CALIFORNIA
Water Boards

EDMUND G. BROWN JR.
GOVERNOR

MATTHEW RODRIQUEZ
SECRETARY FOR
ENVIRONMENTAL PROTECTION

State Water Resources Control Board

RECEIVED
September 22, 2017
Commission on
State Mandates

September 22, 2017

VIA DROP BOX

Heather Halsey
Executive Director
Commission on State Mandates
980 Ninth Street, Suite 300
Sacramento, CA 95814

California Regional Water Quality Control Board, San Diego Region, Order No. R9-2010-0016, 11-TC-03; County of Riverside, Riverside County Flood Control and Water Conservation District, Cities of Murrieta, Temecula and Wildomar, Co-Claimants

Dear Ms. Halsey:

By letter dated May 8, 2017, the Commission on State Mandates (Commission) requested that the California Regional Water Quality Control Board, San Diego Region (San Diego Water Board) and the State Water Resources Control Board (State Water Board) provide copies of the official administrative records of their respective agencies for adoption or review of San Diego Water Board Order No. R9-2010-0016 (NPDES No. CAS0108766). Following subsequent extensions of time, the administrative record is now due September 22, 2017.

Attached is the San Diego Water Board's official administrative record for adoption of Order No. R9-2010-0016, the 2010 Municipal Separate Storm Sewer System Permit for the County of Riverside Copermittees. While petitions for review of Order No. R9-2010-0016 were filed with the State Water Board, the State Water Board has not exercised jurisdiction over these petitions and no administrative record exists regarding any discretionary action taken by that board in this matter. Copies of the petitions for review and/or State Water Board correspondence concerning receipt of the petitions and regarding abeyance status will be provided upon request.

Please do not hesitate to contact me with any questions. I can be reached at (619) 521-3012 or by email at catherine.hagan@waterboards.ca.gov.

Sincerely,

Catherine George Hagan

Catherine George Hagan
Attorney IV

Attachment – Administrative Record for Order No. R9-2010-0016

cc: Service List via Commission Drop Box

Item No.	Date	Subject	Begin Page No.
		Administrative Record	
		Volume No. I	
A001	7/14/2004	Order R9-2004-0001 with Attachments, Monitoring and Reporting Program, and Fact Sheet	0000001
A002	10/22/2007	City of Temecula Runoff Management Plan 2006-2007 Annual Report	0000163
A003	10/23/2007	County of Riverside Runoff Management Plan 2006-2007 Annual Report	0000204
A004	10/31/2007	City of Murrieta Runoff Management Plan 2006-2007 Annual Report	0000486
A005	10/31/2007	Riverside County Flood Control & Water Conservation District Runoff Management Plan 2006-7 Annual Report	0000554
A006	10/31/2007	Santa Margarita Watershed Management Area Runoff Management Plan 2006-2007 Annual Report	0000988
A007	10/22/2008	City of Temecula Runoff Management Plan 2007-2008 Annual Report	0001487
A008	10/30/2008	City of Murrieta Runoff Management Plan 2007-2008 Annual Report	0001595
A009	10/30/2008	County of Riverside Runoff Management Plan 2007-2008 Annual Report	0001783
A010	10/31/2008	Riverside County Flood Control & Water Conservation District Runoff Management Plan 2007-8 Annual Report	0002306
A011	10/31/2008	Santa Margarita Watershed Management Area Runoff Management Plan 2007-2008 Annual Report	0002623
A012	1/15/2009	Report of Waste Discharge	0002995
A013	10/29/2009	City of Murrieta Runoff Management Plan 2008-2009 Annual Report	0003264
A014	10/29/2009	City of Temecula Runoff Management Plan 2008-2009 Annual Report	0003505
A015	10/29/2009	County of Riverside Runoff Management Plan 2008-2009 Annual Report	0003624
A016	10/29/2009	Riverside County Flood Control & Water Conservation District Runoff Management Plan 2008-2009 Annual Report	0003912
A017	2/18/2010	San Diego Water Board Comments on Report of Waste Discharge	0000424
A018	3/22/2010	March 2, 2010 Copermittee-San Diego Water Board Meeting Notes	0004254
A019	3/23/2010	Comment Letter--Lake Village Community	0004261
A020	4/22/2010	1st Draft MS4 Permit	0004307
A021	4/22/2010	April 22, 2010 Copermittee-San Diego Water Board Meeting Notes	0004399
A022	4/26/2010	Copermittee Comments on 1st Draft MS4 Permit (1)	0004407
A023	4/27/2010	1st Draft MS4 Permit Fact Sheet	0004500
A024	4/28/2010	Copermittee-San Diego Water Board Meeting Notes [2010-- April 28, May 6, May 13, May 20]	0004674
A025	5/24/2010	2nd Draft MS4 Permit	0004704
A026	5/26/2010	May 26, 2010 Copermittee-San Diego Water Board Meeting Notes	0004800
A027	6/2/2010	Copermittee comments on 1st Draft MS4 Permit (2)	0004928
A028	6/3/2010	Copermittee-San Diego Water Board Meeting Notes [2010-- June 3, June 10]	0005039
A029	6/16/2010	Copermittee comments on 1st Draft MS4 Permit (3)	0005153
A030	6/17/2010	Copermittee-San Diego Water Board Meeting Notes [2010-- June 17, June 23, July 1, July 8, July 15]	0005284
A031	7/20/2010	Copermittee Letters of Request for Single Water Board Designation (Cities of Murrieta, Wildomar, Menifee)	0005293
A032	7/23/2010	Tentative Order No. R9-2010-0016 with Fact Sheet and Attachments & Notice of Comment Period	0005305
A033	7/26/2010	Written Comment Letters Received [July 26-September 7, 2010]	0005490
A034	8/13/2010	References Cited in NRDC Comment Letter	0005766
A035	8/18/2010	Copermittee-San Diego Water Board Meeting Sign in Sheets [2010-- August 18, 25]	0006019
A036	9/28/2010	Copermittee Hearing Procedure Request Letter	0006021
A037	9/29/2010	Region 8-Region 9 Letters of Agreement	0006024
A038	9/29/2010	San Diego Water Board Responses to Written Comments	0006033
A039	10/13/2010	Notice of Public Hearing & Newspaper Proofs	0006239
A040	10/13/2010	October 13, 2010 EOSR and Supporting Documents	0006250
A041	11/10/2010	Notice of Public Hearing	0007178
A042	11/10/2010	November 11, 2010 EOSR and Supporting Documents, Presentations and Transcript	0007180
A043	11/10/2010	Adopted Order No. R9-2010-0016 with Attachments and Fact Sheet	0008625
A044	12/21/2010	Lyris List Announcement including Final Adopted Order	0008918

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN DIEGO REGION
ORDER NO. R9-2004-001
NPDES NO. CAS0108766
WASTE DISCHARGE REQUIREMENTS
FOR DISCHARGES OF URBAN RUNOFF FROM
THE MUNICIPAL SEPARATE STORM SEWER SYSTEMS (MS4s)
DRAINING THE COUNTY OF RIVERSIDE,
THE CITY OF MURRIETA, THE CITY OF TEMECULA AND THE
RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION
DISTRICT WITHIN THE SAN DIEGO REGION

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MONITORING AND REPORTING PROGRAM No. R9-2004-001

FINDINGS

The California Regional Water Quality Control Board, San Diego Region (hereinafter SDRWQCB), finds that:

1. The Riverside County Flood Control and Water Conservation District (District), the County of Riverside and the Cities of Murrieta and Temecula (hereinafter called Permittees), own or operate municipal separate storm sewer systems (MS4s), through which urban runoff is discharged into waters of the United States (U.S.) within the Santa Margarita Watershed area of Riverside County in the San Diego Region (hereinafter referred to as the Upper Santa Margarita Watershed).

2. The SDRWQCB has previously issued two MS4 permits for the Upper Santa Margarita Watershed. The first-round MS4 permit was issued on July 16, 1990, and the second-round MS4 permit was issued on May 13, 1998 (Order No. R9-98-02). On May 26, 1998, the United States Environmental Protection Agency (EPA), Region IX, objected to Order No. 98-02 due to concerns regarding the Receiving Water Limitations (RWL) language. The EPA concluded that the RWL language in the permit did not comply with the federal Clean Water Act (CWA) and its implementing regulations. On April 27, 1999, the EPA reissued the MS4 permit, which the SDRWQCB adopted as Addendum No. 1 to Order No. R9-98-02 on November 8, 2000. On May 30, 2003 and in accordance with Order No. R9-98-02, the District, as the Principal Permittee, submitted a Report of Waste Discharge (ROWD) for renewal of their MS4 Permit.

3. The Water Quality Control Plan for the San Diego Basin (Basin Plan), identifies the following beneficial uses for water bodies in the Santa Margarita Watershed: Municipal and Domestic Supply (MUN), Agricultural Supply (AGR), Industrial Process Supply (PROC), Industrial Service Supply (IND), Ground Water Recharge (GWR), Contact Water Recreation (REC1) (potential use), Non-contact Water Recreation (REC2), Warm Freshwater Habitat WARM, Cold Freshwater Habitat (COLD), Wildlife Habitat (WILD), and Rare, Threatened, or Endangered Species (RARE).

4. Urban runoff contains waste, as defined in the California Water Code (CWC), and pollutants that adversely affect the quality of the waters of the State. The discharge of urban runoff from an MS4 is a "discharge of pollutants from a point source" into waters of the U.S. as defined in the CWA.

5. The most common categories of pollutants in urban runoff include total suspended solids, sediment (due to anthropogenic activities); pathogens (e.g., bacteria, viruses, protozoa); heavy metals (e.g., copper, lead, zinc and cadmium); petroleum products and polynuclear aromatic hydrocarbons; synthetic organics (e.g., pesticides, herbicides, and PCBs); nutrients (e.g., nitrogen and phosphorus fertilizers), oxygen-demanding substances (decaying vegetation, animal waste), and trash.

6. The discharge of pollutants and/or increased flows from MS4s may cause or threaten to cause the concentration of pollutants to exceed applicable receiving water quality objectives and impair or threaten to impair designated beneficial uses resulting in a condition of pollution (i.e., unreasonable impairment of water quality for designated beneficial uses), contamination, or nuisance.

7. Pollutants in urban runoff can threaten human health. Human illnesses have been clearly linked to recreating near storm drains flowing to coastal waters. Also, urban runoff pollutants in receiving waters can bioaccumulate in the tissues of invertebrates and fish, which may be eventually consumed by humans.

8. Development and urbanization especially threaten environmentally sensitive areas (ESAs), such as water bodies designated as supporting a RARE beneficial use (supporting rare, threatened or endangered species) and CWA 303(d) impaired water bodies. Such areas have a much lower capacity to withstand pollutant shocks than might be acceptable in the general circumstance. In essence, development that is ordinarily insignificant in its impact on the environment may become significant in a particular sensitive environment. Therefore, additional control to reduce pollutants from new and existing development may be necessary for areas adjacent to or discharging directly to an ESA.

9. Urban runoff often contains pollutants that cause toxicity to aquatic organisms (i.e., adverse responses of organisms to chemicals or physical agents ranging from mortality to physiological responses such as impaired reproduction or growth anomalies). Toxic pollutants impact the overall quality of aquatic systems and beneficial uses of receiving waters.

10. The Final 2002 CWA Section 303(d) List of Water Quality Limited Segments identifies the entire length of Murrieta Creek (12 miles) and the upper portion of the Santa Margarita River (18 miles) as impaired for phosphorus. Potential sources of the phosphorus impairment include urban runoff and unknown point and nonpoint sources. The Santa Margarita Lagoon is listed as impaired for eutrophication.

11. The Permittees' water quality monitoring data submitted to date documents persistent exceedances of Basin Plan water quality objectives for various urban runoff-related pollutants (chlorpyrifos, chromium, diazinon, dissolved oxygen, fecal coliform, MBAS, phosphorus, etc.) at eight different monitoring stations in the Upper Santa Margarita Watershed. The data indicate that urban runoff from activities such as over-application of pesticides and potential illicit discharges from industrial and commercial activities may be contributing to potential water quality impairments. Also, bioassessment monitoring, conducted by the California Department of Fish and Game, and physical assessments, conducted as part of the development of the Draft Operational Guidebook For Referenced Based Assessment of the Functions of Riverine Waters/Wetlands in the Santa Margarita Watershed, indicate that impacts to the biological and physical integrity of receiving waters have occurred as a result of urbanization in the upper watershed.

12. Peak storm water discharges rates, velocities and durations must be controlled to prevent downstream erosion and protect stream habitat. When natural vegetated pervious ground cover is converted to impervious surfaces such as paved highways, streets, rooftops, and parking lots, the natural absorption and infiltration abilities of the land are lost. Therefore, runoff leaving a developed urban area is significantly greater in volume, velocity, peak flow rate, and pollutant load than pre-development runoff from the same area. The increased volume, velocity, rate, and duration of runoff greatly accelerate the erosion of downstream natural channels.

13. As part of the ROWD, the Permittees proposed to update and modify their existing Drainage Area Management Plan (DAMP), dated March 1993, to incorporate new programs, requirements, and commitments. Direction to the Permittees in revising the DAMP, hereinafter referred to as a Storm Water Management Plan (SWMP), is necessary to ensure that the document provides a written description of the specific urban runoff management measures and programs that each Permittee will implement to fulfill its individual responsibilities and the area-wide and watershed-based activities necessary to meet the maximum extent practicable (MEP) standard. It is practicable for the Permittees to update the SWMP within one year. The SWMP is an integral and enforceable component of this Order.

14. The MEP standard is an ever-evolving, flexible, and advancing concept, which considers technical and economic feasibility. As knowledge about controlling urban runoff continues to evolve, so does that which constitutes MEP. Reducing the discharge of pollutants in urban runoff to the MEP requires Permittees to conduct and document evaluation and assessment of each program component and revise activities, control measures, best management practices (BMPs), and measurable goals, as necessary to meet MEP. Because MEP is a dynamic performance standard, it is necessary to describe in greater detail, measures that are essential for compliance.

15. Pollutants can be effectively reduced in urban runoff by the application of a combination of pollution prevention, source control, and treatment control BMPs. Pollution prevention is the reduction or elimination of pollutant generation at its source and is the best "first line of defense". Source control BMPs (both structural and non-structural) minimize the contact between pollutants and flows (e.g., rerouting run-on around pollutant sources or keeping pollutants on-site and out of receiving waters). Treatment control BMPs remove pollutants from urban runoff.

16. Developing minimum BMPs and implementing or requiring their implementation at industrial and commercial facilities, construction sites, and residential areas is necessary for the Permittees to ensure that, ultimately, discharges of pollutants into and from its MS4 are reduced to the MEP.

17. Controlling urban runoff pollution by using a combination of onsite source control BMPs augmented with treatment control BMPs before the runoff enters the MS4 is important for the following reasons: (1) Many end-of-pipe BMPs (such as diversion to the sanitary sewer) are typically ineffective during significant storm events. Whereas, onsite source control BMPs can be applied during all runoff conditions; (2) End-of-pipe BMPs are often incapable of capturing and treating the wide range of pollutants which can be generated on a sub-watershed scale; (3) End-of-pipe BMPs are more effective when used as polishing BMPs, rather than the sole BMP to be implemented; (4) End-of-pipe BMPs do not protect the quality or beneficial uses of receiving waters between the source and the BMP; and (5) Offsite end-of-pipe BMPs do not aid in the effort to educate the public regarding sources of pollution and their prevention.

18. Urban runoff treatment and/or mitigation must occur prior to the discharge of urban runoff into a receiving water. Federal regulations at 40 CFR 131.10(a) state that in no case shall a state adopt waste transport or waste assimilation as a designated use for any waters of the U.S. Authorizing the construction of an urban runoff treatment facility within a water of the U.S., or using the water body itself as a treatment system or for conveyance to a treatment system, would be tantamount to accepting waste assimilation as an appropriate use for that water body. Furthermore, the construction, operation, and maintenance of a pollution control facility in a water body can negatively impact the physical, chemical, and biological integrity, as well as the beneficial uses, of the water body. This is consistent with EPA guidance to avoid locating structural controls in natural wetlands.

19. Historic and current developments make use of natural drainage patterns and features as conveyances for urban runoff. Urban streams used in this manner are both MS4s and receiving waters.

20. As operators of the MS4s, the Permittees cannot passively receive and discharge pollutants from third parties. By providing free and open access to an MS4 that conveys discharges to waters of the U.S., the operator essentially accepts responsibility for discharges into the MS4 that it does not prohibit or control. These discharges may cause or contribute to a condition of contamination or exceedances of water quality objectives.

21. In accordance with federal NPDES regulations and to ensure the most effective oversight of industrial and construction site discharges, discharges of runoff from industrial and construction sites are subject to dual (state and local) storm water regulation. Under this dual system, the SDRWQCB is responsible for enforcing the General Construction Activities Storm Water Permit, SWRCB Order 97-03 DWQ, NPDES No. CAS000001 (General Construction Permit) and the General Industrial Activities Storm Water Permit, SWRCB Order 99-08 DWQ, NPDES No. CAS000002 (General Industrial Permit), and each municipal Permittee is responsible for enforcing its local permits, plans, and ordinances, which may require the implementation of additional BMPs than required under the statewide general permits.

22. This Order implements the federal CWA, the Porter-Cologne Water Quality Control Act (Division 7 of the CWC, commencing with section 13000), applicable state and federal regulations, all applicable provisions of statewide Water Quality Control Plans and Policies adopted by the State Water Resources Control Board (SWRCB), and the Basin Plan.

23. The RWL language specified in this Order is consistent with language recommended by the EPA and established in SWRCB Water Quality Order 99-05, adopted by the SWRCB on June 17, 1999. The RWL in this Order require compliance with water quality standards through an iterative approach requiring the implementation of improved and better-tailored BMPs over time.

24. The Standard Urban Storm Water Management Plan (SUSMP) requirements contained in this Order are consistent with Order WQ-2000-11 adopted by the SWRCB on October 5, 2000. In the precedential order, the SWRCB found that the design standards, which essentially require that urban runoff generated by 85 percent of storm events from specific development categories be infiltrated or treated, reflects the MEP standard. The order also found that the design standards are appropriately applied to the majority of the Priority Development Project categories contained in Section F of this Order. It gave Regional Water Quality Control Boards (RWQCBs) the discretion to include additional categories and locations, such as retail gasoline outlets (RGOs) and ESAs, in future SUSMPs.

25. RGOs are significant sources of pollutants in urban runoff. RGOs are points of convergence for motor vehicles for automotive related services such as repair, refueling, tire inflation, and radiator fill-up and consequently produce significantly higher loadings of hydrocarbons and trace metals (including copper and zinc) than other urban areas. To meet MEP, source control and treatment control BMPs are needed at RGOs that meet the following criteria: (a) 5,000 square feet or more, or (b) a projected Average Daily Traffic (ADT) of 100 or more vehicles per day. These are appropriate thresholds since vehicular development size and volume of traffic are good indicators of potential impacts of urban runoff from RGOs on receiving waters.

26. This Order is in conformance with SWRCB Resolution No. 68-16 and the federal Antidegradation Policy described in 40 CFR 131.12.

27. Section 6217(g) of the Coastal Zone Act Reauthorization Amendments of 1990 (CZARA) requires coastal states with approved coastal zone management programs to address non-point pollution impacting or threatening coastal water quality. CZARA addresses five sources of non-point pollution: agriculture, silviculture, urban, marinas, and hydromodification. This NPDES permit addresses the management measures required for the urban category, with the exception of septic systems. The adoption and implementation of this NPDES permit relieves the Permittee from developing a non-point source plan, for the urban category, under CZARA. The SDRWQCB addresses septic systems through the administration of other programs.

28. Each Permittee is individually responsible for adoption and enforcement of ordinances and/or policies, implementation of identified control measures/BMPs needed to prevent or reduce pollutants in storm water runoff, and for the allocation of funds for the capital, operation and maintenance, and enforcement expenditures necessary to implement and enforce such control measures/BMPs under its jurisdiction.

29. Although dependent on several factors, the risks typically associated with properly managed infiltration of runoff (especially from residential land use areas) are not significant. The risks associated with infiltration can be managed by many techniques, including (1) designing landscape drainage features that promote infiltration of runoff, but do not "inject" runoff (injection bypasses the natural processes of filtering and transformation that occur in the soil); (2) taking reasonable steps to prevent the illegal disposal of wastes; and (3) ensuring that each drainage feature is adequately maintained in perpetuity.

30. If not properly designed or maintained, certain BMPs implemented or required by municipalities for urban runoff management may create a habitat for vectors (e.g. mosquitoes and rodents). However, proper BMP design to avoid standing water can prevent the creation of vector habitat. Nuisances and public health impacts resulting from vector breeding can be prevented with close collaboration and cooperative effort between municipalities and local vector control agencies and the State Department of Health Services during the development and implementation of the SWMP.

31. The issuance of waste discharge requirements and an NPDES permit for the discharge of urban runoff from MS4s to waters of the U.S. is exempt from the requirement for preparation of environmental documents under the California Environmental Quality Act (CEQA) (Public Resources Code, Division 13, Chapter 3, section 21000 et seq.) in accordance with the CWC section 13389.

32. The SDRWQCB has notified the Permittees, all known interested parties, and the public of its intent to consider adoption of an Order prescribing waste discharge requirements that would serve to renew an NPDES permit for the existing discharge of urban runoff.

33. The SDRWQCB has, at public meetings on February 11, 2004 and July 14, 2004, held public hearings and heard and considered all comments pertaining to the terms and conditions of this Order.

PERMIT PROVISIONS

IT IS HEREBY ORDERED: That the Permittees, in order to meet the provisions contained in Division 7 of the CWC and regulations adopted thereunder, and the provisions of the CWA and regulations adopted thereunder, shall each comply with the following:

A. PROHIBITIONS

1. Discharges into and from MS4s in a manner causing, or threatening to cause, a condition of pollution, contamination, or nuisance (as defined in CWC section 13050), in waters of the State are prohibited.

2. Discharges from MS4s that cause or contribute to exceedances of water quality objectives for surface water or groundwater are prohibited.

3. Discharges from MS4s containing pollutants which have not been reduced to the MEP are prohibited.

4. In addition to the above prohibitions, discharges from MS4s are subject to all Basin Plan prohibitions cited in **Attachment A** to this Order.

B. NON-STORM WATER DISCHARGES

1. Each Permittee shall effectively prohibit all types of non-storm water discharges into its MS4 unless such discharges are either authorized by a separate NPDES permit; or authorized in accordance with Requirements B.2 and B.3 below.

2. The following categories of non-storm water discharges are not prohibited unless a Permittee or the SDRWQCB identifies the discharge category as a source of pollutants to waters of the U.S. For such a discharge category, the Permittee shall either prohibit the discharge category or develop and implement appropriate control measures under the SWMP to reduce pollutants to the MEP and submit the report to the SDRWQCB pursuant to section III.A.1.d of Monitoring and Reporting Program No. R9-2004-001 (hereafter referred to as the MRP).

   a) Diverted stream flows;
   b) Rising ground waters;
   c) Uncontaminated ground water infiltration [as defined at 40 CFR 35.2005(20)] to MS4s;
   d) Uncontaminated pumped ground water;
   e) Foundation drains;
   f) Springs;
   g) Water from crawl space pumps;
   h) Footing drains;
   i) Air conditioning condensation;
   j) Flows from riparian habitats and wetlands;
   k) Water line flushing;
   l) Landscape irrigation;
   m) Discharges from potable water sources not subject to NPDES Permit No. CAG679001, other than water main breaks;
   n) Irrigation water;
   o) Lawn watering;

p) Individual residential car washing;
q) Non-emergency fire fighting flows; and
r) Dechlorinated swimming pool discharges.

3. Discharges from emergency fire fighting activities are not prohibited. If discharges are determined to be a significant source of pollutants to waters of the U.S., the Permittees shall require the implementation of appropriate BMPs to reduce the discharge of pollutants to the MEP, when not interfering with the protection of health and property.

4. Each Permittee shall examine its Illicit Discharge Monitoring results collected in accordance with Requirement J.3 of this Order and section II.B of the MRP to identify water quality problems which may be the result of any non-prohibited discharge category(ies) listed above in Requirement B.2. Follow-up investigations shall be conducted as necessary to identify and control any non-prohibited discharge category(ies) listed above.

C. RECEIVING WATER LIMITATIONS

1. Discharges from MS4s that cause or contribute to the violation of water quality standards (designated beneficial uses and water quality objectives developed to protect beneficial uses of receiving waters) are prohibited.

2. Each Permittee shall comply with Requirement C.1, Prohibition A.2, and Prohibition A.4 as it applies to Prohibition No. 5 in **Attachment A** of this Order through timely implementation of control measures and other actions to reduce pollutants in urban runoff discharges in accordance with the SWMP and other requirements of this Order including any modifications. The SWMP shall be designed to achieve compliance with Requirement C.1, Prohibition A.2, and Prohibition A.4 as it applies to Prohibition 5 in **Attachment A** of this Order. If exceedance(s) of water quality standards persist notwithstanding implementation of the SWMP and other requirements of this Order, the Permittee shall assure compliance with Requirement C.1, Prohibition A.2, and Prohibition A.4 as it applies to Prohibition 5 in **Attachment A** of this Order by complying with the following procedure:

   a) Upon a determination by either a Permittee or the SDRWQCB that MS4 discharges are causing or contributing to an exceedance of an applicable water quality standard, the Permittee shall promptly notify and thereafter submit a report to the SDRWQCB that describes BMPs that are currently being implemented and additional BMPs that will be implemented to prevent or reduce any pollutants that are causing or contributing to the exceedance of water quality standards. The report may be incorporated in the SWMP Annual Report unless the SDRWQCB directs an earlier submittal. The report shall include an implementation schedule. The SDRWQCB may require modifications to the report;

   b) Submit any modifications to the report required by the SDRWQCB within 30 days of notification;

   c) Within 30 days following SDRWQCB approval of the report described above, the Permittee shall revise its SWMP and monitoring program to incorporate the approved modified BMPs that have been and will be implemented, the implementation schedule, and any additional monitoring required;

   d) Implement the revised SWMP and monitoring program in accordance with the approved schedule.

   So long as the Permittee has complied with the procedures set forth above and are implementing

the revised SWMP, the Permittee does not have to repeat the same procedure for continuing or recurring exceedances of the same receiving water limitations unless directed by the SDRWQCB to develop additional BMPs.

D. LEGAL AUTHORITY

1. Each Permittee shall establish, maintain, and enforce adequate legal authority to control pollutant discharges into and from its MS4 through ordinance, statute, permit, contract or similar means. This legal authority must, at a minimum, authorize the Permittee to:

   a) Control the contribution of pollutants in discharges of runoff associated with industrial and construction activity to its MS4 and control the quality of runoff from industrial and construction sites. This requirement applies both to industrial and construction sites that have coverage under the General Industrial Permit and General Construction Permit, as well as to those sites that do not. Grading ordinances shall be upgraded and enforced as necessary to comply with this Order.

   b) Prohibit all identified illicit discharges not otherwise allowed pursuant to Requirement B.2 including but not limited to:

      (1) Sewage;

      (2) Discharges of wash water resulting from the hosing or cleaning of gas stations, auto repair garages, or other types of automotive services facilities;

      (3) Discharges resulting from the cleaning, repair, or maintenance of any type of equipment, machinery, or facility including motor vehicles, cement-related equipment, and port-a-potty servicing, etc.;

      (4) Discharges of wash water from mobile operations such as mobile automobile washing, steam cleaning, power washing, and carpet cleaning, etc.;

      (5) Discharges of wash water from the cleaning or hosing of impervious surfaces in municipal, industrial, commercial, and residential areas including parking lots, streets, sidewalks, driveways, patios, plazas, work yards and outdoor eating or drinking areas, etc.;

      (6) Discharges of runoff from material storage areas containing chemicals, fuels, grease, oil, or other hazardous materials;

      (7) Discharges of pool or fountain water containing chlorine, biocides, or other chemicals; discharges of pool or fountain filter backwash water;

      (8) Discharges of sediment, pet waste, vegetation clippings, or other landscape or construction-related wastes; and

      (9) Discharges of food-related wastes (e.g., grease, fish processing, and restaurant kitchen mat and trash bin wash water, etc.).

   c) Prohibit and eliminate illicit connections to the MS4;

   d) Control the discharge of spills, dumping, or disposal of materials other than storm water to its MS4;

   e) Require compliance with conditions in Permittee ordinances, permits, contracts or orders (i.e., hold dischargers to its MS4 accountable for their contributions of pollutants and flows);

f) Require the use of BMPs to prevent or reduce the discharge of pollutants into MS4s to the MEP.

g) Carry out all inspections, surveillance, and monitoring necessary to determine compliance and noncompliance with local ordinances and permits and with this Order, including the prohibition on illicit discharges to the MS4. This means the Permittee must have authority to enter, sample, inspect, review and copy records, and require regular reports from industrial facilities discharging into its MS4, including construction sites;

h) Utilize enforcement mechanisms to require compliance with Permittee storm water ordinances, permits, contracts, or orders; and

i) Control the contribution of pollutants from one portion of the shared MS4 to another portion of the MS4 through interagency agreements among Permittees;

2. Each Permittee shall include as part of its Individual SWMP, which must be submitted within 365 days of adoption of this Order, a statement certified by its chief legal counsel that the Permittee has adequate legal authority to implement and enforce each of the requirements contained in 40 CFR 122.26(d)(2)(i)(A-F) and this Order.

E. STORM WATER MANAGEMENT PLAN (SWMP)

1. Within 365 days from the date of this Order, the Principal Permittee shall submit a SWMP to the SDRWQCB. The SWMP shall describe the various urban runoff management programs that will be implemented to comply with this Order and to reduce pollutants in urban runoff to the MEP for the duration of this Order. The SWMP is an integral and enforceable component of this Order and shall consist of the following:

   a) Individual SWMP - The written description of each Permittee's individual programs that address Sections B through J of this Order. **Attachment D** contains direction for the preparation of the Individual SWMP. Each Permittee shall submit their Individual SWMP to the Principal Permittee by a date determined by the Principal Permittee for inclusion in the SWMP.

   b) Watershed SWMP - The written account of all area-wide and watershed-based programs and activities conducted by the Permittees. The Watershed SWMP shall contain the programs and items required above in Requirements K.1 – K.4 of this Order.

2. Unless otherwise specified, within 365 days of the adoption of this Order, each Permittee shall have completed full implementation of the SWMP and all requirements in this Order. Prior to the implementation of new or revised programs, each Permittee shall, at a minimum, continue implementation of existing programs developed pursuant to Order No. R9-98-02 and described in the 2002-2003 Annual Progress Report.

3. Each Permittee shall incorporate a mechanism for public participation during the development and implementation of its SWMP.

F. DEVELOPMENT PLANNING

Permittees shall implement a program, including but not limited to, the requirements in this section, to reduce pollutants in urban runoff from developments to the MEP.

1. Assess General Plan

Each Permittee's General Plan or equivalent plan (e.g., Comprehensive, Master, or Community Plan) shall include water quality and watershed protection principles and policies to direct land-use decisions and require implementation of consistent water quality protection measures for development projects. As part of its Individual SWMP, each Permittee shall provide a workplan with a time schedule detailing any changes to its General Plan regarding water quality and watershed protection. Examples of water quality and watershed protection principles and policies to be considered include the following:

a) Minimize the amount of impervious surfaces and directly connected impervious surfaces in areas of development and, where feasible, slow runoff and maximize on-site infiltration of runoff.

b) Implement pollution prevention methods supplemented by source control and treatment control BMPs. Use small collection strategies located at, or as close as possible to, the source (i.e., the point where water initially meets the ground) to minimize the transport of urban runoff and pollutants offsite and into an MS4.

c) Preserve, and where possible, create or restore areas that provide important water quality benefits, such as riparian corridors, wetlands, and buffer zones. Encourage land acquisition of such areas.

d) Limit disturbances of natural water bodies and natural drainage systems caused by development including roads, highways, and bridges.

e) Prior to making land use decisions, utilize methods available to estimate increases in pollutant loads and flows resulting from projected future development. Require incorporation of appropriate BMPs to mitigate the projected increases in pollutant loads and flows.

f) Avoid development of areas that are particularly susceptible to erosion and sediment loss; or establish development guidance that identifies these areas and protects them from erosion and sediment loss.

g) Reduce pollutants associated with vehicles and increasing traffic resulting from development.

h) Post-development runoff from a site shall not contain pollutant loads that cause or contribute to an exceedance of receiving water quality objectives and which have not been reduced to the MEP.

2. <u>Modify Development Project Approval Processes</u>

a) Requirements for all Development Projects (New Development and Redevelopment)

During the planning process, prior to the issuance of permits, Permittees shall require all proposed development projects to implement BMPs to ensure that the discharge of pollutants from the development will be reduced to the MEP and will comply with this Order and all local ordinances, plans, and permits. Development project requirements shall ensure that water quality objectives are not violated throughout the life of the development. At a minimum, requirements shall:

(1) Require project proponent to implement applicable pollution prevention and source control BMPs for applicable development projects.

(2) Require project proponent to implement site design/landscape characteristics where feasible which maximize infiltration, provide retention, slow runoff, and minimize impervious land coverage for all development projects.

(3) Require project proponent to incorporate buffer zones for natural water bodies, where feasible. Where buffer zones are infeasible, require project proponent to implement other buffers such as trees, access restrictions, etc.

(4) When known, require industrial facility operators subject to the General Industrial Permit to provide evidence of permit coverage prior to occupancy.

(5) Require project proponent to ensure its grading or other construction activities meet the provisions specified in Section G of this Order.

(6) Require project proponent to provide proof of a mechanism which will ensure ongoing long-term maintenance of all structural post-construction BMPs.

b) Standard Urban Storm Water Mitigation Plans (SUSMPs) – Requirements for Priority Development Projects

Within 365 days of adoption of this Order, each Permittee shall develop, adopt, and implement a SUSMP to reduce pollutants to the MEP and to maintain or reduce downstream erosion and protect stream habitat from all Priority Development Projects. Priority Development Projects are: a) all new development projects, and b) those redevelopment projects that create, add or replace at least 5,000 square feet of impervious surfaces on an already developed site, that are listed under the project categories or locations in Requirement F.2.b.(1) below. Redevelopment includes, but is not limited to: the expansion of a building footprint or addition or replacement of a structure; structural development including an increase in gross floor area and/or exterior construction or remodeling; replacement of impervious surface that is not part of a routine maintenance activity; and land disturbing activities related with structural or impervious surfaces. Where redevelopment results in an increase of less than fifty percent of the impervious surfaces of a previously existing development, and the existing development was not subject to SUSMP requirements, the numeric sizing criteria discussed in Requirement F.2.b.(3) applies only to the addition, and not to the entire development. Each Permittee shall submit both the adopted SUSMP and amended ordinances to the SDRWQCB no later than 365 days after the adoption of this Order.

Immediately following adoption of its SUSMP, each Permittee shall review and ensure that all Priority Development Projects meet SUSMP requirements. The SUSMP requirements shall apply to all Priority Development Projects or phases of Priority Development Projects that have not yet begun grading or construction activities. If a Permittee determines that lawful prior approval of a project exists, whereby application of SUSMP requirements to the project is infeasible, SUSMP requirements need not apply to the project. Where feasible, the Permittees shall utilize the 12-month SUSMP development and implementation period to ensure that projects undergoing approval processes include application of SUSMP requirements in their plans.

(1) Priority Development Project Categories

(a) *Housing subdivisions of 10 or more dwelling units.* This category includes single-family homes, multi-family homes, condominiums, and apartments.

(b) *Commercial developments greater than 100,000 square feet.* This category is defined as any development on private land that is not for heavy industrial or residential uses where the land area for development is greater than 100,000 square feet. The category includes, but is not limited to: hospitals; laboratories and other medical facilities; educational institutions; recreational facilities; municipal facilities; commercial nurseries; multi-apartment buildings; car wash facilities; mini-

malls and other business complexes; shopping malls; hotels; office buildings; public warehouses; automotive dealerships; airfields; and other light industrial facilities.

(c) *Automotive repair shops.* This category is defined as a facility that is categorized in any one of the following Standard Industrial Classification (SIC) codes: 5013, 5014, 5541, 7532-7534, or 7536-7539.

(d) *Restaurants.* This category is defined as a facility that sells prepared foods and drinks for consumption, including stationary lunch counters and refreshment stands selling prepared foods and drinks for immediate consumption (SIC code 5812), where the land area for development is greater than 5,000 square feet. Restaurants where land development is less than 5,000 square feet shall meet all SUSMP requirements except for structural treatment BMP and numeric sizing criteria requirement F.2.b.(3) and peak flow rate requirement F.2.b.(2)(a).

(e) *All hillside development greater than 5,000 square feet.* This category is defined as any development which creates 5,000 square feet of impervious surface which is located in an area with known erosive soil conditions, where the development will grade on any natural slope that is twenty-five percent or greater.

(f) *Environmentally Sensitive Areas (ESAs).* All development located within or directly adjacent to or discharging directly to an ESA (where discharges from the development or redevelopment will enter receiving waters within the ESA), which either creates 2,500 square feet of impervious surface on a proposed project site or increases the area of imperviousness of a proposed project site to 10% or more of its naturally occurring condition. "Directly adjacent" means situated within 200 feet of the ESA. "Discharging directly to" means outflow from a drainage conveyance system that is composed entirely of flows from the subject development or redevelopment site, and not commingled with flows from adjacent lands.

(g) *Parking lots 5,000 square feet or more.* Parking lot is defined as a land area or facility for the temporary parking or storage of motor vehicles used personally, for business, or for commerce.

(h) *Street, roads, highways, and freeways.* This category includes any paved surface that is 5,000 square feet or greater used for the transportation of automobiles, trucks, motorcycles, and other vehicles.

(i) *Retail Gasoline Outlets.* This category includes RGOs that meet the following criteria: (a) 5,000 square feet or more or (b) a projected Average Daily Traffic (ADT) of 100 or more vehicles per day

(2) BMP Requirements – The SUSMP shall include a list of recommended source control and treatment control BMPs. The SUSMP shall require all Priority Development Projects to implement a combination of on-site source control and on-site/shared treatment control BMPs (to treat the runoff specifically generated from each project) selected from the recommended BMP list. The BMPs shall, at a minimum:

(a) Control the post-development urban runoff discharge velocities, volumes, durations, and peak rates to maintain or reduce pre-development downstream erosion, and to protect stream habitat;

(b) Conserve natural areas where feasible;

(c) Minimize storm water pollutants of concern in urban runoff from the Priority Development Projects (through implementation of source control BMPs). Identification of pollutants of concern shall include, at a minimum, all pollutants for which water bodies receiving the development's runoff are listed as impaired under CWA section 303(d), all pollutants associated with the land use type of the development, and all pollutants commonly associated with urban runoff;

(d) Be effective at removing or treating the pollutants of concern associated with the project;

(e) Minimize directly connected impervious areas where feasible;

(f) Protect slopes and channels from eroding;

(g) Include storm drain stenciling and signage;

(h) Include properly designed outdoor material storage areas;

(i) Include properly designed trash storage areas;

(j) Include proof of a mechanism, to be provided by the project proponent or Permittee, which will ensure ongoing long-term BMP maintenance;

(k) Include additional water quality provisions applicable to individual Priority Development Project categories;

(l) Be correctly designed so as to remove pollutants to the MEP;

(m) Be implemented close to pollutant sources, when feasible, and prior to discharging into receiving waters; and

(n) Ensure that post-development runoff does not contain pollutant loads which cause or contribute to an exceedance of water quality objectives and which have not been reduced to the MEP.

Under no circumstances can a BMP be constructed in a receiving water.

(3) Numeric Sizing Criteria – The SUSMP shall require treatment control BMPs to be implemented for all Priority Development Projects. All treatment control BMPs shall be located so as to infiltrate, filter, or treat the required runoff volume or flow prior to its discharge to any receiving water. Treatment control BMPs may be shared by multiple Priority Development Projects as long as construction of any shared treatment control BMPs is completed prior to the use of any development project from which the treatment control BMP will receive runoff, and prior to discharge to a receiving water.

In addition to meeting the BMP requirements listed in Requirement F.2.b.(2) above, all treatment control BMPs for a single Priority Development Project shall collectively be sized to comply with the following numeric sizing criteria:

(a) *Volume* - Volume-based BMPs shall be designed to mitigate (infiltrate, filter, or treat) either:

(i) The volume of runoff produced from a 24-hour 85th percentile rainfall depth, as determined from the local historical rainfall record (0.6 inch approximate average for the Riverside County area)[1]; or

(ii) The volume of runoff produced by the 85th percentile 24-hour runoff event, determined as the maximized capture storm water volume for the area, from the formula recommended in Urban Runoff Quality Management, WEF Manual of Practice No. 23/ASCE Manual of Practice No. 87, (1998); or

(iii) The volume of annual runoff based on unit basin storage volume, to achieve 90% or more volume treatment by the method recommended in *California Stormwater Best Management Practices Handbook New Development and Redevelopment* (2003)); or

(iv) The volume of runoff, as determined from the local historical rainfall record, that achieves approximately the same reduction in pollutant loads and flows as achieved by mitigation of the 85th percentile 24-hour runoff event;[2]

OR

(b) *Flow* - Flow-based BMPs shall be designed to mitigate (infiltrate, filter, or treat) either:

(i) The maximum flow rate of runoff produced from a rainfall intensity of 0.2 inch of rainfall per hour, for each hour of a storm event; or

(ii) The maximum flow rate of runoff produced by the 85th percentile hourly rainfall intensity (for each hour of a storm event), as determined from the local historical rainfall record, multiplied by a factor of two; or

(iii) The maximum flow rate of runoff for each hour of a storm event, as determined from the local historical rainfall record, that achieves approximately the same reduction in pollutant loads and flows as achieved by mitigation of the 85th percentile hourly rainfall intensity multiplied by a factor of two.

(4) Equivalent Numeric Sizing Criteria - The Permittees may develop, as part of the SUSMP, any equivalent method for calculating the volume or flow which must be mitigated (i.e., any equivalent method for calculating numeric sizing criteria) by post-construction treatment control BMPs. Such equivalent sizing criteria may be authorized by the SDRWQCB for use in place of the above criteria. In the absence of development and subsequent authorization of such equivalent numeric sizing criteria, the above numeric sizing criteria requirement shall be implemented.

[1] This volume is not a single volume to be applied to all of Riverside County. The size of the 85th percentile storm event is different for various parts of the County. The Permittees are encouraged to calculate the 85th percentile storm event for each of their jurisdictions using local rain data pertinent to their particular jurisdiction (inch standard is a rough average for the County and should only be used where appropriate rain data is not available). In addition, isopluvial maps may be used to extrapolate rainfall data to areas where insufficient data exists in order to determine the volume of the local 85th percentile storm event in such areas. Where the Permittees will use isopluvial maps to determine the 85th percentile storm event in areas lacking rain data, the Permittees shall describe their method for using isopluvial maps in their SUSMPs.

[2] Under this volume criteria, hourly rainfall data may be used to calculate the 85th percentile storm event, where each storm event is identified by its separation from other storm events by at least six hours of no rain. Where the Permittees may use hourly rainfall data to calculate the 85th percentile storm event, the Permittees shall describe their method for using hourly rainfall data to calculate the 85th percentile storm event in their SUSMPs.

(5) Pollutants or Conditions of Concern – As part of the SUSMP, the Permittees shall develop a procedure for pollutants or conditions of concern to be identified for each Priority Development Project. The procedure shall address, at a minimum: (1) Receiving water quality (including pollutants for which receiving waters are listed as impaired under CWA section 303(d)); (2) Land use type of the development project and pollutants associated with that land use type; (3) Pollutants expected to be present on site; (4) Changes in storm water discharge flow rates, velocities, durations, and volumes resulting from the development project; and (5) Sensitivity of receiving waters to changes in storm water discharge flow rates, velocities, durations, and volumes.

(6) Implementation Process – As part of the SUSMP, the Permittees shall develop a process by which SUSMP requirements will be implemented. The process shall identify at what point in the planning process development projects will be required to meet SUSMP requirements. The process shall also include identification of the roles and responsibilities of various municipal departments in implementing the SUSMP requirements, as well as any other measures necessary for the implementation of SUSMP requirements.

(7) Waiver Provision – A Permittee may provide for a project to be waived from the requirement of implementing all treatment control BMPs (Requirements F.2.b.(2) & F.2.b.(3)) if infeasibility can be established. A waiver of infeasibility shall only be granted by a Permittee when all available treatment control BMPs have been considered and rejected as infeasible. Permittees shall notify the SDRWQCB within 5 days of each waiver issued and shall include the following information in the notification:

(a) Name of the person granting each waiver;

(b) Name of developer receiving the waiver;

(c) Site location;

(d) Reason for waiver; and

(e) Description of BMPs required.

As part of the SUSMP, the Permittees may develop a program to require project proponents who have received waivers to transfer the savings in cost, as determined by the Permittee(s), to a storm water mitigation fund. This program may be implemented by all Permittees that choose to provide waivers. Funds may be used on projects to improve urban runoff quality within the watershed of the waived project. The waiver mitigation program should, at a minimum, identify:

(a) The entity or entities that will manage the storm water mitigation fund (i.e., assume full responsibility for);

(b) The range and types of acceptable projects for which mitigation funds may be expended;

(c) The entity or entities that will assume full responsibility for each mitigation project including its successful completion; and

(d) How the dollar amount of fund contributions will be determined.

(8) Infiltration and Groundwater Protection – To protect groundwater quality, each Permittee shall apply restrictions to the use of treatment control BMPs that are designed to primarily function as infiltration devices (such as infiltration trenches and infiltration

basins). Such restrictions shall ensure that the use of such infiltration treatment control BMPs shall not cause or contribute to an exceedance of groundwater quality objectives. At a minimum, use of treatment control BMPs that are designed to primarily function as infiltration devices shall meet the following conditions.[3] As part of the SUSMP, the Permittees may develop alternative restrictions on the use of treatment control BMPs which are designed to primarily function as infiltration devices.

(a) Urban runoff shall undergo pretreatment such as sedimentation or filtration prior to infiltration;

(b) All dry weather flows shall be diverted from infiltration devices;

(c) Pollution prevention and source control BMPs shall be implemented at a level appropriate to protect groundwater quality at sites where infiltration treatment control BMPs are to be used;

(d) Infiltration treatment control BMPs shall be adequately maintained so that they remove pollutants to the MEP;

(e) The vertical distance from the base of any infiltration treatment control BMP to the seasonal high groundwater mark shall be at least 10 feet. Where groundwater basins do not support beneficial uses, this vertical distance criteria may be reduced, provided groundwater quality is maintained;

(f) The soil through which infiltration is to occur shall have physical and chemical characteristics (such as appropriate cation exchange capacity, organic content, clay content, and infiltration rate) which are adequate for proper infiltration durations and treatment of urban runoff for the protection of groundwater beneficial uses;

(g) Infiltration treatment control BMPs shall not be used for areas of industrial or light industrial activity; areas subject to high vehicular traffic (25,000 or greater average daily traffic on main roadway or 15,000 or more average daily traffic on any intersecting roadway); automotive repair shops; car washes; fleet storage areas (bus, truck, etc.); nurseries; and other high threat to water quality land uses and activities as designated by each Permittee; and

(h) Infiltration treatment control BMPs shall be located a minimum of 100 feet horizontally from any water supply wells. As part of the SUSMPs, the Permittees may develop alternative restrictions on the use of treatment control BMPs that are designed to primarily function as infiltration devices.

(9) Downstream Erosion – The Permittees shall develop numeric criteria to ensure that discharges from Priority Development Projects maintain or reduce pre-development downstream erosion and protect stream habitat. At a minimum, numeric criteria shall be developed to control urban runoff discharge velocities, volumes, durations, and peak rates in order to maintain or reduce pre-development downstream erosion and protect stream habitat. The Permittees shall propose numeric criteria and a time-schedule for implementation of the criteria on new development projects within 365 days of the identification of the criteria and no later than the fourth-year Annual Report, or the application for permit renewal, to be submitted no later than October 31, 2008.

[3] These conditions do not apply to treatment control BMPs that allow incidental infiltration and are not designed to primarily function as infiltration devices (such as grassy swales, detention basins, vegetated buffer strips, constructed wetlands, etc.).

The Permittees shall be prepared to implement the numeric criteria upon renewal of this Order.

3. Revise Environmental Review Processes

Permittees shall revise their current environmental review processes as necessary to include requirements for evaluation of water quality effects and identification of appropriate mitigation measures for all development projects. The following questions are examples to be considered in addressing increased pollutants and flows from proposed projects:

a) Could the proposed project result in an increase in pollutant discharges to receiving waters? Consider water quality parameters such as temperature, dissolved oxygen, turbidity and other typical storm water pollutants (e.g., heavy metals, pathogens, petroleum derivatives, synthetic organics, sediment, nutrients, oxygen-demanding substances, and trash).

b) Could the proposed project result in significant alteration of receiving water quality during or following construction?

c) Could the proposed project result in increased impervious surfaces and associated increased runoff?

d) Could the proposed project create a significant adverse environmental impact to drainage patterns due to changes in runoff flow rates or volumes?

e) Could the proposed project result in increased erosion downstream?

f) Is the project tributary to an already impaired water body, as listed on the CWA section 303(d) list? If so, can it result in an increase in any pollutant for which the water body is already impaired?

g) Is the project tributary to other environmentally sensitive areas? If so, can it exacerbate already existing sensitive conditions?

h) Could the proposed project have a potentially significant environmental impact on surface water quality of marine, fresh, or wetland waters?

i) Could the proposed project have a potentially significant adverse impact on groundwater quality?

j) Could the proposed project cause or contribute to an exceedance of applicable surface or groundwater receiving water quality objectives or degradation of beneficial uses?

k) Can the project impact aquatic, wetland, or riparian habitat?

4. Conduct Education Efforts Focused on Development

a) Internal: Municipal Staff

Each Permittee shall implement an education program that includes annual training to ensure that planning and development review staffs (and Planning Boards and Elected Officials, if applicable) have an understanding of:

(1) Federal, state, and local water quality laws and regulations applicable to development projects;

(2) The connection between land use decisions and short and long-term water quality impacts (i.e., impacts from land development and urbanization); and

(3) How impacts to receiving water quality resulting from development can be minimized (i.e., through implementation of various source control and treatment control BMPs).

b) External: Project Applicants, Developers, Contractors, Property Owners, Community Planning Groups

As early in the planning and development process as possible, each Permittee shall implement a program to educate project applicants, developers, contractors, property owners, and community planning groups on the following topics:

(1) Federal, state, and local water quality laws and regulations applicable to development projects;

(2) Required federal, state, and local permits pertaining to water quality;

(3) Water quality impacts of urbanization; and

(4) Methods for minimizing the impacts of development on water quality.

G. CONSTRUCTION

Each Permittee shall implement a program to address construction sites to reduce pollutants in runoff to the MEP during all construction phases. At a minimum the construction component shall address:

1. Pollution Prevention

Each Permittee shall implement pollution prevention methods in its Construction Component and shall require its use by construction site owners, developers, contractors, and other responsible parties, where appropriate.

2. Grading Ordinance Update

Within 365 days of adoption of this Order, each Permittee shall review and update its grading ordinances as necessary for compliance with its storm water ordinances and this Order. The updated grading ordinance shall require implementation of BMPs designated by the Permittees pursuant to Requirements G.5 of this Order and other measures during all construction activities.

3. Modify Construction and Grading Approval Process

Each Permittee shall develop and implement a process to ensure that BMPs to reduce the discharge of pollutants to the MEP are applicable to construction and grading permits and plans prior to their approval and issuance. Such BMPs shall include the following requirements or their equivalent:

a) Require project proponent to develop and implement a plan to manage storm water and non-storm water discharges from the site at all times;

b) Require project proponent to minimize grading during the wet season and coincide grading with seasonal dry weather periods to the extent feasible. If grading does occur during the wet season, require project proponent to implement additional BMPs for any rain events which may occur, as necessary for compliance with this Order;

c) Require project proponent to emphasize erosion prevention as the most important measure for keeping sediment on site during construction;

d) Require project proponent to utilize sediment controls as a supplement to erosion prevention for keeping sediment on-site during construction, and never as the single or primary method;

e) Require project proponent to minimize areas that are cleared and graded to only the portion of the site that is necessary for construction;

f) Require project proponent to minimize exposure time of disturbed soil areas;

g) Require project proponent to temporarily stabilize and reseed disturbed soil areas as rapidly as possible;

h) Require project proponent to permanently revegetate or landscape as early as feasible;

i) Require project proponent to stabilize all slopes; and

j) Require project proponents subject to the General Construction Permit to provide evidence of existing permit coverage.

4. Source Identification

Each Permittee shall annually develop and update, prior to the rainy season, an inventory of all construction sites within its jurisdiction regardless of site size or ownership. This requirement is applicable to all construction sites regardless of whether the construction site is subject to the General Construction Permit, or other individual NPDES permit. The use of an automated database system, such as Geographical Information System (GIS) is highly recommended, but not required.

5. BMP Implementation

a) Each Permittee shall designate a set of minimum BMPs that ensure the following at all construction sites:

(1) Erosion prevention;

(2) Slope stabilization;

(3) Phased grading;

(4) Revegetation as early as feasible;

(5) Preservation of natural hydrologic features where feasible;

(6) Preservation of riparian buffers and corridors where feasible;

(7) Maintenance of all source control and treatment control BMPs; and

(8) Retention and proper management of sediment and other construction pollutants on site.

b) Each Permittee shall implement, or require the implementation of, the designated minimum BMPs at each construction site within its jurisdiction year round. If a particular minimum BMP is infeasible at any specific site, each Permittee shall implement, or require the implementation of, other equivalent BMPs. Each Permittee shall also implement or require any additional site specific BMPs as necessary to comply with this Order, including BMPs which are more stringent than those required under the General Construction Permit.

c) Each Permittee shall implement, or require the implementation of, BMPs year round; however, BMP implementation requirements can vary based on wet and dry seasons.

d) Each Permittee shall implement, or require implementation of, additional controls for construction sites tributary to CWA section 303(d) water bodies impaired for sediment as necessary to comply with this Order. Each Permittee shall implement, or require implementation of, additional controls for construction sites within or adjacent to or discharging directly to receiving waters within ESAs as necessary to comply with this Order.

6. Inspection of Construction Sites

   a) Each Permittee shall conduct construction site inspections for compliance with its local ordinances (grading, storm water, etc.), permits (construction, grading, etc.), and this Order.

   b) During the wet season Permittees shall, at a minimum, inspect the following sites every two weeks[4]:

      (1) All sites 50 acres or more in size and grading will occur during the wet season;

      (2) All sites 5 acres or more, and tributary to a CWA section 303(d) water body impaired for sediment or within or directly adjacent to or discharging directly to a receiving water within ESA; and

      (3) Other sites determined by the Permittees or the SDRWQCB as a significant threat to water quality. In evaluating threat to water quality, the following factors shall be considered: (1) soil erosion potential; (2) site slope; (3) project size and type; (4) sensitivity of receiving water bodies; (5) proximity to receiving water bodies; (6) non-storm water discharges; and (7) any other relevant factors.

   c) The Permittees, at a minimum, shall inspect all construction sites that do not meet the criteria specified in Requirement G.6.b above, but encompass 1 acre or more of soil disturbance at least three times during the wet season.

   d) The Permittees shall inspect construction sites less than 1 acre in size on as needed basis.

   e) Permittees shall inspect all construction sites as needed during the dry season.

   f) Based upon site inspection findings, each Permittee shall implement all follow-up actions necessary to comply with this Order.

7. Enforcement of Construction Sites

   Each Permittee shall enforce its ordinances (grading, storm water, etc.) and permits (building, grading, etc.) at all construction sites as necessary to maintain compliance with this Order. Permittee ordinances or other regulatory mechanisms shall include sanctions to ensure compliance. Sanctions shall include the following or their equivalent: stop work authority, non-monetary penalties, fines, financial security, and/or permit denials for non-compliance.

8. Education Focused on Construction Activities

   a) Internal: Municipal Staff

      Each Permittee shall implement an education program that includes annual training to ensure that its construction, building, and grading review staff and inspectors have, at a minimum, an understanding of:

      (1) Federal, state, and local water quality laws and regulations applicable to construction and grading activities;

[4] Any site may be inspected on a monthly basis if the responsible Permittee certifies in a written statement to the SDRWQCB ALL of the following (certified statements may be submitted to the SDRWQCB at any time for one or more sites):

- Permittee has record of construction site's WDID number documenting the site's coverage under the General Construction Permit;
- Permittee has reviewed the construction site's SWPPP and finds the SWPPP to be in compliance with all local ordinances, permits, and plans; and
- Permittee finds that the SWPPP is being properly implemented on site.

(2) The connection between construction activities and water quality impacts (i.e., impacts from land development and urbanization);

(3) How erosion can be prevented;

(4) How impacts to receiving water quality resulting from construction activities can be minimized (i.e., through implementation of various source control and treatment control BMPs); and

(5) How to assess construction sites for adequate BMP implementation and compliance with local codes, ordinances, and permits, and this Order.

b) External: Project Applicants, Contractors, Developers, Property Owners, and other Responsible Parties

Each Permittee shall implement an education program to ensure that project applicants, contractors, developers, property owners, and other responsible parties have an understanding of the topics outlined above.

H. EXISTING DEVELOPMENT

Each Permittee shall develop and implement programs to prevent or reduce pollutants in runoff to the MEP from all existing development under its jurisdiction. The Existing Development programs shall address Sections H.1 through H.3 for municipal facilities and activities, industrial and commercial facilities, and residential activities.

1. Municipal Program

a) Pollution Prevention

Each Permittee shall require the use of pollution prevention methods by municipal departments, contractors, and personnel, where appropriate.

b) Source Identification

Each Permittee shall develop, and update annually, an inventory of the name, address (if applicable), and description of all of the Permittee's municipal facilities and activities that generate pollutants. Municipal facilities and activities to be inventoried shall include, but are not limited to, the following:

- Roads, streets, highways, and parking facilities;
- Flood management projects and flood control devices;
- Drainage facilities;
- Active or closed municipal landfills;
- Publicly owned treatment works (including water and wastewater treatment plants) and sanitary sewage collection systems;
- Incinerators;
- Solid waste transfer facilities;
- Land application sites;
- Uncontrolled sanitary landfills;
- Corporate yards including maintenance and storage yards for materials, waste, equipment and vehicles;
- Sites for disposing and treating sewage sludge;
- Hazardous waste treatment, disposal, and recovery facilities;
- Household hazardous waste collection facilities;

- Municipal airfields;
- Parks and recreational facilities;
- Golf courses;
- Cemeteries;
- Other landscaped areas;
- Channel maintenance activities involving mowing and pesticide/herbicide application;
- Municipal facilities and activities tributary to a CWA section 303(d) impaired water body, where an area or activity generates pollutants for which the water body is impaired. Facilities and activities within or adjacent to or discharging directly to receiving waters within ESAs; and
- Other municipal facilities and activities that the Permittee determines may contribute a significant pollutant load to the MS4.

c) BMP Implementation

(1) Within 365 days from the date of this Order, each Permittee shall implement or require the implementation of BMPs to reduce pollutants in urban runoff to the MEP from all of the Permittee's municipal facilities and activities. The required BMPs shall be facility or activity specific as appropriate.

(2) For facilities and/or activities tributary to CWA section 303(d) impaired water bodies that generate pollutants for which the water body is impaired, each Permittee shall implement or require the implementation of additional BMPs to target that pollutant. Each Permittee shall implement, or require implementation of, additional controls for municipal facilities and activities within or directly adjacent to or discharging directly to receiving waters within ESAs as necessary to comply with this Order.

d) MS4 Maintenance

(1) Each Permittee shall implement a schedule of maintenance activities for its structural source and treatment control BMPs designed to reduce pollutant discharges to or from its MS4s and related drainage structures.

(2) Each Permittee shall implement a schedule of maintenance activities for its MS4. The maintenance activities must, at a minimum, include:

(a) Inspection of all of the Permittee's catch basins and storm drain inlets at least once a year between May 1 and September 30. If accumulated waste is visible, the catch basin, or storm drain inlet, shall be cleaned out. Additional cleaning shall be conducted as necessary;

(b) Removal of anthropogenic litter from the Permittee's open channels at least once a year between May 1 and September 30, with additional removal as necessary;

(c) Record keeping of the Permittee's MS4 cleaning activities;

(d) Proper disposal of waste removed from the Permittee's MS4 pursuant to applicable laws; and

(e) Measures to eliminate waste discharges during MS4 maintenance and cleaning activities.

e) Management of Pesticides, Herbicides, and Fertilizers

The Permittees shall implement BMPs to reduce the contribution of pollutants to the MEP

associated with the application, storage, and disposal of pesticides, herbicides and fertilizers from municipal facilities and activities to MS4s. Such BMPs shall include, at a minimum: (1) educational activities, permits, certifications and other measures for municipal applicators and distributors; (2) integrated pest management measures that rely on non-chemical solutions; (3) the use of native vegetation; (4) schedules for irrigation and chemical application; and (5) the collection and proper disposal of unused pesticides, herbicides, and fertilizers.

f) Inspection of Municipal Facilities and Activities

At a minimum, each Permittee shall inspect all municipal facilities and activities annually. Inspections shall include an assessment of BMP implementation and effectiveness. Based upon site inspection findings, each Permittee shall implement all follow-up actions necessary to comply with this Order.

g) Enforcement of Municipal Facilities and Activities

Each Permittee shall enforce its storm water ordinance at all of its municipal facilities and activities as necessary to maintain compliance with this Order.

2. Industrial/Commercial Facilities Program

a) Pollution Prevention

Each Permittee shall require the use of pollution prevention methods by industrial/commercial facilities, where appropriate.

b) Source Identification

Each Permittee shall develop an inventory or database of all industrial and commercial facilities under its jurisdiction (regardless of site ownership) that could contribute a significant pollutant load to the MS4. At a minimum, the following facilities shall be included:

(1) Commercial Facilities:

- Automobile mechanical repair, maintenance, fueling, or cleaning;
- Airplane mechanical repair, maintenance, fueling, or cleaning;
- Boat mechanical repair, maintenance, fueling, or cleaning;
- Equipment repair, maintenance, fueling, or cleaning;
- Automobile and other vehicle body repair or painting;
- Mobile automobile or other vehicle washing (base of operations);
- Automobile (or other vehicle) parking lots and storage facilities;
- Retail or wholesale fueling;
- Pest control services (base of operations);
- Eating or drinking establishments;
- Mobile carpet, drape or furniture cleaning (base of operations);
- Concrete mixing or cutting (base of operations);
- Masonry (base of operations);
- Painting and coating (base of operations);
- Landscaping (base of operations);
- Nurseries and greenhouses;
- Golf courses, parks and other recreational areas/facilities;

- Cemeteries;
- Pool and fountain cleaning (base of operations);
- Port-a-Potty servicing (base of operations);

(2) Industrial Facilities:

- Industrial facilities, as defined at 40 CFR 122.26(b)(14), including those subject to the General Industrial Permit;
- Operating and closed municipal landfills;
- Facilities subject to SARA Title III;
- Hazardous waste treatment, disposal, storage and recovery facilities;

(3) All other facilities tributary to a CWA section 303(d) impaired water body, where a facility generates pollutants for which the water body is impaired; and

(4) All other facilities that the Permittee determines may contribute a significant pollutant load to the MS4.

The inventory shall include the following minimum information for each facility: name; address; a narrative description that best reflects the principal products or services provided by each facility, and the SIC code for industrial facilities.

Each Permittee shall maintain an up-to-date inventory. New information obtained during inspections or through other intra-agency informational sources (e.g. business licenses, pretreatment permits, sanitary sewer hook-up permits, yellow pages, etc.) shall be used to update the inventory on a regular basis.

c) BMP Implementation

(1) Within 365 days from the date of this Order, each Permittee shall designate a set of minimum BMP requirements for all inventoried industrial/commercial facilities to reduce the discharge of pollutants in runoff to the MEP. Designated BMPs may be specific to facility types or to pollutant-generating activities conducted at the facilities.

(2) For facilities and/or activities tributary to CWA section 303(d) impaired water bodies that generate pollutants for which the water body is impaired, each Permittee shall designate additional BMPs to target that pollutant. Each Permittee shall implement, or require implementation of, additional controls for industrial/commercial facilities and activities within or directly adjacent to or discharging directly to receiving waters within ESAs as necessary to comply with this Order.

(3) Within 365 days from the date of this Order, each Permittee shall notify all inventoried facilities of their applicable minimum BMP requirements, and a description of the local codes or ordinances requiring compliance with reducing the discharge of pollutants in runoff to the MEP.

(4) Each Permittee shall implement, or require the implementation of, the designated minimum BMPs at each inventoried facility within its jurisdiction. If a particular minimum BMP is infeasible at any specific site, each Permittee shall implement, or require implementation of, other equivalent BMPs. Each Permittee shall also implement or require any additional site specific BMPs as necessary to comply with this Order including BMPs which are more stringent than those required under the General Industrial Permit.

d) Inspection of Industrial/Commercial Facilities

(1) To establish priorities for inspections and oversight of industrial/commercial facilities, the Permittees shall prioritize each inventory described in Requirement H.2.b. above by threat to water quality (high, medium, or low). In evaluating threat to water quality, each Permittee shall consider, at a minimum, the following:

- Type of facility (SIC Code);
- Materials used at the facility;
- Wastes generated;
- Exposure of activities and pollutant discharge potential;
- History of non-storm water discharges;
- Size of facility;
- Proximity to receiving water bodies and sensitivity of receiving water bodies;
- Whether the industrial site is subject to the General Industrial Permit;
- Any available source monitoring data; and
- Any other relevant factors.

(2) Each Permittee shall inspect and ensure minimum BMP implementation at all inventoried industrial/commercial facilities in accordance with the following schedule:

(a) High priority facilities shall be inspected annually;

(b) Medium priority facilities shall be inspected biannually (twice during the 5-year term of the permit);

(c) Low priority facilities shall be inspected once during the 5-year term of the permit; and

(d) Mobile operations shall be inspected as needed.

(3) Inspections of industrial facilities shall include, but not be limited to:

(a) Check for coverage under the General Industrial Permit (Notice of Intent (NOI) and/or Waste Discharge Identification No.);

(b) Assessment of compliance with Permittee ordinances and permits related to urban runoff, including the implementation and maintenance of designated minimum BMPs;

(c) Assessment of BMP effectiveness;

(d) Visual observations for non-storm water discharges, potential illicit connections, and potential discharge of pollutants in storm water runoff; and

(e) Education and outreach on storm water pollution prevention.

(4) Inspections of commercial facilities shall include, but not be limited to:

(a) Assessment of compliance with Permittee ordinances and permits related to urban runoff, including the implementation and maintenance of designated minimum BMPs;

(b) Assessment of BMP effectiveness;

(c) Visual observations for non-storm water discharges, potential illicit connections, and potential discharge of pollutants in storm water runoff; and

(d) Education and outreach on storm water pollution prevention.

(5) To the extent that the SDRWQCB has conducted an inspection of an industrial facility during a particular year, the requirement for the responsible Permittee to inspect this site during the same year will be satisfied.

(6) Based upon facility inspection findings, each Permittee shall implement all follow-up actions necessary to comply with this Order.

e) Enforcement of Industrial/Commercial Facilities

Each Permittee shall enforce its storm water ordinance at all industrial/commercial facilities as necessary to maintain compliance with this Order. Permittee ordinances or other regulatory mechanisms shall include sanctions to ensure compliance. Sanctions shall include the following or their equivalent: Non-monetary penalties, fines, bonding requirements, and/or permit denials for non-compliance.

f) Reporting of Industrial Non-Filers

As part of each Annual Report, each Permittee shall report a list of industrial facilities, including the name, address, and SIC code, that may require coverage under the General Industrial Permit for which a NOI has not been filed.

g) Industrial/Commercial Inspection Training

Each Permittee shall train staff responsible for conducting inspections of industrial/commercial facilities at least once a year. Permittees are encouraged to conduct training programs and provide compliance assistance to industrial/commercial facility owners, operators, and employers.

3. Residential Program

a) Pollution Prevention

Each Permittee shall encourage the use of pollution prevention methods by residents, where appropriate.

b) Source Identification

Each Permittee shall identify high priority residential activities that may contribute a significant pollutant load to the MS4. These activities may include:

- Automobile repair and maintenance;
- Automobile washing;
- Automobile parking;
- Home and garden care activities and product use (pesticides, herbicides, and fertilizers);
- Disposal of household hazardous waste;
- Disposal of pet waste;
- Disposal of green waste; and
- Any other residential source that the Permittee determines may contribute a significant pollutant load to the MS4.

c) BMP Implementation

(1) Within 365 days from the date of this Order, each Permittee shall designate a set of minimum BMP requirements for all high priority residential activities to reduce the discharge of pollutants in urban runoff to the MEP.

(2) For residential activities tributary to CWA section 303(d) impaired water bodies that generate pollutants for which the waterbody is impaired, each Permittee shall designate additional BMPs to target that pollutant. Each Permittee shall implement, or require implementation of, additional controls for high priority residential activities within or directly adjacent to or discharging directly to receiving waters within ESAs as necessary to comply with this Order.

(3) Each Permittee shall implement, or require implementation of, the designated minimum BMPs for the high priority residential activities identified pursuant to Requirement H.3.b. above. If a particular minimum BMP is infeasible for any specific site/source, each Permittee shall require implementation of other equivalent BMPs. Each Permittee shall also implement, or require implementation of, any additional BMPs necessary to comply with this Order.

(4) Within 365 days from the date of this Order, each Permittee shall notify residents of the applicable minimum BMP requirements, and a description of the local codes or ordinances requiring compliance with reducing the discharge of pollutants in runoff to the MEP.

d) Enforcement of Residential Areas and Activities

Each Permittee shall enforce its storm water ordinance for residential activities as necessary to maintain compliance with this Order.

I. EDUCATION

Each Permittee shall implement an Education Component using all media as appropriate to (1) measurably increase the knowledge of the target communities regarding MS4s, impacts of urban runoff on receiving waters, and potential BMP solutions for the target audience; and (2) to measurably change the behavior of target communities and thereby reduce pollutant releases to MS4s and the environment. At a minimum the education component shall address the following target communities:

1. Municipal Departments and Personnel
2. Construction Site Owners and Developers
3. Industrial Owners and Operators
4. Commercial Owners and Operators
5. Residential Community, General Public, and School Children
6. Quasi-Governmental Agencies/Districts (i.e., educational institutions, water districts, sanitation districts, etc.)

J. ILLICIT DISCHARGE DETECTION AND ELIMINATION PROGRAM

Each Permittee shall implement an Illicit Discharge Detection and Elimination program containing measures to actively seek and eliminate illicit discharges and connections. At a minimum the Illicit Discharge Detection and Elimination program shall address:

1. Illicit Discharges and Connections

Each Permittee shall implement a program to actively seek and eliminate illicit discharges and connections into its MS4. The program shall address all types of illicit discharges and connections excluding those non-storm water discharges not prohibited by the Permittee in accordance with Section B of this Order.

2. Develop/Maintain MS4 Map

   Each Permittee shall develop or obtain an up-to-date labeled map of its entire MS4 and the corresponding drainage areas within its jurisdiction. The use of a GIS is highly recommended. The accuracy of the MS4 map shall be confirmed and updated at least annually.

3. Illicit Discharge Monitoring

   Each Permittee shall implement the Illicit Discharge Monitoring Program in accordance with Section II.B of the MRP to detect illicit discharges and connections.

4. Investigation/Inspection and Follow-Up

   Each Permittee shall investigate and inspect any portion of its MS4 that, based on visual observations, monitoring results or other appropriate information, indicates a reasonable potential for illicit discharges, illicit connections, or other sources of non-storm water (including non-prohibited discharge(s) identified in Section B of this Order). Each Permittee shall develop numeric criteria in accordance with section II.B.3. of the MRP to determine when follow-up actions will be necessary. Numeric criteria and follow-up procedures shall be described in each Permittees' Individual SWMP.

5. Elimination of Illicit Discharges and Connections

   Each Permittee shall eliminate all illicit discharges, illicit discharge sources, and illicit connections as soon as possible after detection. Elimination measures may include an escalating series of enforcement actions for those illicit discharges that are not a serious threat to public health or the environment. Illicit discharges that are a serious threat to public health or the environment must be eliminated immediately.

6. Enforce Ordinances

   Each Permittee shall implement and enforce its ordinances, orders, or other legal authority to prevent illicit discharges and connections to its MS4. Each Permittee shall also implement and enforce its ordinance, orders, or other legal authority to eliminate detected illicit discharges and connections to it MS4.

7. Sewage Spill Prevention and Response

   Each Permittee shall take appropriate actions to prevent, respond to, contain and cleanup sewage spills (including private laterals and failing septic systems) into the MS4 and to prevent the contamination of surface water, ground water and soil to the MEP. Appropriate actions may include the following:

   - Develop and implement a mechanism to be notified of all sewage spills from private laterals and failing septic systems into the MS4;
   - Coordinate sewage spill prevention, containment and response activities throughout all appropriate departments, programs and agencies to ensure maximum water quality protection at all times;
   - Require adequately sized and properly maintained private property sewerage systems, such as at residential and commercial complexes;
   - Require proper connections of private laterals to the public sewer main;
   - Require adequately-sized, and properly maintained grease control devices at food establishments which otherwise could result in sewer line grease blockages;

- Conduct municipal activities such as street repair or tree plantings in a manner that minimizes sewer line damages or root blockages;
- Identify priority areas, produce maps and other information on systems obtained during development review;
- Educate the public on measures to prevent sewage spills; and
- Ensure that private sewer lines are inspected.

8. Facilitate Public Reporting of Illicit Discharges and Connections - Public Hotline

   Each Permittee shall promote, publicize and facilitate public reporting of illicit discharges or water quality impacts associated with discharges into or from MS4s. Each Permittee shall facilitate public reporting through development and operation of a public hotline. Public hotlines can be Permittee-specific or shared by Permittees. All storm water hotlines shall be capable of receiving reports in both English and Spanish 24 hours per day / seven days per week. Permittees shall respond to and resolve each reported incident. All reported incidents, and how each was resolved, shall be summarized in each Permittee's Individual Annual Report.

9. Facilitate Disposal of Used Oil and Toxic Materials

   Each Permittee shall facilitate the proper management and disposal of used oil, toxic materials, and other household hazardous wastes. Such facilitation shall include educational activities, public information activities, and establishment of collection sites operated by the Permittee or a private entity. Neighborhood collection of household hazardous wastes is encouraged.

K. WATERSHED-BASED ACTIVITIES

1. Each Permittee shall collaborate with other Permittees to identify, address, and mitigate the highest priority water quality issues/pollutants in the Upper Santa Margarita Watershed.

2. Each Permittee shall collaborate with all other Permittees to develop and implement a Watershed SWMP for the Upper Santa Margarita Watershed. The Watershed SWMP shall, at a minimum, contain the following:

   a) An accurate map of the Upper Santa Margarita Watershed (preferably in GIS format) that identifies all receiving waters, all CWA section 303(d) impaired receiving waters, existing and planned land uses, MS4s, major highways, jurisdictional boundaries, and industrial and commercial facilities, municipal sites, and residential areas.

   b) A description of any interagency agreement, or other efforts, with non-Permittee owners of the MS4 (such as Caltrans, Native American Tribes, and school districts) to control the contribution of pollutants from one portion of the shared MS4 to another portion of the shared MS4;

   c) An assessment of the water quality of all receiving waters in the watershed based upon (1) existing water quality data; and (2) results from the Receiving Waters and Illicit Discharge Monitoring Programs described in the MRP;

   d) An identification and prioritization of major water quality problems in the watershed caused or contributed to by MS4 discharges and the likely source(s) of the problem(s);

   e) An implementation time schedule of short and long-term recommended activities (individual and collective) needed to address the highest priority water quality problem(s) identified in Requirement K.2.d. above. For this section, "short-term activities" shall mean those activities

that are to be completed during the life of this Order and "long-term activities" shall mean those activities that are to be completed beyond the life of this Order;

f) A watershed-based education program, which focuses on water quality issues specific to the Santa Margarita watershed;

g) A mechanism to facilitate collaborative "watershed-based" (i.e., natural resource-based) land use planning with neighboring local governments in the watershed.

h) A description of any other urban runoff management programs or activities being conducted collectively by the Permittees to address water quality issues;

i) A description of Permittee responsibilities for implementing the programs described in the Watershed SWMP;

j) The expenditures and funding sources for the area-wide and watershed-based activities and programs;

k) Standardized reporting formats developed collectively by the Permittees, as specified in Requirement M.1;

l) Short-term strategy for assessing the effectiveness of the activities and programs implemented as part of the Watershed SWMP. The short-term assessment strategy shall identify methods to assess program effectiveness and include specific direct and indirect performance measurements that will track the immediate progress and accomplishments of the Watershed SWMP towards improving receiving water quality impacted by urban runoff discharges. The short-term strategy shall also discuss the role of monitoring data collected by the Permittees in substantiating or refining the assessment; and

m) Long-term strategy for assessing the effectiveness of the Watershed SWMP. The long-term assessment strategy shall identify specific direct and indirect performance measurements that will track the long-term progress of the Watershed SWMP towards achieving improvements in receiving water quality impacted by urban runoff discharges. Methods used for assessing effectiveness shall include the following or their equivalent: surveys, pollutant loading estimations, receiving water quality monitoring, and achievement of measurable goals. The long-term strategy shall also discuss the role of monitoring data in substantiating or refining the assessment.

3. Permittees shall, as appropriate, participate in watershed management efforts to address storm water quality issues within the entire Santa Margarita Watershed, including efforts conducted by other entities in the watershed, such as San Diego County, U.S. Marine Corps Base Camp Pendleton, Native American tribes, and other state, federal, and local agencies.

4. At least once a year, all Permittees shall meet to review and assess available water quality data (from the MRP and other reliable sources), assess program effectiveness, and to review and update the Watershed SWMP.

L. MONITORING AND REPORTING PROGRAM

Pursuant to CWC section 13267, the Permittees shall comply with all requirements contained in the **MRP**.

M. PRINCIPAL PERMITTEE RESPONSIBILITIES

The Principal Permittee shall, at a minimum:

1. Coordinate the joint development by all of the Permittees of standardized format(s) for all reports required under this Order (e.g., annual reports, monitoring reports, fiscal analysis reports, and program effectiveness reports, etc.). The standardized reporting format(s) shall be submitted to the SDRWQCB for review as part of the SWMP. The standardized format(s) shall be used by all Permittees and shall include protocols for electronic reporting.

2. Integrate individual Permittee documents and reports required under this Order into single unified documents and reports for submittal to the SDRWQCB as described below. If a reporting date falls on a non-working day or State holiday, then the report is to be submitted on the following working day.

   a) SWMP – The Principal Permittee shall submit the SWMP in its entirety to the SDRWQCB within 365 days of the adoption of this Order. The Principal Permittee shall be responsible for preparing the Watershed SWMP and its Individual SWMP. The Principal Permittee shall also be responsible for collecting and assembling the Individual SWMPs describing the activities and programs to be implemented by each individual Permittee.

   b) MRP - The Principal Permittee shall submit the SWMP Annual Reports and the Monitoring Program Annual Reports in accordance with MRP No. R9-2004-001. The Principal Permittee shall be responsible for producing the Watershed SWMP Annual Report as well as its Individual Annual Report, and for collecting and assembling the Individual SWMP Annual Reports covering the activities conducted by each Permittee. The Principal Permittee shall also be responsible for coordinating the implementation of and reporting on the Receiving Waters Monitoring Program, described in sections II.A and III.B of the MRP.

   c) Interagency Agreement - The Principal Permittee shall submit a copy of the Interagency Agreement to the SDRWQCB, if and when the agreement is updated.

N. STANDARD PROVISIONS

1. Each Permittee shall comply with the standard provisions contained in **Attachment B** of this Order. This includes 24 hour/5day reporting requirements for any instance of non-compliance with this Order as described in Section 1.1.6 of **Attachment B**.

2. All documents submitted to the SDRWQCB pursuant to this Order, including but not limited to SWMP documents, annual reports, monitoring reports, and SUSMPs, shall include an executive summary, introduction, conclusion, recommendations, and signed certified statement.

3. All plans, reports and subsequent amendments submitted in compliance with this Order shall be implemented immediately (or as otherwise specified) and shall be an enforceable part of this Order upon submission to the SDRWQCB. All submittals by Permittees must be adequate to implement the requirements of this Order.

*I, John H.Robertus, Executive Officer, do hereby certify the foregoing is a full, true, and correct copy of an Order adopted by the California Regional Water Quality Control Board, San Diego Region, on **July 14, 2004.***

John H. Robertus
Executive Officer

ATTACHMENT A

BASIN PLAN PROHIBITIONS

California Water Code (CWC) section 13243 provides that a California Regional Water Quality Control Board (RWQCB), in a water quality control plan, may specify certain conditions or areas where the discharge of waste, or certain types of waste is not permitted. The following discharge prohibitions are applicable to any person, as defined by section 13050(c) of the CWC, who is a citizen, domiciliary, or political agency or entity of California whose activities in California could affect the quality of waters of the state within the boundaries of the SDRWQCB.

1. The discharge of waste to waters of the state in a manner causing, or threatening to cause a condition of pollution, contamination or nuisance as defined in CWC section 13050, is prohibited.

2. The discharge of waste to land, except as authorized by waste discharge requirements or the terms described in CWC section 13264 is prohibited.

3. The discharge of pollutants or dredged or fill material to waters of the United States except as authorized by an NPDES permit or a dredged or fill material permit (subject to the exemption described in CWC section13376) is prohibited.

4. Discharges of recycled water to lakes or reservoirs used for municipal water supply or to inland surface water tributaries thereto are prohibited, unless the SDRWQCB issues a NPDES permit authorizing such a discharge; the proposed discharge has been approved by the State Department of Health Services and the operating agency of the impacted reservoir; and the discharger has an approved fail-safe long-term disposal alternative.

5. The discharge of waste to inland surface waters, except in cases where the quality of the discharge complies with applicable receiving water quality objectives, is prohibited. Allowances for dilution may be made at the discretion of the SDRWQCB. Consideration would include streamflow data, the degree of treatment provided and safety measures to ensure reliability of facility performance. As an example, discharge of secondary effluent would probably be permitted if streamflow provided 100:1 dilution capability.

6. The discharge of waste in a manner causing flow, ponding, or surfacing on lands not owned or under the control of the discharger is prohibited, unless the discharge is authorized by the RWQCB.

7. The dumping, deposition, or discharge of waste directly into waters of the state, or adjacent to such waters in any manner which may permit its being transported into the waters, is prohibited unless authorized by the SDRWQCB.

8. Any discharge to a MS4 that is not composed entirely of "*storm water*" is prohibited unless authorized by the SDRWQCB. [The federal regulations, 40 CFR 122.26 (b) (13), define storm water as storm water runoff, snow melt runoff, and surface runoff and drainage. 40 CFR 122.26 (b) (2) defines an illicit discharge as any discharge to a MS4 that is not composed entirely of storm water except discharges pursuant to a NPDES permit and discharges resulting from fire fighting activities. [40 CFR 122.26 amended at 56 FR 56553, November 5, 1991; 57 FR 11412, April 2, 1992].

9. The unauthorized discharge of treated or untreated sewage to waters of the state or to a MS4 is prohibited.

10. The discharge of industrial wastes to conventional septic tank/subsurface disposal systems, except as authorized by the terms described in CWC section 13264, is prohibited.

11. The discharge of radioactive wastes amenable to alternative methods of disposal into the waters of the state is prohibited.

12. The discharge of any radiological, chemical, or biological warfare agent into waters of the state is prohibited.

13. The discharge of waste into a natural or excavated site below historic water levels is prohibited unless the discharge is authorized by the SDRWQCB.

14. The discharge of sand, silt, clay, or other earthen materials from any activity, including land grading and construction, in quantities which cause deleterious bottom deposits, turbidity or discoloration in waters of the state or which unreasonably affect, or threaten to affect, beneficial uses of such waters is prohibited.

ATTACHMENT B
STANDARD PROVISIONS

1. FEDERAL NPDES STANDARD PROVISIONS [40 CFR 122.41]

(a) *Duty to comply* [40 CFR 122.41(a)]. The permittee must comply with effluent standards or prohibitions established under section 307(a) of the CWA for toxic pollutants and with standards for sewage sludge use or disposal established under section 405(d) of the CWA within the time provided in the regulations that establish these standards or prohibitions or standards for sewage sludge use or disposal, even if the Order has not yet been modified to incorporate the requirement.

(1) The permittee shall comply with effluent standards or prohibitions established under section 307(a) of the CWA toxic pollutants and with standards for sewage sludge use or disposal established under section 405(d) of the CWA within the time provided in the regulations that establish these standards or prohibitions or standards for sewage sludge use or disposal, even if the Order has not yet been modified to incorporate the requirement.

(2) The CWA provides that any person who violates section 301, 302, 306, 307, 308, 318 or 405 of the Act, or any permit condition or limitation implementing any such sections in a permit issued under section 402, or any requirement imposed in a pretreatment program approved under sections 402(a)(3) or 402(b)(8) of the Act, is subject to a civil penalty not to exceed $25,000 per day for each violation. The CWA provides that any person who negligently violates section 301, 302, 306, 307, 308, 318 or 405 of the Act, or any condition or limitation implementing any of such sections in a permit issued under section 402 of the Act, or any requirement imposed in a pretreatment program approved under section 402(a)(3) or 402(b)(8) of the Act, is subject to criminal penalties of $2,500 to $25,000 per day of violation, or imprisonment of not more than 1 year, or both. In the case of a second or subsequent conviction for a negligent violation, a person shall be subject to criminal penalties of not more than $50,000 per day of violation, or by imprisonment of not more than 2 years, or both. Any person who knowingly violates such sections, or such conditions or limitations is subject to criminal penalties of $5,000 to $50,000 per day of violation, or imprisonment for not more than 3 years, or both. In the case of a second or subsequent conviction for a knowing violation, a person shall be subject to criminal penalties of not more than $100,000 per day of violation, or imprisonment of not more than 6 years, or both. Any person who knowingly violates section 301, 302, 306, 307, 308, 318 or 405 of the Act, or any permit condition or limitation implementing any of such sections in a permit issued under section 402 of the Act, and who knows at that time that he thereby places another person in imminent danger of death or serious bodily injury, shall, upon conviction, be subject to a fine of not more than $250,000 or imprisonment of not more than 15 years, or both. In the case of a second or subsequent conviction for a knowing endangerment violation, a person shall be subject to a fine of not more than $500,000 or by imprisonment of not more than 30 years, or both. An organization, as defined in section 309(c)(3)(B)(iii) of the CWA, shall, upon conviction of violating the imminent danger provision, be subject to a fine of not more than $1,000,000 and can be fined up to $2,000,000 for second or subsequent convictions.

(3) Any person may be assessed an administrative penalty by the Administrator for violating section 301, 302, 306, 307, 308, 318 or 405 of the CWA, or any permit condition or limitation implementing any of such sections in a permit issued under Section 402 of the CWA. Administrative penalties for Class I violations are not to exceed $10,000 per violation, with the maximum amount of any Class I penalty assessed not to exceed $25,000. Penalties for Class II violations are not to exceed $10,000 per day for each day during which the violation continues, with the maximum amount of any Class II penalty not to exceed $125,000.

(b) *Duty to reapply* [40 CFR 122.41(b)]. If the permittee wishes to continue an activity regulated by this Order after the expiration date of this Order, the permittee must apply for and obtain a new order.

(c) *Need to halt or reduce activity not a defense* [40 CFR 122.41(c)]. It shall not be a defense for the permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this Order.

(d) *Duty to mitigate* [40 CFR 122.41(d)]. The permittee shall take all reasonable steps to minimize or prevent any discharge or prevent any discharge or sludge use or disposal in violation of this Order which has a reasonable likelihood of adversely affecting human health or the environment.

(e) *Proper operation and maintenance* [40 CFR 122.41(e)]. The permittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the discharger to achieve compliance with the conditions of this Order. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures. This provision requires the operation of back-up or auxiliary facilities or similar systems which are installed by the discharger only when the operation is necessary to achieve compliance with the conditions of this Order.

(f) *Permit actions* [40 CFR 122.41(f)]. This Order may be modified, revoked and reissued, or terminated for cause. The filing of a request by the permittee for a permit modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance does not stay any permit condition.

(g) *Property rights* [40 CFR 122.41(g)]. This Order does not convey any property rights of any sort or any exclusive privilege.

(h) *Duty to provide information* [40 CFR 122.41(h)]. The permittee shall furnish to the Director, within a reasonable time, any information which the SDRWQCB may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this Order or to determine compliance with this Order. The permittee shall also furnish to the SDRWQCB upon request, copies of records required to be kept by this Order.

(i) *Inspection and entry* [40 CFR 122.41(i)]. The permittee shall allow the SDRWQCB, or an authorized representative (including an authorized contractor acting as a representative of the SDRWQCB or EPA), upon presentation of credentials and other documents as may be required by law, to:

(1) Enter upon the permittee's premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of this Order;
(2) Have access to and copy, at reasonable times, any records that must be kept under the conditions of this Order;
(3) Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this Order; and
(4) Sample or monitor at reasonable times, for the purposes of assuring compliance with this Order or as otherwise authorized by the CWA , any substances or parameters at any location.

(k) *Signatory requirement* [40 CFR 122.41(k)]

(1) All applications, reports, or information submitted to the SDRWQCB shall be signed and certified (see 40 CFR 122.22)

(2) The CWA provides that any person who knowingly makes any false statement, representation, or certification in any record or other document submitted or required to be maintained under this Order, including monitoring reports or reports of compliance or non-compliance shall, upon conviction, be punished by a fine of not more than $10,000 per violation, or by imprisonment for not more than 6 months per violation, or by both.

(l) *Reporting requirements* [40 CFR 122.41(l)]

(1) *Planned changes.* The permittee shall give notice to the SDRWQCB as soon as possible of any planned physical alterations or additions to the permitted facility. Notice is required only when:

i) The alteration or addition to a permitted facility may meet one of the criteria for determining whether a facility is a new source in 40 CFR 122.29(b); or
ii) The alteration or addition could significantly change the nature or increase the quantity of pollutants discharged. This notification applies to pollutants, which are subject neither to effluent limitations in the permit, nor to notification requirements under 40 CFR 122.42(a)(1).
iii) The alteration or addition results in a significant change in the permittee's sludge use or disposal practices, and such alteration, addition, or change may justify the application of permit conditions that are different from or absent in the existing Order, including notification of additional use or disposal sites not reported during the permit application process or not reported pursuant to an approved land application plan;

(2) *Anticipated noncompliance.* The permittee shall give advance notice to the SDRWQCB of any planned changes in the permitted facility or activity, which may result in noncompliance with permit requirements.

(3) *Transfers.* This permit is not transferable to any person except after notice to the SDRWQCB. The SDRWQCB may require modification or revocation and reissuance of the permit to change the name of the permittee and incorporate such other requirements as may be necessary under the CWA. (See 40 CFR 122.61; in some cases, modification or revocation and reissuance is mandatory.)

(4) *Monitoring reports.* The applicable provisions from 40 CFR 122.41(l)(4) are contained in the Monitoring and Reporting Program for this Order.

(5) *Compliance schedules.* Reports of compliance or noncompliance with, or any progress reports on, interim and final requirements contained in any compliance schedule of this permit shall be submitted no later than 14 days following each schedule date.

(6) *Twenty-four hour reporting.*

i) The permittee shall report any noncompliance, which may endanger health or the environment. Any information shall be provided orally within 24 hours from the time the permittee becomes aware of the circumstances. A written submission shall also be provided within 5 days of the time the permittee becomes aware of the circumstances. The written submission shall contain a description of the noncompliance and its cause; the period of noncompliance, including exact dates and times, and if the noncompliance has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance.
ii) The following shall be included as information, which must be reported within 24 hours under this paragraph.

(A) Any unanticipated bypass which exceeds any effluent limitation in the Order (See 40 CFR 122.41(g)).
(B) Any upset which exceeds any effluent limitation in the Order.
(C) Violation of a maximum daily discharge limitation for any of the pollutants listed by the SDRWQCB in the permit to be reported within 24 hours. (See 40 CFR 122.44(g)).

iii) The SDRWQCB may waive the written report on a case-by-case basis for reports under paragraph (l)(6)(ii) of this section if the oral report has been received within 24 hours.

(7) *Other noncompliance.* The permittee shall report all instances of noncompliance not reported under paragraphs (l)(4), (5), and (6) of this section, at the time monitoring reports are submitted. The reports shall contain the information listed in paragraph (l)(6) of this section.

(8) *Other information.* Where the permittee becomes aware that it failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application or in any report to the SDRWQCB, it shall promptly submit such facts or information.

(m) *Bypass* [40 CFR 122.41(m)]

(1) Definitions

i) "Bypass" means the intentional diversion of waste streams from any portion of a treatment facility.
ii) "Severe property damage" means substantial physical damage to property, damage to the treatment facilities which causes them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production.

(2) Bypass not exceeding limitations. The permittee may allow any bypass to occur which does not cause effluent limitations of this Order or the concentrations of pollutants set forth in Ocean Plan Table A or Table B to be exceeded, but only if it also is for essential maintenance to assure efficient operation. These bypasses are not subject to the provisions of paragraphs (m)(3) and (m)(4) of this provision.

(3) Notice

i) Anticipated bypass. If the permittee knows in advance of the need for a bypass, it shall submit prior notice, if possible, at least ten days before the date of the bypass.

ii) Unanticipated bypass. The permittee shall submit notice of an unanticipated bypass as required in paragraph (1)(6) of this section (24-hour notice).

(4) Prohibition of Bypass

i) Bypass is prohibited, and the SDRWQCB may take enforcement action against the permittee for bypass, unless:

(A) Bypass was unavoidable to prevent loss of life, personal injury, or severe property damage;

(B) There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate back-up equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass which occurred during normal periods of equipment downtime or preventive maintenance; and

(C) The permittee submitted notices as required under paragraph (m)(3) of this section.

ii) The SDRWQCB may approve an anticipated bypass, after considering its adverse effects, if the SDRWQCB determines that it will meet the three conditions listed above in paragraph (m)(4)(i) of this section.

(n) *Upset* [40 CFR 122.41(n)]

(1) Definition. "Upset" means an exceptional incident in which there is unintentional and temporary noncompliance with technology based effluent limitations because of factors beyond the reasonable control of the discharger. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation.

(2) Effect of an upset. An upset constitutes an affirmative defense to an action brought for noncompliance with such technology based permit effluent limitations if the requirements of paragraph (n)(3) of this section are met. No determination made during administrative review of claims that noncompliance was caused by upset, and before an action for noncompliance, is final administrative action subject to judicial review.

(3) Conditions necessary for a demonstration of upset. A permittee who wishes to establish the affirmative defense of upset shall demonstrate, through properly signed, contemporaneous operating logs, or other relevant evidence that:

i) An upset occurred and that the permittee can identify the cause(s) of the upset;

ii) The permitted facility was at the time being properly operated;

iii) The permittee submitted notice of the upset as required in section (1)(6)(ii)(B) of this section (24-hour notice); and

iv) The permittee complied with any remedial measures required under paragraph (d) of this section.

(4) Burden of Proof. In any enforcement proceeding the discharger seeking to establish the occurrence of an upset has the burden of proof.

2. SIGNATORY REQUIREMENTS [40 CFR 122.22]

(a) *Applications* [40 CFR 122.22(a)(3)]. All applications shall be signed by either a principal executive officer or ranking elected official.

(b) *Reports* [40 CFR 122.22(b)]. All reports required by this Order, and other information requested by the SDRWQCB shall be signed by a person described in paragraph a. of this reporting requirement, or by a duly authorized representative of that person. A person is a duly authorized representative only if:

(1) The authorization is made in writing by a person described in section (a) above;

(2) The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity, such as the position of plant manager, operator of a well or a well field, superintendent, position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters for the company. (A duly authorized representative may thus be either a named individual or any individual occupying a named position.); and,

(3) The written authorization is submitted to the SDRWQCB.

(c) *Changes to authorization.* If an authorization under paragraph (b) of this reporting requirement is no longer accurate because a different individual or position has responsibility for the overall operation of the facility, a new authorization satisfying the requirements of paragraph b. of this reporting requirement must be submitted to the SDRWQCB prior to or together with any reports, information, or applications to be signed by an authorized representative.

(d) *Certification.* Any person signing a document under paragraph (a) or (b) of this section shall make the following certification:

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

3. ADDITIONAL STANDARD PROVISIONS

(a) *Municipal separate storm sewer systems* [40 CFR 122.42(c)]. The operator of a large or medium municipal separate storm sewer system or a municipal separate storm sewer that has been designated by the Director under 40 CFR 122.26(a)(1)(v) must submit an annual report by the anniversary of the date of the issuance of the permit for such system. The report shall include:

(1) The status of implementing the components of the storm water management program that are established as permit conditions;

(2) Proposed changes to the storm water management programs that are established as permit conditions. Such proposed changes shall be consistent with 40 CFR 122.26(d)(2)(iii); and

(3) Revisions, if necessary, to the assessment of controls and the fiscal analysis reported in the permit application under 40 CFR 122.26(d)(2)(iv) and 40 CFR 122.26(d)(2)(v);

(4) A summary of data, including monitoring data, that is accumulated throughout the reporting year;

(5) Annual expenditures and budget for year following each annual report;

(6) A summary describing the number and nature of enforcement actions, inspections, and public education programs; and

(7) Identification of water quality improvements or degradation.

(b) *Storm water discharges* [40 CFR 122.42(d)]. The initial permits for discharges composed entirely of storm water issued pursuant to 40 CFR 122.26(e)(7) shall require compliance with the conditions of

the permit as expeditiously as practicable, but in no event later than three years after the date of issuance of the permit.

(c) *Discharge is a privilege* [CWC section 13263(g)]. No discharge of waste into the waters of the State, whether or not such discharge is made pursuant to waste discharge requirements, shall create a vested right to continue such discharge. All discharges of waste into waters of the State are privileges, not rights.

(d) *Review and revision of Order* [CWC section 13263(e)]. Upon application by any affected person, or on its own motion, the SDRWQCB may review and revise this permit.

(e) *Termination or modification of Order* [CWC section13381]. This permit may be terminated or modified for causes, including, but not limited to, all of the following:

(8) Violation of any condition contained in this Order;
(9) Obtaining this Order by misrepresentation, or failure to disclose fully all relevant facts.
(10) A change in any condition that requires either a temporary or permanent reduction or elimination of the permitted discharge.

(f) *Transfers.* When this Order is transferred to a new owner or operator, such requirements as may be necessary under the CWC may be incorporated into this Order.

(g) *Conditions not stayed.* The filing of a request by the permittee for modification, revocation and reissuance, or termination of this Order, or a notification of planned change in or anticipated noncompliance with this Order does not stay any condition of this Order.

(h) *Availability.* A copy of this Order shall be kept at a readily accessible location and shall be available to on-site personnel at all times.

(i) *Duty to minimize or correct adverse impacts.* The permittees shall take all reasonable steps to minimize or correct any adverse impact on the environment resulting from noncompliance with this Order, including such accelerated or additional monitoring as may be necessary to determine the nature and impact of the noncompliance.

(j) *Responsibilities, liabilities, legal action, penalties* [CWC sections 13385 and 13387]. The Porter-Cologne Water Quality Control Act provides for civil and criminal penalties comparable to, and in some cases greater than, those provided for under the CWA.

Nothing in this Order shall be construed to protect the discharger from its liabilities under federal, state, or local laws.

Except as provided for in 40CFR 122.41(m) and (n), nothing in this Order shall be construed to relieve the permittee from civil or criminal penalties for noncompliance.

Nothing in this Order shall be construed to preclude the institution of any legal action or relieve the permittee from any responsibilities, liabilities, or penalties to which the discharger is or may be subject to under Section 311 of the CWA.

Nothing in this Order shall be construed to preclude institution of any legal action or relieve the permittee from any responsibilities, liabilities, or penalties established pursuant to any applicable state law or regulation under authoring preserved by Section 510 of the CWA.

(k) *Noncompliance.* Any noncompliance with this Order constitutes violation of the CWC and is grounds for denial of an application for modification of the Order (also see 40 CFR 122.41(a).

(l) *Director.* For purposes of this Order, the term "Director" used in parts of 40 CFR incorporated into this Order by reference and/or applicable to this Order shall have the same meaning as the term "SDRWQCB" used elsewhere in this Order, except that in 40 CFR 122.41(h) and (I), "Director" shall mean "SDRWQCB. SWRCB, and EPA."

(m) The SDRWQCB has, in prior years, issued a limited number of individual NPDES permits for non-storm water discharges to MS4s. The SDRWQCB or SWRCB may in the future, upon prior notice to the Permittee(s), issue an NPDES permit for any non-storm water discharge (or class of non-storm water discharges) to a MS4. Permittees may prohibit any non-storm water discharge (or class of non-storm water discharges) to a MS4 that is authorized under such separate NPDES permits.

(n) *Effective date.* This Order shall become effective on the date of its adoption provided the EPA has no objection. If the EPA objects to its issuance, this Order shall not become effective until such objection is withdrawn. This Order supersedes Order No. R9-98-02 upon the effective date of this Order.

(o) *Expiration.* This Order expires on **July 14, 2009**.

(p) *Continuation of expired order* [23 CCR 2235.4]. After this Order expires, the terms and conditions of this Order are automatically continued pending issuance of a new permit if all requirements of the federal NPDES regulations on the continuation of expired permits (40 CFR 122.6) are complied with.

(q) *Applications.* Any application submitted by a permittee for reissuance or modification of this Order shall satisfy all applicable requirements specified in federal regulations as well as any additional requirements for submittal of a Report of Waste Discharge specified in the CWC and the CCR.

(r) *Confidentiality.* Except as provided for in 40 CFR 122.7, no information or documents submitted in accordance with or in application for this Order will be considered confidential, and all such information and documents shall be available for review by the public at the SDRWQCB office.

(s) *Severability.* The provisions of this Order are severable, and if any provision of this Order, or the application of any provisions of this Order to any circumstance, is held invalid, the application of such provision to other circumstances and the remainder of this Order shall not be affected thereby.

(t) *Report submittal.* The discharger shall submit reports and provide notifications as required by this Order to the following:

NORTHERN WATERSHED PROTECTION UNIT
CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN DIEGO REGION
9174 SKY PARK COURT, SUITE 100
SAN DIEGO CA 92123-4340
Telephone: (858) 467-2952 Fax: (858) 571-6972

EUGENE BROMLEY
US ENVIRONMENTAL PROTECTION AGENCY
REGION IX
PERMITS ISSUANCE SECTION (W-5-1)

75 HAWTHORNE STREET
SAN FRANCISCO CA 94105

Unless otherwise directed, the discharger shall submit one hard copy for the official record and one electronic copy of each report required under this Order to the SDRWQCB and one hard copy to the EPA.

ATTACHMENT C
DEFINITIONS

Anthropogenic Litter – Trash generated from human activities, not including sediment.

Basin Plan – Water Quality Control Plan, San Diego Basin, Region 9, and amendments, developed by the SDRWQCB.

BAT (Best Available Technology) – The technology-based standard established by congress in CWA section 402(p)(3)(A) for industrial dischargers of storm water. Technology-based standards establish the level of pollutant reductions that dischargers must achieve, typically by treatment or by a combination of treatment and best management practices, or BMPs. For example, secondary treatment (or the removal of 85% suspended solids and BOD) is the BAT for suspended solid and BOD removal from a sewage treatment plant. BAT generally emphasizes treatment methods first and pollution prevention and source control BMPs secondarily.

The best economically achievable technology that will result in reasonable further progress toward the national goal of eliminating the discharge of all pollutants, as determined in accordance with regulations issued by the EPA Administrator. Factors relating to the assessment of best available technology shall take into account the age of equipment and facilities involved, the process employed, the engineering aspects of the application of various types of control techniques, process changes, the cost of achieving such effluent reduction, non-water quality environmental impact (including energy requirements), and such other factors as the permitting authority deems appropriate.

Beneficial Uses - The uses of water necessary for the survival or well being of man, plants, and wildlife. These uses of water serve to promote the tangible and intangible economic, social, and environmental goals "Beneficial Uses" of the waters of the State that may be protected against include, but are not limited to, domestic, municipal, agricultural and industrial supply; power generation; recreation; aesthetic enjoyment; navigation; and preservation and enhancement of fish, wildlife, and other aquatic resources or preserves. Existing beneficial uses are uses that were attained in the waters of the State on or after November 28, 1975; and potential beneficial uses are uses that would probably develop in future years through the implementation of various control measures. "Beneficial Uses" are equivalent to "Designated Uses" under federal law. [CWC section 13050(f)].

Bioaccumulate - The progressive accumulation of contaminants in the tissues of organisms through any route including respiration, ingestion, or direct contact with contaminated water, sediment, pore water, or dredged material to a higher concentration than in the surrounding environment. Bioaccumulation occurs with exposure and is independent of the tropic level.

Bioassessment - The use of biological community information to evaluate the biological integrity of a water body and its watershed. With respect to aquatic ecosystems, bioassessment is the collection and analysis of samples of the benthic macroinvertebrate community together with physical/habitat quality measurements associated with the sampling site and the watershed to evaluate the biological integrity of a water body.

Biological Integrity - Defined in Karr J.R. and D.R. Dudley. 1981. Ecological perspective on water quality goals. Environmental Management 5:55-68 as: "A balanced, integrated, adaptive community of organisms having a species composition, diversity, and functional organization comparable to that of natural habitat of the region." Also referred to as ecosystem health.

(BMP) Best Management Practices - Defined in 40 CFR 122.2 as schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the pollution of waters of the U.S. BMPs also include treatment requirements, operating procedures and practices to control plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage.

Clean Water Act Section 303(d) Impaired Water Body - An impaired water body in which water quality does not meet applicable water quality standards and/or is not expected to meet water quality standards, even after the application of technology based pollution controls required by the CWA.

Construction Site – Any project requiring a local grading or building permit, including projects requiring coverage under the General Construction Permit, that involves soil disturbing activities. Soil disturbing activities include clearing, grading, disturbances to ground such as stockpiling, and excavation.

Contamination - As defined in the Porter-Cologne Water Quality Control Act, contamination is "an impairment of the quality of waters of the State by waste to a degree which creates a hazard to the public health through poisoning or through the spread of disease. 'Contamination' includes any equivalent effect resulting from the disposal of waste whether or not waters of the State are affected."

CWA – Federal Clean Water Act

CWC – California Water Code

Designated Waste - A "nonhazardous waste which consists of pollutants which, under ambient environmental conditions at the waste management unit, could be released at concentrations in excess of applicable water quality objectives, or which could cause degradation of waters of the State" [CCR Title 27, chapter 3, subchapter 2, article 2, section 20210; CWC section 13173].

Development Projects - New development or redevelopment with land disturbing activities; structural development, including construction or installation of a building or structure, the creation of impervious surfaces; and land subdivision.

Dry Season – May 1 through September 30 of each year.

Effluent Limitations – any restriction imposed on quantities, discharge rates, and concentrations of pollutants, which are discharged from point sources into waters of the State.

Erosion – When land is diminished or worn away due to wind, water, or glacial ice. Often the eroded debris (silt or sediment) becomes a pollutant via storm water runoff. Erosion occurs naturally but can be intensified by land clearing activities such as farming, development, road building, and timber harvesting.

ESA (Environmentally Sensitive Area) – Areas "in which plant or animal life or their habitats are either rare or especially valuable because of their special nature or role in an ecosystem and which would easily be disturbed or degraded by human activities and developments" (California Public Resources Code section 30107.5). ESAs subject to urban runoff requirements include but are not limited to all CWA section 303(d) impaired water bodies, areas designated as Areas of Special Biological Significance by the SWRCB (Basin Plan); water bodies designated with the RARE beneficial use by the SWRCB (Basin Plan); areas within the Western Riverside County Multi-Species Habitat Conservation Plan (MSHCP) plan area that contain rare or especially valuable plant or animal life or their habitat; and any other equivalent environmentally sensitive areas which the Permittees have identified.

GIS – Geographic Information System

Grading - The cutting and/or filling of the land surface to a desired slope or elevation.

Hazardous Material – Any substance that poses a threat to human health or the environment due to its toxicity, corrosiveness, ignitability, explosive nature or chemical reactivity. These also include materials named by the EPA in 40 CFR 116 to be reported if a designated quantity of the material is spilled into the waters of the U.S. or emitted into the environment.

Hazardous Waste - Hazardous waste is defined as "any waste which, under Section 600 of Title 22 of this code, is required to be managed according to Chapter 30 of Division 4.5 of Title 22 of this code" [CCR Title 22, Division 4.5, Chapter 11, Article 1].

Household Hazardous Waste – Paints, cleaning products, and other wastes generated during home improvement or maintenance activities.

Illicit Connection – Any connection to the MS4 that conveys an illicit discharge.

Illicit Discharge - Any discharge to the MS4 that is not composed entirely of storm water except discharges pursuant to a NPDES permit and discharges resulting from fire fighting activities [40 CFR 122.26(b)(2)].

Inert Waste - Material that "does not contain hazardous waste or soluble pollutants at concentrations in excess of applicable water quality objectives, and does not contain significant quantities of decomposable waste" [CCR Title 27, Chapter 3, Subchapter 2, Article 2, Section 20230].

MEP (Maximum Extent Practicable) – The technology-based standard established by Congress in CWA section 402(p)(3)(B)(iii) that operators of MS4s must meet. Technology-based standards establish the level of pollutant reductions that dischargers must achieve, typically by treatment or by a combination of source control and treatment control BMPs. MEP generally emphasizes pollution prevention and source control BMPs primarily (as the first line of defense) <u>in combination</u> with treatment methods serving as a backup (additional line of defense). MEP considers economics and is generally, but not necessarily, less stringent than BAT. A definition for MEP is not provided either in the statute or in the regulations. Instead the definition of MEP is dynamic and will be defined by the following process over time: municipalities propose their definition of MEP by way of their SWMP. Their total collective and individual activities conducted pursuant to the SWMP becomes their proposal for MEP as it applies both to their overall effort, as well as to specific activities (e.g., MEP for street sweeping, or MEP for MS4 maintenance). In the absence of a proposal acceptable to the SDRWQCB, the SDRWQCB defines MEP.

In a memo dated February 11, 1993, entitled "Definition of Maximum Extent Practicable," Elizabeth Jennings, Senior Staff Counsel, SWRCB addressed the achievement of the MEP standard as follows:

> "*To achieve the MEP standard, municipalities must employ whatever Best Management Practices (BMPs) are technically feasible (i.e., are likely to be effective) and are not cost prohibitive. The major emphasis is on technical feasibility. Reducing pollutants to the MEP means choosing effective BMPs, and rejecting applicable BMPs only where other effective BMPs will serve the same purpose, or the BMPs would not be technically feasible, or the cost would be prohibitive. In selecting BMPs to achieve the MEP standard, the following factors may be useful to consider:*
>
> *a. Effectiveness: Will the BMPs address a pollutant (or pollutant source) of concern?*

b. *Regulatory Compliance: Is the BMP in compliance with storm water regulations as well as other environmental regulations?*
c. *Public Acceptance: Does the BMP have public support?*
d. *Cost: Will the cost of implementing the BMP have a reasonable relationship to the pollution control benefits to be achieved?*
e. *Technical Feasibility: Is the BMP technically feasible considering soils, geography, water resources, etc?*

The final determination regarding whether a municipality has reduced pollutants to the maximum extent practicable can only be made by the Regional or State Water Boards, and not by the municipal discharger. If a municipality reviews a lengthy menu of BMPs and chooses to select only a few of the least expensive, it is likely that MEP has not been met. On the other hand, if a municipal discharger employs all applicable BMPs except those where it can show that they are not technically feasible in the locality, or whose cost would exceed any benefit derived, it would have met the standard. Where a choice may be made between two BMPs that should provide generally comparable effectiveness, the discharger may choose the least expensive alternative and exclude the more expensive BMP. However, it would not be acceptable either to reject all BMPs that would address a pollutant source, or to pick a BMP base solely on cost, which would be clearly less effective. In selecting BMPs the municipality must make a serious attempt to comply and practical solutions may not be lightly rejected. In any case, the burden would be on the municipal discharger to show compliance with its permit. After selecting a menu of BMPs, it is the responsibility of the discharger to ensure that all BMPs are implemented."

MS4 (Municipal Separate Storm Sewer System) – A conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, or storm drains): (i) Owned or operated by a State, city town, borough, county, parish, district, association, or other public body (created by or pursuant to State law) having jurisdiction over disposal of sewage, industrial wastes, storm water, or other wastes, including special districts under State law such as a sewer district, flood control district or drainage district, or similar entity, or an Indian tribe or an authorized Indian tribal organization, or designated and approved management agency under section 208 of the CWA that discharges to waters of the United States; (ii) Designated or used for collecting or conveying storm water; (iii) Which is not a combined sewer; (iv) Which is not part of the Publicly Owned Treatment Works (POTW) as defined at 40 CFR 122.26.

NOI – Notice of Intent

Non-hazardous Solid Waste - All putrescible and nonputrescible solid, semi-sold, and liquid wastes, including garbage, trash, refuse, paper, rubbish, ashes, industrial wastes, demolition and construction wastes, abandoned vehicles and parts thereof, discarded home and industrial appliances, manure, vegetable or animal solid and semi-sold wastes and other discarded solid or semi-solid waste; provided that such wastes do not contain wastes which must be managed as hazardous wastes, or wastes which contain soluble pollutants in concentration which exceed applicable water quality objectives or could cause degradation of wasters of the state." [CCR Title 27, Chapter 3, Subchapter 2, Article 2, Section 20220]

Non-Storm Water - All discharges to and from a MS4 that do not originate from precipitation events (i.e., all discharges from a MS4 other than storm water). Non-storm water includes illicit discharges, non-prohibited discharges, and NPDES permitted discharges.

NPDES (National Pollution Discharge Elimination System) - The national program for issuing, modifying, revoking and reissuing, terminating, monitoring and enforcing permits, and imposing and enforcing pretreatment requirements, under Sections 307, 318, 402, and 405 of the CWA.

NPS (Nonpoint Source) – Diffuse, widespread sources of pollution. These sources may be large or small, but are generally numerous throughout a watershed. Non Point Sources include but are not limited to urban, agricultural, or industrial areas, roads, highways, construction sites, communities served by septic systems, recreational boating activities, timber harvesting, mining, livestock grazing, as well as physical changes to stream channels, and habitat degradation. NPS pollution can occur year round any time rainfall, snowmelt, irrigation, or any other source of water runs over land or through the ground, picks up pollutants from these numerous, diffuse sources and deposits them into rivers, lakes, and coastal waters or introduces them into ground water.

Nuisance - As defined in the Porter-Cologne Water Quality Control Act a nuisance is "anything which meets all of the following requirements: 1) Is injurious to health, or is indecent, or offensive to the senses, or an obstruction to the free use of property, so as to interfere with the comfortable enjoyment of life or property. 2) Affects at the same time an entire community or neighborhood, or any considerable number of persons, although the extent of the annoyance or damage inflicted upon individuals may be unequal. 3) Occurs during, or as a result of, the treatment or disposal of wastes."

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Person - A person is defined as an individual, association, partnership, corporation, municipality, State or Federal agency, or an agent or employee thereof [40 CFR 122.2].

Point Source - Any discernible, confined, and discrete conveyance, including, but not limited to, any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operations, landfill leachate collection systems, vessel, or other floating craft from which pollutants are or may be discharged. This term does not include return flows from irrigated agriculture or agricultural storm water runoff.

Pollutant - Any agent that may cause or contribute to the degradation of water quality such that a condition of pollution or contamination is created or aggravated.

Pollution - As defined in the Porter-Cologne Water Quality Control Act: "the alteration of the quality of the waters of the State by waste, to a degree that unreasonably affects the either of the following: 1) The waters for beneficial uses; or 2) Facilities that serve these beneficial uses." Pollution may include contamination.

Pollutants of Concern – All pollutants for which water bodies are listed as impaired under CWA section 303(d), all pollutants associated with the land use type of a development, and all pollutants commonly associated with urban runoff. Pollutants commonly associated with urban runoff include total suspended solids; sediment; pathogens (e.g., bacteria, viruses, protozoa); heavy metals (e.g., copper, lead, zinc, and cadmium); petroleum products and polynuclear aromatic hydrocarbons; synthetic organics (e.g., pesticides, herbicides, and PCBs); nutrients (e.g., nitrogen and phosphorus fertilizers); oxygen-demanding substances (decaying vegetation, animal waste, and anthropogenic litter).

Pollution Prevention - Pollution prevention is defined as practices and processes that reduce or eliminate the generation of pollutants, in contrast to source control BMPs, treatment control BMPs, or disposal.

Post-Construction BMPs - A subset of BMPs including structural and non-structural controls which detain, retain, filter, or educate to prevent the release of pollutants to surface waters during the final functional life of developments.

Principal Permittee – Riverside County Flood Control and Water Conservation District

Priority Development Projects – New development and redevelopment projects listed in Requirement F.2.b.(1) of tentative Order No. R9-2004-001.

Receiving Waters – Waters of the U.S.

RWLs (Receiving Water Limitations) - Waste discharge requirements issued by the SDRWQCB typically include both: (1) "Effluent Limitations" (or "Discharge Limitations") that specify the technology-based or water-quality-based effluent limitations; and (2) "Receiving Water Limitations" that specify the water quality objectives in the Basin Plan as well as any other limitations necessary to attain those objectives. In summary, the "Receiving Water Limitations" provision is the provision used to implement the requirement of CWA section 301(b)(1)(C) that NPDES permits must include any more stringent limitations necessary to meet water quality standards.

Sediment - Soil, sand, and minerals washed from land into water. Sediment resulting from anthropogenic sources (i.e. human induced land disturbance activities) is considered a pollutant. This Order regulates only the discharges of sediment from anthropogenic sources and does not regulate naturally occurring sources of sediment. Sediment can destroy fish-nesting areas, clog animal habitats, and cloud waters so that sunlight does not reach aquatic plants.

Shared Treatment BMP - BMPs used by multiple developments to infiltrate, filter, or treat the required volume or flow prior to discharge to a receiving water. This could include, for example, a treatment BMP at the end of an enclosed storm drain that collects runoff from several commercial developments.

Source Control BMP – Land use or site planning practices, or structural or nonstructural measures that aim to prevent urban runoff pollution by reducing the potential for contamination at the source of pollution. Source control BMPs minimize the contact between pollutants and urban runoff.

Storm Water – Per 40 CFR 122.26(b)(13), means storm water runoff, snowmelt runoff and surface runoff and drainage.

SUSMP (Standard Urban Storm Water Mitigation Plan) – A plan developed to mitigate the impacts of urban runoff from Priority Development Projects in accordance with Requirement F.2.b. of tentative Order No. R9-2004-001.

SWMP (Storm Water Management Plan) – A written description of the specific urban runoff management measures and programs that each Permittee will implement to reduce the discharge of pollutants in urban runoff to the MEP and to comply with Order No. R9-2004-001.

TMDL (Total Maximum Daily Load) - The maximum amount of a pollutant that can be discharged into a water body from all sources (point and non-point) and still maintain water quality standards. Under CWA section 303(d), TMDLs must be developed for all water bodies that do not meet water quality standards after application of technology-based controls.

Toxicity - Adverse responses of organisms to chemicals or physical agents ranging from mortality to physiological responses such as impaired reproduction or growth anomalies). The water quality objectives

for toxicity provided in the Basin Plan state in part... *"All waters shall be free of toxic substances in concentrations that are toxic to, or that produce detrimental physiological responses in human, plant, animal, or aquatic life... The survival of aquatic life in surface waters subjected to a waste discharge or other controllable water quality factors, shall not be less than that for the same water body in areas unaffected by the waste discharge."*

Treatment Control BMP – Any engineered system designed to remove pollutants by simple gravity settling of particulate pollutants, filtration, biological uptake, media absorption or any other physical, biological, or chemical process.

Urban Runoff - All flows in a storm water conveyance system and consists of the following components: (1) storm water (wet weather flows) and (2) non-storm water illicit discharges (dry weather flows).

Waste - As defined in CWC Section 13050(d), "waste includes sewage and any and all other waste substances, liquid, solid, gaseous, or radioactive, associated with human habitation, or of human or animal origin, or from any producing, manufacturing, or processing operation, including waste placed within containers of whatever nature prior to, and for purposes of, disposal."

Article 2 of CCR Title 23, Chapter 15 (Chapter 15) contains a waste classification system that applies to solid and semi-solid waste, which cannot be discharged directly or indirectly to water of the state and which therefore must be discharged to land for treatment, storage, or disposal in accordance with Chapter 15. There are four classifications of waste (listed in order of highest to lowest threat to water quality): hazardous waste, designated waste, non-hazardous solid waste, and inert waste.

Water Quality Objective - Numerical or narrative limits on constituents or characteristics of water designated to protect designated beneficial uses of the water. [CWC section 13050 (h)]. California's water quality objectives are established by the SWRCB and RWQCBs in the Water Quality Control Plans.

Water Quality Standards - The beneficial uses (e.g., swimming, fishing, municipal drinking water supply, etc.,) of water and the water quality objectives necessary to protect those uses.

Waters of the State - Any water, surface or underground, including saline waters within the boundaries of the State [CWC section 13050 (e)]. The definition of the Waters of the State is broader than that for the Waters of the United States in that all water in the State is considered to be a Waters of the State regardless of circumstances or condition. Under this definition, a MS4 is always considered to be a Waters of the State.

Waters of the United States - As defined in 40 CFR 122.2, the Waters of the U.S. are defined as: **"(a) All waters, which are currently used, were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide;** (b) All interstate waters, including interstate "wetlands;" (c) All other waters such as intrastate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, "wetlands," sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds the use, degradation or destruction of which would affect or could affect interstate or foreign commerce including any such waters: (1) Which are or could be used by interstate or foreign travelers for recreational or other purposes; (2) From which fish or shellfish are or could be taken and sold in interstate or foreign commerce; or (3) Which are used or could be used for industrial purposes by industries in interstate commerce; (d) All impoundments of waters otherwise defined as waters of the United States under this definition**: (e) Tributaries of waters identified in paragraphs (a) through (d) of this definition;** (f) The territorial seas; and (g) "Wetlands" adjacent to waters (other than waters that are themselves wetlands) identified in paragraphs (a) through (f) of this

definition. Waters of the United States do not include prior converted cropland. Notwithstanding the determination of an area's status as prior converted cropland by any other federal agency, for the purposes of the CWA, the final authority regarding CWA jurisdiction remains with the EPA."

Watershed - That geographical area which drains to a specified point on a water course, usually a confluence of streams or rivers (also known as drainage area, catchment, or river basin).

WDRs – Waste Discharge Requirements

Wet Season – October 1 through April 30 of each year.

ATTACHMENT D

INDIVIDUAL SWMP CONTENTS

Pursuant to Requirement E.1.a. of tentative Order No. R9-2004-001, each Permittee shall develop an Individual SWMP that describes their specific urban runoff management programs and activities that will be implemented to comply with the Order. An individual SWMP that addresses the items listed below would provide a complete description of the programs and activities the Permittee plans to implement to comply with the Order and to reduce pollutants in urban runoff to the MEP. In the event that a specific component is not applicable to a Permittee, the Permittee shall provide an explanation of non-applicable programs with the SWMP submittal and does not need to provide the information requested below in that particular section of their Individual SWMP.

1. Administrative and Legal Procedures

a) Identification of all departments within the jurisdiction that conduct urban runoff related activities, and their roles and responsibilities under the Order. Include an up-to-date organizational chart specifying these departments and key personnel;

b) Citation of urban runoff related ordinances and the reasons they are enforceable;

c) Identification of the local administrative and legal procedures available to mandate compliance with urban runoff related ordinances and therefore with the conditions of the Order;

d) Description of how these ordinances are implemented and appealed; and

e) Description of whether the Permittee can issue administrative orders and injunctions or if it must go through the court system for enforcement actions.

2. Development Planning (Section F)

a) A description of the water quality and watershed protection principles that have been or will be included in the Permittee's General plan, and a time schedule where modifications are planned, if applicable;

b) A description of the development project approval process and how it ensures that urban runoff from new development and redevelopment will be reduced to the MEP, that post-development runoff volumes and velocities will be controlled, and that water quality objectives will not be violated throughout the life of the project;

c) A final SUSMP document that meets the requirements specified in Section F.2.b. of the Order, and a copy of the ordinance (amended or new) that gives the Permittee the authority to implement and enforce the SUSMP. The SUSMP may be submitted under separate cover as an attachment to the SWMP;

d) A description of the Permittee's current environmental review process and how it addresses impacts to water quality and appropriate mitigation measures. If the Permittee plans to modify the process during the permit term, a time schedule for modifications shall be included;

e) A description of education efforts related to development and how they will be implemented; and

f) A description of the measurable goals that will be used to assess the effectiveness of this program component.

3. Construction Component (Section G)

a) A description of which pollution prevention methods will be required for implementation, and the steps that will be taken to ensure implementation;

b) Updated grading ordinances, including adequate enforcement mechanisms;

c) A description of the modified construction and grading approval process;

d) Updated construction and grading project requirements in local grading and construction permits;

e) A completed inventory of all construction sites;

f) A list and description of minimum BMPs that will be implemented, or required to be implemented;

g) A description of the steps that will be taken to ensure the implementation of prescribed BMPs at all construction sites;

h) A description of planned inspection frequencies;

i) A description of inspection procedures;

j) A description of enforcement mechanisms and steps that will be used;

k) A description of the construction education program and how it will be implemented; and

l) A description of the measurable goals that will be used to assess the effectiveness of this program component.

4. Municipal Component (Section H.1)

a) A description of which pollution prevention methods will be required for implementation, and the steps taken to ensure implementation;

b) A completed inventory of all municipal facilities and activities;

c) A description of which BMPs will be implemented, or required to be implemented, for municipal facilities and activities;

d) A description of steps that will be taken to ensure the implementation of prescribed BMPs at municipal facilities and activities;

e) A description of municipal maintenance activities and schedules;

f) A description of the management strategy for pesticides, herbicides, and fertilizer use;

g) A description of inspection procedures;

h) A description of enforcement mechanisms and how they will be used; and

i) A description of the measurable goals that will be used to assess the effectiveness of this program component.

5. Industrial/Commercial Facilities Component (Section H.2)

a) A description of which pollution prevention methods will be required for implementation, and the steps that will be taken to ensure implementation;

b) A completed and prioritized inventory of all industrial/commercial facilities that could contribute a significant pollutant load to the MS4;

c) A list of minimum BMPs that will be implemented, or required to be implemented, for each facility type or pollutant-generating activity;

d) A description of the steps that will be taken to ensure the implementation of prescribed BMPs at industrial/commercial facilities, including notification procedures;

e) A description of inspection procedures;

f) A description of enforcement mechanisms and how they will be used;

g) A description of training efforts; and

h) A description of the measurable goals that will be used to assess the effectiveness of this program component.

6. Residential Component (Section H.3)

a) A description of which pollution prevention methods will be encouraged for implementation, and the steps that will be taken to encourage implementation;

b) A list of residential activities that have been identified as high priority;

c) A list of minimum BMPs that will be implemented, or required to be implemented, for high priority residential activities;

d) A description of the steps that will be taken to ensure the implementation of prescribed BMPs for high priority residential activities;

e) A description of enforcement mechanisms and how they will be used; and

f) A description of the measurable goals that will be used to assess the effectiveness of this program component.

7. Education Component (Section I)

a) A description of the content, form, and frequency of education efforts for each target community; and

b) A description of the measurable goals that will be used to assess the effectiveness of the public education program.

8. Illicit Discharge Detection and Elimination Component (Section J)

a) A description of the program to actively seek and eliminate illicit discharges and illicit connections;

b) An Illicit Discharge Monitoring Program, in accordance with the Monitoring and Reporting Program, to be conducted to detect illicit discharges and illicit connections;

c) A description of investigation and inspection procedures to follow up on dry weather monitoring results or other information which indicate potential for illicit discharges and illicit connections;

d) A description of procedures to promptly eliminate detected illicit discharges and illicit connections;

e) A description of enforcement mechanisms and how they will be used;

f) A description of the mechanism to receive notification of spills;

g) A description of efforts to facilitate public reporting of illicit discharges and connections, including a public hotline;

h) A description of efforts to facilitate proper disposal of used oil and other toxic materials; and

i) A description of measurable goals that will be used to assess the effectiveness of this program component.

9. Public Participation Component (Section E.3)

A description of how public participation will be included in the development and implementation of each Permittee's Individual SWMP.

10. Assessment of Individual SWMP Effectiveness Component

As part of its Individual SWMP, each Permittee shall develop a long-term strategy for assessing the effectiveness of its Individual SWMP. The long-term assessment strategy shall, at a minimum, include the following:

a) An assessment of the progress towards meeting the measurable goals identified in each program component;

b) An assessment of Illicit Discharge and Receiving Water monitoring data; and

c) An assessment of overall program effectiveness.

11. Fiscal Analysis Component

Each Permittee shall secure the resources necessary to meet the requirements of the Order. As part of its Individual SWMP, each Permittee shall describe and analyze the capital and operation and maintenance expenditures necessary to accomplish the activities required in the Order, and a description of the source of funds the Permittee proposes to use to meet those expenditures.

12. Fire Fighting

A description of a program to reduce pollutants from non-emergency fire fighting flows identified by the Permittee to be significant sources of pollutants.

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN DIEGO REGION
MONITORING AND REPORTING PROGRAM No. R9-2004-001
NPDES PERMIT No. CAS0108766
FOR THE DISCHARGES OF URBAN RUNOFF FROM THE MUNICIPAL SEPARATE STORM SEWER SYSTEMS (MS4s) DRAINING THE COUNTY OF RIVERSIDE, THE CITY OF MURRIETA, THE CITY OF TEMECULA AND THE RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT WITHIN THE SANTA MARGARITA WATERSHED IN THE SAN DIEGO REGION

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I. PURPOSE

This Monitoring and Reporting Program (MRP) is intended to meet the following goals:

1. Assess compliance with Order No. R9-2004-001;
2. Measure and improve the effectiveness of the SWMPs;
3. Assess the chemical, physical, and biological impacts of receiving waters resulting from urban runoff;
4. Characterize urban runoff discharges;
5. Identify sources of specific pollutants;
6. Prioritize drainage and sub-drainage areas that need management actions;
7. Detect and eliminate illicit discharges and illicit connections to the MS4; and
8. Assess the overall health of receiving waters.

II. MONITORING PROGRAM

The Monitoring Program consists of the Receiving Waters Monitoring, Illicit Discharge Monitoring, Monitoring Provisions, and the program assessments required under Section III.B of this MRP. All monitoring program components shall be implemented no later than October 2004, unless otherwise specified herein.

A. Receiving Waters Monitoring

The Receiving Waters Monitoring consists of: 1) **Core Monitoring** requirements to address on-going, site-specific needs, such as estimating pollutant loads and assessing trends; 2) **Regional Monitoring** to address watershed-wide issues; and 3) **Special Studies** to address specific research or management issues.

A.I Core Monitoring

In order to achieve the above goals, the triad[1] and tributary Core Monitoring requirements are intended to generate water quality data that will build upon existing data to begin answering the following management questions:

- Are conditions in receiving waters protective, or likely to be protective, of beneficial uses?
- What is the extent and magnitude of the current or potential receiving water problems?
- What is the relative urban runoff contribution to the receiving water problem(s)?
- What are the sources of urban runoff that contribute to receiving water problem(s)?
- Are conditions in receiving waters getting better or worse?

1. Mass Loadings

   a) The Permittees shall monitor mass loadings from the following three triad stations. Alternative locations representative of urban/urbanizing drainage areas may be selected.

      (1) Lower Temecula Creek;

      (2) Lower Murrieta Creek @ USGS Weir; and

      (3) A reference station representative of natural, undeveloped conditions. Permittees shall evaluate the reference station annually for suitability and select new reference stations as needed.

[1] Triad means a station where chemical, toxicity, and bioassessment monitoring occur.

b) At each triad station, the Permittees shall monitor the first storm event of each monitoring year[2] that produces sufficient flow to collect a composite sample, and a minimum of two additional storm events during each monitoring year.

c) In the event that the required number of storm events are not sampled during one monitoring year at any given station, the Permitees shall submit, with the subsequent Annual Report, a written explanation for a lack of sampling data, including streamflow data from the nearest USGS gauging station.

d) In addition to the storm events, the Permittees shall analyze a minimum of two dry weather samples from each triad station per monitoring year. If flow is insufficient to collect a sample, this shall be documented in the subsequent annual report.

e) Sampling at triad stations shall begin no later than the first storm after October 2004 that produces sufficient flow to collect a composite sample.

f) Mass loading sampling and analysis protocols shall be consistent with 40 CFR 122.21(g)(7)(ii) and with the EPA Storm Water Sampling Guidance Document (EPA 833-B-92-001). Storm water samples shall be flow-weighted composites[3], collected during the first 3 hours of flow, or for the duration of the storm if it is less than 3 hours. A minimum of 3 sample aliquots, separated by a minimum of 15 minutes, shall be taken within each hour of discharge, unless the SDRWQCB Executive Officer approves an alternate protocol. Automatic samplers are recommended, but manual samples may be collected from mass loading stations where it is not feasible to install an automatic sampler. Grab samples[4] shall be taken for pathogen indicators and oil and grease. Grab samples are acceptable for dry weather sample collection.

g) Permittees shall measure or estimate flow rates and volumes for each triad sampling event in order to determine mass loadings of pollutants. Data from nearby USGS gauging stations may be utilized, or flow rates may be estimated in accordance with the EPA Storm Water Sampling Guidance Document (EPA-833-B-92-001), Section 3.2.1.

h) At triad stations, the first storm of every sampling year shall be analyzed for the full EPA priority pollutant list (40 CFR 122, Appendix D). For the remaining sampling events, analysis may be reduced to the constituents listed in Table below, unless data from the first storm indicate the need for additional constituents.

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[2] A monitoring year is from July 1 through June 30.
[3] A flow-weighted composite sample is a mixed or combined sample that is formed by combining a series of individual and discrete samples of specific volume in proportion to flow.
[4] A grab sample is a discrete, individual sample taken within a short period of time (usually less than 15 minutes).

Table 1. Short List of Constituents	
Trace Metals	**Pesticides**
Total Cadmium	Diazinon
Total Chromium	chlorpyrifos
Total Copper	Other OP pesticides
Total Nickel	
Total Lead	**Conventionals**
Total Zinc	Temperature
Nutrients	pH
Ammonia (NH_3)	Hardness
Total Kjeldahl Nitrogen (TKN)	Specific conductance
Nitrate (NO_3)	Dissolved oxygen
Total phosphorus	MBAS
Bacteria	**PAHs**
Total coliform	
Fecal coliform	**Volatiles** (dry weather only)
E. coli	
	Total suspended solids

2. Water Column Toxicity Testing

The Permittees shall conduct toxicity testing at triad stations to evaluate the extent and causes of toxicity in receiving waters.

a) The Permittees shall analyze all storm samples (at least three annually) collected at the three triad stations for toxicity. The Permittees shall conduct toxicity testing using the following three species and EPA protocol for each sample:

- *Ceriodaphnia dubia* (water flea) – EPA-821-R-02-012 or EPA-821-R-02-013;
- *Hyalella azteca* (freshwater amphipod) – EPA-821-R-02-012; and
- *Pseudokirchneriella subcapitata*, formally known as *Selenastrum capricornutum*, (unicellular algae) – EPA-821-R-02-013.

b) The presence of acute toxicity shall be determined in accordance with EPA protocol (EPA-821-R-02-012). The presence of chronic toxicity shall be determined in accordance with EPA protocol (EPA-821-R-02-013).

3. Bioassessment

The Permittees shall conduct bioassessment monitoring at the three triad stations to evaluate the biological integrity of receiving waters, to detect biological responses to pollutants in urban runoff, and to identify probable causes of impairment not detected by chemical and toxicity monitoring. The program required in this section replaces the program currently being conducted by the Permittees under CWC section 13225 Directive for Assessing Water Quality Impacts of Urban Runoff in the Santa Margarita Watershed, issued by the SDRWQCB on March 6, 2003. Bioassessment monitoring shall include the following:

a) Each bioassessment station shall be monitored twice annually, in May and October of each year. A minimum of three replicate samples shall be collected at each station during each sampling event.

b) Sampling, laboratory, quality assurance, and analysis procedures shall follow the standardized procedures set forth in the California Department of Fish and Game's California Stream Bioassessment Procedure (CSBP)[5]. Analysis procedures shall include comparison between station mean values for various biological metrics and the Preliminary San Diego Index of Biotic Integrity (IBI)[6], or any subsequently developed applicable IBI. Sampling, laboratory, quality assurance, and analytical procedures shall follow the standardized "Non-Point Source Bioassessment Sampling Procedures" for professional bioassessment set forth in the CSBP. In the event that the CSBP "Point-Source Professional Bioassessment Procedure" is performed in place of the "Non Point Source Bioassessment Sampling Procedure," justification and documentation of the procedure shall be submitted with the annual monitoring report.

c) A professional environmental laboratory shall perform all sampling, laboratory, quality assurance, and analytical procedures. Permittee staff trained in CSBP methods may collect samples, but data collected by volunteer monitoring organizations shall not be submitted in place of professional assessments.

4. Follow-up Analysis and Actions Based on Triad Approach

When results from the chemistry, toxicity, and bioassessment monitoring described above indicate urban runoff-induced degradation, Permittees shall evaluate the extent and causes of urban runoff pollution in receiving waters and prioritize management actions to eliminate or reduce sources. Toxicity Identification Evaluations (TIEs) shall be used to determine the cause of toxicity, and Toxicity Reduction Evaluations (TRE) shall be used to identify sources and implement management actions to reduce pollutants in urban runoff causing toxicity. Permittees shall conduct TIE(s) and TRE(s) based on Table 2 below.

[5] California Stream Bioassessment Procedure (Protocol Brief for Biological and Physical/Habitat Assessment in Wadeable Streams), California Department of Fish and Game – Aquatic Bioassessment Laboratory, May 1999.
[6] This document can be downloaded from http://www.swrcb.ca.gov/rwqcb9/programs/bioassessment.html

Table 2. Triad Approach to Determining Follow-Up Actions

	Chemistry	Toxicity	Bioassessment	Action
1.	Persistent[7] exceedance of water quality objectives	Evidence of toxicity[8]	Indications of benthic alteration[9]	Conduct TIE to identify contaminants of concern, based on TIE metric, initiate TRE
2.	No persistent exceedances of water quality objectives	No evidence of toxicity	No indications of benthic alteration	No action necessary
3.	Persistent exceedance of water quality objectives	No evidence of toxicity	No indications of benthic alteration	Assess possible upstream sources causing exceedances
4.	No persistent exceedances of water quality objectives	Evidence of toxicity	No indications of benthic alteration	Conduct TIE to identify contaminants of concern, based on TIE metric, initiate TRE
5.	No persistent exceedances of water quality objectives	No evidence of toxicity	Indications of benthic alteration	No action necessary due to toxic chemicals Initiate TRE for physical sources of benthic alteration
6.	Persistent exceedance of water quality objective	Evidence of toxicity	No indications of benthic alteration	If chemical and toxicity tests indicate persistent degradation, conduct TIE to identify contaminants of concern, based on TIE metric, initiate TRE
7.	No persistent exceedances of water quality objectives	Evidence of toxicity	Indications of benthic alteration	Conduct TIE to identify contaminants of concern, based on TIE metric, initiate TRE
8.	Persistent exceedance of water quality objectives	No evidence of toxicity	Indications of benthic alteration	Initiate upstream source identification

[7] Persistent exceedance shall mean the exceedance of relevant Basin Plan or California Toxics Rule objectives by 20% for 3 sampling events.
[8] Evidence of toxicity shall mean a high score, in relation to other stations, on metric that combines magnitude and persistence of toxicity over an entire year.
[9] Indications of benthic alteration shall mean an IBI score of Fair, Poor, or Very Poor.

a) Toxicity Identification Evaluations (TIE)

The goal of a TIE is to identify the pollutant(s) causing toxicity in the receiving waters.

(1) Permittees shall conduct Phase I TIEs in accordance with Table 2 above. Permittees shall use EPA protocol described in *Methods for Aquatic Toxicity Identification Evaluations: Phase I Toxicity Characterization Procedures* (EPA/600/6-91/003) or subsequent editions.

(2) If the Phase I TIE is not sufficient to identify the toxicant(s), a Phase II TIE may be required in order to identify or confirm the identity of the pollutants causing toxicity. Phase II TIEs shall be conducted in accordance with Methods for Aquatic Toxicity Identification Evaluations: Phase II Toxicity Identification Procedures for Samples Exhibiting Acute and Chronic Toxicity (EPA/600/R-92/080), or subsequent editions.

(3) In the event that the pollutant causing toxicity has been sufficiently identified through previous TIEs or corresponding chemical monitoring data, a TIE may not need to be conducted.

b) Toxicity Reduction Evaluations (TRE)

The purpose of a TRE is to investigate the cause of and to identify corrective actions to eliminate toxicity from urban runoff in receiving waters.

When a TIE identifies a pollutant(s) associated with urban runoff as a cause of toxicity, Permittees shall initiate a TRE immediately. The TRE shall include all reasonable steps to identify the source(s) of toxicity and propose appropriate BMPs to eliminate the causes of toxicity. Once the source of toxicity and appropriate BMPs are identified, the Permittees shall submit the TRE to the SDRWQCB for review. Within 30 days following the approval by the SDRWQCB, Permittees shall revise their SWMPs to incorporate the modified BMPs that will be implemented. At a minimum, a TRE shall include a discussion of the following items:

(1) The potential sources of pollutant(s) causing toxicity;

(2) A list of municipalities and other entities that may have jurisdiction over sources of pollutant(s) causing toxicity; and

(3) Proposed actions that will be taken to reduce the pollutants causing toxicity and methods to measure the effectives of those actions.

5. Tributary Monitoring

a) The Permittees shall collect a grab sample from the first storm event of each monitoring year, a minimum of one additional storm event, and two dry weather events during each monitoring year at the following four tributary stations to help identify sources of pollutants. Alternative locations representative of urban/urbanizing drainage areas may be selected.

(1) Warm Springs Creek, near the confluence with Murrieta Creek;

(2) Santa Gertudis Creek, near the confluence with Murrieta Creek;

(3) Long Canyon Creek near the confluence with Murrieta Creek; and

(4) Redhawk Channel, near the confluence with Temecula Creek

b) If flow is insufficient to collect a sample, this shall be documented in the subsequent annual report.

c) Tributary samples shall be analyzed for constituents of concern. Constituents of concern shall be determined based on exceedances of water quality objectives at respective triad and dry weather monitoring stations, as well as land uses in the area.

d) Sampling at tributary stations shall begin no later than the first storm after October 2004.

A.II Regional Monitoring

The Permittees shall participate and coordinate with federal, state, and local agencies and other dischargers in the Santa Margarita Watershed in development and implementation of a regional watershed monitoring program as directed by the Executive Officer. The intent of a regional monitoring program is to maximize the efforts of all monitoring partners using a more cost-effective monitoring design and to best utilize the pooled resources of the watershed. During a coordinated watershed sampling effort, the Permittees' sampling and analytical effort may be reallocated to provide a regional assessment of the impact of discharges to the watershed.

A.III Special Studies

Special studies are intended to address specific research or management issues that are not addressed by the routine core monitoring program. The Permittees' shall conduct special studies as directed by the Executive Officer, including the study described below.

Numeric Criteria to Control Runoff from New Developments

The Permittees shall develop and implement a study to determine numeric criteria for controlling the volume, velocity, duration, and peak discharge rate of runoff from new developments (required in section F.2.b(9) of Order No. 2004-001) to minimize erosion of natural stream channels and impacts to instream habitat. The Permittees shall propose numeric criteria and a time-schedule for implementation of the criteria on Priority Development Projects within 365 days of the identification of the criteria and no later than the fourth-year Annual Report, or the application for permit renewal. In each Annual Report, the Permittees shall describe the status of this special study, details of implementation, and progress towards the development of numeric criteria. Permittees may satisfy this requirement if they can demonstrate to the SDRWQCB that criteria developed in other areas of Southern California are applicable to and protective of the conditions in the Upper Santa Margarita Watershed. This should be accomplished through demonstrating similarities in areas monitored as part of studies outside of the Santa Margarita Watershed.

B. Illicit Discharge Monitoring

Each Permittee shall develop and implement an Illicit Discharge Monitoring program that meets or exceeds the requirements of this section within 365 days of the adoption of Order No. R9-2004-001. Each Permittees' program shall be designed to emphasize frequent, geographically widespread inspections, monitoring, and follow-up investigations to detect illicit discharges and connections. Each Permittees' Illicit Discharge Monitoring Program shall be described in the Individual SWMP.

1. Station Location

   a) Each Permittee shall select Illicit Discharge Monitoring stations within its jurisdiction. The number of stations shall be sufficient to represent the MS4 and detect illicit discharges that may occur throughout the system. Stations shall be accessible points in the MS4 (i.e., outfalls, manholes or open channels) located downstream of potential sources of illicit discharges (i.e., commercial, industrial, and residential areas). Permittees shall use the MS4 map, developed pursuant to section J.2 of Order No. R9-2004-001, to help locate dry weather monitoring stations and to determine the number necessary to adequately represent the entire MS4. Each identified station shall be inspected at least twice between May 1st and September 30th of each year, and more frequently if the Permittee determines necessary to comply with section J of Order No. R9-2004-001.

   b) In addition to the stations required in section B.1.a. above, each Permittee shall inspect all other dry weather flows that are observed or reported.

2. Illicit Discharge Monitoring Methods

   a) At each inspected site, Permittees shall record the following general information:
      - Time since last rain;
      - Quantity of last rain;
      - Site descriptions (i.e., conveyance type, dominant land uses in drainage area);
      - Flow estimation (i.e., width of surface, approximate depth of water, approximate flow velocity, flow rate); and
      - Visual observations (e.g., odor, color, clarity, floatables, deposits/stains, oil sheen, surface scum, vegetation condition, structural condition, and biology).

   b) If flow or ponded water is observed at a station and there has been at least seventy-two hours of dry weather, a field screening analysis using suitable methods to estimate the following constituents shall be conducted:

      (1) Specific conductance (or calculate estimated Total Dissolved Solids);
      (2) Turbidity;
      (3) PH;
      (4) Temperature; and
      (5) Dissolved Oxygen.

   c) If field screening analysis or visual observations at a site indicate a potential illicit discharge, a sample shall be collected for laboratory analysis. At a minimum, samples shall be analyzed at a laboratory for the following constituents:

      (1) Total hardness;

(2) Oil and grease;
(3) Ammonia Nitrogen;
(4) Total phosphorus;
(5) Copper (total and dissolved);
(6) Surfactants (MBAS);
(7) Diazinon and Chlorpyrifos;
(8) Lead (dissolved);
(9) Nitrate Nitrogen;
(10) E. coli;
(11) Total coliform; and
(12) Fecal coliform.

3. As part of the Illicit Discharge Monitoring Program, the Permittees shall develop numeric criteria for field screening and analytical monitoring results that will trigger follow-up investigations to identify the source causing the exceedance of the criteria. In the event of an exceedance of the criteria, Permittees shall implement the follow-up investigation procedures developed pursuant to section J.4 of Order No. R9-2004-001.

C. Monitoring Provisions

All monitoring activities shall meet the following requirements:

a) Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity [40 CFR 122.41(j)(1)].

b) The Permittees shall retain records of all monitoring information, including all calibration and maintenance of monitoring instrumentation, copies of all reports required by this Order, and records of all data used to complete the Report of Waste Discharge and application for this Order, for a period of at least five (5) years from the date of the sample, measurement, report, or application. This period may be extended by request of the SDRWQCB or EPA at any time and shall be extended during the course of any unresolved litigation regarding this discharge. [40 CFR 122.41(j)(2), CWC section 13383(a)]

c) Records of monitoring information shall include [40 CFR 122.41(j)(3)]:

(1) The date, exact place, and time of sampling or measurements;
(2) The individual(s) who performed the sampling or measurements;
(3) The date(s) analyses were performed;
(4) The individual(s) who performed the analyses;
(5) The analytical techniques or methods used; and,
(6) The results of such analyses.

d) All sampling, sample preservation, and analyses must be conducted according to test procedures approved under 40 CFR part 136, unless other test procedures have been specified in this MRP or approved by the Executive Officer [40 CFR 122.41(j)(4)].

e) Where procedures are not otherwise specified in this MRP, sampling, analysis and quality assurance/quality control must be conducted in accordance with the Quality Assurance Program Plan (QAPP) for the State of California's Surface Water Ambient Monitoring Program, adopted

by the State Water Resources Control Board (SWRCB). The QAPP can be downloaded from the SWRCB web page at: http://www.swrcb.ca.gov/swamp/docs/swamp_qapp.pdf.

f) The CWA provides that any person who falsifies, tampers with, or knowingly renders inaccurate any monitoring device or method required to be maintained under this Order shall, upon conviction, be punished by a fine of not more than $10,000, or by imprisonment for not more than two years, or both. If a conviction of a person is for a violation committed after a first conviction of such person under this paragraph, punishment is a fine of not more than $20,000 per day of violation, or by imprisonment of not more than four years, or both. [40 CFR 122.41(j)(5)]

g) Calculations for all limitations which require averaging of measurements shall utilize an arithmetic mean unless otherwise specified in this MRP [40 CFR 122.41(l)(4)(iii)].

h) All chemical, bacteriological, and toxicity analyses shall be conducted at a laboratory certified for such analyses by the California Department of Health Services or a laboratory approved by the Executive Officer.

i) For priority toxic pollutants that are identified in the California Toxics Rule (CTR) (65 *Fed. Reg.* 31682), the Permittees shall instruct its laboratories to establish calibration standards that are equivalent to or lower than the Minimum Levels (MLs) published in Appendix 4 of the Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California (SIP). If a Permittee can demonstrate that a particular ML is not attainable, in accordance with procedures set forth in 40 CFR 136, the lowest quantifiable concentration of the lowest calibration standard analyzed by a specific analytical procedure (assuming that all the method specified sample weights, volumes, and processing steps have been followed) may be used instead of the ML listed in Appendix 4 of the SIP. The Permittee must submit documentation from the laboratory to the SDRWQCB for approval prior to raising the ML for any priority toxic pollutant.

j) The SDRWQCB Executive Officer or the SDRWQCB may make revisions to this MRP at any time during the term of Order No R9-2004-001, and may include a reduction or increase in the number of parameters to be monitored, locations monitored, the frequency of monitoring, or the number and size of samples collected.

III. REPORTING PROGRAM

A. SWMP Reporting Requirements

The Principal Permittee shall submit a SWMP Annual Report to the SDRWQCB on or before October 31 annually. The reporting period for these annual reports shall be the previous fiscal year. For example, the report submitted on or before October 31, 2005 shall cover the reporting period July 1, 2004 to June 30, 2005. The SWMP Annual Report shall contain the Watershed Annual Report, and the four Individual Annual Reports.

1. **Individual Annual Report** - Each Individual Annual Report shall be a documentation of the activities conducted by each Permittee during the previous annual reporting period. Each Permittee shall submit their Individual Annual Report to the Principal Permittee by a date determined by the Principal Permittee for inclusion in the SWMP Annual Report. Each Individual Annual Report shall, at a minimum, contain the following:

   a) Comprehensive description of all activities conducted by the Permittee to meet all requirements of Order No. R9-2004-001, including, but not limited to, the following information:

      (1) Development Planning (Section F):
         - (i) Description of any amendments to the General Plan or the development project approval process;
         - (ii) Number of grading permits issued;
         - (iii) Number of developments conditioned to meet SUSMP requirements*;
         - (iv) Attach one example of a development project that was conditioned to meet SUSMP requirements and a description of the required BMPs;
         - (v) Description of any updates to the environmental review process;
         - (vi) Description and number of training efforts conducted during the reporting period (for staff, developers, contractors, etc.), including the number of staff trained; and
         - (vii) An assessment of program effectiveness based on the measurable goals established in the Permittee's Individual SWMP.*

      (2) Construction (Section G):
         - (i) Number of inspections conducted;
         - (ii) Number and type of enforcement actions related to construction sites;
         - (iii) Description of modifications made to the construction and grading approval process;
         - (iv) Description and number of training efforts conducted during the reporting period (for staff inspectors, contractors, and construction site operators); and
         - (v) An assessment of program effectiveness based on the measurable goals established in the Permittee's Individual SWMP.*

      (3) Municipal (Section H.1):
         - (i) Number of municipal inspections conducted;
         - (ii) Number and types of enforcement actions taken;
         - (iii) Number of catch basins and inlets that were inspected and the number that were cleaned;

* Items with an asterisk are not applicable to the first annual report.

(iv) Assessment of the amount and type of debris removed from catch basins, streets, and open channels, including an identification of problem areas that generate the most pollutants;

(v) Assessment of effectiveness of BMPs that have been implemented for municipal facilities and activities;

(vi) Description and number of training efforts conducted over the last year (for municipal facility operators and/or inspectors); and

(vii) An assessment of program effectiveness based on the measurable goals established in each Permittee's Individual SWMP.*

(4) Industrial/Commercial (Section H.2):

(i) Number of inspections conducted;

(ii) Number and type of enforcement actions taken; and

(iii) An assessment of overall program effectiveness based on the measurable goals established in the Permittee's Individual SWMP.*

(5) Residential (Section H.3):

(i) A description of residential areas that were focused on during the past year;

(ii) Number and types of enforcement actions taken; and

(iii) Assessment of overall program effectiveness based on the measurable goals established in the Permittee's Individual SWMP.*

(6) Education (Section I):

(i) Description of education efforts conducted by the Permittee (not collectively with other Permittees) during the previous year;

(ii) Assessment of overall program effectiveness based on the measurable goals established in the Permitee's Individual SWMP.*

(7) Illicit Discharge Detection and Elimination (Section J):

(i) Number of illicit discharges, connections and spills reported and/or identified during the reporting period;

(ii) Number of illicit discharges or connections investigated during the reporting period and the outcome of the investigations;

(iii) Number and types of enforcement actions taken for illicit discharges or connections during the reporting period;

(iv) Number of times your agency's hotline was called during the reporting period, as compared to previous reporting periods;

(v) Number and location of dry weather monitoring sites that were monitored during the reporting period;

(vi) Summary of Illicit Discharge Monitoring Program results, including: 1) All inspection, field screening, and analytical monitoring results; 2) All follow-up and elimination activities; and 3) Any proposed changes to station locations and/or sampling frequencies; and

(vii) An assessment of overall program effectiveness based on the measurable goals established in the Permittee's Individual SWMP.*

(8) Public Participation – a description of efforts to include the public in urban runoff management programs during the reporting period (i.e., river clean-ups, volunteer monitoring, Permittee council meetings related to the SWMP, etc.).

b) Assessment of Program Effectiveness - each Permittee shall include an assessment of the effectiveness of its Individual SWMP using the measurable goals and direct and indirect assessment measurements developed in the SWMP, in accordance with **Attachment D** of Order No. R9-2004-001.

c) Fiscal Analysis Component - each Permittee shall include an annual fiscal analysis, for each fiscal year covered by Order No. R9-2004-001, in its Individual Annual Report. This analysis shall evaluate the expenditures (such as capital, operation and maintenance, education, and administrative expenditures) necessary to accomplish the activities of the Pemittee's Individual SWMP. The analysis shall include the following:

(1) A report of the previous reporting period's budget, and a budget for the upcoming reporting period. To the extent possible, the budgets should be broken down by the following programs:

(i) Program management;
(ii) Construction Inspections;
(iii) Development plan review/SUSMP implementation;
(iv) Industrial/Commercial inspections;
(v) Illicit discharge and connection response and elimination;
(vi) Municipal activities (catch basin cleaning, BMP maintenance, etc.);
(vii) Education;
(viii) Monitoring; and
(ix) Other

(2) A description of the source(s) of funds that were utilized during the previous fiscal year and the source(s) of funds proposed to meet the necessary expenditures for the subsequent year, including legal restrictions on the use of such funds.

d) Non-Storm Water Discharges – Permittees shall report on any discharge category listed in Requirement B.2 of Order No. R9-2004-001 that was identified as a source of pollutants during the reporting period. For each identified category, the Permittee shall report whether it elected to prohibit the discharge or to require BMPs to reduce pollutants in the discharge to the MEP. If the discharge is not prohibited, the BMPs that will be implemented, or required to be implemented, shall be described in each Permittee's Individual SWMP Annual Report.

e) Receiving Water Limitations – the report required pursuant to Requirement C.2.a. of Order No. R9-2004-001, if applicable.

f) A summary of all urban runoff related data not included in the annual monitoring report (e.g., special investigations); and

g) Proposed revisions to the Individual SWMP, including areas in need of improvement based on the assessment of effectiveness of each program component.

2. **Watershed Annual Report** – The Watershed Annual Report, to be produced by the Principal Permittee shall describe the area-wide and watershed-based programs and activities (as described in

the Watershed SWMP) conducted during the previous reporting period. At a minimum, the Watershed Annual Report shall contain the following information:

a) A description of all area-wide and watershed-based activities conducted during the reporting period;

b) A description of efforts to coordinate with other stakeholders in the Santa Margarita Watershed, such as San Diego County and the U.S. Marine Corps Base Camp Pendleton;

c) An assessment of water quality in the Santa Margarita watershed area of Riverside County, this assessment shall include data from the previous monitoring report;

d) Identification of water quality improvement or degradation;

e) A prioritization of water quality problems and potential sources;

f) A description of watershed-specific educational activities conducted during the reporting period;

g) Recommended activities to be conducted jointly by the Permittees to address the identified water quality problems;

h) An assessment of overall program effectiveness based on the measurable goals established in the Watershed SWMP; and

i) Proposed revisions to the Watershed SWMP.

B. Receiving Waters Monitoring Reporting Requirements

1. Monitoring Program Annual Report

The Principal Permittee shall submit the Monitoring Program Annual Report (Monitoring Report) to the SDRWQCB on or before October 31 of each year. The Monitoring Report shall contain tabular and graphical summaries as well as discussions and interpretations of the receiving water monitoring data obtained during the previous monitoring year. At a minimum, each Monitoring Report shall include the following:

a) Description of each receiving water monitoring station, including but not limited to:

(1) Station location (latitude and longitude, and a narrative description).
(2) Photographs of triad stations.
(3) Approximate size and land uses of the drainage area.
(4) Any other relevant information.

b) A description of monitoring methods for each type of monitoring, including but not limited to:

(1) Monitoring equipment.
(2) Sampling procedures.
(3) Quality assurance/quality control (QA/QC) procedures (laboratory QA/QC documentation shall be submitted with the report).
(4) Laboratory analytical methods including the method detection limits (MDLs). Analytical data shall be reported with one of the following methods, as appropriate:

- An actual numerical value for sample results greater than or equal to the MDL;
- "Not-detected (ND)" for sample results less than the laboratory's MDL; or

- "Detected, but Not Quantified (DNQ)" if results are greater than or equal to the laboratory's MDL but less than the ML. The estimated chemical concentration of the sample shall also be reported. This is the concentration that results from the confirmed detection of the substance by the analytical method below the ML value.

c) A description of monitoring results, including but not limited to:

(1) Data and data products, including but not limited to:

- Actual data.
- Identification of exceedances of Basin Plan and CTR objectives.
- Estimated annual mass loadings at each station.
- Toxicity testing results in Toxic Units (TUs).
- Bioassessment data (including electronic data formatted to California Department of Fish and Game Aquatic Bioassessment Laboratory specifications) and analysis using metrics in the CSBP and the San Diego IBI.
- Graphical summaries of data.

(2) Methods used to evaluate data. Methods shall be appropriate to answer the management questions listed in Section II.A of this MRP and to assess the progress towards achieving the goals listed in Section I of this MRP. Examples of methods include, but are not limited to:

- Site-by-site summaries and comparisons of results at triad and tributary stations for wet and dry weather, including graphs of concentrations and toxicity.
- Rough estimates of the relative contribution of urban runoff to total pollutant loads.
- Maps of potential sources of pollutants.
- Any other appropriate analysis.

(3) Discussion of results and analyses of each Monitoring Program Component, including but not limited to:

- Discussion of pollutants of concern and their potential sources.
- Interpretation of bioassessment metric values.
- Discussion of any TIEs that were conducted and the potential sources of toxic pollutants.
- If applicable, a discussion of the development, implementation, and results of any TREs.
- Discussion of any relevant information or conclusions from the Illicit Discharge Monitoring Program.
- Discussion of the progress towards answering the management questions listed in Section II.A of this MRP and achieving the goals listed in Section I of this MRP.
- Discussion of any other data analyses performed.

d) In addition to the information required above, the fourth-year Monitoring Report due no later than October 31, 2008, shall include:

- A discussion of any long-term trends that can be detected from existing data (from all previous permit terms).
- Recommendations for future monitoring based on the results of previous efforts and the progress towards answering the management questions listed in Section II.A of this MRP and achieving the goals listed in Section I of this MRP.
- Recommended modifications to Individual or Watershed SWMPs to address identified source of pollutants in urban runoff.

e) If the Permittees monitor any pollutant more frequently than required by this MRP using test procedures approved under 40 CFR part 136, unless otherwise specified in the Order, the results

of this monitoring shall be included in the calculation and reporting of the data submitted in the Monitoring Reports [40 CFR 122.41(l)(4)(ii)].

f) All Monitoring Reports shall be submitted in both electronic and paper formats.

C. Certified Perjury Statement

All reports submitted to the SDRWQCB shall include the following signed, certified perjury statement:

> "I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

I, John H. Robertus, Executive Officer, do hereby certify the foregoing is a full, true, and correct copy of a Monitoring and Reporting Program adopted by the California Regional Water Quality Control Board, San Diego Region, on July 14, 2004.

John. H. Robertus
Executive Officer

FACT SHEET/TECHNICAL REPORT

FOR

SDRWQCB ORDER NO. R9-2004-001
MUNICIPAL STORM WATER PERMIT

FOR

THE COUNTY OF RIVERSIDE, THE CITY OF MURRIETA, THE CITY OF TEMECULA, AND THE RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
WITHIN THE SANTA MARGARTIA WATERSHED
IN THE SAN DIEGO REGION
(UPPER SANTA MARGARITA WATERSHED)

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I. LIST OF ACRONYMS

ADT – Average Daily Traffic

BAT – Best Available Technology

BMP – Best Management Practice

CEQA – California Environmental Quality Act

CWA – Clean Water Act

CWC – California Water Code

DAMP – Santa Margarita Regional Drainage Area Management Plan

EPA – United States Environmental Protection Agency

GIS – Geographic Information System

MEP – Maximum Extent Practicable

MS4 – Municipal Separate Storm Sewer System

NOI – Notice of Intent

NPDES – National Pollutant Discharge Elimination System

NURP – Nationwide Urban Runoff Program

RWQCB – Regional Water Quality Control Board

SDRWQCB – San Diego Regional Water Quality Control Board

SIC – Standard Industrial Classification Code

SUSMP – Standard Urban Storm Water Mitigation Plan

SWMP – Storm Water Management Plan

SWRCB – State Water Resources Control Board

SWPPP – Storm Water Pollution Prevention Plan

TAC - State Water Resources Control Board Urban Runoff Technical Advisory Committee

TMDL – Total Maximum Daily Load

II. FACT SHEET FORMAT

This Fact Sheet briefly sets forth the principle facts and the significant factual, legal, methodological, and policy questions that the San Diego Regional Water Quality Control Board (SDRWQCB) considered in preparing Order No. R9-2004-001. In accordance with the Code of Federal Regulations (CFR) title 40 parts 124.8 and 124.56, this Fact Sheet includes, but is not limited to, the following information:

- **Contact information (Section III);**
- **Public process and notification procedures (Section IV);**
- **A brief description of the type of facility or activity that is being regulated by the Order (Section V);**
- **The type and quantity of pollutants discharged (Section VI);**
- **A brief summary of the basis for the requirements in the Order, including references to the applicable statutory or regulatory provisions (Section VII); and**
- **A discussion of the requirements in the Order (Sections VIII and IX).**

Findings contained in the Order are discussed throughout this Fact Sheet. The findings that broadly apply to the entire Order are discussed in Sections V, VI and VII. Findings that justify specific requirements in the Order are discussed in the applicable subsections of Section VIII.

III. CONTACT INFORMATION

SDRWQCB

Northern Watershed Protection Unit
Bob Morris, Senior WRC Engineer
Megan Quigley, Environmental Scientist C
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858-268-5363
858-571-6972 (fax)
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The Order and other related documents can be downloaded from the SDRWQCB website at: http://www.swrcb.ca.gov/rwqcb9/programs/rsd_stormwater.html

All documents referenced in this Fact Sheet and in Order No. R9-2004-001 are available for public review at the SDRWQCB office, located at the address listed above. Public records are available for inspection during regular business hours, from 8:00 am to 5:00 pm Monday through Friday. To schedule an appointment to inspect public records, contact Megan Quigley at 858-268-5363, or DiAnne Broussard at 858-492-1763.

Permittees

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IV. PUBLIC PROCESS AND NOTIFICATION PROCEDURES

The SDRWQCB followed the schedule listed below for the preparation of Order No. R9-2004-001:

- The SDRWQCB received the Report of Waste Discharge (ROWD) on May 30, 2003
- On December 15, 2003, the SDRWQCB released the Order and supporting Fact Sheet, beginning the public comment period. The documents were available on the SDRWQCB web page at http://www.swrcb.ca.gov/rwqcb9/programs/rsd_stormwater.html and mailed to the Permittees and all other parties who requested a copy.
- A public notice was published in the Riverside Press-Enterprise on December 20, 2003 notifying the public of the opportunity to submit written comments and to present verbal comments to the San Diego Regional Board at the February 11, 2004 meeting.
- The SDRWQCB held a public workshop on January 23, 2004 at the Temecula City Hall. The purpose of the workshop was to answer questions regarding the Order and to discuss the affect of potential new requirements on the business community.
- A public hearing to receive testimony at the San Diego Regional Board meeting was conducted on February 11, 2004.
- The public comment period closed at 5:00 pm on March 10, 2004.
- A response to written comments received during the public comment period and the revised Order were issued on May 7, 2004.
- After deliberation, the San Diego Regional Board adopted the Order at the July 14, 2004 meeting.

In addition to the public process described above, various informal meetings have been conducted with SDRWQCB staff and the Permittees. The meetings served as workshops for the Permittees to express their concerns and questions regarding the permit.

V. DESCRIPTION OF THE TYPE OF FACILITY OR ACTIVITY THAT IS BEING REGULATED BY THE NPDES PERMIT

A. Permit History (Finding Nos. 1 and 2)

The Riverside County Flood Control and Water Conservation District (District), the County of Riverside, and the Cities of Murrieta and Temecula (hereinafter called Permittees), own or operate municipal separate storm sewer systems (MS4s) through which urban runoff is discharged into waters of the United States (U.S.) within the portion of the Santa Margarita watershed located in Riverside County in the San Diego Region (hereinafter referred to as the Upper Santa Margarita Watershed) (**Finding No. 1**). Pursuant to the 1987 Water Quality Act (WQA) and the U. S. Environmental Protection Agency's (EPA) final storm water regulations (the "Phase I rule" at 55 Fed. Reg. 47990), the Permittees obtained a National Pollutant Discharge Elimination System (NPDES) permit for discharges from their MS4(s) to waters of the U.S. in the Upper Santa Margarita Watershed.

In July of 1990, the District, the County, and the City of Temecula obtained a first-round NPDES permit (Order No. R9-90-46). Following its incorporation, the City of Murrieta was added to that permit on May 18, 1992. Then, on May 13, 1998, the SDRWQCB adopted Order No. R9-98-02 as a second-round MS4 permit for the Upper Santa Margarita Watershed. The EPA objected to the order due to the Receiving Water Limitations (RWL) language, which EPA determined did not comply with the federal Clean Water Act (CWA) and its implementing regulations. EPA assumed responsibility and reissued the permit on April 27, 1999. Subsequently on November 8, 2000, the SDRWQCB issued Addendum No. 1 to Order R9-98-02, which incorporated EPA's permit by reference. On May 30, 2003, the District, as the Principal Permittee, submitted a Report of Waste Discharge (ROWD) for renewal of their NPDES MS4 permit (**Finding No. 2**). Order No. R9-2004-001 is the third-round Phase I NPDES MS4 permit for the Upper Santa Margarita Watershed.

B. Permit Coverage (Finding Nos. 19 and 20)

The Order regulates discharges of urban runoff from MS4s owned or operated by the Permittees, and discharges into MS4s from areas within the Permittees' jurisdiction. In the Order, urban runoff is defined as "all flows in a storm water conveyance system and consists of the following components: (1) storm water (wet weather flows) and (2) non-storm water illicit discharges (dry weather flows)."

A MS4 is defined in the federal regulations as a conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, or storm drains), owned or operated by a Permittee, and designed or used for collecting or conveying urban runoff (EPA, 2000a). In addition, natural drainage patterns and urban streams are frequently used by municipalities to convey urban runoff away from development within their jurisdiction. Therefore, as stated in **Finding No.19**, the SDRWQCB considers natural drainages that are used for conveyances of urban runoff, regardless of whether or not they've been altered by the municipality, as both part of the MS4s **and** as receiving waters. To clarify, an unaltered natural drainage, which receives runoff from a point source (channeled by a Permittee to drain an area within their

jurisdiction), which then conveys the runoff to an altered natural drainage or a man-made MS4 is both an MS4 and a receiving water (SDRWQCB, 2001c). Whereas, a natural channel which receives sheet flow from a property in a rural area is not part of the MS4.

Federal, state, regional, or local entities within the Permittees' boundaries, and which are not named in the Order, may operate storm drain facilities and/or discharge urban runoff to storm drains and water courses covered by the Order. In addition, discharges into the Permittees' MS4s from agricultural and other activities identified in 40 CFR 122.3 are excluded from federal NPDES regulations. However, the Permittees are responsible for all discharges from their MS4s to receiving waters, and discharges from entities and activities not specifically regulated by the Order may cause or contribute to a condition of contamination or exceedances of water quality objectives. Therefore, Permittees cannot passively receive and discharge pollutants from third parties. By providing free and open access to a MS4 that conveys discharges to waters of the U.S., the operator of the MS4 that does not prohibit or control discharges into its own system essentially accepts responsibility for those discharges (**Finding No. 20**).

In their comments on the Order, the Permittees proposed a procedure to address discharges from third parties outside of their jurisdictions (Permittees, 2004a). The proposed procedure includes documenting and sampling discharges, utilizing the Hazardous Materials Emergency Response Team in emergency situations, verbally notifying the discharger, notifying the appropriate enforcement agency and/or the SDRWQCB, and notifying the discharger of available assistance to address the discharge. The proposed procedure meets the SDRWQCB's expectations for addressing discharges from third parties.

C. Description of Permitted Area (Finding No. 3)

The Upper Santa Margarita Watershed is approximately 548 square miles and includes unincorporated portions of Riverside County, the Cities of Murrieta and Temecula, as well as portions of the Cleveland and San Bernardino National Forests, and the Cahuilla, Ramona, Pauma, and Pechanga Indian Reservations. Approximately 168,400 people reside within the permitted area (Permittees, 2003). Approximately 36,400 people reside in the unincorporated area while approximately 132,000 people reside within the Cities of Murrieta and Temecula (Permittees, 2003).

Temecula Creek, which drains the Palomar Mountains, and Murrieta Creek, which drains the Santa Ana Mountains, are the main drainages in the permitted area. They join to form the Santa Margarita River near the City of Temecula. Main tributaries to Murrieta Creek include Warm Springs Creek and Santa Gertrudis Creek. Main tributaries to Temecula Creek include Pechanga Creek and Arroyo Seco Creek. Vail Lake, Skinner Reservoir, and Diamond Valley Reservoir are major impoundments in the permitted area. For more information about watershed characteristics, see the ROWD (Permittees, 2003).

The Water Quality Control Plan for the San Diego Basin (SDRWQCB, 1994) identifies the following beneficial uses for water bodies in the Santa Margarita Watershed: Municipal and Domestic Supply (MUN), Agricultural Supply (AGR), Industrial Process Supply (PROC), Industrial Service Supply (IND), Ground Water Recharge (GWR), Contact Water Recreation (REC1) (potential use), Non-contact Water Recreation (REC2), Warm Freshwater Habitat

WARM, Cold Freshwater Habitat (COLD), Wildlife Habitat (WILD), and Rare, Threatened, or Endangered Species (RARE) (**Finding No. 3**).[1]

In addition to providing habitat and recreation opportunities, residents and businesses in the permitted area rely heavily on local water for drinking, agriculture, and industrial supply. Over 40% of water used in the watershed is locally produced (Jenks, 2002). In 2001, local water production in the watershed was 41,765 acre-feet. Imported supplies totaled 66,369 acre-feet. Of the total water supply, 49,212 acre-feet were used for agriculture, 5,390 acre-feet were used for commercial purposes, and 41,802 acre feet were used for domestic purposes (Jenks, 2002). In addition, portions of Fallbrook in San Diego County and the U.S. Marine Corps Base Camp Pendleton, depend on surface and ground water that originates form the Upper Santa Margarita Watershed.

The Santa Margarita River is one of the few remaining natural gorge rivers in Southern California, with approximately 70 species of special concern (rare, threatened, or endangered, regularly inhabiting the watershed, including 30 that are currently protected under the Federal Endangered Species Act (Stein, 1998). Although the majority of the river is not within the jurisdiction of the Permittees, the riparian systems in the upper watershed play an integral role in the maintenance of sensitive downstream ecological functions (Stein, 1998). The upper watershed riparian habitats are in direct hydrologic contact with downstream systems and are associated with freshwater recharge to a series of downstream aquifers (Shapiro, 1991). In addition, these riparian systems in the Upper Santa Margarita Watershed often provide breeding, migratory, or escape habitat for many animal species that reside in the lower watershed (Stein, 1998).

VI. TYPE AND QUANTITY OF POLLUTANTS DISCHARGED

A. Background

Pollutants in Urban Runoff (Finding Nos. 4, 5 and 6)

Urban runoff contains waste, as defined in the California Water Code (CWC), and pollutants that adversely affect the quality of waters of the State. The discharge of urban runoff from an

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[1] **MUN** – Municipal and Domestic Supply – Uses of water for community, military, or individual water supply systems (i.e., drinking water).
AGR – Agricultural Supply – Uses of water for farming, horticulture, or ranching.
IND – Industrial Service Supply – Uses of water for industrial activities that do not depend primarily on water quality (i.e., mining, cooling water supply, gravel washing, fire protection).
PROC – Industrial Process Supply – Uses of water for industrial activities that depend primarily on water quality.
GWR – Ground Water Recharge – Uses of water for natural or artificial recharge of ground water for purposes of future extraction, maintenance of water quality, or halting of saltwater intrusion into freshwater aquifers.
REC1 – Contact Water Recreation – Uses of water for recreational activities involving body contact with water, where ingestion of water is reasonably possible (i.e., swimming, wading, fishing, and white water activities). * Means this is a potential use.
REC2 – Non-contact Water Recreation – Uses of water for recreational activities involving proximity to water, but not normally involving body contact with water (i.e., picnicking, hiking, camping, boating, and sightseeing).
WARM – Warm Freshwater Habitat – Uses of water that support warm water ecosystems.
COLD – Cold Freshwater Habitat – Uses of water that support cold water ecosystems including.
WILD – Wildlife Habitat – Uses of water that support terrestrial ecosystems.
RARE – Rare, Threatened, or Endangered Species – Uses of water that support habitats necessary, at least in part, for the survival and successful maintenance of plant and animal species established under state or federal law as rare, threatened, or endangered.

MS4 is a "discharge of pollutants from a point source" into waters of the United States as defined in the CWA (**Finding No. 4**). Section 13050(d) of the CWC defines "waste" as "sewage and any and all other waste substances, liquid, solid, gaseous, or radioactive, associated with human habitation, or of human or animal origin, or from any producing, manufacturing, or processing operation, including waste placed within containers of whatever nature prior to, and for purposes of, disposal." 40 CFR 122.2 defines "point source" as "any discernable, confined, and discrete conveyance, including but not limited to, any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, landfill leachate collection system, vessel or other floating craft from which pollutants are or may be discharged. This term does not include return flows from irrigated agriculture or agricultural storm water runoff." 40 CFR 122.2 defines "discharge of a pollutant" as "Any addition of any pollutant or combination of pollutants to waters of the U.S. from any point source." Also, the justification for control of pollution into Californian waters can be found at CWC section 13260(a)(1), and State Water Resource Control Board (SWRCB) Order WQ 2001-15 verifies that urban runoff contains waste (SWRCB, 2001).

The quality of urban runoff is fundamentally important to the health of the environment and the quality of life in Southern California. The discharge of pollutants and/or increased flows from MS4s may cause or threaten to cause the concentration of pollutants to exceed applicable receiving water quality objectives and impair or threaten to impair designated beneficial uses resulting in a condition of pollution (i.e., unreasonable impairment of water quality for designated beneficial uses), contamination, or nuisance (**Finding No. 6**). The 1992, 1994, and 1996 National Water Quality Inventory Reports to Congress prepared by the EPA showed a trend of impairment in the Nation's waters from contaminated storm water and urban runoff (EPA, 2000b). The 1998 National Water Quality Inventory Report showed that urban runoff discharges affect 11% of rivers, 12% of lakes, and 28% of estuaries (EPA, 2000b). The report states that ocean shoreline impairment due to urban runoff increased from 55% in 1996 to 63% in 1998. The report notes that urban runoff discharges are the leading source of pollution and the main factor in the degradation of surface water quality in California's coastal waters, rivers, and streams (EPA, 2000b).

Furthermore, the National Urban Runoff Program (NURP) Study found that pollutant levels from illicit discharges were high enough to significantly degrade receiving water quality, and threaten aquatic life, wildlife, and human health (EPA, 1993b).

The most common categories of pollutants in urban runoff include total suspended solids, sediment (due to anthropogenic activities); pathogens (e.g., bacteria, viruses, protozoa); heavy metals (e.g., copper, lead, zinc, and cadmium); petroleum products and polynuclear aromatic hydrocarbons; synthetic organics (e.g., pesticides, herbicides, and PCBs); nutrients (e.g., nitrogen and phosphorus fertilizers), oxygen-demanding substances (decaying vegetation, animal waste), and trash (**Finding No. 5**). The NURP study showed that heavy metals, organics, coliform bacteria, nutrients, oxygen demanding substances (e.g., decaying vegetation), and total suspended solids are found at relatively high levels in urban runoff (EPA, 1993b). It also found that MS4 discharges draining residential, commercial, and light industrial areas contain significant loadings of total suspended solids and other pollutants. The Basin Plan goes on to identify urban runoff pollutants to include lawn and garden chemicals, household and automotive care products dumped or drained on streets, and sediment that

erodes from construction sites (SDRWQCB, 1994). In addition, the SWRCB Urban Runoff Technical Advisory Committee (TAC) finds that urban runoff pollutants include sediments, nutrients, oxygen-demanding substances, heavy metals, petroleum hydrocarbons, pathogenic bacteria, viruses, and pesticides (SWRCB, 1994). Water that flows over streets, parking lots, construction sites, and industrial, commercial, residential, and municipal areas carries these untreated pollutants through storm drain networks directly to the receiving waters of the Upper Santa Margarita Watershed.

According to the Center for Watershed Protection, the quality of both surface and ground water in urbanizing areas of arid and semi-arid regions of the southwest is strongly shaped by urbanization. Since rain events are so rare, pollutants have more time to build up on impervious surfaces compared to humid regions. Therefore, the pollutant concentrations of storm water runoff from arid watersheds tends to be higher than that of humid watersheds (Center for Watershed Protection, Article 66).

Impacts From Urbanization (Finding No. 12)

The Natural Resources Defense Council (NRDC) 1999 Report, "Stormwater Strategies, Community Responses to Runoff Pollution" identifies two main causes of the storm water pollution problem in urban areas (NRDC, 1999). Both causes are directly related to development in urban and urbanizing areas:

1. Increased volume and velocity of surface runoff. There are three types of human-made impervious covers that increase the volume and velocity of runoff: (i) rooftop, (ii) transportation imperviousness, and (iii) non-porous (impervious) surfaces. As these impervious surfaces increase, infiltration will decrease, forcing more water to run off the surface, picking up speed and pollutants.
2. The concentration of pollutants in the runoff. As discussed above, certain industrial, commercial, residential and construction activities are large contributors of pollutant concentrations in urban runoff. As human population density increases, it brings with it proportionately higher levels of car emissions, car maintenance wastes, municipal sewage, pesticides, household hazardous wastes, pet wastes, trash, etc.

As a result of these two causes, runoff leaving developed urban areas is significantly greater in volume, velocity, and pollutant load than pre-development runoff from the same area (**Finding No. 12**). The Permittees have demonstrated their support for this finding in the DAMP (Permittees, 1993), which states:

> "Many storm water runoff problems are primarily a consequence of urbanization. Water that previously soaked into the ground, removing pollutants by filtering through soil, and eventually replenishing groundwater supplies, now must flow overland and therefore enters local streams more rapidly. The rapid transport of water increases the erosion of stream banks and hillsides and does not permit filtering of pollutants. Sediment carried by storm water runoff can build up in streambeds, harming fish and aquatic habitat. The sediment acts as a transport mechanism for pollutants which adhere to soil particles. Typical urban runoff pollutants found in surface waters include heavy metals, nutrients, petroleum products, sediment, bacteria, chemicals, and litter."

Studies have shown that the level of imperviousness in an area strongly correlates with the quality of nearby receiving waters (EPA, 1999b). One comprehensive study, which looked at numerous areas, variables, and methods, revealed that stream degradation occurs at levels of imperviousness as low as 10 – 20% (EPA, 1999b). Stream degradation is a decline in the biological integrity and physical habitat conditions that are necessary to support natural biological diversity. For instance, few urban streams can support diverse benthic communities with imperviousness greater than or equal to 25% (EPA, 1999b). To provide some perspective, a medium density, single-family home area can be from 25% to 60% impervious (variation due to street and parking design) (Schueler, 1994).

To demonstrate the principle of increased volume and velocity of runoff from urbanization, the following figure shows the flow rate of an urban vs. a natural stream. What the figure demonstrates is that urban stream flows have greater peaks and volumes, as well as shorter retention times than natural stream flows. The greater peak flows and volumes result in stream degradation through increased erosion of stream banks and damage to aquatic habitat. The shorter retention times result in less time for sediments and other pollutants to settle before being carried out to the ocean. This sediment, and the associated pollutants it carries, can be a significant cause of water quality degradation.

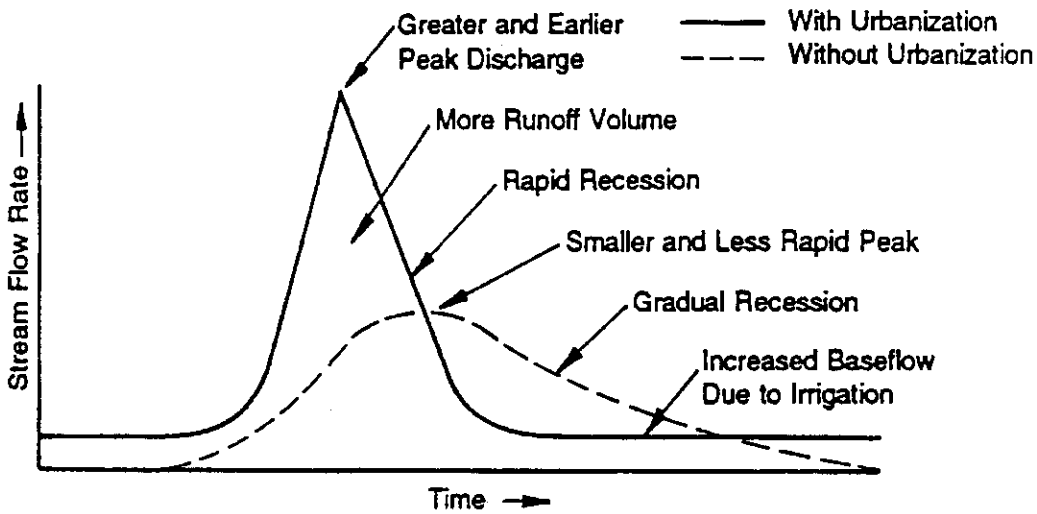

Source: Adapted from Schueler, 1997

Increased volume and velocity of runoff adversely impacts receiving waters and their beneficial uses in many ways. According to the TAC report (SWRCB, 1994), increases in population density and imperviousness result in changes to stream hydrology including:

1. Increased peak discharges compared to pre-development levels;
2. Increased volume of storm water runoff with each storm compared to pre-development levels;
3. Decreased travel time to reach receiving water; increased frequency and severity of floods;
4. Reduced stream flow during prolonged periods of dry weather due to reduced levels of infiltration;

5. Increased runoff velocity during storms due to a combination of effects of higher discharge peaks, rapid time of concentration, and smoother hydraulic surfaces from channelization, and
6. Decreased infiltration and diminished ground water recharge.

Even though the rainfall depths in arid watersheds are lower, watershed development can greatly increase peak discharge rates during rare flood events (Center for Watershed Protection, Article 66). A study conducted in arid watersheds around Riverside, CA showed that, over two decades, impervious cover increased from 9% to 22%, which resulted in an increase of more than 100% in the peak flow rate for the two-year storm event. The study also showed that the average annual storm water runoff volume had increased by 115% to 130% over the same time span (Center for Watershed Protection, Article 66).

Flooding caused by the increased volume and velocity of runoff from urbanization in the Upper Santa Margarita Watershed are clear examples of the effects described above. Disastrous flooding has occurred more frequently in recent years. In the last century, major flood events occurred in 1938, 1969, 1980, 1993, 1995, and 1998 (U.S. Army Corps of Engineers, 2000). In the 1993 flood event, the Cities of Murrieta and Temecula sustained $12 million dollars in damage, and Camp Pendleton sustained $88 million in damage (U.S. Army Corps of Engineers, 2000). Future flooding is expected to occur more frequently because of continued urban development within the watershed, and flood damages are expected to continue accruing at an estimated annual rate of $1,780,300 (U.S. Army Corps of Engineers, 2000).

Impacts to Aquatic Life (Finding No. 9)

In addition to chemical and physical impacts, urban runoff often contains pollutants that cause toxicity to aquatic organisms (i.e., adverse responses of organisms to chemicals or physical agents ranging from mortality to physiological responses such as impaired reproduction or growth anomalies). Toxic pollutants impact the overall quality of aquatic systems and beneficial uses of receiving waters (**Finding No. 9**). A study of urban runoff samples from Chollas Creek in San Diego County, revealed toxic concentrations of organophospate pesticides and metals (Bay, 2001). In Los Angeles County, storm water samples were found to be toxic to various aquatic organisms in the Los Angeles River, the San Gabriel River, Ballona Creek, and the Santa Monica Bay (LARWQCB, 2001). Also, a water quality data assessment conducted in Aliso Creek in Orange County showed that storm events caused varying degrees of mortality to test organisms (SDRWQCB, 2002a). To date, there has not been sufficient monitoring to determine if toxicity from urban runoff exists in the Upper Santa Margarita Watershed, however, the land uses causing toxicity in other urbanized areas of Southern California are little different than urbanized areas in Murrieta and Temecula.

Impacts to Human Health (Finding No. 7)

In addition to impairing receiving water quality and aquatic life, pollutants in urban runoff can also threaten human health. According to the EPA, spilled fuel, solvents, waste oil, paints, and other maintenance fluids pose a risk to the environment but may be especially harmful if they enter someone's drinking water supply (EPA, 2004b). "The percolation of

contaminated runoff can cause unacceptable consequences to ground water resources." Urban runoff discharges were identified in a California Department of Health Services assessment as one of the most prevalent possible contaminating activities for drinking water sources (EPA, 2004b). This issue of potential source water contamination is of fundamental importance, because of the dependence on local water for domestic use in the Santa Margarita Watershed. Rancho California Water District and Eastern Municipal Water District, which serve the Upper Santa Margarita Watershed, the Fallbrook Public Utilities District, which serves the community of Fallbrook, and Camp Pendleton are among those agencies in the watershed who are directly dependent on surface and ground water for domestic use.

Human health is also a concern related to body contact recreation. Human illnesses have been clearly linked to recreating near storm drains flowing to coastal waters (**Finding No. 7**). A landmark study, conducted by the Santa Monica Bay Restoration Project, found that there was an increased occurrence of illness in people that swam in proximity to a flowing storm drain (Haile, 1996). Although the Upper Santa Margarita Watershed is inland, the watershed drains to the Pacific Ocean, and pollutants generated in the permitted area may impact coastal waters. For example, the Santa Margarita River system provides the main source of beach sand for the beaches of northern San Diego County (Shapiro, 1991). Also, residents in the permitted area who recreate at Southern California beaches benefit from clean water.

Furthermore, urban runoff pollutants in receiving waters can bioaccumulate in the tissues of invertebrates and fish, which may eventually be consumed by humans (**Finding No. 7**). Pollutants such as heavy metals and pesticides, which are commonly found in urban runoff, have been found to bioaccumulate and biomagnify in long-lived organisms at the higher trophic levels (Abel, 1996). Since many aquatic species are utilized for human consumption, toxic substances accumulated in species' tissues can pose a significant threat to public health. The EPA supports this finding when it states, "As runoff flows over areas altered by development, it picks up harmful sediment and chemicals such as oil and grease, pesticides, heavy metals, and nutrients (e.g., nitrogen and phosphorus). These pollutants often become suspended in runoff and are carried to receiving waters, such and lakes, ponds, and streams. Once deposited, these pollutants can enter the food chain through small aquatic life, eventually entering the tissues of fish and humans" (EPA, 2000c).

Environmentally Sensitive Areas (Finding No. 8)

Development and urbanization especially threaten environmentally sensitive areas (ESAs), such as water bodies designated as supporting a RARE beneficial use and CWA section 303(d) impaired water bodies. Such areas have a much lower capacity to withstand pollutant shocks than might be acceptable in the general circumstance. In essence, development that is ordinarily insignificant in its impact on the environment may become significant in a particularly sensitive environment. Therefore, additional control to reduce pollutants from new and existing development may be necessary for areas adjacent to or discharging directly to an environmentally sensitive area (**Finding No. 8**). ESAs are defined in the Order as "areas in which plant or animal life or their habitats are either rare or especially valuable because of their special nature or role in an ecosystem and which would easily be disturbed or degraded by human activities and developments (California Public Resources Code section 30107.5). ESAs subject to urban runoff requirements include but are not limited to

all CWA section 303(d) impaired water bodies; areas designated as Areas of Special Biological Significance by the SWRCB (Basin Plan); water bodies designated with the RARE beneficial use by the SWRCB (Basin Plan); areas within the Western Riverside County Multi-Species Habitat Conservation Plan (MSHCP) plan area that contain rare or especially valuable plant or animal life or their habitat; and any other equivalent environmentally sensitive areas which the Permittees have identified." Areas that meet this definition are inherently sensitive habitats containing unique, rare, threatened, or endangered species, or are not achieving their designated beneficial uses. As discussed above, urban runoff is known to contain a wide range of pollutants and have demonstrated toxicity to plants and animals. Therefore, it is necessary to apply additional controls for developments within, adjacent to, or directly discharging to ESAs. This need for additional controls is addressed within each component of the Order.

The EPA supports the requirement for additional controls, stating "For construction sites that discharge to receiving waters that do not support their designated use or other waters of special concern, additional construction site controls are probably warranted and should be strongly considered" (EPA, 1992a). Further support for requiring additional controls to reduce pollutants in discharges to ESAs can be found in *Mitigation of Storm Water Impacts From New Developments in Environmentally Sensitive Areas*, a technical report written by the LARWQCB (LARWQCB, 2001b).

B. Water Quality Concerns in the Upper Santa Margarita Watershed

In addition to the general information about typical urban runoff-related pollutants discussed above in Section VI.A, various sources document water quality concerns in the Upper Santa Margarita Watershed. **Tables 1 and 2** below summarize existing and potential problems. **Table 3** summarizes exceedances of urban runoff-related pollutants reported in the Permittees water quality monitoring reports, and **Table 4** lists potential sources of the reported exceedances.

Table 1. Water Quality Concerns in the Santa Margarita Watershed

Source	Existing or Potential Problem
SWRCB 303(d) List[2]	**Listings:** Phosphorus (entire 12 miles of Murrieta Creek and upper 18 miles of Santa Margarita River) Eutrophication (estuary) **Constituents of concern:** sedimentation/siltation, iron, manganese, TDS
Riverside County General Plan[3]	Sediment from construction-related erosion; Pollution due to urban storm water runoff
San Diego County WURMP[4]	Eutrophication, nitrogen, phosphorus, diazinon, TDS, other toxic substances, trash
SDRWQCB	Degraded biological and physical integrity

[2] SDRWQCB. 2003. Final 2002 Clean Water Act Section 303(d) List of Water Quality Limited Segments.

[3] County of Riverside. October 2003. County of Riverside General Plan: Multipurpose Open Space Element. Chapter 5, OS-10.

[4] County of San Diego. January 2003. Watershed Urban Runoff Management Program for the Santa Margarita Watershed. Table 4-5.

Bioassessment Data[5]	
SDRWQCB, EPA Draft Operational Guidebook for reference based assessment[6]	Severe physical impacts (Excessive erosion, down cutting, sedimentation, etc.) from rapid and high volumes of urban runoff and a lack of effective runoff management practices
Santa Margarita Regional DAMP[7]	Oxygen demanding substances, heavy metals, pesticides, herbicides, oil and grease, nutrients, settleable solids, TDS, TSS Volatile organic carbon, pathogens, and debris

Impairments and Pollutants of Concern (Finding Nos. 10 and 11)

According to the *Final 2002 CWA Section 303(d) List of Water Quality Limited Segments* (SDRWQCB, 2003a), the entire length of Murrieta Creek (12 miles) and the upper 18 miles of the Santa Margarita River are impaired for phosphorus. Potential sources of the phosphorus impairment include urban runoff and unknown point and nonpoint sources. The Santa Margarita Lagoon is listed as impaired for eutrophication. (**Finding No. 10**). In addition to the impairments, the SDRWQCB has identified various constituents of potential concern (SWRCB, 2003b). These constituents, listed above in Table 1, were not included on the 2002 303(d) list as impairments because available data was not adequate and more information is needed to determine whether water quality objectives and beneficial uses are being met. The impairments and constituents of concern were based on quarterly data collected and analyzed by Camp Pendleton from 1997-2000, data collected and analyzed by the Department of Water Resources from May 1998-November 2000, Rancho California Water District's receiving water monitoring, and grab sampling conducted by the SDRWQCB in June 1998.

The San Diego County's *Watershed Urban Runoff Management Program (WURMP) for the Santa Margarita Watershed* (San Diego County, 2003) states that eutrophication (associated with low dissolved oxygen, and the presence of solids and excessive nutrients), toxic substances (trace elements and synthetic organics), diazinon contamination, and high levels of TDS are potential water quality issues in the watershed, and that these constituents of concern may have detrimental impacts to the beneficial uses. The WURMP prioritizes the problems based on potential beneficial use impairment (Table 2 below). The WURMP states that data is limited and further data collection and assessment should be made to substantiate concerns.

Table 2. WURMP Prioritization of Water Quality Problems[8]

[5] California Department of Fish and Game. 2002. SDRWQCB 2002 Biological Assessment Report: Results of May 2001 Reference Site Study and Preliminary Index of Biotic Integrity.

[6] EPA. November 2003. Draft Operational Guidebook for reference based assessment of the functions of riverine waters/wetlands in the Santa Margarita Watershed, Riverside County. Chapter 4.

[7] Permittees, 1993

[8] Table 2 was modified from Table 4-5 of the WURMP (San Diego County, 2003)

Constituents of Concern	Potential Beneficial Use Impairment	Priority
Eutrophication, nitrogen, phosphorus	MUN, REC1, REC2, WARM, COLD, WILD, and RARE	High
Toxic substances – diazinon	WARM, COLD, WILD and RARE	Medium
TDS	MUN and AGR	Medium
Toxic substances – other	WARM, COLD, WILD and RARE	Low
Trash	REC1, REC2, WARM, COLD, WILD and RARE	Low

In addition to the sources discussed above, the Permittees have been conducting water quality monitoring pursuant to the MS4 permit since 1993. Although the program has many deficiencies (SDRWQCB, 2002b), the data shows various persistent exceedances of water quality objectives for urban runoff-related pollutants. Table 3 below lists the monitoring stations and the constituents for which multiple or persistent exceedances of water quality objectives have been reported (Permittees, 2002a, 2002b, and 2003b). Due to inadequate monitoring and reporting, it was not possible to conduct a detailed analysis.

Table 3. MS4 Monitoring Results[9]

Stn #	Station Name	Multiple or Persistent Exceedances of Water Quality Objectives[10] (from 1993 – 2003)
188	Cole Creek	Color, Total Nitrogen, Total Phosphorus, Iron, Manganese
404	Wildomar outlet	MBAS, Color, Total Nitrogen, Total Phosphorus, Fecal Coliform, Chromium, Iron, Manganese, Nitrogen-Nitrate, Ammonia, Odor, Thallium, Turbidity, pH, Antimony, Beryllium, Chlorpyrifos, Diazinon
768	Redhawk Channel	Boron, MBAS, Color, Total Nitrogen, Total Phosphorus, Fecal Coliform, Fluoride, Iron, Manganese, Nitrogen-Nitrate, Ammonia, Odor, DO, TDS, Sulfate, Turbidity, pH, Antimony, Beryllium, Chlorpyrifos, Diazinon
769	Empire Creek	Boron, MBAS, Color, Total Nitrogen, Total Phosphorus, Fecal Coliform, Chromium, Iron, Manganese, Nitrogen-Nitrate, Odor, DO (increasing trend), TDS, Thallium, Turbidity, pH, Antimony, Beryllium, Chlorpyrifos, Diazinon
776	Cal Oaks Channel (Line F)	MBAS, Color, Total Nitrogen, Total Phosphorus, Fecal Coliform, Chromium, Iron, Manganese, Nitrogen-Nitrate, Ammonia, Odor, TDS, Turbidity, pH, Antimony, Chlorpyrifos, Diazinon
777	Temecula Creek	Color, Total Nitrogen, Total Phosphorus, Fecal Coliform, Iron, Manganese, Nitrogen-Nitrate, DO, TDS, Sulfate, Turbidity, Antimony
778	Lower Murrieta	Color, Total Nitrogen, Total Phosphorus, Fecal Coliform,

[9] Information obtained from Permittee Annual Program Reports (Permittees, 2002a, 2002b, and 2003b).

[10] Does not include California Toxics Rule

	Creek	Iron, Manganese, Nitrogen-Nitrate, Odor, DO, TDS, Sulfate, Turbidity, Antimony, Chlorpyrifos, Diazinon
779	Upper Murrieta Creek	Color, Total Nitrogen, Total Phosphorus, Fecal Coliform, Iron, Manganese, Nitrogen-Nitrate, Ammonia, TDS, Turbidity, pH, Antimony
828	Santa Margarita River near Temecula	Color, Total Nitrogen, Total Phosphorus, Fecal Coliform, Chromium, Iron, Manganese, Nitrogen-Nitrate, Odor, DO, TDS, Turbidity, Antimony, Chlorpyrifos, Diazinon

Table 4 below identifies potential sources of the pollutants that exceeded water quality objectives at the majority of the MS4 monitoring stations. This information indicates that urban runoff from construction, residential, industrial, commercial and municipal activities is contributing to the degradation of water quality. Specifically, the data indicate potential illicit discharges from industrial and commercial activities, over-application of pesticides and fertilizers by residents and/or businesses, and sediment discharges from construction sites and/or eroding channels.

Table 4. Potential Sources of Pollutants[11]

Pollutant	Potential Sources
Antimony	Industrial activity
Chlorpyrifos	Organophosphate pesticide commonly used in residential areas
Chromium	Industrial activity (plating operations, manufacture of paints, dyes, explosives, ceramics, and paper)
Diazinon	Organophosphate pesticide commonly used in residential areas
Dissolved oxygen	Biodegradable organics, increased temperatures and salinity decrease dissolved oxygen
Fecal coliform	Bacteria originating from humans, animals, amphibians and birds
Iron	Industrial activity, acid mine drainage, corrosion from iron pipes and other material
Manganese	Industrial sources (manufacture of steel alloys, dry-cell batteries, glass and ceramics, paints and varnishes, inks and dyes, matches and fireworks and agriculture
MBAS	Detergents typically associated with dry cleaners
Nitrogen	Excessive application of fertilizer in agriculture and urban areas, septic tank leachate
Phosphorus	Excessive application of fertilizer in agriculture and urban areas
PH	Industrial wastes can be strongly acidic, and laundry waste, and soda and sulfate-pump rinse water are alkaline wastes
Sulfate	Agricultural runoff, mining, tanneries, sulfate-pump mills, and other plants that use sulfates or sulfuric acid

[11] Potential source information from Permittees, 2003b and San Diego County, 2003.

Turbidity	Microorganisms, detritus, mineral substances, manganese compounds, industrial wastes, and eroded soil and silt.
TDS	Urban runoff, imported water, irrigation practices

Biological and Physical Concerns

In addition to the chemical water quality data described above, biological and physical monitoring in the Upper Santa Margarita Watershed also indicates impacts to receiving waters from urbanization.

According to the *San Diego Regional Water Quality Control Board: 2002 Biological Assessment Report*, based on data collected from 1998 – 2001, the bioassessment stations located in lower Murrieta Creek, lower Temecula Creek, and upper Santa Margarita River exhibited degraded biological and physical integrity (Index of Biotic Integrity (IBI) ranged from "Very Poor" to "Good"). As a comparison, the reference stations in the watershed, located in Sandia Creek and DeLuz Creek, were characterized by a high degree of biological and physical integrity (IBI was consistently "Very Good"). This data indicates that urbanization, not agriculture, is contributing to the impairment of the biological and physical integrity of the receiving waters.

The *Draft Operational Guidebook for reference based assessment of the functions of riverine waters/wetlands in the Santa Margarita Watershed, Riverside and San Diego Counties, California* (EPA, 2003) documents the physical impacts that have resulted from urbanization, including but not limited to:

- Temecula and Murrieta Creeks have been moderately to severely impacted by development and degradation of their watersheds. No hydrogeomorphic reference standard conditions were observed. Local effects are caused by **(a) massive earthwork associated with flood control projects, (b) channelization, (c) hardening of the channel bed and banks with concrete, rip-rap, etc., (d) rapid and high volume inputs of storm water runoff from impervious surfaces associated with urbanizing areas, (e) rapid and concentrated inputs of urban pollutants associated with untreated storm water, and (f) large accumulations of trash/debris**. "Currently, development pressures along the Temecula, Murrieta and Wilson Creeks are severe and apparently irreversible in the context of current land use practices and rates of urbanization."
- **Storm water inputs from roads, yards, and parking areas tend to be direct, without benefit of oil-water separators, grit removal, or retention/detention of storm flows**. "The consequences of poor watershed, riparian, and channel management practices in agricultural and developing areas are clear."
- **It is clear that Murrieta and Temecula Creeks are not performing hydrologic functions to their potential.** Specifically, given the urban setting of these creeks, the degree of development taking place within and near their floodplains, and **the current lack of effective stormwater management practices**, improvements in ecosystem functioning within these systems are likely to occur very slowly, if at all. **"Functional improvements in Murrieta and Temecula Creeks depend not only on changes in stream management techniques, but also upon BMPs throughout the upper watershed."**

- "As a result of urban/suburban development, infiltration rates have decreased, peak flows have increased, and base flows have been diminished in both durations and volume"
- "Significant impacts from erosion resulted from poor sediment and erosion control practices and/or development of impervious and smoothed surfaces in the contributing area."
- **"Landscape-scale development in the Santa Margarita watershed appears to be causing main stem hydrologic and biogeochemical functions to degrade at unprecedented rates."**

A recent environmental assessment of Murrieta Creek (USFWS, 2000) further describes some of the physical impacts that have occurred as a result of urbanization in the Upper Santa Margarita Watershed:

> "Since the 1980's, rapid development and urbanization in Murrieta Creek's watershed, including its floodplain and riparian corridor, has severely altered the watershed's drainage. The urbanization has simultaneously introduced artificial flows from activities such as landscape irrigation, washing down of parking lots, and washing of personal vehicles, and has increased impervious surface, which reduces groundwater recharge. Consequently, the volumes and velocities of the discharges from the surface flows and flows through the storm water conveyance systems into Murrieta Creek have increased dramatically. The changes in the hydrology and the hydraulics of Murrieta Creek and its watershed caused by development, flood control activities, ground water dewatering, and a reduction in groundwater recharge, have upset the natural fluvial processes and greatly diminished the ecological value of Murrieta Creek and its riparian corridor. The increased volumes and velocities have intensified the erosion along the stream bed and banks of Murrieta Creek, its tributaries, and downstream of Murrieta Creek. This erosion has exacerbated the sediment loading into Murrieta Creek and the Santa Margarita River."

The assessment goes on to say that, without appropriate controls, water quality is expected to continue to decline. "Advancing erosion and downcutting of stream channels will continue to feed larger amounts of sediment into the system. [...] Increasing development of the watershed is expected to continue to impact available habitat. In addition, an elimination of infiltration zones, increase in peak discharges with associated impacts on downstream riparian area, and the replacement of native plants with non-native species would likely occur." (USFWS, 2000)

Overall, the chemical, biological, and physical data and information described above indicate that urban runoff is causing degradation of the quality and the biological and physical integrity of the receiving waters in the Santa Margarita Watershed.

VII. BASIS FOR PERMIT REQUIREMENTS

This section discusses the broad legal authority that supports the requirements contained in Order No. R9-2004-001. It also discusses the intent of the federal NPDES storm water regulations and several findings that broadly support all requirements in the Order.

A. Broad Legal Authority (Finding No. 22)

Order No. R9-2004-001 implements the CWA, the Porter-Cologne Water Quality Control Act (Division 7 of the CWC, commencing with Section 13000), applicable state and federal regulations, all applicable provisions of statewide Water Quality Control Plans and Policies adopted by the SWRCB, and the Basin Plan adopted by the SDRWQCB (**Finding No. 22**).

In 1987, Congress established CWA Amendments to create requirements for storm water discharges under the NPDES program, which provides for permit systems to regulate the discharge of pollutants. Under the Porter-Cologne Water Quality Control Act, the SWRCB and each Regional Water Quality Control Board (RWQCB) have primary responsibility for the coordination and control of water quality, including the authority to implement the CWA. Porter Cologne (section 13240) directs the RWQCBs to set water quality objectives via adoption of Basin Plans that conform to all state policies for water quality control. As a means for achieving those water quality objectives, Porter Cologne (section 13243) further authorizes the RWQCBs to establish waste discharge requirements (WDRs) to prohibit waste discharges in certain conditions or areas. Since 1990 the SDRWQCB has issued area-wide MS4 NPDES permits. The Order will renew Order No. R9-98-02 as a means to attain water quality objectives in the Basin Plan by limiting the contributions of pollutants conveyed by urban runoff and to comply with CWA. Further discussions of the broad and specific legal authority associated with the prohibitions and directives of the Order are provided throughout this document.

Specific federal regulations include 40 CFR parts 122, 123, 124 (NPDES Permit Application Regulations for Storm Water Discharges, Final Rule), Part II of 40 CFR Parts 9, 122, 123, and 124 (NPDES – Regulations for Revision of the Water Pollution Control Program Addressing Storm Water Discharges; Final Rule), and 40 CFR 131 Water Quality Standards; Establishment of Numeric Criteria for Priority Toxic Pollutants for the State of California; Rule (California Toxics Rule).

The following broad legal authority citations generally apply to all requirements in Order No. R9-2004-001, and provide the SDRWQCB with ample underlying authority to require each of the directives.

CWA 402(p)(3)(B)(ii) – The CWA requires in section 402(p)(3)(B)(ii) that permits for discharges from MS4s "shall include a requirement to effectively prohibit non-stormwater discharges into the storm sewers."

CWA 402(p)(3)(B)(iii) – The CWA requires in section 402(p)(3)(B)(iii) that permits for discharges from MS4s "shall require controls to reduce the discharge of pollutants to the maximum extent practicable, including management practices, control techniques and system, design and engineering methods, and such other provisions as the Administrator or the State determines appropriate for the control of such pollutants."

40 CFR 122.26(d)(2)(i)(B,C,E, and F) – Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B,C,E, and F) provide that each Permittee's permit application "shall consist of: (i) Adequate legal authority. A demonstration that the applicant can operate pursuant to legal authority established by statute, ordinance or series of contracts which authorizes or enables the applicant at a minimum to: [...] (B) Prohibit through ordinance, order or similar means, illicit discharges to the municipal separate storm sewer; (C) Control through

ordinance, order or similar means the discharge to a municipal separate storm sewer of spills, dumping or disposal of materials other than storm water; [...] (E) Require compliance with condition in ordinances, permits, contracts or orders; and (F) Carry out all inspection, surveillance and monitoring procedures necessary to determine compliance and noncompliance with permit conditions including the prohibition on illicit discharges to the municipal separate storm sewer."

40 CFR 122.26(d)(2)(iv) – Federal NPDES regulation 40 CFR 122.26(d)(2)(iv) provides that the Permittee shall develop and implement a proposed management program which "shall include a comprehensive planning process which involves public participation and where necessary intergovernmental coordination, to reduce the discharge of pollutants to the maximum extent practicable using management practices, control techniques and system, design and engineering methods, and such other provisions which are appropriate. The program shall also include a description of staff and equipment available to implement the program. [...] Proposed programs may impose controls on a systemwide basis, a watershed basis, a jurisdiction basis, or on individual outfalls. [...] Proposed management programs shall describe priorities for implementing controls."

CWC section 13377 – CWC section 13377 provides that "Notwithstanding any other provision of this division, the state board or the regional boards shall, as required or authorized by the Federal Water Pollution Control Act (CWA), as amended, issue waste discharge requirements and dredged or fill material permits which apply and ensure compliance with all applicable provisions of the act and acts amendatory thereof or supplementary, thereto, together with anymore stringent effluent standards or limitation necessary to implement water quality control plans, or for the protection of beneficial uses, or to prevent nuisance."

In addition to the broad legal authority items cited above, which underlie all of the directives in Order No. R9-2004-001, additional specific legal authority citations applicable to particular directives of the Order are provided in this Fact Sheet as necessary.

Order No. R9-2004-001 is an essential mechanism for achieving the water quality objectives that have been established for protecting the beneficial uses of the water resources in the Santa Margarita Watershed. Federal NPDES regulation 40 CFR 122.44(d)(1) requires MS4 permits to include any requirements necessary to "achieve water quality standards established under CWA section 303, including State narrative criteria for water quality." The term "water quality standards" in this context refers to a water body's beneficial uses and the water quality objectives necessary to protect those beneficial uses, as established in the Basin Plan.

B. Maximum Extent Practicable (Finding No. 14)

Under CWA section 402(p), municipalities are required to reduce the discharge of pollutants from their MS4s to the maximum extent practicable (MEP). MEP is the critical technology-based performance standard that municipalities must attain in order to comply with their MS4 permits. The MEP standard establishes the level of pollutant reductions the municipality must achieve. The MEP standard can be achieved by means of implementing pollution prevention and source control BMPs (as the first line of defense) in combination with treatment control BMPs serving as a backup (additional line of defense).

The MEP standard is an ever-evolving, flexible, and advancing concept, which considers technical and economic feasibility. As knowledge about controlling urban runoff continues to evolve, so does that which constitutes MEP. Reducing the discharge of storm water pollutants to the MEP requires Permittees to conduct and document evaluation and assessment of each program component and revise activities, control measures, best management practices (BMPs), and measurable goals, as necessary to meet MEP. Because MEP is a dynamic performance standard, it is necessary to describe in greater detail, necessary and effective measures that are essential for compliance. **(Finding No. 14)**

To achieve the MEP standard, municipalities must employ whatever BMPs are technically feasible (i.e., are likely to be effective) and are not cost prohibitive. The major emphasis is on technical feasibility. Reducing pollutants to the MEP means choosing effective BMPs, and rejecting applicable BMPs only where other effective BMPs will serve the same purpose, or the BMPs would not be technically feasible, or the cost would be prohibitive. In selecting BMPs to achieve the MEP standard, the following factors may be useful to consider:

1. Effectiveness: Will the BMPs address a pollutant (or pollutant source) of concern?
2. Regulatory Compliance: Is the BMP in compliance with storm water regulations as well as other environmental regulations?
3. Public Acceptance: Does the BMP have public support?
4. Cost: Will the cost of implementing the BMP have a reasonable relationship to the pollution control benefits to be achieved?
5. Technical Feasibility: Is the BMP technically feasible considering soils, geography, water resources, etc?

If a municipality reviews a lengthy menu of BMPs and chooses to select only a few of the least expensive BMPs, it is likely that MEP has not been met. On the other hand, if a municipal discharger employs all applicable BMPs except those where it can show that they are not technically feasible in the locality, or whose cost is prohibitive, it would have met the standard. Where a choice may be made between two BMPs that should provide generally comparable effectiveness, the discharger may choose the least expensive alternative and exclude the more expensive BMP. However, it would not be acceptable either to reject all BMPs that would address a pollutant source, or to pick a BMP base solely on cost, which would be clearly less effective. In selecting BMPs the municipality must make a serious attempt to comply and practical solutions may not be lightly rejected. In any case, the burden would be on the municipal discharger to show compliance with its permit. After selecting a menu of BMPs, it is the responsibility of the discharger to ensure that all BMPs are implemented. (SWRCB, 1993)

A definition of MEP is not provided in either the federal statute or in the federal regulations. The final determination regarding whether a municipality has reduced pollutants to the MEP can only be made by the SDRWQCB or the SWRCB, and not by the municipal discharger. While the SDRWQCB or the SWRCB ultimately define MEP, it is the responsibility of the Permittees to initially propose actions that implement BMPs to reduce pollution to the MEP. In other words, the Permittees' Individual and Watershed SWMPs to be developed under the Order are the Permittees' proposals of MEP. Their total collective and individual activities

conducted pursuant to their SWMPs become their proposal for MEP as it applies both to their overall effort, as well as to specific activities.

It is the SDRWQCB's responsibility to evaluate the proposed programs and specific BMPs to determine what constitutes MEP, using the above guidance and the court's 1994 decision in NRDC v. California Department of Transportation, Federal District Court, Central District of California. The federal court stated that a permittee must evaluate and implement BMPs except where (1) other effective BMPs will achieve greater or substantially similar pollution control benefits; (2) the BMP is not technically feasible; or (3) the cost of BMP implementation greatly outweighs the pollution control benefits. In the absence of a proposal acceptable to the SDRWQCB, the SDRWQCB will define MEP by requiring implementation of additional measures by the Permittees.

The Order represents the SDRWQCB's definition of MEP. The Order provides a minimum framework that allows Permittees the flexibility to develop and implement their own unique programs and BMP requirements and to improve and modify them as necessary to achieve and maintain compliance with the Order, and therefore, the MEP standard. The EPA supports the SDRWQCB's finding that the Order is consistent with the MEP standard when it states, "Overall, we believe that the permit [Order No. R9-2004-001] is fully consistent with the Clean Water Act (CWA), EPA regulations, and is appropriate for the Santa Margarita Watershed..." (EPA, 2004).

C. BMP Implementation (Finding Nos. 15, 16 and 17)

Pollutants can be effectively reduced in urban runoff by the application of a combination of pollution prevention, source control, and treatment control BMPs. Pollution prevention is the reduction or elimination of pollutant generation at its source and is the best "first line of defense". Source control BMPs (both structural and non-structural) minimize the contact between pollutants and flows (e.g., rerouting run-on around pollutant sources or keeping pollutants on-site and out of receiving waters). Treatment control BMPs remove pollutants from urban runoff. (**Finding No. 15**)

The SWRCB finds in its Order WQ 98-01 that BMPs are effective in reducing pollutants in urban runoff, stating that "implementation of BMPs [is] generally the most appropriate form of effluent limitations when designed to satisfy technology requirements, including reduction of pollutants to the maximum extent practicable." The TAC further supports this finding by recommending "that nonpoint source pollution control can be accomplished most effectively by giving priority to [BMPs] in the following order:

1. Pollution Prevention – implementation of practices that use or promote pollution free alternatives;
2. Source Control – implementation of control measures that focus on preventing or minimizing urban runoff from contacting pollution sources;
3. Treatment Control – implementation of practices that require treatment of polluted runoff either onsite or offsite."

Pollution prevention, the reduction or elimination of pollutant generation at its source, is an essential aspect of BMP implementation. By limiting the generation of pollutants by urban activities, less pollutants are available to be washed from urban areas, resulting in reduced

pollutant loads in storm water discharges from these areas. In addition, there is no need to control or treat pollutants that are not initially generated. Furthermore, pollution prevention BMPs are generally more cost effective than removal of pollutants by treatment facilities or cleanup of contaminated media (Schueler, 2000).

In the Pollution Prevention Act of 1990, Congress established a national policy that emphasizes pollution prevention over control and treatment. CWC section 13263.3(a) also supports pollution prevention, stating "The Legislature finds and declares that pollution prevention should be the first step in a hierarchy for reducing pollution and managing wastes, and to achieve environmental stewardship for society. The Legislature also finds and declares that pollution prevention is necessary to support the federal goal of zero discharge of pollutants into navigable waters." Finally, the Basin Plan also supports this finding by stating "To eliminate pollutants in storm water, one can either clean it up by removing pollutants or prevent it from becoming polluted in the first place. Because of the overwhelming volume of storm water and the enormous costs associated with pollutant removal, pollution prevention is the only approach that makes sense" (SDRWQCB, 1994).

Controlling urban runoff pollution by using a combination of onsite source control BMPs augmented with treatment control BMPs before the runoff enters the MS4 is important for the following reasons: (1) Many end-of-pipe BMPs (such as diversion to the sanitary sewer) are typically ineffective during significant storm events. Whereas, onsite source control BMPs can be applied during all runoff conditions; (2) End-of-pipe BMPs are often incapable of capturing and treating the wide range of pollutants which can be generated on a sub-watershed scale; (3) End-of-pipe BMPs are more effective when used as polishing BMPs, rather than the sole BMP to be implemented; (4) End-of-pipe BMPs do not protect the quality or beneficial uses of receiving waters between the source and the BMP; and (5) Offsite end-of-pipe BMPs do not aid in the effort to educate the public regarding sources of pollution and their prevention (**Finding No. 17**).

The EPA also supports the utilization of a combination of BMPs to address pollutants in urban runoff. For example, the EPA has found there has been success in addressing illicit discharge related problems through BMP initiatives like storm drain stenciling and recycling programs, including household hazardous waste special collection days (EPA, 1999b). Structural BMP performance data has also been compiled and summarized by the EPA (EPA, 1999e). This data indicates that structural BMPs can be effective in reducing pollutants in urban runoff discharges. The summary provides the performance ranges of various types of structural BMPs for removing suspended solids, nutrients, pathogens, and metals from storm water flows. These pollutants are in general the pollutants of most concern in storm water in the San Diego Region. For suspended solids, the least effective structural BMP type was found to remove 30-65% of the pollutant load, while the most effective was found to remove 65-100% of the pollutant load. For nutrients, the least effective structural BMP type was found to remove 15-45% of the pollutant load, while the most effective was found to remove 65-100% of the pollutant load. For pathogens, the least effective structural BMP type was found to remove <30% of the pollutant load, while the most effective was found to remove 65-100% of the pollutant load. For metals, the least effective structural BMP type was found to remove 15-45% of the pollutant load, while the most effective was found to remove 65-100% of the pollutant load.

As discussed above, developing minimum BMPs and implementing or requiring their implementation at industrial and commercial facilities, construction sites, and residential areas is necessary for the Permittees to ensure that, ultimately, discharges of pollutants into and from its MS4 are reduced to the MEP (**Finding No. 16**). Therefore, **Sections F through H of the Order** require Permittees to develop and require the implementation of minimum BMPs, including pollution prevention as a first line of defense, to reduce the discharge of pollutants in urban runoff to the MEP from all areas and activities with their jurisdictions.

D. Permittee Responsibility for Requiring BMPs (Finding No. 28)

Through its permitting processes, each Permittee authorizes the three major phases of urban development within its jurisdiction. Therefore, each Permittee must assume responsibility for its urban development decisions. The federal regulations clearly require municipalities to address urban runoff during each stage of development. Regarding BMP implementation during each stage of urban development, the EPA recommends that Permittees ensure the appropriate implementation of the structural BMPs by considering some or all of the following: pre-construction review of BMP designs; inspections during construction to verify BMPs are built as designed; post-construction inspection and maintenance of BMPs; and penalty provisions for noncompliance with design, construction or operation and maintenance (EPA, 1999b).

Since municipalities approve and permit construction and land use within their jurisdiction, they must assume responsibility for urban runoff discharges from these activities and land uses. The Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(A – D) are clear in placing responsibility on municipalities for control of urban runoff from third party activities and land uses to their MS4 (EPA, 2000a). In order for municipalities to assume this responsibility, they must implement ordinances, permits, and plans addressing urban runoff from third parties. Assessments for compliance with their ordinances, permits, and plans are essential for a municipality to ensure that third parties are not causing the municipality to be in violation of its municipal storm water permit. When conditions of non-compliance are determined, enforcement is necessary to ensure that violations of municipality ordinances and permits are corrected. As stated in **Finding No. 28**, each Permittee is responsible for adoption and enforcement of ordinances and/or policies, implementation of identified BMPs, and for the allocation of funds for the capital, operation, and maintenance, and enforcement expenditures necessary to implement and enforce such BMPs within its jurisdiction. Therefore, when a Permittee determines a violation of its storm water ordinance, it must pursue correction of the violation. Without enforcement, third parties do not have incentive to correct violations. The EPA supports inspections and enforcement by municipalities when it states "Effective inspection and enforcement requires [...] penalties to deter infractions and intervention by the municipal authority to correct violations. Enforcement mechanisms [...] also must be described" (EPA, 1992a).

MS4 permits are issued to municipalities because of their land use authority. The ultimate responsibility for the pollutant discharges, increased runoff, and inevitable long-term water quality degradation that results from urbanization lies with local governments. This responsibility is based on the fact that it is the local governments that have authorized the urbanization (i.e., conversion of natural pervious ground cover to impervious urban surfaces) and the land uses that generate the pollutants and runoff. Furthermore, the MS4 through which

the pollutants and increased flows are conveyed, and ultimately discharged into natural receiving waters, are owned and operated by the same local governments. In summary, the Permittees under the Order are responsible for discharges into and out of their MS4s because (1) they own and operate the MS4; and (2) they have the legal authority that authorizes the very development and land uses with generate the pollutants and increased flows in the first place.

For example, since grading cannot commence prior to the issuance of a local grading permit, the Permittees have a built-in mechanism to ensure that all grading activities are protective of receiving water quality. The Permittee has the authority to withhold issuance of the grading permit until the project proponent has demonstrated to the satisfaction of the Permittee that the project will not violate the Permittee's ordinances or cause the Permittee to be in violation of its MS4 permit. Since the Permittee will ultimately be held responsible for any discharges from the grading project by the SDRWQCB, the Permittee will want to use its own permitting authority to ensure that whatever measures the Permittee deems necessary to protect discharges into its MS4 are in fact taken by the project proponent.

Order No. R9-2004-001 holds the local government accountable for this direct link between its land use decisions and water quality degradation. The Order recognizes that each of the three major stages in the urbanization process (development planning, construction, and the use or operational stage) are controlled by and must be authorized by the local government. Developing minimum BMPs and implementing or requiring their implementation at industrial and commercial facilities, construction sites, and residential areas is necessary for the Permittees to ensure that, ultimately, discharges of pollutants into and from its MS4 are reduced to the MEP (**Finding No. 16**). As discussed in **Finding No. 20**, Permittees cannot passively receive and discharge pollutants from third parties (within or outside of their jurisdiction). In the absence of BMPs, these discharges may cause or contribute to a condition of contamination or exceedances of receiving water quality objectives. Accordingly, the Order requires the local government to implement, or require others to implement, appropriate BMPs to reduce pollutant discharges and increased flow during each of the three stages of urbanization.

E. Dual Regulation of Industrial and Construction Sites (Finding No. 21)

In accordance with federal NPDES regulations and to ensure the most effective oversight of industrial and construction site discharges, discharges of runoff from industrial and construction sites are subject to dual (state and local) storm water regulation. Under this dual system, the SDRWQCB is responsible for enforcing the statewide General Construction Activities Storm Water Permit, SWRCB Order 97-03 DWQ, NPDES No. CAS000001 (General Construction Permit) and the statewide General Industrial Activities Storm Water Permit, SWRCB Order 99-08 DWQ, NPDES No. CAS000002 (General Industrial Permit), and each municipal Permittee is responsible for enforcing its local permits, plans, and ordinances, which may require the implementation of additional BMPs than required under the statewide general permits. (**Finding No. 21**)

According to the EPA, the storm water regulations envision that NPDES permitting authorities [SDRWQCB] and municipal operators [the Permittees] will cooperate to develop programs to monitor and control pollutants in storm water discharges from industrial facilities (EPA, 1992a).

The EPA discusses the "dual regulation" of construction sites in its Storm Water Phase II Compliance Assistance Guide (EPA, 2000c), which states "Even though all construction sites that disturb more than one acre are covered nationally by an NPDES storm water permit, the construction site runoff control minimum measure [...] is needed to induce more localized site regulation and enforcement efforts, and to enable operators [...] to more effectively control construction site discharges into their MS4s." While the Storm Water Phase II Compliance Assistance Guide applies to small municipalities, it is applicable to the Permittees, because they are similar in size and have the potential to discharge similar pollutant types as Phase II municipalities.

Municipalities assume initial responsibility for enforcement against illegal discharges from land uses and activities within their jurisdiction because of their land use authority. Since the municipality approves and permits development and land use, it must ensure that its development or land use decisions do not result in receiving water quality degradation. The SDRWQCB will assist municipalities in enforcement against non-compliant sites after the municipality has exhibited a good faith effort to bring the site into compliance.

VIII. DISCUSSION OF PERMIT REQUIREMENTS

This section discusses each component of Order No. R9-2004-001. Each discussion includes the specific legal authority in addition to the broad legal authority discussed in section VII.A of this Fact Sheet, a discussion of the requirements, and comments on the Permittees' existing and proposed programs related to each component.

A. PROHIBITIONS (Order Section A)

1. Specific Legal Authority for Prohibitions

- CWA section 402(p)(3)(B)(ii) states that municipalities shall "effectively prohibit non-stormwater discharges **into** the storm sewers."
- CWA section 402(p)(3)(B)(iii) requires that permits for discharges from MS4s "shall require controls to reduce the discharge of pollutants to the maximum extent practicable, including management practices, control techniques and system, design and engineering methods, and such other provisions as the Administrator or the State determines appropriate for the control of such pollutants."
- Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(A - D) require municipalities to have legal authority to control various discharges **to** their MS4.
- Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(A - D) require municipalities to implement controls to reduce pollutants in urban runoff **from** commercial, residential, industrial, and construction land uses or activities.
- Federal NPDES regulation 40 CFR 122.44(d)(1)(i) requires NPDES permits to include limitations to "control all pollutants or pollutant parameters (either conventional, nonconventional, or toxic pollutants) which the Director determines are or may be discharged at a level which will cause, have reasonable potential to cause, or contribute to an excursion above any State water quality standard, including State narrative criteria for water quality."

- The Basin Plan contains the following waste discharge prohibition: "The discharge of waste to waters of the state in a manner causing, or threatening to cause a condition of pollution, contamination, or nuisance as defined in California Water Code section 13050, is prohibited."
- CWC section 13050(l) states "(1) 'Pollution' means an alteration of the quality of waters of the state by waste to a degree which unreasonably affects either of the following: (A) The water for beneficial uses. (B) Facilities which serve beneficial uses. (2) 'Pollution' may include 'contamination'."
- CWC section 13050(k) states "'Contamination' means an impairment of the quality of waters of the state by waste to a degree which creates a hazard to public health through poisoning or through the spread of disease. 'Contamination' includes any equivalent effect resulting from the disposal of waste, whether or not waters of the state are affected."
- CWC section 13050(m) states "'Nuisance' means anything which meets all of the following requirements: (1) Is injurious to health, or is indecent or offensive to the senses, or an obstruction to the free use of property, so as to interfere with the comfortable enjoyment of life or property. (2) Affects at the same time an entire community or neighborhood, or any considerable number of persons, although the extent of the annoyance or damage inflicted upon individuals may be unequal. (3) Occurs during, or as a result of, the treatment or disposal of wastes."
- CWC section 13241 requires each RWQCB to "establish such water quality objectives in water quality control plans as in its judgment will ensure the reasonable protection of beneficial uses and the prevention of nuisance [...]."
- CWC section 13243 provides that "A regional board, in a water quality control plan or in waste discharge requirements, may specify certain conditions or areas where the discharge of waste, or certain types of waste, will not be permitted."
- CWC section 13263(a) provides that waste discharge requirements prescribed by the SDRWQCB implement the Basin Plan.

2. Discussion of Prohibitions

The entire thrust of Order No. R9-2004-001 is to prevent discharges from MS4s from causing, or threatening to cause, a condition of pollution, contamination, or nuisance. In fact, **Prohibition A.1** exhibits a major component of the SDRWQCB's mission, and is included in its Basin Plan. The SDRWQCB seeks to preserve and enhance the quality of the region's waters, and one primary method to achieve this is by preventing conditions of pollution, contamination, or nuisance in the region's waters.

Because discharges that enter the MS4 are generally discharged unimpeded directly into receiving waters, **Prohibition A.1** applies to both discharges into and from MS4s. Federal NPDES regulations clearly provide the SDRWQCB with the legal authority to require municipalities to control discharges from third parties into their MS4. 40 CFR 122.26(d)(2)(iv)(A - D) require municipalities to implement controls to reduce pollutants in urban runoff from commercial, residential, industrial, and construction land uses or activities. Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(A - D) require municipalities to have legal

authority to control various discharges to their MS4. This concept is further supported in the Preamble to the Phase II Final Rule NPDES storm water regulations, which states "The operators of regulated small MS4s cannot passively receive and discharge pollutants from third parties" (EPA, 1999b). As discussed in section VII.E of this Fact Sheet, Phase II Final Rule findings are applicable to the Permittees. Finally, underlying the Federal NPDES storm water regulations is the CWA, which states in Section 402(p)(3)(B)(ii) that municipalities shall "effectively prohibit non-stormwater discharges into the storm sewers."

As with Prohibition A.1, **Prohibition A.2** also characterizes a primary goal of Order No. R9-2004-001 and the SDRWQCB. This goal is to protect the beneficial uses of the region's waters and achieve the water quality objectives necessary to protect those uses. The overarching intent of the CWA embodies **Prohibition A.2** as well; the CWA's objective is to "restore and maintain all chemical, physical and biological integrity of the Nation's waters [to make all surface waters] fishable [and] swimmable."

Prohibition A.3 is consistent with the direction provided in SWRCB Order WQ 2001-15 (SWRCB, 2001). The CWA and Federal NPDES regulations clearly require operators of MS4s to reduce pollutants in discharges from MS4s to the MEP. Therefore, the SDRWQCB has prohibited discharges that do not meet this requirement.

Prohibition A.4 pertains to the Basin Plan Prohibitions, which were established by the SDRWQCB pursuant to CWC section 13243. The SDRWQCB is required to implement Basin Plan Prohibitions in Order No. R9-2004-001 pursuant to CWC section 13263(a).

3. Comments on Existing and Proposed Programs Related to Prohibitions

The Permittees report in Section 2.5 of the ROWD states "The Permittees shall continue to maintain adequate legal authority to control the contribution of pollutants to the MS4s by urban runoff and enforce those authorities." The Permittees further report that they are taking "the necessary steps… to ensure that non-storm water discharges to their MS4s do not cause or contribute to violations of water quality objectives or discharge pollutants to waters of the U.S." In addition, Section 3.1 of the ROWD states "The Permittees shall prohibit illicit discharges from entering into the MS4 and require controls to reduce the discharge of pollutants to the [MEP]." The Permittees should determine if they need to revise their existing ordinances to provide the authority to specifically prohibit discharges from their MS4s that have not been reduced to the MEP.

Discharge Prohibition A.4 is not specifically addressed in the ROWD. Again the Permittees should determine if they need to revise their existing ordinances to provide the authority to specifically prohibit discharges in violation of Basin Plan prohibitions cited in Attachment A to Order No. R9-2004-001.

B. NON-STORM WATER DISCHARGES (Order Section B)

1. Specific Legal Authority for Non-Storm Water Discharge Requirements

- Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B) requires MS4 operators "to detect and remove (or require the discharger to the municipal separate storm sewer to obtain a separate NPDES permit for) illicit discharges and improper disposal into the storm sewer."

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- Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B)(1) provides that the Permittees shall prevent all types of illicit discharges into the MS4 except for the non-storm water discharges listed in Prohibition B.2, provided that these discharges are not found to be a significant source of pollutants to waters of the U.S.
- CWA section 402(p)(3)(B)(ii) requires each Permittee to prohibit non-storm water discharges into its MS4.
- Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B)(2) requires that Permittees shall provide "A description of procedures to conduct on-going field screening activities during the life of the permit, including areas or locations that will be evaluated by such field screens."
- Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B)(3) provides that Permittees shall "investigate portions of the separate storm sewer system that, based on the results of a field screen, or other appropriate information, indicate a reasonable potential of containing illicit discharges or other sources on non-storm water."
- CWC section 13267 provides that "the regional board may require that any person who has discharged [...] shall furnish, under penalty of perjury, technical or monitoring reports which the regional board requires."

2. Discussion of Non-Storm Water Discharge Requirements

The discharges listed in Non-Storm Water Discharges **Requirement B.2** are referred to as "de minimis" discharges in the Federal NPDES regulations. However, if a municipality identifies any of these discharges as a source of pollutants to waters of the U.S., they must be addressed in the municipalities storm water management plan (40 CFR 122.26(d)(2)(iv)(B)(1)).

The list of "de minimis" discharges in **Requirement B.2** is essentially the same as the current list prescribed by EPA in NPDES Permit No. CAS0108766 and identical to the list in State Board Order No. 2003-0005-DWQ, the General Storm Water Permit for small MS4s (SWRCB, 2003).

3. Comments on Existing and Proposed Programs Related to Non-Storm Water Discharge Requirements

The Permittees currently have the legal authority to prohibit non-storm water discharges to the MS4, and their existing ordinance contains a list of non-prohibited non-storm water discharges that is consistent with the Order.

In Section 3.1 of the ROWD, the Permittees proposed to add street wash water, fire hydrant testing and flushing, and other types of discharges identified and recommended by the Permittees to their list of allowable non-storm water discharges. Fire hydrant testing and flushing is a category of discharge that is considered by the SDRWQCB as a Non-emergency fire fighting flow (**Requirement B.2.q.**). Order No. R9-2004-001 requires that Permittees address discharges from non-emergency fire fighting activities when those discharges are identified as a significant source of pollutants. However, the EPA determined street wash water to be contaminated and deleted it as a non-prohibited discharge when it issued NPDES Permit CAS0108766 in April 1999 (EPA, 1999d). The Permittees have not provided

monitoring data to document that street wash water does not contain pollutants that pose a threat to water quality. In addition, SWRCB Order No. 99-06-DWQ, the Statewide Storm Water permit for Caltrans and State Board Order No. 2003-0005-DWQ, the General Storm Water Permit for small MS4s do not include street wash water as a non-prohibited discharge. Therefore, the SDRWQCB did not include street wash water on the list in **Requirement B.2** of the Order.

The discharge categories in 40 CFR 122.26(d)(2)(iv)(B)(1) comprise an inclusive and not exemplary list. Consequently, the SDRWQCB does not have the authority to add other discharge categories to the list. Pursuant to **Requirement B.1**, discharges other than those listed in Requirement B.2. are allowed if authorized by a separate NPDES permit.

Although Section 3.1 of the ROWD states that Permittees will prohibit any of the listed discharges if they are identified by the Permittees or the SDRWQCB as a source of pollutants, **Requirement B.2** of the Order allows the Permittees the option to implement BMPs to reduce pollutants to the MEP.

Pursuant to Order No. R9-98-02, the Permittees developed BMPs to address fire fighting activities (Permittees, 2000). These BMPs should be incorporated into the Permittees' SWMPs.

C. RECEIVING WATER LIMITATIONS (Order Section C)

1. Specific Legal Authority for Receiving Water Limitations (RWL) Requirements

- CWC section 13241 provides that the "SDRWQCB shall establish such water quality objectives in water quality control plans as in its judgment will ensure the reasonable protection of beneficial uses and the prevention of nuisance."
- CWC section 13263(a) provides that waste discharge requirements prescribed by the SDRWQCB implement the Basin Plan.

2. Discussion of RWL Requirements

As stated in **Finding No. 23**, the RWL language specified in the Order is consistent with language recommended by the EPA and established in SWRCB Order WQ-99-05 (SWRCB, 1999a). The RWL in the Order require compliance with water quality standards through an iterative approach for implementing improved and better-tailored BMPs over time.

The iterative BMP process requires the implementation of increasingly stringent BMPs until receiving water standards are achieved. This is necessary because implementation of BMPs alone cannot ensure attainment of receiving water quality objectives. For example, a BMP that is effective in one situation may not be applicable in another. An iterative process of BMP development, implementation, and assessment is needed to promote consistent compliance with receiving water quality objectives. If assessment of a given BMP confirms that the BMP is ineffective, the iterative process should be restarted, with redevelopment of a new BMP that is anticipated to result in compliance with receiving water quality objectives.

On October 14, 1999, the SWRCB issued a legal opinion on the federal appellate decision and provided advice to the RWQCBs on how to proceed in the future (SWRCB, 1999b). In the memorandum, the SWRCB concludes that the recent Ninth Circuit opinion upholds the

discretion of the EPA and the State to (continue to) issue permits to MS4s that require compliance with water quality standards through iterative BMPs. Moreover, the memorandum states, "[...] because most MS4 discharges enter impaired water bodies, there is a real need for permits to include stringent requirements to protect those water bodies. As total maximum daily loads (TMDLs) are developed, it is likely that MS4s will have to participate in pollutant load reductions, and the MS4 permits are the most effective vehicles for those reductions." In summary, the SWRCB concludes that the RWQCBs should continue to include the RWL language established in SWRCB Order WQ 99-05 in all future permits.

It should be noted that while implementation of the iterative BMP process is a means to achieve compliance with water quality objectives, it does not shield the discharger from enforcement actions for continued non-compliance with water quality objectives. Consistent with EPA guidance (EPA, 1998a and 1998b) regardless of whether or not an iterative process is being implemented, discharges that cause or contribute to an exceedance of water quality objectives are in violation of Order No. R9-2004-001.

3. Comments on Existing and Proposed Programs Related to RWL Requirements

The RWL requirements were not discussed in the ROWD.

D. LEGAL AUTHORITY (Order Section D)

1. Specific Legal Authority for Legal Authority Requirements

- Federal NPDES regulation 40 CFR 122.26(d)(2)(i)(A) provides that the Permittees shall develop and implement legal authority to "Control through ordinance, order or similar means, the contribution of pollutants to the municipal storm sewer by storm water discharges associated with industrial activity and the quality of storm water discharged from sites of industrial activity."
- Federal NPDES regulation 40 CFR 122.26(d)(2)(i)(D) provides that the Permittees shall develop and implement legal authority to "Control through interagency agreements among coapplicants the contribution of pollutants from one portion of the municipal system to another portion of the municipal system."
- Illicit discharge is defined under Federal NPDES regulation 40 CFR 122.26(b)(2) as "any discharge to a municipal separate storm sewer system that is not composed entirely of storm water except discharges pursuant to a NPDES permit (other than the NPDES permit for discharges from the municipal separate storm sewer) and discharges resulting from fire fighting activities."
- Federal NPDES regulation 40 CFR 122.26(b)(14) provides that "The following categories of facilities are considered to be engaging in 'industrial activity' for purposes of this subsection: [...] Construction activity including clearing, grading and excavation activities [...]."
- Federal NPDES regulation 40 CFR 122.26(d)(1)(ii) requires from the Permittee "A description of existing legal authority to control discharges to the municipal separate storm sewer system."

- Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(A - D) require municipalities to implement controls to reduce pollutants in urban runoff from commercial, residential, industrial, and construction land uses or activities.
- CWC section 13243 also provides that a "regional board, in a water quality control plan or in waste discharge requirements, may specify certain conditions or areas where the discharge of waste, or certain types of waste, will not be permitted."

2. Discussion of Legal Authority Requirements

An important means for a municipality to control the discharge of pollutants in urban runoff is through development of municipal legal authority. The EPA states "A crucial requirement of the NPDES storm water regulation is that a municipality must demonstrate that it has adequate legal authority to control the contribution of pollutants in storm water discharged **to** its MS4. [...] In order to have an effective municipal storm water management program, a municipality must have adequate legal authority to control the contribution of pollutants to the MS4. [...] 'Control,' in this context, means not only to require disclosure of information, but also to limit, discourage, or terminate a storm water discharge to the MS4" (EPA, 1992a).

Since discharges that enter the MS4 are generally discharged unimpeded directly into receiving waters, the Permittees' legal authority is to apply to both discharges **into** and **from** MS4s. Federal NPDES regulations clearly provide the SDRWQCB with the legal authority to require municipalities to control discharges from third parties into their MS4. 40 CFR 122.26(d)(2)(iv)(A - D) require municipalities to implement controls to reduce pollutants in urban runoff from commercial, residential, industrial, and construction land uses or activities. Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(A - D) require municipalities to have legal authority to control various discharges **to** their MS4. This concept is further supported in the Preamble to the Phase II NPDES storm water regulations, which states "The operators of regulated small MS4s cannot passively receive and discharge pollutants **from** third parties" (EPA, 1999b). As discussed in section VII.E of this Fact Sheet, Phase II findings for small municipalities are applicable to the Permittees. Finally, underlying the Federal NPDES storm water regulations is the CWA, which states in section 402(p)(3)(B)(ii) that municipalities shall "effectively prohibit non-stormwater discharges **into** the storm sewers."

In order to effectively prohibit illicit or non-storm water discharges, legal authority addressing the discharges must be developed and implemented by each Permittee (see discussion of **Finding No. 28** in Section VII.D of this Fact Sheet). An illicit connection is a connection to the MS4 that carries an illicit discharge. Because illicit discharges to the MS4 are prohibited, illicit connections are also prohibited and must be eliminated. In order to effectively prohibit and eliminate illicit connections, legal authority addressing the discharges must be developed and implemented by each Permittee.

In order for the ordinances to be effective, each Permittee must be able to require compliance with the ordinances. Lack of ordinance enforcement by a Permittee allows third parties to violate a municipality's ordinances with little fear of retribution, leading to receiving water quality degradation. The EPA recommends that a municipality in its urban runoff management program "identify the administrative and legal procedures available to mandate compliance with appropriate ordinances, and therefore, with permit conditions. [Programs] should contain descriptions of how ordinances are implemented and appealed. In particular,

a municipality should indicate if it can issue administrative orders and injunctions or if it must go through the court system for enforcement actions" (EPA, 1992a).

Discharges from Permittees that share an MS4 eventually reach the same receiving water body. Each Permittee that discharges to the shared MS4 is therefore responsible for discharges from the shared MS4, and the impacts of those discharges on receiving waters. The Permittees of a shared MS4 must demonstrate that together they can control the contribution of pollutants over the whole shared MS4. To this effect, the EPA states "When two or more municipalities submit a joint application, each coapplicant must demonstrate that it individually possesses adequate legal authority over the entire municipal system it operates and owns. A coapplicant need not fulfill every component of legal authority specified in the regulations, as long as the combined legal authority of all coapplicants satisfies the regulatory criteria for every segment of the MS4 (including authority over all sources that discharge to the MS4). [...] Coapplicants also may use interjurisdictional agreements to show legal authority and to ensure planning, coordination, and the sharing of the resource burden of permit compliance" (EPA, 1992a).

The Permittees' ability to determine compliance and noncompliance with permit conditions is critical to control pollutant discharges to and from MS4s. Determination of compliance and noncompliance allows for significant sources of pollutants to be identified and addressed, thereby minimizing the discharge of pollutants from the MS4 and the resulting receiving water quality degradation. For this reason each Permittee must have legal authority to carry out the inspections, surveillance, and monitoring necessary to assess compliance. Regarding compliance determination, the EPA states "municipalities should provide documentation of their authority to enter, sample, inspect, review, and copy records, etc., as well as demonstrate their authority to require regular reports" (EPA, 1992a).

Permittees must demonstrate that they can operate pursuant to legal authority to meet the requirements of Federal NPDES regulations 40 CFR 122.26(d)(2)(A-F). For the Permittee to demonstrate this legal authority, the EPA suggests that "One acceptable way to support a declaration of adequate legal authority, including the ability to enforce appropriate ordinances, is for the municipality to provide a certification from the Municipal General Counsel or equivalent. The certification should state that the applicant has the legal authority to apply and enforce the requirements of 40 CFR 122.26(d)(2)(i)(A-F) in State or local courts. The certification would, therefore, cite specific ordinances and the reasons why they are enforceable. The statement should discuss what the municipality can do to ensure full compliance with 40 CFR 122.26(d)(2)(i)" (EPA, 1992a).

3. Comments on Existing and Proposed Programs Related to Legal Authority

Section 2.4.1 of the ROWD states that the Permittees have adopted a comprehensive storm water ordinance and have previously provided a certification of adequate legal authority to the SDRWQCB. The Permittees may have had adequate legal authority to implement Order No. R9-98-02, but the existing ordinances may need to be updated to reflect requirements contained in Order No. R9-2004-001 (i.e. the required implementation of designated minimum BMPs that each Permittee develops for industrial and commercial sites, residential areas and activities, and construction sites), and a new certification will need to be submitted. The Permittees report in Section 2.4 of the ROWD that the Permittees have the legal authority

to prohibit the disposal of pollutants onto public or private land, to prohibit illicit connections and discharges and to prohibit non-storm water discharges (except for those specifically listed).

Section 2.4.1 of the ROWD states that Permittees have the authority to require construction activity to comply with local erosion and sediment control ordinances. Industrial sites are not specifically addressed in the ROWD. However, the ordinances that are currently in place in Riverside County and the City of Temecula state that any industrial discharger, discharger associated with construction activity, or other discharger subject to an NPDES permit shall comply with all requirements of such permit. Compliance with the General Industrial Permit and the General Construction Permit is specifically required.

Section 2.4.1 of the ROWD states that the Permittees have the authority to prohibit illicit connections and discharges to the MS4 and to prohibit the disposal of pollutants on public or private land.

Section 2.4.2.2 of the ROWD lists various enforcement/compliance mechanisms, but is vague about how they will be used. The ROWD states that the SDRWQCB will take the lead in initiating enforcement actions related to high priority incidents. This is incorrect and must be revised in the SWMP. Permittees are responsible for enforcing compliance with all aspects of Order No. R9-2004-001.

Although specific **Requirements D.1.g., D.1.h. and D.1.i**. are not addressed in the ROWD, the model urban runoff ordinance adopted by the Permittees (Riverside County, 1995), requires compliance with existing and future MS4 permits. This general statement may provide adequate legal authority to comply with these requirements of Order No. R9-2004-001.

It should be noted that the ROWD states that the SDRWQCB will take the lead in initiating enforcement actions related to high priority incidents. This is incorrect and must be revised in the SWMP. Permittees are responsible for enforcing compliance with all aspects of Order No. R9-2004-001.

It should also be noted that the District does not have an ordinance to prohibit illicit discharges to its MS4(s) or to require implementation of MS4 permits. The District relies on the legal authority of the municipalities that have jurisdiction over the land uses within the District.

E. STORM WATER MANAGEMENT PLAN (SWMP) (Order Section E)

1. Specific Legal Authority for SWMP Requirements

Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(A) – (D) require that permittees develop a management program that covers the duration of the permit. The regulations require that permittee plans include descriptions of each required program component to demonstrate how they will reduce pollutants to the MEP using management practices, control techniques and systems, design and engineering methods.

2. Discussion of SWMP Requirements

To meet the above-referenced federal requirements, Section E of the Order requires the development of **Individual and Watershed SWMPs**, and Attachment D provides specific

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information that, where applicable, must be included in each Permittee's SWMP. The framework provided in Attachment D allows the Permittees to develop the programs, activities, and measures that will satisfy or exceed the requirements of the federal regulations, and therefore, the Order. It provides the Permittees with the flexibility and discretion to build upon existing programs and develop BMP requirements most appropriate for their jurisdiction.

The Order requires each Permittee to develop its own **Individual SWMP**. This is necessary for each Permittee to describe their own specific programs and activities that will be implemented to reduce pollutants in discharges of urban runoff within their jurisdiction to the MEP. For example, Permittees may have different enforcement protocol or development project review procedures, while another Permittee may lack a program component altogether (i.e., the District has no jurisdiction over residential, commercial, or industrial areas). Therefore, individual plans specific to each Permittee are necessary.

Section E of the Order also requires the development of a **Watershed SWMP**. This is necessary because watershed-wide issues should be addressed collectively (see Section VIII.K of this Fact Sheet for a discussion of the watershed management approach). Also, some programs are conducted collectively by the Permittees, or solely by the Principal Permittee on behalf of the Permittees. For example, the Permittees collaborate to develop materials and implement the public education program. These area-wide programs and activities should be described in an area-wide plan.

The Order requires the Permittees to develop, submit, and implement the SWMP within one year from the date of adoption (**Finding No. 13**). The one-year time schedule is both necessary and feasible for the following reasons:

- In accordance with 40 CFR 122.26(d)(2)(iv)(A) – (D), the Permittees should have developed a comprehensive SWMP as part of their application for permit renewal. In various correspondence, beginning in July of 2002, the SDRWQCB provided the Permittees with specific information that should have been addressed in the management plan to be submitted as an application. The Permittees have disregarded these requests for a detailed SWMP and submitted an application that stated that the DAMP would be revised within 18 months of permit adoption. Providing the Permittees 365 days from the date of permit adoption, is essentially providing them with an additional year. Further additional time is not justified.
- The requirements are based on federal NPDES regulations that have been in place for 13 years. Therefore, the Permittees should have an existing plan that can feasibly be improved to meet the current expectation of the MEP standard within one year.
- 34 other permittees in the San Diego Region were given 365 days to develop and implement similar requirements. All of these permittees met the requirements in a timely fashion. The City of Escondido said the one-year schedule was reasonable, including the inter-departmental planning and review, public meetings, Planning Commission review and approval, and City Counsel approval. The Permittees have not proven that they are significantly different procedurally from the 34 other permittees to warrant additional time.

- The SDRWQB has provided the Permittees with several acceptable models that can be used as examples.
- In order to reduce pollutants in runoff to the MEP, the Permittees, in the rapidly-developing Upper Santa Margarita Watershed, must implement improved urban runoff management programs as soon as possible.

3. Comments on Existing and Proposed Programs Related to SWMP Requirements

As part of the ROWD, the Permittees proposed to update and modify their existing DAMP, dated March 1993, to incorporate new programs and commitments. Section E and Attachment D of the Order provide direction to the Permittees in revising the DAMP, which serves the purpose of, and should be referred to as, a SWMP. It is not required or necessary for the Permittees to abandon existing programs and management measures. The SWMP is just a framework for each Permittee to describe existing and improved programs that will be implemented during the permit term.

The Permittees proposed to improve the DAMP within 18 months from the adoption of the Order. For the reasons described above, and considering that Permittees will be building on existing programs, one year is ample time to develop a SWMP (consisting of the Individual and Watershed SWMPs).

F. DEVELOPMENT PLANNING (Order Section F)

1. Specific Legal Authority for Development Planning Requirements

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A)(2) provides that Permittees' proposed SWMPs must include "A description of planning procedures including a comprehensive master plan to develop, implement and enforce controls to reduce the discharge of pollutants from municipal storm sewers which receive discharges from areas of new development and significant redevelopment. Such plan shall address controls to reduce pollutants in discharges from municipal separate storm sewers after construction is completed." This regulation generally applies to all directives contained in Requirements F.1-F.4 of Order No. R9-2004-001.

2. Discussion of Development Planning Requirements

As discussed in section VI of this Fact Sheet, urban development can negatively impact water quality by increasing the pollutant load, volume, and velocity of urban runoff. An effective means for minimizing these impacts is to address water quality concerns during the planning phase of urban development. The EPA supports this, stating "Post-construction storm water management in areas undergoing new development or redevelopment is necessary because runoff from these areas has been shown to significantly effect receiving water bodies. Many studies indicate that prior planning and design for the minimization of pollutants in post-construction storm water discharges is the most cost-effective approach to storm water quality management" (EPA, 2000c). The Preamble to the Phase I Final Rule emphasizes that municipalities with large areas of new development have a greater opportunity to focus controls to reduce pollutants in storm water generated by new developments during the planning phase (55 Fed. Reg. 48053). For these reasons, section F

of the Order No. R9-2004-001 includes requirements for the development and implementation of BMPs to reduce the discharge of pollutants in urban runoff from development projects to the MEP.

The EPA finds that the Permittee "must thoroughly describe how the municipality's comprehensive plan is compatible with the storm water regulations" (EPA, 1992a). To achieve this, in accordance with **Requirement F.1**, the Permittee shall incorporate water quality and watershed protection principles and policies into its general plan (or equivalent plan). The EPA supports addressing urban runoff problems in general plans (or equivalent plans) when it states "Runoff problems can be addressed efficiently with sound planning procedures. Master plans, comprehensive plans, and zoning ordinances can promote improved water quality by guiding the growth of a community away from sensitive areas and by restricting certain types of growth (industrial, for example) to areas that can support it without compromising water quality" (EPA, 2000c).

In the Santa Margarita Watershed, there is concern among resource managers that the cumulative impacts associated with rapid development of the upper watershed will degrade the ecological integrity of the entire watershed (Stein and Ambrose, 1998). Controls on new development are critical for the protection of the sensitive ecological functions and downstream aquifers in the Santa Margarita Watershed.

The principles and policies included in **Requirement F.1** are based on TAC findings (SWRCB, 1994). They incorporate basic measures that have been found to minimize pollutants in urban runoff from new development and redevelopment.

Requirement F.2 directs Permittees to incorporate post-construction BMPs into all new development and redevelopment projects during the planning and approval. The EPA finds that review of development plans during the project approval process is necessary, stating:

> "Proposed storm water management programs should include planning procedures for both during and after construction to implement control measures to ensure that pollution is reduced to the maximum extent practicable in areas of new development and redevelopment. Design criteria and performance standards may be used to assist in meeting this objective. Further, storm water management program goals should be reviewed during planning processes that guide development to appropriate locations and steer intensive land uses away from sensitive environmental areas. [...] A municipality should describe how it plans to implement the proposed standards (e.g., through an ordinance requiring approval of storm water management programs, a review and approval process, and adequate enforcement)" (EPA, 1992a).

Regarding conditions of approval in storm water permits, the EPA finds that "Proposed storm water management programs should include planning procedures for both during and after construction to implement control measures to ensure that pollution is reduced to the maximum extent practicable in areas of new development and redevelopment. Design criteria and performance standards may be used to assist in meeting this objective" (EPA, 1992a). The EPA further finds that "The municipality should consider storm water controls and structural controls in planning, zoning, and site or subdivision plan approval" (EPA, 1992a). In addition, the EPA states each Permittee should "have an ordinance or other

regulatory mechanism requiring the implementation of post-construction runoff controls [...]" (EPA 2000c).

Furthermore, in its Phase II Final Rule, EPA requires small municipalities to "Use an ordinance or other regulatory mechanism to address post-construction runoff from new development and redevelopment projects [...]" (EPA, 1999b). As discussed in section VII.E of this Fact Sheet, Phase II findings and guidance are applicable to the Permittees.

Standard Urban Storm Water Mitigation Plan (SUSMP) - (Requirement F.2.b):

As part of the SWMP, Permittees must also develop SUSMPs for Priority Development Projects. The SUSMPs include requirements for implementation of minimum source control and treatment control BMPs. The treatment control BMPs also have numeric sizing criteria that must be met based on volume or flow (of runoff). By developing and implementing the SUSMPs, the Permittees are reducing the potential negative impacts of urban runoff on receiving waters.

SUSMP requirements are necessary due to the potential for new development to increase the volume, flow velocity, and pollutant load of urban runoff. As the TAC states, "Urban development often results in impacts to the land and consequently the water bodies adjacent to the land. The two major changes that result from urbanization are changes in stream hydrology and an increase in pollutant loading" (SWRCB, 1994). To alleviate these potential negative impacts on receiving waters, each Permittee must develop and implement a SUSMP for various categories of development. This is consistent with EPA guidance, which states "Through ordinances, permits, or contracts, municipalities may mandate storm water controls for new residential, commercial, or industrial developments in order to improve or assure maintenance of the quality of receiving water at or near pre-development levels (EPA, 1992a)". Also, EPA recommends design criteria (such as numeric sizing criteria) and performance standards for post construction BMPs at development sites (EPA, 1992a).

The post-construction requirements and design standards contained in **Section F** of Order No. R9-2004-001 are consistent SWRCB guidance, Superior Court decision, and RWQCB requirements. The SWRCB and RWQCBs have made several recent decisions in regards to inclusion of SUSMP in MS4 permits. In a precendential decision, SWRCB WQ Order No. 2000-11 (SWRCB, 2000b), SWRCB found that the SUSMP provisions constitute MEP for addressing pollutant discharges resulting from Priority Development Projects (**Finding No. 24**). The provisions of Section F of the Order are consistent with those previously issued by the SDRWQCB for Orange County (Order No. R9-2002-0001) and San Diego County (Order No. R9-2001-001), as well as requirements in the Los Angeles County MS4 permit (Order No. R4-2001-182). In SWRCB Order WQ 2001-15, the SWRCB reaffirmed the inclusion of SUSMP requirements as meeting MEP (SWRCB, 2001). On February 13, 2003, the State Superior Court dismissed an appeal of the San Diego County MS4 permit (Order No. R9-2001-001) that includes the SUSMP requirements (Superior Court of CA, 2003).

Requirement F.2.b. gives the Permittees 365 days to develop, adopt, and implement local SUSMPs. This requirement is reasonable because the SUSMPs have been implemented by various neighboring municipalities and several examples of documents and programs exist for the Permittees to use in the development of their own local SUSMPs. For example, on June 12, 2002, the SDRWQCB approved a Final Model SUSMP as meeting the new development and redevelopment controls and SUSMP requirements of the San Diego County

Permit (San Diego Co-Permittees, 2002). The Orange County permittees developed a Model Water Quality Management Plan that can also be used for guidance (County of Orange, 2003). The 640 days for SUSMP implementation requested by the Permittees has not been incorporated into the Order. In addition to the multiple SUSMP examples already available for the Permittees, the City of Murrieta and Riverside County will have developed SUSMP-type requirements pursuant to the Santa Ana RWQCB MS4 permit (Order No. R8-2002-0011) by January 2005, well before the 365-day schedule contained in the Order. Furthermore, the Permittees already have the authority to require BMPs for new development through their existing storm water ordinances. Overall, the 365-day time schedule is practicable for the Permittees.

Priority Development Project Categories

Priority Development Projects include: a) all new development projects; and b) those redevelopment projects that create, add or replace at least 5,000 square feet of impervious surfaces on an already developed site[12], that are listed under the project categories or locations in **Requirement F.2.b.(1)**. The project categories generally result in the large increases in impervious surfaces, are potential significant sources of pollutants, or have a history of storm water mismanagement. SWRCB Order WQ Order 2000-11 addressed the majority of the categories included in **Requirement F.2.b.(1)** and gave RWQCBs discretion to include additional categories or locations in SUSMP requirements in future MS4 permits (SWRCB, 2000b). Those categories that were not included in the precedential outcome of the SWRCB Order are discussed below.

Requirement F.2.b.1.(h) includes streets, roads, highways, and freeways as a SUSMP Priority Development Project category. This is due to their potential to be a significant contributor of pollutants in urban runoff. A Federal Highway Administration (FHA) report finds that concentrations of total suspended solids, nitrate + nitrite nitrogen, and zinc exceed EPA benchmark values for concentrations of these pollutants in urban runoff (FHA, 1990). Another study found that, "Water quality impacts due to highway runoff could be significant particularly in environmentally sensitive areas, such as wetlands, ground-water recharge zones, and drinking water supply watershed" (CTE, 1998). Streets, roads, highways, and freeways also consist of extensive impervious surfaces, which alter flow regimes and increase potential for downstream erosion.

Requirement F.2.b.1.(i) includes retail gasoline outlets (RGOs) as a Priority Development Project category because RGOs are points of confluence for motor vehicles for automotive related surfaces such as repair, refueling, tire inflation, and radiator fill-up and consequently produce significantly greater loadings of hydrocarbons and trace metals (including copper and zinc) than other urban areas. To meet MEP, source control and structural treatment BMPs are needed at RGOs that meet the following criteria: (a) 5,000 square feet or more or (b) a projected Average Daily Traffic (ADT) of 100 or more vehicles per day. These are

[12] Redevelopment includes, but is not limited to: the expansion of a building footprint or addition or replacement of a structure; structural development including an increase in gross floor area and/or exterior construction or remodeling; replacement of impervious surface that is not part of a routine maintenance activity; and land disturbing activities related with structural or impervious surfaces. Where redevelopment results in an increase of less then fifty percent of the impervious surfaces of a previously existing development, and the existing development was not subject to SUSMP requirements, the numeric sizing criteria discussed in Requirement F.2.b.(3) applies only to the addition, and not to the entire development.

appropriate thresholds since vehicular development size and volume of traffic are good indicators of potential impacts of urban runoff from RGOs on receiving waters. (**Finding No. 25**)

In SWRCB WQ Order No. 2000-11, the SWRCB removed RGOs as a SUSMP category because they were already heavily regulated, and limited on their ability to construct infiltration devices or perform treatment. Order No. 2000-11 also acknowledged that a threshold (size, average daily traffic, etc.) appropriate to trigger SUSMP requirements should be developed and that specific findings regarding RGOs should be included in MS4 permits to justify the requirement (SWRCB, 2000b). The SWRCB removed the RGO category from the San Diego County MS4 permit (Order No. R9-2001-01) because the SDRWCB did not specifically address the issues raised in WQ Order No. 2000-11. As discussed below, the LARWQCB and the SDRWQCB have adequately addressed the issues, and RGOs have been included as a SUSMP category in the Los Angeles County MS4 permit (Order No. R4-01-182), and the statewide general Phase II MS4 permit (WQ Order No. 2003-0005-DWQ). Additional detailed supporting information can found in the technical Report, *Retail Gasoline Outlets: New Development Design Standards for Mitigation of Storm Water Impacts* (LA and SDRWQCB, 2001b).

- Heavily Regulated - The heavily regulated distinction does not remove RGOs as significant source of pollutants in urban runoff and therefore should not be a basis for exempting them. Other regulation of RGOs is separate from regulation under the CWA and does not necessarily relate to water quality from urban runoff. Other municipalities already require that RGOs implement structural BMPs even though they are regulated under other programs.

- Treatment Limitations - Structural treatment BMPs are available for RGOs to reduce pollutants and control peak flow rates and velocities that that are both inexpensive and effective. Studies have shown that catch basin inserts can remove hydrocarbons and heavy metals that are the pollutants of concern. Sand or media filters have also been found to be effective and available for use at RGOs. Cisterns are examples of established BMPs to control flow, but RGOs could also use site design measures such as small weirs, baffles, and redirecting roof runoff to pervious areas.

- Safety - No evidence has been provided to indicate that use of these structural BMPs will pose a safety risk. In fact, filter BMP have been installed at RGOs in other municipalities without apparent adverse safety effects. In addition, similar BMPs such as oil/water separators have been used for years by RGOs without apparent adverse safety risks.

- Threshold - Studies indicate that runoff from RGOs contains similar pollutants to runoff from commercial parking lots. In precedential WQ Order 2000-11, the SWRCB determined that parking lots with a size threshold of 5,000 square feet or more is an appropriate SUSMP category (SWRCB, 2000b). Based in part on the similarity of pollutants, the 5,000 square feet size threshold was also included for RGOs in the Order. In addition, other municipalities currently use similar size thresholds for RGOs to require design standards to mitigate storm water runoff. To provide additional flexibility for the Permitees, another threshold of 100 or more motor vehicles ADT has been added to the Order. This threshold is based on requirements from Washington and Oregon for what is

considered a "high use" site. This is an appropriate threshold since vehicular traffic is a good indicator of the amount of pollutants generated at a site.

The SDRWQCB followed the SWRCB's direction for the inclusion of RGOs as a Priority Development Project category by including the above discussion in this Fact Sheet, as well as a specific finding (Finding No. 25) that justifies the regulation of urban runoff from RGOs that meet certain criteria. The SWRCB also addressed the inclusion of RGOs through the appeals of MS4 permits issued by the Los Angeles and San Francisco RWQCBs that included RGOs as a priority development category. The SWRCB held a workshop that identified RGOs as significant sources of pollutants and dismissed the petitions for removal of RGOs from the SUSMP requirements in the permits. The Western States Petroleum Association, who filed the petitions to the inclusion of RGOs, did not appeal the SWRCB's dismissal of the petitions and did not comment on the Order. Finally, the SWRCB adopted a General Permit for the Discharge of Storm Water from Small MS4s (WQ Order No. 2003-0005-DWQ), which includes RGOs as a priority development category.

Considering all of the supporting documentation discussed above, it is appropriate to include RGOs as a Priority Development Project category.

ESAs are also included as a Priority Development Project location for the reasons discussed in section VI of this Fact Sheet. For further information regarding the inclusion of ESAs is contained in the technical report, *Mitigation of Storm Water Impacts from New Development in Environmentally Sensitive Areas* (LARWQCB, 2000c).

Requirement F.2.b.2 specifies that SUSMPs include a list of recommended source control and treatment control BMPs for all projects falling under the Priority Development Project categories. This requirement also establishes criteria that these BMPs must meet. The intent of the requirement is to allow the Permittees and developers flexibility in choosing which combination of source control and treatment control BMPs are to be implemented at a site and to define what minimum performance standards must be met by these selected BMPs.

As described in **Finding No. 18**, urban runoff treatment and/or mitigation in accordance with any of the requirements in Order No. R9-2004-001 must occur prior to the discharge of storm water or urban runoff into receiving waters. Allowing polluted runoff to enter a receiving water prior to treatment to the MEP will result in degradation of the water body and potential exceedances of water quality standards, from the discharge point to the point of dissipation, infiltration, or treatment. Furthermore, the construction, operation, and maintenance of a pollution control facility in a water body can negatively impact the physical, chemical, and biological integrity, as well as the beneficial uses, of the water body. This requirement is supported by federal regulation 40 CFR 131.10(a) and EPA guidance. According to the EPA, "To the extent possible, municipalities should avoid locating structural controls in natural wetlands. Before considering siting of controls in a natural wetland, the municipality should demonstrate that it is not possible or practicable to construct them in sites that do not contain natural wetlands... Practices should be used that settle solids, regulate flow, and remove contaminants prior to discharging storm water into a wetland" (EPA, 1992a).

The numeric sizing criteria is included to ensure that structural BMPs are sized effectively to remove the pollutants of concern. The sizing criteria are based on capture of runoff from a

24-hour 85th percentile rainfall depth. The 24-hour 85th percentile storm represents the "knee" of a precipitation probability curve from which it is no longer cost effective to treat runoff. The precipitation curve is calculated by using local historical rainfall data on the number and intensity of storm events. SDRWQCB staff has calculated the average 24-hour 85th percentile rainfall depth for area covered by the permit to be 0.6 inch (See Table 2 below). The San Diego SUSMP Staff Report developed for the San Diego MS4 Permit is available for example calculations on how staff determined the average 85th percentile rainfall depth t (SDRWQCB, 2001b). However, the requirements allow needed flexibility for the Permittees and developers to mitigate runoff based on either volume or flow. In addition, the requirements allow for several different options to calculate the amount of runoff to ensure that projects are not required to capture runoff from storm events beyond the point of diminishing returns. For example, a project proponent may demonstrate that the 24-hour 85th rainfall depth may be less than the average 0.6 inch by using local precipitation data.

Table 5. Calculation of 85th Percentile Rainfall Depth for the Upper Santa Margarita Watershed

Wildomar

Total Range (Inches)	Number of Storms	Cumulative	Cumulative Percent
0.01 - 0.09	917	917	29.80
0.10 - 0.49	1344	2261	73.46
0.50 - 0.99	467	2728	88.63
1.00 - 1.99	246	2974	96.62
2.00 - 2.99	78	3052	99.16
3.00 - 3.99	14	3066	99.61
4.00 - 4.99	8	3074	99.87
5.00 - 5.99	2	3076	99.93
6.00 – 6.99	2	3078	100.00

Temecula

Total Range (Inches)	Number of Storms	Cumulative	Cumulative Percent
0.01 - 0.09	652	652	33.94
0.10 - 0.49	758	1410	73.40
0.50 - 0.99	281	1691	88.03
1.00 - 1.99	171	1862	96.93
2.00 - 2.99	44	1906	99.22
3.00 - 3.99	10	1916	99.74
4.00 – 4.99	5	1921	100.00

Winchester

Total Range (Inches)	Number of Storms	Cumulative	Cumulative Percent
0.01 - 0.09	725	725	36.47
0.10 - 0.49	826	1551	78.02
0.50 - 0.99	281	1832	92.15
1.00 - 1.99	126	1958	98.49
2.00 - 2.99	26	1984	99.80
3.00 - 3.99	3	1987	99.95
5.00 – 5.99	1	1988	100.00

Average 85th Percentile Rainfall Depth For Area=(Wildomar + Temecula + Winchester)/3 (0.4 + 0.8 + 0.6)/3= 0.6 inch 85th Percentile Rainfall Depth for Southern Riverside County

Requirement F.2.b.4 allows Permittees the opportunity to develop an equivalent method for calculating the volume or flow to be mitigated. The intent of the requirement is to provide necessary flexibility to Permittees to develop equivalent methods in calculating the volume or flow that must be mitigated from the 24-hour 85th percentile rainfall depth.

As part of the SUSMP (**Requirement F.2.b.5**), the Permittees are required to develop a procedure to identify pollutants or conditions or concern for each Priority Development Project. Identifying the pollutants or conditions or concern for a project is crucial to selecting the appropriate BMPs.

Requirement F.2.b.7 allows Permittees to waive treatment control BMPs when all available BMPs have been considered and rejected as infeasible. The requirement also allows the Permittees to develop a program to require projects that receive waivers, to transfer the cost savings to a fund. The intent of the requirements is to allow Permittees necessary flexibility to waive treatment control BMPs when it can be established that the implementation of treatment control BMPs that meet numeric sizing criteria is not feasible at a given site. This provision also allows Permittees discretion to transfer the costs saving from such a waiver to a fund for water quality projects within the watershed.

Requirement F.2.b.8 defines what restrictions to protect groundwater quality are placed on treatment control BMPs that are designed to primarily function as infiltration devices, but allows Permittees to develop alternative restrictions. Applying large amounts of runoff water in a small area has the potential to adversely impact groundwater quality. The intent of these requirements is to provide necessary restrictions for use of these structural BMPs to protect the beneficial uses (municipal, agricultural, industrial) of groundwater in the Santa Margarita watershed. The intent of the requirements is also to provide the Permittees needed flexibility to develop alternative restrictions for projects or locations.

Requirement F.2.b.9 directs Permittees to develop numeric criteria to ensure discharges from Priority Development Projects maintain or reduce pre-development downstream erosion and protect stream habitat. Development can cause increases in runoff amount and velocity causing down erosion problems. Simply maintaining the peak flow rate may not be adequate to prevent increased downstream erosion because of the increase in duration of erosive flows. According to several studies, this approach is an oversimplification of geomorphological processes (Brown, 2001). Simply controlling the post-development peak discharge rate

causes the duration of erosive flows to increase, which may actually exacerbate channel erosion since bank are exposed to a longer duration of erosive events (Brown, 2001). Development of numeric criteria over the permit cycle is needed to establish a design storm type and level of discharge that is appropriate to protect downstream habitat from increased erosion. Due to urbanization, there is a substantial increase in volume and rates of runoff during smaller storm events. The intent of the requirements in the Order to control peak rates, velocities, volumes, and durations from these smaller storms (typically 1 or 2 year storm events) to maintain downstream erosion and not the larger storm events (Brown, 2001). Section II.A of Monitoring and Reporting Program No. R9-2004-001 requires the Permittees to conduct a study to help develop the numeric criteria.

The Ventura County Flood Control District and the Southern California Coastal Water Research Project are currently conducting studies to evaluate the erosive effects on urbanization in part, to quantitatively predict downstream impacts due to development. The development of numeric criteria by the Permittees should build upon these efforts and not duplicate them. The intent of these requirements is to mitigate these potential increases and prevent downstream erosion problems like the severe bank erosion and channel degradation that has occurred in Murrieta Creek (USFWS, 2000 and EPA, 2003).

The Permittees are encouraged to use any existing programs to meet these requirements and should provide detail on how these programs are implemented in the SUSMPs. It is expected that the Permittees will utilize information from any studies that are conducted on numeric criteria to protect downstream erosion and incorporate them into their development of their own numeric criteria by 2009.

Requirement F.3 requires the Permittees to consider the effects of development projects on water quality during project approval processes. This measure will help ensure that potential water quality problems resulting from the development are identified and addressed. The EPA finds that "Proposed storm water management programs should include planning procedures for both during and after construction to implement control measures to ensure that pollution is reduced to the maximum extent practicable in areas of new development and redevelopment. Design criteria and performance standards may be used to assist in meeting this objective" (EPA, 1992a). The EPA further finds that "The municipality should consider storm water controls and structural controls in planning, zoning, and site or subdivision plan approval" (EPA, 1992a). The TAC advises that the Permittees' CEQA initial study checklists be revised to include consideration of water quality effects from new development or redevelopment. The questions included in Requirement F.3. are based on questions recommended by the TAC (SWRCB, 1994).

Requirement F.4 requires Permittees to educate staff (on an annual basis) and the development community on the impacts from development and the requirements of the Order. Training of municipal planning and development review staff is a critical aspect of an urban runoff management program. With adequate training, municipal planning and development review staff can require implementation of BMPs early in the project planning process, thereby minimizing the urban runoff impacts of development in a cost effective manner. The EPA supports training of municipal staff when it identifies "training for

appropriate employees" as a measurable goal of an urban runoff management program (EPA, 2000c).

Education on urban runoff planning issues for the public sector involved with development is equally critical. When the public sector has knowledge of urban runoff issues and regulations, it is more likely to incorporate storm water planning in the development and redevelopment process. In this manner, implementation of measures to address these issues will be included in development plans, saving time and money for the developer and the municipality. The TAC finds that Permittees should "Establish an education/information dissemination program that includes such things as: brochures to distribute to developers and contractors at permit counters and by mail; reference and training manuals for planners, engineers, inspectors, developers, contractors; and training and information exchange workshops" (SWRCB, 1994).

Furthermore, in its Phase II Final Rule, EPA requires small municipalities to "...implement a public education program to distribute educational materials to the community or conduct equivalent outreach activities [...]" (EPA, 1999b). As discussed in section VII.E oft his Fact Sheet, Phase II findings are applicable to the Permittees.

3. Comments on Existing and Proposed Programs Related to Development Planning

Section 6.3 of the ROWD states that, "Within 10 months of permit adoption, each Co-Permittee will review its general plan and land use ordinances to assess whether the following principles and policies are properly considered:

1. Limit disturbance of natural water bodies and drainage systems; conserve natural areas; protect slopes and channels; minimize impacts from urban runoff on the biological integrity of natural drainage systems and water bodies;
2. Minimize changes in hydrology and pollutant loading; require incorporation of source control and structural BMPs to mitigate the projected increases in pollutant loads and flows; ensure that post-construction runoff rates and velocities from a site do not result in significant adverse impact on downstream erosion and stream habitat; limit the quantity of Urban Runoff directed to impermeable surfaces and the MS4s; and maximize the percentage of permeable surfaces to allow more percolation of Urban Runoff in to the ground;
3. Preserve wetlands, riparian corridors, and buffer zones, establish reasonable limits on the clearing of vegetation from the project site;
4. Encourage the use of BMPs to manage Urban Runoff quality and quantity;
5. Provide for appropriate permanent measures to reduce pollutant loads in Urban Runoff from the development site; and
6. Establish development guidelines for areas particularly susceptible to erosion and sediment loss.

In addition each Co-Permittee shall provide a summary of the review and assessment in that year's Annual Progress Report and within 24 months the Co-Permittees shall revise their general plans and land use ordinances as determined necessary during review and assessment."

This proposal is basically consistent with **Requirement F.1**.

Section 6.3 of the ROWD proposes that Permittees will reduce pollutants and runoff flows form new developments and significant redevelopment to the MEP by:

1. Reviewing and revising their respective land use approval and CEQA review processes to ensure that they address urban runoff issues.
2. Developing and implementing a public/business education program.

To be consistent with the **Requirement F.2.a**. the Permittees' proposal must also provide that BMPs will be required and that new developments will not cause or contribute to an exceedance of water quality standards.

Section 6.3 of the ROWD states that Permittees will continue to implement the New Development Guidelines and will continue to address the maintenance, operation and funding of structural BMPs that ensure management of Urban Runoff quality from new development. The Permittees' current processes, including the New Development Guidelines, do not contain specific requirements consistent with those in **Requirement F.2.b.(1)**.

Section 6.3 of the ROWD proposes that, within 9 months of permit adoption, the Permittees will develop a Model Water Quality Management Plan (WQMP) identifying BMPs, including design standards for source control and structural BMPs to be applied when discretionary approval is sought. The WQMP is intended to address regional and sub-regional BMPs and to provide guidelines for site-specific, post-construction BMPs to address management of urban runoff quantity and quality in new development and significant redevelopment projects. The ROWD does not specify priority development categories, numeric criteria, or any other specific provisions required in **Requirement F.b**, which must be included in the WQMP. It should also be noted that the SDRWQCB requires the use of site-specific source and treatment control BMPs and does not encourage the use of regional or sub-regional BMPs. Regional and sub-regional BMPs are sometimes necessary in an area that has already been developed without urban runoff management measures, but it is not justified for a developing area that has the opportunity to incorporate low-impact designs and management measures into new developments during the planning process.

Also, if the Permittees choose to develop a model document, this should be completed within 6 months of the permit adoption date, so that Permittees have sufficient time to begin implementation of SUSMP requirements within 1 year. Permittees are encouraged to use existing model SUSMP documents (County of Orange, 2003; San Diego Co-Permittees, 2002), which the SDRWQCB has previously approved, so that resources can be focused on program implementation instead of developing another similar model.

Section 6.3 of the ROWD proposes that, within 10 months of permit adoption, Permittees shall review their land use approval and CEQA processes to ensure that urban runoff issues are properly considered, and revise if necessary to mitigate impacts to water quality. The ROWD states that the following six factors will be considered in each Permittee's environmental assessment:

- Potential impact that construction of the project may have on urban runoff;
- Potential impact that operation of the project may have on urban runoff;

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- Potential for discharge of pollutant in urban runoff from areas identified within the project site to be used for material storage, vehicle or equipment fueling, vehicle or equipment maintenance (including washing), waste handling, hazardous materials handling or storage, delivery areas or loading docks, or other outdoor work areas;
- Potential for pollutants in urban runoff discharged from a project site to affect the beneficial uses of receiving waters;
- Potential for significant changes in the flow velocity or volume of urban runoff from a project site to result in environmental harm; and
- Potential for significant increases in erosion of a project site or surrounding areas.

These factors are similar to the examples listed in **Requirement F.3**, therefore, this proposal is sufficient to comply with the **Requirement F.3**.

No specific internal or external training regarding development planning is proposed in the ROWD. It states that the New Development Guidelines, which contains the information needed to acquaint developers and contractors with the requirements for post-construction BMPs, will be made available during the review process for project planning and permitting. This proposal does not meet the MEP standard and, therefore, is insufficient to meet the requirements in **Requirement F.4**.

G. CONSTRUCTION (Order Section G)

1. Specific Legal Authority for Construction Requirements

- Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(D) provides that the proposed management program include "A description of a program to implement and maintain structural and non-structural best management practices to reduce pollutants in storm water runoff from construction sites to the municipal storm sewer system."
- Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(D)(1) provides that the proposed management program include "A description of procedures for site planning which incorporate consideration of potential water quality impacts."
- Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(D)(2) provides that the proposed management program include "A description of requirements for nonstructural and structural best management practices."
- Federal NPDES regulation 40 CFR 122.26(d)(2)(i)(A) provides that each Permittee must demonstrate that it can control "through ordinance, permit, contract, order or similar means, the contribution of pollutants to the municipal storm sewer by storm water discharges associated with industrial activity and the quality of storm water discharged from site of industrial activity."
- Federal NPDES regulation 40 CFR 122.26(b)(14) provides that "The following categories of facilities are considered to be engaging in 'industrial activity' for the purposes of this subsection: [...] Construction activity including clearing, grading and excavation activities [...]."
- Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(D)(3) provides that the proposed management program include "A description of procedures for identifying priorities for

inspecting sites and enforcing control measures which consider the nature of the construction activity, topography, and the characteristics of soils and receiving water quality."

- Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(D)(4) provides that the proposed management program include "A description of appropriate educational and training measures for construction site operators."

2. Discussion of Construction Requirements

CWA sections 402(p)(3)(B)(ii-iii) requires each Permittee to prohibit non-storm water discharges into its MS4 and to reduce the discharge of pollutants to the MEP for all urban land uses. The purpose of these two broad requirements is to minimize the short and long-term impacts of urban runoff on receiving water quality. Land used for construction activities is clearly identified in the federal regulations as one of several high priority land uses from which pollutants in urban runoff discharges must be reduced to the MEP by each Permittee.

Requirements G.2 and G.3 are consistent with the EPA statement that "A description of the local erosion and sediment control law or ordinance is needed to satisfy this requirement [i.e., Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(D)(2)]" (EPA, 1992a). Regarding Permittee approval of construction activities, the EPA further states, "applicants must propose site review and approval procedures that address sediment and erosion controls, storm water management, and other appropriate measures. Approvals should be clearly tied to commitments to implement structural and nonstructural BMPs during the construction process" (EPA, 1992a).

Furthermore, the EPA requires small municipalities to develop and implement for construction sites "An ordinance or other regulatory mechanism to require erosion and sediment controls, as well as sanctions to ensure compliance [...]" (EPA, 2000c).

Requirement G.2 provides the Permittees with 365 days to update their grading ordinances and not the 640 days requested the Permittees. The Permittees will have adequate authority to require and enforce minimum BMPs at construction sites prior to the next rainy season and 365 days is adequate to allow for the only minor changes needed in the grading ordinances.

An effective means for reducing pollutants discharges from construction and grading activities is specified under **Requirement G.3** for the Permittees to develop conditions of approval for grading and construction permits that require measures to minimize pollutant discharges. The EPA recommends approval processes which consider water quality impacts, stating that approval process requirements should "include phasing development to coincide with seasonal dry periods, minimizing areas that are cleared and graded to only the portion of the site that is necessary for construction, exposing areas for the briefest period possible, and stabilizing and reseeding disturbed areas rapidly after construction activity is completed (EPA, 1992a)". Other suggested construction and grading conditions of approval listed in this item are based on TAC recommendations (SWRCB, 1994).

During approval and issuance of grading and construction permits, each Permittee must review construction and grading plans to ensure that the conditions of approval are met. The EPA states that to determine if a construction site is in compliance with construction and

grading ordinances and permits, the "MS4 operator should review the site plans submitted by the construction site operator before ground is broken" (EPA, 2000c). Furthermore, the EPA requires small municipalities to develop and implement for construction sites "Procedures for site plan review which incorporate consideration of potential water quality impacts" (EPA, 1999b).

Development of an inventory of construction sites as specified by **Requirement G.4**. will help identify potential sources of pollutants in storm water. By assessing information provided in the inventory (such as site topography and site proximity to receiving waters), sites can be prioritized by threat to water quality. Those sites that pose the greatest threat can then be targeted for inspection and monitoring. This will allow for limited inspection and monitoring time to be most effective. The EPA requires that all construction sites be addressed (and therefore inventoried), stating: "All construction sites, regardless of size, must be addressed by the municipality. To begin to identify these sites, the applicant should obtain lists of construction site operators that are covered by general or individual storm water NPDES permits from the NPDES permitting authority. However, construction sites not covered by a storm water discharge permit also need to be addressed by the municipality. The best way to identify these construction sites and implement an effective BMP program to reduce pollutants in their runoff is through the site planning process" (EPA, 1992a).

Designation of a set of minimum BMPs for construction sites as specified by **Requirement G.5** will help ensure that appropriate, consistent controls are implemented and that discharges of pollutants from construction sites are reduced to the MEP. **Requirement G.5.c.** provides the Permittees with the flexibility to allow different BMPs for the wet and dry seasons. See the discussions regarding BMP Implementation and Permittee Responsibility for Requiring BMPs in Sections VII.C. and VII.D of this Fact Sheet.

Regarding designation of BMPs to be implemented, the EPA states, "the proposed management program should describe requirements for nonstructural and structural BMPs that operators of construction activities that discharge to MS4s must meet" (EPA, 1992a). While minimum BMPs will be required at all construction sites, implementation of particular BMPs will be site specific in order to address various conditions at different sites. Regarding site specific BMPs, the EPA states, "Appropriate structural and nonstructural control requirements will vary by project. Project type, size, and duration, as well as soil composition, site slope, and proximity to sensitive receiving waters will determine the appropriate structural and nonstructural BMPs" (EPA, 1992a).

In order to comply with Order No. R9-2004-001 requirements, implemented BMPs may need to be more stringent than those required under the General Construction Permit. The EPA implies that local sediment and erosion control requirements may be more stringent than General Construction Permit requirements when it states that "construction sites covered under NPDES permit regulations must indicate whether they are in compliance with State and local sediment and erosion control plans" (EPA, 1992a).

Requirement G.6. specifies requirements for inspecting construction sites. Inspections provide a necessary means by which Permittees can evaluate compliance with their municipal ordinances. Inspections are especially important at high-risk areas for pollutant discharges, such as industrial and construction sites. The Order (Attachment C - Definitions) defines the wet season as Oct 1 through April 30, which is consistent with Order No. R9-

2001-001, Order No. R9-2001-0001, Order No. R8-2002-0011, and the SDRWQCB implementation of the General Construction Permit. To ensure that BMPs are properly installed and maintained, the EPA states MS4 operators should "develop procedures for site inspection and enforcement of control measures to deter infractions" (EPA, 1992a).

The EPA further states that "Site inspections are expected to be the primary enforcement mechanism by which erosion and sediment controls are maintained" (EPA, 1992a). When inspections result in findings of noncompliance, follow-up by the Permittee to ensure compliance is necessary. The EPA states "Effective inspection and enforcement requires [...] intervention by the municipal authority to correct violations" (EPA, 1992a). This is supported by the North Carolina Study that provided empirical support for the importance of inspections in increasing construction site compliance with local and state ordinances. Both the frequency and duration of project inspections were positively associated with the level of installation and maintenance compliance at the construction sites (Malcom, 1990). The EPA further finds "inspections give the MS4 operator an opportunity to provide additional guidance and education, issue warnings or assess penalties" (EPA, 2000c). Frequent inspections by Permittees of high priority construction sites will keep compliance a priority, and allow opportunities for inspectors to enhance problem-solving skills among site personnel.

Construction site inspection frequencies are to be based on threat to water quality. The EPA supports this, stating that site inspection procedures should "identify priority sites for inspection and enforcement based on the nature and extent of the construction activity, topography, and the characteristics of soils and receiving water quality" (EPA, 2000c). For example, construction sites that are considered a high threat to water quality are to be given a high priority for inspection. This will allow for limited inspection and monitoring time to be most effective. Bi-weekly to monthly inspection of high threat sites is necessary due to the dynamic nature of construction activities. Medium and low threat construction sites can be inspected less frequently, due to their reduced risk of negatively impacting receiving waters. The minimum inspection schedule in the Permit is reasonable for the Permittees to ensure that construction sites are implementing adequate BMPs. More frequent inspections may be necessary due to site conditions. Review of storm water pollution prevention plans (SWPPPs) can be one effective tool for determining frequency of site inspections. Construction sites that effectively implement the measures of a comprehensive SWPPP may not need to be inspected as frequently as less diligent sites.

Each Permittee must develop grading and storm water ordinances under its Individual SWMP. When a Permittee determines a violation of its grading or storm water ordinance, it must pursue correction of the violation. A critical aspect of the correction of violations is enforcement of ordinances. Enforcement increases the probability of correction of a violation. The EPA supports development of enforceable ordinances and permits when it states "applicants must describe proposed regulatory programs to reduce pollutants in storm water runoff from construction sites to the MS4" (EPA, 1992a). The EPA supports enforcement of these ordinances and permits at construction sites when it states "Effective inspection and enforcement requires [...] penalties to deter infractions and intervention by the municipal authority to correct violations. Enforcement mechanisms [...] also must be described" (EPA, 1992a).

Furthermore, the EPA requires small municipalities to develop and implement "An ordinance or other regulatory mechanism to require erosion and sediment controls, as well as sanctions to ensure compliance [...]" (EPA, 1999b).

Implementation of an education program is an important best management practice for construction sites and activities. The TAC "recognizes that education with an emphasis on pollution prevention is the fundamental basis for solving nonpoint source pollution problems." The TAC points out several target communities for education efforts, including "Government: Educate agencies and officials to achieve better communication, consistency, collaboration, and coordination at the federal, state and local levels" and "Development Community: Educate the development community, including developers, contractors, architects, and local government planners, engineers, and inspectors, on nonpoint source pollution problems associated with development and redevelopment and construction activities and involve them in problem definitions and solutions" (SWRCB, 1994).

The EPA also supports education efforts for parties involved in construction, stating "technical information on how to incorporate storm water management with erosion and sediment control and other BMP training courses are recommended for municipal employees and construction site operators" (EPA, 1992a).

3. Comments on Existing and Proposed Programs Related to Construction

Pollution Prevention as required in **Requirement G.1** is not specifically mentioned in the ROWD.

Section 2.5 of the ROWD proposes that Permittees will, within 18 months of permit adoption, review and revise grading/erosion control ordinances in order to reduce erosion caused by new development and significant redevelopment. The ROWD proposal does not include the specific provisions required in **Requirement G.2**, and ordinances must be revised and adopted no later than 6 months following permit adoption (SWMPs must be implemented in full within 1 year).

The ROWD does not indicate that the Permittees' construction approval processes will be modified to include the requirements in **Requirement G.3**, except that the requirement for evidence of coverage under the General Construction Permit prior to issuance of grading permits.

Section 5.2 of the ROWD states that, within 10 months of permit adoption, "each Permittee will develop an inventory (database) of active construction sites within its jurisdiction for projects for which a building or grading permit has been issued for a site that is 1 acre or larger." This proposal is not consistent with **Requirement G.4** of the Order, since all construction sites, regardless of size, must be included in the inventory.

Section 5.2 of the ROWD proposed that, within 6 months of permit adoption, Permittees shall develop a list of erosion control BMPs appropriate for use during construction. The proposed time frame is adequate, but the list must also include minimum erosion prevention and sediment control BMPs that address **Requirement G.5**. Also, the ROWD does not state that the BMPs will be required, which is necessary to comply with Order No. R9-2004-001. The ROWD does not require additional controls for construction sites that are tributary to

CWA section 303(d) water bodies or within/adjacent to or discharging directly to receiving waters within environmentally sensitive areas, which is necessary to comply with the Order.

The ROWD proposes to initiate inspections of all inventoried sites within 11 months of permit adoption. The ROWD proposal is not sufficient to meet the requirements in Order No. R9-2004-001 because it does not include inspection frequencies. Also, construction inspections should be ongoing, as they were required in Order No. R9-98-02, until new programs begin. Stating that inspections will be "initiated" 11 months after permit adoption would cause Permittees to be in violation of the requirement to continue implementation of Order No. R9-98-02 until the SWMP is fully implemented.

Section 2.4.2.2. of the ROWD, which describes enforcement and compliance responses, states that Permittees will emphasize and encourage voluntary compliance and will initiate enforcement/compliance actions within 60 days form the date a violation was identified. It also says that the SDRWQCB will take all enforcement actions related to compliance with the General Construction Permit and that the SDRWQCB will take the lead in initiating enforcement actions related to high-priority incidents. The Permittees are responsible for enforcing their ordinances and permits related to all violations, especially those of high priority. The SDRWQCB is responsible for enforcement of the General Construction Permit, however, if Permittee ordinances are also violated, Permittees must address these violations. Furthermore, 60 days is an inappropriately long amount of time to allow a violation to occur. The ROWD does not include adequate sanctions to ensure that BMPs are implemented at construction sites. The authority to issue sanctions (including the authority to stop work) at construction sites for lack of adequate BMPs is necessary to proactively prevent discharges. The Enforcement/Compliance Strategy, as described in the ROWD, is insufficient to maintain compliance with Order No. R9-2004-001.

Section 5.2 of the ROWD proposes that, within 10 months of permit adoption, each Permittee will have arranged for training of its current inspection staff and on an annual basis thereafter, and new hires and transfers will be trained within 6 months of starting inspection duties. This proposal to train municipal staff on an annual basis is adequate to meet permit requirements. However, the ROWD does not address external training.

H. EXISTING DEVELOPMENT (Order Section H)

The Existing Development section contains the following three sections:

H.1 Municipal Program

H.2 Industrial/Commercial Facilities Program

H.3 Residential Program

H.1 MUNICIPAL PROGRAM (Order Section H.1)

1. Specific Legal Authority for Municipal Program Requirements

- Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A)(1) provides that the proposed management program include "A description of maintenance activities and a

maintenance schedule for structural controls to reduce pollutants (including floatables) in discharges from municipal separate storm sewers."

- Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A)(3) provides that the proposed management program include "A description for operating and maintaining public streets, roads and highways and procedures for reducing the impact on receiving waters of discharges from municipal storm sewer systems, including pollutants discharged as a result of deicing activities."
- Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A)(4) provides that the proposed management program include "A description of procedures to assure that flood management projects assess the impacts on the water quality of receiving water bodies and that existing structural flood control devices have been evaluated to determine if retrofitting the device to provide additional pollutant removal from storm water is feasible."
- Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A)(5) provides that the proposed management program include "A description of a program to monitor pollutants in runoff from operating or closed municipal landfills or other treatment, storage or disposal facilities for municipal waste, which shall identify priorities and procedures for inspections and establishing and implementing control measures for such discharges."
- Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A)(6) provides that the proposed management program include "A description of a program to reduce to the maximum extent practicable, pollutants in discharges from municipal separate storm sewers associated with the application of pesticides, herbicides, and fertilizer which will include, as appropriate, controls such as educational activities, permits, certifications, and other measures for commercial applicators and distributors, and controls for application in public right-of-ways and at municipal facilities."
- Federal NPDES regulation 40 CFR 122.26(d)(1)(iii) requires source identification, including the location of MS4 outfalls, the location and description of the activities of each currently operating or closed municipal land fill or other treatment, storage or disposal facility for municipal waste, the location of major structural controls for storm water discharge, and the identification of publicly owned parks, recreational areas, and other open lands.

2. Discussion of Municipal Program Requirements

Municipal facilities and activities are clearly identified in the federal regulations as one of several high priority land uses from which pollutants in urban runoff discharges must be reduced to the MEP. The EPA targets municipal areas and activities "to help ensure a reduction in the amount and type of pollution that (1) collects on streets, parking lots, open spaces, and storage and vehicle maintenance areas and is discharged into local waterways; and (2) results from actions such as environmentally damaging land development and flood management practices or poor maintenance of storm sewer systems" (EPA, 2000c).

As specified by **Requirement H.1.b**, Permittees must first identify all of the municipal areas and activities that generate pollutants within their jurisdiction. The areas and activities listed in **Requirement H.1.b** are either specifically addressed in the federal NPDES regulations

referenced above, or have been determined by the Permittees (Permittees, 2003), the SDRWQCB (SDRWQCB, 2002a), or the EPA (EPA, 1992a) to contribute pollutants to the MS4. Source identification is necessary to characterize the nature and extent of pollutants in discharges and to develop appropriate control measures. It is the first step in developing a targeted approach to urban runoff management.

Regarding **Requirement H.1.d**, MS4 Maintenance is critical to the successful implementation of every SWMP. The requirement to conduct a maintenance program is specifically directed in both the Phase I and Phase II storm water regulations. The EPA finds that "Lack of maintenance often limits the effectiveness of storm water structural controls such as detention/retention basins and infiltration devices. [...] The proposed program should provide for maintenance logs and identify specific maintenance activities for each class of control, such as removing sediment from retention ponds every five years, cleaning catch basins annually, and removing litter from channels twice a year" (EPA, 1992a). Regarding catch basin cleaning, the EPA states, "The removal of sediment, decaying debris, and highly polluted water from catch basins has aesthetic and water quality benefits, including reducing foul odors, reducing suspended solids, and reducing the load of oxygen-demanding substances that reach receiving waters" (EPA, 1999c). It goes on to say, "Catch basin cleaning is an efficient and cost-effective method for preventing the transport of sediment and pollutants to receiving water bodies. The requirement (Requirement H.1.d.(d)) is necessary to identify problem areas and sources of debris in catch basins.

Requirement H.1.e, Management of Pesticides, Herbicides and Fertilizers, is supported by the EPA finding that "The proposed program should include educational measures for the public and commercial applicators, and should include integrated pest management measures that rely on non-chemical solutions to pest control. The program should also describe how educational materials will be developed and distributed. Applicants are encouraged to consider providing information for the collection and proper disposal of unused pesticides, herbicides, and fertilizers, or to establish their own program. [...] In addition, applicants must include a discussion of controls for the application of pesticides, herbicides, and fertilizers in public rights-of-way and at municipal facilities. Planting low-maintenance vegetation, such as perennial ground covers, reduces pesticide and herbicide use. Native vegetation is often preferable because there is less need to apply fertilizers and herbicides, and to perform other forms of maintenance, such as mowing" (EPA, 1992a).

Requirement No. H.1.f, Inspections of Municipal Facilities and Activities, is specified to insure that proper measures are being undertaken to reduce pollutant discharges to the MEP. The EPA supports inspections of municipal areas and activities, stating "Applicants must describe programs that identify measures to monitor and reduce pollutants in storm water discharges from facilities that handle municipal waste, including sewage sludge. [...] The types of facilities that should be included are: active or closed municipal waste landfills; publicly owned treatment works, including water and wastewater treatment plants; incinerators; municipal solid waste transfer facilities; land application sites; uncontrolled sanitary landfills; maintenance and storage yards for waste transportation fleets and equipment; sites for disposing or treating sludge from municipal treatment works; and other treatment, storage, or disposal facilities for municipal waste" (EPA, 1992a). The EPA further states, "Procedures to evaluate, inspect, monitor, and establish control measures for

municipal waste sites over the term of the NPDES permit should be described" (EPA, 1992a)."

3. Comments on Existing and Proposed Municipal Programs

Section 4.1 of the ROWD describes the Municipal Facilities Strategy, which the Permittees developed pursuant to Order No. R9-98-02 to identify BMPs for activities conducted at municipal facilities. This section of the ROWD identifies the types of municipal facilities and the activities conducted at those facilities that have the potential to contribute pollutants to urban runoff (ROWD Table 4-1). The Permittees identified maintenance yards, vehicle and equipment maintenance areas, waste transfer stations, corporation and storage yards, and parks and recreational facilities as "facilities of concern". The number of each type of facility operated by each Permittee is listed in Table 4-2 of the ROWD. All other facilities that may be sources of pollutants, including parking areas, hazardous material collection facilities, and other facilities covered under the General Industrial Permit were not identified as "facilities of concern", and were not included in Table 4-2. As discussed above, all facilities and activities listed in **Requirement H.1.b** of the Order must be identified in the inventory. Also, Table 4-2 only lists the number of each type of facility in each Permittee's jurisdiction. The inventory must include, at a minimum, the name, address, and description of activities conducted at each facility.

The ROWD also identifies potential pollutants of concern from municipal facilities and activities (Table 4-3) and "potential" source control BMPs to address the pollutant-generating activities (Table 4-4). The Permittees propose to "maintain up-to-date site-specific Urban Runoff pollution prevention plans for public agency facilities and activities." If the "potential" BMPs listed in Table 4-4 include pollution prevention methods, and are required to be implemented (as applicable) these programs are adequate to comply with **Requirements H.1.a and c** of the Order.

It is important to note that the ROWD claims that brake pad wear, the operation of internal combustion engines, and tire wear, among other thing, are beyond the ability of the Permittees to control. The EPA and the SDRWQCB do not concur with this claim. The EPA states, "proposed management programs must include a description of practices for operation and maintenance of public streets, roads, and highways, and procedures for reducing the impact of runoff from these areas on receiving waters. [...] Pollutants from traffic can be minimized by using nonstructural controls (e.g., traffic reduction and improved traffic management), structural controls (e.g., traditional and innovative BMPs), and changing maintenance activities" (EPA, 1992a).

Regarding MS4 maintenance, Section 4.2 of the ROWD proposes that, within 12 months of permit adoption, Permittees will develop "Model Maintenance Procedures" for public agency activities and drainage facilities. However, in December 1999, the Permittees submitted proposed "Storm Drain System Inspection and Maintenance" programs, pursuant to Order No. R9-98-02 (Permittees, 1999). Each Permittee's proposed program would satisfy the requirements in **Requirement H.1.d** of the Order. Because such plans have already been submitted, the Permittees do not need 12 months to develop another program, and they do not need additional time to implement maintenance activities. Considering that this is a third-round permit, the Permittees should already be conducting the proposed MS4

maintenance activities and continued implementation would be adequate for compliance with Order No. R9-2004-001 without requiring additional resources.

Regarding the management of pesticides, herbicides, and fertilizers, Section 4.2 of the ROWD proposes that "Permittees shall continue to provide training to municipal staff and to contract field operations staff on fertilizer and pesticide management, maintenance procedures, and other pollution control measures. Permittee staff shall attend at least 3 out of 5 annual training sessions." This proposal satisfies **Requirement H.1.e** of the Order, but it does not address the requirements to include integrated pest management measures that rely on non-chemical solutions.

Section 4.2 of the ROWD proposes to "review municipal activities and facilities annually to identify needed revisions of the Municipal Facilities Strategy". In order to identify needed revisions to BMP requirements and municipal programs, inspections are necessary. Therefore, it is assumed that the Permittees proposal includes inspections of municipal facilities and activities. Considering the small number of municipal facilities that each Permittee operates, with the exception of parks (ROWD Table 4-2), inspecting each facility annually is feasible.

Regarding parks and recreation facilities, the Permittees identified these areas as facilities of concern in the ROWD due to their potential to generate pollutants. Therefore, parks and recreation facilities, or the municipal activity conducted at the facilities must be inspected annually. If the same municipal maintenance staff perform similar landscaping or other activities at all parks, the inspection process could be streamlined to focus on the activities. For example, the Permittees could possibly develop one pollution prevention plan for all parks that includes all activities conducted at municipal parks, and conduct annual inspections of the activities performed to ensure that effective BMPs are being implemented (not necessarily inspecting all parks annually).

Enforcement of municipal areas and activities is not specifically addressed in the ROWD. This program will need to be developed as part of each Permittee's Individual SWMP.

Overall, with minor refinement, the existing and proposed municipal programs are adequate to meet the requirements of **Requirement H.1** of the Order.

H.2 INDUSTRIAL/COMMERCIAL FACILITIES PROGRAM (Order Section H.2)

1. Specific Legal Authority for Industrial/Commercial Facilities Requirements

- Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(C) provides that the proposed management program include "A description of a program to monitor and control pollutants in storm water discharges to municipal systems from municipal landfills, hazardous waste treatment, disposal and recovery facilities, industrial facilities that are subject to Section 313 of title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA), and industrial facilities that the municipal permit applicant determines are contributing a substantial pollutant loading to the municipal storm sewer system."
- Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(C)(1) provides that the permittee must "identify priorities and procedures for inspections and establishing and implementing control measures for such discharges."

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- Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A) provides that the permittee develop a proposed management program which includes "A description of structural and source control measures to reduce pollutants from runoff from commercial and residential areas that are discharged from the municipal storm sewer system that are to be implemented during the life of the permit, accompanied with an estimate of the expected reduction of pollutant loads and a proposed schedule for implementing such controls."
- Federal NPDES regulation 40 CFR 122.26(d)(2)(ii) provides that the permittee "Provide an inventory, organized by watershed of the name and address, and a description (such as SIC codes) which best reflects the principal products or services provided by each facility which may discharge, to the municipal separate storm sewer, storm water associated with industrial activity."
- Federal NPDES regulation 40 CFR 122.44(d)(1)(i) requires NPDES permits to include limitations to "control all pollutants or pollutant parameters (either conventional, nonconventional, or toxic pollutants) which the Director determines are or may be discharged at a level which will cause, have reasonable potential to cause, or contribute to an excursion above any State water quality standard, including State narrative criteria for water quality."

2. Discussion of Industrial/Commercial Facilities Requirements

The requirements contained in Section H.2 provide a framework for developing management programs to reduce pollutants in urban runoff discharges from industrial and commercial facilities to the MEP.

The EPA supports the industrial/commercial facility requirements when it states, "NPDES permits for MS4s will establish responsibilities for municipal system operators to control pollutants from industrial storm water discharged through their system" (EPA, 1992a). The guidance further states that Permittees are ultimately responsible for discharges to their MS4. Therefore, storm water management programs should do the following:

- Identify priority industries discharging to their systems;
- Review and evaluate SWPPPs and other procedures that industrial facilities must develop under general or individual permits;
- Establish and implement BMPs to reduce pollutants from these industrial facilities (or require industry to implement them); and
- Inspect and monitor industrial facilities to verify that the industries discharging storm water to the MS4 are in compliance with their NPDES storm water permit, if required.

Source identification is necessary to characterize the nature and extent of pollutants in discharges and to develop appropriate BMPs. The industrial and commercial facilities listed in **Requirement H.2.b** are either specifically addressed in the federal NPDES regulations referenced above, or have been determined by the Permittees, or the SDRWQCB (SDRWQCB, 2002a) to contribute pollutants to the MS4. The Permittees have not provided data, or other information, documenting that any of the facilities should be removed from the list because they are not a source of pollutants in the Upper Santa Margarita Watershed.

The EPA supports the list of facilities in the Order when it states the following (EPA, 2004):

> "EPA regulations at 40 CFR 122.26(d)(2)(iv)(A) provide for a broad program of 'source control and structural control measures to reduce pollutants from runoff from commercial and residential areas…' We believe that this regulation provides a firm basis for the permit's [Order] requirements related to commercial facilities. The requirements for outreach to commercial facilities, inspections, and the follow-up enforcement would all be consistent with a program of 'source control' measures to be included in a storm water management program…"

Regarding the list of industrial facilities, EPA goes on to say:

> "The issue of industrial inspections also arose for the Los Angeles County MS4 permit. The State Board, in a memo dated November 9, 2001, from Michael Lauffer of the State Board to Dennis Dickerson, Executive Officer of the Los Angeles Regional Board, noted that under Section 402 (p)(3)(B)(iii) of the CWA, the Board has broad authority to require 'such other provisions…as the State determines appropriate…' and that this would provide a basis for requirements that go beyond specific provisions of the EPA regulations. We would agree with the State Board on this matter, and that the Regional Board would have the authority to require inspections of all the industrial facilities listed in the permit [Order], notwithstanding the specific provisions of the EPA regulations."

Regarding **Requirement H.2.c**, BMP Implementation, guidance from the EPA makes it clear that Permittees are required to designate BMPs for industrial and commercial facilities when it states that permittees should, "Establish and implement BMPs to reduce pollutants from these facilities (or require industry to implement them)" (EPA, 1992a). The EPA goes on to say that BMPs more stringent than those required under the General Industrial Permit may be necessary. The EPA finds that "nothing in the Federal regulations would prohibit the municipality from requiring additional controls beyond the permit requirements for industrial activities. For this reason, the EPA recommends that municipal applicants incorporate a provision in the proposed storm water management program that allows the municipality to require priority industrial facilities to implement the controls necessary for the municipality to meet its permit responsibilities" (EPA, 1992a). These statements from the EPA support the requirement for dual regulation of facilities covered by the General Industrial Permit (see discussion in support of **Finding No. 21** in Section VII.E of this Fact Sheet).

In support of **Requirement H.2.c.(3)**, the EPA recommends that Permittees provide BMP guidance to industrial facilities, stating, "The applicant should suggest procedures for requiring pollutant control measures in runoff from priority industrial facilities. Applicants should provide information to the industrial facilities that discharge to the MS4s and industry-specific guidance on appropriate control measures that industries discharging to the systems should follow" (EPA, 1992a). The EPA goes on to say, "Applicants should provide information to the industrial facilities that discharge to the MS4s and industry-specific guidance on appropriate control measures that industries discharging to their systems should follow" (EPA, 1992a).

Furthermore, inspections are necessary to verify that industries are in compliance with the MS4 permit and local ordinances (EPA, 1992a). According to the EPA, "The proposed management program should describe the inspection procedures that will be followed. […]

Proposed management programs should address minimum frequency for routine inspections. For example, how often, how much of the site, and how long an inspection may take are appropriate to explain in this proposed management program component. Applicants should also describe procedures for conducting inspections and provide an inspector's checklist" (EPA, 1992a). In further support of inspections and dual regulation of industrial facilities, the EPA states "Municipalities are urged to evaluate pollution prevention plans and discharge monitoring data collected by the industrial facility to ensure that the facility is in compliance with its NPDES storm water permit. Site inspections should include (1) an evaluation of the pollution prevention plan and any other pertinent documents, and (2) an onsite visual inspection of the facility to evaluate the potential for discharges of contaminated storm water from the site and to assess the effectiveness of the pollution prevention plan" (EPA, 1992a).

The EPA also finds that follow-up actions are to be implemented based upon site inspection findings: "The results of inspection may be used as a basis for requiring storm water management controls and enhanced pollution prevention measures" (EPA, 1992a).

Industrial site inspection frequencies specific in **Requirement H.2.d** are based on threat to water quality prioritization in order to allow for limited inspection resources to be most effective. Annual or bi-annual inspection of high threat sites is necessary to ensure that changes to the site that may be detrimental to water quality are identified and addressed.

Requirement H.2.f, Reporting of Non-Filers, is necessary to ensure effective oversight of industrial facilities.

3. Comments on Existing and Proposed Industrial/Commercial Programs

Pursuant to Order No. R9-98-02, the Permittees have developed and implemented an industrial/commercial facilities program that meets or exceeds several of the requirements in Section H.2 of the Order. Each Permittee has already developed a prioritized list of facilities, including industrial facilities as defined at 40 CFR 122.26(b)(14), food facilities, and all other facilities that store, generate, or handle hazardous waste. The method of prioritization used in developing the current lists is consistent with what the SDRWQCB considers to be "high", "medium", and "low". Section 7.3 of the ROWD proposes that, within 9 months of permit adoption, each Permittee will update its existing inventories of industrial and commercial facilities within its jurisdiction that have the potential to discharge pollutants to the MS4. The ROWD says that the industrial and commercial facilities databases will include the name, address, location reference, facility contact and phone number, SIC code, WDID number, assessor's parcel number, and site size.

Also pursuant to Order No. R9-98-02, the Permittees developed the Commercial/Industrial Compliance Assistance Program (CAP) as a mechanism to conduct the required inspections of inventoried facilities. The CAP was formed as an agreement between the District and the County's Department of Environmental Health and involves the completion of a "storm water compliance survey" in addition to the routine inspections that the Department Environmental Health conducts pursuant to other regulations. Through the CAP, the County currently inspects sites with underground storage tanks once per year, sites that handle and generate hazardous waste every two years (began in May 2002), and retail food facilities 1-3 times annually (began in January 2002). Section 7.3 of the ROWD proposes that, within 12

months of permit adoption, each Permittee will implement an inspection frequency for industrial and commercial facilities of no less than:

- Once a year for industrial facilities designated as high priority;
- Once biannually for commercial facilities designated as medium priority; and
- Once during the permit term for facilities designated as low priority.

Except for the facilities that are not captured under the CAP, which must be addressed by each Permittee, the Permittees existing and proposed programs are adequate to comply with the requirements in **Requirement H.2.b and H.2.d.**

Section 7.2 of the ROWD states that, "In conducting a commercial/industrial facility inspection, if it appears that the facility may be required to have coverage under the General Permit for Stormwater Discharges Associated with Industrial Activities and the facility operator has indicated that an NOI has not been filed, the inspector will provide the operator with an informational sheet on the requirements of the General Permit for Stormwater Discharges Associated with Industrial Activities. The inspector also documents the name, address, and SIC code of the facility. Subsequently, a listing of such facilities is compiled and forwarded to the San Diego Regional Board staff on a frequency to be determined by the Permittees." This proposal meets **Requirement H.2.f.**

It is important to note that there are approximately 25 industrial facilities currently covered by the General Industrial Permit within the Upper Santa Margarita Watershed. Most of these facilities are already included in the Permittees' inventories and covered under the CAP. The remaining few that will require inspections and oversight will not constitute a significant burden on the Permittees. Therefore, dual regulation of these sites should not be an issue. In the Permittees comments on the Order, they proposed BMP requirements to comply with Requirement H.2.c.1. The proposed BMPs may be adequate minimum requirements for food facilities and for facilities that store hazardous waste. However, broadly applying these few BMPs to all types of inventoried industrial and commercial facilities may not be adequate or appropriate. Adequate minimum BMPs should address all facility types and activities that could potentially contribute pollutants to the MS4.

Regarding enforcement, Section 2.4.2.2. of the ROWD states that Permittees will emphasize and encourage voluntary compliance and will initiate enforcement/compliance actions within 60 days form the date a violation was identified. It also says that the SDRWQCB will take all enforcement actions related to compliance with the General Industrial Permit and that the SDRWQCB will take the lead in initiating enforcement actions related to high-priority incidents. These statements are incorrect and do not meet the requirements of **Requirement H.2.e**. As discussed in Sections VII.D and VII.E of this Fact Sheet, the Permittees are responsible for enforcing their ordinances and permits related to ALL violations, especially those of high priority. The SDRWQCB is responsible for enforcement of the General Industrial Permit, however, if Permittee ordinances are also violated, Permittees must address these violations. Furthermore, 60 days is an inappropriately long amount of time to allow a violation to occur. The Permittees' Enforcement/Compliance Strategy, as described in the ROWD, is insufficient to meet the enforcement requirements contained in Order No. R9-2004-001.

Section 7.3 of the ROWD proposes that, within 1 year of permit adoption, each Permittee will have arranged for adequate training of all staff inspectors and on an annual basis thereafter. New hires that will be performing inspections will be trained within 6 months of starting field duties. This proposed training schedule meets **Requirement H.2.g** of the Order.

H.3 RESIDENTIAL PROGRAM (Order Section H.3)

1. Specific Legal Authority for Residential Requirements

- Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A) provides that the Permittee develop a proposed management program which includes "A description of structural and source control measures to reduce pollutants from runoff from commercial and residential areas that are discharged from the municipal storm sewer system that are to be implemented during the life of the permit, accompanied with an estimate of the expected reduction of pollutant loads and a proposed schedule for implementing such controls."
- Federal NPDES regulation 40 CFR 122.44(d)(1)(i) requires NPDES permits to include limitations to "control all pollutants or pollutant parameters (either conventional, nonconventional, or toxic pollutants) which the Director determines are or may be discharged at a level which will cause, have reasonable potential to cause, or contribute to an excursion above any State water quality standard, including State narrative criteria for water quality."

2. Discussion of Residential Requirements

Land used for residential activities is clearly identified in the federal regulations as one of several high priority land uses from which pollutants in urban runoff discharges must be reduced to the MEP by each Permittee (40 CFR 122.26(d)(2)(iv)). Residential activities have the potential to be significant sources of pollutants in urban runoff. In residential areas, pollution sources conveyed by the MS4 include activities related to automobile maintenance, landscaping/gardening, home-improvement, pets, and others, including those listed in **Requirement H.3.b.** The requirements contained in Section H.3 will provide a program for the development and implementation of BMPs to reduce pollutants in urban runoff discharges from residential activities to the MEP (see discussion of **BMP Implementation** in Section VII.C of this Fact Sheet).

Pursuant to Order No. R9-98-02 and pre-existing programs, the Permittees have instituted or promoted residential pollution prevention BMPs, including street sweeping, household hazardous waste collections, and education. Nationally, education is increasingly being used as a tool for pollution prevention in residential areas, where the use of regulatory enforcement actions has traditionally been less than in other land use areas. Pollution prevention can encourage responsible residential nutrient management, such as proper fertilization rates and proper pet waste disposal, when a connection is established between such practices and local or regional water quality needs (Nonpoint Source News Notes, 2000). Similarly, source control is vital to protect urban watersheds from pesticides that are applied in residential areas and are transported to streams via the MS4. For example in a

review, "Diazinon Sources in Runoff from the San Francisco Region," the Center for Watershed Protection concluded that, "the only real tool to control diazinon in urban watersheds is source control to either reduce the use of diazinon or to apply it in a safer manner." In addition, where structural BMPs or MS4 facilities are owned or operated by the residential community, pollution prevention activities taken by local governments can include maintenance guidance.

3. Comments on Existing And Proposed Residential Programs

Section 8.0 of the ROWD states that pollution prevention is a major focus of the Permittees' existing StormWater/CleanWater Protection Program, and the following pollution prevention themes are emphasized in public outreach activities and materials:

- Proper disposal of household hazardous waste;
- Proper disposal of used motor oil;
- Pesticide and fertilizer use guidelines;
- Good housekeeping BMPs; and
- Proper disposal of pet waste.

Section 8.2 of the ROWD proposes to educate the public regarding pollutants in urban runoff. Education and outreach may be sufficient to reduce the discharge of pollutants to the MEP from residential areas, however, additional BMPs may be necessary in some cases. These minimum BMP requirements should be identified in each Permittee's Individual SWMP.

I. EDUCATION (Order Section I)

1. Specific Legal Authority for Education Requirements

- Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A)(6) provides that the proposed management program include "A description of a program to reduce to the maximum extent practicable, pollutants in discharges from municipal separate storm sewers associated with the application of pesticides, herbicides, and fertilizer which will include, as appropriate, controls such as educational activities, permits, certifications, and other measures for commercial applicators and distributors, and controls for application in public right-of-ways and at municipal facilities."
- Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B)(6) provides that the proposed management program include "A description of educational activities, public information activities, and other appropriate activities to facilitate the proper management and disposal of used oil and toxic materials."
- Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(D)(4) provides that the proposed management program include "A description of appropriate educational and training measures for construction site operators."

2. Discussion of Education Requirements

Education is a critical BMP and an important aspect of the SWMP. The EPA finds that "An informed and knowledgeable community is critical to the success of a storm water management program since it helps ensure the following:

> "Greater support for the program as the public gains a greater understanding of the reasons why it is necessary and important. [...]
>
> Greater compliance with the program as the public becomes aware of the personal responsibilities expected of them and others in the community, including the individual actions they can take to protect or improve the quality of area waters". (EPA, 2000c)

Regarding target audiences, EPA states "The public education program should use a mix of appropriate local strategies to address the viewpoints and concerns of a variety of audiences and communities, including minority and disadvantaged communities, as well as children" (EPA, 2000c). The target communities included in Requirement I. are based on recommendations of the TAC (SWRCB, 1994).

3. Comments on Existing and Proposed Education Programs

Public education was strongly emphasized in the Permittees' 1993 DAMP implemented under the first and second term permits. Consequently, the Permittees already have well-developed education programs that may be readily reviewed and revised, as necessary, to satisfy the requirements of Order No. R9-2004-001.

Section 8.2 of the ROWD includes several good program commitments, such as conducting a survey to measure changes in awareness, which should be incorporated into the SWMP.

J. ILLICIT DISCHARGE DETECTION AND ELIMINATION (Order Section J)

1. Specific Legal Authority for Illicit Discharge Detection and Elimination Requirements

- Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(B) and 40 CFR 122.26(d)(2)(iv)(B)(1) generally apply to all directives under Section J. Illicit Discharge Detection and Elimination of Order No. R9-2004-0001.
- Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B)(2) provides that the permittee include in its proposed management program "a description of procedures to conduct on-going field screening activities during the life of the permit, including areas or locations that will be evaluated by such field screens."
- Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B)(3) provides that the permittee include in its proposed management program "procedures to be followed to investigate portions of the separate storm sewer system that, based on the results of the field screen, or other appropriate information, indicate a reasonable potential of containing illicit discharges or other sources of non-storm water."
- Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(B)(5) provides that the permittee include in its proposed management program "a description of a program to promote, publicize, and facilitate public reporting of the presence of illicit discharges

or water quality impacts associated with discharges from municipal separate storm sewers."

- Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(B)(6) provides that the permittee include in its proposed management program "a description of educational activities, public information activities, and other appropriate activities to facilitate the proper management and disposal of used oil and toxic materials."

2. Discussion of Illicit Discharge Detection and Elimination Requirements

In accordance with 40 CFR 122.26(d)(2)(iv)(B) and 122.26(d)(2)(iv)(B)(1), **Requirement J.1** requires each Permittee to actively seek and eliminate illicit discharges and illicit connections. As guidance for detecting and eliminating illicit discharges and connections, the EPA suggests "The proposed management program must include a description of inspection procedures, orders, ordinances, and other legal authorities necessary to prevent illicit discharges to the MS4" (EPA, 1992a).

In order to detect illicit discharges and connections, **Requirement J.2** requires each Permittee to develop and maintain an accurate, up-to-date map of its MS4. An accurate map of the MS4 will enable the Permittees to monitor the system for illicit discharges and connections and to be aware of the entire MS4 within its jurisdiction.

Requirement J.3 requires Permittees to develop and implement an Illicit Discharge Monitoring Program as specified in **section II.B of Monitoring and Reporting Program No. R9-2004-001 (hereafter referred to as the MRP)**. If results indicate that an illicit discharge or connection may be present, **Requirement J.4** specifies that the Permittees shall conduct follow-up procedures to pinpoint the source of the illicit discharge or connection. Once the illicit discharge or connection source is identified, steps may be taken to eliminate the discharge or connection. In this manner, monitoring of dry weather urban runoff can lead to the elimination of illicit discharges and connections and the reduction of pollutants in urban runoff.

Requirement J.5 requires the elimination of illicit discharges and illicit connections as soon as possible. The time needed to eliminate the discharge/connection will depend on the nature and circumstance of the problem including conditions that are not under the control of the Permittees. However, discharges that the Permittees have the ability to eliminate immediately must be eliminated immediately. The EPA supports elimination as soon as possible when it states, "Once the source is identified, the offending discharger should be notified and directed to correct the problem. Education efforts and working with the discharger can be effective in resolving the problem before taking legal action" (EPA, 1992a).

The EPA states that the "proposed management program component should describe how the prohibition on illicit discharges will be implemented and enforced. The description could include a schedule and allocation of staff and resources. A direct linkage should exist between this program component and the adequate legal authority requirements for the ordinances and orders to effectively implement the prohibition of illicit discharges" (EPA, 1992a). Consistent with this statement, **Requirement J.6** requires Permittees to implement and enforce its ordinance, orders, or other legal authority over illicit discharges and connections.

Requirement J.7 pertains to sewage spill prevention and response. Such spills into and from the MS4 can severely impair receiving water quality and pose a significant threat to public health. To avoid these negative impacts, the Order requires Permittees to implement appropriate procedures to prevent, contain, and respond to spills that may discharge into the MS4. The Order contains suggestions of possible appropriate actions. The EPA states, "The goal of a spill prevention program is to reduce the frequency and extent of spills of hazardous materials which can cause water quality impairment" (EPA, 1992a).

Requirement J.8 pertains to public reporting of illicit discharges or water quality impacts associated with discharges from MS4s. Regarding this issue, the EPA states "Timely reporting by the public of improper disposal and illicit discharges are critical components of programs to control such sources. To enhance public awareness, programs may include setting up a public information hotline number, educating school students, community and volunteer watchdog groups, using inserts into utility bills, and newspaper, radio, and television announcements to inform the public about what to look for and how to report incidents" (EPA, 1992a).

The EPA states "If private individuals find the proper disposal of used oil or toxic materials difficult, incidents of improper disposal (such as into the MS4) increase" (EPA, 1992a). Therefore **Requirement J.9** directs the Permittees to propose a program component that will facilitate the proper disposal of used oil and toxics from households by establishing municipally operated collection sites, or ensuring that privately operated collections sites are available. The EPA suggests this program component "should describe outreach plans to handlers of used oil and to the public, and operating plans for oil and household waste collection programs" (EPA, 1992a).

3. Comments on Existing and Proposed Illicit Discharge Detection and Elimination Programs

The ROWD references a reconnaissance survey that the Permittees conducted pursuant to their first-round MS4 permit (Order No. R9-90-46), which identified and removed any illicit connections. According to the 2001-2002 Annual Progress Report, the Reconnaissance survey showed that illicit connections were almost non-existent within the Upper Santa Margarita Watershed, whereas illegal discharges were more commonplace (Permittees, 2001). Based on these results, the Permittees concluded that focusing on inspections of open channels and the curtailment of illicit discharges is a more effective use of resources than inspections of underground storm drains. The EPA concurs with this conclusion when it says, "Permits for older municipalities may emphasize control of cross-connections, while permits for municipalities with large areas of new development may emphasize the installation of permanent structural controls during construction" (EPA, 1992a). **Requirement J.1** of the Order gives the Permittees the flexibility to focus their programs on priority areas, so long as they are actively seeking and eliminating illegal discharges. It should be noted that the reconnaissance survey was conducted 10 years ago and the length of the MS4 has increased significantly. The survey, dated September 30, 1993, covered approximately 25.2 miles of underground storm drains and over 8.9 miles of open channels. According to the ROWD, the District's MS4 currently consists of about 71 miles of open and closed storm drains, and the City of Murrieta's MS4 currently consists of about 18 miles of open and closed storm drains. The total length of Temecula's MS4 is unknown. Therefore, the survey covered less than half

of the current MS4 and cannot serve as evidence that illicit connections are currently non-existent.

Section 3.2 of the ROWD states that the Permittees have programs in place to identify and eliminate illicit connections. According to the 2001-2002 Annual Progress Report, the City of Murrieta conducts annual video inspections of portions of its MS4 and investigates any illicit connections identified, and District and County staff perform visual inspections of open storm drains to check for discharges. The City of Temecula seems to have a reactive program that relies on reports of illegal discharges.

Regarding **Requirement J.2**, the District and the City of Murrieta submitted a map of their MS4s with the ROWD. The City of Temecula has not yet submitted a map.

Section 3.5 of the ROWD proposes that Permittees shall continue to implement and improve routine inspection and monitoring and reporting programs for their MS4s. In order to satisfy **Requirement J.3** of the Order, each Permittee shall describe their inspection and monitoring programs to meet the requirements of Section II.B of the MRP in their Individual SWMPs.

Section 3.5 of the ROWD proposes that, "If routine inspections or dry weather monitoring indicate illicit connections or illegal discharges, they shall be investigated and eliminated or permitted within sixty (60) calendar days of receipt of notice." Sixty days is an unreasonably long time frame for the investigation and elimination of illicit discharges and connections. As stated above, these discharges can cause or contribute to receiving water degradation and are prohibited. Also, illicit discharges are often a discrete event that must be investigated immediately to identify the source. Therefore, the proposed timeframe for investigation and elimination must be decreased to represent the most immediate response time as is possible for the Permittees. In accordance with **Requirement J.5**, illicit discharges that pose a serious threat to public health or the environment must be eliminated immediately, and all others must be eliminated as soon as possible.

Section 3.2 of the ROWD states that the Permittees have programs in place to identify, eliminate, and respond to illicit connections and discharges. However, these programs are not described. According to the 2001-2002 Annual Progress Report, the District manages a toll-free reporting hotline, which satisfies **Requirement J.8** of the Order (Permittees, 2002a). The reports do not mention hotlines for the Cities of Murrieta and Temecula and it is not clear if the countywide hotline is coordinate with the other Permittees. In order for the Cities to satisfy this requirement, Individual SWMPs must either discuss individual public reporting hotlines or describe how the countywide hotline is coordinated.

As indicated in Section 3.3 of the ROWD, the Permittees already have mechanisms in place to facilitate the proper management and disposal of used oil and toxic materials that meet or exceed **Requirement J.8**.

K. WATERSHED-BASED ACTIVITIES (Order Section K)

1. Discussion of Watershed Requirements

Management of urban runoff on a watershed basis is recommended by the SWRCB and the SDRWQCB. The TAC defines watershed-based water quality protection as "the prevention/control of pollution and management of human activities in a geographically or other defined drainage area to protect, restore, and/or enhance the natural resources and

beneficial uses within the watershed" (SWRCB, 1994). The TAC recommends that "All NPDES permits and Waste Discharge Requirements should be considered for reissuance on a watershed basis" (SWRCB, 1994). The SDRWQCB also recommends watershed-based water quality protection, stating in the Basin Plan that "Public agencies and private organizations concerned with water resources have come to recognize that a comprehensive evaluation of pollutant contributions on a watershed scale is the only way to realistically assess cumulative impacts and formulate workable strategies to truly protect our water resources" (SDRWQCB, 1994).

The requirements in Section K of the Order are necessary for the Permittees to identify and mitigate sources of pollutants in urban runoff from the entire watershed that impact common downstream receiving waters. This is the key to addressing the impacts from areas and activities within the Permittees' jurisdiction on downstream receiving waters and their beneficial uses (i.e. Camp Pendleton's drinking water supply) as well as addressing pollutant sources in the watershed which are outside the Permittees' jurisdiction. **Finding No. 20** emphasizes the need for watershed-based activities and collaboration among dischargers in a common watershed. It states, "As operators of the MS4s, the Permittees cannot passively receive and discharge pollutants from third parties. By providing free and open access to an MS4 that conveys discharges to waters of the U.S., the operator essentially accepts responsibility for discharges into the MS4 that it does not prohibit or control. These discharges may cause or contribute to a condition of contamination or exceedances of receiving water quality objectives." Permittees could be held responsible for discharges of pollutants from sources outside of their jurisdiction if they cause or contribute to exceedances of water quality objectives, therefore, it is necessary for Permittees to make efforts to address all sources of pollutants in the watershed.

2. Comments on Existing and Proposed Watershed Programs

The Permittees already collaborate with each other through monthly meetings. However, these meetings, as well as many aspects of the existing DAMP, are countywide. In order to address watershed-specific issues, the Permittees should meet separately to focus on the Upper Santa Margarita Watershed. The Permittees also already participate in San Diego County's current effort to develop a Santa Margarita Watershed Management Plan, the Southern California Stormwater Monitoring Coalition, and the Santa Margarita River Executive Management Team. At this time, this level of participation is appropriate to meet the objectives of Requirement K.3. of the Order.

L. MONITORING AND REPORTING PROGRAM (Order Section L)

See discussion in Section IX of this Fact Sheet.

M. PRINCIPAL PERMITTEE RESPONSIBILITIES (Order Section M)

1. Specific Legal Authority for Principal Permittee Responsibility Requirements

- Federal NPDES regulation 40 CFR 122.26(d)(2)(i)(D) provides that "[The Permittee must demonstrate that it can control] through interagency agreements among coapplicants the contribution of pollutants from one portion of the municipal system to another portion of the municipal system."

- Federal NPDES regulation 40 CFR 122.26(a)(3)(iii)(C) provides that "A regional authority may be responsible for submitting a permit application."

2. Discussion of Principal Permittee Responsibility Requirements

The Principal Permittee responsibilities required in Section M are necessary to facilitate intergovernmental coordination and for the standardization and compilation of required reports. Standardized documents provide for easier assessment and application of report data, making reports more useful for the SDRWQCB and the Permittees, which can result in more effective urban runoff management. The EPA recommends intergovernmental coordination, such as a memorandum of understanding, to define specific municipal roles, responsibilities and points of coordination (EPA, 1992a).

3. Comments on Existing and Proposed Principal Permittee Responsibilities

The Permittees currently operate under an Implementation Agreement, which was executed in November 1998. The Implementation Agreement sets forth the responsibilities of the Principal Permittee and the Permittees and provides for funding of "umbrella" activities. In Section 2.1 of the ROWD, the Permittees propose to amend the implementation agreement to set forth the responsibilities of the Permittees in accordance with the Order.

N. STANDARD PROVISIONS (Order Section O and Attachment B)

The standard provisions included in **Attachment B** of Order No. R9-2004-001 are consistent to all NPDES permits and are generally found in federal NPDES regulation 40 CFR sections 122.22, 122.41, 122.42 and the CWC (specific citations are provided in **Attachment B** of Order No. R9-2004-001).

IX. MONITORING AND REPORTING PROGRAM

The MRP consists of requirements for receiving waters monitoring, monitoring of dry weather flows/illicit discharges, and annual reporting.

A. RECEVING WATERS MONITORING

1. Specific Legal Authority for Receiving Waters Monitoring Requirements

Federal NPDES regulations at 40 CFR 122.26(d)(2)(iii)(D) require municipal permittees to propose a monitoring program for representative data collection for the term of the permit that describes the location of outfalls, field screening points, instream stations, why the location is representative, the frequency of sampling, parameters to be sampled, and a description of sampling equipment.

2. Discussion of Monitoring Requirements

According to the EPA, the benefits of sampling data include, but are not limited to (EPA, 1992b):

- Providing a means for evaluating the environmental risk of storm water discharges by identifying types and amounts of pollutants present;

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- Determining the relative potential for storm water discharges to contribute to water quality impacts or water quality standard violations;
- Identifying potential sources of pollutants; and
- Eliminating or controlling identified sources more specifically through permit conditions.

Most importantly, monitoring programs are an essential link in urban runoff management efforts. Data collected from monitoring programs can be assessed to determine the effectiveness of management programs and practices, which is vital for the success of the iterative approach used to meet the MEP standard. Specifically, when data indicates that a particular BMP is not effective, an improved BMP can be selected. Also, when water quality data indicate that water quality standards or objectives are being exceeded, particular pollutants, sources, and drainage areas can be identified and targeted for urban runoff management and specific education efforts.

Considering the benefits described above, the MRP has been designed to determine impacts to receiving water quality and beneficial uses from urban runoff and to use the results to refine the SWMP for the reduction of pollutant loadings to the MEP. The primary goals of the MRP include:

1. Assess compliance with Order No. R9-2004-001;
2. Measure and improve the effectiveness of the SWMPs;
3. Assess the chemical, physical, and biological impacts of receiving waters from urban runoff;
4. Characterize urban runoff discharges;
5. Identify sources of specific pollutants;
6. Prioritize drainage and sub-drainage areas that need management actions;
7. Detect and eliminate illicit discharges and illicit connections to the MS4; and
8. Assess the overall health of receiving waters.

Each of the components of the Receiving Waters and Illicit Discharge Monitoring Programs is necessary to meet the objectives listed above. The justifications for each component are discussed below.

Framework

The SDRWQCB typically uses the following framework in NPDES MRPs:

1. Core monitoring to address ongoing, site-specific needs, such as estimating pollutant loads and assessing trends;
2. Regional monitoring to address large spatial scales at infrequent (i.e. every five years) intervals. Regional monitoring is useful to put localized site-specific results into context of the larger ecosystem; and
3. Special studies to address directed needs or to answer specific questions. This monitoring is useful to address unique issues, oftentimes triggered by routine monitoring

to help understand results or identify efficient management measures. Special studies are short-term studies with a predefined beginning, middle and end.

Core Monitoring

Section II.A.1 of the MRP requires mass loading monitoring at three triad[13] and four tributary stations. The mass loading monitoring will provide data representing the total pollutant loadings from specific drainage and sub-drainage areas. This data can be used to help achieve the MRP goals listed above and answer the following management questions:

- Are conditions in receiving waters protective, or likely to be protective, of beneficial uses?
- What is the extent and magnitude of the current or potential receiving water problems?
- What is the relative urban runoff contribution to the receiving water problem(s)?
- What are the sources of urban runoff that contribute t receiving water problem(s)?
- Are conditions in receiving waters getting better or worse?

The number and locations of triad and tributary stations are consistent with the Permitees' proposal (Permittees, 2004b). In addition to one reference station, the triad stations are existing Permittee monitoring stations located in lower Murrieta Creek and lower Temecula Creek. These stations are located at the downstream end of the Upper Santa Margarita Watershed and should be representative of discharges from the entire permitted area. The tributary station locations were proposed by the Permittees and are representative of urbanized sub-drainage areas. Data from these locations will allow the Permittees to better identify sources of pollutants, prioritize drainage areas for management actions, and determine the conditions of the tributary streams (MRP Goals 4,5,6 and 8).

Federal NPDES regulations at 40 CFR 122.21(g)(7)(ii) require the sampling protocols specified in **section II.A.1 of the MRP.** These protocols are necessary to ensure consistent sampling, adequate representation of storm events, and accurate, comparable data.

Section II.A.2 of the MRP requires the Permittees to conduct toxicity monitoring to evaluate the extent and causes of toxicity in receiving waters. Toxicity testing is used to assess the impact of urban runoff on the overall quality of aquatic systems (Center for Watershed Protection, 1996). Evidence of toxicity indicates that pollutants are bioavailable and have the potential to cause degradation to aquatic systems. When combined with chemical data, which by itself does not necessarily reveal the impacts of urban runoff to aquatic life or the beneficial uses of receiving waters, toxicity monitoring data can be used to better determine the extent and causes of impacts to aquatic systems (MRP Goals 3 and 8).

Toxicity testing can also be used to evaluate the effectiveness of urban runoff BMPs and other management measures (MRP Goal No. 2). The Center for Watershed Protection rated it as a "very useful" indicator for assessing municipal storm water programs. Permittees can use the results of toxicity testing to identify areas of high concern and to establish priority locations for BMPs (MRP Goal No. 6).

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[13] Triad means a station where chemical, toxicity, and bioassessment monitoring occur.

Section II.A.2.a specifies three freshwater test species for use, because multiple species are needed to provide a more complete assessment of the causes of toxicity in urban runoff (Bay, 2001). Different species vary in their sensitivity to contaminants and, therefore, multiple species can reveal when varying contaminants are present at toxic levels (Bay, 2001). Reliance on single species tests may not provide an accurate assessment of toxicity (Center for Watershed Protection, 1996). The rationale for the specified test species is as follows:

- *Ceriodaphnia dubia* (water flea): represents the invertebrates that live in the water column and serve as a food source for larger invertebrates and small fish. This species is known to be sensitive to metals and pesticides in water, as well as other contaminants. (San Diego County, 2004)
- *Hyalella azteca* (freshwater amphipod): an invertebrate associated with the sediment at the bottom of streams and lakes. It serves as a food source for larger invertebrates as well as fish. This species is generally sensitive to metals and pesticides, as well as nitrogen compounds such as ammonia. (San Diego County, 2004)
- *Pseudokirchneriella subcapitata*, formally known as *Selenastrum capricornutum*: unicellular algae present in the water column of streams and lakes. It is the base of the food chain in freshwater systems. It is sensitive to herbicides and metals and its growth is greatly affected by nutrient loads. (San Diego County, 2004)

An additional reason to use the species listed above, is for consistency with other monitoring in the Santa Margarita Watershed. Pursuant to the County of San Diego's MS4 permit (Order No. R9-2001-01), toxicity testing using these three species occurs at the mass loading station near the mouth of the Santa Margarita River. Using the same species throughout the watershed will allow the results to be comparable and potential sources of toxicity to be better identified.

For cost purposes, toxicity testing is only required on wet weather samples.

Section II.A.3 of the MRP requires the Permittees to conduct bioassessment monitoring. Bioassessment data is a cost-effective tool that measures the effects of water quality over time (CDFG, 2002). It is an important indicator of stream health and impacts from urban runoff. It can detect impacts that chemical and toxicity monitoring cannot. The EPA encourages permitting authorities to consider requiring biological monitoring methods to fully characterize the nature and extent of impacts from urban runoff (EPA, 1996c). Therefore, the SDRWQCB and other RWQCBs commonly require bioassessment monitoring in MS4 and other types of discharge permits.

Bioassessment is the direct measurement of the biological and physical condition, and the attainment of beneficial uses (COLD, WARM, WILD, and RARE) of receiving water, using benthic macroinvertebrates. Bioassessment monitoring integrates the effects of both water chemistry and physical habitat impacts (e.g., sedimentation or erosion) of various discharges on the biological community native to the receiving waters. Moreover, bioassessment is a direct measurement of the impact of cumulative, sub-lethal doses of pollutants that may be below reasonable water chemistry detection limits, but that still have biological affects.

Because bioassessment focuses on communities of living organisms as integrators of cumulative impacts resulting from water quality or habitat degradation, it defines the ecological risks resulting from urban runoff. Bioassessment not only identifies that an

impact has occurred, but also measures the effect of the impact and tracks recovery when control or restoration measures have been taken. These features make bioassessment a powerful tool to assess compliance, evaluate the effectiveness of BMPs, and to track both short and long-term trends (MRP Goals 1,2,3, and 8).

From 1998 through 2001, the SDRWQCB implemented the Ambient Bioassessment Monitoring Program, which monitored rivers and streams in the San Diego region. The monitoring concluded that waters in the Upper Santa Margarita Watershed, including Murrieta Creek, Temecula Creek, and the upper Santa Margarita River, exhibited degraded biological and physical integrity (Index of Biotic Integrity (IBI) ranged from "Very Poor" to "Good"). As a comparison, the reference stations in the watershed, located in Sandia Creek and De Luz Creek, were characterized by a high degree of biological and physical integrity (IBI was consistently "Very Good") (CDFG, 2002). These conclusions support the need for continued bioassessment monitoring to determine the long-term health of the receiving waters and impacts from MS4 discharges.

Through a CWC section 13225 directive, issued in March 2003, the Permittees were required to begin implementing a bioassessment monitoring program. The bioassessment required in the MRP replaces that required under the directive. The program consists of sampling, monitoring, and analysis of data at the three triad stations. The Permittees began bioassessment monitoring four stations in November 2003, pursuant to the directive. For cost purposes, the number of stations was reduced to three.

Section II.A.4 of the MRP requires the Permittees to use the results of the chemistry, toxicity, and bioassessment monitoring, to determine if impacts from urban runoff are occurring and when follow-up actions are necessary. The triad approach allows a wide range of measurements to be combined to more efficiently identify pollutants, their sources, and appropriate follow-up actions. Results from the three types of monitoring shall be assessed to evaluate the extent and causes of pollution in receiving waters and to prioritize management actions to eliminate or reduce the sources. The framework provided in Table 6 below shall be used to determine conclusions from the data and appropriate follow-up actions. The framework in Table 6 was derived from the *Model Monitoring Program for Municipal Separate Storm Sewer Systems in Southern California* (SMC, 2004).

When, based on the framework in Table 6, data indicates the presence of toxic pollutants in runoff, Permittees are required to conduct a Toxicity Identification Evaluation (TIE). A TIE is a set of procedures used to identify the specific chemical(s) responsible for toxicity to aquatic organisms. When discharges are toxic to a test organism, a TIE must be conducted to confirm potential constituents of concern and rule out others, therefore allowing Permittees to determine and prioritize appropriate management actions. If a sample is toxic to more than one species, it is necessary to determine the toxicant(s) affecting each species. If the type and source of pollutants can be identified based on the data alone and an analysis of potential sources in the drainage area, a TIE is not necessary.

When a TIE identifies a pollutant associated with urban runoff as a cause of toxicity, it is then necessary to conduct a toxicity reduction evaluation (TRE). A TRE is a study conducted in a step-wise process to identify the causative agents of toxicity, isolate the sources of toxicity, evaluate the effectiveness of toxicity control options, and then confirm the reduction in toxicity. A TRE should include an analysis and discussion of all potential

source(s) causing toxicity, proposed BMPs to eliminate or reduce the pollutants causing toxicity, and suggested follow-up monitoring to demonstrate that toxicity has been removed.

Table 6. Triad Approach to Determining Follow-Up Actions

	Chemistry	Toxicity	Bioassessment	Possible Conclusion Determining Action	Action
1.	Persistent[14] exceedance of water quality objectives	Evidence of toxicity[15]	Indications of benthic alteration[16]	Strong evidence of pollution-induced degradation	Conduct TIE to identify contaminants of concern, based on TIE metric, initiate TRE
2.	No persistent exceedances of water quality objectives	No evidence of toxicity	No indications of benthic alteration	No evidence of pollutant-induced degradation	No action necessary
3.	Persistent exceedance of water quality objectives	No evidence of toxicity	No indications of benthic alteration	Contaminants are present but not bioavailable	Assess possible upstream sources of pollutants causing exceedances
4.	No persistent exceedances of water quality objectives	Evidence of toxicity	No indications of benthic alteration	Unmeasured contaminants exist with the potential to cause degradation to aquatic life	Conduct TIE to identify contaminants of concern, based on TIE metric, initiate TRE
5.	No persistent exceedances of water quality objectives	No evidence of toxicity	Indications of benthic alteration	Alteration probably not due to toxic pollutants	No action necessary due to toxic chemicals Initiate TRE for physical sources of benthic alteration
6.	Persistent exceedance of water quality objective	Evidence of toxicity	No indications of benthic alteration	Toxic contaminants are bioavailable, but in situ effects are not demonstrable	If chemical and toxicity tests indicate persistent degradation, conduct TIE to identify

[14] Persistent exceedance shall mean the exceedance of relevant Basin Plan or CTR objectives by 20% for three sampling events.

[15] Evidence of toxicity shall mean a high score, in relation to other stations, on metric that combines magnitude and persistence of toxicity over an entire year.

[16] Indications of benthic alteration shall mean an IBI score of Fair, Poor, or Very Poor.

					contaminants of concern, based on TIE metric, initiate TRE
7.	No persistent exceedances of water quality objectives	Evidence of toxicity	Indications of benthic alteration	Unmeasured toxic contaminants are causing degradation	Conduct TIE to identify contaminants of concern, based on TIE metric, initiate TRE
8.	Persistent exceedance of water quality objectives	No evidence of toxicity	Indications of benthic alteration	Inconclusive	Initiate upstream source identification (TIE cannot be conducted when toxicity is not present)

Regional Monitoring

Section II.A.II of the MRP requires that the Permittees participate and coordinate with federal, state, and local agencies and other dischargers in the Santa Margarita Watershed in development and implementation of a regional monitoring program as directed by the Executive Officer. The purpose of regional monitoring is to maximize the efforts of all monitoring partners using a more cost-effective monitoring design and to best utilize the pooled resources of the watershed. If a coordinated watershed sampling effort is approved or directed by the Executive Officer, the Permittees' sampling and analytical efforts may be reallocated.

Special Studies

Special studies are intended to address specific research or management issues that are not addressed by the routine core monitoring program. The MRP requires the Permittees to develop and implement a study to determine appropriate numeric criteria for controlling the volume, velocity, duration, and peak discharge rate of runoff to minimize erosion of natural channels and impacts to in-stream habitat. The study is necessary to comply with section F.2.b.9 of the Order.

Various similar studies and other efforts have occurred in southern California to address the issue of downstream erosion caused by increased runoff rates, volumes, velocities and durations. MS4 permits in San Diego, Orange, Los Angeles, and Ventura Counties have similar requirements, and the Southern California Stormwater Monitoring Coalition (SMC) is in the process of conducting a study (funded by Los Angeles County) to assess the connection between stream erosion and urbanization in natural drainage systems in southern California (SCCWRP, 2004). Ventura County has also conducted a similar study. It is expected that the Permittees will build on existing work and utilize the results and

conclusions of previous studies. The Permittees are encouraged to continue the SMC study in an area in the Santa Margarita Watershed.

3. Comments on Existing and Proposed Monitoring Program

The current monitoring program, the *Consolidated Program for Water Quality Monitoring* (District, 1994), was submitted as an element of the NPDES Municipal Storm Water Application for Permit Renewal, Santa Margarita Watershed, dated January 17, 1995. The objectives and components of the program are listed below (the program does not contain sampling frequencies):

1. Program Objectives:
   - Assessment of mass loadings from storm drains
   - Assess influence of land use on water quality
   - Verification and control of illicit discharges
   - Compliance monitoring of water quality
   - Assess effectiveness of various urban practices designed to control pollution
   - Identify problem areas and/or trends
   - Establish database for future reference
   - Identify baseline conditions
   - Identify pollutants of concern

2. Dry weather sampling stations:
   - Wildomar Channel
   - Cal Oaks Drain (permanent station)
   - Empire Creek Channel
   - Redhawk Parkway Drain

3. Wet weather stations:
   - Wildomar Channel
   - Cal Oaks Drain
   - Empire Creek Channel

4. Sediment sampling at the above stations plus the I-15 basin

5. Receiving water stations
   - Upper Murrieta
   - Lower Murrieta
   - Temecula Creek

6. Toxicity testing

The *Consolidated Program for Water Quality Monitoring* contains many of the same program objectives and components as the Monitoring Program. However, as determined and discussed in several documents (SDRWQCB, 2002b, 2002d, 2003b; Permittees, 2002b), the current program has been inadequate to meet its objectives and needs to be improved.

For details regarding previous monitoring, see the documents referenced herein. The Permittees did not propose a monitoring program as part of the ROWD.

B. ILLICIT DISCHARGE MONITORING PROGRAM

1. Specific Legal Authority for Illicit Discharge Monitoring Requirements

- Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B)(2) provides that the permittee include in its proposed management program "a description of procedures to conduct on-going field screening activities during the life of the permit, including areas or locations that will be evaluated by such field screens."

2. Discussion of Illicit Discharge Monitoring Requirements

Section II.B of the MRP describes the Illicit Discharge Monitoring Program. The requirements are consistent with the specifications for developing a field screening program contained at 40 CFR 122.26 (d)(1)(iv)(D). Although the minimum number of inspections is set at twice during the period of May 1st to September 30th of each year, it is expected that more frequent inspections may be necessary. An emphasis is placed on designing a program with clear criteria and rationale. The programs designed should be flexible and implemented in a manner that will enable the Permittees to identify illicit discharges and illegal connections, respond to citizen complaints, and follow-up on ongoing investigations to identify and eliminate sources.

3. Discussion of Existing and Proposed Dry Weather Monitoring

The Permittees' current water quality monitoring program identifies four dry weather monitoring stations, but no sampling frequencies, sampling protocol, or specific screening program are specified. In order to comply with **Requirement J.3** of the Order, Permittees will need to develop an Illicit Discharge Monitoring Program that meets the requirements in **section II.B of the MRP**.

C. MONITORING COSTS

The cost of the Receiving Waters and Illicit Discharge Monitoring Programs is reasonable, considering the need for the data in the Upper Santa Margarita Watershed. All of the monitoring requirements are necessary to meet the goals of the MRP, stated in Section IX.A above, and are consistent with other MS4 monitoring programs in southern California.

As part of their written comments on the Order (Permittees, 2004b), the Permittees provided cost estimates for the MRP, dated December 15, 2003, and for their proposed revised MRP. The Permittees estimated that the annual cost of the original Receiving Waters and Dry Weather Monitoring Programs would be $468,353. They estimated the annual cost of their proposed revised program to be $255,873. Due to variability of necessary overtime, parameters to be analyzed, necessary TIEs, etc., it is difficult to estimate a total cost of the monitoring program. Therefore, the SDRWQCB is assuming that the Permittees' estimate is representative.

In response to the cost information the Permittees submitted, the SDRWQCB revised and reduced the Receiving Waters and Illicit Discharge Monitoring Program requirements to the essential equivalent of the Permittees' proposal. Therefore, the cost should be equivalent to the Permittees' estimate and is reasonable for an MS4 monitoring program in southern California.

D. REPORTING REQUIREMENTS

1. Specific Legal Authority for Reporting Requirements

- Standard provisions and reporting requirements are consistent to all NPDES permits and are generally found in federal NPDES regulation 40 CFR 122.41.
- Federal NPDES regulation 40 CFR 122.42(c) requires that "The operator of a large or medium municipal separate storm sewer system of a municipal separate storm sewer system that has been designated by the Director under section 122.26(a)(1)(v) of this part must submit an annual report by the anniversary of the date of the issuance of the permit for such system. The report shall include: (1) The status of implementing the components of the storm water management program that are established as permit conditions; (2) Proposed changes to the storm water management program that are established as permit condition. Such proposed changes shall be consistent with § 122.26(d)(2)(iii) of this part; (3) Revisions, if necessary, to the assessment of controls and the fiscal analysis reported in the permit application under § 122.26(d)(2)(iv) and (d)(2)(v) of this part; (4) A summary of data, including monitoring data, that is accumulated throughout the reporting year; (5) Annual expenditures and budget for year following each annual report; (6) A summary describing the number and nature of enforcement actions, inspections, and public education programs; and (7) Identification of water quality improvements or degradation."

2. Discussion of Annual Reporting Requirements

SWMP Reporting Requirements (Section III.A of the MRP)

All of the SWMP reporting requirements are necessary to meet the above-referenced federal requirements and to measure the effectiveness of programs and BMPs. According to the EPA, measurable goals are necessary to evaluate the effectiveness of individual BMPs and the storm water management program as a whole (EPA, 2000d). The EPA strongly recommends that measurable goals include: (1) The activity, or BMP, to be implemented; (2) A schedule or date of implementation; and (3) A quantifiable target to measure progress toward achieving the activity or BMP (EPA, 2002d). The Order is structured so that the descriptions of programs and BMPs are included in the SWMP, and the quantifiable measurements are reported in each annual report.

The current permit, Order No. R9-98-02 requires the annual report to be submitted on September 15 of each year. However, the District submitted a request, dated November 3, 2003, to change the annual report date to October 31. The District's request was based on the difficulty of obtaining necessary materials with sufficient time to prepare a report. The SDRWQCB concurs with the request.

Monitoring Provisions and Reporting Requirements (Sections II.C and III.B of the MRP)

The majority of the monitoring provisions and reporting requirements contained in sections II.C and III.B of the MRP are specified in 40 CFR 122.41. Those that are not are standard provisions in SDRWQCB NPDES permits, or are necessary to meet the objectives of the MRP.

Section II.C.h of the MRP specifies that the Minimum Levels (MLs) listed in Appendix 4 of the State Board Policy for Implementation of Toxics Standards for Inland Surface Water, Enclosed

Bays, and Estuaries of California, 2000 (SIP) shall be used for analyses of priority toxic pollutants identified in the CTR (65 Fed. Reg. 31682). The MLs from the SIP represent the lowest quantifiable concentration in a sample based on the proper application of all method-based analytical procedures and the absence of any matrix interferences (SWRCB, 2000a). The SIP's MLs therefore represent the best available science for determining the presence of toxic pollutants at concentrations of concern. If MLs are not used, concentrations of concern of priority toxic pollutants may not be detected. Detection and control of toxic pollutants in surface waters is necessary to achieve the CWA's goals and objectives (65 Fed. Reg. 31683). Using MLs will also provide quantifiable data that is necessary to better assess water quality and BMP effectiveness. Non-detects cannot be used to accurately determine mass loadings. Therefore, the method detection limits (MDLs) used for analysis of priority toxic pollutants must be equivalent to or lower than the MLs in Appendix 4 of the SIP.

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CITY OF TEMECULA
ANNUAL PROGRESS REPORT

Reporting Period
July 1, 2006 to June 30, 2007

Santa Margarita River Watershed

FOR
SAN DIEGO REGIONAL WATER QUALITY CONTROL BOARD
(ORDER NO. R9-2004-001)

PREPARED
OCTOBER 22, 2007

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CERTIFICATION STATEMENT

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to ensure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

_____
Signature

Daniel A. York, City Enginee_____
Name and Title, Printed or Typed

_____
Date

1.0 EXECUTIVE SUMMARY

This annual report represents the current status of the stormwater management program for the City of Temecula (City). This report covers the reporting period between July 1, 2006, and June 30, 2007. Each section addresses individual programs that were implemented in order to comply with the requirements of the municipal separate storm-sewer system permit (MS4 permit) issued to the Santa Margarita River (SMR) watershed permittees of Riverside County. The SMR MS4 permit was issued on July 14, 2004 by the San Diego Regional Water Quality Control Board (Board) and is a third-term MS4 permit.

The following represents the major improvements to the City's NPDES program during this reporting period.

- WQMPs were conditioned on more projects during this reporting period than during the previous reporting period;
- The City completed the required High-priority business inspections. In addition, a significant number of Medium and Low-priority business inspections were also completed. These efforts increased compliance and decreased the number of citations;
- The City increased the number of Construction inspections. These efforts increased compliance and decreased the number of citations;
- The City increased its Education and Outreach efforts throughout the Construction, Industrial/Commercial, and new Residential sectors;
- The City's Stormwater and Urban Runoff ordinance was fully implemented and enforced.

2.0 INTRODUCTION

The information contained herein is presented in the same format as that outlined in Section III of the Monitoring and Reporting Program (MRP) of the MS4 permit (Permit). Each section addresses individual components of the Permit and summarizes the progress accomplished during the reporting period. These sections include the City's Development Planning process, Construction program, Municipal program, Industrial and Commercial program, Residential program, Education program, and Illicit Discharge Detection and Elimination Program (IC/ID), respectively.

This Annual Report specifically responds to the Permit's reporting requirements and includes identifying program progress and effectiveness evaluations. This report will be the second year that the new Permit programs are fully implemented and effectiveness data is collected to establish baseline conditions. The Permit also requires the Permittees to develop a long term strategy for addressing the effectiveness of each jurisdiction's Storm Water Management Plan (SWMP). The SWMP is the set of written policies and procedures for each component outlined in the MS4 permit. To that end, the Permittees have developed a long term strategy to evaluate the effectiveness of the SWMPs.

The long term strategy for the program effectiveness assessment (PEA) will be conducted at two levels described below. It should be noted that a PEA requires the initial establishment of a set of baseline conditions using measurable metrics. These baseline conditions can then be used to establish measurable goals based on the measured metrics. Thereafter, effectiveness can be evaluated by comparisons of successive years of measurable metrics against the baseline data and measurable goals.

At the first level, or Annual Assessment Level, the PEA will focus on an annual assessment of program implementation and Permit compliance. These assessments will be addressed by completing the Annual Reporting Forms, which will confirm program implementation, Permit compliance, and collection of measurable metrics. These assessments are included at the end of each Annual Report section. Inferences about the compliance of each program (new development, construction, IC/ID, etc.) will predominantly be drawn from both direct and indirect measures of progress for each program.

At the second level, or Long Term Level, the Permittees will collectively evaluate the measurable metrics, Receiving Water monitoring Data, and IC/ID monitoring data to assess changes in knowledge and behavior, load reductions and improvements in Receiving Water Quality. This long-term analysis will be conducted as part of the Report of Waste Discharge (ROWD). The results of this long-term assessment will be evaluations of the need to make significant programmatic revisions to the Permit compliance programs, as necessary, to protect Beneficial Uses of Receiving Waters. This level will place more emphasis on using direct measures of progress (monitoring data, long term trend analysis) and will support the review and any revisions to the Drainage Area Management Plan (DAMP) and Individual SWMPs using information from the water quality monitoring program, IC/ID monitoring program and measurable metrics that have been collected.

Where the period of evaluation is characterized by the implementation of new program requirements, determinations of program effectiveness will initially be limited to confirmation of program implementation and collection of measurable metrics until baseline conditions can be properly established. Further, it must be recognized that direct measures of long term program effectiveness may not be available within the timeframe of the Third Term Permits. This lack of direct measure confirmation arises because:

- Baseline water quality conditions are not readily established;
- Water quality changes in response to program implementation are likely to be very slow; and
- Establishing a link between receiving water condition and program activities is difficult at the watershed scale when programs are being implemented incrementally with the development/redevelopment cycle.

While program effectiveness assessment is a key step in the iterative process of program implementation, it should be realized that effectiveness assessment itself is a part of the management process that is also evolving. Assessing program effectiveness is recognized as a challenge for program managers across California, and the City of Temecula is supporting the effort of the California Stormwater Quality Association (CASQA) to develop guidance in this area at a statewide level.

3.0 DEVELOPMENT PLANNING PROGRAM

1) Description of any amendments to the General Plan or the development project approval process:

General Plan – On April 12, 2005, the City adopted updates to its General Plan and included, per the MS4 permit and comments from the Regional Board, water quality and watershed protection elements. The Planning Department administers any changes to the City's General Plan. According to the Planning Department, there have been no modifications to the General Plan during this reporting period. The City's goals and policies that address the MS4 are listed in Table 6-1 of Section 6.2 (under General Plan) of the City's SWMP.

Development Projects - On July 1, 2005, the City incorporated the Water Quality Management Plan (WQMP) requirements into all new-development applications and on applications for modifications to existing developments. The revised applications are listed in Section 6.3 (under CEQA Environmental Review Process) of the SWMP under Project Application Forms. All applicable projects that did not receive legal approval, in the form of an approved status by the Planning Commission, prior to July 1st 2005 were required to include a WQMP with the planning application materials. The City also required all proposed projects with prior legal approval to incorporate WQMP-related treatment BMPs into their final designs and to show the locations and details on the grading drawings themselves. Although post-construction BMPs were included on these plans, fully-developed WQMPs were not required due to their prior-legal-approval status. In addition, WQMP requirements were included in the Conditions of Approval (COAs) associated with each applicable development project.

2) Number of grading permits issued:

The City issued 38 grading permits during this reporting period, compared to 62 from the 2005-2006 reporting period, and compared to 76 from the 2004-2005 reporting period. As in the previous reporting periods, many of these projects had legal approval prior to the July 1st WQMP start date and have been in the processing phase until now. Most projects required complete WQMPs. However, those with prior legal approval were not conditioned for this requirement but were still obligated to include post-construction treatment BMPs on the grading plans at a minimum. In both cases, the City has ensured that post-construction BMPs have been designed into the site plan. The list of grading permits issued during this reporting period is included in Attachment A.

3) Number of developments conditioned to meet WQMP requirements:

The City conditioned 25 development projects for the WQMP document submittal requirement during this reporting period, compared to 30 from the 2005-2006 reporting period. It should also be noted that 29 projects were conditioned for the installation of post-construction BMPs during the 2004-2005 reporting period prior to the WQMP requirement. A WQMP tracking log is included in Attachment A.

4) Attach one example of a development project that was conditioned to meet WQMP requirements and a description of the required BMPs:

Attachment A includes an approved COA for a new development that was conditioned with the WQMP requirement. The WQMP requirement is located in item number 17, under the 'General Requirements' section.

5) Description of any updates to the environmental review process:

There have been no updates to the City's CEQA process during this reporting period. The City revised its CEQA Initial Study Checklist in June 2005 to include the submittal of a WQMP for priority projects. The revised Environmental Checklist is presented in Section 6.3 (under CEQA Environmental Review Process) of the SWMP under Initial Study Checklist. The WQMP requirement is listed as item 'f' under the 'Hydrology and Water Quality' section.

6) Description and number of municipal employee training efforts conducted during the reporting period:

a) Training:

Training (collectively with other Permittees)	Training Description	Training Dates	Number of Attendees
WQMP	Review and Approval process	Dec 10, 2004	3
WQMP	Review and Approval process	Dec 15, 2004	1
WQMP	Review and Approval process	May 4, 2005	19
WQMP	Review and Approval process	June 21, 2006	26
WQMP	Review and Approval process	Proposed for November and December 2007	TBD [(1)]

[(1)] TBD – To Be Determined.

A copy of the City's tracking log for staff training is included in Attachment A.

b) Summarize any additional education and outreach activities conducted for project applicants, contractors, developers, property owners, and/or other responsible parties in support of the Development Planning Component:

City staff also attended the annual CASQA conference on September 25, 26, and 27, 2006. This three-day conference included presentations on low impact development, and on the design, implementation, and maintenance of site-specific post-construction BMPs. Staff also attended the Low Impact Development Training seminar sponsored by the SWRCB on June 28 and 29, 2007, in Marina Del Rey. These courses also focused on low impact development and post-construction BMPs. The City's WQMP requirement began on July 1, 2005. WQMP notification flyers were posted at the Public Works and Planning counters throughout the previous reporting period, as well as on the City's web site

(www.cityoftemecula.org/Temecula/Government/PublicWorks/WQMPandNPDES/). The City's NPDES website also includes a WQMP design handbook, a downloadable project-specific WQMP template, checklists to ensure completeness, and links to CASQA's BMP handbooks.

7) An assessment of program effectiveness based on the measurable goals established in the SWMP:

The following information represents measurable data that the City collected in order to begin establishing a series of baseline values that will be used as the basis for the long-term effectiveness assessment required in the permit.

	Projects Conditioned for the WQMP	WQMPs accepted by the City	Total Staff Trained (collectively with other Permittees)
FY 2004-2005	Not Applicable	Not Applicable	23
FY 2005-2006	30	4	26
FY 2006-2007	25	14	Proposed for November and December 2007

Overall, the City has been successful in requiring WQMPs on all development projects meeting the WQMP criteria. These projects were required to incorporate, as applicable, a combination of Site, Source, and Treatment BMPs into the design of their respective projects.

4.0 CONSTRUCTION PROGRAM

1) Number of inspections conducted:

The City conducted 2,965 NPDES construction inspections during this reporting period, compared to 2,154 inspections during the 2005-2006 reporting period, and compared to 1,647 from the 2004-2005 reporting period. Attachment B includes the record of inspections performed during this reporting period. This list is based on the monthly inspection frequency sheets, presented in Appendix C of the SWMP, and provides a month-to-month tally of all of the NPDES inspections, a break-down by project priority (high, medium, low), and monthly cumulative totals.

2) Number and type of enforcement actions related to construction sites:

Enforcement and Compliance Responses	Private Projects	Public Projects	Total
Verbal Warning	633	43	676
Written Warning	116	7	123
Fines	22	2	24
Stop Work Authority	*	*	*
Permit/Certificate of Occupancy Denial	*	*	*
Referral to SDRWQCB	*	*	*

*** -** Due to increased inspections, these measures were not required.

3) Description of modifications made to the construction and grading approval process:

The City is currently in the process of updating the existing Grading Ordinance, Grading Manual, Standard Grading Notes, and Standard Erosion and Sediment Control Notes. These updates will reflect successful practices observed since the previous round of revisions. A complete set of Standard Erosion and Sediment Control Notes are required on all Erosion and Sediment Control Plans. These plans must be approved by the City prior to any Grading Permit approvals. Each Erosion and Sediment Control Plan must also include exact locations and details of each proposed BMP, WDID number if applicable, BMP legend, quantities, topography, flow directions, etc. The Grading Ordinance and standard notes are posted on the City's website, as well as included in Appendix A of the SWMP.

4) Description and number of municipal employee training efforts conducted during the reporting period.

a) Training

Training (collectively with other Permittees)	Training Description	Training Dates	Number of Attendees
Construction	Erosion and Sediment Control	Aug 18, 2004	30
Construction	Erosion and Sediment Control	Mar 2, 2005	2

Construction	Erosion and Sediment Control	May 3, 2005	7
Construction	Erosion and Sediment Control	Aug 29, 2005	15
Construction	Erosion and Sediment Control	Sep 28, 2005	3
Construction	Erosion and Sediment Control	Oct 18, 2006	29

A copy of the City's tracking log for staff training is included in Attachment A.

b) Summarize any additional education and outreach activities conducted for project applicants, contractors, developers, property owners, and/or other responsible parties in support of the Construction Component:

On September 8, 2006, the City began hand-delivering the City's annual NPDES notification letter to each active construction site currently inspected for NPDES compliance. This letter is a formal notification to all active projects obligating each one to implement wet-weather BMPs by October 1st , in addition to complying with the State General Construction Permit, and maintaining pollution prevention measures year-round during the project duration. All of the active sites listed on the September 2006 NPDES Inspection Frequency Sheet List are included in Attachment B and were provided a notification letter. As such, approximately 107 annual letters were delivered to the field superintendents; 99 of these projects were in the private sector while 8 were City-owned projects. The annual letter was also provided to plan-reviewers in the Land Development division of the Public Works department of the City to ensure consistency between the development community and municipal staff. A copy of this letter is included in Attachment B. The City also participated with the Building Industry Association's (BIA) annual all-day Construction Stormwater Compliance Workshop on September 19, 2006 as a guest speaker. The City's presentation focused on SWPPP compliance and WQMP requirements. The City also distributed workshop flyers to all field superintendents for this workshop.

5) An assessment of program effectiveness based on the measurable goals established in the SWMP:

The following information represents measurable data that the City collected in order to begin establishing a series of baseline values that will be used as the basis for the long-term effectiveness assessment required in the permit.

	Inspections	Monetary Penalties	Total Staff Trained (collectively with other Permittees)
FY 2004-2005	1,647	51	39
FY 2005-2006	2,154	67	18
FY 2006-2007	2,965	24	29

Overall, the City improved this component from the previous reporting period by increasing inspections by approximately 37%. This increase in the number of inspections allowed the city to closely monitor each active site, which in turn, increased compliance and decreased the number of citations. In addition, field observations indicate that the development community, in

general, has become more knowledgeable of the requirement. In addition, it has been noted that larger developments have hired in-house SWPPP specialists specifically to minimize non-compliance. It is also important to note that the permittees' staff training programs are category-specific for different in-house divisions. As such, all applicable staff members were directed to their respective training categories.

5.0 MUNICIPAL PROGRAM

1) Number of inspections conducted at existing Municipal facilities:

Routinely performed but not formerly documented. The City is still in the process of developing inspection tracking procedures for areas and facilities owned and/or maintained by the City. A detailed listing of these areas and facilities is presented in Appendix B of the SWMP as the 'City of Temecula Inventory of Municipal Facilities and Activities'. It is anticipated that the City will have a tracking system in place by the end of the third-term permit that will document inspection dates and any NPDES-related issues that were observed and addressed for each facility. This system will ensure that the City is actively maintaining compliance at each facility.

2) Number and type of enforcement actions related to municipal construction sites:

Enforcement and Compliance Responses	Number
Education and Information	Provided but not documented
Verbal Warning	Provided but not documented
Written Warning	8

3) Number of catch basins that were inspected and the number that were cleaned:

	Total on GIS Map (City, Caltrans, private)	City-Maintained Catchbasins	Minimum Number Inspected	Number Cleaned
Catch Basins	1,964	1,600	3,200 (1)	1,974(2)

(1) There were 40 catch basins that were routinely inspected quarterly due to their proximity to heavier trafficked areas. However, the figure listed herein represents two inspections at each catch basin.
(2) This figure represents the number of documented catch basins cleaned.

All of the 1,600 city-maintained catchbasins currently documented on the City's GIS map were visited twice during the reporting period. Many of these required cleaning during both visits, while others did not. The City maintains a monthly catch basin maintenance log that lists dates, locations, and number of catch basins cleaned during any given month. In addition, the City also maintains a monthly NPDES stencil (legends) log that also lists the dates, locations, and number of legends installed during any given month. These legends are placed at the top of each catchbasin opening and state "Only Rain In The Drain". An example of each of these monthly logs is included in Attachment C.

4) Assessment of the amount and type of debris removed from catch basins, streets, and open channels, including identification of areas that generate the most pollutants:

Facility	Type of Debris	Approx. %	Problem Areas that Generate Most Pollutants
Catch basins	Anthropogenic Litter Green Waste Sediment	35(1) 60(1) 5(1)	Residential/Commercial areas Residential areas

		100	**Total Removed: 160 CY[(1)]**
Street Sweeping[(3)]	Anthropogenic Litter Sediment	**100**	**Total Removed: 1,798 Tons[(2)] (approximately 1,798 CY)**
Open Channels	Anthropogenic Litter Green Waste Sediment	7[(1)] 3[(1)] 90[(1)] **100**	Natural channels **Total Removed: 2,000 CY[(1)]**
			Grand Total: 3,958 CY

Notes:
(1) – These figures are provided by the Maintenance Division of the PW Department.
(2) – This figure is provided by Temecula Community Services District's "City of Temecula Tonnage Report".
(3) – Street sweeping areas consist of all paved city-maintained streets. Currently, street sweeping is conducted on 283 miles of paved streets.

5) Assessment of effectiveness of BMPs implemented for municipal facilities and activities:

BMP Code	Description	Used	Notes
SC-10	Non-Stormwater Discharges	☒ Yes ☐ No	
SC-11	Spill Prevention, Control and Clean-up	☒ Yes ☐ No	
SC-20	Vehicle and Equipment Fueling	☐ Yes ☒ N/A	Fueling is conducted offsite
SC-21	Vehicle and Equipment Cleaning	☒ Yes ☐ No	City vehicles are washed onsite. Stormcepter collects all discharges.
SC-22	Vehicle and Equipment Repair	☐ Yes ☒ N/A	Repairs are conducted offsite
SC-30	Outdoor Loading/Unloading of Materials	☒ Yes ☐ No	
SC-31	Outdoor Liquid Container Storage	☒ Yes ☐ No	
SC-32	Outdoor Equipment Maintenance	☐ Yes ☒ N/A	New facility has been constructed to cover all maintenance equipment
SC-33	Outdoor Storage of Raw Materials	☒ Yes ☐ No	
SC-34	Waste Handling and Disposal	☒ Yes ☐ No	
SC-35	Safe Alternative Products	☒ Yes ☐ No	
SC-40	Contaminated or Erodible Areas	☒ Yes ☐ No	
SC-41	Building and Grounds Maintenance	☒ Yes ☐ No	
SC-42	Building Repair and Construction	☒ Yes ☐ No	
SC-43	Parking/Storage Area Maintenance	☒ Yes ☐ No	
SC-44	Drainage System Maintenance	☒ Yes ☐ No	
SC-60	Housekeeping Practices	☒ Yes ☐ No	
SC-61	Safe Alternative Products	☒ Yes ☐ No	
SC-70	Road and Street Maintenance	☒ Yes ☐ No	
SC-71	Plaza and Sidewalk Cleaning	☒ Yes ☐ No	Street sweeping has been extended into specific commercial areas
SC-72	Fountain and Pool Maintenance	☒ Yes ☐ No	
SC-73	Landscape Maintenance	☒ Yes ☐ No	
SC-74	Drainage System Maintenance	☒ Yes ☐ No	
SC-75	Waste Handling and Disposal	☒ Yes ☐ No	
SC-76	Water and Sewer Utility Maintenance	☐ Yes ☒ N/A	Provided by RCWD and EMWD

6) Description and number of municipal employee training efforts conducted during the reporting period.

a) Training:

Training (collectively with other Permittees)	Training Description	Training Dates	Number of Attendees
Municipal	Operations, Maintenance, Inspections	Oct 21, 2004	8
Municipal	Operations, Maintenance, Inspections	May 3, 2005	16

Municipal	Operations, Maintenance, Inspections	Sep 26, 2005	4
Municipal	Operations, Maintenance, Inspections	Apr 27, 2006	20
Municipal	Operations, Maintenance, Inspections	Oct 18, 2006	7
Municipal	Operations, Maintenance, Inspection	Proposed for November and December 2007	TBD

A copy of the City's tracking log for staff training is included in Attachment A.

b) Summarize any additional education and outreach activities conducted for municipal staff in support of the Municipal Component:

Due to the period between training workshops, only those who did not attend the Aril 27, 2006 session were required to attend the October 18, 2006 session. Although the fiscal year numbers only show 7 participants for the 2006-2007 fiscal year, a total of 27 participants were formally trained during the 2006 calendar year. The next round of training workshops are scheduled for November and December 2007. Although no additional formal classroom-type workshops were conducted this reporting period, numerous informal, one-on-one training has been ongoing with field crew members, the maintenance supervisor, and the maintenance superintendent on an as-needed basis.

7) An assessment of program effectiveness based on the measurable goals established in the SWMP:

The following information represents measurable data that the City collected in order to begin establishing a series of baseline values that will be used as the basis for the long-term effectiveness assessment required in the permit.

	Inspections	Pollutants Removed (CY)	Total Staff Trained (collectively with other Permittees)
FY 2004-2005	Undocumented	1,794	24
FY 2005-2006	Undocumented	11,859	24
FY 2006-2007	Documented	3,958	7

Note: The FY 2006-2007 value listed under 'Pollutants Removed' reflects 3.75" of rain during the wet-weather season.

Overall, the City improved this component from the previous reporting period by increasing the awareness for documentation.

6.0 INDUSTRIAL/COMMERCIAL PROGRAM

1) Number of inspections conducted:

Category	Number of Inspections	
Industrial/Commercial Facilities	FY 2005-2006	FY 2006-2007
High Priority Facilities	252	266
Medium Priority Facilities	52	61
Low Priority Facilities	1	96
Total	**305**	**423**

The City completed all of the annual high-priority inspections this reporting period and also addressed many medium and low priority facilities as well. The criteria used to prioritize each business is outlined in the MS4 permit and includes the facility's Standard Industrial Classification (SIC) code, materials used, wastes generated, exposure of activities to stormwater, size, proximity to receiving waters, etc. These inspections uncovered various facilities that were in different stages of compliance. However, each active facility, regardless of the stage of compliance, was provided educational materials, and verbal and written guidance and warnings through written inspection notices. These inspection notices served to document the current condition at each facility, including any deficiencies observed, and areas for improvement. Follow-up visits were also conducted at many of the more challenging sites to ensure that these were actively pursuing total compliance. The City's current prioritized inventory of industrial and commercial facilities, including the City's current inspection form, are located in Appendix D of the SWMP.

2) Number and type of enforcement actions taken:

Enforcement and Compliance Responses	FY 2005-2006	FY 2006-2007
Education and information	305	380(1)
Verbal Warning	19	380(1)
Written Warning	19	380(1)
Citation	8	1
Business License Denial	*	*
Referral to SDRWQCB	*	*

(1) - Although 423 business locations were visited, many were no longer active or had become home-based.
* - Due to increased inspections, these measures were not required.

3) An assessment of program effectiveness based on the measurable goals established in the SWMP:

The following information represents measurable data that the City collected in order to begin establishing a series of baseline values that will be used as the basis for the long-term effectiveness assessment required in the permit.

	Inspections	Monetary Penalties	Total staff trained
FY 2004-2005	161	3	1
FY 2005-2006	305	8	1
FY 2006-2007	423	1	*

* - The City contracted with AEI-CASC to conduct all business inspections. As such, municipal staff have not been required to participate in the business inspection training.

Overall, the City improved this component from the previous reporting period by inspecting more businesses, completing the high-priority inspections, and increasing the number of inspections at medium and low-priority facilities. This increase allowed the city to extend further into the business community, which in turn, increased compliance and decreased the number of citations. Field observations indicate that the business community, in general, has also become more knowledgeable of the requirements.

4) Additional Comments/Information:

Attachment D of this report includes two letters. The first letter is an outreach letter that was provided to all of the facilities that were inspected during this reporting period. The information contained in this letter describes the new NPDES regulations, the inspection criteria, and the previous outreach letter sent throughout the business community on June 7, 2005. This letter was provided to the facility representative at the time of each inspection. The second letter is provided to property management associations as an example of how to inform their respective tenants of the new discharge requirements and associated penalties for non-compliance.

7.0 RESIDENTIAL PROGRAM

1) A description of residential areas that were focused on during the past year:

Residential areas that had recently been released for occupancy continued to be the focus during this reporting period. Activities from these new residential neighborhoods generated more non-permitted discharges following occupancy than existing residential neighborhoods due to improvements incurred by the new homeowners, such as landscaping, pools, patios, etc. These areas generated limited discharges of dirt, sand, fertilizers, gravel, cement, and excess irrigation water from the newly installed lawns. The City's existing residential efforts are presented in Section 9.0 of the SWMP under Residential Sources.

2) Number and type of enforcement actions taken:

Enforcement and Compliance Responses	
Education and information	Provided but not documented
Verbal Warning	Provided but not documented
Written Warning	0
Citation	5

3) An assessment of program effectiveness based on the measurable goals established in the SWMP:

The following information represents measurable data that the City collected in order to begin establishing a series of baseline values that will be used as the basis for the long-term effectiveness assessment required in the permit.

	Residential SORs(1) Received	Monetary Penalties	Trash/Recyclables/Green Waste (Tons)
FY 2004-2005	Not documented	Not documented	Not documented
FY 2005-2006	28 (42(2))	0	54,429
FY 2006-2007	41	5	53,692

(1) – SOR – Service Order Request. SORs consist of written documentation of complaints that are called into City Hall by the general public.
(2) – This value reflects the total number of same-day field inspections conducted in response to completed written SORs as well as to inspections conducted without formal written SORs.

Overall, the City continued improving this component from the previous reporting period by further educating staff responsible for collecting SOR information to identify incoming calls associated with NPDES issues. All calls associated with NPDES issues are now being documented as formal written Service Order Requests. As such, staff have increased their base knowledge with the NPDES requirements.

4) Additional Comments/Information:

Public outreach was implemented through information contained in the City's "Inside Temecula" newsletters, "Guide to Leisure Living Activities" guide, "CityWide Clean-up" flyers, and Household Hazardous Waste Collection" flyers that are distributed biannually to

all City residents. Information pertaining to stormwater, recycling, hazardous waste disposal, community clean-up events, greenwaste management, landscape maintenance, street sweeping, etc. were presented in one or more issues of these newsletters and guides. In addition, biannual City-wide community clean-up events were conducted on November 11, 2006 and on May 19, 2007. Relevant sections from the various mailings and the community clean-up flyers are included in Attachment E.

8.0 EDUCATION PROGRAM

1) Description of education efforts conducted by the Permittee (not collectively with other Permittees) during the previous year:

Audience	Measures
Permittee Departments and Personnel	Number of Permittee employees trained for: • Construction Inspection: * • Industrial/Commercial Inspection: * • Municipal Facilities and Activities: * • Development Planning: * * - City staff are provided with continuous informal in-house training on an individual and as-needed basis. As such, these one-on-one opportunities are not formally documented. However, all formal classroom-type workshops are conducted and documented thru the regional education program administered by the Riverside County Flood Control District and paid with contributions from all permittees.
Construction Site Owners and Developers	Outreach: (1) Distributed BIA's annual workshop flyer to all field superintendents. (2) Distributed the City's annual NPDES notification letter to all active sites.
Industrial/ Commercial Owners and Operators	Outreach events conducted: Conducted inspections at 423 businesses and provided educational brochures and written inspection notices at each active facility.
Residential Community, General Public, Other Public Agencies and Students	Number of Media Impressions in: • Newspaper: Refer to watershed report • Mailings: All outreach activities took place through hand-deliveries. • Radio/TV: Refer to watershed report • Web Site: In place. The number of visitors is not documented. • Billboards: Refer to watershed report • Brochures: Distributed but not documented <u>Classroom Presentations Conducted:</u> The City contributes funds for NPDES-related presentations at elementary schools. These presentations are conducted by the Mission Resource Conservation District. 50 presentations were conducted at 6 elementary schools in Temecula during FY 2006-2007.

	Public Education Events Conducted: **Biannual Events** - "City-Wide Cleanup" & "Household Hazardous Waste Collection". **Annual Events** - Earth Day at the Promenade; Temecula Wine and Balloon Festival; SMR Watershed Cleanup.

2) Assessment of overall program effectiveness based on the measurable goals established in the SWMP:

The following information represents measurable data that the City collected in order to begin establishing a series of baseline values that will be used as the basis for the long-term effectiveness assessment required in the permit.

Total Staff Trained (collectively with other Permittees)				
	New Development	Construction	Municipal	Commercial/ Industrial
FY 2004-2005	23	39	24	1
FY 2005-2006	26	18	24	1
FY 2006-2007	(1)	29	7(2)	(3)

(1) - 26 staff members attended training in the 2006 calendar year. The next set of workshops is scheduled for Nov and Dec 2007.
(2) - 27 staff members attended training in the 2006 calendar year. The next set of workshops is scheduled for Nov and Dec 2007.
(3) - The City contracted with AEI-CASC to conduct all business inspections. As such, municipal staff have not been required to participate in the business inspection workshops.

Although no formal in-house classroom-type workshops were conducted this reporting period, numerous informal training has been ongoing with staff on an individual and as-needed basis.

9.0 ILLICIT DISCHARGE DETECTION AND ELIMINATION PROGRAM

1) Number of illicit discharges, connections and spills reported and/or identified during the reporting period:

a) Illicit Discharges (ID): 22 (based on Service Order Requests)
b) Illicit Connections (IC): 0
c) Sewage Spills (S): 2

2) Number of illicit discharges or connections investigated during the reporting period and the outcome of the investigations:

All of the SORs were addressed. The City did not receive any calls related to illicit connections.

3) Number and types of enforcement actions taken for illicit discharges or connections during the reporting period:

Enforcement and Compliance Responses	Private Facilities	Public Facilities
Non-monetary penalties	16	
Fines (Residential & Business)	6	
Total	**22**	**0**

4) Number of times City Hall was notified (calls, e-mail, walk-ins, etc.) during the reporting period, as compared to previous reporting periods.

	Number of Notifications		
	2003-04	**2004-05**	**2006-07**
NPDES SORs	74	24	41

5) Number and location of dry weather monitoring sites that were monitored during the reporting period:

Number of Site(s): The City of Temecula selected 4 sites that were monitored during the fiscal year's dry-weather fall and spring seasons. These sites consist of the following locations:

1. Empire Creek at the Del Rio Bridge.
2. Pechanga Parkway stormdrain channel near the confluence into Temecula Creek.
3. Pechanga Creek at the Rainbow Canyon bridge.
4. Temecula Creek at the confluence into the upper reach of the Santa Margarita River.

In addition, the Riverside County Flood Control District has four separate sites throughout the City that are also monitored in like manner. These sites consist of the following locations:

1. Long Canyon Wash at the Commerce Center Drive bridge
2. Murrieta Creek at the USGS station at the end of Pujol street
3. Redhawk Parkway stormdrain channel near the confluence with Temecula Creek
4. Santa Gertrudis Creek at the Jefferson Avenue bridge.

As such, eight locations are monitored throughout the City of Temecula. The latest version of the City's Dry-Weather Illicit Discharge Monitoring Log is presented in Appendix E of the SWMP. The results of the field activities conducted during this reporting period are presented in Attachment F herein.

6) Summary of Illicit Discharge Monitoring Program results, including: 1) All inspection, field screening, and analytical monitoring results; 2) All follow-up and elimination activities; and 3) Any proposed changes to station locations and/or sampling frequencies:

Date	Location	Monitoring Results	Follow-up and Elimination Activities	Proposed Changes
August 31, 2006	Primary Locations	No indications of illicit discharges	None	No Changes Comment(s):
June 15, 2007	Primary Locations	No indications of illicit discharges	None	No Changes Comment(s):

7) Assessment of overall program effectiveness based on the measurable goals established in the SWMP:

Overall, all of the primary dry-weather monitoring locations were monitored, and all SORs were investigated. The City did not encounter any illicit discharges or connections into or at any of the monitoring locations, and all of the SORs resulted in either verbal or written warnings and citations that enforced the mitigation of each specific incident.

10.0 PUBLIC PARTICIPATION

1) A description of efforts to include the public in urban runoff management programs during the reporting period.

The City conducted various outreach efforts to the public this reporting period. The more visible programs included larger events consisting of community clean-up activities on November 11, 2006 and on May 19, 2007, a Household Hazardous Waste Collection Event on January 27, 2007, and the annual creek clean-up. The less visible programs included personal contact with the public regarding pollution prevention thru business inspections, responses to Service Order Requests, in-house meetings with project applicants, and field meetings with developers.

11.0 ASSESSMENT OF OVERALL SWMP EFFECTIVENESS

The SWMP continued to be implemented in its entirety this reporting period. Other than minor edits, each section provides enough detail to successfully implement each of the components of the permit.

12.0 FISCAL ANALYSIS

1) A summary of the reporting period's expenditures and an estimated budget for the upcoming reporting period.

Program Element	Fiscal Year 2005-2006		Fiscal Year 2006-2007		Fiscal Year 2007-2008 (Estimated)	
	Capital Expenditures	O&M/Admin Expenditure	Capital Expenditures	O&M/Admin Expenditure	Capital Expenditures	O&M/Admin Expenditure
Program Management (1)	--	116,196	--	118,261	--	122,747
Annual Fee for NPDES Permit from SWRCB	--	9,609 (actual invoice)	--	11,109 (actual invoice)	--	14,813
Implementation Agreement (I.A.) Shared Cost	--	130,147	--	129,769	--	130,173
Construction Inspections (2)	--	60,635	--	62,798	--	63,163
Development Planning (WQMP reviews) (3)	--	11,054	--	12,224	--	10,000
Industrial and Commercial Inspections (4)	--	24,650	--	51,791	--	70,000
IC/ID Program	--	1,000	--	1,000	--	1,000
Municipal Programs (PW Maint) (5)	--	250,000	--	150,000 (Dryer than average Wet-Weather Season)	--	250,000
Municipal Programs (TCSD) (6)	--	5,885,545	--	6,381,136	--	7,134,931
Public Outreach (i.e. classrooms, brochures, etc.)	--	Included in the I.A.	--	Included in the I.A.	--	Included in the I.A.
Monitoring Program	--	Included in the I.A.	--	Included in the I.A.	--	Included in the I.A.
Other (7)	--	5,000	--	15,000	--	15,000
Total (8)		**$608,291**		**$551,952**		**$676,896**
Grand Total	**$ 0**	**$6,493,836**	**$ 0**	**$6,933,088**	**$ 0**	**$7,811,827**

Notes:
(1) This cost reflects program administrator time.
(2) This costs reflects NPDES inspector time plus 10K vehicle expenses
(3) This cost reflects out-sourced WQMP reviews
(4) This cost reflects out-sourced inspection services
(5) This cost reflects drainage channel clearing, catchbasin maintenance, and stenciling.
(6) This cost reflects the operating budgets for refuse/recycling, street sweeping, landscape/slope programs through Temecula Community Services District.
(7) This cost reflects staff's time for formal classroom training, conferences, inspection forms, citation books, mailings, etc.
(8) This total does not include the refuse/recycling, street sweeping, landscape/slope programs.

2) A description of the source(s) of funds that were utilized during the previous fiscal year and the source(s) of funds proposed to meet the necessary expenditures for the subsequent year, including legal restrictions on the use of such funds.

Source of Funds	Percent of Program Funding	Restrictions on Use (if applicable)
General Fund	96	Allocations to other departments and divisions.
WQMP Review Fees	4	

13.0 NON-STORM WATER DISCHARGES

Permittees shall report on any discharge category listed in Requirement B.2 of Order No. R9-2004-001 that was identified as a source of pollutants during the reporting period. For each identified category, the Permittee shall report whether it elected to prohibit the discharge or to require BMPs to reduce pollutants in the discharge to the MEP. If the discharge is not prohibited, the BMPs that will be implemented, or required to be implemented, shall be described in each SWMP Annual Report.

Category	Prohibited	BMP to be Implemented
Diverted stream flows	☐ Yes ☒ No	Not Applicable
Rising ground waters	☐ Yes ☒ No	Not Applicable
Uncontaminated ground water infiltration [as defined at 40 CFR 35.2005(20)] to MS4s	☐ Yes ☒ No	Not Applicable
Uncontaminated pumped ground water	☐ Yes ☒ No	Not Applicable
Foundation drains	☐ Yes ☒ No	Not Applicable
Springs	☐ Yes ☒ No	Not Applicable
Water from crawl space pumps (Identified as a source of pollutants when commingled with construction-related sediment).	☐ Yes ☒ No	Filtered through gravel-bag chevrons prior to entering a CB
Footing drains	☐ Yes ☒ No	Not Applicable
Air conditioning condensation	☐ Yes ☒ No	Not Applicable
Flows from riparian habitats and wetlands	☐ Yes ☒ No	Not Applicable
Water line flushing. (Identified as a source of pollution when commingled with construction-related sediment).	☐ Yes ☒ No	Filtered through gravel-bag chevrons prior to entering a CB
Landscape irrigation	☐ Yes ☒ No	Not Applicable
Discharges from potable water sources not subject to NPDES Permit No. CAG679001, other than water main breaks. (Identified as a source of pollutants when commingled with construction-related sediment).	☐ Yes ☒ No	Filtered through gravel-bag chevrons prior to entering a CB
Irrigation water	☐ Yes ☒ No	Not Applicable
Lawn watering	☐ Yes ☒ No	Not Applicable
Individual residential car washing	☐ Yes ☒ No	Not Applicable
Non-emergency fire fighting flows	☐ Yes ☒ No	Not Applicable
Dechlorinated swimming pool discharges	☐ Yes ☒ No	Not Applicable

14.0 RECEIVING WATER LIMITATIONS

This section includes the report required pursuant to Requirement C.2.a. of Order No. R9-2004-001, if applicable. Requirement C.2.a. states:

"Upon a determination by either a Permittee or the SDRWQCB that MS4 discharges are causing or contributing to an exceedance of an applicable water quality standard, the Permittee shall promptly notify and thereafter submit a report to the SDRWQCB that describes BMPs that are currently being implemented and additional BMPs that will be implemented to prevent or reduce any pollutants that are causing or contributing to the exceedance of water quality standards. The report may be incorporated in the SWMP Annual Report unless the SDRWQCB directs an earlier submittal. The report shall include an implementation schedule. The SDRWQCB may require modifications to the report."

Not Applicable. The City has not received any indications of exceedances to an applicable water quality standard in this area during the reporting period. Please refer to the watershed monitoring data report for a detailed review of the monitoring data.

15.0 SUMMARY OF ADDITIONAL URBAN RUNOFF DATA

This section is a summary of all urban runoff related data not included in the annual monitoring report (e.g., special investigations).

The City of Temecula did not conduct any special investigations during this reporting period.

16.0 PROPOSED REVISIONS TO THE SWMP

This section includes proposed revisions to the Individual SWMP, including areas in need of improvement based on the assessment of effectiveness of each program component.

There were no revisions to the City's SWMP during this reporting period. Attachment G includes the list of revisions that were provided previously for the FY 2005-2006 reporting period as an example. This list will eventually show a cumulative summary of all revisions to the SWMP since the full implementation of all components of the third-term permit.

ATTACHMENT A

DEVELOPMENT PLANNING PROGRAM

- List of Grading Permits
- List of WQMPs
- Example of Final Conditions of Approval
- NPDES Training Log

ATTACHMENT B

CONSTRUCTION PROGRAM

- Monthly Tally of NPDES Inspections
- Annual Letter to Development Community
- NPDES Inspection Frequency Sheet

ATTACHMENT C

MUNICIPAL PROGRAM

- Debris Tonnage Report
- Monthly Catch Basin Maintenance Log
- Monthly Stencil Log

ATTACHMENT D

INDUSTRIAL/COMMERCIAL PROGRAM

- Outreach Letter
- Letter from Property Management Company to Tenants

ATTACHMENT E

RESIDENTIAL PROGRAM

- Biannual “Inside Temecula” Newsletters
- Biannual “Guide to Leisure Activities”
- Biannual “City-Wide Clean-up” Flyers
- Biannual “Household Hazardous Waste Collection” Flyers

ATTACHMENT F

ILLICIT DISCHARGE DETECTION PROGRAM

- Completed Dry-Weather Monitoring Log

ATTACHMENT G

REVISIONS TO THE SWMP

- SWMP Revisions List

CITY OF TEMECULA
CERTIFICATION STATEMENT

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to ensure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

_____
Signature

Daniel A. York, City Engineer
Name and Title, Printed or Typed

_____
Date

2007 OCT 3

Executive Office
County of Riverside

Larry Parrish
County Executive Officer

October 23, 2007

Mr. John Robertus
Executive Officer
California Regional Water Quality Control Board
San Diego-Region 9
9174 Sky Park Court, Suite 100
San Diego, CA 92123-4340

RE: FY 2006/2007 Annual Progress Report, Santa Margarita River Watershed
MS4 Permit No. CAS0108766
San Diego Regional Water Quality Control Board No. R-9-2004-001

Dear Mr. Robertus,

Enclosed is a Copy of the Riverside County FY2006/2007 Annual Report for the Santa Margarita River Watershed. The report outlines Riverside County's efforts in implementing the third round permit and the Riverside County Individual Stormwater Management Plan (SWMP).

The Annual Report contains information in response to the requirements contained within the permit. If you or your staff have any questions regarding this submittal please contact Michael Shetler or Mr. Alex Gann at 951.955.1110.

Kenneth M. Mohr,
Assistant County Executive Officer

Attachment: FY 2006/2007 Annual Progress Report, Santa Margarita River Watershed
MS4 Permit No. CAS0108766
San Diego Regional Water Quality Control Board No. R-9-2004-001

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Signed: _____

Kenneth M. Mohr
Assistant County Executive Officer
Riverside County Executive Office
County of Riverside

Executive Office
County of Riverside

Larry Parrish
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Signed: _____

Kenneth M. Mohr
Assistant County Executive Officer
Riverside County Executive Office
County of Riverside

SANTA MARGARITA WATERSHED
NPDES MUNICIPAL STORMWATER PERMIT
(NPDES No. CAS0108766)

ANNUAL REPORTING FORMS

FOR

CITY/COUNTY/DISTRICT
FISCAL YEAR 2006- 2007

I. Executive Summary
1. Development Planning
2. Construction
3. Municipal
4. Industrial/Commercial
5. Residential
6. Education
7. Illicit Discharge Detection and Elimination
8. Public Participation
9. Fiscal Analysis Component
10. Non-Storm Water Discharges
11. Receiving Water Limitations
12. Additional Urban Runoff Data
13. Proposed Revisions

BOARD ORDER NO. R9-2004-001
CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN DIEGO REGION

Executive Summary

The County of Riverside (County), the Riverside County Flood Control and Water Conservation District (District), and incorporated Cities of Riverside County operate municipal storm drain systems and discharge stormwater and urban runoff pursuant to NPDES Permits. The County of Riverside is unique in that there are three Permits, administered independently by three Regional Water Quality Control Boards with jurisdiction within the boundaries of the County. Specific to the Santa Margarita Watershed is the NPDES Permit governed by the San Diego Regional Water Quality Control Board (afterwards referred to as the Regional Board), which requires the County, District (Principal Permittees), and the cities of Murrieta and Temecula (afterwards referred to collectively as the Permittees) to develop and implement surface water quality protection and management programs and report annually on progress with respect to specified compliance activities.

Current History and Demographics

Population

As of January 1, 2007, the California State Department of Finance (DOF) estimates Riverside County's population at 2,031,625, making Riverside County the state's fourth largest of the fifty eight counties. This amounts to about 5.39% of California's total population. An influx of 65,000 people in 2006, ranked the County second in numerical change in California, with Los Angeles County being first. Riverside County also ranked second in percentage change at about 3.31%, with only Imperial County growing slightly faster at about 3.38%.

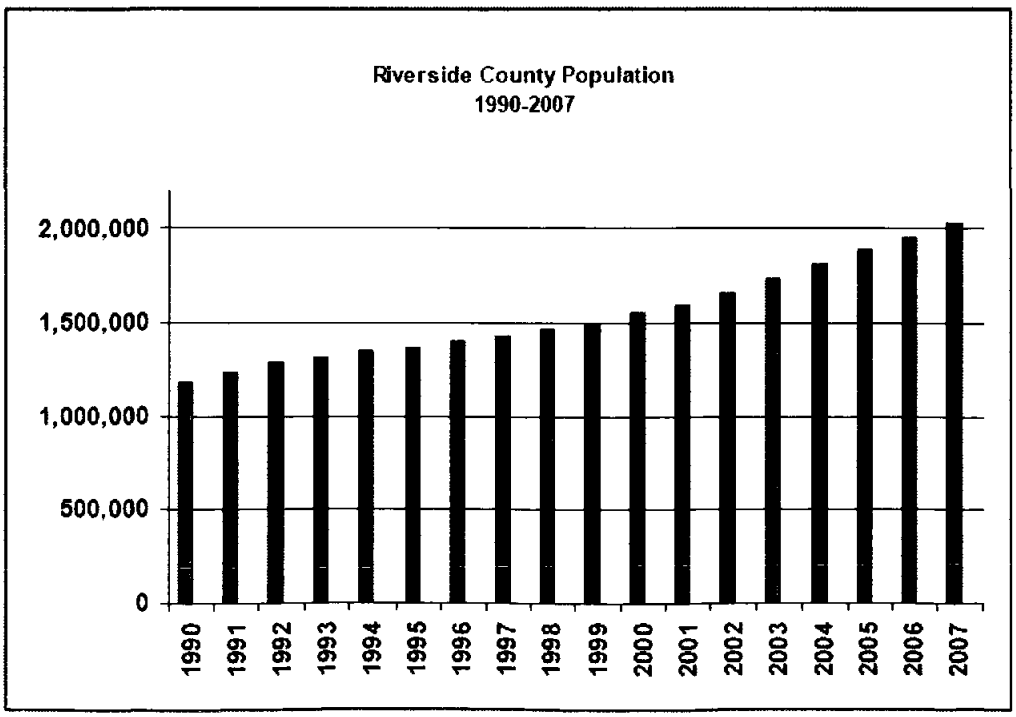

Precipitation

The 2006-2007 NPDES stormwater permit reporting period was perhaps one of the driest seasons on record in Riverside County with rainfall numbers equating to that of Death Valley, CA proportions at 1.93 inches.

> *2006 apparently produced the lowest amount of rainfall in Riverside County since annual rainfall had been recorded, at just 1.93 inches. That beat out the previous low of 2.94 inches reported in 1883.*-**(Source:** Riverside Press Enterprise)
>
> *"The past 12 month period was driest on record for California and Nevada. The abnormally dry conditions have led to severe-to-extreme drought from the southern California coast eastward to Arizona and north along the Sierra Nevada Mountains into the Great Basin."* **–(Source:** National Oceanic & Atmospheric Administration)

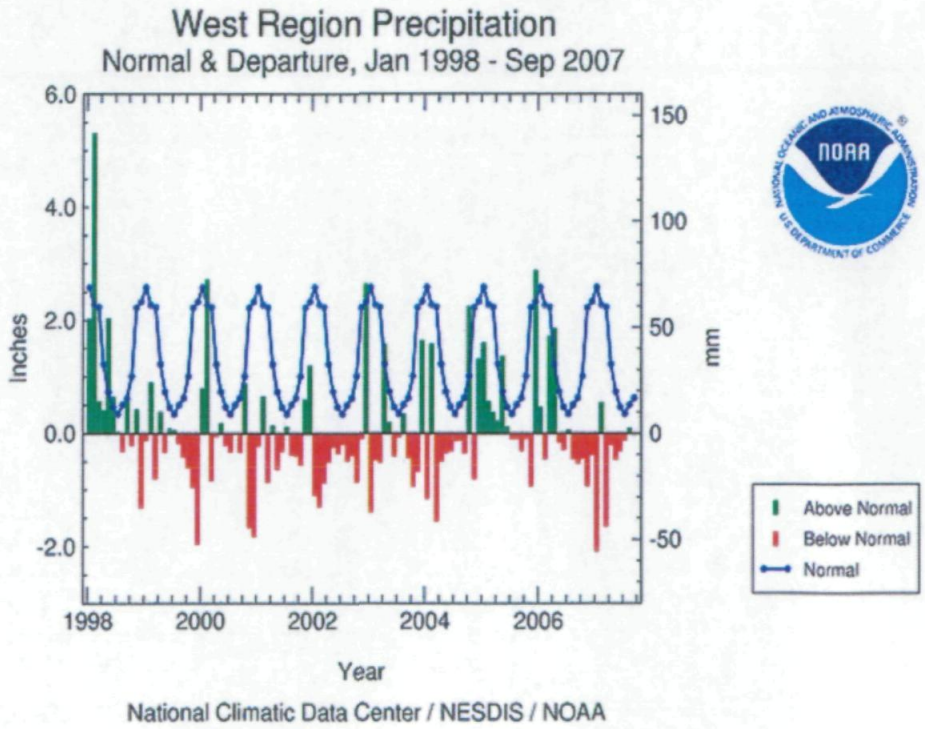

This is a significant change from the approximate 32 inches of rainfall realized in 2004-2005. With such a dramatic climate shift a dry and warming cycle is apparent.

Economic Outlook

Another significant event is the downturn of economic indicators and the reduction of assessed value growth projected for the next five years toppling to almost zero by the end of 2011. This is in comparison to a peak value of almost 22.5% in 2006-early 2007. (**Source:** Riverside County Auditor Controller)

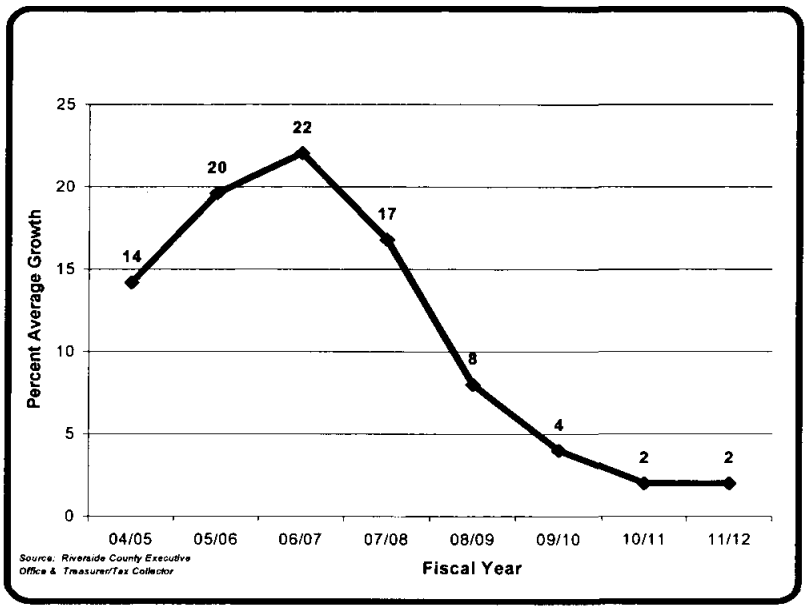

Decline in Residential Building Permits

The number of residential building permits issued is highly correlated to the inflow of the domestic migration pattern and housing production in the County. During the mid- 1990s, residential permits issued were low due to fewer people moving to Riverside County as a result of the economic downturn. Building permits increased drastically after 2000 driven by the high demand in the housing market. A total of 179,000 residential units were issued from 2000 to 2006 according to US Department of Housing and Urban Development. In 2006, total residential unit permits issued was 24,800,

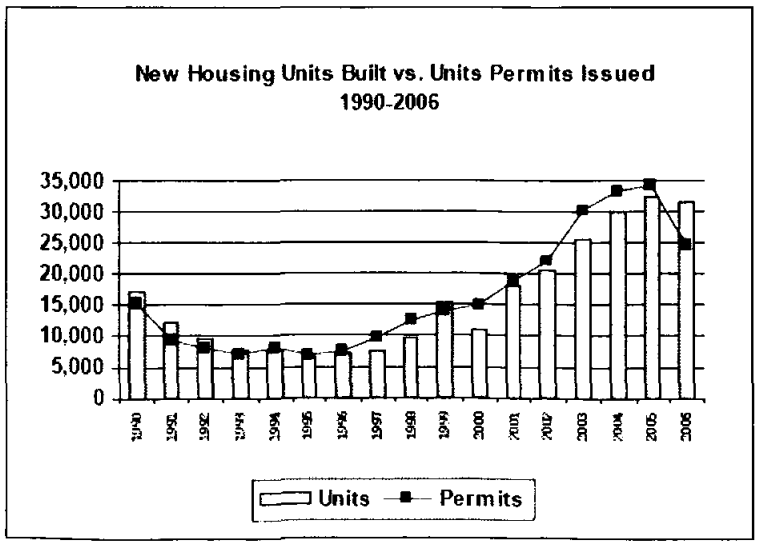

representing a significant drop (-28% or -9,600) in comparison to 34,400 in 2005. The decrease in the number of building permits in 2006 would indicate slower housing construction in the upcoming year. (**Source:** County of Riverside Demographics Unit-TLMA)

The County is in the midst of an economic decline which has not fully been realized.

> *Construction of single family homes in the first eight months of 2007 declined nearly 54 percent in Riverside County compared with the same period a year ago, according to a report released Thursday by the California Building Industry Association. Through August, Riverside and San Bernardino counties accounted for nearly half of the statewide year-to year decline, with the number of permits issued for construction of single family homes in the region plummeting from 26,508 to 13,405.*
>
> *Home construction has come to a near-standstill in the region as builders and developers react to an unexpectedly severe drop-off in buying.*
>
> *Alan Nevin, chief economist of the state builder's association, said buying has been crippled in the two-county region by rising gasoline prices, which turns off commuters, and the virtual loss of sub-prime mortgages that /some/first-time buyers, who represent a large portion of the Inland market, need to get a loan.* **Source:** Building Industry Council-Riverside Press Enterprise

Building Industry Association of Riverside County, Executive Officer Borre Winckel issued the following statement regarding the decrease in housing activity:

> *"Unfortunately, the housing market stabilization is still continuing in Riverside County. The economic link between the homebuilding industry, local economy and local government budgets is undeniable. Riverside homebuilders directly and indirectly support hundreds of thousands of jobs and add billions of dollars to the economy and local government budgets.*
>
> *With the decrease in building permit activity continuing, local governments are seeing dramatic reductions in fee revenues, countywide. Early data for 2007 shows the problem is enormous if the trend continues. The near 50% drop off in permits considering an average of over $50,000 in fees per house, could result in local government losses of up to $750 million this year.*

With these conditions continuing into the unforeseen future, The County of Riverside's NPDES Stormwater program continues to hold the line on the development review process and continues to monitor proposed projects and inspect those projects that are in-process throughout the county.

With the concern that development projects may be abandoned without maintaining Best Management Practices (BMPs) for sediment and erosion control inspectors were out early during the rainy season keeping pressure on the development community to ensure that projects were in compliance with the stormwater requirements despite the fact that the county is suffering severe drought conditions.

Leadership in Energy and Environmental Design (LEED)

The Leadership in Energy and Environmental Design (LEED) Green Building Rating System ™ is a nationally accepted benchmark for the design, construction, and operation of high performance green buildings. LEED gives building owners and operators the tools they need to have an immediate and measurable impact on their buildings' performance. LEED promotes a whole-building approach to sustainability by recognizing performance in five key areas of human and environmental health: sustainable site development, water savings, energy efficiency, materials selection, and indoor environmental quality. The County of Riverside Facilities Management Department is on the cutting edge as it begins to incorporate LEED into capital improvement projects (CIP). Although not in the Santa Margarita watershed, the county is in the process of constructing a regional library that will be the model for future municipal construction projects throughout region.

> *Riverside County will break ground for the new Woodcrest Library in a public ceremony on Thursday, November 2, 2006 at 10:00 a.m. The new 10,000 square foot library, located at Krameria and Trisha Lane in the Woodcrest area, will replace the small county library currently operating out of the shopping center at the corner of Washington and Van Buren. The new library will open to the public in early 2008.*
>
> *Planned to blend into the natural landscape of the community, the new library will be the first LEED (Leadership in Energy and Environmental Design) certified building constructed by Riverside County. "This is truly something for this community to be proud of", said First District Supervisor Bob Buster. "The new Woodcrest Library will be a model of sustainable site development, water savings, energy efficiency, sustainable materials usage, and indoor environmental quality".*
>
> *Some of the features planned for the new library and its site include low water native landscaping; a permeable parking lot and bio-swales to reduce and utilize stormwater run-off; and a building design which uses*

and directs ambient lighting from roof and windows to reduce the use of artificial light. Building materials have been selected with durability and sustainability in mind. A water-wise demonstration garden is also planned for the site.
"The building plan has already won an award for design excellence", continued Buster, referring to the 2005 Merit Award presented to HMC Architects by the local chapter of the American Institute of Architects. "I think it will serve the Woodcrest community well as an educational and recreational resource, as a community meeting place and as an attractive amenity which invites the use of both library and grounds." ***Source:-*** *County of Riverside-Nancy Johnson, County Librarian*
See attached Grand Opening flyer)

Business Registration and Licensing Program

On November 7, 2006 the Board of Supervisors for the County of Riverside approved Ordinance No. 857 which provides the regulatory and administrative framework to implement a Business Registration and Licensing Program within the unincorporated area of Riverside County. The ordinance contains a variety of administrative procedures that are outlined including: contents of the application form, license issuance protocol, description of license fee, license inspections, water quality inspections and enforcement, and business license enforcement procedures.

The business license fees are $45 for initial licensing and $30 for annual renewal. Exemptions are granted for various agricultural activities, certain residential businesses, places of worship, specific non-profit, and any business exempt by virtue of constitution law, however exempted business will be required to register. Business license fees charged under the provisions of this ordinance shall be revenue-neutral in that they may not exceed the reasonable costs of providing the regulatory services included in the business registration and licensing program. No business license fee charged under the provisions of this ordinance shall be construed as a business license tax.

Countywide over 6,000 businesses have registered. The first round of inspections of these businesses will be to evaluate their risk and impact to stormwater flows and contribution to urban runoff. In addition, educational materials on best management practices (BMPs) will be provided. Any violations observed will be corrected by progressive enforcement include written warning (Notice of violation with time frame for correction), administrative enforcement (citation with administrative penalty), and referral to the regional board for recalcitrant and gross violators.

This program will augment the program activities currently provided by the Department of Environmental Health's Compliance Assistance Program (CAP) that inspect restaurants and other food establishments, businesses that store

hazardous materials and generate hazardous waste and businesses that operate underground storage tanks.

Multi Species Habitat Conservation Plan

In the 2005-2006 Annual Report a significant amount of time was spent describing the Multi Species Habitat Conservation Plan (MSHCP) and the importance of preserving open space, biological diversity and quality of life. Progress continues with 11, 131.5 acres of private land that has been purchased since the inception of the MSHCP with the bulk of the properties being purchased in 2006-2007.

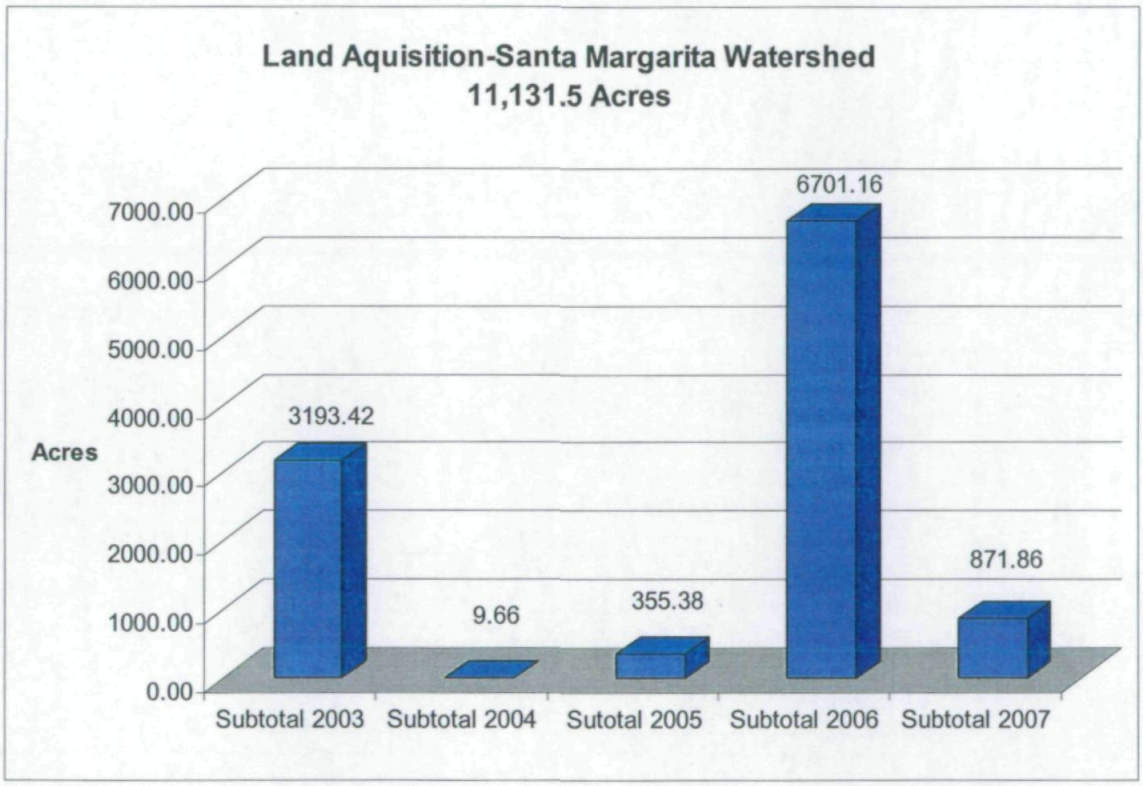

Illegal Dumping

Because of the rural nature of the unincorporated regions of the county and the transformation from rural farming to urban and suburban residential, illegal dumping has become a significant issue for the County Board of Supervisors. In an attempt to refocus on the problem of blight in the unincorporated communities, the Board of Supervisors made the Code Enforcement Division of Building and Safety a stand alone department within the Transportation Land Management Agency. This restructuring of program resources and a more enforcement oriented philosophy has made a significant impact on the community.

As an example, the number of illegal dumping cases investigated is at 439 countywide, which is 1.76 times the number of cases investigated in the previous year. Investigations for illegal dumping within the Santa Margarita watershed set a new high at 133 cases processed.

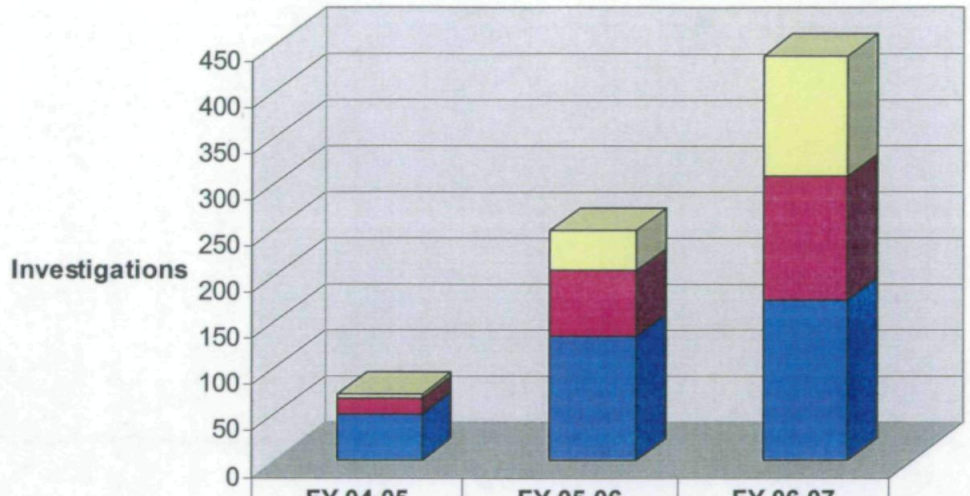

	FY 04-05	FY 05-06	FY 06-07
Whitewater	5	44	131
Santa Margarita	16	71	133
Santa Ana	51	135	175

Further in a continuing effort to provide trash cleanup days throughout the County the Code Enforcement Department has processed an estimated 380 tons of trash collected at various scheduled events during July 1 2006 through June 30, 2007 permit period. In addition, illegal roadside dumping per capita shows a decreasing trend with 97.99 tons in the last year collected and ultimately disposed of at county cost into a local landfill.

All thought this is not a significant amount of trash per person, with the sky rocketing population growth in the region and the volume of illegal dumping staying static or a little bit below the previous year is an indicator that the various environmental messages are getting out to the public, specifically on issues such as illegal dumping, "only rain in the drain", don't pollute our natural resources and other public service announcements. The Inland Empire does not have a major network for TV programming and therefore, relies on the Los Angeles based news and network TV. So dollars spent on TV advertising for stormwater pollution from other counties such as the Orange and Los Angeles have a positive collateral valued added effect on the community.

Illegal Grading

Illegal grading is another area where the Code Enforcement Department has made a significant impact with 383 investigations conducted in FY 006-2007 for the Santa Margarita Watershed.

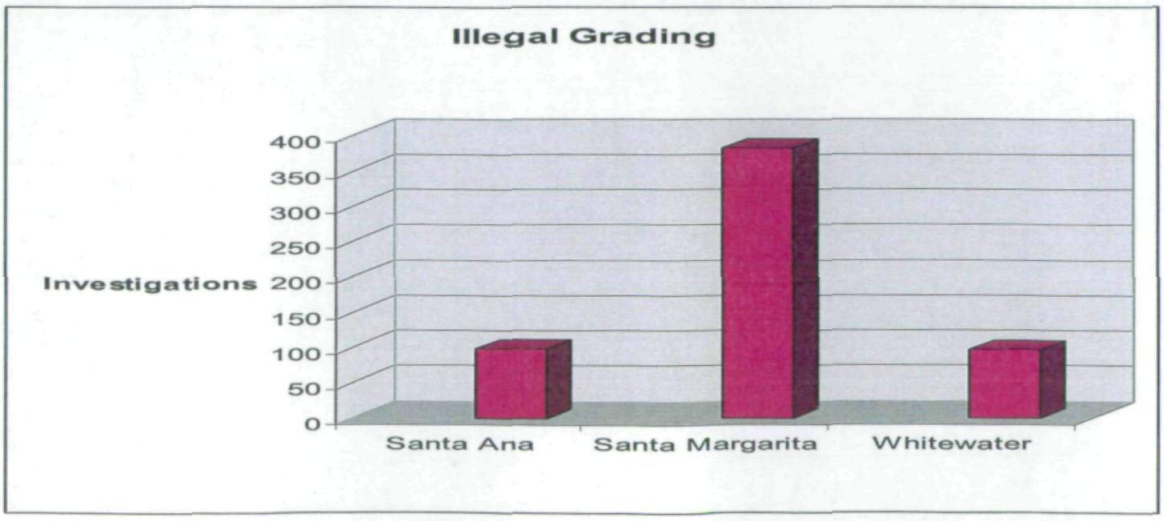

Organizational Structure

The County of Riverside is a complex organization with numerous county departments with significant independent program oversight. The County Executive Office is tasked with bringing this diverse group together on stormwater issues.

1. Riverside County Executive Office acts as a facilitator and coordinates with county departments keeping them abreast of NPDES requirements and provides overall program oversight.
2. Flood Control and Water Conservation District (Principle Permittee with the county)
    a. Flood control infrastructure
    b. NPDES Stormwater Regulatory and Permit implementation
    c. Monitoring
    d. WQMP review
    e. Stormwater Education
3. Transportation Land Management Agency
    a. Planning Department
        i. Plan Review process and conditions of approval
    b. Building and Safety Department
        i. NPDES Construction inspections
        ii. NPDES business licensing inspections (new)
    c. Code Enforcement Department
        i. Illegal dumping and Illegal discharges
        ii. Illicit connections
    d. Transportation Department
        i. Transportation improvement projects
        ii. Repair and maintenance of stormwater facilities adjacent to roadways
    e. Environmental Programs Department
    f. TLMA Administration GIS and Demographics Unit
4. Community Health Agency
    a. Department of Environmental Health-Compliance Assistance Program (CAP)

i. District Environmental Services Division
    1. food facility and restaurant inspections
ii. Environmental Resources Management Division
    1. sewage spills > 1000 gallons
    2. Septic system moratoriums
    3. Local Enforcement Agency-Solid Waste
        a. Illegal dumping
        b. Franchise Agreements-street sweeping
        c. Mandatory trash collection
iii. Hazardous Materials Management Division
    1. Environmental Crime in coordination with the District Attorney's Office
    2. Public and private underground storage tanks
    3. Industrial and commercial hazardous materials storage
    4. Industrial and commercial hazardous waste management

5. Western Riverside County Regional Conservation Authority
    a. Land Acquisition
    b. Multi Species Habitat Plan for Western Riverside County
6. Economic Development/Redevelopment
    a. Landscape Lighting Maintenance District
    b. Community Services Districts
    c. Street Sweeping
7. Facilities Management Department
    a. Municipal projects
    b. Municipal maintenance
8. County Parks and Open Space District
    a. Park and trails construction
    b. Parks and trails maintenance
    c. Habitat restoration
9. Waste Management Department
    a. Household Hazardous, Universal and e-Waste Waste
    b. Landfill Operations
    c. Load check (illegal dumping)
    d. Recycling and material recovery

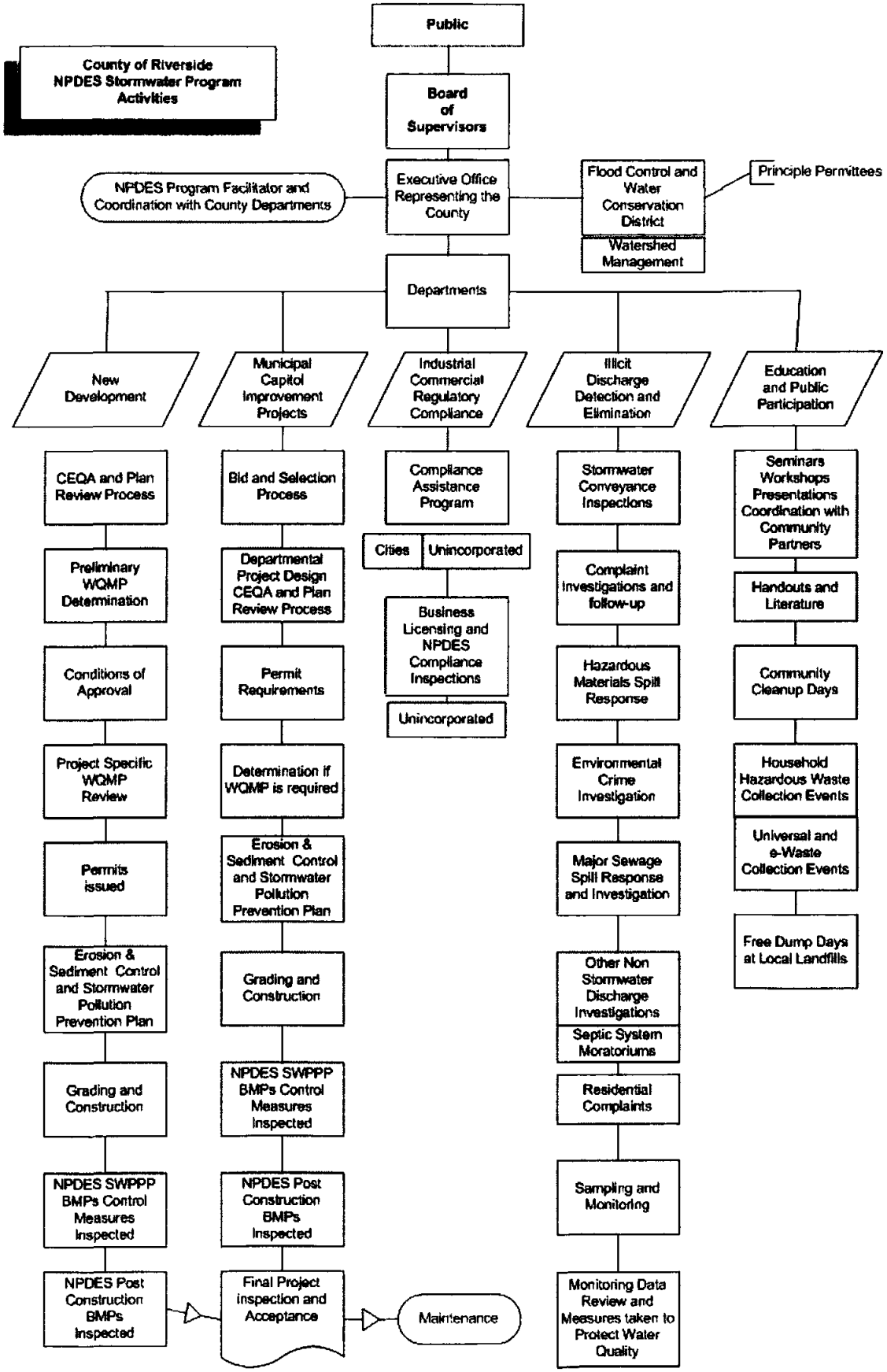
County of Riverside
NPDES Stormwater Program
Activities
Public
Board of Supervisors
NPDES Program Facilitator and Coordination with County Departments
Executive Office Representing the County
Flood Control and Water Conservation District
Watershed Management
Principle Permittees
Departments
New Development
Municipal Capitol Improvement Projects
Industrial Commercial Regulatory Compliance
Illicit Discharge Detection and Elimination
Education and Public Participation
CEQA and Plan Review Process
Preliminary WQMP Determination
Conditions of Approval
Project Specific WQMP Review
Permits issued
Erosion & Sediment Control and Stormwater Pollution Prevention Plan
Grading and Construction
NPDES SWPPP BMPs Control Measures Inspected
NPDES Post Construction BMPs Inspected
Bid and Selection Process
Departmental Project Design CEQA and Plan Review Process
Permit Requirements
Determination if WQMP is required
Erosion & Sediment Control and Stormwater Pollution Prevention Plan
Grading and Construction
NPDES SWPPP BMPs Control Measures Inspected
NPDES Post Construction BMPs Inspected
Final Project Inspection and Acceptance
Maintenance
Compliance Assistance Program
Cities
Unincorporated
Business Licensing and NPDES Compliance Inspections
Unincorporated
Stormwater Conveyance Inspections
Complaint Investigations and follow-up
Hazardous Materials Spill Response
Environmental Crime Investigation
Major Sewage Spill Response and Investigation
Other Non Stormwater Discharge Investigations
Septic System Moratoriums
Residential Complaints
Sampling and Monitoring
Monitoring Data Review and Measures taken to Protect Water Quality
Seminars Workshops Presentations Coordination with Community Partners
Handouts and Literature
Community Cleanup Days
Household Hazardous Waste Collection Events
Universal and e-Waste Collection Events
Free Dump Days at Local Landfills

Concluding Remarks

The NPDES Stormwater Program in Riverside County is a collaborative and evolving effort between County Departments, the Flood Control and Water Conservation District and participating co- permittees (cities), along with the three State Regional Water Quality Control Boards. Program consistency is the goal with the acknowledgement that differences in climate, hydrology and jurisdictional philosophy exist between the three watersheds, this makes for an interesting dynamic.

Internal and external program evaluations are tools that can be used to enhance program delivery. The County is in the process of awarding a contract to an independent third party evaluator to look at program delivery and make recommendations on program effectiveness and operational structure. Implementation of these suggested program alternatives will help to enhance program delivery and operability.

The Riverside County NPDES Stormwater Program believes that partnerships between the public and private sector are vital for the program implementation efforts to be effective. Lines of communication need to be open so that dialog on stormwater issues can be debated and consensus can be reached. It is difficult to educate the public on stormwater issues when most of the streams and channels within Riverside County are ephemera and have been dry for almost two years. Many of our residents have never ventured from their communities and it's doubtful that they have been to the Pacific Ocean or have seen a lake. To these people the only interface they have with water and stormwater issues is that water comes out of a tap, and they have limited knowledge on how it gets to their home or how it is disposed. For example, many people believe that the stormwater system and the sanitary sewer are the same thing. So, the tried and true coastal public educational tools have been modified so that regionality can be incorporated into the stormwater message.

There are continuing challenges in every aspect of life and the issue of stormwater management and flows from urban discharge will continue to have an impact on new development, municipal projects and the regulated business community.

Finally, how to finance the operation and maintenance (O&M) of post construction BMPs continues to be a challenge; the Flood Control and Water Conservation District has been working with David Tausig and Associates, a respected economist to develop a strategy for structuring a funding mechanism through the formation of a District wide Community Facilities District (CFD) for stormwater quality and post construction BMP Maintenance. A proposal is being developed that must be approved by the Riverside County Board of Supervisors

Once implemented, when each new development is completed, met all conditions of approval, and the post BMPs have been accepted, the development will be annexed into the CFD. Because this action must meet Proposition 218 scrutiny existing Home Owners' Associations (HOAs) will have to receive a two thirds vote of approval prior to being annexed into the CFD. Cities within the Flood Control and Water Conservation District's jurisdiction may also choose to join the CFD so that the O&M for post construction BMPs is consolidated, coordinated and consistent.

Please join Riverside County 1st District Supervisor Bob Buster and the Riverside County Library Systems at the

Woodcrest Community Library Grand Opening

Riverside County's First Certified Green (LEED) Building

Map & Directions

From Lake Matthews/Gavilan Hills Area

Take Mockingbird Canyon towards Van Buren Blvd.
Turn Right onto Van Buren Blvd.
Turn Right on King Ave.
Turn Right onto Krameria
Arrive at 16625 Krameria Ave. on the right hand side

From Downtown Riverside

Take the CA91 W toward Corona
Take the Madison Ave. Exit
Turn Left onto Madison Ave.
Turn Left onto Victoria Ave.
Turn Right onto Washington Ave.
Turn Right on Krameria Ave.
Arrive at 16625 Krameria Ave. on the right hand side

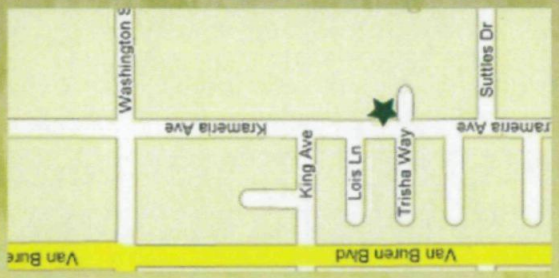

Riverside County Library System
your destination point

Please RSVP to Tasha Edwards at 951-955-3095 or TEDWARDS@RVCOEDA.ORG

0000222

SATURDAY, NOVEMBER 10, 2007, 10AM-3PM

GRAND OPENING CEREMONY 10AM-11AM
REFRESHMENTS, ENTERTAINMENT & TOURS TO FOLLOW

MAGICIAN · BALLOON ARTIST · LIVE MUSIC
VENTRILOQUIST · GIVEAWAYS

LOCATED AT
16625 KRAMERIA AVE., RIVERSIDE, CA 92504

00000223

1. DEVELOPMENT PLANNING
(SECTION F of ORDER NO. R9-2004-001)

1) **Description of any amendments to the General Plan or the development project approval process:** None

2) **Number of grading permits issued:** During the last year the number of grading permits issued throughout Riverside County includes the following: 300 in the Indio Inspection District, 800 in the Riverside Inspection District and 1500 in the Temecula Inspection District.

3) **Number of developments conditioned to meet SUSMP requirements:** See Flood Control and Water Conservation District Report for totals on the number of Water Quality Management Plans (WQMP) conditioned. The WQMP is equivalent to the SUSMP

4) **Attach one example of a development project that was conditioned to meet SUSMP requirements and a description of the required BMPs:** See Flood Control and Water Conservation District Report Attachment B

5) **Description of any updates to the environmental review process:** The County on an annual basis reviews all policies and procedures and makes updates as appropriate. No changes with regard to the environmental review process were noted. See Flood Control and Water Conservation District Report Attachment C .

6) **Description and number of training efforts conducted during the reporting period (for staff, developers, contractors, etc.), including the number of staff trained.**

   a) **Training:**

Training	Training Description	Training Dates	Number of Attendees
WQMP	Water Quality Management Planning Requirements	Oct 3,23 Apr 16	20
	What Triggers a WQMP?		
		Total	**20**

1. DEVELOPMENT PLANNING
(SECTION F of ORDER NO. R9-2004-001), CONT.

b) **Summarize the educational and outreach activities the Development Planning Component has conducted over the past year:** Each development project conditioned for approval is required to obtain copies of public education/outreach materials sign and sign an affidavit stating that they will distribute stormwater related educational materials to the new property owners. The affidavit is recorded with the development's individual file.

In addition the county attempts to keep the general public and the development community (Building Industry Association informed of all the training and educational opportunities. There are several organizations that sponsor training classes to include the University of California Extension, Building Industry Association, and private contractors.

The County also provides a public information kiosk located at the Transportation Land Management Agency (TLMA) counter services area. Stormwater information is provided and NPDES requirements are posted.

7) **An assessment of program effectiveness based on the measurable goals established in the Permittee's Individual SWMP:**

a) Training continues to be a priority with quality and accessibility to municipal employees being improved from year to year.

b) Low Impact Development (LID) and LEED certification of projects enhances design and also takes into consideration landscape based BMPs. As projects are approved the amount of runoff is diminish and quality of runoff is improved compared to projects that were built prior to WQMP requirements being established.

c) The County and Flood Control and Water Conservation District have hired a consultant that has made recommendations to establish a community facilities/services utility/district to deal with the operation and maintenance of post construction BMPs. These recommendations are being evaluated for future implementation. Until a final solution can be implemented the current use of landscape & lighting maintenance districts will be utilized.

8) **Additional Comments/Information:**

Describe the major accomplishments of the Development Planning Component over the past year. (General Plan or ordinance revisions, procedure/approval process changes, SUSMP guidance material): The WQMP process

Summarize new activities or improvements to be implemented next year as a result of your self assessment of the Development Planning Component: The County continues to look at ways to consolidate and streamline program implementation and is in the process of awarding a contract to a third party program evaluator to perform a complete program audit.. Recommendations from this external audit will be used to look at options for program enhancements.

1. DEVELOPMENT PLANNING
(SECTION F of ORDER NO. R9-2004-001), CONT.

ATTACHMENT A

2. CONSTRUCTION
(SECTION G of ORDER NO. R9-2004-001)

1) **Number of inspections conducted:** During the 2006-07 Storm Season 249 construction sites were inspected for NPDES compliance in the Santa Margarita Region. Sites verified included the following, 201 single family residential site (SFR), 10 commercial sites (Com) and 38 Tracts (Tr). While overlooking the erosion and sediment control measures being implemented on construction sites, approximately 697 separate verifications were conducted in this region.

See Table 1: 2006-07 Storm Season Contruction Site Invertory.

See Attachment A: 2006-07 Storm Season Final Statistics. This attachment lists the Regional Water Quality Control Board responsible, end of storm season compliance percentage, number of verification s conducted and the date of the last verification concerning all construction sites in Riverside County.

2) **Number and type of enforcement actions related to construction sites:**

Enforcement and Compliance Responses	Private Projects	Public Projects
Non-monetary Penalties	0	0
Stop Work Authority [SFR= 32- (18 remain), Comm.= 0, Tr.= 1]	33	0
Fines	0	0
Financial Security	0	0
Permit/Certificate of Occupancy Denial	0	0
Referral to SDRWQCB [SFR= 155, Comm.= 4, Tr.= 30]	189	0
Total	**222**	**0**

See Attachment B: 2006-07 Storm Season Sites Where Enforcement Action Was Taken. This attachment lists the stop work orders, correction notices and other enforcement actions taken during the Storm Season by jobsite.

3) **Description of modifications made to the construction and grading approval process:** The County continues to enforce the requirement of adding General NPDES Inspection Notes on all grading plans that propose a disturbance of one acre or more. A copy of the Notes appears on the Department Web Site for reference and informational purposes for engineers, developers and the general public. The requirement of providing a copy of the site NOI and WDID along with the ara of proposed disturbance is incorporated into existing software and proposed software for grading permit tracking purposes. This requirement ensures that grading permits are not issued until prrof of compliance with the General Construction Permit has been provided.

2. CONSTRUCTION
(SECTION G of ORDER NO. R9-2004-001), CONT.

4) **Description and number of training efforts conducted during the reporting.**

a) **Training:**

Training	Training Description	Training Dates	Number of Attendees
Annual Staff Training	General NPDES Construction Site Inspection Training	10/2/06	
		10/10/06 10/12/06 10/16/06 10/17/06 5/3/07	- See sign in logs -
		Total	**113**

b) **Summarize any additional education and outreach activities conducted for project applicants, contractors, developers, property owners, and/or responsible parties in support of the Construction Component:** The Initial Site Verification Program was expanded this Storm Season to include SFR construction sites. This expansion of activities and effort afforded the single family developer the same opportunity as the commercial developer to be ready for the upcoming storm season. Developers are cautioned during the initial site verification regarding the need to implement site erosion and sediment control BMPs from October 1 through the end of May. Approximately 1952 Initial Site Verifications were conducted this past storm season on single family and commercial construction site throughout the County.

5) **An assessment of program effectiveness based on the measurable goals established in the Permittee's Individual SWMP:**

A. The categories shown below provide the total number of construction projects disturbing one acre or more located throughout the County of Riverside during the 2006-07 Storm Season:

1) Single Family Residential (SFR) - 269

2) Commercial Projects (Com) - 51

3) Tract Projects (Tr) - 218

2. CONSTRUCTION
(SECTION G of ORDER NO. R9-2004-001), CONT.

A method for assessing the NPDES Construction Inspection Program effectiveness is becoming identifiable. A numeric site assessment appears to be evolving that future results can be compared with. The site assessment "standard/norm" is becoming more evident as additional averages of the acceptable County percentage of compliance minimum are being tracked, evaluated and compared at the end of each storm season. Additional seasonal site statistics will assist in refining and reinforcing this overall Program "standard/ norm".

The acceptable County percentage of compliance minimum used since the inception of Riverside County's NPDES Construction Inspection Program, is a site compliance rate of 50% or better. While conducting site NPDES Verifications (Inspections), our Department NPDES Consultant compares site BMPs required in the site SWPPP with those BMPs actually installed on the site. An estimate of the percentage of compliance is awarded each site as part of the verification process. That percentage of compliance is tracked during the storm season and the site is expected to improve compliance as the storm season evolves. If however two consecutive verifications are conducted any time during the storm season and both award the site a 50% or less percentage of compliance, the site is issued a Stop Work Order. All grading and building inspections are stopped at that time. Prior to resuming grading and building inspections an acceptable site re-verification must be accomplished.

Table 2: Construction Site Compliance Comparison, below, is a comparison of the construction sites found not in compliance with those sites found in compliance at the end of the storm season for this and the preceding three storm seasons. Note that the figures reported exclude the site compliance results of SFR sites.

Date- Storm Season	Number of Commercial and Tract Sites	**Sites Not In Compliance**		**Sites In Compliance**	
		Number	Percentage	Number	Percentage
2003-04	275	128	47%	147	53%
2004-05	339	70	20%	269	80%
2005-06	329	46	14%	267	81%
2006-07	269	48	18%	221	82%

(1) Base on Table 2, the results of the 2003-2004 Storm Season should be considered entirely contrary to the results of subsequent seasons. The result of 47% of sites found <u>not in</u> compliance indicates that radical measures were needed immediately by this Department in order to improve Program results. Possible reasons for the poor results includes:

- Verification processing times by the County may have been too lengthy.
- Poor attention on the part of the developer was being paid to site NPDES issues.

2. CONSTRUCTION
(SECTION G of ORDER NO. R9-2004-001), CONT.

- A large number of sites were only verified once during the storm season. If the site was initially found not in compliance, no opportunity was available to bring the site back into compliance prior to the end of the storm season.

(2) Consideration of the results of the last three storm seasons may indicate that a "standard/norm" could be developing. Based on the results presented in Table 2 above, a percentage of compliance for sites not in compliance mean of 17% can be assumed while using the results of the last three storm seasons. While the mean for those sites found in compliance equals a respectable 81%. Possible reasons for the development of a "standard/norm" includes:

- Additional controls/measures were asserted by the County on developers for construction site compliance. The additional controls asserted dramatically improved overall site compliance. The measures included use of a dedicated staff member for the processing of verifications and coordination of the NPDES Construction Program.
- Increased site verification and educational emphasis by our NPDES Consultant and staff resulted in more attention being paid by the developer to inadequate site NPDES issues.
- The increased efficiency of processing verifications results by the County may have asserted an additional need for site compliance on behalf of the developer.

(3) While specific results and conclusions can be drawn from an evaluation of Table 2 above, all of which are of interest to the Program success, a number of non-controllable variables effecting site compliance limit why certain project types were not included in the reported results. Non-controllable site variables were also observed having a significant influence on general site compliance as well. Non-controllable variables include but are certainly not limited to the following:

- The single family development situation and its lack of NPDES compliance is considered as the major non-controllable variable issue faced by Riverside County. This situation includes the lack of responsibility being assumed by the project civil engineer concerning the need for site Storm Water Pollution Prevention Plan (SWPPP) preparation and compliance. It also includes a lack of preparedness on the part of the developer for the costs associated with implementing and maintaining SWPPP Best Management Practices. The single family development non-controllable situation remains the primary reason why the results of single family NPDES compliance are not included in the statistics presented as a part of the overall program assessment. Until this situation is resolved, compliance results of single family developers will not be included in the storm season averages.
- The issue date of the grading permit for the site. If the grading permit was issued toward the end of the storm season and the site was considered not in compliance, even though the site may be brought back into compliance, enough time may not have been available in order to conduct a follow-up site verification prior to the end of the storm season.

2. CONSTRUCTION
(SECTION G of ORDER NO. R9-2004-001), CONT.

(4) Program Assessment Summary:

The results of future storm seasons will continue to be evaluated and compiled in the Program Assessment portion of the annual NPDES reports. Although additional refinement of the Riverside County Program Assessment "standard/norm" for site compliance and non-compliance is anticipated, Program results appear to be falling within the perimeters of what appears to be an average. The evaluation of final storm season results will continue being of great interest in the future as Program seasonal results are compared and analyzed based on what is believed to be the current "standard/norm".

6) **Additional Comments/Information:**

Describe the major accomplishments of the Constrution Component over the past year:

- 250 construction sites including single family (200 SFR), commercial (10 Com) and tract (40 Tr) were verified for site compliance this storm season in the Santa Margarita Region.
- 700 total verifications were conducted on the single family, commercial and tract sites this past storm season in the Santa Margarita Region.
- A fully dedicated NPDES Construction coordinator (Senior Inspector) has been assigned to the Program in order to minimize verification processing time and to improve coordination efforts.
- The third annual Pre-Storm Season Get-Together was organized and conducted by this Department. The three RWQCBs having jurisdiction in Riverside County were invited to meet with and discuss NPDES related issues with representatives of other County departments.

Summarize new activities or improvements to be implemented next year as a result of your self assessment of the Construction Component:

- Additional controls/measures were asserted by the County on developers for construction site compliance. The additional controls asserted dramatically improved overall site compliance. The measures included use of a dedicated staff member for the processing of verifications and coordination of the NPDES Construction Program. The additional control measures will continue being used during the upcoming storm season during the processing of site verifications.
- Pre-storm season construction site visits to remind construction superintendents of their due diligence to have BMPs in place.
- Increased educational emphasis by our NPDES Consultant and staff will continue during site verifications to ensure that additional attention is being paid by the

2. CONSTRUCTION
(SECTION G of ORDER NO. R9-2004-001), CONT.

developer to site NPDES issues. The use of educational material furnished by Riverside County Flood Control and the suggestion of seeking NPDES training from Flood Control and others will certainly continue.

Attachment B: 2006-07 Storm Season – Sites Where Enforcement Action Was Taken

LEGAL	RWQCB	% COMPLIANCE IMPROVEMENT	VERIFICATION NO. & DATE STOP WORK ORDER WAS ISSUED		VERIFICATION NO. & DATE STOP WORK ORDER RESCINDED		COMMENT REGARDING ACTION TAKEN
STOP WORK ORDERS							
APN 286-120-004	SA	-	1	04-06	-	Rollover	Remains in Effect
APN 287-110-013	SA	-	1	04-06		Rollover	Remains in Effect
APN 365-210-040	SA	-	1	02-06	-	Rollover	Remains in Effect
APN 367-270-027	SM	-	1	05-06	-	Rollover	Remains in Effect
APN 470-380-037	SM	-	1	03-06	-	Rollover	Remains in Effect
APN 915-110-045	SM	-	1	03-06	-	Rollover	Remains in Effect
APN 917-260-060	SM	45-65%	1	05-06	3	05-07	
APN 927-250-008	SM	20-70%	1	05-06	1	12-06	
APN 928-030-008	SM	10-75%	4	04-07	1	06-07	
APN 929-290-002	SM	10-65%	1	04-06	1	08-06	
APN 929-350-002	SM	10-65%	4	04-07	1	06-07	
APN 930-200-010	SM	-	3	04-07			Remains in Effect
APN 930-230-011	SM	30-70%	4	04-07	1	07-07	
APN 930-310-009	SM		3	04-07	-	-	Remains in Effect
APN 931-070-013	SM	-	3	04-07	-	-	Remains in Effect
APN 931-310-010	SM	5/70%	3	04-07	1	04-07	
APN 932-300-010	SM	50%-CLD	1	09-06			Project Complete
APN 932-340-004	SM	-	1	12-06	-	-	Remains in Effect
APN 932-340-013	SM	-	3	04-07	-	-	Remains in Effect
APN 933-030-013	SM	25%-CLD	3	04-07	-	-	Project Complete
APN 928-090-010	SM	15-60%	1	03-06	2	12-06	Project Complete
APN 934-020-005	SM	-	1	10-06	-	-	Remains in Effect
APN 934-260-008	SM	45-70%	3	04-07	1	06-07	
APN 935-110-016	SM	-	1	03-06	-	-	Remains in Effect
APN 935-260-008	SM	-	3	04-07	-	-	Remains in Effect
APN 936-050-017	SM	35-70%	2	04-07	1	07-07	
APN939-050-004	Par3 SM	-	1	12-06	-	-	Remains in Effect
APN 939-060-017	SM	-	1	04-06	-	-	Remains in Effect
APN 940-090-006	SM	-	4	`04-07	-	-	Remains in Effect
APN 940-200-001	Lot4 SM	-	4	04-07	-	-	Remains in Effect
APN 940-200-002	Lot8 SM	-	4	05-07	-	-	Remains in Effect
APN 940-210-001	Lot10 SM	-	3	05-07	-	-	Remains in Effect
APN 940-210-012	SM	10-80%	4	05-07	1	05-07	
APN 942-250-026	SM	40-75%	2	02-06	2	04-07	
TR 25316	SA	25-55%	4	12-06	2	02-07	
TR 25745	SA	25-70%	4	12-06	2	02-07	
TR 27887	SA	2-65%	4	11-06	2	12-06	
TR 29534	SA	25-65%	4	03-07	1	04-07	
TR 30440	SA	45-65%	7	04-07	2	04-07	
TR 31643	SA	35-65%	3	04-07	1	04-07	
TR 32761	CR	25-55%	3	04-07	1	06-07	

3. MUNICIPAL
(SECTION H.1 of ORDER NO. R9-2004-001)

1) **Number of inspections conducted at existing municipal facilities:**

Economic Development Agency	36
TLMA transportation maintenance yards and materials storage sites	23

During the inspection of TLMA transportation maintenance yards and materials storage sites the most common deficiencies were oil and grease staining, needed repairs to existing berms, trash and debris removal on a more frequent basis and protection of sand, gravel and asphalt stockpiles

2) **Number and type of enforcement actions related to municipal sites:**

Enforcement and Compliance Responses	Number
Education and Information	23
Verbal warning	0
Written warning	0
written reports for each inspection on file with TLMA with follow-up on	23
status and completion of correction of deficiencies	
Total	**23**

3) **Number of catch basins and inlets that were inspected and the number that were cleaned:**

	Number Inspected	Number Cleaned
Catch Basins and Inlets	552	393

3. MUNICIPAL
(SECTION H.1 of ORDER NO. R9-2004-001), CONT.

4) **Assessment of the amount and type of debris removed from catch basins, streets, and open channels, including an identification of problem areas that generate the most pollutants:**

Facility	Type of Debris	Amount (tons)	Problem Areas that Generate Most Pollutants
Catch basins	Vegetative Litter Anthropogenic Litter Sediment Other man-made debris	6.66 2.93 5.75	
Total		**15.34**	**tons (wet weight)**
Streets (i)	Vegetative Litter Anthropogenic Litter Sediment Other man-made debris	350.64 87.66 1,314.92	
Total		**1753.22**	**tons (wet weight)**
Roadside Litter Litter Removal Program	Anthropogenic Litter	23.74	
Total		**23.74**	**tons (wet weight)**
Code Enforcement Cleanup Program (ii)	Anthropogenic Litter	**1870**	
Total		**1870**	**tons (wet weight)**

(i) Debris removal includes activities for all watersheds within the County

(ii) Debris removal includes activities for Supervisorial Districts 1 and 3 within the Santa margarita Watershed.

0000235

3. MUNICIPAL
(SECTION H.1 of ORDER NO. R9-2004-001), CONT.

5) **Assessment of effectiveness of BMPs that have been implemented for municipal facilities and activities:**

BMP Code	Description	Used	Notes
SC-10	Non-Stormwater Discharges	☒ Yes ☐ No	
SC-11	Spill Prevention, Control and Clean-up	☒ Yes ☐ No	
SC-20	Vehicle and Equipment Fueling	☒ Yes ☐ No	
SC-21	Vehicle and Equipment Cleaning	☒ Yes ☐ No	
SC-22	Vehicle and Equipment Repair	☒ Yes ☐ No	
SC-30	Outdoor Loading/Unloading of Materials	☒ Yes ☐ No	
SC-31	Outdoor Liquid Container Storage	☒ Yes ☐ No	
SC-32	Outdoor Equipment Maintenance	☒ Yes ☐ No	
SC-33	Outdoor Storage of Raw Materials	☒ Yes ☐ No	
SC-34	Waste Handling and Disposal	☒ Yes ☐ No	
SC-35	Safe Alternative Products	☒ Yes ☐ No	
SC-40	Contaminated or Erodible Areas	☒ Yes ☐ No	
SC-41	Building and Grounds Maintenance	☒ Yes ☐ No	
SC-42	Building Repair and Construction	☒ Yes ☐ No	
SC-43	Parking/Storage Area Maintenance	☒ Yes ☐ No	
SC-44	Drainage System Maintenance	☒ Yes ☐ No	
SC-60	Housekeeping Practices	☒ Yes ☐ No	
SC-61	Safe Alternative Products	☒ Yes ☐ No	
SC-70	Road and Street Maintenance	☒ Yes ☐ No	
SC-71	Plaza and Sidewalk Cleaning	☐ Yes ☐ No	N/A
SC-72	Fountain and Pool Maintenance	☐ Yes ☐ No	N/A
SC-73	Landscape Maintenance	☒ Yes ☐ No	
SC-74	Drainage System Maintenance	☒ Yes ☐ No	
SC-75	Waste Handling and Disposal	☒ Yes ☐ No	
SC-76	Water and Sewer Utility Maintenance	☐ Yes ☐ No	N/A

Assessment of the effectiveness of BMPs that have been implemented for municipal facilities and activities.

0000236

3. MUNICIPAL
(SECTION H.1 of ORDER NO. R9-2004-001), CONT.

6) **Description and number of training efforts conducted over the last year (for municipal facility operators and/or inspectors).**

a) **Training:**

Training	Training Description	Training Dates	Number of Attendees
NPDES	Municipal Training	4/16/05	
		5/1/07	
		10/2/061 0/16/061 0/17/061 0/18/06	See sign in logs
		Total	**54**

b) **Summarize the internal and external education and outreach activities the Municipal Component has conducted over the past year:** Training offered by the Flood Control and Water Conservation District. TLMA is very interested in maintaining their level of training to appropriate staff positions and will send additional staff as appropriate as more training becomes available.

7) **An assessment of program effectiveness based on the measurable goals established in the Permittee's Individual SWMP:** Employees are becoming more familiar with stormwater issues. However, if a state auditor were to walk up to an employee and ask someone about a SWMP requirement you will get a blank look. But, if the question was phrased in more layman's terms such as, tell me about the things you do in your job to prevent runoff from leaving the site then you will get an informed answer.

8) **Additional Comments/Information:**

Describe the major accomplishments of the Municipal Component over the past year: Catch basin GIS mapping is completed in the Santa Margarita Watershed and is being used as a tool to for inspection and cleaning schedules. Special attention is paid to drainage facilities located within problem areas. This information is updated into the GIS database and used for making adjustments to frequency of cleanups.

TLMA has hired a consultant to update the Stormwater Pollutions Prevention Plans for all of the municipal facilities in the department. Additional preventative BMPs have been implemented to ensure that no runoff is leaving their sites.

3. MUNICIPAL
(SECTION H.1 of ORDER NO. R9-2004-001), CONT.

Most of the TLMA-Transportation Department's municipal improvement projects (CIP) occurred in the Santa Ana watershed with Five (5) construction projects anticipated in that watershed for FY 06/07-07/08 with one (1) project planned in the Whitewater watershed. No projects were constructed or are planned in the Santa Margarita watershed.

Summarize new activities or improvements to be implemented next year as a result of your self assessment of the Municipal Component:

- Training will continue to be a high priority
- Updates of GIS catch basin data base will be used to make informed decisions on operation and maintenance of TLMA's catch basin system.

SANTA MARGARITA ATTACHMENT A

BACKGROUND

The Transportation Department obtained general funds that supported the FY 06/07 Roadside Litter Removal Program, Catch Basin Inspection & Cleaning Program, Code Enforcement Clean up Program, and the enhancement to the integrated approach in the continued development of the MS4 map.

The Roadside Litter Removal Program has a crew of seven (7) employees that provides roadside clean up efforts. The funding for this Program is provided by each of the five Board of the Supervisors. The crew collects roadside litter from ten (10) linear miles of designated roadways in each five Supervisorial Districts within the County. Ten (10) linear miles are cleaned on a rotating basis, allowing for problems areas to be re-addressed every ten (10) weeks. Cumulatively, this program cleans approximately 60 linear miles quarterly. This effort has proven successful in reducing the amount of debris and anthropogenic litter entering the catch basins, nearby streams and waterbodies within the different watersheds. Roughly, 28.40 road miles were cleaned, and approximately 23.74 tons of anthropogenic litter was removed for FY 06/07.

The Catch Basin Inspection & Cleaning Program has a crew of three (3) employees and two (2) vacant positions that will be filled in the future. The funding for this Program is provided by the Executive Office. This Program performs inspection and maintenance on storm drainage facilities. The crew inspects and maintains catch basins, inlets, culverts, detention basins and other drainage infrastructures to ensure maximum storm water diversion from rights-of-way, while simultaneously maintaining the National Pollutant Discharge Elimination System standards. For FY 06/07, approximately 2.93 tons of anthropogenic litter, 6.66 tons of vegetative litter, and 5.75 tons of sediment litter were removed from the Santa Margarita watershed.

The Code Enforcement Clean up Program has a crew of fourteen (14) employees and three (3) vacant positions. The funding for this Program is provided by Code Enforcement Department. The crew carries out wide-ranging clean ups. Santa Margarita watershed falls in parts of Supervisorial Districts 1 & 3. For FY 06/07, approximately 1,870 tons of litter was removed in Supervisorial District 1 & 3.

ROAD REPAIR AND STREET SWEEPING

For FY 06/07, the Transportation Department received a total of 1,075 complaint calls countywide for general road repair and maintenance, of which a total of 147 complaints were within the Santa Margarita Region involving the following issues:

a. Flooding-road shoulder, ditch damage (0 complaint)
b. Ditches gutter, culvert drains, clean out (9 complaints)
c. Ditches gutter, culvert drains, cleaned out (5 complaints)
d. Mud gravel, dirt, rock, snow, swept/cleared (2 complaints)
e. Trash, debris, object removed or cleared (26 complaints)
f. Trees, palm fronds and branches (21 complaints)
g. Weed, grass, brushes and tumbleweeds (8 complaints)
h. Graffiti (1 complaint)
i. Potholes or large holes (26 complaints)
j. Improvements, grading paving & resurfacing (47 complaints)
k. Road sidewalk, curb gutter damage & repair (2 complaints)

The amount of countywide complaint calls received for FY 06/07 slightly increased in comparison to 1059 compliant calls received for FY 05/06. Even though the amounts of complaint calls were slightly higher for FY 06/07, they were still significantly lower in comparison to 2,030 complaint calls received for FY 04/05. During FY 04/05, Riverside County experienced intense storm events that increased the level of maintenance activities needed to respond to public concerns.

Additionally, new development projects within the County (with curb and gutter) are required to annex into County Service Area (CSA) 152 in order to receive street

sweeping services. These services are contracted out and roadways are swept at least once a month, and in some cases more frequently. Whenever possible, the Department has increased the frequency of street sweeping to twice a month. During FY 06/07, a total of 12,664 curb miles were swept. In comparison to last fiscal year, FY 05/06, a total of 10,704 curb miles were swept, which represents an 18.31% increase.

The amount of debris removed from street sweeping activities also increased this year. For FY 05/06 1,141 tons of debris was removed from streets, in comparison to this FY 06/07 1,753 tons of debris was removed. The increase in amount of debris removed can be explained in part by the increase in street sweeping activities and population growth.

FISCAL EXPENDITURES FOR FY 06/07

Activity	**Source**	**FY 06/07 Expenditures**
Overlay, Sealing	Gas Tax	$3,415,119
Storm Damage	Gas Tax, FEMA	$5,990,135
Municipal Inspections		$6,240
Street Sweeping CSA 152	County Assessment Area 152	$525,518
Street Sweeping		$531,624
MS4 Mapping	General Funds	$115, 051
Catch Basin Inspection & Cleaning Program - Santa Margarita	General Funds	$217,962
Code Enforcement Clean Up Program & Roadside Litter Removal Program	Code Enforcement, General Funds	$1,724,082

Total expenditures for NPDES activities for this FY 06/07 were $2,057,095, and costs are expected to increase as the program expands.

TRAINING

The Transportation Department is very supportive of NPDES training. Training was offered through Flood Control and forty-nine (49) Transportation staff attended training during FY 06/07. Furthermore, additional employees are anticipated to register for NPDES training that is anticipated to start in the fall.

ILLICIT CONNECTION/ILLEGAL DISCHARGE(IC/ID)

The Riverside County Transportation Department, as part of its normal duties, is actively involved with review of its channel and storm drain facilities. The Highway Operations Division provides the County with coverage concerning illegal connections or illegal discharges within the storm drain systems such as inlets, outlets, culverts, swales and channels which ultimately make their way to facilities owned by Riverside County Flood Control District. The Transportation Department District Road Maintenance Supervisors and Assistant Supervisors visually inspect the storm drain infrastructure on a regular basis as part of their daily routine. They pay close attention to facilities located within areas of concern, or areas with historical issues. This could involve areas where illegal dumping has occurred or other maintenance issues need to be addressed, which would require additional follow-up. These issues could necessitate additional assistance from the County illegal dumping cleanup programs and/or Code Enforcement investigation.

The Transportation Department Permit Engineer also sends a letter to property owners that encroach upon County right-of-way with illegal connections or other obstructions, and if needed is reported to Code Enforcement. The Permit Engineer is responsible for reviewing encroachment applications along County road right-of-way. If the illegal connection is not remedied in a timely manner, it is removed by the County and billed to the owner of the property.

In summary, for FY 06/07, Code Enforcement supervised three (3) types of illicit discharges, connections and spills.

a. There were 878 cases of illegal grading or grading without permit in which 589 are currently opened and 289 are closed. They were discharge of soil and

sediments.

b. There were 573 cases of illegal dumping in which 485 are currently opened and 88 are closed. They were a variety of materials from hazmat, tires, green waste, construction debris, and household waste.

c. There were 17 NPDES investigations in which 9 are currently opened and 8 are closed. The NPDES violations were for illegal pool water discharges and the cleaning of pool filters into gutters.

Attachment A: 2006-07 Storm Season Final Statistics

Legal Description	Regional Water Quality Control Board Responsible	End of Storm Season Percent Compliance	Number of Verifications Conducted	Date Last Verification Processed
APN 341-190-004	SM	20%	4	04-07
APN 365-170-009	SM	CLD	2	11-06
APN 365-170-010	SM	CLD	2	11-06
APN366-320-020	SM	CLD	1	08-06
APN 367-270-027	SM	StopWorkOrder	1	08-06
APN 367-310-006	SM	CLD	1	08-06
APN 368-160-009	SM	CLD	3	04-07
APN434-240-002	SM	CLD	2	11-06
APN 470-180-025	SM	40%	4	05-07
APN 470-380-037	SM	StopWorkOrder	1	08-06
APN 571-130-026	SM	CLD	1	09-06
APN 571-630-010	SM	05%	4	05-07
APN 571-630-021	SM	70%	3	05-07
APN 572-280-011	SM	30%	4	05-07
APN 580-160-008	SM	40%	3	05-07
APN 584-040-023	SM	40%	4	05-07
APN 584-180-006	SM	CLD	1	09-06
APN 584-250-031	SM	CLD	1	09-06
APN 915-110-045	SM	SWO	1	08-06
APN 915-220-010	SM	CLD	1	08-06
APN 915-220-016	SM	CLD	2	11-06
APN 915-290-002	SM	CLD	1	08-06
APN 915-370-032	SM	CLD	2	11-06
APN 915-440-043	SM	CLD	1	04-07
APN 915-460-001	SM	35%	3	04-07
APN 915-550-050`	SM	CLD	2	11-06
APN 915-590-012	SM	CLD	2	11-06
APN 915-630-001	SM	CLD	2	11-06
APN917-140-015	SM	60%	3	03-07
APN 917-260-060	SM	60%	3	05-07
APN 918-020-018	SM	CLD	2	11-06
APN 918-020-022	SM	45%	3	05-07
APN 924-060-006	SM	CLD	1	09-06
APN 924-060-007	SM	CLD	1	09-06
APN 924-140-010	SM	CLD	1	09-06
APN 924-230-011	SM	NO WORK	3	03/07
APN 927-100-043	SM	65%	4	03-07
APN 927-120-012	SM	50%	4	03-07
APN 927-140-033	SM	NO WORK	3	03-07
APN 927-150-024	SM	0%	2	04-07
APN 927-180-007	SM	40%	3	03-07

APN 927-200-020	SM	CLD	1	09-06
APN 927-220-018	SM	15%	3	03-07`
APN 927-230-020	SM	CLD	1	09-06
APN 927-242-004	SM	CLD	1	09-06
APN 927-250-008	SM	70%	3	03-07
APN 927-250-015	SM	CLD	3	02-07
APN 927-260-003	SM	CLD	1	09-06
APN 927-310-007	SM	CLD	1	09-06
APN 927-390-049	SM	CLD	2	12-06
APN 927-470-008	SM	CLD	1	09-06
APN 927-520-015	SM	CLD	2	09-06
APN 927-640-004	SM	55%	4	03-07
APN 927-660-004 Par 4	SM	CLD	2	12-06
APN 927-660-004	SM	CLD	2	12-06
APN 927-660-031	SM	50%	1	09-06
APN 927-690-019	SM	20%	4	03-07
APN 928-030-008	SM	75%	5	06-07
APN 928-080-004	SM	CLD	4	03-07
APN 928-090-009	SM	CLD	2	12-06
APN 928-090-010	SM	CLD	2	12-06
APN 928-100-003	SM	55%	4	03-07
APN 928-100-005	SM	CLD	1	09-06
APN 928-170-016	SM	60%	4	03-07
APN 928-100-006	SM	SWO	4	03-07
APN 928-180-005	SM	CLD	2	12-06
APN 928-210-003	SM	60%	4	05-07
APN 928-240-001	SM	CLD	1	09-06
APN 928-240-006	SM	60%	4	05-07
APN 928-240-014	SM	25%	5	05-07
APN 928-250-012	SM	NO WORK	1	09-06
APN 928-240-015	SM	75%	4	03-07
APN 928-250-013	SM	CLD	2	02-07
APN 928-260-004	SM	CLD	1	09-06
APN 928-260-009	SM	CLD	2	09-06
APN 928-270-012	SM	CLD	2	12-06
APN 928-310-011	SM	CLD	1	09-06
APN 928-340-012	SM	CLD	1	09-06
APN 929-060-009	SM	60%	3	04-07
APN 929-090-009	SM	60%	3	03-07
APN 929-120-007	SM	CLD	1	09-06
APN 929-270-001	SM	10%	3	02-07
APN 929-220-010	SM	60%	3	03-07
APN 929-290-002	SM	65%	4	03-07
APN 929-350-001	SM	CLD	1	12-06
APN 929-350-002	SM	65%	5	06-07
APN 930-130-008	SM	CLD	3	12-06
APN 930-170-007	SM	CLD	1	09-06
APN 930-170-007	SM	CLD	1	12-06

APN 930-180-016	SM	CLD	2	12-06
APN 930-190-028	SM	5%	3	05-07
APN 930-200-010	SM	StopWorkOrder	3	03-07
APN 930-230-009	SM	80%	4	03-07
APN 930-230-011	SM	70%	5	07-07
APN 930-230-015	SM	NO WORK	1	09-06
APN 930-290-010	SM	50%	3	04-07
APN 930-290-018	SM	65%	1	12-06
APN 930-310-001	SM	StopWorkOrder	4	03-07
APN 930-340-001	SM	CLD	1	09-06
APN 931-040-014	SM	60%	3	03-07
APN 931-040-015	SM	CLD	2	02-07
APN 931-050-011	SM	55%	3	03-07
APN 931-070-006	SM	CLD	1	09-06
APN 931-070-012	SM	45%	3	04-07
APN 931-070-013	SM	StopWorkOrder	3	04-07
APN 931-100-007	SM	70%	2	04-07
APN 931-120-013	SM	5%	3	04-07
APN 931-150-012	SM	55%	3	04-07
APN 931-160-005	SM	NO WORK	3	04-07
APN 931-290-007	SM	NO WORK	2	02-07
APN 931-290-016	SM	55%	3	02-07
APN 931-310-010	SM	70%	3	07-07
APN 932-040-006	SM	20%	3	04-07
APN 932-050-037	SM	45%	3	04-07
APN 932-080-013	SM	5%	2	04-07
APN 932-200-025	SM	CLD	1	09-06
APN 932-260-009	SM	NO WORK	2	04-07
APN 932-260-010	SM	65%	4	05-07
APN 932-260-033	SM	CLD	1	09-06
APN 932-286-021	SM	CLD	2	04-07
APN 932-280-030	SM	CLD	1	09-06
APN 932-280-036	SM	5%	2	05-07
APN 932-280-037	SM	10%	2	05-07
APN 932-300-010	SM	CLD	1	09-06
APN 932-300-018	SM	0	3	04-07
APN 932-310-014	SM	80%	3	04-07
APN 932-320-024	SM	CLD	1	10-06
APN 932-320-029	SM	CLD	1	10-06
APN 932-330-034	SM	CLD	2	02-07
APN 932-340-001	SM	CLD	1	10-06
APN 932-340-004	SM	StopWorkOrder	2	10-06
APN 932-340-013	SM	StopWorkOrder	3	04-07
APN 932-340-018	SM	CLD	1	10-06
APN 932-350-025	SM	CLD	1	10-06
APN 932-370-006	SM	35%	3	04-07
APN 932-380-004	SM	CLD	1	10-06
APN 933-030-022	SM	CLD	4	05-07
APN 934-020-005	SM	StopWorkOrder	2	10-06

APN 934-260-008	SM	70%	4	06-07
APN 934-290-006	SM	CLD	1	10-06
APN 935-020-003	SM	CLD	1	10-06
APN 935-030-013	SM	65%	3	04-07
APN 935-110-016	SM	StopWorkOrder	1	10-06
APN 935-190-007	SM	NO WORK	2	02-07
APN 935-260-008	SM	StopWorkOrder	3	04-07
APN 935-330-015	SM	CLD	1	10-06
APN 936-050-017	SM	70%	4	07-07
APN 936-110-031	SM	CL;D	1	10-06
APN 936-150-015	SM	80%	3	04-07
APN 936-270-022	SM	CLD	1	10-06
APN 936-290-011	SM	55%	3	04-07
APN 937-160-004	SM	80%	3	04-07
APN 938-080-016	SM	CLD	1	10-06
APN 938-160-004	SM	75%	2	11-06
APN 938-170-007	SM	StopWorkOrder	1	12-06
APN 939-050-004 Par 3	SM	StopWorkOrder	1	08-06
APN 939-050-004	SM	CLD	1	10-06
APN 939-060-017	SM	StopWorkOrder	1	10-06
APN 939-080-014	SM	CLD	1	10-06
APN 939-100-006	SM	CLD	1	10-06
APN 939-110-022	SM	CLD	1	10-06
APN 939-130-001	SM	80%	3	04-07
APN 939-130-002	SM	80%	3	04-07
APN 939-140-010	SM	CLD	1	10-06
APN 939-150-012	SM	50%	3	04-07
APN 939-150-014	SM	55%	3	04-07
APN 940-040-005	SM	70%	3	04-07
APN 940-040-006	SM	70%	3	04-07
APN 940-070-004	SM	20%	2	05-07
APN 940-090-006	SM	StopWorkOrder	4	04-07
APN 940-090-007	SM	CLD	2	04-07
APN 940-090-001 Lot 4	SM	StopWorkOrder	5	05-07
APN 940-200-002 Lot 1	SM	65%	4	04-07
APN 940-200-002 Lot 5	SM	55%	3	03-07
APN 940-200-002 Lot 2	SM	80%	4	04-07
APN 940-200-002 Lot 8	SM	80%	5	05-07
APN 940-210-001 Lot 10	SM	StopWorkOrder	3	05-07
APN 940-210-001 Lot 9	SM	65%	5	05-07
APN 940-210-012	SM	80%	4	05-07

APN 941-060-019	SM	20%	1	04-07
APN 941-070-005	SM	70%	3	04-07
APN 941-100-003	SM	CLD	1	10-06
APN 941-100-004	SM	CLD	1	10-06
APN 941-170-007	SM	CLD	1	10-06
APN 941-200-014	SM	25%	3	04-07
APN 941-270-027	SM	45%	3	04-07
APN 942-080-021	SM	50%	3	04-07
APN 942-120-005	SM	5%	3	04-07
APN 942-190-014	SM	CLD	1	10-06
APN 942-250-026	SM	75%	3	04-07
APN 943-120-018	SM	60%	3	04-07
APN 943-190-031	SM	60%	3	04-07
APN 943-190-037	SM	80%	3	04-07
APN 943-270-007	SM	CLD	1	10-06
APN 943-270-008	SM	60%	3	03-07
APN 943-270-009	SM	75%	3	04-07
APN 951-110-011	SM	CLD	1	10-06
APN 951-190-002	SM	40%	3	04-07
APN 951-240-003	SM	CLD	1	10-06
APN 951-250-007	SM	5%	3	04-07
APN 952-070-019	SM	CLD	3	04-07
CU3323	SM	CLD	3	05-07
CUP3474- PM34144	SM	50%	3	05-07
PM30629 PP18437	SM	CLD	1	08-06
PP18717	SM	CLD	1	08-06
PP18731	SM	75%	3	04-07
PP18891	SM	55%	2	10-06
PP19223 PM32166	SM	40%	1	05-07
PP20200 PM17477	SM	NO WORK	1	04-07
PU554	SM	5%	1	05-07
PU556	SM	CLD	2	10-06
TR22948	SM	85%	2	03-07
TR24831	SM	60%	4	03-07
TR25994	SM	80%	2	02-07
TR27603	SM	55%	3	02-07
TR28297	SM	55%	4	04-07
TR28298	SM	50%	4	04-07
TR28695	SM	65%	3	02-07
TR28695	SM	55%	2	05-07
TR28695	SM	CLD	6	11-06
TR29114	SM	80%	17	05-07
TR29214	SM	70%	17	05-07
TR29259	SM	CLD	1	10-06
TR29408	SM	CLD	2	10-06

TR29473-1	SM	60%	3	03-07
TR29473	SM	CLD	3	03-07
TR29962	SM	80%	4	03-07
TR30069	SM	55%	17	05-07
TR30155	SM	70%	11	05-07
TR30297	SM	65%	4	04-07
TR30347	SM	55%	7	03-07
TR30440	SM	70%	4	02-07
TR30656	SM	65%	15	05-07
TR30791	SM	45%	4	03-07
TR30839	SM	65%	4	05-07
TR30885	SM	75%	15	05-07
TR30939	SM	60%	4	05-07
TR30996	SM	70%	3	07-07
TR31118	SM	70%	3	04-07
TR31119	SM	CLD	2	10-06
TR31175	SM	55%	4	05-07
TR31329	SM	70%	3	02-07
TR31331	SM	55%	3	04-07
TR31353	SM	60%	3	05-07
TR30674	SM	75%	3	05-07
TR31837	SM	70%	4	03-07
TR32049	SM	65%	5	04-07
TR32171	SM	55%	3	04-07
TR32185	SM	70%	9	05-07

COUNTY OF RIVERSIDE
TRANSPORTATION AND LAND MANAGEMENT AGENCY

Building and Safety Department
NPDES Compliance Verification Sheet

Tract/Plot Plan No:_____ Date Verification:_____

1. A) Grading Permit No:_____ By:_____

B) WDID Number:_____ APN:_____

Size/Site (Acres Disturbed):_____ Per: _____

Weather Conditions:_____ Site Inspection Priority Level*:

Thomas Brothers Coordinates: _____ ❑ Low ❑ Med ❑ High

Project Owner/Applicant:_____

_____

_____

_____

Site Address:_____

Contact Person for Emergencies:_____

Contact Person 24-Hour Phone Number:(___)_____

Yes	No	
		2. Storm Water Pollution Prevention Plan:
___	___	A) SWPPP found on site ?
___	___	B) SWPPP is being installed according to actual construction progress ?
___	___	C) SWPPP includes sufficient BMPs to ensure erosion and sediment will be realistically controlled ?
		3. Best Management Practices:
___	___	A) BMPs installed per the site SWPPP ?
___	___	B) BMPs in place for various subcontractor trades, PCC cleanout, material storage, waste storage.
___	___	C) Overall are site BMPs effective ?
___	___	D) Effective combination of erosion and sediment controls on site ?
___	___	E) BMPs installed per construction progress ?
		4. Site Erosion Control Measures:
___	___	A) Erosion manufactured and/or denuded natural slopes ?
___	___	B) Erosion control BMPs installed in accordance with the site SWPPP ?
		5. Site Sediment Control Measures:
___	___	A) Construction site sediment present outside permit site or present on the site in an area that requires protection ?
___	___	B) Evidence construction site sediment buildup on County maintained streets, downstream storm drains and/or drainage ways?
___	___	C) Evidence of track out observed on surface streets adjoining the project site ?
___	___	D) Sediment controls installed and maintained in accordance with the site SWPPP ?
		6. Illegal/Illicit Discharges:
___	___	A) Evidence that structural controls are breached or failed under storm events of minor intensity ?
___	___	B) Evidence that active non-storm water discharges or potential illicit connections or illegal discharges to the streets or storm drains ?
		7. Per RWQCB requirements Applicant, Contractor, Developer, Property Owner NPDES Training:
___	___	A) Onsite contractors and subcontractors receive construction activity water quality impact training.

8. Site Violation(s) Notification:

A. Verbal By:_____ Date/Time Issued: _____

B. Written By:_____ Date/Time Issued: _____

C. Notice of Violation By:_____ Date/Time Issued: _____

D. Stop Work Order By: _____ Date/Time Issued: _____

E. Other Action: _____ Date/Time Taken: _____

Comments: _____

_____

_____

9. Date Regional Water Board Notified: _____

Rev. 10-05 COMPLY

(Use Back of Form for General Comments)

NPDES Compliance Inspection Sheet- Continued

Tract/Plot Plan No:_____

Grading Permit No:_____

Date/Inspection:_____

By:_____

Inspection Comments

Estimate Erosion Control Protection- Percentage Complete: _____

10. * Site Inspection Priority Level Justification: (Indicate "Site Inspection Priority Level" shown on top right of Sheet One. High Priority Level sites- inspected every two weeks, Medium -inspected at least three times during the wet season and Low Priority- inspected on an as-needed basis).

Y	N	
___	___	A. Site is 50 acres or more of disturbance.
___	___	B. Site disturbs greater than one (1) acre and is tributary (within 200') to a CWA Section 303(d) sediment impaired water body.
___	___	C. Site disturbs greater than one (1) acre and is directly adjacent or discharging to a CWA 303(d) sediment impaired water body and/or to a receiving water within an Environmental Sensitive Area.
___	___	D. Site determined by County or a RWQCB to be a significant threat to water quality.

4. INDUSTRIAL/COMMERCIAL
(SECTION H.2 of ORDER NO. R9-2004-001), CONT.

1) **Number of inspections conducted:**

Category	Number of Inspections
Industrial Facilities	**85**
High Priority Facilities	58
Medium Priority Facilities	27
Low Priority Facilities	---
Commercial Facilities	**548**
High Priority Facilities	213
Medium Priority Facilities	176
Low Priority Facilities	159
Total	**633**

2) **Number and type of enforcement actions taken:**

Enforcement and Compliance Responses	Industrial	Commercial
Non-Monetary Penalties	---	---
Fines	3	---
Bonding Requirements	---	---
Permit Denial	---	---
Referral to SDRWQCB	1	1
Total	**0**	**0**

4. INDUSTRIAL/COMMERCIAL
(SECTION H.2 of ORDER NO. R9-2004-001), CONT.

3) **Description and number of training efforts conducted over the last year (for industrial/commercial facility operators and/or inspectors).**

a. **Training:**

Training	Training Description	Training Dates	Number of Attendees
Annual Training	Industrial/Commercial Site Inspection Training presented by Riverside Co. Flood Control District	03/30/06	5
HAZMAT Training	Control of Hazardous Materials Storage	8/29/06	22
UST Compliance	UST regulations and prevention of unauthorized releases	9/4/06	20
Special/Detailed Training	Specialized Industrial/Commercial Site Inspection Training presented by AEI-CASC Engineering	06/14 and 07/07/07	8
Stormwater	Stormwater I/C compliance	10/3 & 19/06	22
Generators of Hazardous Waste	Stormwater Survey Form review	11/2/06	18
AST Storage	Review of regulations to prevent releases	6/11/07	28
Special/Detailed Training	Industrial/Commercial Prioritization Training presented by AEI-CASC Engineering	07/10/07	5
Effective Post Construction Program	Post Construction 102: US EPA Stormwater Program's Webcast Series	09/05/07	2
		Total	**130**

4) **An assessment of program effectiveness based on the measurable goals established in the Permittee's Individual SWMP:** For Building and Safety Staff this is the beginning of a completely new program that will augment the Compliance Assistance Program that is operated by the Department of Environmental Health. A Business Registration and Licensing program was implemented in November of 2006 to capture those businesses not currently inspected by the Department of Environmental Health or any other county program. Building and Safety Field inspections have received NPDES training and anticipate beginning industrial and commercial inspections of approximately 6,500 businesses in the unincorporated portions of the county. . An assessment of program effectiveness will be undertaken next storm season to gauge decreases in urban runoff, maintenance of post construction BMPs and industry specific BMPs.

5) **Additional Comments/Information:**

(A) Describe the major accomplishments of the Industrial Component over the past year:

Two major accomplishments have been undertaken by the County of Riverside involving the Industrial/Commercial NPDES components this past year. The most significant accomplishment undertaken involves the implementation of a Business Registration Program by the County of Riverside. In November 2006, the Riverside County Board of

4. INDUSTRIAL/COMMERCIAL
(SECTION H.2 of ORDER NO. R9-2004-001), CONT.

Supervisors approved County Ordinance 857 creating a Business Registration and Licensing Program which requires that all businesses within the unincorporated area of Riverside County obtain a business license. The business licensing program continues to date, registering businesses throughout the county area. To date approximately 6,500 businesses have been registered. The second major accomplishment involves Industrial/Commercial NPDES Site Inspections that are tentatively scheduled to begin in January of 2008. Field inspections of all registered business facilities will be conducted and a data base shall be created to track inspection results.

(B) Describe the major accomplishments of the Commercial Component over the past year:

Refer to Answer (A), above, for accomplishments concerning the Commercial Component.

(C) Summarize the internal and external education and outreach activities the Industrial Component has conducted over the past year:

Internal education activities: Two distinct Industrial/Commercial educational opportunities were offered to staff in June and July, 2007. A focused in-depth one-on-one class was presented by our Department Industrial/Commercial Consultant AEI-CASC Engineering. This training presented classroom and field training concerning Industrial/Commercial NPDES field inspections while presenting detailed information to eight staff members. A separate training session was present by AEI-CASC Engineering which covered site prioritization and classification using SIC codes.

External educational activities: Since Riverside County's Business Registration and Industrial/Commercial NPDES Inspection Programs are both new, a huge educational effort is being undertaken to educate the public and business owners regarding NPDES concerns. This effort is being conducted as new businesses are being registered through telephone contact as well as by pamphlet or brochure. The distribution and use of educational material from Riverside County Flood Control is also being implemented in this external educational effort. Pamphlets and posters are being provided which do an excellent job of reinforcing the County Industrial/Commercial NPDES concerns. Once field inspections begin, educational material will be distributed directly from the inspector to the business owner.

(D) Summarize the internal and external education and outreach activities the Commercial Component has conducted over the past year:

Refer to Answer (C), above for a summarization of the internal and external education and outreach activities concerning the Commercial Component.

(E) Summarize new activities or improvements to be implemented next year as a result of your self assessment of the Industrial Component:

4. INDUSTRIAL/COMMERCIAL
(SECTION H.2 of ORDER NO. R9-2004-001), CONT.

Since the Business Registration and Industrial/Commercial Programs are both entirely new, any activities associated with the programs should be considered completely new activities and accepted as such. Therefore there is no need at this time for the consideration of new or improved activities. The establishment of new or improved activities will be considered the following year as the results of the initial Industrial/Commercial NPDES field inspections are compiled and analyzed.

(F) Summarize new activities or improvements to be implemented next year as a result of your self assessment of the Commerical Component:

Refer to Answer (E), above for details for a summarization of new activities or improvement to be implemented resulting in the assessment of the Commercial Component.

(G) The Department of Environmental continues to perform inspections of businesses within in their inspection authority. The inspections include restaurants and other food handling facilities, businesses that handle and store hazardous materials, businesses that generate hazardous waste and businesses that have underground storage tanks. Many of the businesses that handle, store or generate hazardous materials have been classified as being higher in risk and therefore are inspected on a frequency schedule of 12 to 18 months.

5. RESIDENTIAL
(SECTION H.3 of ORDER NO. R9-2004-001)

1) **A description of residential areas that were focused on during the past year:**

2) **Number and type of enforcement actions taken:**

Enforcement and Compliance Responses	Public Projects
Education and information	
Verbal Warning	
Written Warning	13
Notice of Non-Compliance	3
Administrative Compliance Order	
Misdemeanor	
Infraction	
Citation	
Referral to SDRWQCB	
Total	**16**

3) **An assessment of program effectiveness based on the measurable goals established in the Permittee's Individual SWMP:** Educational materials are provided to new home developments, however, complaints in residential areas tend to be generated due to neighbor disputes and often times are not as described. Legitimate complaints with identifiable NPDES violation are those counted in the table above. Other complaint categories include illegal dumping at or near a residence that can not be substantiated as to who is at faults are tabulated under TLMA Code Enforcement tonnage amounts.

4) **Additional Comments/Information:**

Describe the major accomplishments of the Residential Component over the past year: community cleanup and dump days, household hazardous waste (HHW), e-waste and universal collection events continue to expand on a countywide basis.

Summarize the internal and external education and outreach activities the Residential Component has conducted over the past year: See Flood Control and Water Conservation District Report

RESIDENTIAL
(SECTION H.3), CONT.

Summarize new activities or improvements to be implemented next year as a result of your self assessment of the Residential Component: A goal for expansion of regional collection sites for various HHW, e-waste, universal waste is anticipated.

6. EDUCATION
(SECTION I of ORDER NO. R9-2004-001)

1) **Description of education efforts conducted by the Permittee (not collectively with other Permittees) during the previous year:** See Flood Control and Waster conservation District Report

Audience	Measures
Permittee Departments and Personnel	Number of Permittee employees trained for: • Construction Inspection: • Industrial/Commercial Inspection: • Municipal Facilities and Activities: • Development Planning:
Construction Site Owners and Developers	Outreach events conducted:
Industrial/Commercial Owners and Operators	Industrial/Commercial outreach events conducted:
Residential Community, General Public, Other Public Agencies and Students	Number of Media Impressions in: • Newspaper: • Mailings: • Radio/TV: • Billboards: • Other: • Materials: Number of classroom presentations: Public Education events conducted:

2) **Assessment of overall program effectiveness based on the measurable goals established in the Permittee's Individual SWMP:** See Flood control and Water Conservation District Report

3) **Additional Comments/Information:**

The County Departments in coordination with the Flood Control and Water Conservation District partner on all educational opportunities and share in costs and time at community events throughout the county with their "Only Rain in the Drain" campaign.

7. ILLICIT DISCHARGE DETECTION AND ELIMINATION
(SECTION J of ORDER NO. R9-2004-001)

1) **Number of illicit discharges, connections and spills reported and/or identified during the reporting period:**

   a) **Illicit Discharges (ID):** 133 (Code Enforcement)
   b) **Illicit Connections (IC):** See Flood Control and Water Conservation Report
   c) **Spills (S):** 1 Sewage > 1000 gals.

2) **Number of illicit discharges or connections investigated during the reporting period and the outcome of the investigations:**

Type	Category	Substance	Outcome of Investigation
ID	Other	Other	133 cases investigated with return to complinace and 43 cases still pending.
Spill	Municpal	Sewage	> 1000 gal spill of sewage reported to Environmental Health and referred to Regional Board
ID	Residential	Oil/Grease	
ID	Residential	Oil/Grease	
ID	Residential	Oil/Grease	
ID	Residential	Oil/Grease	

3) **Number and types of enforcement actions taken for illicit discharges or connections during the reporting period:**

Enforcement and Compliance Responses	Private Facilities	Public Facilities
Non-monetary penalties	90	0
Stop work authority		
Fines		
Financial Security		
Permit/Business License Denial		
Total	**90**	**0**

7. ILLICIT DISCHARGE DETECTION AND ELIMINATION
(SECTION J of ORDER NO. R9-2004-001), CONT.

4) **Number of times your agency's hotline was called during the reporting period, as compared to previous reporting periods.** See Flood Control and Water Conservation Report

	Number of Calls		
	2004-05	**2005-06**	**2006-07**
Water Pollution Hotline	See Flood Control Report	See Flood Control Report	See Flood Control Report

5) **Number and location of dry weather monitoring sites that were monitored during the reporting period:** See Flood Control and Water Conservation Report for specific details on dry weather and wet weather monitoring.

Number of Site(s): 4

Location(s): # 781 Murrieta Creek at Clinton Keith Rd.

800 Tucaloca Creek at Murrieta Hot Springs Rd

806 Benton Creek at Van Gaale Lane

849 Pechanga Creek at Pala Rd.

7. ILLICIT DISCHARGE DETECTION AND ELIMINATION
(SECTION J of ORDER NO. R9-2004-001), CONT.

6) **Summary of Illicit Discharge Monitoring Program results, including: 1) All inspection, field screening, and analytical monitoring results; 2) All follow-up and elimination activities; and 3) Any proposed changes to station locations and/or sampling frequencies:** See Flood Control and Water Conservation Report for specific details.

Date	Location	Monitoring Results	Follow-up and Elimination Activities	Proposed Changes
				No Changes Comment(s):
				No Changes Comment(s):
				No Changes Comment(s):
				No Changes Comment(s):
				No Changes Comment(s):
				No Changes Comment(s):
				No Changes Comment(s):
				No Changes Comment(s):
				No Changes Comment(s):
				No Changes Comment(s):

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7. ILLICIT DISCHARGE DETECTION AND ELIMINATION
(SECTION J of ORDER NO. R9-2004-001), CONT.

7) **An assessment of overall program effectiveness based on the measurable goals established in the Permittee's Individual SWMP:** See Flood Control and Water conservation District Report-All county staff who have NPDES specific responsibilities have received training. As IC/ID are identified, follow-up investigations are conducted and as appropriate cease and desist orders, notices of violation are issued or referrals made to administering agencies to abate conditions of non-compliance.

8) **Additional Comments/Information:**

Describe the major accomplishments of the Illicit Discharge Detection and Elimination Component over the past year: See Flood Control and Water Conservation District Report

Summarize the internal and external education and outreach activities the Illicit Discharge Detection and Elimination Component has conducted over the past year: See Flood Control and Water Conservation District Report- Transportation Department staff assigned to monitor and inspect catch basins make that there are no illegal connections- referrals are made to Code Enforcement for follow –up.

Summarize new activities or improvements to be implemented next year as a result of your self assessment of the Illicit Discharge Detection and Elimination Component: As part of the total program external audit recommendations will be evaluated and programs implemented to Further enhance program delivery.

8. PUBLIC PARTICIPATION

1) **A description of efforts to include the public urban runoff management programs during the reporting period (i.e., river clean-ups, volunteer monitoring, Permittee council meetings related to the SWMP, etc.):** As stated in previous reports the county and the Flood Control and Water Conservation District provide public comment through a transparent public review process of the SWMP and other NPDES stormwater related activities. In addition the County and the Flood Control and Water Conservation District provide access to local government through a monthly technical advisor committee (TAC) meeting, quarterly management steering committee (MSC) meeting with city managers, and monthly water quality management committee (WQMC) meetings with county departments.

   As identified earlier, coordinated community cleanup days sponsored by various county department are scheduled throughout the year.

2) **Additional Comments/Information:**

   Assessment of overall program effectivenss based on the measurable goals established in the Permittee's Individual SWMP: Attendance to TAC, MSC, and WQMC meeting continue at a high level and is a forum for exchange of ideas, program consolidation, coordination, and county-wide consistency

   Describe the major accomplishments of the Public Participation Component over the past year: See summary of public participation from Flood Control and Water Conservation district Report

   Summarize the internal and external education and outreach activities the Public Participation Component has conducted over the past year: See Flood Control and Water Conservation District Report.

   Summarize new activities or improvements to be implemented next year as a result of your self assessment of the Public Participation Component: Recommendations from the third party external audit may point to various options to consider.

9. FISCAL ANALYSIS COMPONENT

Fiscal Analysis Component - each Permittee shall include an annual fiscal analysis, for each fiscal year covered by Order No. R9-2004-001, in its Individual Annual Report. This analysis shall evaluate the expenditures (such as capital, operation and maintenance, education, and administrative expenditures) necessary to accomplish the activities of the Permittee's Individual SWMP. The analysis shall include the following:

1) **A report of the previous reporting period's budget and a budget for the upcoming reporting period. To the extent possible, the budgets should be broken down by the following programs:**

Approved Budget

Program Element	Fiscal Year 2006-2007		Fiscal Year 2007-2008	
	Capital Expenditures	O&M/Admin Expenditure	Capital Expenditures	O&M/Admin Expenditure
Program Management		700,000		725,000 estimate
Annual Fee for MS4 NPDES Permit		30,000		30,000
Implementation Agreement Shared Cost		90,000		150,00
Construction Inspections		485,000		485,000
SWPPPs	32,892	7,636	0	0
Development Planning		30,000*		30,000*
Industrial and Commercial Inspections		175,000*		175,000*
Illicit Connections & Illegal Discharges Program		1,610,000		1,610,000
Municipal Facilities and Activities		159,000		174,900
Catch Basin Cleaning	426,500	912,051	330,003	624,582
GIS MS4 Mapping		423,816		553,847
Street Sweeping		348,343		525,518
Public Education & Outreach		680,000*		680,000*
Monitoring Program		685,000*		685,000*
Other		581,965		416,552
Total	**$459,392**	**$ 6,356,199**	**$330,003**	**$6,890,399**

9. FISCAL ANALYSIS COMPONENT

(CONT.)

2) **A description of the source(s) of funds that were utilized during the previous fiscal year and the source(s) of funds proposed to meet the necessary expenditures for the subsequent year, including legal restrictions on the use of such funds.**

Source of Funds	Capital Expenditures	Percent of Total Program Funding	Restrictions on Use (if applicable)
General Fund	22%	N/A	Revenue provided to fund: Catch basin Inspections and Cleanout; MS4 mapping, and roadside litter removal.
County Service Area 152		N/A	Benefit assessment for street sweeping
Gas Tax		N/A	Revenues to be used for road maintenance activities within the county maintained road system
Development Revue Fees		100%	Costs associated with the review of WQMPs on projects in accordance with the permit.
Lighting and Landscape Maintenance Districts (LLMD)		N/A	Revenues are to be used solely for designated areas within the LLMD
Developer Fees	100%	N/A	Revenues to be utilized on a project specific basis
Capitol Projects	2%	N/A	Revenues to be utilized on a project specific basis

3) **Additional Comments/Information:**

Overall the direct and indirect costs for NPDES related program activities are in the range of $17,000,000-17,200,000.for countywide implementation. Program costs continue to rise each year due to new development, industrial commercial inspections increased catch basin inspections and clean out schedules, and implementation of TMDLs in all three distinctively different watersheds. Each watershed requires additional quantification of activities, tracking and funding. It is important to mention that these ancillary programs (indirect costs) provide an direct nexus and benefit to the NPDES stormwater program and include litter control, street sweeping, highway O & M repairs, HHW, e-waste, universal waste collection programs, emergency spill response and illegal dumping. It is imperative that the county continues to closely monitor program costs in this declining economy and work closely with the three

9. FISCAL ANALYSIS COMPONENT

(CONT.)

regional boards to ensure that economic considerations are taken into account when planning any new program requirements.

10. NON-STORM WATER DISCHARGES

Permittees shall report on any discharge category listed in Requirement B.2 of Order No. R9-2004-001 that was identified as a source of pollutants during the reporting period. For each identified category, the Permittee shall report whether it elected to prohibit the discharge or to require BMPs to reduce pollutants in the discharge to the MEP. If the discharge is not prohibited, the BMPs that will be implemented, or required to be implemented, shall be described in each Permittee's Individual SWMP Annual Report.

Category	Prohibited	BMP to be Implemented
Diverted stream flows	☐ Yes ☐ No	Not Applicable
Rising ground waters	☐ Yes ☐ No	Not Applicable
Uncontaminated ground water infiltration [as defined at 40 CFR 35.2005(20)] to MS4s	☐ Yes ☐ No	Not Applicable
Uncontaminated pumped ground water	☐ Yes ☐ No	Not Applicable
Foundation drains	☐ Yes ☐ No	Not Applicable
Springs	☐ Yes ☐ No	Not Applicable
Water from crawl space pumps	☐ Yes ☐ No	Not Applicable
Footing drains	☐ Yes ☐ No	Not Applicable
Air conditioning condensation	☐ Yes ☒ No	Not Applicable
Flows from riparian habitats and wetlands	☐ Yes ☐ No	Not Applicable
Water line flushing	☐ Yes ☐ No	Not Applicable
Landscape irrigation	☐ Yes ☐ No	Not Applicable
Discharges from potable water sources not subject to NPDES Permit No. CAG679001, other than water main breaks	☐ Yes ☐ No	Not Applicable
Irrigation water	☐ Yes ☐ No	Not Applicable
Lawn watering	☐ Yes ☐ No	Not Applicable
Individual residential car washing	☐ Yes ☐ No	Not Applicable
Non-emergency fire fighting flows	☐ Yes ☐ No	Not Applicable
Dechlorinated swimming pool discharges	☐ Yes ☐ No	Not Applicable

1) **Additional Comments/Information:**

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11. RECEIVING WATER LIMITATIONS

This section includes the report required pursuant to Requirement C.2.a. of Order No. R9-2004-001, if applicable.

Requirement C.2.a. states:

"Upon a determination by either a Permittee or the SDRWQCB that MS4 discharges are causing or contributing to an exceedance of an applicable water quality standard, the Permittee shall promptly notify and thereafter submit a report to the SDRWQCB that describes BMPs that are currently being implemented and additional BMPs that will be implemented to prevent or reduce any pollutants that are causing or contributing to the exceedance of water quality standards. The report may be incorporated in the SWMP Annual Report unless the SDRWQCB directs an earlier submittal. The report shall include an implementation schedule. The SDRWQCB may require modifications to the report;"

The county relies on the Flood Control and Water Conservation District to conduct the water quality monitoring program. The District advises the Permittees of any pollutants of concern that have been identified. At this time the District is working with the County of San Diego on and 13267 Order issued by the Regional Board that will monitor for bacteria, nutrients, sediment, and total dissolved solids (TDS) in impaired lagoons. See the Flood Control and Water Conservation District Report for more detailed information.

12. ADDITIONAL URBAN RUNOFF DATA

This section is a summary of all urban runoff related data not included in the annual monitoring report (e.g., special investigations).

See Flood Control and Water Conservation District Report

13. PROPOSED REVISIONS

This section includes proposed revisions to the Individual SWMP, including areas in need of improvement based on the assessment of effectiveness of each program component.

Limited progress has been made on the third party program audit and evaluation discussed in last year's annual report. It was determined that due to the fact that two of the three MS4 permits were being negotiated that the third party external program review should wait until the new permits were in place. It is anticipated that a contractor will be selected and progress made during the FY 07-08 permit period with the goal of providing a report that will be a strategic implementation plan and departmental work manual for the future with recommended alternatives for program implementation.

MAPS

Santa Margarita Watershed 2007

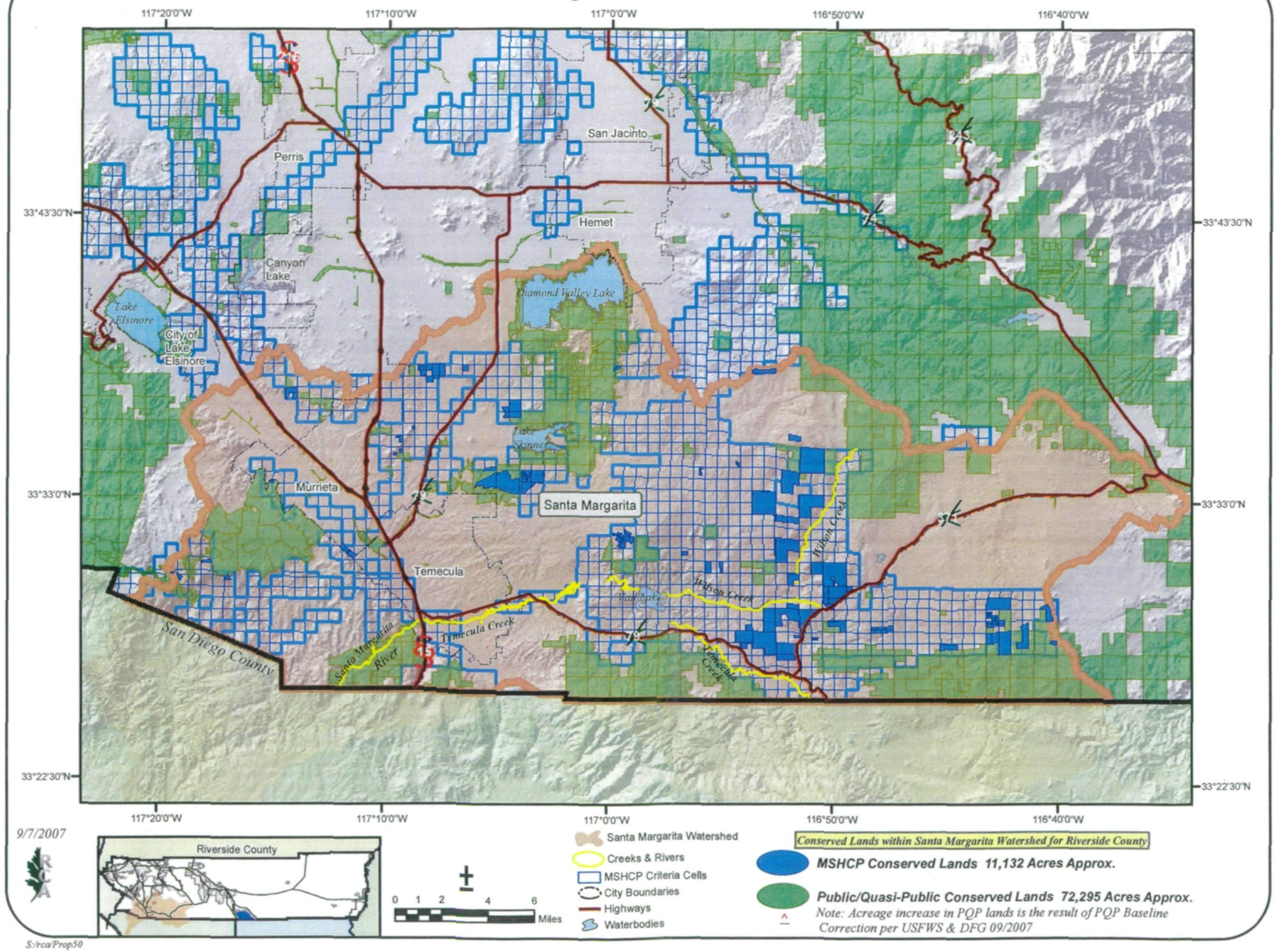

NPDES Progress Map

Santa Margarita Watershed

As of 2/6/2007

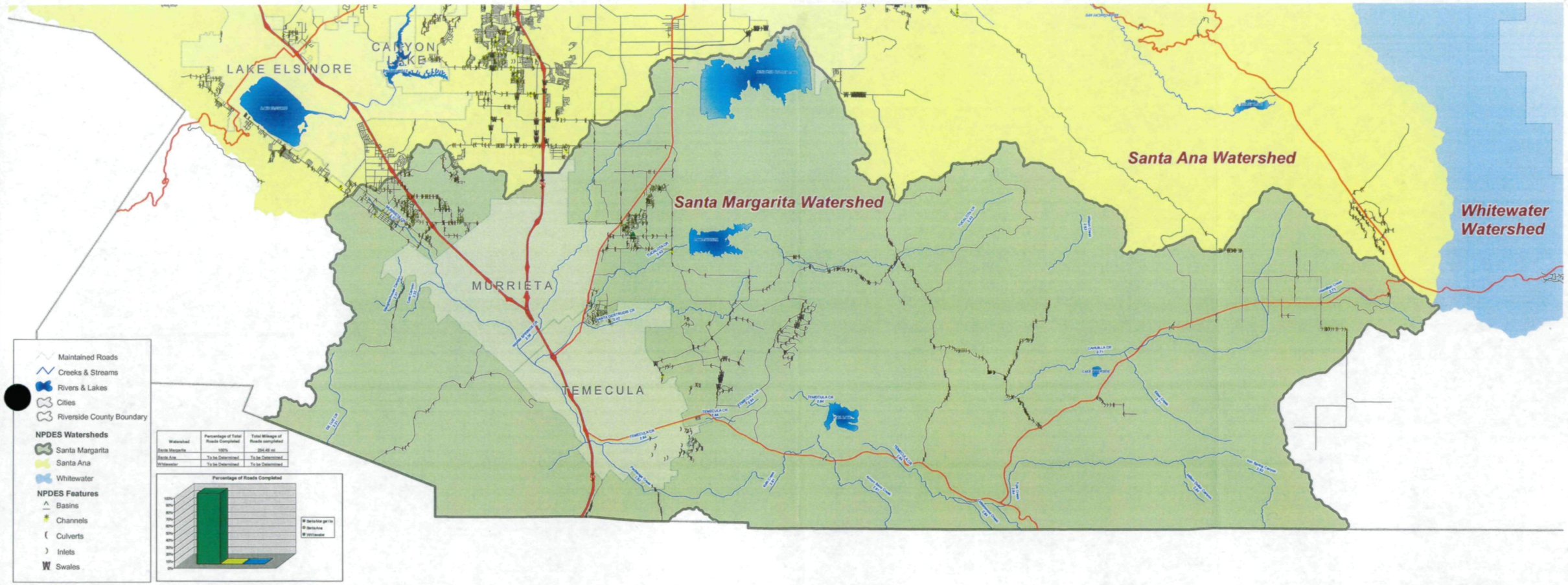

Watershed	Percentage of Total Roads Completed	Total Mileage of Roads completed
Santa Margarita	100%	284.49 mi
Santa Ana	To be Determined	To be Determined
Whitewater	To be Determined	To be Determined

Data Collected By John Morris and Cesar Gutierrez
As of 2/6/2007

Watershed	Basin Points	Basins	Channel Points	Channels	Culvert Points	Culverts	Inlet Points	Inlets	Swale Points	Swales	Total Maintained Road	Road Checked	% Completed
Santa Margarita	22		16		779		952		22		285.18 mi	285.18 mi	**100.0%**
Santa Ana			5		139		126				1572.18 mi	*In Progress*	*In Progress*
Whitewater							14				582.46 mi	*To be Determined*	*To be Determined*
Total	**22**	**2**	**21**	**9**	**918**	**406**	**1092**	**1092**	**22**	**11**			

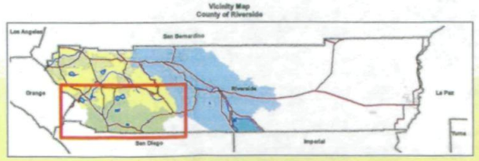

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Disclaimer: Maps and data are to be used for reference purposes only. Map features are approximate, and are not necessarily accurate to surveying or engineering standards. The County of Riverside makes no warranty or guarantee as to the content (the source is often third party), accuracy, timeliness, or completeness of any of the data provided, and assumes no legal responsibility for the information contained on this map. Any use of this product with respect to accuracy and precision shall be the sole responsibility of the user.

Map created by Adriana Soares, County of Riverside, TLMA/GIS February, 6/2007
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Example of a Basin

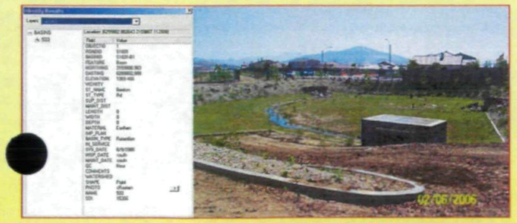

Example of a Channel

Example of a Culvert

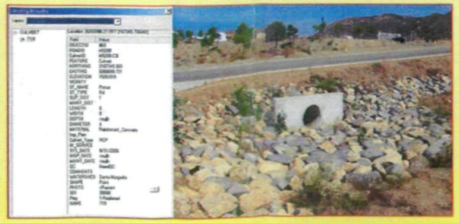

Example of an Inlet

Example of a Swale

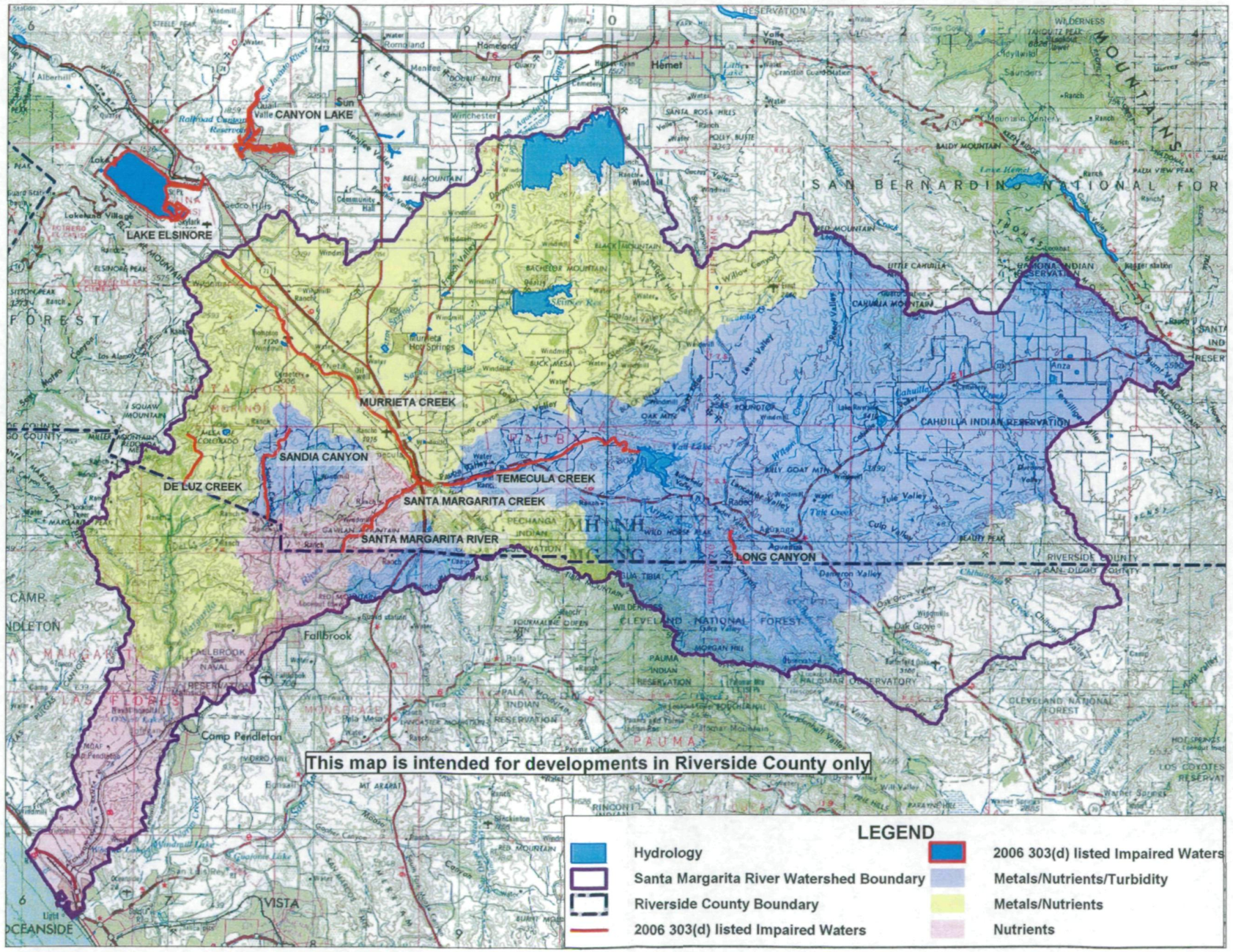
CANYON LAKE
LAKE ELSINORE
MURRIETA CREEK
SANDIA CANYON
DE LUZ CREEK
TEMECULA CREEK
SANTA MARGARITA CREEK
SANTA MARGARITA RIVER
LONG CANYON
CAHUILLA INDIAN RESERVATION
RIVERSIDE COUNTY
SAN DIEGO COUNTY
This map is intended for developments in Riverside County only
LEGEND
Hydrology
Santa Margarita River Watershed Boundary
Riverside County Boundary
2006 303(d) listed Impaired Waters
2006 303(d) listed Impaired Waters
Metals/Nutrients/Turbidity
Metals/Nutrients
Nutrients

Training Logs

NPDES STORMWATER QUALITY TRAINING FOR
Municipal Facilities and Activities
Riverside County Flood Control & Water Conservation District

Meeting of: October 2, 2006 1pm - 4pm SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Signature
1	Benjamin	Aborita	County of Riverside	Waste Management	
2	Chris	Baldino	City of Corona	Parks and Community	
3	Danilo	Batson	City of Riverside	Public Works Streets	
4	Jim	Butler	City of Moreno Valley	Parks & Recreation	
5	Fred	Cerda	City of Riverside	Public Works Streets	
6	Roger	Chavez	City of Moreno Valley	Parks & Recreation	
7	Jessica	Chin	City of Riverside	Public Works	
8	Tom	Collins	City of Riverside	Public Utilities - Water	Tom Collins
9	Arturo	Contreras	City of Palm Desert	Public Works	
10	Chris	Cordova	City of Beaumont	Code Enforcement	
11	Andrew	Cortez	County of Riverside	Waste Management	
12	Daniel	Cover	City of Moreno Valley	Public Works	
13	Ron	DeHoop	City of Corona	Parks and Community	
14	James	Dooley	County of Riverside	Transportation Department	
15	John	Dyer	City of Moreno Valley	Parks & Recreation	
16	Walt	Edmiston	City of Corona	Parks and Community	
17	Jesse	Encino	City of Corona	Public Works	
18	Rick	Fite	County of Riverside	Transportation Department	
19	Nimrod	Garay	County of Riverside	Waste Management	N. Garay
20	Paul	Gearhart	City of Riverside	Public Utilities - Water	
21	SUZANNE	GILLETTE	RIVERSIDE COUNTY	TLMA- BUILDING & SAFETY	

NPDES STORMWATER QUALITY TRAINING FOR
Municipal Facilities and Activities
Riverside County Flood Control & Water Conservation District

Meeting of: October 2, 2006 1pm - 4pm SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Signature
22	Valin	Gray	City of Moreno Valley	E.S.A	
23	Andy	Guerrero	City of Riverside	Public Works Streets	
24	Carlos	Hernandez	City of Palm Desert	Public Works	
25	Ed	Hornyak	City of Moreno Valley	Parks & Recreation	
26	George	Kelley	City of Riverside	Public Utilities - Water	
27	Eui	Kim	County of Riverside	Building & Safety	
28	Scott	Kraak	County of Riverside	Waste Management	
29	John	Leamon	City of Riverside	Public Works Streets	
30	Andy	Lindsay	City of Riverside	Public Utilities - Water	
31	Carlos	Lira	City of Moreno Valley	Parks & Recreation	
32	Jim	Lowery	City of Riverside	Public Works Streets	
33	Jerry	Lytle	County of Riverside	Transportation Department	
34	Ben	Mah	County of Riverside	Waste Management	
35	Joe	Manzo	City of Hemet	Public Works	
36	Tom	McKay	County of Riverside	Transportation Department	
37	Jerry	Mendoza	City of Riverside	Public Works Streets	
38	Daniel	Mendoza	City of Moreno Valley	Parks & Recreation	
39	Dante	Mikkelson	County of Riverside	Waste Management	
40	Dave	Miller	County of Riverside	Transportation Department	Dave Miller
41	roger	miller	lima	building & safty	
42	Daniel	Monto	City Of Moreno Valley	Public Works	

NPDES STORMWATER QUALITY TRAINING FOR

Municipal Facilities and Activities

Riverside County Flood Control & Water Conservation District

Meeting of: October 2, 2006 1pm - 4pm

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Signature
43	Dave	Navarro	City of Corona	Public Works	
44	Cynthia	Overby	City of Beaumont	Code Enforcement	
45	Larry	Page	City of Perris	Public Works	
46	Randy	Parker	City of Moreno Valley	Parks and Recreation	
47	Robert	Pena Sr	City of Corona	Parks and Community	Robert Pena Sr
48	WILLIAM	PEPPAS	COUNTY OF RIVERSIDE	BUILDING & SAFETY	
49	Luis	Perez	City of Riverside	Public Works Streets	
50	Luis	Quevedo	City of Corona	Public Works	
51	Rudy	Quiroz	City of Moreno Valley	Parks & Recreation	
52	Ryan	Righetti	County of Riverside	Transportation Department	
53	Dan	Riley	City of Corona	Parks and Community	
54	Rick	Rios	City of Corona	Parks and Community	
55	Richard	Roberts	City of Riverside	Public Works Streets	
56	Sergio	Rosas	City of Palm Desert	Public Works	
57	Bren	Seki	City of Riverside	Public Works Streets	
58	steven	toth	Riverside County	Transportation Dept	
59	Tina	Tuason	RCFC	NPDES	
60	~~Coleen~~	~~Weeks~~	City of Riverside	Public Works Streets	
61					
62					
63	Tim	[illegible]	City of Riv	Street	

How many times have you taken this class?

NPDES STORMWATER QUALITY TRAINING FOR
Municipal Facilities and Activities
Riverside County Flood Control & Water Conservation District

Meeting of: October 16, 2006 9am - 12pm

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Signature	
1	Danny	Alfaro	City of Riverside	Public Works Streets		
2	Felipe	Alvarado	City of Moreno Valley	Parks & Recreation		0
3	Luis	Baez	City of Corona	Parks and Community		
4	Daniel	Barba	City of San Jacinto	Code Enforcement	Daniel Barba	0
5	Abdul	Behnawa	COUNTY OF RIVERSIDE	BUILDING AND SAFETY		0
6	Christina	Bowser	City of Beaumont	Code Enforcement	Christina Bowser	0
7	TRENIS	BRAGA	COUNTY OF RIVERSIDE	BUILDING AND SAFTY		
8	PHIL	BROESAMLE	COUNTY OF RIVERSIDE	BUILDING&SAFETY		
9	Rudy	Casados	City of Moreno Valley	Parks & Recreation		0
10	Isaac	Chappell	City of Moreno Valley	Parks & Recreation		0
11	David	ortega	Riverside County	Flood Control		2
12	Charles	de Chambeau	Riverside County	TLMA-Building and Safety		0
13	LaDonna	Eldridge	City of Corona	Parks and Community		0
14	Dave	Everitt	City of Moreno Valley	Parks & Recreation		0
15	Jesse	Fierro	City of Riverside	Public Works Streets		1
16	Wally	Firlit	City of Moreno Valley	PW/M&O		0
17	ROBERT	FLOREZ	CITY OF MORENO	ESA		10
18	Tony	Garcia	City of Moreno Valley	Parks & Recreation		0
19	Phil	Hallberg	City of San Jacinto	Building & Safety	Phil Hallberg	0
20	Eddie	Hernandez	City of Corona	Parks and Community		
21	Marianna	Hernandez	County of Riverside	Transportation Department		

Municipal Facilities and Activities

Riverside County Flood Control & Water Conservation District

Meeting of: October 16, 2006 9am - 12pm SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Signature
22	Tim	Hostrawser	Riverside County	Building and Safety	
23	Rob	Istik	County of Riverside	Waste Management	
24	Jorge ~~Ruben~~	MIRANDA ~~Jimenez~~	City of Hemet	Public Works	
25	Scott	Johnston	County of Riverside	Transportation Department	
26	Ernie	Kluck	City of Hemet	Public Works	
27	James Crew	Smitley Leader I	City of Riverside	Public Works	0
28	Coleen Crew	Weeks Leader II	City of Riverside	Public Works Streets	1
29	Jeff	Lewellen	County of Riverside	Transportation Department	2
30	Bob	Lucas	City of Riverside	Public Utilities - Water	
31	Art	Madril	City of Riverside	Public Utilities - Water	
32	Juan	Martinez	City of Moreno Valley	Parks & Recreation	+1
33	Ben	Matye	County of Riverside	Waste Management	
34	Marcee	Maupin	City of San Jacinto	Code Enforcement	0
35	Harvey	McCoy	County of Riverside	Transportation Department	
36	Chantay	McKnight	City of Moreno Valley	Parks & Recreation	0
37	Jeff	Mitchell	County of Riverside	Waste Management	
38	gary	moss	Riverside county	transportation	4
39	Robert	Munoz	City of Riverside	Public Works Streets	
40	Greg	Oliver	City of Riverside	Public Utilities - Water	2
41	Alfrey	Patterson	City of Moreno Valley	Parks & Recreation	
42	Darren	Ramsey	City of Riverside	Public Works Streets	2

NPDES STORMWATER QUALITY TRAINING FOR

Municipal Facilities and Activities

Riverside County Flood Control & Water Conservation District

Meeting of: October 16, 2006 9am - 12pm SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Signature	
43	Byron	Recksiek	County of Riverside	Transportation Department		
44	Jamie	Rios	City of Riverside	Public Works Streets		1
45	Dean	Ristow	City of Moreno Valley	Parks & Recreation		3
46	Ramon	Roman	County of Riverside	Waste Management		0
47	Robert	Romero	City of Moreno Valley	Parks & Recreation		
48	Paul	Russell	County of Riverside	Transportation Department		3
49	Rick	Ryno	City of Riverside	Public Utilities - Water		
50	Chris	Sauve'	City of Riverside	Building Services		3
51	Leon	Schrader	City of Moreno Valley	PW/M&O		
52	TONY	SILVAS	CITY OF MORENO	PUBLIC WORKS		3
53	Bren ~~James~~	Seki ~~Smilley~~	City of Riverside	Public Works Streets		1
54	Martin	Soria	City of Corona	Parks and Community		
55	Ted	Teagarden	City of Corona	Parks and Community		2
56	Charles	Tellis	City of San Jacinto	Building & Safety		
57	Nate	Viste	County of Riverside	Waste Management		
58	Gary	Wagner	City of Moreno Valley	Parks & Recreation		0
59	Kim	Williams	City of Riverside	Public Works Streets		
60	Panda	Workman	County of Riverside	Waste Management		
61	JAMES	BUTLER	CITY MORENO VALLEY	PARKS	James Butler	3
62	John R	BURNS	County Parks	Parks	John Burns	
63	MIKE	COMBS	CITY OF RIVERSIDE	BLDG SERVICES		
	Jim	DAVIS	CO. PARK DIST EASTERN CO.	PARKS		
	BRIAN	WAGNER	RIV. CO	FIRE/HAZ-MAT		
	Joshua	Lent	RIV. CO	Fire/Haz-Mat		8
	ROBERT	BECKER	RIV. CO.	FIRE/HAZMAT		2

NPDES STORMWATER QUALITY TRAINING FOR
Municipal Facilities and Activities
Palm Springs Convention Center

times you have taken this course

Meeting of: October 17, 2006 9am - 12pm

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Signature	
1	Steve	Aguirre	City of Moreno Valley	P/W Enterprise Services		2nd
2	Solarez	Albert	County of Riverside	Transportation Department		
3	Daniel	Borges	City of Hemet	Public Works		
4	John	Carmona	State of California	Regional Water Quality Control		
5	Jose	Castro	City of Hemet	Public Works		
6	Bo	Chen	City of Palm Desert	Public Works		1st
7	Oliver	Chori	City of Hemet	Public Works		1st
8	David	DeRenard	Coachella Valley Water District	Domestic Construction		1st
9	Elizabeth	Escatel	City Of La Quinta	Code Enforcement		
10	MEGAN	FISHER	CITY OF LA QUINTA	BUILDING AND SAFETY		
11	Zachary	Foster	City of Moreno Valley	Enterprise Servises		2x
12	Mike	Goar	City of Hemet	Public Works		3
13	Robert	Gray	County of Riverside	Transportation Department		
14	Steve	Grewe	County of Riverside	Transportation Department		2
15	John	Hatsios	City of Palm Springs	Aviation		
16	steve	lasley	indio	code enforcement		1st
17	forest	meadows	city of indio	code enforcement		1.5T
18	Jay	Mirpour	RWQCB-7	Stormwater		1st
19	Robert	Morris	County of Riverside	Transportation Department		1ST
20	Morgan	Newlin	City of Hemet	Public Works		1st
21	Linda	Nixon	City of Hemet	Public Works	Linda Nixon	3

Municipal Facilities and Activities

Palm Springs Convention Center

times taken training

Meeting of: October 17, 2006 9am - 12pm

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Signature	
22	Albert	Padilla	Coachella Valley Water District	Domestic Construction		2
23	Robert	Parsons	County of Riverside	Transportation Department		
24	Robert	Rodriguez	Coachella Valley Water District	Domestic Construction		1st
25	Cora	Salas	City of Palm Desert	Public Works		
26	Ralph	Scharffenberg	City of Moreno Valley	Public Works/ESA		2nd
27	Craig	Toms	City of Palm Springs	Aviation		
28	Alana	Townsend	City of Palm Desert	Public Works		
29	carlos	vargas	indio	code enforcement		1ST
30	Barry	Verdusco	City of Moreno Valley	Public works Dept.		
31	John C.	Wilson	County of Riverside	Transportation Department		2
32	John	Carmona	R-7	Regional Board		1
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NPDES STORMWATER QUALITY TRAINING FOR

Municipal Facilities and Activities

How Many times taken this class before ?

NPDES STORMWATER QUALITY TRAINING FOR
Municipal Facilities and Activities
Murrieta City Hall

Meeting of: October 18, 2006 1pm - 4pm

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Signature	
1	Erik	Aguilar	City of Corona	Public Works		
2	Mike	Almodovar	City of Murrieta	Public Works Maintenance		34
3	Alberto	Aspe	City of Murrieta	Community Services Dept.		
4	Damien	Avalos	City of Murrieta	Community Services Dept.		
5	Mike	Biggay	City of Murrieta	Community Service Dept.		
6	Kevin	Black	City of Hemet	Public Works		0
7	Mike	Brooks	City of Murrieta	Public Works Maintenance		5
8	Mark	Bullschweiller	City of Murrieta	Public Works Maintenance		
9	Mike	Burris	City of Murrieta	Public Works Maintenance		
10	Danny	Dawley	City of Corona	Public Works		
11	Juan	Del Val	City of Murrieta	Community Service Dept.		
12	Shawn	Dullanty	City of Murrieta	Community Services Dept.		
13	Mark	Durbin	City of Murrieta	Community Services Dept.		
14	Phil	Esnayra	City of Murrieta	Community Services Dept.		
15	Lanker	Figueroa	City of Murrieta	Public Works Maintenance		
16	Lupe	Gomez	City Of Lake Elsinore	Engineering		
~~17~~	~~Larry~~	~~Gross~~	~~City of Murrieta~~	~~Community Services Dept.~~		
18	Fernando	Gutierrez	City of Corona	Public Works		1
19	Jay	Haecker	City of Murrieta	Community Services Dept.		
20	Dave	Hendry	City of Murrieta	Public Works Maintenance		3
21	Ken	Jones	City of Murrieta	Public Works Maintenance		3

NPDES STORMWATER QUALITY TRAINING FOR

How many times taken class before?

Municipal Facilities and Activities

Murrieta City Hall

Meeting of: October 18, 2006 1pm - 4pm

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Signature	
22	Bob	Kast	City of Murrieta	Community Services Dept.		
23	Billy	Koller	City of Hemet	Public Works		
24	Ed	Lockhart	City of Corona	Public Works		
25	Danny	Marks	City of Murrieta	Community Service Dept.		
26	Clay ~~Jorge~~	Smith ~~Miranda~~	City of Hemet	Public Works		1
27	Jason	Morrell	City of Murrieta	Public Works Maintenance		5
28	Jose	Munoz	City of Murrieta	Community Services Dept.		
29	Farida	Naceem	City of Murrieta	Public Works / Engineering		
30	Steve	Nickerson	City of Murrieta	Public Works Maintenance		
31	Douglas	Norfolk	City of Norco	Public Works		3
32	Craig	Priest	City of Hemet	Public Works		0
33	Rosa	Santana	City of Murrieta	Community Services Dept.		
34	Dave	Sarian	City of Murrieta	Community Services Dept.		
35	Charles	Sommermeyer	City of Hemet	Public Works		1
36	Charlie	Soto	City of Murrieta	Community Services Dept.		
37	Ron	Stuart	City of Murrieta	Community Services Dept.		
38	Loren	Thoe	City of Corona	Public Works		
39	Rick	Thompson	City of Murrieta	Commmunity Service Dept.		
40	Steven	Torres	City of Hemet	Public Works		
41	Nick	Vaughn	City of Murrieta	Public Works Maintenance		
42						

NPDES STORMWATER QUALITY TRAINING FOR

Municipal Facilities and Activities

How Many times taken class before ?

Murrieta City Hall

Meeting of: October 18, 2006 1pm - 4pm

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Signature	
43	GEORGE	DELAROSA	TEMECULA	MAINT		
44	Steve	Sterling	City Tem	maint		
45	KARL	NORDGREN	TEMECULA	MAINT		
46	RICHARD	SHEA	Temecula	Maint		
47	Bill	Kolla	Hemet	Maint		
48	Scott	Russell	Murrieta	Maint		0
49	RICK	SERVEN	TEMECULA	TCSD		
50	ALEX	CASTRO	CORONA	BUILD.		1
51	Steve	Bustillos	Corona	Street		2
52	DAVID	SARIAN	MVR	CSD		
53	ROD	STUART	MVR	CSD		5
54	JASON	ALFARO	Excel Landscape	MAINT		
55	Mario	Ruvalcaba	City of Corona	Maint.		2
56	Garrett	Butler	City of Corona	Maint		1
57	LARRY	GROSS	CSD INSPECTOR	CSD		0
58	DAVID	NAVARRO	CITY OF CORONA	ST MAINT		5
59	Andre	Valenciana	Corona	ST Maint		1
60	Jesse	Encino	Corona	Public works		
61	ERIC	SWOON	County of Riverside	EDA		
62	JOSE	ALFARO	EXCEL LANDSCAPE	MAINT.		
63	Jerry	Cardenas	EXCEL LANDSCAPE	CLD		
	RANDY	WEST	TEMECULA	Public Works		
	DAVE	DAVIS	TEMECULA	Public works		

NPDES STORMWATER QUALITY TRAINING FOR
Municipal Training
Riverside County Flood Control & Water Conservation District

Meeting of: Monday, April 16 - 08:00 - 11:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
1	Arlene	Chun	RCFC & WCD	NPDES	(951) 955-1330	
2	Mark	Hughes	Riverside County	Transportation Department	(951) 955-6767	
3	Carl	Szoyka	City of Banning	Street	(951) 922-3286	
4	Tom	Lara	City of Banning	Street	(951) 922-3286	
5	Gourley	Collins	City of Banning	Street	(951) 922-3286	
6	Troy	Conner	City of Banning	Street	(951) 922-3286	
7	Andrew	Hagaman	City of Banning	Street	(951) 922-3286	
8	Ramiro	Garcia	City of Banning	Fleet maintenance	(951) 922-3291	
9	Terry	Dunn	City of Banning	Fleet maintenance	(951) 922-3291	
10	Stuart	Sheldon	City of Moreno Valley	Public Works	(951) 413-3483	
11	Deby	Conrad	City of La Quinta	Building & Safety	(760) 777-7022	
12	Jack	Porter	City of Canyon Lake	Code Enforcement	(951) 244-2955	
13	Richard	Messer	City of Canyon Lake	Code Enforcement	(951) 244-2955	
14	Richard	Rupert	City of Canyon Lake	Code Enforcement	(951) 244-2955	
15	michael	morris	City of La Quinta	Code Complience	(760) 777-7014	
16	Elizabeth	Escatel	City of La Quinta	Building and Safety	(760) 777-7110	
17	Angel	Lazareno	City of Moreno Valley	maintenance	(909) 380-3012	
18	Robert	Pena Jr	City of Corona	Parks and Community Services	(951) 279-3754	
19	Ruben	Valterria	City of Corona	Parks and Community Services	(951) 279-3754	

20	Gary	Tomes	City of Corona	Parks and Community Services	(951) 279-3754	
21	Brian	Bassler	City of Corona	Parks and Community Services	(951) 736-2489	
22	George	Jackson	City of Corona	Parks and Community Services	(951) 739-4991	
23	Jeff	Potts	City of Corona	Public Works	(951) 736-2442	
24	John	Kennedy	Riverside County	Transportation Department	(951) 845-5015	
25	Kirk	Light	Riverside County	Transportation Department	(951) 845-5015	
26	Tom	Mader II	Riverside County	Transportation Department	(951) 845-5015	
27	Richard	Burley	Riverside County	Transportation Department	(951) 845-5015	
28	Robert	Robledo	Riverside County	Transportation Department	(951) 845-5015	
29	Helio	Valdez	Riverside County	Transportation Department	(951) 845-5015	
30	Tante Rey	Ramoran	Riverside County	Transportation Department	(951) 845-5015	
31	Scott	Rubin	City of Corona	Parks and Community Services	(951) 736-2463	
32	Marty	Fox	Other	Contractor	(909) 208-8101	
33	Hector	Lopez	Other	Contractor	(909) 322-4520	
34	Brandon	Viayra	City of Corona	Public Works	(951) 736-2405	
35	Ted	Lauriano	City of Corona	Public Works	(951) 736-2405	
36	Rick	Shaffer	City of Corona	Public Works	(951) 736-2405	
37	Exiquel	DeLeon	City of Corona	Public Works	(951) 736-2405	
38	Martin	Arias	City of Corona	Public Works	(951) 736-2405	
39	Jose	Payan	City of Corona	Public Works	(951) 736-2405	
40	Mihai	Dan	City of Indian Wells	Public Works	(760) 776-0237	
41	Chris	Wiggins	City of Indian Wells	Public Works	(760) 776-0237	

42	Jerry	Gregory	Riverside County	Waste Management		
43	Scott	Kraak	Riverside County	Waste Management		
44	Molly	Stewart	Riverside County	Waste Management		
45	Benjamin	Mah	Riverside County	Waste Management	486 3212	
46	Benjamin	Aborita	Riverside County	Waste Management		
47	Tom	Hays	Riverside County	Waste Management	486-3322	
48	Panda	Workman	Riverside County	Waste Management		
49	Kurt	Van Dusen	Riverside County	Waste Management		
50	Brandon	Harlacher	City of Hemet	Public Works	(951) 765-3712	
51	Carlos	Gonzalez	City of Hemet	Public Works	(951) 765-3712	
52	Joseph	Contaoi	Riverside County	Waste Management		
53	Floren ~~William~~	Rogen ~~Anderson~~	Riverside County	Transportation Department	(951) 955-1095	
54	Jeff	Gullett	Riverside County	Transportation Department	(951) 955-1095	
55	Michael	Coates	Riverside County	Transportation Department	(951) 955-1095	
56	James	Araiza	Riverside County	Transportation Department	(951) 955-1095	
57	Matt	Sayre	Riverside County	Transportation Department	(951) 955-1095	
58	~~Travis~~	~~Peterson~~	City of Hemet	Public Works	(951) 765-3712	
59	~~R.W.~~	~~Bross~~	City of Hemet	Public Works	(951) 765-3712	
60	Stephen	Glenore	Riverside County	Waste Management		

Donald Kay City of Hemet Street Sweeper 925-3777 DK
CAAD MORA City of Hemet Street Sweeper 925-3777

NPDES STORMWATER QUALITY TRAINING FOR
Municipal Training
Riverside County Flood Control & Water Conservation District

Meeting of: Tuesday, May 1 - 13:00 - 16:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
1	Louis	Ybarra	City of Corona	Public Works	(951) 736-2405	
2	Steve	Schmidt	City of Corona	Public Works	(951) 739-4820	
3	John	Longo	City of Corona	Public Works	(951) 739-4820	
4	Dale	Lesinski	City of Corona	Public Works	(951) 739-4820	
5	Ed	Lockhart	City of Corona	Public Works	(951) 736-2443	
6	Luis	Quevedo	City of Corona	Public Works	(951) 739-4820	
7	Jeff	Baker	City of Corona	Public Works	(951) 739-4820	
8	John	Perez	City of Corona	Public Works	(951) 739-4820	
9	Angel	Zuniga	City of Corona	Public Works	(951) 739-4820	
10	Eddie	Casarez	City of Corona	Public Works	(951) 739-4820	
11	Noel	Cervantes	City of Corona	Public Works	(951) 739-4820	
12	Jimmie	Johnson	City of Corona	Public Works	(951) 736-2405	
13	Pablo	Quintero	City of Corona	Public Works	(951) 736-2405	
14	Ron	Jimenez	City of Corona	Public Works	(951) 736-2405	
15	Edward	Quevedo	City of Corona	Public Works	(951) 736-2405	
16	Bob	French	City of Calimesa	Public Works	(909) 795-9801	
17	Victor	Ayala	City of Calimesa	Public Works	(909) 795-9801	
18	Dale	Everman	City of Calimesa	Public Works	(909) 795-9801	
19	Mike	McCabe	City of Calimesa	Public Works	(909) 795-9801	
20	Donald	Raymond	Riverside County	Transportation Department	(760) 778-2491	

21	Brandon	Garcia	Riverside County	Transportation Department	(760) 778-2491	
22	Victor	Casillas	Riverside County	Transportation Department	(760) 778-2491	
23	Gayle	Cuneo	RCFC & WCD	Flood Control	(951) 955-1311	
24	Steve	Parker	City of Banning	Facilities	(951) 922-3292	
25	Donald	Kay	City of Hemet	Public Works	(951) 765-3712	
26	Salvador	Terriquez-Lopez	Riverside County	Transportation Department	(951) 955-1095	
27	Roger	Flores	Riverside County	Transportation Department	(951) 955-1095	
28	Richard	Ott	Riverside County	Transportation Department	(951) 955-1095	
29	George	Williams	Riverside County	Transportation Department	(951) 955-1095	
30	Joseph	Place	Riverside County	Transportation Department	(951) 955-1095	
31	Dave	Moen	Riverside County	Transportation Department	(951) 955-1095	
32	Robert	Cardenas	Riverside County	Transportation Department	(951) 955-1095	
33	Bill	Shesgreen	City of Banning	Street	(951) 922-3286	
34	Steve	Armitage	City of Banning	Street	(951) 922-3286	
35	Robert	Guillen	City of Banning	Street	(951) 922-3286	
36	Gregory	Cottage	City of Banning	Street	(951) 922-3286	
37	Sergio	Guzman	Riverside County	Transportation Department	(760) 408-3248	
38	Joe	Nappi	City of Hemet	Public Works	(951) 765-3712	
39	Justin	Gunn	City of Hemet	Public Works	(951) 765-3712	
40	Carlos	Navarro	City of Banning	Fleet Maintenance		
41	Moses	Medina	City of Banning	Fleet Maintenance	951 922-3284	
42	Owen	Carder	City of Banning	Fleet Maintenance	951 922-3284	
43	Silviano	Romero	Riverside County	Transportation Department	(951) 955-1095	

44	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
45	Jackie	Mustanca	City of [illegible]	Code	(760) 777-7050	[illegible]
46	Lloyd	Campbell	City of La Quinta	Code	760 777-7050	[illegible]
47	Victoria	Anderson	Riv County	Trans Dept	[illegible]	[illegible]
48						
49	Wanda	Norris	City of Riverside	PW	951 351 6331	[illegible]
50	Steven	Payne	Riverside City Fire	Fire	951 [illegible]	[illegible]
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NPDES STORMWATER QUALITY TRAINING FOR
Construction Site Inspections
Riverside County Flood Control & Water Conservation District

Meeting of: October 2, 2006 9am - 12pm SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Signature
1	Henry	Aldredge	City of Corona	Public Works	
2	Ron	Allen	Beaumont	Public Works	
3	Ron	Allen	Beaumont	P.W.	
4	Thomas	Baier	City of Moreno Valley	PW/M&O	
5	Keith	Barnett	County of Riverside	Transportation Department	
6	Erwin	Barton	City of Moreno Valley	PW/M&O	
7	Alan	Bosia	City of Riverside	Public Works	
8	Mark	Bowles	County of Riverside	Transportation Department	
9	Dennis	Buckle	City of Moreno Valley	PW/M&O	
10	CRAIG	CARLSON	RIVERSIDE COUNTY	TLMA	
11	George	Chang	City of Moreno Valley	PW/M&O	
12	Jessica	Chin	City of Riverside	Public Works	
13	Troy	Clement	Beaumont	P.W.	
14	Tom	Collins	City of Riverside	Public Utilities - Water	
15	Sly	Collins	City of Moreno Valley	PW/M&O	
16	glen	crawford	riverside county	transportation dept	
17	Steve	Dondalski	County of Riverside	Building and Safety	
18	James	Dooley	County of Riverside	Transportation Department	
19	Brian	Durfee	City of Moreno Valley	PW/M&O	
20	Lisa	Elder	County of Riverside	Transportation Department	
21	Alfred	Fierro	City of Moreno Valley	PW/M&O	

NPDES STORMWATER QUALITY TRAINING FOR
Construction Site Inspections
Riverside County Flood Control & Water Conservation District

Meeting of: October 2, 2006 9am - 12pm SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Signature
22	Rick	Fite	County of Riverside	Transportation Department	
23	Paul	Gearhart	City of Riverside	Public Utilities - Water	
24	Kevin	Gillette	County of Riverside	Transportation Department	
25	Morgan	Haun	City of Moreno Valley	PW/M&O	
26	Joe	Janda	Beaumont	P.W.	
27	DAVID	JANSEN	RIVERSIDE COUNTY	TLMA	
28	PAUL	jOHNSON	Riverside County	TLMA	
29	George	Kelley	City of Riverside	Public Utilities - Water	
30	Kyle	Kim	County of Riverside	TLMA-building & safety	
31	Eui	Kim	County of Riverside	Building & Safety Department	
32	Jeff	Lewellen	County of Riverside	Transportation Department	
33	BARRY	LEWIS	RIVERSIDE COUNTY	BUILDING AND SAFETY	
34	Andy	Lindsay	City of Riverside	Public Utilities - Water	
35	Eric	Lohr	County of Riverside	Transportation Department	
36	Gregory	McCombs	Riverside County	Building and Safety	
37	Roger	Miller	riverside county	building & satty	
38	gary	moss	Riverside county	transportation	
39	Mike	Neal	Beaumont	P.W.	
40	Larry	Page	City of Perris	Public Works	
41	WILLIAM	PEPPAS	COUNTY OF RIVERSIDE	BUILDING & SAFETY	
42	Byron	Recksiek	County of Riverside	Transportation Department	

NPDES STORMWATER QUALITY TRAINING FOR

Construction Site Inspections

Riverside County Flood Control & Water Conservation District

Meeting of: October 2, 2006 9am - 12pm SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Signature
43	Ryan	Righetti	County of Riverside	Transportation Department	
44	Emiliza	Rodolfo	County of Riverside	Building and Safety	
45	Paul	Russell	County of Riverside	Transportation Department	
46	Mojahed	Salama	County of Riverside	Transportation Department	
47	Dave	Thibault	Beaumont	P.W.	
48	Tina	Tuason	RCFC	NPDES	
49	Steven	Wann	County of Riverside	Transportation Department	
50	David	Zhao	County of Riverside	Building & Safety	
51	[illegible]	[illegible]	[illegible]	[illegible]	
52	[illegible]	[illegible]	[illegible]	[illegible]	
53	[illegible]	[illegible]	[illegible]	[illegible]	
54	[illegible]	[illegible]	[illegible]	[illegible]	
55	[illegible]	[illegible]	[illegible]	[illegible]	
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RIVERSIDE COUNTY
CONSTRUCTION STORM WATER
TRAINING

Monday, October 1, 2000

Name	Agency	Email
Barry Wilson	Bear Spring	
Michael Beck	Beck Dev. Co.	
Rick Desrosiers	Brs & Co.	
Kyle Kim	B & S	
Elliot (Eli) Kim	B & S	
Mike Neal	Public Work Beaumont	
Ron Allen	Public Works Beaumont	
Tom Baier	Public Works - Moreno Valley	
George Chang	Public Works Moreno Valley	
Dave Thibault	City of Beaumont P.W.	
Tom Collins	City of Riverside	
Paul Lindsay	City of Riverside P.W. Water	
George Kellet	City of Riverside P.W. Water	
Larry Pace	City of Perris	L.M. Pacheco & Associates
David Shaw	County of Riverside, Parks	
Troy L. Clement	Public Works Beaumont	
Lisa Elsner	County of Riv Trans Permits	
Joe Uranga	Beaumont Public Works	
[illegible]	[illegible]	
[illegible]	" " "	
[illegible]	" " "	
[illegible]	[illegible]	
William Perkins	TCMA	
Paul Johnson	TCMA	
[illegible]	[illegible]	
[illegible]	[illegible]	
[illegible]	[illegible]	
[illegible]	[illegible]	
[illegible]	[illegible]	

[illegible]	[illegible]
Ernie Bartos	Moreno Valley
[illegible]	Mo Vall.
James M Woolley	TLMA
Paul Geeslin	City of Rcc
Dave Jansen	TLMA
Sylvester Collin	Moreno Valley
Alan Bosia	City of Riverside
Rick Tolzer	City of Riverside
Tina Tuson	RCFC&WCD
Henry Alonzo	City of Corona
Mark Bowles	Riv Co TLMA

NPDES STORMWATER QUALITY TRAINING FOR
Construction Site Inspections
Murrieta City Hall

Meeting of: October 10, 2006 1pm - 4pm

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Signature
1	Michael	Aguilar	City of Murrieta	Engineering	
2	Venita	Anderson	City of Murrieta	Code Enforcement	
3	Mick	Bartholomew	City of Murrieta	Engineering	
4	Claire	Clark	Riverside County	Parks	
5	Dan	Cuthbertson	City of Norco	Public Works	
6	Lupe	Gomez	City Of Lake Elsinore	Engineering	
7	David	Hartman	City of Canyon Lakes	Building and Safety	Dave Hartman
8	Jessie	Hillis	City of Canyon Lakes	Building and Safety	Jessie Hillis
9	Jeffrey	Hitch	City of Murrieta	Engineering	
10	Chris	McClain	City of Murrieta	Public Works	
11	Robert	Moehling	City of Murrieta	Engineering	
12	Farida	Naceem	City of Murrieta	Engineering	
13	Russ	Napier	City of Murrieta	Engineering	
14	George	Nelson	City of Murrieta	Code Enforcement	
15	Tom	Nowak	City of Murrieta	Engineering	Tom Nowak
16	Sirath	Patzer	City Of Canyon Lake	Building and Safety	
17	Collins	Solomon	City of Murrieta	Engineering	
18	Ken	Sotelo	Riverside County	Parks	
19	Mark	Stoneking	City of Murrieta	Public Works	
20	Benisimo	Schetter	City of Murrieta	Public works	
21	SCOTT	BURNS	City OF LAKE ELSINORE	Bldg+SAFETY	

NPDES STORMWATER QUALITY TRAINING FOR

Construction Site Inspections

Murrieta City Hall

Meeting of: October 10, 2006 1pm - 4pm

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Signature
22	Miriam	Shumway	City of Murrieta	M.P.D. code enforcement	Miriam Shumway
23	~~CLAIRE~~	~~CLARK~~	~~COUNTY RIVERSIDE~~	~~PARKS~~	
24	Chris ~~Vega~~	Vega-McLain	C.O.M.	Public works	
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NPDES STORMWATER QUALITY TRAINING FOR

Construction Site Inspections

NPDES STORMWATER QUALITY TRAINING FOR
Construction Site Inspections
Palm Springs Convention Center

Meeting of: October 12, 2006 9am - 12pm

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Signature
1	Loi	Chan	Riverside County	Building & Safety	
2	John	Collins	Coachella Valley Water District	Domestic Operations	
3	Frank	Crain	City of Coachella	Public Works	
4	Chuck	Dodd	City of Desert Hot Springs	Engineering	
5	Ryan	Duarte	City of Desert Hot Springs	Engineering	
6	TIM	FAGG	RIVERSIDE COUNTY	FLOOD CONTROL	
7	Gordon	Fisher	City of Coachella	Public Works	
8	Beto	Gonzales	City of La quinta	Public Works	
9	Robert	Gray	County of Riverside	Transportation Department	
10	Steve	Grewe	County of Riverside	Transportation Department	
11	Scott	Hamilton	City of La quinta	Public Works	
12	Rusty	Hannah	Riverside County	Building & Safety	
13	Steve	Kochell	City of La quinta	Public Works	
14	James	Lindsey	City of La quinta	Public Works	
15	GARY	LUNDBERG	RIVERSIDE COUNTY	FLOOD CONTROL	
16	Bob	Lyman	Riverside County	TLMA	
17	William	Mastas	city of palm springs	street maintenance	
18	Joe	Morales	Coachella Valley Water District	Domestic Operations	
19	David	Nelson	City of Moreno Valley	Public Works/Land Dev	
20	Dominick	Octavio	Riverside County	Building & Safety	
21	HENRY	OLIVO	RIVERSIDE COUNTY	FLOOD CONTROL	

NPDES STORMWATER QUALITY TRAINING FOR

Construction Site Inspections

Palm Springs Convention Center

Meeting of: October 12, 2006 9am - 12pm

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Signature
22	Demetrio	Pecina	City of La quinta	Public Works	
23	Roman	Ramirez	Riverside County	Building & Safety	
24	DARIO	SAMONTE	RIVERSIDE COUNTY	FLOOD CONTROL	Dario Sa
25	James	Staight	City of La quinta	Public Works	
26	Daniel	Valenzuela	City of La Quinta	Public Works	
27	Kent	Wegelin	City of Moreno Valley	Public Works	
28	John C.	Wilson	County of Riverside	Transportation Department	
29	Ed	Wimmer	City of La Quinta	Public Works	
30	Hua-Hsing	Wu	Riverside County	Building & Safety	
31	Amy	Yu	Riverside County	Building & Safety	
32	DALE	ANDERSON	Riverside COUNTY	FLOOD CONTROL	
33	RON	ALEXANDER	C.V.W.D.	DOMESTIC	
34	RICHARD	BENNETT	CVWD	DOMESTIC	
35	DAN	FENWICK	CVWD	DOMESTIC	Dan J. Fenwick
36	MARK	BODNAR	CITY OF LA QUINTA	PUBLIC WORKS	
37	MIKE	BROWN	CITY OF PALM DESERT	P.W.	
38	TERRY	CECHIN	CITY OF PALM DESERT	P.W.	
39	Ruben	Castaneda	City of La Quinta	P.W.	
40	Raul	Hernandez	Palm Springs	P.W.	
41	Rick	Mitchell	Palm Springs	ST.	
42	RUS	Baker	Riverside Co.	B/S	

NPDES STORMWATER QUALITY TRAINING FOR

Construction Site Inspections

Palm Springs Convention Center

Meeting of: October 12, 2006 9am - 12pm

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Signature
43	Rusty	Hannah	Co. Riv	B&S	
44	Kent	Wegelin	City of Moreno Valley	P.W	
45	Daniel	Valenzuela	C.O. La Quinta	P.W.	
46	Steve	Kochell	COLQ	PW	
47	Agustin	Arellano	COLQ	P/W	
48	Beto	Gonzales	COLQ	P/W	
49	Demetrio	Pecina	COLQ	P.W	
50	James	Stright	"	P.W.	
51	Adolfo	Cabrera	"	PW	
52	Robert	Fisher	City of Coachella	PW	
53	Loi	Chan	County of Riverside	B&S	
54	James	Lindsey	City of L.Q	P/W	
55	Tim	Batten	City of L.Q.	P/W	
56	Raphael	Alvarado	City of LQ	P.W	
57	Pui Ting (Amy)	Yu	CO. RIV	B&S	
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How many times had this class?

NPDES STORMWATER QUALITY TRAINING FOR
Construction Site Inspections
Riverside County Flood Control and Water Conservation District

Meeting of: October 16, 2006 1pm - 4pm SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Signature	
1	SCOTT	BAKER	RIVERSIDECOUNTY	BUILDING AND SAFETY	Scott Baker	3
2	Abdul	Behnawa	COUNTY OF RIVERSIDE	BUILDING AND SAFETY		2
3	Michael P.	Bess	Riverside Co.	Building & Saftey		
4	TODD	BILO	COUNTY OF RIVERSIDE	BUILDING AND SAFETY		2
5	Christina	Bowser	City of Beaumont	Code Enforcement	Christina Bowser	0
6	Ronald	Brawdy	Riverside County	Transportation Dept.		1
7	LAURENCE	BUCKLEY	RIVERSIDE COUNTY	BUILDING & SAFETY		3
8	ERNIE	BURNS	RIVERSIDE COUNTY	BUILDING & SAFETY		3
9	JORGE	CABALLERO	RIVERSIDE COUNTY	BUILDING & SAFETY		2
10	Michele	Colbert	City of Corona	Public Works		3
11	Chris	Cordova	City of Beaumont	Code Enforcement		
12	David [redacted]	Ortega [redacted]	Riverside County	Flood Control	David J. Ortega	2
13	DENNIS	DE SAGUN	COUNTY OF RIVERSIDE	BUILDING AND SAFETY		2
14	Stephen	Duffin	City of Corona	Public Works		
15	Daniel	Fernandez	County of Riverside	Building and Safety		2
16	Victor	Garcia	City of Riverside	Public Utilities - Electric		
17	Hany	Henein	City of Corona	Public Works		
18	Marianna	Hernandez	County of Riverside	Transportation Department		
19	Elias	Hutchinson	City of Moreno Valley	PW/M&O		1
20	Alfredo	Ignacio	Beaumont	P.W.		4
21	Jeramy	Jackson	City of Moreno Valley	Public Works		4

How Many times taken this class?

Construction Site Inspections

Riverside County Flood Control and Water Conservation District

Meeting of: October 16, 2006 1pm - 4pm SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Signature	
22	Carlos	Juarez	City of Moreno Valley	PW/M&O		1
23	Charles	Kolb	City of Moreno Valley	PW/M&O		
24	Kyung-Yol	Lee	County of Riverside	Building & Safety		3
25	David	Leonard	County of Riverside	Building and Safety		4
26	David	Lopez	County of Riverside	building - safety		4
27	Bob	Lucas	City of Riverside	Public Utilities - Water		0
28	Art	Madril	City of Riverside	Public Utilities - Water		0
29	Alfredo	Martinez	County of Riverside	Building and Safety		0
30	Andy	McDonel	City of Moreno Valley	PW/M&O		0
31	Dave	Miller	County of Riverside	Transportation Department	Dave Miller	
32	Mike	Neal	Beaumont	P.W.		
33	JESSICA	NGUYEN	RIVERSIDE COUNTY	BLDG & SAFETY		0
34	Dave	Ochs	Beaumont	P.W.		6
35	Greg	Oliver	City of Riverside	Public Utilities - Water		1
36	marty	otero	Riverside County	Transportation Dept.		1
37	Cynthia	Overby	City of Beaumont	Code Enforcement		3
38	Mike	Parsons	Beaumont	P.W.		2
39	Pepito	Pinlac	Beaumont	P.W.		0
40	Ernest	Precie	City of Moreno Valley	PW/M&O		
41	Michel	Ramek	Riverside County	TLMA/ Building and Safety		5
42	Charles	Ray	County of Riverside	TLMA		3

NPDES STORMWATER QUALITY TRAINING FOR

Construction Site Inspections

How many times taken this class?

Riverside County Flood Control and Water Conservation District

Meeting of: October 16, 2006 1pm - 4pm SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Signature	
43	Justin	Robbins	County of Riverside	Transportation Department		0
44	Rick	Ryno	City of Riverside	Public Utilities - Water		
45	Greg	Schroeder	County of Riverside	Building & Saftey		3
46	TONY	SILVAS	CITY OF MORENO	PUBLIC WORKS		0
47	Paul	Spencer	City of Moreno Valley	PW/M&O		2
48	Brian	Thompson	City of Moreno Valley	PW/M&O	Brian Thompson	2
49	Robert	Torrence	Riverside County	Building & Safety	Robert L. Torrence	6
50	steven	toth	Riverside County	Transportation Dept	Steve Toth	2
51	James	Willem	City of Moreno Valley	PW/M&O		1
52	Art	Wilson	City of Moreno Valley	PW/M&O	Arthur L. Wilson	
53	Albert	Cruz	City of Beaumont	P.W		1
54	Tom	Cole	City of Temecula	Code Enf		
55	Zara	Smith	City of Temecula	Code Enforcement		0
56	JEFF	GROVE	CITY OF TEMECULA	CODE ENF		
57	MIKE	McCAFFERTY	CNTY OF RIV	TLMA		5
58	RICK	SHARP	County of Riv	TLMA		4
59	Travis	Bragan	County of Riv	TLMA		2
60	PHIL	BROESAMLE	COUNTY OF RIVERSIDE	TLMA	Phil Broesamle	4
	TIM	HOSTRASSER	CO RIVERSIDE	TLMA	Tim Hostrasser	2

Number of Times taken this class before

NPDES STORMWATER QUALITY TRAINING FOR
Construction Site Inspections
Palm Springs Convention Center

Meeting of: October 17, 2006 1pm - 4pm SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Signature	
1	Steve	Aguirre	City of Moreno Valley	P/W Enterprise Services		1st
2	Solarez	Albert	County of Riverside	Transportation Department		
3	Jeannie	Bigler	Riverside County	Building & Safety		3 or 4
4	John	Carmona	State of California	Regional Water Quality Control		1
5	Bo	Chen	City of Palm Desert	Public Works		
6	GLORIA	COHEN	CATHEDRAL CITY	ENGINEERING		2
7	Scott	Davenport	Coachella Valley Water District	Domestic Operations		0
8	Craig	Degroot	Riverside County	Building & Safety		3
9	David	DeRenard	Coachella Valley Water District	Domestic Construction		1
10	Jose	Enriquez	City of Coachella	Public Works		
11	JOHN ~~Dan~~	Collins ~~Fewings~~	Coachella Valley Water District	Domestic Operations		3
12	Gabe	Garza	Coachella Valley Water District	Domestic Operations		
13	Robert	Gray	County of Riverside	Transportation Department		
14	Brenda	Hannah	Riverside County	Building & Safety		3 or 4
15	Dave	Helfman	Riverside County	Building & Safety		4
16	George	Iniguez	City of Coachella	Engineering		
17	steve	lasley	indio	code enforcement		
18	Steve	Lech	Riverside County	Parks		2
19	Bob	Lyman	Riverside County	TLMA		
20	SHAWN	MADDOX	CATHEDRAL CITY	ENGINEERING INSPECTION		1
21	forest	meadows	city of indio	code enforcement		

Number of Times taken class before

Construction Site Inspections

Palm Springs Convention Center

Meeting of: October 17, 2006 1pm - 4pm

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Signature	
22	Jay	Mirpour	RWQCB-7	Stormwater		0
23	Fred	Moore	Riverside County	Building & Safety		2
24	Robert	Morris	County of Riverside	Transportation Department		0
25	Morgan	Newlin	City of Hemet	Public Works		2
26	Linda	Nixon	City of Hemet	Public Works		3
27	Joe	Ortiz	Riverside County	Building & Safety		2
28	Albert	Padilla	Coachella Valley Water District	Domestic Construction		2
29	Robert	Parsons	County of Riverside	Transportation Department		
30	Robert	Rodriguez	Coachella Valley Water District	Domestic Construction		1
31	Leah	Rodriguez	Government	Riverside County EDA		0
32	Anna	Rodriguez	Government	Riverside County EDA		0
33	Cora	Salas	City of Palm Desert	Public Works		0
34	Ralph	Scharffenberg	City of Moreno Valley	Public Works/ESA		0
35	Garry	Shopshear	Riverside County	Building & Safety		3
36	Joaquin	Tijerina	Government	Riverside County EDA		0
37	Alana	Townsend	City of Palm Desert	Public Works		3
38	carlos	vargas	indio	code enforcement		
39	Lance	Young	Coachella Valley Water District	Domestic Operations		2
40	MICHAEL	MOTT	CITY OF PALM SPRINGS	PUBLIC WORKS ENGINEERING		
41	MIKE	LYTAR	PALM SPRINGS	ENG.		
42	Michael	Ray	Waste Management	ENG		0

NPDES STORMWATER QUALITY TRAINING FOR

Construction Site Inspections

Number of times taken before

Palm Springs Convention Center

Meeting of: October 17, 2006 1pm - 4pm

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Signature	
43	C. Peebles	Peebles	Cof SJ	ENG.	Peebles	3
44	Terry	Hvemer	Tri Lake Consultants	Inspection		0
45	Robert	Anderson	Tri Lake Consultants	Inspection	Robert S. Anderson	0
46	George	Garcia	TRI-LAKE CONSULTANTS	PERMIT INSPECTOR		1
47	Michelle	Corredato	Riverside County	EDA	Michelle Corredato	0
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How many times taken class before?

NPDES STORMWATER QUALITY TRAINING FOR
Construction Site Inspections
Murrieta City Hall

Meeting of: October 18, 2006 9am - 12pm

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Signature	
1	Jerry	Alegria	City of Temecula	Public Works		3
2	Doug	Armstrong	City of Temecula	Public Works		3
3	Amer	Attar	City of Temecula	Public Works		3
4	Steven	Beswick	City of Temecula	Public Works		
5	Annie	Bostre - Le	City Of Temecula	Public Works		
6	Laura	Bragg	City of Temecula	Public Works		2
7	Steve	Brown	City of Temecula	Code Enforcement		
8	Greg	Butler	City of Temecula	Public Works		3
9	Lloyd	Bylund	County of Riverside	Building & Safety		2
10	Steve	Charette	City of Temecula	Public Works		2
11	Tom	Cole	City of Temecula	Code Enforcement		
12	Andrew	Cortez	County of Riverside	Waste Management		
13	George	De La Rosa	City of Temecula	TCSD		
14	Mayra	De La Torre	City of Temecula	Public Works		
15	Nimrod	Garay	County of Riverside	Waste Management		3
16	Eddie	Godinez	Moreno Valley, CA	Public Works/Land Dev.		
17	Jeff	Grove	City of Temecula	Code Enforcement		
18	Kavon	Haghighi	City of Temecula	Public Works		3
19	Kendra	Hannah	City of Temecula	Public Works		3
20	Scott	Harvey	City of Temecula	Public Works		2
21	Jack	Hodson	City of Temecula	Public Works		

NPDES STORMWATER QUALITY TRAINING FOR

How many times you have taken class before?

Construction Site Inspections

Murrieta City Hall

Meeting of: October 18, 2006 9am - 12pm

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Signature	
22	Mike	Hudson	City of Temecula	Public Works		2
23	Rob	Istik	County of Riverside	Waste Management		
24	Reza	James	City of Temecula	Public Works		3
25	Scott	Johnston	County of Riverside	Transportation Department		
26	Scott	Kraak	County of Riverside	Waste Management		
27	CORINNE	LANDEROS	COUNTY OF RIVERSIDE	BLDG AND SAFETY		2
28	Ben	Mah	County of Riverside	Waste Management		
29	Ben	Matye	County of Riverside	Waste Management		0
30	David	Maus	County of Riverside	Transportation Department		
31	David	McBride	City of Temecula	Public Works		
32	Karl	Nordgren	City of Temecula	TCSD		
33	Avlin	Odviar	City of Temecula	Public Works		
34	Jay	Oldham	City of Temecula	Public Works		0
35	Marianne	Parker	City of Temecula	Code Enforcement		2
36	Ron	Parks	City of Temecula	Public Works		
37	John	Pourkazemi	City of Temecula	Public Works		2
38	Alex	Ramirez	Moreno Valley, CA	Public Works/Land Dev.		3
39	Ramon	Roman	County of Riverside	Waste Management		0
40	Patrick	Ryan	City of Temecula	Public Works		3
41	Jon	Salazar	City of Temecula	Public Works		
42	Rick	Serven	City of Temecula	TCSD		

NPDES STORMWATER QUALITY TRAINING FOR

Construction Site Inspections

How many times you have taken class before?

Murrieta City Hall

Meeting of: October 18, 2006 9am - 12pm

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Signature	
43	Rudy	Shabec	City of Temecula	Public Works	Rudy Shabec	4
44	Steve	Sterling	City of Temecula	TCSD		
45	Nate	Viste	County of Riverside	Waste Management		
46	Chris	Vlahos	City Of Temecula	Public Works	Chris Vlahos	
47	Jean	Voshall	City of Temecula	Code Enforcement		
48	Chris	White	City Of Temecula	Public Works	Chris White	3
49	Panda	Workman	County of Riverside	Waste Management		
50	Evangelina	Zapien	County of Riverside	Waste Management	Evangel Zapien	3
51	Misty	Clark	City of Temecula	Code Enforcement		0
52	James	Hutchinson	City of San Jacinto	mgr	James	
53	JIM	SIKET	CITY SAN JAC.	ENGINEER.	Jim Siket	
54	Bill	McATEER	City of Temecula	Const. Mgr.		
55	David	Bilby	City of Temecula	Public Works	David Bilby	1
56	WILLIAM	BECERRA	CITY of TEMECULA	P/W		3
57	ALDO	LICITRA	COT	PW	Aldo Licitra	4
58						
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NPDES STORMWATER QUALITY TRAINING FOR
Construction Training
Coachella Valley Water District

Meeting of: Tuesday, April 24 - 13:00 - 16:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
1	Amir	Modarressi	City of Indio	PW/Engineering Division	(760) 491-4017	
2	Jaime	Engler	City of Indio	PW/Engineering Division	(760) 391-4017	
3	Juan	Raya	City of Indio	PW/Engineering Division	(760) 391-4017	
4	Tom	Rafferty	City of Indio	PW/Engineering Division	(760) 391-4017	
5	Grant	Eklund	City of Indio	PW/Engineering Division	(760) 391-4018	
6	Adrienne	Dunfee	City of Indio	PW/Engineering Division	(760) 391-4017	
7	Roldan	Lopez	City of Indio	PW/Engineering Division	(760) 391-4017	
8	Aaron	Kulp	City of Indio	PW/Engineering Division	(760) 391-4017	
9	James	Achuff	City of Indio	PW/Engineering Division	(760) 391-4017	
10	Jesse	Isaacson	City of Indio	PW/Engineering Division	(760) 391-4017	
11	Mike	Vela	City of Indio	PW/Engineering Division	(760) 391-4017	
12	Mike	Wilkey	City of Indio	PW/Engineering Division	(760) 391-4017	
13	David	DeRenard	CVWD	Operations		
14	Emmanuel	Aceves	CVWD	Operations		
15	Rick	Bennet	CVWD	Operations		
16	Lance	Young	CVWD	Operations		
17	Jaime	Aguirre	CVWD	Operations		
18	John	Soto	CVWD	Operations		
19	John	Collins	CVWD	Operations		
20	Albert	Padilla	CVWD	Operations		

21	Scott	Davenport	CVWD	Operations		
22	Art	Vasquez	CVWD	Operations		
23	Fred	Amador	CVWD	Operations		
24	Javier	Villarreal	CVWD	Operations		
25	Dan	Fewings	CVWD	Operations		
26	Ron	Alexander	CVWD	Operations		
27	Joe	Morales	CVWD	Operations		371
28	Marty	Rodriguez	CVWD	Operations		
29	Bernie	Sauceda	CVWD	Operations		
30	John	Hale	CVWD	Operations		
31	Bryan	McKinney	City of La Quinta	Public Works	(760) 777-7045	
32	Bobby	Hand	Riverside County	Transportation	(760) 921-9820	
33	Kenneth	George	Riverside County	Transportation	(760) 921-7820	
34	ALBERT	SOLAREZ	Riverside County	TLMA	(760) 399-5836	
35	Rene	Luna	CVWD	Stormwater/Drainage Maintenance	(760) 398-2661	
36	Chad	Austin	CVWD	Stormwater/Drainage Maintenance	(760) 398-2661	
37	Tim	Hoffman	CVWD	Stormwater/Drainage Maintenance	(760) 398-2661	
38	Troy	Clement	City of Beaumont	Public Works	(951) 377-5720	
39	Mike	Parsons	City of Beaumont	Public Works	(951) 760-4910	
40	Ron	Allen	City of Beaumont	Public Works	(951) 634-1779	
41	Joe	Janda	City of Beaumont	Public Works	(951) 377-5360	
42	James	Thompson	City of Banning	Public Works	(951) 922-3142	
43	Howard	Wen	City of Indio	PW/Engineering Division	(760) 391-4017	

Catherine Saveere

44	Leland	Cole	City of Rancho Mirage	Public Works	(760) 770-3224	
45	Bruce	Pelletier	City of Indian Wells	Public Works	(760) 776-0237	
46	Sam	Ruffner	City of Indian Wells	Public Works	(760) 776-0237	
47	Donald	Raymond	Riverside County	Transportation Department	(760) 778-2491	
48	Brandon	Garcia	Riverside County	Transportation Department	(760) 778-2491	
49	Victor	Casillas	Riverside County	Transportation Department	(760) 778-2491	
50	David	Jones	RCFC & WCD	Maintenance	(951) 955-1234	
51	Claudia	Trembus	City of Palm Springs	Engineering	(760) 323-8253	
52	Leonard	St.Sauver	City of La Quinta	Public Works	(760) 275-2143	
53	Miguel	Pena	City of Indio	Indio Water Authority	(760) 391-4195	
54	Gordon	Fisher	City of Coachella	Engineering	(760) 398-5744	
55	George	Iniguez	City of Coachella	Engineering	(760) 398-5744	
56	Ernie	Saenz	City of Coachella	Engineering	(760) 398-5744	EPS
57	Frank	Crain	City of Coachella	Engineering	(760) 398-5744	
58	Rene	Martinez	City of Palm Springs	Engineering	(760) 323-8253	
59	RAHO ~~Ahmad~~	CHUK ~~Karimi~~	City of Palm Desert	Public Works	(760) 346-0611	
60	Ed	Gallardo	City of Palm Desert	Public Works	(760) 346-0611	

JEREMY JACKSON / CITY OF INDIAN WELLS PUBLIC WORKS 760 674-1566

NPDES STORMWATER QUALITY TRAINING FOR
Construction Training
Riverside County Flood Control & Water Conservation District

Meeting of: Monday, April 30 - 09:00 - 12:00

SIGN-IN SHEET

Switch per email →

	First Name	Last Name	Municipality	Department	Phone No	Signuature
1	Adriana	Soares	Riverside County	TLMA/GIS	(951) 955-8823	Adriana Soares
2	Richard "Mike"	Call	Riverside County	Transportation Department	(951) 955-8614	
3	George	~~Boyden~~ YASSA	Riverside County	Transportation Department	(951) 955-8614	
4	Joseph	Dunlap	Riverside County	Transportation Department	(951) 955-8614	
5	David	Hylkema	Riverside County	Transportation Department	(951) 955-8614	
6	William "Bill"	Jackson	Riverside County	Transportation Department	(951) 955-8614	
7	Eric	Lohr	Riverside County	Transportation Department	(951) 955-8614	
8	Gabriel	Munoz	Riverside County	Transportation Department	(951) 955-8614	
9	Trai	Nguyen	Riverside County	Transportation Department	(951) 955-8614	
10	Luana	Roth	Riverside County	Transportation Department	(951) 955-8614	
11	Nick	Sison	Riverside County	Transportation Department	(951) 955-8614	Nick
12	RAY	DUNN	RCFC & WCD	FLOOD CONTROL	(951) 961-9576	
13	GENE	LEWIS	RCFC & WCD	FLOOD CONTROL	(951) 850-6917	
14	MIKE	LUNA	RCFC & WCD	FLOOD CONTROL	(909) 908-0978	
15	BRENT	MYTINGER	RCFC & WCD	FLOOD CONTROL	(909) 560-1142	
16	BARRY	TEMPLE	RCFC & WCD	FLOOD CONTROL	(909) 560-1148	
17	SAM	TERCERO	RCFC & WCD	FLOOD CONTROL	(951) 955-1287	
18	Jessica	Chin	City of Riverside	Public Works	(951) 826-5760	
19	Barney	Hunter	City of Riverside	Public Works	(951) 712-3[illegible]	
20	Jack	Lynn	City of Riverside	Public Works	[illegible]	

21	Jack	Palomarez	City of Riverside	Public Works		
22	Ray	Garcia	City of Riverside	Public Works		
23	Jess	Romo	City of Riverside	Public Works		
24	Fred	Cerda	City of Riverside	Public Works		
25	Danny	Cwiak	City of Riverside	Public Works		
26	Tim	Dexter	City of Riverside	Public Works		
27	Victor	Moore	City of Riverside	Public Works		
28	Andy	Beck	City of Riverside	Public Works		
29	Donald	Buchannon	City of Riverside	Public Works		
30	Daniel	Barba	City of San Jacinto	Development, Cd Enf	(951) 487-7330	
31	Dave	Huster	City of San Jacinto	Development, Bldg,	(951) 487-7330	
32	Sergio	Ortiz	City of San Jacinto	Development, Bldg,	(951) 487-7330	S. ORTIZ
33	Barry	Ghaemi	City of Corona	Public Works	(951) 739-4961	
34	Crystal	Nguyen	City of Corona	Public Works	(951) 817-5798	
35	Estella	Valderrama	City of Corona	Public Works	(951) 279-3751	
36	Stephen	Duffin	City of Corona	Public Works	(951) 817-5758	
37	Noel	Castillo	City of Corona	Public Works	(951) 279-3537	
38	Lupe	Barrera	City of Corona	Public Works	(951) 736-2435	
39	Terrence	Piorkowski	City of Norco	Public Works	(951) 270-5607	
40	Omar	Gonzalez	City of Corona	Public Works	(951) 279-3515	
41	Clint	Herrera	City of Corona	Public Works	(951) 739-4888	
42	dale	bonham	City of Norco	Public Works	(951) 270-5607	
43	Greg	Worley	City of Riverside	Public Util - Water Field Dep	(951) 351-6350	

44	Don	Neal	City of Riverside	Public Util - Water Field Dep	(951) 351-6368	
45	Andrew	Ramos	City of Riverside	Public Util - Water Field Dep	(951) 351-6350	
46	Joseph	Gandara	City of Riverside	Public Util - Water Field Dep	(951) 351-6350	
47	Raymond	Aguilar	City of Riverside	Public Util - Water Field Dep	(951) 351-6350	
48	Christopher	Collins	City of Riverside	Public Util - Water Field Dep	(951) 351-6350	
49	Jeffrey	Karalun	City of Riverside	Public Util - Water Field Dep	(951) 351-6350	
50	Dexter	Cole	City of Riverside	Public Util - Water Field Dep	(951) 351-6350	
51	Thomas	Garcia	City of Riverside	Public Util - Water Field Dep	(951) 351-6350	
52	Mike	Neal	City of Beaumont	Public Works	(951) 377-5314	
53	Al	Ignacio	City of Beaumont	Public Works	(951) 377-5790	
54	Chad	Nichols	City of Beaumont	Public Works	(951) 760-4971	
55	Karl	Shrader	City of Beaumont	Public Works	(951) 377-5315	
56	Pete	Pinlac	City of Beaumont	Public Works	(951) 445-7531	
57	Dave	Thibault	City of Beaumont	Public Works	(951) 377-5315	
58	Dave	Ochs	City of Beaumont	Public Works	(951) 906-9224	
59	Abel	Garcia	City of Norco	Public Works	(951) 270-5607	
60	Lyndon	Lorance	City of Norco	Public Works	(951) 270-5607	
61	Jeff	Potts	City of Corona	Public Works	(951) 736-2442	
	Steve	Glenn	County of Riv.	Waste Manage	951 486-3200	
	Jeff	[illegible]	RCWMD	Waste Management	951-486-3245	
	EDWARD	WEE ENG.	RCWMD	WASTE MANAGEMENT	951 486-3261	

NPDES STORMWATER QUALITY TRAINING FOR
Construction Training
Riverside County Flood Control & Water Conservation District

Meeting of: Thursday, May 3 - 13:00 - 16:00 SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
1	Farida	Naceem	City of Murrieta	Engineering	(951) 461-6075	
2	Richard	Temple	City of Indian Wells	Public Works	(760) 776-0237	
3	Eduardo	Castellanos	Riverside County	Waste Management		
4	Andy	Cortez	Riverside County	Waste Management		
5	Nimrod	Garay	Riverside County	Waste Management	486 3920	N. Garay
6	Scott	Kraak	Riverside County	Waste Management		
7	Benjamin	Matye	Riverside County	Waste Management	6 3251	
8	Panda	Workman	Riverside County	Waste Management	486 3276	
9	Fouad	Mina	Riverside County	Waste Management	951-486-3244	
10	Marin	Cionca	Riverside County	Waste Management		
11	Kevin	Joyce	Riverside County	Waste Management	486-3240	
12	Sarah	Watrous	Riverside County	Waste Management		
13	Nate	Viste	Riverside County	Waste Management		
14	Randy	Taylor	Riverside County	Waste Management	951-247/724	
15	John	Contrado	City of Corona	Public Works Inspection	951-279-3512	
16	Tom	Hall	City of Corona	Public Works Inspection	951-232-1989	
17	Ken	Dagenais	City of Corona	Public Works Inspection		
18	Remi	Nunez	City of Corona	Public Works Inspection	951-538-2462	
19	Brian	Ladnier	City of Corona	Public Works Inspection	951-232-2766	
20	Rosario	Ruvalcaba	City of Corona	Public Works Inspection	(951) 232-1981	

21	Dave	Mitchell	City of Corona	Public Works Inspection		
22	Randy	Bender	City of Corona	Public Works Inspection		
23	David	Shreve	City of Corona	Public Works Inspection		
24	Mirek	Jaroslawski	City of Corona	Public Works Inspection		
25	William	Anderson	Riverside County	Transportation Department	(951) 955-1095	
26	Salvador	Terriquez-Lopez	Riverside County	Transportation Department	(951) 955-1095	
27	Jeff	Gullett	Riverside County	Transportation Department	(951) 955-1095	
28	Michael	Coates	Riverside County	Transportation Department	(951) 955-1095	
29	James	Araiza	Riverside County	Transportation Department	(951) 955-1095	
30	Tracy	Bravo	Riverside County	Transportation Department	(951) 955-1095	
31	Matt	Sayre	Riverside County	Transportation Department	(951) 955-1095	
32	Richard	Ott	Riverside County	Transportation Department	(951) 955-1095	
33	George	Williams	Riverside County	Transportation Department	(951) 955-1095	
34	Joseph	Place	Riverside County	Transportation Department	(951) 955-1095	
35	Dave	Moen	Riverside County	Transportation Department	(951) 955-1095	
36	Robert	Cardenas	Riverside County	Transportation Department	(951) 955-1095	
37	Tom	Vaughn	City of Hemet	Public Works	(951) 765-2360	
38	Mac	McCall	City of Hemet	Public Works	(951) 765-2360	
39	Ed	Lara	City of Corona	Public Works	(951) 739-4825	
40	Steve	Enna	City of Corona	Public Works	(951) 739-4815	
41	Victor	Ayala	City of Calimesa	Public Works	(909) 795-9801	
42	Bob	French	City of Calimesa	Public Works	(909) 795-9801	
43	Dale	Everman	City of Calimesa	Public Works	(909) 795-9801	

44 Jessie Hillis

45 DARREN Young CITY OF CORONA P.W. 909-736-2204

46 GERALD GREGORY RCWMD 372-9851

47 STEVEN WANN TRANSPORTATION (951) 961-5446

48 Keith Barnett " " (951) 961-6072

44	Mike	McCabe	City of Calimesa	Public Works	(909) 795-9801	
45	Perry	Gerdes	City of Banning	Water/Wastewater Utility	(951) 922-3281	
46	DAVID ~~Greg~~	MARTINEZ ~~Campbell~~	City of Banning	Water/Wastewater Utility	(951) 922-3281	
47	MATT ~~Ed~~	STEVENS ~~Moore~~	City of Banning	Water/Wastewater Utility	(951) 922-3281	
48	Scott	Barnhart	City of Banning	Water/Wastewater Utility	(951) 922-3281	
49	Jason	Valdez	City of Banning	Water/Wastewater Utility	(951) 922-3281	
50	Tom	Shipley	Riverside County	Transportation Department	(951) 955-1095	
51	MAUS ~~Randy~~	DAVE ~~White~~	Riverside County	Transportation Department	(951) 955-1095	D. Maus
52	Jon	Tressler	Riverside County	Transportation Department	(951) 955-1095	
53	Stephen	Glenore	Riverside County	Waste Management		
54	Dwight "Kelley"	Donovan	Riverside County	Transportation Department	(951) 955-1095	
55	Mark	Bailey	City of Moreno Valley	Public Works	(951) 413-3243	
56	Cory	Hammond	City of Murrieta	Public Works Inspection		
57	Steve	Kestly	City of Murrieta	Public Works Inspection	(951) 201-1031	
58	Salvador	Lopez	Riverside county		(951) 955-6899	Salvador Lopez Jr.
59	Tom	Shipley	Riv County			
60	RICHARD	TEMPLE	CITY OF INDIAN WELLS	BLDG INSP	(760) 776-0230	
61	Justin	Robbins	RIV. CO.	Const. Insp.	951-961-6882	

NATE VISTE RIVCO 909 528

NPDES STORMWATER QUALITY TRAINING FOR INDUSTRIAL COMMERCIAL FACILITY ACTIVITIES

Meeting of: October 3, 2006 8 a.m. – 11 a.m. SIGN-IN SHEET

FIRST NAME	LAST NAME	MUNICIPALITY	DEPARTMENT	SIGNATURE
Michael	Adkins	City of Palm Desert	Code Compliance	Michael F. Adkins
Bruce	Bailey	Riverside County	Environmental Health/Haz Mat	
Carolyn	Brown	Riverside County	Environmental Health/Haz Mat	
David	Brummier	County of Riverside	Building and Safety	
Sandy	Bunchek	Riverside County	Environmental Health/Haz Mat	Sandy Bunchek
Richard	Carrera	County of Riverside	Building and Safety	
Richard	Chase	County of Riverside	Waste Management	
Jessica	Chin	City of Riverside	Public Works	
Chris	Cordova	City of Beaumont	Code Enforcement	
Gayle	Cuneo	Riverside County	Flood Control	Gayle Cuneo
Michael	Daly	Riverside County	Environmental Health/Haz Mat	Michael Daly
Rudy	Fandel	City of Corona	DWP	
Ted	Gascoigne	County of Riverside	Building and Safety	
Jim	Gill	County of Riverside	Building and Safety	Jim Gill
Richard	Guerrero	Riverside County	Environmental Health/Haz Mat	
Ronald	Horton	Riverside County	TLMA-Building & Safety	
George	Jediny	County of Riverside	Building and Safety	
Sung	Kack	RIVERSIDE	Building & Safety	
Kyle	Kim	County of Riverside	TLMA-building & safety	
Scott	Kraak	County of Riverside	Waste Management	
Ben	Mah	County of Riverside	Waste Management	
Roger	Miller	TLMA	Building & Safety	

Training Location – Riverside County Flood Control and Water Conservation District

0000324

NPDES STORMWATER QUALITY TRAINING FOR INDUSTRIAL COMMERCIAL FACILITY ACTIVITIES

Meeting of: October 3, 2006 8 a.m. – 11 a.m.

SIGN-IN SHEET

FIRST NAME	LAST NAME	MUNICIPALITY	DEPARTMENT	SIGNATURE
Arthur	Miller	County of Riverside	Building and Safety	
Paul	Mitchell	Riverside County	Environmental Health/Haz Mat	
Gino	Monterroso	Riverside County	Environmental Health/Haz Mat	
Penny	Nanney	Flood Control	NPDES	
Vic	Olmeda	Riverside County	Bldg. & Safety/ Admin	
Lionel	Ornelas	City of Corona	DWP	
Cynthia	Overby	City of Beaumont	Code Enforcement	
Larry	Page	City of Perris	Public Works	
Christine	Parsons	Riverside County	Environmental Health/Haz Mat	
Dave	Reynolds	County of Riverside	Building and Safety	
Bernd	Schleicher	Riverside County	Environmental Health/Haz Mat	
Jim	Shaver	County of Riverside	Building and Safety	
James	Stratton	County of Riverside	Building and Safety	
Doug	Thompson	Riverside County	Environmental Health/Haz Mat	
Greg	Trujillo	County of Riverside	Building and Safety	
Tina	Tuason	RCFC	NPDES	
Chandra	Desai	County Re	NPDES	
Thomas	HSU	" "	"	
Richard	Carrera	" "	BLDG/SAFETY	

Training Location – Riverside County Flood Control and Water Conservation District

0000325

NPDES STORMWATER QUALITY TRAINING FOR INDUSTRIAL COMMERCIAL FACILITY ACTIVITIES

Meeting of: October 19, 2006 9:00 a.m. – 12:00 p.m. SIGN-IN SHEET

FIRST NAME	LAST NAME	MUNICIPALITY	DEPARTMENT	SIGNATURE
Brad	Ballen	Riverside County	Environmental Health/Haz Mat	
Jeannie	Bigler	Riverside County	Building & Safety	
John	Carmona	State of California	Regional Water Quality Control Board	
Suhas	Chakraborty	CRWQCB	Stormwater	
Jerry	Copeland	County of Riverside	Waste Management	
Jackie	Jones	Riverside County	Environmental Health/Haz Mat	
Larry	Joseph	County of Riverside	Waste Management	
Steve	Kupsak	City of Moreno Valley	Parks & Recreation	
Vic	Olmeda	Riverside County	Bldg. & Safety/Admin.	
Jim	Ray	Riverside County	Environmental Health/Haz Mat	
John	Riddell	Riverside County	Environmental Health/Haz Mat	
Bobby	Riggs	Riverside County	Environmental Health/Haz Mat	
Michael	Shalhub	Riverside County	Environmental Health/Haz Mat	
Carolinn	Shay	Riverside County	Environmental Health/Haz Mat	
Anastasia	Studer	Riverside County	Environmental Health/Haz Mat	
Kent	Wegelin	City of Moreno Valley	Public Works	

Training Location – Palm Springs Convention Center

0000329

NPDES STORMWATER QUALITY TRAINING FOR INDUSTRIAL COMMERCIAL FACILITY ACTIVITIES

Meeting of: October 23, 2006 1:00 p.m. – 4:00 p.m. **SIGN-IN SHEET**

FIRST NAME	LAST NAME	MUNICIPALITY	DEPARTMENT	SIGNATURE
Abdul	Behnawa	County of Riverside	Building & Safety	
Shad	Boal	County of Riverside	Building & Safety	
Christina	Bowser	City of Beaumont	Code Enforcement	Christina Bowser
Jessica	Chin	Riverside	Public Works	
Andrew	Cortez	County of Riverside	Waste Management	
Daniel	Gregorio	County of Riverside	Building & Safety	Daniel J Gregorio
Doug	Hannah	County of Riverside	Building & Safety	
Steve	Hooper	City of Riverside	Public Works	
Rob	Istik	County of Riverside	Waste Management	
Jeramy	Jackson	City of Moreno Valley	Public Works	
Shawn	Kilpatrick	City of Palm Desert	Code Compliance	
Tim	King	City of Riverside	Public Works	
David	Leonard	County of Riverside	Building & Safety	
Derick	London	County of Riverside	Building & Safety	
Ed	Lotz	Riverside County Flood Control District	Encroachment Permits	
Ben	Matye	County of Riverside	Waste Management	
Shaheen	Mooman	Santa Ana	RCFC	
Linda	Nixon	City of Hemet	Public Works	
David	Ortego	Riverside County	Flood Control	
Neil	Ozonur	Riverside County	Environmental Health/Haz Mat	
Sande	Pence	Riverside County	Environmental Health/Haz Mat	
Al	Pielin	City of Riverside	Public Works	
Hart	Ponder	City of Palm Desert	Code Compliance	
Steven	Rainsbury	County of Riverside	Building & Safety	S. Rainsbury
Noah	Rau	County of Riverside	Waste Management	Noah Rau

Training Location – Riverside County Flood Control

0000327

NPDES STORMWATER QUALITY TRAINING FOR INDUSTRIAL COMMERCIAL FACILITY ACTIVITIES

Meeting of: **October 23, 2006 1:00 p.m. – 4:00 p.m.** **SIGN-IN SHEET**

FIRST NAME	LAST NAME	MUNICIPALITY	DEPARTMENT	SIGNATURE
Pedro	Rodriguez	City of Palm Desert	Code Compliance	
Ramon	Roman	County of Riverside	Waste Management	
Larry	Salazar	City of Riverside	Public Works	
Cindy	Snavely-Peck	City of Riverside	Public Works	
Brian	Stephenson	County of Riverside	Waste Management	
Jane	Tate	County of Riverside	Building & Safety	
Gabriel	Tejeda	County of Riverside	Building & Safety	
Johnny	Terfehr	City of Palm Desert	Code Compliance	
Manny	Vargas	Riverside County	Environmental Health/Haz Mat	
Nate	Viste	County of Riverside	Waste Management	
Ron	Welch	Riverside County	Building & Safety	
Panda	Workman	County of Riverside	Waste Management	
Mike	Yasmer	City of Riverside	Public Works	
John	Autrey	County of Riverside	Building & Safety	
TRICH	FIELD	County Of Riv. /EDA	EDA/RDA	

Training Location – Riverside County Flood Control

0000328

NPDES STORMWATER QUALITY TRAINING FOR
Industrial/Commercial Training
Riverside County Flood Control & Water Conservation District

Meeting of: Wednesday, April 18 - 13:00 - 16:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
1	Rene	Upson	City of San Jacinto	Community Development, Cd Enf	(951) 487-7330	
2	Phil	Hallberg	City of San Jacinto	Community Development, Cd Enf	(951) 487-7330	
3	Tom	Van Dorn	City of San Jacinto	Community Development, Cd Enf	(951) 487-7330	
4	Bob	Bohan	City of Canyon Lake	Code Enforcement	(951) 244-2955	
5	John	Bivens	City of Canyon Lake	Code Enforcement	(951) 244-2955	
6	Anthony	Moreno	City of La Quinta	Building & Safety	(760) 777-7034	Anthony Moreno
7	Moises	Rodarte	City of La Quinta	Code Enforcement	(760) 777-7050	
8	Paul	Shaffer	City of Corona	Department of Water and Power	(951) 279-3592	
9	Mark	Solano	City of Corona	Department of Water and Power	(951) 279-3558	
10	James	Thompson	City of Banning	Public Works	(951) 922-3142	
11	Ed	Rehfeld	City of Norco	Building and Safety	[illegible]	
12	Matt	Creason	City of Indian Wells	Public Works	(760) 776-0237	
13	Kareem	Zayed	City of Indio	PW/Engineering Division	(949) 474-1960	
14	Paul	Lucas	City of Indio	PW/Engineering Division	(949) 474-1960	
15	Kevin	Rhodes	Riverside County	Waste Management		
16	Benjamin	Mah	Riverside County	Waste Management		
17	Jerry	Copeland	Riverside County	Waste Management		
18	Brian	Stephenson	Riverside County	Waste Management	(951) 315-7298	
19	Panda	Workman	Riverside County	Waste Management		
20	Scott	Kraak	Riverside County	Waste Management		

21	Benjamin	Matye	Riverside County	Waste Management	[illegible]	[illegible]
22	Marin	Cionca	Riverside County	Waste Management		
23	Sarah	Watrous	Riverside County	Waste Management		
24	Nate	Viste	Riverside County	Waste Management	[illegible]	[illegible]
25	Randy	Taylor	Riverside County	Waste Management	241-7134	[illegible]
26	Hart	Ponder	City of Palm Desert	Public Works	(760) 346-0611	[illegible]
27	Johnny	Terfehr	City of Palm Desert	Public Works	(760) 346-0611	[illegible]
28	Shawn	Kilpatrick	City of Palm Desert	Public Works	(760) 346-0611	[illegible]
29	Larry	Joseph	Riverside Co	Waste Mgt	951.312-88[illegible]	[illegible]
30	JACKSON	JERAMY	CITY OF MORENO	VALLEY	951 237 700[illegible]	[illegible]
31	Thompson	JAMES	City of Banning		951 922-31[illegible]	[illegible]
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NPDES STORMWATER QUALITY TRAINING FOR
Industrial/Commercial Training
Riverside County Flood Control & Water Conservation District

Meeting of: Monday, April 30 - 13:00 - 16:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
1	Mike	Shetler	Riverside County	Executive Office	(951) 955-1186	
2	dan	cuthbertson	City of Norco	Public Works	(951) 270-5607	
3	Jeff	Potts	City of Corona	Public Works	(951) 736-2442	
4	Dennis	Hurford	City of Norco	Building and Safety		
5	Danny	Derrick	City of Norco	Building and Safety		
6	Michele	Colbert	City of Corona	Public Works	(951) 736-2248	
7	Laura	Bednar	City of Corona	~~Public Works~~ FIRE	(951) 817-5792	
8	Jim	Nickell	Riverside County	Waste Management	951 312-7015	
9	Larry	Joseph	Riverside County	Waste Management		
10	Richard	Chase	Riverside County	Waste Management		
11	Molly	Stewart	Riverside County	Waste Management		
12	Edward	Wee Eng	Riverside County	Waste Management	(951) 486-322	
13	Andy	Cortez	Riverside County	Waste Management		
14	Nimrod	Garay	Riverside County	Waste Management		N. Garay
15	Jeff	Gow	Riverside County	Waste Management	(951) 486-3245	
16	Fouad	Mina	Riverside County	Waste Management	(951) 486-3244	
17	Jerry	Gregory	Riverside County	Waste Management		
18	Joseph	Contaoi	Riverside County	Waste Management		
19	Eduardo	Castellanos	Riverside County	Waste Management		
20	Joseph	Hickman	Riverside County	Waste Management		
21	Kevin	Joyce	Riverside County	Waste Management		
22	Mike	Adkins	City of Palm Desert	Public Works	(760) 346-0611	
23	Pedro	Rodriguez	City of Palm Desert	Public Works	(760) 346-0611	
24	Stephen	Glenore	Riverside County	Waste Management		
25	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

26	Paul	Lucas	Fuscoe Eng	Indio	949-271	4472
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NPDES STORMWATER QUALITY TRAINING FOR
Water Quality Management Plan
Riverside County Flood Control & Water Conservation District

Meeting of: October 3, 2006 1pm - 4pm

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Signature
1	Shonda	Bello Herold	City of Riverside	Planning	
2	~~Jessica~~ Elaine	~~Chin~~ Hsieh	City of Riverside	Public Works	
3	Chris	Cordova	City of Beaumont	Code Enforcement	Chris Cordova
4	Arturo	Diaz	RCFC	Planning	
5	Leonardo	Ferrando	Riverside County	Flood Control District	
6	Jeffrey	Fulton	RCFCWCD	Plan Check	
7	Kamyar	Ghods	Riverside	Flood Control	
8	Sam	Gonzalez	Riverside County	Building & Safety	
9	Hany	Henein	City of Corona	Public Works	
10	MARK	INGOLD	COUNTY OF RIVERSIDE	TLMA	
11	Michael	Krantz	Riverside County	Transportation	
12	Steve	Kupsak	City of Moreno Valley	Parks & Recreation	
13	Bob	Lyman	Riverside County	TLMA	
14	DEV	MANI	RIVERSIDE COUNTY	TLMA	
15	Arthur	Miller	County of Riverside	Building and Safety	
16	Clara	Miramontes	City of Riverside	Planning	
17	jerry	mullen	riverside county	building & safety	
18	Penny	Nanney	Flood Control	NPDES	
19	Hoang	Nguyen	City of Moreno Valley	Public Works	
20	Cynthia	Overby	City of Beaumont	Code Enforcement	
21	Larry	Page	City of Perris	Public Works	

NPDES STORMWATER QUALITY TRAINING FOR
Water Quality Management Plan
Riverside County Flood Control & Water Conservation District

Meeting of: October 3, 2006 1pm - 4pm

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Signature
22	~~Edward~~	~~Perez~~	~~Consultant (PBS&J)~~	~~Plan Check~~	
23	Edward	Perez	Flood Control	Planning	
24	Derek	Petersen	Riverside County Flood Control	Planning	
25	Edwin	Quinonez	Riverside County	Flood Control District	
26	Travis	Randel	City of Riverside	Planning Department	
27	DAVID	ROSS	CITY OF MORENO	LAND DEVELOPMENT	
28	Kyle	Smith	City of Riverside	Planning Division	
29	Helio	Takano	RCFC	Planning Section	
30	Tim	Taylor	City of Hemet	Development Engineering	
31	Dowling	Tsai	County of Riverside	Transportation	
32	Tina	Tuason	RCFC	NPDES	
33	Kent	Wegelin	City of Moreno Valley	Public Works	
34	Cenk	Yavas	Flood Control	Planning	
35	Soon	No	City of Corona	PW	
36	Edward	Lara	City of Corona	PW	
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NPDES STORMWATER QUALITY TRAINING FOR

Water Quality Management Plan

Riverside County Flood Control & Water Conservation District

Meeting of: October 3, 2006 1pm - 4pm

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Signature
43	DON	DELGADILLO	RCFC	PLANNING	[illegible]
44					
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NPDES STORMWATER WATER QUALITY MANAGEMENT PLAN TRAINING

Meeting of: **October 23, 2006 8:00 a.m. – 12:00 p.m.** **SIGN-IN SHEET**

FIRST NAME	LAST NAME	MUNICIPALITY	DEPARTMENT	SIGNATURE
Kent	Allen	Riverside County	Flood Control	
Daisy	Barreto	RCFC & WCD	Planning	
Jeannie	Bigler	Riverside County	Building & Safety	
Christina	Bowser	City of Beaumont	Code Enforcement	
David	Brunmier	County of Riverside	Building & Safety	
Mike	Cairns	Riverside County	Flood Control	
Loi	Chan	Riverside County	Building & Safety	
Jessica	Chin	Riverside ~~County~~ City	Public Works	
Robert	Cullen	Riverside County	Flood Control District	
Olivia	Daniels	CVWD	Engineering	
Elena	Destefano	City of Riverside	Public Utilities Energy Delivery Contracts Division	
Glen	Drogin	County of Riverside	Flood Control	
Everett	Duckworth	County of Riverside	Flood Control	
Grosvenor	Fish	City of Riverside	Parks & Recreation	
Kris	Flanigan	Riverside County	Flood Control	
Jennifer	Gale	Riverside County Flood Control	Development Review	
Timothy	Kearns	Riverside	Building & Safety	
Jim	Kong	RCFC	Design	
Ewina	Lau	City of Riverside	Parks & Recreation	
Steve	Loriso	City of Norco	Public Works	
Ed	Lotz	Riverside County Flood Control District	Encroachment Permits	
Amy	McNeil	Riverside County	Flood Control	Amy McNeill
Demeke	Muarega	RCFC	Design	

Training Location – Riverside County Flood Control and Water Conservation District

0000836

NPDES STORMWATER WATER QUALITY MANAGEMENT PLAN TRAINING

Meeting of: **October 23, 2006 8:00 a.m. – 12:00 p.m.** **SIGN-IN SHEET**

FIRST NAME	LAST NAME	MUNICIPALITY	DEPARTMENT	SIGNATURE
Linda	Nixon,	City of Hemet	Public Works	Linda Nixon
Jennifer	Otterson	Riverside County	Flood Control	
Claudio	Padres	RCFC	Design	
Jeff	Potts	City of Corona	Public Works	
Roman	Ramirez	Riverside County	Building & Safety	
Eric	Russell	Riverside County	Flood Control	Eric u Russell
Alisa	Sramala	City of Riverside	Parks, Recreation, and Community Services	
Lori	Wolfe	Riverside County	Flood Control	Wolfe
Mike	Wong	Riverside County	Flood Control	Mike M. Wong
Panda	Workman	County of Riverside	Waste Management	
Amy	Yu	Riverside County	Building & Safety	
Shaheer	Moonan	RCFC		
Lombardo	Detrimedeo	CVMDO	Planning	
Ewina	Lau	City of Riverside	Park & Rec.	Ewina Lau

Training Location – Riverside County Flood Control and Water Conservation District

0000337

NPDES STORMWATER QUALITY TRAINING FOR
WQMP Training
Riverside County Flood Control & Water Conservation District

Meeting of: Monday, April 16 - 12:00 - 16:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
1	Benjie	Cho	RCFC & WCD	NPDES	(951) 955-2901	
2	Gloria	Perez	Riverside County	Development Department	(951) 955-9056	
3	Michele	Colbert	City of Corona	Public Works	(951) 736-2248	
4	Barry	Ghaemi	City of Corona	Public Works	(951) 739-4961	
5	Crystal	Nguyen	City of Corona	Public Works	(951) 817-5798	
6	Estella	Valderrama	City of Corona	Public Works	(951) 279-3751	
7	Noel	Castillo	City of Corona	Public Works	(951) 279-3537	
8	Lupe	Barrera	City of Corona	Public Works	(951) 736-2435	
9	Cora	Soto	City of Perris	Planning	(951) 943-5003	
10	Jeramy	Jackson	City of Moreno Valley	Land Development	(951) 616-4564	
11	dan	cuthbertson	City of Norco	Public Works	(951) 270-5607	
12	Lisa	McCullough	City of San Jacinto	Community Development / GIS	(951) 537-6360	
13	~~Brian~~	~~Ching~~	~~City of La Quinta~~	~~Public Works~~	~~(760) 777-7044~~	(CVWD) 4/26
14	~~Ed~~	~~Wimmer~~	~~City of La Quinta~~	~~Public Works~~	~~(760) 777-7088~~	
15	Pui Ting (Amy)	Yu	City of La Quinta	Public Works	(760) 777-7047	(CVWD) 4/26
16	Mark	Gross	City of Moreno Valley	Planning	(951) 413-3215	
17	Mark	Berg	City of Norco	Building and Safety	(951) 270-5637	
18	Craig	Welch	City of Norco	Building and Safety		
19	Mary	Zambon	City of Riverside	Transportation	(951) 955-6759	
20	Andrew	Huneck	City of Riverside	Transportation	951-955-1504	

21	Marcia	Rose	City of Riverside	Transportation	951-955-1505	
22	Tamrat	Seyoum	City of Riverside	Water Engineering-Construction Unit	(951) 826-5672	
23	Xavier	Jacobo	City of Riverside	Water Engineering-Construction Unit	(951) 538-3461	
24	Stewart	Noble	City of Riverside	Water Engineering-Construction Unit	(951) 538-6970	
25	Jim	Henke	City of Riverside	Water Engineering-Construction Unit	(951) 538-3451	
26	Ernest	Marquez	City of Riverside	Water Engineering-Construction Unit	(951) 826-5409	
27	Panda	Workman	Riverside County	Waste Management		Panda Workman
28	~~Carol~~	~~Templeton~~	~~City of Palm Springs~~	~~Engineering~~	~~(760) 323-8253~~	(CVWD) — 4/26
29	David	Newell	City of Palm Springs	Planning Services	(760) 323-8245	
30	Bryan	Fernandez	City of Palm Springs	Planning	(760) 323-8245	
31	~~RICK~~	~~MINJARES~~	~~City of Palm Springs~~	~~ENGINEERING~~	~~(760) 323-8253~~	(CVWD) — 4/26
32	Jorge	Biagioni	City of Hemet	Engineering	(951) 765-2360	
33	Denise	Bartz	City of Hemet	Engineering	(951) 765-2366	
34	~~George~~	~~Farago~~	~~City of Palm Springs~~	~~Public Works and Engineering~~	~~(760) 323-8253~~	[illegible] — 4/26
35	Chris	Wiberg	City of Moreno Valley	Public Works	(951) 413-3135	

[illegible]

Steve Hayes City of Riverside Planning (951) 826-5771
Jeremy Strawder " " " (951) 826-5357
Nellie Bernardino " " " (951) 826-5165
GUSTAVO GONZALEZ " " " 951-826-5931
Zorik Lulu County of Riverside 951-955-7351

[illegible]

Lucas Bennett County of Riverside TLMA 951-416-[illegible]
(EIS)

New Development/Re-development (WQMP) Training

April 25, 2007

CVWD, 12 - 4 p.m.

	First	Last	Agency	E-mail	Phone	Sign-in
1	Arlene	Chun	RCFC	abchun@co.riverside.ca.us	951-955-1330	
2	Amy	Yu	City of La Quinta	ayu@la-quinta.org	760-777-7047	
3	Brian	Ching	City of La Quinta	bching@la-quinta.org	760-777-7044	
4	Alana	Townsend	City of Palm Desert	atownsend@ci.palm-desert.ca.us	760-346-0611	Alana Townsend
5	Page	Garner	City of Palm Desert	pgarner@ci.palm-desert.ca.us	760-346-0611	
6	Ryan	Stendell	City of Palm Desert	rstendell@ci.palm-desert.ca.us	760-346-0611	
7	Tony	Lucero	City of Coachella	tlucero@coachella.org	760-398-5744 x134	
8	Brett	Daniels	City of Coachella	bdaniels@coachella.org	760-398-5744 x180	Brett DANIELS
9	George	Farago	City of Palm Springs	George.Farago@palmsprings-ca.gov	760-323-8253 x8743	
10	Rick	Minjares	City of Palm Springs	Rick.Minjares@palmsprings-ca.gov	760-323-8253	Rick Minjares
11	Carol	Templeton	City of Palm Springs	Carol.Templeton@palmsprings-ca.gov	760-323-8253 x8741	
12	Grant	Eklund	City of Indio	geklund@indio.org	760-391-4018	
13	Roldan	Lopez	City of Indio	rlopez@indio.org	760-391-4017	
14	James	Achuff	City of Indio	jachuff@indio.org	760-391-4017	
15	Georgia	Celehar	CVWD	geelehar@cvwd.org	760-398-2651	
16	Tyme	Truscella	CVWD	ttruscella@cvwd.org	760-398-2651	
17	Steve	Bigley	CVWD	sbigley@cvwd.org	760-398-2651	
18	Wil	Gonzalez	CVWD	wgonzalez@cvwd.org	760-398-2651	
19	Olivia	Daniels	CVWD	odaniels@cvwd.org	760-398-2651	
20	Tommy	Fowlkes	CVWD	tfowlkes@cvwd.org	760-398-2651	
21	Rosie	Anacleto	CVWD	ranacleto@cvwd.org	760-398-2651	
22	Tyler	Hull	CVWD	thull@cvwd.org	760-398-2651	
23	Frank	Crain	City of Coachella	fcrain@coachella.org	760-398-5744 x138	
24	Amir	Modarressi	City of Indio	amir@indio.org	760-398-4017 x4219	
25	Jaime	Engler	City of Indio	jengler@indio.org	760-398-4017 x4223	
26	Tom	Rafferty	City of Indio	trafferty@indio.org	760-398-4017 x4270	
27	Teresa	Demosie	CVWD		760-398-2666 x2605	T. Demosie
28	Robert	Edwards	City of Indio	Redwards@indio.org	760-391-4195	
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0000340

NPDES
STORMWATER QUALITY TRAINING FOR
- INDUSTRIAL/COMMERCIAL FACILITY INSPECTIONS -

A NO FEE TRAINING-

DATE AND LOCATION:

WHEN: **Wednesday, March 22, 2006 - Half-Day Training**
1:00 P.M. – 4:00 P.M.

WHERE: **Riverside County Flood Control & Water Conservation District**
1995 Market Street – Conference Room 1
Riverside, CA 92501 Phone: 951.955.1200

TRAINING: **The Riverside County National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer Systems (MS4) Permits require annual training. The Santa Ana Regional Water Quality Control Board (RWQCB) Permit also requires new employees to receive training within six months of hire.**

WHO SHOULD ATTEND:

- Industrial/Commercial Site Inspectors
- Code Enforcement Staff
- Public Works Maintenance Staff
- Building & Safety Staff

WORKSHOP TOPICS:

- NPDES Regulatory Framework Overview
- Overview of General Industrial Activities Storm Water Permit (GIASP)
- Municipal Stormwater Permit Requirements
- County and City Stormwater Ordinances
- Protocols for Industrial/Commercial Facilities Inspections
- Drainage Area Management Plan (DAMP) and Enforcement/Compliance procedures
- Pollution Prevention Plans (PPPs)
- Best Management Practices (BMPs)
- Constituents of Concern in Urban Runoff from Industrial/Commercial Facilities

TO REGISTER: *PLEASE COMPLETE THE INFORMATION REQUESTED BELOW, PRINT CLEARLY AND FAX TO: (951) 788-9965, Attention: NPDES Training Coordinator or e-mail* CharleneWarren@co.riverside.ca.us. **Registration deadline is March 10, 2006**. **Seating is limited, so Register early!**

Contact: _____ **Agency/Dept:** _____
Phone: _____ **Fax:** _____
Attendee(s): _____ **Dept:** _____
_____ **Dept:** _____
_____ **Dept:** _____
_____ **Dept:** _____
_____ **Dept:** _____
_____ **Dept:** _____

Please indicate number of attendees. Attach additional sheet if needed.

March 22, 2006 - Number of attendees _____

Class Roster

Monday, May 22, 2006, 2:42 PM

Class: NPDES Stormwater Quality Training

Course Type: Off-site

Written Exam: No **Length (days):** 1 **Retraining Req. (months):**

Total Hours: 3.00 **CEU:**

Additional Schedule Information:

Maximum Class Size: **Students Scheduled:** 30 **Students Wait Listed:** 0

Date: 03/22/2006 **Time:** 01:00 PM to 04:00 PM

Instructor: Contractor, Outside

Location: CHA HAB Auditorium

Date: **Time:**

Instructor:

Location:

Student	Status	Priority	Job Title	Department	Office Phone
Abdollahi, Zarrin	Completed		Environmental Health Specialis	Distirict Environmental Services	
Alemi, Qais	Completed		Environmental Health Specialis	Distirict Environmental Services	
Amon, Kelly	Completed		Environmental Health Specialis	Distirict Environmental Services	
[illegible]tt, Sandra	Completed		Environmental Health Specialis	Distirict Environmental Services	
Bacon, Shantel	Completed		Environmental Health Specialis	Distirict Environmental Services	
Balancier, Darrel	Completed		Environmental Health Specialis	Distirict Environmental Services	
Barrios, Heidi	Completed		Environmental Health Specialis	Distirict Environmental Services	
Briones, Andrea	Completed		Environmental Health Specialis	Distirict Environmental Services	
Burnham, Kristen	Completed		Environmental Health Specialis	Distirict Environmental Services	
Cartagena, Mary	Completed		Environmental Health Specialis	Distirict Environmental Services	
Casey, Brent	Completed		Environmental Health Specialis	Distirict Environmental Services	
Consaul, Eugenie	Completed		Environmental Health Specialis	Distirict Environmental Services	
Crossman, Sarah	Completed		Environmental Health Specialis	Distirict Environmental Services	
Ellis-Merki, Dorothy	Completed		Environmental Health Specialis	Distirict Environmental Services	
Fonseca, Yesenia	Completed		Environmental Health Specialis	Distirict Environmental Services	
Fregoso, Ralph	Completed		Environmental Health Specialis	Distirict Environmental Services	
Garcia, Mike	Completed		Environmental Health Specialis	Distirict Environmental Services	
Giannini, Tamara	Completed		Environmental Health Specialis	Distirict Environmental Services	
Gribben, Robert	Completed		Environmental Health Specialis	Distirict Environmental Services	
Hunt, Robert	Completed		Environmental Health Specialis	Distirict Environmental Services	
Lewis, DeAnda	Completed		Environmental Health Specialis	Distirict Environmental Services	
Moran, David	Completed		Environmental Health Specialis	Distirict Environmental Services	
Osborn, Douglas	Completed		Environmental Health Specialis	Distirict Environmental Services	
Powell, Lester	Completed		Environmental Health Specialis	Distirict Environmental Services	
Reyes, Greg	Completed		Environmental Health Specialis	Distirict Environmental Services	
Sanchez, Angela	Completed		Environmental Health Specialis	Distirict Environmental Services	
Smith, Alicia	Completed		Environmental Health Specialis	Distirict Environmental Services	
Sybrandy, Richelle	Completed		Environmental Health Specialis	Distirict Environmental Services	
Tepetitla, Daisy	Completed		Environmental Health Specialis	Distirict Environmental Services	
Trinidad, Jesus	Completed		Environmental Health Specialis	Distirict Environmental Services	

List of Stormwater Training Attendees

1. DeAnda Lewis
2. Mike Garcia
3. Jenny Fonseca
4. Tamara Giannini
5. Daisy Tepititla
6. Jess Trinidad
7. Dottie Ellis-Merki
8. David Moran
9. Greg Reyes
10. Quais Alemi
11. Alicia Smith
12. Heidi Barrios
13. Kelly Amon
14. Sandy Arnett
15. Angela Sanchez
16. Joleen Sybrandy
17. Doug Osborn
18. Bob Hunt
19. Shantel Bacon
20. Zarrin Abdollahi
21. Sarah Crossman
22. Andrea Briones
23. Lester Powell
24. Mary Cartagena
25. Brent Casey
26. Jenay Consaul
27. Kristen Burnham
28. Darrel Balancier
29. Robert Gribben
30. Ralph Fregoso

Community Cleanup & Household Hazardous Waste Logs

2007 Community Clean-Up Schedule

0000346

COMMUNITY	DISTRICT	F/A	HAULER	SPRING 07	FALL 07	HHW
Mead Valley	1	3A	WMIE	28-Apr	6-Oct	10-Mar Riverside
Wildomar(L. Village)	1	5	CR&R	11-May	12-Oct	
Temescal Canyon	1	3A	WMIE		??	
Lake Matthews	1	4A	WMIE		??	
Home Gardens*	2	4A	WMIE	19-May		20-Apr Corona
Jurupa	2	2	Burrtec	12-May		
Glen Avon	2	2	Burrtec	12-May		
Pedley	2	2	Burrtec	12-May		
District wide CCU	3	1C & 8	WMIE	4/1-4/7 2007	N/A	
Quail Valley	3	1C	WMIE	10-Feb	3-Nov	14-Apr Cyn Lake
Winchester	3	1C	WMIE	10-Feb	3-Nov	22-Jun Hemet
Marine Drive - Hemet	3		WMIE		22-Sep	
North Shore	4	11	Burrtec	3-Mar	20-Oct	
Indio Hills	4	11	Burrtec	28-Apr	29-Sep	
Sky Valley	4	11	Burrtec	28-Apr	29-Sep	
Thousand Palms	4	12	Burrtec	10-Feb	3-Nov	
Bermuda Dunes	4	12	Burrtec	10-Feb	3-Nov	
Tri-Palms Estates	4	12	Burrtec	10-Feb	22-Sep	
SCVCSD	4	0	Burrtec	28-Apr		
Homeland	5	1C	WMIE	3-Feb	18-Aug	22-Jun Hemet
Romoland	5	1C	WMIE	3-Feb	18-Aug	22-Jun Hemet
Green Acres	5	1C	WMIE	3-Feb	18-Aug	22-Jun Hemet
Nuevo	5	1C	WMIE	17-Mar	22-Sep	
Lakeview*	5	1C	WMIE	17-Mar	22-Sep	
Cabazon	**5**		**CR&R**	**2-Jun**	**N/A**	**Just added 03.22.07,**
Juniper Flats*	5	1C	WMIE	17-Mar	22-Sep	
Goodhope	5	3A	WMIE	16-Jun	17-Nov	14-Apr Cyn Lake
Meadowbrook	5	3A	WMIE	16-Jun	17-Nov	14-Apr Cyn Lake
Desert Hot Springs	5	10	DVD	3-Mar	15-Sep	
Highgrove	5	3B	WMIE	3-Mar	27-Oct	

***Note: These communities were added to the regular schedule during 2006. Additional events may be added only if an organized community group requests an event 30 days prior to requested date and it is approved by District Supervisor's Office, Waste Management Department, Code Enforcement Department and Hauler. The Department will make efforts to schedule new communities during the time frame for adjacent communities that are already scheduled.**

Riverside County Community Clean Ups January 2007 - December 2007

Account	Community	Date of Event	Franchise Area	Total Loads	Total Tons	Disposal Costs	Service Costs	Comments
RVM-214664	Green Acres, Homeland, Romoland	2/3/2007	Area 1C	14	27.29	$ 870.82	$ 3,245.19	2-white good, 2-G/W
RVM-86058	Quail Valley, Winchester	2/10/2007	Area 1C	11	28.19	$ 899.54	$ 2,651.05	2-recycle
RVC-201194	Highgrove	3/3/2007	Area 3B	8	19.07	$ 608.52	$ 2,302.89	
RVM-207534	Nuevo	3/17/2007	Area 1C	18	45.04	$ 1,437.23	$ 4,203.70	
RVM-207534	Nuevo	3/17/2007	Area 1C	2	4.55	$ 204.75	$ 475.29	
RVM-209556	Mead Valley	4/28/2007	Area 1B	33	63.87	$ 2,038.09	$ 6,992.32	9 residents to T-Station
RVC-202481	Home Gardens	5/19/2007	Area 4A	2	2.5	$ 79.78	$ 653.84	
RVM-69347	3rd Dist - Bob Iverson	6/1/2007	Area 1C	7	17.24	$ 550.13	$ 1,478.74	
RVM-86046	3rd Dist - Maryann Porter	6/1/2007	Area 1C	4	11.53	$ 367.92	$ 1,098.40	
RVC-199683	Meadowbrook/Goodhope	6/16/2007	Area 3A	14	35.04	$ 1,118.13	$ 3,568.12	
RVC-199681	Meadowbrook/Goodhope	6/16/2007	Area 3A	10	23.91	$ 762.97	$ 2,527.54	
RVM-221298	Romoland, Homeland, Green Acres	8/11/2007	Area 1C	14	37.09	$ 1,222.49	$ 3,360.44	
RVM-221306	Romoland, Homeland, Green Acres	8/11/2007	Area 1C	3	11.35	$ 510.75	$ 621.93	Tire disposal paid by customer
RVM-207534	Nuevo	9/22/2007	Area 1C	27	53.58	$ 1,766.00	$ 6,055.47	
						$ -		
				167	**380.25**	**$ 12,437.11**	**$ 39,234.92**	

* Per franchise agreements, haulers are to provide 2-40 yard roll-offs per 1,000 residents serviced

Franchise Area	Required Loads Per Area/Per Year
Area 1A	4
Area 1B	6
Area 1C	87
Area 3	26

0000347

Riverside County Cleanup Campaign (Reporting Week December 4, 2006)

District #	Cleanup Date	Community/ APN	Private Property	Targeted Location	Department	Tonnage Collected	Estimated Cost (attach methodology)	Comments and Note if Photos Attached
3		964-050-001	X	Southeast corner of Auld Rd. & Pourroy Rd. (French Valley)				Referred to Code
3		964-050-002	X	Northeast corner of Mazoe St. & Pourroy Rd. (French Valley)				
3		469-220-006	?	Diamond Valley (see next description)		47.14		Diamond Valley Completed
3		469-220-007	?	L-shape Prop w/ State St on West and Santa Fe St. on east		31.74		Diamond Valley Completed
3		469-160-013	?	Beneath APN 469160023 (Diamond Valley)		51.67		Diamond Valley Completed
3	1/8/2007	469-160-023	?	Bordered w/ Sant Fe St on West & Hemet Ranch Rd on East		32.57		Diamond Valley Completed
3		361-132-008	X	**Across the street from 32865 Upton Dr(Cottonwood Canyon)**		6.52		
3		361-132-009	X	**Across the street from 32865 Upton Dr(Cottonwood Canyon)**		6.52		
3		361-132-010	X	**Across the street from 32865 Upton Dr(Cottonwood Canyon)**		6.52		
3		361-132-011	X	**Across the street from 32865 Upton Dr(Cottonwood Canyon)**		6.52		
3		361-132-012	X	**Across the street from 32865 Upton Dr(Cottonwood Canyon)**		6.52		
3		Menifee	?	**Left onto Wright Rd traveling East on Bundy Canyon**		7.06		End of Wright Rd-stay to right
3				n/e corner of Scott and Mira, Menfiee		59.68		
3				area of Olive and California for an alleged dumpsite		7.45		
3		341-200-002		Goetz Rd. going into Quail Valley, south of Vista Way		2.65		garbage and debris along side road
3		341-190-024		Canejo Dr. East of Beverly Dr. (across from 24400 Canejo Dr.)		1		car batteries, tires, plastic chair

District #	Cleanup Date	Community/ APN	Private Property	Targeted Location	Department	Tonnage Collected	Estimated Cost (attach methodology)	Comments and Note if Photos Attached
3		Quail Valley		Empty field off right of Canejo Dr. (Thomas Guide pg 867 - H 1); Make RT turn at APN 341-170-037; Garbage s located on Murphy Ranch		1		living room set in middle of field
3		351-193-062		Corner of Crosshill Dr. and Hecht Rd. (down in embankment)		1		tires in natural watercourse by trees
3		351-193-050		Hecht Rd (parcel next "East" of 23161 Hecht)		1		Exercise bike, other rubbish
3		351-193-051		Hecht Rd (parcel next "East" of 23161 Hecht)		1		see above
3		351-031-018		Cross Hill Dr., North of Winters Rd.		2.16		On Left side -rubbish, sofa, pallets
3				Casa Bonita & Streuble Lane on Right side		3.98		boxes, sofa, household appliances
3				Cassandra Dr. & Mountain View		4.11		Garbage and debris on NE corner
3				Cassandra Dr - Next to "East of" 23741 Cassandra Dr.		1.98		Garbage and debris
3				Shreeder Place- SW from 23580 Shreeder Place		0.36		piled tires, debris, sink
3				Left of "West of" 23630 Shreeder Place		0.36		Boat Mold on vacant lot
3				Shreeder Place- two parcels west right of 23709 Shreeder Pl		0.36		
3				Goetz Drive - Across the street from 23593 Goetz Drive		3.54		
3				Clark Place & Mt. Vernon		1		NE corner- sofa, debris
3				Mt. Vernon - left of 23702 Mt. Vernon		1		camper
3				Mt. Vernon - left of 23664 Mt. Vernon		1		garbage, debris
3				Mountain View btwn Elsinore Lane & Lake Dr.		0.36		garbage, debris along Mountain View
3				Parcel across from 23711 Lake Drive btwn Clark & Mountain View		1		garbage, debris, camper top
3				Elsinore Lane & Palm Dr. - Rt. Corner		0.36		dumped green waste

District #	Cleanup Date	Community/ APN	Private Property	Targeted Location	Department	Tonnage Collected	Estimated Cost (attach methodology)	Comments and Note if Photos Attached
3				23912 Elsinore Lane - on right side		0.36		sofa, garbage, debris
3				23912 Elsinore Lane - across street		1		cart filled with garbage and debris
3				23866 Elsinore Lane		1.98		old vehicle car seat sitting alongside rd.
3		350-052-049		San Jacinto Rd & Mountain View - follow dirt road of right San Jacinto (Exit is out on Circle Drive)				sofas, tires, recliner, debris-completed
3		350-052-050		San Jacinto Rd & Mountain View - follow dirt road of right San Jacinto (Exit is out on Circle Drive)				sofas, tires, recliner, debris-completed
3		350-060-007		San Jacinto Rd & Mountain View - follow dirt road of right San Jacinto (Exit is out on Circle Drive)				sofas, tires, recliner, debris-completed
3		350-060-008		San Jacinto Rd & Mountain View - follow dirt road of right San Jacinto (Exit is out on Circle Drive)				sofas, tires, recliner, debriscompleted
3		350-060-009		San Jacinto Rd & Mountain View - follow dirt road of right San Jacinto (Exit is out on Circle Drive)				sofas, tires, recliner, debris-completed
3				North Canyon Rd. & Goetz Rd. - Right corner		16.97		white Pickup truck bed
3	12/28/2006			Goetz Rd. - Across from 28584 Goetz Rd.	Trans	28.96		construction debris
3	12/29/2006			Simpson Rd near the railroad tracks	Trans	9.33		
3				Homeland, Juniper Springs Rd.,				nothing found
3				Grate Street btwn Railroad Canyon Road and Olive Street (half way down between them both) near a chain linked fence.				
3				Both sides of Marine Drive (between Dartmouth and Stanford- two alleys				
3	12/28/2006			Shreeder Place- two parcels west right of 23709 Shreeder Pl	Trans	30.2		
3	12/29/2006			Shreeder Place - off r/w	Trans	10.98		
3	1/2/2007			Sage Road South of Cactus Valley	Trans			same as Diamond Valley
3	12/27/2006			Scotts Road X Briggs Road	Trans	7.06		

	District #	Cleanup Date	Community/ APN	Private Property	Targeted Location	Department	Tonnage Collected	Estimated Cost (attach methodology)	Comments and Note if Photos Attached
	3	1/5/2007			Scotts Road X Briggs Road	Trans	19.2		
	3	1/9/2007			Scotts Road X Briggs Road	Trans	63.17		
	3	1/10/2007			Scotts Road X Briggs Road	Trans	59.68		
	3	1/11/2007			Scotts Road X Briggs Road	Trans	32.6		
	3	1/19/2007			Scotts Road X Briggs Road	Trans	79.72		
	3	1/17/2007			Scotts Road X Briggs Road	Trans	23.08		
	3				vacant land across the street from 27470 Keller Rd, Menifee				
	3	3/19/2007			Benton Rd E/O Hwy 79	Trans	1.62		
	3	3/19/2007			Thompson Rd E/O Hwy 79	Trans	1.39		
	3	3/19/2007			Sherman Rd N/O Mc Call Blvd	Trans	134.99		
	3	3/19/2007			Sherman Rd N/O Mc Call Blvd	Trans	141.15		
	3	3/21/2007			Sherman Rd	Trans	10.91		
	3	3/21/2007			Sherman Rd	Trans	26.23		
	3	3/21/2007			Valley @ Chambers	Trans	10.99		
	3	3/21/2007		x	Chambers Ave	Trans	1.89		
	3	4/4/2007		x	Chambers Ave	Trans	1.84		
	3	4/4/2007		x	Valley @ Chambers	Trans	10.99		
	3	4/4/2007		x	Sherman Road	Trans	10.91		

	District #	Cleanup Date	Community/ APN	Private Property	Targeted Location	Department	Tonnage Collected	Estimated Cost (attach methodology)	Comments and Note if Photos Attached
	3	4/4/2007		x	Sherman Road	Trans	11.23		
	3	4/4/2007		x	Benton Road	Trans	3.01		
	3	4/4/2007		x	Benton Road	Trans	0.82		
	3	4/9/2007		x	Commerce	Trans	16.81		
	3	4/11, 12, 13/2007			non-site specific locations	Trans	22.39		
	3	5/15/2007	Menifee		Matthews Road	Trans	110.53		
	3	5/16/2007	Menifee		Matthews Road	Trans	29.37		
	3	5/16/2007	Menifee		Matthews Road	Trans	44.72		
	3	6/1/2007	Quail Valley		Avenida Estrella	Trans	46.14		
	3	6/27/2007			Leon Road @ Lake Mathews Road	Trans	3.81		
	3	6/27/2007			Antelope Road	Trans	2.31		
	3	7/13/2007			Simpson Rd	Trans	0.78		
	3	7/13/2007			Scott Road	Trans	0.28		
	3	7/13/2007			Scott Road	Trans	0.34		
	3	7/13/2007			Benton Road	Trans	0.31		
	3	7/13/2007			Lost Road	Trans	0.19		
	3	7/13/2007			Antelope Road	Trans	4.85		
	3	7/13/2007			Antelope Road	Trans	1.75		

District #	Cleanup Date	Community/ APN	Private Property	Targeted Location	Department	Tonnage Collected	Estimated Cost (attach methodology)	Comments and Note if Photos Attached
3	7/13/2007			Leon Road	Trans	4.35		
3	7/13/2007			Leon Road	Trans	3.17		
3	7/13/2007			Leon Road	Trans	1.36		
3	7/13/2007			Leon Road	Trans	0.74		
3	7/19/2007			Lost Road	Trans	0.41		
3	7/19/2007			Sun City Blvd	Trans	2.06		
3	7/19/2007			Bradley Road	Trans	2.56		
3	7/19/2007			Simpson Road	Trans	2.08		
3	7/19/2007			Encanto Dr	Trans	2.81		
3	8/6/2007			Simpson Road	Trans	2.67		
3	8/6/2007			Alessandro Blvd @ Ramona Expressway	Trans	0.2		
3	8/6/2007			Gilman Springs Road	Trans	0.57		
3	8/6/2007			Gilman Springs Road	Trans	0.88		
3	8/6/2007			Marine Drive	Trans	6.55		
3	1/5/2007	Winchester		Richmond Road	Wmgmt	2.15		
3	1/6/2007	Menifee		Lesser Ln	Wmgmt	0.82		
3	1/8/2007	Homeland		Ruth Ln	Wmgmt	0.95		
3	1/8/2007	Homeland		Gilmore Rd	Wmgmt	0.74		

District #	Cleanup Date	Community/ APN	Private Property	Targeted Location	Department	Tonnage Collected	Estimated Cost (attach methodology)	Comments and Note if Photos Attached
3	1/8/2007	Homeland		Minton	Wmgmt	0.8		
3	1/10/2007	Hemet		Brown Rd/Marine Drive	Wmgmt	4.07		
3	1/11/2007	Hemet		Brown Rd/Marine Drive	Wmgmt	21		
3	1/19/2007	Hemet		Brown Rd/Marine Drive	Wmgmt	1.89		
3	1/24/2007	Hemet		Brown Rd/Marine Drive	Wmgmt	0.1		
3	2/7/2007	Hemet		Brown Rd	Wmgmt	1.77		
3	2/21/2007	Menifee		La Piedra Rd	Wmgmt	1.02		
3	3/2/2007	Homeland		Watson Rd	Wmgmt	3.34		
3	3/2/2007	Homeland		Watson Rd	Wmgmt	2.53		
3	3/14/2007	Winchester		Richmond Road	Wmgmt	0.93		
3	3/14/2007	Winchester		Richmond Road	Wmgmt	0.56		
3	3/14/2007	Winchester		Richmond Road	Wmgmt	2.56		
3	3/17/2007	Menifee		Scenic View Drive	Wmgmt	2.46		
3	3/17/2007	Winchester		Juniper Springs	Wmgmt	1.3		
3	3/17/2007	Homeland		Watson Rd	Wmgmt	1.29		
3	3/23/2007	Hemet		Saddle Ridge Road	Wmgmt	3.57		
3	4/11/2007	Menifee		McLaughlin Rd	Wmgmt	19.39		
3	4/12/2007	Sun City		MacLaughlin	Wmgmt	5.74		

District #	Cleanup Date	Community/ APN	Private Property	Targeted Location	Department	Tonnage Collected	Estimated Cost (attach methodology)	Comments and Note if Photos Attached
3	4/18/2007	Menifee		Scenic View Drive	Wmgmt	2.5		
3	4/25/2007	Menifee		Scenic View Drive	Wmgmt	10.96		
3	4/27/2007	Sun City		MacLaughlin	Wmgmt	1.97		
3	5/9/2007	Winchester		Watson Rd	Wmgmt	1.54		
3	5/9/2007	Winchester		Richmond Road	Wmgmt	1.48		
3	5/24/2007	Hemet		Olive St	Wmgmt	2.37		
3	5/25/2007	Hemet		alleys	Wmgmt	1.46		
3	6/5/2007	Homeland		Falcon View Ln	Wmgmt	2.59		
3	6/20/2007	Menifee		Lesser Ln	Wmgmt	1.37		
3	6/22/2007	Menifee		Yucca	Wmgmt	0.85		
3	6/25/2007	Menifee		Yucca	Wmgmt	1.09		
3	6/25/2007	Menifee		Howard Road	Wmgmt	1.2		
3	6/26/2007	Menifee		Yucca	Wmgmt	1.98		
3	6/26/2007	Menifee		Yucca	Wmgmt	2.02		
3	6/29/2007	Hemet		Unnamed brown road	Wmgmt	0.4		
3	6/29/2007	Hemet		Saddle Ridge Road	Wmgmt	0.74		
3	7/17/2007	Winchester		Richmond Road	Wmgmt	1.53		
3	8/20/2007			Briggs Road	Trans	8.93		

	District #	Cleanup Date	Community/ APN	Private Property	Targeted Location	Department	Tonnage Collected	Estimated Cost (attach methodology)	Comments and Note if Photos Attached
	3	8/20/2007			Goetz Road	Trans	2.05		
	3	8/20/2007			Goetz Road	Trans	1.09		
	3	8/20/2007			Rancho California	Trans	0.18		
	3	8/20/2007			State St	Trans	1.33		
	3	8/20/2007			Simpson Rd	Trans	0.83		
	3	8/20/2007			Domenegoni	Trans	2.38		
	3	8/20/2007			Leon Rd	Trans	0.57		
	3	8/20/2007	Hemet		9th St	Trans	0.56		
	3	9/6/2007			Valley	Trans	3.9		
	3	9/6/2007			Rouse Rd	Trans	1.04		
	3	9/6/2007			Matthews Road	Trans	21.67		
	3	9/6/2007			Simpson Rd	Trans	56.43		
	3	9/6/2007			Olive St	Trans	12.7		
	3	9/6/2007			Alessandro Blvd @ Ramona Expressway	Trans	1.49		
	3	9/6/2007			Bundy Canyon	Trans	4.14		
	3	9/17/2007			Buck Road	Trans	2.59		
	3	9/17/2007			Buck Road	Trans	4.56		
	3	9/27/2007			Buck Road	Trans	5.26		

Riverside County Cleanup Campaign (Reporting Week October 16-20)

	District #	Cleanup Date	Community/ APN	Private Property	Targeted Location	Department	Tonnage Collected	Estimated Cost (attach methodology)	Comments and Note if Photos Attached
1.1	2		182290019		Riverview Dr X Mission Blvd	EDA			Cleaned
2	2	10/4/2006	177250010		La Rue and Mission	Transportation	0.05		
2.1	2	4/4/2007		x	La Rue	Transportation	4.2		
3	2	10/18/2006	182032009		Opal before Mission	Transportation			Tonnage Pending
4	2	10/4/2006	182031001		Mission and Stobbs	Sheriff/Trans			exception: homeless encampment
5	2		183020002		S.E. of Mission and Camino Real West	EDA			Cleaned
6	2		171260013		West of Pyrite and Mission				
7	2		170041028		Mission and Bellgrave		33.89		
8	2		167110002		Galena to Van Buren	Transportation			
9	2		170340017		Rutile and Van Buren Roadway				
10	2		171030001		Pyrite and Granite Hill				
11	2	10/23/2006	182190012		Pacific Avenue	Transportation	0.34		
12	2	10/19/2006	177130007		Canal St and Opal	Transportation	11.7		& 10/19 -9 hours
13	2	10/18/2006	177210001		Canal East of Pacific	Transportation	18.69		Possible Cameras location
14	2	10/19/2006	178212020		28th and Rubidoux	Transportation	5.58		
15	2		179180010		34th and Wallace				Chain Link Fenced
16	2	10/2/2006	156200003		Van Buren Blvd-from the Santa Ana River, N to Eitwanda				Tonnage Pending
17	2		170030004		Mission Blvd.-from the Santa Ana River W to Pedley Rd		13.67		
18	2	10/2/2006	163152021		Limonite Ave.-from Mission Blvd. to Van Buren Blvd.	Transportation			Tonnage Pending
19	2	10/3/2006	167330003		Galena St.-from Jurupa Rd. to Van Buren Blvd.	Transportation	0.52		
20	2	10/3/2006	167231002	X	Jurupa Rd.-from Mission Blvd. to Van Buren Blvd.	Transportation	0.97		
20.1	2	1/22/2007	167231002	X	Jurupa Rd.-from Mission Blvd. to Van Buren Blvd.	Transportation	57.31		
20.2	2	1/23/2007	167231002	X	Jurupa Rd.-from Mission Blvd. to Van Buren Blvd.	Transportation	121.65		
20.2	2	1/24/2007	167231002	X	Jurupa Rd.-from Mission Blvd. to Van Buren Blvd.	Transportation	91.6		
20.3	2	1/25/2007	167231002	X	Jurupa Rd.-from Mission Blvd. to Van Buren Blvd.	Transportation	23.07		
20.4	2	1/25/2007	167231002	X	Jurupa Rd.-from Mission Blvd. to Van Buren Blvd.	Transportation	6.54		
21	2	10/5/2006	174150011	X	Granite Hill from Soto to Quartz Canyon (Glen Avon)	Transportation	19.66		1
21.1	2	10/6/2006	174150011		Granite Hill from Soto to Quartz Canyon (Glen Avon)	Transportation	7.17		
21.2	2	10/10/2006	174150011	X	Granite Hill from Soto to Quartz Canyon (Glen Avon)	Transportation	22.05		
21.3	2	10/10/2006	174150011	X	Granite Hill from Soto to Quartz Canyon (Glen Avon)	Transportation	22.11		

	District #	Cleanup Date	Community/ APN	Private Property	Targeted Location	Department	Tonnage Collected	Estimated Cost (attach methodology)	Comments and Note if Photos Attached
21.4	2	10/11/2006	174150011	X	Granite Hill from Soto to Quartz Canyon (Glen Avon)	Transportation	13.67		
21.5	2	10/24/2006	174150011	X	Granite Hill from Soto to Quartz Canyon (Glen Avon)	Transportation	5.58		
22	2	10/12/2006	177130007		Canal St x Pacific x La Canada- all along the railroad tracks	Transportation	7.99		
23	2	10/16/2006			La Canada (Pacific Ave. to La Rue)	Transportation	17.45		
24	2	10/19/2006			La Canada at Joel St.	Transportation	3.86		
25	2		170330030		Bellegrave x Bain (Mira Loma)	Transportation	2.06		1
26	2		170350057	x	Muth x Orco Pkwy (off Galena between Felspar and Rutile) -	WMDepartment	4.84		
26.1	2	4/4/2007		x	Muth x Orco Pkwy (off Galena between Felspar and Rutile) -	Transportation	2.01		
27	2	2/15/2007	174360001	x	Sierra x 30th - (Rubidoux)	WMDepartment	1.6		1
28	2	10/12/2006	177130007		Canal St west of Patricia (just west of Pacific)	Transportation/WM	3.89		
29	2	10/16/2006	162110007		58th x Ash (Mira Loma)	WMDepartment/Tr	8.3		1
29.2	2	10/24/2006	162110007		58th x Ash (Mira Loma)	Transportation	0.01		1
30	2	10/13/2006	135050004	X	Grant x Indiana (Home Gardens)	Transportation	8.7		Hazardous Waste Collected
30.1	2		135050004		Grant x Indiana (Home Gardens)		16.69		
30.2		12/21/2006	135050004		Grant x Indiana (Home Gardens)		4.36		
31	2	10/3/2006	166540022	X	Swing Dr. x Northwood Dr. (near Golf St.)	Transportation	19.51		
32	2	10/2/2006	169070025		Ben Nevis (from Mission to Pedley)	Transportation	23.05		street - 6.5
32.1	2	2/20/2007		x	Ben Nevis (from Mission to Pedley)	Transportation	0.52		
33	2	10/2/2006	183112014		Valley X Mission	Transportation	13.67		
34	2	10/19/2006	173020566	X	SE Corner of Philadelphia and Country Village	Transportation	26.18		
34.2		10/20/2006	173020566	X	SE Corner of Philadelphia and Country Village	Transportation	47.7		
34.3		10/23/2006	173020566	X	SE Corner of Philadelphia and Country Village	Transportation	73.73		
35	2				Golf Street and Jurupa Road	Transportation	19.51		
35.1	2	3/5/2007		x	Golf Street and Jurupa Road	Transportation	0.1		
35.2	2	3/19/2007		x	Golf Street and Jurupa Road	Transportation	0.1		
36	2		179060007		Avalon and Alta (59th Street)				
37	2	10/5/2006	161020005		54th Street	WM Department	0.87		
37.1	2	10/19/2006	161020005		54th Street	WM Department	0.58		
38	2	10/5/2006	167090022		52nd Street	WMDepartment	0.87		
39	2	10/16/2006	162110004		Serendipity & 58th	Transportation/WM	8.72		
39.1	2	10/16/2006	162170001		Serendipity & 58th	Transportation			
40	2	10/19/2006			63rd Street	WMDepartment	1.93		
41	2	10/12/2006			Bain St. at Galena St	Transportation	6.17		

	District #	Cleanup Date	Community/ APN	Private Property	Targeted Location	Department	Tonnage Collected	Estimated Cost (attach methodology)	Comments and Note if Photos Attached
41.1	2	4/4/2007			Bain St. at Galena St	Transportation	5.3		
42	2	10/24/2006			Beach St. (near Limonite Ave	Transportation	8.69		
43	2	10/24/2006		X	Country Village Rd. @ Wagon Way	Transportation	3.34		
44	2	10/30/2006	115261033		Ellis @ Magnolia Ave.	Transportation	2.09		
45	2	3/7/2007		x	68th X 15Fwy	Transportation	1.04		
45.1	2	4/4/2007		x	68th X 15Fwy	Transportation	1.56		
45.2	2	6/18/2007			68th X 15Fwy	Transportation	1.52		
46	2				Mission X Agate	Transportation			
47	2			X	Riverview x Rio Rd	Transportation			
48	2	2/15/2007			Union Street at Bellegrave Ave	Transportation	2.61		
49	2	2/20/2007			Bellegrave at Glen Street	Transportation	6.06		
49.1	2	2/20/2007			Bellegrave at Glen Street	Transportation	3.13		
50	2	2/6/2007			Granite Hill Drive	Transportation	1.14		
50.1	2	4/4/2007		x	Granite Hill Drive	Transportation	2		
50.2	2	6/27/2007			Granite Hill Drive	Transportation	1.81		
50.3	2	6/27/2007			Granite Hill Drive	Transportation	1.99		
51	2	3/1/2007			Etiwanda Avenue	Transportation	0.81		
51.1	2	3/19/2007			Etiwanda Avenue	Transportation	0.31		
52	2	3/5/2007			Limonite Avenue	Transportation	2.34		
52.1	2	3/6/2007			Limonite Avenue	Transportation	1.08		
52.2	2	3/19/2007			Limonite Avenue	Transportation	0.76		
52.3	2	3/19/2007			Limonite Avenue	Transportation	0.47		
52.4	2	3/19/2007			Limonite Avenue	Transportation	1.08		
52.5	2	3/19/2007			Limonite Avenue	Transportation	0.6		
52.6	2	3/19/2007			Limonite Avenue	Transportation	0.98		
53	2	3/19/2007			Limonite Avenue	Transportation	2.51		
53.1	2	6/1/2007			Limonite Avenue	Transportation	1.92		
53.2	2	6/18/2007			Limonite Avenue	Transportation	1.65		
53.3	2	6/18/2007			Limonite Avenue	Transportation	1.1		
54	2	3/13/2007			Neece and Indiana	City of Corona	43		
55	2	4/4/2007		x	Galena Street	Transportation	2.55		
56	2	4/4/2007		x	Brookhollow Ave	Transportation	2.43		
56.1	2	4/4/2007		x	Brookhollow Ave	Transportation	3.29		

	District #	Cleanup Date	Community/ APN	Private Property	Targeted Location	Department	Tonnage Collected	Estimated Cost (attach methodology)	Comments and Note if Photos Attached
57	2	4/4/2007		x	Bellegrave	Transportation	1.41		
57.1	2	4/4/2007		x	Bellegrave	Transportation	1.41		
57.2	2	4/4/2007		x	Bellegrave	Transportation	1.19		
57.3	2	6/1/2007			Bellegrave	Transportationj	3.95		
58	2	4/4/2007		x	34th @ Rubidoux Blvd	Transportation	2.51		
59	2	4/4/2007		x	Canal Street	Transportation	3.63		
60	2				Jurupa Clean up (from Dist. 1 list)	Env. Health	11.04		
61	2	4/16/2007	Rubidoux		Pedley Road	Transportation	3.12		
62	2	4/16/2007	Rubidoux		Van Buren Blvd	Transportation	4.57		
62.1	2	4/26/2007	Rubidoux		Van Buren Blvd	Transportation	0.57		
62.2	2	4/26/2007	Rubidoux		Van Buren Blvd	Transportation	0.16		
62.3	2	6/18/2007	Rubidoux		Van Buren Blvd	Transportation	2.92		
62.4	2	6/27/2007	Rubidoux		Van Buren Blvd	Transportation	3.86		
62.5	2	6/27/2007	Rubidoux		Van Buren Blvd	Transportation	3.2		
62.6	2	6/27/2007	Rubidoux		Van Buren Blvd	Transportation	2.87		
63	2	4/26/2007			Riverside Drive	Transportation	0.57		
64	2	4/26/2007			Mission Blvd.	Transportation	0.21		
64.1	2	4/26/2007			Mission Blvd	Transportation	0.29		
64.2	2	4/26/2007			Mission Blvd	Transportation	2.19		
64.3	2	4/26/2007			Mission Blvd	Transportation	6.96		
64.4	2	7/13/2007			Mission Blvd	Transportation	3.26		
64.5	2	7/13/2007			Mission Blvd	Transportation	4.56		
64.4	2	6/1/2007			Mission Blvd	Transportation	4.03		
65	2	5/10/2007			Pedley Road x 63rd - Homeless Encampment	Transportation	1.12		
65.1	2	5/10/2007			Pedley Road x 63rd - Homeless Encampment	Transportation	3.1		
65.2	2	5/10/2007			Pedley Road x 63rd - Homeless Encampment	Transportation	0.56		
66	2	5/10/2007			Jurupa Road @ Pyrite	Transportation	1.2		
66.1	2	5/10/2007			Jurupa Road @ Pyrite	Transportation	0.92		
67	2	5/10/2007			Sierra Avenue	Transportation	2.95		
68	2	6/1/2007	Rubidoux		Rubidoux Blvd	Transportation	5.01		
69	2	6/18/2007			37th Street	Transportation	7.1		
70	2	6/18/2007	Jurupa		Clay Street	Transportation	1.52		
70.1	2	6/18/2007	Jurupa		Clay Street	Transportation	0.67		

	District #	Cleanup Date	Community/ APN	Private Property	Targeted Location	Department	Tonnage Collected	Estimated Cost (attach methodology)	Comments and Note if Photos Attached
71	2	6/27/2007			56th Street	Transportation	5.5		
72	2	6/27/2007	Mira Loma		Felspar	Transportation	2.58		
73	2	6/27/2007			River Road	Transportation	2.58		
73.1	2	6/27/2007			River Road	Transportation	2.66		
73.2	2	6/27/2007			River Road	Transportation	2.53		
74	2	8/6/2007			Pedley Road	Transportation19	1.93		
75	2	8/6/2007			Van Buren	Trans	4.75		
76	2	8/6/2007			Bellegrave	Trans	0.84		
77	2	8/6/2007			Van Buren @ Mission Blvd	Trans	2.66		
78	2	6/27/2007	Mira Loma		Felspar St, Hudson St. and Limonite Ave	Transportation	3.07		
79	2				Not Site Specific		702.57		
80	2	8/6/2007	Rubidoux		Wallace Street	Trans	1.38		
81	2	8/6/2007	Rubidoux		Hall Ave	Trans	2.75		
82	2	1/23/2007	Glen Avon		Orco Pkwy	WMgmt	1.2		
83	2	1/23/2007	Glen Avon		Canal St	WMgmt	1.1		
84	2	1/24/2007	Mira Loma		Bain St.	WMgmt	2.84		
85	2	1/30/2007	Mira Loma		Bain St	Wmgmt	23.27		
86	2	1/30/2007	Mira Loma		Bain St	WMgmt	6.47		
87	2	1/31/2007	Mira Loma		Bain St	WMgmt	5.95		
88	2	1/31/2007	Mira Loma		Bain St	WMgmt	13.62		
89	2	1/31/2007	Mira Loma		Bain St	WMgmt	12.72		
90	2	1/31/2007	Mira Loma		Bain St	WMgmt	12.72		
91	2	2/5/2007	Mira Loma		Bain St	WMgmt	13.88		
92	2	2/6/2007	Mira Loma		Bain St	WMgmt	33.83		
93	2	2/7/2007	Mira Loma		Bain St	WMgmt	24.44		
94	2	3/2/2007	Glen Avon		Canal Rd	WMgmt	1.33		
95	2	5/31/2007	Glen Avon		Canal Rd	WMgmt	1.01		
96	2	5/31/2007	Glen Avon		Lindsay Rd	WMgmt	0.39		
97	2	6/1/2007	Glen Avon		Canal Rd	WMgmt	0.86		
98	2	6/1/2007	Glen Avon		Soto St	WMgmt	0.26		
99	2	6/20/2007	Mira Loma		Orco Pkwy	WMgmt	1.2		
100	2	6/20/2007	Mira Loma		63rd Street	WMgmt	0.72		
101	2	7/2/2007	Jurupa		Canal Rd	WMgmt	0.71		

	District #	Cleanup Date	Community/ APN	Private Property	Targeted Location	Department	Tonnage Collected	Estimated Cost (attach methodology)	Comments and Note if Photos Attached
102	2	7/2/2007	Jurupa		54th Street	WMgmt	1.05		
103	2	7/2/2007	Jurupa		Soto St	WMgmt	0.87		
104	2	7/18/2007	Glen Avon		Canal Rd	WMgmt	0.74		
105	2	9/6/2007	Jurupa		Jurupa Rd	Trans	2.54		
106	2	9/6/2007	Glen Avon		Mission Blvd	Trans	0.38		
107	2	9/6/2007			Galena	Trans	0.32		
108	2	9/6/2007			Galena	Trans	0.58		
109	2	9/6/2007	Glen Avon		Mission	Trans	2.66		
110	2	9/6/2007	Pedley		Pedley Rd	Trans	2.05		
111	2	9/6/2007			Limonite	Trans	0.52		
112	2	9/6/2007			Van Buren	Trans	0.49		
113	2	9/17/2007			Van Buren	Trans	0.62		
114	2	9/17/2007			Limonite Avenue	Trans	0.42		
115	2	9/17/2007			Linares Ave	Trans	0.39		
116	2	9/17/2007			Jurupa Rd	Trans	2.09		
117	2	9/17/2007			River Road	Trans	5.66		
118	2	9/17/2007			River Road	Trans	2.93		
119	2	9/17/2007			River Road	Trans	5.93		
120	2	9/17/2007			River Road	Trans	5.06		
121	2	9/17/2007			River Road	Trans	3.07		
122	2	9/27/2007	Home Gard		Neece and Indiana	Trans	1.74		
123	2	9/27/2007	El Cerritos		Liberty Ln	Trans	47.98		
124	2	9/27/2007			Odell St.	Trans	5.17		
125	2	9/27/2007			Mission Blvd	Trans	2.34		
126	2	9/27/2007			Canal St	Trans	17.67		
	2								
	2								
	2								
	2								

Patrol and Surveillance (Reporting Week October 10-16)

	District	Targeted Location	Date and Time	Community/ APN	Private Property	Citation	Camera Deployed(Yes/No)	Estimated Costs (attach methodology)	Comments and Note if Photos Attached
0	3	Southeast corner of Auld Rd. & Pourroy Rd. (French Valley)		964-050-001	X				
0	3	Northeast corner of Mazoe St. & Pourroy Rd. (French Valley)		964-050-002	X				
0	3	Diamond Valley (see next description)		469-220-006	?				
0	3	L-shape Prop w/ State St on West and Santa Fe St. on east		469-220-007	?				
0	3	Beneath APN 469160023 (Diamond Valley)		469-160-013	?				
0	3	Bordered w/ Sant Fe St on West & Hemet Ranch Rd on East		469-160-023	?				
0	3	Across the street from 32865 Upton Dr(Cottonwood Canyon)		361-132-008	X				
0	3	Across the street from 32865 Upton Dr(Cottonwood Canyon)		361-132-009	X				
0	3	Across the street from 32865 Upton Dr(Cottonwood Canyon)		361-132-010	X				
0	3	Across the street from 32865 Upton Dr(Cottonwood Canyon)		361-132-011	X				
0	3	Across the street from 32865 Upton Dr(Cottonwood Canyon)		361-132-012	X				
0	3	Left onto Wright Rd traveling East on Bundy Canyon		Menifee	?				
0	3	n/e corner of Scott and Mira, Menfiee			0	0			
0	3	area of Olive and California for an alleged dumpsite			0	0			
0	3	Goetz Rd. going into Quail Valley, south of Vista Way		341-200-002		0			
0	3	Canejo Dr. East of Beverly Dr. (across from 24400 Canejo Dr.)		341-190-024		0			
0	3	Empty field off right of Canejo Dr. (Thomas Guide pg 867 - H 1); Make RT turn		Quail Valley		0			
0	3	Corner of Crosshill Dr. and Hecht Rd. (down in embankment)		351-193-062		0			
0	3	Hecht Rd (parcel next "East" of 23161 Hecht)		351-193-050		0			
0	3	Hecht Rd (parcel next "East" of 23161 Hecht)		351-193-051		0			
0	3	Cross Hill Dr., North of Winters Rd.		351-031-018		0			
0	3	Casa Bonita & Streuble Lane on Right side			0	0			
0	3	Cassandra Dr. & Mountain View			0	0			
0	3	Cassandra Dr - Next to "East of" 23741 Cassandra Dr.			0	0			
0	3	Shreeder Place- SW from 23580 Shreeder Place			0	0			
0	3	Left of "West of" 23630 Shreeder Place			0	0			
0	3	Shreeder Place- two parcels west right of 23709 Shreeder Pl			0	0			
0	3	Goetz Drive - Across the street from 23593 Goetz Drive			0	0			
0	3	Clark Place & Mt. Vernon			0	0			
0	3	Mt. Vernon - left of 23702 Mt. Vernon			0	0			
0	3	Mt. Vernon - left of 23664 Mt. Vernon			0	0			
0	3	Mountain View btwn Elsinore Lane & Lake Dr.			0	0			
0	3	Parcel across from 23711 Lake Drive btwn Clark & Mountain View			0	0			
0	3	Elsinore Lane & Palm Dr. - Rt. Corner			0	0			
0	3	23912 Elsinore Lane - on right side			0	0			
0	3	23912 Elsinore Lane - across street			0	0			
0	3	23866 Elsinore Lane			0	0			
0	3	San Jacinto Rd & Mountain View - follow dirt road of right San Jacinto (Exit is o		350-052-049		0			
0	3	San Jacinto Rd & Mountain View - follow dirt road of right San Jacinto (Exit is o		350-052-050		0			
0	3	San Jacinto Rd & Mountain View - follow dirt road of right San Jacinto (Exit is o		350-060-007		0			

Patrol and Surveillance (Reporting Week October 10-16)

	District	Targeted Location	Date and Time	Community/ APN	Private Property	Location	Camera Deployed(Yes/No)	Estimated Costs (attach methodology)	Comments and Note if Photos Attached
0	3	San Jacinto Rd & Mountain View - follow dirt road of right San Jacinto (Exit is o		350-060-008	0				
0	3	San Jacinto Rd & Mountain View - follow dirt road of right San Jacinto (Exit is o		350-060-009	0				
0	3	North Canyon Rd. & Goetz Rd. - Right corner		0	0				
0	3	Goetz Rd. - Across from 28584 Goetz Rd.		0	0				
0	3	Simpson Rd near the railroad tracks		0	0				
0	3	Homeland, Juniper Springs Rd.,		0	0				
0	3	Grate Street btwn Railroad Canyon Road and Olive Street (half way down betw		0	0				
0	3	Both sides of Marine Drive (between Dartmouth and Stanford- two alleys		0	0				
0	3	Shreeder Place- two parcels west right of 23709 Shreeder Pl		0	0				
0	3	Shreeder Place - off r/w		0	0				
0	3	Sage Road South of Cactus Valley		0	0				
##	##		#REF!	#REF!	###				
##	##		#REF!	#REF!	###				
##	##		#REF!	#REF!	###				
##	##		#REF!	#REF!	###				
0	3	Scotts Road X Briggs Road		0	0				
0	3	Scotts Road X Briggs Road		0	0				
0	3	Scotts Road X Briggs Road		0	0				
0	3	Scotts Road X Briggs Road		0	0				
0	3	Scotts Road X Briggs Road		0	0				
0	3	Scotts Road X Briggs Road		0	0				
0	3	Scotts Road X Briggs Road		0	0				
0	3	vacant land across the street from 27470 Keller Rd, Menifee		0	0				
0	3	Benton Rd E/O Hwy 79		0	0				
0	3	Thompson Rd E/O Hwy 79		0	0				
0	3	Sherman Rd N/O Mc Call Blvd		0	0				
0	3	Sherman Rd N/O Mc Call Blvd		0	0				
0	3	Sherman Rd		0	0				
##	##		#REF!	#REF!	###				
0	##		#REF!	#REF!	###				
0	3	Valley @ Chambers		0	0				
0	3	Chambers Ave		0	x				
0	3	Chambers Ave		0	x				
0	3	Valley @ Chambers		0	x				
0	3	Sherman Road		0	x				
0	3	Sherman Road		0	x				
0	3	Benton Road		0	x				
0	3	Benton Road		0	x				
0	3	Commerce		0	x				
0	3	non-site specific locations		0	0				
0	3	Matthews Road		Menifee	0				
0	3	Matthews Road		Menifee	0				
0	3	Matthews Road		Menifee	0				

Household Hazardous Waste

During FY 2006-2007, eight (8) HHW collection events were held within the SMR. The ABOP? events were staged at the County's Transportation Maintenance Yard in Murrieta and serviced a total of 1,460 participants. Approximately 93,700 pounds of HHW were collected. Additionally, approximately 76,500 pounds of HHW were collected in the rural HHW collection event. Approximately 350 participants attended the event. The ABOP facility was open for a total of 40 Saturdays, servicing 1,740 participants. Approximately 89,400 pounds of ABOP wastes were collected. A detailed breakdown of the HHW and ABOP waste streams is included on the next page

	FY05-06	FY06-07
HHW Participants	1,238	1,460
HHW Collected (lbs)	78,000	93,700
ABOP Participants	1,490	1,740
ABOP Collected (lbs)	63,000	89,400
HHW Rural Participants		350
HHW Rural Collected (lbs)		76,500
Total Participants	**2,728**	**3,550**
Total Collected (lbs)	**141,000**	**259,600**

Riverside County Waste Management Department
Household Hazardous Waste Collection Program
FY 2006/2007 Activities in
Santa Margarita Watershed

Location	Service Dates	Number of Service Days in FY 2006/2007	Cost	Number of HHW Vehicles	Number of E-Waste Vehicles	Total Vehicles	Batteries (Auto) (lbs) 45#/unit	Nicad/ Lithium Batteries (lbs)	Waste Oil (lbs) 8.5 lb/gal	Anti-Freeze (lbs) 8.5 lb/gal	Latex Paint (lbs) 10 lb/gal	Oil Filters (lbs)	Alkaline Batteries (lbs)	Mercury (lbs)	Propane (lbs)	Paint Related (lbs)	Fluor. Tubes (lbs) 0.2 lbs/linear foot	Flam. Solid/Liq (lbs)	Reuse (lbs)	Poison (lbs)	Acid (lbs)	Base (lbs)	Oxidizer (lbs)	Other (lbs)	Aerosols (lbs)	Asbestos (lbs)	Sharps (lbs)	CRTs (lbs)	Misc E-waste (lbs)	Total Pounds Shipped
Murrieta ABOP HHW Collection Facility																														
	All non-holiday Saturdays	42	$18,320	1,713	0	1,713	17,323	291	21,675	2,238	40,000	435	1,393																	83,355
Temporary HHW Collection Facility (THHWCF) Events																														
Aguanga	10/7/2006	1	$2,500	15	0	15	800	0	600	0	600	25	0	0	0	0	40	50	0	150	0	15	0	0	10	0	0	480	0	2,770
Aguanga	6/9/2007	1	$2,500	14	6	20	647	0	170	85	50	5	13	0	45	0	0	398	0	0	0	0	0	0	35	0	0	874	0	2,322
Subtotal		2	$5,000	29	6	35	1,447	0	770	85	650	30	13	0	45	0	40	448	0	150	0	15	0	0	45	0	0	656	0	4,394
Anza	9/16/2006	1	$8,701	113	30	143	4,485	35	5,100	0	2,000	45	60	20	260	2,400	5	3,005	0	240	55	200	130	0	100	0	8	6,360	2,675	27,183
Anza	12/2/2006	1	$5,000	54	14	68	1,270	6	2,125	0	500	7	15	0	322	528	0	828	0	131	0	62	0	0	57	75	7	2,281	1,300	9,514
Anza	3/10/2007	1	$2,500	34	14	48	1,856	15	1,275	43	500	20	66	5	50	220	0	494	0	152	16	32	0	0	50	0	10	2,737	456	7,997
Subtotal		3	$16,201	201	58	259	7,611	56	8,500	43	3,000	72	141	25	632	3,148	5	4,327	0	523	71	294	130	0	207	75	25	11,378	4,431	44,694
Pinyon Flats	11/4/2006	1	$2,500	15	5	20	200	0	300	0	0	20	25	0	0	500	20	200	0	0	0	0	0	0	10	0	0	600	500	2,375
Pinyon Flats	5/5/2007	1	$5,000	57	5	62	2,245	0	1,275	20	1,000	10	25	0	145	1,200	10	1,450	0	100	45	25	70	0	75	0	3	293	1,850	9,841
Subtotal		2	$7,500	72	10	82	2,445	0	1,575	20	1,000	30	50	0	145	1,700	30	1,650	0	100	45	25	70	0	85	0	3	893	2,350	12,216
Temecula	9/16/2006	1	$20,636	268	53	321	2,430	27	2,125	340	5,000	86	186	9	351	2,213	73	2,702	114	1,197	167	511	372	14	413	0	96	4,632	3,680	26,738
Temecula	1/27/2007	1	$31,416	408	73	481	2,711	78	3,060	128	8,059	63	479	5	682	9,984	121	4,968	100	2,316	243	181	226	9	672	0	94	11,131	10,955	56,265
Temecula	5/12/2007	1	$19,250	250	55	305	1,963	53	1,105	425	4,100	30	211	7	606	2,560	193	2,599	263	597	186	150	115	5	374	0	60	6,649	3,972	26,223
Subtotal		3	$71,302	926	181	1,107	7,104	158	6,290	893	17,159	179	876	21	1,639	14,757	387	10,269	477	4,110	596	842	713	28	1,459	0	250	22,412	18,607	109,226
TOTAL THHWCF		10	$100,003	1,228	255	1,483	18,607	214	17,135	1,041	21,809	311	1,080	46	2,461	19,605	462	16,694	477	4,883	712	1,176	913	28	1,796	75	278	35,339	25,388	170,530
TOTAL AMOUNTS FROM ALL HHW FACILITY TYPES IN SANTA MARGARITA WATERSHED																														
		52	$118,323	2,941	255	3,196	35,930	505	38,810	3,279	61,809	746	2,473	46	2,461	19,605	462	16,694	477	4,883	712	1,176	913	28	1,796	75	278	35,339	25,388	253,885

HAZARDOUS WASTE FOUND AND PROPERLY MANAGED AT LANDFILL SITES
No Landfill sites located in this watershed.

Environmental Health Septic and Sewage Spill Report

Environmental Resources Management Division: The Environmental Resources Management (ERM) Division is responsible for several programs including regulatory compliance for solid waste issues as the Local Enforcement Agency (LEA), water engineering (wells and onsite wastewater systems), Local Oversight Program (leaking underground storage tanks), environmental compliance construction plan review for development projects, and medical waste. On sewage releases of greater than 1000 gallons ERM provides cleanup and abatement requirements to responsible parties and provides spill notification reports to various governmental entities, agencies, departments, and the press. From July 1, 2006 through June 30, 2007, one major discharge occurred in the Watershed. This incident took place on November 14, 2006 when eight hundred thousand (800,000) gallons of untreated sewage were released to Murrieta Creek from a ruptured 10 inch force main (see attached Sewage Release/Spill Notification and Office of Emergency Services reports). ERM also makes referrals to franchise trash haulers and County departments for collection of trash illegally disposed of on public and private lands. As the LEA they investigate illegal and un-permitted landfills.

In July of 2007 ERM established a septic tank prohibition in the Cherry Valley community. This measure was taken in an attempt to curtail the ongoing nitrate degradation of the underlying groundwater basin – the only source of drinking water for the Banning Pass Communities. The prohibition was enacted under Riverside County Ordinance No. 871 (attached), and although the Cherry Valley Area is not contributory to the Santa Margarita Watershed, it does demonstrate the kind of action that can be taken to protect threatened water resources in any area of the County.

INCIDENT NO. SA-06-08

SEWAGE RELEASE/SPILL NOTIFICATION

☒ ***Major***
☐ ***Minor***
☐ ***Non Reportable***

From the Riverside County Health Services Agency, Department of Environmental Health (951)955-8980

The Department of Environmental Health has been advised by:
The Regional Water Quality Control Board for
☐ Santa Ana ☐ San Diego ☐ Colorado
☒ The Governors Office of Emergency Services (OES),
☒ Other: Eastern Municipal Water District

That, as of 11/14/2006 at 10:15 AM that there has been a sewage discharge of
☒ Untreated sewage
☐ Incompletely treated sewage Effluent
☐ Fully treated Sewage effluent inadvertently discharged

at

Location of Discharge	**28076 Diaz Rd., Temecula, CA - Ruptured 10 inch Force Main - Discharge to Murrieta Creek**

Amount of discharge	**800,000 (eight hundred thousand) gallons of untreated sewage**					
Time of Discharge	From	**11/14/06** (date)	**10:15** (time)	to	**11/14/06** (date)	**ongoing** (time)
The discharge	☒ Has been stopped ☐ Has not been stopped					
The discharge	☒ is ☐ is not	Upstream from known recreation areas, which			☒ are ☐ are not	Posted by this Department – Discharge to Murrieta Creek
The area of the discharge	☒ Has been ☐ Will be ☐ Will not be	Inspected by the Department to evaluate contamination.				
Areas of contamination	☐ Have been cleaned, with approximately unk gallons recaptured ☐ Have been disinfected ☒ Will be cleaned ☐ Do not require cleaning					

This report is an ☒ **initial** ☐ **follow-up** **notification related to this spill**

Contact
☒ **Charles Strey, Sr. Public Health Engineer, at (951) 955-8982**
☐ _____
for more information on this incident

Distribution list

Date of Notification: Nov. 14, 2006 | **Incident Number:** **SA-06-08**

TO:
- ☒ Health Officer, County of Riverside — e-mail
- ☒ Members of the Board of Supervisors — e-mail
- ☒ The Chief Executive Officer of the County of Riverside — e-mail
- ☒ The Information Office (Deputy CEO) for the County of Riverside — e-mail
- ☒ Flood control / NPDES — e-mail
- ☐ Riverside County Sheriff — e-mail

State Office of Emergency Services (OES) — 800-852-7550

Regional Water Quality Control Board
- ☒ Santa Ana Region — Fax (951) 781-6288 — (951) 782-4130
  - Executive Officer — e-mail SW@waterboards.ca.gov
- ☐ Colorado Region — Fax (760) 341-6820 — (760) 346-7491
- ☐ San Diego Region — Fax (619) 571-6972 — (619) 467-2952

Newspapers
- ☒ The Press Enterprise- Riverside — Fax (951) 368-9023
- ☐ The Press Enterprise- Corona — Fax (951) 734-2518
- ☐ The Desert Sun
- ☒ The Californian — Fax (951) 694-1215
- ☐ Other _____

Local "Spanish format" media (newspaper and radio)
- ☐ KDES Radio Station
- ☐ KUNA Radio Station — Fax (760) 568-3984
- ☐ Other _____

Local Hospitals

City Manager of

☐ Banning	(951) 922-3105	☐ Lake Elsinore	(951) 674-3124
☐ Beaumont	(951) 769-8520	☐ La Quinta	(760) 777-7000
☐ Blythe	(760) 922-6161	☐ Moreno Valley	(951) 413-3000
☐ Calimesa	(951) 795-9801	☒ Murrietta	(951) 698-9885
☐ Canyon Lake	(951) 246-2022	☐ Norco	(951) 736-2493
☐ Cathedral City	(760) 770-0372	☐ Palm Desert	(760) 346-0611
☐ Coachella	(760) 398-3502	☐ Palm Springs	(760) 323-8201
☐ Corona	(951) 736-2493	☐ Perris	(951) 943-6100
☐ Desert Hot Springs	(760) 329-6411	☐ Rancho Mirage	(760) 324-4511
☐ Hemet	(951) 765-2301	☐ Riverside	(951) 782-5470

or
951) 782-2543

☐ Indian Wells (760) 346-2489 ☐ San Jacinto (951) 654-7337
☐ Indio (760) 342-6580 ☒ Temecula (951) 694-6499

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ORDINANCE NO. 871
AN ORDINANCE OF THE COUNTY OF RIVERSIDE PROHIBITING THE INSTALLATION OF SPECIFIED SEPTIC TANK SYSTEMS IN CHERRY VALLEY

The Board of Supervisors of the County of Riverside ordains as follows:

Section 1. FINDINGS. The Board of Supervisors hereby makes the following findings of
fact:

a. The proper disposal of sewage waste as generated in homes and business is essential to protect the health and welfare of the residents and visitors to the County of Riverside.

b. High levels of nitrate in drinking water are implicated in a number of illnesses and health disorders. For that reason, both the USEPA and the State of California have established maximum contaminant levels (MCLs) that may not be exceeded in water provided to the public.

c. Rising nitrate levels have been observed in wells in the Cherry Valley Community of Interest (CVCOI) and recently nitrate concentrations in wells owned by the Beaumont Cherry Valley Water District (BCVWD) have approached the maximum contaminant level (MCL) for nitrates.

d. Two water companies in the CVCOI, Bonita Vista Mutual Water Company and Cherry Valley Mutual Water Company, have been annexed into BCVWD's service area, due in part to the high nitrate concentrations in their wells.

e. On July 12, 2006, Wildermuth Environmental Inc. published a draft report entitled Water Quality Impacts from On-Site Waste Disposal Systems in the Cherry Valley Community of Interest (Report). The report was prepared for the San Timeteo Watershed Management Authority and provides compelling evidence that groundwater in the CVCOI is becoming degraded by elevated nitrates and that local septic systems are a primary contributor to that degradation.

f. In light of the above findings, a potential health hazard exists in the Cherry Valley area due to the effects of current wastewater treatment systems in the CVCOI.

g. It is appropriate that the County initiate reasonable and prudent actions to prevent this potential public health hazard from becoming a public health emergency.

h. The current technology for septic system design includes systems that can effectively reduce the nitrates in the effluent to levels that will not lead to further degradation of the groundwater.

i. Ordinance No. 864 was adopted on October 16, 2006 establishing a

ninety (90) day moratorium on the installation of septic systems unless designed to remove fifty percent (50%) of the nitrogen in the wastewater. This was established to allow staff time to coordinate review of the relevant documents.

j. Ordinance No. 864.1 was adopted on February 27, 2007 extending the moratorium for an additional one hundred twenty (120) days to allow

for further review by staff and coordination with the Regional Water Quality Control Board.

k. Pursuant to the review of the Report and supporting documentation, discussion with the Regional Board staff and limited field investigations, staff can find no basis for challenging the conclusions of the Report and recommend that the moratorium be revised to a non-expiring prohibition.

Section 2. DEFINITIONS. As used in this ordinance, the following terms shall have the following meanings:

a. Department. The Riverside County Department of Environmental Health.

b. Cherry Valley Community of Interest. The area generally located north of the City of Beaumont, east of the City of Calimesa, west of Bellflower Avenue and south of the San Bernardino County line, with the exception of the areas south and west of the Beaumont Avenue and Brookside Avenue intersection, and the area north of Sylvania Lane and east of Taiga Road.

Section 3. PROHIBITION.

a. No application for a new septic system shall be accepted for any lot or parcel within the CVCOI unless that system is designed to remove no less than fifty percent (50%) of the nitrogen released in the effluent (advanced treatment, denitrifying systems).

b. No existing system in the area shall be expanded or otherwise modified to accommodate new construction and/or additional wastewater generating fixtures or appliances.

Section 4. REPLACING OR REPAIRING EXISTING SYSTEM. In the event that an existing system requires replacement or repair, such replacement may be approved and installed, subject to the existing requirements of Riverside County Ordinance No. 650.

Section 5. REQUIREMENT OR COMPLIANCE. Non-compliance with this ordinance shall be deemed a violation of Riverside County Ordinance No. 650.

Section 6. SEVERABILITY. If any clause, provision, sentence, or paragraph of this ordinance or the application thereof, is deemed to be invalid as to any person, entity,

establishment, or circumstance, such invalidity shall not affect the other provisions of the
ordinance which shall remain in effect.
Section 7. EFFECTIVE DATE. This ordinance is hereby declared to be an urgency
measure and shall take effect immediately upon its adoption. In accordance with the
requirements of Government Code section 25123, subdivision (d), the Board of Supervisors hereby declares that the provisions contained herein are necessary for the
immediate preservation of the public peace, health, or safety for the following reasons: 1)
the County's moratorium on installing septic systems designed to remove less than fifty
(50) percent of nitrogen in wastewater is only for one hundred twenty (120) days and is set
to expire; 2) upon expiration of the moratorium, escalation of nitrate levels in drinking water

will continue; and 3) preventing further degradation of the groundwater is necessary to
avoid a potential public health emergency in the CVCOI.
Adopted: 871 Item 3.3 of 07/31/2007 (Eff: Immediately)

Environmental Health Inspection Log Food Program

FACILITY	DBA	Address	City	Date	Watershed
41584	Beaumont Purified Water Store	750 Beaumont Ave.	Beaumont	08/15/06	SA
44668	Galaxy Video	1663 E. 6th Street	Beaumont	12/18/06	SA
44773	Baker's Burgers, Inc.	529 Beaumont Ave.	Beaumont	1/27/03	SA
32751	Denny's Restaurant	449 E. 4th St.	Beaumont	3/6/03	SA
32765	Ramona's Restaurant	249 W. 6th St.	Beaumont	2/6/03	SA
32913	The Sandwich Stoppe	225 E. 6th St.	Beaumont	2/6/03	SA
32971	Donald's Burger	364 E. 6th St.	Beaumont	2/6/03	SA
34533	Azteca Bakery	846 E. 6th St. #d	Beaumont	1/16/03	SA
34890	Dowling Fruit Orchard	38021 Hwy. 60	Beaumont	3/12/03	SA
34976	Beaumont Market	1201 E. 6th St.	Beaumont	2/6/03	SA
35758	The Shopping Bag Market	999 E. 6th St.	Beaumont	2/6/03	SA
35975	Ziggy's Spirit Shoppe	345 E. 6th St.	Beaumont	1/28/03	SA
36316	Manna Donuts	846 E. 6th St.	Beaumont	1/8/03	SA
38241	Stop & Shop Food Store	846 E. 6th St.	Beaumont	2/6/03	SA
38659	Save More Market	296 E. 6th St.	Beaumont	1/28/03	SA
41723	Ranchito Taco Shop #3	418 E. 6th St.	Beaumont	3/6/03	SA
43503	Little Russo's	762 Beaumont Ave.	Beaumont	1/28/03	SA
44058	McDonalds	501 Beaumont Ave.	Beaumont	1/27/03	SA
44855	Dos Hermanos	986 Beaumont	Beaumont	1/28/03	SA
34120	New York Pizzaria	846 E. 6th St. #A	Beaumont	3/6/03	SA
42966	PIZZA PALACE	10140 BEAUMONT AVE	BEAUMONT	04/09/07	SA
43110	CHILI'S GRILL & BAR #1333	1490 E 2ND ST	BEAUMONT	04/16/07	SA
43458	Rosie's	1145 Calimesa Blvd.	Calimesa	09/12/06	SA
43673	George's Market	1023 Calimesa Blvd.	Calimesa	1/8/03	SA
44258	Mesa Grande Academy	975 S. Fremont St.	Calimesa	1/8/03	SA
44742	MCDONALDS	1199 CALIMESA BLVD	CALIMESA	05/02/07	SA
44784	Domino's Pizza	31546 Railroad Canyon Rd.	Canyon Lake	1/27/03	SA
32573	Panda Buffet	1210 W. 6th Street	Corona	12/12/06	SA
40836	Mojo's Drive Thru Coffee	1455 W. 6th St.	Corona	12/12/06	SA
41641	6th Street Market & Deli	935 W. 6th St.	Corona	3/3/03	SA
33037	Adams Elementary School	2350 Border Ave.	Corona	2/20/03	SA
34665	The Vons Co., Inc. #1737	1130 W. 6th St.	Corona	3/3/03	SA
34693	Corona Car Wash	1401 W. 6th St.	Corona	3/6/03	SA
35233	Super Taco	450 S. Main St.	Corona	3/7/03	SA
35618	El Torero Mexicana	222 E. 3rd St.	Corona	1/16/03	SA
43937	Glen Ivy General Store	24601 Glen Ivy Rd.	Corona	1/17/03	SA

44088	Glen Ivy Lodge	24601 Glen Ivy Rd.	Corona	1/17/03	SA
44251	Hong Kong Restaurant	1370 W. 6th St.	Corona	3/21/03	SA
44304	JJ's Live Oak Steakhouse	21700 Temescal Canyon Rd.	Corona	3/25/03	SA
44315	Ralphs Grocery Co. No. 14	1212 Magnolia	Corona	2/18/03	SA
44388	Seven Oaks General Store	21501 Temescal Canyon Rd.	Corona	3/25/03	SA
44964	Silver Dollar Pancake House	710 E. 6th St.	Corona	3/11/03	SA
44988	Freddy's 99 Cent Discount Store	1390 W. 6th St.	Corona	3/3/03	SA
45048	Tom's Farms Fruit Co.	23900 Temescal Canyon Rd.	Corona	1/17/03	SA
42513	Wienerschnitzel	315 S. Main St.	Corona	3/5/03	SA
44969	Baskin-Robbins 31 Flavors	1206 Magnolia Ave.	Corona	2/27/03	SA
34280	99 Cents Only Store #78	725 S. Main St.	Corona	3/5/03	SA
33064	Corona Discount Place	685 E. Gra #107	Corona	3/11/03	SA
40702	Citrus Hills Interm (Sch Cafeteria)	3211 S. Main St.	Corona	1/14/03	SA
44647	99 Cent & Quality Warehouse	944 W. 6th Street	Corona	2/27/03	SA
44992	Susan Banthony Elementary School	2665 Gilbert Ave.	Corona	2/20/03	SA
32749	Albertsons #6728	260 W. Foothill Blvd.	Corona	2/26/03	SA
32755	Cross Roads Christian School	1400 Fullerton	Corona	1/30/03	SA
33016	Corona Nutritional Center	1390 W. 6th Street S.#132	Corona	3/6/03	SA
33171	Ricky's Mex Food	416 W. 6th St.	Corona	3/6/03	SA
33262	Eagle Glen Country Club	1800 Eagle Glen Pathway	Corona	3/18/03	SA
33289	Wilson Elementary School	1750 Spyglass Dr.	Corona	3/25/03	SA
33667	H20 To Go	1411 Rimpau #103	Corona	3/11/03	SA
34122	Tommy's Hamburgers	2280 Compton Avenue	Corona	3/13/03	SA
34311	Farmer Boys	1625 E. Sixth St.	Corona	1/15/03	SA
34322	Sweet Shop	1520 W. 6th St. #108	Corona	2/27/03	SA
36232	Cowboy Surfer Grill, Inc.	387 Magnolia Ave. #106	Corona	3/13/03	SA
38300	COUNTRY POLLO	1550 W 6TH ST #108	CORONA	04/03/07	SA
39570	STARBUCKS #6978	1575 E ONTARIO AVE	CORONA	04/10/07	SA
31887	Falatico's	124 S. Harvard	Hemet	08/03/06	SA
32023	Henry's Marketplace	1295 S. State St.	Hemet	07/18/06	SA
32025	Jack In The Box	3111 W. Florida Ave.	Hemet	07/19/06	SA
32413	El Grullense Restaurant	138 N. Harvard	Hemet	08/22/06	SA
44864	Chagolla's Taqueria	118-120 N. Harvard	Hemet	09/20/06	SA
44896	Beacon Gas & Food Market	202 N. State St.	Hemet	09/12/06	SA
44923	Vini's Super Subs	3221 W. Florida Ave. #S-6	Hemet	08/21/06	SA
44946	Juice It Up	1131 S. Sanderson Ave.	Hemet	08/01/06	SA
44999	Rubio's Fresh Mexican Grill	2701 W. Florida Ave.	Hemet	08/21/06	SA

36156	Steve's Jr Burgers	3330 E. Florida	Hemet	10/06/06	SA
41713	Submarina	3220 W. Florida Ave.	Hemet	11/21/06	SA
44826	Walgreens	43200 State Hwy. 74	Hemet	11/02/06	SA
44867	Juan's Mexicali Cafe	279 N. Sanderson Ave.	Hemet	11/21/06	SA
44914	Burger King #9972	2020 W. Florida	Hemet	1/13/03	SA
44917	Ocotillo Restaurant & Cantina	33668 Hwy. 74	Hemet	1/28/03	SA
44934	N & W Antonious Pizza	41855 E. Florida Avenue	Hemet	2/7/03	SA
44944	Food Center, The - Homeless	1000 N. State St.	Hemet	1/9/03	SA
44984	Orange Julius	2200 W. Florida Ave.	Hemet	1/9/03	SA
44993	Mia's Country Kitchen	3323 W. Florida Ave.	Hemet	1/8/03	SA
45032	Manila Fiesta	1727 W. Florida Ave.	Hemet	1/8/03	SA
32527	General Nutrition Center #7385	2200 W. Florida Ave.	Hemet	1/9/03	SA
33438	Stater Bros. Market #76	3200 W. Florida Ave.	Hemet	1/13/03	SA
35670	Longs Drugs #183	3055 W. Florida Ave.	Hemet	1/21/03	SA
35959	See's Candy #35	3333 W. Florida Ave.	Hemet	1/2/03	SA
36235	Spicy Sushi & Grill	3353 W. Florida Ave.	Hemet	1/2/03	SA
36697	Depot Deli	200 W. Florida Ave.	Hemet	1/8/03	SA
41087	Ramona Valley Lions	129 N. Carmelita	Hemet	1/13/03	SA
44955	Taco Bell #3420	3317 W. Florida Ave.	Hemet	1/8/03	SA
45045	Gus Jr. #15	1531 E. Florida Ave.	Hemet	1/6/03	SA
44281	China Palace	475 W. Stetson	Hemet	1/21/03	SA
45008	Jenny Craig	3377 W. Florida	Hemet	1/2/03	SA
41361	Subway	2200 W. Florida #205	Hemet	1/9/03	SA
42575	Greek Boys Burgers	1031 W. Florida Ave.	Hemet	1/28/03	SA
44468	Vini's Super Subs	3221 W. Florida Ave. #S-6	Hemet	1/3/03	SA
30409	Ramona Bowl Snack Bar	27400 Ramona Bowl Rd.	Hemet	3/13/03	SA
30488	Wendy's	3450 W. Florida Ave.	Hemet	1/8/03	SA
30556	GEORGE'S PIZZA N' SUBS	2920 E FLORIDA AVE 105	HEMET	05/29/07	SA
30646	MAX MUSCLE	247 N SANDERSON A1	HEMET	06/27/07	SA
30719	GELATO KING	110 W STETSON AVE	HEMET	06/27/07	SA
30766	PIER 1 IMPORTS	2999 W FLORIDA AVE	HEMET	06/27/07	SA
31063	Uni-Mart	31880 Hwy. 74	Homeland	1/14/03	SA
35027	Jack In The Box #5378	29993 Canyon Hill Rd.	Lake Elsinore	07/13/06	SA
35043	Longs Drugs	29985 Canyon Hills Rd.	Lake Elsinore	07/13/06	SA
35088	Starbucks	29991 Canyon Hills Rd.	Lake Elsinore	08/21/06	SA
35115	Subway Sandwiches	29989 Canyon Hill #1704	Lake Elsinore	08/21/06	SA
39298	Panda Express	29989 Canyon HIlls Rd.	Lake Elsinore	08/21/06	SA

39946	Juice It Up	29991 Canyon Hills Rd. #1708	Lake Elsinore	08/21/06	SA
40560	Los Jilberto's	29989 Canyon Hills	Lake Elsinore	08/31/06	SA
32661	Hana Sushi	29989 Canyon Hills Rd. Ste. 170	Lake Elsinore	09/27/06	SA
32665	La Conchita Restaurant	111 W Graham Ave	Lake Elsinore	11/16/06	SA
32676	Arco AM/PM	250 Diamond Dr.	Lake Elsinore	11/09/06	SA
32678	Walgreens	18296 Collier Ave.	Lake Elsinore	10/11/06	SA
32679	Papa John's Pizza	25381 Railroad Canyon Rd. #1100	Lake Elsinore	10/06/06	SA
33384	99 Cents Only Stores #234	18286 Collier Ave.	Lake Elsinore	10/11/06	SA
34137	Lakeland Village Middle School	18730 Grand Ave.	Lake Elsinore	12/01/06	SA
34247	The Cheesecake House Co.	504 N. Spring #A	Lake Elsinore	11/06/06	SA
34250	Starbucks	18285 Collier Ave. #N	Lake Elsinore	12/04/06	SA
34252	Del Taco #1020	29245 Central Ave.	Lake Elsinore	12/04/06	SA
35009	Luisno Horse Thief Elementary	54500 Chaney	Lake Elsinore	3/18/03	SA
35259	Stater Bros. Market #98	16750 Lakeshore Dr.	Lake Elsinore	1/29/03	SA
35570	Elsinore Elementary School	512 W. Sumner	Lake Elsinore	1/28/03	SA
36207	Haymen Elementary	21440 Lemon	Lake Elsinore	1/22/03	SA
39224	Railroad Canyon Elem. School	1300 Mill St.	Lake Elsinore	1/29/03	SA
39244	Alberton's #6798	30901 Riverside Drive	Lake Elsinore	1/21/03	SA
41146	Withrow Elementary	30100 Audelo	Lake Elsinore	2/6/03	SA
42296	Elsinore Middle School	1203 Graham Ave.	Lake Elsinore	1/30/03	SA
32410	Country Store & Deli	30850 Riverside Dr. A-1	Lake Elsinore	1/28/03	SA
41304	98 Cents Discount Store	32275 Mission Trail #M7	Lake Elsinore	1/22/03	SA
35560	Carniceria Lucio	31760 Mission Trail	Lake Elsinore	3/17/03	SA
32378	Starbucks Coffee	31800 Grape Street, #-A	Lake Elsinore	3/26/03	SA
33034	LAS CUATRO MILPAS	157 N MAIN ST	LAKE ELSINORE	05/01/07	SA
33287	QUALITY INN	31808 CASINO DR	LAKE ELSINORE	05/03/07	SA
33455	GOLDEN CHOPSTIX	18285 COLLIER AVE #M	LAKE ELSINORE	05/21/07	SA
33519	WATER SPRING	31940 MISSION TRAIL	LAKE ELSINORE	06/20/07	SA
33597	SUBWAY SANDWICHES	18285 COLLIER ST STE J	LAKE ELSINORE	05/21/07	SA
34104	JOE & TONY'S FAMOUS	16005 GRAND AVE STE E	LAKE ELSINORE	05/24/07	SA
34129	TOM'S #2	18492 DEXTER AVE	LAKE ELSINORE	05/21/07	SA
34225	Big 5 Sporting Goods #369	18298 Collier Ave.	Lake Elsinore	04/18/07	SA
34599	BEST WESTERN LODGE VIEW INN & S	31781 CASINO DRIVE	LAKE ELSINORE	06/20/07	SA
34849	ARCHIBALD'S	29285 CENTRAL AVE	LAKE ELSINORE	06/13/07	SA
35857	Jack In The Box #5347	26015 Newport Rd.	Menifee	07/13/06	SA
36138	Submarina	26045 Newport Rd., Suite C	Menifee	08/03/06	SA
36152	Lil Joe Pizza	26025 Newport Rd. #C	Menifee	08/29/06	SA

36321	Evans Ranch Elementary School	30465 Evans Rd.	Menifee	10/10/06	SA
36378	Concession Stand	30627 Menifee Rd.	Menifee	1/31/03	SA
37032	Paloma Valley High School Cafeteria	31375 Bradley Rd.	Menifee	2/24/03	SA
37723	Mt. San Jacinto College Dist.	28237 La Pieda Rd.	Menifee	2/24/03	SA
37850	My Dollar Store	30141 Antelope Road	Menifee	2/5/03	SA
37923	BLOCKBUSTER VIDEO	26910 NEWPORT RD 14	MENIFEE	06/26/07	SA
38388	Applebee's Neighborhood Grill & Bar #573	12375 Limonite Ave.	Mira Loma	08/16/06	SA
38917	Country Village Market	10211 Country Club Dr.	Mira Loma	10/16/06	SA
38945	EL RODEO CAFE	5164 ETIWANDA AVE	MIRA LOMA	05/06/07	SA
40110	PHILLY STEAK & SUB CO	10427 SAN SEVAINE WAY G	MIRA LOMA	05/14/07	SA
41002	ONE DOLLAR STORE	5606 ETIWANDA AVE	MIRA LOMA	06/06/07	SA
41018	Ono Hawaiian BBQ	12751 Moreno Beach Dr. #102	Moreno Valley	08/02/06	SA
41119	Lolita's Doleena Mexicana	25211 Sunnymead Blvd, #C-13	Moreno Valley	09/05/06	SA
41449	Sushi Palms	12831 Moreno Beach Dr. #104	Moreno Valley	08/02/06	SA
41457	Little Caesars Pizza	12190 Perris Blvd. Ste. A-2	Moreno Valley	09/14/06	SA
34270	Quizno's Sub #8675	12831 Moreno Beach Dr. #102	Moreno Valley	08/02/06	SA
36527	Mabuhay Filipino Fast Food	24757 Alessandro Blvd.	Moreno Valley	09/27/06	SA
30003	Vincenteo's	24430 Alessandro Blvd. #112	Moreno Valley	09/27/06	SA
30011	American Legion Post 574	13876 Old Hwy. 215	Moreno Valley	11/28/06	SA
30012	San Juande Los Lagos Mexican Restaura	12220 Pigeon Pass Rd. #J	Moreno Valley	12/04/06	SA
30080	Margarita's Grill	12630 Perris Blvd.	Moreno Valley	11/15/06	SA
30120	Vista Heights School	23049 Old Lake St.	Moreno Valley	11/28/06	SA
30131	Superior Super Warehouse	23857 Sunnymead Blvd.	Moreno Valley	11/20/06	SA
30148	GORDO'S RESTAURANT	22720 ALESSANDRO BLVD	MORENO VALLEY	11/09/06	SA
30150	Juice It Up	12831 Moreno Beach Dr. #103	Moreno Valley	11/01/06	SA
30163	Winco Foods #46	12880 Day Street	Moreno Valley	11/16/06	SA
30203	Mr. You Chinese Food Express	12831 Moreno Beach Dr. #101	Moreno Valley	11/01/06	SA
30254	Tony's Pizza Kitchen	22920 Alessandro Blvd.	Moreno Valley	11/16/06	SA
30270	Express Cafe	16420 Perris Blvd. Ste. L	Moreno Valley	11/29/06	SA
30274	7-11 Food Store #2171- 23520	23021 Sunnymead Blvd.	Moreno Valley	1/14/03	SA
30278	Best Western Image Suites Hotel	24840 Elder Ave.	Moreno Valley	1/7/03	SA
30310	Chevron U.S.A.	12431 Heacock St.	Moreno Valley	1/29/03	SA
30321	Gloria Bakery	12235 Heacock,	Moreno Valley	1/21/03	SA
32283	El Pollo Loco	24800 Sunnymead	Moreno Valley	1/7/03	SA
38299	All Star Pizza	13373 Perris Blvd.	Moreno Valley	2/24/03	SA
38430	Gloria Jean's Gourmet Coffee	22500 Towngate Cir. #2117	Moreno Valley	1/22/03	SA
39479	Kentucky Fried Chicken	13945 Perris Blvd.	Moreno Valley	2/4/03	SA

39819	Lucky Greek, The	23887a Sunnymead Blvd.	Moreno Valley	1/3/03	SA
40328	Guadalajara Bakery	13121-a Perris Blvd.	Moreno Valley	2/26/03	SA
40622	Red Anchor Fish Market #2	13373 Perris Blvd. #e414	Moreno Valley	2/24/03	SA
40657	Brittany's Cafe	12190 Perris Blvd. #A	Moreno Valley	1/14/03	SA
40681	Shannons Health Foods	23701 C Sunnymead	Moreno Valley	1/3/03	SA
40721	Steve's Burgers	12640 Heacock St.	Moreno Valley	1/2/03	SA
40863	Subway Sandwiches & Salads	23845 Sunnymead Blvd. #B	Moreno Valley	1/3/03	SA
40902	Ultra-Mart	12400 Perris Blvd.	Moreno Valley	1/6/03	SA
41075	Valley Liquor & Market	13373 Perris Blvd.	Moreno Valley	2/24/03	SA
41936	Wienerschnitzel	24007 Sunnymead Blvd.	Moreno Valley	1/7/03	SA
42174	Moreno Liquor & Market	23896 Sunnymead	Moreno Valley	1/14/03	SA
42284	Toys 'R' Us	12125 Day St. Bldg. W	Moreno Valley	1/7/03	SA
42289	Rene's	25024 Filaree Ave.	Moreno Valley	2/5/03	SA
32728	Wienerschnitzel #561	23750 Alessandro	Moreno Valley	1/2/03	SA
32732	Charlebois Liquors	21840 Alessandro Blvd.	Moreno Valley	1/15/03	SA
32733	ABC Food Store	24491 Alessandro Blvd.	Moreno Valley	2/5/03	SA
32738	Papa Joe's Pizza	24735 Alessandro Blvd.	Moreno Valley	1/15/03	SA
32741	Zapata's Burritos	24757 Alessandro #6 & #7	Moreno Valley	2/13/03	SA
32743	Louisiana Famous Fried Chicken	24757 Alessandro Blvd.	Moreno Valley	1/22/03	SA
32744	Joana's Italian Restaurant	24825 Alessandro Blvd.	Moreno Valley	2/27/03	SA
32746	Joana's Italian Restaurant	24825 Alessandro Blvd.	Moreno Valley	3/3/03	SA
33012	China Hua Mulan Buffet	24853 -3 Alessandro Blvd.	Moreno Valley	3/7/03	SA
33437	Sunnymead Hamburgers #2	24655 Alessandro Ste.c-8	Moreno Valley	3/10/03	SA
33632	Taco Bell #2858	23880 Alessandro Blvd.	Moreno Valley	1/16/03	SA
34277	Easter Market	29010 Alessandro Blvd.	Moreno Valley	2/11/03	SA
34280	El Mercadito	25036 Filaree Ave.	Moreno Valley	2/5/03	SA
34722	Kwick Pick Liquor	24150 Alessandro Blvd.	Moreno Valley	1/15/03	SA
34907	Circle K #1775	24051 John F. Kennedy	Moreno Valley	1/8/03	SA
35210	Thai Dinette	14910 Perr #C	Moreno Valley	1/17/03	SA
35246	Thrifty #9718	22990 Alessandro	Moreno Valley	2/10/03	SA
36140	99 Cents Only Stores	24899 Alessandro Blvd.	Moreno Valley	1/13/03	SA
37326	Daniel Nutritional	13373 Perris Blvd.#E402	Moreno Valley	2/24/03	SA
37492	Don's Golden Chicken & Fish	12400 Perris Blvd.	Moreno Valley	1/6/03	SA
37735	P.W. Enchancment Center	24490 Sunnymead Blvd. #107	Moreno Valley	1/14/03	SA
37820	Chuck E Cheese	23160 Sunnymead Blvd.	Moreno Valley	1/3/03	SA
41652	Dalias Pizza #12	24100 Alessandro	Moreno Valley	1/13/03	SA
32228	Big Papa's Hot Dog	14051 Indian Ave. #D	Moreno Valley	3/17/03	SA

32398	Dragon House	22456 Alessandro Blvd.	Moreno Valley	04/18/07	SA
32585	M & N Market	21942 Alessandro Blvd.	Moreno Valley	06/05/07	SA
33223	HAPPY BUFFET	23750 ALESSANDRO BLVD	MORENO VALLEY	04/09/07	SA
33716	EXTREME PITA	12430 DAY ST C3	MORENO VALLEY	05/27/07	SA
33786	Three Brothers Snack Shop	25211 Sunnymead Blvd., #E-4	Moreno Valley	04/18/07	SA
33792	Mario's Cafe & Deli	12125 Day St #409	Moreno Valley	04/16/07	SA
34293	Salo Salo Grill & Restaurant	12625 Frederick St. #K6	Moreno Valley	04/17/07	SA
34301	MAS PARTY SUPPLY OR RENTAL	25211 SUNNYMEAD BLVD	MORENO VALLEY	04/18/07	SA
34542	APPLEBEES NEIGHBORHOOD GRILL &	12600 DAY ST	MORENO VALLEY	05/24/07	SA
42275	LOS METATES	3370 HAMNER AVE	NORCO	06/28/07	SA
31774	T.P.'s Restaurant	29618 Nuevo Rd. #A	Nuevo	1/8/03	SA
31798	Nuevo Market Inc.	29616 A Nuevo Rd.	Nuevo	1/8/03	SA
31809	Beverly Ann's Donut & Yogurt	29618 Nue #B2	Nuevo	1/8/03	SA
31815	Mt. Shadow Middle School	30401 Ravine	Nuevo	3/3/03	SA
36806	Round Table Pizza	15 W. Nuevo Rd. #C	Perris	09/11/06	SA
36849	Lulu BBQ	85 E. Ramona Expressway #10,	Perris	09/27/06	SA
37028	Tortas El Rey	1675 N. Perris Blvd.	Perris	10/16/06	SA
37043	Citrus Hill High School	18150 Wood Road	Perris	11/28/06	SA
37096	Gavilan Hills Ranch Market	22060 Gavilan Rd.	Perris	2/3/03	SA
37318	Midway Jr.	21700 Markham St.	Perris	1/22/03	SA
37447	Wal-Mart Stores, Inc. #1747	2560 N. Perris Blvd.	Perris	1/15/03	SA
37486	Taquito House	1019 D. St.	Perris	1/15/03	SA
37488	Jack In The Box	2560 Perris Blvd.	Perris	1/31/03	SA
37497	Temple Christian School	745 N. Perris Blvd.	Perris	1/15/03	SA
38006	Harb Market	22707 San Jacinto St.	Perris	1/22/03	SA
38026	Family Basket	670 W. 7th St.	Perris	1/22/03	SA
38462	La Mexicana Tortilleria & Panaderia	343 Wilkerson Ave. #C	Perris	1/15/03	SA
38915	Lakeside Liquor And Market	4164 N. Perris Blvd.	Perris	1/16/03	SA
39350	Pueblo Viejo #2	75 W. Nue #C	Perris	1/16/03	SA
39605	Perris Raceway LLC	1205 Burton St.	Perris	1/15/03	SA
39660	Market +	2055 Perris Blvd.	Perris	1/15/03	SA
39715	Jeff's Place	2055 N. Perris Blvd.	Perris	1/15/03	SA
40355	Paris Donut	2055 N. Pe G-4	Perris	1/15/03	SA
40455	Taco Bell #9581	2560 Perris Blvd.	Perris	1/31/03	SA
40593	McDonald's Walmart #17506	2560 Perris Blvd.	Perris	1/15/03	SA
41087	Texaco Star Mart	4039 N. Perris Blvd.	Perris	1/15/03	SA
41145	Del Taco #941	1688 "A" N. Perris Blvd.	Perris	1/14/03	SA

41415	Subway Sandwiches & Salad	4039 North Perris	Perris	1/15/03	SA
42165	El Comalito Taco Shop	802 Navajo Rd. #A	Perris	06/19/07	SA
42255	Subway Of Rancho Mirage	34151 Monterey Ave.	Rancho Mirage	2/3/03	SA
40669	Coffee Roasters 1	5225 Canyon Crest	Riverside	08/29/06	SA
41396	Sire's	6440 Magnolia Ave.	Riverside	09/28/06	SA
41435	Su Taqueria Park Ave.	4038 Park Ave.	Riverside	09/28/06	SA
41464	Spruce Street Eatery	1485 Spruce St.	Riverside	08/24/06	SA
41480	El Cowboy Restaurant	2130 3rd St.	Riverside	08/24/06	SA
41547	Pho Vinam	1201 University Ave. #107	Riverside	07/03/06	SA
41549	Mexicali Bar & Grill	1690 Spruce St.	Riverside	08/14/06	SA
41574	BK Subs	1490 University Ave.	Riverside	08/18/06	SA
41701	Mi Lupita Mexican Food	4135 Chicago Ave. #B3	Riverside	08/17/06	SA
42207	Tommy's Hamburgers #33	7504 Mission Grove Parkway	Riverside	08/03/06	SA
42229	Domino's Pizza	11170 Magnolia Ave.	Riverside	12/04/06	SA
42241	La Sierra Liquor	11037 Hole Ave.	Riverside	10/05/06	SA
42261	Pho Que Huong	10051 Magnolia Ave. #B1	Riverside	11/07/06	SA
42279	Wienerschnitzel #36	9595 Magnolia Ave.	Riverside	10/31/06	SA
42315	Cavalier Liquor	4068 Tyler St.	Riverside	10/16/06	SA
30443	Van Buren 76	4890 Van Buren Blvd.	Riverside	12/18/06	SA
30599	Coco's	3640 Central Ave.	Riverside	12/13/06	SA
30697	La Bodega Liquors	3512 Central Ave.	Riverside	12/06/06	SA
30708	Olympic Market	3072 Cridge St.	Riverside	10/17/06	SA
30745	El Potrero Bar	2140 3rd St.	Riverside	11/01/06	SA
30751	7-11 Food Store	6060 Camino Real	Riverside	10/16/06	SA
30766	FACES	1725 SPRUCE ST	RIVERSIDE	11/06/06	SA
30813	Capones Pizza	755 Blaine St.	Riverside	10/24/06	SA
30815	Santanas Mex Food	1450 University Ave P	Riverside	11/16/06	SA
30903	Lee's Liquor	2710 University Ave.	Riverside	11/02/06	SA
30928	Lucky Green	2770 University Ave.	Riverside	10/19/06	SA
30941	Zacateca's	2472 University Ave.	Riverside	10/19/06	SA
30950	Quizno's Classic Subs	2265 Galleria @ Tyler	Riverside	11/01/06	SA
30958	F.O.E. #997	466 E. La Cadena	Riverside	11/01/06	SA
30959	Subway Sandwiches	6160 Arlington #C-9	Riverside	10/13/06	SA
31497	Papa John's Pizza	3850 Chicago Ave.	Riverside	12/28/06	SA
34442	Cruzin Java	7594 Indiana	Riverside	11/27/06	SA
38033	Super 99 Cents Plus Store	8151 Arlington Ave. #R & S	Riverside	10/25/06	SA
41451	Domino's #7394	8300 Limonite Ave. #H	Riverside	10/16/06	SA

41624	Royal Orchid Thai Restaurant	9791 Magnolia Ave.	Riverside	10/13/06	SA
42256	Donovan Bros. Golf Inc.	16700 Village West Dr.	Riverside	11/29/06	SA
42265	Cypress Mini Market	8043 Cypress Ave.	Riverside	10/17/06	SA
42283	La Milpa Restaurant Mexican & Central Ar	3812 Pierce St. Unit J	Riverside	10/05/06	SA
32360	Farmer Boys - Alessandro	2000 E. Alessandro Blvd.	Riverside	11/28/06	SA
34387	Gelato Di Roma	1400 University Ave. #A101	Riverside	11/30/06	SA
36866	Wonder/Hostess Bakery Outlet	6118 Van Buren Blvd.	Riverside	10/13/06	SA
37258	Baker's Burgers #160	1300 Blaine St.	Riverside	10/24/06	SA
41006	Ten Ren's Tea Time	1400 University Ave. #A103	Riverside	11/30/06	SA
32843	Gra-Pow	497 Alessandro Blvd. #D	Riverside	12/13/06	SA
33312	Starbucks	2692 Canyon Springs Ste. E	Riverside	11/16/06	SA
33605	Mark Twain Elementary School	19411 Krameria	Riverside	11/29/06	SA
33695	Pho Express 1	1766 University Ave.	Riverside	12/04/06	SA
34187	n R Gize Lifestyle Cafe @ L.A. Fitness	2600 Canyon Springs Parkway	Riverside	11/29/06	SA
34368	DREAM DINNERS	19069 VAN BUREN BLVD	RIVERSIDE	12/08/06	SA
34369	Harold's Saloon	3834 Megginson Ln.	Riverside	1/27/03	SA
34371	Stater Bros. Market #22	4680 La Sierra Ave.	Riverside	2/4/03	SA
34435	Billy B's	10390 Arlington Ave.	Riverside	1/15/03	SA
34450	Campbell's Market	10590 Campbell Ave.	Riverside	1/27/03	SA
35143	Donut Star	6160 Arlington	Riverside	1/13/03	SA
35144	Mijos Tacos	9003 Arlington Ave.	Riverside	1/22/03	SA
35213	Ons Inc.	4890 Van Buren Blvd.	Riverside	1/7/03	SA
35351	K-Mart #3106	7200 Arlington Ave.	Riverside	1/6/03	SA
40506	Kentucky Fried Chicken	6221 Van Buren Blvd.	Riverside	1/6/03	SA
42320	Rickie's Tavern	4850 Tyler St.	Riverside	2/3/03	SA
32559	Stater Bros. Market #79	10370 Arlington Ave.	Riverside	2/3/03	SA
34177	Troy's Burgers #2	5980 Van Buren Blvd.	Riverside	1/16/03	SA
34206	Rite Aid #5712	6150 Van Buren Blvd.	Riverside	1/7/03	SA
36304	Tyler Lounge	4495 Tyler St.	Riverside	1/22/03	SA
36390	Tyler Market	4773 Tyler St.	Riverside	1/22/03	SA
37914	EL POYO	6160 Arlington Ave.	Riverside	1/21/03	SA
32477	Rosemary Kennedy Elementary School	6411 Mitchell St.	Riverside	2/10/03	SA
34186	Alvord Central Kitchen	6499 Tyler	Riverside	2/10/03	SA
36605	McDonalds	5010 Van Buren	Riverside	1/6/03	SA
36691	Norm's Restaurant	3889 Tyler St.	Riverside	1/7/03	SA
36740	Izzy's Baja Grill	3556 Adams St.	Riverside	1/21/03	SA
36822	Miguel's Jr.	1301 Galleria @ Tyler #E-16	Riverside	1/15/03	SA

38153	ABC Nutritional	10265 Arlington Ave.	Riverside	2/3/03	SA
39728	China Wok Inn	3866 La Sierra Ave.	Riverside	06/18/07	SA
40757	Hotlanta Wings & Things	3950 Pierce St.	Riverside	04/12/07	SA
41398	Nola's Place	2955 Van Buren Blvd.	Riverside	04/19/07	SA
41507	Kentucky Fried Chicken	18585 Van Buren Blvd.	Riverside	04/18/07	SA
41703	Goody's Kitchen	5665 Van Buren Blvd A	Riverside	04/19/07	SA
41719	J & I Agua Pura	3511 Madison St. #B	Riverside	06/04/07	SA
42218	Goodrich Cafe	8200 Arlington Ave.	Riverside	04/11/07	SA
42258	ZERO SUBS	5624 VAN BUREN BLVD	RIVERSIDE	06/15/07	SA
42317	9th St. Eatery	3530 9th St.	Riverside	04/26/07	SA
42337	Beggar's Banquet	7786 Limonite Ave.	Riverside	04/17/07	SA
32470	CASA JIMENEZ	2964 RUBIDOUX BLVD	RIVERSIDE	05/29/07	SA
35748	LA PASADITA	6051 MISSION BLVD	RIVERSIDE	04/02/07	SA
32986	LA PLAYITA MARKET	3375 IOWA AVE	RIVERSIDE	06/05/07	SA
32987	UNIVERSITY VILLAGE MARKET	3796 WATKINS DR	RIVERSIDE	06/05/07	SA
34189	DUGOUT GRILL	9131 MISSION BLVD	RIVERSIDE	06/26/07	SA
34482	FUN HOUSE SEAFOOD RESTAURANT I	1445 UNIVERSITY AVE	RIVERSIDE	06/07/07	SA
35173	SANSEI JAPAN	2261 GALLERIA @ TYLER	RIVERSIDE	04/19/07	SA
36393	SBARRO #931	2259 GALLERIA @ TYLER FCO3	RIVERSIDE	06/18/07	SA
36396	LA MASA MEXICAN GRILL	2263 GALLERIA @ TYLER	RIVERSIDE	06/11/07	SA
36618	Domino's Pizza	4955 Felspar St. #E	Riverside	04/13/07	SA
37002	Green Burrito	6033 Magnolia Ave.	Riverside	05/09/07	SA
38181	GOLD STAR HAMBURGERS	6400 CLAY ST	RIVERSIDE	05/02/07	SA
38258	PINEAPPLE JOE'S	195 E ALESSANDRO BLVD STE 8D	RIVERSIDE	04/18/07	SA
39474	Papa John's Pizza	6410 Magnolia Ave.	Riverside	04/30/07	SA
41903	Canyon Crest Ice Cream & Water	5225 Canyon Crest Dr. #27	Riverside	05/07/07	SA
42259	La Torta	765 Blaine St.	Riverside	05/15/07	SA
42287	New York Super Buffet	5600 Van Buren Blvd #A	Riverside	04/05/07	SA
32621	Refugio Quiroz	5714 Mission Blvd.	Riverside	04/13/07	SA
32419	SUSHI ARIGATO	2955 VAN BUREN BLVD D2 D3	RIVERSIDE	04/02/07	SA
45342	Panera Bread #1249	3560 Riverside Plaza Dr. #410	Riverside	04/09/07	SA
33156	Arlington Regional Learning Center	6511 Arlington Ave.	Riverside	04/04/07	SA
45341	THE CHEESECAKE FACTORY	3525 TYLER STREET	RIVERSIDE	04/02/07	SA
35888	THE WHITE STORK & MORE	5636 VAN BUREN BLVD	RIVERSIDE	04/05/07	SA
35439	Tall Tree Oriental Market, Inc.	3845 Pierce St.#B	Riverside	04/16/07	SA
45304	RESTAURANTE SALVADORENO USULI	4650 LA SIERRA AVE	RIVERSIDE	06/01/07	SA
45477	STEWART'S LIQUOR	5505 VAN BUREN BLVD	RIVERSIDE	04/05/07	SA

45403	SUNRISE AT RAINCROSS VILLAGE	5232 CENTRAL AVE	RIVERSIDE	04/23/07	SA
45317	LITTLE INDIA BAZAAR	1450 UNIVERSITY AVE A	RIVERSIDE	04/12/07	SA
45359	MR BLUE'S DONUTS	19009 VAN BUREN BLVD	RIVERSIDE	04/25/07	SA
45378	Bryant Elementary School	4324 3rd Street	Riverside	06/05/07	SA
45434	THE PRESS ENTERPRISE CAFETERIA	3450 14TH ST	RIVERSIDE	05/02/07	SA
45555	JUICE IT UP	3380 LA SIERRA AVE STE 107	RIVERSIDE	04/19/07	SA
45563	PAPA JOHNS	10330 HOLE AVE 3	RIVERSIDE	06/01/07	SA
35135	SUPER 89 SEAFOOD MARKET	11160 MAGNOLIA AVE	RIVERSIDE	06/07/07	SA
36536	E & J DRINKING WATER	1450 UNIVERSITY AVE	RIVERSIDE	04/19/07	SA
36716	RICOS TACOS EL PRIMO	1788 UNIVERSITY AVE 102	RIVERSIDE	05/08/07	SA
39357	RUBIDOUX CHECK CASHING MART	2960 RUBIDOUX BLVD	RIVERSIDE	05/14/07	SA
44326	TORTILLA GRILLE	5225 CANYON CREST DR	RIVERSIDE	06/12/07	SA
45512	Chinese Bistro	28490 Hwy. 74	Romoland	09/27/06	SA
45332	Menifee Elementary School	26301 Garboni Rd.	Romoland	10/16/06	SA
45369	Panda Train	28490 Hwy. 74	Romoland	1/14/03	SA
45389	Romoland Market	27856 Hwy. 74	Romoland	1/3/03	SA
45390	Romo Gas Mart	27682 Hwy. 74	Romoland	1/3/03	SA
45465	Harvest Valley Elementary	29955 Watson Rd.	Romoland	1/14/03	SA
45574	Arco AM/PM	26050 Menifee Rd.	Romoland	1/3/03	SA
43343	Mazatlan Grill	173 E. Main St.	San Jacinto	07/24/06	SA
45276	Asian Market Of San Jacinto	500 S. State St. #105	San Jacinto	09/05/06	SA
45318	Arturitos	690 S. State St.	San Jacinto	09/12/06	SA
45320	Annas Juice Bar	1489 S. San Jacinto Ave.	San Jacinto	08/30/06	SA
45366	Fastrip Food Store	692 S. San Jacinto	San Jacinto	1/7/03	SA
45514	Reflection Lake Rec. Vehicle Pk	3440 Cottonwood	San Jacinto	2/25/03	SA
33624	1 Stop Mart	163 S. Ramona Blvd.	San Jacinto	1/7/03	SA
45429	Clifford Kwock Meat Processing	145 Kellam	San Jacinto	2/25/03	SA
45584	Lopez Market	105 E. Main St.	San Jacinto	2/3/03	SA
45554	Hyatt Elementary School	400 E. Shaver St.	San Jacinto	1/10/03	SA
31398	Monte Vista Middle School	181 N. Ramona Blvd.	San Jacinto	2/25/03	SA
31581	7-11 Food Store 2171-25959A	1490 S. San Jacinto	San Jacinto	1/7/03	SA
45358	Ramona Produce	794 Ramona Blvd.	San Jacinto	2/25/03	SA
32391	Subway #1459	1410 S. San Jacinto	San Jacinto	1/10/03	SA
32402	Del Taco #202	1401 San Jacinto Ave.	San Jacinto	1/10/03	SA
42522	99 Cents Plus Store	163 E. Main Street	San Jacinto	2/25/03	SA
43835	Farmer Boys - San Jacinto	1385 S. State St.	San Jacinto	3/4/03	SA
44503	JACK IN THE BOX #5392	3291 W ESPLANDE AVE	SAN JACINTO	06/04/07	SA

44552	WALMART SUPERCENTER	1861 S SAN JACINTO AVE	SAN JACINTO	06/05/07	SA
44602	MCDONALDS	1861 S SAN JACINTO AVE	SAN JACINTO	06/05/07	SA
45396	STARBUCKS	2281 W ESPLANADE AVE	SAN JACINTO	06/04/07	SA
45411	Ridgemoor Elementary School	25455 Ridgemoor Road	Sun City	10/10/06	SA
45397	Vons #2386	27220 Sun City Blvd.	Sun City	1/30/03	SA
45453	Mountain View Market	31371 Murrieta Rd.	Sun City	1/22/03	SA
45480	Stater Bros. Market #83	27160 Sun City Blvd.	Sun City	1/31/03	SA
45497	Chester W. Morrison Elem.	30250 Bradley	Sun City	2/24/03	SA
45513	Kay Ceniceros Senior Center	29995 Evans Rd.	Sun City	1/31/03	SA
45525	Albertsons #6791	26100 Newport Rd.	Sun City	1/22/03	SA
45301	Stadium Pizza	32395 Clinton Keith Rd.	Wildomar	08/02/06	SA
45303	Michaels Pizza	21465 Palomar #8	Wildomar	1/30/03	SA
45343	Pam's Donuts	21465 Palomar St.	Wildomar	1/30/03	SA
45348	Round Up Liquors	20651 Palomar St.	Wildomar	3/20/03	SA
45357	Wildomar School	21575 Palomar Rd.	Wildomar	2/18/03	SA
45362	V.F.W. CLUB	21180 Waite St.	Wildomar	1/31/03	SA
45376	Kwik Stop Market & Liquor	32395 Clinton Keith	Wildomar	1/29/03	SA
45377	Home Run Pizza	32395 Clin #2	Wildomar	1/29/03	SA
45406	Inland Valley Regional Me Dical Cent	36485 Inland Valled Rd.	Wildomar	2/18/03	SA
45432	J & S Market	21465 Palomar St.	Wildomar	1/30/03	SA
45462	Raised Donts & Bagels	32475 Clinton Keith Rd.	Wildomar	1/29/03	SA
45544	Jack In The Box #3311	21960 Bundy Canyon Rd.	Wildomar	1/16/03	SA
45409	Brown Middle School	21861 Grand Ave.	Wildomar	2/18/03	SA
45468	California Luthern High School	31970 Central Ave.	Wildomar	1/7/03	SA
45471	USA Gasoline	23905 Catt Rd.	Wildomar	2/5/03	SA
45476	Clinton Keith Chevron	23805 Clinton Keith Rd.	Wildomar	2/18/03	SA
33664	Stater Bros. Markets	30712 Benton Rd.	Winchester	08/17/06	SA
35666	Del Taco	30640 Benton Rd.	Winchester	09/01/06	SA
35800	Flamehouse	28539 Winchester Rd.	Winchester	09/29/06	SA
36257	Susan La Vorgnu Elementary School	31777 Algarve Ave.	Winchester	11/01/06	SA
36366	Coldstone Creamery #1692	30628 Benton Dr. #201	Winchester	10/26/06	SA
42087	Juice It Up	30628 Benton Rd. #204	Winchester	10/26/06	SA
44024	Pizza Factory	30676 Benton Rd.	Winchester	11/01/06	SA
44073	Los Primos Mexican Food	30628 Benton Rd.	Winchester	11/01/06	SA
44486	Carl's Jr. #1519	30604 Benton Rd.	Winchester	11/13/06	SA
45295	Subway Sandwiches	30698 Benton Rd. #B202	Winchester	10/26/06	SA
45352	Starbucks	30628 Benton Rd.	Winchester	11/29/06	SA

45355	Chevron Conv. Store	30616 Benton Rd.	Winchester	12/06/06	SA
45380	CVS/Pharmacy #8848	30736 Benton Rd.	Winchester	12/04/06	SA
45387	Skybox Grill & Tavern	30724 Benton Rd. C-308	Winchester	12/05/06	SA
45436	Defazio's Restaurant And Dance Hall	28314 Winchester Rd.	Winchester	2/24/03	SA
44664	A Carini's	37701 Warren Rd.	Winchester	04/13/07	SA
44443	Stagecoach Inn	43851 Hwy. 79 South	Aguanga	2/6/03	SM
35083	Lakeside Cafe & Market	45525 Hwy. 79 S.	Aguanga	2/6/03	SM
32964	Aguanga Village Feed	42755 Hwy. 79	Aguanga	2/6/03	SM
44717	Tumbleweed Junction	58581 Hwy. 371	Anza	08/11/06	SM
44587	Hamilton Elementary School	Mitchell Rd.	Anza	1/9/03	SM
34707	Mama Roses Pizzeria	39621 Los Alamos Rd. #B	Murrieta	08/17/06	SM
34776	The Orchid Restaurant	25359 Madison Ave. #F101	Murrieta	09/15/06	SM
34923	Niti's Indian Cuisine	39400 Murrieta Hot Springs Rd. #108	Murrieta	09/29/06	SM
35343	Dinner Studio Riverside County	40165 Murrieta Hot Springs # I	Murrieta	08/03/06	SM
35409	Richies Real American Diner	40651 Murrieta Hot Springs Rd.	Murrieta	07/27/06	SM
35537	Chile Hot Family Restaurant	40119 Murrieta Hot Springs Rd.	Murrieta	08/16/06	SM
36088	Starbucks	40735 Murrieta Hot Springs Rd.	Murrieta	08/30/06	SM
36265	7-Eleven #33552	40210 Murrieta Hot Springs	Murrieta	09/15/06	SM
40717	Terry's Coffee Trader	24630 Washington Ave.	Murrieta	09/15/06	SM
41337	Rail Ranch School Elementary	25030 Via San Tee	Murrieta	10/30/06	SM
41584	Submarina	40970 California Oaks Rd.	Murrieta	11/02/06	SM
41621	Indigo Joe's Sport Pub & Restaurant	40675 Murrieta Hot Springs Rd.	Murrieta	10/13/06	SM
42211	Red Tomato Pizza	39040 Sky Canyon Dr. #108	Murrieta	10/31/06	SM
36418	Gourmet Italia North	40711 Murrieta Hot Springs Rd.	Murrieta	10/26/06	SM
34488	Mr You Chinese Food	29910 Murrieta Hot Springs Rd.	Murrieta	11/07/06	SM
42234	Super Suppers	40663 Murrieta Hot Springs #C4	Murrieta	11/09/06	SM
42173	Booster Juice	24635 Madison #B	Murrieta	11/08/06	SM
32463	Havana Kitchen	41775 Elm St. #401	Murrieta	12/06/06	SM
33434	Comfort Inn & Suites	41005 California Oaks Rd.	Murrieta	11/29/06	SM
36194	BED BATH AND BEYOND	24450 VILLAGE WALK PL	MURRIETA	11/29/06	SM
38614	Murrieta Elementary School	41769 'b' St.	Murrieta	2/19/03	SM
39623	Oak Grove Institute	24275 Jefferson Ave.	Murrieta	1/29/03	SM
40659	The Colony At California Oaks	40710 Avenida Florita	Murrieta	1/29/03	SM
40736	Colony Grill Room	40603 Colony	Murrieta	1/29/03	SM
41572	The Mill	24690 Washington St.	Murrieta	3/10/03	SM
41642	I Hop #779	25340 Madison Ave.	Murrieta	3/5/03	SM
32832	Tovashal	23801 St. Rafael	Murrieta	2/6/03	SM

34333	Tomson Middle School	42400 Nighthawk Way	Murrieta	2/18/03	SM
34423	Cole Canyon Elementary	23750 Via Alisol	Murrieta	2/6/03	SM
35278	Walmart	41200 Murrieta Hot Springs Rd.	Murrieta	1/22/03	SM
36191	Old Murrieta Plow Boys Produce, Inc.	24683 Washington Ave.	Murrieta	1/29/03	SM
38228	Denny's	25365 Madison Ave.	Murrieta	2/25/03	SM
38628	Ralphs	23801 Washington Ave.	Murrieta	1/7/03	SM
41717	WALGREENS #9884	40663 CALIFORNIA OAKS	MURRIETA	06/20/07	SM
42253	PROCARE PHARMACY	25405 HANCOCK AVE 100	MURRIETA	06/01/07	SM
42277	TUCUMBO ICE CREAM SHOP	39381 LOS ALAMOS RD	MURRIETA	06/21/07	SM
42339	Buffalo Wild Wings	40484 Murrieta Hot Springs Road	Murrieta	06/21/07	SM
42358	LOS CABOS MEXICAN GRILL	26770 JEFFERSON AVE	MURRIETA	06/12/07	SM
42192	ARAGHI JAPANESE	40365 MURRIETA HOT SPRINGS C5	MURRIETA	06/28/07	SM
33084	PARTY CITY OF MURRIETA	24510 VILLAGEWALK PL	MURRIETA	06/15/07	SM
39478	LE PETIT CAFE	26499 JEFFERSON AVE	MURRIETA	06/13/07	SM
41121	PRO-BUILD	27826 CLINTON KEITH RD	MURRIETA	06/12/07	SM
45351	JENNY DONUTS	630 S STATE A	SAN JACINTO	12/19/06	SM
45353	Tiger Plaza Market	691 N. Ramona Blvd. #C	San Jacinto	2/25/03	SM
45464	Little Women Cafe	318 S. Pico	San Jacinto	2/25/03	SM
45527	Hooters Of Temecula	27345 Jefferson Ave.	Temecula	08/24/06	SM
45534	La Casita Nueva	27645 Jefferson	Temecula	09/13/06	SM
45547	Abbott/Take A Break	42301 Zevo Dr.	Temecula	09/20/06	SM
32080	Dippin Dots	31938 Hwy. 79 S. #C	Temecula	07/19/06	SM
45404	Penfold's Cattle Co.	42072 5th Street, Suite #301	Temecula	08/10/06	SM
45490	CVC/Pharmacy	31771 Rancho California Rd.	Temecula	09/25/06	SM
42165	Rainbow Service Station	30535 Hwy. 79 S.	Temecula	09/22/06	SM
35312	Prestos	30590 Rancho Calif.	Temecula	11/08/06	SM
35651	Wolfe's	29760 Rancho California Rd 110	Temecula	12/20/06	SM
40160	Nutri-Sport Vail Ranch	31741 Hwy. 79 S.#D	Temecula	12/21/06	SM
40203	French Valley Elementary School	36680 Cady Rd.	Temecula	10/31/06	SM
40929	Kadu	31757 Hwy. 79 S	Temecula	10/26/06	SM
42267	BJ's Restaurant	26500 Ynez Rd.	Temecula	10/03/06	SM
45373	Cosi #607	41493 Margarita Rd. #5109	Temecula	10/03/06	SM
45572	The Pinnacle	40620 Calle Contento	Temecula	12/20/06	SM
44119	Oishi Japanese Restaurant	27507 Ynez Rd. #B	Temecula	12/06/06	SM
41480	Aiyara Thai Cuisine	41533 Margarita Rd	Temecula	10/31/06	SM
30449	BASKIN ROBBINS	31891 RANCHO CALIFORNIA RD 300	TEMECULA	12/21/06	SM
30578	The Linfield School	31950 Pauba Rd.	Temecula	1/23/03	SM

30587	Vons #2382	27481 Ynez Rd.	Temecula	2/5/03	SM
30816	Cilurzo Winery	41220 Calle Contento	Temecula	1/24/03	SM
30866	Q-Club	27911 Front St.	Temecula	1/16/03	SM
30893	Prestos	30590 Ran #303	Temecula	1/27/03	SM
30907	Redhawk Golf Club	45100 Redhawk Parkway	Temecula	1/23/03	SM
30976	Stadium Pizza - Redhawk	31950 Hwy B-1	Temecula	1/23/03	SM
30988	Main Street Sub Station	41971 Main St.	Temecula	1/9/03	SM
31344	St. Jeanne De Lestonnac School	32650 Avenida Lestonnac	Temecula	1/24/03	SM
31352	Ralphs	33145 Hwy. 79 S.	Temecula	2/3/03	SM
31419	Mobil "On The Run"	33165 Hwy. 79 South	Temecula	1/23/03	SM
31508	It's A Grind	33215 Hwy. 79 #B	Temecula	1/24/03	SM
31605	Cold Stone Creamery	33215 Hwy. 79 S. Ste. 1A	Temecula	1/24/03	SM
31661	Temecula Olive Oil Co.	28653 Old Town Front St.	Temecula	1/9/03	SM
31746	Pick Up Stix	40315 Winchester Rd. #D	Temecula	2/25/03	SM
32224	Milano's	32240 Hwy. 70 S.	Temecula	2/25/03	SM
32226	Madlins Coffee House	27625 Jefferson Ave. #103	Temecula	3/27/03	SM
32230	Tipanan Restaurant	28326 Front St.	Temecula	04/17/07	SM
37585	Bernies Cafe & Deli	27535 Jefferson Ave.	Temecula	06/04/07	SM
38364	Calico Coffee Co.	28601 Front St. #F	Temecula	06/23/07	SM
38809	THE VALLEY GOURMET	41790 WINCHESTER RD F	TEMECULA	04/10/07	SM
38818	CALIFORNIA CLASSIC BURGER	27300 JEFFERSON AVE A	TEMECULA	04/18/07	SM
38847	Arco AM/PM	44987 Old Town Front St.	Temecula	06/05/07	SM
39529	THE CREEK MINI CAFE	31285 HWY 79 S A	TEMECULA	06/08/07	SM
41626	SIAM SURPRISE	26690 YNEZ ROAD B	TEMECULA	05/31/07	SM
43034	The Home Depot #1028	32020 Hwy. 79 S.	Temecula	05/14/07	SM
43218	BIG 5 SPORTING GOODS	33385 HWY 79 SOUTH	TEMECULA	05/11/07	SM
43397	RITE AID #6438	39782 WINCHESTER RD	TEMECULA	05/31/07	SM
43980	THE CLUBHOUSE AT THE PARK	32380 DEER HOLLOW WAY	TEMECULA	05/09/07	SM
44939	BEVERAGES & MORE	39672 WINCHESTER RD	TEMECULA	06/01/07	SM
45081	THE OLIVE GARDEN	29025 OVERLAND DR	TEMECULA	05/31/07	SM
45148	MR YOU EXPRESS	31795 RANCHO CALIFORNIA RD 100	TEMECULA	06/04/07	SM
32356	Palermo Pizza	300 S. Highland Sprs. Ave.	Banning	09/05/06	W
32488	McDonalds	2140 W. Ramsey	Banning	12/05/06	W
35833	Guys Family Italian Restaurant	5970 W. Ramsey St.	Banning	3/6/03	W
36027	Del Taco #39	1964 W. Ramsey St.	Banning	3/6/03	W
36334	22nd Street Liquor	2185 W. Ramsey St.	Banning	3/6/03	W
36378	McDonald's #2642	2140 W. Ramsey St.	Banning	3/6/03	W

37032	San Gorgonio Inn	150 E. Ramsey St.	Banning	3/11/03	W
37431	Banning Donuts	584 W. Ramsey St.	Banning	3/6/03	W
37923	Banning Unified Warehouse	350 E. Lincoln	Banning	3/6/03	W
41446	Donut De-Lite	6350 H W. Ramsey	Banning	3/6/03	W
44498	G & M Oil Co. LLC #20	827 W. Ramsey	Banning	3/6/03	W
44674	Jack's Market	62 N. 8th St.	Banning	3/6/03	W
44771	Banning AM/PM	2228 W. Ramsey St.	Banning	3/6/03	W
44789	K's Food Shop & Nutrition Center	163 N. San Gorgonio Ave.	Banning	3/6/03	W
44809	Nicolet Middle School	300 N. Alessandro	Banning	3/6/03	W
32744	Logan's Liquor & Deli	310 E. Ramsey St.	Banning	3/6/03	W
44837	Ahloo Chinese Food	755 W. Ransey St.	Banning	1/10/03	W
44883	Chelo's Taco Shop	1987 W. Ramsey St.	Banning	1/10/03	W
33766	Chevron Gasoline - Food Mart	3230 W. Ramsey St.	Banning	3/6/03	W
34554	Dentco	580 W. Ramsey St.	Banning	3/6/03	W
34950	Fraternal Order Of Eagles #3768	5200 W. Ramsey St.	Banning	3/19/03	W
35079	99 Cents Store N More	3333 W. Ramsey	Banning	3/6/03	W
35561	Guys Family Italian Restaurant	5970 W. Ramsey St.	Banning	04/16/07	W
36105	Papa Johns Pizza	6350 W. Ramsey St.	Banning	04/23/07	W
44618	La Tablita	68369 Hwy. 111	Cathedral City	09/29/06	W
44693	Saraya American Turkish Coffee House	67778 E. Palm Canyon Dr.	Cathedral City	08/16/06	W
44755	Alkobar	31855 Date Palm Dr.#11	Cathedral City	08/16/06	W
44757	Cicchi's Sports Shack	68955 Ramon Rd. #7	Cathedral City	08/29/06	W
44768	The Bone-yard BBQ	68100 Ramon Rd. #C6	Cathedral City	09/05/06	W
44776	El Coyote Cojo	35943 Date Palm Dr.	Cathedral City	07/31/06	W
44829	NY Slice & Ice	69185 Ramon Rd.	Cathedral City	08/29/06	W
44848	Las Carretas Taco Shop	67555 E. Palm Canyon	Cathedral City	09/28/06	W
44645	The Pour House	68703 Perez Rd. #A-3	Cathedral City	08/01/06	W
44733	McDonald's Restaurant	67555 E. Palm Canyon Dr.	Cathedral City	09/28/06	W
44775	Paradise Ice	67782 Hwy. 111 #B-106	Cathedral City	07/05/06	W
44952	Albertsons #6562	35935 Date Palm Dr.	Cathedral City	10/02/06	W
44454	Big Mama's Soul Food	68510 E. Palm Canyon #120	Cathedral City	10/25/06	W
44511	Delilah's	67555 E. Palm Canyon #A104	Cathedral City	10/31/06	W
44712	Del Taco	67794 Hwy. 111	Cathedral City	3/13/03	W
44730	Sav-On Drugs	31575 Date Palm Dr.	Cathedral City	2/13/03	W
44731	Market Place Shell	34021 Date Palm Dr.	Cathedral City	3/17/03	W
44739	Arco AM/PM #5884	67625 E. Palm Canyon	Cathedral City	2/26/03	W
44863	Sizzler	31875 Date Palm Dr.	Cathedral City	2/6/03	W

38236	Chiliburger	68780 First Street	Cathedral City	1/21/03	W
41905	Big Lots #4265	69026 Hwy. 111	Cathedral City	3/18/03	W
44026	Circle K Food Store #333	37040 Cathedral Canyon Dr	Cathedral City	2/13/03	W
44726	Weber Bread Thirft Shop	34870 Date Palm Dr.	Cathedral City	1/28/03	W
44732	The Barracks Bar	67625 E. Palm Canyon	Cathedral City	3/18/03	W
44756	New Hong Kong Chinese Restaurant	35875 Date Palm Dr.	Cathedral City	1/3/03	W
44777	Ming's Chinese Cuisine	35290-3530 Date Palm Dr.	Cathedral City	2/26/03	W
44840	Sam's Club #6609	35780 Date Palm Dr.	Cathedral City	3/12/03	W
44857	El Pollo Loco	32089 Date Palm Rd.	Cathedral City	3/17/03	W
33854	Ultramar	67890 Hwy. 111	Cathedral City	3/13/03	W
40260	Sub King	31855 Date #11	Cathedral City	3/17/03	W
44640	Ultramar Station 1 - 667	69123 Ramon	Cathedral City	3/24/03	W
44705	Dates/Adobe Restaurant	67670 Carey Rd.	Cathedral City	2/27/03	W
44721	Sunny Sands Elementary	69310 Mccallum Way	Cathedral City	2/20/03	W
44725	Subway	67730 E. Palm Canyon	Cathedral City	3/13/03	W
44729	Taqueria Chicali	35943 Date Palm Dr.	Cathedral City	3/18/03	W
44767	Magic Wok Chinese Deli	69185 Ramon Rd.	Cathedral City	2/26/03	W
34039	Applebee's Neighborhood Grill & Bar	32400 Date Palm Dr.	Cathedral City	3/6/03	W
34360	Fun In The Sun Candies	68845 Perez Rd.	Cathedral City	2/11/03	W
38698	The Pour House	68703 Per #A-3	Cathedral City	2/11/03	W
44669	Carniceria Valley Market II	32275 Date Palm	Cathedral City	3/17/03	W
35997	General Nutrition #2726	69185 Ran #D2	Cathedral City	2/3/03	W
44877	Carrusel Bakery	35280 Date Palm Dr.	Cathedral City	3/18/03	W
34077	Desert Imax	68510 E. Palm Canyon Dr.	Cathedral City	3/18/03	W
41184	Tai-pei Express	34091 Date Palm B-5	Cathedral City	1/22/03	W
31252	Arco AM/PM	36001 Date Palm Dr.	Cathedral City	3/17/03	W
31259	Papa John's Pizza	35400 Date Palm Dr.	Cathedral City	2/5/03	W
31277	Starbucks #5925	67760 E. Palm Canyon	Cathedral City	3/13/03	W
31520	Taqueria Los Ponchos	68351 Palm Canyon	Cathedral City	3/18/03	W
31670	Ming's Chinese Cuisine	35300 Date Palm Dr	Cathedral City	05/30/07	W
37867	DE LEON BAR & GRILL	35850 DATE PALM DR	CATHEDRAL CITY	04/24/07	W
42202	FIL AM ORIENTAL MART	34010 DATE PALM DR	CATHEDRAL CITY	06/05/07	W
44567	Torres Produce	51335 Harrison St. #114	Coachella	09/05/06	W
44764	Mango's Fruit & Juice Bar	49261 Grapefruit Blvd.	Coachella	09/06/06	W
32360	Albertsons #6643	83053 Ave. 48	Coachella	09/19/06	W
33585	Juice It Up!	83093 Ave. 48 Ste. C-3	Coachella	09/07/06	W
44802	Lindo Michoacan Panaderia	51687 Harrison St.	Coachella	11/14/06	W

44803	Fosters Freeze #16	51840 Harrison	Coachella	10/18/06	W
44811	The Diet Chicken	49939 Harrison St.	Coachella	11/15/06	W
32975	Pizza Hut Of Southeast KS Inc.	49954 Harrison	Coachella	11/02/06	W
35466	Fong Lam	49707 Harrison St.	Coachella	11/15/06	W
44659	La Jaliscience Ice Cream	49613 Harrison St. A-107	Coachella	11/01/06	W
44692	Starbucks	49251 Grapefruit Blvd. #1	Coachella	11/02/06	W
44734	Rosticeria Miranda	50225 Harrison #101	Coachella	11/09/06	W
44828	Valle Del Sol Elementary School	51433 Education Way	Coachella	10/23/06	W
44841	Taqueria Monarca	49305 Grapefruit Blvd. #2	Coachella	12/18/06	W
39509	Del Taco #782	85494 Vista Del Norte	Coachella	12/05/06	W
36396	Taqueria Guerrero	83103 Avenue 48 #1A	Coachella	11/15/06	W
44700	Coral Mount Academy	51375 Van Buren	Coachella	11/07/06	W
44832	Mario's Italian Cafe'	83103 Ave 48 Suite D	Coachella	12/12/06	W
44884	El Toro Loco #2	85101 Avenue 52	Coachella	1/13/03	W
44910	Ceci's Mini Mart	51695 Harrison St.	Coachella	1/13/03	W
43135	LOS COMPAS MINI MARKET	1221 SIXTH ST	COACHELLA	05/11/07	W
43827	Firehouse Tavern	12520 Palm Dr.	Desert Hot Springs	09/19/06	W
44266	Starbucks	14207 Palm Dr. #104	Desert Hot Springs	09/19/06	W
35820	Builders Suppy Ace Hardware	66550 Pierson Blvd.	Desert Hot Springs	09/19/06	W
36501	Payless Donut	65961 Pierson Blvd.	Desert Hot Springs	10/24/06	W
37844	Casa Blanca #2	66370 Pierson Blvd.	Desert Hot Springs	3/19/03	W
37983	Escapade	12347 Palm Dr.	Desert Hot Springs	2/25/03	W
39022	Playoffs	12105 Palm Dr.	Desert Hot Springs	3/3/03	W
39166	Paradise Deli & Grill	11000 Palm Dr.	Desert Hot Springs	1/10/03	W
39234	South Of The Border	11719 Palm Dr.	Desert Hot Springs	2/11/03	W
43398	Thai Palm's Restaurant	12106 Palm Dr.	Desert Hot Springs	3/12/03	W
44311	Tommy's	12520 Palm Dr.	Desert Hot Springs	3/3/03	W
44856	Two Bunch Palms/Le Casino	67425 2 Bunch Palms Trail	Desert Hot Springs	3/14/03	W
44881	El Charro	13156 Palm Dr.	Desert Hot Springs	2/25/03	W
33837	Village Donut #A	13900-a Palm Dr.	Desert Hot Springs	1/21/03	W
35398	El Tarasco 2	13900 Palm Dr. #B-C	Desert Hot Springs	3/5/03	W
44804	Super One Food Store	12350 Palm Dr.	Desert Hot Springs	3/13/03	W
44825	Payless Donut	65961 Pierson Blvd.	Desert Hot Springs	3/3/03	W
44854	China Food House	14220 Palm Dr.	Desert Hot Springs	3/6/03	W
44858	KFC Of Palm Desert, Inc.	13947 Palm Dr.	Desert Hot Springs	3/14/03	W
44900	Catalina Spa Country Store	18800 Corkill Rd.	Desert Hot Springs	1/15/03	W
44949	Lu's Arco AM/PM	12775 Palm Dr.	Desert Hot Springs	3/5/03	W

44981	Desert Dunes Golf Club L.L.C	19300 Palm Dr.	Desert Hot Springs	2/11/03	W
43694	Pizza Hut	14577 Palm	Desert Hot Springs	2/13/03	W
44751	Domino's Pizza	13900 Palm Dr.	Desert Hot Springs	3/14/03	W
44876	Farmer And The Dale	66425 Pierson Blvd.	Desert Hot Springs	3/26/03	W
31697	PALM KOREA RESTAURANT	13440 Palm Dr.	Desert Hot Springs	3/13/03	W
31793	Teriyaki Grill House	13112 Palm Dr.	Desert Hot Springs	2/25/03	W
31141	Miramonte Resort	76477 Hwy. 111	Indian Wells	1/2/03	W
31195	Art Cafe	74901 Hwy. 111	Indian Wells	1/7/03	W
31320	Denny's Restaurant #7589	82120 Hwy. 111	Indio	07/11/06	W
31321	Fajita Express	82227 Hwy. 111 #3	Indio	07/10/06	W
31528	Jack In The Box #82	82210 Hwy. 111	Indio	07/24/06	W
31560	La Pinata Dining Room	81921 Hwy. 111	Indio	09/27/06	W
31706	Baja Meat Market	47570 Van Buren	Indio	09/29/06	W
31830	Elmer's Of Indio	81539 Hwy. 111	Indio	09/27/06	W
31878	Wok Around	81599 Hwy. 111	Indio	09/27/06	W
32034	Circle K Store #2708680	80980 Hwy. 111	Indio	07/05/06	W
32232	Arco AM/PM #05252	82338 Hwy. 111	Indio	07/10/06	W
39464	Super Sub Stop	81673 Hwy. 111 #6	Indio	09/27/06	W
40112	Fresh Fish Company	81944 Hwy. 111 #A	Indio	09/28/06	W
40361	Gas N Save	81485 Miles Ave.	Indio	07/06/06	W
40948	Cisko's Cafe	46767 Monroe St.	Indio	09/28/06	W
41906	The Naked Noodle	81944 Hwy. 111 #C	Indio	09/28/06	W
42161	Little Caesar's Pizza	82360 Hwy 111 Ste. #B	Indio	09/05/06	W
42836	Subway Sandwiches	44100 Jefferson St. #E	Indio	09/28/06	W
43699	Andy's #4 Burgers Inc.	83699 Indio Blvd.	Indio	11/27/06	W
43861	El Campanario	44185 Monroe	Indio	10/19/06	W
44179	Loyal Order Of Moose #771	46459 Monroe St.	Indio	10/26/06	W
44633	Mariscos Guerrero	82204 Hwy. 111	Indio	12/19/06	W
44643	Shield's Date Gardens	80225 Hwy. 111	Indio	10/30/06	W
44746	Sizzler #1412	81760 Hwy 111	Indio	10/18/06	W
44801	Valero #3770	81831 Hwy 111	Indio	10/25/06	W
44822	Circle K Food Store #538	43955 Clinton	Indio	10/16/06	W
44849	Carniceria La Tapatia	44250 N. Jackson St.	Indio	10/31/06	W
44908	Thrifty Drug #5670	82154 Hwy. 111	Indio	10/26/06	W
44960	G & M Oil #147	82003 Hwy. 111	Indio	11/21/06	W
44980	Outdoor Resorts Juice Bar	80394 Ave. 48	Indio	12/05/06	W
44995	Indio Metro 8	81725 Hwy. 111	Indio	10/18/06	W

45025	Brisas Raspados Y Fruitas	44091 Jackson St. #14	Indio	11/06/06	W
34449	Outdoor Resorts Motorcoach Country Clut	80501 Ave. 48	Indio	11/20/06	W
45049	Pizza Hut	81850 Ave. 46	Indio	1/8/03	W
37781	TAQUERIA GUERRERO	81576 HWY 111	INDIO	05/24/07	W
36740	Don Jose's Taco Shop	81944 Hwy. 111 #B	Indio	04/09/07	W
37058	La Estancia Restaurant	80755 Hwy 111	Indio	05/31/07	W
41278	Panaderia El Pelos	44320 Jackson St. #B	Indio	04/24/07	W
42606	Longs Drug Store #0012	49980 Jefferson St.	Indio	05/21/07	W
44554	EL TACO MACO	46900 MONROE ST 402	INDIO	05/24/07	W
44842	Circle K Food Store #457	78110 Calle Tampico	La Quinta	07/06/06	W
44844	Canton Bistro	79405 Hwy. 111 #S	La Quinta	09/29/06	W
44860	Surf City Squeeze	79405 Hwy. 111 #1	La Quinta	09/29/06	W
44906	Stuff Pizza Bar & Grill	78015 Main St. #100	La Quinta	09/19/06	W
44909	Abilene Pit BBQ	47150 Washington #B	La Quinta	08/09/06	W
45035	Maxcy's Grill	79305 Hwy. 111 Ste. 1	La Quinta	09/29/06	W
43539	Taqueria Teotihuacan	79410 Hwy 111, Suite 107	La Quinta	07/24/06	W
44888	Papa Dan's	79410 Hwy. 111 Ste. 112	La Quinta	08/14/06	W
44889	Desert Sage	78085 Avenida La Fonda	La Quinta	10/17/06	W
44901	Blend	78073 Calle Barcelona	La Quinta	10/17/06	W
44913	Lake La Quinta Inn	78120 Caleo Bay Dr.	La Quinta	10/19/06	W
44935	Traditions Golf Club	78505 Old Ave. 52	La Quinta	11/08/06	W
44937	Traditions Coyote Cafe'	78505 Old Ave. 52	La Quinta	11/14/06	W
44938	Pizza Hut	50855 Washington St	La Quinta	10/11/06	W
44968	Rancho La Quinta Racquet Club	79-355 Cascadas Circle	La Quinta	12/20/06	W
44978	Main St. Bar & Grill	78065 Main St. #104	La Quinta	10/30/06	W
44985	Jake's Pizza, La Quinta LLC	78995 Hwy. 111 Ste. 9	La Quinta	10/27/06	W
32581	Santa Rosa Plaza	50777 Santa Rosa Plaza	La Quinta	11/21/06	W
40589	Colonel Mitchell Paige Middle School	43495 Palm Royal Drive	La Quinta	10/05/06	W
42197	Andrew's Bar & Grill	78121 Avenida La Fonda	La Quinta	1/9/03	W
34427	ARCO AM/PM #5419	46150 Washington	La Quinta	1/8/03	W
32419	PGA West Resort Club House	56150 PGA Blvd.	La Quinta	1/14/03	W
32638	Quarry At La Quinta	1 Quarry Ln.	La Quinta	1/16/03	W
32641	Pga West Stadium Course Snack Bar	56138 Pga Blvd.	La Quinta	1/14/03	W
32645	The Palms Golf Club	57000 Palms Drive	La Quinta	1/16/03	W
32651	Norman Golf Clubhouse	81405 Kingston Heath	La Quinta	1/14/03	W
32659	USA Gasoline	79490 Hwy. 111	La Quinta	1/17/03	W
33048	Circle K #27-05911	78364 Hwy. 111	La Quinta	1/2/03	W

33499	OLD TOWN COFFEE COMPANY	78100 MAIN ST 102	LA QUINTA	04/17/07	W
33527	SAMS CLUB	79315 HWY 111	LA QUINTA	05/10/07	W
34234	DIPPIN DOTS	79275 HWY 111 STE 6	LA QUINTA	05/10/07	W
34239	JUICE IT UP	79024 HWY 111 STE 103	LA QUINTA	05/10/07	W
34240	YUMMI YOGURT	46480 WASHINGTON ST 1	LA QUINTA	05/23/07	W
34403	COFFEE BEAN & TEA LEAF	79024 HWY 111 STE 101	LA QUINTA	06/21/07	W
35439	Mecca Del Taco	90488 66th Ave.	Mecca	12/06/06	W
35579	Arco Travel Center	90480 Ave. 66	Mecca	1/13/03	W
35589	Ofelias Mexican Restaurant	91280 2nd St.	Mecca	06/18/07	W
35638	MEX AMERICAN GRILL	90480 66TH AVE	MECCA	05/15/07	W
35833	TAQUERIA EL TARENGO	91193 2ND ST C	MECCA	06/18/07	W
31690	Windmill Market	17080 Indian Ave.	North Palm Springs	3/14/03	W
31712	Ray And Joe's Office	64647 Dillon Rd.	North Palm Springs	2/25/03	W
31751	Bruiser's Iron Horse Saloon	19465 Indian Ave. #U	North Palm Springs	1/22/03	W
31852	The Inn on El Paseo	73445 El Paseo,#11-A	Palm Desert	09/26/06	W
31879	Palm Desert Athletic Club	74824 Lennon Place	Palm Desert	07/27/06	W
31930	Pick Up Stix	73030 El Paseo Rd. #102	Palm Desert	07/26/06	W
31952	Sams Club	34220 Monterey Ave.	Palm Desert	07/17/06	W
31960	Wal-mart Super Center Store #5096	34500 Monterey Ave.	Palm Desert	07/14/06	W
31968	McDonalds Restaurant	34500 Monterey Ave.	Palm Desert	07/14/06	W
31982	Jack In The Box #5363	36555 Cook Street	Palm Desert	08/01/06	W
31984	Del Taco #1010	34540 Monterey Ave.	Palm Desert	08/03/06	W
32016	Palm Desert Country Club	77200 California Dr.	Palm Desert	11/22/06	W
32018	Chevron Stations, Inc.	72801 Hwy. 111	Palm Desert	1/14/03	W
32029	Tsing Tao	74040 Hwy. 111	Palm Desert	1/3/03	W
32250	Mobil On The Run #10400	78005 Country Club Dr.	Palm Desert	1/16/03	W
32270	Sav-On Drug #3046	42155 Washington St.	Palm Desert	1/2/03	W
32549	Mobile On The Run	75000 Gerald Ford Dr.	Palm Desert	1/16/03	W
33110	Panda Express #791	74520 Hwy. 111	Palm Desert	1/7/03	W
34116	QUIZNOS SUBS	78010 COUNTRY CLUB DR 200	PALM DESERT	05/23/07	W
34198	MARIOS ITALIAN CAFE V	78152 VARNER RD G & H	PALM DESERT	05/23/07	W
34632	MAMA OLA'S SOUL FOOD	410 SAN RAFAEL RD	PALM SPINGS	05/30/07	W
34703	Taqueria Tlaquepaque	650 E. Sunny Dunes	Palm Springs	09/01/06	W
34746	7-11 Store #16690F-2171	1798 N. Sunrise Way	Palm Springs	08/18/06	W
34792	Sunny Daze Cafe LLC	4751 E. Palm Canyon Dr. #C	Palm Springs	09/28/06	W
34792	Larry's Wine Cellar & Spirits	2781 N. Palm Canyon Dr.	Palm Springs	07/26/06	W
34818	L'escargot At Smoke Tree	1775 E. Palm Canyon	Palm Springs	11/29/06	W

34965	Ignition	123 N. Palm Canyon Dr.	Palm Springs	10/04/06	W
35199	Santa Maria Meat Market	1550 N. Palm Canyon Dr.	Palm Springs	12/05/06	W
35257	Seng Dao Thai Restaurant	2249 N. Palm Canyon Dr.	Palm Springs	10/04/06	W
35385	Native Food, Inc.	1775 E. Palm Canyon Dr.	Palm Springs	11/01/06	W
35483	Wild For The Vine	390 N. Palm Canyon Dr.	Palm Springs	12/06/06	W
35779	Papa Johns Pizza	425 S. Sunrise Way #H-9	Palm Springs	11/28/06	W
36177	Walgreens #01079	1700 E. Vista Chino Rd.	Palm Springs	12/12/06	W
37129	American Legion Post 519	400 N. Belardo Rd.	Palm Springs	2/25/03	W
40378	Extreme Blends	4050 Airport Center Dr.	Palm Springs	2/3/03	W
40945	Cecebrity Bistro	3400 Tahquitz Canyon Way	Palm Springs	3/5/03	W
41054	Pizza Hut	1501 N. Palm Canyon	Palm Springs	3/3/03	W
41089	Carl's Jr. #725	102 Sunrise Way	Palm Springs	2/19/03	W
41571	Denny's #452	1201 N. Palm Canyon Dr.	Palm Springs	3/14/03	W
41578	Mykonos Deli	139 E. Andreas Rd.	Palm Springs	3/12/03	W
42224	Jelly Donut	1751 N. Sunrise Way #D	Palm Springs	3/3/03	W
34452	Las Casuelas	368 N. Palm Canyon Dr.	Palm Springs	2/4/03	W
36302	Las Casuelas Terraza	222 S. Palm Canyon Dr.	Palm Springs	1/6/03	W
36356	Le Vallauris	385 Tahquitz Way	Palm Springs	1/29/03	W
36731	Palm Springs Chop House	262 S. Palm Canyon Dr.	Palm Springs	3/17/03	W
37336	The Palms At Palm Springs, Inc.	572 N. Indian Canyon Dr.	Palm Springs	3/3/03	W
37763	Thai Bistro World Cuisine	394 N. Palm Canyon Dr.	Palm Springs	3/18/03	W
40343	Capra's	204 N. Palm Canyon Dr.	Palm Springs	2/25/03	W
40744	Las Palmas Liquor	1595 N. Palm Canyon Dr.	Palm Springs	3/3/03	W
40916	Vons #2384	4733 E. Palm Canyon Dr.	Palm Springs	3/17/03	W
41041	J J`s	1550 N. Palm Canyon Dr.	Palm Springs	1/14/03	W
41289	Vons Grocery Co. #2171	2315 E. Tahquitz-McCallum	Palm Springs	1/31/03	W
41711	Penguins Frozen Yogurt	333 N. Palm Canyon #102	Palm Springs	2/3/03	W
42220	Palm Springs Convention Center	277 N. Avenida Caballeros	Palm Springs	3/17/03	W
32535	One Stop Liquor	220 N. Indian Ave.	Palm Springs	2/3/03	W
35323	Marriott Courtyard	1300 Tahquitz Way	Palm Springs	3/5/03	W
36500	Starbucks Coffe #5235	101 S. Palm Canyon	Palm Springs	1/16/03	W
35972	California Pizza Kitchen	123 N. Palm Canyon #117	Palm Springs	3/14/03	W
35980	Baja Noche's	611 S. Palı #13	Palm Springs	1/16/03	W
36912	Tomboyz	214 E. Arenas	Palm Springs	2/20/03	W
37148	Rizzo's Pizzeria	100 S. Sun #B	Palm Springs	1/22/03	W
32791	El Salvador Cafe	175 N. Sunrise #F2	Palm Springs	3/12/03	W
32819	El Taco Asado	440 El Ciel #B19 & 20	Palm Springs	1/30/03	W

35894	Kaiser Grill Palm Springs	205 S. Palm Canyon	Palm Springs	3/28/03	W
37174	Sunrise Chinese Restaurant	1751 N. Su #F5	Palm Springs	3/20/03	W
41682	Albertsons #6569	1751 N. Sunrise Way	Palm Springs	2/19/03	W
42249	Rocky's Pizza	1751 N. Su #F1	Palm Springs	3/27/03	W
32311	Togo's Eatery	255 S. Palr #G B-1	Palm Springs	2/27/03	W
33263	Jamba Juice	111 S. Palm Canyon Dr.	Palm Springs	2/11/03	W
33912	El Fuerte	1750 N. Sunrise Way	Palm Springs	3/26/03	W
33921	La Shank House (Persian Cuisin)	621.00 N. Palm Canyon Dr.	Palm Springs	3/12/03	W
33938	Fatburger	451 Paseo Dorotea	Palm Springs	1/8/03	W
33946	Heminger's Fudge & Chocolates	211 S. Palm Canyon	Palm Springs	2/11/03	W
33963	McDonalds Restaurant	1717 E. Vis #D	Palm Springs	3/3/03	W
33969	Stater Bros. Markets #126	1717 Vista Chino	Palm Springs	2/10/03	W
33982	AM/PM #5968	1717 Vista Chino	Palm Springs	3/3/03	W
33983	Coldstone Creamery	155 S. Palm Canyon Dr. #B-2	Palm Springs	2/11/03	W
33984	Twisted Fish Co.	105 S. Palm Canyon Dr.	Palm Springs	1/16/03	W
33998	Leoco Fuel	145 S. Gene Autry Trail	Palm Springs	3/13/03	W
34011	Chocolateria	390 N. Palm Canyon Dr.	Palm Springs	2/3/03	W
34036	More Than A Mouthful	134 E. Tahquitz Canyon Way	Palm Springs	1/10/03	W
34042	Toucan's Tiki Lounge	2100 N. Palm Canyon #A-100	Palm Springs	3/18/03	W
34348	Mama Ola's Soul Food	410 W. San Rafael	Palm Springs	1/30/03	W
34519	China 8 Buffet	2355 Tahquitz Canyon Way	Palm Springs	2/20/03	W
34755	Manhattan Delicatessen	2665 E. Palm Canyon Rd.	Palm Springs	05/07/07	W
34987	Palm Canyon Resort & Spa V.P.O.A.	2800 S. Palm Canyon	Palm Springs	06/13/07	W
35007	BACKSTAGE BISTRO	210 S. PALM CANYON DR	PALM SPRINGS	05/15/07	W
35720	Palm Springs Shell	4875 Ramon Rd.	Palm Springs	04/17/07	W
35781	The Falls Prime Steakhouse	155 S. Palm Canyon Dr. #A21	Palm Springs	06/25/07	W
35817	Match Box	155 S. Palm Canyon Dr. #A21	Palm Springs	06/20/07	W
35901	JULIUS GRILL	67782 E PALM CANYON DR	PALM SPRINGS	05/02/07	W
36542	TACO DEL MAR	109 S PALM CANYON DR	PALM SPRINGS	06/18/07	W
30772	Sushi Bar "Fuu Rin" Restaurant	42490 Bob Hope Dr.	Rancho Mirage	09/29/06	W
31067	Grand China Wok	42540 Bob Hope Dr.	Rancho Mirage	07/05/06	W
32909	Borders	71800 Hwy. 111 #B119	Rancho Mirage	11/28/06	W
33395	Tortilla Express L.L.C.	72877 Dinah Shore Dr.	Rancho Mirage	12/06/06	W
33567	The Home Depot #667	34249 Monterey Ave.	Rancho Mirage	12/26/06	W
33598	Pavilions #218	36101 Bob Hope Dr.	Rancho Mirage	3/24/03	W
34178	Panda Express	36101 Bob Hope Dr.	Rancho Mirage	2/26/03	W
35240	Chart House Restaurant	69934 Hwy. 111	Rancho Mirage	3/24/03	W

35254	Eisenhower Memorial Hospital	39000 Bob Hope Dr.	Rancho Mirage	3/24/03	W
35515	Jensens Minute Shoppe	69900 Frank Sinatra Dr.	Rancho Mirage	2/21/03	W
36062	Coco's #1283	42560 Bob Hope Dr.	Rancho Mirage	2/19/03	W
36727	Marie Callender Pie Shop #59	69830 Hwy. 111	Rancho Mirage	2/19/03	W
36897	Marriott's Rancho Las Palm Main Kitchen	41000 Bob Hope Dr.	Rancho Mirage	1/2/03	W
37031	Marriott's Rancho Las Palm Tortuga	41000 Bob Hope Dr.	Rancho Mirage	1/2/03	W
37280	Tamarisk Country Club	70240 Frank Sinatra Dr.	Rancho Mirage	2/26/03	W
37341	Tamarisk Country Club Snack Bar	70240 Frank Sinatra Dr.	Rancho Mirage	3/24/03	W
39139	Thunderbird Country Club-Halfway House	70612 Hwy. 111	Rancho Mirage	2/5/03	W
39738	Longs Drug Stores #153	42370 Bob Hope Dr.	Rancho Mirage	2/11/03	W
40013	Rancho Mirage Elementary School	42985 Indian Trail	Rancho Mirage	2/20/03	W
42270	Eisenhower Research Centr Annenburg	39000 Bob Hope Dr.	Rancho Mirage	3/24/03	W
42262	Rancho Mirage C.C. Patio Snack Bar	38500 Bob Hope Dr.	Rancho Mirage	1/3/03	W
33394	Goldmine Yogurt	42414 Bob Hope Dr.	Rancho Mirage	1/23/03	W
33478	Eisenhower Medical Center Kewitt Blg	39000 Bob Hope Dr.	Rancho Mirage	3/24/03	W
34060	Main Kitchen	68900 Frank Sinatra	Rancho Mirage	3/24/03	W
34064	Lobby Bar	68900 Frank Sinatra	Rancho Mirage	3/24/03	W
34067	Pool Side Bar	68900 Frank Sinatra Dr.	Rancho Mirage	3/24/03	W
34071	Tennis Club Snack	68900 Frank Sinatra Dr.	Rancho Mirage	3/24/03	W
34079	Rancho Mirage 6	72777 Dinah Shore Dr.	Rancho Mirage	2/24/03	W
34080	Marriott's Rancho Las Palm Fresca's	41000 Bob Hope Dr.	Rancho Mirage	1/2/03	W
34081	Wellington Place Of Rancho Mirage	34560 Bob Hope Dr.	Rancho Mirage	2/26/03	W
34095	Applebees	71740 Hwy. 111	Rancho Mirage	2/26/03	W
34096	Fleming's	71800 Hwy. 111	Rancho Mirage	1/23/03	W
34098	Yard House	71800 Hwy. 111 #B101	Rancho Mirage	1/24/03	W
34373	Baja Fresh Mexican Grill	71800 Hwy. 111 Unit A116	Rancho Mirage	1/23/03	W
34461	Prego	71800 Hwy. 111 #A167	Rancho Mirage	1/28/03	W
34937	Babe's Barbeque-Grill-Brewhouse	71800 Hwy. 111, A-176	Rancho Mirage	1/24/03	W
35081	Ben & Jerry's	71800 Hwy. #A-124	Rancho Mirage	1/28/03	W
35193	Bouchee Fine Foods	42410 Bob Hope Dr.	Rancho Mirage	2/20/03	W
35272	Guaymas	71800 Hwy. 111 #D101	Rancho Mirage	1/28/03	W
35696	The Westin Mission Hills Villa	71777 Dinah Shore Dr.	Rancho Mirage	1/10/03	W
35697	Panda Express	34151 Monterey Ave. #105	Rancho Mirage	2/3/03	W
35712	Tulip Hill Winery	71800 Hwy. 111, A125	Rancho Mirage	1/23/03	W
35713	Maki Maki	71800 Highway 111 #A101	Rancho Mirage	1/23/03	W
40267	Wendy's	72837 Dinah Shore Drive	Rancho Mirage	2/3/03	W
40337	It's A Grind Coffee House	34151 Monterey Ave. #100	Rancho Mirage	2/20/03	W

40386	Piero's Aequa Pazza	71800 Hwy. 111 #A167	Rancho Mirage	04/16/07	W
45354	Moreno Foods	462 Scovell Ave. #C	San Jacinto	1/7/03	W
45153	Oasis Date Garden	59111 Hwy. 111	Thermal	1/13/03	W
45159	Thermal Senior Center	87229 Church	Thermal	1/15/03	W
45270	Taqueria Guerrero	72246 Varner Rd.	Thousand Palms	07/26/06	W

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Inspected Facilities

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Area: 1

Facility	DBA	Address	More	City	Zip	SIC Code
80040	Alvord Unified School District	10365 Keller Ave	(Section B)	Riverside	92505	8299
80041	Merit Oil Company	1751 3rd St		Riverside	92507	5983
80050	Arco #1941/Prime Smog & Repair Inc.	6692 Indiana Ave		Riverside	92506	5541
80054	Riverside Gas Mart	4196 Van Buren Blvd		Riverside	92503	5541
80061	Arco #5168 Prestige Stations 0665	3659 Central Ave		Riverside	92506	5541
80066	New Basis	2626 Kansas Ave		Riverside	92507	3000
80112	Starbucks Customs	12391 Sampson Ave	#R & S	Riverside	92505	7539
80119	Brockton Auto Clinic	4468 Brockton Ave		Riverside	92501	7538
80125	Budget Transmissions	2129 3rd St		Riverside	92507	7500
80138	California Highway Patrol	8118 Lincoln Ave		Riverside	92504	9221
80155	Champion Lumber	1600 Columbia Ave		Riverside	92507	5031
80157	Chevron #0200734	3390 La Sierra Ave		Riverside	92503	5541
80158	Gasco Oil	5305 Arlington Ave		Riverside	92504	5541
80161	Chevron #95753	3505 Central Ave		Riverside	92506	5541
80164	Chevron 94702, Eli's	3476 Van Buren Blvd		Riverside	92503	7500
80210	County Of Riverside Admin Center	4080 Lemon St	Section # 2	Riverside	92501	0
80217	County Of Riverside Fleet Services	4066 County Circle Dr		Riverside	92503	0
80223	Crown Cleaners	5190 Arlington Ave		Riverside	92504	7200
80244	Don's Auto Care	6417 Jurupa Ave		Riverside	92504	7538
80251	Dutton Motor Company	8201 Auto Dr		Riverside	92504	5500
80255	Union 76	350 Stephens Ave		Riverside	92501	5541
80263	Econo Firestone Tire & Auto Ctr Inc	7445 Arlington Ave		Riverside	92503	7538
80290	Fastrip Food Store #16	10306 Arlington Ave		Riverside	92505	5541
80309	Fritts Ford Inc	8000 Auto Dr		Riverside	92504	5500
80310	RBS Petrol, Inc	4975 Van Buren Blvd		Riverside	92503	5541
80324	BlueLinx Corp	1450 Citrus Ave		Riverside	92507	2400
80326	Shell Oil Products US	3261 Iowa Ave		Riverside	92507	5541
80341	Hamblin Body & Paint	7590 Cypress Ave		Riverside	92503	7500
80346	Hertz Equipment Rental	929 W La Cadena Dr		Riverside	92501	7359
80372	Inland Towing	9500 Arlington Ave		Riverside	92503	7500
80380	Dealer Services of Riverside	7726 California Ave		Riverside	92504	7500
80382	Quality Fuel	9407 Magnolia Ave		Riverside	92503	7500

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Facility	DBA	Address	More	City	Zip	SIC Code
80387	5-Point Auto Service	11096 Hole Ave		Riverside	92505	7538
80396	Jones Dry Cleaners	5360 Arlington Ave		Riverside	92504	7216
80403	Kaiser Foundation Hospital	10800 Magnolia Ave		Riverside	92505	6324
80437	Lexus Of Riverside	3150 Adams St		Riverside	92504	5500
80467	Scher Tire Inc #13	5110 Arlington Ave		Riverside	92504	7539
80477	Chevron #29	8283 Arlington Ave		Riverside	92503	7500
80497	Arlington Smog Pro	8970 Arlington Ave		Riverside	92503	5541
80501	ExxonMobil Oil Corporation #10197	3480 Madison St		Riverside	92504	5541
80502	ExxonMobil Oil Corporation	1147 University Ave		Riverside	92507	5541
80503	ExxonMobil Oil Corporation	7290 Arlington Ave		Riverside	92503	5541
80506	Imperial Stations, Inc. #3	3315 14th St		Riverside	92501	5500
80510	Valero	10290 Magnolia Ave		Riverside	92503	5541
80511	ExxonMobil Oil Corporation #10773	3399 Adams St		Riverside	92504	5541
80540	MWD/Lake Mathews Reservoir	18250 La Sierra Ave		Riverside	92503	4941
80548	High Light Electric	7000 Jurupa Ave		Riverside	92504	4911
80561	Pacific Bell LB-148	9129 Magnolia Ave		Riverside	92503	4813
80562	Pacific Bell LB-149	3580 Orange St		Riverside	92501	4813
80563	Pacific Bell LB-469	16991 Van Buren Blvd		Riverside	92504	4813
80567	Palm Springs Oil #14	6002 Van Buren Blvd		Riverside	92503	5983
80570	Parkview Community Hospital	3865 Jackson St		Riverside	92503	6324
80592	Poma Automated Fueling In	3020 E La Cadena Dr	#A	Riverside	92507	7538
80627	RCR Companies	12620 Magnolia Ave		Riverside	92503	1711
80638	Solorio AutoTech, Inc	1735 3rd St	Unit A	Riverside	92507	7538
80655	Riverside Machine Works	6301 Baldwin Ave		Riverside	92509	3400
80714	Sears Roebuck & Co #1298/6711	5261 Arlington Ave		Riverside	92504	5300
80720	AGA, LLC	1308 University Ave		Riverside	92507	5541
80726	Shell Oil Products US	3502 Adams St		Riverside	92504	5541
80756	Circle K Store, #2705248	3950 Pierce St	Unit A	Riverside	92505	5541
80771	Swiss Dairy	4221 Buchanan St		Riverside	92503	2000
80779	Western Gas	5310 La Sierra Ave		Riverside	92505	5500
80788	Central Shell	3498 Central Ave		Riverside	92506	5541
80792	Arco #9710/prestige Stations #9710	4930 Van Buren Blvd		Riverside	92503	5541
80793	Arco #9711/prestige Stations #9711	3399 Van Buren Blvd		Riverside	92503	5541

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80794	Arco #9712/prestige Stations #9712	3570 Central Ave		Riverside	92506	5541
80805	Toyota Of Riverside	7870 Indiana Ave		Riverside	92504	5500
80822	UCR Fleet Services	3401 Watkins Dr		Riverside	92521	8221
80826	United Parcel Service	1391 Spruce St		Riverside	92507	4200
80831	Union 76	2278 Main St		Riverside	92501	5541
80832	Circle K #2705693	9501 Indiana Ave		Riverside	92503	5500
80836	ConocoPhillips Co #2705745	6575 Brockton Ave		Riverside	92506	5500
80849	Quicklane/Fritts Ford	7990 Auto Dr		Riverside	92504	5500
80861	RDO Equipment Company	20 Iowa Ave		Riverside	92507	5000
80862	Wiest Rentals & Sales	3890 Pierce St		Riverside	92503	7359
80872	Baghouse & Industrial Sheet Metal	1731 Pomona Rd		Corona	92882	8900
80873	3M/Corona Plant	18750 Minnesota Rd		Corona	92881	3295
80878	Gas N' Go	8790 Mission Blvd		Riverside	92509	5541
80896	Advance Business Graphics	3810 Wabash Dr		Mira Loma	91752	2700
80903	Alcorn Fence Co	6445 Pedley Rd		Riverside	92509	1799
80912	Arco Am/Pm Diamond Drive	250 Diamond Dr		Lake Elsinore	92530	5541
80913	Arco #5644/Prestige Stations #5310	33986 Orange St		Wildomar	92595	5541
80916	American Auto Body & Frame	1643 Hamner Ave		Norco	92860	7538
80918	American Drive Thru Cleaners	310 S Main St		Corona	92882	7200
80922	Arco #5556/Prestige Stations #5272	3700 Hamner Ave		Norco	92860	5541
80923	Mission 60 AM/PM	10112 Mission Blvd		Riverside	92509	5541
80924	High Desert Oil Co Inc #596	8677 Limonite Ave		Riverside	92509	8324
80925	Arco #5618/Prestige Stations #5293	29355 Central Ave		Lake Elsinore	92532	5541
80929	Apro #31	1488 6th St		Norco	92860	5541
80930	Arco AM/PM Mini Market #01259	702 E 6th St		Corona	92879	5541
80935	Arvinyl Metal Laminates Corp	233 N Sherman Ave		Corona	92882	3300
80948	Alpha Omega Auto Repair	313 E Grand Blvd		Corona	92879	7538
80953	Downs Energy	501 N Spring St		Lake Elsinore	92530	5541
80972	Microbac Laboratories, Inc.	280 N Smith Ave		Corona	92882	8000
80976	Cabo Marine Inc.	144 N Sherman Ave		Corona	92882	3700
80980	California Rehabilitation	5th & Western Ave		Norco	92860	9223
80993	Red Carpet Auto Wash & Gas Station	199 River Rd		Corona	92880	7542
81003	Universal Forest Products	2100 Avalon St		Riverside	92509	0

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81016	Norco Fueling	2740 Hamner Ave		Norco	92860	5540
81019	Chevron SS #1433/91582	2270 Frontage Rd		Corona	92882	5541
81030	Corona Regional Medical Center	730 Magnolia Ave		Corona	92879	8011
81032	Kayo Oil Co #2705093	33982 Mission Tr		Wildomar	92595	5541
81034	Circle K Stores, Inc. #337	10597 Jurupa Rd		Mira Loma	91752	5541
81036	Circle K #2700345	300 N Main St		Lake Elsinore	92530	5411
81038	Kayo Oil Co #2705019	10255 Mission Blvd		Riverside	92509	5541
81039	Circle K #5063	8190 Mission Blvd	#A	Riverside	92509	5541
81046	City Of Norco Fire Station #21	3367 Corydon Ave		Norco	92860	9224
81050	Bravo Trailers	3832 Wacker Dr		Mira Loma	91752	5500
81058	Swift Transportation	11888 Mission Blvd		Mira Loma	91752	4231
81059	Jefferson Smurfit	185 N Smith Ave		Corona	92882	2600
81064	Corky's Pest Control	3864 Pedley Ave		Norco	92860	7300
81073	Corona Clay Company	22079 Knabe Rd		Corona	92883	1400
81077	Corona Regional Medical	800 S Main St		Corona	92882	8011
81125	Dart Container Corp	150 S Maple St		Corona	92880	3000
81131	Food Express	4720 Brookhollow Cir		Riverside	92509	4212
81139	Medina Construction	2537 Rubidoux Blvd		Riverside	92509	1700
81141	Double D Rentals, Inc.	1547 Hamner Ave		Norco	92860	7359
81151	Skanska	1995 Agua Mansa Rd		Riverside	92509	1622
81156	Econo Lube 'n Tune #74	31700 Casino Dr		Lake Elsinore	92530	7500
81162	Eileen's Cleaners	351 Railroad Cyn Rd		Lake Elsinore	92532	7200
81177	Mike's 76	2807 Hamner Ave		Norco	92860	5541
81185	EZ Food Mart	6310 Mission Blvd		Riverside	92509	5541
81201	Food Gas N Go Mini Mart	3710 Etiwanda Ave		Mira Loma	91752	5412
81205	Southwest Chrysler Jeep	2075 Hamner Ave		Norco	92860	5599
81211	Sprint Nextel (CA7253-Bain)	10051 Limonite Ave		Riverside	92509	0
81221	Rebel Rents, Inc	6102 Etiwanda Ave		Mira Loma	91752	7359
81231	Grady Garrison Paint & Auto	212 N Smith Ave		Corona	92882	7538
81232	EZ Lube #111	1270 E Grand Blvd		Corona	92879	7500
81234	Green River Golf Course	5215 Green River Rd		Corona	92882	7992
81238	Verizon/Elsinore Main Co	311 W Graham Ave		Lake Elsinore	92530	4813
81239	Verizon/Elsinore Grand CO	33064 Blackwell Blvd		Lake Elsinore	92530	4813

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Facility	DBA	Address	More	City	Zip	SIC Code
81245	Harte Hanks/Pennysaver	3885 Wabash Dr		Mira Loma	91752	2741
81248	Hemborg Ford, Inc.	1900 Hamner Ave		Norco	92860	5511
81272	Interstate Design Industries	1631 W Pomona Rd	Unit B	Corona	92882	2500
81276	Lake Car Wash	31784 Casino Dr		Lake Elsinore	92530	7542
81299	Jurupa Dairy #229	9775 Jurupa Rd		Riverside	92509	241
81322	Elsinore Car Wash & Gas Corp	200 W Graham Ave		Lake Elsinore	92530	5541
81323	City Of Lake Elsinore	521 N Langstaff St		Lake Elsinore	92530	0
81330	Lakeside Automotive	18770 E Conard Ave		Lake Elsinore	92532	7538
81334	Ly's Gas & Mini Market	17595 Grand Ave		Lake Elsinore	92530	1203
81370	Mission Clay Products	23835 Temescal Cyn Rd		Corona	92883	3200
81375	G & M Oil Co, Inc	9267 Jurupa Rd		Riverside	92509	5541
81377	ExxonMobil Oil Corporation #12342	6824 Valley Wy		Riverside	92509	5541
81378	Valero Gas Norco	3840 Hamner Ave		Norco	92860	5541
81382	ExxonMobil Oil Corp #11443	31702 Mission Tr		Lake Elsinore	92530	5541
81383	Shell Oil	3071 Rubidoux Blvd		Riverside	92509	5541
81384	ExxonMobil Oil Corporation #10626	29300 Central Ave		Lake Elsinore	92530	5541
81388	Spirit Gas	5599 Mission Blvd		Riverside	92509	5541
81411	Norco Hills Car Wash	1840 2nd St		Norco	92860	7542
81412	Norco Conservation Camp	5th & Western Ave		Norco	92860	9224
81416	Norco Ranch, Inc	1811 Mountain Ave		Norco	92860	252
81418	Norco Transmission	2521 Hamner Ave		Norco	92860	7500
81419	Norco Truck & Auto Parts/Towing	2000 S Four Wheel Dr	#A	Norco	92860	7538
81428	One Way Transmission	2187 Sampson Ave	#101	Corona	92879	7500
81432	Orco Block Company, Inc.	4510 Rutile St		Riverside	92509	3271
81435	Copp Materials, Inc.	11901 Hwy 71		Corona	92882	3200
81440	SBC/Pacific Bell LB-150	4821 Pedley Rd		Riverside	92509	4813
81443	Pacific Fabric Reels	859 Etiwanda Ave	#811C	Mira Loma	91752	2600
81447	Page Automotive	811 E 6th St	1/2	Corona	92879	7538
81460	Harvey's Autotech	521 W 6th St		Corona	92882	7538
81463	Norco Mazda	2000 Hamner Ave		Norco	92860	5511
81471	Brake Masters	3215 Hamner Ave	#A	Norco	92860	7539
81477	Sprint PCS, RV-084	11551 Arlington Ave		Riverside	92505	4812
81493	Raya's Foreign & Domestic Auto	1950 S Four Wheel Dr	#A	Norco	92860	7538

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Facility	DBA	Address	More	City	Zip	SIC Code
81511	Penske Truck Leasing Co., L.P.	2350 Hall Ave		Riverside	92509	7513
81517	Round Up Liquor & Deli	20651 Palomar Rd		Wildomar	92595	5541
81525	Ryder Transportation Svcs #0563	5880 20th St		Riverside	92509	7513
81534	Shell Oil Products US #2045	1850 Hamner Ave		Norco	92860	5541
81535	Jagged Edge Corp #68804	4721 Green River Rd		Corona	92882	5541
81538	Glen Avon Shell #68537	10171 Mission Blvd		Riverside	92509	5541
81541	Shell Oil Products US	6100 Clay St		Riverside	92509	5541
81573	Circle K #5245	6105 Clay St		Riverside	92509	5541
81574	Circle K #5247	5804 Mission Blvd		Riverside	92509	5541
81575	Circle K #5203	6290 Mission Blvd		Riverside	92509	5541
81576	Kayo Oil Co #2705204	6190 Etiwanda Ave		Mira Loma	91752	5541
81584	Superior Ready Mix	24635 Temescal Cyn Rd		Corona	92883	3273
81593	Texaco Station, Main Street	301 N Main St		Lake Elsinore	92530	5541
81595	Shell Oil Products US #120936	230 S Lincoln Ave		Corona	92882	5541
81602	Arco #9708/prestige Stations #9708	2600 Hamner Ave		Norco	92860	5541
81603	Arco P#9705/Prestige Stations LLC	1735 W 6th St		Corona	92882	5541
81604	Arco #9706/Prestige Stations Inc.,	624 W 6th St		Corona	92882	5541
81605	Arco #9707/Prestige Stations Inc.,	1205 S Main St		Corona	92879	5541
81612	Recon Auto Center	1453 W 6th St	#105	Corona	92882	7500
81621	TTX Company /Calpro Division	10800 San Sevaine Wy		Mira Loma	91752	3743
81623	Tune-up Masters #61	3394 Hamner Ave		Norco	92860	7539
81626	Special Operations Group, Inc.	526 Railroad St		Corona	92882	4200
81630	United States Tile Company	909 Railroad St		Corona	92882	3200
81634	Circle K #5705	304 S Main St		Corona	92882	5500
81650	Via Ery Park N' Eat Catering	131 Industrial Wy		Corona	92882	5800
81665	Western Homes Corporation	299 N Smith Ave		Corona	92882	2400
81666	Clark Western Building Systems	6510 General Dr		Riverside	92509	3449
82124	Inland Valley Regional Medical Ctr	36485 Inland Valley Dr		Wildomar	92595	8011
82235	Superior Metal	4768 Felspar Ave		Glen Avon	92509	3999
83851	United Oil #68	170 Hidden Valley Pkwy		Norco	92860	5541
83865	Seven Eleven #16825(2111)	6060 Camino Real		Riverside	92509	5541
83927	Borden Trucking	3401 Etiwanda Ave	#911D	Mira Loma	91752	4200
83933	T R Auto Body & Paint/Motorsport	1476 Hamner Ave		Norco	92860	7532

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Facility	DBA	Address	More	City	Zip	SIC Code
84086	County Of Riverside Hall Of Justice	4100 Main St		Riverside	92501	7300
84089	Royal Cleaners	4300 Green River Rd	#117	Corona	92882	7200
84130	Norco Mitsubishi	2100 Hamner Ave		Norco	92860	5511
84164	Speedway Muffler	1527 Hamner Ave		Norco	92860	7538
84192	Sprint PCS, RV-014	12085 Limonite Ave		Mira Loma	91752	4812
84330	Tom Alger Dairy	11612 E 68th St		Mira Loma	91752	241
84369	International Golf Maintenance, Inc	32001 Railroad Canyon Rd		Canyon Lake	92587	7900
84437	Precision Motion	1177 Ardmore St	#A	Riverside	92507	7500
84477	Reflections Auto Trends	14881 Temescal Canyon		Lake Elsinore	92530	4200
84497	Mighty Mover Trailers, Inc.	224 N Sherman Ave		Corona	92882	4789
84502	Aero-Craft Hydraulics, Inc	392 N Smith Ave		Corona	92882	3999
84582	West Coast Porcelain, Inc.	133 N Sherman Ave		Corona	92882	3264
84615	Price Manufacturing Co	372 N Smith Ave		Corona	92882	3999
84654	Heritage Container	4777 Felspar St		Mira Loma	91752	2653
84664	Pioneer Converting	3850 Wabash Dr		Mira Loma	91752	0
84675	Team Car Care	481 Railroad St		Corona	92882	7538
84678	GS Furniture	10385 San Sevaine Wy		Mira Loma	91752	4783
84679	Advanced Business Graphics	10240 San Sevaine Wy		Mira Loma	91752	2752
84740	Norco Foreign & Domestic	2248 Hamner Ave		Norco	92860	7538
84764	Chevron	2200 Alessandro Blvd		Riverside	92508	5541
84800	Philadelphia Recycling Mine	12000 E Philadelphia St		Mira Loma	91752	1442
84829	Precision Import Auto Repair	1545 Yorba St		Corona	92882	7538
84899	A + Plus Auto Repair	1359 W 6th St	#C	Corona	92882	7538
85128	Premier Plastics	9239 Orco Pkwy	#A	Riverside	92509	3089
85231	Breed Love Automotive	2831 Hamner Ave		Norco	92860	7538
85283	Lewis Cleaners	269 Railroad Canyon Rd		Lake Elsinore	92530	7216
85354	Chevron SS #1883/203621	1501 6th St		Norco	92860	5541
85451	Performance By Paul	6722 Columbus Ave		Riverside	92504	7538
85452	Moore Electrical Contracting	463 N Smith Ave		Corona	92882	4911
85453	Sal's Propane	10097 Mission Blvd		Mira Loma	91752	2810
85475	California Baptist University	8432 Magnolia Ave	#1	Riverside	92504	8299
85595	Allsup's Convenience Store	1703 Main St		Riverside	92501	5541
85609	Husk-ITT Distributors Corporation	1580 Industrial Ave		Norco	92860	2992

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Facility	DBA	Address	More	City	Zip	SIC Code
85623	Morey's Collision Repair	2057 Hamner Ave		Norco	92860	7538
85636	Sherwin Williams Co., (The)	1950 S Four Wheel Dr	#C	Norco	92860	7538
85693	Rodriguez Auto Repair	1950 S Four Wheel Dr	#G	Norco	92860	7538
85708	Kayo Oil Co #2705739	31805 Grape St		Lake Elsinore	92530	5541
85711	M & M Transmissions	1950 S Four Wheel Dr	#F	Norco	92860	7538
85761	Ace Bros Tire & Auto Repair	10585 Arlington Ave		Riverside	92505	7539
85776	Jurupa Area Recreation/Park Distrct	4393 Riverview Dr		Riverside	92509	7999
85836	Queen's RV Supplies & Service	16831 Grand Ave		Lake Elsinore	92530	7538
85913	Kim's Arco AM/PM	2985 Rubidoux Blvd		Riverside	92509	5541
85924	Country Village Apartments	10250 Country Club Dr		Mira Loma	91752	6513
85961	Cargo Cats	3401 Etiwanda Ave	#811A&D	Mira Loma	91752	4841
86157	Southeast Construction Products Inc	33600 Mission Tr		Lake Elsinore	92595	5211
86195	USA Station #68196	8902 Trautwein Rd		Riverside	92508	
86218	Wall Design, Inc	1338 6th St		Norco	92860	
86243	Jamar Performance Products	570 Central Ave	#C	Lake Elsinore	92530	
86308	Auto Care USA	31638 Railroad Canyon Rd		Canyon Lake	92587	7538
86311	Allied Auto Salvage	1926 Spruce St		Riverside	92507	
86477	Buggy World	1950 S Four Wheel Dr	# I	Norco	92860	7538
86687	Arco Am/Pm Mini Mart	17905 Van Buren Blvd		Riverside	92508	5541
86733	American Independent, Inc	6550 Box Springs Blvd	#A	Riverside	92507	
86757	FedEx	12100 Riverside Dr		Mira Loma	91752	4213
86769	De Anza Contractors, Inc	8550 Limonite Ave		Riverside	92509	
86784	Arco Am/Pm	19930 Collier Ave		Lake Elsinore	92530	5541
86794	Hidden Valley Golf Club	10 Clubhouse Dr		Norco	92860	7900
86898	A Transmission Clinic	313 E Grand Blvd	#C	Corona	92879	
86946	Frahm Dodge	1983 Hamner Ave		Norco	92860	5599
86971	Poma Automated Fueling	11074 Inland Ave		Mira Loma	91752	7538
87219	Spectrum Cleaners	31500 Grape St	#4	Lake Elsinore	92532	7216
87278	Sav On Drug #6545	1100 Hamner Ave		Norco	92860	5912
87294	A.L.L. Roofing & Building Materials	1606 Hamner Ave		Norco	92860	5033
87383	Hammer Down, Inc.	1595 Mountain Ave		Norco	92860	
87384	Verizon/Red Poppy RSUO/CEV	20455 Red Poppy Ln		Riverside	92508	4813
87470	Surface Finish Technology	130 N Sherman Ave	#E	Corona	92882	

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Facility	DBA	Address	More	City	Zip	SIC Code
87751	Ralph D. Mitzel, Inc.	203 N Maple St		Corona	92882	
87848	J & H Auto Body of Riverside	9000 Arlington Ave	#106	Riverside	92503	
87858	MGM Shell	3873 Pyrite St		Riverside	92509	5541
87904	Arco Am/Pm	800 Serfas Club Dr		Corona	92880	5541
87925	Blow Molded Products, Inc	4720 Felspar St		Glen Avon	92509	3080
88325	Motorwork Specialists	12321 Sampson Ave	L and M	Riverside	92503	
88327	Chevron Service Station	130 W Foothill Pkwy		Corona	92882	5541
88343	Hart & Cooley, Inc	10855 Philadelphia Ave	# B	Mira Loma	91752	5075
88346	Box Springs Station	5720 Sycamore Cyn Blvd		Riverside	92507	
88366	Car Spa	996 Mountain Ave		Norco	92860	5411
88400	Cylinder Head Technologies	1710 Palmyrita Ave	#17	Riverside	92507	
88437	Jiffy Lube #2681	311 Summerhill Dr		Lake Elsinore	92530	7549
88464	Legion Iron	1836 Acre St		Norco	92860	
88479	Arco/Churches Chicken	10015 Bellegrave Ave		Riverside	92509	5541
88508	Lake Elsinore Ford	31500 Auto Center Dr	#A	Lake Elsinore	92530	5511
88555	AutoZone #3340	1404 Hamner Ave		Norco	92860	7538
88606	Lake Elsinore-PHHWCF	512 N Langstaff St		Lake Elsinore	92530	
88701	CA Do It Center	32241 Mission Tr		Lake Elsinore	92530	
88804	Fernando's Auto Care	3716 Spruce St		Riverside	92501	
88900	Clinton Keith Chevron	23805 Clinton Keith Rd	#1	Wildomar	92595	5541
88962	California Correct Craft	200 Hidden Valley Pkwy	#A	Norco	92860	
88970	Sam's Club #6378	6363 Valley Sprgs Pkwy	# B	Riverside	92507	
89037	G.T. Fast Mart	7494 Indiana Ave		Riverside	92504	
89048	International Auto Crafters	29385 Hunco Wy		Lake Elsinore	92530	
89055	Costco Wholesale Corp (Gas Station)	482 N McKinley		Corona	92879	5541
89061	AutoZone #5575	10249 Arlington Ave		Riverside	92503	
89067	Hudd Distribution	4155 Wineville Rd		Mira Loma	91752	4225
89068	Hudd Distribution	11850 Riverside Dr		Mira Loma	91752	4225
89075	CVS Pharmacy #9654	2091 E Lakeshore Dr		Lake Elsinore	92530	
89076	Architectural Design & Signs	2950 Palisades Dr		Corona	92882	
89116	Food 4 Less #343	4250 Van Buren Blvd	#B	Riverside	92503	
89131	Top Cleaners	16758 Lakeshore Dr	Ste A	Lake Elsinore	92530	7216
89158	HCI Co., Inc.	3166 Horseless Carriage Dr		Norco	92860	4825

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Facility	DBA	Address	More	City	Zip	SIC Code
89246	J.C. McClinton Trucking	1955 Compton Ave		Corona	92881	
89251	Lake Buick Pontiac GMC	31400 Auto Center Dr		Lake Elsinore	92531	5511
89272	Circle K #2701942	31701 Riverside Dr		Lake Elsinore	92530	5411
89291	USA Station #68238	23905 Catt Rd		Wildomar	92595	5415
89332	Sprint Nextel CA 7208	11175 Inland Ave		Mira Loma	91752	5133
89339	Meiko America, Inc	12471 Riverside Dr		Mira Loma	91752	4931
89412	Arco	3685 Valley Wy		Riverside	92509	
89426	Norco Shell #68572	125 Hidden Valley Pkwy		Norco	92860	5541
89487	Alpha Materials	5467 28th St		Riverside	92509	3531
89531	Eibach Springs	264 Mariah Cir		Corona	92879	
89534	M. D. Automotive	3620 Fairmount Blvd		Riverside	92501-2744	
89573	R & S Madrigal, Inc	2181 Vandell Rd		Riverside	92509	
89575	Economy Paint & Collision	2548 Rubidoux Blvd		Riverside	92509	
89604	County of Riverside Waste Mgmt Dept	1810 Agua Mansa Rd		Riverside	92509	4924
89659	Qualified Mobile, Inc	1720 Industrial Ave		Norco	92860	7542
89674	Bernell Hydraulics, Inc	9643 Mission Blvd		Glen Avon	92509	
89705	Meiko America, Inc	12300 Riverside Dr		Mira Loma	91752	
89732	Libbey Glass, Inc	3401 Etiwanda Ave	#711	Mira Loma	91752	4225
89736	Norco Car Wash	2176 Hamner Ave		Norco	92860	5812
89740	CPS Express, Inc	3401 Etiwanda Ave	#1011A	Mira Loma	91752	
89747	Primos Auto Repair	29350 Hunco Wy	#C	Lake Elsinore	92530	
89768	Dave's Automotive	311 Minthorn	Unit #3	Lake Elsinore	92532	
89853	Miguel's Jr	1432 Hamner Ave		Norco	92860	
89858	Nic's Auto Repair	10050 Arlington Ave	#S	Riverside	92503	
89871	Albertson's #6576	8310 Limonite Ave		Riverside	92509	7384
89884	Luevano Iron Works	6092 Pedley Rd		Pedley	92509	
89893	Jack in the Box #3223	10960 Limonite Rd		Mira Loma	91752	5812
89894	Big O Tires	1787 Hamner Ave		Norco	92860	
89914	Cal-Flex Corp	3401 Etiwanda Ave	#911A	Mira Loma	91752	3599
89946	Honda Cars of Corona	1080 Pomona Rd		Corona	92882	5599
89947	Earth Protection Services, Inc	10888 San Sevaine Wy	Ste D	Mira Loma	91752	
89976	Ingram Micro Logistics	12510 Micro Dr		Mira Loma	91752	4225
90005	Auto Diagnostic Service	1710 Palmyrita Ave	#6	Riverside	92507	

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Facility	DBA	Address	More	City	Zip	SIC Code
90018	Bear Creek Service Station, Inc	36228 Hidden Sprgs Rd		Wildomar	92595	
90075	CJJ Enterprises/KFC	321 Summerhill Dr		Lake Elsinore	92532	5812
90076	Wienerschnitzel #623	301 Summerhill Dr		Lake Elsinore	92532	5812
90079	McDonald's #6764	31650 Mission Tr		Lake Elsinore	92530	5812
90081	Del Taco #245	31904 Mission Tr		Lake Elsinore	92530	5812
90082	Taco Bell	31712 Mission Tr		Lake Elsinore	92530	
90087	Burger King #10876	18611 Dexter Ave		Lake Elsinore	92532	
90089	Del Taco #238	16810 Lakeshore Dr		Lake Elsinore	92530	5812
90090	Jack in the Box #3182	31650 Riverside Dr		Lake Elsinore	92530	5812
90093	El Pollo Loco	31550 Grape St		Lake Elsinore	92532	
90095	SS Burger Basket	16820 Lakeshore Dr		Lake Elsinore	92530	
90096	Coco's #5028	31706 Casino Dr		Lake Elsinore	92530	5812
90097	Don Jose's	31712 Casino Dr	#4	Lake Elsinore	92530	5812
90098	Sizzler #886	31724 Casino Dr		Lake Elsinore	92530	5812
90110	Vons Fuel Center #2688	6110 Hamner Ave		Mira Loma	91752	5541
90111	Inland Aerial Surveys, Inc.	7117 Arlington Ave	Suite A	Riverside	92503	
90125	Seven Eleven #27155	257 Railroad Cyn Rd		Lake Elsinore	92530	5541
90162	Los Amigos Body Shop	8864 Jurupa Rd	Bldg 3	Glen Avon	92509	
90165	Pizza Hut #507	31736 Casino Dr		Lake Elsinore	92530	5812
90200	Carl's Jr	2896 Hamner Ave		Norco	92860	5812
90201	Del Taco	2552 Hamner Ave		Norco	92860	5812
90202	In-N-Out Burgers	1810 Hamner Ave		Norco	92860	5812
90203	KFC	1330 Hamner Ave		Norco	92860	
90204	Fazoli's	1255 Hamner Ave		Norco	92860	
90206	Wendy's Consolidated Restaurants	994 Hamner Ave		Norco	92860	5812
90207	McDonald's	150 Hidden Valley Pkwy		Norco	92860	5812
90220	S S AUTO CARE, INC.	1950 S Four Wheel Dr	#H	Norco	92860	
90233	Wahoo's Fish Tacos	1295 Hamner Ave		Norco	92860	5812
90258	Guy Yocom Construction, Inc	3299 Horseless Carriage Ln		Norco	92860	1541
90262	Railway Express, Inc	3401 Etiwanda Ave	#831C-D 931D	Mira Loma	91752	
90263	A & D Auto Repair	9000 Arlington Ave	#115	Riverside	92503	
90266	Premier Auto	10050 Arlington Ave	#J	Riverside	92503	
90267	Starcrest Products, Inc	3401 Etiwanda Ave	#921A	Mira Loma	91752	

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Facility	DBA	Address	More	City	Zip	SIC Code
90450	Arby's #7274	1325 Hamner Ave		Norco	92860	
90508	Sizzler Restaurant	1750 Hamner Ave		Norco	92860	5812
90556	Burger King #6816	1666 E Second St		Norco	92860	5812
90574	Group A Autosports, Inc	2050 Fifth St		Norco	92860	5013
90622	Kevin's Cleaners	2085 River Rd	#F	Norco	92860	7212
90626	Canidae Corporation	1975 Tandem Wy		Norco	92860	
90627	Jack in the Box #3212	1491 Sixth St		Norco	92860	5812
90631	Dubach Racing Development	2038 Second St		Norco	92860	
90640	Rubio's	110 Hidden Valley Pkwy	Ste G	Norco	92860	5812
90655	Jack in the Box #3193	10151 Ben Nevis Blvd		Riverside	92509	5812
90671	T-Mobile USA, Inc	6150 Beach St		Riverside	92509	4811
90676	T-Mobile USA, Inc	12095 Limonite Ave		Mira Loma	91752	
90690	Seven Eleven	1845 Hamner Ave	#E	Norco	92860	5541
90695	Jack in the Box #3572	5642 30th St		Riverside	92509	5812
90696	Seven Eleven #16024	1933 River Rd		Norco	92860	5541
90739	Burger Basket	2775 Hamner Ave		Norco	92860	5812
90777	First Class Cleaners	2053 River Rd		Norco	92860	7216
90815	Finishmaster, Inc #962	11072 Philadelphia St		Mira Loma	91752	5013
90826	AT&T Mobility (12392)	12085 Limonite Ave	#A	Mira Loma	91752	4812
90831	Norco Auto Air Co	1805 Commerce St	#G	Norco	92860	
90837	Canyon Hills Chevron	25361 Railroad Cyn Rd		Lake Elsinore	92532	5541
90843	International K-9	3951 Vernon Ave		Riverside	92509	
90935	Costco Gasoline #746	29325 Central Ave		Lake Elsinore	92532	5541
90955	Jack in the Box	2065 River Rd		Norco	92860	
90960	Landscape Development, Inc	1874 Tandem Wy		Norco	92860	
91073	Target T-1843	2755 Canyon Sprgs Pkwy		Riverside	92507	
91152	EZ Lube #096	29285 Central Ave		Lake Elsinore	92532	
91349	Alpha Materials, Inc	6170 20th St		Riverside	92509	3531
91388	Schwing America, Inc	3351 Grapevine St	Bldg A	Mira Loma	91752	3531
91390	Chino II Desalter	11251 Harrel St		Mira Loma	91752	
91451	AVAR Construction System	8864 Jurupa Rd	#1	Riverside	92509	
91478	Total Transportation Logistics	4325 Etiwanda Ave	#A	Mira Loma	91752	4225
91487	Power Marine	341 N Delilah St	#101	Corona	92879	

Riverside County Environmental Health Department

Hazardous Materials Management Program

Inspected Facilities

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Facility	DBA	Address	More	City	Zip	SIC Code
91544	Prestige Golf Carts	31672 Railroad Cyn Rd		Canyon Lake	92587	
91546	New Cingular Wireless CA Site#50929	6038 Mission Blvd		Riverside	92509	4812
91547	New Cingular Wireless CA Site#36690	6625 Clay St	#B	Riverside	92509	
91549	University Auto & Tire	681 Blaine St		Riverside	92507	
91550	Walgreens #2712	8044 Limonite Ave		Riverside	92509	5912
91576	Home Depot #8988	18282 Collier Ave		Lake Elsinore	92530	5211
91581	G & C Forklift Service	2937 Norco Dr		Norco	92860	
91583	Inland Color Graphics	2054 Tandem Wy		Norco	92860	
91587	General Auto Repair	1607 University Ave		Riverside	92507	7538
91591	EVMWD (A-5 Liftstation)	32850 Oleander Dr		Lake Elsinore	92530	4941
91592	EVMWD (B-10 Liftstation)	16240 Grand Ave		Lake Elsinore	92530	4941
91593	Long's Drug Store #148	29985 Canyon Hills Rd		Lake Elsinore	92532	5912
91596	EVMWD Alberhill Liftstation	28670 Lake St		Lake Elsinore	92530	4941
91597	EVMWD Continental Liftstation	23424 Continental Dr		Canyon Lake	92587	4941
91599	EVMWD A-2 Liftstation	31071 Wisconsin St		Lake Elsinore	92530	4941
91600	EVMWD A-4 Liftstation	32390 Riverside Dr		Lake Elsinore	92530	4941
91608	EVMWD B-8 Liftstation	17010 Grand Ave		Lake Elsinore	92530	4941
91609	EVMWD B-9 Liftstation	32990 Garner Ave		Lake Elsinore	92530	4941
91610	EVMWD New Longhorn Liftstation	30321 Longhorn Dr		Canyon Lake	92587	4941
91612	EVMWD Big Range	29161 Big Range Rd		Canyon Lake	92587	4941
91613	EVMWD Village Way Liftstation	22390 Village Way Dr		Canyon Lake	92587	4941
91616	EVMWD Serena Liftstation	32865 Serena Wy		Lake Elsinore	92530	4941
91618	EVMWD Vacation Liftstation	28931 Vacation Dr		Canyon Lake	92587	4941
91620	EVMWD Longhorn Liftstation	29849 Longhorn Dr		Canyon Lake	92587	4941
91621	EVMWD Grey Fox Liftstation	22750 Grey Fox Dr		Canyon Lake	92587	4941
91622	EVMWD Collier Liftstation	17602 Collier St		Lake Elsinore	92530	4941
91646	CDF-Station 64	25310 Campbell Ranch Rd		Corona	92883	9224
91672	Round-Up Jr Mart #1	24370 Canyon Lake Dr	North #A	Canyon Lake	92587	
91684	AT&T Mobility (24396)	10400 Bellegrave Ave		Mira Loma	91752	
91685	Sprint PCS	10120 60th St		Riverside	92509	
91686	New Cingular Wireless	10130 60th St		Riverside	92509	
91687	Verizon Wireless	10140 60th St		Riverside	92509	
91690	Regal Edwards Jurupa 14 #1041	8032 Limonite Ave		Riverside	92509	7832

Riverside County Environmental Health Department
Hazardous Materials Management Program
Inspected Facilities

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Facility	DBA	Address	More	City	Zip	SIC Code
91724	The Retreat Golf & Country Club LLC	8007 Soft Winds Dr		Corona	92883	
91730	Western Insulation	3190 Cornerstone Dr		Mira Loma	91752	
91780	R Cleaners	29991 Canyon Hills Rd	#1710	Lake Elsinore	92532	7216
91801	EVMWD New Lighthouse Liftstation	22650 Lighthouse Dr		Canyon Lake	92587	4941
91802	Mingus Constructors, Inc	23380 Continental Dr		Canyon Lake	92587	
91803	Farmer Boys	18288 Collier Ave		Lake Elsinore	92530	5812
91804	El Pollo Loco #6014	18292 Collier Ave		Lake Elsinore	92530	5812
91836	Applebee's	12375 Limonite Ave		Mira Loma	91752	5812
91837	Palm Cleaners	36004 Hidden Sprgs Rd		Wildomar	92595	7216
91838	Quality Business Solutions	1900 Fifth St		Norco	92860	
91844	Hidden Valley Wildlife Area	11401 Arlington Ave		Riverside	92505	
91845	Los Metates	3370 Hamner Ave		Norco	92860	
91861	West Coast Short Load	24475 Mayhew Rd	#A	Corona	92883	
91872	Verizon Logistics	4880 Felspar St	#A	Riverside	92509	

Area total facilities: 442

Area: 2

Facility	DBA	Address	More	City	Zip	SIC Code
80048	Arco #1807	12428 Heacock St		Moreno Valley	92553	5541
80056	Arco #82581	16466 Perris Blvd		Moreno Valley	92553	5541
80058	Moreno Gas Mart	24994 Alessandro Blvd		Moreno Valley	92553	5541
80059	Arco #82311	23501 Alessandro Blvd		Moreno Valley	92553	5541
80085	Baldwin Automotive	21891 Alessandro Blvd		Moreno Valley	92553	7538
80154	Arco #9723/Prestige Stations #9723	24991 Sunnymead Blvd		Moreno Valley	92553	5541
80156	Chevron SS# 1480/200908	22520 Cactus Ave		Moreno Valley	92553	5541
80163	Chevron SS#1419/97568	12431 Heacock St		Moreno Valley	92553	5541
80173	Circle K #1775	24051 John F Kennedy Dr		Moreno Valley	92553	5541
80177	MZP Food and Gas	12255 Heacock St		Moreno Valley	92557	1799
80183	Circle K #2700872	13261 Perris Blvd		Moreno Valley	92553	5541
80215	CDF-Kennedy Park 65	15111 Indian St		Moreno Valley	92553	9224
80258	Easter Market	29010 Alessandro Blvd		Moreno Valley	92554	5541
80289	Fastrip Food Store #13-896	23991 Sunnymead Blvd		Moreno Valley	92553	5514

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Hazardous Materials Management Program

Inspected Facilities

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Facility	DBA	Address	More	City	Zip	SIC Code
80334	Verizon California Inc /Edgemont CO	22400 Alessandro Blvd		Moreno Valley	92553	4813
80336	Verizon/Sunnymead CO	12656 Perris Blvd		Moreno Valley	92553	4813
80376	International Auto Crafters	14156 Business Center Dr		Moreno Valley	92553	7538
80407	Barons Auto Service	21866 Alessandro Blvd		Moreno Valley	92553	7538
80415	Mark's One Stop	24300 Sunnymead Blvd	#102	Moreno Valley	92553	7538
80500	ExxonMobil Oil Corporation #15903	12625 Frederick St		Moreno Valley	92553	5541
80504	ExxonMobil Oil Corporation #12985	24440 Alessandro Blvd		Moreno Valley	92553	5541
80534	Gina's Auto Repair	24320 Sunnymead Blvd	#106	Moreno Valley	92553	7500
80541	MWD/Perris Power Plant	27500 Ramona Expwy		Perris	92571	4941
80580	Bruno Farms Inc.	233 Markham St		Perris	92571	100
80601	Costco Wholesale#455	12700 Day St		Moreno Valley	92553	5311
80676	Robertson's Ready Mix Inc	12890 Day St	Section A	Moreno Valley	92553	3273
80710	San Diego Gas/Electric-c/o Sempra	14601 Virginia St		Moreno Valley	92555-8100	4922
80718	Seven Eleven #23520(2111)	23021 Sunnymead Blvd		Moreno Valley	92553	5541
80727	Iris Shell #68567	15980 Perris Blvd		Moreno Valley	92551	5541
80728	Shell Oil Products US	23050 Sunnymead Blvd		Moreno Valley	92553	5541
80729	Heacock Shell #68566	12301 Heacock St		Moreno Valley	92557	5541
80791	Arco #9718/Prestige Stations #9718	22990 Alessandro Blvd		Moreno Valley	92553	5541
80824	Valero	12400 Perris Blvd		Moreno Valley	92557	5541
80827	MARB-Base Supply/HW Accum. Site	Bldg 2310 2319		Moreno Valley	92518	0
80834	ConocoPhillips Co #256962	25020 Alessandro Blvd		Moreno Valley	92553	5541
81683	Accurate Auto Repair	941 Calimesa Blvd		Calimesa	92320	7538
81687	Abbott Cardiovascular Systems	26531 Ynez Rd		Temecula	92591-4628	3841
81689	Agape Auto Repair	43216 Via Dos Picos	#A	Temecula	92590	7538
81691	Agri-Empire	630 7th St		San Jacinto	92583	161
81701	AOC, L.L.C.	19991 Seaton Ave		Perris	92570	2821
81711	Beaumont Gas Mart	1696 E 6th St		Beaumont	92223	5541
81713	Arco #1935	2228 W Ramsey St		Banning	92220	5541
81715	Arco #1958/Gopal Krishna Co., Inc.	1216 Calimesa Blvd		Calimesa	92320	5541
81717	Seven Eleven #33571	104 N San Jacinto St		Hemet	92543	5541
81718	Arco #05500	41555 Winchester Rd		Temecula	92590	5541
81719	Arco #5543/Orange Tree Fresh Fruits	833 N Ramona Blvd		San Jacinto	92583	5541
81720	Arco #5555/Prestige Stations #5265	500 Stetson Ave		Hemet	92543	5541

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Hazardous Materials Management Program

Inspected Facilities

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Facility	DBA	Address	More	City	Zip	SIC Code
81721	Arco #5593	298 Sanderson Ave		Hemet	92543	5541
81722	Arco/Orange Tree Fresh Fruits & Nut	690 N State St		Hemet	92543	5541
81723	Arco #5750/Prestige Stations #5380	33440 Hwy 74		Green Acres	92545	5541
81724	Arco #82553	687 S San Jacinto Ave		San Jacinto	92583	5541
81741	Temecula Marine Center, Inc	27495 W Enterprise Cir		Temecula	92590	7538
81754	County Of Riverside Fleet Services	1628 S Hargrave St		Banning	92220	0
81763	Robertson's Ready Mix	452 W Luis Estrada Rd		Beaumont	92223	3273
81775	Best For Less Tires	28733 Via Montezuma	#A	Temecula	92590	7539
81776	Best For Less Tires	3865 N Perris Blvd	#A7	Perris	92571	7539
81777	Bianchi International	27969 Jefferson		Temecula	92590	3111
81780	Saint George Spirit	636 W Florida Ave		Hemet	92543	5541
81809	CEMEX USA	29065 Front St		Temecula	92590	3272
81810	Shamrock Sand And Rock	41751 Hwy 79		Aguanga	92536	3273
81811	Cabazon Truck Stop	50876 Seminole Dr		Cabazon	92230	5541
81812	Rental Service Corporation	28377 Felix Valdez Ave		Temecula	92590	7353
81815	California Highway Patrol	27685 Commerce Center Dr		Temecula	92592	9221
81817	Calimesa Auto Repair	530 W Avenue L		Calimesa	92320	7538
81820	Caltrans/Banning Maint St	2033 E Ramsey St		Banning	92220	7549
81828	Car Wash Depot	140 N Inez St		Hemet	92543	7542
81833	CDF-Bautista Conservation Camp	33015 Bautista Rd		Hemet	92544	9224
81852	Cherry Valley Sanitation Inc	40590 High St		Cherry Valley	92223	4214
81853	Chevron SS #1483/200374	720 W Ramona Expwy		San Jacinto	92583	5541
81854	Chevron Stations Inc. #1484/201241	40500 California Oaks Rd		Murrieta	92562	5541
81855	West Florida Ave Chevron	3308 W Florida Ave		Hemet	92545	5541
81856	Chevron #90863	903 W Florida Ave		Hemet	92543	5541
81857	Idyllwild Chevron	25015 Hwy 243	#B	Idyllwild	92549	5541
81858	Sun City Chevron	26980 McCall Blvd		Sun City	92586	5541
81860	Chevron #94886	290 S Highland Sprgs Ave		Banning	92220	5541
81861	Chevron SS #1446/99947	428 S Redlands Ave		Perris	92570	5541
81863	Chevron Jefferson Street	27560 Jefferson Ave		Temecula	92590	5541
81864	Lakeview Valero	19560 Lakeview Ave		Lakeview	92567	5500
81866	Chevron #1814/91870	28900 Rancho California Rd		Temecula	92590	5541
81868	Valero Shop 'N' Go Food Stores	697 S State St		San Jacinto	92583	5541

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Riverside County Environmental Health Department

Hazardous Materials Management Program

Inspected Facilities

Reporting period from 07/01/2006 through 06/30/2007.

Facility	DBA	Address	More	City	Zip	SIC Code
81872	Kayo Oil Co #2705034	41995 E Florida Ave	#C	Hemet	92544	5541
81875	Circle K #2700736	56621 Hwy 371		Anza	92539	5541
81881	L & L Market	395 W Stetson Ave		Hemet	92544	5541
81884	Network Auto Body Inc.	27555 Commerce Center Dr		Temecula	92590	7538
81892	South Bay Cable Corp	42033 Rio Nedo St		Temecula	92590	3357
81894	Interstate Brands Corporation	1493 E 6th St		Beaumont	92223	5149
81905	CDF-Garner Valley 53	59200 Morris Ranch Rd		Mountain Center	92561	9224
81909	County Of Riverside Fleet Services	824 N State		Hemet	92543	
81911	County Of Riverside TLMA Road Yard	595 N Juanita St		Hemet	92543	16
81914	Creekside Gas And Food Mart	29115 Front St		Temecula	92590	5541
81925	Hospitality Car Wash & Quick Lube	40495 Winchester Rd		Temecula	92591	7500
81926	Datatronics Inc	28151 Hwy 74		Romoland	92585	3600
81933	Ritz Camera # 1075	27540 Ynez Rd	# JI	Temecula	92591	7300
81939	Deutsch Engineered Connecting Dev	5733 W Whittier Ave		Hemet	92545	3678
81941	Deutsch Engineering Connecting Dev	700 S Hathaway St		Banning	92220	3600
81942	Magnecomp Corp.	26201 Ynez Rd	Ste 103	Temecula	92591	8000
81950	Chase Auto Repair	27516 Commerce Ctr Dr	#C	Temecula	92590	7538
81959	Dura Plastic Products Inc	533 E 3rd St		Beaumont	92223	3089
81968	EMWD Ellis Booster Plant	28255 Ellis Ave		Perris	92570	4971
81969	EMWD Vista Pumping Plant	24510 Menifee Rd		Romoland	92585	4971
81981	EMWD Romoland Pumping Plant	27990 Ethanac Rd		Romoland	92585	4971
81996	Fastrip Food Store #12-777	692 S San Jacinto Ave		San Jacinto	92583	5514
82000	Ferrellgas Inc	28993 Hwy 243		Idyllwild	92549	5984
82010	Franz' Mercedes Service & Repair	27585 Commerce Center Dr	#10	Temecula	92590	7500
82016	Friendly Cleaners	28900 Front St	#101A	Temecula	92590	7200
82020	G & M Oil Co., Inc #20	827 W Ramsey St		Banning	92220	5541
82021	G & M Oil #25	3230 W Ramsey St		Banning	92220	5541
82034	Golden Era Productions	19625 Hwy 79		Gilman Hot Spgs	92583	7800
82043	Verizon/Service Group	160 W Hays St		Banning	92220	4813
82044	Verizon/Beaumont	861 Beaumont Ave		Beaumont	92223	4813
82046	Verizon/Calimesa CO	1010 Calimesa Blvd		Calimesa	92320	4813
82048	Verizon/Hemet PY	331 E Menlo Ave	#E16	Hemet	92543	4813
82050	Verizon/Homeland CO	26501 Winchester Rd		Homeland	92548	4813

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Facility	DBA	Address	More	City	Zip	SIC Code
82056	Verizon/Service Group	120 E Third St		Perris	92570	4813
82058	Verizon/Rancho California CO	41963 Moreno Rd		Temecula	92590	4813
82061	Verizon California, Inc. San Jacint	699 N State St		San Jacinto	92583	4813
82064	H & D Automotive	414 W Florida Ave		Hemet	92543	7538
82067	Southwest Traders, Inc	27565 Diaz Rd		Temecula	92592	5100
82075	A Plus Automotive	41015 E Florida Ave		Hemet	92544	7500
82080	City of Hemet Fire Station #1	450 E Latham Ave		Hemet	92543	9111
82081	City Of Hemet (City Yard)	3777 Industrial Ave	#B	Hemet	92545	9111
82085	Superior Ready Mix	1130 N State St		Hemet	92543	5032
82089	Hemet Unified School District/MOT	2350 W Latham Ave		Hemet	92545	8299
82090	Hemet Unified School District-Cottn	44260 Sage Rd		Aguanga	92536	8211
82091	Hamilton School	57550 Mitchell Rd		Anza	92539	8299
82100	Highland Springs Express Lube	655 Highland Sprgs Ave	#B	Beaumont	92223	7538
82115	Idyllwild Automotive	54170 Pine Crest Ave		Idyllwild	92549	7538
82121	RTA	700 Scaramella Cir		Hemet	92545	4900
82127	International Rectifier/Hexfet	41915 Business Park Dr		Temecula	92590	3674
82131	J & J Automotive & Radiator	191 Bissell Pl		San Jacinto	92582	7538
82134	Grove Lumber	27126 Watson Rd		Romoland	92585	5031
82146	Joseph R Scott Inc	185 W 4th St		Beaumont	92223	1623
82147	Makestar	28733 Via Montezuma	#K	Temecula	92590	7500
82155	Kirby Auto Repair	710 Kirby St		Hemet	92545	7538
82164	Lake Hemet Campground	56570 Hwy 74		Mountain Center	92561	4941
82165	Lake Hemet Municipal Water District	42525 E Stetson Ave		Hemet	92544	4941
82169	L & M Fertilizer, Inc.	28690 Las Haciendas		Temecula	92590	9154
82173	Lee's Auto Body	325 E 5th St		Beaumont	92223	7538
82174	Lewis Cleaners	29760 Rancho California Rd	#101	Temecula	92591	101
82183	M & M Auto Wrecking*Towing	249 Veile Ave		Beaumont	92223	7538
82194	McMillan Farm Management	35350 Rancho California Rd		Temecula	92591	762
82208	Highland Springs Valero	501 Highland Sprgs Ave		Beaumont	92223	5541
82209	ExxonMobil Oil Corporation #17797	300 S Highland Sprgs Ave	#A	Banning	92220	5541
82210	ExxonMobil Oil Corporation #10840	29500 Rancho California Rd		Temecula	92591	5541
82212	ExxonMobil Oil Corporation #10747	3995 Perris Blvd		Perris	92571	5541
82213	ExxonMobil Oil Corporation #10923	39850 Los Alamos Rd		Murrieta	92562	5541

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Riverside County Environmental Health Department

Hazardous Materials Management Program

Inspected Facilities

Reporting period from 07/01/2006 through 06/30/2007.

Facility	DBA	Address	More	City	Zip	SIC Code
82214	ExxonMobil Oil Corporation #10193	44520 Bedford Ct		Temecula	92592	5514
82215	22ND Street Shell	2192 W Ramsey St		Banning	92220	5541
82216	ExxonMobil Oil Corporation #11503	1675 N Perris Blvd		Perris	92571	5541
82221	Moore Business Forms	40610 County Center Dr	#471	Temecula	92591	2700
82227	Mt San Jacinto Community College	1499 N State St		San Jacinto	92583	8221
82228	All Valley Auto Care	28730 Via Montezuma	#105	Temecula	92590	7538
82233	MWD Chlorine Unloading Facility	19765 Patterson Ave		Perris	92570	4941
82236	McAnally Enterprises LLC	32710 Reservoir Ave		Lakeview	92567	200
82241	National RV, Inc	3411 N Perris Blvd		Perris	92571	3716
82246	Quality Nissan Of Temecula	41895 Motor Car Pkwy		Temecula	92591	5511
82251	Access Business Group, LLC	19600 6th St		Lakeview	92567	2099
82254	Oak Valley Golf Club Maintenance	38875 Brookside Ave		Beaumont	92223	7900
82256	OK Service Sales Inc	240 E 1st St		Perris	92570	5541
82258	Old Town Tire & Service	28700 Front St		Temecula	92590	7539
82272	The Snack Attack	832 E Ramsey St		Banning	92220	5541
82273	Gas Mart	1005 W Florida Ave		Hemet	92543	5541
82275	Michele Keyser's Family Auto Repair	1211 W Acacia Ave	Unit #14	Hemet	92543	7539
82276	VYVX Steel Valley Teleport	20021 Santa Rosa Mine Rd		Perris	92570	4813
82280	DCH Dodge of Temecula	26845 Ynez Rd		Temecula	92591	5511
82286	Pedley Propane	42046 Rio Nedo St		Temecula	92590	5984
82289	CK Gas and Mart, Inc.	216 S Perris Blvd		Perris	92570	5541
82295	Perris Valley Airport	2091 Goetz Rd		Perris	92570	4500
82301	Amerigas Propane, Inc.	41830 Enterprise Cir		Temecula	92590	4929
82306	Pine Cove Market	23235 Hwy 243		Idyllwild	92549	5541
82312	Poma Automated Fueling Inc	5840 Joshua Palmer Wy		Banning	92220	5541
82320	Corona Ranch-Grapefruit	33320 Hwy 79		Temecula	92591	100
82323	Qwik Korner	25760 New Chicago Ave	Ste A	Hemet	92544	5541
82330	Consult-A-Tech	28671 Calle Cortez	#K	Temecula	92591	7500
82339	Ranch Muffler & Truck Accessories	27499 Commerce Center Dr		Temecula	92590	7533
82342	Rancho Car Wash	27378 Jefferson Ave		Temecula	92590	7542
82344	Enterprise Automotive	28696 Via Montezuma	#105	Temecula	92590	7538
82353	RCWD Well #118	28076 Diaz Rd		Temecula	92590	4941
82355	RCWD Well #138	30192 Rancho California Rd		Temecula	92590	4941

Riverside County Environmental Health Department

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Facility	DBA	Address	More	City	Zip	SIC Code
82359	RCWD Well #139	31008 Rancho California Rd		Temecula	92590	4941
82389	RCWD Well #101	41995 Cherry St		Temecula	92590	4941
82391	RCWD Well #235	42125 Lynde Ln		Temecula	92590	4941
82414	Redhawk Golf Club	45100 Redhawk Pkwy		Temecula	92592	7992
82427	Ronnie's Cooling System	28129 Jefferson Ave		Temecula	92590	7500
82429	Advantage Automotive	28696 Via Montezuma	#104	Temecula	92590	7538
82450	Rancho Springs Medical Center	25500 Medical Center Dr		Murrieta	92562	8062
82453	Calimesa Shell	1213 Calimesa Blvd		Calimesa	92320	5541
82454	Palm Valley Shell	41735 E Florida Ave		Hemet	92544	5541
82455	Hemet Shell #68542	1704 W Florida Ave		Hemet	92543	5541
82457	County of Riv SW Justice/Detention	30755 Auld Rd	Bldg 1307	Murrieta	92563	0
82459	Perris Shell	490 E San Jacinto Ave		Perris	92570	5541
82460	Valero 24-7	26730 McCall Blvd		Sun City	92586-2222	5541
82477	South Mesa Water Company	391 W Avenue L		Calimesa	92320	4941
82479	Southern California Gas Company	251 E 1st St	#1	Beaumont	92223-2903	4923
82480	Southern California Gas Company	25200 Trumble Rd		Romoland	92585	4923
82481	Union Pacific Railroad	235 W 5th Pl		Beaumont	92223	4011
82483	Spartan Oil Co, Inc.	148 S Gilbert St		Hemet	92543	5541
82486	Jiffy Lube #1878	30690 Rancho California Rd		Temecula	92591	7500
82488	Stagecoach Inn	43851 Hwy 79		Aguanga	92536	7033
82498	Stetson One Hour Photo	232 E Stetson Ave	#D	Hemet	92543	7384
82517	Techalloy Company Inc	2500 "A" St		Perris	92570	3315
82519	DCH Chrysler Jeep Temecula	26799 Ynez Rd		Temecula	92591	5511
82523	DCH Honda of Temecula	26755 Ynez Rd		Temecula	92591	5511
82524	Temecula Creek Inn	44501 Rainbow Canyon Rd		Temecula	92590	7900
82525	Temecula Diesel Auto/ Truck Repair	43216 Via Dos Picos	#B	Temecula	92590	7538
82526	SKS, Inc	41981 Avenida Alvarado		Temecula	92590	5172
82528	Temecula Valley Unified School Dist	31350 Rancho Vista Rd		Temecula	92592	8211
82538	Shell Station	10501 Beaumont Ave		Cherry Valley	92223	5541
82539	Betancourt Service Center	202 N State St		Hemet	92543	5541
82550	Arco #9722/Prestige Stations #9722	2105 E Florida Ave		Hemet	92543	5541
82551	Arco #9719/Prestige Stations #9719	401 E 6th St		Beaumont	92223	5541
82552	Arco #9721/Prestige Stations #9721	268 E 4th St		Perris	92570	5541

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Facility	DBA	Address	More	City	Zip	SIC Code
82561	Toyota Of Temecula Valley	26631 Ynez Rd		Temecula	92591	5511
82568	Troyce's Automotive	625 W County Line Rd		Calimesa	92320	7538
82571	Turner Transmission	1501 W Acacia Ave	#105	Hemet	92543	7500
82572	County Of Riverside/Twin Pines Rnch	49500 Twin Pines Rd		Banning	92220	
82576	Uni-Mart	31880 Hwy 74		Homeland	92548	5541
82579	ConocoPhillips Co #257406	33 W Nuevo Rd		Perris	92571	5541
82580	ConocoPhillips Co #251836	501 E Florida Ave		Hemet	92543	5541
82586	ConocoPhillips Co #256519	28903 Rancho California Rd		Temecula	92590	5541
82587	Beaumont 76 #255546	502 Beaumont Ave		Beaumont	92223	5541
82589	Baker's Drive Thru	665 W County Line Rd		Calimesa	92320	5500
82590	UPS - Hemet Center	25283 Sherman Rd		Romoland	92585	4211
82595	Val Verde USD	975 E Morgan St		Perris	92570	8211
82597	Valley Auto	58581 Hwy 371 (Cahuilla		Anza	92539	453
82599	Americas Automotive	108 N Ramona St		Hemet	92543	7500
82605	Idyllwild Shell	26128 Hwy 243		Idyllwild	92549-3120	5541
82619	Temecula Tire & Auto Repair	27415 Jefferson Ave		Temecula	92590	7539
83859	Blackmore Co	27840 Del Rio Rd		Temecula	92590	1600
83864	Arco #5695/Prestige Stations #5354	44239 Margarita Rd		Temecula	92590	5541
83875	Midas Auto Systems Experts	501 W Florida Ave		Hemet	92543	7538
83880	Murrieta Valley RV Service	27882 Del Rio Rd		Temecula	92590	5172
83907	Suburban Propane, Lmtd Prtnrshp	54225 Ridgeview Dr		Idyllwild	92549	5171
83940	Sid Sybrandy Dairy	34860 Ramona Expy		San Jacinto	92582	241
83944	Magic Cleaners	41925 Motor Car Pkwy	#E	Temecula	92591	7200
83987	Econo Lube N'Tune #97	2309 N Perris Blvd		Perris	92571	7549
83989	Quinn's Automotive	1501 W Acacia Ave	#106	Hemet	92543	7538
84005	Pep Boys #800	40605 Winchester Rd		Temecula	92590	5531
84008	Rancho Cleaners	27477 Ynez Rd	#F-2	Temecula	92591	7200
84011	Rancho Auto Service & Smog	27591 Commerce Center Dr		Temecula	92590	7538
84013	Chevron SS #1492/201596	40635 Winchester Rd		Temecula	92590	5541
84046	Omega Print	41669 Winchester Rd	#103	Temecula	92590	3555
84050	Los Alamos Shell #68568	39614 Los Alamos Rd		Murrieta	92563	5541
84149	Integrity Automotive	28730 Via Montezuma	#103	Temecula	92590	7538
84225	Caltrans Keen Camp MTCE Station	54999 Hwy 74	#6	Mountain Center	92561	9919

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Facility	DBA	Address	More	City	Zip	SIC Code
84268	Blakely's Truck Service	31495 Avenida Del Reposo		Temecula	92591	4200
84272	Advanced Automotive	27860 Del Rio Rd	#A	Temecula	92590	7538
84373	Trailer Products Inc	1121 N Buena Vista St		Hemet	92543	4200
84374	Perris Valley Auto Center	707 E 4th St		Perris	92570	5511
84388	Precision Tune	26673 Ynez Rd	#A	Temecula	92591	7538
84404	Fourth Street Automotive	41935 4th St		Temecula	92590	7538
84405	Excaliber Fuels #5	40648 California Oaks Rd		Murrieta	92562	5541
84438	Arco 5934/Prestige Stations #5471	41240 Kalmia St		Murrieta	92562	5541
84451	Steris Isomedix Services	43425 Business Park Dr		Temecula	92590	3842
84452	Weber's Equipment And Services	21589 Dracaea Ave		Moreno Valley	92553	3589
84487	Aamco Transmissions	26671 Ynez Rd	#C	Temecula	92591	7538
84736	Skat-Trak	654 Avenue K		Calimesa	92320	
84755	Cherry Valley Automotive	655 E 5th St	#B	Beaumont	92223	7538
84756	Big O Tires #628	40525 Winchester Rd		Temecula	92590	7539
84770	Vortex Whirlpool Systems	275 W Rider St		Perris	92570	3900
84883	Box Springs Mutual Water Co	21740 Dracaea Ave		Moreno Valley	92553	4941
84908	All Purpose Rentals	1048 E 6th St		Beaumont	92223	7359
84916	T.V.S. Complete Auto Care	28822 Front St	107	Temecula	92592	7538
84944	C. H. P. Automotive	1668 S Juanita St		San Jacinto	92583	7538
84980	Robertson Ready Mix	27050 Watson Rd		Romoland	92585	3273
84982	Precision Alignment	27860 Del Rio Rd	#B	Temecula	92590	7538
84991	RCWD Headquarters	42135 Winchester Rd		Temecula	92590	4941
85121	Rancho Verde High School	17750 Lasselle St		Moreno Valley	92555	8299
85179	Temecula Valley School District	40516 Roripaugh Rd		Temecula	92591	8211
85194	EMWD Dept Fish & Game	31501 W Contour		Lakeview	92567	4941
85197	EMWD Green Acres Lift Sta	33570 Stetson Ave		Hemet	92543	4952
85242	County Of Riverside Lamb Cyn Lndfll	16411 Lamb Canyon Rd	#B	Beaumont	92223	4953
85269	Home Depot #616	12255 Pigeon Pass Rd		Moreno Valley	92557	5211
85305	Tension Envelope Corp	40750 County Center Dr		Temecula	92591	2600
85323	County Of Riverside Regl Med Ctr	26520 Cactus Ave		Moreno Valley	92555	8011
85499	Chevron SS #1838/204029	31669 Hwy 79		Temecula	92592	5541
85523	Verizon/Perris RSU00	29219 Lakeview Ave		Lakeview	92567	4813
85526	Menifee Mart, Inc	26925 Newport Rd		Menifee	92584	5541

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Facility	DBA	Address	More	City	Zip	SIC Code
85536	Rancho Valley Orthopedic Surgery	29373 Rancho California Rd		Temecula	92591	8011
85545	Arco #5928/Prestige Stations #5472	27691 Ynez Rd		Temecula	92591	5541
85582	Calimesa Country Club	1300 S 3rd St		Calimesa	92320	7900
85583	Target T-678	30251 Antelope Rd		Menifee	92584	5399
85591	USA Station #68186	39055 Winchester Rd		Murrieta	92561	5541
85613	Target Stores #359	29676 Rancho California Rd		Temecula	92591	5311
85615	Action Pool & Spa Supply	27497 Jefferson Ave		Temecula	92590	5900
85630	Tranny Mikes Inc	655 E 5th St	#A	Beaumont	92223	7538
85632	Dutch Dry Cleaners	27461 Jefferson Ave		Temecula	92590	7216
85673	Tal D Jergensen, DDS, Inc.	27450 Ynez Rd	#106	Temecula	92591	8011
85674	Gas Plus-Hemet	5771 W Florida Ave		Hemet	92545	5541
85679	Rancho Shell #68623	29750 Rancho California Rd		Temecula	92591	5541
85682	Dyno-trans Transmission	43186 Via Dos Picos	Ste A	Temecula	92590	7538
85703	Rancho Ford Lincoln Mercury	26895 Ynez Rd		Temecula	92591	5511
85717	Perris Shell #68585	4039 N Perris Blvd		Perris	92571	5541
85737	Verizon/Nuevo RSU3 CEV	27366 Nuevo Rd		Nuevo	92567	4813
85741	Verizon/ Romoland RSU1	27900 Watson Rd		Romoland	92585	4813
85750	Arco Am/Pm	280 Old Nuevo Rd		Perris	92571	5541
85754	Vista Paints #16	23030 Sunnymead Blvd		Moreno Valley	92553	2851
85766	Calif Hwy Patrol/San Gorgonio Pass	195 Highland Spgs Ave		Beaumont	92223	0
85786	Target T-761	3527 W Florida Ave		Hemet	92543	5399
85789	Midas Of Temecula	26677 Ynez Rd		Temecula	92591	7538
85794	Jiffy Lube	12300 Heacock St		Moreno Valley	92557	7538
85835	Frazee Paint & Wallcovering	27355 Jefferson Ave	#G	Temecula	92590	5211
85862	Moreno Valley Unocal	22470 Cactus Ave		Moreno Valley	92553	5541
85863	Federal Express	27260 Jefferson Ave		Temecula	92590	4789
85885	Former Lockheed Propulsion	17255 S Highland Sprgs		Beaumont	92223	9511
85953	Precision Stampings Inc	500 Egan Ave		Beaumont	92223	3643
85963	Verizon/Val Verde RSU2	19565 Clark St		Perris	92570	4813
85964	Verizon/Commerce RSU8	62 Commerce Dr		Perris	92571	4813
85965	Verizon/Cowie RSU4	23190 Cowie Ave		Perris	92570	4813
85966	Verizon/Meadowbrook RSU5	27290 Greenwald Ave		Perris	92570	4813
85972	Japanese Auto Specialty Inc	28730 Via Montezuma	#101	Temecula	92590	7538

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Facility	DBA	Address	More	City	Zip	SIC Code
85973	C R & R, Inc.	1706 Goetz Rd		Perris	92570	4953
86013	Ynez Shell Food Mart/Car Wash	26680 Ynez Rd		Temecula	92591	5541
86024	Grizzle & Hunter Plastics LLC	27957 Diaz Rd		Temecula	92590	3999
86068	CAR Enterprises, Inc	23573 Sunnymead Ranch		Moreno Valley	92557	5541
86070	Redhawk Shell #68622	44260 Redhawk Pkwy		Temecula	92591	5541
86090	Menifee Car Wash	26825 Newport Rd		Menifee	92584	
86093	Rhino Linings	28822 Front St	# 205	Temecula	92590	7538
86094	Hy-Lite Products Inc	101 California Ave		Beaumont	92223	3999
86102	Arco AM/PM # 06555	23145 Hemlock Ave		Moreno Valley	92557	5541
86104	APRO, LLC	1500 Patricia Ln		Perris	92570	5541
86142	Temecula Garden & Power	28860 Front St	#C-3	Temecula	92590	781
86145	Opti-Forms, Inc.	42310 Winchester Rd		Temecula	92590	3827
86152	Wholesale Shutter Co.L.L.C.	411 Olive Ave		Beaumont	92223	3999
86178	Basics, Etc	41375 McCabe Ct		Temecula	92590	5013
86203	California Oaks Shell	40981 California Oaks Rd		Murrieta	92562	5541
86222	Corona Ranch-Big Horse Feed	33320 S Hwy 79		Temecula	92592	
86226	Arco #6305/Prestige Stations #6305	40212 Winchester Rd		Temecula	92592	5541
86230	Mobil	2070 N Sanderson Ave		San Jacinto	92582	
86234	Kurt's One Stop Tire & Auto Repair	14184 Business Center Dr		Moreno Valley	92553	7538
86235	A Mart Gas	56245 Hwy 371		Anza	92539	
86252	Minuteman Press	27452 Jefferson Ave		Temecula	92590	
86325	Calavo Growers Of California	28410 Vincent Moraga Dr		Temecula	92590	
86487	Madison Shell #68569	25336 Madison Ave		Murrieta	92562	5541
86628	Express Tire - Temecula	29095 Front St		Temecula	92590	7539
86649	Golden State Smog	27860 Del Rio Rd	#C	Temecula	92590	
86685	Garcia's Garage	425 W Rider St	#A10	Perris	92571	7538
86758	Palomar Village Shell	42197 Margarita Rd		Temecula	92591	5541
86760	Airgas West Inc	41735 Rider Wy		Temecula	92590	5169
86978	Vail Ranch Cleaners	31821 Hwy 79	B-5	Temecula	92592	
86979	County Of Riverside TLMA Rd - Idyll	25780 Johnson Rd		Idyllwild	92549	16
86987	Vail Lake Resort	40940 Hwy 79		Temecula	92591	
87017	Downs Energy	27985 Diaz Rd		Temecula	92593	5172
87127	Time Warner Cable	30975 La Serena Wy		Temecula	92591	

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Facility	DBA	Address	More	City	Zip	SIC Code
87168	Quaid Temecula Harley Davidson	28897 Front St		Temecula	92590	
87224	Verizon/Perris Blvd RSU2	15795 Perris Blvd		Moreno Valley	92553	4813
87225	Verizon California/Alessandro RSU1	27764 Alessandro Blvd		Moreno Valley	92555	4813
87226	Verizon/Hemlock RSU3 CEV	23851 Hemlock Ave		Moreno Valley	92555	4813
87227	Verizon California/Locust RLU0 CEV	23851 Locust Ave		Moreno Valley	92555	4813
87228	Verizon/Old Lake RSU0/CEV	23106 Old Lake Dr		Moreno Valley	92557	4813
87238	CVS Pharmacy #9606	29610 Rancho California Rd		Temecula	92591	5912
87265	Arco AM/PM Mini-Market	300 N Fern St		Cabazon	92230	5541
87279	Chevron Stations #1886/207497	48320 Seminole Dr		Cabazon	92230-2136	5541
87419	Temeku Hills Golf Club	41687 Temeku Dr		Temecula	92591	7900
87838	Verizon/Redhawk CO	32505 Hwy 79		Temecula	92592	4813
87839	Xpress Lube-Temecula/Winchester	40917 Winchester Rd		Temecula	92590	7539
87856	Global P.E.T., Inc	353 E Ellis Ave	#A	Perris	92570	
87868	A 1 Auto	28696 Via Montezuma	#101-102	Temecula	92590	7538
87891	Edge Development	42116 Winchester Rd		Temecula	92590	781
87894	Extreme Performance Auto & Repair	1200 W Florida Ave	C&D	Hemet	92543	7538
87920	G & M Oil Co/Chevron	499 Sandalwood		Calimesa	92320	5541
87924	Empire Marine Inc	28780 Front St	C3 C5	Temecula	92590	
87931	Express Tire	40915 Winchester Rd		Temecula	92590	7539
87953	Thompson's Discount Tire Center	28007 Jefferson	Ste E	Temecula	92590	7539
88124	Line-X of Temecula Valley	28069 Diaz Rd	# F	Temecula	92590	2489
88163	Carriage Motor Corporation	27420 Ynez Rd		Temecula	92591	5511
88166	La Masters Of Fine Jewelry	26780 Ynez Rd	Ste A	Temecula	92591	
88189	Verizon/Temecula	41611 Reagan Ave		Murrieta	92562	4813
88225	Minegar Contracting	27705 Commerce Center Dr		Temecula	92590	
88226	Seven Eleven #33613	44260 Apis Rd	#A	Temecula	92592	5541
88342	Rossi Concrete, Inc.	47423 Rainbow Canyon Rd		Temecula	92592	
88365	Muffler West Auto Service Inc	43119 Via Dos Picos		Temecula	92590	7538
88416	Rite Aid #6231	24991 Alessandro Blvd		Moreno Valley	92557	
88423	Sears Roebuck & Company	40710 Winchester Rd		Temecula	92591	5399
88424	Macy's #247	40900 Winchester Rd		Temecula	92590	5311
88448	Robinson Printing & Creative Media	42685 Rio Nedo St		Temecula	92590	2752
88450	Kayo Oil Co #2705793	41010 California Oaks Rd		Murrieta	92562	5411

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Facility	DBA	Address	More	City	Zip	SIC Code
88466	Unocal 76	40720 Winchester Rd		Temecula	92592	
88481	DCH Autogroup Vehicle Prep	41922 Motor Car Pkwy		Temecula	92591	
88485	Long Machine, Inc.	27450 Colt Ct		Temecula	92590	
88507	Garcia's Auto Service	26855 Hwy 74		Perris	92570	7538
88510	PGA Southern California Golf Club	35990 San Timoteo Canyon		Beaumont	92223	7900
88579	Arco AM/PM	26050 Menifee Rd		Romoland	92585	5541
88585	Safar & Safar Brothers', Inc	4040 N Perris Blvd		Perris	92571	
88594	Sterling Senior Communities	41780 Butterfield Stage Rd		Temecula	92592	6513
88638	County of Riv SW County Justice/Juv	30755 Auld Rd	Bldg 1311	Murrieta	92563	
88650	Temecula Quick Lube	29764 Rancho California		Temecula	92591	
88663	Costco Wholesale Corp.	26610 Ynez Rd		Temecula	92591	5199
88703	Lenny's Auto Repair	24320 Sunnymead Blvd	#105	Moreno Valley	92553	7538
88713	Juan's Golf Cart & Repair Service	1050 W Acacia Ave		Hemet	92543	7538
88727	A C Propane	296 California Ave		Beaumont	92223	5984
88784	Front St. Service Station LP	44987 Front St		Temecula	92590	5541
88785	Hemet Dairy Queen And Food Mart	3291 W Florida Ave		Hemet	92543	241
88806	ExxonMobil Oil Corporation #19137	33165 Hwy 79		Temecula	92592	5541
88831	CDF-Mead Valley 59	19450 Clark St		Perris	92570	9224
88852	MCM Poultry Farm	3701 4th St		Beaumont	92223	
88901	Ramona Tire And Service Center	31955 Via Rio Temecula Rd		Temecula	92592	7539
88914	County Of Riverside Transportation	57210 Hwy 371		Anza	92539	16
88950	Perricone Juice	550 "B" St		Beaumont	92223	
88951	Quality Nissan (Used Car Prep Ctr)	28671 Calle Cortez	#C	Temecula	92591	
88977	Rebel Equipment Rentals	42188 Winchester Rd		Temecula	92590	7359
88979	Cross Creek Golf Course	43860 Glen Meadows Rd		Temecula	92590	7900
88988	Sunnymead Shell	24840 Sunnymead Blvd		Moreno Valley	92553	5541
89007	Temecula Precision Machining	42201 Sarah Way		Temecula	92590	
89008	Provision Auto Painting/Restoration	41979 Rio Nedo	#B	Temecula	92590	
89073	National RV, Inc	100 W Sinclair		Perris	92571	3716
89092	Circle K Union 76	29955 Haun Rd		Sun City	92586	5541
89094	7 Eleven #33062	41260 Murrieta Hot Sprgs		Murrieta	92562	5541
89113	Village Nurseries Wholesale	20099 Santa Rosa Mine		Perris	92571	
89148	County Of Riverside Waste	14290 Frederick St		Moreno Valley	92551	

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Facility	DBA	Address	More	City	Zip	SIC Code
89201	EMWD Brousseau Booster	30984 Contour Ave		Nuevo	92567	4941
89202	EMWD Perry Street Well	24600 Perry St		Perris	92570	
89205	EMWD Moreno Valley Water Reclaim	17140 Kitching Ave		Moreno Valley	92551	
89214	Long's Drug Store #550	40365 Winchester Rd		Temecula	92590	
89219	Hemet Shell Gas Station	44462 E Florida Ave		Hemet	92544	
89240	MVUSD Transportation Facility	41870 Mc Alby Ct		Murrieta	92562	8211
89257	Micro Crystal Technology, Inc.	43095 Blackdeer Loop		Temecula	92590	
89267	Adobe Plaza Cleaners	27625 Jefferson Ave	#100	Temecula	92590	
89292	Albertson's #6734	39224 Winchester Rd		Murrieta	92563	
89311	Diversfied Automotive	43094 Via Dos Picos	#D	Temecula	92590	
89359	Ralphs Grocery Company #118	23801 Washington Ave		Murrieta	92562	
89378	Temecula Auto Repair & Radiator	43191 Rancho Wy		Temecula	92590	7539
89400	Macy's	40780 Winchester Rd		Temecula	92590	
89458	Baker's Drive Thru	529 Beaumont Ave		Beaumont	92223	
89540	Lakeside Transmissions	3515 Perris Blvd		Perris	92571	
89543	Joe's Circle K & 76	19248 Harvill Ave		Perris	92570	
89629	Quality 1 Auto Service	27512 W Enterprise Cir		Temecula	92590	
89661	Johnson Matthey	27449 Colt Ct		Temecula	92590	
89683	American Medical Response	208 E Devonshire		Hemet	92543	
89686	Temecula Motorcycle Service	41860 Enterprise Cir	S	Temecula	92590	
89695	Sam's Club #4822	40500 Murrieta Hot Sprgs		Murrieta	92562	5399
89700	County of Riv SW County Justice/Crt	30755 Auld Rd	Bldg 1317	Murrieta	92563	
89745	Lowe's Home Improvement	12400 Day St		Moreno Valley	92553	5211
89752	AutoZone #5565	23031 Sunnymead Blvd		Moreno Valley	92553	5531
89843	DCH Acura of Temecula	26705 Ynez Rd		Temecula	92591	5511
89903	All Tune and Lube	26622 Jefferson Ave	#101	Murrieta	92562	
89909	Vons Fuel Center #2660	29910 Murrieta Hot Sprgs	#B	Murrieta	92563	5541
89944	Luther's Truck & Equipment, Inc	36233 Cherry Valley Blvd		Cherry Valley	92223	
89971	Discount Auto Service	41680 Enterprise Cir	S	Temecula	92590	
89978	Southland Gunite, Inc	23330 Cajalco Rd		Perris	92571	
89984	Home Depot #1087	15975 Perris Blvd		Moreno Valley	92551	5211
90061	A-1 Welding	3437 Tanya Ave		Hemet	92545	
90113	County of Riverside Transportation	10901 Hannon Rd		Beaumont	92223	16

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Facility	DBA	Address	More	City	Zip	SIC Code
90144	Arby's #6058	3320 E Florida Ave		Hemet	92544	
90149	McDonald's #13645	2321 W Florida Ave		Hemet	92543	
90150	RSM McGladrey Fin. Arby's #1546	2915 W Florida Ave		Hemet	92545	5812
90151	Sizzler	1023 E Florida Ave		Hemet	92543	5812
90155	KTM	27635 Diaz Rd		Temecula	92590	7623
90158	Just 4 Fun 76	1111 S Sanderson		Hemet	92545-9047	5541
90183	McDonald's	1855 E Florida Ave		Hemet	92544	
90193	Hometown Buffet #742	3041 W Florida Ave		Hemet	92545	5812
90214	Del Taco	435 E 4th St		Beaumont	92223	
90218	Sharkey's Pizza & Game	102 E Florida Ave		Hemet	92543	
90223	Affordable Transmission Auto Center	1211 W Acacia Ave	#8	Hemet	92543	
90225	EMWD Harvill Booster Plant	21865 Harvill Ave		Perris	92570	4971
90228	EMWD Perris Valley RWRF	1301 Case Rd		Perris	92570	4952
90250	EMWD La Ventana Dechlorination	28264 La Ventana		Winchester	92596	4941
90286	EMWD Simpson/Patterson Pump	28441 Patterson Ave		Winchester	92596	4941
90287	EMWD Winchester Lift Station	30554 Olive Ave		Winchester	92596	4952
90291	Souplantation	26420 Ynez Rd		Temecula	92591	
90308	Cardinal CG	24100 Cardinal Ave		Moreno Valley	92551	
90317	EMWD Good Hope Pumping Plant	410 W Third St		Perris	92571	4941
90318	EMWD Lake Perris Lift Station	Lot 7, Vial Del Lago		Perris	92571	4952
90319	EMWD Sky Mesa Repeater	23728 Tapatia Rd		Homeland	92548	4941
90338	Cal Pac Drilling	526 W Avenue L		Calimesa	92320	
90351	Seven Eleven #33484	28015 Scott Rd		Murrieta	92562	
90365	Burger King #8668	1503 S San Jacinto Ave		San Jacinto	92583	5812
90411	Johnny Carino's	26478 Ynez Rd		Temecula	92591	
90417	Chick-fil-A	40531 Margarita Rd		Temecula	92591	
90430	AutoZone #5936	40345 Winchester Rd		Temecula	92592	5531
90434	Stuart Anderson's Black Angus	27735 Ynez Rd		Temecula	92591	
90563	Collision Center of Temecula	27590 Commerce Center Dr		Temecula	92590	7532
90599	Burger King #11423	50910 Seminole Dr		Cabazon	92230	
90600	Walgreens #7714	1400 Beaumont Ave		Beaumont	92223	
90613	Sterling Autosport	26765 Madison Ave	#100	Murrieta	92562	
90616	Tom's Foreign Autohouse, Inc	42327 Rio Nedo St	Ste B	Temecula	92590	

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Hazardous Materials Management Program

Inspected Facilities

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Facility	DBA	Address	More	City	Zip	SIC Code
90656	Lake Hemet MWD (Well #2)	25001 Chicago Ave		Hemet	92544	4941
90658	Lake Hemet MWD (Well #14)	25100 Fairview Ave		Hemet	92544	4941
90659	Lake Hemet MWD (Web Cor Well)	1990 Meridian St		Hemet	92544	4941
90686	Ben Clymer's The Body Shop, Inc	22335 Alessandro Blvd		Moreno Valley	92553	7532
90700	The Movie Experience	27531 Ynez Rd		Temecula	92591	
90745	England Family Mortuary	27135 Madison Ave		Temecula	92590	
90752	Chipotle	40573 Margarita Rd	#A	Temecula	92591	
90753	Temeku Cinema	26463 Ynez Rd		Temecula	92591	
90765	Taco Bell #16933	1190 Calimesa Blvd		Calimesa	92320	
90775	McDonald's	1199 Calimesa Blvd		Calimesa	92320	
90992	Yellow Basket	40575 Winchester Rd		Temecula	92591	
90998	Cinema Star Theater	1688 N Perris Blvd		Perris	92571	
91005	Edmond Equipment West	32395 Hwy 74		Hemet	92545	
91059	Advanced Cardiovascular Systems	42301 Zevo Dr	Ste B&E	Temecula	92590	3841
91060	Toyota of Temecula Valley	41892 Motor Car Pkwy		Temecula	92591	5511
91168	EMWD Ethanac Lift Station	362 Ethanac Rd		Perris	92572	4952
91177	Gilmore Liquid Air Co	42217 Rio Nedo	Ste.B102	Temecula	92590	5169
91233	AutoZone #2882	1151 E 6th St		Beaumont	92223	5531
91238	Olive Garden #1266	22880 Center Point Dr		Moreno Valley	92553	5812
91263	March Fueling Services	17305 Heacock Ave		Riverside	92518	4581
91265	Wal-Mart Supercenter #5156	1540 E 2nd St		Beaumont	92223	5399
91273	Creative Touch Interiors	43085 Business Park Dr		Temecula	92590	3281
91278	HD Supply White Cap Construction	28065 Diaz Rd		Temecula	92590	5032
91279	H & S Bros Enterprises, Inc	12611 Moreno Beach Dr		Moreno Valley	92555	5541
91282	ABX Air	17101 Heacock St	#2	Riverside	92518	4513
91295	Creative Touch Interiors	42301 Zevo Dr	Ste A	Temecula	92590	5023
91336	Freedom Storage	30630 Hwy 74		Homeland	92548	
91428	Home Depot #8987	1480 E 2nd St		Beaumont	92223	5211
91444	Hemet West Mobile Estate	5001 W Florida Ave		Hemet	92545	
91448	City of Perris Fire Station 2,CDF90	333 Placentia Ave		Perris	92571	9224
91464	Party City	40486 Winchester Rd		Temecula	92591	
91475	Ask Terry Automotive	28733 Via Montezuma	#J	Temecula	92590	
91482	Joe's Automotive	42387 Avenida Alvarado	#108	Temecula	92590	

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Inspected Facilities

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Facility	DBA	Address	More	City	Zip	SIC Code
91483	Plant CML	42505 Rio Nedo		Temecula	92590	
91484	Quantum Precision Products	27531 Enterprise Cir W		Temecula	92590	
91486	Anza Equipment Rental & RV Storage	55177 Hwy 371		Anza	92539	
91490	DJ's Sons Smog, Inc	553 E Ramsey St	#2	Banning	92220	
91542	Rhino Linings of the San Gorgonio	655 E 5th St	#D	Beaumont	92223	
91562	Hot Rods Speed & Custom	41669 Winchester Rd	#102	Temecula	92590	
91563	Carl's Jr	40820 Winchester Rd	FC-2	Temecula	92591	9079
91627	MCM Poultry Farm	30511 San Timoteo Cyn Rd		Redlands	92373	259
91640	Walgreens Distribution Center	17500 Perris Blvd		Moreno Valley	92551	4225
91677	Prestige Gunite of California, Inc	26105 Sherman Rd		Romoland	92580	
91695	79 South Motorsports	32839 S Hwy 79		Temecula	92592	
91696	King Auto Collision, Inc	14340 Elsworth Ave	#101	Moreno Valley	92553	
91698	Road Machinery Co	475 W Rider St		Perris	92571	
91699	Mutual Propane	47055 Rainbow Cyn Rd		Temecula	92593	
91715	Steelweld of California, Inc	453 W Esplanade Ave		Hemet	92543	
91731	Valley Wide Small Engine Svcs	28780 Front St	C4	Temecula	92590	
91758	Ras's Auto Repair	42103 Rio Nedo	Ste 109	Temecula	92590	
91759	Torres Performance & Machining	42103 Rio Nedo	Ste 101	Temecula	92590	
91760	Kragen Auto Parts	33417 S Hwy 79		Temecula	92590	
91768	Laegers Machine Shop	685 N Palm Ave		Hemet	92543	
91769	Superior Ready Mix	1315 N State St		Hemet	92543	
91785	Redhawk Hand Car Wash	44260 Apis Rd	#C	Temecula	92592	
91797	Idyllwild Fire Protection District	54160 Maranatha Dr	#A	Idyllwild	92549	
91817	Penske Truck Leasing Co., L.P.	27565 Diaz Rd	#A	Temecula	92590	
91835	Meadeows Cleaners	31915 Rancho California Rd		Temecula	92591	
91839	Minka Lighting, Inc	23700 Cactus Ave		Moreno Valley	92553	
91858	Wal-Mart Supercenter #5425	1861 S San Jacinto Ave		San Jacinto	92583	
91867	Muffler Plus Custom Exhaust	1685 S State St	#D	San Jacinto	92583	

Area total facilities: 537

Area: 3

Facility	DBA	Address	More	City	Zip	SIC Code
80915	Ocean Mist Farms-Desert Mist Cool.	52300 Enterprise Wy		Coachella	92236	700
81578	Sun Date LLC	85215 Avenue 50		Coachella	92236	100

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Inspected Facilities

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Facility	DBA	Address	More	City	Zip	SIC Code
81907	CDF-Pinyon Station 30	70080 Hwy 74		Mountain Center	92561	9224
82381	Sprint Nextel (Indio-CA6765)	82347 Highway 111		Indio	92201	5133
82636	A-1 Aggregates, Inc.	72200 Vista Chino		Thousand Palms	92276	1400
82643	J & M Hydraulics	84189 Indio Blvd	#A	Indio	92201	7500
82651	Alamo Discount Market	81050 Hwy 86		Oasis	92274	5541
82672	An American Car Wash	44440 Town Center Wy		Palm Desert	92260	7542
82679	Apple Market One	56491 Hwy 111		Thermal	92274	5541
82680	Apple Market Two	65959 Hwy 86		Thermal	92274	5541
82685	Arco #5475/Tim Finnell, Inc.	73980 Hwy 111		Palm Desert	92260	5541
82686	Arco #5476/Prestige Stations 5192	27900 Date Palm Dr	#1	Cathedral City	92234	5541
82688	Arco #5826/Prestige Stations #5364	48055 Grapefruit Blvd		Coachella	92236	5541
82689	KSC & Son Corp	82338 Hwy 111		Indio	92201	5541
82690	North Palm Sprgs Travel Center	64200 20th Ave		N Palm Sprgs	92258	5541
82691	Arco #06502/Lu Mini Inc.	12775 Palm Dr		Desert Hot Sprgs	92240	5541
82698	Arrow Company The	12491 W 14th Ave		Blythe	92225	1500
82712	Autohaus of the Desert, Inc	83207 Requa Ave		Indio	92201	7538
82720	Baker Farms	17561 W 24th Ave		Blythe	92225	191
82722	Bally's Cleaners	74260 Hwy 111	#1&2	Palm Desert	92260	7212
82734	Caliber Collision Centers	82279 Avenue 44		Indio	92201	7532
82741	CarQuest Auto Parts	45460 Fargo St	#2	Indio	92201	7538
82748	KSC & Son Corporation	52138 Harrison St		Coachella	92236	2851
82750	Blythe Auto Parts Inc	184 N Spring St		Blythe	92225	7538
82753	Blythe Laundry & Cleaners Inc	170 S 3rd St		Blythe	92225	7216
82760	Breeze Air Conditioning, Inc.	75145 St Charles Pl		Palm Desert	92211	17
82761	Sunline Transit Agency	83255 Hwy 111		Indio	92201	4173
82763	Brito Ranch	78479 Hwy 86		Oasis	92274	191
82769	Budget Rent A Car System, Inc.	305 N Civic Dr		Palm Sprgs	92262	7514
82778	C V Organic Fertilizers Co	55591 Hwy 111		Thermal	92274	700
82782	California Highway Patrol	430 S Broadway		Blythe	92225	9221
82786	Caltrans/Desert Center	44470 Ragsdale Rd		Desert Center	92239	9199
82791	The Fountains at the Carlotta	41505 Carlotta Dr		Palm Desert	92260	8059
82792	Carr & Carr Inc	45242 Commerce St		Indio	92201	7500
82795	Cathedral City/City Of, Fire Dept	32100 Desert Vista		Cathedral City	92234	9224

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Facility	DBA	Address	More	City	Zip	SIC Code
82800	Chaffin Farms	13100 W 24th Ave		Blythe	92225	241
82801	Chairel Custom Hay, Inc	10250 N Intake Blvd		Blythe	92225	4200
82803	Chapala Market	66351 Hwy 86		Thermal	92274	5541
82805	G&M Oil #147	82003 Hwy 111		Indio	92201	5541
82806	Blythe Freeway Chevron #91045	321 S Lovekin Blvd		Blythe	92225	5541
82810	G&M Oil #148	45760 Dillon Rd		Coachella	92236	5541
82814	Washington Shell	77920 Avenue Of The State		Palm Desert	92260	5541
82815	Downtown Shell	300 Indian Canyon Dr		Palm Sprgs	92262	5541
82816	Chevron Stations Incorporated	72801 Hwy 111		Palm Desert	92260	5541
82817	Valero California Retail Co #3667	69123 Ramon Rd		Cathedral City	92234	5541
82820	Oasis Chevron Food Mart	72276 Ramon Rd		Thousand Palms	92276	5541
82821	Chevron-Ramon Service Center	68010 Ramon Rd		Cathedral City	92234	5541
82823	Chuchian Ranch	Avenue 52 Sw Of Van		Coachella	92236	241
82824	Chuchian Ranch	Avenue 58 & Van Buren		Thermal	92274	241
82830	E-Z Mart East	945 E Hobsonway		Blythe	92225	5171
82841	Circle K 76 #2700457	78110 Calle Tampico		La Quinta	92253	5541
82843	Circle K 76 #2700538	43955 Clinton St		Indio	92201	5541
82844	Circle K #2700564	73010 Ramon Rd		Thousand Palms	92276	5541
82847	Kayo Oil Co #2708680	80976 Hwy 111		Indio	92201	5541
82851	Clark's Travel Center	82253 Indio Blvd		Indio	92201	3129
82855	Morningside Community Association	82 Mayfair Dr		Rancho Mirage	92270	7997
82863	C.V. Ice Company, Inc.	83796 Date St		Indio	92201	2000
82878	CVWD	85955 Avenue 52		Coachella	92236	4941
82882	Callan Oil Distributing, Inc.	332 W Chanslor Wy		Blythe	92225	
82888	Country Club Auto Collision	81781 Oleander Ave	#B	Indio	92201	7538
82891	County Of Riverside Administration	3255 E Tahquitz Dr		Palm Springs	92262	0
82892	County Of Riverside Administration	46209 Oasis St		Indio	92201	0
82899	CDF-Palm Desert 33	44400 Town Center Wy		Palm Desert	92260	9224
82904	County Of Riverside Jail	46209 Oasis St		Indio	92201	0
82905	County Of Riverside Probation	47665 Oasis St		Indio	92201	0
82906	Alpine McIntyre, L.L.C.	8750 E 26th Ave		Blythe	92225	7033
82908	County Of Riverside TLMA Rd-	86199 Airport Blvd		Thermal	92274	16
82909	County Of Riverside TLMA Rd-Blythe	561 S Broadway		Blythe	92225	16

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Inspected Facilities

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Facility	DBA	Address	More	City	Zip	SIC Code
82910	County Of Riverside Service Area 51	26251 Park View Dr		Desert Center	92239	7500
82913	Jessup Chevrolet	68130 Kyle Rd		Cathedral City	92234	5511
82914	Crawford Associates	8100 E Riverside Dr		Blythe	92225	4200
82921	Cyr Aviation Inc	15401 S Lovekin Blvd		Blythe	92225	1151
82925	Dare Cadillac	68800 Ramon Rd		Cathedral City	92234	7500
82931	Dennis Taylor Automotive	9300 E Hobsonway		Blythe	92225	7538
82948	Golden State Herbs	87305 Avenue 60 & Polk		Thermal	92274	762
82949	Desert Horizons Country Club	44900 Desert Horizons Dr		Indian Wells	92210	7997
82953	Desert Island Country Club	71777 Frank Sinatra Dr		Rancho Mirage	92270	7997
82973	Desert Security Farms	19250 S Defrain Blvd		Blythe	92225	139
82980	Desert Valley Date	86740 Industrial Wy		Coachella	92236	4200
82983	Dewey Pest Control	72395 Varner Rd		Thousand Palms	92276	7342
82993	Pack Ryt, Inc	87500 Airport Blvd		Thermal	92274	723
82995	Dollar Rent A Car	325 N Civic Dr		Palm Sprgs	92262	7514
82999	Drake Larson	89780 Avenue 60		Thermal	92274	100
83025	Compton Ag Services	19751 S Defrain Blvd		Blythe	92225	5191
83027	Duran Termite Control	44521 Monroe St		Indio	92201	5160
83028	Escalade Cleaners	72790 El Paseo		Palm Desert	92260	7216
83031	SR & DH Corporation	84425 Indio Blvd		Indio	92201	5541
83037	The Lube Shop	81780 Hwy 111		Indio	92201	7549
83045	Electric Car Distributors Inc	71441 Hwy 111		Rancho Mirage	92270	5298
83050	Clairemont Equipment	81501 Industrial Pl		Indio	92201	7500
83062	Expressway Market Inc.	17001 Palm Dr		Desert Hot Sprgs	92240	5541
83065	EZ Stop	220 S Lovekin Blvd		Blythe	92225	5541
83067	R & C Auto Shop	4560 E Camino Parocela		Palm Sprgs	92264	7538
83068	GroWest Nurseries	59002 S Monroe St		Thermal	92274	700
83081	Ramona Tire	71491 Hwy 111		Rancho Mirage	92270	7530
83087	USA Station #68184	72300 Hwy 111		Palm Desert	92260	5541
83088	Flying J. Travel Plaza	72235 Varner Rd		Thousand Palms	92276	5541
83102	Desert European Motorcars Ltd	71387 Hwy 111		Rancho Mirage	92270	5511
83109	Garza Lawnmower	81101 Indio Blvd	#D13	Indio	92201	7500
83112	Verizon/Palm Springs PY/CEV/RSU3	979 Gene Autry Tr		Palm Sprgs	92262	4813
83113	Red Mule Farms	15501 Defrain Blvd		Blythe	92225	100

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Facility	DBA	Address	More	City	Zip	SIC Code
83115	Gilbert Guilin	12150 W 14th Ave		Blythe	92225	100
83120	Harvey's Golden Lantern Market	70041 Dillon Rd		Desert Hot Sprgs	92240	5541
83126	Jack Sauter's Tire Factory	78105 Country Club Dr		Bermuda Dunes	92201	5014
83127	Daniels Tire Service Inc	81943 Hwy 111		Indio	92201	5014
83131	Granite Construction Company	38155 N Monroe St		Indio	92201	1620
83135	Helena Chemical Company	10821 15th Ave		Blythe	92225	4200
83141	Verizon/Indio Central Office	45550 Jackson St		Indio	92201	4813
83143	Verizon/La Quinta CO	78150 Avenida La Fonda		La Quinta	92253	4813
83147	Verizon/California Palm Desert Ctrl	73766 Hwy 111		Palm Desert	92260	4813
83148	Verizon/Palm Springs East CO	295 N Sunrise Wy		Palm Sprgs	92262	4813
83150	Verizon/Rancho Mirage CO	35625 Duvall Rd		Rancho Mirage	92270	4813
83152	Verizon/California Bermuda Dunes	42540 Washington St		Bermuda Dunes	92201	4813
83157	H & H Ramsey Towing Company	190 S Intake Blvd		Blythe	92225	7549
83159	Hadley, Inc	83555 Airport Blvd		Thermal	92274	100
83164	Harvest Fuels	10955 W Seeley Ave		Blythe	92225	5171
83167	Heimark Distributing Company	82851 Avenue 45		Indio	92201	5100
83173	Hertz Service Center	2992 W Civic Dr		Palm Sprgs	92262	7514
83174	Hidden Beaches River RV Resort,	6951 6th St		Blythe	92225	7033
83180	Hillside Acres Mecca/Anthony Vineyd	91970 Avenue 60		Mecca	92254	1500
83182	Hms Agricultural Corp	52304 Jackson St		Coachella	92236	
83184	Hoffman Motors	650 Eugene Rd	Section #1	Palm Sprgs	92264	7500
83191	Hull Farms Inc	29501 S Neighbors Blvd		Blythe	92225	100
83192	Hunter Ranch	Avenue 68 and Colfax		Mecca	92254	174
83196	Imperial Irrigation District	81600 Avenue 58		La Quinta	92253	3599
83199	President's Club And Resort	48630 Monroe St		Indio	92201	7900
83200	Indian Springs Golf & Country Club	80265 Miles Ave		Indio	92201	7997
83201	Indian Wells Country Club	46000 Club Dr		Indian Wells	92210	7900
83205	Indio Auto Body & Paint	83573 Peach St		Indio	92201	7538
83211	Indio Water Authority Reservoir #2	81930 Crown Way		Indio	92201	9121
83212	Indio Water Authority Reservoir #3	82191 Garden Ave		Indio	92201	9121
83216	Indio Dune Buggy Center	81211 Indio Blvd	#A	Indio	92201	7500
83225	Indio City Of Public Works Yard	83101 Avenue 45		Indio	92201	9121
83228	Ironwood Country Club	73735 Irontree Dr		Palm Desert	92260	7997

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Facility	DBA	Address	More	City	Zip	SIC Code
83232	J & L Material Inc.	72230 Varner Rd		Thousand Palms	92276	1741
83242	Valero California Retail Co #3769	70255 Hwy 111		Rancho Mirage	92270	5541
83246	Jan Ranch	66975 Grant Ave		Mecca	92254	0
83252	Jim's Desert Radiator Service	83146 Hwy 111		Indio	92201	7500
83257	John F Kennedy Hospital	47111 Monroe St		Indio	92201	6324
83267	Joshua Tree Cottonwood	Cottonwood Ranger Station		Joshua Tree Natl Park	92201	7033
83269	Southern California Recycling Co.	29250 Rio Del Sol Rd		Thousand Palms	92276	4953
83274	Kaiser Eagle Mountain	1 Court St		Desert Center	92239	6599
83278	Standage Tire & Automotive	420 W Hobsonway		Blythe	92225	7538
83291	Signature Flight Support	56850 Higgins Dr		Thermal	92274	4500
83293	La Quinta Country Club	77750 Avenue 50		La Quinta	92253	7997
83294	Citrus Golf Maintenance	78752 Avenue 52		La Quinta	92253	7900
83297	Village Station	77985 Avenida Montezuma		La Quinta	92253	5541
83302	Landells Aviation	69873 Silver Moon Tr		Desert Hot Sprgs	92241	4500
83310	Lemon King I	SW Avenue 64 and Hayes		Mecca	92254	0
83311	Eddie's Place Inc.	65770 Hammond Rd		Mecca	92254	5541
83323	Lovekin Liquor & Deli	310 S Lovekin Blvd		Blythe	92225	5541
83327	Lucky Vehicles	51229 Harrison St		Coachella	92236	5500
83328	Sullivan's Shutter Factory	81161 Indio Blvd		Indio	92201	2499
83341	Marrakesh Country Club	47000 Marrakesh Dr		Palm Desert	92260	7900
83342	Marriott Desert Springs Resorts	74855 Country Club Dr		Palm Desert	92260	7000
83344	Rancho Las Palmas Resort & Spa	51 Cueta Dr		Rancho Mirage	92270	7011
83357	Mecca Farms Supply Company	68550 Grant St		Mecca	92254	100
83359	Mecca Star Ranch	68750 Colfax St		Mecca	92254	100
83365	Mesquite Golf and Country Club	2700 E Mesquite Ave		Palm Sprgs	92264	7997
83368	Midas	80962 Hwy 111		Indio	92201	7500
83377	Mission Lakes Country Club	64776 Sanderling Ct		Desert Hot Sprgs	92240	7997
83382	Palm Springs Oil #4 Chevron	166 N Sunrise Wy		Palm Sprgs	92262	5541
83383	Valero California Retail Co #3761	72360 Ramon Rd		Thousand Palms	92276	5541
83386	Yousef's Shell Station	1708 N Palm Canyon Dr		Palm Sprgs	92262	5541
83387	ExxonMobil Oil Corporation #12999	28051 Date Palm Dr		Cathedral City	92234	5541
83388	ExxonMobil Oil Corporation #12997	68990 Ramon Rd		Cathedral City	92234	5541
83389	ExxonMobil Oil Corporation #11431	73001 Country Club Dr		Palm Desert	92261	5541

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Facility	DBA	Address	More	City	Zip	SIC Code
83390	ExxonMobil Oil Corporation #10440	78005 Country Club Dr		Palm Desert	92260	5541
83395	Modern Ginning Company	10601 W Seeley Ave		Blythe	92225	724
83399	Club At Morningside, The	84 Mayfair Dr		Rancho Mirage	92270	7900
83406	MWD/Eagle Mountain Pumping	15500 Kaiser Truck Rd		Desert Center	92239	4941
83408	MWD/Julian Hinds Pump Plant	100 Hayfield Rd		Desert Center	92239	4941
83409	Davies Auto Care	68300 Perez Rd		Cathedral City	92234	7538
83411	National Car Rental Systems	2988 Civic Dr		Palm Sprgs	92262	7514
83438	Oudi K Auto Repair	68743 Perez Rd	#38	Cathedral City	92234	7538
83447	Palm Desert Country Club	77200 California Dr		Palm Desert	92211	7900
83450	Palm Desert High School	43570 Phyllis Jackson Ln		Palm Desert	92260	8299
83461	Palm Springs/City Of -Police	200 S Civic Dr		Palm Sprgs	92262	9221
83478	Valero California Retail Co #3768	67890 Hwy 111		Cathedral City	92234	5541
83480	Palm Springs Oil #12	68855 Ramon Rd		Cathedral City	92234	5541
83482	Palm Springs Oil #13	68450 Ramon Rd		Cathedral City	92234	5541
83483	Valero California Retail Co #3770	81831 Hwy 111		Indio	92201	5541
83485	Palm Springs Oil #8/ Chevron USA	670 Palm Canyon Dr		Palm Sprgs	92262	5541
83490	Palm Springs Plating	345 Del Sol Rd		Palm Sprgs	92262	3471
83502	Time Warner Cable Palm Desert	41725 Cook St		Palm Desert	92211	8350
83506	Palo Verde Irrigation District	180 W 14th Ave		Blythe	92225	4200
83507	Palo Verde Unified School Dist	187 N 7th St		Blythe	92225	8299
83509	Panco LTD	45605 Citrus Ave		Indio	92201	100
83512	Joey De Coninck	11351 4th St		Blythe	92225	4200
83517	Pep Boys Manny Moe And Jack #675	81246 Hwy 111		Indio	92201	5531
83518	Pepsi Cola Bottling Group	83801 Citrus Ave		Indio	92201	2080
83522	Peter Rabbit Farms	85810 Peter Rabbit Ln		Coachella	92236	100
83526	PGA West Stadium/Nick Tournament	54201 Madison St		La Quinta	92253	7900
83527	PGA West/Arnold Palmer Course	79811 Avenue 54		La Quinta	92253	7900
83551	Pyramid Date Gardens	50503 Van Buren Blvd		Coachella	92236	100
83555	Quik Chek West- Larry's Quik Chek	14021 W Hobsonway		Blythe	92225	5171
83556	Brian's Blythe Shell - Dairy Queen	401 S Lovekin Blvd		Blythe	92225	5171
83558	Quik Chek East	8991 E Hobsonway		Blythe	92225	5171
83559	R & R Mini Mart	338 W Chanslor Wy		Blythe	92225	5541
83571	CDF-Rancho Mirage Station 50	70801 Hwy 111		Rancho Mirage	92270	9224

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Inspected Facilities

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Facility	DBA	Address	More	City	Zip	SIC Code
83573	Rancho Mirage Country Club	38500 Bob Hope Dr		Rancho Mirage	92270	7900
83574	Country Villa Rancho Mirage Health	39950 Vista Del Sol		Rancho Mirage	92270	8000
83585	Quality Automotive Center	44288 Sungold St		Indio	92201	7538
83588	Riverbottom Auto Body	9721 E Hobsonway		Blythe	92225	7538
83591	Riviera RV Resort	14100 Riviera Dr		Blythe	92225	7033
83596	Rolo's Collision Diagnostic	140 W Hobsonway		Blythe	92225	7500
83602	Dekens Implement Company	135 N Commercial St		Blythe	92225	5000
83605	Salton Sea State Rec Area	Hwy 111 and Parkside Dr		North Shore	92254	7033
83607	Sam's Cycle Service	34044 Bob Hope Dr		Rancho Mirage	92270	7500
83611	Sanchez Mini Mart	1003 Grapefruit Blvd	#B	Coachella	92236	5541
83614	Schindler Brothers, LLC	14020 W Hobsonway		Blythe	92225	200
83621	Seven Eleven #16525(2171)	67510 Ramon Rd		Cathedral City	92234	5541
83623	Seven Eleven #18401	81500 Hwy 111		Indio	92201	5541
83627	Thousand Palms Mobil	72275 Ramon Rd		Thousand Palms	92276	5541
83630	Market Place Shell	34021 Date Palm Dr		Cathedral City	92234	5541
83631	Monroe Shell	43411 Monroe St		Indio	92201	5541
83636	Palm Springs Service	4875 Ramon Rd		Palm Sprgs	92262	5541
83637	Valley Gas	45800 Dillon Rd		Coachella	92236	5541
83638	North Palm Canyon Shell	2796 N Palm Canyon Dr		Palm Sprgs	92262	5541
83639	Blythe Freeway Shell	201 S Lovekin Blvd		Blythe	92225	5541
83644	Silva's Radiator & Air Con Service	83598 Indio Blvd		Indio	92201	7500
83645	Champion Cadillac Chevrolet	78611 Hwy 111		La Quinta	92253	5511
83650	Slowrider Ranch	Hwy 86 Ns Avenue 84		Oasis	92274	100
83661	El Toro Loco #3	52051 Grapefruit Blvd		Coachella	92236	5541
83664	SCE Co. /Blythe Service Ctr	505 W 14th Ave		Blythe	92225	4911
83665	Southern California Gas Company	13100 W 14th Ave		Blythe	92225	4922
83667	Southern California Gas Company	75095 Mayfair Dr		Palm Desert	92260	4923
83671	M & J Motorsports	13875 Palm Dr		Desert Hot Sprgs	92240	7538
83678	Specialty Auto Works	81837 Oleander Ave	#41 & 42	Indio	92201	7538
83683	Springs Country Club The	One Duke Dr		Rancho Mirage	92270	7997
83689	Sun Glow Ranch	1/2mi S Avenue 68 (on		Mecca	92254	100
83691	Sun World International, L.L.C.	10151 Buck Blvd		Blythe	92225	1500
83692	Sun World International-Ranch 540	66425 Hayes St		Mecca	92254	172

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Facility	DBA	Address	More	City	Zip	SIC Code
83693	Sun World International, L.L.C.	87951 Avenue 73		Oasis	92274	172
83698	Superior Ready Mix Concrete, L.P.	72270 Varner Rd		Thousand Palms	92276	3272
83701	Sunnylands	71231 Tamarisk Ln		Rancho Mirage	92270	7997
83702	Sunrise Ctry Club of Rancho Mirage	71601 Country Club Dr		Rancho Mirage	92270	7997
83703	Time Warner	75181 Mediterranean		Palm Desert	92211	700
83713	Tamarisk Country Club	70968 La Paz Rd		Rancho Mirage	92270	7997
83721	Chevron 7th Street	761 E Hobsonway		Blythe	92225	5500
83722	Stanco	44250 Ragsdale Rd		Desert Center	92239	5541
83723	Walgreens #1079	1700 Vista Chino		Palm Sprgs	92262	7500
83724	Gas-N-Save	81485 Miles Ave		Indio	92201	7500
83725	Apple Market #5	80631 Indio Blvd		Indio	92201	5541
83727	World Oil Marketing Co., #106	71689 Hwy 111		Rancho Mirage	92270	5541
83730	Texaco Station Mitchell's	81201 Indio Blvd		Indio	92201	5541
83731	Cecil's Automotive	83186 Hwy 111		Indio	92201	5541
83733	Lou's Automotive	68805 Perez Rd	#G105	Cathedral City	92234	7538
83741	Thunderbird Country Club	71001 Country Club Dr		Rancho Mirage	92270	7997
83743	Hayday Farms	15500 S Commercial St		Blythe	92225	7389
83746	Torrence's Farm Implements	54050 Hwy 86	#A	Thermal	92274	5000
83749	Kustom Kraft	74853 Velie Dr		Palm Desert	92260	7500
83754	Tri-Palm Estates	32050 Desert Moon Dr		Thousand Palms	92276	6500
83759	Ty's Automotive	68743 Perez Rd	#D31	Cathedral City	92234	7538
83765	Passmore Gas And Oil Inc.	391 S Main St		Blythe	92225	5171
83767	United Parcel Service	650 N Commercial Rd		Palm Sprgs	92262	4213
83770	Lovekin 76	301 S Lovekin		Blythe	92225	5541
83771	Palm Desert 76	73801 Hwy 111		Palm Desert	92260	5541
83772	ConocoPhillips Co #255423	1777 E Palm Canyon Dr		Palm Sprgs	92264	5541
83774	ConocoPhillips Co #257423	40010 Washington St		Bermuda Dunes	92201	5541
83775	Kayo Oil Co #2705699	19995 Indian Ave		N Palm Sprgs	92258	5541
83785	Sprint Palm Springs POP	3601 N Indian Canyon Dr		Palm Sprgs	92262	4813
83790	Madison Cleaners	81096 Hwy 111	A	Indio	92201	7200
83793	Valley Sanitary District	45500 Van Buren Blvd		Indio	92201	4952
83798	Van Dyke Farms Inc	8951 N Lovekin Blvd		Blythe	92225	4200
83810	The Vintage Club	75001 Vintage Dr W		Indian Wells	92210	7997

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Facility	DBA	Address	More	City	Zip	SIC Code
83812	Cameron Welding Supply	44710 San Pablo Ave		Palm Desert	92260	4924
83815	Palm Springs Disposal Services	4690 E Mesquite Ave		Palm Sprgs	92263	4953
83817	Wayne Stroschein	15410 28th Ave		Blythe	92225	100
83818	Weeks Printing	123 S Main St		Blythe	92225	3555
83819	Bircher Exterminating Service, Inc.	13400 W 14th Ave		Blythe	92225	4789
83831	Wiley Automotive	83066 Hwy 111	B	Indio	92201	7500
83834	Impression Cleaners	42380 Bob Hope Dr		Rancho Mirage	92270	7200
83837	Big O Tires	82443 Indio Blvd		Indio	92201	7539
83846	Woodhaven Country Club	41555 Woodhaven Dr	E	Palm Desert	92260	7997
83849	Smokin Joe's Cycle Service	83629 Indio Blvd		Indio	92201	5500
83856	Arco #5896/Prestige Stations #5419	46150 Washington St		La Quinta	92253	5541
83868	Blythe Marine Service	9741 E Hobsonway		Blythe	92225	7500
83871	Kayo Oil Co #2701740	43502 Monroe St		Indio	92201	5541
83876	Arco #05884/Prestige Stations #5417	67625 E Palm Canyon Dr		Cathedral City	92234	5541
83895	La Quinta Shell	78998 Hwy 111		La Quinta	92253	5541
83916	Meineke Car Care Center	68725 Ramon Rd	A & B	Cathedral City	92234	7500
83967	Amerigas Propane L. P.	81929 Indio Blvd		Indio	92201	5984
83969	Cosme RV	9573 E Hobsonway		Blythe	92225	
84064	Pilot Travel Center #307	6605 N Indian Cyn Dr		N Palm Sprgs	92258	5541
84113	Anaya's Transmission	85811 Hwy 111		Coachella	92236	7538
84114	Joshua Tree Pinto Wye	Pinto Basin Rd & Utah Trail		Joshua Tree Nat'l Park	92252	7033
84129	Francisco Designs	72096 Dunham Wy	#E	Thousand Palms	92276	7538
84242	G & M Oil Co. #122	13900 Palm Dr		Desert Hot Sprgs	92240	5541
84425	Monroe Street 76	43401 Monroe St		Indio	92201	5541
84448	Cerritos Ranch	3051 N Arrowhead Blvd		Blythe	92225	100
84457	The Dimare Company	82025 Avenue 44		Indio	92201	4783
84464	City Cab	668 S Eugene Rd		Palm Sprgs	92264	3462
84517	County Of Riverside Park Mayflower	4980 Colorado River Rd		Blythe	92225	0
84534	Caltrans/Blythe	400 S Broadway		Blythe	92225	9199
84578	Palo Verde High School	667 N Lovekin Blvd		Blythe	92225	8216
84592	Valley Beverage Distributors	390 N Eucalyptus Ave		Blythe	92225	5149
84595	Texaco Express Lube	128 N Palm Dr		Blythe	92225	5541
84611	California Highway Patrol	79650 Varner Rd		Indio	92201	9221

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Facility	DBA	Address	More	City	Zip	SIC Code
84639	Arco Am/Pm - Ramon Canyon Car	68500 Ramon Rd		Cathedral City	92234	5541
84656	Yeager Skanska, Inc. - 1000 Palms	27950 Sierra Del Sol		Thousand Palms	92276	1442
84692	Z Best Grinding, Inc	27105 Sierra Del Sol		Thousand Palms	92276	2511
84728	Larry Green Ford	410 E Hobsonway		Blythe	92225	7538
84805	County Of Riverside Health Ctr M.H.	47919 Oasis St		Indio	92201	8011
84887	Blythe Wastewater Treatment Plant	15901 S Broadway		Blythe	92225	4941
84892	Jiffy Lube #2824	78988 Hwy 111		La Quinta	92253	7538
84893	Mission Hills Cleaners	36101 Bob Hope Dr	Sect 1	Rancho Mirage	92270	7200
84894	Desert Discount Cleaners	73250 Hwy 111		Palm Desert	92260	2618
84900	Ritz Camera #939	72840 Hwy 111	#409	Palm Desert	92261	7384
85023	Cardenas Transmission & Auto	83900 Avenue 45	#A	Indio	92201	7538
85041	Desert Automotive Warehouse	72182 Corporate Wy		Thousand Palms	92276	7538
85051	Indio Transmission	83167 Hwy 111		Indio	92201	7538
85142	Archuleta Excavating	83864 Avenue 45		Indio	92201	1700
85144	C. V. Automotive Mach Shop Inc.	82413 Indio Blvd		Indio	92201	7538
85150	Orange King Ranch	SW Cleveland St and		Mecca	92254	100
85152	City Of Blythe D.P.W.	440 S Main St		Blythe	92225	0
85160	Tudor Ranch Inc (Home Ranch)	65010 Grant St		Mecca	92254	100
85167	Rite Aid #5681	72875 Hwy 111		Palm Desert	92260	5541
85243	Edom Hill Transfer Station	70100 Edom Hill Rd		Cathedral City	92234	4212
85244	County Of Riverside Blythe Landfill	1000 Midland Rd		Blythe	92225	4953
85304	Car City	83885 Indio Blvd		Indio	92201	7538
85321	Hot Rod Ron, Inc	74866 Velie Dr	#7	Palm Desert	92260	7538
85339	Rancho La Quinta Country Club	79301 Cascadas Wy		La Quinta	92253	7997
85442	Larsen Justice Ctr/State of CA	46200 Oasis St		Indio	92201	9211
85567	Sun World International Ranch 544	76924 Polk St		Oasis	92274	172
85602	Speedy Car Care Center	83679 Indio Blvd		Indio	92201	7538
85603	Kangaroo Food Mart	28201 Date Palm Dr		Cathedral City	92234	5541
85664	Baja Boyz Auto & Tire Repair	84425 Indio Blvd		Indio	92201	7539
85667	Arco #05968/Prestige Stations 05968	1717 Vista Chino		Palm Sprgs	92262	5541
85668	Rancho Mirage Hand Car Wash	69800 Hwy 111		Rancho Mirage	92270	7542
85676	Ironwood State Prison	19005 Wiley's Well Rd		Blythe	92225	0
85677	John Deere Landscapes, Inc	74991 Velie Dr		Palm Desert	92260	781

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Facility	DBA	Address	More	City	Zip	SIC Code
85698	Rite Aid #5673	890 E Hobsonway		Blythe	92225	5912
85712	SCP Distributors, LLC	5700 Indian Sprgs Rd		Palm Sprgs	92264-5968	5091
85716	Yoshi's Lawnmower Shop	652 Williams Rd		Palm Sprgs	92264	8999
85769	Palm Springs Pump Inc	83651 Dr Carreon Blvd		Indio	92201	7359
85841	Immediate Care Center La Quinta	78822 Hwy 111		La Quinta	92253	8011
85938	Belk Farms	57800 Desert Cactus Dr		Thermal	92274	191
85950	Kragen Auto Parts #1123	1315 W Hobsonway		Blythe	92225	5531
85952	Blue Beyond Fisheries	17955 Bubbling Wells Rd		Desert Hot Sprgs	92240	
85958	Hertz Equipment Rental Corporation	81495 Industrial Pl		Indio	92201	7359
85983	Jorge's Auto Repair	68707 Summit Dr		Cathedral City	92234	
85995	Fastrip Foodstore #652	51893 Harrison St		Coachella	92236	5514
86040	Arco	400 S Lovekin Blvd		Blythe	92225	5541
86080	Desert Earth Resorces-Kohl Ranch	86075 Avenue 60		Thermal	92274	762
86096	U.S. Border Patrol	16870 W Hobsonway		Blythe	92225	9229
86108	Robinson Farms	15500 S Lovekin Blvd		Blythe	92225	100
86116	Arco #06306/Prestige Stations #6306	32975 Monterey Ave		Thousand Palms	92276	5541
86180	UCR-C.V. Agricultural Research Sttn	72155 Avenue 72		Thermal	92274	
86208	Rucker Homestead	87400 Airport Blvd		Thermal	92274	
86231	C & C Cleaners	74924 Country Club Dr		Palm Desert	92260	
86238	Mesa Drive Fuel	13015 Mesa Dr		Blythe	92225	
86273	Super Transmission	83752 Avenue 45	#7	Indio	92201	
86277	Mint Cleaners	50949 Washington St	#B	La Quinta	92253	7216
86323	Doctor V Auto Clinic	68416 Perez Rd		Cathedral City	92234	7538
86453	High Tech Auto Center	68421 Commercial Rd	#H	Cathedral City	92234	
86504	Jiffy Lube #2823	81088 Hwy 111		Indio	92201	
86683	G & C Smog And Auto Repair	83420 Indio Blvd	#B	Indio	92201	7538
86776	Jordan/Central Implement Co	212 N Carlton		Blythe	92225	5599
86825	Short Stop Mobil Store	74478 Hwy 111		Palm Desert	92260	5541
86917	CBS-TV2	31276 Dunham Wy		Thousand Palms	92276	
86926	Turf Star	79253 Country Club Dr		Bermuda Dunes	92201	
86928	Hort Tech Inc.	78355 Darby Rd		Bermuda Dunes	92201	
86929	Vintage Associates, Inc	78755 Darby Rd		Bermuda Dunes	92201	
86936	Grey Wolfs Enterprises, Inc.	78260 Darby Rd		Bermuda Dunes	92203	

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Facility	DBA	Address	More	City	Zip	SIC Code
86949	Costco Wholesale #0441	72800 Dinah Shore Dr	#B	Palm Desert	92211	5541
86959	Anthony Vineyards, Inc.	52301 Enterprise Wy		Coachella	92236	5148
86968	Pacific Pulmonary Svcs	3500 E Tachevah Dr	#C	Palm Sprgs	92262	8011
87018	Applied Pathology Med. Associates	81715 Dr Carreon Blvd	#A-2	Indio	92201	8011
87160	Heritage Palms	44291 Heritage Palms Dr		Indio	92201	7997
87231	Desert Transmissions Auto Repair	83525 Indio Blvd		Indio	92201	7538
87281	Cardiff Limousine	75255 Sheryl Ave		Palm Desert	92211	7538
87661	Chevron Service Station #207512	6600 N Indian Ave		N Palm Sprgs	92258	5541
87662	Palm Gas Mart	22755 Palm Dr		Desert Hot Sprgs	92240	5541
87696	Grimmway-Coachella Cold Storage	64225 Hwy 111		Mecca	92254	
87697	Tudor Ranch, Inc.	66455 Arthur St		Mecca	92254	
87758	Chuchian Ranch-East Slope	End Of Ave 62-next To		Mecca	92254	
87867	Waste Water Lift Station	67900 Avenue 34		Palm Sprgs	92264	4952
87871	Northwest Plating, LLC	45625 Citrus Ave		Indio	92201	
87912	Chiriaco Summit Chevron	62450 Chiriaco Rd		Chiriaco Summit	92201	
87940	Tradition	78505 Old Ave 52		La Quinta	92253	7997
87988	Chevron Stations Inc. #1478/207510	36101 Bob Hope Dr	Bldg. H	Rancho Mirage	92270	5541
88010	AutoZone #5549	812 E Hobsonway		Blythe	92225	5531
88072	Jack In The Box #3523 QS#7712	46651 Dillion Rd		Coachella	92236	5541
88212	Arco AM/PM/Geo Petro	3600 Ramon Rd		Palm Sprgs	92262	5541
88244	L & G Desert Store	49900 Jackson St		Indio	92201	
88274	HMS/Wheeler	NW Corner Of Ave 68th &		Mecca	92254	16
88275	HMS/Pitzer	1/4 Mi West Of Hayes N Of		Mecca	92254	16
88276	HMS/Orlando	3/4 Mi East Of Cleveland/S		Mecca	92254	16
88301	CVS Pharmacy #9646	42155 Washington St		Palm Desert	92260	5912
88337	Arco #06508/Prestige Stations #6279	78355 Varner Rd		Palm Desert	92211	5541
88338	G&M Oil #145	78415 Varner Rd		Palm Desert	92211	5541
88347	El Valle Auto Parts	51890 Harrison St		Coachella	92236	7538
88414	Brighton Distributing Inc	81935 Avenue 62		Thermal	92274	
88449	County Of Riverside-Fleet Services	82775 Plaza		Indio	92201	7538
88483	Arco AM/PM	36001 Date Palm Dr		Cathedral City	92234	5541
88505	Love's Travel Stop #207	45761 Dillon Rd		Coachella	92236	5541
88506	Leja Farms	52500 Van Buren		Coachella	92236	

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Facility	DBA	Address	More	City	Zip	SIC Code
88520	G&M Oil #146	79513 Hwy 111		La Quinta	92253	
88542	Cool Running's Auto Repair	79345 Country Club Dr	Unit #D	Bermuda Dunes	92201	7538
88544	The Golf Club at Terra Lago	42010 Golf Center Pkwy		Indio	92203	7900
88557	Majestic Shutters	83876 Avenue 45		Indio	92201	
88567	The Palms Golf Club- Golf Maintenan	81771 Airport Blvd		La Quinta	92253	7997
88584	ExxonMobil Oil Corporation #19004	79985 Hwy 111		Indio	92201	5541
88597	Dodge City Chrysler Jeep	79025 Hwy 111		La Quinta	92253	5511
88614	USA Station #68144	79490 Hwy 111		La Quinta	92253	5415
88635	Torre Nissan	79125 Hwy 111		La Quinta	92253	5511
88636	Kia of La Quinta	79225 Hwy 111		La Quinta	92253	5511
88642	Waterline Technologies-PSOC	42570 Melanie Pl		Palm Desert	92211	
88658	Sprint Nextel (CA6080-Oasis)	77110 Hwy 86	Section 2	Thermal	92274	5133
88659	Jack Ivey Ranch Golf	74580 Varner Rd		Thousand Palms	92276	7997
88674	Superior Ready Mix	86160 Avenue 54		Coachella	92236	
88767	Sprint Nextel (CA6078-Mayoma)	75050 Merle Dr		Palm Desert	92211	5133
88768	Sprint Nextel (CA6072-Ironwood)	73241 Hwy 111		Palm Desert	92260	5133
88769	Sprint Nextel (CA6086-Warm Springs)	86035 Avenue 52		Coachella	92236	5133
88772	Sprint Nextel (CA6079-La Quinta)	47950 Dune Palms Rd		La Quinta	92253	5133
88774	Spectrum Custom Design Inc.	65242 San Jacinto Ln		Desert Hot Sprgs	92240	
88826	JAC Auto Repair	83480 Avenue 45	#10	Indio	92201	
88841	Torres Auto Repair	83480 Avenue 45	#16	Indio	92201	
88881	Arco Travel Center	90480 Avenue 66		Mecca	92254	5541
88883	Milauskas Eye Institute	78560 Hwy 111		La Quinta	92253	
88973	Mountain/Dunes Golf Maintenance	51001 Carranza Ave		La Quinta	92253	7900
88987	Rancho Mirage Hyperbarics	39935 Vista Del Sol	Ste 101-A	Rancho Mirage	92270	
89017	Ralphs Grocery Co. - Store #681	42150 Washington St		Bermuda Dunes	92203	5411
89020	ExxonMobil Oil Corporation #18824	75000 Gerald Ford Dr		Palm Desert	92255	5541
89036	Ralph's Grocery Store #179	74895 Hwy 111		Indian Wells	92210	5411
89040	Energy Unlimited	1/2 Mi W Of Hwy 62, N Of		Desert Hot Sprgs	92240	
89057	Circle K 76 #2705911	78364 Hwy 111		La Quinta	92253	5411
89098	Ralph's Grocery Co. Store #195	50929 Washington St		La Quinta	92253	5411
89134	The River Retail, LLC	71800 Hwy 111	#A-208	Rancho Mirage	92270	
89260	Mountain View Country Club	51990 El Dorado St		La Quinta	92253	

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Facility	DBA	Address	More	City	Zip	SIC Code
89261	Shadow Lake Estates	83004 N Shore Dr		Indio	92201	
89266	Kuykendall, Inc.	72295 Manufacturing Rd		Thousand Palms	92276	6218
89284	C.B. Inc	75130 St Charles Pl		Palm Desert	92211	5712
89285	Blythe Energy,L.L.C.	15560 Hobsonway		Blythe	92226	4911
89313	Sprint Nextel (CA6767-Desert Shore)	87165 Avenue 59		Thermal	92274	5133
89321	Sprint Nextel (CA6756-Blue Eyes)	73605 Reche Ln		Palm Desert	92260	4812
89322	Sprint Nextel (CA7266-Mecca)	64250 Lincoln St		Mecca	92254	5133
89379	Desert Cities Automotive	81791 Oleander	#7	Indio	92201	
89380	Gabriel's Wrought Iron	81837 Oleander	#19	Indio	92201	
89381	Al's Automotive	81837 Oleander	#45	Indio	92201	
89396	Coachella Valley Collision Center	36550 Perez Rd		Cathedral City	92234	
89398	Circle K #2705087	40100 Washington St	#142	Bermuda Dunes	92201	5411
89420	Big O Tires of Bermuda Dunes	42098 Washington St		Bermuda Dunes	92201	
89429	Red River Farms	13400 W 11th Ave		Blythe	92225	
89440	Sprint Nextel (CA6071-Indian)	69202 E Palm Cyn Dr		Cathedral City	92234	5133
89453	Larson Golf Car	44925 Jackson St		Indio	92201	
89460	Red Robin/Top Robin Ventures	78722 Hwy 111		La Quinta	92253	
89493	Von's SS#2177	14030 Palm Dr		Desert Hot Sprgs	92240	5541
89503	Citrus Cleaners	49950 Jefferson	Ste 100	Indio	92203	
89517	Bermuda C&C Cleaners, Inc	42204 Washington St		Bermuda Dunes	92201	
89519	Sprint Nextel (CA7235-Indio Blvd)	80783 Indio Blvd		Indio	92201	5133
89520	Sprint Nextel (CA6721-Fargo)	83740 Citrus Ave		Indio	92201	5133
89546	Photo Colorgraphix	31265 Reserve Dr	Ste. B	Thousand Palms	92276	
89555	Sprint Nextel (CA6720-Lake Cahuilla	77865 Avenida Montezuma		La Quinta	92253	5133
89584	The Hideaway	80955 Avenue 52		La Quinta	92253	
89585	Apria Healthcare, Inc	38888 El Desierto		Palm Desert	92211	
89643	La Quinta Cleaners	78311 Hwy 111		La Quinta	92253	
89648	Rancho Mirage Cleaners	70223 Hwy 111	Ste A	Rancho Mirage	92270	1897
89650	Pacific Brake & Alignment II	83260 Indio Blvd		Indio	92201	
89655	Price's Nursery & Garden Supply	80420 Avenue 52		La Quinta	92253	
89657	Alex Auto Service	65090 San Jacinto Ln		Desert Hot Sprgs	92240	
89662	Airgas/Puritan Medical Products	75059 Woburn Ct	1	Thousand Palms	92276	5169
89727	Mobile Lube Express	57100 Desert Cactus Dr		Thermal	92274	

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Riverside County Environmental Health Department

Hazardous Materials Management Program

Inspected Facilities

Reporting period from 07/01/2006 through 06/30/2007.

Facility	DBA	Address	More	City	Zip	SIC Code
89741	Rite Aid #5678	49681 Harrison St		Coachella	92236	
89742	Carl's Jr	50087 Harrison St		Coachella	92236	
89872	Mowers Plus, Inc	79141 Country Club Dr		Bermuda Dunes	92201	
89899	Desert Discount Cleaners	50801 Washington St		La Quinta	92253	2618
89922	Victor's Automotive	1251 Montalvo	#E	Palm Sprgs	92262	
89933	Palm Springs Nissan	68177 Kyle Rd		Cathedral City	92234	5511
89942	CVS Pharmacy #9804	425 S Sunrise Wy	Ste C	Palm Sprgs	92262	
89951	Kaminsky Productions	68905 Vista Chino		Cathedral City	92234	
89953	Jack in the Box #5328/Quick #7734	22600 Palm Dr		Desert Hot Sprgs	92240	5812
89957	KFC/Long John Silver's	49950 Harrison St		Coachella	92236	
90003	Lloyd Extreme Auto Body	14880 S Broadway		Blythe	92225	
90009	Burger King #5230	379 S Lovekin Blvd		Blythe	92225	
90010	Taco Bell #3631	375 S Lovekin Blvd		Blythe	92225	9083
90012	Trilogy Golf Club at La Quinta	81252 Avenue 62		La Quinta	92253	7997
90037	McDonald's	79295 Hwy 111	Ste A	La Quinta	92253	
90060	Washington Cleaners	72817 Dinah Shore Dr	#101	Rancho Mirage	92270	
90145	KDI Stoneworks	79431 Country Club Dr		Bermuda Dunes	92201	2590
90178	Desert Battery Company	79469 Country Club Dr	Ste B	Bermuda Dunes	92203	
90179	Walker Auto Works Inc	79553 County Club Dr	Ste C	Bermuda Dunes	92203	
90238	John Barajas Masonry Contractor	42901 Lima Hall Rd		Bermuda Dunes	92201	
90239	California Desert Nursery, Inc	78600 Darby Rd		Bermuda Dunes	92203	
90253	Jack in the Box #0067	190 S Lovekin Blvd		Blythe	92225	5812
90273	Regal Cinemas/Metro 8	81725 Hwy 111		Indio	92201	
90277	City of La Quinta (Road Yard)	78106 Frances Hack Ln		La Quinta	92253	
90296	Date Palm Cleaners	30877 Date Palm Dr		Cathedral City	92234	
90297	McDonald's #13695	78962 Hwy 111		La Quinta	92253	
90300	Powerstride Battery	41921 Beacon Hill	#D	Palm Desert	92211	
90303	Sizzler #1049	31875 Date Palm		Cathedral City	92234	
90309	McDonald's #3112	191 S Lovekin Blvd		Blythe	92225	
90325	La Quinta High School	79255 Westward Ho Dr		La Quinta	92253	
90349	Taco Bell #9454	78932 Hwy 111		La Quinta	92253	
90356	Lemon King II (Rancho Colina)	One Qtr Mi W of Polk and		Oasis	92274	

Riverside County Environmental Health Department

Hazardous Materials Management Program

Inspected Facilities

Reporting period from 07/01/2006 through 06/30/2007.

Facility	DBA	Address	More	City	Zip	SIC Code
90357	Dudley & Maxfield	Ave 70 One Half mi E of Cleveland		Mecca	92254	
90368	Inland Power Equipment	81405 Hwy 111		Indio	92201	
90399	Walgreens #7765	47900 Washington St		La Quinta	92253	5912
90400	Jack in the Box #3593	79724 Hwy 111		La Quinta	92253	5812
90402	Rubio's #149	78447 Hwy 111	Ste A	La Quinta	92253	
90404	A-OK Smog & Repair	83700 Indio Blvd		Indio	92201	
90408	Jack in the Box #5344	52144 Harrison St		Coachella	92236	5812
90418	Tidwell Concrete Construction Inc.	81785 Trader Pl		Indio	92201	1700
90455	Rancho Mirage Stadium 16	72777 Dinah Shore Dr		Rancho Mirage	92270	7832
90466	10 West Motorsports, Inc	72131 Northshore		Thousand Palms	92276	
90467	Indio Water Authority Reservoir #4	80500 Avenue 46		Indio	92201	9121
90468	Sprint Nextel (CA7270-Salton Sea)	84110 Lincoln St		Oasis	92274	5133
90469	Indio Water Authority Well #5	80250 Avenue 49		Indio	92201	9121
90470	Indio Water Authority Well #T	79785 Miles Ave		Indio	92201	9121
90471	Indio Water Authority Well #U	82998 Avenue 50		Indio	92201	9121
90472	Indio Water Authority Well #V	49955 Hjorth St		Indio	92201	9121
90473	Indio Water Authority Well #W	80536 Jasper Ave		Indio	92201	9121
90477	Longs Drug Store #012	49980 Jefferson St		Indio	92201	5912
90763	West Coast Turf	47301 Tyler St		Coachella	92236	
91045	Sprint Nextel (CA8585-Perez)	68625 Perez Rd		Cathedral City	92234	5133

Riverside County Environmental Health Department

Hazardous Materials Management Program

Inspected Facilities

Reporting period from 07/01/2006 through 06/30/2007.

Facility	DBA	Address	More	City	Zip	SIC Code
91046	Sprint Nextel (CA8356-West Indio)	42301 Sand Dune Dr		Palm Desert	92211	5133
91167	Sprint PCS, RV60XC861	79290 Ave 40		Indio	92203	5133
91218	Costco Gasoline #638	79795 Hwy 111		La Quinta	92253	5541
91250	Sam's Club #6609	34220 Monterey Ave		Palm Desert	92260	5399
91327	Sam's Club #4941	79315 Hwy 111		La Quinta	92253	5541
91368	Sprint Nextel (CA5314)	47331 Hwy 74		Palm Desert	92260	5133
91383	Sprint Nextel (CA8575-Thunderbird)	70170 Hwy 111		Rancho Mirage	92270	5133
91384	Sprint Nextel (CA8571-Hawking)	32090 Rancho Vista Dr		Cathedral City	92234	5133
91385	Sprint Nextel (CA8855-North Indio)	Well 5718 Fred Waring Dr		Bermuda Dunes	92201	
91407	Sprint Nextel (CA8857-East Indio)	81929 Indio Blvd	#A	Indio	92201	4899
91408	Sprint Nextel (CA8574-Sweetwater)	173 Rainbird Cir		Palm Desert	92211	4899
91422	McDonald's #31388	34500 Monterey Ave	#A	Palm Desert	92211	5812
91429	Sprint Nextel (CA8586-PGA West)	54001 Madison St	#A	La Quinta	92274	5133
91431	CVWD Lift Station #80-05	Yavapa & Mtn Cove Dr Intersection		Indian Wells	92210	
91442	Wal-Mart Supercenter #5096	34500 Monterey Ave		Palm Desert	92260	5399
91443	Sprint Nextel (CA912Z)	84675 Ave 60	#A	Thermal	92274	
91445	A Flores Excavating & Grading Inc	86110 Ave 54		Coachella	92236	
91446	California Pools & Spas	86100 Ave 54		Coachella	92236	
91454	Walgreens #4756	44830 Monterey Ave		Palm Desert	92260	5912
91461	Jack In The Box #5363	36555 Cook St		Palm Desert	92211	5812

Riverside County Environmental Health Department
Hazardous Materials Management Program
Inspected Facilities

Reporting period from 07/01/2006 through 06/30/2007.

Facility	DBA	Address	More	City	Zip	SIC Code
91466	California Tire & Wheel	46720 Clinton St		Indio	92201	
91468	Hughes Supply	44909 Golf Center Pkwy		Indio	92201	
91469	Ferguson	81925 Industrial Pl		Indio	92201	
91470	The Cheesecake Factory	71800 Hwy 111	#D101	Rancho Mirage	92270	5812
91488	Stone Eagle Golf Course	72440 Stone Eagle Dr		Palm Desert	92260	7997
91525	Yuma Auto Service	83912 Avenue 45	#11	Indio	92201	
91526	Desert Fiberglass & Paint	83900 Avenue 45	#E	Indio	92201	
91527	All Tune & Lube	83651 Avenue 45	#A	Indio	92201	
91528	A & P Automotive	83651 Avenue 45	#F	Indio	92201	
91529	Auto Pro Collision Center II	83651 Avenue 45	#C	Indio	92201	
91530	Palms to Pines Automotive & Smog	74725 Joni Dr	D and E	Palm Desert	92260	
91531	Sprint Nextel (CA5654-Hwy 86)	65959 Hwy 86	#A	Thermal	92274	4812
91532	Sprint Nextel (CA8587-Painters)	71800 Hwy 111	#1	Rancho Mirage	92270	
91535	Seven Eleven #22375	66500 8th St		Desert Hot Springs	92240	5541
91543	Hawthorne Lift Systems	86998 Ave 52		Coachella	92236	
91560	Arbor Tech Lawn Care	2050 Executive Dr		Palm Springs	92262	
91567	Rite Aid #5679	12900 Palm Dr		Desert Hot Springs	92240	
91568	Time Warner Cable	11855 Palm Dr		Desert Hot Springs	92240	4841
91623	Andalusia Country Club	81120 60th Ave		La Quinta	92253	7997
91633	Hub	81760 Oleander St		Indio	92201	

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Riverside County Environmental Health Department

Hazardous Materials Management Program

Inspected Facilities

Reporting period from 07/01/2006 through 06/30/2007.

Facility	DBA	Address	More	City	Zip	SIC Code
91634	John Glenn Middle School	79655 Miles Ave		Indio	92201	
91649	Mountainview Tire & Service	79265 Hwy 111		La Quinta	92253	
91650	Regal Palm Springs Stadium 9	789 E Tahquitz Cyn Way		Palm Spgs	92262	7832
91671	Ernie Ball, Inc	53973 Polk St		Coachella	92236	
91682	Del Taco #1010	34540 Monterey Ave		Palm Desert	92260	
91683	Lenscrafters #885	72840 Hwy 111	#F201	Palm Desert	92260	
91689	Albertson's #6643	83053 Ave 48		Coahella	92236	
91727	Pathfinder Ranch	35510 Pathfinder Ranch Rd	#104	Mountain Center	92561-3034	
91739	Acura of the Desert	68100 Perez Rd		Cathedral City	92234	
91776	HD Supply Waterworks LTD	82314 Market St		Indio	92201	
91789	Silver Rock Resort	79600 Ave 54		La Quinta	92253	
91812	10 West Motorsports	42270 Spectrum St		Indio	92201	
91815	Sprint Nextel	67650 18th Ave		Desert Hot Sprgs	92241	
91818	CVS Pharmacy #1520	68010 Vista Chino		Cathedral City	92234	
91819	Papich Construction, Inc	70100 Edom Hill Rd	#A	Cathedral City	92234	
91824	Alvarez Auto Repair	51701 Hwy 111	Ste B-3	Coachella	92236	
91830	Mirage Center Oral &	39935 Vista Del Sol	Ste 102	Rancho Mirage	92270	8062
91831	RDO Equipment Co	83300 Ave 45		Indio	92201	
91849	Jonathan's Cleaners	46480 Washington St	Ste 3	La Quinta	92253	
91850	A.T. Designs	42250 Spectrum St		Indio	92203	
91851	The Madison Club	53980 Gray Ave		La Quinta	92253	7997
91868	County of Riverside Health	47923 Oasis St		Indio	92201	
91869	County of Riverside Central Plant	47919 Oasis St	#A	Indio	92201	

Area total facilities: 579

Riverside County Environmental Health Department

Hazardous Materials Management Program

Inspected Facilities

Reporting period from 07/01/2006 through 06/30/2007.

Area: 4

Facility	DBA	Address	More	City	Zip	SIC Code
87325	Color By Woz	6680 View Park Ct		Riverside	92503	

Area total facilities: 1

Report total facilities: 1559

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Business Registration and Licensing Program

SUBMITTAL TO THE BOARD OF SUPERVISORS
COUNTY OF RIVERSIDE, STATE OF CALIFORNIA

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FROM: TLMA/Building and Safety

SUBMITTAL DATE: October 26, 2006

SUBJECT: Business Registration and Licensing Program and NPDES Commercial/Industrial Compliance Program

RECOMMENDED MOTION: That the Board of Supervisors:

1. Adopt, pursuant to the requirements of California Government Code §§ 6062a and 66018, Ordinance 857, an Ordinance of the County of Riverside Regarding the Establishment of a Business Registration and Licensing Program (Attachment A);
2. Adopt Ordinance 754.2, an Ordinance of the County of Riverside Amending Ordinance No. 754.1 Establishing Stormwater/Urban Runoff Management and Discharge Controls (Attachment B); and,
3. Direct Building and Safety to provide a status report on the Business Registration and Licensing Program to the Board, six months after the adoption of Ordinance 857.

BACKGROUND: After two public hearings, on September 12, 2006, the Board of Supervisors concluded the public hearing for Ordinance 857 and 754.2 and tentatively approved a Business License Program for the unincorporated area of Riverside County. The Board's tentative approval was given subject to a few requested amendments to Ordinance No. 857 and to the administrative procedures to implement the Business License Program.

(Continued on page 2)

Alex Gann, Senior Management Analyst
County Executive Office

James J. Miller, Director
Department of Building and Safety

FINANCIAL DATA				
	Current F.Y. Total Cost:	$ 300,000	In Current Year Budget:	Yes
	Current F.Y. Net County Cost:	$ 300,000	Budget Adjustment:	No
	Annual Net County Cost:	$ N/A	For Fiscal Year:	2006/07

SOURCE OF FUNDS: General Funds approved as part of the FY 06-07 budget.

Positions To Be Deleted Per A-30 ☐

Requires 4/5 Vote ☐

C.E.O. RECOMMENDATION: APPROVE.

County Executive Office Signature

☒ Policy ☐ Consent — Dep't Recomm.:

☒ Policy ☐ Consent — Per Exec. Ofc.:

Prev. Agn. Ref.: 16.2 of 9/12/06; 3.23 of 03/21/06, 16.1 a&b of 07/11/06 16.1 a&b of 08/29/06

District: All

11/07/06

Agenda Number: 3.34

BACKGROUND continued:

The Board, after closing the public hearing, requested that staff prepare amendments to the draft Business License Ordinance (Ordinance No. 857) and/or the administrative procedures for the Business License Program. The amendments include the following:

1) The Board requested the following amendment regarding businesses without a fixed facility: Change the Ordinance to reflect that businesses without a fixed facility be amended so that it's clear that the activity of roadside vendors without a license in Riverside County is not permitted. Roadside vendors cannot operate without a license until such time that we have a street vendor ordinance. County Counsel is preparing a separate ordinance to address the issue of roadside vendors. The Roadside Vendor Ordinance will address the legal pathway for vendors to come into compliance with the appropriate standards. As a result, Ordinance No. 857 does not appear to be the appropriate document to reference roadside vending. It should be noted that the proposed Ord. No. 857 does not authorize roadside vending and specifically prohibits unlawful businesses as provided in Section 15 of the Ordinance.

2) Payment of License Fees to be convenient to the public and available through on-line services. The Board recommended that the payment of fees should be available through an online method in order to make the process more efficient. The Transportation Land Management Agency has researched this issue and will implement a streamlined online registration process that will allow for both online registration and payment of license fees. This process will provide the business community with a user friendly, convenient method to register their business and pay their fees electronically. The streamlined process will also assist with the overall program efficiency in terms of staff utilization and keeping program costs relatively low.

3) Exempt businesses must still obtain a business license. The Board indicated that although the exemption categories are created to exempt specified types of businesses from payment of all fees, that a complete database be developed including exempt businesses. Businesses will be given an opportunity to obtain a business license without payment of any fees. However, businesses would be subject to payment of fees if a proper claim of exemption has not been filed within 60 calendar days of notification by TLMA that a license is required.

4) The Board requested clarification regarding the definition of a Home Occupation. Staff has reviewed the Home Occupation definition within both Ordinance No. 348 and the proposed Ordinance No. 857 (which are identical), and concludes that the previously discussed example involving a large commercial truck or semi-tractor trailer rig parked on a residential property would be prohibited under the definition of a Home Occupation. The definition of Home Occupation provides in pertinent part "No vehicles or trailers except those normally incidental to residential use shall be kept on the site." The large commercial truck and semi-tractor trailer rig vehicles are also subject to regulation by the Riverside County Truck Parking Ordinance, Ordinance No. 413.

5) The Board added an exemption for federally recognized non-profits. Staff has revised the exemptions category to include language indicating that any non-profit organizations that are legally recognized as tax-exempt pursuant to the provisions of Internal Revenue Code Section 501 (c) (3) are exempt as provided within this section.

ORDINANCE NO. 857

AN ORDINANCE OF THE COUNTY OF RIVERSIDE REGARDING THE ESTABLISHMENT OF A BUSINESS REGISTRATION AND LICENSING PROGRAM

The Board of Supervisors of the County of Riverside Ordains as Follows:

Section 1. Statement of Purpose and Intent.

The purpose of the provisions of this ordinance is solely to provide for necessary regulation of lawful businesses being conducted within the unincorporated area of Riverside County, in order to protect the public health, safety, and welfare of the people of Riverside County. Business license fees charged under the provisions of this ordinance shall be revenue-neutral in that they may not exceed the reasonable costs of providing the regulatory services included in the business registration and licensing program. No business license fee charged under the provisions of this ordinance shall be construed as a business license tax.

Section 2. Definitions.

"Business" shall mean and include professions, trades, vocations, enterprises, establishments, occupations, and all and every kind of calling, any of which are conducted, transacted or carried on for the purpose of earning in whole or in part a profit or livelihood, whether or not a profit or livelihood actually is earned thereby, whether paid in money, goods, labor, or otherwise. This definition shall apply to business establishments located within the unincorporated area of Riverside County that are operated at a fixed physical location and those that are operated on a mobile basis by a mobile-operator as defined herein.

"County" shall mean the County of Riverside and its respective agencies and departments thereof.

"Home Occupation" means those uses that are customarily conducted in a residence, provided that such uses must be incidental and secondary to the principal use of a dwelling as a residence. The following criteria shall apply to any home occupation: 1) Except for large family day care homes which may require two assistants and small family day care homes which may require one assistant to be

FORM APPROVED COUNTY COUNSEL
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present in addition to the licensee or provider, no person other than a resident of the dwelling shall be employed on the premises in the conduct of a home occupation; 2) A home occupation shall be conducted entirely within the dwelling and shall be incidental and secondary to the use of the dwelling as a residence; 3) A home occupation shall not be conducted in an accessory structure and there shall be no storage of equipment or supplies in an accessory structure or outside building; 4) The residential character of the exterior and interior of the dwelling shall not be changed; 5) No vehicles or trailers except those normally incidental to residential use shall be kept on the site; and 6) No signs other than one unlighted identification sign, not more than two square feet in area, shall be erected on the premises.

"License Inspector" shall mean any employee, agent, representative or contractor designated by the Director of the Transportation and Land Management Agency of the County of Riverside to carry out license inspections under the provisions of this ordinance.

"Local law enforcement or governmental entities" means any city, charter city, county, charter county, or city and county, or the respective agencies and departments thereof, in the State of California.

'Mobile-Operator" shall mean and refer to those businesses that are operated on a mobile basis utilizing a motor vehicle to visit customer locations to carry out business-related services. This term shall be expressly limited to those mobile-operated businesses involving: mobile automobile or other motor vehicle washing; pest control services; mobile carpet, drape or furniture cleaning; concrete mixing or cutting; masonry; painting and coating; landscaping; pool and fountain cleaning; and Port-a-Potty or other portable toilet servicing.

"Nuisance" shall have the same meaning as set forth in California Civil Code § 3479.

"Person" shall mean and include all domestic and foreign corporations, associations, syndicates, joint stock corporations, partnerships of every kind, clubs, common-law trusts, societies, and individuals conducting, transacting or carrying on any lawful business within the unincorporated area of Riverside County other than as an employee.

"Productive Hourly Rate" shall mean and refer to the fully burdened hourly rates for each job classification required to provide a specified service. Hourly rates for services shall be established

through the yearly budget process and adopted by the Board of Supervisors as part of the County budget public hearings.

"Retail Greenhouses" shall mean and refer to all commercial greenhouses other than those that are licensed by the State of California in the "producer" category to grow and sell nursery stock in the amount of $1,000 or more in one year and that are inspected by the County Agricultural Commissioner pursuant to California Food & Agricultural Code §§ 6701 et seq. and any applicable state regulations promulgated thereto.

"Retail Nurseries" shall mean and refer to all commercial nurseries other than those that are licensed by the State of California in the "producer" category to grow and sell nursery stock in the amount of $1,000 or more in one year and that are inspected by the County Agricultural Commissioner pursuant to California Food & Agricultural Code §§ 6701 et seq. and any applicable state regulations promulgated thereto.

"Sworn statement" shall mean a written affidavit, declaration, or statement made under penalty of perjury under the laws of the State of California.

"TLMA" shall mean and refer to the Transportation and Land Management Agency of the County of Riverside and departments thereof.

Section 3. Business Registration and License Required.

~~Except as provided by Section 4 herein,~~ Every person conducting or carrying on a business as defined in this ordinance ~~of any kind or description~~ anywhere in the unincorporated area of Riverside County shall register by obtaining a business license. A separate business license shall be obtained for each physical location (including branch establishments) or for each business operated on a mobile basis by a mobile-operator as defined herein.

Section 4. Exemption.

The payment of business license fees contained in this ordinance, including inspection and enforcement fees as provided in Sections 10 and 13, shall not be required for those businesses falling within any of the exempt categories described in this section so long as a timely claim of exemption is filed with TLMA as hereinafter provided. ~~A business license shall not be required for, and the provisions of this ordinance shall not be otherwise applicable to, those businesses described in this~~

~~section.~~ Any person claiming an exemption pursuant to the provisions of this section shall within sixty (60) calendar days of being sent initial written notification of the requirement to obtain a business license file a sworn statement with TLMA stating the facts upon which an exemption is claimed. In ~~, and in~~ the absence of such statement substantiating the claim or in the event that the statement is filed with TLMA on an untimely basis, such person shall be liable for the payment of the business license fees imposed by this ordinance, including inspection and enforcement fees as provided in Sections 10 and 13.

A. Residential Facilities. Apartments, rooming houses, and other residential facilities in which living units are rented or leased solely on a term of thirty days or longer, residential care homes for adults or children, family day care homes are exempt as provided in this section.

B. Churches, Temples or Other Places of Worship. Churches, temples or other places of worship, to the extent of their use for worship, religious education or the social affairs of the religious group are exempt as provided in this section. ~~from the provisions of this ordinance.~~ This exemption shall not apply to other activities, which are not undertaken primarily for members of the religious group, including, but not limited to, day schools, social service programs or Church-owned or operated business enterprises.

C. Home Occupations. Home occupations that operate within the limitations defined herein are exempt as provided in this section. ~~from the provisions of this ordinance.~~ This exemption shall not apply to those home occupations that are subject to compliance with water quality requirements imposed by Riverside County Ordinance Nos. 457 and 754, California Water Code §§ 13000 et seq. (Porter-Cologne Water Quality Control Act), Title 33 U.S.C. §§ 1251 et seq. (Clean Water Act) and any applicable state or federal regulations promulgated thereto, and any related administrative orders or permits issued in connection therewith.

D. Agriculture. The following agricultural activities are exempt as provided in this section: agricultural pursuits consisting of the growing of crops, raising of livestock, and dairying, including auxiliary and ancillary uses incidental to the operation of a farm or ranch, consisting of the purchase and storage of substances, materials, supplies, animal feeds and produce, and the marketing of farm products; provided however, that a business license shall be required in connection with any of the following: 1) retail nurseries; 2) retail greenhouses; and 3) wholesaling, processing, storage or manufacturing use which

involves assembly of the products of multiple farms or ranches by a cooperative or other business enterprise for marketing distribution.

E. Federal or State Law. The provisions of this ordinance shall not be deemed or construed to apply to any person transacting or carrying on any business exempt by virtue of the Constitution or applicable statutes of the United States or of the State of California from the payment of such regulatory business license fees charged pursuant to this ordinance.

F. Non-Profit Organizations. Any non-profit organizations that are legally recognized as tax-exempt pursuant to the provisions of 26 U.S.C. § 501(c)(3) are exempt as provided in this section.

Section 5. Evidence of Doing Business.

The following circumstances shall be considered prima facie evidence that a person is conducting business in the unincorporated area of Riverside County: where any person, by use of any sign, circular, card, brochure, telephone book, magazine, newspaper, website, electronic media or other publication, shall advertise, hold out or by any other means represent that the person is in business in the unincorporated area of Riverside County, or when any person holds an active license or permit issued by a governmental agency indicating that the person is in business in the unincorporated area of Riverside County, and such person fails upon request of TLMA to sign and provide to the County a sworn statement attesting that such person is not conducting or carrying on a business from the unincorporated area of Riverside County. TLMA shall provide a form for the purposes of the sworn statement required by this section.

Section 6. Application and Issuance of Business License.

A. Application Contents. Any person required to obtain a business license pursuant to this ordinance shall apply therefore by submitting the information required by TLMA on behalf of the County. Such information shall be a sworn statement, upon a form provided by TLMA, that includes the name of the applicant, the ownership of the business involved, and the following information:

1. The name, location and exact nature or kind of business for which the license is requested. In the event that the business is not carried out at a permanent location, the names and places of residence of those owning the business shall also be required.

2. A copy of any current permit issued by the State of California Board of Equalization to a person who contracts, sells or delivers any goods, wares, or merchandise in the unincorporated area of Riverside County for which sales or use tax is payable to the State of California.

3. In the event that application is made for the issuance of a license to a person doing business under a fictitious name, the application shall set forth the names and places of residence of those owning said business.

4. In the event that application is made for the issuance of a license to a corporation or partners, the application shall set forth the names and place of residence of the officers or partners thereof.

5. The urban runoff and stormwater information form shall also be completed and signed.

6. Any further information which TLMA may require to enable it to issue a business license for which the application is made.

B. Issuance. A business license shall be issued upon satisfactory completion of an application and payment of the fee prescribed in this ordinance. Said license shall remain in full force and effect for a period of one year unless one of the following events takes place: business changes address or name, business is discontinued or business ownership changes.

C. License Fee. A standard business license fee shall be charged by the County to cover the reasonable costs of providing the regulatory services included in the business registration and licensing program. The business license holder shall also be subject to periodic supplemental charges by the County in the form of an additional license inspection and enforcement fee as provided in Sections 10 and 13 of this ordinance. No business license fee charged under the provisions of this ordinance shall be construed as a business license tax.

Section 7. Renewal of Business License. Any person who has obtained a business license pursuant to this ordinance shall apply for renewal on an annual basis prior to expiration of the then-current business license term. Said renewal application shall be accompanied by payment of the business license fee prescribed by this ordinance.

Section 8. Nontransferable – Change of Location or Ownership, Name of Business. No business license issued pursuant to this ordinance shall be automatically transferable; provided however, that where a license is issued indicating a person is conducting, transacting or carrying on a business at a

particular place under a particular name, such license holder, upon application therefore, and payment of a change fee may obtain a new license showing some other location and/or name of the business and/or business ownership change. A new business registration and license shall be required as provided in Section 3 herein in the event that there are any other changes that take place with regard to a business.

Section 9. **Duplicate License.** A duplicate license may be issued to replace any license issued hereunder which has been lost or destroyed where such license holder submits a statement of such fact and provides payment of a duplicate license fee.

Section 10. **License Fees.**

A. License fees charged pursuant to the provisions of this ordinance shall be according to the rates set forth herein as follows:

1. Standard business license fee (one year) - $45
2. Business license annual renewal fee - $30
3. Change Fee - $30
4. Duplicate Fee - $10
5. Inspection Fee – Productive Hourly Rate of a Building Inspector II (currently set at $131.00/hr. in FY 2005-2006) as approved annually by the Board of Supervisors.
6. Enforcement Fee –Productive Hourly Rate of a Code Enforcement Officer II (currently set at $111.00/hr. in FY 2005-2006) as approved annually by the Board of Supervisors.

B. TLMA may require a business license holder to provide an advance deposit amount to the County to cover the cost of inspection fees in an amount not to exceed three (3) hours depending on the size and/or complexity of the business that is subject to inspection. For deposit-based inspection fee functions only, fees collected in excess of the actual cost of providing the inspection service shall be refunded. In the event that the actual cost of providing the inspection service exceeds the advance deposit amount then there shall be required an additional deposit to cover the costs incurred by the County.

Section 11. **Contents of Business License; Display Required.**

A. Every person who has submitted a satisfactory application and who has paid the required fee, as provided in this ordinance, shall be issued a business license which contains the following information:

1. The name of the person to whom the license is issued;

2. The name of the business licensed;

3. The physical location where such business is to be transacted and carried on;

4. The date of expiration of such license; and

5. Such other information as may be necessary for the enforcement of the provisions of this ordinance.

B. Any person conducting, transacting or carrying on a business at a fixed location in the unincorporated area of Riverside County shall keep the business license posted in a conspicuous place in plain public view upon the physical premises where such business is taking place.

C. Any person conducting, transacting or carrying on a business but not operating at a fixed location in the unincorporated area of Riverside County shall keep the business license on his or her person at all times while conducting, transacting or carrying on the business for which it is issued. Such person shall display the business license to any license inspector, code enforcement officer, peace officer or any other authorized representative employed by the County upon request.

Section 12. License Inspectors. License inspectors may enter free of charge, at any time, any place of business for which a business license is required by this ordinance and demand the display of any such license by any person engaged or employed in the transaction or carrying on of such business.

Section 13. Water Quality Inspections and Enforcement; Additional License Fees. A license inspector, code enforcement officer or peace officer employed by the County may enter free of charge, at any time, any place of business for which a business license is required by this ordinance and inspect the premises, grounds, facilities and structures located therein for compliance with water quality requirements imposed by Riverside County Ordinance Nos. 457 and 754, California Water Code §§ 13000 et seq. (Porter-Cologne Water Quality Control Act), Title 33 U.S.C. §§ 1251 et seq. (Clean Water Act) and any applicable state or federal regulations promulgated thereto, and any related administrative orders or permits issued in connection therewith. Failure to maintain the business premises, grounds, facilities and structures located therein in compliance with water quality requirements is a violation of this ordinance. The County may initiate enforcement actions against business license holders whose business premises are found upon inspection to be in violation of water quality requirements. The business license holder shall be liable to

the County for an additional license inspection and enforcement fee based on the hourly rates provided in Section 10 of this ordinance.

Section 14. **False Statements.** Every person who makes any false statement or representation in any application for a business license commits a violation of this ordinance.

Section 15. **Unlawful Business.** No business license issued pursuant to this ordinance shall be construed as authorizing the conduct of or continuance of any occupation, use or activity of any kind which is prohibited by County ordinance, state or federal law or regulation.

Section 16. **Violation – Penalty.** Any person in violation of this chapter is subject to the procedures and penalties set forth in Riverside County Ordinance No. 725.

Section 17. **Severability.** If any portion, provision, section, paragraph, sentence, or word of this Ordinance is rendered or declared to be invalid by any final court action in a court of competent jurisdiction, or by reason of any preemptive legislation, the remaining portions, provisions, sections, paragraphs, sentences, and words of this Ordinance shall remain in full force and effect and shall be interpreted by the court so as to give effect to such remaining portions of the Ordinance.

Section 18. This ordinance shall take effect thirty (30) days after its adoption.

BOARD OF SUPERVISORS OF THE COUNTY
OF RIVERSIDE, STATE OF CALIFORNIA

By:_____
Chairman, Board of Supervisors

ATTESTED:

NANCY ROMERO
Clerk of the Board

By: _____
Deputy

ORDINANCE NO. 754.2

AN ORDINANCE OF THE COUNTY OF RIVERSIDE AMENDING ORDINANCE NO. 754.1 ESTABLISHING STORMWATER/URBAN RUNOFF MANAGEMENT AND DISCHARGE CONTROLS

The Board of Supervisors of the County of Riverside Ordains as Follows:

ARTICLE I

TITLE, PURPOSE AND GENERAL PROVISIONS

Section 1. **Title.** This ordinance shall be known as the Riverside County Stormwater/Urban Runoff Management and Discharge Controls Ordinance and may be so cited.

Section 2. **Purpose and Intent.** The purpose of this ordinance is to ensure the future health, safety, and general welfare of County [redacted] ~~citizens~~ by:

A. Reducing pollutants in stormwater discharges to the maximum extent practicable;

B. Regulating illicit connections and discharges to the storm drain system; and

C. Regulating non-stormwater discharges to the storm drain system.

The intent of this ordinance is to protect and enhance the water quality of County watercourses, water bodies, ground water, and wetlands in a manner pursuant to and consistent with [redacted] the Federal Clean Water Act ~~(33 U.S.C. § 1342).~~ [redacted]

Section 3. **Definitions.** The terms as used in this ordinance shall have the following meanings:

A. Best Management Practice (BMPs) shall mean any activities, prohibitions, practices, procedures, programs, or other measures designed to prevent or reduce the discharge of pollutants directly or indirectly into waters of the United States. BMPs shall include, but are not limited to, those measures specified in the California Stormwater Best Management Practice Handbooks for Municipal, Industrial/Commercial and Construction Activity and those measures identified by the Director of TLMA.

FORM APPROVED COUNTY COUNSEL NOV 0 1 2006 BY

B. County shall mean the County of Riverside.

C. Commercial and Industrial Facilities shall mean and refer to a facility or facilities that consist of any of the following:

1. Auto-Related – mechanical repair, maintenance, fueling or cleaning of automobiles, airplanes, boats and equipment, body repair or painting of automobiles and other vehicles, retail or wholesale fueling, automobile parking lots and storage facilities.

2. Mobile-Related activities – mobile automobile or other motor vehicle washing; pest control services; mobile carpet, drapery or furniture cleaning; concrete mixing or cutting; masonry; painting and coating; landscaping; pool and fountain cleaning; and Port-a-Potty or other portable toilet servicing.

3. Leisure – cemeteries, nurseries, greenhouses, golf courses, parks, other recreational areas/facilities, eating and drinking establishments.

4. Industrial – industrial facilities as defined within the Federal Clean Water Act, operating and closed municipal landfills, facilities subject to SARA Title III, hazardous waste treatment, disposal, storage and recovery facilities.

~~D~~C. Illicit Discharge shall mean any discharge to the storm drain system that is not composed entirely of stormwater runoff except discharges made pursuant to a National Pollutant Discharge Elimination System (NPDES) permit or as otherwise authorized by the Santa Ana, San Diego, or Colorado River basin Regional Water Quality Control Board.

~~E~~D. Illicit Connection shall mean any physical connection to a storm drain system which has not been permitted by Riverside County, the Riverside County Flood Control and Water Conservation District, or other appropriate public agency.

~~F~~E. National Pollutant Discharge Elimination System (NPDES) Permit shall mean a stormwater discharge permit issued by the Santa Ana, San Diego, or Colorado River Basin Regional Water Quality Control Board or the State Water Resources Control Board in compliance with the Clean Water Act.

G~~F~~. Municipal NPDES Permit shall mean an area-wide NPDES permit issued to a government agency or agencies for the discharge of stormwater from a stormwater system. Such a permit is commonly referred to as a "MS4 Permit" (referring to "municipal separate storm sewer system").

H~~G~~. Non-Stormwater Discharge shall mean any discharge to the storm drain system that is not entirely composed of stormwater.

I~~H~~. Person shall mean any natural person, firm, association, club, organization, corporation, partnership, business trust, company or other entity which is recognized by law as the subject of rights or duties.

J~~I~~. Pollutant shall mean anything which causes the deterioration of water quality such that it impairs subsequent and/;or competing uses of the water. Pollutants ~~Pollutants~~ may include but are not limited to paints, oil and other automotive fluids, soil, sand, dirt, rubbish, trash, garbage, debris, refuse, waste, fecal coliform, fecal streptococcus, enterococcus, other biological materials, radiological materials, suspended solids, heavy metals, hazardous waste, chemicals, fresh concrete, yard waste from commercial landscaping operations, animal waste, materials that result from the process of constructing a building or structure, nauseous or offensive matter of any kind.

K~~J~~. Premises shall mean any building, lot, parcel of land, land or portion of land whether improved or unimproved.

L~~K~~. Storm Drain System shall mean any facility within the unincorporated areas of the County by which stormwater may be conveyed to waters of the United States. Storm drain system includes but is not limited to any roads with drainage systems, streets, curbs, gutters, catch basins, natural and artificial channels, ditches, aqueducts, storm drains, inlets, conduit or other drainage structure.

M~~L~~. Stormwater Runoff shall mean surface runoff and drainage associated with rain storm events and snow melt.

N. Suspended Solids shall mean solid materials or particles that either float on the surface of or are in suspension in, stormwater, wastewater or other liquid.

O~~M~~. Director of TLMA shall mean the Director of the County Transportation and Land Management Agency.

Section 4. **Responsibility for Administration.** This ordinance shall be administered for the County by the Director of TLMA.

Section 5. **Regulatory Consistency.** This ordinance shall be construed to assure consistency with the requirements of the Clean Water Act, Porter-Cologne Water Quality Control Act and acts amendatory thereof or supplementary thereto, applicable implementing regulations, and any existing or future municipal NPDES Permits and any amendments or revisions thereto or reissuance thereof.

Section 6. **Severability.** If any provision, clause, sentence, or paragraph of this ordinance or the application thereof to any person, establishment, or circumstances shall be held invalid, such invalidity shall not affect the other provisions or application of this ordinance which can be given effect without the invalid provision or application, and to this end, the provisions of this ordinance are hereby declared to be severable.

ARTICLE II

MANAGEMENT AND DISCHARGE CONTROLS

Section 1. **Reduction of Pollutants in Stormwater.**

A. **General.** It is a violation of this ordinance to throw, deposit, leave, maintain, keep, or permit to be thrown, deposited, placed, left or maintained, any pollutant in or upon any street, alley, sidewalk, storm drain, inlet, catch basin, conduit or other drainage structures, business place, or upon any public or private plot of land in the County. The only exception being where such pollutant is temporarily placed in an appropriate container with a spill containment system for later collection and removal. It is a violation of this ordinance to cause or permit any dumpster, solid waste bin, or similar container to leak such that any pollutant is discharged into any street, alley, sidewalk, storm drain, inlet, catch basin, conduit or other drainage structures, business place, or upon any public or private plot of land in the County.

B. **Construction Sites.** Any person performing construction work in the County shall comply with the provisions of this ordinance, Sections 4.J.12 and 4.J.13 of Ordinance No. 457 and, Sections 5.1.D. and 5.2.E. of Ordinance No. 460.

C. **New Development and Redevelopment.** New development or redevelopment projects shall control stormwater runoff so as to prevent any deterioration of water quality that would impair

subsequent or competing uses of the water. The Director of TLMA shall identify the BMP's that may be implemented to prevent such deterioration and shall identify the manner of implementation. The BMP's may, among other things, require new developments or redevelopments to do any of the following:

1. Increase Permeable Areas, by leaving highly porous soil and low lying areas undisturbed; by incorporating landscaping and open space into the project design; by using porous materials for or near driveways and walkways; and by incorporating detention ponds and infiltration pits into the project design.

2. Direct Runoff to Permeable Areas, by orienting it away from impermeable areas to swales, berms, green strip filters, gravel beds, and french drains; by installing rain-gutters oriented towards permeable areas; by modifying the grade of the property to divert flow to permeable areas and minimize the amount of stormwater runoff leaving the property; and by designing curbs, berms or other structures such that they do not isolate permeable or landscaped areas.

3. Maximize Stormwater Storage for Reuse, by using retention structures, subsurface areas, cisterns, or other structures to store stormwater runoff for reuse or slow release.

D. Existing Development. Existing development shall control stormwater runoff so as to prevent any deterioration of water quality that would impair subsequent or competing uses of the water. The Director of TLMA shall identify the BMP's that may be implemented to prevent such deterioration and shall identify the manner of implementation.

E. Commercial and Industrial Facilities. Any person or entity that owns or operates a commercial and/or industrial facility(s) shall comply with the provisions of this ordinance and Ordinance Nos. 457 and 857. All such facilities shall be subject to a regular program of inspections as required by this ordinance, Riverside County Ordinance Nos. 457 and 857, California Water Code §§ 13000 et seq. (Porter-Cologne Water Quality Control Act), Title 33 U.S.C. §§ 1251 et seq. (Clean Water Act), any applicable state or federal regulations promulgated thereto, and any related administrative orders or permits issued in connection therewith.

Section 2. **Illicit Connections/Discharges.** It is a violatio nis ordinance to establish, use, maintain, or continue illicit connections to the storm drain system. commence or continue any illicit discharges to the storm drain system. This prohibition against illicit connections and discharges is expressly retroactive and applies to connections and discharges made in the past, regardless of whether permissible under the law or practices applicable or prevailing at the time of the connection or discharge.

Section 3. **Non-Stormwater Discharges.** The discharge of non-stormwater into the storm drain system is a violation of this ordinance except as specified below.

A. The discharge prohibition shall not apply to any discharge regulated under a NDPES Permit or Waiver issued to the discharger and administered by the State of California under the authority of the EPA, provided that the discharger is in full compliance with all requirements of the permit or waiver and other applicable laws or regulations.

B. Discharges from the following activities will not be considered a violation of this ordinance when properly managed: water line flushing and other discharges from potable water sources, landscape irrigation and lawn watering, irrigation water, diverted stream flows, rising ground waters, infiltration to separate storm drains, uncontaminated pumped ground water, foundation and footing drains, water from crawl space pumps, air conditioning condensation, springs, individual residential car washing, flows from riparian habitats and wetlands, swimming pool discharges or flows from fire fighting.

Section 4. **Discharges in violation of Permit.**

A. Municipal NPDES Permit. Any discharge that would result in or contribute to a violation of an existing or future Municipal NPDES Permit(s) or any amendment or revision thereto or reissuance thereof, either separately considered or when combined with other discharges, is a violation of this ordinance and is prohibited. Liability for any such discharge shall be the responsibility of the person(s) causing or responsible for the discharge, and such persons shall defend, indemnify and hold harmless the County in any administrative or judicial enforcement action relating to such discharge.

B. NPDES Permit for Industrial/Commercial and Construction Activity. Any industrial discharger, discharger associated with construction activity, or other discharger subject to any NPDES permit issued by the United States Environmental Protection Agency, the State Water Resources Control Board, the Santa Ana Regional Water Quality Control Board, the Santa Ana Regional Water Quality

Control Board, the San Diego Regional Water Quality Control Board or the Colorado River Basin Regional Water Quality Control Board, shall comply with all requirements of such permit. Such dischargers shall specifically comply with the following permits: the Industrial Stormwater General Permit, the Construction Activity Stormwater General Permit, and the Dewatering General Permit. Proof of compliance with said NPDES General Permits may be required in a form acceptable to the Director prior to issuance of any County grading, building, or occupancy permits.

[redacted]

ARTICLE III

ENFORCEMENT

Any person in violation of this ordinance is subject to the procedures and penalties set forth in Ordinance No. 725. In addition, to the extent that the County makes any provision of this ordinance or identified BMP a condition of approval to the issuance of a permit, any person in violation of such condition is subject to the permit revocation [redacted] procedures set forth in the ordinance governing permit issuance.

ARTICLE IV

EFFECTIVE DATE OF ORDINANCE

This ordinance shall take effect thirty (30) days after its adoption.

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Business Registration and License Program

Thank you for your interest in the Riverside County Business Registration and Licensing Program. Please complete the information below and return this form to the front counter. Your information will be processed and an application packet will be mailed to you within 10 business days. You will be provided with an account and pin number allowing you to complete your application by mail or on our County website.

Date: _____

_____
Business Name:

_____
Business Site Address:

_____
Business Mailing Address:

Phone No. ( ) _____ Fax No. ( )_____

_____
Email Address:

_____
Type of Business:

_____
Owner's Name:

_____
Owner's Phone No.

COUNTY STAFF ONLY
WHEN COMPLETED RETURN TO MAIL STOP #1095

COUNTY OF RIVERSIDE

P. O. Box 1208, Riverside, CA 92502-1208 • (951) 955-1400

E-Mail: rctlma.org/buslic

BUSINESS REGISTRATION APPLICATION

• Please review and edit entire application •

0000471
REGISTRATION DUE DATE
03/08/2007

BUSINESS REGISTRATION NO. 021427

Business Name and Location
Fogh & Nicholls Mercedes
1234 E Rodeo Dr
Gotham, CA 99999-9999

Mailing Address
FOGH & NICHOLLS MERCEDES
ATTN: ACCOUNTS PAYABLE
P O BOX 456
GOTHAM CA 99999-9999

Phone No. (951) 687-6876 x6
Fax No.
Start Date 01/31/2007
Rate Type 01
Email Address: Ed@Home.Com
Website: Jakcie@Mercedes.Org
State License No. 1242222
License Type
Expiration Date
APN 897-8979-797
Federal ID No. 98-7897979
State ID No. 877-8587-6
Resale No. SREHY-768768868

Description of Business

Ownership: ☐ Corporation ☐ Ltd Liability ☐ Sole Proprietor ☐ Partnership ☐ Trust

Owners, Partners, or Corporate Officers - Please make any necessary corrections.

Name Jackie T. Fogh
Address --ON FILE--
Title Owner
Phone #1 (909) 725-3727
Phone #2 (951) 687-6888

Name Ed W. Nicholls
Address --ON FILE--
Title Owner
Phone #1 (909) 455-7677
Phone #2 (909) 674-6546

Emergency Contact - Please make any necessary corrections.

Name Ed W Nicholls **Title** Owner **Phone No.** (909) 455-7677
Address --ON FILE

FOR YOUR CONVENIENCE YOU MAY CONFIRM YOUR INFORMATION, REGISTER YOUR BUSINESS, AND PAY ON OUR WEBSITE:

WWW.RCTLMA.ORG/BUSLIC

OR, YOU MAY COMPLETE THIS APPLICATION BY VERIFYING THE INFORMATION AND RETURN WITH YOUR CHECK FOR $45.00 IN THE ENCLOSED ENVELOPE

PLEASE COMPLETE THE FOLLOWING:

No. of Employees #

Registration Fee $ 45.00

TOTAL AMOUNT DUE $ 45.00

I declare under penalty of perjury that the information contained in this application is true and correct.

Signature of Owner or Representative _____ Date _____

Printed 2/1/2007: 2:23 pm

0000472

DECLARATION OF EXEMPTION / EXCLUSION

Riverside County Ordinance 857 Requires Completion of This Form

EXEMPTION

☐ I am **not exempt** from paying Business Registration Fees.

☐ I am **exempt** from paying Business Registration Fees for the following reason:

- ☐ **Residential Facility:** Apartments, rooming houses, residential care homes, & family day care homes.
- ☐ **Church, Temple, Places of Worship:** Churches, temples or other places of worship, religious education, or the social affairs of the religious group. This exemption does not apply to day schools, social service programs or Church owned or operated business enterprises.
- ☐ **Home Occupation:** If your business affects water quality, it will not be exempt from registration fees.
- ☐ **Agriculture:** Growing crops, raising livestock, dairying, purchase & storage of materials, supplies, animal feeds or produce, and marketing of farm products are **exempt.** Retail nurseries or greenhouses and wholesaling, processing, storage or manufacturing uses which involves collection of products of multiple ranches by a coop or other business enterprise for marketing distribution is **not exempt.**
- ☐ **Federal Law:** Exemption applies to any business legally recognized as exempt by the U.S. Constitution, U.S. applicable statutes or by the State of California.
- ☐ **Non-Profit – Attach Copy of 501 (c) (3):** Any non profit organization that is legally recognized as tax exempt pursuant to the provisions of 26 U.S.C. Section 501 (c), (3).

NOTE: You are required to register your business within 60 days of the notice to maintain your fee exempt status. If you are exempt from fees, website registration is not available at this time. Please complete your form and send your check in the enclosed envelope.

Urban Runoff and Stormwater Information

Ordinance ~~857~~ 754.2

Are any of the following activities being conducted at your facility?

- ☐ **Auto-related:** Including mechanical auto repair, maintenance, fueling or cleaning of automobiles, airplanes, boats and equipment body, repair or painting of automobiles and other vehicles, retail or wholesale fueling, and auto parking lots and storage facilities.
- ☐ **Mobile-related activities:** Including mobile auto or other vehicle washing, pest control services, mobile carpet, drape, or furniture cleaning, concrete mixing or cutting, masonry, painting and coating, landscaping, pool and fountain cleaning, portable toilet servicing.
- ☐ **Industrial:** Including mining, oil, or gas, storage, treatment, or production, hazardous waste treatment, storage, or disposal, landfill, land application site, and open dumps that receive industrial waste, recycling, including metal scrap yards, battery re-claimers, salvage yards, or auto yards, transportation facilities that conduct vehicle maintenance, such as fueling, cleaning, repairing, steam electric generating, sewage treatment plant, light industry where, equipment, or activities are exposed to storm water.
- ☐ **Miscellaneous:** Including cemeteries nurseries and golf courses, parks and other recreational areas/facilities greenhouses eating and drinking establishment.
- ☐ **Other activities not listed above.** affecting water quality.

EXCLUSION

☐ I am no longer in business in unincorporated Riverside County.

☐ My business is not located within unincorporated Riverside County.
I am located in the City of _____.

I declare under the penalty of perjury that the information contained in this **Declaration of Exemption/Exclusion** is true and correct.

Name_____ Date_____

Title_____ Account Number:_____

BUSINESS REGISTRATION

RIVERSIDE COUNTY

The person, firm or corporation named below is granted this registration certificate pursuant to the provisions of RIVERSIDE COUNTY Ordinance 857. Issuance of certificate is not an endorsement, nor certification of compliance with other ordinances or laws, nor an assurance that the proposed use is in conformance with the county zoning regulations. This certificate is issued without verification that the taxpayer is subject to or exempt from licensing by the State of California.

Business Name: El Comal

Business Location: 29580 1/2 Nuevo Rd
Nuevo, CA 92567-9575

1st Owner Name: Jose Guadalupe Benitez

2nd Owner Name:

EL COMAL
29580 1/2 NUEVO RD
NUEVO, CA 92567-9575

BUSINESS LICENSE #: **004096**

Business Type: 00024

Description: Restaurants No Alcohol

Effective Date:

Expiration Date: -

TO BE POSTED IN A CONSPICUOUS PLACE

NOT TRANSFERABLE

0000473

BUSINESS REGISTRATION AND LICENSING PROGRAM

In November 2006, the Riverside County Board of Supervisors approved Ordinance No. 857 creating a Business Registration and Licensing Program. The ordinance requires that businesses within the unincorporated area of Riverside County obtain a business license. The ordinance includes information regarding the contents of the application form, license issuance protocol, description of license fee, license inspections, water quality inspections and enforcement, and business license enforcement procedures.

The ordinance requires all businesses to register; however, some businesses are exempt from paying fees. Fee exemptions will be granted for various agricultural activities, certain residential businesses, places of worship, specific non-profit, and any business exempt by virtue of constitutional law.

Business license fees will not exceed the reasonable cost of providing an inventory of county businesses and the required registration information. No business license fee charged under the provisions of this ordinance shall be construed as a business license tax.

A business registration form designed to ascertain pertinent information regarding the businesses will be mailed to every known business within unincorporated area of Riverside County. In addition, businesses have the ability to access the County of Riverside's website for an on-line registration and payment system. For more information regarding business registration requirements, please contact the Business Registration and

License Program Office at 951-955-1400. or on the website: www.rctlma.org.buslic

FEE EXEMPTIONS

Pursuant to Ordinance No. 857, some businesses are exempt from paying fees; however, they must register within 60 days of being notified by the County in order to maintain their exempt status. Exemptions apply to the following:

Residential Facility: Apartments, rooming houses, residential care homes, and family day care homes.

Church, Temple or Places of Worship: Churches, temples or other places of worship, for worship, religious education, or the social affairs of the religious group. **NOTE:** This exemption shall not apply to other activities, including, but not limited to, day schools, social service programs or Church-owned or operated business enterprises.

Home Occupations: Home occupations that are not subject to compliance with water quality restrictions. If your business affects water quality, it will not be exempt from the registration fee.

Agriculture: Agricultural pursuits consisting of the growing of crops, raising of livestock, and dairying, the purchase and storage of substances, materials, supplies, animal feeds and produce, and the marketing of farm products. **NOTE:** A business license shall be required in connection with any of the following: 1) retail nurseries, 2) retail greenhouses; and 3) wholesaling, processing, storage or manufacturing use which involves the collection of products of multiple farms or ranches .

Federal or State Law: Any businesses that are legally recognized as exempt by the U. S. Constitution or applicable statutes, or by the State of California.

Non-Profit Organizations: Any non-profit organizations that are legally recognized as tax exempt pursuant to the provisions of 26 U.S.C. Section 501 (c)(3).

RIVERSIDE COUNTY

BUSINESS REGISTRATION

AND

LICENSING PROGRAM

4080 Lemon St.

P.O. Box 1208

Riverside, Ca 92503

www.rctlma.org/buslic

(951) 955-1400

0000474

Frequently Asked Questions?

WHAT IS THE PURPOSE OF THE BUSINESS REGISTRATION AND LICENSING PROGRAM?

This program provides a comprehensive inventory of businesses in unincorporated area of Riverside County, enhances public safety and helps achieve compliance with federal, state and local water quality regulations.

HOW DOES THE BUSINESS REGISTRATION PROGRAM BENEFIT BUSINESS OWNERS AND THE GENERAL PUBLIC?

There are a two major benefits to the business community and general public from the business registration program:

Public Safety

The program gives county law enforcement and fire personnel a better understanding of the business community and its processes and alerts them to potential hazards, making them more effective responding to protect residents and property. .

Water Quality

The business registration program requires that specific business types be identified, prioritized and inspected for storm water management requirements. It will ensure that those businesses have implemented best management practices to prevent illicit discharges into the storm water system that could ultimately harm water quality.

HOW MUCH WILL THE BUSINESS LICENSE COST?

License fees charged pursuant to this ordinance are as follows:

License fee (first year):	**$45**
Annual renewal fee:	**$30**
Change of name/ location:	**$30**
Duplicate license:	**$30**

WHO IS REQUIRED TO HAVE A LICENSE?

Every person conducting business as defined in Riverside County Ordinance 857 in unincorporated areas of Riverside County must obtain a business license. A separate license must be obtained for each physical location. Any person who does not obtain the required license is subject to the procedures and penalties set forth in the ordinance.

WHAT IF I OPERATE A MOBILE BUSINESS?

A business license is required for the following mobile businesses: mobile automobile or other motor vehicle washing; pest control services; mobile carpet; drape or furniture cleaning; concrete mixing or cutting; masonry; painting and coating; landscaping; pool and fountain cleaning; and portable toilet servicing.

WHAT IF MY BUSINESS ALSO CONDUCTS BUSINESS IN ANOTHER CITY OR COUNTY?

You might need a separate business license to conduct business in any city or county. Most California cities and counties have a business license ordinance. Each jurisdiction, however, has it's own filing fee and requirements. Check with the appropriate jurisdiction for its' fees.

HOW LONG IS THIS LICENSE GOOD FOR?

Your license is current for one calendar year from the effective date of license issuance. Renewal fees are due 30 days prior to the expiration date on the license.

DO STATE LICENSED CONTRACTORS NEED A BUSINESS LICENSE?

Any person licensed as a contractor by the State Contractors Board must obtain a business license if they are physically located within the unincorporated areas of the County.

DO I NEED A LICENSE IF I WORK OUT OF MY HOME?

Yes, home-based businesses also require registration. Most home occupations are exempt from paying registration fees. The fee exemption shall not apply to those home occupations that are subject to comply with water quality requirements. Please refer to the brochure's fee exemption section or go to our website at: www.rctlma.org/buslic.

IF I AM A NONPROFIT BUSINESS, DO I HAVE TO REGISTER?

You are required to register, but are exempt from paying fees if your organization is legally recognized as tax exempt pursuant to the provisions of Internal Revenue Code Section 501 (C) (3) and your exemption is filed within 60 days of notification of the County's registration requirement.

DO I NEED A LICENSE FOR GROWING OR PRODUCING AGRICULTURAL PRODUCTS?

Yes, all agricultural businesses must register; however, some agricultural activities may be exempt from fees. Refer to the fee exemption section on this brochure or go to www.rctlma.org/buslic.

WHAT IS THE APPLICATION PROCEDURE?

The process to obtain a business license takes only a few minutes and may be completed by mail or on the web based registration system. Using the internet, go to the county business registration website at: www.rctlma.org/buslic where you will find online instructions, a registration application and convenient payment system.

IF I AM EXEMPT FROM FEES, DO I STILL HAVE TO REGISTER?

Yes. Business that are exempt from paying fees still must register within 60 days of notification.

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COUNTY OF RIVERSIDE

Department of Building and Safety

BUSINESS REGISTRATION AND LICENSING PROGRAM

James J. Miller
Director

January 31, 2007

Martha's Gift Shoppe
ATTN: ACCOUNTS PAYABLE
PO BOX 456
GOTHAM, CA 99999-9999

Dear Business Owner,

Your business has been identified as being located within the unincorporated area of the County of Riverside. The County has recently enacted Ordinance 857 requiring all businesses within the unincorporated areas to register and obtain a business license. The purpose of this program is to create a comprehensive inventory and data base of all businesses. This inventory will be used to assist the County in complying with Federal clean water regulations and to improve public safety services and economic development outreach to the business community.

Included with this letter are the Business License Application, a brochure about the program, the Declaration of Exemption, and a return envelope. **The first time filing fee for the Business License is $45 with an annual renewal fee of $30.** *Also, for your convenience, you can register and pay on line at www.rctlma.org/buslic.* All applications must be returned within 60 days of receipt of this letter or you may be subject to late filing fees.

If you have any questions, please contact the Business License and Registration Program Division at (951) 955-1400 or visit the web page at *www.rctlma.org/buslic*. Thank you.

Respectfully,

Ed Nicholls
County of Riverside
Business Registration and Licensing Division

4080 Lemon Street 12th Floor Riverside, CA 92502 951-955-1400 FAX 951-955-2023
MAIL: P.O. Box 1208, Riverside, CA 92502-1208

Code Enforcement Program Newsletter

Many hands make light work!

Nuevo Cleanup Volunteers

Several groups came together to collect 50 tons of trash & tires.

Jurupa Valley Tire Event

Code Enforcement staff was able to assist Riverside County Waste Management in the very first Jurupa Valley Tire Collection Event that was held on Saturday, March 24th. With the help of 55 participants, we were able to collect 566 tires, 113 of these tires were collected when Code Enforcement staff took 3 volunteer Jurupa Valley High School students out to collect illegally dumped tires in a vacant lot off of Galena Street and Etiwanda Avenue across the street from the High School, along Etiwanda Avenue by the freeway off ramps and behind the Farmer Boys off of Etiwanda Avenue.

Susan Rush

50 Tons Collected

Supervisor Marion Ashley's Office and the residents of Friends of Nuevo, Juniper Flats, and Lakeview came together to participate in a successful Community Cleanup & Tire Collection Event on Saturday, March 17, 2007. The event took place at the Valley View Elementary School where over 15 agencies and groups participated, including: AAA Egg Farm, Nuview Union School District, Eastern Municipal Water District, Riverside County Public Library-Nuevo, Nuevo Citizen's Patrol, County Fire Department, Nuevo Post Office, Nuevo Municipal Advisory Council, Waste Management Inc., Riverside County Code Enforcement Department, County Waste Management Department, and Western Riverside Council of Governments. These agencies and groups offered their support ranging from informing the local residents of the cleanup, to volunteering their time and resources, as well as providing the clean up tools and support for all participants. Over 50 tons were collected because of this cleanup, including tires, all thanks to a tire bin, which was sponsored by Supervisor Marion Ashley's office.

Susana Orozco

Making a Difference

For many years, 68th Street in Mecca has been considered a mini landfill, attracting all types of illegal dumpers. Thanks to the hard work and dedication of the Transportation Department's litter crews, which are now working full force in all unincorporated areas of the County, this area is no longer an eyesore!

This is a wonderful example of the improvements we are making Countywide in our fight against illegal dumping, with the collaborated efforts between Riverside County's Transportation Department, Environmental Health Department, Waste Management and our Code Enforcement Department. The services we are providing are necessary in improving the health and safety of all community members. Way to go team!

Susan Rush

Department Updates

Code Enforcement Administration is currently revising the Department Grooming and Dress Code Standards. A final draft of the Dress Code will be in place by May 1, 2007. Starting May 1st, all field staff will be required to be in uniform. This includes Techs, Officers, Sr. Officers, and Supervising Officers. Supervising Code Officers will have the option to wear business attire. If any one doesn't have their uniforms now, please contact me as soon as possible.

The Safety Lighting (light bars) has arrived at Woodcrest Vehicle Center. A plan is currently being developed to bring the vehicles in on Thursdays so they can be worked on over the weekends. Please be flexible with this process. The plan is to do 10 vehicles per week until the entire fleet is done.

Mike Bowles

Tire Enforcement Grant

In November of 2006, our Code Enforcement Department applied for a Tire Enforcement Grant, which will provide funding to pay for personnel and equipment cost associated with carrying out a local waste tire inspection and surveillance program for the California Integrated Waste Management Board (CIWMB). Our Department has recently been awarded $300,000.00, to carry out the inspections that will begin in July of 2007. Our duties as a department will entail 1) identifying illegal waste tire piles; 2) inspecting tire facilities, points of tire generation, haulers, and end-use facilities; 3) investigating referrals and complaints; 4) examining waste tire hauler registration and manifest documents; and 5) providing outreach and education to waste tire facilities, generators, and haulers. In addition to these, we have the authority to issue Notice of Violations (NOV), but it will be up to the CIWMB to carry out enforcement action after the NOV stage. According to the CIWMB records there are over 800 of these facilities in Riverside County and our plan is to inspect all of these, during fiscal year 2007/2008, with the use of these funds.

Susana Orozco

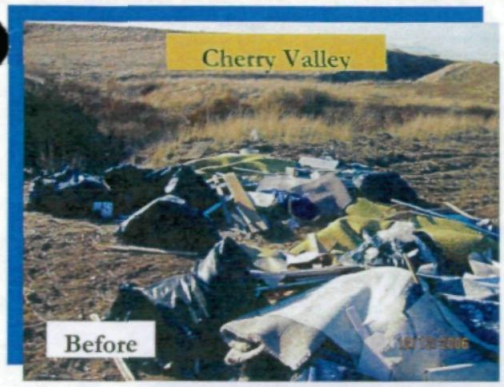

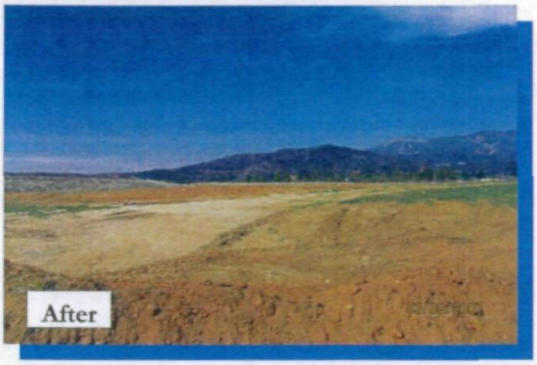

Teamwork - District 5

Substandard structures, trailers, accumulated rubbish, unpermitted business and inoperable vehicles kept seven Team 5 Code Enforcement Officers busy in Desert Hot Springs. Danny Pike, CEO, and Regina Keyes, Sr. CEO, coordinated the effort. On 3/29/07 the team partnered with RAID, RSO, and CHP on a property that has been an eyesore for months. With the cooperation of all departments an initial investigation was conducted and the property owner was issued a Notice of the violation and necessary compliance measures.

Accumulated Rubbish in Cherry Valley. Sara Cervantes, CEO III, responded to this property and found accumulated rubbish throughout several parcels in the area. Sara notified the property owner of the violation and the property was cleaned within two months of notice, compliance gained.

On March 17, 2007 David W. Newton, Vice President of the I-10 Corridor Neighborhood Watch Program presented Tracey Towner, Supervising Code Enforcement Officer, a Certificate of Appreciation in Recognition of Participation and Cooperation with the Program. A meeting and introduction of Danny Pike, CEO, and Tony Green, CEO, was held with the Cabazon / Whitewater community members. The group was very appreciative of all the work that Code Enforcement has done and excited with the new Officers coming on board.

Tracey Towner

Tracey Towner receives award

Helping One Another - District 1

Officer Matt Jones contacted me about a tip that someone had dumped a large amount of oil in front of a home. Officer Jones investigated the allegations and found that there was approximately thirty gallons of an unknown fluid on the road gutter and in five gallon containers. I advised Officer Jones to get the information, and to stay at the scene until further notice. I called Riverside County's Transportation Department and Environmental Health's Hazmat and advised them of the situation and location. I also contacted Manuel Acueto of the SET who advised me that he was going to get someone out to the location. I drove out to assist Officer Jones and we documented the scene with photographic evidence. Using networking with other departments, and real team effort, Officers from SET, Hazmat, and the District Attorney's Environmental Crimes obtained a confession. Criminal charges are pending. GREAT JOB TO ALL!

Jose Cruz

Three Years to Clear - District 2

After three long years of diligence and hard work a major nuisance has been cleared in the Pedley area. Jurupa Code Enforcement Officers and staff have worked to gain compliance on the subject property for multiple violations including: excessive outside storage, accumulated rubbish, construction without a permit, multiple inoperative vehicles, and several substandard structures. The property had become a community problem that taxed resources from Fire Dept., Sheriff Dept., Planning Dept., and the property owner. Recently the vacant property had become a haven for the homeless, which caused the piles of rubbish to grow and created an increase in the crime rate in the surrounding area. The Jurupa Special Enforcement Team became involved when it was found out squatters were charging a tipping fee for violators to dump their trash on the lot.

On March 30, 2007 the property owner began a major clean up effort that included demolition of the substandard structures, and removal of vehicles and debris. The property is now clean, clear and secured with a chain link fence around its perimeter. The property owner has also agreed to monitor and maintain the fence.

Credits: Candace O'Gara, Marcella Villanueva, Diana Parra, Jim Palmer, John Game, Ed Torres, and Julio Pineda

Mickey Parmele

So Much to See in District 3

Team 3 keeps a non-stop pace! Officers assigned from Hemet work the northern areas of District 3, and Murrieta officers work the southern areas. Both areas have numerous high profile cases. Currently there are several cases at counsel for injunctions. The last half of March, officers executed three seizure warrants; conducted a pre-bid job walk; and partnered with County Counsel staff on an inspection of Crossroads in Aguanga. NET officers worked with SET officers and Sheriffs in a sweep of a chronic problem area in Hemet. Thirteen notices were issued with excellent results. Officer Wayne "J" Durant has seen great success recently (see before and after below). Good job, Wayne! Kudos to Mark Slocum, SET Sr., for his great attitude, team mentality and willingness to include area officers in SET activities. Mark and SET officers have assisted NET officers in execution of warrants and shared equipment and resources. Awesome!

Mary Overholt

Reaching Our Goals - District 4

First of all, we would like to congratulate Manolito for winning the newsletter contest. "The Posting" is a great opportunity for all of us to share our successes in doing what we love doing best....making our communities a better place to live and to take pride in doing it. The goal for this inaugural event of being our own department has taken on a new meaning for all of us.

For the month of March, District 4 officers took on the challenge of setting goals with a higher expectation of such issues as gaining compliance voluntarily from property owners, especially in the Thousand Palms area. The numbers speak for themselves.

25 non-operational vehicles removed

13 vacant lots cleared of trash and debris

3 substandard structures abated

Along with our community improvement specialists, we are raising awareness of issues pertaining to accumulated rubbish, abandoned vehicles, substandard living conditions and reaching out to the residents and homeless as well. Along with District 4, we are currently working under a Tribal Gaming Grant to investigate violations of State Codes and County Ordinances in the unincorporated areas surrounding the tribal lands, utilizing a Community Enhancement Program.

The program will improve the quality of life for the citizens as well as eliminate identified health and safety issues associated with the older existing neighborhoods, thus reducing the potential for loss of property and life. With the reduction of accumulated materials in residential areas and vacant land, not excluding inoperable vehicles. This will greatly improve the aesthetics of the surrounding areas of tribal lands, and improve the quality of life. The property owner can take part in this program without the burden of expense and will know that Riverside County and the local Indian tribunal do care about these issues that affect all of us at some level.

Dave Lawless

Structure that was abated in Thousand Palms

Riverside County
CODE ENFORCEMENT ADMINISTRATION
A Department of TLMA
4080 Lemon Street, 12th Floor
Riverside, CA 92502
Phone: 951-955-2004
Fax: 951-955-2023

Editor's Corner

Dawn Burnett

Contact Information:

(951) 955-0106

daburnet@rctlma.org

Example of Water Quality Management Meeting (Agenda, Minutes & sign-in log)

County of Riverside
Water Quality Management Committee

County Administrative Center
4080 Lemon Street, 4th Floor – Conference Room A
Riverside, California 92501

Monday, January 29, 2007
10:00 a.m. – 12:00 p.m.

AGENDA

1. **Self Introductions**

2. **Business Registration and Licensing Ordinance 857**
   Update on Building and Safety's Progress – Ed Nicholls

3. **Santa Ana Regional Board Audit** – Alex Gann, Mike Shetler, Jason Uhley
   Regional Board Letter to the City of Calimesa

4. **Total Maximum Daily Load (TMDL) Update** – Jason Uhley
   a. Middle Santa Ana River
   b. Lake Elsinore/Canyon Lake Nutrient TMDL
   c. Coachella Valley Storm Channel Bacterial TMDL
   d. 11266 Investigative Order – Santa Margarita Watershed-Lagoons

5. **Annual Progress Reports**
   Whitewater Watershed R7-2001-0011/CAS617002, due January 7, 2006

6. **RFP for County Program Assessment**

7. **Report of Waste Discharge (ROWD) for Santa Ana Permit Renewal**
   Progress Report

8. **IC/ID Complaints**
   Audie Murphy Ranch / Dredging Material Canyon Lake (update)

9. **Non-agenda items and round table discussion**

10. **Next meeting date** Feb 19 2007

Water Quality Management Committee
Meeting Agenda
Feb 19, 2007
10:00-12:00
Conference Room A
Riverside County Executive Office

1. **Self Introductions**

Attendees: Mike Shetler, Steve Dondalski, Roger Miller, Ed Nicholls, Jason Uhley, Marc Brewer, Ron Baxter, Damian Meins, Marianna Hernandez Alex Gann, David Mares, Lou Pizatella

2. **Business Registration and Licensing Ordinance 857**
   -Update on Building and Safety's Progress.- Ed Nicholls

Ed Nichols provided status of the Business Licensing fee program the first mailing is to go out this week with about 700 applications, It is anticipated that approximately 14,000 businesses in the County unincorporated area of the County will have to register. A handout was provided and a discussion of submittal and payment options was vetted including when should new business be brought in. Dave Mares presented some options that would make sense from a planning perspective. He will forward draft language to Alex Gann and Jim Miller for review.

3. **RFP for County Program Assessment**
   March 5 will be the kick off for the RFP review with scoring of applicants to take place on March 19.

4. **Environmental Health's commitment to continue the CAP program in incorporated cities or until a full implementation of a city's program or other options.**

5. **Report from Flood Control and Water Conservation District-Jason Uhley**
   Four items to discuss.
   a. Integrated Regional Watershed Management Plan comments due in one month
   b. MS4 permit renewal-training options
      - New hires formal classroom training first six months
      - Formal classroom training for all employees in a specific career field each permit cycle.
      - Annual review or other time frame for tailgate or lunch box topic

      All training secessions must be documented
   c. Spring training classes are being organized contact Benji Cho so that appropriate classes and # of participants can be identified.

Water Quality Management Committee
Meeting Agenda
Feb 26, 2007
10:00-12:00
Conference Room A
Riverside County Executive Office

1. **Self Introductions**

2. **Business Registration and Licensing Ordinance 857**
   -Update on Building and Safety's Progress.- Ed Nicholls

3. **RFP for County Program Assessment**
4. **Environmental Health's commitment to continue the CAP program in incorporated cities or until a full implementation of a city's program or other options.**
5. **Report from Flood Control and Water Conservation District**

6. **IC/ID Complaints**

7. ***Non-agenda items and round table discussion.***

8. **Next meeting date _____**

County of Riverside Water Quality Management Committee
County Executive Office
4080 Lemon Street, 4th Floor, Conference Room A, Riverside, California 92501

Monday, February 19, 2007
10:00 a.m.

Name	Department	Phone	E-Mail Address
Michael Shetler	Executive Office	51186	mshetler@rceo.org
Steve Doundals	B+S	5-2569	sdoundals@rctlma.org
Roger Miller	B+S	5-0886	RLMiller@rctlma.org
Ed Nicholls	B+S	5-8807	enicholl@rctlma.org
Jason Uhley	RCFCSWCD	5-1273	juhley@co.riverside.ca.us
Marc Brewer	RIV CO. Parks & Op	5-4316	mbrewer@co.riverside.ca.us
Ron Baxter	CO PARKS	637-6984	RBAXTER@CO.RIVERSIDE.CA.US
Damian Meins	ENV. Health	5-3910	DMEINS@co. " "
Marianna Hernandez	Transportation	51945	marihern@rctlma.org
Alex Gann	Exec. Office	5-1180	agann@rceo.org
David Mares	Planning	5-9541	DMares@rcTLMA.org
Lou Pizatella	Code Enforcement	56835	LPizatel@rcTLMA.org

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SAN DIEGO REGIONAL
WATER QUALITY
CONTROL BOARD

2007 OCT 31 P 12: 10

CITY OF MURRIETA
ANNUAL PROGRESS REPORT

Reporting Period
July 1, 2006 to June 30, 2007

Santa Margarita River Watershed

FOR
SAN DIEGO REGIONAL WATER QUALITY CONTROL BOARD
(ORDER NO. R9-2004-001)

CITY OF MURRIETA
ANNUAL PROGRESS REPORT

Reporting Period
July 1, 2006 to June 30, 2007

Santa Margarita River Watershed

2007 OCT 31 P 12:1
SAN DIEGO REG
WATER QUALI
CONTROL BD

FOR
SAN DIEGO REGIONAL WATER QUALITY CONTROL BOARD
(ORDER NO. R9-2004-001)

CITY OF MURRIETA

CERTIFICATION STATEMENT

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Patrick A Thomas

Signature

Mr. Patrick A. Thomas / Director of Public Works

Name & Title

10/31/09

Date

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ATTACHMENTS

1 General Plan Amendments (Ordinance No. 378-06 & Ordinance No. 378-07)
2 List of Grading Permits Issued (July 1, 2067 thru June 30, 2007)
3 Conditions of Approval for a Development Project Subject to WQMP Requirements
4 Dry Weather Monitoring Data

Executive Summary

This annual report describes the current status of the storm water management program for the City of Murrieta (City). This annual report is for reporting period / fiscal year 2006 – 2007 beginning July 1, 2006 through June 30, 2007. Each section addresses individual programs that were implemented to comply with the requirements of the municipal separate storm sewer system permit (MS4 Permit) issued to the Santa Margarita Watershed Permittees by the San Diego Regional Water Quality Control Board on July 14, 2004. This is the third-term MS4 Permit issued to Riverside County Flood Control and Water Conservation District, the City of Temecula, the City of Murrieta and the County of Riverside.

During this reporting period, the requirement for Water Quality Management Plans for new development projects as well as modifications to existing developments was continued to be implemented.

1.0 INTRODUCTION

The information contained herein is presented in the same format as that outlined in Section III of the Monitoring and Reporting Program (MRP) of the MS4 permit (Permit). Each section addresses individual components of the Permit and summarizes the progress accomplished during the reporting period. These sections include the City's Development Planning process, Construction program, Municipal program, Industrial and Commercial program, Residential program, Education program, and Illicit Discharge Detection and Elimination Program, respectively.

This Annual Report specifically responds to the Permit's reporting requirements and includes identifying program progress and effectiveness evaluations. The Permit requires the Permittees to develop a long term strategy to evaluate the effectiveness of the SWMP's. This report will be the first year that the new Permit programs are fully implemented and that Program Effectiveness Assessments (PEAs) are required. IT should be noted that a PEA requires the initial establishment of a set of baseline conditions using measurable metrics. These baseline conditions can then be used to establish measurable goals based on the measured metrics. Thereafter, effectiveness can be evaluated by comparisons of successive years of measurable metrics against the baseline data and measurable goals.

The long term strategy for the program effectiveness assessment (PEA) will be conducted at two levels. At the first level, or Annual Assessment Level, the PEA will focus an annual assessment of program implementation and Permit compliance. These assessments will be addressed by completing the Annual Reporting Forms, which will confirm program implementation, Permit compliance and collection of measurable metrics. Assessments will be included at the end of each Annual Report section. Inferences about the compliance of each program (development, construction, etc.) will be predominantly drawn from both direct and indirect measures of progress for each program.

At the next level, or Long Tern Level, the Permittees will collectively evaluate the measurable metrics, Receiving Water monitoring data, and IC/ID monitoring data to assess changes in knowledge and behavior, load reductions and improvements in Receiving Water Quality. This analysis will be conducted as part of the Report of Waste Discharge (ROWD). The results of this assessment will evaluate the need to make significant programmatic revisions to the Permit compliance programs to protect Beneficial Uses of Receiving Waters. This analysis will place more emphasis on using direct measures of progress (monitoring data, long term trend analysis) and will support the review and any revisions to the Drainage Area Management Plan (DAMP) and Individual SWMP's using information from the water quality monitoring program, IC/ID monitoring program and measurable metrics that have been collected.

Where the period of evaluation is characterized by the implementation of new program requirements, determinations of program effectiveness will initially be limited to confirmation of program implementation and collection of measurable metrics until baseline conditions can be properly established. Further, it must be recognized that direct measures of long term program effectiveness may not be available within the timeframe of the Third Term Permits. This lack of direct measure confirmation arises because:

- Baseline water quality conditions are not readily established;
- Water quality changes in response to program implementation are likely to be very slow;

- Establishing a link between receiving water condition and program activities is difficult at the watershed scale when programs are being implemented incrementally with the development/redevelopment cycle; and
- Inherent variability of natural systems and stormwater quality.

While program effectiveness assessment is a key step in the iterative process of program implementation, it should be realized that effectiveness assessment itself is a part of the management process that is also evolving. Assessing program effectiveness is recognized as a challenge for program managers across California, and the City of Murrieta is supporting the effort of the California Stormwater Quality Association (CASQA) to develop guidance in this area at a statewide level.

2.0 DEVELOPMENT PLANNING PROGRAM

1) Description of any amendments to the General Plan or the development project approval process:

General Plan – During the reporting year, City of Murrieta updated the General Plan twice to incorporate requests for zone changes. The first amendment to the General Plan was done on December 19, 2006 where certain properties were rezoned from Business Park (BP) to Regional Commercial (RC).

The second amendment to the General Plan was done on April 3, 2007 where 10,464 ft^2 of property located north of Kalmia Street and west of Jefferson Avenue was rezoned from Civic / Institutional to Multiple Use – 3. Copies of the ordinances authorizing the two amendments are included in Attachment 1.

Development Projects – The City incorporated Water Quality Management Plan (WQMP) requirements into all new development applications and on modifications to existing developments. All applicable projects which did not receive legal approval prior to July 1, 2005 were required to complete a WQMP. The City also required proposed projects with prior legal approval to incorporate treatment control BMPs into their final designs and to include these on the grading plans.

2) Number of grading permits issued:

City of Murrieta issued 36 grading permits between July 1, 2006 and June 30, 2007. A list of the grading permits issued during the reporting period is included in Attachment 2.

3) Number of developments conditioned to meet WQMP requirements:

City of Murrieta conditioned 15 development planning projects during the reporting period. Applicable development planning projects were required to prepare project-specific WQMPs.

4) Attach one example of a development project that was conditioned to meet SUSMP requirements and a description of the required BMPs:

Attachment 3 includes conditions of approval for a development planning project approved during the reporting year. The conditions of approval were approved on December 13, 2006 and the WQMP requirement is condition # 131.

5) Description of any updates to the environmental review process:

There have no updates to the City's CEQA process during this reporting period.

6) Description and number of municipal employee training efforts conducted during the reporting period:

a) Training:

Training Topic	Description of Training	Training Date	Number of Attendees
WQMP	Review & approval process	06/21/06	12
		Proposed for December 2007	To be determined

b) Summarize any additional education and outreach activities conducted for project applicants, contractors, developers, property owners and / or other responsible parties in support of the Development Planning program:

City staff attended the low impact development (LID) training seminar sponsored by the State Water Resources Control Board on June 28 & June 29, 2007 in Marina Del Rey, California. This seminar also focused on post construction best management practices.

7) An assessment of program effectiveness based on the measurable goals established in the SWMP:

The City continues to implement the requirement of WQMPs on all development projects meeting the WQMP criteria. Projects subject to WQMP requirements were required to incorporate site design, source control and treatment control BMPs.

3.0 CONSTRUCTION PROGRAM

1) Number of inspections conducted:

The City's NPDES inspector conducted 1,408 inspections between July 1, 2005 and June 30, 2006. In addition, the Public Works Inspectors ensured that sites were compliant with NPDES requirements during their routine construction inspections.

2) Number and type of enforcement actions related to construction sites:

Enforcement and Compliance Responses	Private Projects
Written Warning	42
Second Written Warning	73
Stop Work Notice	11
Withhold Certificate of Occupancy	-
Code Enforcement Citation	5
Notify SDRWQCB	1

3) Description of modifications made to the construction and grading approval process:

City of Murrieta is currently in the process of updating the existing grading ordinance, grading manual and standard notes. Updated ordinance and standard notes (grading notes, and erosion and sediment control notes) will be included in the next annual report.

4) Description and number of municipal employee training efforts conducted during the reporting period:

a) Training:

Training Topic	Description of Training	Training Date	Number of Attendees
Construction Site Inspections	Erosion & Sediment Control	10/10/06	13

b) Summarize any additional education and outreach activities conducted for project applicants, contractors, developers, property owners and / or other responsible parties in support of the Construction Program:

City of Murrieta began hand-delivering the annual "First Notice to All Project Developments" to site owners, project managers and filed superintendents, in the first week of September 2006, notifying them of the annual requirement for implementation of wet-weather BMPs by the 1st of October. Year-round implementation and maintenance of the erosion and sediment control at the construction sites was also emphasized in this letter. A "Second Notice to All Project Developments" emphasizing the requirement and implementation of wet-weather BMPs was distributed in the last week of September 2006.

5) An assessment of program effectiveness based on the measurable goals established in the SWMP:

The tracking of NPDES inspections of construction sites will be improved during the next reporting year to accurately reflect the compliance level of site during each inspection.

4.0 MUNICIPAL PROGRAM

1) *Number of inspections conducted at existing facilities:*

The existing facilities are maintained on a daily basis and a monthly inspection is conducted by the Maintenance Inspectors. The City is still in the process of developing inspection tracking procedures for municipal facilities owned and / or maintained by the City.

2) Number and type of enforcement actions related to municipal facilities:

Enforcement and Compliance Responses	*Number*
Education and Information	Provided but not documented
Verbal warning	Provided but not documented
Written warning	None

3) Number of catch basins and inlets that were inspected and the number that were cleaned:

	Number Inspected	Number Cleaned
Catch Basins and Inlets	1,245	250

4) Assessment of the amount and type of debris removed from catch basins, *streets, and open channels, including an identification of problem area that* generate the most pollutants:

Facility	Type of Debris	Approx. %	Problem Areas that Generate Most Pollutants
Catch Basins	Anthropogenic Litter Sediment Other man-made debris	**50** **40** **10**	Commercial areas, residential areas **Total Removed: 19,700 pounds**
Streets	Sediment		**Total Removed: 1,800 tons**
Open Channels	Anthropogenic Litter Sediment Other man-made debris	**10** **80** **10**	**Total Removed: Not applicable – open channels maintained by Riverside County Flood Control & Water Conservation District**

5) **Assessment of effectiveness of BMPs that have been implemented for municipal facilities and activities:**

BMP Code	Description	Used			Notes
SC-10	Non-Stormwater Discharges	☒ Yes	☐ No	☐ N/A	
SC-11	Spill Prevention, Control and Clean-up	☒ Yes	☐ No	☐ N/A	
SC-20	Vehicle and Equipment Fueling	☐ Yes	☐ No	☒ N/A	
SC-21	Vehicle and Equipment Cleaning	☐ Yes	☐ No	☒ N/A	
SC-22	Vehicle and Equipment Repair	☐ Yes	☐ No	☒ N/A	
SC-30	Outdoor Loading/Unloading of Materials	☒ Yes	☐ No	☐ N/A	
SC-31	Outdoor Liquid Container Storage	☒ Yes	☐ No	☐ N/A	
SC-32	Outdoor Equipment Maintenance	☐ Yes	☐ No	☒ N/A	
SC-33	Outdoor Storage of Raw Materials	☒ Yes	☐ No	☐ N/A	
SC-34	Waste Handling and Disposal	☒ Yes	☐ No	☐ N/A	
SC-40	Contaminated or Erodible Areas	☒ Yes	☐ No	☐ N/A	
SC-41	Building and Grounds Maintenance	☒ Yes	☐ No	☐ N/A	
SC-42	Building Repair and Construction	☒ Yes	☐ No	☐ N/A	
SC-43	Parking/Storage Area Maintenance	☒ Yes	☐ No	☐ N/A	
SC-44	Drainage System Maintenance	☒ Yes	☐ No	☐ N/A	
SC-60	Housekeeping Practices	☒ Yes	☐ No	☐ N/A	
SC-61	Safe Alternative Products	☒ Yes	☐ No	☐ N/A	
SC-70	Road and Street Maintenance	☒ Yes	☐ No	☐ N/A	
SC-71	Plaza and Sidewalk Cleaning	☐ Yes	☐ No	☒ N/A	
SC-72	Fountain and Pool Maintenance	☒ Yes	☐ No	☐ N/A	
SC-73	Landscape Maintenance	☒ Yes	☐ No	☐ N/A	
SC-74	Drainage System Maintenance	☒ Yes	☐ No	☐ N/A	
SC-75	Waste Handling and Disposal	☒ Yes	☐ No	☐ N/A	
SC-76	Water and Sewer Utility Maintenance	☐ Yes	☐ No	☒ N/A	

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11/12/2009

6) Description and number of municipal employee training efforts conducted during the reported period:

a) Training:

Training Topic	Description of Training	Training Date	Number of Attendees
Municipal Facilities & Activities	Operations, Maintenance & Inspections	10/18/06	29

b) Summarize any additional education and outreach activities conducted for municipal staff in support of the Municipal Program:

No additional education and outreach activities were conducted for municipal staff in this reporting year.

7) An assessment of program effectiveness based on the measurable goals established in the SWMP:

The quantity of pollutants (debris, sediment, anthropogenic litters, etc.) from catch basins and areas owned and / or maintained by the City will be tracked on a monthly basis.

5.0 INDUSTRIAL / COMMERCIAL PROGRAM

1) Number of inspections conducted:

Category	Number of Inspections
Industrial & Commercial Facilities	
High Priority Facilities	3
Medium Priority Facilities	28
Low Priority Facilities	4
Total	**35**

City of Murrieta utilizes the Compliance Assistance Program (CAP), which generates NPDES survey reports from inspections completed by the County of Riverside Hazardous Materials Department (HMMD) for businesses storing or handling hazardous materials and also from the County of Riverside Department of Environmental Health (DEH) for inspections of food establishments. The number of food establishments inspected during the reporting year was twenty-eight and were "medium" priority facilities. DEH also inspected four "low" priority facilities and HMMD inspected three "high" priority facilities.

2) Number and type of enforcement actions related to industrial / commercial facilities:

Enforcement and Compliance Responses	Number
Education and information	12 (posters provided by Environmental Health Specialist)
Verbal Warning	Provided but not documented
Written Warning	0
Citation	None
Referral to SDRWQCB	None

3) An assessment of program effectiveness based on the measurable goals established in the SWMP:

The list of industrial & commercial facilities with the City will be reviewed to verify the priority rating and ensure that all of the identified facilities are inspected in the next reporting year. A tracking system for the inspection frequency will be established by the end of the third-term permit.

6.0 RESIDENTIAL PROGRAM

1) A description of residential areas that were focused on during the past year:

The residential program is a continuation of the construction inspection program that the City currently performs throughout new residential developments. All new residential projects, before being accepted for maintenance by the City, are required to submit a video tape inspection of the storm drain and drainage system, ensuring no illicit connections or points of discharge. This process is a good precautionary step for the City involving new residential developments. Existing residential developments are normally only inspected by City personnel as they pass through the different areas as part of their daily trips to other sites.

2) Number and type of enforcement actions taken:

Enforcement and Compliance Responses	Number
Education and information	Provided but not documented
Verbal Warning	Provided but not documented
Written Warning	0
Citation	0

3) An assessment of program effectiveness based on the measurable goals established in the SWMP:

7.0 EDUCATION PROGRAM

1) Description of education efforts conducted by the Permittee (not collectively with other Permittees) during the previous year:

Audience	Measures
Permittee Departments and Personnel	Number of Permittee employees trained for: • Construction Inspection: **13** • Industrial/Commercial Inspection: **0** • Municipal Facilities and Activities: **29** • Development Planning: **12**
Construction Site Owners and Developers	Outreach events conducted: **Distributed "first & second notice to all project developments" in September 2006.**
Industrial/ Commercial Owners and Operators	Industrial/Commercial outreach events conducted: **None**
Residential Community, General Public, Other Public Agencies and Students	Number of Media Impressions in: • Newspaper: **Not Applicable** • Mailings: **None.** • Radio/TV: **Not Applicable** • Billboards: **Not Applicable** • Brochures: **Distributed but not documented** Number of classroom presentations: • Public Education events conducted: **Annual Car Show (June 2007) and City of Murrieta's 15th Birthday Bash (June 30, 2007).**

2) An assessment of program effectiveness based on the measurable goals established in the SWMP:

The City continued to provide training to municipal staff in specific categories (i.e. new development, construction, municipal activities and industrial / commercial) through the implementation agreement with Riverside County Flood Control & Water Conservation District.

8.0 ILLICIT DISCHARGE DETECTION AND ELIMINATION PROGRAM

1) Number of illicit discharges, connections and spills reported and / or identified during the reporting period:

Code Enforcement received about 84 NPDES related calls-for-service during the reporting period. The nature of the calls is currently not being tracked. The Code Enforcement officer does address the concern either by a follow-up telephone call or a site visit. In the event of an illegal discharge from a construction site, the Public Works inspectors were also notified.

2) Number of illicit discharges or connections investigated during the reporting period and the outcome of the investigations:

All of the NPDES related calls-for-service were addressed. During the site visit regarding the illegal discharges, either the specific source of the illegal discharge could not be determined or there was no evidence of the illegal discharge. There were instances when calls-for-service were due to disputes between private property owners / occupants.

3) Number and types of enforcement actions taken for illicit discharges or connections during the reporting period:

The tracking system to determine the nature of the calls-for-service is still being revised and the accurate number and type of enforcement action taken for illicit discharges or connections will be tracked and including in the 2007 – 2008 annual report.

4) Number of times City Hall was notified (e-mails, calls, etc.) during the reporting period, as compared to previous reporting periods:

	Number of Calls	
	2005-06	**2006-07**
NPDES related calls-for-service	**75**	**84**

5) Number and location of dry weather monitoring sites that were monitored during the reporting period:

Number of Site(s): **2**

Location(s): **Catt Road and California Oaks Channel**

6) Summary of Illicit Discharge Monitoring Program results, including: 1) All inspection, field screening, and analytical monitoring results; 2) All follow-up and elimination activities; and 3) Any proposed changes to station locations and / or sampling frequencies:

Attachment 4 contains the results of the dry weather monitoring for the two listed locations.

7) An assessment of program effectiveness based on the measurable goals established in the SWMP:

Additional dry weather monitoring sites will be established in the next reporting year and monitoring data will be included in next annual report.

9.0 PUBLIC PARTICIPATION

1) A description of efforts to include public in urban runoff management programs during the reporting period:

The City distributed educational and promotional material during the annual car show in June 2007 and at the birthday bash on June 30, 2007.

10.0 ASSESSMENT OF PROGRAM EFFECTIVENESS

Each section of the SWMP was implemented during this reporting year. Any procedural changes during FY 2007 – 2008 will be included in the 2007 – 2008 annual report.

11.0 FISCAL ANALYSIS

1) A summary of the reporting period's expenditures and an estimated budget for the upcoming reporting period.

Program Element	Fiscal Year 2006 - 2007		Fiscal Year 2007 – 2008 (Budget)	
	Capital Expenditures	O&M / Admin Expenditure	Capital Expenditures	O&M / Admin Expenditure
Program Management	-	$82,350	-	$82,350
Annual Fee for MS4 NPDES Permit	-	$7,406	-	$20,000
Implementation Agreement Shared Cost	-	$121,481	-	$150,000
Construction Inspections	-	$85,000	-	$85,000
Development Planning	-	$5,000	-	$15,000
Industrial and Commercial Inspections	-	$1,000	-	$5,000
Illicit Connections & Illegal Discharges Program	-	$10,000	-	$10,000
Municipal Facilities and Activities		$1,802,766	-	$1,950,000
Public Education & Outreach	-	Included in Implementation Agreement	-	Included in Implementation Agreement
Monitoring Program	-		-	
Other (training, promotional supplies, vehicle, etc.)	-	$5,000	-	$10,000
TOTAL =	**$0**	**$2,115,003**	**$0**	**$2,327,350**

2) A description of the source(s) of funds that were utilized during the previous fiscal year and the source(s) of funds proposed to meet the necessary expenditures for the subsequent year, including legal restrictions on the use of such funds:

Source of Funds	Percent of Total Program Funding
County Service Area (CSA) 152	27%
General Fund	73%

12.0 NON-STORM WATER DISCHARGES

Permittees shall report on any discharge category listed in Requirement B.2 of Order No. R9-2004-001 that was identified as a source of pollutants during the reporting period. For each identified category, the Permittee shall report whether it elected to prohibit the discharge or to require BMPs to reduce pollutants in the discharge to the MEP. If the discharge is not prohibited, the BMPs that will be implemented, or required to be implemented, shall be described in each Annual Report.

Category	Prohibited	BMP to be Implemented
Diverted stream flows	☒ Yes ☐ No	Not Applicable
Rising ground waters	☒ Yes ☐ No	Not Applicable
Uncontaminated ground water infiltration [as defined at 40 CFR 35.2005(20)] to MS4s	☒ Yes ☐ No	Not Applicable
Uncontaminated pumped ground water	☐ Yes ☒ No	Analyze water sample for total suspended solids, specific conductance, semi-volatiles and volatiles by EPA method's 624 & 625.
Foundation drains	☒ Yes ☐ No	Not Applicable
Springs	☒ Yes ☐ No	Not Applicable
Water from crawl space pumps (identified as a source of pollutant at a construction site)	☐ Yes ☒ No	Filtered prior to pumped into a catch basin
Footing drains	☒ Yes ☐ No	Not Applicable
Air conditioning condensation	☒ Yes ☐ No	Not Applicable
Flows from riparian habitats and wetlands	☒ Yes ☐ No	Not Applicable
Water line flushing (identified as a source of pollutant at a construction site)	☐ Yes ☒ No	Filtered prior to pumped into a catch basin
Landscape irrigation	☒ Yes ☐ No	Not Applicable
Discharges from potable water sources not subject to NPDES Permit No. CAG679001, other than water main breaks (identified as a source of pollutant at a construction site)	☐ Yes ☒ No	Filtered prior to pumped into a catch basin
Irrigation water	☒ Yes ☐ No	Not Applicable
Lawn watering	☒ Yes ☐ No	Not Applicable
Individual residential car washing	☒ Yes ☐ No	Not Applicable
Non-emergency fire fighting flows	☒ Yes ☐ No	Not Applicable
Dechlorinated swimming pool discharges	☒ Yes ☐ No	Not Applicable

13.0 RECEIVING WATER LIMITATIONS

This section includes the report required pursuant to Requirement C.2.a of Order No. R9-2004-001, if applicable. Requirement C.2.a. states:

"Upon a determination by either a Permittee or the SDRWQCB that MS4 discharges are causing or contributing to an exceedance of an applicable water quality standard, the Permittee shall promptly notify and thereafter submit a report to the SDRWQCB that describes BMPs that are currently being implemented and additional BMPs that will be implemented to prevent or reduce any pollutants that are causing or contributing to the exceedance of water quality standards. The report may be incorporated in the SWMP Annual Report unless the SDRWQCB directs an earlier submittal. The report shall include an implementation schedule. The SDRWQCB may require modifications to the report."

This section does not apply to this reporting period as there have been no indications of exceedances to applicable water quality standards established in this area.

14.0 SUMMARY OF ADDITIONAL URBAN RUNOFF DATA

This section is a summary of all urban runoff related data not included in the annual monitoring report (e.g., special investigations).

Additional data was not generated during this reporting period by the City of Murrieta.

15.0 PROPOSED REVISIONS TO THE SWMP

This section includes proposed revisions to the Individual SWMP, including areas in need of improvement based on the assessment of effectiveness of each program component.

City of Murrieta's SWMP will be revised to include the revised grading ordinance, grading manual and standard notes (grading control, and erosion and sediment control). Additional revisions, if necessary, to each program component will be included in the 2007 – 2008 annual report.

ORDINANCE NO. 378-06

AN ORDINANCE OF THE CITY COUNCIL OF THE CITY OF MURRIETA, CALIFORNIA, REZONING CERTAIN PROPERTIES FROM BUSINESS PARK (BP) TO REGIONAL COMMERCIAL (RC)

The City Council of the City of Murrieta does ordain as follows:

SECTION 1. REZONING The area identified in Exhibit 1 are hereby rezoned from and the General Plan designation changed from Business Park (BP) to Regional Commercial (RC).

SECTION 2. FINDINGS The site(s) are physically suitable for the requested zoning designation and anticipated land use development including access, provision of utilities, compatibility with adjoining land uses, and absence of physical constraints, as evidenced through the staff review process, the environmental review process and the public hearing and discussion process.

SECTION 3. ADOPTION The City Clerk shall certify to the adoption of this ordinance and shall publish a summary of this ordinance and post a certified copy of the full ordinance in the office of the City Clerk at least five days prior to the adoption of the proposed ordinance; and within 15 days after adoption of this ordinance, the City Clerk shall publish a summary of the ordinance with the names of the council members voting for and against the ordinance. This ordinance shall take effect thirty days after the date of its adoption.

ADOPTED by the City Council and signed by the Mayor and attested by the City Clerk this 19th day of December, 2006.

MAYOR
City of Murrieta

ATTEST:

Mitzi Ortiz, Deputy
CITY CLERK
City of Murrieta

APPROVED AS TO FORM:

CITY ATTORNEY

I, A. Kay Vinson, City Clerk of the City of Murrieta, California, hereby certify that the foregoing ordinance was duly and regularly introduced at a meeting of the City Council on December 5, 2006, and that thereafter the said ordinance was duly and regularly adopted at a meeting of the City Council on the 19th day of December, 2006, by the following vote, to wit:

Ayes: Bennett, Gibbs, McAllister, Thomasian

Noes: None

Absent: None

Abstain: Enochs

IN WITNESS WHEREOF, I have herunto set my hand and official seal of the City of Murrieta, California, this 19th day of December, 2006.

Mitzi Ortiz, Deputy

City Clerk of the City of Murrieta

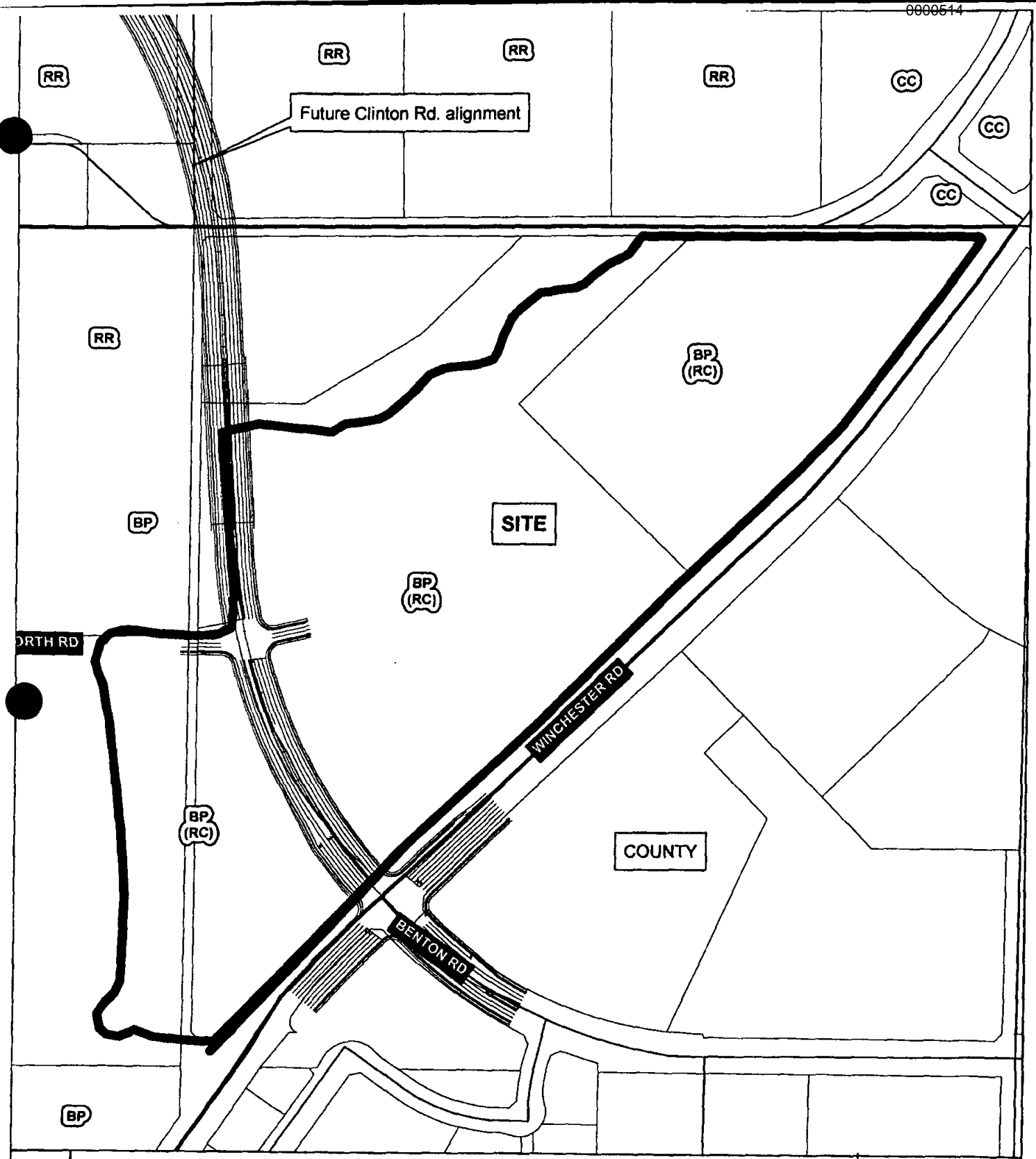

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10/12/06

GPA/ ZCO 004-057 and 006-1944

APN: Multiple

ORDINANCE NO. 386 - 07

AN ORDINANCE OF THE CITY COUNCIL OF THE CITY OF MURRIETA, CALIFORNIA AMENDING THE ZONING MAP ON 10,464 SQUARE FEET FROM CIVIC/INSTITUTIONAL TO MULTIPLE USE - 3 ON PROPERTY LOCATED NORTH OF KALMIA STREET AND WEST OF JEFFERSON AVENUE

The City Council of the City of Murrieta ordains as follows:

SECTION 1. The Zoning Map of the City of Murrieta is hereby amended from Civic/Institutional (C/I) to Multiple Use -3 (MU-3) on a 10,464 square foot property as shown on attached Exhibit "A".

SECTION 2. The City Council bases its decision on the following findings:

Findings for Approval of Zoning Change 2006-2097

1. The proposed zone change ensures and maintains internal consistency with all of the objectives, policies, general land uses, programs and actions of all elements of the General Plan.
2. The proposed amendment will not be detrimental to the public convenience, safety or general welfare of the City.
3. The proposed amendment is in compliance with the applicable provisions of the California Environmental Quality Act.
4. The site is physically suitable (including access, provision of utilities, compatibility with adjoining land uses, and absence of physical constraints) for the requested zoning designation and anticipated land use development.

SECTION 3. The City Clerk shall certify to the adoption of this Ordinance and shall publish a summary of this Ordinance and post a copy of the full ordinance in the office of the City Clerk at least five days prior to the adoption of the proposed ordinance; and within 15 days after adoption of the ordinance, the City Clerk shall publish a summary of the ordinance with the names of the council members voting for and against the ordinance. This Ordinance shall take effect thirty days after the date of its adoption.

ADOPTED by the City Council and signed by the Mayor and attested by the City Clerk this 3rd day of April, 2007.

Douglas R. McAllister, Mayor
City of Murrieta

ATTEST:

City Clerk
City of Murrieta

I, A. Kay Vinson, City Clerk of the City of Murrieta, California, hereby certify that the foregoing Ordinance was duly and regularly introduced at a meeting of the City Council on the 20th day of March, 2007 and that thereafter the said Ordinance was duly and regularly adopted at a meeting of the City Council on the 3rd day of April, 2007, by the following vote, to wit:

AYES: Bennett, Enochs, Gibbs, McAllister, Thomasian

NOES: None

ABSENT: None

IN WITNESS WHEREOF, I have hereunto set my hand and official seal of the City of Murrieta, California, this 3rd day of April, 2007.

City Clerk, City of Murrieta

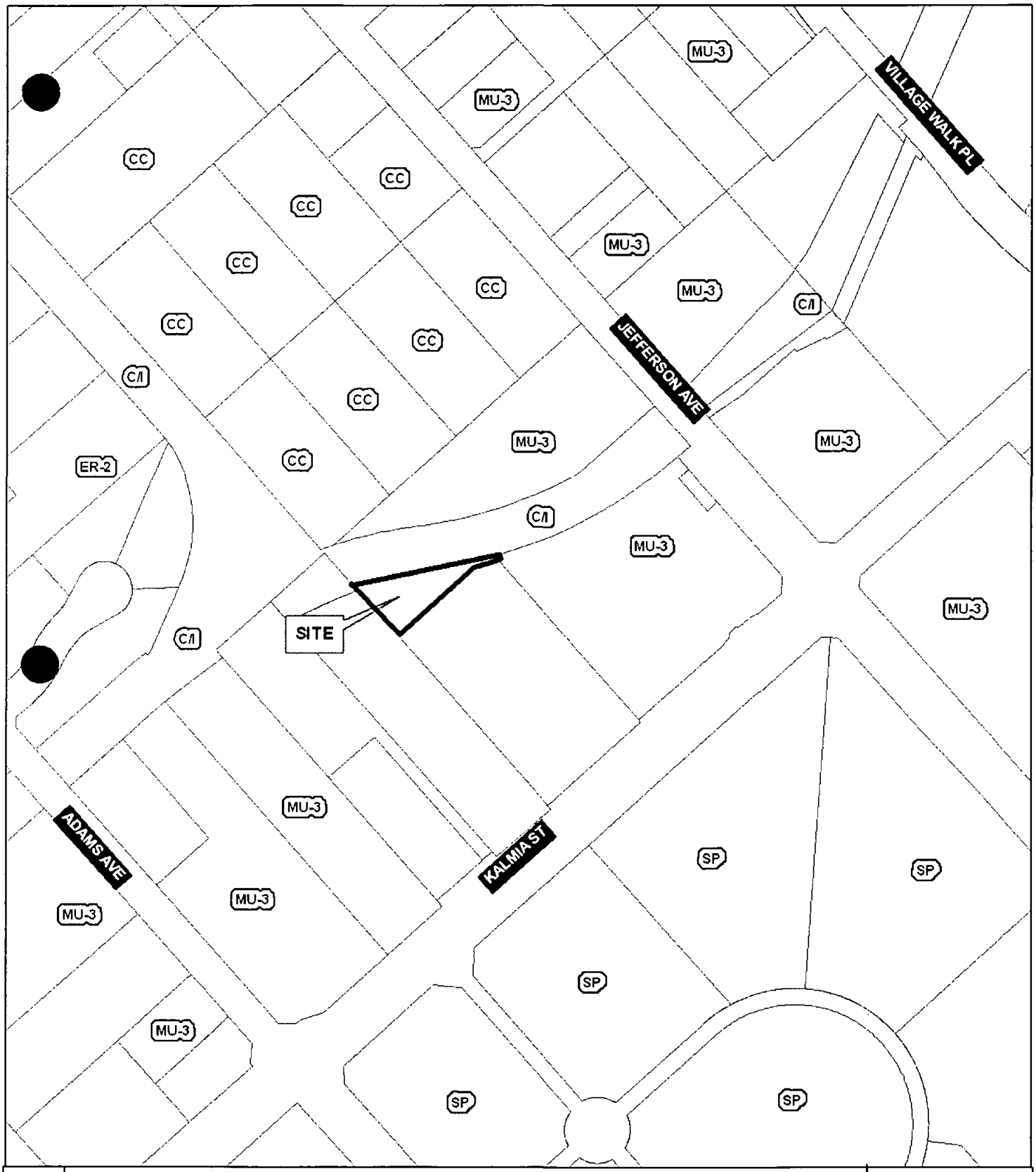

N

KALMIA OFFICE PLAZA

10/11/06

GPA / ZCO 006-2097

APN: 906060067

GRADING PERMITS ISSUED (1 July 2006 thru 30 June 2007)

#	Permit Number	Applicant Name	Project Address	Tract # / PM #	Lot #	Lot Size (Sq Ft)	Assessor Parcel Number(s)	Issue Date
1	60935	Nathan J. Earnest - T & M Manufactured Housing Construction, Inc.	28837 Via Zapata	TR 4108	153	5,369	913-043-031	07/26/06
2	60953	Alfonso Avalos - A & A Mobile Homes	38247 Via La Colina	TR 4108	11	4,053	913-033-002	07/24/06
3	62365	Rutilo Villasenor	24671 Fourth Avenue		10	10,171	906-194-050	01/16/07
4	62706	Russell Dechenne - Dechenne Water Well Drilling	35854 Greer Road		3	107,230	392-230-008	02/15/07
5	62946	Richard Curran	24721 New Clay Avenue		20	28,332	906-192-002	03/12/07
6	60297	Abrahan Greenboim - AVI Properties LLC	-	TR 31997	14	248,584	906-070-065	10/06/06
7	60788	Alexander Communities	Washington Avenue	TR 31497	-	76,266	906-070-029	07/07/06
8	63385	Dave Wakefield - Antelope Square Partners	South east corner of Scott Road and Antelope Road	PM 32258	-	-	359-110-042	05/10/07
9	53632	Centex Homes	Creekside Village - Murrieta Hot Springs Road	TR 28379	151 - 153	-	912-300-005	04/03/07
10	59579	David Wakefield - Davcon Development Inc.	-	TR 23094	5	86,494	910-250-019	08/15/06
11	59822	Frank Dollarhide - Cambridge Homes	-	MB 8/359	Portion Lot 205	171,487	909-130-012	10/17/06
12	60840	Eddie Daher - BDG&H Development	40400 Juniper Street	PM 31884		104,223	949-130-013	08/03/06
13	60863	Daniel Arenas Jr.	42272 War Admiral Lane	TR 30173	22		909-400-022	07/17/06
14	61149	Jim Domann	42582 Brown Street	PM 33912	3	454,325	909-140-040	08/21/06
15	61401	Gilbert Lynch - Kip Incorporated	-	Tr 29217-3	108	1,747	-	09/07/06

GRADING PERMITS ISSUED (1 July 2006 thru 30 June 2007) (Contd.)

#	Permit Number	Applicant Name	Project Address	Tract # / PM #	Lot #	Lot Size (Sq Ft)	Assessor Parcel Number(s)	Issue Date
16	61578	Bala Vairavan	25425 Jefferson Avenue	PM 22481	1	27,760	909-170-019	10/06/06
17	62037	George F Mears - Santa Rosa Properties, Inc.	-	TR 29429	1	977,613	909-140-029	11/17/06
18	62188	Alan Davis - Orchard Development	Clinton Keith Road	PM 32893	3	0	359-510-013	12/22/06
19	62230	Steven Taylor-Via Reata	42832 Dawn Wood Street	PM 30122	1	85,416	906-240-063	12/29/06
20	62349	Sidney Binder - Storage Us Mini-Storage / Offices Of Sidney Binder	41070 Guava Street	PM 12560	-	89,092	910-140-037	01/10/07
21	62402	Kevin R. & Kelli Devey	24495 Family Lane	PM 31388	3		906-060-079	02/01/07
22	62457	Lise Cowderoy - Artisan Montecito, LLC	Greer Road	31121		-	359-210-059	01/25/07
23	62561	Covenant Group, Inc.	40760 California Oaks Road		2	33,453	949-470-024	02/20/07
24	62936	Markham Development Management Group	25740 Washington Avenue	PM 6703	1	217,173	909-060-029	03/23/07
25	63099	Hunsaker & Associates - Riverside	Park Site on Pictor Avenue	29707-6	G	-	956-300-003	03/27/07
26	63103	Tom & Ronna Hellweg - Hellweg Properties LLC.	41085 Golden Gate Circle	PM 21997	14	58,471	910-210-036	03/27/07
27	63108	Lennar Homes of California, Inc. - Temecula	Hunter Road	Tr 31878	44, 45, 46 & 49	452,467	956-130-007	03/28/07
28	63109		Hunter Road	Tr 31878	1- 4 & 73 - 77		956-130-007	03/28/07
29	63216	John Trevor Sudweeks - Sudweeks Construction, Inc.	Jefferson Avenue	PM 11124	2	99,634	909-020-042	04/04/07

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GRADING PERMITS ISSUED (1 July 2006 thru 30 June 2007) (Contd.)

#	Permit Number	Applicant Name	Project Address	Tract # / PM #	Lot #	Lot Size (Sq Ft)	Assessor Parcel Number(s)	Issue Date
30	63241	Casey Walther - YCH Murrieta, L.P.	-	Tr 32266	-	0	359-160-013	04/06/07
31	63298	Michael J. & Tracy LaPaglia	42700 Brown Street	PM 15832	1	421,963	909-140-022	04/13/07
32	63494	Behzad Barouti (Giant RV)	24700 Madison Avenue	PM 29157	4	87,156	949-600-004	05/23/07
33	63515	Lise Cowderoy - Artisan Montecito, LLC	Greer Road	Tr 31121	-	-	359-210-059	05/04/07
34	63572	Konny Pereira	26077 Hayes Avenue	PM 8709	3	196,991	909-220-006	05/25/07
35	63720	Alan Young - Alesco Development Company, LLC	25910 ADAMS AVE	PM 7547	3	305,067	909-060-025	05/22/07
36	63980	Carl Van Fleet - IN-N-OUT Burger	-	PM 31339	6	7,199	948-310-004	06/20/07

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CITY OF MURRIETA

January 16, 2007

Murrieta Commons, LLC
30448 Rancho Viejo Road, #110
San Juan Capistrano, CA 92675
Attn: Glenn Eichler

Re: Development Plan 2004-251 (Murrieta Commons)

Dear Mr. Eichler:

At its meeting of December 13, 2006 the City of Murrieta Planning Commission acted to approve the above referenced project.

Attached is signed Planning Commission Resolution 2006-06.

If you have any questions, please contact me at (951) 461-6037.

Sincerely,

Dennis Watts

Dennis Watts
Senior Planner

encl.

26142 Beckman Court • Murrieta, California 92562
phone: 951.304.CITY (2489) • fax: 951.698.4509 • web: murrieta.org

PLANNING COMMISSION
RESOLUTION NO. PLANNING COMMISSION-2006-6

A RESOLUTION OF THE PLANNING COMMISSION OF THE CITY OF MURRIETA APPROVING DEVELOPMENT PLAN PERMIT 2004-251, AN APPLICATION BY MURRIETA COMMONS, LLC, TO CONSTRUCT A 147,130 SQUARE FOOT COMMERCIAL/OFFICE CENTER LOCATED AT 24490-24520 WASHINGTON AVENUE (EASTERLY SIDE OF WASHINGTON AVE. AND APPROX 420 FEET NORTH OF KALMIA STREET, MURRIETA, CALIFORNIA.

The Planning Commission of the City of Murrieta hereby resolves as follows:

SECTION 1. On July 27, 2005 an application was filed by Murrieta Commons, LLC for a Development Plan Permit, located at 24490-24520 Washington Avenue, to allow the construction of a 147,130 square foot commercial/office shopping center on 12.5 acres. The applicant proposes to construct two office buildings, two-stories high, totaling 67,485 square feet and 6 single-story commercial buildings totaling 79,645 square feet, with 622 parking spaces, and 20% of the site as landscaped area. A Development Plan is required by Section 16.56. The application was deemed complete on March 21, 2006.

SECTION 2. A public hearing was duly noticed for the Planning Commission meeting of December 13, 2006, by mailing a notice to property owners within a 500 foot radius of the site on November 22, 2006, publishing the notice in The Californian newspaper on November 22, 2006, and posting the site on December 1, 2006.

SECTION 3. An Initial Study (attached) was prepared for the project in accordance with Section 15070 of the California Environmental Quality Act (CEQA), which determined that a Mitigated Negative Declaration could be adopted for the project. The Initial Study did not identify any potentially significant environmental effects that could not be mitigated to a less-than significant level. Mitigation measures are required to reduce the impacts to transportation/circulation, cultural/historical, geology/soils, hazards, noise, air, and water quality. The Planning Commission accepts the Mitigated Negative Declaration as satisfying the requirements of CEQA and includes all mitigations measures as Conditions of Approval.

SECTION 4. In accordance with Section 16.56.040 of the Murrieta Municipal Code, the Planning Commission makes the following findings regarding Development Plan 2004-251:

1. The proposed use is allowed within the subject zoning district and complies with all applicable provisions of the Murrieta Development Code.

FACTS: The proposed commercial/office center is consistent with the Community Commercial (CC) zoning district, which allows various commercial, office, and service uses. The site complies with Development Code requirements, including but not limited to on-site parking, setbacks, building height, floor area ratio, drainage, and landscaping.

2. The proposed use would be consistent with the objectives, policies, general land uses and programs of the General Plan and any applicable specific plan.

   FACTS: The proposed use is consistent with General Plan policies and objectives of the Community Commercial General Plan designation and no specific plans are applicable. The facility meets the commercial-residential separation of use requirement of the Community Commercial zoning.

3. The site of the proposed use is physically suitable for the type and density/intensity of development being proposed.

   FACTS: The site is physically suitable for development and is compatible to the surrounding properties. The proposed facility is located on a major street complying with the General Plan requirements. The project is designed to provide a buffer between adjacent residential properties through landscaping and building setback. The site is not located within the fault hazard, flood hazard, special geologic hazard zone, liquefaction, subsidence, or dam inundation hazard zone.

4. The location, size, design and operating characteristics of the proposed use would be compatible with existing land uses within the general area in which the proposed use is to be located.

   FACTS: The site is physically suitable for development and is compatible to the surrounding properties. The proposed facility will comply with the City's architectural standards for commercial development, Section 16.10.030 of the Murrieta Development Code.

5. There are adequate provisions for sanitation, water, and public utilities to ensure public convenience, health, safety, and general welfare.

   FACTS: The Western Municipal Water District will provide sewer and water services; electricity by Southern California Edison Company; and gas by the Gas Company. These facilities are available through connections from the existing street network.

6. The proposed use is in compliance with the provisions of the California Environmental Quality Act.

FACTS: An initial study and mitigated negative declaration was prepared and circulated for the project in compliance with Section 15070 of the California Environmental Quality Act Guidelines. The project site is not listed on any hazardous waste site listings. Mitigation measures are implemented to reduce impacts to transportation/circulation, cultural/historical resources, geology/soils, hazards, noise, air, and water quality.

The City of Murrieta adopted the Multiple Species Habitat Conservation Plan (MSHCP) on September 16, 2003. The proposed development site is outside the Criteria Area defined by the Multiple Species Habitat Conservation Plan (MSHCP); therefore does not present the potential to adversely affect reserve assembly or design. Development on lands outside a defined criteria area is a lawful, "covered activity". The proposed project is found to be consistent with the MSHCP.

SECTION 5. Pursuant to the above findings, the Planning Commission of the City of Murrieta hereby approves Development Plan Permit 2004-251 subject to the following conditions:

General:

1. The applicant shall defend (with attorneys approved by the City), indemnify and hold harmless the City of Murrieta, its agents, officers, and employees from any claims, damages, action, or proceeding against the City or its agents, officers, or employees to attack, set aside, void, or annul an approval of the City, its advisory agencies, appeal boards, or legislative body concerning this approval Development Plan 2004-251. The City will promptly notify the permittee of any such claim, action, or proceeding against the City and will cooperate fully in the defense.

2. Any fees due the City of Murrieta for processing this project shall be paid to the City within thirty (30) calendar days of final action by the approval authority. Failure to pay such outstanding fees within the time specified shall invalidate any approval or conditional approval granted. No permits, site work, or other actions authorized by this action shall be processed by the City, nor permitted, authorized or commenced until all outstanding fees are paid to the City.

3. The project approval is for a 147,130 square foot commercial and office center on 12.51 acres, 622 parking spaces, and 20.3% landscape coverage. Buildings A and D consists of 67,485 s.f. of office area and Buildings B and C-G, plus "FUTURE" Building encompasses 79,645 s.f. of commercial uses. All construction plans shall be in substantial conformance with the approved site plans, floor plans, elevations, material and color board(s), landscaping plans and grading plans dated December 13, 2006. Any proposed change substantially different than the approved plan shall require an amendment to this approval in accordance with the Development Code.

4. The project shall be in substantial conformance with all adopted environmental mitigation measures, any written project proposal information and any verbal agreements or representations made to the decision making body as part of its consideration of the project. Any proposed change substantially different than the approved project shall require an amendment to this approval in accordance with the Development Code.

5. Pursuant to Section 711.4 of the State of California Fish and Game Code, the applicant is required to pay a $1314.00 handling fee. Said fees shall be paid to the Clerk/Recorder of the County of Riverside at the time the Notice of Determination is filed pursuant to Section 21152 of the Public Resources Code. If this fee is not paid, the approval of this project shall not be operative, vested, or final. In order to comply with State mandated time lines for filing of a Notice of Determination the above fee must be delivered to the Planning Department within **two (2)** working days after the date of final approval.

6. Subsequent modifications of this approval, which do not intensify the use, including but not limited to reorientation of structures, alteration of parking and circulation design, minor changes to the conditions of approval, interpretations of the conditions of approval relative to intent, necessity of, and timing, may be approved by the Planning Director, unless the Director requires a Substantial Conformance or Revised Permit application in accordance with the Development Code.

7. The applicant shall pay all applicable impact and/or mitigation fees or provide proof that all required fees have been paid in accordance with City policies and ordinances in effect at the time of permit issuance.

8. In the event the use hereby permitted under this permit is: (a) found to be in violation of the terms and conditions of this permit; (b) found to have been obtained by fraud or perjured testimony; or (c) found to be detrimental to the public health, safety or general welfare, or a public nuisance; this permit shall be subject to the revocation procedures in Section 16.82 of the Development Code.

9. The Developer shall comply with all applicable provisions of federal, state and local ordinances in effect at the time of building permit issuance.

10. The applicant shall obtain approval of all necessary plans for the construction of structures on the subject property in accordance with the Murrieta Development Code. Such plans include, but are not limited to, site plans, floor plans, building elevations, grading plans and landscaping plans.

11. This approval shall be used within two (2) years of approval date, otherwise it shall become null and void and of no effect whatsoever. "Used," means the beginning of substantial construction contemplated by this approval which is thereafter diligently pursued to completion or to the actual occupancy of existing buildings or land under the terms of the authorized use.

12. Prior to the expiration of this approval, the permittee may request a one (1) year extension of time in which to use this approval. A maximum of three one-year extensions of time requests shall be permitted. Should the time period established by any of the extension of time requests lapse, or should all three one-year extensions be obtained and no substantial construction or use of this approval be initiated within five

(5) years of the effective date of the issuance of this approval, this approval shall become null and void.

13. The project shall be developed in compliance with all applicable requirements and standards identified within the Community Commercial (CC) zone.

14. Prior to precise grade plan submittal for Building E (Future Phase), a substantial conformance application shall be submitted to the Planning Department:

    a. The review is intended to demonstrate compliance with parking and site design with the approved site plan.

    b. Architecture for "FUTURE BUILDING" shall be of similar and consistent design as other buildings within the center.

    c. Allow for the relocation of the Thompson House as provided for in Condition # 51.

15. The developer shall submit the following documents to the City for review and approval by the City Attorney. The intent is to establish a Master Association for maintenance of the common areas.

    a. A cover letter identifying the project for which approval is sought;

    b. A signed and notarized declaration of covenants, conditions, and restrictions; and

    c. A sample document conveying title to the purchaser of an individual lot or unit which provides that the declaration of covenants, conditions and restrictions (CC&R's) are incorporated therein by reference.

    The declaration of covenants, conditions and restrictions (CC&R's) submitted for review shall (a) provide for a minimum term of 60 years, (b) provide reciprocal easements for ingress, egress and parking, (c) provide for the establishment of a maintenance operator, and (d) contain the following provisions verbatim:

    > "Notwithstanding any provision in this Declaration to the contrary, the following provision shall apply:
    >
    > The maintenance operator established herein shall manage and continuously maintain the 'landscape area and common area', more particularly described on Exhibit '_', attached hereto.
    >
    > The Maintenance Operator shall have the right to assess the owners of each individual parcel for the reasonable cost of maintaining such 'landscape area and common area', and shall have the right to lien the property of any such owner who defaults in the payment of a maintenance assessment. An assessment lien, once created, shall be prior to all other liens recorded subsequent to the notice of assessment or other document creating the assessment lien.

This declaration shall not be terminated, substantially amended, or property deannexed therefrom absent the prior written consent of the Development Services Director of the City of Murrieta or the City's successor-in-interest.

A proposed amendment shall be considered substantial if it affects the extent, usage or maintenance of the 'landscape area and common area' or reciprocal easement established pursuant to the Declaration."

In the event of any conflict between this Declaration and the Articles of Incorporation, the Bylaws or the property owners association Rules and Regulations, if any, this declaration shall control.

Once approved by the city Attorney, the declaration of covenants, conditions and restriction shall be recorded with one copy retained for the case file.

16. A minimum 6-foot decorative block wall (measured from finished grade of project side) shall be constructed along the easterly property boundary to provide separation from residential zones. (Pursuant to Section 16.22.060.D., if a 6-foot block wall is existing then that wall would meet the requirement). Trees (combination of 36 and 48" box) shall be provided at minimum 25-foot intervals within the 15-foot landscape setback area. Note: Any alternative wall material shall be reviewed by staff and presented to the Planning Commission *(Added by Planning Commission)*.

17. A fencing plan shall be submitted showing all wall and fence locations and typical views of all types of fences or walls proposed. This plan shall require anti-graffiti coatings on fences and walls, where applicable.

18. Construction of this project may be done progressively in phases provided a phasing plan is submitted (with appropriate fees) to the Planning Department and approved prior to issuance of any building permits.

19. A clearance letter from Riverside County Waste management District shall be provided to the City's Planning Department verifying compliance. The developer shall provide adequate area for collecting and loading recyclable materials such as paper products, glass and green waste. Prior to placement of any recycling facility, the applicant shall submit a Development Plan application in accordance with Section 16.44.140 for review and approval.

20. Prior to the issuance of grading permits, the project applicant shall comply with the provisions of any existing City ordinance that has been established as a mitigation measure for the Stephens' Kangaroo Rat. These ordinances may include fee schedules, mechanisms for protecting habitat, or a combination thereof.

21. The project site shall be the point-of-sale for the purpose of collecting any sales tax on goods that are sold, delivered or rented on the site.

22. Prior to issuance of grading permits, the Planning Department shall determine if the deposit based fees for the project are in a negative balance. If so, any outstanding fees shall be paid by the applicant/developer.

23. Prior to building permit issuance, the applicant shall submit an application for addressing of the center.

24. Applicant shall coordinate with the telecommunications facility on the relocation of the facility to the area shown on the site plan, unless otherwise amended by a revised permit.
    a. Facility design and height shall be substantially conforming to original approval (Minor Conditional Use Permit 02-256), consisting of a 50ft high monopine pole design having a total height of 55 feet high with 12 antennae panels.
    b. Equipment enclosure shall be of an 8-foot high tubular steel (or block wall) with landscaping around the perimeter.
    c. A minimum of 2 additional pine trees shall be planted within the landscape area and in proximity to the telecommunications facility.

Design and Lighting:

25. All mechanical equipment and vents (ground or rooftop) shall be screened from public view. Screening method and location shall be reviewed and approved by the Planning Department.

26. An interior room, with direct exterior access, shall be provided for the placement of main utility electrical switch gear distribution and roof access ladders.

27. Roof gutters and downspouts are not permitted on the exterior of the building unless satisfactorily integrated into the architecture as determined by the Planning Department prior to building permit issuance.

28. The City is located within the Mt. Palomar Special Lighting Area, as defined in Section 16.18.110 of the Development Code, low pressure sodium vapor lighting or overhead high pressure sodium vapor lighting with shields or cut off luminaries, shall be utilized.

29. Any exterior lighting within parking areas adjacent to a residential zoning district shall not exceed 15-feet in pole height (specifically rear parking lot area within Lot 1 and 2 of site plan), with a maximum of 0.3 foot-candles illumination at adjacent residential property lines. All lighting fixtures shall be designed with shielding or cut-off fixtures to project in a downward manner to minimize glare and to not shine directly upon adjoining property or public rights-of-way. A detailed lighting study (photometric) shall be provided prior to building permit issuance to demonstrate compliance with this condition.

30. All parking lot lights and other outdoor lighting shall be shown on electrical plans submitted to the Department of Building and Safety for plan check approval and shall comply with the requirements of Development Code Section 16.18.100-Lighting and 16.18.110-Mt Palomar Lighting Standards.

31. All trash bins shall be stored in approved enclosures and screened in compliance with Sections 16.18.120 and 16.18.150 of the Murrieta Development Code. The location of the enclosures must be shown on the precise grade plan and shall provide a minimum of 576 square feet of refuse storage area (288 square feet for refuse and 288 for recycling).

Parking:

32. Prior to the execution of any purchase contract or tenant lease agreements, a detailed statement disclosing to perspective buyer/tenant(s) the amount of parking provided for each unit, and that the City's parking requirements could significantly restrict a proposed use. Additionally, the disclosure shall advise buyers/tenants to confirm with the City the parking requirements for the any proposed use. Any use requiring additional parking above that provided or otherwise made available shall not be permitted.

33. Parking for this project was determined primarily on the basis of Development Code Section 16.34 and requires a minimum of 491 parking spaces (1 space per 300 square feet for shopping centers over 30,000 s.f.) for a 147,130 square foot commercial center. Note: The approved site plan shows 622 parking spaces.

    The applicant shall remove and relocate the two handicap (2) parking spaces along the main drive entrance aisle, near Building G to an area approved by the Building & Safety Department (Added by Planning Commission).

34. All parking shall be designed and improved pursuant to Section 16.34 of the Murrieta Development Code, and shall be in conformance with the approved plans.

35. A minimum of thirty (30) bicycle rack spaces shall be provided in convenient locations to facilitate bicycle access to the project area a shown on approved plans. The bicycle racks shall be shown on project landscaping and improvement plans submitted for Planning Department approval, and shall be installed in accordance with those plans.

36. Parking spaces(s) for persons with disabilities shall be provided as shown on APPROVED PLANS. Each parking space reserved for persons with disabilities shall: (a) be identified by a permanently affixed reflective sign constructed of porcelain on steel, beaded text or equal, displaying the International Symbol of Accessibility; (b) not be smaller than 70 square inches in area; (c) be centered at the interior end of the parking space at a minimum height of 80 inches from the bottom of the sign to the parking space finished grade; and (d) have a surface identification sign duplicating the symbol of the accessibility in blue paint of at least 3 square feet in size.

37. A sign shall be posted in a conspicuous place at each entrance to the off-street parking area, not less than 17 inches by 22 inches, clearly and conspicuously stating the language provided by the Building and Safety Department regarding accessible parking.

38. A minimum of ten (10) loading spaces(s) shall be provided in accordance with Section 16.34.100 of the Development Code as shown on the approved plans. The loading space shall be surfaced with six (6) inches of concrete over a suitable base and shall not be less than 15 feet wide by 25 feet long, with 14 feet vertical clearance.

39. Sign(s) stating that "EXTENDED IDLING TRUCK ENGINES IS NOT PERMITED" shall be located at the loading area of the grocery use and at the truck parking area as shown on APPROVED PLANS. The sign(s) at the entrance to facility shall not be less than twenty four inches square and will provide directions to truck parking spaces with electrical hookups.

40. The hookups will provide power for refrigerated trailers that need to be parked on-sight for more than 15 minutes.

41. Applicant shall record a reciprocal access and parking easement. This easement shall be separate from the CC&R's, but can be incorporated into the CC&R's.

42. A minimum 5-foot landscape area must be provided along the southerly property line (adjacent to the parking spaces along the southerly most drive entrance). Parking spaces must be 18 feet deep and not encroach into the minimum 5-foot landscape area. Note: This will require site design changes.

43. No compact parking spaces are permitted. Any parking spaces shown as compact must be revised to meet the current parking space requirements.

Signage:

44. No signs are approved as part of this project approval except as specifically identified in these conditions. Prior to the installation of any on-site advertising or directional signs, a comprehensive sign plan shall be submitted to and approved by the Planning Department pursuant to the requirements of Section 16.38 of the City's Development Code.

45. Prior to building permit issuance, a comprehensive sign program shall be submitted for review.

    a. The proposed sign program shall be presented to the Planning Commission.
    b. Prior to occupancy, the comprehensive sign program shall be approved.

Cultural & Archaeological Resources:

46. If any human remains are encountered during ground-disturbing activities, all such activities in the vicinity of the discovery shall be terminated immediately and notification shall be provided to the County Coroner's office and the Pechanga Band of Luiseno Indians, shall be contacted to arrange for the management of the remains. Work shall not resume in the vicinity of the discovery until authorized by the Planning Department.

47. A report documenting the monitoring activities shall be submitted to the City of Murrieta within 60 days of the completion of the grading activities. This report shall document the type of cultural resources recovered and the disposition of these resources. The artifacts shall be deposited into an accredited institution that is authorized to accept these types of cultural resources.

MITIGATION MEASURES:

(Numbers in parenthesis correspond to mitigation measures identified in the initial study)

48. The following measures, which correspond to measures that have been input to the URBEMIS 2002 computer model to estimate the daily construction emissions of the

proposed project, would be included as part of the proposed project pursuant to the requirements under SCAQMD Rule 403:

a. Soil stabilizers shall be applied to inactive construction areas.
b. Ground cover in disturbed areas shall be quickly replaced.
c. Exposed surfaces shall be watered twice daily.
d. All haul roads shall be watered twice daily.
e. All stock piles of debris, dirt, or rusty materials shall be covered with a tarp.
f. Vehicle speed on unpaved roads shall be reduced to less than 15 miles per hour (mph).

49. (5-1) The Thompson House shall be preserved on- or off-site and the Developer shall submit a Historic Preservation Plan to address the following:

a. Prior to grading permit issuance, possible temporary displacement of structure on site and protection during grading;
b. Prior to occupancy, provide steps and agreements for fair market appraisal of the structure and value of the structure following restoration;
c. Relocation of structure to a site within the area generally described as bounded by south of Nighthawk, north of Guava, and west of Washington Ave. The structure shall be rehabilitated and maintained according to the Secretary of the Interior's Standards; and relocation of structure and 'certificate of appropriateness.
d. Adaptive re-use in accordance with the Secretary of the Interior's Standards, entailing convertion of the building to a use other than that for which it was originally designed, while maintaining the historical integrity of the building's exterior.

Note: Completion of the necessary documents/agreements for Conditions 49c. and 49d. is required prior to occupancy of the project, or as determined by the Planning Director. Planning staff must monitor what is occurring on the Thompson home and provide an update to the Planning Commission *(Amended and added by Planning Commission)*

50. (5-2) If any archaeological materials are encountered during the course of the project development, the project shall be halted. The services of an archaeologist shall be secured by contacting the Center for Public Archaeology - Cal State University Fullerton, or a member of the Society of Professional Archaeologist (SOPA) or a SOPA-qualified archaeologist to assess the resources and evaluate the impact. Copies of the archaeological survey, study, or report shall be submitted to the UCLA Archaeological Information Center. A covenant and agreement shall be recorded prior to obtaining a grading permit.

51. (5-3) The Pechanga Band of Luiseno Indians shall be contacted to develop a management plan for any resources that may be unearthed, to afford the Band an opportunity to monitor ground-disturbing activities and to participate in the decisions regarding collection and curation of any such resources. Pechanga monitors shall be present during any grading of previously undisturbed areas, regardless of grading depth.

52. (5-4) If any paleontological materials are encountered during the course of the project development, the project shall be halted. The services of a paleontologist shall be secured by contacting the Center for Public Paleontology - USC, UCLA, Cal State Los Angeles, Cal State Long Beach, or the County Museum to assess the resources and evaluate the impact. Copies of the paleontological survey, study or report shall be

submitted to the Los Angeles County Natural History Museum. A covenant and agreement shall be recorded prior to obtaining a grading permit.

53. (5-5) If human remains are discovered at the Project Site during construction, work at the specific construction site at which the remains have been uncovered shall be suspended, and the City of Murrieta Public Works Department and County coroner shall be immediately notified. If the remains are determined by the County coroner to be Native American, the Native American Heritage Commission (NAHC) shall be notified within 24 hours, and the guidelines of the NAHC shall be adhered to in the treatment and disposition of the remains.

54. (6-1) The design and construction of the project shall conform to the Uniform Building Code seismic standards as approved by the Murrieta Municipal Code.

55. (6-2) Excavation and grading activities shall be scheduled during dry weather periods. If grading occurs during the rainy season (October 15 through April 1), construct diversion dikes shall be constructed to channel runoff around the site. Channels shall be lined with grass or roughened pavement to reduce runoff velocity.

56. (6-3) Appropriate erosion control and drainage devices shall be provided to the satisfaction of the Building and Safety Department and Engineering and Public Works Department. These measures include interceptor terraces, berms, vee-channels, and inlet and outlet structures, as specified by the municipal code, including planting fast-growing annual and perennial grasses in areas where construction is not immediately planned.

57. (6-4) Stockpiles and excavated soil shall be covered with secured tarps or plastic sheeting.

58. (6-5) All waste shall be disposed of properly. Use appropriately labeled recycling bins to recycle construction materials including: solvents, water-based paints, vehicle fluids, broken asphalt and concrete; wood, and vegetation. Non recyclable materials/wastes shall be taken to an appropriate landfill. Toxic wastes must be discarded at a licensed regulated disposal site.

59. (6-6) Leaks, drips and spills shall be cleaned up immediately to prevent contaminated soil on paved surfaces that can be washed away into the storm drains.

60. (6-7) Pavement shall not be hosed down at material spills. Dry cleanup methods shall be used whenever possible.

61. (6-8) Dumpsters shall be covered and maintained. Place uncovered dumpsters under a roof or cover with tarps or plastic sheeting.

62. (6-9) Where truck traffic is frequent, gravel approaches shall be used to reduce soil compaction and limit the tracking of sediment into streets.

63. (6-10) All vehicle/equipment maintenance, repair, and washing shall be conducted away from storm drains. All major repairs shall be conducted off-site. Drip pans or drop clothes shall be used to catch drips and spills.

64. (6-11) Projects involving the import/export of 1,000 cubic yards or more of dirt shall obtain haul route approval by the Engineering and Public Works Department.

65. (6-12) The developer shall install appropriate traffic signs around the site to ensure pedestrian and vehicle safety. Fences shall be constructed around the site to minimize trespassing, vandalism, short-cut attractions and attractive nuisances.

66. (8-1) Prior to commencement of construction activities, the Project Applicant shall prepare and implement a project-specific Storm Water Pollution Prevention Plan (SWPPP), in conformance with the National Pollution Discharge Elimination System (NPDES) General Permit for Storm Water Discharges Associated with Construction Activity (General Permit) Water Quality Order 99-08-DWQ, dated August 27, 2004. The Project Applicant shall ensure that all BMPs provided in the project-specific SWPPP are implemented throughout the construction of the Proposed Project.

67. (8-2) All grading activities shall conform to the grading, haul route, and erosion/sedimentation requirements of the City's Grading Ordinance (Ordinance No. 346-06), adopted January 17, 2006, which amends Chapter 15.52 of the Municipal Code.

68. (8-3) Prior to the issuance of a building or grading permit, the Project Applicant shall prepare a project-specific Water Quality Management Plan (WQMP) that shall include site design, source control, and treatment control Best Management Practices (BMP's), examples of which are provided in the Riverside County WQMP for Urban Runoff, dated September 17, 2004, pp. 16 – 30. The Project Applicant shall ensure that all BMP's provided in the project-specific WQMP are implemented through the duration of the Proposed Project.

69. (9-1) Prior to construction of the Proposed Project, the Project Applicant shall procure all necessary entitlements and land use approvals from the City of Murrieta Department of City Planning, including but not limited to the various discretionary actions identified in Section II (Project Description), of this document.

70. (11-1) The project shall comply with the provisions pertaining to construction activity as stated in Section 16.30.130 of the City of Murrieta Municipal Code. Under Section 16.30.130 of the City of Murrieta Municipal Code:
    a) The operation of tools or equipment used in construction, drilling, repair, alteration, or demolition work is prohibited between the weekday hours of 7 P.M. and 7 A.M., or at any time on Sundays or holidays.
    b) Construction activities must be conducted in a manner that the maximum noise levels at the affected structures would not exceed those listed in Table IV-5 above.
    c) All mobile or stationary internal combustion engine powered equipment or machinery shall be equipped with suitable exhaust and air-intake silencers in proper working order.

71. (11-2) Construction and demolition activities shall be scheduled so as to avoid operating several pieces of equipment simultaneously, which causes high noise levels.

72. (11-3) The use of those pieces of construction equipment or construction methods with the greatest peak noise generation potential shall be minimized. Examples include the use of drills, jackhammers, and pile drivers.

73. (11-4) Noise attenuation barriers such as plywood structures or flexible sound control curtains shall be erected along the project site's western and southern boundary to reduce the amount of noise the adjacent residences would be subject to such that the noise levels would be within the construction noise standards established in the City Municipal Code.

74. (11-5) Noise construction activities whose specific location on the site may be flexible (e.g. operation of compressors and generators, cement mixing, general truck idling) shall be conducted as far as possible from the nearest noise-sensitive land uses, and natural and/or manmade barriers (e.g., intervening construction trailers) shall be used to screen propagation of noise from such activities towards these land uses to the maximum extent possible.

75. (11-6) The project developer shall require by contract specifications that construction staging areas along with the operation of earthmoving equipment on the project site would be located as far away from vibration-sensitive sites as possible. Contract specifications shall be included in the project construction documents, which shall be reviewed by the City prior to issuance of a grading permit.

76. (13-1) The Proposed Project shall provide hydrants, access, water pressure, and any other requirements of the City of Murrieta Fire Department, or as specified in the California Fire Code (2001).

77. (13-2) The Proposed Project shall pay developer mitigation fees in the sum of $0.26 per square foot of commercial space (or as otherwise increased or reduced by the City) to mitigate the costs of any new fire protection facilities, staffing, or equipment.

78. (13-3) The Proposed Project shall include on-site security features to reduce the demand for City police services. Such security features may include, but are not limited to: secured parking facilities, well-illuminated public and semi-public spaces that minimize dead space, and provision of on-site security guards, if needed.

79. (13-4) Pursuant to Section 65995 of the Government Code, the Project Applicant shall be responsible for the payment of all applicable schools fees to the Murrieta Valley Unified School District to offset the impact of additional student enrollment at schools serving the Project Site.

80. (13-5) Pursuant Section 16.36.030 (Non-Residential Public Facilities Development Impact Fee Required) of the City of Murrieta Municipal Code, the Project Applicant shall pay a public facilities development impact fee for each building proposed in an amount established by resolution of the city council.

81. The project shall participate in the fair share funding for the westbound right turn overlap phasing at the intersection of Washington Avenue at Kalmia Street.

82. (15-2) The project shall be responsible for constructing the traffic signal and roadway improvements associated with the traffic signal at the project access, including the

completion of half section street improvements to Washington Avenue adjacent to the project, as shown in Exhibit N of the revised Traffic Study dated November 16, 2006.

83. (15-3) The project shall contribute to the TUMF and DIF fee programs which are in place at the time development.

84. (15-4) The Applicant shall submit a parking and driveway plan that incorporates design features that shall reduce accidents, to the Bureau of Engineering and the Department of Transportation for approval.

85. (16-1) The Proposed Project shall install water-conserving fixtures and appliances.

86. (16-2) The Proposed Project shall incorporate the principles and practices of sound landscape design and management, particularly those conserving water and energy.

87. (16-3) Whenever appropriate and feasible, the Proposed Project shall minimize surface run off and allow replenishment of soil moisture. Such techniques may include, but not be limited to: the on-site use and retention of storm water, the use of pervious paving material (such as turf block, walk-on-bark, pea gravel, and cobble mulches), the preservation of vegetative covers, and efficiently designed and managed irrigation systems.

88. (16-4) Where appropriate, the Proposed Project shall install dual plumbing systems to provide for the use of reclaimed water.

89. (16-5) The Proposed Project shall institute a recycling program to the satisfaction of the City to reduce the volume of solid waste going to landfills in compliance with AB 939.

90. (16-6) Recycling bins shall be provided at appropriate locations to promote recycling of paper, metal, glass, and other recyclable materials. These bins shall be emptied on a regular basis and recycled appropriately as a part of the project's regular waste disposal program.

Final Inspection:

91. Unless otherwise indicated, all conditions, mitigation measures and other requirements shall be fully constructed and implemented prior to final inspection of the building and/or site improvements.

92. All existing outdoor advertising displays, signs or billboards shall be removed, except for signs permitted by the Development Code.

93. If the project has been phased, all facilities meant to serve the current phase of development shall be installed in a usable condition. Project landscaping may not all be deferred until the final phase.

Landscaping

Prior to the issuance of building permits:

94. Three copies of construction landscaping plans shall be submitted to the Planning Division and approved. A licensed Landscape Architect shall prepare the plans.

95. The above-described plans shall be in substantial conformance with the plans approved by the City Landscape Architect, City Administrative Staff, Planning Commission and/or City Council. Notes, details, and specifications shall be included.

96. All landscape and irrigation plans shall be consistent with Title 16.28 of the Murrieta Municipal Code.

97. All parking lot planting areas, curbing, irrigation, and bumper overhang shall be consistent with Title 16.34.070-H. of the Murrieta Municipal Code. Parking spaces shown at less than 18 feet in length require additional dedication of landscape area for required bumper overhang. The additional landscape area will not count towards satisfying parking lot landscaping requirements.

98. Landscape plans shall be drawn at a scale of 20 feet equal to 1 foot or larger. The City Landscape Architect will not accept plans drawn in 30 feet scale or smaller without prior approval.

99. No light fixture shall be designed for any location in a planting area, which would make it necessary to eliminate a tree. All overhead light fixtures shall be identified on the site plan prior to approval of the site plan.

100. Plant materials shall be installed from container sizes consistent with Murrieta Municipal Code, 16.28.080, Table 3-5, Minimum Required Mix of Plant Materials.

101. All ground covers shall be installed from living plant materials. Spacing shall be such that 100% coverage is achieved within 2 years of the installation.

102. All planter areas shall be a minimum of 5 feet wide excluding curbs and required concrete strip adjacent to parking spaces (12" wide by 4" deep plus 6" wide type "D" curb or 12" wide by 12" deep integrally poured curb). **The end island at Future Building and others that don't meet the minimum planting widths must be widened.**

103. Permanent, evergreen shrubs capable of mature growth to between 36 inches and 48 inches high shall be designed to screen the perimeter parking, walls and fencing, except where site distance requirements call for shrubs at 30 inches high or less.

104. An approved concrete mow strip shall separate all turf and shrub beds.

105. All trash enclosures shall be covered with a wood arbor or other approved architectural treatment to blend with the buildings. Flowering vines shall be trained on to the walls. Trees, shrubs and ground covers shall be included. **The trash enclosure at Buildings B and C must be screened with plants on all 3 sides of the wall enclosure.**

106. Planting areas adjacent to the Washington Avenue shall have trees provided at the rate of one for each 20 lineal feet of landscaped area. Street trees shall be Olea europaea (Fruitless Olive) to match the existing street tree theme. All street trees shall be installed from a combination of 24" box and 36" box containers outside the right-of-way.

107. Mature specimen trees in 36-inch and 48-inch boxes shall be supplied in sufficient quantity to provide variety and emphasis at the entry driveway within street view and other main focal areas.

108. Above ground utility locations shall be approved with prior permission of the Planning Division. Building backflow prevention units shall be located in shrub areas outside of the City right-of-way. All double detector check and backflow assemblies shall be located in shrub beds clearly identified on the grading plan prior to approval of the grading plan. The detector check/backflow devices shall be painted a neutral/earth tone color and any pipes extending above ground shall be finished and painted to match the device.

109. No required canopy shade tree planting area or shrub planting bed shall be narrower than 5 feet wide without permission from the City Landscape Architect.

110. Canopy shade trees shall be located directly adjacent to public parking spaces without walkways or paving between the tree and parking space (wherever feasible) to provide the required percentage of parking spaces shaded at 15 years growth. The trees shall be located no farther than 25 to 30 feet on center (depending on the canopy spread of the species) in continuous planting areas, or no farther than 36 feet on center in tree wells (minimum 25 square feet of planting area). **Additional shade trees are required to shade the parking spaces at Future Building, Building B, Building F and Building G.**

111. All areas of the site not intended for a specific use and for future development or phasing, shall be landscaped with at least a temporary hydro-seed mix and sub-grade irrigation system approved by the City Landscape Architect, or as directed by the Engineering Division.

112. No building roof drain shall daylight into a planter area or splash block. Roof drains located at planter areas shall be adapted to convey excess water through the planter via drain pipes, which daylight through the curb into the adjacent gutter. Roof drain outlets are permitted along the rear and side landscaping adjacent to Building D for water quality treatment purposes, unless treated by some other method.

113. Landscaping shall be incorporated and planned as an integral part of the overall project design around the building. Landscaping should not interfere with pedestrian or handicap accessibility. Pedestrian and handicap accessibility shall be designed not to interfere with landscaping required around the building.

114. All trees shall be double staked with rubber type ties nailed to the lodge pole stakes in at least two vertical locations. Trunk protection devices shall be provided to all trees located in turf grass areas.

115. A weather-based irrigation controller that measures evapo-transpiration shall be provided.

116. Drip irrigation is encouraged in all shrub and slope areas.

117. A rain shut off device shall be installed connected with the irrigation controller.

118. All plantings shall be hydrozoned according to WUCOL's or the "City of Murrieta Guide To Trees, Shrubs, and Ground Covers." The maximum applied water allowance shall not exceed 25 percent of the local annual mean precipitation.

119. All plant selections shall be appropriately sized for their location. Shamel Ash shall not be used. No plant materials that would freeze shall be used (Agave). No plants with thorns shall be used in pedestrian areas (Mahonia). At least 80% of all shrubs shall be evergreen.

120. Planting areas adjacent to residential zoned property shall provide a landscaped buffer with a minimum of fifteen feet planting area. For each 100 lineal feet of landscape area a minimum of 12 trees and 10 shrubs shall be provided.

121. The existing cell tower that is to be relocated shall be screened with approved tall, evergreen shrubs and vines on all walls, except for where access is required. A minimum 3 foot wide planting area for screening is required (excluding wall footings and curbs). At least 4 – 36" box Pinus eldarica shall be installed in close proximity of the relocated cell tower monopine.

122. All infiltration areas within landscaped areas shall be approved by the City of Murrieta Landscape Architect for appropriate visual qualities. At least 5 feet of dense tree and shrub planting area shall be designed on level grade to screen depressed infiltration areas from public view or at property lines. Infiltration areas shall be modified using currently available technology as required to achieve the appropriate visual quality.

Prior to Construction:

123. The City Landscape Architect shall meet with the job site superintendent and the landscape contractor for a pre-job meeting. A copy of the soil fertility recommendations shall be submitted to the City Landscape Architect prior to the meeting. No landscaping shall occur prior to the meeting.

Prior to the issuance of occupancy permits:

124. Performance securities, in the amount determined by the City to guarantee the adequate maintenance of the landscaping materials and irrigation system in accordance with the approved plans for a period of one (1) year from the date of final clearance of the installed landscaping by the City, shall be posted with the Planning Department. Acceptable forms of security shall be limited to cash deposit, cash bonds, or irrevocable letters of credit. The performance securities shall be released one (1) year after final clearance of the installed landscaping by the City, upon written request by the owner, if the landscaping has been adequately maintained. A deposit to cover re-inspection of the landscape, at the current City rate shall be posted with the Planning Department prior to re-inspection for maintenance bond release.

125. All required landscaping and irrigation systems shall be installed in a condition acceptable to the City. The owner's Landscape Architect shall provide inspection of the landscaping. The owner's Landscape Architect shall provide the City with a Certificate of Compliance stating that the landscaping was installed per the approved plans. The City will review the Certificate of Compliance and conduct inspections to ensure that the landscape installation is in compliance with the approved landscape plans.

ENGINEERING DEPARTMENT

GENERAL CONDITIONS

126. The applicant shall pay all applicable Development Mitigation Impact Fees, including but not limited to:

    a. Development Impact Fees, Ordinance 196-98 payable prior to issuance of building permit.

    b. Kangaroo Rat Fee, payable at issuance of grading permit.

    c. Riverside County Area Drainage Fees, payable at issuance of grading permit.

    d. Transportation Uniform Mitigation Fee (TUMF), payable at building permit issuance.

    e. MSHCP Fee, payable prior to issuance of a grading permit.

    Fees shall be based upon Commercial Development Rates.

127. Prior to any work being performed in the public right of way, fees shall be paid and an encroachment permit shall be obtained from the Engineering Department. The applicant shall apply for an encroachment permit from the City for utility trenching, utility connection or any other encroachment onto public right-of-way. The applicant shall be responsible for the associated costs and arrangements with each public utility.

128. Prior to the issuance of building permits, unless other timing is indicated, the applicant shall complete all street improvement, signing, striping, and signal plans (if required) in conformance with all applicable City ordinances and standards, submit and obtain approval, post securities and execute agreements. Prior to occupancy, unless other timing is indicated, all public improvements shall be installed in accordance with all applicable City ordinances.

129. All construction equipment shall be properly maintained and tuned to reduce emissions.

130. Access and maintenance easements shall be provided to existing utilities within the site to the satisfaction of each applicable utility. These easements shall be recorded prior to grading permit. Revisions to the development necessary to comply with the utility requirements shall be the responsibility of the applicant.

GRADING

131. Prior to issuance of a grading permit or other construction activities, the applicant shall provide the following to City staff:

a. A copy of the Notice of Intent (NOI) and waste Discharge Identification (WDID) number from the State Water Resources Control Board.

b. A project-specific Water Quality Management Plan (WQMP) shall be submitted to the City for approval with the grading plan check application. Note: the preliminary WQMP submitted at the time of these conditions was insufficient. The final WQMP, when approved, may require different or additional treatment devices than those shown on the approved development plan. Revisions to the development plan due to these changes shall be the responsibility of the applicant. The WQMP shall be approved by the Engineering Department prior to issuance of a grading permit. A copy of the final project-specific WQMP shall be provided to the Engineering Department and a copy shall be maintained by the applicant and kept on-site.

An adequate Storm Water Pollution Plan (SWPPP) shall be available to state and city inspectors at the job site prior to commencing and throughout construction. The applicant shall be responsible for implementation, monitoring, operation and maintenance of the SWPPP until construction is complete and a Notice of Termination has been filed with the State Water Resources Control Board.

132. All grading activities shall minimize dust through compliance with AQMD Rule 403 which requires watering during earth moving operations.

133. A soils investigation study shall be completed and approved prior to issuance of a grading permit. If the project is located within an earthquake fault zone, a third party review shall be required of the soils investigation report. All recommended measures identified in the soils report shall be incorporated into the project design. On the grading plan, identify all faults located within the project from the Fault Location Map. All plans and maps shall show seismic zones as well as the minimum fault setbacks. Notes shall be placed on all plans if the project is entirely within or outside the seismic zone as the case may be.

134. If appropriate, prior to issuance of any grading permit or ground disturbance, applicant shall obtain necessary approvals and permits from applicable Federal and State regulatory agencies. If the site contains regulated waters, the applicant shall obtain a 404 permit from the Corps of Engineers, a 401 certification from the Regional Water Quality Control Board, a section 1603 Department of Fish and Game stream bed alteration agreement, and file a Notice of Intent of ground disturbance with the State Water Resources Control Board.

135. Prior to commencing of any grading in excess of 50 cubic yards, paving in excess of 3,000 square feet, or alteration of existing drainage patterns, the applicant shall obtain a grading permit from the Engineering Department prior to issuance of a building permit. The developer shall have an approved grading permit prior to the commencement of any clearing or grading of the site.

136. Prior to hauling dirt or construction materials to any proposed construction site within this project, the developer shall submit to and receive approval from the City Engineer for the proposed haul route. The developer shall comply with all conditions and requirements the City Engineer may impose with regards to the hauling operation.

137. In instances where a grading permit involves import or export, the developer shall obtain approval of the import/export location by the City Engineer prior to obtaining a grading permit.

138. Permission from property owners shall be required for work located on adjacent properties. A notarized letter of permission shall be provided to the City prior to issuance of any permit.

139. Clean water measures shall be in place and designed per the guidelines provided in the latest edition California Storm Water Quality Best Management Practices Handbook.

140. Runoff discharge from the construction and fully developed site shall meet NPDES water quality requirements by implementing Best Management Practices (BMP's) on-site to prevent sediment, debris, oils, grease, and other pollutants from flowing through the public storm drain system. The plans shall specifically identify structural and non-structural BMP's that will be designed into and implemented on this project to reduce the discharge of pollutants into the storm drain system to the maximum extent practicable. Structural BMP's shall be provided on-site. Maintenance of BMP's shall be the responsibility of the applicant. Proof of a maintenance mechanism shall be provided prior to issuance of building permit.

141. Plant and irrigate all slopes greater than or equal to 3 feet in vertical height with ground cover to the satisfaction of the City Engineer. Slopes that exceed 15 feet in vertical height are to be planted with shrubs and/or trees.

FLOOD CONTROL

142. Applicant has proposed subgrade infiltration units for water quality purposes. Applicant shall provide calculations satisfactory to the City Engineer that said system will treat stormwater in compliance with Water Quality Control Board regulations. Should said system fail to be sufficient, additional treatment systems shall be provided to the satisfaction of the City Engineer. Positive drainage shall be maintained within the system. System shall have a drawdown time of 48 hours.

143. The proposed on-site storm drain connects to the existing RCFC&WCD storm drain channel. Acquire necessary permits to complete said connection. On-site detention can be waived by the City Engineer if sufficient evidence is provided in writing by RCFC&WCD.

144. Applicant shall provide a drainage study prepared by a registered Civil Engineer identifying storm water runoff quantities expected from the site and upstream of the site. The study shall show all existing and proposed off-site public or private drainage facilities intended to discharge this runoff. The study shall include a capacity analysis verifying the adequacy of said facilities. Runoff from the development or partial phase of development of the property shall not exceed the existing natural discharge quantities with respect to the following criteria:

    a. Detention shall not be required for developments of less than one acre if the development uses volume based water quality measures.

    b. For projects less than 10 acres, including those less than one acre NOT using volume based water quality measures shall analyze and mitigate the difference in

developed and undeveloped runoff based on the 1-hour duration of the 10-year intensity storm. A simplified hydrograph method shall be used that simulates the hydrograph with a triangle. The Rational method flow rate shall be the top value of the triangle and the base width shall be two times the time of concentration (Tc). The difference in area between the developed condition triangle and the existing condition triangle represents the required storage volume. Both triangles shall use time of concentration from the developed condition. Based upon the storage volume head, the outlet structure shall have an outlet flow no larger than the existing flow rate.

c. Projects that are 10 acres or greater shall analyze for the 1, 3, 6 and 24-hour duration for the 2, 5 and 10-year frequency storms.

The design of detention basins shall provide for the detention of nuisance flow. Development shall detain the year and duration incremental storm runoff developed and or increased by means of on-site detention. Detention techniques shall include, but not be limited to: Parking lot detention or on-site detention basin or other methods approved by the City Engineer. Detention shall not be required in the event facilities down stream from the point of discharge are shown to be designed for and have been constructed to convey the fully developed 100 year storm event. Evidence of a maintenance mechanism shall be provided for the basins prior to any building permit. If project discharges/connects to an off-site detention basin, provide permission to drain/connect correspondence from the owner of basin or system and provide corresponding calculations verifying adequacy of off-site basin. Off-site detention basins require a Declaration of Dedication.

145. Street storm flows shall not exceed top of curb for the 10-year storm event and must be contained within the street right-of-way for the 100-year storm event.

146. The applicant shall accept and properly dispose of all offsite drainage flowing onto or through the site.

147. If possible all drainage shall be conveyed onto public property. No cross lot drainage shall be permitted.

148. Applicant shall protect all downstream properties from damages caused by alteration of the drainage patterns, i.e., concentrations or diversion of flow. Protection shall be provided by constructing adequate drainage facilities including enlarging existing facilities and/or by securing a drainage easement. A maintenance mechanism shall be in place for any private drainage facilities constructed on-site or off-site prior to any building permit. Any grading or drainage improvements onto private off site or adjacent property shall require a written permission to grade and/or a permission to drain letter from the affected landowner.

TRANSPORTATION

149. Washington Avenue: Dedicate right-of-way and construct ½-street improvements for Washington Avenue per City of Murrieta standard 104 (modified). A meandering sidewalk design shall be incorporated along the project frontage (Added by Planning Commission).

150. The applicant shall vacate the portion of Washington Avenue that is not required by the

conditions herein. The vacation shall be submitted to the City for review, approval, and recordation prior to any building permit.

151. The applicant shall vacate or provide evidence of prior vacation of the portions of Lots C and D of Parcel Map 9357 within the development plan boundary. The vacation, if necessary, shall be submitted to the City for review, approval, and recordation prior to any building permit.

152. Prior to the issuance of a grading permit, the applicant shall prepare and submit a lot line adjustment or a parcel map for review and approval by the Engineering and Planning Departments. The lot line adjustment or parcel map shall merge or reconfigure Assessor Parcel Numbers (APN's) 906-070-008, 906-070-009, 906-070-052 and 906-070-060 in compliance with the proposed lot lines shown on the development plan or as approved by the City Engineer. Proof of recordation shall be submitted to the Planning and Engineering Departments within six (6) months of recorded deeds. The proposed parcels shall comply with the development standards of the Community Commercial (CC) zone.

153. Construct a 10-foot wide raised median on Washington Avenue from a point 100-feet north of the northerly extended property line south to a distance of not less than 350 feet per City of Murrieta Standard 115 (modified) or as approved by the City Engineer. Modified refers to changing the overall width of the median from 18-feet to 10-feet. Landscaping or hardscaping requirements for the median shall be per the City Engineer.

154. Construct a traffic signal at the intersection of Washington Avenue and the main project entrance no less than 660 feet north of Kalmia Street centerline to main entrance centerline. The intersection geometrics shall be as follows (assuming Washington Avenue is north-south):

a. North-bound: 2 through lanes, 1 right-turn lane

b. South-bound: 1 left-turn lane, 2 through lanes

c. West-bound: 1 left/through lane, 1 right-turn lane

d. East-bound: 1 left/through lane, 1 right-turn lane (City realigned driveway to the driving range)

The signal design and construction shall include fiber optic interconnect from Kalmia to the project entrance to provide signal coordination.

Applicant shall dedicate right-of-way necessary to construct said geometrics. Any off-site widening to accommodate these geometrics shall be the responsibility of the applicant.

Northerly driveway entrance shall be restricted and signed for right-in and right-out movements only. Southerly driveway entrance shall be restricted and signed for right-in movements only, to the satisfaction of the Traffic Engineer.

155. Design and construct a right-turn overlap signal modification for West-bound (Kalmia) to North-bound (Washington) traffic at the Washington/Kalmia intersection or as directed by

the Traffic Engineer.

156. Construct a 14 foot wide, 100-foot long right-turn pocket on north-bound Washington Avenue at the 2nd driveway entrance to the site. Dedicate necessary right-of-way for said improvements.

157. Coordinate with Riverside Transit Agency (RTA) to determine the need and location of a bus stop along the project frontage of Washington Avenue. If a bus stop is required, dedicate necessary right-of-way and construct improvements per City of Murrieta Standard 217 and RTA requirements.

158. Improvement plans shall be prepared by a Registered Civil Engineer based upon a centerline profile extending a minimum of 300 feet beyond the project boundaries at a grade and alignment as approved by the Civil Engineer.

159. Construct driveway approach improvements per City of Murrieta Standards.

160. Construct street lighting per City of Murrieta Standards.

161. Signage and landscaping shall be located so as not to interfere with sight distance per City of Murrieta Standards.

162. Prior to the issuance of any building permit, the applicant shall prepare and have approved signing and striping plans for all on-site, off-site and project frontage improvements as conditioned herein, unless otherwise determined by the City Engineer.

163. The applicant shall provide for the under grounding of all existing and proposed utility distribution facilities within the project unless exempt per the City of Murrieta Development Code. The applicant shall be responsible for the associated costs and arrangements with each public utility.

164. Install required water and sewer systems necessary to serve the project per the City of Murrieta Development Code.

165. All existing street and property monuments within or abutting this project site shall be preserved consistent with AB 1414. If during construction of onsite or offsite improvements monuments are damaged or destroyed, the applicant/developer shall retain a qualified licensed land surveyor or civil engineer to reset those monuments per City of Murrieta Standards and file the necessary information with the County Recorder's office as required by law (AB 1414).

COMMUNITY SERVICES DISTRICT:

166. The applicant shall pay all applicable fees to the Murrieta Community Services Department per City policies and ordinances before issuance of any permits.

BUILDING DEPARTMENT:

General:

167. All structures shall comply with the current 2001 California Building Codes (CBC), and related Codes and Ordinances of the City of Murrieta. Three (3) sets of plans shall be submitted for a building permit, and shall include building data, building use/occupancy, construction type, allowable area increases and actual building square foot area, building setbacks, related building means of egress and ensuing egress discharge to the public right-of-way.

168. Required CBC, site facility accessibility components and details, unload areas, striping and HC parking symbol, accessible exterior routes of travel, as defined in Sec.1127B of the 2001 California Building Code (CBC); routes of travel, transition components etc., shall be provided between all commercial buildings, and each building to its own accessible trash enclosure and at least one exterior route shall be from the project site, to the public right-of-way, which shall be shown on an architectural site plan, and shall correlate with the civil designed precise grade plan. All design and details shall comply with California State guidelines as outlined in Title 24 California Building Code. The property owner shall be responsible for Federal ADA compliance.

169. Plans submitted during the permitting process, including but not limited to, site plan, precise grade plans and building architectural features, shall not vary substantially, from plans previously reviewed and Approved by the Planning, Engineering or other City Departments, without prior authorization form the Planning Manager, Public Works Director and/or Building and Safety Manager.

170. All exterior lighting shall be shown on building permit plans and shall comply with the City of Murrieta's MMC Sec.16.18.110, Mt. Palomar Lighting Pollution Control Standards.

171. A detailed Site Plan and correlating civil precise grade plan shall be submitted to the Building and Safety Department for site development review and Approval, prior to the issuance of a precise grading permit from the Engineering Division. Review for overall site features including trash enclosures construction details, exterior lighting compliance with the Mt. Palomar Lighting Pollution Control; site accessibility features, including exterior routes of travel, accessible transition components, grades and details.

Building Permit Application:

172. Plans submitted for building construction shall contain a full size copy of the Final Approved set of city departments Conditions of Approval.

173. Two sets of signed soil reports shall be submitted and correlate with building foundation design by reference. The report shall be from an individual licensed by the state to prepare such report, including compaction test results and verification of satisfactory placement, of any fill material used to support the foundation of any building or structure, in accordance with accepted engineering practice or, as recommended in any engineering geology preliminary report for any engineered grading design.

174. A sewer/ water permit shall be obtained from the City of Murrieta Building & Safety Department, for on-site (private) underground "wet" utilities for multi-building parcel

development, unless dedicated easements and conveyance to local water/sewer districts is proposed. A deposit shall be paid to the Building and Safety Department at the time civil plans are submitted for plan review. Three (3) sets of civil plans shall be submitted for review, prior to grading permit Final. Maintenance agreements, reciprocal access and/or easements shall be recorded and verified prior to a Final building inspection and/or a building occupancy.

175. Separate permits shall be obtained from the City of Murrieta Building & Safety Department, for individual structures e.g., monument signs, building wall signs, masonry walls, retaining walls, temporary power etc. Temporary power and temporary wiring shall comply with Articles 230 and 305 of the 2001 California Electrical Code.

176. Separate permits shall be obtained from the City of Murrieta Building & Safety Department, for existing structures being relocated or, demolished.

Prior To Building Final:

177. Final permit approvals shall be obtained, and any outstanding fees shall be paid to all City Departments/Divisions which may include Fire, Planning, Engineering, Building & Safety, and the City Landscape Architect, prior to a tenant occupancy of a building permitted as a "shell only" building, a building shell "Notice of Inspection Completion", and the issuance of a Certificate of Occupancy from the City of Murrieta Building & Safety Division.

FIRE DEPARTMENT:

178. The applicant shall comply with all conditions as outlined in the Fire Departments letter dated December 5, 2006 incorporated herein.

179. Fire Prevention has reviewed the plans submitted to our department. The following fire protection requirements must be provided in accordance with The City of Murrieta Ordinances and/or recognized fire protection standards.

BUILDING PLAN SUBMITTAL

180. City of Murrieta Ordinance No. 546 establishes the installation of a fire protection sprinkler system in all buildings with fire flows calculated with a base of 1500 GPM or greater. The sprinkler system post indicator valve and fire department connection shall be located to the front of the project and no further than 40 feet from a super fire hydrant and on the same geographical side of any drive aisles. These appliances shall be located at a minimum of 25 feet from any building. A statement that the building(s) will be automatically fire sprinklered must appear on the title page of the building plans.

181. Comply with all conditions for explosion venting and dust collecting addressed in the Uniform Building Code Section # 307.10. If applicable.

182. Plans must illustrate designated location of fire lanes. Contact Fire Prevention for recommended designations.

183. Fire sprinkler system shall conform to NFPA 13.

184. Minimum fire sprinkler density of .33 GPM/ 2500 SF is required even if high piled stock is planned.

185. If project is planned for Business condominium or changes to business condominium project, additional conditions will apply.

186. Applicant must comply with conditions addressed in the California Administrative Code Titles 19 & 24.

187. Occupancy separation may be required as per the Uniform Building Code, Section 302.

188. All buildings within the City of Murrieta shall have fire retardant roofing with a Class "B" minimum rating. The developer must submit documented fire rated listings, supplied by the manufacturer, to the Fire Marshal if he/she chooses to use wood shingles.

PRIOR TO BUILDING PLAN RELEASE

189. A looped combination of an on-site/off-site fire protection water systems is required with (6" x 4" x 2-1/2" x 2-1/2") super fire hydrants. This system shall be designed and installed with no hydrant closer than 25 feet or no further than 165 feet from any portion of exterior walls as measured along vehicular travelways.

190. Fire Prevention has established a required minimum fire flow for protection of the above referenced project. Using UFC Table III-A for determining fire flows, 2550 GPM for a 4-hour duration at 20-PSI residual operating pressure must be available before any combustible material is placed on the job site. This fireflow is all inclusive of fire sprinkler system and inside / outside hose demand

191. Fire Flow Requirements have been based on UFC guidelines for the determination of fire flow requirements. Factors considered were Type V construction.

192. Applicant/Developer shall furnish one copy of the water system plans to the Fire Department for review. Plans shall conform to fire hydrant types, location and spacing, and, the system shall meet the fire flow requirements. Plans shall be signed/approved by the water company having jurisdiction and a registered engineer must provide the following certification statement.

> "I hereby state that the design of the water system within this project is in accordance with the requirements prescribed by the Murrieta Fire Department as to hydrant type and spacing, and will provide fire flow of 2550 GPM if sufficient water is available at the point of connection."

193. City of Murrieta Fire Department requires all commercial buildings to provide flush mount Knox Box Access Systems and must be no higher than 6' off the finished ground to the right of front and rear doors as being faced. Must also be shown on architectural plans. Applications are provided by our Planning/Prevention Bureau.

GENERAL CONDITIONS

194. All standards, regulations and policies established for public safety and the protection of property established in City of Murrieta Development Code must be in compliance with the approval of all local authorities.

ACCESS REQUIREMENTS

195. The Applicant/Developer shall agree to make application and agreements with the Murrieta Fire Protection District, to install a strobe light monitor receiver with Knox key switch backup, on all electrically controlled gates for vehicular access, prior to occupancy of any structure within this project.

196. Secondary/alternate access points shall meet the requirements established for public safety and shall be installed prior to construction of this project.

197. Access will have a 56-foot turning radius capable of accommodating fire apparatus.

198. Access will be a minimum of 28 feet wide to accommodate fire apparatus.

199. Access will have a minimum of 13 foot 6 inches vertical clearance to accommodate fire apparatus.

200. Any dead end in excess of 150' requires an approved turnaround. Contact Fire Department for details.

201. All access requirements shall be in place and approved by Fire Prevention prior to release of building permits. Foundation only permits may be issued prior to access and water systems being installed. Please contact Fire Department for any needed information or clarification.

PRIOR TO OCCUPANCY

202. Install a supervised sprinkler water flow detection alarm system as per National Fire Protection Association pamphlet No. 71. Notification of alarm to be provided for all tenant spaces. These plans must be designed by a certified fire alarm specialist and submitted for Fire Prevention approval prior to installation.

203. Fire sprinklers may need to be relocated to provide adequate coverage when improvements are installed. Engineered drawings must be submitted to the Fire Department for approval prior to any system modification.

204. Portable Multi-purpose fire extinguishers with a minimum rating of 2A-10BC must be installed. Contact a certified extinguisher company for proper placement of equipment.

205. Restaurants require a hood duct fire extinguishing system to be installed in accordance with National Fire Protection Association pamphlets No. 17 or No. 17A. Plans must be submitted to the Fire Marshal for approval prior to installation. A portable fire extinguisher with a minimum rating of 40BC (for saponification) and a type K fire extinguisher shall be installed in the kitchen area.

206. Applicant/Developer shall be responsible for obtaining underground tank permits from both the County Health and Fire Departments.

207. Federal law under SARA Title III (Right To Know Act) requires that facilities with hazardous materials must provide Material Safety Data Sheets to the local Fire Department, the local Emergency Planning Committee and the State Emergency Response Commission.

208. All buildings will comply with NFPA 704 placard requirements when applicable. Contact Fire Department for information.

209. Address directory shall be provided next to all major entranceways to this project. Alll buildings shall be clearly identified with designators 12" high with 1" strokes mounted on contrasting backgrounds. These designators shall be placed on all 4 sides of each building and show address locations and elevations on architectural plan.

210. All decorative materials must be flame resistive. Prior to release of occupancy, the Developer must submit manufactures State Fire Marshal's listings of all materials being used. Cloth and other flammables must display a label of the State Fire Marshal's seal of approval.

211. Prior to release of above referenced project, the Developer/Applicant is responsible to provide all fire protection measures and information required by Fire Prevention. If any of these conditions are not met before, during or after completion of the proposed buildings, the Developer understands that he is in violation of City of Murrieta Ordinance No. 546 and/or the Uniform Fire Code, and Fire Prevention has the authority to disrupt or permanently stop the construction of the project.

212. A check or money order in the amount of (contact Fire Department for exact amount) shall be made payable to CITY OF MURRIETA FIRE DEPARTMENT for building plan review. Project number submitted by City of Murrieta Planning Department must be referenced in order to credit the appropriate project. Refer to Plan Check Fee/Mitigation Sheet attached to Building Plan Review letter.

213. Murrieta City Resolution requires that fire impact mitigation fees totaling (see planning department) per square foot, as part of the Development Impact Fee, must be paid prior to release of building permit. Contact Planning Department for exact amount.

214. PRIOR TO ANY BUILDING RELEASE, THE APPLICANT/ DEVELOPER SHALL SUBMIT APPROVED WATER PLANS AND PAY ALL REQUIRED FIRE FEE'S.

All questions regarding the meaning of the conditions shall be referred to the Fire Department, Planning, and Engineering staff.

SCHOOL DISTRICT:

215. Prior to the issuance of building permits, the applicant shall pay the school district the required mitigation fee in effect at the time of request.

PASSED, APPROVED AND ADOPTED THIS 13TH DAY OF DECEMBER, 2006

Planning Commission Chairperson

ATTEST:

Jack McGee, Planning Director

I, Jack McGee, Planning Director, City of Murrieta, California do hereby certify under penalty of perjury that the foregoing Resolution was duly adopted at a regular meeting of the Planning Commission on the 13TH day of DECEMBER 2006 by the following roll call vote:

MOTION MADE BY COMMISSIONER Fitzpatrick

SECONDED BY COMMISSIONER LUPRO

AYES: Fitzpatrick, LUPRO, LANE
NOES: NONE
ABSENT: RAWLINGS
ABSTAINED: NONE

Jack McGee, Planning Director

#	Station Name	Date	Specific Conductance (µmhos/cm)	TDS (g/L)	Turbidity (NTU)	pH	Temperature (°C)	Dissolved Oxygen (mg/L)	Comments: (include odor, color, clarity, floatables, stains, oil, sheen, surface scum, etc. at each station)
1	California Oaks Channel	09/12/06	1.75	1,225	15	8.78	25.8	7.33	Light brown, clear, floating particles
		05/24/07	1.68	1,176	12	7.91	26.7	8.58	Brown, cloudy
2	Catt Road	09/12/06	2.1	1,470	18	8.58	27.3	9.49	Light brown, clear
		05/24/07	1.98	1,386	21	8.98	29.8	12.01	Slightly green, clear

11/12/09

0000554

SAN DIEGO REGIONAL
WATER QUALITY
CONTROL BOARD

2007 OCT 31 P 12:

2006 – 2007
DISTRICT INDIVIDUAL SWMP

TO THE
SAN DIEGO REGIONAL WATER QUALITY CONTROL BOARD
AND
UNITED STATES ENVIRONMENTAL PROTECTION AGENCY – REGION IX
(Order No. R9-2004-001, NPDES No. CAS108766)

OCTOBER 31, 2007

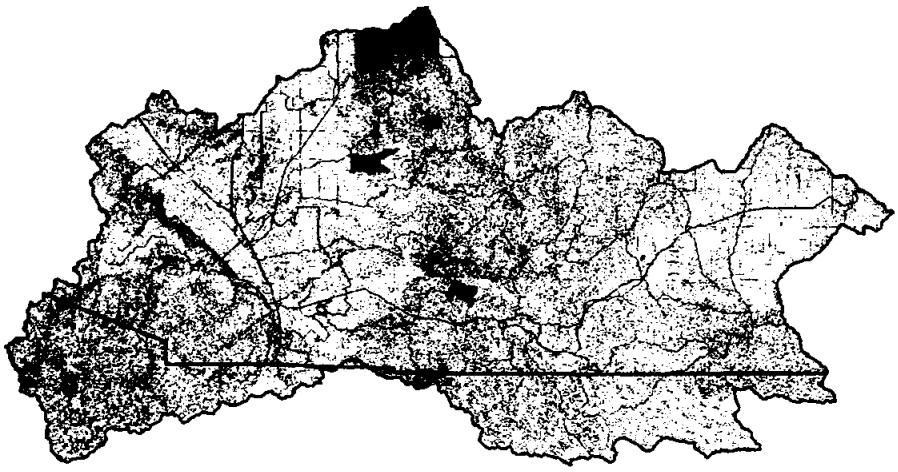

VOLUME 1 of 1

SANTA MARGARITA WATERSHED
RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

NPDES

0000555

2006 – 2007
DISTRICT INDIVIDUAL SWMP

TO THE
SAN DIEGO REGIONAL WATER QUALITY CONTROL BOARD
AND
UNITED STATES ENVIRONMENTAL PROTECTION AGENCY – REGION IX
(Order No. R9-2004-001, NPDES No. CAS108766)

OCTOBER 31, 2007

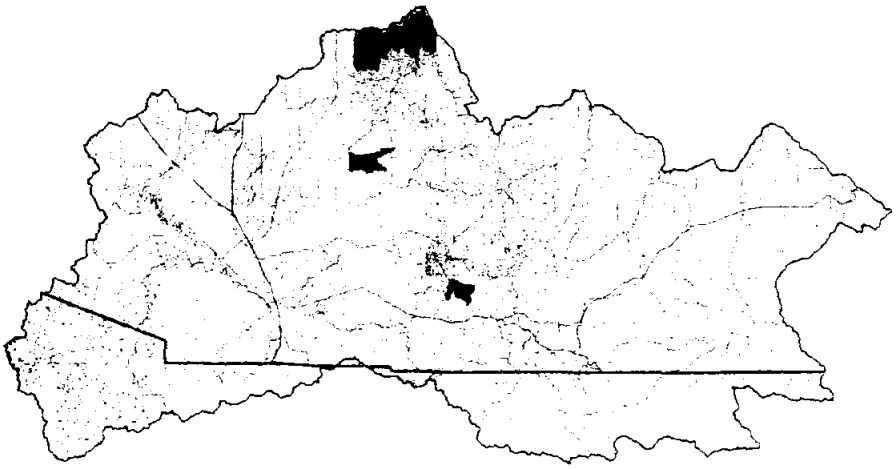

VOLUME 1 of 1

SANTA MARGARITA WATERSHED
RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

N P D E S

CERTIFICATION

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Signed: S. E. Stump

Stephen E. Stump
Chief of Regulatory Division
Riverside County Flood Control
and Water Conservation District

RCFC&WCD

SANTA MARGARITA WATERSHED
NPDES MUNICIPAL STORMWATER PERMIT
(NPDES No. CAS0108766)

ANNUAL REPORTING FORMS

FOR

DISTRICT
FISCAL YEAR 2006 - 2007

I. Executive Summary
1. Development Planning
2. Construction
3. Municipal
4. Industrial/Commercial
5. Residential
6. Education
7. Illicit Discharge Detection and Elimination
8. Public Participation
9. Fiscal Analysis Component
10. Non-Storm Water Discharges
11. Receiving Water Limitations
12. Additional Urban Runoff Data
13. Proposed Revisions

Attachment A – WQMP Tracking Report
Attachment B – WQMP Example conditions
Attachment C – Training Logs
Attachment D – Encroachment Permit Log
Attachment E – Reports of Collected Debris in MS4
Attachment F – IC/ID Reports
Attachment G – Proposed revision to Individual SWMP
Attachment H – Newly accepted Flood Control Facilities

BOARD ORDER NO. R9-2004-001
CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN DIEGO REGION

EXECUTIVE SUMMARY

The Santa Margarita Watershed Riverside County Flood Control and Water Conservation District's (District) Individual SWMP Annual Report (Annual Report) for the District's Individual Stormwater Management Plan (District SWMP) documents specific urban runoff management programs and activities implemented to comply with the requirements of the third-term Municipal Separate Storm Sewer System (MS4) Permit issued to the District by the San Diego Regional Water Quality Control Board (Regional Board) on July 14, 2004 (Board Order R9-2004-001), referred to herein as the "Third-Term MS4 Permit". This Annual Report addresses Provision III.A.1 of the Monitoring and Reporting Program to the Third-Term MS4 Permit.

The Third-Term MS4 Permit required each Permittee to develop an Individual Storm Water Management Plan and for all the Permittees to jointly develop a Watershed Storm Water Management Plan. As Principal Permittee, the District was to coordinate the development of the compliance programs. The compliance program documents, and the programs they describe, were to be completed, submitted to the Regional Board and implemented by July 14, 2005. Annual Reports for each of these documents are required and are to be submitted to the Regional Board on October 31st of each calendar year. The reporting period is specified as the preceeding fiscal year. The District specifically prepares this Annual Report and the Watershed SWMP Annual Report. In addition, as Principal Permittee, the District is tasked with coordinating the submittal of the Individual SWMP Annual Reports for the other Third-Term MS4 Permit Permittees (Riverside County and Cities of Murrieta and Temecula).

This Annual Report covers the period extending from July 1, 2006 through June 30, 2007. This report specifically responds to reporting requirements specified in the Monitoring and Reporting Program of the Third-Term MS4 Permit. This includes identifying program progress and effectiveness evaluations.

This Annual Report specifically responds to the Permit's reporting requirements and including program effectiveness evaluations. The Permit requires the Permittees to develop a long-term strategy to evaluate the effectiveness of the SWMPs. The FY 2005-2006 Annual Report reflects the first year that the new Permit programs were fully implemented and that Program Effectiveness Assessments (PEAs) were required. It should be noted that a PEA requires the initial establishment of a set of baseline conditions using measurable metrics. These baseline conditions can then be used to establish measurable goals based on the measured metrics. Thereafter, effectiveness can be evaluated by comparisons of successive years of measurable metrics against the baseline data and measurable goals.

The long-term strategy for the PEA will be conducted at two levels. At the first level or Annual Assessment Level, the PEA will focus on an annual assessment of program implementation and Permit compliance. These assessments will be addressed by completing the Annual Reporting Forms, which will confirm program implementation, Permit compliance and collection of measurable metrics. Assessments will be included at the end of each Annual Report section as required by the reporting requirements of the Third-Term MS4 Permit. Inferences about the compliance of each program [development, construction, Illicit Connection/Illicit Discharge

EXECUTIVE SUMMARY

(IC/ID), etc.] will predominantly be drawn from both direct and indirect measures of progress for each program.

At the next level or Long-Term Level, the Permittees will collectively evaluate the measurable metrics, Receiving Water monitoring Data, and IC/ID monitoring data to assess changes in knowledge and behavior, load reductions and improvements in Receiving Water Quality. This analysis will be conducted as part of the Report of Waste Discharge (ROWD). The results of this assessment will evaluate the need to make significant programmatic revisions to the Permit compliance programs to protect Beneficial Uses of Receiving Waters. This analysis will place more emphasis on using direct measures of progress (monitoring data, long term trend analysis) and will support the review and any revisions to the Riverside County Drainage Area Management Plan (DAMP) and Individual SWMPs using information from the Water Quality Monitoring Program, IC/ID Monitoring Program and measurable metrics that have been collected.

Where the period of evaluation is characterized by the implementation of new program requirements, determinations of program effectiveness will initially be limited to confirmation of program implementation and collection of measurable metrics until baseline conditions can be properly established. Further, it must be recognized that direct measures of long-term program effectiveness may not be available within the timeframe of the Third-Term Permit. This lack of direct measure confirmation arises because:

- Baseline water quality conditions are not readily established;
- Water quality changes in response to program implementation are likely to be very slow;
- Establishing a link between receiving water condition and program activities is difficult at the watershed scale when programs are being implemented incrementally with the development/redevelopment cycle; and
- Inherent variability of natural systems and stormwater quality.

While program effectiveness assessment is a key step in the iterative process of program implementation, it should be realized that effectiveness assessment itself is a part of the management process that is also evolving. Assessing program effectiveness is recognized as a challenge for program managers across California, and the District is supporting the effort of the California Stormwater Quality Association (CASQA) to develop guidance in this area at a statewide level.

For purposes of this Annual Report, the terms "Watershed Stormwater Management Plan (Watershed SWMP)" and "Standard Urban Stormwater Management Plan (SUSMP)" referenced in the Santa Margarita Region Permit are referred to as the "DAMP" and "Water Quality Management Plan (WQMP)" respectively, to be consistent with terminology previously established in prior compliance documents used by the Permittees. Additional terms and acronyms used in this Annual Report are defined in the glossary included in the DAMP.

1. DEVELOPMENT PLANNING
(SECTION F of ORDER R9-2004-001)

1) Description of any Amendments to the General Plan or the Development Project Approval Process:

The District does not have land-use authority. It, therefore, does not maintain a General Plan or have direct control over the overall development project approval process. However, the District has entered into agreements with the County of Riverside to review proposed developments in the unincorporated County area for water quality and flood control related impacts and issue appropriate conditions of approval on behalf of the County.

In support of this role, the District spent the last fiscal year either completing or initiating the following tasks:

a. On October 5, 2006, the District, in conjunction with Santa Margarita and Santa Ana co-permittees, facilitated a meeting to continue discussion of WQMP implementation issues and experiences. Attendees included representatives from various cities/county planning and engineering departments. The Permittees developed a Frequently Asked Question (FAQ) committee to facilitate consistent implementation of the WQMP. The FAQ was completed on October 10, 2006 and is included in the Watershed SWMP Annual Report. Additionally, a watershed impairment map and updated WQMP template were created on April 2007 and October 26, 2006, respectively. The WQMP meeting is anticipated to be held, as needed, but at least once a year.

b. On April 4, 2006, District and County staff held a public workshop before the Riverside County Board of Supervisors to discuss post-construction Best Management Practices (BMPs) that the County may be willing to accept, a proposed public funding mechanism to ensure that the post-construction BMPs would be fully funded for maintenance, and a proposal for identifying the entities/County departments that would be responsible for tracking and maintaining post-construction BMPs under the proposed public funding mechanism. The Board of Supervisors directed staff to move forward with development of expanded treatment control BMP design guidance with a focus on landscape-based features and to work out the precise mechanism to accomplish public funding for these BMPs. It is expected that this issue will be brought back to the Board for consideration in FY 2006-2007.

c. In support of the District's proposed LID BMP Design Manual, the District initiated a LID BMP Testing and Evaluation Facility. The proposed facility will be constructed via a retrofit of the District's compound in Riverside. The project proposes to construct, test and evaluate a variety of integrated management practices (IMPs) that serve as hydraulic and hydrologic controls consistent with the low impact development (LID) planning and design approach. The project proposes the following Integrated Management Practices (IMPs):

- The replacement of 55,800 sf of existing asphalt pavement & base with new porous asphalt pavement and new porous concrete pavement and sub drain systems.

- The construction of 3 flow-through planter systems.

1. DEVELOPMENT PLANNING
(SECTION F of ORDER R9-2004-001)
CONTINUED

- The replacement of 165' of storm drain pipe with a vegetated infiltration swale.

- The replacement of 2,800 sf landscaped area with a vegetated infiltration swale.

- The deepening of an existing infiltration basin to facilitate monitoring data collection.

In addition, the project proposes the following monitoring and testing components:

- The construction of 7 monitoring vaults with flow metering, discharge pumps and electronic control and recording equipment.

- The evaluation of a standard suite of pollutants for selected runoff events including specific pollutants of concern in the Santa Ana Watershed such as nutrients and pathogens.

- The assessment of each IMP's ability to mitigate increased runoff volumes associated with development.

- The assessment of life-cycle costs of the IMPs

- The assessment of necessary modifications to design standards to improve IMP effectiveness or ease of maintenance

The proposed project will implement a variety of LID IMPs that will be used to test and demonstrate the effectiveness of these practices in contributing to storm water capture and management, treating pollutants of concern associated with urban runoff, mitigating the impacts of hydromodification from urban development, and identifying optimum IMP design criteria and standards for LID IMPs in Riverside County. Data collected by this project will be provided to the regional SMC LID Project and will be available to benefit all SMC members.

d. The District has continued to participate in the Stormwater Monitoring Coalition's efforts to develop numeric guidance for addressing Hydrologic Conditions of Concern, including both their Hydromodification study and their LID Projects, in conformance with Permit requirement F.2.b)9. of Board Order R9-2004-001. The District has been actively participating with this effort by providing comments on the monitoring protocols used in the study, identifying sites that fit the site selection criteria, and by offering in-kind services for the survey work needed.

The goal of this project is to develop a series of tools for implementation of hydromodifcation management measures that could be used to better protect the physical, chemical, and biological integrity of streams and the associated beneficial uses. The project

1. DEVELOPMENT PLANNING
(SECTION F of ORDER R9-2004-001)
CONTINUED

would consist of four technical tasks. The first task would involve developing a mapping and classification system for streams based on their susceptibility to the effects of hydromodification. The second task would establish protocols for ongoing monitoring that is carefully designed to assess the effects of hydromodification. The third task would involve development and calibration of dynamic models to assess the effects of hydromodification on stream condition. The fourth task would involve development of a series of tools that managers can easily apply to make recommendations or set requirements relative to hydromodification for new development and redevelopment.

2) Number of Grading Permits Issued:

Not applicable. The District does not issue grading permits for the County of Riverside.

3) Number of Developments Conditioned to meet SUSMP Requirements:

The District utilizes a case tracking program (District Land Management Tracking) that tracks project statuses and produces reports identifying the number of developments conditioned with SUSMPs (See Attachment A). During this reporting period, the District has conditioned 68 developments to prepare a Preliminary WQMP.

4) Attach One Example of a Development Project that was Conditioned to Meet SUSMP Requirements and a Description of the required BMPs:

See Attachment B.

5) Description of any Updates to the Environmental Review Process:

No revisions were needed nor made.

6) Description and Number of Training Efforts Conducted during the Reporting Period (for staff, developers, contractors, etc.), including the Number of Staff Trained.

a. **Training:** (See Attachment C)

Training	Training Description	Training Dates	Number of Attendees
WQMP	New Development	10/3/06	11
WQMP	New Development	10/23/06	17
WQMP	New Development	4/16/07	1
WQMP	New Development	4/25/07	1
		Total	**30**

1. DEVELOPMENT PLANNING
(SECTION F of ORDER R9-2004-001)
CONTINUED

b. Summarize the Educational and Outreach Activities the Development Planning Component has conducted over the Past Year.

Each development project conditioned by the District is required to obtain copies of appropriate public education and outreach materials from the District's NPDES Public Information Officer or from our website. They are also required to submit an affidavit stating that they will distribute the public education materials to new property owners. This affidavit is recorded in the development's individual file. Additionally, the District has implemented a tracking mechanism to facilitate the accurate reporting of the number of affidavits received each fiscal year.

Additional public education and outreach activities undertaken by the District are considered part of the Regional Public Education Program described in the Watershed SWMP Annual Report.

In addition, an FAQ, Watershed Impairment Map, and updated template were created for the development and plan checking community.

7) An Assessment of Program Effectiveness Based on the Measurable Goals Established in the Permittee's Individual SWMP:

As mentioned above, because the District has no land use authority and provides services on the County's behalf, the District has no direct measurable goals for the Development Planning Component. As indicated in the District's Individual SWMP, we collect the metrics described in this report and forward them to the County for their analysis as part of the County's Individual SWMP Annual Report.

The District has identified the following program areas where, in conjunction with the County, we are evaluating potential ways to improve the effectiveness of post-construction BMPs for Development Planning Program:

a. A public long-term maintenance mechanism for post-construction BMPs within the unincorporated County.

b. Additional post-construction BMP guidance to ensure the effectiveness and efficiency of post-construction BMPs.

This evaluation is on-going. Currently, the District is proposed to spend approximately $1.3 million on BMP testing for the purposes of optimizing the design and verifying the effectiveness of various BMPs. Further details are provided below.

8) Additional Comments/Information:

Major accomplishments of the program are described in responses to questions 1, 3 and 5 of this reporting form.

1. DEVELOPMENT PLANNING
(SECTION F of ORDER R9-2004-001)
CONTINUED

Describe the Major Accomplishments of the Development Planning Component over the Past Year. (General Plan or ordinance revisions, procedure/approval process changes, SUSMP guidance material):

Though initiated January 2006, FY 2006-2007 marks a complete reporting period in which the District has implemented a tracking mechanism to facilitate the accurate reporting of the number of public education affidavits received each fiscal year. This identifies the successful incorporation of the public education tracking process into the development planning procedures. As mentioned above, an FAQ, Watershed Impairment Map and updated template were created for the development and plan checking community.

9) **Summarize New Activities or Improvements to be implemented Next Year as a result of your Self Assessment of the Development Planning Component:**

The District is proposing the following program improvements for the next reporting period as a result of an assessment:

The District is currently working on addressing the areas of improvement identified in Question 7 above.

a. District and County staff are working on the development of expanded treatment control BMP design guidance with focus placed on low impact development concepts such as landscape based BMPs. In addition, a proposed public funding mechanism to ensure that the post-construction BMPs would be fully funded for maintenance and a proposal for identifying the County departments that would be responsible for tracking and maintaining post-construction BMPs under the new public funding mechanism, is also proposed for consideration by the County Board of Supervisors.

b. The District is continuing to work with the Stormwater Monitoring Coalition (SMC) and others to develop numeric hydromodification guidance as required by permit requirement F.2.b)(9). The District has partnered with the SMC and Southern California Coastal Watershed Research Project (SCCWRP) to pursue grant funds to undertake the necessary studies. In addition, the District is proposing to spend approximately $1.3 million on BMP testing to evaluate the effectiveness of Low-Impact Development (LID) BMPs' abilities at addressing hydromodification. This data will be used to supplement our existing BMP design criteria, which should be published ahead of SCCWRPs results. A final set of deisgn criteria and BMP guidance will be developed upon completion of SCCWRPs work. The next steps will be determined based the result of the grant applications.

2. CONSTRUCTION
(SECTION G)

NOTE: THIS SECTION IS APPLICABLE TO DISTRICT ADMINISTERED AND ENCROACHMENT PROJECTS ONLY.

1) Number of Inspections Conducted:

There was one (1) District administered construction project within the Santa Margarita Region in the reporting period. The project was Wildomar Channel Stage 5 located within the unincorporated Wildomar area of southwestern Riverside County between Wesley Street and the northern extension of Jane Court. The project lasted for five (5) months. During the construction period, the District inspects the construction project daily.

There were fourteen (14) encroachment projects through the District within the Santa Margarita Region. A copy of the encroachment permit log, with projects located in the Santa Margarita Region highlighted, is included in Attachment D. In general, most District encroachment projects last for a month or less and do not involve significant construction activity. Occasionally, more extensive projects, like bridges, may encroach on the District property for a longer period. During the encroachment period, the District inspects the construction projects approximately three times a week. There were eleven (11) construction related encroachment permits issued in the District right-of-way.

For both construction and encroachment projects, site inspections include verifying that adequate minimum BMPs are in place to comply with Order R9-2004-001 and the General Construction Permit. Actual inspections reports are not taken during each site visit unless there is a problem which needs to be addressed, at which time a notification is given. There were no significant construction related problems during the reporting period.

2) Number and Type of Enforcement Actions Related to Construction Sites:

Enforcement and Compliance Responses	Private Projects	Public Projects
Non-monetary Penalties	0	0
Stop Work Authority	0	0
Fines	0	0
Financial Security	0	0
Permit/Certificate of Occupancy Denial	0	0
Referral to SDRWQCB	0	0
Total	**0**	**0**

3) Description of Modifications made to the Construction and Grading Approval Process:

No revisions were needed nor made.

2. CONSTRUCTION
(SECTION G)
CONTINUED

NOTE: THIS SECTION IS APPLICABLE TO DISTRICT ADMINISTERED AND ENCROACHMENT PROJECTS ONLY.

4) Description and Number of Training Efforts Conducted during the Reporting Period.

a. Training: (See Attachment C.)

Training	Training Description	Training Dates	Number of Attendees
Construction	Compliance with General Permit	10/2/06	1
Construction	Compliance with General Permit	10/12/06	5
Construction	Compliance with General Permit	10/16/06	1
Construction	Compliance with General Permit	4/30/07	5
		Total	**12**

b. Summarize any Additional Education and Outreach Activities Conducted for Project Applicants, Contractors, Developers, Property Owners, and/or other Responsible Parties in Support of the Construction Component:

The District is only directly responsible for administering District Public Works projects and does not have the authority over private development activities. As stated in the General Construction Permit (Order No. 99-08 DWQ), individuals responsible for SWPPP preparation, implementation, and permit compliance shall be appropriately trained both formally and informally. During the SWPPP review process, the District requires that these requirements are met and training certifications are provided. Additionally, as part of the preconstruction meeting for all District projects, the contractor must attend a NPDES Contractor's Training Presentation given by the District. Additional contractor education and outreach is implemented through the Regional Public Education Program and is described in the Watershed SWMP.

10) An Assessment of Program Effectiveness based on the Measurable Goals Established in the Permittee's Individual SWMP:

As indicated in the District's Individual SWMP, the District does not have land-use or police powers, and as such cannot issue grading permits or regulate private construction activities. Therefore, the District's construction program is limited to District projects or for portions of Third-Party Construction Projects that encroach upon District rights-of-way. The District's Individual SWMP, therefore, did not establish specific measurable numerical values because of our limited role and limited number of District projects in the region. The District's construction program has been found to be effective because our inspectors received training and our construction projects were inspected consistent with permit requirements.

2. CONSTRUCTION
(SECTION G)
CONTINUED

NOTE: THIS SECTION IS APPLICABLE TO DISTRICT ADMINISTERED AND ENCROACHMENT PROJECTS ONLY.

In addition, the District's specifications include minimum erosion and sediment control BMPs that are required of District Capital Improvement Projects, where applicable.

11) Additional Comments/Information:

Attachment D includes the District's standard encroachment permit conditions.

3. MUNICIPAL
(SECTION H.1 of ORDER R9-2004-001)

1) **Number of Inspections Conducted at Existing Municipal Facilities:**

Not Applicable – there are no District municipal facilities within the Santa Margarita Watershed.

2) **Number and Type of Enforcement Actions Related to Municipal Sites:**

Enforcement and Compliance Responses	Number
Education and Information	N/A
Verbal Warning	N/A
Written Warning	N/A
Other	
Total	**N/A**

3) **Number of Catch Basins and Inlets that were Inspected and the Number that were Cleaned:**

	Number Inspected	Number Cleaned
Catch Basins and Inlets	N/A	N/A

NOTE: The District does not operate nor maintain catch basins and inlets within the permit area. Catch basins and inlets are maintained by the municipalities or in rare instances, may be maintained by property owners associations (POAS) or homeowners associations (HOAs).

4) **Assessment of the Amount and Type of Debris Removed from Catch Basins, Streets and Open Channels, including an Identification of Problem Areas that Generate the most Pollutants:** (See Attachment E.)

Facility	Type of Debris	Approx. Weight	Problem Areas that Generate Most Pollutants
Catch basins	Vegetative Litter		N/A
	Anthropogenic Litter		
	Sediment		
	Other man-made debris		
Total		**0.0**	**tons (wet weight)**
Streets	Vegetative Litter		N/A
	Anthropogenic Litter		
	Sediment		
	Other man-made debris		
Total		**0.0**	**tons (wet weight)**
Open Channels	Vegetative Litter	10.4	
	Anthropogenic Litter	4.7	
	Sediment		
	Other man-made debris	2,113.0	1,204.0 cy, assuming density of 130 lbs/cf
Total		**2,128.1**	**tons (wet weight)**
Facility Total		**2,128.1**	**tons (wet weight)**

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3. MUNICIPAL
(SECTION H.1 of ORDER R9-2004-001)
CONTINUED

5) **Assessment of effectiveness of BMPs that have been implemented for municipal facilities and activities:**

BMP Code	Description	Used	Notes
SC-10	Non-Stormwater Discharges	☒ Yes ☐ No	
SC-11	Spill Prevention, Control and Clean-up	☒ Yes ☐ No	
SC-20	Vehicle and Equipment Fueling	☐ Yes ☐ No	N/A
SC-21	Vehicle and Equipment Cleaning	☐ Yes ☐ No	N/A
SC-22	Vehicle and Equipment Repair	☐ Yes ☐ No	N/A
SC-30	Outdoor Loading/Unloading of Materials	☐ Yes ☐ No	N/A
SC-31	Outdoor Liquid Container Storage	☐ Yes ☐ No	N/A
SC-32	Outdoor Equipment Maintenance	☐ Yes ☐ No	N/A
SC-33	Outdoor Storage of Raw Materials	☐ Yes ☐ No	N/A
SC-34	Waste Handling and Disposal	☒ Yes ☐ No	
SC-35	Safe Alternative Products	☒ Yes ☐ No	
SC-40	Contaminated or Erodible Areas	☐ Yes ☐ No	N/A
SC-41	Building and Grounds Maintenance	☒ Yes ☐ No	
SC-42	Building Repair and Construction	☐ Yes ☐ No	N/A
SC-43	Parking/Storage Area Maintenance	☒ Yes ☐ No	
SC-44	Drainage System Maintenance	☒ Yes ☐ No	
SC-60	Housekeeping Practices	☒ Yes ☐ No	
SC-61	Safe Alternative Products	☒ Yes ☐ No	
SC-70	Road and Street Maintenance	☐ Yes ☐ No	N/A
SC-71	Plaza and Sidewalk Cleaning	☐ Yes ☐ No	N/A
SC-72	Fountain and Pool Maintenance	☐ Yes ☐ No	N/A
SC-73	Landscape Maintenance	☒ Yes ☐ No	
SC-74	Drainage System Maintenance	☒ Yes ☐ No	
SC-75	Waste Handling and Disposal	☒ Yes ☐ No	
SC-76	Water and Sewer Utility Maintenance	☐ Yes ☐ No	N/A

Assessment of the effectiveness of BMPs that have been implemented for municipal facilities and activities:

THE DISTRICT DOES NOT OPERATE MUNICIPAL FACILITIES OTHER THAN MS4 IN THE SANTA MARGARITA REGION, THEREFORE THESE RESPONSES ARE LIMITED TO ADDRESSING THE DISTRICT IMPLEMENTATION OF Bmps RELATING AND APPLICABLE TO MS4 MAINTENANCE.

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3. MUNICIPAL
(SECTION H.1 of ORDER R9-2004-001)
CONTINUED

6) **Description and Number of Training Efforts Conducted over the last year (for Municipal Facility Operators and/or Inspectors).**

a. **Training:**

Note – Because District staff do maintain MS4 in the Santa Margarita Region, District maintenance staff do receive municipal NPDES training per the requirement of the NPDES permit (see Attachment C). Detailed curriculum and attendance logs are contained in the Watershed SWMP.

Training	Training Description	Training Dates	Number of Attendees
Municipal Training	Municipal Site Inspection	10/2/06	1
Municipal Training	Municipal Site Inspection	10/16/06	1
Municipal Training	Municipal Site Inspection	10/17/06	1
Municipal Training	Municipal Site Inspection	4/16/07	1
Municipal Training	In-house staff training	6/07/07	54
Worker Safety Training	BMP implementation during herbicide applications	5/1/07	26
Municipal Training	Hazardous Material Spill Notification and Cleanup	11/16/06	58
Municipal Training	Hazardous Material Spill Notification and Cleanup	1/17/07	24
Municipal Training	Hazardous Material Spill Notification and Cleanup	1/18/07	16
		Total	**182**

b. **Summarize the Internal and External Education and Outreach Activities the Municipal Component has Conducted over the past year:**

In compliance with Order No. R9-2004-001, the District maintains the District's corporate yard Pollution Prevention Plan (PPP), which also address field MS4 maintenance in the Santa Margarita Watershed. The PPP provides the pollution prevention strategy to address facilities and associated activities that may cause stormwater pollution without proper controls. A site inspection was conducted by the NPDES staff on September 19, 2006 to verify compliance with the plan. Site and activity assessments are performed annually prior to the storm season.

3. MUNICIPAL
(SECTION H.1 of ORDER R9-2004-001)
CONTINUED

In addition, District NPDES staff met several times with field staff to discuss the requirements of the Statewide General NPDES Permit for the Discharge of Aquatic Pesticides for Aquatic Weed Control.

NPDES staff has convened annual briefing sessions since October 2001 with District Operations and Maintenance crews to discuss BMP implementation during herbicide applications. NPDES staff reviews the Municipal Permit program framework and goal of surface water quality protection, and discuss the Municipal Activity BMPs that are listed in the DAMP, which was conducted on June 11, 2007. Staff also identifies the common features of the Municipal Activity BMPs and the standard operating procedures for herbicide/pesticide management (product label instructions and Material Safety Data Sheets) that are part of the existing education requirements for applicators. Examples of standard procedures that constitute BMPs include schedules for applications considering weather and nesting seasons, and proper storage and disposal of unused product.

Additionally, District NPDES and Maintenance staff has attended annual training events conducted by Monsanto Technologies. These venues focus on BMP implementation for specific herbicides used by the District. The BMPs and related topics included:

- Anticipated Glyphosate concentration ranges in water samples given average AquaMaster application rates and following label instruction.
- Calculation for determining estimated surfactant concentrations.
- Application techniques for effective results when applying AquaMaster.
- California laboratories that can analyze for Glyphosate, should the need arise.

c. An Assessment of Program Effectiveness Based on the Measurable Goals Established in the Permittee's Individual SWMP:

The following metrics are required to be tracked and reported on by Section 5.6 of the District's Individual SWMP:

- Amount and Types of Debris Removed from Open Channels

  Outside of the MS4, there are no District municipal facilities within the Santa Margarita Watershed. Therefore, the District's municipal program is limited to MS4 maintenance. The amount of debris removed for the last three (3) fiscal years were incorrectly reported because it did not include sediment removal amounts. Previously total amount of debris removed reported in the annual reports were 101 tons and 24 tons in FY 2004-2005 and FY 2005-2006, respectively. The type and total amount of debris removed for each fiscal year is as follows:

3. MUNICIPAL
(SECTION H.1 of ORDER R9-2004-001)
CONTINUED

Fiscal Year	Vegetative Litter	Anthropogenic Litter	Other man-made debris (Sediment)	Total Amount of Debris Removed (tons)
FY 2004-2005	55.9	0	5,763.4	5,819.3
FY 2005-2006	16.0	8.1	7,532.5	7,556.6
FY 2006-2007	10.4	4.7	2,113.0	2,128.1

The amount of debris removed decreased from 7,557 tons in FY 2005-2006 to 2,128 tons in FY 2006-2007. This is likely due to the significant wet season in FY 2004-2005, which caused an increased amount of sediment accumulated and removed from open channels in FY 2005-2006. This was then followed by the relatively dry wet season in FY 2006-2007, which reflects a decrease in sediment transport, and thus sediment removal, from the previous FY 2005-2006 totals.

- Description of Training Efforts

  See Section 6.

d. Additional Comments/Information:

The District's municipal program in the Santa Margarita Region is limited to MS4 maintenance. The District reviewed its program to make sure it meets the minimum requirements of Board Order R9-2004-001.

In addition, Section 5.1 (Planning District Facilities) of the Individual SWMP has been modified to ensure site design and source control BMPs are considered during the planning and design stages of all District administered MS4 capital improvement projects. This includes documentation of the site designs BMPs considered. These revisions are shown in Attachment G.

Summarize New Activities or Improvements to be implemented next year as a result of your Self Assessment of the Municipal Component:

As mentioned above, the District reviews the District's corporate yard Pollution Prevention Plan (PPP) at least annually to determine if any revision is necessary to reflect changes in the facility or changes in the activities conducted.

4. INDUSTRIAL/COMMERCIAL
(SECTION H.2 of ORDER R9-2004-001)

The District does not have land use powers or authority and therefore has no jurisdiction over industrial or commercial facilities.

1) **Description and Number of Training Efforts conducted over the last year (for Industrial/Commercial Facility Operators and/or Inspectors).**

   a. **Training:**

   Although the District does not have authority to inspect or regulate industrial/commercial land-uses, District staff who respond to IC/ID complaints or notifications receive this training to ensure they are familiar with minimum BMPs and issues/problems/solutions associated with commercial/industrial activities.

   Note – District staff did receive municipal NPDES training per the requirement of the NPDES permit. (See Attachment C)

Training	Training Description	Training Dates	Number of Attendees
Industrial/Commercial Training	Industrial/Commercial Facility Inspection	10/3/06	3
		Total	**3**

5. RESIDENTIAL
(SECTION H.3 of ORDER R9-2004-001)

The District does not have land use powers or jurisdiction to regulate residential activities.

6. EDUCATION
(SECTION I of ORDER R9-2004-001)

1) **Description of Education Efforts conducted by the Permittee (not collectively with other Permittees) during the previous year:**

The education programs described below were implemented as part of the Watershed SWMP requirements. Additional details regarding these programs are available in the Watershed SWMP Annual Report.

Audience	Measures Impressions are County-wide unless otherwise noted
Permittee Departments and Personnel	Number of Permittee employees trained for: • Construction Inspection: 12 • Industrial/Commercial Inspection: 3 • Municipal Facilities and Activities: 4 • Development Planning: 30
Construction Site Owners and Developers	Outreach events conducted: BIA Presentation (Temecula) Date: September 19, 2006
Industrial/Commercial Owners and Operators	Industrial/Commercial outreach conducted: SGA Home Improvement Stores 5 stores visited and training provided to 15 employees The Business Press (Trade paper) Date: 03/26/07 Impressions: 40,000
Residential Community, General Public, Other Public Agencies and Students	Number of Media Impressions in: • Newspaper: 0 • Website: 68,330: • Radio/TV: 0 • Billboards: 0 • Other: 7,079 • Materials: 72,274 Number of students: 3,884 Public Education events conducted: 5 # Attendees: 1,600

6. EDUCATION
(SECTION I of ORDER R9-2004-001)
CONTINUED

2) Assessment of Overall Program Effectiveness Based on the Measurable Goals Established in the Permittee's Individual SWMP:

Measurable goals for the public education program are defined in Section 10 of the District's Individual SWMP. However, because the District's jurisdiction covers the entire Santa Margarita Region and because the District is also required to implement the watershed-wide public education program, the District does not differentiate between education outreach efforts undertaken as part of the Watershed SWMP and Individual SWMP. Therefore, as stated in Section 10 of the District's Individual SWMP, the public education evaluation is contained in Sections G and J of the Watershed SWMP Annual Report. However, the metrics identified in the District's Individual SWMP are presented in the table on the previous page.

3) Additional Comments/Information:

As Principal Permittee, the District implements the public education program for the entire watershed. A detailed description of the regional public education program implemented by the District is contained in the Watershed SWMP Annual Report. The District generally reports all of its implemented education related activities in the Watershed SWMP.

Describe the major accomplishments of the Education Component over the past year.

See Watershed SWMP Annual Report.

Summarize new activities or improvements to be implemented next year as a result of your self assessment of the Education Component:

See Watershed SWMP Annual Report.

7. ILLICIT DISCHARGE DETECTION AND ELIMINATION
(SECTION J of ORDER R9-2004-001)

1) **Number of Illicit Discharges, Connections and Spills Reported and/or Identified during the Reporting Period:**

   a. **Illicit Discharges (ID):** IC/ID Complaint files for complaints received by the District are included in Attachment F. In addition, the Watershed SWMP contains a Fire Department HazMat Response Team Report of other IC/ID responses acted upon directly by them.

   b. **Illicit Connections (IC):** In 1990, the District performed a detailed reconnaissance of its MS4 to identify potential illicit connections. A very small number of connections were identified. Since then, the District maintenance and construction inspectors have been trained to look for and report any illicit connections. In addition, the District requires entities wishing to connect non-stormwater discharges to its facilities to complete a Third-Party Non-Stormwater Discharge Application to ensure the discharge complies with the requirements of R9-2004-001. Discharge applications received by the District will be reported in future annual reports.

   c. **Spills (S):** Attachment F contains IC/ID complaint files, including spill notifications. In addition, the Watershed SWMP contains a report of illicit discharge spill responses by the Riverside County Fire Department Hazardous Materials Response Team.

2) **Number of Illicit Discharges or Connections Investigated during the Reporting Period and the Outcome of the Investigations:**

   Fifty-nine (59) IC/ID incidents were investigated during the reporting period. See summary reports in Appendix G.

   Number of IC/ID incidents in database for FY 06-07: 59
   Number of IC/ID incidents potentially involving District facilities: 11
   Number of IC/ID incidents requiring follow-up investigation: 5

3) **Number and Types of Enforcement Actions Taken for Illicit Discharges or Connections during the Reporting Period:**

   See Summary Report in Appendix G. Because the District's enabling act does not provide land-use powers, the District relies on combined legal authority with Co-Permittee's to control industrial, commercial or development activities within its jurisdiction. Any enforcement actions resulting from an IC/ID reported to the District would be taken by the respective Co-Permittee with jurisdiction. The District does maintain the ability to regulate third-party activities within its rights-of-way through encroachment permits, construction contracts and other legal agreements.

4) **Number of Times your Agency's Hotline was called during the Reporting Period, as Compared to Previous Reporting Periods.**

   The table below identifies the number of calls that were tracked by our 1-800 hotline. Do to a technical error, the call counters were not used during the FY 2004-2005 reporting period. The

7. ILLICIT DISCHARGE DETECTION AND ELIMINATION
(SECTION J of ORDER R9-2004-001)
CONTINUED

calls identified below for FY 2004-2005 only reflect the calls that were diverted to the District's front counter. The District has restored this service with the County Information Technology Department who hosts the hotline. These calls may have been for IC/ID, education outreach or other purposes.

	Number of Calls		
	2004-05	**2005-06**	**2006-07**
Water Pollution Hotline	100	2015	1648

5) Number and Location of Dry Weather Monitoring Sites that were Monitored during the Reporting Period:

The District maintains four IC/ID dry weather monitoring stations. These stations are identified below:

Number of Site(s): 4

Location(s): Santa Gertrudis Channel, Warm Springs Creek, Long Canyon Creek, Redhawk Channel

The exact location of these stations can be found in Section G-3.0 of the Santa Margarita Region Monitoring Annual Report (Appendix G).

6) Summary of Illicit Discharge Monitoring Program results, including: 1) All inspection, field screening and analytical monitoring results 2) All follow-up and elimination activities and 3) Any proposed changes to station locations and/or sampling frequencies:

The District conducts IC/ID dry weather monitoring at the four tributary stations. As a result, monitoring occurs more frequently than the minimum of two times required under the MRP.

All field screening and analytical monitoring results can be found in the Watershed SWMP Annual Report, Tables G-12 and G-31 for all four tributary stations: Long Canyon Creek, Santa Gertrudis Channel, Redhawk Channel and Warm Springs Creek.

Appendix H contains copies of inspection forms.

The District has developed numeric field screening criteria to determine whether a follow-up laboratory sample should be collected as summarized below:

- Specific conductance more than 25% higher than BPO
- Total dissolved solids more than 25% higher than BPO
- Turbidity more than 25% higher than long-term average

7. ILLICIT DISCHARGE DETECTION AND ELIMINATION
(SECTION J of ORDER R9-2004-001)
CONTINUED

- pH below 6 or above 9.5
- Dissolved oxygen below 4 mg/L
- Unusually low or high water temperature
- Sensory observations in the area of the discharge that indicates the presence of pollutants (e.g., staining, water sheen, water color and/or odor, algae, foaming)

Long-term averages for turbidity are still being established for comparison; it is expected that in the fourth-year report there will be sufficient data from four years of monitoring to develop reasonable comparisons.

Generally, during IC/ID field visits, visual observations and field screening did not indicate the presence of illicit connections or illegal discharges. Exemptions are summarized below:

Ponded water was observed at Redhawk Channel on September 14, 2006 and March 20, 2007. The field pH measured 9.4 and 9.8 pH units, respectively. The field pH measurement on March 20, 2007 warranted follow-up. No other specific signs of an IC/ID were noted on that day. A grab sample was taken on March 20, 2007. Laboratory analyses for the March 20, 2007 sample did not indicate any abnormal pollutant concentration that would indicate a potential illicit connection or illegal discharge to follow-up.

On August 28, 2007, as part of our IC/ID dry weather reconnaissance, field staff did notice abnormal flow at Long Canyon Wash. Staff observed flow originating from a business. It turned out to be a local businessman washing down a large coolant unit. The District staff person approached the individual regarding the discharge and asked him to cease his activities. The District staff person also forwarded a report to the City of Temecula for additional follow-up. City representatives followed up that day and again a few days later. Education regarding potential pollutants contained in the discharge and alternative approaches were discussed. The discharge has ceased.

No changes are proposed to the station locations and/or sampling frequencies.

7) An Assessment of Overall Program Effectiveness Based on the Measurable Goals Established in the Permittee's Individual SWMP:

The measurable goals are defined in Section 4.4 of the District's Individual SWMP. Specific measurable goal numbers will be established once a baseline condition had been determined for complaint calls and enforcement actions. The effectiveness of the dry weather monitoring program is addressed in Section G of the Watershed SWMP Annual Report. Three years worth of data should be sufficient to establish baselines.

In response to the Los Angeles RWQCB and the Ventura County MS4 Permit, CASQA prepared a letter identify proposed measures and goals to evaluate the effectiveness of the IC/ID Program. The measures are as follows:

- Percent (%) of IC/IDs responded to within 24 hours of receiving notice; and

7. ILLICIT DISCHARGE DETECTION AND ELIMINATION
(SECTION J of ORDER R9-2004-001)
CONTINUED

- Percent (%) of Illegal Connections eliminated or permitted once detected.

The goal identified for both measures were 80%. Based on our FY 2006-2007 IC/ID information, 98% of IC/ID incidents were responded to within 24 hours of receiving notice and 100% of Illegal Connection eliminated once detected. Only one (1) of the fifty-nine (59) incident were not responded to within 24 hours and there were no illegal connections identified.

8) **Additional Comments/Information:**

Describe the major accomplishments of the Illicit Discharge Detection and Elimination Component over the past year:

The District continues to improve its IC/ID program through refinements in our ability to track complaints, enhance our ability to gather important complaint related information through custom GIS graphic user interfaces (developed in late 2005) and efforts to enhance our coordination with other municipal agencies with authority to respond to complaints.

Summarize the internal and external education and outreach activities the Illicit Discharge Detection and Elimination Component has conducted over the past year:

During field investigations of complaint calls, field staff disseminates public education and outreach information to violators and adjacent residents/businesses. Other IC/ID education addressed through the public education program is described in the Watershed SWMP.

Summarize new activities or improvements to be implemented next year as a result of your self assessment of the Illicit Discharge Detection and Elimination Component:

The District will continue to implement the program based on the recent improvements. Additional recommendations may be proposed for next year.

The District is also proposing to establish an electronic third-party discharge electronic reporting form and GIS layer that would allow us to quickly research known third-party discharges to our system as part of complaint call responses. Work on the system was intiated this year and may take 1-2 years to complete.

Other Comments:

N/A

8. PUBLIC PARTICIPATION

1) **A Description of Efforts to Include the Public Urban Runoff Management Programs during the Reporting Period (i.e., river clean-ups, volunteer monitoring, Permittee council meetings related to the SWMP, etc.):**

   Public involvement programs for this reporting period included:

   a) Technical Advisory Committee meetings held on a monthly basis and are open to the public.

   b) Watershed Clean-up events held on October 14, 2006.

   c) Participation in SMR Executive Management Team and Water Quality Monitoring Committee meetings.

2) **Additional Comments/Information:**

   There are no additional comments.

9. FISCAL ANALYSIS COMPONENT

Fiscal Analysis Component - each Permittee shall include an annual fiscal analysis, for each fiscal year covered by Order No. R9-2004-001, in its Individual Annual Report. This analysis shall evaluate the expenditures (such as capital, operation and maintenance, education, and administrative expenditures) necessary to accomplish the activities of the Permittee's Individual SWMP. The analysis shall include the following:

1) **A Report of the Previous Reporting Period's Budget and a Budget for the Upcoming Reporting Period. To the Extent Possible, the Budgets should be Broken Down by the following Programs:**

   Expenditures identified below reflect costs incurred by the District for implementing its own NPDES Program and for implementing the Regional Watershed Program. The District does not track its direct implementation costs separately nor does it track costs separately for many permit provisions. Costs are not directly tracked for the asterisked Program Elements identified below. However, a brief text description follows that identifies manpower requirements for those specific Program Elements.

Program Element	Fiscal Year 2005-2006		Fiscal Year 2006-2007	
	Capital Expenditures	O&M/Admin Expenditure	Capital Expenditures	O&M/Admin Expenditure
Program Management	N/A	$300,964	N/A	$439,800
Annual Fee for MS4 NPDES Permit	N/A	0	N/A	$4,000
Implementation Agreement Shared Cost	N/A	N/A	N/A	N/A
Construction Inspections*	N/A	~$10,000	N/A	~$10,000
Development Planning*	N/A	N/A	N/A	N/A
Industrial and Commercial Inspections	N/A	N/A	N/A	N/A
Illicit Connections & Illegal Discharges Program	N/A	N/A	N/A	N/A
Municipal Facilities and Activities	N/A	N/A	N/A	N/A
Public Education & Outreach	N/A	$63,547	N/A	$71,840
Monitoring Program	N/A	$78,251	N/A	$148,720
Other	N/A	$0	N/A	$0
Contributions to Other Programs	N/A	$121,725	N/A	$108,500
Total	**N/A**	**$574,487**	**N/A**	**$782,860**

9. FISCAL ANALYSIS COMPONENT
CONTINUED

Construction Inspection – The District's Construction Inspectors are trained to address construction related NPDES issues associated with District administered construction projects (storm drains, channels, levees, basins, etc.). They perform these inspections as part of their normal duties. The District's NPDES Section staff also has an individual assigned to review SWPPPs associated with District administered construction projects. The NPDES staff person also provides a training presentation on NPDES related construction issues at construction project pre-construction meetings for the benefit of the contractor. Costs for Construction Inspection permit obligations with the Santa Margarita Watershed are recovered from the District's ad-valorum tax revenues collected within the Santa Margarita Region of the County.

Development Planning – The District's Development Review staff are responsible for reviewing proposed development projects in the unincorporated Riverside County area for compliance with the SWMP, recommending conditions of approval relative to water quality/NPDES and reviewing preliminary Project-Specific WQMPs and associated plans within the unincorporated County. Costs incurred by the District's Development Review and Plan Check staff for Development Planning permit obligations are recovered via development review and plan check fees charged to the development proponent.

2) **A Description of the Source(s) of Funds that were Utilized during the Previous Fiscal Year and the Source(s) of Funds Proposed to Meet the Necessary Expenditures for the Subsequent Year, including Legal Restrictions on the use of such Funds.**

Source of Funds	Capital Expenditures	Percent of Total Program Funding	Restrictions on Use (if applicable)
Santa Margarita Watershed Benefit Assessment Fund	$384,000	56%	District NPDES compliance costs, excess funds used to fund regional NPDES activities.
Santa Margarita Watershed Permittee Implementation Agreement	$284,932	41%	Regional NPDES Compliance Programs.
Zone 7 Ad-Valorem Tax Revenue	~$10,000	1.5%	Costs associated with District's compliance with Municipal Construction component of Board Order R9-2004-001.
Developer Development Review/Plan Check Fees	Unknown	Unknown	Costs associated with review of proposed developments in the unincorporated County for compliance with the Development Planning provisions of Board Order R9-2004-001.
Spending Against Reserves	$0	0%	District NPDES Compliance Costs
Miscellaneous Revenue	~$10,000	1.5%	Interest, Other Misc.
TOTAL	**$688,932**	**100%**	

9. FISCAL ANALYSIS COMPONENT
CONTINUED

3) Additional Comments/Information:

The Permittees are working with other stakeholder groups to leverage funds for regional planning objectives including:

Prop 13/40/50 Grant Funds – Working cooperatively with San Diego County, Bureau of Reclamation and other stakeholders to implement a Watershed Management Plan for the Santa Margarita River Watershed.

Stormwater Monitoring Coalition – Partnering with other Southern California Coastal Watershed Research Project, other Southern California Counties and other stakeholders to fund monitoring projects to address high priority water quality issues including development of an appropriate bioassessment metric, determining natural background concentrations of several key pollutants in Southern California watersheds, developing Numeric Criteria for addressing Hydrologic Conditions of Concern, and funding a lab intercalibration study.

Santa Margarita Executive Management Team – Partnering with the Bureau of Land Management and other Santa Margarita Watershed stakeholders to develop water quality models of the Santa Margarita Watershed to help assess pollutant problems and sources within the Santa Margarita Watershed.

Mission Resource Conservation District – Partnering with local upper Santa Margarita stakeholders through the Mission Resource Conservation District to implement watershed education, monitoring, and clean up programs.

Santa Ana Watershed Project Authority – Jointly fund a LID BMP testing and demonstration facility

Southern California Coastal Watershed Research Project – Jointly fund a southern California wide study of hydromodification of southern California streams and assess possible mitigation measures.

10. NON-STORM WATER DISCHARGES

Permittees shall report on any discharge category listed in Requirement B.2 of Order No. R9-2004-001 that was identified as a source of pollutants during the reporting period. For each identified category, the Permittee shall report whether it elected to prohibit the discharge or to require BMPs to reduce pollutants in the discharge to the MEP. If the discharge is not prohibited, the BMPs that will be implemented, or required to be implemented, shall be described in each Permittee's Individual SWMP Annual Report.

Category	Prohibited	BMP to be Implemented
Diverted stream flows	☐ Yes ☒ No	Not Applicable, no applications
Rising ground waters	☐ Yes ☒ No	Not Applicable, no applications
Uncontaminated ground water infiltration [as defined at 40CFR35.2005(20)] to MS4s	☐ Yes ☒ No	Not Applicable, no applications
Uncontaminated pumped ground water	☐ Yes ☒ No	Not Applicable, no applications
Foundation drains	☐ Yes ☒ No	Not Applicable, no applications
Springs	☐ Yes ☒ No	Not Applicable, no applications
Water from crawl space pumps	☐ Yes ☒ No	Not Applicable, no applications
Footing drains	☐ Yes ☒ No	Not Applicable, no applications
Air conditioning condensation	☐ Yes ☒ No	Not Applicable, no applications
Flows from riparian habitats and wetlands	☐ Yes ☒ No	Not Applicable, no applications
Water line flushing	☐ Yes ☒ No	Not Applicable, no applications
Landscape irrigation	☐ Yes ☒ No	Not Applicable, no applications
Discharges from potable water sources not subject to NPDES Permit No. CAG679001, other than water main breaks	☐ Yes ☒ No	Not Applicable, no applications
Irrigation water	☐ Yes ☒ No	Not Applicable, no applications
Lawn watering	☐ Yes ☒ No	Not Applicable, no applications
Individual residential car washing	☐ Yes ☒ No	Not Applicable, no applications
Non-emergency fire fighting flows	☐ Yes ☒ No	Not Applicable, no applications
Dechlorinated swimming pool discharges	☐ Yes ☒ No	Not Applicable, no applications

10. NON-STORM WATER DISCHARGES
CONTINUED

Additional Comments/Information:

The District requires a Third-Party Non-Stormwater Discharge Application to be completed for any encroachment involving a non-stormwater discharge into District facilities. The application requires the applicant to characterize the discharge, including a chemical analysis of the flow when possible. Where the discharges would contain contaminants exceeding receiving water standards, BMPs are required or the specific discharge would be prohibited. No evidence has been identified to date that would indicate that a specific class, or classes, of allowable non-stormwater discharges are persistent sources of pollution per Requirement B.2.

11. RECEIVING WATER LIMITATIONS

This section includes the report required pursuant to Requirement C.2.a. of Order No. R9-2004-001, if applicable.

Requirement C.2.a. states:

"Upon a determination by either a Permittee or the SDRWQCB that MS4 discharges are causing or contributing to an exceedance of an applicable water quality standard, the Permittee shall promptly notify and thereafter submit a report to the SDRWQCB that describes BMPs that are currently being implemented and additional BMPs that will be implemented to prevent or reduce any pollutants that are causing or contributing to the exceedance of water quality standards. The report may be incorporated in the SWMP Annual Report unless the SDRWQCB directs an earlier submittal. The report shall include an implementation schedule. The SDRWQCB may require modifications to the report."

The District has not identified any pollutants that are contributing to an exceedance of an applicable receiving water standard. A detailed review of monitoring data is included in the Watershed SWMP.

12. ADDITIONAL URBAN RUNOFF DATA

This Section is a Summary of all Urban Runoff Related Data not included in the Annual Monitoring Report (e.g., special investigations).

The District did not collect any supplemental data that is not reported in the Annual Monitoring Report.

13. PROPOSED REVISIONS

This Section Includes Proposed Revisions to the Individual SWMP, Including Areas in Need of Improvement Based on the Assessment of Effectiveness of Each Program Component.

The following amendments have been made to the District's Individual SWMP:

Municipal Section 5.1 (Planning District Facilities) of the Individual SWMP has been modified to ensure site design and source control BMPs are considered during the planning and design stages of all District administered MS4 capital improvement projects.

The explainations of these revisions are described further in the applicable program section of this report. The proposed revisions are included in Attachment G.

ATTACHMENT A

WQMP TRACKING REPORT

Riverside County Flood Control and Water Conservation District
WQMP Requirement Report from 07/01/2006 to 06/30/2007

WQMP Required: No

CaseNumber	Received Date	WQMP	Watershed
COC05800	08/18/2006	No	Whitewater
COC05998	09/27/2006	No	Whitewater
COC06348	07/24/2006	No	Santa Ana
COC06384	08/28/2006	No	Santa Margarita
COC06400	07/10/2006	No	Whitewater
COC06402	12/01/2006	No	Santa Margarita
COC06437	08/30/2006	No	Santa Margarita
COC06456	11/30/2006	No	Santa Ana
COC06462	12/18/2006	No	Santa Margarita
COC06493	07/28/2006	No	Santa Ana
COC06494	07/28/2006	No	Santa Ana
COC06503	08/17/2006	No	Santa Ana
COC06504	08/17/2006	No	Santa Ana
COC06515	09/11/2006	No	Whitewater
COC06519	10/04/2006	No	Santa Margarita
COC06521	03/13/2007	No	Whitewater
COC06525	10/30/2006	No	Whitewater
COC06528	10/26/2006	No	Santa Ana
COC06529	10/04/2006	No	Santa Margarita
COC06533	12/21/2006	No	Santa Ana
COC06539	10/17/2006	No	Santa Margarita
COC06544	10/17/2006	No	Santa Ana
COC06555	01/02/2007	No	Santa Ana
COC06582	11/15/2006	No	Santa Ana
COC06583	02/06/2007	No	Santa Ana
COC06594	03/27/2007	No	Santa Ana
COC06600	12/18/2006	No	Santa Ana
COC06601	12/18/2006	No	Santa Ana
COC06603	12/21/2006	No	Santa Ana
COC06619	01/04/2007	No	Santa Ana
COC06641	05/02/2007	No	Whitewater
COC06646	04/16/2007	No	Santa Ana
COC06664	05/14/2007	No	Santa Margarita
COC06666	03/20/2007	No	Santa Ana
COC06667	03/20/2007	No	Santa Ana
COC06668	04/03/2007	No	Santa Ana
COC06671	04/03/2007	No	Santa Ana
COC06679	04/24/2007	No	Santa Ana
COC06681	05/15/2007	No	Santa Ana
COC06707	06/20/2007	No	Santa Margarita
CUP01192	10/26/2006	No	Santa Ana
CUP02589	04/10/2007	No	Whitewater
CUP02617	06/11/2007	No	Santa Ana
CUP02653	06/07/2007	No	Whitewater
CUP02873	01/04/2007	No	Santa Ana
CUP03021	03/29/2007	No	Santa Ana
CUP03218	06/22/2007	No	Whitewater
CUP03228	06/04/2007	No	Whitewater
CUP03265	08/09/2006	No	Santa Ana
CUP03301	02/20/2007	No	Santa Ana
CUP03313	08/09/2006	No	Santa Ana
CUP03403	08/21/2006	No	Santa Ana
CUP03414	05/15/2007	No	Santa Ana
CUP03450	08/21/2006	No	Santa Ana
CUP03473	05/04/2007	No	Whitewater
CUP03474	12/29/2006	No	Santa Margarita
CUP03485	05/14/2007	No	Whitewater
CUP03490	11/21/2006	No	Santa Ana
CUP03493	01/08/2007	No	Santa Ana

Riverside County Flood Control and Water Conservation District
WQMP Requirement Report from 07/01/2006 to 06/30/2007

CUP03512	09/18/2006	No	Santa Ana
CUP03518	04/05/2007	No	Santa Ana
CUP03521	04/10/2007	No	Santa Ana
CUP03527	05/10/2007	No	Santa Ana
CUP03530	10/23/2006	No	Santa Ana
CUP03531	10/23/2006	No	Santa Ana
CUP03534	05/15/2007	No	Santa Ana
CUP03539	01/23/2007	No	Santa Ana
CUP03547	05/22/2007	No	Whitewater
CUP03548	05/02/2007	No	Santa Ana
CUP03549	04/19/2007	No	Santa Ana
CZ06922	05/21/2007	No	Santa Margarita
CZ07008	07/12/2006	No	Santa Ana
CZ07032	10/11/2006	No	Santa Ana
CZ07091	01/22/2007	No	Santa Ana
CZ07214	09/08/2006	No	Santa Margarita
CZ07267	10/30/2006	No	Santa Margarita
CZ07270	04/04/2007	No	Santa Ana
CZ07296	05/24/2007	No	Santa Ana
CZ07300	02/15/2007	No	Santa Ana
CZ07315	10/24/2006	No	Santa Ana
CZ07321	07/24/2006	No	Santa Ana
CZ07337	05/24/2007	No	Santa Margarita
CZ07341	07/24/2006	No	Santa Ana
CZ07344	08/09/2006	No	Santa Ana
CZ07346	11/17/2006	No	Whitewater
CZ07371	07/31/2006	No	Santa Margarita
CZ07373	07/24/2006	No	Santa Margarita
CZ07374	07/31/2006	No	Santa Ana
CZ07381	08/24/2006	No	Santa Ana
CZ07383	08/31/2006	No	Santa Ana
CZ07386	10/23/2006	No	Santa Margarita
CZ07393	08/14/2006	No	Santa Ana
CZ07399	01/08/2007	No	Santa Ana
CZ07401	08/28/2006	No	Santa Margarita
CZ07404	12/04/2006	No	Santa Ana
CZ07406	09/06/2006	No	Whitewater
CZ07420	10/11/2006	No	Santa Ana
CZ07423	11/07/2006	No	Santa Ana
CZ07424	10/16/2006	No	Santa Ana
CZ07425	10/30/2006	No	Santa Ana
CZ07426	05/21/2007	No	Whitewater
CZ07427	05/03/2007	No	Santa Ana
CZ07428	05/15/2007	No	Santa Ana
CZ07437	12/06/2006	No	Santa Margarita
CZ07440	12/14/2006	No	Santa Margarita
CZ07442	11/13/2006	No	Santa Ana
CZ07447	11/20/2006	No	Santa Margarita
CZ07449	11/17/2006	No	Whitewater
CZ07450	11/22/2006	No	Whitewater
CZ07452	01/04/2007	No	Whitewater
CZ07468	02/26/2007	No	Santa Ana
CZ07469	02/14/2007	No	Santa Ana
CZ07477	02/06/2007	No	Santa Ana
CZ07479	02/14/2007	No	Santa Ana
CZ07484	03/07/2007	No	Santa Margarita
CZ07486	02/20/2007	No	Santa Margarita
CZ07491	02/28/2007	No	Santa Margarita
CZ07499	05/02/2007	No	Santa Ana
CZ07500	04/17/2007	No	Santa Ana
CZ07510	06/20/2007	No	Santa Margarita
CZ07512	06/05/2007	No	Santa Ana

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CZ07522	06/12/2007	No	Santa Ana
CZ07531	06/25/2007	No	Santa Margarita
EIR00450	03/14/2007	No	Santa Ana
EIR00482	10/25/2006	No	Santa Ana
EIR00488	10/20/2006	No	Santa Ana
EIR00492	11/16/2006	No	Santa Ana
EIR00493	10/11/2006	No	Santa Ana
EIR00496	06/12/2007	No	Santa Ana
EIR00497	04/04/2007	No	Santa Ana
FT2003-21A	06/08/2007	No	Santa Ana
FT2007-10	06/08/2007	No	Santa Ana
LLA05061	07/24/2006	No	Santa Margarita
LLA05064	07/18/2006	No	Santa Ana
LLA05066	07/13/2006	No	Santa Ana
LLA05075	08/07/2006	No	Santa Ana
LLA05077	08/17/2006	No	Santa Ana
LLA05079	08/14/2006	No	Whitewater
LLA05084	08/28/2006	No	Santa Ana
LLA05087	12/11/2006	No	Santa Ana
LLA05088	09/11/2006	No	Santa Ana
LLA05091	08/18/2006	No	Whitewater
LLA05092	03/08/2007	No	Santa Margarita
LLA05097	09/11/2006	No	Santa Ana
LLA05099	10/04/2006	No	Santa Margarita
LLA05100	09/11/2006	No	Santa Ana
LLA05101	09/11/2006	No	Santa Ana
LLA05104	10/04/2006	No	Santa Margarita
LLA05105	12/06/2006	No	Santa Ana
LLA05106	12/06/2006	No	Santa Ana
LLA05107	10/23/2006	No	Santa Margarita
LLA05108	11/01/2006	No	Santa Margarita
LLA05109	10/12/2006	No	Santa Margarita
LLA05110	10/25/2006	No	Santa Ana
LLA05111	12/11/2006	No	Santa Ana
LLA05115	11/21/2006	No	Santa Margarita
LLA05117	11/07/2006	No	Santa Ana
LLA05118	10/25/2006	No	Santa Margarita
LLA05119	11/09/2006	No	Santa Ana
LLA05121	11/09/2006	No	Santa Ana
LLA05123	02/15/2007	No	Santa Margarita
LLA05124	11/07/2006	No	Santa Margarita
LLA05125	11/07/2006	No	Santa Ana
LLA05127	12/27/2006	No	Santa Margarita
LLA05138	12/27/2006	No	Santa Ana
LLA05141	12/27/2006	No	Santa Ana
LLA05145	01/25/2007	No	Santa Ana
LLA05146	02/05/2007	No	Santa Margarita
LLA05147	01/23/2007	No	Santa Ana
LLA05149	02/15/2007	No	Santa Ana
LLA05152	02/06/2007	No	Santa Ana
LLA05156	02/22/2007	No	Santa Ana
LLA05158	03/01/2007	No	Santa Ana
LLA05159	03/07/2007	No	Santa Margarita
LLA05160	03/08/2007	No	Santa Ana
LLA05162	03/12/2007	No	Santa Ana
LLA05168	04/03/2007	No	Santa Margarita
LLA05171	03/28/2007	No	Santa Ana
LLA05172	05/01/2007	No	Santa Margarita
LLA05173	04/02/2007	No	Santa Ana
LLA05178	04/17/2007	No	Whitewater
LLA05185	05/01/2007	No	Santa Margarita
LLA05189	05/10/2007	No	Santa Ana

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LLA05190	05/14/2007	No	Santa Margarita
LLA05192	05/14/2007	No	Santa Margarita
PAR00899	09/05/2006	No	Santa Ana
PAR00938	07/10/2006	No	Santa Ana
PAR00941	07/03/2006	No	Whitewater
PAR00942	07/13/2006	No	Santa Ana
PAR00947	07/13/2006	No	Santa Ana
PAR00949	07/13/2006	No	Santa Margarita
PAR00951	08/04/2006	No	Santa Ana
PAR00954	08/07/2006	No	Whitewater
PAR00959	08/09/2006	No	Santa Margarita
PAR00961	11/16/2006	No	Santa Ana
PAR00966	08/16/2006	No	Santa Ana
PAR00968	12/11/2006	No	Santa Ana
PAR00973	11/09/2006	No	Santa Ana
PAR00978	10/02/2006	No	Santa Ana
PAR00979	10/04/2006	No	Santa Ana
PAR00980	10/02/2006	No	Santa Margarita
PAR00983	09/26/2006	No	Santa Margarita
PAR00984	09/27/2006	No	Santa Ana
PAR00986	11/20/2006	No	Santa Ana
PAR00987	10/02/2006	No	Santa Ana
PAR00994	10/26/2006	No	Santa Ana
PAR00998	11/07/2006	No	Santa Margarita
PAR01002	11/13/2006	No	Santa Ana
PAR01005	11/03/2006	No	Whitewater
PAR01007	11/13/2006	No	Santa Ana
PAR01013	12/27/2006	No	Santa Margarita
PAR01017	01/08/2007	No	Santa Ana
PAR01018	02/28/2007	No	Santa Ana
PAR01019	12/11/2006	No	Santa Margarita
PAR01020	12/11/2006	No	Santa Ana
PAR01021	12/05/2006	No	Whitewater
PAR01022	12/18/2006	No	Whitewater
PAR01024	12/18/2006	No	Santa Ana
PAR01026	01/08/2007	No	Santa Ana
PAR01029	01/10/2007	No	Santa Margarita
PAR01030	12/15/2006	No	Whitewater
PAR01038	01/29/2007	No	Santa Margarita
PAR01043	02/05/2007	No	Santa Margarita
PAR01049	03/19/2007	No	Whitewater
PAR01050	02/15/2007	No	Santa Ana
PAR01053	02/21/2007	No	Whitewater
PAR01056	03/20/2007	No	Santa Ana
PAR01057	04/30/2007	No	Whitewater
PAR01061	03/20/2007	No	Santa Ana
PAR01067	04/17/2007	No	Santa Margarita
PAR01068	04/02/2007	No	Santa Ana
PAR01073	04/30/2007	No	Whitewater
PAR01076	05/08/2007	No	Santa Margarita
PAR01083	04/26/2007	No	Santa Ana
PAR01086	06/18/2007	No	Santa Ana
PAR01088	04/26/2007	No	Santa Margarita
PAR01089	05/09/2007	No	Santa Margarita
PAR01091	06/01/2007	No	Whitewater
PAR01094	05/09/2007	No	Santa Margarita
PAR01112	06/12/2007	No	Whitewater
PAR01114	06/04/2007	No	Santa Ana
PAR01118	06/25/2007	No	Santa Ana
PM32003	05/30/2007	No	Santa Ana
PM32257	08/21/2006	No	Santa Ana
PM32494	07/12/2006	No	Santa Ana

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PM32738	03/28/2007	No	Santa Margarita
PM32781	02/06/2007	No	Santa Ana
PM32783	06/29/2007	No	Santa Margarita
PM32799	09/11/2006	No	Santa Ana
PM32833	08/14/2006	No	Santa Margarita
PM32842	07/10/2006	No	Santa Ana
PM33005	09/08/2006	No	Santa Ana
PM33093	05/21/2007	No	Santa Margarita
PM33176	06/06/2007	No	Santa Ana
PM33241	12/04/2006	No	Santa Ana
PM33328	10/03/2006	No	Santa Ana
PM33478	03/13/2007	No	Santa Ana
PM33594	08/04/2006	No	Santa Ana
PM33596	10/30/2006	No	Santa Margarita
PM33660	08/14/2006	No	Santa Ana
PM33690	12/05/2006	No	Santa Ana
PM33711	08/03/2006	No	Santa Ana
PM33750	03/01/2007	No	Santa Margarita
PM33777	05/09/2007	No	Santa Ana
PM33789	06/28/2007	No	Santa Margarita
PM33800	06/26/2007	No	Santa Margarita
PM33805	11/13/2006	No	Santa Ana
PM33831	11/16/2006	No	Santa Margarita
PM33835	04/18/2007	No	Santa Ana
PM33838	09/20/2006	No	Santa Ana
PM33856	02/05/2007	No	Santa Ana
PM33881	07/24/2006	No	Santa Ana
PM33911	05/31/2007	No	Santa Margarita
PM33928	09/18/2006	No	Santa Margarita
PM33942	03/14/2007	No	Santa Ana
PM34010	04/17/2007	No	Santa Ana
PM34056	05/02/2007	No	Santa Ana
PM34103	06/27/2007	No	Whitewater
PM34128	09/12/2006	No	Santa Ana
PM34157	02/20/2007	No	Santa Margarita
PM34252	09/20/2006	No	Santa Ana
PM34253	12/28/2006	No	Santa Margarita
PM34279	01/24/2007	No	Santa Ana
PM34341	05/23/2007	No	Santa Ana
PM34343	04/10/2007	No	Santa Margarita
PM34430	01/30/2007	No	Santa Ana
PM34460	08/31/2006	No	Santa Ana
PM34461	03/20/2007	No	Santa Margarita
PM34467	02/26/2007	No	Santa Margarita
PM34531	04/03/2007	No	Santa Margarita
PM34535	02/14/2007	No	Santa Ana
PM34547	07/05/2006	No	Santa Ana
PM34562	10/18/2006	No	Santa Margarita
PM34579	03/21/2007	No	Santa Margarita
PM34637	03/07/2007	No	Santa Ana
PM34701	08/28/2006	No	Santa Margarita
PM34706	07/18/2006	No	Santa Ana
PM34787	03/09/2007	No	Whitewater
PM34790	06/26/2007	No	Santa Ana
PM34799	04/04/2007	No	Santa Ana
PM34803	04/18/2007	No	Santa Ana
PM34818	12/07/2006	No	Santa Ana
PM34836	02/15/2007	No	Santa Ana
PM34870	04/30/2007	No	Santa Ana
PM34889	02/08/2007	No	Santa Ana
PM34893	03/28/2007	No	Santa Ana
PM34894	10/04/2006	No	Santa Ana

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PM34906	02/05/2007	No	Santa Margarita
PM34964	08/24/2006	No	Santa Ana
PM34971	06/21/2007	No	Santa Ana
PM34989	05/09/2007	No	Santa Ana
PM34992	11/07/2006	No	Santa Ana
PM34998	04/19/2007	No	Santa Ana
PM35070	05/21/2007	No	Santa Margarita
PM35071	04/26/2007	No	Santa Ana
PM35096	05/10/2007	No	Santa Margarita
PM35099	01/11/2007	No	Whitewater
PM35109	02/28/2007	No	Santa Margarita
PM35118	06/25/2007	No	Santa Margarita
PM35136	05/22/2007	No	Santa Ana
PM35164	05/29/2007	No	Santa Margarita
PM35180	04/12/2007	No	Santa Margarita
PM35205	05/09/2007	No	Santa Margarita
PM35207	02/26/2007	No	Santa Ana
PM35219	06/04/2007	No	Santa Margarita
PM35222	02/21/2007	No	Santa Ana
PM35250	01/22/2007	No	Santa Ana
PM35261	04/04/2007	No	Santa Ana
PM35267	04/11/2007	No	Santa Ana
PM35285	12/14/2006	No	Santa Ana
PM35287	06/07/2007	No	Santa Margarita
PM35291	04/24/2007	No	Santa Ana
PM35294	03/19/2007	No	Santa Ana
PM35556	04/16/2007	No	Santa Ana
PP13207	04/30/2007	No	Santa Margarita
PP16891	10/02/2006	No	Santa Margarita
PP16925	02/22/2007	No	Whitewater
PP18538	03/12/2007	No	Santa Ana
PP18747	12/14/2006	No	Santa Ana
PP18877	01/11/2007	No	Santa Ana
PP19044	04/24/2007	No	Santa Ana
PP19998	03/27/2007	No	Santa Margarita
PP20161	03/20/2007	No	Santa Margarita
PP20240	01/22/2007	No	Santa Ana
PP20371	11/01/2006	No	Santa Ana
PP20384	08/10/2006	No	Santa Margarita
PP20699	03/14/2007	No	Santa Ana
PP20757	05/31/2007	No	Santa Margarita
PP20994	08/30/2006	No	Santa Ana
PP21004	10/19/2006	No	Santa Margarita
PP21196	07/07/2006	No	Santa Ana
PP21207	02/08/2007	No	Santa Ana
PP21335	10/11/2006	No	Santa Margarita
PP21400	11/14/2006	No	Santa Ana
PP21436	03/15/2007	No	Whitewater
PP21447	06/13/2007	No	Santa Margarita
PP21472	08/08/2006	No	Santa Ana
PP21498	09/08/2006	No	Santa Ana
PP21517	08/31/2006	No	Santa Ana
PP21552	12/07/2006	No	Santa Ana
PP21554	09/26/2006	No	Santa Ana
PP21558	03/15/2007	No	Santa Ana
PP21713	04/19/2007	No	Santa Ana
PP21731	08/17/2006	No	Santa Margarita
PP21733	08/17/2006	No	Santa Margarita
PP21764	07/24/2006	No	Santa Ana
PP21893	04/18/2007	No	Santa Margarita
PP21894	07/17/2006	No	Whitewater
PP21912	07/25/2006	No	Whitewater

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PP22005	08/16/2006	No	Santa Margarita
PP22042	09/08/2006	No	Santa Ana
PP22086	01/17/2007	No	Whitewater
PP22089	09/26/2006	No	Santa Margarita
PP22100	02/20/2007	No	Santa Ana
PP22147	09/26/2006	No	Santa Margarita
PP22241	02/23/2007	No	Santa Ana
PP22306	02/13/2007	No	Santa Ana
PP22337	12/07/2006	No	Santa Ana
PP22338	06/05/2007	No	Santa Ana
PP22352	04/16/2007	No	Santa Margarita
PP22354	12/14/2006	No	Santa Ana
PP22372	01/17/2007	No	Santa Margarita
PP22423	06/25/2007	No	Santa Ana
PP22451	05/04/2007	No	Whitewater
PP22461	01/30/2007	No	Santa Margarita
PP22493	02/20/2007	No	Santa Margarita
PP22497	03/05/2007	No	Santa Ana
PP22524	03/27/2007	No	Santa Ana
PP22540	02/27/2007	No	Whitewater
PP22569	03/12/2007	No	Santa Margarita
PP22575	06/07/2007	No	Santa Margarita
PP22590	03/23/2007	No	Santa Ana
PP22595	03/09/2007	No	Whitewater
PP22650	04/04/2007	No	Santa Margarita
PP22673	05/03/2007	No	Santa Ana
PP22674	04/25/2007	No	Santa Ana
PP22728	05/21/2007	No	Santa Ana
PP22757	05/02/2007	No	Santa Ana
PP22759	05/09/2007	No	Whitewater
PP22768	06/05/2007	No	Santa Ana
PP22830	06/27/2007	No	Whitewater
PUP00163	02/22/2007	No	Santa Ana
PUP00302	02/28/2007	No	Santa Ana
PUP00556	08/29/2006	No	Santa Margarita
PUP00644	01/04/2007	No	Santa Margarita
PUP00751	03/19/2007	No	Santa Margarita
PUP00779	02/20/2007	No	Santa Margarita
PUP00884	06/21/2007	No	Santa Ana
RCL00106	04/19/2007	No	Santa Ana
SMP00193	04/17/2007	No	Whitewater
SMP00200	10/10/2006	No	Whitewater
SMP00214	06/27/2007	No	Whitewater
SP00106	03/01/2007	No	Santa Margarita
SP00210	11/07/2006	No	Santa Ana
SP00212	11/07/2006	No	Santa Ana
SP00243	06/29/2007	No	Santa Ana
SP00256	11/16/2006	No	Santa Ana
SP00260	02/13/2007	No	Santa Ana
SP00266	03/12/2007	No	Santa Ana
SP00308	04/19/2007	No	Santa Ana
SP00317	07/20/2006	No	Santa Ana
SP00323	02/07/2007	No	Santa Ana
SP00340	11/01/2006	No	Santa Margarita
SP00342	05/31/2007	No	Santa Ana
SP00344	10/25/2006	No	Santa Ana
SP00346	10/05/2006	No	Santa Ana
SP00353	09/28/2006	No	Santa Ana
SUP01029	12/11/2006	No	Santa Ana
SUP01032	07/21/2006	No	Santa Ana
SUP01049	12/04/2006	No	Santa Ana
SUP01069	07/31/2006	No	Santa Ana

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SUP01070	12/04/2006	No	Santa Ana
SUP01087	08/31/2006	No	Santa Ana
SUP01106	12/04/2006	No	Santa Ana
SUP01109	11/09/2006	No	Santa Ana
SUP01110	07/03/2006	No	Santa Ana
SUP01111	07/18/2006	No	Santa Margarita
SUP01115	08/22/2006	No	Santa Margarita
SUP01116	03/07/2007	No	Santa Ana
SUP01118	10/27/2006	No	Santa Ana
SUP01120	07/27/2006	No	Santa Margarita
SUP01123	08/07/2006	No	Whitewater
SUP01125	10/23/2006	No	Santa Ana
SUP01126	08/22/2006	No	Santa Ana
SUP01127	08/14/2006	No	Santa Ana
SUP01130	10/12/2006	No	Santa Ana
SUP01132	08/31/2006	No	Santa Ana
SUP01138	09/05/2006	No	Santa Ana
SUP01140	10/04/2006	No	Santa Ana
SUP01142	10/19/2006	No	Santa Ana
SUP01143	10/04/2006	No	Santa Ana
SUP01147	10/12/2006	No	Santa Ana
SUP01148	10/24/2006	No	Santa Margarita
SUP01149	10/12/2006	No	Santa Margarita
SUP01151	11/01/2006	No	Santa Ana
SUP01153	10/13/2006	No	Santa Ana
SUP01154	12/14/2006	No	Santa Ana
SUP01155	10/27/2006	No	Santa Margarita
SUP01157	10/23/2006	No	Santa Ana
SUP01158	12/04/2006	No	Santa Ana
SUP01159	12/04/2006	No	Santa Ana
SUP01160	11/28/2006	No	Santa Margarita
SUP01161	12/21/2006	No	Santa Ana
SUP01162	03/07/2007	No	Santa Ana
SUP01163	12/28/2006	No	Santa Ana
SUP01164	03/07/2007	No	Santa Ana
SUP01166	11/14/2006	No	Santa Margarita
SUP01167	12/11/2006	No	Santa Ana
SUP01168	12/11/2006	No	Santa Ana
SUP01171	01/30/2007	No	Santa Ana
SUP01172	01/09/2007	No	Santa Ana
SUP01174	03/07/2007	No	Santa Ana
SUP01178	12/21/2006	No	Santa Ana
SUP01179	12/13/2006	No	Whitewater
SUP01181	12/28/2006	No	Santa Margarita
SUP01182	12/21/2006	No	Santa Ana
SUP01183	01/04/2007	No	Santa Ana
SUP01185	12/27/2006	No	Santa Ana
SUP01187	01/02/2007	No	Santa Ana
SUP01188	04/30/2007	No	Whitewater
SUP01189	02/07/2007	No	Whitewater
SUP01190	01/24/2007	No	Santa Margarita
SUP01191	01/24/2007	No	Santa Ana
SUP01193	02/06/2007	No	Santa Margarita
SUP01195	02/07/2007	No	Santa Ana
SUP01199	02/26/2007	No	Santa Margarita
SUP01200	02/27/2007	No	Santa Ana
SUP01202	05/10/2007	No	Santa Ana
SUP01203	02/27/2007	No	Santa Ana
SUP01206	03/01/2007	No	Santa Ana
SUP01207	04/10/2007	No	Santa Ana
SUP01208	03/07/2007	No	Santa Margarita
SUP01209	03/07/2007	No	Santa Ana

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SUP01210	03/12/2007	No	Santa Ana
SUP01211	03/12/2007	No	Santa Margarita
SUP01212	03/09/2007	No	Santa Ana
SUP01214	03/09/2007	No	Santa Ana
SUP01215	03/12/2007	No	Santa Ana
SUP01216	03/14/2007	No	Santa Ana
SUP01217	05/10/2007	No	Whitewater
SUP01218	03/27/2007	No	Santa Ana
SUP01220	03/28/2007	No	Santa Ana
SUP01221	05/29/2007	No	Santa Ana
SUP01223	03/29/2007	No	Santa Ana
SUP01224	03/28/2007	No	Santa Ana
SUP01228	04/04/2007	No	Santa Ana
SUP01229	04/09/2007	No	Santa Ana
SUP01231	04/10/2007	No	Santa Ana
SUP01233	04/17/2007	No	Santa Ana
SUP01234	04/19/2007	No	Santa Margarita
SUP01235	04/17/2007	No	Santa Ana
SUP01236	05/02/2007	No	Santa Margarita
SUP01237	04/20/2007	No	Santa Ana
SUP01241	05/02/2007	No	Santa Margarita
SUP01249	05/21/2007	No	Santa Ana
SUP01252	06/04/2007	No	Santa Ana
SUP01254	06/11/2007	No	Santa Ana
SUP01255	06/13/2007	No	Santa Ana
SUP01261	06/25/2007	No	Santa Margarita
TR27887	11/13/2006	No	Santa Ana
TR29326	12/27/2006	No	Santa Ana
TR29327	09/18/2006	No	Santa Ana
TR29328	02/06/2007	No	Santa Ana
TR29599	10/23/2006	No	Santa Ana
TR29762	05/03/2007	No	Santa Ana
TR30153	03/05/2007	No	Santa Ana
TR30231	11/15/2006	No	Santa Ana
TR30337	01/09/2007	No	Santa Ana
TR30480	10/24/2006	No	Santa Ana
TR30851	09/05/2006	No	Santa Ana
TR30852	09/05/2006	No	Santa Ana
TR30926	06/06/2007	No	Santa Ana
TR30977	06/07/2007	No	Santa Ana
TR30993	11/21/2006	No	Santa Ana
TR31207	07/10/2006	No	Santa Ana
TR31397	02/14/2007	No	Santa Ana
TR31409	07/12/2006	No	Santa Ana
TR31545	03/19/2007	No	Santa Ana
TR31546	05/29/2007	No	Santa Ana
TR31554	04/23/2007	No	Santa Ana
TR31597	01/18/2007	No	Santa Margarita
TR31804	12/19/2006	No	Santa Margarita
TR31842	10/26/2006	No	Santa Ana
TR31879	03/27/2007	No	Whitewater
TR32026	05/25/2007	No	Santa Ana
TR32177	03/07/2007	No	Santa Ana
TR32237	09/18/2006	No	Santa Ana
TR32318	02/05/2007	No	Santa Ana
TR32531	01/11/2007	No	Santa Ana
TR32539	10/11/2006	No	Santa Ana
TR32626	02/21/2007	No	Santa Ana
TR32628	02/20/2007	No	Santa Ana
TR32723	08/31/2006	No	Santa Ana
TR32731	01/09/2007	No	Santa Ana
TR32759	04/09/2007	No	Santa Ana

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TR32794	02/20/2007	No	Santa Ana
TR32974	05/08/2007	No	Santa Ana
TR32975	05/08/2007	No	Santa Ana
TR32976	05/10/2007	No	Santa Ana
TR32982	09/14/2006	No	Santa Ana
TR32984	09/21/2006	No	Santa Ana
TR33254	06/25/2007	No	Santa Ana
TR33270	05/15/2007	No	Santa Ana
TR33308	06/04/2007	No	Santa Ana
TR33372	03/22/2007	No	Santa Ana
TR33419	10/02/2006	No	Santa Ana
TR33511	04/05/2007	No	Santa Ana
TR33598	05/31/2007	No	Santa Ana
TR33610	09/07/2006	No	Santa Ana
TR33615	05/15/2007	No	Santa Ana
TR33620	08/08/2006	No	Santa Ana
TR33648	08/29/2006	No	Santa Ana
TR33727	03/14/2007	No	Santa Ana
TR33836	02/14/2007	No	Santa Ana
TR33864	07/10/2006	No	Santa Ana
TR33884	12/14/2006	No	Whitewater
TR33969	09/25/2006	No	Santa Margarita
TR33976	04/19/2007	No	Santa Ana
TR33977	08/14/2006	No	Santa Ana
TR33978	08/14/2006	No	Santa Ana
TR34037	08/09/2006	No	Santa Ana
TR34042	05/21/2007	No	Whitewater
TR34096	11/07/2006	No	Santa Ana
TR34119	11/15/2006	No	Santa Ana
TR34138	05/14/2007	No	Santa Ana
TR34164	09/28/2006	No	Santa Ana
TR34180	10/04/2006	No	Santa Ana
TR34236	10/16/2006	No	Santa Ana
TR34305	08/24/2006	No	Whitewater
TR34358	10/10/2006	No	Santa Ana
TR34406	03/21/2007	No	Santa Ana
TR34440	03/12/2007	No	Santa Ana
TR34478	08/14/2006	No	Santa Margarita
TR34509	07/31/2006	No	Santa Margarita
TR34534	01/30/2007	No	Santa Ana
TR34537	02/15/2007	No	Santa Ana
TR34552	09/05/2006	No	Whitewater
TR34553	09/26/2006	No	Whitewater
TR34587	10/26/2006	No	Santa Margarita
TR34677	10/23/2006	No	Santa Ana
TR34689	03/29/2007	No	Santa Ana
TR34735	03/14/2007	No	Santa Ana
TR34742	11/07/2006	No	Santa Ana
TR34747	04/25/2007	No	Santa Ana
TR34786	09/14/2006	No	Santa Ana
TR34842	02/14/2007	No	Santa Ana
TR34934	10/30/2006	No	Whitewater
TR34972	02/14/2007	No	Santa Ana
TR35400	05/16/2007	No	Santa Ana
TR35409	03/07/2007	No	Santa Ana
TR35477	04/11/2007	No	Santa Ana
UPH00499	08/17/2006	No	Santa Ana
UPH00536	09/19/2006	No	Santa Ana
UPH00537	09/19/2006	No	Santa Ana
UPH00538	11/20/2006	No	Santa Ana
UPH00549	09/19/2006	No	Santa Margarita
UPH00550	09/19/2006	No	Santa Margarita

Riverside County Flood Control and Water Conservation District
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UPH00551	09/19/2006	No	Santa Margarita
UPH00552	10/31/2006	No	Santa Ana
UPH00553	10/31/2006	No	Santa Ana
UPH00554	10/31/2006	No	Santa Ana
UPH00555	10/31/2006	No	Santa Ana
UPH00556	10/31/2006	No	Santa Ana
UPH00557	10/31/2006	No	Santa Ana
UPH00558	10/31/2006	No	Santa Ana
UPH00559	10/31/2006	No	Santa Ana
UPH00563	11/20/2006	No	Santa Ana
UPH00564	11/20/2006	No	Santa Ana
UPH00565	11/20/2006	No	Santa Ana
UPH00566	11/20/2006	No	Santa Ana
UPH00567	11/20/2006	No	Santa Ana
UPH00574	12/14/2006	No	Santa Ana
UPH00575	12/14/2006	No	Santa Ana
UPH00581	04/09/2007	No	Santa Ana
UPH00582	04/09/2007	No	Santa Ana
UPH00583	04/09/2007	No	Santa Ana

Total WQMP Required No: 636

WQMP Required: Yes

CaseNumber	Received Date	WQMP	Watershed
CUP03021	10/16/2006	Yes	Santa Ana
CUP03286	05/24/2007	Yes	Santa Ana
CUP03450	11/01/2006	Yes	Santa Ana
CUP03467	07/26/2006	Yes	Santa Margarita
CUP03471	07/24/2006	Yes	Santa Margarita
CUP03472	05/09/2007	Yes	Santa Ana
CUP03475	11/28/2006	Yes	Santa Ana
CUP03477	06/29/2007	Yes	Santa Ana
CUP03480	12/27/2006	Yes	Santa Ana
CUP03482	06/06/2007	Yes	Santa Ana
CUP03489	04/10/2007	Yes	Santa Ana
CUP03490	08/08/2006	Yes	Santa Ana
CUP03507	11/07/2006	Yes	Santa Ana
CUP03508	06/19/2007	Yes	Santa Ana
CUP03510	03/15/2007	Yes	Santa Ana
CUP03514	07/05/2006	Yes	Santa Ana
CUP03518	04/19/2007	Yes	Santa Ana
CUP03521	09/05/2006	Yes	Santa Ana
CUP03522	01/08/2007	Yes	Santa Ana
CUP03525	01/11/2007	Yes	Santa Ana
CUP03526	04/23/2007	Yes	Santa Ana
CUP03534	04/18/2007	Yes	Santa Ana
CUP03537	01/16/2007	Yes	Santa Ana
CUP03538	01/22/2007	Yes	Santa Ana
CUP03541	01/11/2007	Yes	Santa Ana
CUP03545	03/29/2007	Yes	Santa Margarita
CUP03546	03/22/2007	Yes	Santa Margarita
CUP03554	06/26/2007	Yes	Santa Ana
CZ07408	09/20/2006	Yes	Santa Ana
PAR00928	07/13/2006	Yes	Santa Margarita
PAR00957	08/10/2006	Yes	Santa Margarita
PAR00963	08/14/2006	Yes	Santa Margarita
PAR00965	08/16/2006	Yes	Santa Ana
PAR00977	09/26/2006	Yes	Santa Ana
PAR00981	09/25/2006	Yes	Santa Margarita
PAR00985	10/11/2006	Yes	Santa Margarita

Riverside County Flood Control and Water Conservation District
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PAR00988	10/04/2006	Yes	Santa Margarita
PAR01034	01/22/2007	Yes	Santa Margarita
PAR01036	02/15/2007	Yes	Santa Ana
PAR01041	02/05/2007	Yes	Santa Margarita
PAR01060	02/26/2007	Yes	Santa Margarita
PAR01087	05/01/2007	Yes	Santa Ana
PM32885	09/28/2006	Yes	Santa Ana
PM33349	08/30/2006	Yes	Santa Ana
PM33530	04/16/2007	Yes	Santa Ana
PM33691	01/08/2007	Yes	Santa Margarita
PM33817	09/08/2006	Yes	Santa Margarita
PM34089	11/01/2006	Yes	Santa Ana
PM34094	08/01/2006	Yes	Santa Ana
PM34128	01/18/2007	Yes	Santa Ana
PM34264	10/24/2006	Yes	Santa Ana
PM34706	07/27/2006	Yes	Santa Ana
PM34818	08/01/2006	Yes	Santa Ana
PM34924	05/31/2007	Yes	Santa Ana
PM35007	02/13/2007	Yes	Santa Ana
PM35061	05/01/2007	Yes	Santa Ana
PM35180	04/12/2007	Yes	Santa Margarita
PM35212	11/07/2006	Yes	Santa Ana
PM35273	01/16/2007	Yes	Santa Ana
PM35518	04/25/2007	Yes	Santa Margarita
PP07914	10/23/2006	Yes	Santa Ana
PP11258	02/21/2007	Yes	Santa Ana
PP13207	01/04/2007	Yes	Santa Margarita
PP14420	03/29/2007	Yes	Santa Ana
PP18249	11/07/2006	Yes	Santa Ana
PP18747	08/09/2006	Yes	Santa Ana
PP18751	04/04/2007	Yes	Santa Margarita
PP18876	06/05/2007	Yes	Santa Ana
PP18877	06/07/2007	Yes	Santa Ana
PP18908	05/31/2007	Yes	Santa Ana
PP18966	11/01/2006	Yes	Santa Margarita
PP19818	04/04/2007	Yes	Santa Ana
PP19918	06/05/2007	Yes	Santa Ana
PP19998	10/26/2006	Yes	Santa Margarita
PP20158	05/02/2007	Yes	Santa Ana
PP20208	12/26/2006	Yes	Santa Ana
PP20247	02/07/2007	Yes	Santa Ana
PP20375	04/11/2007	Yes	Santa Margarita
PP20711	07/27/2006	Yes	Santa Ana
PP20784	03/12/2007	Yes	Santa Ana
PP20908	03/22/2007	Yes	Santa Ana
PP20996	08/01/2006	Yes	Santa Ana
PP21024	03/28/2007	Yes	Santa Margarita
PP21069	10/23/2006	Yes	Santa Ana
PP21140	06/18/2007	Yes	Santa Ana
PP21141	03/12/2007	Yes	Santa Ana
PP21163	01/08/2007	Yes	Santa Margarita
PP21207	12/08/2006	Yes	Santa Ana
PP21272	01/04/2007	Yes	Santa Ana
PP21352	06/27/2007	Yes	Santa Margarita
PP21371	05/29/2007	Yes	Santa Ana
PP21400	04/19/2007	Yes	Santa Ana
PP21441	04/26/2007	Yes	Santa Ana
PP21447	04/09/2007	Yes	Santa Margarita
PP21452	03/07/2007	Yes	Santa Ana
PP21558	08/08/2006	Yes	Santa Ana
PP21585	03/15/2007	Yes	Santa Ana
PP21599	04/26/2007	Yes	Santa Ana

Riverside County Flood Control and Water Conservation District
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PP21653	02/01/2007	Yes	Santa Ana
PP21713	02/20/2007	Yes	Santa Ana
PP21786	03/26/2007	Yes	Santa Ana
PP21813	10/16/2006	Yes	Santa Ana
PP21824	03/05/2007	Yes	Santa Ana
PP21874	01/08/2007	Yes	Santa Ana
PP21953	09/19/2006	Yes	Santa Ana
PP21987	02/14/2007	Yes	Santa Ana
PP22027	12/26/2006	Yes	Santa Ana
PP22037	09/14/2006	Yes	Santa Ana
PP22042	05/17/2007	Yes	Santa Ana
PP22176	11/21/2006	Yes	Santa Margarita
PP22217	11/07/2006	Yes	Santa Margarita
PP22220	04/05/2007	Yes	Santa Margarita
PP22229	06/21/2007	Yes	Santa Ana
PP22241	05/22/2007	Yes	Santa Ana
PP22245	05/01/2007	Yes	Santa Ana
PP22249	12/14/2006	Yes	Santa Margarita
PP22254	01/23/2007	Yes	Santa Margarita
PP22255	05/02/2007	Yes	Santa Ana
PP22256	05/10/2007	Yes	Santa Margarita
PP22263	06/06/2007	Yes	Santa Margarita
PP22266	01/02/2007	Yes	Santa Ana
PP22277	05/01/2007	Yes	Santa Ana
PP22278	04/12/2007	Yes	Santa Margarita
PP22284	03/15/2007	Yes	Santa Ana
PP22312	01/30/2007	Yes	Santa Ana
PP22338	12/26/2006	Yes	Santa Ana
PP22344	01/30/2007	Yes	Santa Ana
PP22355	01/23/2007	Yes	Santa Ana
PP22372	04/25/2007	Yes	Santa Margarita
PP22415	06/21/2007	Yes	Santa Ana
PP22423	01/18/2007	Yes	Santa Ana
PP22461	05/17/2007	Yes	Santa Margarita
PP22463	02/13/2007	Yes	Santa Ana
PP22503	02/20/2007	Yes	Santa Ana
PP22513	05/24/2007	Yes	Santa Ana
PP22515	05/23/2007	Yes	Santa Margarita
PP22521	03/05/2007	Yes	Santa Margarita
PP22532	05/24/2007	Yes	Santa Ana
PP22628	03/29/2007	Yes	Santa Ana
PP22636	04/11/2007	Yes	Santa Ana
PP22670	05/09/2007	Yes	Santa Ana
PP22679	05/15/2007	Yes	Santa Ana
PP22682	05/07/2007	Yes	Santa Ana
PP22685	05/24/2007	Yes	Santa Margarita
PP22698	05/01/2007	Yes	Santa Margarita
PP22718	04/30/2007	Yes	Santa Ana
PP22763	06/20/2007	Yes	Santa Margarita
PP22807	06/12/2007	Yes	Santa Ana
PUP00556	08/22/2006	Yes	Santa Margarita
PUP00778	05/09/2007	Yes	Santa Margarita
PUP00799	03/20/2007	Yes	Santa Ana
PUP00884	04/05/2007	Yes	Santa Ana
PUP00885	06/20/2007	Yes	Santa Ana
PUP00887	05/16/2007	Yes	Santa Ana
SP00327	09/15/2006	Yes	Santa Ana
SP00357	08/16/2006	Yes	Santa Ana
TR29495	10/16/2006	Yes	Santa Ana
TR30153	06/20/2007	Yes	Santa Ana
TR30238	11/15/2006	Yes	Santa Ana
TR30284	02/27/2007	Yes	Santa Margarita

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TR30752	02/14/2007	Yes	Santa Ana
TR30851	01/08/2007	Yes	Santa Ana
TR30852	06/13/2007	Yes	Santa Ana
TR30926	11/07/2006	Yes	Santa Ana
TR30976	10/26/2006	Yes	Santa Ana
TR30977	06/07/2007	Yes	Santa Ana
TR31131	02/14/2007	Yes	Santa Ana
TR31156	12/14/2006	Yes	Santa Ana
TR31197	07/17/2006	Yes	Santa Ana
TR31397	10/11/2006	Yes	Santa Ana
TR31597	11/07/2006	Yes	Santa Margarita
TR31736	11/01/2006	Yes	Santa Margarita
TR31856	03/12/2007	Yes	Santa Ana
TR31871	08/17/2006	Yes	Santa Margarita
TR31894	01/03/2007	Yes	Santa Ana
TR31895	04/25/2007	Yes	Santa Margarita
TR32011	02/27/2007	Yes	Santa Margarita
TR32022	08/07/2006	Yes	Santa Ana
TR32026	10/11/2006	Yes	Santa Ana
TR32044	02/05/2007	Yes	Santa Ana
TR32088	05/29/2007	Yes	Santa Ana
TR32151	07/20/2006	Yes	Santa Margarita
TR32227	11/15/2006	Yes	Santa Margarita
TR32277	11/28/2006	Yes	Santa Ana
TR32318	01/25/2007	Yes	Santa Ana
TR32323	03/22/2007	Yes	Santa Margarita
TR32372	12/05/2006	Yes	Santa Ana
TR32535	08/28/2006	Yes	Santa Margarita
TR32627	08/21/2006	Yes	Santa Margarita
TR32628	12/22/2006	Yes	Santa Ana
TR32696	03/16/2007	Yes	Santa Ana
TR32704	05/30/2007	Yes	Santa Ana
TR32721	06/05/2007	Yes	Santa Ana
TR32722	09/20/2006	Yes	Santa Ana
TR32778	03/29/2007	Yes	Santa Margarita
TR32813	11/21/2006	Yes	Santa Margarita
TR32821	06/03/2007	Yes	Santa Ana
TR32822	08/14/2006	Yes	Santa Ana
TR32901	07/17/2006	Yes	Santa Margarita
TR33177	09/08/2006	Yes	Santa Ana
TR33178	04/06/2007	Yes	Santa Ana
TR33248	04/04/2007	Yes	Santa Ana
TR33254	08/07/2006	Yes	Santa Margarita
TR33260	09/19/2006	Yes	Santa Ana
TR33339	05/15/2007	Yes	Santa Ana
TR33356	05/08/2007	Yes	Santa Margarita
TR33369	02/02/2007	Yes	Santa Ana
TR33371	01/04/2007	Yes	Santa Ana
TR33372	01/31/2007	Yes	Santa Ana
TR33376	06/20/2007	Yes	Santa Ana
TR33389	06/18/2007	Yes	Santa Ana
TR33410	04/09/2007	Yes	Santa Ana
TR33428	03/26/2007	Yes	Santa Ana
TR33519	06/26/2007	Yes	Santa Ana
TR33569	05/21/2007	Yes	Santa Ana
TR33688	06/04/2007	Yes	Santa Ana
TR33732	04/12/2007	Yes	Santa Ana
TR33751	03/01/2007	Yes	Santa Margarita
TR33788	04/10/2007	Yes	Santa Margarita
TR33840	11/01/2006	Yes	Santa Margarita
TR33910	11/01/2006	Yes	Santa Margarita
TR33913	09/08/2006	Yes	Santa Ana

Riverside County Flood Control and Water Conservation District

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TR33972	11/16/2006	Yes	Santa Ana
TR33976	08/28/2006	Yes	Santa Ana
TR33992	05/24/2007	Yes	Santa Ana
TR34014	01/22/2007	Yes	Santa Ana
TR34037	07/10/2006	Yes	Santa Ana
TR34092	10/06/2006	Yes	Santa Ana
TR34097	05/16/2007	Yes	Santa Ana
TR34104	10/05/2006	Yes	Santa Ana
TR34118	06/14/2007	Yes	Santa Ana
TR34119	11/15/2006	Yes	Santa Ana
TR34138	05/15/2007	Yes	Santa Ana
TR34202	05/08/2007	Yes	Santa Ana
TR34236	01/08/2007	Yes	Santa Ana
TR34273	10/11/2006	Yes	Santa Ana
TR34301	05/24/2007	Yes	Santa Margarita
TR34324	09/13/2006	Yes	Santa Margarita
TR34333	07/25/2006	Yes	Santa Ana
TR34356	05/08/2007	Yes	Santa Ana
TR34358	07/25/2006	Yes	Santa Ana
TR34402	11/20/2006	Yes	Santa Ana
TR34420	02/06/2007	Yes	Santa Ana
TR34466	12/21/2006	Yes	Santa Margarita
TR34478	12/14/2006	Yes	Santa Margarita
TR34500	08/08/2006	Yes	Santa Ana
TR34536	02/15/2007	Yes	Santa Ana
TR34573	05/08/2007	Yes	Santa Ana
TR34592	11/29/2006	Yes	Santa Ana
TR34598	03/16/2007	Yes	Santa Ana
TR34600	06/19/2007	Yes	Santa Ana
TR34689	09/08/2006	Yes	Santa Ana
TR34713	09/05/2006	Yes	Santa Ana
TR34730	01/17/2007	Yes	Santa Ana
TR34747	03/07/2007	Yes	Santa Ana
TR34796	01/11/2007	Yes	Santa Ana
TR34810	06/12/2007	Yes	Santa Ana
TR34928	11/15/2006	Yes	Santa Ana
TR35025	05/15/2007	Yes	Santa Ana
TR35186	12/06/2006	Yes	Santa Margarita

Total WQMP Required Yes: 260

ATTACHMENT B

WQMP EXAMPLE CONDITIONS

PRELIMINARY

WATER QUALITY MANAGEMENT PLAN

(WQMP)

for

TENTATIVE TRACT MAP 32778

Prepared for:
Salvatore Properties, Inc.
400 South Ramona Avenue, Suite 212
Corona, CA 92879

RECEIVED
MAR 29 2007
RIVERSIDE COUNTY FLOOD CONTROL
AND WATER CONSERVATION DISTRICT
DEVELOPMENT REVIEW/PLAN CHECK

WQMP Preparation Date
February 9, 2007

Prepared by:
Hunsaker & Associates
43460 Ridge Park Drive, Suite 220
Temecula, CA 92590
(951) 509-7096
Aida Hercules-Dodaro, PE, PMP
Project Manager

HUNSAKER & ASSOCIATES
IRVINE, INC.
INLAND EMPIRE REGION

ok for tentative review
JG 4/19/07

OWNER'S CERTIFICATION

This project-specific Water Quality Management Plan (WQMP) has been prepared for:

Salvatore Properties by Hunsaker & Associates Irvine Inc. for the development known as Tentative Tract Map 32778, located immediately south of Anza Road near Rio Linda Road in the unincorporated area of Riverside County (Assessor's Parcel Number 952-250-005).

This WQMP is intended to comply with the requirements of the county of Riverside for Tentative Tract Map 32778, which includes the requirement for the preparation and implementation of a project-specific WQMP.

The undersigned, while developing the property/project described in the preceding paragraph, shall be responsible for the implementation of this WQMP and will ensure that this WQMP is amended as appropriate to reflect up-to-date conditions on the site. This WQMP will be reviewed with the facility operator, facility supervisors, employees, tenants, maintenance and service contractors, or any other party (or parties) having responsibility for implementing portions of this WQMP. At least one copy of this WQMP will be maintained at the project site or project office in perpetuity.

The undersigned is authorized to certify and to approve implementation of this WQMP. The undersigned is aware that implementation of this WQMP is enforceable under the *County of Riverside Water Quality Management Plan for Urban Runoff* (Order No. R8-2002-0011, NPDES No. CAS 618033 adopted by the Santa Ana Regional Water Quality Control Board on October 25, 2002).

If the undersigned transfers its interest in the subject property/project, its successor in interest the undersigned shall notify the successor in interest of its responsibility to implement this WQMP.

"I certify under penalty of law that the provision of this WQMP have been reviewed and accepted and that the WQMP will be transferred to future successors in interest."

Developer's Signature	Date
Developer's Printed Name	Developer's Title/Position

Salvatore Properties, Inc.
400 South Ramona Avenue, Suite 212
Corona, CA 92879
(951) 735-6122

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V	BEST MANAGEMENT PRACTICES	A-8
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APPENDICES

A. CONDITIONS OF APPROVAL

B. VICINITY MAP AND SITE PLAN

C. SUPPORTING DETAIL RELATED TO HYDRAULIC CONDITIONS OF CONCERN (IF APPLICABLE)

D. EDUCATIONAL MATERIALS

E. SOILS REPORT (IF APPLICABLE)

F. TREATMENT CONTROL BMP SIZING CALCULATIONS AND DESIGN DETAILS

G. AGREEMENTS – CC&RS, COVENANT AND AGREEMENTS AND/OR OTHER MECHANISMS FOR ENSURING ONGOING OPERATION, MAINTENANCE, FUNDING AND TRANSFER OF REQUIREMENTS FOR THIS PROJECT-SPECIFIC WQMP

H. PHASE 1 ENVIRONMENTAL SITE ASSESSMENT – SUMMARY OF SITE REMEDIATION CONDUCTED AND USE RESTRICTIONS

I. Project Description

The project description shall completely and accurately describe in narrative form, and with supporting figures (maps or exhibits), where facilities will be located, what activities will be conducted and where, what kinds of materials will be used and/or stored, how and where materials will be delivered, and the types of wastes that will be generated. The following required information has been described and/or addressed in this "Project Description" section of this project-specific WQMP:

- Project owner and WQMP preparer;
- Project location;
- Project size;
- Standard Industrial Classification (SIC), if applicable;
- Location of facilities;
- Activities and location of activities;
- Materials Storage and Delivery Areas;
- Wastes generated by project activities.

Tentative Tract Map No. 32778 is located immediately south of Anza Road near Rio Linda Road in the County of Riverside (see Appendix B for the Vicinity Map and Site Plan). The tentative tract map by Hunsaker & Associates Irvine, Inc. (Hunsaker) proposes 44 single-family residential lots with lot sizes from approximately 7,200 to 16,500 gross square feet. The project site is currently undeveloped and slopes towards the north. An undeveloped hillside south of the site contributes off-site surface runoff towards the site. Under pre-development conditions, the on- and off-site runoff surface flows northerly towards Anza Road.

TTM 32778 will maintain the tributary runoff in a northerly direction. Independent storm drain systems are proposed within the development to prevent co-mingling of on- and off-site runoff. One system will convey the on-site runoff within the development footprint to a water quality/detention basin within the northern portion of the site. Another system will convey off-site tributary runoff westerly through an adjacent tract.

Project Developer: Salvatore Properties, Inc.
400 South Ramona Avenue, Suite 212
Corona, CA 92879
(951) 735-6122

WQMP Preparer: Hunsaker & Associates Irvine, Inc.
43460 Ridge Park Drive, Suite 220
Temecula, CA 92590
(951) 352-7200

Project Site Address: South of Anza Road near Rio Linda Road
Riverside, CA 92592

Planning Area/ Community Name: Southwest Area Land Use Plan

APN Number(s): 952-250-005

Thomas Bros. Map: 2006 Edition, Page 980, B-4

Project Watershed: Santa Margarita Hydrologic Unit (902.00)

Sub-watershed: Pechanga Hydrologic Area (902.50), Pauba Hydrologic Subarea (902.51)

Project Site Size: 20.42 acres

Standard Industrial Classification (SIC) Code: N/A

Formation of Home Owners' Association (HOA) or Property Owners Association (POA): Yes

Additional Permits/Approvals required for the Project:

Agency	Permit required (yes or no)
State Department of Fish and Game, 1601 Streambed Alteration Agreement	No
State Water Resources Control Board, Clean Water Act (CWA) section 401 Water Quality Certification	No
US Army Corps of Engineers, CWA section 404 permit	No
US Fish and Wildlife, Endangered Species Act section 7 biological opinion	No
Other *(please list in the space below as required)*	N/A

Appendix A of this project-specific WQMP shall include a complete copy of the final Conditions of Approval, when available. Appendix B of this project-specific WQMP includes:

1. A Vicinity Map identifying the project site and surrounding planning areas in sufficient detail to allow the project site to be plotted on Co-Permittee base mapping; and
2. A Site Plan for the project. The Site Plan included as part of Appendix B depicts the following project features:
   - Location and identification of all structural BMPs, including Treatment Control BMPs;
   - Landscaped areas;
   - Paved areas and intended uses (i.e., parking, outdoor work area, outdoor material storage area, sidewalks, patios, tennis courts, etc.);
   - Number and type of structures and intended uses (i.e., buildings, tenant spaces, dwelling units, community facilities such as pools, recreation facilities, tot lots, etc.);
   - Infrastructure (i.e., streets, storm drains, etc.) that will revert to public agency ownership and operation;
   - Location of existing and proposed public and private storm drainage facilities (i.e., storm drains, channels, basins, etc.), including catch basins and other inlets/outlet structures. Existing and proposed drainage facilities should be clearly differentiated;
   - Location(s) of Receiving Waters to which the project directly or indirectly discharges;
   - Location of points where onsite (or tributary offsite) flows exit the property/project site;
   - Proposed drainage areas boundaries, including tributary offsite areas, for each location where flows exits the property/project site. Each tributary area should be clearly denoted;
   - Pre- and post-project topography.

A Homeowner's Association will be established for the project. The CC&Rs, Covenant and Agreements, and/or other mechanisms for ongoing operation, maintenance, funding, transfer and implementation of the project-specific WQMP requirements shall be included in Appendix G, when available.

II. Site Characterization

Land Use Designation or Zoning:	R-A-20 (existing), R-1 (proposed)
Current Property Use:	Vacant
Proposed Property Use:	Single-family residential, 44 lots
Availability of Soils Report:	N/A. No infiltration basins proposed.
Phase 1 Site Assessment:	N/A

Receiving Waters for Urban Runoff from Site

Receiving Waters	303(d) List Impairments	Designated Beneficial Uses[1]	Proximity to RARE Beneficial Use
Unnamed minor stream and storm drain system	N/A	N/A	N/A
Temecula Creek	N/A	MUN, AGR, IND, PROC, GWR, REC1, REC2, WARM, WILD	N/A
Santa Margarita River	Phosphorus	MUN, AGR, IND, REC1, REC2, WARM, COLD, WILD	Designated in the River, not location-specific

[1]Beneficial use categories are defined in the *Water Quality Control Plan, San Diego River Basin.*

III. Pollutants of Concern

Potential pollutants associated with Urban Runoff from the proposed project must be identified. Exhibit B of the *Riverside County WQMP for Urban Runoff* provides brief descriptions of typical pollutants associated with Urban Runoff and a table that associates typical potential pollutants with types of development (land use). It should be noted that at the Co-Permittees discretion, the Co-Permittees may also accept updated studies from the California Association of Stormwater Quality Agencies (CASQA), USEPA, SWRCB and/or other commonly accepted agenoies/associations acceptable to the Co-Permittee for determination of Pollutants of Concern associated with given land use. Additionally, in identifying Pollutants of Concern, the presence of legacy pesticides, nutrients, or hazardous substances in the site's soils as a result of past uses and their potential for exposure to Urban Runoff must be addressed in project-specific WQMPs. The Co-Permittee may also require specific pollutants commonly associated with urban runoff to be addressed based on known problems in the watershed. The list of potential Urban Runoff pollutants identified for the project must be compared with the pollutants identified as causing an impairment of Receiving Waters, if any. To identify pollutants impairing proximate Receiving Waters, each project proponent preparing a project-specific WQMP shall, at a minimum, do the following:

1. For each of the proposed project discharge points, identify the proximate Receiving Water for each discharge point, using hydrologic unit basin numbers as identified in the most recent version of the Water Quality Control Plan for the Santa Ana River Basin or the San Diego Region.
2. Identify each proximate identified above that is listed on the most recent list of Clean Water Act Section 303(d) list of impaired water bodies, which can be found at website www.swrcb.ca.gov/tmdl/303d_lists.html. List all pollutants for which the proximate Receiving Waters are impaired.
3. Compare the list of pollutants for which the proximate Receiving Waters are impaired with the pollutants expected to be generated by the project.

Urban Runoff Pollutants:

The following table lists pollutants of concern that can potentially exist at the proposed site. The pollutants are from the Riverside County WQMP.

Type of Development (Land Use)	Sediment/ Turbidity	Nutrients	Organic Compounds	Trash & Debris	Oxygen Demanding Substances	Bacteria & Viruses	Oil & Grease	Pesticides	Metals
Detached Residential	E	E	N	E	E	E	E	E	N
Streets, Highways & Freeways	E	P(1)	E(4)	E	P(1)	P(6)	E	P(1)	E

E = Expected P = Potential N = Not Expected

(1) A potential pollutant if landscaping or open area exists on the project site
(2) A potential pollutant if the project includes uncovered parking areas
(3) A potential pollutant if land use involves animal waste
(4) Specifically, petroleum hydrocarbons
(5) Specifically, solvents
(6) Bacterial indicators are routinely detected in pavement runoff

The receiving waters and their impairments are identified in the previous section. The only receiving water that is 303(d) impaired is the Santa Margarita River, which is several miles below the project site. This is impaired for phosphorus, which are nutrients. Primary sources of nutrients in urban runoff are fertilizers and eroded soils. Educational material will be provided to the Homeowner's Association regarding fertilizers. The landscape maintenance staff will be educated as to the proper selection, use, and application of fertilizers. Eroded soils will be reduced by the project because it will reduce the amount of bare soil exposed to runoff.

IV. Hydrologic Conditions of Concern

Impacts to the hydrologic regime resulting from the Project may include increased runoff volume and velocity; reduced infiltration; increased flow frequency, duration, and peaks; faster time to reach peak flow; and water quality degradation. Under certain circumstances, changes could also result in the reduction in the amount of available sediment for transport; and storm flows could fill this sediment-carrying capacity by eroding the downstream channel. These changes have the potential to permanently impact downstream channels and habitat integrity. A change to the hydrologic regime of a Project's site would be considered a hydrologic condition of concern if the change would have a significant impact on downstream erosion compared to the pre-development condition or have significant impacts on stream habitat, alone or as part of a cumulative impact from development in the watershed.

This project-specific WQMP must address the issue of Hydrologic Conditions of Concern unless one of the following conditions is met:

- **Condition A:** Runoff from the Project is discharged directly to a publicly-owned, operated and maintained MS4; the discharge is in full compliance with Co-Permittee requirements for connections and discharges to the MS4 (including both quality and quantity requirements); the discharge would not significantly impact stream habitat in proximate Receiving Waters; and the discharge is authorized by the Co-Permittee.
- **Condition B:** The project disturbs less than 1 acre. The disturbed area calculation should include all disturbances associated with larger plans of development.
- **Condition C:** The project's runoff flow rate, volume, velocity and duration for the post-development condition do not exceed the pre-development condition for the 2-year, 24-hour and 10-year 24-hour rainfall events. This condition can be achieved by minimizing impervious area on a site and incorporating other site-design concepts that mimic pre-development conditions. This condition must be substantiated by hydrologic modeling methods acceptable to the Co-Permittee.

The storm water runoff from the project and its tributary areas discharges into a natural surface conveyance on the north side of the site. The project will implement site design, source control, and treatment control BMPs to mitigate for the HCOC. These BMPs are described in the following section and consist primarily of a combined detention/water quality basin that will attenuate and treat all on-site runoff. The basin will reduce the peak flow rate and filter storm runoff from the site in order to prevent significant off-site impacts. This is essentially the same as increased runoff mitigation. Mitigation of HCOC's requires attenuation of the 2-year, 24-hour and the 10-year, 24-hour storms to pre-developed rates. The 10-yr, 24 hour storm detention volume has been determined for the tentative review. As the basin is proposed to mitigate water quality as well as increased runoff/HCOC's, the preliminary basin sizing has been based on the combination of the 10-year, 24-hour volume and the water quality volume (Vbmp). Appendix C contains supporting information on the HCOC's.

V. Best Management Practices

V.1 SITE DESIGN BMPS

Project proponents shall implement Site Design concepts that achieve each of the following:

1) Minimize Urban Runoff
2) Minimize Impervious Footprint
3) Conserve Natural Areas
4) Minimize Directly Connected Impervious Areas (DCIAs)

The project proponent should identify the specific BMPs implemented to achieve each Site Design concept and provide a brief explanation for those Site Design concepts considered not applicable. See Section 4.5.1 of the WQMP for additional guidance on Site Design BMPs.

If a particular Site Design BMP concept is found to be not applicable, please provide a brief explanation as to why the concept cannot be implemented. Also provide a narrative describing how each ***included*** BMP will be implemented. In those areas, where Site Design BMPs require ongoing maintenance, the inspection and maintenance frequency, the inspection criteria, and the entity or party responsible for implementation, maintenance, and/or inspection shall be described. The location of each Site Design BMP must also be shown on the WQMP Site Plan included in Appendix B.

Table 1. Site Design BMPs

			Included	
Design Concept	**Technique**	**Specific BMP**	**yes**	**no**
Site Design Concept 1	Minimize Urban Runoff			
		Maximize the permeable area (See Section 4.5.1 of the WQMP).	X	
		Incorporate landscaped buffer areas between sidewalks and streets.		X
		Maximize canopy interception and water conservation by preserving existing native trees and shrubs, and planting additional native or drought tolerant trees and large shrubs.	X	
		Use natural drainage systems.	X	
		Where soils conditions are suitable, use perforated pipe or gravel filtration pits for low flow infiltration.		X
		Construct onsite ponding areas or retention facilities to increase opportunities for infiltration consistent with vector control objectives.	X	
		Other comparable and equally effective site design concepts as approved by the Co-Permittee (Note: Additional narrative required to describe BMP and how it addresses Site Design concept).		X

The development will contain some slope areas around portions of its perimeter and between some lots, which will maximize the permeable area. The small lot sizes do not support landscaped buffer areas between the sidewalks and streets. However, landscaped buffer areas will be provided between the proposed homes and pavement areas. Drought tolerant landscaping will be used, where possible. Additionally, an on-site water quality basin serving nearly all of the proposed residential areas has been incorporated into the site design. The water quality basin and perimeter channels will allow for some infiltration of runoff. A separate storm drain system will be used to convey off-site runoff through the development without commingling with on-site runoff within the development footprint.

Table 1. Site Design BMPs (Cont.)

			Included	
Design Concept	**Technique**	**Specific BMP**	**Yes**	**no**
Site Design Concept 2	Minimize Impervious Footprint			
		Maximize the permeable area (See Section 4.5.1 of the WQMP).	X	
		Construct walkways, trails, patios, overflow parking lots, alleys, driveways, low-traffic streets and other low -traffic areas with open-jointed paving materials or permeable surfaces, such as pervious concrete, porous asphalt, unit pavers, and granular materials.	X	
		Construct streets, sidewalks and parking lot aisles to the minimum widths necessary, provided that public safety and a walk able environment for pedestrians are not compromised.	X	
		Reduce widths of street where off-street parking is available.		N/A
		Minimize the use of impervious surfaces, such as decorative concrete, in the landscape design.	X	
		Other comparable and equally effective site design concepts as approved by the Co-Permittee (Note: Additional narrative required describing BMP and how it addresses Site Design concept).		X
Site Design Concept 3	Conserve Natural Areas			
		Conserve natural areas (See WQMP Section 4.5.1).	X	
		Maximize canopy interception and water conservation by preserving existing native trees and shrubs, and planting additional native or drought tolerant trees and large shrubs.	X	
		Use natural drainage systems.	X	
		Other comparable and equally effective site design concepts as approved by the Co-Permittee (Note: Additional narrative required describing BMP and how it addresses Site Design concept).		X

As indicated above, the development density is reduced by the proposed slopes, which allows the permeable area to be maximized. Homeowner's will be given informational materials on the use of permeable landscaping materials. The street width has been minimized to reduce impervious area, and off-street parking lots are not being proposed. Impervious areas will only be constructed where necessary for homes, streets, and sidewalks. Natural drainages will be created along some perimeter areas of the site. Proposed landscaping in common areas will be drought tolerant to the extent practicable.

Table 1. Site Design BMPs (Cont.)

Design Concept	Technique	Specific BMP	Included yes	Included no
Site Design Concept 4	Minimize Directly Connected Impervious Areas (DCIAs)	Residential and commercial sites must be designed to contain and infiltrate roof runoff, or direct roof runoff to vegetative swales or buffer areas, where feasible.	X	
		Where landscaping is proposed, drain impervious sidewalks, walkways, trails, and patios into adjacent landscaping.	X	
		Increase the use of vegetated drainage swales in lieu of underground piping or imperviously lined swales.	X	
		Rural swale system: street sheet flows to vegetated swale or gravel shoulder, curbs at street corners, culverts under driveways and street crossings.	N/A	
		Urban curb/swale system: street slopes to curb; periodic swale inlets drain to vegetated swale/biofilter.	X	
		Dual drainage system: First flush captured in street catch basins and discharged to adjacent vegetated swale or gravel shoulder, high flows connect directly to MS4s.		X
		Design driveways with shared access, flared (single lane at street) or wheel strips (paving only under tires); or, drain into landscaping prior to discharging to the MS4.	X	
		Uncovered temporary or guest parking on private residential lots may be paved with a permeable surface, or designed to drain into landscaping prior to discharging to the MS4.	X	
		Where landscaping is proposed in parking areas, incorporate landscape areas into the drainage design.	N/A	
		Overflow parking (parking stalls provided in excess of the Co-Permittee's minimum parking requirements) may be constructed with permeable paving.	N/A	
		Other comparable and equally effective design concepts as approved by the Co-Permittee (Note: Additional narrative required describing BMP and how it addresses Site Design concept).		X

The residential development will seek to minimize directly connected drainage systems. Site runoff will be directed to landscape areas to the maximum extent practicable. A water quality basin will treat the majority of the surface runoff leaving the residential areas including streets and driveways. A minimal underground storm drain system is being proposed. Off-site runoff will be conveyed independently through the site to avoid co-mingling with untreated on-site runoff from the development footprint.

V.2 SOURCE CONTROL BMPS

Table 2. Source Control BMPs

BMP Name	Check One		If not applicable, state brief reason
	Included	Not Applicable	
Non-Structural Source Control BMPs			
Education for Property Owners, Operators, Tenants, Occupants, or Employees	X		
Activity Restrictions	X		
Irrigation System and Landscape Maintenance	X		
Common Area Litter Control	X		
Street Sweeping Private Streets and Parking Lots	X		
Drainage Facility Inspection and Maintenance	X		
Structural Source Control BMPs			
MS4 Stenciling and Signage	X		
Landscape and Irrigation System Design	X		
Protect Slopes and Channels	X		
Provide Community Car Wash Racks		X	Project is not car wash
Properly Design:			
Fueling Areas		X	Not proposed at site
Air/Water Supply Area Drainage		X	Not proposed at site
Trash Storage Areas		X	Not proposed at site
Loading Docks		X	Not proposed at site
Maintenance Bays		X	Not proposed at site
Vehicle and Equipment Wash Areas		X	Not proposed at site
Outdoor Material Storage Areas		X	Not proposed at site
Outdoor Work Areas or Processing Areas		X	Not proposed at site
Provide Wash Water Controls for Food Preparation Areas		X	Not proposed at site

Each property owner will be provided with an informational packet outlining water quality objectives, requirements, and activity restrictions. This will be enforced by the Homeowner's Association. An efficient irrigation system will be designed for the project and appropriate landscaping materials will be incorporated into the site design. Street sweeping and drainage facility inspections and maintenance will be performed by the responsible party at least semi-annually. All catch basins will be stenciled. All proposed slopes and channels will be vegetated to prevent erosion.

The location of each structural Source Control BMP is shown on the WQMP Site Plan included in Appendix B.

Appendix D includes copies of the educational materials that will be used in implementing this project-specific WQMP.

V.3 TREATMENT CONTROL BMPS

Directions for completing Table 3: Treatment Control BMP Selection Matrix

For each pollutant of concern enter "yes" if identified using Exhibit B (Riverside County WQMP - General Categories of Pollutants of Concern per the instructions specified in Section III of this Template), or "no" if not identified for the project. Check the boxes of selected BMPs that will be implemented for the project to address each pollutant of concern from the project as identified using Exhibit B. Treatment Control BMPs must be selected and installed with respect to identified pollutant characteristics and concentrations that will be discharged from the site. For any identified pollutants of concern not listed in the Treatment Control BMP Selection Matrix, provide an explanation of how they will be addressed by Treatment Control BMPs.

For identified pollutants of concern that are **causing an impairment in receiving waters**, the project WQMP shall incorporate one or more Treatment Control BMPs of medium or high effectiveness in reducing those pollutants. It is the responsibility of the project proponent to demonstrate, and document in the project WQMP, that all pollutants of concern will be fully addressed. The Agency may require information beyond the minimum requirements of this WQMP to demonstrate that adequate pollutant treatment is being accomplished.

In addition to completing the Selection Matrix, provide detailed descriptions on the location, implementation, installation, and long-term O&M of planned Treatment Control BMPs.

Note: Projects that will utilize infiltration-based Treatment Control BMPs (e.g., Infiltration Basins, Infiltration Trenches, Porous Pavement) must include a copy of the property/project soils report to the project-specific WQMP. The selection of a Treatment Control BMP (or BMPs) for the project must specifically consider the effectiveness of the Treatment Control BMP for pollutants identified as causing an impairment of Receiving Waters to which the project will discharge Urban Runoff.

Table 3: Treatment Control BMP Selection Matrix

Pollutant of Concern		Treatment Control BMP Categories[9]							
		Veg. Swale /Veg. Filter Strips	Detention Basins[2]	Infiltration Basins & Trenches/Porous Pavement[3][10]	Wet Ponds or Wetlands	Sand Filter or Filtration	Water Quality Inlets	Hydrodynamic Separator Systems [4]	Manufactured/ Proprietary Devices
Sediment/Turbidity		H/M	M	H/M	H/M	H/M	L	H/M (L for turbidity)	U
Yes/No?	Yes	X	X						
Nutrients		L	M	H/M	H/M	L/M	L	L	U
Yes/No?	Yes	X	X						
Organic Compounds		U	U	U	U	H/M	L	L	U
Yes/No?	Yes	X	X						
Trash & Debris		L	M	U	U	H/M	M	H/M	U
Yes/No?	Yes	X	X						
Oxygen Demanding Substances		L	M	H/M	H/M	H/M	L	L	U
Yes/No?	Yes	X	X						
Bacteria & Viruses		U	U	H/M	U	H/M	L	L	U
Yes/No?	Yes	X	X						
Oils & Grease		H/M	M	U	U	H/M	M	L/M	U
Yes/No?	Yes	X	X						
Pesticides (non-soil bound)		U	U	U	U	U	L	L	U
Yes/No?	Yes	X	X						
Metals		H/M	M	H	H	H	L	L	U
Yes/No?	Yes	X	X						

Abbreviations:

L: Low removal efficiency H/M: High or medium removal efficiency U: Unknown removal efficiency

Notes:

(1) Periodic performance assessment and updating of the guidance provided by this table may be necessary.

(2) Includes grass swales, grass strips, wetland vegetation swales, and bio-retention.

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(3) Includes extended/dry detention basins with grass lining and extended/dry detention basins with impervious lining. Effectiveness based upon minimum 36-48-hour drawdown time.

(4) Includes infiltration basins, infiltration trenches, and porous pavements.

(5) Includes permanent pool wet ponds and constructed wetlands.

(6) Includes sand filters and media filters.

(7) Also known as hydrodynamic devices, baffle boxes, swirl concentrators, or cyclone separators.

(8) Includes proprietary stormwater treatment devices as listed in the CASQA Stormwater Best Management Practices Handbooks, other stormwater treatment BMPs not specifically listed in this WQMP, or newly developed/emerging stormwater treatment technologies.

(9) Project proponents should base BMP designs on the Riverside County Stormwater Quality Best Management Practice Design Handbook. However, project proponents may also wish to reference the California Stormwater BMP Handbook – New Development and Redevelopment (www.cabmphandbooks.com). The Handbook contains additional information on BMP operation and maintenance.

(10) Note: Projects that will utilize infiltration-based Treatment Control BMPs (e.g., Infiltration Basins, Infiltration Trenches, Porous Pavement) must include a copy of the property/project soils report as an appendix the project-specific WQMP. The selection of a Treatment Control BMP (or BMPs) for the project must specifically consider the effectiveness of the Treatment Control BMP for pollutants identified as causing an impairment of Receiving Waters to which the project will discharge Urban Runoff.

A water quality basin is the primary BMP to be implemented at the site. The majority of the surface runoff from the residential development will be directed to the basin for filtration prior to entering the receiving facilities. In addition, grass-lined and vegetated swales should be provided, where possible, in the landscape areas and along some portions of the site perimeter for filtration. Supporting engineering calculations for the volume-based BMP, V_{BMP}, are included in Appendix F. This basin and landscaping will be maintained by the Homeowner's Association. The water quality basin will also prevent an increase in runoff from the site. The basin will provide water quality benefits as indicated in the above table.

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V.4 EQUIVALENT TREATMENT CONTROL ALTERNATIVES

Not Applicable.

V.5 REGIONALLY-BASED TREATMENT CONTROL BMPS

Not Applicable.

VI. Operation and Maintenance Responsibility for Treatment Control BMPs

Operation and maintenance (O&M) requirements for all structural Source Control and Treatment Control BMPs shall be identified in the project-specific WQMP. The project-specific WQMP shall address the following:

- Identification of each BMP that requires O&M.
- Thorough description of O&M activities, the O&M process, and the handling and placement of any wastes.
- BMP start-up dates.
- Schedule of the frequency of O&M for each BMP.
- Identification of the parties (name, address, and telephone number) responsible for O&M, including a written agreement with the entities responsible for O&M. This agreement can take the form of a Covenant and Agreement recorded by the Project Proponent with the County Recorder, HOA or POA CC&Rs, formation of a maintenance district or assessment district or other instrument sufficient to guarantee perpetual O&M. The preparer of this project-specific WQMP should carefully review Section 4.6 of the WQMP prior to completing this section of the project-specific WQMP.
- Self-inspections and record-keeping requirements for BMPs (review local specific requirements regarding self-inspections and/or annual reporting), including identification of responsible parties for inspection and record- keeping.
- Thorough descriptions of water quality monitoring, if required by the Co-Permittee.

A water quality basin will be provided at the northerly portion of the site. The basin will be constructed as part of the project. All significant surface runoff from the residential development will be directed to the basin for filtration. Contact with vegetation in the basin improves water quality by plant uptake of pollutants, removal of sediment, and an increase in infiltration. Pollutants are removed by filtering and through settling of sediment and other solid particles as the design flow passes through the vegetation. The vegetation will require regular landscape maintenance. Maintenance requirements typically include activities such as irrigation, mowing, trimming, removal of invasive species, and replanting when necessary. The basin will be inspected and maintained by the Homeowner's Association as part of the routine landscape maintenance. Water quality monitoring is not required.

VII. Funding

A funding source or sources for the O&M of each Treatment Control BMP identified in the project-specific WQMP must be identified. By certifying the project-specific WQMP, the Project applicant is certifying that the funding responsibilities have been addressed and will be transferred to future owners. One example of how to adhere to the requirement to transfer O&M responsibilities is to record the project-specific WQMP against the title to the property.

The water quality basin and other BMPs will be initially installed by the developer. Ongoing maintenance will be the responsibility of the Homeowner's Association's landscaping staff.

Appendix A

Conditions of Approval

Planning Commission Resolution _____

Dated _____

INSERT CONDITIONS OF APPROVAL WHEN AVAILABLE

Appendix B

Vicinity Map and Site Plan

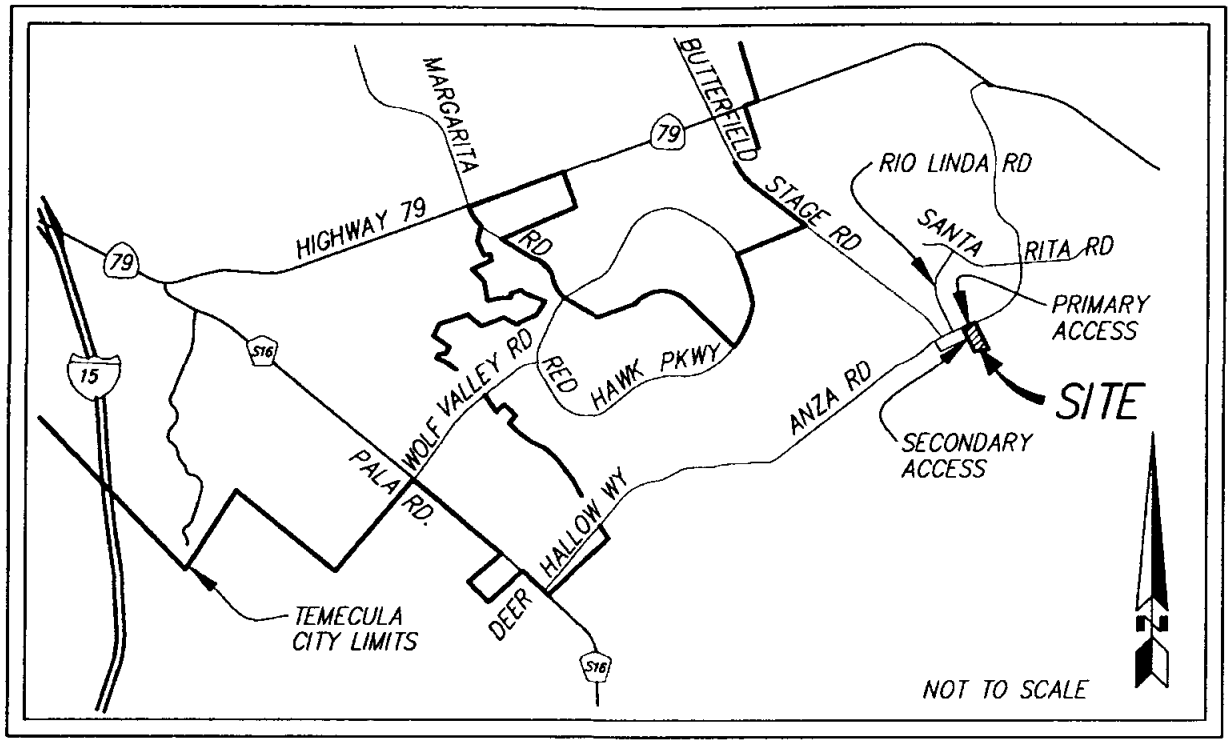

Vicinity Map

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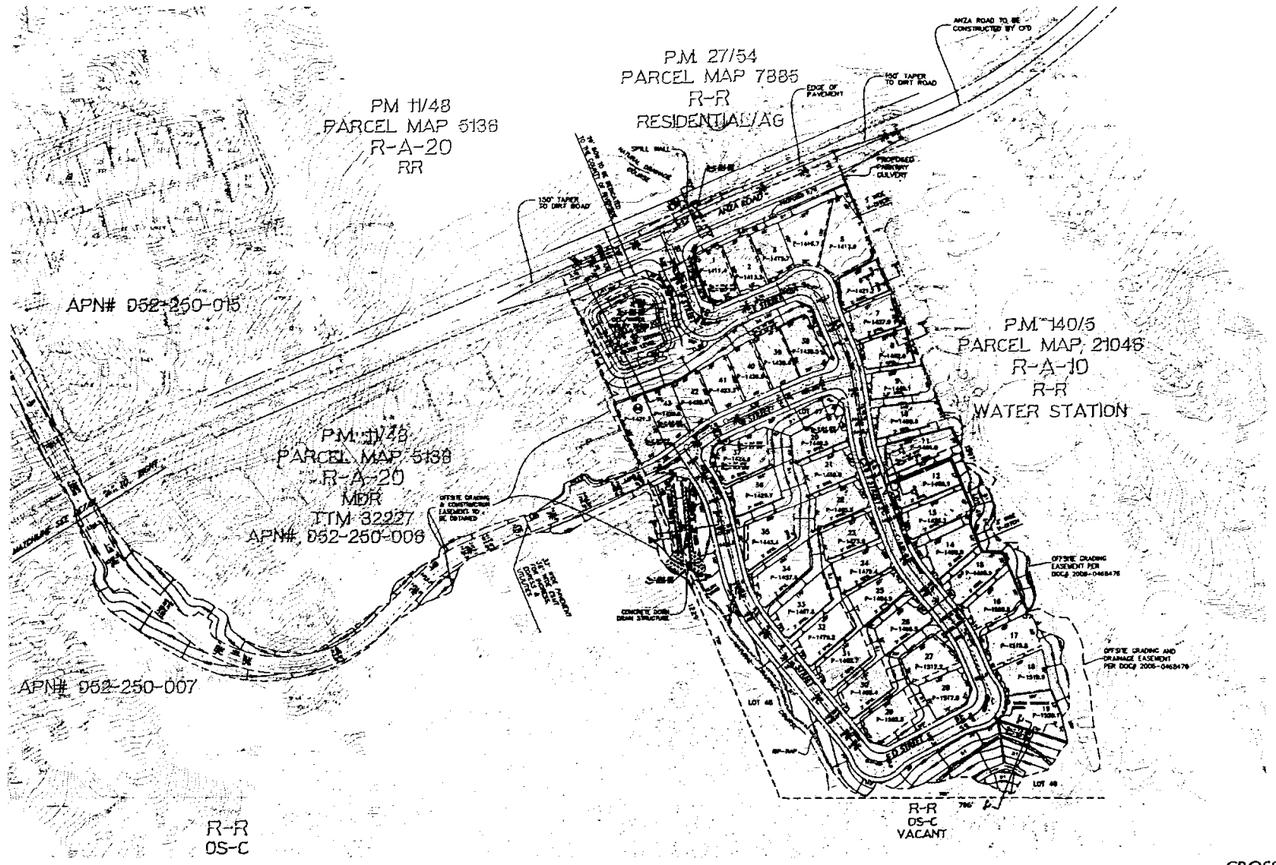

DETAIL "A"

1"=100'

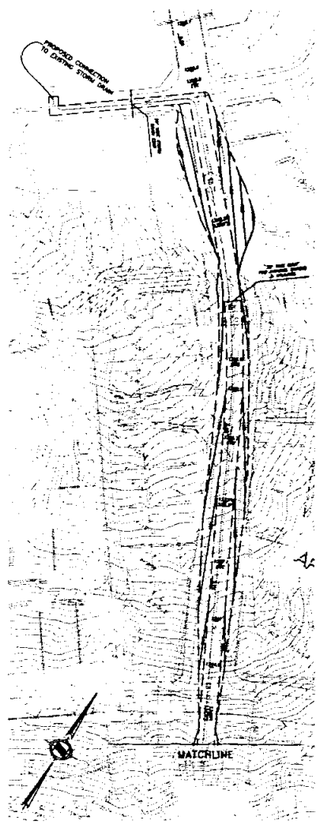

APPLICANT/LAND OWNER:

TURNER DEVELOPMENT, LLC
461 CARLISLE PLACE
ORANGE, CA 92869

ENGINEER/REPRESENTATIVE:

HORSLEY & ASSOCIATES RIVERSIDE, INC
INLAND EMPIRE DIVISION
ATTN: STEVEN PRIATO
43460 RIDGE PARK DRIVE, SUITE 226
TEMECULA, CA 92590
(951) 308-7088
spriato@horslay.com

LEGAL DESCRIPTION:

PARCEL 3 OF PARCEL MAP 5138, AS SHOWN BY MAP ON FILE IN BOOK 11, PAGES 48 AND 49 PARCEL MAPS, RECORDS OF RIVERSIDE COUNTY, STATE OF CALIFORNIA.

GENERAL NOTES:

1. ASSESSORS PARCEL NUMBER: 952-250-015
2. PROPOSED APPROVAL SCHEDULE "A"
3. DENSITY FOR PROJECT SITE IS 2.1 DU/AC AND WITHIN ALLOWED RANGE OF R-1 ZONE OF 2 TO 5 DU/AC.
4. THOMAS BROTHERS GUIDE, PG. 980 B-4 (RIVERSIDE COUNTY 2006 EDITION)
5. THIS TOPOGRAPHIC MAP INCLUDES THE ENTIRE CONTIGUOUS OWNERSHIP OF THE LAND OWNED
6. THIS PROPERTY IS NOT WITHIN A SPECIFIC PLAN PLANNING AREA
7. COUNTY SUPERVISOR: 3RD STONE, 3RD DISTRICT
8. NO EXISTING OR PROPOSED PUBLIC UTILITY EASEMENTS, TRANSMISSION LINES, POWER OR TELEPHONE POLES OR UNDERGROUND UTILITIES ARE SHOWN TO EXIST ON OR ADJOINING THE PROPERTY EXCEPT AS SHOWN HEREON.
9. NO EASEMENTS OF RECORD ARE SHOWN TO EXIST ON THE PROPERTY SITE EXCEPT AS SHOWN HEREON.
10. THIS SITE IS NOT WITHIN A COMMUNITY SERVICE DISTRICT
11. THERE IS NO EXISTING WELL LOCATED ON THIS SITE OR WITHIN 300 FEET OF THE PROPERTY
12. SEPTIC IS NOT INTENDED FOR THIS SITE
13. THIS SITE IS NOT SUBJECT TO LIQUEFACTION, OVERFLOW, INUNDATION, FLOOD HAZARD OR OTHER GEOLOGIC HAZARD.
14. FEMA PANEL NUMBER: 06065C0330G; ZONE C, AREA OF MINIMAL FLOODING
15. TOPOGRAPHY SOURCE: VERTICAL MAPPING RESOURCES, FLOWN 3/2/04
16. THERE ARE NO EXISTING DWELLINGS, BUILDINGS OR OTHER STRUCTURES LOCATED ON THIS SITE
17. ALL SLOPES WILL BE 2:1, UNLESS NOTED OTHERWISE.
18. SETBACKS OF SLOPES TO PROPERTY LINES SHALL CONFORM TO ORDINANCE 457 REQUIREMENTS.
19. THE SUBDIVIDER RESERVES THE RIGHT TO FILE MULTIPLE FINAL MAPS, PER SEC. 66456.1 OF THE STATE MAP ACT.
20. BUILDING SETBACKS OF PROPOSED RESIDENTIAL UNITS WILL CONFORM TO THE SETBACK REQUIREMENTS OF RIVERSIDE CO. ORDINANCE 348,PER R-1 DEVELOPMENT STANDARDS.
21. THE HEIGHT OF PROPOSED RESIDENTIAL STRUCTURE WILL VARY DEPENDING ON WHETHER SAID HOUSING UNIT IS ONE OR TWO STORIES TALL- AND IN NO CASE WILL PROPOSED HEIGHT EXCEED COUNTY RESIDENTIAL ZONING STANDARDS.
22. NO HAZARDOUS MATERIALS HAVE BEEN KNOWN TO BE STORED ON THIS SITE.
23. THIS IS NOT A GATED COMMUNITY.
24. LOTS 46, 48, 47, 49, & 48 TO BE MAINTAINED BY HOA.
25. THE PROPOSED OFFSITE GRADING MAY IMPACT UP TO 8 OAK TREES. PROPOSED 3:1 REPLACEMENT RATIO/TOTAL
26. OFFSITE MANUFACTURED SLOPES WILL BE MAINTAINED BY THE HOA
27. RANCHO CALIFORNIA WATER DISTRICT HAS AGREED TO PROVIDE WATER SERVICE TO TM 32778 USING A HYDROPNEUMATIC PUMP STATION FACILITY (RECIND LETTER OF INTENT DATED 2/1/2007)

ZONING AND LAND USE SUMMARY

DESCRIPTION	ON-SITE	NORTH	SOUTH	EAST	WEST
GENERAL PLAN REF.	SFR (2-5 DU/AC)	A-1 (1 AC MIN)	RR-C	A-2 (1 AC MIN)	(2-5 DU/AC)
EXISTING ZONING	R-A-20	R-A-20, R-R	R-R	R-A-10	R-A-20
PROPOSED ZONING	R-1	N/A	N/A	N/A	N/A
EXISTING LAND USE	VACANT	RESIDENTIAL AG VACANT	VACANT	ON SITE STATION	VACANT (PARCEL 32227)
PROPOSED LAND USE	SINGLE FAMILY RESIDENTIAL	N/A	N/A	N/A	N/A

PUBLIC UTILITIES/SERVICES:

SCHOOL DISTRICT
TEMECULA VALLEY UNIFIED
31350 RANCHO VISTA ROAD
TEMECULA, CA 92592
(951) 676-2661

ELECTRIC
SOUTHERN CALIFORNIA EDISON
24100 MONTEE ROAD
ROMOLAND, CA 92585
(951) 928-8290

WATER
RANCHO CALIFORNIA WATER DISTRICT
42135 WINCHESTER ROAD
TEMECULA, CA 92590
(951) 296-6900

GAS
SOUTHERN CALIFORNIA GAS COMPANY
25400 JEFFERSON AVENUE
MURRIETA, CA 92562
(800) 655-4555

SEWER
EASTERN MUNICIPAL WATER DISTRICT
P.O. BOX 8300
PERRIS, CA 92572
(951) 928-3777

TELEPHONE
VERIZON
1796 NORTH "I" STREET
SAN BERNARDINO, CA 92405
(909) 881-7873

CABLE
ADELPHIA CABLE
4077 W. STETSON AVENUE
HEMET, CA 92545
(888) 683-1000

VICINTY & ACCESS MAP

THOMAS BROTHERS GUIDE: PG. 980 B-4 (RIVERSIDE COUNTY 2006 EDITION)

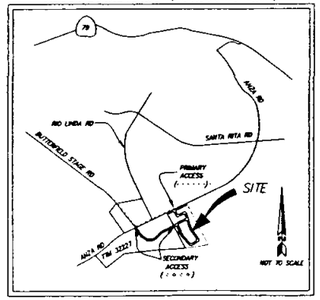

STREET SECTIONS

N.T.S.

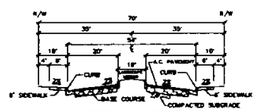

PORTION OF F STREET
COUNTYWIDE DESIGN GUIDELINES
EXHIBIT "C"
N.T.S.

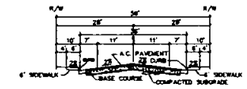

STREETS A, B, C, D, E & A PORTION OF F
GENERAL LOCAL STREET
STD 104
(PUBLIC)
N.T.S.

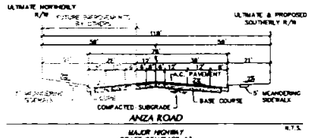

ANZA ROAD
MAJOR HIGHWAY
DRAFT STANDARD 83
(PUBLIC)
N.T.S.

LOT SUMMARY TABLE

LOT NO.	GROSS S.F.	NET S.F.	LOT NO.	GROSS S.F.	NET S.F.	LOT NO.	GROSS S.F.	NET S.F.	LOT NO.	GROSS S.F.	NET S.F.
1	7,905	6,707	14	16,533	7,218	27	9,838	6,533	40	7,380	6,665
2	7,549	6,508	15	8,645	6,885	28	7,897	7,082	41	7,211	6,525
3	7,251	6,825	16	10,625	7,568	29	12,774	6,929	42	7,214	6,521
4	18,445	8,713	17	8,898	8,098	30	12,313	7,820	43	7,816	7,816
5	13,681	12,858	18	8,151	7,376	31	11,433	6,679	44	8,871	8,871
6	8,513	6,535	19	8,525	8,413	32	11,527	7,741	45	62,487	
7	8,994	6,510	20	8,833	6,961	33	12,450	7,853	46	9,594	
8	9,138	6,907	21	7,822	6,511	34	14,648	7,327	47	8,839	
9	10,564	6,663	22	8,768	6,853	35	16,459	6,564	48	163,489	
10	11,583	7,002	23	8,630	6,889	36	15,946	6,947	49	8,755	
11	11,304	8,105	24	8,698	7,065	37	14,074	9,171			
12	8,419	7,178	25	9,572	7,201	38	7,887	7,867			
13	11,161	7,386	26	11,021	6,779	39	7,631	7,193			

TYPICAL LOTS

N.T.S.

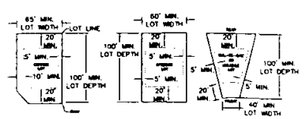

LEGEND

- CATCH BASIN PROPOSED
- STORM DRAIN HEADWALL PROPOSED
- SEWER MANHOLE PROPOSED
- EXISTING FENCE
- EXISTING UTILITY POLE
- EXISTING LIGHT POST
- EXISTING STRUCTURE
- PROPOSED RIP-RAP

SCALE	1"=100'
DATE PREPARED	3/28/07
W.O.	3183-1
GROSS AREA	20.42AC±
NET AREA	20AC±
CONTOUR INTERVAL	10'
TOTAL RESIDENTIAL LOTS	44
DETENTION BASINS	1
OPEN SPACE LOTS	5

CROSS SECTIONS

N.T.S.

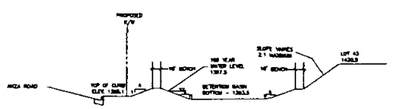

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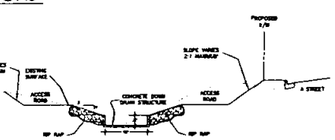

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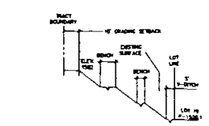

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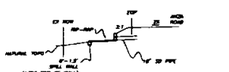

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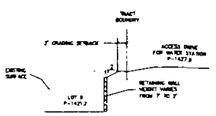

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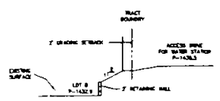

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N.T.S.

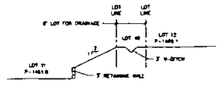

SECTION "G" - "G"
N.T.S.

STREET STATISTICS

DATE	DESCR	BY
3/28/07	Revised opensspace lots	JS
2/01/07	Addressed planning comm.	JS
6/30/06	Amended #2	JMD
DATE	REVISION	BY

TOTAL RESIDENTIAL LOTS	44
MINIMUM LOT SIZE	7,200 SF
AVERAGE LOT SIZE (GROSS)	10,078 SF
AVERAGE LOT SIZE (NET)	7,428 SF

DESIGNED BY: T.C.
DRAFTED BY: JR.
PROCESSED BY: AH.

NORTH

0 50 100 200

EARTHWORK QUANTITIES

CUT= 790,000 C.Y.
FILL= 76,224 C.Y.
BALANCE= 713,776 C.Y. EXPORT
REDUCED FOR SOILS FACTORS RECOMMENDED BY SOILS REPORT

PREPARED UNDER THE DIRECTION OF:

REGISTERED PROFESSIONAL ENGINEER
NO. C55141
EXP. 06/30/08
STATE OF CALIFORNIA

AVDA H. HERCULES NO. C55141
EXPIRES 06/30/08

PREPARED FOR:
TURNER DEVELOPMENT, LLC
461 CARLISLE PLACE
ORANGE, CA 92869

PREPARED BY:
HORSLEY & ASSOCIATES RIVERSIDE, INC.
INLAND EMPIRE DIVISION
43460 RIDGE PARK DRIVE, SUITE 226
TEMECULA, CA 92590 (951) 308-7088

AMENDMENT #4

TENTATIVE TRACT MAP NO. 32778

RIVERSIDE COUNTY, CA

FILE: 3183-1 / 3183-1 / Phase1 / Maps / TTM32778-1.dwg PLOTTED: Jun 06, 2007 3:16pm BY: dmd

Appendix C

Supporting Detail Related to Hydraulic Conditions of Concern

February 9, 2007

Mitigation of HCOC's requires attenuation of the 2-year, 24-hour and the 10-year, 24-hour storms to pre-developed rates. The 10-year, 24 hour storm is required for tentative review. Since the basin is proposed to mitigate water quality as well as increased runoff/HCOC's, preliminary basin sizing shall be based on the 10-year, 24 hour volume and the water quality volume (Vbmp).

The February 9, 2007, *Drainage Study for Tentative Tract Map No. 32778,* by Hunsaker & Associates contains 10-year, 24-hour detention analyses. The CivilDesign Unit Hydrograph program determined that the on-site proposed condition 10-year, 24-hour flow rate is 6.5 cfs, and the existing condition flow rate is 4.0 cfs. These results were input into a HEC-1 analysis to determine the conceptual detention volume necessary to reduce the flow rate from 6.5 to 4.0 cfs. The results indicate that at least 0.6 acre-feet will be required to achieve the detention. The ultimate storage volume will need to be larger than this to account for freeboard and the outlet works design.

Appendix F in this report contains water quality volume sizing. The results show that the treatment volume must be at least 0.55 acre-feet. The combined detention/water quality basin has been sized based on the 10-year, 24-hour detention analyses and the water quality sizing.

Appendix D

Educational Materials

1. Homeowner's Certification Form
2. State of California Model Efficiency Landscape Ordinance
3. EPA Citizen's Guide to Pest Control and Pesticide Safety
4. Blueprint for a Clean Ocean
5. Healthy Lawn – Healthy Environment
6. Information on What You and Your Community Can Do to Use Water More Efficiently
7. After the Storm
8. Ten Ways That Will Save the Most
9. County of Riverside DAMP, Supplement A
10. Automotive Maintenance and Car Care
11. Storm Water and the Construction Industry
12. Food Service Industry
13. Helpful Hints to Keep our Water Clean
14. Outdoor Cleaning Activities
15. ABOP / HHW Schedule (Antifreeze, Batteries, Oil & Paint
16. What's The Scoop?

Project Name: Tentative Tract Map 32778
Tract No. or Site Name: 32778
City, State: Riverside, California

Homeowners' Certification
Receipt of Public Educational Materials and Discussion by Developers Representative

This is to certify that we, future homeowners and/or occupants, have received from the owner's/developer's representative(s) the public education materials listed below on the *proper use of pesticides, herbicides, and fertilizers; proper disposal of wastes; and other* storm water pollution prevention programs.

We also certify that the developer's representative has discussed these public educational materials with us and that we shall implement these pollution control measures to the best of our ability.

- ☐ "Storm water pollution – what you should know"
- ☐ Storm water Program "Outdoor cleaning activities"
- ☐ "A Home Garden Care Guide"
- ☐ "Household Hazardous Waste"
- ☐ "Water in Your Hands"
- ☐ "The Story of Fancy Fin the Fish"
- ☐ Other:_____
- ☐ Other:_____
- ☐ Other:_____

Date: _____ Place: _____

Homeowner's Printed Name: _____
Homeowner's Signature: _____
Homeowner's Address: _____
_____

Homeowner's Printed Name: _____
Homeowner's Signature: _____
Homeowner's Address: _____
_____

Homeowner's Printed Name: _____
Homeowner's Signature: _____
Homeowner's Address: _____

Model Landscape Ordinance

Section 490. Purpose

The State Legislature has found:

- that the limited supply of state waters are subject to ever increasing demands;
- that California's economic prosperity depends on adequate supplies of water;
- that state policy promotes conservation and efficient use of water;
- that landscapes provide recreation areas, clean the air and water, prevent erosion, offer fire protection, and replace ecosystems displaced by development; and
- that landscape design, installation, and maintenance can and should be water efficient.

Consistent with the legislative findings, the purpose of this model ordinance is to:

- promote the values and benefits of landscapes while recognizing the need to invest water and other resources as efficiently as possible;
- establish a structure for designing, installing, and maintaining water efficient landscapes in new projects; and
- establish provisions for water management practices and water waste prevention for established landscapes.

Authority cited: Sections 65591.5, 65594, Gov. Code. Reference: Sections 65591, 65591.5, 65597, Gov. Code.

Model Landscape Ordinance

Section 491. Definitions

The words used in this ordinance have the meaning set forth below:

"anti-drain valve" or "check valve" means a valve located under a sprinkler head to hold water in the system so it minimizes drainage from the lower elevation sprinkler heads.

"application rate" means the depth of water applied to a given area, usually measured in inches per hour.

"applied water" means the portion of water supplied by the irrigation system to the landscape.

"automatic controller" means a mechanical or solid state timer, capable of operating valve stations to set the days and length of time of a water application.

"backflow prevention device" means a safety device used to prevent pollution or contamination of the water supply due to the reverse flow of water from the irrigation system.

"conversion factor (0.62)" means a number that converts the maximum applied water allowance from acre-inches per acre per year to gallons per square foot per year. The conversion factor is calculated as follows:

- (325,851 gallons/ 43,560 square feet)/12 inches = (0.62)
- 325,851 gallons = one acre foot
- 43,560 square feet = one acre
- 12 inches = one foot

To convert gallons per year to 100-cubic-feet per year, another common billing unit for water, divide gallons per year by 748. (748 gallons = 100 cubic feet.)

"ecological restoration project" means a project where the site is intentionally altered to establish a defined, indigenous, historic ecosystem.

"effective precipitation" or "usable rainfall" means the portion of total precipitation that is used by the plants. Precipitation is not a reliable source of water, but can contribute to some degree toward the water needs of the landscape.

"emitter" means drip irrigation fittings that deliver water slowly from the system to the soil.

"established landscape" means the point at which plants in the landscape have developed roots into the soil adjacent to the root ball.

"establishment period" means the first year after installing the plant in the landscape.

"Estimated Applied Water Use" means the portion of the Estimated Total Water Use that is derived from applied water. The Estimated Applied Water Use shall not exceed the Maximum Applied Water Allowance. The Estimated Applied Water Use may be the sum of the water recommended through the irrigation schedule, as referenced in Section 492 (c) (3).

"Estimated Total Water Use" means the annual total amount of water estimated to be needed to keep the plants in the landscaped area healthy. It is based upon such factors as the local evapotranspiration rate, the size of the landscaped area, the types of plants, and the efficiency of the irrigation system, as described in Section 492 (c) (4).

"ET adjustment factor" means a factor of 0.8, that, when applied to reference evapotranspiration, adjusts for plant factors and irrigation efficiency, two major influences upon the amount of water that needs to be applied to the landscape.

A combined plant mix with a site-wide average of 0.5 is the basis of the plant factor portion of this calculation. The irrigation efficiency for purposes of the ET Adjustment Factor is 0.625.

Therefore, the ET Adjustment Factor (0.8) = (0.5/0.625).

"evapotranspiration" means the quantity of water evaporated from adjacent soil surfaces and transpired by plants during a specific time.

"flow rate" means the rate at which water flows through pipes and valves (gallons per minute or cubic feet per second).

"hydrozone" means a portion of the landscaped area having plants with similar water needs that are served by a valve or set of valves with the same schedule. A hydrozone may be irrigated or non-irrigated. For example, a naturalized area planted with native vegetation that will not need supplemental irrigation once established is a non-irrigated hydrozone.

"infiltration rate" means the rate of water entry into the soil expressed as a depth of water per unit of time (inches per hour).

"irrigation efficiency" means the measurement of the amount of water beneficially used divided by the amount of water applied. Irrigation efficiency is derived from measurements and estimates of irrigation system characteristics and management practices. The minimum irrigation efficiency for purposes of this ordinance is 0.625. Greater irrigation efficiency can be expected from well designed and maintained systems.

"landscape irrigation audit" means a process to perform site inspections, evaluate irrigation systems, and develop efficient irrigation schedules.

"landscaped area" means the entire parcel less the building footprint, driveways, non-irrigated portions of parking lots, hardscapes- such as decks and patios, and other non-porous areas. Water features are included in the calculation of the landscaped area. Areas dedicated to edible plants, such as orchards or vegetable gardens are not included.

"lateral line" means the water delivery pipeline that supplies water to the emitters or sprinklers from the valve.

"main line" means the pressurized pipeline that delivers water from the water source to the valve or outlet.

"Maximum Applied Water Allowance" means, for design purposes, the upper limit of annual applied water for the established landscaped area as specified in Section 492 (c) (2). It is based upon the area's reference evapotranspiration, the ET Adjustment Factor, and the size of the landscaped area. The Estimated Applied Water Use shall not exceed the Maximum Applied Water Allowance.

"mined-land reclamation projects" means any surface mining operation with a reclamation plan approved in accordance with the Surface Mining and Reclamation Act of 1975.

"mulch" means any material such as leaves, bark, straw or other materials left loose and applied to the soil surface for the beneficial purpose of reducing evaporation .

"operating pressure" means the pressure at which a system of sprinklers is designed to operate, usually indicated at the base of a sprinkler.

"overhead sprinkler irrigation systems" means those with high flow rates (pop-ups, impulse sprinklers, rotors, etc.)

"overspray" means the water which is delivered beyond the landscaped area, wetting pavements, walks, structures, or other non-landscaped areas.

"plant factor" means a factor that when multiplied by reference evapotranspiration, estimates the amount of water used by plants. For purposes of this ordinance, the average plant factor of low water using plants ranges from 0 to 0.3, for average water-using plants the range is 0.4 to 0.6, and for high water using plants the range is 0.7 to 1.0.

"rain sensing device" means a system which automatically shuts off the irrigation system when it rains.

"record drawing" or "as-builts" means a set of reproducible drawings which show significant changes in the work made during construction and which are usually based on drawings marked up in the field and other data furnished by the contractor.

"recreational area" means areas of active play or recreation such as sports fields, school yards, picnic grounds, or other areas with intense foot traffic.

"recycled water," "reclaimed water," or "treated sewage effluent water" means treated or recycled waste water of a quality suitable for nonpotable uses such as landscape irrigation; not intended for human consumption.

"reference evapotranspiration" or "ETo" means a standard measurement of environmental parameters which affect the water use of plants. ETo is given in inches per day, month, or year as represented in Section 495, and is an estimate of the evapotranspiration of a large field of four- to seven-inch tall, cool-season grass that is well watered. Reference evapotranspiration is used as the basis of determining the Maximum Applied Water Allowances so that regional differences in climate can be accommodated.

"rehabilitated landscape" means any relandscaping project that requires a permit.

"run off" means water which is not absorbed by the soil or landscape to which it is applied and flows from the area. For example, run off may result from water that is applied at too great a rate (application rate exceeds infiltration rate) or when there is a severe slope.

"soil moisture sensing device" means a device that measures the amount of water in the soil.

"soil texture" means the classification of soil based on the percentage of sand, silt, and clay in the soil.

"sprinkler head" means a device which sprays water through a nozzle.

"static water pressure" means the pipeline or municipal water supply pressure when water is not flowing.

"station" means an area served by one valve or by a set of valves that operate simultaneously.

"turf" means a surface layer of earth containing mowed grass with its roots. Annual bluegrass, Kentucky bluegrass, Perennial ryegrass, Red fescue, and Tall fescue are cool-season grasses. Bermudagrass, Kikuyugrass, Seashore paspalum, St. Augustinegrass, Zoysiagrass, and Buffalo grass are warm-season grasses.

"valve" means a device used to control the flow of water in the irrigation system.

"water conservation concept statement" means a one-page checklist and a narrative summary of the project as shown in Section 492 (c) (1).

Authority cited: Section 65594, Gov. Code. Reference: Section 65597, Gov. Code.

Section 492. Provisions for New or Rehabilitated Landscapes

Applicability

Except as provided in Section 492 (a) (3), this section shall apply to:

- all new and rehabilitated landscaping for public agency projects and private development projects that require a permit; and
- developer-installed landscaping in single-family and multi-family projects.
- Projects subject to this section shall conform to the provisions in Section 492.

This section shall not apply to:

- homeowner-provided landscaping at single-family and multi-family projects;
- cemeteries;
- registered historical sites;
- ecological restoration projects that do not require a permanent irrigation system;
- mined-land reclamation projects that do not require a permanent irrigation system; or
- any project with a landscaped area less than 2,500 square feet.

Landscape Documentation Package

A copy of the landscape documentation package conforming to this chapter shall be submitted to the city or county. No permit shall be issued until the city or county reviews and approves the landscape documentation package.

A copy of the approved landscape documentation package shall be provided to the property owner or site manager along with the record drawings and any other information normally forwarded to the property owner or site manager.

A copy of the Water Conservation Concept Statement and the Certificate of Substantial Completion shall be sent by the project manager to the local retail water purveyor.

Each landscape documentation package shall include the following elements, which are described in Section 492 (c):

- Water Conservation Concept Statement
- Calculation of the Maximum Applied Water Allowance
- Calculation of the Estimated Applied Water Use
- Calculation of the Estimated Total Water Use
- Landscape Design Plan
- Irrigation Design Plan
- Irrigation Schedules
- Maintenance Schedule
- Landscape Irrigation Audit Schedule

- Grading Design Plan
- Soil Analysis
- Certificate of Substantial Completion. (To be submitted after installation of the project.)
- If effective precipitation is included in the calculation of the Estimated Total Water Use, then an Effective Precipitation Disclosure Statement from the landscape professional and the property owner shall be submitted with the Landscape Documentation Package.

Elements of Landscape Documentation Package

Water Conservation Concept Statement

Each landscape documentation package shall include a cover sheet, referred to as the Water Conservation Concept Statement similar to the following example. It serves as a check list to verify that the elements of the landscape documentation package have been completed and has a narrative summary of the project.

SAMPLE WATER CONSERVATION CONCEPT STATEMENT

Project Site:_____ Project Number:_____

Project Location:_____

Landscape Architect/ Irrigation Designer/ Contractor:_____

Included in this project submittal package are:
(Check to indicate completion)

___ 1. Maximum Applied Water Allowance:

_____gallons or cubic feet/year

___ 2. Estimated Applied Water Use:

_____gallons or cubic feet/year

*__ 2.(a) Estimated Amount of Water Expected from Effective Precipitation:

_____gallons or cubic feet/year

___ 3. Estimated Total Water Use:

_____gallons or cubic feet/year

Note: * If the design assumes that a part of the Estimated Total Water Use will be provided by precipitation, the Effective Precipitation Disclosure Statement in Section 494 shall be completed and submitted.

___ 4. Landscape Design Plan

___ 5. Irrigation Design Plan

___ 6. Irrigation Schedules

___ 7. Maintenance Schedule

___ 8. Landscape Irrigation Audit Schedule

___ 9. Grading Design Plan

___ 10. Soil Analysis

Description of Project

(Briefly describe the planning and design actions that are intended to achieve conservation and efficiency in water use.)

Date:_____ Prepared By:_____

The Maximum Applied Water Allowance

A project's **Maximum Applied Water Allowance** shall be calculated using the following formula:

- MAWA = (ETo)(0.8)(LA)(0.62) where:
- MAWA = Maximum Applied Water Allowance (gallons per year)
- Eto = Reference Evapotranspiration (inches per year)
- 0.8 = ET Adjustment Factor
- LA = Landscaped Area (square feet)
- 0.62 = conversion factor (to gallons per square foot)

Two example calculations of the Maximum Applied Water Allowance are:

PROJECT SITE ONE: Landscaped area of 50,000 sq. ft. in Fresno

MAWA = (ETo)(.8)(LA)(.62)

= (51 inches)(.8)(50,000 square feet)(.62)

Maximum Applied Water Allowance = 1,264,800 gallons per year

(or 1,691 hundred-cubic-feet per year: 1,264,800/748 = 1,691)

PROJECT SITE TWO: Landscaped area of 50,000 sq. ft. in San Francisco

MAWA = (ETo)(.8)(LA)(.62)

= (35 inches)(.8)(50,000 square feet)(.62)

Maximum Applied Water Allowance = 868,000 gallons per year

(or 1,160 hundred-cubic-feet per year)

Portions of landscaped areas in public and private projects such as parks, playgrounds, sports fields, golf courses, or school yards where turf provides a playing surface or serves other recreational purposes are considered recreational areas and may require water in addition to the Maximum Applied Water Allowance. A statement shall be included with the landscape design plan, designating recreational areas to be used for such purposes and specifying any needed amount of additional water above the Maximum Applied Water Allowance.

Estimated Applied Water Use

The Estimated Applied Water Use shall not exceed the Maximum Applied Water Allowance.

A calculation of the Estimated Applied Water Use shall be submitted with the Landscape Documentation Package. It may be calculated by summing the amount of water recommended in the irrigation schedule.

Estimated Total Water Use

A calculation of the Estimated Total Water Use shall be submitted with the Landscape Documentation Package. The Estimated Total Water Use may be calculated by summing the amount of water recommended in the irrigation schedule and adding any amount of water expected from effective precipitation (not to exceed 25 percent of the local annual mean precipitation) or may be calculated from a formula such as the following:

The Estimated Total Water Use for the entire landscaped area equals the sum of the Estimated Water Use of all hydrozones in that landscaped area.

EWU (hydrozone) = [(ETo)(PF)(HA)(.62)]/(IE)

EWU (hydrozone) = Estimated Water Use (gallons per year)

Eto = Reference Evapotranspiration (inches per year)

PF = plant factor

HA = hydrozone area (square feet)

(.62) = conversion factor

IE = irrigation efficiency

If the Estimated Total Water Use is greater than the Estimated Applied Water Use due to precipitation being included as a source of water, an Effective Precipitation Disclosure Statement such as the one in Section 494 shall be included in the Landscape Documentation Package.

Landscape Design Plan

A landscape design plan meeting the following requirements shall be submitted as part of the landscape documentation package.

Plant Selection and Grouping

- Any plants may be used in the landscape, providing the Estimated Applied Water Use recommended does not exceed the Maximum Applied Water Allowance and that the plants meet the specifications set forth in (ii), (iii) and (iv).
- Plants having similar water use shall be grouped together in distinct hydrozones.
- Plants shall be selected appropriately based upon their adaptability to the climatic, geologic, and topographical conditions of the site. Protection and preservation of native species and natural areas is encouraged. The planting of trees is encouraged wherever it is consistent with the other provisions of this ordinance.
- Fire prevention needs shall be addressed in areas that are fire prone. Information about fire prone areas and appropriate landscaping for fire safety is available from local fire departments or the California Department of Forestry.

Water Features

- Recirculating water shall be used for decorative water features.
- Pool and spa covers are encouraged.

Landscape Design Plan Specifications

- The landscape design plan shall be drawn on project base sheets at a scale that accurately and clearly identifies:
- Designation of hydrozones.

- Landscape materials, trees, shrubs, groundcover, turf, and other vegetation. Planting symbols shall be clearly drawn and plants labeled by botanical name, common name, container size, spacing, and quantities of each group of plants indicated.
- Property lines and street names.
- Streets, driveways, walkways, and other paved areas.
- Pools, ponds, water features, fences, and retaining walls.
- Existing and proposed buildings and structures including elevation if applicable.
- Natural features including but not limited to rock outcroppings, existing trees, shrubs that will remain.
- Tree staking, plant installation, soil preparation details, and any other applicable planting and installation details.
- A calculation of the total landscaped area.
- Designation of recreational areas.

Irrigation Design Plan

An irrigation design plan meeting the following conditions shall be submitted as part of the Landscape Documentation Package.

Irrigation Design Criteria

- Runoff and Overspray. Soil types and infiltration rate shall be considered when designing irrigation systems. All irrigation systems shall be designed to avoid runoff, low head drainage, overspray, or other similar conditions where water flows onto adjacent property, non-irrigated areas, walks, roadways, or structures. Proper irrigation equipment and schedules, including features such as repeat cycles, shall be used to closely match application rates to infiltration rates therefore minimizing runoff.
- Special attention shall be given to avoid runoff on slopes and to avoid overspray in planting areas with a width less than ten feet, and in median strips.
- No overhead sprinkler irrigation systems shall be installed in median strips less than ten feet wide.
- Irrigation Efficiency. For the purpose of determining the maximum applied water allowance, irrigation efficiency is assumed to be 0.625. Irrigation systems shall be designed, maintained, and managed to meet or exceed 0.625 efficiency.

Equipment.

- Water meters. Separate landscape water meters shall be installed for all projects except for single family homes or any project with a landscaped area of less than 5,000 square feet.
- Controllers. Automatic control systems shall be required for all irrigation systems and must be able to accommodate all aspects of the design.
- Valves. Plants which require different amounts of water shall be irrigated by separate valves. If one valve is used for a given area, only plants with similar water use shall be used in that area. Anti-drain (check) valves shall be installed in strategic points to minimize or prevent low-head drainage.
- Sprinkler heads. Heads and emitters shall have consistent application rates within each control valve circuit. Sprinkler heads shall be selected for proper area coverage, application rate, operating pressure, adjustment capability, and ease of maintenance.
- Rain Sensing Override Devices. Rain sensing override devices shall be required on all irrigation systems.
- Soil Moisture Sensing Devices. It is recommended that soil moisture sensing devices be considered where appropriate.

Recycled Water

- The installation of recycled water irrigation systems (dual distribution systems) shall be required to allow for the current and future use of recycled water, unless a written exemption has been granted as described in the following section (B) (ii).

- Irrigation systems shall make use of recycled water unless a written exemption has been granted by the local water agency, stating that recycled water meeting all health standards is not available and will not be available in the foreseeable future.

- The recycled water irrigation systems shall be designed and operated in accordance with all local and state codes.

Irrigation Design Plan Specifications

- Irrigation systems shall be designed to be consistent with hydrozones.

- The irrigation design plan shall be drawn on project base sheets. It shall be separate from, but use the same format as, the landscape design plan. The scale shall be the same as that used for the landscape design plan described in Section 492 (c) (5) (C).

- The irrigation design plan shall accurately and clearly identify:

- Location and size of separate water meters for the landscape.

- Location, type, and size of all components of the irrigation system, including automatic controllers, main and lateral lines, valves, sprinkler heads, moisture sensing devices, rain switches, quick couplers, and backflow prevention devices.

- Static water pressure at the point of connection to the public water supply.

- Flow rate (gallons per minute), application rate (inches per hour), and design operating pressure (psi) for each station.

- Recycled water irrigation systems as specified in the Section 492 (c) (4) (B).

Irrigation Schedules

Irrigation schedules satisfying the following conditions shall be submitted as part of the Landscape Documentation Package.

An annual irrigation program with monthly irrigation schedules shall be required for the plant establishment period, for the established landscape, and for any temporarily irrigated areas.

The irrigation schedule shall:

- include run time (in minutes per cycle), suggested number of cycles per day, and frequency of irrigation for each station; and

- provide the amount of applied water (in hundred cubic feet, gallons, or in whatever billing units the local water supplier uses) recommended on a monthly and annual basis.

The total amount of water for the project shall include water designated in the Estimated Total Water Use calculation plus water needed for any water features, which shall be considered as a high water using hydrozone.

Recreational areas designated in the landscape design plan shall be highlighted and the irrigation schedule shall indicate if any additional water is needed above the Maximum Applied Water Allowance because of high plant factors (but not due to irrigation inefficiency.)

Whenever possible, irrigation scheduling shall incorporate the use of evapotranspiration data such as those from the California Irrigation Management Information System (CIMIS) weather stations to apply the appropriate levels of water for different climates.

Whenever possible, landscape irrigation shall be scheduled between 2:00 a.m. and 10:00 a.m. to avoid irrigating during times of high wind or high temperature.

Maintenance Schedules

A regular maintenance schedule satisfying the following conditions shall be submitted as part of the Landscape Documentation Package:

Landscapes shall be maintained to ensure water efficiency. A regular maintenance schedule shall include but not be limited to checking, adjusting, and repairing irrigation equipment; resetting the automatic controller; aerating and dethatching turf areas; replenishing mulch; fertilizing; pruning, and weeding in all landscaped areas.

Whenever possible, repair of irrigation equipment shall be done with the originally specified materials or their equivalents.

Landscape Irrigation Audit Schedules

A schedule of landscape irrigation audits, for all but single family residences, satisfying the following conditions shall be submitted to the city or county as part of the Landscape Documentation Package.

At a minimum, audits shall be in accordance with the State of California Landscape Water Management Program as described in the Landscape Irrigation Auditor Handbook, the entire document, which is hereby incorporated by reference. (See Landscape Irrigation Auditor Handbook (June 1990) version 5.5 [formerly Master Auditor Training].)

The schedule shall provide for landscape irrigation audits to be conducted by certified landscape irrigation auditors at least once every five years.

Grading Design Plan

Grading design plans satisfying the following conditions shall be submitted as part of the Landscape Documentation Package.

A grading design plan shall be drawn on project base sheets. It shall be separate from but use the same format as the landscape design plan.

The grading design plan shall indicate finished configurations and elevations of the landscaped area, including the height of graded slopes, drainage patterns, pad elevations, and finish grade.

Soils

A soil analysis satisfying the following conditions shall be submitted as part of the Landscape Documentation Package.

Determination of soil texture, indicating the percentage of organic matter.

An approximate soil infiltration rate (either measured or derived from soil texture/infiltration rate tables.) A range of infiltration rates shall be noted where appropriate.

Measure of pH, and total soluble salts.

A mulch of at least three inches shall be applied to all planting areas except turf.

Certification

Upon completing the installation of the landscaping and the irrigation system, an irrigation audit shall be conducted by a certified landscape irrigation auditor prior to the final field observation. (See Landscape Irrigation Auditor Handbook as referenced in Section 492 (c)(9)(A)).

A licensed landscape architect or contractor, certified irrigation designer, or other licensed or certified professional in a related field shall conduct a final field observation and shall provide a certificate of substantial completion to the city or county. The certificate shall specifically indicate that plants were installed as specified, that the irrigation system was installed as designed, and that an irrigation audit has been performed, along with a list of any observed deficiencies.

Certification shall be accomplished by completing a Certificate of Substantial Completion and delivering it to the city or county, to the retail water supplier, and to the Owner of Record. A sample of such a form, which shall be provided by the city or county is:

SAMPLE CERTIFICATE OF SUBSTANTIAL COMPLETION

Project Site:_____ Project Number:_____

Project Location:_____

Preliminary Project Documentation Submitted: (check indicating submittal)

___ 1. Maximum Applied Water Allowance:

_____ (gallons or cubic feet per year)

___ 2. Estimated Applied Water Use:

_____ (gallons or cubic feet/year)

*__ 2a. Estimated Amount of Water Expected from Effective Precipitation:

_____ (gallons or cubic feet/year)

____ 3. Estimated Total Water Use:

_____ (gallons or cubic feet/year)

Note: * If the design assumes that a part of the Estimated Total Water Use will be provided by precipitation, the Effective Precipitation Disclosure Statement in Section 495 shall be completed and submitted. The Estimated Amount of Water Expected from Effective Precipitation shall not exceed 25 percent of the local annual mean precipitation (average rainfall.)

_____ 4. Landscape Design Plan

_____ 5. Irrigation Design Plan

_____ 6. Irrigation Schedules

_____ 7. Maintenance Schedule

_____ 8. Landscape Irrigation Audit Schedule

_____ 9. Grading Design Plan

_____ 10. Soil Analysis

Post-Installation Inspection: (Check indicating substantial completion)

_____ A. Plants installed as specified

_____ B. Irrigation system installed as designed

___ dual distribution system for recycled water

___ minimal run off or overspray

_____ C. Landscape Irrigation Audit performed

_____Project submittal package and a copy of this certification has been provided to owner/manager and local water agency

Comments:

I/we certify that work has been installed in accordance with the contract documents.

_____

Contractor Signature, Date, State License Number

I/we certify that based upon periodic site observations, the work has been substantially completed in accordance with the Water Efficient Landscape Ordinance and that the landscape planting and irrigation installation conform with the approved plans and specifications.

_____

Landscape Architect Signature, Date, State License Number

or Irrigation Designer/Consultant

or Licensed or Certified Professional in a Related Field

I/we certify that I/we have received all of the contract documents and that it is our responsibility to see that the project is maintained in accordance with the contract documents.

_____

Owner Signature, Date

Authority cited: Section 65594, Gov. Code. Reference: Section 65597, Gov. Code.

Public Education

Publications.

- Local agencies shall provide information to owners of all new, single family residential homes regarding the design, installation, and maintenance of water efficient landscapes.
- Information about the efficient use of landscape water shall be provided to water users throughout the community.

Model Homes.

- At least one model home that is landscaped in each project consisting of eight or more homes shall demonstrate via signs and information the principles of water efficient landscapes described in this ordinance.
- Signs shall be used to identify the model as an example of a water efficient landscape and featuring elements such as hydrozones, irrigation equipment and others which contribute to the overall water efficient theme.
- Information shall be provided about designing, installing, and maintaining water efficient landscapes.

Authority cited: Section 65594, Gov. Code. Reference: Section 65597.

Section 493. Provisions For Existing Landscapes

Water Management

All existing landscaped areas to which the city or county provides water that are one acre or more, including golf courses, green belts, common areas, multi-family housing, schools, businesses, parks, cemeteries, and publicly owned landscapes shall have a landscape irrigation audit at least every five years. At a minimum, the audit shall be in accordance with the California Landscape Water Management Program as described in the Landscape Irrigation Auditor Handbook, the entire document which is hereby incorporated by reference. (See Landscape Irrigation Auditor Handbook, Dept. of Water Resources, Water Conservation Office (June 1990) version 5.5.)

If the project's water bills indicate that they are using less than or equal to the Maximum Applied Water Allowance for that project site, an audit shall not be required.

Recognition of projects that stay within the Maximum Applied Water Allowance is encouraged.

Water Waste Prevention

Cities and counties shall prevent water waste resulting from inefficient landscape irrigation by prohibiting runoff, low head drainage, overspray, or other similar conditions where water flows onto adjacent property, non-irrigated areas, walks, roadways, or structures. Penalties for violation of these prohibitions shall be established locally.

Authority cited: Section 65594, Gov. Code. Reference: Section 65597, Gov. Code.

Model Landscape Ordinance

Section 494. Effective Precipitation

If effective precipitation is included in the calculation of the Estimated Total Water Use, an Effective Precipitation Disclosure Statement (similar to the following Sample Effective Precipitation Disclosure Statement) shall be completed, signed, and submitted with the Landscape Documentation Package. No more than 25 percent of the local annual mean precipitation shall be considered effective precipitation in the calculation of the Estimated Total Water Use.

SAMPLE EFFECTIVE PRECIPITATION DISCLOSURE STATEMENT

I certify that I have informed the project owner and developer that this project depends on _____ (gallons or cubic feet) of effective precipitation per year. This represents _____ percent of the local mean precipitation of _____ inches per year.

I have based my assumptions about the amount of precipitation that is effective upon:_____

_____

_____

_____

I certify that I have informed the project owner and developer that in times of drought, there may not be enough water available to keep the entire landscape alive.

_____

Licensed or Certified Landscape Professional

I certify that I have been informed by the licensed or certified landscape professional that this project depends upon _____ (gallons or cubic feet) of effective precipitation per year. This represents _____ percent of the local mean precipitation of _____ inches per year.

I certify that I have been informed that in times of drought, there may not be enough water available to keep the entire landscape alive.

_____

Owner Developer

Section 495. Reference Evapotranspiration

In inches (Historical Data, extrapolated from 12-Month Normal Year ETo Maps and U.C. publication 21426)

Orange Laguna Beach

2.2	2.6	3.4	4.6	4.6	4.9	4.9	4.4	3.4	2.4	1.9

2. EPA Citizen's Guide to Pest Control and Pesticide Safety

0000653

United States
Environmental Protection
Agency

Prevention, Pesticides,
and Toxic Substances
(7501C)

EPA 730-K-95-001
September 1995

EPA

Citizen's Guide to Pest Control and Pesticide Safety

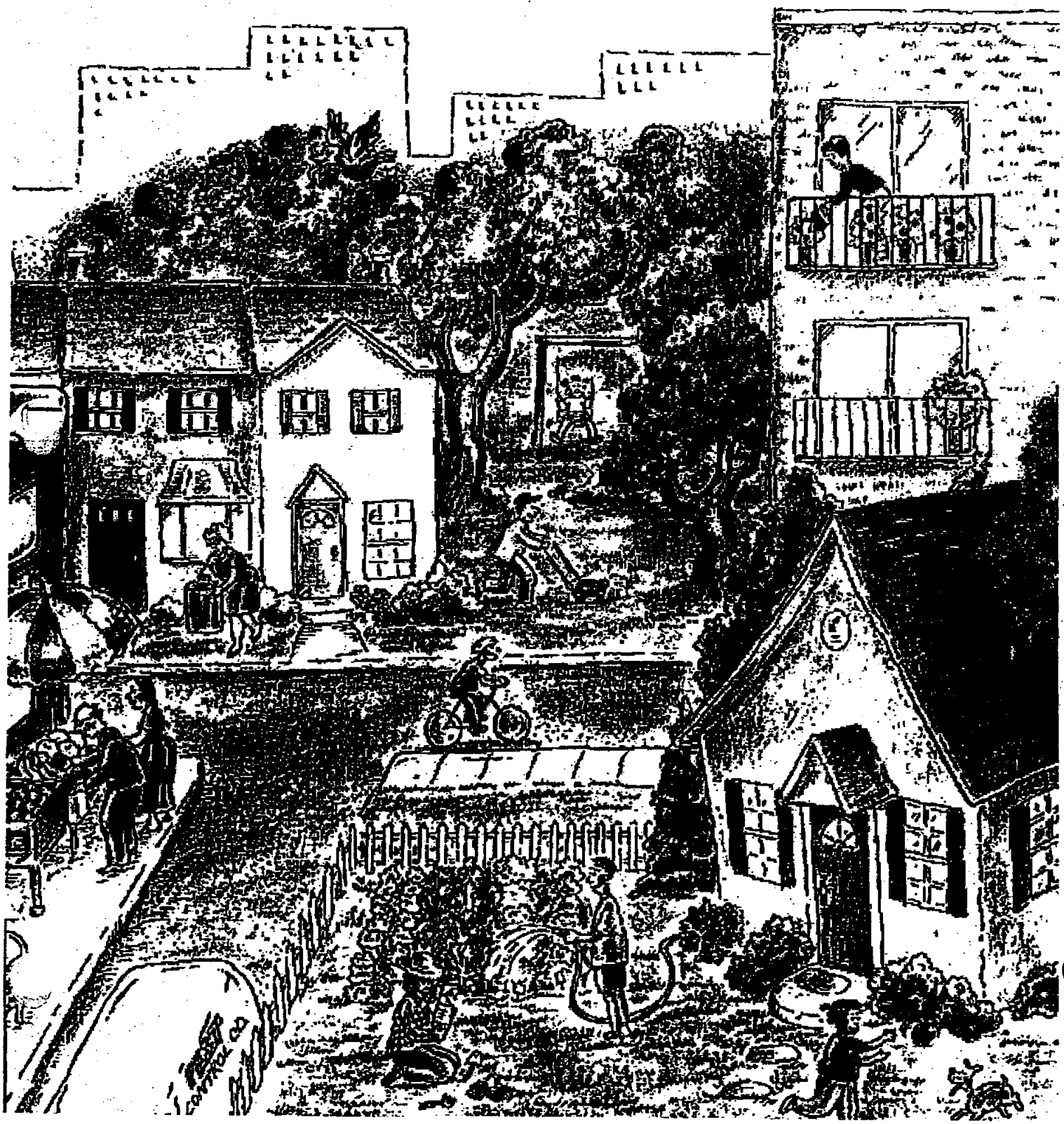

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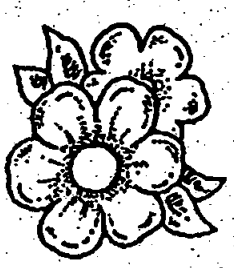

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Foreword

The Environmental Protection Agency (EPA) is charged with ensuring that pesticides do not pose unreasonable risks to the public and to the environment. EPA regulates the use of pesticides under the authority of two laws—the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) and the Federal Food, Drug and Cosmetic Act (FFDCA). Most all pesticides may legally be sold in the United States if they have been "registered" by EPA and if they bear an EPA registration number. Federal pesticide registration, however, is only the first step in preventing pesticide risks. Just as important are the steps that consumers take to control pests and use pesticides safely. EPA hopes that this booklet will help you control pests safely.

Introduction

SOONER OR LATER, we're all pestered by pests. Whether it's ants in the kitchen or weeds in the vegetable garden, pests can be annoying and bothersome. At the same time, many of us are concerned that the pesticides we use to control pests can cause problems too. How can pests be controlled safely? When and how should pesticides be used?

This booklet is intended to help answer these questions. The questions have no single right answer, but *Citizen's Guide to Pest Control and Pesticide Safety* gives the information you need to make informed decisions. You should be able to control pests without risking your family's health and without harming the environment.

The major goals of this booklet are to help you understand—

- What steps to take to control pests in and around your home.
- What alternatives to chemical pesticides are available, including pest prevention and non-chemical pest controls.
- How to choose pesticides and how to use, store, and dispose of them safely.
- How to reduce your exposure when others use pesticides.
- How to choose a pest control company.
- What to do if someone is poisoned by a pesticide.

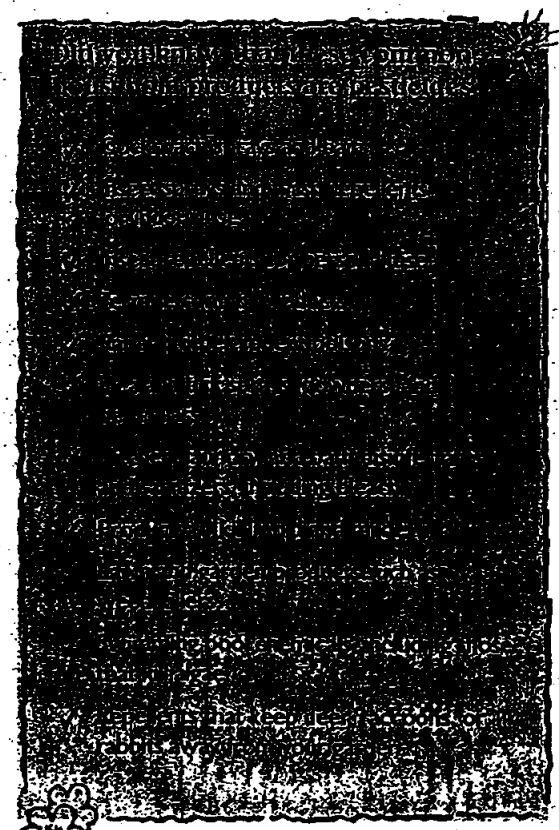

Pests, Pest Control, and Pesticides

PLANTS, insects, mold, mildew, rodents, bacteria, and other organisms are a natural part of the environment. They can benefit people in many ways. But they can also be pests. Apartments and houses are often hosts to common pests such as cockroaches, fleas, termites, ants, mice, rats, mold, or mildew. Weeds, hornworms, aphids, and grubs can be a nuisance outdoors when they get into your lawn, flowers, yard, vegetable garden, or fruit and shade trees. Pests can also be a health hazard to you, your family, and your pets. It's easy to understand why you may need and want to control them.

Nowadays, you can choose from many different methods as you plan your strategy for controlling pests. **Sometimes a non-chemical method of control is as effective and convenient as a chemical alternative.** For many pests, total elimination is almost impossible, but it is possible to control them. **Knowing your options is the key to pest control.** Methods available to you include pest prevention, non-chemical pest controls, and chemical pesticides. Each of these methods will be described in more detail in the next three sections of this booklet (starting on pages 6, 11, and 13).

Pest Management

The most effective strategy for controlling pests may be to combine methods in an approach known as integrated pest management (IPM) that emphasizes preventing pest damage. In IPM, information about pests and available pest control methods is used to manage pest damage by the most economical means and with the least possible hazard to people, property, and the environment. An example of using the IPM approach for lawn care is presented in the next section of this booklet titled "Preventing Pests."

Some signs of pest infestation are unmistakable.

Knowing a range of pest control methods gives you the ability to choose among them for an effective treatment. Knowing the options also gives you the choice of limiting your exposure to potentially harmful chemicals. No matter what option you choose, you should follow these steps to control your pest problem:

First Steps in Pest Management

1 **Identify the pest problem.** This is the first and most important step in pest control—figuring out exactly what you're up against. Some pests (or signs of them) are unmistakable—most people recognize a cockroach or a mouse. Other signs that make you think "pest" can be misleading. For example, what may look like a plant "disease" may be, in fact, a sign of poor soil or lack of water.

Use **free sources** to help identify your pest and to learn the most effective methods to control it. These sources include library reference books (such as insect field guides or gardening books) and pest specialists at your County Cooperative Extension Service or local plant nurseries. These resources are usually listed in the telephone book.

2 **Decide how much pest control is necessary.** Pest control is not the same as pest elimination. Insisting on getting rid of all pests inside and outside your home will lead you to make more extensive, repeated, and possibly hazardous chemical treatments than are necessary. Be reasonable. Ask yourself these questions:

- Does your lawn really need to be totally weed free?
- Recognizing that some insects are beneficial to your lawn, do you need to get rid of all of them?
- Do you need every type of fruit, vegetable, or flower you grow, or could you replace ones that are sensitive to pests with hardier substitutes?
- Can you tolerate some blemished fruits and vegetables from your garden?
- Is anyone in your home known to be particularly sensitive to chemicals?

Preventing Pests

PESTS SEEK PLACES TO LIVE that satisfy basic needs for air, moisture, food, and shelter. The best way to control pests is to try to prevent them from entering your home or garden in the first place. You can do this by removing the elements that they need to survive. Take the following preventive actions:

Indoor Prevention

- **Remove water.** All living things, including pests, need water for survival. Fix leaky plumbing, and do not let water accumulate anywhere in or around your home. For example, do not leave any water in trays under your houseplants, under your refrigerator, or in buckets overnight. Remove or dry out water-damaged and wet materials. Even dampness or high humidity can attract pests.

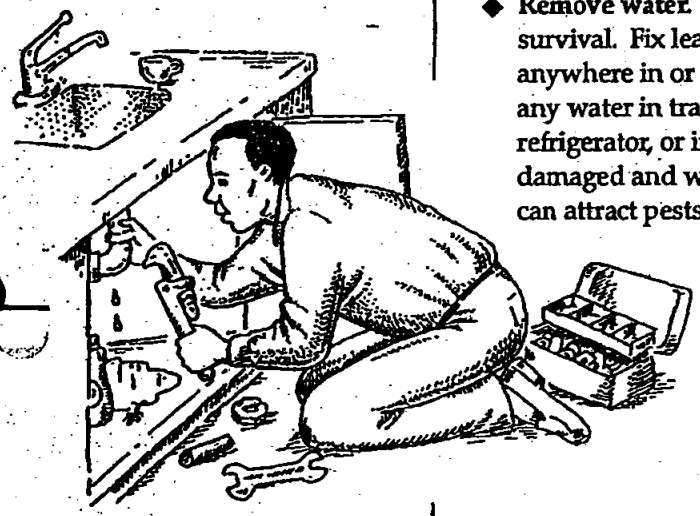

Pests need water to survive. Fix leaky pipes.

- **Remove food.** Store your food in sealed glass or plastic containers, and keep your kitchen clean and free from cooking grease and oil. Do not leave food in pet bowls on the counter or floor for long periods of time. Put food scraps or refuse in tightly covered, animal-proof garbage cans, and empty your garbage frequently.

- **Remove or block off indoor pest hiding places.** Caulk cracks and crevices to control pest access. Bathe pets regularly and wash any mats or surfaces they lie on to control fleas. Avoid storing newspapers, paper bags, and boxes for long periods of time. Also, check for pests in packages or boxes before carrying them into your home.

- **Block pest entryways.** Install screens on all floor drains, windows, and doors to discourage crawling and flying pests from entering your home. Make sure any passageways through the floor are blocked. Place weatherstripping on doors and windows. Caulk and seal openings in walls. Keep doors shut when not in use.

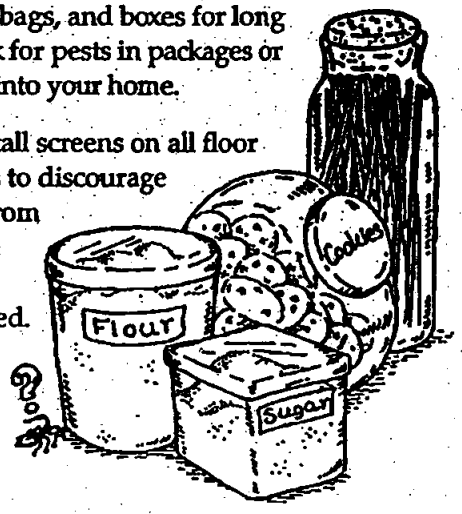

Store food in sealed containers.

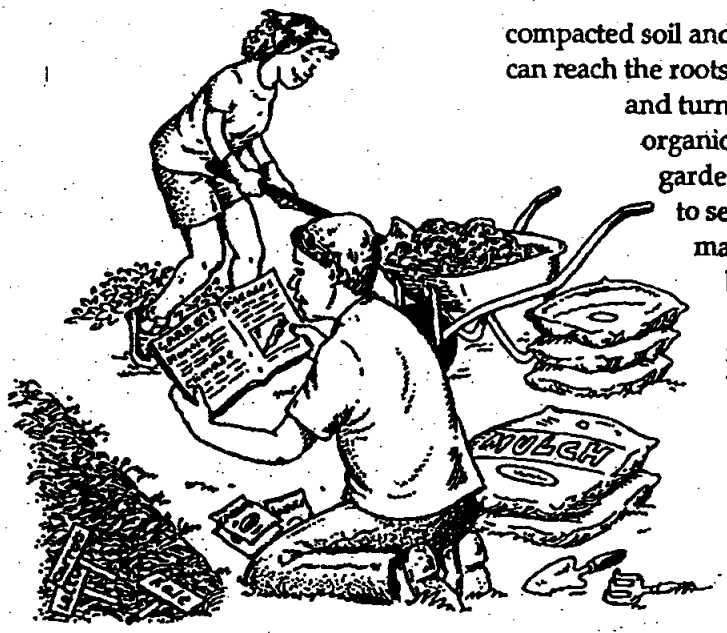

compacted soil and create air spaces so that water and nutrients can reach the roots, buy or rent a tiller that breaks up the dirt and turns it over. Before planting, add sand and organic matter to enrich the soil mixture in your garden plot. Also, have the soil tested periodically to see whether you need to add more organic matter or adjust the pH (acidity/alkalinity) balance by adding lime or sulfur. Your County Cooperative Extension Service, listed in the telephone book, or local nursery should be able to tell you how to do this.

- Mulch your garden with leaves, hay, grass clippings, shredded/chipped bark, or seaweed. **Do not use newspapers** to keep down weeds or to fertilize plants. **Newsprint may contain toxic metals** such as lead and mercury.

Before planting, add organic matter to enrich the soil mixture in your garden plot.

Lawn Care

Tending a garden may not be your hobby; but if you rent or own a home, you might need to care for the lawn. You don't have to be an expert to grow a healthy lawn—the key is to work with nature. You need to create the right conditions for your grass to grow strong and stay healthy. A healthy lawn can resist damage from weeds, disease, and insect pests. Set realistic weed and pest control goals for your lawn.

Think of lawn care as a preventive health care program, like one you would follow to stay healthy yourself. The goal is to prevent problems from ever occurring.

Pesticides can be effective, but should not be relied on as the quick-fix solution to any lawn problem. Serious, ongoing pest problems are often a sign that your lawn is not getting what it needs to stay healthy. Pests may be a symptom of an underlying problem. You need to correct the underlying problem to reduce the chances of pests reappearing.

Make these six steps part of a preventive health care program for your lawn:

1 **Develop healthy soil that has the right pH balance, key nutrients, and good texture.** You can buy easy-to-use soil analysis kits at hardware stores or contact your local County Cooperative Extension Service for a soil analysis.

2 **Choose a type of grass that grows well in your climate.** For instance, if your area gets very little rain, don't plant a type of grass that needs a lot of water. Your local County Cooperative Extension Service can advise you on which grasses grow best in your area.

3 **Mow high, mow often, and make sure the lawn mower blades are sharp.** Grass that is slightly long makes a strong, healthy lawn with few pest problems. Weeds have a hard time taking root and growing when grass is fairly long (around 2½ to 3½ inches for most types of grass). A foot-high meadow isn't necessary; just adding an inch to the length of your grass will give most lawns a real boost.

4 **Water deeply but not too often.** The best rule is to water only when the lawn begins to wilt from dryness—when the color dulls and footprints stay in the grass for more than a few seconds. Avoid watering during the hottest part of the day because the water will evaporate too quickly.

5 **Correct thatch buildup.** Thatch is a layer of dead plant material between the grass blades and the soil. When thatch gets too thick (deeper than ¾ of an inch), it prevents water and nutrients from getting into the soil and reaching the roots of the grass. Overusing synthetic fertilizer can create a heavy layer of thatch, and some kinds of grass are prone to thatch buildup.

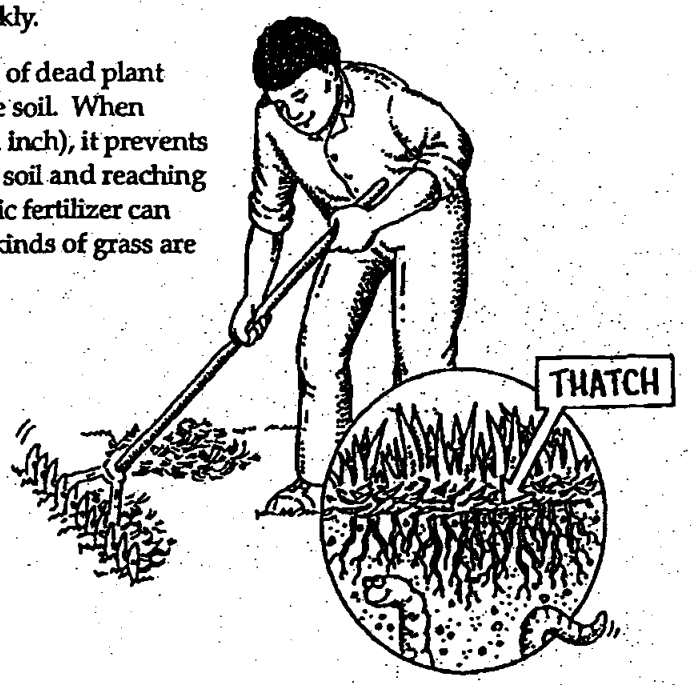

Get rid of excess thatch by raking the lawn or using a dethatching rake.

In a healthy lawn, earthworms, spiders, millipedes, and a variety of microorganisms help keep the thatch layer in balance by breaking it up and using it for food, which releases nutrients into the soil. You can get rid of excess thatch by raking the lawn using a dethatching rake or by using a machine that pulls plugs out of the grass and thatch layer to break it up. Sprinkle a thin layer of topsoil or compost over the lawn after dethatching or aerating it to speed up the process of decomposition.

6 **Set realistic weed and pest control goals.** It is almost impossible to get rid of all weeds and pests. However, even a lawn that is 15 percent weeds can look almost weed-free to the casual observer. A healthy lawn will probably always have some weeds and some insect pests. But a healthy lawn will also have beneficial insects and other organisms like earthworms that keep pests under control. Improper use of pesticides can kill these beneficial organisms.

By following this preventive health care program for your lawn, you should be able to rely **very little, if at all,** on chemical pesticides for weed and insect pest control. For additional information, refer to EPA's booklet *Healthy Lawn, Healthy Environment.* (See page 42 in the Reference Section.)

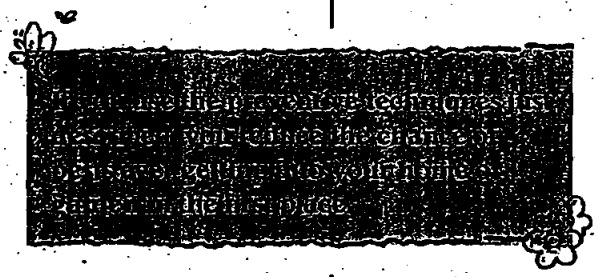

Using Non-Chemical Pest Controls

YOU'VE GOT PESTS, and you want to control them with a dependable pest control method that does not contain chemical pesticides. Non-chemical pest control methods really work, and they have many advantages. Compared to chemical treatments, non-chemical methods are generally effective for longer periods of time. They are less likely to create hardy pest populations that develop the ability to resist pesticides. And many non-chemical pest controls can be used with fewer safeguards, because they are generally thought to pose virtually no hazards to human health or the environment. Two examples of non-chemical pest control methods are biological and manual treatments.

Biological Controls

Did you know that pests themselves may be eaten or otherwise controlled by birds, insects, or other living organisms? You can use a pest's natural enemies (predators) to your advantage. These "biological controls," as they are called, take many forms:

- **Beneficial predators** such as purple martins and other birds eat insects; bats can eat thousands of insects in one night; lady beetles (ladybugs) and their larvae eat aphids, mealybugs, whiteflies, and mites. Other beneficial bugs include spiders, centipedes, ground beetles, lacewings, dragonflies, big-eyed bugs, and ants. You can install a purple martin house in your yard. You can also buy and release predatory insects. They are available from sources such as gardening catalogs and magazines.

  Contact your County Cooperative Extension Service, a nursery, or a garden association for information on how to attract and protect beneficial predators.

- **Parasitoids** such as miniature wasps lay their eggs inside the eggs or bodies of insect pests such as tomato hornworms. Once the eggs hatch, the offspring kill their insect hosts, making parasitoids highly effective pest controllers.

Beneficial Predators

PURPLE MARTIN

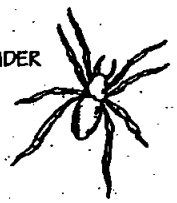
SPIDER

LADYBUG

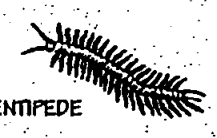
CENTIPEDE

MINI-WASP

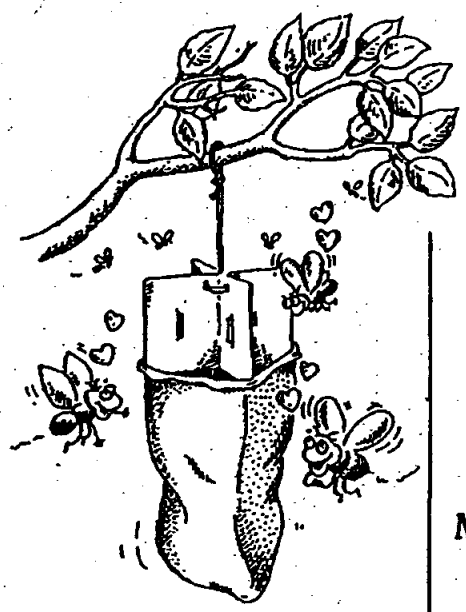

Pheromone traps lure pests.

- **Microscopic pathogens** such as fungi, bacteria, and viruses control pests. An example is milky spore disease, which attacks Japanese beetles. A number of these biological pesticides are available commercially at hardware and garden stores. (See page 43 in the Reference Section for more information.)
- **Biochemical pesticides** include pheromones and juvenile insect hormones. Pheromones are chemical substances released by various organisms (including insects) as means of communicating with others of the same species, usually as an aid to mating. Pheromones lure pests inside a trap. Juvenile insect hormones interfere with an insect's normal growth and reproductive functions by mimicking the effects of compounds that occur naturally in the pest.

Manual Methods

- Spading and hoeing to cut up weeds.
- Hand-picking weeds from your lawn and pests from your plants, indoors or out.
- Using a flyswatter.
- Setting traps to control rats, mice, and some insects.
- Mulching to reduce weed growth.

One or a combination of several non-chemical treatments may be just what you need for your pest problem. You must be patient because results may not be immediate. And, you must work to prevent pests from entering your home or garden in the first place.

Using Chemical Pest Controls

IF YOU DECIDE that the best solution to your pest problem is chemical—by itself or, preferably, combined with non-chemical treatments—be aware that one of the greatest causes of pesticide exposure to humans is the use of pesticides in and around the home.

Anyone can buy a wide variety of "off the shelf" pesticide products to control weeds, unwanted insects, and other pests. No special training is required to use these pesticides. Yet many of the products can be hazardous to people, especially when stored, handled, applied, or disposed of improperly. **The results achieved by using chemical pesticides are generally temporary, and repeated treatments may be required.** Over time, some pests become pesticide-resistant, meaning they adapt to the chemical and are no longer harmed by it. This forces you to choose another product or method. If used incorrectly, home-use pesticide products can be poisonous to humans. As a result, it is extremely important for you to take responsibility for making sure that these products are used properly. The basic steps in reducing pesticide risks are—

- Choosing the right pesticide product.
- Reading the product label.
- Determining the right amount to purchase and use.
- Using the product safely and correctly.
- Storing and disposing of pesticides properly.

Each of these steps is described in more detail in the sections that follow.

Choosing the right product is a basic step in reducing pesticide risks.

Choosing the Right Pesticide Product

Once you decide to use chemical pesticides, you must decide whether to do the job yourself or hire a professional pest control service. If you are interested in hiring professionals, see pages 36–38 for advice. If you choose to tackle the job yourself, the next question is the most important. Which pesticide product is the best one for your situation?

Home-use pesticides come in many forms—including solutions, aerosols, dusts, granules, baits, and wettable powders. As the name implies, wettable powders are usually mixed with water and/or other liquids and then applied. Pesticide solutions are often diluted with water. Certain formulations work better for some pests and/or some target areas than others. Many pesticides also come in ready-to-use forms, such as aerosols and spray bottles, which are often more practical and easy to use because they don't require measuring or mixing.

Before you buy a product, read the label! Compare product labels, and learn as much as you can about the pesticide. Contact your County Cooperative Extension Service (listed in the telephone book), local pesticide dealers, the National Pesticide Telecommunications Network (NPTN) at 1-800-858-7378, or your state pesticide agency for assistance. (See pages 45–48 in the Reference Section for state contacts.)

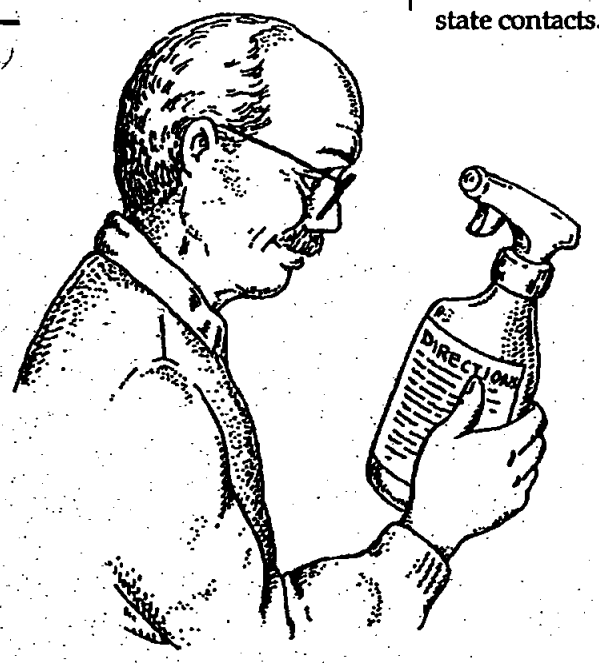

Read the label before you buy or use a pesticide product.

When you are ready to buy a pesticide product, follow these recommendations:

- First, be certain that you have identified the problem correctly. Then, choose the least toxic pesticide that will achieve the results you want and be the least toxic to you and the environment.
- When the words "broad-spectrum" appear on the label, this means the product is effective against a broad range of pests. If the label says "selective," the product is effective against one or a few pests.
- Find the signal word—either *Danger-Poison, Danger, Warning,* or *Caution* on the pesticide label. The signal word tells you how poisonous the product is to humans. (See page 16.)

  Pesticide products labeled *Danger-Poison* are "Restricted Use" and are mainly used under the supervision of a certified applicator. For the most part, these products should not be available for sale to the consumer.
- Choose the form of pesticide (aerosol, dust, bait, or other) best suited to your target site and the pest you want to control.

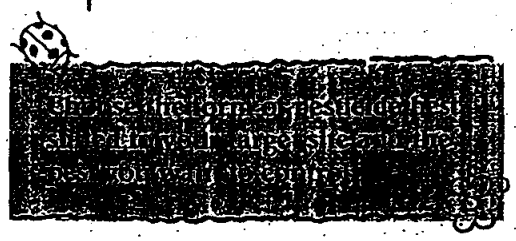

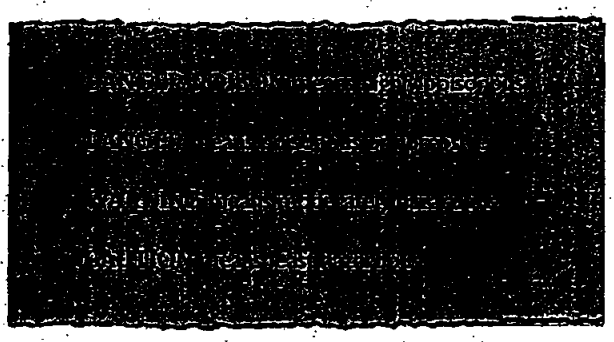

Reading the Pesticide Label

The pesticide label is your best guide to using pesticides safely and effectively. The directions on the label are there primarily to help you achieve "maximum" benefits—the pest control that you desire—with "minimum" risk. Both depend on following label directions and correctly using the pesticide. ***Read the label.*** Read the label ***before buying*** the pesticide. Read the label ***before mixing or using*** the pesticide ***each time,*** and read the label before storing or disposing of the pesticide. Do not trust your memory. You may have forgotten part of the label instructions or they may have changed. Use of any pesticide in any way that is not consistent with label directions and precautions is illegal. It may also be ineffective and, even worse, dangerous.

The main sections of a pesticide label are described below:

1 **EPA Registration Number.** This number tells you that EPA has reviewed the product and determined that it can be used with minimal or low risk if you follow the directions on the label properly. The number is not a stamp of approval or guarantee of effectiveness.

2 **Ingredients Statement or Active Ingredients.** Active ingredients are the chemicals in the pesticide that kill or control the target pest(s).

3 **Signal Words.** The signal words—*Caution, Warning, or Danger*—indicate the pesticide's potential for making you sick. The word *CAUTION* appears on pesticides that are the least harmful to you. A pesticide with the word *WARNING* is more poisonous than those with a *Caution* label. Pesticides with the word *DANGER* on the label are very poisonous or irritating. They should be used with extreme care because they can severely burn your skin and eyes.

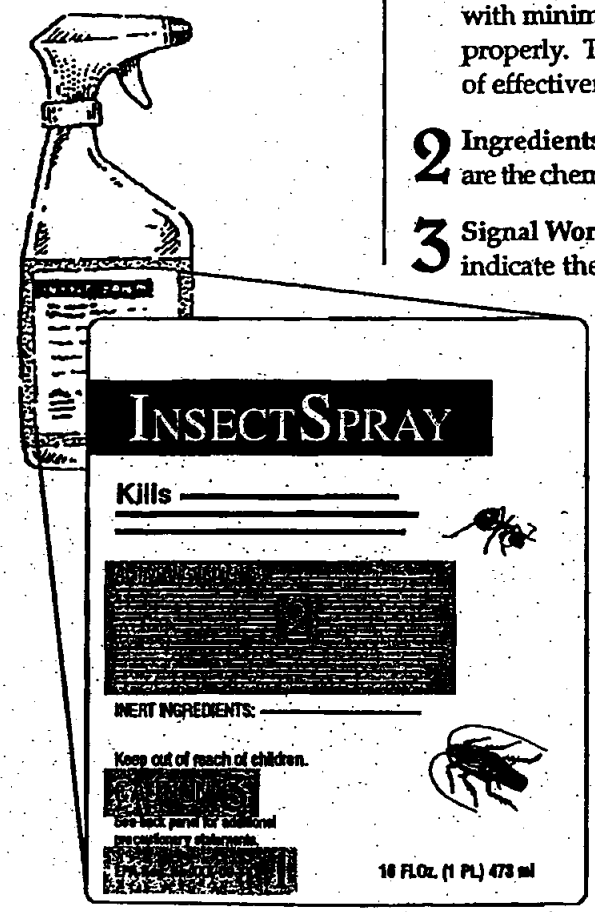

Main sections on front label.

4 **Precautionary Statements.** This part describes the protective clothing, such as gloves or goggles, that you should wear when using the pesticide. The section also tells you how to protect children or pets by keeping them away from areas treated with pesticides.

5 **Environmental Hazards.** This section tells you if the product can cause environmental damage—if it's harmful to wildlife, fish, endangered plants or animals, wetlands, or water.

6 **Directions for Use.** Make sure that the product is labeled for use against the pest(s) that you are trying to control. (For example, products labeled only for termites should not be used to control fleas.) Use only the amounts recommended, and follow the directions exactly.

7 **First Aid Instructions.** The label tells you what to do if someone is accidentally poisoned by the pesticide. Look for this information in the *Statement of Practical Treatment* section. The instructions are only first aid. ALWAYS call a doctor or your local poison control center. You may have to take the person to a hospital right away after giving first aid. Remember to take the pesticide label or container with you.

8 **Storage and Disposal.** Read carefully and follow all directions for safe storage and disposal of pesticide products. Always keep products in the original container and out of reach of children, in a locked cabinet or locked garden shed.

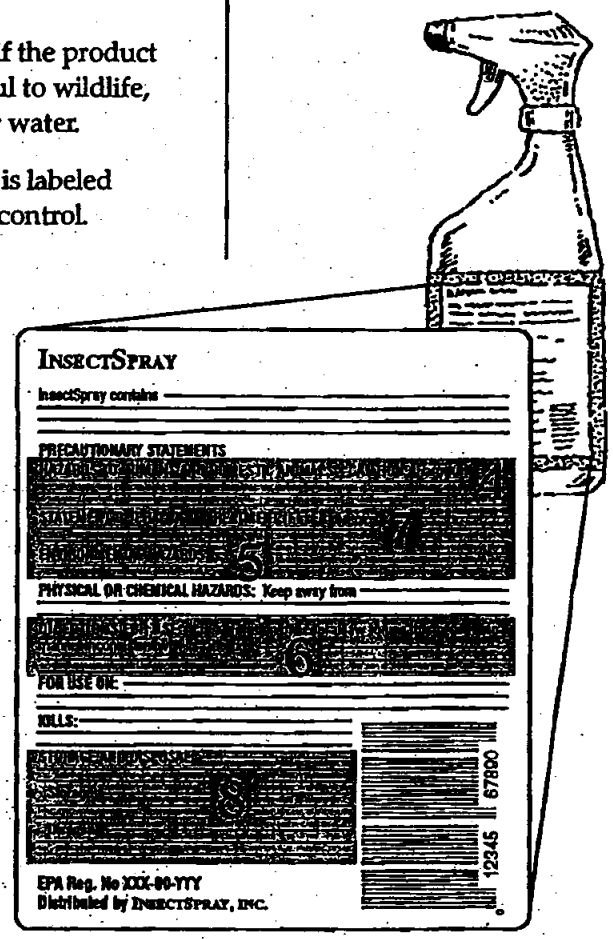

Main sections on back label.

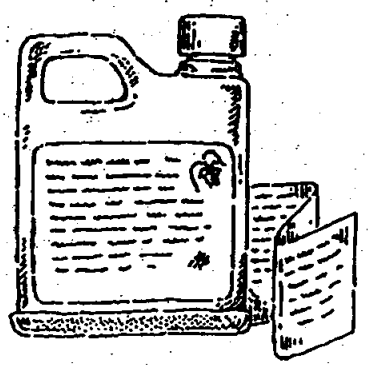

Some pesticides have small foldout booklets containing the label information.

Determining the Correct Amount To Use

Many products can be bought in a convenient ready-to-use form, such as in spray cans or spray bottles, that won't require any mixing. However, if you buy a product that has to be measured out or mixed with water, prepare only the amount of pesticide that you need for the area where you plan to use the pesticide (target area). The label on a pesticide product contains much useful information, but there isn't always room to include examples of different dilutions for every home use. Thus, it is important to know how to measure volume and figure out the exact size of the area where you want to apply the pesticide. Determining the correct amount for your immediate use requires some careful calculations. Use the following example as an illustration of how to prepare only the amount of pesticide needed for your immediate pest control problem.

An example: The product label says, "For the control of aphids on tomatoes, mix 8 fluid ounces of pesticide into 1 gallon of water and spray until foliage is wet." You have only 6 tomato plants. From experience, you know that 1 gallon is too much, and that you really need only 1 quart of water to wet the leaves on these 6 plants. A quart is only ¼ of a gallon. Because you want to use less water than the label says, you need less pesticide. You need only ¼ of the pesticide amount listed on the label—only 2 fluid ounces. This makes the same strength spray recommended by the label, and is the appropriate amount for the 6 tomato plants.

In short, all you need to do is figure the amount of pesticide you need for the size of your target area, using good measurements and careful arithmetic. For help in making these calculations, see pages 39–41 in the Reference Section.

When using pesticides that must be mixed, determine the correct amount for your immediate use.

[redacted]

Using Pesticides Safely and Correctly

Once you have read the pesticide label and are familiar with all precautions, including first aid instructions, follow these recommendations to reduce your risks:

Before Using a Pesticide

- Wear the items of protective clothing the label requires: for example, long-sleeved shirts, long pants, overalls, non-absorbent gloves (not leather or fabric), rubber footwear (not canvas or leather), a hat, goggles, or a dust-mist filter. If no specific clothing is listed, gloves, long-sleeved shirts and long pants, and closed shoes are recommended. You can buy protective clothing and equipment at hardware stores or building supply stores.

When Mixing or Applying a Pesticide

- Never smoke or eat while mixing or applying pesticides. You could easily carry traces of the pesticide from your hands to your mouth. Also, some pesticide products are flammable.

- Follow the use directions on the label carefully. Use only for the purpose listed. Use only the amount directed, at the time and under the conditions specified. **Don't change the recommended amount.** Don't think that twice the amount will do twice the job. It won't. You could harm yourself, others, or whatever you are trying to protect.

- If the directions on the label tell you to mix or dilute the pesticide, do so outdoors or in a well-ventilated area. Use the amount listed on the label and measure the pesticide carefully. (Never use the same measuring cups or spoons that you use in the kitchen.) Mix only the amount that you need for each application. Do not prepare larger amounts to store for possible future use. (See "Determining the Correct Amount To Use" on page 18.)

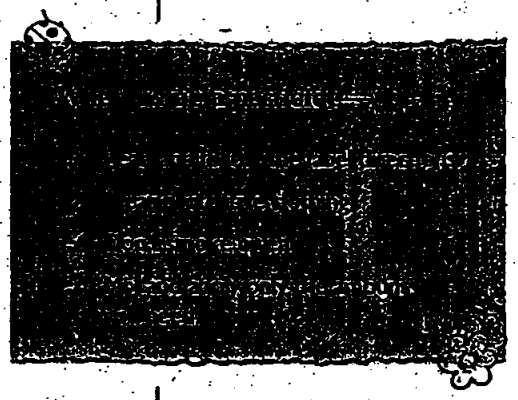

Mix pesticides outdoors or in a well-ventilated area.

- Keep children, pets (including birds and fish), and toys (including pet toys) away from areas where you mix and apply pesticides for at least the length of time required on the label.
- Never transfer pesticides to other containers, such as empty soft drink or milk bottles. Keep pesticides in their original containers—ones that clearly identify the contents. Refasten all childproof caps tightly.
- If a spill occurs, clean it up promptly. Don't wash it away. Instead, sprinkle the spill with sawdust, vermiculite, or kitty litter. Sweep it into a plastic garbage bag, and dispose of it as directed on the pesticide product label.
- Indoors or outdoors, never put bait for insects or rats, mice, and other rodents where small children or pets can reach it. When using traps, make sure the animal inside is dead before you touch or open the trap.

Indoor Applications

- Use pesticides indoors only when absolutely necessary, and use only very limited amounts.
- Provide adequate ventilation. If the label directions permit, leave all windows open and fans operating after the application is completed. If the pesticide product is only effective in an unventilated (sealed) room or house, do not stay there. Put all pets outdoors, and take yourself and your family away from treated areas for at least the length of time prescribed on the label.
- Apply most surface sprays only to limited areas such as cracks; don't treat entire floors, walls, or ceilings.
- Remove food, pots and pans, and dishes before treating kitchen cabinets. Don't let pesticides get on any surfaces that are used for food preparation. Wait until shelves dry before refilling them. Wash any surfaces that may have pesticide residues before placing food on them.

Outdoor Applications

- Never apply pesticides outdoors on a windy day (winds higher than 10 mph). Position yourself so that a light breeze does not blow pesticide spray or dust into your face.
- Before spraying, close the doors and windows of your home.
- Use coarse droplet nozzles on your sprayer to reduce misting, and spray as close to the target as possible.
- Keep pesticides away from plants and wildlife you do not want to treat. Do not apply any pesticide to blooming plants, especially if you see honeybees or other pollinating insects around them. Do not spray bird nests when treating trees.
- Follow label directions carefully to ensure that you don't apply too much pesticide to your lawn, shrubs, or garden. Never water your lawn after applying pesticides. Before using a pesticide outdoors, check the label or contact your EPA Regional Office or County Cooperative Extension Service to find out whether the pesticide is known or suspected to run off or seep into ground water. Ground water is the underground reservoir that supplies water to wells, springs, creeks, and the like. Excessive application of pesticides could cause the pesticide to run off or seep into water supplies and contaminate them. Excess spray may also leave harmful residues on your home-grown fruit and vegetables, and could affect other plants, wildlife, and fish.
- Never mix or apply a pesticide near a wellhead.
- If you have a well, be sure it extends downward to water sources that are below, and isolated from, surface water sources. Be sure the well shaft is tightly sealed. For further information, see EPA's brochure *Pesticides in Drinking Water Wells*. (See page 42 for information on how to order a copy from EPA's Public Information Center.)
- When using total release foggers to control pests, the most important precautions you can take are to use no more than the amount needed and to keep foggers away from ignition sources (ovens, stoves, air conditioners, space heaters, and water heaters, for example). Foggers should not be used in small, enclosed places such as closets and cabinets or under tables and counters.

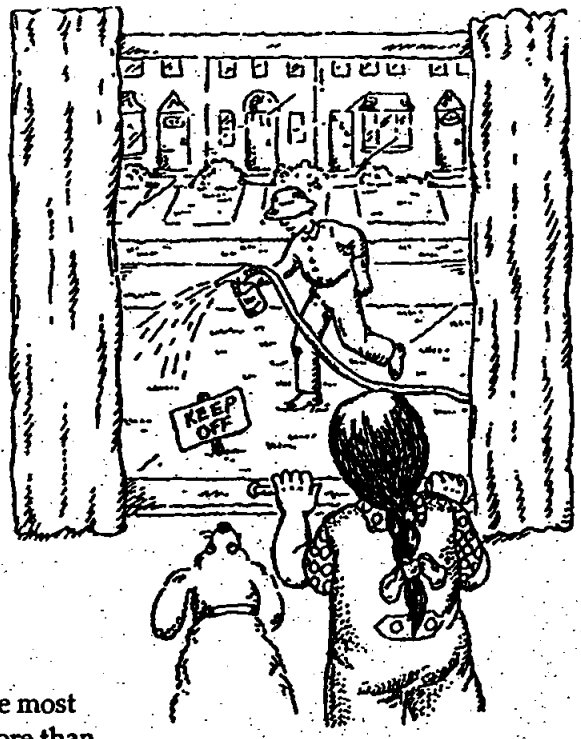

Keep children and pets away from areas where you apply pesticides.

After Applying a Pesticide, Indoors or Outdoors

- To remove pesticide residues, use a bucket to rinse tools or equipment three times, including any containers or utensils that you used when mixing the pesticide. Then pour the rinsewater into the pesticide sprayer and reuse the solution by applying it according to the pesticide product label directions. (See pages 24–25 for safe disposal guidelines.)

- Always wash your hands after applying any pesticide. Wash any other parts of your body that may have come in contact with the pesticide. To prevent tracking pesticides inside, remove or rinse your boots or shoes before entering your home. Wash any clothes that have been exposed to a lot of pesticide separately from your regular wash.

- Evaluate the results of your pesticide use. Consider using a different chemical, a non-chemical method, or a combination of non-chemical and chemical methods if the chemical treatment didn't work. Again, **do not assume** that using more pesticide than the label recommends will do a better job. It won't.

- Watch for negative effects on wildlife (birds, butterflies, and bees) in and near treated areas. If you see any unusual behavior, stop using that pesticide, and contact EPA's Pesticide Incident Response Officer (see page 35).

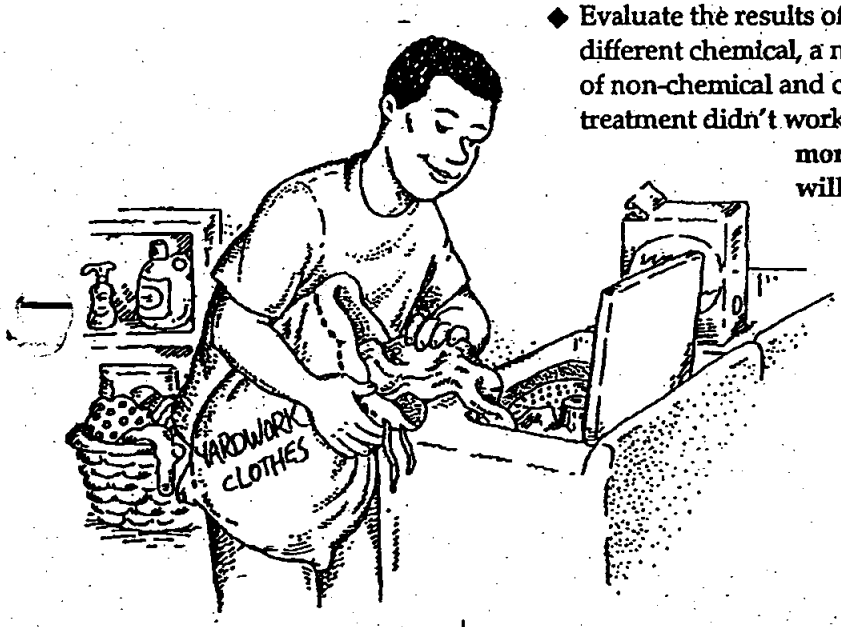

Wash clothing worn when using pesticides separately from other laundry.

Storing and Disposing of Pesticides Properly

Improper pesticide storage and disposal can be hazardous to human health and the environment. Follow these safety recommendations:

Safe Storage of Pesticides

- Don't stockpile. Reduce storage needs by buying only the amount of pesticide that you will need in the near future or during the current season when the pest is active.
- Follow all storage instructions on the pesticide label.
- Store pesticides high enough so that they are out of reach of children and pets. Keep all pesticides in a locked cabinet in a well-ventilated utility area or garden shed.
- Store flammable liquids outside your living area and far away from an ignition source such as a furnace, a car, an outdoor grill, or a power lawn mower.
- Never store pesticides in cabinets with or near food, animal feed, or medical supplies.
- Always store pesticides in their original containers, complete with labels that list ingredients, directions for use, and first aid steps in case of accidental poisoning.
- *Never* transfer pesticides to soft drink bottles or other containers. Children or others may mistake them for something to eat or drink.
- Use child-resistant packaging correctly—close the container tightly after using the product. Child resistant does not mean child proof, so you still must be extra careful to store properly—out of children's reach—those products that are sold in child-resistant packaging.
- Do not store pesticides in places where flooding is possible or in places where they might spill or leak into wells, drains, ground water, or surface water.
- If you can't identify the contents of the container, or if you can't tell how old the contents are, follow the advice on safe disposal in the next section.

Safe Disposal of Pesticides

- The best way to dispose of small amounts of excess pesticides is to use them—apply them—according to the directions on the label. If you cannot use them, ask your neighbors whether they have a similar pest control problem and can use them.

- If all of the remaining pesticide cannot be properly used, check with your local solid waste management authority, environmental agency, or health department to find out whether your community has a household hazardous waste collection program or a similar program for getting rid of unwanted, leftover pesticides. These authorities can also inform you of any local requirements for pesticide waste disposal.

- **State and local laws regarding pesticide disposal may be stricter than the Federal requirements on the label.** Be sure to check with your state or local agencies before disposing of your pesticide containers.

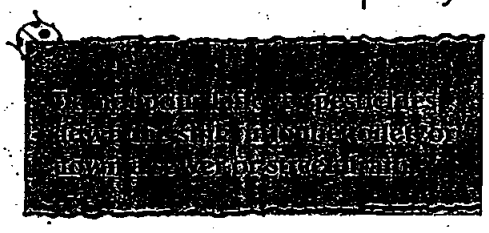

- If no community program or guidance exists, follow the label directions for disposal. In general, to dispose of less than a full container of a liquid pesticide, leave it in the original container with the cap tightly in place to prevent spills or leaks. Wrap the container in several layers of newspaper and tie it securely. Put the package in a covered trash can for routine collection with municipal trash. If you do not have a regular trash collection service, take the package to a permitted landfill (unless your town has other requirements).

  Note: No more than 1 gallon of liquid pesticide at a time should be thrown out with the regular trash in this manner.

- Wrap individual packages of dry pesticides in several layers of newspaper (or place the pesticides in a tight carton or bag), and tape or tie the package closed. Put the package in a covered trash can for routine collection.

  Note: No more than 5 pounds of dry pesticide at a time should be thrown out with the regular trash in this manner.

- Do **not** pour leftover pesticides down the sink, into the toilet, or down a sewer or street drain. Pesticides may interfere with the operation of wastewater treatment systems or pollute waterways. Many municipal systems are not equipped to remove all pesticide residues. If pesticides reach waterways, they may harm fish, plants, and other living things.

- An empty pesticide container can be as hazardous as a full one because of residues left inside. **Never reuse such a container.** When empty, a pesticide container should be rinsed carefully **three times** and the rinsewater thoroughly drained back into the sprayer or the container previously used to mix the pesticide. Use the rinsewater as a pesticide, following label directions. Replace the cap or closure securely. Dispose of the container according to label instructions. Do **not** puncture or burn a pressurized container like an aerosol—it could explode. Do cut or puncture other empty pesticide containers made of metal or plastic to prevent someone from reusing them. Wrap the empty container and put it in the trash after you have rinsed it.

- Many communities have programs to recycle household waste such as empty bottles and cans. Do not recycle any pesticide containers, however, unless the label specifically states that the empty container may be recycled after cleaning.

Follow the label directions for disposal.

Reducing Your Exposure When Others Use Pesticides

EVEN IF YOU NEVER USE PESTICIDES YOURSELF, you can still be exposed to them—at home, school, work, or play—by being in treated areas, as a consumer of commodities that others have treated with pesticides, or through food, water, and air that may have beencontaminated with pesticides.

This section describes sources of exposure other than your own use of pesticides. It also suggests ways to reduce your overall exposure. If you know or suspect that you, or others close to you, are sensitive to chemicals, consult an expert who can help you develop a strategy for handling your potential exposure problems.

Exposure Through Food

Commercial Food

To ensure a safe food supply, EPA regulates the safety of food by setting safety standards to limit the amount of pesticide residues that legally may remain in or on food or animal feed that is sold in the United States. Both domestic and imported foods are monitored by the Food and Drug Administration (FDA) and the U.S. Department of Agriculture (USDA) to ensure compliance with these safety standards.

Because most crops are treated with pesticides at least some of the time, foods you buy at the grocery store may contain small traces of pesticide residues. Pesticide levels tend to decline over time because the residues break down and because crops are usually washed and processed before reaching the marketplace. So, while we all consume small amounts of pesticides regularly, levels in our food generally are well below legal limits by the time the food reaches the grocery shelves.

Although EPA sets safety standards for the amount of pesticide residues allowed both in and on foods, you can take extra precautions to reduce the traces of pesticide residues you and your family consume in the food you buy. Follow these suggestions:

- Trim the fat from meat and poultry because residues of some pesticides concentrate in fat. Remove the skin from fish.
- Discard the fats and oils in broths and pan drippings.

- Rinse fruits and vegetables thoroughly with water. Scrub them with a brush and peel them, if possible. Taking these safety steps will remove most of the existing surface residues, along with any remaining dirt. Note that surface cleaning (rinsing and scrubbing) will not remove pesticide residues that are absorbed into the growing fruit or vegetable before harvest.
- Cook or bake foods to reduce residues of some pesticides even further.

Rinse fruits and vegetables with water. Scrub them with a brush and peel them, if possible.

Home-Grown Food

Growing your own food can be an enjoyable activity. It is also a way to reduce your exposure to pesticide residues in food—especially if you decide not to use chemical pesticides on your produce and you choose a garden site where drift or runoff from a neighbor's use of pesticides will not result in unintended residues on your food. If your house is regularly treated for pest prevention, don't plant your garden where the treatments are applied.

Food from the Wild

While it may seem that hunting your own game, catching your own fish, or gathering wild plant foods would reduce your overall exposure to pesticides, that isn't necessarily true. If you eat wild animals or plants from areas where pesticides are frequently used, this food may contain pesticide residues. In addition, birds such as ducks and geese may absorb pesticide residues if they have stopped to eat treated crops anywhere along their flight path.

If you eat food from the wild, you may want to take the following steps to reduce your exposure to pesticides:

- Do not fish in water bodies where contamination has occurred. Pay attention to posted signs that warn of contamination.
- Consult with fish and game officials or other appropriate officials where you plan to hunt or fish to determine whether there are any chemical problems associated with the area.
- Do not pick wild plants that are growing right next to a road, utility right-of-way, or hedgerow between farm fields. These areas may have been treated with pesticides.
- When preparing wild foods, trim fat from the meat. Discard the skin from fish.

Exposure Through Water

Do not fish in water bodies where contamination has occurred.

When pesticides are applied to land, a certain amount may run off into streams and rivers. This runoff, together with industrial waste, may result in low-level contamination of surface water. In certain settings—for example, when sandy soil lies over a ground-water source that is near the surface—pesticides can seep down through the soil to the ground water.

To ensure a safe supply of drinking water, EPA's Office of Water sets standards for pesticides and other chemicals that may be found in drinking water. Municipal water systems test their water periodically and provide treatment or alternate supply sources if residue problems occur. Generally, private wells are not tested unless the well owner requests an analysis. If you get your drinking water from a private well—

- Contact your state or local health department if you have any questions about pesticide or other chemical residues in your well water.
- If your well water is analyzed and found to contain pesticide residue levels above established or recommended health standards, use an alternate water source such as bottled water for drinking and cooking. The safest choice is distilled spring water in glass bottles. If you buy water from a local bottler, ask for the results of any recent pesticide analysis the bottled water.

EPA sets standards for chemicals that may be found in drinking water.

Exposure Through Air

Outdoors

Air currents may carry pesticides that were applied on properties nearby. You can reduce your exposure outdoors to airborne pesticide residues, or drift, by following these recommendations:

- If a close neighbor or someone else is applying pesticides outdoors near your home, you may want to stay indoors with your children and pets. Keep windows and exterior doors closed.
- If you live near fields, parks, or other areas that receive regular pesticide treatment, consider planting a group of hardy, thick-branched trees or shrubs to help serve as a buffer zone and windbreak.

- Careless application can lead to drift or direct spraying of non-target sites. If your property is accidentally sprayed during an aerial pesticide application, you should call your local, state, or regional pesticide office. (See pages 44–48 in the Reference Section for phone numbers.) If you or someone in your family is accidentally sprayed, wash pesticide off immediately and change into clean clothes. Then call your local poison control center.

Some local governments require public notice before area-wide or broad-scale pesticide spraying activities take place. Affected residents are notified through newspaper announcements, fliers, letters, or signs posted in areas to be treated. Some communities have also enacted "right-to-know" ordinances that require public notice (usually through posting) of lawn treatments and other small-scale outdoor pesticide uses.

Indoors

The air you breathe may contain low levels of pesticide residues long after a pesticide has been applied to objects inside a building or to indoor surfaces and crawl spaces, or after it has been tracked in from outside. Pesticides break down and disappear more slowly indoors than outdoors. In addition, many homes have built-in energy efficiency features that reduce the exchange of indoor and outdoor air and thus aggravate the problem. To limit your exposure to indoor pesticide residues—

- Air out the building adequately after a pesticide is applied indoors. Open doors and windows, and run overhead, whole-house, or window fans to exchange indoor air for outdoor air rapidly and completely.
- If you suspect that the air in your building is contaminated, consult knowledgeable professionals in your local or state health department or EPA's pesticide hotline (1-800-858-7378), 6:30 a.m.– 4:30 p.m. Pacific time (9:30 a.m.–7:30 p.m. Eastern time) Monday–Friday, for advice on the apropriate steps to take.

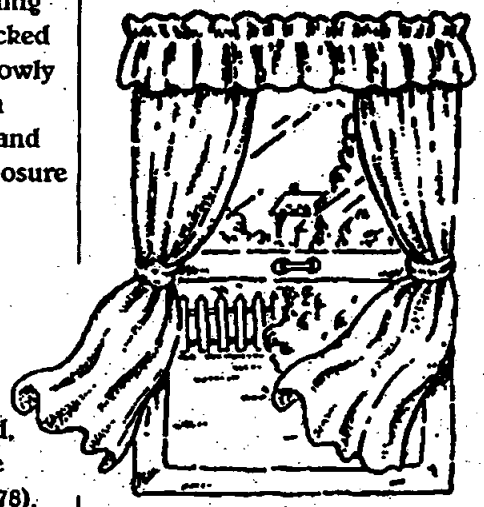

Air out the building adequately after a pesticide is applied indoors.

Poisoned by Pesticides: Don't Let This Happen to Your Child!

A 5-year-old boy drinks from a bottle of bleach that he found under the bathroom sink.

A 3-year-old girl tries to spray her hair the way mommy does, but sprays an aerosol disinfectant in her eyes instead.

A baby who has just begun to crawl eats green pebbles from behind the sofa. They look like candy, but are really rat poison.

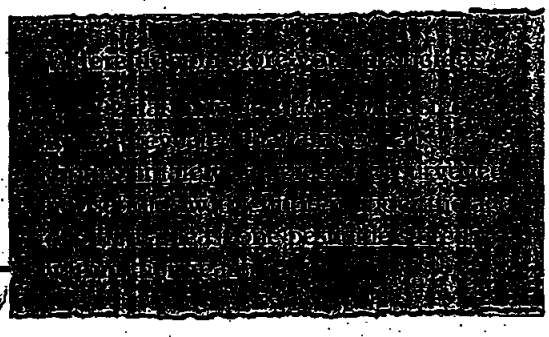

These accidents could happen to your children or to children visiting your home if you don't store pesticides out of their reach or if you don't read the label carefully before using the pesticide product.

The dangers are real. In 1993 alone, an estimated 80,000 children were exposed to or poisoned by a household pesticide product that was used or stored incorrectly.

Whether or not you have young children in your home, take the following precautions to protecall children from unintentional pesticide poisonings or exposures:

- Always store pesticides out of children's reach, in locked cabinet or garden shed. Installing child-proof safety latches or padlocks on cupboards and cabinets is a good idea. Safety latches are available at your local hardware store or building supply warehouse.
- Before applying pesticides—indoors or outdoors—remove children and their toys, along with any pets and their toys, from the area. Keep them away from the area that has been treated until the pesticide has dried and for at least the length of time recommended on the pesticide label.
- If you are interrupted while applying a pesticide—by a phone call, for example—be sure to close the pesticide container properly and put it out of reach of any child who may come into the area while you are gone.

- Never remove labels from containers, and never transfer pesticides to other containers. Children may mistake them for food or drink.
- Never put rodent or insect baits where small children can find them, pick them up, and put them in their mouths.
- Make sure you close any container marked "child resistant" very tightly after you use the product. Check periodically to make sure the product is securely closed. Child resistant does not mean child proof, so you should still be careful with products that are sold in child-resistant packaging.
- Make sure others—especially babysitters, grandparents, and other caregivers—know about the potential hazards of pesticides.
- Teach children that "pesticides are poisons"—something they should never touch or eat.
- Keep the telephone number of youmearest poison control center near each phone. Have the pesticide container handy when you call.
- Always keep Syrup of Ipecac on hand (in your medicine cabinet) to use to induce vomiting. (Be sure the date is current.) But do not give it to your child until a physician or poison control center advises you to do so. The pesticide label may not recommend using Syrup of Ipecac.

Store pesticides out of children's reach.

Handling a Pesticide Emergency

"Help! Someone's Been Poisoned!" What To Do in a Pesticide Emergency

If the person is unconscious, having trouble breathing, or having convulsions . . .
ACT FAST! Speed is crucial.

Give needed first aid immediately.

Call 911 or your local emergency service. If possible, have someone else call for emergency help while you give first aid.

If the person is awake or conscious, not having trouble breathing, and not having convulsions . . .

Read the label for first aid instructions.

Call a doctor, a poison control center, a local emergency service (911), or the National Pesticide Telecommunications Network (toll free at 1-800-858-7378).

Give first aid.

First Aid for Pesticide Poisoning

When you realize a pesticide poisoning has occurred or is occurring, try to determine what the victim was exposed to and what part of the body was affected before you take action—taking the right action is as important as taking immediate action. If the person is unconscious, having trouble breathing, or having convulsions, ACT FAST! Speed is crucial. Give needed first aid immediately. Call 911 or your local emergency service. If possible, have someone else call for emergency help while you give first aid. If the person is awake or conscious, not having trouble breathing, and not having convulsions, read the label for first aid instructions. Call a doctor, a poison control center, a local emergency service (911), or the National Pesticide Telecommunications Network (toll free at 1-800-858-7378). Give first aid.

Read the *Statement of Practical Treatment* section on the product label. The appropriate first aid treatment depends on the kind of poisoning that has occurred. Follow these general guidelines:

- **Swallowed poison.** A conscious victim should drink a small amount of water to dilute the pesticide. Always keep Syrup of Ipecac on hand (in your medicine cabinet) to use to induce vomiting. Be sure the date on the bottle is current. Induce vomiting only if a poison control center or physician advises you to do so, or if instructions on the pesticide label say so. If there is no label available to guide you, do not induce vomiting. Never induce vomiting if the victim is unconscious or is having convulsions.

- **Poison on skin.** Drench skin with water for at least 15 minutes. Remove contaminated clothing. Wash skin and hair thoroughly with soap and water. Dry victim and wrap in blanket. Later, discard contaminated clothing or thoroughly wash it separately from other laundry.

- **Chemical burn on skin.** Drench skin with water for at least 15 minutes. Remove contaminated clothing. Cover burned area immediately with loose, clean, soft cloth. Do not apply ointments, greases, powders, or other drugs. Later, discard contaminated clothing or thoroughly wash it separately from other laundry.

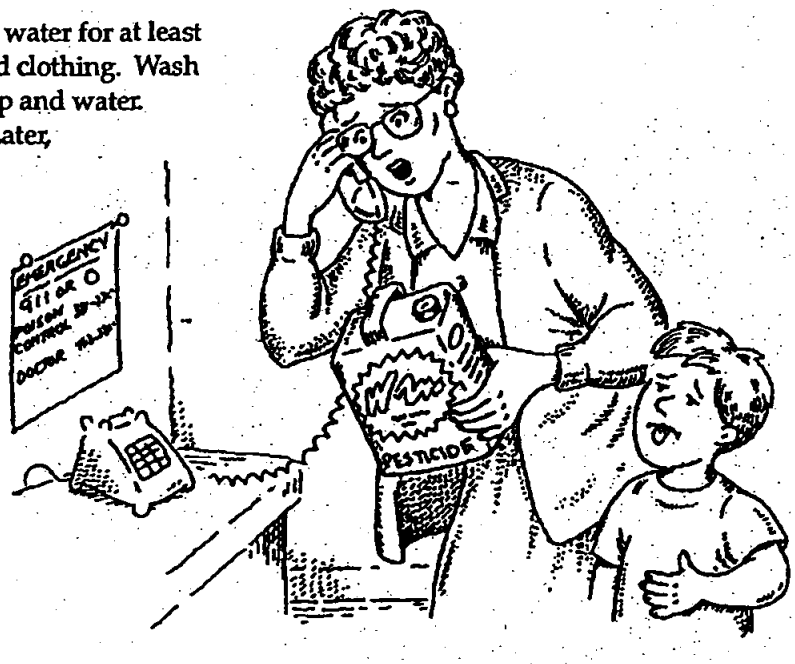

If a poisoning has occurred, call for help, and be ready to read information from the pesticide label.

- **Poison in eye.** Hold eyelid open and wash eye quickly and gently with clean cool running water from the tap or a hose for 15 minutes or more. Use only water; do not use eye drops, chemicals, or drugs in the eye. Eye membranes absorb pesticides faster than any other external part of the body, and eye damage can occur in a few minutes with some types of pesticides.

- **Inhaled poison.** If the victim is outside, move or carry the victim away from the area where pesticides were recently applied. If the victim is inside, carry or move the victim to fresh air immediately. If you think you need protection like a respirator before helping the victim, call the Fire Department and wait for emergency equipment before entering the area. Loosen the victim's tight clothing. If the victim's skin is blue or the victim has stopped breathing, give artificial respiration (if you know how) and call 911 for help. Open doors and windows so no one else will be poisoned by fumes.

What To Do After First Aid

- First aid may precede but should not replace professional medical treatment. After giving first aid, call 911 or your local emergency service immediately. Have the pesticide label at hand when you call.

- Take the pesticide product container with its label to the doctor's office or emergency room where the victim will be treated. Carry the container in your trunk or flatbed away from the passengers in your vehicle. The doctor needs to know what active ingredient is in the pesticide before prescribing treatment. This information is on the label, which sometimes also includes a telephone number to call for additional treatment information.

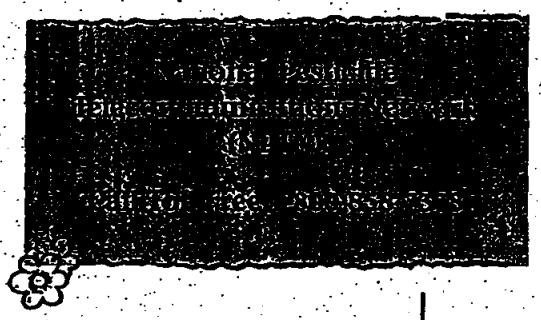

Another good resource in a pesticide emergency is NPTN, the National Pesticide Telecommunications Network, a toll-free telephone service that operates Monday through Friday, from 6:30 a.m.– 4:30 p.m. Pacific time (9:30 a.m.– 7:30 p.m. Eastern time). NPTN provides information on pesticides and how to recognize and respond to pesticide poisonings. If necessary, staff at NPTN can transfer your call directly to a local poison control center. Call NPTN toll free at 1-800-858-7378.

NPTN staff answer questions about animal poisonings, too. To keep your pets from being poisoned, follow label directions on flea and tick products carefully. If you are concerned about the chemicals used in these products, consult your veterinarian.

How To Recognize Pesticide Poisoning

External irritants that contact skin may cause skin damage such as redness, itching, or pimples. External irritants may also cause an allergic skin reaction that produces redness, swelling, or blistering. The mucous membranes of the eyes, nose, mouth, and throat are also quite sensitive to chemicals. Pesticide exposure may cause stinging and swelling in these membranes.

Internal injuries also may occur if a pesticide is swallowed, inhaled, or absorbed through the skin. Symptoms vary from organ to organ. Lung injury may result in shortness of breath, drooling (heavy salivation), or rapid breathing. Direct injury to the stomach and intestines may produce nausea, vomiting, abdominal cramps, or diarrhea. Injury to the nervous system may cause excessive fatigue, sleepiness, headache, muscle twitching, and numbness. In general, different types of pesticides produce different sets of symptoms.

If someone develops symptoms after working with pesticides, seek medical help immediately to determine if the symptoms are pesticide related. In certain cases, blood or urine should be collected for analysis, or other specific exposure tests can be made. **It is better to be too cautious than too late.**

Avoid potential health problems by minimizing your exposure to pesticides. Follow all the safety recommendations on pages 19–25.

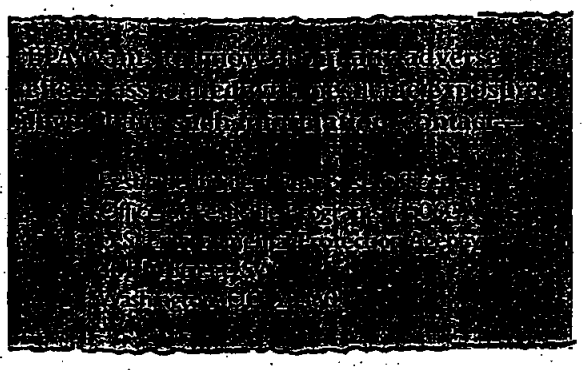

Choosing a Pest Control Company

IF YOU HAVE a pest control problem that you do not want to handle on your own, you may decide to turn to a professional applicator. How can you be sure that the pest control company you hire will do a good job? Before you choose a company, get answers to these questions:

1 Is the company licensed?
Most state or local agencies issue state pest control licenses. Make sure the pest control operator's licence is current if one is required in your state. Also, ask if the company's employees are bonded, meaning that the company reimburses you for any loss or damage caused by the employee.

You may want to contact your state pesticide agency to find out about its pesticide certification and training programs and to ask whether periodic recertification is required for pest control operators. (See pages 45–48 for addresses and phone numbers.)

In addition, possession of a city license—where they are issued—is one more assurance that the company you are dealing with is reputable and responsible.

2 Is the company willing and able to discuss the treatment proposed for your home?
Selecting a pest control service is just as important as selecting other professional services. Look for the same high degree of competence you would expect from a doctor or lawyer. Any company, including those advertising themselves as "green," should inspect your premises and outline a recommended control program, including the—

- Pests to be controlled.
- Extent of the problem.
- Active ingredient(s) in the pesticide chosen.
- Potential adverse health effects and typical symptoms of poisoning associated with the active ingredient.
- Form of the pesticide and application techniques.
- Non-chemical alternatives available.

- Special instructions to reduce your exposure to the pesticide (such as vacating the house, emptying the cupboards, and removing pets).
- Steps to take to minimize your pest problems in the future.

3 Does the company have a good track record?
Don't rely on the company salesperson to answer this question. Research the answer yourself. Ask neighbors and friends if they have ever dealt with the company. Were they satisfied with the service they received? Call the Better Business Bureau or local consumer office and find out if they have received complaints about the company.

4 Does the company have appropriate insurance? Can the salesperson show proof on paper that the company is insured?
Most contractors carry general liability insurance, including insurance for sudden and accidental pollution. Their insurance gives you a certain degree of protection should an accident occur while pesticides are being applied in your home. Contractors may also carry workmen's compensation insurance, which can help protect you should one of their employees be injured while working in or around your apartment or house. Although most states do not require pest control companies to buy insurance, you should think twice before hiring a company that is not insured.

5 Does the company guarantee its work?
You should be skeptical about a company that does not guarantee its work. In addition, be sure to find out what you must do to keep your part of the bargain. For example, in the case of termite control treatments, the company's guarantee may become invalid if you make structural alterations to your home without giving prior notice to the pest control company.

6 Is the company affiliated with a professional pest control association?
Professional associations—national, state, or local—keep members informed of new developments in pest control methods, safety, training, research, and regulations. Members agree to honor a code of ethics. The fact that a company, small or large, chooses to join a professional association signals its concern for quality.

Ask questions before choosing a pesticide company.

You and the company of your choice should develop the contract together. Your safety concerns should be noted and reflected in the choice of pesticides to be used. These concerns may include allergies, sensitivities, age of occupants (infants or elderly), resident pets, and treatment near wildlife and fish. Wise consumers get bids from two or three companies and look at value more than price. What appears to be a bargain may warrant a second look.

If you hire a pest control firm to do the job, ask the company to use the least toxic chemical method available that will do the job. Ask to see the label or Material Safety Data Sheet, which will show precautionary warnings.

Hiring a company to take care of your pest problem does not mean your job is over. You must evaluate the results. If you believe something has gone wrong with the pesticide application, contact the company and/or your state pesticide agency. Be a responsible, wise consumer and keep asking questions until your pests are under control.

Reference Section

Calculating the Correct Amount of Pesticide To Use for Your Target Area

To determine the size of your target area outdoors (usually a square or rectangular part of your lawn or garden), measure each side and multiply the length times the width. For example, if you want to apply a pesticide in an area that is 15 feet long and 15 feet wide, multiply 15 x 15 to get a total of 225 square feet.

When you read the label for pesticides commonly applied outdoors, you will see measurements in square feet or in square yards. A section of lawn that is 1 yard long x 1 yard wide has an area of 1 square yard. Because 1 yard = 3 feet, another way to calculate the same area is this: 3 feet long x 3 feet wide = 9 square feet = 1 square yard.

To know the size of your target area indoors, you may need to determine the volume of a room. You must calculate the volume of a room, for instance, before using a bug bomb (aerosol release) to control cockroaches or fleas. In a case like this, measure and multiply the room's length times width times height. For example, if the kitchen in your apartment is 6 feet long, 5 feet wide, and 8 feet high, its volume is 240 cubic feet (6 x 5 = 30 x 8 = 240).

Tables 1 to 3 (on pages 40–41) give examples for changing measurements you find on the pesticide label to match your specific target area and pest problem.

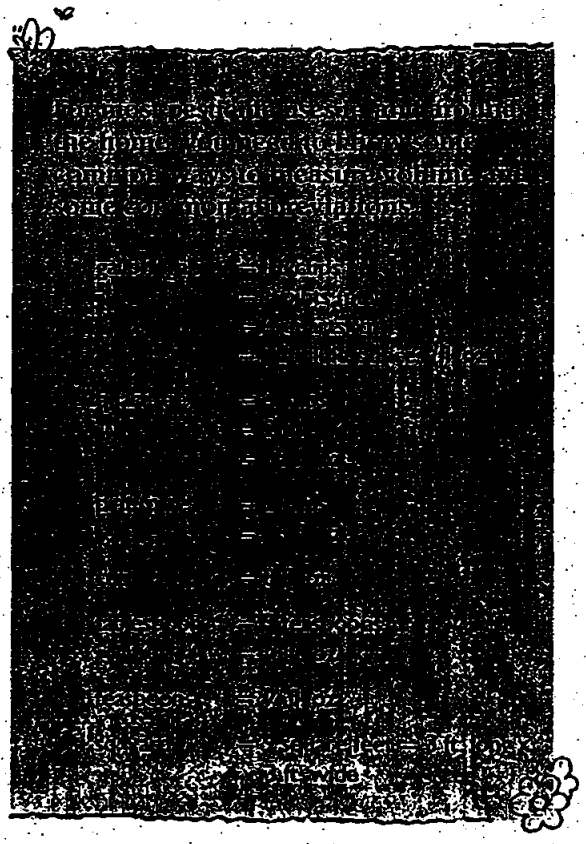

Not all amounts are included in the tables. For amounts not included, use the following notes as a guide:

- To figure the amount of a ready-to-use pesticide (not to be diluted with water), you must change the quantity of pesticide in the same way that you change the area/volume/number of items treated to keep the correct proportion.

  For example—

  ½ lb. of pesticide per 1,000 sq.ft. = ¼ lb. of pesticide per 500 sq.ft.

- To figure the amount of a pesticide that is to be diluted with water, you must change the quantity of pesticide and the quantity of water in the same way that you change the area/volume/number of items treated to keep the correct proportion.

  For example—

  1 lb. of pesticide in 2 gals. of water per 2,000 sq.ft. = ½ lb. of pesticide in 1 gal. of water per 1,000 sq.ft.

TABLE 1 — Diluting Pesticides with Water

Unit stands for any measure of pesticide quantity. Read across.

Pesticide Label Says: Mix "x" Units of Pesticide . . .	*You mix . . .*		
8 units *per* 1 gal water	2 units *per* 1 qt water	*or*	1 unit *per* 1 pt water
16 units *per* 1 gal water	4 units *per* 1 qt water	*or*	2 units *per* 1 pt water
32 units *per* 1 gal water	8 units *per* 1 qt water	*or*	4 units *per* 1 pt water
128 units *per* 1 gal water	32 units *per* 1 qt water	*or*	16 units *per* 1 pt water

TABLE 2 — Measuring Pesticides for a Surface Application
Unit stands for any measure of pesticide quantity. Read across.

Pesticide Label Says: Apply "x" Units of Pesticide . . .		*Your surface measures . . .* 20,000 sq.ft.	10,000 sq.ft.	500 sq.ft.
1 unit *per* 1,000 sq.ft.	*Apply:*	20 units	10 units	½ unit
2 units *per* 1,000 sq.ft.		40 units	20 units	1 unit
5 units *per* 1,000 sq.ft.		100 units	50 units	2½ units
10 units *per* 1,000 sq.ft.		200 units	100 units	5 units

TABLE 3 — Buying Pesticides for a Room Application
Read across.

Pesticide Label Says: Release One Aerosol Can . . .		*Your room measures . . .* 20,000 cu.ft.	10,000 cu.ft.	5,000 cu.ft.
1 *per* 10,000 cu.ft.	*Use:*	2 cans	1 can	don't use
1 *per* 5,000 cu.ft.		4 cans	2 cans	1 can
1 *per* 2,500 cu.ft.		8 cans	4 cans	2 cans

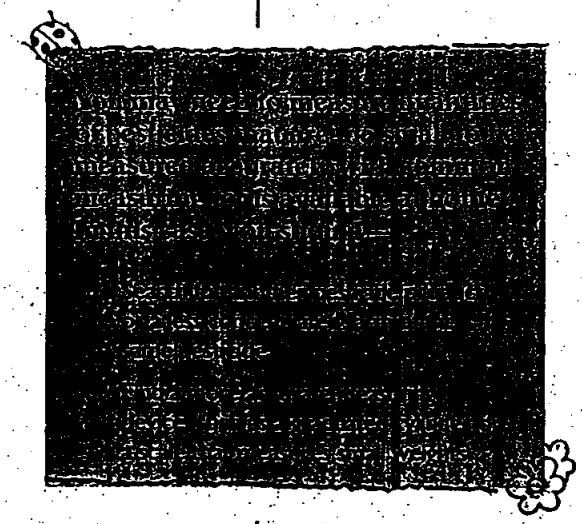

For More Information

For additional copies of this booklet, or for more information on subjects discussed in this booklet, contact—

EPA's Public Information Center (PIC), 401 M Street, SW, Washington, DC 20460 (Telephone: 202-260-2080); or the National Center for Environmental Publications and Information (NCEPI), P.O. Box 42419, Cincinnati, OH 45242-2419 (Telephone: 513-489-8190 or Fax: 513-489-8695).

PIC and NCEPI have the following free information available:

- *Healthy Lawn, Healthy Environment* (EPA 700-K-92-005).
- *Pesticides in Drinking Water Wells* (EPA 20T-1004).
- *Pest Control in the School Environment: Adopting Integrated Pest Management* (EPA 735-F-93-012).
- *Pesticides and Child Safety* fact sheet (English and Spanish) (EPA 735-F-93-050 and EPA 735-F-93-051).
- *Using Insect Repellents Safely* fact sheet (English and Spanish).
- *Safety Precautions for Total Release Foggers* fact sheet.
- NCEPI also has EPA's *National Publications Catalog 1995* (EPA 703-B-95-001) and the *Catalog of Office of Pesticide Programs (OPP) Publications and Other Information Media* (EPA 730-B-94-001).

Other sources for information about pesticides and pest control include—

- The National Pesticide Telecommunications Network (NPTN)—1-800-858-7378 (general public), 6:30 a.m.–4:30 p.m. Pacific time (9:30 a.m.–7:30 p.m. Eastern time) Monday–Friday. NPTN provides the following information:
  - Pesticide information.
  - Information on recognizing and managing pesticide poisonings.
  - Safety information.
  - Health and environmental effects.
  - Referrals for investigation of pesticide incidents and emergency treatment information.
  - Cleanup and disposal procedures, and much more.

- County Cooperative Extension Service offices are usually listed in the telephone directory under county or state government; these offices often have a range of resources on lawn care and landscape maintenance, including plant selection, pest control, and soil testing.
- State agriculture and environmental agencies may publish information on pests, pest management strategies, and state pesticide regulations. (See state contacts on pages 45–48.)
- Libraries, bookstores, and garden centers usually have a wide selection of books that identify various pests and discuss lawn care. Garden centers may also have telephone hotlines or experts available on the premises to answer gardening questions.
- The California Department of Pesticide Regulation's Environmental Monitoring and Pest Management Branch publishes a booklet on mail order sources of biological control organisms. Single free copies of *Suppliers of Beneficial Organisms in North America* are available by writing the Department at 1020 N Street, Room 161, Sacramento, CA 95814-5624. Telephone: 916-324-4100.
- Bio-Integral Resource Center (BIRC), a non-profit organization formed in 1978 through an EPA grant, has information on least toxic methods for pest management. Write to P.O. Box 7414, Berkeley, CA 94707.

EPA Addresses

Headquarters

U.S. Environmental Protection Agency
Office of Pesticide Programs (7506C)
401 M Street, SW
Washington, DC 20460

Telephone: (703) 305-5017
Fax: (703) 305-5558

EPA Regional Offices

U.S. EPA, Region 1
Air, Pesticides and Toxic Management Division
State Assistance Office (ASO)
1 Congress Street
Boston, MA 02203

Telephone: (617) 565-3932
Fax: (617) 565-4939

U.S. EPA, Region 2
Building 10 (MS-105)
Pesticides and Toxics Branch
2890 Woodbridge Avenue
Edison, NJ 08837-3679

Telephone: (908) 321-6765
Fax: (908) 321-6788

U.S. EPA, Region 3
Toxics and Pesticides Branch (3AT-30)
841 Chestnut Building
Philadelphia, PA 19107

Telephone: (215) 597-8598
Fax: (215) 597-3156

U.S. EPA, Region 4
Pesticides and Toxics Branch (4-APT-MD)
345 Courtland Street, NE
Atlanta, GA 30365

Telephone: (404) 347-5201
Fax: (404) 347-5056

U.S. EPA, Region 5
Pesticides and Toxics Branch (SP-14J)
77 West Jackson Boulevard
Chicago, IL 60604

Telephone: (312) 886-6006
Fax: (312) 353-4342

U.S. EPA, Region 6
Pesticides and Toxics Branch (6PD-P)
1445 Ross Avenue
Dallas, TX 75202-2733

Telephone: (214) 665-7240
Fax: (214) 665-7263

U.S. EPA, Region 7
Water, Wetlands and Pesticides Division
726 Minnesota Avenue
Kansas City, KS 66101

Telephone: (913) 551-7030
Fax: (913) 551-7065

U.S. EPA, Region 8
Air, Radiation and Toxics Division (8ART)
One Denver Place, Suite 500
999 18th Street
Denver, CO 80202-2405

Telephone: (303) 293-1730
Fax: (303) 293-1229

U.S. EPA, Region 9
Pesticides and Toxics Branch (A-4)
75 Hawthorne Street
San Francisco, CA 94105

Telephone: (415) 744-1090
Fax: (415) 744-1073

U.S. EPA, Region 10
Pesticides and Toxics Branch (AT-083)
1200 Sixth Avenue
Seattle, WA 98101

Telephone: (206) 553-1091
Fax: (206) 553-8338

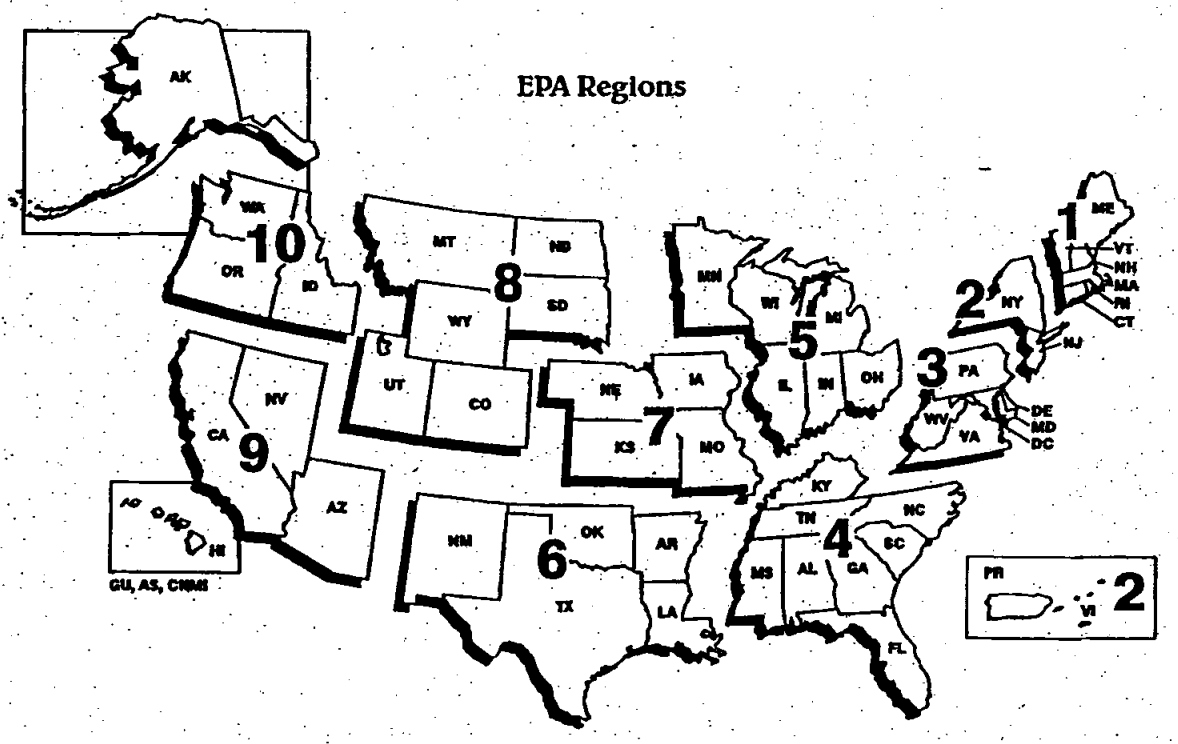

Addresses for State Pesticide Agencies

Region 1

Connecticut
Director
Pesticide Management Division
Department of Environmental Protection
79 Elm Street
Hartford, CT 06106
(203) 424-3369

Maine
Director
Board of Pesticide Control
Maine Department of Agriculture
State House Station #28
Augusta, ME 04333
(207) 287-2731

Massachusetts
Chief
Pesticides Bureau
Massachusetts Department of Food and Agriculture
100 Cambridge Street, 21st Floor
Boston, MA 02202
(617) 727-3000

New Hampshire
Director
Division of Pesticide Control
New Hampshire Department of Agriculture, Markets and Food
P.O. Box 2042
Concord, NH 03302-2042
(603) 271-3550

Rhode Island
Chief
Division of Agriculture
Rhode Island Department of Environmental Management
22 Hayes Street
Providence, RI 02908
(401) 277-2782

Vermont
Director
Plant Industry, Laboratory and Standards Division
Vermont Department of Agriculture
116 State Street
Montpelier, VT 05602
(802) 828-2431

Region 2

New Jersey
Assistant Director
Pesticide Control Program
New Jersey Department of Environmental Protection
CN 411
Trenton, NJ 08625-0411
(609) 530-4011

New York
Chief
Bureau of Pesticides and Radiation
Division of Solid and Hazardous Materials Regulation
New York Department of Environmental Conservation
50 Wolf Road
Albany, NY 12233-7254
(518) 457-7482

Puerto Rico
Director
Analysis and Registration of Agricultural Materials
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Estate Nisky, Charlotte Amalie
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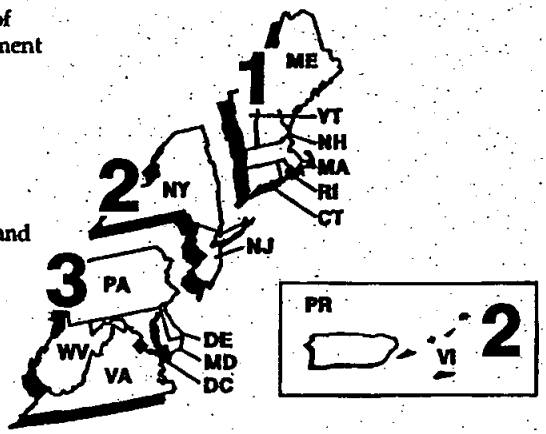

Region 3

Delaware
Deputy Secretary
Delaware Department of Agriculture
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District of Columbia
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Environmental Regulation Administration
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Pesticide Regulation Section
Office of Plant Industries and Pest Management
Maryland Department of Agriculture
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Pennsylvania
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Agronomic Services Division
Bureau of Plant Industry
Pennsylvania Department of Agriculture
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Harrisburg, PA 17110-9408
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Virginia
Program Manager
Office of Pesticide Services
Virginia Department of Agriculture and Consumer Service
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Pesticide Division
West Virginia Department of Agriculture
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Charleston, WV 25305-0190
(304) 558-2209

State Pesticide Agencies (cont'd)

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Alabama Department of Agriculture and Industries
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Florida
Director
Division of Agricultural Environmental Services
Department of Agriculture and Consumer Services
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Georgia Department of Agriculture
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Kentucky
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Kentucky Department of Agriculture
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Bureau of Plant Industry
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Raleigh, NC 27611-0647
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Tennessee
Director
Plant Industries Division
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Nashville, TN 37204
(615) 360-0130

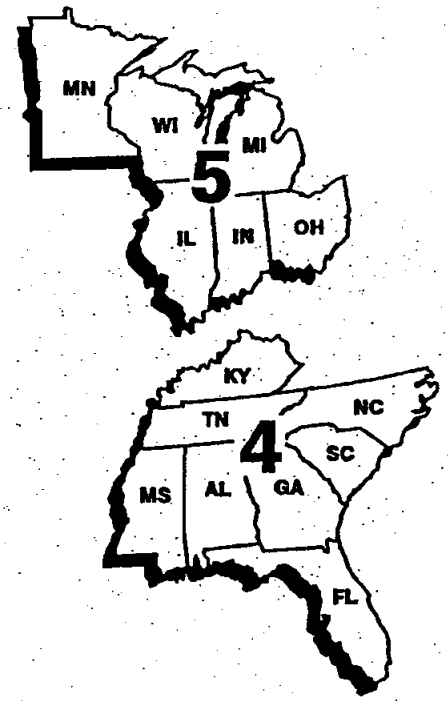

Region 5

Illinois
Chief
Bureau of Environmental Programs
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Pesticide and Plant Management Division
Michigan Department of Agriculture
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Minnesota
Director
Division of Agronomy Services
Minnesota Department of Agriculture
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St. Paul, MN 55107
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Ohio
Specialist in Charge of Pesticide Regulation
Division of Plant Industry
Ohio Department of Agriculture
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Reynoldsburg, OH 43068-3399
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Administrator
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Wisconsin Department of Agriculture
Trade and Consumer Protection
2811 Agriculture Drive
Madison, WI 53704
(608) 224-4546

State Pesticide Agencies (cont'd)

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Director
Division of Feeds, Fertilizer
and Pesticides
Arkansas State Plant Board
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Little Rock, AR 72205
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Louisiana
Director
Pesticide and Environmental Programs
Louisiana Department of
Agriculture and Forestry
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Baton Rouge, LA 70821-3596
(504) 925-3763

New Mexico
Chief
Bureau of Pesticide Management
Division of Agricultural and
Environmental Services
New Mexico State Department
of Agriculture
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Oklahoma
Director
Department of Environmental Quality
Plant Industry and Consumer Services
Oklahoma Department of Agriculture
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Texas
Assistant Commissioner for
Pesticides
Texas Department of
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Austin, TX 78711
(512) 463-7624

Region 7

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Pesticide Bureau
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Plant Health Division
Kansas Department of Agriculture
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Topeka, KS 66612-1281
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Missouri
Director
Bureau of Pesticide Control
Missouri Department of Agriculture
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Jefferson City, MO 65102
(314) 751-2462

Nebraska
Director
Bureau of Plant Industry
Nebraska Department of Agriculture
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Lincoln, NE 68509
(402) 471-2394

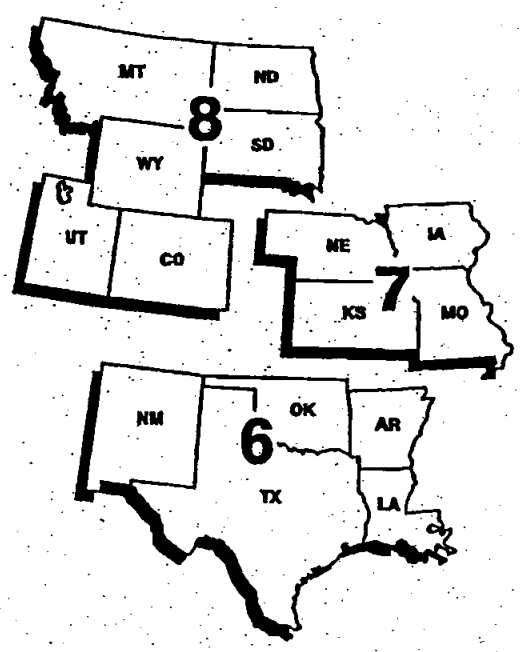

Region 8

Colorado
Director
Division of Plant Industry
Colorado Department of Agriculture
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Agricultural Sciences Division
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South Dakota
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Agricultural Services
South Dakota Department of
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State Pesticide Agencies (cont'd)

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California
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Administrator
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Nevada
Director
Bureau of Plant Industry
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Guam Environmental
Protection Agency
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American Samoa EPA
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American Samoa Government
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Pago Pago, American Samoa 97699
(684) 633-2304

Commonwealth of the Northern Mariana Islands
Department of Public Works
Division of Environmental Quality
Commonwealth of the Northern
Mariana Islands (CNMI)
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Saipan, Mariana Islands 96950
(670) 234-6984

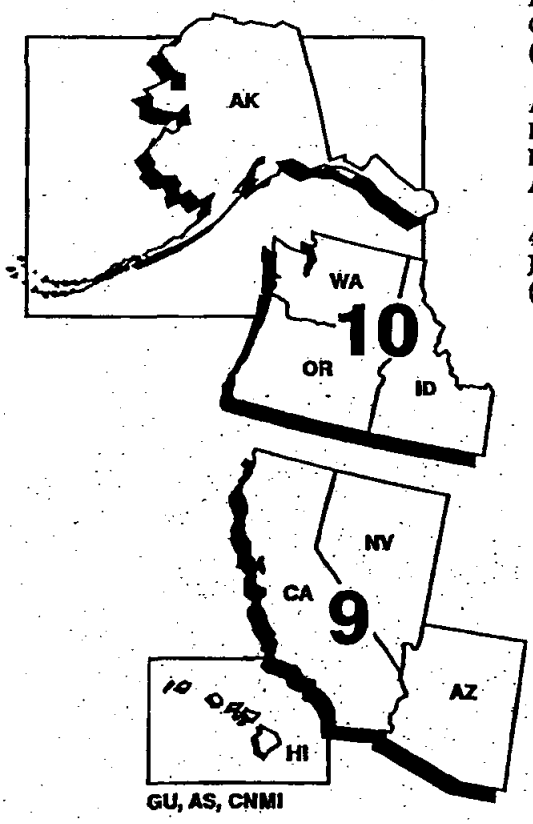

Region 10

Idaho
Administrator
Division of Agricultural Technology
Idaho Department of Agriculture
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Oregon
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Plant Division
Oregon Department of Agriculture
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Pesticide Management Division
Washington State Department
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Alaska
Director
Division of Environmental Health
Alaska Department of
Environmental Conservation
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Juneau, AK 99801-1795
(907) 465-5280

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"Help! Someone's Been Poisoned!"
What To Do in a Pesticide Emergency

If the person is unconscious, having trouble breathing, or having convulsions . . .
ACT FAST! Speed is crucial.

Give needed first aid immediately.

Call 911 or your local emergency service. If possible, have someone else call for emergency help while you give first aid.

If the person is awake or conscious, not having trouble breathing, and not having convulsions . . .

Read the label for first aid instructions.

Call a doctor, a poison control center, a local emergency service (911), or the National Pesticide Telecommunications Network (toll free at 1-800-858-7378).

Give first aid.

3. Blueprint for a Clean Ocean

Blueprint for a Clean Ocean

Best Management Practices to Prevent Stormwater Pollution from Construction-Related Activities

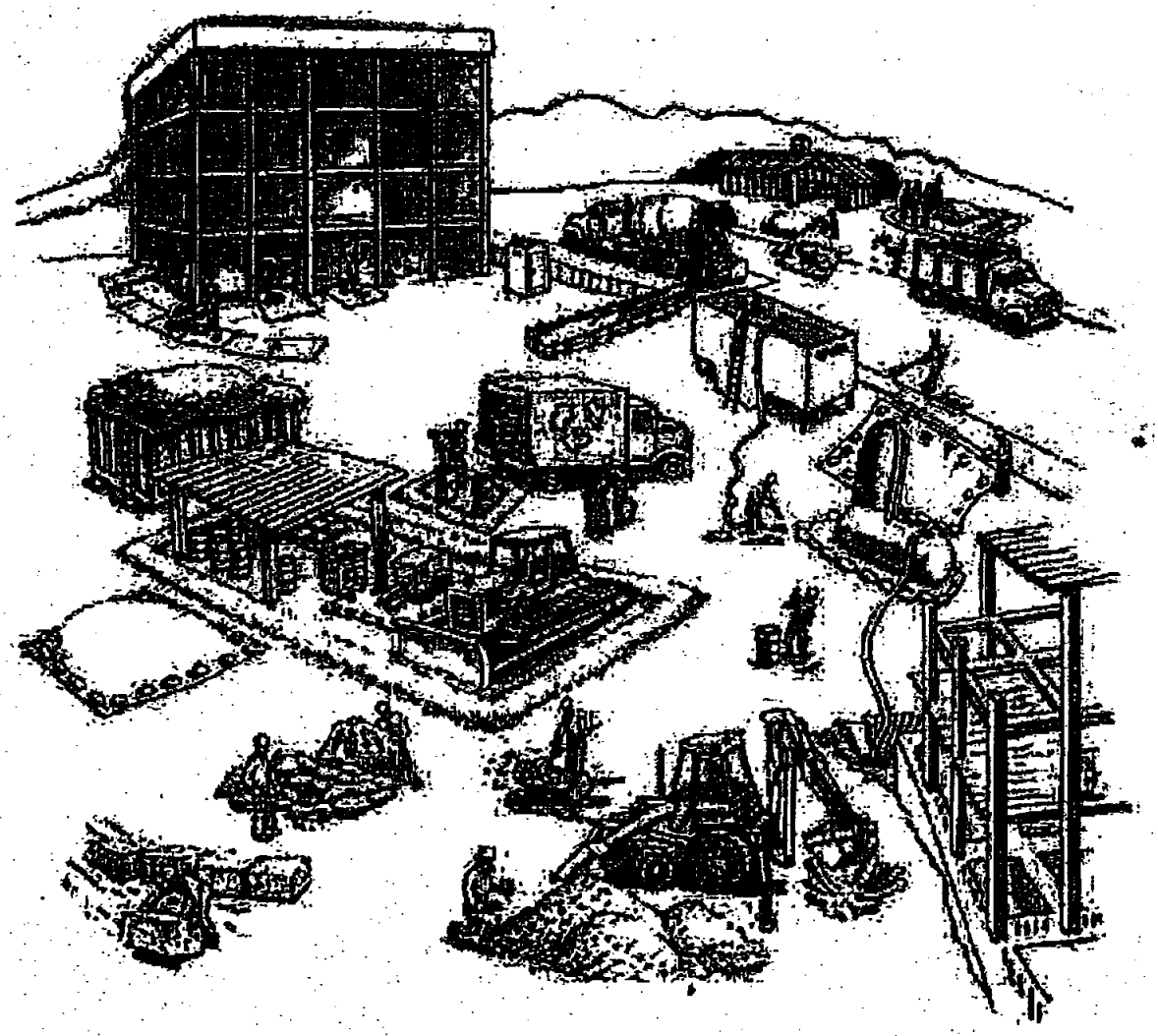

Introduction

Stormwater pollution is rapidly growing in importance as a national environmental issue. In California, stormwater pollution is a major source of water pollution. To help combat the problems of stormwater pollution, federal and state governments have developed a program for monitoring and permitting discharges to municipal storm drain systems, creeks, and water bodies such as the Pacific Ocean.

Municipalities in the Orange County Area are required by the Clean Water Act to develop stormwater management programs that include requirements for construction activities. Your construction project will need to comply with local municipal requirements. If your construction activity will disturb five acres or more, you must also obtain coverage under the General Construction Activity Permit (see Requirements for Dischargers).

Blueprint for a Clean Ocean is an introductory guide to stormwater quality control on construction sites. It contains several principles and techniques that you can use to help prevent stormwater pollution. This booklet has been developed as a resource for all general contractors, home builders, and subcontractors working on construction sites.

Blueprint for a Clean Ocean is not a design manual or a Stormwater Pollution Prevention Plan (SWPPP) (see Requirements for Dischargers). For more information on the General Permit, designing stormwater quality controls, or producing a Stormwater Pollution Prevention Plan, please refer to the California Storm Water Best Management Practice Handbook for Construction Activity, or consult your local program or the SWRCB (see below). Please note that this booklet is concerned only with the management of construction sites and activities during construction.

Stormwater Pollution

Storm Drain System

Stormwater or runoff from sources like sprinklers and hoses flows over the ground into the storm drain system. In the Orange County Area, storm drain systems consist of gutters, storm drains, underground pipes, open channels, culverts, and creeks. Storm drain systems are designed to drain directly to the Pacific Ocean with no treatment.

Pollution From Construction Sites

Stormwater runoff is part of a natural hydrologic process. However, land development and construction activities can significantly alter natural drainage patterns and pollute stormwater runoff. Runoff picks up pollutants as it flows over the ground or paved areas and carries these pollutants into the storm drain system. Common sources of pollutants from construction sites include: sediments from soil erosion; construction materials and waste (e.g., paint, solvents, concrete, drywall); landscaping runoff containing fertilizers and pesticides; and spilled oil, fuel, and other fluids from construction vehicles and heavy equipment.

Adverse Effects from Stormwater Pollution

Stormwater pollution is a major source of water pollution in California. It can cause declines in fisheries, disrupt habitats, and limit water recreation activities. Even more importantly, stormwater pollution poses a serious threat to the overall health of the ecosystem.

For more information on stormwater requirements call the State Water Resources Control Boards Stormwater Information Line at (916) 657-1146 or your local program.

Requirements for Dischargers

Municipal Stormwater Program

Municipalities in the Los Angeles Area are required by federal regulations to develop programs to control the discharge of pollutants to the storm drain system, including the discharge of pollutants from construction sites and areas of new development or significant redevelopment. As a result, your development and construction projects may be subject to new requirements designed to improve stormwater quality such as, expanded plan check and review, new contract specifications, and increased site inspection. For more information on municipal requirements, please contact the municipal representative listed on the back cover of this booklet.

Projects Equal To Or Greater Than 5 Acres

If your construction activity will disturb five acres or more, you must obtain coverage under the General Construction Activity Storm Water Permit (General Construction Permit) issued by the State Water Resources Control Board (SWRCB) for stormwater discharges associated with construction activity. To obtain coverage under the General Permit, a Notice of Intent (NOI) must be filed with the SWRCB. The General Construction Permit requires you to prepare and carry out a "Stormwater Pollution Prevention Plan" or SWPPP Your SWPPP must identify appropriate stormwater pollution prevention measures or best management practices (BMPs), like the ones described in this booklet, to reduce pollutants in stormwater discharges from the construction site both during and after construction is completed. A best management practice or BMP is defined as any program, technology, process, practice, operating method, measure, or device which controls, prevents, removes, or reduces pollution.

Projects Less Than 5 Acres

If your project is less than five acres, you may still need to use BMPs to comply with local municipal requirements. Check with the local planning or engineering department for details.

Best Management Practices

General Practices

The following are some general principles that can significantly reduce pollution from construction activity and help make compliance with stormwater regulations easy:

- Identify all storm drains, drainage swales and creeks located near the construction site and make sure all subcontractors are aware of their locations to prevent pollutants from entering them.
- Clean up leaks, drips, and other spills immediately so they do not contact stormwater.
- Refuel vehicles and heavy equipment in one designated location on the site and take care to clean up spills immediately.
- Wash vehicles at an appropriate off-site facility. If equipment must be washed on-site, do not use soaps, solvents, degreasers, or steam cleaning equipment, and prevent wash water from entering the storm drain. If possible, direct wash water to a low point where it can evaporate and/or infiltrate.
- Never wash down pavement or surfaces where materials have spilled. Use dry cleanup methods whenever possible.

- Avoid contaminating clean runoff from areas adjacent to your site by using berms and/or temporary or permanent drainage ditches to divert water flow around the site. Reduce stormwater runoff velocities by constructing temporary check dams and/or berms where appropriate.

- Protect all storm drain inlets using filter fabric cloth or other best management practices to prevent sediments from entering the storm drainage system during construction activities.

- Keep materials out of the rain - prevent runoff pollution at the source. Schedule clearing or heavy earth moving activities for periods of dry weather. Cover exposed piles of soil, construction materials and wastes with plastic sheeting or temporary roofs. Before it rains, sweep and remove materials from surfaces that drain to storm drains, creeks, or channels.

For more information on the General Permit, call the State Water Resources Control Board's Stormwater Information Line at 916-657-1146 or visit our website at

- Keep pollutants off exposed surfaces. Place trash cans around the site to reduce litter. Dispose of non-hazardous construction wastes in covered dumpsters or recycling receptacles.

- Practice source reduction - reduce waste by ordering only the amount you need to finish the job.

- Do not over-apply pesticides or fertilizers and follow manufacturers instructions for mixing and applying materials.

- Recycle leftover materials whenever possible. Materials such as concrete, asphalt, scrap metal, solvents, degreasers, cleared vegetation, paper, rock, and vehicle maintenance materials such as used oil, antifreeze, batteries, and tires are recyclable.

- Dispose of all wastes properly. Materials that cannot be reused or recycled must be taken to an appropriate landfill or disposed of as hazardous waste. Never throw debris into channels, creeks or into wetland areas. Never store or leave debris in the street or near a creek where it may contact runoff.

- Illegal dumping is a violation subject to a fine and/or time in jail. Be sure that trailers carrying your materials are covered during transit. If not, the hauler may be cited and fined.

- Train your employees and inform subcontractors about the stormwater requirements and their own responsibilities.

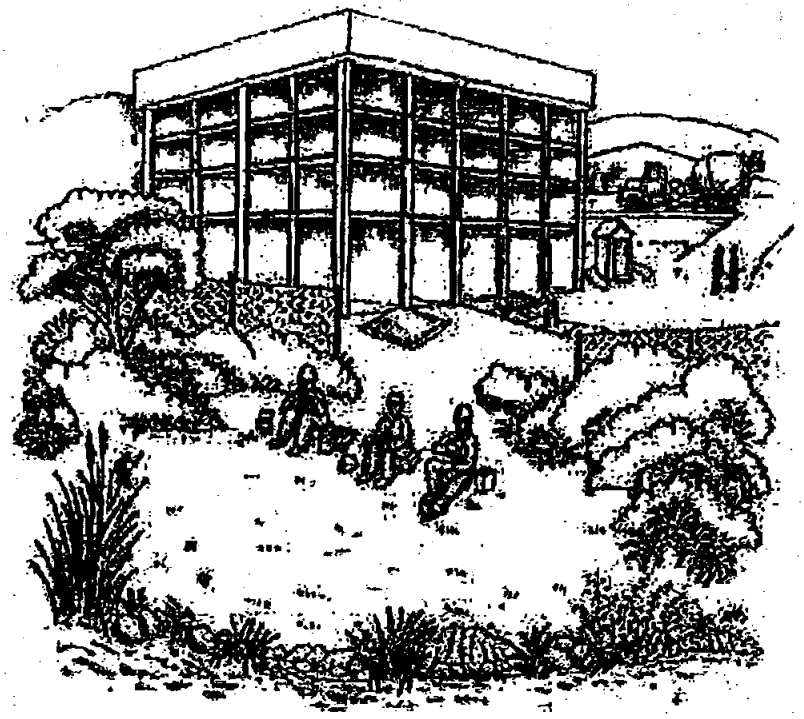

Specific Practices

Following is a summary of specific best management practices for erosion and sediment control and contractor activities. For more information on erosion and sediment control BMPs and their design, please refer to the California Storm Water Best Management Practice Handbook for Construction Activity (March 1993).

Erosion Prevention and Sediment Control

Prevent erosion

Soil erosion is the process by which soil particles are removed from the land surface, by wind, water and/or gravity. Soil particles removed by stormwater runoff are pollutants that when deposited in local creeks, lakes, and the Pacific Ocean, can have negative impacts on aquatic habitat. Exposed soil after clearing, grading, or excavation is easily eroded by wind or water. The following practices will help prevent erosion from occurring on the construction site:

- Plan the development to fit the topography, soils, drainage pattern and natural vegetation of the site.
- Delineate clearing limits, easements, setbacks, sensitive or critical areas, trees, drainage courses, and buffer zones to prevent excessive or unnecessary disturbances and exposure.
- Phase grading operations to reduce disturbed areas and time of exposure.
- Avoid excavation and grading during wet weather.
- Limit on-site construction routes and stabilize construction entrance(s).
- Remove existing vegetation only when absolutely necessary.

- Construct diversion dikes and drainage swales to channel runoff around the site.
- Use berms and drainage ditches to divert runoff around exposed areas. Place diversion ditches across the top of cut slopes
- Plant vegetation on exposed slopes. Where replanting is not feasible, use erosion control blankets (e.g., jute or straw matting, glass fiber or excelsior matting, mulch netting).
- Consider slope terracing with cross drains to increase soil stability.
- Cover stockpiled soil and landscaping materials with secured plastic sheeting and divert runoff around them.
- As a back-up measure, protect drainage courses, creeks, or catch basins with straw bales, silt fences and/or temporary drainage swales.
- Once grading is completed, stabilize the disturbed areas using permanent vegetation as soon as possible.
- Conduct routine inspections of erosion control measures especially before and immediately after rainstorms, and repair if necessary.

Control sediment

Sedimentation is defined as the process of depositing sediments picked up by runoff. Sediments consist of soil particles, clays, sands, and other minerals. The purpose of sediment control practices is to remove sediments from stormwater before they are transported off-site or reach a storm drain inlet or nearby creek. 'Me most effective sediment control practices reduce runoff velocity and trap or detain runoff allowing sediments to settle out.

- Use terracing, rip rap, sand bags, rocks, straw bales, and/or temporary vegetation on slopes to reduce runoff velocity and trap sediments. Do not use asphalt rubble or other demolition debris for this purpose.
- Use check dams in temporary drains and swales to reduce runoff velocity and promote sedimentation.
- Protect storm drain inlets from sediment-laden runoff. Storm drain inlet protection devices include sand bag barriers, filter fabric fences, block and gravel filters, and excavated drop inlet sediment traps.
- Collect and detain sediment-laden runoff in sediment traps (an excavated or bermed area or constructed device) to allow sediments to settle out prior to discharge.
- Use sediment controls and filtration to remove sediments from water generated by dewatering.
- Prevent construction vehicle tires from tracking soil onto adjacent streets by constructing a temporary stone pad with a filter fabric underliner near the site exit where dirt and mud can be removed.
- When cleaning sediments from streets, driveways and paved areas on construction sites, use dry sweeping methods where possible. If water must be used to flush pavement, collect runoff to settle out sediments and protect storm drain inlets.

Note: Performance of erosion and sediment controls is dependent on proper installation, routine inspections and maintenance of the controls. Most of the BMPs described above are temporary

and if left alone can quickly fall into disrepair and/or become ineffective. Routine inspections and maintenance, particularly before and after a storm event, must be Part of erosion and sediment control plan.

The California Storm Water Best Management Practices Handbook for Construction Activity provides specific details and design criteria for erosion and sediment control plans.

Drainage swales channel runoff around a construction site. Planting temporary vegetation on freshly graded areas, and trenching and staking straw bales and/or silt fences downslope are common techniques for preventing erosion and controlling sediment.

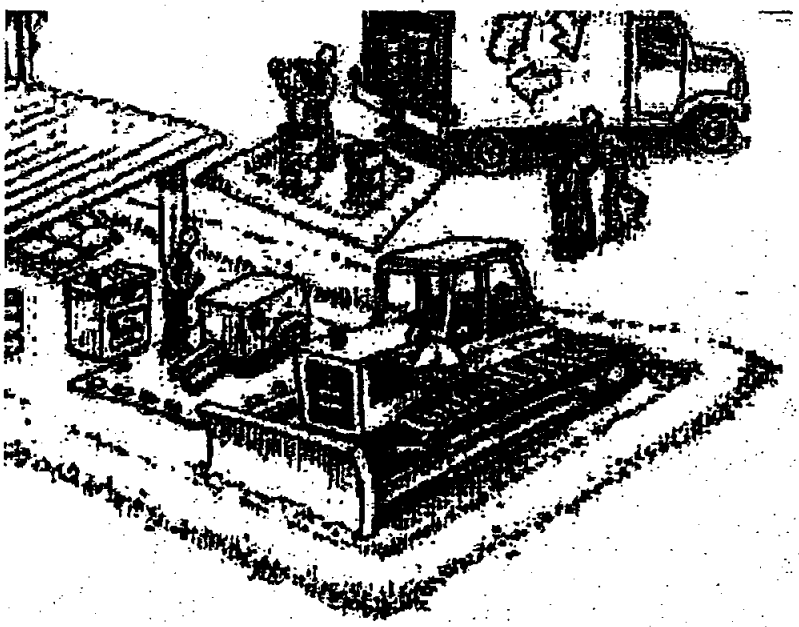

Make sure equipment repair area is bermed or well away from creeks and storm drains.

General Site Maintenance

Prevent spills and leaks

Poorly maintained vehicles and heavy equipment leaking fuel, oil, antifreeze, or other fluids on the construction site are common sources of stormwater pollution and soil contamination. Construction material spills can also cause serious problems. Careful site planning, preventive maintenance, and good materials handling practices can eliminate most spills and leaks.

- Maintain all vehicles and heavy equipment. Inspect frequently for and repair leaks.
- Designate specific areas of the construction site, well away from creeks or storm drain inlets, auto and equipment parking and routine vehicle and equipment maintenance.
- Perform major maintenance, repair jobs and vehicle and equipment washing off-site when feasible, or in designated and controlled areas on-site.
- If you must drain and replace motor oil, radiator coolant, or other fluids on-site, use drip pans or drop cloths to catch drips and spills. Collect all spent fluids, store in labeled separate containers, and recycle whenever possible. Note that in order to be recyclable, such liquids must not be mixed with other fluids. Non-recycled fluids generally must be disposed of as hazardous wastes.

Clean up spills immediately after they happen

When vehicle fluids or materials such as paints or solvents are spilled, cleanup should be immediate, automatic, and routine.

- Sweep up spilled dry materials (e.g., cement, mortar, or fertilizer) immediately. Never attempt to "wash them away" with water, or bury them. Use only minimal water for dust control.
- Clean up liquid spills on paved or impermeable surfaces using "dry" cleanup methods (e.g.,absorbent materials like cat litter, sand or rags).
- Clean up spills on dirt areas by digging up and properly disposing of the contaminated soil.
- Report significant spills to the appropriate spill response agencies immediately (See reference list on the back cover of this booklet for more information).

Clean up spills on dirt areas by removing contaminated soil.

Note: Used cleanup rags that have absorbed hazardous materials must either be sent to a certified industrial laundry or dry cleaner, or disposed of through a licensed hazardous waste disposal company.

Store materials under cover

Wet and dry building materials with the potential to pollute runoff should be stored under cover and/or surrounded by berms when rain is forecast or during wet weather.

- Store stockpiled materials and wastes under a temporary roof or secured plastic sheeting or tarp.
- Berm around storage areas to prevent contact with runoff.
- Plaster or other powders can create large quantities of suspended solids in runoff, which may be toxic to aquatic life and cause serious environmental harm even if the materials are inert. Store all such potentially polluting dry materials -especially open bags- under a temporary roof or inside a building, or cover securely with an impermeable tarp. By storing dry materials under a roof, you may also help protect air quality, as well as water quality.
- Store containers of paints, chemicals, solvents, and other hazardous materials in accordance with secondary containment regulations and under cover during rainy periods.

Cover and maintain dumpsters

Open or leaking dumpsters can be a source of stormwater pollution.

- Cover open dumpsters with plastic sheeting or a tarp during rainy weather. Secure the sheeting or tarp around the outside of the dumpster. If your dumpster has a cover, close it.
- If a dumpster is leaking, contain and collect leaking material. Return the dumpster to the leasing company for repair/exchange.
- Do not clean dumpsters on-site. Return to leasing company for periodic cleaning, if necessary.

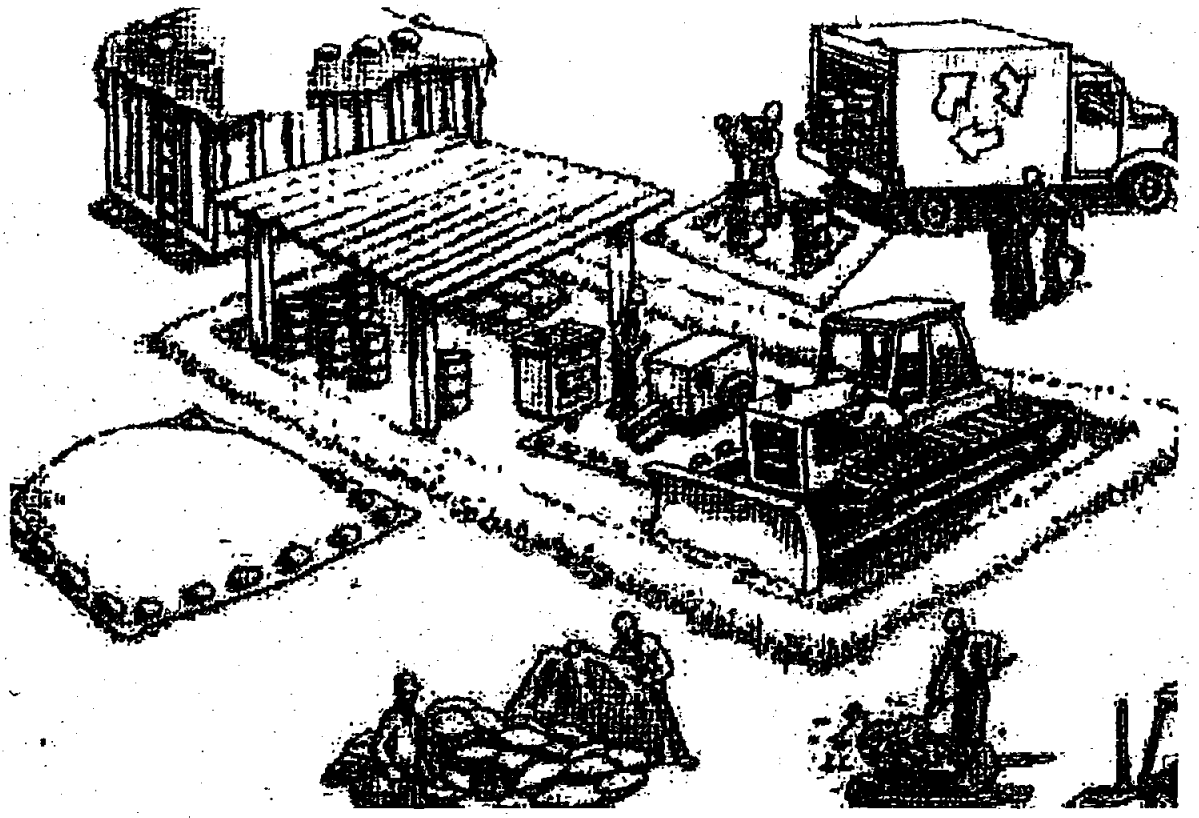

Store building materials under cover. Make sure dumpsters are properly covered to keep out rain.

Collect and properly dispose of paint removal wastes

Paint removal wastes include chemical paint stripping residues, paint chips and dust, sand blasting material and wash water. These wastes contain chemicals that are harmful to the wildlife in our creeks and the water bodies they flow to. Keep all paint wastes away from the gutter, street, and storm drains.

- Non-hazardous paint chips and dust from dry stripping and sand blasting may be swept up or collected in plastic drop cloths and disposed of as trash. Chemical paint stripping residue and chips and dust from marine paints or paints containing lead or tributyl tin must be disposed of as a hazardous waste.

- When stripping or cleaning building exteriors with high-pressure water, cover or berm storm drain inlets. If possible (and allowed by your local wastewater treatment plant), collect (mop or vacuum) building cleaning water and discharge to the sanitary sewer. Alternatively, discharge non-contaminated wash water onto a dirt area and spade into the soil. Be sure to shovel or sweep up any debris that remains in the gutter and dispose of as garbage.

Clean up paints, solvents, adhesives, and cleaning solutions properly

Although many paint materials can and should be recycled, liquid residues from paints, thinners, solvents, glues, and cleaning fluids are hazardous wastes. When they are thoroughly dry, empty paint cans, used brushes, rags, absorbent materials, and drop cloths are no longer hazardous and may be disposed of as garbage.

- Never clean brushes or rinse paint containers into a street, gutter, storm drain, or creek.

- For water-based paints, paint out brushes to the extent possible and rinse to a drain leading to the sanitary sewer (i.e., indoor plumbing).
- For oil-based paints, paint out brushes to the extent possible, and filter and reuse thinners and solvents. Dispose of unusable thinners and residue as hazardous waste.
- Recycle, return to supplier or donate unwanted water-based (latex) paint. You may be able to recycle clean empty dry paint cans as metal.
- Dried latex paint may be disposed of in the garbage.
- Unwanted paint (that is not recycled), thinners, and sludges must be disposed of as hazardous waste.
- More and more paint companies are recycling excess latex paint (See separate list of "Recyclers and Disposal Services" for more information).

Keep fresh concrete and cement mortars out of gutters, storm drains, and creeks

Concrete and cement-related mortars that wash into gutters and storm drains are toxic to fish and the aquatic environment.

- Avoid mixing excess amounts of fresh concrete or cement mortar on-site.
- Store dry and wet materials under cover, protected from rainfall and runoff.
- Wash out concrete transit mixers only in designated wash-out areas where the water will flow into settling ponds or onto dirt or stockpiles of aggregate base or sand. Pump water from settling ponds to the sanitary sewer, where allowed. Whenever possible, recycle washout by pumping back into mixers for reuse. Never dispose of washout into the street, storm drains, drainage ditches, or creeks.
- Whenever possible, return contents of mixer barrel to the yard for recycling. Dispose of small amounts of excess concrete, grout, and mortar in the trash.

Service and maintain portable toilets

Leaking portable toilets are a potential health and environmental hazard.

- Inspect portable toilets for leaks.
- Be sure the leasing company adequately maintains, promptly repairs, and replaces units as needed.
- The leasing company must have a permit to dispose of waste to the sanitary sewer.

Dispose of cleared vegetation properly

Cleared vegetation, tree trimmings, and other plant material can cause environmental damage if it gets into creeks. Such "organic" material requires large quantities of oxygen to decompose, which reduces the oxygen available to fishes and other aquatic life.

- Do not dispose of plant material in a creek or drainage facility or leave it in a roadway where it can clog storm drain inlets.
- Avoid disposal of plant material in trash dumpsters or mixing it with other wastes. Compost plant material or take it to a landfill or other facility that composts yard waste.

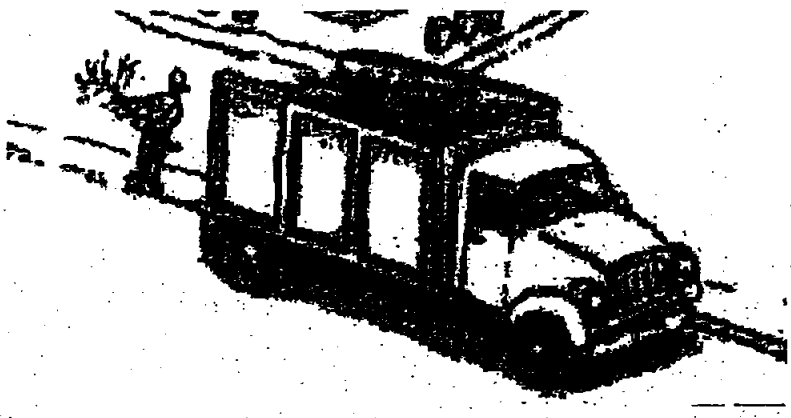

Recycle yard waste and tree prunings at a landfill that chips and composts plant material.

Demolition Waste Management

Make sure all demolition waste is properly disposed of

- Demolition debris that is left in the street or pushed over a bank into a creek bed or drainage facility causes serious problems for flood control, storm drain maintenance, and the health of our environment. Different types of materials have different disposal requirements or recycling options.
- Materials that can be recycled from demolition projects include: metal framing, wood, concrete, asphalt, and plate glass.
- Materials that can be salvaged for reuse from old structures include: doors, banisters, floorboards, windows, 2x4s, and other old, dense lumber.
- Unusable, unrecycleable debris should be confined to dumpsters, covered at night and during wet weather, and taken to a landfill for disposal.
- Hazardous debris such as asbestos must be handled in accordance with specific laws and regulations and disposed of as a hazardous waste. For more information of asbestos handling and disposal regulations, contact the South Coast Air Quality Management District.
- Arrange for an adequate debris disposal schedule to insure that dumpsters do not overflow.

Roadwork and Pavement Construction

Plan roadwork and pavement construction to avoid stormwater pollution

Road paving, surfacing, and asphalt removal happen right in the street, with numerous opportunities for stormwater pollution from the asphalt mix, saw-cut slurry, or excavated material. Properly proportioned asphalt mix and well-compacted pavement avoid a host of water pollution problems.

- Apply concrete, asphalt, and seal coat during dry weather to prevent contaminants from contacting stormwater runoff.

- Cover storm drain inlets and manholes when paving or applying seal coat, slurry seal, fog seal, etc.
- Always park paving machines over drip pans or absorbent materials, since they tend to drip continuously.
- When making saw-cuts in pavement, use as little water as possible. Cover each catch basin completely with filter fabric during the sawing operation and contain the slurry by placing straw bales, sand bags, or gravel dams around the catch basin. After the liquid drains or evaporates, shovel or vacuum the slurry residue from the pavement or gutter and remove from site.
- Wash down exposed aggregate concrete only when the wash water can: (1) flow onto a dirt area; (2) drain onto a bermed surface from which it can be pumped and disposed of properly; or (3) be vacuumed from a catchment created by blocking a storm drain inlet. If necessary, place straw bales downslope, or divert runoff with temporary berms. Make sure runoff does not reach gutters or storm drains.
- Allow aggregate rinse to settle, and pump the water to the sanitary sewer if allowed by your local wastewater authority.
- Never wash sweepings from exposed aggregate concrete into a street or storm drain. Collect and return to aggregate base stockpile, or dispose with trash.
- Recycle broken concrete and asphalt.

Contaminated Ponded Stormwater, Groundwater, and Soil Guidance

Look for ponded stormwater, groundwater, and/or soil contamination

Ponded stormwater, groundwater and soil may become contaminated if exposed to hazardous materials. If any of the following conditions apply, contaminated ponded stormwater, groundwater, and/or soil may be present and pose a potential health and environmental hazard:

- The project site is in an area of previous commercial/industrial activity;
- There is a history of illegal dumping on the site or adjacent properties;
- The construction site is subject to a Superfund, state, or local cleanup order;
- Ponded stormwater, groundwater and/or water generated by dewatering exhibits an oily-sheen and/or smells of petroleum;
- Soil appears discolored, smells of petroleum and/or exhibits other unusual properties;
- Abandoned underground storage tanks, drums, or other buried debris are encountered during construction activities; or
- Spills have occurred on the site or adjacent properties involving pesticides and herbicides; fertilizers; detergents; plaster and other products; petroleum products such as fuel, oil, and grease; or other hazardous chemicals such as acids, lime, glues, paints, solvents, and curing compounds.

Take appropriate action

Ponded stormwater, groundwater, or water generated by dewatering that is contaminated cannot be discharged to a street, gutter, or storm drain. If contamination is suspected, the water should be contained and held for testing. Call the appropriate local agency and/or the Regional Water Quality Control Board for further guidance (See reference list on the back cover of this booklet for more information).

Remember: The property owner and the contractor share ultimate responsibility for the activities that occur on the construction site. You may be held responsible for any environmental damage caused by your subcontractors or employees.

Pollution Control Agencies and Sources of Information

Orange County Storm Water Program

(714) 567-6363

Agencies to call in the event of a spill

You are required by law to report all significant releases or suspected significant releases of hazardous materials, including oil.

To report a spill, call the following agencies:

1.Dial (800) 303-0003 or your local emergency response number.

2. Call the Governor's Office of Emergency Services Warning Center, (800) 852-7550 (24 hours).

For spills of "Federal Reportable Quantities" of oil, chemicals, or other hazardous materials to land, air, or water, notify the National Response Center (800-424-8802). If you are not sure whether the spill is of a "reportable quantity," call the federal Environmental Protection Agency (800) 424-9346 for clarification.

For further information, see *California Hazardous Material Spill Release Notification Guidance* (State Office of Emergency Services, Hazardous Materials Division).

Agencies to call if you find or suspect contaminated soil or groundwater

Regional Water Quality Control Board:

California Environmental
Protection Agency (Cal EPA),
Department of Toxic Substances
Control (DTSC) (510) 540-3732

Documents and available resources

From State Water Resources Control Board (SWRCB)
(916) 657-1146:

General Construction Activity
Storm Water Permit

California Storm Water Best Management Practice Handbook - Construction Activity

From Cal EPA, DTSC
(916) 322-3670.

Waste Minimization for the Building Construction Industry - Fact Sheet

The City of Seal Beach gratefully acknowledges the Santa Clara Valley NonPoint Source Pollution Control Program and BASMAA and Los Angeles County for the concept, content, and artwork for this booklet.

4. Healthy Lawn – Healthy Environment

Your lawn care program should be tailored to local conditions--the amount of rainfall you get, for example, and the type of soil you have. The sources listed at the back of this brochure can help you design a lawn care program that suits both local conditions and your own particular needs. But no matter where you live, you can use the program outlined in this brochure as a general guide to growing a healthy lawn.

A preventive health care program for your lawn should have the following steps:

1. Develop healthy soil
2. Choose a grass type that thrives in your climate
3. Mow high, often, and with sharp blades
4. Water deeply but not too often
5. Correct thatch build-up
6. Set realistic goals

1. Develop Healthy Soil

Good soil is the foundation of a healthy lawn. To grow well, your lawn needs soil with good texture, some key nutrients, and the right pH, or acidity/alkalinity balance.

Start by checking the texture of your soil to see whether it's heavy with clay, light and sandy, or somewhere in between. Lawns grow best in soil with intermediate or "loamy" soils that have a mix of clay, silt, and sand. Whatever soil type you have, you can probably improve it by periodically adding organic matter like compost, manure, or grass clippings. Organic matter helps to lighten a predominantly clay soil and it helps sandy soil retain water and nutrients.

Also check to see if your soil is packed down from lots of use or heavy clay content. This makes it harder for air and water to penetrate, and for grass roots to grow. To loosen compacted soil, some lawns may need to be aerated several times a year. This process involves pulling out plugs of soil to create air spaces, so water and nutrients can again penetrate to the grass roots.

Most lawns need to be fertilized every year, because they need more nitrogen, phosphorus, and potassium than soils usually contain. These three elements are the primary ingredients found in most lawn fertilizers. It's important not to over-fertilize--you could do more harm to your lawn than good--and it's best to use a slow-release fertilizer that feeds the lawn slowly. It's also important to check the soil's pH. Grass is best able to absorb nutrients in a slightly acidic soil, with a pH of 6.5 to 7.0. Soil that is too acidic can be "sweetened" with lime; soil that's not acid enough can be made more sour by adding sulfur.

Have your soil tested periodically to see whether it needs more organic matter or the pH needs adjusting. Your county extension agent (listed in your phone book under county government) or local nursery should be able to tell you how to do this. These experts can also help you choose the right fertilizer, compost, and other "soil amendments," and they can advise you about aerating if your soil is compacted. If a professional service takes care of your lawn, make sure it takes these same steps to develop good soil. There's no getting around it: your lawn's health is only as good as the soil it grows in.

2. Choose A Grass Type That Thrives In Your Climate

The right type of grass--one that suits your needs and likes the local weather--will always give better results. Grasses vary in the type of climate they prefer, the amount of water and nutrients they need, their resistance to pests, their tolerance for shade, and the degree of wear they can withstand.

If you are putting in a new lawn, it will be worth your while to do some research to identify the best grass type for your needs.

If you're working with an established lawn that fails to thrive despite proper care, you might consider replanting with a different type of grass.

Why struggle to grow grass that's susceptible to fungal disease if you live in a humid climate? Or a water-loving species if you live in an area with water shortages? Grass that is well-adapted to your area will grow better and resist local pests and diseases better.

New grass varieties and mixtures come out on the market every year.

Ask your county extension agent or another one of the sources listed in this brochure for recommendations.

3. Mow High, Often and With Sharp Blades

Mowing high--that is, keeping your lawn a bit long--will produce stronger, healthier grass with fewer pest problems.

Longer grass has more leaf surface to take in sunlight. This enables it to grow thicker and develop a deeper root system, which in turn helps the grass survive drought, tolerate insect damage, and fend off diseases. Longer grass also shades the soil surface keeping it cooler, helping it retain moisture, and making it difficult for weeds to germinate and grow.

A lawn's ideal length will vary with the type of grass, but many turf grass species are healthiest when kept between 2-1/2 and 3-1/2 inches. The ruler at the back of this

brochure will help the best mowing height for your grass variety. You may have to readjust your mower--most are set too low.

It's also important to mow with sharp blades to prevent tearing and injuring the grass. And it's best to mow often, because grass adjusts better to frequent than infrequent mowing. The rule of thumb is to mow often enough that you never cut more than one-third of the height of the grass blades. Save some time and help your lawn and the environment by leaving short clippings on the grass--where they recycle nitrogen--rather than sending them in bags to the landfill.

You don't have to grow a foot-high meadow to get good results. Just adding an inch will give most lawns a real boost.

4. Water Deeply But Not Too Often

Watering properly will help your lawn grow deep roots that make it stronger and less vulnerable to drought. Most lawns are watered too often but with too little water. It's best to water only when the lawn really needs it, and then to water slowly and deeply. This trains the grass roots down. Frequent shallow watering trains the roots to stay near the surface, making the lawn less able to find moisture during dry periods.

Every lawn's watering needs are unique: they depend on local rainfall, the grass and soil type, and the general health of the lawn. But even in very dry areas, no established home lawn should require daily watering.

Try to water your lawn in a way that imitates a slow, soaking rain, by using trickle irrigation, soaker hoses, or other water-conserving methods. It's also best to water in the early morning, especially during hot summer months, to reduce evaporation. Apply about an inch of water--enough that it soaks 6-8 inches into the soil. Then let the lawn dry out thoroughly before watering it again.

The best rule is to water only when the lawn begins to wilt from dryness--when the color dulls and footprints stay compressed for more than a few seconds.

5. Correct Thatch Build-Up

All grass forms a layer of dead plant material, known as thatch, between the grass blades and the soil. When thatch gets too thick--deeper than one-half inch--it prevents water and nutrients from penetrating to the soil and grass roots. Some grasses tend to form a thick layer of thatch. Overuse of fertilizer can also create a heavy layer of thatch.

You can reduce thatch by raking the lawn or using a machine that slices through the thatch layer to break it up. Sprinkling a thin layer of topsoil or compost over the lawn will also help.

In a healthy lawn, microorganisms and earthworms help keep the thatch layer in balance by decomposing it and releasing the nutrients into the soil.

6. Set Realistic Goals

Setting realistic goals will allow you to conduct an environmentally sensible lawn care program. It's probably not necessary to aim for putting-green perfection. Did you know that a lawn with 15 percent weeds can look practically weed-free to the average observer? Even a healthy lawn is likely to have some weeds or insect pests. But it will also have beneficial insects and other organisms that help keep pests under control.

Also realize that grass just can't grow well in certain spots. Why fight a losing battle with your lawn, when you have other options? At the base of a tree, for example, you might have better luck with wood chips or shade-loving ornamental plants like ivy, periwinkle, or pachysandra. If your climate is very dry, consider converting some of your lawn to dry-garden landscaping. It could save time, money, and water resources.

What Is IPM?

Integrated Pest Management is essentially common-sense pest control. IPM is not a new concept; some forms of it have been practiced for centuries.

IPM involves the carefully managed use of three different pest control tactics--biological, cultural, and chemical--to get the best long-term results with the least disruption of the environment. Biological control means using natural enemies of the pest, like lady bugs to control aphids. Cultural or horticultural control involves the use of gardening methods, like mowing high to shade out weeds. Chemical control involves the judicious use of pesticides.

IPM is a highly effective approach that minimizes the use of pesticides and maximizes the use of natural processes. Lawn care professionals who use IPM should have a sophisticated understanding of the ecosystem of your turf and the available pest control tactics. Home gardeners can also practice IPM by following the steps outlined in this brochure.

Tips For Using Pesticides

Sometimes, even with good lawn care practices, weather conditions or other factors can cause pest problems to develop. Pesticides can help control many lawn pests. But pesticides have risks as well as benefits, and it's important to use them properly.

The chemicals we call pesticides include insecticides, herbicides, and fungicides. These products are designed to kill or control pest insects, weeds, and fungal diseases. Pesticides can be very effective. But don't be tempted to rely solely on pesticides as a quick-fix solution to any lawn problem. Serious, ongoing pest problems are often a

sign that your lawn is not getting everything it needs. In other words, the pests may be a symptom of an underlying problem. You need to correct the underlying problem to reduce the chance that the pest will reappear.

All pesticides are toxic to some degree. This means they can pose some risk to you, to your children and pets, and to any wildlife that venture onto your lawn--especially if these chemicals are overused or carelessly applied. Pesticides can also kill earthworms and other beneficial organisms, disrupting the ecological balance of your lawn.

Store pesticides out of children's reach in a locked cabinet or garden shed.

When Spraying, Protect your skin, your eyes, your lungs

Wash this clothing separately before using it again.

Before Using Any Pesticide, Be Sure To Review These Basic Rules

1. Take safety precautions. Never assume a pesticide is harmless.

- Read the entire label and follow its instructions. Use only the amount directed, at the time and under the conditions specified, and for the purpose listed.
- Be sure to wear any protective clothing--like gloves, long sleeves, and long pants--indicated on the label. Wash this clothing separately before using it again.
- Keep children and pets away from pesticides, and make sure no one goes on a treated lawn for at least the time prescribed by the pesticide label.
- Remember to follow any state or local requirements for posting your treated lawn or notifying your neighbors that a pesticide has been applied.
- Store and dispose of pesticides properly, according to the label directions and any state and local regulations.

2. Use pesticides to minimize pests, not eradicate them. The latter is often impossible and unnecessary.

3. Be sure you have accurately identified the pest so you can choose the best pesticide for the job and use it most effectively. Obtain professional advice from your county extension agent or a local expert.

4. Spot treat whenever possible. In most cases, it isn't necessary to treat the whole lawn with pesticides if the problem is confined to certain areas. Spraying more than necessary is wasteful and can be environmentally damaging.

If you have questions about a pesticide, call EPA's tollfree National Pesticide Telecommunications Network (1-800-858-7378). For general information on minimizing pesticide risks, call or write EPA for a free copy of the Citizen's Guide to Pesticides. The number to call is 703-305-5017; the address is: EPA, Office of Pesticide Programs, Field Operations Division, H7506C, 401M Street, S.W., Washington, D.C. 20460.

Choosing A Lawn Care Service

Many people choose to hire a professional company to help maintain their lawn. Lawn care companies offer a range of services, from fertilizing and pest control to aerating, mowing, and renovation.

Lawn care companies should follow the same healthy lawn program outlined in this brochure. They should also follow the same precautions for minimizing pesticide risks.

How can you be sure that a service will do these things? Start by asking questions like these:

Q. Is the company licensed?

A. Nearly all states require lawn care companies to be licensed. The qualifications for obtaining a license vary from state to state, but having a license is one indication that the company is reputable and operating legally.

Q. Does the company have a good track record?

A. Ask neighbors and friends who have dealt with the company if they were satisfied with the service they received. Call the Better Business Bureau or the state or local consumer protection office listed in your phone book; have they received any complaints about the company? Determine from the state pesticide regulatory agency if the company has a history of violations.

Q. Is the company affiliated with a professional lawn care association?

A. Affiliation with a professional association helps members to stay informed of new developments in the lawn care field.

Q. Does the company offer a variety of pest management approaches? Does it apply pesticides on a set schedule or only when they are really needed? Does it use integrated pest management, or "IPM"--an approach that often reduces pesticide use by combining it with other, non-chemical methods of pest control?

A. More and more lawn companies are offering integrated pest management (IPM) in response to public concern about pesticides. Be aware that IPM is a general term and

that companies may use it to describe a wide range of activities. Find out exactly what a company means if it says it uses IPM.

Q. Is the company willing to help you understand your lawn's problems and the solutions?

A. Lawn services generally apply fertilizers and pesticides. But you may be the one who mows and waters--and poor watering and mowing practices can lead to disappointing results. The company should tell you how it plans to take care of your lawn, and advise you about the work you need to do to keep your lawn in good shape.

Q. Will the company tell you what pesticides it applies to your lawn and why, and what health and environmental risks may be presented by their use?

A. You have a right to this information. If asked, the company should readily supply it. All pesticides sold legally in the United States are registered by EPA, but such registration is not a guarantee of safety. Ask to see a copy of pesticide labels to make sure they bear an EPA registration number, and to review the directions that should be followed. If the company can't answer your questions about the chemicals it uses, call NPTN (1-800-858-7378) for more information.

For More Information

Affiliated with the Land Grant university in each state is a system of County Cooperative Extension Offices. Usually listed in the telephone directory under county or state government, these offices often have a range of resources on lawn care and landscape maintenance, including plant selection, pest control, and soil testing.

State agriculture and/or environmental agencies may publish information on pests and pest management strategies. The state pesticide regulatory agency can provide information on pesticide regulations, and may also have information on companies with a history of complaints or violations. NPTN (see below) can identify the agency responsible for pesticide regulation in each state.

The National Pesticide Information Center has a tollfree, 24-hour information service that can be reached by calling 1-800-858-7378 or by FAX at 806-743-3094. The operators can provide a wide range of information about the health effects of pesticides, and provide assistance in dealing with pesticide-related emergencies.

Libraries, bookstores, and garden centers usually have a wide selection of books that discuss lawn care and other aspects of landscape management. Garden centers may also have telephone hotlines or experts available on the premises to answer your gardening questions.

The Environmental Protection Agency can provide information on integrated pest management strategies for lawn care. Write EPA's Office of Pesticide Programs, Field Operations Division (H7506C), 401 M St., S.W., Washington, D.C. 20460.

Some suppliers of lawn care products can provide helpful tips, answer questions, and help identify problems. Look for information/hotline numbers on product packaging.

The Bio-Integral Resource Center (BIRC), a non-profit organization formed in 1978 through an EPA grant, has information on least-toxic methods for lawn care. BIRC's address is: P.O. Box 7414, Berkeley, CA 94707.

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1. **Choosing the right plant:** You won't have to spend as much time caring for your plants if you choose plants that are suited to your environmental conditions and gardening style. Let the Floracle help you find which plants are right for you.

2. **Watering:** Test the soil in your containers every day with your finger. If it's dry an inch below the surface - water. If you can't water your plants on a regular basis, consider self-watering containers.

3. **Fertilizing:** Mix a dry, time-release fertilizer into the soil when planting, and use small amounts of liquid fertilizer for regular feeding every few weeks.

4. **Fighting Pests:** Inspect plants regularly for fungus, insects, bugs, etc. Remove any diseased or dying leaves. Spray insects with water or other natural repellants to get rid of them.

5. **Pruning:** Don't be afraid to cut or trim plants to keep their shape and encourage growth - just leave at least 2/3 of the original plant intact so it'll have enough surface area to absorb sunlight. Pinch (aka. deadhead) faded flowers regularly to encourage more blooms on annual plants.

Keep in mind that every plant is different. Take some time to read up on your plants and learn as much as you can about their individual needs. A little time spent reading and planning now can save you a lot of time and disappointment later.

5. Information on What You and Your Community Can Do to Use Water More Efficiently

Information on What You and Your Community Can Do To Use Water More Efficiently

For more information on what you and your community can do to use water more efficiently, contact:

U.S. Environmental Protection Agency
Office of Water
401 M Street, S.W.
Washington, D.C. 20460

For more information on pollution prevention programs at U.S. EPA, contact:

U.S. Environmental Protection Agency
Office of Pollution Prevention
401 M Street, S.W.
Washington, D.C. 20460

United States: 20W-0002
Environmental Protection Agency
July 1990

OW (WH-556): OPPE OPM-222

Preventing Pollution Through Efficient Water Use

- How Efficient Water Use Helps Prevent Pollution
- What Individuals Can Do
- What Communities Can Do

How Efficient Water Use Helps Prevent Pollution

Using water more efficiently can help prevent pollution as well as protect and conserve our finite water resources. More efficient water use by you and your community has many other benefits.

Fewer Pollutants

Using less water reduces the amount of waste-water discharged into our lakes, streams, rivers, and marine waters.

The amount of pollutants wastewater carries can also be reduced, as treatment efficiency improves.

Recycled process water can reduce pollutants from industry.

More efficient irrigation can minimize runoff of agricultural pollutants and reduce the use of fertilizers and pesticides.

Protection of Aquatic Habitats

- Building fewer and smaller new water projects can help preserve wetlands, which naturally treat pollutants.
- Diverting less water preserves more stream flow to maintain a healthy aquatic environment.

Protection of Drinking Water Sources

- Less pumping of groundwater lowers the chance that pollutants will be drawn into a water supply well.
- With less water use, septic system performance can improve, reducing the risk of groundwater contamination.
- Highest quality water sources are preserved for drinking water by using treated wastewater for other uses.

Energy Conservation

- Efficient water use means less power needed to pump and treat water and wastewater.
- Less water use reduces the amount of energy required for heating hot water.
- Less energy demand results in fewer harmful by-products from power plants.

Other Reasons to Use Water Wisely

Preventing pollution is only one reason why using water efficiently makes sense. Here are a few more:

Money Saved

- Less water use results in fewer pumping and treatment costs.
- Saving money on water and wastewater operations frees money for meeting water quality, public health and water treatment goals.
- Water saved is also energy, and money, saved for you and your community.

Improved Reliability

- Water conservation provides a hedge against drought impacts.
- Improving water efficiency may be quicker and cheaper than developing a new supply.
- Reduced water use may extend the life of your water or wastewater facility.

or

- Reduced water use may increase the efficiency of wastewater treatment, and reduce overflows during storms.
- Communities which use water efficiently are better prepared to cope with effects of possible future climate change.

What Individuals Can Do

More efficient water use begins with individuals, in the home and place of work. Taking these and other steps, and encouraging others to do so, makes good economic as well as environmental sense.

In: The Home

- Install a toilet dam or plastic bottle in your toilet tank.
- Install a water-efficient showerhead (2.5 gallons or less per minute).
- When you buy a new toilet, purchase a low flow model (1.6 gallons or less per flush).

Outdoors

- Water in the morning or evening to minimize evaporation.
- Install a drip-irrigation watering system for valuable plants.
- Use drought-tolerant plants and grasses for landscaping, and reduce grass-covered areas.

At Work or School

- Adopt the same water-saving habits that are effective at home.
- Ask about installing water-efficient equipment and reducing outdoor water use.
- Encourage employers to explore the use of recycled "gray-water" or reclaimed wastewater.

What Communities Can Do

A water supplier or wastewater system operator (public or private) has cost-effective options to process and deliver water more efficiently. A community can do the same, and can foster ways to use water wisely.

Not all of these steps are expensive. The best choices vary by region and by community, start by asking if these are appropriate where you live and work.

A Water Supplier or Wastewater Processor Can:

- Identify who uses water, and reduce unaccounted for water use.
- Find and repair leaking pipes.

- Consider a new pricing scheme which encourages conservation.
- Reduce excess pressure in water lines.
- Explore the reuse of treated wastewater for uses other than drinking water.
- Charge hookup fees which encourage more efficient water use in new buildings.
- Build water efficiency into future demand projections, facility planning, and drought planning.

A Community Can:

- Adopt plumbing and building codes that require water-efficient equipment and practices.
- Adopt a water-efficient landscaping ordinance to reduce the water used for golf courses and commercial landscapes.
- Retrofit older buildings with water-efficient equipment, starting with public buildings.
- Reduce municipal water use for landscaping and other uses.

6. After the Storm

The effects of pollution

Stormwater runoff occurs when precipitation from rain or snowmelt flows over the ground. Impervious surfaces like driveways, sidewalks, and streets prevent stormwater from naturally soaking into the ground.

Polluted stormwater runoff can have many adverse effects on plants, fish, animals, and people.

- Sediment can cloud the water and make it difficult or impossible for aquatic plants to grow. Sediment also can destroy aquatic habitats.
- Excess nutrients can cause algae blooms. When algae die, they sink to the bottom and decompose in a process that removes oxygen from the water. Fish and other aquatic organisms can't exist in water with low dissolved oxygen levels.
- Bacteria and other pathogens can wash into swimming areas and create health hazards, often making beach closures necessary.
- Debris—plastic bags, six-pack rings, bottles, and cigarette butts—washed into waterbodies can choke, suffocate, or disable aquatic life like ducks, fish, turtles, and birds.
- Household hazardous wastes like insecticides, pesticides, paint, solvents, used motor oil, and other auto fluids can poison aquatic life. Land animals and people can become sick or die from eating diseased fish and shellfish or ingesting polluted water.
- Polluted stormwater often affects drinking water sources. This, in turn, can affect human health and increase drinking water treatment costs.

Stormwater can pick up debris, chemicals, dirt, and other pollutants and flow into a storm sewer system or directly to a lake, stream, river, wetland, or coastal water. Anything that enters a storm sewer system is discharged untreated into the waterbodies we use for swimming, fishing, and providing drinking water.

Recycle or properly dispose of household products that contain chemicals, such as insecticides, pesticides, paint, solvents, and used motor oil and other auto fluids. Don't pour them onto the ground or into storm drains.

Lawn care

Excess fertilizers and pesticides applied to lawns and gardens wash off and pollute streams. In addition, yard clippings and leaves can wash into storm drains and contribute nutrients and organic matter to streams.

- Don't overwater your lawn. Consider using a soaker hose instead of a sprinkler.
- *Use pesticides and fertilizers* sparingly. When use is necessary, use these chemicals in the recommended amounts. Use organic mulch or safer pest control methods whenever possible.
- Compost or mulch yard waste. Don't leave it in the street or sweep it into storm drains or streams.
- Cover piles of dirt or mulch being used in landscaping projects.

Auto care

Washing your car and degreasing auto parts at home can send detergents and other contaminants through the storm sewer system. Dumping automotive fluids into storm drains has the same result as dumping the materials directly into a waterbody.

- Use a commercial car wash that treats or recycles its wastewater, or wash your car on your yard so the water infiltrates into the ground.
- Repair leaks and dispose of used auto fluids and batteries at designated drop-off or recycling locations.

Septic systems

Leaking and poorly maintained septic systems release nutrients and pathogens (bacteria and viruses) that can be picked up by stormwater and discharged into nearby waterbodies. Pathogens can cause public health problems and environmental concerns.

- Inspect your system every 3 years and pump your tank as necessary (every 3 to 5 years).
- Don't dispose of household hazardous waste in sinks or toilets.

Pet waste

Pet waste can be a major source of bacteria and excess nutrients in local waters.

- When walking your pet, remember to pick up the waste and dispose of it properly. *Flushing* pet waste is the best disposal method. Leaving pet waste on the ground increases public health risks by allowing harmful bacteria and nutrients to wash into the storm drain and eventually into local waterbodies.

Education is essential to changing people's behavior. Signs and markers near storm drains warn users that pollutants entering the drains will be rarely untreated into a local waterbody.

Residential landscaping

Permeable Pavement—Traditional concrete and asphalt don't allow water to soak into the ground. Instead these surfaces rely on storm drains to divert unwanted water. Permeable pavement systems allow rain and snowmelt to soak through, decreasing stormwater runoff.

Rain Barrels—You can collect rainwater from rooftops in mosquito-proof containers. The water can be used later on lawn or garden areas

Rain Gardens and Grassy Swales—Specially designed areas planted with native plants can provide natural places for rainwater to collect and soak into the *ground. Rain from* rooftop areas or paved areas can be diverted into these areas rather than into storm drains

Vegetated Filter Strips—Filter strips are areas of native grass or plants created along roadways or streams. They trap the pollutants stormwater picks up as it flows across driveways and streets.

Dirt, oil, and debris that collect in parking lots and paved areas can be washed into the storm sewer system and eventually enter local waterbodies.

- Sweep up litter and debris from sidewalks, driveways and parking lots, especially around storm drains.
- Cover grease storage and dumpsters and keep them clean to avoid leaks.
- Report any chemical spill to the local hazardous waste cleanup team. They'll know the best way to keep spills from harming the environment.

Erosion controls that aren't maintained can cause excessive amounts of sediment and debris to be carried into the stormwater system. Construction vehicles can leak fuel, oil, and other harmful fluids that can be picked up by stormwater and deposited into local waterbodies.

- Divert stormwater away from disturbed or exposed areas of the construction site.
- Install silt fences, vehicle mud removal areas, vegetative cover, and other sediment and erosion controls and properly maintain them, especially after rainstorms.
- Prevent soil erosion by minimizing disturbed areas during construction projects, and seed and mulch bare areas as soon as possible.

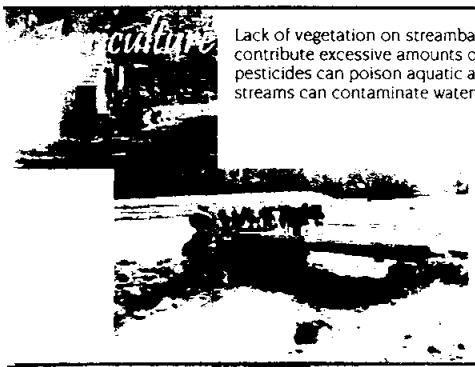

Lack of vegetation on streambanks can lead to erosion. Overgrazed pastures can also contribute excessive amounts of sediment to local waterbodies. Excess fertilizers and pesticides can poison aquatic animals and lead to destructive algae blooms. Livestock in streams can contaminate waterways with bacteria, making them unsafe for human contact.

- Keep livestock away from streambanks and provide them a water source away from waterbodies.
- Store and apply manure away from waterbodies and in accordance with a nutrient management plan.
- Vegetate riparian areas along waterways
- Rotate animal grazing to prevent soil erosion in fields.
- Apply fertilizers and pesticides according to label instructions to save money and minimize pollution

Uncovered fueling stations allow spills to be washed into storm drains. Cars waiting to be repaired can leak fuel, oil, and other harmful fluids that can be picked up by stormwater.

- Clean up spills immediately and properly dispose of cleanup materials.
- Provide cover over fueling stations and design or retrofit facilities for spill containment.
- Properly maintain fleet vehicles to prevent oil, gas, and other discharges from being washed into local waterbodies.
- Install and maintain oil/water separators.

Improperly managed logging operations can result in erosion and sedimentation.

- Conduct preharvest planning to prevent erosion and lower costs.
- Use logging methods and equipment that minimize soil disturbance.
- Plan and design skid trails, yard areas, and truck access roads to minimize stream crossings and avoid disturbing the forest floor.
- Construct stream crossings so that they minimize erosion and physical changes to streams.
- Expedite revegetation of cleared areas.

7. Ten Ways That Will Save the Most

Ten ways that will save the most:

1. Water your lawn only when it needs it. Step on your grass. If it springs back, when you lift your foot, it doesn't need water. So set your sprinklers for more days in between watering. **Saves 750-1,500 gallons** per month. Better yet, especially in times of drought, water with a hose.

2. Fix leaky faucets and plumbing joints. **Saves 20 gallons** per day for every leak stopped.

3. Don't run the hose while washing your car. Use a bucket of water and a quick hose rinse at the end. **Saves 150 gallons** each time. For a two-car family that's **up to 1,200 gallons** a month.

4. Install water-saving shower heads or flow restrictors. **Saves 500 to 800 gallons** per month.

5. Run only full loads in the washing machine and dishwasher. **Saves 300 to 800 gallons** per month.

6. Shorten your showers. Even a one or two minute reduction can **save up to 700 gallons** per month.

7. Use a broom instead of a hose to clean driveways and sidewalks. **Saves 150 gallons** or more each time. At once a week, that's **more than 600 gallons** a month.

8. Don't use your toilet as an ashtray or wastebasket. **Saves 400 to 600 gallons** per month.

9. Capture tap water. While you wait for hot water to come down the pipes, catch the flow in a watering can to use later on house plants or your garden. **Saves 200 to 300 gallons** per month.

10. Don't water the sidewalks, driveway or gutter. Adjust your sprinklers so that water lands on your lawn or garden where it belongs--and only there. **Saves 500 gallons** per month.

In the bathroom:

1. Put a plastic bottle or a plastic bag weighted with pebbles and filled with water in your toilet tank. Displacing water in this manner allows you to use less water with each flush. **Saves 5 to 10 gallons** a day. That's **up to 300 gallons** a month, even more for large families. Better yet, for even greater savings, replace your water-guzzling five to seven gallon a flush toilet with a three and a half gallon, low flush, or one and a half gallon, ultra-low flush model.

2. If you're taking a shower, don't waste cold water while waiting for hot water to reach the shower head. Catch that water in a container to use on your outside plants or to flush your toilet. **Saves 200 to 300 gallons** a month.

3. Check toilet for leaks. Put dye tablets or food coloring into the tank. If color appears in the bowl without flushing, there's a leak that should be repaired. **Saves 400 gallons** a month.

4. Turn off the water while brushing your teeth. **Saves three gallons** each day.

5. Turn off the water while shaving. Fill the bottom of the sink with a few inches of water to rinse your razor. **Saves three gallons** each day.

In the kitchen and laundry:

1. If you wash dishes by hand--and that's the best way--don't leave the water running for rinsing. If you have two sinks, fill one with rinse water. If you only have one sink, use a spray device or short blasts instead of letting the water run. **Saves 200 to 500 gallons** a month.

2. When washing dishes by hand, use the least amount of detergent possible. This minimizes rinse water needed. **Saves 50 to 150 gallons** a month.

3. Keep a bottle of drinking water in the refrigerator. This beats the wasteful habit of running tap water to cool it for drinking. **Saves 200 to 300 gallons** a month.

4. Don't defrost frozen foods with running water. Either plan ahead by placing frozen items in the refrigerator overnight or defrost them in the microwave. **Saves 50 to 150 gallons** a month.

5. Don't let the faucet run while you clean vegetables. Rinse them in a filled sink or pan. **Saves 150 to 250 gallons** a month.

6. Use the garbage disposal less and the garbage more (even better--compost!). **Saves 50 to 150 gallons** a month.

Outside:

1. Put a layer of mulch around trees and plants. Chunks of bark, peat moss or gravel slows down evaporation. **Saves 750 to 1,500 gallons** a month.

2. If you have a pool, use a pool cover to cut down on evaporation. It will also keep your pool cleaner and reduce the need to add chemicals. **Saves 1,000 gallons** a month.

3. Water during the cool parts of the day. Early morning is better than dusk since it helps prevent the growth of fungus. **Saves 300 gallons.**

4. Don't water the lawn on windy days. There's too much evaporation. **Can waste up to 300 gallons** in one watering.

5. Cut down watering on cool and overcast days and don't water in the rain. Adjust or deactivate automatic sprinklers. **Can save up to 300 gallons** each time.

6. Set lawn mower blades one notch higher. Longer grass means less evaporation. **Saves 500 to 1,500 gallons** each month.

7. Have an evaporative air conditioner? Direct the water drain line to a flower bed, tree base, or lawn.

8. Drive your car onto a lawn to wash it. Rinse water can help water the grass.

9. Tell your children not to play with the garden hose. **Saves 10 gallons** a minute.

10. If you allow your children to play in the sprinklers, make sure it's only when you're watering the yard--if it's not too cool at that time of day.

11. Xeriscape--replace your lawn and high-water-using trees and plants with less thirsty ones. But do this only in wet years. Even drought resistant plantings take extra water to get them going. That'll **save 750 to 1,500 gallons** a month.

12. When taking your car to a car wash--a good idea for saving water--be sure it's one of the many that recycles its wash water.

13. Dispose of hazardous materials properly! One quart of oil can contaminate 250,000 gallons of water, effectively eliminating that much water from our water supply. Contact your city or county for proper waste disposal options.

While Shopping

Water is an essential ingredient in most manufacturing operations. Especially for those 1 billion of us in the high-consumption class, cutting down on our purchases of material things--from clothes and shoes to paper and appliances--**conserves and protects water supplies as effectively as installing a low-flush toilet does.** As with so many natural resources, as long as prices in the marketplace fail to reflect full social and ecological costs, voluntary changes in consumption patterns will play an important role in the quest for sustainability.

- A kilogram (2.2 lbs) of hamburger or steak produced by a typical California beef cattle operation, for instance, uses some 20,500 liters (5,400 gal.) of water.
- We rarely think about water when we see an automobile, for example, but producing a typical U.S. car requires more than 50 times its weight in water!
- Producing 1 serving (4.3 oz.) of tomatoes requires 8 gallons of water.
- Producing 1 serving (4.6 oz.) of oranges requires 14 gallons of water.
- Producing 1 serving (2 oz.) of pasta requires 36 gallons of water.
- Producing 1 serving (8 fl. oz.) of milk requires 48 gallons of water.
- Producing 1 serving (8 oz.) of chicken requires 330 gallons of water.

8. County of Riverside DAMP, Supplement A

SUPPLEMENT A

TO THE RIVERSIDE COUNTY DRAINAGE AREA MANAGEMENT PLANS

NEW DEVELOPMENT GUIDELINES

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TABLES

Table 1: Appropriate Nonstructural BMP's

Table 2: Routine Structural BMP's

ATTACHMENT

Selection and Design of Stormwater Quality Controls
(under separate cover)

1.0 INTRODUCTION

This document is to be used by Riverside County NPDES Co-permittees county-wide as a supplement to the Drainage Area Management Plan(s) (DAMP). It was developed by the Construction and New Development Sub-committee, and approved by the NPDES Advisory Committee. Appendix G of the Orange County Drainage Area Management Plan, dated April 1993, served as a model for the development of this document.

The objective in preparing this Supplement "A" was to identify post construction source pollutant prevention and treatment measures that could be incorporated into development projects. This Supplement recommends which Best Management Practices (BMPs) should be required as standard practice. For projects with unique water quality issues additional applicable solutions may be required on a case by case basis.

The DAMP does not specify a minimum development size to be considered for BMP applications nor does it specify which land uses should receive the most attention. In general, BMPs are required on a wide variety of land uses, both residential and non-residential. BMPs should also be required on accessory uses of concern (such as outdoor material/equipment storage, vehicle/ equipment fueling and service) and certain low intensity, but potentially high polluting uses (such as golf courses and plant nurseries).

2.0 BACKGROUND

In 1987 Congress amended the Clean Water Act to require the permitting of stormwater discharges from municipal storm drain systems. The EPA promulgated regulations in 1990 to enact the new law. In the regulations (and the preceding draft regulations), EPA listed the County of Riverside as a county that must obtain an NPDES permit.

The Regional Water Quality Control Boards (RWQCB) enforce the EPA regulations and the Clean Water Act in California. Each RWQCB in Riverside County has required the County, Cities, Riverside County Flood Control and Water Conservation District and Coachella Valley Water District (as applicable) to be included in the NPDES permits.

The NPDES permits require the permittees to control the discharge of pollutants to the Waters of the United States by the implementation of BMPs. These BMPs are listed in the Santa Ana and Santa Margarita Permits and DAMPs and in the 'Proposed Management Programs' section of the Eastern Riverside County NPDES Part 2 Application.

The members of the Santa Ana/Santa Margarita Advisory Committee recognized the sensitive issue of imposing development and construction BMPs on the building industry. They, therefore, formed the Construction and New Development Sub-Committee. The sub-committee included representatives from the co-permittees, development companies, Building Industry Association, Western States Petroleum Association, engineering companies and the Riverside County Coordinating Committee. The group developed this document with particular insight from and cooperation of the development industry. The BMPs proposed herein will meet the permit requirements while not imposing undue burden on those that are to implement the actions called for.

3.0 DEVELOPMENT PLANNING PROCESS

The Municipal Storm Water Permit states that stormwater quality management should be considered during a project's planning phase, implemented during construction, and ultimately maintained for the life of the project. As such, standard conditions of approval were developed to address land use areas of concern to minimize the amount of pollution entering the drainage system.

Each municipality should require the implementation of BMPs for redevelopment and specified new development. A redevelopment project is any project where major modifications to an existing site and/or structure requiring a permit is undertaken. Routine maintenance, interior remodeling, minor structural additions, reroofing, and maintenance of parking lots are intended to be exempt. A redevelopment project is not to be confused with the projects sponsored by a Redevelopment Agency of a jurisdiction. It is assumed that each jurisdiction will further define a "redevelopment project", utilizing its own permitting criteria.

Planning review procedures must be adopted and uniformly implemented by all the municipalities to ensure consistency. The typical process is outlined as follows:

1. The present municipal procedure for approval of grading, building, and similar permits will be modified to include incorporation of the BMPs listed in Tables 1 and 2, as applicable.

2. Municipalities will make this Supplement detailing implementation of BMPs available to development applicants through the permitting/land development process. Applicants will be informed at the earliest possible point of processing of these requirements.

3. Municipalities will develop implementation procedures for the new development BMP guidelines, including training and education for the employees that will implement this Supplement.

4. Implementing staff will notify applicant at the earliest possible opportunity if there is a known water quality problem which might affect the proposed development.

The municipal permitting/development review process will verify that plans contain all the applicable BMPs. Compliance is intended to be a matter of incorporating the measures specified in this Supplement or other acceptable standard into the plans and submittals currently required by each municipality, and the review process will effectively be a verification that these are included.

GENERAL CONDITIONS to be applied by municipalities:

For discretionary actions that include a precise plan of development:

1. Prior to issuance of building permits, the permit applicant shall include in its development plans for approval by County/City Official(s) water quality management controls by specifically identifying BMPs that will be used onsite to control predictable pollutant runoff.

The permit applicant shall identify the structural and non-structural measures specified in this Supplement or other equally effective standard detailing implementation of BMPs whenever they are applicable to the project (when the project has a loading dock, for example); the assignment of long-term maintenance responsibilities (specifying the developer, parcel owner, maintenance association, lessee, etc.); and shall reference the location(s) of structural BMPs.

For Subdivisions of Land:

2. Prior to recordation and if determined applicable by County/City Official(s), applicant shall identify and include in its plans those routine structural and non-structural BMPs outlined in this Supplement or other equally effective standard, for approval of County/City officials.

Both conditions 1 and 2 also functionally apply to public projects where the local jurisdiction technically chooses not to issue formal permits to itself or hired contractors, but nonetheless undertakes the work.

SPECIAL CONDITIONS:

When a building is being proposed for which no anticipated use is designated or when an unanticipated element of land use or occupancy is proposed after a basic building has already been completed, use of language similar to the following condition is recommended for inclusion in the conditions which must be satisfied prior to issuance of the appropriate permit:

Prior to issuance of certificates of use and occupancy or building permits for individual tenant improvements or construction permits for a tank or pipeline, uses shall be identified and, for specified uses (where the proposed improvements will store, generate or handle hazardous materials in quantities that will require permitting and inspection once operational), the applicant shall propose plans and measures for chemical management (including, but not limited to, storage, emergency response, employee training, spill contingencies and disposal) to the satisfaction of the County/City Building Official(s).

Chemical management plans shall be approved by the County/City and other appropriate agencies such as County/City Fire Department, the Health Services Agency's Department of Environmental Health, and sewering and/or water agencies to ensure implementation of each agency's respective requirements. Approval by the appropriate agencies shall be furnished to the Building and Safety Department, prior to the issuance of any certificates of use and/or occupancy.

Certificates or permits may be ministerially withheld if features needed to properly manage chemicals cannot be incorporated into a previously completed building, center, or complex.

A list of specified uses and occupancies of concern should be developed by each jurisdiction according to their needs.

4.0 BMP SELECTION

The DAMP requires identification and implementation of BMPs for new development via regulatory and enforcement activities. This Supplement lists particular routine structural and non-structural BMPs that will be evaluated for application and intensity for these activities. Thus, some of the BMPs listed herein will become conditions of approval for new development and construction.

The measures identified in Tables 1 and 2 are to be deemed "standard practice" to be required on new developments, as specified. Two general terms used in this supplement are defined by example as follows:

> Structural Controls: Physical facilities or controls which may include secondary containment, first flush diversion, detention/retention basins, infiltration trenches/basins, oil/grease separators, grass swales, and engineering and design modification of existing structures. These examples include both routine structural controls and special structural controls.
>
> Non-structural Controls: In general, these would be activities or programs to educate the public on proper disposal of hazardous/toxic wastes, regulatory approaches, street sweeping and facility maintenance, detection and elimination of illicit connections and illegal dumping.

Each new development will be required to implement appropriate non-structural BMPs in keeping with the size and type of development, and potential for stormwater pollution, to minimize the introduction of pollutants onto the drainage system.

Each new development will also be required to implement appropriate "routine" structural BMPs in keeping with the size and type of development, and potential for stormwater pollution. "Routine" structural BMPs are economical, practicable, small scale measures which can be feasibly applied at the smallest unit of development.

A major concept of the County's NPDES stormwater quality program, as set forth in the Riverside County DAMP, is a regional approach to stormwater quality planning and management on a watershed basis. Later, "special" structural BMPs may be installed to address any specific water quality problems identified in the watershed planning process. "Special" structural BMPs are engineered facilities designed to address specific water quality problems identified in the watershed planning process, runoff management plan, CEQA process, or similar watershed planning. There may be the need to revisit these requirements at an as yet unspecified date or frequency.

Efforts will be directed toward determining the effectiveness of structural BMPs before they are required. Those measures which demonstrate superior cost-effectiveness, considering right-of-way, construction, operation, maintenance, monitoring, and pollutant removal, may be adopted as special structural BMPs for application as indicated during the watershed planning studies.

4.1 Non-structural Measures

N1. Education for Property Owners, Tenants and Occupants - Project conditions of approval for all new developments will require that the developer provide environmental awareness education materials on general good housekeeping practices that contribute

to protection of stormwater quality to all initial residents, occupants/tenants. Such materials will be provided to the developer through the co-permittees' County-wide education program. Different materials for residential, office commercial, retail commercial, vehicle-related commercial, and industrial uses will be involved.

N2. Activity Restrictions - If a property owners association (POA) or homeowners association (HOA) is formed, conditions, covenants, and restrictions shall include measures shown in Table No. 1 for the purpose of surface water quality protection.

N3. Common Area Landscape Management - All pesticides shall be applied in strict accordance to pesticide application laws as stated in the State of California Agricultural Code. All pesticide applicators shall be certified by the State as a Qualified Applicator or be directly supervised by a Qualified Applicator. All fertilizers shall be applied at the rate stipulated by the manufacturer. Fertilizer Applicators shall be trained in the proper procedures of determining fertilizer rates and calibration of application equipment. Fertilizer shall be applied in such a manner as to avoid application onto hardscape surfaces. Annual soil tests are recommended to advise on which fertilizer elements are needed to avoid application of unnecessary elements, or over application. The local water agency or resource conservation district can assist with detailed information concerning this BMP.

N4. Common Area Catch Basin Inspection - For developments with POAs/HOAs and privately maintained drainage systems, the association will be required to have privately owned catch basins inspected and, if necessary, cleaned prior to the storm season, no later than October 15th each year.

N5. POA/HOA Common Area Litter Control - For developments with an association, the POA/HOA will be required to implement trash management and litter control procedures in the common areas aimed at reducing pollution of drainage water. The associations may contract with their landscape maintenance firms to provide this service during regularly scheduled maintenance, which should consist of litter patrol, emptying of trash receptacles in common areas, noting trash disposal violations by homeowners or businesses, and reporting the violations to the association for investigation.

N6. Street Sweeping Private Streets and Parking Lots - For developments with POAs/HOAs, and privately owned streets and parking lots, the association will be required to have the streets and parking lots swept prior to the storm season, no later than October 15th each year.

N7. Underground Storage Tank Compliance - Compliance with State regulations dealing with underground storage tanks will be enforced by the County Department of Environmental Health on behalf of the State.

N8. Spill Contingency Plan - A spill contingency plan (Business Plan/Hazardous Materials Management Plan) shall be prepared by the owner/operator in accordance with Section 6.95 of the California Health and Safety Code. The Environmental Health Department or the Fire Department in the City of Riverside, Corona, or Banning shall be responsible for enforcement. Spills will be immediately cleaned up according to the Spill Contingency Plan.

N9. Hazardous Materials Disclosure Compliance - Compliance with County/City ordinances shall be enforced by the Environmental Health Department or the Fire Department in the City of Riverside, Corona, or Banning.

N10. Uniform Fire Code Implementation Plan - Compliance with Article 80 of the Uniform Fire Code enforced by fire protection agency will be required.

N11. Title 22 CCR Compliance - Compliance with Title 22 of the California Code of Regulations and relevant sections of the California Health & Safety Code regarding hazardous waste management will be enforced by the County Department of Environmental Health on behalf of the State.

N12. Housekeeping of Loading Docks - Loading docks for grocery, drug and discount stores, and warehouse type commercial and industrial buildings must be kept in a clean and orderly condition through a regular program of sweeping, litter control, and immediate cleanup of spills and broken containers. Polluted material or wash waters shall not be allowed to discharge into a storm drain.

N13. Employee Training/Education Program (see N1) as it would apply to future employees of individual businesses - Based on information provided through the County-wide education program, developer either prepares manual(s) for initial purchasers of business sites or, for development that is constructed for an unspecified use, conveys commitment for this responsibility to POA or purchaser.

N14. BMP Maintenance - The responsibility for implementation of each non-structural BMP and scheduled cleaning of all structural BMP controls shall be identified (owner, agency name, phone number, and address).

4.2 Routine Structural BMPs

S1. Control of Impervious Runoff - Impervious areas shall be graded and constructed so as to drain to a filtration BMP, such as a landscaped area or equally effective alternative wherever practicable and as recommended by the engineer of record. Direct drainage from impervious areas to the street or a storm drain facility is discouraged and should be avoided. For example, parking lot catch basins could be placed in landscaped areas with allowances for minor ponding.

S2. Common Area Efficient Irrigation - All sites shall employ multi-programmable irrigation controllers which have enough programs to break up all irrigation stations into hydrozones. If practical and feasible, rain shutoff devices shall be employed to prevent irrigation after significant precipitation. Irrigation systems shall be designed so areas which have different water use requirements are not mixed on the same station (hydrozones). Assistance in implementing a schedule based on plant water needs is available from CIMIS or Mobile Lab. The use of drip irrigation should be considered for all planter areas which have a shrub density that will cause excessive spray interference of an overhead irrigation system. Use flow reducers to mitigate broken heads next to sidewalks, streets and driveways.

S3. Common Area Runoff-minimizing Landscape Design - Group plants with similar water requirements in order to reduce excess irrigation runoff and promote surface filtration, where practical. Examples could include the following:

a. Use mulches in planter areas without ground cover to avoid sedimentation runoff.

b. Set irrigation times to avoid runoff. This will involve splitting nightly irrigations into several short cycles if slope and soil conditions warrant.

c. Use only enough water to provide for adequate plant health and growth.

d. Use the water budget mode to make global/weather related scheduling changes.

e. Use CIMIS data for global changes so they will accurately reflect weather changes.

f. Install appropriate plant materials for the location, in accordance with sunset climate zones.

g. Install plants with low water requirements and consider the use of native plant material where possible and recommended by the landscape architect.

S4. Community Car Wash Racks - In high density multi-family developments (apartments, stacked flats) larger than 100 units where car washing is allowed, and development having a common parking area, a designated car wash area which does not drain directly to a storm drain shall be provided for common usage. An example of such an area would be joint use of an open space or visitor parking area. Wash waters from this area may be directed to the sanitary sewer (with prior approval of the sewering agency), to an engineered infiltration, or equally effective alternative.

S5. Wash Water Controls for Food Preparation Areas - Food establishments (per State Health and Safety Code 27520) shall have contained areas, floor sink(s) and/or mop sink(s) with sanitary sewer connections for cleaning of kitchen floor mats and for disposal of wash waters containing kitchen and food wastes, if located outside. The contained area shall also be covered to prevent entry of stormwater.

S6. Trash Container (dumpster) Areas - Trash container (dumpster) areas shall have drainage from adjoining roofs and pavements diverted around the area(s), and:

a. Dumpsters shall be leak proof and have attached workable covers.

b. Trash container areas are to be screened or walled to prevent offsite transport of trash.

S7. Self-contained Areas for Vehicle Washing/Steam Cleaning/ Maintenance/Repair/ Material Processing - Self-contained areas are required for washing/steam cleaning, wet material processing, and maintenance activities, specifically:

a. For businesses where washing of vehicles without steam cleaning occurs, provide wash racks constructed in accordance with local sewering agency guidelines or other acceptable standard and with the prior approval of the sewering agency (Note: Discharge monitoring may be required by the sewering agency).

b. Where steam cleaning occurs, provide wash racks as in S7.a., or structurally contain (with a cover to restrict the entry of stormwater during rain events) runoff from such areas onsite for commercial waste removal.

c. Where wet material processing occurs (e.g., electroplating), secondary containment structures shall be provided to hold spills resulting from accidents, leaking tanks or equipment, or any other unplanned releases (Note: If these are plumbed to the sanitary sewer, the structures and plumbing shall be in accordance with State and local spill containment and reporting requirements and have the prior approval of the sewering agency). Also see N10.

d. Where vehicle repair/maintenance occurs, impermeable berms, drop inlets, trench catch basins, or overflow containment structures shall be provided around repair bays to prevent spilled materials and wash-down waters from entering the storm drain system.

S8. Outdoor Storage - Where a plan of development proposes or building plans incorporate outdoor containers of oils, fuels, solvents, coolants, wastes, and other chemicals, the areas where these materials are to be used or stored must be protected by secondary containment structures such as a berm, dike, or curb (see N10). For commercial outdoor vehicle and equipment salvage yards, and commercial outdoor recycling, the entire storage area shall drain through water quality inlets (see SP1).

S9. Motor Fuel Concrete Dispensing Areas - Areas used for fuel dispensing shall be paved with concrete (use of asphalt prohibited). Concrete surfacing must extend a minimum of 8' from the face side of each pump receptacle and 4' from the nose of the pump island. In addition, the fuel dispensing area shall be graded and constructed so as to prevent drainage flow through the concrete fueling area.

S10. Motor Fuel Dispensing Area Canopy - All motor fuel concrete dispensing areas are to have a canopy structure. Canopy roof downspouts are to be routed to prevent drainage across the concrete fueling area.

S11. Energy Dissipators - Energy dissipators such as riprap, are to be installed at the outlets of new storm drains which enter unlined channels in accordance with applicable agency specifications.

S12. Catch Basin Stenciling - Phrase "No Dumping - Only Rain in the Drain" or equally effective phrase as approved by the County/City NPDES Advisory Committee is to be stenciled on catch basins to alert the public as to the destination of pollutants discharged into stormwater.

S13. Diversion of Below Grade Loading Dock Drainage - Below grade loading docks for grocery stores and warehouse/distribution centers of fresh food items will drain through water quality inlets (see SP1), or to an engineered infiltration system, or an equally effective alternative.

S14. Inlet Trash Racks - Where appropriate to reduce intake and transport through the storm drain system of large floatable debris, trash racks shall be provided where drainage from open areas enters storm drains (Caltrans Standard Plan D96 and D98-C, or equivalent).

4.3 Special Structural BMPs

SP1. Water Quality Inlets - Water Quality Inlets designed to remove free phase liquid petroleum compounds, grease, floatable debris and settleable solids can be used in the following applications: Nos. S7, S8, and S13.

5.0 EDUCATIONAL PROGRAM FOR DEVELOPERS AND CONTRACTORS

The following defines the required educational program for developers and contractors in response to Appendix E of the Riverside County DAMP:

This DAMP Supplement "A" with its attachments will contain the legal, administrative, and technical information needed to acquaint developers and contractors with the NPDES program. Riverside County developers and contractors have been implementing erosion control plans for many years and are familiar with that portion of the program. New requirements resulting from the NPDES Permit and the DAMP are contained herein.

It is, therefore, recommended that the Building Industry Association and the Associated General Contractors be asked to use their newsletters to alert their members of the information contained in this Supplement. The Supplement text will be made available by the County and Cities as part of the development review process.

TABLE 1
APPROPRIATE NONSTRUCTURAL BMPs

Appropriate Nonstructural BMPs		Residential	Industrial	Retail/Office Center	Restuarants Warehouse/Grocery	Fuel Dispensing	Vehicle Repair / Maintenance
Homeowner/Tenant Education	(N1)	X	X	X			
Activity Restrictions	(N2)	X	X	X	X		X
Common Area Landscape Management	(N3)	X	X	X			
Catch Basin Inspection	(N4)	X	X	X	X	X	X
Common Area Litter Control	(N5)	X	X	X	X	X	X
Private Street/Lot Sweeping	(N6)	X	X	X			
Underground Storage Tank Compliance	(N7)		X		X	X	
Spill Contingency Plan	(N8)		X			X	X
Haz-Mat Disclosure Compliance	(N9)		X			X	X
Uniform Fire Code Implementation	(N10)		X			X	X
Title 22 CCR Compliance	(N11)		X			X	X
Housekeeping of Loading Docks	(N12)		X		X		
Employee Training	(N13)		X	X	X	X	X
BMP Maintenance	(N14)	X	X	X	X	X	X

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10. Storm Water and the Construction Industry

Stormwater and the Construction Industry

Protect Natural Features

Construction Fencing

Vegetative Buffers

Silt Fencing

Bad

Good

Site Stabilization

Bad

Good

Maintain your BMPs!

IN RIVERSIDE COUNTY Call 1-800-506-2555

TO REPORT ILLEGAL STORMDRAIN DISPOSAL

Construction Entrances

Bad

Good

Slopes

Bad

Good

Dirt Stockpiles

Bad

Good

Storm Drain Inlet Protection

Bad

Good

www.epa.gov/npdes/menuofbmps

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Stormwater and the Construction Industry

Pollution Prevention Techniques and Control Practices

Best Management Practice (BMP)

A BMP is a method used to prevent or control stormwater runoff and other pollution from construction activities. Silt fences, inlet protection, and stabilized construction entrances are examples of BMPs.

Operator

An operator is someone who has control over and the ability to implement plans and specifications, and to make changes to construction plans and specifications in order to meet the requirements of the general permit.

Someone who has control over the day-to-day operations at a site (i.e., owner, developer, general contractor) is responsible to ensure compliance with the permit requirements. It is the responsibility of the operator to develop a site specific plan to control stormwater runoff and prevent erosion during all stages of construction.

There may be more than one person at a site who meets these definitions and more than one operator. In this instance, there may have different definitions of the term "operator."

Soil erosion control tips...

- Design the site to influence sediment from the ground and to keep it out of storm drains. Minimize or minimize the use of environmental pollution and management systems while maintaining the use of conservation techniques and maintenance techniques.
- Minimize the amount of exposed soil on site.
  - To the extent possible, plan the project to stage or subdivide the sections of area that is bare and subject to erosion. This has will control, the areas and changes it will be or control erosion.
  - Vegetate disturbed areas with permanent or temporary seeding immediately upon reaching final grade.
  - Vegetate or cover stockpiles that will not be used immediately.
- Reduce the velocity of stormwater from area and away from the project area.
  - Interceptors, diversions, vegetated buffers, and check dams are a few of the BMPs that can be used to slow down stormwater as it travels across and away from the property.
  - Diversions or swales can also be used to divert flow away from exposed areas toward stable portions of the site.
  - Silt fences and other types of perimeter filters should never be used to reduce the velocity of runoff.
- Prevent debris elements immediately with erosion techniques to handle the water flow expected. Soil, pesticides, herbicides, debris, or other contaminant stormwater should be used to allow the elements to enter water without causing erosion. The other negative bits pesticides or vegetation where possible to prevent downstream deposits.
- Keep sediment on site.
  - Place aggregate or stone at construction gate vehicle exits to decontaminate or have into the foundation of large construction vehicles. Much of the dirt on site tires will fall off before the vehicle gets to the street.
  - Regular street sweeping at the construction entrance will prevent dirt from entering storm drains. Do not hose paved areas.
  - Sediment traps and basins are temporary structures and should be used in conjunction with other measures to reduce the amount of sediment.
- Maintaining all BMPs in addition to control their effectiveness during the life of the project.
  - Regularly remove collected sediment from silt fences, berms, traps, and other BMPs.
  - Stabilize permanently and quickly remove in place until vegetation is well established.
  - Maintain berms that prevent excessive water, silt fences, diversions structures, and other BMPs.

Other BMPs and Activities to Control Polluted Runoff

You'll need to utilize other methods to minimize potential pollutant sources on your site. Construction materials, debris, waste, fuel, paints, and contaminants becomes pollution sources when it rains. Implementation procedures can significantly reduce the amount of pollution leaving construction sites. The following are some sample processes that should be included in the Plan and implemented on site:

- Keep potential sources of pollution out of the rain or precipitation (e.g., provide a building, covered with plastic or tarps, or build slightly in a lock-proof container).
- Clearly identify a protected, level area for concrete truck washout. This area should be located away from storm drains, swale, drain inlets, or drainage and should be cleaned out periodically.
- Park, refuel, and maintain vehicles and equipment in one area of the site to minimize the area exposed to possible spills and fuel drainage. This area should be well away from wetlands, storm drain inlets, or drainage. Keep spill kits close by and clean up any spills or leaks immediately, including spills on pavement or exposed surfaces.
- Provide good housekeeping. Keep the construction site free of litter, construction debris, and building structures. Keep all waste in one area to minimize cleanup.
- Never hose down paved surfaces to clean dust, debris, or trash. This water could wash directly into storm drains or streams. Sweep up pavement and dispose of waste in the trash. Never hose down or dump.
- Dispose of hazardous materials properly.

Preconstruction Checklist

- A site description, including
  - Nature of the activity
  - Intended sequence of major construction activities
  - Total area of the site
  - Existing soil type and related runoff data
  - A site map with:
    - Drainage patterns
    - Approximate slopes after major grading
    - Area of soil disturbance
    - Outline of areas which will not be disturbed
    - Location of major structures and impervious soil erosion controls
    - Areas where stabilization practices are expected to occur
    - Surface waters
    - Stormwater discharge locations
  - Name of the receiving water(s)
- A description of controls:
  - Erosion and sediment controls, including
    - Stabilization practices for all areas disturbed by construction
    - Structural practices for all drainage/discharge locations
  - Stormwater management controls, including
    - Measures used to control pollutants occurring in stormwater discharges after construction activities are complete
    - Velocity dissipation devices to provide non-erosive flow conditions from the discharge point along the length of any conveyance channel
  - Other controls, including
    - Waste disposal practices that prevent discharge of solid materials
    - Measures to minimize offsite tracking of soil waste by construction vehicles
    - Measures to ensure compliance with state or local waste disposal, sanitary sewer, or septic tank regulations
  - Description of the timing during the construction when measures will be implemented
- State or local requirements incorporated into the Plan
- Inspection and maintenance procedures for control measures identified in the Plan
- Consistent attachments and Plan certification

Implementation Checklist

- Maintain records of construction activities, including
  - Dates when major grading activities occur
  - Dates when construction activities temporarily cease on the site or a portion of the site
  - Dates when construction activities permanently cease on the site or a portion of the site
  - Dates when stabilization measures are completed on the site
- Prepare inspection reports concerning
  - Name of person conducting BMP inspections
  - Qualifications of person conducting BMP inspections
  - BMPs/areas inspected
  - Observed conditions
  - Necessary changes to the Plan
- Report releases of reportable quantities of oil or hazardous substances
  - Notify the National Response Center at 800-424-8802 immediately
  - Report release to your permitting authority immediately, or as specified in your permit. You may also provide a written report within 14 days.
  - Modify the Plan to include
    - The date of release
    - Circumstances leading to the release
    - Steps taken to prevent recurrence of the release
- Modify Plan as necessary
  - Incorporate requests of the permitting authority to bring the Plan into compliance
  - Address changes in design, construction operation, or maintenance that affect the potential for discharge of pollutants

*Taking the time to plan and implement pollution prevention techniques and control practices on your site is not just for more efficient and cost-effective work. It's for more efficient and cost-effective work. It's for more efficient and cost-effective work. It's

11. Food Service Industry

12. Helpful Hints to Keep Our Water Clean

Helpful Hints To Keep Our Water Clean

There are a number of things you can do to prevent stormwater pollution. Whether you're in your home, in your yard, in the garage or in your community... be aware of how your actions affect the environment. Pollution prevention is much easier, and less costly, than clearing up "after the fact," so we're counting on YOU to do your share to help protect our environment.

- Home
- Yard
- Garage
- Community

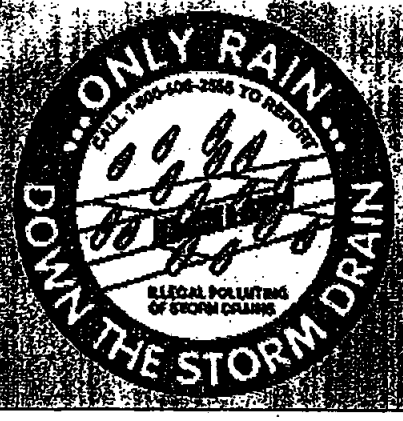

In Your Home

Hazardous Waste: It's as close as your kitchen cupboard.

Did you know that many products used around our homes can be hazardous to our health and our environment? While products such as household cleaners, bleach, oven cleaners, spot solvents and toilet bowl cleaners serve useful purposes, you must remember to handle them as household hazardous waste (HHW) when you throw them away. Never throw HHW in the trash, on the ground or into a storm drain.

Take unwanted products to an HHW collection event. Check the HHW Collection Event Schedule for an event in your area. Bringing these items to a collection event is the proper thing to do and it's FREE!

Try environmentally friendly alternatives to household hazardous waste. Order the Easy Recipes for A Healthy House brochure to learn how to make your own environmentally friendly cleaning products.

Painting Activities: Use the proper cleanup methods.

Even though latex paint is a water based paint, you must clean paint brushes and containers in the sink. Never clean brushes or rinse paint containers into the street, gutter or storm drain. If you use oil-based paints and stains, filter, settle, and reuse the thinners and solvent.

Dispose of unusable paints, thinners, thinner residue, and paint strippers at a Household Hazardous Waste Collection Event. Empty, dry paint cans may go in household garbage, or they may be recyclable in your area - check with your local waste hauler.

Housecleaning: Use the proper disposal methods for washwater.

When washing your windows or mopping the floors, send dirty cleaning water down a sink or toilet. Don't throw washwater into the street, gutter, or storm drain. Also, if you clean your carpets, dispose of dirty washwater down a sink or toilet. If you have your carpets professionally cleaned, make sure the cleaning service either disposes of washwater in the sink or toilet or takes the dirty washwater back to his/her facility for proper discharge into a sewer system.

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In Your Yard

What's the Scoop on Pet Waste?

Never hose pet waste into to the street or gutter. Pick-up waste and dispose of it in trash can. And, remember to take something to pick-up after your dog when you take it for a walk. You'll be helping the environment and keeping peace with your neighbors.

Overdose the Environment!

Achieving a healthy garden doesn't require the use of toxic pesticide and herbicides.

Try non-toxic alternatives for the garden. Try planting plants that deter bad pests and plant other plants that help attract beneficial insects. Chemicals should always be your last choice in the garden. Review the Home Garden Care Guide for various non-toxic alternatives in the garden, or come to a Home Garden Workshop for a live demonstration of how to achieve a healthy chemical-free garden.

Composting - a natural way of recycling organic material

Composting can provide a healthy soil amendment for your yard or garden. Compost provides natural essential nutrients for healthier plants, increases moisture retention and is less expensive then commercial fertilizers and mulches. Learn how to compost from the expert *Master Composters*. Master Composters show residents just how easy it is to compost. Join the Master Composters at a FREE Composting Workshop. Check the workshop schedule for a workshop in your community.

Properly drain your pool to help protect local waterways

If you need to drain your pool, contact your local sewering agency for drainage requirements. If you have a septic tank system or if your sewering agency has no special requirements for draining the pool, let the pool water dechlorinate (this may take up to two weeks) and then discharge the water into landscaped areas. Avoid allowing any water to flow into the street, gutter or storm drain. You may have to drain the pool over a number of days to allow dirt and landscaped areas to absorb the water.

Septic Systems: Properly maintain them to keep our environment clean.

Septic systems should never be piped into a road ditch, stream, concrete flood channel or storm drains. Avoid washing or flushing grease, alcohol, or strong chemicals into your septic system as these substances kill the bacteria needed to break down wastes.

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In the Garage

Do you know where the nearest Certified Collection Center is?

It's probably not too far from you. Many auto service/supply stores accept used motor oil and oil filters. Certified collection centers will even give you some spare change for every gallon your bring in. Remember to bring your used motor oil in a clean container. Do not mix with antifreeze or water. Call 1-800-CLEANUP to find the nearest collection center in your area or visit www.1800CLEANUP.org.

Come to the ABOPs!

ABOPs are recycling centers for Antifreeze, Batteries (car and household), motor Oil and oil filters, and latex/water-based Paints. Bringing these items to the ABOP is the proper ways to dispose of these items and it's FREE! ABOPs are open each Saturday from 9 a.m. to 2 p.m. and are closed on holiday weekends. Check for an ABOP in your area.

Use Proper Car Wash Methods

Did you know that water runoff from carwashing activities contains various pollutants? Most detergents contain phosphates that harm aquatic life and dirty soap water usually contains oil, grease and dirt that gets washed off the car and tires. All of these pollutants can harm our environment if the washwater is allowed to flow into the street and gutter. Here's what you can do: wash cars on the lawn or in an area that will absorb the water runoff. Use biodegradable and phosphate-free detergents. If you must use wheel cleaners, use them sparingly and avoid any runoff. Or, give yourself a break and take the car to a carwash facility. Carwash facilities are constructed to capture water runoff to help protect our environment.

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In Your Community

Illegal Dumping Harms Our Environment!

Report illegal dumping by calling 1.800.506.2555.

Stencil A Drain Campaign

Help remind neighbors and communities to never pour anything down a storm drain. Call 951.683.7691 to volunteer to stencil storm drains with the message - NO DUMPING, ONLY RAIN IN THE DRAIN. Students and boy/girl scouts seeking community hours can participate in this effort.

[illegible] Information

LOCAL SEWERING AGENCIES IN RIVERSIDE COUNTY:

City of Beaumont	(909) 769-8520
Belair Homeowners Association	(909) 277-1414
City of Banning	(909) 922-3130
City of Blythe	(760) 922-6161
City of Coachella	(760) 391-5006
Coachella Valley Water District	(760) 398-2651
City of Corona	(909) 736-2259
Desert Center, CSA #51	(760) 227-3203
Eastern Municipal Water District	(909) 928-3777
Elsinore Valley MWD	(909) 674-3146
Farm Mutual Water Company	(909) 244-4198
Idyllwild Water District	(909) 659-2143
Jurupa Community Services Dist.	(909) 685-7434
Lake Hemet MWD	(909) 658-3241
Lee Lake Water District	(909) 277-1414
March Air Force Base	(909) 656-7000
Mission Springs Water District	(760) 329-6448
City of Palm Springs	(760) 323-8242
Rancho Caballero	(909) 780-9272
Rancho California Water Dist.	(909) 676-4101
Ripley, CSA #62	(760) 922-4909
Rubidoux Community Services Dist.	(909) 684-7580
City of Riverside	(909) 782-5341
Silent Valley Club, Inc	(909) 849-4501
Valley Sanitary District	(760) 347-2356
Western Municipal Water District	(909) 780-4170

SPILL RESPONSE AGENCY:

HAZ-MAT:	(909) 358-5055
HAZARDOUS WASTE DISPOSAL:	(909) 358-5055
TO REPORT ILLEGAL DUMPING OR A CLOGGED STORM DRAIN:	1-800-506-2555

StormWater CleanWater PROTECTION PROGRAM

Riverside County gratefully acknowledges the Bay Area Stormwater Management Agencies Association and the Construction Equipment Trade Association for information provided in this brochure.

StormWater Pollution

What you should know for...

OUTDOOR CLEANING ACTIVITIES

NON-STORMWATER DISCHARGES

GUIDELINES for disposal of wastewater from:

- Sidewalk [illegible]
- Vehicle [illegible]
- Pavement [illegible]
- Water [illegible]
- Equipment [illegible]

Do you know ... where the water should go?

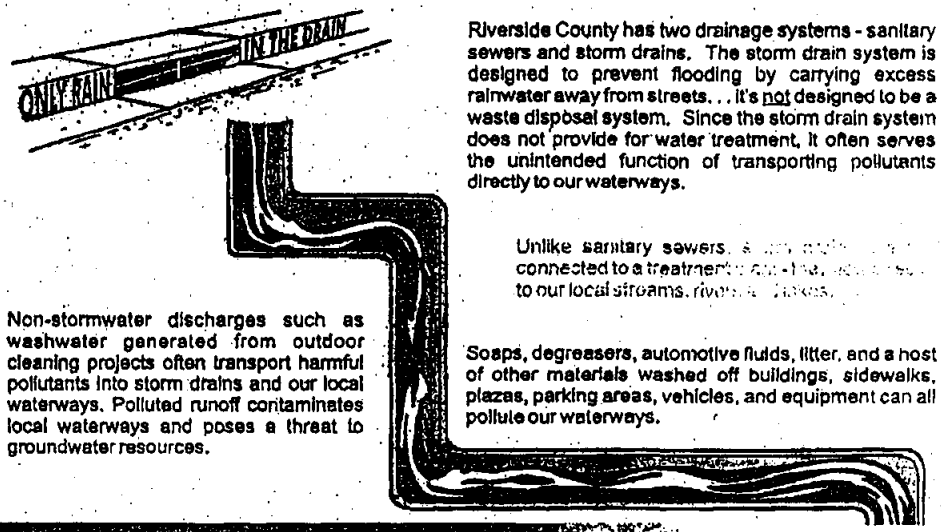

Riverside County has two drainage systems - sanitary sewers and storm drains. The storm drain system is designed to prevent flooding by carrying excess rainwater away from streets. . . it's not designed to be a waste disposal system. Since the storm drain system does not provide for water treatment, it often serves the unintended function of transporting pollutants directly to our waterways.

Unlike sanitary sewers, [illegible] connected to a treatment [illegible] to our local streams, rivers [illegible] lakes.

Non-stormwater discharges such as washwater generated from outdoor cleaning projects often transport harmful pollutants into storm drains and our local waterways. Polluted runoff contaminates local waterways and poses a threat to groundwater resources.

Soaps, degreasers, automotive fluids, litter, and a host of other materials washed off buildings, sidewalks, plazas, parking areas, vehicles, and equipment can all pollute our waterways.

The Cities and County of Riverside StormWater/CleanWater Protection Program

Since preventing pollution is much easier, and less costly than cleaning up after the fact, the Cities and County of Riverside StormWater/CleanWater Protection Program informs [illegible] and businesses of pollution prevention activities such as those described in this pamphlet.

The Cities and County of Riverside have adopted ordinances for stormwater management and discharge control. In accordance with state and federal law, these local stormwater ordinances prohibit the discharge of wastes into the storm drain system or local surface waters. This includes non-stormwater discharges containing oil, grease, detergents, degreasers, trash, or other [illegible] materials.

PLEASE NOTE: The discharge of pollutants into the street, gutters, storm drain system, or waterways - without a Regional Water Quality Control Board permit or waiver - is ***strictly prohibited*** by local ordinances and state and federal law.

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Help Protect Our Waterways!

Use These Guidelines For Outdoor Cleaning Activities and Washwater Disposal

DO . . . Dispose of **small amounts of washwater from cleaning building exteriors, sidewalks, or plazas** onto landscaped or unpaved surfaces provided you have the owner's permission and the discharge will not cause flooding or nuisance problems, or flow into a storm drain.

DO NOT . . . Discharge **large amounts** of these types of washwater onto landscaped areas or soil where water may run to a street or storm drain. Wastewater from exterior cleaning may be pumped to a sewer line with specific permission from the local sewering agency.

DO . . . Check with your **local sewering agency's policies and requirements concerning waste water disposal. Water from many outdoor cleaning activities may be acceptable for disposal to the sewer system.** See the list on the back of this flyer for phone numbers of the sewering agencies in your area.

DO NOT . . . Pour **hazardous wastes** or toxic materials into the storm drain or sewer system . . . properly dispose of it instead. When in doubt, contact the local sewering agency. The agency will tell you what types of liquid wastes can be accepted.

DO . . . Understand that **water (without soap) used to remove dust from clean vehicles** may be discharged to a street or storm drain. **Washwater from sidewalk, plaza, and building surface cleaning** may go into a street or storm drain if ALL of the following conditions are met:

1) The surface being washed is free of residual oil stains, debris and similar pollutants by using dry cleanup methods (sweeping, and cleaning any oil or chemical spills with rags or other absorbent materials before using water).
2) Washing is done with water only - no soap or other cleaning materials.
3) You have not used the water to remove paint from surfaces during cleaning.

DO NOT . . . Dispose of water containing **soap or any other type of** cleaning agent into a storm drain or water body. This is a direct violation of state and/or local regulations. Because **wastewater from cleaning** parking areas or roadways normally contains metallic brake pad dust, oil and other automotive fluids, it should never be discharged to a street, gutter, or storm drain.

DO . . . Understand that **mobile auto detailers** should divert washwater to landscaped or dirt areas. Note: Be aware that soapy washwater may adversely affect landscaping; consult with the property owner. Residual washwater may remain on paved surfaces to evaporate; sweep up any remaining residue. If there is sufficient water volume to reach the storm drain, collect the runoff and obtain permission to pump it into the sanitary sewer. Follow local sewering agency's requirements for disposal.

DO NOT . . . Dispose of left over cleaning agents into the gutter, storm drain or sanitary sewer.

Regarding Cleaning Agents:

If you must use soap, use biodegradable/phosphate free cleaners. Avoid use of petroleum based cleaning products. Although the use of nontoxic cleaning products is strongly encouraged, *do* understand that these products can still degrade water quality and, therefore, the discharge of these products into

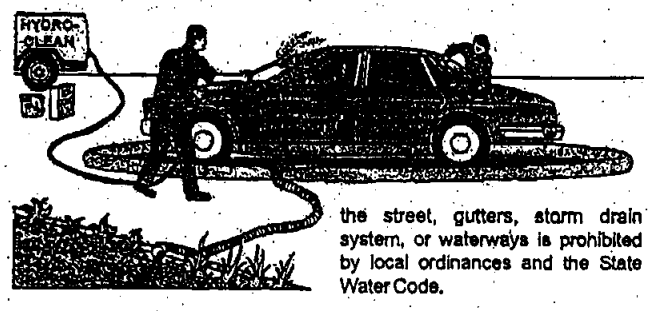

the street, gutters, storm drain system, or waterways is prohibited by local ordinances and the State Water Code.

Note: When cleaning surfaces with a high pressure washer or steam cleaning methods, additional precautions should be taken to prevent the discharge of pollutants into the storm drain system. These two methods of surface cleaning, as compared to the use of a low pressure hose, can remove additional materials that can contaminate local waterways.

Other Tips to Help Protect Our Water . . .

Screening Wash Water

A thorough dry cleanup before cleaning (no soap) surfaces such as building exteriors and [illegible] without loose paint; sidewalks, or plaza areas should *be sufficient to protect storm drains.* [illegible] debris (solids) could enter storm drains or remain in the gutter or street after cleaning, washwater should first pass through a "20 mesh" or finer screen to catch the solid material, which should then be disposed of in the trash.

Drain Inlet Protection/ Containing & Collecting Wash Water

- Sand bags can be used to create a barrier around storm drain inlets.
- Plugs or rubber mats can be used to temporarily seal storm drain openings.
- You can also use vacuum booms, [illegible] pads, or temporary berms to keep [illegible] away from the street, gutter or storm drain.

Equipment and Supplies

Special materials such as absorbents, [illegible] plugs and seals, small sump pumps, and booms are available from many vendors. For more information check catalogs such as New [illegible] (800-468-4647), Lab Safety Supply (800-356-0783), [illegible] (800-558-9966), and W.W. Grainger (800-[illegible]) or call the Cleaning Equipment Trade Association (800-441-0111) or the Power Washing [illegible] America (800-393-PWNA).

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RIVERSIDE COUNTY COMMUNITY HEALTH AGENCY
DEPARTMENT OF ENVIRONMENTAL HEALTH

HOUSEHOLD HAZARDOUS WASTE COLLECTION

SCHEDULE FOR SEPTEMBER 2004 THRU JUNE 2005

ABOP Sites- (Antifreeze, Car & Home Batteries, Oil & Oil Filters, & Latex Paint Only!) are open every Saturday except Holiday weekends. Click on "ABOP Sites" to go to site locations, maps and schedules of operation. If you are just interested in recycling used motor oil there are many drop off centers throughout Riverside County in addition to our ABOP sites. Go to Drop Off Centers for a complete listing. For ways to recycle tree trimmings, construction debris scrap appliances or electronic waste (universal waste) go to recycling resources.

For the Latest information call our 24 hour Household Hazardous Waste Hot line: (951) 358-5256 or (800) 304-2226

For Household Hazardous Waste Disposal Sites outside Riverside County go to Earth 911

The following locations are scheduled for the collection of Household Hazardous Waste (HHW) on the dates indicated. The sites will be open from 9:00 a.m. until 2:00 p.m. These sites are for the use of Riverside County Residents only. State law prohibits the non-licensed transport of hazardous waste liquid greater than 5 gallons or more than 50 pounds total per vehicle per trip - enforced by CHP (multiple trips are allowed). All containers must be marked and secured so as not to leak. What are Household Hazardous Wastes?

Restrictions: No business or non-profit waste; No explosives/ammunition; No 30 or 55 gallon drums; No radioactive materials; No appliances; No tires, No TV's or Computer Monitors (CRTs) and No medical waste except syringes and hypodermic needles (sharps). CRTs can be taken to County Landfills for recycling, you may go to the Waste Management Department's website for more information.

Services - Now Available

Residents (primarily diabetics) may dispose of their syringes/hypodermic needles at our Mobile Household Hazardous Waste Collection events. Sharps containers are available at no charge, while supplies last. Please see our informational bulletin on How to Dispose of Used Needles and Syringes at Home.

Conditionally Exempt Small Quantity Generators (CESQG)
What is a CESQG? Businesses that generate 27 gallons or 220 lbs of hazardous waste or 2.2 lbs of extremely hazardous waste per month are called CESQGs. Businesses are required to use a licensed hazardous waste hauler to manifest and transport their waste. The most common CESQGs are painters, print shops, auto shops, builders, churches, schools, non-profit groups and property managers.
What is the CESQG Program? This program is a hazardous waste pick-up disposal service for eligible businesses/non-profit organizations in the County of Riverside. This program provides an affordable way to legally dispose of this waste. To arrange an appointment or request further information call 1-800-952-5566.

Collection sites are closed during inclement weather such as rain or high winds!

Location	Date
Banning Area	November 6, 2004 May 7, 2005
Blythe	November 13, 2004 April 9, 2005
Calimesa	March 26, 2005
Canyon Lake	April 16, 2005
Cathedral City	November 12 &13, 2004 March 4 & 5, 2005
Corona	September 24 & 25, 2004 January 21 & 22, 2005 April 22 & 23, 2005 June 3 & 4, 2005
Desert Hot Springs	January 8, 2005
Hemet	November 19 & 20, 2004 June 24 & 25, 2005
Idyllwild	May 21, 2005
Indio- Coachella	December 11, 2004
Lake Elsinore	1st Saturday of Each Month (Except December & January)
La Quinta	October 2, 2004 April 2, 2005
Moreno Valley	October 15 & 16, 2004 February 4 & 5, 2005 June 17 & 18, 2005

Murrieta	September 17 & 18, 2004 January 28 & 29, 2005 May 13 & 14, 2005
Norco	October 23, 2004 March 19, 2005
Palm Springs	October 29 & 30, 2004 April 29 & 30, 2005
Pedley	September 3 & 4, 2004 March 25 & 26, 2005
Rancho Mirage	April 9, 2005
Riverside	September 11, 2004 December 4, 2004 March 12, 2005 June11, 2005
San Jacinto	February 26, 2005
Anza Transfer Station	March 12, 2005 September 17, 2005 December 3, 2005
Desert Center Landfill	February 3, 2005
Mecca II Landfill	May 21, 2005 October 22, 2005
Aguanga Fire Station	June 11, 2005 October 8, 2005
Pinyon Flats Dropoff Center	May 7, 2005 November 5, 2005

HHW SITE ADDRESSES

Banning

Repplier Park
789 N. San Gorgonio Ave (Cross of Wilson St.), Banning - 92220
Click here for map of Repplier Park in Banning from Yahoo! Maps TB722B2

Blythe

Riverside County Administration Center
260 N. Broadway Street (Cross of Murphy St.), Blythe - 92225
Click here for map of Riverside County Administration Center from Yahoo! Maps TB5491E6

Calimesa

Calimesa City Hall/Community Center
908 Park Ave. (Cross of Erwin St.), Calimesa - 92320
Click here for map of Calimesa City Hall/Community Center from Yahoo! Maps TB649H7

Canyon Lake

The City of Canyon Lake Parking Lot
31516 Railroad Canyon Road (Cross of Canyon Lake Drive, S.E. corner of Business Ctr), Canyon Lake - 92587
Click here for map of Canyon Lake Parking Lot from Yahoo! Maps TB867E4

Cathedral City

68-700 Avenida Lalo Guerrero, (Cross of Van Fleet Ave. & Buddy Rogers Ave) Cathedral City - 92234
Click here for map of Cathedral City from Yahoo! Maps TB787E7

Corona

City of Corona Corp Yard
730 Corp Yard Way Formerly McGrath Dr. (Cross of Cota St.), Corona - 91720
Click here for map of City of Corona from Yahoo! Maps TB743C4

Desert Hot Springs

CDF Fire Station #37
65958 Pierson Blvd. (Cross of West Dr.), Desert Hot Springs - 92240
Click here for map of CDF Fire Station #37 from Yahoo! Maps TB696H4

Hemet - San Jacinto

Riverside County Road Yard
595 North Juanita Ave. (Cross of Oakland Ave.), Hemet - 92343
Click here for map of TLMA Facility in Hemet from Yahoo! Maps TB811A6

Idyllwild

Riverside County Road Yard
25780 Johnson Road (Cross of Hwy. 243off Maranatha Dr.), Idyllwild - 92349
Sorry there is no map available. TB814C6

Indio - Coachella

National Date Festival Fairground
46-350 Arabia St., (Enter by Dr. Carreon Blvd. Gate #6) Indio - 92201
Click here for map of National Date Festival from Yahoo! Maps TB5470F2

La Quinta

Parking Lot South Side of Avenue 52

Click here for map of Riverside City Corporation Yard from Yahoo! Maps TB715D5

San Jacinto

City of San Jacinto, Old City Corporation Yard
910 Industrial Way, (Cross of Grand Ave.), San Jacinto - 92582
Click here for map of San Jacinto City Corporation Yard from Yahoo! Maps TB810J2

Household Hazardous Waste Collection
Sponsored by Riverside County Waste Management Department
For Information regarding these collection sites call (951) 486-3283 or (951) 486-3308
or go to their web site at http://www.rivcowm.org//Recycling/HHW-Flyer.htm
Hours of Operation 10:00 am to 2:00 pm

Mecca II Landfill

95-250 66th Avenue, approximately two miles east of Hwy 111 and north of the Salton Sea

Desert Center Landfill

17-991 Kaiser Road, north of I-10 and west of Hwy 177

Anza Transfer Station

40329 Terwillinger Road and the Anza Landfill property, south of Hwy 371 and adjacent to the Cahuilla Reservation

Aguanga Fire Station

Cottonwood Fire Station - 44222 Sage Road, north of Hwy 79

Pinyon Flats Dropoff Center

Southern end of Pinyon Flats Road

ABOP SITE ADDRESSES

Only Antifreeze, Batteries, Oil and Latex Paint will be accepted!
These sites are open on Saturdays only, from 9:00 a.m. until 2:00 p.m. (except Palm Springs 7:00 a.m. - 12:00 p.m. during June, July, August & September). They will be closed on Saturdays of holiday weekends. Note: Sites are closed on inclement weather days (high winds, rain, etc.)

These sites are for the use of Riverside County Residents only, who may not transport liquid hazardous waste over 5 gallons or more than 50 pounds total per vehicle per trip - enforced by CHP (multiple trips are allowed). All containers must be marked and secured so as not to leak.

No business or non-profit organization waste accepted and No 30 or 55 gallon drums.

Pedley (Riverside)

Riverside County TLMA Maintenance Facility
6851 Van Buren Blvd. (Cross of Clay Street), Riverside - 92509
Click here for map of TLMA Facility in Riverside from Yahoo! Maps

Palm Springs

Palm Springs Fire Department Training Center
3000 East Alejo Road (Cross of Civic Dr.), Palm Springs - 92262
Open 7:00 a.m. - 12:00 p.m. during June, July, August & September
Click here for map of Palm Springs Fire Department Training Center from Yahoo! Maps

Southwest County (Murrieta)

Riverside County TLMA Maintenance Facility
25315 Jefferson Ave.(Cross of Murrieta Hot Springs Road), Murrieta - 92362
Click here for map of Riverside County TLMA Maintenance Facility from Yahoo! Maps

City of Hemet

The City of Hemet operates a ABOP site, for City residents, at the City of Hemet Corporation Yard, 3777 Industrial Ave. The site operates Monday thru Friday from 8:00 a.m. to 4:00 p.m. Call the City at (951) 765-2319 for more information.
Click here for map of City of Hemet Corporation Yard (approximate location) from Yahoo! Maps

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For additional information, please visit the following websites:

State Water Quality Resources Control Board
http://www.swrcb.ca.gov/stormwtr/index.html

OR

E-mail us at:
flood.fcnpdes@co.riverside.ca.us

OR

Call our TOLL FREE HOTline number at **1-800-506-2555**, to report illegal storm drain disposal, or visit our website at http://www.co.riverside.ca.us/depts/flood/YouCanHelp.asp

RIVERSIDE COUNTY ANIMAL SHELTER LOCATIONS:

BLYTHE
16450 West Hobson Way
Blythe, CA 92225
760-921-7857

HEMET
800 South Sanderson
Hemet, CA 92545
909-925-8025

INDIO
45-355 Van Buren
Indio, CA 92201
760-347-2319

RIVERSIDE
5950 Wilderness Avenue
Riverside, CA 92504
909-358-7387

FOR ALL OTHER AREAS CALL 1-888-636-7387

Riverside County gratefully acknowledges the City of Los Angeles Stormwater Program for the design concept of this brochure.

What's the Scoop?

TIPS FOR A HEALTHY PET AND A HEALTHIER ENVIRONMENT

CREATE A HEALTHY ENVIRONMENT in and around your home by following these simple pet practices. Your pet, family and neighbors will appreciate their clean comfortable surroundings.

HOUSEHOLD PETS

We all love our pets, but pet waste is a subject everyone likes to avoid. Pet waste left on trails, sidewalks, streets, and grassy areas are immediately flushed into the nearest waterway when it rains. Even if you can't see water near you, the rain or waste water WASHES all that PET WASTE and BACTERIA INTO THE STORMDRAIN, where it travels to your neighborhood creek or lake untreated. These animal droppings also contain nutrients that can promote the growth of algae, in our streams and lakes. The risk of STORMWATER CONTAMINATION INCREASES, if pet waste is allowed to accumulate in animal pen areas or left on sidewalks, streets, or driveways where runoff can carry them to storm sewers.

Some of the DISEASES THAT CAN SPREAD from pet waste are E. coli, a bacterium that can cause disease, and fecal coliform bacteria, which is spread through feces. Dogs also carry salmonella and giardia. Organisms causing these diseases move from the dog into the environment. They can be carried by flies and other insects, wind and dust.

Flies and other pest insects can also increase when pet waste is disposed of improperly, becoming a nuisance and adding yet another vector for disease transmission.

WHAT CAN YOU DO?

- SCOOP up pet waste and flush it down the toilet.
- NEVER DUMP pet waste into a storm drain or catch basin.
- USE the complimentary BAGS or mutt mitts offered in dispensers at local parks.
- CARRY EXTRA BAGS when walking your dog and make them available to other pet owners who are without.
- TEACH CHILDREN how to properly clean up after a pet.
- TELL FRIENDS AND NEIGHBORS about the ill effects of animal waste on the environment. Encourage them to clean up after pets.

DID YOU KNOW ...Calling the TOLL FREE 1-800-506-2555 can be your one-stop resource to report improper storm drain practices, locate dates and times of your nearest Household Hazardous Waste Collection Event; obtain an array of free printed material on storm water pollution prevention, request classroom presentations, and free grasscycling information and composting workshops.

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SCOOP THE POOP

Many communities have "Scoop the Poop" laws that govern pet waste cleanup. Some of these laws specifically require anyone who walks an animal off of their property to carry a bag, shovel, or scooper. Any waste left by the animal must be cleaned up immediately. CALL YOUR LOCAL CODE ENFORCEMENT OFFICER to find out more about pet waste regulations.

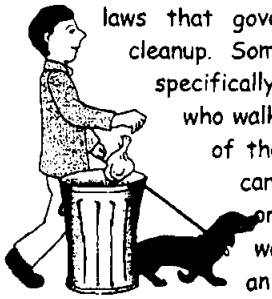

Pets are only one of the many fixtures of suburban America that add to water pollution. Lawn fertilizers, rinse water from driveways and motor oil also commonly end up in streams and lakes. **CALL 1-800-506-2555 FOR HOUSEHOLD HAZARDOUS WASTE COLLECTION LOCATIONS AND DATES** to dispose of your leftover hazardous materials. Maintain your automobile to avoid leaks. Dispose of used vehicle fluids properly. Your pets can be poisoned if they ingest gas, oil or antifreeze that drips onto the pavement or is stored in open containers.

NEVER HOSE VEHICLE FLUIDS into the street or gutter. USE ABSORBENT MATERIALS such as cat litter to clean-up spills. SWEEP UP used absorbent materials and place it in the trash.

HORSES AND LIVESTOCK

Fortunate enough to own a horse or livestock? You, too, can play a part in protecting and cleaning up our water resources. The following are a few simple Best Management Practices (BMPs) specifically designed for horse owners and landowners with horses.

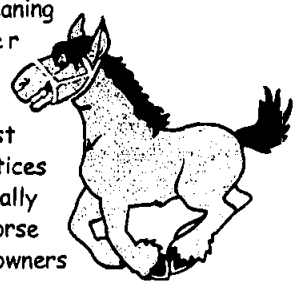

- **STORE** your manure properly. Do not store unprotected piles of manure in places where runoff may enter streams, and wash the manure away. Place a cover or tarp over the pile to keep rainwater out.
- **CHECK** with your local conservation district to design manure storage facilities to protect water quality. These structures usually consist of a concrete pad to protect ground water and a short wall on one or two sides to make manure handling easier.
- **TRY** composting - A vegetative cover placed around buildings or on steeper slopes can help minimize erosion and absorb nutrients while improving the appearance of your property. In addition, vegetative covers will provide animals with better traction during wet or icy conditions.

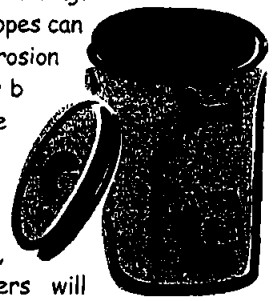

- **KEEP** animals out of steams - Designed stream crossings provide a safe, easy way for horses and livestock to streams. Fencing encourages the use of the crossing instead of the streambed to navigate streams. This will allow vegetation to stabilize natural stream banks and reduce sediment pollution.
- **MOW** pastures to proper height, six (6") inches is typically recommended.

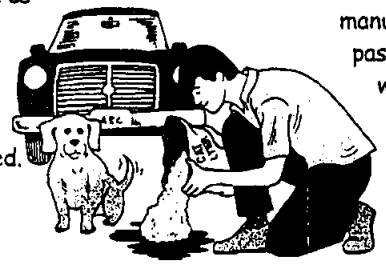

- **MATERIAL STORAGE SAFETY TIPS**
  Many of the chemicals found in barns require careful handling and proper disposal. When using these chemicals, be certain to follow these common sense guidelines:
  - Buy only what you need.
  - Treat spills of hoof oils like a fuel spill. Use kitty litter to soak up the oil and dispose of it in a tightly sealed plastic bag.
  - Store pesticides in a locked, dry, well-ventilated area.
  - Protect stored fertilizer and pesticides from rain and surface water.

Call 1-800-506-2555 to locate your local conservation district to find out what to do with your current backyard manure pile, how to re-establish a healthy pasture, what to do about weeds, and what grasses grow best in your soils.

Thank you for doing your part to protect your watershed, the environment, and the equestrian way of life in your community!

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Appendix E

Soils Report

February 9, 2007

INSERT SOILS REPORT WHEN AVAILABLE

Appendix F

Treatment Control BMP Sizing Calculations and Design Details

Volume Based BMPs

General

The largest concentrations of pollutants are found in runoff from small volume storms and from the first flush of larger storms. Therefore, volume based BMPs should be sized to capture and treat the initial and more frequent runoff surges that convey the greatest concentration of pollutants. To maximize treatment and avoid health hazards, volume-based BMPs must retain and release the runoff between a 24 and 72 hour period. This handbook typically recommends a draw down time of 48 hours, as recommended by the California BMP Handbook. The drawdown time refers to the minimum amount of time the design volume must be retained.

In order to meet RWQCB requirements, the method for determining the design volume is based on capturing 85 percent of the total annual runoff. These 85 percent capture values were determined throughout Riverside County using rain gages with the greatest periods of record. Key model assumptions are based on studies used in the *Urban Runoff Quality Management, WEF Manual of Practice No. 23/ASCE Manual of Practice No. 87, (1998)* and *the California Best Management Practice Handbook*. This handbook gives a simple procedure for determining the design volume of a BMP based on the location of the project.

BMP Design Volume Calculations

Following is a step-by-step procedure for determining design volume for BMPs using Worksheet 1. Examples of the following procedure can be found in Appendix B.

1. Create Unit Storage Volume Graph:
   a) Locate the project site on the Slope of the Design Volume Curve contained in Appendix A.
   b) Read the slope value at this location. This value is the Unit Storage Volume for a runoff coefficient of 1.0.
   c) Plot this value as a point (corresponding to a coefficient of 1.0) on the Unit Storage Volume Graph shown on Figure 2.
   d) Draw a straight line from this point to the origin, to create the graph.

2. Determine the runoff coefficient (C) from Figure 1 or the following relationship:

$$C = .858i^3 - .78i^2 + .774i + .04$$

where i = impervious percentage

3. Using the runoff coefficient found in step 2, determine 85th percentile unit storage volume (V_u) using Figure 2 (created in step 1).

4. Determine the design storage volume (V_{BMP}). This is the volume to be used in the design of selected BMPs presented in this handbook.

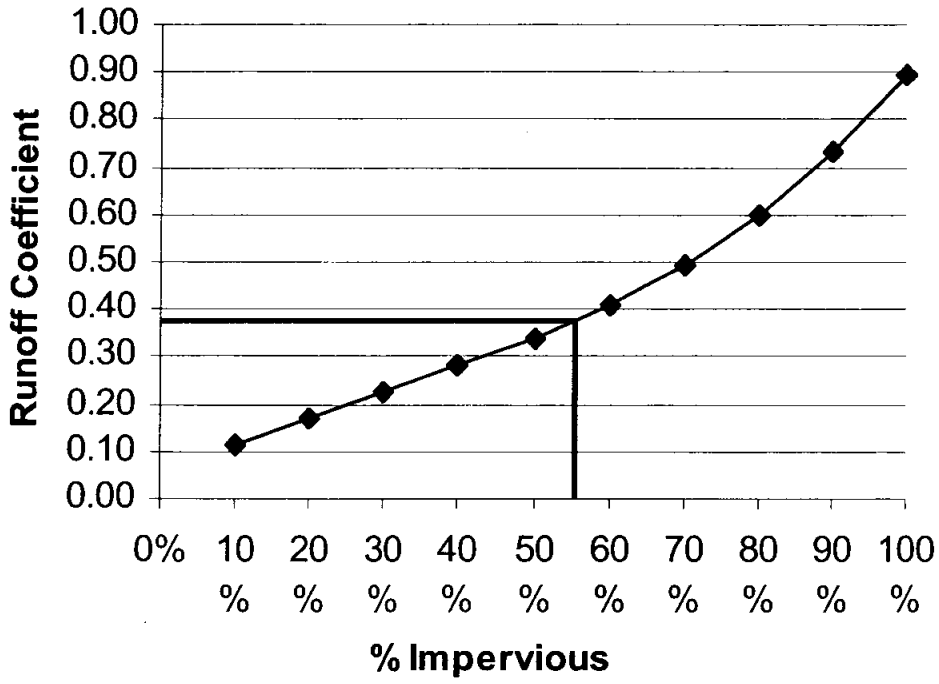

Figure 1. Impervious – Coefficient Curve (WEF/ASCE Method[1])

[1] Imperviousness is the decimal fraction of the total catchment covered by the sum of roads, parking lots, sidewalks, rooftops, and other impermeable surfaces of an urban landscape.

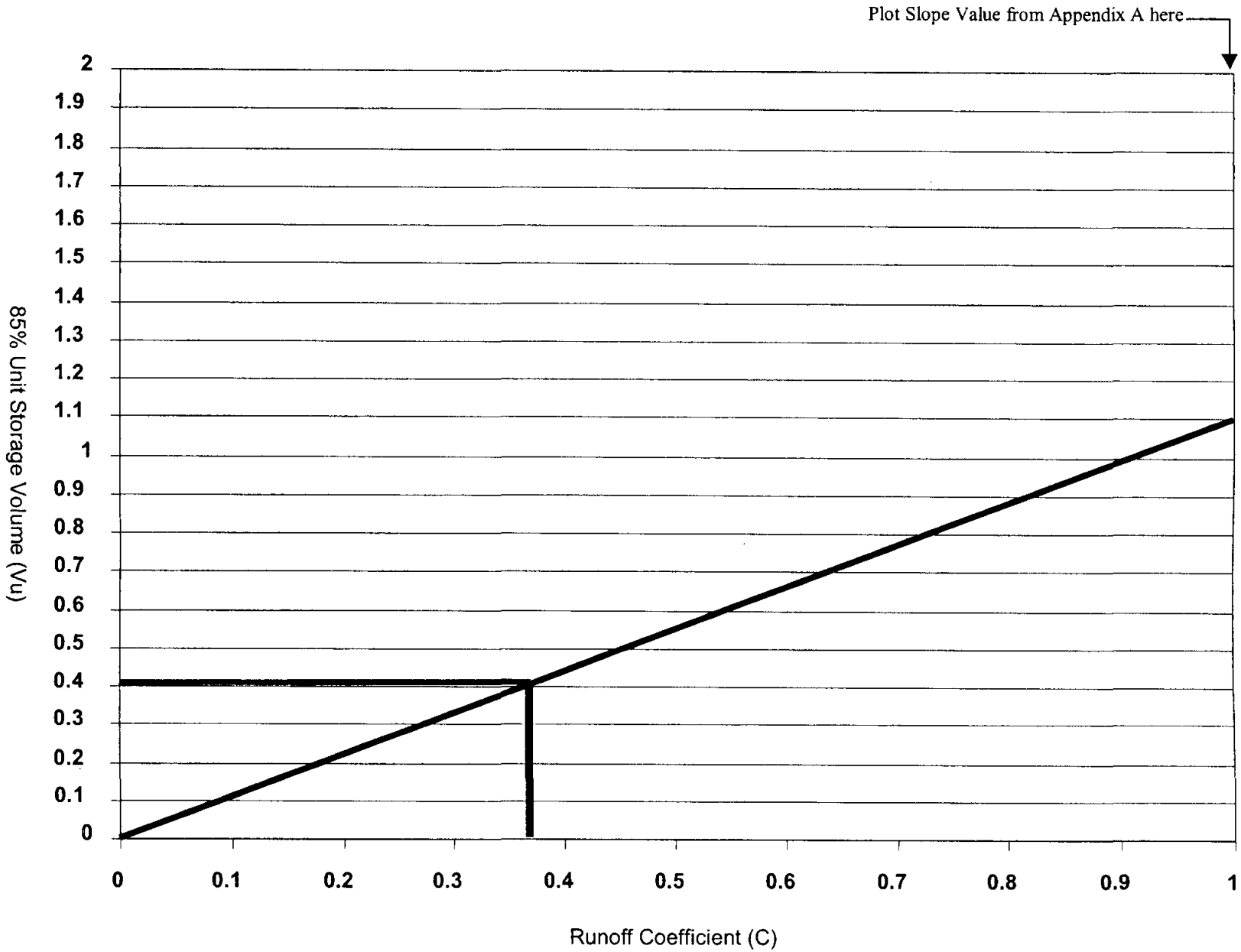

Figure 2 Unit Storage Volume Graph

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Worksheet 1

Design Procedure for BMP Design Volume

85th percentile runoff event

Designer: WWC
Company: HUNSAKER AND ASSOCIATES IRVINE, INC.
Date: FEBRUARY 9, 2007
Project: TTM 32778
Location: RIVERSIDE COUNTY

1. Create Unit Storage Volume Graph a. Site location (Township, Range, and Section). b. Slope value from the Design Volume Curve in **Appendix A**. c. Plot this value on the Unit Storage Volume Graph shown on **Figure 2.** d. Draw a straight line form this point to the origin, to create the graph	T 8S &R 2W Section 23 Slope = 1.10 Is this graph attached? Yes ☒ No ☐	*(1)* *(2)*
2. Determine Runoff Coefficient a. Determine total impervious area b. Determine total tributary area c. Determine Impervious fraction i = *(5)* / *(6)* d. Use *(7)* in **Figure 1** to find Runoff OR $C = .858i^3 - .78i^2 + .774i + .04$	$A_{impervious}$ = 9.09 acres A_{total} = 16.52 acres i = 0.55 C = 0.37	*(5)* *(6)* *(7)* *(8)*
3. Determine 85% Unit Storage Volume a. Use *(8)* in **Figure 2** Draw a Vertical line from *(8)* to the graph, then a Horizontal line to the desired V_u value.	V_u = 0.4 in-acre / acre	*(9)*
4. Determine Design Storage Volume a. V_{BMP} = *(9)* x *(6)* [in- acres] b. V_{BMP} = *(10)* / 12 [ft- acres] c. V_{BMP} = *(11)* x 43560 [ft^3]	V_{BMP} = 6.61 in-acre V_{BMP} = 0.55 ft-acre V_{BMP} = 23,958 ft^3	*(10)* *(11)* *(12)*

Notes:

Appendix G

Agreements – CC&Rs, Covenant and Agreements and/or Other Mechanisms for Ensuring Ongoing Operation, Maintenance, Funding and Transfer of Requirements for This Project-Specific WQMP

INSERT DOCUMENTS WHEN AVAILABLE

Appendix H

PHASE 1 ENVIRONMENTAL SITE ASSESSMENT – SUMMARY OF SITE REMEDIATION CONDUCTED AND USE RESTRICTIONS

INSERT DOCUMENTS

WHEN AND IF AVAILABLE

ATTACHMENT C

TRAINING LOGS

NPDES

STORMWATER QUALITY TRAINING FOR

I.) Construction
II.) Industrial / Commercial
III.) Municipal
IV.) Water Quality Management Plan (WQMP)

NO FEE TRAINING

Training: The Riverside County National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer Systems (MS4) Permits require annual training. The Santa Ana Regional Water Quality Control Board (RWQCB) Permit also requires new employees to receive training within six months of hire.

TO REGISTER: ***INTERNET ACCESSS IS REQUIRED TO REGISTER.*** *Please have all of the information below ready and register on-line at* www.eplyevents.com/riversidenpdes. *To help maintain class sizes you can only register 1 applicant for each log-in.* **Registration deadline is September 22, 2006**. **Seating is limited, so register early!**

- ATTENDEE'S NAME
- MUNICIPALITY
- DEPARTMENT
- CONTACT
- PHONE#
- EMAIL
- CLASS THEY WISH TO ATTEND
- FAX #

Overflow classes will be held in at the Murrieta City Hall. **The overflow class location will be closed unless reservations fill up in the other sessions. Hopefully we'll have a good idea if we need to open the class well in advance of the 15th of September. If classes do fill up we can open some of the Murrieta classes and extend the registration deadline. This should provide advance notice for any cancellations that may take place for our Murrieta locations.*

WHO SHOULD ATTEND:

I.) Construction Training is for building and construction staff that conducts:

- Construction Site Inspections / Enforcement
- Public Works Construction Activities
- Grading/Building Permit review staff (should attend 1 class, either WQMP or Construction, which ever is newest)
- Any staff reviewing or preparing construction project SWPPPs.

II.) Industrial Commercial Training is for health, building and code enforcement staff that conducts:

- Industrial/Commercial Site Inspections / Enforcement for Water Quality Ordinances

III.) Municipal Training is for municipal maintenance workers in:

- Building Services
- Parks Department
- Fleet Services
- Warehouse/Receiving Personnel
- Building & Grounds Maintenance

IV.) WQMP Training is for:

- Planning staff
- Engineering staff
- Plan Review and Plan Check staff
- Grading/Building Permit review staff (should attend 1 class, either WQMP or Construction, which ever is newest)
- Post-construction BMP inspectors interested in learning about the BMP design basis

I.) CONSTRUCTION TRAINING

WORKSHOP TOPICS:

- NPDES Regulatory Framework Overview
- Overview of General Construction Permit
- Site Inspection Responsibilities
- Enforcement Options
- Erosion/Sediment Control Best Management Practices (BMPs)
- Municipal Stormwater Permit Requirements
- Runoff Sampling and Analysis
- Post Construction BMPs
- Constituents of Concern in Urban Runoff from Construction Site Activities
- Storm Water Pollution Prevention Plans (SWPPP)

	Date and Time	Location
1	**Monday, October 2, 2006 - Half-Day Training (AM)** 9:00 A.M. – 12:00 A.M.	**Riverside County Flood Control & Water Conservation District** 1995 Market Street – Conference Room 1 Riverside, CA 92501 Phone: 951.955.1200
2	**Monday, October 16, 2006 - Half-Day Training (PM)** 1:00 P.M. – 4:00 P.M.	**Riverside County Flood Control & Water Conservation District** 1996 Market Street – Conference Room 1 Riverside, CA 92501 Phone: 951.955.1201
3	**Thursday, October 12, 2006 -** Half-Day Training (AM) 9:00 A.M. – 12:00 P.M.	**Palm Springs Convention Center** 277 N. Avenida Caballeros - Parking at the NE corner of Amado Rd. and Alvarado Rd. Palm Springs, CA 92262 Phone: 800.333.7537
4	**Tuesday, October 17, 2006 -** Half-Day Training (PM) 1:00 P.M. – 4:00 P.M.	**Palm Springs Convention Center** 277 N. Avenida Caballeros - Parking at the NE corner of Amado Rd. and Alvarado Rd. Palm Springs, CA 92262 Phone: 800.333.7537
5	**Tuesday, October 10, 2006 - Half-Day Training (PM)** 1:00 P.M. – 4:00 P.M.	**Murrieta City Hall*** 26442 Beckman Court - City Counsel Chambers (Street parking and entrance is through the rear of the building) Murrieta, CA 92562 Phone: 951.461.6075
6	**Wednesday, October 18, 2006 - Half-Day Training (AM)** 9:00 A.M. – 12:00 P.M.	**Murrieta City Hall*** 26443 Beckman Court - City Counsel Chambers (Street parking and entrance is through the rear of the building) Murrieta, CA 92562 Phone: 951.461.6076

II.) INDUSTRIAL / COMMERCIAL TRAINING

WORKSHOP TOPICS:

- NPDES Regulatory Framework Overview
- Overview of General Industrial Activities Storm Water Permit (GIASP)
- Municipal Stormwater Permit Requirements
- County and City Stormwater Ordinances
- Protocols for Industrial/Commercial Facilities Inspections
- Drainage Area Management Plan (DAMP) and Enforcement/Compliance procedures
- Pollution Prevention Plans (PPPs)
- Best Management Practices (BMPs)
- Constituents of Concern in Urban Runoff from Industrial/Commercial Facilities

	Date and Time	Location
1	**Tuesday, October 3, 2006 - Half-Day Training (AM)** 8:00 A.M. – 11:00 A.M.	**Riverside County Flood Control & Water Conservation District** 1996 Market Street – Conference Room 1 Riverside, CA 92501 Phone: 951.955.1201
2	**Monday, October 23, 2006 - Half-Day Training (PM)** 1:00 P.M. – 4:00 P.M.	**Riverside County Flood Control & Water Conservation District** 1997 Market Street – Conference Room 1 Riverside, CA 92501 Phone: 951.955.1202
3	**Wednesday, October 11, 2006 -** Half-Day Training (PM) 1:00 A.M. – 4:00 A.M.	**Palm Springs Convention Center** 277 N. Avenida Caballeros - Parking at the NE corner of Amado Rd. and Alvarado Rd. Palm Springs, CA 92262 Phone: 800.333.7536
4	**Thursday, October 19, 2006 -** Half-Day Training (AM) 9:00 P.M. – 12:00 P.M.	**Palm Springs Convention Center** 277 N. Avenida Caballeros - Parking at the NE corner of Amado Rd. and Alvarado Rd. Palm Springs, CA 92262 Phone: 800.333.7537
5	**Thursday, October 5, 2006 - Half-Day Training (PM)** 1:00 P.M. – 4:00 P.M.	**Murrieta City Hall*** 26443 Beckman Court - City Counsel Chambers (Street parking and entrance is through the rear of the building) Murrieta, CA 92562 Phone: 951.461.6076
6	**Monday, October 9, 2006 - Half-Day Training (AM)** 8:00 A.M. – 11:00 P.M.	**Murrieta City Hall*** 26444 Beckman Court - City Counsel Chambers (Street parking and entrance is through the rear of the building) Murrieta, CA 92562 Phone: 951.461.6077

III.) MUNICIPAL TRAINING

WORKSHOP TOPICS:

- NPDES Regulatory Framework Overview
- Municipal Stormwater Permit Requirements
- Best Management Practices
- Pollution Prevention Plans
- Storage & Disposal of Chemicals
- Vehicle Cleaning & Maint.
- Pesticides & Fertilizers
- Painting Activities
- Landscape Maintenance
- Outdoor Loading Activities
- Pavement & Parking Lot Cleaning
- Parks Maintenance Activities
- Constituents of Concern in Urban Runoff from Municipal Facilities and Activities

	Date and Time	Location
1	**Monday, October 2, 2006 - Half-Day Training (PM)** 1:00 P.M. – 4:00 P.M.	**Riverside County Flood Control & Water Conservation District** 1996 Market Street – Conference Room 1 Riverside, CA 92501 Phone: 951.955.1201
2	**Monday, October 16, 2006 - Half-Day Training (AM)** 9:00 P.M. – 12:00 P.M.	**Riverside County Flood Control & Water Conservation District** 1997 Market Street – Conference Room 1 Riverside, CA 92501 Phone: 951.955.1202
3	**Thursday, October 12, 2006 -** Half-Day Training (PM) 1:00 P.M. – 4:00 P.M.	**Palm Springs Convention Center** 277 N. Avenida Caballeros - Parking at the NE corner of Amado Rd. and Alvarado Rd. Palm Springs, CA 92262 Phone: 800.333.7535
4	**Tuesday, October 17, 2006 -** Half-Day Training (AM) 9:00 P.M. – 12:00 P.M.	**Palm Springs Convention Center** 277 N. Avenida Caballeros - Parking at the NE corner of Amado Rd. and Alvarado Rd. Palm Springs, CA 92262 Phone: 800.333.7536
5	**Tuesday, October 10, 2006 - Half-Day Training (AM)** 9:00 A.M. – 12:00 P.M.	**Murrieta City Hall*** 26443 Beckman Court - City Counsel Chambers (Street parking and entrance is through the rear of the building) Murrieta, CA 92562 Phone: 951.461.6076
6	**Wednesday, October 18, 2006 - Half-Day Training (PM)** 1:00 P.M. – 4:00 P.M.	**Murrieta City Hall*** 26444 Beckman Court - City Counsel Chambers (Street parking and entrance is through the rear of the building) Murrieta, CA 92562 Phone: 951.461.6077

IV.) WQMP TRAINING

WORKSHOP TOPICS:

- National Pollutant Discharge Elimination System (NPDES) Regulatory Overview
- Constituents of Concern in Urban Runoff from New Development & Significant Re-development
- Solutions Overview
- Best Management Practices (BMPs) for:
  - ✓ Site Design
  - ✓ Source Control
  - ✓ Treatment Control
- Implementing the Water Quality Management Plan (WQMP) Guidance Documents

	Date and Time	Location
1	**Tuesday, October 3, 2006 - Half-Day Training (PM)** 12:00 P.M. – 4:00 P.M.	**Riverside County Flood Control & Water Conservation District** 1997 Market Street – Conference Room 1 Riverside, CA 92501 Phone: 951.955.1202
2	**Monday, October 23, 2006 - Half-Day Training (AM)** 8:00 A.M. – 12:00 P.M.	**Riverside County Flood Control & Water Conservation District** 1998 Market Street – Conference Room 1 Riverside, CA 92501 Phone: 951.955.1203
3	**Wednesday, October 4, 2006 - Half-Day Training (PM)** 1 P.M. – 5:00 P.M.	**Murrieta City Hall** 26443 Beckman Court - City Counsel Chambers (Street parking and entrance is through the rear of the building) Murrieta, CA 92562 Phone: 951.461.6076
4	**Thursday, October 12, 2006 - Half-Day Training (PM)** 1:00 A.M. – 5:00 P.M.	**Murrieta City Hall** 26445 Beckman Court - City Counsel Chambers (Street parking and entrance is through the rear of the building) Murrieta, CA 92562 Phone: 951.461.6078
5	**Thursday, October 5, 2006 - Half-Day Training (AM)** 8:00 A.M. – 12:00 P.M.	**Murrieta City Hall*** 26444 Beckman Court - City Counsel Chambers (Street parking and entrance is through the rear of the building) Murrieta, CA 92562 Phone: 951.461.6077
6	**Monday, October 9, 2006 - Half-Day Training (PM)** 12:00 A.M. – 4:00 P.M.	**Murrieta City Hall*** 26444 Beckman Court - City Counsel Chambers (Street parking and entrance is through the rear of the building) Murrieta, CA 92562 Phone: 951.461.6077

INDUSTRIAL/COMMERCIAL FACILITY ACTIVITIES TRAINING

8100-3

NPDES STORMWATER QUALITY TRAINING FOR INDUSTRIAL COMMERCIAL FACILITY ACTIVITIES

Meeting of: October 3, 2006 8 a.m. – 11 a.m. SIGN-IN SHEET

FIRST NAME	LAST NAME	MUNICIPALITY	DEPARTMENT	SIGNATURE
Michael	Adkins	City of Palm Desert	Code Compliance	
Bruce	Bailey	Riverside County	Environmental Health/Haz Mat	
Carolyn	Brown	Riverside County	Environmental Health/Haz Mat	
David	Brunmier	County of Riverside	Building and Safety	
Sandy	Bunchek	Riverside County	Environmental Health/Haz Mat	
Richard	Carrera	County of Riverside	Building and Safety	
Richard	Chase	County of Riverside	Waste Management	
Jessica	Chin	City of Riverside	Public Works	
Chris	Cordova	City of Beaumont	Code Enforcement	
Gayle	Cuneo	Riverside County	Flood Control	
Michael	Daly	Riverside County	Environmental Health/Haz Mat	
Rudy	Fandel	City of Corona	DWP	
Ted	Gascoigne	County of Riverside	Building and Safety	
Jim	Gill	County of Riverside	Building and Safety	
Richard	Guerrero	Riverside County	Environmental Health/Haz Mat	
Ronald	Horton	Riverside County	TLMA-Building & Safety	
George	Jediny	County of Riverside	Building and Safety	
Sung	Kack	RIVERSIDE	Building & Safety	
Kyle	Kim	County of Riverside	TLMA-building & safety	
Scott	Kraak	County of Riverside	Waste Management	
Ben	Mah	County of Riverside	Waste Management	
Roger	Miller	TLMA	Building & Safety	

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Training Location – Riverside County Flood Control and Water Conservation District

NPDES STORMWATER QUALITY TRAINING FOR INDUSTRIAL COMMERCIAL FACILITY ACTIVITIES

Meeting of: October 3, 2006 8 a.m. – 11 a.m. SIGN-IN SHEET

FIRST NAME	LAST NAME	MUNICIPALITY	DEPARTMENT	SIGNATURE
Arthur	Miller	County of Riverside	Building and Safety	
Paul	Mitchell	Riverside County	Environmental Health/Haz Mat	
Gino	Monterroso	Riverside County	Environmental Health/Haz Mat	
Penny	Nanney	Flood Control	NPDES	
Vic	Olmeda	Riverside County	Bldg. & Safety/ Admin.	
Lionel	Ornelas	City of Corona	DWP	
Cynthia	Overby	City of Beaumont	Code Enforcement	
Larry	Page	City of Perris	Public Works	
Christine	Parsons	Riverside County	Environmental Health/Haz Mat	
Dave	Reynolds	County of Riverside	Building and Safety	
Bernd	Schleicher	Riverside County	Environmental Health/Haz Mat	
Jim	Shaver	County of Riverside	Building and Safety	
James	Stratton	County of Riverside	Building and Safety	
Doug	Thompson	Riverside County	Environmental Health/Haz Mat	
Greg	Trujillo	County of Riverside	Building and Safety	
Tina	Tuason	RCFC	NPDES	
Chandra	Desai	County Re	NPDES	
Thomas	HSU	" "	"	
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RICHARD	CANERRA	" "	BLDG/SAFETY	

Training Location – Riverside County Flood Control and Water Conservation District

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NPDES STORMWATER QUALITY TRAINING FOR INDUSTRIAL COMMERCIAL FACILITY ACTIVITIES

Meeting of: October 19, 2006 9:00 a.m. – 12:00 p.m. SIGN-IN SHEET

FIRST NAME	LAST NAME	MUNICIPALITY	DEPARTMENT	SIGNATURE
Brad	Ballen	Riverside County	Environmental Health/Haz Mat	
Jeannie	Bigler	Riverside County	Building & Safety	
John	Carmona	State of California	Regional Water Quality Control Board	
Suhas	Chakraborty	CRWQCB	Stormwater	Suhas Kr. Chakraborty
Jerry	Copeland	County of Riverside	Waste Management	Jerry Copeland
Jackie	Jones	Riverside County	Environmental Health/Haz Mat	Jackie Jones
Larry	Joseph	County of Riverside	Waste Management	Larry Joseph
Steve	Kupsak	City of Moreno Valley	Parks & Recreation	
Vic	Olmeda	Riverside County	Bldg. & Safety/Admin	
Jim	Ray	Riverside County	Environmental Health/Haz Mat	
John	Riddell	Riverside County	Environmental Health/Haz Mat	
Bobby	Riggs	Riverside County	Environmental Health/Haz Mat	
Michael	Shalhub	Riverside County	Environmental Health/Haz Mat	
Carolinn	Shay	Riverside County	Environmental Health/Haz Mat	
Anastasia	Studer	Riverside County	Environmental Health/Haz Mat	
Kent	Wegelin	City of Moreno Valley	Public Works	

Training Location – Palm Springs Convention Center

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NPDES STORMWATER QUALITY TRAINING FOR INDUSTRIAL COMMERCIAL FACILITY ACTIVITIES

Meeting of: **October 23, 2006 1:00 p.m. – 4:00 p.m.** **SIGN-IN SHEET**

FIRST NAME	LAST NAME	MUNICIPALITY	DEPARTMENT	SIGNATURE
Abdul	Behnawa	County of Riverside	Building & Safety	
Shad	Boal	County of Riverside	Building & Safety	
Christina	Bowser	City of Beaumont	Code Enforcement	Christina Bowser
Jessica	Chin	Riverside	Public Works	
Andrew	Cortez	County of Riverside	Waste Management	
Daniel	Gregorio	County of Riverside	Building & Safety	Daniel Gregorio
Doug	Hannah	County of Riverside	Building & Safety	
Steve	Hooper	City of Riverside	Public Works	
Rob	Istik	County of Riverside	Waste Management	
Jeramy	Jackson	City of Moreno Valley	Public Works	
Shawn	Kilpatrick	City of Palm Desert	Code Compliance	
Tim	King	City of Riverside	Public Works	
David	Leonard	County of Riverside	Building & Safety	
Derick	London	County of Riverside	Building & Safety	
Ed	Lotz	Riverside County Flood Control District	Encroachment Permits	
Ben	Matye	County of Riverside	Waste Management	
Shaheen	Mooman	Santa Ana	RCFC	
Linda	Nixon	City of Hemet	Public Works	
David	Ortego	Riverside County	Flood Control	
Neil	Ozonur	Riverside County	Environmental Health/Haz Mat	
Sande	Pence	Riverside County	Environmental Health/Haz Mat	
Al	Pielin	City of Riverside	Public Works	
Hart	Ponder	City of Palm Desert	Code Compliance	
Steven	Rainsbury	County of Riverside	Building & Safety	S. Rainsbury
Noah	Rau	County of Riverside	Waste Management	Noah Rau

Training Location – Riverside County Flood Control

0000097

NPDES STORMWATER QUALITY TRAINING FOR INDUSTRIAL COMMERCIAL FACILITY ACTIVITIES

Meeting of: October 23, 2006 1:00 p.m. – 4:00 p.m. **SIGN-IN SHEET**

FIRST NAME	LAST NAME	MUNICIPALITY	DEPARTMENT	SIGNATURE
Pedro	Rodriguez	City of Palm Desert	Code Compliance	
Ramon	Roman	County of Riverside	Waste Management	
Larry	Salazar	City of Riverside	Public Works	
Cindy	Snavely-Peck	City of Riverside	Public Works	
Brian	Stephenson	County of Riverside	Waste Management	
Jane	Tate	County of Riverside	Building & Safety	
Gabriel	Tejeda	County of Riverside	Building & Safety	
Johnny	Terfehr	City of Palm Desert	Code Compliance	
Manny	Vargas	Riverside County	Environmental Health/Haz Mat	
Nate	Viste	County of Riverside	Waste Management	
Ron	Welch	Riverside County	Building & Safety	
Panda	Workman	County of Riverside	Waste Management	
Mike	Yasmer	City of Riverside	Public Works	
John	Autrey	County of Riverside	Building & Safety	
TRIGH	FIELD	County of Riv. /EDA	EDA/RDA	

Training Location – Riverside County Flood Control

0000798

NPDES STORMWATER QUALITY TRAINING FOR
Industrial/Commercial Training
Riverside County Flood Control & Water Conservation District

Meeting of: Wednesday, April 18 - 13:00 - 16:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
1	Rene	Upson	City of San Jacinto	Community Development, Cd Enf	(951) 487-7330	
2	Phil	Hallberg	City of San Jacinto	Community Development, Cd Enf	(951) 487-7330	
3	Tom	Van Dorn	City of San Jacinto	Community Development, Cd Enf	(951) 487-7330	
4	Bob	Bohan	City of Canyon Lake	Code Enforcement	(951) 244-2955	
5	John	Bivens	City of Canyon Lake	Code Enforcement	(951) 244-2955	
6	Anthony	Moreno	City of La Quinta	Building & Safety	(760) 777-7034	
7	Moises	Rodarte	City of La Quinta	Code Enforcement	(760) 777-7050	
8	Paul	Shaffer	City of Corona	Department of Water and Power	(951) 279-3592	
9	Mark	Solano	City of Corona	Department of Water and Power	(951) 279-3558	
10	James	Thompson	City of Banning	Public Works	(951) 922-3142	
11	Ed	Rehfeld	City of Norco	Building and Safety		
12	Matt	Creason	City of Indian Wells	Public Works	(760) 776-0237	
13	Kareem	Zayed	City of Indio	PW/Engineering Division	(949) 474-1960	
14	Paul	Lucas	City of Indio	PW/Engineering Division	(949) 474-1960	
15	Kevin	Rhodes	Riverside County	Waste Management		
16	Benjamin	Mah	Riverside County	Waste Management		
17	Jerry	Copeland	Riverside County	Waste Management		
18	Brian	Stephenson	Riverside County	Waste Management	[illegible]	
19	Panda	Workman	Riverside County	Waste Management		
20	Scott	Kraak	Riverside County	Waste Management		

21	Benjamin	Matye	Riverside County	Waste Management		
22	Marin	Cionca	Riverside County	Waste Management		
23	Sarah	Watrous	Riverside County	Waste Management		
24	Nate	Viste	Riverside County	Waste Management		
25	Randy	Taylor	Riverside County	Waste Management		
26	Hart	Ponder	City of Palm Desert	Public Works	(760) 346-0611	
27	Johnny	Terfehr	City of Palm Desert	Public Works	(760) 346-0611	
28	Shawn	Kilpatrick	City of Palm Desert	Public Works	(760) 346-0611	
29	Larry	Joseph	Riverside Co	waste Mgt	951.312-88[illegible]	
30	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
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NPDES STORMWATER QUALITY TRAINING FOR
Industrial/Commercial Training
Riverside County Flood Control & Water Conservation District

Meeting of: Monday, April 30 - 13:00 - 16:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
1	Mike	Shetler	Riverside County	Executive Office	(951) 955-1186	
2	dan	cuthbertson	City of Norco	Public Works	(951) 270-5607	
3	Jeff	Potts	City of Corona	Public Works	(951) 736-2442	
4	Dennis	Hurford	City of Norco	Building and Safety		
5	Danny	Derrick	City of Norco	Building and Safety		
6	Michele	Colbert	City of Corona	Public Works	(951) 736-2248	
7	Laura	Bednar	City of Corona	~~Public Works~~ Fire	(951) 817-5792	
8	Jim	Nickell	Riverside County	Waste Management	[illegible]	
9	Larry	Joseph	Riverside County	Waste Management		
10	Richard	Chase	Riverside County	Waste Management		
11	Molly	Stewart	Riverside County	Waste Management		
12	Edward	Wee Eng	Riverside County	Waste Management	[illegible]	
13	Andy	Cortez	Riverside County	Waste Management		
14	Nimrod	Garay	Riverside County	Waste Management		N. Garay
15	Jeff	Gow	Riverside County	Waste Management	(951) 456-3244	
16	Fouad	Mina	Riverside County	Waste Management	[illegible]44	
17	Jerry	Gregory	Riverside County	Waste Management		
18	Joseph	Contaoi	Riverside County	Waste Management		
19	Eduardo	Castellanos	Riverside County	Waste Management		
20	Joseph	Hickman	Riverside County	Waste Management		
21	Kevin	Joyce	Riverside County	Waste Management		
22	Mike	Adkins	City of Palm Desert	Public Works	(760) 346-0611	
23	Pedro	Rodriguez	City of Palm Desert	Public Works	(760) 346-0611	
24	Stephen	Glenore	Riverside County	Waste Management		
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26	Paul	Lucas	Fuscoe Eng	Indio	949-271	4472
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CONSTRUCTION SITE INSPECTION TRAINING

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NPDES STORMWATER QUALITY TRAINING FOR
Construction Site Inspections
Riverside County Flood Control & Water Conservation District

Meeting of: October 2, 2006 9am - 12pm SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Signature
1	Henry	Aldredge	City of Corona	Public Works	
2	Ron	Allen	Beaumont	Public Works	
3	Ron	Allen	Beaumont	P.W.	
4	Thomas	Baier	City of Moreno Valley	PW/M&O	
5	Keith	Barnett	County of Riverside	Transportation Department	
6	Erwin	Barton	City of Moreno Valley	PW/M&O	
7	Alan	Bosia	City of Riverside	Public Works	
8	Mark	Bowles	County of Riverside	Transportation Department	
9	Dennis	Buckle	City of Moreno Valley	PW/M&O	
10	CRAIG	CARLSON	RIVERSIDE COUNTY	TLMA	
11	George	Chang	City of Moreno Valley	PW/M&O	
12	Jessica	Chin	City of Riverside	Public Works	
13	Troy	Clement	Beaumont	P.W.	
14	Tom	Collins	City of Riverside	Public Utilities - Water	
15	Sly	Collins	City of Moreno Valley	PW/M&O	
16	glen	crawford	riverside county	transportation dept	
17	Steve	Dondalski	County of Riverside	Building and Safety	
18	James	Dooley	County of Riverside	Transportation Department	
19	Brian	Durfee	City of Moreno Valley	PW/M&O	
20	Lisa	Elder	County of Riverside	Transportation Department	
21	Alfred	Fierro	City of Moreno Valley	PW/M&O	

NPDES STORMWATER QUALITY TRAINING FOR
Construction Site Inspections

Riverside County Flood Control & Water Conservation District

Meeting of: October 2, 2006 9am 12pm

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Signature
22	Rick	Fite	County of Riverside	Transportation Department	
23	Paul	Gearhart	City of Riverside	Public Utilities - Water	
24	Kevin	Gillette	County of Riverside	Transportation Department	
25	Morgan	Haun	City of Moreno Valley	PW/M&O	
26	Joe	Janda	Beaumont	P.W.	
27	DAVID	JANSEN	RIVERSIDE COUNTY	TLMA	
28	PAUL	jOHNSON	Riverside County	TLMA	
29	George	Kelley	City of Riverside	Public Utilities - Water	
30	Kyle	Kim	County of Riverside	TLMA-building & safety	
31	Eui	Kim	County of Riverside	Building & Safety Department	
32	Jeff	Lewellen	County of Riverside	Transportation Department	
33	BARRY	LEWIS	RIVERSIDE COUNTY	BUILDING AND SAFETY	
34	Andy	Lindsay	City of Riverside	Public Utilities - Water	
35	Eric	Lohr	County of Riverside	Transportation Department	
36	Gregory	McCombs	Riverside County	Building and Safety	
37	Roger	Miller	riverside county	building & safty	
38	gary	moss	Riverside county	transportation	
39	Mike	Neal	Beaumont	P.W.	
40	Larry	Page	City of Perris	Public Works	
41	WILLIAM	PEPPAS	COUNTY OF RIVERSIDE	BUILDING & SAFETY	
42	Byron	Reckstek	County of Riverside	Transportation Department	

NPDES STORMWATER QUALITY TRAINING FOR

Construction Site Inspections

Riverside County Flood Control & Water Conservation District

Meeting of: October 2, 2006 9am - 12pm SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Signature
43	Ryan	Righetti	County of Riverside	Transportation Department	
44	Emiliza	Rodolfo	County of Riverside	Building and Safety	
45	Paul	Russell	County of Riverside	Transportation Department	
46	Mojahed	Salama	County of Riverside	Transportation Department	
47	Dave	Thibault	Beaumont	P.W.	
48	Tina	Tuason	RCFC	NPDES	
49	Steven	Wann	County of Riverside	Transportation Department	
50	David	Zhao	County of Riverside	Building & Safety	
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Mike Neal	Public Work Beaumont
Ron Allen	Public Works Beaumont
Don Baker	Public Works - Riverside County
George Chang	Public Works, Moreno Valley
Dave Thibault	City of Beaumont P.W.

[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	TLMA
Paul [illegible]	City of [illegible]
[illegible] Jansen	TLMA
SYLVESTER [illegible]	Moreno Valley
ALAN BOSIA	CITY OF RIVERSIDE
[illegible] TOLZER	[illegible]
[illegible]	[illegible]
Henry [illegible]	[illegible]
Mark Bowlers	Riv Co TLMA

NPDES STORMWATER QUALITY TRAINING FOR

Construction Site Inspections

Murrieta City Hall

Meeting of: October 10, 2006 1pm - 4pm

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Signature
1	Michael	Aguilar	City of Murrieta	Engineering	
2	Venita	Anderson	City of Murrieta	Code Enforcement	
3	Mick	Bartholomew	City of Murrieta	Engineering	
4	Claire	Clark	Riverside County	Parks	
5	Dan	Cuthbertson	City of Norco	Public Works	
6	Lupe	Gomez	City Of Lake Elsinore	Engineering	
7	David	Hartman	City of Canyon Lakes	Building and Safety	
8	Jessie	Hillis	City of Canyon Lakes	Building and Safety	
9	Jeffrey	Hitch	City of Murrieta	Engineering	
10	Chris	McClain	City of Murrieta	Public Works	
11	Robert	Moehling	City of Murrieta	Engineering	
12	Farida	Naceem	City of Murrieta	Engineering	
13	Russ	Napier	City of Murrieta	Engineering	
14	George	Nelson	City of Murrieta	Code Enforcement	
15	Tom	Nowak	City of Murrieta	Engineering	
16	Sirath	Patzer	City Of Canyon Lake	Building and Safety	
17	Collins	Solomon	City of Murrieta	Engineering	
18	Ken	Sotelo	Riverside County	Parks	
19	Mark	Stoneking	City of Murrieta	Public Works	
20	Berisimo	Schaffer	City of Murrieta	Public Works	
21	SCOTT	BURNS	City of Lake Elsinore	Bldg + Safety	

Construction Site Inspections

Murrieta City Hall

Meeting of: October 10, 2006 1pm - 4pm

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Signature
22	Miriam	Shumway	City of Murrieta	M.P.D. Code Enforcement	Miriam Shumway
23	~~CLAIRE~~	~~CLARK~~	~~COUNTY RIVERSIDE~~	~~PARKS~~	
24	~~Vega~~ Chris	Vega-McLain	C.O.M.	Public Works	
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NPDES STORMWATER QUALITY TRAINING FOR

Construction Site Inspections

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NPDES STORMWATER QUALITY TRAINING FOR
Construction Site Inspections
Palm Springs Convention Center

Meeting of: October 12, 2006 9am - 12pm

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Signature
1	Loi	Chan	Riverside County	Building & Safety	
2	John	Collins	Coachella Valley Water District	Domestic Operations	
3	Frank	Crain	City of Coachella	Public Works	
4	Chuck	Dodd	City of Desert Hot Springs	Engineering	Chuck Dodd
5	Ryan	Duarte	City of Desert Hot Springs	Engineering	Ryan Duarte
6	TIM	FAGG	RIVERSIDE COUNTY	FLOOD CONTROL	Tim Fagg
7	Gordon	Fisher	City of Coachella	Public Works	
8	Beto	Gonzales	City of La quinta	Public Works	
9	Robert	Gray	County of Riverside	Transportation Department	
10	Steve	Grewe	County of Riverside	Transportation Department	Steve Grewe
11	Scott	Hamilton	City of La quinta	Public Works	
12	Rusty	Hannah	Riverside County	Building & Safety	
13	Steve	Kochell	City of La quinta	Public Works	
14	James	Lindsey	City of La quinta	Public Works	
15	GARY	LUNDBERG	RIVERSIDE COUNTY	FLOOD CONTROL	
16	Bob	Lyman	Riverside County	TLMA	
17	William	Mastas	city of palm springs	street maintenance	
18	Joe	Morales	Coachella Valley Water District	Domestic Operations	
19	David	Nelson	City of Moreno Valley	Public Works/Land Dev	
20	Dominick	Octavio	Riverside County	Building & Safety	
21	HENRY	OLIVO	RIVERSIDE COUNTY	FLOOD CONTROL	

NPDES STORMWATER QUALITY TRAINING FOR

Construction Site Inspections

Palm Springs Convention Center

Meeting of: October 12, 2006 9am - 12pm

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Signature
22	Demetrio	Pecina	City of La quinta	Public Works	
23	Roman	Ramirez	Riverside County	Building & Safety	
24	DARIO	SAMONTE	RIVERSIDE COUNTY	FLOOD CONTROL	Dario Samonte
25	James	Staight	City of La quinta	Public Works	
26	Daniel	Valenzuela	City of La Quinta	Public Works	
27	Kent	Wegelin	City of Moreno Valley	Public Works	
28	John C.	Wilson	County of Riverside	Transportation Department	
29	Ed	Wimmer	City of La Quinta	Public Works	
30	Hua-Hsing	Wu	Riverside County	Building & Safety	
31	Amy	Yu	Riverside County	Building & Safety	
32	DALE	ANDERSON	Riverside County	FLOOD CONTROL	
33	RON	ALEXANDER	C.V.W.D.	DOMESTIC	
34	RICHARD	BARNETT	CVWD	DOMESTIC	
35	DAN	FEWINGS	CVWD	Domestic	Daniel J. Fewings
36	MARK	BODNAR	CITY OF LA QUINTA	PUBLIC WORKS	
37	MIKE	BROWN	CITY OF PALM DESERT	P.W.	
38	TERRY	CEHIN	CITY OF PALM DESERT	P.W.	
39	Ruben	Castaneda	City of La Quinta	P.W.	
40	Raul	Hernandez	Palm Springs	P.W.	
41	Rick	Mitchell	Palm Springs	ST.	
42	Ris	Baker	Riverside Co.	B/S	

NPDES STORMWATER QUALITY TRAINING FOR

Construction Site Inspections

Palm Springs Convention Center

Meeting of: October 12, 2006 9am - 12pm

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Signature
43	RUSTY	HAUNATH	CO. RIV	B&S	
44	Kent	Wegelin	City of Moreno Valley	P.W	
45	DANIEL	VALENZUELA	C.O. LA QUINTA	P.W.	
46	Steve	Kochell	COLQ	PW	
47	Agustin	Arellano	COLQ	P/W	
48	Beto	Gonzales	COLQ	P/W	
49	DEMETRIO	PEGINA	COLQ	P.W	
50	James	Straight	"	P.W.	
51	Adolfo	Cabrera	"	PW	
52	ROBERT	FISHER	CITY OF COACHELLA	PW	
53	LOI	CHAN	COUNTY OF RIVERSIDE	B&S	
54	JAMES	Lindsey	City of L.Q	P/W	
55	TIM	BATTEN	City of L.Q.	P/W	
56	RAPHAEL	ALVARADO	City of LQ	P.W	
57	Pui Ting (Amy)	Yu	CO. RIV	B&S	
58					
59					
60					

0000814

How many times had this class?

NPDES STORMWATER QUALITY TRAINING FOR
Construction Site Inspections
Riverside County Flood Control and Water Conservation District

Meeting of: October 16, 2006 1pm - 4pm SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Signature	
1	SCOTT	BAKER	RIVERSIDECOUNTY	BUILDING AND SAFETY		3
2	Abdul	Behnawa	COUNTY OF RIVERSIDE	BUILDING AND SAFETY		2
3	Michael P.	Bess	Riverside Co.	Building & Saftey		
4	TODD	BILO	COUNTY OF RIVERSIDE	BUILDING AND SAFETY		2
5	Christina	Bowser	City of Beaumont	Code Enforcement		0
6	Ronald	Brawdy	Riverside County	Transportation Dept.		1
7	LAURENCE	BUCKLEY	RIVERSIDE COUNTY	BUILDING & SAFETY		3
8	ERNIE	BURNS	RIVERSIDE COUNTY	BUILDING & SAFETY		3
9	JORGE	CABALLERO	RIVERSIDE COUNTY	BUILDING & SAFETY		2
10	Michele	Colbert	City of Corona	Public Works		3
11	Chris	Cordova	City of Beaumont	Code Enforcement		
12	David [redacted]	Ortega [redacted]	Riverside County	Flood Control		2
13	DENNIS	DE SAGUN	COUNTY OF RIVERSIDE	BUILDING AND SAFETY		2
14	Stephen	Duffin	City of Corona	Public Works		
15	Daniel	Fernandez	County of Riverside	Building and Safety		2
16	Victor	Garcia	City of Riverside	Public Utilities - Electric		
17	Hany	Henein	City of Corona	Public Works		
18	Marianna	Hernandez	County of Riverside	Transportation Department		
19	Elias	Hutchinson	City of Moreno Valley	PW/M&O		1
20	Alfredo	Ignacio	Beaumont	P.W.		4
21	Jeramy	Jackson	City of Moreno Valley	Public Works		4

NPDES STORMWATER QUALITY TRAINING FOR

0000815

How Many Times Taken this class?

Construction Site Inspections

Riverside County Flood Control and Water Conservation District

Meeting of: October 16, 2006 1pm - 4pm

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Signature	
22	Carlos	Juarez	City of Moreno Valley	PW/M&O		1
23	Charles	Kolb	City of Moreno Valley	PW/M&O		
24	Kyung-Yol	Lee	County of Riverside	Building & Safety		3
25	David	Leonard	County of Riverside	Building and Safety	David Leonard	4
26	David	Lopez	County of Riverside	building - safety	David Lopez 4	
27	Bob	Lucas	City of Riverside	Public Utilities - Water	Robert F. Lucas	0
28	Art	Madril	City of Riverside	Public Utilities - Water	Art Madril	0
29	Alfredo	Martinez	County of Riverside	Building and Safety	Alfredo Martinez	0
30	Andy	McDonel	City of Moreno Valley	PW/M&O	AM	0
31	Dave	Miller	County of Riverside	Transportation Department	Dave Miller	
32	Mike	Neal	Beaumont	P.W.		
33	JESSICA	NGUYEN	RIVERSIDE COUNTY	BLDG & SAFETY	Jessica Nguyen	0
34	Dave	Ochs	Beaumont	P.W.	Dave Ochs	6
35	Greg	Oliver	City of Riverside	Public Utilities - Water	Greg Oliver	1
36	marty	otero	Riverside County	Transportation Dept.	Martin Otero	1
37	Cynthia	Overby	City of Beaumont	Code Enforcement	Cynthia Overby	3
38	Mike	Parsons	Beaumont	P.W.		2
39	Pepito	Pinlac	Beaumont	P.W.		6
40	Ernest	Precie	City of Moreno Valley	PW/M&O		
41	Michel	Ramek	Riverside County	TLMA/ Building and Safety	Michel Ramek	5
42	Charles	Ray	County of Riverside	TLMA	Charles Ray	3

NPDES STORMWATER QUALITY TRAINING FOR

Construction Site Inspections

0000816

How many times taken this class?

Riverside County Flood Control and Water Conservation District

Meeting of: October 16, 2006 1pm - 4pm

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Signature	
43	Justin	Robbins	County of Riverside	Transportation Department		0
44	Rick	Ryno	City of Riverside	Public Utilities - Water		
45	Greg	Schroeder	County of Riverside	Building & Saftey		3
46	TONY	SILVAS	CITY OF MORENO	PUBLIC WORKS		0
47	Paul	Spencer	City of Moreno Valley	PW/M&O		2
48	Brian	Thompson	City of Moreno Valley	PW/M&O	Brian Thompson	2
49	Robert	Torrence	Riverside County	Building & Safety	Robert L. Torrence	6
50	steven	toth	Riverside County	Transportation Dept	Steve Toth	2
51	James	Willem	City of Moreno Valley	PW/M&O		1
52	Art	Wilson	City of Moreno Valley	PW/M&O	Arthur L Wilson	
53	Albert	Cruz	City of Beaumont	P.W		1
54	Tom	Cole	City of Temecula	Code Enf		
55	Zara	Smith	City of Temecula	Code Enforcement		0
56	JEFF	GROVE	CITY OF TEMECULA	CODE ENF		
57	MIKE	McCAFFERTY	CNTY OF RIV	TLMA		5
58	RICK	SHARP	County of Riv	TLMA		4
59	Travis	Braga	County of Riv	TLMA		2
60	PHIL	BROEGAMLE	COUNTY OF RIVERSIDE	TLMA	Phil Broegamle	4
	Tim	[illegible]	[illegible]	[illegible]	[illegible]	2

Number of Times taken this class before

NPDES STORMWATER QUALITY TRAINING FOR

Construction Site Inspections

Palm Springs Convention Center

Meeting of: October 17, 2006 1pm - 4pm

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Signature	
1	Steve	Aguirre	City of Moreno Valley	P/W Enterprise Services		1st
2	Solarez	Albert	County of Riverside	Transportation Department		
3	Jeannie	Bigler	Riverside County	Building & Safety		3 out
4	John	Carmona	State of California	Regional Water Quality Control		1
5	Bo	Chen	City of Palm Desert	Public Works		
6	GLORIA	COHEN	CATHEDRAL CITY	ENGINEERING		2
7	Scott	Davenport	Coachella Valley Water District	Domestic Operations		0
8	Craig	Degroot	Riverside County	Building & Safety		3
9	David	DeRenard	Coachella Valley Water District	Domestic Construction		1
10	Jose	Enriquez	City of Coachella	Public Works		
11	JOHN ~~Dan~~	Collins ~~Fewings~~	Coachella Valley Water District	Domestic Operations		3
12	Gabe	Garza	Coachella Valley Water District	Domestic Operations		
13	Robert	Gray	County of Riverside	Transportation Department		
14	Brenda	Hannah	Riverside County	Building & Safety		3 or 4
15	Dave	Helfman	Riverside County	Building & Safety		4
16	George	Iniguez	City of Coachella	Engineering		
17	steve	lasley	indio	code enforcement		
18	Steve	Lech	Riverside County	Parks		2
19	Bob	Lyman	Riverside County	TLMA		
20	SHAWN	MADDOX	CATHEDRAL CITY	ENGINEERING INSPECTION		1
21	forest	meadows	city of indio	code enforcement		

NPDES STORMWATER QUALITY TRAINING FOR

0000818

Number of Times taken class before

Construction Site Inspections

Palm Springs Convention Center

Meeting of: October 17, 2006 1pm - 4pm

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Signature	
22	Jay	Mirpour	RWQCB-7	Stormwater		0
23	Fred	Moore	Riverside County	Building & Safety		2
24	Robert	Morris	County of Riverside	Transportation Department		0
25	Morgan	Newlin	City of Hemet	Public Works		2
26	Linda	Nixon	City of Hemet	Public Works	Linda Nixon	3
27	Joe	Ortiz	Riverside County	Building & Safety		2
28	Albert	Padilla	Coachella Valley Water District	Domestic Construction		2
29	Robert	Parsons	County of Riverside	Transportation Department		
30	Robert	Rodriguez	Coachella Valley Water District	Domestic Construction		1
31	Leah	Rodriguez	Government	Riverside County EDA		0
32	Anna	Rodriguez	Government	Riverside County EDA		0
33	Cora	Salas	City of Palm Desert	Public Works		0
34	Ralph	Scharffenberg	City of Moreno Valley	Public Works/ESA		0
35	Garry	Shopshear	Riverside County	Building & Safety		3
36	Joaquin	Tijerina	Government	Riverside County EDA		0
37	Alana	Townsend	City of Palm Desert	Public Works	Alana Townsend	3
38	carlos	vargas	indio	code enforcement		
39	Lance	Young	Coachella Valley Water District	Domestic Operations		2
40	MICHAEL	MOTT	CITY OF PALM SPRINGS	PUBLIC WORKS ENGINEERING		
41	MIKE	LYTAR	PALM SPRINGS	ENG.		
42	Michael	Ray	Waste Management	ENG		0

NPDES STORMWATER QUALITY TRAINING FOR

Construction Site Inspections

Number of times taken before

Palm Springs Convention Center

Meeting of: October 17, 2006 1pm - 4pm

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Signature	
43	C. Peebles	Peebles	C of SJ	ENG.	C Peebles	3
44	Terry	Hvemer	Tri Lake Consultants	Inspection	Terry Hvemer	0
45	Robert	Anderson	Tri Lake Consultants	Inspection	Robert S. Anderson	0
46	George	Carreia	TRI-LAKE CONSULTANTS	PERMIT INSPECTOR	[illegible]	1
47	Michelle	Corredato	Riverside County	EDA	Michelle Corredato	0
48						
49						
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0000820

SIGN-IN SHEET of
How Many times taken class before?

NPDES STORMWATER QUALITY TRAINING FOR
Construction Site Inspections
Murrieta City Hall

Meeting of: October 18, 2006 9am - 12pm

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Signature	
1	Jerry	Alegria	City of Temecula	Public Works		3
2	Doug	Armstrong	City of Temecula	Public Works		
3	Amer	Attar	City of Temecula	Public Works		3
4	Steven	Beswick	City of Temecula	Public Works		
5	Annie	Bostre - Le	City Of Temecula	Public Works		
6	Laura	Bragg	City of Temecula	Public Works		2
7	Steve	Brown	City of Temecula	Code Enforcement		
8	Greg	Butler	City of Temecula	Public Works		3
9	Lloyd	Bylund	County of Riverside	Building & Safety		2
10	Steve	Charette	City of Temecula	Public Works		2
11	Tom	Cole	City of Temecula	Code Enforcement		
12	Andrew	Cortez	County of Riverside	Waste Management		
13	George	De La Rosa	City of Temecula	TCSD		
14	Mayra	De La Torre	City of Temecula	Public Works		
15	Nimrod	Garay	County of Riverside	Waste Management		3
16	Eddie	Godinez	Moreno Valley, CA	Public Works/Land Dev.		
17	Jeff	Grove	City of Temecula	Code Enforcement		
18	Kavon	Haghighi	City of Temecula	Public Works		3
19	Kendra	Hannah	City of Temecula	Public Works		3
20	Scott	Harvey	City of Temecula	Public Works		2
21	Jack	Hodson	City of Temecula	Public Works		

NPDES STORMWATER QUALITY TRAINING FOR

How many times you have taken class before?

Construction Site Inspections

Murrieta City Hall

Meeting of: October 18, 2006 9am - 12pm

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Signature	
22	Mike	Hudson	City of Temecula	Public Works		2
23	Rob	Istik	County of Riverside	Waste Management		
24	Reza	James	City of Temecula	Public Works		3
25	Scott	Johnston	County of Riverside	Transportation Department		
26	Scott	Kraak	County of Riverside	Waste Management		
27	CORINNE	LANDEROS	COUNTY OF RIVERSIDE	BLDG AND SAFETY		2
28	Ben	Mah	County of Riverside	Waste Management		
29	Ben	Matye	County of Riverside	Waste Management		0
30	David	Maus	County of Riverside	Transportation Department		
31	David	McBride	City of Temecula	Public Works		
32	Karl	Nordgren	City of Temecula	TCSD		
33	Avlin	Odviar	City of Temecula	Public Works		
34	Jay	Oldham	City of Temecula	Public Works		0
35	Marianne	Parker	City of Temecula	Code Enforcement		2
36	Ron	Parks	City of Temecula	Public Works		
37	John	Pourkazemi	City of Temecula	Public Works		2
38	Alex	Ramirez	Moreno Valley, CA	Public Works/Land Dev.		3
39	Ramon	Roman	County of Riverside	Waste Management		0
40	Patrick	Ryan	City of Temecula	Public Works		3
41	Jon	Salazar	City of Temecula	Public Works		
42	Rick	Serven	City of Temecula	TCSD		

NPDES STORMWATER QUALITY TRAINING FOR

Construction Site Inspections

How many times you have taken class before?

Murrieta City Hall

Meeting of: October 18, 2006 9am - 12pm

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Signature	
43	Rudy	Shabec	City of Temecula	Public Works	Rudy Shabec	4
44	Steve	Sterling	City of Temecula	TCSD		
45	Nate	Viste	County of Riverside	Waste Management		
46	Chris	Vlahos	City Of Temecula	Public Works	Chris Vlahos	
47	Jean	Voshall	City of Temecula	Code Enforcement		
48	Chris	White	City Of Temecula	Public Works	Chris White	3
49	Panda	Workman	County of Riverside	Waste Management		
50	Evangelina	Zapien	County of Riverside	Waste Management	Evangel Zapien	3
51	Misty	Clark	City of Temecula	Code Enforcement		0
52	James	Hutchinson	City of San Jacinto	mnp	James	
53	JIM	SIKET	CITY SAN JAC.	ENGINEER.	Jim Siket	
54	Bill	McATEER	City of Temecula	Const. Mgr.		
55	David	Bilby	City of Temecula	Public Works	David Bilby	1
56	WILLIAM	BECERRA	City of Temecula	P/W		3
57	ALDO	LICITRA	COT	PW	Aldo Licitra	4
58						
59						
60						

NPDES STORMWATER QUALITY TRAINING FOR
Construction Training
Coachella Valley Water District

Meeting of: Tuesday, April 24 - 13:00 - 16:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
1	Amir	Modarressi	City of Indio	PW/Engineering Division	(760) 491-4017	
2	Jaime	Engler	City of Indio	PW/Engineering Division	(760) 391-4017	
3	Juan	Raya	City of Indio	PW/Engineering Division	(760) 391-4017	
4	Tom	Rafferty	City of Indio	PW/Engineering Division	(760) 391-4017	
5	Grant	Eklund	City of Indio	PW/Engineering Division	(760) 391-4018	
6	Adrienne	Dunfee	City of Indio	PW/Engineering Division	(760) 391-4017	
7	Roldan	Lopez	City of Indio	PW/Engineering Division	(760) 391-4017	
8	Aaron	Kulp	City of Indio	PW/Engineering Division	(760) 391-4017	
9	James	Achuff	City of Indio	PW/Engineering Division	(760) 391-4017	
10	Jesse	Isaacson	City of Indio	PW/Engineering Division	(760) 391-4017	
11	Mike	Vela	City of Indio	PW/Engineering Division	(760) 391-4017	
12	Mike	Wilkey	City of Indio	PW/Engineering Division	(760) 391-4017	
13	David	DeRenard	CVWD	Operations		
14	Emmanuel	Aceves	CVWD	Operations		
15	Rick	Bennet	CVWD	Operations		
16	Lance	Young	CVWD	Operations		
17	Jaime	Aguirre	CVWD	Operations		
18	John	Soto	CVWD	Operations		
19	John	Collins	CVWD	Operations		
20	Albert	Padilla	CVWD	Operations		

21	Scott	Davenport	CVWD	Operations		
22	Art	Vasquez	CVWD	Operations		
23	Fred	Amador	CVWD	Operations		
24	Javier	Villarreal	CVWD	Operations		
25	Dan	Fewings	CVWD	Operations		D.Fewings
26	Ron	Alexander	CVWD	Operations		
27	Joe	Morales	CVWD	Operations		371
28	Marty	Rodriguez	CVWD	Operations		Marty Rodriguez
29	Bernie	Sauceda	CVWD	Operations		
30	John	Hale	CVWD	Operations		
31	Bryan	McKinney	City of La Quinta	Public Works	(760) 777-7045	
32	Bobby	Hand	Riverside County	Transportation	(760) 921-9820	
33	Kenneth	George	Riverside County	Transportation	(760) 921-7820	
34	ALBERT	SOLAREZ	Riverside County	TLMA	(760) 399-5836	
35	Rene	Luna	CVWD	Stormwater/Drainage Maintenance	(760) 398-2661	
36	Chad	Austin	CVWD	Stormwater/Drainage Maintenance	(760) 398-2661	
37	Tim	Hoffman	CVWD	Stormwater/Drainage Maintenance	(760) 398-2661	
38	Troy	Clement	City of Beaumont	Public Works	(951) 377-5720	
39	Mike	Parsons	City of Beaumont	Public Works	(951) 760-4910	
40	Ron	Allen	City of Beaumont	Public Works	(951) 634-1779	
41	Joe	Janda	City of Beaumont	Public Works	(951) 377-5360	
42	James	Thompson	City of Banning	Public Works	(951) 922-3142	
43	Howard	Wen	City of Indio	PW/Engineering Division	(760) 391-4017	

Catherine Sweere

44	Leland	Cole	City of Rancho Mirage	Public Works	(760) 770-3224	
45	Bruce	Pelletier	City of Indian Wells	Public Works	(760) 776-0237	
46	Sam	Ruffner	City of Indian Wells	Public Works	(760) 776-0237	
47	Donald	Raymond	Riverside County	Transportation Department	(760) 778-2491	
48	Brandon	Garcia	Riverside County	Transportation Department	(760) 778-2491	
49	Victor	Casillas	Riverside County	Transportation Department	(760) 778-2491	
50	David	Jones	RCFC & WCD	Maintenance	(951) 955-1234	
51	Claudia	Trembus	City of Palm Springs	Engineering	(760) 323-8253	
52	Leonard	St.Sauver	City of La Quinta	Public Works	(760) 275-2143	
53	Miguel	Pena	City of Indio	Indio Water Authority	(760) 391-4195	
54	Gordon	Fisher	City of Coachella	Engineering	(760) 398-5744	
55	George	Iniguez	City of Coachella	Engineering	(760) 398-5744	
56	Ernie	Saenz	City of Coachella	Engineering	(760) 398-5744	
57	Frank	Crain	City of Coachella	Engineering	(760) 398-5744	
58	Rene	Martinez	City of Palm Springs	Engineering	(760) 323-8253	
59	~~Ahmed~~	~~Karimi~~	City of Palm Desert	Public Works	(760) 346-0611	
60	Ed	Gallardo	City of Palm Desert	Public Works	(760) 346-0611	

Sheet 5

0000826

NPDES STORMWATER QUALITY TRAINING FOR
Construction Training
Riverside County Flood Control & Water Conservation District

Meeting of: Monday, April 30 - 09:00 - 12:00

SIGN-IN SHEET

Switch per email →

	First Name	Last Name	Municipality	Department	Phone No	Signuature
1	Adriana	Soares	Riverside County	TLMA/GIS	(951) 955-8823	
2	Richard "Mike"	Call	Riverside County	Transportation Department	(951) 955-8614	
3	George	~~Boyden~~ YASSA	Riverside County	Transportation Department	(951) 955-8614	
4	Joseph	Dunlap	Riverside County	Transportation Department	(951) 955-8614	
5	David	Hylkema	Riverside County	Transportation Department	(951) 955-8614	
6	William "Bill"	Jackson	Riverside County	Transportation Department	(951) 955-8614	
7	Eric	Lohr	Riverside County	Transportation Department	(951) 955-8614	
8	Gabriel	Munoz	Riverside County	Transportation Department	(951) 955-8614	
9	Trai	Nguyen	Riverside County	Transportation Department	(951) 955-8614	
10	Luana	Roth	Riverside County	Transportation Department	(951) 955-8614	
11	Nick	Sison	Riverside County	Transportation Department	(951) 955-8614	Nick
12	RAY	DUNN	RCFC & WCD	FLOOD CONTROL	(951) 961-9576	
13	GENE	LEWIS	RCFC & WCD	FLOOD CONTROL	(951) 850-6917	
14	MIKE	LUNA	RCFC & WCD	FLOOD CONTROL	(909) 908-0978	
15	BRENT	MYTINGER	RCFC & WCD	FLOOD CONTROL	(909) 560-1142	
16	BARRY	TEMPLE	RCFC & WCD	FLOOD CONTROL	(909) 560-1148	
17	SAM	TERCERO	RCFC & WCD	FLOOD CONTROL	(951) 955-1287	
18	Jessica	Chin	City of Riverside	Public Works	(951) 826-5760	
19	Barney	Hunter	City of Riverside	Public Works		
20	Jack	Lynn	City of Riverside	Public Works		

21	Jack	Palomarez	City of Riverside	Public Works		
22	Ray	Garcia	City of Riverside	Public Works		
23	Jess	Romo	City of Riverside	Public Works		
24	Fred	Cerda	City of Riverside	Public Works		
25	Danny	Cwiak	City of Riverside	Public Works		
26	Tim	Dexter	City of Riverside	Public Works		
27	Victor	Moore	City of Riverside	Public Works		
28	Andy	Beck	City of Riverside	Public Works		
29	Donald	Buchannon	City of Riverside	Public Works		
30	Daniel	Barba	City of San Jacinto	Development. Cd Enf	(951) 487-7330	
31	Dave	Huster	City of San Jacinto	Development. Bldg.	(951) 487-7330	
32	Sergio	Ortiz	City of San Jacinto	Development. Bldg.	(951) 487-7330	S. ORTIZ
33	Barry	Ghaemi	City of Corona	Public Works	(951) 739-4961	
34	Crystal	Nguyen	City of Corona	Public Works	(951) 817-5798	
35	Estella	Valderrama	City of Corona	Public Works	(951) 279-3751	
36	Stephen	Duffin	City of Corona	Public Works	(951) 817-5758	
37	Noel	Castillo	City of Corona	Public Works	(951) 279-3537	
38	Lupe	Barrera	City of Corona	Public Works	(951) 736-2435	
39	Terrence	Piorkowski	City of Norco	Public Works	(951) 270-5607	
40	Omar	Gonzalez	City of Corona	Public Works	(951) 279-3515	
41	Clint	Herrera	City of Corona	Public Works	(951) 739-4888	
42	dale	bonham	City of Norco	Public Works	(951) 270-5607	
43	Greg	Worley	City of Riverside	Public Util - Water Field Dep	(951) 351-6350	

44	Don	Neal	City of Riverside	Public Util - Water Field Dep	(951) 351-6368	
45	Andrew	Ramos	City of Riverside	Public Util - Water Field Dep	(951) 351-6350	
46	Joseph	Gandara	City of Riverside	Public Util - Water Field Dep	(951) 351-6350	
47	Raymond	Aguilar	City of Riverside	Public Util - Water Field Dep	(951) 351-6350	
48	Christopher	Collins	City of Riverside	Public Util - Water Field Dep	(951) 351-6350	
49	Jeffrey	Karalun	City of Riverside	Public Util - Water Field Dep	(951) 351-6350	
50	Dexter	Cole	City of Riverside	Public Util - Water Field Dep	(951) 351-6350	
51	Thomas	Garcia	City of Riverside	Public Util - Water Field Dep	(951) 351-6350	
52	Mike	Neal	City of Beaumont	Public Works	(951) 377-5314	
53	Al	Ignacio	City of Beaumont	Public Works	(951) 377-5790	
54	Chad	Nichols	City of Beaumont	Public Works	(951) 760-4971	
55	Karl	Shrader	City of Beaumont	Public Works	(951) 377-5315	
56	Pete	Pinlac	City of Beaumont	Public Works	(951) 445-7531	
57	Dave	Thibault	City of Beaumont	Public Works	(951) 377-5315	
58	Dave	Ochs	City of Beaumont	Public Works	(951) 906-9224	
59	Abel	Garcia	City of Norco	Public Works	(951) 270-5607	
60	Lyndon	Lorance	City of Norco	Public Works	(951) 270-5607	
61	Jeff	Potts	City of Corona	Public Works	(951) 736-2442	

NPDES STORMWATER QUALITY TRAINING FOR
Construction Training
Riverside County Flood Control & Water Conservation District

Meeting of: Thursday, May 3 - 13:00 - 16:00 SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
1	Farida	Naceem	City of Murrieta	Engineering	(951) 461-6075	
2	Richard	Temple	City of Indian Wells	Public Works	(760) 776-0237	
3	Eduardo	Castellanos	Riverside County	Waste Management		
4	Andy	Cortez	Riverside County	Waste Management		
5	Nimrod	Garay	Riverside County	Waste Management	486 3320	N. Garay
6	Scott	Kraak	Riverside County	Waste Management		
7	Benjamin	Matye	Riverside County	Waste Management	63251	
8	Panda	Workman	Riverside County	Waste Management	486 3276	
9	Fouad	Mina	Riverside County	Waste Management	951-486-3244	
10	Marin	Cionca	Riverside County	Waste Management		
11	Kevin	Joyce	Riverside County	Waste Management	486-3260	
12	Sarah	Watrous	Riverside County	Waste Management		
13	Nate	Viste	Riverside County	Waste Management		
14	Randy	Taylor	Riverside County	Waste Management	951-247124	
15	John	Contrado	City of Corona	Public Works Inspection	951-279-3512	
16	Tom	Hall	City of Corona	Public Works Inspection	951-252-1785	
17	Ken	Dagenais	City of Corona	Public Works Inspection		
18	Remi	Nunez	City of Corona	Public Works Inspection	951-538-2162	
19	Brian	Ladnier	City of Corona	Public Works Inspection	951-232-2762	
20	Rosario	Ruvalcaba	City of Corona	Public Works Inspection	(951) 232-1981	

21	Dave	Mitchell	City of Corona	Public Works Inspection		
22	Randy	Bender	City of Corona	Public Works Inspection		
23	David	Shreve	City of Corona	Public Works Inspection		
24	Mirek	Jaroslawski	City of Corona	Public Works Inspection		
25	William	Anderson	Riverside County	Transportation Department	(951) 955-1095	
26	Salvador	Terriquez-Lopez	Riverside County	Transportation Department	(951) 955-1095	
27	Jeff	Gullett	Riverside County	Transportation Department	(951) 955-1095	
28	Michael	Coates	Riverside County	Transportation Department	(951) 955-1095	
29	James	Araiza	Riverside County	Transportation Department	(951) 955-1095	
30	Tracy	Bravo	Riverside County	Transportation Department	(951) 955-1095	
31	Matt	Sayre	Riverside County	Transportation Department	(951) 955-1095	
32	Richard	Ott	Riverside County	Transportation Department	(951) 955-1095	
33	George	Williams	Riverside County	Transportation Department	(951) 955-1095	
34	Joseph	Place	Riverside County	Transportation Department	(951) 955-1095	
35	Dave	Moen	Riverside County	Transportation Department	(951) 955-1095	
36	Robert	Cardenas	Riverside County	Transportation Department	(951) 955-1095	
37	Tom	Vaughn	City of Hemet	Public Works	(951) 765-2360	
38	Mac	McCall	City of Hemet	Public Works	(951) 765-2360	
39	Ed	Lara	City of Corona	Public Works	(951) 739-4825	
40	Steve	Enna	City of Corona	Public Works	(951) 739-4815	
41	Victor	Ayala	City of Calimesa	Public Works	(909) 795-9801	
42	Bob	French	City of Calimesa	Public Works	(909) 795-9801	
43	Dale	Everman	City of Calimesa	Public Works	(909) 795-9801	

44 Jessie Hillis

45 DARREN Young CITY OF CORONA P.W. 909-736-2204

46 GERALD GREGORY RCWMD 352-9851

47 STEVEN WANN Transportation (951) 461-5416

48 Keith Barnett " " (951) 961-6072

44	Mike	McCabe	City of Calimesa	Public Works	(909) 795-9801	
45	Perry	Gerdes	City of Banning	Water/Wastewater Utility	(951) 922-3281	
46	DAVID ~~Greg~~	MARTINEZ ~~Campbell~~	City of Banning	Water/Wastewater Utility	(951) 922-3281	
47	MATT ~~Ed~~	STEVENS ~~Moore~~	City of Banning	Water/Wastewater Utility	(951) 922-3281	
48	Scott	Barnhart	City of Banning	Water/Wastewater Utility	(951) 922-3281	
49	Jason	Valdez	City of Banning	Water/Wastewater Utility	(951) 922-3281	
50	Tom	Shipley	Riverside County	Transportation Department	(951) 955-1095	
51	MAUS ~~Randy~~	DAVIE ~~White~~	Riverside County	Transportation Department	(951) 955-1095	D. Maus
52	Jon	Tressler	Riverside County	Transportation Department	(951) 955-1095	
53	Stephen	Glenore	Riverside County	Waste Management		
54	Dwight "Kelley"	Donovan	Riverside County	Transportation Department	(951) 955-1095	
55	Mark	Bailey	City of Moreno Valley	Public Works	(951) 413-3243	
56	Cory	Hammond	City of Murrieta	Public Works Inspection		
57	Steve	Kestly	City of Murrieta	Public Works Inspection	(951) 201-1031	
58	Salvador	Lopez	Riverside county		(951) 955-6899	Salvador Lopez Jr.
59	Tom	Shipley	Riv County			
60	RICHARD	TEMPLE	City of INDIAN WELLS	BLDG INSP	~~760-578~~ 776-0230	
61	Justin	Robbins	Riv. Co.	Const. Insp.	951-961-6882	

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MUNICIPAL FACILITIES & ACTIVITIES TRAINING

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NPDES STORMWATER QUALITY TRAINING FOR
Municipal Facilities and Activities
Riverside County Flood Control & Water Conservation District

Meeting of: October 2, 2006 1pm - 4pm SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Signature
1	Benjamin	Aborita	County of Riverside	Waste Management	
2	Chris	Baldino	City of Corona	Parks and Community	
3	Danilo	Batson	City of Riverside	Public Works Streets	
4	Jim	Butler	City of Moreno Valley	Parks & Recreation	
5	Fred	Cerda	City of Riverside	Public Works Streets	
6	Roger	Chavez	City of Moreno Valley	Parks & Recreation	
7	Jessica	Chin	City of Riverside	Public Works	
8	Tom	Collins	City of Riverside	Public Utilities - Water	
9	Arturo	Contreras	City of Palm Desert	Public Works	
10	Chris	Cordova	City of Beaumont	Code Enforcement	
11	Andrew	Cortez	County of Riverside	Waste Management	
12	Daniel	Cover	City of Moreno Valley	Public Works	
13	Ron	DeHoop	City of Corona	Parks and Community	
14	James	Dooley	County of Riverside	Transportation Department	
15	John	Dyer	City of Moreno Valley	Parks & Recreation	
16	Walt	Edmiston	City of Corona	Parks and Community	
17	Jesse	Encino	City of Corona	Public Works	
18	Rick	Fite	County of Riverside	Transportation Department	
19	Nimrod	Garay	County of Riverside	Waste Management	
20	Paul	Gearhart	City of Riverside	Public Utilities - Water	
21	SUZANNE	GILLETTE	RIVERSIDE COUNTY	TLMA- BUILDING & SAFETY	

NPDES STORMWATER QUALITY TRAINING FOR
Municipal Facilities and Activities
Riverside County Flood Control & Water Conservation District

Meeting of: October 2, 2006 1pm - 4pm SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Signature
22	Valin	Gray	City of Moreno Valley	E.S.A	
23	Andy	Guerrero	City of Riverside	Public Works Streets	
24	Carlos	Hernandez	City of Palm Desert	Public Works	
25	Ed	Hornyak	City of Moreno Valley	Parks & Recreation	
26	George	Kelley	City of Riverside	Public Utilities - Water	George Kelley
27	Eui	Kim	County of Riverside	Building & Safety	
28	Scott	Kraak	County of Riverside	Waste Management	
29	John	Leamon	City of Riverside	Public Works Streets	
30	Andy	Lindsay	City of Riverside	Public Utilities - Water	
31	Carlos	Lira	City of Moreno Valley	Parks & Recreation	
32	Jim	Lowery	City of Riverside	Public Works Streets	
33	Jerry	Lytle	County of Riverside	Transportation Department	
34	Ben	Mah	County of Riverside	Waste Management	
35	Joe	Manzo	City of Hemet	Public Works	
36	Tom	McKay	County of Riverside	Transportation Department	
37	Jerry	Mendoza	City of Riverside	Public Works Streets	
38	Daniel	Mendoza	City of Moreno Valley	Parks & Recreation	
39	Dante	Mikkelson	County of Riverside	Waste Management	
40	Dave	Miller	County of Riverside	Transportation Department	Dave Miller
41	roger	miller	lima	building & safety	
42	Daniel	Monto	City Of Moreno Valley	Public Works	

NPDES STORMWATER QUALITY TRAINING FOR

Municipal Facilities and Activities

Riverside County Flood Control & Water Conservation District

Meeting of: October 2, 2006 1pm - 4pm SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Signature
43	Dave	Navarro	City of Corona	Public Works	
44	Cynthia	Overby	City of Beaumont	Code Enforcement	
45	Larry	Page	City of Perris	Public Works	
46	Randy	Parker	City of Moreno Valley	Parks and Recreation	
47	Robert	Pena Sr	City of Corona	Parks and Community	Robert Pena Sr
48	WILLIAM	PEPPAS	COUNTY OF RIVERSIDE	BUILDING & SAFETY	
49	Luis	Perez	City of Riverside	Public Works Streets	
50	Luis	Quevedo	City of Corona	Public Works	
51	Rudy	Quiroz	City of Moreno Valley	Parks & Recreation	
52	Ryan	Righetti	County of Riverside	Transportation Department	
53	Dan	Riley	City of Corona	Parks and Community	
54	Rick	Rios	City of Corona	Parks and Community	
55	Richard	Roberts	City of Riverside	Public Works Streets	
56	Sergio	Rosas	City of Palm Desert	Public Works	
57	Brian	Sex	City of Riverside	Public Works Streets	
58	steven	toth	Riverside County	Transportation Dept	
59	Lisa	Lasson	RCFC	NPDES	
60	~~Coleen~~	Weeks	City of Riverside	Public Works Streets	
61					
62					
63					

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How many times you taken this class?

NPDES STORMWATER QUALITY TRAINING FOR
Municipal Facilities and Activities
Riverside County Flood Control & Water Conservation District

Meeting of: October 16, 2006 9am - 12pm

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Signature	
1	Danny	Alfaro	City of Riverside	Public Works Streets		
2	Felipe	Alvarado	City of Moreno Valley	Parks & Recreation		0
3	Luis	Baez	City of Corona	Parks and Community		
4	Daniel	Barba	City of San Jacinto	Code Enforcement	Daniel Barba	0
5	Abdul	Behnawa	COUNTY OF RIVERSIDE	BUILDING AND SAFETY		0
6	Christina	Bowser	City of Beaumont	Code Enforcement	Christina Bowser	0
7	TRENIS	BRAGA	COUNTY OF RIVERSIDE	BUILDING AND SAFTY		
8	PHIL	BROESAMLE	COUNTY OF RIVERSIDE	BUILDING&SAFETY		
9	Rudy	Casados	City of Moreno Valley	Parks & Recreation		0
10	Isaac	Chappell	City of Moreno Valley	Parks & Recreation		0
11	David	Ortega	Riverside County	Flood Control		2
12	Charles	de Chambeau	Riverside County	TLMA-Building and Safety		0
13	LaDonna	Eldridge	City of Corona	Parks and Community		0
14	Dave	Everitt	City of Moreno Valley	Parks & Recreation		0
15	Jesse	Fierro	City of Riverside	Public Works Streets		1
16	Wally	Firlit	City of Moreno Valley	PW/M&O		0
17	ROBERT	FLOREZ	CITY OF MORENO	ESA		10
18	Tony	Garcia	City of Moreno Valley	Parks & Recreation		0
19	Phil	Hallberg	City of San Jacinto	Building & Safety	Phil Hallberg	0
20	Eddie	Hernandez	City of Corona	Parks and Community		
21	Marianna	Hernandez	County of Riverside	Transportation Department		

NPDES STORMWATER QUALITY TRAINING FOR

Municipal Facilities and Activities

Riverside County Flood Control & Water Conservation District

Meeting of: October 16, 2006 9am - 12pm SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Signature
22	Tim	Hostrawser	Riverside County	Building and Safety	
23	Rob	Istik	County of Riverside	Waste Management	
24	Jorge ~~Ruben~~	MIRANDA ~~Jimenez~~	City of Hemet	Public Works	
25	Scott	Johnston	County of Riverside	Transportation Department	
26	Ernie	Kluck	City of Hemet	Public Works	
27	James Crew	Smithey Leader I	City of Riverside	Public Works	0
28	Coleen Crew	WEEKS Leader II	City of Riverside	Public Works Streets	1
29	Jeff	Lewellen	County of Riverside	Transportation Department	2
30	Bob	Lucas	City of Riverside	Public Utilities - Water	
31	Art	Madril	City of Riverside	Public Utilities - Water	
32	Juan	Martinez	City of Moreno Valley	Parks & Recreation	+1
33	Ben	Matye	County of Riverside	Waste Management	
34	Marcee	Maupin	City of San Jacinto	Code Enforcement	0
35	Harvey	McCoy	County of Riverside	Transportation Department	
36	Chantay	McKnight	City of Moreno Valley	Parks & Recreation	0
37	Jeff	Mitchell	County of Riverside	Waste Management	
38	gary	moss	Riverside county	transportation	4
39	Robert	Munoz	City of Riverside	Public Works Streets	
40	Greg	Oliver	City of Riverside	Public Utilities - Water	2
41	Alfrey	Patterson	City of Moreno Valley	Parks & Recreation	
42	Darren	Ramsey	City of Riverside	Public Works Streets	2

NPDES STORMWATER QUALITY TRAINING FOR

Municipal Facilities and Activities

Riverside County Flood Control & Water Conservation District

Meeting of: October 16, 2006 9am - 12pm

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Signature	
43	Byron	Recksiek	County of Riverside	Transportation Department		
44	Jamie	Rios	City of Riverside	Public Works Streets		1
45	Dean	Ristow	City of Moreno Valley	Parks & Recreation		3
46	Ramon	Roman	County of Riverside	Waste Management		0
47	Robert	Romero	City of Moreno Valley	Parks & Recreation		
48	Paul	Russell	County of Riverside	Transportation Department	Paul Russell	3
49	Rick	Ryno	City of Riverside	Public Utilities - Water		
50	Chris	Sauve'	City of Riverside	Building Services		3
51	Leon	Schrader	City of Moreno Valley	PW/M&O		
52	TONY	SILVAS	CITY OF MORENO	PUBLIC WORKS		3
53	Bren ~~James~~	Seki ~~Smitley~~	City of Riverside	Public Works Streets		1
54	Martin	Soria	City of Corona	Parks and Community		
55	Ted	Teagarden	City of Corona	Parks and Community		2
56	Charles	Tellis	City of San Jacinto	Building & Safety		
57	Nate	Viste	County of Riverside	Waste Management		
58	Gary	Wagner	City of Moreno Valley	Parks & Recreation	Gary Wagner	0
59	Kim	Williams	City of Riverside	Public Works Streets		
60	Panda	Workman	County of Riverside	Waste Management		
61	JAMES	BUTLER	CITY MORENO VALLEY	PARKS	James Butler	3
62	John	BURNS	County Parks	Parks	John Burns	
63	MIKE	COMBS	CITY OF RIVERSIDE	BLDG SERVICES		
	Jim	DAVIS	CO. PARK DIST EASTERN CO	PARKS		
	BRIAN	WAGNER	RIV. CO	FIRE/HAZ-MAT		
	Joshua	Lent	RIV. CO	Fire/Haz-Mat		
	ROBERT	BECKER	RIV. CO.	FIRE/HAZMAT		2

Sheet 1 = 1

NPDES STORMWATER QUALITY TRAINING FOR
Municipal Facilities and Activities
Palm Springs Convention Center

times you have taken this course

Meeting of: October 17, 2006 9am - 12pm

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Signature	
1	Steve	Aguirre	City of Moreno Valley	P/W Enterprise Services		2nd
2	Solarez	Albert	County of Riverside	Transportation Department		
3	Daniel	Borges	City of Hemet	Public Works		
4	John	Carmona	State of California	Regional Water Quality Control		
5	Jose	Castro	City of Hemet	Public Works		
6	Bo	Chen	City of Palm Desert	Public Works		1st
7	Oliver	Chori	City of Hemet	Public Works		1st
8	David	DeRenard	Coachella Valley Water District	Domestic Construction		1st
9	Elizabeth	Escatel	City Of La Quinta	Code Enforcement		
10	MEGAN	FISHER	CITY OF LA QUINTA	BUILDING AND SAFETY		
11	Zachary	Foster	City of Moreno Valley	Enterprise Servises		2x
12	Mike	Goar	City of Hemet	Public Works		3
13	Robert	Gray	County of Riverside	Transportation Department		
14	Steve	Grewe	County of Riverside	Transportation Department		2
15	John	Hatsios	City of Palm Springs	Aviation		
16	steve	lasley	indio	code enforcement		1st
17	forest	meadows	city of indio	code enforcement		1.ST
18	Jay	Mirpour	RWQCB-7	Stormwater		1st
19	Robert	Morris	County of Riverside	Transportation Department		1ST
20	Morgan	Newlin	City of Hemet	Public Works		1st
21	Linda	Nixon	City of Hemet	Public Works	Linda Nixon	3

NPDES STORMWATER QUALITY TRAINING FOR

Municipal Facilities and Activities

Palm Springs Convention Center

Meeting of: October 17, 2006 9am - 12pm

SIGN-IN SHEET

times taken training

	First Name	Last Name	Municipality	Department	Signature	
22	Albert	Padilla	Coachella Valley Water District	Domestic Construction		2
23	Robert	Parsons	County of Riverside	Transportation Department		
24	Robert	Rodriguez	Coachella Valley Water District	Domestic Construction		1st
25	Cora	Salas	City of Palm Desert	Public Works		
26	Ralph	Scharffenberg	City of Moreno Valley	Public Works/ESA	Ralph Scharffenberg	2nd
27	Craig	Toms	City of Palm Springs	Aviation		
28	Alana	Townsend	City of Palm Desert	Public Works		
29	carlos	vargas	indio	code enforcement		1ST
30	Barry	Verdusco	City of Moreno Valley	Public works Dept.		
31	John C.	Wilson	County of Riverside	Transportation Department		2
32	John	Carmona	R-7	Regional Board		1
33						
34						
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NPDES STORMWATER QUALITY TRAINING FOR

Municipal Facilities and Activities

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How many times taken this class before?

NPDES STORMWATER QUALITY TRAINING FOR
Municipal Facilities and Activities
Murrieta City Hall

Meeting of: October 18, 2006 1pm - 4pm

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Signature	
1	Erik	Aguilar	City of Corona	Public Works		
2	Mike	Almodovar	City of Murrieta	Public Works Maintenance		3
3	Alberto	Aspe	City of Murrieta	Community Services Dept.		
4	Damien	Avalos	City of Murrieta	Community Services Dept.		
5	Mike	Biggay	City of Murrieta	Community Service Dept.		
6	Kevin	Black	City of Hemet	Public Works		0
7	Mike	Brooks	City of Murrieta	Public Works Maintenance		5
8	Mark	Bullschweiller	City of Murrieta	Public Works Maintenance		
9	Mike	Burris	City of Murrieta	Public Works Maintenance		
10	Danny	Dawley	City of Corona	Public Works		
11	Juan	Del Val	City of Murrieta	Community Service Dept.		
12	Shawn	Dullanty	City of Murrieta	Community Services Dept.		
13	Mark	Durbin	City of Murrieta	Community Services Dept.		
14	Phil	Esnayra	City of Murrieta	Community Services Dept.		
15	Lanker	Figueroa	City of Murrieta	Public Works Maintenance		
16	Lupe	Gomez	City Of Lake Elsinore	Engineering		
~~17~~	~~Larry~~	~~Gross~~	~~City of Murrieta~~	~~Community Services Dept.~~		
18	Fernando	Gutierrez	City of Corona	Public Works		
19	Jay	Haecker	City of Murrieta	Community Services Dept.		
20	Dave	Hendry	City of Murrieta	Public Works Maintenance		3
21	Ken	Jones	City of Murrieta	Public Works Maintenance		3

NPDES STORMWATER QUALITY TRAINING FOR

How many times take class before?

Municipal Facilities and Activities

Murrieta City Hall

Meeting of: October 18, 2006 1pm - 4pm

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Signature	
22	Bob	Kast	City of Murrieta	Community Services Dept.		
23	Billy	Koller	City of Hemet	Public Works		
24	Ed	Lockhart	City of Corona	Public Works		
25	Danny	Marks	City of Murrieta	Community Service Dept.		
26	Clay ~~Jorge~~	Smith ~~Miranda~~	City of Hemet	Public Works		1
27	Jason	Morrell	City of Murrieta	Public Works Maintenance		5
28	Jose	Munoz	City of Murrieta	Community Services Dept.		
29	Farida	Naceem	City of Murrieta	Public Works / Engineering		
30	Steve	Nickerson	City of Murrieta	Public Works Maintenance		
31	Douglas	Norfolk	City of Norco	Public Works		3
32	Craig	Priest	City of Hemet	Public Works		0
33	Rosa	Santana	City of Murrieta	Community Services Dept.		
34	Dave	Sarian	City of Murrieta	Community Services Dept.		
35	Charles	Sommermeyer	City of Hemet	Public Works		1
36	Charlie	Soto	City of Murrieta	Community Services Dept.		
37	Ron	Stuart	City of Murrieta	Community Services Dept.		
38	Loren	Thoe	City of Corona	Public Works		
39	Rick	Thompson	City of Murrieta	Commmunity Service Dept.		
40	Steven	Torres	City of Hemet	Public Works		
41	Nick	Vaughn	City of Murrieta	Public Works Maintenance	—	
42						

NPDES STORMWATER QUALITY TRAINING FOR

Municipal Facilities and Activities

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How Many times taken class before?

Murrieta City Hall

Meeting of: October 18, 2006 1pm - 4pm

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Signature	
43	GEORGE	DELAROSA	TEMECULA	MAINT		
44	Steve	Sterling	City Tem	maint		
45	KARL	NORDGREN	TEMECULA	MAINT		
46	RICHARD	SHEA	Temecula	Maint		
47	Bill	Kolla	Hemet	Maint		
48	Gary	Russell	Murrieta	Maint	Gary Russell	0
49	RICK	SERVEN	TEMECULA	TCSD		
50	ALEX	CASTRO	CORONA	BUILD.		1
51	Steve	Bustillos	Corona	Street	Steve A Bustillos	2
52	DAVID	SARIAN	MUR	CSD		
53	RON	STUART	MVR	CSD		5
54	JASON	ALFARO	Excel Landscape	Maint		
55	Mario	Ruvalcaba	City of Corona	Maint.		2
56	Garrett	Butler	City of Corona	Maint		1
57	LARRY	GROSS	CSD INSPECTOR	CSD		0
58	DAVID	NAVARRO	CITY OF CORONA	ST MAINT	David A Navarro	5
59	Andre	Valenciana	Corona	ST Maint	Andre Valenciana	1
60	Jesse	Encino	Corona	Public works		
61	ERIK	SHOW	County of Riverside	EDA		
62	JOSE	ALFARO	EXCEL LANDSCAPE	MAINT.		
63	Jerry	Cardenas	EXCEL LANDSCAPE	C.S.D.		
	RANDY	WEST	TEMECULA	Public Works	Randy West	
	DAVE	DAVIS	TEMECULA	Public works		

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NPDES STORMWATER QUALITY TRAINING FOR
Municipal Training
Riverside County Flood Control & Water Conservation District

Meeting of: Monday, April 16 - 08:00 - 11:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
1	Arlene	Chun	RCFC & WCD	NPDES	(951) 955-1330	
2	Mark	Hughes	Riverside County	Transportation Department	(951) 955-6767	
3	Carl	Szoyka	City of Banning	Street	(951) 922-3286	
4	Tom	Lara	City of Banning	Street	(951) 922-3286	
5	Gourley	Collins	City of Banning	Street	(951) 922-3286	
6	Troy	Conner	City of Banning	Street	(951) 922-3286	
7	Andrew	Hagaman	City of Banning	Street	(951) 922-3286	
8	Ramiro	Garcia	City of Banning	Fleet maintenance	(951) 922-3291	
9	Terry	Dunn	City of Banning	Fleet maintenance	(951) 922-3291	
10	Stuart	Sheldon	City of Moreno Valley	Public Works	(951) 413-3483	
11	Deby	Conrad	City of La Quinta	Building & Safety	(760) 777-7022	
12	Jack	Porter	City of Canyon Lake	Code Enforcement	(951) 244-2955	
13	Richard	Messer	City of Canyon Lake	Code Enforcement	(951) 244-2955	
14	Richard	Rupert	City of Canyon Lake	Code Enforcement	(951) 244-2955	
15	michael	morris	City of La Quinta	Code Complience	(760) 777-7014	
16	Elizabeth	Escatel	City of La Quinta	Building and Safety	(760) 777-7110	Elizabeth Escatel
17	Angel	Lazareno	City of Moreno Valley	maintenance	(909) 380-3012	
18	Robert	Pena Jr	City of Corona	Parks and Community Services	(951) 279-3754	
19	Ruben	Valtierra	City of Corona	Parks and Community Services	(951) 279-3754	

20	Gary	Tomes	City of Corona	Parks and Community Services	(951) 279-3754	
21	Brian	Bassler	City of Corona	Parks and Community Services	(951) 736-2489	
22	George	Jackson	City of Corona	Parks and Community Services	(951) 739-4991	
23	Jeff	Potts	City of Corona	Public Works	(951) 736-2442	
24	John	Kennedy	Riverside County	Transportation Department	(951) 845-5015	
25	Kirk	Light	Riverside County	Transportation Department	(951) 845-5015	
26	Tom	Mader II	Riverside County	Transportation Department	(951) 845-5015	
27	Richard	Burley	Riverside County	Transportation Department	(951) 845-5015	
28	Robert	Robledo	Riverside County	Transportation Department	(951) 845-5015	RRR
29	Helio	Valdez	Riverside County	Transportation Department	(951) 845-5015	
30	Tante Rey	Ramoran	Riverside County	Transportation Department	(951) 845-5015	
31	Scott	Rubin	City of Corona	Parks and Community Services	(951) 736-2463	
32	Marty	Fox	Other	Contractor	(909) 208-8101	
33	Hector	Lopez	Other	Contractor	(909) 322-4520	
34	Brandon	Viayra	City of Corona	Public Works	(951) 736-2405	
35	Ted	Lauriano	City of Corona	Public Works	(951) 736-2405	
36	Rick	Shaffer	City of Corona	Public Works	(951) 736-2405	
37	Exiquel	DeLeon	City of Corona	Public Works	(951) 736-2405	
38	Martin	Arias	City of Corona	Public Works	(951) 736-2405	
39	Jose	Payan	City of Corona	Public Works	(951) 736-2405	
40	Mihai	Dan	City of Indian Wells	Public Works	(760) 776-0237	
41	Chris	Wiggins	City of Indian Wells	Public Works	(760) 776-0237	

42	Jerry	Gregory	Riverside County	Waste Management		
43	Scott	Kraak	Riverside County	Waste Management		
44	Molly	Stewart	Riverside County	Waste Management		
45	Benjamin	Mah	Riverside County	Waste Management		
46	Benjamin	Aborita	Riverside County	Waste Management		
47	Tom	Hays	Riverside County	Waste Management		
48	Panda	Workman	Riverside County	Waste Management		
49	Kurt	Van Dusen	Riverside County	Waste Management		
50	Brandon	Harlacher	City of Hemet	Public Works	(951) 765-3712	
51	Carlos	Gonzalez	City of Hemet	Public Works	(951) 765-3712	
52	Joseph	Contaoi	Riverside County	Waste Management		
53	William	Anderson	Riverside County	Transportation Department	(951) 955-1095	
54	Jeff	Gullett	Riverside County	Transportation Department	(951) 955-1095	
55	Michael	Coates	Riverside County	Transportation Department	(951) 955-1095	
56	James	Araiza	Riverside County	Transportation Department	(951) 955-1095	
57	Matt	Sayre	Riverside County	Transportation Department	(951) 955-1095	
58	~~Travis~~	Peterson	City of Hemet	Public Works	(951) 765-3712	
59	R.W.	Broos	City of Hemet	Public Works	(951) 765-3712	
60	Stephen	Glenore	Riverside County	Waste Management		

Donald Kay City of Hemet Street Sweeper 925-3777 DK
CARD MORA City of Hemet Street Sweeper 925-3777

NPDES STORMWATER QUALITY TRAINING FOR
Municipal Training
Riverside County Flood Control & Water Conservation District

Meeting of: Tuesday, May 1 - 13:00 - 16:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
1	Louis	Ybarra	City of Corona	Public Works	(951) 736-2405	
2	Steve	Schmidt	City of Corona	Public Works	(951) 739-4820	
3	John	Longo	City of Corona	Public Works	(951) 739-4820	
4	Dale	Lesinski	City of Corona	Public Works	(951) 739-4820	
5	Ed	Lockhart	City of Corona	Public Works	(951) 736-2443	
6	Luis	Quevedo	City of Corona	Public Works	(951) 739-4820	
7	Jeff	Baker	City of Corona	Public Works	(951) 739-4820	
8	John	Perez	City of Corona	Public Works	(951) 739-4820	
9	Angel	Zuniga	City of Corona	Public Works	(951) 739-4820	
10	Eddie	Casarez	City of Corona	Public Works	(951) 739-4820	
11	Noel	Cervantes	City of Corona	Public Works	(951) 739-4820	
12	Jimmie	Johnson	City of Corona	Public Works	(951) 736-2405	
13	Pablo	Quintero	City of Corona	Public Works	(951) 736-2405	
14	Ron	Jimenez	City of Corona	Public Works	(951) 736-2405	
15	Edward	Quevedo	City of Corona	Public Works	(951) 736-2405	
16	Bob	French	City of Calimesa	Public Works	(909) 795-9801	
17	Victor	Ayala	City of Calimesa	Public Works	(909) 795-9801	
18	Dale	Everman	City of Calimesa	Public Works	(909) 795-9801	
19	Mike	McCabe	City of Calimesa	Public Works	(909) 795-9801	
20	Donald	Raymond	Riverside County	Transportation Department	(760) 778-2491	

21	Brandon	Garcia	Riverside County	Transportation Department	(760) 778-2491	
22	Victor	Casillas	Riverside County	Transportation Department	(760) 778-2491	
23	Gayle	Cuneo	RCFC & WCD	Flood Control	(951) 955-1311	
24	Steve	Parker	City of Banning	Facilities	(951) 922-3292	
25	Donald	Kay	City of Hemet	Public Works	(951) 765-3712	
26	Salvador	Terriquez-Lopez	Riverside County	Transportation Department	(951) 955-1095	
27	Roger	Flores	Riverside County	Transportation Department	(951) 955-1095	
28	Richard	Ott	Riverside County	Transportation Department	(951) 955-1095	
29	George	Williams	Riverside County	Transportation Department	(951) 955-1095	
30	Joseph	Place	Riverside County	Transportation Department	(951) 955-1095	
31	Dave	Moen	Riverside County	Transportation Department	(951) 955-1095	
32	Robert	Cardenas	Riverside County	Transportation Department	(951) 955-1095	
33	Bill	Shesgreen	City of Banning	Street	(951) 922-3286	
34	Steve	Armitage	City of Banning	Street	(951) 922-3286	
35	Robert	Guillen	City of Banning	Street	(951) 922-3286	
36	Gregory	Cottage	City of Banning	Street	(951) 922-3286	
37	Sergio	Guzman	Riverside County	Transportation Department	(760) 408-3248	
38	Joe	Nappi	City of Hemet	Public Works	(951) 765-3712	
39	Justin	Gunn	City of Hemet	Public Works	(951) 765-3712	
40	Carlos	Navarro	City of Banning	Fleet Maintenance		
41	Moses	Medina	City of Banning	Fleet Maintenance	951 922-3284	
42	Owen	Carder	City of Banning	Fleet Maintenance	951 922-3284	
43	Silviano	Romero	Riverside County	Transportation Department	(951) 955-1095	

44						
45	Jackie					
46						
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49	Linda					
50			Riverside City Fire			
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WATER QUALITY MANAGEMENT PLAN TRAINING

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NPDES STORMWATER QUALITY TRAINING FOR
Water Quality Management Plan
Riverside County Flood Control & Water Conservation District

Meeting of: October 3, 2006 1pm - 4pm SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Signature
1	Shonda	Bello Herold	City of Riverside	Planning	
2	~~Jessica~~ Elaine	~~Chin~~ Hsieh	City of Riverside	Public Works	
3	Chris	Cordova	City of Beaumont	Code Enforcement	Chris Cordova
4	Arturo	Diaz	RCFC	Planning	
5	Leonardo	Ferrando	Riverside County	Flood Control District	
6	Jeffrey	Fulton	RCFCWCD	Plan Check	
7	Kamyar	Ghods	Riverside	Flood Control	
8	Sam	Gonzalez	Riverside County	Building & Safety	
9	Hany	Henein	City of Corona	Public Works	
10	MARK	INGOLD	COUNTY OF RIVERSIDE	TLMA	
11	Michael	Krantz	Riverside County	Transportation	
12	Steve	Kupsak	City of Moreno Valley	Parks & Recreation	
13	Bob	Lyman	Riverside County	TLMA	
14	DEV	MANI	RIVERSIDE COUNTY	TLMA	
15	Arthur	Miller	County of Riverside	Building and Safety	
16	Clara	Miramontes	City of Riverside	Planning	
17	jerry	mullen	riverside county	building & safety	
18	Penny	Nanney	Flood Control	NPDES	
19	Hoang	Nguyen	City of Moreno Valley	Public Works	
20	Cynthia	Overby	City of Beaumont	Code Enforcement	
21	Larry	Page	City of Perris	Public Works	

[redacted]

NPDES STORMWATER QUALITY TRAINING FOR

Water Quality Management Plan

Riverside County Flood Control & Water Conservation District

Meeting of: October 3, 2006 1pm - 4pm

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Signature
22	~~Edward~~	~~Perez~~	~~Consultant (PBS&J)~~	~~Plan Check~~	
23	Edward	Perez	Flood Control	Planning	
24	Derek	Petersen	Riverside County Flood Control	Planning	
25	Edwin	Quinonez	Riverside County	Flood Control District	
26	Travis	Randel	City of Riverside	Planning Department	
27	DAVID	ROSS	CITY OF MORENO	LAND DEVELOPMENT	
28	Kyle	Smith	City of Riverside	Planning Division	
29	Helio	Takano	RCFC	Planning Section	
30	Tim	Taylor	City of Hemet	Development Engineering	
31	Dowling	Tsai	County of Riverside	Transportation	
32	Tina	Tuason	RCFC	NPDES	
33	Kent	Wegelin	City of Moreno Valley	Public Works	
34	Cenk	Yavas	Flood Control	Planning	
35	Soon	No	City of Corona	PW	
36	Edward	Lara	City of Corona	PW	
37					
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NPDES STORMWATER QUALITY TRAINING FOR

Water Quality Management Plan

Riverside County Flood Control & Water Conservation District

Meeting of: October 3, 2006 1pm - 4pm

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Signature
43	DON	DELGADILLO	RCFC	PLANNING	[illegible]
44					
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810001-17

NPDES STORMWATER WATER QUALITY MANAGEMENT PLAN TRAINING

Meeting of: **October 23, 2006 8:00 a.m. – 12:00 p.m.** **SIGN-IN SHEET**

FIRST NAME	LAST NAME	MUNICIPALITY	DEPARTMENT	SIGNATURE
Kent	Allen	Riverside County	Flood Control	
Daisy	Barreto	RCFC & WCD	Planning	
Jeannie	Bigler	Riverside County	Building & Safety	
Christina	Bowser	City of Beaumont	Code Enforcement	
David	Brunmier	County of Riverside	Building & Safety	
Mike	Cairns	Riverside County	Flood Control	
Loi	Chan	Riverside County	Building & Safety	
Jessica	Chin	Riverside ~~County~~ City	Public Works	
Robert	Cullen	Riverside County	Flood Control District	
Olivia	Daniels	CVWD	Engineering	
Elena	Destefano	City of Riverside	Public Utilities Energy Delivery Contracts Division	
Glen	Drogin	County of Riverside	Flood Control	
Everett	Duckworth	County of Riverside	Flood Control	
Grosvenor	Fish	City of Riverside	Parks & Recreation	
Kris	Flanigan	Riverside County	Flood Control	
Jennifer	Gale	Riverside County Flood Control	Development Review	
Timothy	Kearns	Riverside	Building & Safety	
Jim	Kong	RCFC	Design	
Ewina	Lau	City of Riverside	Parks & Recreation	
Steve	Loriso	City of Norco	Public Works	
Ed	Lotz	Riverside County Flood Control District	Encroachment Permits	
Amy	McNeil	Riverside County	Flood Control	Amy McNeil
Demeke	Muarega	RCFC	Design	

Training Location – Riverside County Flood Control and Water Conservation District

00008855

NPDES STORMWATER WATER QUALITY MANAGEMENT PLAN TRAINING

Meeting of: October 23, 2006 8:00 a.m. – 12:00 p.m. SIGN-IN SHEET

FIRST NAME	LAST NAME	MUNICIPALITY	DEPARTMENT	SIGNATURE
Linda	Nixon,	City of Hemet	Public Works	Linda Nixon
Jennifer	Otterson	Riverside County	Flood Control	
Claudio	Padres	RCFC	Design	
Jeff	Potts	City of Corona	Public Works	
Roman	Ramirez	Riverside County	Building & Safety	
Eric	Russell	Riverside County	Flood Control	Eric W Russell
Alisa	Sramala	City of Riverside	Parks, Recreation, and Community Services	
Lori	Wolfe	Riverside County	Flood Control	Wolfe
Mike	Wong	Riverside County	Flood Control	Mike M. Wong
Panda	Workman	County of Riverside	Waste Management	
Amy	Yu	Riverside County	Building & Safety	
Shaheen	Moonan	RCFC		
Lombardo	Ostrimidas	CVMSD	Planning	
Ewina	Lau	City of Riverside	Park & Rec.	Ewina Lau

Training Location – Riverside County Flood Control and Water Conservation District

00000856

NPDES STORMWATER QUALITY TRAINING FOR
WQMP Training
Riverside County Flood Control & Water Conservation District

Meeting of: Monday, April 16 - 12:00 - 16:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
1	Benjie	Cho	RCFC & WCD	NPDES	(951) 955-2901	
2	Gloria	Perez	Riverside County	Development Department	(951) 955-9056	
3	Michele	Colbert	City of Corona	Public Works	(951) 736-2248	
4	Barry	Ghaemi	City of Corona	Public Works	(951) 739-4961	
5	Crystal	Nguyen	City of Corona	Public Works	(951) 817-5798	
6	Estella	Valderrama	City of Corona	Public Works	(951) 279-3751	
7	Noel	Castillo	City of Corona	Public Works	(951) 279-3537	
8	Lupe	Barrera	City of Corona	Public Works	(951) 736-2435	
9	Cora	Soto	City of Perris	Planning	(951) 943-5003	
10	Jeramy	Jackson	City of Moreno Valley	Land Development	(951) 616-4564	
11	dan	cuthbertson	City of Norco	Public Works	(951) 270-5607	
12	Lisa	McCullough	City of San Jacinto	Community Development / GIS	(951) 537-6360	
13	Brian	Ching	City of La Quinta	Public Works	(760) 777-7044	
14	Ed	Wimmer	City of La Quinta	Public Works	(760) 777-7088	
15	Pui Ting (Amy)	Yu	City of La Quinta	Public Works	(760) 777-7047	
16	Mark	Gross	City of Moreno Valley	Planning	(951) 413-3215	
17	Mark	Berg	City of Norco	Building and Safety	(951) 270-5637	
18	Craig	Welch	City of Norco	Building and Safety		
19	Mary	Zambon	City of Riverside	Transportation	(951) 955-6759	
20	Andrew	Hunsick	City of Riverside	Transportation		

21	Marcia	Rose	City of Riverside	Transportation	[illegible]	
22	Tamrat	Seyoum	City of Riverside	Water Engineering-Construction Unit	(951) 826-5672	
23	Xavier	Jacobo	City of Riverside	Water Engineering-Construction Unit	(951) 538-3461	
24	Stewart	Noble	City of Riverside	Water Engineering-Construction Unit	(951) 538-6970	
25	Jim	Henke	City of Riverside	Water Engineering-Construction Unit	(951) 538-3451	
26	Ernest	Marquez	City of Riverside	Water Engineering-Construction Unit	(951) 826-5409	
27	Panda	Workman	Riverside County	Waste Management		
28	~~Carol~~	~~Templeton~~	~~City of Palm Springs~~	~~Engineering~~	~~(760) 323-8253~~	[illegible]
29	David	Newell	City of Palm Springs	Planning Services	(760) 323-8245	
30	Bryan	Fernandez	City of Palm Springs	Planning	(760) 323-8245	
31	~~RICK~~	~~MINJARES~~	~~City of Palm Springs~~	~~ENGINEERING~~	~~(760) 323-8253~~	[illegible]
32	Jorge	Biagioni	City of Hemet	Engineering	(951) 765-2360	
33	Denise	Bartz	City of Hemet	Engineering	(951) 765-2366	
34	George	Farago	City of Palm Springs	Public Works and Engineering	(760) 323-8253	
35	Chris	Wiberg	City of Moreno Valley	Public Works	(951) 413-3135	

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New Development/Re-development (WQMP) Training

April 25, 2007

CVWD, 12 - 4 p.m.

	First	Last	Agency	E-mail	Phone	Sign-in
1	Arlene	Chun	RCFC	abchun@co.riverside.ca.us	951-955-1330	
2	Amy	Yu	City of La Quinta	ayu@la-quinta.org	760-777-7047	
3	Brian	Ching	City of La Quinta	bching@la-quinta.org	760-777-7044	
4	Alana	Townsend	City of Palm Desert	atownsend@ci.palm-desert.ca.us	760-346-0611	Alana Townsend
5	Page	Garner	City of Palm Desert	pgarner@ci.palm-desert.ca.us	760-346-0611	
6	Ryan	Stendell	City of Palm Desert	rstendell@ci.palm-desert.ca.us	760-346-0611	
7	Tony	Lucero	City of Coachella	tlucero@coachella.org	760-398-5744 x134	
8	Brett	Daniels	City of Coachella	bdaniels@coachella.org	760-398-5744 x180	Brett DANIELS
9	George	Farago	City of Palm Springs	George.Farago@palmsprings-ca.gov	760-323-8253 x8743	
10	Rick	Minjares	City of Palm Springs	Rick.Minjares@palmsprings-ca.gov	760-323-8253	Rick Minjares
11	Carol	Templeton	City of Palm Springs	Carol.Templeton@palmsprings-ca.gov	760-323-8253 x8741	
12	Grant	Klund	City of Indio	geklund@indio.org	760-391-4018	
13	Roldan	Lopez	City of Indio	rlopez@indio.org	760-391-4017	
14	James	Schuff	City of Indio	jschuff@indio.org	760-391-4017	
15	Georgia	Celebar	CVWD	gcelebar@cvwd.org	760-398-2651	
16	Terry	Truscella	CVWD	ttruscella@cvwd.org	760-398-2651	
17	Steve	Bigley	CVWD	sbigley@cvwd.org	760-398-2651	
18	Will	Gonzalez	CVWD	wgonzalez@cvwd.org	760-398-2651	
19	Olivia	Daniels	CVWD	odaniels@cvwd.org	760-398-2651	
20	Tommy	Fowlkes	CVWD	tfowlkes@cvwd.org	760-398-2651	
21	Rosie	Anacleto	CVWD	ranacleto@cvwd.org	760-398-2651	
22	Tyler	Hull	CVWD	thull@cvwd.org	760-398-2651	
23	Frank	Crain	City of Coachella	fcrain@coachella.org	760-398-5744 x138	
24	Amir	Modarressi	City of Indio	amir@indio.org	760-398-4017 x4219	
25	Jaime	Ingler	City of Indio	jangler@indio.org	760-398-4017 x4223	
26	Tom	Rafferty	City of Indio	trafferty@indio.org	760-398-4017 x4270	
27	[illegible]	[illegible]	CVWD		760-398-2666 x2661	[illegible]
28	[illegible]	[illegible]	City of [illegible]	[illegible]	760-391-4195	[illegible]
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HAZARDOUS MATERIALS NOTIFICATION AND DISPOSAL OF SPILLED OR DISCOVERED MATERIALS

11/16/06

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

PROCEDURE FOR NOTIFICATION AND DISPOSAL OF SPILLED OR DISCOVERED HAZARDOUS MATERIALS

A. **Definitions:**

Emergency Event

1. Any spill that requires medical attention beyond the first aid capabilities of a trained District employee or cannot wait for transportation to a local occupational medicine clinic. A medical emergency may occur when either a District employee or a member of the public is exposed to hazardous materials. An example would be concentrated herbicide splashing into your eyes.
2. Any spill that cannot be contained with the spill kits on the trucks and threatens public health or could enter the storm or sewer systems. An example would be a large herbicide spill on a public street.
3. Any spill that involves a substantial amount of a flammable liquid. An example would be a gasoline tank leak that cannot be plugged.

Non-emergency Event

1. Any hazardous material spill that does not satisfy the above criteria. In addition, this includes discovery of unknown or possibly hazardous materials on District property. **CAUTION: These abandoned materials may have no labels or marking on the drums, gas cylinders, or batteries. Do not move the material until directed to do so by the proper agency. Moving material discovered on District property without approval from County HAZMAT or the appropriate Fire Department may create an emergency event. An example would be moving an abandoned battery and having it explode. Needles and human waste should not be handled; call the appropriate phone number for support.**

Under no circumstances should rubbish or hazardous materials be buried or disposed of in an illegal or inappropriate manner. Rubbish should be taken to a designated landfill or transfer station. Hazardous materials should be cleaned up, placed in an appropriate container, tagged, and reused or properly stored and disposed of as a hazardous waste.

B. Notification of Emergency Events

1. Call 911 and explain your situation.
2. If an employee or member of the public is injured, report the injury and the chemical being used.
3. Take care of the injured. Flush eyes or provide other first aid support until help arrives.
4. If no one is injured, report your location, the chemical spilled, the amount spilled, and the total amount on the truck.
5. Call supervisor or Mark Biloki (955-1310, cell 951.288.5254) and report situation. If they are unavailable, call NPDES at 955-4390 (David Ortega, cell 951.961.9574) or 955-1248 (Linda Garcia).
6. When emergency responders arrive, provide MSDS and follow their directions. If responders recommend outside clean up assistance, contact supervisor or Mark Biloki. If supervisor or Mark Biloki is not available, contact NPDES at the numbers listed above.

Mark Biloki, the supervisor or NPDES will contact Consolidated Waste Industries (CWI) if spill clean up is required.

C. Notification of Non-emergency Events

1. For large District created spills or hazardous materials found on District property, call your supervisor or Mark Biloki (955-1310, cell 951-288-5254). If they are unavailable, call NPDES at 955-4390 (David Ortega, cell 951-961-9574) or 955-1248 (Linda Garcia). Report location and situation.
2. Supervisor, Mark Biloki, or NPDES will call the appropriate HAZMAT support agency if required.

951.358.5055	County Hazardous Materials Management Division Ask for Christine Parsons (Cell 951.453.7842) or person on-call
951.922.3210	CDF/Banning Fire Service
951.736.2220	City of Corona Fire Department
951.826.5321	City of Riverside Fire Department

3. The Supervisor or Mark Biloki will contact NPDES, if not contacted earlier.
4. If additional clean up support is required, Supervisor, Mark Biloki, or NPDES will task Consolidated Waste Industries for large spills.
5. For small spills you can clean up with your spill kits, contact your supervisor or Mark Biloki after you have completed spill clean up. Supervisor or Mark Biloki will contact NPDES.
6. When needles are found, contact Environmental Health at 951.955.8982.
7. When human waste is found, contact your Supervisor or Mark Biloki. They will coordinate clean up with the appropriate contractor.

D. Post-Spill Clean up Reporting

After spill clean up, employee shall fill out Environmental Spill Report in SOM – 12 and submit to supervisor. Supervisor shall provide a copy to NPDES.

POST FOR EMPLOYEES

HAZARDOUS MATERIALS BUSINESS EMERGENCY PLAN: EMERGENCY NOTIFICATION

During an emergency involving a release or a threatened release of a hazardous material you must notify appropriate agencies. Information you should be prepared to supply includes:

1. Name and telephone number of the reporting party;
2. Name and address of business;
3. Time and type of release (e.g., damaged containers, malfunctioning equipment, etc.);
4. Name and quantity of material(s) involved;
5. Extent and number of injuries;
6. Actions taken or being taken to mitigate or reduce emergency;
7. Potential hazards to human health or the environment surrounding the business.

AGENCY NOTIFICATION:

Fire Department	911
Ambulance/Paramedic	911
Police/Sheriff	911

Hospital Riverside Community Phone # (951) 788-3200

Primary Facility Emergency Contact Person
Name Steve Thomas Phone # 5-1280; Cell (909) 223-2127

Hazardous Materials Management Division	(951) 358-5055
CDF/Banning Fire Service	(951) 922-3210
City of Corona Fire Department	(951) 736-2220
City of Riverside Fire Department	(951) 826-5321
California Office of Emergency Services	(800) 852-7550
National Response Center	(800) 424-8802
Poison Control Center	(800) 876-4766
Hazardous Materials Cleanup Contractor	(800) 233-3748
Needles: Environmental Health	(951) 955-8982

Name of Contractor (if applicable): Consolidated Waste Industries

Other Contacts: Mark Biloki 5-1310; Cell (951) 288-5254

David Ortega 5-4390; Cell (951) 961-9574

Jason Uhley 5-1273; Cell (951) 783-7130

Linda Garcia 5-1248

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT ENVIRONMENTAL SPILL OR NON-VEHICLE DAMAGE REPORT

Department _____

Equipment Involved, Type and Model _____

Environmental Spill or Equipment Damage _____

Operator's/User's Name _____

Date _____ Time _____ Place _____

Operator's/User's Description of the Incident*

_____
_____
_____
_____
_____
_____
_____
_____
_____
_____

Signature_____ Date_____

Witnesses/Other Personnel Involved*

_____
_____

Encl (5)

11/16/06

John Huggins
John TAYLOR
Raymond McGEE
Edward Moore
?
Tom
Mike
Doug Rose
Jimmy Lucas
Dale Gaulden
Mike Haywood
PHIL HURTADO
?
Lysiak
Bob Rubio
?

Chris MACIAS
Mike SLACK
Phil Viall
Ed Underhill
KEN CLARK
MIKE ROSSI
Brandon Hernandez
Carl Robrake
Angel SALAZAR
Tim Melendrez

George H
Robert Lysiak
Kenneth S Clark II
Tyrone Mitchell
Richard Garza
JOHN NEWSOM
JESSIE ARIAS
J Gutknecht
R. Vaughan
MARK LUNA

WALTER NECOCHEA

STEVE HOUSE

JOSE ESPINOZA

MIGUEL NEGRETE

HECTOR VALDEZ

JESS TOVAR

GEORGE EDWARD KAY MCPHERSON

0000869

GABRIEL RUBIO

MIKE O'MALLEY

Michael Piccio

Matthew Prichard
GENE ALLS
Mario Silva

Rich [illegible]
Bryan Whitmore
CARLOS VILLEGAS
AVELINO VALENCIA
RUBEN LEYVA
Brian Hernandez
Jaime [illegible]
TIM REGAN
Billy Bryant
FRANK DAPPILE
Ignacio Guerra
GEORGE RUIZ

HAZMAT SPILL NOTIFICATION
17 JAN 07

	PRINT NAME	SIGNATURE
1.	DEE SMITH	
2.	Mick Talbert	
3.	JEFF JONES	
4.	RUDY GIL	
5.	Dan Dennington	
6.	LLOYD HARMON	
7.	Raul C VILLegas	
8.		
9.		
10.		
11.		
12.		
13.		
14.		
15.		
16.		
17.		
18.		
19.		
20.		
21.		

PRINT NAME	SIGNATURE
22. ROBERT FOWLER	
23. LARRY Cecil	
24. DAVID ALLERS	
25. ANTHONY KORTHELY	
26. CHARLES DeBRUIN	
27. JIM MCNEILL	
28. DAVID McEACHERN	
29. JOE HUNGE	
30. DAVIN CHANG	
31. PAM CUNNINGHAM	
32. RANDY PATTERSON	
33. JOHN NEWSON	
34. JAY KELLER	
35. KAREN TIETRAT	
36. JOHN ALVINO	
37. MAURICIO YAQUOT	
38.	HOUSTON
39.	
40.	
41.	
42.	
43.	

HAZMAT SPILL NOTIFICATION
18 JAN 07

	PRINT NAME	SIGNATURE
1.	Barry Temple	Barry C. Temple
2.	RAY DUNN	
3.	Brent Mytinger	B Mytinger
4.	DARIO SAMONTE	Dario Samonte
5.	GARY LUNDBERG	
6.	Pam Berberg	
7.	Gene Lewis	
8.	Tim Figg	
9.	DALE V. ANDERSON	Dale V. Anderson
10.	David J. Ortega	David J. Ortega
11.	MIKE LUNA	Mike Luna
12.	STEVE CLARK	Steve E. Clark
13.	Robert Long	Robert Long
14.	Linda Garcia	
15.	Penny Nanney	
16.		
17.		
18.		
19.		
20.		
21.		

Qualified Application License Training

Negrete, Miguel	QA License: 45301		QA Expiration Date 12/31/2008
Name of Class	**Class Code**	**Date**	**Units**
Annual Flood Control Seminar	A-0735-06	04/06/06	4.00
Education Pays		06/22/06	7.50
Traget Water Symposium	A-766-06	07/06/06	6.00
Annual Vegetation Management Seminar	A-1139-06	08/02/06	7.00
Orange County Vegetation Mgmt Laws & Reg.	A-0844-04	04/10/07	2.00
Annual Worker Safety Training 2007 Other	A-0019-07	05/01/07	2.00
Annual Worker Safety Training 2007 Laws & Reg.	A-0019-07	05/01/07	4.00
Vegatation Management	A-1096-07	07/11/07	6.00
San Bernardino Hilton Pesticide Training		07/19/07	6.00
		Units	44.5

Qualified Application License Training

Newson, John	QA License:		QA Expiration Date mm/dd/yyyy
Name of Class	**Class Code**	**Date**	**Units**
Annual Worker Safety Training 2007 Other	A-0019-07	05/01/07	1.00
Annual Worker Safety Training 2007 Laws & Reg.	A-0019-07	05/01/07	4.00

Houston, Walter	QA License:		QA Expiration Date mm/dd/yyyy
Name of Class	**Class Code**	**Date**	**Units**
Annual Worker Safety Training 2007 Laws & Reg.	A-0019-07	05/01/07	4.00
Annual Worker Safety Training 2007 Other	A-0019-07	05/01/07	1.00

Valdez, Hector	QA License: 25296		QA Expiration Date 12/31/2007
Name of Class	**Class Code**	**Date**	**Units**
Annual Worker Safety Training 2007 Laws & Reg.	A-0019-07	05/01/07	4.00
Annual Worker Safety Training 2007 Other	A-0019-07	05/01/07	1.00

Rubio, Gabriel	QA License:		QA Expiration Date mm/dd/yyyy
Name of Class	**Class Code**	**Date**	**Units**
Annual Worker Safety Training 2007 Other	A-0019-07	05/01/07	1.00
Annual Worker Safety Training 2007 Laws & Reg.	A-0019-07	05/01/07	4.00

Leon, Robert	QA License:		QA Expiration Date mm/dd/yyyy
Name of Class	**Class Code**	**Date**	**Units**
Annual Worker Safety Training 2007 Laws & Reg.	A-0019-07	05/01/07	4.00
Annual Worker Safety Training 2007 Other	A-0019-07	05/01/07	2.00

Slaick, Mike

QA License: 20376

QA Expiration Date 12/31/2007

Name of Class	Class Code	Date	Units
Annual Worker Safety Training 2007 Laws & Reg.	A-0019-07	05/01/07	4.00
Annual Worker Safety Training 2007 Other	A-0019-07	05/01/07	1.00
Annual Worker Safety Training 2007 Laws & Reg.	A-0019-07	05/01/07	4.00
Annual Worker Safety Training 2007 Other	A-0019-07	05/01/07	1.00

Drake, Carl

QA License:

QA Expiration Date mm/dd/yyyy

Name of Class	Class Code	Date	Units
Annual Worker Safety Training 2007 Laws & Reg.	A-0019-07	05/01/07	4.00
Annual Worker Safety Training 2007 Other	A-0019-07	05/01/07	1.00

Tovar, Jess

QA License: 24653

QA Expiration Date 12/31/2007

Name of Class	Class Code	Date	Units
Annual Worker Safety Training 2007 Laws & Reg.	A-0019-07	05/01/07	4.00
Annual Worker Safety Training 2007 Other	A-0019-07	05/01/07	2.00

Negrete, Miguel

QA License: 45301

QA Expiration Date 12/31/2008

Name of Class	Class Code	Date	Units
Annual Worker Safety Training 2007 Laws & Reg.	A-0019-07	05/01/07	4.00
Annual Worker Safety Training 2007 Other	A-0019-07	05/01/07	2.00

Hernandez, Brian

QA License:

QA Expiration Date mm/dd/yyyy

Name of Class	Class Code	Date	Units
Annual Worker Safety Training 2007 Laws & Reg.	A-0019-07	05/01/07	4.00
Annual Worker Safety Training 2007 Others	A-0019-07	05/01/07	1.00

Picazo, Michael

QA License:

QA Expiration Date mm/dd/yyyy

Name of Class	Class Code	Date	Units
Annual Worker Safety Training 2007 Laws & Reg.	A-0019-07	05/01/07	4.00
Annual Worker Safety Training 2007 Other	A-0019-07	05/01/07	1.00

Necochea, Walter

QA License:

QA Expiration Date mm/dd/yyyy

Name of Class	Class Code	Date	Units
Annual Worker Safety Training 2007 Other	A-0019-07	05/01/07	2.00
Annual Worker Safety Training 2007 Laws & Reg.	A-0019-07	05/01/07	4.00

Luce, James

QA License:

QA Expiration Date mm/dd/yyyy

Name of Class	Class Code	Date	Units
Annual Worker Safety Training 2007 Others	A-0019-07	05/01/07	1.00
Annual Worker Safety Training 2007 Laws & Reg.	A-0019-07	05/01/07	4.00

Melendrez, Tim

QA License:

QA Expiration Date mm/dd/yyyy

Name of Class	Class Code	Date	Units
Annual Worker Safety Training 2007 Laws & Reg.	A-0019-07	05/01/07	4.00
Annual Worker Safety Training 2007 Others	A-0019-07	05/01/07	2.00

Macias, Christopher

QA License:

QA Expiration Date mm/dd/yyyy

Name of Class	Class Code	Date	Units
Annual Worker Safety Training 2007 Other	A-0019-07	05/01/07	1.00
Annual Worker Safety Training 2007 Laws & Reg.	A-0019-07	05/01/07	4.00

Vaughan, Ronnie

QA License: 24603

QA Expiration Date 12/31/2007

Name of Class	Class Code	Date	Units
Annual Worker Safety Training 2007 Other	A-0019-07	05/01/07	1.00
Annual Worker Safety Training 2007 Laws & Reg.	A-0019-07	05/01/07	4.00

Alls, Jr., Eugene

QA License:

QA Expiration Date mm/dd/yyyy

Name of Class	Class Code	Date	Units
Annual Worker Safety Training 2007 Laws & Reg.	A-0019-07	05/01/07	4.00
Annual Worker Safety Training 2007 Other	A-0019-07	05/01/07	2.00

Viall, Phillip

QA License:

QA Expiration Date mm/dd/yyyy

Name of Class	Class Code	Date	Units
Annual Worker Safety Training 2007 Other	A-0019-07	05/01/07	1.00
Annual Worker Safety Training 2007 Laws & Reg.	A-0019-07	05/01/07	4.00

Clark II, Kenneth (Steve)

QA License:

QA Expiration Date mm/dd/yyyy

Name of Class	Class Code	Date	Units
Annual Worker Safety Training 2007 Laws & Reg.	A-0019-07	05/01/07	4.00
Annual Worker Safety Training 2007 Other	A-0019-07	05/01/07	1.00

Valerdi, Mauricio

QA License:

QA Expiration Date mm/dd/yyyy

Name of Class	Class Code	Date	Units
Annual Worker Safety Training 2007 Other	A-0019-07	05/01/07	4.00
Annual Worker Safety Training 2007 Laws & Reg.	A-0019-07	05/01/07	4.00

Amis, Timmy

QA License:

QA Expiration Date mm/dd/yyyy

Name of Class	Class Code	Date	Units
Annual Worker Safety Training 2007 Other	A-0019-07	05/01/07	1.00
Annual Worker Safety Training 2007 Laws & Reg.	A-0019-07	05/01/07	4.00

Moore, Edward

QA License:

QA Expiration Date mm/dd/yyyy

Name of Class	Class Code	Date	Units
Annual Worker Safety Training 2007 Other	A-0019-07	05/01/07	1.00
Annual Worker Safety Training 2007 Laws & Reg.	A-0019-07	05/01/07	4.00

Espinoza, Jose

QA License: **QA Expiration Date mm/dd/yyyy**

Name of Class	Class Code	Date	Units
Annual Worker Safety Training 2007 Other	A-0019-07	05/01/07	2.00
Annual Worker Safety Training 2007 Laws & Reg.	A-0019-07	05/01/07	4.00

Riemer, Rodney

QA License: **QA Expiration Date mm/dd/yyyy**

Name of Class	Class Code	Date	Units
Annual Worker Safety Training 2007 Other	A-0019-07	05/01/07	2.00
Annual Worker Safety Training 2007 Laws & Reg.	A-0019-07	05/01/07	4.00

Glassey, Mike

QA License: **QA Expiration Date mm/dd/yyyy**

Name of Class	Class Code	Date	Units
Annual Worker Safety Training 2007 Other	A-0019-07	05/01/07	1.00
Annual Worker Safety Training 2007 Laws & Reg.	A-0019-07	05/01/07	4.00
			Units5

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MAINTENANCE SAFETY MEETING SIGN IN

TRAINER: BILOKI

TOPIC: STREAMBED INTEGRATIONS

Video ☒

Date: 6/7/07

EMPLOYEE	SIGNATURE
Alls, Jr., Eugene	
Alvino, John	
Amis, Timmy	
Arias, Jessie	
Biloki, Mark	
~~Bryant, Billy~~	
Butler, Minerva	
Clark, Ken	
Clark II, Kenneth (Steve)	
D'Aprile, Frank	SICK
Drake, Carl	
Espinoza, Jose	SICK
Garza, Richard	
Glassey, Mike	
Guillen, David	
Gutknecht, Josh	
Haskins, George	
Haywood, Michael	
~~Hernandez, Brandon~~	
Hernandez, Brian	
Hernandez, Tom	
House, Steve	
Houston, Walter	
Huggins, John	JOHN HUGGINS (NO SIG.)
Hurtado, Phil	
Jones, David	

EMPLOYEE	SIGNATURE
Leon, Robert	
~~Leyva, Ruben~~	
Luce, James	SICK
Luna, Mark	
Lysiak, Robert	
Macias, Christopher	
McGee, Raynard	
McPherson, George	
Melendrez, Tim	
Mitchell, Tyrone	
Moore, Edward	
Necochea, Walter	
Negrete, Miguel	
Newson, John	
O'Malley, Mike	
Picazo, Michael	SICK
Pinon, Jaime	
Prichard, Matthew	SICK
Regan, Tim	SICK
Riemer, Rodney	
Rogers, George	
Rossi, Michael	
Rubio, Gabriel	
Ruiz, George	GEORGE RUIZ (NO SIG)
Salazar, Angel	
Seager, Richard	
Silva, Mario	
Slaick, Mike	

EMPLOYEE	SIGNATURE
Slaick, Nicholas	
Smith, Ryan	
Taylor, John	
Tietsort, Kevin	
Tovar, Jess	
Underhill, Edward	
Valdez, Hector	
Valencia, Avelino	Avelino Valencia
Valerdi, Mauricio	
Vaughan, Ronnie	
Viall, Phillip	Phillip C Viall
Villegas, Carlos	
Villegas, Raul	
Whitmore, Bryan	
~~Ziske, Travis~~	

ATTACHMENT D

ENCROACHMENT PERMIT LOG

DATE	PERMIT NUMBER PERMITTEE	CHANNEL NAME DWG. NO./STS	TRACT OR PARCEL MAP NO. AGENCY PROJECT NAME	FILING FEE PAID	ENTERED DATABASE	PERMIT WRITTEN	INSPECTION FEE PAID	INSURANCE CERT. IN	COMPLETED OR CLOSED	DATABASE UPDATED	AS BUILTS PLOTTED
6/5	4-0-0110-2995 SCE	SALT CREEK 4-786/2	ELECTRICAL CONDUIT INSTALLATION	✓	○	✓	✓	✓	✓	○	●
6/5	7-0-0143-2996 AVI PROPERTIES, LLC	MURRIETA LINEF 7-200/3	TRACT 31997 24" RCP CONNECTION	✓	○	✓	✓	●	○	○	○
6/5	5-0-0160-2997 YUCAIPA VALLEY WATER DISTRICT	CALIMESA 5-139/4	24" WATERLINE INSTALLATION	✓	○	✓	✓	✓	✓	○	●
6/16	4-0-0120-2998 BLUE-SAN JACINTO, LLC	SAN JACINTO LINEE 4-708/12	TRACT 22665 RCB CONSTRUCTION AND 24" RCP CONNECTION	✓	○	✓	✓	✓	○	○	○
6/16	1-0-0250-2999 IDI	DAY CREEK 1-499/2	TRACT 31644 2-54" RCP CONNECTIONS	✓	○	✓	✓	○	✓ CLOSED	○	N/A
6/16	4-0-0270-3000 MODERN BUILDING	PERRIS "G" ST. STORM DRAIN 4-251/5	2-18" STORM DRAIN CONNECTIONS & UTILITY CROSSINGS	✓	○	○	✓	○	✓ CLOSED	○	N/A
6/22	4-0-0120-3001 SCE	SAN JACINTO CIRE E 4-708/7	UNDERGROUND UTILITY CROSSING	✓	○	✓	✓	✓	✓	○	●
6/26	1-0-0090-3002 YEAGER	BLY. CH SD 1-356/4	18" STORM DRAIN CONNECTION	✓	○	✓	✓	✓	✓	○	●
6/28	4-0-010-3003 KLEINFELDER	4-103/5 & 4 PERRIS VALLEY SD	Soil Borings	✓	○	✓	✓	○	✓	○	N/A
7/10	4-0-0120-3004 G COMPANIES	SAN JACINTO LINEE 4-708/7	TRACT 32247 24" RCP CONNECTION	✓	○	○	✓	○	✓ CLOSED	○	N/A

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DATE	PERMIT NUMBER PERMITTEE	CHANNEL NAME DWG. NO./STS	TRACT OR PARCEL MAP NO. AGENCY PROJECT NAME	FILING FEE PAID	ENTERED DATABASE	PERMIT WRITTEN	INSPECTION FEE PAID	INSURANCE CERT. IN	COMPLETED OR CLOSED	DATABASE UPDATED	AS BUILTS PLOTTED
7/10	7-0-0144-3005 HUNSAKER & ASSOCIATES	MURRIETA LINE F3 7-125/8	TRACT 31497 24" RCP CONNECTION	✓	○	✓	✓	○	✓	○	●
7/10	5-0-0180-3006 SCE	HIGHLAND SPRINGS 5-138/6	ELECTRICAL CONDUIT INSTALL	✓	○	✓	✓	○	✓	○	●
7/18	1-0-0043-3007 WINDROW	ALESSANDRO DAM	SEDIMENT REMOVAL	✓	○	✓	✓	✓	✓	○	N/A
7/20	2-0-0303-3008 RICHLAND COMMUNITIES	EASTVALE LINE B 2-362/5	TRACT 31492 DOUBLE 24" RCP CONNECTION	✓	○	○	✓	○	✓ CLOSED	○	N/A
7/24	4-0-0110-3009 WEBB ASSOCIATES	SALT CREEK CH.	TRIPLE 14'x8' CULVERT/DIP XING	✓	○	✓	✓	✓	✓	○	●
7/31	2-0-0303-3010 SC EASTVALE DEVELOPMENT	EASTVALE LINE B 2-362/2-5	TRACTS 30971, 31622, 31931 15-RCP CONNECTIONS	✓	○	✓	✓	✓	✓	○	●
7/31	5-0-0180-3011 BEAUMONT-CHERRY VALLEY WATER DISTRICT	HIGHLAND SPRINGS 5-138/6	WELL WATER DISCHARGE LINE	✓	○	✓	✓	✓	✓	○	N/A
8/2	2-0-0270-3012 CITY OF CORONA	COMPTON AVE. STORM DRAIN 2-281/3	36" RCP CONNECTION	✓	○	✓	✓	●	○	○	○
8/9	2-0-0050-3013 RGI	TEMESCAL 2-195/6	ELECTRICAL UTILITY INSTALLATION	✓	○	✓	✓	●	○	○	○
8/9	5-0-0020-3014 BEAUMONT-CHERRY VALLEY WATER DISTRICT	NOBLE CREEK 5-128/6	2- GROUNDWATER RECHARGE BASIN OVERFLOW CONNECTIONS	✓	○	○	✓	○	○	○	○

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DATE	PERMIT NUMBER PERMITTEE	CHANNEL NAME DWG. NO./STS	TRACT OR PARCEL MAP NO. AGENCY PROJECT NAME	FILING FEE PAID	ENTERED DATABASE	PERMIT WRITTEN	INSPECTION FEE PAID	INSURANCE CERT. IN	COMPLETED OR CLOSED	DATABASE UPDATED	AS BUILTS PLOTTED
8/17	7-0-0051-3015 Pacific Century Group	TEMECULA LINE VV 7-305/2 7-221/4	TR 33891 2-24" SD CONNECTIONS	✓	○	✓	✓	●	○	○	○
8/21	1-0-0272-3016 HALL AND FOREMAN	DRY CREEK LINE I 1-601/4-7	PARCEL MAP 32545 8-RCP CONNECTIONS	✓	○	✓	✓	✓	✓	○	●
8/24	1-0-0010-3017 SUNCAL COMPANIES	SANTA ANA RIVER 1-550/2&3	TRACT 32971 GROUND WATER DEWATERING	✓	○	○	✓	○	○	○	○
8/29	5-0-0030-3018 PARDEE HOMES	CHERRY AVE. STORM DRAIN 5-79/1	TRACT 31468 48" BASIN OUTLET CONNECTION	✓	○	○	✓	○	○	○	○
8/29	7-0-0020-3019 TBC SOLUTIONS, INC.	MURRIETA CREEK	SOIL BORINGS	✓	○	✓	✓	✓	●	○	N/A
8/30	1-0-0010-3020 S.B. REGIONAL PARKS	SANTA ANA RIVER	BICYCLE AND PEDESTRIAN TRAIL	✓	○	✓	✓	✓	✓	○	●
8/31	4-0-0120-3021 MARINO CONSTRUCTION	SAN JACINTO CIRCLE 4-708	TRACT 33546 18" STORM DRAIN CONNECTION	✓	○	✓	✓	✓	○	○	○
9/11	7-0-0070-3022 WEST COAST REALITY	WILDOMAR 7-94/4	TEMPORARY PIPELINE ON CHANNEL MAINTENANCE ROAD	✓	○	✓	✓	○	✓	○	N/A
9/19	1-0-0240-3023 CITY OF RIVERSIDE	PHOENIX AVE. STORM DRAIN 1-394/2	48" RCP CONNECTION	✓	○	✓	✓	●	○	○	○
9/19	7-0-0020-3024 EMWD	MURRIETA CREEK	36" SEWERLINE INSTALLATION	✓	○	○	✓	○	✓ CLOSED	○	N/A

DATE	PERMIT NUMBER PERMITTEE	CHANNEL NAME DWG. NO./STS	TRACT OR PARCEL MAP NO. AGENCY PROJECT NAME	FILING FEE PAID	ENTERED DATABASE	PERMIT WRITTEN	INSPECTION FEE PAID	INSURANCE CERT. IN	COMPLETED OR CLOSED	DATABASE UPDATED	AS BUILTS PLOTTED
9/29	2-0-0070-3025 DR. NOLASCO STA. ANA	OAK STREET CH. 2-71 Sheet 3	8" RCP CONNECTION	✓	○	○	✓	○	○	○	○
10/3	1-0-0020-3026 CORPS OF ENGINEERS	MURRIETA CREEK N/A	ONE 8" SOIL BORING	W/D	○	✓	W/D	✓	✓	○	N/A
10/12	2-0-0304-3027 PINNACLE	EASTVALE MAP CH. 2-296 SHEET 2	36" SD CONNECTION TRACT 32125	✓	○	✓	✓	✓	○	○	○
10/17	1-0-0171-3028 PSOMAS	ARIZONA LINE G-1 1-457/2	TRACT 32772-6 18" RCP CONNECTION	✓	○	✓	✓	●	○	○	○
10/18	4-0-0758-3029 PSOMAS	MORENO LINE F-6 4-528/4-4	TRACT 33532 24" RCP CONNECTION	✓	○	○	✓	○	○	○	○
10/20	4-0-0000-3030 EDELBROCK	SAN JACINTO LINE E-1A	2-18" RCP CONNECTIONS	✓	○	✓	✓	●	○	○	○
10/30	4-0-0281/0640-3031 PJRT IRIS INVESTMENT	GENTIAN AVE. S.D. & SUNNYMEAD LINE E 4-319/8 & 4-346/3	TRACT 22180-2 & 3 30" & 54" RCP CONNECTIONS	✓	○	✓	✓	●	○	○	○
10/30	1-0-0124-3032 WALTERS WHOLESALE ELECTRICAL	UNIVERSITY WASH SPRUCE ST. STORM DRAIN 1-361/4	18" RCP CONNECTION	✓	○	✓	✓	✓	✓	○	●
11/1	1-0-0049-3033 JCSD	DE FOREST CIRCLE LINE D 1-528/15	24" WELL WATER CONNECTION	✓	○	✓	✓	○	✓	○	●
11/6	2-0-0150-3034 MADISON FCS, INC.	SOUTH NORCO 2-102/6	18" RCP CONNECTION	✓	○	○	✓	○	○	○	○

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DATE	PERMIT NUMBER PERMITTEE	CHANNEL NAME DWG. NO./STS	TRACT OR PARCEL MAP NO. AGENCY PROJECT NAME	FILING FEE PAID	ENTERED DATABASE	PERMIT WRITTEN	INSPECTION FEE PAID	INSURANCE CERT. IN	COMPLETED OR CLOSED	DATABASE UPDATED	AS BUILTS PLOTTED
11/14	5-0-0170-3035 MG BANNING, LLC	GILMAN HOME 5-154/5	TRACT 34736 24" RCP CONNECTION AND SEWER LINE INSTALLATION	✓	○	✓	✓	●	○	○	○
11/14	6-0-0185-3036 DESERT WATER AGENCY	PALM SPRINGS LINE 32 6-337/	WELL WATER CONNECTIONS	✓	○	○	✓	○	✓ CLOSED	○	N/A
11/28	7-0-0143-3037 AVI PROPERTIES, LLC	Kalmia ST. Wash 7-200/4	Tract 31992 12" Connection To exist Wash	✓	○	○	✓	○	○	○	○
11/30	2-0-0041/0070-3038 EARTH MECHANICS, INC.	MARDE CANYON BASIN KIRCHENLYNE CHANNEL 2-162/9	SOIL EXPLORATIONS	✓	○	✓	✓	✓	✓	○	N/A
12/1	4-0-0762-3039 BEAZER HOMES	MORENO MDP LINE I 4-745/3	TRACT 32834 24" RCP CONNECTION	✓	○	✓	✓	✓	✓	○	●
12/1	7-0-0144-3040 AC MAGNOLIA, LLC	MURRIETA F-3 7-189/3	TRACT 31467 2-24" RCP CONNECTIONS	✓	○	✓	✓	●	○	○	○
12/5	4-0-0102/0370-3041 MORENO VALLEY HEALTH, LLC	SUNNYMEAD LINES T & T-7 4-579/5 4-598/2	PARCEL MAP 33930 3-24" RCP CONNECTIONS	✓	○	✓	✓	✓	✓	○	●
12/6	1-0-0250-3042 JCSD	DAY CREEK 1-507/4	24" WELL WATER CONNECTION	✓	○	○	✓	○	○	○	○
12/11	4-0-0684-3043 OMNIVIEW CONSTRUCTION	SUNNYMEAD MDP LINE M-4 4-730/2	24" RCP CONNECTION	✓	○	✓	✓	✓	✓	○	●
12/11	3-0-0120-3044 CORMAN LEIGH	4 CORNERS STORM DRAIN 3-116/	TRACT 33486 36" RCP CONNECTION	✓	○	✓	✓	✓	✓	○	●

0000889

DATE	PERMIT NUMBER PERMITTEE	CHANNEL NAME DWG. NO./STS	TRACT OR PARCEL MAP NO. AGENCY PROJECT NAME	FILING FEE PAID	ENTERED DATABASE	PERMIT WRITTEN	INSPECTION FEE PAID	INSURANCE CERT. IN	COMPLETED OR CLOSED	DATABASE UPDATED	AS BUILTS PLOTTED
12/18	3-0-0100-3045 EVMWD	W. ELSINORE ADP LINE B-1 3-149/2	WELL WATER DISCHARGE DRAIN	✓	○	○	○	○	○	○	○
12/19	7-0-0020-3046 CITY OF TEMECULA	MURRIETA CREEK	MULTI-PURPOSE TRAIL	✓	○	○	✓	○	○	○	○
1/3/07	4-0-0020-3047 CENTEX HOMES	SAN JACINTO RIVER	TRACT 32666-1 96" RCP CONNECTION	✓	○	○	✓	○	○	○	○
1/10	4-0-0020-3048 EMWD	SAN JACINTO RIVER	WELL WATER CONNECTIONS	✓	○	✓	✓	●	○	○	○
1/18	1-0-0227-3049 VICTORIA HOMES	JURUPA-PYRITE MDP LINE G 1-609/2	TRACT 33675-1 36" RCP CONNECTION	✓	○	○	✓	○	○	○	○
1/22	3-0-0180-3050 EVMWD	WASSON CANYON 3-127/W2	54" SEWER INSTALLATION	✓	○	✓	✓	●	○	○	○
1/29	6-0-0010-3051 CITY OF CATHEDRAL CITY	W. CATHEDRAL CYN.	8" SEWER LINE INSTALLATION	✓	○	○	✓	○	○	○	○
1/30	4-0-0010-3052 SCE	PERRIS VALLEY 4-731/3	AERIAL ELECTRICAL LINE	✓	○	✓	✓	✓	○	○	○
2/1	4-0-0110-3053 GENERAL ELECTRIC	SALT CREEK 4-169/6	24" WASTE LINE	✓	○	✓	✓	✓	○	○	○
2/1	4-0-0758-3054 PACIFIC COMMUNITIES	MORENO LINE F-6 4-528/2	TRACT 29920 18" RCP CONNECTION	✓	○	✓	✓	✓	✓	○	●

0680000

DATE	PERMIT NUMBER PERMITTEE	CHANNEL NAME DWG. NO./STS	TRACT OR PARCEL MAP NO. AGENCY PROJECT NAME	FILING FEE PAID	ENTERED DATABASE	PERMIT WRITTEN	INSPECTION FEE PAID	INSURANCE CERT. IN	COMPLETED OR CLOSED	DATABASE UPDATED	AS BUILTS PLOTTED
2/6	4-0-0510-3055 SUMMERLAND PARTNERS	PERRIS ADP LINE L 4-554/2	24" RCP CONNECTION	✓	○	✓	✓	●	○	○	○
2/7	1-0-0072-3056 CITY OF RIVERSIDE	MONROE S.D. R/R LATERAL 1-385/8&9	36" RCP CONNECTION	✓	○	✓	✓	○	✓	○	●
2/7	4-0-0008-305[redacted] EMWD	PVC LATERAL A 4-617/6-9	SEWER LINE PROTECTION	WAIVED	○	✓	N/A	●	○	○	○
2/13	7-0-0144-3058 CAPITAL PACIFIC HOMES	MURRIETA CREEK ADP LINE E-3 7-189/3	TRACT 30954 42" RCP CONNECTION	✓	○	✓	✓	●	○	○	○
2/14	4-0-0752-3059 HIGHLAND FAIRVIEW PROPERTIES	MORENO VALLEY ADP LINE F 4-527/4	WATERLINE POT HOLEING	✓	○	✓	✓	✓	✓	○	N/A
2/26	1-0-0335-3060 CMD	ALGA MANSA CHANN AVE. LATERAL 1-514/15	36" RCP CONNECTION	✓	○	✓	✓	●	○	○	○
2/26	4-0-0762-3061 BEAZER HOMES	MORENO ADP LINE I 4-583/3	TRACT 32834 24" RCP CONNECTION	✓	○	✓	✓	✓	✓	○	●
2/27	7-0-0130-3062 SUNWEEKS DEV.	MURRIETA CREEK LINE E. 7-323/12	48" RCP CONNECTION	✓	○	✓	✓	✓	✓	○	●
3/1	2-0-0050-3063 SCE	TEMESCAL 2-188/S-1	CONDUIT INSTALLATION	✓	○	✓	✓	✓	✓	○	●
3/7	6-0-0250-3064 SCE	WHITEWATER RIVER 6-319/10	POWER POLE RELOCATION	✓	○	✓	✓	○	✓	○	●

DATE	PERMIT NUMBER PERMITTEE	CHANNEL NAME DWG. NO./STS	TRACT OR PARCEL MAP NO. AGENCY PROJECT NAME	FILING FEE PAID	ENTERED DATABASE	PERMIT WRITTEN	INSPECTION FEE PAID	INSURANCE CERT. IN	COMPLETED OR CLOSED	DATABASE UPDATED	AS BUILTS PLOTTED
3/8	7-0-0143-3065 MURRIETA COMMONS, LLC	MURRIETA LINE F 7-200/3	36" RCP CONNECTION	✓	○	○	✓	○	○	○	○
3/8	4-0-0120-3066 LENNAR HOMES	SAN JACINTO LINE E	CHANNEL CAPACITY INCREASE	✓	○	○	✓	○	○	○	○
3/9	6-0-0400-3067 ENDURS INVESTMENTS	PALM SPRINGS LINE 34 6-309/11, 12, 14	PARCEL MAP 31968 18", 36", 42" RCP CONNECTION	✓	○	✓	✓	✓	○	○	○
3/12	1-0-0020-3068 GENESIS CONSTRUCTION	ARLINGTON 1-483/ 1-547/	8" & 16" WATERLINES	✓	○	✓	✓	✓	○	○	○
3/20	4-0-0110-3069 TRIMARK	SALT CREEK 4-786/10	TRACT 30322 18" & 36" RCP CONNECTIONS	✓	○	○	✓	○	○	○	○
3/21	4-0-0110-3070 D.R. HORTON	SALT CREEK 4-786/9 & 10	TRACT 30809 2-24" & 2-36" RCP CONNECTIONS	✓	○	○	✓	○	○	○	○
4/4	4-0-0011-3071 EMWD	HEACOCK CH. 4/610/2	48" WATERLINE	✓	○	✓	✓	●	○	○	○
4/5	6-0-0010-3072 SHADOW VALLEY HEIGHTS	W. CATH. CANYON 6-236/3	TRACT 33668 MAINTENANCE RD. FILL	✓	○	✓	✓	●	○	○	○
4/18	7-0-0020-3073 EMWD	MURRIETA CREEK	24" FORCE MAIN INSTALLATION	✓	○	✓	✓	●	○	○	○
4/24	6-0-0040-3074 CITY OF PALM SPRINGS	PALM CANYON 6-134/5	24" RCP CONNECTION	○	○	○	○	○	○	○	○

DATE	PERMIT NUMBER PERMITTEE	CHANNEL NAME DWG. NO./STS	TRACT OR PARCEL MAP NO. AGENCY PROJECT NAME	FILING FEE PAID	ENTERED DATABASE	PERMIT WRITTEN	INSPECTION FEE PAID	INSURANCE CERT. IN	COMPLETED OR CLOSED	DATABASE UPDATED	AS BUILTS PLOTTED
4/25	1-0-0050-3075 JCSD	SAN SEVAINE 1-593/3841	42" WATERLINE INSTALLATION	✓	○	✓	✓	●	○	○	○
4/26	1-0-0023-3076 MGC, INC	HOME GARDENS D-1 1-538/1 & 5	24" RCP CONNECTION	✓	○	○	✓	○	○	○	○
4/26	4-0-0020-3077 EMWD	SAN JACINTO RIVER	24" WATERLINE INSTALLATION	✓	○	✓	✓	●	○	○	○
4/30	4-0-0108-3078 California Pools	Salt Creek CT A,B 4-547/1-2	Pool Construction	✓	○	✓	✓	✓	✓	○	N/A
5/3	4-0-0030-3079 LHMWD	BAUTISTA CREEK 4-354/23	PRESSURE REDUCING VALVE STATION	✓	○	✓	✓	✓	✓	○	●
5/3	1-0-0290-3080 MASTER CRAFT DEVELOPMENT	CRESTMORE 1-510/6812	TRACT 31503 24" RCP CONNECTION	✓	○	○	✓	○	○	○	○
5/3	2-0-0323-3081 GEORGE HARADA	EASTVALE LINE D5 2-350/5	TRACT 28943 18" RCP CONNECTION	✓	○	○	✓	○	○	○	○
5/14	1-0-0272-3082 HOPKINS REAL ESTATE GROUP	DAY CREEK LINE J 1-601/5	PARCEL MAP 32545 24" RCP CONNECTION	✓	○	✓	✓	✓	✓	○	●
5/22	6-0-0250-3083 SCE	WHITEWATER LEVEE 6-319/8	Utility Relocation	✓	○	○	✓	○	○	○	○
6/1	7-0-0130-3084 SUB WEEKS DEVELOPMENT	MURRIETA CREEK LINE E7-323/12	PARCEL MAP 11124 2-8" PVC WATERLINES INSTAL	✓	○	✓	✓	●	○	○	○

0008993

DATE	PERMIT NUMBER PERMITTEE	CHANNEL NAME DWG. NO./STS	TRACT OR PARCEL MAP NO. AGENCY PROJECT NAME	FILING FEE PAID	ENTERED DATABASE	PERMIT WRITTEN	INSPECTION FEE PAID	INSURANCE CERT. IN	COMPLETED OR CLOSED	DATABASE UPDATED	AS BUILTS PLOTTED
6/4	5-0-0050-3085 CITY OF BANNING	MONTGOMERY CREEK	30" WATERLINE INSTALLATION	✓	○	✓	✓	●	○	○	○
6/6	4-0-0110-3086 D.R. HORTON	SALT CREEK 4-786/8	TRACT 32817 2-48" RCP CONNECTIONS	✓	○	○	✓	○	○	○	○
6/11	2-0-0221-3087 SCE	CORONA STORM DRAINS 2-116/7 & 10	ELECTRICAL DUCT INSTALLATION	✓	○	✓	✓	✓	✓	○	●
6/19	3-0-0120-3088 WD PARTNERS	4-CORNERS S.D. 3-116/5	24" RCP CONNECTIONS	✓	○	○	✓	○	○	○	○
6/28	4-0-0010-3089 EMPIRE COMMERCIAL CONST.	PERRIS VALLEY 4-731/8	30" RCP CONNECTION	✓	○	○	✓	○	○	○	○
7/3	1-0-0100-3090 RUBIDOUX COMMUNITY SERVICES DISTRICT	SUNNYSLOPE 1-226/4	24" SEWER LINE INSTALLATION & 18" RCP CONNECTION	✓	○	○	✓	○	○	○	○
7/18	4-0-0621-3091 IAS PARTNERS	SUNNYMEAD C-1/2 4-442/4	PARCEL MAP 33726 36" STORM DRAIN	✓	○	✓	✓	●	○	○	○
7/23	6-0-0070-3092 DESERT WATER AGENCY	CHINO CANYON LEVEE 6-213/6	8" WELL DRAIN INSTALLATION	✓	○	○	✓	○	○	○	○
7/24	6-0-0050-3093 O&M, LLC	TAHCHEVAH DAM OUTLET 6-212/28	TRACT 24165 36" RCP CONNECTION	✓	○	○	✓	○	○	○	○
8/13	4-0-0010-3094 PERRIS INDUSTRIAL	PERRIS VALLEY 4-103/5	48" RCP CONNECTION	✓	○	○	✓	○	○	○	○

ATTACHMENT E

REPORTS OF COLLECTED DEBRIS IN MS4

Riverside County Flood Control and Water Conservation District

Debris Removal Santa Margarita Watershed

Filter ((((..\Start Date Actual is after #7/1/06#) And (Start Date is through #6/30/07#)) And (rcfc_activity contains "7000")) And (..\rcfc zone contains "7"))

Report Title **Debris Removal Santa Margarita Watershed**

Activity Number: 7000 **Activity Name:** Debris taken out of Channels

Zone 7 **Quantity:** 10.40

Total Quantity: 10.40 **Unit:** Ton

Riverside County Flood Control and Water Conservation District

Debris Removal Santa Margarita Watershed

Filter ((((..\Start Date Actual is after #7/1/06#) And (Start Date is through #6/30/07#)) And (rcfc_activity contains "404")) And (..\rcfc zone contains "7"))

Report Title **Debris Removal Santa Margarita Watershed**

Activity Number: 404 **Activity Name:** Trash Pickup

Zone 7 **Quantity:** 4.70

Total Quantity: 4.70 **Unit:** Ton

Riverside County Flood Control and Water Conservation District

Sediment Removal Santa Margarita Watershed

Filter ((((..\Start Date Actual is after #7/1/06#) And (Start Date is through #6/30/07#)) And (rcfc_activity contains "616")) And (..\rcfc zone contains "7"))

Report Title **Sediment Removal Santa Margarita Watershed**

Activity Number: 616 **Activity Name:** Sediment Removal

Zone 7 **Quantity:** 1,204.00

Total Quantity: 1,204.00 **Unit:** Cy

Riverside County Flood Control and Water Conservation District

Sediment Removal Santa Margarita Watershed

Filter ((((..\Start Date Actual is after #7/1/04#) And (Start Date is through #6/30/05#)) And (rcfc_activity contains "616")) And (..\rcfc zone contains "7"))

Report Title **Sediment Removal Santa Margarita Watershed**

Activity Number: 616 **Activity Name:** Sediment Removal

Zone 7 **Quantity:** 800.00

Total Quantity: 800.00 **Unit:** Cy

Riverside County Flood Control and Water Conservation District

Debris Removal Santa Margarita Watershed

Filter ((((..\Start Date Actual is after #7/1/04#) And (Start Date is through #6/30/05#)) And (rcfc_activity contains "404")) And (..\rcfc zone contains "7"))

Report Title **Debris Removal Santa Margarita Watershed**

Activity Number: **Activity Name:**

Zone	**Quantity:**	0.00		
	Total Quantity:	0.00	**Unit:**	(accomplishment unit)

Riverside County Flood Control and Water Conservation District

Debris Removal Santa Margarita Watershed

Filter ((((..\Start Date Actual is after #7/1/04#) And (Start Date is through #6/30/05#)) And (rcfc_activity contains "7000")) And (..\rcfc zone contains "7"))

Report Title **Debris Removal Santa Margarita Watershed**

Activity Number: 7000 **Activity Name:** Debris taken out of Channels

Zone 7 **Quantity:** 55.92

Total Quantity: 55.92 **Unit:** Ton

Riverside County Flood Control and Water Conservation District

Sediment Removal Santa Margarita Watershed

Filter ((((..\Start Date Actual is after #7/1/04#) And (Start Date is through #6/30/05#)) And (rcfc_activity contains "613")) And (..\rcfc zone contains "7"))

Report Title **Sediment Removal Santa Margarita Watershed**

Activity Number: 613 **Activity Name:** Dams - Stck Sediment

Zone 7 **Quantity:** 80.00

Total Quantity: 80.00 **Unit:** CY

Riverside County Flood Control and Water Conservation District

Sediment Removal Santa Margarita Watershed

Filter ((((..\Start Date Actual is after #7/1/04#) And (Start Date is through #6/30/05#)) And (rcfc_activity contains "5129")) And (..\rcfc zone contains "7"))

Report Title **Sediment Removal Santa Margarita Watershed**

Activity Number: 5129 **Activity Name:** Sediment Removal

Zone 7 **Quantity:** 2,404.00

Total Quantity: 2,404.00 **Unit:** CY

Riverside County Flood Control and Water Conservation District

Debris Removal Santa Margarita Watershed

Filter ((((..\Start Date Actual is after #7/1/05#) And (Start Date is through #6/30/06#)) And (rcfc_activity contains "404")) And (..\rcfc zone contains "7"))

Report Title **Debris Removal Santa Margarita Watershed**

Activity Number: 404 **Activity Name:** Trash Pickup

Zone 7 **Quantity:** 8.09

Total Quantity: 8.09 **Unit:** Ton

Riverside County Flood Control and Water Conservation District

Debris Removal Santa Margarita Watershed

Filter ((((..\Start Date Actual is after #7/1/05#) And (Start Date is through #6/30/06#)) And (rcfc_activity contains "7000")) And (..\rcfc zone contains "7"))

Report Title **Debris Removal Santa Margarita Watershed**

Activity Number: 7000 **Activity Name:** Debris taken out of Channels

Zone 7 **Quantity:** 15.98

Total Quantity: 15.98 **Unit:** Ton

Riverside County Flood Control and Water Conservation District

Sediment Removal Santa Margarita Watershed

Filter ((((..\Start Date Actual is after #7/1/05#) And (Start Date is through #6/30/06#)) And (rcfc_activity contains "616")) And (..\rcfc zone contains "7"))

Report Title **Sediment Removal Santa Margarita Watershed**

Activity Number: 616 **Activity Name:** Sediment Removal

Zone 7 **Quantity:** 4,292.00

Total Quantity: 4,292.00 **Unit:** Cy

Riverside County Flood Control and Water Conservation District

Sediment Removal Santa Margarita Watershed

Filter ((((..\Start Date Actual is after #7/1/05#) And (Start Date is through #6/30/06#)) And (rcfc_activity contains "5129")) And (..\rcfc zone contains "7"))

Report Title **Sediment Removal Santa Margarita Watershed**

Activity Number: **Activity Name:**

Zone **Quantity:** 0.00

Total Quantity: 0.00 **Unit:** (accomplishment unit)

Riverside County Flood Control and Water Conservation District

Sediment Removal Santa Margarita Watershed

Filter ((((..\Start Date Actual is after #7/1/05#) And (Start Date is through #6/30/06#)) And (rcfc_activity contains "613")) And (..\rcfc zone contains "7"))

Report Title **Sediment Removal Santa Margarita Watershed**

Activity Number: **Activity Name:**

Zone	**Quantity:**	0.00		
	Total Quantity:	0.00	**Unit:**	(accomplishment unit)

ATTACHMENT F

IC/ID REPORTS

0000910

Total Records for this Complaint is 1

Printed 8/15/2007 2:23:39 PM

Riverside County Flood Control & Water Conservation District

NPDES Complaint No. 425

Complaint No.: 425

Complaint Date: 7/6/2006

Received By: David Ortega

Caller Name: Eastern Municipal Water District (EMWD)

Caller Phone: (0)

Caller Address: ,

APN: 959390005

Complaint Address: 32220 Highway 79 South
Temecula, CA 92592

Location: Cross street of Margarita

Watershed: SM

Complaint: Unknown amount of sewage coming out of a manhole.

Findings: 7/6/06: The EMWD called the Governor's Office of Emergency Services (OES) to report that they received a call from the Information Center; they had received a report of sewage coming out of a manhole. This blockage is possibly causing a backup inside a business that reported the over flowing man hole. The OES issued a Hazardous Materials Spill Report, Control# 06-4002, concerning this incident. The OES report states that the sewage was not contained, that it is unknown if water was involved and that no drinking water was impacted by this incident. The Riverside County Environmental Health Department was notified about this incident. A Riverside County Flood Control District facility is located near the complaint address: "Temecula Creek Line V Stage 1 Hwy. 79 South at Margarita Rd."

Actions:

0000911

Riverside County Flood Control & Water Conservation District

NPDES Complaint No. 508

Total Records for this Complaint is 1

Printed 8/15/2007 2:23:28 PM

Complaint No.: 508

Complaint Date: 7/20/2006

Received By: Linda Garcia

Caller Name: Anonymous

Caller Phone: ( )

Caller Address: ,

APN: 904050020

Complaint Address:

Murrieta, CA 92562

Location: Schools in the Murrieta School District

Watershed: SM

Complaint: Waste streams from carpet and floor cleaning tasks at the schools of the Murrieta School District are being poured down the flood control drains.

Findings: 7/20/06: Linda Garcia of the Riverside County Flood Control (RCFC) District received an anonymous complaint call at 1015 hours today. The anonymous complainant stated that these practices have been going on for the last 14 years. The location that the complainant gave was the "old" Murrieta High School near the intersection of Washington Avenue & Nighthawk Way, in the quad at the center of the campus between the 700 and 800 buildings.

Actions: 7/20/06: Ms. Garcia called Ms. Farida Naceem at the City of Murrieta and asked if one of their Code Enforcement staff could take a look at the complaint location and to let Ms. Garcia at the RCFC know what was found. The anonymous complainant said that he will call Ms. Garcia back early next week for an update.

0000912

Riverside County Flood Control & Water Conservation District

NPDES Complaint No. 516

Total Records for this Complaint is 1

Printed 8/15/2007 2:23:20 PM

Complaint No.: 516

Complaint Date: 7/25/2006

Received By: David Ortega

Caller Name: Rancho California Water District (RCWD)

Caller Phone: (951) 296-6900

Caller Address: 34295 Vail Ranch Parkway,

APN: 960081010

Complaint Address: 34295 Vail Ranch Parkway
Temecula, CA 92592

Location:

Watershed: SM

Complaint: 93,450 gallons of reclaimed water (irrigation water) spilled into Temecula Creek starting on 7/23/06 at about 1130 hours.

Findings: 7/25/06: The RCWD called the Governor's Office of Emergency Services (OES) to report this release that was caused by a rusty bolt on a flange. The OES issued a Hazardous Materials Spill Report, Control# 06-4407, concerning this incident. The OES report states that the release was contained and cleaned up by the reporting party. The OES report also states that water was involved in Temecula Creek. No drinking water was impacted due to this release. The Riverside County Environmental Health Department was notified about this incident.

Actions:

0000913

Total Records for this Complaint is 1

Printed 8/15/2007 2:23:10 PM

Riverside County Flood Control & Water Conservation District

NPDES Complaint No. 517

Complaint No.: 517

Complaint Date: 7/25/2006

Received By: David Ortega

Caller Name: So. Cal. Edison

Caller Phone: (0)

Caller Address: ,

APN: 362643008

Complaint Address:

Wildomar, CA 92595

Location: Mandarin Court near Menifee

Watershed: SM

Complaint: 5 gallons of mineral oil (non-PCB, petroleum) spilled into a storm drain. A car hit a pad mounted transformer, spilling 30 gallons of oil.

Findings: 7/25/06: So. Cal. Edison called the Governor's Office of Emergency Services (OES) to report this incident. The OES issued a Hazardous Materials Spill Report, Control# 06-4412, concerning this incident. The OES report states that the substance was contained and cleaned up by the reporting party. Water was involved in a storm drain, but no drinking water was impacted due to this incident. The Riverside County Environmental Health Department was notified about this incident. The nearest Riverside County Flood Control District facility is located about 1.5 miles to the west of the complaint location: "Wildomar Bundy Canyon Channel, Line B". NOTE: The complaint APN listed on this report is a reference APN only.

Actions:

0000914

Riverside County Flood Control & Water Conservation District

NPDES Complaint No. 522

Total Records for this Complaint is 1

Printed 8/15/2007 2:23:00 PM

Complaint No.: 522

Complaint Date: 7/27/2006

Received By: David Ortega

Caller Name: Metropolitan Water District (MWD)

Caller Phone: ( )

Caller Address: ,

APN: 964060001

Complaint Address: 33740 Borel Road
Winchester, CA 92596

Location:

Watershed: SM

Complaint: 2 quarts of Sodium Hydroxide was released from a delivery truck that had a faulty connection.

Findings: 7/27/06: The MWD called the Governor's Office of Emergency Services (OES) to report this release. The OES issued a Hazardous Materials Spill Report, Control# 06-4462, concerning this incident. The OES report states that the substance was contained and that no water was involved due to this incident. The Riverside County Environmental Health Department was notified about this incident. The complaint address is located at the Lake Skinner treatment/sewage facility. The nearest Riverside County Flood Control District facility is located about 1.4 miles to the west of the complaint address: "Warm Springs VY Coral Tree SD, Stage 2."

Actions:

0000915

Total Records for this Complaint is 1

Printed 8/15/2007 2:22:53 PM

Riverside County Flood Control & Water Conservation District

NPDES Complaint No. 525

Complaint No.: 525

Complaint Date: 7/30/2006

Received By: David Ortega

Caller Name: Veeder Root

Caller Phone: ( )

Caller Address: ,

APN: 916541024

Complaint Address: 44520 Medford Court
Temecula, CA 92591

Location:

Watershed: SM

Complaint: 1 ounce of gasoline leaked from a nozzle at a service station.

Findings: 7/30/06: Veeder Root called the Governor's Office of Emergency Services (OES) to report this incident. The OES issued a Hazardous Materials Spill Report, Control# 06-4515, concerning this incident. The OES report states that the substance was contained. The OES report also states that no water and no drinking water was involved and/or impacted by this incident. The Riverside County Environmental Health Department was notified about this incident. The nearest Riverside County Flood Control District facility is located about .4 mile to the east of the complaint address: "Santa Gertrudis Harveston SD". NOTE: The complaint APN listed on this report is a reference APN only.

Actions:

0000916

Total Records for this Complaint is 1

Printed 8/15/2007 2:22:45 PM

Riverside County Flood Control & Water Conservation District

NPDES Complaint No. 530

Complaint No.: 530

Complaint Date: 8/2/2006

Received By: David Ortega

Caller Name: NRC

Caller Phone: (0)

Caller Address: ,

APN: 964330020

Complaint Address: 36956 Pebley Court
Winchester, CA 92596

Location:

Watershed: SM

Complaint: The reporting party advised there is a person who repairs cars and motorcycles at a home which causes a spill of materials into the street and storm drain.

Findings: 8/2/06: The NRC called the Governor's Office of Emergency Services (OES) to report this possible ongoing activity at a residence. The OES issued a Hazardous Materials Spill Report, Control# 06-4588 and NRC# 806447, concerning this complaint. The OES report states that it is unknown if any of the substances from the repair activities have been contained. The OES report also states that water is involved, but no drinking water is being impacted because of this complaint. The nearest Riverside County Flood Control District facility is located about .4 mile to the northwest of the complaint address: "Warm Springs VY Coral Tree SD, Stage 2."

Actions:

0000917

Riverside County Flood Control & Water Conservation District

NPDES Complaint No. 543

Total Records for this Complaint is 1

Printed 8/15/2007 2:22:31 PM

Complaint No.: 543

Complaint Date: 8/14/2006

Received By: David Ortega

Caller Name: Riverside County Fire Department

Caller Phone: ( )

Caller Address: ,

APN: 918140013

Complaint Address:
Riverside County, CA 92590

Location: Southbound I-15 Freeway South of Lower Highway 79

Watershed: SM

Complaint: 50 gallons of diesel fuel released on the road.

Findings: 8/14/06: The Riverside County Fire Department called the Governor's Office of Emergency Services (OES) to report this incident. The OES issued a Hazardous Materials Spill Report, Control# 06-4846, for this release that was due to a traffic accident. There was damage to saddle tanks on a big rig. The diesel fuel was mixed with 100 gallons of water. The OES report states that the substance was contained and cleaned up by Cal Trans. The OES report also states that water was involved in a storm drain that goes to Temecula Creek. No drinking water was impacted due to this incident.

Actions:

0000918

Total Records for this Complaint is 1

Printed 8/15/2007 2:22:23 PM

Riverside County Flood Control & Water Conservation District

NPDES Complaint No. 554

Complaint No.: 554

Complaint Date: 8/23/2006

Received By: David Ortega

Caller Name: Citizen

Caller Phone: ( )

Caller Address: ,

APN: 912161002

Complaint Address: 25296 Shadescale Drive
Murrieta, CA 92563

Location:

Watershed: SM

Complaint: Neighbor washes out his construction truck which us used for drywall, on a weekly basis. Caller states that drywall debris and dust in the bed of the truck is washed into the street. This is turn goes into the storm drain around the corner from the complaint address.

Findings: 8/23/06: A citizen near the complaint address called the Governor's Office of Emergency Services (OES) to report this complaint. The OES issued a Hazardous Materials Spill Report, Control# 06-5051, concerning this complaint. The OES report states that it is unknown if drinking water has been impacted by this complaint. Also, water is involved in a storm drain; this may be part of a City of Murrieta storm drain system. "Murrieta Valley I-215 Retention Basin", a Riverside County Flood Control District facility, is located about .25 mile to the north, northwest of the complaint address. The Riverside County Environmental Health Department was notified about this complaint.

Actions: 8/29/06: David Ortega of the Riverside County Flood Control (RCFC) forwarded a copy of this complaint call report to Tina Tuason, Jason Uhley and Linda Garcia of the RCFC. A copy of this complaint call was forwarded to Farida Naceem of the City of Murrieta.

0000919

Total Records for this Complaint is 1

Printed 8/15/2007 2:21:50 PM

Riverside County Flood Control & Water Conservation District

NPDES Complaint No. 562

Complaint No.: 562

Complaint Date: 8/29/2006

Received By: David Ortega

Caller Name: Home Depot

Caller Phone: (0)

Caller Address: ,

APN: 959390005

Complaint Address: 32020 Highway 79 South
Temecula, CA 92592

Location: Home Depot

Watershed: SM

Complaint: 25 gallons of ZEP Floor Stripper leaked and traveled to the rear of the store and outside into a storm drain.

Findings: 8/29/06: Home Depot called the Governor's Office of Emergency Services (OES) to report this incident. The OES issued a Hazardous Materials Spill Report, Control# 06-5152, concerning this incident. The OES report states that an unknown waterway was involved with this incident. No drinking water was impacted by this incident. The Riverside County Environmental Health Department was notified about this incident. The nearest Riverside County Flood Control District facility is located about 1,000' to the north, northwest of the complaint address: "Temecula Creek Lines VV Stage 4,C,D,E De Portola Rd.-Campanula Way."

Actions: 8/29/06: The OES report also states that an emergency was dispatched by the company to the site. One 55 gallon drum of solid waste and 400 gallons of liquid waste was removed from the storm drain. The chemical was contained in the catch basin and cleanup was completed by a contractor. The substance never reached a waterway.

0000920

Total Records for this Complaint is 1

Printed 8/15/2007 2:21:36 PM

Riverside County Flood Control & Water Conservation District

NPDES Complaint No. 569

Complaint No.: 569

Complaint Date: 9/2/2006

Received By: David Ortega

Caller Name: So. Cal. Edison (SCE)

Caller Phone: ( )

Caller Address: ,

APN: 367240024

Complaint Address:
Wildomar, CA 92595

Location: Baxter at Cherry Street

Watershed: SM

Complaint: 20 gallons of mineral oil spilled from a transformer when a vehicle, driven by a drunk driver, hit two poles.

Findings: 9/2/06: SCE called the Governor's Office of Emergency Services (OES) to report this incident. The OES issued a Hazardous Materials Spill Report, Control# 06-5254, concerning this incident. The OES report states that no water and no drinking water was involved and/or impacted from this incident. The OES report states that the spill was contained and that SCE provided cleanup. The Riverside County Environmental Health Department was notified about this incident. The County Health Department and the Fire Department were on scene concerning this incident. The nearest Riverside County Flood Control District facility is located about .75 mile to the southwest of the complaint location: "Wildomar MDP Channel." NOTE: The complaint APN listed on this report is a reference APN only.

Actions:

0000921

Total Records for this Complaint is 1

Printed 8/15/2007 2:21:27 PM

Riverside County Flood Control & Water Conservation District

NPDES Complaint No. 581

Complaint No.: 581

Complaint Date: 9/9/2006

Received By: David Ortega

Caller Name: Rancho Calif. Water District (RCWD)

Caller Phone: (0)

Caller Address: ,

APN: 909120055

Complaint Address:

Temecula, CA 92591

Location: Near the corner of Diaz Road & Winchester Road

Watershed: SM

Complaint: 600 gallons of sewage was released due to the pH meter hose that came loose releasing sewage to the curb that leads to a storm drain that releases to Murrieta Creek.

Findings: 9/9/06: The RCWD called the Governor's Office of Emergency Services (OES) to report this release of sewage. The OES issued a Hazardous Materials Spill Report, Control# 06-5388, concerning this incident. The OES report states that no drinking water was impacted from this sewage release, however, water was involved in Murrieta Creek. The area where this incident occurred appears to have impacted Riverside County Flood Control District property near the confluence of Santa Gertrudis Creek and Murrieta Creek. The Riverside County Environmental Health Department was notified about this incident.

Actions: 9/9/06: The OES report states that the sewage release was contained and that cleanup was provided by RCWD. The OES report also states that the pH meter has been secured which stopped the release.

0000922

Total Records for this Complaint is 1

Printed 8/15/2007 2:21:14 PM

Riverside County Flood Control & Water Conservation District

NPDES Complaint No. 584

Complaint No.: 584

Complaint Date: 9/11/2006

Received By: David Ortega

Caller Name: Ocean Blue

Caller Phone: (0)

Caller Address: ,

APN: 910110047

Complaint Address: 40640 County Center Drive
Temecula, CA 92591

Location:

Watershed: SM

Complaint: 1 to 2 gallons of Hydrochloric Acid #8 (UN1789, Packing Group 2) was released due to a drum being punctured.

Findings: 9/11/06: Ocean Blue called the Governor's Office of Emergency Services (OES) to report this incident. The OES issued a Hazardous Materials Spill Report, Control# 06-5422, concerning this incident. The OES report states that 230 people were evacuated due to this incident. 3 Firefighters were transported to the hospital because of this incident. The OES report also states that no water was involved from this release. The substance has been contained by a contractor. Agencies on scene concerning this incident were: Riverside County Health, Fire Department, Police Department, Riverside County Haz-Mat and City of Temecula personnel. The nearest Riverside County Flood Control District facility is located approx. .25 mile to the northeast of the complaint address: "Santa Gertrudis Harveston Storm Drain."

Actions: 9/11/06: The OES received NRC Report# 811099 concerning this incident. The OES received a situation update concerning this incident from Bill Piekkola of Ocean Blue. There were 3 injuries and one has been released from the hospital; they were NOT firefighters, they were employees of the facility (a forklift driver, a health and safety officer and a dock worker.)

0000923

Total Records for this Complaint is 1

Printed 8/15/2007 2:21:05 PM

Riverside County Flood Control & Water Conservation District

NPDES Complaint No. 598

Complaint No.: 598

Complaint Date: 9/19/2006

Received By: David Ortega

Caller Name: Metropolitan Water District of Southern California (MWD)

Caller Phone: (0)

Caller Address: ,

APN: 964100012

Complaint Address: 33740 Borel Road
Winchester, CA 92596

Location:

Watershed: SM

Complaint: 7,000 to 8,000 gallons of sulfuric acid was threatened to be released due to a crack in the side of an above ground chemical storage tank.

Findings: 9/19/06: The MWD called the Governor's Office of Emergency Services (OES) to notify them of a possible release. The OES issued a Hazardous Materials Spill Report, Control# 06-5590, concerning this threatened release. The OES report states that the tank contains 7,000 to 8,000 gallons of sulfuric acid. If the product does release, it will release into a containment area with the capacity to contain it all. This tank is at a water treatment plant. They are setting up an exclusion zone, but are not evacuating the facility. The OES report also states that no water was involved from this incident. The OES report also states that the situation was contained and that clean up was provided by MWD and a contractor.

Actions: 9/20/06: At 0830 hours, a situation update about this incident came to the OES from David Johnson of the MWD. Mr. Johnson advised that the release was discovered on 9/18/06 at 1400 hours. The tank has a capacity 8,000 gallons however, the actual level of the tank was at 4,500 gallons at the time of the initial call to OES.

0000924

Total Records for this Complaint is 1

Printed 8/15/2007 2:20:56 PM

Riverside County Flood Control & Water Conservation District

NPDES Complaint No. 609

Complaint No.: 609

Complaint Date: 9/7/2006

Received By: Jason Uhley

Caller Name: Debra Julian

Caller Phone: (951) 245-4342

Caller Address: 34288 Hidden Glen Circle,

APN: 367121008

Complaint Address: 34288 Hidden Glen Circle
Wildomar, CA 92595

Location:

Watershed: SM

Complaint: A neighbor with a very large pine tree has pine needles plugging up the storm drain.

Findings: 9/7/06: Jason Uhley of the Riverside County Flood Control (RCFC) District passed this complaint to David Ortega of the NPDES Section at the RCFC. 9/8/06: Mr. Ortega left a message with Lou Pizatella of the County of Riverside Code Enforcement concerning this complaint and asking for a little guidance about it. 9/13/06: Ms. Julian (complainant) called again today about this complaint. Mr. Ortega has not heard from County Code Enforcement about this complaint.

Actions: 9/25/06: Mr. Ortega went to the complaint address today and took a few photos of the pine tree on the front yard, the pine needles in the street gutter and of the storm drain system in this neighborhood. Mr. Ortega determined, while on site today, that the pine needles did not pose a threat to "plug up" the storm drain system in this neighborhood. The street gutter located on Hidden Glen Circle flows south and then west on Hunters Run Court. There is a flow through storm drain located at the end of the cul-de-sac of Hunters Run Circle. This flow through appears to allow street gutter flows in this neighborhood to infiltrate in a vacant lot area just west of the cul-de-sac of Hunters Run Court and just east of Allison Lane. Mr. Ortega spent some time in the neighborhood handing out 20 public information door hangers with an "After the Storm; A Citizen's Guide to Understanding Stormwater" brochure to notify residents about Stormwater Pollution Solutions.

0000925

Total Records for this Complaint is 1

Printed 8/15/2007 2:20:47 PM

Riverside County Flood Control & Water Conservation District

NPDES Complaint No. 612

Complaint No.: 612

Complaint Date: 9/25/2006

Received By: Helio Takano

Caller Name: Marie Deason

Caller Phone: (951) 526-2255

Caller Address: ,

APN: 957381014

Complaint Address: 30248 Stargazer Way
French Valley, CA 92563

Location:

Watershed: SM

Complaint: Swimming pool filter water being discharged from a residence to the street gutter.

Findings: 9/25/06: Helio Takano of the Riverside County Flood Control (RCFC) received this complaint today and told the complainant to call the NPDES Hotline with the complaint, (800) 506-2555. Mr. Takano also stated to the complainant that he would talk to someone in the NPDES Section of the RCFC about this complaint. He also suggested to the complainant to take photos for evidence since she mentioned that the water sprinklers would wash away the powder (white) substance. 9/27/06: The complainant sent photos today in an email to Mr. Takano concerning this complaint. The complainant spoke to Mr. Takano today and stated that most of the evidence is almost washed away from the sprinklers in the neighborhood, and that she left a message in the NPDES Hotline. Mr. Takano spoke to Tina Tuason in the NPDES Section of the RCFC about this complaint. Ms. Tuason referred Mr. Takano to speak with David Ortega of the NPDES Section at the RCFC for further follow-up.

Actions: 10/02/06: David Ortega of the RCFC went to the neighborhood of the complaint address and handed out 20 Stormwater Pollution door hangers attached with a public information pamphlet about Swimming Pool and Fountain water maintenance.

0000926

Total Records for this Complaint is 1

Printed 8/15/2007 2:20:00 PM

Riverside County Flood Control & Water Conservation District

NPDES Complaint No. 619

Complaint No.: 619

Complaint Date: 10/5/2006

Received By: David Ortega

Caller Name: Veeder Root

Caller Phone: ( )

Caller Address: ,

APN: 948500003

Complaint Address: 39850 Los Alamos Road
Murrieta, CA 92562

Location: Service Station

Watershed: SM

Complaint: 1 cup of gasoline spilled on to the concrete when a customer drove off at dispenser #14 at an Exxon Mobil Service Station.

Findings: 10/5/06: Veeder Root called the Governor's Office of Emergency Services (OES) to report this incident. The OES issued a Hazardous Materials Spill Report, Control# 06-5933, concerning this spill. The OES report states that no water was involved from this spill. The Riverside County Environmental Health Department was notified about this incident. The nearest Riverside County Flood Control District facility is located within .2 mile to the west of the complaint address, "Murrieta Valley, Coliseum Way Storm Drain."

Actions: 10/5/06: The OES report states that the spilled gasoline was contained and cleaned up by a gas station attendant. The OES report also states that a contractor will correct and fix problem.

0000927

Total Records for this Complaint is 1

Printed 8/15/2007 2:19:47 PM

Riverside County Flood Control & Water Conservation District

NPDES Complaint No. 639

Complaint No.: 639

Complaint Date: 10/19/2006

Received By: David Ortega

Caller Name: Rancho California Water District (RCWD)

Caller Phone: ( )

Caller Address: ,

APN: 921040040

Complaint Address:
Temecula, CA 92592

Location: Diaz Road near Rancho Way

Watershed: SM

Complaint: 150,000 gallons of reclaimed water was released due to a small hole on a 20" reclaimed water pipe.

Findings: 10/19/06: RCWD called the Governor's Office of Emergency Services (OES) to report this release that occurred yesterday, 10/18/06. The OES issued a Hazardous Materials Spill Report, Control# 06-6193, concerning this incident. The OES report states that the reclaimed water was released into a storm drain which lead to a small dry tributary. It did not reach Murrieta Creek. The release was secured (contained) yesterday at 1730 hours. No clean up; it all soaked into the dry sandy bed. The Riverside County Environmental Health Department was notified about this release. The OES report also states that no water and no drinking water was involved and/or impacted from this release.

Actions:

0000928

Riverside County Flood Control & Water Conservation District

NPDES Complaint No. 646

Total Records for this Complaint is 1

Printed 8/15/2007 2:19:38 PM

Complaint No.: 646

Complaint Date: 10/26/2006

Received By: David Ortega

Caller Name: Rancho California Water District (RCWD)

Caller Phone: ( )

Caller Address: ,

APN: 909370031

Complaint Address: 26879 Diaz Road
Temecula, CA 92590

Location:

Watershed: SM

Complaint: 181,527 gallons of reclaimed water was released when a contractor hit an 8" reclaimed water line.

Findings: 10/26/06: The RCWD called the Governor's Office of Emergency Services (OES) to report this release. The OES issued a Hazardous Materials Spill Report, Control# 06-6347, concerning this release. The OES report states that the reclaimed water was released into a 1,300' long stretch of dirt road. The reclaimed water was contained. The OES report also states that no water was involved with this release. The Riverside County Environmental Health Department was notified about this release. Murrieta Creek is located about 200' to 300' to the northeast of the complaint address.

Actions:

0000929

Total Records for this Complaint is 1

Printed 8/15/2007 2:19:29 PM

Riverside County Flood Control & Water Conservation District

NPDES Complaint No. 653

Complaint No.: 653

Complaint Date: 10/31/2006

Received By: David Ortega

Caller Name: Riverside County Environmental Health Haz.-Mat.

Caller Phone: (0)

Caller Address: ,

APN: 910320035

Complaint Address:

Temecula, CA 92591

Location: Intersection of Winchester Road and Ynez Road

Watershed: SM

Complaint: 30 gallons of diesel fuel was released from the saddle tank of a big rig that was involved in a traffic accident.

Findings: 10/31/06: The Riverside County Environmental Health Hazardous Materials Division (County Haz.-Mat.) called the Governor's Office of Emergency Services (OES) to report this incident. The OES issued a Hazardous Materials Spill Report, Control# 06-6458, concerning this diesel fuel release. The OES report states that no water was involved with this incident. The OES report also states that the release was contained and cleaned up by the fire department. On scene concerning this incident was CDF, Fire Department, Police Department, County Haz.-Mat. and City of Temecula Public Works. "Santa Gertrudis Channel I-15 to Ynez Road", a Riverside County Flood Control District facility is located within .1 mile to the northwest of the complaint location.

Actions:

0000930

Total Records for this Complaint is 1

Printed 8/15/2007 2:19:21 PM

Riverside County Flood Control & Water Conservation District

NPDES Complaint No. 665

Complaint No.: 665

Complaint Date: 11/7/2006

Received By: David Ortega

Caller Name: Metropolitan Water District of So. Cal. (MWD)

Caller Phone: (0)

Caller Address: ,

APN: 964030010

Complaint Address:

Winchester, CA 92596

Location: Skinner Water Filtration Plant on Borel Road

Watershed: SM

Complaint: 12 gallons of Ferric Chloride was released due to a leaking valve.

Findings: 11/7/06: The MWD of So. Cal. called the Governor's Office of Emergency Services (OES) to report this release. The OES issued a Hazardous Materials Spill Report, Control# 06-6631, concerning this incident. The OES report states that no water was involved with this incident. The OES report also states that the ferric chloride was contained and cleaned up the MWD. Lake Skinner is located at this complaint location. The Riverside County Environmental Health Department was notified about this release.

Actions:

0000931

Riverside County Flood Control & Water Conservation District

NPDES Complaint No. 668

Total Records for this Complaint is 1

Printed 8/15/2007 2:19:08 PM

Complaint No.: 668

Complaint Date: 11/14/2006

Received By: Jason Uhley

Caller Name: Steve Thomas

Caller Phone: (951) 955-1280

Caller Address: 28076 Diaz Road,

APN: 921040023

Complaint Address: 28076 Diaz Road
Temecula, 92590

Location: Murrieta Creek near Rancho California Road

Watershed: SM

Complaint: 11/14/06: Steve Thomas of the Riverside County Flood Control (RCFC), Operations & Maintenance Division called Jason Uhley of the RCFC, NPDES Section, to report a sewage spill into Murrieta Creek, (an RCFC District facility), from a broken EMWD force main.

Findings: 11/14/06: The spill was reported to the Governor's Office of Emergency Services (OES). The OES issued a Hazardous Materials Spill Report, Control# 06-6758. The OES report states that approximately 1,000 gallons was released at around 10:15 this morning due to a broken forced main. No drinking water was impacted due to this release. EMWD initiated clean up actions and notified the RWQCB through the OES. Riverside County Environmental Health was also notified about this release. 1438 hours: Chuck Strey, Senior Public Health Engineer, Riverside County Department of Environ. Health, issued a Sewage Release/ Spill Notification, Incident No. SA-06-08, concerning this incident. This report stated that the discharge was ongoing and that an approx. 800,000 gallons of untreated sewage has been released. NOTE: The complaint APN listed on this report is a reference APN only.

Actions: 11/14/06: Complaint information entered into system by Jason Uhley, Riverside County Flood Control (RCFC), NPDES Section. Call forwarded to David Ortega at 2:15 pm. Jason also contacted RWQCB to report per permit requirements. 1445 hours: Mr. Ortega contacted Al Javier of Eastern Municipal Water District (EMWD), (951) 928-3777, to get an update of the "on the scene" conditions. Mr. Javier noted that the approx. rate of sewage coming out of the 10" main is 3,000 gallons/minute. The flow of sewage has reached a point located about 500' downstream of the Rancho California Road bridge. Mr. Javier also stated that the EMWD just received permission to allow heavy equipment in the creek to berm up the sewage release to prevent it from flowing further down the creek. 1500 hours: Steve Clark, of the RCFC, drove to the site to provide photo documentation for the RCFC District. 11/15/06, 0855 hours: David Ortega, of the RCFC, spoke to Al Javier, of EMWD, to get an update about this incident. Mr. Javier stated that last night at 1800 hours, the flow of sewage was stopped from going into Murrieta Creek. Approx. 80,000 gallons of sewage was removed from Murrieta Creek as of 0800 hours today. EMWD is currently trying to get permission from the City of Temecula to shut down a portion of Old Front Street/Jefferson Avenue to be able to pump sewage directly from Murrieta Creek and into sewer manhole/vault.

0000932

Riverside County Flood Control & Water Conservation District

NPDES Complaint No. 669

Total Records for this Complaint is 1

Printed 8/15/2007 2:18:54 PM

Complaint No.: 669

Complaint Date: 11/10/2006

Received By: David Ortega

Caller Name: Veeder Root

Caller Phone: ( )

Caller Address: ,

APN: 948500003

Complaint Address: 39850 Los Alamos Road
Murrieta , CA 92562

Location: Service Station

Watershed: SM

Complaint: 2 cups of gasoline spilled from dispenser# 11 when an auto shut off valve failed. The gasoline spilled on to the concrete.

Findings: 11/10/06: Veeder Root called the Governor's Office of Emergency Services (OES) to report this incident. The OES issued a Hazardous Materials Spill Report, Control# 06-6675, concerning this spill. The OES report states that the gasoline was contained on the concrete and was cleaned up by the reporting party (Veeder Root). There was no water involved with this spill. The Riverside County Environmental Health Department was notified about this incident. The nearest Riverside County Flood Control District facility is located about .1 mile to the west of the complaint address, "Murrieta Valley - Coliseum Way Storm Drain."

Actions:

0000933

Riverside County Flood Control & Water Conservation District

NPDES Complaint No. 682

Total Records for this Complaint is 1

Printed 8/15/2007 2:18:43 PM

Complaint No.: 682

Complaint Date: 11/20/2006

Received By: David Ortega

Caller Name: Veeder Root

Caller Phone: ( )

Caller Address: ,

APN: 960030017

Complaint Address: 33165 U.S. Highway 79
Temecula, CA 92592

Location: Exxon Mobil Service Station

Watershed: SM

Complaint: 1/2 cup of gasoline spilled when a customer drove away from the service station.

Findings: 11/20/06: Veeder Root called the Governor's Office of Emergency Services (OES) to report this spill. The OES issued a Hazardous Materials Spill Report concerning this incident; Control# 06-6901. The OES report states that no water was involved from this spill. The OES report also states that the gasoline was contained and cleaned up by site personnel. The Riverside County Environmental Health Department was notified about this incident. The nearest Riverside County Flood Control District facility is located within .1 mile of the complaint address: "Temecula Creek Channel Line A Paloma Del Sol."

Actions:

0000934

Riverside County Flood Control & Water Conservation District

NPDES Complaint No. 691

Total Records for this Complaint is 1

Printed 8/15/2007 2:18:31 PM

Complaint No.: 691

Complaint Date: 11/28/2006

Received By: David Ortega

Caller Name: Southern California Edison (SCE)

Caller Phone: (0)

Caller Address: ,

APN: 921270048

Complaint Address:

Temecula, CA 92591

Location: Northwest corner of Rancho California Rd. and Ynez Rd., 300' from corner on Ynez

Watershed: SM

Complaint: 42 gallons of mineral oil with possible PCB's was discharged from an underground vault due to an equipment failure. Small oil sheen on the street and sidewalk. 10' by 10' area of coverage.

Findings: 11/28/06: SCE called the Governor's Office of Emergency Services (OES) to report this incident. The OES issued a Hazardous Materials Spill Report, Control# 06-7028, concerning this discharge. The OES report states that no water was involved from this incident. The other material is contained within the vault. There is a one lane road closure due to the material on the roadway. The Riverside County Environmental Health Department was notified about this discharge. The nearest Riverside County Flood Control District facility is located about .2 mile to the north of the complaint location: "Murrieta Creek MDP Line A Empire Creek."

Actions: 11/28/06: Per Mary Zepeda, the spill was non-pcb with a manufacture date of 1993.

0000935

Riverside County Flood Control & Water Conservation District

NPDES Complaint No. 708

Total Records for this Complaint is 1

Printed 8/15/2007 2:18:20 PM

Complaint No.: 708

Complaint Date: 12/12/2006

Received By: David Ortega

Caller Name: Metropolitan Water District (MWD)

Caller Phone: ( )

Caller Address: ,

APN: 964060001

Complaint Address: 33740 Borel Road
Winchester, CA 92596

Location: Skinner Filtration Plant

Watershed: SM

Complaint: 10 gallons of polymer was released into a spill containment unit, due to a leak in a PVC joint.

Findings: 12/12/06: The MWD called the Governor's Office of Emergency Services (OES) to report this incident. The OES issued a Hazardous Materials Spill Report, Control# 06-7347, concerning this spill. The OES report states that no water and no drinking water was involved and/or impacted from this release. The OES report states that the polymer was contained and cleaned up by a contractor. The Riverside County Environmental Health Department was notified about this incident. The nearest Riverside County Flood Control District facility is located about 1.3 miles to the west of the complaint address, "Warm Springs VY Coral Tree SD Stage 2."

Actions:

0000936

Riverside County Flood Control & Water Conservation District

NPDES Complaint No. 715

Total Records for this Complaint is 1

Printed 8/15/2007 2:18:10 PM

Complaint No.: 715

Complaint Date: 12/15/2006

Received By: David Ortega

Caller Name: Hemet Unified School District

Caller Phone: ( )

Caller Address: ,

APN: 575050045

Complaint Address: 57430 Mitchell Road
Anza, CA 92539

Location: School

Watershed: SM

Complaint: 2 cups of diesel fuel was released from the fuel pump due to a faulty nozzle.

Findings: 12/15/06: The Hemet Unified School District called the Governor's Office of Emergency Services (OES) to report this spill. The OES issued a Hazardous Materials Spill Report, Control# 06-7401, concerning this incident. The OES report states that no water was involved from this spill. The diesel fuel was contained and cleaned up by the reporting party. The Riverside County Environmental Health Department was notified about this spill. There are no Riverside County Flood Control District facilities near the complaint address that could have been impacted from this incident.

Actions:

0000937

Riverside County Flood Control & Water Conservation District

NPDES Complaint No. 718

Total Records for this Complaint is 1

Printed 8/15/2007 2:18:00 PM

Complaint No.: 718

Complaint Date: 12/17/2006

Received By: David Ortega

Caller Name: So. Cal. Edison (SCE)

Caller Phone: ( )

Caller Address: ,

APN: 367050064

Complaint Address:
Wildomar, CA 92595

Location: Walnut Street and Brazil Lane

Watershed: SM

Complaint: 25 gallons of mineral oil leaked from a pole-mounted transformer when a car hit a pole and knocked it down.

Findings: 12/17/06: SCE called the Governor's Office of Emergency Services (OES) to report this incident. The OES issued a Hazardous Materials Spill Report, Control# 06-7442, concerning this leak. The OES report states that no water was involved from this incident. Also, the mineral oil was contained and cleaned up by a contractor. The Riverside County Environmental Health Department was notified about this leak. The nearest Riverside County Flood Control District facility is located about .9 mile to the south of the complaint location: "Wildomar Channel Interim Channel Cert to Leslie." NOTE: The complaint APN listed on this report is a reference APN only.

Actions:

0000938

Riverside County Flood Control & Water Conservation District

NPDES Complaint No. 720

Total Records for this Complaint is 1

Printed 8/15/2007 2:17:52 PM

Complaint No.: 720

Complaint Date: 12/18/2006

Received By: David Ortega

Caller Name: Hemet School District

Caller Phone: ( )

Caller Address: ,

APN: 575050046

Complaint Address: 57430 Mitchell Road
Anza , CA 92539

Location:

Watershed: SM

Complaint: 1 cup of diesel fuel leaked from a school bus.

Findings: 12/18/06: The Hemet School District called the Governor's Office of Emergency Services (OES) to report this leak. The OES issued a Hazardous Materials Spill Report, Control# 06-7448, concerning this incident. The OES report states that "when the bus shut off, it (diesel) kicked back out." The OES report also states that no water was involved from this leak. The diesel fuel was contained and cleaned up by the reporting party. The Riverside County Environmental Health Department was notified about this incident. There are no Riverside County Flood Control District facilities near the complaint address that could have been impacted by this leak.

Actions:

0000939

Riverside County Flood Control & Water Conservation District

NPDES Complaint No. 721

Total Records for this Complaint is 1

Printed 8/15/2007 2:17:39 PM

Complaint No.: 721

Complaint Date: 12/20/2006

Received By: David Ortega

Caller Name: Eastern Municipal Water District (EMWD)

Caller Phone: ( )

Caller Address: ,

APN: 922100034

Complaint Address:
Temecula , CA 92592

Location: Pujol Street and 1st Street

Watershed: SM

Complaint: 1,000 gallons of sewage was released due to a leaking valve.

Findings: 12/20/06: The EMWD called the Governor's Office of Emergency Services (OES) to report this release. The OES issued a Hazardous Materials Spill Report, Control# 06-7514, concerning this incident. The OES report states that no water and no drinking water was involved and/or impacted by this release. The OES report states that the sewage was contained and cleaned up by the reporting party (EMWD). The Riverside County Environmental Health Department was notified about this incident. Murrieta Creek is located about .1 mile to the east, northeast of the complaint location.

Actions:

0000940

Riverside County Flood Control & Water Conservation District

NPDES Complaint No. 724

Total Records for this Complaint is 1

Printed 8/15/2007 2:17:31 PM

Complaint No.: 724

Complaint Date: 12/26/2006

Received By: David Ortega

Caller Name: Water Quality Specialists

Caller Phone: ( )

Caller Address: ,

APN: 362100040

Complaint Address: 33383 Mill Pond Drive
Wildomar, CA 92595

Location:

Watershed: SM

Complaint: 2,000 barrels of treated waste water (sewage type) was released. An equipment failure caused this spill.

Findings: 12/26/06: Water Quality Specialists called the Governor's Office of Emergency Services (OES) to report this incident. The OES issued a Hazardous Materials Spill Report, Control# 06-7597, concerning this spill. The OES report states that no water and no drinking water was involved and/or impacted from this release. The OES report also states that the substance was contained and cleaned up by the responsible party. The Riverside County Environmental Health Department was notified about this incident. The nearest Riverside County Flood Control District facility is located about 1.8 miles to the west, southwest of the complaint location: "Wildomar Bundy Canyon Channel Line B."

Actions:

0000941

Riverside County Flood Control & Water Conservation District

NPDES Complaint No. 732

Total Records for this Complaint is 1

Printed 8/15/2007 2:17:18 PM

Complaint No.: 732

Complaint Date: 1/7/2007

Received By: David Ortega

Caller Name: ERTS

Caller Phone: ( )

Caller Address: ,

APN: 964090004

Complaint Address:
Winchester, CA 92596

Location: Metropolitan Water District

Watershed: SM

Complaint: 5 gallons of UN1824, 25% caustic solution spilled out of an overflow valve on the back of a tanker when the driver was going up a hill.

Findings: 1/7/07: ERTS called the Governor's Office of Emergency Services (OES) to report this spill. The OES issued a Hazardous Materials Spill Report, Control# 07-0130, concerning this incident. The OES report states that no water was involved from this spill. The OES report also states that that the substance was contained and cleaned up by a contractor. The Riverside County Environmental Health Department was notified about this incident. The nearest Riverside County Flood Control District facility is located about 1.6 miles to the southwest of the complaint APN listed on this report: "Santa Gertrudis Browning Storm Drain."

Actions:

0000942

Riverside County Flood Control & Water Conservation District

NPDES Complaint No. 738

Total Records for this Complaint is 1

Printed 8/15/2007 2:17:08 PM

Complaint No.: 738

Complaint Date: 1/11/2007

Received By: David Ortega

Caller Name: Eastern Municipal Water District (EMWD)

Caller Phone: ( )

Caller Address: ,

APN: 909290009

Complaint Address: 42565 Avenida Alvarado
Temecula, CA 92590

Location: Treatment/Sewage Facility

Watershed: SM

Complaint: 9,630 gallons of secondary water overflowed from a secondary containment area due to a pipe back-up.

Findings: 1/11/07: EMWD called the Governor's Office of Emergency Services (OES) to report this incident. The OES issued a Hazardous Materials Spill Report, Control# 07-0227, concerning this overflow. The OES report states that no water and no drinking water was involved and/or impacted from this incident. The OES report also states that the substance was contained and cleaned up by the reporting party (EMWD). The Riverside County Environmental Health Department was notified about this incident. The nearest Riverside County Flood Control District facility is located about .8 mile to the northeast of the complaint address: "Murrieta Creek at Winchester Road."

Actions:

0000943

Riverside County Flood Control & Water Conservation District

NPDES Complaint No. 742

Total Records for this Complaint is 1

Printed 8/15/2007 2:16:56 PM

Complaint No.: 742

Complaint Date: 1/16/2007

Received By: David Ortega

Caller Name: Western Municipal Water District (WMWD)

Caller Phone: (0)

Caller Address: ,

APN: 906040067

Complaint Address:

Murrieta, CA 92562

Location: Magnolia Street and Washington Avenue

Watershed: SM

Complaint: 1,200 gallons of sewage overflowed due to a grease blockage.

Findings: 1/16/07: The WMWD called the Governor's Office of Emergency Services (OES) to report this sewage overflow. The OES issued a Hazardous Materials Spill Report, Control# 07-0325, concerning this incident. The OES report states that water was involved in a storm drain, but no drinking water was impacted from this sewage overflow. The OES report also states that it is unknown if the sewage overflow was contained. Cleanup of the sewage was being performed by a contractor. The Riverside County Environmental Health Department was notified about this incident. There is a Riverside County Flood Control District facility located at the intersection of the complaint location: "Murrieta Creek ADP Line F3 Stage 2 MVHS." NOTE: The complaint APN listed on this report is a reference APN only.

Actions:

0000944

Riverside County Flood Control & Water Conservation District

NPDES Complaint No. 747

Total Records for this Complaint is 1

Printed 8/15/2007 2:16:46 PM

Complaint No.: 747

Complaint Date: 1/22/2007

Received By: Steven Clark

Caller Name: Christy

Caller Phone: (951) 453-7842

Caller Address: 28710 Las Haciendas St,

APN:

Complaint Address: 28710 Las Haciendas St
Temecula, CA

Location: TB 958 G6

Watershed: SM

Complaint: Fire and water discharge at Auto Center Auto Body.

Findings: Water from the fire fighting entered a curb inlet and traveled via a City owned and operated storm drain to Murrieta Creek. The plume then traveled about 100 feet down the creek.

Actions: Haz Mat reported damming the discharge from the fire 100 feet from the discharge point in Murrieta Creek.

0000945

Total Records for this Complaint is 1

Printed 8/15/2007 2:16:36 PM

Riverside County Flood Control & Water Conservation District

NPDES Complaint No. 748

Complaint No.: 748

Complaint Date: 1/19/2007

Received By: David Ortega

Caller Name: Southern California Edison (SCE)

Caller Phone: ( )

Caller Address: ,

APN: 943200014

Complaint Address: 39815 Calle De Fuenos
Murrieta, CA 92563

Location:

Watershed: SM

Complaint: 20 gallons of mineral oil (non-PCB) spilled when a car struck a pad mounted transformer.

Findings: 1/19/07: SCE called the Governor's Office of Emergency Services (OES) to report this incident. The OES issued a Hazardous Materials Spill Report, Control# 07-0417, concerning this spill. The OES report states that no water and no drinking water was involved and/or impacted from this incident. The OES report also states that the mineral oil was contained and cleaned up by a contractor. The Riverside County Environmental Health Department was notified about this spill. NOTE: The complaint APN listed on this report is a reference APN only.

Actions:

0000946

Total Records for this Complaint is 1

Printed 8/15/2007 2:16:27 PM

Riverside County Flood Control & Water Conservation District

NPDES Complaint No. 749

Complaint No.: 749

Complaint Date: 1/19/2007

Received By: David Ortega

Caller Name: Southern California Edison (SCE)

Caller Phone: ( )

Caller Address: ,

APN: 921290010

Complaint Address: 27420 Ynez Road
Temecula, CA 92591

Location:

Watershed: SM

Complaint: 40 gallons of mineral oil (non-PCB) spilled when a car struck a pad mounted transformer.

Findings: 1/19/07: SCE called the Governor's Office of Emergency Services (OES) to report this incident. The OES issued a Hazardous Materials Spill Report, Control# 07-0418, concerning this spill. The OES report states that no water and no drinking water was involved and/or impacted from this incident. The OES report also states that the mineral oil was contained and cleaned up by a contractor. The Riverside County Environmental Health Department was notified about this spill. There are two Riverside County Flood Control District facilities near this complaint address. About .4 mile to the north of the complaint address is "Temecula Valley Ynez Road Storm Drain". And about .45 mile to the south of the complaint address is "Murrieta Creek Empire Creek."

Actions:

0000947

Riverside County Flood Control & Water Conservation District

NPDES Complaint No. 760

Total Records for this Complaint is 1

Printed 8/15/2007 2:16:17 PM

Complaint No.: 760

Complaint Date: 2/1/2007

Received By: David Ortega

Caller Name: Metro. Water of Southern California (MWD)

Caller Phone: (0)

Caller Address: ,

APN: 964060001

Complaint Address: 33740 Borel Road
Winchester, CA 92396

Location:

Watershed: SM

Complaint: 3,000 gallons of Chlorine, 1%, was discharged into an excavation area when a construction crew broke a chlorine line.

Findings: 2/1/07: The MWD called the Governor's Office of Emergency Services (OES)to report this incident. The OES issued a Hazardous Materials Spill Report, Control# 07-0691, concerning this discharge. The OES report states that no water, no waterway and no drinking water was involved and/or impacted from this incident. The chlorine was contained and cleaned up by the MWD. The Fire Department and the Police Department were on scene concerning this discharge. The Riverside County Environmental Health Department was notified about this incident. The nearest Riverside County Flood Control District facility is located about 1.3 miles to the west of the complaint address: "Warm Springs Valley Coral Tree Storm Drain, Stage 2."

Actions:

0000948

Total Records for this Complaint is 1

Printed 8/15/2007 2:16:05 PM

Riverside County Flood Control & Water Conservation District

NPDES Complaint No. 774

Complaint No.: 774

Complaint Date: 2/13/2007

Received By: David Ortega

Caller Name: Michael Sanders

Caller Phone: (951) 245-3392

Caller Address: ,

APN: 362150008

Complaint Address:
Wildomar, CA 92595

Location: Porras Road and Rosita Drive

Watershed: SM

Complaint: There are a number of kids who are biking and loitering in the street next to the drain, using trash that they bring up from the vacant lot as a skateboard ramp. Three complaints have come into the County of Riverside, Code Enforcement Office in Lake Elsinore from 2/8/07 to 2/10/07 concerning this matter. Neighbors are very concerned that when they are backing out of their driveways, they hope not to run over any pieces of wood or hit any kids who are jumping out of this basin and on to the street. One neighbor's complaint was very emphatic that this area needs to be fenced.

Findings: 2/13/07, 0913 hours: David Ortega of the Riverside County Flood Control (RCFC) District received three emails today from Michael Sanders, Supervising Code Enforcement Officer, County of Riverside Code Enforcement Office, Lake Elsinore concerning this complaint. Mr. Sanders said that this basin was most likely an RCFC District facility. 1110 hours: Mr. Ortega arrived at the complaint location and initially noticed that this drainage basin, located on the northwest corner of the complaint location, is not an RCFC District facility. There are signs at this location stating that this basin belongs to the Riverside County Parks and Open Space District. Also, there is no fencing of any kind around this basin. Mr. Ortega took a few photos of the site and of the dirt ramps located in the basin and just outside of the basin on the adjacent sidewalk.

Actions: 2/13/07: Mr. Ortega spoke with a Ruben Rodriguez, Park Ranger Supervisor for the Riverside County Parks and Open Space District, (951) 637-6981, concerning this complaint. Mr. Rodriguez did say that his District does maintain this basin. Mr. Rodriguez also said that there have been complaints in the past about this basin concerning kids playing in the basin and trash being dumped there. Mr. Rodriguez also stated that there are Rangers from his District who sometimes patrol this site on the weekends. Mr. Rodriguez did say that because of these recent complaints from the neighbors, that he may have to see how his District might be able to get some fencing installed around this basin in the near future. A copy of the complaint call report was sent to Mr. Sanders at the Code Enforcement Office in Lake Elsinore, Jason Uhley a the RCFC, NPDES Section, Alex Gann and Mike Shetler at the Riverside County Executive Office, and to Mr. Rodriguez at the Riverside County Parks and Open Space District.

0000949

Total Records for this Complaint is 1

Printed 8/15/2007 2:15:56 PM

Riverside County Flood Control & Water Conservation District

NPDES Complaint No. 776

Complaint No.: 776

Complaint Date: 2/17/2007

Received By: David Ortega

Caller Name: Metropolitan Water Dist. (MWD)

Caller Phone: ( )

Caller Address: ,

APN: 964060001

Complaint Address: 33740 Borel Road
Winchester, CA 92596

Location:

Watershed: SM

Complaint: 2 quarts of sodium hydroxide (caustic soda) was released due to discharge valve failure.

Findings: 2/17/07: MWD called the Governor's Office of Emergency Services (OES) to report this incident. The OES issued a Hazardous Materials Spill Report, Control# 07-1069, concerning this release. The OES report states that no water was involved from this incident and that the substance was contained and cleaned up by the reporting party (MWD). The Riverside County Environmental Health Department was notified about this release. There are no Riverside County Flood Control District facilities in the area of the complaint address that could have been impacted from this incident.

Actions:

0000950

Total Records for this Complaint is 1

Printed 8/15/2007 2:15:46 PM

Riverside County Flood Control & Water Conservation District

NPDES Complaint No. 780

Complaint No.: 780

Complaint Date: 2/23/2007

Received By: David Ortega

Caller Name: NRC

Caller Phone: (0)

Caller Address: ,

APN: 918180014

Complaint Address: 45000 Pechanga Parkway
Temecula, CA 92590

Location: Service Station

Watershed: SM

Complaint: 15 gallons of gasoline was released when the tank of a vehicle at a gas station was overfilled.

Findings: 2/23/07: NRC called the Governor's Office of Emergency Services (OES) to report that the Indian Tribe is the reporting party concerning this gasoline spill. The OES issued a Hazardous Materials Spill Report, Control# 07-1191, concerning this incident. The OES report states that no drinking water was impacted from this spill, but that water was involved in a storm drain. NRC Report# 827364. The OES report also states that cleanup (by the fire department) has been completed and the substance was contained and placed in a drum awaiting pick up at the time of the call to OES. The Fire Department was on scene concerning this incident. The Riverside County Environmental Health and the NRC were notified about this spill. The nearest Riverside County Flood Control District facility is located about .8 mile to the southeast of the complaint address: "Wolf Valley Pechanga Storm Drain Line A1."

Actions:

0000951

Total Records for this Complaint is 1

Printed 8/15/2007 2:15:36 PM

Riverside County Flood Control & Water Conservation District

NPDES Complaint No. 783

Complaint No.: 783

Complaint Date: 2/28/2007

Received By: Jason Uhley

Caller Name: Aldo Licitra

Caller Phone: (951) 694-6411

Caller Address: ,

APN:

Complaint Address: 31900 Calle Chapos
Temecula, CA 92591

Location: Off roadside near intersection of Calle Chapos and Walcott in Temecula

Watershed: SM

Complaint: On 2/27/07, a truck accident here in Temecula caused an oil spill alongside one of our roads. The fire department responded and created a small dirt berm to contain the oil. Attached are the photos. According to our NPDES spill procedures, who do we need to report this incident to? Please advise. Thanks.

Findings:

Actions: -----Original Message----- From: Uhley, Jason Sent: Wednesday, February 28, 2007 5:24 PM To: 'Aldo.Licitra@cityoftemecula.org' Cc: Garcia, Linda; Ortega, David Subject: FW: Spill Procedures Aldo, I'm cc'ing this to our monitoring/ic/id response staff for incorporation into our records, however, I also believe that you should forward this to the Regional Board as an FYI. I believe Kristin Schwall (858) 467-2345 or kschwall@waterboards.ca.gov is the right contact. Just let her know that you are reporting an oil spill per our permit requirements. The text below is the instruction I received from Jimmy regarding these issues: Jason, Please comply with the requirements of Order No. R9-2004-001, Attachment B, Section I (1)(6) by submitting reports directly to my attention. This shall include both third party and Permittee spills. Reports to OES can often take several days to reach our office. While there will be certain cases where direct reporting to the Regional Board is duplicative (by the owner of the sewer system and by the compermittee), this increases the opportunity for immediate action if one or more persons are away from their desks. In my absence, please contact Ms. Kristin Schwall (858) 467-2345. R, -Jimmy J. Smith Senior Environmental Scientist Northern Watershed Unit California Regional Water Quality Control Board, San Diego Region 9174 Sky Park Court, Suite 100 San Diego, CA 92123 (858) 467-2732 FX (858) 571-6972 http://www.waterboards.ca.gov/sandiego/ (Excerpt from my original E-mail to Jimmy) I also thought it might be prudent to ask you what your preference was for reporting. I would like to prevent duplicative effort as much as possible. Normally, when a SSO or other Hazardous Spill occurs, either the responsible agency and/or County Fire HazMat teams will generally report the spill to OES. OES is then responsible for notifying appropriate Local, State (including appropriate RWQCB) and Federal agencies regarding the incident. The owner of the Sanitary Sewer System (EMWD) also has requirements to contact RWQCB staff (Charles Chang in this case). So on incidents such as these, there are several entities that will be reporting to Regional Board staff. In addition, the District reviews OES spill reports on at least a weekly basis (mostly daily though). Any spills which may impact MS4s are then investigated (if they were not already addressed through other processes). We then document appropriate OES reports in our complaints database and provide a summary of these reports from the complaint database as part of the

0000952

District's Individual SWMP MS4 annual reports. So, any spill impacting the MS4 is documented and reported to your staff at least annually (in compliance with Attachment B, Requirement 1(l)(7), page B-4. So, 1) Do you want us to report third-party spills to you if they have already been reported to OES and OES has contacted Region 9 staff (or if the responsible agency is already coordinating with your Board)? Or can we presume that if it was a third party incident has been reported to OES (and OES indicates that they have contacted RWQCB9 staff), or the RWQCB directly, that no additional immediate reporting is required? The purpose of the OES spill reporting system is to consolidate and simplify the spill reporting process, so I would like to be able to allow that system to function as intended. 2) If we have a District (or Permittee) initiated spill or incident, are you the correct contact person? If not, who should I tell the Permittees to contact? I just want to make sure that we are communicating properly and coordinating appropriately. Please feel free to give me a call if you wish to discuss further. Regards, Jason Uhley Senior Civil Engineer NPDES Section Riverside County Flood Control District 951.955.1273 Regards, Jason

0000953

Total Records for this Complaint is 1

Printed 8/15/2007 2:15:28 PM

Riverside County Flood Control & Water Conservation District

NPDES Complaint No. 797

Complaint No.: 797

Complaint Date: 3/2/2007

Received By: David Ortega

Caller Name: Metro Water of Winchester

Caller Phone: ( )

Caller Address: ,

APN: 964060001

Complaint Address: 33740 Borel Road
Winchester, CA 92596

Location:

Watershed: SM

Complaint: 15 gallons of hydraulic oil leaked when a contractor's equipment failed.

Findings: 3/2/07: Metro Water of Winchester called the Governor's Office of Emergency Services (OES) to report this incident. The OES issued a Hazardous Materials Spill Report, Control# 07-1352, concerning this leak. The OES report states that no water and no drinking water was involved and/or impacted from this incident. The OES report also states that the hydraulic oil was contained and cleaned up by a contractor. The Riverside County Environmental Health Department was notified about this leak. There are no Riverside County Flood Control District facilities in the area of this incident that could have been impacted.

Actions:

0000954

Total Records for this Complaint is 1

Printed 8/15/2007 2:15:16 PM

Riverside County Flood Control & Water Conservation District

NPDES Complaint No. 800

Complaint No.: 800

Complaint Date: 3/5/2007

Received By: David Ortega

Caller Name: Metropolitan Water Dist. (MWD)

Caller Phone: (0)

Caller Address: ,

APN: 964060001

Complaint Address: 33740 Borel Road
Winchester, CA 92596

Location:

Watershed: SM

Complaint: 300 gallons of chlorine solution spilled.

Findings: 3/5/07: The MWD called the Governor's Office of Emergency Services (OES) to report this incident. The OES report states that a contractor cracked a 6" line with a shovel while working in a piping trench. No water and no drinking water was involved and/or impacted from this spill. The OES report also states that the chlorine solution was contained and cleaned up by the reporting party (MWD). The water was dechlorinated and cleanup and repairs are in progress. The Riverside County Environmental Health Department was notified about this incident. There are no Riverside County Flood Control District facilities in the area of the complaint address that could have been impacted.

Actions:

0000955

Riverside County Flood Control & Water Conservation District

NPDES Complaint No. 802

Total Records for this Complaint is 1

Printed 8/15/2007 2:15:04 PM

Complaint No.: 802

Complaint Date: 3/6/2007

Received By: David Ortega

Caller Name: Eastern Municipal Water District (EMWD)

Caller Phone: ( )

Caller Address: ,

APN: 906030012

Complaint Address:

Murrieta, CA 92562

Location: On Lemon Street, between Adams Avenue & Jefferson Avenue

Watershed: SM

Complaint: 500 gallons of sewage leaked.

Findings: 3/6/07: EMWD called the Governor's Office of Emergency Services (OES) to report this incident. The OES issued a Hazardous Materials Spill Report, Control # 07-1467, concerning this sewage leak. The OES report states that a homeowner reported a sewer leak. No water was involved with this incident. The OES report also states that the sewage was contained and cleaned up by the reporting party (EMWD). Western Municipal Water District (WMWD) was on scene concerning this sewage leak. The Riverside County Environmental Health Department and the RWQCB were notified about this incident. There is a Riverside County Flood Control District facility located on Lemon Street, between Adams Avenue & Jefferson Avenue: "Murrieta Creek MDP Line F1 Valor to Line F."

Actions:

0000956

Riverside County Flood Control & Water Conservation District

NPDES Complaint No. 808

Total Records for this Complaint is 1

Printed 8/15/2007 2:14:46 PM

Complaint No.: 808

Complaint Date: 3/9/2007

Received By: David Ortega

Caller Name: Haz. Mat. 1

Caller Phone: (0)

Caller Address: ,

APN: 918130011

Complaint Address:

Temecula, CA 92592

Location: I-15 Freeway at Boundary Canyon Road (?)

Watershed: SM

Complaint: 100 gallons of diesel fuel when a driver hit some debris in the road and ruptured both of his fuel tanks.

Findings: 3/9/07: Haz.-Mat. 1 called the Governor's Office of Emergency Services (OES) to report this incident. The OES issued a Hazardous Materials Spill Report, Control# 07-1532, concerning this spill. The OES report states that no water and no drinking water was involved and/or impacted from this incident. The OES report also states that the diesel fuel was contained and cleaned up by Ocean Blue (Contractor). The Riverside County Environmental Health Department was notified about this spill. It is unknown exactly where is Boundary Canyon Road is not only in Temecula but in Riverside County. The complaint APN in this report is a reference APN only.

Actions:

0000957

Riverside County Flood Control & Water Conservation District

NPDES Complaint No. 819

Total Records for this Complaint is 1

Printed 8/15/2007 2:14:35 PM

Complaint No.: 819

Complaint Date: 3/17/2007

Received By: David Ortega

Caller Name: Riverside Co. Metropolitan Water Dist. (MWD)

Caller Phone: ( )

Caller Address: ,

APN: 964060001

Complaint Address: 33740 Borel Road
Winchester, CA 92596

Location: Skinner Treatment Facility

Watershed: SM

Complaint: 250 gallons of chlorine solution was released at the facility.

Findings: 3/17/07, 0730 hours: A crack occurred in a PVC line during asphalt operations causing a release. MWD called the Governor's Office of Emergency Services (OES) to report this release. The OES issued a Hazardous Materials Spill Report, Control# 07-1713, concerning this incident. The OES report states that no water and no drinking water was involved and/or impacted from this release. There are no Riverside County Flood Control District facilities in the area of the complaint address that could have been impacted from this incident.

Actions: 3/17/07: The OES report states that the substance was contained in the piping trench by a contractor. Sodium Bisulfate was used to de-chlorinate the substance. The Riverside County Environmental Health Department was notified about this incident.

0000958

Riverside County Flood Control & Water Conservation District

NPDES Complaint No. 821

Total Records for this Complaint is 1

Printed 8/15/2007 2:14:21 PM

Complaint No.: 821

Complaint Date: 3/22/2007

Received By: David Ortega

Caller Name: Metropolitan Water Dis (MWD)

Caller Phone: ( )

Caller Address: ,

APN: 964030010

Complaint Address:

Winchester, CA 92596

Location: Benton Road at Washington Street

Watershed: SM

Complaint: 2 quarts of diesel fuel leaked on the road.

Findings: 3/22/07: The MWD called the Governor's Office of Emergency Services (OES) to report this leak. The OES issued a Hazardous Materials Spill Report, Control# 07-1828, concerning this incident. The OES report states that a delivery truck for a contractor had a compression fitting on a fuel line leak. No water and no drinking water was involved and/or impacted from this leak. The OES report also states that the diesel fuel was contained and cleaned up by Metropolitan Haz. Mat. Contractor. The Riverside County Environmental Health Department was notified about this incident. There are no Riverside County Flood Control District facilities in the area of the complaint location that could have been impacted from this leak.

Actions:

0000959

Total Records for this Complaint is 1

Printed 8/15/2007 2:14:09 PM

Riverside County Flood Control & Water Conservation District

NPDES Complaint No. 823

Complaint No.: 823

Complaint Date: 4/3/2007

Received By: Steven Clark

Caller Name:

Caller Phone: (951) 453-5604

Caller Address: ,

APN: 921030040

Complaint Address: 27565 Diaz Road
Temecula, CA 92590

Location:

Watershed: SM

Complaint: Green substance flowing into Murrieta Creek from an earthen channel. The green substance is coming from a cmp that drains some comercial area. The Investigator and the Murrieta City NPDES rep are searching for the source. TB Map Page# 958 F5.

Findings: 4/3/07, 1635 hours: Kelly Winters, Haz. Mat. mgmt. Specialist with the County of Riverside, Haz. Mat. Division, called David Ortega, NPDES Section of the Riverside County Flood Control (RCFC), concerning this incident. Mr. Ortega referred Mr. Winters to call Steve Clark and/or Linda Garcia at the RCFC concerning this discharge. Mr. Winters also contacted the Governor's Office of Emergency Services (OES) to report this incident. The OES issued a Hazardous Materials Spill Report, Control# 07-2104, concerning this discharge. The OES report states that Riverside County Haz.-Mat suspects that the substance came from Southwest Traders located at the complaint address. The green liquid (Propylene Glycol) went into a storm drain that services the Southwest Traders facility (parking lot) and then flows through a drain into Temecula Creek which is directly across the street from their facility. Per Riverside County Haz.-Mat., they found Propylene Glycol in the facility in a mop bucket (as if it has been cleaned up). Southwest Traders has barrels of the substance at their facility. It is used to keep their floors warm and not freeze. It runs under the concrete through pipes. 1951 hours: The OES received a fax copy of NRC report# 831253 concerning this incident. NOTE: The waterway that was involved with this discharge is not Temecula Creek as stated in the OES report. It is Murrieta Creek and it is also on RCFC District right-of-way.

Actions: 4/3/07: The OES report also states that a spill boom was placed on the creek to prevent furthur migration of the substance. Also the OES report emphasizes that Southwest Traders is the SUSPECTED responsible party. Kelly Winters informed the Riverside County Flood Control (RCFC) District that the spill had been cleaned up by Southwest Traders and that the substance was propylene glycol. Aldo Licitra of the City of Temecula was on scene concerning this incident. 4/9/07: Mr. Licitra sent a report about this incident to the RCFC, NPDES Section; Tracking# 6493. This report states that the liquid discharged through a 24" CMP storm drain located just south of Sarah Way in the City of Temecula on the west bank of the Murrieta Creek. The call came from a rep. from the County Environmental Health Dept. who was already onsite addressing the complaint. Mr. Licitra went out to meet with this rep. (Mr. Winters). Collectively, Mr. Winters and Mr. Licitra determined that Southwest Traders, Inc. may have been involved due to discovering a liquid similar in color on their property. However, Mr. Winters and Mr. Licitra were unable to verify that the liquid was actually discharged from their site. In other words, Mr. Winters and Mr. Licitra did not find

0000960

evidence that the liquid had been released into their storm drain system. However, Mr. Winters and Mr. Licitra did direct Southwest Traders to place absorbent booms in Murrieta Creek to capture the liquid and prevent it from migrating any furthur, in addition to having them pump the liquid out of Murrieta Creek with a pump truck and disposing of it legally. Southwest Traders complied and ordered all of their personnel to stop any kind of outside washing activities, in the event that one of their various shifts were washing down the loading docks. Currently, there is no visual indication of any furthur releases of green liquid into Murrieta Creek.

0000961

Total Records for this Complaint is 1

Printed 8/15/2007 2:13:58 PM

Riverside County Flood Control & Water Conservation District

NPDES Complaint No. 826

Complaint No.: 826

Complaint Date: 3/26/2007

Received By: Linda Garcia

Caller Name: Andy McElhinney

Caller Phone: (951) 751-2903

Caller Address: ,

APN: 368200028

Complaint Address: 21182 Palomar Street
Wildomar, CA 92595

Location:

Watershed: SM

Complaint: A neighbor living at the complaint address is draining a saltwater swimming pool onto the complainants property. It has killed a tree already and he is concerned that it will do further damage to his property.

Findings: 3/26/07, 1530 hours: Linda Garcia of the NPDES Section of the Riverside County Flood Control (RCFC), received this complaint call from the complainant, Mr. McElhinney. Ms. Garcia forwarded this complaint via email to David Ortega, also in the NPDES Section of the RCFC. The complainant also said that he already called Code Enforcement, who said it is a civil matter, and Building and Safety, who told him to call Flood Control. ms. Garcia told the complainant that if the flow is not leaving hi property that it is generally a civil matter.

Actions: 4/5/06: David Ortega went to the complainants address and spoke briefly with Mr. McElhinney about this matter. Mr. Ortega took a few photos of his next door neighbors property, specifically where there is a damaged PVC or plastic type of piping that runs out of the backyard wall and out along a small sloped hill. There is visual evidence that shows some white staining and "rutting" of the sloped hill that continues from the complaint address onto the Mr. McElhinney's property. Mr. Ortega spoke to a Ms. Wendy Lopez at the complaint address while on site. She said that the recent incident that prompted Mr. McElhinney to contact us was not a draining of the pool but rather some of the pool water drained from the backyard and out into the pipe that went into Mr. McElhinney's yard. Ms. Lopez said that her and her husband will be installing new pipe and re-routing this drain line so that it drains closer to the middle of their property. She also said that this will happen in a week or two at the most. She said that when the pool drains that they keep in mind not to have the pool drain onto anybody elses property and that it will not drain out into the street. Mr. Ortega gave a Stormwater/Cleanwater brochure to both Mr. McElhinney and to Ms. Lopez specifically for proper maintenance of spa, pool and fountain water.

0000962

Riverside County Flood Control & Water Conservation District

NPDES Complaint No. 844

Total Records for this Complaint is 1

Printed 8/15/2007 2:13:46 PM

Complaint No.: 844

Complaint Date: 4/12/2007

Received By: David Ortega

Caller Name: Metropolitan Water District, Riverside Co. (MWD)

Caller Phone: ( )

Caller Address: ,

APN: 964060001

Complaint Address: 33740 Borel Road
Winchester, CA 92596

Location:

Watershed: SM

Complaint: 8 ounces of diesel fuel leaked from a fuel line on a company truck.

Findings: 4/12/07: MWD called the Governor's Office of Emergency Services (OES) to report this leak. The OES issued a Hazardous Materials Spill Report, Control# 07-2273, concerning this incident. The OES report states that no water was involved from this leak. The OES report also states that the diesel fuel was contained and cleaned up by the reporting party (MWD). The Riverside County Environmental Health Department was notified about this incident.

Actions:

0000963

Total Records for this Complaint is 1

Printed 8/15/2007 2:13:33 PM

Riverside County Flood Control & Water Conservation District

NPDES Complaint No. 854

Complaint No.: 854

Complaint Date: 4/20/2007

Received By: David Ortega

Caller Name: Hemet Unified School District

Caller Phone: ( )

Caller Address: ,

APN: 575050045

Complaint Address: 57430 Mitchell Road
Anza , CA 92539

Location:

Watershed: SM

Complaint: 1/2 cup of diesel fuel was spilled when a tank that was being fueled overflowed.

Findings: 4/20/07: The Hemet Unified School District called the Governor's Office of Emergency Services (OES) to report this spill. The OES issued a Hazardous Materials Spill Report, Control# 07-2434, concerning this incident. The OES report states that no water and no drinking water was involved and/or impacted from this spill. The OES report also states that the diesel was contained and cleaned up by the reporting party (Hemet Unified School District). The Riverside County Environmental Health Department was notified about this incident. There are no Riverside County Flood Control District facilities in the area of the complaint address that could have been impacted from this spill.

Actions:

0000964

Total Records for this Complaint is 1

Printed 8/15/2007 2:13:22 PM

Riverside County Flood Control & Water Conservation District

NPDES Complaint No. 856

Complaint No.: 856

Complaint Date: 4/22/2007

Received By: David Ortega

Caller Name: Eastern Municipal Water District (EMWD)

Caller Phone: (0)

Caller Address: ,

APN: 961382001

Complaint Address:
Temecula, CA 92592

Location: Peacock Place & Badger Way

Watershed: SM

Complaint: An unknown amount of sewage is being reported as overflowing.

Findings: 4/22/07, 1745 hours: EMWD called the Governor's Office of Emergency Services (OES) to report this overflow. The OES issued a Hazardous Materials Spill Report, Control# 07-2468, concerning this incident. The OES report states that it is unknown at the initial time of call what the cause is or how much sewage has been spilled. Crews from EMWD are en route. The Sheriffs Office is on scene concerning this sewage spill. The Riverside County Environmental Health Department was notified about this incident. 1851 hours: A situation update came in to the OES concerning this spill. Per Gary McCance, EMWD crew is on scene and cannot find any sewer overflow in the area. The nearest Riverside County Flood Control District facility is located about .1 mile to the northwest of the complaint location: "Temecula Valley Via Del Coronado Storm Drain." NOTE: The complaint APN listed on this report is a reference APN only.

Actions:

0000965

Total Records for this Complaint is 1

Printed 8/15/2007 2:13:12 PM

Riverside County Flood Control & Water Conservation District

NPDES Complaint No. 874

Complaint No.: 874

Complaint Date: 5/6/2007

Received By: David Ortega

Caller Name: Rancho Water

Caller Phone: (0)

Caller Address: ,

APN: 949470026

Complaint Address:
Murrieta, CA 92562

Location: Monroe Avenue & California Oaks Road

Watershed: SM

Complaint: 157,500 gallons of sewage overflowed due to vandalism.

Findings: 5/6/07: The Rancho California Water District (RCWD) called the Governor's Office of Emergency Services (OES) to report this incident. The OES issued a Hazardous Materials Spill Report, Control# 07-2742, concerning this overflow. The OES report states that a manhole cover in the road was removed and debris was thrown into it causing the overflow. The debris entered into a catch basin where it was cleaned up. The RCWD state in the OES report that according to a map, it doesn't appear to enter or affect any streams. The overflow ended on 5/6/07 at 0230 hours. The OES report states that the incident started on 5/5/07 at about 1600 hours. No water and no drinking water was involved and/or impacted from this spill. The Riverside County Environmental Health Department was notified about this incident. The nearest Riverside County Flood Control District facility is located about .2 mile to the north, northeast of the complaint location: "California Oaks Stage 4 Line A Cal Oaks to Sunflower".

Actions:

0000966

Riverside County Flood Control & Water Conservation District

NPDES Complaint No. 881

Total Records for this Complaint is 1

Printed 8/15/2007 2:12:48 PM

Complaint No.: 881

Complaint Date: 5/12/2007

Received By: David Ortega

Caller Name: Metropolitan Water Dist. of So. Cal. (MWD)

Caller Phone: ( )

Caller Address: ,

APN: 964060001

Complaint Address: 33740 Borel Road
Winchester, CA 92596

Location: Lake Skinner Filtration Plant

Watershed: SM

Complaint: An unknown amount of chlorine gas was released.

Findings: 5/12/07: MWD called the Governor's Office of Emergency Services (OES) to report this incident. The OES issued a Hazardous Materials Spill Report, Control# 07-2893, concerning this release. The OES report states that a contractor onsite broke an irrigation line that if connected to a fire water loop which is connected to the plant potable water pump. They could not located the line until they excavated and located the industrial line. The line was then shut off. When the line was shut off, the chlorinator lost its vacuum for approx. 30 seconds, which subsequently triggered a pump of chlorine gas to the pressure release/vacuum release vent box thus triggering a chlorine alarm. The OES report also states that no water and no drinking water was involved and/or impacted from this incident. The gas was contained and cleaned up by the reporting party (MWD). The Riverside County Environmental Health Department was notified about this release. There are no Riverside County Flood Control District facilities in the area of the complaint address that could have been impacted from this very brief gas release.

Actions:

0000967

Total Records for this Complaint is 1

Printed 8/15/2007 2:12:32 PM

Riverside County Flood Control & Water Conservation District

NPDES Complaint No. 893

Complaint No.: 893

Complaint Date: 5/21/2007

Received By: Kyle Gallup

Caller Name: Donna Griffin

Caller Phone: (951) 694-6584

Caller Address: ,

APN:

Complaint Address:

Rancho California, CA

Location:

Watershed: SM

Complaint: Ms. Griffin (Complainant) said that the neighbor's home just upstream (and uphill) from her residence is constantly "disking" their property with a tractor. This activity has been sending sediment via blowing wind and by water runoff onto her property. The property line of her residence and her neighbor's is a sloped hill that is eroding.

Findings: 5/21/07: Kyle Gallup, Planning Section of the Riverside County Flood Control (RCFC) received this complaint today from the complainant. Mr. Gallup sent this complaint to David Ortega in the NPDES Section of the RCFC. 5/22/07: Mr. Ortega called the complainant today and asked for more details concerning her complaint. Mr. Ortega noted to her that the RCFC District does not have any facilities in the area of her address that could be impacted by this sediment issue. She mentioned that she has tried to place sandbags along the property line with her neighbor to prevent erosion, but that hasn't worked. Also, she mentioned that the drainage ditches and/or culverts on her property were filling up with sediment from her neighbor's property and are now not functioning properly.

Actions: 5/22/07: Mr. Ortega called Steve Dondalski, County of Riverside, Building & Safety Department at (951) 232-7960, cell#, and left a message about this complaint along with the complainant's home phone number. Mr. Ortega also left a message at the County of Riverside, Building & Safety office in Riverside (951) 955-2020, concerning this complaint along with the complainant's home phone number. Mr. Ortega also referred Ms. Griffin to call the County of Riverside, Building & Safety office in Riverside at (951) 955-2020 concerning her complaint.

0000968

Total Records for this Complaint is 1

Printed 8/15/2007 2:12:22 PM

Riverside County Flood Control & Water Conservation District

NPDES Complaint No. 908

Complaint No.: 908

Complaint Date: 5/31/2007

Received By: David Ortega

Caller Name: Hemet Unified School District

Caller Phone: (0)

Caller Address: ,

APN: 575050045

Complaint Address: 57430 Mitchell Road
Anza, CA 92539

Location:

Watershed: SM

Complaint: 1/2 cup of diesel fuel spilled during the fueling of a school bus.

Findings: 5/31/07: The Hemet Unified School District called the Governor's Office of Emergency Services (OES) to report this spill. The OES issued a Hazardous Materials Spill Report, Control# 07-3308, concerning this incident. The OES report states that no water and no drinking water was involved and/or impacted from this spill. The OES report also states that the diesel fuel was contained and cleaned up by the reporting party (Hemet Unified School District). The Riverside County Environmental Health Department was notified about this incident.

Actions:

0000969

Riverside County Flood Control & Water Conservation District

NPDES Complaint No. 923

Total Records for this Complaint is 1

Printed 8/15/2007 2:12:07 PM

Complaint No.: 923

Complaint Date: 6/6/2007

Received By: David Ortega

Caller Name: Southern Ca. Edison (SCE)

Caller Phone: (0)

Caller Address: ,

APN:

Complaint Address:

Murrieta, CA 92562

Location: Nutmeg Street & Nicolette Way

Watershed: SM

Complaint: 25 gallons of mineral oil-non PCB was released when a car hit a telephone pole and the transformer hit the ground.

Findings: 6/6/07: SCE called the Governor's Office of Emergency Services (OES) to report this incident. The OES issued a Hazardous Materials Spill Report, Control# 07-3438, concerning this release. The OES report states that no water and no drinking water was involved and/or impacted from this incident. The OES report also states that the substance was contained and cleaned up by a contractor. The nearest Riverside County Flood Control District facility is located about .1 mile to the west of the complaint location: "Murrieta Creek MDP Line G at Washington".

Actions:

0000970

Riverside County Flood Control & Water Conservation District

NPDES Complaint No. 943

Total Records for this Complaint is 1

Printed 8/15/2007 2:11:40 PM

Complaint No.: 943

Complaint Date: 6/30/2007

Received By: David Ortega

Caller Name: Eastern Municipal Water Dist. (EMWD)

Caller Phone: ( )

Caller Address: ,

APN: 957330004

Complaint Address:

Murrieta, CA 92563

Location: Off Sky Canyon, between Technology Drive & Murrieta Hot Springs Road

Watershed: SM

Complaint: 1,000 gallons of sewage was released by an unknown cause.

Findings: 6/30/07: EMWD called the Governor's Office of Emergency Services (OES) to report this release. The OES issued a Hazardous Materials Spill Report, Control# 07-3935, concerning this incident. The OES report states that no drinking water was impacted from this release. However, the OES report does stated that Santa Gertrudis Creek was involved from this incident. The OES report also states that the sewage was contained and cleaned up by the reporting party (EMWD). The Riverside County Environmental Health Department was notified about this release. The nearest Riverside County Flood Control District facility is located about .1 mile to the east of the complaint location: "Santa Gertrudis Tucalota Creek Stage 1 Winchester Ranch". NOTE: The complaint APN listed in this report is a reference APN only.

Actions:

ATTACHMENT G

PROPOSED REVISIONS TO INDIVIDUAL SWMP AND ANNUAL REPORTING FORMS

5.0 MUNICIPAL FACILITIES AND ACTIVITIES

5.1 PLANNING DISTRICT FACILITIES

District projects involve the design, construction, operation and maintenance of MS4 infrastructure, including channels, storm drains, dams, levees and basins. The District has no plans to construct any non-MS4 fixed facilities (e.g. maintenance and operations centers, field offices) within the Santa Margarita Region. District MS4 facility projects do not involve land uses that generate pollutants commonly associated with Urban Runoff [there is no actual use of the land associated with significant traffic loads (vehicle usage is <<1 vehicles per day on average], residential, commercial or industrial activities). For this reason, District MS4 infrastructure is not considered to meet the New Development or Significant Redevelopment project criteria. District projects must, however, meet the requirements of DAMP Section 6 for non-Category projects, including the incorporation of site design and source control BMPs where applicable and feasible. District administered MS4 capital improvement projects must comply with the following general procedures for implementing Site Design and Source Control BMPs:

5.1.1 Incorporation of Site Design BMPs:

As indicated in Section 6.4.4 of the DAMP, non-Category (other development) projects are required to incorporate Site Design BMPs. Most Site Design BMPs are not applicable to single use projects such as flood control facilities. Examples of non-applicable Site Design BMPs include incorporating landscape buffer areas between streets and sidewalks, constructing walkways and parking lots with open-jointed paving materials, constructing streets to minimum widths, minimizing decorative use of concrete, and containing and infiltrating roof runoff.

District planning/design engineers examine the feasibility of incorporating applicable site design BMPs that minimize the impervious footprint, minimize directly connected impervious areas and conserve natural areas where applicable and feasible. This is accomplished by examining the ability of a proposed District facility to maintain natural stream courses and reduce infiltrative capacity loss caused by channelization projects with impervious lining during the facility planning design phase, as appropriate.

The District prepares community flood management plans, or Master Drainage Plans (MDPs), which identify flood control infrastructure needs for communities in Riverside County. MDPs typically provide a sub-watershed level analysis of a community's drainage infrastructure deficiencies based on ultimate development conditions described in the appropriate City/County General Plan. The MDPs consider environmental constraints on flood control infrastructure, including Multiple Species Habitat Conservation Plans and/or Special Area Management Plans ~~adopted by the County~~. Other unique environmental concerns may be considered as well. MDPs must undergo environmental review pursuant to CEQA (Public Resources Code §21000 et seq.) and the State CEQA Guidelines (Title 14 of the California Code of Regulations) prior to their adoption ~~are adopted~~ by the District's Board of Supervisors and/or appropriate City Council ~~and must undergo CEQA review~~. Documentation of aforementioned Site Design BMP consideration will be incorporated into the MDP supporting documentation.

[illegible] as appropriate, for new MDPs. During the design process, [illegible] of the review [illegible] shall be incorporated into the facility design notebooks.

On occasion, the District constructs Flood Control Infrastructure not covered by an existing MDP, or as part of an MDP that predated NPDES MS4 Permit requirements. For these projects, examination of the feasibility and applicability to maintain natural stream course and/or reduce infiltrative capacity loss caused by projects with impervious lining is considered during the facility design process. Documentation of consideration of Site Design BMPs shall be incorporated into the facility design notebooks ~~and CEQA documentation~~. Likewise, analysis of necessary site design BMPs will be included in the CEQA documents, as appropriate, for these projects.

5.1.2 Incorporation of Source Control BMPs:

Chapter 6 of the Riverside County DAMP and the WQMP require several source control BMPs to be implemented as part of project [illegible]. Most of these BMPs are specific to land uses that are not included in the District's MS4 capital improvement projects. The following source control BMPs that are identified in the WQMP may be applicable to District MS4 facilities:

- MS4 stenciling and signage
- Protection of slopes and channels

The District will ensure that these BMPs are incorporated into District projects where applicable and feasible.

5.2 District Construction Activities

Section 5.2 of the Riverside County DAMP describes how the District ensures that its construction projects are in compliance with the latest version of the General Permit-Construction and the requirements of the Third-term MS4 Permit. District Design staff accomplishes this by incorporating standard boilerplate language regarding Third-term MS4 Permit requirements into the Special Provisions of the specifications and contract documents for the construction of District facilities. This boilerplate language is maintained by the Design and Construction Division.

SWPPPs and Facility Pollution Prevention Plans required for District administered capital improvement projects are reviewed by the NPDES Section. The NPDES Section ensures the SWPPPs are prepared in conformance with the appropriate General Permit-Construction and that SWPPPs incorporate the minimum BMPs identified in the Riverside County DAMP Section 6.4.7.1 and applicable erosion and sediment control BMPs in the Riverside County DAMP Table 7-1. In addition, the District's boilerplate Standard Specifications have been revised to specifically address the minimum BMPs requirements.

ATTACHMENT H

NEWLY ACCEPTED FLOOD CONTROL FACILITIES

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

0000975

TRACT 30114

GENERAL NOTES

HE CONTRACTOR SHALL CONSTRUCT THE FLOOD CONTROL MPROVEMENTS SHOWN ON THE DRAWINGS IN CONFORMANCE ITH THE REQUIREMENTS OF THE RIVERSIDE COUNTY FLOOD ONTROL AND WATER CONSERVATION DISTRICT'S MEMORANDUM F UNDERSTANDING STANDARD SPECIFICATIONS DATED EPTEMBER 1984, AND DESIGN MANUAL STANDARD DRAWINGS ATED MAY 1971.

AN ENCROACHMENT PERMIT IS REQUIRED FROM RIVERSIDE OUNTY FLOOD CONTROL. THEN CONTACT ED LOTZ AT 909) 955-1266. AFTER THE PERMIT IS ISSUED THE DISTRICT UST BE NOTIFIED ONE WEEK PRIOR TO CONSTRUCTION. ONSTRUCTION INSPECTION WILL BE PERFORMED BY RIVERSIDE OUNTY FLOOD CONTROL. CONTACT DALE ANDERSON AT 909) 955-1288. THE DISTRICT MUST BE NOTIFIED 20 DAYS RIOR TO CONSTRUCTION.

L STATIONING REFERS TO CENTERLINE OF CONSTRUCTION UNLESS THERWISE NOTED.

TATIONING FOR LATERALS AND CONNECTOR PIPE REFER TO THE ENTERLINE-CENTERLINE INTERSECTION STATION.

ORTY-EIGHT HOURS BEFORE EXCAVATION, CALL UNDERGROUND ERVICE ALERT 1-800-227-2600.

L ELEVATIONS SHOWN ARE IN FEET AND DECIMALS THEREOF ASED ON U.S.C. & G.S. DATUM. (REFER TO BENCHMARK HEREON)

L CROSS SECTIONS ARE TAKEN LOOKING DOWNSTREAM.

LEVATIONS OF UTILITIES ARE APPROXIMATE UNLESS OTHERWISE NOTED.

PENINGS RESULTING FROM THE CUTTING OR PARTIAL REMOVAL OF XISTING CULVERTS, PIPES OR SIMILAR STRUCTURES TO BE ABANDONED HALL BE SEALED WITH 6" OF CLASS "B" CONCRETE.

IPE CONNECTED TO THE MAINLINE PIPE SHALL CONFORM TO UNCTION STRUCTURE NO. 4 (JS 229) UNLESS OTHERWISE NOTED.

EDDING PIPE SHALL CONFORM TO RCFC&WCD STD. M815, EXCEPT FOR OVER < 2'. FOR COVER < 2', CONCRETE SLURRY (2000 PSI-2 SACK) HALL BE USED. THE ENTIRE TRENCH SHALL BE SLURRY EXTENDING 4" INIMUM AND 12" MAXIMUM ABOVE THE TOP OF THE PIPE.

-1 THROUGH B-5 INDICATE SOIL BORING LOCATIONS BASED ON HE SOILS REPORTS BY PETRA (JN 480-00) DATED 1-15-01. LOCATIONS HOWN ARE APPROXIMATE.

I" IS THE DEPTH OF INLET OF CATCH BASINS MEASURED FROM HE NORMAL GUTTER FLOWLINE TO THE INVERT OF THE OUTLET PIPE. ATCH BASINS SHALL BE LOCATED SO THAT LOCAL DEPRESSION HALL BEGIN AT EXISTING CURB RETURN JOINT, UNLESS THERWISE SPECIFIED.

L CURBS, GUTTERS, SIDEWALKS, DRIVEWAYS AND OTHER EXISTING MPROVEMENTS TO BE RECONSTRUCTED IN KIND AND AT THE SAME LEVATION AND LOCATION AS THE EXISTING IMPROVEMENTS UNLESS THERWISE NOTED.

L UTILITY LINE CROSSINGS SHOWN ON THESE PLANS ARE PPROXIMATE AND WILL REQUIRE VERIFICATION BY THE CONTRACTOR. RIOR TO ANY CONSTRUCTION THE CONTRACTOR SHALL POTHOLE ND VERIFY ALL EXISTING UTILITY LINE CROSSINGS WITH PROPOSED ORM DRAINS AND REPORT ANY DISCREPANCIES TO THE DESIGN VIL ENGINEER FOR RESOLUTION. FAILURE TO DO SO WILL MOVE ALL LIABILITY OF THE DESIGN CIVIL ENGINEER FOR ANY CONSTRUCTION THAT MAY OCCUR.

NLESS OTHERWISE NOTED ON THESE PLANS, ALL CONCRETE RAPEZOIDAL CHANNEL SECTIONS SHALL BE REINFORCED WITH 3 BAR @ 18" C.C. EACH WAY AND CENTERED WITHIN THE CONCRETE HICKNESS. "HOOKING" OF REINFORCEMENT IS NOT PERMITTED. THE HANNEL SUBGRADE SHALL BE FREE OF LOOSE AND UNCOMPACTED ATERIAL PRIOR TO PLACEMENT OF CONCRETE. THE CONTRACTOR IS EQUIRED TO FOLLOW THE SOILS ENGINEER'S RECOMMENDATIONS AS RESENTED IN THE REPORT BY GEOSOILS, INC. DATED 10/20/03 V.O. 3945-0-SC).

LIST OF UTILITY COMPANIES

SOUTHERN CALIFORNIA EDISON
(909) 928-8272

VERIZON COMMUNICATIONS
(909) 929-9464

SOUTHERN CALIFORNIA GAS COMPANY
(909) 335-7558

COMCAST CABLE
(909) 549-3977

LEGEND

INDICATES SOIL BORING

Underground Service Alert
Call TOLL FREE
1-800
227-2600
TWO WORKING DAYS
BEFORE YOU DIG

R / DEVELOPER:
EYSTONE
OMMUNITIES
MISSION CENTER, STE 360
IEGO, CA 92108-1350
299-4855 • FAX (619) 299-4845

ATE ENGINEER SIGNING THESE PLANS IS RESPONSIBLE FOR THE ACCURACY AND ACCEPTABILITY OF THE DESIGN HEREON. ENT OF DISCREPANCIES ARISING AFTER COUNTY APPROVAL NG CONSTRUCTION, THE PRIVATE ENGINEER SHALL BE BLE FOR DETERMINING AN ACCEPTABLE SOLUTION AND THE PLANS FOR APPROVAL BY THE COUNTY.

NOTE:
WORK CONTAINED WITHIN THESE PLANS SHALL NOT COMMENCE UNTIL AN ENCROACHMENT PERMIT AND/OR A GRADING PERMIT HAS BEEN ISSUED.

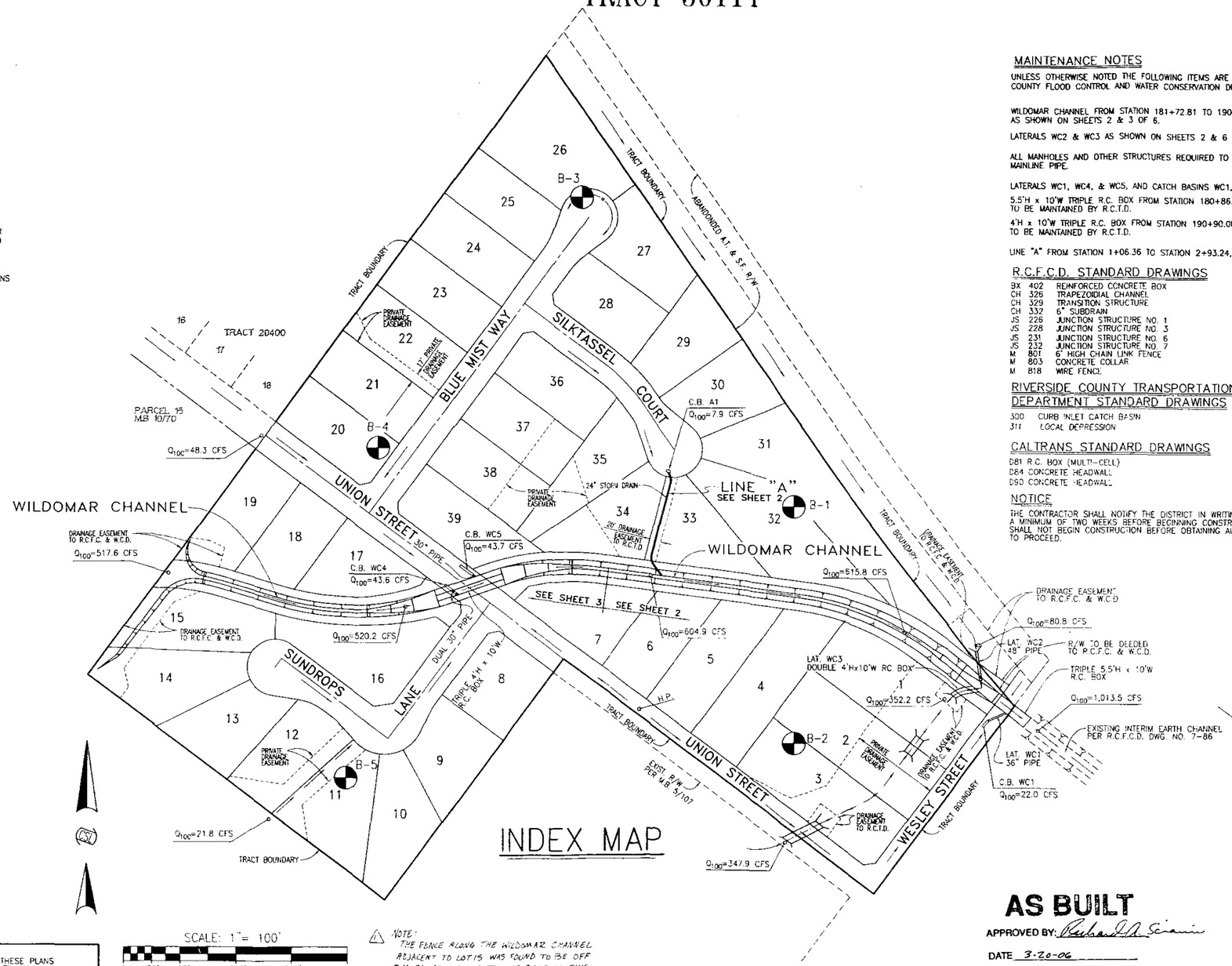

INDEX MAP

SCALE: 1"= 100'
0 50' 100' 200' 300' 400'

NOTE:
THE FENCE ALONG THE WILDOMAR CHANNEL ADJACENT TO LOT 15 WAS FOUND TO BE OFF ± 1'-2'. ACCORDING TO THE CLIENT, THIS IS GOING TO BE MOVED SHORTLY.

MAINTENANCE NOTES

UNLESS OTHERWISE NOTED THE FOLLOWING ITEMS ARE TO BE INSPECTED AND MAINTAINED BY RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT:

WILDOMAR CHANNEL FROM STATION 181+72.81 TO 190+90.00 AND STATION 192+12.00 TO STATION 196+37.00 AS SHOWN ON SHEETS 2 & 3 OF 6.

LATERALS WC2 & WC3 AS SHOWN ON SHEETS 2 & 6 OF 6

ALL MANHOLES AND OTHER STRUCTURES REQUIRED TO COMPLETE THE CONSTRUCTION OF THE ABOVE MENTIONED MAINLINE PIPE.

LATERALS WC1, WC4, & WC5, AND CATCH BASINS WC1, WC4, & WC5 TO BE MAINTAINED BY R.C.T.D.

5.5'H x 10'W TRIPLE R.C. BOX FROM STATION 180+86.60 TO STATION 181+72.81 AS SHOWN ON SHEET 2 OF 6 TO BE MAINTAINED BY R.C.T.D.

4'H x 10'W TRIPLE R.C. BOX FROM STATION 190+90.00 TO STATION 192+12.00 AS SHOWN ON SHEET 3 OF 6 TO BE MAINTAINED BY R.C.T.D.

LINE "A" FROM STATION 1+06.36 TO STATION 2+93.24, AND C.B. A1 TO BE MAINTAINED BY R.C.T.D.

R.C.F.C.D. STANDARD DRAWINGS

BX	402	REINFORCED CONCRETE BOX
CH	326	TRAPEZOIDIAL CHANNEL
CH	329	TRANSITION STRUCTURE
CH	332	6" SUBDRAIN
JS	226	JUNCTION STRUCTURE NO. 1
JS	228	JUNCTION STRUCTURE NO. 3
JS	231	JUNCTION STRUCTURE NO. 6
JS	232	JUNCTION STRUCTURE NO. 7
M	801	6' HIGH CHAIN LINK FENCE
M	803	CONCRETE COLLAR
M	818	WIRE FENCE

RIVERSIDE COUNTY TRANSPORTATION DEPARTMENT STANDARD DRAWINGS

300	CURB INLET CATCH BASIN
311	LOCAL DEPRESSION

CALTRANS STANDARD DRAWINGS

D81	R.C. BOX (MULTI-CELL)
D84	CONCRETE HEADWALL
D90	CONCRETE HEADWALL

NOTICE

THE CONTRACTOR SHALL NOTIFY THE DISTRICT IN WRITING A MINIMUM OF TWO WEEKS BEFORE BEGINNING CONSTRUCTION, AND SHALL NOT BEGIN CONSTRUCTION BEFORE OBTAINING AUTHORIZATION TO PROCEED.

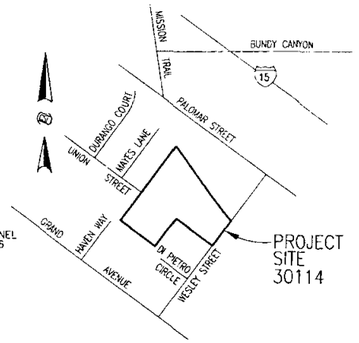

VICINITY MAP
NOT TO SCALE
SECTION 27, TOWNSHIP 6 SOUTH, RANGE 4 WEST
THOMAS BROS. 2003 EDITION
PAGE 897, GRID A-6

AS BUILT
APPROVED BY: Richard A. Scianni
DATE 3-20-06

SHEET INDEX

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PLAN & PROFILE	2-3
LATERAL PROFILES AND DETAILS	4

DG

COUNTY
REGISTERED PROFESSIONAL ENGINEER RICHARD A. SCIANNI 33950 Exp. 6/30/06 CIVIL STATE OF CALIFORNIA

COUNTY OF RIVERSIDE
TRANSPORTATION DEPARTMENT
APPROVED BY:
CHIEF D.A. ENGINEER — DATE 4/27/04
RECOMMENDED BY WILLDAN — DATE 4/23/04

SEAL-ENGINEER
REGISTERED PROFESSIONAL ENGINEER No. 25917 Exp. 12/31/05 CIVIL STATE OF CALIFORNIA

CSL ENGINEERING, INC.
11651 STERLING AVENUE, SUITE E
RIVERSIDE, CALIFORNIA 92503
(909) 785-5122 • FAX (909) 785-5180
PREPARED BY: R.C.E. NO. 25917 (EXP. 12/31/05)
RICHARD A. SCIANNI — DATE: 4-2-04

BENCHMARK:
RIV. CO. B.M. M-14-63 IN THE TEE INTERSECTION OF NEWPORT RD. & LINDENBERGER RD. A 1" IRON PIPE & TAG MARKED COUNTY IN CAP WELL MON.
1984 ELEV.= 1425.301

REVISIONS

REF.	DESCRIPTION	APPR.	DATE
△1	AS BUILT 3-20-06		

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

DESIGNED BY: S.E.	RECOMMENDED FOR APPROVAL BY: PLANNING ENGINEER — DATE: 7-27-2004	APPROVED BY: CHIEF ENGINEER — DATE: 7/27/04
DRAWN BY: S.E.		
DATE DRAWN: 2/03		
CHECKED BY: R.A.S.		

TRACT 30114 IP 030054
WILDOMAR MASTER DRAINAGE PLAN CHANNEL STAGE4
STORM DRAIN IMPROVEMENT PLANS
TITLE SHEET

PROJECT NO. 7-0-0070-04
DRAWING NO. 7-380
SHEET NO. 1 OF 6

JN595/04-01-04/595SD1.DWG/S:1:0

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

0000976

CONSTRUCTION NOTES & QUANTITY ESTIMATES

ITEM NO.	DESCRIPTION	UNIT	QUANTITY
1	CONSTRUCT CATCH BASIN NO. 1 WITH LOCAL DEPRESSION NO. 2, CASE "B" PER RCFC & WCD STD. DWG. NOS. CB100 & LD201	EA.	3
2	CONSTRUCT JUNCTION STRUCTURE NO. 2 PER RCFC & WCD STD. DWG. NO. JS227.	EA.	1
3	CONSTRUCT TRANSITION STRUCTURE NO. 1 PER RCFC & WCD STD. DWG. NO. TS301.	EA.	1
4	CONSTRUCT MANHOLE NO. 2 PER RCFC & WCD STD. DWG. NO. MH252.	EA.	2
5	CONSTRUCT MANHOLE NO. 4 PER RCFC & WCD STD. DWG. NO. MH254.	EA.	1
6	INSTALL REINFORCED CONCRETE PIPE PER RCFC & WCD SPEC'S.		
	42" RCP (1350-D)	L.F.	600
	30" RCP (1350-D)	L.F.	70.57
	24" RCP (CLASS - IV)	L.F.	77.60
	18" RCP (CLASS-IV)	L.F.	36.40
7	PROVIDE SANITARY SEWER PROTECTION PER RCFC STD. DWG 807	EA.	11
4	CONSTRUCT MANHOLE NO. 3 PER RCFC & WCD STD. DWG. NO. MH253.	EA.	1

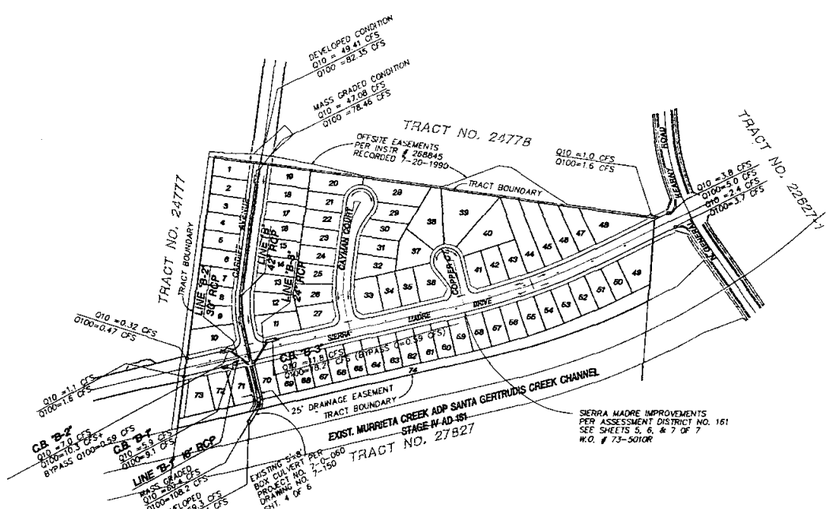

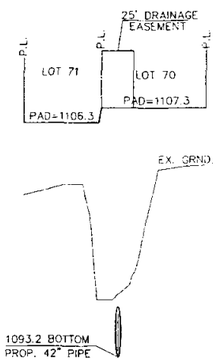

SECTION AT STA. 11+00.00

1 inch = 50 ft HORIZONTAL
1 inch = 5 ft VERTICAL

GENERAL NOTES (RCFC & WCD):

1. THE CONTRACTOR SHALL CONSTRUCT THE FLOOD CONTROL IMPROVEMENTS SHOWN ON THE DRAWINGS IN CONFORMANCE WITH THE REQUIREMENTS OF THE RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT'S SPECIAL MOU STANDARD DATED SEPTEMBER, 1984, AND DESIGN MANUAL STANDARD DRAWINGS DATED MAY, 1971.
2. THE ENCROACHMENT PERMIT IS REQUIRED FROM RIVERSIDE COUNTY FLOOD CONTROL, THEN CONTACT ED LOTZ AT (909)955-1266. AFTER THE PERMIT IS ISSUED, THE DISTRICT MUST BE NOTIFIED ONE WEEK PRIOR TO CONSTRUCTION.
3. CONSTRUCTION INSPECTION WILL BE PERFORMED BY RIVERSIDE COUNTY FLOOD CONTROL. CONTACT CLYDE JOHNSON AT (909) 955-1288. THE DISTRICT MUST BE NOTIFIED TWO WEEKS PRIOR TO CONSTRUCTION.
4. ALL STATIONING REFERS TO CENTERLINE OF CONSTRUCTION UNLESS OTHERWISE NOTED.
5. STATIONING FOR LATERALS AND CONNECTOR PIPE REFER TO THE CENTERLINE-CENTERLINE INTERSECTION STATION.
6. FORTY-EIGHT HOURS BEFORE EXCAVATION, CALL UNDERGROUND SERVICE ALERT 1-800-227-2600
7. ALL ELEVATIONS SHOWN ARE IN FEET AND DECIMALS THEREOF BASED ON U.S.C. & G.S. DATUM.
8. ALL CROSS-SECTIONS ARE TAKEN LOOKING DOWNSTREAM.
9. ELEVATIONS OF UTILITIES ARE APPROXIMATE UNLESS OTHERWISE NOTED.
10. OPENINGS RESULTING FROM CUTTING OR PARTIAL REMOVAL OF EXISTING CULVERTS, PIPES OR SIMILAR STRUCTURES TO BE ABANDONED SHALL BE SEALED WITH 6" OF CLASS "B" CONCRETE.
11. BEDDING PIPE WITH LESS THAN TWO FEET OF COVER SHALL CONFORM TO LOS ANGELES COUNTY FLOOD CONTROL DISTRICT STANDARD DRAWINGS 2-D213.3 AND D-D177 FOR CONCRETE BACKFILL IN TRENCHES. ALL OTHER PIPE SHALL CONFORM TO RCFC & WCD STD. M815.
12. B1 INDICATES SOIL BORING LOCATIONS BASED ON SOILS REPORT DATED JANUARY 10, 1996 BY GEOTECHNICAL & ENVIRONMENTAL ENGINEERS. LOCATIONS SHOWN ARE APPROXIMATE.
13. "V" IS THE DEPTH OF INLET OF CATCH BASIN MEASURED FROM THE TOP OF CURB TO INVERT OF CONNECTOR PIPE.
14. CATCH BASINS SHALL BE LOCATED SO THAT LOCAL DEPRESSION SHALL BEGIN AT EXISTING CURB RETURN JOINT, UNLESS OTHERWISE SPECIFIED.
15. ALL CURBS, GUTTER, SIDEWALKS,DRIVEWAYS AND OTHER EXISTING IMPROVEMENTS TO BE RECONSTRUCTED IN KIND AND AT THE SAME ELEVATION AND LOCATION AS THE EXISTING IMPROVEMENTS UNLESS OTHERWISE NOTED.
16. PIPE CONNECTED TO THE MAINLINE PIPE SHALL CONFORM TO JUNCTION STUCTURE NO. 4 (JS 229) UNLESS OTHERWISE NOTED.

ENGINEER'S NOTE:

CONTRACTOR AGREES THAT HE SHALL ASSUME SOLE AND COMPLETE RESPONSIBILITY FOR JOB SITE CONDITIONS DURING THE COURSE OF CONSTRUCTION OF THIS PROJECT, INCLUDING SAFETY OF ALL PERSONS AND PROPERTY; THAT THIS REQUIREMENT SHALL APPLY CONTINUOUSLY AND NOT BE LIMITED TO NORMAL WORKING HOURS; AND THAT THE CONTRACTOR SHALL DEFEND, INDEMNIFY AND HOLD THE CITY AND ENGINEER HARMLESS FROM ANY AND ALL LIABILITY, REAL OR ALLEGED IN CONNECTION WITH THE PERFORMANCE OF WORK ON THIS PROJECT, EXCEPT FOR LIABILITY ARISING FROM THE SOLE NEGLIGENCE OF THE OWNER OR THE ENGINEER.

THE EXISTENCE AND LOCATION OF ANY UNDERGROUND UTILITIES OR STRUCTURES SHOWN ON THESE PLANS ARE OBTAINED BY A DILIGENT SEARCH OF ALL AVAILABLE RECORDS. THE CONTRACTOR IS REQUIRED TO TAKE ALL PRECAUTIONARY MEASURES TO PROTECT THE UTILITIES SHOWN AND ANY OTHER LINES OR STRUCTURES SHOWN OR NOT SHOWN ON THESE PLANS, AND IS RESPONSIBLE FOR THE PROTECTION OF, AND ANY DAMAGE TO THESE LINES OR STRUCTURES.

THE PRIVATE ENGINEER SIGNING THESE PLANS IS RESPONSIBLE FOR ASSURING THE ACCURACY OF DESIGN AND ACCEPTABILITY OF THE WORK HEREON. IN THE EVENT OF DISCREPANCIES ARISING AFTER CITY APPROVAL OR DURING CONSTRUCTION, THE PRIVATE ENGINEER SHALL BE RESPONSIBLE FOR DETERMINING AN ACCEPTABLE SOLUTION AND REVISING THE PLANS FOR APPROVAL BY THE CITY.

BENCHMARK DESCRIPTION:

RIVERSIDE COUNTY BENCHMARK T-46-81
2-1/2" BRASS DISK IN CONCRETE BRIDGE WALL LOCATED FROM THE INTERSECTION OF RANCHO CALIFORNIA ROAD AND FRONT STREET 1.7 MILES NW ON FRONT STREET-JEFFERSON AVENUE AND WINCHESTER ROAD (HIGHWAY 79), 2.0 MILES NE ON WINCHESTER ROAD (HIGHWAY 79) TO A BRIDGE OVER THE TUCALOTA CREEK AND SANTA GERTRUDIS CREEK FORK. IN THE SE WING WALL, 6' SE CORNER OF BRIDGE ABUTMENT, 3' E OF STEEL GUARD RAIL, 19' N OF TELEPHONE SERVICE BOX.
ADJ. DATE: 9-13-82 ELEV. 1091.074

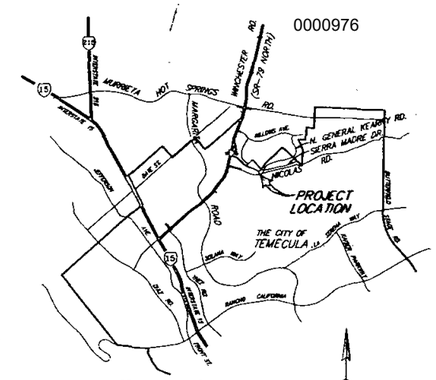

SEC 19 & 30, T7S R2W & 3W SBBM

VICINITY MAP
NOT TO SCALE

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R.C.F.C.& W.C.D. STANDARD DRAWINGS

CB100 CATCH BASIN NO. 1
LD201 LOCAL DEPRESSION NO. 2
MH252 MANHOLE NO. 2
MH253 MANHOLE NO. 3
MH254 MANHOLE NO. 4
JS227 JUNCTION STRUCTURE NO. 2
TS301 TRANSITION STRUCTURE NO. 1
M807 SANITARY SEWER PROTECTION

NOTICE:

THE CONTRACTOR SHALL NOTIFY THE CITY (OR DISTRICT, AS APPROPRIATE) IN WRITING A MINIMUM OF TWO WEEKS BEFORE BEGINNING CONSTRUCTION, AND SHALL NOT BEGIN CONSTRUCTION BEFORE OBTAINING AUTHORIZATION TO PROCEED.

UNDERGROUND STRUCTURES:

ALL UNDERGROUND UTILITIES OR STRUCTURE REPORTED BY THE OWNER OR OTHERS AND THOSE SHOWN ON THE RECORDS EXAMINED ARE INDICATED WITH THEIR APPROXIMATE LOCATION AND EXTENT. THE OWNER BY ACCEPTING THESE PLANS OR PROCEEDING WITH IMPROVEMENTS PURSUANT THERETO AGREES TO ASSUME LIABILITY AND TO HOLD UNDERSIGNED HARMLESS FOR ANY DAMAGES RESULTING FROM THE EXISTENCE OF UNDERGROUND UTILITIES OR STRUCTURES NOT REPORTED TO THE UNDERSIGNED; NOT INDICATED ON THE PUBLIC RECORDS EXAMINED; LOCATED AT VARIANCE WITH THAT REPORTED OR SHOWN ON RECORDS EXAMINED; THE CONTRACTOR IS REQUIRED TO TAKE DUE PRECAUTIONARY MEASURES TO PROTECT THE UTILITIES OR STRUCTURE SHOWN AND ANY OTHER UTILITIES OR STRUCTURES FOUND AT THE SITE. IT SHALL BE THE CONTACTOR'S RESPONSIBILITY TO NOTIFY THE OWNERS OF THE UTILITIES OR STRUCTURES CONCERNED BEFORE STARTING WORK.

UNAUTHORIZED CHANGES & USES:

CAUTION: THE ENGINEER PREPARING THESE PLANS WILL NOT BE RESPONSIBLE FOR, OR LIABLE FOR, UNAUTHORIZED CHANGES TO OR USES OF THESE PLANS. ALL CHANGES TO THE PLANS MUST BE IN WRITING AND MUST BE APPROVED BY THE PREPARER OF THESE PLANS.

CALIFORNIA COUNCIL OF CIVIL ENGINEERS & LAND SURVEYORS

IP 990046

MAINTENANCE NOTE:

THE FOLLOWING ITEMS ARE TO BE INSPECTED AND MAINTAINED BY RCFC&WCD:

42" RCP - CARDIFF AVENUE STORM DRAIN LINE "B" FROM STA. 10+73.52 TO STA. 17+12.20 AS SHOWN ON SHEET NO. 2

ALL MANHOLES AND OTHER STRUCTURES REQUIRED TO COMPLETE THE CONSTRUCTION OF THE ABOVE MENTIONED MAINLINE PIPE.

INDEX MAP

GRAPHIC SCALE
200 0 100 200 400 600
(IN FEET)
1 inch = 200 ft.

REGISTERED PROFESSIONAL ENGINEER WON SANG YOO No 26457 Exp 3-31-04 CIVIL STATE OF CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER RICHARD L. VALDEZ No 48060 Exp 12-31-03 CIVIL STATE OF CALIFORNIA

AS BUILT
APPROVED BY: RICHARD VALDEZ
DATE 9-25-2003

Underground Service Alert	SEAL:	TRANS-PACIFIC CONSULTANTS	BENCHMARK:	REVISIONS	RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT	County of Riverside	SANTA GERTRUDIS VALLEY CARDIFF AVE. STORM DRAIN LINE B TRACT NO. 28924 TITLE SHEET	PROJECT NO. 7-0-0188
Call: TOLL FREE 1-800 227-2600 TWO WORKING DAYS BEFORE YOU DIG	REGISTERED PROFESSIONAL ENGINEER WON SANG YOO No. 26457 Exp. 03-31-00 CIVIL STATE OF CALIFORNIA	27431 ENTERPRISE CIRCLE WEST TEMECULA, CALIFORNIA 92590 TEL. (909) 676-7000	SEE SHEET NO. 1	1 AS-BUILT (NO REVISION) BY 9.25.03	RECOMMENDED FOR APPROVAL BY: PLANNING ENGINEER DATE: 5/12/00	APPROVED BY: CHIEF ENGINEER DATE: 5/4/00	APPROVED BY: FOR TRANSPORTATION DEPARTMENT RIVERSIDE COUNTY, CALIF. DATE: 4/13/03	DRAWING NO. 7-306
		SUBMITTED BY: DATE: 3/27/00		REF. DESCRIPTION APPR. APPR. DATE				SHEET NO. 1 OF 2

REGISTERED CIVIL ENGINEER NO. 26457 Expires 03-31-00

RIVERSIDE COUNTY FLOOD CONTROL
AND
WATER CONSERVATION DISTRICT

0000977

GENERAL NOTES

1. THE CONTRACTOR SHALL CONSTRUCT THE FLOOD CONTROL IMPROVEMENTS SHOWN ON THE DRAWINGS IN CONFORMANCE WITH THE REQUIREMENTS OF THE RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT'S SPECIFICATIONS DATED SEPTEMBER 1984, AND DESIGN MANUAL STANDARD DRAWINGS DATED MAY 1971.
2. IF AN ENCROACHMENT PERMIT IS REQUIRED FROM THE RIVERSIDE COUNTY FLOOD CONTROL, CONTACT ED LOTZ AT (909) 955-1266. AFTER THE PERMIT IS ISSUED THE DISTRICT MUST BE NOTIFIED 20 DAYS PRIOR TO CONSTRUCTION.
3. CONSTRUCTION INSPECTION WILL BE PERFORMED BY RIVERSIDE COUNTY FLOOD CONTROL. CONTACT DALE ANDERSON AT (909) 955-1288. THE DISTRICT MUST BE NOTIFIED TWO WEEKS PRIOR TO CONSTRUCTION.
4. ALL STATIONS REFER TO CENTERLINE OF CONSTRUCTION UNLESS OTHERWISE NOTED.
5. STATIONING FOR LATERALS AND CONNECTOR PIPE REFER TO THE CENTER LINE CENTERLINE INTERSECTION STATION.
6. FORTY-EIGHT HOURS BEFORE EXCAVATION, CALL UNDERGROUND SERVICE ALERT 1-800-422-4133
7. ALL ELEVATIONS SHOWN ARE IN FEET AND DECIMALS THEREOF BASED ON U.S.C. & G.S. DATUM.
8. ALL CROSS-SECTIONS ARE TAKEN LOOKING DOWNSTREAM.
9. ELEVATIONS OF UTILITIES ARE APPROXIMATE UNLESS OTHERWISE NOTED.
10. OPENINGS RESULTING FROM CUTTING OR PARTIAL REMOVAL OF EXISTING CULVERTS, PIPES OR SIMILAR STRUCTURES TO BE ABANDONED SHALL BE SEALED WITH 6" OF CLASS "B" CONCRETE.
11. PIPE CONNECTED TO THE MAINLINE PIPE SHALL CONFORM TO THE JUNCTION STRUCTURE NO. 4 (JS-229) UNLESS OTHERWISE NOTED.
12. BEDDING PIPE SHALL CONFORM TO RCFC&WCD STD. MB15, EXCEPT FOR COVER < 2 FEET. FOR COVER < 2 FEET, CONCRETE SLURRY (2000 PSI - 2 SACK) SHALL BE USED. THE ENTIRE TRENCH SHALL BE SLURRY EXTENDING 4 INCHES MINIMUM AND 12 INCHES MAXIMUM ABOVE THE TOP OF THE PIPE.
13. "V" IS THE DEPTH OF INLET OF CATCH BASINS MEASURED FROM THE TOP OF CURB TO INVERT OF CONNECTOR PIPE.
14. CATCH BASINS SHALL BE LOCATED SO THAT LOCAL DEPRESSION SHALL BEGIN AT EXISTING CURB RETURN JOINT, UNLESS OTHERWISE SPECIFIED.
15. ALL CURBS, GUTTERS, SIDEWALKS, DRIVEWAYS AND OTHER EXISTING IMPROVEMENTS TO BE RECONSTRUCTED IN KIND AND AT THE SAME ELEVATION AND LOCATION AS THE EXISTING IMPROVEMENTS UNLESS OTHERWISE NOTED.
16. LOCATIONS OF PUBLIC UTILITIES SHOWN HAVE BEEN DETERMINED FROM AVAILABLE INFORMATION. HOWEVER, IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO DETERMINE THE TRUE LOCATION OF ANY EXISTING UTILITIES AND TO EXERCISE PROPER PRECAUTIONS TO AVOID INJURY AND DAMAGE THERETO.
17. A SOILS INVESTIGATION DATED OCTOBER 25, 2000, PREPARED BY GEO TEK, INC. SHALL BE INCLUDED AS A PART OF THESE PLANS. ALL WORK SHALL CONFORM TO RECOMMENDATIONS AS OUTLINED IN SAID REPORT.
18. B-1 INDICATES SOIL BORING LOCATIONS BASED ON THE SOILS REPORT PREPARED BY GEO TEK, INC. DATED OCT. 5, 2000. LOCATIONS SHOWN ARE APPROXIMATE.

NOTIFICATIONS

THE CONTRACTOR SHALL NOTIFY THE FOLLOWING UTILITIES OR AGENCIES 48 HOURS PRIOR TO STARTING CONSTRUCTION OR EXCAVATION:

RIVERSIDE COUNTY FLOOD CONTROL & WATER CONSERVATION DISTRICT	(909) 955-1200
RIVERSIDE COUNTY TRANSPORTATION DEPARTMENT	(909) 955-6740
GENERAL TELEPHONE COMPANY	(909) 929-9494
VALLEY WIDE PARKS & RECREATION DISTRICT	(909) 654-1505
SOUTHERN CALIFORNIA GAS COMPANY	(909) 335-7744
SOUTHERN CALIFORNIA EDISON COMPANY	(909) 820-5588
EASTERN MUNICIPAL WATER DISTRICT	(909) 928-3777

MAINTENANCE NOTES:

- DISTRICT ACCEPTS SOLE OWNERSHIP AND SOLE RESPONSIBILITY FOR MAINTENANCE OF CHANNEL'S LINE, GRADE AND STRUCTURAL ELEMENTS IN ACCORDANCE WITH THE AGREEMENT BETWEEN THE DISTRICT, COUNTY, VALLEY WIDE AND BARRATT AMERICAN, INC.
- VALLEY WIDE RECREATION AND PARK DISTRICT ACCEPTS SOLE RESPONSIBILITY FOR THE OPERATION AND MAINTENANCE OF THE NON-STRUCTURAL ELEMENTS OF CHANNEL, INCLUDING BUT NOT LIMITED TO REMOVAL OF TRASH AND DEBRIS, MAINTAINING PUBLIC TRAILS, PATHWAYS AND ACCESS ROADS IN SAFE CONDITION, AND PERFORMING GRAFFITI REMOVAL AND VEGETATION CONTROL INCLUDING ALL NECESSARY MOWING, CUTTING AND WEED ABATEMENT OUTSIDE OF THE MITIGATION AREA IN ACCORDANCE WITH THE AGREEMENT BETWEEN DISTRICT, VALLEY WIDE AND BARRATT AMERICAN, INC.
- US ARMY CORPS OF ENGINEERS (ACOE) 404 PERMIT NO. 199916311-ESL WILL APPLY AND MAY RESTRICT CERTAIN CHANNEL MAINTENANCE ACTIVITIES.

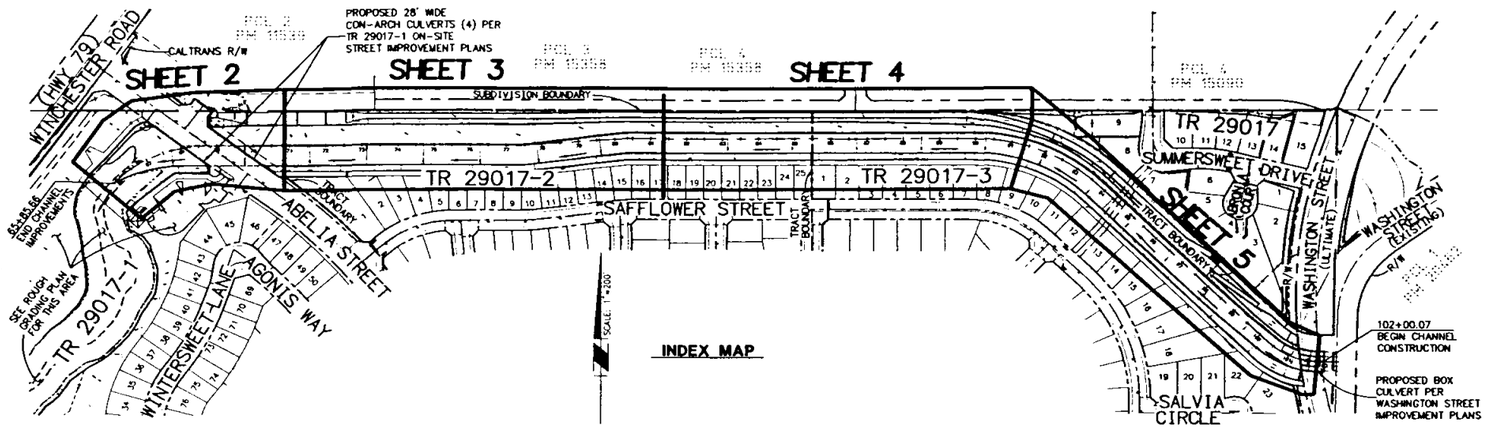

INDEX MAP

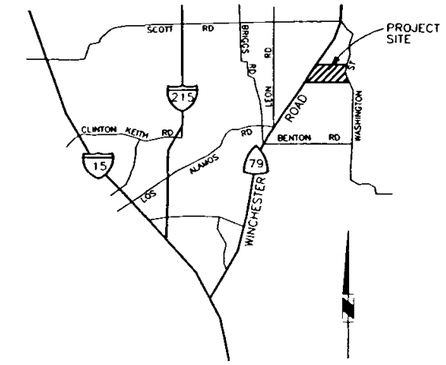

VICINITY MAP
NOT TO SCALE
SECTION 28 TOWNSHIP 6 SOUTH RANGE 2 WEST

R.C.F.C.D. STANDARD DRAWING NO's

CH 326 6" CONCRETE CHANNEL LINING
M 801 CHAIN LINK FENCE
CH 330 MAINTENANCE RAMP

NOTICE TO CONTRACTOR

THE LOCATIONS OF EXISTING UNDERGROUND UTILITIES ARE SHOWN IN AN APPROXIMATE WAY ONLY AND HAVE NOT BEEN INDEPENDENTLY VERIFIED BY THE OWNER OR ITS REPRESENTATIVE. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION OF ALL EXISTING UTILITIES BEFORE COMMENCING WORK, AND AGREES TO BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH MIGHT BE OCCASIONED BY THE CONTRACTOR'S FAILURE TO EXACTLY LOCATE AND PRESERVE ANY AND ALL UNDERGROUND UTILITIES.

IT IS THE CONTRACTORS RESPONSIBILITY TO CONTACT UNDERGROUND SERVICE ALERT (PHONE: 1-800-422-4133) 48 HOURS IN ADVANCE OF ANY EXCAVATION FOR THE MARK-OUT OF THE LOCATION OF UTILITIES AND NOTIFICATION OF COMMENCEMENT OF WORK.

CONTRACTOR WILL MAKE EXPLORATION EXCAVATIONS AND LOCATE EXISTING UNDERGROUND FACILITIES SUFFICIENTLY AHEAD OF CONSTRUCTION TO PERMIT REVISIONS TO PLANS IF REVISIONS ARE NECESSARY. NOTIFY THE ENGINEER OF WORK IF ANY DISCREPANCIES IN UTILITY LINE LOCATIONS ARE FOUND.

LOCATION AND ELEVATION OF IMPROVEMENTS TO BE MET BY WORK TO BE DONE SHALL BE CONFIRMED BY FIELD MEASUREMENTS PRIOR TO CONSTRUCTION OF NEW WORK.

CONTRACTOR IS REQUIRED TO TAKE PRECAUTIONARY MEASURES TO PROTECT THE UTILITY LINES SHOWN HEREON AND ANY OTHER EXISTING LINES NOT OF RECORD OR NOT SHOWN ON THESE PLANS.

CONTRACTOR AGREES THAT HE SHALL ASSUME SOLE ANY COMPLETE RESPONSIBILITY FOR JOB SITE CONDITIONS DURING THE COURSE OF CONSTRUCTION OF THIS PROJECT, INCLUDING SAFETY OF ALL PERSONS AND PROPERTY; THAT THIS REQUIREMENT SHALL APPLY CONTINUOUSLY AND NOT BE LIMITED TO NORMAL WORKING HOURS; AND THAT THE CONTRACTOR SHALL DEFEND, INDEMNIFY AND HOLD THE OWNER AND THE ENGINEER HARMLESS FROM ANY AND ALL LIABILITY, REAL OR ALLEGED, IN CONNECTION WITH THE PERFORMANCE OF WORK ON THIS PROJECT, EXCEPTING FOR LIABILITY ARISING FROM THE SOLE NEGLIGENCE OF THE OWNER OR THE ENGINEER.

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STA. 70+85.63 TO STA. 81+35.63, PLAN AND PROFILE	3
STA. 81+35.63 TO STA. 91+35.63, PLAN AND PROFILE	4
STA. 91+35.63 TO STA. 102+00.07, PLAN AND PROFILE	5

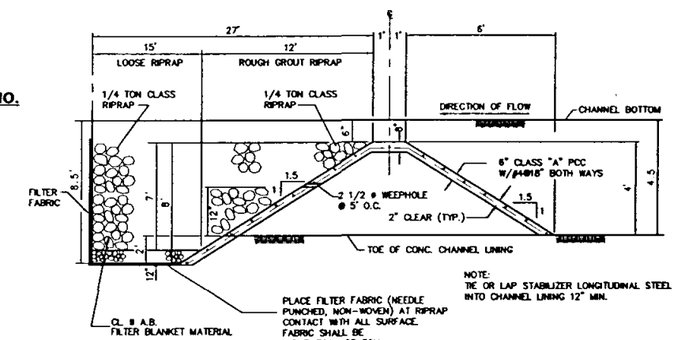

② STABILIZER DETAIL
NOT TO SCALE

LEGEND

	SUBDIVISION BOUNDARY
℄	CHANNEL CENTERLINE
	2:1 SIDE SLOPE
1400	FINISHED CONTOUR
	EXISTING CONTOUR
SD	STORM DRAIN
VIF	VERIFY IN FIELD
W	PROPOSED WATER LINE
	PROPOSED SEWER LINE
	6" CONCRETE CHANNEL LINING
	RIP RAP
	CHAINLINK FENCE

CONSTRUCTION NOTES AND ESTIMATED QUANTITIES

NO.	DESCRIPTION OF ITEM	UNIT	AMOUNT
1	CONSTRUCT CONC. LINED CHANNEL PER R.C.F.C. STD. CH 326 AND DETAIL HEREON	CY	1,860
2	CONST. STABILIZER PER DETAIL HEREON	CY	211
3	INSTALL CHAIN LINK FENCE PER R.C.F.C. STD. M-801, OR AS INDICATED ON PLAN	LF	6,260
4	CONSTRUCT MAINTENANCE RAMP PER R.C.F.C. STD. CH 330 WITH 6" THICK CONCRETE LINING	SF	1,800
5	CONSTRUCT 3" CL. 2 BASE OVER 90% COMPACTED SOIL	SF	95,600
6	INSTALL 2.5" THICK 150 lb (D50) RIPRAP CHANNEL LINING PER DETAILS ON PLAN (90,000 SF @ 2.5" THICK) (OR USE 1/4 TON RIPRAP AS AN ALTERNATE)	CY	8,300
6B	INSTALL 1/4 TON RIPRAP CHANNEL LINING PER DETAILS ON PLAN (7,200 SF @ 3.5' THICK)	CY	980
7	CONSTRUCT MODIFIED DRAINAGE APRON FOR ACCESS ROAD PER RCFCD STD CH-333	SF	13,600
8	CONSTRUCT RETAINING WALL PER SEPERATE PERMIT	LF	284
9	CONSTRUCT COLLECTOR DITCH PER DETAIL ON SHEET 5	LF	1,043
10	INSTALL 8" PVC DRAIN PIPE SCHEDULE 40	LF	54

2

BASIS OF BEARING

THE BEARINGS ON THIS PLAN ARE BASED ON THE LINE BETWEEN STATIONS "TRAK" AND "MATH" (POSITIONS PER NATIONAL GEODETIC SURVEY, NAD83, EPOCH 1995.5) AS SHOWN ON THE MAP FILED IN BOOK 102, PAGES 50 THROUGH 65 OF RECORDS OF SURVEYS IN THE OFFICE OF THE COUNTY RECORDER OF RIVERSIDE COUNTY, CALIFORNIA, BEING N 52°49'02.84" E.

AS BUILT
APPROVED BY: [signature]
DATE 10/20/05

THE CONTRACTOR IS ADVISED TO PERPARE HIS OWN ESTIMATES OF EARTHWORK FOR THE PURPOSES OF BIDDING, CONTRACT AND CONSTRUCTION.

"AS BUILT" HR

DIGALERT
DIAL TOLL FREE
1-800-227-2600
AT LEAST TWO DAYS BEFORE YOU DIG
UNDERGROUND SERVICE ALERT OF SOUTHERN CALIFORNIA

UNAUTHORIZED CHANGES & USES

CAUTION - THE ENGINEER PREPARING THESE PLANS WILL NOT BE RESPOSIBLE FOR, OR LIABLE FOR, UNAUTHORIZED CHANGES TO OR USES OF THESE PLANS. ALL CHANGES TO THE PLANS MUST BE IN WRITING AND MUST BE APPROVED BY THE PREPARER OF THESE PLANS.

OWNER

BARRATT AMERICAN INCORPORATED
2035 CORTE DEL NOGAL
SUITE 160
CARLSBAD, CA 92009
(760) 431-0800

BENCHMARK ELEV. 1,339.04

RIVERSIDE COUNTY BM 1-49-81, 2.5" BRASS DISK IN CONC. CYLINDER LOCATED AS FOLLOWS: FROM THE INT. OF RANCHO CA RD & FRONT ST. 1.7 MI NW ON FRONT ST./JEFFERSON AVE. TO THE INT. OF JEFFERSON & WINCHESTER RD (HWY 79). 5.5 MILES NE ON WINCH RD (HWY 79) TO THE INT. OF WINCH. AND BENTON RD. .05 MI W ON BENTON RD TO THE BENTON/BRIGGS ROAD INT., .03 MI N ON BRIGGS RD TO THE BRIGGS/THOMPSON RD INT., 200' E. OF THE INT., 22' S. OF THE C/L THOMPSON RD. NEAR THE NW COR OF 16" x 22" CHAIN LINK FENCE AROUND SOUTHERN CAL. GAS CO. VALVES WIRE@ PADDLE MARKED TO FENCE.

NOTE:
WORK CONTAINED WITHIN THESE PLANS SHALL NOT COMMENCE UNTIL AN ENCROACHMENT PERMIT AND/OR A GRADING PERMIT HAS BEEN ISSUED.
The private engineer signing these plans is responsible for verifying the accuracy and acceptability of the design hereon. In the event of discrepancies or arising after county approval of grading construction, the private engineer shall be responsible for determining an acceptable solution and reviewing the plans approved by the county.

REGISTERED PROFESSIONAL ENGINEER JOHN D. TANNER No 60132 Exp. 06/30/04 CIVIL STATE OF CALIFORNIA

RBF CONSULTING
PLANNING ■ DESIGN ■ CONSTRUCTION
27555 YNEZ ROAD, SUITE 400
TEMECULA, CALIFORNIA 92591-4679
909 676 8042 • FAX 909 676 7240 • www.RBF.com
PREPARED BY: JOHN D. TANNER, RCE
EXP. DATE: 6-30-04
RCE NO. 60132
DATE: 11/5/02

REVISIONS

	DESCRIPTION	APPR.	DATE	APPR.	DATE
1	REVISED LOT LINE @ LOTS 1 & 121 REMOVED RETAINING WALL	JT	2-5-03		
2	AS-BUILT - REVISED QUANTITIES (10-20-05)	JT	10/20/05		

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

RECOMMENDED FOR APPROVAL BY: [signature] PLANNING ENGINEER DATE: 12/10/02

APPROVED BY: [signature] CHIEF ENGINEER DATE: 12/10/02

SEAL - COUNTY: REGISTERED PROFESSIONAL ENGINEER DALE A. DRAKE No. 33950 Exp. 6-30-06 CIVIL STATE OF CALIFORNIA

COUNTY OF RIVERSIDE
RECOMMENDED BY: DATE:
APPROVED BY: [signature] 12/9/02
KHALED A. OTHMAN DATE
R.C.E. NO. 33950 EXP. 6-30-06
TRANSPORTATION DEPARTMENT
COUNTY OF RIVERSIDE

WARM SPRINGS VALLEY-
FRENCH VALLEY CHANNEL
PLAN & PROFILE
FOR
TR 29017, 29017-1, 29017-2 & 29017-3
TITLE SHEET
FOR BARRATT AMERICAN HOMES

PROJECT NO. 7-0-0205
DRAWING NO. 7-352
SHEET NO. 1 OF 5

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
LUSHING PROPERTY- TRACT NO. 29017

0000978

THIS DESIGN REFLECTS THE CRITERIA WITHIN THE FOLLOWING TTM 29017 CONDITIONS:
10.FLOOD RI. 1 "MAP 10 YR CURB - 100 YR ROW"
10.FLOOD RI. 2 "MAP 100 YR SUMP OUTLET"

GENERAL NOTES

1. THE CONTRACTOR SHALL CONSTRUCT THE FLOOD CONTROL IMPROVEMENTS SHOWN ON THE DRAWINGS IN CONFORMANCE WITH THE REQUIREMENTS OF THE RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT'S SPECIFICATIONS DATED SEPTEMBER 1984, AND DESIGN MANUAL STANDARD DRAWINGS DATED MAY 1971.
2. IF AN ENCROACHMENT PERMIT IS REQUIRED FROM RIVERSIDE COUNTY FLOOD CONTROL, THEN CONTACT ED LOTZ AT (909) 955-1266. AFTER THE PERMIT IS ISSUED THE DISTRICT MUST BE NOTIFIED ONE WEEK PRIOR TO CONSTRUCTION.
3. CONSTRUCTION INSPECTION WILL BE PERFORMED BY RIVERSIDE COUNTY FLOOD CONTROL. CONTACT DALE ANDERSON AT (909) 955-1288. THE DISTRICT MUST BE NOTIFIED TWO WEEKS PRIOR TO CONSTRUCTION.
4. ALL STATIONS REFERS TO CENTERLINE OF CONSTRUCTION UNLESS OTHERWISE NOTED.
5. STATIONING FOR LATERALS AND CONNECTOR PIPE REFER TO THE CENTER LINE CENTERLINE INTERSECTION STATION.
6. FORTY-EIGHT HOURS BEFORE EXCAVATION, CALL UNDERGROUND SERVICE ALERT 1-800-227-2600
7. ALL ELEVATIONS SHOWN ARE IN FEET AND DECIMALS THEREOF BASED ON U.S.C. & G.S. DATUM.
8. ELEVATIONS OF UTILITIES ARE APPROXIMATE UNLESS OTHERWISE NOTED.
9. OPENINGS RESULTING FROM CUTTING OR PARTIAL REMOVAL OF EXISTING CULVERTS, PIPES OR SIMILAR STRUCTURES TO BE ABANDONED SHALL BE SEALED WITH 6" OF CLASS "B" CONCRETE.
10. BEDDING PIPE WITH LESS THAN TWO FEET OF COVER SHALL CONFORM TO LOS ANGELES COUNTY FLOOD CONTROL DISTRICT STANDARD DRAWINGS 2-D213.3. AND 2-0177 FOR CONCRETE BACKFILL IN TRENCHES. ALL OTHER PIPE SHALL CONFORM TO RCFC & WCD STD. DWG. M815.
11. ALL CROSS-SECTIONS ARE TAKEN LOOKING DOWNSTREAM.
12. ALL CURBS, GUTTERS, SIDEWALKS, DRIVEWAYS AND OTHER EXISTING IMPROVEMENTS TO BE RECONSTRUCTED IN KIND AND AT THE SAME ELEVATION AND LOCATION AS THE EXISTING IMPROVEMENTS UNLESS OTHERWISE NOTED.
13. "V" IS THE DEPTH OF INLET OF CATCH BASINS MEASURED FROM THE TOP OF CURB TO INVERT OF CONNECTOR PIPE.
14. CATCH BASINS SHALL BE LOCATED SO THAT LOCAL DEPRESSION SHALL BEGIN AT EXISTING CURB RETURN JOINT, UNLESS OTHERWISE SPECIFIED.
15. ALL CURBS, GUTTERS, SIDEWALKS, DRIVEWAYS AND OTHER EXISTING IMPROVEMENTS TO BE RECONSTRUCTED IN KIND AND AT THE SAME ELEVATION AND LOCATION AS THE EXISTING IMPROVEMENTS UNLESS OTHERWISE NOTED.

ENGINEERS NOTE:

THE PRIVATE ENGINEER SIGNING THESE PLANS IS RESPONSIBLE FOR ASSURING THE ACCURACY OF DESIGN AND ACCEPTABILITY OF THE WORK HEREON. IN THE EVENT OF DISCREPANCIES ARISING AFTER COUNTY APPROVAL OR DURING CONSTRUCTION, THE PRIVATE ENGINEER SHALL BE RESPONSIBLE FOR DETERMINING AN ACCEPTABLE SOLUTION AND REVISING THE PLANS FOR APPROVAL BY THE COUNTY.

NOTICE TO THE CONTRACTOR

THE EXISTENCE AND LOCATION OF ANY UNDERGROUND UTILITY PIPES OR STRUCTURES SHOWN ON THESE PLANS ARE OBTAINED BY A SEARCH OF THE AVAILABLE RECORDS. APPROVAL OF THIS PLAN BY THE CITY OF TEMECULA, RIVERSIDE COUNTY FLOOD CONTROL DISTRICT, EASTERN MUNICIPAL WATER DISTRICT OR RANCHO CALIFORNIA WATER DISTRICT DOES NOT CONSTITUTE A REPRESENTATION AS TO THE ACCURACY OR COMPLETENESS OR THE EXISTENCE OR NON-EXISTENCE OF ANY UNDERGROUND UTILITY PIPE OR STRUCTURE WITHIN THE LIMITS OF THIS PROJECT. THE CONTRACTOR IS REQUIRED TO TAKE ALL DUE PRECAUTIONARY MEANS TO PROTECT THE UTILITY LINES NOT OF RECORD OR SHOWN ON THIS PLAN.

RCFCD & WCD STANDARD PLAN NOS.

CB100 CATCH BASIN NO. 1
MH251 MANHOLE NO. 1
MH252 MANHOLE NO. 2
MH253 MANHOLE NO. 3
MH254 MANHOLE NO. 4
M821 CONNECTOR PIPE COLLAR
JS227 JUNCTION STRUCTURE NO.2
JS231 JUNCTION STRUCTURE NO.6

RCTD STANDARD PLAN NOS.

STD PLAN NO. 311 GUTTER DEPRESSION

SHEET INDEX

	SHEET NO.
TITLE SHEET, GENERAL NOTES, CONSTRUCTION NOTES AND ESTIMATED QUANTITES	1
STORM DRAIN PLAN AND PROFILE- LINE "A" STA 1+97.88 TO STA. 13+00.00	2
STORM DRAIN PLAN AND PROFILE- LINE "A" STA 13+00.00 TO STA. 22+00.00	3
STORM DRAIN PLAN AND PROFILE- LINE "A" STA 22+00.00 TO STA. 34+00.00	4
STORM DRAIN PLAN AND PROFILE- LINE "A" STA 34+00.00 TO STA. 41+95.69 STORM DRAIN PLAN AND PROFILE- LINE "D" STA 5+00.00 TO STA. 8+34.76	5
STORM DRAIN PLAN AND PROFILE- LINE "C" STA 5+00.00 TO STA. 12+79.83 STORM DRAIN PLAN AND PROFILE- LINE "E" STA 10+00.00 TO STA. 13+80.93	6
STORM DRAIN PLAN AND PROFILE- LINE "B" STA 10+25.09 TO STA. 16+00.00 STORM DRAIN PLAN AND PROFILE- LINE "F" STA 10+00.00 TO STA. 13+20.25	7
STORM DRAIN PLAN AND PROFILE- LINE "B" STA 16+00.00 TO STA. 23+35.07	8
STORM DRAIN PLAN AND PROFILE- LINE "G" STA 10+00.00 TO STA. 13+23.87	9
STORM DRAIN LATERAL PROFILES LAT A1 THRU A9 LATS C1, D1, D2, E1, E2	10
LOCAL DEPRESSIONS 1	11
LOCAL DEPRESSIONS 2 AND MISC. DETAILS	12

CONSTRUCTION ESTIMATES

CONST. NOTE	ITEM	UNIT	QUANTITY
20	CONSTRUCT 18" RCP	LF	255
21	CONSTRUCT 24" RCP	LF	2476
22	CONSTRUCT 30" RCP	LF	632
23	CONSTRUCT 36" RCP	LF	578
24	CONSTRUCT 42" RCP	LF	587
27	CONSTRUCT 54" RCP	LF	2049
26	CONSTRUCT 83"(W) X 53"(H) PRE-CAST ELLIPTICAL PIPE	LF	1139
30	CONSTRUCT PIPE HEADWALL, PER CALTRANS STD PLAN NO. D89.	EA	1
31	CONSTRUCT GUTTER DEPRESSION PER RCTD STD NO.311.	EA	24
32	CONSTRUCT CURB OPENING CB NO. 1 PER RCFCD STD PLAN NO. CB100	EA	24
33	CONSTRUCT MH NO. 2 PER RCFCD STD PLAN NO. MH252	EA	3
34	CONSTRUCT MH NO. 4 PER RCFCD STD PLAN NO. MH254	EA	3
35	CONSTRUCT MH NO. 1 PER RCFCD PLAN NO. MH251	EA	10
37	CONSTRUCT MH NO. 3 PER RCFCD PLAN NO. MH253	EA	3
38	CONSTRUCT CONNECTOR PIPE COLLAR PER RCFCD & WCD STD PLAN NO. M821	EA	2
40	CONSTRUCT 10' X 10' RIPRAP PAD PER SHEET 12.	EA	3
42	CONSTRUCT CONCRETE OUTLET STRUCTURE, PER SHEET 9.	EA	1
43	CONSTRUCT J.S. NO.2 PER RCFCD & WCD STD PLAN NO.JS227.	EA	2
44	CONSTRUCT J.S. NO.6 PER RCFCD & WCD STD PLAN NO.JS231.	EA	2
45	CONSTRUCT PIPE CULVERT HEADWALL, PER CALTRANS STD PLAN NO. D90.	EA	1
46	CONSTRUCT CONCRET BACKFILL PER LACFCD STD DWG NO. 2-D213.3 AND 2-D177	LF	535
47	CONSTRUCT WINGWALL DETAL PER SHEET 12. PLAN NO. D90.	EA	1

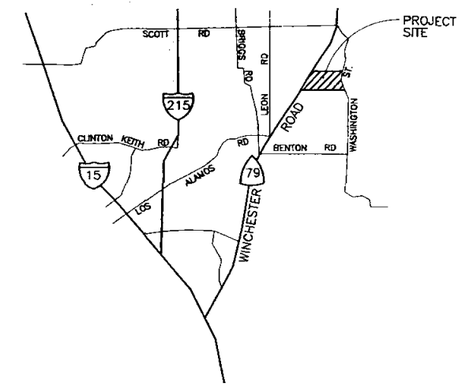

LOCATION MAP
N.T.S.
SECTION 28 - TOWN 6 SOUTH, RANGE 2 WEST

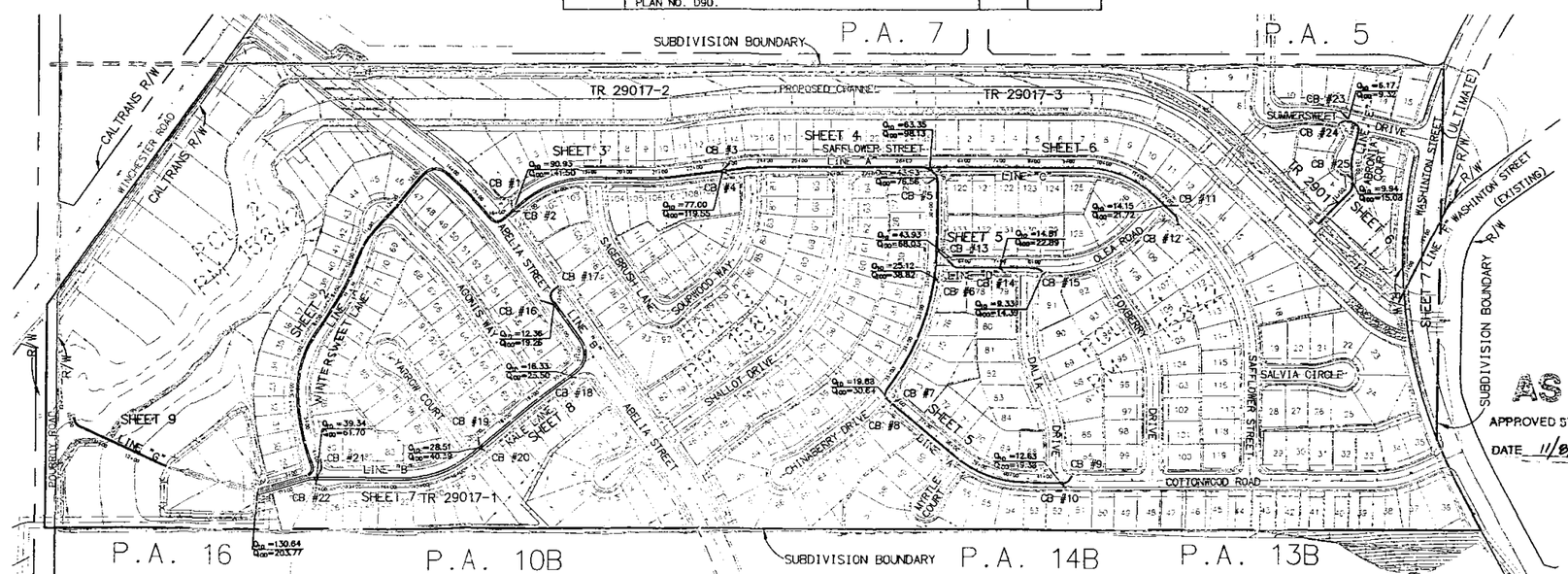

PROJECT SITE PLAN

SCALE: 1"=200'

TRACT NO. 29017-1, 2, 3 & FINAL

4R

IGALERT
DIAL TOLL FREE 1-800-227-2600
AT LEAST TWO DAYS BEFORE YOU DIG
UNDERGROUND SERVICE ALERT OF SOUTHERN CALIFORNIA

BENCHMARK: ELEV. 408.139m
RIVERSIDE COUNTY B.M. T-49-81, 2.5" BRASS DISK IN CONC. CYLINDER LOCATED AS FOLLOWS: FROM THE INT. OF RANCHO CA. RD. & FRONT ST. 1.7 MI. NW ON FRONT ST./JEFFERSON AVE. TO THE INT. OF JEFFERSON & WINCHESTER RD. (HWY 79), 5.5 MILES NE ON WINCH. RD. (HWY 79) TO THE INT. OF WINCH. AND BENTON RD., .05 MI. W. ON BENTON RD TO THE BENTON/BRIGGS ROAD INT. , 0.5 MI. N ON BRIGGS RD TO THE BRIGGS/THOMPSON RD INT. , 200' E. OF THE INT., 22' S. OF THE C/L THOMPSON RD. NEAR THE NW COR OF 18' x 22' CHAIN LINK FENCE AROUND SOUTHERN CAL. GAS CO. VALVES. WIRED PADDLE MARKED TO FENCE.

REGISTERED PROFESSIONAL ENGINEER ANDY WONG No. C59484 Exp. 12/2003 CIVIL STATE OF CALIFORNIA

RBF CONSULTING
PLANNING ▯ DESIGN ▯ CONSTRUCTION
27555 YNEZ ROAD SUITE 200
TEMECULA, CALIFORNIA 92591-4679
909.676.8042 • FAX 909.676.7240 • www.RBF.com
PREPARED BY: R.C.E. NO. C59484
EXP. DATE:
ANDY GONG DATE: 12/2003

REVISIONS				
REF	DESCRIPTION	APPR.	DATE	APPR.	DATE

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
RECOMMENDED FOR APPROVAL BY: Michael A. Romos PLANNING ENGINEER DATE: 12/9/02
APPROVED BY: David Fine CHIEF ENGINEER DATE: 12/10/02

COUNTY OF RIVERSIDE
RECOMMENDED BY: DATE: 9-17-02
APPROVED BY: KHALED A. OSMAN DATE 9/19/02
R.C.E. NO. 33950 EXP. 6-30-02
TRANSPORTATION DEPARTMENT
COUNTY OF RIVERSIDE

IP000-150, 151, 190, 191
WARM SPRINGS VALLEY
SAFFLOWER ST. AND KALE LN.
STORMDRAIN PLAN AND PROFILE
TITLE SHEET

PROJECT NO. 7-0-0203 7-0-0204
DRAWING NO. 7-349
SHEET NO. 1 OF 12

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

WARM SPRINGS VALLEY: POURROY ROAD STORM DRAIN STAGE 1

0000979

GENERAL NOTES

THE CONTRACTOR SHALL CONSTRUCT THE FLOOD CONTROL IMPROVEMENTS SHOWN ON THE DRAWINGS IN CONFORMANCE WITH THE REQUIREMENTS OF THE RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONVERSATION DISTRICT'S MEMORANDUM OF UNDERSTANDING STANDARD SPECIFICATIONS DATED SEPTEMBER 1984, AND DESIGN MANUAL STANDARD DRAWINGS DATED MAY 1971.

IF AN ENCROACHMENT PERMIT IS REQUIRED FROM RIVERSIDE COUNTY FLOOD CONTROL, THEN CONTACT ED LOTZ AT 909-955-1266. AFTER THE PERMIT IS ISSUED THE DISTRICT MUST BE NOTIFIED ONE WEEK PRIOR TO CONSTRUCTION.

CONSTRUCTION INSPECTION WILL BE PERFORMED BY RIVERSIDE COUNTY FLOOD CONTROL. CONTACT DALE ANDERSON AT 909-955-1288. THE DISTRICT MUST BE NOTIFIED TWENTY DAYS PRIOR TO CONSTRUCTION.

ALL STATIONING REFERS TO CENTERLINE OF CONSTRUCTION UNLESS OTHERWISE NOTED.

STATIONING FOR LATERALS AND CONNECTOR PIPE REFER TO THE CENTERLINE-CENTERLINE INTERSECTION STATION.

FORTY-EIGHT HOURS BEFORE EXCAVATION, CALL UNDERGROUND SERVICE ALERT 1-800-227-2600.

ALL ELEVATIONS SHOWN ARE IN FEET AND DECIMALS THEREOF BASED ON U.S.C. & G.S. DATUM.

ALL CROSS SECTIONS ARE TAKEN LOOKING DOWNSTREAM.

ELEVATIONS AND LOCATIONS OF UTILITIES SHOWN ARE APPROXIMATE UNLESS OTHERWISE NOTED. ALL UTILITIES ARE TO BE PROTECTED IN PLACE UNLESS OTHERWISE NOTED.

OPENINGS RESULTING FROM THE CUTTING OR PARTIAL REMOVAL OF EXISTING CULVERTS, PIPES OR SIMILAR STRUCTURES TO BE ABANDONED SHALL BE SEALED WITH 6" OF CLASS "B" CONCRETE.

PIPE CONNECTED TO THE MAINLINE PIPE SHALL CONFORM TO JUNCTION STRUCTURE NO. 4 (JS 229) UNLESS OTHERWISE NOTED.

BEDDING PIPE SHALL CONFORM TO RFC&WCD STD. M 815, EXCEPT FOR COVER LESS THAN 2 FEET. FOR COVER LESS THAN 2 FEET, CONCRETE SLURRY (2,000 PSI - 2 SACK) SHALL BE USED. THE ENTIRE TRENCH SHALL BE SLURRY EXTENDING 4" MINIMUM AND 12" MAXIMUM ABOVE THE TOP OF PIPE.

"V" IS THE DEPTH OF INLET OF CATCH BASINS MEASURED FROM THE TOP OF THE CURB TO INVERT OF CONNECTOR PIPE.

CATCH BASINS SHALL BE LOCATED SO THAT LOCAL DEPRESSION SHALL BEGIN AT EXISTING CURB RETURN JOINT, UNLESS OTHERWISE SPECIFIED.

ALL CURBS, GUTTERS, SIDEWALKS, DRIVEWAYS AND OTHER EXISTING IMPROVEMENTS TO BE REMOVED IN KIND AND AT THE SAME ELEVATION AND LOCATION AS THE EXISTING IMPROVEMENTS UNLESS OTHERWISE NOTED.

HYDRAULIC GRADE LINE SHOWN IN PROFILES ARE FOR 100 YEAR FREQUENCY FLOWS, UNLESS OTHERWISE NOTED.

THE CONCRETE COVER ON THE INSIDE OF ALL REINFORCED CONCRETE PIPES MUST BE INCREASED TO PROVIDE A MINIMUM OF 1-1/2" OVER THE REINFORCING WHEN THE DESIGN VELOCITIES EXCEED 20 FEET PER SECOND. THE CONCRETE DESIGN STRENGTH IN THESE REACHES SHALL BE f'c=5,000 PSI FOR VELOCITIES EXCEEDING 20 FEET PER SECOND, AND f'c=6,000 PSI FOR VELOCITIES EXCEEDING 30 FEET PER SECOND.

THE CONTRACTOR SHALL COMPLY WITH THE STATE AND LOCAL SAFETY CODES DURING THE PROGRESS OF WORK.

THE DEVELOPER SHALL MAINTAIN ADJACENT STREETS IN A NEAT, SAFE, CLEAN AND SANITORY CONDITION AT ALL TIMES AND TO THE SATISFACTION OF THE COUNTY'S OR DISTRICT'S INSPECTOR. THE ADJACENT STREETS SHALL BE KEPT CLEAN OF DEBRIS, WITH DUST AND OTHER NUISANCE BEING CONTROLLED AT ALL TIMES. THE DEVELOPER SHALL BE RESPONSIBLE FOR ANY CLEAN-UP ON SHALL BE BY DRY SWEEPING OF ALL PAVED AREAS.

THE CONTRACTOR AGREES THAT HE SHALL ASSUME SOLE AND COMPLETE RESPONSIBILITY FOR THE JOB SITE CONDITIONS DURING THE COURSE OF CONSTRUCTION OF THIS PROJECT. INCLUDING SAFETY OF ALL PERSONS AND PROPERTY, THAT THIS REQUIREMENT SHALL APPLY CONTINUOUSLY AND NOT TO BE LIMITED TO NORMAL WORKING HOURS; AND THAT THE CONTRACTOR SHALL DEFEND, INDEMNIFY AND HOLD THE OWNER, R.C.F.C.D., COUNTY ROAD DEPARTMENT, AND THE DEVELOPER'S ENGINEER HARMLESS FROM ANY AND ALL LIABILITY, REAL OR ALLEGED, IN CONNECTION WITH THE PERFORMANCE OF WORK ON THIS PROJECT, EXCEPTING FOR LIABILITY ARISING FROM THE SOLE NEGLIGENCE OF THE OWNERS, OR THE DEVELOPERS ENGINEER.

ADJUST ALL STORM DRAIN, SEWER MANHOLES, AND WATER VALVES TO GRADE.

ALL PIPE LENGTHS AREA HORIZONTAL PROJECTIONS (:NOT TRUE LENGTHS OF PIPES) AND ARE THE BASIS OF THE ESTIMATES OF QUANTITIES. THE CONTRACTOR SHALL DETERMINE THE TRUE QUANTITY OF PIPE REQUIRED FOR THIS PROJECT PRIOR TO PLACING THE ORDER.

ALL ELEVATIONS SHOWN ARE TO THE INVERT OF PIPE, EXCEPT WHERE OTHERWISE NOTED.

AT THE DISCRETION OF THE ENGINEER, THE CONTRACTOR MAY BE REQUIRED TO VERIFY BY POTHOLING THE LOCATION OF POTENTIALLY AFFECTED UTILITIES.

CONTRACTOR SHALL DISPOSE OF ALL EXCESS EXCAVATED MATERIAL AT MANDATORY DISPOSAL SITE. MUST BE NOTIFIED ONE WEEK PRIOR TO CONSTRUCTION.

ALL BACKFILL AND BEDDING AROUND STRUCTURES AND PIPES SHALL BE COMPACTED TO NOT LESS THAN 90 PERCENT RELATIVE COMPACTION EXCEPT WHERE SUCH MATERIAL IS PLACED UNDER EXISTING PAVED ROADWAYS. THE TOP 3 FEET MEASURED FROM THE FINISHED PAVING, SHALL BE COMPACTED TO 95 PERCENT REALATIVE COMPACTION.

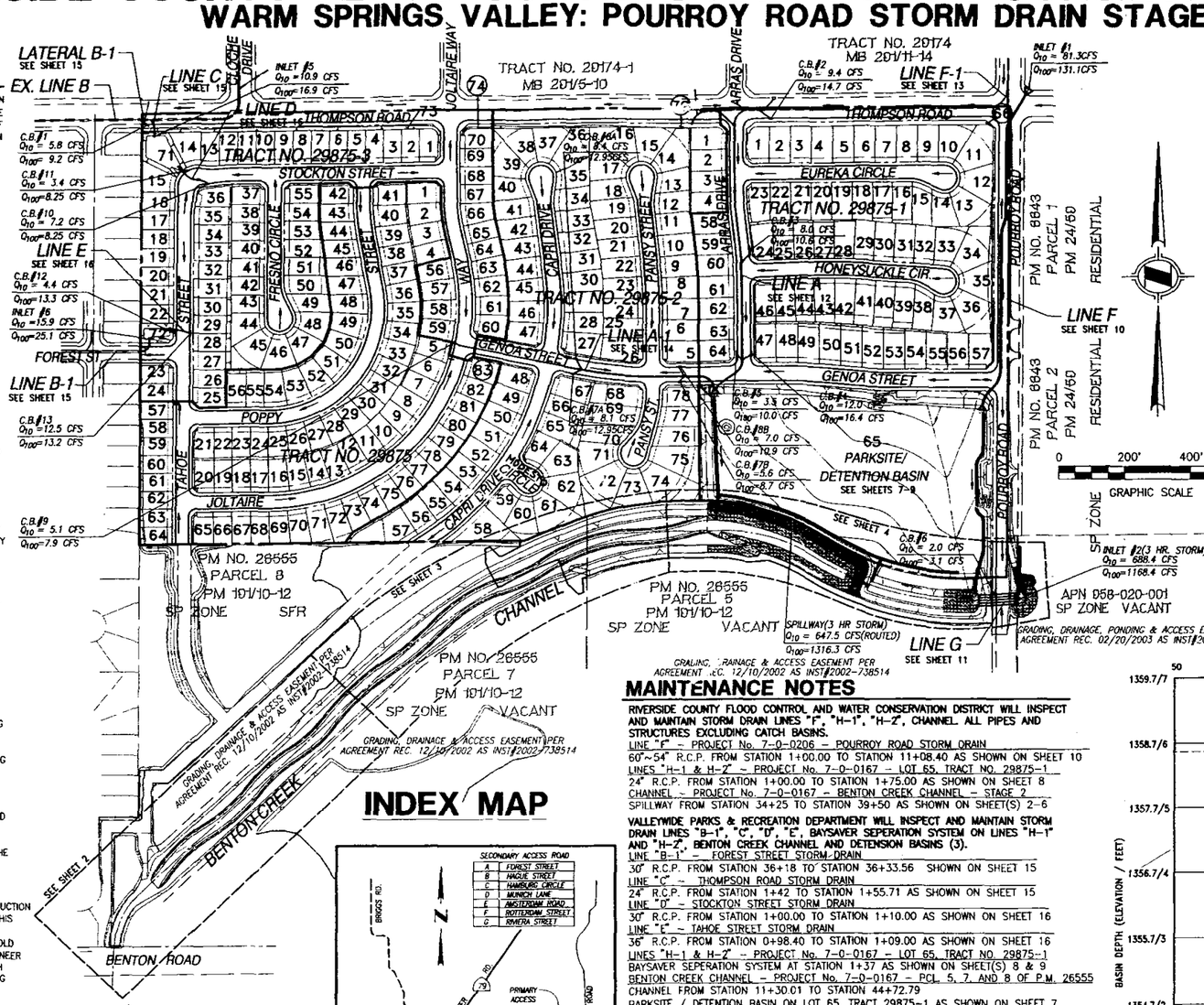

INDEX MAP

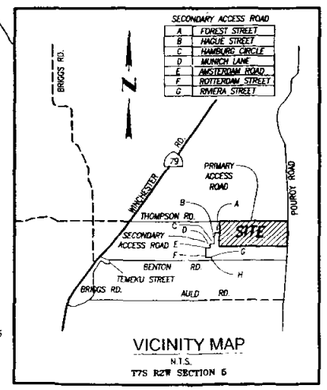

VICINITY MAP
N.T.S.
T7S R2W SECTION 6

TOPOGRAPHIC SURVEY SOURCE:

AERIAL PHOTOGRAPHIC METHODS. FLOWN 3-30-00 BY.

INLAND AERIAL SURVEY
5826 Magnolia Ave.
Riverside, CA. 92506
(909) -683-3248

SOILS ENGINEER:

PACIFIC SOILS ENGINEERING, INC.
7715 CONVOY COURT
SAN DIEGO, CA 92111
(858) 560-0380

OWNER:

SHEFFIELD HOMES
3400 Central Ave. Ste. 325
Riverside, Ca. 92506
(909) 682-5352

MAINTENANCE NOTES

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT WILL INSPECT AND MAINTAIN STORM DRAIN LINES "F", "H-1", "H-2", CHANNEL. ALL PIPES AND STRUCTURES EXCLUDING CATCH BASINS.

LINE "F" - PROJECT No. 7-0-0206 - POURROY ROAD STORM DRAIN
60"~54" R.C.P. FROM STATION 1+00.00 TO STATION 11+08.40 AS SHOWN ON SHEET 10
LINES "H-1 & H-2" - PROJECT No. 7-0-0167 - LOT 65, TRACT NO. 29875-1
24" R.C.P. FROM STATION 1+00.00 TO STATION 1+75.00 AS SHOWN ON SHEET 8
CHANNEL - PROJECT No. 7-0-0167 - BENTON CREEK CHANNEL - STAGE 2
SPILLWAY FROM STATION 34+25 TO STATION 39+50 AS SHOWN ON SHEET(S) 2-6

VALLEYWIDE PARKS & RECREATION DEPARTMENT WILL INSPECT AND MAINTAIN STORM DRAIN LINES "B-1", "C", "D", "E", BAYSAVER SEPERATION SYSTEM ON LINES "H-1" AND "H-2", BENTON CREEK CHANNEL AND DETENSION BASINS (3).

LINE "B-1" - FOREST STREET STORM DRAIN
30" R.C.P. FROM STATION 36+18 TO STATION 36+33.56 SHOWN ON SHEET 15
LINE "C" - THOMPSON ROAD STORM DRAIN
24" R.C.P. FROM STATION 1+42 TO STATION 1+55.71 AS SHOWN ON SHEET 15
LINE "D" - STOCKTON STREET STORM DRAIN
30" R.C.P. FROM STATION 1+00.00 TO STATION 1+10.00 AS SHOWN ON SHEET 16
LINE "E" - TAHOE STREET STORM DRAIN
36" R.C.P. FROM STATION 0+98.40 TO STATION 1+09.00 AS SHOWN ON SHEET 16
LINES "H-1 & H-2" - PROJECT No. 7-0-0167 - LOT 65, TRACT NO. 29875-1
BAYSAVER SEPERATION SYSTEM AT STATION 1+37 AS SHOWN ON SHEET(S) 8 & 9
BENTON CREEK CHANNEL - PROJECT No. 7-0-0167 - PCL. 5, 7, AND 8 OF P.M. 26555
CHANNEL FROM STATION 11+30.01 TO STATION 44+72.79
PARKSITE / DETENTION BASIN ON LOT 65, TRACT 29875-1 AS SHOWN ON SHEET 7
DETENTION BASIN ON LOT 71, TRACT 29875-3 AS SHOWN ON SHEET 15
DETENTION BASIN ON LOT 72, TRACT 29875-3 AS SHOWN ON SHEET 15

RIVERSIDE COUNTY TRANSPORTATION DEPARTMENT WILL INSPECT AND MAINTAIN STORM DRAIN LINES "A", "A-1", "B-1", "C", "D", "E", "F-1" AND "G"

LINE "A" - ARRAS DRIVE STORM DRAIN - 24"~42" R.C.P., STATION 1+31.95~11+38.77 AS SHOWN ON SHEET 12
LINE "A-1" - GENOA STREET STORM DRAIN - 24" TO 48" R.C.P. FROM STATION 0+83.69 TO STATION 9+13.03 AS SHOWN ON SHEET 14
LINE "B-1" - FOREST STREET STORM DRAIN - 30" R.C.P., STATION 35+80.72~36.18 AS SHOWN ON SHEET 15
LINE "C" - THOMPSON ROAD STORM DRAIN - 24" R.C.P., STATION 1+00~1+42 AS SHOWN ON SHEET 15
LINE "D" - STOCKTON STREET STORM DRAIN - 24" R.C.P., STATION 1+10~1+98.87 AS SHOWN ON SHEET 16
LINE "E" - TAHOE STREET STORM DRAIN - 24" R.C.P., STATION 1+09~1+60.80 AS SHOWN ON SHEET 16
LINE "F-1" - POURROY ROAD STORM DRAIN - 36" R.C.P., STATION 1+00~2+12.24 AS SHOWN ON SHEET 13
LINE "G" - BENTON CREEK CHANNEL STORM DRAIN - (4)-8'WX4'H R.C. BOXES., STATION 42+92.25~44+03.51 AS SHOWN ON SHEET 11

INDEX MAP

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STORM DRAIN LINE "B-1", LINE "C" & LATERAL "B-1" PLAN & PROFILE	15
STORM DRAIN LINES "D", "E" & LATERALS PLAN & PROFILE	16
STORM DRAIN SECTION DETAILS & OUTFLOW CURVES FOR LOTS 71 & 72, TRACT 29875-3	17

R.C.F.C.D. STD. DRAWINGS

CB 108	INLET TYPE "X"	TS 303	TRANSITION STRUCTURE NO. 3
CB 110	DROP INLET	MH 254	MANHOLE NO. 4
JS 228	JUNCTION STRUCTURE NO. 3	M 801	CHAINLINK FENCE
JS 229	JUNCTION STRUCTURE NO. 4	M 803	CONST. CONCRETE COLLAR
MH 251	MANHOLE NO. 1	M 814	ABBREVIATIONS & SYMBOLS
MH 252	MANHOLE NO. 2	M 820	PIPE SWING GATE

R.C.T.D. STD. DRAWINGS

300	CURB INLET CATCH BASIN		

AMERICAN PUBLICS WORKS ASSOCIATION

360-0	SLOPED PROTECTION BARRIER	361-0	TRASH RACK (INCLINED)

CALTRANS STD. DRAWINGS [JULY 1992 MANUAL (ENGLISH UNITS)]

D 81	DOUBLE BOX CULVERT	D 86B	CONCRETE HEADWALL
D 84	CONCRETE HEADWALL	D 90	CONCRETE HEADWALL
D 86A	CONCRETE HEADWALL		

ADDITIONAL NOTES TO CONTRACTOR

1. CONTRACTOR AGREES THAT HE SHALL ASSUME SOLE AND COMPLETE RESPONSIBILITY FOR JOB SITE CONDITIONS DURING THE COURSE OF CONSTRUCTION OF THIS PROJECT, INCLUDING SAFETY OF ALL PERSONS AND PROPERTY; THAT THIS REQUIREMENT SHALL APPLY CONTINUOUSLY AND NOT BE LIMITED TO NORMAL WORKING HOURS; AND THAT THE CONTRACTOR SHALL DEFEND, INDEMNIFY AND HOLD THE OWNER AND THE ENGINEER HARMLESS FROM ANY AND ALL LIABILITY, REAL OR ALLEGED, IN CONNECTION WITH THE PERFORMANCE OF WORK ON THIS PROJECT, EXCEPTING FOR LIABILITY ARISING FROM THE SOLE NEGLIGENCE OF THE OWNER OR THE ENGINEER.
2. THE EXISTENCE AND LOCATION OF ANY UNDERGROUND UTILITIES OR STRUCTURES SHOWN ON THESE PLANS ARE OBTAINED BY A SEARCH OF AVAILABLE RECORDS TO THE BEST OF OUR KNOWLEDGE. THERE ARE NO EXISTING UTILITIES EXCEPT THOSE SHOWN ON THESE PLANS. THE CONTRACTOR IS REQUIRED TO TAKE ALL PRECAUTIONARY MEASURES TO PROTECT THE UTILITIES SHOWN, AND ANY OTHER UTILITIES SHOWN, AND ANY OTHER LINES OR STRUCTURES NOT SHOWN ON THESE PLANS AND IS RESPONSIBLE FOR THE PROTECTION OF OR ANY DAMAGE TO THESE LINES OR STRUCTURES.
3. ALL RETAINING WALLS SHOWN ON THESE PLANS ARE SHOWN FOR REFERENCE ONLY AND ARE TO BE CONSTRUCTED PER SEPARATE PERMIT.
4. CONTRACTOR SHALL VERIFY ALL CONDITIONS AND DIMENSIONS AND SHALL REPORT ALL DISCREPENCIES TO THE ENGINEER PRIOR TO COMMENCEMENT OF WORK.

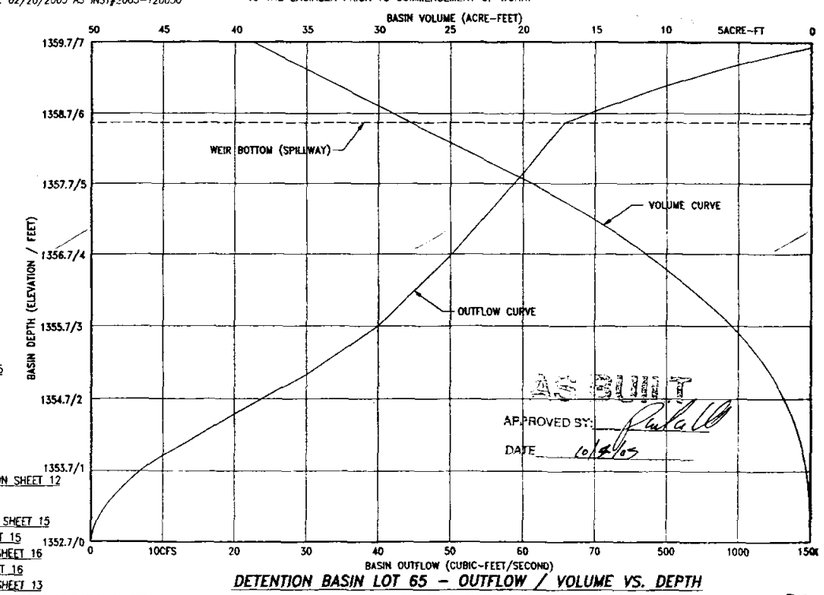

AS BUILT
APPROVED BY:
DATE 10/4/05

DETENTION BASIN LOT 65 - OUTFLOW / VOLUME VS. DEPTH

LP. NO.'s 020009, 020010, 020011, 020012

DG

IGALERT — TWO WORKING DAYS BEFORE YOU DIG — 1-800-227-2600 — A PUBLIC SERVICE BY UNDERGROUND SERVICE ALERT

HUNSAKER & ASSOCIATES
IRVINE, INC
INLAND EMPIRE REGION
2900 ADAMS STREET, SUITE A-15
RIVERSIDE CA 92504 (909)352-7200
PLANNING/ENGINEERING/SURVEYING/GOVERNMENT RELATIONS

PREPARED BY: PAUL R. HUDDLESTON, JR. — R.C.E. NO. 58020 — DATE 12/12/02

SEAL ENGINEER: REGISTERED PROFESSIONAL ENGINEER PAUL R. HUDDLESTON NO. 58020 EXP. 6/30/06 CIVIL STATE OF CALIFORNIA

BENCH MARK: A BRASS DISK, STAMPED ML 88 1971, SET IN THE TOP OF A CONCRETE POST, 3 INCHES ABOVE GROUND. 275 FEET NORTH ALONG McCALLISTER STREET FROM THE INTERSECTION OF McCALLISTER AND EL SOBRANTE ROAD; 22 FEET WEST OF McCALLISTER; 2 FEET NORTH OF TP #(NO NUMBER) 2 FEET SOUTH OF A MARKER POST.
ELEVATION = 1302.812

SEAL COUNTY: REGISTERED PROFESSIONAL ENGINEER KHALED A. OTHMAN NO. 33950 EXP. 6/30/06 CIVIL STATE OF CALIFORNIA

REVISIONS

REF	DESCRIPTION	APPR	DATE
A	"AS-BUILT"		10/4/05

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
RECOMMENDED FOR APPROVAL BY: Stuart T. Kirk — PLANNING ENGINEER — DATE 6-3-2003
APPROVED BY: — CHIEF ENGINEER — DATE 6-4-03

COUNTY OF RIVERSIDE TRANSPORTATION DEPARTMENT
APPROVED BY: KHALED A. OTHMAN R.C.E. 33950 EXP.: 6/30/06 — DATE: 5/6/03
RECOMMENDED BY: BOYLE ENGINEERING — DATE: 4-29-03

TRACT NO. 29875-1, 29875-2, 29875-3 & 29875
WARM SPRINGS VALLEY -
POURROY ROAD STORM DRAIN - STAGE 1
BENTON CREEK CHANNEL - STAGE 2
TITLE SHEET

FOR: SHEFFIELD HOMES — W.O. 2655-1 — COUNTY FILE NO.

PROJECT NO. 7-0-0206 7-0-0167-0
DRAWING NO. 7-370
SHEET 1 OF 17

0000980

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

VICINITY MAP
N.T.S.

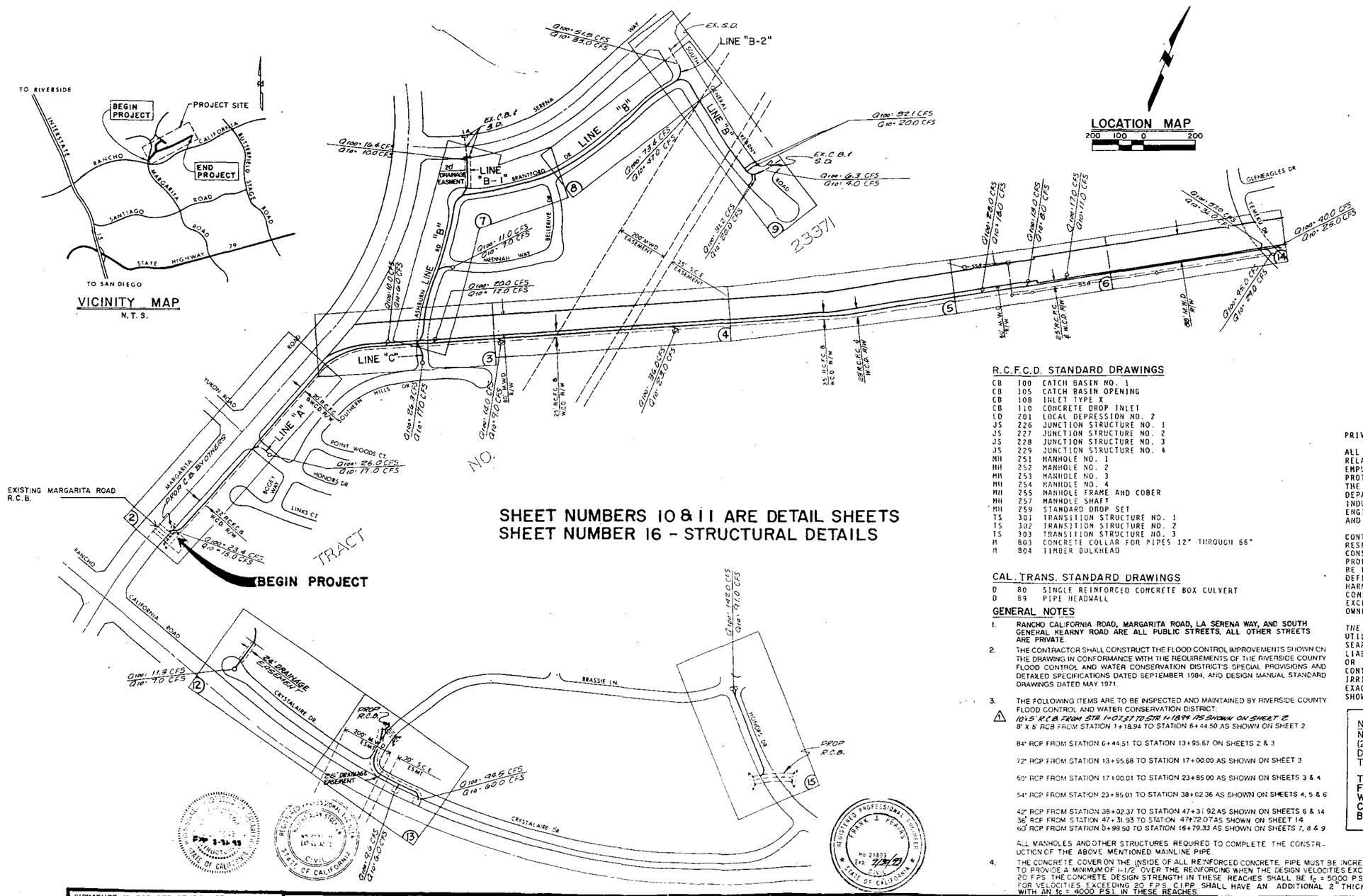

SHEET NUMBERS 10 & 11 ARE DETAIL SHEETS
SHEET NUMBER 16 - STRUCTURAL DETAILS

R.C.F.C.D. STANDARD DRAWINGS

CB	100	CATCH BASIN NO. 1
CB	105	CATCH BASIN OPENING
CB	108	INLET TYPE X
CB	110	CONCRETE DROP INLET
LD	201	LOCAL DEPRESSION NO. 2
JS	226	JUNCTION STRUCTURE NO. 1
JS	227	JUNCTION STRUCTURE NO. 2
JS	228	JUNCTION STRUCTURE NO. 3
JS	229	JUNCTION STRUCTURE NO. 4
MH	251	MANHOLE NO. 1
MH	252	MANHOLE NO. 2
MH	253	MANHOLE NO. 3
MH	254	MANHOLE NO. 4
MH	255	MANHOLE FRAME AND COBER
MH	257	MANHOLE SHAFT
MH	259	STANDARD DROP SET
TS	301	TRANSITION STRUCTURE NO. 1
TS	302	TRANSITION STRUCTURE NO. 2
TS	303	TRANSITION STRUCTURE NO. 3
M	803	CONCRETE COLLAR FOR PIPES 12" THROUGH 66"
M	804	TIMBER BULKHEAD

CAL. TRANS. STANDARD DRAWINGS

D	80	SINGLE REINFORCED CONCRETE BOX CULVERT
D	89	PIPE HEADWALL

GENERAL NOTES

1. RANCHO CALIFORNIA ROAD, MARGARITA ROAD, LA SERENA WAY, AND SOUTH GENERAL KEARNY ROAD ARE ALL PUBLIC STREETS. ALL OTHER STREETS ARE PRIVATE.
2. THE CONTRACTOR SHALL CONSTRUCT THE FLOOD CONTROL IMPROVEMENTS SHOWN ON THE DRAWING IN CONFORMANCE WITH THE REQUIREMENTS OF THE RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT'S SPECIAL PROVISIONS AND DETAILED SPECIFICATIONS DATED SEPTEMBER 1984, AND DESIGN MANUAL STANDARD DRAWINGS DATED MAY 1971.
3. THE FOLLOWING ITEMS ARE TO BE INSPECTED AND MAINTAINED BY RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT:

   1 *10'x5' R.C.B. FROM STA 1+07.37 TO STA 14+18.94 AS SHOWN ON SHEET 2*
   8' X 6' RCB FROM STATION 3+18.94 TO STATION 6+44.50 AS SHOWN ON SHEET 2

   84" RCP FROM STATION 6+44.51 TO STATION 13+95.67 ON SHEETS 2 & 3

   72" RCP FROM STATION 13+95.68 TO STATION 17+00.00 AS SHOWN ON SHEET 3

   60" RCP FROM STATION 17+00.01 TO STATION 23+85.00 AS SHOWN ON SHEETS 3 & 4

   54" RCP FROM STATION 23+85.01 TO STATION 38+02.36 AS SHOWN ON SHEETS 4, 5 & 6

   42" RCP FROM STATION 38+02.37 TO STATION 47+31.92 AS SHOWN ON SHEETS 6 & 14
   36" RCP FROM STATION 47+31.93 TO STATION 47+72.07 AS SHOWN ON SHEET 14
   60" RCP FROM STATION 0+99.50 TO STATION 16+79.33 AS SHOWN ON SHEETS 7, 8 & 9

   ALL MANHOLES AND OTHER STRUCTURES REQUIRED TO COMPLETE THE CONSTRUCTION OF THE ABOVE MENTIONED MAINLINE PIPE.
4. THE CONCRETE COVER ON THE INSIDE OF ALL REINFORCED CONCRETE PIPE MUST BE INCREASED TO PROVIDE A MINIMUM OF 1-1/2" OVER THE REINFORCING WHEN THE DESIGN VELOCITIES EXCEED 20 F.P.S. THE CONCRETE DESIGN STRENGTH IN THESE REACHES SHALL BE f_c = 5000 P.S.I. FOR VELOCITIES EXCEEDING 20 F.P.S. C.I.P.P. SHALL HAVE AN ADDITIONAL 2" THICKNESS WITH AN f_c = 4000 P.S.I. IN THESE REACHES.

QUANTITIES

10' x 5' R.C.B. PER CALTRANS STD. DWG. D80	12 LF
TRANSITION - 10' X 5' R.C.B. TO 8' X 6' P.C.B.	10 LF
8' X 6' R.C.B. PER CALTRANS STD. DWG. D80	517 LF
TRANSITION - 8' X 6' R.C.B. TO 84" PIPE	14 LF
84" R.C.P. (1000-D) OR C.I.P.P.	1021 LF
42" C.M.P.	4 LF
60" R.C.P. (1350-D) OR C.I.P.P.	476 LF
60" R.C.P. (1250-D) OR C.I.P.P.	750 LF
60" R.C.P. (1000-D) OR C.I.P.P.	444 LF
60" R.C.P. (800-D) OR C.I.P.P.	676 LF
54" R.C.P. (1250-D) OR C.I.P.P.	1173 LF
54" R.C.P. (800-D) OR C.I.P.P.	182 LF
48" R.C.P. (1000-D) OR C.I.P.P.	367 LF
48" C.M.P.	52 LF
42" R.C.P. (1350-D) OR C.I.P.P.	313 LF
42" R.C.P. (1250-D) OR C.I.P.P.	471 LF
42" R.C.P. (1000-D) OR C.I.P.P.	832 LF
36" R.C.P. (1350-D) OR C.I.P.P.	9 LF
36" R.C.P. (1000-D) OR C.I.P.P.	100 LF
36" C.M.P.	54 LF
30" R.C.P. (2000-D) OR C.I.P.P.	4 LF
30" R.C.P. (1350-D) OR C.I.P.P.	152 LF
24" R.C.P. (CLASS IV) OR C.I.P.P.	285 LF
24" C.M.P.	24 LF
18" R.C.P. (CLASS IV)	646 LF
15" R.C.P. (CLASS IV)	13 LF
J.S. NO. 1 PER R.C.F.C.& W.C.D. STD. DWG. JS 226	2 EA
J.S. NO. 2 PER R.C.F.C.& W.C.D. STD. DWG. JS 227	1 EA
J.S. NO. 4 PER R.C.F.C.& W.C.D. STD. DWG. JS 229	10 EA
T.S. NO. 1 PER R.C.F.C. & W.C.D. STD. DWG. TS 301	1 EA
T.S. NO. 2 PER R.C.F.C. & W.C.D. STD. DWG. TS 302	1 EA
T.S. NO. 3 PER R.C.F.C. & W.C.D. STD. DWG. TS 303	7 EA
M.H. NO. 1 PER R.C.F.C. & W.C.D. STD. DWG. MH 251	1 EA
M.H. NO. 2 PER R.C.F.C. & W.C.D. STD. DWG. MH 252	13 EA
M.H. NO. 3 PER R.C.F.C. & W.C.D. STD. DWG. MH 253	1 EA
M.H. NO. 4 PER R.C.F.C. & W.C.D. STD. DWG. MH 254	3 EA
C.B. NO. 1 PER R.C.F.C. & W.C.D. STD. DWG. CB 100	6 EA
C.B. NO. 300 PER COUNTY ROAD STD. DWG. NO. 300	1 EA
INLET TYPE X PER R.C.F.C. & W.C.D. STD. DWG. CB 108	6 EA
CONCRETE DROP INLET PER R.C.F.C. & W.C.D. STD. DWG. CB 110	3 EA
CONCRETE COLLAR PER R.C.F.C. & W.C. D. STD. DWG. M 803	6 EA
TIMBER BULKHEAD PER R.C.F.C. & W.C.D. STD. DWG. M 804	3 EA
LOCAL DEPRESSION NO. 2 PER R.C.F.C. & W.C.D. STD. DWG. LD 201	2 EA
15" C.M.P. V-BRANCH	*1 EA.*
TYPE 'L' HEADWALL PER CALTRANS STD. DWG. D 89	1 EA
STRAIGHT HEADWALL PER CALTRANS STD. DWG. D 89	1 EA
LIGHT CLASS RIP-RAP	7 SY
CONNECTION 10'x5' TO 12'x5'	*1 EA.*

PRIVATE ENGINEER'S NOTICE TO CONTRACTORS:

ALL CONTRACTORS AND SUB-CONTRACTORS PERFORMING WORK SHOWN ON OR RELATED TO THESE PLANS SHALL CONDUCT THEIR OPERATIONS SO THAT ALL EMPLOYEES ARE PROVIDED A SAFE PLACE TO WORK AND THE PUBLIC IS PROTECTED. ALL CONTRACTORS AND SUB-CONTRACTORS SHALL COMPLY WITH THE "OCCUPATIONAL SAFETY AND HEALTH REGULATIONS" OF THE U.S. DEPARTMENT OF LABOR AND THE STATE OF CALIFORNIA DEPARTMENT OF INDUSTRIAL RELATIONS "CONSTRUCTION SAFETY ORDERS." THE CIVIL ENGINEER SHALL NOT BE RESPONSIBLE IN ANY WAY FOR THE CONTRACTORS AND SUB-CONTRACTORS COMPLIANCE WITH SAID REGULATIONS AND ORDERS.

CONTRACTOR FURTHER AGREES THAT HE SHALL ASSUME SOLE AND COMPLETE RESPONSIBILITY FOR JOB-SITE CONDITIONS DURING THE COURSE OF CONSTRUCTION OF THIS PROJECT, INCLUDING SAFETY OF ALL PERSONS AND PROPERTY, THAT THIS REQUIREMENT SHALL APPLY CONTINUOUSLY AND NOT BE LIMITED TO NORMAL WORKING HOURS, AND THAT THE CONTRACTOR SHALL DEFEND, INDEMNIFY AND HOLD THE OWNER AND THE CIVIL ENGINEER HARMLESS FROM ANY AND ALL LIABILITY, REAL OR ALLEGED, IN CONNECTION WITH THE PERFORMANCE OF WORK ON THIS PROJECT, EXCEPTING FOR LIABILITY ARISING FROM THE SOLE NEGLIGENCE OF THE OWNER OR ENGINEER.

THE EXISTENCE AND APPROXIMATE LOCATIONS OF ANY UNDERGROUND UTILITIES OR STRUCTURES SHOWN ON THESE PLANS ARE OBTAINED BY A SEARCH OF THE AVAILABLE RECORDS. THE CIVIL ENGINEER ASSUMES NO LIABILITY AS TO THE EXACT LOCATION OF SAID LINES NOR FOR UTILITY OR IRRIGATION LINES WHOSE LOCATIONS ARE NOT SHOWN. THE CONTRACTOR SHALL BE RESPONSIBLE FOR NOTIFYING ALL UTILITY AND IRRIGATION COMPANIES PRIOR TO WORK OR EXCAVATION TO DETERMINE THE EXACT LOCATIONS OF ALL LINES AFFECTING THIS WORK, WHETHER OR NOT SHOWN HEREON, AND FOR ANY DAMAGE OR PROTECTION TO THESE LINES.

NOTICE TO CONTRACTOR:
NOTIFY ED ALVES, OPERATIONS SERVICES BRANCH, M.W.D., (213) 250 - 6432, AT LEAST TWO WORKING DAYS PRIOR TO DOING ANY WORK WITHIN THE M.W.D. EASEMENT OR WITHIN THE VICINITY OF THE M.W.D. PIPELINES NO. 1 AND NO. 2.

THE CONTRACTOR SHALL NOTIFY THE RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT IN WRITING A MINIMUM OF TWO WEEKS BEFORE BEGINNING CONSTRUCTION, AND SHALL NOT BEGIN CONSTRUCTION BEFORE OBTAINING AUTHORIZATION TO PROCEED.

ALL SHORING PLANS MUST BE SUBMITTED TO THE DISTRICT FOR APPROVAL TWO WEEKS PRIOR TO ANY WALL REMOVAL OF THE EXISTING TRIPLE BOX CULVERT IN MARGARITA ROAD.

SIGNATURE IS FOR STRUCTURAL DESIGN OF 10'x5' R.C.B. AND TRANSITION STRUCTURE TO 8'x6' R.C.B. & JUNCTION STRUCTURE TO EXISTING TRIPLE 12'x5' R.C.B.

APPROVED BY:
STRUCTURAL ENG. JOHN COIL — R.E. # 1543 — DATE 9-26-89

RICK ENGINEERING COMPANY
CIVIL ENGINEERS : PLANNING CONSULTANTS : SURVEYORS
3120 CHICAGO AVE. SUITE 100 RIVERSIDE CA 92507 (714) 782-0707
ENGINEER OF WORK: ROBERT A. STOCKTON, R.C.E. NO. 33591 — DATE 12-7-89
DRAWN BY: | DESIGNED BY: | CHECKED BY: | APPROVED BY:

BENCH MARK
COUNTY OF RIVERSIDE B.M. T-29-81:
2 1/2" BRASS DISK IN CONC. CYLINDER, IN THE N.W. CORNER OF THE INTERSECTION OF RANCHO CALIFORNIA ROAD WITH MARGARITA ROAD, 10' EAST OF A 7.0' CL. FENCE, 40.0' NORTH OF P.P. # 94.0' NORTH OF THE 'L' OF RANCHO CALIFORNIA ROAD. SET FIBERGLASS WITNESS POST 1.0' WEST OF MONUMENT.
ELEVATION: 1128.410 (ADJ. 9-13-82)

REVISIONS		
1 REVISED NOTE # 3	C.C. 12-90	
REF.	DESCRIPTION	APPR. DATE

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
RECOMMENDED FOR APPROVAL BY: Frank D. Pearce, PLANNING ENGINEER R.E. NO 21809 — DATE 12/13/89
APPROVED BY: Kenneth Edwards, CHIEF ENGINEER R.E. NO 12400 — DATE 12-15-89

County of Riverside
APPROVED BY: Peter F. Rauenzahn
FOR ROAD COMMISSIONER RIVERSIDE COUNTY, CALIF. — DATE 12/14/89

MARGARITA ROAD STORM DRAIN
TITLE SHEET
COUNTY OF RIVERSIDE
TRACT NO. 23371

PROJECT NO. 7-0315
DRAWING NO. 7-142
SHEET NO. 1 OF 16

JN10583 F

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

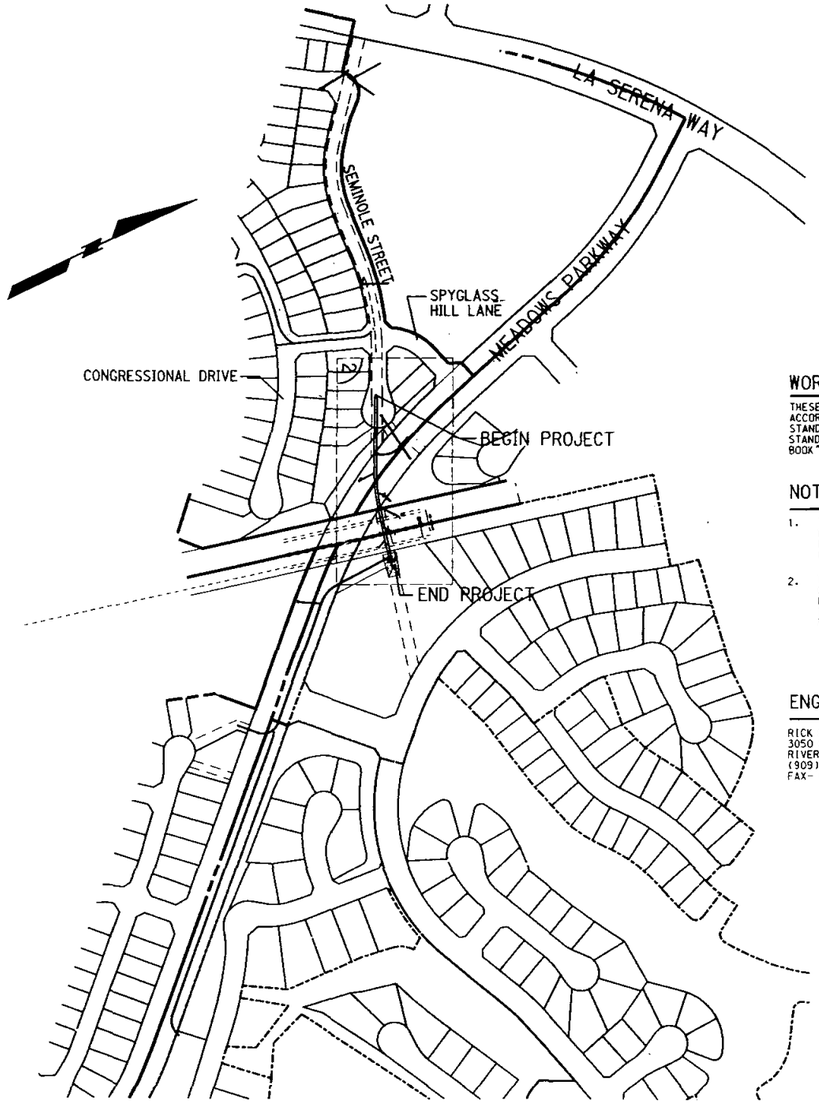

LOCATION MAP

SCALE: 1"=200'

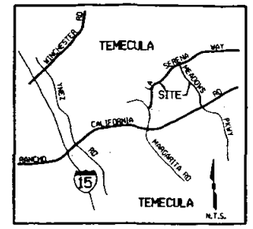

VICINITY MAP

WORK TO BE DONE

THESE IMPROVEMENTS CONSIST OF THE FOLLOWING WORK TO BE DONE ACCORDING TO THESE PLANS, THE CURRENT RIVERSIDE COUNTY FLOOD CONTROL STANDARDS AND SPECIFICATIONS, AND THE LATEST EDITION OF THE STANDARD SPECIFICATIONS FOR PUBLIC WORK CONSTRUCTION ("GREEN BOOK").

NOTIFICATION

1. THE CONTRACTOR SHALL NOTIFY CITY OF TEMECULA DEPARTMENT OF PUBLIC WORKS, (909) 649-6411, AT LEAST 48 HOURS IN ADVANCE OF STARTING CONSTRUCTION.
2. THE CONTRACTOR SHALL NOTIFY MS HENRIETTE HOANG AT METROPOLITAN WATER DISTRICT'S OPERATIONS MAINTENANCE BRANCH, AT (213) 217-7820 AT LEAST TWO WORKING DAYS (MON THRU THURS) PRIOR TO ANY WORK IN THE VICINITY OF THEIR FACILITIES.

ENGINEER OF WORK

RICK ENGINEERING COMPANY
3050 CHICAGO AVENUE SUITE 100
RIVERSIDE, CALIFORNIA 92507
(909) 782-0707
FAX- (909) 782 0723

PRIVATE ENGINEER'S NOTE TO CONTRACTOR

ALL CONTRACTORS AND SUBCONTRACTORS PERFORMING WORK SHOWN ON OR RELATED TO THESE PLANS SHALL CONDUCT THEIR OPERATIONS SO THAT ALL EMPLOYEES ARE PROVIDED A SAFE PLACE TO WORK AND THE PUBLIC IS PROTECTED. ALL CONTRACTORS AND SUBCONTRACTORS SHALL COMPLY WITH THE OCCUPATIONAL SAFETY AND HEALTH REGULATION OF THE U.S. DEPARTMENT OF LABOR AND THE STATE OF CALIFORNIA DEPARTMENT OF INDUSTRIAL RELATIONS CONSTRUCTION SAFETY ORDERS. THE CIVIL ENGINEER SHALL NOT BE RESPONSIBLE IN ANY WAY FOR THE CONTRACTORS AND SUBCONTRACTORS COMPLIANCE WITH SAID REGULATIONS AND ORDERS.

CONTRACTOR FURTHER AGREES THAT HE SHALL ASSUME SOLE AND COMPLETE RESPONSIBILITY FOR JOB-SITE CONDITIONS DURING THE COURSE OF CONSTRUCTION OF THIS PROJECT, INCLUDING SAFETY OF ALL PERSONS AND PROPERTY, THAT THIS REQUIREMENT SHALL APPLY CONTINUOUSLY AND NOT BE LIMITED TO NORMAL WORKING HOURS, AND THAT THE CONTRACTOR SHALL DEFEND, INDEMNIFY AND HOLD THE OWNER AND CIVIL ENGINEER HARMLESS FROM ANY AND ALL LIABILITY, REAL OR ALLEGED, IN CONNECTION WITH THE PERFORMANCE OF WORK ON THIS PROJECT, EXCEPTION FOR LIABILITY RISING FROM THE SOLE NEGLIGENCE OF THE OWNER OR ENGINEER.

THE EXISTENCE AND APPROXIMATE LOCATIONS OF ANY UNDERGROUND UTILITIES OR STRUCTURES SHOWN ON THESE PLANS ARE OBTAINED BY A SEARCH OF THE AVAILABLE RECORDS. THE CIVIL ENGINEER ASSUMES NO LIABILITY AS TO THE EXACT LOCATION OF SAID LINES NOR FOR UTILITY OR IRRIGATION LINES WHOSE LOCATIONS ARE NOT SHOWN. THE CONTRACTOR SHALL BE RESPONSIBLE FOR NOTIFYING ALL UTILITY AND IRRIGATION COMPANIES PRIOR TO WORK OR EXCAVATION TO DETERMINE THE EXACT LOCATIONS OF ALL LINES AFFECTING THIS WORK, WHETHER OR NOT SHOWN HEREIN, AND FOR ANY DAMAGE OR PROTECTION TO THESE LINES.

GENERAL NOTES

1. THE CONTRACTOR SHALL CONSTRUCT THE FLOOD CONTROL IMPROVEMENTS SHOWN ON THE DRAWINGS IN CONFORMANCE WITH THE REQUIREMENTS OF THE RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT'S MEMORANDUM OF UNDERSTANDING STANDARD SPECIFICATIONS DATED SEPTEMBER 1984, AND DESIGN MANUAL STANDARD DRAWINGS DATED MAY 1971.
2. IF AN ENCROACHMENT PERMIT IS REQUIRED FROM RIVERSIDE COUNTY FLOOD CONTROL, THEN CONTACT ED LOTZ AT 909-955-1266. AFTER THE PERMIT IS ISSUED THE DISTRICT MUST BE NOTIFIED ONE WEEK PRIOR TO CONSTRUCTION.
3. CONSTRUCTION INSPECTION WILL BE PERFORMED BY RIVERSIDE COUNTY FLOOD CONTROL. CONTACT CLYDE JOHNSON AT 909-955-1288. THE DISTRICT MUST BE *NOTIFIED TWO WEEKS PRIOR TO CONSTRUCTION.*
4. ALL STATIONING REFERS TO CENTERLINE OF CONSTRUCTION UNLESS OTHERWISE NOTED.
5. STATIONING FOR LATERALS AND CONNECTOR PIPE REFER TO THE CENTERLINE-CENTERLINE INTERSECTION STATION.
6. FORTY-EIGHT HOURS BEFORE EXCAVATION, CALL UNDERGROUND SERVICE ALERT 1-800-227-2600.
7. ALL ELEVATIONS SHOWN ARE IN FEET AND DECIMALS THEREOF BASED ON U.S.C. & G.S. DATUM.
8. ALL CROSS SECTIONS ARE TAKEN LOOKING DOWNSTREAM.
9. ELEVATIONS OF UTILITIES ARE APPROXIMATE UNLESS OTHERWISE NOTED.
10. OPENINGS RESULTING FROM THE CUTTING OR PARTIAL REMOVAL OF EXISTING CULVERTS, PIPES OR SIMILAR STRUCTURES TO BE ABANDONED SHALL BE SEALED WITH 6" OF CLASS "B" CONCRETE.
11. PIPE CONNECTED TO THE MAINLINE PIPE SHALL CONFORM TO JUNCTION STRUCTURE NO. 4 (JS 229) UNLESS OTHERWISE NOTED.
12. BEDDING PIPE WITH LESS THAN TWO FEET OF COVER SHALL CONFORM TO LOS ANGELES COUNTY FLOOD CONTROL DISTRICT STANDARD DRAWINGS 2-D213.3 AND 2-D177 FOR CONCRETE BACKFILL IN TRENCHES. ALL OTHER PIPE SHALL CONFORM TO RCFC & WCD STD. DWG. M815.
13. "V" IS THE DEPTH OF INLET OF CATCH BASINS MEASURED FROM THE TOP OF CURB TO INVERT OF CONNECTOR PIPE.
14. CATCH BASINS SHALL BE LOCATED SO THAT LOCAL DEPRESSION SHALL BEGIN AT EXISTING CURB RETURN JOINT, UNLESS OTHERWISE SPECIFIED.
15. ALL CURBS, GUTTERS, SIDEWALKS, DRIVEWAYS AND OTHER EXISTING IMPROVEMENTS TO BE RECONSTRUCTED IN KIND AND AT THE SAME ELEVATION AND LOCATION AS THE EXISTING IMPROVEMENTS UNLESS OTHERWISE NOTED.

INDEX

	SHEET NO.
TITLE SHEET	1
MAIN LINE PLAN AND PROFILE SHEET	2
MWD BLOWOFF CONNECTIONS	3
STORM DRAIN GRADING	4

RCFCD STANDARD DRAWINGS — QUANTITIES

(1) INSTALL 18" RCP	33.0 LF
(2) INSTALL 24" RCP	156.0 LF
(3) INSTALL 36" RCP	107.5 LF
(4) INSTALL 84" RCP	457.6 LF
(5) CB 100 CONSTRUCT CATCH BASIN NO. 1 - W=10	1 EA
- W=14	1 EA
(6) MH252 CONSTRUCT MH NO. 2	4 EA
(7) JS 227 CONSTRUCT JS NO. 2	2 EA
(8) JS 229 CONSTRUCT JS NO. 4	4 EA
(9) CONSTRUCT HEAD WALL PER CALTRANS STD PLAN D-90 *TYPE "C" AND DETAIL SHT 5.*	1 EA
(10) M803 CONSTRUCT CONCRETE COLLAR	5 EA
(12) M804 CONSTRUCT TIMBER BULKHEAD	1 EA
(13) CONSTRUCT INLET TYPE X PER RCFC STD DWG NO. CB108	1 EA
(14) INSTALL 30" RCP	26.4 LF
(15) INSTALL 84" RCP IN ACCORDANCE WITH MWD DRAWING NO. C-11632 AT CROSSING	1 EA
4" AIR PLACED CONC SLAB AT INLET	2233 SF
(16) INSTALL 84" RCP OR CIPP	457.6 LF

CAST-IN-PLACE REQUIREMENTS

1. CONCRETE MIXES SHALL NOT HAVE LESS THAN SIX (6) SACKS OF PORTLAND CEMENT/CU.YD.
2. CONCRETE MIX DESIGNS SHALL BE SUBMITTED BY CONTRACTOR FOR APPROVAL PRIOR TO START OF CONSTRUCTION.
3. IF AND WHEN FLOW VELOCITY EXCEEDS 10 F.P.S. A 140 SEGMENT OF THE C.I.P.P. INVERT SHALL BE THICKENED 2 INCHES IN WALL THICKNESS AS "SACRIFICIAL CONCRETE" TO RESIST ABRASION. COMPRESSIVE STRENGTH OF CONCRETE FOR DESIGN VELOCITIES=20 F.P.S. SHALL BE FC=4,000 P.S.I.
4. MAXIMUM PERMISSIBLE CONCRETE SLUMP SHALL BE 2-1/2".
5. CONTRACTOR SHALL ALLOW INSPECTOR INTO PIPE WHILE UNDER CONSTRUCTION & "ROD" FOR WALL THICKNESS AT A MIN. OF 25 C.Y. OF THE POUR.
6. AT THE END OF ALL POURS AND AT THE END OF EACH WORKING DAY THE CONTRACTOR SHALL INSTALL #4 DOWELS 24" LONG 12" INTO THE LAST POUR AT 12" CENTERS AROUND THE CIRCUMFERENCE OF CAST-IN-PLACE PIPE.
7. JUNCTION STRUCTURES SHOWN ON THE PLANS ARE FOR REINFORCED CONCRETE PIPE. THE FOLLOWING SUBSTITUTIONS SHALL BE MADE FOR JUNCTION STRUCTURES FOR USE WITH CAST-IN-PLACE PIPE:
   A. A JUNCTION STRUCTURE NO. 4 (J.S. 229) SHALL BE REPLACED WITH EITHER A JUNCTION STRUCTURE NO. 2 (J.S. 227) OR A TRANSITION STRUCTURE NO. 3 (T.S. 303).
   B. A JUNCTION STRUCTURE NO. 2 (J.S. 227) SHALL BE REPLACED WITH A TRANSITION STRUCTURE NO. 3 (T.S. 303).
8. STANDARD DRAWING NO. (J.S. 227) JUNCTION STRUCTURE NO. 2 WHEN USED WITH CAST-IN-PLACE PIPE SHALL BE MODIFIED TO INCLUDE CONCRETE BACKFILL 1 FOOT OVER THE CAST-IN-PLACE PIPE.

DIG ALERT
CALL BEFORE YOU DIG!
1-800-422-4133
UNDERGROUND SERVICE ALERT
Called least 2 working days prior to excavating.

CAUTION:
EXACT LOCATION OF EXISTING UNDERGROUND FACILITIES IS UNKNOWN. CONTRACTOR TO VERIFY IN FIELD.

L.D99-032C0

SEAL: REGISTERED PROFESSIONAL ENGINEER — EDWARD MICHEL RATICAN — No. 46804 — Exp. 6-30-03 — CIVIL — STATE OF CALIFORNIA

RICK ENGINEERING COMPANY
3050 Chicago Avenue, Suite 100, Riverside, California 92507 (909) 782-0707

Plans Prepared Under Supervision Of
EDWARD MICHEL RATICAN — Date 8/18/99
R.C.E. No. 46804 — Expires 6-30-03

BENCH MARK
COUNTY OF RIVERSIDE B.M. T-29-81
2-1/2" BRASS DISK IN CONCRETE CYLINDER, IN THE N.W. CORNER OF THE INTERSECTION OF RANCHO CALIFORNIA RD. WITH MARGARITA RD. 1.0' EAST OF A 7.0' C.L. FENCE, 40' NORTH OF P.P. AND NUMBER, 94' NORTH OF THE CENTER LINE OF RANCHO CALIFORNIA RD. SET FIBERGLASS WITNESS POST 1.0' WEST OF MONUMENT.
ELEVATION: 1128.410 (ADJ. 9-13-82)

REVISIONS			
REF.	DESCRIPTION	APPR.	DATE

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

DESIGNED BY: EDL	RECOMMENDED FOR APPROVAL BY:	APPROVED BY:	
DRAWN BY: EH			
DATE DRAWN: AUG 1999	DATE: 8-27-99	DATE: 8-30-99	
CHECKED BY: EMR			

CITY OF TEMECULA
APPROVED BY: RONALD J. PARKS, DEPUTY DIRECTOR OF PUBLIC WORKS, RCE NO: 19744 EXPIRES: 9-30-01 — DATE: 8/30/99

TEMECULA VALLEY
LA SERENA WAY STORM DRAIN
STAGE II

TITLE SHEET

PROJECT NO. 7-0-0315
DRAWING NO. 7-298
SHEET NO. 1 OF 4

g:\d_13193\1933sd9.dgn

PLOT DATE: 20-AUG-1999 JN 13193

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

0001982

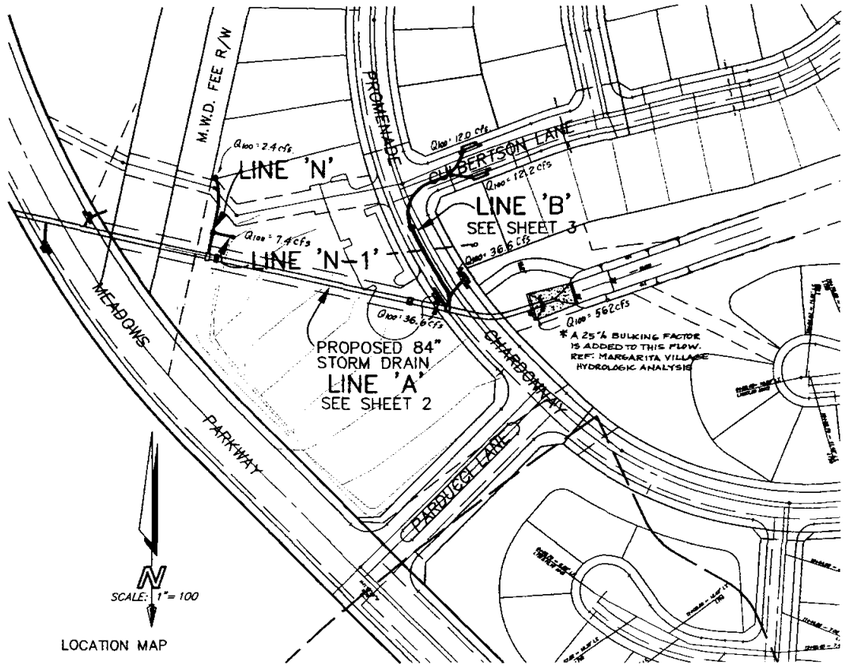

LOCATION MAP

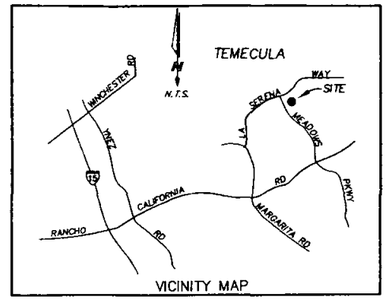

VICINITY MAP

INDEX

TITLE SHEET	SHEET 1
LINE 'A' PLAN AND PROFILE SHEET	SHEET 2
LINE 'B' PLAN AND PROFILE SHEET	SHEET 3
DESILTING BASIN	SHEET 4

RCFCD STANDARD DRAWINGS — QUANTITIES

1	INSTALL 84" R.C.P. OR C.I.P.P.	460	L.F.
2	INSTALL 36" R.C.P. (1750-D) OR C.I.P.P.	128	L.F.
3	INSTALL 24" R.C.P. (CLASS IV) OR C.I.P.P.	157	L.F.
4	INSTALL 18" R.C.P. (CLASS IV) OR C.I.P.P.	137	L.F.
5	CONSTRUCT JUNCTION STRUCTURE NO. 2 PER RCFCD STANDARD DRAWING NO. JS227	3	EA.
6	CONSTRUCT JUNCTION STRUCTURE NO. 4 PER RCFCD STANDARD DRAWING NO. JS229 CASE-1	1	EA.
7	CONSTRUCT MANHOLE NO. 1 PER RCFCD STANDARD DRAWING NO. MH251	1	EA.
8	CONSTRUCT MANHOLE NO. 2 PER RCFCD STANDARD DRAWING NO. MH252	1	EA.
9	CONSTRUCT CATCH BASIN NO. 1 PER RCFCD STANDARD DRAWING NO. CB100	2	EA.
10	CONSTRUCT LOCAL DEPRESSION PER RCFCD STANDARD DRAWING NO. LD201 CASE B W=14' / W=21'	2 / 2	EA. / EA.
11	CONSTRUCT LOCAL DEPRESSION PER RCFCD STANDARD DRAWING NO. LD201 CASE C	2	EA.
12	CONSTRUCT CONCRETE COLLAR PER RCFCD STANDARD DRAWING NO. M803	1	EA.
13	CONNECT 84" R.C.P. TO PROPOSED 84" R.C.P.	1	EA.
14	CONSTRUCT HEAD WALL PER CALTRANS STD. PLAN D-90	1	EA.
15	CONSTRUCT CONCRETE APRON PER SECTIONS A & B HEREON	2,000	S.F.
16	REMOVE EXISTING HEADWALL & APRON (PER DWG. NO. 7-298)		
17	CONSTRUCT DRIVEWAY APPROACH PER CITY OF TEMECULA ST. DWG. 207.	1	EA.
18	CONSTRUCT CONCRETE DROP INLET PER RCFCD STD. DWG. CB110 OR EQUAL	1	EA.
19	INLET TYPE X PER RCFCD STD DWG CB108 OR EQUAL	2	EA.
20	JOIN EXISTING JUNCTION STRUCTURE.	1	EA.

NOTE:
THE CONCRETE COVER ON THE INSIDE OF ALL REINFORCED CONCRETE PIPE MUST BE INCREASED TO PROVIDE A MINIMUM OF 1½" OVER THE REINFORCING STEEL WHEN THE DESIGN VELOCITIES EXCEED 20 fps. THE CONCRETE DESIGN STRENGTH IN THESE REACHES SHALL BE f_c = 5000 psi FOR VELOCITIES EXCEEDING 20 fps AND f_c = 6000 psi FOR VELOCITIES EXCEEDING 30 fps.

PRIVATE ENGINEER'S NOTE TO CONTRACTOR

ALL CONTRACTORS AND SUBCONTRACTORS PERFORMING WORK SHOWN ON OR RELATED TO THESE PLANS SHALL CONDUCT THEIR OPERATIONS SO THAT ALL EMPLOYEES ARE PROVIDED A SAFE PLACE TO WORK AND THE PUBLIC IS PROTECTED. ALL CONTRACTORS AND SUBCONTRACTORS SHALL COMPLY WITH THE OCCUPATIONAL SAFETY AND HEALTH REGULATION OF THE U.S. DEPARTMENT OF LABOR AND THE STATE OF CALIFORNIA DEPARTMENT OF INDUSTRIAL RELATIONS CONSTRUCTION SAFETY ORDERS. THE CIVIL ENGINEER SHALL NOT BE RESPONSIBLE IN ANY WAY FOR THE CONTRACTORS AND SUBCONTRACTORS COMPLIANCE WITH SAID REGULATIONS AND ORDERS.

CONTRACTOR FURTHER AGREES THAT HE SHALL ASSUME SOLE AND COMPLETE RESPONSIBILITY FOR JOB-SITE CONDITIONS DURING THE COURSE OF CONSTRUCTION OF THIS PROJECT. INCLUDING SAFETY OF ALL PERSONS AND PROPERTY. THAT THIS REQUIREMENT SHALL APPLY CONTINUOUSLY AND NOT BE LIMITED TO NORMAL WORKING HOURS, AND THAT THE CONTRACTOR SHALL DEFEND, INDEMNIFY AND HOLD THE OWNER AND CIVIL ENGINEER HARMLESS FROM ANY AND ALL LIABILITY, REAL OR ALLEGED, IN CONNECTION WITH THE PERFORMANCE OF WORK ON THIS PROJECT, EXCEPTION FOR LIABILITY RISING FROM THE SOLE NEGLIGENCE OF THE OWNER OR ENGINEER.

THE EXISTENCE AND APPROXIMATE LOCATIONS OF ANY UNDERGROUND UTILITIES OR STRUCTURES SHOWN ON THESE PLANS ARE OBTAINED BY A SEARCH OF THE AVAILABLE RECORDS. THE CIVIL ENGINEER ASSUMES NO LIABILITY AS TO THE EXACT LOCATION OF SAID LINES NOR FOR UTILITY OR IRRIGATION LINES WHOSE LOCATIONS ARE NOT SHOWN. THE CONTRACTOR SHALL BE RESPONSIBLE FOR NOTIFYING ALL UTILITY AND IRRIGATION COMPANIES PRIOR TO WORK OR EXCAVATION TO DETERMINE THE EXACT LOCATIONS OF ALL LINES AFFECTING THIS WORK, WHETHER OR NOT SHOWN HEREON. AND FOR ANY DAMAGE OR PROTECTION TO THESE LINES.

WORK TO BE DONE

THESE IMPROVEMENTS CONSIST OF THE FOLLOWING WORK TO BE DONE ACCORDING TO THESE PLANS, THE CURRENT RIVERSIDE COUNTY FLOOD CONTROL STANDARDS AND SPECIFICATION, AND THE LATEST EDITION OF THE STANDARD SPECIFICATIONS FOR PUBLIC WORK CONSTURCTION ("GREEN BOOK").

NOTIFICATION

1. THE CONTRACTOR SHALL NOTIFY CITY OF TEMECULA DEPARTMENT OF PUBLIC WORKS, (909) 694-6411), AT LEAST 48 HOURS IN ADVANCE OF STARTING CONSTRUCTION.
2. THE CONTRACTOR SHALL NOTIFY MS HENRIETTE HOANG AT METROPOLITAN WATER DISTRICT'S OPERATIONS MAINTAINANCE BRANCH, AT (213) 217-7820 AT LEAST TWO WORKING DAYS (MON THRU THURS) PRIOR TO ANY WORK IN THE VACINITY OF THEIR FACILITIES.

SPECIAL PIPES

THE CONCRETE COVER ON THE INSIDE OF ALL REINFORCED CONCRETE PIPES MUST BE INCREASED TO PROVIDE A MINIMUM OF 1 1/2" OVER THE REINFORCING WHEN THE DESIGN VELOCITIES EXCEED 20 FEET PER SECOND. THE CONCRETE DESIGN STRENGTH IN THESE REACHES SHALL BE f'c=5,000 PSI FOR VELOCITIES EXCEEDING 20 FEET PER SECOND AND f'c=6,000 PSI FOR VELOCITIES EXCEEDING 30 FEET PER SECOND.

CAST-IN-PLACE REQUIREMENTS

1. CONCRETE MIXES SHALL NOT HAVE LESS THAN SIX (6) SACKS OF PORTLAND CEMENT/CU. YD.
2. CONCRETE MIX DESIGNS SHALL BE SUBMITTED BY CONTRACTOR FOR APPROVAL PRIOR TO START OF CONSTRUCTION.
3. IF AND WHEN FLOW VELOCITY EXCEEDS 10 F.P.S. A 140 SEGMENT OF THE C.I.P.P. INVERT SHALL BE THICKENED 2 INCHES IN WALL THICKNESS AS "SACRAFICIAL CONCRETE" TO RESIST ABRASION. COMPRESSIVE STRENGTH OF CONCRETE FOR DESIGN VELOCITIES + 20 F.P.S. SHALL BE FC=5,000 P.S.I.
4. MAXIMUM PERMISSIBLE CONCRETE SLUMP SHALL BE 2-1/2".
5. CONTRACTOR SHALL ALLOW INSPECTOR INTO PIPE WHILE UNDER CONSTRUCTION & "ROD" FOR WALL THICKNESS AT A MIN. OF 25 C.Y. OF THE POUR.
6. AT THE END OF ALL POURS AND AT THE END OF EACH WORKING DAY THE CONTRACTOR SHALL INSTALL #4 DOWELS 24" LONG 12" CIRCUMFERENCE OF CAST-IN-PLACE PIPE.

ENGINEER OF WORK

MAY GROUP, INC.
6540 LUSK BOULEVARD
SUITE C-225
SAN DIEGO, CA 92121
(619) 550-9901
(619) 550-9469 FAX

GENERAL NOTES

1. THE CONTRACTOR SHALL CONSTRUCT THE FLOOD CONTROL IMPROVEMENTS SHOWN ON THE DRAWINGS IN CONFORMANCE WITH THE REQUIREMENTS OF THE RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT'S MEMORANDUM OF UNDERSTANDING STANDARD SPECIFICATIONS DATED SEPTEMBER 1984, AND DESIGN MANUAL STANDARD DRAWINGS DATED MAY 1971.
2. IF AN ENCROACHMENT PERMIT IS REQUIRED FROM RIVERSIDE COUNTY FLOOD CONTROL, THEN CONTACT ED LOTZ AT (909) 955-1266. AFTER THE PERMIT IS ISSUED THE DISTRICT MUST BE NOTIFIED ONE WEEK PRIOR TO CONSTRUCTION.
3. CONSTRUCTION INSPECTION WILL BE PERFORMED BY RIVERSIDE COUNTY FLOOD CONTROL. CONTACT CLYDE JOHNSON AT (909) 955-1288. THE DISTRICT MUST BE NOTIFIED TWO WEEKS PRIOR TO CONSTRUCTION.
4. ALL STATIONING REFERS TO CENTERLINE OF CONSTRUCTION UNLESS OTHERWISE NOTED.
5. STATIONING FOR LATERALS AND CONNECTOR PIPE REFER TO THE CENTERLINE-CENTERLINE INTERSECTION STATION.
6. FORTY-EIGHT HOURS BEFORE EXCAVATION, CALL UNDERGROUND SERVICE ALERT 1(800)277-2600.
7. ALL ELEVATIONS SHOWN ARE IN FEET AND DECIMALS THEREOF BASED ON U.S.C. & G.S. DATUM.
8. ALL CROSS SECTIONS ARE TAKEN LOOKING DOWNSTREAM.
9. ELEVATIONS OF UTILITIES ARE APPROXIMATE UNLESS OTHERWISE NOTED.
10. OPENINGS RESULTING FROM THE CUTTING OR PARTIAL REMOVAL OF EXISTING CULVERTS, PIPES OR SIMILAR STRUCTURES TO BE ABANDONED SHALL BE SEALED WITH 6" OF CLASS "B" CONCRETE
11. PIPE CONNECTED TO THE MAINLINE PIPE SHALL CONFORM TO JUNCTION STRUCTURE NO. 4 (JS229) UNLESS OTHERWISE NOTED.
12. BEDDING PIPE WITH LESS THAN TWO FEET OF COVER SHALL CONFORM TO LOS ANGELES COUNTY FLOOD CONTROL DISTRICT STANDARD DRAWINGS 2-D213.3 AND 2-D177 FOR CONCRETE BACKFILL IN TRENCHES. ALL OTHER PIPE SHALL CONFORM TO RCFC&WCD STD. DWG. M815.
13. BH-1 INDICATES SOIL BORING LOCATIONS BASED ON THE SOILS REPORT DATED APRIL 12, 1988. LOCATIONS SHOWN ARE APPROXIMATE.
14. "V" IS THE DEPTH OF INLET OF CATCH BASINS MEASURED FROM THE TOP OF CURB TO INVERT OF CONNECTOR PIPE.
15. CATCH BASINS SHALL BE LOCATED SO THAT LOCAL DEPRESSION SHALL BEGIN AT EXISTING CURB RETURN JOINT, UNLESS OTHERWISE SPECIFIED.
16. ALL CURBS, GUTTERS, SIDEWALKS, DRIVEWAYS AND OTHER EXISTING IMPROVEMENTS TO BE RECONSTRUCTED IN KIND AND AT THE SAME ELEVATION AND LOCATION AS THE EXISTING IMPROVEMENTS UNLESS OTHERWISE NOTED.

AS BUILT
APPROVED BY: Marwan A. Younis
DATE 10/30/03
ENGINEER OF WORK
MARWAN A. YOUNIS R.C.E. 43217
EXP. 3/31/00

LD99-176CO

CAUTION:
EXACT LOCATION OF EXISTING UNDERGROUND FACILITIES IS UNKNOWN. CONTRACTOR TO VERIFY IN FIELD.

Underground Service Alert
Call TOLL FREE
1-800 422-4133
TWO WORKING DAYS BEFORE YOU DIG

REGISTERED PROFESSIONAL ENGINEER — MARWAN A. YOUNIS — NO. 43217 — EXP. 3/31/2000 — CIVIL — STATE OF CALIFORNIA

MAY GROUP
PLANNING • ENGINEERING • SURVEYING
6540 Lusk Boulevard • Suite C-225 • San Diego, CA 92121
619/550-9901, FAX 619/550-9469

BENCHMARK
COUNTY OF RIVERSIDE B.M. NO. T-29-81
2-1/2" BRASS DISK IN CONCRETE CYLINDER, IN THE N.W. CORNER OF THE INTERSECTION OF RANCHO CALIFORNIA RD. WITH MARGARITA RD. 1.0' EAST OF A 7.0' C.L. FENCE, 40' NORTH OF P.P. (NO NUMBER), 94' NORTH OF THE CENTERLINE OF RANCHO CALIFORNIA RD. SET FIBERGLASS WITNESS POST 1.0' WEST OF MONUMENT. ELEVATION: 1128.410

REVISIONS			
1	REV CONC SPEC FROM 4,000 TO 5,000 PSI (YBA)	MW	10/14/99
2	ADD SHEET 4	MW	31 Mar 03
REF.	DESCRIPTION	APPR.	DATE

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
RECOMMENDED FOR APPROVAL BY: PLANNING ENGINEER — DATE: 10-18-99
APPROVED BY: CHIEF ENGINEER — DATE: 10/18/99

CITY OF TEMECULA
RECOMMENDED BY: DATE 10/13/99
APPROVED BY:
RONALD J. PARKS
DEPUTY DIRECTOR OF PUBLIC WORKS
R.C.E. NO. 19744 EXPIRES: 9-30-01
DATE: 10/13/99

TEMECULA VALLEY
LA SERENA WAY STORM DRAIN
TRACT 23101-6 STAGE III
TITLE SHEET

PROJECT NO. 7-0-03152 0316
DRAWING NO. 7-299
SHEET NO. 1 OF 4

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

DE PORTOLA ROAD & CAMPANULA WAY STORM DRAIN IMPROVEMENT PLANS CITY OF TEMECULA

GENERAL NOTES

1. THE CONTRACTOR SHALL CONSTRUCT THE FLOOD CONTROL IMPROVEMENTS SHOWN ON THE DRAWINGS IN CONFORMANCE WITH THE REQUIREMENTS OF THE RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT'S SPECIFICATIONS DATED SEPTEMBER 1984, AND DESIGN MANUAL STANDARD DRAWINGS DATED MAY 1971.
2. AN ENCROACHMENT PERMIT IS REQUIRED FROM RIVERSIDE COUNTY FLOOD CONTROL. CONTACT ED LOTZ AT (909) 275-1266. AFTER THE PERMIT IS ISSUED THE DISTRICT MUST BE NOTIFIED ONE WEEK PRIOR TO CONSTRUCTION.
3. CONSTRUCTION INSPECTION WILL BE PERFORMED BY RIVERSIDE COUNTY FLOOD CONTROL. CONTACT CLYDE JOHNSON AT (909) 275-1288. THE DISTRICT MUST BE NOTIFIED TWENTY DAYS PRIOR TO CONSTRUCTION.
4. ALL STATIONS REFERS TO CENTERLINE OF CONSTRUCTION UNLESS OTHERWISE NOTED.
5. STATIONING FOR LATERALS AND CONNECTOR PIPE REFER TO THE CENTER LINE CENTERLINE INTERSECTION STATION.
6. FORTY-EIGHT HOURS BEFORE EXCAVATION, CALL UNDERGROUND SERVICE ALERT 1-800-422-4133
7. ALL ELEVATIONS SHOWN ARE IN FEET AND DECIMALS THEREOF BASED ON U.S.C. & G.S. DATUM.
8. ELEVATIONS OF UTILITIES ARE APPROXIMATE UNLESS OTHERWISE NOTED.
9. OPENINGS RESULTING FROM CUTTING OR PARTIAL REMOVAL OF EXISTING CULVERTS, PIPES OR SIMILAR STRUCTURES TO BE ABANDONED SHALL BE SEALED WITH 6" OF CLASS "B" CONCRETE.
10. BEDDING PIPE WITH LESS THAN TWO FEET OF COVER SHALL CONFORM TO LOS ANGELES COUNTY FLOOD CONTROL DISTRICT STANDARD DRAWINGS 2-D213.3. AND 3080-1 FOR CONCRETE BACKFILL IN TRENCHES. ALL OTHER PIPE SHALL CONFORM TO RCFC & WCD STD. DWG. M815.
11. ALL CROSS-SECTIONS ARE TAKEN LOOKING DOWNSTREAM.
12. ALL CURBS, GUTTERS, SIDEWALKS, DRIVEWAYS AND OTHER EXISTING IMPROVEMENTS TO BE RECONSTRUCTED IN KIND AND AT THE SAME ELEVATION AND LOCATION AS THE EXISTING IMPROVEMENTS UNLESS OTHERWISE NOTED.

CAST-IN-PLACE CONCRETE PIPE GENERAL NOTES

1. CAST IN PLACE CONCRETE PIPE MATERIALS AND INSTALLATION METHODS SHALL CONFORM TO THE RIVERSIDE COUNTY AND RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT CAST-IN-PLACE CONCRETE PIPE DESIGN STANDARDS FOR SUBDIVISION PROJECT IMPROVEMENTS PLANS FOR FACILITIES TO BE MAINTAINED BY COUNTY OR DISTRICT. THE ACI STANDARD 346-70, STANDARD SPECIFICATIONS OF THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION AND RECOMMENDATION OF PACIFIC SOILS ENGINEERING GEOTECHNICAL REVIEW, WORK ORDER 400145 DATED MARCH 13, 1989.
2. CAST-IN-PLACE CONCRETE PIPE WHICH IS TO BE MAINTAINED BY THE COUNTY OR DISTRICT SHALL NOT BE PLACED EXCEPT IN THE PRESENCE OF THE AGENCY ENGINEER.
3. DEWATERING SHALL BE INCLUDED IN THE PLACE BID PER LINEAL FOOT FOR CAST-IN-PLACE CONCRETE PIPE. THE DEWATERING SYSTEM SHALL BE SUCH THAT FORM VERTICAL TRENCH WALLS WILL BE MAINTAINED THROUGH THE PIPE ZONE, AND THE TRENCH INVERT SHALL BE FORMED AND FREE OF RUNNING WATER. THIS DOES NOT PRECLUDE CONSTRUCTION OF A FRENCH DRAIN UNDER THE TRENCH INVERT, IF SUCH A FACILITY ADEQUATELY RELIEVED THE GROUND WATER TO PROVIDE A TRENCH AS PREVIOUSLY SPECIFIED.
4. ALL CIPP INSTALLATION SHALL BE DONE PER THE FOLLOWING RECOMMENDATIONS:
   - "CAST-IN-PLACE CONCRETE PIPELINE RECOMMENDATIONS" INFRASTRUCTURE AT CAMPANULA WAY & DE PORTOLA ROAD, PASEO DEL SOL MASTER PLANNED COMMUNITY, BY GEOTECHNICAL CONSULTING, DATED APRIL 7, 2000.
   - "DE PORTOLA ROAD & CAMPANULA WAY STORM DRAIN CAST-IN-PLACE CONCRETE PIPE STRUCTURAL ANALYSIS" BY TERRAIN ENGINEERING INC. DATED MARCH 20, 2000.
   - "HYDRAULICS ANALYSIS FOR STORM DRAIN, CIPP INFRASTRUCTURE IMPROVEMENTS, DE PORTOLA ROAD & CAMPANULA WAY" BY RBF & ASSOC. DATED MAY 22, 1000.

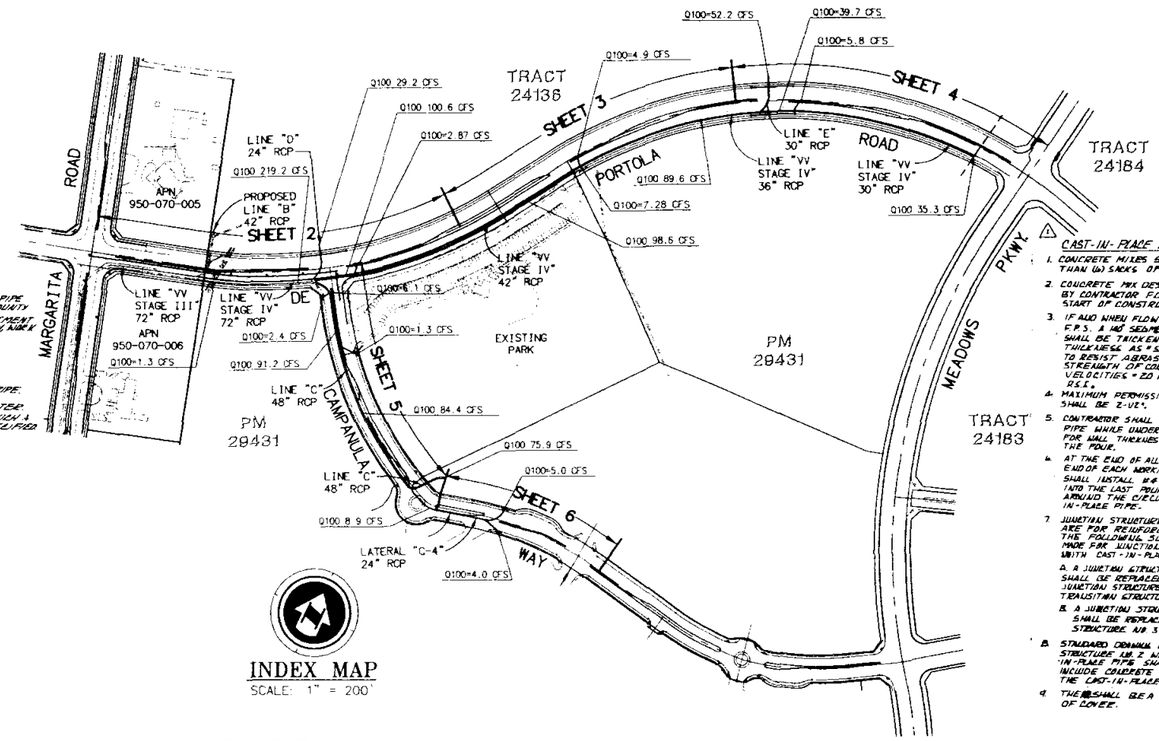

INDEX MAP
SCALE: 1" = 200'

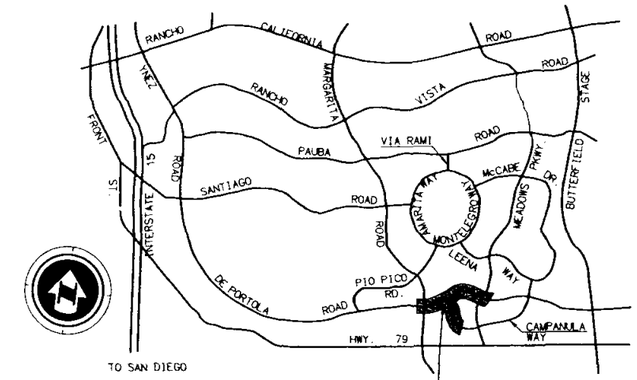

VICINITY MAP
NOT TO SCALE

CAST-IN-PLACE REQUIREMENTS (CIP)

1. CONCRETE MIXES SHALL NOT HAVE LESS THAN (6) SACKS OF PORTLAND CEMENT/CU.YD.
2. CONCRETE MIX DESIGN SHALL BE SUBMITTED BY CONTRACTOR FOR APPROVAL PRIOR TO START OF CONSTRUCTION.
3. IF AVG WHEN FLOW VELOCITY EXCEEDS 10 F.P.S. & NO SEDIMENT OF C.I.P.P. INVERT SHALL BE THICKENED 2 INCHES IN WALL THICKNESS AS "SACRIFICIAL CONCRETE" TO RESIST ABRASION COMPRESSIVE STRENGTH OF CONCRETE FOR DESIGN VELOCITIES > 20 F.P.S. SHALL BE F'c=6000 P.S.I.
4. MAXIMUM PERMISSIBLE CONCRETE SLUMP SHALL BE 2-1/2".
5. CONTRACTOR SHALL ALLOW INSPECTOR INTO PIPE WHILE UNDER CONSTRUCTION 2'-0"D" FOR WALL THICKNESS AT MIN OF 2.5 C.Y. OF THE POUR.
6. AT THE END OF ALL POURS AND AT THE END OF EACH WORKING DAY THE CONTRACTOR SHALL INSTALL #4 DOWELS 24" LONG 12" INTO THE LAST POUR AT 12" CENTERS AROUND THE CIRCUMFERENCE OF CAST-IN-PLACE PIPE.
7. JUNCTION STRUCTURES SHOWN ON THE PLANS ARE FOR REINFORCED CONCRETE PIPE. THE FOLLOWING SUBSTITUTIONS SHALL BE MADE FOR JUNCTION STRUCTURES FOR USE WITH CAST-IN-PLACE PIPE:
   A. A JUNCTION STRUCTURE NO. 6 (J.S. 227) SHALL BE REPLACED WITH EITHER A JUNCTION STRUCTURE NO. 2 (J.S. 227) OR A TRANSITION STRUCTURE NO. 2 (T.S. 303)
   B. A JUNCTION STRUCTURE NO. 2 (J.S. 227) SHALL BE REPLACED WITH A TRANSITION STRUCTURE NO. 5 (T.S. 303)
8. STANDARD DRAWING NO. J.S. 227 JUNCTION STRUCTURE NO. 2 WHEN USED WITH CAST-IN-PLACE PIPE SHALL BE MODIFIED TO INCLUDE CONCRETE BACKFILL 1 FOOT OVER THE CAST-IN-PLACE PIPE.
9. THERE SHALL BE A MINIMUM OF 3 FEET OF COVER.

ESTIMATED QUANTITIES

NO.	ITEM DESCRIPTION	QTY'S	UNIT
1	INSTALL 18" RCP, CLASS IV	224	LF
2	INSTALL 24" RCP, CLASS IV OR CIPP	428	LF
3	INSTALL 30" RCP, D-LOAD PER PROFILE OR CIPP	699	LF
4	INSTALL 36" RCP, D-LOAD PER PROFILE OR CIPP	761	LF
5	INSTALL 42" RCP, D-LOAD PER PROFILE OR CIPP	553	LF
6	INSTALL 48" RCP, D-LOAD PER PROFILE OR CIPP	739	LF
7	INSTALL 60" RCP, D-LOAD PER PROFILE	0	LF
8	INSTALL 72" RCP, D-LOAD PER PROFILE	302	LF
9	CONSTRUCT CATCH BASIN NO.1 PER RCFCD STD. NO. CB100	122	LF
10	CONSTRUCT MANHOLE NO.1 PER RCFCD STD. NO. MH251	1	EA
11	CONSTRUCT MANHOLE NO.2 PER RCFCD STD. NO. MH252	6	EA
12	CONSTRUCT MANHOLE NO.4 PER RCFCD STD. NO. MH254	4	EA
13	CONSTRUCT TRANSITION STRUCTURE NO.3 PER RCFCD STD. NO. TS303	0	EA
14	CONSTRUCT LOCAL DEPRESSION NO.2 CASES B & C PER RCFCD STD. NO. LD201	9	EA
15	CONSTRUCT CONCRETE COLLAR PER RCFCD STD. NO. M803	1	EA
16	CONSTRUCT CONCRETE BULKHEAD PER RCFCD STD. NO. M816	2	EA
17	CONSTRUCT CONCRETE JUNCTION STRUCTURE NO.2 PER RCFCD STD. NO. JS227	1	EA
18	CONSTRUCT CONCRETE JUNCTION STRUCTURE NO.4 PER RCFCD STD. NO. JS229	3	EA
19	CONSTRUCT CONCRETE ENCASEMENT PER EMWD STD. SB-157	3	EA

NOTICE TO THE CONTRACTOR

THE EXISTENCE AND LOCATION OF ANY UNDERGROUND UTILITY PIPES OR STRUCTURES SHOWN ON THESE PLANS ARE OBTAINED BY A SEARCH OF THE AVAILABLE RECORDS. APPROVAL OF THIS PLAN BY THE CITY OF TEMECULA, RIVERSIDE COUNTY FLOOD CONTROL DISTRICT, EASTERN MUNICIPAL WATER DISTRICT OR RANCHO CALIFORNIA WATER DISTRICT DOES NOT CONSTITUTE A REPRESENTATION AS TO THE ACCURACY OR COMPLETENESS OR THE EXISTENCE OR NON-EXISTENCE OF ANY UNDERGROUND UTILITY PIPE OR STRUCTURE WITHIN THE LIMITS OF THIS PROJECT. THE CONTRACTOR IS REQUIRED TO TAKE ALL DUE PRECAUTIONARY MEANS TO PROTECT THE UTILITY LINES NOT OF RECORD OR SHOWN ON THIS PLAN.

LEGEND

CENTERLINE	℄	EXIST. STORM DRAIN	36" RCP
RIGHT-OF-WAY	R/W	PROPOSED STORM DRAIN	18" RCP
TOP OF CURB	TC	EXISTING SEWER LINE	EX 8"SWR
FLOW LINE	FL	EXISTING WATER LINE	EX 18"WTR
FINISHED GRADE	FG	STREET LIGHT	SL
GRADE BREAK	GB	BARRICADE	
TYPICAL	TYP	STREET SIGN	
ASPHALTIC CONCRETE	A.C.	STOP SIGN	
CONSTRUCTION NOTE NUMBER	8	CURB INLET	CI
PROJECT BOUNDARY		LOCAL DEPRESSION	LD

AS BUILT
APPROVED BY: [signature]
DATE 11/30/06

NOTE :

THE FOLLOWING ITEMS ARE TO BE INSPECTED AND MAINTAINED BY RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT.

72" R.C.P. FROM STA. 22+67.06 TO 25+68.78 AS SHOWN ON SHEET NO. 2
42" R.C.P. FROM STA. 25+77.95 TO 31+35.36 AS SHOWN ON SHEETS **NO. 2 & 3** (OR CIPP)
48" R.C.P. FROM STA. 40+00.00 TO **46+62.45** AS SHOWN ON SHEET NO. 5 (OR CIPP)

SHEET INDEX

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LINE "VV-STAGE IV", LINE "E"	4
LINE "C"	5
LATERALS "C-4" & "C-5"	6
DETAILS & LOCAL DEPRESSIONS	7

△ LD00-072 CO
DM LD99-206CO

BENCH MARK

COUNTY OF RIVERSIDE B.M. NO. T-1-81 EL=1026.428
2 1/2" BRASS DISC IN CONC. CYLINDER, 2.4 MILES SOUTHEAST ON HWY. 79 FROM INTERSECTION MAIN AND FRONT STREET IN TEMECULA. 53.3' SOUTH OF CENTERLINE HWY. 79, 3.2' EAST OF GT POLE (GT 2453) 300' EAST OF PRODUCE STAND MIDWAY BETWEEN P.P. 75580 AND P.P. 75581 ON LINE WITH OLD FENCE LINE, RUNNING N. & S. SET FIBERGLASS WITNESS POST 1' SOUTH OF MONUMENT.

OWNER / DEVELOPER

NEWLAND ASSOCIATES, INC.
27393 YNEZ ROAD, SUITE 230
TEMECULA, CA 92591
(909) 694-5572

BASIS OF BEARING NOTE

THE BEARINGS SHOWN HEREON ARE BASED ON A PORTION OF THE CENTERLINE OF MARGARITA ROAD AS SHOWN ON PARCEL MAP NO. 23432 FILED IN BOOK 159, PAGES 38 THROUGH 61 OF PARCEL MAPS IN THE OFFICE OF THE COUNTY RECORDER OF RIVERSIDE COUNTY, CALIFORNIA, BEING NORTH 16°56'06" WEST.

REGISTERED PROFESSIONAL ENGINEER MICHAEL A. TYLMAN No. 43090 Exp. 3/31/04 CIVIL STATE OF CALIFORNIA

Robert Bein, William Frost & Associates
PROFESSIONAL ENGINEERS, PLANNERS & SURVEYORS
27555 YNEZ ROAD, STE. 400, TEMECULA, CA. 92591
(909) 676-4042 FAX (909) 676-7240
MICHAEL A. TYLMAN
R.C.E. NO. 43090
EXP. 3.31.04
4/27/00
DATE

REVISIONS

MK	DESCRIPTION	APR	DATE	APR	DATE
1	RBF CIPP REVISIONS 6-9-00	MM	6/16/00		

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
RECOMMENDED FOR APPROVAL BY: [signature] PLANNING ENGINEER DATE 5/19/00
APPROVED BY: [signature] CHIEF ENGINEER DATE 5/19/00

CITY OF TEMECULA
RECOMMENDED BY: [signature] DATE 5/1/00
APPROVED BY: [signature] 5/1/00
RONALD J. PARKS DATE
R.C.E. NO. 19744 EXP. 9-30-01
DEPUTY DIRECTOR OF PUBLIC WORKS
CITY OF TEMECULA

STORM DRAIN PLANS
DE PORTOLA ROAD
& CAMPANULA WAY
LINE "VV-STAGE IV"
LINES C, D & E

PROJECT NO. 7-0-0051
DRAWING NO. 7-310
SHEET NO. 1 OF 7

X-REFS: 0000001, 0000000, 0000000, 0000001
H:\GR960\PDATA\401438\DWG\STORM\DPORTOA\Y4365010.DWG 04/21/00 9:02 am

0000984

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

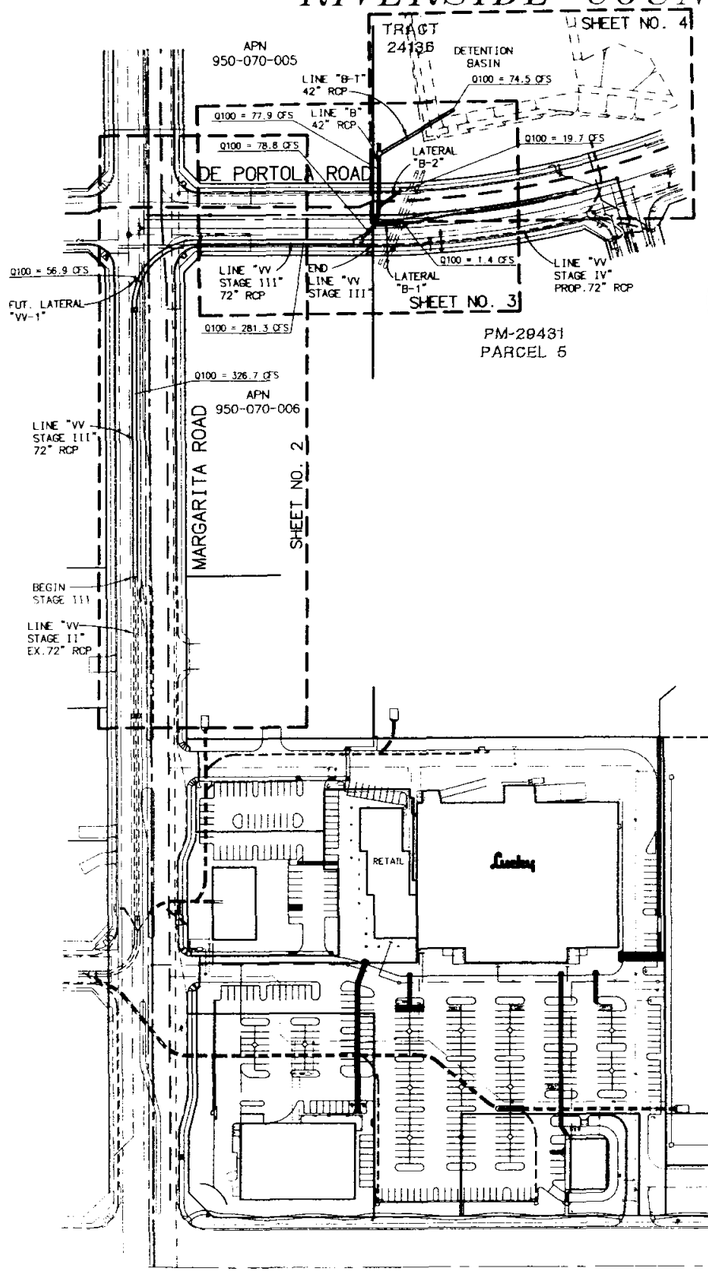

INDEX MAP

SCALE : 1"=100'

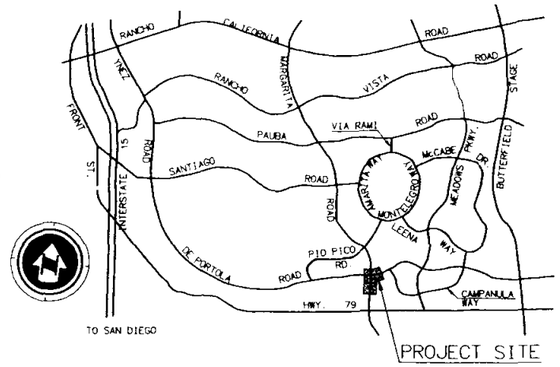

VICINITY MAP

NOT TO SCALE

GENERAL NOTES

1. THE CONTRACTOR SHALL CONSTRUCT THE FLOOD CONTROL IMPROVEMENTS SHOWN ON THE DRAWINGS IN CONFORMANCE WITH THE REQUIREMENTS OF THE RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT'S SPECIFICATIONS DATED SEPTEMBER 1984, AND DESIGN MANUAL STANDARD DRAWINGS DATED MAY 1971.
2. AN ENCROACHMENT PERMIT IS REQUIRED FROM RIVERSIDE COUNTY FLOOD CONTROL. CONTACT ED LOTZ AT (909) 275-1266. AFTER THE PERMIT IS ISSUED THE DISTRICT MUST BE NOTIFIED ONE WEEK PRIOR TO CONSTRUCTION.
3. CONSTRUCTION INSPECTION WILL BE PERFORMED BY RIVERSIDE COUNTY FLOOD CONTROL. CONTACT CLYDE JOHNSON AT (909) 275-1288. THE DISTRICT MUST BE NOTIFIED TWENTY DAYS PRIOR TO CONSTRUCTION.
4. ALL STATIONS REFERS TO CENTERLINE OF CONSTRUCTION UNLESS OTHERWISE NOTED.
5. STATIONING FOR LATERALS AND CONNECTOR PIPE REFER TO THE CENTER LINE CENTERLINE INTERSECTION STATION.
6. FORTY-EIGHT HOURS BEFORE EXCAVATION, CALL UNDERGROUND SERVICE ALERT 1-800-422-4133
7. ALL ELEVATIONS SHOWN ARE IN FEET AND DECIMALS THEREOF BASED ON U.S.C. & G.S. DATUM.
8. ELEVATIONS OF UTILITIES ARE APPROXIMATE UNLESS OTHERWISE NOTED.
9. OPENINGS RESULTING FROM CUTTING OR PARTIAL REMOVAL OF EXISTING CULVERTS, PIPES OR SIMILAR STRUCTURES TO BE ABANDONED SHALL BE SEALED WITH 6" OF CLASS "B" CONCRETE.
10. BEDDING PIPE WITH LESS THAN TWO FEET OF COVER SHALL CONFORM TO LOS ANGELES COUNTY FLOOD CONTROL DISTRICT STANDARD DRAWINGS 2-D213.3. AND 2-D177 FOR CONCRETE BACKFILL IN TRENCHES. ALL OTHER PIPE SHALL CONFORM TO RCFC & WCD STD. DWG. M815.
11. ALL CROSS-SECTIONS ARE TAKEN LOOKING DOWNSTREAM.
12. ALL CURBS, GUTTERS, SIDEWALKS, DRIVEWAYS AND OTHER EXISTING IMPROVEMENTS TO BE RECONSTRUCTED IN KIND AND AT THE SAME ELEVATION AND LOCATION AS THE EXISTING IMPROVEMENTS UNLESS OTHERWISE NOTED.

ESTIMATED QUANTITIES FOR THOSE FACILITIES INSPECTED BY R.C.F.C.D.

NO.	ITEM DESCRIPTION	UNIT	AMOUNT
1	INSTALL 18" RCP, CLASS IV	L.F.	33
2	INSTALL 24" RCP, CLASS IV	L.F.	0
3	INSTALL 30" RCP, D-LOAD PER PROFILE	L.F.	39
4	INSTALL 42" RCP, D-LOAD PER PROFILE	L.F.	247
5	INSTALL 72" RCP, D-LOAD PER PROFILE	L.F.	742
6	CONSTRUCT MANHOLE NO. 4 PER RCFCD STD. NO. MH254	EA.	1
7	CONSTRUCT CATCH BASIN NO. 1 PER RCFCD STD. NO. CB100	L.F.	18
8	CONSTRUCT LOCAL DEPRESSION NO. 2 CASES B & C PER RCFCD STD. NO. LD201	EA.	2
9	CONSTRUCT JUNCTION STRUCTURE NO. 2 PER RCFCD STD. JS227	EA.	1
10	CONSTRUCT CONCRETE BULKHEAD PER RCFCD STD. NO. MB16	EA.	2
11	REMOVE EXIST. CONCRETE BULKHEAD	EA.	1
12	REMOVE AND REPLACE A.C. PAVEMENT	S.F.	5,588
13	CONSTRUCT TRANSITION STRUCTURE NO. 3 PER RCFCD STD. TS303	EA.	1
14	CONSTRUCT MANHOLE NO. 2 PER RCFCD STD. NO. MH252	EA.	1
15	CONSTRUCT JUNCTION STRUCTURE NO. 4 PER RCFCD STD. JS229	EA.	1

NOTE :

THE FOLLOWING ITEMS ARE TO BE INSPECTED AND MAINTAINED BY RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT.

72" R.C.P. FROM STA. 15+08.55 TO 22+67.06
AS SHOWN ON SHEET NO. 2 & 3

SHEET INDEX

SHEET INDEX	SHEET NO.
TITLE SHEET, GENERAL NOTES, CONSTRUCTION NOTES AND ESTIMATED QUANTITIES	1
LINE "VV" STAGE III	2
LINE "VV" STAGE III, LINE "B"	3
LINE "B" & DETENTION BASIN	4

AS BUILT
APPROVED BY: [signature]
DATE 11/30/06

SCALE : 1"=100'

100 50 0 100 200 300
GRAPHIC SCALE IN FEET

UNDERGROUND STRUCTURES

ALL UNDERGROUND UTILITIES OR STRUCTURES REPORTED BY THE OWNER OR OTHERS AND THOSE SHOWN ON THE RECORDS EXAMINED ARE INDICATED WITH THEIR APPROXIMATE LOCATION AND EXTENT. THE OWNER BY ACCEPTING THESE PLANS OR PROCEEDING WITH IMPROVEMENTS PURSUANT THERETO AGREES TO ASSUME LIABILITY AND TO HOLD UNDERSIGNED HARMLESS FOR ANY DAMAGE RESULTING FROM THE EXISTENCE OF UNDERGROUND UTILITIES OR STRUCTURES NOT REPORTED TO THE UNDERSIGNED NOR INDICATED ON THE PUBLIC RECORDS EXAMINED, LOCATED AT VARIANCE WITH THAT REPORTED AS SHOWN ON RECORDS EXAMINED. THE CONTRACTOR IS REQUIRED TO TAKE DUE PRECAUTIONARY MEASURES TO PROTECT THE UTILITIES OR STRUCTURES SHOWN AND ANY OTHER UTILITIES OR STRUCTURES FOUND AT THE SITE. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO NOTIFY THE OWNERS OF THE UTILITIES OR STRUCTURES CONCERNED BEFORE STARTING WORK.

NOTICE :

THE CONTRACTOR SHALL NOTIFY THE DISTRICT IN WRITING A MINIMUM OF TWO WEEKS BEFORE BEGINNING CONSTRUCTION AND SHALL NOT BEGIN CONSTRUCTION BEFORE OBTAINING AUTHORIZATION TO PROCEED.

UNAUTHORIZED CHANGES & USES

CAUTION : THE ENGINEER PREPARING THESE PLANS WILL NOT BE RESPOSIBLE FOR, OR LIABLE FOR, UNAUTHORIZED CHANGES TO OR USES OF THESE PLANS. ALL CHANGES TO THE PLANS MUST BE IN WRITING AND MUST BE APPROVED BY THE PREPARER OF THESE PLANS.

BENCH MARK

T-1-81 EL= 1026.428

2 1/2" BRASS DISC IN CONC. CYLINDER, 2.4 MILES SOUTHEAST ON HWY. 79 FROM INTERSECTION MAIN AND FRONT STREET IN TEMECULA 53.3' SOUTH OF CENTERLINE HWY. 79, 3.2' EAST OF GT POLE (GT 2453) 300' EAST OF PRODUCE STAND MIDWAY BETWEEN P.P. 75580 AND P.P. 75581 ON LINE WITH OLD FENCE LINE, RUNNING N. & S. SET FIBERGLASS WITNESS POST 1' SOUTH OF MONUMENT.

DM LD99-223CO

BASIS OF BEARING NOTE

THE BEARINGS SHOWN HEREON ARE BASED ON A PORTION OF THE CENTERLINE OF MARGARITA ROAD AS SHOWN ON PARCEL MAP NO. 23432 FILED IN BOOK 159, PAGES 38 THROUGH 61 OF PARCEL MAPS IN THE OFFICE OF THE COUNTY RECORDER OF RIVERSIDE COUNTY, CALIFORNIA, BEING NORTH 16°56'06" WEST.

REGISTERED PROFESSIONAL ENGINEER MICHAEL A. TYLMAN No. 43090 Exp. 3/31/04 CIVIL STATE OF CALIFORNIA

Robert Bein, William Frost & Associates
PROFESSIONAL ENGINEERS, PLANNERS & SURVEYORS
27555 MUSI ROAD, STE. 400 TEMECULA CA 92591
(909) 676-9040 FAX (909) 676-7240
MICHAEL A. TYLMAN
R.C.E. NO. 43090
EXP. 3 31 04
4/25/00
DATE

REVISIONS

REF	DESCRIPTION	APPR	DATE	APPR	DATE

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
RECOMMENDED FOR APPROVAL BY: [signature] PLANNING ENGINEER DATE 5/19/00
APPROVED BY: [signature] CHIEF ENGINEER DATE 5/19/00

CITY OF TEMECULA
RECOMMENDED BY: [signature] DATE: 4/27/00
APPROVED BY: [signature] 4/27/00
RONALD J. PARKS DATE
R.C.E. NO. 19744 EXP. 9-30-01
DEPUTY DIRECTOR OF PUBLIC WORKS
CITY OF TEMECULA

STORM DRAIN PLANS
LINE "VV" STAGE III
& LINE "B"
PARCEL MAP NO. 29431

PROJECT NO. 7-0-0051
DRAWING NO. 7-305
SHEET NO. 1 OF 4

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RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

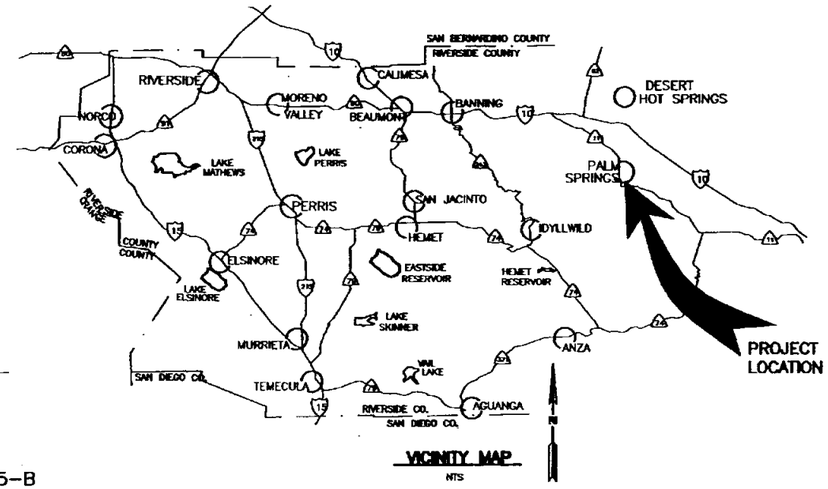

VICINITY MAP
NTS

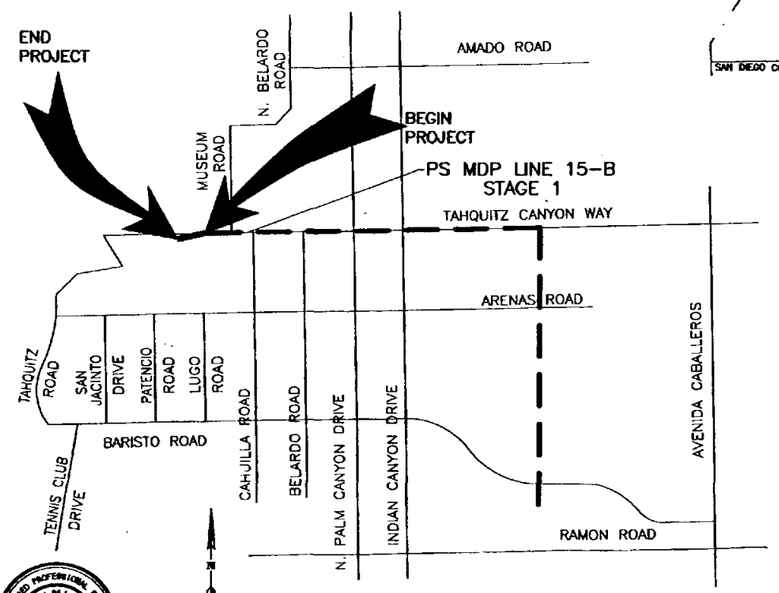

INDEX MAP
NTS

INDEX

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PLAN & PROFILE	2

GENERAL NOTES

1. ALL STATIONING REFERS TO CENTERLINE OF CONSTRUCTION.
2. ALL CHANNEL/STORM DRAIN REFERENCES AND CROSS SECTIONS ARE TAKEN LOOKING DOWNSTREAM.
3. TOPOGRAPHY BY DIGITAL PHOTOGRAMMETRIC METHODS. AERIAL PHOTOGRAPHS TAKEN AT AN ALTITUDE NOT TO EXCEED A FLYING HEIGHT TO CONTOUR INTERVAL RATIO OF 1800. PHOTOGRAPHY DATED 00-00-00.
4. THE VERTICAL DATUM IS DERIVED FROM (NGVD 29 OR NAVD 88). THE HORIZONTAL DATUM IS DERIVED FROM (NAD 27 OR NAD 83).
5. STANDARD DRAWINGS CALLED FOR ON THE PLAN & PROFILE SHALL CONFORM TO RCFC. & WCD STD DRAWINGS, OR CALTRANS/CITY/COUNTY STANDARD PLANS.
6. *ELEVATIONS AND LOCATIONS OF UTILITIES WERE OBTAINED FROM* AVAILABLE INFORMATION AND ARE SHOWN APPROXIMATELY ON THESE PLANS. 48 HOURS BEFORE EXCAVATION CALL UNDERGROUND SERVICE ALERT AT 1-800-227-2600. ALL UTILITIES SHALL BE PROTECTED IN PLACE EXCEPT AS NOTED ON PLANS AND SPECIFICATIONS.
7. THE CONTRACTOR IS REQUIRED TO CONTACT ALL UTILITY AGENCIES REGARDING TEMPORARY SUPPORT AND SHORING REQUIREMENTS FOR THE VARIOUS UTILITY LINES SHOWN ON THESE PLANS.
8. ALL OPENINGS RESULTING FROM CUTTING OR PARTIAL REMOVAL OF EXIST. CULVERTS, PIPES, OR SIMILAR STRUCTURES TO BE ABANDONED, SHALL BE SEALED AT BOTH ENDS WITH 6" MIN. CLASS "B" CONCRETE.
9. UNLESS OTHERWISE SPECIFIED, MINIMUM STREET RECONSTRUCTION SHALL BE 0.25' TYPE "B" ASPHALT CONCRETE OVER 6" CLASS 2 AGGREGATE BASE OR IN KIND, WHICHEVER IS GREATER.
10. ALL RECONSTRUCTION, RESURFACING AND PAVEMENT DELINEATION, CURBS, SIDEWALKS AND OTHER IMPROVEMENTS ARE TO BE RECONSTRUCTED IN KIND AT THE SAME LOCATIONS AND ELEVATIONS AS THE EXISTING IMPROVEMENTS, UNLESS OTHERWISE NOTED.
11. ⊕ INDICATES APPROX. SOIL BORING LOCATION PER SOILS REPORT DATED 00/00/00.
12. FOR COMPLETE RIGHT-OF-WAY AND TEMPORARY EASEMENT REFER TO DRAWING NO. 0-000, SHT 0 TO 00, AND DRAWING NO. 0-000T, SHT 0 TO 00 T.

MSA CONSULTING, INC.
MAINIERO, SMITH & ASSOCIATES, INC.
PLANNERS ■ CIVIL ENGINEERS ■ LAND SURVEYORS
34280 BOB HOPE DRIVE ■ RANCHO MIRAGE ■ CA 92270
TELEPHONE (760) 320-9811 ■ FAX (760) 323-7893

REGISTERED PROFESSIONAL ENGINEER — JULIAN A. DE LA TORRE — C43880 Exp. 6-30-05 — CIVIL — STATE OF CALIFORNIA

PREPARED UNDER THE DIRECT SUPERVISION OF SIGNATURE JULIAN A. DE LA TORRE EXP. 6-30-05	R.C.E. NO. 43880 DATE 5/19/04	APPROVED BY CITY OF PALM SPRINGS CITY ENGINEER R.C.E. NO. 28931 EXP. 3/31/07	Don't Dig...Until You Call U.S.A. Toll Free 1-800-227-2600 for the location of buried utility lines. Don't disrupt vital services.	PERMANENT BENCH MARK B.M. NO. 15-19 CHISLED BOX ON THE W.S.W. B.C.R. OF THE CURB AT THE INTERSECTION OF CAHUILLA ROAD AND BARISTO ROAD. 454.717 EL.	REVISIONS REV. DESCRIPTION APPR. DATE	RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT DESIGNED BY: RRL DRAWN BY: JLC DATE DRAWN: JULY 2003 CHECKED BY: RECOMMENDED FOR APPROVAL BY: PLANNING ENGINEER DATE: 6-9-2004 APPROVED BY: CHIEF ENGINEER DATE: 6-15-04	PALM SPRINGS MASTER DRAINAGE PLAN LINES 15 + 15B STAGE III STATION 43+92.74 TO 45+17.26 TITLE SHEET	PROJECT NO. 6-0-0220 DRAWING NO. 6-335 SHEET NO. 1 OF 2

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

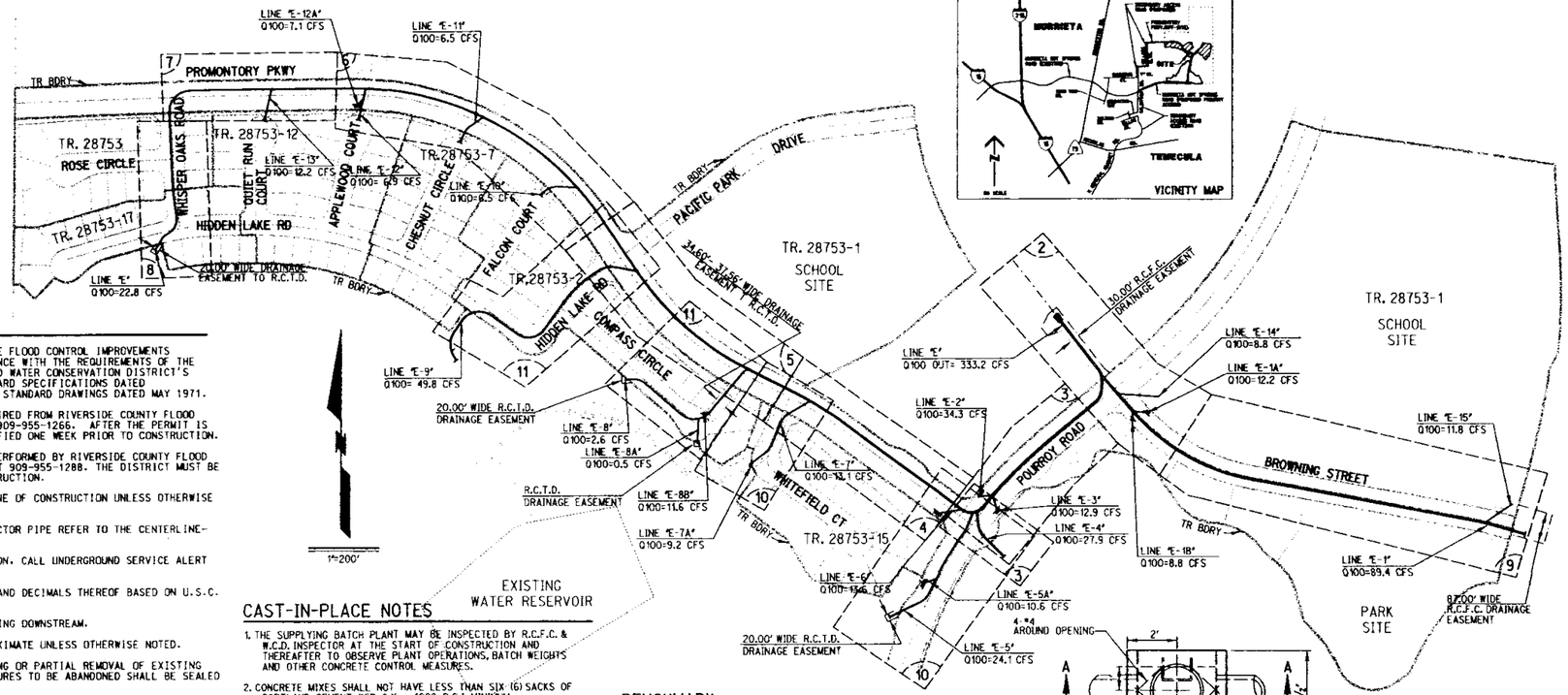

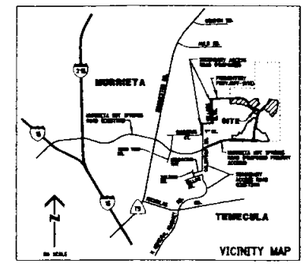

RCFC GENERAL NOTES:

1. THE CONTRACTOR SHALL CONSTRUCT THE FLOOD CONTROL IMPROVEMENTS SHOWN ON THE DRAWINGS IN CONFORMANCE WITH THE REQUIREMENTS OF THE RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT'S MEMORANDUM OF UNDERSTANDING STANDARD SPECIFICATIONS DATED SEPTEMBER 1984, AND DESIGN MANUAL STANDARD DRAWINGS DATED MAY 1971.
2. IF AN ENCROACHMENT PERMIT IS REQUIRED FROM RIVERSIDE COUNTY FLOOD CONTROL, THEN CONTACT ED LOTZ AT 909-955-1266. AFTER THE PERMIT IS ISSUED, THE DISTRICT MUST BE NOTIFIED ONE WEEK PRIOR TO CONSTRUCTION.
3. CONSTRUCTION INSPECTION WILL BE PERFORMED BY RIVERSIDE COUNTY FLOOD CONTROL. CONTACT *DALE ANDERSON* AT 909-955-1288. THE DISTRICT MUST BE NOTIFIED TWO WEEKS PRIOR TO CONSTRUCTION.
4. ALL STATIONING REFERS TO CENTERLINE OF CONSTRUCTION UNLESS OTHERWISE NOTED.
5. STATIONING FOR LATERALS AND CONNECTOR PIPE REFER TO THE CENTERLINE-CENTERLINE INTERSECTION STATION.
6. FORTY-EIGHT HOURS BEFORE EXCAVATION, CALL UNDERGROUND SERVICE ALERT 1-800-227-2600.
7. ALL ELEVATIONS SHOWN ARE IN FEET AND DECIMALS THEREOF BASED ON U.S.C. & G.S. DATUM.
8. ALL CROSS SECTIONS ARE TAKEN LOOKING DOWNSTREAM.
9. ELEVATIONS OF UTILITIES ARE APPROXIMATE UNLESS OTHERWISE NOTED.
10. OPENINGS RESULTING FROM THE CUTTING OR PARTIAL REMOVAL OF EXISTING CULVERTS, PIPES OR SIMILAR STRUCTURES TO BE ABANDONED SHALL BE SEALED WITH 6" OF CLASS "B" CONCRETE.
11. PIPE CONNECTED TO THE MAINLINE PIPE SHALL CONFORM TO JUNCTION STRUCTURE NO. 4 (JS 229) UNLESS OTHERWISE NOTED.
12. BEDDING PIPE WITH LESS THAN TWO FEET OF COVER SHALL CONFORM TO LOS ANGELES COUNTY FLOOD CONTROL DISTRICT STANDARD DRAWINGS 2-0213.3 AND 2-0177 FOR CONCRETE BACKFILL IN TRENCHES. ALL OTHER PIPE SHALL CONFORM TO RCFC & WCD STD. DWG. M815.
13. "V" IS THE DEPTH OF INLET OF CATCH BASINS MEASURED FROM THE TOP OF CURB TO INVERT OF CONNECTOR PIPE.
14. CATCH BASINS SHALL BE LOCATED SO THAT LOCAL DEPRESSION SHALL BEGIN AT EXISTING CURB RETURN JOINT, UNLESS OTHERWISE SPECIFIED.
15. ALL CURBS, GUTTERS, SIDEWALKS, DRIVEWAYS AND OTHER EXISTING IMPROVEMENTS TO BE RECONSTRUCTED IN KIND AND AT THE SAME ELEVATION AND LOCATION AS THE EXISTING IMPROVEMENTS UNLESS OTHERWISE NOTED.
16. THE CONCRETE COVER ON THE INSIDE OF ALL REINFORCED CONCRETE PIPE MUST BE INCREASED TO PROVIDE A MINIMUM OF 1½" OVER THE REINFORCING WHEN THE DESIGN VELOCITIES EXCEED 20 FEET PER SECOND. THE CONCRETE DESIGN STRENGTH IN THESE REACHES SHALL BE FC=5,000 PSI FOR VELOCITIES EXCEEDING 20 FEET PER SECOND AND FC=6,000 PSI FOR VELOCITES EXCEEDING 30 FEET PER SECOND.
17. A SOILS INVESTIGATION DATED SEPT. 6 2000 WO NO. 2405-A8-SC BY GEOSOILS, INC. SHALL BE INCLUDED AS A PART OF THESE PLANS. ALL WORK SHALL CONFORM TO RECOMMENDATIONS AS OUTLINED IN SAID REPORT. FOR GEOTECHNICAL RECOMMENDATIONS FOR CAST IN-PLACE PIPE (CIPP), SEE LETTER FROM PACIFIC SOILS ENGINEERING, INC. DATED MAY 15, 2001, W.O. NO. 400775

CAST-IN-PLACE NOTES

1. THE SUPPLYING BATCH PLANT MAY BE INSPECTED BY R.C.F.C. & W.C.D. INSPECTOR AT THE START OF CONSTRUCTION AND THEREAFTER TO OBSERVE PLANT OPERATIONS, BATCH WEIGHTS AND OTHER CONCRETE CONTROL MEASURES.
2. CONCRETE MIXES SHALL NOT HAVE LESS THAN SIX (6) SACKS OF PORTLAND CEMENT PER C.Y. - 4000 P.S.I. MINIMUM.
3. CONCRETE MIX DESIGNS SHALL BE SUBMITTED BY THE CONTRACTOR FOR APPROVAL PRIOR TO START OF CONSTRUCTION.
4. IF AND WHEN VELOCITY EXCEED 10 F.P.S., A 140(SEGMENT OF THE C.I.P.P. INVERT SHALL BE THICKENED 2 INCHES IN WALL THICKNESS AS "SACRIFICIAL CONCRETE" TO RESIST ABRASION. COMPRESSIVE STRENGTH OF CONCRETE AT 28 DAYS SHALL BE AT LEAST F'c=5,000 P.S.I. FOR DESIGN VELOCITIES GREATER THAN 20 F.P.S. C.I.P.P. SHALL NOT BE USED.
5. THE CONTRACTOR SHALL ALLOW THE DISTRICT INSPECTOR INTO PIPE WHILE UNDER CONSTRUCTION & ROD FOR ALL THICKNESS AT A MINIMUM.
6. AT THE END OF ALL POURS AND THE END OF EACH WORKING DAY, THE CONTRACTOR SHALL INSTALL #4 DOWELS 24" LONG 12" INTO THE LAST POUR AT 12" CENTERS AROUND THE CIRCUMFERENCE OF C.I.P.P.
7. A JUNCTION STRUCTURE NO. 2 (JS227) SHOWN ON THE PLANS ARE FOR REINFORCED CONCRETE PIPE, AND SHALL BE REPLACED WITH A TRANSITION STRUCTURE NO. 3 (TS303) FOR USE WITH C.I.P.P.

UNDERGROUND STRUCTURES

ALL UNDERGROUND UTILITIES OR STRUCTURES REPORTED BY THE OWNER OR OTHERS AND THOSE SHOWN ON THE RECORDS EXAMINED ARE INDICATED WITH THEIR APPROXIMATE LOCATION AND EXTENT. THE OWNER BY ACCEPTING THESE PLANS OR PROCEEDING WITH IMPROVEMENTS PURSUANT THERETO AGREES TO ASSUME LIABILITY AND TO HOLD UNDERSIGNED HARMLESS FOR ANY DAMAGES RESULTING FROM THE EXISTENCE OF UNDERGROUND UTILITIES OR STRUCTURES NOT REPORTED TO THE UNDERSIGNED; NOT INDICATED ON THE PUBLIC RECORDS EXAMINED; OR LOCATED AT VARIANCE WITH THAT REPORTED OR SHOWN ON RECORDS EXAMINED. THE CONTRACTOR IS REQUIRED TO TAKE DUE PRECAUTIONARY MEASURES TO PROTECT THE UTILITIES OR STRUCTURES SHOWN AND ANY OTHER UTILITIES OR STRUCTURES FOUND AT THE SITE. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO NOTIFY THE OWNERS OF THE UTILITIES OR STRUCTURES CONCERNED BEFORE STARTING WORK.

BENCHMARK:

MWD DESIGNATION: SD 6 1
NAVD 88 ELEV. 1401.44

1.1 MILES SOUTHWEST OF LAKE SKINNER DAM, FROM THE INTERSECTION OF BOREL ROAD AND BOOTLEGG ROAD, 118 FEET NORTH OF THE CENTERLINE OF BOOTLEGG ROAD, 21 FEET EAST OF THE CENTERLINE OF BOREL RD, 8 FEET SOUTH OF A TELEPHONE RISER, A 3-1/4 INCH STANDARD MWDSC ALUMINUM DISK, SET FLUSH, IN TOP OF, AND IN THE CENTER OF A 3 FEET WIDE CATCH BASIN, 1 FEET EAST OF CURB FACE.

DATUM CONVERSION NOTE

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UNAUTHORIZED CHANGES AND USES

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CAUTION:

EXACT LOCATION OF EXISTING UNDERGROUND FACILITIES IS UNKNOWN. CONTRACTOR TO VERIFY IN FIELD.

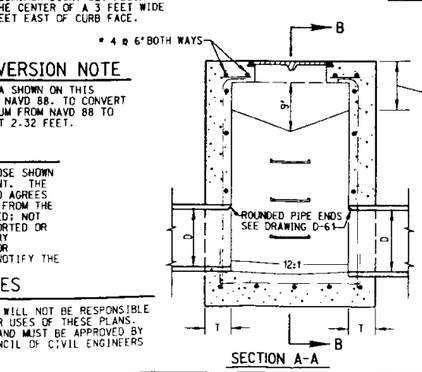

SECTION A-A

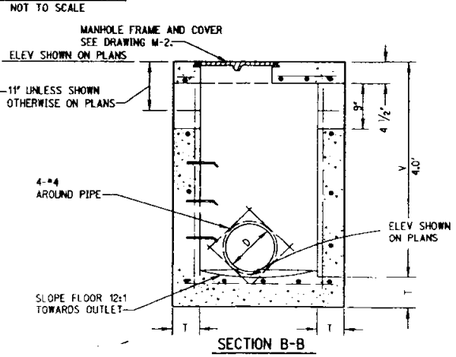

SECTION B-B

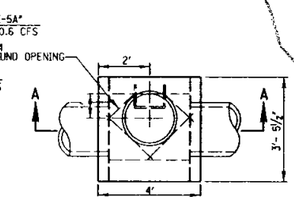

PLAN

CATCH BASIN -TYPE F
NOT TO SCALE

WORK TO BE DONE

THESE IMPROVEMENTS CONSIST OF THE FOLLOWING WORK TO BE DONE ACCORDING TO THESE PLANS, THE CURRENT RIVERSIDE COUNTY FLOOD CONTROL STANDARDS AND SPECIFICATIONS, AND THE LATEST EDITION OF THE STANDARD SPECIFICATIONS FOR PUBLIC WORK CONSTRUCTION ("GREEN BOOK").

NOTIFICATION

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ENGINEER OF WORK

RICK ENGINEERING COMPANY
3050 CHICAGO AVENUE SUITE 100
RIVERSIDE, CALIFORNIA 92507
PHONE- (909) 782-0707
FAX- (909) 782 0723

PRIVATE ENGINEER'S NOTE TO CONTRACTOR

ALL CONTRACTORS AND SUBCONTRACTORS PERFORMING WORK SHOWN ON OR RELATED TO THESE PLANS SHALL CONDUCT THEIR OPERATIONS SO THAT ALL EMPLOYEES ARE PROVIDED A SAFE PLACE TO WORK AND THE PUBLIC IS PROTECTED. ALL CONTRACTORS AND SUBCONTRACTORS SHALL COMPLY WITH THE OCCUPATIONAL SAFETY AND HEALTH REGULATION OF THE U.S. DEPARTMENT OF LABOR AND THE STATE OF CALIFORNIA DEPARTMENT OF INDUSTRIAL RELATIONS CONSTRUCTION SAFETY ORDERS. THE CIVIL ENGINEER SHALL NOT BE RESPONSIBLE IN ANY WAY FOR THE CONTRACTORS AND SUBCONTRACTORS COMPLIANCE WITH SAID REGULATIONS AND ORDERS.

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R.C.F.C.D. STANDARD DRAWINGS

D90	HEADWALL PER CALTRANS (MANHOLE)
CB 100	CATCH BASIN
CB 108	CSP INLET
JS 227	JUNCTION STRUCTURE NO.2
JS 229	JUNCTION STRUCTURE NO.4
M 803	CONCRETE COLLAR
MH 251	MANHOLE NO.1
MH 252	MANHOLE NO.2
MH 254	MANHOLE NO.4
TS 303	TRANSITION STRUCTURE NO.3

AS BUILT
APPROVED BY: Edward M. Ratican
DATE 2/21/7

CALTRANS STANDARD DRAWINGS

D89	HEADWALL

COUNTY OF RIVERSIDE STANDARD DRAWINGS

CB300	CURB INLET CATCH BASIN

TRANSPORTATION QUANTITIES

PLACE 18" RCP (CLASS IV)	894 LF
PLACE 24" RCP (CLASS IV)	1535 LF
PLACE 30" RCP (D LOAD PER PLAN)	271 LF
PLACE 36" RCP (D LOAD PER PLAN)	1854 LF
CONSTRUCT MANHOLE (MH) NO. 1 PER RCFCD STD MH 251	10 EA
CONSTRUCT MANHOLE (MH) NO. 4 PER RCFCD STD MH 254	2 EA
CONSTRUCT CATCH BASIN W=4' PER RCFCD STD CB 100	3 EA
CONSTRUCT CATCH BASIN W=7' PER RCFCD STD CB 100	2 EA
CONSTRUCT CATCH BASIN W=14' PER RCFCD STD CB 100	2 EA
CONSTRUCT CATCH BASIN W=21' PER RCFCD STD CB 100	3 EA
CONSTRUCT TRANSITION STRUCTURE (TS) NO. 3 PER RCFCD STD TS303	2 EA
CONSTRUCT JUNCTION STRUCTURE (JS) NO. 4 PER RCFCD STD JS 229	3 EA
CONSTRUCT HEADWALL PER CALTRANS D89	4 EA
CONSTRUCT INLET TYPE IX	3 EA
CONSTRUCT INLET TYPE F	2 EA
CONSTRUCT CONCRETE COLLAR PER RCFCD STD. M803	1 EA HR

SEAL-COUNTY
REGISTERED PROFESSIONAL ENGINEER KHALED A. OTHMAN No. 33950 Exp.6-30-02 CIVIL STATE OF CALIFORNIA

COUNTY OF RIVERSIDE
TRANSPORTATION DEPARTMENT
APPROVED BY: DATE: 10/16/01
RECOMMENDED BY WILLDAN DATE: 10/9/01

DIG ALERT
CALL BEFORE YOU DIG!
1-800-227-2600
UNDERGROUND SERVICE ALERT
Called least 2 working days prior to excavating.

SEAL:
REGISTERED PROFESSIONAL ENGINEER EDWARD MICHEL RATICAN No. 46804 Exp.6-30-03 CIVIL STATE OF CALIFORNIA

RICK ENGINEERING COMPANY
San Diego Riverside Orange Phoenix Tucson
1223 University Ave. Ste 240 - Riverside, CA 92507-3410 - (909)782-0707 - FAX (909)782-0723 - www.rickeng.com
Plans Prepared Under Supervision Of
EDWARD MICHEL RATICAN Date 10/4/01
R.C.E. No. 46804 Expires 6-30-03

BENCH MARK
SEE ABOVE

REVISIONS

REF.	DESCRIPTION	APPR.	DATE
2	1-31-02 REC REVISED LINE E-11 TO 60 OVER EXIST. 30" WATERLINE	MRG	2-14-02
1	ADD CIPP AS ALT PIPE ON LATERALS	MRG	7/16/01

EWR

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

DESIGNED BY:	MRG
DRAWN BY:	MRG
DATE DRAWN	08/2001
CHECKED BY:	EWR

RECOMMENDED FOR APPROVAL BY: Michael D. Rauner DATE: 11/6/01
APPROVED BY: DATE: 11/6/01

CASE TYPE: MS 3833 I.P. NO. 010062

TITLE SHEET
SANTA GERTRUDIS VALLEY-BROWNING STREET STORM DRAIN AND LATERAL

PROJECT NO. 7-0-0036
DRAWING NO. 7-333
SHEET NO. 1 OF 11

G:\d_13108\108sd21.dgn

PLOT DATE: 04-OCT-2001 JN 13108

© 2001 County of Riverside

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

RCFC GENERAL NOTES:

1. THE CONTRACTOR SHALL CONSTRUCT THE FLOOD CONTROL IMPROVEMENTS SHOWN ON THE DRAWINGS IN CONFORMANCE WITH THE REQUIREMENTS OF THE RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT'S MEMORANDUM OF UNDERSTANDING STANDARD SPECIFICATIONS DATED SEPTEMBER 1984, AND DESIGN MANUAL STANDARD DRAWINGS DATED MAY 1971.
2. IF AN ENCROACHMENT PERMIT IS REQUIRED FROM RIVERSIDE COUNTY FLOOD CONTROL, THEN CONTACT ED LOTZ AT 909-955-1266. AFTER THE PERMIT IS ISSUED THE DISTRICT MUST BE NOTIFIED ONE WEEK PRIOR TO CONSTRUCTION.
3. CONSTRUCTION INSPECTION WILL BE PERFORMED BY RIVERSIDE COUNTY FLOOD CONTROL. CONTACT CLYDE JOHNSON AT 909-955-1288. THE DISTRICT MUST BE NOTIFIED TWO WEEKS PRIOR TO CONSTRUCTION.
4. ALL STATIONING REFERS TO CENTERLINE OF CONSTRUCTION UNLESS OTHERWISE NOTED.
5. STATIONING FOR LATERALS AND CONNECTOR PIPE REFER TO THE CENTERLINE-CENTERLINE INTERSECTION STATION.
6. FORTY-EIGHT HOURS BEFORE EXCAVATION, CALL UNDERGROUND SERVICE ALERT 1-800-227-2600.
7. ALL ELEVATIONS SHOWN ARE IN FEET AND DECIMALS THEREOF BASED ON U.S.C. & G.S. DATUM.
8. ALL CROSS SECTIONS ARE TAKEN LOOKING DOWNSTREAM.
9. ELEVATIONS OF UTILITIES ARE APPROXIMATE UNLESS OTHERWISE NOTED.
10. OPENINGS RESULTING FROM THE CUTTING OR PARTIAL REMOVAL OF EXISTING CULVERTS, PIPES OR SIMILAR STRUCTURES TO BE ABANDONED SHALL BE SEALED WITH 6" OF CLASS "B" CONCRETE.
11. PIPE CONNECTED TO THE MAINLINE PIPE SHALL CONFORM TO JUNCTION STRUCTURE NO. 4 (JS 229) UNLESS OTHERWISE NOTED.
12. BEDDING PIPE WITH LESS THAN TWO FEET OF COVER SHALL CONFORM TO LOS ANGELES COUNTY FLOOD CONTROL DISTRICT STANDARD DRAWINGS 2-0213.3 AND 2-0177 FOR CONCRETE BACKFILL IN TRENCHES. ALL OTHER PIPE SHALL CONFORM TO RCFC & WCD STD. DWG. M815.
13. "V" IS THE DEPTH OF INLET OF CATCH BASINS MEASURED FROM THE TOP OF CURB TO INVERT OF CONNECTOR PIPE.
14. CATCH BASINS SHALL BE LOCATED SO THAT LOCAL DEPRESSION SHALL BEGIN AT EXISTING CURB RETURN JOINT, UNLESS OTHERWISE SPECIFIED.
15. ALL CURBS, GUTTERS, SIDEWALKS, DRIVEWAYS AND OTHER EXISTING IMPROVEMENTS TO BE RECONSTRUCTED IN KIND AND AT THE SAME ELEVATION AND LOCATION AS THE EXISTING IMPROVEMENTS UNLESS OTHERWISE NOTED.
16. THE CONCRETE COVER ON THE INSIDE OF ALL REINFORCED CONCRETE PIPE MUST BE INCREASED TO PROVIDE A MINIMUM OF 1½" OVER THE REINFORCING WHEN THE DESIGN VELOCITIES EXCEED 20 FEET PER SECOND. THE CONCRETE DESIGN STRENGTH IN THESE REACHES SHALL BE FC=5,000 PSI FOR VELOCITIES EXCEEDING 20 FEET PER SECOND AND FC=6,000 PSI FOR VELOCITES EXCEEDING 30 FEET PER SECOND.
17. A SOILS INVESTIGATION DATED SEPT. 6, 2000 W.O. NO. 2405-A8-SC BY GEOSOILS, INC. SHALL BE INCLUDED AS A PART OF THESE PLANS. ALL WORK SHALL CONFORM TO RECOMMENDATIONS AS OUTLINED IN SAID REPORT. FOR GEOTECHNICAL RECOMMENDATIONS FOR CAST IN-PLACE PIPE (CIPP), SEE LETTER FROM PACIFIC SOILS ENGINEERING, INC. DATED MAY 15, 2001. W.O. NO. 400775.

UNDERGROUND STRUCTURES

ALL UNDERGROUND UTILITIES OR STRUCTURES REPORTED BY THE OWNER OR OTHERS AND THOSE SHOWN ON THE RECORDS EXAMINED ARE INDICATED WITH THEIR APPROXIMATE LOCATION AND EXTENT. THE OWNER BY ACCEPTING THESE PLANS OR PROCEEDING WITH IMPROVEMENTS PURSUANT THERETO AGREES TO ASSUME LIABILITY AND TO HOLD UNDERSIGNED HARMLESS FOR ANY DAMAGES RESULTING FROM THE EXISTENCE OF UNDERGROUND UTILITIES OR STRUCTURES NOT REPORTED TO THE UNDERSIGNED: NOT INDICATED ON THE PUBLIC RECORDS EXAMINED: OR LOCATED AT VARIANCE WITH THAT REPORTED OR SHOWN ON RECORDS EXAMINED. THE CONTRACTOR IS REQUIRED TO TAKE DUE PRECAUTIONARY MEASURES TO PROTECT THE UTILITIES OR STRUCTURES SHOWN AND ANY OTHER UTILITIES OR STRUCTURES FOUND AT THE SITE. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO NOTIFY THE OWNERS OF THE UTILITIES OR STRUCTURES CONCERNED BEFORE STARTING WORK.

UNAUTHORIZED CHANGES AND USES

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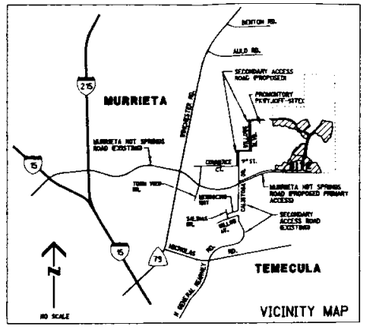

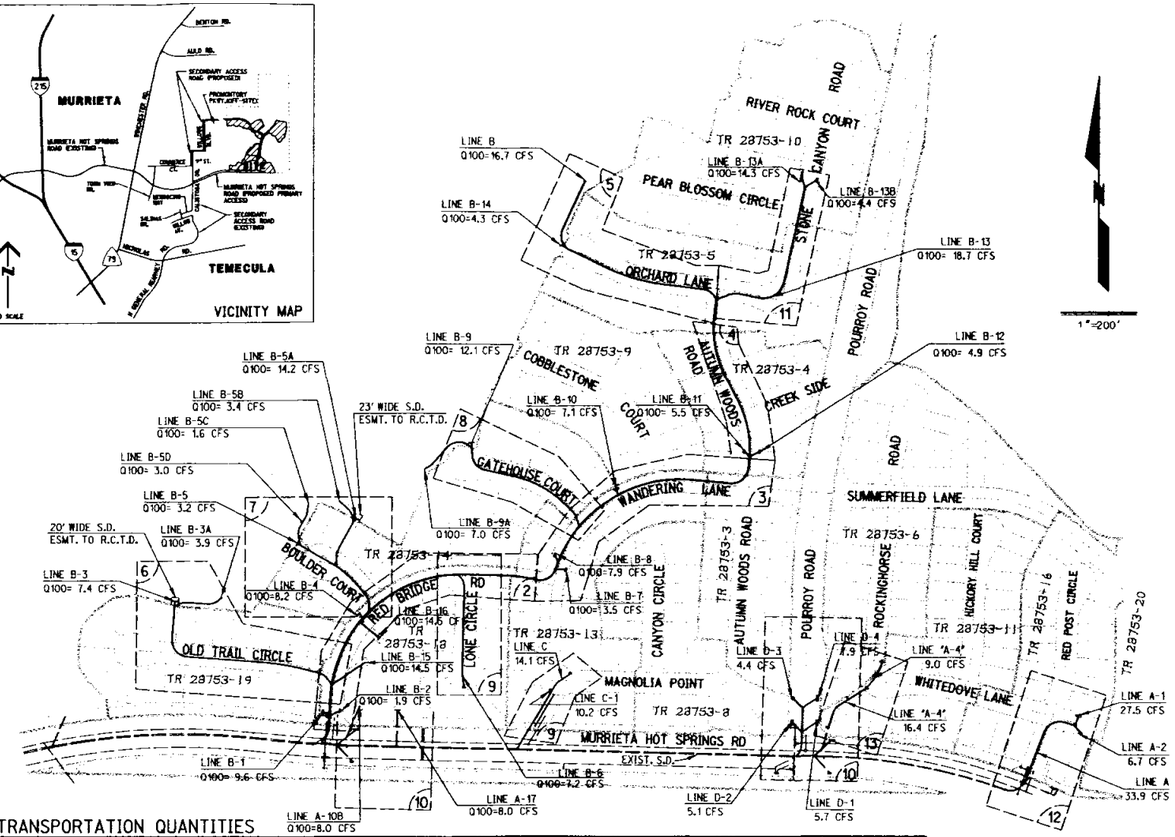

TRANSPORTATION QUANTITIES

CONSTRUCT 18" RCP (CLASS IV)	2778 LF
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CONSTRUCT 30" RCP (D LOAD PER PLAN)	1197 LF
CONSTRUCT 36" RCF (D LOAD PER PLAN	353 LF
CONSTRUCT 18' OUTLET STRUCTURE	1 EA
CONSTRUCT 18' INLET STRUCTURE (HEADWALL)	4 EA
CONSTRUCT MANHOLE(MH) NO.1 PER RCFCD STD MH251	15 EA
CONSTRUCT MANHOLE(MH) NO.2 PER RCFCD STD MH	2 EA
CONSTRUCT CATCH BASINS W=4' PER RCFCD STD CB100	5 EA
CONSTRUCT CATCH BASINS W=7' PER RCFCD STD CB100	10 EA
CONSTRUCT CATCH BASINS W=14' PER RCFCD STD CB100	5 EA
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CONSTRUCT JUNCTION STRUCTURE(JS) NO. 2 PER RCFCD STD JS227	3 EA
CONSTRUCT CATCH BASIN(CB) NO. 1 PER RCFCD STD CB100	16 EA
CONSTRUCT CONCRETE COLLAR PER RCFCD STD M803	6 EA
CONSTRUCT MANHOLE(MH) NO. 4 PER RCFCD STD MH 254	2 EA
CONSTRUCT JUNCTION STRUCTURE(JS) NO. 4 PER RCFCD STD JS229	6 EA
CONSTRUCT CSP INLET PER RCFCD STD CB108	7 EA
CONSTRUCT HEADWALL PER CALTRANS D89	4 EA
CONSTRUCT 12" PVC SDR-35	349 LF
CONSTRUCT GUTTER DEPRESSION PER COUNTY OF RIVERSIDE STD NO.311	21 EA
INLET TYPE X	7 EA

BENCHMARK:

MWD DESIGNATION: SD 6 1
NAVD 88 ELEV. 1401.44

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ENGINEER OF WORK

RICK ENGINEERING COMPANY
3050 CHICAGO AVENUE SUITE 100
RIVERSIDE, CALIFORNIA 92507
PHONE- (909) 782-0707
FAX- (909) 782 0723

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RCFCD STANDARD DRAWINGS

CB 108	CSP INLET
CB 300	CATCH BASIN
JS 227	JUNCTION STRUCTURE NO.2
JS 229	JUNCTION STRUCTURE NO.4
M 803	CONCRETE COLLAR
MH 251	MANHOLE NO.1
MH 254	MANHOLE NO.4
TS 303	TRANSITION STRUCTURE NO.3

CALTRANS STANDARD DRAWINGS

D89	HEADWALL

COUNTY OF RIVERSIDE STANDARD DRAWINGS

300	CATCH BASIN
311	GUTTER DEPRESSION

AS BUILT
APPROVED BY: Ewm
DATE 2/23/7

HR

DIG ALERT
CALL BEFORE YOU DIG!
1-800-227-2600
UNDERGROUND SERVICE ALERT
Call at least 2 working days prior to excavating.

CAUTION:
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SEAL-COUNTY: REGISTERED PROFESSIONAL ENGINEER HALED A. OTHMAN No. 33950 Exp.6-30-02 CIVIL STATE OF CALIFORNIA

COUNTY OF RIVERSIDE
TRANSPORTATION DEPARTMENT
APPROVED BY: DATE: 10/16/01
RECOMMENDED BY WILLDAN DATE: 10/9/01

SEAL: REGISTERED PROFESSIONAL ENGINEER EDWARD MICHEL RATICAN No. 46804 Exp.6-30-03 CIVIL STATE OF CALIFORNIA

RICK ENGINEERING COMPANY
San Diego Riverside Orange Phoenix Tucson
1333 University Ave., Ste 240 - Riverside, CA 92507-3418 - (909)782-0707 - FAX (909)782-0723 - www.rickeng.com
Plans Prepared Under Supervision Of
EDWARD MICHEL RATICAN Date 8/30/01
R.C.E. No. 46804 Expires 6-30-03

REVISIONS			
REF.	DESCRIPTION	APPR.	DATE

BENCH MARK: SEE ABOVE

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

DESIGNED BY: MRG	RECOMMENDED FOR APPROVAL BY:	APPROVED BY:	
DRAWN BY: MRG			
CHECKED BY: EMR			
SCALE: HORIZ. 1"=200' VERT. N/A	DATE: 11/6/01	DATE: 11/6/01	

CASE TYPE: MS 3834 I.P. NO. 010063

TITLE SHEET
SANTA GERTRUDIS VALLEY-
MURRIETA HOT SPRINGS ROAD
RED BRIDGE ROAD LATERAL
TRACT NO. 28753

PROJECT NO. 7-0-0034
DRAWING NO. 7-332
SHEET NO. 1 OF 13

G:\d_13108\108sd10.dgn

PLOT DATE: 29-AUG-2001 JN 13108

WARREN D. WILLIAMS
General Manager-Chief Engineer

0000988
1995 MARKET STREET
RIVERSIDE, CA 92501
951.955.1200
FAX 951.788.9965
www.floodcontrol.co.riverside.ca.us
116775

RIVERSIDE COUNTY FLOOD CONTROL
AND WATER CONSERVATION DISTRICT

October 31, 2007

Hand Delivered

Mr. John Robertus, Executive Officer
San Diego Regional Water Quality Control Board
9771 Clairemont Mesa Blvd., Suite A
San Diego, CA 92124

Sent UPS Next Day Air

Mr. Terry Oda, Chief
CWA Standards and Permits
United States Environmental Protection Agency
Region IX (WTR-5)
75 Hawthorne Street
San Francisco, CA 94015-3901

Dear Messrs. Robertus and Oda:

Re: FY 2006-2007 Annual Reports
Order No. R9-2004-001
NPDES Permit No. CAS0108766

Please find attached copies of the FY 2006-2007 annual reports for the National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) program for the Santa Margarita Region of Riverside County. The following annual reports are submitted in accordance with Third-Term NPDES MS4 Permit (Board Order No. R9-2004-001, NPDES Permit No. CAS0108766) adopted by the San Diego Region Regional Water Quality Control Board (Regional Board) on July 14, 2004 for the Santa Margarita Watershed Region of Riverside County (Third-Term NPDES MS4 Permit):

- Riverside County Flood Control and Water Conservation District (District) Individual Storm Water Management Plan (Individual SWMP) Annual Report
- County of Riverside Individual SWMP Annual Report
- City of Murrieta Individual SWMP Annual Report
- City of Temecula Individual SWMP Annual Report
- Watershed SWMP Annual Report
- Monitoring Program Annual Report (as Appendix G of Watershed Annual Report)

The reports provide a comprehensive summary and analysis of the Third-Term NPDES MS4 Permit compliance activities during FY 2006-2007 by the District, County of Riverside, and Cities of Murrieta and Temecula (Permittees).

Re: FY 2006-2007 Annual Report
Order No. R9-2004-01
NPDES Permit No. CAS0108766

These annual reports specifically respond to the Third-Term NPDES MS4 Permit's reporting requirements. This report is the first to report on the new Third-Term NPDES MS4 Permit programs. The Individual SWMP Annual Reports summarize the Permittees individual compliance activities. The Watershed SWMP Annual Report summarizes the Permittees combined watershed based compliance activities. These watershed based activities include the Permittees continued commitment to protecting water quality through:

- Development of the Integrated Regional Water Management Plan in conjunction the Permittees, Rancho California Water District, Elsinore-Murrieta-Anza Resource Conservation District, Trout Unlimited, Riverside Lands Conservancy, San Diego State University/Santa Margarita Ecological Reserve, Southwestern Riverside County Multi-Species Reserve, U. S. Bureau of Reclamation, Eastern Municipal Water District, Western Municipal Water District, The Nature Conservancy, California Department of Fish and Game, U.S. Army Corps of Engineers and Regional Board. The intent of the IRWMP is to pave the way for greater watershed-wide coordination and management of water resources within the Santa Margarita watershed as a whole, as well as adjoining watershed and regional planning efforts;
- Initiation of Toxicity Reduction Evaluation (TRE) to address potential Pyrethroid Toxicity in Receiving Waters; and
- Jointly fund a low impact development (LID) Best Management Practices (BMP) testing and demonstration facility for southern California. The facility will be a retrofit of the District's compound in Riverside. Data collected from the facility will be used to update the BMP Design Manual, develop numeric criteria for hydromodification, and provide data for Statewide efforts to better define the effectiveness of LID BMPs. The facility will also serve as a regional demonstration facility for southern California MS4 Permittee groups.

The District is committed to continuing its ongoing efforts to work cooperatively with the Co-Permittees, Regional Board staff and other stakeholders in implementing an effective municipal stormwater program and fulfilling the requirements of the current Third-Term NPDES MS4 Permit. If you have any questions concerning this matter, please feel free to call me at 951.955.8411 or Jason Uhley at 951.955.1273.

Very truly yours,

S. E. Stump

STEPHEN E. STUMP
Chief of Regulatory Division

Re: FY 2006-2007 Annual Report
Order No. R9-2004-01
NPDES Permit No. CAS0108766

Attachments:
District Individual SWMP Annual Report
Temecula Individual SWMP Annual Report
Murrieta Individual SWMP Annual Report
Riverside County Individual SWMP Annual Report
Watershed SWMP Annual Report

c: County of Riverside
Attn: Alex Gann
Mike Shetler
City of Murrieta
Attn: Farida Naceem
City of Temecula
Attn: Aldo Licitra
U. S. Environmental Protection Agency - Region IX
Attn: Eugene Bromley
RCFC&WCD
Attn: Jason Uhley
Tina Tuason

TT:bjp

2006 – 2007 WATERSHED ANNUAL PROGRESS REPORT

TO THE
SAN DIEGO REGIONAL WATER QUALITY CONTROL BOARD
AND
UNITED STATES ENVIRONMENTAL PROTECTION AGENCY – REGION IX
(Order No. R9-2004-001, NPDES No. CAS108766)

OCTOBER 31, 2007

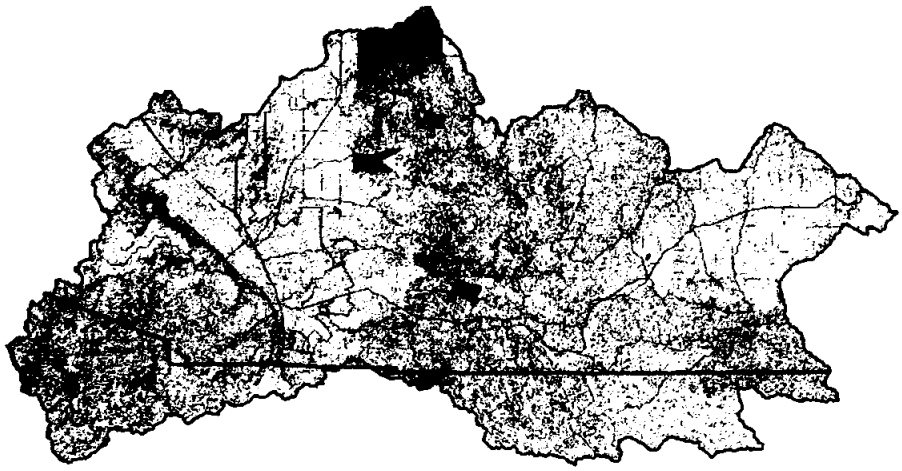

VOLUME 1 of 1

SANTA MARGARITA WATERSHED

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT,
COUNTY OF RIVERSIDE, CITY OF MURRIETA, and CITY OF TEMECULA

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2006 – 2007 DISTRICT INDIVIDUAL SWMP

TO THE
SAN DIEGO REGIONAL WATER QUALITY CONTROL BOARD
AND
UNITED STATES ENVIRONMENTAL PROTECTION AGENCY – REGION IX
(Order No. R9-2004-001, NPDES No. CAS108766)

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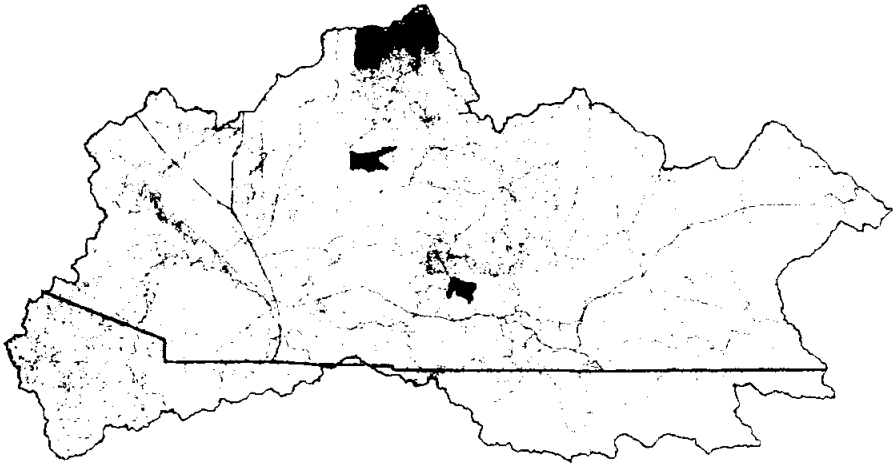

VOLUME 1 of 1

SANTA MARGARITA WATERSHED

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

N P D E S

CERTIFICATION

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Signed: S. E. Stump

Stephen E. Stump
Chief of Regulatory Division
Riverside County Flood Control
and Water Conservation District

CERTIFICATION

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Signed: _____

Kenneth M. Mohr
Assistant County Executive Officer
Riverside County Executive Office
County of Riverside

CERTIFICATION STATEMENT

I certify under penalty of law that this document and all attachments were prepared or reviewed under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Patrick J. Thomas

Signature

Patrick J. Thomas, Director of Public Works

Name and Title, Printed or Typed

10/29/07

Date

WATERSHED ANNUAL REPORT CERTIFICATION STATEMENT

I certify under penalty of law that this document and all attachments were prepared or reviewed under my direction or supervision in accordance with a system designed to ensure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Signature

Daniel A. York, City Engineer
Name and Title, Printed or Typed

October 30, 2007
Date

RIVERSIDE COUNTY

SANTA MARGARITA REGION
NPDES MUNICIPAL STORMWATER PERMIT
(NPDES No. CAS0108766)

WATERSHED ANNUAL PROGRESS REPORT
FOR
FISCAL YEAR 2006-2007

A. Executive Summary
B. Overview of Upper Santa Margarita River Watershed
C. A Description of Efforts to Coordinate with other Stakeholders in the Upper Santa Margarita Watershed, Including San Diego County and the U.S. Marine Corps Base Camp Pendleton
D. An Assessment of Water Quality in the Santa Margarita Region, This Assessment Shall Include Data From the Previous Monitoring Report
E. Identification of Water Quality Improvement or Degradation in the Santa Margarita Region
F. A Prioritization of Water Quality Problems and Potential Sources in the Santa Margarita Region
G. A Description of Watershed Specific Education Activities Conducted During the Reporting Period
H. A Description of All Area-Wide and Watershed-Based Activities Conducted During the Reporting Period
I. Recommended Activities to be Conducted Jointly by Permittees to Address the Identified Water Quality Problems
J. An Assessment of Overall Program Effectiveness Based on Measurable Goals Established in the DAMP
K. Proposed Revision to the Watershed SWMP

Appendix A - Meeting Agendas and Notes
Appendix B - Public Education
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Appendix F – Watershed MS4 Facilities Map
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BOARD ORDER NO. R9-2004-001
CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN DIEGO REGION

Fiscal Year 2006-2007 Watershed Annual Report

A. Executive Summary

The Watershed Annual Report documents regional Urban Runoff management programs and activities that were implemented to comply with the requirements of Provision K and the Monitoring and Reporting Program (MRP) of the Municipal Separate Storm Sewer System (MS4) Permit issued to the Riverside County Permittees by the San Diego Regional Water Quality Control Board (Regional Board) on July 14, 2004 (Board Order R9-2004-001). This is the third MS4 permit issued for the Santa Margarita Region (SMR) by the Regional Board and is referred to as the "Third-term SMR Permit". This Watershed Annual Report specifically addresses the reporting requirements identified in the Watershed Annual Report section of the MRP to the Third-term SMR Permit. It provides a description of the area-wide and watershed-based programs and activities that the Permittee implemented during the Fiscal Year 2006-2007 reporting period to comply with the Third-term SMR Permit and to reduce pollutants in Urban Runoff to the Maximum Extent Practicable (MEP).

The Third-term MS4 Permit required each Permittee to develop an Individual Storm Water Management Plan (SWMP) and for all the Permittees to jointly develop a Watershed SWMP. These compliance documents, and the programs they describe, were to be completed, submitted to the Regional Board and implemented by July 14, 2005. Annual Reports for each of these documents are required and are to be submitted to the Regional Board on October 31st of each calendar year. The reporting period is specified as the preceeding fiscal year. The Riverside County Flood Control and Water Conservation District (District) is specifically required to prepare an Individual SWMP Annual Report and to coordinate the preparation of the Watershed SWMP Annual Report with Riverside County and the Cities of Murrieta and Temecula (Permittees). As Principal Permittee, the District is also tasked with coordinating the submittal of the Individual SWMP Annual Reports for the other Permittees.

This Watershed Annual Report covers the period extending from July 1, 2006 through June 30, 2007. The FY 2005-2006 Annual Report reflects the first year that all programs have been implemented for a full year.

In general, this Watershed Annual Report provides specific detail regarding implementation of the regional programs described in the Riverside County Drainage Area Management Plan (DAMP). The DAMP serves the dual role of a model Individual SWMP and Watershed SWMP for the purposes of the Third-term MS4 Permit.

For purposes of this Watershed Annual Report, the terms "(Watershed SWMP)" and "Standard Urban Stormwater Management Plan (SUSMP)" referenced in the SMR Permit are referred to as the "DAMP" and "Water Quality Management Plan (WQMP)," respectively, to be consistent with terminology established and in use by the Permittees. Additional terms and acronyms used in this Watershed Annual Report are defined in the glossary included in the DAMP.

Figure A-1 shows the SMR, which is the area covered under the SMR Permit. A copy of the Third-term SMR Permit is included as Appendix C of the DAMP.

Figure A-1. Santa Margarita Region

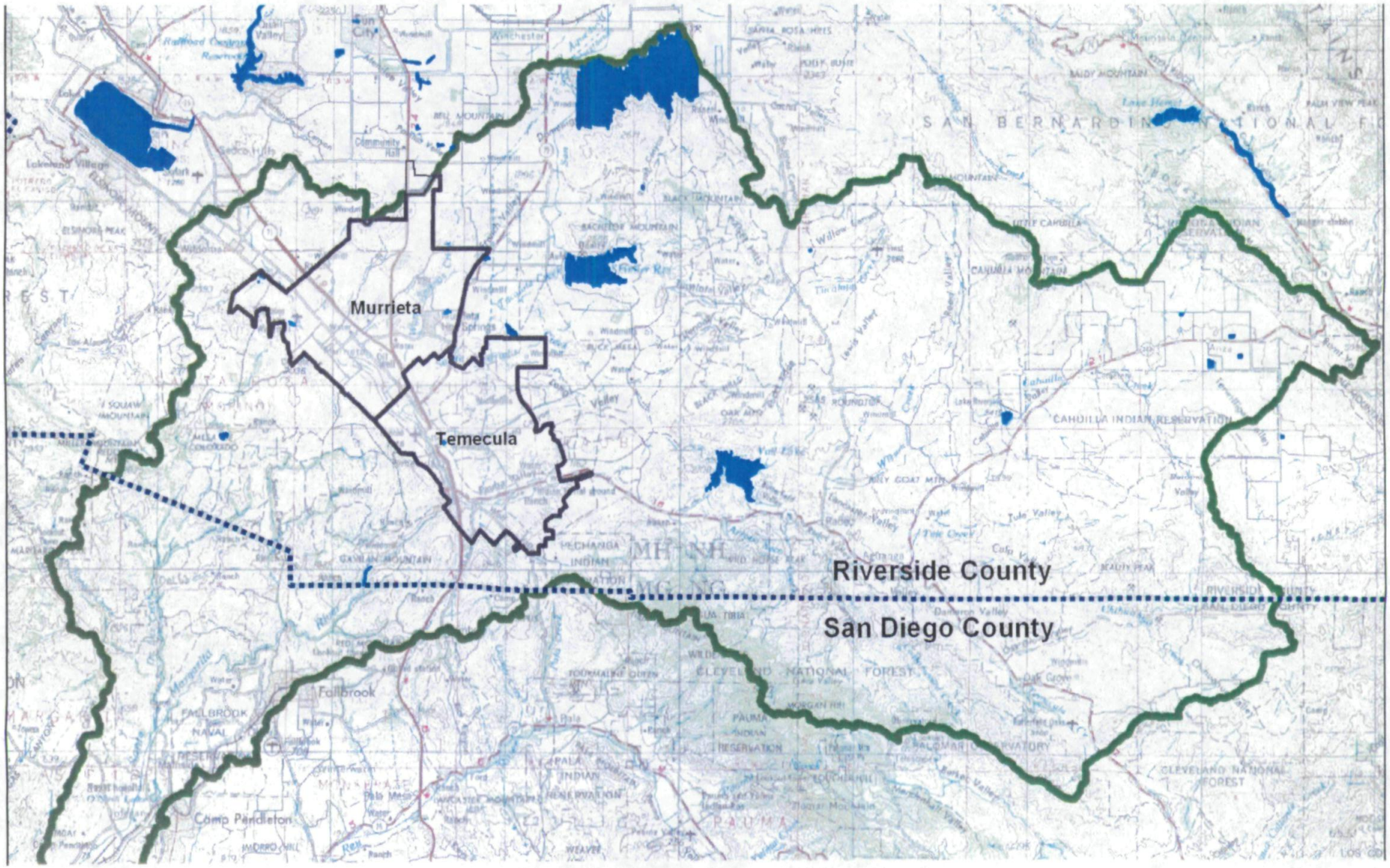

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B. Overview of Upper Santa Margarita River Watershed

B.1. Description of the SMR

The SMR (Figure A-1) is defined as the area delineated by the County boundary line on the south and the Regional Board boundary line on the north, east, and west. Further, the entire SMR lies within the Murrieta Creek and Temecula Creek watersheds. It is important to recognize that the Clean Water Act exempts agricultural activities from regulation under NPDES. Further, under federal and state law, Permittees do not have legal jurisdiction over stormwater discharges into their respective MS4 from:

- California and federal facilities,
- Utilities and special districts, and
- Native American tribal lands.

These areas are not included in the SMR. However, the Regional Board requires the Permittees to coordinate with these stakeholders to reduce discharges from their lands. In addition, other point and non-point source discharges otherwise permitted by or under the jurisdiction of the Regional Board may affect water quality in the Murrieta and Temecula Creek watersheds. Current land uses within the SMR are shown on a map contained in Appendix I (updated August 28, 2007).

The area of Riverside County under the jurisdiction of the Regional Board is approximately 548 square miles, which is less than 8 percent of the 7,300 square miles within Riverside County. Only 3 of the 24 municipalities within Riverside County are under the jurisdiction of the Regional Board.

B.2. Changes in Population

The California Department of Finance estimates that as of January 1, 2007, the total population of Riverside County was approximately 2,031,625. Of the 2.03 million people, approximately 248,885 persons (approximately 12 percent) reside within the portion of Riverside County under the jurisdiction of the Regional Board. Approximately 55,291 persons[1] reside in the unincorporated area while approximately 195,192 persons reside within the Cities of Murrieta and Temecula.

Since the adoption of the Third-term SMR Permit in 2004, population growth in Riverside County has been significantly higher than in neighboring counties and has also been greater than the average percent change in population in the entire State (3.8%).[2] Table B-1 shows the population data for years 1998-2007 and the percent change for the neighboring counties and for each of the Permittees for the years 2004 - 2007.

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1 *Riverside County Progress Report 2007*, Riverside County Center for Demographic Research/TLMA.
2 California Department of Finance, May 2007.

Table B-1. Population Estimates 1998 – 2007 [a]

Area	Year										% Change 2004 - 2007
	1-1-98	1-1-99	1-1-00	1-1-01	1-1-02	1-1-03	1-1-04	1-1-05	1-1-06	1-1-07	
State	32,657,000	33,140,000	33,753,000	34,367,000	35,000,000	35,612,000	36,271,091	36,728,196	37,195,240	37,662,518	3.8%
Los Angeles County	9,225,800	9,330,100	9,487,400	9,646,300	9,817,400	9,966,200	10,107,451	10,166,417	10,257,994	10,331,939	2.2%
Orange County	2,724,500	2,776,100	2,829,800	2,880,600	2,930,500	2,975,400	3,022,613	3,047,054	3,071,924	3,098,121	2.5%
San Bernardino County	1,637,900	1,666,600	1,701,700	1,741,400	1,788,500	1,842,100	1,897,950	1,950,806	1,993,983	2,028,013	6.9%
San Diego County	2,702,800	2,751,000	2,805,900	2,856,000	2,908,500	2,976,100	3,013,014	3,039,277	3,064,113	3,098,269	2.8%
Riverside County	1,451,400	1,490,500	1,533,800	1,584,300	1,645,300	1,719,000	1,807,858	1,888,311	1,966,607	2,031,625	12.4%
Unincorporated Area	ND[b]	ND	36,400[c]	ND	ND	ND	ND	ND	ND	55,291[d]	ND
Murrieta	38,950	41,650	43,850	46,300	51,700	66,600	79,045	85,648	93,567	97,257	23.0%
Temecula	48,900	51,600	56,600	61,600	72,800	75,700	78,841	81,921	94,575	97,935	24.2%

(a) Population estimates obtained from California Department of Finance at www.dof.ca.gov/html/ Demograp/E-1table.xls
(b) ND = No data
(c) *Riverside County Progress Report 2007*, Riverside County Center for Demographic Research/TLMA.
(d) Derived from the *Riverside County Progress Report 2007*, Riverside County Center for Demographic Research/TLMA.

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Although population growth in the SMR will continue to be greater than in surrounding counties, the percent increase will decline. Table B-2 shows population projections for neighboring counties and the Permittees in the year 2010.[3]

Table B-2. Projected Population for 2010

Area	2007	2010 (b)	% Change
Los Angeles County	10,331,939	10,514,663	1.8%
Orange County	3,098,121	3,227,836	4.2%
San Bernardino County	2,028,013	2,177,596	7.4%
San Diego County	3,098,269	3,199,706	3.3%
Riverside County	2,031,625	2,242,744	10.4%
Unincorporated Area	55,291 (a)	62,362	12.8%
Murrieta(c)	97,257	103,726(a)	6.7%
Temecula(c)	97,935	99,387(a)	1.5%

(a) Derived from the *Riverside County Progress Report 2007*, Riverside County Center for Demographic Research/TLMA.
(b) Derived from the *Riverside County Progress Report 2007*, Riverside County Center for Demographic Research/TLMA and P1 Population Projections, California Department of Finance May 28, 2004
(c) Estimated build-out for: Murrieta = 128,000 and Temecula = 125,000. These figures include annexation of parts of County.

B.3. Changes in Land Use

In 1956, only 0.3 percent of the SMR (less than two square miles) was urbanized.[4] Almost half a century later, even with a significant rate of growth in population relative to the State and neighboring counties, approximately 93 percent of the SMR remains in non-urban land uses (rural residential, agriculture, preserves and open space, state lands, federal lands, and tribal lands). Further, almost thirty percent (30%) of the SMR consists of federal, state, and tribal lands[5] that are not under the jurisdiction of the Permittees' MS4 programs. It is projected that the population of Riverside County will increase approximately ten percent (10%) by 2010 with significantly slower growth occurring in the south area of the County. Assuming that the urbanized area increases proportional to population, ninety-two percent (92%) of the SMR would remain in non-urban land uses in 2010.

Changes in land uses from 2006 to 2007 are shown in Table B-3. The land uses listed in the table are based on the Riverside County Assessor Parcel Data, Close of Roll 2006. Current land uses within the SMR are identified in the Santa Margarita Watershed MS4 Facilities Map in Appendix I.

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3 Southern California Association of Governments, May 2003, and San Diego Association of Governments, May 2003.
4 State of California Department of Public Works, Division of Water Resources, Bulletin No. 57, Santa Margarita River Investigation, Volume I, June 1956.
5 Riverside County Assessor Parcel Data, Close of Roll 2004.

B.4. Conserved Lands

Much of the remaining non-urbanized lands will ultimately be incorporated into the Western Riverside County Multiple Species Habitat Conservation Plan (MSHCP). The MSHCP requires the ongoing conservation of 500,000 acres within the County, a large portion of which are in the SMR (at least 150,000 acres in total, or approximately 1/3 to 1/2 of the SMR). There are approximately 72,000 acres of existing public or quasi-public lands preserved in Riverside County within the Santa Margarita River watershed. Approximately 11,000 additional acres have been purchased since the adoption of the MSHCP. The Criteria Reserve Goals and Objectives will add approximately 70,500 additional acres of permanent habitat reserve lands that the RCA will purchase with mitigation fees generated by the MSHCP.

Table B-3. Change in Land Use – 2005 to 2006[a]

Land Use	2006 (Acres) Uninc[b]	2006 (Acres) Murrieta	2006 (Acres) Temecula	2006 (Acres) Total	2006 % of Total	2007 (Acres) Uninc[b]	2007 (Acres) Murrieta	2007 (Acres) Temecula	2007 (Acres) Total	2007 % of Total	Change 2006 to 2007 (Acres)	Change 2006 to 2007 %
Commercial	785	698	1,277	2,760	0.8%	820	759	1,243	2,822	0.8%	62	2.2%
Industrial	111	161	608	880	0.3%	150	196	622	968	0.3%	88	10.0%
Urban Residential (< 1 acre)	2,973	4,567	5,034	12,574	3.6%	3,837	4,883	5,243	13,963	4.0%	1,389	11.0%
Parks & Recreation Facilities	1,983	994	1,755	4,732	1.3%	827	527	628	1982	0.6%	-2,750	-58.1%
Streets & Roads		2,463	2,287	4,750	1.4%		2918	3,169	6,087	1.7%	1,337	28.1%
Subtotal – Urban Land Use	**5,852**	**8,883**	**10,961**	**25,696**	**7.3%**	**5,634**	**9,283**	**10,905**	**25,822**	**7.4%**	**126**	**0.5%**
Preserves & Open Space	8,6726	6891	3657	97,274	27.7%	47,615	5,001	3,002	55,618	15.9%	-41,656	-42.8%
Rural Residential (> 1 acre)	8,5447	2596	2345	90,388	25.8%	113,708	4,262	3,578	121,548	34.8%	31,160	34.5%
Agriculture	28,750	480	125	29,355	8.4%	38,159	826	150	39,135	11.2%	9,780	33.3%
Highways & Roads	7,495			7,495	2.1%	9,665			9,665	2.8%	2,170	29.0%
Federal/State/Tribal Lands/Non-County Jurisdiction	96,552	1321	1295	99,168	28.3%	93,795	1,686	1,657	97,138	27.8%	-2,030	-2.0%
No Land Use Designation	1,011	310	95	1,416	0.4%				0	0.0%	-1,416	-100.0%
Total	**311,833**	**20,481**	**18,478**	**350,792**	**100.0%**	**308,576**	**21,058**	**19,292**	**348,926**	**99.9%**	**-1,866**	**-0.5%**

(a) 2006 figures based upon Riverside County Assessor Parcel Data, Close of Roll 2006. 2007 figures based on County Assessor Parcel Data, Close of Roll, 2007

(b) Uninc = Unincorporated County

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C. A Description of Efforts to Coordinate with other Stakeholders in the Santa Margarita River Watershed, Including San Diego County and the US Marine Corps Base Camp Pendleton.

C.1. *Introduction*

The Permittees schedule at least one annual meeting with the San Diego County MS4 Permittees within the Santa Margarita River watershed, Camp Pendleton, U.S. Bureau of Reclamation (USBR), and others. The purpose of these meetings is to:

- Discuss land use planning;
- Discuss monitoring data and potential management measures to target Focus Area Constituents of Concern;
- Exchange ideas of how to address sources of Focus Area Constituents of Concern and evaluate effectiveness of actions;
- Collaborate with water districts in an effort to reduce irrigation water runoff; and
- Consider grant applications to coordinate and prioritize water quality projects that address Focus Area Constituents of Concern.

This meeting may occur from within the context of another workgroup, such as the Santa Margarita River Executive Management Team, or as separately called meetings, as appropriate.

The District, in consultation with the Permittees, participates in several cooperative activities through informal or formal regional stakeholder workgroups. Stakeholders often include other public and private entities within the Santa Margarita watershed. These efforts can broadly be categorized as management efforts to address stormwater quality issues within the Santa Margarita River watershed, or broader regions including the Santa Margarita River watershed. These efforts may be expanded, reduced or abandoned over time based on budget, changing regulations, program needs, program effectiveness consideration, or other factors.

Coordination between watershed stakeholders has continued to expand. There are now at least three separate watershed stakeholder groups meeting several times a year to discuss a) the lagoon Total Maximum Daily Load (TMDL); b) watershed based planning issues and a watershed model for the Santa Margarita River; and c) the Santa Margarita Watershed Nutrient Numeric Endpoint (NNE)/TMDL efforts. These efforts are inter-coordinated and have been administered, at stakeholder request, by the USBR on behalf of the comprising stakeholders. Due to their interconnectedness, the aforementioned efforts are coordinated by the Santa Margarita River Executive Management Team. In addition, the Permittees continue to coordinate with the Southern California Monitoring Coalition, a cooperative effort between Southern California Counties and Regional Water Quality Control Boards

geared towards improving the science of stormwater monitoring. Additional information on these efforts is provided below.

C.2. Santa Margarita River Executive Management Team (SMREMT)

During FY2006-2007, the District continued its participation in the SMREMT. Participants include the District, the U.S. Bureau of Reclamation (BuRec), Murrieta County Water District (now Western Municipal Water District), Eastern Municipal Water District, Fallbrook Public Utilities District, U.S. Marine Corps Camp Pendleton, County of San Diego, Mission Resource Conservation District (MRCD), Elsinore-Murrieta-Anza RCD, Regional Board, and San Diego State University. SMREMT has focused its efforts to identify and address the highest priority water quality concerns in the Santa Margarita watershed, including development of a watershed model to assist with land use planning and TMDL development, coordinating watershed monitoring, and developing formal agreements between interested stakeholders for the purposes of evaluating impairment listing and data gaps in the watershed. Both Urban Runoff and reclaimed water issues are being studied. Projects include the "Santa Margarita Watershed Supply Augmentation, Water Quality Protection, and Environmental Enhancement Program" (SMR Study).

The most recent task, Phase 3, was to develop a watershed model for the entire Santa Margarita River watershed that would incorporate surface water, groundwater, and lagoon modules.

Phase 3A, which was completed in December 2003, was the development of a preliminary model to address water quality issues in the Santa Margarita River watershed and evaluation of the effectiveness of the model for determining the assimilative capacity of the Santa Margarita River and its ability to resolve long-term issues of effluent discharge to the River. The Watershed Analysis Risk Management Framework (WARMF) computer model was selected as the basis for the Santa Margarita River watershed model.

The SMREMT has been working out the Phase 3B Scope of Work and funding arrangements. Tasks being considered under Phase 3B include:

- Determine how the Santa Margarita River watershed model could be refined to support stakeholder driven TMDL development;
- Develop a proposed work plan that could be used to seek future Basin Plan amendments, such as site-specific nutrient criteria;
- Document ground/surface water interactions below the Santa Margarita Gorge;
- Update the Santa Margarita River watershed model;
- Prepare documentation for the Santa Margarita River watershed model; and
- Model proposed management programs in the Santa Margarita River.

The model is based on WARMF. The current version of WARMF is compatible with the USEPA BASINS watershed model and has been released to the public domain through USEPA's Ecosystem Research Division's TMDL Modeling Toolbox.

The BuRec has approached Regional Board staff requesting that they consider third – Party TMDL development for nutrients and Total Dissolved Solids in the Santa Margarita River watershed. The Regional Board responded that they "do not plan to enter into an agreement with BuRec to institute a third party TMDL program." The SMREMT stakeholders are now reevaluating their objectives and priorities for the Santa Margarita River watershed.

Meeting dates with the SMREMT, or coordinated with the SMREMT to discuss watershed issues include: August 8, 2006, August 15, 2006, October 2006, November 15, 2006, January 16, 2007, January 17, 2007, February 2007, March 2007, May 2007, and June 12, 2007. Copies of meeting Agendas are contained in Appendix A, where available.

C.3. Southern California Stormwater Monitoring Coalition (SMC)

The District participates in the Stormwater Monitoring Coalition (SMC) on behalf of the Permittees. The SMC includes representatives from the Los Angeles, San Diego and Santa Ana Regional Boards and each of the Principal Permittees in Southern California (i.e., the counties of Los Angeles, Orange, San Bernardino, San Diego and Ventura), and other interested municipalities. The overall goal for the SMC is to establish a Southern California stormwater research and monitoring agenda that would focus on improving stormwater monitoring science, coordinate data collection efforts, and evaluating the effects of stormwater discharges to receiving waters specific to Southern California. Appendix A contains the SMC Annual Report, which highlights activities completed during the past fiscal year.

In addition to the completed projects identified in the SMC Annual Report, the SMC has pursued consolidated grants for phase 2 of the Peak Flow Study and a Study of the effectiveness of Low Impact Development BMPs in Southern California. Pending results of those grant applications in October, the SMC will re-evaluate next steps for these proposed projects. The proposed peak flow study would meet the intent of Requirement F.2.b)(9) of the Third-term MS4 Permit.

In addition, the SMC has completed, or is in the process of completing, most of the projects in its initial five-year research agenda and is now evaluating future projects for the next five-year period. This analysis is being coordinated with CASQA and the Regional Boards. Finally, the District is also coordinating with the Southern California Coastal Water Research Project (SCCWRP), who facilitates the SMC, to collect data on natural loadings of various pollutants from watersheds throughout Southern California.

Meetings attended were held on: September 11, 2006; December 5, 2006; March 6, 2007, and June 5, 2007. Copies of meeting agendas and of the SMC Annual Project Report are contained in Appendix A.

C.4. California Stormwater Quality Association (CASQA)

CASQA assists the State Water Resources Control Board (SWRCB) and MS4 Permittees throughout California in implementing the federal stormwater regulations. In fulfilling this purpose, CASQA recommends objectives and procedures for stormwater discharge control programs which:

- Are technically and economically feasible;
- Provide significant environmental benefits and protect water resources;
- Promote the advancement of stormwater management technology; and
- Effect compliance with state and federal laws, regulations and policies.

CASQA also holds workshops on important technical issues such as better understanding of monitoring programs and best management practices.

The Permittees have strongly supported CASQA's mission. The Permittees use CASQA's resources to improve compliance programs. Several Riverside County District NPDES staff and Board Members are Committee Chairs of CASQA. Specifically:

- Steve Stump, Board Member since 2004
- Jason Uhley, Legislative Chair since 2003
- Linda Garcia, Monitoring Co-Chair 2004 - 2007

C.5. Integrated Regional Water Management Workgroup (IRWM)

During FY2006-2007, participants in the IRWM included the Permittees, Rancho California Water District, Elsinore-Murrieta-Anza Resource Conservation District, Trout Unlimited, Riverside Lands Conservancy, San Diego State University/Santa Margarita Ecological Reserve, Southwestern Riverside County Multi-Species Reserve, BuRec, Eastern Municipal Water District, Western Municipal Water District, The Nature Conservancy, California Department of Fish and Game, U.S. Army Corps of Engineers (USACE), and Regional Board. Because the upper Santa Margarita watershed was not included in the San Diego Integrated Regional Water Management Plan (IRWMP), the IRWM focused its efforts on the development of an IRWMP for the upper portion of the watershed. The intent of the IRWMP is to pave the way for greater watershed-wide coordination and management of water resources within the Santa Margarita watershed as a whole, as well as adjoining watershed and regional planning efforts.

The regional objectives for the IRWMP include:

- Develop a more reliable and diverse portfolio of water supplies;
- Promote economic, social and environmental sustainability;
- Improve water quality;
- Restore, enhance and maintain habitats and open spaces;
- Promote sustainable floodplain management;
- Promote appropriate recreational opportunities;
- Promote appropriate land use planning;
- Increase stakeholder involvement and stewardship; and
- Maximize implementation of water resources projects.

The IRWMP will also initiate its implementation in a specific funding environment that includes existing state and federal grant opportunities, and local funding programs that will be developed as part of the regional effort. The IRWMP was finalized on July 31, 2007.

Meeting dates with the IRWM include: May 31, 2007, June 13, 2007, June 25, 2007, and July 13, 2007. Copies of meeting Agendas are contained in Appendix A.

D. An Assessment Of Water Quality In The Santa Margarita Region, This Assessment Shall Include Data From The Previous Monitoring Report.

This reporting requirement is addressed in the conclusion of the Monitoring Annual Report (Appendix G).

E. Identification of Water Quality Improvement or Degradation in the Santa Margarita Region

This reporting requirement is addressed in the conclusion of the Monitoring Annual Report (Appendix G).

F. A Prioritization of Water Quality Problems and Potential Sources in the Santa Margarita Region

This reporting requirement is addressed in the conclusion of the Monitoring Annual Report (Appendix G).

G. A Description of Watershed Specific Educational Activities Conducted During the Reporting Period

G.1 Introduction

This section provides an overview of watershed specific education activities conducted by the Permittees during the reporting period Appendix B contains images of most of the public education materials that are described in this section. Impressions, attendance, and other measures of effectiveness relative to these programs are included in Section J (Assessment of Overall Program Effectiveness) of this Watershed Annual Report.

G.1.1 Program Overview

The Permittees have established an ongoing watershed based public education and outreach program known as the "**Only Rain Down the Storm Drain"** pollution prevention program. The specific objectives of the public education program include:

- Fostering a broad public awareness of water pollution concerns;
- Increasing public acceptance of pollution prevention activities to curtail everyday human behaviors that contribute to water quality problems;
- Educating/informing the general public, regulators and key local government and state decision makers on Urban Runoff conditions in Riverside County; and
- Promoting stewardship of local water resources.

The "Only Rain Down the Storm Drain" program implements the public awareness objectives by focusing on three areas of pollutant reduction/prevention:

- Public Behavior;
- Proper Management of Pollutants; and
- Business Specific Education Outreach.

In addition, when attempting to make use of the finite resources available to the Public Education Program, the Permittees use these management goals to ensure that resources are used effectively:

- Focusing on pollutants of concern specific to each region within Riverside County;
- Coordinating public education efforts with adjacent stormwater management programs and other related education programs to share resources, coordinate outreach efforts, and avoid costly duplication of effort; and
- Adapt public education programs and objectives, based on effectiveness analysis, to address changing MS4 programs and objectives.
- Have at minimum, one outreach education partnership with the San Diego Regional Water Quality Board in the Santa Margarita Watershed.

G.1.2. Program Highlights

The public education program was significantly improved this year, Program highlights include:

- The public education program has developed surveys in both English and Spanish to be distributed to the public at community events. The purpose of these surveys is to evaluate the effectiveness of the public education program. The results of these surveys are contained in Appendix B. Two surveys were also developed for the K-3 and 4 - 6 grades education outreach programs. However, the Permittees are currently evaluating the feasibility of this survey effort due to the limited time provided by teachers in the classroom.
- The public education web page continues to be improved.
- The program continues to update brochures and develop outreach programs specific to the needs of the MS4.
- The Home Garden Care Guide was made to appeal to all levels of gardeners, but seems to be a favorite resource among the professional gardener. In order to draw the interest of a wider audience, staff is using materials from the University of Riverside, Riverside Corona RCD, Be Water Wise CD, San Jacinto Watershed Council Guide and the Western Municipal Water District's Guide to Landscape and Water Conservation.
- The "Only Rain Down the Storm Drain" Program is performing a complete enhancement analysis of our current Permittee training programs. The intent is for the Permittees to identify needed enhancements to our training programs within the next fiscal year and begin work on improving the programs. Since the Permittees initiated this effort, CASQA has formed its own Training Committee. The Permittees have opted to continue our enhancement analysis through the CASQA process in order to promote statewide consistency in training materials, methods, and testing. Updates of products from the CASQA Training Committees will be forthcoming in future annual reports.
- As part of the on-going effectiveness evaluation for the municipal training programs, testing has been incorporated into the training for evaluation of its efficiency. In addition, the overall training program was evaluated and is included in The Assessment and Enhancement Analysis of the NPDES Training Program, August 2006 in Appendix B.
- The County hosts a monthly New Employee Orientation to an average of forty new employees. The attendees receive "Only Rain Down the Storm Drain" materials and promotional items. The Toll Free 800 Number, to call to report illegal storm drain disposal, is incorporated into all materials.

G.2 Santa Margarita River Watershed Pollutants of Concern

Based on monitoring data collected to date, the current 303(d) list, and discussions among the Co-Permittees and stakeholders, the following preventative pollutants of

concern were established for the Santa Margarita River watershed. More discussion on the selection of preventative pollutants of concern can be found in the monitoring section of this report. After each identified pollutant, specific BMP outreach activities are identified to address the pollutant:

- Sedimentation associated with Urban Development and Land Uses
    - Specific section on construction, municipal, industrial/commercial and new development training focusing on the need to address sedimentation within the Santa Margarita River;
    - Distribution of dust pans at public education outreach events to promote dry cleaning of drive ways and impervious surfaces;
    - Stormwater and Construction BMP Poster;
    - School/Student program incorporates education on controlling soil erosion;
    - The "After the Storm" brochure; and
    - General Construction Activities brochure.

- Nutrients and pathogens associated with Urban Development and Land Uses
    - Specific section on construction, municipal, industrial/commercial and new development training focusing on the need to address increased nutrients within the watershed;
    - Pet Waste "What's the Scoop" brochure;
    - Home Garden Care workshops;
    - Partnership with SGA Advertising to place pet waste information in pet stores, veterinarian clinics, kennels and pet grooming facilities;
    - Coordination with Riverside County Animal Control Department to distribute "What's the Scoop" and "After the Storm" brochures to families adopting pets;
    - Coordinating with other non-profit animal care advocates;
    - The Agricultural Commissioner assists in educational activities on water conservation, fertilizer management and integrated pest management practices. In conjunction with County Waste Management's Composting Workshop, the "After the Storm" brochure and Household Hazardous Waste flyer is included in the adult informational packet;
    - "Keep Our Water Clean" video to cover proper use of fertilizers as well as excess runoff from sprinklers;
    - Annual National Pollution Prevention Week/Earth Day mailing inserts to inform residents about the problem of stormwater pollution and provide simple pollution prevention activities in gardening;
    - Adult presentations conducted by RCRCD discussing the effects of fertilizers and pesticides on local waterways;
    - The "After the Storm" brochure; and
    - Construction BMP Activities brochure and poster.

- Toxicity Related to Pyrethroid Pesticides

Public Education

- Introduction in FY2006-2007 of a new spray bottle for distribution to the public. The spray bottle includes non-toxic recipes that can be used to control common household pests.
- Distribution of "shelf talkers" in hardware stores describing alternatives to pesticides, proper pesticide use, and proper pesticide disposal. Materials are basically the same as those used in the Our World Our Watershed program.
- Active participation and distribution of outreach for HHW/ABOP facilities to provide free venues to dispose of excess pesticides.
- Distribution of USEPA's "After the Storm" and "Make your home the solution to stormwater pollution" which includes descriptions of BMPs to limit the discharge of pesticides from residential dwellings.
- Distribution of California EPA bookmarks which are brochures that include descriptions of BMPs to limit the discharge of pesticides from residential dwellings.
- Distribution of Water Conservation Guides for Residential areas developed by Southern California Water Agencies and Western Municipal Water District. These materials include discussions of proper pesticide use and alternatives.

Regulatory

- The District, on behalf of the Permittees, has provided input on draft comments by CASQA on the proposed Pyrethroid Working Group Proposal to Address Offsite Movement of Pyrethroids.
- The District, on behalf of the Permittees has specifically requested that CASQA include the Santa Margarita watershed as one of watersheds to be evaluated for offsite movement of Pyrethroids by the Pyrethroid Working Group.

In addition, the District has developed other outreach materials to focus on other pollutants and pollutant causing activities/businesses commonly associated with urban runoff. These additional outreach materials are described in subsections that follow. Section G.7. describes how outreach methods combine to focus on specific pollutants that may exist within the Santa Margarita River watershed. Impressions, attendance, and other measures of effectiveness relative to these programs are included in Section J (Assessment of Overall Program Effectiveness) of this Watershed Annual Report.

G.3 24-hour SMR-Wide Outreach Portals

The Permittees maintain three 24-hour/7 days per week watershed wide portals to receive and distribute information regarding the "Only Rain Down the Storm Drain" program. These portals include a website, 1-800 number, and an e-mail address.

Impressions, attendance, and other measures of effectiveness relative to these programs are included in Section J (Assessment of Overall Program Effectiveness) of this Watershed Annual Report.

G.3.1. Storm Water Protection Program Website

The District operates a website that provides information on how to report illegal dumping, clogged storm drains and lack of curb markers, as well as provide information on upcoming activities, opportunities for public participation in program development and general information about Urban Runoff pollution prevention techniques. The website is located at:

http://www.floodcontrol.co.riverside.ca.us/stormwater/

Some of the District's outreach materials have been scanned into an electronic .pdf format and are available for download. Online Order forms and phone numbers are also available to assist in obtaining information that might not be available online.

The website contains pages specific to the following target audiences:

- General public/residents
- Businesses
- Developers
- Contractors
- Schools and teachers
- Kids page

In addition the website contains links to:

- Assist viewers in locating their watershed
- An online media library
- Materials order form
- 1-800 information to report storm drain pollution
- View an online events calendar

The District tracks the number of hits to its public education website. The website was completely revamped during the previous reporting period and the web-page counter was replaced this reporting period. Results of the webpage counter report are included in Appendix B.

G.3.2. Storm Water toll free 1-800 Hotline

In October 1994 a Toll Free "800" telephone number for reporting suspected Urban Runoff pollution and obtaining pollution prevention information was established. This call line offers easy to understand instructions for connecting to County Environmental Health or Waste Management to obtain grasscycling, composting, or household hazardous waste collection dates and locations. The 24-hour Hotline also allows callers to report clogged catch basin inlets, illegal dumping and other illicit discharge violations. Callers to the hotline are given options in both English and Spanish to seek emergency services if a spill is of a suspicious origin or a safety issue. Finally, the hotline allows people to order public education materials and/or request stormwater presentations for schools or community groups. The Permittees advertise the hotline in all appropriate County telephone directories, public education outreach materials, and in other appropriate venues and locations.

The 1-800 line diverts callers to appropriate Permittee departments based on caller selections. Callers requesting information on pollution collection activities are diverted to either County Environmental Health or Waste Management depending on their specific selection. Callers reporting illicit discharges are directed to County Code Enforcement, who accepts the calls and then re-directs them to appropriate Permittee Code Enforcement Departments. Calls for public education materials or presentations are directed to the District's front desk, and then to the District's Public Education Staff. School presentation inquiries are directed to the MRCD office, which has been contracted to provide education to elementary school students in the SMR. The specific text to the hotline is included as Exhibit A.

The provider of the 1-800 line, Riverside County Communications, tracks the number of incoming calls to the line. This tracking mechanism was discontinued during the past reporting period but restored this reporting period, but still with some problems. The number of Toll Free calls reported tracked during this Fiscal Year were 1,648.

Exhibit A

ONLY RAIN DOWN THE STORM DRAIN POLLUTION PREVENTION PROGRAM TOLL FREE 1-800 LINE DIALOGUE

Thank you for calling the "Only Rain Down the Storm Drain" Pollution Prevention Program. To better serve the needs of our County communities, please listen carefully to the following options:

If this is an emergency, or you wish to report a significant release or threatened releases of hazardous material into the storm drain or elsewhere in the environment, please hang up and immediately Dial 911.

(Si esta llamada es una emergencia o decea reportar desechos de contaminantes peligrosos en las alcantarillas o en el medio ambiente, por favor cuelge y llame 911.)

For water service connection, disconnection, or any other water utility information, call your local water service provider.

To report illegal dumping at residential, commercial, industrial or construction sites, please call Environmental Health at 951.955.8982, or press #1 to be directly connected.

For information regarding Household Hazardous Waste Collection Events, please Press #2.

To report clogged storm drains, please call your local municipal public works department. To report faded or missing "Only Rain Down the Storm Drain" storm drain markers, please press #3.

For General or specific business pollution prevention information or to receive other pollution prevention information please press #3.

(Drop Off Dialogue)

Thank you for your interest in obtaining information on storm drain pollution protection. Basic, construction, industrial, commercial and children's stormwater protection outreach packets are available. For a quick response to your request, please slowly and clearly leave your name, address, city and zip code. Also state the type and quantity of the materials you are interested in receiving. Should you need additional assistance, provide your area code and phone number and someone will contact you as soon as possible.

To inquire about our free stormwater classroom presentations, workshops, youth group activities and other outreach programs, please press #4.

(Drop Off Dialogue)

The "Only Rain Down the Storm Drain" public education program offers classroom presentations, workshops, youth group activities, special event opportunities and other programs. For inquiries for the Temecula or Murrieta area, please press #1 (Drops to Mission Resource Conservation District)

For inquiries in all other Riverside County areas, press 2 (drops to Riverside/Corona Resource Conservation District).

For Grasscycling and composting information or workshops, please PRESS #5. (to 951.486.3200)

For additional assistance regarding our storm drain pollution prevention program during regular business office hours, Monday through Thursday from 7:30 am to 5:30 pm and on Friday from 7:30 am to 4:30 pm press #6.

G.3.3. E-mail

The Permittees also maintain an e-mail address that can be used to report illicit discharges or request stormwater related public information. The e-mail address is:

Flood.fcnpdes@co.riverside.ca.us

E-mails are received by the District's Public Information Specialist and are responded to in most cases within 2 business days when possible.

G.4. Program Coordination with other Stakeholders

The "Only Rain Down the Storm Drain" program has used partnerships to leverage available resources. The District utilizes opportunities to work with Co-permittees, local environmental groups, and other public, private and business organizations to maximize use of existing distribution outlets, events, programs and materials. Impressions, attendance, and other measures of effectiveness relative to these programs are included in Section J (Assessment of Overall Program Effectiveness) of this Watershed Annual Report.

To facilitate statewide awareness of stormwater public education, educate local and state decision makers, and assist in the development of more effective public education outreach programs, the District participates in the following public education committees:

- Public Information Public Participation Committee (PIPP) – A subcommittee of the California Storm Water Quality Association, and

- Western Regional Pollution Prevention Network (WRPPN)

To leverage education outreach resources and coordinate public education activities with other environmental programs, the Permittees closely coordinate and/or have existing partnerships with the following entities/organizations:

- Household Hazardous Waste Information Exchange (HHWIE); This is an eGroup that provides household hazardous waste affiliates the ability to better communicate, share ideas and the latest in legislative rulings.

- California Regional Environmental Education Community Network (CREEC)

A network whose mission is to develop a communication network that provides educators with access to high quality environmental education resources to enhance the environmental literacy of California students.

- Santa Margarita River Watershed Clean Up Group

In coordination with the Riverside County Community Improvement, Riverside County Park and Open Space District, Santa Margarita River Ecological Reserve, Santa Rosa Plateau State Ecological Reserve, the Nature Conservancy and the California Department Fish and Game, the California Coastal Commission's Coast Week Program supports and encourages volunteers, partners and groups to gather for a day to remove trash and debris from the Santa Margarita River watershed.

- In addition, the "Only Rain Down the Storm Drain" program also coordinates with the following Permittee departments to distribute appropriate stormwater education outreach materials:
- Front Counters
- Waste Management
- Public Health Department
- Agriculture Department
- Code Enforcement
- Animal Control
- Economic Development Agency
- County Assessor/Recorder's Office
- Bio-terrorism
- Fleet Services
- Human Resources
- Library System
- County Parks
- County Safety
- Transportation and Land Management. (TLMA)

In general, brochures and promotional items are provided to these departments for distribution in public lobbies, training sessions, through customer interactions and new employee orientations.

Finally, the Only Rain Down the Storm Drain Program also coordinates with the following state and/or local government or business entities to distribute public education information:

- Western Riverside Council of Governments
- South Coast Air Quality Management District
- Santa Rosa Plateau
- Bureau of Reclamation
- Metropolitan Water District
- Lake Elsinore/San Jacinto Watershed Authority
- Eastern Municipal Water District
- Rancho California Water District
- Valley Greeters
- Department of Water Resources Southern District
- Western Municipal Water District

- Business Industrial Association (BIA)
- Caltrans

G.5. Outreach Tools to Change Public Behavior

The "Only Rain Down the Storm Drain" program conducts a range of outreach activities to residents, students, community groups, new home owners, homeowner associations; informing them of how their "everyday activities" may contribute to the pollution of Receiving Waters, and encouraging them to adopt alternatives that will lessen or eliminate pollution-causing behaviors. Program efforts include providing information on pollution prevention techniques and informing residents about the proper disposal of household hazardous wastes, construction materials, used motor oil, pet waste and litter. Public education materials and media emphasize the theme that all citizens have a role to play in reducing and preventing the pollution of Receiving Waters. The goal is to present a clear and consistent message that explains the simple connections between people's everyday activities and their impacts upon Receiving Water quality.

As the public education and outreach program continues to be implemented and enhanced, the Permittees hope to broaden public awareness of Urban Runoff quality problems, promote proper disposal of household hazardous waste and motor oil, encourage illegal discharge reporting, foster good stewardship of Receiving Waters, and take personal responsibility for their actions in preventing pollution.

While public education outreach at events indicates that most people are willing to act in an environmentally responsible manner if given simple ways to change their behavior to avoid polluting our water bodies, some are unaware of the sources of pollution from everyday urban land use. The "Only Rain Down the Storm Drain" program using various media forms to educate the County's population about modified behaviors to prevent stormwater pollution by focusing on residents, general public, students, home gardeners, do-it-yourselfers, mobile businesses, etc. Impressions, attendance, and other measures of effectiveness relative to these programs are included in Section J (Assessment of Overall Program Effectiveness) of this Watershed Annual Report.

G.5.1. Direct Outreach methods

The "Only Rain Down the Storm Drain" program interfaces directly with the public through attendance at community events, school education programs, adult education programs and/or by providing classroom based training. Specific outreach activities, segregated by target audiences, are described below.

<u>General Community Outreach</u>

The "Only Rain Down the Storm Drain" program participates in various community events to ensure that our message is delivered to the largest

possible municipal audience. At these community events, surveys, to assess overall program effectiveness, have been used.

In addition, the "Only Rain Down the Storm Drain" program has partnered with County Environmental Health to ensure that storm drain pollution prevention material is available and distributed at all HHW and Antifreeze, Batteries, Oil and Paint (ABOP) Collection Centers and/or events throughout each of the regions within Riverside County. These events provide free disposal sites for receiving common pollutants that can impair Receiving Waters.

Elementary School Outreach

Elementary (K-6)

The MRCD continues to provide a variety of K-6 education programs for the "Only Rain Down the Storm Drain" program. The K-6 education program includes materials such as the Storm Water Pollution Prevention Patrol workbook, the Fancy Fin hands-on classroom presentation and accompanying coloring book, various word match and crossword activity sheets and videos. A second story line featuring Fancy Fin and her friend Phinnious J. Green (a Pacific Tree Frog) educates students about point and non-point pollution and their effects on the environment and other creatures in the watershed. School materials are offered to all public and private schools in the SMR, as well as to youth groups such as the boy and girl scouts and girls and boys clubs.

Secondary Schools

A video entitled "How to Conduct an Environmentally Friendly Car Wash and Make Money Too" was developed for the "Car Wash Challenge" program. An accompanying flyer is also used which informs students/groups of the potential stormwater problems generated from car wash runoff, and provides practical BMPs to minimize or eliminate contaminated runoff. The original focus of the program was high school clubs. However, after contacting several high schools, it was discovered that car washing fundraisers are relatively rare and revenue deficient in comparison with other high school fund raising activities. Nevertheless, church groups, Boy Scout troops and other organizations do conduct car wash fundraisers. Thus, the scope of the Car Wash Challenge program has been expanded to include these additional fundraising organizations.

Adult Outreach

Valley Greeters is a "Welcoming Wagon" business taking discount coupons, product samples and general vicinity information door to door to new residents and homeowners to the Temecula, Murrieta and Lake Elsinore area. For the past four years, Valley Greeters has included our MS4 materials

(After the Storm; What's the Scoop; Pool, Spa and Fountain Maintenance; and HHW Collection Schedule). This information is accompanied with a handy full size dustpan, shop cloth and vehicle air freshener. Each material and promotional is clearly imprinted with the 1-800 Toll Free number for reporting illegal discharges into the storm drain. Young family members receive a copy of Fancy Finn and a box of crayons for their learning enjoyment.

The "Only Rain Down the Storm Drain" program contracts with the MRCD for public outreach. Stormwater pollution prevention presentations are given to community groups who call and request such services.

Employee workshops are presented at major home improvement stores throughout Riverside County. The workshops include distribution of reading material regarding targeted BMPs to the public through established corporate partnerships (paint, hardware, home show coordinators, home improvement, garden centers, nurseries and pet stores). Employees are informed about stormwater impacts that could occur from the improper application of all types of home and garden hazardous chemicals. The employees are then able to provide information to customers on the proper use and disposal of products that are potential water pollutants. Attendees at the workshop receive "Only Rain Down the Storm Drain" promotional materials to help emphasize the stormwater pollution prevention message. Fixed advertising tools such as point of purchase displays, tear sheets and counter displays have been placed throughout to educate the public directly.

G.5.2 Brochures

Residential: After the Storm; Household Hazardous Waste Collection Schedule, Outdoor Activities; Swimming Pool, Jacuzzi and Fountain Maintenance; and What's the Scoop (Petwaste).

G.5.3 Outreach Materials

In addition to the brochures mentioned above, the program utilizes other effective outreach materials such as magnets, a billboard ad, videos, newspaper supplements, flyers, door knob hangers, calendars, promotional items, workbooks, curriculum, shop rags, shelf talkers, tear sheets, posters and print ads to cultivate interest in the program.

A door hanger is also being utilized to help address problem discharges that are commonly observed in residential settings. The door hanger notifies the recipient that a problem discharge was observed flowing in to the street and offering help by following recommended pollution prevention activities. The door hanger is provided to all cities and is used by various County departments and the NPDES staff when conducting field or site activities/inspections.

G.5.4 Mailing Inserts/Slugs

The "Only Rain Down the Storm Drain" program encouraged advertising the reporting of illegal disposal into storm drains via the use of mail slugs. Although this form of media was successful, County Mail discontinued its availability.

G.5.5 Media Outreach

The "Only Rain Down the Storm Drain" program continues to utilize various mass media to reach the public and promote the stormwater pollution prevention. Special newspaper inserts, flyers, and advertisements help increase public awareness of stormwater pollution and environmental protection.

Our Sixth Edition of a four-page insert called the National Pollution Prevention or P-2 (National Pollution Prevention Week recognization), was distributed Countywide through the PennySaver. The insert included topics on proper disposal of pet waste, pesticide alternatives, motor oil recycling, grass-cycling, pool and spa best management practices, storm drain marking program, stormwater school presentations, general storm drain pollution protection, business stormwater pollution information, HHW collection events, syringe disposal program, composting workshops and motor oil specific recycling locations. The insert is distributed to over 650,500 Riverside County homes generating an increase of calls on the 800 Toll Free Hotline and District IC/ID investigations.

Billboard availability in the Santa Margarita area is difficult to attain, since long term contracts are being secured by the area casino properties.

G.5.6. Cooperative Used Oil Program

The Western Riverside Council of Governments (WRCOG) is responsible for administering the Used Oil Block Cycle Grant on behalf of ten cities within WRCOG's boundaries. These cities include Banning, Beaumont, Canyon Lake, Lake Elsinore, Murrieta, Norco, Perris, Riverside, San Jacinto and Temecula.

The objective of the Used Oil Block Grant is to make it convenient for Do-It-Yourselfers (DIYers) to recycle their used oil and to make it easy for them to find a Certified Center accepting used oil. In order for these centers to be certified, they need to apply for certification with the California Integrated Waste Management Board (CIWMB). As a grant recipient, WRCOG contacts non-certified centers in the jurisdictions to interest them in becoming certified used motor oil collection center. The goal is to see a significant decrease in the amount of illegally dumped motor oil by adding more oil collection centers within close proximity to users.

Through the same grant funding source, WRCOG also provides used oil containers for distribution to DIYers who need proper containers for automotive fluids. Through WRCOG efforts, all certified centers in the County are in compliance to state and local mandates.

The Storm Drain Pollution Prevention Program assists WRCOG's efforts by making available our MS4 information and supporting promotional materials for distribution to their targeted groups.

At various venues, WRCOG staff obtain participant responses to a ten question survey. The survey examines the public's understanding on:

- used oil recycling,
- used oil drop-off locations, and
- curbside programs and other local recycling programs.

The program also maintains an English and Spanish 800 hotline that can be used to get answers to any recycling question a resident may have regarding, "where is the nearest Certified Center located?" and "where can I find a used oil container?" The phone number is printed on all distributed materials including the oil containers.

G.5.7 Cleanest County in the West Program

Through another grant funding source, WRCOG created the "Cleanest County in the West" program to address issues relating to litter and illegal dumping. The program was designed to assist jurisdictions in meeting the 50% diversion goals mandated by Assembly Bill 939. AB 939 was a state mandate signed in 1989 that required cities to reduce their waste by 50% by the year 2000.

At the end of the elementary school assemblies, WRCOG provides the school with two recycling containers for the collection of cans and bottles. During the 06/07 school year, over 18,000 students and 600 teachers have attended the assemblies. Each student receives an environmental activity book and an application to join the Riverside County Kids Recycle Club where they will receive a quarterly newspaper. This club has over 200 members.

Like the "Only Rain Down the Storm Drain" program that promotes litter reduction and recycling throughout the SMR, WRCOG also participates in events to promote litter reduction and beverage container recycling. These events provides an opportunity to assess how informed the local community is regarding recycling and to distribute brochures and informational flyers that will assist in locating the nearest recycling center. During these events, promotional items made from recycled content are also distributed to show how used items such as money can be recycled into new items such as a

pencil, a promotional product first used by the "Only Rain Down the Storm Drain" program. This particular promotional item especially increased the interest of the people visiting our booth and demonstrated how almost anything can be recycled and reused.

G.6. Outreach tools specific to Business

The "Only Rain Down the Storm Drain" program conducts a number of outreach activities to businesses informing them how their "everyday activities" may contribute to pollution of Receiving Waters, and encouraging the use of alternatives that will lessen or eliminate pollution. These activities include providing information on pollution prevention techniques and informing businesses about the proper disposal of wastes. Public education materials and media emphasize the theme that all businesses have a role to play in reducing and preventing water pollution. The goal is to present a clear and consistent message that explains the simple connections between a business' everyday activities and their impacts on water quality.

Originally, the business education program mainly consisted of the development and distribution of formal BMP guidance and outreach to business associations. The program has now expanded to include direct outreach to businesses through classroom formats and advertising in business trade papers and providing exhibits at various business specific symposiums.

Descriptions of the current business-specific outreach tools implemented by the Permittees are provided below. Impressions, attendance, and other measures of effectiveness relative to these programs are included in Section J (Assessment of Overall Program Effectiveness) of this Watershed Annual Report.

G.6.1. Direct Business Outreach Activities

The "Only Rain Down the Storm Drain" program partners with various entities to provide training and education. Currently, the District has contracted with AEI-CASC Engineering, a consultant who provides the Permittees internal education programs to train developers and consultants regarding the new WQMP/SUSMP requirements for Riverside County. The District has partnered with Riverside/Corona RCD, to develop a Water Quality Design class that focuses on sub-regional solutions and low impact development. This class was offered for the first time through UCR extension in October 2005. Additionally, the District presented the Water Quality Design class at the Construction Storm Water Compliance Workshop hosted by the Building Industry Association of Southern California (BIA/SC) on March 22, 2006. The workshop focused on state and municipal construction requirements for contractors, developers, and consultants.

Through the Compliance Assistance Program (CAP), a partnership with County Environmental Health, restaurants and businesses that handle hazardous wastes are reviewed for potential water pollution impacts from

their activities. Each business is provided with pollution prevention public education outreach information specific to their activities.

Workshops are presented at major home improvement stores throughout Riverside County. The workshops include a handout educating the store's employees about water quality impacts that could result from improper application of paint, pesticides or fertilizers. Attendees at the workshops also receive "Only Rain Down the Storm Drain" information and promotional items to help highlight the water protection message. Employees are then able to provide information to customers on the proper use and disposal of products that are potential water pollutants. Point of purchase displays, tearsheets and counter displays have been installed at strategic locations to educate the public directly.

Each new business trade in Riverside County that is listed in the Inland Business Press newspaper is provided with an "Only Rain Down the Storm Drain" Pollution Prevention packet.

G.6.2. Brochures

Commercial: After the Storm; Food Facilities; Outdoor Cleaning Activities and Non-Point Source Discharges; Automotive Maintenance & Car Care. Note: (Staff is revising the Outdoor Activity brochure to include broader examples of urban pollution causing activities such as power washers and mobile vehicle maintenance operators).

Industrial: After the Storm; Outdoor Cleaning Activities and Non-Point Source Discharges; and Your Facility May Need a Storm Water Permit.

Construction: After the Storm; Outdoor Cleaning Activities and Non-Point Source Discharges; General Construction & Site Supervision.

G.6.3. Posters

BMP posters for automotive, food service establishments (available in Spanish) and construction employees are available. The posters address activities associated with the automotive repair industry and the food/restaurant industry that may pose a threat to water quality. There are also two new posters for the Fueling Stations and Service Bay Service centers. All the posters recommend stormwater BMPs and are designed to serve as informative and attractive visual reminders for employees.

G.6.4. Media Outreach

In March of 2007 a full-page ad was placed in the Inland Business Press newspaper to draw the attention of Inland Empire businesses whose urban runoff activities might be threatening local water quality. The ad also provided links to the District's and CASQA's website for more detailed BMP information.

G.6.5. Supplemental Environmental Projects (SEP)

There were no SEP related projects during 2006-2007.

G.7. Outreach tools specific to Pollutants

The "Only Rain Down the Storm Drain" program conducts a range of outreach activities focusing on reducing the discharge of water pollutants. These outreach activities address residential, business, municipal, state, and federal sources of pollutants. Education materials explain how "everyday activities" can be potential sources of water pollutants, and encourage adoption of alternative approaches that will reduce or eliminate water pollution. Program efforts include providing information on pollution prevention techniques and proper disposal of pollutants. Public education materials and media emphasize the theme that all citizens/businesses have a role to play in reducing and preventing water pollution. The goal is to present a clear and consistent message that explains the connections between a business' everyday activities and their impacts upon water quality.

Each subsection that follows identifies how the outreach materials previously described address specific potential pollutant sources in the SMR. Impressions, attendance, and other measures of effectiveness relative to these programs are included in Section J (Assessment of Overall Program Effectiveness) of this Watershed Annual Report.

G.7.1 Use of pesticides, fertilizers, and herbicides.

A. The Riverside County Agricultural Commissioner's Pesticide Applicator's License renewal information package includes materials on the proper use of pesticides and offers information on training workshops. The license renewal process requires continuing education of applicants and detailed record keeping of pesticide applications. Permittee employees that are responsible for the application of pesticides are encouraged to obtain and maintain credentials as Certified Applicators and/or licensed Pest Control Advisors.

B. The "Home Garden Care Guide" is being revised to attract the interest of the general public and amateur gardener. The guide will also be updated to include Integrated Pest Management and plant selection and materials from the State Water Resource Control Board, Central Contra Costa IPM Outreach Program, University of California and The Orange County Storm Water Program. All the materials selected offer alternatives to using pesticides, herbicides and fertilizers.

C. The "Keep Our Water Clean" video covers proper use of pesticides, fertilizers and herbicides as well as excess runoff from sprinklers.

D. A multi-agency effort, the National Pollution Prevention Week two-page booklet informs residents about urban runoff and water quality protection, household hazardous waste disposal collection events, recycling and composting.

E. The "Only Rain Down the Storm Drain" adult presentations conducted by MRCD discuss the effects of pesticides and fertilizers on local waterways. The materials distributed following the presentation promote alternatives to pesticide use in the yard and garden.

F. The 2006 Environmental Calendar includes a wide array of water quality protection information. It is designed to attract adult audiences by listing BMPs, scheduled special events, household hazardous waste collection sites, used oil collection sites, composting workshops, citywide clean ups, and each of the watersheds along with geographical information. Throughout the calendar the main message is "Only Rain Down the Storm Drain" and the hotline number to call for additional home garden care information.

G. Employee workshops are presented to staff from major home improvement stores throughout Riverside County. This information is then distributed to the public via the shelf talkers accessible to the public or when an employee is addressed with a question. The workshops include information on BMPs for pesticide and fertilizer application, use, and storage to prevent water pollution.

G.7.2 Educate/inform on the negative impacts from littering and improper waste disposal.

A. The brochure "*Household Hazardous Waste - A Guide For Proper Disposal Of HHW And The Use Of Environmentally Friendly Products*" informs residents of the effects of improper disposal of household hazardous waste (HHW) and offers recipes for less toxic alternatives to commonly used household products. This brochure is currently in revision for updating contacts, phone numbers and website links.

B. Through classroom activity books, work sheets, coloring books and presentations, students are taught to put trash in its proper place, to never throw hazardous products in the trash, and to dispose of HHW at an HHW collection event.

C. All "Only Rain Down the Storm Drain" brochures and promotional items support and encourage residents to report illegal dumping to the "Only Rain Down the Storm Drain" toll-free phone number. The design of the dual picture frame magnet was changed to ensure a more practical and informative promotional that would be utilized.

D. The MRCD adult presentation discusses the various pollutants of concern that contribute to water pollution – including trash and debris – and reminds the public to always pick up waste and dispose of it properly.

E. A door hanger is available informing residents about the effects of improper waste disposal and encourages them to participate in simple pollution prevention activities.

F. Car litter bags.

G. Portable ashtrays.

G.7.3 Educate/inform on impacts from dumping pollutants into MS4s.

A. The *"Storm Water Pollution - What You Should Know"* brochure informs residents of the negative environmental impacts caused by pollutants allowed to enter MS4s.

B. The *"Keep Our Water Clean"* video and public service announcements (PSAs) inform residents about the problem of water pollution and describe pollution prevention activities.

C. The school program stresses the message of never dumping anything into a storm drain. Both the Santa Ana Classroom activity book and the "Fancy Fin" presentation specifically address this issue.

D. MRCD makes efforts to organize volunteer groups for catch basin marking events throughout the Santa Margarita Region. The durable and colorful storm drain inlet marker reminds residents to NEVER POUR ANYTHING DOWN A STORM DRAIN.

E. The *"Only Rain in the Drain"* song, produced by the "Only Rain Down the Storm Drain" program for the elementary school education program, also addresses the improper dumping issue.

F. The MRCD adult presentation addresses the issue of improper disposal of pollutants into storm drains and advises residents that storm drains connect directly – without treatment – to local waterways.

G. The "2006 Environmental Calendar" contains informative articles to remind users to keep all wastes out of the storm drain system, and more specifically to remember the "Only Rain Down the Storm Drain" slogan.

H. The door hanger informs residents about the environmental effects of disposal of pollutants into storm drains, encourages them to

follow simple pollution prevention activities and curtails illegal dumping behavior.

I. Employee workshops are presented at major home improvement stores throughout Riverside County, so that employees can properly share with the public the safe disposal of hazardous waste when an employee is asked. The workshops mention that paints or paint-related products should never be disposed of in a storm drain or gutter. Tear sheet displays are also placed near the check-out registers that list the HHW collection schedule.

G.7.4 Educate on impacts from gasoline, fuel oil, and oil and grease.

A. The "*Automotive Maintenance & Car Care*" BMP brochure identifies recommended BMPs that address the problem of gasoline, oil and grease entering into storm drains.

B. Nearly all "Only Rain Down the Storm Drain" brochures, utility inserts, advertisements, the school program, and video PSAs provide information on the water quality impacts from improper disposal and spills from gasoline, oil and chemicals in a general context.

C. The "Keep Our Water Clean" video specifically covers the topic of grease and oil from vehicles.

D. The "Only Rain Down the Storm Drain" program works cooperatively with the Permittees' motor oil recycling programs to distribute information on the "why" and "how to" of used motor oil disposal. The motor oil recycling programs actively distribute the "Only Rain Down the Storm Drain" materials in conjunction with their outreach efforts since both programs are working toward the same goal of environmental protection through pollution prevention.

E. The new "*What you should know for . . . Outdoor Cleaning Activities*" brochure informs customers that vehicle fluids pose a threat to local waterways and groundwater resources and provides BMPs to keep these pollutants out of the storm drains. This brochure is being revised to include power washing activities and additional MS4 Permit requirements.

F. The *"Environmental Calendar"* provided a full page section on recycling motor oil. The calendar included information on the environmental problems spilled motor oil can cause. The State's 1-800-CLEANUP toll free number is provided to locate the nearest motor oil collection center in Riverside County. The calendar also lists the State's Clean Up Website at www.1800cleanup.org.

G. The Environmental Health HHW collection schedule is provided with stormwater related materials and promotional items. The

schedule covers the times, dates and locations of both temporary and permanent facilities from September through June. Their website is: www.rivcoeh.org.

G.7.5 Educate/inform on impacts from airborne particles.

A. The County of Riverside Employee Rideshare, which encourages employees to carpool, vanpool, use transit, cycle or walk to work, has a high employee participation rate. Also, the County actively supports the use of zero/low emission vehicles. The County's Fleet Services includes a variety of alternative vehicles including CNG, propane, electric and methanol powered vehicles.

B. Several County facilities are installing alternative fuel fueling stations to expand the use of alternative fuel vehicles. This is a direct result of the County Board Policy to use alternative fuel vehicles as the "first choice" when purchasing or leasing vehicles.

C. The County of Riverside is an active member of the Clean Cities Coalition and provides financial support for various clean air efforts/activities throughout the County.

D. The County also partners with the South Coast Air Quality Management District and their highly successful Lawn Mower Exchange Program.

G.7.6 Educate on the need to keep stormwater from contacting potential contaminants.

A. The "After the Storm" brochures inform residents about keeping stormwater from contacting potential contaminants and explains pollution prevention activities. It also advises residents to keep common water pollutants from entering our storm drains.

B. The *Automotive Maintenance & Car Care*, *The Food Service Industry,* and the *General Construction & Site Supervision* BMP brochures advise facility and site operators to properly manage sources of water pollutants and prevent polluted stormwater from entering storm drains. The brochures also inform owner/operators that local ordinances strictly prohibit the discharge of pollutants to the MS4 or local waterways without a permit. Each of these brochures has a companion poster.

G.7.7 Educate on the clean-up and proper disposal of pet waste.

A. The "What's the Scoop" and Storm Water Pollution…What You Should Know" brochures address the need to pick up animal waste and to dispose of it properly.

B. The school activity book and the "Fancy Fin" presentation discuss the proper disposal of pet waste.

C. The "Keep Our Water Clean" video also addresses the topic of proper disposal of pet waste and the impacts to our waterways.

D. The "Only Rain Down the Storm Drain" adult stormwater presentation discusses the hazards and the proper disposal of pet waste and includes a project slideshow showing the potential impacts of improper disposal. The slide shows – from a distance – small yellow flags marking pet waste deposits in what is obviously a very popular dog walking area.

E. The Pollution Prevention Week is recognized in a flyer type informational and is released every September. Along with other useful BMP's, the flyer has an article that specifically addresses pet waste under the article "*What's The Scoop . . . Tips For A Healthy Pet And A Healthier Environment*".

F. The Earth Day flyers distributed every April contains an article on the health hazards of pet droppings.

G. The *"2006 Environmental Calendar"* reminds us to always "pick up animal waste". The accompanying message informs residents of the effects of pet waste on local waterways.

H. The District does not allow the disposal of pet waste or other trash within its MS4 facilities. Signs have been installed at access gates to discourage illegal dumping and encourage reporting thereof.

G.7.8 Develop programs for landowners on erosion and sediment control practices.

A. The " *After the Storm*" brochure and the school program address the topic of controlling soil erosion.

B. The "*After the Storm*" brochure identifies erosion and sediment as a stormwater pollutant.

C. The "Only Rain Down the Storm Drain" program continues to work cooperatively with MRCD to offer workshops on the topic and has conducted additional workshops for the needs of the stormwater program.

D. The "Only Rain Down the Storm Drain" program adult stormwater presentation was modified to specifically address soil erosion as it relates to the Santa Margarita Region and what homeowners and businesses can do to minimize soil erosion.

G.7.9 Cover contaminants and prevent runoff through polluted areas.

A. The urban stormwater runoff brochures for the restaurant, automotive and construction industry include specific BMPs to cover outside work areas; keep dumpster lids closed; prevent run-on through work and material storage areas; cover exposed stockpiles; avoid wash down of paved surfaces that drain to storm drains; and many other BMPs that help prevent pollutants from entering the storm drains.

B. The industrial/commercial training workshop titled, "NPDES Industrial/Commercial Facilities Inspection Training" includes specific segments on the covering of outside materials to prevent contaminated runoff. The target audience for this workshop is Permittee staff responsible for conducting NPDES Urban Runoff inspections of industrial/commercial facilities.

G.7.10 Educate municipalities/agencies on the need for vehicle inspections.

A. As part of the Permittee employee-training program, departments with vehicle management responsibilities have been instructed to inform employees about the need for vehicle inspections and have been provided with a complete training package to help in this area. Included in the training information are brochures and posters that Fleet Services personnel have distributed at garage/work sites. Also, air fresheners clearly imprinted with the "Only Rain Down the Storm Drain" logo are provided to County Fleet Services Department for use in all County vehicle cars.

B. Permittee departments are also encouraged to use alternative fuel vehicles that not only help reduce vehicle emissions but also, in some cases (*e.g.*, electric vehicles), eliminate the use of motor oil and antifreeze. The County highly encourages its departments to convert to these types of vehicles whenever possible.

C. The Permittee employee training workshops cover such topics as inspecting vehicles and equipment for fluid leakage.

H. A Description of all Area-Wide and Watershed-Based Activities Conducted During the Reporting Period.

H.1. Introduction

This section provides a summary of area-wide and watershed-based activities that were conducted during the reporting period, but not described elsewhere in this report. Due to the small percentage of urbanization and small population within the SMR, the Permittees leverage resources by implementing several regional programs. These programs are both cost effective and protective of water quality.

H.2. Permittee Management Activities

H.2.1. Management Steering Committee (MSC) Meetings

The Permittees established the MSC to address Urban Runoff management policies for the Santa Ana Region (SAR) and SMR and to review and approve revisions to the DAMP and the SAR and SMR Implementation Agreements. In addition, the MSC facilitates coordination with related water quality management programs and monitoring and establishes positions relative to legislative and regulatory initiatives. The MSC consists of city managers or equivalent representatives from each of the Co-Permittees and an executive-level representative from the County. The General Manager-Chief Engineer of the District participates on the MSC as Chair. The District provides staff support to the MSC. The MSC meets quarterly or as determined by the Chair. MSC meeting agendas and minutes are included in Appendix A.

H.2.2. Summary of Technical Advisory Committee (TAC) Meetings

A TAC has been established consisting of representatives formally appointed by the city manager or equivalent of each Permittee. The purpose of the TAC is to coordinate the implementation of the DAMP and overall MS4 Permit compliance program. The TAC members also provide technical assistance and support to facilitate coordination with related water quality management programs and monitoring and to respond to legislative and regulatory initiatives. The District chairs and provides staff support to the TAC. TAC meeting agendas and minutes are included in Appendix A.

H.2.3. Summary of Permit Development Meetings

Work Groups are established by the TAC to oversee the development and implementation of the DAMP program components, as necessary. The Work Groups include Permittee representatives and may also include industry representatives, representatives of environmental special interest groups, and other stakeholders as appropriate. Work Groups have been established to guide the following program components:

- Program Implementation / Public Education
- New Development/Redevelopment

- Construction
- Industrial and Commercial Facility Compliance
- Monitoring
- Effectiveness Analysis

On October 5, 2006, SMR and SAR Co-Permittees facilitated a meeting to continue discussion of WQMP implementation issues and experiences. Attendees included representatives from Permittee planning and engineering departments. The Permittees developed a Frequently Asked Questions (FAQ) committee to facilitate consistent implementation of the WQMP. The FAQ was completed on October 10, 2006 and is included in Appendix A. The WQMP meeting is anticipated to be held as needed, but at least once a year.

Because of the small number of Permittees subject to the Third-term SMR Permit, multiple work group topics are often covered in a single meeting. Meeting dates to discuss these topics during the reporting period included: August 10, 2006 and October 26, 2006. Available Work Group meeting agendas and notes are included in Appendix A. Please note that agendas and meeting notes are not commonly prepared for these meetings.

H.2.4. Summary of Santa Margarita River Watershed Meetings

The SMR Permittees schedule at least one annual meeting with the San Diego County MS4 Permittees within the Santa Margarita River watershed, Camp Pendleton, and others to discuss land use planning, discuss monitoring data and potential management measures to target Focus Area Constituents of Concern, exchange ideas of how to address sources of Focus Area Constituents of Concern and evaluate effectiveness of actions, collaborate with water districts in an effort to reduce irrigation water runoff and consider grant applications to coordinate and prioritize water quality projects that address Focus Area Constituents of Concern. The past fiscal year several meetings have been coordinated through the SMREMT.

The Permittees partner with the Bureau of Land Management and other stakeholders in the Santa Margarita watershed to develop water quality models of the Santa Margarita River watershed to help assess pollutant problems and sources.

Additional coordination meetings have also occurred through other workgroups, such as coordination meetings for the Lagoon TMDL effort, or as a separately called meetings, as appropriate.

Meeting dates of this group, or activities coordinated with this group during the reporting period occurred on: August 8, 2006, August 15, 2006, October 2006, November 15, 2006, January 16, 2007, January 17, 2007, February

2007, March 2007, May 2007, and June 12, 2007. Meeting agendas and notes, as available, are included in Appendix A. Please note that meeting notes and agendas are not regularly prepared for many of these meetings.

H.2.5. Public Involvement

All major permit compliance programs were developed during the FY 2004 - 2005 period, therefore, there were no significant revisions to the DAMP or SMR programs warranting public involvement. However, the Permittees hold the following open meetings to facilitate public involvement.

H.2.5.1. Open Meetings

TAC meetings are scheduled monthly and are open to the public. The TAC meetings are described in Section H.2.2.

The Bureau of Reclamation, on behalf of the SMREMT has held several publicly noticed meetings to discuss SMR watershed issues and priorities for watershed efforts.

Further, stakeholders provided for public notices, open meetings, and a public comment period during the development of the IRWMP.

H.3. Budget

Expenditures identified below reflect costs incurred by the District for implementing its own NPDES program and to implement the regional watershed programs. The District does not track its direct implementation costs separately. Nor does it track costs separately for many permit provisions. Costs are not directly tracked for the asterisked Program Elements identified below.

Future compliance costs could increase significantly to address TMDL monitoring requirements in future fiscal years.

Program Element	Fiscal Year 2006-2007		Fiscal Year 2007-2008	
	Capital Expenditures	O&M/Admin Expenditure	Capital Expenditures	O&M/Admin Expenditure
Program Management	N/A	$300,964	N/A	$439,800
Annual Fee for MS4 NPDES Permit	N/A	0	N/A	$4,000
Implementation Agreement Shared Cost	N/A	N/A	N/A	N/A
Construction Inspections*	N/A	~$10,000	N/A	~$10,000
Development Planning*	N/A	N/A	N/A	N/A
Industrial and Commercial Inspections	N/A	N/A	N/A	N/A
Illicit Connections & Illegal Discharges Program	N/A	N/A	N/A	N/A
Municipal Facilities and Activities	N/A	N/A	N/A	N/A
Public Education & Outreach	N/A	$63,547	N/A	$71,840
Monitoring Program	N/A	$78,251	N/A	$148,720
Other	N/A	$0	N/A	$0
Contributions to Other Programs	N/A	$121,725	N/A	$108,500
Total	**N/A**	**$574,487**	**N/A**	**$782,860**

A description of the sources of funds that were utilized during the previous fiscal year and the sources of funds proposed to meet the necessary expenditures for the subsequent year, including legal restrictions on the use of such funds are as follows:

Source of Funds	Capital Expenditures	Percent of Total Program Funding	Restrictions on Use (if applicable)
Santa Margarita Watershed Benefit Assessment Fund	$384,000	56%	District NPDES compliance costs, excess funds used to fund regional NPDES activities.
Santa Margarita Watershed Permittee Implementation Agreement	$284,932	41%	Regional NPDES Compliance Programs.
Zone 7 Ad-Valorem Tax Revenue	~$10,000	1.5%	Costs associated with District's compliance with Municipal Construction component of Board Order R9-2004-001.
Developer Development Review/Plan Check Fees	Unknown	Unknown	Costs associated with review of proposed developments in the unincorporated County for compliance with the Development Planning provisions of Board Order R9-2004-001.
Spending Against Reserves	$0	0%	District NPDES Compliance Costs
Miscellaneous Revenue	~$10,000	1.5%	Interest, Other Misc.
TOTAL	**$688,932**	**100%**	

Additional Comments/Information:

The Permittees are working with other stakeholder groups to leverage funds for regional planning objectives including:

Stormwater Monitoring Coalition – The SMR Permittees are partnering with other participants in the Southern California Coastal Watershed Research Project, Southern California Counties and stakeholders to fund monitoring projects to address high priority water quality issues including development of an appropriate bioassessment metric, determining natural background concentrations of several key pollutants in Southern California watersheds, developing numeric criteria for addressing hydrologic conditions of concern, and funding a lab intercalibration study.

Santa Margarita Executive Management Team – Partnering with the Bureau of Land Management and other Santa Margarita watershed stakeholders to develop water quality models of the Santa Margarita Watershed to help assess pollutant problems and sources within the Santa Margarita Watershed.

Mission Resource Conservation District – Partnering with stakeholders in the SMR through the MRCD to implement watershed education, monitoring, and clean up programs.

Santa Ana Watershed Project Authority – Jointly fund a low impact development (LID) BMP testing and demonstration facility for southern California. The facility will be a retrofit of the District's compound in Riverside. Data collected from the facility will be used to update the BMP Design Manual, develop numeric criteria for hydromodification, and provide data for statewide efforts to better define the effectiveness of LID BMPs. The facility will also serve as a regional demonstration facility for southern California MS4 Permittee groups. Additional information regarding this project is available in the Special Project's section of the Monitoring and Reporting Annual Report (Section G).

Southern California Coastal Watershed Research Project – Jointly fund a southern California wide study of hydromodification of southern California streams and assess possible mitigation measures. Additional information regarding this project is available in the Special Project's section of the Monitoring and Reporting Annual Report (Section G).

H.4. Municipal

Under the prior SMR Permit, the Permittees developed a Municipal Facilities Strategy to identify BMPs for activities conducted at municipal facilities. The municipal facilities of concern identified by the Permittees included maintenance yards, vehicle and equipment maintenance areas, waste transfer stations, corporation and storage yards, and parks and recreational facilities. In addition, the Permittees identified BMPs for street sweeping, catch basin cleaning, landscape and swimming pool maintenance activities, MS4 maintenance activities, and the application of pesticides. The Municipal facilities strategy was incorporated into Chapter 5 of the DAMP as part of the permit update process. The following table updates the Public Agency Facilities Matrix contained within the DAMP.

H.5. Update Public Agencies Facilities Matrix

Table H-3 lists the types and numbers of municipal facilities operated by the Permittees.

Table H-3. Public Agency Facilities Matrix

Permittee	Corporate Yards	Parks & Recreation Facilities	Warehouses	Fire Stations	Police Stations	Hazardous Materials Storage	Animal Shelters	Swimming Pools	Water Treatment Facilities
District [a]	--	--	--	--	--	--	--	--	--
County	3	3	--	10	--	1	--	--	--
Murrieta	1	47 [d]	--	4	1	--	--	1	--
Temecula	1	36	--	4 [b]	2 [c]	--	--	2	--

[a] The District have no municipal facilities, other than MS4, in the Santa Margarita Region.

[b] Although within city limits, two of these stations are operated by the City of Temecula, and two are operated by Riverside County Fire Department.

[c] Although within city limits, these stations are operated by the Riverside County Sheriff's Department.

[d] There are forty-four (44) parks and three (3) recreational facilities within City of Murrieta limits.

H.5.1. Updated Drainage Maps

The updated drainage map is included in Appendix I of this report and Appendix D of the DAMP. The drainage map is in GIS format and identifies all receiving waters, all CWA section 303(d) impaired receiving waters, existing and planned land uses, MS4s, major highways, jurisdictional boundaries, and industrial and commercial facilities, municipal sites, and residential areas.

H.6. Industrial/Commercial

The industrial and commercial program includes the implementation of the Compliance Assistance Program (CAP), which makes use of existing County Department of Environmental Health site inspections. As the responsible Certified Unified Program Agency (CUPA) in Riverside County, the County Department of Environmental Health is responsible for regularly inspecting all sites within the County that handle hazardous waste. The County Department of Environmental Health also inspects all food service restaurants (approximately 237 facilities) within the SMR at least annually.

Revisions to the inspection program requirements contained within the Third-term SMR Permit expanded the scope of the overall commercial/industrial inspection program beyond the ability of the CAP to address. Each municipal Permittee now implements a supplemental inspection program for facilities not covered by the CAP. In addition, the Third-term SMR Permit required inventories/databases of facilities, prioritization of industrial and commercial sources relative to the potential to impact water quality, and specified inspection frequencies based upon facility priority.

The revised industrial and commercial sources program continues to have both regional and local jurisdiction components. Although the overall industrial/commercial inspection program has grown beyond the CAP, the CAP still addresses most of the facilities identified in the Third-term SMR Permit. With its low overhead cost, it remains a cost effective approach to mitigating the impacts of industrial and commercial facilities on the MS4 and Receiving Waters.

H.6.1. CAP Summary Report

Under the CAP, County Department of Environmental Health inspectors added a stormwater compliance survey to their regular inspection process. Completed surveys are forwarded to the appropriate Permittees for their records, review and further action, if necessary. The CAP industrial and commercial program has been an effective element of the DAMP. Individual inspection results are contained in each of the Permittee's Annual Reports. Section J includes a summary table identifying the total number of facilities inspected under the CAP.

H.7. Illicit Connections/Illegal Discharge (IC/ID) Activities

H.7.1. Hazmat Response Teams

The HazMat Emergency Response Team is a partnership program with combined efforts from the Riverside County Fire Department and the Hazardous Material Branch of Environmental Health. The HazMat Response Team is staffed daily by firefighters/HazMat specialists at two separate locations. Hazmat 34 is stationed at the Winchester Fire Station and Hazmat 81 is stationed at the Palm Desert Fire Station. The Hazmat Team oversees the NPDES program for the County Fire Department's fire stations and facilities and provides training to the employees of the Fire Department. (See Appendix C, for detailed information regarding HazMat Team Activities.).

H.7.2. Complaint Call Summary Logs

As described in Section G.3.2, an "800" telephone number has been established to report activities suspected of polluting Urban Runoff. The total number of calls received on the 800 Line is summarized in Section J.1. Please note that hang-ups or disconnects are not included.

H.7.3. Watershed Clean-Up Event Summary

Permittee staff participated with other public agencies and community organizations in the annual Santa Margarita Watershed Cleanup Day to remove trash and debris from the area watercourses. Following the cleanup activities, the "Only Rain in the Storm Drain" program conducted outreach to the volunteers at the post-event barbecue. Specific quantities are identified in Section J.1.

H.7.4. Household Hazardous Waste/Antifreeze, Battery, Oil and Latex Paint (HHW/ABOP)

One of the principal components of the Permittees' source control efforts are the HHW and ABOP collection programs conducted by the County's Environmental Health Department. The goal of these programs is to provide convenient alternatives to illegally disposing of wastes into the MS4. Specific quantities are identified in Section J.1.

H.7.5. Integrated Pesticide Management

The Permittees encourage the use of integrated pesticide management measures through coordination with the County Agriculture Commission.

H.8. Training Summaries

This section describes the Permittee training programs jointly funded by the Permittees. Tables of attendance are provided in Section J.1 of this report. Training was provided by AEI-CASC and Brown and Caldwell, with an overall training program evaluation performed by Camp, Dresser and McKee (CDM). The training

programs were revised to include modules specifically addressing Constituents of Concern which includes preventative BMPs for nutrients, bacteria and sediment due to 303(d) listed pollutants in the SAR and SMR. Appropriate BMPs were identified and discussed for each training area.

H.8.1. Construction

In compliance with R9-2004-001, nine (9) Construction training seminars were held on the following dates: October 2, 2006, October 10, 2006, October 12, 2006, October 16, 2006, October 17, 2006, October 18, 2006, April 24, 2007, April 30, 2007, and May 3, 2007. The overall training attendance sheet and training flyer are included in Appendix D.

H.8.2. Industrial/Commercial

In compliance with the SMR Permit, five (5) Industrial/Commercial training seminars were held on the following dates: October 3, 2006, October 19, 2006, October 23, 2006, April 18, 2007, and April 30, 2007. The overall training attendance sheet and training flyer are included in Appendix D.

H.8.3. New Development

In compliance with the SMR Permit, four (4) New Development training seminars were held on the following dates: October 3, 2006, October 23, 2006, April 16, 2007, and April 25, 2007. The overall training attendance sheet and training flyer are included in Appendix D.

H.8.4. Municipal

In compliance with the SMR Permit, six (6) Permittee training seminars were held on the following dates: October 2, 2006, October 16, 2006, October 17, 2006, October 18, 2006, April 16, 2007, and May 1, 2007. The overall training attendance sheet and training flyer are included in Appendix D.

I. Recommended Activities to be Conducted Jointly by the Permittees to Address the Identified Water Quality Problems.

The Permittees have evaluated the effectiveness of the revised programs and are proposing the following modifications to Permit Compliance Progams and/or studies to address identified water quality problems.

The Permittees have determined that Monitoring and Reporting Program for the 2004 SMR MS4 Permit does not appropriately apply the TRIAD method as specified in the 2004 Model Monitoring Program Guidance developed by the Stormwater Monitoring Committee. Specifically:

1) The TRIAD approach (combined analysis of bioassessment, chemistry and toxicity data) as described in the SMC guidance was intended to assess the status of habitat conditions during dry weather flow conditions only as bioassessment data is only valid during static dry weather conditions. However, the SMR Permit Monitoring and Reporting Program inappropriately requires that the TRIAD approach be applied by using data from both dry and wet weather sampling periods.

2) The SMR Permit Monitoring and Reporting Program does not currently require the collection of dry weather toxicity data, making appropriate evaluation of the TRIAD during dry weather impossible.

The Permittees are concerned that the misapplication of the method may result in mis-allocation of finite Permittee resources to extensive source assessments for pollutants that may not actually be impairing the watershed.

According to the 2004 Model Monitoring Program Guidance, the TRIAD analysis was only intended to be applied to dry weather data. Wet weather should only be analyzed for negative habitat impacts based on chemistry and toxicity data (Model Monitoring Program, Stormwater Monitoring Coalition, 2004, pg. 5-37). The Model Monitoring Program notes that it is inappropriate to use the TRIAD for wet weather as the dry weather bioassessment results are not applicable to wet weather conditions (Model Monitoring Program, Stormwater Monitoring Coalition, 2004, pg. 5-39). The misapplication of the TRIAD approach is likely because the NPDES MS4 Permit was adopted prior to the final release of the Model Monitoring Program. The NPDES MS4 Permit Monitoring and Reporting Program was based on an early draft of this document.

The Permittees are committed to adding dry weather toxicity testing to the TRIAD stations for Fiscal Year 2007-2008 so that the TRIAD approach may be properly applied to dry weather conditions. Wet weather chemistry and toxicity data will also continue to be independently analyzed. Initial changes to the Monitoring and Reporting Program Annual Report were initiated this year to facility addition of the data to next year's Monitoring and Reporting Program Annual Report.

Initiation of Toxicity Reduction Evaluation (TRE) to address potential Pyrethroid Toxicity in Receiving Waters

Toxicity monitoring at Temecula Creek and Murrieta Creek was initiated in 2004 using Ceriodaphnia, Selenastrum, and Hyalella. During the 2004-05 and 2005-06 reporting periods, toxicity to Hyalella was observed in 1 of 3 and 3 of 4 stormwater collections respectively, for both Temecula and Murrieta Creeks. During the 2006-07 reporting period, 1 of 1 stormwater collections resulted in toxicity to Hyalella. Toxicity was not observed to either Ceriodaphnia or Selenastrum in any of the eight samples collected over the last 3 annual reporting cycles. Dry weather samples have not been tested for toxicity to date. Toxicity testing during the 2005-06 season categorized the toxicity in both creeks as persistent.

The Monitoring and Reporting Program No. R9-2004-001 (MRP), Section II.A. I. 4, states,

> *When results from the chemistry, toxicity, and bioassessment monitoring*indicate urban runoff-induced degradation, Permittees shall evaluate the extent and causes of urban runoff pollution in receiving waters and prioritize management actions to eliminate or reduce sources. Toxicity Identification Evaluations shall be used to determine the cause of the toxicity, and Toxicity Reduction Evaluations shall be used to identify sources and implement management actions to reduce pollutants in urban runoff causing toxicity.*

A Toxicity Identification Evaluation (TIE) was completed on July 7, 2007 on the data collected during the 2006-2007 reporting period in accordance with Table 2 in the MRP, and identified pyrethroids as a potential source of toxicity and biological degradation of both Murrieta and Temecula Creeks. Bioassessments at both of these creeks have indicated *Fair* to *Poor* benthic communities and physical habitats ranging from *Suboptimal* to *Marginal*. Pyrethroid pesticides are not currently measured in either creek. During the four toxic wet weather collection events between 2005 and 2007, measured analytes do not appear to exhibit a relationship with toxicity.

Due to limited rainfall during the 2006-2007 reporting period, only a single storm event, and thus, a single TIE was able to be conducted. A single TIE assessment of pyrethroids as the source of toxicity is not sufficient to verify the persistence of pyrethroids as the sole source of toxicity. Further, additional data collection is necessary to characterize likely sources of pyrethroid toxicity.

Further, methods to measure pyrethroid toxicity have proven challenging because method development requires the ability to measure low concentrations of the toxicant, which remains a challenge for pyrethroids; Phase II TIE methods are not yet available. However, TIE methods for pyrethroids are progressing well and moving toward standardization (Pesticides in Urban Surface Water Annual Review of New Scientific Findings 2007, San Francisco Estuary Project, June 2007, pg. 7).

After receiving the TIE results on July 7, 2007, the District initiated work on developing a TRE. The District is currently preparing a scope of work to conduct a TRE to identify the source of the pyrethroid toxicity consistent with the requirements of the permit. However, in anticipation of the necessary requirements to further characterize sources for the TRE, additional dry weather toxicity data collection and direct pyrethroid sampling of dry weather flows (and follow up TIEs if necessary) have already been initiated. A first set of samples

was collected on October 16, 2007. This study is being designed to answer the following management questions:

1) Is the pyrethroid toxicity persistent in the receiving waters?

2) Does the toxicity occur during dry weather?

3) Are there any obvious sources of illicit discharges of pyrethroids that can be abated by the Permittees?

4) What are the likely sources of pyrethroid toxicity in the Santa Margarita Watershed?

5) What potential management measures are available to mitigate the impacts of pyrethroid pesticide application?

It is anticipated that the draft scope of work will be finalized by the end of October. Implementation of the workplan will be initiated in early 2008. Verification that pyrethroids are the persistent cause of toxicity.

Additional Special Studies conducted by and/or on behalf of the Permittees. The Special Studies section of the Monitoring and Reporting Program (Appendix G, Section 7).

J. An Assessment of Overall Program Effectiveness Based on Measurable Goals Established in the DAMP.

The Third-term SMR Permit requires the Permittees to develop a short and long term strategy for addressing the effectiveness of the Watershed SWMP. This strategy is described in Appendix S of the DAMP. The Watershed SWMP Annual Report FY 2005-2006 was the first year that the newly required Third-term MS4 Permit programs was fully implemented and the effectiveness evaluations required. This Annual Report is a continuation of the program implementation and effectiveness evaluation process.

The strategy for assessment requires the initial establishment of a set of baseline conditions. These baseline conditions can be used to establish measurable goals based on measurable metrics. Thereafter effectiveness can be evaluated by comparisons of successive years of indicator information against the baseline data and measurable goals. Where the period of evaluation is characterized by the implementation of new program requirements, determinations of program effectiveness will initially be limited to confirmation of program implementation and collection of measurable metrics until baseline conditions can be properly established. Further, it must be recognized that direct measures of long-term program effectiveness may not be available within the timeframe of the Third Term Permits. This lack of direct measure confirmation arises because:

- Baseline water quality conditions are not readily established;
- Stormwater and dry weather discharge data is inherently variable;
- Water quality changes in response to program implementation are likely to be very slow; and
- It is difficult to establish a link between receiving water condition and program activities at the watershed scale when programs are being implemented incrementally with the development/redevelopment cycle.

While program effectiveness assessment is a key step in the iterative process of program implementation, it should be realized that effectiveness assessment itself is a part of the management process that is also evolving. Assessing program effectiveness is recognized as a challenge for program managers across California, and the Riverside County Stormwater Program is supporting the effort of the CASQA to develop guidance in this area at a statewide level.

J.1 Short Term Measures of Effectiveness

The short-term strategy for assessing the effectiveness of the Watershed SWMP requires the development of measurable goals and measures of effectiveness for programs proposed to mitigate the impacts of Focus Area Constituents of Concern. The measures of effectiveness track the year-to-year implementation of the regional programs. The measures of effectiveness also are used as part of the Long-Term Strategy to measure the effectiveness of the Watershed SWMP as described in Provision K.2.m of the Watershed SWMP. Measurable Goals and Measures of Effectiveness for the existing and proposed regional programs are presented below.

- Encourage Watershed Based Planning Effort

SUMMARY EFFECTIVENESS ANALYSIS:

One of the most significant events of the reporting period was the development and implementation of the IRWMP. The IRWMP was adopted on July 31, 2007. IRWMPs are the current gold standard of watershed based planning. The IRWMP was initiated by Rancho California Water District, the County of Riverside and the District. The IRWM stakeholders included Elsinore-Anza-Murrieta Resource Conservation District, the Regional Board, the U.S. Army Corps of Engineers, California Department of Fish and Game, the Cities of Temecula and Murrieta, the BuRec, and several other community organizations. The plan describes the stakeholders goals for the watershed and identifies projects necessary to achieve those goals. Focus was placed on projects that integrated multiple watershed benefits. Based on the IRWMP, several stakeholders submitted an application for Prop 84 IRWM Implementation Grant projects, including the District, who requested the funds to complete the Murrieta Creek Flood Control, Environmental Restoration and Recreation Project. A copy of the IRWM is included on CD in Appendix A.

The Permittees continue to lead efforts to mitigate the impact of new development on water quality in the SMR. The MSCHP effort continues to purchase habitat and streambank properties through grants and other funding mechanisms and ensure that new developments appropriately protect natural resources. Approximately 872 acres were conserved this last calendar year. The Permittees are also pursuing a Special Area Management Plan, in conjunction with the Regional Board and the USACE for the purposes of identifying and protecting, at a watershed level, high priority Waters of the U.S. In addition, the Permittees are working with the other stakeholders in the watershed to aggressively address the 303(d) listed impairments in the Santa Margarita watershed, through efforts coordinated by the Bureau of Reclamation. The Bureau, with the support of the Permittees, has developed a watershed model and approached the Regional Board regarding developing a third-party TMDL for the nutrient impairments in the Santa Margarita watershed. Finally, the District continues to develop an enhanced BMP guidance manual, focused on low impact development, landscape based BMPs, capable of addressing the water quality impairments affecting the Santa Margarita watershed. A first draft of this manual is expected in FY2007-08. In addition, the Permittees are coordinating with SCCWRP to develop a regional southern California approach to addressing hydromodification. The Permittees believe that the combined efforts not only meet but exceed the minimum requirements established by the Watershed SWMP and the measurable goals established for addressing the highest priority Water Quality Problems in the Santa Margarita watershed. Specific measurable metrics are as follows:

- Annual Summary Reports of benefits of MSHCP Implementation

Acreages Acquired per Year	Approximate Acres
2003	3,193.4
2004	9.7
2005	355.4
2006	6,701.2
2007	871.9
Total	**11,131.6**

Note: In the previous FY 2006-2007 Watershed Annual Report, the above MSCHP acreages were reported on a fiscal year basis. Since acreage information is collected and reported on a calendar basis, this and future annual reports will be reported on a calendar year basis to ensure accuracy and consistency.

- Annual Summary Report of SAMP Development

The USACE, in conjunction with the Permittees, is developing a Special Area Management Plan (SAMP) for both the San Jacinto and upper Santa Margarita watersheds. This comprehensive watershed based planning effort will identify, prioritize and protect the highest priority Waters of the U.S., while considering the broader needs of growth and transportation improvements. It will be used to assist federal, state and local agencies with their decision making and permitting authority to protect, restore and enhance aquatic resources, while accommodating various types of development activities and infrastructure projects. The upper Santa Margarita and San Jacinto watersheds include such resources as woodlands, wetlands, freshwater marshes, vernal pools, streams, lakes and rivers that will be evaluated and protected under the project. The final product of the SAMP will be the establishment of an abbreviated or expedited regulatory permitting process by the USACE under Section 404 of the Clean Water Act. Additionally, the California Department of Fish and Game is preparing a Master Streambed Alteration Agreement in conjunction with the SAMP to provide an expedited permitting process under the State's Section 1600 of the Fish and Game Code.

The $4.5 million in appropriations received since FY 2001 has allowed the USACE to complete a *'Landscape Level Aquatic Resource Delineation'* and *'Functional Assessment'* to determine the value of waters and wetlands within these watersheds. During the last two fiscal years the USACE did not receive any funding for the SAMP and all efforts were put on hold. The District has teamed up with the Riverside County Transportation and Land Management Agency, the Riverside County Resource Conservation Authority and the Riverside County Transportation Commission to assist the USACE with the final stages of the SAMP which include the completion of the draft EIR/EIS, the development of the expedited permits and the development of the conservation/mitigation areas. The goal is to have the SAMP completed by end of 2008.

- Summary Report of Watershed Stakeholder meetings and agendas.

The Permittees are working with other stakeholder groups to leverage funds for regional planning objectives including:

Prop 13/40/50/84 Grant Funds – Working cooperatively with San Diego County, Bureau of Reclamation and other stakeholders to implement a Santa Margarita River Watershed Management Plan. In support of this, the Permittees partnered with Rancho California Water District and other stakeholders to develop an Upper Santa Margarita River IRWM. The Permittees are pursuing several million dollars in Proposition 84 IRWM grants under this IRWM which was adopted on July 31, 2007. The development of the Upper Santa Margarita Watershed IRWM is the epitome of watershed planning and a huge step, and effort, by the watershed stakeholders.

Santa Margarita Executive Management Team – Partnering with the Bureau of Land Management and other Santa Margarita watershed stakeholders to develop water quality models to help assess pollutant problems and sources within the Santa Margarita watershed. This group is currently coordinating the implementation of the 13267 Lagoon Monitoring Order for the Santa Margarita River, continuing discussions on the ongoing development and expansion of the Santa Margarita River Watershed Model, and preparing a study to collect data to support an Numeric Nutrient Endpoint analysis of the Santa Margarita River.

Mission Resource Conservation District – Partnering with local upper Santa Margarita stakeholders through the MRCD to implement watershed education, monitoring, and clean up programs. The MRCD coordinates the annual Santa Margarita Watershed Clean Up Event with support from the Permittees.

- Summary Report of status of WQMP BMP Guidance

District and County staff are working on the development of expanded treatment control BMP design guidance with focus placed on low impact development concepts, such as landscape based BMPs. In addition, an FAQ, Watershed Impairment Map, and updated template were created for the development and plan checking community. The District has also initiated a retrofit of our Riverside compound to conduct LID BMP testing and demonstration. Construction is scheduled to begin in late 2008. See Appendix G - Section 7, Special Studies for more information.

Additionally, the Permittees are continuing to work with the SMC and others to develop numeric hydromodification guidance as required by permit requirement F.2.b)(9). The District has partnered with the SMC and SCCWRP to pursue grant funds to undertake the necessary studies. The next steps will be determined based on the result of the grant applications. An Annual Report summarizing these studies is included in Appendix B.

- Continue to support development of regional science and other studies to further understand and mitigate water quality impairments

  SUMMARY OF EFFECTIVENESS ANALYSIS: The Permittees continue to participate in the development of science necessary to better manage the NPDES MS4 Stormwater Programs. The Permittees are core members of the Southern California Monitoring Coalition, have supported SCCWRP on independent studies of natural background concentrations for bacteria, and District staff (Linda Garcia) Co-Chaired the CASQA Stormwater Monitoring and Science Subcommittee. The Permittees are also working with local watershed stakeholders to develop models of the watershed to assess sources of pollution and possibly test the effectiveness of proposed BMPs.

  Specific studies such as the lab intercalibration studies and Bioassessment Protocol studies currently being conducted by the SMC have directly addressed our goal of standardizing monitoring and sampling analysis protocols. The water quality model being developed in conjunction with the BuRec is expected to provide a useful tool for assessing BMP effectiveness. The coordination with SCCWRP on the natural background bacteria study and the BuRec's efforts to evaluate natural conditions in the Santa Margarita watershed address our goal of better understanding ambient water quality conditions.

  - Annual Status Reports of ongoing studies

    Appendix G - Section 7, Special Studies, contains a summary of the current status of all special monitoring studies the Permittees are participating in.

- Public Education and Outreach

  EFFECTIVE ANALYSIS ASSESSMENT. The metrics being collected for the Public education program are presented below. Due to the need to establish a baseline condition, and due to the fact that this is the section full year of the Watershed SWMP and Permittee Individual SWMP implementation, a detailed effectiveness analysis of this component is not provided. However, the Permittees would note that overall website hits have been steadily increasing over the fiscal year and it appears that knowledge regarding our program is increasing. In addition, the collection of survey data preliminarily indicates significant knowledge of stormwater related issues among the general public. More detailed analysis will be provided in future annual reports as trends can be extrapolated. Please note that the Permittees implement a consistent public education program across the County, with specific modifications to focus on watershed issues as necessary. To this end, many of the metrics provided below are Countywide as it is consistent with the implementation of the Public Education Program. It is also infeasible to collect many of these metrics at a finer resolution. SMR specific metrics are provided where appropriate.

- Track materials distributed

Countywide Education Materials Outreach

	Attendance and/or Outreach Materials Distributed				
Materials Distribution	**FY04-05**	**FY05-06**	**FY06-07**	**FY07-08**	**FY08-09**
Calendars	25,000	20,000	20,000		
After the Storm Brochure	20,000	25,000	60,000		
Outdoor Activities Brochure	20,000	25,000	15,000		
Construction BMP Brochure	11,450	1,607	6,000		
Car Care Brochure	16,400	1,062	16,000		
HHW Schedules	20,000	20,000	20,000		
What's the Scoop Brochure	17,750	25,000	20,000		
Pool, Spa and Fountain Brochure	16,900	25,000	14,000		
Food Facilities Brochure	7,850	1,379	10,000		
Construction Poster	3,700	272	1,200		
Car Care Poster	2,450	39	1,200		
Food Services Poster	4,500	1,650	700		
Fueling Station Poster	200	12	100		
Service Bay Station Poster	200	12	100		
Santa Ana Children's Workbook	3,000	5,500	4,000		
Fancy Finn			40,000		

- Track public education events attended

Classroom Presentations and Residential Outreach

	Attendance and/or Outreach Materials Distributed				
Residential Outreach	**FY04-05**	**FY05-06**	**FY06-07**	**FY07-08**	**FY08-09**
School Outreach	4,418 students 175 classes	136 classes	3,884 students		
Animal Control Outreach	2,490	2,620	2,000		
New Employee Orientation	Aug. 19, 2004 100	2,900	3,000		
Valley Greeters	Murrieta -990 Temecula - 1,113	Aug 25, 2005 – June 30, 2006 5,298	216		
Recycling Alley in Murrieta	July 4, 2004 750	N/A	N/A		
Santa Margarita Clean Up	Sept 25, 2004 400	Nov 12, 2005 350	Oct 14, 2006 200		
Temecula Car Show	Oct 8. 2004 35,000	N/A	N/A		
Wildomar Community Celebration	Nov 16, 2004 350	N/A	Nov 9 2006 200		
Temecula Flower Show	Apr 30, 2005 750	N/A	100		
Temecula Water Festival	May 7, 2005 5,538	N/A	May 5, 2007 500+		
Temecula Public Safety Expo	N/A	Nov 3, 2005 200+	N/A		
Wildomar Town Hall Meeting	N/A	Dec 3, 2005 300	200		

Industrial/Commercial Outreach Events Conducted

	Attendance and/or Outreach Materials Distributed				
Industrial/Commercial Outreach	**FY04-05**	**FY05-06**	**FY06-07**	**FY07-08**	**FY08-09**
Business Outreach Packets mailed to new businesses identified in the Business Press	313	487	979		
CAP Food Service Outreach	2,218*	303	237		
Inland Empire Economic Briefing and Business Exposition, sponsored by the Press Enterprise.	April 22, 2005 500	N/A	N/A		
HHW Facility Inspections	1,979*	241	237		

* County-wide

Construction outreach events conducted

	Attendance				
Developer Outreach Activities	**FY04-05**	**FY05-06**	**FY06-07**	**FY07-08**	**FY08-09**
Brown and Caldwell WQMP Outreach	Jan. 31, 2005 Temecula 75	N/A	October 18, 2006 28		
AEI/CASC Training	N/A	June 21, 2006 Murrieta 64			
BIA Presentation	N/A	Mar. 22, 2006 240			

- Provide summary report of on-going program modifications

  In fiscal year 2006-2007 the Permittees implemented the following program improvements to the "Only Rain Down the Storm Drain Program":

  - Completion of an evaluation of the effectiveness of Permittee training programs. Possibly initiating development of recommended enhancements.

  - An update of the Outdoor Activities Brochure to ensure that it adequately addresses issues related to mobile operators, power washers and carpet

cleaners. Additional resource information and phone numbers, as well as legislative mandates will be added.

- Implementation of a reliable tracking mechanisms for website hits and calls to the 1-800 hotline.

o Conduct public surveys to assess public understanding of stormwater issues

o Track media impressions

Media Impressions

	Attendance and/or Outreach Materials Distributed				
Media Impressions	**FY04-05**	**FY05-06**	**FY06-07**	**FY07-08**	**FY08-09**
Earth Day Flier (Penny Saver)	650,000	685,500	687,500		
Pollution Prevention Flier (Penny Saver)	650,000	667,000	691,000		
Billboard	N/A	20,792,700	N/A		
Website Hits Public Education Storm Water Web Page District General Storm Water Web Page	N/A	55,932 7,767	68,330		
County Postage Stamp "Only Rain Down the Storm Drain" 1-800 number	5,164,844	5,275,142	N/A		
Chemical Products Shelf Talker	5,200	450	1,800		
Herbicides and Pesticides Shelf Talker	6,750	300	10,556		
Paint Products Shelf Talkers	4,700	750	10,556		
Hazardous Chemicals Shelf Talker	1,650	300	4,025		
Environmental Calendar	300,000	300,000	150,000		
HHW Schedules	100,000	15,000	100,000		
SMART Yellow Pages* Estimated only			200,000		
Business Cards w logo and number*			500		
Fact Sheets			350		

- The Number of Urban Runoff Complaints received through hotlines

The 1-800 hotline call counter was not functioning during the reporting period. However, the Permittees are working to correct this issue. Normally, complaint calls are routed to County Code Enforcement for action or referral to the appropriate Permittee. Although calls were routed, they were not tracked by the Counter.

The District received fifty-nine (59) complaints. Forty-five (45) were referred to County Code Enforcement or Environmental Health for follow-up, two (2) were referred to the City of Temecula, two (2) were referred to the City of Murrieta, one (1) was referred to County Building and Safety Code Compliance, one (1) was referred to County Parks and Open Space District and one (1) was referred to County Haz Mat. There are no complaints that are currently being investigated by District staff. In addition, the Riverside County Fire Department HazMat team responded to 117 events within the County that potentially impacted the MS4.

It should be noted that complaints received by the District came through phone lines, e-mail requests, and/or mail. Sources of the complaints directed to the District are currently not tracked.

- Training

EFFECTIVENESS ANALYSIS ASSESSMENT: Metrics for training participation are presented below. In addition, the comprehensive analysis of the effectiveness of our training programs was evaluated and is included in The Assessment and Enhancement Analysis of the NPDES Training Program, August 2006 in Appendix B.

The Number of Permittee staff receiving Riverside County NPDES training for activities related to DAMP implementation

	Municipal Training Attendance										
	Municipal						Industrial/Commercial				
	10/2/06	10/16/06	10/17/06	10/18/06	4/16/07	5/1/07	10/3/06	10/19/06	10/23/06	4/18/07	4/30/07
District	1	1	1	0	1	0	3	0	0	0	0
County	13	13	3	1	14	7	29	10	14	9	12
Temecula	0	0	0	7	0	0	0	0	0	0	0
Murrieta	0	0	0	29	0	0	0	0	0	0	0

	Municipal Training Attendance												
	Construction									New Development			
	10/2/06	10/10/06	10/12/06	10/16/06	10/17/06	10/18/06	4/24/07	4/30/07	5/3/07	10/3/06	10/23/06	4/16/07	4/25/06
District	1	0	5	1	0	0	0	5	0	11	17	1	1
County	30	2	11	26	15	6	3	10	19	7	6	6	0
Temecula	0	0	0	0	0	28	0	0	0	0	0	0	0
Murrieta	0	13	0	0	0	0	0	0	0	0	0	0	0

  - Summary statistics on testing results

Testing results are included in the Assessment and Enhancement Analysis of the NPDES Training Program, August 2006 in Appendix B.

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- Waste Collection and Watershed Clean-Up Events

EFFECTIVENESS ASSESSMENT: The Permittees continue to collect data on waste collection and watershed clean up events. The Permittees' trash collection programs increased their collection by over 20% looking at same sites. Including the additional rural collection site, it increased collection by 118%. There appears to be increase knowledge and continued demand for HHW/ABOP facilities. Some of the increases can be accounted for with population growth. Other factors include continued outreach and advertising. The Watershed Clean Up event also continues to generate interest and press coverage. This portion of the program appears to be effective and warranted.

  - Annual summary report of materials removed/collected

During FY 2006-2007, eleven (11) HHW collection events were held within the SMR. Also there were forty-two (42) ABOP events staged at the County's Transportation Maintenance Yard in Murrieta and serviced a total of 1,483 participants. Approximately 109,226 pounds of HHW were collected. Additionally, approximately 61,054 pounds of HHW were collected in the rural HHW collection event. Approximately 372 participants attended the event. The ABOP facility was open for a total of 42 Saturdays, servicing 1,713 participants. Approximately 83,355 pounds of ABOP wastes were collected. A detailed breakdown of the HHW and ABOP waste streams is included as Appendix E.

	FY04-05	**FY05-06**	**FY06-07**	**FY07-08**	**FY08-09**
HHW Participants	1,238	1,460	1,483		
HHW Collected (lbs)	78,000	93,700	109,226		
ABOP Participants	1,490	1,740	1,713		
ABOP Collected (lbs)	63,000	89,400	83,355		
HHW Rural Participants		350	372		
HHW Rural Collected (lbs)		76,500	61,504		
Total Participants	**2,728**	**3,550**	**3,568**		
Total Collected (lbs)	**141,000**	**259,600**	**254,085**		

Santa Margarita Watershed Clean Up Event

The Watershed Clean Up was held on October 14, 2006, and the Permittees hauled away 18 tons of trash and debris in support of the event. To encourage the public to keep their communities clean, the District purchased and gave away storm water related promotional items and brochures.

- Annual summary report of public outreach conducted as part of collection/removal events

  During the Watershed Clean Up event, each of the participants and event organizers received outreach material. The volunteers are made up of those who need to complete community service hours; part of their rehabilitation; Boy and Girl Scout Project; environmental groups' family environmental enthusiasts; etc.

J.2 Long Term Measures of Effectiveness

The objective of the Watershed SWMP is to maintain and/or improve the quality of Receiving Waters within the SMR by mitigating impacts of Constituents of Concern in urban runoff using regional programs, while considering economic, social and environmental resource limitations. As identified in Appendix S, Provision K.2.m. of the DAMP, the Permittees' long-term effectiveness analysis will be incorporated into future ROWD as part of the long-term strategy to measure the effectiveness of the Watershed SWMP. Measurable metrics necessary to assess long-term effectiveness are collected as part of the short-term effectiveness measures program.

K. Proposed Revisions to the Watershed SWMP

The Permittees have identified two issues that may require Revision of the SMR Permit and/or DAMP:

- The necessary revisions to the Monitoring and Reporting Program identified in Section I of this Watershed Annual Report.

- Modification of the DAMP/SWMP as determined by the Toxicity Reduction Evaluation Summarized in Section I of the Watershed Annual Report and as discussed in Appendix G. The Toxicity Reduction Evaluation will determine sources, and potential BMPs, for potential pyrethroid pesticide toxicity detected in Murrieta and Temecula Creeks.

In addition, as part of the ROWD, the Permittees will likely recommend substantial revisions to the Permit requirements for the layout of the Watershed Annual Report. The Permit requires substantial duplication of reporting, which either increases the volume of the report, or requires substantial cross-referencing. In either case, it is confusing to write, and likely confusing to read.

The Permittees are also developing a revised Post-Construction LID BMP Design Handbook. Proposed revisions to the program based on these documents, or at least progress reports on these efforts, will be included in future Annual Reports.

APPENDIX A

MEETING AGENDA AND NOTES

SANTA ANA/SANTA MARGARITA MANAGEMENT STEERING COMMITTEE

RIVERSIDE COUNTY STORMWATER MANGEMENT PROGRAM
MANAGEMENT STEERING COMMITTEE
SANTA ANA & SANTA MARGARITA REGIONS

MEETING AGENDA

(Lunch Served)
11:30 a.m.* – 12:30 p.m. January 18, 2007
Room A
Riverside County Administrative Office, Fourth Floor
4080 Lemon Street, Riverside, CA 92501

* meeting to begin at 11:30 a.m. or immediately following the WRCOG TAC meeting should it end later than 11:30

1. Welcome and Self Introduction – Dusty Williams, RCFC&WCD

2. Approval of September 21, 2006 Meeting Notes and review January 18, 2007 Agenda – Dusty Williams, RCFC&WCD

3. Santa Ana/Santa Margarita Program Status – Jason Uhley, RCFC &WCD
   - Audits
   - Annual Reports
   - ROWD

4. TMDL Development - Jason Uhley, RCFC&WCD
   - Lake Elsinore and Canyon Lake Nutrient TMDL
     - 2007/2008 TMDL Cost Share Budget
   - Middle Santa Ana River Watershed Bacteria Indicator TMDL
     - Tentative Agreement

5. Next Meeting Date – March 15, 2007

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RIVERSIDE COUNTY STORMWATER MANAGEMENT PROGRAM
MANAGEMENT STEERING COMMITTEE
SANTA ANA/SANTA MARGARITA REGIONS

MEETING MINUTES
for
September 21, 2006

I. ***Attendees:***

Jason Uhley	RCFC & WCD
Charlene Warren	RCFC & WCD
Dusty Williams	RCFC&WCD
Gary Christmas	Riverside County Executive Office
Alan Kapanicas	City of Beaumont
Asad Korgan	City of Corona
Chris Vogt	City of Moreno Valley

II. ***Welcome and Self Introductions – Dusty Williams RCFC&WCD***

Dusty Williams welcomed attendees to the MSC meeting and asked that everyone review the sign-in sheet (passed around table) to verify that the correct information for primary and alternate representatives are listed. Dusty then discussed the purpose and requirements of the MSC meeting noting that city representatives are required to attend 3 of the 4 meetings per fiscal year. The September 21, 2006 meeting is the first meeting of the 2006/2007 fiscal year.

III. ***Approval of February 16, 2006 Meeting Minutes, May 18, 2006 Summary sent via email and Review September 21, 2006 Agenda – Dusty Williams RCFC&WCD***

Dusty briefly reviewed the agenda items, informing attendees that Jason Uhley would provide further detail on the items. The May 18, 2006 MSC meeting was cancelled and an executive summary was sent via email to City Managers and the County Executive Office in lieu of the meeting. Everyone was given credit for attending the May 18th meeting.

Alan Kapanicas made mention that be believed Joe Afluki was in attendance at the February 16, 2006 MSC meeting. The sign-in sheet for the February meeting did not reflect Joe's signature. An attempt will be made by Charlene Warren to further clarify his attendance.

Handouts Provided:

- Agenda for September 21, 2006
- Minutes for February 16, 2006
- Executive Summary for May 18, 2006 (meeting canceled, exec.summary sent in lieu of)

IV. ***Regional Board MS4 Program Audits – Jason Uhley***

Jason reported on the audits conducted by the Santa Ana Regional Board noting that the audits were near completion and that there would likely be NOV's and ACL's issued for some cities. Dusty added that NOVs and ACLs can be appealed if issued. Results of the audits will be released simultaneously for all cities. Jason then discussed last year's audits, issues with Tetra Tech's philosophy of auditing, and San Bernardino County audits.

V. *TMDL Development – Jason Uhley*

- **Lake Elsinore/Canyon Lake Nutrient TMDL**
  Jason informed attendees that there was an agreement entered into by all entities that were named in the TMDL. He noted that all cities except for the City of Beaumont have signed the Implementation Agreement. City Managers should have received a copy of the Agreement in May 2006. Alan asked that Jason forward him the Agreement for signature. Jason stated that he would send the document directly to Alan via email. The group then engaged in discussion on the following items:

  - Fish Kills/Algae problems in Lake Elsinore Lake
  - Chemistry of Lake
  - Amount of Nutrients Allowed
  - Implementation Agreement (City of Beaumont still needs to sign the Agreement)
  - Regional Board Pressing Cities on TMDL Implementation
  - Water Quality of the Lake (better now than in past years)
  - Consultant Tim Moore of Risk Science retained to assist Permittees with TMDL
  - BMPs needing to be addressed
  - Numeric Values
  - Cities contributions towards TMDL Task Force
  - Benefits of Wetlands ($600,000 grant received)

  ***The Nutrient Total Maximum Daily Load for Canyon Lake and Lake Elsinore (TMDL) was adopted in October 2004 and has been approved by the State and Federal governments. The TMDL regulates discharge of nutrients to Lake Elsinore/Canyon Lake. Stakeholders include MS4 Permittees, California Department of Transportation (CalTrans), March Air Reserve Base Joint Powers Authority (March JPA), California Department of Fish and Game, Western Riverside County Agriculture Coalition on behalf of AG and dairy operators, Lake Elsinore and San Jacinto Watershed Project Authority (LESJWA), Eastern Valley Municipal Water District (EVMWD) and Eastern Municipal Water District (EMWD).*

- **Middle Santa Ana River Watershed Bacteria Indicator TMDL** – Jason noted that the TMDL was adopted by the Regional Board in August 2005 and is awaiting EPA approval. The TMDL affects the cities of Corona, Norco, and Riverside. The first task due for the TMDL is the Implementation Agreement which should be before City Managers in January 2007. Jason also added that a $600,000 grant had been received to be used primarily for monitoring efforts of the TMDL. Attendees then engaged in a brief discussion of the following items regarding the TMDL:

  - Natural Sources and Exceedances of Bacteria
  - Formation of a Storm Water Quality Standards Task Force (SWQSTF)
  - Recreational Uses and Water Contact Recreation
  - Ecoli
  - Monitoring and Jurisdiction of Federal Lands
  - Requirements of Lake Elsinore TMDL (public education and enforcement)
  - Septic Systems Management Plans (possible solutions to be looked at)

VI. *Santa Ana Permit Renewal*

Jason reported on the status and efforts of the permit renewal process. The current Permit expires October 25, 2007. Items of discussion included:

- Federal Law Requirements
- Report of Waste Discharge (ROWD) due April 25, 2007
- Consultant to begin work on the Permit by the end of September
- Possible Mandatory Inspection for Construction BMPs
- Additional Monitoring
- Municipal Maintenance
- The need for Cities to become more Proactive
- Discussion that Regional Board may combine Riverside/San Bernardino County Permits
- Differences in Riverside/San Bernardino Permits
- Coordination of Public Education Efforts in the 2 Counties

VII. *New Agenda Items/ Schedule Next Meeting*

There were no new agenda items requested for future meetings. Jason verified future meeting dates which are November 16, 2006, February 17th, May 17th, and September 20th 2007. Dusty thanked everyone for attending and adjourned the meeting.

NEXT MEETING IS SET FOR:
THURSDAY, November 16, 2006 - [redacted]
AT
RIVERSIDE COUNTY EXECUTIVE OFFICE, FOURTH FLOOR
4080 Lemon Street, Riverside, CA 92501

Visit the StormWater/Clean Water Protection Program website at:
http://www.co.riverside.ca.us/depts/flood/YouCanHelp.asp.
The Site contains a variety of useful stormwater program information including links to other stormwater management programs and related web sites.

P8/111797

RIVERSIDE COUNTY STORMWATER MANGEMENT PROGRAM
MANAGEMENT STEERING COMMITTEE
SANTA ANA & SANTA MARGARITA REGIONS

MEETING AGENDA

(Lunch Served)
11:30 a.m.* – 12:30 p.m. March 15, 2007
Room C/D
Riverside County Administrative Office, Fourth Floor
4080 Lemon Street, Riverside, CA 92501

* meeting to begin at 11:30 a.m. or immediately following the WRCOG TAC meeting should it end later than 11:30

1. Welcome and Self Introduction – Dusty Williams, RCFC&WCD

2. Approval of January 18, 2007 Meeting Notes and review March 15, 2007 Agenda – Dusty Williams, RCFC&WCD

3. Santa Ana/Santa Margarita Program Status – Jason Uhley
   - Industrial/Commercial Compliance Assistance Program
   - Legislative Update
   - Permit Renewal Update

4. TMDL Development - Jason Uhley
   - Lake Elsinore and Canyon Lake Nutrient TMDL
   - Middle Santa Ana River Watershed Bacteria Indicator TMDL

5. Next Meeting Date – May 17, 2007

P8/112704

RIVERSIDE COUNTY STORMWATER MANAGEMENT PROGRAM
MANAGEMENT STEERING COMMITTEE
SANTA ANA/SANTA MARGARITA REGIONS

MEETING MINUTES
for
January 18, 2007

I. ***Attendees:***

Benjie Cho	RCFC&WCD
Steve Stump	RCFC&WCD
Jason Uhley	RCFC & WCD
Charlene Warren	RCFC & WCD
Dusty Williams	RCFC&WCD
Alex Gann	Riverside County Executive Office
Mike Shetler	Riverside County Executive Office
Joe Aklufi	City of Beaumont
David Lane	Calimesa
Bob Bohan	City of Canyon Lake
Ati Eskandari	City of Corona
John Davidson	City of Hemet
Kent Wegelin	City of Moreno Valley
Farida Naceem	City of Murrieta
Jeff Allred	City of Norco
Barry McClellan	City of San Jacinto

II. ***Welcome and Self Introductions – Steve Stump RCFC&WCD***

Steve Stump welcomed everyone to the meeting and initiated self introductions.

III. ***Approval of September 21, 2006 Meeting Minutes, May 18, 2006 and Review January 18, 2007 Agenda – Jason Uhley RCFC&WCD***

It was noted that under agenda item V (TMDL Development), Eastern Valley Municipal Water District (EVMWD) should be Elsinore Valley Municipal Water District (EVMWD). The correction was made.

Handouts Provided:

- Agenda for January 18, 2007
- Minutes for September 21, 2006
- Draft Lake Elsinore and Canyon Lake Task Force Budget – January 17, 2007 version
- City of Calimesa Notice of Violation (NOV) letter from CRWQCB Santa Ana Region

IV. ***Regional Board MS4 Program Audits – Jason Uhley***

Audits - Jason Uhley explained the purpose of the audits conducted by the Santa Ana Regional Board and the City of Calimesa's NOV. Copies of the NOV were provided in the handouts. Jason also noted that there may possibly be more NOVs issued as well as Administrative Civil Liabilities (ACLs). He recommended that should any other cities receive an NOV, they take the matter seriously. The District's assistance is available to the cities regarding audit response.

Annual Reports – Jason noted that the Santa Ana Annual Report was submitted to the Regional Board on time.

ROWD – Jason advised the group that the current Permit expires October 26, 2007. He then discussed the strategy being taken in regards to the Permit renewal. The Permit reapplication or Report of Waste Discharge (ROWD) is due April 25, 2007. It is expected that the Regional Board will want to enhance local documentation of the Permit compliance programs, enhance controls on new developments, and enhance Permit reporting requirements. Jason also added that data requested from the cities for the ROWD was received and should the District require any additional information, NPDES representatives and/or City Managers would be contacted.

V. ***TMDL Development – Jason Uhley***

- **Lake Elsinore/Canyon Lake Nutrient TMDL - 2007/2008 TMDL Cost Share Budget**
  Jason reviewed the cost share budget handout provided to the group. A brief discussion ensued. Jason then discussed the following items:

  - Cost Sharing Methodology
  - Basin Plan limitations affecting compliance
  - City's compliance obligations

  Jason also noted that he will continue to pursue grant dollars and that to date approximately 2 million dollars have been obtained for TMDL efforts. Budget information was provided in the agenda packets distributed to attendees during the meeting. Tim Moore of Risk Sciences has been contracted to assist with developing compliance programs of the TMDL.

- **Middle Santa Ana River Watershed Bacteria Indicator TMDL** –
  Jason noted that a tentative TMDL Task Force Agreement was submitted to the Permittees for legal counsel review. Comments are due March 1, 2007. Jason advised the group that the next meeting would be February 1, 2007 – 2:00 p.m. at SAWPA.

  Tentative Agreement - Jeff Allred raised concerns regarding agreement cost for the City of Norco. Jason reviewed the basis for the cost share, noted recent corrections to the cost share allocation, and recommended the City's send a representative to the next TMDL meeting to raise any remaining concerns.

VI. ***Compliance Assistance Program (CAP)*** - Jason summarized the purpose and status of the CAP Program. The CAP Program provides surveys of businesses and food facilities in the County conducted by the County Department of Environmental Health on behalf of the Permittees. Jason informed the group that the Regional Board may want a major expansion of the program. He then noted that Environmental Health was also no longer interested in continuing the program once the current contract ended in 2009 and that each city would need to develop their own inspection programs in its place. Jason offered to hold a workshop to help the cities develop programs. Joe Aklufi, Ati Eskandari, Kent Wegelin, Mike Shetler, and Jason engaged in further discussion regarding the CAP Program's deficiencies, costs, value, and the desire of several cities to have Environmental Health continue the inspection program services. Alex Gann agreed to follow up with Environmental Health regarding possible alternatives.

VII. ***New Agenda Items/ Schedule Next Meeting***

There were no new agenda items requested for the next meeting. Jason verified future meeting dates, which are May 17th, and September 20th 2007. Dusty thanked everyone for attending and adjourned the meeting.

NEXT MEETING IS SET FOR:
THURSDAY, March 15, 2007 - *12:00 P.M. (Tentative)*
AT
RIVERSIDE COUNTY EXECUTIVE OFFICE, FOURTH FLOOR
4080 Lemon Street, Riverside, CA 92501

Visit the StormWater/Clean Water Protection Program website at:
http://www.co.riverside.ca.us/depts/flood/YouCanHelp.asp.
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P8/112705

RIVERSIDE COUNTY STORMWATER MANGEMENT PROGRAM
MANAGEMENT STEERING COMMITTEE
SANTA ANA & SANTA MARGARITA REGIONS

MEETING AGENDA

(Lunch Served)
11:30 a.m.* – 12:30 p.m. May 17, 2007
Room C/D
Riverside County Administrative Office, Fourth Floor
4080 Lemon Street, Riverside, CA 92501

* meeting to begin at 11:30 a.m. or immediately following the WRCOG TAC meeting should it end later than 11:30

1. Welcome and Self Introduction – Dusty Williams, RCFC&WCD

2. Review May 17, 2007 Agenda and Approval of March 15, 2007 Meeting Minutes – Dusty Williams, RCFC&WCD

3. Santa Ana/Santa Margarita Program Status – Jason Uhley
   - Legislative Update
   - Permit Renewal Update
   - Draft General Construction Permit
   - Unification of the Santa Margarita Permit

4. TMDL Development - Jason Uhley
   - Lake Elsinore and Canyon Lake Nutrient TMDL – Compliance Plan for In-Lake Treatment
   - Middle Santa Ana River Watershed Bacteria Indicator TMDL - Agreement

5. Approve Next Fiscal Year's MSC Meeting Schedule
   - Proposed MSC meeting dates August 16th, October 18th, February 21st* and April 17th*

*Tentative meeting dates pending WRCOG 2008 schedule

P8/113877

RIVERSIDE COUNTY STORMWATER MANAGEMENT PROGRAM
MANAGEMENT STEERING COMMITTEE
SANTA ANA/SANTA MARGARITA REGIONS

MEETING MINUTES
for
March 15, 2007

I. ***Attendees:***

Benjie Cho	RCFC&WCD
Jason Uhley	RCFC & WCD
Charlene Warren	RCFC & WCD
Alex Gann	Riverside County Executive Office
Mike Shetler	Riverside County Executive Office
Joe Aklufi	City of Beaumont
David Lane	Calimesa
Lori Moss	City of Canyon Lake
Asad Korgan	City of Corona
Duane Baker	City of Hemet
Farida Naceem	City of Murrieta
Jeff Allred	City of Norco
Tom Boyd	City of Riverside
Barry McClellan	City of San Jacinto
Aldo Licitra	City of Temecula
John Pourkazemi	City of Temecula

II. ***Welcome and Self Introductions – Jason Uhley RCFC&WCD***

Jason Uhley welcomed everyone to the meeting and initiated self introductions. He noted that Dusty Williams and Steve Stump were attending CEAC Conference in Monterey, CA and would not be attending the meeting.

III. ***Review March 15, 2007 Agenda and Approval of January 18, 2007 Meeting Minutes – Jason Uhley RCFC&WCD***

The January 18, 2007 meeting minutes were approved. There were no items added to the March 15, 2007 agenda.

Handouts Provided:

- Agenda for March 15, 2007
- Minutes for January 18, 2007
- Legislative Highlights
- City of Norco Notice of Violation (NOV) letter from CRWQCB Santa Ana Region
- Mid-Year: Lake Elsinore and Canyon Lake Task Force Budget

IV. ***Regional Board MS4 Program Status – Jason Uhley***

Industrial/Commercial Compliance Assistance Program – Mike Shetler informed the MSC that County Building and Safety will be heading a new business licensing program for unincorporated Riverside County. The business license program will help to identify all of the businesses that require NPDES inspections in the unincorporated portions of the County. The program will develop a database which will be used by a new classification of inspectors that are solely dedicated to NPDES stormwater inspections. The intent of the program is to ultimately replace

the Industrial/Commercial Compliance Assistance Program since this program is no longer sufficient in the Santa Margarita Region of Riverside County.

Mike Shetler reported that the Department of Environmental Health will continue the CAP Program, which provides surveys of businesses and food facilities on behalf of Permittees in the incorporated areas. Aldo Licitra inquired as to how long the program will continue and was informed by Mike Shetler that it would continue at least until the next Permit cycle. Jason thanked Mike Shetler and Alex Gann for meeting with the Environmental Health Department.

Legislative Update – Jason provided attendees a legislative update. AB739, a Bill that would require the SWRCB to develop a comprehensive framework for assessing the effectiveness, as measured by receiving water quality, of stormwater management programs undertaken in accordance with those laws was highlighted. Jason noted that the District and CASQA are concerned that the use of monitoring data is not feasible for this purpose due to extreme variations in the natural systems that we are trying to measure. Jason noted that Geoff Brosseau, CASQA's Executive Director is in communication with the Assemblyman and working to educate him regarding an alternative approach based on CASQA Program Effectiveness Framework.

Jason also noted that Prop 84 was passed last year. Prop 84 is a 5 billion dollar water quality bond. District staff intends to pursue these grants dollars to offset costs for implementing TMDLs for Lake Elsinore, Canyon Lake, and the Santa Margarita Region.

Permit Renewal Update – Jason informed attendees that the Santa Ana Permit application was currently being prepared and is due to the Regional Board April 27, 2007. He discussed Permit renewal process, which includes negotiations with Board staff, followed by Permit workshops before the Regional Board and ultimately Permit adoption. He then informed the group to expect that in the next permit each city would be required to maintain an individual Local Implementation Plan which will describe how it complies with the Permit requirements. The Draft Permit will be released to Permittees and City Managers via email March 15, 2007. Comments on the Permit application package are due back to Jason by April 2, 2007.

Jason noted that the Santa Ana Regional Board issued a NOV to the City of Norco. A brief discussion regarding the release of NOVs ensued. Lori Moss indicated that the City of Canyon Lake was also issued an NOV and will forward it to Jason. Jason asked that the cities copy the District on all of the NOV response letters to the Regional Board. Jeff Allred, City Manager of Norco added that he was taking the NOV very seriously and will provide a thorough response letter to the Regional Board and will also forward the letter to Jason. Jason added that the Districts NPDES Section is available to assist Cities with addressing NOV responses and other issues, if necessary.

V. *TMDL Development – Jason Uhley*

- **Lake Elsinore/Canyon Lake Nutrient TMDL - 2007/2008 TMDL Cost Share Budget**
  Jason reviewed the LE/CL TMDL cost share budget handout provided to the group. A brief discussion ensued.

- **Middle Santa Ana River Watershed Bacteria Indicator TMDL**
  Jason reported that EPA is due to approve the TMDL at any time. A grant has been obtained to assist in the development of the TMDL.

VII. ***New Agenda Items/ Schedule Next Meeting***

There were no new agenda items requested for the next meeting. Jason informed the group the last meeting for the fiscal year was set for May 17th and advised them that it is a requirement that a city representative for each city attends 3 of the 4 meetings per fiscal year. A summary of attendance will be forwarded to City Managers.

NEXT MEETING IS SET FOR:
THURSDAY, May 17, 2007 - *12:00 P.M. (Tentative)*
AT
RIVERSIDE COUNTY EXECUTIVE OFFICE, FOURTH FLOOR
4080 Lemon Street, Riverside, CA 92501

Visit the StormWater/Clean Water Protection Program website at:
http://www.co.riverside.ca.us/depts/flood/YouCanHelp.asp.
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P8/113872

RIVERSIDE COUNTY STORMWATER MANAGEMENT PROGRAM
MANAGEMENT STEERING COMMITTEE
SANTA ANA & SANTA MARGARITA REGIONS

MEETING AGENDA

(Lunch Served)
11:30 a.m.* – 12:30 p.m. September 20, 2007
Room C/D
Riverside County Administrative Office, Fourth Floor
4080 Lemon Street, Riverside, CA 92501

* meeting to begin at 11:30 a.m. or immediately following the WRCOG TAC meeting should it end later than 11:30

1. Welcome and Self Introduction – Dusty Williams, RCFC&WCD

2. Review September 20, 2007 Agenda and Approval of May 17, 2007 Meeting Minutes - Dusty Williams, RCFC&WCD

3. Santa Ana/Santa Margarita Program Status - Jason Uhley
   - Legislative Update - Senate Constitutional Amendment 12 (SCA 12)
   - CASQA Conference Update
   - Draft General Construction Permit
   - Permit Renewal Update
   - Audits/NOVs

4. TMDL Development - Jason Uhley
   - Lake Elsinore and Canyon Lake Nutrient TMDL
   - Middle Santa Ana River Watershed Bacteria Indicator TMDL
   - Canyon Lake Bacteria Indicator TMDL

5. New Agenda Items/Schedule Next MSC Meetings
   - October 18th, February 21st* and April 17th*

*Tentative meeting dates pending WRCOG 2008 schedule

P8/115178

RIVERSIDE COUNTY STORMWATER MANAGEMENT PROGRAM
MANAGEMENT STEERING COMMITTEE
SANTA ANA/SANTA MARGARITA REGIONS

MEETING MINUTES
for
May 17, 2007

I. ***Attendees:***

Benjie Cho	RCFC&WCD
Charlene Warren	RCFC & WCD
Jason Uhley	RCFC & WCD
Alex Gann	Riverside County Executive Office
Mike Shetler	Riverside County Executive Office
Joe Aklufi	City of Beaumont
Casey Daily	City of Calimesa
Lori Moss	City of Canyon Lake
Asad Korgan	City of Corona
Duane Baker	City of Hemet
Farida Naceem	City of Murrieta
Jeff Allred	City of Norco
Tom Boyd	City of Riverside
Barry McClellan	City of San Jacinto
Aldo Licitra	City of Temecula

II. ***Welcome and Self Introductions – Jason Uhley RCFC&WCD***

Jason Uhley welcomed everyone to the meeting and initiated self introductions of attendees.

III. ***Review May 17, 2007 Agenda and Approval of March 15, 2007 Meeting Minutes – Jason Uhley RCFC&WCD***

Aldo Licitra (Temecula) noted that he and Farida Naceem (Murrieta) were in attendance at the March 15, 2007 meeting. Though the March 15, 2007 meeting minutes did reflect their attendance, the document titled "Attendance at FY 2006-2007 NPDES Santa Ana/Santa Margarita MSC Meetings and Future MSC Meetings" did not reflect their attendance. Corrections will be made. Tom Boyd (Riverside) inquired about his attendance at the September 21, 2006 meeting. Lori Moss (Canyon Lake) also inquired about her attendance at the September 21, 2006 meeting, in which she was then representing the City of Murrieta. Subsequent to the meeting, records were reviewed and there was no record of Tom's or Lori's attendance at the September 21, 2006 meeting. There were no items added to the May 17, 2007 agenda.

Handouts Provided:

- Agenda for May 17, 2007
- Minutes for March 15, 2007
- Bills 2007-2008 Legislative Session Legislative Highlights
- Preliminary Draft General National Pollution Discharge Elimination System Permit for Construction Activities Letter dated May 4, 2007 to Ms. Song Her/Clerk of the Board, SWRCB
- Final Version (4/17/07) Agreement to Form the Middle Santa Ana River Watershed TMDL Task Force

IV. *Santa Ana/Santa Margarita Program Status – Jason Uhley*

Legislative Update – Jason provided a brief update on Legislative Bill SCA 12. Senate Constitutional Amendment 12 (SCA 12) would propose to the people of the State of California an amendment to the Constitution of the State adding exemptions for fees and charges for stormwater and surface water drainage to the sewer, water, and refuse collection fee or charge exemptions already included in Proposition 218. This bill would make it easier for cities to fund and comply with new and increasingly stringent Federal Clean Water Act National Pollutant Discharge Elimination System (NPDES) stormwater permit requirements adopted by the California Regional Water Quality Control Boards. If passed by the legislature, this Amendment would be placed before the voters for approval. This bill is virtually identical to ACA 10 and ACA 13, which were prior efforts to amend Proposition 218.

Permit Renewal Update – Jason reported that the Report of Waste Discharge (ROWD) Permit Application for the Santa Ana Watershed was submitted to the Regional Board April 30th. Jason added that after the Regional Board releases their draft of the MS4 Permit, the Permittee representatives will have monthly, possibly weekly, discussions with the Regional Board. It is important that the cities dedicate staff to reviewing and commenting on the draft permits and proposed revisions to the draft Permit, as these programs can have significant fiscal consequences for the cities.

Jason provided an update on the audits conducted by the Santa Ana Regional Board noting that the next audits due to be released are the County of Riverside and the City of Lake Elsinore.

Draft General Construction Permit – Jason provided an update on the draft General Construction Permit. He informed City Managers that the Permit affects any construction project that disturbs more than one acre of land. The draft Permit released in March by the State Board included a number of changes that could be significant for the cities. Jason discussed the changes with the and further discussion ensued among the group on the following items:

- Revision of SWPPP requirements
- Notice of Intent (NOI) submittal changes
- Proposed 90-day public review process for SWPPPs
- The inclusion of Hydromodification and active treatment requirements in the draft Permit
- District comment letter submitted to the State Board on behalf of Permittees
- Tentative adoption date for the Permit is near the end of 2007

Unification with Riverside County MS4 Permits – Jason noted that the Chairwoman of the SWRCB approached Jason regarding combination of the Santa Ana, Santa Margarita and Colorado Region Permits. Jason expressed his thoughts on this issue, noting that although there are significant administrative inefficiencies with the current regulatory structure, he recommended that the County continue to work with three separate permits so as to ensure that each Permit addresses the unique needs of their respective watersheds. He further stated that should anyone have any thoughts on how to further approach this issue to please contact him.

V. *TMDL Development – Jason Uhley*

Lake Elsinore/Canyon Lake Nutrient TMDL – Compliance Plan for In-Lake Treatment

This TMDL is starting to move into the implementation phase. Tim Moore with Risk Sciences, a consultant for the TMDL, will be releasing a coordinated implementation strategy on behalf of the TMDL dischargers for Regional Board approval. In the meantime other implementation tasks are

under way such as the installation of the aeration system in Lake Elsinore, dredging Canyon Lake, development of a San Jacinto nutrient management plan and other discharger specific tasks.

Middle Santa Ana River Watershed Bacteria Indicator TMDL - Agreement
This TMDL affects the cities of Riverside, Corona, Norco and the County of Riverside. It has been adopted by the State and is awaiting EPA approval. Jason informed the group there is an Agreement to form the Middle Santa Ana River Watershed TMDL Task Force (Agreement included in agenda packet) that has been released to Permittees for approval by City Managers. Jason asked that the cities review and approve the Agreement as soon as possible. He further discussed costs associated with the TMDL.

VII. ***Approve Next Fiscal Year's MSC Meeting Schedule***
Jason thanked everyone for their attendance adding that the May 17, 2007 MSC meeting was the last meeting for the fiscal year. He then proposed the future MSC meeting dates for August 16th, October 18th, February 21st and April 17th. By a show of hands the meeting dates were approved.

VIII. ***New Agenda Items/Schedule Next Meeting***
There were no new agenda items requested for the next meeting.

NEXT MEETING IS SET FOR:
THURSDAY, August 16, 2007 - *11:30 A.M. (Tentative)*
AT
RIVERSIDE COUNTY EXECUTIVE OFFICE, FOURTH FLOOR
4080 Lemon Street, Riverside, CA 92501

Visit the StormWater/Clean Water Protection Program website at:
http://www.co.riverside.ca.us/depts/flood/YouCanHelp.asp.
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P8/115175

SOUTHERN CALIFORNIA STORMWATER MONITORING COALITION (SMC)

ANNUAL MONITORING REPORT 2006-2007

Stormwater Monitoring Coalition
Of Southern California

September 2, 2007

INTRODUCTION

As a result of the increasing regulatory focus and the lack of scientific knowledge base, both stormwater regulators and municipal stormwater management agencies throughout southern California have developed a collaborative working relationship. The goal of this relationship is to develop the technical information necessary to better understand stormwater mechanisms and impacts, and then develop the tools that will effectively and efficiently improve stormwater decision-making. As individuals and agency representatives, there was early recognition that these issues are oftentimes not localized, but typically cross watershed and jurisdictional boundaries. This relationship culminated in a formal letter of agreement, signed in 2000, by all of the Phase I municipal stormwater NPDES lead permittees and the NPDES regulatory agencies in southern California to create the Stormwater Monitoring Coalition (SMC) (Table 1).

The SMC has been so successful that the member agencies have decided to renew the letter of agreement for another five years. Moreover, the organization's appeal has been recognized by others and is resulting in four new member agencies. The new agencies include Caltrans, the City of Los Angeles, the State Water Resources Control Board, and the US Environmental Protection Agency. The SMC welcomes these new members and looks forward to working together.

Table 1. List of member agencies in the Stormwater Monitoring Coalition.

California Regional Water Quality Control Board, Los Angeles Region[1]
California Regional Water Quality Control Board, San Diego Region[1]
California Regional Water Quality Control Board, Santa Ana Region[1]
California Department of Transportation, Caltrans
City of Long Beach[1]
City of Los Angeles, Watershed Protection Division
County of Orange, Public Facilities and Resources Dept.[1]
County of San Diego Stormwater Management Program[1]
Los Angeles County Department of Public Works[1]
Riverside County Flood Control and Water Conservation District[1]
San Bernardino County Flood Control District[1]
Southern California Coastal Water Research Project[1]
State Water Resources Control Board
US Environmental Protection Agency, Office of Research and Development
Ventura County Watershed Protection District[1]

[1] original SMC member agency

The first project supported by the SMC was to develop a five-year Research Agenda. The research agenda, published in 2001, consisted of 15 unique projects developed around three main foci: 1) developing a regional monitoring infrastructure; 2) understanding stormwater runoff mechanisms and processes; and 3) assessing receiving water impacts. The SMC has made tremendous progress implementing the Research Agenda. Nine of the 15 projects have been started and nearly all have been completed. Each of these projects has, in one form or another, influenced stormwater management. Three examples of the SMC's influence include: 1) the project on evaluating microbial

source tracking (MST) has led to a significant change in how MST is conducted in southern California; 2) the project on indicators of peak flow directly influenced the development of peak flow criteria in Los Angeles; 3) the project to establish standardized data formats has led to language in multiple stormwater NPDES permits requiring electronic data submittal. The SMC is currently developing an agreement to update and revise the research agenda. This will provide vision and direction to the SMC for the next five years.

Not only does the collaborative nature of SMC projects represent value in terms of improved effectiveness of management activities, but value in terms of cost efficiency to its member agencies. All of the completed SMC projects have been on time and on (or under) budget. The cost of the studies is divided among multiple agencies rather than each agency trying to support individual isolated projects. In addition, the SMC has been successful in attracting outside resources and agency support. For example, all but a single project has attracted additional funds amounting to well over $700,000. In addition, we have received in-kind assistance from inland wastewater dischargers, environmental groups, universities, and regulatory or stormwater agencies that are not currently SMC members. The power of collaboration should magnify as the SMC continues to be successful in accomplishing its goals. Below is a list of the project accomplishments during the 2006-07 Fiscal Year.

PROJECT ACCOMPLISHMENTS

Building A Regionally Consistent and Integrated Freshwater Stream Bioassessment Monitoring Program

Status: 95% complete
Project budget: $280,000

Assessment of freshwater biological communities represents a potentially powerful tool for evaluating the effects of discharges in southern California creeks and streams. Bioassessments integrate the effects of multiple stressors, including chemical pollutants and physical alterations in receiving waters. The value of biological assessments is that they are closer to many of the defined beneficial uses of receiving waters (i.e. aquatic life, warm water habitat, cold water habitat) than chemically-derived water quality objectives.

The goal of this study is to build a regionally consistent bioassessment monitoring program. This project will be completed in three phases including: 1) building a monitoring infrastructure; 2) calibrating and validating a regional assessment tool; and 3) designing an integrated, coordinated regional monitoring program. The first phase focuses on creating a monitoring infrastructure so that multiple agencies are properly trained, data are collected in comparable manners, and data can be efficiently shared. The second phase focuses on developing an assessment tool that is robust enough to be used by all agencies across the region. This will enable a consistent approach for evaluating the status of freshwater biological communities and provide the answers

regarding community impacts to managers in meaningful and understandable terms. The third phase focuses on creating a study design that most efficiently answers specific questions of interest at large regional scales. Addressing some questions at regional scales can provide cost efficiency for addressing reference condition, cumulative impacts, and when nested within a local sampling design, provides unparalleled information for providing context to local monitoring data.

Our main collaborator on this project is the California Department of Fish and Game (CDF&G). The project is 50% funded by the SWRCB, whose main desire is to ensure integration with the Surface Water Ambient Monitoring Program (SWAMP). This will provide further value to SMC member agencies. To help accomplish this project, an SMC Technical Subcommittee has been formed.

All three phases have been implemented by the SMC. The first goal towards monitoring infrastructure is complete. SMC member agencies have used training, workshops, field audits, enhanced laboratory quality assurance activities, and written or collated information management and field protocol documents. Of particular note, SMC member agencies have helped to create an important network of laboratory taxonomists called the Southwestern Association of Freshwater Invertebrate Taxonomists that will be important in standardizing and ensuring the quality of laboratory identifications. The second task to evaluate an assessment tool is nearing completion. The southern California index of biological integrity (SC IBI) was being tested in 15 low gradient streams of varying levels of impact. It was clear from this study that the IBI is not the best assessment tool for describing impact in these habitats. The low gradient project was so successful that the Working Group helped SCCWRP and CDFG to prepare a State Consolidated Grant proposal to test the SC IBI in another important habitat; non-perennial streams. Finally, the Working Group has designed an integrated, collaborative Regional Watershed Monitoring program. The goal of the Regional Watershed Monitoring program is to increase the effectiveness of existing NPDES monitoring programs by integrating among permittees and SWAMP to achieve a large-scale assessment of watershed condition. The cost of implementing this program would be negligible because the Working Group identified significant redundancies and inefficiencies in existing monitoring programs that could be reprogrammed towards a regional design. Finally, the Working Group has found additional partners to help contribute to the regional monitoring program including the Wetland Recovery Project (WRP), other RWQCBs, and other NPDES permittees.

This project is in its final phases. The written workplan should be completed within the next quarter and a regional watershed monitoring program could be implemented as soon as 2008.

Laboratory Intercalibration Study
Status: 35% complete
Project budget: $60,000

One goal of the southern California Stormwater Monitoring Coalition (SMC) is to compile monitoring data from separate monitoring programs to make regionwide assessments. The SMC has begun integrating their monitoring programs by agreeing on goals, objectives, and study designs as part of their development of a southern California Model Monitoring Program ftp://ftp.sccwrp.org/pub/download/PDFs/419_smc_mm.pdf. As part of the model monitoring program, 11 analytical laboratories that perform chemical analysis of runoff samples for SMC member agencies conducted an intercalibration study to assess interlaboratory variability and enhance comparability.

The laboratory intercalibration study quantified the range of variability both within and among laboratories that SMC member agencies can expect when examining their own data, or combining data with other agencies. It was successful because the laboratories worked together to minimize interlaboratory variability through the use of performance-based limits for accuracy, precision, and sensitivity. The intercalibration study also defined a series of protocols for specific analytical techniques where performance-based guidelines needed to be enhanced with methodological consistency to ensure comparability. Finally, the intercalibration and resulting guidelines/protocols were documented in a Laboratory Guidance Manual for SMC member agency laboratories <ftp://ftp.sccwrp.org/pub/download/PDFs/420_smc_chem.pdf>.

The laboratory Guidance Manual and intercalibration effort, however, was incomplete in three areas. The first area was the need to repeat the intercalibration periodically as new laboratories, or new personnel at existing laboratories, come along. The second area was the need to intercalibrate on additional constituents. The original laboratory calibration focused on suspended solids (TSS), nutrients, and trace metals. Organic constituents such as chlorinated hydrocarbons (CHC), organophosphorus pesticides (OP), and polycyclic aromatic hydrocarbons (PAH) were not included. Third, the integration of the laboratory performance-based guidelines were insufficiently integrated into monitoring programs. While the Laboratory Manual could be used as citation for monitoring agencies or regulatory compliance, no specific permitting or contractual language was provided for SMC member agencies.

The goal of this project is to complete the three areas of missing information to make the Laboratory Guidance Manual an ongoing and effective document. It will involve three steps: 1) repeat the laboratory intercalibration for TSS, nutrients, and trace metals; 2) initiate an intercalibration for organic constituents and toxicity; and 3) create draft contract language for integration into stormwater monitoring programs. A technical Working Group consisting mostly of laboratory managers has been formed to assist in the study.

The SMC has successfully finished the first task of the study. The intercalibration of TSS, nutrients, and trace metals was based on customized certified reference materials just for our project and runoff samples from different land use types. Gratifyingly, most of the laboratories that participated previously successfully completed the second iteration. An objective laboratory scoring system, which consists of letter scores for each analyte, has been developed and is being used for the contract language in task 3.

Pending formal agreement signatures, the working group is prepared to implement the toxicity testing element of the intercalibration.

Bacterial Reference Watershed Study
Status: 90% complete
Project budget: $165,000 + in-kind services

High fecal indicator bacteria levels are one of the most common surface water impairments in southern California. Frequent exceedences of bacterial water quality standards have resulted in development of Total Maximum Daily Loads (TMDL) as a regulatory mechanism to address bacterial contamination in several southern California watersheds.

Current water quality standards for freshwater use fecal coliforms or E. coli as an indicator of fecal contamination because their presence is well correlated with the many waterborne disease-causing organisms or pathogens. However, fecal coliforms and E. coli are naturally present in the intestines of warm-blooded. Consequently, fecal contamination of surface waters can result from numerous sources of fecal pollution, including human sewage, manure from livestock operations, indigenous wildlife and urban runoff. In undeveloped areas wildlife, such as small and large mammals and birds, have the potential to be a significant source of fecal bacteria to surface waters.

In recognition of the potential for natural sources to affect bacteria levels in surface waters, several TMDLs either allow or require development of numeric targets that account for natural bacteria levels. For example, the Malibu Creek Bacteria TMDL requires responsible jurisdictions to monitor unimpaired streams in the local watershed during dry weather, dry winter weather, and wet weather for at least one full year in order to develop a representative numeric target for allowable bacteria exceedence days. Several similar studies are currently being considered or proposed in Ventura, Los Angeles, Orange, and San Diego counties; however, there is currently no coordination between these proposed studies.

The objective of this project is to assess natural bacteria levels in numerous streams throughout southern California in order to provide a regional characterization of background bacteria concentrations. Bacterial indicators were measured from unimpaired streams in 12 southern California watersheds weekly for one full year. These data were used to investigate background levels, frequency of exceedences of relevant water quality standards, and spatial and temporal patterns.

This project is a partnership of numerous SMC agencies who are participating via in-kind contributions. Three regional water quality control boards, six storm water agencies, and several cities cooperated on field data collection and laboratory analysis. Following laboratory and field intercalibration, samples were collected weekly between May 2006

and May 2007. Overall, the 30-day geometric mean exceedences of freshwater standards were 2% for *E. coli* and 14% for *enterococci*. There were clear seasonal patterns with exceedences being most common during July and August. Data collection and analysis for this project is complete, with a project report expected in December 2007.

Hydromodification Study
Status: 10% complete
Project budget: $1,137,440

The process of urbanization has the potential to affect stream courses by altering watershed hydrology. Development and redevelopment can increase the amount of impervious surfaces on formerly undeveloped landscapes. This reduces the capacity of remaining pervious surfaces to capture and infiltrate rainfall and, as a result, a larger percentage of rainfall becomes runoff during any given storm. In addition, runoff reaches the stream channel much more efficiently, so peak discharge rates postdevelopment are higher compared to predevelopment for an equivalent rainfall event. This process has been termed hydromodification.

Hydromodification can result in adverse effects to stream habitat, surface water quality, and water supply. The stream erosion that results from the increased peak flow can threaten infrastructure, homes, and businesses. Intermittent and ephemeral streams that possess riparian and wetland habitat are at particular risk from effects of hydromodification. Streams in semi-arid regions are especially vulnerable to urbanization due to a prevalence of sand bed channels, lack of vegetative reinforcement, and relatively large net changes in water and sediment supply associated with stormwater runoff. Recent studies by the SMC have indicated that intermittent and ephemeral streams in southern California degrade at lower levels of watershed urbanization than streams in the eastern US.

In response to the effects of hydromodification, state and local agencies are developing standards and management approaches to control and/or mitigate the effects of hydromodification on natural and semi-natural stream courses. Successful implementation of these regulatory programs requires development of tools to better assess hydromodification effects and develop appropriate mitigation and management strategies.

The goal of this project is to develop a series of tools supporting implementation of hydromodification management measures that could be used to better protect the physical, chemical, and biological integrity of streams and their associated beneficial uses. This project will provide tools to answer the following questions: 1) Which streams are at the greatest risk from the effects of hydromodification? 2) What are the anticipated effects in terms of increased erosion, sedimentation, or habitat loss, associated with increases in impervious cover? 3) What are some potential management measures that could be implemented to offset hydromodification effects and how effective are they likely to be?

This project is being conducted in collaboration with researchers from Colorado State University, Fort Collins. In May 2007, we held an initial Technical Advisory Committee meeting for the project, which was attended by over 30 scientists and managers. Based on the results of this meeting, we refined our scope of work and produced the Project Work Plan and Quality Assurance Project Plan (QAPP). Field reconnaissance of sampling sites was completed during the summer of 2007, resulting in the identification of 18 sites where model calibration data will be collected, and an additional 15 sites where data will be collected for development of the screening tools. Field data collection will occur in Fall 2007. Finally, we have continued to coordinate this project with similar efforts being conducted by several county stormwater programs, CASQA, and the Water and Land Use Partnership (WALUP).

Low Impact Development Study
Status: 10% complete
Project budget: $1,000,000 ($400,000 SMC plus $600,000 State Prop 40 Grant)

The Low Impact Development Guidance (LID) Study is being conducted with funding from the State Water Resource Control Board's Consolidated Grants Program, under the Urban Runoff Program of Proposition 40. A proposal was submitted by the County of San Bernardino on behalf of the SMC for the LID Project known as "LID Guidance and Training for Southern California."

The LID Project will develop a comprehensive program to incorporate LID strategies and techniques into the planning and design of public and private sector projects. The LID Project will develop a model program for localities in California that are interested in adopting LID strategies and techniques. This will include determining the key technical and institutional issues that must be addressed for successful implementation, pilot projects that demonstrate the effectiveness of LID, and training and outreach to help solidify an implementation strategy to ensure large-scale and long-term success.

The grant funded portion of the project must be completed by September 2008. This will require a two-year work effort that is organized into the following funding areas:

1. **Pilot Project Planning and Design**. *Establish design criteria and site selection*
2. **Monitoring.** *Implementation and demonstration of technology*
3. **Outreach and Training.** *Reporting and facilitation of wide-spread programmatic implementation*

The SMC will provide the required 25% matching funds ($200,000) for the grant funded tasks. These tasks include preparing a literature review, conducting a series of training workshops, and developing a field monitoring program for LID features. The Literature Review has been completed and the final report will be made available through the California Stormwater Quality Association Website and the SMC website when operational.

A Technical Advisory Committee has been established and they reviewed the Literature Review and provided guidance on the initial tasks for the project. The TAC will meet as needed to advise the project as it proceeds.

Training workshops are in preparation. Several potential field monitoring sites have been identified, and Stantec Consulting has been hired to develop the monitoring program and select monitoring sites.

Once the grant-funded tasks are completed, the SMC will continue to fund (approximately $200,000) and manage the project for three additional years that will primarily require field monitoring and analysis of LID features.

Stormwater Monitoring Coalition Steering Committee
Meeting Agenda
September 11, 2006
10:00 a.m. – 2:30 p.m.
at
Southern California Coastal Water Research Project
7171 Fenwick Lane
Westminster, CA 92683

1. Introductions

2. Agreements
   a. Renewal of SMC Master Agreement D06-049 and addition of new parties – Chris Crompton (Orange County)
   b. Low Impact Development (LID) and peak flow follow-up grant status Matt Yeager (SB County Flood)/ Eric Stein (SCCWRP)
   c. Toxicity amendment to laboratory intercalibration study – Ken Schiff (SCCWRP) District has funds allocated

3. Existing project updates
   a. Bioassessment project and grant submittal status – Ken Schiff
   b. Laboratory intercalibration project – Ken Schiff
   c. Reference watershed project – Eric Stein

4. Presentation and ranking of proposed projects for 2006-07
   a. Update of SMC Research Agenda – Ken Schiff
   b. California Sustainable Watershed/Wetlands Information Manager (CalSWIM) - UCI (Dr. Grant)
   c. Other committee member projects Susan Zielski, Sea Grant program

5. Other items
   a. Follow-up on SMC web site - may make this a component of a larger project
   b. Committee member items

6. Next Meeting

Minutes of the
Stormwater Monitoring Coalition of Southern California

September 11, 2006

Attendees:	
Arne Anselm	Ventura County Watershed Protection Division
Art Barnett	Southern California Coastal Water Research Project
Mike Borst	US EPA Office of Research and Development
Valerie Connor	State Water Resources Control Board
Chris Crompton	County of Orange
Karl Dreher	Caltrans
Terry Fleming	US EPA Region IX
Linda Garcia	Riverside County Flood Control District
Stan Grant	University of California Irvine
Ken Schiff	Southern California Coastal Water Research Project
Youn Sim	Los Angeles County Dept of Public Works
Bob Stein	City of Newport Beach
Eric Stein	Southern California Coastal Water Research Project
Mark Smythe	Santa Ana Regional Water Quality Control Board
Xavier Swammikannu	Los Angeles Regional Water Quality Control Board
Jason Uhley	Riverside County Flood Control District
Joann Weber	San Diego County Dept. Environmental Health
Steve Weisberg	Southern California Coastal Water Research Project
Matt Yeager	San Bernardino County Flood Control District
Charlie Yu	City of Los Angeles
Susan Zaleski	University of Southern California Sea Grant

1. Introductions

Chris Crompton began the meeting at 10:20 AM with roundtable introductions. The objectives of the day included: 1) introductions; 2) existing agreements; 3) existing projects; 4) presentation and ranking of proposed projects for 2006-2007; 5) other items; and 6) next meeting date.

2. Agreements

There were four agreements for discussion. The first agreement was for the renewal of the original SMC agreement (No. D99-072). The new agreement was similar to the last agreement in terms of structure and function including a Steering Committee, subsequent implementation agreements, a lifespan of five years, and the addition of four new member agencies. Most member agencies found the agreement acceptable or acceptable with minor changes. Lawyers at two agencies expressed larger concerns. Chris had made the requested changes, distributed the revised agreement, and discussed the alterations with the group. Timing urgency was expressed by more than one member agency. The SMC agreed to two action items:

- Chris is to distribute the latest version electronically
- Member agencies are to provide legal review of the new agreement and respond to Chris. Any counsel that has major issues should contact Chris directly

The second and third agreements were for assessing the effectiveness of low impact site development BMPs and the hydromodification study. A consolidated grant proposal was submitted for both projects and award notifications won't be announced until October 2006. The SMC agreed to the action item:

- Wait and see if the projects receive grant funding

The fourth potential agreement was to amend an existing agreement for laboratory intercalibration studies to include toxicity testing. Ken Schiff had distributed a written Scope of Work prior to the meeting. After some clarification of project tasks and objectives, the SMC agreed to fund the study, including the addition of three new agencies. The SMC agreed to two action items:

- Chris will prepare the amendment
- Member agencies will begin the process of allocating funds to the study

Matt Yeager made a brief presentation to the SMC based on his experiences in preparing proposals for outside funding for SMC projects. Although the SMC has completed numerous successful projects, most had been administered by SCCWRP. SCCWRP will not be able to administer all SMC projects so other member agencies are going to have to assume some additional responsibilities. SMC member agencies have several limitations, however, including restricted staff time to identify grant opportunities and write proposals, limited expertise, inability to receive and distribute funds, manage subcontracts, and have management commit to multi-year programs. Matt recommended that the SMC form a subcommittee that can track grant opportunities, identify partnerships, coalesce expertise, and provide marketing. Such a subcommittee could either be written into the next SMC Agreement or through the use of hired consultants. The SMC agreed to the action item:

- Chris, Xavier, Matt and Linda will form a subcommittee to explore ideas for resolving these issues

3. Existing project updates

The agenda item on existing projects covered three studies. The first existing project was the bioassessment study co-funded by our project partners at the SWRCB and LACSD. The project has three main goals; 1) build monitoring infrastructure among SMC member agencies; 2) evaluate and enhanced assessment tools; and 3) create a regional monitoring program for southern California watersheds. While the Technical Working Group had taken a short hiatus for summer, progress on the study was significant. Task 1 was estimated to be 95% complete. Task 2 was estimated to be 70% complete. Task 3 was estimated to be 30% complete. During the summer, SCCWRP had created a monitoring inventory in order to determine if there were monitoring redundancies or inefficiencies

that could be used to improve individual programs and at the same time identify potential resources for implementing the regional program. The SMC agreed to the action item:

- Ken will prepare a progress report at the next meeting

The second existing project was the laboratory intercalibration study. The goal of this study was to continue periodic intercalibration studies and develop common contractual language for the member agency contract analytical laboratories. Ken distributed the final letter of invitation for contract laboratories. The SMC agreed to two action items:

- Ken will provide an electronic version of the letter to SMC member agencies for distribution to their contract laboratories
- Ken will post the letter to the SCCWRP web site and distribute to non-contractor laboratories in the region

The third existing project was for the reference watershed study. Eric Stein presented the results from the initial phase of the study. More than 31 wet weather site-events and 53 dry weather site-events were sampled between 2004 and 2006 and analyzed for a long list of constituents including TSS, nutrients, trace metals, and bacteria. Eric summarized his presentations in four conclusions: 1) concentrations in runoff from natural areas were generally one to two orders of magnitude lower than in urban areas; 2) concentrations in dry weather runoff from natural areas were generally below water quality standards for all constituents; 3) concentrations in wet weather runoff from natural areas generally exceeded water quality standards for bacteria; and 4) concentrations in wet weather runoff from natural areas generally did not exceed water quality standards for trace metals or nutrients. The SMC agreed to the action item:

- Provide feedback on the draft report when it is brought before the project technical committee in November

4. Presentation and ranking of proposed projects for 2006-07

The next agenda item was on developing new project ideas for the upcoming fiscal year. Ken began the discussion by providing the status of project on the Research Agenda. Of the 15 projects listed, 10 were either completed or in progress. At least nine projects were identified and evaluated based upon five criteria (Table 1). They eventually were combined into three broad categories. These included:

a) Renew the 5-year Research Agenda.
The goal of this project is to revise and update the research based on progress to date, new questions or issues to be addressed, and incorporating the needs of the new member agencies.

b) Biological based projects
The goal of these projects is to address biological based endpoints related to stormwater management. Several biological based projects were suggested including

a Tiered Aquatic Life Use (TALU) study, Regional biological monitoring, nutrients and algae, and bioaccumulation.

c) Information technology (IT) based projects
The goal of these projects is to address information storage, retrieval, analysis, and training for member agencies. Several IT based projects were suggested including an SMC web site, CalSWIM, SWAMP data accessibility, evaluating BMP effectiveness in receiving waters (using a computer model), and training-based information sharing.

The SMC agreed to three action items:

- Ken, Chris and Karl will lead the research agenda proposal
- Ken, Val, Terry, Art and Jason will lead the biological based projects
- Chris, Susan, Stan, Rusty Fairey (SWAMP/MLML), and Bob will lead the IT based project

Each group will prepare an oral presentation for the next meeting that should include a description of the problem, how each project will address the problem, generalized tasks or steps, and a rough cost estimate and timeline.

5. Other items

The last agenda item was on other topics and covered one item. The SMC member agencies asked for a copy of this year's Annual Report. Member agencies agreed to review the document electronically so that it can be completed by October 31st. The SMC agreed to the action item:

- Ken will prepare a draft Annual Report and distribute it to the SMC no later than October 15th

6. Next meeting

The next meeting was scheduled for 10:00 to 12:30 on December 5, 2006 tentatively located at SCCWRP. The meeting adjourned at 2:45 PM.

$50k
Hydromod study status?
TALU scope - SEU not able to assist at this time

Table of proposed projects for next FY.

	Project Name	Project Proponent	On existing Research Agenda	Linked to an Existing SMC study?	Time to Completion?	Additional Partners?	Immediacy?
1	Tiered Aquatic Life Use	Group	Yes	Yes	1 – 3 yr	SWRCB, EPA	High
3	Training based Information Sharing	Susan Zalesky	Yes	Yes	1 – 2 yr	Sea Grant	Med High
3	Renew the Research Agenda	Ken Schiff	No	Yes	1 yr	CASQA	High
3	CalSWIM	Stan Grant	Yes	No	1 - 3 yr	No	Med
2	SWAMP Expansion	Val Connor	Yes	Yes	1 – 3 yr	SWRCB	High
1	Evaluate BMP Effectiveness on Receiving Waters	Bob Stein	Yes	No	1 - 2 yr	City of Newport Beach	High

Stormwater Monitoring Coalition Steering Committee
Meeting Agenda
December 5, 2006
10:00 a.m. – 12:30 p.m.
at
Southern California Coastal Water Research Project
7171 Fenwick Lane
Westminster, CA 92683

Conference Call In: 888.296.6500 guest code: 425157

Conference room web cam: http://216.117.211.109 username: sccwrp
password: portal

1. Introductions

2. Existing project updates
   a. Bioassessment project – Ken Schiff
   b. Laboratory intercalibration project – Ken Schiff
   c. Reference watershed project – Eric Stein

3. Agreements
   a. Renewal of SMC Master Agreement D06-049 and addition of new parties – Chris Crompton (Orange County)
   b. Toxicity amendment to laboratory intercalibration study – Chris Crompton
   c. Low Impact Development (LID) - Matt Yeager (SB County Flood)

4. Update on proposed projects for 2006-07
   a. Update of SMC Research Agenda – Ken Schiff
   b. Update on IT project
      EPA Capacity Building Grant - California Sustainable Watershed/Wetlands Information Manager (CalSWIM) – Stan Grant
      Pilot project on electronic data reporting – Terry Fleming
   c. Update on biological based project
   d. Update on hydromodification project
   e. Other committee member projects

5. Other items
   a. Follow-up on SMC web site
   b. Committee member items

6. Next Meeting

Minutes of the
Stormwater Monitoring Coalition of Southern California

December 5, 2006

Attendees:	
Arne Anselm	Ventura County Watershed Protection Division
Mike Borst	US EPA Office of Research and Development
Chris Crompton	County of Orange
Terry Fleming	US EPA Region IX
Bruce Fujimoto	State Water Resources Control Board
Linda Garcia	Riverside County Flood Control District
Stan Grant	University of California Irvine
Mike McCann	San Diego Regional Water Control Board
Kevin Murphy	California State University Sacramento (Caltrans)
Jamie Rinehart	Malibu Watershed
Ken Schiff	Southern California Coastal Water Research Project
Youn Sim	Los Angeles County Dept of Public Works
Eric Stein	Southern California Coastal Water Research Project
__ Soloman	Los Angeles Regional Water Quality Control Board
Joann Weber	San Diego County Dept. Environmental Health
Steve Weisberg	Southern California Coastal Water Research Project
Matt Yeager	San Bernardino County Flood Control District
Shoukofe Marishi	City of Los Angeles

Chris Crompton began the meeting at 10:10 AM. The objectives of the day included: 1) introductions; 2) existing project updates; 3) existing agreements; 4) update on proposed projects; 6) other items; and 7) next meeting date.

The agenda item on existing projects covered three studies. Ken presented the progress on the first project, the bioassessment study co-funded by our project partners at the SWRCB and LACSD. The project has three main goals; 1) build monitoring infrastructure among SMC member agencies; 2) evaluate and enhance assessment tools; and 3) create a regional monitoring program for southern California watersheds. The Technical Working Group had made great progress thus far completing the first goal. Ken presented some results from the second goal indicating that the SoCal Index of Biological Integrity (IBI) was working marginally well in low gradient habitats. An evaluation of methods showed that sampling technique had less influence than natural variation in low gradient habitats. The third goal, the design of a Regional Watershed Monitoring Program, was making the most progress. Ken showed initial monitoring designs created by the Technical Working Group and the SMC encouraged further progress.

The second existing project was the laboratory intercalibration study. The goal of this study was to continue periodic intercalibration studies and develop common contractual language for the member agency contract analytical laboratories. Ken noted that the first meeting of the Intercalibration Working Group was scheduled for next week. The SMC agreed to the following action item:

- SMC member agencies will ensure that their contract laboratories are participating in the study

The third existing project was the reference watershed study. Eric Stein had presented the results of the study at the last meeting. A draft report had been distributed and the SMC member agencies had participated in a review meeting the previous week. The final report is expected in January. The SMC spin-off study on bacterial levels in reference watersheds was proceeding on schedule. The SMC agreed to the action item:

- Provide feedback on the draft report no later than Dec 15th

There were three agreements for discussion. The first agreement was renewal of the master SMC agreement (No. D99-072). The new agreement was similar to the last agreement in terms of structure and function including an Executive Committee, subsequent implementation agreements, a lifespan of five years, and the addition of four new member agencies. Chris distributed the 3rd draft and discussed the following changes that were made at the request of signatory agencies; 1) remove EPA from the agreement and create a separate agreement that will be suitable to their legal counsel; and 2) minor editorial changes and clarifications. The SMC agreed to two action items:

- Chris will distribute the latest version electronically
- Member agencies should email confirmation of the revised agreement, including any updates of signature pages, no later than January 15, 2007

The second agreement was the amendment of the existing agreement for laboratory intercalibration studies to include toxicity testing. The SMC agreed to initiate the study in the summer of 2007 since a number of member agencies needed the information for either NPDES permit or TMDL requirements. All member agencies agreed to fund this study with the City of Long Beach paying half-share. The SMC agreed to the following action item:

- The City of Los Angeles and Caltrans will check their resources for joining into the agreement

The third agreement was for assessing the effectiveness of low impact site development BMPs and the hydromodification study. The County of San Bernardino had received notification of award for a Prop 50 consolidated grant proposal. The State contract was now being ratified within the County. In the meantime, San Bernardino is bringing the LID Center under contract to assist in the study. There was some discussion regarding the SWRCB's LID Project. It was obvious the two projects had different, but complimentary audiences. Matt is looking for study sites and acquiring additional partners including CASQA and Santa Clara. Timing is an issue for this study. The Grant will expire within two years, but the SMC project may go as long as 3-5 years. The SMC agreed to the action item:

- Chris will work with Matt to finalize the agreement
- All member agencies need to verify their participation in the study

The next agenda item was on developing new projects for the upcoming fiscal year. At the last meeting, the SMC Executive Committee had outlined four basic groups of projects that were to be brought before the SMC today. Ken began with a description of

a new project to renew the SMC Research Agenda. After some discussion, the Executive Committee agreed that this was an important project because it sets the direction of the SMC for the next 5 years. They also agreed on a format for a workshop to develop the new research agenda, which included integrating other organizations with similar needs and desires (i.e., CASQA, Caltrans, etc.). The SMC agreed to the action item:

- Ken should prepare a written scope of work outlining the research agenda project

The second group of projects for consideration was information technology-based studies. Stan Grant outlined a capacity building grant he had delivered to the US EPA for building the next version of CalSWIM. Stan agreed to keep the SMC apprised of the grant status. Terry Fleming suggested a second information technology project. He would like to implement the standardized data transfer formats (SDTFs) developed by the SMC during the model monitoring program so he can integrate member agency monitoring data with SWAMP, ultimately improving 305b and 303d listing decisions. Moreover, Terry had resources to support SCCWRP to assist in this effort. After some discussion, the SMC agreed to:

- Conduct a half-day meeting with the model monitoring committee to update the SDTF
- SCCWRP will work individually with the member agencies to ensure data upload to SWAMP
- Terry will report back to the SMC how the data were utilized by SWMP and the SWRCB

The third group of projects for consideration was biologically based projects. Ken led this agenda item with recommending implementation of the Regional Watershed Monitoring program. He described a process whereby existing monitoring inefficiencies could be exchanged for funding the majority of the regional program. This program would then get leveraged against the SWAMP program since the RWQCB staff responsible for SWAMP was a part of the SMC Technical Working Group designing the study. The SMC agreed to:

- Ken should write up a scope of work for the next meeting
- A presentation of the San Gabriel River watershed-wide monitoring program will be presented to demonstrate the increased effectiveness of monitoring information after trading off inefficient effort.

The last potential new project was the hydromodification study. Eric presented the project goals, which included: 1) identifying the most at-risk streams; 2) determining the largest effects; 3) developing management tools for minimizing these effects; and 4) training SMC staff to use the tools. The project had received a Prop 50 consolidated grant proposal. Eric described his need for the SMC, which included a Technical Advisory Committee and to focus additional effort, if needed. After some discussion, the SMC Executive Committee. The SMC also agreed to:

- Send Eric names of staff via email for the Hydromodification Technical Advisory Committee

The last agenda item was on other topics and covered one item. Chris reiterated the need for an SMC web site. The SMC agreed to the action item:

- Chris will check to see if Orange County server can host the web site

The next meeting was scheduled for 10:00 to 1:00 on March 6 or 13, 2007 tentatively located at Riverside County. The meeting adjourned at 12:45 PM.

Stormwater Monitoring Coalition Steering Committee
Meeting Agenda
March 6, 2007
10:00 a.m. – 12:30 p.m. (Pacific Time)
at
Riverside County Flood Control and Water Conservation District
1995 Market Street, Riverside, CA 92501
http://maps.yahoo.com/maps_result?addr=1995+Market+Street%2C&csz=Riverside%2CCA+92501&country=us&new=1&name=&qty=

Conference Call In: 888.296.6500 guest code:425157

1. Introductions

2. Status of SMC website – Ken Schiff (SCCWRP)/Chris Crompton (Orange County)

3. SMC participation in committee to develop procedures and guidance for stormwater toxicity in the Los Angeles Region – Xavier Swamikannu (Los Angeles Regional Board)

4. Agreements
   a. Renewal of SMC Master Agreement D06-049 and addition of new parties – Chris Crompton
   b. EPA participation agreement with SMC – Mike Borst (EPA)
   c. Toxicity amendment to laboratory intercalibration study – Chris Crompton
   d. Low Impact Development (LID) - Matt Yeager (SB County Flood)/ Chris Crompton
   e. Update of SMC Research Agenda – Ken Schiff /Chris Crompton

5. Existing project updates
   a. Bioassessment project – Ken Schiff
   b. Laboratory intercalibration project – Ken Schiff
   c. Reference watershed project – Eric Stein (SCCWRP)
   d. Pilot project on electronic data reporting – Terry Fleming (EPA)

6. Update on proposed projects for 2006-07
   a. Update on biological based project – Ken Schiff
      San Gabriel River collaborative watershed monitoring program
   b. Update on hydromodification project – Eric Stein
   c. Other committee member projects

7. Other items
   a. Committee member items

8. Next Meeting

Stormwater Monitoring Coalition Steering Committee
Meeting Agenda
June 5, 2007
10:00 a.m. – 12:30 p.m. (Pacific Time)
at
Riverside County Flood Control and Water Conservation District
1995 Market Street, Riverside, CA 92501

http://maps.yahoo.com/maps_result?addr=1995+Market+Street%2C&csz=Riverside%2CCA+92501&country=us&new=1&name=&qty=

Conference Call In: 888.296.6500 guest code:425157

1. Introductions

2. Status of SocalSMC website – Chris Crompton (Orange County)
   In process of buying domain name. May add to Research Agenda to fund website devlpt.

3. SMC participation in meeting to develop procedures and guidance for stormwater toxicity in the Los Angeles Region – Ken Schiff (SCCWRP) and Xavier Swamikannu (Los Angeles Regional Board)

4. LID project status – Matt Yeager (SB County Flood)

5. Hydromodification project status – Eric Stein (SCCWRP)

6. Agreements
   a. Renewal of SMC Master Agreement D06-049 and addition of new parties – Chris Crompton SWRCB has given approval; can now process execution by the other SMC members. Wants execution w/in 2 mos
   b. Status of review of Low Impact Development (LID) Agreement D06-051 - Chris Crompton Chris asking for comments w/in 2 wks. (6/19)
   c. EPA participation agreement with SMC – Mike Borst (EPA) EPA is working on a separate MOU w SMC. May have a document by Sept
   d. Update of SMC Research Agenda Agreement D07-025 – Chris Crompton Requests comments by 7/1
   e. Toxicity amendment to laboratory intercalibration study – Chris Crompton Still in progress. Draft will be sent out blwn now + the Sept mtg.

7. Ongoing project updates
   a. Bioassessment project – Ken Schiff
   b. Laboratory intercalibration project – Ken Schiff
   c. Pilot project on electronic data reporting – Ken Schiff
      Issue w using SMC's data transfer format for 305(b) + 303(d) reporting

8. Other items
   Committee member items

9. Next Meeting September, 10-2:30, 9/18 (pending room availability)

SCCWRP's open house this Friday
12:30-5

SANTA ANA/SANTA MARGARITA TECHNICAL COMMITTEE

Attendance at FY 2006-2007 SA/SM Technical Committee Meetings

	27-Jul-06	24-Aug-06	28-Sep-06	26-Oct-06	16-Nov-06	28-Dec-06	25-Jan-07	22-Feb-07	22-Mar-07	26-Apr-07	24-May-07	28-Jun-07
RCFC	✓	✓	✓	✓	✓	Dark	✓	✓	✓	✓	✓	Dark
County	✓	✓	✓	✓	✓	Dark	✓	✓	✓	✓	✓	Dark
						Dark						Dark
						Dark						Dark
Beaumont	X	✓	✓	✓	✓	Dark	✓	✓	✓	✓	✓	Dark
Calimesa	X	X	X	X	X	Dark	X	✓	✓	X	✓	Dark
Canyon Lake	✓	✓	X	X	X	Dark	X	✓	✓	X	X	Dark
Corona	✓	✓	✓	✓	✓	Dark	✓	✓	✓	✓	✓	Dark
Hemet	✓	✓	✓	X	✓	Dark	✓	✓	✓	✓		Dark
Lake Elsinore	✓	X	✓	X	X	Dark	X	X	X	X	X	Dark
Moreno Valley	✓	✓	✓	✓	✓	Dark	✓	✓	✓	✓	✓	Dark
Murrieta	✓	✓	X	X	✓	Dark	X	✓	✓	X	X	Dark
Norco	✓	✓	✓	✓	✓	Dark	X	✓	✓	✓	✓	Dark
Perris	X	X	✓	X	✓	Dark	✓	X	✓	X	X	Dark
Riverside	✓	✓	✓	✓	✓	Dark	✓	✓	✓	✓	✓	Dark
San Jacinto	X	✓	X	✓	X	Dark	X	X	X	✓	✓	Dark
Temecula	✓	✓	X	X	X	Dark	X	X	✓	X	✓	Dark
CRWQCB San Diego	X	X	X	X	X	Dark	X	X	✓	X	✓	Dark
CRWQCB Santa Ana	✓	✓	✓	✓	X	Dark	✓	✓	✓	✓	✓	Dark

✓	Attended Meeting
X	Did Not Attend

0001101

Table 1-2

MEETING AGENDA

NPDES
SANTA ANA / SANTA MARGARITA
TECHNICAL COMMITTEE

10:00 – 12:30 p.m. Thursday, July 27, 2006
Riverside County Flood Control District
1995 Market Street
Riverside, CA 92501

I. Introductions

II. Agenda Changes

III. Review of Minutes: June 22, 2006

IV. Announcements
   A. CASQA Meeting Update - Sept 25-27 Conference, Workshop, Awards (Sacramento Radisson Hotel)
   B. Next MSC Meetings – Sept 21, Nov 16, 2006
   C. Numeric Effluent Limits Update
   D. Sanitary Sewer Overflow Permit
   E. NPDES Training

V. Public Education Program – Florence Mowrer

VI. TMDL Progress Report – Jason Uhley
   A. Lake Elsinore/Canyon Lake Nutrient TMDL Update
   B. Middle Santa Ana River Bacteria Indicator TMDL Update
   C. San Diego Lagoons TMDL/Investigation Order

VII. Santa Ana/Santa Margarita Region Programs – Tina Tuason/Jason Uhley
   A. Stormwater Quality Standards Task Force Update

VIII. Open Discussion
   A. Santa Ana RWQCB
   B. San Diego RWQCB
   C. U.S. EPA – Region IX
   D. Round Table

IX. New Agenda Items/Schedule Next Meeting – August 24, 2006

Storm Water Clean Water
PROTECTION PROGRAM

Member Agencies:

Banning
Beaumont
Calimesa
Canyon Lake
Cathedral City
Coachella
Coachella Valley Water District
Corona
County of Riverside
Desert Hot Springs
Hemet
Indian Wells
Indio
La Quinta
Lake Elsinore
Moreno Valley
Murrieta
Norco
Palm Desert
Palm Springs
Perris
Rancho Mirage
Riverside City
Riverside County Flood Control District
San Jacinto
Temecula

NPDES
SANTA ANA / SANTA MARGARITA
TECHNICAL COMMITTEE
Meeting Minutes
for
June 22, 2006

I. Attendees:

Linda Garcia	Riverside County Flood Control District
Tom Rheiner	Riverside County Flood Control District
Daisy Rios	Riverside County Flood Control District
Charlene Warren	Riverside County Flood Control District
Doug Thompson	Riverside County Environmental Health
Marianna Hernandez	Riverside County Transportation
Claudia Perez	Riverside County Transportation
Keith Elliott	Santa Ana Regional Board
Michael Roth	Santa Ana Regional Board
John Wilder	City Beaumont
Michele Colbert	City of Corona
Linda Nixon	City of Hemet
Phuong Hunter	City of Moreno Valley
Kent Wegelin	City of Moreno Valley
Lori Askew	City of Norco
Jessica Chin	City of Riverside
Hal Schillinger	Kristar
Bill Flores	HDR
Ernie Mansfield	Lennar Homes
Vaikko Allen	Contech
Darwin Dizon	Contech

II. *Introductions*

Tom Rheiner announced that he will be moving to the Federal Projects department within the District. Benjie Cho will be replacing Tom as the Santa Ana Permit Manager. Tom noted that he would still be available to assist Permittees with any questions and concerns and acknowledged Regional Board staff and Permittees for their supportive work efforts in making the program a success. Tom then welcomed everyone to the meeting and initiated the self introduction of attendees.

III. *Agenda Changes*

There were no changes to the agenda.

IV. *Review of Minutes: April 27, 2006*

Corrections will be made to reflect that Jessica Chin and Linda Garcia were in attendance at the April 27, 2006 meeting. The meeting minutes did not list them as being present. *Note:* Please be sure to sign in at the meeting to receive credit for your attendance.

Handouts and Materials Provided:

- Agenda, Minutes, Roster
- Caltrans Water Quality Newsflash 06-22 through 06-25
- Powerpoint Slides – Tom Rheiner
- Initial Draft 2006 Basin Plan Triennial Review Priority List
- Stormwater Quality Standards Task Force Phase II print out – Phase/Summary, Phase II, Agenda & Meeting Notes (information retrieved from website: http://www.sawpa.org/projects/planning/stormwater2.htm)
- Risk Science – Example of Implementation Targets for Narravtive Pathogen Objectives
- CONTECH – Stormwater Treatment Product Overview brochure

V. *Announcements*

A. ***CASQA Meeting Update*** – Tom informed attendees of the CASQA 2006 Conference which offers a full program of training workshops, presentations and exhibits for holders of municipal, industrial and construction NPDES stormwater permits. The conference is being held at the Radisson Hotel, in Sacramento from September 25th – 27th. For more information please visit the CASQA website at: http://www.casqa.org/.

B. ***Next MSC Meeting Sept 21, Nov 16, 2006*** – Future meeting dates for the MSC are September 21st and November 16th. The May 18, 2006 meeting was cancelled and a one-page executive summary will be sent to City Managers via email to provide them an update on the current activities of the NPDES program.

C. ***June 21, 2006 WQMP Training ~ Murrieta*** – Tom announced that AEI-CASC conducted WQMP training in the City of Murrieta which had an attendance of approximately 60 people. Marianna Hernandez inquired about construction training in which Tom informed her that it would need to be coordinated with Brown and Caldwell who has been contracted to conduct construction training for Permittees. Tom added that, should any of the cities feel the need for further training for their staff, to please contact NPDES staff.

VI. *Public Education Program – Florence Mowrer*

There was no public education report available, however, Tom provided a brief update on the efforts of the public education department noting that the Riverside Corona Resource

Conservation District (RCRCD), Steve Groner, and Mission Resource Conservation District (MRCD) contracts for public education outreach services are being renewed by the District. Tom also noted that the public education billboard that was put up in October 2005 is still posted off of the 60 freeway in Riverside.

VII. ***TMDL Progress Report – Tom Rheiner***

A. ***Lake Elsinore/Canyon Lake Nutrient TMDL Update*** – The TMDL workgroup met May 17th and June 13th. Items of discussion included the Delphi Process, legacy loads, and background conditions. Tom informed Permittees that the contract agreement has been circulated to stakeholders for action by their respective Boards/Councils. Also, the language for the contract agreement has been finalized. Tom asked Permittees which of them had calendared the item to be taken to their Boards or Councils for review. The City of Moreno Valley and Riverside stated that the item had been calendared for their cities. No other cities commented. Tom asked that Permittees seek to get a date as to when the item will go before their council.

B. ***Middle Santa Ana River Bacteria Indicator TMDL Update*** – This TMDL was adopted at the August 26, 2006 Regional Board meeting and was approved by State Board in May 2006. It is now awaiting approval by EPA. The workgroup met to discuss the TMDL May 18th. The June 15th meeting was cancelled. There were no questions from the group. For more information on the TMDLs please see the powerpoint slides provided at the meeting.

C. ***San Diego Lagoons TMDL/Investigation Order*** - Linda Garcia discussed with attendees the efforts relating to this item. Several lagoons in San Diego County are on the 303(d) list for bacteria indicators, siltation, and/or nutrients. In advance of conducting TMDL studies, the San Diego Regional Board is issuing an Investigation Order that includes monitoring requirements to support models developed by Tetra Tech. Comments on the Investigation Order are due June 23, 2006.

VIII. ***Santa Ana/Santa Margarita Region Programs –Tom Rheiner***

A. ***Stormwater Quality Standards Task Force Update*** – Tom Rheiner discussed the efforts to regulate beneficial use in REC 1 and REC 2 facilities noting that the Task Force met June 15th. Tom further discussed the goal to reevaluate REC 1 in the Santa Ana Region Watershed, progress status, how the issue affects Riverside County MS4 Permittees, technical memos, Phase III near-term products, and next steps. Attendees engaged in further discussion regarding REC 1 and REC 2 issues.

IX. ***Open Discussion***

A. ***Santa Ana Regional Board*** – Keith Elliott stated that the Blue Ribbon Panel workshop conclusions will be available in July 2006.

B. ***San Diego RWQCB*** – Not present.

C. ***U.S. EPA – Region IX*** – Not present.

D. ***Round Table*** – No comments.

X. ***New Agenda Items / Schedule Next Meeting***

The next NPDES TAC Meeting is scheduled for July 27, 2006. If there are any questions or items for the next meeting agenda, please contact the Flood Control District's NPDES Section at 951.955.4375. Suggestions are always welcome.

XI. ***Contech Stormwater Solutions Presentation – Vaikko Allen***

Vaikko Allen of Contech Stormwater Solutions conducted a presentation on stormwater treatment services provided by Contech.

Please visit the StormWater/CleanWater Protection Program website at: http://www.floodcontrol.co.riverside.ca.us. The site contains a variety of useful stormwater program information including links to other stormwater management programs and related websites.

NEXT MEETING IS SET FOR:

THURSDAY July 27, 2006 – 10 A.M.
AT
RIVERSIDE COUNTY FLOOD CONTROL DISTRICT
1995 Market Street
Riverside, CA 92501

MEETING AGENDA

NPDES
SANTA ANA / SANTA MARGARITA
TECHNICAL COMMITTEE

10:00 – 12:00 p.m. Thursday, August 24, 2006
Riverside County Flood Control District
1995 Market Street
Riverside, CA 92501

I. Introductions

II. Agenda Changes

III. Review of Minutes: July 27, 2006

IV. Announcements
- A. CASQA Meeting Update - Sept 25-27 Conference, Workshop, Awards (Sacramento Radisson Hotel)
- B. Next MSC Meetings – Sept 21, Nov 16, 2006
- C. Numeric Effluent Limits Update – Aug 18-19
- D. Sanitary Sewer Overflow Permit – Added the City of Perris as a sewering agency
- E. NPDES Training – Schedule is set, registration will follow
- F. WQMP – Workgroup
- G. Microbial Source Tracking
- H. CASQA Numerical Effluent method workshops
- I. Audits
- J. Annual Report – Reporting Forms

V. Public Education Program – Florence Mowrer

VI. TMDL Progress Report – Jason Uhley
- A. Lake Elsinore/Canyon Lake Nutrient TMDL Update
- B. Middle Santa Ana River Bacteria Indicator TMDL Update
- C. San Diego Lagoons TMDL/Investigation Order

VII. Santa Ana/Santa Margarita Region Programs – Tina Tuason/Jason Uhley
- A. Stormwater Quality Standards Task Force Update

VIII. Open Discussion
- A. Santa Ana RWQCB
- B. San Diego RWQCB
- C. U.S. EPA – Region IX
- D. Round Table

IX. New Agenda Items/Schedule Next Meeting – September 28, 2006

Storm Water Clean Water
PROTECTION PROGRAM

Member Agencies:

Banning
Beaumont
Calimesa
Canyon Lake
Cathedral City
Coachella
Coachella Valley Water District
Corona
County of Riverside
Desert Hot Springs
Hemet
Indian Wells
Indio
La Quinta
Lake Elsinore
Moreno Valley
Murrieta
Norco
Palm Desert
Palm Springs
Perris
Rancho Mirage
Riverside City
Riverside County Flood Control District
San Jacinto
Temecula

NPDES
SANTA ANA / SANTA MARGARITA
TECHNICAL COMMITTEE
Meeting Minutes
for
July 27, 2006

I. Attendees:

Benjie Cho	Riverside County Flood Control District
Penny Nanney	Riverside County Flood Control District
Juan Martinez	Riverside County Flood Control District
Florence Mowrer	Riverside County Flood Control District
Deisy Rios	Riverside County Flood Control District
Charlene Warren	Riverside County Flood Control District
Tina Tuason	Riverside County Flood Control District
Jason Uhley	Riverside County Flood Control District
Mike Shetler	Riverside County Executive Office
Marianna Hernandez	Riverside County Transportation
Claudia Perez	Riverside County Transportation
Keith Elliott	Santa Ana Regional Board
Michael Roth	Santa Ana Regional Board
James Grimm	City of Canyon Lake
Michele Colbert	City of Corona
Linda Nixon	City of Hemet
Alex Gutierrez	City of Lake Elsinore
Phuong Hunter	City of Moreno Valley
Kent Wegelin	City of Moreno Valley
Farida Naceem	City of Murrieta
Doug Norfolk	City of Norco
Sandy Caldwell	City of Riverside
Jessica Chin	City of Riverside
Aldo Licitra	City of Temecula
Dell Ross	Resource Conservation District–Southwest County
Rosanna Lacarra	PBS&J

II. *Introductions*

Jason Uhley announced that Tom Rheiner was no longer the Santa Ana Permit Manager and has been transferred to the District's Federal Projects Section. These duties have been assigned to Benjie Cho, who Jason introduced to the group. Benjie gave a brief self introduction. Jason then announced that Juan Martinez will no longer be working in the public education department and congratulated him on his promotion. Jason thanked Juan for his assistance in the public education department and asked that should Permtitees have any requests for public education materials, they request them ahead of time, due to the fact that Flo will be shorthanded.

III. *Agenda Changes*

There were no changes to the agenda.

IV. *Review of Minutes: June 22, 2006*

It was documented in the meeting minutes that Linda Nixon (City of Hemet) was in attendance at the June 22, 2006 meeting, when in fact she was not. Corrections were made.

Handouts and Materials Provided:

- Agenda, Minutes, Roster
- Caltrans Water Quality Newsflash #s 06-26 through 06-30
- Email Message from John Carmona of the Colorado Regional Board dated, June 7, 2006 Re: Sanitary Sewer Overflow Information
- July 27, 2006 Public Education Information Report
- 2005-2006 Stormwater/Cleanwater Protection Program-Santa Ana River Watershed Report
- Statewide Waste Discharge Requirements (WDR)
- CASQA 2006 Conference Draft Agenda
- Draft Letter to Gerard Thibeault Re: Report of Compliance with Lake Elsinore /Canyon Lake TMDL, Board Order No. R8-2004-0037 (Permittees only)

V. *Announcements*

A. ***CASQA Meeting Update~Sept 25-27 Conference*** – Copies of the draft agenda for the CASQA 2006 Conference were distributed to attendees. Jason reviewed the topics of the agenda with attendees. The CASQA 2006 Conference offers a full program of training workshops, presentations and exhibits for holders of municipal, industrial and construction NPDES stormwater permits. The conference is being held at the Radisson Hotel, in Sacramento from September 25th – 27th. For more information please visit the CASQA website at: http://www.casqa.org/.

B. ***Next MSC Meeting Sept 21, Nov 16, 2006*** – Future meeting dates for the MSC are September 21st and November 16th. The May 18, 2006 meeting was cancelled and a one-page executive summary was sent to City Managers via email on June 28, 2006, providing them an update on current activities of the NPDES program.

C. ***Numeric Effluent Limits Update*** – Jason provided an update on the SWRCB numeric effluent limits hearing. Items of discussion included:

- Upcoming CASQA Workshop to review CASQA Blueprint for Municipal Permits
- Issues raised by the NGOs, Dischargers, and RWQCB and SWRCB staff.

D. ***Sanitary Sewer Overflow Permit*** – Benjie gave an update on the Sanitary Sewer Overflow (SSO) Permit. He discussed background SSO information, action items, training information, and key requirements and guidelines. For more detailed information, please refer to the Statewide Waste Discharge Requirements (WDR) handout distributed at the meeting. Benjie inquired as to the interest of the Permittees in having the Southern California Alliance of Publicly Owned Treatment Works (SCAP) provide a presentation on the SSO Permit to educate Permittees who operate sanitary sewer systems. The contact person for information on WDR is Ken Tyson who can be reached at 951.320.2028.

E. ***NPDES Training*** – Jason discussed the upcoming NPDES Annual Training. He noted that an effective analysis was currently being drafted and several items related to the training classes are being analyzed. Training classes were being scheduled, based on preliminary discussions with CDM, the consultant performing the effectiveness evaluation. Benjie provided a schedule of tentative dates for training. Once the training schedule has been finalized, an email notice will be sent to Permittees. Mike Roth inquired as to why the effective analysis was being conducted. Jason informed him that it is to make sure that Permittees are meeting Permit requirements and to see how effective the classes are in educating attendees. Results of the effective analysis will be included in the Annual Report.

E. ***WQMP Revisions*** – Jason informed attendees that there were several de minimus revisions made to the Water Quality Management Plan (WQMP) which will be posted on the District's website at the end of week of June 22, 2006. Permittees will be provided copies of the updated WQMP via CD at the August 24, 2006 NPDES TAC meeting, along with a list of the revisions. Several attendees engaged in a brief discussion regarding issues surrounding the revisions of the WQMP. Tina asked that Permittees make efforts to notify the general public in their cities of the revised WQMP. Jason advised attendees that there were no substantial revisions to the WQMP. The WQMP has been approved by the Board and any substantial revisions would need to be approved by them. Changes were limited to correcting web links, footnote references, and reorganization of a table currently contained in the Best Management Practices (BMP) Design Handbook to make it consistent with a table in the WQMP pro per. More significant revisions to the BMP Handbook are being proposed and will be provided to the Permittees for review at a future date.

VI. ***Public Education Program – Florence Mowrer***

Flo provided attendees an update on the efforts of the public education department. Items of discussion included:

- Household Hazardous Waste Collection Schedule
- Curb Markers
- All Public Outreach Requests
- 800 Toll Free Results
- Inventory Update
- New Promotional Backpacks (samples available for Permittees)
- New Promotional Butts Out Cigarette Container (samples available for Permittees)
- 2007 Calendars
- Riverside Corona Resource Conservation District (RCRCD) Report
- Mission Resource Conservation District (MRCD) Report

- Steve Groner & Associates
- Perris Fair scheduled for October (help is needed from Permittees to assist with event)

Phoung Hunter inquired as to how Moreno Valley School District (MVSD) can be included in the presentations. Flo advised her that she would check with MRCD and RCRCD in efforts to have MVSD included. Please see public education report for more detailed information on these items.

VII. ***TMDL Progress Report – Tom Rheiner***

A. ***Lake Elsinore/Canyon Lake Nutrient TMDL Update*** – The TMDL workgroup met May 17th and June 13th. The Agreement was approved by the Lake Elsinore Technical Advisory Committee (TAC) members and was in process of formal adoption by member agency legislative boards. It was mentioned that SAWPA has issued Bills for the fiscal year.

In accordance with Task 7 of the TMDL, the District provided the Regional Board with a list of recommended changes to the Drainage Area Management Plan (DAMP) and WQMP necessary to comply with the Total Maximum Daily Load (TMDL). In addition, the letter also addressed the District's plan to obtain compliance with the TMDL and a schedule of activities. The letter was reviewed by Permittee staff and the final version was then emailed to them.

B. ***Middle Santa Ana River Bacteria Indicator TMDL Update*** – This TMDL was adopted at the August 26, 2006 Regional Board meeting and was approved by State Board in May 2006. It is now awaiting approval by EPA. Jason informed everyone that he was currently working on the Cooperative Agreement to form a Task Force similar to the Lake Elsinore TMDL Task Force.

C. ***San Diego Lagoons TMDL/Investigation Order*** – Several lagoons in San Diego County are on the 303(d) list for bacteria indicators, siltation, and/or nutrients. In support of developing a TMDL, the San Diego Regional Board has issued an Investigation Order that requires watershed stakeholders to collect monitoring data needed to support models to be developed by Tetra Tech on behalf of the Regional Board. District and Santa Margarita Permittee staff will need to coordinate with San Diego County and Camp Pendleton to further develop the approach and cost sharing.

VIII. ***Santa Ana/Santa Margarita Region Programs – Tina Tuason/Jason Uhley***

A. ***Annual Report Update*** – It was announced that Annual Report season is nearing and the District will be getting a head start on the compling of the reports. Tina has scheduled to release the reporting forms for the Santa Margarita Region on August 1, 2006. The forms are due back to Tina by September 31, 2006. Annual reporting forms for the Santa Ana Region will be released at the end of August and are due back to Benjie in October.

IX. ***Open Discussion***

A. ***Santa Ana Regional Board*** – Keith Elliot offered the Regional Board's assistance with training should Permittees need it. Please contact Keith for further information. Also, the Regional Board has released the schedule of dates for the 6 cities who have been issued audits.

B. ***San Diego RWQCB*** – Not present.

C. ***U.S. EPA – Region IX*** – Not present.
D. ***Round Table*** – No comments.

X. *New Agenda Items / Schedule Next Meeting*
The next NPDES TAC Meeting is scheduled for August 24, 2006. If there are any questions or items for the next meeting agenda, please contact the Flood Control District's NPDES Section at 951.955.4375. Suggestions are always welcome.

Please visit the StormWater/CleanWater Protection Program website at: http://www.floodcontrol.co.riverside.ca.us. The site contains a variety of useful stormwater program information including links to other stormwater management programs and related websites.

NEXT MEETING IS SET FOR:

THURSDAY August 24, 2006 – 10 A.M.
AT
RIVERSIDE COUNTY FLOOD CONTROL DISTRICT
1995 Market Street
Riverside, CA 92501

MEETING AGENDA

NPDES
SANTA ANA / SANTA MARGARITA
TECHNICAL COMMITTEE

10:00 – 12:00 p.m. Thursday, September 28, 2006
Riverside County Flood Control District
1995 Market Street
Riverside, CA 92501

I. Introductions

II. Agenda Changes

III. Review of Minutes: August 24, 2006

IV. Announcements
- A. CASQA Meeting Update - Sept 25-27 Conference, Workshop, Awards (Sacramento Radisson Hotel)
- B. Next MSC Meetings – Sept 21, Nov 16, 2006
- C. NPDES Training – Schedule set/Class size update
- D. WQMP – Workgroup Meeting October 5, 2006 at 3:30 p.m. (RCFC)
- E. Audits – County Audit update
- F. Annual Report – Reporting Forms due September 30th

V. Public Education Program – Florence Mowrer

VI. TMDL Progress Report – Jason Uhley
- A. Lake Elsinore/Canyon Lake Nutrient TMDL
  - September 20th meeting Update
- B. Middle Santa Ana River Bacteria Indicator TMDL Update
  - Next meeting is October 3, 2006 from 1:30 to 4:00 p.m.
- C. San Diego Lagoons TMDL/Investigation Order
  - September 22nd NNE Presentation Update

VII. Santa Ana/Santa Margarita Region Programs – Tina Tuason/Jason Uhley
- A. Stormwater Quality Standards Task Force Update
  - Next meeting is October 12, 2006 from 9:30 a.m. to 1:00 p.m.

VIII. Open Discussion
- A. Santa Ana RWQCB
- B. San Diego RWQCB
- C. U.S. EPA – Region IX
- D. Round Table

IX. New Agenda Items/Schedule Next Meeting – October 26, 2006

Storm Water Clean Water
PROTECTION PROGRAM

Member Agencies:

Banning
Beaumont
Calimesa
Canyon Lake
Cathedral City
Coachella
Coachella Valley Water District
Corona
County of Riverside
Desert Hot Springs
Hemet
Indian Wells
Indio
La Quinta
Lake Elsinore
Moreno Valley
Murrieta
Norco
Palm Desert
Palm Springs
Perris
Rancho Mirage
Riverside City
Riverside County Flood Control District
San Jacinto
Temecula

NPDES
SANTA ANA / SANTA MARGARITA
TECHNICAL COMMITTEE
Meeting Minutes
for
August 24, 2006

I. Attendees:

Benjie Cho	Riverside County Flood Control District
Arlene Chun	Riverside County Flood Control District
Linda Garcia	Riverside County Flood Control District
Florence Mowrer	Riverside County Flood Control District
Charlene Warren	Riverside County Flood Control District
Tina Tuason	Riverside County Flood Control District
Jason Uhley	Riverside County Flood Control District
Steve Dondalski	Riverside County Building & Safety
Doug Thompson	Riverside County Environmental Health
Mike Shetler	Riverside County Executive Office
Marianna Hernandez	Riverside County Transportation
Claudia Perez	Riverside County Transportation
Keith Elliott	Santa Ana Regional Board
Maria Macario	Santa Ana Regional Board
John Wilder	City of Beaumont
James Grimm	City of Canyon Lake
Michele Colbert	City of Corona
Linda Nixon	City of Hemet
Phuong Hunter	City of Moreno Valley
Kent Wegelin	City of Moreno Valley
Farida Naceem	City of Murrieta
Lori Askew	City of Norco
Sandy Caldwell	City of Riverside
Jessica Chin	City of Riverside
Mike Emberton	City of San Jacinto
Susie Flores	City of San Jacinto
Aldo Licitra	City of Temecula
Jamie Aderhold	J2A Environmental
Dell Ross	Resource Conservation District–Southwest County
Rosanna Lacarra	PBS&J

II. *Introductions*

Jason Uhley welcomed everyone to the meeting and initiated self introductions.

III. *Agenda Changes*

Agenda item V (Public Education Program) was moved up to agenda item IV. Presentation by Arlene Chun on draft revised WQMP template was added to the agenda. Bureau of Reclamation was added to agenda as item VII-B (Santa Ana/Santa Margarita Region Programs).

IV. *Review of Minutes: July 27, 2006*

Item VII-B of the July 27, 2006 minutes, Middle Santa Ana River Bacteria TMDL Update read that the TMDL was adopted at the August 26, 2006 Regional Board meeting. The correct adoption date is August 26, 2005.

Handouts and Materials Provided:

- Agenda, Minutes, Roster
- Caltrans Water Quality Newsflash #s 06-31 through 06-34
- June 2006-July 2007 Household Hazardous Waste Collection Program schedule
- Southern California Heritage Gardening Guide DVD

V. *Public Education Program – Florence Mowrer*

Flo provided attendees an update on the efforts of the public education department. Items of discussion included:

a. Trash Task Force Meeting – On August 31st, Flo, the Public Informations Specialist, attended Supervisor Ashley's Riverside County Trash Task Force Stakeholders Meeting to discuss combining our intra-county agency efforts to combat illegal dumping (solids and liquid waste) problems in Riverside County. The program is comprised of four committees: legislative, site maintenance, enforcement and public outreach/education. County Public Informations Officer, Ray Smith, leads the public outreach subcomittee group that the public information specialist is an affiliate of.
b. Household Hazardous Waste Collection Schedule – The schedule has been released and was provided to attendees at the meeting.
c. Garden Guide DVD – The District's public education department has networked with Metropolitan Water District and Southern California Water agencies for public education purposes. Flo received several hundred DVDs that will be used to help support the public education home garden care presentations. DVDs were made available to attendees.
d. Posters – Stormwater Pollution Prevention Week (September 18th through the 24th) posters were made available at the meeting for Permittees.
e. Starting August 25, 2006 there will be a new assistant in the public education department to assist Flo.
f. Flo attended a learning standards workshop to help establish better presentations for elementary kids.
g. The 2007 calendars are being processing. Flo advised Permittees that if they had a specific event they would like to have published in the calendar to please inform her. By suggestion of Steve Dondalski the calendars will include the rainy wet season dates. To allow for complete coverage of all watersheds, the calendar will reflect October 1st through May 31st as the rainy wet season dates.

h. Backpack Promotional - Flo is waiting to hear back from schools on the affect that the backpacks has had on the elementary school children.

VI. ***WQMP Template – Arlene Chun***

Arlene gave a Powerpoint presentation on the WQMP template and discussed the changes that were made. Permittees will be emailed the template for their review. Comments on the template will be due back a week after they are sent, then posted on the District's website once the template is finalized.

V. ***Announcements***

A. ***CASQA Meeting Update~Sept 25-27 Conference*** – Jason discussed the upcoming CASQA conference scheduled for September 25-27th in Sacramento CA. Hotel rooms and reservations were discussed.

B. ***Next MSC Meeting Sept 21, Nov 16, 2006*** – Jason advised attendees of the upcoming (Management Steering Committee) MSC Meeting on September 21, 2006. The focus of the meeting will be Audits and TMDLs.

C. ***Numeric Effluent Limits Update*** – CASQA held a conference in Brea, CA to address numeric effluent limits and the Blue Ribbon Panel. Benjie briefed attendees on the events of the conference. Items of discussion included NGO s negotiations, the four stages Permittees will have to progress through to meet water quality objectives. Those stages included, reiterative approach, reiterative approach with benchmarks, technology based effluent limits, and water quality based effluent limits. Jason then discussed the basis behind the recent numeric effluent limits issues advising Permittees of the requirements that will need to be met in the event that this item moves forward.

D. ***Sanitary Sewer Overflow Permit*** – Permittees were informed of the updated SSO contact list posted on the District's website.

E. ***NPDES Training*** – Permittees discussed upcoming NPDES annual training dates, online registration, class size reduction, and registration forms that will be sent the week of August 28th. There will be no email, phone, fax registrations for these trainings classes. Training dates will be scheduled for the month of October.

F. ***WQMP Workgroup*** – This workgroup was formed to address WQMP Implementation. An objective of the workgroup is to develop an FAQ that would help Permittees and the development community to address the WQMP requirements. The first draft of the FAQ has been released to several Permittees who attended the workgroup meeting. It will be released to the remaining Permittees and a follow up meeting will be scheduled to assess responses to any questions and comments.

G. ***Microbial Source Training*** - PBS&J held a lunch and learn session at the District on August 22, 2006. The topic covered was microbial source assessments. Those who attended the lunch and learn session were asked to complete an evaluation, providing their feedback on the class. Discussion on future lunch and learn sessions were discussed.

H. ***CASQA Numerical Effluent Method Workshops*** – Discussed in item C above.

I. ***Audits*** – Keith Elliot noted that the Regional Board audits will be complete once the County, Canyon Lake, and Lake Elsinore audits have been conducted. As an FYI Jason briefly discussed an article in the Inland Valley Bulletin regarding the audits, San Bernardino County, and the Regional Board.

J. ***Annual Report Reporting Forms*** – The Santa Margarita Region Annual Reporting forms were sent out to Pemittees on August 2, 2006 and are due back September 15, 2006. The Santa Ana Region annual reporting forms will be sent out to Permittees September 1, 2006 and are due back September 30, 2006.

VII. ***TMDL Progress Report – Tom Rheiner***

A. ***Lake Elsinore/Canyon Lake Nutrient TMDL Update*** – The Lake Elsinore/Canyon Lake TMDL meeting was held August 23, 2006. The primary points of discussion was the Implementation Agreement and compliance. Jason advised Permittees that there are still entities and cities who needed to sign the Implementation Agreement. He then reported on the water quality of Lake Elsinore noting that the water quality in Lake Elsinore is good at this point, biominipulation to achieve compliance, carp removal from the Lake, nutrient targets and concentrations, and impairments. Tim Moore of Risk Sciences is assisting with the efforts of this TMDL.

B. ***Middle Santa Ana River Bacteria Indicator TMDL Update*** – Jason advised the group that there was not much to report on regarding this TMDL however, it has been approved by the State and a draft Implementation Agreement has been prepared for the TMDL. Jason also informed Permittees that a task force will need to be formed to support this TMDL.

C. ***San Diego Lagoons TMDL/Investigation Order*** – Jason provided an update on the status of this TMDL. Items of discussion included; requirements of the TMDL, 13267 letters to be sent to all discharges of the lagoon, data collection necessary to develop the TMDL, Bureau of Reclamation's interest in developing the TMDL, extension of timelines, and Regional Board efforts in regards to moving forward on the nutrient and TDS TMDL for various waterbodies within the Santa Margarita Watershed.

VIII. ***Santa Ana/Santa Margarita Region Programs – Tina Tuason/Jason Uhley***

A. ***Stormwater Quality Standards Task Force Update*** – A meeting has been scheduled. Meeting information will be sent to Permittees via email.

IX. ***Open Discussion***

A. ***Santa Ana Regional Board*** – No comments.
B. ***San Diego RWQCB*** – Not present.
C. ***U.S. EPA – Region IX*** – Not present.
D. ***Round Table*** – No comments.

X. ***New Agenda Items / Schedule Next Meeting***

Jamie Aderhold requested that he conduct a presentation at the end of the October meeting. The next NPDES TAC Meeting is scheduled for September 28, 2006. If there are any

questions or items for the next meeting agenda, please contact the Flood Control District's NPDES Section at 951.955.4375. Suggestions are always welcome.

Please visit the StormWater/CleanWater Protection Program website at: http://www.floodcontrol.co.riverside.ca.us. The site contains a variety of useful stormwater program information including links to other stormwater management programs and related websites.

NEXT MEETING IS SET FOR:

THURSDAY September 28, 2006 – 10 A.M.
AT
RIVERSIDE COUNTY FLOOD CONTROL DISTRICT
1995 Market Street
Riverside, CA 92501

MEETING AGENDA

NPDES
SANTA ANA / SANTA MARGARITA
TECHNICAL COMMITTEE

10:00 – 12:00 p.m. Thursday, October 26, 2006
Riverside County Flood Control District
1995 Market Street
Riverside, CA 92501

I. Introductions

II. Agenda Changes

III. Review of Minutes: September 28, 2006

IV. Announcements

A. Next MSC Meetings – Sept 21st & Nov 16th 2006
C. NPDES Training – Schedule set/Class size update
D. WQMP – Workgroup Meeting October 5, 2006 at 3:30 p.m. (RCFC)
E. Audits – County Audit update
F. Annual Report – Reporting Forms due September 30th

V. Public Education Program – Florence Mowrer

VI. TMDL Progress Report – Jason Uhley

A. Middle Santa Ana River Bacteria Indicator TMDL Update
- Next meeting is October 3, 2006 from 1:30 to 4:00 p.m.

B. San Diego Lagoons TMDL/Investigation Order
- September 22nd NNE Presentation Update

VII. Santa Ana/Santa Margarita Region Programs – Tina Tuason/Jason Uhley
A. Stormwater Quality Standards Task Force Update
- Next meeting is October 12, 2006 from 9:30 a.m. to 1:00 p.m.

VIII. Open Discussion
A. Santa Ana RWQCB
B. San Diego RWQCB
C. U.S. EPA – Region IX
D. Round Table

IX. New Agenda Items/Schedule Next Meeting – November 16, 2006 (Thanksgiving falls on the 4th Thursday, the 23rd)

X. J2A Environmental Presentation – Jamie Aderhold

Storm Water Clean Water
PROTECTION PROGRAM

Member Agencies:

Banning
Beaumont
Calimesa
Canyon Lake
Cathedral City
Coachella
Coachella Valley Water District
Corona
County of Riverside
Desert Hot Springs
Hemet
Indian Wells
Indio
La Quinta
Lake Elsinore
Moreno Valley
Murrieta
Norco
Palm Desert
Palm Springs
Perris
Rancho Mirage
Riverside City
Riverside County Flood Control District
San Jacinto
Temecula

NPDES
SANTA ANA / SANTA MARGARITA
TECHNICAL COMMITTEE
Meeting Minutes
for
September 28, 2006

I. Attendees:

Benjie Cho	Riverside County Flood Control District
Linda Garcia	Riverside County Flood Control District
Florence Mowrer	Riverside County Flood Control District
Penny Nanney	Riverside County Flood Control District
Charlene Warren	Riverside County Flood Control District
Tina Tuason	Riverside County Flood Control District
Jason Uhley	Riverside County Flood Control District
Steve Dondalski	Riverside County Building & Safety
Doug Thompson	Riverside County Environmental Health
Mike Shetler	Riverside County Executive Office
Claudia Perez	Riverside County Transportation
Keith Elliott	Santa Ana Regional Board
John Wilder	City of Beaumont
Michele Colbert	City of Corona
Jeff Potts	City of Corona
Linda Nixon	City of Hemet
Phuong Hunter	City of Moreno Valley
Kent Wegelin	City of Moreno Valley
Lori Askew	City of Norco
Michael Morales	City of Perris
Sandy Caldwell	City of Riverside
Jessica Chin	City of Riverside

II. *Introductions*

Jason Uhley welcomed everyone to the meeting and initiated self introductions.

III. *Agenda Changes*

There were no changes to the agenda.

IV. *Review of Minutes: July 27, 2006*

There were no changes to the meeting minutes.

Handouts and Materials Provided:

- Agenda, Minutes, Roster
- Caltrans Water Quality Newsflash #s 06-35 through 06-38
- Public Education Information Report – September 28, 2006
- National Pollution Prevention Week
- RCRCD Flyer – Dates to Remember 2006
- Handout of Public Education Gazebo Design

V. *Announcements*

A. ***CASQA Meeting Update~Sept 25-27 Conference Workshop, Awards (Sacramento Radisson Hotel)*** – Jason Uhley, Benjie Cho, Tina Tuason, Linda Garcia, and Linda Nixon reported on their attendance and activities of the workshop. Items of discussion included:

- MS4 Permit Monitoring
- Environmental Communities
- Public Education
- Planning
- Effective Analysis (Source and Treatment Control)
- Best Management Practices (BMPs) and BMP Lake Design
- Numeric Effluent Limits
- Blue Ribbon Panel and State Litigation
- Hydromodification
- Bigger Detention Basins
- Bacteriodes, E coli, and Beneficial Uses
- Los Angeles County's Study on Ground Water and Infiltration (Nutrients and Pathogens)
- Low Impact Development (LID) Concepts
- Presentation given by Celeste Cantu
- White Paper released by CASQA
- Caltrans Studies
- Santa Margarita Region need for Hydromodification Plan Development

B. ***Next MSC Meeting - Sept 21, Nov 16, 2006*** – Jason informed Permittes that during the September 21st MSC meeting, City Managers were put on notice that an Request for Qualification (RFQ) would be released, the (Report of Waste Discharge) ROWD would be due in April 2007, and there would be cost increases related to the (Total Maximum Daily Load) TMDLs. City Managers were also informed that the city

audits conducted by the Regional Board had been reviewed and comment letters would be sent for all cities simultaneously.

C. ***NPDES Training – Schedule Set/ Class Size Update*** – Permittees engaged in a lenghty discussion regarding upcoming NPDES annual training dates, online registration, class size reduction, the implementation of more classes that will be available, Building Industry Association (BIA) training services, and consultant costs for conducting training. There will be no email, phone, or fax registrations for these trainings classes. Training dates will be scheduled for the month of October. Jason noted that the comment letter from CDM who conducted a effective analysis on District training classes would be released to Permittees for their input. Training will be offered again in the Spring of 2007.

D. ***WQMP Workgroup Meeting October 5, 2006 at 3:30 p.m*** – Permittees were advised that a revised draft Frequently Asked Questions (FAQ) had been released via email and their input on the document was needed. The next workgroup meeting will be held October 5, 2006 at the District.

E. ***Audits ~ County Audit Update*** – Maria Macario updated the Permittees on the status of the audit that was being conducted by the Regional Board. There was a brief discussion regarding San Bernardino County audits.

F. ***Annual Report – Reporting Forms due September 30th*** – Permittees were informed that the Santa Margarita Region annual reporting forms were sent to Pemittees August 2, 2006 and were due to back to Tina September 15, 2006. The Santa Ana Region annual reporting forms were sent to Permittees September 1, 2006 and are due to Benjie September 30, 2006. Benjie noted that it was his hope to have the Industrial/Commercial summary forms back to Permittees by the end of the day on September 28, 2006.

VI. *Public Education Program – Florence Mowrer*

Flo provided attendees an update on the efforts of the public education department. Items of discussion included:

- Final Draft of Gazebo Design (Permittee assistance needed in okaying the design. Flyer examples of the gazebo were provided to attendees)
- Costs
- Perris Home & Garden Fair
- Scheduled Clean-ups
- HHW Schedule
- Southern California Fair Oct 7th – 15th (Permittee help needed at event)
- City of Lake Elsinore information inquiries in efforts to obtain their own gazebo through www.greatgazebo.com
- Rotating Displays available for Permittee use (contact Flo for issuance)

For more detailed information, please refer to the September 28, 2006 Public Education Information Report distributed at the meeting.

VII. ***TMDL Progress Report – Jason Uhley***

A. ***Lake Elsinore/Canyon Lake Nutrient TMDL Update ~ September 20th Meeting Update*** – Jason informed Permittees that this TMDL is likely to be effective in December 2006 or January 2007. Tim Moore of Risk Sciences has been assisting the Permittees with revising the REC 1 standards. Jason further discussed costs for monitoring, ecoli regulation, implementation agreement, and efforts of the Storm Water Quality Standards Task Force (SWQSTF) in relation to the TMDL. He then informed Permittees that Hope Smythe had received the District's Task 7 Compliance letter dated August 1, 2006. A $600,000 grant has been obtained by the Task Force which will be used to install wetlands that may augment ongoing biomanipulation efforts.

B. ***Middle Santa Ana River Bacteria Indicator TMDL Update ~ Next meeting is October 3, 2006 from 1:30 to 4:00 p.m.*** – A $600,000 grant to conduct bacteria source assessment and implement pilot BMPs has been received. Jason provided a brief update on the status of this TMDL noting that the TMDL will be approved by Environmental Protection Agency (EPA) shortly and that a draft Task Force agreement will soon be released to formalize coordinated efforts associated with TMDL implementation and monitoring.

C. ***San Diego Lagoons TMDL/Investigation Order ~ September 22nd NNE Presentation Update*** – Jason provided an update on the status of the 13267 order. Items of discussion included; requirements of the 13267 letter (require collection of data necessary to establish a TMDL). Due to the time frame in which the Regional Board gave to complete these tasks, the District and other dischargers named in the order requested a hearing before the San Diego Regional Board to request more time to complete the tasks. The hearing has been scheduled for October 11, 2006.

VIII. ***Santa Ana/Santa Margarita Region Programs – Tina Tuason/Jason Uhley***

A. ***Stormwater Quality Standards Task Force Update*** – The Task Force met with EPA and the State Board in September to discuss the proposed SWQSTF amendments to the REC 1 Water Quality Standards. The State Water Resource Control Board (SWRCB) and EPA were generally supportive of the effort. Jason noted that revised REC 1 standards may possibly be in effect by July 2007. The next Task Force meeting is October 12, 2006. Permittees were invited to attend the meeting.

IX. ***Open Discussion***

A. ***Santa Ana Regional Board*** – No comments.

B. ***San Diego RWQCB*** – Not present.

C. ***U.S. EPA – Region IX*** – Not present.

D. ***Round Table*** – No comments.

X. ***New Agenda Items / Schedule Next Meeting***

The next NPDES TAC Meeting is scheduled for October 26, 2006. If there are any questions or items for the next meeting agenda, please contact the Flood Control District's NPDES Section at 951.955.4375. Suggestions are always welcome.

Please visit the StormWater/CleanWater Protection Program website at: http://www.floodcontrol.co.riverside.ca.us. The site contains a variety of useful stormwater program information including links to other stormwater management programs and related websites.

NEXT MEETING IS SET FOR:

THURSDAY October 26, 2006 – 10 A.M.
AT
RIVERSIDE COUNTY FLOOD CONTROL DISTRICT
1995 Market Street
Riverside, CA 92501

MEETING AGENDA

NPDES
SANTA ANA / SANTA MARGARITA
TECHNICAL COMMITTEE

10:00 – 12:00 p.m. Thursday, November 16, 2006
Riverside County Flood Control District
1995 Market Street
Riverside, CA 92501

I. Introductions

II. Agenda Changes

III. Review of Minutes: October 26, 2006

IV. Announcements
- A. Next MSC Meetings – January 18th, March 15th, May 17th
- B. On-line Training Registration Demonstration Update
- C. WQMP Updated on District Website (WQMP, FAQ, Template and Summary of Changes)
- D. Audits – County Audit Update
- E. Annual Report – Santa Ana Report due November 30th

V. Public Education Program
- A. County Mail Slugs

VI. TMDL Progress Report – Jason Uhley
- A. Middle Santa Ana River Bacteria Indicator TMDL Update
  - Next Meeting - November 30, 2006 from 1:30 to 4:00 p.m.
- B. San Diego Lagoons TMDL/Investigation Order

VII. Santa Ana/Santa Margarita Region Programs
- A. Stormwater Quality Standards Task Force Update
  - Next meeting - November 30, 2006 from 9:30 a.m. to 1:00 p.m.

VIII. Report of Waste Discharge / Permit Renewal Workgroup
- A. URS Presentation
- B. Permit Renewal Workgroup Meeting – December 5, 2006 from 10:00 a.m. to 12:00 noon

IX. Open Discussion
- A. Santa Ana RWQCB
- B. San Diego RWQCB
- C. U.S. EPA – Region IX
- D. Round Table

X. New Agenda Items/Schedule Next Meeting – January 25, 2006 (There will be no meeting in December)

XI. Filterra Bioretention/Filtration System Presentation – Will Harris

Storm Water Clean Water
PROTECTION PROGRAM

Member Agencies:

Banning
Beaumont
Calimesa
Canyon Lake
Cathedral City
Coachella
Coachella Valley Water District
Corona
County of Riverside
Desert Hot Springs
Hemet
Indian Wells
Indio
La Quinta
Lake Elsinore
Moreno Valley
Murrieta
Norco
Palm Desert
Palm Springs
Perris
Rancho Mirage
Riverside City
Riverside County Flood Control District
San Jacinto
Temecula

NPDES
SANTA ANA / SANTA MARGARITA
TECHNICAL COMMITTEE
Meeting Minutes
for
October 26, 2006

I. Attendees:

Benjie Cho	Riverside County Flood Control District
Arlene Chun	Riverside County Flood Control District
Florence Mowrer	Riverside County Flood Control District
Charlene Warren	Riverside County Flood Control District
Jason Uhley	Riverside County Flood Control District
Doug Thompson	Riverside County Environmental Health
Mike Shetler	Riverside County Executive Office
Marianna Hernandez	Riverside County Transportation
Michael Roth	Santa Ana Regional Board
Mike Neal	City of Beaumont
Michele Colbert	City of Corona
Jeff Potts	City of Corona
Phuong Hunter	City of Moreno Valley
Kent Wegelin	City of Moreno Valley
Lori Askew	City of Norco
Jessica Chin	City of Riverside
Aldo Licitra	City of Temecula
Dell Ross	EMARCD

II. ***Introductions***
Jason Uhley welcomed everyone to the meeting and initiated self introductions.

III. ***Agenda Changes***
There were no changes to the agenda.

IV. ***Review of Minutes: September 28, 2006***
There were no changes to the meeting minutes.

Handouts and Materials Provided:

- Agenda, Minutes, Roster
- Caltrans Water Quality Newsflash #s 06-39 through 06-43
- RCFC NPDES Training Summary Report for October 13, 2006

V. ***Announcements***

A. ***Next MSC Meetings – November 16th, February 15th, & May 17th***
Jason Uhley announced that the meetings dates for future MSC meetings adding that NPDES Permittees will now be included in the email notifications sent to City Managers regarding the MSC meetings. The primary focus of the November 16, 2006 MSC meeting will be the Middle Santa Ana TMDL and cities audits.

C. ***NPDES Training – Schedule Set/ Class Size Update*** – Benjie Cho informed attendees that the training sessions went well. There was an email sent to Permittees regarding lessons that were learned and things that need to be worked on for future training in regards to the online registration process. Aldo Licitra forwarded comments regarding changes he would like to see in future training classes to Benjie.

D. ***WQMP Update*** – Permittees were advised that a revised draft Frequently Asked Questions (FAQ) had been released via email and their input on the document was needed. The deadline for comments was set for November 2, 2006. Marianna Hernanadez asked that Benjie forward her the email as she did not receive the initial email sent to Permittees. The next workgroup meeting will be held October 5, 2006 at the District.

E. ***Audits ~ County Audit Update*** – Mike Roth announced that the audit reports wouldn't be available until the new year (2007).

F. ***Annual Report Update*** – Jason reported that Tina Tuason was currently working on compiling the Santa Margarita Region Annual Report. Benjie added that the District has received most of the annual reporting information from the cities in the Santa Ana Region. Benjie added that an email request sent the earlier part of the week of October 23rd, requesting Permittees to forward an electronic version of their MS4 locations. He advised Permittees that should there be problems with them providing the electronic copy, that it is best to provide the information to him in hardcopy now rather than electronic copy later. Any questions, please contact Benjie.

G. ***Available Funding*** – Dell Ross informed attendees that he had recently became aware of the fact that there was funds available in a trust to be used for enforcement of lake

and basin projects. He stated that should Permittees become aware of any projects that may be worth while needing restoration in efforts to save the creeks, this money may be used for those purposes. Dell also made mention that the Regional Board had reached an agreement with Mr. Johnson who had been found to be in violation of providing false intentional information to obtain a permit.. The case is no longer being handled as a lawsuit, nor will there be a fine.

VI. ***Public Education Program – Florence Mowrer***

Flo provided attendees an update on the efforts of the public education department. Items of discussion included:

- Permittee email address confirmations
- Flo's last day working is November 3rd, return date is unknown
- Permittee Inventory

Jason asked that Permittees send thier request for public education materials through the NPDES website. The District is working to get an assistant on board to aid in the public education efforts during Flo's absence.

VII. ***TMDL Progress Report – Jason Uhley***

A. ***Lake Elsinore/Canyon Lake Nutrient TMDL (EVMWD)*** ~ Jason announced that the next meeting is November 9th from 2 to 4:30 p.m. He added that he was asked by Hope Smyth to give a presentation on the August 1st submittal that was made on behalf of Permittees. The presetation will provide a presentation

VII.

TMDL Progress Report – Jason Uhley

A. ***Lake Elsinore/Canyon Lake Nutrient TMDL (EVMWD)*** ~ Jason announced that the next meeting is November 9th from 2 to 4:30 p.m. He added that he was asked by Hope Smyth to give a presentation on the Permittees TMDL Task 7 Compliance plan submitted to the RWQCB on August 1, 2006. Jason noted the presentation will discuss the basic MS4 Permit requirements, TMDL requirements, and the specifics of the Permittees plan.

B. ***Middle Santa Ana River Bacteria Indicator TMDL Update ~ Next meeting is November 30, 2006 from 1:30 to 4:00 p.m.*** – Jason provided a brief update on the status of this TMDL noting that the TMDL will be approved by Environmental Protection Agency (EPA) shortly and that a draft Task Force agreement will soon be released to formalize coordinated efforts associated with TMDL implementation and monitoring. He added that a $600,000 grant to conduct bacteria source assessment and implement pilot BMPs has been received and Permittees will soon need to develop a Task Force. Tim Moore of Risk Sciences will work as the consultant to assist Permittees with the efforts of this TMDL

C. ***San Diego Lagoons TMDL/Investigation Order ~ September 22nd NNE Presentation Update*** – There was a workshop provided to the the San Diego Regional Board by District staff. A task force will need to be formed to implement the TMDL.

VIII. ***Santa Ana/Santa Margarita Region Programs – Tina Tuason/Jason Uhley***

A. ***Stormwater Quality Standards Task Force Update*** (SAWPA) Next meeting is November 9, 2006 from 9:30 to 1:00 p.m. – Jason discussed EPA issues related to this TMDL, REC uses, and the finalizing of the proposed ammendment language.

IX. ***Open Discussion***

A. ***Santa Ana Regional Board*** – No comments.

B. ***San Diego RWQCB*** – Not present.

C. ***U.S. EPA – Region IX*** – Not present.

D. ***Round Table*** – No comments.

X. ***New Agenda Items / Schedule Next Meeting***

The next NPDES TAC Meeting is scheduled for November 16, 2006. If there are any questions or items for the next meeting agenda, please contact the Flood Control District's NPDES Section at 951.955.4375. Suggestions are always welcome.

XI. ***Vendor Presentation – J2A Environmental***

Jamie Aderhold from J2A Environmental conducted a presentation on trident curb screens and a new monitoring tool for illegal dishcarges.

Please visit the StormWater/CleanWater Protection Program website at: http://www.floodcontrol.co.riverside.ca.us. The site contains a variety of useful stormwater program information including links to other stormwater management programs and related websites.

NEXT MEETING IS SET FOR:

THURSDAY November 16, 2006 – 10 A.M.
AT
RIVERSIDE COUNTY FLOOD CONTROL DISTRICT
1995 Market Street
Riverside, CA 92501

MEETING AGENDA

NPDES
SANTA ANA / SANTA MARGARITA
TECHNICAL COMMITTEE

10:00 – 12:00 p.m. Thursday, January 25, 2007
Riverside County Flood Control District
1995 Market Street
Riverside, CA 92501

I. Introductions

II. Agenda Changes

III. Review of Minutes: November 16, 2006

IV. Announcements
- A. Next MSC Meetings – March 15th & May 17th
- B. On-line Training Registration Demonstration Update
- C. Audits – County Audit Update
- D. CASQA General Meeting Update
- E. Annual Report – Santa Ana Report submitted November 30th
- F. Calimesa NOV

V. Public Education Program
- A. Billboard Advertising
- B. School Outreach Program
- C. Earth Day Flyer
- D. 2007 Calendar

VI. TMDL Progress Report – Jason Uhley
- A. Middle Santa Ana River Bacteria Indicator TMDL Update
  - Next Meeting – 1:30-4:00 p.m. February 1st, March 1st, April 19th, May 31st
- B. San Diego Lagoons TMDL/Investigation Order

VII. Santa Ana/Santa Margarita Region Programs
- A. Stormwater Quality Standards Task Force Update
  - Next Meeting - 9:30-1:00 p.m. February 1st, March 1st, April 19th, May 31st
- B. Santa Margarita Individual SWMP Updates

VIII. Report of Waste Discharge / Permit Renewal Workgroup
- A. URS Presentation
- B. Permit Renewal Workgroup Meeting – February 6th
- C. Michael Adackapara Meeting Status Update

IX. Open Discussion
- A. Santa Ana RWQCB
- B. San Diego RWQCB
- C. U.S. EPA – Region IX
- D. Round Table

X. New Agenda Items/Schedule Next Meeting – February 22, 2007

Storm Water Clean Water
PROTECTION PROGRAM

Member Agencies:

Banning
Beaumont
Calimesa
Canyon Lake
Cathedral City
Coachella
Coachella Valley Water District
Corona
County of Riverside
Desert Hot Springs
Hemet
Indian Wells
Indio
La Quinta
Lake Elsinore
Moreno Valley
Murrieta
Norco
Palm Desert
Palm Springs
Perris
Rancho Mirage
Riverside City
Riverside County Flood Control District
San Jacinto
Temecula

NPDES
SANTA ANA / SANTA MARGARITA
TECHNICAL COMMITTEE
Meeting Minutes
for
November 16, 2006

I. Attendees:

Benjie Cho	Riverside County Flood Control District
Linda Garcia	Riverside County Flood Control District
Florence Mowrer	Riverside County Flood Control District
Charlene Warren	Riverside County Flood Control District
Jason Uhley	Riverside County Flood Control District
Mike Shetler	Riverside County Executive Office
Marianna Hernandez	Riverside County Transportation
Claudia Perez	Riverside County Transportation
Dave Thibault	City of Beaumont
Michele Colbert	City of Corona
Jeff Potts	City of Corona
Linda Nixon	City of Hemet
Phuong Hunter	City of Moreno Valley
Kent Wegelin	City of Moreno Valley
Farida Naceem	City of Murrieta
Lori Askew	City of Norco
Michael Morales	City of Perris
Sandy Caldwell	City of Riverside
Jessica Chin	City of Riverside
Jamie Aderhold	J2A Environmental
Dell Ross	EMARCD

II. *Introductions*

Jason Uhley welcomed everyone to the meeting and initiated self introductions. Bob Collocott informed Permittees that Julie Quinn of URS would be assisting him with working efforts of the NPDES Program.

III. *Agenda Changes*

Jason added item F under agenda item V (Announcements), a brief peresentation provided by the County on their new license program.

IV. *Review of Minutes: October 26, 2006*

There were no changes to the meeting minutes. Minutes were approved.

Handouts and Materials Provided:

- Agenda, Minutes, Roster
- Caltrans Water Quality Newsflash #s 06-44 through 06-46
- Trident Curb Screen brochure
- Filterra Stormwater Bioretention Filtration System brochure (presentation provided by Will Harris)
- ROWD Data Request Sheet
- Letter to City Managers - Request for ROWD Information January 5, 2007 Deadline

V. *Announcements*

A. ***Next MSC Meetings – January 18th, March 15th, & May 17th***

Jason announced that the November 16, 2006 MSC meeting was canceled. He added that Permit Managers will begin to be notified via emial of the MSC meetings.

B. ***On-line Training Registration Demonstration Update*** – Benjie Cho discussed the E-Ply on-line training presentation provided to District NPDES staff by Rebecca Guill of AEI-CASC. Jason noted that he had not received any negative feedback regarding the on-line training and expects to continue its use. Future changes that may be implemented to the on-line training program, costs associated with the training, and the District's IT Departments efforts of implementing the on-line training application were also discussed.

C. ***WQMP Update on District Website (WQMP, FAQ, Template and Summary of Changes)*** – Benjie informed attendees that all changes regarding the WQMP had been made to the District's website in which the revised document was sent to Permittees via email. Phoung Hunter addressed her concern with discrepancies in the WQMP FAQ. Permitees were advised to forward any comments they may have regarding the WQMP to Benjie.

D. ***Audits ~ County Audit Update*** – Jason informed the group that he had no recent information regarding the audits but expects to receive a letter from the Regional Board in January 2007. Jason then briefly discussed that local implementation and tracking of post construction BMPs which were two items being discussed in the San Bernardino County Permit.

E. ***Annual Report ~ Santa Ana Report due November 30th***
Benjie announced that he was currently working on the report and it will be submitted on time.
Jason noted that the CASQA meeting will be held November 17, 2006 in Ontario and recommended that Permittees attend.

F. ***New County Program*** – Mike Shetler reported on the new Business Registration and Licensing Program approved by Riverside County Board of Supervisors. Items of discussion included:

- Program requirements expected to be in effect January 1, 2007
- Building and Safety to act as the lead department of the program
- A move from the CAP Program to an actual Inspection and Enforcment program for the County
- Permittees need to begin evaluating how they will conduct their inspection programs
- Permit Renewal & Fees

Sandy Caldwell announced that the City of Riverside won 1st place in the nation for the best Pre-treatment Program. Congratulations went out to the City of Riverside.

VI. ***Public Education Program – Florence Mowrer***

A. County Mail Slug – Jason updated Permittees on the efforts of the public education program noting that the for the last 2 years every piece of mail sent by Riverside County is stamped with the Stormwater logo for public education impression purposes. Due to changes of how County mail will begin to be sent there will be now be costs incorporated should Permittees decided to continue to use this program. Permittees were asked to consider their thoughts whether or not the program should be continued. Questions and comments can be forwarded to Jason via email.

VII. ***TMDL Progress Report – Jason Uhley***

A. ***Middle Santa Ana River Bacteria Indicator TMDL Update***
Next Meeting – November 20 , 2006 from 1:30 to 4:00 p.m. – Attendees were provided an update on the efforts of this TMDL. Items of disucssion included:

- Grants in the works
- Identifying Souces of Contamination
- Pilot BMPs
- Implementation Agreement
- Future Grant Pursual for TMDL Compliance
- The use of Prop 84 Money

San Bernardino County will be forwarding Jason comments in which Jason will then begin finalizing the Implementation Agreement. Jason added that he had given a presentation on Permittees Proposal for Compliance at the November 9, 2007 Lake Elsinore TMDL meeting.

A. ***San Diego Lagoons TMDL/Investigation Order*** – Jason informed attendees that the Order has been issued in the Santa Margarita Region by the San Diego Regional Board in which they have requested that data be collected to establish the TMDL. District staff is currently in the process of collecting the necessary data. Dell Ross informed attendees that he was looking to establish a grant watershed council and may find the need to come to Permittees for letters of support in regards to these efforts. Jaime Aderhold recommended that Dell contact the person who is the head of Bayona Creek for assistance in his efforts. Jaime added that he would email Dell the contact information.

VIII. ***Santa Ana/Santa Margarita Region Programs***

A. ***Stormwater Quality Standards Task Force Update ~ Next meeting November 30, 2006 from 9:30 a.m. to 1:00 p.m.*** - Jason provided an update on the status of the Stormwater Quality Standards Task Force. The next meeting will focus on water quality objectives and cost implication. The following items were discussed:

- Task Force Efforts
- REC 1 Waterbody Use
- San Sevaine Channel & Appropriate Standards in Tributary Streams
- Current Basin Plans
- EPA Participation
- Treatment Systems
- Bacterial Contamination in the Watersheds
- Basin Plan Amendment Language

IX. ***Report of Waste Discharge/Permit Renewal Workgroup***

A. ***URS Presentation*** – Prior to Bob and Julie giving their presentation Jason briefly discussed with Permittees the following items regarding the Permit renewal process:

- Permit expires October 2007
- ROWD due April 2007
- Bob Collacott of URS will be assisting with preparation of Permit Renewal
- San Bernardino and Riverside County Permit will be processed simultaneously by Regional Board
- Incorporating the TMDL Requirements into the Permit
- LIP and Post Construction BMPS

Bob discussed with Permittees the permit renewal process of the current Permit due to expire October 2007 advising them of several things that would need to be updated during the Permit renewal process. He noted that basic information will need to begin being gathered such as the current status of Permittee land uses, area permitting, Permittee comments on the existing Santa Ana Permit, and the Riverside County DAMP. Information should be submitted by January 5, 2007. Benjie will be coordinating these efforts with Permittees. Julie will then take the information and incorporate it into the ROWD.

Julie provided Permittees with background information on her education and work history. She then discussed the following items regarding the ROWD. Please refer to the handout provided at the meeting for more detailed information (ROWD Data Request).

- Land use
- Developments up to 2012
- Current population information
- MS4 System and maps
- GIS Maps
- BMPs

B. ***Permit Renewal Workgroup Meeting – December 5, 2006 10:00 a.m. to 12:00 noon***
Benjie advised Permittees of the Permit renewal workgroup meeting in which Permittees will discuss continuous efforts of the Permit renewal process. Jason then summarized tasks needing to be completed by Permittees.

X. ***Open Discussion***

A. ***Santa Ana RWQCB*** – No comments.
B. ***San Diego RWQCB*** – Not present.
C. ***U.S. EPA – Region IX*** – Not present.
D. ***Round Table*** – No comments.

X. ***New Agenda Items / Schedule Next Meeting***
There will be no meeting in the month of December. The next NPDES TAC Meeting is scheduled for January 25, 2007. If there are any questions or items for the next meeting agenda, please contact the Flood Control District's NPDES Section at 951.955.4375. Suggestions are always welcome.

XI. ***Vendor Presentation – Filterra Bioretention/Filtration System Presentation***
Will Harris of Filterra conducted a presentation on Bioretention/Filtration Systems.

Please visit the StormWater/CleanWater Protection Program website at: http://www.floodcontrol.co.riverside.ca.us. The site contains a variety of useful stormwater program information including links to other stormwater management programs and related websites.

NEXT MEETING IS SET FOR:

THURSDAY January 25, 2007 – 10 A.M.
AT
RIVERSIDE COUNTY FLOOD CONTROL DISTRICT
1995 Market Street
Riverside, CA 92501

MEETING AGENDA

NPDES
SANTA ANA / SANTA MARGARITA
TECHNICAL COMMITTEE

10:00 – 12:00 p.m. Thursday, February 22, 2007
Riverside County Flood Control District
1995 Market Street
Riverside, CA 92501

I. Introductions

II. Agenda Changes

III. Review of Minutes: January 25, 2007

IV. Announcements
   A. Next MSC Meetings – March 15th & May 17th
   B. County Compliance Assistance Program (CAP) update

V. Public Education Program

VI. TMDL Progress Report – Jason Uhley
   A. Middle Santa Ana River Bacteria Indicator TMDL Update
      - Next Meeting – 1:30-4:00 p.m. February 1st, March 1st, April 19th, May 31st
   B. San Diego Lagoons TMDL/Investigation Order
   C. Lake Elsinore / Canyon Lake TMDL

VII. Santa Ana/Santa Margarita Region Programs
   A. Stormwater Quality Standards Task Force Update
      - Next Meeting - 9:00a.m.-12:30 p.m. March 1st & 9:30a.m.-1:00 p.m. April 19th, May 31st

VIII. Report of Waste Discharge / Permit Renewal Workgroup
   A. Permit Renewal Workgroup Meeting February 6th and 20th Update

IX. Open Discussion
   A. Santa Ana RWQCB
   B. San Diego RWQCB
   C. U.S. EPA – Region IX
   D. Round Table

X. New Agenda Items/Schedule Next Meeting – March 22, 2007

XI. Resource Trends Presentation – Dan Noble

P8/

Storm Water
Clean Water
PROTECTION PROGRAM

Member Agencies:

Banning
Beaumont
Calimesa
Canyon Lake
Cathedral City
Coachella
Coachella Valley Water District
Corona
County of Riverside
Desert Hot Springs
Hemet
Indian Wells
Indio
La Quinta
Lake Elsinore
Moreno Valley
Murrieta
Norco
Palm Desert
Palm Springs
Perris
Rancho Mirage
Riverside City
Riverside County Flood Control District
San Jacinto
Temecula

NPDES
SANTA ANA / SANTA MARGARITA
TECHNICAL COMMITTEE
Meeting Minutes
for
January 25, 2007

I. Attendees:

Benjie Cho	Riverside County Flood Control District
Arlene Chun	Riverside County Flood Control District
Linda Garcia	Riverside County Flood Control District
Florence Mowrer	Riverside County Flood Control District
Penny Nanney	Riverside County Flood Control District
Penny Skog	Riverside County Flood Control District
Tina Tuason	Riverside County Flood Control District
Charlene Warren	Riverside County Flood Control District
Jason Uhley	Riverside County Flood Control District
Mike Shetler	Riverside County Executive Office
Keith Elliot	CRWQCB – Santa Ana Region
Adam Fischer	CRWQCB – Santa Ana Region
Mike Roth	CRWQCB – Santa Ana Region
Maria Macario	CRWQCB – Santa Ana Region
Michele Colbert	City of Corona
Jeff Potts	City of Corona
Linda Nixon	City of Hemet
Phuong Hunter	City of Moreno Valley
Kent Wegelin	City of Moreno Valley
Lori Askew	City of Norco
Larry Page	City of Perris
Michael Morales	City of Perris
Sandy Caldwell	City of Riverside
Jessica Chin	City of Riverside
Hal Schillinger	Kristar
Jeff Brandt	Fish & Game
Gene McCarren	Tell Brother

II. *Introductions*

Jason Uhley welcomed everyone to the meeting and initiated self introductions.

III. *Agenda Changes*

Jason changed agenda item IV (F) from Calimesa NOV to Status of ROWD.

IV. *Review of Minutes: November 16, 2006*

There were no changes to the meeting minutes. Minutes were approved.

Handouts and Materials Provided:

- Agenda, Minutes, Roster
- Caltrans Water Quality Newsflash #s 06-48 through 07-02
- NPDES Cost Sharing Summary Fiscal Year 06-07 & 07-08 dated 1/18/2006
- NPDES Public Information Report for January 25, 2007
- Mission Resource Conservation District (MRCD) January 25, 2007 Report
- Riverside Corona Resource Conservation District (RCRCD) January 18, 2007 Report

V. *Announcements*

A. *Next MSC Meetings – March 15th & May 17th*

Benjie Cho provided an summary of the January 18, 2007 MSC Meeting. Items of discussion included:

- Cost Sharing (handouts provided to Permittees and MSC attendees)
- Implementation Agreement
- Middle Santa Ana Fees (tentative at this point)
- Moreno Valley's sample ordinance to be provided to the other cities
- CAP Program – Jason announced that Environmental Health is no longer willing to participate in the CAP Program which assists Permittees with inspections. Jason noted that a workshop will possibly be established to help Permittees implement their inspection programs.
- A meeting will be held with Executive Office staff, TLMA, and Environmental Health to discuss the transistion of the CAP Program.

B. ***On-line Training Registration Demonstration Update*** – Benjie updated the group on the efforts of the on-line training noting that District staff continues to work on implementing their own in house website.

C. ***Audits ~ County Audit Update*** – Jason provided an update on the audits conducted by Regional Board staff in which the City of Calimesa was issued a NOV. The City of Calimesa is in the process of responding to the NOV. He then noted that in speaking with Regional Board staff he learned that they were working on getting their responses out to San Bernardino County who was audited prior to Riverside County and is uncertain as to when the next comments letters will be sent.

D. ***CASQA General Meeting Update*** – Benjie provided an summary of the items discussed at the CASQA meeting which included:

- State issues update provided by Gary Wolfe of the State Water Board

- Industrial Permit ready for comment in the summer 2007
- Construction Permit ready for comment in late February 2007
- LA County speaking of using action levels for Permit compliance
- TMDLs
- Central Valley Enforcement Compliance
- Objective Based Permit
- Blue Ribbon Panel
- Current Standards
- Numeric Effluent Limits
- Target Exceedances
- Data Set Concerns
- Water Quality Objectives

E. ***Annual Report ~ Santa Ana Report due November 30th*** Benjie announced that the Santa Ana Annual Report was submitted to the Regional Board on time. The Annual Report was provided to Permittees on CD during the meeting.

F. ***Status of ROWD*** – Permittees were provided an update on the statusof the ROWD. Jason informed the group that a meeting with Regional Board staff was scheduled for January 22, 2007 to discuss their goals and objectives regarding the ROWD. Discussion of the meeting included:

- Findings of Regional Board audits and concerns that they may have
- Findings of Permit to promote Regional BMPs
- Local Implementation plans to be developed by the cities
- New Development Review process
- CEQA 401 BMPs
- WQMPs
- The use of bonds to help ensure compliance
- Enforcement issues
- State laws and restrictions
- Better documentation of programs by the cities
- IC/ID (the need of municipal employees being out in the field looking for spills)

VI. ***Public Education Program – Florence Mowrer***

Flo provided attendees an update of the public education efforts and introduced Penny Skog, the new assistant to the District's public education department. Reports from RCRCD and Mission RCD were provided to attendees, as well as the monthly public information report.

A. ***Billboard Advertising*** – As discussed by Public Education Sub-Committee members, staff will be transferring the $19, 793.00 allocated for the 2007 calendars to be used to purchase additional billboard advertisements.

B. ***School Outreach Program*** – Please see MRCD and RCRCD reports provided during the meeting.

C. ***Earth Day Flyer*** – Work has begun to set the articles in place for the 2007 Earth Day flyer due to be released in April.

D. ***2007 Calendar*** – Due to the fact that the 2007 calendars were not released for bid in time they were not produced. Other items Flo discussed were:

- Block Grants
- Mail Slugs
- New Home Garden Guide
- New home garden spray promotional item in the works
- List of businesses for Riverside County
- Moreno Valley's request of school outreach information

Please see the public information report and the reports from MRCD and RCRCD provided during the meeting for more detailed information.

VII. ***TMDL Progress Report – Jason Uhley***

A. ***Middle Santa Ana River Bacteria Indicator TMDL Update***
Next Meeting – 1:30 to 4:00 p.m. February 1st, March 1st, April 19th, May 31st – Attendees were provided an update on the efforts of this TMDL. Jason reported that for the cities of Norco, Corona, and Riverside, there is a draft agreement in the works and will be available February 1st at the meeting. Other items of disucssion included:

- Hand Swales
- Bacteria Inserts
- Tentative Cost Share
- $700,000 grant obtained by SAWPA for source BMPs
- The use of existing BMPs to be used as test beds

B. ***San Diego Lagoons TMDL/Investigation Order*** – Jason noted that a study is being conducted in Santa Margarita Region regarding nutrient impacts.

VIII. ***Santa Ana/Santa Margarita Region Programs***

A. ***Stormwater Quality Standards Task Force Update ~ Next meeting 9:30 a.m. to 1:00 p.m. February 1st, March 1st, April 19th, May 31st*** - Benjie provided an update on the status of the Stormwater Quality Standards Task Force. The following items were discussed:

- E. coli and numeric standards
- Limited REC uses, REC use in terms of channels, and REC 1, 2, 3, and 4 uses
- Cameras being setup in the channels
- Issues of no support of science
- Following what is in the Basin Plan
- Basin Plan analysis and evaluation
- Task Force review of 7 different channels and future channel review efforts
- Regional treatment and waterbody
- EPA Guidance
- CDM selected as the sole source contractor for Middle Santa Ana TMDL

B. ***Santa Margarita Individual SWMP Updates*** – Tina Tuason informed Permittees to be sure that anything reported in the Annual Report be reported in the Individual SWMPs as well.

IX. ***Report of Waste Discharge/Permit Renewal Workgroup***

A. ***URS Presentation*** – Bob Collacott asked that Permittees who had not submitted comments on the ROWD to please provided them as soon as possible as he is hoping to submit the first draft to the District by February 2, 2007. Bob further discussed the following items:

- Local Implementation Plans
- TMDL requirements
- Changes in the CAP Program
- Redline docment of the existing 2002 MS4 Permit of the Santa Ana Region to identify changes
- Workgroup efforts

B. ***Permit Renewal Workgroup Meeting – February 6, 2007***
Next workgroup meeting is February 6, 2007 at 10:30. All Permittees were invited to attend.

C. ***Michael Adackapara Meeting Status Update***

X. ***Open Discussion***

A. ***Santa Ana RWQCB*** – No comments.
B. ***San Diego RWQCB*** – Not present.
C. ***U.S. EPA – Region IX*** – Not present.
D. ***Round Table*** – Jason informed attendees that there would be a special presentation on composting.

X. ***New Agenda Items / Schedule Next Meeting***
The next NPDES TAC Meeting is scheduled for February 22, 2007 If there are any questions or items for the next meeting agenda, please contact the Flood Control District's NPDES Section at 951.955.4375. Suggestions are always welcome.

Please visit the StormWater/CleanWater Protection Program website at: http://www.floodcontrol.co.riverside.ca.us. The site contains a variety of useful stormwater program information including links to other stormwater management programs and related websites.

NEXT MEETING IS SET FOR:

THURSDAY February 22, 2007 10:00 A.M.
AT
RIVERSIDE COUNTY FLOOD CONTROL DISTRICT
1995 Market Street
Riverside, CA 92501

P8/112463

MEETING AGENDA

NPDES
SANTA ANA / SANTA MARGARITA
TECHNICAL COMMITTEE

10:00 – 12:00 p.m. Thursday, March 22, 2007
Riverside County Flood Control District
1995 Market Street
Riverside, CA 92501

I. Introductions

II. Agenda Changes

III. Review of Minutes: February 22, 2007

IV. Announcements
- A. Summary of MSC Meeting Minutes
  - Next MSC Meeting – Tenatively May 17th
- B. Audit Update
- C. EPA Audit Guidance

V. Public Education Program – Florence Mowrer
- A. IC/ID Brochure
- B. Car Care Revision
- C. Billboard Update
- D. New Promotionals
- E. Events

VI. TMDL Progress Report – Jason Uhley
- A. Middle Santa Ana River Bacteria Indicator TMDL Update
  - Future Meetings – 1:30-4:00 p.m. April 19th & May 31st
- B. Lake Elsinore / Canyon Lake TMDL
- C. San Diego Lagoons TMDL/Investigation Order
  - Lagoons TMDL NNE Study Bureau Workgroup

VII. Santa Ana/Santa Margarita Region Programs – Benjie Cho
- A. Stormwater Quality Standards Task Force Update
  - Future Meetings - 9:30a.m.-1:00 p.m. April 19th & May 31st
- B. Update on Orange County Stormwater Permit
- C. Santa Margarita IRWM Grants Update – March 2nd from 10a.m. to PM at CSUSB
- D. Presentation on Draft General Construction Permit

VIII. Report of Waste Discharge / Permit Renewal Workgroup – Benjie Cho
- A. Closed Session Meeting – March 22, 2007

IX. Open Discussion
- A. Santa Ana RWQCB
- B. San Diego RWQCB
- C. U.S. EPA – Region IX
- D. Round Table

X. New Agenda Items/Schedule Next Meeting – April 26, 2007

P8/

Storm Water Clean Water
PROTECTION PROGRAM

Member Agencies:

Banning
Beaumont
Calimesa
Canyon Lake
Cathedral City
Coachella
Coachella Valley Water District
Corona
County of Riverside
Desert Hot Springs
Hemet
Indian Wells
Indio
La Quinta
Lake Elsinore
Moreno Valley
Murrieta
Norco
Palm Desert
Palm Springs
Perris
Rancho Mirage
Riverside City
Riverside County Flood Control District
San Jacinto
Temecula

NPDES
SANTA ANA / SANTA MARGARITA
TECHNICAL COMMITTEE
Meeting Minutes
for
February 22, 2007

I. Attendees:

Benjie Cho	Riverside County Flood Control District
Arlene Chun	Riverside County Flood Control District
Bob Cullen	Riverside County Flood Control District
Charlene Warren	Riverside County Flood Control District
Jason Uhley	Riverside County Flood Control District
Doug Thompson	Riverside County Environmental Health
Marianna Hernandez	Riverside County Transportation Department
Keith Elliott	CRWQCB – Santa Ana Region
Maria Macario	CRWQCB – Santa Ana Region
Mike Roth	CRWQCB – Santa Ana Region
John Wilder	City of Beaumont
Bob French	City of Calimesa
Mike McCabe	City of Calimesa
James Grimm	City of Canyon Lake
Michele Colbert	City of Corona
Jeff Potts	City of Corona
Linda Nixon	City of Hemet
Phuong Hunter	City of Moreno Valley
Kent Wegelin	City of Moreno Valley
Farida Naceem	City of Murrieta
Lori Askew	City of Norco
Larry Page	City of Perris
Sandy Caldwell	City of Riverside
Jessica Chin	City of Riverside
Eric Strahan	Contech Stormwater Solutions
Al Javier	EMWD
Jaime Aderhold	J2A Environmental
Rosanna Lacarra	PBS&J
Bob Collacott	URS Corporation
Dell Ross	EMARCD

II. *Introductions*

Benjie Cho welcomed everyone to the meeting and initiated self introductions. Jaime Aderhold introduced Wally Trenca of Fresh Tree Technologies (brochures provided). Dan Noble introduced himself and gave a brief introduction of the presentation he would be providing at the end of the February 22nd TAC meeting. Joe McCormick of CEC introduced himself and briefly described the services offered by his company (brochures provided).

III. *Agenda Changes*

Benjie added items C, D, and E to agenda item IV – Announcements.

IV. *Review of Minutes: January 25, 2007*

There were no changes to the meeting minutes. Minutes were approved.

Handouts and Materials Provided:

- Agenda, Minutes, Roster
- Email Printout Re: Water Quality Newsflash discontinued
- Brochures provided by Fresh Tree Technologies
- Brochures provided by Resource Trends
- Brochures provided by CEC

V. *Announcements*

Benjie made the following announcements:

A. ***Next MSC Meetings – March 15th & May 17th***

B. ***County Compliance Assistance Program (CAP) Update*** – Riverside County Environmental Health has agreed to continue the CAP Program in the incorporated portions of the county until the end of the next Permit term, which should assist Permittees with their commerical and industrial inspections.

C. ***New Director of State Board*** – The California State Water Resource Control Board now has a new Executive Director replacing Celeste Cantu.

D. ***Caltrans Water Quality NewsFlash*** – The Caltrans Water Quality NewsFlash has been discontinued. A brief discussion regarding the discontinuance among the group ensued.

E. ***San Jacinto IRWM Grant*** – Jason Uhley announced that Permittees would be receiving a copy of a project application form for the IRWM grant via email. The purpose of the form is to identify water resource projects, watershed management projects, water quality, flood control, and supply projects needing improvement in cities within Riverside County. Jason added that Permittees should think along the lines of long term goals of Regional BMPs, TMDLs, septic systems, etc., when assessing projects needing improvement. Steve Carter of Tetra Tech will be assisting Permittees with work efforts of the IRWM grant.

VI. *Public Education Program – Benjie Cho*

The District's Public Education Department will be participating in the following upcoming events:

- Riverside Raincross Walk – February 24th
- Riverside Celebrates Trees - March 10th
- Supervisor Tavaglione's Youth Summit – March 14th
- Walk With The Animals – March 24th
- Riverside Flower Show and Garden Tour–April 14-15th

VII. *TMDL Progress Report – Benjie Cho*

A. ***Middle Santa Ana River Bacteria Indicator TMDL Update - Next Meeting – 1:30 to 4:00 p.m. February 1st, March 1st, April 19th, May 31st*** – Benjie provided an update on the Middle Santa Ana River Bacteria Indicator TMDL. The strategy for compliance with the grant included:

- Selecting Tim Moore as a sole source contractor to coordinate activities to ensure compliance with the grant
- Selecting existing BMPs to be used as test beds for performance evaluations
- Develop a monitoring strategy to identify the sources of pollutants

Jason noted that a revised final draft of the Middle Santa Ana River TMDL Implementation Agreement will be made available to Permittees at the March 22nd TAC meeting. It is expected that EPA will approve the TMDL by the end of February 2007.

B. ***San Diego Lagoons TMDL/Investigation Order*** – There was no information provided on this agenda item.

C. ***Lake Elsinore/Canyon Lake TMDL*** – Benjie noted that District staff is in the process of implementing actions for the TMDL. Tim Moore of Risk Sciences (consultant assisting Permittees with TMDL) is scheduled to provide an Instream Management Plan for both lakes. Due to issues with stream aeration treatment, the Instream Management Plan will be provided slightly later than expected. Tim will be identifing problems regarding the lakes at the next LESJWA TAC meeting.

VIII. *Santa Ana/Santa Margarita Region Programs*

A. ***Stormwater Quality Standards Task Force Update ~ Next meeting 9:00 a.m. - 12:30 p.m. March 1st and 9:00 a.m. – 1:00 p.m. April 19th, May 31st*** – Benjie briefly discussed the REC use changes currently proposed by stakeholders for the triannual Basin Plan review.

Jason added that additional camera locations are being looked at in Riverside County to conduct a Use Attainability Analysis. Possible camera location include Sunnyslope Channel, Anza Channel, Arlington Channel, and Perris Valley Channel. Once it is determined which channels will be selected, associated city representatives will be contacted to coordinate implementation.

IX. ***Report of Waste Discharge/Permit Renewal Workgroup***

A. ***Permit Renewal Workgroup Meeting February 6th and 20th Update*** – Bob Collacott advised the group that the current MS4 Permit will expire in October 2007 and discussed the approach being taken towards the renewal of the Permit. The following items were discussed:

- ROWD will be distributed to Permittees for their review at the March 22nd, TAC meeting
- ROWD due to be submitted no later than April 27, 2007
- The general strategy to move the details of the Permit to implementation plans such as the DAMP and subsequently into local implementation plans
- Removing completed studies or one time reporting requirements and general "clean-up" of the Permit text
- A proposed Redline version of the 2002 MS4 Permit will be submitted along with the ROWD to the Santa Ana Regional Board
- Address program changes such as the CAP Program

X. ***Open Discussion***

A. ***Santa Ana RWQCB*** – No comments

B. ***San Diego RWQCB*** – Not present

C. ***U.S. EPA – Region IX*** – Not present

D. ***Round Table*** – No comments

XI. ***New Agenda Items / Schedule Next Meeting***

The next NPDES TAC meeting is scheduled for March 22, 2007 If there are any questions or items for the next meeting agenda, please contact the Flood Control District's NPDES Section at 951.955.4375. Suggestions are always welcome.

XII. ***Resource Trends Presentation – Dan Noble***

Dan Noble conducted a presentation on products and services provided by Resource Trends

Please visit the StormWater/CleanWater Protection Program website at: http://www.floodcontrol.co.riverside.ca.us. The site contains a variety of useful stormwater program information including links to other stormwater management programs and related websites.

NEXT MEETING IS SET FOR:

THURSDAY March 22, 2007 10:00 A.M.
AT
RIVERSIDE COUNTY FLOOD CONTROL DISTRICT
1995 Market Street
Riverside, CA 92501

MEETING AGENDA

NPDES
SANTA ANA / SANTA MARGARITA
TECHNICAL COMMITTEE

10:00 – 12:00 p.m. Thursday, April 26, 2007
Riverside County Flood Control District
1995 Market Street
Riverside, CA 92501

I. Introductions

II. Agenda Changes

III. Review of Minutes: March 22, 2007

IV. Announcements
- A. Next MSC Meeting – May 17th
- B. Construction Permit April 17th Update
- C. Department of Water Resources visit to Santa Margarita Region
- D. Hydromodification test sites in Santa Ana and Santa Margarita Regions
- E. Training Update
- F. Audit Update

V. Public Education Program – Florence Mowrer
- A. IC/ID Brochure
- B. Car Care Revision
- C. Billboard Update
- D. New Promotionals
- E. Events

VI. TMDL Progress Report – Jason Uhley
- A. Middle Santa Ana River Bacteria Indicator TMDL April 19th Update
  - Future Meetings – 1:30-4:00 p.m. May 31st, July 12th, and August 23rd
  - Tour of Santa Ana Monitoring stations April 11th Update
- B. Lake Elsinore/Canyon Lake TMDL
  - Future Meetings – 1:30-4:00 p.m. May 29th
  - San Jacinto Septic System Management Plan
- C. San Diego Lagoons TMDL/Investigation Order
  - Lagoons TMDL NNE Study Bureau Workgroup

VII. Santa Ana/Santa Margarita Region Programs – Benjie Cho
- A. Stormwater Quality Standards Task Force Update
  - Future Meetings - 9:30a.m.-1:00 p.m. May 31st
- B. Update on Orange County Stormwater Permit

VIII. Report of Waste Discharge / Permit Renewal Workgroup – Benjie Cho
- A. ROWD due April 27, 2007

IX. Open Discussion
- A. Santa Ana RWQCB
- B. San Diego RWQCB
- C. U.S. EPA – Region IX
- D. Round Table

X. New Agenda Items/Schedule Next Meeting – May 24, 2007

Storm Water Clean Water
PROTECTION PROGRAM

Member Agencies:

Banning
Beaumont
Calimesa
Canyon Lake
Cathedral City
Coachella
Coachella Valley Water District
Corona
County of Riverside
Desert Hot Springs
Hemet
Indian Wells
Indio
La Quinta
Lake Elsinore
Moreno Valley
Murrieta
Norco
Palm Desert
Palm Springs
Perris
Rancho Mirage
Riverside City
Riverside County Flood Control District
San Jacinto
Temecula

NPDES
SANTA ANA / SANTA MARGARITA
TECHNICAL COMMITTEE
Meeting Minutes
for
March 22, 2007

I. Attendees:

Benjie Cho	Riverside County Flood Control District
Arlene Chun	Riverside County Flood Control District
Linda Garcia	Riverside County Flood Control District
Florence Mowrer	Riverside County Flood Control District
Penny Skog	Riverside County Flood Control District
Tina Tuason	Riverside County Flood Control District
Jason Uhley	Riverside County Flood Control District
Charlene Warren	Riverside County Flood Control District
Mike Shetler	Riverside County Executive Office
Doug Thompson	Riverside County Environmental Health
Keith Elliott	CRWQCB – Santa Ana Region
Maria Macario	CRWQCB – Santa Ana Region
Mike Roth	CRWQCB – Santa Ana Region
Brandi Outwin	CRWQCB-San Diego Region
John Wilder	City of Beaumont
Bob French	City of Calimesa
Mike McCabe	City of Calimesa
James Grimm	City of Canyon Lake
Michele Colbert	City of Corona
Linda Nixon	City of Hemet
Phuong Hunter	City of Moreno Valley
Kent Wegelin	City of Moreno Valley
Farida Naceem	City of Murrieta
Lori Askew	City of Norco
Larry Page	City of Perris
Sandy Caldwell	City of Riverside
Jessica Chin	City of Riverside
Aldo Licitra	City of Temecula
Al Javier	EMWD
Jaime Aderhold	J2A Environmental
Rosanna Lacarra	PBS&J
Bob Collacott	URS Corporation
Dell Ross	EMARCD

II. *Introductions*

Jason Uhley welcomed everyone to the March 22, 2007 NPDES Santa Ana/Santa Margarita Techincal Committee Meeting and initiated the self introductions of attendees.

III. *Agenda Changes*

- 303d List was added under agenda item ***V - Announcements***.
- Misc. was added under agenda item ***VI – Public Education***

IV. *Review of Minutes: February 22, 2007*

Changes to the minutes will be made and documented to reflect Farida Naceem's attendance at the February 22, 2007 meeting. (1st page, item ***I - Attendees***:).

Handouts and Materials Provided:

- March 22, 2007 Agenda, February 22, 2007 Minutes, Roster
- Public Information Report – March 22, 2007
- RCRCDs Santa Ana River Watershed Stormwater/Cleanwater Protection Program Public Education Monthly Report – March 2007
- State of Michigan's Report Suspicious Connections or Dumping! (flyer)
- Fingerprint America Child Identification (flyer)
- Riverside County MS4 Permit Findings from the Audit/Draft
- Draft General Permit PowerPoint Slides
- CASQA 2006 Annual Report

V. *Announcements*

A. *Summary of MSC Meeting Mintues/Next MSC Meeting – Tentatively May 17th*

Jason provided a summary of items discussed during the March 15, 2007 MSC Meeting which included:

- CAP Program status
- Audits conducted by Regional Board/ NOVs issued by Regional Board
- ROWD/Permit Renewal
- TMDL Development/07-08 TMDL Cost Share Budget
- Tentative Agreement

Permittees were advised that the May 17th MSC Meeting may be rescheduled due to a possible conflict of City Manager's attending a separate meeting.

B. *Audit Update* – The Santa Ana Regional Board has released two additional audits for the cities of Canyon Lake and Norco.

C. *EPA Audit Guidance* – EPA has developed a EPA Audit Guidance. The document has been forwarded to Permittees for their review. The document will be also be made available at the April 26, 2007 NPDES Santa Ana/ Santa Margarita TAC Meeting.

D. *303d List* - Maria Macario announced that the State Board has listed their 2006 303d List. Please see Santa Ana Regional Board website for more information.

VI. ***Public Education Program – Florence Mowrer***

Flo reviewed the March 22, 2007 Santa Ana/Santa Margarita Public Education Information Report where she discussed the following items:

A. ***IC/ID Brochure*** – The State of Michigan has provided the District's public education department use of their IC/ID brochure file. The brochure will be customized to reflect State and County regulations.

B. ***Car Care Revision*** – The Public Education Sub-Committee has been in the process of reviewing revisions to be made to the Car Care Guide.

C. ***Billboard Update*** – Valley Way off the 60 freeway facing East and I-10 north lane ¼ mile west of County Line in Calimesa have been two locations identified for billboard advertising the "Only Rain Down the Storm Drain" Program. Permittees support utilizing the 2007 Calendar funds to purchase the billboard(s).

D. ***New Promotionals*** – The public education department now has red aluminum carabiner keychains available. Fingerprint America Child I.D. kits and U-Mix-It Spray bottles (for both house and garden earth friendly recipes) are on order.

E. ***Events*** – The Synagro Free Composting Giveaway is scheduled for April 7th.

F: ***Misc.***- Facility signs have been ordered for placement on all Municipal properties where receiving waters are collected. Each sign states that the water flows seen in that particular area are from water discharges, hopefully from rain.

For more detailed information on the above items, please refer to the Public Education Information Report provided during the March 22, 2007 SA/SM TAC Meeting.

VII. ***TMDL Progress Report – Jason Uhley***

A. ***Middle Santa Ana River Bacteria Indicator TMDL Update - Future Meeting – 1:30 to 4:00 p.m. April 19th & May 31st*** – Jason informed the group that the Draft Agreement is near completion and will be forwarded to Stakeholders March 23, 2007. Permittees (Cities of Corona, Norco, and Riverside) were asked to submit the Agreement to their legal counsel and submit comments within 2 weeks. It was noted that SAWPA is proposing to be the 1st agency to accept the Agreement. Jason then added that a grant for approximately $650,000 was obtained to help conduct urban source assessment for the TMDL and discussed issues surrounding the intended use of the grant dollars (ie; DNA technology). He noted that stakeholders are currently reevaluating the source assessment study.

B. ***Lake Elsinore/Canyon Lake TMDL*** – Jason informed attendees that budget approval and proposal for three plans are currently in development (new lake sediment reduction for Lake Elsinore, sediment treatment plan for Canyon Lake, and pollutant trading plan for the watershed) and due to be submittted to the Regional Board sometime in the next few weeks.

C. ***San Diego Lagoons TMDL/Investigation Order – Lagoons TMDL NNE Study Bureau Workgroup*** - The San Diego Regional Board issued a 13267 letter in April/May of 2006 requiring stakeholders in various watersheds of the San Deigo region to undertake a study

to help collect data necessary to develop a TMDL to help protect the Lagoons. The order was challenged by the Stakeholders which lead the Regional Board to hold a public hearing. A decision was made to allow SCCWRP to act as the inter-mediator between stakeholders and the Regional Board in regards to the TMDL. Linda Garcia spoke on the actions of the meetings held to discuss the TMDL in which she addressed the concerns of the Regional Board and options both stakeholders and Regional Board staff are looking at in terms of developing the TMDL. Other items of discussion included:

- Numeric Nutrient Endpoint Study for the Santa Margarita River
- EPA protocol for evaluating appropriate numeric targets for nutrient-impaired waterbodies
- Draft study being conducted by Tetra Tech and due to Regional Board by end of April 2007 (issues to be addressed in draft study)
- Water rights/Water supply
- Discharge of waste water
- Nutrients that are hard to treat and hard for Permittees to comply with
- Wet/Dry weather events and targets
- EPA basis for testing

VIII. ***Santa Ana/Santa Margarita Region Programs – Benjie Cho***

A. ***Stormwater Quality Standards Task Force Update ~ Future Meetings 9:30 a.m. - 1:00 p.m. April 19th & May 31st*** – Jason announced future meeting dates for the Stormwater Quality Standards Task Force and briefly discussed REC uses, basin plans, and regional treatment controls. Jason recommended that Permittees make an effort to attend these informative meetings.

B. ***Update on Orange County Stormwater Permit*** – On April 11th the San Diego Regional Water Control Board held a hearing on the proposed Orange County Permit (Tentative Order No. R9-2007-0002). The main concerns that Orange County has with the proposed permit are requirements for site specific versus regional treatment BMPs, unsubstantiated prescriptions (street sweeping optimization based upon traffic counts, duplicative sewer collection system oversight, etc.), and legal/policy issues. Discussion on additional comment periods and future permit hearings ensued during the hearing (please see the San Diego Board website for specific dates). Board adoption for the proposed permit is scheduled for August 2007. Brandi Outwin shared her thoughts and concerns on the Permit and advised Permittees to contact Jeremy Haas or herself should they have questions and or concerns about the permit.

Jason made note that the Whitewater Permit was currently in negotiation and a draft of the Permit would be available April 2007. Also, CVWDs Pathogen TMDL draft has been released.

C. ***Santa Margarita IRWM Grants Update – March 2nd, 10:00 a.m. at CSUSB***
Permittees were informed that there would be a IRWM grant workshop held March 2, 2007 at 10:00 at CSUSB. Jason discussed with Permittees the following items regarding IRWMs:

- Purpose of IRWMs
- Pursual and benefits of IRWM grants
- Priority and importance of IRWM projects

- Interest, participation, and cost of developing an IRWM document
- Approval of Prop 84 and Planning grants

Jason advised Permittees to begin reviewing the needs of their cities in terms of potential projects (short and long term) that could benefit from IRWMs. Jason noted that there was currently no IRWM plans for the Santa Margarita and Whitewater regions. However, SAWPA is in the process of revamping the IRWM for those in the Santa Ana Watershed and who are not part of the San Jacinto Watershed.

D. ***Presentation on Draft General Construction Permit*** – Tina gave a summary presentation on the Preliminary Draft General Construction Permit (Order No. 2007-XX-DWQ). The proposed permit is substantially different than the current General Construction Permit, which it will replace upon adoption. The presentation and follow-up e-mail sent to Permittees identifies the significant changes to the Permit. A public workshop will be held on April 17th in the Rancho Cucamonga Civic Center. Permittees were encouraged to attend the workshop.

IX. ***Report of Waste Discharge/Permit Renewal Workgroup – Benjie Cho***

A. ***Closed Session Meeting March 22, 2007*** – Jason made note that a meeting was scheduled for 11:30 a.m. following the Santa Ana/Santa Margarita TAC meeting to discuss the Draft ROWD.

X. ***Open Discussion***

A. ***Santa Ana RWQCB*** – No comments

B. ***San Diego RWQCB*** – No comments

C. ***U.S. EPA – Region IX*** – Not present

D. ***Round Table*** – Jason welcomed Brandi Outwin of the San Diego Regional Board. Brandi is the current NPDES representative for the Board.

XI. ***New Agenda Items / Schedule Next Meeting***

The next NPDES TAC meeting is scheduled for March 22, 2007 If there are any questions or items for the next meeting agenda, please contact the Flood Control District's NPDES Section at 951.955.4375. Suggestions are always welcome.

Please visit the StormWater/CleanWater Protection Program website at: http://www.floodcontrol.co.riverside.ca.us. The site contains a variety of useful stormwater program information including links to other stormwater management programs and related websites.

NEXT MEETING IS SET FOR:

THURSDAY April 26, 2007 10:00 A.M.
AT
RIVERSIDE COUNTY FLOOD CONTROL DISTRICT
1995 Market Street
Riverside, CA 92501

P8/ 113704

MEETING AGENDA

NPDES
SANTA ANA / SANTA MARGARITA
TECHNICAL COMMITTEE

10:00 – 12:00 p.m. Thursday, May 24, 2007
Riverside County Flood Control District
1995 Market Street
Riverside, CA 92501

I. Introductions

II. Agenda Changes

III. Review of Minutes: April 26, 2007

IV. Announcements
- A. May 17th MSC Meeting Update
- B. Department of Water Resources visit to Santa Margarita Region
- C. Hydromodification Test Sites in Santa Ana and Santa Margarita Regions
- D. Training Update
- E. Audit Update

V. Public Education Program – Florence Mowrer

VI. TMDL Progress Report – Jason Uhley
- A. Middle Santa Ana River Bacteria Indicator TMDL April 19th Update
  - Future Meetings – May 31st at 9:30 a.m.
  - Tour of Santa Ana Monitoring Stations April 11th Update
- B. Lake Elsinore/Canyon Lake TMDL
  - Future Meetings – May 29th from 1:30 p.m. to 4:00 p.m.
  - San Jacinto Septic System Management Plan
- C. San Diego Lagoons TMDL/Investigation Order
  - Lagoons TMDL NNE Study Bureau Workgroup

VII. Santa Ana/Santa Margarita Region Programs – Benjie Cho
- A. Stormwater Quality Standards Task Force Update
  - Future Meetings - June 27th from 1:30 p.m. to 4:00 p.m.
- B. Orange County Stormwater Permit Update

VIII. Report of Waste Discharge / Permit Renewal Workgroup – Benjie Cho

IX. Open Discussion
- A. Santa Ana RWQCB
- B. San Diego RWQCB
- C. U.S. EPA – Region IX
- D. Round Table

X. New Agenda Items/Schedule Next Meeting – June 28, 2007

Storm Water Clean Water PROTECTION PROGRAM

Member Agencies:

Banning
Beaumont
Calimesa
Canyon Lake
Cathedral City
Coachella
Coachella Valley Water District
Corona
County of Riverside
Desert Hot Springs
Hemet
Indian Wells
Indio
La Quinta
Lake Elsinore
Moreno Valley
Murrieta
Norco
Palm Desert
Palm Springs
Perris
Rancho Mirage
Riverside City
Riverside County Flood Control District
San Jacinto
Temecula

NPDES
SANTA ANA / SANTA MARGARITA
TECHNICAL COMMITTEE
Meeting Minutes
for
April 26, 2007

I. Attendees:

Benjie Cho	Riverside County Flood Control District
Florence Mowrer	Riverside County Flood Control District
Tina Tuason	Riverside County Flood Control District
Jason Uhley	Riverside County Flood Control District
Charlene Warren	Riverside County Flood Control District
Doug Thompson	Riverside County Environmental Health
Marianna Hernandez	Riverside County Transportation
Keith Elliott	CRWQCB – Santa Ana Region
John Wilder	City of Beaumont
Bob French	City of Calimesa
Michele Colbert	City of Corona
Jeff Potts	City of Corona
Linda Nixon	City of Hemet
Phuong Hunter	City of Moreno Valley
Kent Wegelin	City of Moreno Valley
Lori Askew	City of Norco
Sandy Caldwell	City of Riverside
Jessica Chin	City of Riverside
Mike Emberton	City of San Jacinto
Jaime Aderhold	J2A Environmental
Eric Strahan	CONTECT Stormwater Solutions
Del Ross	EMARCD

II. *Introductions*

Jason Uhley welcomed everyone to the April 26, 2007 NPDES Santa Ana/Santa Margarita Techincal Committee Meeting and initiated the self introductions of attendees.

III. *Agenda Changes*

There were no changes to the agenda.

IV. *Review of Minutes: March 22, 2007*

There were no changes to meeting minutes. Minutes were approved.

Handouts and Materials Provided:

- April 26, 2007 Agenda, March 22, 2007 Minutes, Roster
- Audit Policy Interpretive Guidance (January 1997, Office of Regulatory Enforcement U.S. Environmental Protection Agency)
- Trident Curb Screen flyer
- RCRCDs Santa Ana River Watershed Stormwater/Cleanwater Protection Program Public Education Monthly Report – March 2007
- Earthday brochure
- Santa Ana Watershed Stormwater Classroom Presentations summary handout

V. *Announcements*

A. ***Summary of MSC Meeting Mintues/Next MSC Meeting – May 17th***

Jason announced that the next MSC meeting was scheduled for May 17th. He noted that the League of California Cities Legislative Action Days is also scheduled for the same week and City Managers may be attending this event. He asked that Permittees communicate with their City Managers to ensure that the alternate person can attend the MSC meeting in place of the City Manager if they are unable to attend the MSC meeting. City Managers are required to attend 3 of the 4 meetings per fiscal year.

B. ***Construction Permit April 17th Update*** – The Construction Permit has been proposed for renewal. The State Board held a workshop on the Permit in Rancho Cucamonga April 17th. Jason provided attendees a brief summary on the details of the workshop. A draft comment letter is being prepared by District staff which will be forwarded to Permittees for their comments. Comments are due to the State Board on May 4th.

C. ***Department of Water Resources visit to Santa Margarita Region*** – Jason reported on the Department of Water Resources' visit to the Santa Margarita Region to discuss proposed Prop 84 IRWM projects for the Santa Margarita Region. The stakeholders in the Riverside County Santa Margarita Region are working to develop an IRWM plan and are looking to obtain a planning grant to assist in this effort. Jason added that San Diego County Water Authority had already initiated an IRWM plan for the lower portion of the watershed, however San Diego County Water Authority does not want to integrate their part of the watershed with the upper part of the watershed, causing complications for DWR. Dell Ross added that it appears that Rancho California Water District will be the lead agency on the IRWM and briefly discussed stakeholders efforts regarding the IRWM.

D. ***Hydromodification Test Sites in Santa Ana and Santa Margarita Regions*** – Permittees were informed that both the Santa Ana and Santa Margarita Region Watersheds requires them to develop a hydromodification plan. The WQMP identifies that Permittees' propose to comply with this requirement by coordinating with SCCRWP on a Southern California Study of hydromodification, including the level of impacts in the watersheds,

what types of watersheds are susceptable to hydromodification, and identifying potential management measures for hydromodification. Jason informed attendees that SCCWRP had received a $500,000 grant from the State to conduct a hydromodification study and are looking for test areas to evaluate low gradiant streams in unimpacted environments. Permittees will be kept updated as these efforts progress. Jason added that he would look into having Eric Stein who is leading this effort to give a presentation at a future SA/SM TAC meeting.

E. ***Training Update*** – Benjie reported that the Annual NPDES Spring training classes were in progress and asked Permittees for their thoughts and comments on how the training was being conducted. He also added that an additional WQMP training class had been opened in the Desert area. There were no comments from Permittees.

F. ***Audit Update*** – Jason reported that there had been no audit reports issued since Canyon Lake. Keith added that the Regional Board was first focusing on San Bernardino County and would then focus on Riverside County.

G. ***Field Trip*** - Jamie Aderhold announced that there would be a field trip to Hamilton Bull, a large Los Angeles County flood control facility May 1st at 10 a.m. and extended an invitation to Permittees.

VI. ***Public Education Program – Florence Mowrer***

Flo reviewed the March 22, 2007 Santa Ana/Santa Margarita Public Education Information Report. The she discussed the following items:

A. ***IC/ID Brochure*** – The IC/ID brochure file is currently in its draft stage.

B. ***Car Care Revision*** – The Public Education Sub-Committee has been in the process of reviewing revisions to be made to the Car Care Guide.

C. ***Billboard Update*** – Flo reported that she was currently working with SGA in efforts to refine the billboards that will be posted at Valley Way off the 60 freeway facing East and I-10 north lane ¼ mile west of County Line in Calimesa.

D. ***New Promotionals*** – Permittees will be informed when new promotionals arrive.

E. ***Events*** – Flo announced the following events.

- Dos Lagos - April 21st
- Living Desert - April 21st
- Car Care in Perris - April 27th
- Temecula Garden Show - April 28th
- Pollution Prevention – September 17th - 23rd

Flo asked that Permittees inform Charlene Warren of any staffing changes (names of city representatives for NPDES program, email addresses etc.) to ensure she is sending updated public education information to the appropriate persons. Keith Elliott and Flo ensued in a brief discussion regarding the home garden show in Temecula.

VII. *TMDL Progress Report – Jason Uhley*

A. *Middle Santa Ana River Bacteria Indicator TMDL April 19th Update*

- **Future Meeting – May 31st at 9:30, July 12th & August 23rd 1:30 to 4:00 p.m.**
  Jason reported that the TMDL Task Force Agreement had been approved by SAWPA and recommended that Permittees take the Agreement to their Board for approval. SAWPA will be issuing invoices upon completion of the Agreement. Riverside County and the District will be taking the Agreement to their Board on June 5th.
- **Tour of Santa Ana Monitoring Stations April 11th**
  Jason reported that SAWPA obtained a Prop 50 grant that will assist with the funding of the TMDL monitoring program. District staff along with with CDM conducted a tour of the tentative Santa Ana monitoring stations on April 11th to help establish monitoring stations for the TMDL.

B. *Lake Elsinore/Canyon Lake TMDL*

- **Future Meeting – 1:30-4:00 p.m. May 29th**
  Attendees were informed that Tim Moore would be presenting a draft plan for the inlake sediment remediation tasks required in the TMDL May 29th at EVMWD. Jason noted that Tim presented the plan at the LESJWA TAC meeting. Jason then briefly discussed ramifications of the plan. It was recommended that Permittees attend the meeting and ask questions about the plan to help ensure that the plan being put together is functionable, makes sense, and protects water quality.

- **San Jacinto Septic System Management Plan**
  Jason added that he is expects to receive an updated draft of the San Jacinto Septic System Management Plan from Tetra Tech at the end of the April.

- **Canyon Lake Pathogen TMDL**
  Bill Rice presented the draft Canyon Lake Pathogen TMDL at the LESJWA TAC meeting. He briefly discussed water quality objectives, REC uses, wet weather, and lake compliance issues surrounding the Canyon Lake Pathogen TMDL. The tentative schedule is to hold a workshop for the TMDL in August 2007 and possible adoption in December 2007. Hope Smythe has agreed to meet with Permittees to further discuss the tentative draft Canyon Lake Pathogen TMDL. There were no questions/comments from Permittees.

C. *San Diego Lagoons TMDL/Investigation Order*

- ***Lagoons TMDL NNE Study Bureau Workgroup*** - Jason tabled this item until an update was available from Santa Margarita Region Permittees and District staff who were attending a meeting at the San Diego Regional Board regarding this item.

VIII. *Santa Ana/Santa Margarita Region Programs – Benjie Cho*

A. *Stormwater Quality Standards Task Force Update*

- ***Future Meetings 9:30 a.m. - 1:00 p.m. May 31st*** – The May 31st meeting was cancelled and the next meeting will be held June 27th. Topics of most recent meeting were deciding where to install the cameras the next time around, reaches, and REC uses.
- ***ROWD*** – The document will be sent via email to Permittees April 26th. Permittees were asked to review the document and provide substantial comments only.

B. ***Orange County Stormwater Permit Update*** – Tina Tuason reported on her attendance at the April 11th public workshop in Mission Viejo. Issues with the Permit included, active treatment requirements, unsubstainiated prescriptions (such as enhanced street sweeping requirements), sewer collection system oversight, and financing and reporting of programs. Permittees have been told by the San Diego Board that the OC Permit will serve as a model for Riverside County.

IX. ***Report of Waste Discharge/Permit Renewal Workgroup – Benjie Cho***

A. ***ROWD due April 27, 2007*** – The ROWD will be submitted to the Santa Ana Regional Board April 30th .

X. ***Open Discussion***

A. ***Santa Ana RWQCB*** – Keith posed questions and discussion ensued among Permittees regarding the methodology of having BMPs protect landscaping areas under construction.

B. ***San Diego RWQCB*** – No comments

C. ***U.S. EPA – Region IX*** – Not present

D. ***Round Table*** – No comments

XI. ***New Agenda Items / Schedule Next Meeting***

The next NPDES TAC meeting is scheduled for May 24, 2007. If there are any questions or items for the next meeting agenda, please contact the Flood Control District's NPDES Section at 951.955.4375. Suggestions are always welcome.

Please visit the StormWater/CleanWater Protection Program website at: http://www.floodcontrol.co.riverside.ca.us. The site contains a variety of useful stormwater program information including links to other stormwater management programs and related websites.

NEXT MEETING IS SET FOR:

THURSDAY May 24, 2007 10:00 A.M.
AT
RIVERSIDE COUNTY FLOOD CONTROL DISTRICT
1995 Market Street
Riverside, CA 92501

P8/ 114105

MEETING AGENDA

NPDES
SANTA ANA / SANTA MARGARITA
TECHNICAL COMMITTEE

10:00 – 12:00 p.m. Thursday, July 26, 2007
Riverside County Flood Control District
1995 Market Street
Riverside, CA 92501

I. Introductions

II. Agenda Changes

III. Review of Minutes: May 24, 2007

IV. Announcements
- A. May 17th MSC Meeting Update
- B. IRWM update
- C. Hydromodification and LID update
- D. Audit Update

V. Public Education Program – Florence Mowrer

VI. TMDL Progress Report – Jason Uhley
- A. Middle Santa Ana River Bacteria Indicator TMDL April 19th Update
  - Future Meetings –August 23, 2007, 1:30 p.m. to 4:00 p.m.
  - Tour of Santa Ana Monitoring Stations April 11th Update
- B. Lake Elsinore/Canyon Lake TMDL
  - Future Meetings – August 8, 2007, 1:30 p.m. to 4:00 p.m.
  - San Jacinto Septic System Management Plan
- C. San Diego Lagoons TMDL/Investigation Order
  - Lagoons TMDL NNE Study Bureau Workgroup

VII. Santa Ana/Santa Margarita Region Programs – Benjie Cho
- A. Stormwater Quality Standards Task Force Update
  - Future Meetings - August 23, 2007, 9:30 p.m. to 1:30 p.m.
- B. Orange County Stormwater Permit Update

VIII. Report of Waste Discharge / Permit Renewal – Benjie Cho

IX. Open Discussion
- A. Santa Ana RWQCB
- B. San Diego RWQCB
- C. U.S. EPA – Region IX
- D. Round Table

X. New Agenda Items/Schedule Next Meeting – August 23, 2007

Storm Water Clean Water
PROTECTION PROGRAM

Member Agencies:

Banning
Beaumont
Calimesa
Canyon Lake
Cathedral City
Coachella
Coachella Valley Water District
Corona
County of Riverside
Desert Hot Springs
Hemet
Indian Wells
Indio
La Quinta
Lake Elsinore
Moreno Valley
Murrieta
Norco
Palm Desert
Palm Springs
Perris
Rancho Mirage
Riverside City
Riverside County Flood Control District
San Jacinto
Temecula

NPDES
SANTA ANA / SANTA MARGARITA
TECHNICAL COMMITTEE
Meeting Minutes
for
May 24, 2007

I. Attendees:

Benjie Cho	Riverside County Flood Control District
Arlene Chun	Riverside County Flood Control District
Linda Garcia	Riverside County Flood Control District
Tina Tuason	Riverside County Flood Control District
Jason Uhley	Riverside County Flood Control District
Charlene Warren	Riverside County Flood Control District
Marianna Hernandez	Riverside County Transportation
Keith Elliott	CRWQCB – Santa Ana Region
Maria Macario	CRWQCB – Santa Ana Region
Brandi Outwin	CRWQCB – San Diego Region
John Wilder	City of Beaumont
Bob French	City of Calimesa
Mike McCabe	City of Calimesa
Jack Porter	City of Canyon Lake
Michele Colbert	City of Corona
Jeff Potts	City of Corona
Phuong Hunter	City of Moreno Valley
Kent Wegelin	City of Moreno Valley
Lori Askew	City of Norco
Jessica Chin	City of Riverside
Mike Emberton	City of San Jacinto
Aldo Licitra	City of Temecula
Bob Collacott	URS Corporation
Bill Flores	HDR
Frank Tolerico	CONTECH Stormwater Solutions
Del Ross	EMARCD

II. *Introductions*

Jason Uhley welcomed everyone to the May 24, 2007 NPDES Santa Ana/Santa Margarita Techincal Committee Meeting and initiated the self introductions of attendees.

III. *Agenda Changes*

Items F and G were added under agenda item V – Announcements.

IV. *Review of Minutes: April 26, 2007*

There were no changes to meeting minutes. Minutes were approved.

Handouts and Materials Provided:

- May 24, 2007 Agenda, April 26, 2007 Minutes, Roster
- ASCE San Bernardino & Riverside Counties Branch Stormwater Committee 2007-2008 Annual Dinner Program

V. *Announcements*

A. *May 17th MSC Meeting Update* - Jason reported on the May 17th MSC meeting. Key items of discussion at the MSC the meeting were:

- Middle Santa Ana River TMDL status update
- Santa Ana Permit renewal process and submittal of the ROWD for the Santa Ana Region
- Impacts of the Construction Permit on public works projects
- The 2007-08 FY MSC meeting schedule was approved (August 16th, October 18th, February 21st, and April 17th).

B. *Department of Water Resources visit to Santa Margarita Region*

Jason provided an update on the efforts of IRWM grant pursual. The Department of Water Resources (DWR) will review and award grant proposals. DWR would like this grant process to facilitate calaboration among stakeholders, however San Diego County has made it clear that they would not like to integrate their plan with interests in the Riverside County portion of the watershed. Stakeholders, led by Rancho California Water District, in the Riverside County Santa Margarita Region are working to develop an IRWM plan that will address needs of the upper watershed. The first stakeholder meeting for the IRWM plan was held May 23rd. The stakeholders are working toward obtaining approval of the plan by July 2007 in efforts to take advantage of Prop 50 implementation dollars that will be available August 1st. This plan will make the Upper Watershed available for future Prop 84 planning and implementation dollars in the near future.

C. *Hydromodification Test Sites in Santa Ana and Santa Margarita Regions* – Jason discussed the need to address hydromodification caused by new development on existing receiving waters and streams. The current Permit requires some mitigation for hydromodification, however future permit requirments may necessitate a more comprehensive look at the causes and impacts of hydromodification as well as developing productive mitigation methods. Jason stated that a 2-tier approach had been developed which includes developing a low impact design manual (LID) and participating with the SCCWRP study to develop tools that can be used to develop region specific Hydromodifation Management Plans (HMPs). Marianna Hernandez inquired as to what type of sites will be evaluated for the study. Jason stated that they would be looking at sites where there are emerging development with 5-15% impervious area, low gradient streams, with sandy substrates. Brief discussion ensued among the group regarding

progress reports and tech memos associated with the study, grant time schedule, site assessment, and monitoring and tool development. Benjie Cho has been designated as the District's contact person for this effort.

D. ***Training Update*** – Benjie reported that the Annual NPDES Spring training classes were complete. He added that he was waiting for an additional attendee sign-in sheet and once received, Permittees would be forwarded all training sign-in sheets, to be used as docmentation of their staff attendance.

E. ***Audit Update*** – Maria Macario announced that the audits were being finalized. Keith Elliott added that the City of Beaumont's audit report would be the next report released.

F. ***ASCE*** – Bill Flores announced that ASCE will begin to hold the Stormwater Committee 2007-2008 Annual Dinner Program for the ASCE San Bernardino and Riverside Counties branch and is open to all Permittees. He discussed several topics of the future meetings and added that he would send an electronic version of the meeting information to Benjie for further distribution among interested parties. The program will begin September 19, 2007. Please see handout provided during the meeting for more information.

G. ***Court Ruling*** - Dell Ross reported that the County of Los Angeles and other Permittees filed a claim with the Commission on State Mandates seeking reimbursement for two new provisions in their 2001 MS4 Permit. The Commission denied the claims, holding that Government Code Section 17516(c) specifically excludes reimbursement for state mandates issued by the State [or] Regional Board. However, the Permittees filed a declaratory relief action in superior court, claiming that Section 17516(c) was unconstitutional on its face. Both the trial court and Court of Appeals agreed with the Permittees, and the matter has now been remanded back to the Commission for a factual determination of whether the reimbursement claims fall within Art. XIII B, §6.

VI. ***Public Education Program – Florence Mowrer***

There was no public education report available for the month of May. Jason informed Permittees that the household spray bottles had arrived and to contact Penny Skog for their supply of spray bottles. Sample spray bottles were displayed during the meeting.

VII. ***TMDL Progress Report – Jason Uhley***

A. **Middle Santa Ana River Bacteria Indicator TMDL April 19th Update**

- **Future Meeting – May 31st at 9:30**
- **Tour of Santa Ana Monitoring Stations April 11th Update** – There was no discussion on this item. Please see April 26, 2007 meeting minutes for previous update information.

Jason informed Permittees that the Middle Santa Ana Task Force Agreement was approved by SAWPA in April 2007 and Permittees in the Middle Santa Ana Region would need to agenditize approval of the Agreement. The District and County of Riverside will be seeking approval of the Agreement June 5th.

Jason added that a grant was obtained from the State to evaluate sources of bacterial contamination as well as to identify potential BMPs to mitigate the impacts of that contamination. He then informed Permittees that Kristar had extended an offer to Permittees to install a catch basin insert or upflow filter in one of their city's existing catch

basins in exchange for having the system tested as part of the grant effort. Permittees were asked to contact Jason if they were interested in Kristar's offer.

B. **Lake Elsinore/Canyon Lake TMDL**

- **Future Meetings – May 29th from 1:30 p.m. - 4:00 p.m.**
  Permittees involved with the Lake Elsinore/Canyon Lake TMDL were advised to attend the May 29th meeting where Tim Moore would be presenting his draft plan for inlake sediment.
- **San Jacinto Septic System Management Plan** – Jason stated that a draft scope of work was released for the San Jacinto Septic System Management Plan and had received comments from all cities except Riverside. Jason asked that the City of Riverside review and provide comments as soon as possible.

C. **San Diego Lagoons TMDL/Investigation Order**

- **Lagoons TMDL NNE Study Bureau Workgroup** – Jason reported that the Bureau for the Santa Margarita Lagoon had released a draft agreement to be reviewed by legal council. Linda Garcia of the District has had the Agreement approved by the County of Riverside's County Council. Linda noted that there would be a teleconference with SCWRRP May 24th to discuss efforts of the TMDL. Monitoring and cost sharing issues were briefly discussed.

VIII. ***Santa Ana/Santa Margarita Region Programs – Benjie Cho***

A. **Stormwater Quality Standards Task Force Update**

- **Future Meetings – June 27th from 1:30 p.m. to 4:00 p.m.** - The purpose of the June 27th meeting will be to finalize camera locations for next years monitoring efforts.

B. **Orange County Stormwater Permit Update** – Brandi Outwin informed the group that the San Diego Regional Board received approximately 320 written comments on the Permit. She added that comments were being reviewed and a meeting was scheduled for August 8th in which all comments will have been addressed. The Board will also be making a determination on the Permit at the meeting. Permittees were advised to contact Brandi should they have any questions.

IX. ***Report of Waste Discharge/Permit Renewal Workgroup – Benjie Cho***

The Santa Ana Region ROWD was submitted April 27th. Keith Elliott stated that he had completed and submitted an administrative completeness review of the ROWD to Milasol Gaslan for further review. Keith briefly discussed 122.26(d), a item of concern that would be addressed in the Regional Board's response letter.

X. ***Open Discussion***

A. ***Santa Ana RWQCB*** – No comments

B. ***San Diego RWQCB*** – Brandi stated that she was working on last years Annual Reports and hopes to have her review complete by the end of June. She added that should Permittees desire informal feedback on the report to feel free to contact her.

C. ***U.S. EPA – Region IX*** – Not present

D. ***Round Table*** – Jason stated that SAWPA would be having their watershed kickoff meeting for their IRWM program April 24th at 3:30 p.m. at the Inland Empire Utilities Agency. He briefly discussed SAWPAs efforts and recommended that Permittees attend the meeting.

XI. ***New Agenda Items / Schedule Next Meeting***

The next NPDES TAC meeting was scheduled for June 28, 2007. If there are any questions or items for the next meeting agenda, please contact the Flood Control District's NPDES Section at 951.955.4375. Suggestions are always welcome.

Please visit the StormWater/CleanWater Protection Program website at: http://www.floodcontrol.co.riverside.ca.us. The site contains a variety of useful stormwater program information including links to other stormwater management programs and related websites.

NEXT MEETING IS SET FOR:

THURSDAY July 26, 2007 10:00 A.M.
AT
RIVERSIDE COUNTY FLOOD CONTROL DISTRICT
1995 Market Street
Riverside, CA 92501

The June 28th meeting was cancelled on June 20th

P8/ 114565

FAQ

Water Quality Management Plan
FAQ's
10-10-2006

Q.1--What is a project-specific WQMP and why would I need one?

Q.2--When is a preliminary project-specific WQMP required?

Q.3--How does a WQMP differ from a SWPPP?

Q.4--What are Best Management Practices (BMPs)?

Q.5--What projects require a project-specific WQMP?

Q.6-- My project is in the Santa Margarita Region, does it require a Project-Specific WQMP?

Q.7-- My project is in the Santa Ana Region, does it require a Project-Specific WQMP?

Q.8--Where can I find additional information on preparing my project-specific WQMP?

Q.9--What is an Environmentally Sensitive Area?

Q.10--What are Pollutants of Concern?

Q.11--How do you address Pollutants of Concern?

Q.12--What is a Receiving Water?

Q.13--Where can the latest 303(d) List of Impaired Waters be found?

Q.14--What are "proximate Receiving Waters"?

Q.15--Where can you find Hydrologic Unit Basin Numbers?

Q.16--When are Hydrologic Conditions of Concern addressed?

Q.17--What are "animal wastes" as defined in Footnote 3 of WQMP Exhibit B?

Q.18--What is meant by "the handling and placement of any wastes" in Section 4.6 of the WQMP?

Q.19--What is meant by "bmp start-up dates" in Section 4.6 of the WQMP?

Q.20--What are options for "High/Medium" effectiveness BMPs for bacteria/pathogen indicators necessary to address 303(d) listings and TMDLs in the Santa Ana and San Jacinto Watersheds? (4.5.3 page 25)

Q.21--Does a Commercial/Industrial or Residential Development with parking lots and/or streets incorporated into the development need to address all pollutants associated with each of the aforementioned development categories identified in WQMP Exhibit B?

Q.22--If a development includes multiple WQMP development types or land uses such as a Commercial Shopping Center with one or more satellite restaurants, does the entire development have to address the combined Pollutants of Concern identified for both development categories in WQMP Exhibit B?

Q.23--Is a Registered Engineer's stamp required on the preliminary and/or final project-specific WQMP?

Q.24--Should an owner's certification be required on a preliminary and/or final project-specific WQMP?

Q.25--What elements of a project-specific WQMP should be included in a project-specific WQMP submittal?

Q.26--Can pollutants associated with development categories in WQMP Exhibit B be addressed solely through site design and/or source control BMPs?

Q.27--Issue: Is roof runoff a pollutant? Does it need to be treated?

Q.28--What controls on property or titles are necessary to ensure that site design BMPs are not abandoned or destroyed by future property owners?

Q.1--What is a project-specific WQMP and why would I need one?

WQMP is the acronym for Water Quality Management Plan. A project-specific WQMP is a plan for managing the quality of stormwater or urban runoff that flows from a developed site after construction is completed and the facilities or structures are occupied and/or operational. A Project-Specific WQMP describes the Site Design, Source Control and Treatment Control Best Management Practices (BMPs) that will be implemented and maintained throughout the life of a project and is used by property owners, facility operators, tenants, facility employees, maintenance contractors, etc. to prevent and minimize water pollution that can be caused by stormwater or urban runoff. Municipalities in Riverside County require new developments and significant development projects to prepare and implement Project-Specific WQMPs as part of a federal and state regulatory program to reduce or eliminate water pollution caused by runoff flowing from storm water drainage systems into receiving waters. Note that project-specific WQMPs are required only in the Santa Ana and Santa Margarita Watersheds. Projects in the Whitewater Watershed are currently not subjected to WQMP requirements, but instead use Supplement A to the 1993 Drainage Area Management Plan (DAMP). A Project-Specific WQMP must be based upon the Riverside County Model WQMP, which can be found at
http://www.floodcontrol.co.riverside.ca.us/districtsite/downloads/NPDES/WQMP%20complete.pdf.
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Q.2--When is a preliminary Project-Specific WQMP required?

A preliminary Project-Specific WQMP maybe required as part of the project application for discretionary project approval. Developers should check with the local Permittee to determine when the Preliminary Project-Specific WQMP is required. Final Project-Specific WQMPs must be approved prior to issuance of building and grading permits.

Section 1 of the WQMP states that Project-Specific WQMPs are required prior to the first discretionary project approval or permit. Section 1 of the WQMP allows the Permittees to require a preliminary Project-Specific WQMP prior to discretionary approval and a final project-specific WQMP, in substantial conformance with the preliminary Project-Specific WQMP, prior to the issuance of building or grading permits.

Due to the interrelationship between project layout and lot layouts with site, source and treatment control BMPs, many Permittees require a preliminary Project-Specific WQMP as part of the initial project application package for a development proposal and consider project applications incomplete until a preliminary Project-Specific WQMP is submitted.
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Q.3--How does a WQMP differ from a SWPPP?

SWPPP is the acronym for Stormwater Pollution Prevention Plan. For construction that will disturb one acre or more, a SWPPP is required for compliance with the California General Permit for Stormwater Discharges Associated with Construction Activity. The focus of a construction SWPPP is to manage soil disturbance, non-stormwater discharges, construction materials, and construction

wastes during the construction phase of a project. The focus of a WQMP is to manage the quality of urban runoff after construction is completed.
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Q.4--What are Best Management Practices (BMPs)?

For purposes of a Project-Specific WQMP, there are three types of BMPs:

(1) **Site Design BMPs** – Project features that are designed or incorporated into a project to minimize the increase in stormwater runoff from the developed project site. Examples of Site Design BMPs include the use of porous asphalt or pavers, minimizing the use of decorative concrete, and directing roof drains to landscaped areas.

(2) **Source Control BMPs** – Activities or structures aimed at eliminating or minimizing contact between pollutant sources and rainfall or stormwater/urban runoff. Examples of Source Control BMPs include education, sweeping, litter collection, canopies over fueling islands, awnings or tarps to cover materials stored outdoors.

(3) **Treatment Control BMPs** – Engineered devices or systems incorporated into the project's drainage system to remove pollutants from runoff before the runoff leaves the project site. Examples of Treatment Control BMPs include vegetated swales, infiltration trenches, detention/retention basins, catch basin filters, and vortex separators.

More information about BMPs can be found at: www.cabmphandbooks.com.
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Q.5--What projects require a Project-Specific WQMP?

All projects that require discretionary approval and that are considered Significant Redevelopments or New Developments require a Project-Specific WQMP. Preliminary Project-Specific WQMPs must be approved prior to tentative use/map approvals by the appropriate administrative or legislative body. Siting, maintenance and funding commitments made in the Preliminary Project-Specific WQMP must be recognized by the site owner prior to this approval.
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Q.6--My project is in the Santa Margarita Region[1], does it require a Project-Specific WQMP?

Mark **yes** in the checklist if projects is a new development that meets the project categories or locations in question,
or
Mark **yes** in the checklist if your redevelopment* projects creates, adds or replaces** at least 5,000 square feet of impervious surfaces on an already developed site for the project categories or locations in question

If any question is answered "Yes," your project requires a Project-Specific WQMP.
If all questions are answered "No," your project does **NOT** require a Project-Specific WQMP.

Does your proposed project include:	**Yes**	**No**
1. Housing subdivisions of 10 or more dwelling units. This category includes single-family homes, multi-family homes, condominiums, and apartments.		
2. Commercial developments greater than 100,000 square feet. This category is defined as any development on private land that is not for heavy industrial or residential uses where the land area for development is greater than 100,000 square feet. The category includes, but is not limited to: hospitals; laboratories and other medical facilities; educational institutions; recreational facilities; municipal facilities; commercial nurseries; multi-apartment buildings; car wash facilities; mini-malls and other business complexes; shopping malls; hotels; office buildings; public warehouses; automotive dealerships; airfields; and other light industrial facilities		
3. Automotive repair shops (SIC codes[2] 5013, 5014, 5541, 7532-7534, or 7536-7539.)		
4. Restaurants (SIC code 5812), where the land area for development is greater than 5,000 square feet. Restaurants where land development is less than 5,000 square feet shall meet all SUSMP requirements except for structural treatment BMP and WQMP volume sizing and flow rate requirements		
5. Hillside developments that creates 10,000 square feet or more of impervious area including developments in areas with known erosive soil conditions or where natural slope is 25 % or more		
6. Parking Lots 5,000 square feet or more of impervious area		
7. Retail gasoline outlets of 5,000 square feet or more with projected average daily traffic of 100 or more vehicles per day.		
8. Street, roads, highways, and freeways, which include any paved surface that is 5,000 square feet or greater used for the transportation of automobiles, trucks, motorcycles, and other vehicles.		
9. Environmentally Sensitive Areas (ESAs). All development located within or directly adjacent to or discharging directly to an ESA (where discharges from the development or redevelopment will enter receiving waters within the ESA), which either creates 2,500 square feet of impervious surface on a proposed project site or increases the area of imperviousness of a proposed project site to 10% or more of its naturally occurring condition. "Directly adjacent" means situated within 200 feet of the ESA. "Discharging directly to" means outflow from a drainage conveyance system that is composed entirely of flows from the subject development or redevelopment site, and not commingled with flows from adjacent lands.		

* Significant Redevelopment includes, but is not limited to:

- the expansion of a building footprint or addition or replacement of a structure;
- structural development including an increase in gross floor area and/or exterior construction or remodeling;
- replacement of impervious surface that is not part of a routine maintenance activity;
- land disturbing activities related with structural or impervious surfaces.
- Where Significant Redevelopment results in an increase of less than 50 percent of the existing impervious surfaces of an existing developed site, and the existing developed site received its discretionary land use approvals prior to the adoption of the WQMP (7/13/05 in Santa Margarita Region), the WQMP would apply only to the addition, and not the existing development.

** Replacement not part of routine maintenance activity is considered a significant development.

[1] Projects in the Santa Ana Watershed have different requirements see question 7. Projects in the Whitewater Watershed are not subjected to WQMP requirements, but instead use Supplement A to the 1993 Drainage Area Management Plan (DAMP).

[2] Information regarding SIC codes can be found at http://www.osha.gov/pls/imis/sicsearch.html

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Q.7-- My project is in the Santa Ana Region[1], does it require a Project-Specific WQMP?

If any question is answered "Yes," your project requires a Project-Specific WQMP. If all questions are answered "No," your project is does **NOT** require a Project-Specific WQMP.		
Does your proposed project include:	**Yes**	**No**
1. All **Significant Redevelopment projects;** defined as the addition or creation of 5,000 or more square feet of impervious surface on an existing developed site. This includes, but is not limited to: • construction of additional buildings and/or structures, • extension of the existing footprint of a building, • construction of impervious or compacted soil parking lots. • Where Significant Redevelopment results in an increase of less than fifty percent of the existing impervious surfaces of an existing developed site, and the existing developed site received its discretionary land use approvals prior to the adoption of the WQMP (12/31/2004 in Santa Ana Region; 7/13/05 in Santa Margarita Region), the WQMP would apply only to the addition, and not the existing development. Significant Redevelopment does not include routine maintenance activities that are conducted to maintain original line and grade, hydraulic capacity, the original purpose of the constructed facility or emergency actions required to protect public health and safety;		
2. Residential development of 10 units or more, including Single Family and Multi-Family Dwelling Units, Condominiums, or Apartments		
3. Industrial and commercial development where the land area represented by the proposed map or permit is 100,000 square feet, or more, including, but not limited to, non-residential developments such as hospitals, educational institutions, recreational facilities, mini-malls, hotels, office buildings, warehouses, light industrial, and heavy industrial facilities;		
4. Automotive repair shops (with standard industrial classification ("SIC") codes[2] 5013, 7532, 7533, 7534, 7537, 7538, and 7539).		
5. Restaurants (SIC Code 5812) where the project site is 5,000 square feet, or more.		
6. Hillside developments that creates 10,000 square feet or more of impervious area including developments in areas with known erosive soil conditions or where natural slope is 25 % or more		
7. Parking lots of 5,000 square feet or more of impervious surface exposed to storm water. Parking lot is defined as a site or facility for the temporary storage of motor vehicles.		
8. Developments creating 2,500 square feet, or more, of impervious surface that is adjacent to (within 200 feet) or discharging directly into areas designated in the Basin Plan as waters supporting habitats necessary for the survival and successful maintenance of plant or animal species designated under state or federal law as rare, threatened, or endangered species (defined in the Basin Plan as "RARE") or waterbodies listed on the CWA Section 303(d) list of Impaired Waterbodies within the Permit Area.		

[1] For projects in the Santa Ana Watershed; additional requirement exist for the San Diego (a.k.a. Santa Margarita) watershed, see question 6. Projects in the Colorado River (a.k.a. Whitewater River) Watershed are not subjected to WQMP requirements, but instead use Supplement A to the 1993 Drainage Area Management Plan (DAMP).

[2] Information regarding SIC codes can be found at http://www.osha.gov/pls/imis/sicsearch.html

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Q.8--Where can I find additional information on preparing my Project-Specific WQMP?

Information packets are generally available upon request at most municipal Planning or Public Works Departments. Guidance documents and a template can also be downloaded from the Riverside County Flood Control website, http://www.floodcontrol.co.riverside.ca.us/districtsite/default.asp. Follow the links to the Stormwater Program. Additional information can be found on the applicable City's website.

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Q.9--What is an Environmentally Sensitive Area?

Generally, these are areas "in which plant or animal life or their habitats are either rare or especially valuable because of their special nature or role in an ecosystem and which would easily be disturbed or degraded by human activities and developments" (California Public Resources Code §30107.5). Examples are Areas of Special Biological Significance as designated by the State Water Resources Control Board, areas identified in Habitat Conservation Plans as supporting endangered or threatened species, and receiving waters that are designated as being impaired. More information about Environmentally Sensitive Areas can be found at http://www.rcip.org/conservation.htm
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Q.10--What are Pollutants of Concern?

Pollutants of Concern are potential pollutants associated with Urban Runoff that are related with the type of development (land use) and legacy pollutants such as pesticides, nutrients, or hazardous substances in the site's soils as a result of past uses. See Exhibit B of the WQMP a more detailed description of pollutant and their sources.
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Q.11--How do you address Pollutants of Concern?

If the development/project includes pollutants of concerns not associated with a 303(d) listing for proximate receiving waters, then a combination of Site Design, Source Control and Treatment Control BMP would be used to address Pollutants of Concern.

If the development/project includes pollutants of concern associated with a 303(d) listing for proximate receiving waters, then Treatment Control BMPs must be of HIGH or MEDIUM effectiveness as stated on Table 3 of the Riverside County WQMP manual or any other reasonable source approved by the Permittee.
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Q.12--What is a Receiving Water?

Generally, a receiving water is a surface waterbody or watercourse such as a canyon drainage, spring, creek, river, lake, estuary, lagoon, bay, surface reservoir, or ocean. A receiving water can be ephemeral, perennial, or intermittent in nature. Waters of the U.S. are always Receiving Waters. Developments must address water quality impacts to proximate receiving waters.
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Q.13--Where can the latest 303(d) List of Impaired Waters be found?

The most recent 303(d) list can be downloaded at
http://www.waterboards.ca.gov/tmdl/303d_lists.html?counter=2723

The table below contains the 303(d) listed waterbodies, impairing pollutants, and tributary Hydrologic Units as proposed on the 2006 – 303(d) list. This list should remain in effect until 2008. Project pollutants of concern should be compared to impaired waterbody/pollutant tables below to determine if the proposed project impacts impaired waterbodies.

SAR & SMR - 303(d) listed Waterbodies with Tributary Hydrologic Units

Based on the 2006 - 303(d) list of waterbody impairments

Region	Impaired Waterbody	Hydrologic Sub Area Name	Hydrologic Unit No.	Impairment	Tributary Hydrologic Unit Numbers
8	Canyon Lake (Railroad Cyn Reservoir)	Perris Valley	802.11	***Nutrients****, **Bacteria & Viruses** (Pathogens)	802.11-15, 802.21-23
8	Chino Creek Reach 1	Chino Split	801.21	**Nutrients**	801.21
8	Elsinore, Lake	Elsinore	802.31	***Nutrients****, PCBs, Unknown Toxicity	802.11-15, 21-23, 31-32
8	Fulmor Lake	Gilman Hot Springs	802.21	**Bacteria & Viruses** (Pathogens)	802.21-23
8	Mill Creek (Prado Area)	Chino Split	801.21	**Nutrients, Turbidity** (Total Suspended Solids)	801.21
8	Santa Ana River, Reach 3	Chino Split	801.21	**Bacteria & Viruses** (Pathogens)	801.21, 25-27, 31-35
8	Santa Ana River, Reach 4	Riverside	801.27	**Bacteria & Viruses** (Pathogens)	801.27
9	Santa Margarita Lagoon	Lower Ysidora	902.11	**Nutrients** (Eutrophic)	902.11-13, 21-22, 31-35, 41-44, 51-52, 61-63, 81-84, 71-74, 91
9	De Luz Creek	De Luz Creek	902.21	**Metals** (Iron & Manganese)	902.21
9	Long Canyon	Redec	902.83	**Turbidity** (Total dissolved solids)	902.83, 84, 91
9	Murrieta Creek	Wolf Creek	902.52	**Metals** (Iron, Manganese), **Nutrients** (Nitrogen, Phosphorus)	902.31-35, 41-44, 51-52, 61-63, 71-74, 81-84, 91

9	Rainbow Creek	Gavilan	902.22	**Metal** (Iron) **Nutrient** (Sulfates), **Turbidity** (Total Dissolved Solids)	902.23
9	Sandia Creek	Gavilan	902.22	**Metal** (Iron, Manganese), **Nutrients** (Nitrogen, Sulfates), **Turbidity** (Total Dissolved Solids)	902.22
9	Santa Margarita River (upper)	Gavilan	902.22	**Nutrients** (Phosphorus)	902.22, 31-35, 41-44, 51-52, 61-63, 71-74, 81-84, 91
9	Temecula Creek	Pauba	902.51	**Nutrients** (Nitrogen, Phosphorus), **Turbidity** (Total Dissolved Solids)	902.51, 61-63, 71-74, 81-84, 91

*TMDL's have been established that remove these constituents from the 303(d) list, but these constituents must be mitigated to meet the objectives of the TMDL.

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Q.14--What are "proximate Receiving Waters" for Pollutant of Concern?

TMDL's typically require regulation of impairing pollutants, for 303 (d) listed waterbodies, through all hydrologic conditions. Therefore, Proximate Receiving Waters for Pollutant of Concern analysis are all receiving waters between the project and either the ocean or natural/engineered hydrologic barriers that prevent pollutant transport for events up to 100 year flood conditions. Terminus proximate Receiving Waters in the Santa Ana and Santa Margarita 100-year Watersheds are listed below:

Santa Margarita Watershed: All downstream receiving waters to the Ocean. These potentially include Murrieta Creek, Temecula Creek, Long Canyon Creek and the Santa Margarita Lagoon

San Jacinto Watershed: All downstream receiving waters to Lake Elsinore, potentially including the San Jacinto River and Canyon Lake

Santa Ana Watershed (excluding the San Jacinto Watershed): All downstream waters to Prado Dam, potentially including the Santa Ana River, Reach 3.

Whitewater Watershed: All downstream receiving waters to the Salton Sea, potentially including the Coachella Valley Stormwater Channel and the Whitewater River.

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Q. 15--Where can you find Hydrologic Unit Basin Numbers?

The most recent Basin Plan Maps identifying Hydrologic Unit Basin Numbers may be downloaded at:

Santa Ana Watershed: http://www.waterboards.ca.gov/santaana/
Santa Margarita Watershed: http://www.waterboards.ca.gov/sandiego/
Whitewater Watershed: http://www.waterboards.ca.gov/coloradoriver/

Santa Ana Region Hydrologic Numbers		Santa Margarita Region Hydrologic Numbers		White Water Region Hydrologic Numbers	
801.13	Santa Ana Narrows	901.25	Upper San Juan	708.10	Warren
801.21	Chino Split	901.40	San Mateo Canyon	709.10	Copper Mountain
801.25	Temescal	902.21	DeLuz Creek	709.20	Dale Valley
801.26	Arlington	902.22	Gavilan	711.00	Cadiz
801.27	Riverside	902.23	Vallecitos	712.00	Ward
801.31	Coldwater	902.31	Wildomar	715.10	Vidal
801.32	Bedford	902.32	Murrieta	715.20	Big Wash
801.33	Cajalco	902.33	French	715.30	Quien Sabe
801.34	Lee Lake	902.34	Lower Domenigoni	715.40	Palo Verde
801.35	Terra Colta	902.35	Domenigoni	715.50	Midway Well
801.45	Reche	902.36	Diamond	716.00	Rice
801.62	Beaumont	902.41	Bachelor Mountain	717.10	Ford
801.63	Cherry Valley	902.42	Gertrudis	717.20	Palen
801.69	Nobie Creek	902.43	Low Tucalota	717.30	Pinto
802.11	Perris Valley	902.44	Tucalota	717.40	Pleasant
802.12	Menifee	902.51	Pauba	718.00	Hayfield
802.13	Winchester	902.52	Wolf	719.10	Morongo
802.14	Lakeview	902.61	Lancaster Valley	719.20	Shavers
802.15	Hemet	902.62	Lewis	719.31	Banning
802.21	Gilman Hot Springs	902.63	Reed Valley	719.32	Cabazon
802.22	Hemet Lake	902.71	Lower Coahuila	719.41	Garent Hill
802.23	Bautista	902.72	Upper Coahuila	719.42	Mission Creek
802.31	Elsinore	902.73	Anza	719.43	Miracle Hill
802.32	Railroad	902.74	Burnt	719.44	Sky Valley
		902.81	Vail	719.45	Fargo Canyon
		902.82	Devils Hole	719.46	Thousands Palms
		902.83	Redec	719.47	Indio
		902.84	Tule Creek	720.00	Clark
		902.91	Lower Culp	722.11	Terwilliger
		902.92	Previtt Canyon	722.12	Collins
		903.21	Pala	723.10	Brawley
				725.00	East Salton

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Q.16--When are Hydrologic Conditions of Concern addressed?

Section 4.4 of the WQMP identifies three conditions under which hydrologic condition of concern would not need to be addressed. Conditions A and B exempt projects discharging to publicly maintained MS4 systems and projects less than one acre in size. Condition C exempts projects with runoff flow rates, volumes, velocity and durations less than the pre-development condition for 2-year and 10-year 24 hour rainfall events.

Note that Hydrologic Conditions of Concern address impacts runoff events from de minimus runoff events through the 10-year 24-hour rainfall event. Therefore, proximate Receiving Waters for Hydrologic Conditions of Concern are the waterbodies that may be impacted under these conditions. Generally, stream systems with 20 square miles or greater tributary area can be considered a final terminus for HCOC analysis.
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Q.17--What are "animal wastes" as defined in Footnote 3 of WQMP Exhibit B?

Facilities with animal wastes include pet stores, veterinary clinics, animal shelters, zoos, and other facilities handling live animals. Facilities processing animal bi-products are also included such as restaurants, meat packing facilities, grocery stores, etc.
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Q.18--What is meant by "the handling and placement of any wastes" in Section 4.6 of the WQMP?

Certain source control and treatment control BMPs may collect waste that is classified as hazardous, or whose transport and disposal is otherwise limited by state or federal law. Two examples are: (1) depending upon the land uses in the drainage area of a detention or retention basin, the accumulated sediment may have characteristics that restrict its disposal; (2) in some applications, catch basin filter inserts may accumulate enough pollutants (e.g., metals, petroleum hydrocarbons) to warrant restricted disposal. Operation and Maintenance procedures should address how these wastes will be collected, stored, transported and disposed.
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Q.19--What is meant by "BMP start-up dates" in Section 4.6 of the WQMP?

Section 4.6 of the WQMP requires the project proponent to address "BMP start-up dates", or dates when BMPs are expected to become functional, to assist with determining compliance with Section 2.2 of the WQMP. Section 2.2 of the WQMP states that Permittee conditions of approval must require the project proponent describe the mechanism for funding the long-term operation and maintenance of the BMPs requiring long-term maintenance prior to the issuance of building or grading permits. In addition conditions of approval must require guarantee of BMP construction and installation prior to building or grading permit close-out or issuance of certificate of occupancy or certificate of use, as applicable. The Permittees must verify that maintenance and operations

entities are aware of when their obligations begin and to ensure that BMPs are effectively functioning prior to closing out a development project.
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Q.20--What are options for "High/Medium" effectiveness BMPs for bacteria/pathogen indicators necessary to address 303(d) listings and TMDLs in the Santa Ana and San Jacinto Watersheds? (4.5.3 page 25)

Section 4.5.3 of the WQMP requires that sites that are tributary to 303(d) listed waterbodies require Post Construction BMPs capable of reducing 303(d) listed pollutants of concern with at least a "Medium" removal efficiency per Table 3 of the WQMP. The San Jacinto River watershed tributary to Canyon Lake and the Santa Ana River watershed are 303(d) listed for bacteria/pathogen indicators and will require BMPs that are rated at least "Medium" removal efficiency for bacteria.

The Riverside County WQMP Table 3 - Treatment Control BMP Selection Matrix designates Infiltration BMPs and Filtration Systems, including sand and media filters, as High or Medium pollutant removal efficiency for bacteria.

Additional BMPs with high and/or medium bacteria reduction effectiveness are cited by CASQA in documents like the "2003 Stormwater Best Management Practices Handbook for New Development and Redevelopment" and Caltrans studies like the "April 2006 Treatment BMP Technology Report". These studies identify acceptable alternative BMPs. Underground filtration systems may also be an option given sufficient support for removal efficiency from manufacturers.

Based on Caltrans' 2006 Treatment BMP Technology Report, the most effective BMPs (based on pathogen removal and cost) are Biofiltration strips, followed by Infiltration Basins, then Dry Weather Flow Diversions. These BMPs are all approved by Caltrans.

BMP Type	Pathogen Removal	Confidence	Benefit	Cost	Confidence
Biofiltration Strips	High	High	High	Low	High
Infiltration Basin	High	Med	High	Low	High
Dry Weather Flow Diversions	High	Med	High	Low	Low

Caltrans cites other BMPs that were costly but had a high-medium pathogen removal with high-medium confidence, which include:

1. Infiltration Trenches*
2. Wet Basin*
3. Dual Media Austin Filter
4. Wetland Systems
5. Disinfection – Ozone
6. Several below Grade Infiltration products
7. Porous Asphalt Pavement
8. Austin Sand Filter*
9. Delaware Sand Filter*
10. Filtration Bed

*Caltrans approved BMPs
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Q.21--Does a Commercial/Industrial or Residential Development with parking lots and/or streets incorporated into the development need to address all pollutants associated with each of the aforementioned development categories identified in WQMP Exhibit B?

No. Most commercial and residential developments incorporate parking lots and roads, streets and highways. WQMP Exhibit B identifies various Types of Developments or Land Uses as separate development categories with unique Pollutants of Concern. The Pollutants of Concern for parking lots and roads, streets and highways are not necessarily subsets of other types of development types or land uses. For example, WQMP Exhibit B indicates that Commercial/Industrial Development potentially have organic compounds in runoff IF solvents will be used or stored by the project in a way that exposes solvents to precipitation or runoff. However, parking lots are identied as ALWAYS having organic compounds as a potential pollutant of concern (in the form of petroleum hydrocarbons).

The studies used to identify pollutants in runoff for the Type of Development (Land Use) identified in WQMP Exhibit "B" considered all aspects of the typical land use (including parking lots and roads) when defining the pollutants associated with that type of development or land use category. Therefore, if construction of parking lots and/or roads are a condition of approval for the map or permit for which discretionary approval is sought and are hydrologically interconnected, the encompassing development category (i.e. Commercial/Industrial development type or land use) would define the Pollutants of Concern. Hydrologically independent development categories for that same map or permit should address all Pollutants of Concern associated with the hydrologically independent development type or land use category in Model WQMP Exhibit B. As always, there are exceptions to every rule, and project applicant should consider and describe in the Project-Specific WQMP the unique circumstances that may influence the Pollutant of Concern identified for a specific project based upon the development category or combination of categories that are appropriate. For example, a Permittee may require that a commercial automobile parts store shall address petroleum hydrocarbons (organic compounds), which are not associated with the commercial/industrial development category in the Exhibit B of the WQMP, but are associated with parking lots, due to the increased likelihood of automotive repair activities occurring in the customer parking areas and automobiles in need of maintenance utilizing the customer parking area.

For other development type or land use mixes of a map or permit for which discretionary approval is sought, such as commercial shopping center with satellite restaurants and/or automotive repair shop pads, the project-specific WQMP should specifically consider Potential Pollutants associated with each separate development type or land use.
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Q.22--If a development includes multiple WQMP development types or land uses such as a Commercial Shopping Center with one or more satellite restaurants, does the entire development have to address the combined Pollutants of Concern identified for both development categories in WQMP Exhibit B?

Yes. Those portions of the commercial development containing hydrologically interconnected development categories must address all pollutants of concern associated with the hydrologically interconnected development categories. Where it is feasible to address certain pollutants, such as pathogens, at the source with a proactive site and source control prospective, the need to address

pathogens in downstream treatment control BMPs would not be required. In other cases, it may be feasible to grade the overall site in such a manner to allow localized treatment of specific Pollutants of Concern can be addressed.
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Q.23--Is a Registered Engineer's stamp required on the preliminary project-specific WQMP?

Yes, however this requirement can be waived for preliminary WQMPs at the discretion of the Permittee. Preliminary project-specific WQMPs contain details such as lot layout, drainage control, site grading, and BMP footprint. These project features are integral to final lot layout and must necessarily be determined with some level of confidence prior to discretionary approval for the map or permit by the appropriate legislative or administrative body. Therefore, a Registered Engineer shall stamp and sign the preliminary project-specific WQMP as well as the final project-specific WQMP to ensure accuracy of calculations. A Registered Engineer's stamp is always required on the final project-specific WQMP.
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Q.24--Is an owner's certification be required on a preliminary project-specific WQMP?

Yes, however this requirement can be waived for preliminary WQMPs at the discretion of the Permittee. The owner's certification page is located in the WQMP Exhibit A, Project-Specific WQMP template. Preliminary WQMPs contain design details and developer commitments regarding operation, maintenance and funding of post-construction BMPs. Preliminary project-specific WQMPs must be approved prior to discretionary approval for the map or permit by the appropriate administrative or legislative body. Siting, maintenance and funding commitments made in the Preliminary project-specific WQMP should be recognized by the site owner prior to this approval. Consequently, the owner should be required to sign the preliminary and final project-specific WQMP. An owner's certification is always required on a final project-specific WQMP.
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Q.25--What elements should be included in a project specific WQMP submittal?

Page 8 of the Model WQMP specifies the main elements of a preliminary project specific WQMP:

1) Project description and site characterization
2) Identification of Pollutants and Hydrologic Conditions of Concern
3) Identification of Site Design BMPs to be incorporated
4) Identification of Source Control BMPs to be incorporated
5) Selection, preliminary sizing and siting of applicable post-construction BMPs
6) Preliminary Operation and Maintenance Program, including responsible parties
7) Proposed funding source for O&M

The level of detail in a preliminary project-specific WQMP will depend on the level of detail known about the overall project design the time project approval is sought. The level of detail associated with a Preliminary project-specific WQMP should be sufficient to:

- Identify the major features of the development, including the location of activities, storage areas, or other features that could expose Urban Runoff to pollutants.
- Identify impacts of developments
- Ensure that applicable BMPs are reasonably incorporated into site layout and appropriately sized.
- Ensure that a reasonable and feasible operations and maintenance mechanism is proposed and that identified maintenance parties are committed to participation (for example, if public maintenance is proposed, ensure that public maintenance agencies have committed to the proposal)
- Ensure that a feasible and acceptable funding mechanism has been proposed.

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Q.26--Can pollutants associated with development categories in WQMP Exhibit B be addressed solely through site design and/or source control BMPs?

Yes. Section 7 of the WQMP, under Condition A, indicates that Treatment Control BMP requirements may be eliminated, with the approval of the local jurisdiction, if Site Design and Source Control BMPs are demonstrated to effectively eliminate discharges of Pollutants of Concern for the Flow Based Design or Volume Based Design criteria. Equivalency can be demonstrated for all pollutants associated with a site, or specific individual pollutants associated with a site.

For example, parking lots are identified as expected sources of pathogens (non-human sources would be considered natural background). However, the source of pathogens may vary with the land use associated with the parking lot. If a parking lot is associated with a real estate office, the only urban source of pathogens is likely to be trash dumpsters. If those trash dumpsters were covered, maintained in enclosed areas that divert stormwater around the dumpster enclosure, and had non-stormwater flows diverted to sewer, then pathogens could be considered addressed for that parking lot. Other pollutants, such as trash, nutrients and oil and grease may still need to be addressed would still need to be addressed with other site, source or treatment control BMPs.

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Q.27--Issue: Is roof runoff a pollutant? Does it need to be treated?

Yes. Roof runoff is a part of the encompassing Development Type or Land Use (i.e. Commercial/Industrial) in WQMP Exhibit "B". Roof runoff has been found to contain pollutants associated with aerial deposition and various materials used to construct roofs and appurtenant roof infrastructure (air conditioners, vents, roofing material). Roof runoff, particularly from commercial and industrial buildings, has been demonstrated to significantly exceed zinc and copper water quality objectives in certain circumstances. This is of particular concern as zinc and copper have been identified on the draft 2004 303(d) list as impairing Beneficial Uses for

Murrieta Creek. By architectural design, roofs may be either hydrologically independent to the encompassing Development Type or Land Use or hydrologically interconnected to the same.
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Q.28--What controls on property or titles are necessary to ensure that site design BMPs are not abandoned or destroyed by future property owners?

Site Design BMPs may need to be recorded on final maps as easements to ensure that their functionality is not hindered by future property owners. For example, an easement could be in place to protect a gravel-lined water quality swale along a driveway, a setback from a natural watercourse or a water quality pond that is integrated in to the site design of a project. Covenants, HOAs, POAs, CC&Rs may also be used to describe locations of site design BMPs and limitations on the use of areas incorporating site design BMPs (e.g., areas utilizing open-jointed paving materials or permeable surfaces, such as pervious concrete, porous asphalt, unit pavers, and granular materials or landscaped buffer areas between sidewalks and streets).
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WORK GROUPS

Riverside County

2006-07 NPDES Pre-Storm Season Meeting

August 10, 2006

MEETING AGENDA

1. Welcome to all the first time attendees and to those who joined us during our previous pre-storm season meeting. This is our second annual pre-storm season meeting. We thank you for taking time out of your busy schedule to join us!
2. Our meeting structure today will be very informal.
3. Logistics of the meeting room. Parking validation is available before you leave.
4. Plan to wrap our meeting up at 12:00 PM or sooner.
5. Opening comments and summary of "The 2005-06 Storm Season for the County of Riverside"- Steve Dondalski.
6. Comments concerning "The NPDES Consultant's Point Of View For The 2005-06 Storm Season"- Mike Malone (Geopacifica).
7. Open discussion featuring all attendees.
8. Meeting summary.
9. Riverside County Flood Control is once again offering no-cost NPDES Training covering the following subject matter: Construction Inspection, Industrial/Commercial Facility Training and Water Quality Management Plan Training. Training sessions will be held at the Flood Control District in Riverside, in Temecula or in Palm Springs. The training sessions are being offered the first three weeks of October. If you are interested please let me know and I will be happy to provide registration information and exact dates and locations. Seating is usually limited so the sooner you register the better.
10. California Storm Water Quality Association (CASQA) will offer NPDES Training September 25-27, 2006 in Sacramento, CA this year. Pre-register for the training at: http://stormwaterconference.com/. Last year CASQA training was held at Ontario, CA.
11. Meet the same time next year for our next Pre-Season NPDES Meeting ?

BORN LOSER
by Art & Chip Sansom

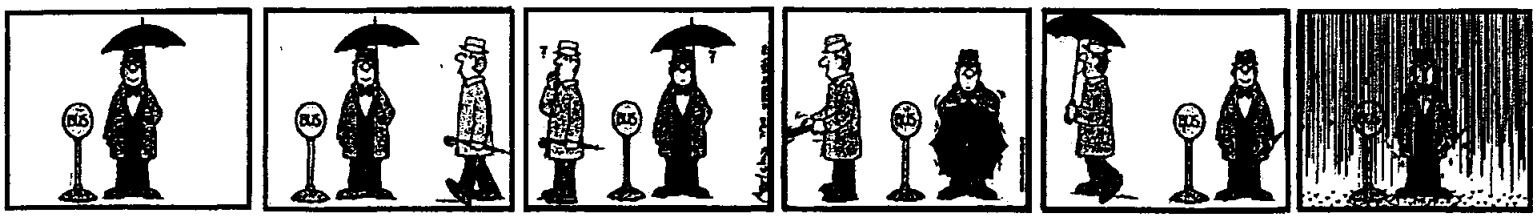

SANTA MARGARITA PRE-MEETING
OCTOBER 26, 2006
AGENDA

1. **Number of Facilities within the CAP Program**

2. **Number of Annual Report required for submittal**

   Submittal Requirement shall include two (2) hard copies and a CD version. The hard copies should be three-hole punched and binded.

   Reminder: Submittals to include certifications for both Watershed and Individual Annual Reports.

3. **Annual Report deadline submittal to Flood**

   Please submit your report by Monday, October 30th. Similar to last year, we want to submit all the reports together.

4. **Executive Summary**

   Discussion on effectiveness assessment introduction

5. **Open Discussion**

SANTA MARGARITA RIVER EXECUTIVE MANAGEMENT TEAM (SMREMT)

SMR Watershed Efforts Meeting

Date: August 8, 2006
Time: 10:00 – 11:00 a.m.
Place: U.S. Bureau of Reclamation

Expected Participants:
Bill Steele, U.S. Bureau of Reclamation
Nicole Rowan, CDM (teleconference)
Jason Uhley and Linda Garcia, Riverside County Flood Control District

Objective:
Summarize SMREMT efforts from a management perspective and describe anticipated future activities.

Key points:

1. History of SMR watershed model development and calibration
   a. Concerns with water quality calibrations?

2. Communication with the SDRB
   a. Receptiveness to a stakeholder-driven TMDL
   b. Concerns about using a model other than what they are familiar with
   c. Comparisons between BASINS (HSPF?) and WARMF – Are some of the perceived limitations of the WARMF model really limitations?

3. What will the District be getting out of participation in the modeling effort?
   a. Short-term benefits
   b. Long-term benefits
   c. Potential costs in money and monitoring requirements

4. What level of participation is the SMREMT getting from other stakeholders?

5. Future activities

Proposed Meeting Agenda

Santa Margarita River Watershed
Total Maximum Daily Load Development

1:00 – 3:30 p.m. August 15, 2006

Rancho California Water District Board Room
42135 Winchester Rd
Temecula, CA 92590
(951) 296-6900

Meeting Purpose: To determine how the process the U.S. Bureau of Reclamation has led to address watershed water management issues over the past five years can be expanded to include additional stakeholders focusing on scientifically based TMDL development in the Santa Margarita River Watershed.

1. Welcome, Introductions and Agenda Review (15 minutes)

2. Process that Led to Today's Meeting (10 minutes)

3. TMDL Process Overview (15 minutes)

4. RWQCB discussion of Coastal Lagoon TMDL Process and California Numeric Nutrient Endpoints (30 minutes)

5. Importance of Stakeholder Involvement (15 minutes)

6. Brief Overview of Watershed Efforts (20 minutes)
   A. Santa Margarita River Watershed Urban Runoff Management Plan and Watershed Management Plan - San Diego County
   B. MS4 Permits
   C. Framework Monitoring Plan
   D. Santa Margarita Watershed Water Supply Augmentation, Water Quality Protection and Environmental Enhancement Program Phase 3A
   E. Santa Margarita Watershed Water Supply Augmentation, Water Quality Protection and Environmental Enhancement Program Phase 3B
   F. Questions and Discussion of Other Efforts

7. Recommendations and Brainstorming on how stakeholder involvement can improve TMDL process. (25 minutes)

8. Feedback and Next Steps (20 minutes)

Santa Margarita River Water Quality Monitoring Group

Agenda

10:00-12:00 PM
Wednesday, November 15, 2006

1. Introductions (5 min)

2. Purpose of Meeting (5 min)

3. Review Mission and Goals as previously established by group (10 min)

4. Discuss Water Quality and Quantity Monitoring Programs (30 min)
   - Discussion at a general level, with details to come later (Who, What, When, Where, Why?)

   a. Ongoing Programs
   b. Planned
   c. Discontinued

5. Review Draft Monitoring Needs Matrix (20 min)
   -This was developed in 2004-5 by SDSU and Camp Pendleton with input from several other agencies in the watershed and several regional research organizations

6. Plan next meeting date(s) and agenda(s) (10 min)

Some initial thoughts for future discussion:

-Review #4 above in greater detail (constituents, frequency, methods, etc.)
-Review the group's 2001 Framework Monitoring Plan
-Review monitoring aspects of the goals contained in the SMR Watershed Management Plan of 2005
-Review sampling requirements for improving the existing watershed model (WARMF)
-Explore ways to better share information between participants
-Explore ways to collaborate across agencies to "lighten the load"
    -cost sharing?
    -streamlining programs?
-Review monitoring requirements of the MS4 programs
-Discuss how various planning groups in the watershed fit together
    -Water Quality Monitoring Group
    -Proposed Watershed Council
    -Executive Management Team

- -Watermaster Steering Committee
- -SMR-SLR Joint Powers Authority
- -others
- -Watershed Tour

Meeting Agenda

Santa Margarita River Watershed
Watershed Water Quality Management

1:30 – 3:30 p.m. January 16, 2007

U.S. Bureau of Reclamation
Southern California Area Office
27708 Jefferson Avenue, Suite 202
Temecula, CA 92590
(951) 695-5310

1. Welcome, Introductions and Agenda Review (5 minutes)
2. Presentation by Camp Pendleton on their recent data collection program (10 minutes)
3. Update on the Lagoon TMDL effort (10 minutes)
4. Discussion of the Proposed Phase 4 Study (45 minutes)
5. Break (5 minutes)
6. Cost Sharing Discussion on Phase 4 (15 minutes)
7. Santa Margarita Watershed Council Overview (10 minutes)
8. Water Quality Monitoring Efforts (10 minutes)
9. Next meetings (5 minutes)
    a. Discussion of Cost sharing
    b. Next EMT Meeting

Santa Margarita River Water Quality Monitoring Group

Agenda for January 2007 Meeting

When: 1:30-3:30 PM, Wednesday, January 17, 2007
Where: US Bureau of Reclamation Conference Room, Temecula

1. Introductions (5 min)

2. Review Agenda (5 min)

3. Review Draft Monitoring Needs Matrix (30 min)
   -This was developed in 2004-5 by SDSU and Camp Pendleton with input from several other agencies in the watershed and several regional research organizations

4. Review Framework Monitoring Plan (30 min)

5. Discuss the following monitoring programs (30 min)
   a. MS4
   b. Rainbow Creek TMDL monitoring
   c. Volunteer WQ Monitoring – Home-2-Ocean Program
   d. SDSU program at SMER
   e. Investigation Order for Estuary TMDL

6. Discuss precipitation monitoring requirements throughout watershed

7. Plan next meeting date(s) and agenda(s) (5 min)

DRAFT

Potential Discussion items for March & May 2007 WQMG Meetings:

1. Discuss overall watershed-wide monitoring needs

    a. Review Stetson's recent comparative analysis of sampling recommendations contained within last 15-years worth of plans and programs
    b. Review sampling requirements for improving/calibrating the Bureau's existing watershed model (WARMF)
    c. Review Camp Pendleton's new WQ monitoring program
    d. Discuss how MS4 sampling programs fit into the mix

2. Discuss requirements and potential for a centralized repository of monitoring data.
    a. SDSU?
    b. Project Clean Water?
    c. Other?

3. Review SDSU's web-based database of watershed studies.

4. Review TNC's geomorphic assessment of main stem of river (Stetson 2001)

5. Plan Watershed Tour

Agenda For Santa Margarita River Water Quality Monitoring Group

Date: June 12, 2007
Time: 10:00 - 11:45 AM

Location: USBR office in Temecula
27708 Jefferson Avenue, Suite 202
Temecula, CA
Phone: (951) 695-5310

1. Introductions

2. Discuss Water Quality Monitoring - Ongoing and Planned

a. Latest Version of Estuary Monitoring per Investigation Order (USBR Lead)
b. Monitoring with Federal Funding (USBR Lead)
-Main Stem
-Upper Watershed
c. Discuss how will these two programs should relate/reinforce one another? (Scott lead)
d. What is the next step? Discussion of additional upstream and tributary monitoring needs. (Scott lead)

3. Review content and Capabilities of SDSU's online database of watershed studies and information (SDSU Lead)

4. Discuss Precipitation Monitoring Requirements - Current, Planned, and Additional Needed (UCSD Lead)

a. What do we get by installing more stations?

5. Set next Meeting & Adjourn

Items for Future Meetings:

1. Review the Mission of the Group - Editing Needed?
2. Review the Goals of the Group - Any Changes/Additions Needed?
3. Plan watershed tour
4. Discuss Implications of SMR Geology upon Water Quality 5. Discuss reference conditions - What is the "background" water quality? What do we know? What do we suspect, but needed to research?
6. Review comments on document disseminated at previous meeting: Review of Perceived Threats to the Santa Margarita River Watershed.

Please let me know if you have any questions. I look forward to seeing you soon.

Regards,
Scott Thomas, Ph.D.
Senior Scientist
Stetson Engineers, Inc.
PO Box 6645
Diamondhead, Mississippi 39525
(228) 342-0239
(415) 457-1638 (fax)

MISSION RESOURCE CONSERVATION DISTRICT (MRCD)

INTEGRATED REGIONAL WATER MANAGEMENT

(IRWM)

Memorandum

To: *Perry Louck, Rancho California Water District*
Jason Uhley, Riverside County Flood Control District

From: *Wendy Katagi, Camp Dresser & McKee*

Date: *May 31, 2007*

Subject: *Santa Margarita Watershed IRWMP Stakeholder Workshop #1, Minutes*

Participants

Bruce Posthumus	CA Regional Water Quality Control Board
Jeremy Haas	CA Regional Water Quality Control Board
Wendy Katagi	**Camp Dresser & McKee**
Shea Petry	**Camp Dresser & McKee**
Stephanie Roberts	**Camp Dresser & McKee**
Dan Rodrigo	**Camp Dresser & McKee**
Farida Naceem	City of Murrieta
Aldo Licitra	City of Temecula
Alex Gann	**County of Riverside**
Micheal Shetler	County of Riverside
Mary Larson	Department of Fish and Game, Fishery Restoration Grants Program
Holly Sheradin	**Department of Fish and Game, Fishery Restoration Grants Program**
Greg Krzys	**Department of the Interior, US Bureau of Reclamation**
Mike Nusser	**Eastern Municipal Water District (EMWD)**
Behrooz Mortazavi, Ph.D.,P.E.	**Eastern Municipal Water District (EMWD)**
Phil Miller	Eastern Municipal Water District (EMWD)
Del Ross	EDAC
Vicki Long	**Elsinore/Murrieta/Anza Resource Conservation District (EMARCD)**
Bob Wheeler	**Elsinore/Murrieta/Anza Resource Conservation District (EMARCD)**
Charolette Fox	Elsinore/Murrieta/Anza Resource Conservation District (EMARCD) and League of Women Voters
Pam Nelson	**Elsinore/Murrieta/Anza Resource Conservation District (EMARCD)**

Judy Mitchell	Mission Resource Conservation District (MRCD)
Benjie Cho	Riverside County Flood Control (RCFC)
Tina Tuason	**Riverside County Flood Control (RCFC)**
Jason Uhley	**Riverside County Flood Control (RCFC)**
Tim Barr	**Rancho California Water District (RCWD)**
Perry Louck	**Rancho California Water District (RCWD)**
David Gibson	San Diego Regional Water Quality Control Board
George Sutherland	Trout Unlimited, South Coast Chapter
Christine Medak	U.S. Fish and Wildlife Service
Daniel Sulzer	**US Army Corps of Engineers**
Bill Steele	**US Bureau of Reclamation**
Samantha Marcum	US Forest and Wildlife Service
Jack Safely	**Western Municipal Water District (WMWD)**

I. Welcome and Introductions

1. The meeting was called to order and there were introductions of all participants.

2. Perry Louck of Rancho California Water District and Jason Uhley of the County of Riverside thanked everyone for being a part of this IRWMP development. Perry Louck provided background on the process leading up to this point.

II. Project Overview and Schedule Milestones

1. Wendy Katagi of CDM presented the background of the project and the IRWMP process and announced that Stakeholder Meeting #2 is planned for June 13, 2007 from 9am -11:30 pm and Stakeholder Meeting #3 is on June 25 from 1-3:30. CDM stated that they will be available to help with the project nomination process and reviewed the handouts.

III. Stakeholder Process and Workshops

1. Perry Louck stated that the lower section of the Santa Margarita watershed that is located in San Diego County will be participating in the San Diego IRWMP process.

2. Wendy Katagi reviewed the concepts of integration of water resources, IRWMP objectives and eligible projects. The Proposition 50 guidelines state that $64 million dollars will be available for projects, but only $25 million is available for the region including all of San Diego County and the Santa Margarita Region.

3. A stakeholder asked if Proposition 50 monies will be available to be used for planning. Daniel Cozad of IPM, Inc. responded that they cannot be used but Proposition 84 monies can.

IV. Data Needs and Coordination

1. Daniel Cozad stated that the regulatory bodies should be deciding on projects that are in the area, but not the state.

2. Dan Rodrigo of CDM facilitated a brainstorm session on the vision statement and objectives. Notes from this discussion follow.

Keywords for Vision Statement

1) "Improve" (resources)

2) "Identify (resources); recharge areas, esp. natural and man-made

3) Caltrans-green design

4) Allow for growth of economy (Riverside County)

5) "Preserve and Enhance" (endangered habitat and species and critical habitat

6) Sustainability and cost (reduce pumping cost and reduce secondary energy impacts

7) Avoiding development in floodplains (tie to land use)

8) RCD-targets for habitat restoration

9) Ensure compliance with existing landscape planning efforts (e.g. MSHCP)

Issues to include in the Vision Statement

1) Improve water use efficiency; Reduce per capita water demand

2) Preserve/enhance environmental corridors and sensitive and critical habitats

3) Reduce dependency on imported water

4) Increase use of recycled water

5) Identify and protect natural and man-made recharge areas

6) Developing solutions based on economics implementation, and regional benefits

7) Improved Flood Protection

8) Promote integrated stormwater management

9) Promote low impact development

10) Protect and improve water quality

11) Evaluate appropriateness of existing water quality standards

12) Promote sustainability of agriculture

13) Evaluate relative costs and benefits of natural uses, man-made solutions

14) Removal of non-native species and restoration of native

15) Increase open space

16) Promote public education and outreach

17) Enhancing fish habitats

18) Attain salt balances

19) Provide for reliable water supply

20) Improve partnerships

21) Seek multi-benefit, multipurpose projects

22) Maximize outside funding

23) Seek "win-"win" solutions

Objectives to include in the IRWMP

1) Water Supply

2) Water Quality

3) Environment

4) Flood Control

5) Open Space

6) Reduce fish passage impediments

7) Keep in-stream flow to support fish

8) Monitoring and evaluating of fish habitat health

9) BMPs-Water Quality

10) Water Conservation

11) Urbanizing rural areas (septic systems, Anza), Discontinuity of systems and data (Water Quality sampling)

    a. recognize

    b. monitor

    c. watershed dysfunction

Questions

2) Prop 50-no planning only **implementation;** planning grant application

3) How do we coordinate with San Diego County? When it goes to the State?

    a. Preliminary discussion-sub-regional plan

    b. Reference: existing adopted plans

3. CDM compiled all of the ideas and created a draft vision statement. The group agreed that every objective needed at least one target to be able to measure the objective's success.

4. The vision statement will include language that addresses improving water supply reliability, enhancing natural resources, "healthy" watersheds, habitats, balance and regional planning and multiple benefits.

5. A stakeholder added that previous IRWMP and other types of water management plans have only addressed problems that deal with water. He stated that the problem may actually be in water but the cause is from land use or some other contributing factor. Land use design should be integrated with the plan this time.

6. Another stakeholder suggested integrating Caltrans green design standards.

7. A stakeholder suggested using terms from Proposition 50.

8. Some objectives of the IRWMP are to:

   a. Reduce dependence on imported water

   b. Increase use of recycled water

   c. Identify and protect imported water

9. A stakeholder commented that he thought all the previously listed objectives fall under the broader category of conservation

10. Additional objectives are:

    a. Improve Flood Protection

    b. Promote integrated Stormwater

    c. Sustainable agriculture

    d. Evaluate relative costs and benefits of natural vs. maintained

    e. Removal of non-native grasses, esp. invasive non-native

    f. Increase open space, name some species

    g. Promote public education and outreach

    h. Enhance fish habitat

    i. Attain salt balance

    j. Provide for reliable water supply

    k. Improve partnerships

    l. Seek multi-benefits, multi-purpose projects

    m. Seek "win-win" solutions

11. CDM presented the vision statement to the stakeholder group and they commented and made suggestions to improve the vision statement.

V. Overview of Governance Structure

1. Daniel Cozad discussed governance. He stated that there will be a stakeholder advisory committee open to agencies and organizations interested in participating.

VI. Next Steps

1. Stakeholder Meeting #2 is planned for June 13, 2007 from 9am -11:30 pm and Stakeholder Meeting #3 is on June 25 from 1-3:30.

2. Submit projection nomination forms to Wendy Katagi of CDM, Katagiwr@cdm.com by June 12, 2007. Project interviews will be conducted to help project proponents complete forms prior to June 12, 2007.

3. Perry Louck and Jason Uhley thanked everyone for their involvement in the process.

4. The meeting was adjourned at 3:20 pm.

Memorandum

To: *Perry Louck, Rancho California Water District*
Jason Uhley, Riverside County Flood Control District

From: *Wendy Katagi, Camp Dresser & McKee*

Date: *June 14, 2007*

Subject: *Santa Margarita Watershed IRWMP Stakeholder Workshop #2, Public Hearing Intent to Adopt IRWMP held on June 13, 2007, Minutes*

Participants

Meeting attendees are shown in bold.

Bruce Posthumus	CA Regional Water Quality Control Board
Jeremy Haas	CA Regional Water Quality Control Board
Jennifer Jones	**Camp Dresser & McKee**
Wendy Katagi	**Camp Dresser & McKee**
Shea Petry	**Camp Dresser & McKee**
Stephanie Roberts	Camp Dresser & McKee
Dan Rodrigo	**Camp Dresser & McKee**
Karen Schwarz	**Camp Dresser & McKee**
Farida Naceem	**City of Murrieta**
Aldo Licitra	City of Temecula
Alex Gann	County of Riverside
Micheal Shetler	**County of Riverside**
Mary Larson	Department of Fish and Game, Fishery Restoration Grants Program
Holly Sheradin	**Department of Fish and Game, Fishery Restoration Grants Program**
Greg Krzys	Department of the Interior, US Bureau of Reclamation
Mike Nusser	**Eastern Municipal Water District (EMWD)**
Behrooz Mortazavi, Ph.D.,P.E.	Eastern Municipal Water District (EMWD)
Phil Miller	Eastern Municipal Water District (EMWD)
Del Ross	EDAC
Vicki Long	**Elsinore/Murrieta/Anza Resource Conservation District (EMARCD)**
Bob Wheeler	Elsinore/Murrieta/Anza Resource Conservation

	District (EMARCD)
Charolette Fox	**Elsinore/Murrieta/Anza Resource Conservation District (EMARCD) and League of Women Voters**
Pam Nelson	**Elsinore/Murrieta/Anza Resource Conservation District (EMARCD)**
Judy Mitchell	Mission Resource Conservation District (MRCD)
Bob Hewitt	**Natural Resources Conservation Service**
Benjie Cho	Riverside County Flood Control (RCFC)
Tina Tuason	**Riverside County Flood Control (RCFC)**
Jason Uhley	**Riverside County Flood Control (RCFC)**
Tim Barr	Rancho California Water District (RCWD)
Perry Louck	Rancho California Water District (RCWD)
Gail Egenco	**Riverside Land Conservancy**
David Gibson	San Diego Regional Water Quality Control Board
Christine Moen	**Southwestern Riverside County Mulit-Species Reserve**
George Sutherland	**Trout Unlimited, South Coast Chapter**
Christine Medak	U.S. Fish and Wildlife Service
Daniel Sulzer	US Army Corps of Engineers
Doug McPherson	**US Bureau of Reclamation**
Bill Steele	US Bureau of Reclamation
Samantha Marcum	US Forest and Wildlife Service
Fakhri Manghi	**Western Municipal ater District**
Jack Safely	Western Municipal Water District (WMWD)

I. Welcome and Introductions

1. Dan Rodrigo of CDM opened the meeting with a welcome and introduction of everyone attending the meeting.

2. It was explained to the group that the meeting doubles as a public hearing to satisfy the requirement of notice of intent to prepare an Integrated Resources Watershed Management Plan (IRWMP). Comments made during the meeting will be recorded and minutes will be prepared for public record.

II. Project Overview and Background

1. Wendy Katagi discussed the Public Workshop process that is being held as part of the IRWMP planning process. Workshops are as follows:

   - Workshop 1 - Discuss IRWMP process, vision, regional objectives, and governance structure (completed)

- Workshop 2 - Hearing of intent to prepare an IRWMP, review vision, regional objectives, projects, and IRWMP progress - June 13, 2007 (9:00 a.m. to 11:30 a.m.)
- Workshop 3 - Project ranking and integration, review of IRWMP progress - June 25, 2007 (1:00 p.m. to 3:30 p.m.)
- Workshop 4 - Hearing of intent to adopt an IRWMP, IRWMP presentation - July 13, 2007 (1:00 p.m. to 3:30 p.m.)

2. The Public Draft IRWMP is expected to be available July 1, 2007.

3. The final Proposition 50 guidelines for Phase 2 were recently released and are available at:
http://www.swrcb.ca.gov/funding/irwmgp/docs/final_r2_irwm_guide_psp.pdf
The schedules for the Proposition 50 expedited phase 2 and Proposition 84 were presented to the group. Proposition 50 phase 2 projects are to focus on implementation oriented projects.

II. Review of Vision Statement and Objectives

1. Dan Rodrigo facilitated a discussion on the vision statement and IRWMP objectives. After Stakeholder Workshop #1, three vision statements were drafted and emailed to the group for feedback. Based on the responses, a new vision statement was crafted and presented to the stakeholder group at the meeting. More discussion ensued at Stakeholder Workshop #2. The agreed upon vision statement is:

   "The Integrated Regional Water Management Plan will take a balanced and consensus-based approach that will provide for the protection and sustainability of the upper Santa Margarita Watershed's water resources, natural resources, and habitats."

2. The stakeholder group discussed and approved the nine Objectives and Sub-objectives that will be included in the IRWMP. Revised objectives are as follows:

   1. Develop a More Reliable and Diverse Portfolio of Water Supplies

   - Continue to implement water conservation efforts to reduce water consumption for the region

- Continue to develop cost-effective, sustainable local water supplies such as groundwater, surface water, and recycled water in order to reduce dependency on imported water
- Manage drought response to increase water supply reliability through implementation of water districts' urban water management plans, drought management plans
- Construct, operate and maintain an efficient water supply infrastructure, including water conveyance, treatment, storage and distribution
- Consider climate change in the evaluation of future water supply options

2. **Promote Economic, Social, and Environmental Sustainability**

- Account for expected economic growth, societal quality of life, and environment enhancement when developing water resources projects
- Equitably address disadvantaged community needs
- Promote sustainable practices for agriculture
- Reduce energy usage and greenhouse gas emissions in operations of water supply, stormwater, wastewater facilities
- Promote green building construction and low impact development to reduce water consumption and effectively manage runoff
- Prioritize integrated projects that provide multiple benefits
- Seek cost-effective, long term solutions to meet watershed objectives
- Seek "win-win" solutions that emphasize partnerships and collaboration, maximize benefits, and minimize or resolve conflicts

3. **Improve Water Quality**

- Develop and implement projects that improve water quality both upstream and downstream, with emphasis on point source control and implementing best management practices
- Evaluate appropriateness of existing water quality standards

- Reduce runoff through projects that implement best management practices
- Minimize hydromodification of the watershed as development increases
- Reduce water quality impacts of septic tanks
- Reduce salt loading with a goal of salt balance in the watershed and groundwater basin
- Monitor health of aquatic organisms in watershed

4. **Restore, Enhance and Maintain Habitats and Open Space**

- Increase activities that enhance aquatic and terrestrial habitats, and protect endangered, threatened and key species
- Support efforts to acquire, manage, and preserve open space for habitat and groundwater recharge areas
- Support projects to interconnect wildlife corridors
- Reduce invasive species and enhance native biological diversity
- Increase restoration of degraded aquatic habitats

5. **Manage Flood Plain Impacts**

- Promote regional, interconnected programs of flood plain management that incorporate environmental and economic and flood management impacts
- Reduce impacts on community from flooding

6. **Promote Appropriate Recreational Opportunities**

- Seek recreational opportunities and access to waterways for recreational activities that do not adversely impact sensitive habitat and other beneficial uses of water

7. **Promote Appropriate Land Use Planning**

- Identify and protect groundwater recharge areas from development and potential introduction of contaminants

- Review land use at a regional level to reduce impacts on water resources and natural environment
- Support the location of new development outside of flood prone areas and preserve flood plain as open space

8. **Increase Stakeholder Involvement and Stewardship**

- Increase diversity of actively participating stakeholders in the watershed, and develop partnerships with tribal governments
- Enhance public outreach, awareness, and education to promote stewardship of water resources programs

9. **Maximize Implementation of Water Resources Projects**

- Identify and support projects with long-term regional benefits
- Prioritize projects that have the greatest likelihood of rapid, successful implementation
- Seek outside funding from federal, state, and regional grants, loans, and other programs

3. A suite of water resource management strategies was presented to the group. The plan objectives and the projects reflect the water resource management strategies. The more strategies that the plan and individual project addresses, the more highly the projects will be evaluated.

4. The San Diego County regional management plan can be found on the internet at http://www.projectcleanwater.org/html/sdirwm.html. Originally, the State wanted to see the upper Santa Margarita watershed, south Orange County and San Diego County as one super-region. However, key regional water managers in San Diego have listed reasons in their plan why they have excluded Southern Orange County and Riverside County from their plan. Advance notice of this led the upper Santa Margarita region to come together and develop its own plan. The upper Santa Margarita IRWMP will note the importance of a watershed-wide approach including interrelationships between upstream, downstream, and instream features as well as connections with adjoining regions.

III. Governance Update and Stakeholder Advisory Committee Interest

1. Daniel Cozad presented a governance update. A draft Memorandum of Understanding (MOU) between the responsible agencies has been prepared and reviewed by legal council. The MOU authorizes a Chartered Stakeholder Advisory Committee for the Santa Margarita IRWM Planning effort.

2. The Stakeholder Advisory Committee (SAC) will be a group of stakeholders who have a significant interest in the watershed. Members on the SAC will represent the region as a whole, not only the interests of the organization from which the member comes.

3. Daniel invited stakeholders to consider participating in the SAC. If interested, please notify Daniel and submit a letter of commitment and agreement to the terms of the SAC charter and rules, similar to the example that Daniel provided. A final SAC charter will be available by July 1st. **Please notify Daniel of your interest in participating in the SAC by July 1st, and forward him a formal letter of commitment by July 12th,**. An MOU will be adopted by the end of June.

IV. Overview of Nominated Projects

1. Wendy Katagi led a discussion on nominated projects. Project proponents had the opportunity to explain their organization, and to give a brief overview of their project(s) and explain which water management strategies that project(s) address. A member of the following agencies/organizations presented projects. Project names and descriptions can be found on the "Project Readiness Matrix" provided at the meeting.

   - Rancho California Water District
   - Western Municipal Water District
   - Elsinore Murrieta Anza Resource Conservation District
   - Santa Margarita Ecological Reserve
   - Southwestern Riverside County Multi-Species Reserve
   - Riverside Land Conservancy
   - Riverside County Flood Control and Water Conservation District
   - Western Riverside County Regional Conservation Authority

- US Bureau of Reclamation
- Trout Unlimited

2. CDM will coordinate with project proponents prior to the next meeting to continue developing the project nomination forms. At the next meeting, the water management strategies of each project will be presented and the group discussion will focus on prioritizing the projects.

3. There is a need to identify representatives from disadvantaged communities who could be involved in the stakeholder effort. Disadvantaged communities should also be identified in the project proposals.

4. Alternative energy programs, new or existing, can also be identified as IRWMP projects.

V. Next Steps

1. Stakeholder Meeting #3 is planned for June 25, 2007 from 1pm -3:30 pm.

2. Wendy Katagi and Dan Rodrigo thanked everyone for their involvement in the process.

3. The meeting as a public hearing was formally closed at 11:30am.

Memorandum

To: *Perry Louck, Rancho California Water District*
Jason Uhley, Riverside County Flood Control District

From: *Wendy Katagi, Camp Dresser & McKee*

Date: *June 26, 2007*

Subject: *Santa Margarita Watershed IRWMP Stakeholder Workshop #3 held on June 25, 2007, Minutes*

Participants

Meeting attendees are shown in bold.

Elena Mafla	**Anza Valley Municipal Advisory Council**
Bruce Posthumus	CA Regional Water Quality Control Board
Jeremy Haas	CA Regional Water Quality Control Board
Jennifer Jones	**Camp Dresser & McKee**
Wendy Katagi	**Camp Dresser & McKee**
Shea Petry	**Camp Dresser & McKee**
Stephanie Roberts	Camp Dresser & McKee
Dan Rodrigo	**Camp Dresser & McKee**
Karen Schwarz	**Camp Dresser & McKee**
Farida Naceem	**City of Murrieta**
Steve Brown	**City of Temecula**
Aldo Licitra	**City of Temecula**
Alex Gann	County of Riverside
Micheal Shetler	**County of Riverside**
Mary Larson	Department of Fish and Game, Fishery Restoration Grants Program
Holly Sheradin	Department of Fish and Game, Fishery Restoration Grants Program
Greg Krzys	Department of the Interior, US Bureau of Reclamation
Mike Nusser	**Eastern Municipal Water District (EMWD)**
Behrooz Mortazavi, Ph.D.,P.E.	Eastern Municipal Water District (EMWD)
Phil Miller	Eastern Municipal Water District (EMWD)
Del Ross	EDAC
Vicki Long	**Elsinore/Murrieta/Anza Resource Conservation District (EMARCD)**
Bob Wheeler	Elsinore/Murrieta/Anza Resource Conservation

	District (EMARCD)
Charolette Fox	**Elsinore/Murrieta/Anza Resource Conservation District (EMARCD) and League of Women Voters**
Pam Nelson	**Elsinore/Murrieta/Anza Resource Conservation District (EMARCD)**
Judy Mitchell	Mission Resource Conservation District (MRCD)
Bob Hewitt	Natural Resources Conservation Service
Benjie Cho	Riverside County Flood Control (RCFC)
Tina Tuason	**Riverside County Flood Control (RCFC)**
Jason Uhley	Riverside County Flood Control (RCFC)
Tim Barr	Rancho California Water District (RCWD)
Perry Louck	**Rancho California Water District (RCWD)**
Gail Egenes	**Riverside Land Conservancy**
David Gibson	San Diego Regional Water Quality Control Board
Christine Moen	Southwestern Riverside County Mulit-Species Reserve
George Sutherland	**Trout Unlimited, South Coast Chapter**
Christine Medak	U.S. Fish and Wildlife Service
Daniel Sulzer	US Army Corps of Engineers
Doug McPherson	US Bureau of Reclamation
Bill Steele	US Bureau of Reclamation
Samantha Marcum	US Forest and Wildlife Service
Fakhri Manghi	**Western Municipal ater District**
Jack Safely	Western Municipal Water District (WMWD)

I. Welcome and Introductions

1. Dan Rodrigo of CDM opened the meeting with a welcome and introduction of everyone attending the meeting.

2. Dan reminded the group that the plan serves a dual purpose: (1) to meet the Prop 50 funding cycle, projects must be constructed within 3 years; (2) to serve as a long term watershed management plan that will help to secure funding from the Prop 84 funding cycle

3. Daniel Cozad, IPM stated that Prop 50 passed many years ago: Specifically says that acquisition can only be funded under Prop 50 if incidental to the project. Prop 84 reflects a different division of funds; monies are guaranteed to various regions and projects can reflect a larger set of water management strategies.

4. Approximately $25M earmarked for the San Diego region. This Plan is within the San Diego region.

II. Overview of IRWMP Progress Update

1. Wendy Katagi gave an overview of the IRWMP progress. This IRWM plan is only for the upper portion of the Santa Margarita watershed. The lower portion of the watershed is included in the San Diego IRWM plan. However, the Upper Santa Margarita Watershed Planning Region does evaluate watershed-wide issues such as ecosystem restoration, fisheries, and water quality so that the IRWMP benefits adjoining regions.

   - Workshop 1 - Discuss IRWMP process, vision, regional objectives, and governance structure (completed)
   - Workshop 2 - Hearing of intent to prepare an IRWMP, review vision, regional objectives, projects, and IRWMP progress - June 13, 2007 (completed)
   - Workshop 3 - Project ranking and integration, review of IRWMP progress - June 25, 2007 (completed as of 6/26/07, subject of minutes)
   - Workshop 4 - Hearing of intent to adopt an IRWMP, IRWMP presentation - July 13, 2007 (1:00 p.m. to 3:30 p.m.)

2. The Public Draft IRWMP is expected to be available July 1, 2007 on the Rancho California Water District website. A notice will be emailed to the stakeholder list when the document is available. The document will be available for public review for a 30-day comment period. All stakeholders are encouraged to review and comment on the Plan during the review period.

III. Overview and Discussion of Planning Targets

1. Dan Rodrigo facilitated a discussion on the Planning Targets which will be included in Section 3 of the IRWMP. A handout of the draft version of Section 3 was provided to the group. However, the Planning Targets are not yet included in this section, as they will be developed based on the results of today's discussion.

2. Objectives are the reasons why we are doing something. Planning Targets are how we will achieve the objective. Also may provide a metric (numeric target) that should be achieved.

3. The stakeholder group discussed and approved Planning Targets for each of the nine IRWMP Objectives. Planning Targets to be included in the Plan are as follows:

   1. Develop a More Reliable and Diverse Portfolio of Water Supplies

- Water agencies in the region will develop 0ver 114,000 acre-feet/yr of additional local supply by 2030
- Imported water dependency will be reduced by 25% from conservation and local supply development by 2030
- Diversity of supplies will include:
  - Expanded groundwater
  - New brackish desalination of groundwater
  - New recycled water, including demineralization to improve water quality
  - Conjunctive use storage (surface and groundwater)
  - Water transfers

2. **Promote Economic, Social, and Environmental Sustainability**

- Support the Riverside County's Integrated Project program that supports the region's general plan, transportation plan and multi species habitat conservation plan
- Provide reliable and high quality water supply to support the region's current and projected population and economy
- Protect the region's quality of life, specifically the balance between urban growth, rural lifestyle, and agriculture and open space
- Evaluate and implement renewable energy for water projects, which will help meet the state's goal of reducing greenhouse gas emissions to 1990 levels by 2020, consistent with AB 32

3. **Improve Water Quality**

- Review water quality standards to ensure appropriateness for the region, matching quality to intended use of water
- Comply with TMDLs that are being developed to meet beneficial uses for region

- Implement projects to remove water bodies from the 303(d) impaired list
- Maintain a salt concentration of 500 ppm or less in the watershed's drinking water sources
- Implement state regulations (AB 885) for septic tank management and review
- Mitigate significant nutrient and contaminant impacts to groundwater

4. **Restore, Enhance and Maintain Habitats and Open Space**

- Add approximately 70,000 acres of permanent habitat reserve lands to support Riverside County's MSHCP
- Remove approximately 3 acres of invasive species per year for a total of 9 acres
- Develop reliable, cost effective water supply projects for agriculture in order to maintain open space and increase wildlife corridors
- Native planting, monitoring and maintenance, inventory and mapping included in the 9 acres of invasive removal

5. **Manage Flood Plain Impacts**

- Complete Murrieta Creek Flood Control, Habitat Restoration and Recreation Project by 2030
- Plan and construct flood management projects to protect public health and safety, as identified in the Riverside County Flood Control District Master Drainage Plans
- Plan and construct multi-use flood management projects that incorporate combinations of open space, parks, flood control, groundwater recharge, and habitat protection, with specific goal of increased implementation of these types of projects

6. **Promote Appropriate Recreational Opportunities**

- Support increasing the current ratio of parklands/ recreational open space of 5 acres per 1,000 residents to 8 to 10 acres

- Implement recreational projects for Lake Skinner and Diamond Valley Reservoir, as identified by the Metropolitan Water District of Southern California

7. **Promote Appropriate Land Use Planning**

   - Support increased residential densities by:

     - Establishing minimum densities in residential zones

     - Requiring cities that all new tracts of 20 homes or more have one-fourth of the parcels be 14% smaller than existing code minimum

   - Support mixed use development by providing incentives and density bonuses, and modifying zoning codes

   - Ensure general plans provide for adequate job-related land uses

   - Evaluate and implement hydromodification and low impact development

   - Support the development of appropriate targets for new development within the flood plain

8. **Increase Stakeholder Involvement and Stewardship**

   - Currently there are 30 different stakeholder organizations involved in the IRWMP process, the goal is to increase stakeholder involvement by adding at least:

     - Local tribal lands

     - CALTRANS

     - Wineries, avocado and citrus growers

     - Building developers

     - Disadvantaged community representatives

   - Promote targeted education and training to support watershed goals

   - Support the future development of a Santa Margarita Watershed Council

9. **Maximize Implementation of Water Resources Projects**

- Regional projects will be prioritized higher when they are well integrated and meet three or more of the State's water management strategies
- Seek multiple sources of funding, such as regional, state and federal
- Provide adequate local match funding
- Seek projects that provide "win-win" solutions and minimize conflict

4. During the discussion of Objective 6, it was suggested that Paul Frandsen of the Riverside County Trails Commission be contacted. It is possible that the Commission has specific targets for development of new trails which could be incorporated into the IRWMP Planning Targets section.

In Response to Questions:

What is AB 885?
Assembly Bill No. 885 (AB 885) was passed in 2000 by the California Legislature for the purpose of requiring further controls over **On-Site Wastewater Treatment System (OWTS) Regulations**. The bill required the SWRCB to develop regulations to implement the new requirements. The State Water Resources Control Board developed a public process to gather input on the contents of the regulations. Draft regulations were posted to the State Water Board website in spring 2007. Information on AB 885 can be found on the State Water Board Website: http://www.swrcb.ca.gov/ab885/index.html

- *For Objective 3 Planning Targets, will the words mitigate and significant be defined? "Mitigate significant nutrient and contaminant impacts to groundwater"*

The IRWMP will develop a baseline for monitoring water quality pollutants of concern, such as nutrients and other contaminants. Once this baseline has been set, a monitoring program can be established with specific targets or thresholds for pollutants concentrations, where the words, "mitigate and significant" can be more specifically defined. This subject is a data gap that will be defined in the future work plan for updating the IRWMP.

Who qualifies as a disadvantaged community? Wildomar may have a low income area.
A disadvantaged community is an area that where the household annual income is 80% less than the median household income based on 2000 census data for this region (or approximately $37,994). It is important to identify water-related projects that will benefit disadvantaged communities because separate funds have been set aside in Prop 84 for these projects.

III. Governance Update and Stakeholder Advisory Committee Interest

1. Daniel Cozad presented a governance update. A draft Memorandum of Understanding (MOU) between the responsible agencies has been prepared, reviewed, and will be signed by the agencies on June 26-27.

2. In the draft MOU the word "Charter" has been changed to "organizing statement".

3. The Stakeholder Advisory Committee (SAC) will be a group of stakeholders who have a significant interest in the watershed. This group will facilitate the process of revising the IRWMP so that it meets the Proposition 84 guidelines. The group will help prioritize projects and advise the MOU responsible agencies on projects and relevant topics of interest in the watershed.

4. Daniel invited the stakeholders to consider participating in the SAC. The intent is for one representative, and an alternate, per organization to be a part of the SAC. If interested, send Daniel a letter of participation. At the last meeting, Daniel distributed an example letter; however, a few minor changes have been made since then. The new version of the example letter was redistributed to the group, and is attached to these meeting minutes. Please forward Daniel a formal letter of participation by July 13th. These letters will be included in the Final IRWMP.

IV. Discussion of Project Prioritization and Integration

1. Wendy Katagi led a discussion on the priority projects, the prioritization process, and integration. The group reviewed the information provided on the meeting handouts.

2. One project has been added to the Prop 50 projects since the last workshop. RCWD has submitted a solar power project which entails the installation of solar photo voltaic panels at RCWD's Santa Rosa Water Reclamation Facility for an expected generation of 1.8 to 2.0 million kWh annually. As such, this project reduces energy use and greenhouse gas emissions. As an enhancement to Project B, this project will benefit agriculture and associated disadvantaged communities.

3. Another change since the last workshop is that the restoration focused projects have been put together as one larger, more robust, regional project that could be managed by one organization, likely the County of Riverside. These projects were put together because collaboration will enhance resource management in the watershed as well as streamline required project management and reporting.

In Response to Questions:

Is it projected that in the future there will be more agricultural land?
Perry Louck of RCWD explained that there are no projections for new agriculture in the region. If there were to be new agriculture, it would likely be in the eastern portion of the watershed.

How does EMARCD propose programs for sustainable agriculture?
Perry Louck stateg that RCWD has a number of pilot projects in the vineyards. There are also potential partnerships with the Bureau of Reclamation and other entities that may be appropriate under Proposition 84.

If a project is not included in the Plan for Prop 50 funding, ,can it still be included in the Plan for Prop 84?
Yes, Projects can be added to the IRWMP when it is being revised to meet the Prop 84 guidelines. There will be a call for projects under Prop 84 in the future.

Is it too late to add the Anza groundwater study to the list of Prop 50 projects; it is a ready project and has matching funds from USGS.
Unfortunately, planning/studies cannot be funded under Proposition 50, only implementation projects can be included. However, Proposition 84 has planning/studies funds available; planning for Proposition 84 projects will begin in the next few months. This project is already included in the IRWMP as a Proposition 84 project.

V. Next Steps

1. Stakeholder Meeting #4 is planned for July 13, 2007 from 1pm -3:30 pm. This is a public hearing on the intent to adopt an IRWMP for this region.

2. Wendy Katagi and Dan Rodrigo thanked everyone for their involvement in the process.

3. The meeting adjourned at 3:30 pm.

On Organization Letterhead

Brian Brady
RANCHO CALIFORNIA WATER DISTRICT
42135 Winchester Rd.
Temecula, CA 92590

Dusty Williams
RIVERSIDE COUNTY FLOOD CONTROL
AND WATER CONSERVATION DISTRICT
1995 Market Street
Riverside, CA 92501

Larry Parrish
COUNTY OF RIVERSIDE
4080 Lemon Street, 14th Floor
Riverside, CA 92501-3656

Re: Integrated Regional Water Management Planning – Stakeholder Advisory Committee Letter of Participation

_____ accepts its appointment to the Stakeholder Advisory Committee for the Santa Margarita Integrated Regional Water Management Planning effort. We are a stakeholder with significant water supply, water quality, habitat, conservation, recycled water, recreation, open space, disadvantaged community, agricultural, or _____ other interests in the Santa Margarita Watershed. We support and will continue participating as a stakeholder in the Rancho California Water District (RCWD), Riverside County Flood Control and Water Conservation District (RCFC&WCD), and County of Riverside led IRWM Planning effort. We will assist and provide information and in-kind assistance to the committee and the County, RCFC&WCD and RCWD for the Region.

We will provide our best efforts and advice on goals, priorities, projects and opportunities for integration along with our fellow committee members in supporting the entire region. We will abide by the terms of the Organizing Statement and rules developed by the Committee.

Because of the amount of planning already completed by the County and RCWD, the rapid timeline for completion of this effort, and the cooperative working relationship we have with RCWD; we endorse the planning effort and support the IRWM plan being prepared by the County and RCWD.

Sincerely

Name

Title

Memorandum

To: *Perry Louck, Rancho California Water District*
Jason Uhley, Riverside County Flood Control District

From: *Wendy Katagi, Camp Dresser & McKee*

Date: *July 26, 2007*

Subject: *Santa Margarita Watershed IRWMP Stakeholder Workshop #4 held on July 13, 2007, Minutes*

Participants

Meeting attendees are shown in bold.

Elena Mafla	Anza Valley Municipal Advisory Council
Bruce Posthumus	**CA Regional Water Quality Control Board**
Jeremy Haas	CA Regional Water Quality Control Board
Darren Hartwich	**Camp Dresser & McKee**
Jennifer Jones	Camp Dresser & McKee
Wendy Katagi	**Camp Dresser & McKee**
Shea Petry	**Camp Dresser & McKee**
Stephanie Roberts	Camp Dresser & McKee
Dan Rodrigo	**Camp Dresser & McKee**
Karen Schwarz	**Camp Dresser & McKee**
Farida Naceem	City of Murrieta
Steve Brown	City of Temecula
Aldo Licitra	**City of Temecula**
Alex Gann	**County of Riverside**
Micheal Shetler	County of Riverside
Mary Larson	Department of Fish and Game, Fishery Restoration Grants Program
Holly Sheradin	**Department of Fish and Game, Fishery Restoration Grants Program**
Tracie Billington	**Department of Water Resources**
Chang Lee	**Department of Water Resources**
Mike Nusser	Eastern Municipal Water District (EMWD)
Behrooz Mortazavi, Ph.D.,P.E.	Eastern Municipal Water District (EMWD)
Phil Miller	Eastern Municipal Water District (EMWD)
Cristy Crowther	**Eastern Municipal Water District (EMWD)**
Del Ross	EDAC
Vicki Long	**Elsinore/Murrieta/Anza Resource Conservation**

	District (EMARCD)
Bob Wheeler	**Elsinore/Murrieta/Anza Resource Conservation District (EMARCD)**
Charolette Fox	**Elsinore/Murrieta/Anza Resource Conservation District (EMARCD) and League of Women Voters**
Pam Nelson	**Elsinore/Murrieta/Anza Resource Conservation District (EMARCD)**
Daniel Cozad	**Integrated Planning and Management, Inc.**
Judy Mitchell	Mission Resource Conservation District (MRCD)
Bob Hewitt	Natural Resources Conservation Service
Benjie Cho	Riverside County Flood Control (RCFC)
Tina Tuason	Riverside County Flood Control (RCFC)
Jason Uhley	**Riverside County Flood Control (RCFC)**
Tim Barr	**Rancho California Water District (RCWD)**
Brian Brady	**Rancho California Water District (RCWD)**
Perry Louck	**Rancho California Water District (RCWD)**
Meggan Reed	**Rancho California Water District (RCWD)**
Gail Egenes	Riverside Land Conservancy
David Gibson	San Diego Regional Water Quality Control Board
Christine Moen	Southwestern Riverside County Mulit-Species Reserve
Drew Irby	**Trout Unlimited, South Coast Chapter**
George Sutherland	**Trout Unlimited, South Coast Chapter**
Christine Medak	U.S. Fish and Wildlife Service
Daniel Sulzer	US Army Corps of Engineers
Greg Krzys	US Bureau of Reclamation
Doug McPherson	**US Bureau of Reclamation**
Bill Steele	US Bureau of Reclamation
Samantha Marcum	US Forest and Wildlife Service
Fakhri Manghi	**Western Municipal Water District**
Jack Safely	Western Municipal Water District (WMWD)

I. Welcome and Introductions

1. Dan Rodrigo of CDM opened the meeting with a welcome and introduction of everyone attending the meeting. Dan reminded the group that the plan serves a dual purpose: (1) to meet the Prop 50 funding cycle, projects must be constructed within 3 years and (2) to serve as a long term watershed management plan that will help to secure funding from the Prop 84 funding cycle. The purpose of this meeting was to present the draft plan to the stakeholder group, in an open public forum in which public comments could be received and recorded.

2. Perry Louck of Rancho California Water District (RCWD) thanked everyone for participating in the development of the Plan and introduced Brian Brady, RCWD Director, to the group.

II. Presentation on Draft IRWMP

Dan Rodrigo presented the Draft IRWMP. It was noted that the plan was completed in a very short amount of time. The aggressive timeframe was able to be achieved because of the existing planning efforts in the region and the active stakeholder participation. The following highlights of items that were discussed

1. Although the Upper Santa Margarita is the focus of the Plan, the underlying goal was to represent the watershed in its entirety, without the countyline being a barrier. Stakeholders from the entire watershed were invited to participate in the workshops.

2. *Water supply:* It was noted that all the recycled water is being used for urban irrigation.

3. *Regional Description:* The region is changing from a retirement center to a region of employment.

4. *Watershed features*: The watershed characteristics were highlighted with multiple maps showing habitat conservation areas, wildlife corridors, urban core (Murrietta and Temecula), surrounded by agricultural lands, significant recreation (Lake Skinner, Diamond Valley Lake), and disadvantaged communities.

5. *Public outreach and stakeholder involvement*: Through the project solicitation process and workshops a stakeholder group specifically interested in restoration and land acquisition has formed. Several workshops were conducted throughout the planning process:

   - Workshop 1 - Discuss IRWMP process, vision, regional objectives, and governance structure – May 23, 2007

   - Workshop 2 - Hearing of intent to prepare an IRWMP, review vision, regional objectives, projects, and IRWMP progress - June 13, 2007

   - Workshop 3 - Project ranking and integration, review of IRWMP progress - June 25, 2007

   - Workshop 4 - Hearing of intent to adopt an IRWMP, IRWMP presentation - July 13, 2007 (subject of meeting minutes)

6. The Public Draft IRWMP was posted at Rancho California Water District's website (http://www.ranchowater.com/alerts.aspx) on June 29, 2007. The document will be available for public review for a 30-day comment period ending on July 30, 2007. All stakeholders are encouraged to review and comment on the Plan during the review period. Comments should be submitted to Wendy Katagi,

CDM at Katagiwr@cdm.com, 213-457-2132 (phone), 213-627-8295 (fax), CDM, 523 W. Sixth Street, Suite 400, Los Angeles, CA 90014.

7. Daniel Cozad of Integrated Planning and Management, Inc presented a Governance update. Riverside County approved the MOU on June 26, 2007. RCWD Board of Directors approved the agreement on July 12, 2007. Daniel has received many Stakeholder Advisory Committee (SAC) participation letters and welcomes more stakeholders to write letters and join the SAC.

8. Dan Rodrigo reviewed the visioning process and vision statement with the group, which is:

   "The Integrated Regional Water Management Plan will take a balanced and consensus-based approach that will provide for the sustainability of the upper Santa Margarita Watershed's water and natural resources, and protection of habitats."

   The goals and targets for water management that were developed for the plan were discussed. During the development of the targets, it was realized that some targets were easily quantified, while others require more data to be made available before numerical metrics can be established. Other items discussed were the nine objectives that the stakeholders created, Short-Term and Long-Term Regional Goals, and maintaining a regional governance structure/forum for reviewing implementation items such as planning targets as data becomes available.

9. Another outcome of the stakeholder workshops was the creation of a watershed council, consistent with California Water Plan

10. The Plan includes several projects, which were prioritized based on readiness, number of water management strategies achieved, partnerships/integration, whether the projects met the Plan's goals. If a project was deemed not eligible for Proposition 50, Chapter 8 funding, it was included as a potential Proposition 84 project. The result of the prioritization process is 7 highly integrated projects that address regional planning objectives, priorities, and targets. The total request is approximately $7.4 million

11. An overview of the projects identified for Prop 50, Chapter 8 implementation grant funding was provided.

12. The IRWMP will provide benefits to other regions through implementation of water management strategies and projects.

III. Open Public Hearing on Draft IRWMP

Brian Brady of Rancho California Water District reiterated that the MOU was approved by the RCWD Board of Directors, and that the Board is appreciative of this planning effort. He opened the Public Hearing on the intent to adopt and IRWMP for the Upper Santa Margarita watershed planning region. The meeting was advertised in local papers. The following public comments were made.

1. Charlotte Fox, the League of Women Voters, gave positive comments in support of the IRWMP. Since the 1920's the organization has studied these issues and is happy that the Plan identifies specific actions for the watershed.

2. George Sutherland, Trout Unlimited, has been working for 20 years on restoration efforts in San Mateo Creek and was involved in prior watershed efforts in the Santa Margarita region. He highlighted the 2006 report to congress for fisheries restoration in the US. The report stated that over the years $525M has been given to the western US to restore fisheries. He is hopeful that Federal funds will still be available for fisheries restoration and that there will be opportunities to work with the agencies and water districts. Mr. Sutherland stated, "If it is good for the fish it is good for the people. "

3. Pam Nelson, EMARCD, explained that over the past years the organization has been trying to figure out how to become involved in this watershed's planning effort and is extremely happy to have found this venue.

Mr. Brady closed the public hearing at 1:55 p.m.

III. Department of Water Resources remarks on Proposition 50, Chapter 8 and Proposition 84 eligibility and process

Tracie Billington, DWR, presented the group with an update on Propositions 50 and 84.

1. DWR is working on an update to the State Water Plan, to be available in 2009. DWR is holding workshops; the next one will be July 25, 2007 at MWD, Los Angeles from 8:30 a.m. to 12:00 p.m. Everyone is welcome to attend to discuss regional issues that should be discussed in the State Water Plan.

2. Proposition 50, Chapter 8 has $64 million remaining. Of the remaining funds, at least $43 million must be awarded to projects in Southern California. Evaluation and distribution of the funds is a joint effort between SWRCB and DWR. The IRWM Plans are due August 1 at 5pm. .

3. Proposition 84 has $1 billion in identified funds. Funds are allocated to 11 regions in California, with $91M allocated to the San Diego subregion. A fact sheet is available that discusses the funding regions. One intention of the fact sheet is to

highlight that this region is included in the San Diego region. Money will be awarded competitively, such that if there are various plans in a given region, then the the parties leading those plans will need to compete for funding.

4. Specific monies are set aside for interregional projects, Thirty million dollars are set aside for planning grants. Companion funds for regional flood management planning are available and should be requested via a consolidated grant application with IRWM planning money.

5. Proposition 1E is funding for storm water flood management planning. In order to be eligible, projects must be coupled with flood management projects.

In Response to Question from Drew Irby, Trout Unlimited:
It is rumored that there are issues with Proposition 84 and that the funding may be suspended. Is this true?
Ms. Billington explained that the budget process is being discussed at high levels within the State and DWR is waiting for the outcome. More information will be available once the budget passes. Then the legislation guidelines will be drafted. Ms. Billington is hopeful that the guidelines and some planning money will be distributed in this fiscal year. She mentioned a groundwater planning grant program, which disperses small grants on the order of $250k for groundwater projects.

IV. Next Steps

1. The IRWMP and regional application will be submitted by the August 1, 2007 deadline. The total request in this IRWMP is $7.4M. It is everyone's hope that the region will be called back for Step 2 of the Implementation Grant program.

2. Continue to develop planning and implementation project nominations to prepare for Proposition 84.

3. Continue outreach to disadvantaged communities and other targeted groups.

4. Enact administration of IRWMP program and establish formation of Santa Margarita Watershed Council

5. Please submit your comments on the Draft IRWMP no later than July 30, 2007 to Wendy Katagi, CDM, Katagiwr@cdm.com.

APPENDIX B

PUBLIC EDUCATION

PUBLIC EDUCATION MATERIAL

Only Rain Down the Storm Drain Brochures

Storm Water Pollution 'What You Should Know…' Series

&

'After the Storm'

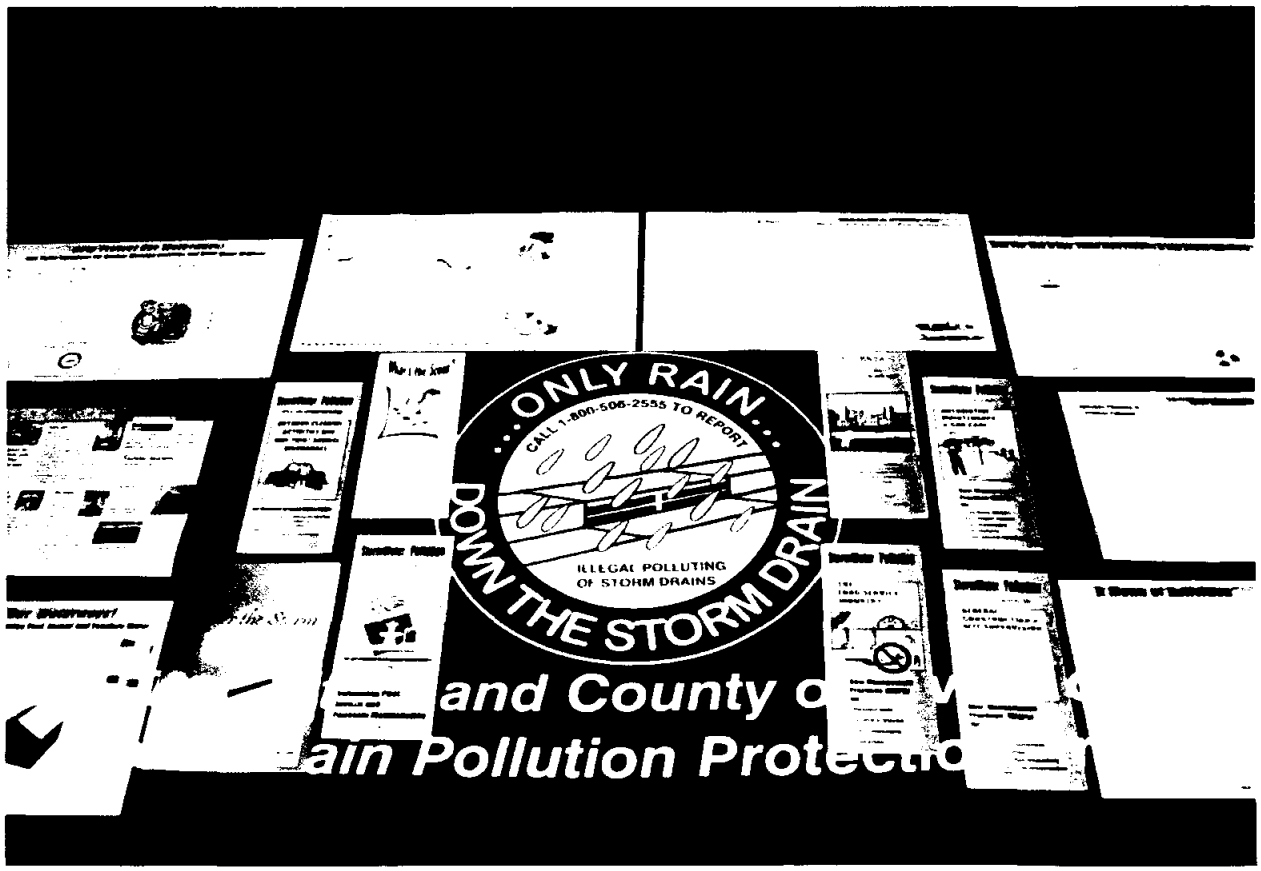

Series includes 'What's the Scoop,' 'Outdoor Activities,' 'Pool & Spa,'

'The Food Service Industry,' 'General Construction & Site Supervision,' 'Automotive Maintenance & Car Care,'

&

'Did You Know Your Facility May Need a Storm Water Permit?'

Only Rain Down the Storm Drain Posters

Titles include, 'Maintaining A Storm Water Friendly Gas Station,' 'Stormwater & the Construction Industry,' 'Maintaining Storm Water Friendly Service Bays & Car Washes,' 'A Menu of Activities… to Keep Our Water Clean'

&

'Keep Your Shop in Tune… and Protect our Waterway!'

Only Rain Down the Storm Drain Promotionals

Promotionals above include Dustpans, Shop Cloths, Air Fresheners, Sponges, Magnets, Erasable Highlighters, Pens, Pencils, Collapsible Frisbees, Shoe Laces, Crayons, Slap Bracelets, Rulers, Children's Bag & Adult Bag

ASSESSMENT AND ENHANCEMENT ANALYSIS OF THE NPDES TRAINING PROGRAM

AUGUST 2006

CDM

Riverside County Flood Control and Water Conservation District

Assessment and Enhancement Analysis of the NPDES Training Program

August 2006

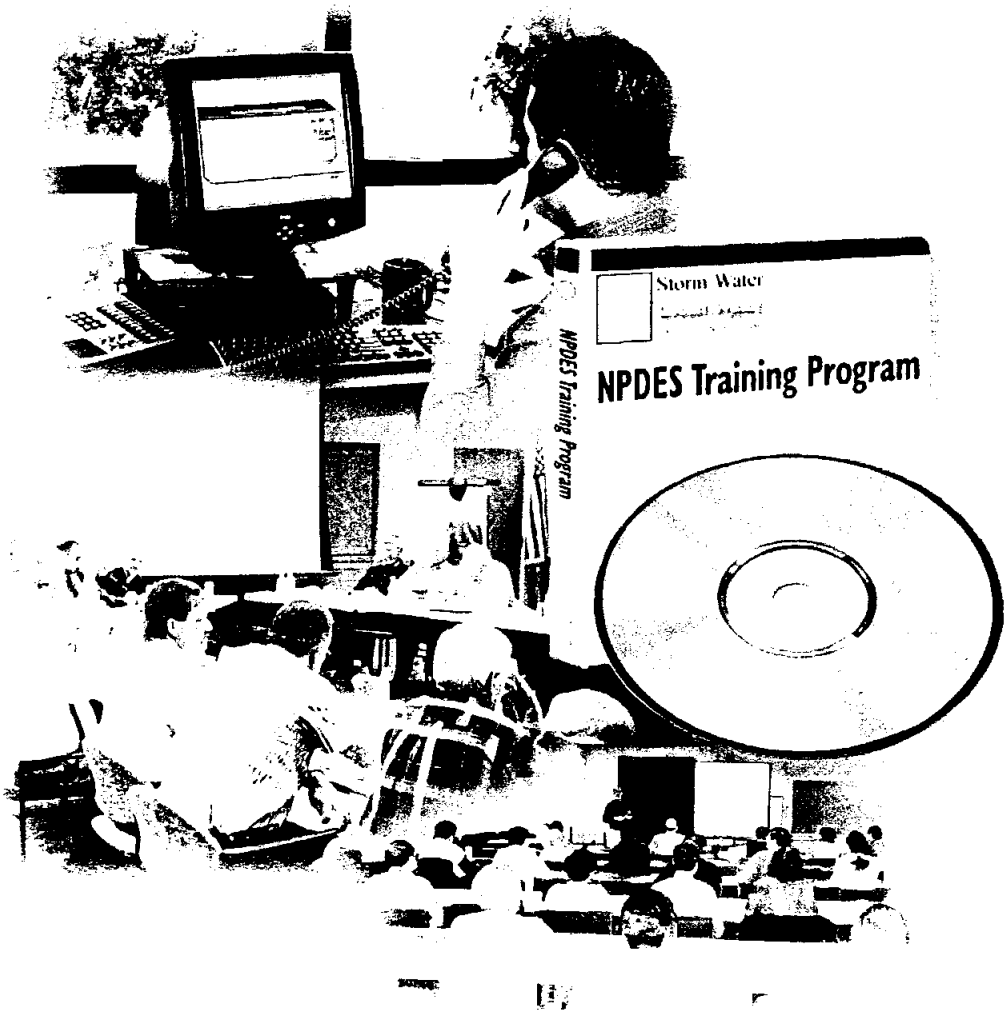

Report: Final Draft

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Appendices

Appendix A Computer Based Training

Section 1
Introduction

1.1 Background and Purpose

In 1972, provisions of the federal Water Pollution Control Act, also referred to as the Clean Water Act (CWA), were amended so that discharge of pollutants to waters of the United States from any point source is effectively prohibited, unless the discharge is in compliance with a National Pollutant Discharge Elimination (NPDES) permit. The 1987 amendments to the CWA added Section 402(p), which established a framework for regulating municipal, industrial, and construction stormwater discharges under the NPDES program.

On November 16, 1990, USEPA published final Phase I regulations that established application requirements for stormwater permits for municipal separate storm sewer systems (MS4s) serving a population of over 100,000 and certain industrial facilities, including construction sites greater than 5 acres. These regulations were revised in July 1998 (USEPA, 1998). On December 8, 1999, USEPA published the final Phase II regulations for communities under 100,000 and operators of construction sites between 1 and 5 acres (USEPA, 1999).

In California, the principal legislation for controlling stormwater pollutants is the state Porter-Cologne Act (Water Code 13000, et seq.), which requires development of Basin Plans for drainage basins within California. These basin plans serve as a blueprint for protecting water quality within the various watersheds and are used to identify more specific controls for discharges (e.g., wastewater treatment plant effluent, urban runoff, and agriculture drainage). Specific controls are implemented through permits called Waste Discharge Requirements (WDRs). In California, the federal NPDES stormwater permitting program is administered by the State Water Resources Control Board (SWRCB) through the nine Regional Water Quality Control Boards (RWQCBs) by issuing joint Waste Discharge Requirements and NPDES permits. SWRCB and RWQCBs use three types of NPDES permits to regulate stormwater discharges.

Riverside County is in a very unique situation compared to other areas in the state, as the County falls within the jurisdiction of three of the nine RWQCBs; they are: the Santa Ana Region, the Colorado River Basin Region, and the San Diego Region. To meet CWA Section 402(p) requirements, Phase I MS4s are required to implement a stormwater management program. This compliance is required under a Municipal NPDES Permit. The Riverside County Flood Control and Water Conservation District (District) is the Principal Permittee for the NPDES Permits shown in Table 1.

Table 1
Municipal NPDES Permits for Riverside County

Regional Water Quality Control Board Region	Permit Number	Description
Santa Ana	ORDER NO. R8-2002-0011 NPDES NO. CAS 618033	Waste Discharge Requirements for the Riverside County Flood Control and Water Conservation District, the County of Riverside, and the Incorporated Cities of Riverside County within the Santa Ana Region Areawide Urban Runoff
San Diego Basin	ORDER NO. R9-2004-001 NPDES NO. CAS010876	Waste Discharge Requirements for Discharges of Urban Runoff from the Municipal Separate Storm Sewer Systems (MS4s) Draining the County of Riverside, the City of Murrieta, the City of Temecula and the Riverside County Flood Control and Water Conservation District Within the San Diego Region
Colorado River Basin	ORDER NO.01-077 NPDES NO. CAS617002	National Pollutant Discharge Elimination System (NPDES) Permit and Waste Discharge Requirements for Riverside County Flood Control District, Owner/Operator, County of Riverside, Owner/Operator, Coachella Valley Water District, Owner/Operator, and Incorporated Cities Of Riverside County Within the Whitewater River Basin, Owners/Operators, for the Discharge of Whitewater River Watershed Storm Water, Riverside County

All three Permits have specific training requirements for the various areas within the County's NPDES Program, including New Development/WQMP, Construction, Industrial/Commercial Inspections, and Municipal Facilities and Activities. The training requirements of each Permit are summarized in Table 2.

The purpose of this project was to conduct an assessment and enhancement analysis of the District's NPDES Training Program. The results of the assessment and enhancement analysis, and recommendations for potential improvements are included in the following sections.

Table 2
RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
NPDES TRAINING PROGRAM REQUIREMENTS

	Santa Ana River Region Permit (Santa Ana RWQCB)	**Santa Margarita River Region Permit** (San Diego RWQCB)	**Whitewater River Region Permit** (Colorado River RWQCB)
New Development/Planning Review Staff		Implement an education program that includes **annual training** of planning and development review staffs (and Planning Boards and Elected Officials, if applicable) to ensure they have an understanding of: (1) Federal, state, and local water quality laws and regulations applicable to development projects; (2) The connection between land use decisions and short and long-term water quality impacts (i.e., impacts from land development and urbanization); and (3) How impacts to receiving water quality resulting from development can be minimized (i.e., through implementation of various source control and treatment control BMPs)	Item D.2.: "Continue to provide NPDES related workshops for in-house staff training. Training for staff shall include implementation and administration of the Riverside County WQMP as it applies to classes of Permittee employees. Employee classes expected to administer WQMP requirements include Planning Department staff, Industrial/Commercial Inspectors and Construction Inspectors
Municipal Inspection Program **Construction Sites**	Train staff involved in inspecting construction sites **on an annual basis prior to the start of the rainy season**. Training will address the requirements of the following: a) The Storm Water Ordinances, resolutions and codes; b) The MS4 Permit, the approved Water Quality Management Plan (WQMP), and the Drainage Area Management Plan (DAMP); c) The General Construction Permit; d) Storm Water Pollution Prevention Plans (SWPPPs); e) Selection and maintenance of appropriate Best Management Practices (BMPs) for construction sites, including erosion and sediment control f) The Enforcement/Compliance Strategy (E/CS)	Implement an education program that includes **annual training** for construction, building, and grading review staff, and inspectors to ensure that they have, at a minimum, an understanding of: (1) Federal, state, and local water quality laws and regulations applicable to construction and grading activities; (2) The connection between construction activities and water quality impacts (i.e., impacts from land development and urbanization); (3) How erosion can be prevented; (4) How impacts to receiving water quality resulting from construction activities can be minimized (e.g., through implementation of various source control and treatment control BMPs); and (5) How to assess construction sites for adequate BMP implementation and compliance with local codes, ordinances, and permits, and this Order	Section E.1.a.5 Develop and conduct a training program for field personnel (including -field workshops) to conduct inspections. Training programs may include development of appropriate field manuals, training materials, and field sampling techniques *and procedures*
Municipal Inspection Program **Industrial Facilities**	Train staff involved in conducting compliance surveys/inspections of industrial facilities **on an annual basis**. Training will address the requirements of the following: a) The Storm Water Ordinance; b) The MS4 Permit and the DAMP; c) The General Industrial Activities Storm Water Permit and any other permit issued to industrial facilities within the Permit Area by the State or Regional Board; d) The E/CS; e) Pollution prevention plans; and f) Implementation of appropriate BMPs for industrial facilities	Train staff responsible for conducting inspections of industrial facilities at least **once a year.** Permittees are encouraged to conduct training programs and provide compliance assistance to industrial/commercial facility owners, operators, and employers	Section E.1.a.5 Develop and conduct a training program for field personnel (including -field workshops) to conduct inspections. Training programs may include development of appropriate field manuals, training materials, and field sampling techniques and procedures
Municipal Inspection Program **Commercial Facilities**	Training to staff that is involved in the compliance surveys/inspections of commercial facilities **on an annual basis**. Staff training will address the requirements of the following: a) The Storm Water Ordinance; b) The MS4 Permit and the DAMP; c) The General Industrial Activities Storm Water Permits and any other permit issued to a commercial facility within the Permit Area by the State or Regional Board; d) The EC/S; e) Pollution prevention plans; and f) Implementation and maintenance of appropriate BMPs for commercial sites	Train staff responsible for conducting inspections of commercial facilities at least **once a year**. Permittees are encouraged to conduct training programs and *provide compliance assistance to industrial/commercial facility owners, operators,* and employers	Section E.1.a.5 Develop and conduct a training program for field personnel (including -field workshops) to conduct inspections. Training programs may include development of appropriate field manuals, training materials, and field sampling techniques and procedures
Municipal Facilities Programs and Activities	Training to the public agency staff and to contract field operations staff on fertilizer and pesticide management, model maintenance procedures and other pollution control measures	While this permit section does not specifically require training, the task of inspecting implies a need to conduct training for inspection staff. Staff will inspect all municipal facilities and activities annually. Inspectors shall include an assessment of BMP implementation and effectiveness. Based upon site inspection findings, each Permittee shall implement all follow-up actions necessary to comply with the MS4 Permit.	Section E.1.a.5 Develop and conduct a training program for field personnel (including -field workshops) to conduct inspections. Training programs may include development of appropriate field manuals, training materials, and field sampling techniques and procedures. Section d.7.iv (page 19): Landscape personnel trained

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1.2 Project Scope

The scope of this training program assessment included the following major tasks:

- Review existing training program. This task included reviewing materials from the District's existing training program and other training programs, identifying training audiences, and discussing the objectives of the assessment with the District's Watershed Permit Manager.

- Perform enhancement analysis. This task included performing an analysis to determine if the existing materials properly address the three Riverside County NPDES MS4 permit requirements, if the training programs effectively teach practical skills and provide materials that will assist Permittee staff in performing their jobs in a manner consistent with the NPDES MS4 permit requirements, if the training programs are effectively reaching their audience, if the training delivery methods are appropriate to the audience, if other training methods would be more appropriate, or would supplement current methods, and other potential issues with the existing training. The enhancement analysis then included identifying preliminary recommendations for program enhancements.

- Prepare a summary and recommendations report. This task involved preparing a report of findings and recommendations.

1.3 Project Goals and Objectives

Working with the District, it was determined that it was necessary to have a clear understanding of the program training objectives, the outcomes the District and Co-Permittees hope to achieve through the training, and the information (and level of learning) the Program wishes to disseminate. This understanding would help lay the foundation for recommendations to enhance the training program and develop effective training modules. During the project's kick-off meeting, CDM staff met with the District's Watershed Permit Manager to determine the goals and objectives of the evaluation.

The District's NPDES Training Program goals are:

- Comply with the NPDES Permits

- Increase and maintain knowledge of municipal employees in a measurable manner

- Change behavior of employees to the protect water quality

- Protect beneficial uses of receiving waters in Riverside County

The objectives of the training program evaluation were to:

- Identify if the training program complies with the requirements of the Permits
- Recommend enhancements to the training program for greater effectives in content, delivery, and cost
- Identify any deficiencies (if applicable) and review other municipal training programs such as those of Orange County and San Bernardino County to determine if their programs can address the deficiencies
- Identify the potential of regionalizing the training efforts with other Counties

1.4 Report Organization

This report consists of three sections and appendices. Each section is briefly described below:

Section 1 - Provides the background and purpose of the project, the project scope, and the organization of the report.

Section 2 - Describes the review of the existing NPDES Training Program.

Section 3 - Describes the analysis of the training program and recommendations for potential program improvements.

Section 2
Review of Existing Training Program

2.1 Data Collection

As part of this task, CDM collected the following materials for review:

- Existing Riverside County NPDES Permits
- Riverside County (District) NPDES Training Program materials, including copies of handouts to participants, training evaluation forms for Spring 2006 and Fall 2005 , and copies of the presentation slides used during the training sessions
- Orange County NPDES training presentations
- Presentations from the introductory workshops to the California Stormwater Quality Association (CASQA) Best Management Practice Handbooks
- San Bernardino County training – training was evaluated by accessing County's training website, and going through the training modules, at http://www.atcintranetu.com/iusbcounty/login.asp. The County of San Bernardino also provided printouts of the WQMP training presentations.
- California Department of Transportation (Caltrans) NPDES training presentations
- District training attendance records
- Current training costs for the District's training program

2.2 Riverside County Training Components

Currently, the District training is organized in sessions or courses specific to each of the program areas specified in the Permits: Industrial/Commercial, New Development/WQMP, Construction, and Municipal Facilities. These course titles include:

- Industrial and Commercial Pollution Control
- Municipal Facilities and Activities Pollution Control
- Construction Site Pollution Control
- Water Quality Management Plans

2.2.1 Organization of Training Sessions

CDM staff attended the District's Spring 2006 NPDES training sessions as observers on March 29 and 30, to become familiar with the training presentations, evaluate the training for compliance with the Permits, identify training audiences, evaluate effectiveness of the training delivery, and evaluate the receptiveness of the audience to the training. Observations of the various training sessions follow.

All training courses have been offered for at least four rounds, except for the newest course, WQMP Training, which has been offered in two rounds of training. The training courses are typically delivered in the Fall and in the Spring of each year.

In the latest offering, the District conducted its Spring 2006 NPDES training on March 20 and 22, and also on March 29 and 30. The scheduled training sessions and the total number of participants in each class are listed in Table 3 below.

Table 3
RCFCWCD Spring 2006 NPDES Courses

Date	Time	Training course	No. of participants	
			Signed	Attended
March 20, 2006	8:00 a.m. – 11:00 a.m.	Construction Site Activities	94	87
March 20, 2006	1:00 p.m. – 4:00 p.m.	Municipal Facilities and Activities	79	65
March 22, 2006	8:00 a.m. – 12:00 p.m.	New Development/WQMP	38	36
March 22, 2006	1:00 p.m. – 4:00 p.m.	Industrial/Commercial Facilities & Activities	33	34
March 29, 2006	8:00 a.m. – 11:00 a.m.	Municipal Facilities and Activities	80	65
March 29, 2006	1:00 p.m. – 4:00 p.m.	Construction Site Activities	81	86
March 30, 2006	8:00 a.m. – 11:00 a.m.	Industrial/Commercial Facilities & Activities	47	42
March 30, 2006	1:00 p.m. – 5:00 p.m.	New Development/WQMP	47	45
		TOTAL	499	460

Training sessions are delivered by District consultants with on-going knowledge and experience in storm water issues and NPDES programs. Training delivery is typically lecture style with use of PowerPoint slides and slide handouts. Some limited hands-on exercises are completed in small groups in the WQMP training course. The other three training courses,

Industrial/Commercial, Municipal Facilities and Activities, and Construction, do not have hands-on exercises.

During the spring 2006 NPDES training, nearly 500 people signed up to attend the training. A total of 460 participants actually attended the various NPDES training courses offered by the District. With the exception of a limited number of individuals working as consultants for a City, all of the attendees were staff from the County and various Cities throughout the County.

Attendees were from various departments such as Code Enforcement, Code Compliance, Waste Management, Environmental Services, Environmental Health, Flood Control, Building and Safety, Engineering, Public Works, Transportation, Planning, Maintenance, Parks, and Construction. The background of the attendees vary widely from employee staff who are new to the various County and/or City departments involved in the different program areas, others that have no previous NPDES or storm water experience, to others who are experienced in working in stormwater and conducting inspections.

Each of the four training courses contains an introductory module that highlights various federal, state, and local water quality laws and regulations, NPDES Permits under which Riverside County and its cities are regulated, requirements of the Permits for each of the programs, water quality impacts, pollutants, and specific responsibilities of the municipal staff. Each introductory module is similar to the others, but has been customized slightly for each of the program areas (New Development/WQMP, Construction, Industrial/Commercial, and Municipal).

In past training sessions, the District trainers have distributed a post-course survey to all participants after the completion of each training session. Participants are asked to complete the survey and provide their opinions of the training with regards to the material, clarity of the information, length of the training, knowledge of the presenters, room setup, and others. The surveys only ask for course satisfaction, but not how trainees would implement the many things they learned.

The training courses delivered during the Spring 2006 were the first ones to have participants take a quiz at the end of each training course. Results of these quizzes have not been provided by the District and have not been reviewed at this time.

2.2.2 Comparison to Other Training Programs

The training presentations from the various sources were compared to San Bernardino and Orange County training programs to determine potential areas of improvement to the District's training program. During this comparison, it was determined that the Construction training portion of the

District training has good information, but needs to be enhanced with more example photographs of construction site BMPs that have been implemented on construction projects, either properly or not, so that these examples can be discussed in class.

San Bernardino County

San Bernardino County also has used classroom-based delivery in the past. During the last couple of years, they decided to migrate to Computer-Based Training (CBT) delivery of the training via the Internet, in which participants walk through the training modules on their own time and at their computer. The training modules used in this training are the same ones that were developed in PowerPoint for the class-room training, and were not designed for true CBT and with adult learning techniques in mind.

San Bernardino believes that the training is effectively reaching the audience but is also looking into ways to refresh the training with new technology, newer photos, and discussion items. Training effectiveness is assessed through a "knowledge check" (basically a test), but the County is also looking for ways to improve this assessment. With regards to the effectiveness assessment, their representative stated that no participant has answered more than 75% correct of their knowledge check. San Bernardino staff did comment that their training has not been enhanced or improved since its inception, and they would like to find ways to enhance it with discussions, add videos (as needed), and ways to engage the audience.

Orange County

The County of Orange arranges their NPDES training using the same classroom-based delivery as the District. Training is also provided in modules for the four program elements of the NPDES program. Classes are scheduled by the County, are delivered by consultants, and vary in sizes from 30 to over 80 participants. Orange County does not do testing of training attendees and presently does not have a way to assess the effectiveness of the training. Representatives from the County of Orange have stated that they would be interested in participating in development of a joint training program with other counties.

Section 3
Analysis, Recommendations, and Cost Considerations

3.1 Analysis

By reviewing the various data compiled and attending the District's training sessions, CDM determined that the current training materials properly address the requirements of all three Permits. They address background information on the Federal, state, and local water quality laws and regulation, including the Clean Water Act; the MS4 Permits; Storm Water Ordinances; the Drainage Area Management Plan (DAMP); Storm Water Pollution Prevention Plans (SWPPPs) for industrial and construction activities; the connection between land use decisions and short and long-term water quality impacts from land development and urbanization; how impacts to receiving water quality resulting from development can be minimized through implementation of BMPs; selection and maintenance of appropriate Best Management Practices (BMPs) for industrial, commercial, and municipal facilities, and for construction sites; the Enforcement/ Compliance Strategy (E/CS); and provide general guidance on fertilizer and pesticide management, model maintenance procedures and other pollution control measures.

The existing training modules for the various program areas do a good job in teaching practical skills and provide materials that assist Permittee staff in performing their jobs in a manner consistent with Permit requirements. The presentations have good graphics and photos, and are delivered by consultants that have good knowledge of the regulations, the Permits, the various program elements, and BMPs. Black and white handouts of the presentations are also provided to the participants, together with printouts of any other information such as exercises.

The present training delivery method of the having a PowerPoint slides and the training being presented or delivered by a live person seems to be appropriate for the audience that attends the training and seems to effectively reach the audience. Participants that have little to no experience in the storm water arena were observed to be more engaged and asked more questions. Participants with more experience in storm water were observed to be "tuning out" at the beginning of the training sessions (during the first hour or so) when the background information was discussed, as they have heard the message before, but were more engaged when questions were asked and they provided good input and comments.

The existing training program has a post-course survey that is distributed to all participants after the completion of each training session. Participants are asked to complete the survey and provide their opinions of the training. The

present surveys only ask for course satisfaction, but not how trainees would implement the many things they learned. According to a California Stormwater Quality Association (CASQA) report , most NPDES programs use surveys as a method of determining effectiveness of training.[1]

3.2 Recommendations for Potential Improvements

CDM made the following observations and developed the recommendations proposed from examination of the training material and attendance at training sessions. If the recommendations are implemented they would positively enhance the overall effectiveness of the current training programs:

Decrease class size

The number of persons that are allowed to attend each training session is large. As shown previously in Table 1, the smallest attendance number for one of the Spring 2006 training sessions was 34 people. Adult learning theory suggests that adult learners benefit most when they are actively engaged. Interactive exercises are most successful within smaller group sizes. Previous training experience has shown that class sizes between 20 and 30 people maximum allow for more effective training. Attendance of over 30 people potentially leads to a lecture format and participants may not necessarily get the message or may decrease participation during the lecture. This class size reduction would require increasing the number of class training offerings.

Conduct separate training for those with previous training or experience

Training is recommended to be delivered in separate sessions to groups of people with previous experience (focus groups), or that have previously been trained, separately from new staff or those new to the NPDES program areas. By separating training in this manner, more time could be spent on discussing scenarios that experienced staff see in the field and how they resolve issues with use of BMPs, instead of having more experienced attendees "tune out." These focus group meetings can be facilitated by a District staff or by one of the consultants who are presently delivering the training and can also be used to provide updates on new permits and/or regulations. For those new to the NPDES storm water training, more time could be spent discussing regulatory requirements and the impact of storm water pollution so attendees establish a comprehensive background understanding of the NPDES program.

Increase use of breakout sessions/ hands-on exercises

If class size reduction is difficult to accomplish because of the limited number of training sessions available due to costs and logistics, the use of more breakout sessions for smaller focus group (composed of more experienced attendees) discussion and/or hands-on exercises can be implemented to

[1] Stormwater Program Effectiveness Assessment Survey Summary Report, July 2005. Prepared for CASQA by Eisenberg, Olivieri and Associates, Inc. and Larry Walker Associates.

minimize the disadvantages of a large group training environment. Use of small focus groups will provide more class interaction and groups can discuss real case examples, such as those situations encountered by an inspector at an industrial or commercial facility and what actions were taken to resolve the situation. As discussed above, these focus group discussions can be facilitated by a District staff or by one of the consultants who are presently delivering the training.

Develop a common introductory NPDES component

Each of the four training courses currently contains an introductory component that highlights various federal, state, and local water quality laws and regulations, NPDES Permits under which Riverside County and its cities are regulated, requirements of the Permits for each of the programs, water quality impacts, pollutants, and specific responsibilities of the municipal staff. Each introductory module is similar to the others, but has been slightly customized for each of the program areas (New Development/WQMP, Industrial/Commercial, Municipal, and Construction). Developing a common introductory NPDES module is recommended for simplification.

Reduce length of training session

On average, the duration of each of the four introductory portions of the four training courses was observed to be approximately one hour in duration. By separating those previously trained from new attendees, the training sessions for the experienced attendees can be shortened by simply not repeating the introductory NPDES material. Attendees can be trained on specific topics immediately without having to re-train on the introductory material.

Conduct a pre- and post-training assessment (Benchmarking)

A single post-training test is currently administered for each of the four training courses. The WQMP training course used a combination of true/false and multiple choice questions. The Commercial/ Industrial Facilities Inspection BMP training offered in Spring 2006 also included 20 questions (11 multiple choice/9 true or false).

The current structure of the training does not allow for determining if the training leads to application of the knowledge gained by participants. A way to enhance tracking the effectiveness of the training would be to give a test before the training starts (pre-assessment) and another after the training session (post-assessment). Comparing the results of both the pre- and post-training tests would assist the District in determining if the message is being delivered appropriately. Pre and post tests can be a quick way of measuring learning, but they do not measure how participants are implementing the concepts during their day to day operations.

Another potential enhancement could be that, three to six months after the training, participants can be queried again to see if the knowledge they gained

from the training is being assimilated and applied by the participants as they perform their responsibilities related to the NPDES program. Self-reporting does not fully provide an accurate measure of effectiveness and should also be compared to feedback provided by environmental managers responsible for overseeing components of municipal NPDES programs as well as compared to inspection records or reported incidents of spills or discharges. In addition, evaluation forms could be developed that may identify the impact of the training with questions about what participants are going to do differently as a result of the training.

Vary Content Delivery Method

Delivery of the training via an instructor-led classroom session is viewed as being appropriate to the audience, especially when it comes to the detailed training of the various program areas. In fact, post-course evaluations of attendees show a majority of participants prefer classroom-based training followed by video-based and DVD-based training as the next preferred from of training deliver.

A potential enhancement would be to introduce a short course in a computer-based training (CBT) environment that first takes the introductory NPDES material and develops the introductory training modules either in an Internet on-line system, or within a CD-ROM delivery method initially (to reduce initial implementation costs for transitioning from live instructor-led training courses to a CBT course). The introductory NPDES training should be developed by a firm experienced in CBT and adult learning, with cooperation and input from staff experienced in NPDES and stormwater issues. The result would be one training module that is appropriately designed for adult learning, effectively deliver the introductory NPDES information, and encourage participation of the trainees by use of interactive mini quizzes. Assessment types could include multiple choice or true/false tests. After completing the introductory NPDES computer-based introductory modules, the trainee would then be cleared to take an instructor-lead classroom training that goes directly into more "hands-on" NPDES training.

The cost to develop the computer-based introductory training modules can be shared with other counties, as the modules can be customized to each County/Permit requirements. By implementing this CBT, the duration of the current instructor-led classroom training sessions could be shorter and more time could be used to discuss specific details of each program area and to encourage discussion and participation among the attendees. Additional details of CBT are discussed in Appendix A.

During telephone conversations with representatives of San Bernardino and Orange counties, they stated that they think that developing an introductory module in a CBT environment is an excellent idea. If the introductory module is developed in a computer-based environment, it is possible that the District

would benefit from contributing with San Bernardino and Orange Counties for this development, as they have expressed interest in collaborating in such a project. The introductory module could then be developed in a way that most of the information would be consistent across all three counties, and only specific information would be modified to customize them for a specific County and/or Permit. Representatives from the other counties also like the idea of separating participant in groups of beginners and more experience participants, and facilitating sessions with the more advanced participants. Orange and San Bernardino counties presently do not separate training participants into new and experienced NPDES staff.

Add more photos to presentations

The various training modules should add real-life photos and examples of Best Management Practices (BMPs) that are being employed at various residential developments, construction sites, and municipal, industrial, and commercial facilities, which the presenters could use to encourage the participation of attendees and discuss examples to determine whether the BMP is being implemented properly or not. The District could request electronic versions of these photos from the various co-permittees, who are probably already gathering a collection of photos from the many inspections they have already conducted. These photos do not necessarily need to be examples of good and/or effective implementation of BMPs, but also of incorrect implementation of BMPs. Course activities could then include discussion about the proper or improper use of BMPs in a group or smaller focus group discussion, and could also include case studies of applied BMPs.

Creative instruction

Another way to potentially enhance the classroom training would be to use some of those staff that have attended the training previously to co-teach and share their experiences in their specific program area(s). This approach may also result in reducing costs to the District by using consultants to deliver just some and not all of the training.

Supplemental Training Methods

Other training methods that should be considered to supplement the existing classroom type training, is the use of field visits with the groups. This type of activity would provide the participants with the opportunity to visits various facilities such as construction sites, industrial/commercial facilities, and other facilities, and be able to discuss inspection procedures and proper implementation of BMPs. Field visits can be especially good for the advanced, multi-year trainees. Issues that can arise with supplementing training with site visits may be the time that it would take District staff to find an appropriate site and coordinate the visit, and additional time and cost that would be incurred by the participants traveling to the site(s).

Tracking Training Effectiveness

It is recommended that the District considers developing a web-based tracking database application. Such a database can be designed to track training attendance, assessments, and any other information deemed necessary by the District, and could also be designed to print out certificates of participation. A database could also be used to demonstrate to the Regional Board that training is occurring and provide them with reports of attendance.

A much more sophisticated and advanced way of tracking training would be the acquisition and implementation of a Learning Management System (LMS). A LMS is a software platform that provides additional features such as the ability to perform participant registration, response tracking, and recordkeeping. A LMS stores the training modules and additionally has multiple data tracking functions to keep track of enrollment, course completion, training time, correct responses, etc.

Implementation of a LMS can be relatively costly and time consuming to initiate implementation; but, when fully implemented, provides distinct advantages due to its ability to track information. For example, once a participant completes a module and has answered all the "mini quizzes" correctly, the system would allow the trainee to register for more detailed instructor-led NPDES training. In addition, a LMS can be used for other types of training throughout the County. A LMS is not necessary to conduct a web-based training program but would provide additional enhancements to web-based training.

3.3 Cost Considerations

- Developing the introductory module in a CBT environment would require initial costs to transform existing introductory NPDES training content and develop it into an interactive CBT (delivered via CD-ROM). The cost to develop the introductory module on CD-ROM would be potentially $35,000 to $70,000 for a 1-hr module. The final cost would depend on the desired level of interactivity, the extent of use of graphics, and the level of testing and tracking that is built into the training. This estimate also assumes each of the four NPDES program elements includes similar/overlapping content which provides for cost savings. The cost of developing part (the introductory module) of all of the training to a CBT environment could be shared between the District and the counties of San Bernardino and Orange. Also, there is the potential of applying and obtaining a grant for the development of the training.

- In 2004, the consultant costs for development and presentation (2 sessions/6-8 hours each) of training modules (New Development/WQMP training - $16,000; Construction, Industrial/Commercial, and Municipal

Facilities and Activities was approximately $25,000.) In 2006, consultant fees for each training module cost approximately $4,000.

- On-going or additional expenses incurred by the District, such as staff time spent in setup , coordination, review, facility fees, copies of handouts, refreshments, beverages, snacks, etc. have not been estimated.

- Reducing the number of participants per class (20 to 30 participants per class) would potentially increase the District's costs of providing training, since more training sessions of each of the four program elements may be required.

- Acquisition of a Learning Management System (LMS) software and implementation to enable a full web-delivered CBT could cost anywhere from $500,000 to over $1 million. This cost could also be higher depending on the system selected and if computer infrastructure modifications or upgrades are needed.

3.4 Other Considerations

- Depending on the implementation of web-delivered CBT, the refresher classroom training could be delivered by a trainer via the Internet. Trainees may then take the course in groups or individually over the Internet.

- Depending on interest and potential shared funding among the three Counties (San Bernardino, Orange, and Riverside), purchasing a Learning Management System (LMS) and upgrading the CBT to one that is delivered through the LMS via the Internet, could become more affordable if costs were share. A LMS system provides additional benefits: tracking enrollment/participation, record keeping, and web-based system capability.

Appendix A
Computer-Based Training (CBT)

Computer-Based Training (CBT) can be delivered in multiple delivery methods. A CBT program can be delivered via a CD-ROM; online, self-paced training (asynchronous training); or online, instructor-lead (synchronous training). CBT methods are further discussed below. CBT offers several distinct advantages:

- Trainees can take courses tailored to their specific job assignment rather than attending "en-mass" instructor led training.
- CBT courses can be distributed over a wide geography, potentially saving time and money.
- Trainees are free to take the training when and where they please and at a pace that suits their learning needs.
- Self assessments or mini-quizzes can be given to the trainee periodically throughout the course to reinforce concepts. This makes the training more interactive. The CBT can be designed to prohibit the user to advance until all the questions in the mini quiz are answered correctly (or set "pass" rate). At the completion of the course, a quiz can test for overall comprehension and passing this quiz would be a requirement of receiving a course certificate. This helps improve the effectiveness of delivery and better measure that the user is meeting the learning objectives.
- Incorporation of multi-media (e.g. audio, video, customized graphics) further enhances the learning environment and presentation of the material. Material can be organized differently without the restrictions of typical PowerPoint presentations (e.g. "pop-ups" containing information which would normally be shown in a separate slide). Hand out and reference materials can be made accessible at any time, and trainees can print them out if necessary.
- Instructor-led training time is reduced. In this case, each program area would be reduced by at least one hour per session. This would make each session a maximum of 2 hours duration (3 hours for the New Development/WQMP training).

CD-ROM Delivery Method

The participant would utilize a computer and insert the CD-ROM and follow the course at a self-paced manner. The participant can take the self-paced introductory modules on a computer, at their own convenience, and reduce overall training time by eliminating time spent traveling to attend training and time away from the office. Throughout the course, the training could include mini assessments quizzes. At the completion of the course, the participant can

be linked to an email or website that updates a database to show completion of the course.

Delivery of training via this CD-ROM method would not provide a means to determine the length of time a participant took to complete the course. Another, drawback of this delivery method is that it is challenging to manage new releases of the training. The CD version of the training would potentially be difficult to control as new updated training versions are developed and distributed. The administrator of the training would need to ensure participants are utilizing the latest CD-ROM versions.

Online Self-Paced Delivery Method

CBT can also be delivered within a web-based online environment in which the course content is maintained. A participant could log into a website and take the training course online at his own pace, at one sitting, or log out and return to the training at a later time. Similar to the CD-ROM delivery method, the content could be designed to be very interactive with assessments paced throughout the course. Course version would not be a factor as in the case of CD-ROM delivery method. Users can take only the modules that are applicable to their specific job assignment rather sit through lengthy instructor led training.

The introductory modules can be developed in such a way that a "mini quiz" is given to the participant periodically (every 4-5 screens) to reinforce concepts. This makes the module interactive. The system would not allow the user to advance to the next screen until all the questions in the mini quiz are answered correctly (or set "pass" rate), to ensure that the information is being effectively delivered, and that the user understands the concepts.

The duration of the detailed instructor lead training for each program area would be reduced by at least one hour per session. This would make each session a maximum of 2 hours duration (3 hours for the New Development/WQMP training).

If desired, the introductory modules can be developed to potentially provide Continuing Education Units (CEUs) or Professional Development Hours (PDHs). In this case, IACET requirements are stringent and include assessments/tests and a passing score.

Online Instructor-Led Delivery Method

This delivery method is similar to the online self-paced method except that the course would be lead and thus paced by the instructor. Participants would call into a conference telephone line and listen to the course instructor while following online via a website.

Riverside County
Storm Water - Clean Water Program
Fall 2005 Training Evaluation

Summary of Training Participants' Numerical Evaluation of Training

	WQMP					Industrial/Commercial					Municipal					Construction Site				
Number of Attendees	60					58					79					94				
Number of Evaluations	43					42					58					67				
Satisfactory = 1 Excellent = 5	*1*	*2*	*3*	*4*	*5*	*1*	*2*	*3*	*4*	*5*	*1*	*2*	*3*	*4*	*5*	*1*	*2*	*3*	*4*	*5*
A. Presentation																				
1. Presentation materials/content		1	3	11	28			8	23	11				26	25			4	8	10
2. Clarity of information		1	3	14	25			10	19	10				26	22			2	8	12
3. Usefulness of information			3	8	30			7	17	14			1	22	16			1	10	11
4. Length of presentation		1	4	11	25		2	7	25	6		1	2	26	19		1	5	6	9
B. Presenter																				
1. Presenter's knowledge of subject			2	4	37			4	13	23			2	15	36				6	16
2. Ability to answer			2	7	32			4	18	17				15	34				7	15
3. Presenter kept me interested		1	3	12	25		5	6	13	14			3	19	27			2	11	9
C. Room Location																				
1. Visibility of presentation			2	7	34			1	21	19				18	32		1	1	10	10
2. Sound quality			3	6	32			1	19	17				18	29			1	8	13

Riverside County
Storm Water - Clean Water Program
Fall 2005 Training Evaluation

Summary of Training Participants' Narrative Comments on Training

	WQMP	Industrial/Commercial	Municipal	Construction Site
D. The most useful information for me was:				
	All (5)	Everything (2)	Everything (9)	Presentation (5)
	Hands on project (8)	BMPs in industrial sites	Maintenance yard challenges	Local agency liabiities
	Scope/coverage requirements (3)	Examples for inspections (4)	Overall materials (2)	EC and SC (6)
	Conditions of approval	Review of municipal permit (2)	Landscape / graffitti procedures	Erosion prevention
	Concepts	Handouts	Municipal facility plans	BMP Examples
	Handouts and Exhibits (4)	New enforcement actions	Only rain in the drain	SWPPP design
	Process and BMP use information	Personal experiences	Containment	Presenter and video
	303(d) - Canyon Lake		Case studies	Everything (5)
	WQMP		Fueling and maintenance	Drain protection
	Triad Approach		Pool water and steam cleaning	Preparing for rain events
				Sediment basins for sed. control
				Keeping me current
				Handouts and presentation (5)
				Definitions concerning NPDES
				Local ordinances
				Information and laws
				Pollution and control examples
				Photos of Good Vs Bad
				Videos
E. The least useful information for me was:				
	Copy of slides	Good overview, but too broad	Illicit connections	Housekeeping
	The test	Mobile washing info not accurate	Permits and requirments (2)	SWPPP preparation information
	Information on SMR Watershed	Fine schedule is not one I use	Graffitti	Information presented by FCD
				On-site BMPs
				Tracking controls

Riverside County
Storm Water - Clean Water Program
Fall 2005 Training Evaluation

Summary of Training Participants' Narrative Comments on Training

	WQMP	Industrial/Commercial	Municipal	Construction Site
F. What type of additional information would you like to see presented in the class:				
	Phase II training for folks that	Examples - dealing w/ violators	I felt the class was complete	More erosion control
	Coordination with Code Enfmt.	Enforcement information	New alternative methods	More pollution prevention
	Spanish handouts (2)	Mobile cleaning technologies	CD	More on FCD education materials
	More photos	Copies of permits	More on trash	Focus on BMP implementation
	WQMP information	Field inspector names/contacts		Compare BMP methods
	Comparisons between methods	Inspection case studies		
G. Additional Comments:				
	Add technical BMP design to class	Good information but needed	Class was very motivational	Covered material too fast
	Provide class updates	Information was sufficiently	Allow 8 hours not 4 hours for class	Good presentation (2)
	Project review process information	Presenter was clear and concise	Site specific examples	
	Improved my understanding of	Presenter was mono tone	Road maintenance examples	
	Allow more time for the class	Some writing on slides was too	Sewer maintenance examples	
	Room was too small for the class	Presentation was too short	Good job	
	The final acronymns	More breaks		
	Very good	Too many acronyms		
	Slower for staff w/o drainage exp.	Presenter must know all permits		
	Add more on water quality issues	Presenter avoided enforcement		
	Answers vague due to breadth of			
	Go slower			
H. What is your specific area of expertise:				
	Co-permitee	Residential Under New	Street Clean up	Inspection
	MS4	Construction BMPs (2)	Water Discharge	Parks
	NPDES Coordinator	Permit Coordination	Administrative	Local Bldg Official
	Planning (4)	Lanfill, Transfer Stations	Storm Water Program Coordinator	Maint. Svc
	WQMP Plan Check (4)	Storm Water Program Coordinator	Public Workes / Streets	SWPPP
	Storm Water Project Coordinator	NPDES Requirements	Waste Oil / Fuel	Storm Water Coordinator
	SWPPP	Code Enforcement	Irrigation	Code Enforcement (2)
	BMP verification	Illegal Discharges	Herbicide Application Sensitive	SWPPP Inspector (7)
	Construction		Field Insp & Sampling for EMWD	Discharge
	Grading Permits		Generalist	Drainage
				Sampling

Riverside County
Storm Water - Clean Water Program
Fall 2005 Training Evaluation

Summary of Training Participants' Preferences for Future Training

I. How do you prefer to receive training on the NPDES progam? Please rank the following delivery formats from 1 (for least preferred) to 5 (for most preferred) training delivery mechanism:	WQMP					Industrial/Commercial					Municipal					Construction Site				
Least Preferred = 1 Most Preferred = 5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
Classroom	4	2	2	1	28	4	1	1	1	20	6	2		1	17	3	3	1	2	34
Video Tape	4	4	1	1	6	3	3	2	4	6	3	2	4	1	6	5	2	6	3	16
CD-Rom		4	5	5	1	1	3	6	1		4	3	5	4	1	2	5	3	6	8
DVD	2	4	5	3	1		2	4	7		2	3	2	5	6	2	3	7	6	11
Web-based	3	1	2	6	3	3	3	1	3	2	3	2	4		8	6	6	2	2	5

J. Please Check the equipment and resources you have routine access to at work:	Computer	DVD Player	VCR	Internet	Computer	DVD Player	VCR	Internet	Computer	DVD Player	VCR	Internet	Computer	DVD Player	VCR	Internet
	37	17	13	30	25	13	19	23	30	15	20	15	43	23	25	35

Riverside County Storm Water – Clean Water Program
Commercial/Industrial Facilities Inspection
Spring 2007

April 30, 2007
Riverside County

Test #1

15 tests taken
Average – 63%
Question #25 – 15 true
0 false

Test #2

19 tests taken
Average – 84%
Question #25 – 19 true
0 false

Patterns Observed in Test #2

Question #20 – True or False: All industrial/commercial facilities require coverage under GIASP?
12 answered incorrectly (63%)

Evaluations

17 evaluations completed

Presentation: 53% gave a '5'- the rest 4's

Presenter: 76% gave a '5' – the rest '4's

Room Location: 59% gave '5' – however some 3's and 4's

AEI-CASC Engineering, Inc.
Riverside County Stormwater-Clean Water Program
Training for Construction Site Inspectors
Spring 2007

Overview of Tests Given

Pre-Test #1 (out of 22 questions):
46 participants
Average-**76%**
Question #25 **26**-True
2-False

Post-Test #2 (out of 22 questions):
48 participants
Average-**85%**
Question #25 **42**-True
2-False

General Observation of Patterns:
Questions most answered incorrectly: (these questions are knowledge based and more complicated)
Question #20- What is an illicit connection?
Question #24- What are proximate receiving waters?

(This question is not clear the way it is written)
Question #5-What BMP's are required to address the condition shown in Photo C?

Survey Results:

A brief overview of the surveys revealed:

Section 1: Presentation: Overall a **4**
"Too Long",
Section 2: Presenter: Overall a **5**
There are comments stating the presenter had good "knowledge of the subject", "Very upbeat", "Able to answer questions", "Made subject matter interesting".
Section 3: Room Location: overall a **4**
Least Useful Information: section 1
Additional Comments: "liked the healthy snacks"
"Liked the snickers"

WEBPAGE COUNTER

APPENDIX C

2006/07 ANNUAL REPORT RIVERSIDE COUNTY FIRE DEPARTMENT HAZARDOUS MATERIALS EMERGENCY RESPONSE TEAM ACTIVITIES

RIVERSIDE COUNTY FIRE DEPARTMENT

210 West San Jacinto Avenue • Perris, California 92570 • (909) 940-6900 • Fax (909) 940-6910

John Hawkins
Fire Chief

Proudly serving the unincorporated areas of Riverside County and the Cities of:

Banning
❖
Beaumont
❖
Calimesa
❖
Canyon Lake
❖
Coachella
❖
Desert Hot Springs
❖
Indian Wells
❖
Indio
❖
Lake Elsinore
❖
La Quinta
❖
Moreno Valley
❖
Palm Desert
❖
Perris
❖
Rancho Mirage
❖
San Jacinto
❖
Temecula

Board of Supervisors

Bob Buster, District 1

John Tavaglione, District 2

Jim Venable, District 3

Roy Wilson, District 4

Marion Ashley, District 5

September 14, 2007

To: Riverside County Flood Control and Water Conservation District NPDES Section

Re: 2006/07 Annual Report on Hazardous Materials Emergency Response Team Activities

Attached is the Annual Report on Hazardous Materials Response Team activities for FY 2006/2007. Responses included in this annual summary are for the Santa Ana, Santa Margarita and Whitewater Rivers and the respective Regional Boards. Should you require clarification or further information, please contact us at your convenience.

Respectfully submitted,

Robert H. Becker Jr.
Fire Apparatus Engineer/Hazmat Specialist
Hazardous Materials Response Team 34
(951) 926 3591

2006/07 Annual Report
Riverside County Fire Department
Hazardous Materials Emergency Response Team Activities

Santa Ana, Santa Margarita and Whitewater Regions

September 14, 2007

Prepared for

Riverside County Flood Control and Water Conservation District

Cal Fire/Riverside County Fire Department
210 West San Jacinto Street
Perris, CA 92570

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1.0 Summary

This report addresses the Riverside County Fire Department's Hazardous Materials Response Team activities for the period of July 1, 2006 to June 30, 2007. The report details program development, public outreach efforts, municipal staff training, runoff prevention measures, and call summary. Hazardous Material Response Team activities included in this report were actual hazardous material releases that potentially threatened the watersheds of the Santa Ana, Santa Margarita, and Whitewater Rivers overseen by the Riverside County Flood Control and Water Conservation District.

2.0 Introduction to the Hazardous Materials Response Team

The 2006/2007 Annual Report on Hazardous Materials Emergency Response Team Activities summarizes responses to environmental emergencies for the purpose of controlling the release of toxic materials and minimizing the impact on public safety and the environment. The Riverside County Fire Department Hazardous Materials Response Team, established in 1986, continues with its mission of providing service within Riverside County through a partnership program that combines the efforts from Cal Fire/Riverside County Fire Department and the Hazardous Material Branch of Riverside County Environmental Health.

The Hazardous Materials Response Team responds to environmental emergencies within the County of Riverside and proves mutual aid to Imperial County. An additional responsibility of the HMRT is oversight and coordination of the NPDES Storm Water Discharge Permit for Riverside County Fire Department facilities. The HMRT oversees maintenance and implementation of the Storm Water Pollution Prevention Program (SWPPP) for county fire stations and facilities which includes the implementation of Best Management Practices (BMPs) municipal employee training and Riverside County Fire Fighting Agencies BMPs.

Riverside County Fire Department is one of the largest fire departments within California in both geographic coverage and firefighting personnel, providing emergency service to Riverside County and the cities of Banning, Beaumont, Calimesa, Coachella, Desert Hot Springs, Indian Wells, Indio, La Quinta, Moreno Valley, Palm Desert, Perris, Rancho Mirage, San Jacinto, and Temecula. The Riverside County Fire Department operates 94 fire stations with over 1200 employees.

3.0 Program Management and Development

With the continued development and population growth of Riverside County, total numbers of emergency incidents are increasing. Riverside County Fire Department is committed to meeting the demand for public service and has developed plans and contingencies for continued expansion through placement of new facilities and additional personnel. With the increase in the total number of emergency incidents, there is a related increase in Hazardous Materials related incidents. The Hazardous Material Response Team is meeting this increase in service with the following program developments:

- FY 2001/2002, this year saw the development of two dedicated Hazardous Materials Response Teams, consisting of five Firefighter/Hazardous Material Technicians per team. Team One is located in Winchester, CA and Team Two is located in Palm Desert, CA.

- FY 2002/2003, the purchase of three new hazardous materials response vehicles, consisting of two support trucks, and a tractor-trailer main unit. The main unit was assigned to Hazmat Team 1 and one support truck is assigned to each team. There have been additional purchases of equipment and monitors to ensure a full compliment of tools for both teams.

- FY 2003/2004, two Mass Decontamination Response Trailers, capable of treating 200 patients per hour, were purchased with grant money and placed in-service for both teams. A change in the designators for the Hazardous Materials Response Teams was made; "Hazmat 1" and "Hazmat 2" became "Hazmat 34" and "Hazmat 81", to reflect the geographic locations of the Hazmat Response teams, improving communications and organization.

- FY 2004/2005, participating fire departments within Riverside County developed Best Management Practices (BMPs) that are intended to be used by fire fighting agencies for urban runoff management. These BMPs are a requirement of the Riverside County Municipal Stormwater permit (section XI.B) adopted by the Santa Ana Regional Water Quality Control Board (SARWQCB). Due to an operational need the two response teams were combined into one team and separated into three locations.

- FY 2005/2006, the Hazardous Materials Response Team was reorganized into two distinct teams, Hazmat 34 at Winchester Fire Station 34 and Hazmat 81 at North Bermuda Dunes Fire Station 81. Daily on duty staff is 10 Hazardous Materials Specialists providing service to the county.

- FY 2006/2007, approximately $25000.00 was expended on Vetter air bags to replace older complements and add to the capabilities of Hazmat 81. Vetter air bags are a significant tool that can be used to occlude accidental discharges from impacting the storm water system. Further developments, the installation of MDTs (mobile data terminals) in all front line fire equipment, and Riverside County environmental health officer vehicles. This allows for improvements in locating and responding to incidents, orthographic mapping of incidents and integrating technology which the ability to access the Health Department's Business Response Plans. A $400,000 purchase has been approved to replace the main Hazmat Response Team vehicle at Station 81 and it is scheduled to be placed in service in FY 2007/2008.

4.0 Public Education

The Hazardous Materials Response Team is available for public education, and dedicates time to provide information and education regarding environmental safety and Storm Water Pollution Prevention. Both teams have participated in public relation and education events during FY 2006/2007 on an average of 1- 2 per month. Hazmat Response Team personnel are made available to provide information and education through direct public contact, and materials. These events have included:

- The Riverside County Fair held annually at Indio, CA.
- Educational presentations at public schools, grades K through 12.
- Safety fairs held at the cities of La Quinta, Hemet, Perris, Moreno Valley, and Temecula.
- Public events within Riverside County.

Public information and education is provided through materials that the Hazardous Materials Response Team hands out during the various events that are attended during the year and information that team members provide during equipment displays.

- "Household Hazardous Waste Collection Site Schedule" (schedule) Riverside County Environmental Health.
- "Household Hazardous Waste" (pamphlet), Stormwater Cleanwater Protection Program.

- "Stormwater Pollution, What You Should Know" (pamphlet) Stormwater Cleanwater Protection Program.
- "Stormwater Pollution, Outdoor Cleaning Activities" (pamphlet) Stormwater Cleanwater Protection Program.
- "Storm Drains Flow directly to our Waterways" (poster) Stormwater Cleanwater Protection Program.

5.0 Municipal Employee Training

Successful Storm Water Pollution Prevention is dependent upon a standard operation policy and effective education of department employees. Team members from the Hazardous Material Response Team are available to train and educate the approximately 1200 Riverside County Fire Department personnel on the Storm Water Pollution Prevention Program and the National Pollution Discharge Elimination System. In previous years, the training was conducted at individual fire stations, or during employee orientation at Clark Training Center.

To comply with NPDES permit requirements for municipal employee training, and to ensure a consistent training program, Riverside County Fire Department produced a video training program that is distributed to all 95 fire department facilities to compliment the SWPPP manuals that are available for reference at the facilities. Employees are encouraged to view the program on an annual basis. The training covers BMPs, (best management practices) that apply to municipal facilities.

Fire Station/Municipal Facility Activities

- Dispensing of Fuel.
- Vehicle and equipment parking and storage.
- Vehicle and equipment maintenance.
- Vehicle and equipment washing and cleaning.
- Leak and spill cleanup.
- Landscape, garden, and general maintenance and cleaning.
- Loading, handling, storage of chemicals, oil, trash, and debris.

6.0 Prevention Measures

Members of the Hazardous Materials Response Team were involved in the development of best management practices (BMPs) that are used by participating Riverside County fire fighting agencies for urban runoff management. These best management practices were a requirement of the Riverside County Municipal Storm Water Permit (section XI.B) adopted by the Santa Ana Regional Water Quality Control Board in 2004.

The Riverside County Fire Chief's Association adopted the fire department activities to provide guidance to firefighting personnel for management of urban runoff. The BMPs, when followed, minimize discharges of runoff to the municipal separate storm sewer system (MS4) associated with firefighting activities such as fire training, emergency scene spills, discharges and firefighting.

The following Emergency and Non-emergency Firefighting Activities were addressed:

- Discharges associated with fire training activities.
- Discharges associated with post-emergency fire fighting activities.
- Discharges associated with activities conducted at fire department facilities.
- Discharges associated with emergency fire fighting activities.
- Stormwater NPDES training of fire department employees.

7.0 Incident Summary

From July 2006 through June of 2007, Hazardous Materials Response Teams, Hazmat 34 and Hazmat 81, responded to a total of **580** hazardous material related incidents. **117** of these incidents were a threat or potential threat to the stormwater system of Riverside County Flood Control and the Santa Ana, Santa Margarita and Whitewater watersheds.

- Hazardous Materials Fires **6**
- Clandestine Drug Lab **1**
- Illegal Dumping **55**
- Spills at Fixed Facilities **6**
- Spills from Mobile Property and Equipment **49**

Total **117**

The average length of time spent on a hazardous materials related incident is two hours. Based on **117** flood control related incidents, the Hazardous Materials Response Team provided **406** service hours to the Riverside County Flood Control District.

Incident Date	Incident Number	Station PRA	Watershed	Type of Hazmat
07/03/06	6056277	3,Nuevo	Santa Ana	ILD
07/07/06	6057623	6,MoVal	Santa Ana	ILD
07/10/06	6058634	90,Perris	Santa Ana	SPM
07/13/06	6059515	58,MoVal	Santa Ana	ILD
07/15/06	6060422	88,Indio	Whitewater	SPM
07/17/06	6060952	2,MoVal	Santa Ana	ILD
07/19/06	6061472	24,Cabazon	Whitewater	ILD
07/20/06	6061841	16,Pedley	Santa Ana	ILD
07/26/06	6063979	58,MoVal	Santa Ana	ILD
08/07/06	6067599	61,Wildomar	Santa Ana	ILD
08/09/06	6068161	81,P.Desert	Whitewater	SPM
08/14/06	6069501	12,Temecula	San Diego	SPM
08/17/06	6070403	2,MoVal	Santa Ana	SPM
08/17/06	6070474	4,Cajalco	Santa Ana	ILD
08/23/06	6072273	1,Perris	Santa Ana	ILD
08/26/06	6073237	58,MoVal	Santa Ana	SPM
09/02/06	6075369	58,MoVal	Santa Ana	ILD
09/11/06	6078102	73,Temecula	San Diego	SPM
09/16/06	6079683	19,HighGrv	Santa Ana	ILD
09/20/06	6080783	59,MeadVal	Santa Ana	ILD

09/20/06	6080820	25,S.Jacinto	Santa Ana	SPM
09/21/06	6081042	94,L.Elsinore	Santa Ana	ILD
09/21/06	6081067	4,Cajalco	Santa Ana	ILD
09/30/06	6083819	54,Homeland	Santa Ana	ILD
10/01/06	6084062	36,N.PalmSpr	Whitewater	SPM
10/02/06	6084339	89,Banning	Santa Ana	SPM
10/04/06	6084933	54,Homeland	Santa Ana	ILD
10/08/06	6086100	16,Pedley	Santa Ana	SPM
10/09/06	6086344	66,Beaumnt	Santa Ana	SPM
10/12/06	6087190	13,HomeGrdn	Santa Ana	ILD
10/24/06	6090899	15,ElCerrito	Santa Ana	HZF
10/27/06	6091583	89,Banning	Santa Ana	SPM
10/31/06	6092856	4,Cajalco	Santa Ana	ILD
10/31/06	6092908	73,Temecula	San Diego	SPM
11/06/06	6094714	27,Eastvale	Santa Ana	ILD
11/15/06	6097156	17,GlenAvon	Santa Ana	SPM
11/17/06	6097877	25,S.Jacinto	Santa Ana	ILD
11/25/06	6100396	42,Thermal	Whitewater	HZF
11/27/06	6101050	66,Beaumnt	Santa Ana	SPM
11/29/06	6101439	24,Cabazon	Whitewater	SPM
12/02/06	6102485	7,SunCity	Santa Ana	SPM
12/08/06	6104362	17,GlenAvon	Santa Ana	ILD
12/12/06	6105613	59,MeadVal	Santa Ana	ILD
12/12/06	6105653	34,Winchestr	Santa Ana	ILD
12/19/06	6107823	78,S.Jacinto	Santa Ana	SPM
12/24/06	6109426	Murrieta	San Diego	SPM
12/25/06	6109741	78,S.Jacinto	Santa Ana	SPM
01/01/07	7000182	87,Indio	Whitewater	ILD
01/06/07	7001718	72,ValVista	Santa Ana	DRUG
01/06/07	7001739	68,Menifee	Santa Ana	ILD
01/06/07	7001874	66,Beaumnt	Santa Ana	ILD
01/09/07	7002657	35,Thous.Palms	Whitewater	SPM
01/10/07	7003064	78,S.Jacinto	Santa Ana	ILD
01/14/07	7004459	34,Wincheter	Santa Ana	HZF
01/14/07	7004491	1,Perris	Santa Ana	ILD
01/15/07	7004886	58,MoVal	Santa Ana	HZF
01/22/07	7007155	25,S.Jacinto	Santa Ana	SPM
01/31/07	7009853	17,GlenAvon	Santa Ana	SPM
01/31/07	7009855	38,Rubidoux	Santa Ana	SPM
02/02/07	7010639	66,Beaumnt	Santa Ana	SPM
02/07/07	7012289	76,Menifee	Santa Ana	ILD
02/10/07	7013231	61,Wildomar	Santa Ana	ILD
02/16/07	7014967	65,MoVal	Santa Ana	SPM
02/16/07	7015030	5,QuailVal	Santa Ana	SPM
02/21/07	7016565	32,LaQuinta	Whitewater	ILD
02/23/07	7017276	35,Thous.Palms	Whitewater	SPM
02/26/07	7018124	50,R.Mirage	Whitewater	SPF
02/27/07	7018394	84,Temecula	San Diego	ILD
02/28/07	7018834	17,GlenAvon	Santa Ana	SPM

03/02/07	7026750	68,Menifee	Santa Ana	SPM
03/03/07	7019653	73,Temecula	San Diego	SPM
03/03/07	7019746	73,Temecula	San Diego	ILD
03/03/07	7019828	6,MoVal	Santa Ana	ILD
03/04/07	7019990	36,N.PalmSpr	Whitewater	SPM
03/06/07	7020581	68,Menifee	Santa Ana	SPM
03/23/07	7026216	27,Eastvale	Santa Ana	ILD
03/24/07	7026587	72,ValVista	Santa Ana	ILD
03/25/07	7026843	42,Thermal	Whitewater	ILD
03/25/07	7026702	15,ElCerrito	Santa Ana	SPM
03/26/07	7027011	66,Beaumnt	Santa Ana	SPM
03/28/07	7027638	90,Perris	Santa Ana	ILD
03/29/07	7027993	13,HomeGrdn	Santa Ana	SPF
04/03/07	7029656	41,N.Shore	Whitewater	SPM
04/04/07	7029844	12,Temecula	San Diego	ILD
04/04/07	7029888	34,Winchester	Santa Ana	SPF
04/07/07	7030784	17,GlenAvon	Santa Ana	SPM
04/09/07	7031605	Murrieta	Whitewater	SPM
04/09/07	7031457	12,Temecula	San Diego	ILD
04/10/07	7031741	66,Beaumnt	Santa Ana	ILD
04/14/07	7033092	38,Rubidoux	Santa Ana	ILD
04/16/07	7033677	16,Pedley	Santa Ana	ILD
04/19/07	7034545	83,Temecula	San Diego	ILD
04/26/07	7036787	94,L.Elsinore	Santa Ana	SPM
04/27/07	7037064	94,L.Elsinore	Santa Ana	SPM
05/02/07	7038791	18,W.Riverside	Santa Ana	SPF
05/03/07	7039065	34,Winchestr	Santa Ana	SPM
05/03/07	7039117	92,Temecula	San Diego	SPF
05/07/07	7040388	93,LaQuinta	Whitewater	ILD
05/08/07	7040795	17,GlenAvon	Santa Ana	HZF
05/09/07	7041180	88,Indio	Whitewater	ILD
05/18/07	7043850	1,Perris	Santa Ana	ILD
05/23/07	7045523	12,Temecula	San Diego	SPM
05/25/07	7046025	58,MoVal	Santa Ana	SPM
05/28/07	7046972	6,MoVal	Santa Ana	ILD
06/01/07	7048118	65,MoVal	Santa Ana	SPM
06/08/07	7050240	92,Temecula	San Diego	SPM
06/08/07	7050342	1,Perris	Santa Ana	ILD
06/13/07	7051883	66,Beaumnt	Santa Ana	ILD
06/16/07	7052824	22,CherryVal	Santa Ana	SPF
06/17/07	7053191	53,GarnerVal	Santa Ana	ILD
06/18/07	7053592	68,Menifee	Santa Ana	ILD
06/22/07	7054754	21,Calimesa	Santa Ana	SPM
06/24/07	7055548	89,Banning	Santa Ana	SPM
06/25/07	7055736	89,Banning	Santa Ana	HZF
06/26/07	7055961	34,Winchester	Santa Ana	ILD
06/28/07	7056637	17,GlenAvon	Santa Ana	SPM
06/29/07	7057012	28,Sage	San Diego	ILD

APPENDIX D

TRAINING ATTENDANCE SHEETS AND FLYERS

NPDES

STORMWATER QUALITY TRAINING FOR

I.) Construction
II.) Industrial / Commercial
III.) Municipal
IV.) Water Quality Management Plan (WQMP)

NO FEE TRAINING

Training: The Riverside County National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer Systems (MS4) Permits require annual training. The Santa Ana Regional Water Quality Control Board (RWQCB) Permit also requires new employees to receive training within six months of hire.

TO REGISTER: ***INTERNET ACCESSS IS REQUIRED TO REGISTER.*** *Please have all of the information below ready and register on-line at* www.eplyevents.com/riversidenpdes. *To help maintain class sizes you can only register 1 applicant for each log-in.* **Registration deadline is September 22, 2006**. **Seating is limited, so register early!**

- ATTENDEE'S NAME
- MUNICIPALITY
- DEPARTMENT
- CONTACT
- PHONE#
- EMAIL
- CLASS THEY WISH TO ATTEND
- FAX #

Overflow classes will be held in at the Murrieta City Hall. **The overflow class location will be closed unless reservations fill up in the other sessions. Hopefully we'll have a good idea if we need to open the class well in advance of the 15th of September. If classes do fill up we can open some of the Murrieta classes and extend the registration deadline. This should provide advance notice for any cancellations that may take place for our Murrieta locations.*

WHO SHOULD ATTEND:

I.) Construction Training is for building and construction staff that conducts:

- Construction Site Inspections / Enforcement
- Public Works Construction Activities
- Grading/Building Permit review staff (should attend 1 class, either WQMP or Construction, which ever is newest)
- Any staff reviewing or preparing construction project SWPPPs.

II.) Industrial Commercial Training is for health, building and code enforcement staff that conducts:

- Industrial/Commercial Site Inspections / Enforcement for Water Quality Ordinances

III.) Municipal Training is for municipal maintenance workers in:

- Building Services
- Parks Department
- Fleet Services
- Warehouse/Receiving Personnel
- Building & Grounds Maintenance

IV.) WQMP Training is for:

- Planning staff
- Engineering staff
- Plan Review and Plan Check staff
- Grading/Building Permit review staff (should attend 1 class, either WQMP or Construction, which ever is newest)
- Post-construction BMP inspectors interested in learning about the BMP design basis

I.) *CONSTRUCTION TRAINING*

WORKSHOP TOPICS:

- NPDES Regulatory Framework Overview
- Overview of General Construction Permit
- Site Inspection Responsibilities
- Enforcement Options
- Erosion/Sediment Control Best Management Practices (BMPs)
- Municipal Stormwater Permit Requirements
- Runoff Sampling and Analysis
- Post Construction BMPs
- Constituents of Concern in Urban Runoff from Construction Site Activities
- Storm Water Pollution Prevention Plans (SWPPP)

	Date and Time	Location
1	**Monday, October 2, 2006 - Half-Day Training (AM)** 9:00 A.M. – 12:00 A.M.	**Riverside County Flood Control & Water Conservation District** 1995 Market Street – Conference Room 1 Riverside, CA 92501 Phone: 951.955.1200
2	**Monday, October 16, 2006 - Half-Day Training (PM)** 1:00 P.M. – 4:00 P.M.	**Riverside County Flood Control & Water Conservation District** 1996 Market Street – Conference Room 1 Riverside, CA 92501 Phone: 951.955.1201
3	**Thursday, October 12, 2006 -** Half-Day Training (AM) 9:00 A.M. – 12:00 P.M.	**Palm Springs Convention Center** 277 N. Avenida Caballeros - Parking at the NE corner of Amado Rd. and Alvarado Rd. Palm Springs, CA 92262 Phone: 800.333.7537
4	**Tuesday, October 17, 2006 -** Half-Day Training (PM) 1:00 P.M. – 4:00 P.M.	**Palm Springs Convention Center** 277 N. Avenida Caballeros - Parking at the NE corner of Amado Rd. and Alvarado Rd. Palm Springs, CA 92262 Phone: 800.333.7537
5	**Tuesday, October 10, 2006 - Half-Day Training (PM)** 1:00 P.M. – 4:00 P.M.	**Murrieta City Hall*** 26442 Beckman Court - City Counsel Chambers (Street parking and entrance is through the rear of the building) Murrieta, CA 92562 Phone: 951.461.6075
6	**Wednesday, October 18, 2006 - Half-Day Training (AM)** 9:00 A.M. – 12:00 P.M.	**Murrieta City Hall*** 26443 Beckman Court - City Counsel Chambers (Street parking and entrance is through the rear of the building) Murrieta, CA 92562 Phone: 951.461.6076

II.) INDUSTRIAL / COMMERCIAL TRAINING

WORKSHOP TOPICS:

- NPDES Regulatory Framework Overview
- Overview of General Industrial Activities Storm Water Permit (GIASP)
- Municipal Stormwater Permit Requirements
- County and City Stormwater Ordinances
- Protocols for Industrial/Commercial Facilities Inspections
- Drainage Area Management Plan (DAMP) and Enforcement/Compliance procedures
- Pollution Prevention Plans (PPPs)
- Best Management Practices (BMPs)
- Constituents of Concern in Urban Runoff from Industrial/Commercial Facilities

	Date and Time	Location
1	**Tuesday, October 3, 2006 - Half-Day Training (AM)** 8:00 A.M. – 11:00 A.M.	**Riverside County Flood Control & Water Conservation District** 1996 Market Street – Conference Room 1 Riverside, CA 92501 Phone: 951.955.1201
2	**Monday, October 23, 2006 - Half-Day Training (PM)** 1:00 P.M. – 4:00 P.M.	**Riverside County Flood Control & Water Conservation District** 1997 Market Street – Conference Room 1 Riverside, CA 92501 Phone: 951.955.1202
3	**Wednesday, October 11, 2006 -** Half-Day Training (PM) 1:00 A.M. – 4:00 A.M.	**Palm Springs Convention Center** 277 N. Avenida Caballeros - Parking at the NE corner of Amado Rd. and Alvarado Rd. Palm Springs, CA 92262 Phone: 800.333.7536
4	**Thursday, October 19, 2006 -** Half-Day Training (AM) 9:00 P.M. – 12:00 P.M.	**Palm Springs Convention Center** 277 N. Avenida Caballeros - Parking at the NE corner of Amado Rd. and Alvarado Rd. Palm Springs, CA 92262 Phone: 800.333.7537
5	**Thursday, October 5, 2006 - Half-Day Training (PM)** 1:00 P.M. – 4:00 P.M.	**Murrieta City Hall*** 26443 Beckman Court - City Counsel Chambers (Street parking and entrance is through the rear of the building) Murrieta, CA 92562 Phone: 951.461.6076
6	**Monday, October 9, 2006 - Half-Day Training (AM)** 8:00 A.M. – 11:00 P.M.	**Murrieta City Hall*** 26444 Beckman Court - City Counsel Chambers (Street parking and entrance is through the rear of the building) Murrieta, CA 92562 Phone: 951.461.6077

III.) MUNICIPAL TRAINING

WORKSHOP TOPICS:

- NPDES Regulatory Framework Overview
- Municipal Stormwater Permit Requirements
- Best Management Practices
- Pollution Prevention Plans
- Storage & Disposal of Chemicals
- Vehicle Cleaning & Maint.
- Pesticides & Fertilizers
- Painting Activities
- Landscape Maintenance
- Outdoor Loading Activities
- Pavement & Parking Lot Cleaning
- Parks Maintenance Activities
- Constituents of Concern in Urban Runoff from Municipal Facilities and Activities

	Date and Time	Location
1	**Monday, October 2, 2006 - Half-Day Training (PM)** 1:00 P.M. – 4:00 P.M.	**Riverside County Flood Control & Water Conservation District** 1996 Market Street – Conference Room 1 Riverside, CA 92501 Phone: 951.955.1201
2	**Monday, October 16, 2006 - Half-Day Training (AM)** 9:00 P.M. – 12:00 P.M.	**Riverside County Flood Control & Water Conservation District** 1997 Market Street – Conference Room 1 Riverside, CA 92501 Phone: 951.955.1202
3	**Thursday, October 12, 2006 -** Half-Day Training (PM) 1:00 P.M. – 4:00 P.M.	**Palm Springs Convention Center** 277 N. Avenida Caballeros - Parking at the NE corner of Amado Rd. and Alvarado Rd. Palm Springs, CA 92262 Phone: 800.333.7535
4	**Tuesday, October 17, 2006 -** Half-Day Training (AM) 9:00 P.M. – 12:00 P.M.	**Palm Springs Convention Center** 277 N. Avenida Caballeros - Parking at the NE corner of Amado Rd. and Alvarado Rd. Palm Springs, CA 92262 Phone: 800.333.7536
5	**Tuesday, October 10, 2006 - Half-Day Training (AM)** 9:00 A.M. – 12:00 P.M.	**Murrieta City Hall*** 26443 Beckman Court - City Counsel Chambers (Street parking and entrance is through the rear of the building) Murrieta, CA 92562 Phone: 951.461.6076
6	**Wednesday, October 18, 2006 - Half-Day Training (PM)** 1:00 P.M. – 4:00 P.M.	**Murrieta City Hall*** 26444 Beckman Court - City Counsel Chambers (Street parking and entrance is through the rear of the building) Murrieta, CA 92562 Phone: 951.461.6077

IV.) WQMP TRAINING

WORKSHOP TOPICS:

- National Pollutant Discharge Elimination System (NPDES) Regulatory Overview
- Constituents of Concern in Urban Runoff from New Development & Significant Re-development
- Solutions Overview
- Best Management Practices (BMPs) for:
  - ✓ Site Design
  - ✓ Source Control
  - ✓ Treatment Control
- Implementing the Water Quality Management Plan (WQMP) Guidance Documents

	Date and Time	Location
1	**Tuesday, October 3, 2006 - Half-Day Training (PM)** 12:00 P.M. – 4:00 P.M.	**Riverside County Flood Control & Water Conservation District** 1997 Market Street – Conference Room 1 Riverside, CA 92501 Phone: 951.955.1202
2	**Monday, October 23, 2006 - Half-Day Training (AM)** 8:00 A.M. – 12:00 P.M.	**Riverside County Flood Control & Water Conservation District** 1998 Market Street – Conference Room 1 Riverside, CA 92501 Phone: 951.955.1203
3	**Wednesday, October 4, 2006 - Half-Day Training (PM)** 1 P.M. – 5:00 P.M.	**Murrieta City Hall** 26443 Beckman Court - City Counsel Chambers (Street parking and entrance is through the rear of the building) Murrieta, CA 92562 Phone: 951.461.6076
4	**Thursday, October 12, 2006 - Half-Day Training (PM)** 1:00 A.M. – 5:00 P.M.	**Murrieta City Hall** 26445 Beckman Court - City Counsel Chambers (Street parking and entrance is through the rear of the building) Murrieta, CA 92562 Phone: 951.461.6078
5	**Thursday, October 5, 2006 - Half-Day Training (AM)** 8:00 A.M. – 12:00 P.M.	**Murrieta City Hall*** 26444 Beckman Court - City Counsel Chambers (Street parking and entrance is through the rear of the building) Murrieta, CA 92562 Phone: 951.461.6077
6	**Monday, October 9, 2006 - Half-Day Training (PM)** 12:00 A.M. – 4:00 P.M.	**Murrieta City Hall*** 26444 Beckman Court - City Counsel Chambers (Street parking and entrance is through the rear of the building) Murrieta, CA 92562 Phone: 951.461.6077

WATER QUALITY MANAGEMENT PLAN TRAINING

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NPDES STORMWATER QUALITY TRAINING FOR
Water Quality Management Plan
Riverside County Flood Control & Water Conservation District

Meeting of: October 3, 2006 1pm - 4pm

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Signature
1	Shonda	Bello Herold	City of Riverside	Planning	
2	~~Jessica~~ Elaine	~~Chin~~ Hsieh	City of Riverside	Public Works	
3	Chris	Cordova	City of Beaumont	Code Enforcement	Chris Cordova
4	Arturo	Diaz	RCFC	Planning	
5	Leonardo	Ferrando	Riverside County	Flood Control District	
6	Jeffrey	Fulton	RCFCWCD	Plan Check	
7	Kamyar	Ghods	Riverside	Flood Control	
8	Sam	Gonzalez	Riverside County	Building & Safety	
9	Hany	Henein	City of Corona	Public Works	
10	MARK	INGOLD	COUNTY OF RIVERSIDE	TLMA	
11	Michael	Krantz	Riverside County	Transportation	
12	Steve	Kupsak	City of Moreno Valley	Parks & Recreation	
13	Bob	Lyman	Riverside County	TLMA	
14	DEV	MANI	RIVERSIDE COUNTY	TLMA	
15	Arthur	Miller	County of Riverside	Building and Safety	
16	Clara	Miramontes	City of Riverside	Planning	
17	jerry	mullen	riverside county	building & safety	
18	Penny	Nanney	Flood Control	NPDES	
19	Hoang	Nguyen	City of Moreno Valley	Public Works	
20	Cynthia	Overby	City of Beaumont	Code Enforcement	
21	Larry	Page	City of Perris	Public Works	

[redacted]

NPDES STORMWATER QUALITY TRAINING FOR
Water Quality Management Plan
Riverside County Flood Control & Water Conservation District

Meeting of: October 3, 2006 1pm - 4pm

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Signature
22	Edward	Perez	Consultant (PBS&J)	Plan Check	
23	Edward	Perez	Flood Control	Planning	
24	Derek	Petersen	Riverside County Flood Control	Planning	
25	Edwin	Quinonez	Riverside County	Flood Control District	
26	Travis	Randel	City of Riverside	Planning Department	
27	DAVID	ROSS	CITY OF MORENO	LAND DEVELOPMENT	
28	Kyle	Smith	City of Riverside	Planning Division	
29	Helio	Takano	RCFC	Planning Section	
30	Tim	Taylor	City of Hemet	Development Engineering	
31	Dowling	Tsai	County of Riverside	Transportation	
32	Tina	Tuason	RCFC	NPDES	
33	Kent	Wegelin	City of Moreno Valley	Public Works	
34	Cenk	Yavas	Flood Control	Planning	
35	Soon	No	City of Corona	PW	
36	Edward	Lara	City of Corona	PW	
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NPDES STORMWATER QUALITY TRAINING FOR

Water Quality Management Plan

Riverside County Flood Control & Water Conservation District

Meeting of: October 3, 2006 1pm - 4pm

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Signature
43	DON	DELGADILLO	RCFC	PLANNING	[illegible]
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NPDES STORMWATER WATER QUALITY MANAGEMENT PLAN TRAINING

Meeting of: October 23, 2006 8:00 a.m. – 12:00 p.m. SIGN-IN SHEET

FIRST NAME	LAST NAME	MUNICIPALITY	DEPARTMENT	SIGNATURE
Kent	Allen	Riverside County	Flood Control	
Daisy	Barreto	RCFC & WCD	Planning	Daisy Barreto
Jeannie	Bigler	Riverside County	Building & Safety	
Christina	Bowser	City of Beaumont	Code Enforcement	
David	Brunmier	County of Riverside	Building & Safety	
Mike	Cairns	Riverside County	Flood Control	
Loi	Chan	Riverside County	Building & Safety	
Jessica	Chin	Riverside ~~County~~ City	Public Works	
Robert	Cullen	Riverside County	Flood Control District	
Olivia	Daniels	CVWD	Engineering	
Elena	Destefano	City of Riverside	Public Utilities Energy Delivery Contracts Division	
Glen	Drogin	County of Riverside	Flood Control	
Everett	Duckworth	County of Riverside	Flood Control	
Grosvenor	Fish	City of Riverside	Parks & Recreation	
Kris	Flanigan	Riverside County	Flood Control	
Jennifer	Gale	Riverside County Flood Control	Development Review	
Timothy	Kearns	Riverside	Building & Safety	
Jim	Kong	RCFC	Design	
Ewina	Lau	City of Riverside	Parks & Recreation	
Steve	Loriso	City of Norco	Public Works	
Ed	Lotz	Riverside County Flood Control District	Encroachment Permits	
Amy	McNeil	Riverside County	Flood Control	Amy McNeil
Demeke	Muarega	RCFC	Design	

Training Location – Riverside County Flood Control and Water Conservation District

0001284

NPDES STORMWATER WATER QUALITY MANAGEMENT PLAN TRAINING

Meeting of: October 23, 2006 8:00 a.m. – 12:00 p.m. **SIGN-IN SHEET**

FIRST NAME	LAST NAME	MUNICIPALITY	DEPARTMENT	SIGNATURE
Linda	Nixon,	City of Hemet	Public Works	Linda Nixon
Jennifer	Otterson	Riverside County	Flood Control	
Claudio	Padres	RCFC	Design	
Jeff	Potts	City of Corona	Public Works	
Roman	Ramirez	Riverside County	Building & Safety	
Eric	Russell	Riverside County	Flood Control	Eric W Russell
Alisa	Sramala	City of Riverside	Parks, Recreation, and Community Services	
Lori	Wolfe	Riverside County	Flood Control	Wolfe
Mike	Wong	Riverside County	Flood Control	Mike M. Wong
Panda	Workman	County of Riverside	Waste Management	
Amy	Yu	Riverside County	Building & Safety	
Shaheen	Moonan	RCFC		
Lombardo	Detrinidad	CVMSD	Planning	
Ewina	Lau	City of Riverside	Park & Rec.	Ewina Lau

Training Location – Riverside County Flood Control and Water Conservation District

0001285

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NPDES STORMWATER QUALITY TRAINING FOR
WQMP Training
Riverside County Flood Control & Water Conservation District

Meeting of: Monday, April 16 - 12:00 - 16:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
1	Benjie	Cho	RCFC & WCD	NPDES	(951) 955-2901	
2	Gloria	Perez	Riverside County	Development Department	(951) 955-9056	
3	Michele	Colbert	City of Corona	Public Works	(951) 736-2248	
4	Barry	Ghaemi	City of Corona	Public Works	(951) 739-4961	
5	Crystal	Nguyen	City of Corona	Public Works	(951) 817-5798	
6	Estella	Valderrama	City of Corona	Public Works	(951) 279-3751	
7	Noel	Castillo	City of Corona	Public Works	(951) 279-3537	
8	Lupe	Barrera	City of Corona	Public Works	(951) 736-2435	
9	Cora	Soto	City of Perris	Planning	(951) 943-5003	
10	Jeramy	Jackson	City of Moreno Valley	Land Development	(951) 616-4564	
11	dan	cuthbertson	City of Norco	Public Works	(951) 270-5607	
12	Lisa	McCullough	City of San Jacinto	Community Development / GIS	(951) 537-6360	
13	~~Brian~~	~~Ching~~	~~City of La Quinta~~	~~Public Works~~	~~(760) 777-7044~~	(CVWD) 4/26
14	~~Ed~~	~~Wimmer~~	~~City of La Quinta~~	~~Public Works~~	~~(760) 777-7088~~	
15	Pui Ting (Amy)	Yu	City of La Quinta	Public Works	(760) 777-7047	(CVWD) 4/26
16	Mark	Gross	City of Moreno Valley	Planning	(951) 413-3215	
17	Mark	Berg	City of Norco	Building and Safety	(951) 270-5637	
18	Craig	Welch	City of Norco	Building and Safety		
19	Mary	Zambon	City of Riverside	Transportation	(951) 955-6759	
20	Andrew	Huneck	City of Riverside	Transportation		

21	Marcia	Rose	City of Riverside	Transportation	951-955-1505	
22	Tamrat	Seyoum	City of Riverside	Water Engineering-Construction Unit	(951) 826-5672	
23	Xavier	Jacobo	City of Riverside	Water Engineering-Construction Unit	(951) 538-3461	
24	Stewart	Noble	City of Riverside	Water Engineering-Construction Unit	(951) 538-6970	
25	Jim	Henke	City of Riverside	Water Engineering-Construction Unit	(951) 538-3451	
26	Ernest	Marquez	City of Riverside	Water Engineering-Construction Unit	(951) 826-5409	
27	Panda	Workman	Riverside County	Waste Management		Panda Workman
28	~~Carol~~	~~Templeton~~	~~City of Palm Springs~~	~~Engineering~~	~~(760) 323-8253~~	(CVWD) — 4/26
29	David	Newell	City of Palm Springs	Planning Services	(760) 323-8245	
30	Bryan	Fernandez	City of Palm Springs	Planning	(760) 323-8245	
31	~~RICK~~	~~MINJARES~~	~~City of Palm Springs~~	~~ENGINEERING~~	~~(760) 323-8253~~	(CVWD) — 4/26
32	Jorge	Biagioni	City of Hemet	Engineering	(951) 765-2360	
33	Denise	Bartz	City of Hemet	Engineering	(951) 765-2366	
34	George	Farago	City of Palm Springs	Public Works and Engineering	(760) 323-8253	(CVWD) — 4/26
35	Chris	Wiberg	City of Moreno Valley	Public Works	(951) 413-3135	

[illegible] [illegible] [illegible] [illegible] 951-95[illegible]

Steve Hayes City of Riverside Planning (951) 826-5775

Jeremy Standifer " " " (951) 826-5358

Yvette Sonnenwald " " " (951) 826-5168

GUSTAVO GONZALEZ " " " 951-826-5931

[illegible] [illegible] City of Riverside 951-683-7351

[illegible] Bennett City of Riverside TLMA 951-826-[illegible]
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New Development/Re-development (WQMP) Training

April 25, 2007

CVWD, 12 - 4 p.m.

	First	Last	Agency	E-mail	Phone	Sign-in
1	Arlene	Chun	RCFC	abchun@co.riverside.ca.us	951-955-1330	
2	Amy	Yu	City of La Quinta	ayu@la-quinta.org	760-777-7047	
3	Brian	Ching	City of La Quinta	bching@la-quinta.org	760-777-7044	
4	Alana	Townsend	City of Palm Desert	atownsend@ci.palm-desert.ca.us	760-346-0611	Alana Townsend
5	Page	Garner	City of Palm Desert	pgarner@ci.palm-desert.ca.us	760-346-0611	
6	Ryan	Stendell	City of Palm Desert	rstendell@ci.palm-desert.ca.us	760-346-0611	
7	Tony	Lucero	City of Coachella	tlucero@coachella.org	760-398-5744 x134	
8	Brett	Daniels	City of Coachella	bdaniels@coachella.org	760-398-5744 x180	Brett DANIELS
9	George	Farago	City of Palm Springs	George.Farago@palmsprings-ca.gov	760-323-8253 x8743	
10	Rick	Minjares	City of Palm Springs	Rick.Minjares@palmsprings-ca.gov	760-323-8253	Rick MINJARES
11	Carol	Templeton	City of Palm Springs	Carol.Templeton@palmsprings-ca.gov	760-323-8253 x8741	
12	Grant	Eklund	City of Indio	geklund@indio.org	760-391-4018	
13	Roldan	Lopez	City of Indio	rlopez@indio.org	760-391-4017	
14	James	Achuff	City of Indio	jachuff@indio.org	760-391-4017	
15	Georgia	Celehar	CVWD	gcelehar@cvwd.org	760-398-2651	G. Celehar
16	Tyme	Fruscella	CVWD	tfruscella@cvwd.org	760-398-2651	T. Fruscella
17	Steve	Bigley	CVWD	sbigley@cvwd.org	760-398-2651	
18	Wil	Gonzalez	CVWD	wgonzalez@cvwd.org	760-398-2651	
19	Olivia	Daniels	CVWD	odaniels@cvwd.org	760-398-2651	
20	Tommy	Fowlkes	CVWD	tfowlkes@cvwd.org	760-398-2651	
21	Rosie	Anacleto	CVWD	ranacleto@cvwd.org	760-398-2651	
22	Tyler	Hull	CVWD	thull@cvwd.org	760-398-2651	
23	Frank	Crain	City of Coachella	fcrain@coachella.org	760-398-5744 x138	
24	Amir	Modarressi	City of Indio	amir@indio.org	760-398-4017 x4219	
25	Jaime	Engler	City of Indio	jangler@indio.org	760-398-4017 x4223	
26	Tom	Rafferty	City of Indio	trafferty@indio.org	760-398-4017 x4270	
27	Teresa	Demosie	CVWD		760-398-2666 x2605	T. Demosie
28	Robert	EDWARDS	CITY OF INDIO	REDWARDS@INDIO.ORG	760-391-4195	
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INDUSTRIAL/COMMERCIAL FACILITY ACTIVITIES TRAINING

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NPDES STORMWATER QUALITY TRAINING FOR INDUSTRIAL COMMERCIAL FACILITY ACTIVITIES

Meeting of: October 3, 2006 8 a.m. – 11 a.m. SIGN-IN SHEET

FIRST NAME	LAST NAME	MUNICIPALITY	DEPARTMENT	SIGNATURE
Michael	Adkins	City of Palm Desert	Code Compliance	
Bruce	Bailey	Riverside County	Environmental Health/Haz Mat	
Carolyn	Brown	Riverside County	Environmental Health/Haz Mat	
David	Brunmier	County of Riverside	Building and Safety	
Sandy	Bunchek	Riverside County	Environmental Health/Haz Mat	
Richard	Carrera	County of Riverside	Building and Safety	
Richard	Chase	County of Riverside	Waste Management	
Jessica	Chin	City of Riverside	Public Works	
Chris	Cordova	City of Beaumont	Code Enforcement	
Gayle	Cuneo	Riverside County	Flood Control	
Michael	Daly	Riverside County	Environmental Health/Haz Mat	
Rudy	Fandel	City of Corona	DWP	
Ted	Gascoigne	County of Riverside	Building and Safety	
Jim	Gill	County of Riverside	Building and Safety	
Richard	Guerrero	Riverside County	Environmental Health/Haz Mat	
Ronald	Horton	Riverside County	TLMA-Building & Safety	
George	Jediny	County of Riverside	Building and Safety	
Sung	Kack	RIVERSIDE	Building & Safety	
Kyle	Kim	County of Riverside	TLMA-building & safety	
Scott	Kraak	County of Riverside	Waste Management	
Ben	Mah	County of Riverside	Waste Management	
Roger	Miller	TLMA	Building & Safety	

Training Location – Riverside County Flood Control and Water Conservation District

NPDES STORMWATER QUALITY TRAINING FOR INDUSTRIAL COMMERCIAL FACILITY ACTIVITIES

Meeting of: October 3, 2006 8 a.m. – 11 a.m. SIGN-IN SHEET

FIRST NAME	LAST NAME	MUNICIPALITY	DEPARTMENT	SIGNATURE
Arthur	Miller	County of Riverside	Building and Safety	
Paul	Mitchell	Riverside County	Environmental Health/Haz Mat	
Gino	Monterroso	Riverside County	Environmental Health/Haz Mat	
Penny	Nanney	Flood Control	NPDES	
Vic	Olmeda	Riverside County	Bldg. & Safety/ Admin.	
Lionel	Ornelas	City of Corona	DWP	
Cynthia	Overby	City of Beaumont	Code Enforcement	
Larry	Page	City of Perris	Public Works	
Christine	Parsons	Riverside County	Environmental Health/Haz Mat	
Dave	Reynolds	County of Riverside	Building and Safety	
Bernd	Schleicher	Riverside County	Environmental Health/Haz Mat	
Jim	Shaver	County of Riverside	Building and Safety	
James	Stratton	County of Riverside	Building and Safety	
Doug	Thompson	Riverside County	Environmental Health/Haz Mat	
Greg	Trujillo	County of Riverside	Building and Safety	
Tina	Tuason	RCFC	NPDES	
Chandra	Desai	County Pa	NPDES	
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Thomas	HSU	" "	"	
~~CANERRA~~				
RICHARD	CANERRA	" "	BLDG/SAFETY	

Training Location – Riverside County Flood Control and Water Conservation District

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NPDES STORMWATER QUALITY TRAINING FOR INDUSTRIAL COMMERCIAL FACILITY ACTIVITIES

Meeting of: **October 19, 2006 9:00 a.m. – 12:00 p.m.** **SIGN-IN SHEET**

FIRST NAME	LAST NAME	MUNICIPALITY	DEPARTMENT	SIGNATURE
Brad	Ballen	Riverside County	Environmental Health/Haz Mat	
Jeannie	Bigler	Riverside County	Building & Safety	
John	Carmona	State of California	Regional Water Quality Control Board	
Suhas	Chakraborty	CRWQCB	Stormwater	
Jerry	Copeland	County of Riverside	Waste Management	
Jackie	Jones	Riverside County	Environmental Health/Haz Mat	
Larry	Joseph	County of Riverside	Waste Management	
Steve	Kupsak	City of Moreno Valley	Parks & Recreation	
Vic	Olmeda	Riverside County	Bldg. & Safety/Admin.	
Jim	Ray	Riverside County	Environmental Health/Haz Mat	
John	Riddell	Riverside County	Environmental Health/Haz Mat	
Bobby	Riggs	Riverside County	Environmental Health/Haz Mat	
Michael	Shalhub	Riverside County	Environmental Health/Haz Mat	
Carolinn	Shay	Riverside County	Environmental Health/Haz Mat	
Anastasia	Studer	Riverside County	Environmental Health/Haz Mat	
Kent	Wegelin	City of Moreno Valley	Public Works	

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Training Location – Palm Springs Convention Center

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NPDES STORMWATER QUALITY TRAINING FOR INDUSTRIAL COMMERCIAL FACILITY ACTIVITIES

Meeting of: October 23, 2006 1:00 p.m. – 4:00 p.m. SIGN-IN SHEET

FIRST NAME	LAST NAME	MUNICIPALITY	DEPARTMENT	SIGNATURE
Abdul	Behnawa	County of Riverside	Building & Safety	
Shad	Boal	County of Riverside	Building & Safety	
Christina	Bowser	City of Beaumont	Code Enforcement	Christina Bowser
Jessica	Chin	Riverside	Public Works	
Andrew	Cortez	County of Riverside	Waste Management	
Daniel	Gregorio	County of Riverside	Building & Safety	Daniel Gregorio
Doug	Hannah	County of Riverside	Building & Safety	
Steve	Hooper	City of Riverside	Public Works	
Rob	Istik	County of Riverside	Waste Management	
Jeramy	Jackson	City of Moreno Valley	Public Works	
Shawn	Kilpatrick	City of Palm Desert	Code Compliance	
Tim	King	City of Riverside	Public Works	
David	Leonard	County of Riverside	Building & Safety	
Derick	London	County of Riverside	Building & Safety	
Ed	Lotz	Riverside County Flood Control District	Encroachment Permits	
Ben	Matye	County of Riverside	Waste Management	
Shaheen	Mooman	Santa Ana	RCFC	
Linda	Nixon	City of Hemet	Public Works	
David	Ortego	Riverside County	Flood Control	
Neil	Ozonur	Riverside County	Environmental Health/Haz Mat	
Sande	Pence	Riverside County	Environmental Health/Haz Mat	
Al	Pielin	City of Riverside	Public Works	
Hart	Ponder	City of Palm Desert	Code Compliance	
Steven	Rainsbury	County of Riverside	Building & Safety	S. Rainsbury
Noah	Rau	County of Riverside	Waste Management	Noah Rau

0001293

Training Location – Riverside County Flood Control

NPDES STORMWATER QUALITY TRAINING FOR INDUSTRIAL COMMERCIAL FACILITY ACTIVITIES

Meeting of: October 23, 2006 1:00 p.m. – 4:00 p.m. **SIGN-IN SHEET**

FIRST NAME	LAST NAME	MUNICIPALITY	DEPARTMENT	SIGNATURE
Pedro	Rodriguez	City of Palm Desert	Code Compliance	
Ramon	Roman	County of Riverside	Waste Management	
Larry	Salazar	City of Riverside	Public Works	
Cindy	Snavely-Peck	City of Riverside	Public Works	
Brian	Stephenson	County of Riverside	Waste Management	
Jane	Tate	County of Riverside	Building & Safety	
Gabriel	Tejeda	County of Riverside	Building & Safety	
Johnny	Terfehr	City of Palm Desert	Code Compliance	
Manny	Vargas	Riverside County	Environmental Health/Haz Mat	
Nate	Viste	County of Riverside	Waste Management	
Ron	Welch	Riverside County	Building & Safety	
Panda	Workman	County of Riverside	Waste Management	
Mike	Yasmer	City of Riverside	Public Works	
John	Autrey	County of Riverside	Building & Safety	
Trish	Field	County of Riv. /EDA	EDA/RDA	

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Training Location – Riverside County Flood Control

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NPDES STORMWATER QUALITY TRAINING FOR
Industrial/Commercial Training
Riverside County Flood Control & Water Conservation District

Meeting of: Wednesday, April 18 - 13:00 - 16:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
1	Rene	Upson	City of San Jacinto	Community Development, Cd Enf	(951) 487-7330	
2	Phil	Hallberg	City of San Jacinto	Community Development, Cd Enf	(951) 487-7330	
3	Tom	Van Dorn	City of San Jacinto	Community Development, Cd Enf	(951) 487-7330	
4	Bob	Bohan	City of Canyon Lake	Code Enforcement	(951) 244-2955	
5	John	Bivens	City of Canyon Lake	Code Enforcement	(951) 244-2955	
6	Anthony	Moreno	City of La Quinta	Building & Safety	(760) 777-7034	
7	Moises	Rodarte	City of La Quinta	Code Enforcement	(760) 777-7050	
8	Paul	Shaffer	City of Corona	Department of Water and Power	(951) 279-3592	
9	Mark	Solano	City of Corona	Department of Water and Power	(951) 279-3558	
10	James	Thompson	City of Banning	Public Works	(951) 922-3142	
11	Ed	Rehfeld	City of Norco	Building and Safety		
12	Matt	Creason	City of Indian Wells	Public Works	(760) 776-0237	
13	Kareem	Zayed	City of Indio	PW/Engineering Division	(949) 474-1960	
14	Paul	Lucas	City of Indio	PW/Engineering Division	(949) 474-1960	
15	Kevin	Rhodes	Riverside County	Waste Management		
16	Benjamin	Mah	Riverside County	Waste Management		
17	Jerry	Copeland	Riverside County	Waste Management		
18	Brian	Stephenson	Riverside County	Waste Management	951 315-7298	
19	Panda	Workman	Riverside County	Waste Management		
20	Scott	Kraak	Riverside County	Waste Management		

21	Benjamin	Matye	Riverside County	Waste Management	[illegible]	[illegible]
22	Marin	Cionca	Riverside County	Waste Management	[illegible]	[illegible]
23	Sarah	Watrous	Riverside County	Waste Management		
24	Nate	Viste	Riverside County	Waste Management	[illegible]	[illegible]
25	Randy	Taylor	Riverside County	Waste Management	241-7774	[illegible]
26	Hart	Ponder	City of Palm Desert	Public Works	(760) 346-0611	[illegible]
27	Johnny	Terfehr	City of Palm Desert	Public Works	(760) 346-0611	[illegible]
28	Shawn	Kilpatrick	City of Palm Desert	Public Works	(760) 346-0611	[illegible]
29	Larry	Joseph	Riverside Co	Waste Mgt	951-312-88[illegible]	[illegible]
30	JACKSON	JERAMY	CITY OF MORENO VALLEY		951 237 700[illegible]	[illegible]
31	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]
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NPDES STORMWATER QUALITY TRAINING FOR
Industrial/Commercial Training
Riverside County Flood Control & Water Conservation District

Meeting of: Monday, April 30 - 13:00 - 16:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
1	Mike	Shetler	Riverside County	Executive Office	(951) 955-1186	
2	dan	cuthbertson	City of Norco	Public Works	(951) 270-5607	
3	Jeff	Potts	City of Corona	Public Works	(951) 736-2442	
4	Dennis	Hurford	City of Norco	Building and Safety		
5	Danny	Derrick	City of Norco	Building and Safety		
6	Michele	Colbert	City of Corona	Public Works	(951) 736-2248	
7	Laura	Bednar	City of Corona	~~Public Works~~ FIRE	(951) 817-5792	
8	Jim	Nickell	Riverside County	Waste Management	951)312-7015	
9	Larry	Joseph	Riverside County	Waste Management		
10	Richard	Chase	Riverside County	Waste Management		
11	Molly	Stewart	Riverside County	Waste Management		
12	Edward	Wee Eng	Riverside County	Waste Management	(951)486-32	
13	Andy	Cortez	Riverside County	Waste Management		
14	Nimrod	Garay	Riverside County	Waste Management		N. Garay
15	Jeff	Gow	Riverside County	Waste Management	(951)486-3244	
16	Fouad	Mina	Riverside County	Waste Management	(951) 486-3244	
17	Jerry	Gregory	Riverside County	Waste Management		
18	Joseph	Contaoi	Riverside County	Waste Management		
19	Eduardo	Castellanos	Riverside County	Waste Management		
20	Joseph	Hickman	Riverside County	Waste Management		
21	Kevin	Joyce	Riverside County	Waste Management		
22	Mike	Adkins	City of Palm Desert	Public Works	(760) 346-0611	
23	Pedro	Rodriguez	City of Palm Desert	Public Works	(760) 346-0611	
24	Stephen	Glenore	Riverside County	Waste Management		
25						

26	Paul	Lucas	Fuscoe Eng	Indio	949-271	4472
27	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
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CONSTRUCTION SITE INSPECTION TRAINING

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NPDES STORMWATER QUALITY TRAINING FOR
Construction Site Inspections
Riverside County Flood Control & Water Conservation District

Meeting of: October 2, 2006 9am - 12pm SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Signature
1	Henry	Aldredge	City of Corona	Public Works	
2	Ron	Allen	Beaumont	Public Works	
3	Ron	Allen	Beaumont	P.W.	
4	Thomas	Baier	City of Moreno Valley	PW/M&O	
5	Keith	Barnett	County of Riverside	Transportation Department	
6	Erwin	Barton	City of Moreno Valley	PW/M&O	
7	Alan	Bosia	City of Riverside	Public Works	
8	Mark	Bowles	County of Riverside	Transportation Department	
9	Dennis	Buckle	City of Moreno Valley	PW/M&O	
10	CRAIG	CARLSON	RIVERSIDE COUNTY	TLMA	
11	George	Chang	City of Moreno Valley	PW/M&O	
12	Jessica	Chin	City of Riverside	Public Works	
13	Troy	Clement	Beaumont	P.W.	
14	Tom	Collins	City of Riverside	Public Utilities - Water	
15	Sly	Collins	City of Moreno Valley	PW/M&O	
16	glen	crawford	riverside county	transportation dept	
17	Steve	Dondalski	County of Riverside	Building and Safety	
18	James	Dooley	County of Riverside	Transportation Department	
19	Brian	Durfee	City of Moreno Valley	PW/M&O	
20	Lisa	Elder	County of Riverside	Transportation Department	
21	Alfred	Fierro	City of Moreno Valley	PW M&O	

NPDES STORMWATER QUALITY TRAINING FOR
Construction Site Inspections
Riverside County Flood Control & Water Conservation District

Meeting of: October 2, 2006 9am - 12pm SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Signature
22	Rick	Fite	County of Riverside	Transportation Department	
23	Paul	Gearhart	City of Riverside	Public Utilities - Water	
24	Kevin	Gillette	County of Riverside	Transportation Department	
25	Morgan	Haun	City of Moreno Valley	PW/M&O	
26	Joe	Janda	Beaumont	P.W.	
27	DAVID	JANSEN	RIVERSIDE COUNTY	TLMA	
28	PAUL	jOHNSON	Riverside County	TLMA	
29	George	Kelley	City of Riverside	Public Utilities - Water	
30	Kyle	Kim	County of Riverside	TLMA-building & safety	
31	Eui	Kim	County of Riverside	Building & Safety Department	
32	Jeff	Lewellen	County of Riverside	Transportation Department	
33	BARRY	LEWIS	RIVERSIDE COUNTY	BUILDING AND SAFETY	
34	Andy	Lindsay	City of Riverside	Public Utilities - Water	
35	Eric	Lohr	County of Riverside	Transportation Department	
36	Gregory	McCombs	Riverside County	Building and Safety	
37	Roger	Miller	riverside county	building & safty	
38	gary	moss	Riverside county	transportation	
39	Mike	Neal	Beaumont	P.W.	
40	Larry	Page	City of Perris	Public Works	
41	WILLIAM	PEPPAS	COUNTY OF RIVERSIDE	BUILDING & SAFETY	
42	Byron	Recksiek	County of Riverside	Transportation Department	

NPDES STORMWATER QUALITY TRAINING FOR

Construction Site Inspections

Riverside County Flood Control & Water Conservation District

Meeting of: October 2, 2006 9am - 12pm

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Signature
43	Ryan	Righetti	County of Riverside	Transportation Department	
44	Emiliza	Rodolfo	County of Riverside	Building and Safety	
45	Paul	Russell	County of Riverside	Transportation Department	
46	Mojahed	Salama	County of Riverside	Transportation Department	
47	Dave	Thibault	Beaumont	P.W.	
48	Tina	Tuason	[redacted]	NPDES	
49	Steven	Wann	County of Riverside	Transportation Department	
50	David	Zhao	County of Riverside	Building & Safety	
51	[illegible]	[illegible]	County of Riverside	[illegible]	
52	[illegible]	[illegible]	County of Riverside	Building & Safety	
53	[illegible]	[illegible]	County of Riverside	Building & Safety	
54	[illegible]	[illegible]	County of Riverside	[illegible]	
55	[illegible]	[illegible]	County of Riverside	[illegible]	
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RIVERSIDE COUNTY CONSTRUCTION STORM WATER TRAINING

Monday, October [illegible], 2006

Name	Agency	E-mail
BARRY WILSON	BLUE SAFETY	
Michael C. Beck	B+S So. Co.	
Rick DESROSIERS	B+S So. Co.	
Kylie Kim	B&S	
Elliot (Eli) Kim	B&S	
MIKE NEAL	Public Work Beaumont	
RON ALLEN	PUBLIC WORKS BEAUMONT	
TOM BAIER	PUBLIC WORKS - MORENO VALLEY	
GEORGE CHANG	Public Works Moreno Valley	
Dave Thibault	City of Beaumont P.W.	
TOM Collins	CITY OF RIVERSIDE	
[illegible]	City of Riverside P.W. Water	
GEORGE KELLET	CITY OF RIVERSIDE P. WATER	
LARRY PAC-	CITY OF PERRIS	LARRY PAC[illegible]
DAVE [illegible]	COUNTY OF RIVERSIDE [illegible]	
TROY L. CLEMENT	PUBLIC WORKS BEAUMONT	
[illegible] ECKER	COUNTY OF RIV TRANS PERMITS	
[illegible]	Beaumont Public Works	
[illegible]	[illegible]	
[illegible]	[illegible]	
[illegible]	[illegible]	
[illegible]	[illegible]	
[illegible]	[illegible]	
[illegible]	[illegible]	

Steven Wann	TLMA
Ernie Bartera	Moreno Valley
[illegible]	Mo Val.
James M Woolley	TLMA
Paul Gerchuck	City of Riv
Dave Jansen	TLMA
Sylvester Collins	Moreno Valley
Alan Bosia	City of Riverside
Rick Tolzek	City of Riverside
Tina Tuason	RCFCWCD
Henry Alaniadm	City of Corona
Mark Bowles	Riv Co TLMA

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NPDES STORMWATER QUALITY TRAINING FOR
Construction Site Inspections
Murrieta City Hall

Meeting of: October 10, 2006 1pm - 4pm

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Signature
1	Michael	Aguilar	City of Murrieta	Engineering	
2	Venita	Anderson	City of Murrieta	Code Enforcement	
3	Mick	Bartholomew	City of Murrieta	Engineering	
4	Claire	Clark	Riverside County	Parks	
5	Dan	Cuthbertson	City of Norco	Public Works	
6	Lupe	Gomez	City Of Lake Elsinore	Engineering	
7	David	Hartman	City of Canyon Lakes	Building and Safety	Dave Hartman
8	Jessie	Hillis	City of Canyon Lakes	Building and Safety	Jessie Hillis
9	Jeffrey	Hitch	City of Murrieta	Engineering	
10	Chris	McClain	City of Murrieta	Public Works	
11	Robert	Moehling	City of Murrieta	Engineering	
12	Farida	Naceem	City of Murrieta	Engineering	Farida Naceem
13	Russ	Napier	City of Murrieta	Engineering	
14	George	Nelson	City of Murrieta	Code Enforcement	
15	Tom	Nowak	City of Murrieta	Engineering	Tom Nowak
16	Sirath	Patzer	City Of Canyon Lake	Building and Safety	
17	Collins	Solomon	City of Murrieta	Engineering	
18	Ken	Sotelo	Riverside County	Parks	
19	Mark	Stoneking	City of Murrieta	Public Works	
20	Berisimo	Schetter	City of Murrieta	Public works	
21	SCOTT	BURNS	CITY OF LAKE ELSINORE	BLDG & SAFETY	

NPDES STORMWATER QUALITY TRAINING FOR

Construction Site Inspections

Murrieta City Hall

Meeting of: October 10, 2006 1pm - 4pm

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Signature
22	Miriam	Shumway	City of Murrieta	M.P.D. code enforcement	Miriam Shumway
23	~~CLAIRE~~	~~CLARK~~	~~COUNTY RIVERSIDE~~	~~PARKS~~	
24	~~Vega~~ Chris	Vega-McLain	C.O.M.	Public works	
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NPDES STORMWATER QUALITY TRAINING FOR

Construction Site Inspections

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NPDES STORMWATER QUALITY TRAINING FOR
Construction Site Inspections
Palm Springs Convention Center

Meeting of: October 12, 2006 9am - 12pm

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Signature
1	Loi	Chan	Riverside County	Building & Safety	
2	John	Collins	Coachella Valley Water District	Domestic Operations	
3	Frank	Crain	City of Coachella	Public Works	
4	Chuck	Dodd	City of Desert Hot Springs	Engineering	Chuck Dodd
5	Ryan	Duarte	City of Desert Hot Springs	Engineering	Ryan Duarte
6	TIM	FAGG	RIVERSIDE COUNTY	FLOOD CONTROL	
7	Gordon	Fisher	City of Coachella	Public Works	
8	Beto	Gonzales	City of La quinta	Public Works	
9	Robert	Gray	County of Riverside	Transportation Department	
10	Steve	Grewe	County of Riverside	Transportation Department	
11	Scott	Hamilton	City of La quinta	Public Works	
12	Rusty	Hannah	Riverside County	Building & Safety	
13	Steve	Kochell	City of La quinta	Public Works	
14	James	Lindsey	City of La quinta	Public Works	
15	GARY	LUNDBERG	RIVERSIDE COUNTY	FLOOD CONTROL	
16	Bob	Lyman	Riverside County	TLMA	
17	William	Mastas	city of palm springs	street maintenance	
18	Joe	Morales	Coachella Valley Water District	Domestic Operations	
19	David	Nelson	City of Moreno Valley	Public Works/Land Dev	
20	Dominick	Octavio	Riverside County	Building & Safety	
21	HENRY	OLIVO	RIVERSIDE COUNTY	FLOOD CONTROL	

NPDES STORMWATER QUALITY TRAINING FOR

Construction Site Inspections

Palm Springs Convention Center

Meeting of: October 12, 2006 9am - 12pm

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Signature
22	Demetrio	Pecina	City of La quinta	Public Works	
23	Roman	Ramirez	Riverside County	Building & Safety	
24	DARIO	SAMONTE	RIVERSIDE COUNTY	FLOOD CONTROL	Dario Santa
25	James	Staight	City of La quinta	Public Works	
26	Daniel	Valenzuela	City of La Quinta	Public Works	
27	Kent	Wegelin	City of Moreno Valley	Public Works	
28	John C.	Wilson	County of Riverside	Transportation Department	
29	Ed	Wimmer	City of La Quinta	Public Works	
30	Hua-Hsing	Wu	Riverside County	Building & Safety	
31	Amy	Yu	Riverside County	Building & Safety	
32	DALE	ANDERSON	Riverside County	FLOOD CONTROL	
33	RON	ALEXANDER	C.V.W.D.	DOMESTIC	
34	RICHARD	BARNETT	CVWD	DOMESTIC	
35	DAN	FEWINGS	CVWD	DOMESTIC	Daniel J. Fewings
36	MARK	BODNAR	CITY OF LA QUINTA	PUBLIC WORKS	
37	MIKE	BROWN	CITY OF PALM DESERT	P.W.	
38	TERRY	CECHIN	CITY OF PALM DESERT	P.W.	
39	Ruben	Castaneda	City of La Quinta	P.W.	
40	Raul	Hernandez	Palm Springs	P.W.	
41	Rick	Mitchell	Palm Springs	ST.	Rick Mitchell
42	Rus	Baker	Riverside Co.	B/S	

NPDES STORMWATER QUALITY TRAINING FOR

Construction Site Inspections

Palm Springs Convention Center

Meeting of: October 12, 2006 9am - 12pm

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Signature
43	RUSTY	HANNAH	CO. RIV	B&S	
44	Kent	Wagelin	City of Moreno Valley	P.W	
45	DANIEL	VALENZUELA	C.O. LA QUINTA	P.W.	
46	Steve	Kochell	COLQ	PW	
47	Agustin	Arellano	COLQ	P/W	
48	Beto	Gonzales	COLQ	P/W	
49	DEMETRIO	PEGINA	COLQ	P.W	
50	James	Straight	"	P.W.	
51	Adolfo	Cabrera	"	PW	
52	ROBERT	FISHER	CITY OF COACHELLA	PW	
53	LOI	CHAN	COUNTY OF RIVERSIDE	B&S	
54	JAMES	Lindsey	City of L.Q	P/W	
55	TIM	BATTEN	City of L.Q.	P/W	
56	RAPHAEL	ALVARADO	City of LQ	P.W	
57	Pui Ting (Amy)	Yu	CO. RIV	B&S	
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How many times had this class?

NPDES STORMWATER QUALITY TRAINING FOR
Construction Site Inspections
Riverside County Flood Control and Water Conservation District

Meeting of: October 16, 2006 1pm - 4pm SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Signature	
1	SCOTT	BAKER	RIVERSIDECOUNTY	BUILDING AND SAFETY	Scott Baker	3
2	Abdul	Behnawa	COUNTY OF RIVERSIDE	BUILDING AND SAFETY		2
3	Michael P.	Bess	Riverside Co.	Building & Saftey		
4	TODD	BILO	COUNTY OF RIVERSIDE	BUILDING AND SAFETY		2
5	Christina	Bowser	City of Beaumont	Code Enforcement	Christina Bowser	0
6	Ronald	Brawdy	Riverside County	Transportation Dept.		1
7	LAURENCE	BUCKLEY	RIVERSIDE COUNTY	BUILDING & SAFETY		3
8	ERNIE	BURNS	RIVERSIDE COUNTY	BUILDING & SAFETY		3
9	JORGE	CABALLERO	RIVERSIDE COUNTY	BUILDING & SAFETY		2
10	Michele	Colbert	City of Corona	Public Works		3
11	Chris	Cordova	City of Beaumont	Code Enforcement	Chris Cordova	
12	David [redacted]	Ortega [redacted]	Riverside County	Flood Control !	David J. Ortega	2
13	DENNIS	DE SAGUN	COUNTY OF RIVERSIDE	BUILDING AND SAFETY		2
14	Stephen	Duffin	City of Corona	Public Works		
15	Daniel	Fernandez	County of Riverside	Building and Safety		2
16	Victor	Garcia	City of Riverside	Public Utilities - Electric		
17	Hany	Henein	City of Corona	Public Works		
18	Marianna	Hernandez	County of Riverside	Transportation Department		
19	Elias	Hutchinson	City of Moreno Valley	PW/M&O		1
20	Alfredo	Ignacio	Beaumont	P.W.	4	
21	Jeramy	Jackson	City of Moreno Valley	Public Works		4

NPDES STORMWATER QUALITY TRAINING FOR

How Many times taken this class?

Construction Site Inspections

Riverside County Flood Control and Water Conservation District

Meeting of: October 16, 2006 1pm - 4pm

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Signature	
22	Carlos	Juarez	City of Moreno Valley	PW/M&O		1
23	Charles	Kolb	City of Moreno Valley	PW/M&O		
24	Kyung-Yol	Lee	County of Riverside	Building & Safety		3
25	David	Leonard	County of Riverside	Building and Safety		4
26	David	Lopez	County of Riverside	building - safety		4
27	Bob	Lucas	City of Riverside	Public Utilities - Water		0
28	Art	Madril	City of Riverside	Public Utilities - Water		0
29	Alfredo	Martinez	County of Riverside	Building and Safety		0
30	Andy	McDonel	City of Moreno Valley	PW/M&O		0
31	Dave	Miller	County of Riverside	Transportation Department		
32	Mike	Neal	Beaumont	P.W.		
33	JESSICA	NGUYEN	RIVERSIDE COUNTY	BLDG & SAFETY		0
34	Dave	Ochs	Beaumont	P.W.		6
35	Greg	Oliver	City of Riverside	Public Utilities - Water		1
36	marty	otero	Riverside County	Transportation Dept.		1
37	Cynthia	Overby	City of Beaumont	Code Enforcement		3
38	Mike	Parsons	Beaumont	P.W.		2
39	Pepito	Pinlac	Beaumont	P.W.		0
40	Ernest	Precie	City of Moreno Valley	PW/M&O		
41	Michel	Ramek	Riverside County	TLMA/ Building and Safety		5
42	Charles	Ray	County of Riverside	TLMA		3

NPDES STORMWATER QUALITY TRAINING FOR

Construction Site Inspections

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(How many times taken this class?

Riverside County Flood Control and Water Conservation District

Meeting of: October 16, 2006 1pm - 4pm

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Signature	
43	Justin	Robbins	County of Riverside	Transportation Department		0
44	Rick	Ryno	City of Riverside	Public Utilities - Water		
45	Greg	Schroeder	County of Riverside	Building & Saftey		3
46	TONY	SILVAS	CITY OF MORENO	PUBLIC WORKS		0
47	Paul	Spencer	City of Moreno Valley	PW/M&O		2
48	Brian	Thompson	City of Moreno Valley	PW/M&O	Brian Thompson	2
49	Robert	Torrence	Riverside County	Building & Safety	Robert L. Torrence	6
50	steven	toth	Riverside County	Transportation Dept	Steve Toth	2
51	James	Willem	City of Moreno Valley	PW/M&O		1
52	Art	Wilson	City of Moreno Valley	PW/M&O	Arthur L Wilson	
53	Albert	Cruz	City of Beaumont	P.W		1
54	TOM	COLE	City of Temecula	Code Enf		
55	Zara	Smith	City of Temecula	Code Enforcement		0
56	JEFF	GROVE	CITY OF TEMECULA	CODE ENF		
57	MIKE	McCAFFERTY	CITY OF RIV	TLMA		5
58	RICK	STARZYD	County of Riv	TLMA		4
59	Travis	Brager	County of Riv	TLMA		3
60	PHIL	BROEGAMLE	COUNTY OF RIVERSIDE	TLMA		4
	TIM	HOSTRASER	Co Riverside	TLMA		2

Number of Times taken this class before

NPDES STORMWATER QUALITY TRAINING FOR
Construction Site Inspections
Palm Springs Convention Center

Meeting of: October 17, 2006 1pm - 4pm SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Signature	
1	Steve	Aguirre	City of Moreno Valley	P/W Enterprise Services		1st
2	Solarez	Albert	County of Riverside	Transportation Department		
3	Jeannie	Bigler	Riverside County	Building & Safety		3 or 4
4	John	Carmona	State of California	Regional Water Quality Control		1
5	Bo	Chen	City of Palm Desert	Public Works		
6	GLORIA	COHEN	CATHEDRAL CITY	ENGINEERING		2
7	Scott	Davenport	Coachella Valley Water District	Domestic Operations		0
8	Craig	Degroot	Riverside County	Building & Safety		3
9	David	DeRenard	Coachella Valley Water District	Domestic Construction		1
10	Jose	Enriquez	City of Coachella	Public Works		
11	JOHN ~~Dan~~	Collins ~~Fewings~~	Coachella Valley Water District	Domestic Operations		3
12	Gabe	Garza	Coachella Valley Water District	Domestic Operations		
13	Robert	Gray	County of Riverside	Transportation Department		
14	Brenda	Hannah	Riverside County	Building & Safety		3 or 4
15	Dave	Helfman	Riverside County	Building & Safety		4
16	George	Iniguez	City of Coachella	Engineering		
17	steve	lasley	indio	code enforcement		
18	Steve	Lech	Riverside County	Parks		2
19	Bob	Lyman	Riverside County	TLMA		
20	SHAWN	MADDOX	CATHEDRAL CITY	ENGINEERING INSPECTION		1
21	forest	meadows	city of indio	code enforcement		

NPDES STORMWATER QUALITY TRAINING FOR

0001314

Number of Times taken class before

Construction Site Inspections

Palm Springs Convention Center

Meeting of: October 17, 2006 1pm - 4pm

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Signature	
22	Jay	Mirpour	RWQCB-7	Stormwater		0
23	Fred	Moore	Riverside County	Building & Safety	Fred Moore	2
24	Robert	Morris	County of Riverside	Transportation Department		0
25	Morgan	Newlin	City of Hemet	Public Works		2
26	Linda	Nixon	City of Hemet	Public Works	Linda Nixon	3
27	Joe	Ortiz	Riverside County	Building & Safety		2
28	Albert	Padilla	Coachella Valley Water District	Domestic Construction		2
29	Robert	Parsons	County of Riverside	Transportation Department		
30	Robert	Rodriguez	Coachella Valley Water District	Domestic Construction	Robert Rodriguez	1
31	Leah	Rodriguez	Government	Riverside County EDA		0
32	Anna	Rodriguez	Government	Riverside County EDA		0
33	Cora	Salas	City of Palm Desert	Public Works		0
34	Ralph	Scharffenberg	City of Moreno Valley	Public Works/ESA	Ralph Scharffenberg	0
35	Garry	Shopshear	Riverside County	Building & Safety		3
36	Joaquin	Tijerina	Government	Riverside County EDA		0
37	Alana	Townsend	City of Palm Desert	Public Works	Alana Townsend	3
38	carlos	vargas	indio	code enforcement		
39	Lance	Young	Coachella Valley Water District	Domestic Operations		2
40	MICHAEL	MOTT	CITY OF PALM SPRINGS	PUBLIC WORKS ENGINEERING		
41	MIKE	LYTAR	PALM SPRINGS	ENG.		
42	Michael	Ray	Waste Management	ENG		0

NPDES STORMWATER QUALITY TRAINING FOR

Construction Site Inspections

Number of times taken before

Palm Springs Convention Center

Meeting of: October 17, 2006 1pm - 4pm

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Signature	
43	C. Peebles	Peebles	C of SJ	ENG.	C Peebles	3
44	Terry	Hvemer	Tri Lake Consultants	Inspection	Terry Hvemer	0
45	Robert	Anderson	Tri Lake Consultants	Inspection	Robert S. Anderson	0
46	George	Carella	TRI-LAKE CONSULTANTS	PECELS INSPECTOR	George R Carella	1
47	Michelle	Corredato	Riverside County	EDA	Michelle Corredato	0
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How many times taken class before?

NPDES STORMWATER QUALITY TRAINING FOR
Construction Site Inspections
Murrieta City Hall

Meeting of: October 18, 2006 9am - 12pm

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Signature	
1	Jerry	Alegria	City of Temecula	Public Works		3
2	Doug	Armstrong	City of Temecula	Public Works		3
3	Amer	Attar	City of Temecula	Public Works		3
4	Steven	Beswick	City of Temecula	Public Works		
5	Annie	Bostre - Le	City Of Temecula	Public Works		
6	Laura	Bragg	City of Temecula	Public Works		2
7	Steve	Brown	City of Temecula	Code Enforcement		
8	Greg	Butler	City of Temecula	Public Works		3
9	Lloyd	Bylund	County of Riverside	Building & Safety		2
10	Steve	Charette	City of Temecula	Public Works		2
11	Tom	Cole	City of Temecula	Code Enforcement		
12	Andrew	Cortez	County of Riverside	Waste Management		
13	George	De La Rosa	City of Temecula	TCSD		
14	Mayra	De La Torre	City of Temecula	Public Works		
15	Nimrod	Garay	County of Riverside	Waste Management		3
16	Eddie	Godinez	Moreno Valley, CA	Public Works/Land Dev.		
17	Jeff	Grove	City of Temecula	Code Enforcement		
18	Kavon	Haghighi	City of Temecula	Public Works		3
19	Kendra	Hannah	City of Temecula	Public Works		3
20	Scott	Harvey	City of Temecula	Public Works		2
21	Jack	Hodson	City of Temecula	Public Works		

NPDES STORMWATER QUALITY TRAINING FOR

How many times you have taken class before?

Construction Site Inspections

Murrieta City Hall

Meeting of: October 18, 2006 9am - 12pm

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Signature	
22	Mike	Hudson	City of Temecula	Public Works		2
23	Rob	Istik	County of Riverside	Waste Management		
24	Reza	James	City of Temecula	Public Works		3
25	Scott	Johnston	County of Riverside	Transportation Department		
26	Scott	Kraak	County of Riverside	Waste Management		
27	CORINNE	LANDEROS	COUNTY OF RIVERSIDE	BLDG AND SAFETY		2
28	Ben	Mah	County of Riverside	Waste Management		
29	Ben	Matye	County of Riverside	Waste Management		0
30	David	Maus	County of Riverside	Transportation Department		
31	David	McBride	City of Temecula	Public Works		
32	Karl	Nordgren	City of Temecula	TCSD		
33	Avlin	Odviar	City of Temecula	Public Works		
34	Jay	Oldham	City of Temecula	Public Works		0
35	Marianne	Parker	City of Temecula	Code Enforcement		2
36	Ron	Parks	City of Temecula	Public Works		
37	John	Pourkazemi	City of Temecula	Public Works		2
38	Alex	Ramirez	Moreno Valley, CA	Public Works/Land Dev.		3
39	Ramon	Roman	County of Riverside	Waste Management		0
40	Patrick	Ryan	City of Temecula	Public Works		3
41	Jon	Salazar	City of Temecula	Public Works		
42	Rick	Serven	City of Temecula	TCSD		

NPDES STORMWATER QUALITY TRAINING FOR

Construction Site Inspections

How many times you have taken class before?

Murrieta City Hall

Meeting of: October 18, 2006 9am - 12pm

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Signature	
43	Rudy	Shabec	City of Temecula	Public Works	Rudy Shabec	4
44	Steve	Sterling	City of Temecula	TCSD		
45	Nate	Viste	County of Riverside	Waste Management		
46	Chris	Vlahos	City Of Temecula	Public Works	Chris Vlahos	
47	Jean	Voshall	City of Temecula	Code Enforcement		
48	Chris	White	City Of Temecula	Public Works	Chris White	3
49	Panda	Workman	County of Riverside	Waste Management		
50	Evangelina	Zapien	County of Riverside	Waste Management	Evangel Zapien	3
51	Misty	Clark	City of Temecula	Code Enforcement		0
52	James	Hutchinson	City of San Jacinto	MSP	James	
53	JIM	SIKET	CITY SAN JAC.	ENGINEER.	Jim Siket	
54	Bill	McATEER	City of Temecula	Cust. Mgr.		
55	David	Bilby	City of Temecula	Public Works	David Bilby	1
56	WILLIAM	BECERRA	City of Temecula	P/W		3
57	ALDO	LICITRA	COT	PW	Aldo Licitra	4
58						
59						
60						

NPDES STORMWATER QUALITY TRAINING FOR
Construction Training
Coachella Valley Water District

Meeting of: Tuesday, April 24 - 13:00 - 16:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
1	Amir	Modarressi	City of Indio	PW/Engineering Division	(760) 491-4017	
2	Jaime	Engler	City of Indio	PW/Engineering Division	(760) 391-4017	
3	Juan	Raya	City of Indio	PW/Engineering Division	(760) 391-4017	
4	Tom	Rafferty	City of Indio	PW/Engineering Division	(760) 391-4017	
5	Grant	Eklund	City of Indio	PW/Engineering Division	(760) 391-4018	
6	Adrienne	Dunfee	City of Indio	PW/Engineering Division	(760) 391-4017	
7	Roldan	Lopez	City of Indio	PW/Engineering Division	(760) 391-4017	
8	Aaron	Kulp	City of Indio	PW/Engineering Division	(760) 391-4017	
9	James	Achuff	City of Indio	PW/Engineering Division	(760) 391-4017	
10	Jesse	Isaacson	City of Indio	PW/Engineering Division	(760) 391-4017	
11	Mike	Vela	City of Indio	PW/Engineering Division	(760) 391-4017	
12	Mike	Wilkey	City of Indio	PW/Engineering Division	(760) 391-4017	
13	David	DeRenard	CVWD	Operations		
14	Emmanuel	Aceves	CVWD	Operations		
15	Rick	Bennet	CVWD	Operations		
16	Lance	Young	CVWD	Operations		
17	Jaime	Aguirre	CVWD	Operations		
18	John	Soto	CVWD	Operations		
19	John	Collins	CVWD	Operations		
20	Albert	Padilla	CVWD	Operations		

21	Scott	Davenport	CVWD	Operations		
22	Art	Vasquez	CVWD	Operations		
23	Fred	Amador	CVWD	Operations		
24	Javier	Villarreal	CVWD	Operations		
25	Dan	Fewings	CVWD	Operations		D. Fewings
26	Ron	Alexander	CVWD	Operations		
27	Joe	Morales	CVWD	Operations		371
28	Marty	Rodriguez	CVWD	Operations		
29	Bernie	Sauceda	CVWD	Operations		
30	John	Hale	CVWD	Operations		
31	Bryan	McKinney	City of La Quinta	Public Works	(760) 777-7045	
32	Bobby	Hand	Riverside County	Transportation	(760) 921-9820	
33	Kenneth	George	Riverside County	Transportation	(760) 921-7820	
34	ALBERT	SOLAREZ	Riverside County	TLMA	(760) 399-5836	
35	Rene	Luna	CVWD	Stormwater/Drainage Maintenance	(760) 398-2661	
36	Chad	Austin	CVWD	Stormwater/Drainage Maintenance	(760) 398-2661	
37	Tim	Hoffman	CVWD	Stormwater/Drainage Maintenance	(760) 398-2661	
38	Troy	Clement	City of Beaumont	Public Works	(951) 377-5720	
39	Mike	Parsons	City of Beaumont	Public Works	(951) 760-4910	
40	Ron	Allen	City of Beaumont	Public Works	(951) 634-1779	
41	Joe	Janda	City of Beaumont	Public Works	(951) 377-5360	
42	James	Thompson	City of Banning	Public Works	(951) 922-3142	
43	Howard	Wen	City of Indio	PW/Engineering Division	(760) 391-4017	

Catherine Swearo

44	Leland	Cole	City of Rancho Mirage	Public Works	(760) 770-3224	
45	Bruce	Pelletier	City of Indian Wells	Public Works	(760) 776-0237	
46	Sam	Ruffner	City of Indian Wells	Public Works	(760) 776-0237	
47	Donald	Raymond	Riverside County	Transportation Department	(760) 778-2491	
48	Brandon	Garcia	Riverside County	Transportation Department	(760) 778-2491	
49	Victor	Casillas	Riverside County	Transportation Department	(760) 778-2491	
50	David	Jones	RCFC & WCD	Maintenance	(951) 955-1234	
51	Claudia	Trembus	City of Palm Springs	Engineering	(760) 323-8253	
52	Leonard	St.Sauver	City of La Quinta	Public Works	(760) 275-2143	
53	Miguel	Pena	City of Indio	Indio Water Authority	(760) 391-4195	
54	Gordon	Fisher	City of Coachella	Engineering	(760) 398-5744	
55	George	Iniguez	City of Coachella	Engineering	(760) 398-5744	
56	Ernie	Saenz	City of Coachella	Engineering	(760) 398-5744	EPS
57	Frank	Crain	City of Coachella	Engineering	(760) 398-5744	
58	Rene	Martinez	City of Palm Springs	Engineering	(760) 323-8253	
59	~~Ahmad~~	~~Karimi~~	City of Palm Desert	Public Works	(760) 346-0611	
60	Ed	Gallardo	City of Palm Desert	Public Works	(760) 346-0611	

JEREMY [illegible] DIRECTOR OF PUBLIC WORKS [illegible]

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NPDES STORMWATER QUALITY TRAINING FOR
Construction Training
Riverside County Flood Control & Water Conservation District

Meeting of: Monday, April 30 - 09:00 - 12:00

SIGN-IN SHEET

Switch per email →

	First Name	Last Name	Municipality	Department	Phone No	Signuature
1	Adriana	Soares	Riverside County	TLMA/GIS	(951) 955-8823	Adriana Soares
2	Richard "Mike"	Call	Riverside County	Transportation Department	(951) 955-8614	
3	George	~~Boyden~~ YASSA	Riverside County	Transportation Department	(951) 955-8614	
4	Joseph	Dunlap	Riverside County	Transportation Department	(951) 955-8614	
5	David	Hylkema	Riverside County	Transportation Department	(951) 955-8614	
6	William "Bill"	Jackson	Riverside County	Transportation Department	(951) 955-8614	
7	Eric	Lohr	Riverside County	Transportation Department	(951) 955-8614	
8	Gabriel	Munoz	Riverside County	Transportation Department	(951) 955-8614	
9	Trai	Nguyen	Riverside County	Transportation Department	(951) 955-8614	
10	Luana	Roth	Riverside County	Transportation Department	(951) 955-8614	
11	Nick	Sison	Riverside County	Transportation Department	(951) 955-8614	Nick
12	RAY	DUNN	RCFC & WCD	FLOOD CONTROL	(951) 961-9576	
13	GENE	LEWIS	RCFC & WCD	FLOOD CONTROL	(951) 850-6917	
14	MIKE	LUNA	RCFC & WCD	FLOOD CONTROL	(909) 908-0978	
15	BRENT	MYTINGER	RCFC & WCD	FLOOD CONTROL	(909) 560-1142	
16	BARRY	TEMPLE	RCFC & WCD	FLOOD CONTROL	(909) 560-1148	
17	SAM	TERCERO	RCFC & WCD	FLOOD CONTROL	(951) 955-1287	
18	Jessica	Chin	City of Riverside	Public Works	(951) 826-5760	
19	Barney	Hunter	City of Riverside	Public Works	(951) 7[illegible]	
20	Jack	Lynn	City of Riverside	Public Works	[illegible]	

21	Jack	Palomarez	City of Riverside	Public Works		
22	Ray	Garcia	City of Riverside	Public Works		
23	Jess	Romo	City of Riverside	Public Works		
24	Fred	Cerda	City of Riverside	Public Works		
25	Danny	Cwiak	City of Riverside	Public Works		
26	Tim	Dexter	City of Riverside	Public Works		
27	Victor	Moore	City of Riverside	Public Works		
28	Andy	Beck	City of Riverside	Public Works		
29	Donald	Buchannon	City of Riverside	Public Works		
30	Daniel	Barba	City of San Jacinto	Development, Cd Enf	(951) 487-7330	
31	Dave	Huster	City of San Jacinto	Development, Bldg,	(951) 487-7330	
32	Sergio	Ortiz	City of San Jacinto	Development, Bldg,	(951) 487-7330	S. ORTIZ
33	Barry	Ghaemi	City of Corona	Public Works	(951) 739-4961	
34	Crystal	Nguyen	City of Corona	Public Works	(951) 817-5798	
35	Estella	Valderrama	City of Corona	Public Works	(951) 279-3751	
36	Stephen	Duffin	City of Corona	Public Works	(951) 817-5758	
37	Noel	Castillo	City of Corona	Public Works	(951) 279-3537	
38	Lupe	Barrera	City of Corona	Public Works	(951) 736-2435	
39	Terrence	Piorkowski	City of Norco	Public Works	(951) 270-5607	
40	Omar	Gonzalez	City of Corona	Public Works	(951) 279-3515	
41	Clint	Herrera	City of Corona	Public Works	(951) 739-4888	
42	dale	bonham	City of Norco	Public Works	(951) 270-5607	
43	Greg	Worley	City of Riverside	Public Util - Water Field Dep	(951) 351-6350	

44	Don	Neal	City of Riverside	Public Util - Water Field Dep	(951) 351-6368	
45	Andrew	Ramos	City of Riverside	Public Util - Water Field Dep	(951) 351-6350	
46	Joseph	Gandara	City of Riverside	Public Util - Water Field Dep	(951) 351-6350	
47	Raymond	Aguilar	City of Riverside	Public Util - Water Field Dep	(951) 351-6350	
48	Christopher	Collins	City of Riverside	Public Util - Water Field Dep	(951) 351-6350	
49	Jeffrey	Karalun	City of Riverside	Public Util - Water Field Dep	(951) 351-6350	
50	Dexter	Cole	City of Riverside	Public Util - Water Field Dep	(951) 351-6350	
51	Thomas	Garcia	City of Riverside	Public Util - Water Field Dep	(951) 351-6350	
52	Mike	Neal	City of Beaumont	Public Works	(951) 377-5314	
53	Al	Ignacio	City of Beaumont	Public Works	(951) 377-5790	
54	Chad	Nichols	City of Beaumont	Public Works	(951) 760-4971	
55	Karl	Shrader	City of Beaumont	Public Works	(951) 377-5315	
56	Pete	Pinlac	City of Beaumont	Public Works	(951) 445-7531	
57	Dave	Thibault	City of Beaumont	Public Works	(951) 377-5315	
58	Dave	Ochs	City of Beaumont	Public Works	(951) 906-9224	
59	Abel	Garcia	City of Norco	Public Works	(951) 270-5607	
60	Lyndon	Lorance	City of Norco	Public Works	(951) 270-5607	
61	Jeff	Potts	City of Corona	Public Works	(951) 736-2442	
	Steve	Glenn	County of Riv.	Waste Manage	951 486-3200	
	Jeff	[illegible]	Riverside	Waste [illegible]	951-980-3275	
	Edward	[illegible]	Riverside	Waste Management	[illegible]	

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NPDES STORMWATER QUALITY TRAINING FOR
Construction Training
Riverside County Flood Control & Water Conservation District

Meeting of: Thursday, May 3 - 13:00 - 16:00 SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
1	Farida	Naceem	City of Murrieta	Engineering	(951) 461-6075	
2	Richard	Temple	City of Indian Wells	Public Works	(760) 776-0237	
3	Eduardo	Castellanos	Riverside County	Waste Management		
4	Andy	Cortez	Riverside County	Waste Management		
5	Nimrod	Garay	Riverside County	Waste Management	486 3920	N. Garay
6	Scott	Kraak	Riverside County	Waste Management		
7	Benjamin	Matye	Riverside County	Waste Management	63251	
8	Panda	Workman	Riverside County	Waste Management	486 3276	
9	Fouad	Mina	Riverside County	Waste Management	951-486-3244	
10	Marin	Cionca	Riverside County	Waste Management		
11	Kevin	Joyce	Riverside County	Waste Management	486-3260	
12	Sarah	Watrous	Riverside County	Waste Management		
13	Nate	Viste	Riverside County	Waste Management		
14	Randy	Taylor	Riverside County	Waste Management	951-247/724	Randy Taylor
15	John	Contrado	City of Corona	Public Works Inspection	951-279-3512	
16	Tom	Hall	City of Corona	Public Works Inspection	951-232-1988	
17	Ken	Dagenais	City of Corona	Public Works Inspection		
18	Remi	Nunez	City of Corona	Public Works Inspection	951-538-2162	
19	Brian	Ladnier	City of Corona	Public Works Inspection	951-232-2766	
20	Rosario	Ruvalcaba	City of Corona	Public Works Inspection	(951) 232-1981	

21	Dave	Mitchell	City of Corona	Public Works Inspection		
22	Randy	Bender	City of Corona	Public Works Inspection		
23	David	Shreve	City of Corona	Public Works Inspection		
24	Mirek	Jaroslawski	City of Corona	Public Works Inspection		
25	William	Anderson	Riverside County	Transportation Department	(951) 955-1095	
26	Salvador	Terriquez-Lopez	Riverside County	Transportation Department	(951) 955-1095	
27	Jeff	Gullett	Riverside County	Transportation Department	(951) 955-1095	
28	Michael	Coates	Riverside County	Transportation Department	(951) 955-1095	
29	James	Araiza	Riverside County	Transportation Department	(951) 955-1095	
30	Tracy	Bravo	Riverside County	Transportation Department	(951) 955-1095	
31	Matt	Sayre	Riverside County	Transportation Department	(951) 955-1095	
32	Richard	Ott	Riverside County	Transportation Department	(951) 955-1095	
33	George	Williams	Riverside County	Transportation Department	(951) 955-1095	
34	Joseph	Place	Riverside County	Transportation Department	(951) 955-1095	
35	Dave	Moen	Riverside County	Transportation Department	(951) 955-1095	
36	Robert	Cardenas	Riverside County	Transportation Department	(951) 955-1095	
37	Tom	Vaughn	City of Hemet	Public Works	(951) 765-2360	Tom Vaughn
38	Mac	McCall	City of Hemet	Public Works	(951) 765-2360	Mac McCall
39	Ed	Lara	City of Corona	Public Works	(951) 739-4825	
40	Steve	Enna	City of Corona	Public Works	(951) 739-4815	
41	Victor	Ayala	City of Calimesa	Public Works	(909) 795-9801	
42	Bob	French	City of Calimesa	Public Works	(909) 795-9801	
43	Dale	Everman	City of Calimesa	Public Works	(909) 795-9801	

44 Jessie Hillis

45 DARREN Young CITY OF CORONA P.W. 909-736-2204

46 GERALD GREGORY RCWMD 352-9891

47 STEVEN WAHN TRANSPORTATION (951) 461-5416

48 Keith Barnett " " (951) 961-6072

44	Mike	McCabe	City of Calimesa	Public Works	(909) 795-9801	
45	Perry	Gerdes	City of Banning	Water/Wastewater Utility	(951) 922-3281	
46	DAVID ~~Greg~~	MARTINEZ ~~Campbell~~	City of Banning	Water/Wastewater Utility	(951) 922-3281	
47	MATT ~~Ed~~	STEVENS ~~Moore~~	City of Banning	Water/Wastewater Utility	(951) 922-3281	
48	Scott	Barnhart	City of Banning	Water/Wastewater Utility	(951) 922-3281	
49	Jason	Valdez	City of Banning	Water/Wastewater Utility	(951) 922-3281	
50	Tom	Shipley	Riverside County	Transportation Department	(951) 955-1095	
51	MAUS ~~Randy~~	DANIE ~~White~~	Riverside County	Transportation Department	(951) 955-1095	D. Maus
52	Jon	Tressler	Riverside County	Transportation Department	(951) 955-1095	
53	Stephen	Glenore	Riverside County	Waste Management		
54	Dwight "Kelley"	Donovan	Riverside County	Transportation Department	(951) 955-1095	
55	Mark	Bailey	City of Moreno Valley	Public Works	(951) 413-3243	
56	Cory	Hammond	City of Murrieta	Public Works Inspection		
57	Steve	Kestly	City of Murrieta	Public Works Inspection	951 201-1031	
58	Salvador	Lopez	Riverside county		(951) 955-6899	Salvador Lopez Jr.
59	Tom	Shipley	Riv. County			
60	RICHARD	TEMPLE	City of INDIAN WELLS	BLDG INSP	~~760-578~~ 776-0230	
61	Justin	Robbins	Riv. Co.	Const. Insp.	951-961-6882	
	NOTE	VISTE	RIVCO		909 528	

MUNICIPAL FACILITIES & ACTIVITIES TRAINING

NPDES STORMWATER QUALITY TRAINING FOR
Municipal Facilities and Activities
Riverside County Flood Control & Water Conservation District

Meeting of: October 2, 2006 1pm - 4pm SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Signature
1	Benjamin	Aborita	County of Riverside	Waste Management	
2	Chris	Baldino	City of Corona	Parks and Community	
3	Danilo	Batson	City of Riverside	Public Works Streets	
4	Jim	Butler	City of Moreno Valley	Parks & Recreation	
5	Fred	Cerda	City of Riverside	Public Works Streets	
6	Roger	Chavez	City of Moreno Valley	Parks & Recreation	
7	Jessica	Chin	City of Riverside	Public Works	
8	Tom	Collins	City of Riverside	Public Utilities - Water	Tom Collins
9	Arturo	Contreras	City of Palm Desert	Public Works	
10	Chris	Cordova	City of Beaumont	Code Enforcement	
11	Andrew	Cortez	County of Riverside	Waste Management	
12	Daniel	Cover	City of Moreno Valley	Public Works	
13	Ron	DeHoop	City of Corona	Parks and Community	
14	James	Dooley	County of Riverside	Transportation Department	
15	John	Dyer	City of Moreno Valley	Parks & Recreation	
16	Walt	Edmiston	City of Corona	Parks and Community	
17	Jesse	Encino	City of Corona	Public Works	
18	Rick	Fite	County of Riverside	Transportation Department	
19	Nimrod	Garay	County of Riverside	Waste Management	N. Garay
20	Paul	Gearhart	City of Riverside	Public Utilities - Water	
21	SUZANNE	GILLETTE	RIVERSIDE COUNTY	TLMA- BUILDING & SAFETY	

NPDES STORMWATER QUALITY TRAINING FOR
Municipal Facilities and Activities
Riverside County Flood Control & Water Conservation District

Meeting of: October 2, 2006 1pm - 4pm SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Signature
22	Valin	Gray	City of Moreno Valley	E.S.A	
23	Andy	Guerrero	City of Riverside	Public Works Streets	
24	Carlos	Hernandez	City of Palm Desert	Public Works	
25	Ed	Hornyak	City of Moreno Valley	Parks & Recreation	
26	George	Kelley	City of Riverside	Public Utilities - Water	George Kelley
27	Eui	Kim	County of Riverside	Building & Safety	
28	Scott	Kraak	County of Riverside	Waste Management	
29	John	Leamon	City of Riverside	Public Works Streets	
30	Andy	Lindsay	City of Riverside	Public Utilities - Water	
31	Carlos	Lira	City of Moreno Valley	Parks & Recreation	
32	Jim	Lowery	City of Riverside	Public Works Streets	
33	Jerry	Lytle	County of Riverside	Transportation Department	
34	Ben	Mah	County of Riverside	Waste Management	
35	Joe	Manzo	City of Hemet	Public Works	
36	Tom	McKay	County of Riverside	Transportation Department	
37	Jerry	Mendoza	City of Riverside	Public Works Streets	
38	Daniel	Mendoza	City of Moreno Valley	Parks & Recreation	
39	Dante	Mikkelson	County of Riverside	Waste Management	
40	Dave	Miller	County of Riverside	Transportation Department	Dave Miller
41	roger	miller	rlma	building & safty	
42	Daniel	Monto	City Of Moreno Valley	Public Works	

NPDES STORMWATER QUALITY TRAINING FOR

Municipal Facilities and Activities

Riverside County Flood Control & Water Conservation District

Meeting of: October 2, 2006 1pm - 4pm

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Signature
43	Dave	Navarro	City of Corona	Public Works	
44	Cynthia	Overby	City of Beaumont	Code Enforcement	
45	Larry	Page	City of Perris	Public Works	
46	Randy	Parker	City of Moreno Valley	Parks and Recreation	
47	Robert	Pena Sr	City of Corona	Parks and Community	Robert Pena Sr
48	WILLIAM	PEPPAS	COUNTY OF RIVERSIDE	BUILDING & SAFETY	
49	Luis	Perez	City of Riverside	Public Works Streets	
50	Luis	Quevedo	City of Corona	Public Works	
51	Rudy	Quiroz	City of Moreno Valley	Parks & Recreation	
52	Ryan	Righetti	County of Riverside	Transportation Department	
53	Dan	Riley	City of Corona	Parks and Community	
54	Rick	Rios	City of Corona	Parks and Community	
55	Richard	Roberts	City of Riverside	Public Works Streets	
56	Sergio	Rosas	City of Palm Desert	Public Works	
57	Bren	Seki	City of Riverside	Public Works Streets	
58	steven	toth	Riverside County	Transportation Dept	
59	Tina	Tuason	RCFC	NPDES	
60	~~Coleen~~	~~Weeks~~	City of Riverside	Public Works Streets	
61					
62					
63	Tim	[illegible]	[illegible]	[illegible]	

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How many times you taken this class?

NPDES STORMWATER QUALITY TRAINING FOR
Municipal Facilities and Activities
Riverside County Flood Control & Water Conservation District

Meeting of: October 16, 2006 9am - 12pm SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Signature	
1	Danny	Alfaro	City of Riverside	Public Works Streets		
2	Felipe	Alvarado	City of Moreno Valley	Parks & Recreation		0
3	Luis	Baez	City of Corona	Parks and Community		
4	Daniel	Barba	City of San Jacinto	Code Enforcement	Daniel Barba	0
5	Abdul	Behnawa	COUNTY OF RIVERSIDE	BUILDING AND SAFETY		0
6	Christina	Bowser	City of Beaumont	Code Enforcement	Christina Bowser	0
7	TRENIS	BRAGA	COUNTY OF RIVERSIDE	BUILDING AND SAFTY		
8	PHIL	BROESAMLE	COUNTY OF RIVERSIDE	BUILDING&SAFETY		
9	Rudy	Casados	City of Moreno Valley	Parks & Recreation		0
10	Isaac	Chappell	City of Moreno Valley	Parks & Recreation		0
11	David ~~[illegible]~~	ortega ~~[illegible]~~	Riverside County	Flood Control		2
12	Charles	de Chambeau	Riverside County	TLMA-Building and Safety		0
13	LaDonna	Eldridge	City of Corona	Parks and Community		0
14	Dave	Everitt	City of Moreno Valley	Parks & Recreation		0
15	Jesse	Fierro	City of Riverside	Public Works Streets		1
16	Wally	Firlit	City of Moreno Valley	PW/M&O		0
17	ROBERT	FLOREZ	CITY OF MORENO	ESA		10
18	Tony	Garcia	City of Moreno Valley	Parks & Recreation		0
19	Phil	Hallberg	City of San Jacinto	Building & Safety		0
20	Eddie	Hernandez	City of Corona	Parks and Community		
21	Marianna	Hernandez	County of Riverside	Transportation Department		

NPDES STORMWATER QUALITY TRAINING FOR

Municipal Facilities and Activities

Riverside County Flood Control & Water Conservation District

Meeting of: October 16, 2006 9am - 12pm

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Signature
22	Tim	Hostrawser	Riverside County	Building and Safety	
23	Rob	Istik	County of Riverside	Waste Management	
24	Jorge ~~Ruben~~	MIRANDA ~~Jimenez~~	City of Hemet	Public Works	
25	Scott	Johnston	County of Riverside	Transportation Department	
26	Ernie	Kluck	City of Hemet	Public Works	
27	James Crew	Smithey Leader I	City of Riverside	Public Works	0
28	Coleen Crew	WEEKS Leader II	City of Riverside	Public Works Streets	1
29	Jeff	Lewellen	County of Riverside	Transportation Department	2
30	Bob	Lucas	City of Riverside	Public Utilities - Water	
31	Art	Madril	City of Riverside	Public Utilities - Water	
32	Juan	Martinez	City of Moreno Valley	Parks & Recreation	+1
33	Ben	Matye	County of Riverside	Waste Management	
34	Marcee	Maupin	City of San Jacinto	Code Enforcement	0
35	Harvey	McCoy	County of Riverside	Transportation Department	
36	Chantay	McKnight	City of Moreno Valley	Parks & Recreation	0
37	Jeff	Mitchell	County of Riverside	Waste Management	
38	gary	moss	Riverside county	transportation	4
39	Robert	Munoz	City of Riverside	Public Works Streets	
40	Greg	Oliver	City of Riverside	Public Utilities - Water	2
41	Alfrey	Patterson	City of Moreno Valley	Parks & Recreation	
42	Darren	Ramsey	City of Riverside	Public Works Streets	2

NPDES STORMWATER QUALITY TRAINING FOR

Municipal Facilities and Activities

Riverside County Flood Control & Water Conservation District

Meeting of: October 16, 2006 9am - 12pm SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Signature	
43	Byron	Recksiek	County of Riverside	Transportation Department		
44	Jamie	Rios	City of Riverside	Public Works Streets		1
45	Dean	Ristow	City of Moreno Valley	Parks & Recreation		3
46	Ramon	Roman	County of Riverside	Waste Management		0
47	Robert	Romero	City of Moreno Valley	Parks & Recreation		
48	Paul	Russell	County of Riverside	Transportation Department	Paul Russell	3
49	Rick	Ryno	City of Riverside	Public Utilities - Water		
50	Chris	Sauve'	City of Riverside	Building Services		3
51	Leon	Schrader	City of Moreno Valley	PW/M&O		
52	TONY	SILVAS	CITY OF MORENO	PUBLIC WORKS		3
53	Bren ~~James~~	Seki ~~Smiley~~	City of Riverside	Public Works Streets		1
54	Martin	Soria	City of Corona	Parks and Community		
55	Ted	Teagarden	City of Corona	Parks and Community		2
56	Charles	Tellis	City of San Jacinto	Building & Safety		
57	Nate	Viste	County of Riverside	Waste Management		
58	Gary	Wagner	City of Moreno Valley	Parks & Recreation		0
59	Kim	Williams	City of Riverside	Public Works Streets		
60	Panda	Workman	County of Riverside	Waste Management		
61	JAMES	BUTLER	CITY MORENO VALLEY	PARKS	James Butler	3
62	John	BURNS	County Parks	Parks	John Burns	
63	MIKE	COMBS	CITY OF RIVERSIDE	BLDG SERVICES		
	Jim	DAVIS	CO. PARK DIST EASTERN CO.	PARKS		
	BRIAN	WAGNER	RIV. CO	FIRE/HAZ-MAT		
	Joshua	Lent	RIV. CO	Fire/Haz-Mat		
	ROBERT	BECKER	RIV. CO.	FIRE/HAZMAT		2

Sheet=1

NPDES STORMWATER QUALITY TRAINING FOR
Municipal Facilities and Activities
Palm Springs Convention Center

times you have taken this course

Meeting of: October 17, 2006 9am - 12pm

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Signature	
1	Steve	Aguirre	City of Moreno Valley	P/W Enterprise Services		2nd
2	Solarez	Albert	County of Riverside	Transportation Department		
3	Daniel	Borges	City of Hemet	Public Works		
4	John	Carmona	State of California	Regional Water Quality Control		
5	Jose	Castro	City of Hemet	Public Works		
6	Bo	Chen	City of Palm Desert	Public Works		1st
7	Oliver	Chori	City of Hemet	Public Works		1st
8	David	DeRenard	Coachella Valley Water District	Domestic Construction		1st
9	Elizabeth	Escatel	City Of La Quinta	Code Enforcement		
10	MEGAN	FISHER	CITY OF LA QUINTA	BUILDING AND SAFETY		
11	Zachary	Foster	City of Moreno Valley	Enterprise Servises		2x
12	Mike	Goar	City of Hemet	Public Works		3
13	Robert	Gray	County of Riverside	Transportation Department		
14	Steve	Grewe	County of Riverside	Transportation Department		2
15	John	Hatsios	City of Palm Springs	Aviation		
16	steve	lasley	indio	code enforcement		1st
17	forest	meadows	city of indio	code enforcement		1.ST
18	Jay	Mirpour	RWQCB-7	Stormwater		1ST
19	Robert	Morris	County of Riverside	Transportation Department		1ST
20	Morgan	Newlin	City of Hemet	Public Works		1st
21	Linda	Nixon	City of Hemet	Public Works	Linda Nixon	3

NPDES STORMWATER QUALITY TRAINING FOR

Municipal Facilities and Activities

Palm Springs Convention Center

Meeting of: October 17, 2006 9am - 12pm

SIGN-IN SHEET

times taken training

	First Name	Last Name	Municipality	Department	Signature	
22	Albert	Padilla	Coachella Valley Water District	Domestic Construction		2
23	Robert	Parsons	County of Riverside	Transportation Department		
24	Robert	Rodriguez	Coachella Valley Water District	Domestic Construction		1st
25	Cora	Salas	City of Palm Desert	Public Works		
26	Ralph	Scharffenberg	City of Moreno Valley	Public Works/ESA		2nd
27	Craig	Toms	City of Palm Springs	Aviation		
28	Alana	Townsend	City of Palm Desert	Public Works		
29	carlos	vargas	indio	code enforcement		1ST
30	Barry	Verdusco	City of Moreno Valley	Public works Dept.		
31	John C.	Wilson	County of Riverside	Transportation Department		2
32	John	Carmona	R-7	Regional Board		1
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NPDES STORMWATER QUALITY TRAINING FOR

Municipal Facilities and Activities

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How many times taken this class before?

NPDES STORMWATER QUALITY TRAINING FOR
Municipal Facilities and Activities
Murrieta City Hall

Meeting of: October 18, 2006 1pm - 4pm

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Signature	
1	Erik	Aguilar	City of Corona	Public Works		
2	Mike	Almodovar	City of Murrieta	Public Works Maintenance		39
3	Alberto	Aspe	City of Murrieta	Community Services Dept.		
4	Damien	Avalos	City of Murrieta	Community Services Dept.		
5	Mike	Biggay	City of Murrieta	Community Service Dept.		
6	Kevin	Black	City of Hemet	Public Works		0
7	Mike	Brooks	City of Murrieta	Public Works Maintenance		5
8	Mark	Bullschweiller	City of Murrieta	Public Works Maintenance		
9	Mike	Burris	City of Murrieta	Public Works Maintenance		
10	Danny	Dawley	City of Corona	Public Works		
11	Juan	Del Val	City of Murrieta	Community Service Dept.		
12	Shawn	Dullanty	City of Murrieta	Community Services Dept.		
13	Mark	Durbin	City of Murrieta	Community Services Dept.		
14	Phil	Esnayra	City of Murrieta	Community Services Dept.		
15	Lanker	Figueroa	City of Murrieta	Public Works Maintenance		
16	Lupe	Gomez	City Of Lake Elsinore	Engineering		
~~17~~	~~Larry~~	~~Gross~~	~~City of Murrieta~~	~~Community Services Dept.~~		
18	Fernando	Gutierrez	City of Corona	Public Works		
19	Jay	Haecker	City of Murrieta	Community Services Dept.		
20	Dave	Hendry	City of Murrieta	Public Works Maintenance		3
21	Ken	Jones	City of Murrieta	Public Works Maintenance		3

NPDES STORMWATER QUALITY TRAINING FOR

How many times take class before?

Municipal Facilities and Activities

Murrieta City Hall

Meeting of: October 18, 2006 1pm - 4pm

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Signature	
22	Bob	Kast	City of Murrieta	Community Services Dept.		
23	Billy	Koller	City of Hemet	Public Works		
24	Ed	Lockhart	City of Corona	Public Works		
25	Danny	Marks	City of Murrieta	Community Service Dept.		
26	~~Jorge~~ Clay	~~Miranda~~ Smith	City of Hemet	Public Works		1
27	Jason	Morrell	City of Murrieta	Public Works Maintenance		5
28	Jose	Munoz	City of Murrieta	Community Services Dept.		
29	Farida	Naceem	City of Murrieta	Public Works / Engineering		
30	Steve	Nickerson	City of Murrieta	Public Works Maintenance		
31	Douglas	Norfolk	City of Norco	Public Works		3
32	Craig	Priest	City of Hemet	Public Works		0
33	Rosa	Santana	City of Murrieta	Community Services Dept.		
34	Dave	Sarian	City of Murrieta	Community Services Dept.		
35	Charles	Sommermeyer	City of Hemet	Public Works		1
36	Charlie	Soto	City of Murrieta	Community Services Dept.		
37	Ron	Stuart	City of Murrieta	Community Services Dept.		
38	Loren	Thoe	City of Corona	Public Works		
39	Rick	Thompson	City of Murrieta	Commmunity Service Dept.		
40	Steven	Torres	City of Hemet	Public Works		
41	Nick	Vaughn	City of Murrieta	Public Works Maintenance	—	
42						

NPDES STORMWATER QUALITY TRAINING FOR

Municipal Facilities and Activities

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How Many times taken class before?

Murrieta City Hall

Meeting of: October 18, 2006 1pm - 4pm

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Signature	
43	GEORGE	DELROSA	TEMECULA	MAINT.		
44	Steve	Sterling	City Tem	maint		
45	KARL	NORDGREN	TEMECULA	MAINT		
46	RICHARD	SHEA	Temecula	Maint		
47	Bill	Kolb	Hemet	Maint		
48	Scott	Russell	Murrieta	Maint		0
49	RICK	SERVEN	TEMECULA	TCSD		
50	ALEX	CASTRO	CORONA	BUILD.		1
51	Steve	Bustillos	Corona	Street		2
52	DAVID	SARIAN	MVR	CSD		
53	RON	STUART	MVR	CSD		5
54	JASON	ALFARO	Excel Landscape	Maint		
55	Mario	Ruvalcaba	City of Corona	Maint.		2
56	Garrett	Butler	City of Corona	Maint		1
57	LARRY	GROSS	CSD INSPECTOR	CSD		0
58	DAVID	NAVARRO	CITY OF CORONA	ST MAINT		5
59	Andre	Valenciana	Corona	ST Maint		1
60	Jesse	Encino	Corona	Public works		
61	ERIC	SHOW	County of Riverside	EDA		
62	JOSE	ALFARO	EXCEL LANDSCAPE	MAINT.		
63	Jerry	Cardenas	EXCEL LANDSCAPE	CED.		
	RANDY	WEST	TEMECULA	Public Works		
	DAVE	DAVIS	TEMECULA	Public works		

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NPDES STORMWATER QUALITY TRAINING FOR
Municipal Training
Riverside County Flood Control & Water Conservation District

Meeting of: Monday, April 16 - 08:00 - 11:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
1	Arlene	Chun	RCFC & WCD	NPDES	(951) 955-1330	
2	Mark	Hughes	Riverside County	Transportation Department	(951) 955-6767	
3	Carl	Szoyka	City of Banning	Street	(951) 922-3286	
4	Tom	Lara	City of Banning	Street	(951) 922-3286	
5	Gourley	Collins	City of Banning	Street	(951) 922-3286	
6	Troy	Conner	City of Banning	Street	(951) 922-3286	
7	Andrew	Hagaman	City of Banning	Street	(951) 922-3286	
8	Ramiro	Garcia	City of Banning	Fleet maintenance	(951) 922-3291	
9	Terry	Dunn	City of Banning	Fleet maintenance	(951) 922-3291	
10	Stuart	Sheldon	City of Moreno Valley	Public Works	(951) 413-3483	
11	Deby	Conrad	City of La Quinta	Building & Safety	(760) 777-7022	
12	Jack	Porter	City of Canyon Lake	Code Enforcement	(951) 244-2955	
13	Richard	Messer	City of Canyon Lake	Code Enforcement	(951) 244-2955	
14	Richard	Rupert	City of Canyon Lake	Code Enforcement	(951) 244-2955	
15	michael	morris	City of La Quinta	Code Complience	(760) 777-7014	
16	Elizabeth	Escatel	City of La Quinta	Building and Safety	(760) 777-7110	Elizabeth Escatel
17	Angel	Lazareno	City of Moreno Valley	maintenance	(909) 380-3012	
18	Robert	Pena Jr	City of Corona	Parks and Community Services	(951) 279-3754	
19	Ruben	Valterria	City of Corona	Parks and Community Services	(951) 279-3754	

20	Gary	Tomes	City of Corona	Parks and Community Services	(951) 279-3754	
21	Brian	Bassler	City of Corona	Parks and Community Services	(951) 736-2489	
22	George	Jackson	City of Corona	Parks and Community Services	(951) 739-4991	
23	Jeff	Potts	City of Corona	Public Works	(951) 736-2442	
24	John	Kennedy	Riverside County	Transportation Department	(951) 845-5015	
25	Kirk	Light	Riverside County	Transportation Department	(951) 845-5015	
26	Tom	Mader II	Riverside County	Transportation Department	(951) 845-5015	
27	Richard	Burley	Riverside County	Transportation Department	(951) 845-5015	
28	Robert	Robledo	Riverside County	Transportation Department	(951) 845-5015	
29	Helio	Valdez	Riverside County	Transportation Department	(951) 845-5015	
30	Tante Rey	Ramoran	Riverside County	Transportation Department	(951) 845-5015	
31	Scott	Rubin	City of Corona	Parks and Community Services	(951) 736-2463	
32	Marty	Fox	Other	Contractor	(909) 208-8101	
33	Hector	Lopez	Other	Contractor	(909) 322-4520	
34	Brandon	Viayra	City of Corona	Public Works	(951) 736-2405	
35	Ted	Lauriano	City of Corona	Public Works	(951) 736-2405	
36	Rick	Shaffer	City of Corona	Public Works	(951) 736-2405	
37	Exiquel	DeLeon	City of Corona	Public Works	(951) 736-2405	
38	Martin	Arias	City of Corona	Public Works	(951) 736-2405	
39	Jose	Payan	City of Corona	Public Works	(951) 736-2405	
40	Mihai	Dan	City of Indian Wells	Public Works	(760) 776-0237	
41	Chris	Wiggins	City of Indian Wells	Public Works	(760) 776-0237	

42	Jerry	Gregory	Riverside County	Waste Management		
43	Scott	Kraak	Riverside County	Waste Management		
44	Molly	Stewart	Riverside County	Waste Management		
45	Benjamin	Mah	Riverside County	Waste Management	486 3210	
46	Benjamin	Aborita	Riverside County	Waste Management		
47	Tom	Hays	Riverside County	Waste Management	486-3322	
48	Panda	Workman	Riverside County	Waste Management		
49	Kurt	Van Dusen	Riverside County	Waste Management		
50	Brandon	Harlacher	City of Hemet	Public Works	(951) 765-3712	
51	Carlos	Gonzalez	City of Hemet	Public Works	(951) 765-3712	
52	Joseph	Contaoi	Riverside County	Waste Management		
53	Flores ~~William~~	Roger ~~Anderson~~	Riverside County	Transportation Department	(951) 955-1095	
54	Jeff	Gullett	Riverside County	Transportation Department	(951) 955-1095	
55	Michael	Coates	Riverside County	Transportation Department	(951) 955-1095	
56	James	Araiza	Riverside County	Transportation Department	(951) 955-1095	
57	Matt	Sayre	Riverside County	Transportation Department	(951) 955-1095	
58	~~Travis~~	~~Peterson~~	City of Hemet	Public Works	(951) 765-3712	
59	~~R.W.~~	~~Bross~~	City of Hemet	Public Works	(951) 765-3712	
60	Stephen	Glenore	Riverside County	Waste Management		

Donald Kay City of Hemet Street Sweeper 925-3777 DK
CAAD MORA City of Hemet Street Sweeper 925-3777

NPDES STORMWATER QUALITY TRAINING FOR
Municipal Training
Riverside County Flood Control & Water Conservation District

Meeting of: Tuesday, May 1 - 13:00 - 16:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
1	Louis	Ybarra	City of Corona	Public Works	(951) 736-2405	
2	Steve	Schmidt	City of Corona	Public Works	(951) 739-4820	
3	John	Longo	City of Corona	Public Works	(951) 739-4820	
4	Dale	Lesinski	City of Corona	Public Works	(951) 739-4820	
5	Ed	Lockhart	City of Corona	Public Works	(951) 736-2443	
6	Luis	Quevedo	City of Corona	Public Works	(951) 739-4820	
7	Jeff	Baker	City of Corona	Public Works	(951) 739-4820	
8	John	Perez	City of Corona	Public Works	(951) 739-4820	
9	Angel	Zuniga	City of Corona	Public Works	(951) 739-4820	
10	Eddie	Casarez	City of Corona	Public Works	(951) 739-4820	
11	Noel	Cervantes	City of Corona	Public Works	(951) 739-4820	
12	Jimmie	Johnson	City of Corona	Public Works	(951) 736-2405	
13	Pablo	Quintero	City of Corona	Public Works	(951) 736-2405	
14	Ron	Jimenez	City of Corona	Public Works	(951) 736-2405	
15	Edward	Quevedo	City of Corona	Public Works	(951) 736-2405	
16	Bob	French	City of Calimesa	Public Works	(909) 795-9801	
17	Victor	Ayala	City of Calimesa	Public Works	(909) 795-9801	
18	Dale	Everman	City of Calimesa	Public Works	(909) 795-9801	
19	Mike	McCabe	City of Calimesa	Public Works	(909) 795-9801	
20	Donald	Raymond	Riverside County	Transportation Department	(760) 778-2491	

21	Brandon	Garcia	Riverside County	Transportation Department	(760) 778-2491	
22	Victor	Casillas	Riverside County	Transportation Department	(760) 778-2491	
23	Gayle	Cuneo	RCFC & WCD	Flood Control	(951) 955-1311	
24	Steve	Parker	City of Banning	Facilities	(951) 922-3292	
25	Donald	Kay	City of Hemet	Public Works	(951) 765-3712	
26	Salvador	Terriquez-Lopez	Riverside County	Transportation Department	(951) 955-1095	
27	Roger	Flores	Riverside County	Transportation Department	(951) 955-1095	
28	Richard	Ott	Riverside County	Transportation Department	(951) 955-1095	
29	George	Williams	Riverside County	Transportation Department	(951) 955-1095	
30	Joseph	Place	Riverside County	Transportation Department	(951) 955-1095	
31	Dave	Moen	Riverside County	Transportation Department	(951) 955-1095	
32	Robert	Cardenas	Riverside County	Transportation Department	(951) 955-1095	
33	Bill	Shesgreen	City of Banning	Street	(951) 922-3286	
34	Steve	Armitage	City of Banning	Street	(951) 922-3286	
35	Robert	Guillen	City of Banning	Street	(951) 922-3286	
36	Gregory	Cottage	City of Banning	Street	(951) 922-3286	
37	Sergio	Guzman	Riverside County	Transportation Department	(760) 408-3248	
38	Joe	Nappi	City of Hemet	Public Works	(951) 765-3712	
39	Justin	Gunn	City of Hemet	Public Works	(951) 765-3712	
40	Carlos	Navarro	City of Banning	Fleet Maintenance		
41	Moses	Medina	City of Banning	Fleet Maintenance	951 922-3284	
42	Owen	Carder	City of Banning	Fleet Maintenance	951 922-3284	
43	Silviano	Romero	Riverside County	Transportation Department	(951) 955-1095	

44	Paul	Lucas	Fire	Engineer	[illegible]	[illegible]
45	Jackie	Misuraca	City of La Quinta	Code	(760) 777-7050	[illegible]
46	LaAyne	Campbell	City of La Quinta	Code	760 777-7050	[illegible]
47	William	Anderson	Riv County	Trans Dept	951-955-6819	[illegible]
48						
49	Linda	Norried	City of Riverside	PU	951 351-6331	[illegible]
50	Steven	Payne	Riverside City Fire	Fire	[illegible]	[illegible]
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APPENDIX E

HOUSEHOLD HAZARDOUS WASTE/ANTIFREEZE, BATTERIES, OIL, AND LATEX PAINT REPORT

RIVERSIDE COUNTY WASTE MANAGEMENT DEPARTMENT

SANTA MARGARITA RIVER WATERSHED FY 2006/2007 Report

HAZARDOUS WASTE FOUND AND PROPERLY MANAGED AT LANDFILL SITES
No Landfill sites located in this watershed.

ABANDONED HAZARDOUS WASTE FOUND AND PROPERLY MANAGED ON LANDFILL ACCESS ROUTES IN ALL WATERSHEDS AND AT ALL SITES

Waste Type	
Aerosols	34
Antifreeze	42
Cathode Ray Tubes	828
Flammable Gas	359
Flammable Liquid/Solids	296
Latex Paint	546
Lead Acid Batteries	1,654
Paint Related	132
Poison Liquid	262
Unknowns	0
Used Oil	159
Used Oil Filters	10
Total lbs. Waste	4,322

Riverside County Waste Management Department
Household Hazardous Waste Collection Program
FY 2006/2007 Activities in
Santa Margarita Watershed

Location	Service Dates	Number of Service Days in FY 2006/2007	Cost	Number of HHW Vehicles	Number of E-Waste Vehicles	Total Vehicles	Batteries (Auto) (lbs) 45#/unit	Nicad/ Lithium Batteries (lbs)	Waste Oil (lbs) 8.5 lb/gal	Anti-Freeze (lbs) 8.5 lb/gal	Latex Paint (lbs) 10 lb/gal	Oil Filters (lbs)	Alkaline Batteries (lbs)	Mercury (lbs)	Propane (lbs)	Paint Related (lbs)	Fluor. Tubes (lbs) 0.2 lbs/linear foot	Flam. Solid/Liq (lbs)	Reuse (lbs)	Poison (lbs)	Acid (lbs)	Base (lbs)	Oxidizer (lbs)	Other (lbs)	Aerosols (lbs)	Asbestos (lbs)	Sharps (lbs)	CRTs (lbs)	Misc E-waste (lbs)	Total Pounds Shipped
Murrieta ABOP HHW Collection Facility																														
	All non-holiday Saturdays	42	$18,320	1,713	0	1,713	17,323	291	21,675	2,238	40,000	435	1,393																	83,355
Temporary HHW Collection Facility (THHWCF) Events																														
Aguanga	10/7/2006	1	$2,500	15	0	15	800	0	600	0	600	25	0	0	0	0	40	50	0	150	0	15	0	0	10	0	0	480	0	2,770
Aguanga	6/9/2007	1	$2,500	14	6	20	647	0	170	85	50	5	13	0	45	0	0	398	0	0	0	0	0	0	35	0	0	874	0	2,322
Subtotal		**2**	**$5,000**	**29**	**6**	**35**	**1,447**	**0**	**770**	**85**	**650**	**30**	**13**	**0**	**45**	**0**	**40**	**448**	**0**	**150**	**0**	**15**	**0**	**0**	**45**	**0**	**0**	**656**	**0**	**4,394**
Anza	9/16/2006	1	$8,701	113	30	143	4,485	35	5,100	0	2,000	45	60	20	260	2,400	5	3,005	0	240	55	200	130	0	100	0	8	6,360	2,675	27,183
Anza	12/2/2006	1	$5,000	54	14	68	1,270	6	2,125	0	500	7	15	0	322	528	0	828	0	131	0	62	0	0	57	75	7	2,281	1,300	9,514
Anza	3/10/2007	1	$2,500	34	14	48	1,856	15	1,275	43	500	20	66	5	50	220	0	494	0	152	16	32	0	0	50	0	10	2,737	456	7,997
Subtotal		**3**	**$16,201**	**201**	**58**	**259**	**7,611**	**56**	**8,500**	**43**	**3,000**	**72**	**141**	**25**	**632**	**3,148**	**5**	**4,327**	**0**	**523**	**71**	**294**	**130**	**0**	**207**	**75**	**25**	**11,378**	**4,431**	**44,694**
Pinyon Flats	11/4/2006	1	$2,500	15	5	20	200	0	300	0	0	20	25	0	0	500	20	200	0	0	0	0	0	0	10	0	0	600	500	2,375
Pinyon Flats	5/5/2007	1	$5,000	57	5	62	2,245	0	1,275	20	1,000	10	25	0	145	1,200	10	1,450	0	100	45	25	70	0	75	0	3	293	1,850	9,841
Subtotal		**2**	**$7,500**	**72**	**10**	**82**	**2,445**	**0**	**1,575**	**20**	**1,000**	**30**	**50**	**0**	**145**	**1,700**	**30**	**1,650**	**0**	**100**	**45**	**25**	**70**	**0**	**85**	**0**	**3**	**893**	**2,350**	**12,216**
Temecula	9/16/2006	1	$20,636	268	53	321	2,430	27	2,125	340	5,000	86	186	9	351	2,213	73	2,702	114	1,197	167	511	372	14	413	0	96	4,632	3,680	26,738
Temecula	1/27/2007	1	$31,416	408	73	481	2,711	78	3,060	128	8,059	63	479	5	682	9,984	121	4,968	100	2,316	243	181	226	9	672	0	94	11,131	10,955	56,265
Temecula	5/12/2007	1	$19,250	250	55	305	1,963	53	1,105	425	4,100	30	211	7	606	2,560	193	2,599	263	597	186	150	115	5	374	0	60	6,649	3,972	26,223
Subtotal		**3**	**$71,302**	**926**	**181**	**1,107**	**7,104**	**158**	**6,290**	**893**	**17,159**	**179**	**876**	**21**	**1,639**	**14,757**	**387**	**10,269**	**477**	**4,110**	**596**	**842**	**713**	**28**	**1,459**	**0**	**250**	**22,412**	**18,607**	**109,226**
TOTAL THHWCF		**10**	**$100,003**	**1,228**	**255**	**1,483**	**18,607**	**214**	**17,135**	**1,041**	**21,809**	**311**	**1,080**	**46**	**2,461**	**19,605**	**462**	**16,694**	**477**	**4,883**	**712**	**1,176**	**913**	**28**	**1,796**	**75**	**278**	**35,339**	**25,388**	**170,530**
TOTAL AMOUNTS FROM ALL HHW FACILITY TYPES IN SANTA MARGARITA WATERSHED																														
		52	**$118,323**	**2,941**	**255**	**3,196**	**35,930**	**505**	**38,810**	**3,279**	**61,809**	**746**	**2,473**	**46**	**2,461**	**19,605**	**462**	**16,694**	**477**	**4,883**	**712**	**1,176**	**913**	**28**	**1,796**	**75**	**278**	**35,339**	**25,388**	**253,885**

HAZARDOUS WASTE FOUND AND PROPERLY MANAGED AT LANDFILL SITES
No Landfill sites located in this watershed.

APPENDIX F

WATERSHED FACILITIES MAP

LARGE SCALE MAP ATTACHED

APPENDIX G

MONITORING ANNUAL REPORT

APPENDIX G

SANTA MARGARITA REGION MONITORING ANNUAL REPORT

FISCAL YEAR 2006-2007

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G-1.0 INTRODUCTION

In July, 2004 the San Diego Regional Water Quality Control Board (SDRWQCB) issued Monitoring and Reporting Program No. R9-2004-001, NPDES Permit No. CAS0108766 for the Discharges of Urban Runoff from the Municipal Separate Storm Sewer Systems (MS4s) Draining the County of Riverside, the City of Murrieta, the City of Temecula and the Riverside County Flood Control and Water Conservation District (RCFCD) within the Santa Margarita Watershed in the San Diego Region (MRP). The goals are identified in section I of the MRP and the management questions that the MRP is designed to address are listed in section IIA of the MRP.

Per the requirements of the MRP, the RCFCD developed and implemented a monitoring program based on the program outline in the MRP and the guidance in the Model Monitoring Program for Municipal Separate Storm Sewer Systems in Southern California (SMC, 2004). The Model Monitoring Program was prepared by the Southern California Stormwater Monitoring Coalition (SMC), which consists of Permittees, Regional Water Quality Control Boards, citizen's groups, Southern California Coastal Watershed Research Project (SCCWRP), private consultants, and other agencies.

The RCFCD established water quality monitoring stations throughout the Santa Margarita Region (SMR). The monitoring stations are generally located at the downstream end of a major MS4 to allow for detection of illicit discharges, characterization of flows, and a better understanding of the water quality as prescribed in the MRP.

This Monitoring Annual Report is designed to meet the requirements of MRP Section III, Reporting Program, Part B, Receiving Waters Monitoring Reporting Requirements. This report presents the results of the Riverside County MS4 program for 2006-2007, the third year of the program. It contains the following components:

- Description of each receiving water monitoring station
- Description of monitoring methods
- Monitoring results
- Methods used to evaluate the data
- Discussion of results and analyses of each Monitoring Program Component

The fourth year (2007-2008) report will contain, in addition to the above information:

- Discussion of any long-term trends that can be detected from existing data
- Recommendations for future monitoring
- Recommendations for modification to individual or watershed SWMPs.

As stated in the MRP,

> *"Receiving Waters Monitoring consists of: 1) **Core Monitoring** requirements to address on-going, site specific need, such as estimating pollutant loads and assessing trends; 2) **Regional Monitoring** to address watershed-wide issues; and 3) **Special Studies** to address specific research or management issues."*

This report presents the results of the Core Monitoring at the stations throughout the SMR, which includes dry weather and illicit discharge monitoring, wet weather sampling, mass loading sampling, toxicity testing, bioassesments, and Toxicity Identification Evaluations (TIEs) and Toxicity Reduction Evaluations (TREs). In addition to the Core Monitoring, the RCFCD participates in Regional Monitoring

and Special Studies. Regional Monitoring initiatives are discussed under the results and analyses of each Monitoring Program Component heading. Special Studies are discussed in Section 7. Also included in this report are precipitation and fire information, and recommended immediate actions based on the data collected to date.

G-2.0 DESCRIPTION OF MONITORING METHODS FOR EACH TYPE OF MONITORING

The Consolidated Monitoring Program (CMP) contains a description of monitoring methods for each type of monitoring, including but not limited to:

- Monitoring equipment
- Sampling procedures
- Quality Assurance/quality control (QA/QC) procedures
- Laboratory analytical methods including the method detection limits (MDLs)

The CMP identifies monitoring elements common to the MS4 permits applicable to Riverside County by the Colorado River, San Diego and Santa Ana Regional Water Quality Control Boards. Watershed-specific appendices include specific MS4 permit provisions. The CMP was revised in 2004 to include the provisions for the recently adopted Board Order R9-2004-001, Santa Ana Region TMDL requirements, and other recent amendments to the Monitoring and Reporting Programs (MRP) of other MS4 permit regions within the County. The CMP is reviewed and updated annually based on program findings and changes in program needs, including TMDL development and implementation. The draft CMP outlines four objectives:

1. Develop and support an effective MS4 management program.

2. Identify those Receiving Waters, which, without additional action to control pollution from Urban Runoff, cannot reasonably be expected to achieve or maintain applicable Water Quality Standards.

3. Characterize pollutants associated with Urban Runoff and assess the influence of Urban land uses on Receiving Water quality.

4. Analyze and interpret the collected data to identify trends, if any, both to prevent impairments through the implementation of preventative BMPs and to track improvements based on the MS4 management program.

These objectives support the goal of the MS4 Urban Runoff management program, which is to manage the quality of Urban Runoff within the Permittee's jurisdictions to prevent impacts on Receiving Waters. These objectives are also a superset of the Model Monitoring Program core management questions developed by the Southern California Stormwater Monitoring Coalition.

The CMP includes the following sampling types:

- Dry Weather
- Wet Weather
- Bioassessment
- Toxicity
- Special Studies

In addition, the CMP contains:

- Health and Safety Guidance
- Field Reconnaissance Guidance

- Water Chemistry Guidance
- Toxicity Guidance
- Bioassessment Guidance
- Special Study Guidance
- Sampling Procedures
- Monitoring Costs
- Quality Assurance/Quality Control Procedures
- Data Collection and Analysis Procedures

Discussion previously contained in the Monitoring Annual Report regarding these standardized guidance and procedures is now provided in the CMP. The CMP will continue to be updated and referred to in this Monitoring Annual Report.

During the first storm event of the monitoring period, samples collected at the Triad stations are to be analyzed for the complete list of priority pollutants (40 CFR 122, Appendix D). For the remaining wet and dry weather monitoring events, samples are to be analyzed for the parameters listed in Table 1 of the MRP, reproduced below as Table G-1. The detected analytical results are provided in Table G-12 in Section 7.1 of this report.

Table G-1 Triad Station – Analytical Parameters

Trace Metals	**Pesticides**
Total Cadmium	Diazinon
Total Chromium	Chloropyrifos
Total Copper	Other OP Pesticides
Total Nickel	
Total Lead	**Conventionals**
Total Zinc	Temperature
Nutrients	pH
Ammonia (NH_3)	Hardness
Total Kjeldahl Nitrogen (TKN)	Specific conductance
Nitrate (NO_3)	Dissolved oxygen
Total phosphorus	MBAS
Bacteria	**PAHs**
Total coliform	
Fecal coliform	**Volatiles** (dry weather only)
E. coli	
	Total suspended solids

Per the MRP, monitoring of the tributary stations consists of the collection of grab samples during the first storm event, an additional storm event and two dry weather events. The samples will be analyzed for the Constituents of Concern listed in Table G-2. Constituents of Concern for 2006-2007 were those constituents that exceeded the BPO or CTR values in 2005-2006. In addition, hardness is included so that CTR values may be calculated.

Table G-2 Tributary Stations – Constituents of Concern

Physical Properties	**Trace Metals**
Turbidity (Field)	Copper
Turbidity (Lab)	Iron
Color	Manganese
Total Hardness	**Pesticides**
Total Dissolved Solids (TDS) (Field)	Chlorpyrifos (ELISA)
Total Dissolved Solids (TDS) (Residue)	Diazinon
Nutrients	**Bacteriological**
Total Nitrogen (as N)	Total Coliform
Total Phosphorus (as P)	Fecal Coliform
	E. coli

In addition to the Constituents of Concern listed in Table G-2, the laboratory analyzed for a number of parameters not mandated by the MRP and not requested by the District. As required by the MRP, results for the analyses of these parameters are displayed graphically in Attachment A and are summarized in Section G-6.0.

G-3.0 DESCRIPTION OF EACH MONITORING STATION

The SMR includes only the upper portion of the Santa Margarita River watershed. The SMR is further subdivided into the Temecula Creek and Murrieta Creek sub-watersheds. The Murrieta Creek sub-watershed is further subdivided into five smaller urbanized sub-watersheds tributary to Murrieta Creek (Empire Creek, Long Canyon Creek, Santa Gertrudis Creek, Warm Springs Creek, and Wildomar Channel). The confluence of Murrieta Creek and Temecula Creek, which forms the Santa Margarita River, occurs just upstream of the Riverside County line.

The MRP requires Triad Monitoring (chemistry, bioassessment, and toxicity) on both Temecula Creek and Murrieta Creek just upstream of their confluence. An additional Triad station known as Cole Creek is located west of, and tributary to, Murrieta Creek. It is used to establish reference water quality conditions for an un-urbanized watershed. Due to a lack of flow in Cole Creek during summer, Adobe Creek was alternatively used to collect reference condition dry weather flows as it is fed part of the year by rising ground water. Monitoring of four Tributary stations (chemistry only) at major MS4 outfalls tributary to Murrieta Creek and Temecula Creek is also required.

A map showing the locations of the CMP Triad and Tributary stations is provided as Figure 1. Station names corresponding to the station numbers shown on the maps are provided in Table G-3. Table G-3 also provides a summary of the location and character of current and past CMP stations, and notes when samples were collected at each station. Table G-4 contains an additional summary of the land use acreages and percentages for several major drainage areas tributary to the Santa Margarita River. Descriptions for each Triad and Tributary CMP station are provided. The descriptions for each station contain location information, photographs, and background information on the monitoring site. They also contain two maps, one showing the location of the drainage or subdrainage area and the other depicting the land uses within the area.

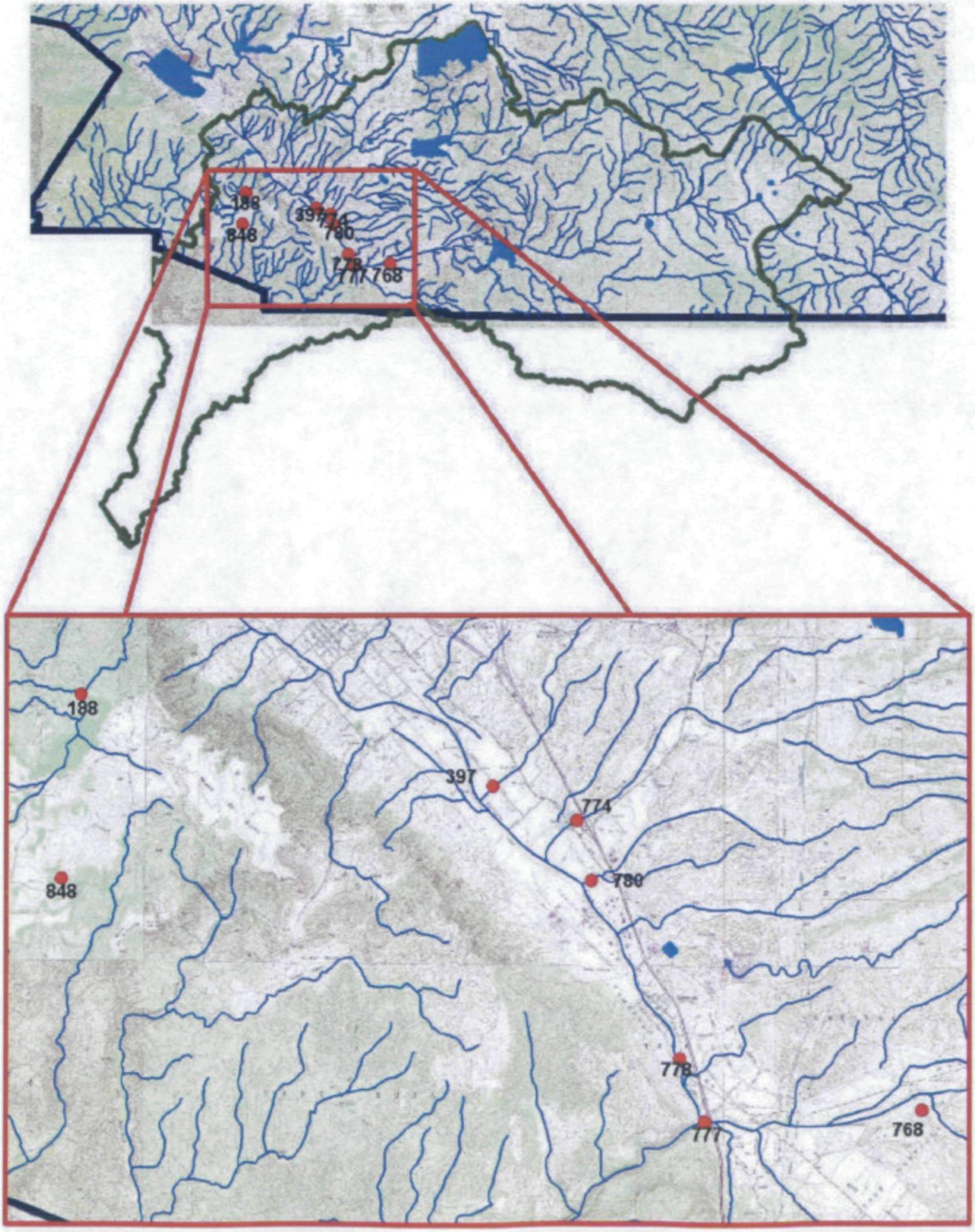
188
848
397
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780
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111
768
188
397
774
780
848
778
111
768

Table G-3 Santa Margarita Region Monitoring Station Summary

Stn #	Station Name	Easting	Northing	Flow Gauge?	Class	Type	Receiving Water	Comp. BPO	HUC	Co-Permittee	1993*	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
TRIAD																									
188	Cole Creek-wet weather and dry weather when flowing	6285284.6	2062605.6	Active	Reference	Dirt	Murrieta Ck	902.3	902.32	County									X		X	X X	X	X	
777	Temecula Creek below Pala Rd	6293503.1	2117224.4	---	Rec Wat	River	Santa Margarita	902.5	902.52	Temecula		X	X X	X X	X X	X X	X					X	X X	X X	X
778	Lower Murrieta Creek @ USGS Weir	6288711	2121113.1	Active	Rec Wat	River	Santa Margarita	902.3	902.32	Temecula		X	X X	X X	X X	X X	X X	X X	X		X X	X X	X X	X X	X
848	Adobe Creek-dry weather alternate	6252588.9	2131581.1	--	Reference	Dirt	De Luz Creek	902.2	902.21	County												X	X X	X X	X
TRIBUTARY																									
397	Warm Springs Channel	6278893.1	2138431.9	---	Outfall	Trap	Murrieta Ck	902.3	902.32	Murrieta												X	X X	X X	X
768	Redhawk Channel D/S of Overland Dr.	6303424	2118127.7	---	Outfall	Trap	Temecula Ck	902.5	902.51	County	X	X X	X X	X X	X X	X X	X X	X X	X X		X X	X X	X X	X X	X
774	Lateral A of Sta.Gert.Chan – Temecula	6282551.1	2135419.3	---	Outfall	RCP	Santa Gertrudis	902.4	902.42	Temecula	X	X										X	X X	X X	X
780	Long Canyon	6284564.6	2131769.1	---	Outfall	Trap	Murrieta Ck	902.3	902.32	Murrieta												X	X X	X X	X
HISTORICAL																									
404	Wildomar NPDES Channel Outlet below Central Av	6250323.5	2163023.3	---	Outfall	Trap	Murrieta Ck	902.3	902.31	County		X	X	X X	X	X	X	X	X X	X X	X X	X			
769	Empire Crk Chan Outlet @ Murrieta Crk –Temecula	6285276.3	2128652.3	---	Outfall	Trap	Murrieta Ck	902.3	902.32	Temecula		X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X			
770	C Street Storm Drain Outlet @ Murrieta Crk –Temecula	6288450.8	2122521.7	---	Outfall	RCP	Murrieta Ck	902.3	902.32	Temecula	X	X													
771	Rancho Way Storm Drain Outlet @ Murrieta Crk –Temecula	6284801.7	2128453.2	---	Outfall	CMP	Murrieta Ck	902.3	902.32	Temecula	X	X													
772	Via Montezuma Storm Drain Outlet –Temecula	6284020.8	2130014.9	---	Outfall	RCP	Murrieta Ck	902.3	902.32	Temecula		X	X												
773	Avenida Alvarado Storm Drain Outlet @ Murrieta Crk	6282403.1	2131912.8	---	Outfall	Dirt	Murrieta Ck	902.3	902.32	Temecula	X	X													
775	Murrieta Line F-3 Outlet near Kalmia & Washington	6266628.7	2147621.4	---	Outfall	RCP	Murrieta Ck	902.3	902.32	Murrieta		X													
776	Cal Oaks Channel- Murrieta line F	6268557.7	2149290.7	Active	Outfall	Trap	Murrieta Ck	902.3	902.32	Murrieta	X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X			
779	Upper Murrieta Creek @ Cole Canyon Junction	6261438.6	2148708.4	---	Rec Wat	River	Murrieta Ck	902.3	902.32	Murrieta			X		X	X		X							
796	Hoover Ranch Pond -Murrieta-Clinton Keith Rd	6250729.3	2157542.3	---	Rec Wat	Lake	Murrieta Ck	902.3	902.31	County			X												
801	I-215 FB –Murrieta	6278139.5	2150286.4	---	Outfall	FB	Murrieta Ck	902.3	902.32	Murrieta				X	X	X	X			X					
828	Santa Margarita River near Temecula	6289592.0	2117064.5	Active	Rec Wat	River		902.5	902.52	Temecula							X	X X	X X	X X	X X	X			
825	Region 9 Misc. & Complaints	0	0	---	Misc.	Misc.	Misc.			Varies			X		X	X				X					

Table G-4 Santa Margarita Region - Land Uses of Selected Drainage Areas (As of October 2007)

	188 Cole Canyon Creek		397 Warm Springs Creek		768 Redhawk Channel		774 Lateral A of Santa Gertrudis Channel		777 Lower Temecula Creek		778 Lower Murrieta Creek		780 Long Canyon Creek		848 Adobe Creek	
LAND USE	Area (ac)	%	Area (ac)	%	Area (ac)	%	Area (ac)	%	Area (ac)	%	Area (ac)	%	Area (ac)	%	Area (ac)	%
Streets	403.97	6.8%	2154.74	8.0%	183.44	11.6%	1494.44	8.1%	4426.95	2.5%	8807.35	8.9%	361.95	15.4%	0.00	0.0%
Agriculture	100.91	1.7%	4805.49	17.8%	111.65	7.1%	3547.09	19.2%	15543	8.8%	12478.62	12.6%	178.88	7.6%	0.00	0.0%
Commercial	0.00	0.0%	186.34	0.7%	0.00	0.0%	336.13	1.8%	747.16	0.4%	2020.99	2.0%	225.62	9.6%	0.00	0.0%
Exempt Public Properties	1364.77	23.0%	3465.59	12.8%	219.09	13.8%	1428.04	7.7%	64369.91	36.6%	13421.92	13.6%	66.45	2.8%	85.78	21.8%
Industrial	0.00	0.0%	125.26	0.5%	0.00	0.0%	65.05	0.4%	47.47	0.0%	896.4	0.9%	48.19	2.1%	0.00	0.0%
Preserves OpenSpace	308.96	5.2%	4359.33	16.1%	238.35	15.1%	3218.61	17.4%	28502.17	16.2%	16342.3	16.6%	489.18	20.8%	0.00	0.0%
Parks & Recreation	3562.90	60.0%	204.54	0.8%	114.49	7.2%	24.76	0.1%	1080.1	0.6%	706.05	0.7%	9.87	0.4%	0.00	0.0%
Rural	0.00	0.0%	8915.39	33.0%	354.97	22.4%	7227.11	39.1%	58356.94	33.2%	32773.9	33.2%	220.59	9.4%	307.81	78.2%
Urban	192.02	3.2%	2804.80	10.4%	360.39	22.8%	1120.58	6.1%	2683.59	1.5%	11237.89	11.4%	747.23	31.8%	0.00	0.0%
TOTAL	5933.53		27021.48		1582.38		18461.81		175757.29		98685.42		2347.96		393.59	

0001365

Below is the legend for the maps within this section.

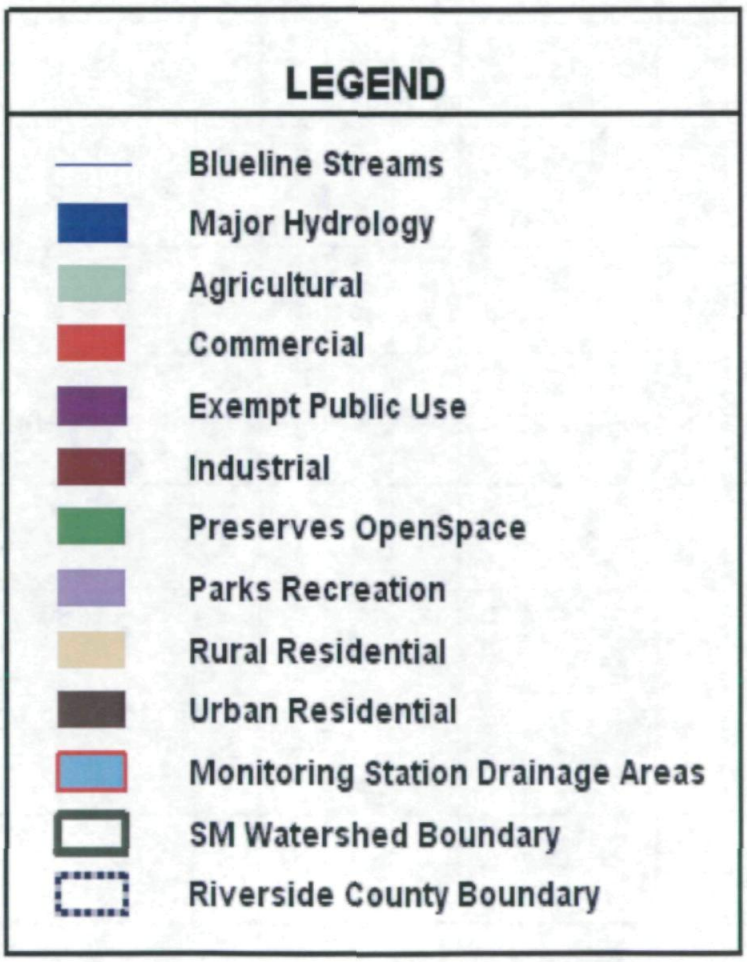

G-3.1 Station Name: Temecula Creek below Pala Road (Lower Temecula Creek)

Hydstra Reference #: 777

Location:

Latitude	33°28'26.4" N
Longitude	117°07'46.1" W
Elevation	1,008 ft
Thomas Bros Pg	979B3

Classification: Receiving Water - Triad

Type of Channel: Natural River

Receiving water: Santa Margarita River

Directions to the site:
Drive south on the I-215 freeway and exit at SR 79 South/Old Town Front Street. Go west of the freeway and turn left at the first stoplight. Turn left about 100 feet past the stop light onto a gravel/dirt road. Turn right, before the yellow EMWD gate. Drive to the dirt road that goes left and up. Go about 100 feet and turn right onto the dirt road. Go about 1,700 feet and drive to where the dirt road meets up with the gravel road. Follow the gravel road to the L3437 Pala II Pump Station. Park just past the pump station. Walk to the east and sample water from the stream flow just under the bridge.

Temecula Creek at Pala Road dry except when there is a significant storm event. No aquatic habitat exists in this reach. Conditions for benthic invertebrates tend to be poor at best. Primary flow at this location is rising groundwater. Vail Lake lies approximately 18 miles upstream of the Pala Road Crossing and traps some of the Temecula Creek storm flows; discharges from Vail Lake flow into infiltration basins above Butterfield Stage Road. The soil profile in this 18-mile reach of Temecula Creek consists of deep alluvium with a high infiltration rate. Non-significant storm flows infiltrate prior to reaching the Santa Margarita River. Less than 5% of this watershed tributary to this station is urbanized and within the Permittee's jurisdiction. Any urban drainages to Temecula Creek flow into a 100-foot-wide vegetated strip that is approximately 13,000 feet long and starts approximately 3½ miles upstream of this sampling location.

Temecula Creek Drainage Area

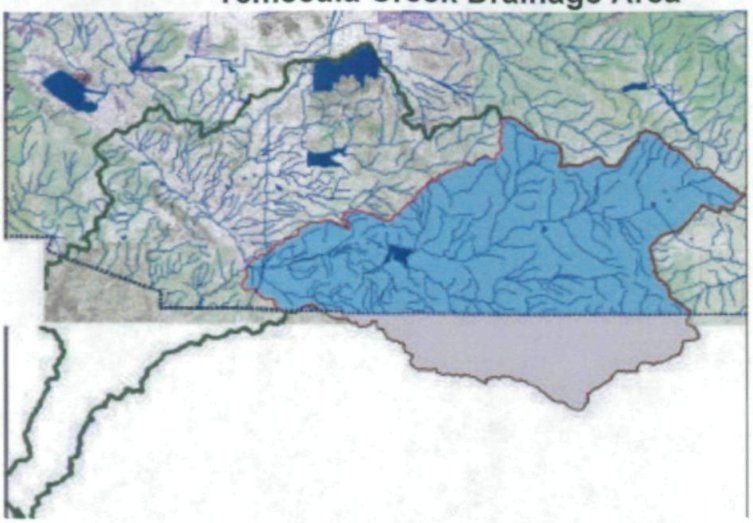

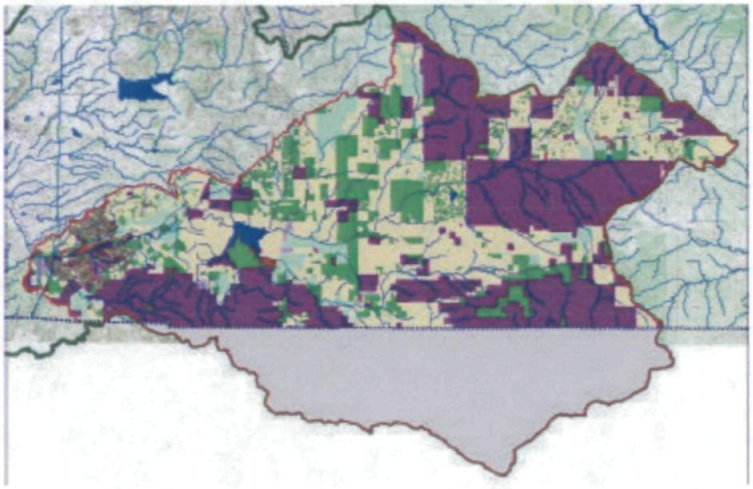

Total drainage area - 232,403.90 acres, of which 175,757.29 acres are within Riverside County.

Land uses by frequency:

Land Use	%
Exempt Public Properties	36.62
Rural Residential	33.20
Preserves Open Space	16.22
Agriculture	8.84
Streets	2.52
Urban Residential	1.53
Parks & Recreation	0.61
Commercial	0.43
Industrial	0.03

G-3.2 Station Name: Murrieta Creek at Temecula (Lower Murrieta Creek)

Hydstra Reference #: 778

Location:

Latitude	33°28'47.0" N
Longitude	117°08'34.8" W
Elevation	1,030 ft
Thomas Bros Pg	978J2

Classification: Receiving Water - Triad

Type of Channel: Natural River

Receiving water: Santa Margarita River

Directions to the site:
Exit Rancho California Road from Interstate 15. Drive west of the freeway and turn left to Front Street. Turn right to Main Street. Turn left to Pujol Street. When Pujol Street goes from asphalt to a dirt road, drive about 500 feet and turn left at the two (2) yellow vertical bollards. CAUTION: A 4-Wheel drive is recommended when driving in this area. Drive straight toward the creek. The picture shows the sampling location which is approximately 100 feet upstream of the RCWD blow-off and approximately 600 feet upstream of the USGS gage house. Note: During storm events, sampling is conducted at the USGS Gage House, upstream of the USGS Weir due to safety.

Lower Murrieta Creek at is a receiving water station. It is located within Murrieta Creek, which is earthen at this location (except for a weir at the USGS gauge). It is the most downstream station within Murrieta Creek. Atributary to the Santa Margarita River, flows during dry weather at this station consist of rising groundwater that begins approximately ½- to ¼-mile from Murrieta Creek's confluence with the Santa Margarita River. There is an active USGS flow gauge at this station.

This sampling site is 0.4 miles upstream of the confluence of Temecula Creek and Murrieta Creek. The soil profile here indicates bedrock at the surface. The flow seen in the photo above is supplied by the mandated RCWD blow off just 100 yards upstream of the gauge and sampling point.

Murrieta Creek Drainage Area

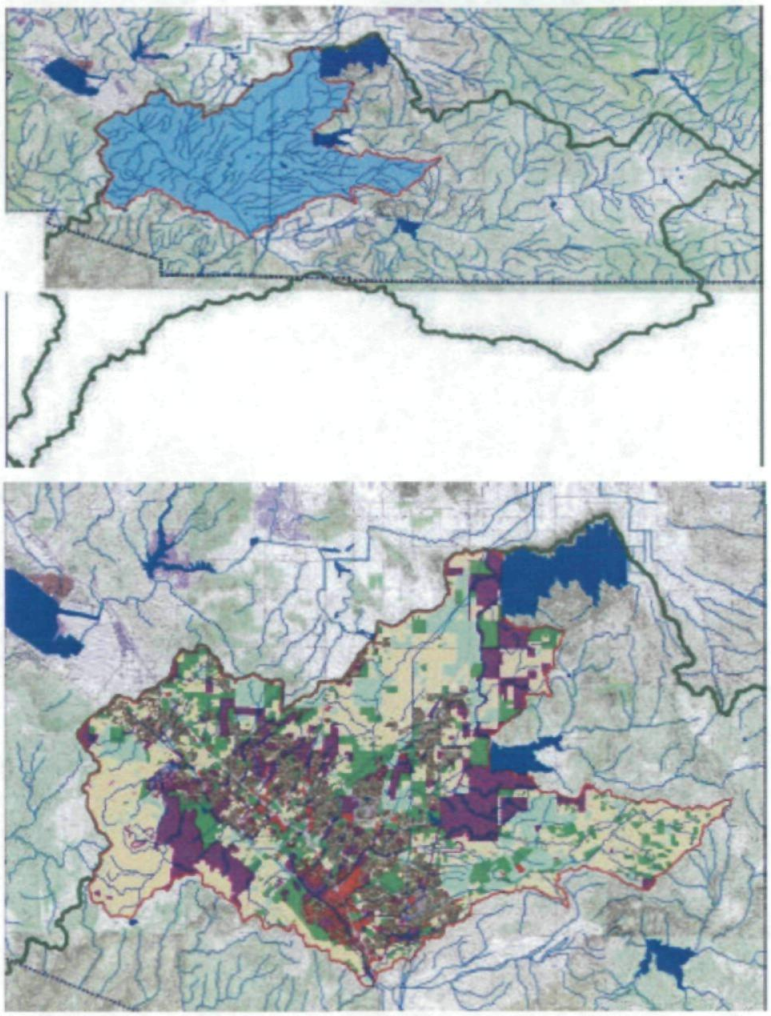

Total drainage area - 98,685.42 acres

Land uses by frequency:

Land Use*	%
Rural Residential	33.21
Preserves Open Space	16.56
Exempt Public Properties	13.60
Agriculture	12.64
Urban Residential	11.39
Streets	8.92
Commercial	2.05
Industrial	0.91
Parks & Recreation	0.72

* Land use area represents portion of watershed below Lake Skinner.

G-3.3 Station Name: Cole Creek

Hydstra Reference #: 188

Location:

Latitude	33°32'37.1" N
Longitude	117°15'47.5" W
Elevation	1,700 ft
Thomas Bros Pg	957D1

Classification: Reference - Triad

Type of Channel: Natural Creek

Receiving water: Murrieta Creek

Directions to the site:
See following pages for detailed directions to the sampling location.

Cole Creek was added to the CMP in 2000 as a reference station. It is located within the Santa Rosa Plateau Ecological preserve and is a natural channel. Cole Creek is a tributary to Murrieta Creek. The Creek at the sampling location only flows when there is a significant winter storm event. The tributary watershed is plateau grassland meadows with a few ranch residences also in the watershed. Approximately 3% of the upper end of the watershed tributary to this station contains urban land uses.

Driving directions to Cole Creek:
Exit the 15 Freeway at Clinton Keith Road and drive west (southwest) of the freeway. Drive about 4 miles and turn left into the "Santa Rosa Plateau Ecological Reserve Visitor Center". You will see this sign at the entrance.

You will also see this sign at the entrance to the Santa Rosa Plateau. When you drive past the sign, park on the left side of the gravel parkway in front of or near the sign that says "Granite Loop Trail".

Walk down the "Granite Loop Trail". It is advisable to use a walking stick; just in case of any critters…namely snakes. Continue walking this trail to the picnic tables.

When you get to this picnic area, continue walking the trail past the picnic tables and slightly to the right. Walk about 500' past the picnic tables and take small path to the left off of the main trail. Walk the foot trail and keep the small drainage area to your left as you walk. Continue walking this trail until the small drainage area meets up with Cole Creek. Turn right at this confluence and walk south parallel to Cole Creek until you start seeing big rocks on the banks (slopes) of Cole Creek.

You will see this metal box that contains the gage sensor. The staff gage for Cole Creek is down the slope from this box.

There is a staff gage on both sides of Cole Creek. You can sample at this gage if there are higher flows. Be careful with footing if there are rapid flows in this area.

This picture just shows some of the bigger rocks that are in Cole Creek where the water will flow over and around. Be careful with footing on these rocks.

These rocks are located about 200 feet south (upstream) of the staff gage. During lower flows, it is recommended to sample water that runs over and around these rocks.

Cole Creek Sub-drainage Area

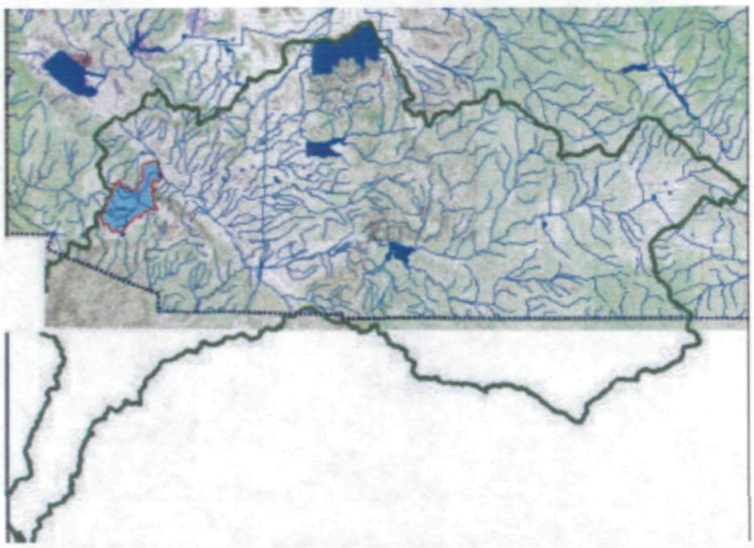

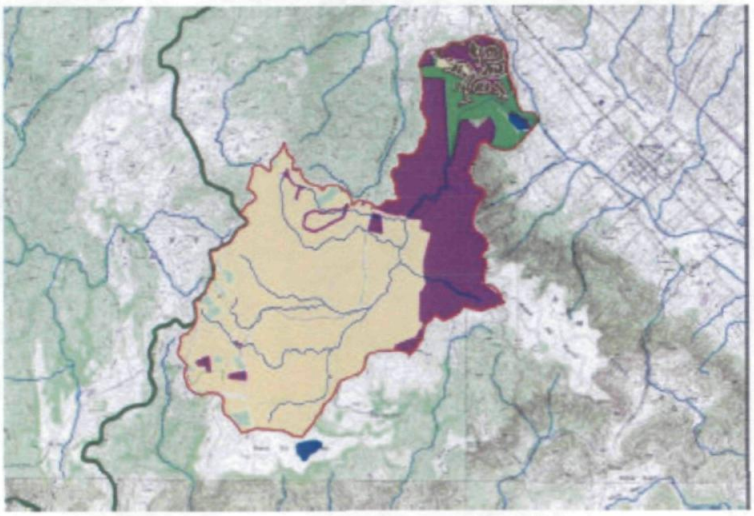

Total drainage area - 5,733.53 acres

Land uses by frequency:

Land Use	%
Parks & Recreation	60.05
Exempt Public Properties	23.00
Streets	6.81
Preserves Open Space	5.21
Urban Residential	3.24
Agriculture	1.70
Industrial	0.00
Commercial	0.00
Rural Residential	0.00

G-3.4 Station Name: Redhawk Channel Downstream of Overland Dr.

Hydstra Reference #: 768

Location:

Latitude	33°28'34.6" N
Longitude	117°05'40.8" W
Elevation	1,040 ft
Thomas Bros Pg	979F3

Classification: Outfall - Tributary

Type of Channel: Earthen

Receiving water: Temecula Creek

Directions to the site:
Exit Highway #79 East (to Indio) from Interstate 15 freeway. Turn right to Redhawk Parkway. Turn left to Overland. Turn left into first driveway and park there. Property belongs to County of Riverside Fire Department. Walk across the street and through the swing gate. Sampling location is just south (upstream) of the concrete lined channel. The picture shows the sampling location.

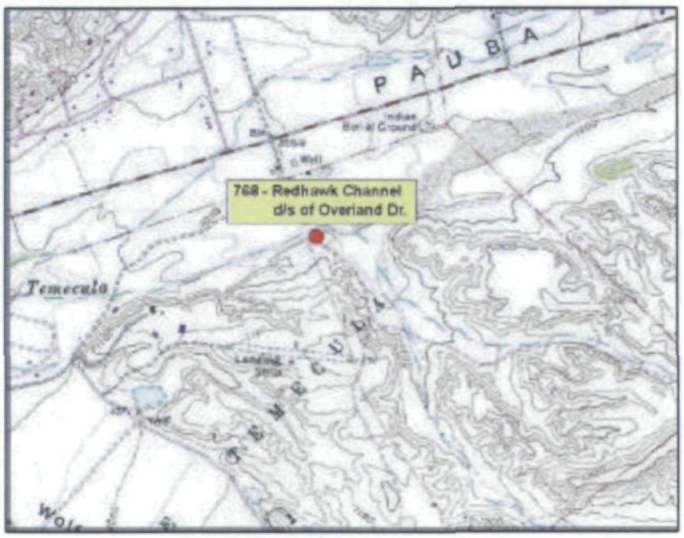

Redhawk Channel Downstream of Overland Drive is an outfall station. The sampling location is in an earthen reach of the channel just upstream of the rip-rap side sloped, soft bottomed channel. Dry weather flows appears to be from a natural spring in a tributary contained within an upstream golf course. Also, reclaimed water from RCWD used to irrigate a park channel side slope nearby adds to dry weather flows. A tributary to Temecula Creek, non-storm runoff from the channel infiltrates into Temecula Creek within a few hundred feet of the confluence. While approximately 23% of the tributary watershed is urbanized, it should be noted that over 50% of the watershed is outside of the jurisdiction of the permittees.

Redhawk Channel Sub-drainage Area

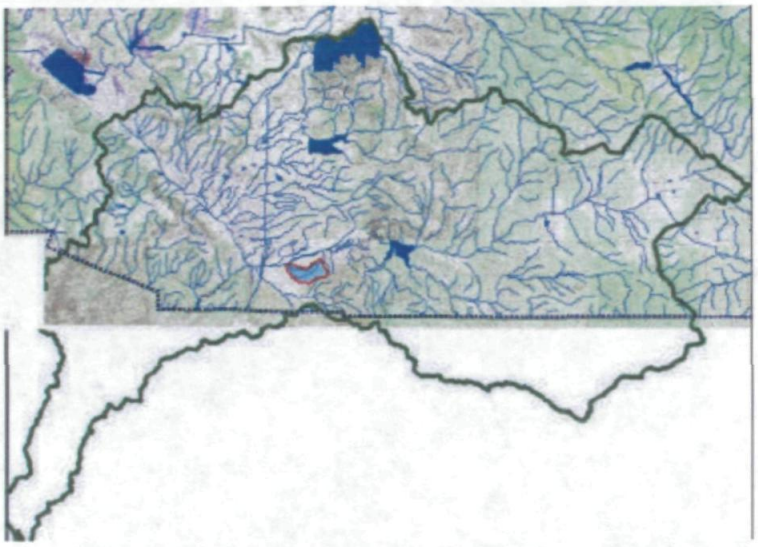

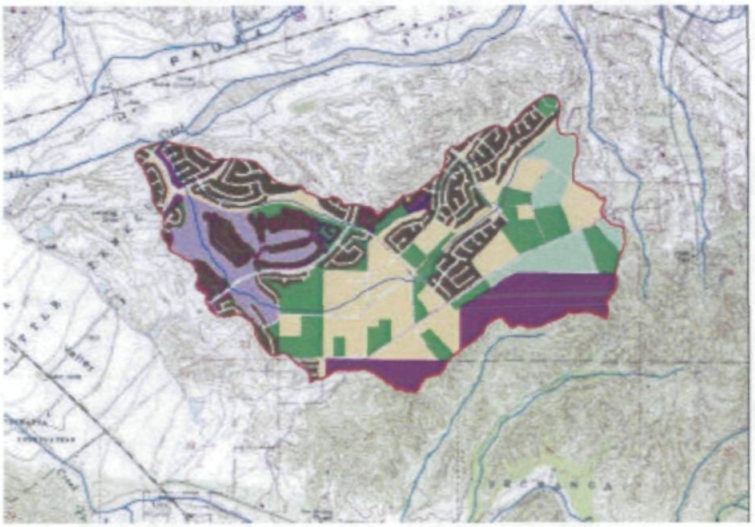

Total drainage area - 1,582.38 acres

Land uses by frequency:

Land Use	%
Urban Residential	22.78
Rural Residential	22.43
Preserves Open Space	15.06
Exempt Public Properties	13.85
Streets	11.59
Parks & Recreation	7.24
Agriculture	7.06
Industrial	0.00
Commercial	0.00

G-3.5 Station Name: Lateral A of Santa Gertrudis Channel - Temecula

Hydstra Reference #: 774

Location:

Latitude:	33°31'28.0" N
Longitude:	117°9'50.0" W
Elevation	1,045 ft
Thomas Bros Pg	958F4

Classification: MS4

Type of Channel: Concrete Trapezoidal

Receiving water: Murrieta Creek

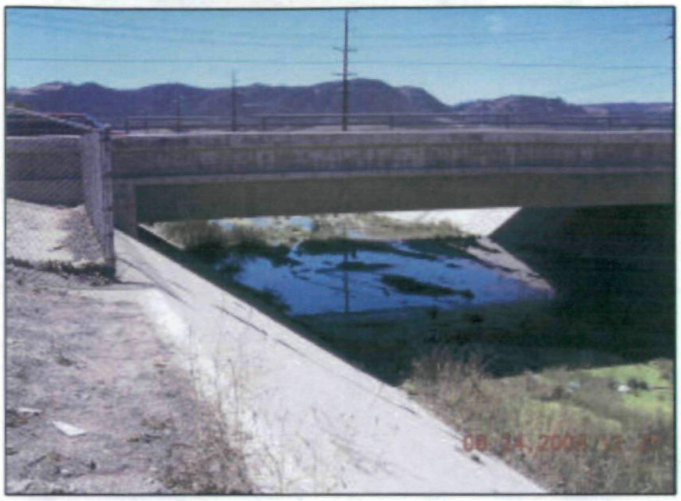

Directions to the site:
Exit Winchester Road from Interstate 15. Drive west of the freeway and turn right on to Jefferson Avenue. Drive about 450 feet and turn left into the access gate on the north side of the channel. The sampling point is off the bridge at Jefferson Street. The channel slope is too steep to climb in and out without a ladder. Note: It is twenty-two feet from the water line to the bridge rail during dry conditions.

Santa Gertrudis Channel (774) is an outfall station tributary to Murrieta Creek. It is a concrete lined trapezoidal channel. Significant non-storm flows are provided from well blow offs into the channel that tend to occur in the mornings and evenings. One well blow off valve and outlet owned and operated by RCWD is located adjacent to the confluence of Santa Gertrudis and Murrieta Creeks. These daily blow offs can each release several CFS of water for short durations of time. Non-storm flows tend to infiltrate within a few hundred yards of the confluence with Murrieta Creek. Sediment and vegetation tends to accumulate near the confluence of Santa Gertrudis Channel and Murrieta Creek due to aggradation of Murrieta Creek.

More than half of the watershed tributary to the Santa Gertrudis station is controlled by the dam that forms Skinner Lake. Storm flows in Santa Gertrudis and the downstream reach of Murrieta Creek are therefore lower than they would be under natural conditions. There is an active USGS flow gauge at this station.

Santa Gertrudis at the USGS Station

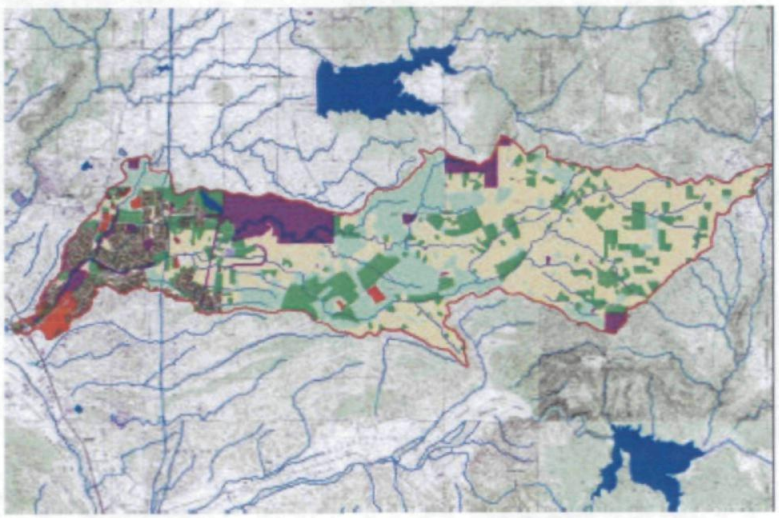

Total drainage area – 18,461.81 acres

Land uses by frequency:

Land Use	%
Rural Residential	39.15
Agriculture	19.21
Preserves Open Space	17.43
Streets	8.09
Exempt Public Properties	7.74
Urban Residential	6.07
Commercial	1.82
Industrial	0.35
Parks & Recreation	0.13

G-3.6 Station Name: Long Canyon Creek near Murrieta Creek

Hydstra Reference #: 780

Location:

Latitude	33°30'38" N
Longitude	117°09'40" W
Elevation	1,005 ft
Thomas Bros Pg	958G5

Classification: Outfall - Tributary

Type of Channel: Rip-Rap Trapezoidal Channel

Receiving water: Murrieta Creek

Directions to site: Exit Winchester Road from Interstate 15. Drive west of the freeway and turn left on to Jefferson Avenue. Drive about 900 feet and turn right on to Overland Drive. Turn left on to Commerce Center Drive. Drive about 230 feet and turn right into the access gate. Dry weather samples can be taken in the channel with hip boots and a backpack. Wet weather sampling should be conducted off of the Commerce Center Drive Bridge with a rope and bucket.

Long Canyon Channel Outlet at Murrieta Creek

Long Canyon (780) is an outfall station tributary to Murrieta Creek. It is a rip-rap trapezoidal channel. Non-storm flows from Long Canyon Channel tend to infiltrate within a few hundred feet of the confluence.

Long Canyon Creek Sub-drainage Area

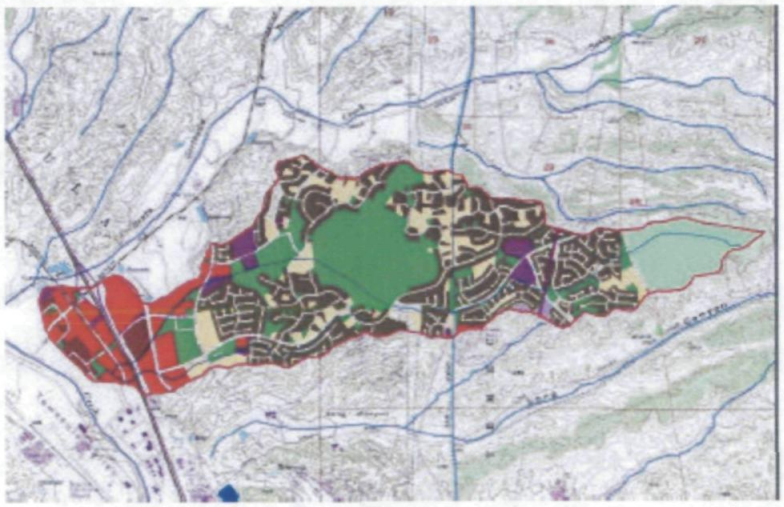

Total drainage area - 2,347.96 acres

Land uses by frequency

Land Use	%
Urban Residential	31.82
Preserves Open Space	20.83
Streets	15.42
Commercial	9.61
Rural Residential	9.39
Agriculture	7.62
Exempt Public Properties	2.83
Industrial	2.05
Parks & Recreation	0.42

G-3.7 Station Name: Warm Springs Creek near Murrieta

Hydstra Reference #: 397

Location:

Latitude	33°31'56" N
Longitude	117°10'34" W
Elevation	1,040 ft
Thomas Bros Pg	958E3

Classification: MS4

Type of Channel: Concrete side-sloped, soft bottom trapezoidal

Receiving water: Murrieta Creek

Directions to the site:
Exit Winchester Road from Interstate 15. Drive west of the freeway and turn right on to Jefferson Avenue. Drive about 1 mile and turn left on to Eastman Drive. Turn right on to Adams Avenue. Drive about 250 feet and turn left on to dirt access road located south of the stream. Dry weather sampling can be performed downstream of the Adams Avenue bridge. Wet weather sampling should be conducted from the Adams Avenue Bridge using a bucket and rope. Note that it is 18 feet from the streambed to the bridge rail.

Warm Springs (397) is an outfall monitoring station. Warm Springs Channel is a concrete side-sloped, soft bottom channel tributary to Murrieta Creek. Flow in Warm Springs Channel only occurs during storm events. There may also be sediment aggradations near the confluence of Warm Springs and Murrieta Creeks.

Warm Springs Sub-Drainage Area

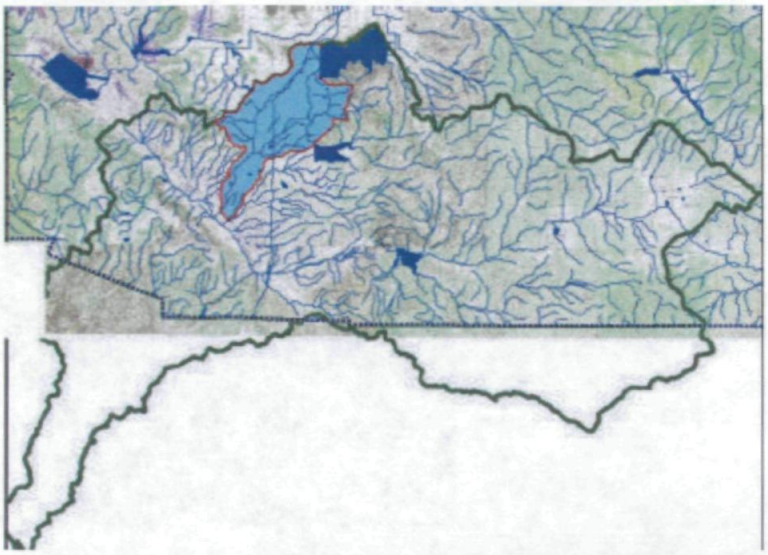

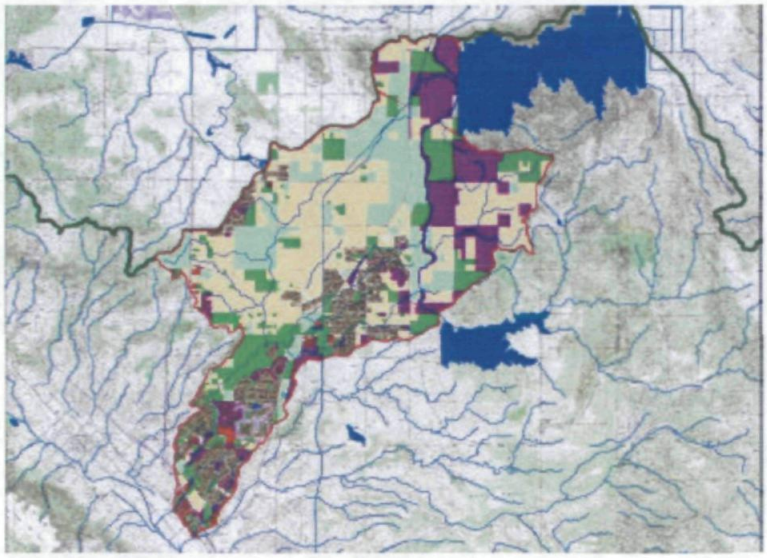

Total drainage area – 27,021.48 acres
Land uses by frequency:

Land Use	%
Rural Residential	32.99
Agriculture	17.78
Preserves Open Space	16.13
Exempt Public Properties	12.83
Urban Residential	10.38
Streets	7.97
Parks & Recreation	0.76
Commercial	0.69
Industrial	0.46

G-3.8 Station Name: Adobe Creek

Hydstra Reference #: 848

Location:

Latitude	33°30'48.10" N
Longitude	117°16'04.40" W
Elevation	1,749 ft.
Thomas Bros Pg:	957 D5

Classification: Reference Triad

Type of Channel: Natural Stream

Receiving water: Sandia Canyon to Santa Margarita River

Adobe Creek is a dry weather reference receiving water station located within the Santa Rosa Plateau. The Creek is tributary to De Luz Creek. During dry weather, flows at this station consist of rising groundwater.

Directions to site: From the RCFC District, drive east on the 60 Freeway and connect with the 215 Freeway southbound. Exit at Clinton Keith Road. Turn right at the end of the off ramp heading west on Clinton Keith Road. Continue past the 15 Freeway and past the Murrieta city limits. When you get to the area of the Santa Rosa Plateau Ecological Reserve, Clinton Keith Road will head at a 90° turn to the right. Before turning to the right, there is a gate to the left that enters the Plateau Reserve. There is a number combination lock on this gate – 2020. After entering past this gate, the dirt road will come to a tee. Turn right and continue the dirt road for about 1 mile, follow the signs that say "Adobe Ranch". Park at the "Ranch house".

- There is a foot trail that goes to the north of the Ranch; walk this trail past the "windmill" to the Adobe Loop Trail. Follow the sign that takes you on to the Adobe Loop Trail.

- Be careful of mountain lions!

- Continue to walk along the foot trail along the Adobe Loop Trail.

This bridge crosses over the Adobe Creek.

- Walk approximately 80' past the bridge to the sampling site.

- This is the sampling location.

848 - Adobe Creek Sub-Drainage Area

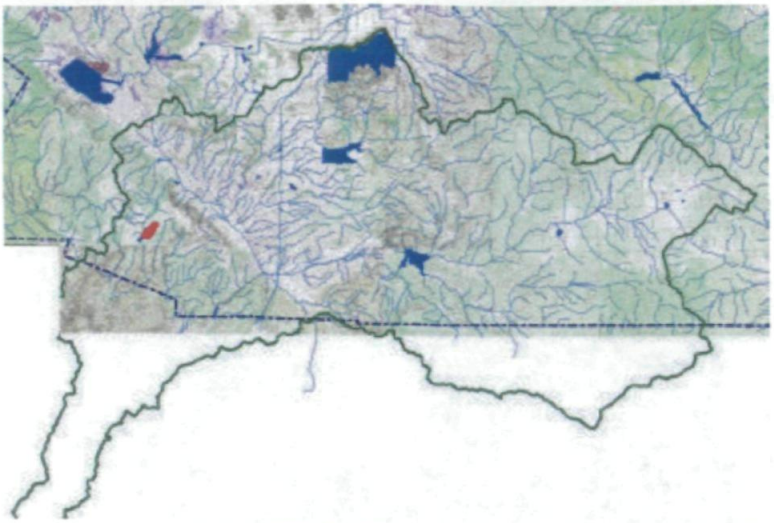

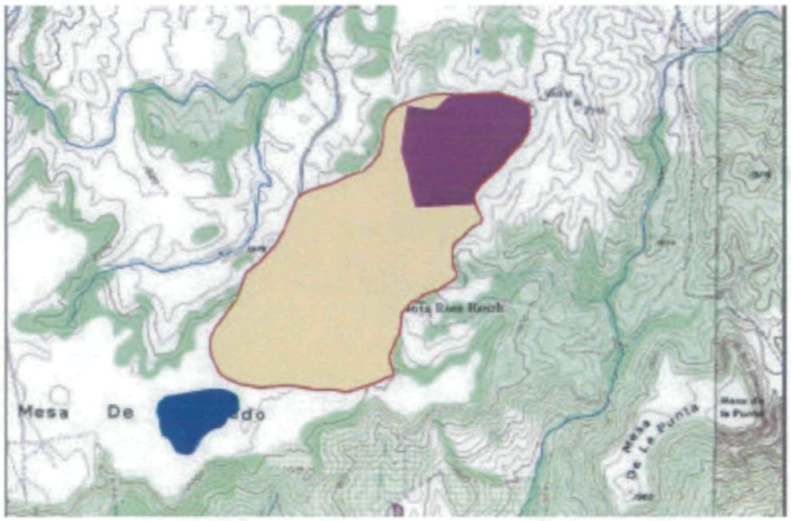

Total drainage area – approximately 393.59 acres

Land uses by frequency:

Land Use	%
Rural Residential	78.21%
Exempt Public Properties	21.79%
Streets	0.00%
Agriculture	0.00%
Commercial	0.00%
Industrial	0.00%
Preserves Open Space	0.00%
Parks & Recreation	0.00%
Urban Residential	0.00%

G-4.0 PRECIPITATION WITHIN THE SANTA MARGARITA WATERSHED

Annual precipitation amounts for the four weather stations (Wildomar, Murrieta Creek, Temecula Creek, and Skinner Lake) located in the Santa Margarita watershed and the watershed averages are presented in Table G-5 below.

Table G-5 Annual Rainfall (inches)

Year Ending*	Murrieta Creek	Skinner Lake	Temecula	Wildomar	Watershed Average
1993	29.82	28.39	36.10	31.86	31.54
1994	11.42	12.96	15.60	10.97	12.74
1995	25.64	20.57	27.60	23.29	24.28
1996	8.50	8.09	9.10	8.84	8.63
1997	10.98	10.77	13.60	10.13	11.37
1998	27.61	24.92	31.90	28.41	28.21
1999	5.75	7.04	8.20	6.28	6.82
2000	9.60	7.51	10.10	8.34	8.89
2001	11.70	9.75	13.70	12.64	11.95
2002	3.80	3.05	3.80	3.06	3.43
2003	18.10	13.81	16.05	18.10	16.52
2004	9.09	6.96	7.80	8.12	7.99
2005	34.82	25.33	33.75	34.55	32.11
2006	7.17	7.70	9.84	8.36	8.27
2007	2.60	2.53	3.43	2.61	2.79

*Fiscal Year (July 1 – June 30)

Table G-6 presents the annual average rainfall and other information for the four weather stations. Note that quality control of reporting routines used to generate these reports has led to a modification of totals reported in prior reports.

Table G-7 presents the annual rainfall as a percent of normal for each of the four stations and the watershed as a whole. Percent of normal is calculated using the current year rainfall (Table G-5) and dividing it by the annual average rainfall (Table G-6). In this analysis, if the current year rainfall equals the annual average rainfall the result would be 100%. For example, in 2005 the Skinner Lake station received 25.33/12.43 = 204% or approximately 2 times the annual average rainfall. In contrast the 2007 season brought only 20% or 1/5 the annual average rain fall and is classified as a dry year.

Table G-8 presents the daily total rainfall from July 1, 2006 to June 30, 2007 for each of the four reference stations. Daily totals are for 24-hour intervals ending at 0800 of the date indicated.

Table G-6 Average Annual Precipitation at Each Station

Name	Station ID	Annual Average Rainfall (In.)	Number of Years	Location
Murrieta Cr	128	15.41	40	7S/3W-18
Skinner Lake	205	12.43	60	7S/2W-10
Temecula	217	15.73	51	8S/3W-12
Wildomar	246	14.06	98	7S/4W-2

Table G-7 Percent (%) of Normal = Current Year / Average Year

Year Ending*	Murrieta Creek	Skinner Lake	Temecula	Wildomar	Watershed	Result
1993	194%	228%	229%	227%	219%	wet
1994	74%	104%	99%	78%	88%	normal
1995	166%	165%	175%	166%	168%	wet
1996	55%	65%	58%	63%	60%	dry
1997	71%	87%	86%	72%	79%	dry
1998	179%	200%	203%	202%	196%	wet
1999	37%	57%	52%	45%	47%	dry
2000	62%	60%	52%	59%	62%	dry
2001	76%	78%	64%	90%	83%	dry
2002	25%	25%	24%	22%	24%	dry
2003	117%	111%	102%	129%	115%	normal
2004	59%	56%	50%	58%	55%	dry
2005	226%	204%	215%	246%	223%	wet
2006	47%	62%	63%	59%	57%	dry
2007	17%	20%	22%	19%	19%	very dry

*Fiscal Year = July 01 thru June 30
100 = Normal

Table G-8 Daily Rainfall for Fiscal Year 2006-2007 (inches) Santa Margarita Watershed

Day	July				August				September			
	Murrieta Creek	Skinner Lake	Temecula	Wildomar	Murrieta Creek	Skinner Lake	Temecula	Wildomar	Murrieta Creek	Skinner Lake	Temecula	Wildomar
1												
2					0.02							
3												
4												
5												
6									0.59	0.13	0.07	0.01
7										0.10		
8												
9												
10												
11												
12												
13												
14												
15												
16					0.01							
17												
18				0.01								
19												
20												
21												
22												
23	0.04		0.20									
24												
25												
26												
27												
28												
29												
30												
31												
Sum	0.04	0.00	0.20	0.01	0.03	0.00	0.00	0.00	0.59	0.23	0.07	0.01
Total	0.04	0.00	0.20	0.01	0.07	0.00	0.20	0.01	0.66	0.23	0.27	0.02

Sum represents total for each month. Total represents total cumulative rainfall for the fiscal year through the end of the month.

Table G-8 (continued) Daily Rainfall for Fiscal Year 2006-2007 (inches) Santa Margarita Watershed

Day	Oct				Nov				Dec			
	Murrieta Creek	Skinner Lake	Temecula	Wildomar	Murrieta Creek	Skinner Lake	Temecula	Wildomar	Murrieta Creek	Skinner Lake	Temecula	Wildomar
1												
2												
3												
4												
5												
6												
7	0.01											
8												
9												
10									0.29	0.56	0.38	0.43
11									0.01			0.01
12										0.01		
13												
14	0.13	0.04	0.11	0.11								
15	0.01	0.01	0.01									
16												
17									0.06	0.06	0.14	0.23
18										0.02	0.01	
19												
20												
21												
22									0.03			
23									0.04	0.02	0.02	0.05
24												
25												
26												
27									0.10	0.16	0.16	0.06
28					0.03	0.05	0.09	0.17	0.02			
29							0.01					
30												
31												
Sum	0.15	0.05	0.12	0.11	0.03	0.05	0.10	0.17	0.55	0.83	0.71	0.78
Total	0.81	0.28	0.39	0.13	0.84	0.33	0.49	0.30	1.39	1.16	1.20	1.08

Sum represents total for each month. Total represents total cumulative rainfall for the fiscal year through the end of the month.

Table G-8 (continued) Daily Rainfall for Fiscal Year 2006-2007 (inches) Santa Margarita Watershed

Day	Jan				Feb				Mar			
	Murrieta Creek	Skinner Lake	Temecula	Wildomar	Murrieta Creek	Skinner Lake	Temecula	Wildomar	Murrieta Creek	Skinner Lake	Temecula	Wildomar
1											0.01	
2												
3												
4												
5	0.01		0.12	0.05								
6	0.01											
7												
8												
9												
10												
11												
12						0.06	0.09	0.06				
13					0.01		0.02					
14						0.02						
15												
16												
17												
18												
19					0.17	0.15	0.28	0.21				
20					0.02	0.02	0.08	0.03				
21						0.01				0.02	0.06	0.05
22										0.01		0.02
23					0.15	0.22	0.33	0.24				
24					0.01							
25												
26												
27					0.06	0.20	0.25	0.17	0.02	0.03	0.06	0.02
28					0.18	0.14	0.24	0.19		0.02		
29										0.01		
30			0.01									
31	0.02	0.02	0.08	0.02								
Sum	0.04	0.02	0.21	0.07	0.60	0.82	1.29	0.90	0.02	0.09	0.13	0.09
Total	1.43	1.18	1.41	1.15	2.03	2.00	2.70	2.05	2.05	2.09	2.83	2.14

Sum represents total for each month. Total represents total cumulative rainfall for the fiscal year through the end of the month.

Table G-8 (continued) Daily Rainfall for Fiscal Year 2006-2007 (inches) Santa Margarita Watershed

Day	Apr				May				Jun			
	Murrieta Creek	Skinner Lake	Temecula	Wildomar	Murrieta Creek	Skinner Lake	Temecula	Wildomar	Murrieta Creek	Skinner Lake	Temecula	Wildomar
1												
2												
3												
4												
5												
6												
7												
8												
9												
10												
11												
12												
13												
14												
15												
16			0.01									
17												
18												
19												
20												
21	0.53	0.39	0.58	0.47								
22		0.01										
23	0.02	0.04	0.01									
24												
25												
26												
27												
28												
29												
30												
31												
Sum	0.55	0.44	0.60	0.47	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	2.60	2.53	3.43	2.61	2.60	2.53	3.43	2.61	2.60	2.53	3.43	2.61

Sum represents total for each month. Total represents total cumulative rainfall for the fiscal year through the end of the month.

G-5.0 FIRES WITHIN THE SANTA MARGARITA WATERSHED

Several significant fires occurred during the FY 2006-2007 reporting period. Fires impact a watershed for several years after their initial burn due to loss of ground cover and chemical changes in the soil. Naturally occurring elements that are usually retained by forest vegetation and soils can be washed away during storm events, in addition to large amounts of sediment. Daniel Cozad, former Deputy General Manager of the Santa Ana Watershed Project Authority, stated[1], "Normally, the forest filters water naturally absorbing nitrates, phosphorus and other elements. Because of the fires, more contaminants will reach stream channels.... Increasingly, rain will cause rocks and soil that usually trap particulate matter on the forest floor to fill watercourses, washing pollutants such as lead, mercury, copper, zinc and phosphorus into debris basins and groundwater."

As it takes several years for ashes and sediments displaced by forest fires to be washed down, fires that occurred in previous years could be a significant source of elevated levels of pollutants. Table G-9 presents pertinent information about the fires that occurred in 2006-2007, including the dates the fires started, their location, and the number of acres that were burned. The District continues to track fires within the County of Riverside in order to document potential future impacts to receiving water(s).

The figures on the following pages show the locations of the fires and the CMP stations that could show water quality impacts from them. Fire names shown on the maps that are not listed in Table G-9 occurred after June 30, 2007.

Fires that occurred upstream of the Skinner and Vail Reservoirs would not substantially impact downstream water quality due to limited to no discharge, although airborne deposition may still pose impacts to downstream water courses. Fires that occurred downstream of the Skinner and Vail Reservoirs can potentially impact downstream water quality by introducing fire retardant components, sediments, and/or organic debris.

[1] "Forest Burned, Filter Broken – Water quality suffers after fires", by Daniel Cozad, California Forests, Winter 2004, pgs. 6-7.

Table G-9 Fires within the Santa Margarita Region for duration of January 2006 thru June 20072

Event_ID	Fire Name	Start Date	Acres	Location	Percent Contained	Latitude	Longitude
2006 Fires							
CA-RRU-8807	OAK	1/30/2006	4	Red mountain Rd x Oak Dr Sage	100	33.631	-116.896
CA-RRU-289252	LAKE-WALES-TEST	3/15/2006	100	Hwy 79 x Vail Lake Rd in sage	100	33.470	-116.953
CA-RRU-37873	BEAUTY	5/6/2006	5	ANZA	100	33.430	-116.682
CA-RRU-45343	SKINNER	5/30/2006	317	WARREN RD/BOREL RD LAKE SKINNER NEAR MURRIETA	100	33.571	-117.031
CA-RRU-45911	BONNY	6/1/2006	38	Bonny Ln. x Tule Peak Rd. Aguanga	100	33.489	-116.724
CA-MVU-005855	CASTLE	6/29/2006	100	OLD CASTLE RD & CHAMPAGNE	100	33.418	-117.259
CA-RRU-055217	BORDER	6/30/2006	150	South of Temecula	100	33.447	-117.136
CA-RRU-059241	CARY	7/12/2006	161	ANZA	100	33.542	-116.741
CA-RRU-62919	COYOTE COMPLEX	7/23/2006	478	ANZA CA		33.493	-116.598
CA-BDF-7258	OAK	7/23/2006	190	ANZA	100	33.627	-116.843
2007 Fires							
CA-RRU-27872	LAKE SKINNER VMP	4/10/2007	1	Lake Skinner @ Borel Road	100	33.569	-117.053
CA-RRU-033645	JOHNSON RANCH VMP	4/16/2007	73	Lake Skinner area of Temecula	100	33.572	-117.077
CA-RRU-000166	SANTA ROSA VMP	4/24/2007	445	Santa Rosa Plateau	100	33.509	-117.365
CA-RRU-66244	DAILY	7/29/2007	210	Scott Rd X Daily Rd (Menifee area north of Murrieta)	100	33.641	-117.191

[2] Source: GeoMAC Wildfire Information (http://geomac.usgs.gov)

Summary Aerial images of fires that occurred near Riverside County - 2006

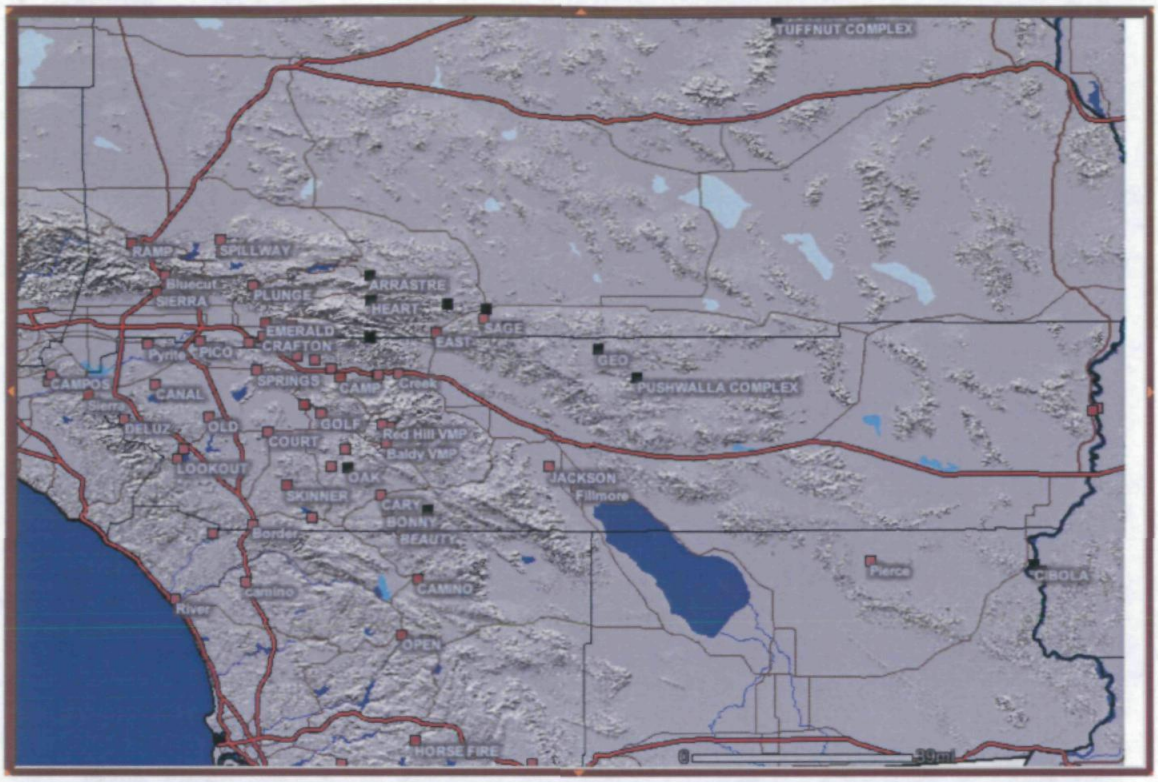

Summary Aerial images of fires that occurred near Riverside County - 2007

Summary Aerial images of fires that have occurred near Santa Margarita Watershed 2006■ thru June 2007▲

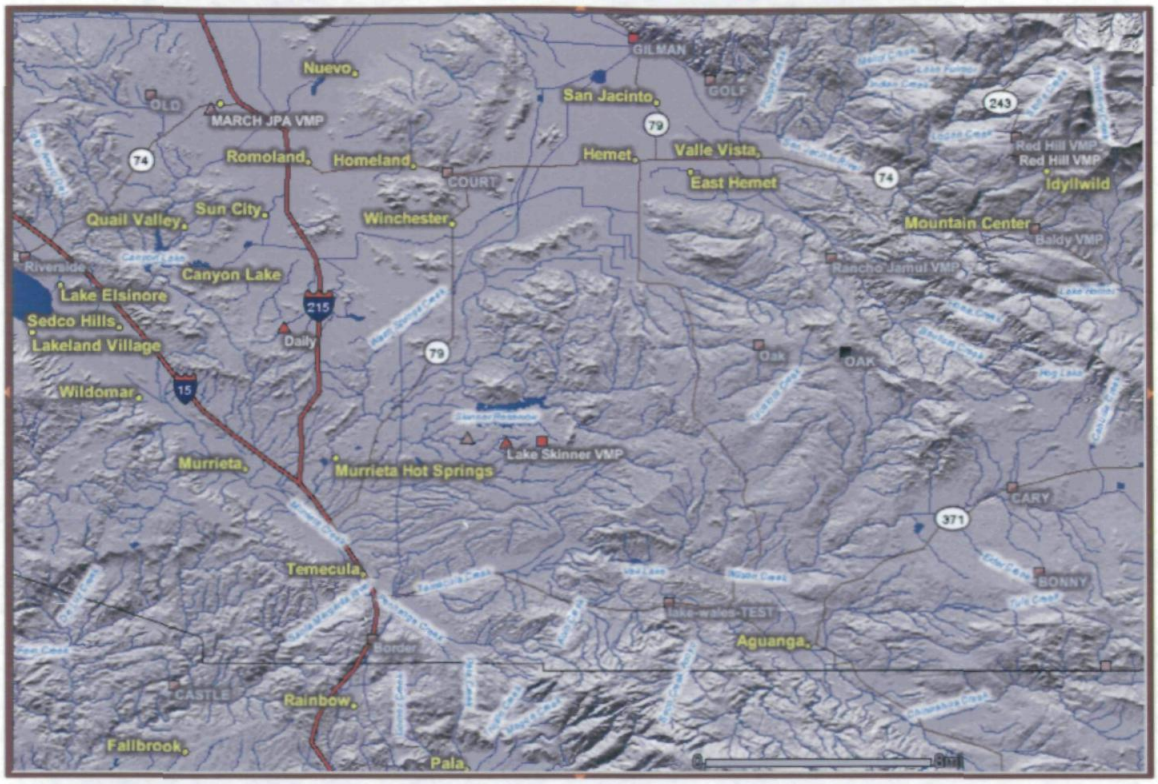

Summary Aerial Images of fires that occurred near Santa Margarita Watershed CMP Stations - 2006■ and 2007▲

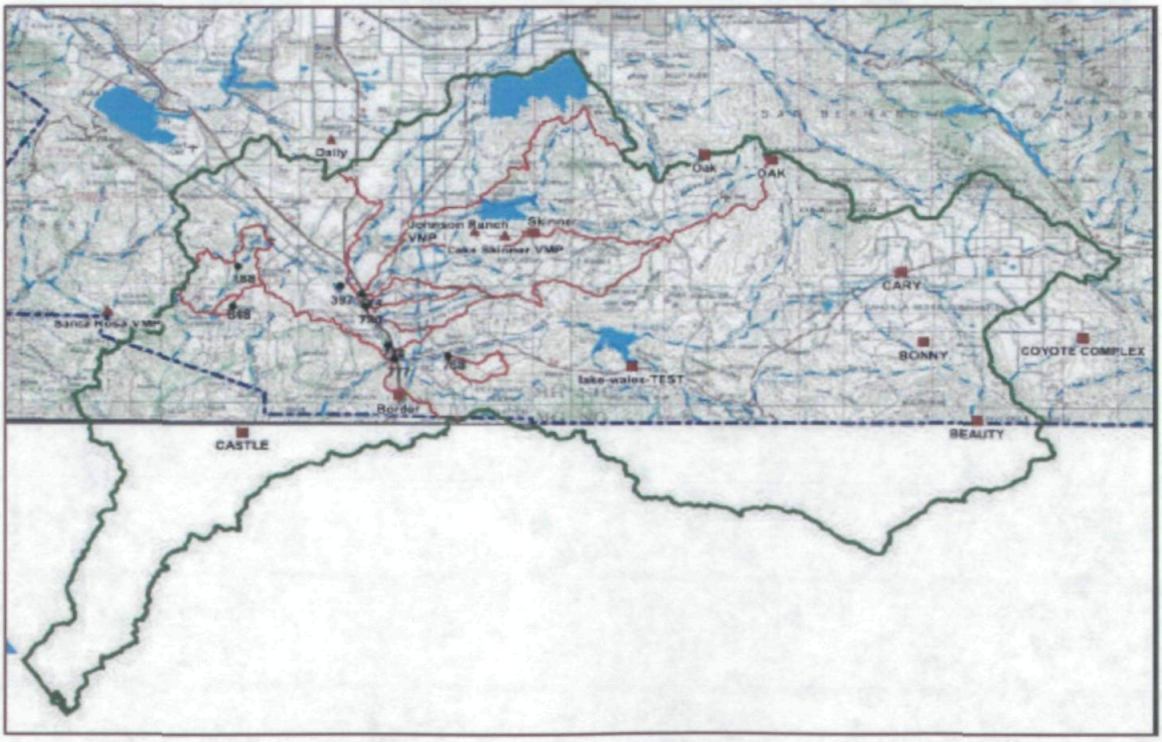

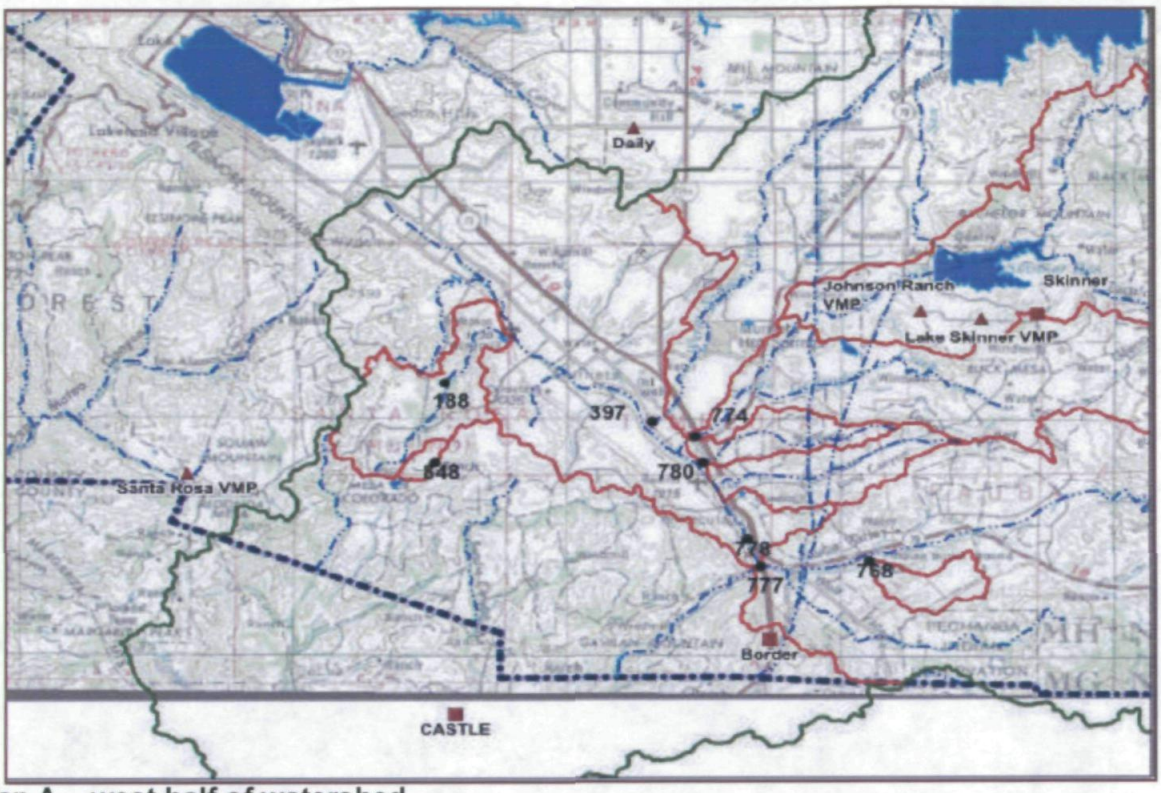

Map A – west half of watershed

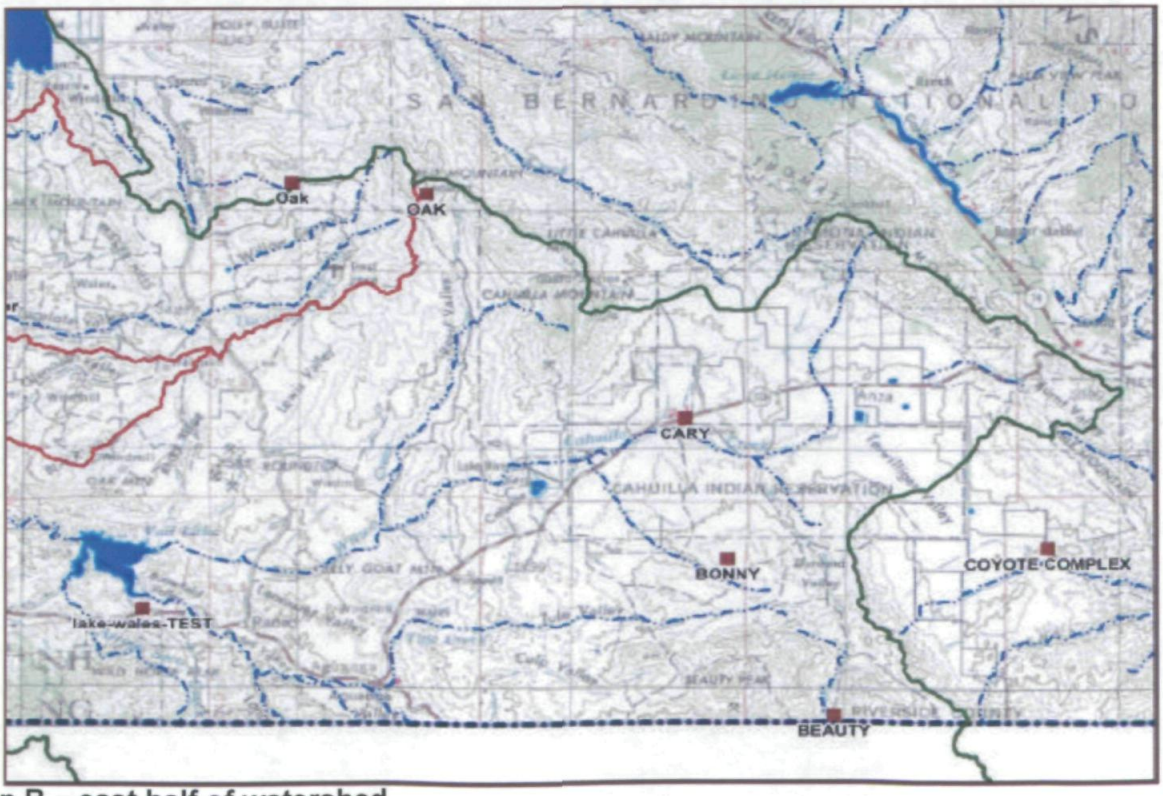

Map B – east half of watershed

Map C – center of watershed

G-6.0 DESCRIPTION OF MONITORING RESULTS

G-6.1 Sampling Events and Core Monitoring

Sampling Events

The MRP requires that wet-weather samples be collected during the reporting period:

- From the first storm event that produces sufficient flow to collect a composite sample at triad stations;
- From the first storm event and an additional storm event at tributary stations; and
- From any two additional storm events at triad stations.

The MRP specifies that a monitoring year, for the purposes of collecting wet and dry weather samples, begins July 1 and ends June 30 of the following year.

The RCFCD has developed guidance on when wet weather samples should be collected. Two National Weather Service weather forecasts are monitored by the RCFCD:

- The normal 7-day National Weather Service forecast for the possibility of a rain event, and
- When within 3 days of a storm, the Quantitative Precipitation Statement (QPS), to determine how much rain is predicted to fall in 6-hour increments over the next 24-hour period and in 24-hour blocks for the following two days.

The antecedent moisture condition (AMC) of the watershed is also evaluated. The AMC is a subjective measure of runoff potential. AMC I represents low runoff potential, such as from a dry watershed. AMC II represents moderate runoff potential. AMC III represents high runoff potential, such as a watershed saturated from previous rain events. Based on the QPS and AMC, the following guidelines are used to determine when to mobilize for a wet weather event:

- AMC I and QPS of ½ inch of precipitation in 24 hours
- AMC II and QPS of $^{3}/_{8}$ inch of precipitation in 24 hours
- AMC III and QPS of ¼ inch of precipitation in 24 hours

These guidelines may be modified based on field experience.

Table G-10 summarizes the storm parameters for the dates samples were collected, including the QPS total amount of rain that fell during the storm.

Table G-10 Upper Santa Margarita Watershed Sampling Events

Start Date	24-hr QPS (in.)	Total Rain(in.)*	Event Type
12/16/2006	0.40	0.12	Wet weather – Tributaries sampled. Triads visited, not sampled.
2/22/2007	0.69	0.23	Wet weather – Triads and Tributaries visited, not sampled
04/20/2007	0.38	0.49	Wet weather – Triads and Tributaries sampled

Notes:

*Average of the four rain gauges listed in Table G-6

Table G-11 summarizes the event dates and types of samples collected for each station.

Table G-11 Sampling Event Summary at each Location

Station Type	Location	09/14/06 (dry)	10/17/06 (dry)	12/16/06 (wet)	03/20/07 (dry)	04/20/07 (wet)	05/10/07 (dry)
Triad	Adobe Creek (848)		X				X
	Cole Creek (188)						
	Temecula Creek (777)		X			X	X
	Murrieta Creek (778)		X			X	X
Tributary	Lat.A of Santa Gert. Chan (774)			X		X	
	Long Canyon (780)			X		X	
	Redhawk Channel (768)	X		X	X	X	
	Warm Springs Creek (397)			X		X	

Notes:
X indicates sample collected, blank spaces indicate no flow at the site.

Core Monitoring

Core Monitoring stations were established to generate data to answer water quality management questions established in Section II.A. of the MRP and to achieve the goals listed in Section 1 of the MRP. Several of these management questions are also reflected in the design of the CMP.

G-6.1.1 Core Monitoring – Triad Stations

Triad stations are those that were monitored for chemical parameters, toxicity, and bioassessment. The Triad stations were:

- Station No. 777: Lower Temecula Creek
- Station No. 778: Lower Murrieta Creek at the USGS Weir
- Station No. 188: Cole Creek
- Station No. 848: Adobe Creek

During 2006–2007, water quality samples were collected at Triad stations 777 and 778 during one wet weather monitoring event and two dry weather events. Stations 188 and 848 were reference stations that were selected by the RCFCD to be representative of natural, undeveloped conditions. Due to their accessibility and flow, the RCFCD selected the Cole Creek station (188) for wet weather sampling and the Adobe Creek station (848) for dry weather sampling. During 2006-2007, two samples were collected during dry weather events at Adobe Creek. An attempt was made to collect a sample from Cole Creek during wet weather, but no sample was collected due to insufficient flow.

During the first storm event of the reporting period, samples collected at the Triad stations were analyzed for the complete list of priority pollutants (40 CFR 122, Appendix D). For the remaining wet and dry weather monitoring events, samples were analyzed for the parameters listed in Table G-1. The detected analytical results are provided in Table G-12.

G-6.1.2 Core Monitoring – Tributary Stations

Tributary stations were established to generate data to identify specific sources of pollution. The Tributary stations were selected to be representative of urban/urbanizing drainage areas and included:

- Station No. 774: Lateral A of Santa Gertrudis Channel near Temecula
- Station No. 780: Long Canyon Creek, near the confluence with Murrieta Creek
- Station No. 768: Redhawk Channel, near the confluence with Temecula Creek
- Station No. 397: Warm Springs Creek near Murrieta

Four dry weather and two wet-weather sampling events were monitored at the Tributary stations during the 2006-2007 reporting period. Wet weather samples were analyzed for the Constituents of Concern in Table G-2. Dry weather samples were collected and analyzed as described in the Illicit Connection/Illicit Discharge (IC/ID) discussion in Section 7.3.5. The detected analytical results are provided in Table G-12.

G-6.1.3 Analytical Laboratories

Wet and dry weather samples were collected by the District under Chain-of-Custody procedures and were submitted to E.S. Babcock & Sons (an analytical laboratory certified by the National Environmental Laboratory Accreditation Conference, Certificate No. 0201CA, Environmental Laboratory Certification No. 1156) for analysis. Babcock & Sons utilized the standard methods called for in the CMP. Toxicity and Bioassessment samples were sub-contracted by Babcock and Sons to Aquatic Bioassay & Consulting Laboratories, Inc., and some toxicity samples were sub-contracted to Nautilus Environmental. Diazinon and Chlorpyrifos analyses were performed by Aqua-Science Environmental Toxicology Consultants, Davis, CA.

G-6.2 Data and Data Products

G-6.2.1 Actual Data

The detected analytical results for Triad and Tributary stations are provided in Table G-12.

Chemical data are summarized in graphs contained in Attachment A (electronic version only). Water column toxicity testing was conducted during each wet weather sampling event at each of the Triad stations during the reporting period. The results of the water column toxicity testing are discussed for each Triad station in Section G-6.2.4 and are presented in Table G-17 and Table G-18. Bioassessment monitoring was conducted at the Triad stations bi-annually. Bioassessment data are summarized in Section G-6.2.5, Table G-19.

Table G-12: Detected Results
Triad Station - Adobe Creek (848)

Constituent	BPO	CTR*	Units	Dry 9/14/2006	Dry 10/17/2006	Wet 12/16/2006	Dry 3/20/2007	Wet 4/20/2007	Dry 5/10/2007
Bacteria									
Total Coliforms			MPN/100 mL						70
Conventionals									
Dissolved Oxygen	< 5		mg/L		19.45				
Eh					169				
O2%Sat					19.5				
pH - field	6.5<pH<8.5		pH Units		7.9				7.5
pH - lab	6.5<pH<8.5		pH Units		8				8
Specific Conductance			umhos/cm		440				426
Temperature C - field			degrees C		15.4				19
Total Dissolved Solids			mg/L		260				
Total Hardness			mg/L		180				170
Total Suspended Solids					< 5				10
Turbidity	20		NTU		0.92				4.3
Turbidity, Field	20		NTU		**86.8**				
Nutrients									
Kjeldahl Nitrogen			mg/L		0.16				0.36
Nitrate as N	10		mg/L		0.5				0.29
Total Phosphorus	0.1		mg/L		**0.45**				0.08
Metals									
Calcium			mg/L		44				41

Notes:

* CTR Freshwater Contiunous Concentration Hardness dependent values from matrix at 40 CFR 131.38(b)(1) calculated using hardness of 100 mg/L. Numbers in parentheses, adjacent to individual results, are CTR objectives for dissolved metals adjusted for the hardness of the sample.

Bold Indicates the result exceeds either the BPO or CTR objective.

Indicates sample was not analyzed or collected for this constituent.

< Sample was not detected above the reporting limit following the "<" symbol.

0001404

Table G-12: Detected Results
Triad Station - Adobe Creek (848)

Constituent	BPO	CTR*	Units	Dry 9/14/2006	Dry 10/17/2006	Wet 12/16/2006	Dry 3/20/2007	Wet 4/20/2007	Dry 5/10/2007
Metals									
Copper			mg/L		0.0008				0.0007
Magnesium			mg/L		18				16
Nickel	0.1		mg/L		0.0019				< 0.001
Total Chromium			mg/L		0.0019				0.0016
Zinc			mg/L		< 0.001				0.0011
Pesticides									
Chlorpyrifos (1178)		0.041	ug/L		0.02				0.0094
Diazinon (ELISA)			ug/L		0.0244				0.0096

Notes:

* CTR Freshwater Contiunous Concentration Hardness dependent values from matrix at 40 CFR 131.38(b)(1) calculated using hardness of 100 mg/L. Numbers in parentheses, adjacent to individual results, are CTR objectives for dissolved metals adjusted for the hardness of the sample.

Bold Indicates the result exceeds either the BPO or CTR objective.

Indicates sample was not analyzed or collected for this constituent.

< Sample was not detected above the reporting limit following the "<" symbol.

0001405

Table G-12: Detected Results
Triad Station - Murrieta Creek (778)

Constituent	BPO	CTR*	Units	Dry 9/14/2006	Dry 10/17/2006	Wet 12/16/2006	Dry 3/20/2007	Wet 4/20/2007	Dry 5/10/2007
Bacteria									
Escherichia Coliforms			MPN/100 mL		20				500
Fecal Coliforms	2000		MPN/100 mL		20				500
Total Coliforms			MPN/100 mL		1100				1700
Conventionals									
Dissolved Oxygen	< 5		mg/L		19.99				
Eh					95				
O2%Sat					19.99				
pH - field	**6.5<pH<8.5**		pH Units		**8.7**			8.08	8.1
pH - lab	**6.5<pH<8.5**		pH Units		8				8.5
Specific Conductance			umhos/cm		1200			214	1080
Temperature C - field			degrees C		19.1			12.5	26.5
Total Dissolved Solids			mg/L		700				
Total Hardness			mg/L		300				210
Turbidity	20		NTU		0.91				4.2
Turbidity, Field	20		NTU		15.7				
Nutrients									
Kjeldahl Nitrogen			mg/L		0.33				0.51
Total Phosphorus	0.1		mg/L		< 0.05				0.06
Metals									
Antimony	0.006		mg/L					0.0013	

Notes:

* CTR Freshwater Contiunous Concentration Hardness dependent values from matrix at 40 CFR 131.38(b)(1) calculated using hardness of 100 mg/L. Numbers in parentheses, adjacent to individual results, are CTR objectives for dissolved metals adjusted for the hardness of the sample.

Bold Indicates the result exceeds either the BPO or CTR objective.

Indicates sample was not analyzed or collected for this constituent.

< Sample was not detected above the reporting limit following the "<" symbol.

0001406

Table G-12: Detected Results

Triad Station - Murrieta Creek (778)

Constituent	BPO	CTR*	Units	Dry 9/14/2006	Dry 10/17/2006	Wet 12/16/2006	Dry 3/20/2007	Wet 4/20/2007	Dry 5/10/2007
Metals									
Arsenic	0.05		mg/L					0.0025	
Beryllium	0.004		mg/L					0.0008	
Calcium			mg/L		71				45
Copper			mg/L		0.0028			0.036	0.0035
Hexavalent Chromium			mg/L		< 0.025			0.0024	< 0.01
Magnesium			mg/L		29				24
Nickel	0.1		mg/L		0.003			0.012	0.0018
Total Chromium			mg/L		0.0023			0.023	0.0027
Zinc			mg/L		< 0.001			0.14	0.0054
Pesticides									
Chlorpyrifos (1178)		0.041	ug/L		0.0201				0.0118
Diazinon (ELISA)			ug/L		0.0182				0.0138
Surfactants									
MBAS	0.5		mg/L		< 0.05				0.06

Notes:

* CTR Freshwater Contiunous Concentration Hardness dependent values from matrix at 40 CFR 131.38(b)(1) calculated using hardness of 100 mg/L. Numbers in parentheses, adjacent to individual results, are CTR objectives for dissolved metals adjusted for the hardness of the sample.

Bold Indicates the result exceeds either the BPO or CTR objective.

Indicates sample was not analyzed or collected for this constituent.

< Sample was not detected above the reporting limit following the "<" symbol.

00014407

Table G-12: Detected Results
Triad Station - Temecula Creek (777)

Constituent	BPO	CTR*	Units	Dry 9/14/2006	Dry 10/17/2006	Wet 12/16/2006	Dry 3/20/2007	Wet 4/20/2007	Dry 5/10/2007
Bacteria									
Escherichia Coliforms			MPN/100 mL		1300				230
Fecal Coliforms	2000		MPN/100 mL		**2400**				230
Total Coliforms			MPN/100 mL		16000				5000
Conventionals									
Dissolved Oxygen	< 5		mg/L		19.99				
Eh					61				
O2%Sat					19.99				
pH - field	**6.5<pH<8.5**		pH Units		7.8			7.99	7.1
pH - lab	**6.5<pH<8.5**		pH Units		7.4				7.7
Specific Conductance			umhos/cm		1700			186	1649
Temperature C - field			degrees C		17.8			13.3	18.3
Total Dissolved Solids			mg/L		1000				
Total Hardness			mg/L		610				540
Turbidity	20		NTU		1.2				0.54
Turbidity, Field	20		NTU		17.9				
Nutrients									
Kjeldahl Nitrogen			mg/L		0.16				0.17
Nitrate as N	10		mg/L		1.5				0.7
Total Phosphorus	0.1		mg/L		0.1				0.1

Notes:

* CTR Freshwater Contiunous Concentration Hardness dependent values from matrix at 40 CFR 131.38(b)(1) calculated using hardness of 100 mg/L. Numbers in parentheses, adjacent to individual results, are CTR objectives for dissolved metals adjusted for the hardness of the sample.

Bold Indicates the result exceeds either the BPO or CTR objective.

Indicates sample was not analyzed or collected for this constituent.

< Sample was not detected above the reporting limit following the "<" symbol.

0001408

Table G-12: Detected Results
Triad Station - Temecula Creek (777)

Constituent	BPO	CTR*	Units	Dry 9/14/2006	Dry 10/17/2006	Wet 12/16/2006	Dry 3/20/2007	Wet 4/20/2007	Dry 5/10/2007
Metals									
Antimony	0.006		mg/L					0.0012	
Arsenic	0.05		mg/L					0.0027	
Beryllium	0.004		mg/L					0.0006	
Cadmium	0.005		mg/L		< 0.0003			0.0004	< 0.0003
Calcium			mg/L		180				160
Copper			mg/L		0.0038			0.046	0.0024
Lead			mg/L		< 0.0005			0.014	< 0.0005
Magnesium			mg/L		40				35
Nickel	0.1		mg/L		0.0074			0.013	0.0021
Total Chromium			mg/L		0.0035			0.017	0.0027
Zinc			mg/L		0.0017			0.15	0.0014
Pesticides									
Chlorpyrifos (1178)		0.041	ug/L		0.0206				0.0087
Diazinon (ELISA)			ug/L		0.0169				0.0075

Notes:

* CTR Freshwater Contiunous Concentration Hardness dependent values from matrix at 40 CFR 131.38(b)(1) calculated using hardness of 100 mg/L. Numbers in parentheses, adjacent to individual results, are CTR objectives for dissolved metals adjusted for the hardness of the sample.

Bold Indicates the result exceeds either the BPO or CTR objective.

Indicates sample was not analyzed or collected for this constituent.

< Sample was not detected above the reporting limit following the "<" symbol.

0001409

Table G-12: Detected Results

Tributary Station - Long Canyon (780)

Constituent	BPO	CTR*	Units	Dry 9/14/2006	Dry 10/17/2006	Wet 12/16/2006	Dry 3/20/2007	Wet 4/20/2007	Dry 5/10/2007
Bacteria									
Escherichia Coliforms			MPN/100 mL					17000	
Fecal Coliforms	2000		MPN/100 mL					**17000**	
Total Coliforms			MPN/100 mL					160000	
Conventionals									
Color	20		units			**80**		**40**	
Dissolved Oxygen	< 5		mg/L	19.9			19.62		
Eh							74		
Oil & Grease (HEM)			mg/L			5.6		< 5.1	
pH - field	**6.5<pH<8.5**		pH Units	**8.6**		7.7	8.4	7.61	
pH - lab	**6.5<pH<8.5**		pH Units			7.6		7.6	
Specific Conductance			umhos/cm	1000		242	1200	103	
TDS (Residue)	750		mg/L			210		94	
Temperature C - field			degrees C	20.3		10.8	15.7	13.6	
Total Dissolved Solids			mg/L	700			800		
Total Hardness			mg/L			81		31	
Turbidity	20		NTU			**120**		**54**	
Turbidity, Field	20		NTU	**32.1**			**149**		
Nutrients									
Ammonia-Nitrogen			mg/L			1.1		0.4	
Kjeldahl Nitrogen			mg/L			4.3		3.7	

Notes:

* CTR Freshwater Contiunous Concentration Hardness dependent values from matrix at 40 CFR 131.38(b)(1) calculated using hardness of 100 mg/L. Numbers in parentheses, adjacent to individual results, are CTR objectives for dissolved metals adjusted for the hardness of the sample.

Bold Indicates the result exceeds either the BPO or CTR objective.

Indicates sample was not analyzed or collected for this constituent.

< Sample was not detected above the reporting limit following the "<" symbol.

0001410

Table G-12: Detected Results

Tributary Station - Long Canyon (780)

Constituent	BPO	CTR*	Units	Dry 9/14/2006	Dry 10/17/2006	Wet 12/16/2006	Dry 3/20/2007	Wet 4/20/2007	Dry 5/10/2007
Nutrients									
Nitrate as N	10		mg/L			1.2		0.52	
Total Nitrogen	1		mg/L			**5.5**		**4.2**	
Total Phosphorus	0.1		mg/L			**0.81**		**0.44**	
Metals									
Calcium			mg/L			21		8.6	
Copper			mg/L			0.045		0.017	
Copper, Diss		0.009	ug/L			9.6 (11)		**7.3 (4)**	
Iron	0.3		mg/L			**8.7**		**3.7**	
Magnesium			mg/L			6.8		< 2.5	
Manganese	0.05		mg/L			**0.16**		**0.068**	
Pesticides									
Chlorpyrifos (1178)		0.041	ug/L			**0.1007**		0.0409	
Diazinon (ELISA)			ug/L			0.1972		0.2237	
Surfactants									
MBAS	0.5		mg/L			**0.97**		0.26	

Notes:

* CTR Freshwater Contiunous Concentration Hardness dependent values from matrix at 40 CFR 131.38(b)(1) calculated using hardness of 100 mg/L. Numbers in parentheses, adjacent to individual results, are CTR objectives for dissolved metals adjusted for the hardness of the sample.

Bold Indicates the result exceeds either the BPO or CTR objective.

Indicates sample was not analyzed or collected for this constituent.

< Sample was not detected above the reporting limit following the "<" symbol.

0001411

Table G-12: Detected Results

Tributary Station - Redhawk Channel (768)

Constituent	BPO	CTR*	Units	Dry 9/14/2006	Dry 10/17/2006	Wet 12/16/2006	Dry 3/20/2007	Wet 4/20/2007	Dry 5/10/2007
Bacteria									
Escherichia Coliforms			MPN/100 mL	300			170	5000	
Fecal Coliforms	2000		MPN/100 mL	**3000**			170	**8000**	
Total Coliforms			MPN/100 mL	50000			2800	160000	
Conventionals									
Color	20		units	**60**		**40**	**45**	**60**	
Dissolved Oxygen	< 5		mg/L	19.99			18.15		
Eh				82			49		
pH - field	6.5<pH<8.5		pH Units	**9.4**		7.9	**9.8**	7.96	
pH - lab	6.5<pH<8.5		pH Units	**9**		8.1	**9**	7.8	
Specific Conductance			umhos/cm	1200		337	1200	238	
TDS (Residue)	750		mg/L	**770**		220	**800**	200	
Temperature C - field			degrees C	25.2		10.1	17.2	14.1	
Total Dissolved Solids			mg/L	800			700		
Total Hardness			mg/L	260		110	240	78	
Turbidity	20		NTU	3.5		**220**	7.9	**130**	
Turbidity, Field	20		NTU	18			**51.7**		
Nutrients									
Ammonia-Nitrogen			mg/L	< 0.1		0.57	< 0.1	0.41	
Kjeldahl Nitrogen			mg/L	1.2		3.1	1.4	3	
Nitrate as N	10		mg/L	0.47		0.9	0.79	0.68	

Notes:

* CTR Freshwater Contiunous Concentration Hardness dependent values from matrix at 40 CFR 131.38(b)(1) calculated using hardness of 100 mg/L. Numbers in parentheses, adjacent to individual results, are CTR objectives for dissolved metals adjusted for the hardness of the sample.

Bold Indicates the result exceeds either the BPO or CTR objective.

Indicates sample was not analyzed or collected for this constituent.

< Sample was not detected above the reporting limit following the "<" symbol.

0001412

Table G-12: Detected Results
Tributary Station - Redhawk Channel (768)

Constituent	BPO	CTR*	Units	Dry 9/14/2006	Dry 10/17/2006	Wet 12/16/2006	Dry 3/20/2007	Wet 4/20/2007	Dry 5/10/2007
Nutrients									
Total Nitrogen	1		mg/L	**1.7**		**4**	**2.2**	**3.7**	
Total Phosphorus	0.1		mg/L	**0.65**		**0.94**	**0.6**	**0.92**	
Metals									
Calcium			mg/L	70		23	64	19	
Copper			mg/L	0.0089		0.023	0.011	0.017	
Copper, Diss		0.009	ug/L	8.6 (33)		4.3 (15)	10 (31)	4.3 (11)	
Iron	0.3		mg/L	**0.33**		**28**	0.07	**16**	
Magnesium			mg/L	22		13	19	7.5	
Manganese	0.05		mg/L	0.038		**0.43**	0.038	**0.24**	
Pesticides									
Chlorpyrifos (1178)		0.041	ug/L	0.0216		**0.0502**	0.0212	0.0328	
Diazinon (ELISA)			ug/L	0.0184		0.1215	0.0203	0.2489	
Surfactants									
MBAS	0.5		mg/L	0.05		< 0.25	0.06	0.15	

Notes:

* CTR Freshwater Contiunous Concentration Hardness dependent values from matrix at 40 CFR 131.38(b)(1) calculated using hardness of 100 mg/L. Numbers in parentheses, adjacent to individual results, are CTR objectives for dissolved metals adjusted for the hardness of the sample.

Bold Indicates the result exceeds either the BPO or CTR objective.

Indicates sample was not analyzed or collected for this constituent.

< Sample was not detected above the reporting limit following the "<" symbol.

0001413

Table G-12: Detected Results

Tributary Station - Santa Gertrudis Creek (774)

Constituent	BPO	CTR*	Units	Dry 9/14/2006	Dry 10/17/2006	Wet 12/16/2006	Dry 3/20/2007	Wet 4/20/2007	Dry 5/10/2007
Bacteria									
Escherichia Coliforms			MPN/100 mL					5000	
Fecal Coliforms	2000		MPN/100 mL					**11000**	
Total Coliforms			MPN/100 mL					160000	
Conventionals									
Color	20		units			**60**		**50**	
Dissolved Oxygen	< 5		mg/L	19.99					
Eh				87					
pH - field	6.5<pH<8.5		pH Units	**8.7**		8.2		8.4	
pH - lab	6.5<pH<8.5		pH Units			8.2		8.3	
Specific Conductance			umhos/cm	1300		362		253	
TDS (Residue)	750		mg/L			260		220	
Temperature C - field			degrees C	20.3		11.1		13.4	
Total Dissolved Solids			mg/L	800					
Total Hardness			mg/L			120		77	
Turbidity	20		NTU			**78**		15	
Turbidity, Field	20		NTU	17.5					
Nutrients									
Ammonia-Nitrogen			mg/L			0.43		0.38	
Kjeldahl Nitrogen			mg/L			2.9		1.7	
Nitrate as N	10		mg/L			0.77		0.56	

Notes:

* CTR Freshwater Contiunous Concentration Hardness dependent values from matrix at 40 CFR 131.38(b)(1) calculated using hardness of 100 mg/L. Numbers in parentheses, adjacent to individual results, are CTR objectives for dissolved metals adjusted for the hardness of the sample.

Bold Indicates the result exceeds either the BPO or CTR objective.

Indicates sample was not analyzed or collected for this constituent.

< Sample was not detected above the reporting limit following the "<" symbol.

0001414

Table G-12: Detected Results

Tributary Station - Santa Gertrudis Creek (774)

Constituent	BPO	CTR*	Units	Dry 9/14/2006	Dry 10/17/2006	Wet 12/16/2006	Dry 3/20/2007	Wet 4/20/2007	Dry 5/10/2007
Nutrients									
Nitrite as N	1		mg/L			0.11		< 0.1	
Total Nitrogen	1		mg/L			**3.8**		**2.3**	
Total Phosphorus	0.1		mg/L			**0.73**		**0.58**	
Metals									
Calcium			mg/L			32		21	
Copper			mg/L			0.015		0.011	
Copper, Diss		0.009	ug/L			4.7 (16)		6 (11)	
Iron	0.3		mg/L			**5.9**		**3.4**	
Lead, Diss		0.0025	mg/L			< 0.5 (0.0815)		**0.6 (0.0463)**	
Magnesium			mg/L			8.6		5.9	
Manganese	0.05		mg/L			**0.15**		**0.067**	
Pesticides									
Chlorpyrifos (1178)		0.041	ug/L			**0.079**		0.0329	
Diazinon (ELISA)			ug/L			0.0745		0.1136	
Surfactants									
MBAS	0.5		mg/L			0.35		0.23	

Notes:

* CTR Freshwater Contiunous Concentration Hardness dependent values from matrix at 40 CFR 131.38(b)(1) calculated using hardness of 100 mg/L. Numbers in parentheses, adjacent to individual results, are CTR objectives for dissolved metals adjusted for the hardness of the sample.

Bold Indicates the result exceeds either the BPO or CTR objective.

Indicates sample was not analyzed or collected for this constituent.

< Sample was not detected above the reporting limit following the "<" symbol.

0001415

Table G-12: Detected Results

Tributary Station - Warm Springs Creek (397)

Constituent	BPO	CTR*	Units	Dry 9/14/2006	Dry 10/17/2006	Wet 12/16/2006	Dry 3/20/2007	Wet 4/20/2007	Dry 5/10/2007
Bacteria									
Escherichia Coliforms			MPN/100 mL					3000	
Fecal Coliforms	2000		MPN/100 mL					**8000**	
Total Coliforms			MPN/100 mL					160000	
Conventionals									
Color	20		units			**50**		**35**	
pH - field	6.5<pH<8.5		pH Units			8.05		8.01	
pH - lab	6.5<pH<8.5		pH Units			7.9		8.1	
Specific Conductance			umhos/cm			1007		314	
TDS (Residue)	750		mg/L			620		280	
Temperature C - field			degrees C			10		13.2	
Total Hardness			mg/L			230		95	
Turbidity	20		NTU			20		**140**	
Nutrients									
Ammonia-Nitrogen			mg/L			0.44		0.26	
Kjeldahl Nitrogen			mg/L			1.6		2.1	
Nitrate as N	10		mg/L			0.77		0.7	
Total Nitrogen	1		mg/L			**2.4**		**2.8**	
Total Phosphorus	0.1		mg/L			**0.31**		**0.68**	
Metals									
Calcium			mg/L			58		24	

Notes:

* CTR Freshwater Contiunous Concentration Hardness dependent values from matrix at 40 CFR 131.38(b)(1) calculated using hardness of 100 mg/L. Numbers in parentheses, adjacent to individual results, are CTR objectives for dissolved metals adjusted for the hardness of the sample.

Bold Indicates the result exceeds either the BPO or CTR objective.

Indicates sample was not analyzed or collected for this constituent.

< Sample was not detected above the reporting limit following the "<" symbol.

0001416

Table G-12: Detected Results

Tributary Station - Warm Springs Creek (397)

Constituent	BPO	CTR*	Units	Dry 9/14/2006	Dry 10/17/2006	Wet 12/16/2006	Dry 3/20/2007	Wet 4/20/2007	Dry 5/10/2007
Metals									
Copper			mg/L			0.014		0.015	
Copper, Diss		0.009	ug/L			12 (29)		6 (13)	
Iron	0.3		mg/L			**1.3**		**11**	
Magnesium			mg/L			19		8.3	
Manganese	0.05		mg/L			**0.083**		**0.17**	
Pesticides									
Chlorpyrifos (1178)		0.041	ug/L			**0.0631**		0.0266	
Diazinon (ELISA)			ug/L			0.0655		0.0747	
Surfactants									
MBAS	0.5		mg/L			0.43		0.12	

Notes:

* CTR Freshwater Contiunous Concentration Hardness dependent values from matrix at 40 CFR 131.38(b)(1) calculated using hardness of 100 mg/L. Numbers in parentheses, adjacent to individual results, are CTR objectives for dissolved metals adjusted for the hardness of the sample.

Bold Indicates the result exceeds either the BPO or CTR objective.

Indicates sample was not analyzed or collected for this constituent.

< Sample was not detected above the reporting limit following the "<" symbol.

0001417

G-6.2.2 Identification of Parameters Detected Above BPO and CTR Objectives

Parameters detected above BPO and CTR objectives are indicated by bold-faced font in Table G-12. Table G-13 presents the percentage of each parameter that was detected above a Basin Plan Objective (BPO) and Table G-14 presents the percentage of each parameter that was detected above a California Toxics Rule Criterion Continuous Concentration (CTR). The CTR values for the dissolved metals were adjusted for hardness according to the CTR. The corresponding figures that display these results are provided as graphs in Attachment A (electronic version only).

It should be noted that the Policy of Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California (SWRCB Res. No. 2000-015) states:

> *"This Policy does not apply to regulation of storm water discharges. The SWRCB has adopted precedential decisions addressing regulation of municipal stormwater discharges in Orders WQ 91-03, 91-04, 96-13, 98-01, and 99-05".*

Data comparison with CTR limits in this report is provided for information purposes only.

There were a number of instances where the analytical result was reported as non-detect, or less than the laboratory's established Reporting Detection Limit (RDL). For some of the results, the RDL was greater than the CTR. Therefore, some samples with results listed as non-detects may actually have concentrations that exceed the CTR or BPO. The District will continue to work with the analytical laboratory to achieve an RDL that is less than the CTR or BPO, as appropriate.

Table G-13 Water Quality Parameters Measured Above Basin Plan Objectives (Exceedances : Samples)

07/01/2006 through 06/30/2007

Analyte Class	Parameter	Adobe Creek (848)	Lower Murrieta Creek (778)	Lower Temecula Creek (777)	Long Canyon Creek (780)	Redhawk Channel (768)	Santa Gertrudis Creek (774)	Warm Springs Creek (397)
Bacteria	Fecal Coliforms	0 : 1	0 : 2	1 : 2	1 : 1	2 : 3	1 : 1	1 : 1
Conventionals	Color	Not Sampled	Not Sampled	Not Sampled	2 : 2	4 : 4	2 : 2	2 : 2
	pH - field	0 : 2	1 : 3	0 : 3	1 : 4	2 : 4	1 : 3	0 : 2
	pH - lab	0 : 2	0 : 2	0 : 2	0 : 2	2 : 4	0 : 2	0 : 2
	TDS (Residue)	Not Sampled	Not Sampled	Not Sampled	0 : 2	2 : 4	0 : 2	0 : 2
	Turbidity	0 : 2	0 : 2	0 : 2	2 : 2	2 : 4	1 : 2	1 : 2
	Turbidity, Field	1 : 1	0 : 1	0 : 1	2 : 2	1 : 2	0 : 1	Not Sampled
Nutrients	Total Nitrogen	Not Sampled	Not Sampled	Not Sampled	2 : 2	4 : 4	2 : 2	2 : 2
	Total Phosphorus	1 : 2	0 : 2	0 : 2	2 : 2	4 : 4	2 : 2	2 : 2
Metals	Iron	Not Sampled	Not Sampled	Not Sampled	2 : 2	3 : 4	2 : 2	2 : 2
	Manganese	Not Sampled	Not Sampled	Not Sampled	2 : 2	2 : 4	2 : 2	2 : 2
Surfactants	MBAS	0 : 2	0 : 2	0 : 2	1 : 2	0 : 4	0 : 2	0 : 2

0001419

Table G-14 Water Quality Parameters Measured Above California Toxics Rule Plan Criterion Continuous Concentration (Exceedances : Samples)

07/01/2005 through 06/30/2006

Analyte Class	Parameter	Warm Springs Creek (397)	Redhawk Channel (768)	Santa Gertrudis Creek (774)	Lower Temecula Creek (777)	Lower Murrieta Creek (778)	Long Canyon Creek (780)	Adobe Creek (848)
Metals	Copper, Diss	Not Sampled	Not Sampled	Not Sampled	1 : 2	0 : 4	0 : 2	0 : 2
	Lead, Diss	Not Sampled	Not Sampled	Not Sampled	0 : 2	0 : 4	1 : 2	0 : 2
Pesticides	Chlorpyrifos (1178)	0 : 2	0 : 2	0 : 2	1 : 2	1 : 4	1 : 2	1 : 2

0001420

G-6.2.3 Estimated Mass Loadings

Estimated instantaneous mass loads were calculated for detected parameters at the Triad stations. The load was calculated by multiplying the concentration for the constituent by the flow rate. The flow rates for Adobe Creek and Temecula Creek were estimated in the field. The flow rate for Murrieta Creek is the average flow for the day calculated from USGS 15 minute interval flow data. The estimated instantaneous mass load results are displayed in Table G-15.

Annual mass loadings (lbs) were estimated for Adobe Creek, Temecula Creek and Murrieta Creek. The estimated annual mass loadings (lbs) are displayed in Table G-16. The annual mass loading at each Triad station was calculated by multiplying the average of the detected concentrations by the total annual flow volume. The annual flow volume, in cubic feet, was calculated based on the hydrology data available. The annual flow volume at Murrieta Creek was calculated using annual USGS 15-minute-interval flow data. The total flow volume at Adobe Creek for 2007 was estimated based on the assumption that total volume is proportional to the rainfall amount. The total annual rainfall for 2005 was compared to the total annual rainfall for 2007 to determine a ratio. This ratio was applied to the total flow volume for 2005 for Adobe Creek to estimate a total flow volume for 2007. The annual flow volume of Temecula creek was estimated based on the assumption that the flow of the Santa Margarita River is equal to the flow of Temecula Creek, Murrieta Creek, and discharge from the Rancho California Water District (RCWD) discharge. The USGS Gage below the confluence of Temecula and Murrieta Creeks is downstream of the RCWD discharge. Total annual flow for the Santa Margarita River was calculated using USGS daily average flow data. Total annual flow for the RCWD was calculated from the daily total flow provided by RCWD. The total annual flow of Temecula Creek was calculated by subtracting the flow volumes of Murrieta Creek and the Rancho California pipe from the flow volume of Santa Margarita.

Annual mass loadings were not calculated for Cole Creek because Cole Creek was not sampled during this monitoring season.

Table G-15 Instantaneous Mass Loading

	Station Number:	848		777			778		
	Station Name:	Adobe Creek		Temecula Creek below Pala Rd			Murrieta Creek at Temecula		
	Sample Date:	10/17/2007	5/10/2007	10/172007	4/20/2007	5/10/2007	10/17/2007	4/20/2007	5/10/2007
	Flow (cfs):	0.1	0.06	0.15	40	0.6	2.9	16	0.05
Analyte Class	**Analyte**	**Load (lbs/day)**	**Load (lbs/day)**	**Load (lbs/day)**	**Load (lbs/day)**	**Load (lbs/day)**	**Load (lbs/day)**	**Load (lbs/day)**	**Load (lbs/day)**
Conventionals	Total Dissolved Solids	70.0		808.2			10937.6		
Nutrients	Nitrogen, nitrate (N)	0.1	0.0	1.2		2.3			
	Nitrogen, total Kjeldahl (N)	0.0	0.0	0.1		0.5	5.2		0.1
	Phosphorus, total (P)	0.1	0.0	0.1	3.0	0.3			0.0
Metals	Antimony				0.3			0.1	
	Arsenic				0.6			0.2	
	Beryllium				0.1			0.1	
	Cadmium				0.1			0.03	
	Calcium	11.9	1.1	145.5	3.7	517.2	0.1		12.1
	Chromium, all valences	0.0	0.0	0.0	9.9	0.0	0.0	2.0	0.0
	Hexavalent Chromium				0.2			0.2	
	Copper	0.0	0.0	0.0		0.0	0.0	3.1	0.0
	Lead				3.0			0.9	
	Magnesium	4.8	0.4	32.3		113.1			
	Nickel	0.0		0.0	2.8	0.0	0.0	1.0	0.0
	Zinc		0.0	0.0	3.2	0.0		12.1	0.0
Pesticides	Chlorpyrifos (ELISA)	0.0	0.0	0.0		0.0	0.0		0.0
	Diazinon	0.0	0.0	0.0		0.0	0.0		0.0
SVOCs	Pyrene				12.9				

0001422

Table G-16 Annual Mass Loading

	Station Number/ Name:	848 / Adobe Creek		777 / Temecula Creek below Pala Rd		778 / Murrieta Creek at Temecula	
	Volume(ac-ft/yr):	15.09		172.250		425.140	
Analyte Class	**Analyte**	**Average Concentration (mg/l)**	**Load (lbs)**	**Average Concentration (mg/l)**	**Load (lbs)**	**Average Concentration (mg/l)**	**Load (lbs)**
Conventionals	Total Dissolved Solids	240	28,680	200	93580	688	794,600
Nutrients	Nitrogen, nitrate (N)	0.5	58	0.9	400		
	Nitrogen, total Kjeldahl (N)	0.2	22	0.2	80	0.3	1
	Phosphorus, total (P)	0.4	51	0.1	50	0.001	1
Metals	Antimony			0.001	1	0.001	2
	Arsenic			0.003	1	0.003	3
	Beryllium			0.001	0	0.001	1
	Cadmium			0.000	0	0.000	0
	Calcium	44	5,310	160	76,700	71	81,500
	Chromium, all valences	0.002	0	0.02	8	0.02	26
	Hexavalent Chromium			0.001	1	0.002	3
	Copper	0.001	0	0.05	20	0.04	40
	Lead			0	0	0.01	10
	Magnesium	18	2,160	36	16,800	28	33,400
	Nickel	0.002	0	0.01	6	0.01	13
	Zinc	0.000	0	0.02	7	0.10	160
Pesticides	Chlorpyrifos (ELISA)	0.2	0	0.01	0	0.02	0
	Diazinon	0.02	0	0.01	0	0.02	0
Surfactants	MBAS					0.001	0
SVOCs	Pyrene			0.06	28		

0001423

G-6.2.4 Toxicity Testing Results

G-6.2.4.1 Toxicity

Monitoring for toxicity was initiated at the Triad stations in 2005 – 2006, making this the second full season of toxicity monitoring. Toxicity is expressed in toxic units (TU) for both acute and chronic toxicity. In this program, the organisms used to measure acute toxicity were the amphipod *Hyalella azteca* and the water flea *Ceriodaphnia dubia*. Survival is the acute endpoint used for both of these test organisms. Acute toxicity units are calculated as follows:

$$TU_a = 100/LC_{50}, \text{ where}$$

The LC_{50} is the concentration of sample expected to cause an adverse effect to 50 percent of the test organisms. The LC_{50} is extrapolated from the results of the toxicity test and cannot be calculated if no toxicity is observed. Therefore, TU_a values range from a lower limit of 0.0 (in the case of no mortality) to values much greater than 1.0 (in the case of very high mortality). If there is less than 50 percent mortality in the undiluted sample (i.e. LC_{50} >100 percent sample), acute toxicity units are calculated as follows:

$$TU_a = \log(100 - \%\text{survival in undiluted sample}) / 1.7$$

The organism used to measure chronic toxicity in samples collected from the Triad stations was the freshwater green algae *Pseudokirchneriella subcapitata* (formerly known as *Selenastrum capricornutum*). Growth inhibition is the endpoint used to measure chronic toxicity. Toxicity is determined using a NOEC, or No Observed Effect Concentration value. The NOEC is the highest concentration tested where no toxicity is observed. The NOEC is used to calculate the TU_c value, which can range from a lower limit of 1.0 (in the case of no toxicity) to values much greater than 1.0 (in the case of a very high toxicity). Chronic toxicity units are calculated as follows:

$$TU_c = 100 / NOEC$$

No toxicity was observed in either the chronic *Pseudokirchneriella* test or the acute *Ceriodaphnia* test for any sample tested. However, statistically reduced survival in at minimum the highest two concentrations tested for both Lower Temecula Creek and Lower Murrieta Creek samples indicate a toxic response with the acute *Hyalella* test. No sample was collected from the reference site, Cole Creek, during this season of testing. A summary of toxicity testing results is presented in Table G-17. A summary of the raw data and statistical results for the toxicity testing is presented in Table G-18.

Table G-17 Toxicity Testing Results in Toxicity Units

Sample Sites and Collection Dates	Acute Toxicity *Hyalella*	Acute Toxicity *Ceriodaphnia*	Chronic Toxicity *Selenastrum*
L. Murrieta Creek, 4/20/07	2.95	0.41	1.00
L. Temecula Creek, 4/20/07	6.32	0.00	1.00

Table G-18 Summary of Raw Data and Statistical Results for Toxicity Testing

		Acute Toxicity *Hyalella*		Acute Toxicity *Ceriodaphnia*		Chronic Toxicity *Pseudokirchneriella*	
Sample Sites and Collection Dates	% Sample Conc.	Survival (%)	LC_{50} (% Sample)	Survival (%)	LC_{50} (%)	Algal Growth (cells/ml)	LC_{50} (% Sample)
L. Murrieta Creek 4/20/07	Lab Control	100	33.9	100	>100	2.28×10^6	>100
	25	85		95		2.31×10^6	
	50	5		95		2.52×10^6	
	100	0		95		2.47×10^6	
	100-filtered	10		na		na	
L. Temecula Creek 4/20/07	Lab Control	95	15.8	100	>100	2.28×10^6	>100
	25	20		100		2.55×10^6	
	50	0		100		2.52×10^6	
	100	0		100		3.33×10^6	
	100-filtered	0		na		na	

na – not applicable

The current year of toxicity testing exhibited results similar to those obtained during the previous monitoring and reporting cycle. Toxicity of *Hyalella* was noted in both creek samples collected; neither of the other two test species exhibited a response. As with the prior year, microscopic protozoans were observed in the samples and infesting dead *Hyalella*. The cause of toxicity to *Hyalella* at both Temecula and Murrieta Creek sample locations was evaluated further by performing Toxicity Identification Evaluations (TIEs), with results and a discussion provided in Section G-6.4.3.

G-6.2.5 Bioassessment Data and Analysis

Bioassessments consisting of a combined evaluation of physical habitat quality and macroinvertebrate assemblages were conducted at the three designated triad stations. Physical habitat quality was assessed using U.S. Environmental Protection Agency (USEPA) Rapid Bioassessment Protocols (RBPs)[3]. Biological sampling and laboratory procedures for the bioassessment surveys followed the California Stream Bioassessment Procedure (CSBP)[4].

The three stream bioassessment sites were located within the upper Santa Margarita River watershed, defined as that portion of the Santa Margarita River above the confluence of Murrieta and Temecula Creeks. Two of the sampling locations were selected based upon their proximity to urban development, with one in Murrieta Creek and the other in Temecula Creek. Adobe Creek was selected as the reference site due to the absence of flow in Cole Creek during dry periods.

The Murrieta Creek site, at an elevation of 987 feet, is located below the gauging station in southern Temecula where Highway 79 crosses the I-15 just before its confluence with Temecula Creek. The

3 Barbour, M.T., et al. 1999. Revision to rapid bioassessment protocols for use in stream and rivers: periphyton, BMIs and fish. USEPA 841-D-97-002. U.S. Environmental Protection Agency. Washington D.C.

4 CSBP. Harrington, J.M. 1999. California stream bioassessment procedures. California Department of Fish and Game, Water Pollution Control Laboratory. Rancho Cordova, CA.

Murrieta Creek site is located in a section of bedrock just downstream from a portion of the creek recently (2004) graded as a result of an Army Corps of Engineers project (Murrieta Creek Phase I Project). Physical habitat at the sampling site fluctuates dramatically from primarily bedrock to deep sand. The Temecula Creek site, at an elevation of 968 feet, is located just west of the I-15 Freeway overpass, before its confluence with Murrieta Creek. During both sampling events of the season, creek flow was subsurface approximately 100 yards upstream of the I-15 Freeway. During the fall 06 sampling event, the 100-meter reach sampled was just east of the overpass. However, due to an influx of vegetation in the creek, the spring 2007 sampling occurred west of the overpass with the eastern most portion of the 100-meter reach located at the overpass.

The Adobe Creek site, at an elevation of 1,614 feet, is located in a small ravine just below its spring fed source in the Santa Rosa Plateau Reserve in an open and relatively undisturbed area.

Bioassessment data for this reporting period were collected on October 17, 2006 and May 10, 2007. Data collected during the previous reporting period on May 23, 2006 have been included in this report for comparison of the effect of dry weather flows over the summer of 2006 on IBI and habitat metrics. These data and the qualitative stream ratings are presented in Table G-19. Mean stream habitat characteristics for each collection event are presented in Table G-20. Analysis and interpretation of these metrics is contained in Section G-6.4.2. The Southern California Index of Biological Integrity (So CA IBI) developed by Ode et al. (2005)[5] was used to evaluate and rank the individual sites.

5 Ode, P.R., A.C. Rehn, and J.T. May. 2005. A quantitative tool for assessing the integrity of Southern Coastal California Streams. Env. Man. Vol. 35, No. 4, pp. 493-504.

Table G-19 Selected Biological Metric Values, IBI Scores and Physical Habitat Parameters of the Upper Santa Margarita Watershed [a]

	Sheridan Creek			Temecula Creek			Adobe Creek		
Survey Date	May 06	Oct 06	May 07	May 06	Oct 06	May 07	May 06	Oct 06	May 07
Biological Metrics[b]									
# Coleoptera Taxa[d]	0.7 (2)	0.7 (2)	0.3 (0)	0.7 (2)	1.7 (4)	0 (0)	4.3 (7)	7.0 (10)	5.0 (8)
# EPT Taxa[d]	3.0 (1)	8.3 (4)	4.7 (3)	3.3 (1)	2.0 (1)	3.7 (2)	7.3 (4)	8.3 (4)	11.7 (6)
# Predator Taxa[d]	5.0 (2)	6.3 (3)	6.7 (4)	2.7 (0)	1.3 (0)	7.0 (4)	8.7 (6)	5.7 (3)	10.3 (7)
% Intolerant Individuals[d]	0 (0)	0.4 (0)	0 (0)	0 (0)	4.4 (2)	0 (0)	8.7 (3)	14.1 (5)	13.7 (5)
% Collector Individuals[e]	95.6 (1)	60.7 (9)	90.8 (2)	96.0 (1)	80.3 (5)	91.2 (2)	64.3 (8)	62.3 (9)	75.7 (5)
% Non-Insect Taxa[e]	9.0 (9)	36.0 (3)	48.7 (0)	5.3 (10)	18.4 (7)	35.1 (3)	10.3 (9)	24.5 (6)	23.7 (6)
% Tolerant Taxa[e]	6.7 (9)	23.7 (4)	31.5 (2)	4.7 (9)	24.1 (4)	14.9 (7)	9.3 (8)	15.6 (7)	12.9 (7)
Index of Biological Integrity [c] (IBI)/Qualitative Rating	34.3 (Poor)	35.8 (Poor)	15.7 (Very Poor)	32.9 (Poor)	32.9 (Poor)	25.7 (Poor)	64.4 (Good)	62.9 (Good)	62.9 (Good)
Physical Habitat Parameters									
Riffle Frequency	7	6	5	1	3	8	5	15	14
Sediment Deposition	15	16	16	2	2	3	16	14	16
Instream Cover	11	13	11	6	5	5	15	16	17
Embeddedness	15	13	17	3	1	8	15	17	16
Channel Flow	14	14	4	6	6	6	16	14	6
Channel Alteration	11	11	17	12	13	14	16	19	20
Bank Stability	13	18	19	13	13	8	12	12	13
Velocity/Depth Regime	16	9	13	4	8	10	8	14	15
Vegetative Protection	7	15	19	12	16	14	10	15	20
Riparian Vegetation Zone Width	17	14	12	13	16	11	18	16	15
Physical Habitat Score	126 (Sub-Optimal)	129 (Sub-Optimal)	133 (Sub-Optimal)	72 (Marginal)	83 (Marginal)	87 (Marginal)	131 (Sub-Optimal)	152 (Optimal)	152 (Optimal)

Table G-19 Selected Biological Metric Values, IBI Scores and Physical Habitat Parameters of the Upper Santa Margarita Watershed (continued)

[a] Biological metrics denoted: Individual metric value, with corresponding So CA IBI score in parenthesis

[b] Biological metrics were calculated using a different method from the 2005-06 annual report. See Section G.7.3.2 for details

[c] Index of Biological Integrity adjusted from 70 to 100 point scale by multiplying sum of IBI scores by 1.43

[d] Considered a positive (beneficial) stream characteristic

[e] Considered a negative (deleterious) stream characteristic

Table G-20 Summary of Selected Mean Habitat Characteristics of the Upper Santa Margarita Watershed for the Fall 06 Bioassessment Sampling Event

Parameter	Sampling Site		
	Murrieta Creek	Temecula Creek	Adobe Creek
Physical Habitat Scores			
Epifaunal Substrate Cover	13	5	16
Embeddedness	13	1	17
Velocity/Depth Regime	9	8	14
Sediment Deposition	16	2	14
Channel Flow Status	14	6	14
Channel Alteration	11	13	19
Riffle Frequency	6	3	15
Bank Stability	18	13	12
Vegetative Protection	15	16	15
Riparian Vegetative Zone	14	16	16
Reach Total	**129**	**83**	**152**
Qualitative Rating	**Sub-optimal**	**Marginal**	**Optimal**
Mean Habitat Characteristics[1]			
Reach Length (m)	100	100	100
Average Riffle Length (m)	3.6	3.7	2.0
Average Riffle Width (m)	0.4	1.0	0.6
Average Riffle Depth (cm)	9.3	5.4	4.7
Riffle Velocity (m/sec)	0.31	0.34	0.32
% Canopy Cover	31	59	97
Substrate Complexity	low	low	mod
Embeddedness	low	high	low
Substrate Consolidation	high	low	mod-high
Gradient (%)	1	1	1
Substrate Composition (%):			
Fines (<0.1 in.)	3	78	20
Gravel (0.1 - 2.0 in.)	8	22	63
Cobble (2 - 10 in.)	2	0	17
Boulder (>10 in.)	0	0	0
Bedrock (solid)	87	0	0
Water Quality			
Water Temperature (°C)	20.6	17.4	14.7
pH (pH units)	7.34	6.13	7.32
Dissolved Oxygen (mg/L)	9.5	3.0	9.2
Specific Conductance (µS/cm)	1126	1646	453

[1] Average of three riffles sampled.

Table G-20 Summary of Selected Mean Habitat Characteristics of the Upper Santa Margarita Watershed for the Spring 07 Bioassessment Sampling Event (continued)

Parameter	Sampling Site		
	Murrieta Creek	Temecula Creek	Adobe Creek
Physical Habitat Scores			
Epifaunal Substrate Cover	11	5	17
Embeddedness	17	8	16
Velocity/Depth Regime	13	10	15
Sediment Deposition	16	3	16
Channel Flow Status	4	6	6
Channel Alteration	17	14	20
Riffle Frequency	5	8	14
Bank Stability	19	8	13
Vegetative Protection	19	14	20
Riparian Vegetative Zone	12	11	15
Reach Total	**133**	**87**	**152**
Qualitative Rating	**Sub-Optimal**	**Marginal**	**Optimal**
Mean Habitat Characteristics[1]			
Reach Length (m)	100	100	100
Average Riffle Length (m)	1.6	5.1	2.4
Average Riffle Width (m)	0.34	0.8	0.35
Average Riffle Depth (cm)	6.2	5.1	7.6
Riffle Velocity (m/sec)	0.33	0.54	0.19
% Canopy Cover	35	56	97
Substrate Complexity	low	low	high
Embeddedness	low	high	low
Substrate Consolidation	high	low	mod
Gradient (%)	1	1	1
Substrate Composition (%):			
Fines (<0.1 in.)	6.7	74	0
Gravel (0.1 - 2.0 in.)	0.3	25	25
Cobble (2 - 10 in.)	0	1	75
Boulder (>10 in.)	0	0	0
Bedrock (solid)	93	0	0
Water Quality			
Water Temperature (°C)	25.4	17.9	19.5
pH (pH units)	8.26	7.06	7.62
Dissolved Oxygen (mg/L)	10.9	6.0	8.7
Specific Conductance (µS/cm)	ns	1649	426

[1] Average of three riffles sampled.

ns - not sampled

G-6.2.6 Graphical Summaries of Data

Graphical summaries of the chemical and toxicity data collected between 1993 and 2007 from the Santa Margarita watershed are provided in Attachment A in the electronic version only, due to the large amount of data.

G-6.3 Methods used to evaluate data

Monitoring data were evaluated by comparing analytical results to regulatory goals, including BPO[6], and the CTR Continuous Concentration Criterion (CCC)[7]. Site by site summaries and comparisons of results at the monitoring stations for wet and dry weather are discussed in the following sections.

Chemical and bacteriological monitoring has been conducted on various Tributary and Triad stations intermittently since 1993. Bioassessment monitoring was initiated at Murrieta Creek and Adobe Creek in the 2003-2004 reporting period. Toxicity and bioassessment monitoring at all of the Triad stations, including Temecula Creek, was initiated in 2004-2005. This is the third year of monitoring for which all three Triad stations are being monitored for chemistry, toxicity, and bioassessment. Chemicals that exceed available CTR CCC and/or BPO levels are summarized briefly in this section.

Persistent exceedances are defined, per the MRP, as the exceedance of relevant BPO or CTR objectives by 20% for three sampling events.

Follow up actions for the Triad stations were determined as per the MRP and the Model Monitoring Program. Both documents contain a matrix that provides the follow-up action based on findings of persistent exceedances of water quality objectives, evidence of toxicity, and indications of benthic alteration. These three criteria, and the action called for by the combination of the results, are presented for each Triad station.

All analytes measured during this and the previous reporting period were compared to Basin Plan Objectives or California Toxics Rule criteria as required in the Monitoring and Reporting Program Board Order R9-2004-01.

G-6.3.1 Site-by-site summaries and comparisons of results at Triad and Tributary stations for wet and dry weather.

G-6.3.1.1 Individual Station Analyses – Triad Stations

Cole Creek/Adobe Creek – 188/848

Both Cole Creek and Adobe Creek are established reference sites to be used as a basis for comparison for this study. Cole Creek was added to the CMP as a reference site during the 2000-2001 season and Adobe Creek was added during the 2004-2005 study and reporting period. Adobe Creek is sampled during the dry seasons for both chemistry and bioassessment. Cole Creek is an ephemeral stream that routinely ceases flow during the dry season. Cole Creek is used as the reference station for chemistry and toxicity during wet weather events due to wet weather safety and access issues at Adobe Creek.

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6 Regional Water Quality Control Board San Diego. 1994. Basin Plan. September 8, 1994
7 U.S. Environmental Protection Agency. National Recommended Water Quality Criteria. 2004

Dry Weather Monitoring Results at Adobe Creek - 848

Dry weather flows at Adobe Creek arise from natural springs in the headwaters. Samples were collected during two dry weather events, October 17, 2006 and May 10, 2007. During the first dry weather event, turbidity (field) and total phosphorus were detected above the BPO by more than 20%. During the second dry weather event, no pollutants were detected above the respective BPO or CTR levels. Historical measurements also indicate no exceedances of these two constituents since sample collections began in 2004. The bioassessment results ranked the physical habitat as "Optimal" in both October 2006 and May 2007. The biological integrity (IBI score) was ranked as "Good" for both sampling periods.

Wet Weather Monitoring Results at Cole Creek -188

An attempt was made to sample Cole Creek during wet weather, but no sample was collected due to insufficient flow.

Triad Site Summary

Adobe Creek has good physical habitat and no indication of benthic alteration. This is the first time turbidity and total phosphorus have been above BPO limits at this site, thus it is not possible to determine if the exceedances observed during this reporting period should be classified as persistent, based on the MRP criteria of a 20% exceedance of BPO or CTR objectives for 3 or more sampling events.

Table G-21 Cole Creek/Adobe Creek Dry Weather Triad Analysis

Chemistry	Toxicity	Bioassessment	Recommended Action
No persistent detections exceedances	Toxicity sampling was not conducted in dry weather during 2006-2007	No indication of benthic alteration	No action necessary.

Table G-22 Cole Creek/Adobe Creek Wet Weather Triad Analysis

Chemistry	Toxicity	Recommended Action
No wet weather sample collected.		

Murrieta Creek – 778

Murrieta Creek has been monitored for chemical constituents during wet and dry sampling events since 1995. This is the third season for which Murrieta Creek has been classified as a Triad station and for which all three lines of evidence have been collected. Bioassessment evaluations were initiated in November 2003 and toxicity in the reporting period of 2004-2005. Dry weather flows in Murrieta Creek tend to originate from a natural spring located just upstream of its confluence with Temecula Creek.

Dry Weather Monitoring Results

Two dry weather events on October 17, 2006 and May 10, 2007 were sampled during this monitoring period. The field measurement for pH during the first dry event was measured at 8.7, less than 20% above the BPO, but the lab measured pH at 8.0, within the BPO range. Chlorpyrifos was detected at a concentration below the CTR criteria during the first dry weather sampling event. There were no analytical parameters detected above the BPO or CTR during the second dry weather sampling event. Chlorpyrifos has been analyzed for this site since August 1999. The highest chlorpyrifos level found during any dry weather event was 0.11 µg/L, which occurred in September 1999.

The physical habitat score for both the bioassessments conducted in October 2006 and May 2007 remained consistent at 129 and 133 respectively (indicating "Sub-Optimal" habitat). However, sharp decrease was noted in the IBI score from 35.8 to 15.7. This decrease changed the qualitative category of the macrobenthic community from "Poor" to "Very Poor", primarily due to an increase in both non-insect and tolerant taxa.

Wet Weather Monitoring Results

Samples were collected from one wet weather event on April 20, 2007 during this monitoring period. No constituents were above BPO or CTR water quality criteria for this sampling event.

Both *Pseudokirchneriella* and *Ceriodaphnia* bioassay tests showed no toxicity. The *Hyalella* acute test, however, exhibited toxicity (2.95 TUs). A TIE initiated to determine the cause of *Hyalella* toxicity identified pyrethroid pesticides, and is discussed further in Section G-6.4.3.

Triad Site Summary

Persistent toxicity has been observed for *Hyalella*, and TIEs have identified pyrethroid pesticides (note that chlorpyrifos is not a pyrethroid pesticide) as a class of toxicants responsible for observed effects. Additional testing will be required in the future to determine consistency of this outcome, and to identify the specific toxic compounds.

Bioassessment scores classify Murrieta Creek as having sub-optimal habitat with poor to very poor benthic community structure.

Table G-23 Murrieta Creek Dry Weather Triad Analysis

Chemistry	Toxicity	Bioassessment	Recommended Actions
No persistent exceedances	Toxicity sampling was not conducted in dry weather during 2006-2007	"Sub-Optimal" habitat and "Poor" to "Very Poor" benthic community	Conduct TIE to identify* contaminants of concern, based on TIE metric, initiate TRE

Table G-24 Murrieta Creek Wet Weather Triad Analysis

Chemistry	Toxicity	Recommended Actions
No persistent exceedances	No toxicity with *Pseudokirchneriella* or *Ceriodaphnia*. Persistent toxicity with *Hyalella*	Conduct TIE to identify* contaminants of concern, based on TIE metric, initiate TRE

* Based on findings initiated during prior year's annual report.

Temecula Creek - 777

Temecula Creek has been monitored for wet and dry weather sampling events since 1995. The primary source of dry weather flows at the Temecula Creek station is rising groundwater just east of, and adjacent to, the I-15 Freeway.

Dry Weather Monitoring Results

Two dry weather events were sampled during this monitoring period. During the first dry weather sampling event on October 17, 2006, fecal coliform was detected above the BPO by 20% or more. In addition, the pesticide chlorpyrifos was detected at a concentration below the CTR criteria on October 17, 2006. There were no analytical parameters detected above the BPO or CTR objectives during the second dry weather sampling event. The two bioassessment events of October 2006 and May 2007 ranked the physical habitat as "Marginal" and the biotic integrity as "Poor". No toxicity testing was conducted on dry weather samples.

Wet Weather Monitoring Results

One wet weather event, April 20, 2007, was sampled during this monitoring period. No constituents were detected above the objectives. Historical data shows that metals have been commonly found in wet weather samples from this site and occasionally at levels exceeding current water quality objectives.

No toxicity was observed in either the *Pseudokirchneriella* chronic or the *Ceriodaphnia* acute test. The sample was acutely toxic to *Hyalella* with a TU value of 6.32. A TIE was subsequently initiated to determine the cause of toxicity to *Hyalella*. The TIE identified pyrethroid pesticides, and is discussed further in Section G-6.4.3.

Triad Site Summary

Metals have exceeded the objectives in the past. Detections this season were below the BPO and CTR objectives.

Persistent toxicity has been observed to *Hyalella* (four of five samples collected since 2005) and TIEs have identified pyrethroid pesticides as a class of toxicants responsible for observed effects. Additional testing will be required in the future to determine consistency of this outcome, and identify the specific toxic compounds.

Bioassessment scores classify Temecula Creek as having "Marginal" habitat with "Poor" benthic community structure.

Table G-25 Temecula Creek Dry Weather Triad Analysis

Chemistry	Toxicity	Bioassessment	Recommended Action
No persistent exceedances	Toxicity sampling was not conducted in dry weather during 2006-2007	"Marginal" habitat and "Poor" benthic community	Conduct TIE to identify* contaminants of concern, based on TIE metric, initiate TRE

Table G-26 Temecula Creek Wet Weather Triad Analysis

Chemistry	Toxicity	Recommended Action
No persistent exceedances	No toxicity with *Pseudokirchneriella* or *Ceriodaphnia*. Consistent toxicity with *Hyalella*.	Conduct TIE to identify* contaminants of concern, based on TIE metric, initiate TRE

* Based on actions initiated as part of prior year's annual report.

G-6.3.1.2 Individual Station Analyses – Tributary Stations

Long Canyon Creek – 780

Dry weather flows at the Long Canyon Creek station generally infiltrate into the creek bed within a few hundred yards of the confluence with Murrieta Creek. Rarely, if ever, do dry weather flows discharge into the receiving water. The Long Canyon Creek station was monitored for the first time during the 2004–2005 reporting period.

Dry Weather Monitoring Results

Ponded water was found at the Long Canyon station on September 14, 2006 and March 20, 2007. Field measurements for turbidity were above the BPO by more than 20%, and pH was above the BPO during the first dry weather event. Samples were not collected for laboratory analysis due to ponded conditions and absence of flow.

Wet Weather Monitoring Results

Two wet weather events were sampled during this monitoring period on December 16, 2006 and April 20, 2007. Color, turbidity, total nitrogen, total phosphorus, iron, and manganese were measured at levels above the respective BPO by more than 20% during both of the wet weather monitoring events. Chlorpyrifos and MBAS were detected above the CTR and BPO, respectively, by more than 20% on December 16, 2006. On April 20, 2007, fecal coliform was greater than the BPO, and dissolved copper was greater than the CTR objective by more than 20%. Chlorpyrifos was detected below the CTR objective. Fecal coliform bacteria have often been measured above water quality standards during wet weather events, generally exhibiting their highest level during the first collection of each year.

Redhawk Channel - 768

The predominant source of dry weather flow in the Redhawk Channel is rising groundwater from headwaters within the Redhawk Golf Course, supplemented by dry weather urban runoff from upstream developments. These flows generally infiltrate into the channel bed within a few hundred yards of the confluence with Temecula Creek. Rarely, if ever, do dry weather flows discharge into the receiving water. Wet and dry weather event monitoring have occurred at the Redhawk Channel since 1995.

Dry Weather Monitoring Results

Ponded water was observed at Redhawk Channel on September 14, 2006. A grab sample was taken on March 20, 2007. In both cases, the field pH exceeded the BPO with results of 9.4 and 9.8 pH units, respectively. On March 20, 2007, the field measurement for turbidity exceeded the BPO with a result of 51.7 NTU. Samples were collected for laboratory analysis. Color, pH, TDS (residue), total nitrogen, and total phosphorus exceeded the BPO by more than 20%. On September 14, 2006, fecal coliform exceeded the BPO by more than 20%, and iron exceeded the BPO by less than 20%.

Wet Weather Monitoring Results

During 2006-2007, there were two wet weather sampling events on December 16, 2006 and April 20, 2007. During both sampling events, exceedances of greater than 20% of the respective BPO were observed for color, turbidity, total nitrogen, total phosphorus, iron, and manganese. On December 16, 2007, chlorpyrifos was detected above the CTR objective. During the second storm event, fecal coliform concentrations were detected above the BPO more than 20%, and chlorpyrifos was detected below the CTR objective.

Santa Gertrudis Channel - 774

Dry weather flow in the Santa Gertrudis Channel combines with discharges of various groundwater pumping (well blow-offs) into the channel. These co-mingled flows generally infiltrate into the channel bed within a few hundred yards of the confluence with Murrieta Creek. Rarely, if ever, do dry weather flows discharge into the receiving water. Wet and dry weather monitoring have occurred at the Santa Gertrudis Channel since 1993.

Dry Weather Monitoring Results

Ponded water was observed at Santa Gertrudis Channel on September 14, 2006. The field pH exceeded the BPO with a result of 8.7 pH units. Samples were not collected for laboratory analysis due to ponded conditions and absence of flow.

Wet Weather Monitoring Results

Two wet weather sampling events were collected on December 16, 2006 and April 20, 2007 during the 2006 - 2007 monitoring period. During both wet weather monitoring events color, total nitrogen, total phosphorus, iron, and manganese were measured at levels above the BPO by more than 20%. During the first storm, turbidity and chlorpyrifos were detected above the BPO and CTR objectives, respectively, by more than 20%. During the second storm, fecal coliform was measured above the BPO, and dissolved lead was measured above the CTR objective by more than 20%. Chlorpyrifos was measured below the CTR objective.

Warm Springs Creek - 397

Dry weather flows in Warm Springs Creek generally infiltrate into the Creek bed within a few hundred yards of the confluence with Murrieta Creek. Rarely, if ever, do dry weather flows discharge into the

receiving water. Warm Springs Creek was recently established as a Tributary station, and monitoring began in 2004.

Dry Weather Monitoring Results
Warm Springs Creek was dry during dry weather sampling events in 2006-2007.

Wet Weather Monitoring Results
During the 2006-2007 reporting period, there were two wet weather events sampled on December 16, 2006 and April 20, 2007. During both sampling events, exceedances of the BPO by more than 20% were recorded for color, total nitrogen, total phosphorus, iron, and manganese. Chlorpyrifos was detected above the CTR objective by more than 20% on December 16. On April 20, 2007, fecal coliform exceeded the BPO by more than 20%.

G-6.3.2 Rough Estimates of the Relative Contribution of Urban Runoff to Total Pollutant Loads

The hydrologic characteristics of runoff in the SMR differ significantly between dry weather and storm events. The source and chemical characteristics of storm flows primarily represent non-urban sources, which constitutes the majority of the watershed. During dry weather, flow consists of localized urban runoff and rising groundwater. Virtually all of the dry weather urban runoff infiltrates into the creek bed prior to entering Receiving Waters. The most significant source of dry weather flow is rising groundwater.

During wet weather, the contribution of urban runoff to Murrieta and Temecula Creeks appears to be a small portion of the total flow. The flow data collected to date, although consistent with Permit requirements, are insufficient (see the assumptions in Section G-6.2.3) for calculating accurate loads for the creeks or the tributary contributors. The Permittees, in conjunction with the Bureau of Reclamation, are in the process of developing a model for the watershed that may be able to be used to better calculate load contributions.

G-6.3.3 Maps of Potential Sources of Pollutants

Section G-3.0 of the Monitoring Annual Report includes descriptions of each station, including tributary land uses. Until more data are collected, land uses can best indicate potential sources of pollutants. For example, industrial and transportation land uses are likely contributors of metals, while agricultural land uses may be the source of nutrients or pesticides. Chlorpyrifos has been detected at most of the stations, possibly indicating that it does not come from a single source.

G-6.4 Discussion of Results and Analyses of each Monitoring Program Component

G-6.4.1 Discussion of Pollutants of Concern and Their Potential Sources

Pollutants of concern are those constituents that persistently exceed BPO or CTR objectives at the receiving water (Triad) stations. This section discusses pollutants that were detected at levels greater than Basin Plan, or CTR objectives by 20% or more for either the dry or wet weather sampling events. Sample results that were detected above the objectives are identified in Table G-12. Attachment A includes graphs of all historical (1993-2006) water quality data collected at both the Triad and Tributary stations. Due to its size, Attachment A is only provided in the electronic format for this report.

The following constituents were detected above the objectives at the Tributary or Triad stations during 2006-2007:

- Chlorpyrifos
- Color
- Copper, dissolved
- Fecal coliform
- Iron
- Lead, dissolved
- Manganese
- MBAS
- Nitrogen
- pH (field)
- Phosphorous
- Total Dissolved Solids (residue)
- Turbidity

Most of these constituents exceeded the objective in multiple samples from multiple sites, however, dissolved copper, dissolved lead, MBAS, and TDS (residue) each exceeded the objective only once during the season.

Table G-27 summarizes the extent of the constituents of concern resulting from the 2006-2007 fiscal year.

Table G-27 also lists the priority given to the constituent in the 2005-2006 Watershed SWMP, and the priority assigned for future monitoring efforts. Priority was assigned based on the following criteria:

- Low: Constituents that were not detected above the objectives at the receiving water (Triad) Stations
- Medium: Constituents detected intermittently at Triad and Tributary Stations
- Medium: Constituents detected persistently at Triad and Tributary Stations and also in the reference stream locations.
- High: Constituents detected persistently above the objectives by more than 20% at Triad and Tributary Stations.

Table G-27 Summary of Constituents of Concern

Constituent	Objective Exceedances			06-07 Ranking	Established Priority
	Triad	Tributary	Reference		
Chlorpyrifos	No	Detected above CTR intermittently at all tributary stations during both dry and wet weather	No	Low	N/A
Color	No	Detected intermittently above BPO during wet weather at all tribs	No	Low	N/A
Dissolved Copper	No	Detected above CTR at one wet weather event at Long Canyon	No	Low	Monitor
Fecal Coliform	Detected above the BPO at Temecula Creek during one dry weather event	Detected above BPO at all tributaries during wet weather	No. However fecal coliform has been detected in excess of BPO in prior years.	Medium	Monitor
Iron	No	Detected intermittently above BPO during wet and dry weather at all tributaries.	No	Low	N/A
Lead, dissolved	No	Detected above BPO at one wet weather event at Santa Gertrudis	No	Low	N/A
Manganese	No	Detected above BPO during wet weather events at all tribs	No	Low	N/A
MBAS	No	Detected above BPO during one wet weather event at Long Canyon	No	Low	N/A
Nitrogen	No	Detected above BPO during wet weather events at all tributaries and during one dry weather at Redhawk.	No	Low	Focus Effort
pH	One field measurement outside of BPO at Murrieta Creek, although lab measurement complied	Detected above BPO intermittently during dry weather at all tributaries.	No	Low	N/A
TP	No	Detected above BPO at all tributaries during wet weather and during dry weather at Redhawk	Yes	Low	Focus Effort
TDS	No	Detected above BPO during dry weather at Redhawk	No	Low	Focus Effort (sediment controls)
Turbidity	No	Detected above BPO during wet weather at all tributaries and during dry weather at Long Canyon and Redhawk	Detected above BPO at Adobe during dry weather	Low	Focus Effort (sediment controls)

Based on the current year's monitoring data, no changes to the established priorities are recommended. Discussions of the Constituents of Concern and their possible sources are provided in the following sections.

G-6.4.1.1 Chlorpyrifos (ELISA)

Chlorpyrifos is an organophosphate pesticide. USEPA reports it as one of the most widely used organophosphate insecticides in the United States. It is used on more than 40 agricultural crops, in non-agricultural settings as a termiticide, in homes, lawns, and offices, and on pet collars.

At the Tributary stations, concentrations of chlorpyrifos were detected with levels ranging from 0.0212 µg/l to 0.1007 µg/l in wet and dry weather sampling events. Chlorpyrifos was measured above the CTR objective at all Tributary stations during the first wet weather sampling event, and below the CTR at all Tributary stations during the second event. At the Triad stations, concentrations of chlorpyrifos were detected with levels ranging from 0.0087 µg/l to 0.0201 µg/l in dry weather sampling events. Chlorpyrifos was detected at the reference station (Adobe Creek) at a concentration of 0.02 µg/l, indicating that chlorpyrifos may be widespread throughout the watershed and not attributable to a point source. Chlorpyrifos does not appear to be a constituent of concern at the Triad stations.

G-6.4.1.2 Color

There are numerous natural sources of color in water including breakdown of minerals (especially those containing iron or manganese compounds) or vegetable matter, humus, peat, tannins, algae, weeds, and protozoa. Waters flowing through erodible soils, such as those found in the Santa Margarita River watershed, are likely to have a detectable color concentration.

Color results ranged from 35 to 80 units at all Tributary stations during both wet weather events. Color does not appear to be a constituent of concern at the Triad stations.

G-6.4.1.3 Copper, dissolved

Sources of copper in storm water may include industrial (i.e., corrosion of copper and brass tubing, pipes, and roofing), copper compounds used for algae control in reservoirs, brake pad wear, and geologic formations. Transportation land uses may be a significant source of copper as a result of tire and brake pad wear.

Dissolved copper was detected at a concentration of 7.3 µg/l at the Long Canyon Tributary station during the wet weather event on April 20, 2007. Adjusted for hardness, the CTR objective was 4.0 µg/l. No other exceedances of dissolved copper were detected during the 2006-2007 season. Total and/or dissolved copper were detected below the objectives in most samples, indicating a non-point source for copper. Copper does not appear to be a constituent of concern at the Triad stations.

G-6.4.1.4 Fecal Coliform Bacteria

Coliform organisms are intestinal bacteria that are in excretions from humans, mammals, amphibians, and birds. They are also found, primarily in the non-fecal forms, on fibrous and vegetable matter in the water. The urban areas within the watershed are relatively new and have modern municipal waste water treatment systems, so human waste is not a likely source of fecal coliform bacteria in stormwater. However, urban areas can increase the levels of bacteria from natural sources. For example, pet waste and bird droppings may wash untreated into a storm drain, instead of infiltrating the ground.

Fecal coliform bacteria were detected at levels above the BPO at all Tributary stations during the wet weather monitoring event on April 20, 2007 and during a dry weather monitoring event at the Redhawk Station. At the Triad stations, fecal coliform bacteria were detected at a level above the BPO at the Temecula Creek station during a dry weather monitoring event.

G-6.4.1.5 Iron

Iron may be found naturally from the corrosion of iron in soil, mineral deposits, and iron-bearing ground water. Industrial sources may include pickling operations, and corrosion from iron pipes and other materials.

Levels of iron above the regulatory objective have been noted in the past at all Tributary stations. During the 2006 – 2007 monitoring period, iron was detected at all Tributary stations at levels above the BPO, ranging from 1.3 to 28 mg/L, during both wet weather events. The greatest concentrations were measured during the wet weather sampling events at Redhawk Channel on December 16, 2006. Iron was measured at 10% above the BPO during one dry weather event at Redhawk Channel. Iron does not appear to be a constituent of concern at the Triad Stations.

G-6.4.1.6 Lead, dissolved

Natural sources of lead in water include leaching from mountain limestone and galena. Industrial sources of lead include mining effluents. Fires may release lead in soil and mineral deposits. Residual lead from the use of leaded gasoline remains in the environment[8]. Streets and parking lots, which accumulate pollutants generated from motor vehicles that are washed-off during storm events, have been identified as major sources of copper, lead, and zinc in storm water runoff from urban areas[9].

Dissolved lead was detected at the Santa Gertrudis Creek station at a concentration above the CTR objective during the wet weather event on April 20, 2007. Lead does not appear to be a constituent of concern at the Triad Stations.

G-6.4.1.7 Manganese

Potential sources of manganese include manufacture of dry-cell batteries, glass and ceramics, paints and varnished, inks and dyes, and its use in agriculture to enrich manganese-deficient soils.

Manganese was detected at levels above the BPO by 20% or more at all Tributary stations during both wet weather events. The BPO is 0.05 mg/L, and concentrations ranged from 0.067 mg/L to 0.43 mg/L. The highest concentration was at Redhawk Channel on December 1, 2006. Manganese does not appear to be a constituent of concern at the Triad stations.

G-6.4.1.8 MBAS

Soaps, detergents, emulsifiers, wetting agents, and penetrants are the primary sources of MBAS. These surfactants lower the surface tension or other interfacial properties of their solvents. This allows dirt to be removed from clothing and for greater absorptions of pesticides into their target organisms.

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8 A recent presentation noting that residual lead in the environment can be traced to the past use of leaded gasoline was given at the 2006 CASQA Conference. "Sources of Dissolved and Particule-Bound Constituents in Highway Run-off", Peter G. Green, H.M.Hwang, M. Kayhanian and T.M.Young.

9 U.S. Environmental Protection Agency (USEPA), 1983, Results of the National Urban Runoff Program, Volume 1 - Final Report, Water Planning Division, Washington DC, NTIS Publication No. 83-185552.

The MBAS concentration at the Long Canyon Tributary station exceeded the BPO by more than 20% during the wet weather event on December 16, 2006. MBAS was detected at concentrations below the BPO in all other samples from Tributary stations. MBAS was detected at a low level in one dry weather sample from the Murrieta Creek Triad station. MBAS does not appear to be a constituent of concern at the Triad stations.

G-6.4.1.9 Nitrogen

Nitrogen is present in natural and polluted waters as ammonia, organic nitrogen, nitrites, and nitrates. The total concentration of nitrogen is not as important as the form in which it exists. Organic nitrogen, amino acids, and ammonia may inhibit biological growth whereas nitrates stimulate phytoplankton. Nitrates are an essential fertilizer for plant life. Potential uses of nitrogen may include field application of fertilizer, livestock wastes, and irrigated agriculture. Nitrates may also be present in groundwater as a result of excessive application of fertilizer or cesspool or septic tank leachate. Total Kjeldahl nitrogen may indicate the presence of treated effluent or manure-based wastes.

Total nitrogen was detected above the BPO by more than 20%, with concentrations ranging from 2.3 mg/L to 5.5 mg/L at all Tributary stations during both wet weather events. Total nitrogen was detected above the BPO at Redhawk Channel during two dry weather events. Nitrogen in other forms was detected below the BPO at Tributary stations during both wet and dry sampling events. Nitrate and Kjeldhal nitrogen were not detected or were detected at levels below the BPO at the Triad stations. Nitrogen does not appear to be a constituent of concern at the Triad stations.

G-6.4.1.10 pH

pH is an indicator of pollution. Natural waters and treated sewage are usually neutral or slightly alkaline (pH above 7.0), but many industrial wastes are strongly acidic (pH below 7.0) or alkaline. Acid wastes include tan liquors, acid dyes, coal-mine drainage, sulfite waste liquors, pickling liquors, and some brewery wastes. Alkaline wastes include masonry wastes, soda- and sulfate-pulp rinse waters, laundry wastes, and bottle wash waters.

Field measurements of pH were above the BPO of 8.5 pH units during the dry weather sampling at the Tributary stations, but within the BPO range during wet weather. The highest measurements were 9.4 and 9.8 pH units at the two dry weather events at Redhawk Channel. Laboratory results for both of these samples were 9.0 pH units. pH was measured in the field at 8.7 pH units at one dry weather event at Murrieta Creek. The laboratory result was below the BPO at 8.0 pH units. pH does not appear to be a constituent of concern at the Triad stations.

G-6.4.1.11 Phosphorous

Phosphorus in nature is found in the form of phosphates in several minerals and it is a constituent of fertile soils, plants, and the protoplasm, nervous tissue and bones of animals. It is an essential nutrient for plant and animal growth. However, excessive phosphorus may lead to an overabundance of algae growth.

Phosphorous was detected above the BPO by more than 20%, at concentrations ranging from 0.31 mg/L to 0.94 mg/L, at all Tributary stations during both wet weather events. At Redhawk Channel, phosphorous was detected above the BPO during two dry weather events. Phosphorous was detected below the BPO at Murrieta Creek and Temecula Creek. Phosphorous was detected above the BPO at the Adobe Creek Triad station during the dry weather event on October 17, 2006, indicating that natural sources may be a contribute to phosphorous in the receiving waters.

G-6.4.1.12 Total Dissolved Solids (TDS)

In natural waters the dissolved solids consist mainly of carbonates, bicarbonates, chlorides, sulfates, phosphates, and possibly nitrates of calcium, magnesium, sodium, and potassium with traces of iron, manganese and other substances. Sources of dissolved solids may include chemical wastes, dissolved salts, acids, alkalis, or drainage waters from irrigated land. Evaporation increases TDS and throughout the monitoring program it has been noted that concentrations tend to be higher during dry weather.

At Redhawk, TDS (residue) was measured above the BPO by less than 20% during two dry weather events. TDS does not appear to be a constituent of concern at the Triad stations.

G-6.4.1.13 Turbidity

Turbidity in water is attributable to suspended and colloidal matter, which diminishes light penetration. Increased turbidity may also indicate the presence of pathogens. Natural sources of turbidity include microorganisms or organic detritus; silica or other mineral substances including zinc, iron, and manganese compounds; and clay or silt. Erosion, as well as domestic sewage and industrial wastes, may also lead to increased turbidity.

Turbidity was detected at all Tributary stations during both wet weather events (except for one sample from each event) above the BPO at concentrations ranging from 54 NTU to 220 NTU. Field turbidity measurements were also above the BPO during dry weather events at the Long Canyon and Redhawk Channel Tributary Stations. Field measurements indicated that turbidity was detected at a level above the BPO at Adobe Creek during the dry weather event on October 17, 2006, however, the laboratory result was below the BPO.

G-6.4.2 Interpretation of Bioassessment Metric Values

The results of the current bioassessment data sets are presented in Table G-19 and Table G-20. The Upper Santa Margarita watershed is a dynamic system with large seasonal variations in flow. In addition, the variability inherent in biological assessment data necessitates that a suitably sized database be established in order for meaningful long-term trends in biological conditions to be realized. This is the third season in which all three Triad sites have been sampled for bioassessment. The overall IBI metric score for data collected during this reporting period was calculated using the updated Southern California Index of Biological Integrity developed by Ode et al. (2005)[10]. The seven individual biological metrics comprising the overall Southern California Index of Biological Integrity score were evaluated using a different method than in the previous annual report. The 2005-2006 annual report bioassessment metrics were calculated by pooling data from individual field replicates for each site to obtain a single metric value. Bioassessment metric values for the current reporting period were determined by calculating a mean value of the individual field replicates. The method used for the current report better takes into account the natural variability of field biological assessment data. Comparisons of the 2006-2007 dataset with the previous sets were performed on a limited basis due to this difference in calculation methods of the individual metrics. However, in order to determine the impacts of dry weather flow on IBI metrics, the May 2006 metrics from the prior reporting period were recalculated using the updated method. Biological metric scores from prior sampling events will be recalculated for comparison when the more integrative long-term analysis is performed following the 2007-2008 season. Several apparent differences existed among the data sets that are noteworthy, but it should be noted that these observations are drawn from a limited data set and may not be representative of long-term trends.

10 Ode, P.R., A.C. Rehn, and J.T. May. 2005. A quantitative tool for assessing the integrity of Southern Coastal California Streams. Env. Man. Vol. 35, No. 4, pp. 493-504.

G-6.4.2.1 Relationships between Dry Weather Flows and IBI and Habitat Metrics

Murrieta Creek

Habitat quality scores at Murrieta Creek remained similar at 126 (sub-optimal) and 129 (sub-optimal), and the IBI scores increased only slightly from 34.3 (poor) to 35.8 (poor) during the dry weather flow period of May 2006 to October 2006. Given that the physical habitat quality score remained stable, it is not surprising that the IBI score remained stable as well. No important changes in individual physical habitat parameters were observed. Although the overall IBI scores did not change much, a significant percentage increase was observed for mean percent tolerant taxa and mean percent non-insect taxa, both considered negative stream characteristics. This was primarily offset by increases in number of EPT taxa and number of predator taxa, both considered positive stream characteristics. One notable difference in mean habitat characteristics was the continued transition in substrate composition from fines to bedrock after heavy sedimentation following the 2004 winter storms. Mean percent fines decreased from 79 to 15 to 3 percent over the three sampling periods encompassing October 2005 to October 2006, while mean percent bedrock increased from 0 to 55 to 87 percent over the same period.

Temecula Creek

Over the dry weather flow period of summer 2006, the habitat quality scores increased slightly from 72 (marginal) to 83 (marginal), while the IBI score remained the same at 32.9 (poor) for both the May 2006 and October 2006 sampling periods. None of the individual physical habitat quality parameters changed dramatically, with the largest increases occurring in vegetative protection and velocity/depth regime. Similar to Murrieta Creek, although the overall IBI score did not change, a substantial percent increase in mean percent tolerant taxa and mean percent non-insect taxa was observed. However, this was largely offset by increases in number of coleopteran taxa and percent intolerant individuals, both considered positive stream characteristics. One clear change in habitat characteristics was a shift in the substrate composition from 50 to 78 percent fines over the summer 2006. The source of the fine sediment is unclear.

Adobe Creek

The physical habitat score at this reference station increased from 131 (sub-optimal) to 152 (optimal) between May 2006 and October 2006. This change was largely related to increases in the riffle frequency and velocity/depth regime. Both riffle frequency and velocity/depth regime scores decreased during the October 2004 and May 2005 sampling periods largely as a result of increased sedimentation from upstream sources of erosion. Since then, scores for these habitat quality parameters have been increasing, and are now reaching the "sub-optimal" category not seen since the April 2004 sampling event. The IBI metric scores remained relatively stable, decreasing slightly from 64.4 (good) to 62.9 (good) over this dry weather flow period. Increases in percent tolerant taxa and percent non-insect taxa were also observed in Adobe Creek, although the magnitude of the change was slightly less than that observed in the other two triad sites.

G-6.4.2.2 Relationships between Wet Season and Dry Weather IBI and Habitat Scores

Murrieta Creek

The physical habitat quality score at Murrieta Creek remained relatively stable, increasing four points from 129 (sub-optimal) to 133 (sub-optimal). The IBI scores, however, decreased substantially from 35.8 (poor) to 15.7 (very poor) during the wet season period of October 2006 to May 2007. Very little rain fell during the winter of 2006-2007 and as a result, very low flows were observed across all sites of this sampling event. Although the overall physical habitat quality score increased slightly, the channel flow status score decreased 10 points, decreasing two qualitative categories from "sub-optimal" to "poor". As a result of the low flow conditions, average riffle length, width, and depth also decreased. The largest biological metric contributors to the decrease in the overall IBI score were increases in all three parameters considered negative stream characteristics: percent collector individuals, percent tolerant taxa, and percent non-insect taxa. In addition, a 50-percent decrease in the mean number of EPT taxa was also observed over this same period.

Temecula Creek

Over the 2006-2007 wet season, Temecula Creek exhibited a slight increase physical habitat quality score from 83 (marginal) to 87 (marginal). The IBI score decreased from 32.9 (poor) to 25.7 (poor). Two of the three negative stream characteristics, percent collector individuals and percent non-insect taxa, increased during this period. Conversely, the mean number of predator taxa increased from 1.3 to 7.0.

Adobe Creek

Both the IBI and physical habitat quality scores remained the same over the 2006-2007 wet season at 62.9 (good) and 152 (optimal), respectively. This stability and consistently high ranking in IBI and habitat quality scores may be attributed to the fact that Adobe Creek's habitat consists of a headwater stream with a small tributary area containing relatively little development. Overall, the individual physical habitat quality parameters remained stable with the exception of channel flow status, which also exhibited a decrease due to low flow conditions.

G-6.4.2.3 Overall Trends of Bioassessment Data

Biological Metrics (IBI scores)

The reference site, Adobe Creek, exhibited a relatively stable IBI score over all three sampling periods from May 2006 to May 2007, ranging from 62.9 to 64.4. Murrieta Creek and Temecula Creek were also stabile between May and October 2006, but the IBI scores for both creeks were lower in May 2007. One potential cause for the lower scores is the decrease in flow observed during the 2006-2007 season, which is attributable to the very low rainfall during the season. Little urban runoff is tributary to these sites during dry weather; the flows are almost exclusively caused by rising groundwater. Examining the individual metrics comprising the overall IBI score reveals some potential trends. Of the biological metrics considered negative stream characteristics, the percent of collector individuals consistently increased across all Triad sites during spring sampling events, while decreasing during fall events. This trend is particularly pronounced, however, at both Temecula and Murrieta Creeks when compared to the reference site and may speak to the fact that Temecula and Murrieta Creek watersheds represent a much larger land area. This may be partially due to spring storms washing greater amounts of fine sediments and organic debris downstream where collectors utilize it. Fine sediments in increasing amounts can be harmful to benthic macro-invertebrate communities by covering and filling interstitial areas of boulder, gravel, and cobble that aquatic insects utilize. Relatively little change was observed in the percent collector individuals at Adobe Creek over the three sampling periods and may speak to a more stable, less

erodible habitat. In addition, the percent non-insect taxa showed a substantial increasing trend at both Temecula and Murrieta Creeks, steadily increasing from 5.3 to 35.1 and 9.0 to 48.7 percent over the three sampling periods, respectively. Percent tolerant taxa also exhibited an increasing trend at Murrieta Creek, steadily increasing from 6.7 to 31.5 percent over the three periods.

Of those biological metrics considered positive stream characteristics, none of the lower watershed sites, including Temecula and Murrieta Creek, exhibited a noteworthy trend, generally oscillating back and forth with no observable pattern. The mean number of EPT taxa increased with each sampling event at Adobe Creek, while the percent intolerant individuals increased over the summer of 2006 and then remained steady in the spring of 2007.

Physical Habitat Quality Metrics

An upward trend was observed in the physical habitat quality score for all three Triad sites. Adobe Creek increased from 133 to 152 during the summer of 2006, and then remained stable at 152 during the last sampling period. Over the course of the three sampling periods Temecula Creek increased its habitat quality score from 72 to 87, however was still categorized in the "Marginal" class. Murrieta Creek saw the smallest increase in habitat quality score increasing a total of seven points from 126 to 133. Decreased channel flow scores were noted across all sites, except Temecula Creek (which consistently scores low channel flow) in the spring of 2007. These low channel flow scores are more than likely due to the 2006-2007 rainy season being one of the driest on record with approximately 25% of the normal amount of rainfall. Murrieta Creek has shown increased sediment deposition scores improving from 5 in May and October 2005 to 16 in May 2007, due to a decrease in sediment. This site was covered in fine sediment as a result of an upstream grading project during the winter of 2004. The sediment deposition score has been recovering since then as the sediment works its way out of the system. Since monitoring began in Temecula Creek, sediment deposition scores have been low, with a high of 7 during the first monitoring period in October 2004. Sediment deposition scores since then have been lower ranging from 1 to 3. Instream cover has paralleled this trend with its highest score of 12 in October 2004 and declining since then to 5 in May 2007. Embeddedness scores for Temecula Creek have also consistently remained low from the resulting sedimentation. The bed of Temecula Creek is broad and sandy, and sediment movement is not unexpected. Adobe Creek has seen an increasing trend in instream cover and velocity/depth regime over the past five sampling periods. Regression analysis revealed no statistically significant relationships between overall physical habitat quality scores and IBI scores. However, the individual physical habitat metric of channel flow status did correlate well with IBI scores at Murrieta Creek ($r^2 = 0.9955$, $p = <0.0427$). Interestingly, this relationship was an inverse one. However, because of the small sample size (n=3), the overall confidence in this result is low. Additional samples will improve the confidence of statistical tests if the additional samples decrease the variability of the results.

Much of the degradation in the biological community of Murrieta and Temecula Creeks seen in the spring of 2007 could be the result of low flow conditions and not the result of any overall decrease in physical habitat quality. It is also possible that the decreased benthic community IBI score could have been the result of a short-term exposure to impaired water quality. The storm occurring three weeks prior to the spring sampling event caused high toxicity to *Hyalella azteca* during bioassay testing. It appears that the degradation of these creeks is not the result of a general decrease in habitat quality, due to the physical habitat score actually increasing slightly over this same period.

G-6.4.3 Discussion of any TIEs that Were Conducted and the Potential Sources of Toxic Pollutants

Toxicity monitoring at Temecula Creek and Murrieta Creek was initiated in 2004 using three species, *Ceriodaphnia*, *Selenastrum*, and *Hyalella*. During the 2004-2005 and 2005-2006 reporting periods, toxicity to Hyalella was observed in 1 of 3 and 3 of 4 stormwater collections respectively, for both Temecula and Murrieta Creeks. During the 2006-2007 reporting period, 1 of 1 stormwater collections

resulted in toxicity to Hyalella. Toxicity was not observed to either Ceriodaphnia or Selenastrum in any of the eight samples collected over the last 3 annual reporting cycles. Dry weather samples have not been tested for toxicity to date. Toxicity testing during the 2005-2006 season categorized the toxicity in both creeks as persistent.

The Monitoring and Reporting Program No. R9-2004-001 (MRP), Section II.A. I. 4, states,

> *"When results from the chemistry, toxicity, and bioassessment monitoring indicate urban runoff-induced degradation, Permittees shall evaluate the extent and causes of urban runoff pollution in receiving waters and prioritize management actions to eliminate or reduce sources. Toxicity Identification Evaluations (TIEs) shall be used to determine the cause of toxicity, and Toxicity Reduction Evaluations (TREs) shall be used to identify sources and implement management actions to reduce pollutants in urban runoff causing toxicity."*

A TIE was completed on July 7, 2007 of the data collected during the 2006-2007 reporting period in accordance with Table 2 in the MRP, and identified pyrethroids as a potential source of toxicity and biological degradation of both Murrieta and Temecula Creeks. Bioassessments at both of these creeks have indicated "Fair" to "Poor" benthic communities and physical habitats ranging from "Suboptimal" to "Marginal". Pyrethroid pesticides are not currently measured in either creek. During the four wet weather collection events between 2005 and 2007, measured analytes do not appear to exhibit a relationship with toxicity.

Due to limited rainfall during the 2006-2007 reporting period, only a single TIE was able to be conducted. A single TIE assessment of pyrethroids as the source of toxicity is not sufficient to verify the persistence of pyrethroids as the sole source of toxicity. Further, additional data collection is necessary to characterize likely sources of pyrethroid toxicity.

Further, methods to measure pyrethroid TIE methods have proven challenging because method development requires the ability to measure low concentrations of the toxicant, which remains a challenge for pyrethroids. Phase II TIE Methods are not yet available. However, TIE methods for pyrethroids are progressing well and moving towards standardization (Pesticides in Urban Surface Water Annual Review of New Scientific Findings 2007, San Francisco Estuary Project, June 2007, pg. 7). A detailed discussion of the TIE procedures and results follows.

Acute testing using the two freshwater species *Ceriodaphnia dubia* and *Hyalella azteca* and chronic testing using the freshwater alga *Pseudokirchneriella capricornutum*, was performed on two stormwater samples collected April 20, 2007. Samples were identified as A7D1961-01 and A7D1961-02, hereafter referred to as Temecula Creek and Murrieta Creek, respectively.

A summary of results for the initial toxicity tests can be found in Section G-6.2.4. Toxicity tests initiated on April 21, 2007 indicated no toxicity to either *Ceriodaphnia* or *Pseudokirchneriella*, but a reduction in *Hyalella* survival was noted in all concentrations of Temecula Creek and in the two highest concentrations of Murrieta Creek. In 2005-2006, similar toxicity was noted, and upon inspection of those samples, microorganisms were found both in the samples and infesting dead *Hyalella*. It was suspected that the microorganisms might have been the cause of toxicity. Prior to initiating the current round of tests, the samples were observed under a 400X microscope and microorganisms larger than 10 microns were observed. To address this, an aliquot of each sample was filtered to 10 microns to remove native microorganisms and tested concurrently with untreated sample for the *Hyalella* tests. Although visible microorganisms were removed, toxicity was similar to that in the unfiltered sample.

To further investigate potential effects of microorganisms to *Hyalella*, follow-up tests were initiated on April 27, 2007 with samples filtered further to a screen size of 0.45-microns, small enough to remove

most bacteria. A summary of these results is presented in Table G-28. By the initiation date of this second round of testing, the toxicity of both samples appeared to have decreased as evidenced by increased survival in the unmanipulated (baseline) samples from zero percent during the initial screens to 30 and 40 percent for Temecula Creek and Murrieta Creek, respectively. Both filtration treatments decreased toxicity further, exhibiting a positive relationship with filter pore size. This result supports the hypothesis of microorganisms as a possible cause of toxicity. Filtration of the samples, however, can also physically remove toxicants bound to particulates, as well as organic toxicants that may adsorb to the filter material.

Table G-28 Summary of *Hyalella* TIE Results Investigating Microorganism Toxicity

Treatment	Temecula Creek		Murrieta Creek	
	Mean 72hr Survival (%)	Mean 120hr Survival (%)	Mean 72hr Survival (%)	Mean 120hr Survival (%)
Lab Control	100	100	100	100
100% Sample Unfiltered (Baseline)	80	30	100	40
100% Sample 10-micron filtered	90	70	100	70
100% Sample 0.45-micron filtered	100	100	100	100

To further investigate effects due to microorganisms versus toxicants removed by filtration, two additional sets of treatments were performed: 1) addition of piperonyl butoxide (PBO) to identify whether organophosphorous (OP) or pyrethroid pesticides may be contributing to toxicity; and 2) a chlorination/dechlorination treatment to eliminate microorganisms prior to testing.

Piperonyl Butoxide Treatment

Both OP and pyrethroid pesticides have been identified as toxicants of concern in local watersheds, as well as other watersheds throughout California (Sheipline, 1993[11] and Wheelock et al, 2004[12]). *Hyalella* are known to be extremely sensitive to both classes of pesticides. Based on this information, treatments were selected to identify if these compounds may be responsible for the observed effects to Hyalella in the samples from the Santa Margarita Watershed. Both classes of compounds are non-polar and have a high affinity for particulates and propensity to sorb to solid surfaces. PBO was added to both filtered (0.45-micron) and unfiltered samples at two concentrations. Piperonyl butoxide added to a sample can perform a dual function by reducing toxicity due to organophosphorous pesticides, while increasing the toxicity of pyrethroid pesticides. Results for these treatments are shown in Table G-29.

11 Sheipline, R. 1993. Background information on nine selected pesticides. California Regional Water Quality Control Board. Sacramento, CA, USA.

12 Wheelock, C.E., J.L. Miller, M.J. Miller, S.J. Gee, G. Shan, B.D. Hammock. 2004. Development of toxicity identification evaluation procedures for pyrethroid detection using esterase activity. Environ. Tox. Chem. Vol. 23(11): 2699-2708.

Results from this round of testing showed further diminished baseline toxicity in Murrieta Creek, while the toxicity of Temecula Creek remained relatively unchanged from the previous round. The addition of PBO dramatically increased the toxicity of both samples. Based on complete removal of toxicity in the 0.45-micron filtration treatments from the previous round of testing, it appears that addition of PBO to the post-filtered sample enhanced its toxicity. Both of these treatments suggest toxicity due to pyrethroid pesticides. At this point, it appears that any toxicity removed by filtration is due to the adsorption of a pesticide to the filter or particulates.

Table G-29 Summary of *Hyalella* TIE Results Investigating Pesticide Toxicity

	Temecula Creek		Murrieta Creek	
Treatment	**Mean 48hr Survival (%)**	**Mean 96hr Survival (%)**	**Mean 48hr Survival (%)**	**Mean 96hr Survival (%)**
Lab Control	100	90	100	90
0.45 micron filtered w/ 100 ug/L PBO Control	80	60	80	60
50 ug/L PBO Control	100	100	100	100
100 ug/L PBO Control	35	20	35	20
100% Sample (Baseline)	95	25	100	75
0.45 micron filtered w/ 100 ug/L PBO	85	45	75	60
50 ug/L PBO	10	0	20	0
100 ug/L PBO	10	0	0	0

Chlorination Dechlorination Treatment

A final treatment was performed on May 10, 2007 to further address whether microorganisms may be related to observed toxic effects with *Hyalella*. The samples and a method control were spiked to 2.0 mg/L sodium hypochlorite for 30 minutes, then dechlorinated prior to initiation. Although some toxicity was present in the baseline samples, results from this round of testing displayed further diminished toxicity in both samples. Increased toxicity was observed in the chlorination/dechlorination treated samples; however, based on similar results seen in the method control it is likely that most of the increased toxicity observed was due to the treatment procedure itself.

Carboxyl esterase / PBO Treatments

A final set of treatments were performed with the two samples to confirm the suspicion of a pyrethroid pesticide(s) causing toxicity. One of three preserved C-18 columns for each sample was eluted with 100% methanol. The elutions were then treated with carboxyl esterase enzyme (CEE) and piperonyl

butoxide (PBO) to determine the relative contribution of toxicity due to pyrethroid and/or organophosphorous pesticides. CEE is an enzyme that has been found to be an effective inhibitor of pyrethroid pesticide toxicity. Carboxyl esterases are enzymes that hydrolyze ester-containing compounds (e.g., pyrethroids) into relatively non-toxic products. As mentioned earlier, PBO can either reduce the toxicity of an organophosphorous pesticide or increase the toxicity of a pyrethroid pesticide.

A summary of results is provided in Table G-30. The untreated baseline elutions, concentrated 2 times, were less toxic than expected (85 and 70 percent survival for elutions from Temecula and Murrieta Creeks, respectively) given the magnitude of toxicity in the original samples. This reduction in toxicity is likely explained by a combination of toxicant dissipation over time during holding and partial inefficiencies related to the elution process itself. The samples were originally collected on April 20 and preserved on the C18 columns used for this evaluation as a contingency on May 1. Given the hydrophobicity of many contaminants (especially pyrethroids), toxicity may have partially dissipated due to binding of toxicants to particulates in the sample and/or the sample container itself prior to preservation on the C-18 column. Second, elution of C-18 columns with methanol is typically not 100 percent efficient at removing highly non-polar toxicants off the column. The elution efficiency can vary depending on the toxicant(s) in question and potential interference from other organics in the sample.

Despite incomplete recovery of toxicity, the TIE results were fairly definitive. In both samples the PBO treatment increased toxicity dramatically. This is a fingerprint for pyrethroids, as PBO is known to enhance pyrethroid toxicity. In addition, the CEE treatment, which reduces toxicity due to pyrethroid pesticides, enhanced survival in the Murrieta elution from 70 to 90 percent. Unfortunately, although survival was increased in the CEE treatment of the Temecula Creek elution, it was minimal due to the high survival already present in the unmanipulated baseline elution.

A bovine serum albumin (BSA) treatment was added to the testing suite as a control for the CEE treatment. Due to the proteinaceous nature of the carboxyl esterase enzyme carrier, it can act as a binding site for organic constituents in the sample. Therefore, it is possible that any reduction in toxicity observed may be the result of addition of the protein matrix itself binding up organic toxicants present, and not a product of the enzyme activity specifically. BSA is an enzyme-free proteinaceous matrix that serves as a control for this. Although increased mortality was noted in the 0.5 U/ml BSA method control as well as the samples, mortality in the 0.25 U/ml BSA treatments of both samples mimicked that in the untreated baseline methanol elutions. Thus, the protein matrix did not reduce toxicity of the samples, suggesting the response for the CEE treatment was related to the carboxyl esterase enzyme itself.

These results currently provide multiple lines of evidence that toxicity in Samples A7D1961-01 and A7D1961-02 is related to pyrethroid pesticide(s). Additional Phase II/III methods would be needed to positively ID specific pesticides.

At the present time, based on the limited studies performed, results suggest that the toxicity to *Hyalella* observed in these Santa Margarita samples is most likely due to a pyrethroid pesticide. The relatively rapid decline in toxicity in the samples is consistent with this hypothesis because these compounds have a high affinity for plastic surfaces and will adhere to the sides of a holding container. In addition, based on an in-house study and literature review, *Hyalella* are much more sensitive to pyrethroid pesticides than either *Ceriodaphnia* or *Pseudokirchneriella*.

Table G-30 Summary of *Hyalella* TIE Results Investigating Pesticide Toxicity

Stormwater Samples (C18 methanol elutions)

Sample	Replicate	Percent Survival (96 hours)						
		2x Methanol Elution (unmanipulated)	Elution + 25 ug/L PBO	Elution + 50 ug/L PBO	Elution + 0.25 U/ml CEE	Elution + 0.50 U/ml CEE	Elution + 0.25 U/ml BSA (protein control)	Elution + 0.50 U/ml BSA (protein control)
Temecula Creek	1	80	80	0	100	80	100	40
	2	100	20	0	100	80	100	80
	3	100	20	20	80	100	80	80
	4	60	60	0	100	100	80	80
	Mean	**85**	**45**	**5**	**95**	**90**	**90**	**70**
Murrieta Creek	1	80	0	0	100	100	100	20
	2	80	0	20	100	80	60	80
	3	60	0	0	80	80	40	40
	4	60	0	0	80	100	40	0
	Mean	**70**	**0**	**5**	**90**	**90**	**60**	**35**

Treatment Controls

Sample	Replicate	Percent Survival (96 hours)						
		Lab Control (LC)	LC + 25 ug/L PBO	LC + 50 ug/L PBO	LC + 0.25 U/ml CEE	LC + 0.50 U/ml CEE	LC + 0.25 U/ml BSA	LC + 0.50 U/ml BSA
Lab Control Water	1	100	80	80	80	80	100	60
	2	100	100	100	100	80	100	100
	3	100	100	100	100	100	100	100
	4	100	100	100	100	80	100	40
	Mean	**100**	**95**	**95**	**95**	**85**	**100**	**75**

Sample	Replicate	Percent Survival (96 hours)	
		Methanol Control (25 ug/L)	Methanol Control (50 ug/L)
Methanol (Control for PBO stock made in methanol)	1	100	100
	2	100	80
	3	100	100
	4	100	100
	Mean	**100**	**95**

PBO - Piperonyl butoxide (pyrethroid potentiator, OP pesticide inhibitor)
CEE - Carboxyl esterase enzyme (pyrethroid inhibitor)
BSA - Bovine serum albumin (protein control for CEE)
U = Units
* 5 animals per replicate added

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G-6.4.4 Discussion of the development, implementation and results of any TREs

A TIE was conducted during the 2006-2007 reporting period in accordance with Table 2 in the MRP (see Section G-6.4.3), and identified pyrethroids as a potential source of toxicity and biological degradation of both Murrieta and Temecula Creeks.

After receiving the TIE results on July 7, 2007, the RCFCD initiated work on developing a TRE. The District is currently preparing a scope of work to conduct a TRE to identify the source of the pyrethroid toxicity consistent with the requirements of the permit. However, in anticipation of the necessary requirements to further characterize sources for the TRE, additional dry weather toxicity data collection and direct pyrethroid sampling of dry weather flows (and follow up TIEs if necessary) have already been initiated. A first set of samples were collected on October 16, 2007. This TRE study is being designed to answer the following management questions:

1. Is the pyrethroid toxicity persistent in the receiving waters?
2. Does the toxicity occur during dry weather?
3. Are there any obvious sources of illicit discharges of pyrethroids that can be abated by the Permittees?
4. What are the likely sources of pyrethroid toxicity in the Santa Margarita Watershed?
5. What potential management measures are available to mitigate the impacts of pyrethroid pesticide application?

It is anticipated that the draft scope of work will be finalized by the end of October, 2007. Implementation of the Work Plan will be initiated in early 2008.

G-6.4.5 Discussion of any relevant information or conclusions from the Illicit Discharge Monitoring Program

In accordance with Section II. B. of the MRP, sixteen locations throughout the Santa Margarita watershed are monitored during dry weather for illicit connections and illicit discharges (IC/IDs). Four locations are monitored by each of the four Permittees (the County of Riverside, the City of Murrieta, the City of Temecula, and the RCFCD). Follow up actions due to IC/ID monitoring results are detailed in the individual Permittee Annual Reports.

Per the Permit, each Permittee performs illicit discharge monitoring at each of its designated four IC/ID stations. At each inspected site, general information was recorded, such as time since and quantity of the previous rainfall, and an estimation of flow and visual observations. If flow or ponded water was observed at a station and there were at least 72 hours of dry weather, field screening was conducted for the following constituents: specific conductance, turbidity, pH, temperature, and dissolved oxygen. If the results of the field screening indicate a potential illicit discharge, a sample is collected for laboratory analysis.

Section II. B. 3. of the MRP requires the Permittees to develop numeric criteria for field screening and analytical monitoring results that will trigger follow-up investigations to identify the source causing the exceedances of the criteria. RCFCD has determined the following criteria, which the Cities and County also generally follow:

- *Specific Conductance >25% higher than WQO*
- *Total Dissolved Solids >25% higher than WQO*
- *Turbidity >25% higher than the long-term average*

- *pH below 6 or above 9.5*
- *Dissolved Oxygen below 4 mg/L*

During the 2006-2007 reporting period, dry weather observations were conducted. Results are presented in Table G-31 below. Results for the four Tributary stations monitored by the RCFCD are also presented in Table G-12.

Table G-31 IC/ID Investigations Conducted by Co-Permittees

IC/ID Station Name	Date	TDS (g/L)	Sp. Cond. (µmhos/cm)	Turbidity (NTU)	pH	T (°C)	DO (mg/L)
Empire Creek	8/31/2006		2.07	10	8.45	27.6	10.27
	6/15/2007		1.74	10	7.8	22.8	7.58
Pechanga Creek	8/31/2006	Dry. No field measurements.					
	6/15/2007						
Pechanga Road Storm Channel	8/31/2006		1.47	10	9.2	28.7	11.37
	6/15/2007		1.09	10	8.9	23.4	9.4
Temecula Creek	8/31/2006		1.65	26	8.74	25.9	8.61
	6/15/2007		1.28	32	8.21	22.3	8.48
Pechanga Creek @ Pala Road	9/14/2006	Dry. No field measurements.					
	3/20/2007						
California Oaks Channel	9/12/2006	1,225	1.75	15	8.75	25.8	7.33
	5/24/2007	1,176	1.68	12	7.91	26.7	8.58
Catt Road	9/12/2006	1,470	2.1	18	8.58	27.3	9.49
	5/24/2007	1,386	1.98	21	8.98	29.8	12.01
Benton Creek @ Van Gaele Lane	9/14/2006	0.8	1200	21.2	8.3	20.6	19.99
	3/20/2007	0.7	1100	118	8.1	15.0	13.70
Tucaloca Creek (u/s MHS Road)	9/14/2006	Dry. No field measurements.					
	3/20/2007	1.0	1600	98.3	8.8	15.9	18.52
Murrieta Creek @ Clinton Keith Rd.	9/14/2006	Dry. No field measurements.					
	3/20/2007	1.9	3000	198	8.1	14.0	17.40
Redhawk Channel	9/14/2006	0.8	1200	18.0	9.4	25.2	>19.99
	8/31/2006		1.33	3	9.15	31.5	11.6
	3/20/2007	0.7	1200	51.7	9.8	17.2	18.15
	6/15/2007	Dry. No field measurements.					
Long Canyon Channel	9/14/2006	0.7	1000	32.1	8.6	20.3	19.90
	3/20/2007	0.8	1200	149.0	8.4	15.7	19.62
Santa Gertrudis Chnl. near Murrieta	9/14/2006	0.8	1300	17.5	8.7	20.3	19.99
	3/20/2007	Ponded. Insufficient water for field measurements.					
Warm Springs Creek near Murrieta	9/14/2006	Dry. No field measurements.					
	3/20/2007						

G-6.4.6 Discussion of the Progress Towards Answering the Management Questions Listed in Section II.A. of the MRP and Achieving the Goals Listed in Section 1 of the MRP.

The purpose of the monitoring program, as defined in Section I of the MRP, is to meet the following goals:

- Assess compliance with the Order No. R9-2004-001
- Measure and improve the effectiveness of the SWMPs
- Assess the chemical, physical, and biological impacts to receiving waters resulting from urban runoff
- Characterize urban runoff discharges
- Identify sources of specific pollutants
- Prioritize drainage and sub-drainage areas that need management actions
- Detect and eliminate illicit discharges and illicit connections to the MS4, and
- Assess the overall health of the receiving waters.

Section II.A.I of the MRP states:

> *"In order to achieve the above goals, the triad and tributary Core Monitoring requirements are intended to generate water quality data that will build on existing data to begin answering the following management questions:*
>
> - *Are conditions in receiving waters protective, or likely to be protective, of beneficial uses?*
> - *What is the extent and magnitude of the current or potential receiving water problems?*
> - *What is the relative urban runoff contribution to the receiving water problems?*
> - *What are the sources of urban runoff that contribute to receiving water problems?*
> - *Are conditions in receiving waters getting better or worse?"*

Discussion of progress achieved to address these goals and questions as a result of data presented in this report follows.

Assess compliance with Order No. R9-2004-001

This report is intended to meet the requirements of Section III. B. of the MRP.

Measure and improve the effectiveness of the SWMPs

As stated in Section III B. 1. d) of the MRP, the fourth year Monitoring Report shall include:

- A discussion of any long term trends that can be detected from existing data
- Recommendations for future monitoring
- Recommended modifications to Individual or Watershed SWMPs

Actions to improve the effectiveness of the program based on the data collected to date are provided in Section G-8.0.

Assess the chemical, physical, and biological impacts to receiving waters resulting from urban runoff

Chemical, toxicity, and bioassessment data have been collected for three years under the MRP. Due to the high variability in storm water and dry weather urban runoff, only limited conclusions about the impacts to receiving waters can be drawn. The composite data collected under the MRP, and the data to

be collected during the fourth year, are the foundation of a data set that may be analyzed to meet this goal. Table G-27 also summarizes the Permittees' analysis of data to date and identifies those pollutants that the Permittees target as part of their urban runoff program.

Characterize urban runoff discharges

Four Tributary stations are being monitored under the current program to characterize urban runoff. IC/ID investigations are being conducted to identify sources of flow and pollutants. A TRE is also being conducted to assess potential urban contributions of detected toxicity in receiving waters. Data collected to date indicate non-point sources of the constituents of concern.

Identify sources of specific pollutants

Due to the high variability in storm water and the limited number of storms monitored under the MRP, data collected to date are insufficient to distinguish between natural and urban sources of pollutants. The TRE currently being conducted and continued monitoring will provide further information. Constituents of concern have been identified, and their likely sources are described in Section G-6.4.1. Turbidity and total phosphorous have been detected at the reference stations (Adobe Creek and Cole Creek). These findings indicate natural sources for these constituents.

Prioritize drainage and sub-drainage areas that need management action

Results to date indicate that the constituents of concern appear throughout the watershed. The initial number of samples collected and variability inherent in stormwater prevent prioritizing of specific areas. The TRE being developed may contribute to the identification of drainage areas that need specific management action. At this time, due to the small size of the watershed, limited number of residents within the watershed, and homogeneity of pollutants of concern, the Permittees continue to implement progress uniformly across the watershed.

Detect and eliminate illicit discharges and illicit connections to the MS4

Sixteen stations within the Santa Margarita watershed are monitored regularly for illicit connections and illicit discharges. Results of the IC/ID monitoring and any follow-up investigations are addressed in each Permittee's Annual Report.

Assess the overall health of the receiving waters

Significant progress has been made in characterizing the health of Murrieta and Temecula Creeks and the Santa Margarita watershed. In the Upper Santa Margarita watershed, 94% of the land area is comprised of non-urban (rural residential, agriculture, state lands, federal lands and tribal lands) land uses.[13] Section 2.4 of the Riverside County Drainage Area Management Plan (DAMP) for the Santa Ana and Santa Margarita Regions contains a detailed discussion of population, land use, climate, hydrology, geology, and water quality within the SMR. Key points from this discussion include:

- Over 50% of the Upper Santa Margarita River watershed has been controlled since 1949 by the construction of Vail Dam and by the Skinner Reservoir in 1974, which created significant storage capacity in the upper watershed.[14] Due to this storage capacity, peak flow rates during major flow events below these facilities in Murrieta and Temecula Creeks for both

13 County of Riverside Assessor, 2002.

14 Phillip Williams & Associates, Santa Margarita Watershed Study: Hydrology and Watershed Processes, October 26, 1998, p. 14.

existing and future land use conditions will be lower than under natural conditions (assuming average storage conditions in the reservoirs).[15] Modifications to the hydrology of the watershed caused by Vail Dam and the Skinner Reservoir may affect stream sedimentation. Physical habitat conditions may change substantially in response to storm flows, and areas of aggregation and degradation of the stream courses will be observed. These processes may be reflected at the bioassessment stations.

- The climate of the SMR is considered Mediterranean, characterized by warm dry summers and cool rainy winters. Precipitation amounts range from less than 10 inches per year near Vail Reservoir to over 40 inches west of Palomar Observatory. However, shading from the coastal ranges forming the western boundary of the watershed lead to substantially less precipitation throughout valley areas of this inland watershed.

- Runoff in the receiving waters is primarily due to rainfall. Almost all streams are ephemeral, only flowing during and immediately after rainfall events. A handful of mountainous streams are fed by groundwater and flow through parts of the summer. Rising groundwater near the confluence of Murrieta and Temecula Creeks also provides a small perennial base flow to the Santa Margarita River.

- Due to lack of flow, significant aquatic habitat is limited to a few locations.

Beneficial uses of the Upper Santa Margarita watershed are presented in Table G-32.

Table G-32 Beneficial Uses of Upper Santa Margarita Watershed

Beneficial Use	Murrieta Creek	Cole Canyon	Warm Springs Creek	Santa Gertrudis Creek	Long Valley	Temecula Creek	Santa Margarita River
Municipal and Domestic Supply	X	X	X	X	X	X	X
Agricultural Supply	X	X	X	X	X	X	X
Industrial Service Supply	X	X	X	X	X	X	X
Industrial Process Supply	X	X	X	X	X	X	
Ground Water Recharge	X					X	
Contact Water Recreation				X	X	X	X
Non-contact Water Recreation	X	X	X	X	X	X	X
Warm Freshwater Habitat	X	X	X	X	X	X	X
Cold Freshwater Habitat							X
Wildlife Habitat	X	X	X	X	X	X	X
Rare, Threatened or Endangered Species							X

The USEPA has indicated that major potential sources creating impacts to the Upper Santa Margarita watershed include urban runoff/storm sewers as well as unknown point sources. In the Upper Santa Margarita watershed, Murrieta Creek has been listed as impaired because of high levels of total phosphorous. However, phosphorous was only detected at Murrieta Creek during one dry weather event

15 Phillip Williams & Associates, Santa Margarita Watershed Study: Hydrology and Watershed Processes, October 26, 1998, p. 20.

during the 2006-2007 season, and the concentration was below the BPO. This may be a result of the variability in storm water runoff or of improving water quality. The upper Santa Margarita watershed experienced significant fires during the fall of 2003, as well as fires in 2004, 2005, and 2006. In addition, the wet season of 2004-2005 had rainfall greater than 200% of the annual average (see Section G-4.0). The combined effect of the fires and storms likely contributed to the variability in the levels of contaminants of concern for the monitored events under the MRP.

Constituents of concern for the watershed, as determined by data collected under the MRP, are presented in Section G-6.4.1.

Toxicity among the lower watershed sites was consistent with previous results. Toxicity was associated with storm water at Temecula and Murrieta Creeks and appears to be a chronic condition, as seven of the last eight samples have exhibited acute toxicity to *Hyalella azteca*. Toxicity Identification Evaluations on Temecula and Murrieta Creeks indicated a pyrethroid pesticide to be the probable cause of toxicity.

A complete historical bioassessment evaluation is unavailable due to the differences in IBI calculation methods of past data. The latest bioassessment results in May 2007 indicate a drop in the overall biological integrity (represented as the IBI score) at all sites. The reduction is possibly related to the low-flow conditions and not water quality impairment. However, the continuously degraded "poor" IBI bioassessment results at Murrieta Creek may indicate anthropogenic inputs. Temecula Creek was categorized as having a "poor" benthic macroinvertebrate community. Chronic "marginal" physical habitat conditions may contribute to this assessment, particularly in relation to sedimentation. However, Temecula Creek upstream of this location is a broad sandy wash and sediment movement is an expected natural variable. Chemical exceedances have been noted in Temecula Creek, however it is difficult to differentiate between the conditions attributable to chemical and physical stressors. Adobe Creek has consistently scored high IBI and physical habitat quality scores. Bioassessment analysis will continue and a more integrative historical assessment of data will be performed following the 2007-2008 cycle.

Bioassessment results for the reference station Adobe Creek were "good" during this reporting period. However, physical habitat quality scores for Murrieta Creek and Temecula Creek are classified as "sub-optimal" and "marginal", respectively, and biological conditions at were "poor" at both sites. Murrieta Creek and Temecula Creek are classified as "impaired" based on all three lines of evidence of the Triad approach, as analyzed under the current requirements of the MRP.

A poor relationship between the biological condition of the stream and the physical habitat quality at Murrieta Creek indicates that water quality may be the driver of the chronic biological impairment. Specifically, the physical habitat quality at Murrieta Creek is currently within 17 points of being categorized as "optimal" and appears to have improved continuously over the last five sampling periods. However, the IBI score has remained relatively stable at "poor." The TIE conducted indicated a pyrethroid pesticide(s) as the likely cause of toxicity.

Bioassessment data also categorized Temecula Creek as having "poor" biological integrity. Similar to Murrieta Creek, physical habitat quality scores have generally increased while biological integrity scores have remained low. The only constituent found to be in exceedance of their criteria in samples collected concurrent to the October 2006 bioassessment sampling event was fecal coliform bacteria. The decrease in the IBI score in the spring of 2007 compared to previous bioassessments at Temecula Creek may have been a result of low flow conditions. Samples were also toxic to *Hyalella* in the wet weather sample collected three weeks prior to the bioassessment event.

A more informative dataset will be produced after the 2007-2008 reporting period by re-analyzing historical bioassessment data in light of the new Southern California IBI assessment metrics, and comparing the results to four complete years of analytical data for constituents of concern, and two years

of toxicity data followed up with a TRE to identify the probable cause(s) of toxicity. Also, in order to conduct a thorough Triad Approach as outlined in the MMP, commencing in the 2007-2008 monitoring year, all three assessments (Bioassessment, Chemistry, and Toxicity) will be conducted during dry weather sampling events and analysis will separately be conducted of dry and wet weather conditions to allow for better characterization of conditions.

G-7.0 SPECIAL STUDIES

Required Special Studies

Special studies are intended to address specific research or management issues that are not addressed by the routine core monitoring program. The Permittees have conducted the following special studies as directed by the Executive Officer:

Numeric Criteria to Control Runoff from New Developments

The Permittees developed numeric criteria for controlling the volume, velocity, duration and peak discharge rate of runoff from new developments (required in section F.2.b(9) of Order No. 2004-001) to minimize erosion of natural stream channels and impacts to instream habitat. Since July 2005, the Permittees have implemented the SUSMP, which establishes numeric criteria for Priority Development Projects. Each permittee's details of implementation are described in each respective individual SWMP.

To develop final numeric criteria in compliance with the Permit, the Permittee's have also initiated the following special studies:

LID BMP Testing and Evaluation Facility: In October 2007, the Santa Ana Watershed Project Authority (SAWPA) awarded the District a Proposition 13 grant to construct a LID testing and demonstration facility. This $1.2 million dollar project will be implemented in cooperation with the SMC and will be constructed at the District's offices in Riverside. The facility will be used to monitor the performance of LID features in the field, to illustrate LID features in training workshops, and to assist in the development of technical guidance regarding LID features. The BMPs include porous pavements, bioswales, and water quality planters. The BMPs will be designed based on the current state of science and will specifically incorporate mechanisms to allow both inflow and effluent water quality and flow volume measurements. The results of the study will be used to establish numeric criteria for crediting flow reductions to developments that implement these BMPs. The project is proposed to initiate construction in September 2008. Monitoring duration will be dependent on power analyses conducted as part of the development of the final monitoring plan. Data will be coordinated with the SMCs overarching LID BMP evaluation project.

SCCWRP Hydromodification Study: The District continues to participate in SCCWRPs efforts to develop regional design criteria for hydromodification.

Through the Southern California Coastal Water Research Project and Colorado State University, the Santa Margarita Permittees are participating in a Hydromodification Study. This special study is addressing the following questions:

- Which streams are at the greatest risk of effects of hydromodification?
- What are the anticipated effects, in terms of increased erosion, sedimentation, or habitat loss associated with increases in impervious cover?
- What are some potential management measures that could be implemented to offset hydromodification effects?

The Hydromodification Study will produce three tools for use by MS4 Program managers:

- Screening tool to evaluate whether a project is likely to be of concern for hydromodification.

- Effects tool to evaluate the expected magnitude or intensity of the effects of hydromodification.
- Mitigation tools to guide mitigation and management measures.

The District used a specific site selection criterion to identify 14 locations in the Santa Ana and Santa Margarita Watershed for consideration as part of the Study. SCCWRP staff visited each of these sites and made assessments on the appropriateness of each location. Sites were characterized as either *Modeling* or a *Screening sites*. *Modeling sites* will be physically surveyed and will be used to determine how a particular stream will react for a variety of hypothetical situations. *Screening sites* will be used to identify the significant thresholds between stream types. Out of the fourteen (14) possible sites, five (5) monitoring sites were selected as modeling sites based on their value toward the goals of this study. In addition, the District has identified at least 5 possible screening sites, but the final number of sites will be determined by SCCWRP's staff.

Unfortunately, the sites identified within the Santa Margarita watershed were eliminated by SCCWRP staff because the sites did not meet specific study criteria. The District has been assured by SCCWRP staff that the sites available in this study will provide enough data to be representative of the specific conditions in the Santa Margarita watershed. The SCCWRP staff has conducted a gap analysis to ensure that all of the various watershed conditions necessary to complete the study are analyzed. Therefore, Santa Ana and other watershed sites will act as surrogates for Santa Margarita sites. The District offered the most number of sites of any municipality in the study and providing comprehensive support for implementing project tasks. The District plans to continue to actively participate with this effort.

Toxicity Identification Evaluation (TIE)

Toxicity monitoring at Temecula Creek and Murrieta Creek was initiated in 2004 using *Ceriodaphnia*, *Selenastrum*, and *Hyalella*. During the 2004-05 and 2005-06 reporting periods, toxicity to *Hyalella* was observed in 1 of 3 and 3 of 4 stormwater collections respectively, for both Temecula and Murrieta Creeks. During the 2006-07 reporting period, 1 of 1 stormwater collections resulted in toxicity to *Hyalella*. Toxicity was not observed to either *Ceriodaphnia* or *Selenastrum* in any of the eight samples collected over the last 3 annual reporting cycles. Dry weather samples have not been tested for toxicity to date. Toxicity testing during the 2005-06 season categorized the toxicity in both creeks as persistent.

The MRP Section II. A. I. 4, states:

> *"When results from the chemistry, toxicity, and bioassessment monitoring...indicate urban runoff-induced degradation, Permittees shall evaluate the extent and causes of urban runoff pollution in receiving waters and prioritize management actions to eliminate or reduce sources. Toxicity Identification Evaluations shall be used to determine the cause of the toxicity, and Toxicity Reduction Evaluations shall be used to identify sources and implement management actions to reduce pollutants in urban runoff causing toxicity."*

A TIE was completed on July 7, 2007 of the data collected during the 2006-2007 reporting period in accordance with Table 2 in the MRP, and identified pyrethroids as a potential source of toxicity and biological degradation of both Murrieta and Temecula Creeks. Bioassessments at both of these creeks have indicated "Fair" to "Poor" benthic communities and physical habitats ranging from "Suboptimal" to "Marginal". Pyrethroid pesticides are not currently measured in either creek. During the four toxic wet weather collection events between 2005 and 2007, measured analytes do not appear to exhibit a relationship with toxicity.

Due to limited rainfall during the 2006-2007 reporting period, only a single TIE was able to be conducted.

A single TIE assessment of pyrethroids as the source of toxicity is not sufficient to verify the persistence of pyrethroids as the sole source of toxicity. Further, additional data collection is necessary to characterize likely sources of pyrethroid toxicity.

Further, methods to measure pyrethroid TIE methods have proven challenging because method development requires the ability to measure low concentrations of the toxicant, which remains a challenge for pyrethroids; Phase II TIE Methods are not yet available. However, TIE methods for pyrethroids are progressing well and moving towards standardization (Pesticides in Urban Surface Water Annual Review of New Scientific Findings 2007, San Francisco Estuary Project, June 2007, pg. 7).

Toxicity Reduction Evaluation

After receiving the TIE results on July 7, 2007, the District initiated work on developing a TRE. The District is currently developing a TRE to identify the source of the pyrethroid toxicity consistent with the requirements of the permit. However, in anticipation of the necessary requirements to further characterize sources for the TRE, additional dry weather toxicity data collection and direct pyrethroid sampling of dry weather flows (and follow up TIEs if necessary) have already been initiated. A first set of dry weather pyrethroid, toxicity samples were collected at the TRIAD stations on October 16, 2007. This study is being designed to answer the following management questions:

1) Is the pyrethroid toxicity persistent in the receiving waters?
2) Does the toxicity occur during dry weather?
3) Are there any obvious sources of illicit discharges of pyrethroids that can be abated by the Permittees?
4) What are the likely sources of pyrethroid toxicity in the Santa Margarita Watershed?
5) What potential management measures are available to mitigate the impacts of pyrethroid pesticide application?

Implementation of the TRE will begin in 2007-2008 and interim results will be submitted as part of the 2007-2008 Annual Report.

Investigation Order No. R9-2006-0076

The San Diego Regional Board issued Investigation Order No. 1 R9-2006-0076 (Order) to address, in part, impairment of the Santa Margarita Lagoon by eutrophication. This Order was issued to stakeholders in the watershed tributary to the lagoon and requires the development of water quality monitoring data to develop TMDLs and load and wasteload allocations and reductions.

During fiscal year 2006-2007, the Santa Margarita Region Permittees have participated with other parties named in the Order in the development of a monitoring program workplan. The workplan will guide the collection of monitoring data needed to characterize dry weather flow and storm flow influenced water quality in order to complete development of TMDLs and load and wasteload allocations and reductions and will address the applicable questions presented in item A.1 of the Order. Monitoring commenced in October 2007.

Additional Special Studies

In addition the special studies directed by the Executive Officer of the San Diego Regional Board, the Santa Margarita MS4 Permittees supported the implementation of the following special studies.

Development of Local Pesticide Regulatory Activities

Through CASQA, the Permittees are supporting a special study to develop local regulatory activities to more effectively control pesticide usage to protect receiving waters. This study is being conducted under a grant from the State Water Resources Control Board, and is also funded by the San Francisco and Central Valley Regional Water Quality Control Boards.

Laboratory Inter-calibration

Through the SMC, the Riverside County Permittees are supporting the implementation of laboratory inter-calibration studies for toxicity, chemistry and bioassessment. The goal of this three-year special study is to ensure quality and comparability among SMC analytical laboratories. This study will develop two basic products: a laboratory guidance manual and standard language for proposals and contracts.

Standardization of Toxicity Testing Methods

The toxicity testing methods described in the MS4 permits issued to the San Diego, Orange County and Riverside County Permits issued by the San Diego Regional Board are all different. In addition, there are differences between toxicity testing methods described in the MS4 permits issued to Riverside County by the San Diego, Santa Ana and Colorado Regional Boards. The Santa Margarita Region MS4 Permittees are participating in a special study to coordinate development of standard toxicity testing methods to facilitate implementation of the requirements and to provide more comparable data between MS4 permit areas. This study will develop minimum monitoring criteria, conduct inter-calibration testing and develop a toxicity testing guidance manual.

Index of Biological Integrity for Low Gradient Streams

Through the SMC, the Permittees are participating in the development of an index of biological integrity (IBI) that is appropriate for Low Gradient Streams. The southern California (SC IBI) was tested in 15 low gradient streams of varying levels of impact. It was clear from this study that the IBI is not the best assessment tool for describing impact in these habitats. The low gradient project was so successful that the Working Group helped SCCWRP and CDFG to prepare a State Consolidated Grant proposal to test the SC IBI in another important habitat; non-perennial streams.

Regional Watershed Monitoring Program

Through the SMC, the Permittees participated in the development of the Regional Watershed Monitoring Program. The Regional Watershed Monitoring Program addresses three questions of importance to regulated agencies, regulatory organizations, and public:

1. What is the condition of streams in Southern California?
2. What are the major stressors to aquatic life?
3. Are conditions in locations of special interest getting better or worse?

Each of these questions is answered by a different component of the monitoring program. Together, these components determine the spatial and temporal extent of impacts, their magnitude, and potential causes.

The first question addresses the magnitude and spatial extent of impacts of all streams in the region using a probabilistic sampling design. The goal will be to achieve an estimate of impacted stream miles at varying severity of impairment. In addition, the spatial extent of impact will be compared among watersheds and land uses. At each site, multiple indicators will be used to assess the ecological health of

the stream including water chemistry, aquatic toxicity, benthic macroinvertebrate community structure, algal biomass, and physical habitat.

The second question addresses the stressors that affect the health of streams in Southern California. The goal of this component is to build upon the data collected in the first component to develop a relative risk index (Van Sickle et al. 2006). The response variables will focus on ecological health endpoints such as biological measures of assemblage metrics or indices (i.e., IBI or O/E).

The third question addresses the temporal changes in stream health at locations of primary interest to managers. The goal is to assess if stream health is improving, degrading, or remaining static over time. To answer this question, a network of long-term monitoring sites will be established across the region. At each site, water chemistry and toxicity will be evaluated at least annually during dry weather.

G-8.0 ACTIONS

Data collected to date indicate that several actions are called for to improve the monitoring program and respond to the monitoring results. These actions may be taken immediately, with the goal of improving the monitoring program before final recommendations are made after the fourth year of effort.

Continue the TRE
A Toxicity Reduction Evaluation was begun in the spring of 2007 with the TIE. The TRE is described in Section G-6.4.4.

Sample Toxicity During Dry Weather Bioassessment Events
Toxicity is currently being sampled for at the Triad stations during wet weather events, but the bioassessments occur during dry weather. However, according to the Model Monitoring Program, the three components of the Triad approach (chemistry, toxicity, and bioassessment) should be conducted at the same time. Bioassessments can not be conducted during wet weather due to safety concerns and the planning necessary. Beginning with the 2007-2008 season, toxicity sampling will be conducted during dry weather, at the same time as the bioassessments and dry weather chemistry sampling event are conducted. Thus, the Triad approach will be conducted during dry weather. Wet weather monitoring will focus on toxicity and chemistry. This action will modify the current program to be consistent with Model Monitoring Program approach.

Section G-2.0 and Section I of the Watershed Annual Report identify actions based on Pollutants of Concern and recommend activities to be conducted jointly by the Permittees to address the identified water quality problems.

G-9.0 REFERENCES

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Attachment A

Station Fact Sheets

Digital Copies Only

Attachment B

Summary of SMR
Monitoring Program Parameters Analyzed

Ambient Air Temperature (#1017, °C; #1018, °F) No BPO

Air temperature can affect water temperature, which can, in turn affect the concentration of dissolved oxygen and un-ionized ammonia. Drinking water standards for fluoride are based on maximum daily air temperatures. Benthic organisms may not thrive as well in warmer climates.

Ammonia-nitrogen (#1051) No BPO for total ammonia
BPO = 0.025 mg/l for unionized ammonia

Ammonia may be found naturally in surface or ground waters from the decomposition of nitrogenous organic matter, being one of the constituents of the complex nitrogen cycle. Rivers known to be unpolluted have very low ammonia concentrations, generally less than 0.2 mg/L as N. Ammonia may be discharged in industrial wastes. Ammonia is also a component of fertilizer, and its presence may indicate agricultural use or over-application in domestic and recreational areas. In water, ammonia occurs in two forms, which together are called the total ammonia nitrogen. Chemically, these two forms are represented as ionized ammonia (NH_4) and un-ionized ammonia (NH_3). This is important to know, since NH_3, unionized ammonia, is the form that is toxic. Water temperature and pH will effect which form of ammonia is predominant at any given time in an aquatic system.

Arsenic (#1070) BPO = 0.05 mg/l
CTR = 0.15 mg/l

Elemental arsenic may be found to a small extent in nature mostly as the arsenides of true metals or pyrites. Its major use, however, is as a component of pesticides (insects, weeds, fungi) and as a wood preservative.

Bacteria; Fecal coliforms (#1075) BPO = 2,000 MPN

Fecal coliform organisms are intestinal bacteria that originate in excretions from humans, mammals, amphibians, and birds.

Bacteria; Total coliforms (#1085) No BPO

Includes all coliforms, including the non-fecal forms on fibrous and vegetable matter in the water.

Bacteria; *E. coli* (#1077) No BPO

Escherichia coli is a specific strain of bacteria that is one of the main species of bacteria that live in the lower intestines of mammals and is of special concern to human health.

Beryllium (#1120) BPO = 0.004 mg/l

Beryllium is relatively rare and not likely to occur in natural waters. Industrial uses of beryllium include metallurgy and electrodes for neon signs.

Cadmium (#1145) BPO = 0.005 mg/l
CTR = 0.25 µg/l

Cadmium has many industrial uses, including metallurgy, electroplating, ceramics, pigmentation, photography, and textile printing. Cadmium salts are sometimes employed as insecticides and antihelminthics.

Chlorpyrifos (#1178) CTR = 0.041 µg/l
0.02 µg/l (WQ objective set by US DF&G)

Chlorpyrifos is an organophosphate pesticide. USEPA reports it as one of the most widely used organophosphate insecticides in the United States. It is used on more than 40 agricultural crops, in non-agricultural settings as a termiticide, in homes, lawns, and offices, and on pet collars.

Chromium, all valences (#1180) BPO = 0.05 mg/l

Chromium wastes can occur in both the hexavalent and trivalent forms. Potential industrial sources include metal pickling and plating operations, aluminum anodizing, cooling water antifouling, textile dyeing, ceramic and glass manufacturing, photography, and in the manufacture of paints, dyes, explosives, ceramics, and paper.

Color (#1195) BPO = 20 units

There are numerous natural sources of color in water including breakdown of minerals (especially those containing iron or manganese compounds) or vegetable matter, humus, peat, tannins, algae, weeds, and protozoa. Sources may include irrigation return water and chemicals. It can be expected that waters flowing through erodible soils, such as those found in the Santa Margarita River watershed, will have a detectable color concentration.

Conductance, specific (#1200, field; #1205, lab) No BPO

Specific conductance measures the ion concentration of water. Increased conductivity increases the osmotic pressure of water, which can be harmful to aquatic organisms. Natural inland waters usually contain small quantities of mineral salts in solution, but waters containing brine, chemical, and agricultural irrigation wastes may have excessive levels of specific conductance.

Copper (#1210) No BPO
CTR = 9 µg/l

Copper salts are not commonly found in natural surface waters. Potential industrial sources of copper may include corrosion of copper and brass tubing, copper compounds used to control undesirable plankton organisms, alloy production, electrical wiring, pipes, roofing, and many purposes where its conductivity or corrosion resistance are important. Copper salts are also used in insecticides and fungicides and many industrial processes.

Cyanide, total (#1215) No BPO
CTR = 5.2 µg/l

Cyanides may be found in effluents from metal cleaning and electroplating processes, and from chemical industries. Cyanide concentrations are usually well below the CTR, and are often below the detection limit (RDL = 5 µg/l). Cyanide has not been monitored since 1994.

Detergent – MBAS (#1225) BPO = 0.5 mg/l

Surface-active agents such as soaps, detergents, emulsifiers, wetting agents, and penetrants lower the surface tension or other interfacial properties of their solvents. This allows dirt to be removed from clothing and for greater absorptions of pesticides into their target organisms.

Diazinon (#1227) No BPO
0.16 µg/l (WQ objective set by US DF&G)

Diazinon is an organophosphate pesticide. The USEPA reports it as one of the most widely used organophosphate insecticides in the United States. It is used on more than 60 agricultural crops, in non-

agricultural settings as a termiticide, and in homes, lawns, and offices. Its use is considered a risk to humans, birds, and other forms of wildlife.

Discharge Level (Hydron # 232) No BPO

Also known as the flow rate, high discharge rates may cause erosion in an earthen channel. Discharge is used along with chemical concentration to calculate the mass loading. In a well-defined channel, the water level, along with the rating curve, can be used to calculate the flow rate.

As discussed in the main body of this Section, outfall discharge rates during dry weather are very low to nonexistent during dry weather, and there are almost no flows in the receiving waters. At the bottom of the watershed, approximately ¼ - ½ mile from their confluence with the Santa Margarita River, surfacing bedrock forces groundwater to rise, creating perennial flows. Where there are dry-weather flows, there has not been a significant change over time. Observing trends in flows near the bottom of the watershed are confounded by the continual addition of imported flows and well blowoff by the Rancho California Water District.

Wet weather flows depend on the size and duration of the storm, the antecedent moisture condition (e.g., moisture content of the soil prior to the storm), and the rate at which the rain falls.

Hardness, total (as $CaCO_3$) (#1265) No BPO

Total hardness measures the concentration of the following ions (converted to an equivalent concentration of $CaCO_3$):

Ca^{+2} HCO_3^- Mg^{+2} SO_4^{-2} Na^+ Cl^- K^+

Analyses of specific ions are included elsewhere in this section. Hardness in water may be caused by the natural accumulation of salts (primarily calcium and magnesium ions) from contact with soil and geological formations. Potential sources may include irrigation return flows. Imported water may also be a source of elevated hardness levels, for example, Colorado River Water has an average hardness of 250-300 mg/L, which is considered hard water.

Iron (#1285) BPO = 0.3 mg/l
CTR = 1.0 mg/l

Iron may be found naturally from the corrosion of iron in mineral deposits and iron-bearing ground water. Industrial sources include pickling operations and corrosion from iron pipes and other materials.

Lead (#1290) No BPO
CTR = 2.5 µg/l

Lead is a harmful substance that can lead to neurological damage. Natural sources of lead in water include leaching from mountain limestone and galena. Potential industrial sources of lead may include legacy pollution from use in motor fuels and use in solder in electronics and piping.

Manganese (#1305) BPO = 0.05 mg/l

Potential sources of manganese may include manufacture of dry-cell batteries, glass and ceramics, paints and varnished, inks and dyes, and in agriculture to enrich manganese-deficient soils.

Mercury (#1310) BPO = 0.002 mg/l
CTR = 0.77 µg/l

Mercury can appear in the metallic state in some natural waters, but the ionic form is most harmful to aquatic life. Potential industrial sources of mercury may include use in scientific and electrical instruments, in dentistry, in solders, in the manufacture of lamps and batteries, and in the improper disposal of thermostat switches and old thermometers and manometers.

Nickel (#1320) BPO = 0.1 mg/l
CTR = 0.052 mg/l

Nickel, in its pure metal form, is not a problem as it is not soluble in water. However, many nickel salts are highly soluble in water. Nickel salts can by a by-product of many industrial uses, such as the metal-plating industry.

Nitrogen: Nitrate (N) (#1340) No BPO

Nitrates are an essential fertilizer for plant life, and are therefore rarely found in natural surface waters at elevated concentrations. Nitrates may also be present in groundwaters as a result of excessive application of fertilizer or cesspool or septic tank leachate. Potential uses of nitrogen may include field application of fertilizer, livestock wastes, and irrigated agriculture.

Nitrogen: Total (N) (#1355) BPO = 1 mg/l

Nitrogen is present in natural and polluted waters as ammonia, organic nitrogen, nitrites, and nitrates. The total concentration of nitrogen is not as important as the form in which it exists. Organic nitrogen, amino acids, and ammonia may inhibit biological growth whereas nitrates stimulate phytoplankton. The various components of total nitrogen are discussed under separate headings.

Nitrogen: total Kjeldahl (N) (#1360) No BPO

High total Kjeldahl nitrogen concentrations may indicate the presence of treated effluent or manure-based wastes.

Odor (#1375) No BPO

Natural sources of odor in water include living microscopic organisms and decaying vegetation, including weeds, bacteria, fungi, actinomycetes, algae, and decaying organic matter. Sources that may generate odor-causing wastes include: petroleum, gasoline, and rubber; chemicals and dyes; and milk products, and other food products.

Odor is reported in terms of "threshold odor number" (TON), which is calculated from the amount of sample in the most diluted portion giving perceptible odor. The threshold odor number equals the volume of the dilution divided by the volume of the sample in the dilution.

It is frequently difficult, if not impossible, to identify the specific cause of an odor or taste, as many substances may cause what appears to be the same effect, or because mixtures of substances may be involved. Chemicals responsible for tastes and odors may include halogens, sulfides, ammonia, turpentine, phenols and cresols, picrates, various hydrocarbons and unsaturated organic compounds, mercaptans, tar and tar oils, hydrocarbons, detergents, pesticides, and innumerable others, many of unknown identity.

Oil & Grease (#1380) No BPO

Oil and grease in water may coat aquatic life and create undesirable odors. Potential industrial sources of oil and grease may include machining operations and garages.

Oxygen, dissolved (#1435) BPO = 5 mg/l

Dissolved oxygen concentration is a function of the temperature and salinity of the water. Increasing temperature or salinity decreases the oxygen-holding capacity of water. Dissolved oxygen is not constant in a natural system, as organisms, chemical reactions, and physical conditions use or generate oxygen at various rates. As dissolved oxygen levels decrease, aquatic life suffers or dies, and in the absence of oxygen, anaerobic decomposition may lead to unfavorable odors and colors in the water.

Oxygen; field saturation (#1445) No BPO

Oxygen saturation is a function of air oxygen pressure, water temperature, and dissolved solids present. Oxygen solubility is higher in fresh waters than in saline waters.

pH (#1705, field; #1710, lab) BPO = 6.5 to 8.5 units

pH is not a pollutant in itself, but an indicator of pollution. Natural waters and treated sewage are usually neutral or slightly alkaline, but many industrial wastes are strongly acidic or alkaline. Acid wastes include tan liquors, acid dyes, coal-mine drainage, sulfite waste liquors, pickling liquors, and some brewery wastes. Alkaline wastes may include masonry wastes, soda- and sulfate-pulp rinse waters, laundry wastes, and bottle wash waters.

Phenolic Compounds (#1459) BPO 1.0 µg/l

Phenols are widely used as disinfectants, in the manufacture of synthetic resin, medical, and industrial compounds, and as a reagent for chemical analyses. Potential sources of phenolic wastes may include the distillation of wood, coke ovens, oil refineries, chemical plants, sheep dips, and human and animal refuse.

Phosphorus, total (P) (#1485) BPO = 0.1 mg/l

Phosphorus in nature is found in the form of phosphates in several minerals and it is a constituent of fertile soils, plants, and the protoplasm, nervous tissue and bones of animals. It is an essential nutrient for plant and animal growth. Excessive phosphorus may lead to an overabundance of algae growth.

Selenium (#1520) BPO = 0.05 mg/l
CTR = 5 µg/l

Selenium is found in some soils as ferric selenite or calcium selenate. It may also be found in decayed plant tissue. Industrial sources of selenium include pigmentation in paints, dyes, and glass production; as a component of rectifiers, semiconductors, photo-electrical cells, and other electrical apparatus; as a supplement to sulfur in the rubber industry; as a component of alloys; and for insecticide sprays. Selenium may also be found in the municipal sewage from industrial communities.

Silver (#1535) BPO = 0.1 mg/l

Industrial sources of silver include manufacture of jewelry and silverware, in alloys, for electroplating, and in the processing of food and beverages. Silver nitrate is used in photography, ink manufacture, electroplating, coloring porcelain, and as an antiseptic.

Solids, total dissolved (#1625) BPO = 750 mg/l

In natural waters the dissolved solids consist mainly of carbonates, bicarbonates, chlorides, sulfates, phosphates, and possibly nitrates of calcium, magnesium, sodium, and potassium with traces of iron, manganese and other substances. Potential sources of dissolved solids may include chemical wastes, dissolved salts, acids, alkalis, or drainage waters from irrigated land

Solids, total suspended (#1630) No BPO

In natural waters, suspended solids consist normally of erosion silt, organic detritus, and plankton. Sources of suspended solids include industrial and domestic wastes, increased erosion from cleared or cultivated land, gravel washings and dusts that are blown into streams.

Temperature, field (#1655, deg. C; #1660, deg. F) No BPO

Water temperature in natural waters is influenced by ambient air temperature, vegetative cover, nature of bed material (*e.g.*, gravel vs. sand), and stream depth. Many industrial and agricultural wastes lead to raising of water temperatures, as does concrete-lining of streams. Increased water temperature may result in decreased oxygen capacity, generation of anaerobic zones, and fungal growth.

Thallium (#1665) BPO = 0.002 mg/l

Thallium salts are used as poisons for rodents, as ant bait, and are used in dyes and pigments in fireworks, in optical glass, and as a depilatory.

Turbidity (#1690, field; #1695, lab) BPO = 20 NTU

The turbidity of a water sample is a measure of the extent to which the intensity of light passing through is reduced by the suspended matter. Turbidity in water is attributable to suspended and colloidal matter, which diminishes light penetration. Increased turbidity may also indicate the presence of pathogens. Natural sources of turbidity include microorganisms or organic detritus; silica or other mineral substances including zinc, iron, and manganese compounds; and clay or silt. Erosion may also lead to increased turbidity as well as domestic sewage and industrial wastes, such as mining, dredging, logging, and pulp and paper manufacturing.

Zinc (#1700) No BPO
CTR = 120 µg/l

Potential industrial sources of zinc and zinc salts may include galvanizing, alloy manufacture, for electrical purposes, in printing plates, dye manufacture and the dyeing process, paint pigments, cosmetics, pharmaceutics, dyes, and insecticides.

Attachment C

Historical Water Quality Data

Source: Bulletin No. 57, Santa Margarita River Investigation, Vol. I, State of California Dept. of Public Works, Division of Water Resources, June 1956, pgs. 89-90

Historical data that exceed current BPOs are marked with a box around the value.

TABLE 17

TYPICAL MINERAL ANALYSES OF SURFACE WATERS[a]

Stream	Stream mile	Date / Time[b]	Discharge, second-feet	EC x 10^6 at 25°C	pH	Ca	Mg	Na	K	CO_3	HCO_3	SO_4	Cl	NO_3	F ppm	B ppm	Total dissolved solids, ppm	Total hardness as $CaCO_3$, ppm	Per cent sodium
						Mineral constituents in parts per million / equivalents per million													
Hydrographic Unit 1																			
Cole Canyon Creek	93-30.1-9.0-0.1	1-25-54	23	149	7.6	10 / 0.5	6 / 0.50	10 / 0.5	2 / 0.06	--	43 / 0.7	15 / 0.32	14 / 0.4	7 / 0.13	0.3	0.01	132	50	30
Murrieta Creek	93-30.1-0.4	6-4-54	1[e]	1,266	7.6	44 / 2.2	15 / 1.22	196 / 8.53	15 / 0.38	--	256 / 4.2	76 / 1.58	223 / 6.5	4 / 0.06	0.6	0.4	743	171	69
Santa Gertrudis Creek	93-30.1-3.9-0.6	1-25-54	55	96	7.0	8 / 0.4	3 / 0.25	5 / 0.23	2 / 0.06	--	31 / 0.5	10 / 0.20	7 / 0.2	6 / 0.09	0.0	0.01	109	32	24
Warm Springs Creek	93-30.1-4.8-0.5	2-27-53	0.12	1,040	7.9	38 / 1.9	11 / 0.89	162 / 7.35	--	--	140 / 2.3	80 / 1.67	216 / 6.1	2 / 0.03	--	1.05	586[d]	140	73
		3-22-54	110	417	7.6	28 / 1.4	8 / 0.67	40 / 1.73	4 / 0.09	--	79 / 1.3	50 / 1.05	50 / 1.4	5 / 0.07	0.1	0.03	306	104	45
Hydrographic Unit 2																			
Coahuila Creek	93-41.6-11.3	12-9-53 / 1515	0.17	600	8.0	40 / 2.0	13 / 1.10	73 / 3.19	4 / 0.11	--	165 / 2.7	83 / 1.72	67 / 1.9	4 / 0.07	0.4	0.1	419	155	50
Lancaster Creek	93-41.6-5.5	11-21-50 / 1615	0.28	1,410	8.6	60 / 3.0	33 / 2.7	250 / 10.90	--	--	244 / 4.0	247 / 5.14	210 / 6.2	4 / 0.06	--	0.0	936[d]	285	67
Wilson Creek	93-41.6-7.2-1.8	5-14-54 / 0855	0.19	1,321	8.3	126 / 6.3	39 / 3.25	125 / 5.43	7 / 0.17	--	396 / 6.5	257 / 5.35	119 / 3.35	3 / 0.04	0.6	0.1	957	478	36
Hydrographic Unit 3																			
Arroyo Seco Creek	93-41.1-1.7	4-8-54	5[e]	357	8.1	35 / 1.75	11 / 0.90	34 / 1.49	3 / 0.07	--	149 / 2.45	41 / 0.86	32 / 0.9	4 / 0.06	0.4	0.1	282	132	35
Chihuahua Creek	93-55.1-4.0	1-10-51 / 1730	0.02	2,130	8.1	234 / 11.7	92 / 7.50	230 / 10.0	--	--	390 / 6.4	802 / 16.7	195 / 5.5	3 / 0.05	--	0.1	1,751[d]	960	34
Temecula Creek	93-45.0	3-22-54	350	135	7.3	16 / 0.8	2 / 0.2	9 / 0.39	3 / 0.08	0 / 0	49 / 0.8	15 / 0.31	2 / 0.05	1 / 0.02	0.1	0.01	116	50	27
	93-45.2	11-30-51	0.5[e]	1,920	8.3	250 / 12.5	2 / 0.2	210 / 9.12	--	--	486 / 7.8	470 / 9.80	160 / 4.5	2 / 0.03	--	0.2	1,337[d]	635	42

TYPICAL MINERAL ANALYSES OF SURFACE WATERS[a]
(continued)

Stream	Stream mile	Date / Time[b]	Discharge, second-feet	EC x 10^6 at 25°C	pH	Ca	Mg	Na	K	CO_3	HCO_3	SO_4	Cl	NO_3	F ppm	B ppm	Total dissolved solids, ppm	Total hardness as $CaCO_3$, ppm	Pe[illegible] [illegible] so[illegible] dis[illegible]
						Mineral constituents in parts per million / equivalents per million													
Hydrographic Unit 3 (continued)																			
Temecula Creek	93-55.6	11-19-51 / 1630	0.5	710	8.5	71 / 3.55	21 / 1.70	64 / 3.01	--	--	262 / 4.4	115 / 2.39	43 / 1.2	4 / 0.06	--	0.1	457[d]	262	37
Hydrographic Unit 4																			
Temecula Creek	93-30.9	4-12-54 / 1200	12[e]	1,058	7.9	87 / 4.34	21 / 1.73	120 / 5.22	3 / 0.07	0 / 0	307 / 5.04	144 / 3.0	108 / 3.05	0 / 0	--	0.1	620	304	46
	93-35.6	4-19-54	0.12	870	7.9	70 / 3.5	20 / 1.62	106 / 4.60	2 / 0.04	--	244 / 4.0	131 / 2.72	99 / 2.8	2 / 0.04	0.6	0.1	596	256	47
Hydrographic Unit 5																			
De Luz Creek	93-12.2-6.5	12-22-53	0.14	490	7.8	38 / 1.9	18 / 1.47	48 / 2.09	1 / 0.03	--	208 / 3.4	36 / 0.75	60 / 1.7	4 / 0.07	0.2	0.0	333	168	38
Santa Margarita River	93-20.0	5-12-52[e] / 1100	6	1,010	7.9	67 / 3.34	25 / 2.06	106 / 4.61	43 / 0.11	10 / 0.33	264 / 4.33	110 / 2.29	128 / 3.55	1 / 0.01	0.4	0.3	607[d]	270	46
Hydrographic Unit 6																			
Fallbrook Creek	93-8.8-7.9	4- 2-54 / 1130	--	1,710	8.3	107 / 5.35	50 / 4.15	173 / 7.54	1 / 0.02	--	275 / 4.5	264 / 5.51	238 / 6.7	27 / 0.44	0.7	0.3	1,138	475	44

a. All Analyses by Division of Water Resources unless otherwise noted.
b. Pacific Standard Time indicated by 24-hour time system.
c. Estimated.
d. Total dissolved solids determined by summation.
e. Analyzed by United States Geological Survey, Water Quality Branch, unpublished records subject to revision.

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Water Body Name	TMDL Priority	Estimated Size Affected	Unit	Pollutant Stressor	Potential Sources	Proposed TMDL Completion
Murrieta Creek	Low	12	Miles	Phosphorus	Urban Runoff/Storm Sewers	
Murrieta Creek	Low	12	Miles	Phosphorus	Unknown Nonpoint Source	
Murrieta Creek	Low	12	Miles	Phosphorus	Unknown point source	
Santa Margarita River (Upper)	Low	18	Miles	Phosphorus	Urban Runoff/Storm Sewers	
Santa Margarita River	Low	18	Miles	Phosphorus	Unknown Nonpoint	

Water Body Name	TMDL Priority	Estimated Size Affected	Unit	Pollutant Stressor	Potential Sources	Proposed TMDL Completion
(Upper)					Source	
Santa Margarita River (Upper)	Low	18	Miles	Phosphorus	Unknown point source	

MS4 (Municipal Separate Storm Sewer System) – An MS4 is a conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, natural drainage features or channels, modified natural channels, man-made channels, or storm drains): (i) Owned or operated by a State, city town, borough, county, parish, district, association, or other public body (created by or pursuant to State law) having jurisdiction over disposal of sewage, industrial wastes, storm water, or other wastes, including special districts under State law such as a sewer district, flood control district or drainage district, or similar entity, or an Indian tribe or an authorized Indian tribal organization, or designated and approved management agency under Section 208 of the CWA that discharges to Waters of the U.S.; (ii) Designated or used for collecting of conveying storm water; (iii) Which is not a combined sewer; (iv) Which is not part of the POTW as defined at 40 CFR 122.2.

Historic and current developments make use of natural drainage patterns and features as conveyances for Urban Runoff. Urban streams used in this manner are part of the municipalities MS4 regardless of whether they are natural, man-made, or partially modified features. In these cases, the urban stream is both an MS4 and a receiving water.

"non-point source" - Non-point source refers to diffuse, widespread sources of pollution. These sources may be large or small, but are generally numerous throughout a watershed. Non-point sources, include but are not limited to urban, agricultural or industrial area, roads, highways, construction sites, communities served by septic systems, recreational boating activities, timber harvesting, mining, livestock grazing, as well as physical changes to stream channels, and habitat degradation. Non-point source pollution can occur year round any time rainfall, snowmelt, irrigation, or any other source of water runs over land or through the ground, picks up pollutants from these numerous, diffuse sources and deposits them into rivers, lakes and coastal waters or introduces them into ground water.

"non-storm water" – Non-storm water consists of all discharges to and from a storm water conveyance system that do not originate from precipitation events (i.e., all discharges from a conveyance system other than storm water). Non-storm water includes illicit discharges, non-prohibited discharges and NPDES permitted discharges. An illicit discharge is defined at 40 CFR 122.26(b)(2) as any discharge to a MS4 that is not composed entirely of storm water except discharges pursuant to a separate NPDES permit and discharges resulting from emergency fire fighting activities.

NPDES (National Pollutant Discharge Elimination System) – Permits issued under Section 402(p) of the CWA for regulating discharge of pollutants to Waters of the U.S.

"nuisance" – As defined in the Porter-Cologne Water Quality Control Act a nuisance is "anything which meets all of the following requirements:

1) Is injurious to health, or is indecent, or offensive to the senses, or an obstruction to the free use of property, so as to interfere with the comfortable enjoyment of life or property.
2) Affects at the same time an entire community or neighborhood, or any considerable number of persons, although the extent of the annoyance or damage inflicted upon individuals may be unequal.

3) Occurs during, or as a result of, the treatment or disposal of wastes."

Order

In the Santa Margarita Region: Order No. 98-02 (NPDES No. CAS0108766), currently in revision.

Permit Area -

In the Santa Margarita Region: "The permitted area is delineated by the Santa Ana RWQCB-SDRWQCB boundary line on the north, the SDRWQCB-Colorado River Basin RWQCB boundary line on the east, and the County of Riverside boundary line on the south and west."

"point source" – Any discernible, confined, and discrete conveyance, including, but not limited to, any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operations, landfill leachate collection systems, vessel, or other floating craft from which pollutants are or may be discharged.

"pollutant" – A pollutant is broadly defined as any agent that may cause or contribute to the degradation of water quality such that a condition of pollution or contamination is created or aggravated.

"pollution" – As defined in the Porter-Cologne Water Quality Control Act, pollution is the alteration of the quality of the Waters of the U.S. by waste, to a degree that unreasonably affects either of the following: A) the waters for beneficial uses; or 2) facilities that serve these beneficial uses. Pollution may include contamination.

POTW – Publicly-Owned Treatment Works

Principal Permittee - Riverside County Flood Control and Water Conservation District.

Rainy Season – October 1 through May 31st of each year.

RCFC&WCD - Riverside County Flood Control and Water Conservation District

"receiving water(s)" – The Waters of the U.S. that includes surface and ground waters.

Receiving Water(s) - The receiving waters within the Permit Area

Receiving Water Limitations – Receiving Water Limitations are requirements included in Orders issued by a Regional Board to assure that the regulated discharges do not violate water quality standards established in the Basin Plan at the point of discharge to Waters of the U.S. Receiving Water Limitations are used to implement the requirement of CWA Section 301(b)(1)(C) that NPDES permits must include any more stringent limitations necessary to meet water quality standards.

Receiving Water Quality Objectives - Water quality objectives specified in a Basin Plan for Receiving Waters.

Regional Board - California Regional Water Quality Control Board, San Diego Region

Riverside County - Territory within the geographical boundaries of the County.

"sediment" – Soil, sand, and minerals washed from land into water. Sediment resulting from

anthropogenic sources (i.e. human induced land disturbance activities) is considered a pollutant. This Order regulates only the discharges of sediment from anthropogenic sources and does not regulate naturally occurring sources of sediment. Sediment can destroy fish-nesting areas, clog animal habitats, and cloud waters so that sunlight does not reach aquatic plants.

SMR - Santa Margarita River Watershed within Riverside County

"source control BMPs" – In general, activities or programs to educate the public or provide low cost non-physical solutions, as well as facility design or practices aimed to limit the contact between pollutant sources and storm water or authorized non-storm water. Examples include: activity schedules, prohibitions of practices, street sweeping, facility maintenance, detection and elimination of illicit connections and illegal dumping, and other non-structural measures. Facility design examples include providing attached lids to trash containers, or roof or awning over material and trash storage areas to prevent direct contact between water and pollutants. Additional examples are provided in Section 4 of Supplement A to the **DAMP** dated April 1996.

State Board - California State Water Resources Control Board

"storm water" – Runoff from urban, open space, and agricultural areas consisting only of those discharges that originates from precipitation events. Storm water is that portion of precipitation that flows across a surface to the MS4 or receiving waters. Examples of this phenomenon include: the water that flows off a building's roof when it rains (runoff from an impervious surface); the water that flows into streams when snow on the ground begins to melt (runoff from a semi-pervious surface); and the water that flows from a vegetated surface when rainfall is in excess of the rate at which it can infiltrate into the underlying soil (runoff from a pervious surface). During precipitation events in urban areas, rain water picks up and transports pollutants through storm water conveyance systems, and ultimately to Waters of the U.S.

TDS - Total dissolved solids.

TMDL (Total Maximum Daily Load) – TMDL is the maximum amount of a pollutant that can be discharged into a water body from all sources (point and non-point) and still maintain water quality standards. Under CWA Section 303(d), TMDLs must be developed for all water bodies that do not meet water quality standards after application of technology-based controls.

"toxicity" – Adverse responses of organisms to chemicals or physical agents ranging from mortality to physiological responses such as impaired reproduction or growth anomalies.

TSS - Total suspended solids.

Urban Runoff – Urban Runoff includes those discharges from residential, commercial, industrial, and construction areas within the Permit Area and excludes discharges from feedlots, dairies, farms, and open space. Urban Runoff discharges consist of storm water and non-storm water surface runoff from drainage sub-areas with various, often mixed, land uses within all of the hydrologic drainage areas that discharge into the Waters of the U. S. In addition to Urban Runoff, the MS4s regulated by this Order receive flows from agricultural activities, open space, state and federal properties and other non-urban land uses not under the control of the Permittees. The quality of the discharges from the MS4s varies considerably and is affected by, among other things, past and present land use activities, basin hydrology, geography and geology, season, the frequency and duration of storm events, and the presence of past or present illegal and allowed disposal practices and illicit connections.

The Permittees lack legal jurisdiction over storm water discharges into their respective MS4s from agricultural activities, California and federal facilities, utilities and special districts, Native American tribal lands, wastewater management agencies and other point and non-point source discharges otherwise permitted by or under the jurisdiction of the Regional Board. The Regional Board recognizes that the Permittees should not be held responsible for such facilities and/or discharges. Similarly, certain activities that generate pollutants present in Urban Runoff are beyond the ability of the Permittees to eliminate. Examples of these include operation of internal combustion engines, atmospheric deposition, brake pad wear, tire wear, residues from lawful application of pesticides, nutrient runoff from agricultural activities, and leaching of naturally occurring minerals from local geography.

USEPA - United States Environmental Protection Agency

Waste Discharge Requirements – As defined in Section 13374 of the California Water Code, the term "waste discharge requirements" is the equivalent of the term "permits" as used in the Federal Water Pollution Control Act, as amended. The Regional Board usually reserves reference to the term "permit" to Waste Discharge Requirements for discharges to surface Waters of the U.S.

Water Code - California Water Code

Waters of the U.S. – Waters of the U.S. can be broadly defined as navigable surface waters and all tributary surface waters to navigable surface waters. Groundwater is not considered to be a Waters of the U.S. As defined in 40 CFR 122.2, the Waters of the U.S. are defined as: (a) All waters, which are currently used, were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide; (b) All interstate waters, including interstate "wetlands;" (c) All other waters such as intrastate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, "wetlands," sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds the use, degradation or destruction of which would affect or could affect interstate or foreign commerce including any such waters: (1) Which are or could be used by interstate or foreign travelers for recreational or other purposes; (2) From which fish or shellfish are or could be taken and sold in interstate or foreign commerce; or (3) Which are used or could be used for industrial purposes by industries in interstate commerce; (d) All impoundments of waters otherwise defined as Waters of the U.S. under this definition: (e) Tributaries of waters identified in paragraphs (a) through (d) of this definition; (f) The territorial seas; and (g) "Wetlands" adjacent to waters (other than waters that are themselves wetlands) identified in paragraphs (a) through (f) of this definition. Waters of the U.S. do not include prior converted cropland. Notwithstanding the determination of an area's status as prior converted cropland by any other federal agency, for the purposes of the CWA, the final authority regarding CWA jurisdiction remains with the USEPA.

"water quality objectives" – Numerical or narrative limits on constituents or characteristics of water designated to protect designated beneficial uses of the water [California Water Code Section 13050 (h)]. California's water quality objectives are established by the State/Regional Water Boards in the Water Quality Control Plans.

As stated in the Porter-Cologne requirements for discharge (CWC 13263): "(Waste discharge) requirements shall implement any relevant water quality control plans that have been adopted, and shall take into consideration the beneficial uses to be protected, the water objectives reasonably required for that purpose, other waste discharges, the need to prevent nuisance, and the provisions of Section 13241."

Numeric or narrative limits for pollutants or characteristics of water designed to protect the beneficial

uses of the water. In other words, a water quality objective is the maximum concentration of a pollutant that can exist in a Receiving Water and still generally ensure that the beneficial uses of the Receiving Water remain protected (i.e., not impaired). Since water quality objectives are designed specifically to protect the beneficial uses, when the objectives are violated the beneficial uses are, by definition, no longer protected and become impaired. This is a fundamental concept under the Porter Cologne Act. Equally fundamental is Porter Cologne's definition of pollution. A condition of pollution exists when the water quality needed to support designated beneficial uses has become unreasonably affected or impaired; in other words, when the water quality objectives have been violated. These underlying definitions (regarding beneficial use protection) are the reason why all waste discharge requirements implementing the federal NPDES regulations require compliance with water quality objectives. (Water quality objectives are also called water quality criteria in the CWA.)

"water quality standards" – are defined as the water quality goals of a waterbody (or a portion of the waterbody) designating beneficial uses (e.g., swimming, fishing, municipal drinking water supply, etc.,) to be made of the water and the water quality objectives or criteria necessary to protect those uses.

"watershed" – That geographical area which drains to a specified point on a watercourse, usually a confluence of streams or rivers (also known as drainage area, catchments, or river basin).

0001486

Final Integrated Regional Water Management Plan for the Upper Santa Margarita Watershed Planning Region

July 31, 2007

Includes Application Attachments 2-5

CD NOT UPLOADED

CONTAINS TOO MANY FILES

CITY OF TEMECULA
ANNUAL PROGRESS REPORT

Reporting Period
July 1, 2007 to June 30, 2008

Santa Margarita River Watershed

FOR
SAN DIEGO REGIONAL WATER QUALITY CONTROL BOARD
(ORDER NO. R9-2004-001)

PREPARED
OCTOBER 22, 2008

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A	Development Planning Program.
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CERTIFICATION STATEMENT

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to ensure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Signature

Daniel A. York, City Engineer
Name and Title, Printed or Typed

October 30, 2008
Date

1.0 EXECUTIVE SUMMARY

This annual report represents the current status of the stormwater management program for the City of Temecula (City). This report covers the reporting period between July 1, 2007 and June 30, 2008. Each section addresses individual programs that were implemented in order to comply with the requirements of the National Pollution Discharge Elimination System (NPDES) Municipal Separate Storm-Sewer System (MS4) Permit (Permit) issued to the Santa Margarita River (SMR) watershed permittees of Riverside County.

The Permit was issued on July 14, 2004 by the San Diego Regional Water Quality Control Board (Board). Throughout this Permit term, the City has collected a considerable amount of data representing measurable metrics for the purpose of establishing baseline values that are intended to be used as the basis for the long-term effectiveness assessment. This data is presented in each section of this report and demonstrates the City's significant investment, positive accomplishments, and commitment in allocating resources to the stormwater program.

In addition to the facts and figures presented throughout this report, the City believes that other indicators provide a good indication of positive results. For example, field observations show that the City's persistent emphasis on education and enforcement is the most contributing factor in promoting and increasing compliance. For example, at active construction sites, superintendents are now enhancing their compliance efforts in order to avoid receiving fines, and have a broader understanding of the NPDES requirements as a result of all of the City's educational efforts. City inspectors have also become proficient at addressing BMP implementation issues due to all of the educational opportunities provided throughout the year.

The City has also observed an increase in awareness among the residential sector of the impacts caused by non-stormwater discharges. This has become quite apparent through a significant increase in the number of Service Order Requests (complaints that were forwarded to City Hall) that the City addressed this reporting period. These observations provide the City with positive feedback indicating that the education and enforcement components of the program are effective.

In addition, in-house support has increased significantly. The program now has full support throughout other City departments, which in turn translates into better cooperation and increased coordination among these departments. For example, the Engineering, Planning, Community Services, and Fire departments now work closely together to ensure that WQMP requirements are addressed early-on into each project to avoid design conflicts during the application and plancheck processes. In essence, the Stormwater Unit has now become a City-wide Stormwater Program.

The City is also partnering with local water districts to address excess irrigation runoff from residential areas, and with the principle permittee to enhance the regional monitoring efforts. As such, the City's limited resources are focusing on a purpose-driven strategy in order to allocate resources in areas requiring the most attention.

In addition to the above accomplishments, the following items represent the significant changes, highlights, and observations noted during the current reporting period.

- The City witnessed a significant decline in the number of issued grading permits and conditioned Water Quality Management Plans (WQMPs).
- The number of construction inspections and citations increased.
- Updates were made to the Grading Ordinance, Grading Manual, and standard ESC notes.
- The program was enhanced to include Wet-weather inspections at City-owned, non-construction, vacant properties.
- The program was also enhanced to include stricter Wet-weather inspections at City-owned construction projects.
- The California Stormwater Quality Association (CASQA) Best Management Practices (BMP) Handbook was adopted as the City's set of BMP standards.
- The City completed all High, Medium, and Low-priority business inspections.

2.0 INTRODUCTION

The information contained herein is presented in the same format as that outlined in Section III of the Monitoring and Reporting Program (MRP) of the City's Permit. Each section addresses individual components of the Permit and summarizes the progress accomplished during the reporting period. These sections include the City's Development Planning process, Construction program, Municipal program, Industrial and Commercial program, Residential program, Education program, and Illicit Discharge Detection and Elimination Program (IC/ID), respectively.

This Annual Report specifically responds to the Permit's reporting requirements and identifies the program's progress and effectiveness. This report will be the third year that the new Permit programs are fully implemented and effectiveness data is collected to establish baseline conditions. The Permit also requires the Permittees to develop a long term strategy for addressing the effectiveness of each jurisdiction's Storm Water Management Plan (SWMP). The SWMP represents each jurisdiction's set of written policies and procedures for each component outlined in the Permit. To that end, the Permittees have developed a long term strategy to evaluate the effectiveness of the SWMPs.

The long term strategy for the program effectiveness assessment (PEA) will be conducted at two levels described below. It should be noted that a PEA requires the initial establishment of a set of baseline conditions using measurable metrics. These baseline conditions can then be used to establish measurable goals based on the measured metrics. Thereafter, effectiveness can be evaluated by comparisons of successive years of measurable metrics against the baseline data and measurable goals.

At the first level, or Annual Assessment Level, the PEA will focus on an annual assessment of program implementation and Permit compliance. These assessments will be addressed by completing the Annual Reporting Forms, which will confirm program implementation, Permit compliance, and collection of measurable metrics. These assessments are included at the end of each Annual Report section. Inferences about the compliance of each program (new development, construction, IC/ID, etc.) will predominantly be drawn from both direct and indirect measures of progress for each program.

At the second level, or Long Term Level, the Permittees will collectively evaluate the measurable metrics to assess potential changes in knowledge and behavior, load reductions and improvements in Receiving Water Quality. This long-term analysis will be conducted as part of the Report of Waste Discharge (ROWD). The results of this long-term assessment will be evaluations of the need to make significant programmatic revisions to the Permit compliance programs, as necessary, to protect Beneficial Uses of Receiving Waters. This level will place more emphasis on using direct measures of progress (monitoring data, long term trend analysis) and will support the review and any revisions to the Drainage Area Management Plan (DAMP) and Individual SWMPs using information from the measurable metrics that have been collected.

Where the period of evaluation is characterized by the implementation of new program requirements, determinations of program effectiveness will initially be limited to confirmation of program implementation and collection of measurable metrics until baseline conditions can be properly established. Further, it must be recognized that direct measures related to long term program effectiveness may not be available within the timeframe of the Third Term Permit. This arises because:

- Baseline water quality conditions are not readily established;
- Water quality changes in response to program implementation are likely to be very slow; and
- Establishing a link between receiving water condition and program activities is difficult at the watershed scale when programs are being implemented incrementally with the development/redevelopment cycle.

While program effectiveness assessment is a key step in the iterative process of program implementation, it should be realized that effectiveness assessment itself is a part of the management process that is also evolving. Assessing program effectiveness is recognized as a challenge for program managers across California, and the City of Temecula is supporting the effort of the California Stormwater Quality Association (CASQA) to develop guidance in this area at a statewide level.

3.0 DEVELOPMENT PLANNING PROGRAM

1) Description of any amendments to the General Plan or the development project approval process:

General Plan – There were no modifications to the General Plan during this reporting period.

Development Projects – There were no modifications to the development project approval process during this reporting period.

2) Number of grading permits issued:

TABLE 3-1

Fiscal Year	Permits Issued
2007 – 2008	28
2006 – 2007	38
2005 – 2006	62
2004 – 2005	76

Attachment A includes the list of grading permits issued during this reporting period.

3) Number of developments conditioned to meet WQMP requirements:

TABLE 3-2

Fiscal Year	Projects Requiring a WQMP (1)	Projects Conditioned for a WQMP (2)	Finalized WQMPs (4)
2007-2008	15	5	17
2006-2007	25	14	15
2005-2006	31	31	5
2004-2005	Not Applicable	30 (3)	Not Applicable

(1) These values show all proposed projects requiring WQMPs at the application stage.
(2) The difference between "Projects Requiring a WQMP' and 'Projects Conditioned for a WQMP' is that many projects became inactive prior to reaching the conditioning stage or were delayed into the next reporting period.
(3) These projects required treatment BMPs prior to the start of the WQMP Program.
(4) Most of these projects had been conditioned during the previous reporting periods.

A WQMP tracking log is included in Attachment A and lists all projects, both private and public, requiring a WQMP. In addition, a tally of all WQMPs accepted, to-date, by the City is also included. This tally provides a monthly breakdown, by land-use category (residential, business, municipal), of the number of WQMPs that have been accepted.

4) Attach one example of a development project that was conditioned to meet WQMP requirements and a description of the required BMPs:

Attachment A includes an approved COA for a new development that was conditioned with the WQMP requirement. The project consisted of expanding the parking lot of an existing Kaiser

medical office building site. The WQMP requirement is referenced in line-items 17, 64, and 65 under the 'General Requirements' section. The BMPs consisted of a perimeter infiltration swale located along the frontage of the site, and another within a landscape median in parking lot itself. Each swale was designed with a catch basin inlet to prevent potential flooding. These inlets were required to be protected with filters to prevent larger trash and debris from exiting the site.

5) Description of any updates to the environmental review process:

There have been no updates to the City's CEQA process during this reporting period.

6) Description and number of municipal employee training efforts conducted during the reporting period:

a) Training:

TABLE 3-3

Training Dates	Training Description (1)	Number of Staff Attended
3/27/08	LID Workshop	1
4/22/08	LID Workshop	3
12/5/07	Annual WQMP Refresher	19
11/28/07	Annual WQMP Refresher	1
9/10/07	CASQA Conference	2
6/27/07	LID Workshop	1
9/25/06	CASQA Conference	1
6/21/06	Annual WQMP Refresher	26
10/3/05	CASQA Conference	2
5/4/05	Annual WQMP Refresher	19
12/15/04	Annual WQMP Refresher	1
12/10/04	Annual WQMP Refresher	3

(1) – 'Annual Refresher' refers to the sessions conducted by the Principle Permittee.

A copy of the City's NPDES Training Log is included in Attachment A.

b) Summarize any additional education and outreach activities conducted for project applicants, contractors, developers, property owners, and/or other responsible parties in support of the Development Planning Component:

The City's WQMP requirement began on July 1, 2005. WQMP notification flyers continued to be posted at the Public Works and Planning counters throughout this reporting period and on the City's web site. The City's website also includes the County-wide WQMP design

handbook, a downloadable project-specific WQMP template, WQMP checklists, and links to CASQA's BMP handbooks.

7) An assessment of program effectiveness based on the measurable goals established in the SWMP:

The information provided in tables 3-1, 3-2, and 3-3 represents measurable data that the City collected in order to begin establishing baseline values that will be used as the basis for the long-term effectiveness assessment as required in the MS4 Permit.

Due to the current economic conditions throughout this region, the City witnessed a decline in the number of issued grading permits by 35% and conditioned WQMPs by 64% during this reporting period. The City continued to capture all projects meeting the WQMP requirements. This is due to the fact that the City established an across-the-board minimum threshold for applying WQMP requirements of 5,000 square feet of impervious surface, and 2,500 square feet if the project is located within an Environmentally Sensitive Area (ESA). This threshold is more restrictive than that of the MS4 Permit and has been effective in preventing development projects from circumventing the WQMP requirements. Since the beginning of the current Permit term, the City has captured 70 development projects meeting the City's more restrictive WQMP criteria. In addition, as Table 3-3 demonstrates, City staff have been attending workshops, conferences, seminars, and annual refresher courses to ensure that projects correctly identify and address their treatment needs.

4.0 CONSTRUCTION PROGRAM

1) Number of inspections conducted:

TABLE 4-1

Fiscal Year	Private	Public	Total Inspections Conducted
2007 – 2008	2949	145	3,094
2006 – 2007	*	*	2,976
2005 – 2006	*	*	2,154
2004 – 2005	*	*	1,647

* Previous tallys did not differentiate between private versus public projects.

Attachment B includes the tally of Total NPDES Construction Inspections performed during this reporting period. This list is based on the City's monthly NPDES Inspection Frequency Sheets, of which September's set is provided in Attachment B. These sheets provide a project-by-project break-down of the number of inspections conducted during the month and grouped by project priority (high, medium, low), and enforcement actions.

2) Number and type of enforcement actions related to construction sites:

TABLE 4-2

Enforcement Action	Private Projects			Public Projects		
	05-06	06-07	07-08	05-06	06-07	07-08
Verbal Warning	268	633	630	16	43	55
Written Warning	414	116	132	18	7	3
Fines	66	22	71	1	2	1
Stop Work Authority	0	*	*	0	*	*
Permit Revocation/Certificate of Occupancy Denial	0	*	*	0	*	*
Referral to SDRWQCB	0	*	*	0	*	*

* These measures were not required.

3) Description of modifications made to the construction and grading approval process:

During this reporting period, enhancements to this component included the following:

1) Updates to the City's existing Grading Ordinance and Grading Manual. These revisions will go into effect by the end of the current calendar year. These updates include revisions to the NPDES Chapter and will reflect successful and reasonable field practices observed since the previous round of revisions.

2) Updates to the City's existing standard Erosion and sediment Control Notes. These revisions will go into effect by the end of the current calendar year. These updates will reflect successful and reasonable field practices observed since the previous round of revisions.

3) Wet-weather inspections at City-owned, non-construction, vacant properties. It must be noted that the MS4 Permit does not specify inspection obligations at sites that do not require grading, building, or State permits, are vacant, or do not have any ongoing or immediately proposed construction activities. As such, the City implemented this enhancement to the program to further ensure adequate protection of our local waterways. The task primarily consisted of identifying all city-owned vacant properties within and immediately surrounding the City limits, determining which properties required erosion and sediment controls, installing BMPs where deemed necessary, and establishing an inspection frequency schedule as that outlined in the MS4 permit. Currently, BMPs have been implemented at sites that could potentially cause sediment releases.

4) Wet-weather inspections at City-owned construction projects. The City placed an added emphasis on ensuring adequate protection at City-owned active construction projects.

5) Updates to the NPDES Inspection Frequency sheets. These sheets now consolidate all active municipal construction projects into a single section to ensure adequate inspection coverage of these types of projects.

6) Adopting the CASQA BMP Handbook. The CASQA BMP Handbook for Construction Activities now serves as the City's uniform set of standards for construction BMPs.

4) Description and number of municipal employee training efforts conducted during the reporting period.

a) Training

TABLE 4-3

Training Dates	Training Description	Number of Staff Attended
3/18/08	International Erosion Control Association Seminar	2
2/29/08	BIA SWPPP Workshop	1
1/17/08	Annual ESC Refresher	13

8/22/07	Inland Erosion's Annual SWPPP Seminar	20
10/18/06	Annual ESC Refresher	29
9/28/05	Annual ESC Refresher	3
8/29/05	Inland Erosion's Annual SWPPP Seminar	15
5/3/05	Annual ESC Refresher	7
3/2/05	Annual ESC Refresher	2
8/18/04	Inland Erosion's Annual SWPPP Seminar	30

A copy of the City's NPDES Training Log is included in Attachment A.

b) Summarize any additional education and outreach activities conducted for project applicants, contractors, developers, property owners, and/or other responsible parties in support of the Construction Component:

1) As of September 6, 2007, the City began hand-delivering the City's annual NPDES notification letter to each active construction site currently inspected for NPDES compliance. This letter is a formal notification to all active projects obligating each one to: 1) implement pollution prevention measures year-round, 2) install additional wet-weather BMPs by October 1st, and 3) adhere to the State General Construction Permit, if applicable. All of the active sites that were listed on the September 2007 NPDES Inspection Frequency Sheets, included in Attachment B, were provided a notification letter. At a minimum, approximately 90 letters were delivered to field superintendents. These included both private and public projects. Additional letters were also forwarded to contractors working at these sites. A copy of this letter is included in Attachment B. The City's latest letter (dated August 25, 2008) added the requirement for enhanced protection at developments that were abandoned or have become partially inactive.

2) The City also participated with the Building Industry Association's (BIA) annual all-day Construction Stormwater Compliance Workshop on February 29, 2008 in riverside as a keynote speaker. The City distributed BIA's flyers for this workshop to all active projects in Temecula.

3) The City also distributed Inland Erosion's flyer for their Annual Erosion Compliance Seminar on August 22, 2007.

5) An assessment of program effectiveness based on the measurable goals established in the SWMP:

The information provided in tables 4-1, 4-2, and 4-3 represents measurable data that the City collected in order to begin establishing baseline values that will be used as the basis for the long-term effectiveness assessment as required in the MS4 Permit.

Overall, the City improved this component from the previous reporting period by increasing inspections by approximately 4%. The issuance of citations increased by 300%. Additional data is required to determine if increased inspections correlate to an increase or a decrease in citations.

The City also continued to make every attempt to contact owners of inactive projects to repair, replace, and/or enhance the BMPs at their sites. Unfortunately, many owners walked away from their projects, which in turn began delaying crucial compliance efforts. It should be noted that the City also identified vacant parcels that were not construction projects. Although these vacant parcels fall outside of the Permit's construction component, the City actively pursued the responsible parties in efforts to minimize any discharges. Unfortunately, the City's resources are finite and the time required for effective BMP implementation at these sites have extended beyond expectations by the City as well as by the Regional Board.

All in all, field observations indicated that the development community, in general, has become more knowledgeable with the NPDES requirements throughout this Permit term.

5.0 MUNICIPAL PROGRAM

1) Number of inspections conducted at existing Municipal facilities:

The City conducts inspections at all facilities owned or maintained by the City. Inspection frequencies vary between facility category. A detailed listing of these categories is presented in Appendix B of the SWMP. For example, the corporate yard, fire stations, City Hall, and other buildings are maintained daily; parks and landscaped areas are maintained weekly; catch basins and open channels are inspected twice annually; and inspections for streets, curbs, and gutters are addressed weekly through the street sweeping program.

2) Number and type of enforcement actions related to municipal construction sites:

TABLE 5-1

Enforcement Action	Active Construction Projects		
	05-06	06-07	07-08
Verbal Warning	16	43	55
Written Warning	18	7	3
Fines	1	2	1
Stop Work Authority	0	(1)	(1)
Permit Revocation/Certificate of Occupancy Denial	0	(1)	(1)
Referral to SDRWQCB	0	(1)	(1)

(1) These measures were not required.

3) Number of catch basins that were inspected and the number that were cleaned:

TABLE 5-2

	Total on GIS Map (1)	Total in the City (2)	City-Maintained Catchbasins	Minimum Number Inspected (3)	Number Cleaned
2007-2008	1975	1901	1,600	3,200	1,828
2006-2007	1,964	*	1,600	3,200	1,974
2005-2006	*	*	*	3,928	2,946

* Not Available.

(1) Consists of all catch basins located within the City limits and in future surrounding annexation areas.

(2) Consists of all catch basins (city, Caltrans, HOA, etc.) located within the City limits only.
(3) Catch Basins are inspected twice per fiscal year.

All of the 1,600 city-maintained catchbasins currently documented on the City's GIS map were visited twice during the reporting period. Many catchbasins required cleaning during both visits, while others did not. The City maintains a monthly catch basin maintenance log that lists dates, locations, and number of catch basins maintained. Maintenance includes inspections, cleaning, and stencil replacement if required. These stencils are placed at the top of each catchbasin opening and state "Only Rain In The Drain". An example of the monthly log is included in Attachment C.

4) Assessment of the amount and type of debris removed from catch basins, streets, and open channels, including identification of areas that generate the most pollutants:

TABLE 5-3

Facility	Type of Debris	Approx. %	Problem Areas that Generate Most Pollutants
Catch basins (1)	Anthropogenic Litter Green Waste Sediment	25 70 5	Residential and Commercial Total Removed: 180 CY
Street Sweeping (3)	Litter and Sediment	100	Total Removed: 1,761 Tons(2)
Open Channels (1)	Anthropogenic Litter Green Waste Sediment	7 3 90	Natural channels Total Removed: 4,000 CY

Notes:
(1) – These figures are provided by the Maintenance Division of the PW Department.
(2) – This figure is provided by Temecula Community Services Department's "City of Temecula Tonnage Report".
(3) – Street sweeping areas consist of all paved city-maintained streets. Currently, street sweeping is conducted on 283 miles of paved streets.

5) Assessment of effectiveness of BMPs implemented for municipal facilities and activities:

TABLE 5-4

BMP Code	Description	Used	Notes
SC-10	Non-Stormwater Discharges	☒ Yes ☐ No	
SC-11	Spill Prevention, Control and Clean-up	☒ Yes ☐ No	
SC-20	Vehicle and Equipment Fueling	☐ Yes ☒ N/A	Fueling is conducted offsite
SC-21	Vehicle and Equipment Cleaning	☒ Yes ☐ No	Oil/Water Separator and Stormcepter systems collect all discharges.
SC-22	Vehicle and Equipment Repair	☐ Yes ☒ N/A	Repairs are conducted offsite
SC-30	Outdoor Loading/Unloading of Materials	☒ Yes ☐ No	
SC-31	Outdoor Liquid Container Storage	☒ Yes ☐ No	Stored in water-tight bins.
SC-32	Outdoor Equipment Maintenance	☐ Yes ☒ N/A	Repairs are conducted offsite
SC-33	Outdoor Storage of Raw Materials	☒ Yes ☐ No	New facility has been constructed to cover all maintenance equipment
SC-34	Waste Handling and Disposal	☒ Yes ☐ No	
SC-35	Safe Alternative Products	☒ Yes ☐ No	
SC-40	Contaminated or Erodible Areas	☒ Yes ☐ No	
SC-41	Building and Grounds Maintenance	☒ Yes ☐ No	
SC-42	Building Repair and Construction	☒ Yes ☐ No	
SC-43	Parking/Storage Area Maintenance	☒ Yes ☐ No	
SC-44	Drainage System Maintenance	☒ Yes ☐ No	
SC-60	Housekeeping Practices	☒ Yes ☐ No	
SC-61	Safe Alternative Products	☒ Yes ☐ No	
SC-70	Road and Street Maintenance	☒ Yes ☐ No	
SC-71	Plaza and Sidewalk Cleaning	☒ Yes ☐ No	
SC-72	Fountain and Pool Maintenance	☒ Yes ☐ No	
SC-73	Landscape Maintenance	☒ Yes ☐ No	
SC-74	Drainage System Maintenance	☒ Yes ☐ No	
SC-75	Waste Handling and Disposal	☒ Yes ☐ No	
SC-76	Water and Sewer Utility Maintenance	☐ Yes ☒ N/A	Provided by RCWD and EMWD

6) Description and number of municipal employee training efforts conducted during the reporting period.

a) Training:

TABLE 5-5

Training Dates	Training Description	Number of Staff Attended
01/17/08	Annual Refresher	29

10/18/06	Annual Refresher	7
04/27/06	Annual Refresher	20
09/26/05	Annual Refresher	4
05/03/05	Annual Refresher	16
10/21/04	Annual Refresher	8

A copy of the City's tracking log for staff training is included in Attachment A.

b) Summarize any additional education and outreach activities conducted for municipal staff in support of the Municipal Component:

The City's field crews undergo continuous informal training throughout the year, on an as-needed basis, as they encounter field conditions requiring BMPs.

7) An assessment of program effectiveness based on the measurable goals established in the SWMP:

The information provided in tables 5-1, 5-2, 5-3, 5-4, and 5-5 represents measurable data that the City collected in order to begin establishing baseline values that will be used as the basis for the long-term effectiveness assessment as required in the MS4 Permit.

Overall, education was the key element to this component. The City improved this component by empowering the field crews to conduct their own NPDES field inspections. This allowed them to claim ownership for adequate BMP implementation at each of their sites. This action allowed the team members to increase their level of awareness and expertise in implementing BMPs.

6.0 INDUSTRIAL/COMMERCIAL PROGRAM

1) Number of inspections conducted:

TABLE 6-1

	Category			
	High Priority	Medium Priority	Low Priority	Total Inspections
2007-2008	73	141	147	361
2006-2007	266	61	96	423
2005-2006	252	52	1	305

The City completed all of the annual high, medium, and low-priority inspections this reporting period. These inspections uncovered various facilities that were in different stages of compliance. Each active facility was provided educational materials (brochures), a completed written inspection, a brief explanation of the State and City requirements, and suggestions for BMP implementation. The inspection forms served to document the current conditions at each facility, including any deficiencies observed and areas for improvement. An example of completed inspection forms is included in Attachment D. Follow-up visits were also conducted at specific sites to ensure that these were actively pursuing total compliance. The City's current prioritized inventory of industrial and commercial facilities and the current inspection forms are located in Appendix D of the SWMP.

2) Number and type of enforcement actions taken:

TABLE 6-2

Enforcement Action	05-06	06-07	07-08
Education and Information (1) (3)	305	380	325
Verbal Warning (1) (3)	305	380	325
Written Warning (1) (3)	305	380	325
Fines	8	1	(2)
Business License Denial	(2)	(2)	(2)
Referral to SDRWQCB	(2)	(2)	(2)

1) Education, verbal and written warnings are all addressed through the NPDES Inspection forms. As such, these numbers will be the same for the specific reporting period.
2) These measures were not required.
3) The inspections revealed that approximately 10% of the businesses moved, closed, or had become home-based at the time of the inspections. As such, the number of enforcement actions is less than the total number of inspections.

4) An assessment of program effectiveness based on the measurable goals established in the SWMP:

The information provided in tables 6-1 and 6-2 represents measurable data that the City collected in order to begin establishing baseline values that will be used as the basis for the long-term effectiveness assessment as required in the MS4 Permit.

Overall, the City improved this component by completing all of the inspections at each of the inspection priority (high, medium, low) facilities. This cross-section of inspections appears to have been a contributing factor in downgrading enforcement actions to simply verbal and written notices. The collective inspection efforts between the City's business inspection program and the County's Department of Environmental Health (specifically, Haz Mat and Food Services groups) also appear to have encouraged business owners to minimize, and in many instances prevent, discharges and the accumulation of trash and debris. As a result, these repeated inspections have caused the business community, in general, to become aware of the City's NPDES requirements since the start of the business inspection program back in 2005.

7.0 RESIDENTIAL PROGRAM

1) A description of residential areas that were focused on during the past year:

Throughout the previous reporting periods, the City focused on residential areas that had recently been granted occupancies. For the most part, these new neighborhoods generated construction-related discharges due to improvements (pools, patios, hardscape, and other activities requiring a city permit) incurred by the new homeowners. In this annual report, all enforcement actions related to permitted construction activities throughout the residential areas have been shifted to Section 4, under the Construction Program.

For the current reporting period, the City focused on high priority residential activities within existing residential areas that could potentially contribute a significant pollutant load to the MS4. According to the MS4 permit, these activities consist of automobile repair, maintenance, washing, parking; garden care; disposal of household waste, pet waste, and green waste; and any other residential source that may contribute a significant pollutant load to the MS4. As such, NPDES staff addressed all concerns and complaints associated with the activities listed above. Each concern or complaint was logged into the City as a Service Order Request (SOR). Each SOR was addressed within 24 hours. Follow-up visits were conducted on an as-needed basis within 72 hours. These SORs were received from throughout the City and did not provide any indication of any specific residential areas requiring special attention. The City's existing residential efforts are presented in Section 9.0 of the SWMP under Residential Sources.

2) Number and type of enforcement actions taken:

TABLE 7-1

Enforcement Action	07-08
Education and Information	(1)
Verbal Warning	(1)
Written Warning (2)	12
Fines	4

(1) Brochures and verbal warnings were provided on an as-needed, drive-by basis.
(2) Written Warnings were issued when responsible parties could not be contacted.

3) An assessment of program effectiveness based on the measurable goals established in the SWMP:

The information provided in tables 7-1 and 7-2 represents measurable data that the City collected in order to begin establishing baseline values that will be used as the basis for the long-term effectiveness assessment as required in the MS4 Permit.

TABLE 7-2

	Residential SORs Received	Trash/Recyclables/Green Waste (Tons)
2007-2008	72	52,277
2006-2007	41	53,692
2005-2006	28	54,429
2004-2005	Not documented	Not documented

Overall, the City continued improving this component from the previous reporting period by further educating staff responsible for collecting SOR information to identify incoming calls associated with NPDES issues. All calls associated with NPDES issues are now being documented as formal written Service Order Requests. As such, staff have increased their base knowledge with the NPDES requirements.

4) Additional Comments/Information:

Public outreach was implemented through the following information and events:

1) Newsletter, Magazines, Flyers. The City's "Inside Temecula" newsletter, "Guide to Leisure Living Activities" guide, "CityWide Clean-up" flyers, and Household Hazardous Waste Collection" flyers were distributed to all City residents during the reporting period. Information pertaining to stormwater, recycling, hazardous waste disposal, community clean-up events, greenwaste management, landscape maintenance, street sweeping, etc. were provided. Relevant sections from the newsletter, guides, and flyers are included in Attachment E.

2) City-Sponsored Clean-Up Events. The City sponsored two community clean-up events on October 20, 2007 and on May 17, 2008.

3) County-Sponsored Household Hazardous Waste Collection Events. City-Hall served as the location for three clean-up events on September 15, 2007, January 19, 2008, and on May 17, 2008.

8.0 EDUCATION PROGRAM

1) Description of education efforts conducted by the Permittee (not collectively with other Permittees) during the previous year:

TABLE 8-1

Audience	Measures
Permittee Departments and Personnel	Number of Permittee employees trained for: • Construction Inspection: * • Industrial/Commercial Inspection: * • Municipal Facilities and Activities: * • Development Planning: * * - City staff are provided with informal in-house training on an individual and as-needed basis. These one-on-one opportunities are not formally documented. However, all formal classroom-type workshops are conducted and documented thru the regional education program administered by the Principle Permitee and paid with contributions from all permittees.
Construction Site Owners and Developers	Outreach: 1) Distributed the City's annual NPDES notification letter to all active projects. 2) Distributed BIA's annual workshop flyer to all active projects. 3) Distributed Inland Erosion's annual workshop flyer to all active projects.
Industrial/ Commercial Owners and Operators	Outreach: 1) Conducted inspections at 361 businesses. 2) Provided educational brochures and written inspection notices at each active facility.
Residential Community, General Public, Other Public Agencies and Students	Number of Media Impressions: • Newspaper: Refer to Watershed Report • Mailings: All outreach material was hand-delivered. • Radio/TV: Refer to Watershed Report • Web Site: In place. • Billboards: Refer to Watershed Report • Brochures: Distributed but not documented Classroom Presentations: 54 presentations were conducted at 6 elementary schools in Temecula during this reporting period. The City contributes funds for NPDES-related presentations at elementary schools. These

	presentations are conducted by the Mission Resource Conservation District through the Principle Permittee. Public Education Events: 1) City-sponsored "City-Wide Cleanup'. 2) County-sponsored 'Household Hazardous Waste Collection'. 3) Earth Day at the Promenade Mall. 4) Temecula Wine and Balloon Festival.

2) Assessment of overall program effectiveness based on the measurable goals established in the SWMP:

The information provided in tables 8-1 and 8-2 represents measurable data that the City collected in order to begin establishing baseline values that will be used as the basis for the long-term effectiveness assessment required in the MS4 Permit.

TABLE 8-2

Total Staff Trained (Workshops conducted by the Principle Permittee)				
	New Development	Construction	Municipal	Commercial/ Industrial
2007-2008	20	33	29	1
2006-2007	(1)	29	7	(2)
2005-2006	26	18	24	1
2004-2005	23	39	24	1

(1) – Staff attended training within the calendar year but not within this specific reporting period.
(2) - The City contracted with AEI-CASC to conduct all business inspections. As such, municipal staff do not conduct these inspections.

Table 8-2 shows that City staff have been receiving formal training on an annual basis, at a minimum. Overall, the City continued maintaining a high level of attendance among each training category. Staff have also attended additional workshops hosted by other organizations such as CASQA, BIA, State Water Resources Control Board, universities, etc. These additional efforts are documented in each separate training table throughout this report. Various divisions are represented in each of these training categories; Land Development, Capital Improvement Projects, Public Works Maintenance, NPDES, Community Services, Code Enforcement, and Planning. Throughout this permit term, and through these workshops, the City has become increasingly aware of the NPDES requirements. This awareness has translated into increased efforts to achieve compliance as compared to previous permit terms. As such, the City will continue its current efforts into the subsequent reporting period.

9.0 ILLICIT DISCHARGE DETECTION AND ELIMINATION PROGRAM

1) Number of times City Hall was notified (calls, e-mail, walk-ins, etc.) during the reporting period, as compared to previous reporting periods.

TABLE 9-1

	NPDES Service Orders Requests
2007-2008	106
2006-2007	41
2005-2006	24
2004-2005	74

2) Number of illicit discharges, connections and spills reported and/or identified during the reporting period:

TABLE 9-2 (1)

	Illicit Discharges	Illicit Connections	Sewage Spills
2007-2008	60	1	0
2006-2007	22	0	2
2005-2006	24	0	0
2004-2005	74	0	2

(1) - Based on Service Order Requests (SORs)

3) Number of illicit discharges or connections investigated during the reporting period and the outcome of the investigations:

All SORs were addressed. Many of the discharges were related to irrigation breaks, or were no longer evident, or had been mitigated prior to the initial site visit. Many of the SORs were disputes between neighbors, while others were called-in as leaks from parked vehicles. Citations were issued against blatant discharges of paints, oils, cements, and pet waste.

4) Number and types of enforcement actions taken for illicit discharges or connections during the reporting period:

TABLE 9-3

Enforcement and Compliance Responses	Private Facilities	Public Facilities
Non-monetary penalties	54	0 (1)
Fines (Residential & Business)	6	0 (1)

(1) – There were no SORs associated with public facilities this reporting period.

5) Number and location of dry weather monitoring sites that were monitored during the reporting period:

Since the beginning of the current permit term, and in concurrence with Regional Board staff at the time of the permit issuance, the City of Temecula has been monitoring 4 sites. These sites consist of the following primary locations:

1. Empire Creek at the Del Rio bridge.
2. Pechanga Parkway stormdrain channel upgradient to the confluence into Temecula Creek.
3. Pechanga Creek at the Rainbow Canyon bridge.
4. Temecula Creek slightly upgradient to the confluence Murrieta Creek.

In addition, the Riverside County Flood Control District selected four separate sites throughout the City that are also monitored in like manner. Their sites consist of the following locations:

1. Long Canyon Wash at the Commerce Center Drive bridge.
2. Murrieta Creek at the USGS station at the end of Pujol street.
3. Redhawk Parkway stormdrain channel near the confluence with Temecula Creek.
4. Santa Gertrudis Creek at the Jefferson Avenue bridge.

The station locations were selected based on the following criteria:

- *Accessibility.* Per the Monitoring and Reporting Program, Part II.B.1.a, all of the stations are open channels, are readily accessible points to City staff, and are located downstream of potential illicit discharges.

- *Assessment of Illegal Discharges.* Since each station is located within a watercourse, these points represent confluences for storm drain lines, catch basins, improved channels, natural tributary drainage courses, outfalls, etc. As such, each location is a critical point in the drainage course of each sub-watershed within the City in which illegal discharges can readily be detected at a single location.

- *Integration with Principle Permittee's stations.* The City coordinated with the Principle Permitee to provide coverage necessary to adequately represent the entire MS4 (MRP II.B.1.a) throughout the City. As such, the City and Principle Permittee collectively monitor a total of eight stations throughout the City.

- *Establishing Numeric Criteria.* These stations were selected based on conditions at each site that would ensure consistency at each station each year. This approach was intended to establish baseline values that could be used in determining meaningful numeric criteria rather than collecting random data from random samples at random locations that have little to no connectivity.

The latest version of the City's Dry-Weather Illicit Discharge Monitoring Log is presented in Appendix E of the SWMP. The results of the field activities conducted during this reporting period are presented in Attachment F herein.

6) Summary of Illicit Discharge Monitoring Program results, including: 1) All inspection, field screening, and analytical monitoring results; 2) All follow-up and elimination activities; and 3) Any proposed changes to station locations and/or sampling frequencies:

TABLE 9-4

Date (1)	Location	Monitoring Results	Follow-up and Elimination Activities	Proposed Changes
August 27, 2007	Primary Locations	No indications of illicit discharges	None	No Changes Comment(s):
June 15, 2007	Primary Locations	No indications of illicit discharges	None	No Changes Comment(s):

(1) - Section II.B.1.a of the MRP requires two (at a minimum) sampling events between May 1 and September 30.

7) Assessment of the overall program effectiveness based on the measurable goals established in the SWMP:

Overall, all of the primary dry-weather monitoring locations were monitored, and all SORs were investigated. The City did not encounter any illicit connections into or at any of the monitoring locations, and all of the SORs resulted in either verbal, written, or monetary enforcement actions. Although the number of SORs increased by 259% from the previous reporting period, the number of citations remained the same. Additional data is obviously necessary to attempt to correlate the number of SORs with the number of illicit discharges, or citations with increases or decreases in compliance. To date, this data is inconclusive. The City is in the process of identifying either additional monitoring locations or alternate stations that will represent the upper portions of the City's drainage systems in order to enhance this component. This will further be addressed in the upcoming ROWD.

10.0 PUBLIC PARTICIPATION

1) A description of efforts to include the public in urban runoff management programs during the reporting period.

The City conducted various outreach efforts to the public this reporting period. The most visible programs consisted of the community clean-up activities on September 15, 2007, October 20, 2007, May 17, 2008, January 19, 2008, and on May 17, 2008. The less visible programs included personal contact with the public regarding pollution prevention. These opportunities were conducted thru the business inspections, responses to Service Order Requests, in-house meetings with project applicants, and field meetings with developers.

11.0 ASSESSMENT OF OVERALL SWMP EFFECTIVENESS

The SWMP continued to be implemented in its entirety this reporting period. Each section provides sufficient detail to successfully implement each of the components of the permit.

12.0 FISCAL ANALYSIS

1) A summary of the reporting period's expenditures and estimated budget for the upcoming reporting period.

Program Element	Fiscal Year 2006-2007		Fiscal Year 2007-2008		Fiscal Year 2008-2009 (Estimated)	
	Capital Expenditures	Capital Expenditures	Capital Expenditures	O&M/Admin Expenditure	Capital Expenditures	O&M/Admin Expenditure
Program Management (1)	--	118,261	--	122,747	--	126,836
Annual Fee for NPDES Permit from SWRCB	--	11,109 (actual invoice)	--	11,109 (actual invoice)	--	14,875
Implementation Agreement (I.A.) Shared Cost	--	129,769	--	130,173	--	163,768
Construction Inspections (2)	--	62,798	--	63,163	--	65,389
Development Planning (WQMP reviews)	--	12,224 (3a)	--	10,000 (3a)	--	30,000 (3b)
Industrial and Commercial Inspections (4)	--	51,791	--	70,000	--	60,000
IC/ID Program	--	1,000	--	1,000	--	1,000
Municipal Programs (PW Maint) (5)	--	150,000 (Dryer than average Wet-Weather Season)	--	400,000	--	400,000
Municipal Programs (TCSD) (6)	--	6,381,136	--	7,134,931	--	7,848,424
Public Outreach (i.e. classrooms, brochures, etc.)	--	Included in the I.A.	--	Included in the I.A.	--	Included in the I.A.
Monitoring Program	--	Included in the I.A.	--	Included in the I.A.	--	Included in the I.A.
Other (7)	--	30,000	--	30,000	--	30,000
Total (8)		**$566,952**		**$838,192**		**$891,868**
Grand Total	**$ 0**	**$6,948,088**	**$ 0**	**$7,973,123**	**$ 0**	**$8,740,292**

Notes:
(1) This cost reflects program administrator time.
(2) This costs reflects NPDES inspector time plus 10K vehicle expenses
(3a) This cost reflects out-sourced WQMP reviews
(3b) This cost reflects in-house staff time based on one WQMP per month.
(4) This cost reflects out-sourced inspection services
(5) This cost reflects drainage channel clearing and catchbasin maintenance.
(6) This cost reflects the operating budgets for refuse/recycling, street sweeping, landscape/slope programs through Temecula Community Services District.
(7) This cost reflects staff's time for formal classroom training, conferences, inspection forms, citation books, mailings, etc.
(8) This total does not include the refuse/recycling, street sweeping, landscape/slope programs.

2) A description of the source(s) of funds that were utilized during the previous fiscal year and the source(s) of funds proposed to meet the necessary expenditures for the subsequent year, including legal restrictions on the use of such funds.

Source of Funds	Percent of Program Funding	Restrictions on Use (if applicable)
General Fund	93	Allocations to other departments and divisions.
WQMP Review Fees	4	Based on project size
ESC Review Fees	3	Based on project's cost estimate

13.0 NON-STORM WATER DISCHARGES

Permittees shall report on any discharge category listed in Requirement B.2 of Order No. R9-2004-001 that was identified as a source of pollutants during the reporting period. For each identified category, the Permittee shall report whether it elected to prohibit the discharge or to require BMPs to reduce pollutants in the discharge to the MEP. If the discharge is not prohibited, the BMPs that will be implemented, or required to be implemented, shall be described in each SWMP Annual Report.

Category	Prohibited	BMP to be Implemented
Diverted stream flows	☐ Yes ☒ No	Not Applicable
Rising ground waters	☐ Yes ☒ No	Not Applicable
Uncontaminated ground water infiltration [as defined at 40 CFR 35.2005(20)] to MS4s	☐ Yes ☒ No	Not Applicable
Uncontaminated pumped ground water	☐ Yes ☒ No	Not Applicable
Foundation drains	☐ Yes ☒ No	Not Applicable
Springs	☐ Yes ☒ No	Not Applicable
Water from crawl space pumps (Identified as a source of pollutants when commingled with construction-related sediment).	☐ Yes ☒ No	Filtered through gravel-bag chevrons prior to entering a CB
Footing drains	☐ Yes ☒ No	Not Applicable
Air conditioning condensation	☐ Yes ☒ No	Not Applicable
Flows from riparian habitats and wetlands	☐ Yes ☒ No	Not Applicable
Water line flushing. (Identified as a source of pollution when commingled with construction-related sediment).	☐ Yes ☒ No	Filtered through gravel-bag chevrons prior to entering a CB
Landscape irrigation	☐ Yes ☒ No	Not Applicable
Discharges from potable water sources not subject to NPDES Permit No. CAG679001, other than water main breaks. (Identified as a source of pollutants when commingled with construction-related sediment).	☐ Yes ☒ No	Filtered through gravel-bag chevrons prior to entering a CB
Irrigation water	☐ Yes ☒ No	Not Applicable
Lawn watering	☐ Yes ☒ No	Not Applicable
Individual residential car washing	☐ Yes ☒ No	Not Applicable
Non-emergency fire fighting flows	☐ Yes ☒ No	Not Applicable
Dechlorinated swimming pool discharges	☐ Yes ☒ No	Not Applicable

14.0 RECEIVING WATER LIMITATIONS

This section includes the report required pursuant to Requirement C.2.a. of Order No. R9-2004-001, if applicable. Requirement C.2.a. states:

"Upon a determination by either a Permittee or the SDRWQCB that MS4 discharges are causing or contributing to an exceedance of an applicable water quality standard, the Permittee shall promptly notify and thereafter submit a report to the SDRWQCB that describes BMPs that are currently being implemented and additional BMPs that will be implemented to prevent or reduce any pollutants that are causing or contributing to the exceedance of water quality standards. The report may be incorporated in the SWMP Annual Report unless the SDRWQCB directs an earlier submittal. The report shall include an implementation schedule. The SDRWQCB may require modifications to the report."

The City is not aware of any exceedances to any water quality standards in this area during the reporting period. Please refer to the watershed annual report for a detailed review of the monitoring data collected throughout the Santa Margarita River in Riverside County.

15.0 SUMMARY OF ADDITIONAL URBAN RUNOFF DATA

This section is a summary of all urban runoff related data not included in the annual monitoring report (e.g., special investigations).

The City of Temecula did not conduct any special investigations during this reporting period.

16.0 PROPOSED REVISIONS TO THE SWMP

This section includes proposed revisions to the Individual SWMP, including areas in need of improvement based on the assessment of effectiveness of each program component.

There were no significant programmatic changes to the City's SWMP during this reporting period. Attachment G includes a list of revisions that have been incorporated into the SWMP since July 1, 2005.

ATTACHMENT A

DEVELOPMENT PLANNING PROGRAM

- List of Issued Grading Permits
- Monthly tally of Finalized WQMPs
- Example of Final Conditions of Approval
- NPDES Training Log

CITY OF TEMECULA
Land Development Activity Report

Reporting Period 7/1/2007 through 6/30/2008

Activity	Type of Plan		Status	Address	Description	Plan Checker
LD07-125GR	LD_GRADE	PA_PGP	ISSUED	26232 MAP 2	PCL 5 - 8	CW
LD05-057GR	LD_GRADE	PA_PGP	ISSUED	27427 BOSTIK CT	PCL 12 & 13	JP
LD07-096GR	LD_GRADE	PA_PGP	ISSUED	28220 JEFFERSON AV	PARCEL 1 - 3 & 6 - SPRINGHILL SUITES	
LD07-012GR	LD_GRADE	PA_PGP	ISSUED	28530 MAP	PARCEL "F" OF LOT LINE ADJUSTMENT NO. PA03-0657	RJ
LD07-090GR	LD_GRADE	PA_PGP	ISSUED	28530 MAP	PCL F OF LLA03-0657 EAST PARKING STRUCTURE	RJ
LD07-081GR	LD_GRADE	PA_PGP	ISSUED	28544 OLD TOWN FRONT ST	MB 15/726 BLK 21 LT 30-32	CW
LD08-030GR	LD_GRADE	MGR_RG	ISSUED	28771 PUJOL ST	LOTS 1 - 13 TM 8643 & LOTS 1 - 13 & LOT A TM 10291 - MASS GRADING	JP
LD07-114GR	LD_GRADE	PA_PGP	ISSUED	28870 PUJOL ST	TEMECULA COMMUNITY CENTER PRECISE GRADING PLAN	JP
LD07-047GR	LD_GRADE	PA_PGP	ISSUED	28975 OLD TOWN FRONT ST	PCL 5	JP
LD07-049GR	LD_GRADE	PA_PGP	ISSUED	29119 MARGARITA RD	LOT 14 - SOUTHWEST RIVERSIDE FAMILY YMCA	JP
LD07-094GR	LD_GRADE	MGR_RG	ISSUED	29710 VIA LAS COLINAS	PARCEL 2 MASS GRADING & EROSION CTRL	CW
LD07-069GR	LD_GRADE	SFR	ISSUED	30705 PAUBA RD	PCL 2 DETACHED GARAGE	CW
LD07-091GR	LD_GRADE	SFR	ISSUED	30935 AVENIDA DEL REPOSO	LOT 396 - PRECISE GRADING AND EROSION CONTROL PLAN -	JP
LD08-010GR	LD_GRADE	SFR	ISSUED	33371 WOLFE ST	LOT 22 OF TR- 26941 - EARTHWORK INCLUDE 100 CY CUT AND FILL. MAX	RJ
LD07-008GR	LD_GRADE	PA_PGP	ISSUED	35181 MAP	LOTS 3 & 4	ABL
LD07-121GR	LD_GRADE	PA_PGP	ISSUED	35481 MAP	PARCEL 1 & 2	CW
LD07-057GR	LD_GRADE	SFR	ISSUED	40390 CALLE FIESTA	LOT 273	KHM
LD08-023GR	LD_GRADE	MGR_RG	ISSUED	41863 MAIN ST	OLD TOWN INFRASTRUCTURE PROJECT - TOWN SQUARE	
LD07-031GR	LD_GRADE	PA_PGP	ISSUED	43055 BLACKDEER LOOP	PCL 10 & 11	CW
LD07-054GR	LD_GRADE	SFR	ISSUED	43599 CALLE DE VELARDO	LOT 10	CV
LD08-012GR	LD_GRADE	SFR	ISSUED	43910 FLORES DR	LOT 53 2ND DWELLING UNIT - MANSER RESIDENCE - CASITAS	RJ
LD07-113GR	LD_GRADE	PA_PGP	ISSUED	43950 MARGARITA RD	PARCEL 2	JP
LD07-109GR	LD_GRADE	PA_PGP	ISSUED	44045 MARGARITA RD	LOT 26 - DE PORTOLA PROFESSIONAL CENTER	KHM

Activity	Type of Plan		Status	Address	Description	Plan Checker
LD08-014GR	LD_GRADE	PA_PGP	ISSUED	44060 MARGARITA RD	LOT 25	CW
LD07-048GR	LD_GRADE	PA_PGP	ISSUED	44092 MARGARITA RD	PARCEL 7 - REDHAWK TIRE STORE	CW
LD08-038GR	LD_GRADE	SFR	ISSUED	44217 LA PAZ ST	GRADING PERMIT - ADMINISTRATIVE	SC
LD05-022GR	LD_GRADE	PA_PGP	ISSUED	44651 AVENIDA DE MISSIONES	PARCELS 3-5	JP
LD08-040GR	LD_GRADE	MGR_RG	ISSUED	4646 MAP	GRADING PERMIT - MATERIAL CRUSHING	SC

5

MONTHLY TALLY OF FINALIZED WQMPS

	Residental	Com/Ind	Mun	Total Accepted
	2006			
Jan-06				0
Feb-06		1		1
Mar-06				0
Apr-06				0
May-06		2		2
Jun-06		1	1	2
Jul-06		1		1
Aug-06	1	1		2
Sep-06		1		1
Oct-06	1	2		3
Nov-06		2		2
Dec-06				0
TOTALS	**2**	**11**	**1**	**14**
	2007			
Jan-07				0
Feb-07		1		1
Mar-07				0
Apr-07		1		1
May-07		2		2
Jun-07		2		2
Jul-07	1	1		2
Aug-07		1		1
Sep-07		2		2
Oct-07	2	5		7
Nov-07		1		1
Dec-07				0
TOTALS	**3**	**16**	**0**	**19**
	2008			
Jan-08		1		1
Feb-08				0
Mar-08				0
Apr-08		1		1
May-08				0
Jun-08		2		2
Jul-08		1		1
Aug-08		1	1	2
Sep-08		2		2
Oct-08				0
Nov-08				0
Dec-08				0
TOTALS	**0**	**8**	**1**	**9**
	2009			
Jan-09				0
Feb-09				0
Mar-09				0
Apr-09				0
May-09				0
Jun-09				0
TOTALS	**0**	**0**	**0**	**0**
Cumulative Total	**5**	**35**	**2**	**42**

WQMP Tracking Log

0001529

July 1, 2005 - June 30, 2008

	ID Number		Project Description	Required	Accepted	Description of BMPs
COMMERCIAL / INDUSTRIAL DEVELOPMENTS						
1	PA04-0584	LD06-096GR	Star World Center	Yes	2/27/07	3 Infil swales, trash grates
2	PA04-0621	LD05-236GR	Butterfield Ranch Shopping Center	Yes	5/19/06	360' perforated CMP; 5 CB filters
3	PA05-0036	LD06-035GR	Temecula Corporate Center	Yes	10/4/06	4 Stormfilters, 5 ponding areas
4	PA05-0086	LD05-186GR	Nelson Auto Service Ctr.	Yes	5/15/07	2 Sand filters, 2 CB filters
5	PA05-0096	LD06-097GR	Westside Business Park	Yes	4/10/07	5 Sandfilters
6	PA05-0100	LD05-242GR	Temecula Lane I (Loma Linda)	Yes	11/20/06	3 Infil Basins,1 Infil Swale, 5 CB Filters
7	PA05-0101	LD05-229GR	Madison Avenue Bldg, Parcel 6	Yes	5/25/06	3 Infil Basins, 4 CB filters, 3 Infil swales
8	PA05-0105	LD06-086GR	Temecula Glass	Yes	8/23/06	80' Swale, 2 Infil Basins
9	PA05-0127	LD05-200GR	Industrial Condominiums of Temecula	Yes	7/24/06	3 sand filters, 150' & 70' swales,3 CB filters
10	PA05-0172	LD07-048GR	Redhawk Tire Store & Car Wash	Yes	9/27/07	710' Infil swale, 4 CB filters
11	PA05-0189	LD06-047GR	Butterfield Storage	Yes	6/26/06	590' Swale, 4 CB filters, 220' Perforated Pipe
12	PA05-0139	LD07-031GR	Redhawk Artisan Communities (PA13) (Deer Hollow)	Yes	6/15/07	105' Grass Sand Filter
13	PA05-0232	LD05-198GR	Marriot Fairfield Inn	Yes	10/31/06	2 Infil Basins
14	PA05-0254	LD06-027GR	Butterfield Station	Yes	5/8/07	3 Infil Swales
15	PA05-0325	LD06-068GR	Guidant/SCE Substation	Yes	2/24/06	Gravel, 1 vegetated swale
16	PA05-0365	LD07-049GR	YMCA	Yes	10/18/07	480 CY Det. Basin, 67' grass swale
17	PA06-0037	LD06-058GR	Dalton III Office Building (Old Town)	Yes	9/18/06	6 Downspout filters
18	PA06-0046	LD06-090GR	Redhawk Pavillion	Yes	10/18/07	3 infil swales (560'), 5 trash grates, 3 CB filters
19	PA06-0048	LD06-071GR	Hine Mazda Dealership	Yes	7/23/07	1 Stormfilter, 5 CB filters
20	PA06-0096	LD06-068GR	Guidant (Abbott) Parking Structure	Yes	11/3/06	1 Vegetated sand detention Basin, 10 CB Filters, 3 Swales
21	PA06-0140	LD07-047GR	Ahmed Medical Office Building	Yes	8/14/07	2 Infil Swales (320')
22	PA06-0178	N/A	Gateway Plaza	Yes	6/2/08	2 Infil Swales, 2 CB Filters, Grasspave System
23	PA06-0201	LD06-175GR	Guidant (Abbott) East Campus	Yes	10/4/07	1 Stormwater Filter, Detention Pipes, Swales, CB Inserts
24	PA06-0278	LD07-109GR	De Portola Professional	Yes	1/30/08	275' Infil Swale, 1 CB Filter, 4 Sand Filters
25	PA06-0293 PA07-0154	LD07-090GR	Promenade Mall Expansion	Yes	10/12/07	Stormfilter, Infiltration pipes
26	PA06-0316	LD07-096GR	Springhill Hotel	Yes	11/28/07	9 Filterra units
27	PA06-0326	LD07-035GR	DCH Honda	Yes	6/6/07	2 Detention basins
28	PA06-0338	LD07-081GR	Old Town Plaza One (Perkins)	Yes	9/24/07	1 Stormfilter
29	PA06-0346	LD07-125GR	Chaparral Village	Yes	4/2/08	380' Infil. Trench
30	PA07-0084	LD07-121GR	Rancho View Professional	Yes	10/11/07	
31	PA07-0337	LD08-024GR	Kaiser Parking	Yes	6/25/08	

WQMP Tracking Log

July 1, 2005 - June 30, 2008

	ID Number		Project Description	Required	Accepted	Description of BMPs
RESIDENTIAL DEVELOPMENTS						
1	PA05-0375 PA05-0377 PA05-0384 PA05-0387 PA06-0002	LD06-187GR	Roripaugh Ranch, project-wide	Yes	10/31/06	2 Infil Basins, 9 Stormfilters; 401 Cert.
2	PA04-0492	LD06-006GR	Temecula Lane I (Loma Linda)	Yes	8/8/06	1 Infil Basin; 23 CB filters
3	PA05-0236 PA05-0235	LD06-131GR	Summerhouse Condos (Dartolo)	Yes	10/18/07	2100' Infil swales, 23 CB filters 1 stormfilter
4	PA06-0060	LD06-199GR	Redhawk Artisan Communities (PA13) (Deer Hollow)	Yes	7/11/07	410' Perf Pipe, 8 CB Filters, 2 Stormfilters
5	TM 35039	LD06-201GR LD06-295CO	Yvette Anthony, Santiago Road	Yes	10/22/07	
MUNICIPAL DEVELOPMENTS						
1	PW99-11		Pechanga Parkway Widening	Yes	6/1/06	5 CB filters; 401 Cert.

EXHIBIT A

FINAL CONDITIONS OF APPROVAL

SCANNED: 6/17/08
G DRIVE: 6/17/08
PERMITS PLUS: 6/17/08
INITIALS: cmf
PLANNER: Schumm

JUN 16 2008

ACCEPTANCE OF CONDITIONS OF APPROVAL

I, Steve Rawlings, understand that Planning Application No. PA07-0337 has been approved with Conditions of Approval which are set forth in Exhibit A. I have read the Conditions of Approval contained in PC Resolution No. 08-20 and understand them. Through signing this ACCEPTANCE OF CONDITIONS OF APPROVAL, I agree and commit to the City of Temecula that I will implement and abide by the Conditions of Approval, including any indemnification requirements imposed by those conditions.

SIGNATURE

6/2/08
DATE

EXHIBIT A

CITY OF TEMECULA

FINAL CONDITIONS OF APPROVAL

Planning Application No.:	PA07-0337
Project Description:	A Major Modification to an approved Development Plan to modify three building entrances, add a trash enclosure, and expand the parking lot to accommodate additional parking for a Kaiser medical facility located at 27309 Madison Avenue
Assessor's Parcel No.:	910-282-012 and 910-272-007
MSHCP Category:	Commercial
DIF Category:	Service Commercial
TUMF Category:	N/A
Approval Date:	May 7, 2008
Expiration Date:	May 7, 2010

PLANNING DEPARTMENT

Within 48 Hours of the Approval of This Project

1. The applicant/developer shall deliver to the Planning Department a cashier's check or money order made payable to the County Clerk in the amount of Sixty-Four Dollars ($64.00) for the County administrative fee, to enable the City to file the Notice of Exemption as provided under Public Resources Code Section 21152 and California Code of Regulations Section 15062. If within said 48-hour period the applicant/developer has not delivered to the Planning Department the check as required above, the approval for the project granted shall be void by reason of failure of condition (Fish and Game Code Section 711.4(c)).

2. The applicant shall review and sign the Acceptance of Conditions of Approval document that will be provided by the Planning Department staff and return the document with an original signature to the Planning Department.

General Requirements

3. The applicant and owner of the real property subject to this condition shall hereby agree to indemnify, protect, hold harmless, and defend the City with Legal Counsel of the City's own selection from any and all claims, actions, awards, judgments, or proceedings against the City to attack, set aside, annul, or seek monetary damages resulting, directly or indirectly, from any action in furtherance of and the approval of the City, or any agency or instrumentality thereof, advisory agency, appeal board or legislative body including actions approved by the voters of the City, concerning the Planning Application. The City shall be

deemed for purposes of this condition, to include any agency or instrumentality thereof, or any of its elected or appointed officials, officers, employees, consultants, contractors, legal counsel, and agents. City shall promptly notify both the applicant and landowner of any claim, action, or proceeding to which this condition is applicable and shall further cooperate fully in the defense of the action. The City reserves the right to take any and all action the City deems to be in the best interest of the City and its citizens in regards to such defense.

4. The permittee shall obtain City approval for any modifications or revisions to the approval of this project.

5. This approval shall be used within two years of the approval date; otherwise, it shall become null and void. By use is meant the beginning of substantial construction contemplated by this approval within the two year period, which is thereafter diligently pursued to completion, or the beginning of substantial utilization contemplated by this approval.

6. The Director of Planning may, upon an application being filed within 30 days prior to expiration, and for good cause, grant a time extension of up to 3 one-year extensions of time, one year at a time.

7. A separate building permit shall be required for all signage.

8. The development of the premises shall substantially conform to the approved site plan and elevations contained on file with the Planning Department.

9. Landscaping installed for the project shall be continuously maintained to the reasonable satisfaction of the Planning Director. If it is determined that the landscaping is not being maintained, the Planning Director shall have the authority to require the property owner to bring the landscaping into conformance with the approved landscape plan. The continued maintenance of all landscaped areas shall be the responsibility of the developer or any successors in interest.

10. The Conditions of Approval specified in this resolution, to the extent specific items, materials, equipment, techniques, finishes or similar matters are specified, shall be deemed satisfied by staff's prior approval of the use or utilization of an item, material, equipment, finish or technique that City staff determines to be the substantial equivalent of that required by the Conditions of Approval. Staff may elect to reject the request to substitute, in which case the real party in interest may appeal, after payment of the regular cost of an appeal, the decision to the Planning Commission for its decision.

11. Trash enclosures shall be provided to house all trash receptacles utilized on the site. These shall be clearly labeled on site plan.

12. Parking for the project shall be shared across the site, including parking spaces in all lots that are a part of the project.

13. If construction is phased, a construction staging area plan or phasing plan for construction equipment and trash shall be approved the Director of Planning.

Prior to Issuance of Grading Permits

14. A Parcel Merger must be filed and approved to the satisfaction of the Director of Public Works.

15. The following shall be included in the Notes Section of the Grading Plan: "If at any time during excavation/construction of the site, archaeological/cultural resources, or any artifacts or other objects which reasonably appears to be evidence of cultural or archaeological resource are discovered, the property owner shall immediately advise the City of such and the City shall cause all further excavation or other disturbance of the affected area to immediately cease. The Director of Planning at his/her sole discretion may require the property owner to deposit a sum of money it deems reasonably necessary to allow the City to consult and/or authorize an independent, fully qualified specialist to inspect the site at no cost to the City, in order to assess the significance of the find. Upon determining that the discovery is not an archaeological/cultural resource, the Director of Planning shall notify the property owner of such determination and shall authorize the resumption of work. Upon determining that the discovery is an archaeological/cultural resource, the Director of Planning shall notify the property owner that no further excavation or development may take place until a mitigation plan or other corrective measures have been approved by the Director of Planning."

Prior to Issuance of Building Permit

16. The applicant shall submit a photometric plan, including the parking lot to the Planning Department, which meets the requirements of the Development Code and the Palomar Lighting Ordinance. The parking lot light standards shall be placed in such a way as to not adversely impact the growth potential of the parking lot trees.

17. Three copies of Construction Landscaping and Irrigation Plans shall be reviewed and approved by the Planning Department. These plans shall conform to the approved conceptual landscape plan, or as amended by these conditions. The location, number, genus, species, and container size of the plants shall be shown. The plans shall be consistent with the Water Efficient Ordinance. The plans shall be accompanied by the following items:

    a. Appropriate filing fee (per the City of Temecula Fee Schedule at time of submittal).

    b. Provide a minimum five foot wide planter to be installed at the perimeter of all parking areas. Curbs, walkways, etc. are not to infringe on this area.

    c. A note on the plans stating that "Two landscape inspections are required: One inspection is required for irrigation lines and a separate inspection is required for final planting inspection."

    d. A note on the plans stating that "The contractor shall provide two copies of an agronomic soils report at the first irrigation inspection."

    e. One copy of the approved Grading Plan.

    f. Water usage calculations per Chapter 17.32 of the Development Code (Water Efficient Ordinance).

    g. Total cost estimate of plantings and irrigation (in accordance with approved plan).

    h. The locations of all existing trees that will be saved consistent with the tentative map.

i. A landscape maintenance program shall be submitted for approval, which details the proper maintenance of all proposed plant materials to assure proper growth and landscape development for the long-term esthetics of the property. The approved maintenance program shall be provided to the landscape maintenance contractor who shall be responsible to carry out the detailed program.

j. Specifications shall indicate that a minimum of two landscape site inspections will be required. One inspection to verify that the irrigation mainline is capable of being pressurized to 150 psi for a minimum period of two hours without loss of pressure. The second inspection will verify that all irrigation systems have head-to-head coverage, and to verify that all plantings have been installed consistent with the approved construction landscape plans. The applicant/owner shall contact the Planning Department to schedule inspections.

k. Precise Grading Plans consistent with the approved rough grading plans including all structural setback measurements.

l. All WQMP information and storm water treatment design details shall be shown on the construction landscape plans. If revisions are made to the WQMP and/or storm water treatment design that result in any changes to the conceptual landscape plans after entitlement, the revisions will be shown on the construction landscape plans, subject to the approval of the Director of Planning.

18. Construction Landscaping and Irrigation Plans shall specify that the hydro-seeded area will be temporarily irrigated.

19. All utilities shall be screened from public view. Landscape construction drawings shall show and label all utilities and provide appropriate screening. Provide a three foot clear zone around fire check detectors as required by the Fire Department before starting the screen. Group utilities together in order to reduce intrusion. Screening of utilities is not to look like an after-thought. Plan planting beds and design around utilities. Locate all light poles on plans and insure that there are no conflicts with trees.

20. Building Construction Plans shall include detailed outdoor areas including but not limited to trash enclosures and hardscape to match the style of the building subject to the approval of the Planning Director.

Prior to Release of Power, Building Occupancy or Any Use Allowed by This Permit

21. An applicant shall submit a letter of substantial conformance, subject to field verification by the Planning Director or his/her designee. Said letter of substantial conformance shall be prepared by the project designer and shall indicate that all plant materials and irrigation system components have been installed in accordance with the approved final landscape and irrigation plans. If a certificate of use and occupancy is not required for the project, such letter of substantial conformance shall be submitted prior to scheduling for the final inspection.

22. The applicant shall be required to screen all loading areas and roof mounted mechanical equipment from view of the adjacent residences and public right-of-ways. If upon final inspection it is determined that any mechanical equipment, roof equipment or backs of building parapet walls are visible from any portion of the public right-of-way adjacent to the project site, the developer shall provide screening by constructing a sloping tile covered mansard roof element or other screening reviewed and approved by the Director of Planning.

23. All required landscape planting and irrigation shall have been installed consistent with the approved construction plans and shall be in a condition acceptable to the Director of Planning. The plants shall be healthy and free of weeds, disease, or pests. The irrigation system shall be properly constructed and in good working order.

24. Performance securities, in amounts to be determined by the Director of Planning, to guarantee the maintenance of the plantings in accordance with the approved construction landscape and irrigation plan shall be filed with the Planning Department for a period of one year from final Certificate of Occupancy. After that year, if the landscaping and irrigation system have been maintained in a condition satisfactory to the Director of Planning, the bond shall be released upon request by the applicant.

25. Each parking space reserved for the handicapped shall be identified by a permanently affixed reflectorized sign constructed of porcelain on steel, beaded text or equal, displaying the International Symbol of Accessibility. The sign shall not be smaller than 70 square inches in area and shall be centered at the interior end of the parking space at a minimum height of 80 inches from the bottom of the sign to the parking space finished grade, or centered at a minimum height of 36 inches from the parking space finished grade, ground, or sidewalk. A sign shall also be posted in a conspicuous place, at each entrance to the off-street parking facility, not less than 17 inches by 22 inches, clearly and conspicuously stating the following:

> "Unauthorized vehicles parked in designated accessible spaces not displaying distinguishing placards or license plates issued for persons with disabilities may be towed away at owner's expense. Towed vehicles may be reclaimed by telephoning (951) 696-3000."

26. In addition to the above requirements, the surface of each parking place shall have a surface identification sign duplicating the Symbol of Accessibility in blue paint of at least three square feet in size.

27. All site improvements including but not limited to parking areas and striping shall be installed.

28. All of the foregoing conditions shall be complied with prior to occupancy or any use allowed by this permit.

OUTSIDE AGENCIES

29. The applicant shall comply with the recommendations set forth in the County of Riverside Department of Environmental Health's transmittal dated January 8, 2008, a copy of which is attached.

30. The applicant shall comply with the recommendations set forth in the Rancho California Water District's transmittal dated December 19, 2007, a copy of which is attached.

BUILDING AND SAFETY DEPARTMENT

General Requirements

31. All design components shall comply with applicable provisions of the 2007 edition of the California Building, Plumbing and Mechanical Codes; 2007 California Electrical Code; California Administrative Code, Title 24 Energy Code, California Title 24 Disabled Access Regulations, and the Temecula Municipal Code.

32. Submit at time of plan review, a complete exterior site lighting plans showing compliance with Ordinance No. 655 for the regulation of light pollution. All street-lights and other outdoor lighting shall be shown on electrical plans submitted to the Department of Building and Safety. Any outside lighting shall be hooded and directed so as not to shine directly upon adjoining property or public rights-of-way.

33. Obtain all building plans and permit approvals prior to commencement of any construction work.

34. Show all building setbacks.

35. Provide an approved automatic fire sprinkler system.

36. All building and facilities must comply with applicable disabled access regulations. Provide all details on plans.

37. Provide disabled access from the public way to the main entrance of the building.

38. Provide van accessible parking located as close as possible to the main entry.

39. Show path of accessibility from parking to furthest point of improvement.

40. Commercial and Industrial project trash enclosures, patio covers, light standards, and any block walls will require separate approvals and permits.

41. Signage shall be posted conspicuously at the entrance to the project that indicates the hours of construction, shown below, as allowed by the City of Temecula Ordinance No. 94-21, specifically Section G (1) of Riverside County Ordinance No. 457.73, for any site within one-quarter mile of an occupied residence. The permitted hours of construction are Monday through Friday 6:30 a.m. to 6:30 p.m., and Saturday from 7:00 a.m. to 6:30 p.m. No work is permitted on Sundays or Government Holidays.

Prior to Issuance of Building Permit

42. At plan submittal, restroom fixtures, number and type, are to be in accordance with the provisions of the 2007 edition of the California Plumbing Code.

43. At plan submittal, provide electrical plan including load calculations and panel schedule, plumbing schematic and mechanical plan applicable to scope of work for plan review.

44. Provide precise grading plan at plan check submittal to check accessibility for persons with disabilities.

45. Provide appropriate stamp of a registered professional with original signature on plans prior to permit issuance.

46. A pre-construction meeting is required with the building inspector prior to the start of the building construction.

COMMUNITY SERVICES DEPARTMENT

General Requirements

47. The developer shall contact the City's franchised solid waste hauler for disposal of construction debris. Only the City's franchisee may haul construction debris.

48. The Applicant shall comply with the Public Art Ordinance.

49. All parkways, landscaping, fencing and on site lighting shall be maintained by the property owner or maintenance association.

Prior to Issuance of Building Permit

50. The developer shall provide TCSD verification of arrangements made with the City's franchise solid waste hauler for disposal of construction debris.

FIRE PREVENTION

General Requirements

51. Final fire and life safety conditions will be addressed when building plans are reviewed by the Fire Prevention Bureau. These conditions will be based on occupancy, use, the California Building Code (CBC), California Fire Code (CFC), and related codes which are in force at the time of building plan submittal.

52. If construction is phased, each phase shall provide approved access and fire protection prior to any building construction (CFC, Chapter 5, Section 503.4).

53. The applicant shall comply with the requirements of the Fire Code permit process and update any changes in the items and quantities approved as part of their Fire Code permit. These changes shall be submitted to the Fire Prevention Bureau for review and approval per the Fire Code and is subject to inspection (CFC Appendix Chapter 1).

Prior to Issuance of Building Permit

54. Fire sprinkler plans shall be submitted to the Fire Prevention Bureau for approval. Three sets of sprinkler plans must be submitted by the installing contractor to the Fire Prevention Bureau. These plans must be submitted prior to the issuance of building permit.

55. Fire alarm plans shall be submitted to the Fire Prevention Bureau for approval. Three sets of alarm plans must be submitted by the installing contractor to the Fire Prevention Bureau. The fire alarm system is required to have a dedicated circuit from the house panel.

Prior to Release of Power, Building Occupancy or Any Use Allowed by This Permit

56. New and existing buildings shall have approved address numbers, building numbers or approved building identification placed in a position that is plainly legible and visible from the street or road fronting the property. These numbers shall contrast with their background. Commercial buildings shall have a minimum of 12-inch numbers with suite numbers being a minimum of six inches in size. All suites shall have a minimum of six-inch high letters and/or numbers on both the front and rear doors (CFC Chapter 5, Section 505.1 and City Ordinance 15.16.020 Section E).

57. A "Knox-Box" shall be provided. The Knox-Box shall be installed a minimum of six feet in height and be located to the right side of the fire riser sprinkler room (CFC Chapter 5, Section 506).

58. The applicant shall submit for review and approval by the City Fire Department a Hazardous Material Inventory Statement. A full hazardous materials inventory report and color coded floor plan is required for any building storing or using hazardous materials (CFC Chapter 28 though 44, Appendix Chapter 1 and City Ordinance 15.16.020).

59. Prior to the issuance of a Certificate of Occupancy or building final, the developer/applicant shall be responsible for obtaining underground and/or aboveground tank permits for the storage of combustible liquids, flammable liquids or any other hazardous materials from both the County Health department and Fire Prevention Bureau (CFC Chapter 34 and City Ordinance 15.16.020).

PUBLIC WORKS DEPARTMENT

General Requirements

60. Unless otherwise noted, all conditions shall be completed by the Developer at no cost to any Government Agency. It is understood that the Developer correctly shows on the site plan all existing and proposed property lines, easements, traveled ways, improvement constraints and drainage courses, and their omission may require the project to be resubmitted for further review and revision.

61. A Grading Permit for precise grading, including all on-site flat work and improvements, shall be obtained from the Department of Public Works prior to commencement of any construction outside of the City-maintained street right-of way.

62. An Encroachment Permit shall be obtained from the Department of Public Works prior to commencement of any construction within an existing or proposed City right-of-way.

63. All grading plans shall be coordinated for consistency with adjacent projects and existing improvements contiguous to the site and shall be submitted on standard 24" x 36" City of Temecula mylars.

64. The project shall include construction-phase pollution prevention controls and permanent post-construction water quality protection measures into the design of the project to prevent non-permitted runoff from discharging offsite or entering any storm drain system or receiving water.

65. A Water Quality Management Plan (WQMP) must be accepted by the City prior to the initial grading plan check. The WQMP will be prepared by a registered Civil Engineer and include site design BMPs (Best Management Practices), source controls, and treatment mechanisms.

Prior to Issuance of Grading Permits

66. A Grading Plan shall be prepared by a registered Civil Engineer and shall be reviewed and approved by the Department of Public Works. The grading plan shall include all necessary erosion control measures needed to adequately protect adjacent public and private property.

67. The developer shall post security and enter into an agreement guaranteeing the grading and erosion control improvements in conformance with applicable City Standards and subject to approval by the Department of Public Works.

68. A Soil Report shall be prepared by a registered Soil or Civil Engineer and submitted to the Director of the Department of Public Works with the initial grading plan check. The report shall address all soils conditions of the site, and provide recommendations for the construction of engineered structures and pavement sections.

69. The developer shall have a Drainage Study prepared by a registered Civil Engineer in accordance with City Standards identifying storm water runoff expected from this site and upstream of this site. The study shall identify all existing or proposed public or private drainage facilities intended to discharge this runoff. The study shall also analyze and identify impacts to downstream properties and provide specific recommendations to protect the properties and mitigate any impacts. Any upgrading or upsizing of downstream facilities, including acquisition of drainage or access easements necessary to make required improvements, shall be provided by the Developer.

70. Construction-phase pollution prevention controls shall be consistent with the City's Grading, Erosion & Sediment Control Ordinance and associated technical manual, and the City's standard notes for Erosion and Sediment Control.

71. The project shall demonstrate coverage under the State NPDES General Permit for Construction Activities by providing a copy of the Waste Discharge Identification number (WDID) issued by the State Water Resources Control Board (SWRCB). A Stormwater Pollution Prevention Plan (SWPPP) shall be available at the site throughout the duration of construction activities.

72. As deemed necessary by the Director of the Department of Public Works, the Developer shall receive written clearance from the following agencies: (a) Planning Department; (b) Department of Public Works.

73. The developer shall comply with all constraints which may be shown upon an Environmental Constraint Sheet (ECS) recorded with any underlying maps related to the subject property.

74. Permanent landscape and irrigation plans shall be submitted to the Planning Department and the Department of Public Works for review and approval.

75. The applicant shall comply with the provisions of Chapter 8.24 of the Temecula Municipal Code (Habitat Conservation) by paying the appropriate fee set forth in that Ordinance or by providing documented evidence that the fees have already been paid.

76. A flood mitigation charge shall be paid. The Area Drainage Plan fee is payable to the Riverside County Flood Control and Water Conservation District by either cashier's check or money order, prior to issuance of permits, based on the prevailing area drainage plan fee. If the full Area Drainage Plan fee or mitigation charge has already been credited to this property, no new charge needs to be paid.

Prior to issuance of Building Permit

77. Precise grading plans shall conform to applicable City of Temecula Standards subject to approval by the Director of the Department of Public Works. The following design criteria shall be observed:

    a. Flow-line grades shall be 0.5% minimum over P.C.C. and 1.00% minimum over A.C. paving.

    b. Driveway shall conform to the applicable City of Temecula Standard No. 207A.

    c. All street and driveway centerline intersections shall be at 90 degrees.

    d. Landscaping shall be limited in the corner cut-off area of all intersections and adjacent to driveways to provide for minimum sight distance and visibility.

78. The Developer shall construct the following public improvements in conformance with applicable City Standards and subject to approval by the Director of the Department of Public Works.

    a. Street improvements, which may include, but not limited to: curb and gutter and drive approaches

    b. Storm drain facilities

    c. Under grounding of proposed and existing utility distribution lines less than 34 KV.

79. The building pad shall be certified to have been substantially constructed in accordance with the approved Precise Grading Plan by a registered Civil Engineer, and the Soil Engineer shall issue a Final Soil Report addressing compaction and site conditions.

80. The Developer shall pay to the City the Public Facilities Development Impact Fee as required by, and in accordance with, Chapter 15.06 of the Temecula Municipal Code and all Resolutions implementing Chapter 15.06.

Prior to Release of Power, Building Occupancy or Any Use Allowed by This Permit

81. The project shall demonstrate that the pollution prevention BMPs outlined in the WQMP have been constructed and installed in conformance with approved plans and are ready for immediate implementation.

82. As deemed necessary by the Department of Public Works, the Developer shall receive written clearance from the following agencies:

    a. Rancho California Water District

    b. Eastern Municipal Water District

    c. Department of Public Works

83. Corner property line cut off shall be required per Riverside County Standard No. 805.

84. All public improvements shall be constructed and completed per the approved plans and City standards to the satisfaction of the Director of the Department of Public Works.

85. The existing improvements shall be reviewed. Any appurtenance damaged or broken shall be repaired or removed and replaced to the satisfaction of the Director of the Department of Public Works.

NPDES TRAINING LOG		FY 2007 - 2008							
								0001544	
DEPARTMENT	STAFF	CONSTRUCTION		MUNICIPAL		NEW DEVELOPMENT		COMMERCIAL / INDUSTRIAL	
ENGINEERING	ALEGRIA, JERRY	08/22/07				12/05/07	04/22/08		
	ATTAR, AMER		01/17/08			12/05/07			
	BECERA, WILL		01/17/08			12/05/07			
	BESWICK, STEVE	08/22/07				12/05/07			
	BILBY, DAVID								
	BOSTRE-LE, ANNIE								
	BRAGG, LAURA	08/22/07				12/05/07			
	BUTLER, GREG		01/17/08						
	CHARETTE, STEVE	08/22/07				12/05/07			
	DE LA TORRE, MAYRA		01/17/08			12/05/07			
	HAGHIGHI, KAVON	08/22/07				12/05/07			
	HANNAH, KENDRA	08/22/07				12/05/07			
	HARVEY, SCOTT	08/22/07							
	JAMES, REZA		01/17/08				04/22/08		
	LICITRA, ALDO	08/22/07	02/29/08		01/17/08	12/05/07		11/27/07	
	MCATEER, BILL		01/17/08			12/05/07			
	MCBRIDE, DAVID	08/22/07				12/05/07			
	ODVIAR, AVLIN		01/17/08			12/05/07			
	POURKAZEMI, JOHN	08/22/07	03/18/08			12/05/07	04/22/08		
	SALAZAR, JON	08/22/07				12/05/07			
	VLAHOS, CHRIS	08/22/07				12/05/07			
	WHITE, CHRIS	08/22/07	03/18/08			12/05/07			
	YORK, DAN		01/17/08			11/28/07			
PW INSPECTORS	ARMSTRONG, DOUG		01/17/08						
	BEILE, MATHEW	08/22/07							
	HODSON, JACK		01/17/08						
	HUDSON, MIKE		01/17/08						
	OLDHAM, JAY	08/22/07							
	RYAN. PAT	08/22/07							
	SHABEC, RUDY	08/22/07							
PW MAINTENANCE	CASTILLO, RYAN				01/17/08				
	DAVIS, DAVID				01/17/08				
	DOMINICK, STEVE								
	GONZALES, GUS				01/17/08				
	GUMBERT, JASON								
	JAIME, JUAN				01/17/08				
	LEVIS, MARK				01/17/08				
	LUDWIG, PERRY				01/17/08				
	NORMAN, FLINT				01/17/08				
	PAYNE, CHRIS				01/17/08				
	ROMINE, LARRY				01/17/08				
	SMITH, JIM				01/17/08				
	TIDWELL, RODNEY				01/17/08				
	WEST, RANDY				01/17/08				
TCSD	CAMBEROS, DINO				01/17/08				
	DE LA ROSA, GEORGE				01/17/08				
	DIAZ, JOSE				01/17/08				
	HARRINGTON, KEVIN				01/17/08				
	KANIGOWSKI, JERZY				01/17/08				
	MAISEY, JOHN				01/17/08				
	MARTINEZ, ANTHONY				01/17/08				
	MCDONALD, DAVID								
	MUNOZ, MARIO				01/17/08				
	NORDGREN, KARL				01/17/08				
	PRICE, BLANCA				01/17/08				
	SERVEN, RICK				01/17/08				
	SHEA, RICHARD				01/17/08				
	STERLING, STEVE				01/17/08				
	THURMAN, DAVID				01/17/08				
	WEDEKING, BRUCE				01/17/08				
	WIECHEC, MATT				01/17/08				

NPDES TRAINING LOG		FY 2007 - 2008							
								0001545	
DEPARTMENT	STAFF	CONSTRUCTION		MUNICIPAL		NEW DEVELOPMENT		COMMERCIAL / INDUSTRIAL	
CODE ENFORCEMENT	COLE, TOM		01/17/08						
	GROVE, JEFF	08/22/07							
	PARKER, MARRIANE		01/17/08						
	SMITH, ZARA	08/22/07							
	VOSHAL, JEAN	08/22/07							
PLANNING	FISK, STUART								
	KITZEROW, CHERYL								
	PAPP, EMERY								
	PETERS, MATT								
	SCHUMA, DANA								
	WEST, DALE					12/05/07			

ATTACHMENT B

CONSTRUCTION PROGRAM

- Monthly Tally of NPDES Inspections
- Example of a Completed NPDES Inspection Frequency Sheet
- Annual Letter to Development Community

TOTAL NPDES CONSTRUCTION INSPECTIONS
2007 - 2008

MONTH	PRIORITY SITES			TOTAL INSPECTIONS	WRITTEN WARNINGS	VERBAL WARNINGS	CITATIONS
	HIGH	MEDIUM	LOW				
July, 2007	132	101	22	255	7	54	2
YEAR-TO-DATE	**132**	**101**	**22**	**255**	**7**	**54**	**2**
August, 2007	115	101	6	222	7	58	2
YEAR-TO-DATE	**247**	**202**	**28**	**477**	**14**	**112**	**4**
September, 2007	91	102	10	203	4	66	2
YEAR-TO-DATE	**338**	**304**	**38**	**680**	**18**	**178**	**6**
October, 2007	164	174	14	352	31	90	15
YEAR-TO-DATE	**502**	**478**	**52**	**1032**	**49**	**268**	**21**
November, 2007	115	126	1	242	3	42	2
YEAR-TO-DATE	**617**	**604**	**53**	**1274**	**52**	**310**	**23**
December, 2007	136	135	12	283	12	68	9
YEAR-TO-DATE	**753**	**739**	**65**	**1557**	**64**	**378**	**32**
January. 2008	163	144	19	326	17	71	8
YEAR-TO-DATE	**916**	**883**	**84**	**1883**	**81**	**449**	**40**
February, 2008	137	143	25	305	16	54	10

R:\NPDES\Active Construction Inspection Tallys\Monthly Tallys of Prioritized Inspections

TOTAL NPDES CONSTRUCTION INSPECTIONS
2007 - 2008

MONTH		PRIORITY SITES			TOTAL INSPECTIONS	WRITTEN WARNINGS	VERBAL WARNINGS	CITATIONS
		HIGH	MEDIUM	LOW				
	YEAR-TO-DATE	1053	1026	109	2188	97	503	50
March, 2008		144	107	14	265	17	71	6
	YEAR-TO-DATE	1197	1133	123	2453	114	574	56
April, 2008		127	119	11	257	7	38	4
	YEAR-TO-DATE	1324	1252	134	2710	121	612	60
May, 2008		109	82	0	191	7	34	6
	YEAR-TO-DATE	1433	1334	134	2901	128	646	66
June, 2008		123	64	6	193	7	39	6
	YEAR-TO-DATE	1556	1398	140	3094	135	685	72

0001548

R:\NPDES\Active Construction Inspection Tallys\Monthly Tallys of Prioritized Inspections

Sept 7

NPDES Inspection Frequency Sheet

Construction

High Priority Sites (*Inspect once every two weeks during the wet season*)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Inspector	
Wolf Creek-1																																Pat	
Woodside Homes-Mahogany																																04-122	2✓
Woodside Homes-Marquis			Complete																													04-233	
6 ac park 45896 W.C. Dr N.																																05-062	2✓
Wolf Creek-2																																	
Standard Pacific-Cottonwood																																06-042&043	2✓
Standard Pacific-Redwood																																30264	3✓
Standard Pacific-LLC																																	2✓
Stanard Pacific-Laurel																																05-224	2✓
Woodside - Ironwood																																05-211	2✓
Woodside - Sycamore																																30264-6	2✓
Woodside Homes- Hawthorne																																05-227	3✓
Woodside - Tamerack																																06-018	2✓
Lennar - Stonebriar																																06-103	2✓
Crowne Hill																																Doug	
Craftsman Homes - The Reserve																																01-139	4✓
Roripaugh Ranch																																Jack	
Panhandle																																	
Ashby LLC -																																05-139	3✓
Davidson -																																04-222	3✓
Tanamera																																	3✓
Pan																																	
Ashby LLC -																																02-138	3✓
6 Ac Park																																03-327	3✓
Harveston																																Doug	
William Lyons - Charleston Ln																																04-209	2✓
Meritage - Aberdeen																																05-117	2✓
Meritage - Charveston																																05-121	2✓
Lennar - Prescott																																06-022	2✓
Lennar - Barrington																																06-082	2✓
Lennar - Emery																																06-101	2✓
Temecula Estates - K&B Homes																																Doug	
Serafina and Murrieta Hot Springs																																	3✓
Reserve -Gallery Homes																																Jack	
Santiago Road e/o John Warner																																05-133	5✓
Temecula Ln - D R Horton																																05-096	
Loma Linda / Temecula Ln																																Pat	5✓
			8-I								19-I			4-V					15-I	6-V				6-I 9-V 1-N								68

91

I = Inspected
V = Verbal
N = Inspection Notice Issued

C = Citation Issued
RB = SDRWQCB Rep Present
** = New Site

Sept 2007

NPDES Inspection Frequency Sheet

Construction

High Priority Sites (*Inspect once every two weeks during the wet season*)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Inspector	
Butterfield Self Storage																																Jack	
79S & Butterfield Ranch											I							I								I						06-047	3✓
Centex Homes - Hemmingway																																Pat	
Via Puebla										I				I																		05-156	2✓
Centex Homes - Statford																																Pat	
Primrose Ave										I	I			I																		05-157	3✓
Temecula Education Ctr-Yeager		Inactive																														Jay	
Dendy Parkway				I								I	I				I		I	I				I								05-126	7✓
Maravilla - Pulte Homes																																Doug	
Rancho Highlands & Ynez					I															I									06-095 /		06-032	2✓
MJW Property																																Jack	
Ave. Alvardo				I								I							I	I						I	I					05-006	6✓
																																	/23
																	4-I								4-I								
			1-I							5-I																							
																	3-V																
			2-V							4-V																							

I = Inspected
V = Verbal
N = Inspection Notice Issued

C = Citation Issued
RB = SDRWQCB Rep Present
** = New Site

0001550

Sept 07

NPDES Inspection Frequency Sheet

Construction

Medium Priority Sites (*Inspect three times during the wet season*)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Inspector	
IND. Dev. - Garrett Group		Inactive																														Jack	
Dendy Pwy				F													F															01-167	2
Abbott Ed. Center																																Jack	
Motor Car Parkway										F		F												F								06-175	7
Gallery Homes - Portraits																																Jack	
Rancho Vista & Ynez																																04-189	6
Margarita Office Center -																																Doug	
43040 Margarita @ Puaba/SE corner																																04-090	2
Commercial Center - Davcon Development																																Jack	
41785 Nicole Ln @ Overland																																05-083	1
Temecula Village Apartments - MJW																																Jack	
Rancho Calif. Rd. e/o Moraga Rd.																																	2
Palomar Dental Plaza - Cornerstone																																05-116	
43980 Margarita @ DePortola																																Jack	3
SFR Byrne Res																																	
43596 Manzano																																Rudy	3
Wolf Creek-1																																	
Standard Pacific - Aspen																																05-144	3
Harveston																																	
William Lyons - Savannah																																04-208	1
Harveston Retirement Res. - Colson & Colson																																05-012	
40024 Harveston Dr.																																Doug	1
Burks Building - Tovey Schulz		Complete																														05-237	
41955 4th St.																																	
Comfort Inn - DS Const.																																05-094	
27330 Jefferson																																Jack	2
Comm. - Shay																																05-186	
28710 Via Montezuma																																	1
Comm. - Fullmer																																06-035	
27298 Via Industria																																	3
Dalton Bldg III																																Jack	
41955 5th St																																06-058	2
Field Operations Center- CIP																																05-228	
PW03-06																																Jay	4
Anthony Res. -SFR																																	
Santiago Rd																																06-048	3
			3-I								13-I								9-I						6-I								
			4-V																4-V						1-V								
											1-N														1-C								

I = Inspected
V = Verbal
N = Inspection Notice Issued
F = Follow-Up Required

M/C = Met/Called Responsible Party
CIT = Citation Issued
WB = SDRWQCB Rep Present
** = New Site

4V

102 | 49

Sept 07

NPDES Inspection Frequency Sheet

Construction

Medium Priority Sites (*Inspect three times during the wet season*)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Inspector	
Schafer Bldg			Complete																													Pat	
41463 Margarita										W																						04-214	1✓
Altura Credit Union																																	
44575 Ave De Missiones											N								N													06-012	2✓
Redhawk Pavilon																																Doug	
44060 Margarita				N										N					N	N												06-090	4✓
Artsan Comm.																																	
Deerhollow & Peachtree										N				N				N														06-199	3✓
Contract Carpet One																																Jack	
30643 79 S										N	N			N	N		N		W							W						06-148	7✓
Vineyard Custom Homes - Vernaccia																																Matt	
Ynez & Quiet Meadows												N						W		N				N								06-098	4✓
Ace Hardware																																Matt	
79 S					N						N															N						06-184	3✓
Verizon																																Rudy	
Various locations										W				W					W													various #'s	3✓
Comm - Marble Express																																	
42068 Winchester													N													N						05-196	2✓
Ynez - Rancho Water																																Matt	
Ynez / Tierra Vista													W																			06-140 ut	1✓
First Bank - New Ground			Complete																													Jack	
30715 79 S										N																						07-062	1✓
North Plaza Auto Mall-Mercer	Inactive																															03-323	
Ynez																																Jack	
Diaz Realignment CIP																																Mike	
Bus. Pk & Rancho Ca					W							N		N			N		N							N						95-27	6✓
Summer House - Pac. Cent. Group																																Doug	
Margarita & Dartolo				N						N				W																		06-131	3✓
Promenade Expansion																																Jack	
Promenade Mall					N						N							N		N				N		N		N				07-022	7✓
Rodrigos Mexican Grill - ITX Const.																																Doug	
39562 Winchester Rd					N																					N							2✓
Delgado Property																																Jack	
Santiago / Ormsby					N								N	N					N	N						N						07-005	7✓

56

1-I 14-I 6-I 9-I

5-V 7-V 9-V 1-V

1-N 1-C

I = Inspected
V = Verbal
N = Inspection Notice Issued
F = Follow-Up Required

M/C = Met/Called Responsible Party
CIT = Citation Issued
WB = SDRWQCB Rep Present
** = New Site

0001552

Sept 7

NPDES Inspection Frequency Sheet

Construction

Low Priority Sites (*Inspect as needed during the wet season*)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Inspector	
Single Family- Thomas McNab																																Doug	
44509 Verde Dr																																05-005	
SFR - Greg Koll																																	
43099 & 43091 Corte Fresca												N					IV														05-243	2
Single Family - Vito Violante																																Pat	
29880 Los Nogales Rd																																05-003	
Single Family Res. - Campora																																	
30306 Del Rey RD																																	
SFR -Naber Res																																	
43840 Vallejo Road																																05-234	
SFR -Wickes Res																																	
29765 Del Rey Rd																																05-239	
SFR - Boers Res																																	
40231 Paseo Del Cielo @ Via Val Verde																																05-238	
Cavary Baptist Church- Gary Center																																Jack	
31087 Nicolas Rd																																04-247	
SFR- Torrales																																	
30865 Via Norte														V																		05-231	1
SFR - Britt																																	
40550 Calle Madero																																06-124	
SFR - Sidhu																																	
28830 Via Norte																			IV	V												06-005	2
SFR-Fen Yong																																05-064	
30881 Del Rey Rd																																	

1-V
1-N

2-I
1-V

10

5

0001553

I = Inspected
V = Verbal
N = Inspection Notice Issued
F = Follow-up Required

M/C = Met/Called Responsible Party
CIT = Citation Issued
WB = SDRWQCB Rep Present
** = New Site

Sept 7

NPDES Inspection Frequency Sheet

Construction

Low Priority Sites (*Inspect as needed during the wet season*)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Inspector
SFR Ritenour																																Jack
39835 Calle Mudusa																																06-194
SFR Gronlund																																
29699 Avenida Del Sol																																06-170
Anthony Boyd																																Doug
40380 Calle Torcida																																06-118
SFR - Augustine																																
30535 Estero St																																07-014
SFR - Dohrman																																
30277 Via Brisa																																05-081
SFR- Dibble																																
41875 Yorba Ave																																07-024
SFR - Chacon																																Pat
40390 Calle Fiesta														N																		07-057
SFR																																Doug
Calle de Velardo					I									I												I						

City of Temecula

Public Works Department
43200 Business Park Drive▪Temecula, CA 92590▪Mailing Address: P.O. Box 9033▪Temecula, CA 92589-9033
(951) 694-6411 ▪ Fax (951) 694-6475

September 6, 2007

To: Property Owners, Developers, Project Managers, Field Superintendents, and Contractors.

RE: National Pollution Discharge Elimination System (NPDES) requirements for construction sites.

The City of Temecula is requiring **Year-Round pollution prevention measures,** also known as Best Management Practices (BMPs), at every permitted construction site throughout the City. Illegal discharges must be prevented throughout your site and from entering and leaving any storm drain system. **Additional 'Wet-Weather' measures must also be implemented between October 1st and April 30th** in order to prevent erosion and sediment discharges.

In addition, compliance with the State General Construction Permit is required if your project disturbs, exposes, or stockpiles one acre or more of soil. If applicable, a Notice of Intent (NOI) must be filed with the State, proof of a Waste Discharge Identification (WDID) Number must be provided to the City, and a Storm Water Pollution Prevention Plan (SWPPP) must be onsite. The SWPPP must be implemented throughout the duration of the project, readily available to City and State inspectors, and updated as site conditions change.

At a minimum, the following requirements must be implemented at each site:

- All onsite and offsite flow-lines, inlets, outlets, streets, and gutters shall be free of sediment, construction materials, construction waste, and miscellaneous debris;
- Construction waste and miscellaneous debris shall be placed in enclosed trash bins. No wire mesh or damaged wood trash receptacles will be allowed. Prior to any forecasted rain, these bins shall be covered with a lid or plastic tarp;
- Wet-Weather erosion and sediment controls shall be installed and maintained throughout the entire site prior to October 1st;
- Prior to any forecasted rain, additional erosion and sediment control materials shall be stockpiled at various locations throughout the site for immediate implementation;
- Wash-out stations shall be provided for concrete, paints, stucco, etc. and shall be lined with plastic and located away from streets, sidewalk right-of-ways, and drainage inlets;

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- Portable toilets shall be placed away from streets, sidewalks, flowlines, and drainage inlets;
- A combination of rock and shaker plates shall be installed at all construction access locations. Interior access points (driveways, staging areas, etc.) shall also have rock accesses;
- All completed slopes and inactive pads shall have BMP protection;
- All portable mixers shall have plastic under-liners with gravel bags placed on the down-hill side of the liners to contain discharges;
- Street sweeping shall be performed on all paved streets within the site and outside of all construction exits on a regular basis. A street sweeper shall also be operating during all hauling operations;
- Vacuum sweepers shall be used when street sweeping become ineffective;
- Water shall be filtered out from retention/desilting basins within 72-hours of collection;
- Erosion and Sediment Control plans and Standard Notes must be followed at all times;
- Project developer is responsible for all discharges from all site personnel, including subcontractors and landscapers.

City inspectors will conduct 'wet-weather' inspections beginning **October 1st** at each site. Failure to implement effective BMPs by October 1st will result in citations, Stop Work notices, suspension of business licenses, withholding of occupancies, and case referrals to the San Diego Regional Water Quality Control Board. If existing BMPs are inadequate, additional ones will be required by City inspectors.

Please call us at (951) 694-6411 if you have any questions regarding this information.

Sincerely,

Aldo Licitra

Aldo Licitra
NPDES Program

ATTACHMENT C

MUNICIPAL PROGRAM

- Debris Tonnage Report
- Monthly Catch Basin Maintenance Logs

CITY OF TEMECULA

TONNAGE REPORT

2007	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Totals
Residential													
REFUSE	2,332.04	1,928.89	2,189.82	2,175.30	2,298.14	2,269.66	2,383.03	2,370.90	1,960.20	2,207.02	2,167.48	2,140.29	26,422.77
RECYCLING	996.68	826.85	951.44	945.71	997.07	938.35	944.51	966.62	807.57	922.49	971.44	975.49	11,244.22
GREEN WASTE	1,182.31	987.02	1,473.78	1,542.65	1,458.29	1,427.96	1,390.49	1,600.67	1,363.54	1,333.65	1,397.96	1,094.89	16,253.21
TOTAL TONS	4,511.03	3,742.76	4,615.04	4,663.66	4,753.50	4,635.97	4,718.03	4,938.19	4,131.31	4,463.16	4,536.88	4,210.67	53,920.20
DIVERSION RATE %	**48.30%**	**48.46%**	**52.55%**	**53.36%**	**51.65%**	**51.04%**	**49.49%**	**51.99%**	**52.55%**	**50.55%**	**52.23%**	**49.17%**	**51.00%**
Commercial													
REFUSE	3,433.65	2,987.78	3,262.47	3,159.58	3,281.74	3,344.68	3,175.66	3,408.01	2,962.62	3,485.68	3,065.63	3,140.93	38,708.42
RECYCLING	198.84	184.61	192.06	185.22	201.04	188.16	188.95	191.12	176.73	203.74	198.39	203.72	2,312.58
SWEEPER WASTE	184.72	141.67	181.54	142.21	130.00	140.14	135.61	133.47	125.69	220.67	174.36	192.05	1,902.13
MRF RECOVERED	116.74	167.97	279.30	274.16	349.95	280.12	197.34	262.43	221.35	121.58	233.36	246.99	2,751.32
TOTAL TONS	3,817.21	3,314.06	3,636.07	3,487.01	3,612.78	3,672.98	3,500.22	3,732.60	3,265.04	3,910.09	3,438.38	3,536.70	42,923.13
DIVERSION RATE %	**13.11%**	**14.91%**	**17.96%**	**17.25%**	**18.85%**	**16.56%**	**14.91%**	**15.73%**	**16.04%**	**13.96%**	**17.63%**	**18.17%**	**16.23%**
Construction													
C&D INBOUND	1,833.38	1,601.16	1,680.18	1,900.83	3,578.97	1,766.75	1,979.14	2,523.64	1,907.78	1,845.89	1,324.28	1,004.85	22,946.85
C&D PROCESSED	1,256.24	1,117.17	1,368.24	1,612.85	2,249.65	1,016.84	1,914.35	2,186.82	1,357.52	1,679.15	1,515.64	964.86	18,239.33
RESIDUAL	174.18	76.02	174.57	197.03	360.39	161.46	254.55	373.19	161.09	108.02	142.02	229.76	2,412.27
C&D RECOVERED	1,082.06	1,041.15	1,193.67	1,415.82	1,889.26	855.38	1,659.80	1,813.63	1,196.44	1,571.13	1,373.62	735.10	15,827.06
DIVERSION RATE %	**86.13%**	**93.20%**	**87.24%**	**87.78%**	**83.98%**	**84.12%**	**86.70%**	**82.93%**	**88.13%**	**93.57%**	**90.63%**	**76.19%**	**86.77%**
Roll Off													
REFUSE	1,942.54	1,632.75	2,093.15	1,917.70	2,024.58	1,963.83	2,118.37	2,052.23	1,648.44	2,029.35	1,863.62	1,584.33	22,870.89
RECYCLING	118.01	107.05	115.57	124.55	114.95	115.46	111.60	129.97	122.08	132.06	143.56	109.37	1,444.23
GREEN WASTE	32.92	36.07	53.45	50.13	111.66	66.62	73.88	52.34	66.89	83.04	122.28	85.77	835.05
TOTAL TONS	2,093.47	1,775.87	2,262.17	2,092.38	2,251.19	2,145.91	2,303.85	2,234.54	1,837.41	2,244.45	2,129.46	1,779.47	25,150.17
DIVERSION RATE %	**7.21%**	**8.06%**	**7.47%**	**8.35%**	**10.07%**	**8.48%**	**8.05%**	**8.16%**	**10.28%**	**9.58%**	**12.48%**	**10.97%**	**9.06%**
City Services													
REFUSE	219.80	158.43	107.25	70.45	90.53	37.74	62.56	35.99	10.10	6.88	14.46	13.45	827.64
RECYCLING	-	-	-	14.89	0.94	3.91	50.24	67.16	29.54	121.14	63.54	23.45	374.81
C&D	-	-	-	18.07	31.61	-	-	32.79	11.02	-	32.63	-	126.12
GREEN WASTE	-	-	-	-	7.30	46.65	36.30	41.30	35.99	60.97	59.15	32.98	320.64
SWEEPER WASTE	-	-	-	-	-	-	-	-	-	-	-	-	-
TOTAL TONS	219.80	158.43	107.25	103.41	130.38	88.30	149.10	177.24	86.65	188.99	169.78	69.88	1,649.21
DIVERSION RATE %	**0.00%**	**0.00%**	**0.00%**	**14.40%**	**6.32%**	**57.26%**	**58.04%**	**61.19%**	**75.63%**	**96.36%**	**72.26%**	**80.75%**	**42.17%**
City Clean Up													
REFUSE	-	-	-	-	106.46	-	-	-	-	117.99	-	-	224.45
Summary													
REFUSE / RESIDUAL	8,102.21	6,783.87	7,827.26	7,520.06	8,161.84	7,777.37	7,994.17	8,240.32	6,742.45	7,954.94	7,253.20	7,108.75	91,466.44
RECYCLING	1,313.53	1,118.51	1,259.07	1,270.37	1,314.00	1,245.88	1,295.30	1,354.87	1,135.92	1,379.43	1,376.93	1,312.03	15,375.84
GREEN WASTE	1,215.23	1,023.09	1,527.23	1,592.78	1,577.25	1,541.23	1,500.67	1,694.31	1,466.42	1,477.66	1,579.39	1,213.64	17,408.90
SWEEPER WASTE	184.72	141.67	181.54	142.21	130.00	140.14	135.61	133.47	125.69	220.67	174.36	192.05	1,902.13
C&D	1,833.38	1,601.16	1,680.18	1,918.90	3,610.58	1,766.75	1,979.14	2,556.43	1,918.80	1,845.89	1,356.91	1,004.85	23,072.97
RECOVERED MRF&CD	1,198.80	1,209.12	1,472.97	1,689.98	2,239.21	1,135.50	1,857.14	2,076.06	1,417.79	1,692.72	1,607.00	982.09	18,578.38
TOTAL TONS	12,649.07	10,668.30	12,475.28	12,444.32	14,793.67	12,471.37	12,904.89	13,979.40	11,389.28	12,878.59	11,740.79	10,831.32	149,226.28
DIVERSION RATE %	**36.17%**	**38.52%**	**41.14%**	**44.61%**	**47.04%**	**37.95%**	**43.83%**	**46.04%**	**43.78%**	**43.24%**	**45.63%**	**37.65%**	**42.22%**

26,998.2

INCLUDES RESIDENTIAL

981.9

0001558

Prepared By Raul Saldana

03/18/2008 - 7:52 AM

12-07 Diversion Report - Temecula.xls

CR&R

CITY OF TEMECULA

SOLID WASTE & RECYCLING TONS SUMMARY REPORT

RESIDENTIAL — MULTI-FAMILY

MONTH	CURBSIDE RECYCLABLES	CURBSIDE GREENWASTE	CURBSIDE WASTE	CURBSIDE DIVERSION	MULTI-FAMILY RECYCLABLES	MULTI-FAMILY WASTE	MULTI-FAMILY DIVERSION	TOTAL RES DIVERSION	BIO-MASS DIVERSION
Jan-08	1,000.60	1,066.84	2187.37	48.59%	0.00	0.00	#DIV/0!	48.59%	71.74
Feb-08	832.54	963.19	1934.56	48.14%	0.00	0.00	#DIV/0!	48.14%	85.60
Mar-08	869.26	1,355.36	2031.67	52.27%	0.00	0.00	#DIV/0!	52.27%	107.84
Apr-08	875.39	1,450.30	2172.70	51.70%	0.00	0.00	#DIV/0!	51.70%	164.92
May-08	879.24	1,446.46	2186.07	51.55%	0.00	0.00	#DIV/0!	51.55%	130.95
Jun-08	793.74	1,295.97	1937.07	51.90%	0.00	0.00	#DIV/0!	51.90%	81.33
Jul-08	869.52	1,446.28	2191.47	51.38%	0.00	0.00	#DIV/0!	51.38%	116.23
Aug-08	777.74	1,301.20	2009.77	50.85%	0.00	0.00	#DIV/0!	50.85%	113.69
Sep-08				#DIV/0!			#DIV/0!	#DIV/0!	
Oct-08				#DIV/0!			#DIV/0!	#DIV/0!	
Nov-08				#DIV/0!			#DIV/0!	#DIV/0!	
Dec-08				#DIV/0!			#DIV/0!	#DIV/0!	
TOTAL	6,898.03	10,325.60	16,650.68	50.85%	0.00	0.00	#DIV/0!	#DIV/0!	872.30
2008 YTD TOTAL	6,898.03	10,325.60	16,650.68	50.85%	0.00	0.00	#DIV/0!	50.85%	872.30

5,250.8 7,518.1 12,444.4 = 25,218.3

COMMERCIAL — ROLL-OFF

MONTH	SEPARATED RECYCLABLES	DIVERTED SWEEPER WASTE	MRF RECOVERED RECYCLABLES	COMMERCIAL WASTE	COMMERCIAL DIVERSION	SOURCE SPEARATED	ROLL OFF RECYCLABLES	ROLL-OFF GREENWASTE	ROLL-OFF WASTE	ROLL-OFF DIVERSION
Jan-08	217.77	145.55	187.53	3,215.05	14.63%	87.45	0.00	86.26	1,472.39	10.55%
Feb-08	173.28	139.81	157.67	2,932.23	13.83%	73.68	0.00	45.85	1,381.38	7.96%
Mar-08	164.52	138.06	134.82	2,917.75	13.04%	92.39	0.00	147.40	1,494.09	13.83%
Apr-08	168.23	135.99	160.51	2,828.51	14.11%	98.54	0.00	75.42	1,555.31	10.06%
May-08	177.55	116.49	193.62	2,954.31	14.17%	85.32	0.00	74.63	1,511.17	9.57%
Jun-08	174.54	103.51	190.37	2,798.32	14.34%	80.24	0.00	22.95	1,456.45	6.62%
Jul-08	173.14	95.77	178.46	2,764.65	13.93%	77.01	0.00	82.92	1,434.00	10.03%
Aug-08	165.42	76.35	128.17	2,762.51	11.81%	83.79	0.00	13.27	1,446.44	6.29%
Sep-08					#DIV/0!					#DIV/0!
Oct-08					#DIV/0!					#DIV/0!
Nov-08					#DIV/0!					#DIV/0!
Dec-08					#DIV/0!					#DIV/0!
TOTAL	1,414.45	951.53	1,331.15	23,173.33	13.76%	678.42	0.00	548.70	11,751.23	9.46%
2008 YTD TOTAL	1,414.45	951.53	1,331.15	23,173.33	13.76%	678.42	0.00	548.70	11,751.23	9.46%

779.4 → INCLUDES RESIDENTIAL

C&D PROCESSING — CITY SERVICES

MONTH	SOURCE SEPARATED	C&D MATERIAL DIVERTED	C&D RESIDUAL WASTE	C&D DIVERSION	SEPARATED RECYCLABLES	C&D MATERIAL	GREENWASTE	SWEEPER WASTE	RESIDUAL WASTE	CITY DIVERSION
Jan-08	22.03	326.11	140.80	71.20%	24.48	0.00	60.90	0.00	4.55	94.94%
Feb-08	49.70	862.69	236.44	79.42%	2.68	0.00	36.43	0.00	27.51	58.71%
Mar-08	8.39	735.32	53.36	93.31%	55.16	0.00	15.19	0.00	9.87	87.70%
Apr-08	130.28	1,160.69	45.94	96.56%	90.61	26.17	28.64	0.00	22.53	86.59%
May-08	18.10	875.25	8.39	99.07%	49.85	0.00	15.26	0.00	13.71	82.61%
Jun-08	101.79	666.01	10.51	98.65%	85.34	8.02	33.27	0.00	1.23	99.04%
Jul-08	74.47	1,011.83	51.51	95.47%	35.66	0.00	46.40	0.00	33.18	71.21%
Aug-08	63.91	1,107.00	0.82	99.93%	84.48	0.00	55.13	0.00	0.91	99.35%
Sep-08				#DIV/0!						#DIV/0!
Oct-08				#DIV/0!						#DIV/0!
Nov-08				#DIV/0!						#DIV/0!
Dec-08				#DIV/0!						#DIV/0!
TOTAL	468.67	6,744.90	547.77	92.94%	428.26	34.19	291.22	0.00	113.49	86.91%
2008 YTD TOTAL	468.67	6,744.90	547.77	92.94%	428.26	34.19	291.22	0.00	113.49	86.91%

OVERALL TOTAL

MONTH	TOTAL DIVERTED	TOTAL LANDFILLED	OVERALL DIVERSION
Jan-08	3,297.26	7,020.16	31.96%
Feb-08	3,423.12	6,512.12	34.45%
Mar-08	3,823.71	6,506.74	37.01%
Apr-08	4,565.69	6,624.99	40.80%
May-08	4,062.72	6,673.65	37.84%
Jun-08	3,637.08	6,203.58	36.96%
Jul-08	4,207.69	6,474.81	39.39%
Aug-08	3,970.15	6,220.45	38.96%
Sep-08	-	-	#DIV/0!
Oct-08	-	-	#DIV/0!
Nov-08	-	-	#DIV/0!
Dec-08	-	-	#DIV/0!
TOTAL	30,987.42	52,236.50	37.23%
2008 YTD TOTAL	30,987.42	52,236.50	37.23%

THIS REPORT REFLECTS THE MOST UP-TO-DATE INFORMATION FOR ALL MONTHS LISTED.

CITY OF TEMECULA
DEPARTMENT OF PUBLIC WORKS
ROADS DIVISION

CATCH BASIN MAINTENANCE

MONTH OF JULY, 2007

DATE	LOCATION	WORK COMPLETED	
07/09/07	CITYWIDE	CLEANED & CHECKED	8 CATCH BASINS
07/16/07	CITYWIDE	CLEANED & CHECKED	19 CATCH BASINS
07/17/07	WINCHESTER CREEK AREA	CLEANED & CHECKED	4 CATCH BASINS
07/18/07	WINCHESTER CREEK AREA	CLEANED & CHECKED	6 CATCH BASINS
07/19/07	CITYWIDE	CLEANED & CHECKED	2 CATCH BASINS
07/23/07	CITYWIDE	CLEANED & CHECKED	16 CATCH BASINS
07/24/07	JEFFERSON AT WINCHESTER	CLEANED & CHECKED	2 CATCH BASINS
07/24/07	MALL AREA	CLEANED & CHECKED	7 CATCH BASINS
07/25/07	INSIDE MALL AREA	CLEANED & CHECKED	6 CATCH BASINS
07/25/07	OAK CLIFF AT QUAD SLOPE	CLEANED & CHECKED	2 CATCH BASINS
07/25/07	RUSTIC GLEN AT MARGARITA	CLEANED & CHECKED	1 CATCH BASINS
07/25/07	KNOLL RIDGE AT CREATIVE	CLEANED & CHECKED	1 CATCH BASINS
07/26/07	KNOLL RIDGE AT MAJELLO	CLEANED & CHECKED	2 CATCH BASINS
07/26/07	27152 MAJELLO	CLEANED & CHECKED	1 CATCH BASINS
07/26/07	DATE AT MARGARITA	CLEANED & CHECKED	1 CATCH BASINS
07/30/07	CITYWIDE	CLEANED & CHECKED	13 CATCH BASINS
	TOTAL CATCH BASINS CLEANED & CHECKED	**91**	

CITY OF TEMECULA
DEPARTMENT OF PUBLIC WORKS
ROADS DIVISION

CATCH BASIN MAINTENANCE

MONTH OF AUGUST, 2007

DATE	LOCATION	WORK COMPLETED	
08/01/07	AREA #4	CLEANED & CHECKED	7 CATCH BASINS
08/06/07	CITYWIDE	CLEANED & CHECKED	11 CATCH BASINS
0807/07	OVERLAND	CLEANED & CHECKED	2 CATCH BASINS
08/13/07	CITYWIDE	CLEANED & CHECKED	9 CATCH BASINS
08/20/07	CITYWIDE	CLEANED & CHECKED	8 CATCH BASINS
08/21/07	MEADOWVIEW AREA	CLEANED & CHECKED	26 CATCH BASINS
08/27/07	CITYWIDE	CLEANED & CHECKED	23 CATCH BASINS
08/30/07	JEFFERSON	CLEANED & CHECKED	3 CATCH BASINS
	TOTAL CATCH BASINS CLEANED & CHECKED 89		

CITY OF TEMECULA
DEPARTMENT OF PUBLIC WORKS
ROADS DIVISION

CATCH BASIN MAINTENANCE

MONTH OF SEPTEMBER, 2007

DATE	LOCATION	WORK COMPLETED	
09/04/07	CITYWIDE	CLEANED & CHECKED	21 CATCH BASINS
09/10/07	CITYWIDE	CLEANED & CHECKED	13 CATCH BASINS
09/11/07	AREA #1	CLEANED & CHECKED	44 CATCH BASINS
09/12/07	AREA #1	CLEANED & CHECKED	42 CATCH BASINS
09/17/07	CITYWIDE	CLEANED & CHECKED	10 CATCH BASINS
09/24/07	CITYWIDE	CLEANED & CHECKED	20 CATCH BASINS
09/25/07	AREA #2	CLEANED & CHECKED	8 CATCH BASINS
09/26/07	AREA #2	CLEANED & CHECKED	22 CATCH BASINS
09/27/07	CITYWIDE	CLEANED & CHECKED	20 CATCH BASINS
	TOTAL CATCH BASINS CLEANED & CHECKED	**200**	

CITY OF TEMECULA
DEPARTMENT OF PUBLIC WORKS
ROADS DIVISION

CATCH BASIN MAINTENANCE

MONTH OF OCTOBER, 2007

DATE	LOCATION	WORK COMPLETED	
10/01/07	CITYWIDE	CLEANED & CHECKED	13 CATCH BASINS
10/02/07	AREA #1	CLEANED & CHECKED	16 CATCH BASINS
10/08/07	CITYWIDE	CLEANED & CHECKED	18 CATCH BASINS
10/15/07	CITYWIDE	CLEANED & CHECKED	23 CATCH BASINS
10/16/07	AREA #1	CLEANED & CHECKED	16 CATCH BASINS
10/17/07	AREA #2	CLEANED & CHECKED	14 CATCH BASINS
10/18/07	AREA #2	CLEANED & CHECKED	15 CATCH BASINS
10/24/07	CITYWIDE	CLEANED & CHECKED	6 CATCH BASINS
10/25/07	CITYWIDE	CLEANED & CHECKED	9 CATCH BASINS
10/29/07	CITYWIDE	CLEANED & CHECKED	22 CATCH BASINS
10/30/07	CITYWIDE	CLEANED & CHECKED	20 CATCH BASINS
10/31/07	CITYWIDE	CLEANED & CHECKED	4 CATCH BASINS
	TOTAL CATCH BASINS CLEANED & CHECKED 176		

CITY OF TEMECULA
DEPARTMENT OF PUBLIC WORKS
ROADS DIVISION

CATCH BASIN MAINTENANCE

MONTH OF NOVEMBER, 2007

DATE	LOCATION	WORK COMPLETED	
11/01/07	CITYWIDE	CLEANED & CHECKED	9 CATCH BASINS
11/05/07	CITYWIDE	CLEANED & CHECKED	17 CATCH BASINS
11/06/07	AREA #2	CLEANED & CHECKED	19 CATCH BASINS
11/07/07	AREA #2	CLEANED & CHECKED	12 CATCH BASINS
11/08/07	AREA #3	CLEANED & CHECKED	12 CATCH BASINS
11/13/07	CITYWIDE	CLEANED & CHECKED	21 CATCH BASINS
11/14/07	AREA #3	CLEANED & CHECKED	13 CATCH BASINS
11/15/07	AREA #3	CLEANED & CHECKED	8 CATCH BASINS
11/19/07	CITYWIDE	CLEANED & CHECKED	19 CATCH BASINS
11/20/07	AREA #3	CLEANED & CHECKED	12 CATCH BASINS
11/26/07	CITYWIDE	CLEANED & CHECKED	25 CATCH BASINS
11/27/07	AREA #3	CLEANED & CHECKED	11 CATCH BASINS
11/28/07	AREA #3	CLEANED & CHECKED	20 CATCH BASINS
11/29/07	CITYWIDE	CLEANED & CHECKED	11 CATCH BASINS
	TOTAL CATCH BASINS CLEANED & CHECKED	**209**	

CITY OF TEMECULA
DEPARTMENT OF PUBLIC WORKS
ROADS DIVISION

CATCH BASIN MAINTENANCE

MONTH OF DECEMBER, 2007

DATE	LOCATION	WORK COMPLETED		
12-03-07	CITY WIDE RAIN	CLEANED & CHECKED	15	CATCH BASINS
12-04-07	CITY WIDE RAIN	CLEANED & CHECKED	19	CATCH BASINS
12-05-07	CITY WIDE	CLEANED & CHECKED	9	CATCH BASINS
12-10-07	CITY WIDE	CLEANED & CHECKED	26	CATCH BASINS
12-13-07	CITY WIDE	CLEANED & CHECKED	12	CATCH BASINS
12-17-07	CITY WIDE	CLEANED & CHECKED	18	CATCH BASINS
12-19-07	CITY WIDE	CLEANED & CHECKED	12	CATCH BASINS
12-20-07	AREA #4	CLEANED & CHECKED	15	CATCH BASINS
12-24-07	CITY WIDE	CLEANED & CHECKED	28	CATCH BASINS
	TOTAL CATCH BASINS CLEANED & CHECKED		154	

CITY OF TEMECULA
DEPARTMENT OF PUBLIC WORKS
ROADS DIVISION

CATCH BASIN MAINTENANCE

MONTH OF JANUARY, 2008

DATE	LOCATION	WORK COMPLETED	
1-2-8	City Wide	CLEANED & CHECKED	12 CATCH BASINS
1-8-8	City Wide Rain	CLEANED & CHECKED	27 CATCH BASINS
1-14-8	City Wide Rain	CLEANED & CHECKED	27 CATCH BASINS
1-16-8	Area #4	CLEANED & CHECKED	9 CATCH BASINS
1-17-8	Area #4	CLEANED & CHECKED	9 CATCH BASINS
1-22-8	City Wide	CLEANED & CHECKED	20 CATCH BASINS
1-23-8	Area #5	CLEANED & CHECKED	31 CATCH BASINS
1-24-8	City Wide	CLEANED & CHECKED	19 CATCH BASINS
1-25-8	City Wide	CLEANED & CHECKED	8 CATCH BASINS
1-28-8	City Wide	CLEANED & CHECKED	12 CATCH BASINS
		CLEANED & CHECKED	CATCH BASINS
		CLEANED & CHECKED	CATCH BASINS
		CLEANED & CHECKED	CATCH BASINS
		CLEANED & CHECKED	CATCH BASINS
		CLEANED & CHECKED	CATCH BASINS
		CLEANED & CHECKED	CATCH BASINS
		CLEANED & CHECKED	CATCH BASINS
		CLEANED & CHECKED	CATCH BASINS
		CLEANED & CHECKED	CATCH BASINS
		CLEANED & CHECKED	CATCH BASINS
		CLEANED & CHECKED	CATCH BASINS
		CLEANED & CHECKED	CATCH BASINS
		CLEANED & CHECKED	CATCH BASINS
	TOTAL CATCH BASINS CLEANED & CHECKED		**171**

CITY OF TEMECULA
DEPARTMENT OF PUBLIC WORKS
ROADS DIVISION

CATCH BASIN MAINTENANCE

MONTH OF FEBRUARY, 2008

DATE	LOCATION	WORK COMPLETED		
2-4-8	CITY WIDE	CLEANED & CHECKED	25	CATCH BASINS
2-6-8	CITY WIDE	CLEANED & CHECKED	18	CATCH BASINS
2-7-8	CITY WIDE	CLEANED & CHECKED	5	CATCH BASINS
2-11-8	CITY WIDE	CLEANED & CHECKED	6	CATCH BASINS
2-13-8	AREA #5	CLEANED & CHECKED	5	CATCH BASINS
2-14-8	CITY WIDE RAIN	CLEANED & CHECKED	11	CATCH BASINS
2-19-8	CITY WIDE RAIN	CLEANED & CHECKED	13	CATCH BASINS
2-20-8	TEMECULA PKWY	CLEANED & CHECKED	4	CATCH BASINS
2-25-8	CITY WIDE	CLEANED & CHECKED	33	CATCH BASINS
		CLEANED & CHECKED		CATCH BASINS
		CLEANED & CHECKED		CATCH BASINS
		CLEANED & CHECKED		CATCH BASINS
		CLEANED & CHECKED		CATCH BASINS
		CLEANED & CHECKED		CATCH BASINS
		CLEANED & CHECKED		CATCH BASINS
		CLEANED & CHECKED		CATCH BASINS
		CLEANED & CHECKED		CATCH BASINS
		CLEANED & CHECKED		CATCH BASINS
		CLEANED & CHECKED		CATCH BASINS
		CLEANED & CHECKED		CATCH BASINS
		CLEANED & CHECKED		CATCH BASINS
		CLEANED & CHECKED		CATCH BASINS
		CLEANED & CHECKED		CATCH BASINS
	TOTAL CATCH BASINS CLEANED & CHECKED	**120**		

CITY OF TEMECULA
DEPARTMENT OF PUBLIC WORKS
ROADS DIVISION

CATCH BASIN MAINTENANCE

MONTH OF MARCH, 2008

DATE	LOCATION	WORK COMPLETED	
03/03/08	CITYWIDE	CLEANED & CHECKED	19 CATCH BASINS
03/05/08	CITYWIDE	CLEANED & CHECKED	3 CATCH BASINS
03/10/08	CITYWIDE	CLEANED & CHECKED	9 CATCH BASINS
03/17/08	CITYWIDE	CLEANED & CHECKED	12 CATCH BASINS
03/18/08	LOW FLOW	CLEANED & CHECKED	5 CATCH BASINS
03/19/08	CITYWIDE	CLEANED & CHECKED	8 CATCH BASINS
03/20/08	AREA #4	CLEANED & CHECKED	27 CATCH BASINS
03/24/08	CITYWIDE	CLEANED & CHECKED	10 CATCH BASINS
03/26/08	CITYWIDE	CLEANED & CHECKED	11 CATCH BASINS
03/31/08	CITYWIDE	CLEANED & CHECKED	34 CATCH BASINS
	TOTAL CATCH BASINS CLEANED & CHECKED	**138**	

CITY OF TEMECULA
DEPARTMENT OF PUBLIC WORKS
ROADS DIVISION

CATCH BASIN MAINTENANCE

MONTH OF APRIL, 2008

DATE	LOCATION	WORK COMPLETED	
04/03/08	AREA #4	CLEANED & CHECKED	11 CATCH BASINS
04/07/08	CITYWIDE	CLEANED & CHECKED	23 CATCH BASINS
04/08/08	AREA #4	CLEANED & CHECKED	30 CATCH BASINS
04/09/08	AREA #4	CLEANED & CHECKED	23 CATCH BASINS
04/10/08	AREA #4	CLEANED & CHECKED	10 CATCH BASINS
04/14/08	CITYWIDE	CLEANED & CHECKED	27 CATCH BASINS
04/17/08	AREA #4	CLEANED & CHECKED	30 CATCH BASINS
04/21/08	CITYWIDE	CLEANED & CHECKED	23 CATCH BASINS
04/22/08	AREA #5	CLEANED & CHECKED	11 CATCH BASINS
04/23/08	AREA #5	CLEANED & CHECKED	9 CATCH BASINS
04/24/08	AREA #5	CLEANED & CHECKED	5 CATCH BASINS
04/28/08	CITYWIDE HOT SPOTS	CLEANED & CHECKED	21 CATCH BASINS
04/30/08	JEFFERSON AT WINCHESTER	CLEANED & CHECKED	2 CATCH BASINS
04/30/08	AREA #5	CLEANED & CHECKED	2 CATCH BASINS
	TOTAL CATCH BASINS CLEANED & CHECKED	**227**	

CITY OF TEMECULA
DEPARTMENT OF PUBLIC WORKS
ROADS DIVISION

CATCH BASIN MAINTENANCE

MONTH OF MAY, 2008

DATE	LOCATION	WORK COMPLETED	
05/01/08	AREA #5	CLEANED & CHECKED	11 CATCH BASINS
05/05/08	CITYWIDE	CLEANED & CHECKED	20 CATCH BASINS
05/06/08	AREA #5	CLEANED & CHECKED	10 CATCH BASINS
05/12/08	CITYWIDE	CLEANED & CHECKED	13 CATCH BASINS
05/15/08	AREA #5	CLEANED & CHECKED	9 CATCH BASINS
05/19/08	CITYWIDE	CLEANED & CHECKED	18 CATCH BASINS
05/23/08	CITYWIDE	CLEANED & CHECKED	16 CATCH BASINS
05/27/08	CITYWIDE	CLEANED & CHECKED	17 CATCH BASINS
	TOTAL CATCH BASINS CLEANED & CHECKED	**114**	

CITY OF TEMECULA
DEPARTMENT OF PUBLIC WORKS
ROADS DIVISION

CATCH BASIN MAINTENANCE

MONTH OF JUNE, 2008

DATE	LOCATION	WORK COMPLETED	
06/02/08	CITYWIDE	CLEANED & CHECKED	24 CATCH BASINS
06/09/08	CITYWIDE	CLEANED & CHECKED	23 CATCH BASINS
06/12/08	CITYWIDE	CLEANED & CHECKED	22 CATCH BASINS
06/16/08	CITYWIDE	CLEANED & CHECKED	15 CATCH BASINS
06/23/08	CITYWIDE	CLEANED & CHECKED	17 CATCH BASINS
06/24/08	AREA 5	CLEANED & CHECKED	15 CATCH BASINS
06/25/08	JEFFERSON	CLEANED & CHECKED	2 CATCH BASINS
06/30/08	CITYWIDE	CLEANED & CHECKED	21 CATCH BASINS
	TOTAL CATCH BASINS CLEANED & CHECKED 139		

ATTACHMENT D

INDUSTRIAL/COMMERCIAL PROGRAM

- Example of Completed NPDES Inspection form for Commercial/Industrial Facilities

0001578

NPDES Inspection For Commercial / Industrial Facilities

NPDES Program
43200 Business Park Drive, Temecula, CA.
(951) 694-6411
www.cityoftemecula.org

Name of Inspector:	Chandra Santiago		
Type of Inspection:	[x] Routine	[ ] Follow-up	[ ] Complaint Investigation
Date:	6-25-08		
Received By:	X James M. [illegible]		

A. CONTACT INFORMATION

Facility Name Collision Center of Temecula **Category:** [ ] Industrial [✓] Commercial

Street Address 27590 & 27598 Commerce center drive **Contact Number:** 951 695 1233

Contact Person Chuck Kammer **Mailing Address (if different):**

B. FACILITY / SITE INFORMATION:

Description of Site Activities: Auto Body Repair & Paint

SIC / NAIC Code (circle one): 7538 **Revised SIC/NAIC Code:**

Priority Classification: [✓] High [ ] Medium [ ] Low

Revised Priority Classification: [✓] High [ ] Medium [ ] Low

Does facility have a current business license? [✓] Yes [ ] No # Exp.

Is facility subject to CA Statewide General Industrial Permit? [ ] Yes [✓] No **WDID #:**

- **If no, does facility have No Exposure Certification (NEC)?** [ ] Yes [✓] No
- **Does facility maintain a SWPPP or equivalent plan?** [ ] Yes [✓] No
- **Are all BMPs implemented?** [ ] Yes [✓] No
- **Does facility maintain a Stormwater Monitoring Plan?** [ ] Yes [✓] No
- **Were storm water samples collected last rain season?** [ ] Yes [✓] No
- **Were sample results within effluent guidelines?** [ ] Yes [✓] No

List the surface flow paths from facility to Murrieta Creek flows via ribbon gutter to street.

C. BEST MANAGEMENT PRACTICES (BMP) ASSESSMENT:

		N/A	Yes	No	Comments
C.1	**General Areas**				
a.	Is the site free of evidence of unauthorized releases?		✓		
b.	Is the site free of evidence of illicit connections?		✓		
c.	Are onsite inlets and flowlines free of dirt, litter, stains, other material?		✓		
d.	Are onsite inlets and flowlines protected from unauthorized releases?		✓		
e.	Is washwater from all cleaning activities disposed properly? Where to?		✓		to sewer
f.	Are biodegradable soaps used? Specify activity.		✓		
g.	Is roof water drained to parking lot / landscaping?		✓		
C.2	**Landscaped Areas**				
a.	Are adequate erosion prevention measures employed? (vegetation or physical stabilization)		✓		
b.	Are irrigation systems programmed to minimize over-watering and runoff?		✓		

NPDES Inspection For Commercial / Industrial Facilities

NPDES Program
43200 Business Park Drive, Temecula, CA.
(951) 694-6411
www.cityoftemecula.org

C. BEST MANAGEMENT PRACTICES (BMP) ASSESSMENT (Contd.):

		N/A	Yes	No	Comments
c.	Are inlets or flowlines free of landscape waste (tree or shrub trimmings, grass clippings, etc)?		/		
d.	Is landscape material (fertilizers, pesticides, etc) stored onsite/protected against runoff?		/		
C.3	**Materials and Wastes Areas**				
a.	Are all materials and activities protected from exposure to stormwater?			/	
b.	Are adequate trash containers provided? (covered, no leaks)		/		
	Are these areas free of litter and stains?		/		
c.	Are adequate recycling containers provided? (covered, no leaks)	/			
	Are these areas free of litter and stains?	/			
d.	Is service provided to prevent trash and recycling containers from overflowing?		/		
e.	Are adequate material storage areas provided (covered, secondary containment, limited access, properly labeled, free of stains)?			/	
f.	Is there an accessible spill response kit?	-3	/		
g.	Are reporting procedures readily available in the event of a release?		/		
h.	Are aboveground storage tanks (greater than 250 gallons) equipped with secondary containment?	/			
	If yes, is the secondary containment monitored for spills & leaks? How often?	/			
i.	Are loading and unloading areas free of litter and stains?		/		
j.	Are inlets, if any, protected/connected to santitary sewer?	/			
k.	Is run-on diverted from entering into these areas?	/			
C.4	**Equipment and Vehicle Areas**				
a.	Are common parking areas and driveways free of litter, stains, non-stormwater liquids?		/		
b.	Are vehicles and equipment stored indoors or under canopies?		/		
c.	Are vehicles and equipment maintained or repaired indoors?		/		
	If not, where?				
d.	Is runoff contained or treated at maintenance areas?		/		
e.	Is runoff contained or treated at fueling areas?	/			
f.	Is runoff contained or treated at wash areas?		/		
g.	Is run-on diverted from entering into these areas?		/		
C.5	**Other**				
a.	Is employee training provided / Information posted?		/		
b.	Specify the number of accidental releases within the past 12 months.	----	----	----	
c.	Does the facility have pollution prevention policies/procedures/plan?		/		
d.	Have all concerns been addressed?			/	If no, describe on Page 3.

NPDES Inspection For Commercial / Industrial Facilities

NPDES Program
43200 Business Park Drive, Temecula, CA.
(951) 694-6411
www.cityoftemecula.org

D. CORRECTIVE ACTIONS REQUIRED:

At 27598 ① Remove 5 gallon gas can from outdoor exposure - move inside flammable storage container

② Equipment at rear (Air compressor I think) needs a roof / cover.

At 27590 ① Store all vehicle washing soaps inside bermed area.

② Oil container storage area, has some containers just outside of secondary and roofed area. Remove those containers from outdoors.

For both: ① Sweep up all outdoor areas, to remove all landscaping wastes (dead leaves), and remove all old car body parts from behind trash enclosure area

— 60 days

E. CITY ACTION(S):

Explained Federal, State, City and County laws and ordinances prohibiting non-stormwater discharges.

Education information provided at time of inspection.

You can find BMPs at www.casqa.org (BMP Handbooks-Industrial and Commercial)

Information on General Industrial Permit can be found at www.waterboards.ca.gov/stormwtr/gen_indus.html

Verbal.

F. ACTIONS TAKEN:

[ ] No violations [✓] Verbal / Written Warning [ ] Citation Issued [ ] SDRWQCB Notified

G. ADDITIONAL COMMENTS:

ATTACHMENT E

RESIDENTIAL PROGRAM

- "Inside Temecula" Newsletters
- "Guide to Leisure Activities"
- City-Sponsored "City-Wide Clean-up" Flyers
- County-Sponsored "Household Hazardous Waste Collection" Flyers

City of Temecula

43200 Business Park Drive
P.O. Box 9033
Temecula, CA 92589-9033
www.cityoftemecula.org

PRST STD
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Temecula City Council

Mayor: Chuck Washington

Mayor Pro Tem: Mike Naggar

Council Members:
Jeff Comerchero
Maryann Edwards
Ron Roberts

City Manager: Shawn Nelson

City Council Meetings are held on the 2nd and 4th Tuesdays each month at 7:00 PM in the Council Chambers at Temecula City Hall. The meetings are televised (at the same time and date) on Adelphia Cable Channel 3 and Verizon Cable Channel 3. Meetings are also available as streaming video on the city website at www.cityoftemecula.org.

City Wide Clean-Up for Temecula Residents Only

Saturday
October 20, 2007
8:00 AM to 2:00 PM

Location: Chaparral High School
27215 Nicolas Road
Temecula

Directions: From I15, travel East on Winchester Road, approximately 1.6 miles, to Nicolas Road

CR&R
RECYCLING AND REFUSE SERVICE

The City of Temecula and CR&R are sponsoring a program to help you dispose of household waste and large miscellaneous debris that can't be placed in your trash bins.

Proof of residency such as a California Driver's License, California ID Card, recent utility bill, or property tax statement is required.

How the Program Works

We will accept:

- Motor Oil
- Batteries (Lead/Acid Only)
- Anti-Freeze
- Large Bulky Items
- Green Waste
- Household Batteries
- Only 2 car batteries, per resident, per visit

Please do not bring:

- Chemicals
- Latex, Oil, or Water-based Paints
- Pesticides
- Empty Drums
- Solvents/Gasoline
- Other Hazardous Waste
- E-Waste
- Tires

National Preparedness Month

Get a kit, Make a plan, Be informed and Get involved!

The goal of the National Preparedness Month is to increase public awareness about the importance of preparing for emergencies and to encourage individuals to take action. Everyone should take some simple steps to make themselves and their families better prepared for emergencies including:

- Get a kit of emergency supplies that will allow you and your family to survive for at least seven days in the event an emergency happens. The kit should include basic items like water, food, battery-powered radio, flashlight and a first aid kit.
- Plan in advance what you and your family will do in an emergency. Your plan should include a communications plan and address sheltering-in-place and evacuation. Plan ahead and prepare for tomorrow!
- Learn more about different threats that could affect your community and appropriate responses to them.

For specific information on any of the above bullet points or for more information about the emergency plans that have been established in your area, go to www.ready.gov.

After preparing yourself and your family for possible emergencies, take the next step: get training in first aid and emergency response and get involved in preparing your community. Citizen Corps provides residents with opportunities to prepare, train, and support local emergency responders. For more information on the Temecula Citizens Corps or to get involved, visit www.tcctcam.org.

Winter Wonders for All

The winter season brings with it the anticipation of the holidays, a wonderful opportunity to spend time with family and friends and Temecula is a great place to start. Take a tour of the local vineyards, enjoy a late lunch or early dinner amongst the vines or at one of our many fine eateries in town, and end with an evening performance at the Old Town Temecula Community Theater. With our mild winter weather, it's never too cold outside to get out and enjoy your town!

For the "Foodie" in the Family

With winter brings the "good cheer" of the holiday party and also an abundant array of delicious drinks, snacks and sweets. Take "heart" in your party fare and bring a lighter-side dish to share.

Cranberry Apple Relish (from the makers of SPLENDA)

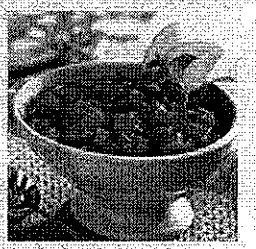

1 12 ounce bag Fresh Cranberries
1 cup Splenda No Calorie Sweetener, Granulated
1 cup water
3 Tablespoons Orange Juice Concentrate
1 medium Apple peeled, cored and diced
1/3 cup golden raisins

Directions:
Place cranberries, SPLENDA No Calorie Granulated Sweetener, water and orange juice concentrate in a medium saucepan. Bring to boil and boil 3-4 minutes until cranberries start to thicken and water is reduced by half. Remove from pan and place in a medium bowl. Cover and refrigerate 2 – 3 hours or overnight. Prior to serving add diced apples and half the raisins, stir and refrigerate until ready to serve. Just before serving sprinkle with remaining raisins. Serve chilled as an appetizer served over cream cheese with a basket of crackers, as a spread for piping hot rolls, as an accompaniment to roasted meats, poultry or ham, or a dessert topping for low calorie cheesecake.

For the Adventurer in the Family – Mountain Town Day Trip

Just a short drive from Temecula is the mountain town of Idyllwild, a quaint "high altitude" day trip destination. Idyllwild offers the "day tripper" an opportunity for outdoor adventure or a relaxing day strolling through the many mom and pop shops, the art galleries, or a stop for lunch at one of the many restaurants.

For the nature lover there is a visit to the Idyllwild Nature Center on Highway 243, followed by a stroll through the forest on one of the many marked trails. Further up the road on Highway 243 to the North of Idyllwild is Pine Cove and Lake Fulmor. Or for the true outdoorsman, travel northeast of town to Humber Park for hiking and rock climbing. And if there is snowfall this winter, Idyllwild is a great place to bring the family to build a snowman and toss the snowballs. For more information on Idyllwild visit www.idyllwild.com.

Lighting Up the Winter Night Sky

You will find twinkling holiday lights illuminating the sky all over Southern California during the winter holiday. Up and down the coast you can find many opportunities to enjoy a harborside Parade of Lights in boat harbors such as Huntington Beach, Newport Beach, Dana Point, San Diego and others. Del Mar Fair Grounds offers a drive-through exhibit of more than 400 lighted holiday displays. The Wild Animal Park opens up to their Annual Festival of Lights during the holiday season with larger-than-life lighted animal figures, toy soldiers, nutcrackers and more. Included are snow play areas, crafts and Santa. Surf the web for more information on these and other fun winter activities in Southern California.

Go "Green" For the Holidays

(from the "California Integrated Waste Management Board" website)
Give the gift of Green by decking the halls with less waste this year! It is estimated that between Thanksgiving and the New Year an extra million tons of waste are generated nationwide each week. In fact, 38,000 miles of ribbon alone is thrown out each year – enough to tie a bow around the Earth!

As part of its ongoing efforts to reach a Zero Waste California, the California Integrated Waste Management Board would like to help you cut the amount of trash you put out at the curb during the upcoming holiday season and is your one-stop site for all the simple steps you will need towards keeping holiday waste out of landfills. These pages are loaded with useful tips on reducing holiday waste. http://www.ciwmb.ca.gov/PublicEd/Holidays/ For more information, please call us at (916) 341-6000.

Winter Calendar of Events

December, 2007

Breakfast with Santa
Date: Saturday, December 08
Time: 8:00 AM - 11:00 AM
Location: Community Recreation Center, 30875 Rancho Vista Road
Phone Number: (951) 694-6480
Description: Share a special moment with your child as Santa visits Temecula. Eat a delicious breakfast, enjoy live holiday entertainment and see Santa. Space is limited, so please register today. Don't forget to bring your camera! $5 per person (FREE for infants under the age of 12 months and not requiring a seat).

Holiday Lights Bus Tour
Date: Wednesday, December 12
Time: 6:00 PM - 8:30 PM
Location: Community Recreation Center, 30875 Rancho Vista Road
Phone Number: (951) 694-6480
Description: Do you want to see the winning homes in our Holiday Lights & Festive Sights home decorating contest without the hassle of driving yourself? Join us for our annual bus tour. Get your friends and family together for a fun evening on a comfortable chartered bus. Pre-registration is required. $8 per person.

Holiday Lights Bus Tour- Special Needs Night
Date: Friday, December 14
Time: 5:30 PM - 8:00 PM
Location: Temecula Community Center, 28816 Pujol Street
Phone Number: (951) 694-6480
Description: Do you want to see the winning homes in our Holiday Lights & Festive Sights home decorating contest without the hassle of driving yourself? Join us for our annual bus tours. Get your friends and family together for a fun evening on a comfortable chartered bus. Pre-registration is required.

Holiday Lights Bus Tour
Date: Saturday, December 15
Time: 5:00 PM - 7:30 PM
Location: Community Recreation Center, 30875 Rancho Vista Road
Phone Number: (951) 694-6480
Description: Do you want to see the winning homes in our Holiday Lights & Festive Sights home decorating contest without the hassle of driving yourself? Join us for our annual bus tours. Get your friends and family together for a fun evening on a comfortable chartered bus. Pre-registration is required. $8 per person.

New Year's Eve at Noon Party
Date: Monday, December 31
Time: 11:00 AM - 12:00 PM
Location: Imagination Workshop, 42081 Main Street, Temecula
Phone Number: (951) 308-6376
www.pennypickles.org
Description: Friends of the Temecula Children's Museum present a New Year's Eve at Noon Party. Celebrate the New Year Pennypickle-style...at noon instead of at midnight! You won't want to miss the Professor's VERY special party offering refreshments, surprise entertainment and general merry-making for those too young (or old!) to stay up late! Join the fun as the Imagination Workshop closes to the general public for this fun-filled celebration. Tickets are $15 per person and include party favors for the kids to take home! For online registration, please go to www.pennypickles.org.

Winter / Spring 2008

City of TEMECULA

Community Services Department

Guide To Leisure Activities

Temecula Public Library

2007 California Park & Recreation Society
Facility Design Award of Excellence Recipient

Refer to page 46 for an exciting list of Library programs

Registration Begins
January 8th

CITY OF TEMECULA
Community Services Department

We're Here For You!

CSD Maintenance Division

The Maintenance Services Division is committed to ensuring an aesthetically pleasing and healthy City by providing safe, clean public areas. The Maintenance Services Program provides effective landscape and facility maintenance services to parks, slopes, medians, recreation facilities, and City Administration Offices. TCSD Maintenance Division also oversees the repair and maintenance of arterial and neighborhood streetlights. If you have a streetlight out in your neighborhood, you may call the Community Services Department at 694-6480, or use our web page at www.cityoftemecula.org

Household Batteries

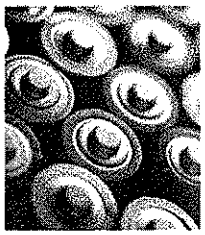

Did you know that you can no longer throw your batteries into your trash bin? As of February 9, 2006, household batteries, such as ones in your children's toys, CD players and flash lights are now banned from the landfill. Household batteries have been labeled as "Universal Waste" which is subject to disposal restrictions.

What can you do with your batteries?

The City of Temecula has provided 6 permanent opportunities to properly dispose of your batteries at the following locations:

1. Lobby at City Hall located at 43200 Business Park Drive
2. Temecula Community Center (TCC) at 28816 Pujol Street
3. Mary Phillips Senior Center (MPSC) at 41845 6th Street
4. Community Recreation Center (CRC) 30875 Rancho Vista Road
5. Temecula Public Library located at 30600 Pauba Road
6. Grace Mellman Community Library located at 41000 County Center Drive

Lowe's Home Improvement Warehouse has offered to collect batteries from residents at no charge. Lowe's has put together a household battery collection program to benefit our community at both of their store locations in Temecula and Murrieta. The Temecula store is located at 40390 Winchester Road near Margarita Road. Lowe's Murrieta store is located at 24701 Madison Ave near Kalmia. For more information contact Janet Kitchel or Barbara Smith at 694-6480.

Riverside County also offers weekly antifreeze, vehicle and household batteries, oil (and filters), and paint (latex only) collections:
WHEN: Every NON-holiday Saturday (Subject to closure during inclement weather)
HOLIDAY CLOSURE DATES: Jan 19, Feb 16, May 24
TIME: 9:00am until 2:00pm
WHERE: 25315 Jefferson Avenue in Murrieta (North of Murrieta Hot Springs)
Maximum chemical load: 5 gallons or 50 lbs. (per trip). Some restrictions apply; contact Riverside County Waste Management at (951) 486-3200 for additional information.

Recycling

The City of Temecula strongly encourages all residents and businesses to recycle. Residents can call CR&R to request an extra recycling container at no charge. Discounted rates are provided for businesses that request a "recycled materials only" bin. For more information, contact CR&R at (800) 755-8112.

Bulky Item Pick-Up

Reminder! City of Temecula residents are allowed two FREE bulky item pick-ups annually (two items per visit). Please call CR&R at (800) 755-8112 and make arrangements in advance for the pick-up of these items.

Street Sweeping

Please be a good neighbor and remember not to park on residential streets on trash pick-up day and street sweeping day. Residential streets are swept the day after trash pick-up day. Keeping vehicles off the streets on these days allows efficient trash collection and street sweeping. Observing this simple request helps keep all of Temecula's neighborhoods looking their best!

Household Hazardous Waste (HHW)

To dispose of Household Hazardous Waste, Riverside County residents can attend a free "HHW" collection event:
WHEN: Jan 26, 2008 or May 10, 2008 (Subject to closure during inclement weather.)
TIME: 9:00am -2:00pm
WHERE: City Hall parking lot, 43200 Business Park Drive
Acceptable items include batteries (vehicle and household), household chemicals (bleach, ammonia, pesticides, motor oil, etc.) Miscellaneous waste (propane tanks, pool chemicals, etc..), paints, solvents, thinners, photo chemicals and non-empty aerosol cans, fluorescent lamps, thermostats, mercury-containing objects, e-waste (computers, monitors, televisions, etc.) and sharps. Maximum Chemical Load: 5 gallons or 50 lbs. (per trip). For more information, please contact Janet Kitchel or Barbara Smith in Community Services at 694-6480.

City Wide Clean Up

CR&R Inc. and the City of Temecula will be co-sponsoring the bi-annual City Wide Clean-up tentatively scheduled for one Saturday in the spring & fall. All City residents may dispose of e-waste, used motor oil, antifreeze, batteries, green waste as well as bulky items. This service is free to Temecula residents. (ID is required) The event will be held at Chaparral High School parking lot between 8am and 2pm. For more information, please contact Janet Kitchel or Barbara Smith in Community Services at 694-6480.

Holiday Schedule Trash Pick-Up

The holidays: New Year's Day, Memorial Day, 4th of July, Labor Day, Thanksgiving and Christmas. This is a reminder, that during the holidays, your trash collection will be delayed one day. For example, if your normal trash day is Monday, your trash will be collected on Tuesday, etc. If your normal trash day is Friday, your trash will be collected on Saturday. Holidays will also affect the street sweeping schedule. If the holiday occurs on Saturday or Sunday, your collection & street sweeping services may not change.

Christmas Tree Recycling

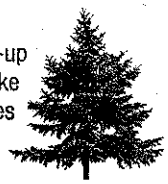

Curbside Christmas tree pick-up begins the first trash pick-up after Christmas and continues for two weeks. Please make sure that trees are free of all decorations and tinsel. Trees should be cut into 4 foot sections and not put in plastic bags.

Multi-Use Trails and Bikeways

- To report hazards on the trails or bike lanes please contact Public Works at 694-6411 or contact us on the City's website at www.cityoftemecula.org.
- If you have comments or suggestions that will help the City provide a better trail and/or bikeway system please contact Barbara Smith in Community Services at 694-6480 or contact can be made via the City's website at www.cityoftemecula.org.

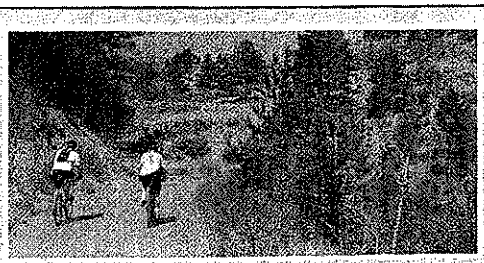

City of TEMECULA

Community Services Department

Summer / Fall 2007

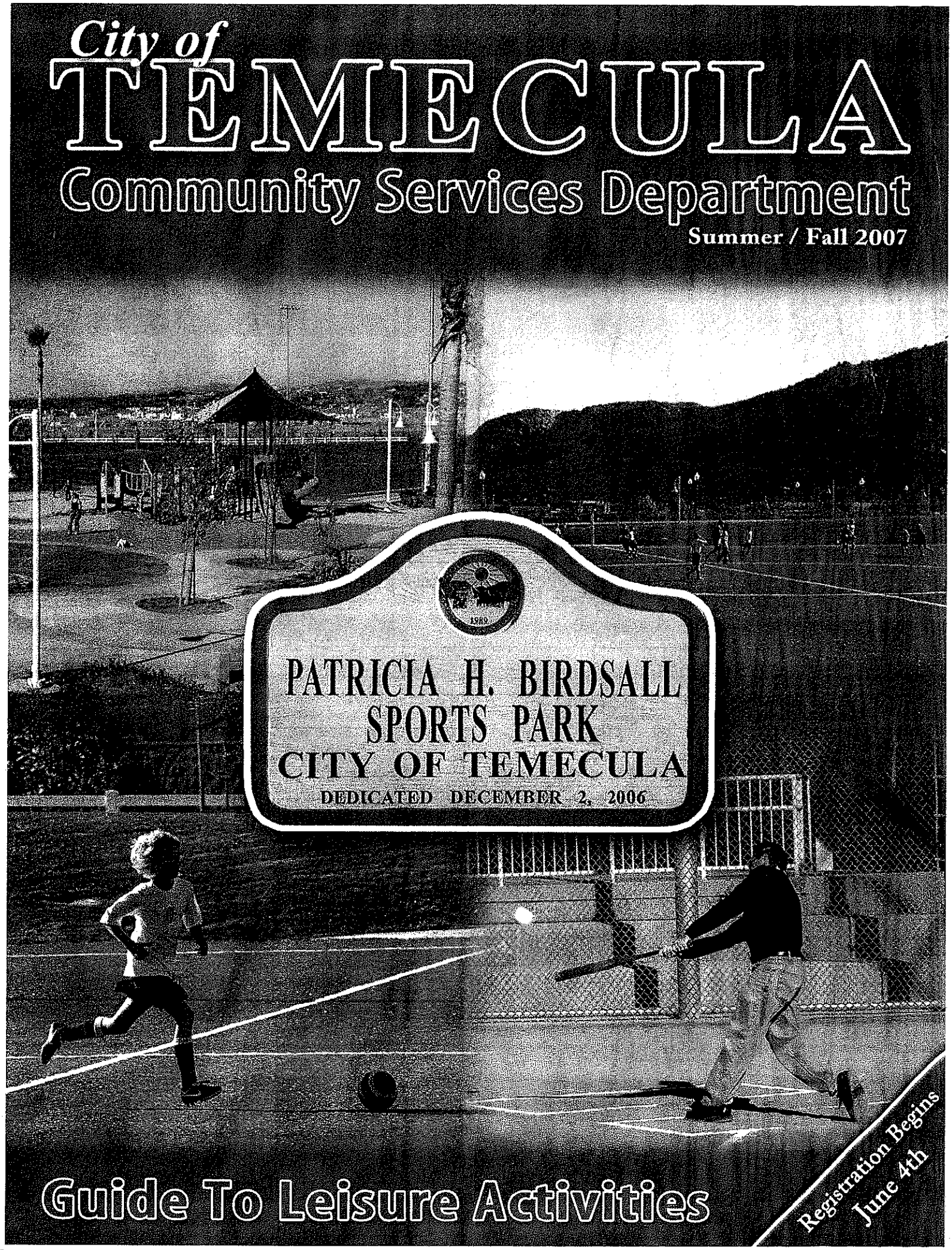

Guide To Leisure Activities

Registration Begins June 4th

Universal Waste

Did you know that you can no longer throw your batteries into your trash bin? As of February 8, 2006 household batteries, such as the ones in your children's toys, CD players and flash lights are now banned from the landfill. Household batteries have been labeled as "Universal Waste" which is subject to disposal restricts.

What can you do with your batteries?

The City of Temecula has provided 6 permanent opportunities to property dispose of your batteries at the following locations:

1. Lobby at City Hall located at 43200 Business Park Drive
2. Temecula Community Center (TCC) at 28816 Pujol Street
3. Mary Phillips Senior Center at 41845 6th Street
4. Community Recreation Center (CRC) at 30875 Rancho Vista Road
5. Library located at 4100 County Center Drive
6. Library located at 30600 Pauba Road

Lowe's Home Improvement Warehouse has offered to collect batteries from residents at no charge. Lowe's has put together a household battery collection program to benefit our community at both of their store locations in Temecula and Murrieta. The Temecula store is located at 40390 Winchester Road near Margarita. Lowe's Murrieta store is located at 24701 Madison Ave near Kalmia. For more information contact Janet Kitchel or Barbara Smith at (951) 694-6480.

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WHEN: Every NON-holiday Saturday (Subject to closure during inclement weather)
TIME: 9:00am until 2:00 pm
WHERE: 25315 Jefferson Ave. in Murrieta (north of Murrieta Hot Springs).

Other items that are collected are antifreeze, vehicle batteries, motor oil and latex paint. Some restrictions apply; contact Riverside County Waste Management at (951) 486-3200 for additional information.

Street Sweeping

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Reminder!!

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CSD Maintenance Division

The Maintenance Services Division is committed to ensuring an aesthetically pleasing and healthy City by providing safe, clean public areas. The Maintenance Services Program provides effective landscape and facility maintenance services to parks, slopes, medians, recreation facilities, and City Administration Offices. TCSD Maintenance Division also oversees the repair and maintenance of arterial and neighborhood streetlights. If you have a streetlight out in your neighborhood, you may call the Community Services Department at 694-6480, or use our web page at www.cityoftemecula.org

Community Clean Up

(Citywide Clean-up and Oil Collection)

CR&R Inc. and the City of Temecula will be co-sponsoring the bi-annual Citywide Clean-up tentatively scheduled for one Saturday in the spring & fall. All City residents may dispose of used motor oil, antifreeze, batteries, green waste as well as bulky items. This service is free to Temecula residents. (ID is required) The event will be held at Chaparral High School parking lot between 8am and 2pm. For more information, please contact Janet Kitchel or Barbara Smith in Community Services at 694-6480.

Holiday Schedule Trash Pick-Up

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We're Here For You!

Online Registration Now FREE of Surcharges

Register Online at:

www.cityoftemecula.org

CITY OF TEMECULA

Community Services Department

City of Temecula Community Services Department And CR&R, Incorporated Presents

City Wide Clean-Up
for
TEMECULA RESIDENTS ONLY

Saturday
May 17, 2008
8:00 AM to 2:00 PM

CR&R
RECYCLING AND REFUSE SERVICE

Location
Chaparral High School
27215 Nicolas Road
Temecula

Directions: From I15, travel East on Winchester Rd., approximately 1.6 miles, to Nicolas Road

The City of Temecula and CR&R are sponsoring a program to help you dispose of household waste and large miscellaneous debris that can't be placed in your trash bins.

Proof of residency such as a California Driver's License, California ID Card, recent utility bill, or property tax statement is required.

HOW THE PROGRAM WORKS:

WE WILL ACCEPT

- Motor Oil
- Batteries (Lead/Acid Only)
- Anti-Freeze
- Large Bulky items
- Green Waste
- Household Batteries
- Only 2 car batteries, per resident, per visit
- E-Waste (computers, monitors, televisions, etc.)

PLEASE DO NOT BRING

- Chemicals
- Latex, Oil, or Water-based Paints
- Pesticides
- Empty Drums
- Solvents/Gasoline
- Other Hazardous Waste
- Tires

For information, contact Janet Kitchel at (951) 308-6393 or CR&R at (800) 755-8112

City of Temecula Community Services Department And CR&R, Incorporated Presents

City Wide Clean-Up
for
TEMECULA RESIDENTS ONLY

Saturday
October 20, 2007
8:00 AM to 2:00 PM

CR&R
RECYCLING AND REFUSE SERVICE

Location
Chaparral High School
27215 Nicolas Road
Temecula

Directions: From I15, travel East on Winchester Rd., approximately 1.6 miles, to Nicolas Road

The City of Temecula and CR&R are sponsoring a program to help you dispose of household waste and large miscellaneous debris that can't be placed in your trash bins.

Proof of residency such as a California Driver's License, California ID Card, recent utility bill, or property tax statement is required.

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- Chemicals
- Latex, Oil, or Water-based Paints
- Pesticides
- Empty Drums
- Solvents/Gasoline
- Other Hazardous Waste
- Tires

For information, contact Janet Kitchel at (951) 308-6393 or CR&R at (800) 755-8112

Household Hazardous Waste Collection Event

Saturday
September 15, 2007
9:00 am – 2:00 pm

This event is for Riverside County residents only and event will close during inclement weather or other hazardous conditions.

Free of charge to all Riverside County RESIDENTS

Location of Event: Temecula City Hall - Parking Lot
43200 Business Park Drive, Temecula, CA 92589

Acceptable Chemical Materials
limit of up to 5 gallons or 50 pounds per trip:

- Batteries (vehicle and household)
- Household chemicals (bleach, ammonia, pesticides, motor oil, etc.)
- Miscellaneous waste (propane tanks, pool chemicals, etc.)
- Paints, solvents, thinners, photo chemicals and non-empty aerosol cans
- Fluorescent lamps, thermostats, mercury-containing objects

And

- E-waste (computers, monitors, televisions, etc.)
- Sharps (sharps containers will be provided at no charge while supplies last)

Did you know?

- Absolutely No Bulky Items Or Yard Waste
- This event is for Residential Use Only; business waste not accepted
- Container volume must not exceed 5 gallons
- Containers will not be returned

For more information, please contact Riverside County at
(951) 486-3200, (800) 304-2226 or go to www.rivcowm.org.

Household Hazardous Waste Collection Event

Saturday
January 19, 2008
9:00 am – 2:00 pm

This event is for Riverside County residents only and event will close during inclement weather or other hazardous conditions.

Free of charge to all Riverside County RESIDENTS

Location of Event: Temecula City Hall - Parking Lot
43200 Business Park Drive, Temecula, CA 92589

Acceptable Chemical Materials
limit of up to 5 gallons or 50 pounds per trip:

- Batteries (vehicle and household)
- Household chemicals (bleach, ammonia, pesticides, motor oil, etc.)
- Miscellaneous waste (propane tanks, pool chemicals, etc.)
- Paints, solvents, thinners, photo chemicals and non-empty aerosol cans
- Fluorescent lamps, thermostats, mercury-containing objects

And

- E-waste (computers, monitors, televisions, etc.)
- Sharps (sharps containers will be provided at no charge while supplies last)

Did you know?

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- This event is for Residential Use Only; business waste not accepted
- Container volume must not exceed 5 gallons
- Containers will not be returned

For more information, please contact Riverside County at
(951) 486-3200, (800) 304-2226 or go to www.rivcowm.org.

Household Hazardous Waste Collection Event

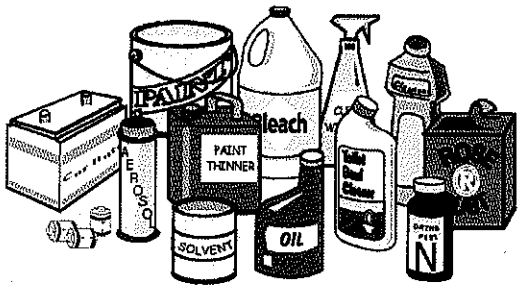

Saturday
May 17, 2008
9:00 am – 2:00 pm

This event is for Riverside County residents only and event will close during inclement weather or other hazardous conditions.

Free of charge to all Riverside County RESIDENTS

Location of Event: Temecula City Hall - Parking Lot
43200 Business Park Drive, Temecula, CA 92589

Acceptable Chemical Materials
limit of up to 5 gallons or 50 pounds per trip:

- Batteries (vehicle and household)
- Household chemicals (bleach, ammonia, pesticides, motor oil, etc.)
- Miscellaneous waste (propane tanks, pool chemicals, etc.)
- Paints, solvents, thinners, photo chemicals and non-empty aerosol cans
- Fluorescent lamps, thermostats, mercury-containing objects

And

- E-waste (computers, monitors, televisions, etc.)
- Sharps (sharps containers will be provided at no charge while supplies last)

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For more information, please contact Riverside County at
(951) 486-3200, (800) 304-2226 or go to www.rivcowm.org.

ATTACHMENT F

ILLICIT DISCHARGE DETECTION PROGRAM

- Completed Dry-Weather Monitoring Log

Dry Weather Illicit Discharge Monitoring Log -2007

	Watercourse	2003 Thomas Brothers	Station I.D.	Location	Inspected time/(M/D/Y)	Date of Last Rain	Quantity of Last Rain	Flow Data	
	Primary Stations (Twice between May 1 and September 30) :							Width / Depth	Velocity / Rate
1	Empire Creek	958 H6	EC1	Del Rio Road Bridge	8/27/07 2:30	8/26/07	0.05"	50'/2'	
	Mdo Ficitra		LOCAL WATER DISTRICT HAS CREEK THIS MONTH.		BEEN DISCHARGING		WELL WATER	INTO MURRIETA	
2	Pechanga Creek	979 B3	PC1	Rainbow Canyon Road Bridge	12:30 8/27/07	8/26/07	0.05"	DRY	
	Mdo Ficitra								
3	Pechanga Rd. stormdrain channel	979 C3	PP1	Behind Canterfield & Trotsdale	12:55 8/27/07	8/26/07	0.05"	2'/1½'	
	Mdo Ficitra								
4	Temecula Creek	979 A3	TC1	Confluence with Murrieta Creek: EMWD ~~909~~ 928 3777 EXT 6265 L 3437 PALA II JACK/DUKE x 6332	1:35 8/27/07	8/26/07	0.05"	3'/1½'	
	Mdo Ficitra								
	Secondary Stations (As needed) :								
5	Empire Creek	959 B5	EC2	Box culvert on Yukon					
6	Long Canyon	959 B4	LC2	Box culvert on Pina Colada					
7	Santa Gertrudis Creek	958 H2	SG2	Winchester Road Bridge					
	Stations Monitored by RCFCD:								
8	Long Canyon	958 G5	LC1	Commerce Ctr. Dr. bridge					
9	Murrieta Creek	978 J2	MC1	USGS station at end of Pujol Street					
10	Redhawk Channel	979 F3	RH1	Confluence of Redhawk channel and Temecula					
11	Santa Gertrudis Creek	958 F4	SG1	Jefferson Av. Bridge					

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~~x 700 = TDS~~

700_-Dry Weather Illicit Discharge Monitoring Log – 2007

	Specific Conductance	Turbidity	pH	Temperature	Dissolved Oxygen	COMMENTS: (include odors, color, clarity, floatables, stains, oil, sheen, surface scum, vegetation, etc at each station)
	Primary Stations (Twice between May 1 and September 30) :					
1	1.85	10	7.66 ✓	19	4.93 ✓	CLEAR, ODORLESS, SLIGHTLY GREY (MATCHING SURROUNDING SOIL), NO ALGAE, ALMOST STAGNANT, FROGS
2	—	—	—	—	—	NO FLOW. DRY CREEK BED
3	1.16	10	8.93 ✓	23.3	8.30 ✓	CLEAR, ODORLESS, COPPER, SMALL FISH, ALMOST STAGNANT, ALGAE.
4	1.35	10	7.92 ✓	23.1	8.35 ✓	SLIGHTLY CLOUDY, GREEN, ABUNDANT VEGETATION, SMALL FISH, ODORLESS, LIMITED ALGAE, ALMOST STAGNANT
	Secondary Stations (As needed) :					
5						
6						
7						
	Stations Monitored by RCFCD:					
8						
9						
10						
11						

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Dry Weather Illicit Discharge Monitoring Log – 2007

	Watercourse	2003 Thomas Brothers	Station I.D.	Location	Inspected time/(M/D/Y)	Date of Last Rain	Quantity of Last Rain	Flow Data	
	Primary Stations (Twice between May 1 and September 30) :							Width / Depth	Velocity / Rate
1	Empire Creek	958 H6	EC1	Del Rio Road Bridge	6/15/07 3:00	4/23/07	0.02"	5'/2'	
	Aldo Licitra								
2	Pechanga Creek	979 B3	PC1	Rainbow Canyon Road Bridge	6/15/07 1:00	4/23/07	0.02"	DRY	
	Aldo Licitra								
3	Pechanga Rd, stormdrain channel	979 C3	PP1	Behind Canterfield & Trotsdale	6/15/07 1:20	4/23/07	0.02"	2'/1½'	
	Aldo Licitra								
4	Temecula Creek	979 A3	TC1	Confluence with Murrieta Creek: EMWD 428 3777,6265 L3437 PALA II	6/15/07 2:00	4/23/07	0.02"	3'/1½'	
	Aldo Licitra			NEW LOCATION ACROSS CONFLUENCE					
	Secondary Stations (As needed) :								
5	Empire Creek	959 B5	EC2	Box culvert on Yukon					
6	Long Canyon	959 B4	LC2	Box culvert on Pina Colada					
7	Santa Gertrudis Creek	958 H2	SG2	Winchester Road Bridge					
	Stations Monitored by RCFCD:								
8	Long Canyon	958 G5	LC1	Commerce Ctr. Dr. bridge					
9	Murrieta Creek	978 J2	MC1	USGS station at end of Pujol Street					
10	Redhawk Channel	979 F3	RH1	Confluence of Redhawk channel and Temecula					
11	Santa Gertrudis Creek	958 F4	SG1	Jefferson Av. Bridge					

000159

Dry Weather Illicit Discharge Monitoring Log – 2007

	Specific Conductance	Turbidity	pH	Temperature	Dissolved Oxygen	COMMENTS: (include odors, color, clarity, floatables, stains, oil, sheen, surface scum, vegetation, etc at each station)
	Primary Stations (Twice between May 1 and September 30) :					
1	1.74	10	7.80	22.8	7.58	CLEAR, ODORLESS, SLIGHTLY BROWN/COPPER COLOR SOME ALGAL GROWTH
2	—	—	—	—	—	NO FLOW. DRY CREEK BED
3	1.09	10	8.90	23.4	9.40	CLEAR, ODORLESS, LIGHT BROWN/COPPER COLOR, ALMOST STAGNANT, SOME ALGAL GROWTH
4	1.28	32	8.21	22.3	8.48	CLEAR, ODORLESS, LIGHT BROWN/COPPER COLOR, ALMOST STAGNANT, SLIGHT ALGAL GROWTH
	Secondary Stations (As needed) :					
5						
6						
7						
	Stations Monitored by RCFCD:					
8						
9						
10						
11						

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ATTACHMENT G

REVISIONS TO THE SWMP

- SWMP Revisions List

Revisions to the SWMP since July 1, 2005

Table of Contents.

January 2006

- Modified format of Appendices.

Section 5.0 Municipal Facilities and Activities.

January 2006:

- Per RB meeting (Aug 31, 2005), included min. BMP source controls rather than generating P3s for each facility.
- Revised the inventory of City facilities to exclude non-jurisdictional facilities (i.e. police stations).

Section 7.0 Private Development Construction Activity.

January 2006:

- Per RB comment letter (Sep 28, 2005), included annual tally of inspections for every project.
- Included latest version of City's ESC standard notes.

Section 11.0 Monitoring Program.

January 2006:

- Included the City's dry-weather monitoring log.

April 2006:

- Revised the locations for the Pechanga Creek and Temecula Creek monitoring stations. The new locations are at the Rainbow Creek bridge and on Temecula creek, near the confluence with the Santa Margarita River.

Appendices.

January 2006

- Attachments were grouped into single appendices corresponding to their respective sections.
- Included city-facility source control table, dry-weather inspection log, annual tally of construction inspections, latest E&S notes, latest monthly construction inspection frequency sheet.

February 2006

- Updated the business inspection form (appendix D) to include complaint calls.

January 2008

- Updated the municipal facilities list (appendix B), updated the construction inspection list (appendix C), updated the business list (appendix D), and removed secondary sampling locations from the dry weather monitoring log (appendix E).

August 2008

- Revised Initial Checklist (Section 6.4.1) to emphasize 'Land Area for Development' in various categories as per the Permit text.

CITY OF MURRIETA
ANNUAL PROGRESS REPORT

Reporting Period
July 1, 2007 to June 30, 2008

Santa Margarita River Watershed

FOR
SAN DIEGO REGIONAL WATER QUALITY CONTROL BOARD
(ORDER NO. R9-2004-001)

CITY OF MURRIETA

CERTIFICATION STATEMENT

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Patrick A Thomas

Signature

Mr. Patrick A. Thomas / Director of Public Works

Name & Title

10.30.08

Date

SANTA MARGARITA WATERSHED
NPDES MUNICIPAL STORMWATER PERMIT
(NPDES No. CAS0108766)

ANNUAL REPORTING FORMS

FOR

CITY OF MURRIETA
FISCAL YEAR 2007 - 2008

I. Executive Summary
1. Development Planning
2. Construction
3. Municipal
4. Industrial/Commercial
5. Residential
6. Education
7. Illicit Discharge Detection and Elimination
8. Public Participation
9. Fiscal Analysis Component
10. Non-Storm Water Discharges
11. Receiving Water Limitations
12. Additional Urban Runoff Data
13. Proposed Revisions

BOARD ORDER NO. R9-2004-001
CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN DIEGO REGION

I. EXECUTIVE SUMMARY

This Annual Progress Report describes the current status of the storm water management program for the City of Murrieta (City) for the Santa Margarita River Watershed. The reporting period is for fiscal years 2007 / 2008 beginning July 1, 2007 and ending June 30, 2008. Each section addresses individual programs that were implemented to comply with the requirements of the municipal separate storm sewer system permit (MS4 Permit) issued to the Santa Margarita Watershed Permittees by the San Diego Regional Water Quality Control board on July 14, 2004. The Permittees consist of the City of Murrieta, City of Temecula, County of Riverside, and Riverside County Flood Control and Water Conservation District.

1. DEVELOPMENT PLANNING
(SECTION F of ORDER NO. R9-2004-001)

1) **Description of any amendments to the General Plan or the development project approval process:** None

2) **Number of grading permits issued:** 35

3) **Number of developments conditioned to meet SUSMP requirements:** Eight

4) **Attach one example of a development project that was conditioned to meet SUSMP requirements and a description of the required BMPs:** See Attachment 'A'

5) **Description of any updates to the environmental review process:** None

6) **Description and number of training efforts conducted during the reporting period (for staff, developers, contractors, etc.), including the number of staff trained.**

   a) **Training:**

Training	Training Description	Training Dates	Number of Attendees
New Development	Riv. Co. NPDES for Damp Implementation	12/5/07	12
		Total	**12**

   b) **Summarize the educational and outreach activities the Development Planning Component has conducted over the past year:** Provide WQMP check list to Applicants and require it to be completed for every project.

1. DEVELOPMENT PLANNING
(SECTION F of ORDER NO. R9-2004-001), CONT.

7) **An assessment of program effectiveness based on the measurable goals established in the Permittee's Individual SWMP:** The effectiveness is good. All projects are conditioned with WQMP's if applicable.

8) **Additional Comments/Information:**

Describe the major accomplishments of the Development Planning Component over the past year. (General Plan or ordinance revisions, procedure/approval process changes, SUSMP guidance material): there are no major accomplishments to make note of this year. There were no changes to the General Plan and the Environmental Review Process is the same.

Summarize new activities or improvements to be implemented next year as a result of your self assessment of the Development Planning Component: review and update WQMP checklist

Other comments

1. DEVELOPMENT PLANNING
(SECTION F of ORDER NO. R9-2004-001), CONT.

ATTACHMENT A

PLANNING COMMISSION
RESOLUTION NO. PLANNING COMMISSION-2007-10

A RESOLUTION OF THE PLANNING COMMISSION OF THE CITY OF MURRIETA ADOPTING A MITIGATED NEGATIVE DECLARATION AND APPROVING DEVELOPMENT PLAN 2006-1913 AND TENTATIVE PARCEL MAP 2006-1914 (TPM 34714) BY ELM-JEFFERSON LLC, TO CONSTRUCT AN OFFICE-INDUSTRIAL COMPLEX OF THREE 2-STORY OFFICE BUILDINGS AND TWO SINGLE-STORY INDUSTRIAL BUILDING TOTALING 160,807 SQUARE FEET ON A 10 ACRE PARCEL LOCATED ON THE EAST SIDE MADISON AVENUE, NORTH OF FIG STREET AND SOUTH OF GUAVA STREET, APN 910-160-006.

The Planning Commission of the City of Murrieta hereby resolves as follows:

SECTION 1. An application has been filed by ELM-JEFFERSON LLC (property owner), for the development an office-industrial complex comprised of three 2-story office and two single-story industrial buildings totaling 160,807 square feet and surface parking.

SECTION 2. The application was deemed complete under Section 16.48.040 of the Development Code on July 31, 2007, and is on file in the Planning Department.

SECTION 3. The project site is located in the Multiple Use – 2 (MU-2) zone, on the east side of Madison Avenue, north of Fig Street and south of Guava Street.

SECTION 4. An Initial Study was prepared for the project in accordance with Section 15070 with the Guidelines for the Implementation of California Environmental Quality Act (CEQA) [and the City's procedures for the implementation of CEQA], and a determination was made to prepare a Mitigated Negative Declaration to address aspects of the project that are within the scope of the General Plan EIR certified on June 21, 1994 and the Jefferson Avenue Business Corridor Master Development Plan environmental determination that were specifically unknown at that time.

SECTION 5. The Mitigated Negative Declaration was circulated for public review from September 6, 2007 to September 26, 2007. Comments received and responses to those comments are included with the Mitigated Negative Declaration.

SECTION 5. A public hearing was duly noticed for the Planning Commission meeting of September 26,, 2007, by mailing a notice to property owners within 500 feet of the perimeter of the property on September 5, 2007, publishing the notice in "The Californian" newspaper on September 6, 2007, and posting the site on September 10, 2007.

SECTION 6. A public hearing for this project was held by the Planning Commission on September 26, 2007, at which time reports, recommendations, and testimony were considered.

SECTION 7. Planning Commission of the City of Murrieta considered the written reports and materials submitted, public testimony given, and such other facts as are of record in these proceedings and makes following findings with regard to Development Plan DP0-2006-1913 in accordance with Section 16.56.040 of the Development Code:

1. The proposed use is allowed within the subject zoning district and complies with all applicable provisions of this development code.

   FACTS: The proposed office and industrial uses are permitted uses in the Multiple Use - 2 (MU-2) zone.

2. The proposed use would be consistent with the objectives, policies, general land uses, and programs of the general plan and any applicable specific plan.

   FACTS: The proposed office and industrial uses are consistent with Multiple Use land use designation of the General Plan. The proposed project meet the policies LU-1.3a, LU-1.3f and LU-1.3g, which allows a mixture of uses, with the MU-2 Area designated for freeway serving use, and prohibits residential development and the MU-2 Area.

3. The approval of the development plan permit and tentative parcel map for the proposed use is in compliance with the requirements of the California Environmental Quality Act (CEQA) and there would be no potentially significant negative impacts upon environmental quality and natural resources that could not be properly mitigated and monitored.

   FACTS: An Initial Study was prepared and a determination was made to prepare a Mitigated Negative Declaration which was circulated for review in compliance with the City's adopted guidelines for the implementation of the California Environmental Quality Act (CEQA). The Planning Commission has been presented with and has reviewed and considered the Mitigated Negative Declaration along with proposed mitigation measures.

4. The location, size, design, and operating characteristics of the proposed use would be compatible with existing land uses within the general area in which the proposed use is to be located.

   FACTS: The location, size, design, and operating characteristics of the proposed use would be compatible with existing land uses within the general area in which it is to be located in that the site is in the vicinity of I-15, and in the Jefferson Avenue Business Corridor, a Master Development Plan (MDP) for infrastructure improvements. The nature of the office and light industrial uses proposed also would be compatible with the nearby existing and proposed uses. The site is adjacent to the U.S. Border Patrol (Homeland Security) station.

5. The subject site is physically suitable for the type and density/intensity of the use being proposed.

   FACTS: The subject can accommodate the proposed three 2-story office building and two single-story industrial buildings at the permitted Floor Area Ratio for the MU-2 zone, and meet the minimum required parking in a surface lot. The site was designed so that each of the four parcels in the proposed subdivision will meet the parking and landscaping requirement for the MU-2 zone

6. There are adequate provisions for public access, water, sanitation, and public utilities and services to ensure that the proposed use would not be detrimental to the public convenience, health, safety, or general welfare.

FACTS: The proposed project will be subject to conditions of approval by all affected public agencies that will require the satisfactory construction and installation of all water, sewer, utilities, circulation, and flood control improvements to support the public convenience, health, safety, and general welfare. Development of the site will require improvements to Madison Avenue and to drainage for this area.

7. The proposed project is consistent with the Multi-Species Habitat Conservation Plan (MSHCP), which was adopted by the City of Murrieta City Council with Ordinance No. 289-03 on October 7, 2003.

   FACTS: The proposed project is not located in a criteria cell of the Multiple Species Habitat Conservation area. However, a survey for the burrowing owl was required and completed, which found no habitat or species present on the site.

SECTION 8. Planning Commission of the City of Murrieta considered the written reports and materials submitted, public testimony given, and such other facts as are of record in these proceedings and makes the following findings with regard to Tentative Parcel Map 2006-1914 (TPM 34714) in accordance with Section 16.94.080 of the Development Code:

1. The proposed Tentative Parcel Map is for a four-lot subdivision of a parcel. The map is consistent with General Plan, the Jefferson Avenue Business Corridor Master Development Plan, the Murrieta Municipal Code and the Subdivision Map Act and complies with all applicable requirements of state law and local ordinances.

   FACTS: The project is consistent with the Murrieta Municipal Code, Jefferson Avenue Business Corridor Plan, and the Subdivision Map Act related to land use, zoning, parcel size and width, landscaping, on-site parking, setbacks, and access.

2. The site of the proposed Tentative Parcel Map is physically suitable for the type and density of the proposed development, is in harmony in scale, height, bulk, density and coverage, and creates a compatible physical relationship to the surrounding properties for which this area has been planned.

   FACTS: The site is vacant parcel adjacent to vacant parcels in the south, east and west. Adjacent to the north of the site is the U.S. Border Patrol Station (Homeland Security). The 10 acre property will take access from Madison Avenue and Jordan Street. All necessary service facilities are available to service the site. Drainage, landscaping, parking and other related issues were addressed during the development review process by City staff and conditioned to comply with local, state and federal regulations.

3 The proposed Tentative Parcel Map is in compliance with the provisions of the California Environmental Quality Act.

   FACTS: An Initial Study was prepared and a determination was made to prepare a Mitigated Negative Declaration which was circulated for review in compliance with the City's adopted guidelines for the implementation of the California Environmental Quality Act (CEQA). The Planning Commission has been presented with, reviewed and considered the Mitigated Negative Declaration along with proposed mitigation measures.

SECTION 9. Planning Commission of the City of Murrieta hereby adopts the Mitigated Negative Declaration prepared for the proposed project including the recommended mitigation measures as shown in the document.

SECTION 10. Pursuant to the above findings, the Planning Commission of the City of Murrieta hereby approves Development Plan DPO-006-1913 and Tentative Parcel Map TPM-006-1914 subject to the following conditions:

DRAFT CONDITIONS OF APPROVAL
DEVELOPMENT PLAN DPO-006-1913
TENTATIVE PARCEL MAP TPM-006-1014

PLANNING DEPARTMENT

General:

1. The applicant shall defend (with attorneys approved by the City), indemnify and hold harmless the City of Murrieta, its agents, officers, and employees from any claims, damages, action, or proceeding against the City or its agents, officers, or employees to attack, set aside, void, or annul an approval of the City, its advisory agencies, appeal boards, or legislative body concerning this approval. The City will promptly notify the permittee of any such claim, action, or proceeding against the City and will cooperate fully in the defense.

2. Any fees due the City of Murrieta for processing this project shall be paid to the City within thirty (30) calendar days of final action by the approval authority. Failure to pay such outstanding fees within the time specified shall invalidate any approval or conditional approval granted. No permits, site work, or other actions authorized by this action shall be processed by the City, nor permitted, authorized or commenced until all outstanding fees are paid to the City.

3. Pursuant to Section 711.4 of the State of California Fish and Game Code, the applicant is required to pay a $64.00 handling fee and $1,800 certification fee. Said fees shall be paid to the Clerk/Recorder of the County of Riverside at the time the Notice of Determination is filed pursuant to Section 21152 of the Public Resources Code. If this fee is not paid, the approval of this project shall not be operative, vested, or final. In order to comply with State mandated time lines for filing of a Notice of Determination, the above fee must be delivered to the Planning Department within **two (2)** working days after the date of final approval.

4. The project approval is for a Development Plan for Elm-Jefferson LLC, to construct three 2-story office and two single-story industrial buildings totaling 160,807 square feet within the Multiple Use - 3 (MU-3) zone and all associated parking, access, and landscaping. All construction shall be in substantial conformance with approved plans, elevations and floor plans dated August 7, 2007 and the material and color board dated August 7, 2007. Any proposed change substantially different than the approved plan shall require an amendment to this approval in accordance with the Development Code.

5. The applicant shall pay all applicable mitigation fees or provide proof that all required fees have been paid in accordance with City policies and ordinances in effect at the time of permit issuance.

6. Tentative Parcel Map No. 34714 shall record within two (2) years from the date of the approval or it shall become null and void unless an extension of time is granted pursuant to City ordinance.

7. The project approval is for a four parcel subdivision that shall be in substantial conformance with the approved map (TPM 34714) dated August 7, 2007. Any proposed changes substantially different from this approval shall require an amendment to this approval.

8. The use of signs, pennants, banners, streamers, flags, or similar attention getting devices is prohibited, unless specifically approved by the Planning Division.

9. All commercial lots shall meet the Development Standards required by the Development Code for the Multiple Use – 2 (MU-2) zone.

10. Fencing/wall requirements shall meet the Development Standards required by the Development Code for the Multiple Use -2 (MU-2) zone, and are subject to review and approval by the Building & Safety and Planning Departments.

11. If during initial ground disturbance activities paleontological resources are encountered a qualified paleontological monitor shall be retained, and have the authority if necessary, to stop, redirect grading activities, and evaluate the significance of any paleontological resources discovered on the property. If significant paleontological resources are encountered, adequate funding shall be provided to collect, curate and report on these resources. A report shall be submitted to the City of Murrieta within 60 days from the completion of grading.

    The applicant shall contact the Pechanga Band of Luiseno Indians and work with them to develop a management plan for any resources that may be unearthed, and to afford the Band an opportunity to monitor ground disturbing activities and participate in the decisions regarding collection and curation of any such resources.

12. The applicant shall afford the Pechanga Band of Luiseno Mission Indians the opportunity to enter into an agreement to monitor ground-disturbing activities, and address the appropriate treatment and disposition of any cultural resources, and/or human remains found during such excavations.

13. If any cultural resources are encountered on the project site during grading or construction activities, a qualified archaeologist shall be consulted so that the significance of the resources can be evaluated. If resources are encountered a letter/report shall be completed by the retained archaeologist stating/identifying in detail the cultural resource find(s), and its/their final disposition. A copy of that letter/report shall be submitted to the City of Murrieta Planning Division within 60 days and upon review and approval shall be retained in the project file.

14. Prior to the execution of purchase and or tenant agreements being completed it shall be disclosed to the perspective tenant(s) the amount of parking provided for each unit and that City parking requirements could significantly restrict the use proposed. Additionally, the disclosure shall advise tenants to confirm with city requirements for the any use proposed. Any use requiring additional parking above that provided shall not be permitted.

15. No signs are approved pursuant to this project approval. Prior to the installation of any on-site advertising or directional signs, a signing plan shall be submitted to and approved by the Planning Department pursuant to the requirements of Section 16.38 of the City's Development Code.

16. No outdoor advertising display, sign or billboard (not including on-site advertising or directional signs) shall be constructed or maintained within the property subject to this approval.

17. The applicant or their successor-in-interest shall comply with the standards of the Jefferson Avenue Business Corridor Master Development Plan, or as approved by the City Engineer.

18. Drought tolerant and native plant species shall be preferred over non-drought tolerant and non-native species. However, the quantity and extent of those species shall depend on the project's climatic zones. Alternative types of low volume irrigation are encouraged to be used in order to conserve water.

19. In the event the development permitted under this permit, a) is found to be in violation of the terms and conditions of this permit, b) is found to have been obtained by fraud or perjured testimony, or c) is found to be detrimental to the public health, safety or general welfare, or is a public nuisance, this permit shall be subject to the revocation procedures in Section 16.82 of the Development Code.

20. Outside storage is not approved/permitted as part of this project.

21. The City is located within the Mt. Palomar Special Lighting Area, as defined in Section 16.18.110 of the Development Code, low pressure sodium vapor lighting or overhead high pressure sodium vapor lighting with shields or cut off luminaries, shall be utilized.

22. The permittee shall comply with all of the applicable requirements of the National Pollution Discharge Elimination System (NPDES) and shall conform to NPDES Best Management Practices for Stormwater Pollution Prevention Plans during the life of this permit.

23. This approval shall be used within two (2) years of approval date; otherwise, it shall become null and void and of no effect whatsoever. By use is meant the beginning of substantial construction contemplated by this approval within a two (2) year period which is thereafter diligently pursued to completion or to the actual occupancy of existing buildings or land under the terms of the authorized use. Prior to the expiration of the two-year period, the permittee may request a one (1) year extension of time request in which to use this Development plan. A maximum of three one-year extensions of time requests shall be permitted. Should the time period established by any of the extension of time requests lapse, or should all three on-year extensions be obtained and no substantial construction or use of this plot plan be initiated within five

(5) years of the effective date of the issuance of this Development plan, this Development plan shall become null and void.

24. All of the Conditions of Approval for DPO-006-1913 and TPM-006-1914 shall be shown on Building Plans submitted to the City Building & Safety Department for plan check.

Design and Lighting:

25. All mechanical equipment and vents (ground or rooftop) shall be screened from public view. Screening method and location shall be reviewed and approved by the Planning Department.

26. Prior to building permit issuance, the applicant shall screen ALL roof top equipment through the incorporation of a mansard or other full roof element to screen equipment 100%. A sight line diagram shall be provided in the building plans. In addition, details including the height of the roof-top equipment, roof deck height, and height of the parapet must be included in the plans prior to building permit issuance.

27. An interior room, with direct exterior access, shall be provided for the placement of main utility electrical switch gear distribution and roof access ladders.

28. Roof gutters and downspouts are not permitted on the exterior of the building unless satisfactorily integrated into the architecture as determined by the Planning Department prior to building permit issuance.

29. The City is located within the Mt. Palomar Special Lighting Area, as defined in Section 16.18.110 of the Development Code, low pressure sodium vapor lighting or overhead high pressure sodium vapor lighting with shields or cut off luminaries, shall be utilized.

30. All lighting fixtures shall be designed with shielding or cut-off fixtures to project in a downward manner to minimize glare and to not shine directly upon adjoining property or public rights-of-way. A detailed lighting study (photometric) shall be provided prior to building permit issuance to demonstrate compliance with this condition.

31. All parking lot lights and other outdoor lighting shall be shown on electrical plans submitted to the Department of Building and Safety for plan check approval and shall comply with the requirements of Development Code Section 16.18.100-Lighting and 16.18.110-Mt Palomar Lighting Standards.

32. All trash bins shall be stored in approved enclosures and screened in compliance with Sections 16.18.120 and 16.18.150 of the Murrieta Development Code. The location of the enclosures must be shown on the precise grade plan and shall provide a minimum of 48 square feet of refuse storage area (24 square feet for refuse and 24 for recycling).

33. Any retaining walls must adhere to the Development Code Sections 16.18.140, D., 4. (b) and 16.22.040. No retaining wall may exceed six (6) feet in height and any proposed wall over six (6) feet in height is subject to approval by the Planning Director.

Parking:

34. Parking is determined based on Development Code Section 16.34 which requires 1 space per 250 square feet for the first 5,000 square feet of gross floor area and 1 space per 350 square feet thereafter for Professional Offices. A minimum of 368 parking spaces is required. The project is required to provide 394 spaces as shown on the approved site plan

35. All parking shall be designed and improved pursuant to Section 16.34 of the Murrieta Development Code, and shall be in conformance with the approved plans.

36. A minimum of eighteen (18) bicycle rack spaces shall be provided in a convenient location to facilitate bicycle access to the project area a shown on approved plans. The bicycle racks shall be shown on project landscaping and improvement plans submitted for Planning Department approval, and shall be installed in accordance with those plans.

37. Parking spaces(s) for persons with disabilities shall be provided as shown on APPROVED PLANS. Each parking space reserved for persons with disabilities shall: (a) be identified by a permanently affixed reflective sign constructed of porcelain on steel, beaded text or equal, displaying the International Symbol of Accessibility; (b) not be smaller than 70 square inches in area; (c) be centered at the interior end of the parking space at a minimum height of 80 inches from the bottom of the sign to the parking space finished grade; and (d) have a surface identification sign duplicating the symbol of the accessibility in blue paint of at least 3 square feet in size.

38. A sign shall be posted in a conspicuous place at each entrance to the off-street parking area, not less than 17 inches by 22 inches, clearly and conspicuously stating the language provided by the Building and Safety Department regarding accessible parking.

39. A minimum of one (1) loading space shall be provided in accordance with Section 16.34.100 of the Development Code as shown on the approved plans. The loading space shall be surfaced with six (6) inches of concrete over a suitable base and shall not be less than 15 feet wide by 25 feet long, with 14 feet vertical clearance.

40. No compact parking spaces are permitted. Any parking spaces shown as compact must be revised to meet the current parking space requirements.

Proposed Uses:

41. This project is designed for office and industrial uses, therefore, no commercial uses will be allowed. In addition, the project was designed at a parking ratio of 1 space per 250 sq. ft. for the first 5,000 sq. ft. and 1 space per 350 sq. ft. thereafter, therefore, any uses that exceed that parking requirements shall not be permitted, e.g. medical offices, restaurants, etc.

42. MITIGATIONS MEASURES:

LAND USE

MITIGATION MEASURE 1-1

Prior to the issuance of a rough grading permit, a pre-construct survey for the burrowing owl shall be prepared by a qualified biologist on behalf of the developer. If burrowing owls are found on the site, the developer shall avoid or mitigate for this species according to the established protocols for the Multiple Species Habitat Conservation Plan.

UTILITIES

MITIGATION MEASURE 3-1

Prior to issuance of a grading permit developer shall submit a drainage report which demonstrates that the following performance standard will be fulfilled: the incremental increase in surface runoff generated on the site will be captured onsite and the volume of storm water released during storm events will not increase by an amount that could cause significant flood or erosion hazards to or exceed the capacity of downstream channels. This report shall be reviewed and approved by the City of Murrieta Public Works Department.

MITIGATION MEASURE 3-2

Prior to the approval of a grading permit, the developer shall demonstrate to the satisfaction of the Director of Public Works that onsite detention facilities are sufficient to detain nuisance flows during a 10-year, 24-hour storm event.

CIRCULATION

MITIGATION MEASURE 5-1

Prior to the issuance of a building permit, the developer shall pay the project fair share of future traffic signal improvements for the intersections of Murrieta Hot Springs Road and Madison Avenue.

MITIGATION MEASURE 5-2

Prior to the issuance of a building permit, the developer shall pay the applicable Transportation Uniform Mitigation Fee (TUMF).

BIOLOGICAL

MITIGATION MEASURE 7–1

Prior to the issuance of a grading permit project is required to pay the MSHCP mitigation fees.

MITIGATION MEASURE 7–2

Prior to the issuance of a rough grading permit, a pre-construct survey for the burrowing owl shall be prepared by a qualified biologist on behalf of the developer. If burrowing owls are found on the site, the developer shall avoid or mitigate for this species according to the established protocols for the Multiple Species Habitat Conservation Plan.

MITIGATION MEASURE 7–3

For all bird species, vegetation removal shall be conducted outside the avian breeding season (March-July) to avoid impacts to nesting birds. If vegetation clearance is conducted during the breeding season, a pre-construction bird survey will be required less than 7-days from vegetation disturbance activities. If passerine birds are found to be nesting or there is evidence of nesting behavior inside or within 250 feet of the impact area, applicant shall provide a 250-foot buffer around the nest where no vegetation disturbance would be permitted; for raptors the buffer would be increased to 500 feet and provide for a qualified biologist to closely monitor the nest until it is determined that the nest is no longer active, at which time vegetation removal could continue.

HAZARDS

MITIGATION MEASURE 13-1

Applicant shall remediate all spills or leakage of petroleum products during construction activities in compliance with applicable state and local regulations regarding cleanup and disposal of the contaminant released. The contaminated waste shall be collected and disposed of at an appropriately licensed disposal or treatment facility. This measure will be incorporated into the SWPPP prepared for the project development.

NOISE

MITIGATION MEASURE 14-1

All exterior construction activities shall be limited to the hours between 7 a.m. to 7 p.m. from Monday through Saturday. Construction shall not be allowed on Sunday or holidays, except during an emergency as identified in the City's Development Code.

MITIGATION MEASURE 14-2

The applicant shall respond to any noise complaints received for this project by measuring noise levels at the affected receptor. If the noise level exceeds an Ldn of 65 dBA exterior or an Ldn of 45 dBA interior at the receptor, the applicant will implement adequate measures to reduce noise levels to the greatest extent feasible, including portable noise barriers or scheduling specific construction activities to avoid conflict with adjacent sensitive receptors.

MITIGATION MEASURE 14-3

During construction, the contractor shall ensure all construction equipment is equipped with appropriate noise attenuation devices. (e.g. mufflers)

AIR QUALITY

MITIGATION MEASURE 15-1

The applicant shall require construction contractors to apply water to the disturbed portions of the project site at least three times per day. On days where wind speeds are sufficient to transport fugitive dust beyond the working area boundary, the contractors shall increase watering to the point that fugitive dust no longer leaves the property (typically a moisture content of 12%), and/or the contractor will terminate grading and loading operations.

MITIGATION MEASURE 15-2

The applicant shall comply with regional rules such as SCAQMD Rules 402, 403 and 404, which would assist in reducing short-term air pollutant emissions. These dust suppression techniques are summarized below.

a. **Portions of the construction site to remain inactive longer than a period of three months will be seeded and watered until grass cover is grown or otherwise stabilized in a manner acceptable to the City.**

b. **All onsite roads will be paved as soon as feasible or watered periodically or chemically stabilized.**

c. **All material transported offsite will be either sufficiently watered or securely covered to prevent excessive amounts of dust.**

d. **The area disturbed by clearing, grading, earth moving, or excavation operations will be minimized at all times.**

e. **Where vehicles leave the construction site and enter adjacent public streets, the streets will be swept daily or washed down at the end of the work day to remove soil tracked onto the paved surface.**

MITIGATION MEASURE 15-3

All material stockpiles subject to wind erosion during construction activities, which will not be utilized within three days, shall be covered with plastic, an alternative cover deemed equivalent to plastic, or sprayed with a nontoxic chemical stabilizer.

MITIGATION MEASURE 15-4

All vehicles on the construction site shall travel at speeds less than 15 miles per hour. This will be enforced by including this requirement in the construction contract between the City and the contracted construction company with penalty clauses for violation of this speed limit.

MITIGATION MEASURE 15-5

The contractor shall establish a car-pool program for construction employees which will include incentives with the goal of achieving a 1.5 persons per vehicle ridership for this construction project.

MITIGATION MEASURE 15-6

All engines will be properly operated and maintained. Proper tune for all diesel-powered vehicles and equipment in the South Coast Air Basin requires that fuel injection timing be retarded 2 degrees from the manufacturer's recommendation and use high pressure injectors.

MITIGATION MEASURE 15-7

All diesel-powered vehicles shall be turned off when not in use for more than 30 minutes and gasoline-powered equipment will be turned off when not in use for more than 5 minutes.

MITIGATION MEASURE 15-8

The construction contractor shall utilize electric or natural gas powered construction equipment in lieu of gasoline or diesel powered engines, where feasible and where economically competitive.

MITIGATION MEASURE 15-9

The project shall use power poles for electricity rather than temporary diesel or gasoline generators except in the event of emergency.

MITIGATION MEASURE 15-10

Low VOC coatings shall be used on all structures.

MITIGATION MEASURE 15-11

Low VOC asphalt shall be used on paved portions of the site.

Prior to recordation of the final map:

43. Developer(s) shall prepare a statement to be provided to the potential purchases of each Subdivided lot, and included in escrow for the sale thereof, indication the General Plan and zone designations for all properties abutting the Parcel Map boundaries, with direction to contact the City of Murrieta concerning questions concerning potential uses of undeveloped property and indicating that zoning may be subject to future change. The form of the letter shall be reviewed and approved by the City of Murrieta as a condition of the Parcel Map approval.

44. Any delinquent property taxes shall be paid prior to the recordation of the final map.

Prior to the issuance of each grading permit:

45. The applicant shall comply with the provisions of any existing City ordinance established as a mitigation measure for the Stephens Kangaroo Rat.

46. The project site shall be surveyed for burrowing owls by a qualified biologist no more than 30 days prior to the commencement of ground disturbance. In the event those burrowing owls inhabit the site and initiated nesting in a burrow, burrows will be avoided and protected in place until such time as the nesting home has fledged. Upon verification by a qualified biologist that owls are no longer nesting on the site the biologist will excavate and collapse the burrows.

47. Grading plans shall be reviewed by the Planning Department for compliance with the approved development plan. Grading plan check fee is an actual cost fee billed at $70.00 per hour. A deposit of $140.00 shall be paid at the time grading plans are submitted for plan check. Applicant is aware that the plan check fee is subject to change and that the fee in effect at the time of plan check submittal shall be applicable.

Prior to issuance of a building permit:

48. The proposed project lies within an area subject to an area wide Transportation Uniform Mitigation Fee (TUMF). This project shall be subject to the payment of these fees prior to the issuance of building permits unless exempted by ordinance. The fees shall be subject to the provisions of the enabling ordinance and based upon the fee schedule in effect at the time of building permit issuance.

49. The local postal delivery office shall review and approve all proposed postal delivery arrangements, including location and access to all mailboxes. The applicant shall provide the City with evidence of postal service approval.

50. If signs are proposed, a separate exhibit and appropriate fees must be submitted for review and approval by the Planning and Building Departments prior to installation.

51. All lighting shall comply with the City's lighting ordinance Section 16.18.110-Mount Palomar Lighting Standards.

52. The applicant shall obtain clearance from the Planning Department verifying that all pertinent conditions of the Tentative Map have been satisfied for the development in question.

53. Applicant shall obtain waste management approval of all solid waste pick-ups for the project.

54. All landscape and irrigation plans shall be consistent with Title 16.28 of the Murrieta Municipal Code.

55. Prior to building permit issuance the applicant shall obtain approval of addressing from the Planning Department.

LANDSCAPE ARCHITECT

Prior to the issuance of building permits:

56. Three copies of construction landscaping plans shall be submitted to the Planning Division and approved. A licensed Landscape Architect shall prepare the plans.

57. The above-described plans shall be in substantial conformance with the plans as approved by the City Landscape Architect, City Administrative Staff, Planning Commission and/or City Council. Notes, details, and specifications shall be included.

58. All landscape and irrigation plans shall be consistent with Title 16.28 of the Murrieta Municipal Code and the guide, "Planting Guide for Jefferson Avenue Business Corridor Master Plan".

59. All parking lot planting areas, curbing, irrigation, and bumper overhang shall be consistent with Title 16.34.070-H. of the Murrieta Municipal Code.

60. Landscape plans shall be drawn at a scale of 20 feet equal to 1 foot or larger. The City Landscape Architect will not accept plans drawn in 30 feet scale or smaller without prior approval.

61. No light fixture shall be designed for any location in a planting area, which would make it necessary to eliminate a tree. **All overhead light fixtures shall be identified on the grading or site plan prior to approval of the site plan.**

62. Plant materials shall be installed from container sizes consistent with Murrieta Municipal Code, page III-79, Table 3-5, Minimum Required Mix of Plant Materials and in accordance with the plant palette listed in the guide, "Planting Guide For Jefferson Avenue Business Corridor Master Plan."

63. All ground covers shall be installed from living plant materials. Spacing shall be such that 100% coverage is achieved within 2 years of the installation.

64. All planter areas shall be a minimum of 5 feet wide excluding curbs and required concrete strip adjacent to parking spaces (12" wide by 4" deep plus 6" wide curb or 12" wide by 12" deep integrally poured modified curb).

65. Permanent, evergreen shrubs capable of mature growth to between 3 feet and 4 feet high shall be designed to screen the parking spaces from public view.

66. All trash enclosures shall be covered with architectural treatment to blend with the buildings as approved by the Planning Division. The walls of the trash enclosure shall have a minimum 5-foot wide planting area. Flowering vines shall be trained on to the walls. Trees, shrubs and ground covers shall be included.

67. Planting areas adjacent to streets shall have trees provided at the rate of one for each 20 lineal feet of landscaped area. The street trees along Madison Avenue shall be informal groupings of *Arbutus 'Marina'* and *Lagerstroemia indica 'Biloxi'*.

68. Mature specimen trees in 36-inch and 48-inch boxes shall be supplied in sufficient quantity to provide variety and emphasis at the driveways and other main focal areas.

69. Above ground utility locations shall be approved with prior permission of the Planning Division. Building backflow prevention units shall be located in shrub areas outside of the City right-of-way. All double detector check and backflow assemblies shall be located in shrub beds clearly identified on the grading plan prior to approval of the grading plan. **On the grading plan it shall be noted that the detector check/backflow devices shall be painted a neutral/earth tone color and any pipes extending above ground shall be finished and painted to match the device.** The detector check shall be fully screened with approved shrubs. **The detector check and post indicator valves shall be located at least 10 feet away from any driveway.**

70. No planting area shall contain less than 5 feet of planting area. Planting areas shall be free of encroachment by wall footings, curbs, parking overhang and other obstructions. **No planting area shall be bisected by a handicap ramp that would make any planting area less than 5 feet in width.**

71. Canopy shade trees shall be located directly adjacent to all parking spaces at no farther than 25 feet on center in continuous planters or 36 feet on center in planter islands to provide the required percentage of parking spaces shaded at 15 years growth. **Shade trees shall not be located within 4 feet of any building.**

72. No building roof drain shall daylight into a planter area or splash block. Roof drains located at planter areas shall be adapted to convey excess water through the planter via drain pipes, which daylight through the curb into the adjacent gutter.

73. Landscaping, including approved dense plantings of evergreen shrubs capable of growth to at least 6 feet high, or as directed by the City of Murrieta Landscape Architect, shall be designed and installed in the planting area to screen the side and rear property walls adjacent to parking spaces to the satisfaction of the City Landscape Architect within 3 years.

74. Landscaping shall be incorporated and planned as an integral part of the overall project design around the building. Landscaping should not interfere with pedestrian or handicap accessibility. Pedestrian and handicap accessibility shall be designed not to interfere with landscaping required around the building. **Handicap ramps shall not be placed in planter areas, if it reduces the planted area to less than 5 feet wide at any point.**

75. All trees shall be double staked with rubber type ties nailed to the lodge pole stakes in at least two vertical locations.

76. A weather-based irrigation controller that measures evapo-transpiration shall be provided. Drip irrigation is required in all shrub areas and on all slope areas, including in the bio-swale.

77. A rain shut off device shall be installed connected with the irrigation controller.

78. All plantings shall be hydro-zoned according to WUCOLS III or the "City of Murrieta Guide To Trees, Shrubs, and Ground Covers." The maximum applied water allowance shall not exceed 25 percent of the local annual mean precipitation.

79. Landscaping shall be provided for lot 1 at 20.6%, for lot 2 at 15.8%, for lot 3 at 19.34% and for lot 4 at 16.1%.

80. No eucalyptus trees and other plant material that could freeze or use excessive water are allowed.

81. At least 5 feet of level planting area shall be provided along Madison Avenue between the parking spaces and the top of the bio-swale slope. At least 5 feet of level planting area shall be provided along Madison Avenue between the right of way and the top of the bio-swale slope.

82. All bio-swales shall be noted as "vegetated". No grass swales will be accepted. Provide at least 18 inches of soil over gravel in the bio-swales to support plant root growth.

83. All pre-plant and installation fertilizers shall be derived from organic sources of higher plant forms.

Prior to Construction:

84. The City Landscape Architect shall meet with the job site superintendent and the landscape contractor for a pre-job meeting. A copy of the soil fertility recommendations using organic fertilizer and soil amendments only shall be presented prior to the meeting. No landscaping shall occur prior to the meeting.

Prior to the issuance of occupancy permits:

85. Performance securities, in the amount determined by the City to guarantee the adequate maintenance of the landscaping materials and irrigation system in accordance with the approved plans for a period of one (1) year from the date of final clearance of the installed landscaping by the City, shall be posted with the Planning Department. Acceptable forms of security shall be limited to cash deposit, cash bonds, or irrevocable letters of credit. The performance securities shall be released one (1) year after final clearance of the installed landscaping by the City, upon written request by the owner, if the landscaping has been adequately maintained. A deposit to cover re-inspection of the landscape, at the current City rate shall be posted with the Planning Department prior to re-inspection for maintenance bond release.

86. All required landscaping and irrigation systems shall be installed in a condition acceptable to the City. The owner's Landscape Architect shall provide inspection of the landscaping. The owner's Landscape Architect shall provide the City with a Certificate of Compliance stating that the landscaping was installed per the approved plans. The City will review the Certificate of Compliance and conduct inspections to ensure that the landscape installation is in compliance with the approved landscape plans.

ENGINEERING CONDITIONS FOR DPO-006-1913:

The Engineering Division has completed our review of the project and provides the following comments and conditions:

GENERAL CONDITIONS

87. The applicant shall pay all applicable Development Mitigation Impact Fees, including but not limited to:

    A. Development Impact Fees, Ordinance 196-98 payable prior to issuance of building permit.

    B. Kangaroo Rat Fee, payable at issuance of grading permit.

    C. Riverside County Area Drainage Fees, payable at issuance of grading permit.

    D. Transportation Uniform Mitigation Fee (TUMF), payable at building permit issuance.

    E. MSHCP Fee, payable prior to issuance of a grading permit.

    Fees shall be based upon Office or Industrial Development Rates depending on building.

88. Prior to any work being performed in the public right of way, fees shall be paid and an encroachment permit shall be obtained from the Engineering Department. The applicant shall apply for an encroachment permit from the City for utility trenching, utility connection or any other encroachment onto public right-of-way. The applicant shall be responsible for the associated costs and arrangements with each public utility.

89. Prior to the issuance of building permits, unless other timing is indicated, the applicant shall complete all street improvement, signing, striping, and signal plans (if required) in conformance with all applicable City ordinances and standards, submit and obtain approval, post securities and execute agreements. Prior to occupancy, unless other timing is indicated, all public improvements shall be installed in accordance with all applicable City ordinances.

90. All construction equipment shall be properly maintained and tuned to reduce emissions.

91. Existing easements underlying proposed improvements shall either be vacated with the approval of the easement grantee or permission shall be obtained from said grantee for development within the easements.

GRADING

92. A project-specific water quality management plan (WQMP) shall be submitted to the Engineering Department for approval with the grading plan check application. The WQMP shall be approved by the Engineering Department prior to the issuance of a grading permit. The post-construction best management practices (BMPs) outlined in the approved project-specific WQMP shall be incorporated in the grading plans. A copy of the approved project-specific WQMP shall be provided to the Engineering Department and a copy shall be maintained by the applicant and kept on-site.

At the completion of the project, the applicant shall enter into a maintenance agreement for the post-construction BMPs. This agreement shall be based on the as-built WQMP BMPs and shall be recorded.

A copy of the as-built WQMP (approved WQMP updated to include any changes made during construction) shall be submitted to the Engineering Department prior to the release of grading and erosion control bonds. The applicant shall keep a copy of the as-built WQMP on-site at all times.

93. Prior to issuance of a grading permit and other construction activities, the applicant shall provide to the Engineering Department, a copy of the Notice of Intent (NOI) and waste discharge identification (WDID) number from the State Water Resources Control Board.

    An adequate storm water pollution prevention plan (SWPPP) shall be available to state and city public works inspectors at the construction site prior to commencing and throughout construction. The applicant shall be responsible for implementation, monitoring, operations and maintenance of the SWPPP until construction is complete and a Notice of Termination (NOT) has been filed with the State Water Resources Control Board.

94. All grading activities shall minimize dust through compliance with AQMD Rule 403 which requires watering during earth moving operations.

95. A soils investigation study shall be completed and approved prior to issuance of a grading permit. If the project is located within an earthquake fault zone, a third party review shall be required of the soils investigation report. All recommended measures identified in the soils report shall be incorporated into the project design. On the grading plan, identify all faults located within the project from the Fault Location Map. All plans and maps shall show seismic zones as well as the minimum fault setbacks. Notes shall be placed on all plans if the project is entirely within or outside the seismic zone as the case may be.

96. If appropriate, prior to issuance of any grading permit or ground disturbance, applicant shall obtain necessary approvals and permits from applicable Federal and State regulatory agencies. If the site contains regulated waters, the applicant shall obtain a 404 permit from the Corps of Engineers, a 401 certification from the Regional Water Quality Control Board, a section 1603 Department of Fish and Game stream bed alteration agreement, and file a Notice of Intent of ground disturbance with the State Water Resources Control Board.

97. Prior to commencing of any grading in excess of 50 cubic yards, paving in excess of 3,000 square feet, or alteration of existing drainage patterns, the applicant shall obtain a grading permit from the Engineering Department prior to issuance of a building permit. The developer shall have an approved grading permit prior to the commencement of any clearing or grading of the site.

98. Prior to hauling dirt or construction materials to any proposed construction site within this project, the developer shall submit to and receive approval from the City Engineer for the proposed haul route. The developer shall comply with all conditions and requirements the City Engineer may impose with regards to the hauling operation.

99. In instances where a grading permit involves import or export, the developer shall obtain approval of the import/export location by the City Engineer prior to obtaining a grading permit.

100. Permission from property owners shall be required for work located on adjacent properties. A notarized letter of permission shall be provided to the City prior to issuance of any permit.

101. Clean water measures shall be in place and designed per the guidelines provided in the latest edition California Storm Water Quality Best Management Practices Handbook.

102. Runoff discharge from the construction and fully developed site shall meet NPDES water quality requirements by implementing Best Management Practices (BMPs) on-site to prevent sediment, debris, oils, grease, and other pollutants from flowing through the public storm drain system. The plans shall specifically identify structural and non-structural BMPs that will be designed into and implemented on this project to reduce the discharge of pollutants into the storm drain system to the maximum extent practicable. Structural BMPs shall be provided on-site. Maintenance of BMPs shall be the responsibility of the applicant. Proof of a maintenance mechanism shall be provided prior to issuance of building permit.

103. Plant and irrigate all slopes greater than or equal to 3 feet in vertical height with ground cover to the satisfaction of the City Engineer. Slopes that exceed 15 feet in vertical height are to be planted with shrubs and/or trees.

FLOOD CONTROL

104. Suitable, drivable access shall be provided to the storm drain inlet accepting water from the eastern property boundary. Applicant shall provide sufficient hydrology and hydraulic calculations to show that ponding will not occur on the upstream property as a result of the proposed improvements.

105. The proposed storm drain crossing Madison Avenue shall be designed to discharge in the existing drainage course and sized to convey existing and proposed developed flows. No diversion will be allowed unless otherwise approved by the City Engineer. A notarized letter of permission shall be obtained from the property owner impacted by grading and discharge for the storm drain.

106. Grading or additional storm drain pipe may be necessary to prevent ponding on the southern property due to revisions to the existing storm drain crossing Madison Avenue. Letters of permission shall be obtained for grading or storm drain installation on adjacent properties.

107. Storm drain and detention pipes shall be designed to maintain a positive gradient of 0.5% unless otherwise approved by the City Engineer.

108. Applicant shall provide a drainage study prepared by a registered Civil Engineer identifying storm water runoff quantities expected from the site and upstream of the site. The study shall show all existing and proposed off-site public or private drainage facilities intended to discharge this runoff. The study shall include a capacity analysis

verifying the adequacy of said facilities. Runoff from the development or partial phase of development of the property shall not exceed the existing natural discharge quantities with respect to the following criteria:

A. Detention shall not be required for developments of less than one acre if the development uses volume based water quality measures.

B. For projects less than 10 acres, including those less than one acre NOT using volume based water quality measures shall analyze and mitigate the difference in developed and undeveloped runoff based on the 1-hour duration of the 10-year intensity storm. A simplified hydrograph method shall be used that simulates the hydrograph with a triangle. The Rational method flow rate shall be the top value of the triangle and the base width shall be two times the time of concentration (Tc). The difference in area between the developed condition triangle and the existing condition triangle represents the required storage volume. Both triangles shall use time of concentration from the developed condition. Based upon the storage volume head, the outlet structure shall have an outlet flow no larger than the existing flow rate.

C. Projects that are 10 acres or greater shall analyze for the 1,3,6 and 24-hour duration for the 2,5 and 10-year frequency storms.

The design of detention basins shall provide for the detention of nuisance flow. Development shall detain the year and duration incremental storm runoff developed and or increased by means of on-site detention. Detention techniques shall include, but not be limited to: Parking lot detention or on-site detention basin or other methods approved by the City Engineer. Detention shall not be required in the event facilities down stream from the point of discharge are shown to be designed for and have been constructed to convey the fully developed 100 year storm event. Evidence of a maintenance mechanism shall be provided for the basins prior to any building permit. If project discharges/connects to an off-site detention basin, provide permission to drain/connect correspondence from the owner of basin or system and provide corresponding calculations verifying adequacy of off-site basin. Off-site detention basins require a Declaration of Dedication.

109. Street storm flows shall not exceed top of curb for the 10-year storm event and must be contained within the street right-of-way for the 100-year storm event.

110. The applicant shall accept and properly dispose of all offsite drainage flowing onto or through the site.

111. If possible all drainage shall be conveyed onto public property. No cross lot drainage shall be permitted.

112. Applicant shall protect all downstream properties from damages caused by alteration of the drainage patterns, i.e., concentrations or diversion of flow. Protection shall be provided by constructing adequate drainage facilities including enlarging existing facilities and/or by securing a drainage easement. A maintenance mechanism shall be in place for any private drainage facilities constructed on-site or off-site prior to any building permit. Any grading or drainage improvements onto private off site or adjacent property shall require a written permission to grade and/or a permission to drain letter from the affected landowner.

TRANSPORTATION

113. Madison Avenue: Applicant shall dedicate right-of-way and construct half-street improvements per City of Murrieta Standard 103 Mod. A. Raised medians shall be required and shall extend either to the end of the property frontage or a minimum of 150-feet from the edge of the driveway closest to the end of the property frontage, which ever is greater, unless otherwise approved by the City Engineer.

114. Jordan Avenue: Applicant shall dedicate right-of-way and construct half-street plus one 12-foot lane per City of Murrieta Standard 111.

115. Street improvements to Madison Avenue and Jordan Avenue shall comply with the approved vertical alignment study for Madison Avenue. Vertical and horizontal transitions shall be constructed on either end of project frontage in conformance with the City design standards and as approved by the City Engineer.

Applicant shall improve the following intersections to provide, at a minimum, the following geometrics, or as approved by the Traffic Engineer:

116. Madison Avenue Driveway (south) Geometrics:

    NB: two through lanes
    SB: one through lanes
    EB: N/A
    WB: one right turn lane

    Driveway shall be right-in/right-out only. Access shall be controlled through the installation of raised median.

117. Madison Avenue Driveway (north) Geometrics:

    NB: two through lanes
    SB: one left turn lane, one through lane
    EB: N/A
    WB: one left/right turn lane

118. Jordan Avenue Driveway Geometrics:

    NB: one left/right turn lane
    SB: N/A
    EB: one through lane
    WB: one through lanes

119. Applicant shall pay 7.2% fair share contribution to improvements to the Murrieta Hot Springs Road and Madison Avenue intersection per the City's Capital Improvement Plan.

120. The southern driveway is intended to be a shared access driveway with the southern property. The proposed retaining wall will prevent access from the southern property. Applicant shall provide sufficient easement for the adjacent property to remove retaining walls and install driveway for access to the southern property or replace retaining walls with offsite grading onto the southern property. Grading offsite shall require a notarized letter of permission from impacted property owners.

121. Water and sewer facilities shall be constructed along project frontage and sufficient distance to provide service to the site in compliance with the JABCMP unless otherwise approved by the serving water and sewer districts.

122. Improvement plans shall be prepared by a Registered Civil Engineer based upon a centerline profile extending a minimum of 300 feet beyond the project boundaries at a grade and alignment as approved by the Civil Engineer.

123. Construct driveway approach improvements per City of Murrieta Standards.

124. Construct street lighting per City of Murrieta Standards.

125. Signage and landscaping shall be located so as not to interfere with sight distance per City of Murrieta Standards.

126. Prior to the issuance of any building permit, the applicant shall prepare and have approved signing and striping plans for all on-site, off-site and project frontage improvements as conditioned herein, unless otherwise determined by the City Engineer.

127. The applicant shall provide for the under grounding of all existing and proposed utility distribution facilities within the project unless exempt per the City of Murrieta Development Code. The applicant shall be responsible for the associated costs and arrangements with each public utility.

128. Install required water and sewer systems necessary to serve the project per the City of Murrieta Development Code.

129. All existing street and property monuments within or abutting this project site shall be preserved consistent with AB 1414. If during construction of onsite or offsite improvements monuments are damaged or destroyed, the applicant/developer shall retain a qualified licensed land surveyor or civil engineer to reset those monuments per City of Murrieta Standards and file the necessary information with the County Recorder's office as required by law (AB 1414).

ENGINEERING CONDITIONS FOR TPM-006-1914:

GENERAL CONDITIONS

130. The applicant shall pay all applicable Development Mitigation Impact Fees, including but not limited to:

    A. Development Impact Fees, Ordinance 196-98 payable prior to issuance of building permit.

    B. Kangaroo Rat Fee, payable at issuance of grading permit.

    C. Riverside County Area Drainage Fees, payable at issuance of grading permit.

    D. Transportation Uniform Mitigation Fee (TUMF), payable at building permit issuance.

    E. MSHCP Fee, payable prior to issuance of a grading permit.

    Fees shall be based upon Office or Industrial Development Rates depending on building.

131. Prior to any work being performed in the public right of way, fees shall be paid and an encroachment permit shall be obtained from the Engineering Department. The applicant shall apply for an encroachment permit from the City for utility trenching, utility connection or any other encroachment onto public right-of-way. The applicant shall be responsible for the associated costs and arrangements with each public utility.

132. Prior to the issuance of building permits, unless other timing is indicated, the applicant shall complete all street improvement, signing, striping, and signal plans (if required) in conformance with all applicable City ordinances and standards, submit and obtain approval, post securities and execute agreements. Prior to occupancy, unless other timing is indicated, all public improvements shall be installed in accordance with all applicable City ordinances.

133. All construction equipment shall be properly maintained and tuned to reduce emissions.

GRADING

134. A project-specific water quality management plan (WQMP) shall be submitted to the Engineering Department for approval with the grading plan check application. The WQMP shall be approved by the Engineering Department prior to the issuance of a grading permit. The post-construction best management practices (BMPs) outlined in the approved project-specific WQMP shall be incorporated in the grading plans. A copy of the approved project-specific WQMP shall be provided to the Engineering Department and a copy shall be maintained by the applicant and kept on-site.

    At the completion of the project, the applicant shall enter into a maintenance agreement for the post-construction BMPs. This agreement shall be based on the as-built WQMP BMPs and shall be recorded.

    A copy of the as-built WQMP (approved WQMP updated to include any changes made during construction) shall be submitted to the Engineering Department prior to the release of grading and erosion control bonds. The applicant shall keep a copy of the as-built WQMP on-site at all times.

135. Prior to issuance of a grading permit and other construction activities, the applicant shall provide to the Engineering Department, a copy of the Notice of Intent (NOI) and waste discharge identification (WDID) number from the State Water Resources Control Board.

    An adequate storm water pollution prevention plan (SWPPP) shall be available to state and city public works inspectors at the construction site prior to commencing and throughout construction. The applicant shall be responsible for implementation, monitoring, operations and maintenance of the SWPPP until construction is complete and a Notice of Termination (NOT) has been filed with the State Water Resources Control Board.

136. All grading activities shall minimize dust through compliance with AQMD Rule 403 which requires watering during earth moving operations.

137. A soils investigation study shall be completed and approved prior to issuance of a grading permit. If the project is located within an earthquake fault zone, a third party review shall be required of the soils investigation report. All recommended measures

identified in the soils report shall be incorporated into the project design. On the grading plan, identify all faults located within the project from the Fault Location Map. All plans and maps shall show seismic zones as well as the minimum fault setbacks. Notes shall be placed on all plans if the project is entirely within or outside the seismic zone as the case may be.

138. If appropriate, prior to issuance of any grading permit or ground disturbance, applicant shall obtain necessary approvals and permits from applicable Federal and State regulatory agencies. If the site contains regulated waters, the applicant shall obtain a 404 permit from the Corps of Engineers, a 401 certification from the Regional Water Quality Control Board, a section 1603 Department of Fish and Game stream bed alteration agreement, and file a Notice of Intent of ground disturbance with the State Water Resources Control Board.

139. Prior to commencing of any grading in excess of 50 cubic yards, paving in excess of 3,000 square feet, or alteration of existing drainage patterns, the applicant shall obtain a grading permit from the Engineering Department prior to issuance of a building permit. The developer shall have an approved grading permit prior to the commencement of any clearing or grading of the site.

140. Prior to hauling dirt or construction materials to any proposed construction site within this project, the developer shall submit to and receive approval from the City Engineer for the proposed haul route. The developer shall comply with all conditions and requirements the City Engineer may impose with regards to the hauling operation.

141. In instances where a grading permit involves import or export, the developer shall obtain approval of the import/export location by the City Engineer prior to obtaining a grading permit.

142. Permission from property owners shall be required for work located on adjacent properties. A notarized letter of permission shall be provided to the City prior to issuance of any permit.

143. Clean water measures shall be in place and designed per the guidelines provided in the latest edition California Storm Water Quality Best Management Practices Handbook.

144. Runoff discharge from the construction and fully developed site shall meet NPDES water quality requirements by implementing Best Management Practices (BMPs) on-site to prevent sediment, debris, oils, grease, and other pollutants from flowing through the public storm drain system. The plans shall specifically identify structural and non-structural BMPs that will be designed into and implemented on this project to reduce the discharge of pollutants into the storm drain system to the maximum extent practicable. Structural BMPs shall be provided on-site. Maintenance of BMPs shall be the responsibility of the applicant. Proof of a maintenance mechanism shall be provided prior to issuance of building permit.

145. Plant and irrigate all slopes greater than or equal to 3 feet in vertical height with ground cover to the satisfaction of the City Engineer. Slopes that exceed 15 feet in vertical height are to be planted with shrubs and/or trees.

FLOOD CONTROL

146. Suitable, drivable access shall be provided to the storm drain inlet accepting water from the eastern property boundary. Applicant shall provide sufficient hydrology and hydraulic calculations to show that ponding will not occur on the upstream property as a result of the proposed improvements.

147. The proposed storm drain crossing Madison Avenue shall be designed to discharge in the existing drainage course and sized to convey existing and proposed developed flows. No diversion will be allowed unless otherwise approved by the City Engineer. A notarized letter of permission shall be obtained from the property owner impacted by grading and discharge for the storm drain.

148. Grading or additional storm drain pipe may be necessary to prevent ponding on the southern property due to revisions to the existing storm drain crossing Madison Avenue. Letters of permission shall be obtained for grading or storm drain installation on adjacent properties.

149. Storm drain and detention pipes shall be designed to maintain a positive gradient of 0.5% unless otherwise approved by the City Engineer.

150. Applicant shall provide a drainage study prepared by a registered Civil Engineer identifying storm water runoff quantities expected from the site and upstream of the site. The study shall show all existing and proposed off-site public or private drainage facilities intended to discharge this runoff. The study shall include a capacity analysis verifying the adequacy of said facilities. Runoff from the development or partial phase of development of the property shall not exceed the existing natural discharge quantities with respect to the following criteria:

    A. Detention shall not be required for developments of less than one acre if the development uses volume based water quality measures.

    B. For projects less than 10 acres, including those less than one acre NOT using volume based water quality measures shall analyze and mitigate the difference in developed and undeveloped runoff based on the 1-hour duration of the 10-year intensity storm. A simplified hydrograph method shall be used that simulates the hydrograph with a triangle. The Rational method flow rate shall be the top value of the triangle and the base width shall be two times the time of concentration (Tc). The difference in area between the developed condition triangle and the existing condition triangle represents the required storage volume. Both triangles shall use time of concentration from the developed condition. Based upon the storage volume head, the outlet structure shall have an outlet flow no larger than the existing flow rate.

    C. Projects that are 10 acres or greater shall analyze for the 1,3,6 and 24-hour duration for the 2,5 and 10-year frequency storms.

    The design of detention basins shall provide for the detention of nuisance flow. Development shall detain the year and duration incremental storm runoff developed and or increased by means of on-site detention. Detention techniques shall include, but not be limited to: Parking lot detention or on-site detention basin or other methods approved by the City Engineer. Detention shall not be required in the event facilities down stream from the point of discharge are shown to be designed for and have been constructed to convey the fully developed 100 year storm event.

Evidence of a maintenance mechanism shall be provided for the basins prior to any building permit. If project discharges/connects to an off-site detention basin, provide permission to drain/connect correspondence from the owner of basin or system and provide corresponding calculations verifying adequacy of off-site basin. Off-site detention basins require a Declaration of Dedication.

151. Street storm flows shall not exceed top of curb for the 10-year storm event and must be contained within the street right-of-way for the 100-year storm event.

152. The applicant shall accept and properly dispose of all offsite drainage flowing onto or through the site.

153. If possible all drainage shall be conveyed onto public property. No cross lot drainage shall be permitted.

154. Applicant shall protect all downstream properties from damages caused by alteration of the drainage patterns, i.e., concentrations or diversion of flow. Protection shall be provided by constructing adequate drainage facilities including enlarging existing facilities and/or by securing a drainage easement. A maintenance mechanism shall be in place for any private drainage facilities constructed on-site or off-site prior to any building permit. Any grading or drainage improvements onto private off site or adjacent property shall require a written permission to grade and/or a permission to drain letter from the affected landowner.

TRANSPORTATION

155. Madison Avenue: Applicant shall dedicate right-of-way and construct half-street improvements per City of Murrieta Standard 103 Mod. A. Raised medians shall be required and shall extend either to the end of the property frontage or a minimum of 150-feet from the edge of the driveway closest to the end of the property frontage, which ever is greater, unless otherwise approved by the City Engineer.

156. Jordan Avenue: Applicant shall dedicate right-of-way and construct half-street plus one 12-foot lane per City of Murrieta Standard 111.

157. Street improvements to Madison Avenue and Jordan Avenue shall comply with the approved vertical alignment study for Madison Avenue. Vertical and horizontal transitions shall be constructed on either end of project frontage in conformance with the City design standards and as approved by the City Engineer.

The following intersections shall be improved to provide, at a minimum, the following geometrics, or as approved by the Traffic Engineer:

158. Madison Avenue Driveway (south) Geometrics:

NB: two through lanes
SB: one through lanes
EB: N/A
WB: one right turn lane

Driveway shall be right-in/right-out only. Access shall be controlled through the installation of raised median.

159. Madison Avenue Driveway (north) Geometrics:

NB: two through lanes
SB: one left turn lane, one through lane
EB: N/A
WB: one left/right turn lane

160. Jordan Avenue Driveway Geometrics:

NB: one left/right turn lane
SB: N/A
EB: one through lane
WB: one through lanes

161. Applicant shall pay 7.2% fair share contribution to improvements to the Murrieta Hot Springs Road and Madison Avenue intersection per the City's Capital Improvement Plan.

162. The southern driveway is intended to be a shared access driveway with the southern property. The proposed retaining wall will prevent access from the southern property. Applicant shall provide sufficient easement for the adjacent property to remove retaining walls and install driveway for access to the southern property or replace retaining walls with offsite grading onto the southern property. Grading offsite shall require a notarized letter of permission from impacted property owners.

163. Water and sewer facilities shall be constructed along project frontage and sufficient distance to provide service to the site in compliance with the JABCMP unless otherwise approved by the serving water and sewer districts.

164. Improvement plans shall be prepared by a Registered Civil Engineer based upon a centerline profile extending a minimum of 300 feet beyond the project boundaries at a grade and alignment as approved by the Civil Engineer.

165. Construct driveway approach improvements per City of Murrieta Standards.

166. Construct street lighting per City of Murrieta Standards.

167. Signage and landscaping shall be located so as not to interfere with sight distance per City of Murrieta Standards.

168. Prior to the issuance of any building permit, the applicant shall prepare and have approved signing and striping plans for all on-site, off-site and project frontage improvements as conditioned herein, unless otherwise determined by the City Engineer.

169. The applicant shall provide for the under grounding of all existing and proposed utility distribution facilities within the project unless exempt per the City of Murrieta Development Code. The applicant shall be responsible for the associated costs and arrangements with each public utility.

170. Install required water and sewer systems necessary to serve the project per the City of Murrieta Development Code.

171. All existing street and property monuments within or abutting this project site shall be preserved consistent with AB 1414. If during construction of onsite or offsite improvements monuments are damaged or destroyed, the applicant/developer shall retain a qualified licensed land surveyor or civil engineer to reset those monuments per City of Murrieta Standards and file the necessary information with the County Recorder's office as required by law (AB 1414).

BUILDING & SAFETY DEPARTMENT

General:

172. All structures shall comply with the current 2001 California Building Codes (CBC), and related Codes and Ordinances of the City of Murrieta. Three (3) sets of plans shall be submitted for a building permit, and shall include building data, building use/occupancy, construction type, allowable area increases and actual building square foot area, building setbacks, related building means of egress and ensuing egress discharge to the public right-of-way.

173. Required CBC, site facility accessibility components and details, unload areas, striping and HC parking symbol, accessible exterior routes of travel, as defined in Sec.1127B of the 2001 California Building Code (CBC); routes of travel, transition components etc., shall be provided between all commercial buildings, and each building to its own accessible trash enclosure and at least one exterior route shall be from the project site, to the public right-of-way, which shall be shown on an architectural site plan, and shall correlate with the civil designed precise grade plan. All design and details shall comply with California State guidelines as outlined in Title 24 California Building Code. The property owner shall be responsible for Federal ADA compliance.

174. Plans submitted during the permitting process, including but not limited to, site plan, precise grade plans and building architectural features, shall not vary substantially, from plans previously reviewed and Approved by the Planning, Engineering or other City Departments, without prior authorization form the Planning Manager, Public Works Director and/or Building and Safety Manager.

175. All exterior lighting shall be shown on building permit plans and shall comply with the City of Murrieta's MMC Sec.16.18.110, Mt. Palomar Lighting Pollution Control Standards.

176. A detailed Site Plan and correlating civil precise grade plan shall be submitted to the Building and Safety Department for site development review and Approval, prior to the issuance of a precise grading permit from the Engineering Division. Review for overall site features including trash enclosures construction details, exterior lighting compliance with the Mt. Palomar Lighting Pollution Control; site accessibility features, including exterior routes of travel, accessible transition components, grades and details.

Building Permit Application:

177. Plans submitted for building construction shall contain a full size copy of the Final Approved set of city departments Conditions of Approval.

178. Two sets of signed soil reports shall be submitted and correlate with building foundation design by reference. The report shall be from an individual licensed by the state to prepare such report, including compaction test results and verification of satisfactory placement, of any fill material used to support the foundation of any building or structure, in accordance with accepted engineering practice or, as recommended in any engineering geology preliminary report for any engineered grading design.

179. A sewer/ water permit shall be obtained from the City of Murrieta Building & Safety Department, for on-site (private) underground "wet" utilities for multi-building parcel development, unless dedicated easements and conveyance to local water/sewer districts is proposed. A deposit shall be paid to the Building and Safety Department at the time civil plans are submitted for plan review. Three (3) sets of civil plans shall be submitted for review, prior to grading permit Final. Maintenance agreements, reciprocal access and/or easements shall be recorded and verified prior to a Final building inspection and/or a building occupancy.

180. Separate permits shall be obtained from the City of Murrieta Building & Safety Department, for individual structures e.g., monument signs, building wall signs, masonry walls, retaining walls, temporary power etc. Temporary power and temporary wiring shall comply with Articles 230 and 305 of the 2001 California Electrical Code.

181. Separate permits shall be obtained from the City of Murrieta Building & Safety Department, for existing structures being relocated or, demolished.

Prior To Building Final:

182. Final permit approvals shall be obtained, and any outstanding fees shall be paid to all City Departments/Divisions which may include Fire, Planning, Engineering, Building & Safety, and the City Landscape Architect, prior to a tenant occupancy of a building permitted as a "shell only" building, a building shell "Notice of Inspection Completion", and the issuance of a Certificate of Occupancy from the City of Murrieta Building & Safety Division.

MURRIETA FIRE PROTECTION DISTRICT:

BUILDING PLAN SUBMITTAL

183. City of Murrieta Ordinance No. 546 establishes the installation of a fire protection sprinkler system in all buildings with fire flows calculated with a base of 1500 GPM or greater. The sprinkler system post indicator valve and fire department connection shall be located to the front of the project and no further than 40 feet from a super fire hydrant and on the same geographical side of any drive aisles. These appliances shall be located at a minimum of 25 feet from any building. A statement that the

building(s) will be automatically fire sprinklered must appear on the title page of the building plans.

184. Comply with all conditions for explosion venting and dust collecting addressed in the Uniform Building Code Section # 307.10. If applicable.

185. Plans must illustrate designated location of fire lanes. Contact Fire Prevention for recommended designations.

186. Fire sprinkler system shell conform to NFPA 13.

187. Minimum fire sprinkler density of .33 GPM/ 2500 SF is required even if high piled stock is planned.

188. If project is planned for Business condominium or changes to business condominium project addition conditions will apply.

189. Applicant must comply with conditions addressed in the California Administrative Code Titles 19 & 24.

190. Occupancy separation may be required as per the Uniform Building Code, Section 302.

191. All buildings within the City of Murrieta shall have fire retardant roofing with a Class "B" minimum rating. The developer must submit documented fire rated listings, supplied by the manufacturer, to the Fire Marshal if he/she chooses to use wood shingles.

PRIOR TO BUILDING PLAN RELEASE

192. A looped combination of an on-site/off-site fire protection water systems is required with (6" x 4" x 2-1/2" x 2-1/2") super fire hydrants. This system shall be designed and installed with no hydrant closer than 25 feet or no further than 165 feet from any portion of exterior walls as measured along vehicular travelways.

193. Fire Prevention has established a required minimum fire flow for protection of the above referenced project. Using UFC Table III-A for determining fire flows, 2850 GPM for a 4-hour duration at 20-PSI residual operating pressure must be available before any combustible material is placed on the job site. This fireflow is all inclusive of fire sprinkler system and inside / outside hose demand (Estimate only further clarification of square footages needed.)

194. Fire Flow Requirements have been based on UFC guidelines for the determination of fire flow requirements. Factors considered were Type V construction.

195. Applicant/Developer shall furnish one copy of the water system plans to the Fire Department for review. Plans shall conform to fire hydrant types, location and spacing, and, the system shall meet the fire flow requirements. Plans shall be signed/approved by the water company having jurisdiction and a registered engineer must provide the following certification statement.

"I hereby state that the design of the water system within this project is in accordance with the requirements prescribed by the Murrieta Fire Department as to hydrant type and spacing, and will provide fire flow of 2850 GPM if sufficient water is available at the point of connection."

196. City of Murrieta Fire Department requires all commercial buildings to provide flush mount Knox Box Access Systems and must be no higher than 6' off the finished ground to the right of front and rear doors as being faced. Must also be shown on architectural plans. Applications are provided by our Planning/Prevention Bureau.

GENERAL CONDITIONS

197. All standards, regulations and policies established for public safety and the protection of property established in City of Murrieta Development Code must be in compliance with the approval of all local authorities.

ACCESS REQUIREMENTS

198. The Applicant/Developer shall agree to make application and agreements with the Murrieta Fire Protection District, to install a strobe light monitor receiver with Knox key switch backup, on all electrically controlled gates for vehicular access, prior to occupancy of any structure within this project.

199. Secondary/alternate access points shall meet the requirements established for public safety and shall be installed prior to construction of this project.

200. Access will have a 56-foot turning radius capable of accommodating fire apparatus.

201. Access will be a minimum of 28 feet wide to accommodate fire apparatus.

202. Access will have a minimum of 13 foot 6 inches vertical clearance to accommodate fire apparatus.

203. Any dead end in excess of 150' requires an approved turnaround. Contact Fire Department for details.

204. All access requirements shall be in place and approved by Fire Prevention prior to release of building permits.

PRIOR TO OCCUPANCY

205. Install a supervised sprinkler water flow detection alarm system as per National Fire Protection Association pamphlet No. 71. Notification of alarm to be provided for all tenant spaces. These plans must be designed by a certified fire alarm specialist and submitted for Fire Prevention approval prior to installation.

206. Fire sprinklers may need to be relocated to provide adequate coverage when improvements are installed. Engineered drawings must be submitted to the Fire Department for approval prior to any system modification.

207. Portable Multi-purpose fire extinguishers with a minimum rating of 2A-10BC must be installed so that the top of the fire extinguisher is not more than 5' ft above and not less than 3'ft from the bottom of the extinguisher to the floor. (Title 19, 567.6) Contact a certified extinguisher company for proper placement of equipment.

208. Restaurants require a hood duct fire extinguishing system to be installed in accordance with National Fire Protection Association pamphlets No. 17 or No. 17A. Plans must be submitted to the Fire Marshal for approval prior to installation. A portable fire extinguisher with a minimum rating of 40BC (for saponification) and a type K fire extinguisher shall be installed in the kitchen area.

209. Applicant/Developer shall be responsible for obtaining underground tank permits from both the County Health and Fire Departments.

210. Federal law under SARA Title III (Right To Know Act) requires that facilities with hazardous materials must provide Material Safety Data Sheets to the local Fire Department, the local Emergency Planning Committee and the State Emergency Response Commission.

211. All buildings will comply with NFPA 704 placard requirements when applicable. Contact Fire Department for information.

212. Address directory shall be provided next to all major entranceways to this project. Al l buildings shall be clearly identified with designators 12" high with 1" strokes mounted on contrasting backgrounds. These designators shall be placed on all 4 sides of each building and show address locations and elevations on architectural plan.

213. All decorative materials must be flame resistive. Prior to release of occupancy, the Developer must submit manufactures State Fire Marshal's listings of all materials being used. Cloth and other flammables must display a label of the State Fire Marshal's seal of approval

214. Prior to release of above referenced project, the Developer/Applicant is responsible to provide all fire protection measures and information required by Fire Prevention. If any of these conditions are not met before, during or after completion of the proposed buildings, the Developer understands that he is in violation of City of Murrieta Ordinance No. 546 and/or the Uniform Fire Code, and Fire Prevention has the authority to disrupt or permanently stop the construction of the project.

215. A check or money order in the amount of (contact Fire Department for exact amount) shall be made payable to CITY OF MURRIETA FIRE DEPARTMENT for building plan review. Project number submitted by City of Murrieta Planning Department must be referenced in order to credit the appropriate project. Refer to Plan Check Fee/Mitigation Sheet attached to Building Plan Review letter.

216. Murrieta City Resolution requires that fire impact mitigation fees totaling (see planning department) per square foot, as part of the Development Impact Fee, must be paid prior to release of building permit. Contact Planning Department for exact amount.

PRIOR TO ANY BUILDING RELEASE, THE APPLICANT/ DEVELOPER SHALL SUBMIT APPROVED WATER PLANS AND PAY ALL REQUIRED FIRE FEE'S.

MURRIETA POLICE DEPARTMENT:

217. Video: Applicant shall install a video surveillance system capable of day and night viewing which encompasses all exterior common areas and every vehicle entry and exit point to the satisfaction of the Chief of Police or his designee. The minimum standards for the system must be a digital system with the capability to view in color and in a low-lux environment and must have the capability to be viewed over the internet by the Murrieta Police Department via a TCP/IP connection. The exterior system must be capable of capturing the front and rear license plates and vehicle occupant(s) within the parking lot to the satisfaction of the Chief or Police or his designee. Video surveillance records must be maintained by the property management company for at least one (1) year and made available to any law enforcement agency for viewing and/or copying within one (1) business day.

218. Building Numbering: Each building within the complex shall be separately identified by a letter and/or number. The number/letter must be visible from a distance of at least 100 feet and large enough (at least 12 inches in height and a contrasting color from the building) and appropriately placed to be clearly seen by emergency responders. The number/letter of the building shall also be marked with a reflectorized material (at least 24 inches in height) on the roof of the building which does not negatively impact the aesthetics of the project.

MURRIETA VALLEY UNIFIED SCHOOL DISTRICT:

219. Prior to the issuance of building permits, the applicant shall pay the school district the required mitigation fee in effect at the time of request.

END OF CONDITIONS

PASSED, APPROVED AND ADOPTED THIS 26th DAY OF September, 2007

Planning Commission, Chairperson

ATTEST:

Mary E. Lanier, Planning Director

I, Mary E. Lanier, Planning Director, City of Murrieta, California do hereby certify under penalty of perjury that the foregoing Resolution was duly adopted at a regular meeting of the Planning Commission on the 26th day of September, 2007 by the following roll call vote:

MOTION MADE BY COMMISSIONER COHEN

SECONDED BY COMMISSIONER FITZPATRICK

AYES:	BUTLER, FITZPATRICK, LANE, LUPRO AND COHEN
NOES:	NONE
ABSENT:	NONE
ABSTAINED:	NONE

Mary E. Lanier, Planning Director

2. CONSTRUCTION
(SECTION G of ORDER NO. R9-2004-001)

1) **Number of inspections conducted:** 554

2) **Number and type of enforcement actions related to construction sites:**

Enforcement and Compliance Responses	Private Projects	Public Projects
Non-monetary Penalties (1st & 2nd Written Warnings)	166	0
Stop Work Authority	9	0
Fines	46	0
Financial Security (Fines Assessed)	$14,500	0
Permit/Certificate of Occupancy Denial	0	0
Referral to SDRWQCB Cory to provide	2	0
Total	**223**	**0**

3) **Description of modifications made to the construction and grading approval process:** There were no changes to the Grading Ordinance, Grading Manual and Standard Notes (grading, erosion, sediment control).

4) **Description and number of training efforts conducted during the reporting.**

a) **Training:**

Training	Training Description	Training Dates	Number of Attendees
Construction	Riv. Co. NPDES to DAMP implementation	1/17/08	9
		Total	**9**

2. CONSTRUCTION
(SECTION G of ORDER NO. R9-2004-001), CONT.

b) **Summarize any additional education and outreach activities conducted for project applicants, contractors, developers, property owners, and/or responsible parties in support of the Construction Component:** The City of Murrieta began hand-delivering the annual "Fist Notice to all Project Developments" to site owners, project managers and field superintendents, on August 20, 2007 notifying them of the annual requirement for implementation of wet-weather BMP's by October 1st to April 30th. Year round implementation and maintenance of the erosion and sediment control at the construction sites was also emphasized in this letter. A "Second Notice to All Project Developments" emphasizing the requirement and implementation of wet-weather BMP's was distributed on September 14, 2007.

5) **An assessment of program effectiveness based on the measurable goals established in the Permittee's Individual SWMP:** The Construction program appears to be effective. Of the 554 inspections perform only 3 resulted in Citations and 2 notices to SDRWQCB.

6) **Additional Comments/Information:**

Describe the major accomplishments of the Constrution Component over the past year: Having a full-time employee able to monitor construction.

Summarize new activities or improvements to be implemented next year as a result of your self assessment of the Construction Component: There are no new activities or improvements to implement at this time.

3. MUNICIPAL
(SECTION H.1 of ORDER NO. R9-2004-001)

1) **Number of inspections conducted at existing municipal facilities:** The municipal facilities are maintained on a daily basis. General housekeeping guidelines are used like covering construction material.

2) **Number and type of enforcement actions related to municipal sites:**

Enforcement and Compliance Responses	Number
Education and Information	0
Verbal warning	0
Written warning	0
Other:	0
Total	**0**

3) **Number of catch basins and inlets that were inspected and the number that were cleaned:**

	Number Inspected	Number Cleaned
Catch Basins and Inlets	1367	23

3. MUNICIPAL
(SECTION H.1 of ORDER NO. R9-2004-001), CONT.

4) **Assessment of the amount and type of debris removed from catch basins, streets, and open channels, including an identification of problem areas that generate the most pollutants:**

Facility	Type of Debris	Amount (tons)	Problem Areas that Generate Most Pollutants
Catch basins	Vegetative Litter	0.69	
	Anthropogenic Litter	0.28	
	Sediment	1.79	
	Other man-made debris		
Total		**2.76**	**tons (wet weight)**
Streets	Vegetative Litter	463	
	Anthropogenic Litter	185	
	Sediment	1,202	
	Other man-made debris		
Total		**1850**	**tons (wet weight)**
Open Channels	Vegetative Litter	36	
	Anthropogenic Litter	36	
	Sediment	36	
	Other man-made debris		
Total		**108**	**tons (wet weight)**
Facility Total		**1960.76**	**tons (wet weight)**

0001639

3. MUNICIPAL
(SECTION H.1 of ORDER NO. R9-2004-001), CONT.

5) **Assessment of effectiveness of BMPs that have been implemented for municipal facilities and activities:**

BMP Code	Description	Used	Notes
SC-10	Non-Stormwater Discharges	☒ Yes ☐ No	
SC-11	Spill Prevention, Control and Clean-up	☒ Yes ☐ No	Swift response and clean up of spills
SC-20	Vehicle and Equipment Fueling	☒ Yes ☐ No	Fueling stations have a barrier to contain spills
SC-21	Vehicle and Equipment Cleaning	☒ Yes ☐ No	Vehicle cleaning done at local car wash
SC-22	Vehicle and Equipment Repair	☒ Yes ☐ No	Repairs are done offsite and under contract
SC-30	Outdoor Loading/Unloading of Materials	☐ Yes ☒ No	
SC-31	Outdoor Liquid Container Storage	☒ Yes ☐ No	Secondary containment
SC-32	Outdoor Equipment Maintenance	☐ Yes ☒ No	
SC-33	Outdoor Storage of Raw Materials	☒ Yes ☐ No	
SC-34	Waste Handling and Disposal	☒ Yes ☐ No	
SC-35	Safe Alternative Products	☐ Yes ☒ No	
SC-40	Contaminated or Erodible Areas	☐ Yes ☒ No	
SC-41	Building and Grounds Maintenance	☒ Yes ☐ No	
SC-42	Building Repair and Construction	☒ Yes ☐ No	
SC-43	Parking/Storage Area Maintenance	☒ Yes ☐ No	
SC-44	Drainage System Maintenance	☒ Yes ☐ No	Filters, cleaning, & annual inspection
SC-60	Housekeeping Practices	☒ Yes ☐ No	
SC-61	Safe Alternative Products	☒ Yes ☐ No	Use bio-degradable cleaning solutions
SC-70	Road and Street Maintenance	☒ Yes ☐ No	Street sweeping and prompt pothole patching
SC-71	Plaza and Sidewalk Cleaning	☐ Yes ☒ No	
SC-72	Fountain and Pool Maintenance	☒ Yes ☐ No	
SC-73	Landscape Maintenance	☒ Yes ☐ No	Use organic fertilizers
SC-74	Drainage System Maintenance	☒ Yes ☐ No	Catch basins are labeled and numbered
SC-75	Waste Handling and Disposal	☒ Yes ☐ No	
SC-76	Water and Sewer Utility Maintenance	☐ Yes ☒ No	

Assessment of the effectiveness of BMPs that have been implemented for municipal facilities and activities.

They appear to be effective to the maximum extent practical.

0001640

3. MUNICIPAL
(SECTION H.1 of ORDER NO. R9-2004-001), CONT.

6) **Description and number of training efforts conducted over the last year (for municipal facility operators and/or inspectors).**

a) **Training:**

Training	Training Description	Training Dates	Number of Attendees
Municipal	Riv. Co. NPDES to DAMP Implementation	1/17/08	20
		Total	**20**

b) **Summarize the internal and external education and outreach activities the Municipal Component has conducted over the past year:** at Tailgate Safety Meetings discuss that construction material to be covered.

7) **An assessment of program effectiveness based on the measurable goals established in the Permittee's Individual SWMP:** good housekeeping practices appear to be effective.

8) **Additional Comments/Information:**

9) **Describe the major accomplishments of the Municipal Component over the past year:** funding was set aside for the purchase of a future vacuum trailer. This will allow more effective cleaning of the catch basins.

Summarize new activities or improvements to be implemented next year as a result of your self assessment of the Municipal Component: create a written procedure to monitor the municipal facilities

Other comments

4. INDUSTRIAL/COMMERCIAL
(SECTION H.2 of ORDER NO. R9-2004-001), CONT.

1) **Number of inspections conducted:** City of Murrieta utilized the Compliance Assistance Program (CAP), which generates NPDES survey reports from inspections completed by the County of Riverside Hazardous Materials Department (HMMD) for businesses storing or handling hazardous materials and also from the County of Riverside Department of Environmental Health (DEH) for inspections of food establishments.

Category	Number of Inspections
Industrial Facilities	
High Priority Facilities	
Medium Priority Facilities	
Low Priority Facilities	61
Commercial Facilities	
High Priority Facilities	
Medium Priority Facilities	
Low Priority Facilities	48
(See Attachment 'B' for Inspection Sheets) Total	**0**

2) **Number and type of enforcement actions taken:**

Enforcement and Compliance Responses	Industrial	Commercial
Non-Monetary Penalties	0	0
Fines	0	0
Bonding Requirements	0	0
Permit Denial	0	0
Referral to SDRWQCB	0	0
Total	**0**	**0**

ATTACHMENT B

0001644

HAZARDOUS WASTE/ HAZARDOUS MATERIALS FACILITY STORM WATER COMPLIANCE SURVEY FORM

FACILITY DBA 7-Eleven #33552	TELEPHONE 951-698-3686	DATE 7/9/07
ADDRESS 40210 Murrieta Hot Spgs. Rd.	CITY, ZIP Murrieta 92563	
MAILING ADDRESS (if different from site address)	MAILING CITY, ZIP	
CONTACT Gurinder Singh	FACILITY# 90958	SIC CODE 5541

Compliance Areas	YES	NO	N/A
***OUTSIDE AREAS (Free of staining & debris; provides good housekeeping; maintained in a manner to prevent runoff.)**		**Requires follow up**	
1. CHEMICAL STORAGE * The outside storage area is kept to minimize the possibility of a release. Chemicals / materials are protected from precipitation / storm water runoff and the containers show no signs of leaking.	✓		
2. DUMPSTER * No liquids are leaking from dumpster; surrounding area is free of trash.	✓		
3. ABOVEGROUND TANKS * No ground staining, no spillage observed and no discharge to storm drain. Tanks are maintained to minimize the possibility of a release (secondary containment).			✓
4. ONSITE STORM DRAIN* Protected from accidental discharge other than water.	✓		
5. POWER WASH OR STEAM CLEAN* (discharge to sewer) Drains to oil/water separator connected to a sanitary sewer and not a septic system. Steam cleaning not discharged to parking lot, storm drain or soil.	✓		
6. PARKING LOT / DRIVE WAY* Free of excess trash, chemical staining or liquids other than water.	✓		
7. OTHER* Non-storm water discharge (i.e. non-hazardous process discharge).			✓
8. MOP WATER TO SANITARY SEWER VIA CLARIFIER. Mop water is not dumped to the soil, parking lot, gutter, or other areas susceptible to storm water drainage.	✓		
9. STORM WATER EDUCATIONAL BROCHURES GIVEN TO FACILITY OR POSTERS DISPLAYED FOR EMPLOYEES. If no, what informational material should be sent to the facility?	✓		
10. IF A SWPPP IS REQUIRED, WAS IT AVAILABLE FOR REVEIW? See storm water handout for industrial facilities.			✓

OVERALL EVALUATION/ COMMENTS: _____

RECEIVED BY: [signature]	HAZ MAT SPEC: C. Denison	BADGE #

Agency referred to as indicated on the back of this page.

If additional information is required, contact the Storm Water /Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

CITY OF MURRIETA
AUG 09 2007
RECEIVED
ENGINEERING DEPT.

Storm Water Clean Water PROTECTION PROGRAM

HAZARDOUS WASTE/ HAZARDOUS MATERIALS FACILITY STORM WATER COMPLIANCE SURVEY FORM

FACILITY DBA MVUSD Transportation	TELEPHONE 696-1600 x1192	DATE 7/23/07
ADDRESS 41870 McAlby Court	CITY, ZIP Murrieta 92562	
MAILING ADDRESS (if different from	MAILING CITY, ZIP	
CONTACT Rick Murrieta	FACILITY# 89240	SIC CODE 4789

	YES	NO	N/A
***OUTSIDE AREAS (Free of s keeping; maintained in a manner to prevent runoff.)**		**Requires follow up**	
1. CHEMICAL STORAGE * Th side storage area is kept to minimize the possibility of a release. Chemicals / materials are protected from precipitation / storm water runoff and the containers show no signs of leaking.	✓		
2. DUMPSTER * No liquids are leaking from dumpster; surrounding area is free of trash.	✓		
3. ABOVEGROUND TANKS * No ground staining, no spillage observed and no discharge to storm drain. Tanks are maintained to minimize the possibility of a release (secondary containment).			✓
4. ONSITE STORM DRAIN* Protected from accidental discharge other than water.	✓		
5. POWER WASH OR STEAM CLEAN* (discharge to sewer) Drains to oil/water separator connected to a sanitary sewer and not a septic system. Steam cleaning not discharged to parking lot, storm drain or soil.	✓		
6. PARKING LOT / DRIVE WAY* Free of excess trash, chemical staining or liquids other than water.	✓		
7. OTHER* Non-storm water discharge (i.e. non-hazardous process discharge).			✓
8. MOP WATER TO SANITARY SEWER VIA CLARIFIER. Mop water is not dumped to the soil, parking lot, gutter, or other areas susceptible to storm water drainage.	✓		
9. STORM WATER EDUCATIONAL BROCHURES GIVEN TO FACILITY OR POSTERS DISPLAYED FOR EMPLOYEES. If no, what informational material should be sent to the facility?	✓		
10. IF A SWPPP IS REQUIRED, WAS IT AVAILABLE FOR REVEIW? See storm water handout for industrial facilities.	✓		

OVERALL EVALUATION/ COMMENTS: _____

RECEIVED BY: [signature]	HAZ MAT SPEC: C. Denison	BADGE #

Agency referred to as indicated on the back of this page.

If additional information is required, contact the Storm Water /Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

0001646

HAZARDOUS WASTE/ HAZARDOUS MATERIALS FACILITY STORM WATER COMPLIANCE SURVEY FORM

FACILITY DBA Wal-Mart #2952	TELEPHONE 951-~~461-1981~~ 686-7135	DATE 7/23/07
ADDRESS 41200 Murrieta Hot Springs Rd.	CITY, ZIP Murrieta 92562	
MAILING ADDRESS (if different from site address)	MAILING CITY, ZIP	
CONTACT Regina Crouse	FACILITY# 88791	SIC CODE 5999 / 7699

Compliance Areas	YES	NO	N/A
***OUTSIDE AREAS (Free of staining & debris; provides good housekeeping; maintained in a manner to prevent runoff.)**		**Requires follow up**	
1. CHEMICAL STORAGE * The outside storage area is kept to minimize the possibility of a release. Chemicals / materials are protected from precipitation / storm water runoff and the containers show no signs of leaking.			✓
2. DUMPSTER * No liquids are leaking from dumpster; surrounding area is free of trash.	✓		
3. ABOVEGROUND TANKS * No ground staining, no spillage observed and no discharge to storm drain. Tanks are maintained to minimize the possibility of a release (secondary containment).	✓		
4. ONSITE STORM DRAIN* Protected from accidental discharge other than water.	✓		
5. POWER WASH OR STEAM CLEAN* (discharge to sewer) Drains to oil/water separator connected to a sanitary sewer and not a septic system. Steam cleaning not discharged to parking lot, storm drain or soil.	✓		
6. PARKING LOT / DRIVE WAY* Free of excess trash, chemical staining or liquids other than water.	✓		
7. OTHER* Non-storm water discharge (i.e. non-hazardous process discharge). Silver Recovery Waste	✓		~~N/A~~ CHE
8. MOP WATER TO SANITARY SEWER VIA CLARIFIER. Mop water is not dumped to the soil, parking lot, gutter, or other areas susceptible to storm water drainage.	✓		
9. STORM WATER EDUCATIONAL BROCHURES GIVEN TO FACILITY OR POSTERS DISPLAYED FOR EMPLOYEES. If no, what informational material should be sent to the facility?			✓
10. IF A SWPPP IS REQUIRED, WAS IT AVAILABLE FOR REVEIW? See storm water handout for industrial facilities.			✓

OVERALL EVALUATION/ COMMENTS: _____

RECEIVED BY: Regina Crouse	HAZ MAT SPEC: C. Denison	BADGE #

Agency referred to as indicated on the back of this page.

If additional information is required, contact the Storm Water /Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

HAZARDOUS WASTE/ HAZARDOUS MATERIALS FACILITY STORM WATER COMPLIANCE SURVEY FORM

FACILITY DBA John Deere Landscapes, Inc	TELEPHONE 951-698-1840	DATE 7/31/07
ADDRESS 26713 Madison Avenue	CITY, ZIP Murrieta 92562	
MAILING ADDRESS (if different from site address)	MAILING CITY, ZIP	
CONTACT Chris Thompson	FACILITY# 88316	SIC CODE 3523

Compliance Areas	YES	NO	N/A
***OUTSIDE AREAS (Free of staining & debris; provides good housekeeping; maintained in a manner to prevent runoff.)**		**Requires follow up**	
1. CHEMICAL STORAGE * The outside storage area is kept to minimize the possibility of a release. Chemicals / materials are protected from precipitation / storm water runoff and the containers show no signs of leaking.	✓		
2. DUMPSTER * No liquids are leaking from dumpster; surrounding area is free of trash.	✓		
3. ABOVEGROUND TANKS * No ground staining, no spillage observed and no discharge to storm drain. Tanks are maintained to minimize the possibility of a release (secondary containment).			✓
4. ONSITE STORM DRAIN* Protected from accidental discharge other than water.			✓
5. POWER WASH OR STEAM CLEAN* (discharge to sewer) Drains to oil/water separator connected to a sanitary sewer and not a septic system. Steam cleaning not discharged to parking lot, storm drain or soil.			✓
6. PARKING LOT / DRIVE WAY* Free of excess trash, chemical staining or liquids other than water.	✓		
7. OTHER* Non-storm water discharge (i.e. non-hazardous process discharge).			✓
8. MOP WATER TO SANITARY SEWER VIA CLARIFIER. Mop water is not dumped to the soil, parking lot, gutter, or other areas susceptible to storm water drainage.			✓
9. STORM WATER EDUCATIONAL BROCHURES GIVEN TO FACILITY OR POSTERS DISPLAYED FOR EMPLOYEES. If no, what informational material should be sent to the facility?		✓ will be mailed	
10. IF A SWPPP IS REQUIRED, WAS IT AVAILABLE FOR REVEIW? See storm water handout for industrial facilities.			✓

OVERALL EVALUATION/ COMMENTS:

RECEIVED BY: Chris Thompson	HAZ MAT SPEC: C. Denison	BADGE #

Agency referred to as indicated on the back of this page.

If additional information is required, contact the Storm Water /Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

StormWater CleanWater PROTECTION PROGRAM

HAZARDOUS WASTE/ HAZARDOUS MATERIALS FACILITY STORM WATER COMPLIANCE SURVEY FORM

FACILITY DBA Agriscape	TELEPHONE 951-696-0651	DATE 8/3/07
ADDRESS 37760 Bond Road	CITY, ZIP Murrieta 92563	
MAILING ADDRESS (if different from site address)	MAILING CITY, ZIP	
CONTACT Ricardo Almejo	FACILITY# 84907	SIC CODE 2875

Compliance Areas	YES	NO	N/A
***OUTSIDE AREAS (Free of staining & debris; provides good housekeeping; maintained in a manner to prevent runoff.)**		**Requires follow up**	
1. CHEMICAL STORAGE * The outside storage area is kept to minimize the possibility of a release. Chemicals / materials are protected from precipitation / storm water runoff and the containers show no signs of leaking.	✓		
2. DUMPSTER * No liquids are leaking from dumpster; surrounding area is free of trash.	✓		
3. ABOVEGROUND TANKS * No ground staining, no spillage observed and no discharge to storm drain. Tanks are maintained to minimize the possibility of a release (secondary containment).	✓		
4. ONSITE STORM DRAIN* Protected from accidental discharge other than water.			✓
5. POWER WASH OR STEAM CLEAN* (discharge to sewer) Drains to oil/water separator connected to a sanitary sewer and not a septic system. Steam cleaning not discharged to parking lot, storm drain or soil.			✓
6. PARKING LOT / DRIVE WAY* Free of excess trash, chemical staining or liquids other than water.			✓
7. OTHER* Non-storm water discharge (i.e. non-hazardous process discharge).			✓
8. MOP WATER TO SANITARY SEWER VIA CLARIFIER. Mop water is not dumped to the soil, parking lot, gutter, or other areas susceptible to storm water drainage.			✓
9. STORM WATER EDUCATIONAL BROCHURES GIVEN TO FACILITY OR POSTERS DISPLAYED FOR EMPLOYEES. If no, what informational material should be sent to the facility?	✓		
10. IF A SWPPP IS REQUIRED, WAS IT AVAILABLE FOR REVEIW? See storm water handout for industrial facilities.			✓

OVERALL EVALUATION/ COMMENTS: _____

RECEIVED BY: [illegible]	HAZ MAT SPEC: C. Denison	BADGE #

Agency referred to as indicated on the back of this page.

If additional information is required, contact the Storm Water /Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

HAZARDOUS WASTE/ HAZARDOUS MATERIALS FACILITY STORM WATER COMPLIANCE SURVEY FORM

FACILITY DBA SCP Distributors, LLC	TELEPHONE 951-894-1220	DATE 8/2/07
ADDRESS 41625 Cherry Street	CITY, ZIP Murrieta 92562	
MAILING ADDRESS (if different from site address)	MAILING CITY, ZIP	
CONTACT Todd Pieri	FACILITY# 89005	SIC CODE 5999

Compliance Areas	YES	NO	N/A
***OUTSIDE AREAS (Free of staining & debris; provides good housekeeping; maintained in a manner to prevent runoff.)**		**Requires follow up**	
1. CHEMICAL STORAGE * The outside storage area is kept to minimize the possibility of a release. Chemicals / materials are protected from precipitation / storm water runoff and the containers show no signs of leaking.			✓
2. DUMPSTER * No liquids are leaking from dumpster; surrounding area is free of trash.	✓		
3. ABOVEGROUND TANKS * No ground staining, no spillage observed and no discharge to storm drain. Tanks are maintained to minimize the possibility of a release (secondary containment).			✓
4. ONSITE STORM DRAIN* Protected from accidental discharge other than water.			✓
5. POWER WASH OR STEAM CLEAN* (discharge to sewer) Drains to oil/water separator connected to a sanitary sewer and not a septic system. Steam cleaning not discharged to parking lot, storm drain or soil.			✓
6. PARKING LOT / DRIVE WAY* Free of excess trash, chemical staining or liquids other than water.	✓		
7. OTHER* Non-storm water discharge (i.e. non-hazardous process discharge).			✓
8. MOP WATER TO SANITARY SEWER VIA CLARIFIER. Mop water is not dumped to the soil, parking lot, gutter, or other areas susceptible to storm water drainage.			✓
9. STORM WATER EDUCATIONAL BROCHURES GIVEN TO FACILITY OR POSTERS DISPLAYED FOR EMPLOYEES. If no, what informational material should be sent to the facility?			✓
10. IF A SWPPP IS REQUIRED, WAS IT AVAILABLE FOR REVEIW? See storm water handout for industrial facilities.			✓

OVERALL EVALUATION/ COMMENTS: _____

RECEIVED BY:	HAZ MAT SPEC: C. Denison	BADGE #

Agency referred to as indicated on the back of this page.

If additional information is required, contact the Storm Water /Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

StormWater Clean Water PROTECTION PROGRAM

HAZARDOUS WASTE/ HAZARDOUS MATERIALS FACILITY STORM WATER COMPLIANCE SURVEY FORM

FACILITY DBA Taco Bell #22691	TELEPHONE 951-894-4402	DATE 8/7/07
ADDRESS 39056 Winchester Road	CITY, ZIP Murrieta 92563	
MAILING ADDRESS (if different from site address)	MAILING CITY, ZIP	
CONTACT Hilda Gallegos	FACILITY# 91139	SIC CODE 5812

Compliance Areas	YES	NO	N/A
***OUTSIDE AREAS (Free of staining & debris; provides good housekeeping; maintained in a manner to prevent runoff.)**		**Requires follow up**	
1. CHEMICAL STORAGE * The outside storage area is kept to minimize the possibility of a release. Chemicals / materials are protected from precipitation / storm water runoff and the containers show no signs of leaking.			✓
2. DUMPSTER * No liquids are leaking from dumpster; surrounding area is free of trash.	✓		
3. ABOVEGROUND TANKS * No ground staining, no spillage observed and no discharge to storm drain. Tanks are maintained to minimize the possibility of a release (secondary containment).			✓
4. ONSITE STORM DRAIN* Protected from accidental discharge other than water.			✓
5. POWER WASH OR STEAM CLEAN* (discharge to sewer) Drains to oil/water separator connected to a sanitary sewer and not a septic system. Steam cleaning not discharged to parking lot, storm drain or soil.			✓
6. PARKING LOT / DRIVE WAY* Free of excess trash, chemical staining or liquids other than water.	✓		✓
7. OTHER* Non-storm water discharge (i.e. non-hazardous process discharge).			✓
8. MOP WATER TO SANITARY SEWER VIA CLARIFIER. Mop water is not dumped to the soil, parking lot, gutter, or other areas susceptible to storm water drainage.			✓
9. STORM WATER EDUCATIONAL BROCHURES GIVEN TO FACILITY OR POSTERS DISPLAYED FOR EMPLOYEES. If no, what informational material should be sent to the facility?			✓
10. IF A SWPPP IS REQUIRED, WAS IT AVAILABLE FOR REVEIW? See storm water handout for industrial facilities.			✓

OVERALL EVALUATION/ COMMENTS:

RECEIVED BY: Hilda Gallegos	HAZ MAT SPEC: C. Denison	BADGE #

Agency referred to as indicated on the back of this page.

If additional information is required, contact the Storm Water /Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

StormWater CleanWater PROTECTION PROGRAM

0001651

HAZARDOUS WASTE/ HAZARDOUS MATERIALS FACILITY STORM WATER COMPLIANCE SURVEY FORM

FACILITY DBA Mc Donald's	TELEPHONE 951-461-8044	DATE 8/7/07
ADDRESS 39196 Winchester Road	CITY, ZIP Murrieta 92563	
MAILING ADDRESS (if different from site address)	MAILING CITY, ZIP	
CONTACT Raquel Ortiz	FACILITY# 90971	SIC CODE 5812

Compliance Areas	YES	NO	N/A
***OUTSIDE AREAS (Free of staining & debris; provides good housekeeping; maintained in a manner to prevent runoff.)**		**Requires follow up**	
1. CHEMICAL STORAGE * The outside storage area is kept to minimize the possibility of a release. Chemicals / materials are protected from precipitation / storm water runoff and the containers show no signs of leaking.			✓
2. DUMPSTER * No liquids are leaking from dumpster; surrounding area is free of trash.	✓		
3. ABOVEGROUND TANKS * No ground staining, no spillage observed and no discharge to storm drain. Tanks are maintained to minimize the possibility of a release (secondary containment).			✓
4. ONSITE STORM DRAIN* Protected from accidental discharge other than water.			✓
5. POWER WASH OR STEAM CLEAN* (discharge to sewer) Drains to oil/water separator connected to a sanitary sewer and not a septic system. Steam cleaning not discharged to parking lot, storm drain or soil.			✓
6. PARKING LOT / DRIVE WAY* Free of excess trash, chemical staining or liquids other than water.	✓		
7. OTHER* Non-storm water discharge (i.e. non-hazardous process discharge).			✓
8. MOP WATER TO SANITARY SEWER VIA CLARIFIER. Mop water is not dumped to the soil, parking lot, gutter, or other areas susceptible to storm water drainage.			✓
9. STORM WATER EDUCATIONAL BROCHURES GIVEN TO FACILITY OR POSTERS DISPLAYED FOR EMPLOYEES. If no, what informational material should be sent to the facility?			✓
10. IF A SWPPP IS REQUIRED, WAS IT AVAILABLE FOR REVEIW? See storm water handout for industrial facilities.			✓

OVERALL EVALUATION/ COMMENTS:

RECEIVED BY: Raquel Ortiz	HAZ MAT SPEC: C. Denison	BADGE #

Agency referred to as indicated on the back of this page.

If additional information is required, contact the Storm Water /Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

HAZARDOUS WASTE/ HAZARDOUS MATERIALS FACILITY STORM WATER COMPLIANCE SURVEY FORM

FACILITY DBA Carl's Jr. #1520	TELEPHONE (951)	DATE 08/07/07
ADDRESS 28023 Scott Road	CITY, ZIP Murrieta, 92562	
MAILING ADDRESS (if different from site address)	MAILING CITY, ZIP	
CONTACT Ariel Garcia	FACILITY# 91432	SIC CODE 5812

Compliance Areas	YES	NO	N/A
***OUTSIDE AREAS (Free of staining & debris; provides good housekeeping; maintained in a manner to prevent runoff.)**		**Requires follow up**	
1. CHEMICAL STORAGE * The outside storage area is kept to minimize the possibility of a release. Chemicals / materials are protected from precipitation / storm water runoff and the containers show no signs of leaking.			✓
2. DUMPSTER * No liquids are leaking from dumpster; surrounding area is free of trash.	✓		
3. ABOVEGROUND TANKS * No ground staining, no spillage observed and no discharge to storm drain. Tanks are maintained to minimize the possibility of a release (secondary containment).			✓
4. ONSITE STORM DRAIN* Protected from accidental discharge other than water.			✓
5. POWER WASH OR STEAM CLEAN* (discharge to sewer) Drains to oil/water separator connected to a sanitary sewer and not a septic system. Steam cleaning not discharged to parking lot, storm drain or soil.			✓
6. PARKING LOT / DRIVE WAY* Free of excess trash, chemical staining or liquids other than water.	✓		
7. OTHER* Non-storm water discharge (i.e. non-hazardous process discharge).			✓
8. MOP WATER TO SANITARY SEWER VIA CLARIFIER. Mop water is not dumped to the soil, parking lot, gutter, or other areas susceptible to storm water drainage.			✓
9. STORM WATER EDUCATIONAL BROCHURES GIVEN TO FACILITY OR POSTERS DISPLAYED FOR EMPLOYEES. If no, what informational material should be sent to the facility?			✓
10. IF A SWPPP IS REQUIRED, WAS IT AVAILABLE FOR REVEIW? See storm water handout for industrial facilities.			✓

OVERALL EVALUATION/ COMMENTS:

RECEIVED BY:

HAZ MAT SPEC: Nicholas Crain/C. Denison BADGE #

Agency referred to as indicated on the back of this page.

If additional information is required, contact the Storm Water /Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

HAZARDOUS WASTE/ HAZARDOUS MATERIALS FACILITY STORM WATER COMPLIANCE SURVEY FORM

FACILITY DBA Chick-fil-A	TELEPHONE 951-677-5173	DATE 8/8/07
ADDRESS 24294 Madison Avenue	CITY, ZIP Murrieta	
MAILING ADDRESS (if different from site address)	MAILING CITY, ZIP	
CONTACT Jenny Jones	FACILITY# NEW	SIC CODE 5812

Compliance Areas	YES	NO	N/A
***OUTSIDE AREAS (Free of staining & debris; provides good housekeeping; maintained in a manner to prevent runoff.)**		**Requires follow up**	
1. CHEMICAL STORAGE * The outside storage area is kept to minimize the possibility of a release. Chemicals / materials are protected from precipitation / storm water runoff and the containers show no signs of leaking.	✓		
2. DUMPSTER * No liquids are leaking from dumpster; surrounding area is free of trash.	✓		
3. ABOVEGROUND TANKS * No ground staining, no spillage observed and no discharge to storm drain. Tanks are maintained to minimize the possibility of a release (secondary containment).	✓		
4. ONSITE STORM DRAIN* Protected from accidental discharge other than water.			✓
5. POWER WASH OR STEAM CLEAN* (discharge to sewer) Drains to oil/water separator connected to a sanitary sewer and not a septic system. Steam cleaning not discharged to parking lot, storm drain or soil.			✓
6. PARKING LOT / DRIVE WAY* Free of excess trash, chemical staining or liquids other than water.	✓		
7. OTHER* Non-storm water discharge (i.e. non-hazardous process discharge).			✓
8. MOP WATER TO SANITARY SEWER VIA CLARIFIER. Mop water is not dumped to the soil, parking lot, gutter, or other areas susceptible to storm water drainage.			✓
9. STORM WATER EDUCATIONAL BROCHURES GIVEN TO FACILITY OR POSTERS DISPLAYED FOR EMPLOYEES. If no, what informational material should be sent to the facility?			✓
10. IF A SWPPP IS REQUIRED, WAS IT AVAILABLE FOR REVEIW? See storm water handout for industrial facilities.			✓

OVERALL EVALUATION/ COMMENTS: _____

RECEIVED BY: Jenny Jones	HAZ MAT SPEC: C. Denison	BADGE #

Agency referred to as indicated on the back of this page.

If additional information is required, contact the Storm Water /Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

HAZARDOUS WASTE/ HAZARDOUS MATERIALS FACILITY STORM WATER COMPLIANCE SURVEY FORM

FACILITY DBA Innovative Engineering Solutions	TELEPHONE 951-304-7600	DATE 8/8/03
ADDRESS 26200 Adams Avenue	CITY, ZIP Murrieta 92562	
MAILING ADDRESS (if different from site address)	MAILING CITY, ZIP	
CONTACT David Kerner	FACILITY# 90667	SIC CODE 8711

Compliance Areas	YES	NO	N/A
***OUTSIDE AREAS (Free of staining & debris; provides good housekeeping; maintained in a manner to prevent runoff.)**		**Requires follow up**	
1. CHEMICAL STORAGE * The outside storage area is kept to minimize the possibility of a release. Chemicals / materials are protected from precipitation / storm water runoff and the containers show no signs of leaking.	✓		
2. DUMPSTER * No liquids are leaking from dumpster; surrounding area is free of trash.	✓		
3. ABOVEGROUND TANKS * No ground staining, no spillage observed and no discharge to storm drain. Tanks are maintained to minimize the possibility of a release (secondary containment).	✓		
4. ONSITE STORM DRAIN* Protected from accidental discharge other than water.			✓
5. POWER WASH OR STEAM CLEAN* (discharge to sewer) Drains to oil/water separator connected to a sanitary sewer and not a septic system. Steam cleaning not discharged to parking lot, storm drain or soil.			✓
6. PARKING LOT / DRIVE WAY* Free of excess trash, chemical staining or liquids other than water.	✓		
7. OTHER* Non-storm water discharge (i.e. non-hazardous process discharge).			✓
8. MOP WATER TO SANITARY SEWER VIA CLARIFIER. Mop water is not dumped to the soil, parking lot, gutter, or other areas susceptible to storm water drainage.			✓
9. STORM WATER EDUCATIONAL BROCHURES GIVEN TO FACILITY OR POSTERS DISPLAYED FOR EMPLOYEES. If no, what informational material should be sent to the facility?			✓
10. IF A SWPPP IS REQUIRED, WAS IT AVAILABLE FOR REVEIW? See storm water handout for industrial facilities.			✓

OVERALL EVALUATION/ COMMENTS:

RECEIVED BY: David C. Kerner	HAZ MAT SPEC: C. Denison	BADGE #

*Agency referred to as indicated on the back of this page.

If additional information is required, contact the Storm Water /Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

StormWater CleanWater PROTECTION PROGRAM

HAZARDOUS WASTE/ HAZARDOUS MATERIALS FACILITY STORM WATER COMPLIANCE SURVEY FORM

FACILITY DBA Robertson's Ready Mix	TELEPHONE 951-461-6956	DATE 8/8/07
ADDRESS 26190 Adams Avenue	CITY, ZIP Murrieta 92562	
MAILING ADDRESS (if different from site address)	MAILING CITY, ZIP	
CONTACT Leo Hernandez	FACILITY# 90668	SIC CODE 3241

Compliance Areas	YES	NO	N/A
***OUTSIDE AREAS (Free of staining & debris; provides good housekeeping; maintained in a manner to prevent runoff.)**		**Requires follow up**	
1. CHEMICAL STORAGE * The outside storage area is kept to minimize the possibility of a release. Chemicals / materials are protected from precipitation / storm water runoff and the containers show no signs of leaking.	✓		
2. DUMPSTER * No liquids are leaking from dumpster; surrounding area is free of trash.	✓		
3. ABOVEGROUND TANKS * No ground staining, no spillage observed and no discharge to storm drain. Tanks are maintained to minimize the possibility of a release (secondary containment).	✓		
4. ONSITE STORM DRAIN* Protected from accidental discharge other than water.			✓
5. POWER WASH OR STEAM CLEAN* (discharge to sewer) Drains to oil/water separator connected to a sanitary sewer and not a septic system. Steam cleaning not discharged to parking lot, storm drain or soil.			✓
6. PARKING LOT / DRIVE WAY* Free of excess trash, chemical staining or liquids other than water.	✓		
7. OTHER* Non-storm water discharge (i.e. non-hazardous process discharge).			✓
8. MOP WATER TO SANITARY SEWER VIA CLARIFIER. Mop water is not dumped to the soil, parking lot, gutter, or other areas susceptible to storm water drainage.			✓
9. STORM WATER EDUCATIONAL BROCHURES GIVEN TO FACILITY OR POSTERS DISPLAYED FOR EMPLOYEES. If no, what informational material should be sent to the facility?			✓
10. IF A SWPPP IS REQUIRED, WAS IT AVAILABLE FOR REVEIW? See storm water handout for industrial facilities.	✓		N/A CEP

OVERALL EVALUATION/ COMMENTS: _____

RECEIVED BY: [signature]	HAZ MAT SPEC: C. Denison	BADGE #
Agency referred to as indicated on the back of this page.		

If additional information is required, contact the Storm Water /Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

0001656

HAZARDOUS WASTE/ HAZARDOUS MATERIALS FACILITY STORM WATER COMPLIANCE SURVEY FORM

FACILITY DBA Exotic Electro-Optics, Inc	TELEPHONE (951) 926-2994	DATE 8/16/07
ADDRESS 36570 Briggs Road	CITY, ZIP Murrieta 92563	
MAILING ADDRESS (if different from site address)	MAILING CITY, ZIP	
CONTACT David Varner	FACILITY# 81993	SIC CODE 3999

Compliance Areas	YES	NO	N/A
***OUTSIDE AREAS (Free of staining & debris; provides good housekeeping; maintained in a manner to prevent runoff.)**		**Requires follow up**	
1. CHEMICAL STORAGE * The outside storage area is kept to minimize the possibility of a release. Chemicals / materials are protected from precipitation / storm water runoff and the containers show no signs of leaking.	✓		
2. DUMPSTER * No liquids are leaking from dumpster; surrounding area is free of trash.	✓		
3. ABOVEGROUND TANKS * No ground staining, no spillage observed and no discharge to storm drain. Tanks are maintained to minimize the possibility of a release (secondary containment).			✓
4. ONSITE STORM DRAIN* Protected from accidental discharge other than water.	✓		
5. POWER WASH OR STEAM CLEAN* (discharge to sewer) Drains to oil/water separator connected to a sanitary sewer and not a septic system. Steam cleaning not discharged to parking lot, storm drain or soil.			✓
6. PARKING LOT / DRIVE WAY* Free of excess trash, chemical staining or liquids other than water.	✓		
7. OTHER* Non-storm water discharge (i.e. non-hazardous process discharge).			✓
8. MOP WATER TO SANITARY SEWER VIA CLARIFIER. Mop water is not dumped to the soil, parking lot, gutter, or other areas susceptible to storm water drainage.			✓
9. STORM WATER EDUCATIONAL BROCHURES GIVEN TO FACILITY OR POSTERS DISPLAYED FOR EMPLOYEES. If no, what informational material should be sent to the facility?		will mail	
10. IF A SWPPP IS REQUIRED, WAS IT AVAILABLE FOR REVEIW? See storm water handout for industrial facilities.	✓		N/A CTLO

OVERALL EVALUATION/ COMMENTS:

RECEIVED BY: Nancy Mer[illegible] | HAZ MAT SPEC: C. Denison | BADGE # 52

Agency referred to as indicated on the back of this page.

If additional information is required, contact the Storm Water /Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

0001657

HAZARDOUS WASTE/ HAZARDOUS MATERIALS FACILITY STORM WATER COMPLIANCE SURVEY FORM

FACILITY DBA The Truck Shop	TELEPHONE 951-764-2777	DATE 8/17/07
ADDRESS 41214 Sandalwood Circle, #B	CITY, ZIP Murrieta 92563	
MAILING ADDRESS (if different from site address)	MAILING CITY, ZIP	
CONTACT Ken Pymm	FACILITY# 91222	SIC CODE 7699

Compliance Areas	YES	NO	N/A
***OUTSIDE AREAS (Free of staining & debris; provides good housekeeping; maintained in a manner to prevent runoff.)**		**Requires follow up**	
1. CHEMICAL STORAGE * The outside storage area is kept to minimize the possibility of a release. Chemicals / materials are protected from precipitation / storm water runoff and the containers show no signs of leaking.	✓		
2. DUMPSTER * No liquids are leaking from dumpster; surrounding area is free of trash.	✓		
3. ABOVEGROUND TANKS * No ground staining, no spillage observed and no discharge to storm drain. Tanks are maintained to minimize the possibility of a release (secondary containment).			✓
4. ONSITE STORM DRAIN* Protected from accidental discharge other than water.	✓		
5. POWER WASH OR STEAM CLEAN* (discharge to sewer) Drains to oil/water separator connected to a sanitary sewer and not a septic system. Steam cleaning not discharged to parking lot, storm drain or soil.			✓
6. PARKING LOT / DRIVE WAY* Free of excess trash, chemical staining or liquids other than water.	✓		
7. OTHER* Non-storm water discharge (i.e. non-hazardous process discharge).			✓
8. MOP WATER TO SANITARY SEWER VIA CLARIFIER. Mop water is not dumped to the soil, parking lot, gutter, or other areas susceptible to storm water drainage.			✓
9. STORM WATER EDUCATIONAL BROCHURES GIVEN TO FACILITY OR POSTERS DISPLAYED FOR EMPLOYEES. If no, what informational material should be sent to the facility?		will mail	
10. IF A SWPPP IS REQUIRED, WAS IT AVAILABLE FOR REVEIW? See storm water handout for industrial facilities.			✓

OVERALL EVALUATION/ COMMENTS:

RECEIVED BY: Jennifer Pymm	HAZ MAT SPEC: C. Denison	BADGE # 52

Agency referred to as indicated on the back of this page.

If additional information is required, contact the Storm Water /Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

0001658

HAZARDOUS WASTE/ HAZARDOUS MATERIALS FACILITY STORM WATER COMPLIANCE SURVEY FORM

FACILITY DBA: Kinch's Radiator & Air Conditioning	TELEPHONE: 951-600-9358	DATE: 8/17/03
ADDRESS: 41714 Sandalwood Circle	CITY, ZIP: Murrieta 92563	
MAILING ADDRESS (if different from site address)	MAILING CITY, ZIP	
CONTACT: Bill McNeal	FACILITY#: 88298	SIC CODE: 7699

Compliance Areas	YES	NO	N/A
***OUTSIDE AREAS (Free of staining & debris; provides good housekeeping; maintained in a manner to prevent runoff.)**		**Requires follow up**	
1. CHEMICAL STORAGE * The outside storage area is kept to minimize the possibility of a release. Chemicals / materials are protected from precipitation / storm water runoff and the containers show no signs of leaking.	✓		
2. DUMPSTER * No liquids are leaking from dumpster; surrounding area is free of trash.	✓		
3. ABOVEGROUND TANKS * No ground staining, no spillage observed and no discharge to storm drain. Tanks are maintained to minimize the possibility of a release (secondary containment).			✓
4. ONSITE STORM DRAIN* Protected from accidental discharge other than water.	✓		
5. POWER WASH OR STEAM CLEAN* (discharge to sewer) Drains to oil/water separator connected to a sanitary sewer and not a septic system. Steam cleaning not discharged to parking lot, storm drain or soil.			✓
6. PARKING LOT / DRIVE WAY* Free of excess trash, chemical staining or liquids other than water.	✓		
7. OTHER* Non-storm water discharge (i.e. non-hazardous process discharge).			✓
8. MOP WATER TO SANITARY SEWER VIA CLARIFIER. Mop water is not dumped to the soil, parking lot, gutter, or other areas susceptible to storm water drainage.			✓
9. STORM WATER EDUCATIONAL BROCHURES GIVEN TO FACILITY OR POSTERS DISPLAYED FOR EMPLOYEES. If no, what informational material should be sent to the facility?		will mail	
10. IF A SWPPP IS REQUIRED, WAS IT AVAILABLE FOR REVEIW? See storm water handout for industrial facilities.			✓

OVERALL EVALUATION/ COMMENTS: _____

RECEIVED BY: Bill McNeal	HAZ MAT SPEC: C. Denison	BADGE # 52

Agency referred to as indicated on the back of this page.

If additional information is required, contact the Storm Water /Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

HAZARDOUS WASTE/ HAZARDOUS MATERIALS FACILITY STORM WATER COMPLIANCE SURVEY FORM

FACILITY DBA RCWD Bear Creek Sewage Lift	TELEPHONE 951-296-6965	DATE 8/22/07
ADDRESS 33158 Clinton Keith Road	CITY, ZIP Murrieta 92563	
MAILING ADDRESS (if different from site address)	MAILING CITY, ZIP	
CONTACT Mike Calvert	FACILITY# 84138	SIC CODE 4952

Compliance Areas	YES	NO	N/A
***OUTSIDE AREAS (Free of staining & debris; provides good housekeeping; maintained in a manner to prevent runoff.)**		**Requires follow up**	
1. CHEMICAL STORAGE * The outside storage area is kept to minimize the possibility of a release. Chemicals / materials are protected from precipitation / storm water runoff and the containers show no signs of leaking.	✓		
2. DUMPSTER * No liquids are leaking from dumpster; surrounding area is free of trash.			✓
3. ABOVEGROUND TANKS * No ground staining, no spillage observed and no discharge to storm drain. Tanks are maintained to minimize the possibility of a release (secondary containment).	✓		
4. ONSITE STORM DRAIN* Protected from accidental discharge other than water.			✓
5. POWER WASH OR STEAM CLEAN* (discharge to sewer) Drains to oil/water separator connected to a sanitary sewer and not a septic system. Steam cleaning not discharged to parking lot, storm drain or soil.			✓
6. PARKING LOT / DRIVE WAY* Free of excess trash, chemical staining or liquids other than water.	✓		
7. OTHER* Non-storm water discharge (i.e. non-hazardous process discharge).			✓
8. MOP WATER TO SANITARY SEWER VIA CLARIFIER. Mop water is not dumped to the soil, parking lot, gutter, or other areas susceptible to storm water drainage.			✓
9. STORM WATER EDUCATIONAL BROCHURES GIVEN TO FACILITY OR POSTERS DISPLAYED FOR EMPLOYEES. If no, what informational material should be sent to the facility?			✓
10. IF A SWPPP IS REQUIRED, WAS IT AVAILABLE FOR REVEIW? See storm water handout for industrial facilities.			✓

OVERALL EVALUATION/ COMMENTS: _____

RECEIVED BY: Mike Calvert	HAZ MAT SPEC: C. Denison	BADGE # 52

Agency referred to as indicated on the back of this page.

If additional information is required, contact the Storm Water /Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

0001660

HAZARDOUS WASTE/ HAZARDOUS MATERIALS FACILITY STORM WATER COMPLIANCE SURVEY FORM

FACILITY DBA RCWD Cal Oaks Sewage Lift #1	TELEPHONE 951-296-6965	DATE 8/22/07
ADDRESS 42533 Tenaja Road, #1	CITY, ZIP Murrieta 92590	
MAILING ADDRESS (if different from site address)	MAILING CITY, ZIP	
CONTACT Mike Calvert	FACILITY# 84137	SIC CODE 4952

Compliance Areas	YES	NO	N/A
***OUTSIDE AREAS (Free of staining & debris; provides good housekeeping; maintained in a manner to prevent runoff.)**		**Requires follow up**	
1. CHEMICAL STORAGE * The outside storage area is kept to minimize the possibility of a release. Chemicals / materials are protected from precipitation / storm water runoff and the containers show no signs of leaking.	✓		
2. DUMPSTER * No liquids are leaking from dumpster; surrounding area is free of trash.			✓
3. ABOVEGROUND TANKS * No ground staining, no spillage observed and no discharge to storm drain. Tanks are maintained to minimize the possibility of a release (secondary containment).	✓		
4. ONSITE STORM DRAIN* Protected from accidental discharge other than water.			✓
5. POWER WASH OR STEAM CLEAN* (discharge to sewer) Drains to oil/water separator connected to a sanitary sewer and not a septic system. Steam cleaning not discharged to parking lot, storm drain or soil.			✓
6. PARKING LOT / DRIVE WAY* Free of excess trash, chemical staining or liquids other than water.	✓		
7. OTHER* Non-storm water discharge (i.e. non-hazardous process discharge).			✓
8. MOP WATER TO SANITARY SEWER VIA CLARIFIER. Mop water is not dumped to the soil, parking lot, gutter, or other areas susceptible to storm water drainage.			✓
9. STORM WATER EDUCATIONAL BROCHURES GIVEN TO FACILITY OR POSTERS DISPLAYED FOR EMPLOYEES. If no, what informational material should be sent to the facility?			✓
10. IF A SWPPP IS REQUIRED, WAS IT AVAILABLE FOR REVEIW? See storm water handout for industrial facilities.			✓

OVERALL EVALUATION/ COMMENTS:

RECEIVED BY: Mike Calvert | HAZ MAT SPEC: C. Denison | BADGE # 52

Agency referred to as indicated on the back of this page.

If additional information is required, contact the Storm Water /Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

HAZARDOUS WASTE/ HAZARDOUS MATERIALS FACILITY STORM WATER COMPLIANCE SURVEY FORM

FACILITY DBA RCWD Santa Rosa Water Treatment	TELEPHONE 951-296-6965	DATE 8/22/07
ADDRESS 26266 Washington Avenue	CITY, ZIP Murrieta 92562	
MAILING ADDRESS (if different from site address)	MAILING CITY, ZIP	
CONTACT Mike Calvert	FACILITY# 84993	SIC CODE 4952

Compliance Areas	YES	NO	N/A
***OUTSIDE AREAS (Free of staining & debris; provides good housekeeping; maintained in a manner to prevent runoff.)**		**Requires follow up**	
1. CHEMICAL STORAGE * The outside storage area is kept to minimize the possibility of a release. Chemicals / materials are protected from precipitation / storm water runoff and the containers show no signs of leaking.	✓		
2. DUMPSTER * No liquids are leaking from dumpster; surrounding area is free of trash.	✓		
3. ABOVEGROUND TANKS * No ground staining, no spillage observed and no discharge to storm drain. Tanks are maintained to minimize the possibility of a release (secondary containment).	✓		
4. ONSITE STORM DRAIN* Protected from accidental discharge other than water.	✓		
5. POWER WASH OR STEAM CLEAN* (discharge to sewer) Drains to oil/water separator connected to a sanitary sewer and not a septic system. Steam cleaning not discharged to parking lot, storm drain or soil.			✓
6. PARKING LOT / DRIVE WAY* Free of excess trash, chemical staining or liquids other than water.	✓		
7. OTHER* Non-storm water discharge (i.e. non-hazardous process discharge).			✓
8. MOP WATER TO SANITARY SEWER VIA CLARIFIER. Mop water is not dumped to the soil, parking lot, gutter, or other areas susceptible to storm water drainage.			✓
9. STORM WATER EDUCATIONAL BROCHURES GIVEN TO FACILITY OR POSTERS DISPLAYED FOR EMPLOYEES. If no, what informational material should be sent to the facility?			✓
10. IF A SWPPP IS REQUIRED, WAS IT AVAILABLE FOR REVEIW? See storm water handout for industrial facilities.	N/A		✓

OVERALL EVALUATION/ COMMENTS: _____

RECEIVED BY: [signature]	HAZ MAT SPEC: C. Denison	BADGE # 52

Agency referred to as indicated on the back of this page.

If additional information is required, contact the Storm Water /Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

HAZARDOUS WASTE/ HAZARDOUS MATERIALS FACILITY STORM WATER COMPLIANCE SURVEY FORM

FACILITY DBA: Murrieta Auto Collision	TELEPHONE	DATE: 8/23/07
ADDRESS: 26793 Madison AVE Suite 107	CITY, ZIP: Murrieta 92562	
MAILING ADDRESS (if different from site address)	MAILING CITY, ZIP	
CONTACT: Misty Dotson	FACILITY#: 840055	SIC CODE: 7699

Compliance Areas	YES	NO	N/A
***OUTSIDE AREAS (Free of staining & debris; provides good housekeeping; maintained in a manner to prevent runoff.)**		**Requires follow up**	
1. CHEMICAL STORAGE * The outside storage area is kept to minimize the possibility of a release. Chemicals / materials are protected from precipitation / storm water runoff and the containers show no signs of leaking.			✓
2. DUMPSTER * No liquids are leaking from dumpster; surrounding area is free of trash.	✓		✓
3. ABOVEGROUND TANKS * No ground staining, no spillage observed and no discharge to storm drain. Tanks are maintained to minimize the possibility of a release (secondary containment).			✓
4. ONSITE STORM DRAIN* Protected from accidental discharge other than water.	✓		
5. POWER WASH OR STEAM CLEAN* (discharge to sewer) Drains to oil/water separator connected to a sanitary sewer and not a septic system. Steam cleaning not discharged to parking lot, storm drain or soil.			✓
6. PARKING LOT / DRIVE WAY* Free of excess trash, chemical staining or liquids other than water.	✓		
7. OTHER* Non-storm water discharge (i.e. non-hazardous process discharge).			✓
8. MOP WATER TO SANITARY SEWER VIA CLARIFIER. Mop water is not dumped to the soil, parking lot, gutter, or other areas susceptible to storm water drainage.			✓
9. STORM WATER EDUCATIONAL BROCHURES GIVEN TO FACILITY OR POSTERS DISPLAYED FOR EMPLOYEES. If no, what informational material should be sent to the facility?		will mail	
10. IF A SWPPP IS REQUIRED, WAS IT AVAILABLE FOR REVEIW? See storm water handout for industrial facilities.			✓

OVERALL EVALUATION/ COMMENTS: _____

RECEIVED BY: Misty Dotson	HAZ MAT SPEC: C. Denison	BADGE # 52

Agency referred to as indicated on the back of this page.

If additional information is required, contact the Storm Water /Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

HAZARDOUS WASTE/ HAZARDOUS MATERIALS FACILITY STORM WATER COMPLIANCE SURVEY FORM

FACILITY DBA Valley Collision	TELEPHONE 951-600-4850	DATE 8/23/07
ADDRESS 26293 Madison Ave., #103	CITY, ZIP Murrieta 92562	
MAILING ADDRESS (if different from site address)	MAILING CITY, ZIP	
CONTACT Gustavo Rodriguez	FACILITY# 89456	SIC CODE 7699

Compliance Areas	YES	NO	N/A
***OUTSIDE AREAS (Free of staining & debris; provides good housekeeping; maintained in a manner to prevent runoff.)**		**Requires follow up**	
1. CHEMICAL STORAGE * The outside storage area is kept to minimize the possibility of a release. Chemicals / materials are protected from precipitation / storm water runoff and the containers show no signs of leaking.			✓
2. DUMPSTER * No liquids are leaking from dumpster; surrounding area is free of trash.	✓		N/A
3. ABOVEGROUND TANKS * No ground staining, no spillage observed and no discharge to storm drain. Tanks are maintained to minimize the possibility of a release (secondary containment).			✓
4. ONSITE STORM DRAIN* Protected from accidental discharge other than water.	✓		
5. POWER WASH OR STEAM CLEAN* (discharge to sewer) Drains to oil/water separator connected to a sanitary sewer and not a septic system. Steam cleaning not discharged to parking lot, storm drain or soil.			✓
6. PARKING LOT / DRIVE WAY* Free of excess trash, chemical staining or liquids other than water.	✓		
7. OTHER* Non-storm water discharge (i.e. non-hazardous process discharge).			✓
8. MOP WATER TO SANITARY SEWER VIA CLARIFIER. Mop water is not dumped to the soil, parking lot, gutter, or other areas susceptible to storm water drainage.			✓
9. STORM WATER EDUCATIONAL BROCHURES GIVEN TO FACILITY OR POSTERS DISPLAYED FOR EMPLOYEES. If no, what informational material should be sent to the facility?		will mail	
10. IF A SWPPP IS REQUIRED, WAS IT AVAILABLE FOR REVEIW? See storm water handout for industrial facilities.			✓

OVERALL EVALUATION/ COMMENTS: _____

RECEIVED BY: [signature]	~~HAZ MAT~~ SPEC: C. Denison	BADGE # 52

Agency referred to as indicated on the back of this page.

If additional information is required, contact the Storm Water /Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

0001664

HAZARDOUS WASTE/ HAZARDOUS MATERIALS FACILITY STORM WATER COMPLIANCE SURVEY FORM

FACILITY DBA The Chop Shop	TELEPHONE 951-695-3572	DATE 8/22/07
ADDRESS 26765 Madison Avenue, #104	CITY, ZIP Murrieta, 92562	
MAILING ADDRESS (if different from site address)	MAILING CITY, ZIP	
CONTACT Sean Gonde	FACILITY# 91773	SIC CODE 7699

Compliance Areas	YES	NO	N/A
***OUTSIDE AREAS (Free of staining & debris; provides good housekeeping; maintained in a manner to prevent runoff.)**		**Requires follow up**	
1. CHEMICAL STORAGE * The outside storage area is kept to minimize the possibility of a release. Chemicals / materials are protected from precipitation / storm water runoff and the containers show no signs of leaking.			✓
2. DUMPSTER * No liquids are leaking from dumpster; surrounding area is free of trash.	✓		
3. ABOVEGROUND TANKS * No ground staining, no spillage observed and no discharge to storm drain. Tanks are maintained to minimize the possibility of a release (secondary containment).			✓
4. ONSITE STORM DRAIN* Protected from accidental discharge other than water.			✓
5. POWER WASH OR STEAM CLEAN* (discharge to sewer) Drains to oil/water separator connected to a sanitary sewer and not a septic system. Steam cleaning not discharged to parking lot, storm drain or soil.			✓
6. PARKING LOT / DRIVE WAY* Free of excess trash, chemical staining or liquids other than water.	✓		
7. OTHER* Non-storm water discharge (i.e. non-hazardous process discharge).			✓
8. MOP WATER TO SANITARY SEWER VIA CLARIFIER. Mop water is not dumped to the soil, parking lot, gutter, or other areas susceptible to storm water drainage.			✓
9. STORM WATER EDUCATIONAL BROCHURES GIVEN TO FACILITY OR POSTERS DISPLAYED FOR EMPLOYEES. If no, what informational material should be sent to the facility?			✓
10. IF A SWPPP IS REQUIRED, WAS IT AVAILABLE FOR REVEIW? See storm water handout for industrial facilities.			✓

OVERALL EVALUATION/ COMMENTS: _____

RECEIVED BY: [signature]	HAZ MAT SPEC: C. Denison	BADGE # 52

Agency referred to as indicated on the back of this page.

If additional information is required, contact the Storm Water /Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

HAZARDOUS WASTE/ HAZARDOUS MATERIALS FACILITY STORM WATER COMPLIANCE SURVEY FORM

FACILITY DBA: County of Riverside Fleet Services	TELEPHONE: 951 640-3090	DATE: 8/23/07
ADDRESS: 30755 V-Auld Rd.	CITY, ZIP: Murrieta 92563	
MAILING ADDRESS (if different from site address)	MAILING CITY, ZIP	
CONTACT: Larry Cassle	FACILITY#: 82513	SIC CODE: 5541

Compliance Areas	YES	NO	N/A
***OUTSIDE AREAS (Free of staining & debris; provides good housekeeping; maintained in a manner to prevent runoff.)**		**Requires follow up**	
1. CHEMICAL STORAGE * The outside storage area is kept to minimize the possibility of a release. Chemicals / materials are protected from precipitation / storm water runoff and the containers show no signs of leaking.	✓		
2. DUMPSTER * No liquids are leaking from dumpster; surrounding area is free of trash.	✓		
3. ABOVEGROUND TANKS * No ground staining, no spillage observed and no discharge to storm drain. Tanks are maintained to minimize the possibility of a release (secondary containment).			✓
4. ONSITE STORM DRAIN* Protected from accidental discharge other than water.	✓		
5. POWER WASH OR STEAM CLEAN* (discharge to sewer) Drains to oil/water separator connected to a sanitary sewer and not a septic system. Steam cleaning not discharged to parking lot, storm drain or soil.	✓		
6. PARKING LOT / DRIVE WAY* Free of excess trash, chemical staining or liquids other than water.	✓		
7. OTHER* Non-storm water discharge (i.e. non-hazardous process discharge).			✓
8. MOP WATER TO SANITARY SEWER VIA CLARIFIER. Mop water is not dumped to the soil, parking lot, gutter, or other areas susceptible to storm water drainage.			✓
9. STORM WATER EDUCATIONAL BROCHURES GIVEN TO FACILITY OR POSTERS DISPLAYED FOR EMPLOYEES. If no, what informational material should be sent to the facility?		will mail	
10. IF A SWPPP IS REQUIRED, WAS IT AVAILABLE FOR REVEIW? See storm water handout for industrial facilities.			✓

OVERALL EVALUATION/ COMMENTS: _____

RECEIVED BY: [signature]	HAZ MAT SPEC: Christine Denson	BADGE # 52

Agency referred to as indicated on the back of this page.

If additional information is required, contact the Storm Water /Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

0001666

HAZARDOUS WASTE/ HAZARDOUS MATERIALS FACILITY STORM WATER COMPLIANCE SURVEY FORM

FACILITY DBA EVMWD Greer Ranch Pump Station	TELEPHONE 951-674-3146	DATE 8/28/07
ADDRESS 35915 Evandel	CITY, ZIP Murrieta 92562	
MAILING ADDRESS (if different from site address)	MAILING CITY, ZIP	
CONTACT Don Taylor	FACILITY# 90440	SIC CODE 4941

Compliance Areas	YES	NO	N/A
***OUTSIDE AREAS (Free of staining & debris; provides good housekeeping; maintained in a manner to prevent runoff.)**		**Requires follow up**	
1. CHEMICAL STORAGE * The outside storage area is kept to minimize the possibility of a release. Chemicals / materials are protected from precipitation / storm water runoff and the containers show no signs of leaking.	✓		
2. DUMPSTER * No liquids are leaking from dumpster; surrounding area is free of trash.			✓
3. ABOVEGROUND TANKS * No ground staining, no spillage observed and no discharge to storm drain. Tanks are maintained to minimize the possibility of a release (secondary containment).	✓		
4. ONSITE STORM DRAIN* Protected from accidental discharge other than water.	✓		
5. POWER WASH OR STEAM CLEAN* (discharge to sewer) Drains to oil/water separator connected to a sanitary sewer and not a septic system. Steam cleaning not discharged to parking lot, storm drain or soil.			✓
6. PARKING LOT / DRIVE WAY* Free of excess trash, chemical staining or liquids other than water.	✓		
7. OTHER* Non-storm water discharge (i.e. non-hazardous process discharge).			✓
8. MOP WATER TO SANITARY SEWER VIA CLARIFIER. Mop water is not dumped to the soil, parking lot, gutter, or other areas susceptible to storm water drainage.			✓
9. STORM WATER EDUCATIONAL BROCHURES GIVEN TO FACILITY OR POSTERS DISPLAYED FOR EMPLOYEES. If no, what informational material should be sent to the facility?		will mail	
10. IF A SWPPP IS REQUIRED, WAS IT AVAILABLE FOR REVEIW? See storm water handout for industrial facilities.			✓

OVERALL EVALUATION/ COMMENTS: _____

RECEIVED BY: [signature]	HAZ MAT SPEC: C. Denison	BADGE # 52

Agency referred to as indicated on the back of this page.

If additional information is required, contact the Storm Water /Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

HAZARDOUS WASTE/ HAZARDOUS MATERIALS FACILITY STORM WATER COMPLIANCE SURVEY FORM

FACILITY DBA: EVMWD Cal Oaks Pump Station	TELEPHONE: 951-674-3146	DATE: 8/28/07
ADDRESS: 24281 Hancock Avenue	CITY, ZIP: Murrieta 92562	
MAILING ADDRESS (if different from site address)	MAILING CITY, ZIP	
CONTACT: Don Taylor	FACILITY#: 84554	SIC CODE: 4941

Compliance Areas	YES	NO	N/A
***OUTSIDE AREAS (Free of staining & debris; provides good housekeeping; maintained in a manner to prevent runoff.)**		**Requires follow up**	
1. CHEMICAL STORAGE * The outside storage area is kept to minimize the possibility of a release. Chemicals / materials are protected from precipitation / storm water runoff and the containers show no signs of leaking.	✓		~~N/A~~ CHD
2. DUMPSTER * No liquids are leaking from dumpster; surrounding area is free of trash.			✓
3. ABOVEGROUND TANKS * No ground staining, no spillage observed and no discharge to storm drain. Tanks are maintained to minimize the possibility of a release (secondary containment).	✓		
4. ONSITE STORM DRAIN* Protected from accidental discharge other than water.	✓		
5. POWER WASH OR STEAM CLEAN* (discharge to sewer) Drains to oil/water separator connected to a sanitary sewer and not a septic system. Steam cleaning not discharged to parking lot, storm drain or soil.			✓
6. PARKING LOT / DRIVE WAY* Free of excess trash, chemical staining or liquids other than water.	✓		
7. OTHER* Non-storm water discharge (i.e. non-hazardous process discharge).			✓
8. MOP WATER TO SANITARY SEWER VIA CLARIFIER. Mop water is not dumped to the soil, parking lot, gutter, or other areas susceptible to storm water drainage.			✓
9. STORM WATER EDUCATIONAL BROCHURES GIVEN TO FACILITY OR POSTERS DISPLAYED FOR EMPLOYEES. If no, what informational material should be sent to the facility?		will mail	
10. IF A SWPPP IS REQUIRED, WAS IT AVAILABLE FOR REVEIW? See storm water handout for industrial facilities.			✓

OVERALL EVALUATION/ COMMENTS: _____

RECEIVED BY: [signature]	HAZ MAT SPEC: C. Denison	BADGE # 52

Agency referred to as indicated on the back of this page.

If additional information is required, contact the Storm Water /Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

StormWater CleanWater PROTECTION PROGRAM

HAZARDOUS WASTE/ HAZARDOUS MATERIALS FACILITY STORM WATER COMPLIANCE SURVEY FORM

FACILITY DBA EVMWD Greer Ranch Lift Station	TELEPHONE 951-624-3146	DATE 8/28/07
ADDRESS 23698 Clinton Keith Rd.	CITY, ZIP Murrieta 92562	
MAILING ADDRESS (if different from site address)	MAILING CITY, ZIP	
CONTACT Don Taylor	FACILITY# 91617	SIC CODE 4952

Compliance Areas	YES	NO	N/A
***OUTSIDE AREAS (Free of staining & debris; provides good housekeeping; maintained in a manner to prevent runoff.)**		**Requires follow up**	
1. CHEMICAL STORAGE * The outside storage area is kept to minimize the possibility of a release. Chemicals / materials are protected from precipitation / storm water runoff and the containers show no signs of leaking.			✓
2. DUMPSTER * No liquids are leaking from dumpster; surrounding area is free of trash.			✓
3. ABOVEGROUND TANKS * No ground staining, no spillage observed and no discharge to storm drain. Tanks are maintained to minimize the possibility of a release (secondary containment).	✓		
4. ONSITE STORM DRAIN* Protected from accidental discharge other than water.	✓		
5. POWER WASH OR STEAM CLEAN* (discharge to sewer) Drains to oil/water separator connected to a sanitary sewer and not a septic system. Steam cleaning not discharged to parking lot, storm drain or soil.			✓
6. PARKING LOT / DRIVE WAY* Free of excess trash, chemical staining or liquids other than water.	✓		
7. OTHER* Non-storm water discharge (i.e. non-hazardous process discharge).			✓
8. MOP WATER TO SANITARY SEWER VIA CLARIFIER. Mop water is not dumped to the soil, parking lot, gutter, or other areas susceptible to storm water drainage.			✓
9. STORM WATER EDUCATIONAL BROCHURES GIVEN TO FACILITY OR POSTERS DISPLAYED FOR EMPLOYEES. If no, what informational material should be sent to the facility?		will mail	
10. IF A SWPPP IS REQUIRED, WAS IT AVAILABLE FOR REVEIW? See storm water handout for industrial facilities.			✓

OVERALL EVALUATION/ COMMENTS:

RECEIVED BY: [signature]	HAZ MAT SPEC: C. Denison	BADGE # 52

Agency referred to as indicated on the back of this page.

If additional information is required, contact the Storm Water /Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

0001669

HAZARDOUS WASTE/ HAZARDOUS MATERIALS FACILITY STORM WATER COMPLIANCE SURVEY FORM

FACILITY DBA EVMWD Robards Liftstation	TELEPHONE 951-674-3146	DATE 8/28/07
ADDRESS 26373 Madison Avenue	CITY, ZIP Murrieta 92562	
MAILING ADDRESS (if different from site address)	MAILING CITY, ZIP	
CONTACT Don Taylor	FACILITY# 91598	SIC CODE 4952

Compliance Areas	YES	NO	N/A
***OUTSIDE AREAS (Free of staining & debris; provides good housekeeping; maintained in a manner to prevent runoff.)**		**Requires follow up**	
1. CHEMICAL STORAGE * The outside storage area is kept to minimize the possibility of a release. Chemicals / materials are protected from precipitation / storm water runoff and the containers show no signs of leaking.	✓		
2. DUMPSTER * No liquids are leaking from dumpster; surrounding area is free of trash.	~~✓~~ CHP		✓
3. ABOVEGROUND TANKS * No ground staining, no spillage observed and no discharge to storm drain. Tanks are maintained to minimize the possibility of a release (secondary containment).	✓		
4. ONSITE STORM DRAIN* Protected from accidental discharge other than water.	✓		
5. POWER WASH OR STEAM CLEAN* (discharge to sewer) Drains to oil/water separator connected to a sanitary sewer and not a septic system. Steam cleaning not discharged to parking lot, storm drain or soil.			✓
6. PARKING LOT / DRIVE WAY* Free of excess trash, chemical staining or liquids other than water.	✓		
7. OTHER* Non-storm water discharge (i.e. non-hazardous process discharge).			✓
8. MOP WATER TO SANITARY SEWER VIA CLARIFIER. Mop water is not dumped to the soil, parking lot, gutter, or other areas susceptible to storm water drainage.			✓
9. STORM WATER EDUCATIONAL BROCHURES GIVEN TO FACILITY OR POSTERS DISPLAYED FOR EMPLOYEES. If no, what informational material should be sent to the facility?		with mail	
10. IF A SWPPP IS REQUIRED, WAS IT AVAILABLE FOR REVEIW? See storm water handout for industrial facilities.			✓

OVERALL EVALUATION/ COMMENTS: _____

RECEIVED BY: [signature]	HAZ MAT SPEC: C. Denison	BADGE # 52

Agency referred to as indicated on the back of this page.

If additional information is required, contact the Storm Water /Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

HAZARDOUS WASTE/ HAZARDOUS MATERIALS FACILITY STORM WATER COMPLIANCE SURVEY FORM

FACILITY DBA	TELEPHONE	DATE
County of Riverside, Juvenile Det CTR	(951) 600-6830	8/29/07
ADDRESS: 30755-D Auld Rd	CITY, ZIP: Murrieta CA 92563	
MAILING ADDRESS (if different from site address)	MAILING CITY, ZIP	
CONTACT: Ward B. Pratt	FACILITY#: 88638	SIC CODE: 9223

Compliance Areas	YES	NO	N/A
***OUTSIDE AREAS (Free of staining & debris; provides good housekeeping; maintained in a manner to prevent runoff.)**		**Requires follow up**	
1. CHEMICAL STORAGE * The outside storage area is kept to minimize the possibility of a release. Chemicals / materials are protected from precipitation / storm water runoff and the containers show no signs of leaking.	✓		
2. DUMPSTER * No liquids are leaking from dumpster; surrounding area is free of trash.	✓		
3. ABOVEGROUND TANKS * No ground staining, no spillage observed and no discharge to storm drain. Tanks are maintained to minimize the possibility of a release (secondary containment).			✓
4. ONSITE STORM DRAIN* Protected from accidental discharge other than water.	✓		
5. POWER WASH OR STEAM CLEAN* (discharge to sewer) Drains to oil/water separator connected to a sanitary sewer and not a septic system. Steam cleaning not discharged to parking lot, storm drain or soil.	✓		
6. PARKING LOT / DRIVE WAY* Free of excess trash, chemical staining or liquids other than water.	✓		
7. OTHER* Non-storm water discharge (i.e. non-hazardous process discharge).			✓
8. MOP WATER TO SANITARY SEWER VIA CLARIFIER. Mop water is not dumped to the soil, parking lot, gutter, or other areas susceptible to storm water drainage.	✓		
9. STORM WATER EDUCATIONAL BROCHURES GIVEN TO FACILITY OR POSTERS DISPLAYED FOR EMPLOYEES. If no, what informational material should be sent to the facility?	✓		
10. IF A SWPPP IS REQUIRED, WAS IT AVAILABLE FOR REVEIW? See storm water handout for industrial facilities.	✓		

OVERALL EVALUATION/ COMMENTS:

No violations Noted

RECEIVED BY: Ward Pratt	HAZ MAT SPEC: M. Vargas	BADGE #

Agency referred to as indicated on the back of this page.

If additional information is required, contact the Storm Water /Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

StormWater CleanWater PROTECTION PROGRAM

HAZARDOUS WASTE/ HAZARDOUS MATERIALS FACILITY STORM WATER COMPLIANCE SURVEY FORM

FACILITY DBA	TELEPHONE	DATE
County of Riverside, Jail Central Plant	(951) 600-6830	8/29/07
ADDRESS: 30755 Auld Rd	CITY, ZIP: Moreno Valley CA 92563	
MAILING ADDRESS (if different from site address)	MAILING CITY, ZIP	
CONTACT: Ward B. Pratt	FACILITY#: 82457	SIC CODE: 9223

Compliance Areas	YES	NO	N/A
***OUTSIDE AREAS (Free of staining & debris; provides good housekeeping; maintained in a manner to prevent runoff.)**		**Requires follow up**	
1. CHEMICAL STORAGE * The outside storage area is kept to minimize the possibility of a release. Chemicals / materials are protected from precipitation / storm water runoff and the containers show no signs of leaking.		✓	
2. DUMPSTER * No liquids are leaking from dumpster; surrounding area is free of trash.	✓		
3. ABOVEGROUND TANKS * No ground staining, no spillage observed and no discharge to storm drain. Tanks are maintained to minimize the possibility of a release (secondary containment).			✓
4. ONSITE STORM DRAIN* Protected from accidental discharge other than water.	✓		
5. POWER WASH OR STEAM CLEAN* (discharge to sewer) Drains to oil/water separator connected to a sanitary sewer and not a septic system. Steam cleaning not discharged to parking lot, storm drain or soil.	✓		
6. PARKING LOT / DRIVE WAY* Free of excess trash, chemical staining or liquids other than water.	✓		
7. OTHER* Non-storm water discharge (i.e. non-hazardous process discharge).			✓
8. MOP WATER TO SANITARY SEWER VIA CLARIFIER. Mop water is not dumped to the soil, parking lot, gutter, or other areas susceptible to storm water drainage.	✓		
9. STORM WATER EDUCATIONAL BROCHURES GIVEN TO FACILITY OR POSTERS DISPLAYED FOR EMPLOYEES. If no, what informational material should be sent to the facility?	✓		
10. IF A SWPPP IS REQUIRED, WAS IT AVAILABLE FOR REVEIW? See storm water handout for industrial facilities.	-		✓

OVERALL EVALUATION/ COMMENTS:

#1) Observed (2) 5 Gallon Waste Containers Next to the Front Gate Entrance. The Waste was stored outside and did not have Secondary Containment. The Facility Staff store their Waste inside + Away From Precipitation.

RECEIVED BY: Ward Pratt	HAZ MAT SPEC: M. Vargas	BADGE #

Agency referred to as indicated on the back of this page.

If additional information is required, contact the Storm Water /Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

0001672

HAZARDOUS WASTE/ HAZARDOUS MATERIALS FACILITY STORM WATER COMPLIANCE SURVEY FORM

FACILITY DBA: SCE Auld Valley Substation	TELEPHONE: (951) 288-6343	DATE: 9/4/07
ADDRESS: Liberty Road	CITY, ZIP: Murrieta 92562	
MAILING ADDRESS (if different from site address)	MAILING CITY, ZIP	
CONTACT: Miguel Flores	FACILITY#: 85218	SIC CODE: 4911

Compliance Areas	YES	NO	N/A
***OUTSIDE AREAS (Free of staining & debris; provides good housekeeping; maintained in a manner to prevent runoff.)**		**Requires follow up**	
1. CHEMICAL STORAGE * The outside storage area is kept to minimize the possibility of a release. Chemicals / materials are protected from precipitation / storm water runoff and the containers show no signs of leaking.	✓		
2. DUMPSTER * No liquids are leaking from dumpster; surrounding area is free of trash.			✓
3. ABOVEGROUND TANKS * No ground staining, no spillage observed and no discharge to storm drain. Tanks are maintained to minimize the possibility of a release (secondary containment).	✓		
4. ONSITE STORM DRAIN* Protected from accidental discharge other than water.			✓
5. POWER WASH OR STEAM CLEAN* (discharge to sewer) Drains to oil/water separator connected to a sanitary sewer and not a septic system. Steam cleaning not discharged to parking lot, storm drain or soil.			✓
6. PARKING LOT / DRIVE WAY* Free of excess trash, chemical staining or liquids other than water.	✓		
7. OTHER* Non-storm water discharge (i.e. non-hazardous process discharge).			✓
8. MOP WATER TO SANITARY SEWER VIA CLARIFIER. Mop water is not dumped to the soil, parking lot, gutter, or other areas susceptible to storm water drainage.			✓
9. STORM WATER EDUCATIONAL BROCHURES GIVEN TO FACILITY OR POSTERS DISPLAYED FOR EMPLOYEES. If no, what informational material should be sent to the facility?			✓
10. IF A SWPPP IS REQUIRED, WAS IT AVAILABLE FOR REVEIW? See storm water handout for industrial facilities.			✓

OVERALL EVALUATION/ COMMENTS:

RECEIVED BY: [signature]	HAZ MAT SPEC: C. Denison	BADGE # 52

Agency referred to as indicated on the back of this page.

If additional information is required, contact the Storm Water /Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

HAZARDOUS WASTE/ HAZARDOUS MATERIALS FACILITY STORM WATER COMPLIANCE SURVEY FORM

FACILITY DBA: VONS Fuel Center #2660	TELEPHONE: (951) 600-9583	DATE: 9/5/07
ADDRESS: 29910 Murrieta Hot Sprgs. Rd. #B	CITY, ZIP: Murrieta 92563	
MAILING ADDRESS (if different from site address)	MAILING CITY, ZIP	
CONTACT: Joseph Higgitt	FACILITY#: 89909	SIC CODE: 5541

Compliance Areas	YES	NO	N/A
***OUTSIDE AREAS (Free of staining & debris; provides good housekeeping; maintained in a manner to prevent runoff.)**		**Requires follow up**	
1. CHEMICAL STORAGE * The outside storage area is kept to minimize the possibility of a release. Chemicals / materials are protected from precipitation / storm water runoff and the containers show no signs of leaking.	✓		
2. DUMPSTER * No liquids are leaking from dumpster; surrounding area is free of trash.	✓		
3. ABOVEGROUND TANKS * No ground staining, no spillage observed and no discharge to storm drain. Tanks are maintained to minimize the possibility of a release (secondary containment).			✓
4. ONSITE STORM DRAIN* Protected from accidental discharge other than water.	✓		
5. POWER WASH OR STEAM CLEAN* (discharge to sewer) Drains to oil/water separator connected to a sanitary sewer and not a septic system. Steam cleaning not discharged to parking lot, storm drain or soil.			✓
6. PARKING LOT / DRIVE WAY* Free of excess trash, chemical staining or liquids other than water.	✓		
7. OTHER* Non-storm water discharge (i.e. non-hazardous process discharge).			✓
8. MOP WATER TO SANITARY SEWER VIA CLARIFIER. Mop water is not dumped to the soil, parking lot, gutter, or other areas susceptible to storm water drainage.			✓
9. STORM WATER EDUCATIONAL BROCHURES GIVEN TO FACILITY OR POSTERS DISPLAYED FOR EMPLOYEES. If no, what informational material should be sent to the facility?			✓
10. IF A SWPPP IS REQUIRED, WAS IT AVAILABLE FOR REVEIW? See storm water handout for industrial facilities.			✓

OVERALL EVALUATION/ COMMENTS: _____

RECEIVED BY: Joseph R. Higgitt Jr.	HAZ MAT SPEC: C. Denison	BADGE # 52

Agency referred to as indicated on the back of this page.

If additional information is required, contact the Storm Water /Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

StormWater CleanWater PROTECTION PROGRAM

HAZARDOUS WASTE/ HAZARDOUS MATERIALS FACILITY STORM WATER COMPLIANCE SURVEY FORM

FACILITY DBA San Diego Airmotive	TELEPHONE (951) 698-4260	DATE 9/5/07
ADDRESS 37552 Winchester Road	CITY, ZIP Murrieta 92563	
MAILING ADDRESS (if different from site address)	MAILING CITY, ZIP	
CONTACT Glen Kratz	FACILITY# New	SIC CODE 7699

Compliance Areas	YES	NO	N/A
***OUTSIDE AREAS (Free of staining & debris; provides good housekeeping; maintained in a manner to prevent runoff.)**		**Requires follow up**	
1. CHEMICAL STORAGE * The outside storage area is kept to minimize the possibility of a release. Chemicals / materials are protected from precipitation / storm water runoff and the containers show no signs of leaking.			✓
2. DUMPSTER * No liquids are leaking from dumpster; surrounding area is free of trash.			✓
3. ABOVEGROUND TANKS * No ground staining, no spillage observed and no discharge to storm drain. Tanks are maintained to minimize the possibility of a release (secondary containment).			✓
4. ONSITE STORM DRAIN* Protected from accidental discharge other than water.			✓
5. POWER WASH OR STEAM CLEAN* (discharge to sewer) Drains to oil/water separator connected to a sanitary sewer and not a septic system. Steam cleaning not discharged to parking lot, storm drain or soil.			✓
6. PARKING LOT / DRIVE WAY* Free of excess trash, chemical staining or liquids other than water.	✓		
7. OTHER* Non-storm water discharge (i.e. non-hazardous process discharge).			✓
8. MOP WATER TO SANITARY SEWER VIA CLARIFIER. Mop water is not dumped to the soil, parking lot, gutter, or other areas susceptible to storm water drainage.			✓
9. STORM WATER EDUCATIONAL BROCHURES GIVEN TO FACILITY OR POSTERS DISPLAYED FOR EMPLOYEES. If no, what informational material should be sent to the facility?			✓
10. IF A SWPPP IS REQUIRED, WAS IT AVAILABLE FOR REVEIW? See storm water handout for industrial facilities.			✓

OVERALL EVALUATION/ COMMENTS: _____

RECEIVED BY: [signature]	HAZ MAT SPEC: C. Denison	BADGE # 52

Agency referred to as indicated on the back of this page.

If additional information is required, contact the Storm Water /Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

HAZARDOUS WASTE/ HAZARDOUS MATERIALS FACILITY STORM WATER COMPLIANCE SURVEY FORM

FACILITY DBA: French Valley Aviation, Inc	TELEPHONE: 951-677-2756	DATE: 9/6/03
ADDRESS: 37552 Winchester Road	CITY, ZIP: Murrieta 92563	
MAILING ADDRESS (if different from site address)	MAILING CITY, ZIP	
CONTACT: Joe Diorio	FACILITY#: 85544	SIC CODE: 7699

Compliance Areas	YES	NO	N/A
***OUTSIDE AREAS (Free of staining & debris; provides good housekeeping; maintained in a manner to prevent runoff.)**		**Requires follow up**	
1. CHEMICAL STORAGE * The outside storage area is kept to minimize the possibility of a release. Chemicals / materials are protected from precipitation / storm water runoff and the containers show no signs of leaking.	✓		
2. DUMPSTER * No liquids are leaking from dumpster; surrounding area is free of trash.	✓		
3. ABOVEGROUND TANKS * No ground staining, no spillage observed and no discharge to storm drain. Tanks are maintained to minimize the possibility of a release (secondary containment).	✓		
4. ONSITE STORM DRAIN* Protected from accidental discharge other than water.	✓		
5. POWER WASH OR STEAM CLEAN* (discharge to sewer) Drains to oil/water separator connected to a sanitary sewer and not a septic system. Steam cleaning not discharged to parking lot, storm drain or soil.			✓
6. PARKING LOT / DRIVE WAY* Free of excess trash, chemical staining or liquids other than water.	✓		
7. OTHER* Non-storm water discharge (i.e. non-hazardous process discharge).			✓
8. MOP WATER TO SANITARY SEWER VIA CLARIFIER. Mop water is not dumped to the soil, parking lot, gutter, or other areas susceptible to storm water drainage.			✓
9. STORM WATER EDUCATIONAL BROCHURES GIVEN TO FACILITY OR POSTERS DISPLAYED FOR EMPLOYEES. If no, what informational material should be sent to the facility?			✓
10. IF A SWPPP IS REQUIRED, WAS IT AVAILABLE FOR REVEIW? See storm water handout for industrial facilities.			✓

OVERALL EVALUATION/ COMMENTS: _____

RECEIVED BY: [signature]	HAZ MAT SPEC: C. Denison	BADGE # 52

Agency referred to as indicated on the back of this page.

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Storm Water Clean Water PROTECTION PROGRAM

HAZARDOUS WASTE/ HAZARDOUS MATERIALS FACILITY STORM WATER COMPLIANCE SURVEY FORM

FACILITY DBA EMWD Citilhamwood Lift Station	TELEPHONE 951-928-3777	DATE 9-7-07
ADDRESS 36384 Citilhamwood PLACE	CITY, ZIP Murrieta 92563	
MAILING ADDRESS (if different from site address)	MAILING CITY, ZIP	
CONTACT DAVID BIENVENUE	FACILITY# 91169	SIC CODE 4952

Compliance Areas	YES	NO	N/A
***OUTSIDE AREAS (Free of staining & debris; provides good housekeeping; maintained in a manner to prevent runoff.)**		**Requires follow up**	
1. CHEMICAL STORAGE * The outside storage area is kept to minimize the possibility of a release. Chemicals / materials are protected from precipitation / storm water runoff and the containers show no signs of leaking.	✓		
2. DUMPSTER * No liquids are leaking from dumpster; surrounding area is free of trash.			✓
3. ABOVEGROUND TANKS * No ground staining, no spillage observed and no discharge to storm drain. Tanks are maintained to minimize the possibility of a release (secondary containment).	✓		
4. ONSITE STORM DRAIN* Protected from accidental discharge other than water.			✓
5. POWER WASH OR STEAM CLEAN* (discharge to sewer) Drains to oil/water separator connected to a sanitary sewer and not a septic system. Steam cleaning not discharged to parking lot, storm drain or soil.			✓
6. PARKING LOT / DRIVE WAY* Free of excess trash, chemical staining or liquids other than water.	✓		
7. OTHER* Non-storm water discharge (i.e. non-hazardous process discharge).			✓
8. MOP WATER TO SANITARY SEWER VIA CLARIFIER. Mop water is not dumped to the soil, parking lot, gutter, or other areas susceptible to storm water drainage.			✓
9. STORM WATER EDUCATIONAL BROCHURES GIVEN TO FACILITY OR POSTERS DISPLAYED FOR EMPLOYEES. If no, what informational material should be sent to the facility?			✓
10. IF A SWPPP IS REQUIRED, WAS IT AVAILABLE FOR REVEIW? See storm water handout for industrial facilities.			✓

OVERALL EVALUATION/ COMMENTS:

RECEIVED BY:	HAZ MAT SPEC: C. DENISON	BADGE # 52

Agency referred to as indicated on the back of this page.

If additional information is required, contact the Storm Water /Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

0001677

HAZARDOUS WASTE/ HAZARDOUS MATERIALS FACILITY STORM WATER COMPLIANCE SURVEY FORM

FACILITY DBA: EMWD Palomar Avenue	TELEPHONE: 951-928-3777	DATE: 9-7-07
ADDRESS: Palomar Avenue	CITY, ZIP: Murrieta 92562	
MAILING ADDRESS (if different from site address)	MAILING CITY, ZIP	
CONTACT: DAVID Bienvenue	FACILITY#	SIC CODE: 4952

Compliance Areas	YES	NO	N/A
***OUTSIDE AREAS (Free of staining & debris; provides good housekeeping; maintained in a manner to prevent runoff.)**		**Requires follow up**	
1. CHEMICAL STORAGE * The outside storage area is kept to minimize the possibility of a release. Chemicals / materials are protected from precipitation / storm water runoff and the containers show no signs of leaking.	✓		
2. DUMPSTER * No liquids are leaking from dumpster; surrounding area is free of trash.			✓
3. ABOVEGROUND TANKS * No ground staining, no spillage observed and no discharge to storm drain. Tanks are maintained to minimize the possibility of a release (secondary containment).	✓		
4. ONSITE STORM DRAIN* Protected from accidental discharge other than water.			✓
5. POWER WASH OR STEAM CLEAN* (discharge to sewer) Drains to oil/water separator connected to a sanitary sewer and not a septic system. Steam cleaning not discharged to parking lot, storm drain or soil.			✓
6. PARKING LOT / DRIVE WAY* Free of excess trash, chemical staining or liquids other than water.	✓		
7. OTHER* Non-storm water discharge (i.e. non-hazardous process discharge).			✓
8. MOP WATER TO SANITARY SEWER VIA CLARIFIER. Mop water is not dumped to the soil, parking lot, gutter, or other areas susceptible to storm water drainage.			✓
9. STORM WATER EDUCATIONAL BROCHURES GIVEN TO FACILITY OR POSTERS DISPLAYED FOR EMPLOYEES. If no, what informational material should be sent to the facility?			✓
10. IF A SWPPP IS REQUIRED, WAS IT AVAILABLE FOR REVEIW? See storm water handout for industrial facilities.			✓

OVERALL EVALUATION/ COMMENTS:

RECEIVED BY:	HAZ MAT SPEC: C. DENISON	BADGE # 52

Agency referred to as indicated on the back of this page.

If additional information is required, contact the Storm Water /Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

0001678

HAZARDOUS WASTE/ HAZARDOUS MATERIALS FACILITY STORM WATER COMPLIANCE SURVEY FORM

FACILITY DBA: EMWD Golden Triangle Well	TELEPHONE: 951-928-3777	DATE: 9-7-07
ADDRESS: 38952 Jackson Street	CITY, ZIP: Murrieta 92562	
MAILING ADDRESS (if different from site address)	MAILING CITY, ZIP	
CONTACT: DAVID BIENVENUE	FACILITY#: 84075	SIC CODE: 4941

Compliance Areas	YES	NO	N/A
***OUTSIDE AREAS (Free of staining & debris; provides good housekeeping; maintained in a manner to prevent runoff.)**		**Requires follow up**	
1. CHEMICAL STORAGE * The outside storage area is kept to minimize the possibility of a release. Chemicals / materials are protected from precipitation / storm water runoff and the containers show no signs of leaking.	✓		
2. DUMPSTER * No liquids are leaking from dumpster; surrounding area is free of trash.			✓
3. ABOVEGROUND TANKS * No ground staining, no spillage observed and no discharge to storm drain. Tanks are maintained to minimize the possibility of a release (secondary containment).	✓		
4. ONSITE STORM DRAIN* Protected from accidental discharge other than water.			✓
5. POWER WASH OR STEAM CLEAN* (discharge to sewer) Drains to oil/water separator connected to a sanitary sewer and not a septic system. Steam cleaning not discharged to parking lot, storm drain or soil.			✓
6. PARKING LOT / DRIVE WAY* Free of excess trash, chemical staining or liquids other than water.	✓		
7. OTHER* Non-storm water discharge (i.e. non-hazardous process discharge).			✓
8. MOP WATER TO SANITARY SEWER VIA CLARIFIER. Mop water is not dumped to the soil, parking lot, gutter, or other areas susceptible to storm water drainage.			✓
9. STORM WATER EDUCATIONAL BROCHURES GIVEN TO FACILITY OR POSTERS DISPLAYED FOR EMPLOYEES. If no, what informational material should be sent to the facility?			✓
10. IF A SWPPP IS REQUIRED, WAS IT AVAILABLE FOR REVEIW? See storm water handout for industrial facilities.			✓

OVERALL EVALUATION/ COMMENTS: _____

RECEIVED BY: [signature] | HAZ MAT SPEC: C. DENISON | BADGE # 52

Agency referred to as indicated on the back of this page.

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Storm Water Clean Water PROTECTION PROGRAM

0001679

HAZARDOUS WASTE/ HAZARDOUS MATERIALS FACILITY STORM WATER COMPLIANCE SURVEY FORM

FACILITY DBA: EMWD (TOLD TRIANGLE #2	TELEPHONE: 951-928-3777	DATE: 9-7-07
ADDRESS: 38888 JACKSON STREET	CITY, ZIP: MURRIETA, 92564	
MAILING ADDRESS (if different from site address)	MAILING CITY, ZIP	
CONTACT: DAVID BIENVENUE	FACILITY#: 84190	SIC CODE: 4941

Compliance Areas	YES	NO	N/A
***OUTSIDE AREAS (Free of staining & debris; provides good housekeeping; maintained in a manner to prevent runoff.)**		**Requires follow up**	
1. CHEMICAL STORAGE * The outside storage area is kept to minimize the possibility of a release. Chemicals / materials are protected from precipitation / storm water runoff and the containers show no signs of leaking.	✓		
2. DUMPSTER * No liquids are leaking from dumpster; surrounding area is free of trash.			✓
3. ABOVEGROUND TANKS * No ground staining, no spillage observed and no discharge to storm drain. Tanks are maintained to minimize the possibility of a release (secondary containment).	✓		
4. ONSITE STORM DRAIN* Protected from accidental discharge other than water.			✓
5. POWER WASH OR STEAM CLEAN* (discharge to sewer) Drains to oil/water separator connected to a sanitary sewer and not a septic system. Steam cleaning not discharged to parking lot, storm drain or soil.			✓
6. PARKING LOT / DRIVE WAY* Free of excess trash, chemical staining or liquids other than water.	✓		
7. OTHER* Non-storm water discharge (i.e. non-hazardous process discharge).			✓
8. MOP WATER TO SANITARY SEWER VIA CLARIFIER. Mop water is not dumped to the soil, parking lot, gutter, or other areas susceptible to storm water drainage.			✓
9. STORM WATER EDUCATIONAL BROCHURES GIVEN TO FACILITY OR POSTERS DISPLAYED FOR EMPLOYEES. If no, what informational material should be sent to the facility?			✓
10. IF A SWPPP IS REQUIRED, WAS IT AVAILABLE FOR REVEIW? See storm water handout for industrial facilities.			✓

OVERALL EVALUATION/ COMMENTS:

RECEIVED BY:	HAZ MAT SPEC: C. DENISON	BADGE # 52

Agency referred to as indicated on the back of this page.

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Storm Water Clean Water PROTECTION PROGRAM

0001680

HAZARDOUS WASTE/ HAZARDOUS MATERIALS FACILITY STORM WATER COMPLIANCE SURVEY FORM

FACILITY DBA: EMWD LAS BRISAS	TELEPHONE: 951-928-3777	DATE: 9-7-07
ADDRESS: 2700 Camino Las Positas	CITY, ZIP: Murrieta 92563	
MAILING ADDRESS (if different from site address)	MAILING CITY, ZIP	
CONTACT: DAVID BIENVENUE	FACILITY#: 85202	SIC CODE: 4941

Compliance Areas	YES	NO	N/A
***OUTSIDE AREAS (Free of staining & debris; provides good housekeeping; maintained in a manner to prevent runoff.)**		**Requires follow up**	
1. CHEMICAL STORAGE * The outside storage area is kept to minimize the possibility of a release. Chemicals / materials are protected from precipitation / storm water runoff and the containers show no signs of leaking.	✓		
2. DUMPSTER * No liquids are leaking from dumpster; surrounding area is free of trash.			✓
3. ABOVEGROUND TANKS * No ground staining, no spillage observed and no discharge to storm drain. Tanks are maintained to minimize the possibility of a release (secondary containment).	✓		
4. ONSITE STORM DRAIN* Protected from accidental discharge other than water.			✓
5. POWER WASH OR STEAM CLEAN* (discharge to sewer) Drains to oil/water separator connected to a sanitary sewer and not a septic system. Steam cleaning not discharged to parking lot, storm drain or soil.			✓
6. PARKING LOT / DRIVE WAY* Free of excess trash, chemical staining or liquids other than water.	✓		
7. OTHER* Non-storm water discharge (i.e. non-hazardous process discharge).			✓
8. MOP WATER TO SANITARY SEWER VIA CLARIFIER. Mop water is not dumped to the soil, parking lot, gutter, or other areas susceptible to storm water drainage.			✓
9. STORM WATER EDUCATIONAL BROCHURES GIVEN TO FACILITY OR POSTERS DISPLAYED FOR EMPLOYEES. If no, what informational material should be sent to the facility?			✓
10. IF A SWPPP IS REQUIRED, WAS IT AVAILABLE FOR REVEIW? See storm water handout for industrial facilities.			✓

OVERALL EVALUATION/ COMMENTS: _____

RECEIVED BY: [signature]	HAZ MAT SPEC: C. DEMISON	BADGE # 52

Agency referred to as indicated on the back of this page.

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StormWater CleanWater PROTECTION PROGRAM

HAZARDOUS WASTE/ HAZARDOUS MATERIALS FACILITY STORM WATER COMPLIANCE SURVEY FORM

FACILITY DBA RCWD Cole Creek Pump Station	TELEPHONE 951-296-6900	DATE 9/26/07
ADDRESS 42533 Tenaja Road, #2	CITY, ZIP Murrieta 92562	
MAILING ADDRESS (if different from site address)	MAILING CITY, ZIP PR0034893	
CONTACT Richard Ottolini	FACILITY# 91449	SIC CODE 4941

Compliance Areas	YES	NO	N/A
***OUTSIDE AREAS (Free of staining & debris; provides good housekeeping; maintained in a manner to prevent runoff.)**		**Requires follow up**	
1. CHEMICAL STORAGE * The outside storage area is kept to minimize the possibility of a release. Chemicals / materials are protected from precipitation / storm water runoff and the containers show no signs of leaking.	✓		
2. DUMPSTER * No liquids are leaking from dumpster; surrounding area is free of trash.	✓		
3. ABOVEGROUND TANKS * No ground staining, no spillage observed and no discharge to storm drain. Tanks are maintained to minimize the possibility of a release (secondary containment).			✓
4. ONSITE STORM DRAIN* Protected from accidental discharge other than water.			✓
5. POWER WASH OR STEAM CLEAN* (discharge to sewer) Drains to oil/water separator connected to a sanitary sewer and not a septic system. Steam cleaning not discharged to parking lot, storm drain or soil.			✓
6. PARKING LOT / DRIVE WAY* Free of excess trash, chemical staining or liquids other than water.	✓		
7. OTHER* Non-storm water discharge (i.e. non-hazardous process discharge).			✓
8. MOP WATER TO SANITARY SEWER VIA CLARIFIER. Mop water is not dumped to the soil, parking lot, gutter, or other areas susceptible to storm water drainage.			✓
9. STORM WATER EDUCATIONAL BROCHURES GIVEN TO FACILITY OR POSTERS DISPLAYED FOR EMPLOYEES. If no, what informational material should be sent to the facility?			✓
10. IF A SWPPP IS REQUIRED, WAS IT AVAILABLE FOR REVEIW? See storm water handout for industrial facilities.			✓

OVERALL EVALUATION/ COMMENTS:

RECEIVED BY: Scott Parker	HAZ MAT SPEC: C. Denison	BADGE # 52

Agency referred to as indicated on the back of this page.

If additional information is required, contact the Storm Water /Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

HAZARDOUS WASTE/ HAZARDOUS MATERIALS FACILITY STORM WATER COMPLIANCE SURVEY FORM

FACILITY DBA RCWD Well #145	TELEPHONE 951-296-6900	DATE 9/26/07
ADDRESS 42150 Guava Street	CITY, ZIP Murrieta 92562	
MAILING ADDRESS (if different from site address)	MAILING CITY, ZIP PR0028443	
CONTACT Richard Ottolini	FACILITY# 82346	SIC CODE 4941

Compliance Areas	YES	NO	N/A
***OUTSIDE AREAS (Free of staining & debris; provides good housekeeping; maintained in a manner to prevent runoff.)**		**Requires follow up**	
1. CHEMICAL STORAGE * The outside storage area is kept to minimize the possibility of a release. Chemicals / materials are protected from precipitation / storm water runoff and the containers show no signs of leaking.	✓		
2. DUMPSTER * No liquids are leaking from dumpster; surrounding area is free of trash.	✓		
3. ABOVEGROUND TANKS * No ground staining, no spillage observed and no discharge to storm drain. Tanks are maintained to minimize the possibility of a release (secondary containment).			✓
4. ONSITE STORM DRAIN* Protected from accidental discharge other than water.			✓
5. POWER WASH OR STEAM CLEAN* (discharge to sewer) Drains to oil/water separator connected to a sanitary sewer and not a septic system. Steam cleaning not discharged to parking lot, storm drain or soil.			✓
6. PARKING LOT / DRIVE WAY* Free of excess trash, chemical staining or liquids other than water.	✓		
7. OTHER* Non-storm water discharge (i.e. non-hazardous process discharge).			✓
8. MOP WATER TO SANITARY SEWER VIA CLARIFIER. Mop water is not dumped to the soil, parking lot, gutter, or other areas susceptible to storm water drainage.			✓
9. STORM WATER EDUCATIONAL BROCHURES GIVEN TO FACILITY OR POSTERS DISPLAYED FOR EMPLOYEES. If no, what informational material should be sent to the facility?			✓
10. IF A SWPPP IS REQUIRED, WAS IT AVAILABLE FOR REVEIW? See storm water handout for industrial facilities.			✓

OVERALL EVALUATION/ COMMENTS: _____

RECEIVED BY: Scott Parker	HAZ MAT SPEC: C. Denison	BADGE # 52

Agency referred to as indicated on the back of this page.

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Storm Water Clean Water PROTECTION PROGRAM

HAZARDOUS WASTE/ HAZARDOUS MATERIALS FACILITY STORM WATER COMPLIANCE SURVEY FORM

FACILITY DBA RCWD Joaquin Pump Station	TELEPHONE 951-296-6900	DATE 9/26/03
ADDRESS 42545 Tenaja Road	CITY, ZIP Murrieta 92562	
MAILING ADDRESS (if different from site address)	MAILING CITY, ZIP PR0029749	
CONTACT Richard Ottolini	FACILITY# ~~84140~~	SIC CODE 4941

Compliance Areas	YES	NO	N/A
***OUTSIDE AREAS (Free of staining & debris; provides good housekeeping; maintained in a manner to prevent runoff.)**		**Requires follow up**	
1. CHEMICAL STORAGE * The outside storage area is kept to minimize the possibility of a release. Chemicals / materials are protected from precipitation / storm water runoff and the containers show no signs of leaking.	✓		
2. DUMPSTER * No liquids are leaking from dumpster; surrounding area is free of trash.	✓		
3. ABOVEGROUND TANKS * No ground staining, no spillage observed and no discharge to storm drain. Tanks are maintained to minimize the possibility of a release (secondary containment).			✓
4. ONSITE STORM DRAIN* Protected from accidental discharge other than water.			✓
5. POWER WASH OR STEAM CLEAN* (discharge to sewer) Drains to oil/water separator connected to a sanitary sewer and not a septic system. Steam cleaning not discharged to parking lot, storm drain or soil.			✓
6. PARKING LOT / DRIVE WAY* Free of excess trash, chemical staining or liquids other than water.	✓		
7. OTHER* Non-storm water discharge (i.e. non-hazardous process discharge).			✓
8. MOP WATER TO SANITARY SEWER VIA CLARIFIER. Mop water is not dumped to the soil, parking lot, gutter, or other areas susceptible to storm water drainage.			✓
9. STORM WATER EDUCATIONAL BROCHURES GIVEN TO FACILITY OR POSTERS DISPLAYED FOR EMPLOYEES. If no, what informational material should be sent to the facility?			✓
10. IF A SWPPP IS REQUIRED, WAS IT AVAILABLE FOR REVEIW? See storm water handout for industrial facilities.			✓

OVERALL EVALUATION/ COMMENTS: _____

RECEIVED BY: Scott Parker	HAZ MAT SPEC: C. Denison	BADGE # 52

Agency referred to as indicated on the back of this page.

If additional information is required, contact the Storm Water /Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

0001684

HAZARDOUS WASTE/ HAZARDOUS MATERIALS FACILITY STORM WATER COMPLIANCE SURVEY FORM

FACILITY DBA RCWD California Oaks Pump Station	TELEPHONE 951-296-6900	DATE 9/26/07
ADDRESS 41135 California Oaks Road	CITY, ZIP Murrieta 92562	
MAILING ADDRESS (if different from site address)	MAILING CITY, ZIP PR0029742	
CONTACT Richard Ottolini	FACILITY# 84133	SIC CODE 4941

Compliance Areas	YES	NO	N/A
***OUTSIDE AREAS (Free of staining & debris; provides good housekeeping; maintained in a manner to prevent runoff.)**		**Requires follow up**	
1. CHEMICAL STORAGE * The outside storage area is kept to minimize the possibility of a release. Chemicals / materials are protected from precipitation / storm water runoff and the containers show no signs of leaking.	✓		
2. DUMPSTER * No liquids are leaking from dumpster; surrounding area is free of trash.	✓		
3. ABOVEGROUND TANKS * No ground staining, no spillage observed and no discharge to storm drain. Tanks are maintained to minimize the possibility of a release (secondary containment).			✓
4. ONSITE STORM DRAIN* Protected from accidental discharge other than water.			✓
5. POWER WASH OR STEAM CLEAN* (discharge to sewer) Drains to oil/water separator connected to a sanitary sewer and not a septic system. Steam cleaning not discharged to parking lot, storm drain or soil.			✓
6. PARKING LOT / DRIVE WAY* Free of excess trash, chemical staining or liquids other than water.	✓		
7. OTHER* Non-storm water discharge (i.e. non-hazardous process discharge).			✓
8. MOP WATER TO SANITARY SEWER VIA CLARIFIER. Mop water is not dumped to the soil, parking lot, gutter, or other areas susceptible to storm water drainage.			✓
9. STORM WATER EDUCATIONAL BROCHURES GIVEN TO FACILITY OR POSTERS DISPLAYED FOR EMPLOYEES. If no, what informational material should be sent to the facility?			✓
10. IF A SWPPP IS REQUIRED, WAS IT AVAILABLE FOR REVEIW? See storm water handout for industrial facilities.			✓

OVERALL EVALUATION/ COMMENTS: _____

RECEIVED BY: Scott Parker	HAZ MAT SPEC: C. Denison	BADGE # 52

Agency referred to as indicated on the back of this page.

If additional information is required, contact the Storm Water /Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water

PROTECTION PROGRAM

0001685

HAZARDOUS WASTE/ HAZARDOUS MATERIALS FACILITY STORM WATER COMPLIANCE SURVEY FORM

FACILITY DBA RCWD Baldaray Pump Station	TELEPHONE 951-296-6900	DATE 9/26/07
ADDRESS 35850 Avenida La Cresta	CITY, ZIP Murrieta 92562	
MAILING ADDRESS (if different from site address)	MAILING CITY, ZIP PR0028439	
CONTACT Richard Ottolini	FACILITY# ~~82341~~	SIC CODE 4941

Compliance Areas	YES	NO	N/A
***OUTSIDE AREAS (Free of staining & debris; provides good housekeeping; maintained in a manner to prevent runoff.)**		**Requires follow up**	
1. CHEMICAL STORAGE * The outside storage area is kept to minimize the possibility of a release. Chemicals / materials are protected from precipitation / storm water runoff and the containers show no signs of leaking.	✓		
2. DUMPSTER * No liquids are leaking from dumpster; surrounding area is free of trash.	✓		
3. ABOVEGROUND TANKS * No ground staining, no spillage observed and no discharge to storm drain. Tanks are maintained to minimize the possibility of a release (secondary containment).			✓
4. ONSITE STORM DRAIN* Protected from accidental discharge other than water.			✓
5. POWER WASH OR STEAM CLEAN* (discharge to sewer) Drains to oil/water separator connected to a sanitary sewer and not a septic system. Steam cleaning not discharged to parking lot, storm drain or soil.			✓
6. PARKING LOT / DRIVE WAY* Free of excess trash, chemical staining or liquids other than water.	✓		
7. OTHER* Non-storm water discharge (i.e. non-hazardous process discharge).			✓
8. MOP WATER TO SANITARY SEWER VIA CLARIFIER. Mop water is not dumped to the soil, parking lot, gutter, or other areas susceptible to storm water drainage.			✓
9. STORM WATER EDUCATIONAL BROCHURES GIVEN TO FACILITY OR POSTERS DISPLAYED FOR EMPLOYEES. If no, what informational material should be sent to the facility?			✓
10. IF A SWPPP IS REQUIRED, WAS IT AVAILABLE FOR REVEIW? See storm water handout for industrial facilities.			✓

OVERALL EVALUATION/ COMMENTS: _____

RECEIVED BY: Scott Parker	HAZ MAT SPEC: C. Denison	BADGE # 52

Agency referred to as indicated on the back of this page.

If additional information is required, contact the Storm Water /Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water
Clean Water
PROTECTION PROGRAM

0001686

HAZARDOUS WASTE/ HAZARDOUS MATERIALS FACILITY STORM WATER COMPLIANCE SURVEY FORM

FACILITY DBA RCWD Avenida Escala Pump Station	TELEPHONE 951-296-6900	DATE 9/26/07
ADDRESS 42011 Avenida Escala	CITY, ZIP Murrieta 92562	
MAILING ADDRESS (if different from site address)	MAILING CITY, ZIP PR0034132	
CONTACT Richard Ottolini	FACILITY# ~~90531~~	SIC CODE 4941

Compliance Areas	YES	NO	N/A
***OUTSIDE AREAS (Free of staining & debris; provides good housekeeping; maintained in a manner to prevent runoff.)**		**Requires follow up**	
1. CHEMICAL STORAGE * The outside storage area is kept to minimize the possibility of a release. Chemicals / materials are protected from precipitation / storm water runoff and the containers show no signs of leaking.	✓		
2. DUMPSTER * No liquids are leaking from dumpster; surrounding area is free of trash.	✓		
3. ABOVEGROUND TANKS * No ground staining, no spillage observed and no discharge to storm drain. Tanks are maintained to minimize the possibility of a release (secondary containment).			✓
4. ONSITE STORM DRAIN* Protected from accidental discharge other than water.			✓
5. POWER WASH OR STEAM CLEAN* (discharge to sewer) Drains to oil/water separator connected to a sanitary sewer and not a septic system. Steam cleaning not discharged to parking lot, storm drain or soil.			✓
6. PARKING LOT / DRIVE WAY* Free of excess trash, chemical staining or liquids other than water.	✓		
7. OTHER* Non-storm water discharge (i.e. non-hazardous process discharge).			✓
8. MOP WATER TO SANITARY SEWER VIA CLARIFIER. Mop water is not dumped to the soil, parking lot, gutter, or other areas susceptible to storm water drainage.			✓
9. STORM WATER EDUCATIONAL BROCHURES GIVEN TO FACILITY OR POSTERS DISPLAYED FOR EMPLOYEES. If no, what informational material should be sent to the facility?			✓
10. IF A SWPPP IS REQUIRED, WAS IT AVAILABLE FOR REVEIW? See storm water handout for industrial facilities.			✓

OVERALL EVALUATION/ COMMENTS:

RECEIVED BY: Scott Parker	HAZ MAT SPEC: C. Denison	BADGE # 52

Agency referred to as indicated on the back of this page.

If additional information is required, contact the Storm Water /Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

StormWater
Clean Water
PROTECTION PROGRAM

HAZARDOUS WASTE/ HAZARDOUS MATERIALS FACILITY STORM WATER COMPLIANCE SURVEY FORM

FACILITY DBA RCWD Avocado Mesa Pump Station	TELEPHONE 951-296-6900	DATE 9/26/07
ADDRESS 19265 Avocado Mesa Road	CITY, ZIP Murrieta 92562	
MAILING ADDRESS (if different from site address)	MAILING CITY, ZIP PR0034133	
CONTACT Richard Ottolini	FACILITY# ~~90532~~	SIC CODE 4941

Compliance Areas	YES	NO	N/A
***OUTSIDE AREAS (Free of staining & debris; provides good housekeeping; maintained in a manner to prevent runoff.)**		**Requires follow up**	
1. CHEMICAL STORAGE * The outside storage area is kept to minimize the possibility of a release. Chemicals / materials are protected from precipitation / storm water runoff and the containers show no signs of leaking.	✓		
2. DUMPSTER * No liquids are leaking from dumpster; surrounding area is free of trash.	✓		
3. ABOVEGROUND TANKS * No ground staining, no spillage observed and no discharge to storm drain. Tanks are maintained to minimize the possibility of a release (secondary containment).			✓
4. ONSITE STORM DRAIN* Protected from accidental discharge other than water.			✓
5. POWER WASH OR STEAM CLEAN* (discharge to sewer) Drains to oil/water separator connected to a sanitary sewer and not a septic system. Steam cleaning not discharged to parking lot, storm drain or soil.			✓
6. PARKING LOT / DRIVE WAY* Free of excess trash, chemical staining or liquids other than water.	✓		
7. OTHER* Non-storm water discharge (i.e. non-hazardous process discharge).			✓
8. MOP WATER TO SANITARY SEWER VIA CLARIFIER. Mop water is not dumped to the soil, parking lot, gutter, or other areas susceptible to storm water drainage.			✓
9. STORM WATER EDUCATIONAL BROCHURES GIVEN TO FACILITY OR POSTERS DISPLAYED FOR EMPLOYEES. If no, what informational material should be sent to the facility?			✓
10. IF A SWPPP IS REQUIRED, WAS IT AVAILABLE FOR REVEIW? See storm water handout for industrial facilities.			✓

OVERALL EVALUATION/ COMMENTS: _____

RECEIVED BY: Scott Parker	HAZ MAT SPEC: C. Denison	BADGE # 52

Agency referred to as indicated on the back of this page.

If additional information is required, contact the Storm Water /Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

StormWater CleanWater PROTECTION PROGRAM

0001688

HAZARDOUS WASTE/ HAZARDOUS MATERIALS FACILITY STORM WATER COMPLIANCE SURVEY FORM

FACILITY DBA J & S Auto Collision, LLC	TELEPHONE 951-304-7433	DATE 9/28/07
ADDRESS 26586 Jefferson Avenue	CITY, ZIP Murrieta 92562	
MAILING ADDRESS (if different from site address)	MAILING CITY, ZIP	
CONTACT William Mudawar	FACILITY# PR0023898	SIC CODE 7699

Compliance Areas	YES	NO	N/A
***OUTSIDE AREAS (Free of staining & debris; provides good housekeeping; maintained in a manner to prevent runoff.)**		**Requires follow up**	
1. CHEMICAL STORAGE * The outside storage area is kept to minimize the possibility of a release. Chemicals / materials are protected from precipitation / storm water runoff and the containers show no signs of leaking.			✓
2. DUMPSTER * No liquids are leaking from dumpster; surrounding area is free of trash.	✓		
3. ABOVEGROUND TANKS * No ground staining, no spillage observed and no discharge to storm drain. Tanks are maintained to minimize the possibility of a release (secondary containment).			✓
4. ONSITE STORM DRAIN* Protected from accidental discharge other than water.	✓		
5. POWER WASH OR STEAM CLEAN* (discharge to sewer) Drains to oil/water separator connected to a sanitary sewer and not a septic system. Steam cleaning not discharged to parking lot, storm drain or soil.			✓
6. PARKING LOT / DRIVE WAY* Free of excess trash, chemical staining or liquids other than water.	✓		
7. OTHER* Non-storm water discharge (i.e. non-hazardous process discharge).			✓
8. MOP WATER TO SANITARY SEWER VIA CLARIFIER. Mop water is not dumped to the soil, parking lot, gutter, or other areas susceptible to storm water drainage.			✓
9. STORM WATER EDUCATIONAL BROCHURES GIVEN TO FACILITY OR POSTERS DISPLAYED FOR EMPLOYEES. If no, what informational material should be sent to the facility?	✓		
10. IF A SWPPP IS REQUIRED, WAS IT AVAILABLE FOR REVEIW? See storm water handout for industrial facilities.			✓

OVERALL EVALUATION/ COMMENTS:

RECEIVED BY: [signature]	HAZ MAT SPEC: C. Denton	BADGE # 52

Agency referred to as indicated on the back of this page.

If additional information is required, contact the Storm Water /Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

0001689

HAZARDOUS WASTE/ HAZARDOUS MATERIALS FACILITY STORM WATER COMPLIANCE SURVEY FORM

FACILITY DBA Express Systems Engineering	TELEPHONE 951-461-1500	DATE 9/28/07
ADDRESS 41357 Date Street	CITY, ZIP Murrieta 92562	
MAILING ADDRESS (if different from site address)	MAILING CITY, ZIP	
CONTACT Bill Oppertshauser	FACILITY# PR 0032908	SIC CODE 3999

Compliance Areas	YES	NO	N/A
***OUTSIDE AREAS (Free of staining & debris; provides good housekeeping; maintained in a manner to prevent runoff.)**		**Requires follow up**	
1. CHEMICAL STORAGE * The outside storage area is kept to minimize the possibility of a release. Chemicals / materials are protected from precipitation / storm water runoff and the containers show no signs of leaking.			✓
2. DUMPSTER * No liquids are leaking from dumpster; surrounding area is free of trash.	✓		
3. ABOVEGROUND TANKS * No ground staining, no spillage observed and no discharge to storm drain. Tanks are maintained to minimize the possibility of a release (secondary containment).			✓
4. ONSITE STORM DRAIN* Protected from accidental discharge other than water.	✓		
5. POWER WASH OR STEAM CLEAN* (discharge to sewer) Drains to oil/water separator connected to a sanitary sewer and not a septic system. Steam cleaning not discharged to parking lot, storm drain or soil.			✓
6. PARKING LOT / DRIVE WAY* Free of excess trash, chemical staining or liquids other than water.	✓		
7. OTHER* Non-storm water discharge (i.e. non-hazardous process discharge).			✓
8. MOP WATER TO SANITARY SEWER VIA CLARIFIER. Mop water is not dumped to the soil, parking lot, gutter, or other areas susceptible to storm water drainage.			✓
9. STORM WATER EDUCATIONAL BROCHURES GIVEN TO FACILITY OR POSTERS DISPLAYED FOR EMPLOYEES. If no, what informational material should be sent to the facility?	✓		
10. IF A SWPPP IS REQUIRED, WAS IT AVAILABLE FOR REVEIW? See storm water handout for industrial facilities.			✓

OVERALL EVALUATION/ COMMENTS:

RECEIVED BY:	HAZ MAT SPEC: C. Denison	BADGE # 52

Agency referred to as indicated on the back of this page.

If additional information is required, contact the Storm Water /Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

HAZARDOUS WASTE/ HAZARDOUS MATERIALS FACILITY STORM WATER COMPLIANCE SURVEY FORM

FACILITY DBA: Verizon / Temecula CO	TELEPHONE: (909) 594-9850	DATE: 9/28/07
ADDRESS: 41611 Reagan Way	CITY, ZIP: Murrieta 92562	
MAILING ADDRESS (if different from site address)	MAILING CITY, ZIP	
CONTACT: Rudy Almazan	FACILITY#: PR0032350	SIC CODE: 4899

Compliance Areas	YES	NO	N/A
***OUTSIDE AREAS (Free of staining & debris; provides good housekeeping; maintained in a manner to prevent runoff.)**		**Requires follow up**	
1. CHEMICAL STORAGE * The outside storage area is kept to minimize the possibility of a release. Chemicals / materials are protected from precipitation / storm water runoff and the containers show no signs of leaking.	✓		
2. DUMPSTER * No liquids are leaking from dumpster; surrounding area is free of trash.	✓		
3. ABOVEGROUND TANKS * No ground staining, no spillage observed and no discharge to storm drain. Tanks are maintained to minimize the possibility of a release (secondary containment).			✓
4. ONSITE STORM DRAIN* Protected from accidental discharge other than water.	✓		
5. POWER WASH OR STEAM CLEAN* (discharge to sewer) Drains to oil/water separator connected to a sanitary sewer and not a septic system. Steam cleaning not discharged to parking lot, storm drain or soil.			✓
6. PARKING LOT / DRIVE WAY* Free of excess trash, chemical staining or liquids other than water.	✓		
7. OTHER* Non-storm water discharge (i.e. non-hazardous process discharge).			✓
8. MOP WATER TO SANITARY SEWER VIA CLARIFIER. Mop water is not dumped to the soil, parking lot, gutter, or other areas susceptible to storm water drainage.			✓
9. STORM WATER EDUCATIONAL BROCHURES GIVEN TO FACILITY OR POSTERS DISPLAYED FOR EMPLOYEES. If no, what informational material should be sent to the facility?			✓
10. IF A SWPPP IS REQUIRED, WAS IT AVAILABLE FOR REVEIW? See storm water handout for industrial facilities.			✓

OVERALL EVALUATION/ COMMENTS: _____

RECEIVED BY: Mary A	HAZ MAT SPEC: C. Denison	BADGE # 52

Agency referred to as indicated on the back of this page.

If additional information is required, contact the Storm Water /Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

HAZARDOUS WASTE/ HAZARDOUS MATERIALS FACILITY STORM WATER COMPLIANCE SURVEY FORM

FACILITY DBA: Sam's Club #4822	TELEPHONE: (951) 696-4500	DATE: 10/10/07
ADDRESS: 40500 Murrieta Hot Sprgs Rd.	CITY, ZIP: Murrieta 92562	
MAILING ADDRESS (if different from site address)	MAILING CITY, ZIP	
CONTACT: Lewis Price	FACILITY#: PR0026701	SIC CODE: 5541

Compliance Areas	YES	NO	N/A
***OUTSIDE AREAS (Free of staining & debris; provides good housekeeping; maintained in a manner to prevent runoff.)**		**Requires follow up**	
1. CHEMICAL STORAGE * The outside storage area is kept to minimize the possibility of a release. Chemicals / materials are protected from precipitation / storm water runoff and the containers show no signs of leaking.	✓		
2. DUMPSTER * No liquids are leaking from dumpster; surrounding area is free of trash.	✓		
3. ABOVEGROUND TANKS * No ground staining, no spillage observed and no discharge to storm drain. Tanks are maintained to minimize the possibility of a release (secondary containment).			✓
4. ONSITE STORM DRAIN* Protected from accidental discharge other than water.	✓		
5. POWER WASH OR STEAM CLEAN* (discharge to sewer) Drains to oil/water separator connected to a sanitary sewer and not a septic system. Steam cleaning not discharged to parking lot, storm drain or soil.			✓
6. PARKING LOT / DRIVE WAY* Free of excess trash, chemical staining or liquids other than water.	✓		
7. OTHER* Non-storm water discharge (i.e. non-hazardous process discharge).			✓
8. MOP WATER TO SANITARY SEWER VIA CLARIFIER. Mop water is not dumped to the soil, parking lot, gutter, or other areas susceptible to storm water drainage.			✓
9. STORM WATER EDUCATIONAL BROCHURES GIVEN TO FACILITY OR POSTERS DISPLAYED FOR EMPLOYEES. If no, what informational material should be sent to the facility?			✓
10. IF A SWPPP IS REQUIRED, WAS IT AVAILABLE FOR REVEIW? See storm water handout for industrial facilities.			✓

OVERALL EVALUATION/ COMMENTS: _____

RECEIVED BY: Lewis E Price	HAZ MAT SPEC: C. Denison	BADGE # 52

Agency referred to as indicated on the back of this page.

If additional information is required, contact the Storm Water /Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

CITY OF MURRIETA
OCT 15 2007
RECEIVED
HAZ MAT PROGRAM

Storm Water
Clean Water
PROTECTION PROGRAM

HAZARDOUS WASTE/ HAZARDOUS MATERIALS FACILITY STORM WATER COMPLIANCE SURVEY FORM

FACILITY DBA Conoco Phillips 76	TELEPHONE	DATE 11/2/07
ADDRESS 39460 Murrieta Hot Springs Rd.	CITY, ZIP Murrieta 92562	
MAILING ADDRESS (if different from site address)	MAILING CITY, ZIP	
CONTACT	FACILITY#	SIC CODE 5541

Compliance Areas	YES	NO	N/A
***OUTSIDE AREAS (Free of staining & debris; provides good housekeeping; maintained in a manner to prevent runoff.)**		**Requires follow up**	
1. CHEMICAL STORAGE * The outside storage area is kept to minimize the possibility of a release. Chemicals / materials are protected from precipitation / storm water runoff and the containers show no signs of leaking.	✓		
2. DUMPSTER * No liquids are leaking from dumpster; surrounding area is free of trash.	✓		
3. ABOVEGROUND TANKS * No ground staining, no spillage observed and no discharge to storm drain. Tanks are maintained to minimize the possibility of a release (secondary containment).			✓
4. ONSITE STORM DRAIN* Protected from accidental discharge other than water.	✓		
5. POWER WASH OR STEAM CLEAN* (discharge to sewer) Drains to oil/water separator connected to a sanitary sewer and not a septic system. Steam cleaning not discharged to parking lot, storm drain or soil.	✓		
6. PARKING LOT / DRIVE WAY* Free of excess trash, chemical staining or liquids other than water.	✓		
7. OTHER* Non-storm water discharge (i.e. non-hazardous process discharge).			✓
8. MOP WATER TO SANITARY SEWER VIA CLARIFIER. Mop water is not dumped to the soil, parking lot, gutter, or other areas susceptible to storm water drainage.	✓		
9. STORM WATER EDUCATIONAL BROCHURES GIVEN TO FACILITY OR POSTERS DISPLAYED FOR EMPLOYEES. If no, what informational material should be sent to the facility?	✓		
10. IF A SWPPP IS REQUIRED, WAS IT AVAILABLE FOR REVEIW? See storm water handout for industrial facilities.			✓

OVERALL EVALUATION/ COMMENTS: _____

RECEIVED BY: Mailed to owner	HAZ MAT SPEC: Sfluce	BADGE #
Agency referred to as indicated on the back of this page.		

If additional information is required, contact the Storm Water /Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

0001693

HAZARDOUS WASTE/ HAZARDOUS MATERIALS FACILITY STORM WATER COMPLIANCE SURVEY FORM

FACILITY DBA: 7 Eleven Gas station	TELEPHONE: (951)	DATE: 11/14/07
ADDRESS: 41260 Murrieta Hot Springs Rd	CITY, ZIP: Murrieta CA 92562	
MAILING ADDRESS (if different from site address)	MAILING CITY, ZIP	
CONTACT: Dave Hendricks	PARCEL: 926665	SIC CODE: 5541

Compliance Areas	YES	NO	N/A
***OUTSIDE AREAS (Free of staining & debris; provides good housekeeping; maintained in a manner to prevent runoff.)**		**Requires follow up**	
1. CHEMICAL STORAGE * The outside storage area is kept to minimize the possibility of a release. Chemicals / materials are protected from precipitation / storm water runoff and the containers show no signs of leaking.	✓		
2. DUMPSTER * No liquids are leaking from dumpster; surrounding area is free of trash.	✓		
3. ABOVEGROUND TANKS * No ground staining, no spillage observed and no discharge to storm drain. Tanks are maintained to minimize the possibility of a release (secondary containment).			✓
4. ONSITE STORM DRAIN* Protected from accidental discharge other than water.	✓		
5. POWER WASH OR STEAM CLEAN* (discharge to sewer) Drains to oil/water separator connected to a sanitary sewer and not a septic system. Steam cleaning not discharged to parking lot, storm drain or soil.	✓		
6. PARKING LOT / DRIVE WAY* Free of excess trash, chemical staining or liquids other than water.	✓		
7. OTHER* Non-storm water discharge (i.e. non-hazardous process discharge).			✓
8. MOP WATER TO SANITARY SEWER VIA CLARIFIER. Mop water is not dumped to the soil, parking lot, gutter, or other areas susceptible to storm water drainage.	✓		
9. STORM WATER EDUCATIONAL BROCHURES GIVEN TO FACILITY OR POSTERS DISPLAYED FOR EMPLOYEES. If no, what informational material should be sent to the facility?	✓		
10. IF A SWPPP IS REQUIRED, WAS IT AVAILABLE FOR REVEIW? See storm water handout for industrial facilities.	✓		

OVERALL EVALUATION/ COMMENTS:

No Violations Noted.

CITY OF MURRIETA
DEC 14 2007
RECEIVED
ENGINEERING DEPT.

RECEIVED BY: [signature] HAZ MAT SPEC: M Vargas BADGE #

Agency referred to as indicated on the back of this page.

If additional information is required, contact the Storm Water /Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

0001694

HAZARDOUS WASTE/ HAZARDOUS MATERIALS FACILITY STORM WATER COMPLIANCE SURVEY FORM

FACILITY DBA: Ralph's	TELEPHONE	DATE: 4/15/07
ADDRESS: 23801 Washington Ave.	CITY, ZIP: Murrieta 92562	
MAILING ADDRESS (if different from site address): —	MAILING CITY, ZIP: —	
CONTACT: Danielle Sparks	FACILITY#: PR0026685	SIC CODE: 5541

Compliance Areas	YES	NO	N/A
***OUTSIDE AREAS (Free of staining & debris; provides good housekeeping; maintained in a manner to prevent runoff.)**		**Requires follow up**	
1. CHEMICAL STORAGE * The outside storage area is kept to minimize the possibility of a release. Chemicals / materials are protected from precipitation / storm water runoff and the containers show no signs of leaking.	✓		
2. DUMPSTER * No liquids are leaking from dumpster; surrounding area is free of trash.	✓		
3. ABOVEGROUND TANKS * No ground staining, no spillage observed and no discharge to storm drain. Tanks are maintained to minimize the possibility of a release (secondary containment).			✓
4. ONSITE STORM DRAIN* Protected from accidental discharge other than water.			✓
5. POWER WASH OR STEAM CLEAN* (discharge to sewer) Drains to oil/water separator connected to a sanitary sewer and not a septic system. Steam cleaning not discharged to parking lot, storm drain or soil.			✓
6. PARKING LOT / DRIVE WAY* Free of excess trash, chemical staining or liquids other than water.	✓		
7. OTHER* Non-storm water discharge (i.e. non-hazardous process discharge).			✓
8. MOP WATER TO SANITARY SEWER VIA CLARIFIER. Mop water is not dumped to the soil, parking lot, gutter, or other areas susceptible to storm water drainage.			✓
9. STORM WATER EDUCATIONAL BROCHURES GIVEN TO FACILITY OR POSTERS DISPLAYED FOR EMPLOYEES. If no, what informational material should be sent to the facility?	✓		
10. IF A SWPPP IS REQUIRED, WAS IT AVAILABLE FOR REVEIW? See storm water handout for industrial facilities.			✓

OVERALL EVALUATION/ COMMENTS:

CITY OF MURRIETA
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RECEIVED BY:	HAZ MAT SPEC: M. Daly	BADGE # 30

Agency referred to as indicated on the back of this page.

If additional information is required, contact the Storm Water /Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

HAZARDOUS WASTE/ HAZARDOUS MATERIALS FACILITY STORM WATER COMPLIANCE SURVEY FORM

FACILITY DBA Excaliber Fuels #5	TELEPHONE	DATE 11/27/07
ADDRESS 40648 California Oaks Rd.	CITY, ZIP Murrieta 92562	
MAILING ADDRESS (if different from site address) 8221 Garden Grove Blvd	MAILING CITY, ZIP Garden Grove, 92844	
CONTACT	FACILITY# 84405 PR0025974	SIC CODE 5541

Compliance Areas	YES	NO	N/A
***OUTSIDE AREAS (Free of staining & debris; provides good housekeeping; maintained in a manner to prevent runoff.)**		**Requires follow up**	
1. CHEMICAL STORAGE * The outside storage area is kept to minimize the possibility of a release. Chemicals / materials are protected from precipitation / storm water runoff and the containers show no signs of leaking.	✓		
2. DUMPSTER * No liquids are leaking from dumpster; surrounding area is free of trash.	✓		
3. ABOVEGROUND TANKS * No ground staining, no spillage observed and no discharge to storm drain. Tanks are maintained to minimize the possibility of a release (secondary containment).			✓
4. ONSITE STORM DRAIN* Protected from accidental discharge other than water.			✓
5. POWER WASH OR STEAM CLEAN* (discharge to sewer) Drains to oil/water separator connected to a sanitary sewer and not a septic system. Steam cleaning not discharged to parking lot, storm drain or soil.	✓		
6. PARKING LOT / DRIVE WAY* Free of excess trash, chemical staining or liquids other than water.	✓		
7. OTHER* Non-storm water discharge (i.e. non-hazardous process discharge).			✓
8. MOP WATER TO SANITARY SEWER VIA CLARIFIER. Mop water is not dumped to the soil, parking lot, gutter, or other areas susceptible to storm water drainage.	✓		
9. STORM WATER EDUCATIONAL BROCHURES GIVEN TO FACILITY OR POSTERS DISPLAYED FOR EMPLOYEES. If no, what informational material should be sent to the facility?			✓
10. IF A SWPPP IS REQUIRED, WAS IT AVAILABLE FOR REVEIW? See storm water handout for industrial facilities.			✓

OVERALL EVALUATION/ COMMENTS:

CITY OF MURRIETA

DEC 1 2007

RECEIVED BY: Alfredo H.	HAZ MAT SPEC: Nicholas Crain	BADGE #

Agency referred to as indicated on the back of this page.

If additional information is required, contact the Storm Water /Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

HAZARDOUS WASTE/ HAZARDOUS MATERIALS FACILITY STORM WATER COMPLIANCE SURVEY FORM

FACILITY DBA Chevron Stations Inc. #1484/ 201241	TELEPHONE (951)	DATE 01/09/08
ADDRESS 40500 California Oaks Rd.	CITY, ZIP Murrieta 92562	
MAILING ADDRESS (if different from site address)	MAILING CITY, ZIP	
CONTACT Charles	FACILITY# 81854 PR0025165	SIC CODE 5541

Compliance Areas	YES	NO	N/A
***OUTSIDE AREAS (Free of staining & debris; provides good housekeeping; maintained in a manner to prevent runoff.)**		**Requires follow up**	
1. CHEMICAL STORAGE * The outside storage area is kept to minimize the possibility of a release. Chemicals / materials are protected from precipitation / storm water runoff and the containers show no signs of leaking.	✓		
2. DUMPSTER * No liquids are leaking from dumpster; surrounding area is free of trash.	✓		
3. ABOVEGROUND TANKS * No ground staining, no spillage observed and no discharge to storm drain. Tanks are maintained to minimize the possibility of a release (secondary containment).			✓
4. ONSITE STORM DRAIN* Protected from accidental discharge other than water.	✓	✓	
5. POWER WASH OR STEAM CLEAN* (discharge to sewer) Drains to oil/water separator connected to a sanitary sewer and not a septic system. Steam cleaning not discharged to parking lot, storm drain or soil.	✓		
6. PARKING LOT / DRIVE WAY* Free of excess trash, chemical staining or liquids other than water.	✓		
7. OTHER* Non-storm water discharge (i.e. non-hazardous process discharge).			✓
8. MOP WATER TO SANITARY SEWER VIA CLARIFIER. Mop water is not dumped to the soil, parking lot, gutter, or other areas susceptible to storm water drainage.	✓		
9. STORM WATER EDUCATIONAL BROCHURES GIVEN TO FACILITY OR POSTERS DISPLAYED FOR EMPLOYEES. If no, what informational material should be sent to the facility?	✓		
10. IF A SWPPP IS REQUIRED, WAS IT AVAILABLE FOR REVEIW? See storm water handout for industrial facilities.			✓

OVERALL EVALUATION/ COMMENTS: Facility is a gasoline service station with a car wash. Drainage onsite and from dispensers runs to onsite storm drain. Facility has procedures in place to protect accidental discharge.

RECEIVED BY:	HAZ MAT SPEC: Nicholas Crain	BADGE #
Agency referred to as indicated on the back of this page.		

If additional information is required, contact the Storm Water /Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

StormWater Clean Water PROTECTION PROGRAM

0001697

2

HAZARDOUS WASTE/ HAZARDOUS MATERIALS FACILITY STORM WATER COMPLIANCE SURVEY FORM

FACILITY DBA Chevron # 209519	TELEPHONE (951) 461-8688	DATE 01/09/08
ADDRESS 24625 Madison Ave	CITY, ZIP Murrieta 92562	
MAILING ADDRESS (if different from site address)	MAILING CITY, ZIP	
CONTACT Richard Williams	FACILITY# 86034 PR0026180	SIC CODE 5541

Compliance Areas	YES	NO	N/A
***OUTSIDE AREAS (Free of staining & debris; provides good housekeeping; maintained in a manner to prevent runoff.)**		**Requires follow up**	
1. CHEMICAL STORAGE * The outside storage area is kept to minimize the possibility of a release. Chemicals / materials are protected from precipitation / storm water runoff and the containers show no signs of leaking.	✓		
2. DUMPSTER * No liquids are leaking from dumpster; surrounding area is free of trash.	✓		
3. ABOVEGROUND TANKS * No ground staining, no spillage observed and no discharge to storm drain. Tanks are maintained to minimize the possibility of a release (secondary containment).			✓
4. ONSITE STORM DRAIN* Protected from accidental discharge other than water.	✓		
5. POWER WASH OR STEAM CLEAN* (discharge to sewer) Drains to oil/water separator connected to a sanitary sewer and not a septic system. Steam cleaning not discharged to parking lot, storm drain or soil.	✓		
6. PARKING LOT / DRIVE WAY* Free of excess trash, chemical staining or liquids other than water.	✓		
7. OTHER* Non-storm water discharge (i.e. non-hazardous process discharge).			✓
8. MOP WATER TO SANITARY SEWER VIA CLARIFIER. Mop water is not dumped to the soil, parking lot, gutter, or other areas susceptible to storm water drainage.	✓		
9. STORM WATER EDUCATIONAL BROCHURES GIVEN TO FACILITY OR POSTERS DISPLAYED FOR EMPLOYEES. If no, what informational material should be sent to the facility?	✓		NO
10. IF A SWPPP IS REQUIRED, WAS IT AVAILABLE FOR REVEIW? See storm water handout for industrial facilities.			✓

OVERALL EVALUATION/ COMMENTS: Facility is a gasoline service station. Two onsite storm drains exist and onsite drainage flows directly to them. Store has written protocol on what to do in the event of a release.

RECEIVED BY: [signature]	HAZ MAT SPEC: Nicholas Crain	BADGE #

Agency referred to as indicated on the back of this page.

If additional information is required, contact the Storm Water /Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

0001698 3

HAZARDOUS WASTE/ HAZARDOUS MATERIALS FACILITY STORM WATER COMPLIANCE SURVEY FORM

FACILITY DBA: Shell / Tesoro	TELEPHONE: 951-600-1031	DATE: 1/10/08
ADDRESS: 25336 Madison Ave	CITY, ZIP: Murrieta	
MAILING ADDRESS (if different from site address)	MAILING CITY, ZIP	
CONTACT	FACILITY#: 86487	SIC CODE: 5541

Compliance Areas	YES	NO	N/A
***OUTSIDE AREAS (Free of staining & debris; provides good housekeeping; maintained in a manner to prevent runoff.)**		**Requires follow up**	
1. CHEMICAL STORAGE * The outside storage area is kept to minimize the possibility of a release. Chemicals / materials are protected from precipitation / storm water runoff and the containers show no signs of leaking.	NOTIE		
2. DUMPSTER * No liquids are leaking from dumpster; surrounding area is free of trash.	✓		
3. ABOVEGROUND TANKS * No ground staining, no spillage observed and no discharge to storm drain. Tanks are maintained to minimize the possibility of a release (secondary containment).			✓
4. ONSITE STORM DRAIN* Protected from accidental discharge other than water.			✓
5. POWER WASH OR STEAM CLEAN* (discharge to sewer) Drains to oil/water separator connected to a sanitary sewer and not a septic system. Steam cleaning not discharged to parking lot, storm drain or soil.			✓
6. PARKING LOT / DRIVE WAY* Free of excess trash, chemical staining or liquids other than water.	✓		
7. OTHER* Non-storm water discharge (i.e. non-hazardous process discharge).			✓
8. MOP WATER TO SANITARY SEWER VIA CLARIFIER. Mop water is not dumped to the soil, parking lot, gutter, or other areas susceptible to storm water drainage.			✓
9. STORM WATER EDUCATIONAL BROCHURES GIVEN TO FACILITY OR POSTERS DISPLAYED FOR EMPLOYEES. If no, what informational material should be sent to the facility?	✓		
10. IF A SWPPP IS REQUIRED, WAS IT AVAILABLE FOR REVEIW? See storm water handout for industrial facilities.			✓

OVERALL EVALUATION/ COMMENTS:

Note: Drum in dumpster area for absorbent from spills at gas station. Lid is tight and drum labeled.

RECEIVED BY: Ulmi Langat	HAZ MAT SPEC: Brown	BADGE # 41

Agency referred to as indicated on the back of this page.

If additional information is required, contact the Storm Water /Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

HAZARDOUS WASTE/ HAZARDOUS MATERIALS FACILITY STORM WATER COMPLIANCE SURVEY FORM

FACILITY DBA Conoco Phillip / Kaup Oil	TELEPHONE	DATE Jan 7. 08
ADDRESS 41010 California Oaks Road	CITY, ZIP Murrieta, CA, 92562	
MAILING ADDRESS (if different from site address) 600 N Dairy Ashford	MAILING CITY, ZIP Houston, TX, 97079	
CONTACT Gary Jaiman	FACILITY# FA0022378	SIC CODE 5541

Compliance Areas	YES	NO	N/A
***OUTSIDE AREAS (Free of staining & debris; provides good housekeeping; maintained in a manner to prevent runoff.)**		**Requires follow up**	
1. CHEMICAL STORAGE * The outside storage area is kept to minimize the possibility of a release. Chemicals / materials are protected from precipitation / storm water runoff and the containers show no signs of leaking.	✓		
2. DUMPSTER * No liquids are leaking from dumpster; surrounding area is free of trash.	✓		
3. ABOVEGROUND TANKS * No ground staining, no spillage observed and no discharge to storm drain. Tanks are maintained to minimize the possibility of a release (secondary containment).	✓		
4. ONSITE STORM DRAIN* Protected from accidental discharge other than water.	✓		
5. POWER WASH OR STEAM CLEAN* (discharge to sewer) Drains to oil/water separator connected to a sanitary sewer and not a septic system. Steam cleaning not discharged to parking lot, storm drain or soil.	✓		
6. PARKING LOT / DRIVE WAY* Free of excess trash, chemical staining or liquids other than water.	✓		
7. OTHER* Non-storm water discharge (i.e. non-hazardous process discharge).			✓
8. MOP WATER TO SANITARY SEWER VIA CLARIFIER. Mop water is not dumped to the soil, parking lot, gutter, or other areas susceptible to storm water drainage.	✓		
9. STORM WATER EDUCATIONAL BROCHURES GIVEN TO FACILITY OR POSTERS DISPLAYED FOR EMPLOYEES. If no, what informational material should be sent to the facility?	✓		
10. IF A SWPPP IS REQUIRED, WAS IT AVAILABLE FOR REVEIW? See storm water handout for industrial facilities.	✓		

OVERALL EVALUATION/ COMMENTS: No violation noted

RECEIVED BY: [signature]	HAZ MAT SPEC: M. Vargas	BADGE #

Agency referred to as indicated on the back of this page.

If additional information is required, contact the Storm Water /Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

HAZARDOUS WASTE/ HAZARDOUS MATERIALS FACILITY STORM WATER COMPLIANCE SURVEY FORM

FACILITY DBA: TESORO SHELL	TELEPHONE: 951-	DATE: 1.16.08
ADDRESS: 39614 LOS ALAMOS RD	CITY, ZIP: Murrietta 92563	
MAILING ADDRESS (if different from site address)	MAILING CITY, ZIP	
CONTACT: ANGELIE HAYES / JUSTIN SCOTT	FACILITY#: PR0021292	SIC CODE: 5541

Compliance Areas	YES	NO	N/A
***OUTSIDE AREAS (Free of staining & debris; provides good housekeeping; maintained in a manner to prevent runoff.)**		**Requires follow up**	
1. CHEMICAL STORAGE * The outside storage area is kept to minimize the possibility of a release. Chemicals / materials are protected from precipitation / storm water runoff and the containers show no signs of leaking.	✓		
2. DUMPSTER * No liquids are leaking from dumpster; surrounding area is free of trash.	✓		
3. ABOVEGROUND TANKS * No ground staining, no spillage observed and no discharge to storm drain. Tanks are maintained to minimize the possibility of a release (secondary containment).			✓
4. ONSITE STORM DRAIN* Protected from accidental discharge other than water.	✓		
5. POWER WASH OR STEAM CLEAN* (discharge to sewer) Drains to oil/water separator connected to a sanitary sewer and not a septic system. Steam cleaning not discharged to parking lot, storm drain or soil.	✓		
6. PARKING LOT / DRIVE WAY* Free of excess trash, chemical staining or liquids other than water.	✓		
7. OTHER* Non-storm water discharge (i.e. non-hazardous process discharge).	✓		
8. MOP WATER TO SANITARY SEWER VIA CLARIFIER. Mop water is not dumped to the soil, parking lot, gutter, or other areas susceptible to storm water drainage.	✓		
9. STORM WATER EDUCATIONAL BROCHURES GIVEN TO FACILITY OR POSTERS DISPLAYED FOR EMPLOYEES. If no, what informational material should be sent to the facility?			✓
10. IF A SWPPP IS REQUIRED, WAS IT AVAILABLE FOR REVEIW? See storm water handout for industrial facilities.			✓

OVERALL EVALUATION/ COMMENTS: NO VIOLATIONS

RECEIVED BY: [signature]	HAZ MAT SPEC: JEFF BUSTAMANTE	BADGE #

Agency referred to as indicated on the back of this page.

If additional information is required, contact the Storm Water /Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

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0001701

HAZARDOUS WASTE/ HAZARDOUS MATERIALS FACILITY STORM WATER COMPLIANCE SURVEY FORM

FACILITY DBA: Murrieta Valley USD - Transportation	TELEPHONE: (951) 696-1600	DATE: 6/2/08
ADDRESS: 41870 McAlby CT	CITY, ZIP: Murrieta CA 92562	
MAILING ADDRESS (if different from site address)	MAILING CITY, ZIP	
CONTACT: Rick Bauer	FACILITY#: PR0026674	SIC CODE: 5541

Compliance Areas	YES	NO	N/A
***OUTSIDE AREAS (Free of staining & debris; provides good housekeeping; maintained in a manner to prevent runoff.)**		**Requires follow up**	
1. CHEMICAL STORAGE * The outside storage area is kept to minimize the possibility of a release. Chemicals / materials are protected from precipitation / storm water runoff and the containers show no signs of leaking.	✓		
2. DUMPSTER * No liquids are leaking from dumpster; surrounding area is free of trash.	✓		
3. ABOVEGROUND TANKS * No ground staining, no spillage observed and no discharge to storm drain. Tanks are maintained to minimize the possibility of a release (secondary containment).	✓		
4. ONSITE STORM DRAIN* Protected from accidental discharge other than water.	✓		
5. POWER WASH OR STEAM CLEAN* (discharge to sewer) Drains to oil/water separator connected to a sanitary sewer and not a septic system. Steam cleaning not discharged to parking lot, storm drain or soil.	✓		
6. PARKING LOT / DRIVE WAY* Free of excess trash, chemical staining or liquids other than water.	✓		
7. OTHER* Non-storm water discharge (i.e. non-hazardous process discharge).			✓
8. MOP WATER TO SANITARY SEWER VIA CLARIFIER. Mop water is not dumped to the soil, parking lot, gutter, or other areas susceptible to storm water drainage.	✓		
9. STORM WATER EDUCATIONAL BROCHURES GIVEN TO FACILITY OR POSTERS DISPLAYED FOR EMPLOYEES. If no, what informational material should be sent to the facility?	✓		
10. IF A SWPPP IS REQUIRED, WAS IT AVAILABLE FOR REVEIW? See storm water handout for industrial facilities.	✓		

OVERALL EVALUATION/ COMMENTS: No Violations noted

RECEIVED BY: [signature]	HAZ MAT SPEC: M. Vargas	BADGE #

Agency referred to as indicated on the back of this page.

If additional information is required, contact the Storm Water /Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

StormWater Clean Water PROTECTION PROGRAM

CITY OF MURRIETA
JUN 23 2008
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HAZARDOUS WASTE/ HAZARDOUS MATERIALS FACILITY STORM WATER COMPLIANCE SURVEY FORM

FACILITY DBA: Verizon Murrieta	TELEPHONE: (951) 677-0000	DATE: 6/4/08
ADDRESS: 24961 Washington Ave	CITY, ZIP: Murrieta 92362	
MAILING ADDRESS (if different from site address)	MAILING CITY, ZIP	
CONTACT: Jimmy Kennedy	FACILITY#: PR0025254	SIC CODE: 4899

Compliance Areas	YES	NO	N/A
***OUTSIDE AREAS (Free of staining & debris; provides good housekeeping; maintained in a manner to prevent runoff.)**		**Requires follow up**	
1. CHEMICAL STORAGE * The outside storage area is kept to minimize the possibility of a release. Chemicals / materials are protected from precipitation / storm water runoff and the containers show no signs of leaking.	✓		
2. DUMPSTER * No liquids are leaking from dumpster; surrounding area is free of trash.	✓		
3. ABOVEGROUND TANKS * No ground staining, no spillage observed and no discharge to storm drain. Tanks are maintained to minimize the possibility of a release (secondary containment).			✓
4. ONSITE STORM DRAIN* Protected from accidental discharge other than water.	✓		
5. POWER WASH OR STEAM CLEAN* (discharge to sewer) Drains to oil/water separator connected to a sanitary sewer and not a septic system. Steam cleaning not discharged to parking lot, storm drain or soil.	✓		
6. PARKING LOT / DRIVE WAY* Free of excess trash, chemical staining or liquids other than water.			✓
7. OTHER* Non-storm water discharge (i.e. non-hazardous process discharge).			✓
8. MOP WATER TO SANITARY SEWER VIA CLARIFIER. Mop water is not dumped to the soil, parking lot, gutter, or other areas susceptible to storm water drainage.	✓		
9. STORM WATER EDUCATIONAL BROCHURES GIVEN TO FACILITY OR POSTERS DISPLAYED FOR EMPLOYEES. If no, what informational material should be sent to the facility?	✓		
10. IF A SWPPP IS REQUIRED, WAS IT AVAILABLE FOR REVEIW? See storm water handout for industrial facilities.			✓

OVERALL EVALUATION/ COMMENTS: No Violations Noted.

RECEIVED BY: Jimmy Kennedy	HAZ MAT SPEC: M. Vargas	BADGE #

Agency referred to as indicated on the back of this page.

If additional information is required, contact the Storm Water /Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

StormWater CleanWater PROTECTION PROGRAM

CITY OF MURRIETA
JUN 23 2008

0001703

8

HAZARDOUS WASTE/ HAZARDOUS MATERIALS FACILITY STORM WATER COMPLIANCE SURVEY FORM

FACILITY DBA CHEVRON #210409	TELEPHONE (951) 461-4178	DATE 6/4/08
ADDRESS 39740 MURRIETA HOT SPRINGS Rd	CITY, ZIP MUR - 92563	
MAILING ADDRESS (if different from site address) —	MAILING CITY, ZIP —	
CONTACT SOMI RATNAYAKE	FACILITY# 90456	SIC CODE 5541

Compliance Areas	YES	NO	N/A
***OUTSIDE AREAS (Free of staining & debris; provides good housekeeping; maintained in a manner to prevent runoff.)**		**Requires follow up**	
1. CHEMICAL STORAGE * The outside storage area is kept to minimize the possibility of a release. Chemicals / materials are protected from precipitation / storm water runoff and the containers show no signs of leaking.	✓		
2. DUMPSTER * No liquids are leaking from dumpster; surrounding area is free of trash.	✓		
3. ABOVEGROUND TANKS * No ground staining, no spillage observed and no discharge to storm drain. Tanks are maintained to minimize the possibility of a release (secondary containment).			✓
4. ONSITE STORM DRAIN* Protected from accidental discharge other than water.			✓
5. POWER WASH OR STEAM CLEAN* (discharge to sewer) Drains to oil/water separator connected to a sanitary sewer and not a septic system. Steam cleaning not discharged to parking lot, storm drain or soil.			✓
6. PARKING LOT / DRIVE WAY* Free of excess trash, chemical staining or liquids other than water.	✓		
7. OTHER* Non-storm water discharge (i.e. non-hazardous process discharge).			✓
8. MOP WATER TO SANITARY SEWER VIA CLARIFIER. Mop water is not dumped to the soil, parking lot, gutter, or other areas susceptible to storm water drainage.	✓		
9. STORM WATER EDUCATIONAL BROCHURES GIVEN TO FACILITY OR POSTERS DISPLAYED FOR EMPLOYEES. If no, what informational material should be sent to the facility?	✓		
10. IF A SWPPP IS REQUIRED, WAS IT AVAILABLE FOR REVEIW? See storm water handout for industrial facilities.			✓

OVERALL EVALUATION/ COMMENTS: Facility is on sewer.

RECEIVED BY: x [signature]	HAZ MAT SPEC: Mike Daly	BADGE # 30
Agency referred to as indicated on the back of this page.		

If additional information is required, contact the Storm Water /Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

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Storm Water Clean Water PROTECTION PROGRAM

HAZARDOUS WASTE/ HAZARDOUS MATERIALS FACILITY STORM WATER COMPLIANCE SURVEY FORM

FACILITY DBA: Mobil Oil	TELEPHONE: (951) 698-4004	DATE: 6/10/08
ADDRESS: 39850 Los Alamos Rd.	CITY, ZIP: ~~Temec~~ Murrieta CA 92562	
MAILING ADDRESS (if different from site address)	MAILING CITY, ZIP	
CONTACT: Cathy Verria	FACILITY#: FR0020202	SIC CODE: 5541

Compliance Areas	YES	NO	N/A
***OUTSIDE AREAS (Free of staining & debris; provides good housekeeping; maintained in a manner to prevent runoff.)**		**Requires follow up**	
1. CHEMICAL STORAGE * The outside storage area is kept to minimize the possibility of a release. Chemicals / materials are protected from precipitation / storm water runoff and the containers show no signs of leaking.	✓		
2. DUMPSTER * No liquids are leaking from dumpster; surrounding area is free of trash.	✓		
3. ABOVEGROUND TANKS * No ground staining, no spillage observed and no discharge to storm drain. Tanks are maintained to minimize the possibility of a release (secondary containment).			✓
4. ONSITE STORM DRAIN* Protected from accidental discharge other than water.	✓		
5. POWER WASH OR STEAM CLEAN* (discharge to sewer) Drains to oil/water separator connected to a sanitary sewer and not a septic system. Steam cleaning not discharged to parking lot, storm drain or soil.	✓		
6. PARKING LOT / DRIVE WAY* Free of excess trash, chemical staining or liquids other than water.	✓		
7. OTHER* Non-storm water discharge (i.e. non-hazardous process discharge).			✓
8. MOP WATER TO SANITARY SEWER VIA CLARIFIER. Mop water is not dumped to the soil, parking lot, gutter, or other areas susceptible to storm water drainage.	✓		
9. STORM WATER EDUCATIONAL BROCHURES GIVEN TO FACILITY OR POSTERS DISPLAYED FOR EMPLOYEES. If no, what informational material should be sent to the facility?	✓		
10. IF A SWPPP IS REQUIRED, WAS IT AVAILABLE FOR REVEIW? See storm water handout for industrial facilities.			✓

OVERALL EVALUATION/ COMMENTS: No Violations Noted.

RECEIVED BY: C. Verria	HAZ MAT SPEC: M. Vargas	BADGE # 51

Agency referred to as indicated on the back of this page.

If additional information is required, contact the Storm Water /Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

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0001705 10

HAZARDOUS WASTE/ HAZARDOUS MATERIALS FACILITY STORM WATER COMPLIANCE SURVEY FORM

FACILITY DBA: Cal Oaks Shell	TELEPHONE: 696-8291 (951) 696-9962	DATE: 6/19/08
ADDRESS: 40981 California Oaks Rd	CITY, ZIP: Murrieta CA 92562	
MAILING ADDRESS (if different from site address)	MAILING CITY, ZIP	
CONTACT: Krisha Rodriguez	FACILITY#: PR0026202	SIC CODE: 5989

Compliance Areas	YES	NO	N/A
***OUTSIDE AREAS (Free of staining & debris; provides good housekeeping; maintained in a manner to prevent runoff.)**		**Requires follow up**	
1. CHEMICAL STORAGE * The outside storage area is kept to minimize the possibility of a release. Chemicals / materials are protected from precipitation / storm water runoff and the containers show no signs of leaking.		✓	
2. DUMPSTER * No liquids are leaking from dumpster; surrounding area is free of trash.	✓		
3. ABOVEGROUND TANKS * No ground staining, no spillage observed and no discharge to storm drain. Tanks are maintained to minimize the possibility of a release (secondary containment).			✓
4. ONSITE STORM DRAIN* Protected from accidental discharge other than water.	✓		
5. POWER WASH OR STEAM CLEAN* (discharge to sewer) Drains to oil/water separator connected to a sanitary sewer and not a septic system. Steam cleaning not discharged to parking lot, storm drain or soil.	✓		
6. PARKING LOT / DRIVE WAY* Free of excess trash, chemical staining or liquids other than water.	✓		
7. OTHER* Non-storm water discharge (i.e. non-hazardous process discharge).			✓
8. MOP WATER TO SANITARY SEWER VIA CLARIFIER. Mop water is not dumped to the soil, parking lot, gutter, or other areas susceptible to storm water drainage.	✓		
9. STORM WATER EDUCATIONAL BROCHURES GIVEN TO FACILITY OR POSTERS DISPLAYED FOR EMPLOYEES. If no, what informational material should be sent to the facility?	✓		
10. IF A SWPPP IS REQUIRED, WAS IT AVAILABLE FOR REVEIW? See storm water handout for industrial facilities.	✓		

OVERALL EVALUATION/ COMMENTS: #1 The Facility has several Hazardous Waste Containers Stored Outside. The Facility shall store these containers inside away from the rain and inside a secondary containment area.

RECEIVED BY: Krisha A Rodriguez	HAZ MAT SPEC: M. Vargas	BADGE # 51

Agency referred to as indicated on the back of this page.

If additional information is required, contact the Storm Water /Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

0001706

FOOD FACILITY STORMWATER COMPLIANCE SURVEY

EI 09123

FACILITY DBA: Taco Bell	FACILITY #: 44163	DATE: July 5, 2007
ADDRESS: 39056 Winchester Rd. Murr.	ACTIVITY: 1625	SERVICE CODE: 410

COMPLIANCE AREAS	YES	NO	N/A
GREASE BARRELS/ INTERCEPTORS			
1. Grease pumped/removed on a regular basis. 1/quarter	✓		
2. Grease interceptor located outside facility, maintained properly.	✓		
EQUIPMENT CLEANING			
3. The following items are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Grease filters	✓		
b. Floor mats	✓		
c. Floors (mop water and rinse water)	✓		
d. Grills	✓		
OUTSIDE AREAS			
4. The following areas are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Sidewalk or outdoor seating		✓	
b. Drive thru	✓		
DUMPSTERS AND RECYCLING CONTAINERS			
5. Food waste bagged and sealed before disposal.		✓	
6. Dumpsters and recycling containers are covered.	✓		
7. Spilled materials around containers are picked up regularly.		✓	
8. Wash water is discharged to the sanitary sewer or is collected for proper disposal.	✓		
EMPLOYEE EDUCATION/ AWARENESS			
9. Brochures or posters displayed.	X		
10. BMPs observed.			X
OVERALL RATING	GOOD	AVERAGE	NEEDS IMPROVEMENT X

CITY OF MURRIETA DEC 0 3 2007

COMMENTS: Grease spill coming from Refuse/Recisier drum enclosu NOV # 42033 ISSUED on RVSD. CO. Code 8.124.010 – 24 HR CLEAN UP ordered in AN Approved Manner – No Runoff.

Received by: X [signature] | Env. Health Specialist: D. Bishop | Badge #: 44

If additional information is required, contact the Storm Water/Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

0001707

FOOD FACILITY STORMWATER COMPLIANCE SURVEY

FACILITY DBA Koo / Bliss	FACILITY # 068415	DATE 7-20-07	
ADDRESS 40635 Cal. Oaks Rd Murrieta CA 92562	ACTIVITY 3620	SERVICE CODE: 410	
COMPLIANCE AREAS	YES	NO	N/A
GREASE BARRELS/INTERCEPTORS			
1. Grease pumped/removed on a regular basis.			X
2. Grease interceptor located outside facility, maintained properly.			X
EQUIPMENT CLEANING			
3. The following items are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Grease filters			X
b. Floor mats			X
c. Floors (mop water and rinse water)	X		
d. Grills			X
OUTSIDE AREAS			
4. The following areas are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Sidewalk or outdoor seating			X
b. Drive thru			X
DUMPSTERS AND RECYCLING CONTAINERS			
5. Food waste bagged and sealed before disposal.	X		
6. Dumpsters and recycling containers are covered.	X		
7. Spilled materials around containers are picked up regularly.	X		
8. Wash water is discharged to the sanitary sewer or is collected for proper disposal.	X		
EMPLOYEE EDUCATION/AWARENESS			
9. Brochures or posters displayed.		X	
10. BMPs observed.	X		
OVERALL RATING	GOOD	AVERAGE	NEEDS IMPROVEMENT

CITY OF MURRIETA
DEC 0 6 2007
REC.
ENGINEERING DEPT.

COMMENTS: New facility.

Received by:	Env. Health Specialist: R. Gibson	Badge # 53

If additional information is required, contact the Storm Water/Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

mw 9/01

0001708

CITY OF MURRIETA

FOOD FACILITY STORMWATER COMPLIANCE SURVEY

DEC 0 5 2007

RECEIVED ENGINEERING DEPT.

FACILITY DBA Bob's Murrieta Pizza Co.	FACILITY # 45463	DATE 7-23-07	
ADDRESS 41539 Kalmia St. #109 Murrieta CA 92563	ACTIVITY 3622	SERVICE CODE: 410	
COMPLIANCE AREAS	YES	NO	N/A
GREASE BARRELS/INTERCEPTORS			
1. Grease pumped/removed on a regular basis.			X
2. Grease interceptor located outside facility, maintained properly.	X		
EQUIPMENT CLEANING			
3. The following items are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Grease filters			X
b. Floor mats		X	
c. Floors (mop water and rinse water)	X		
d. Grills	X		
OUTSIDE AREAS			
4. The following areas are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Sidewalk or outdoor seating	X		
b. Drive thru			X
DUMPSTERS AND RECYCLING CONTAINERS			
5. Food waste bagged and sealed before disposal.	X		
6. Dumpsters and recycling containers are covered.	X		
7. Spilled materials around containers are picked up regularly.	X		
8. Wash water is discharged to the sanitary sewer or is collected for proper disposal.	X		
EMPLOYEE EDUCATION/AWARENESS			
9. Brochures or posters displayed.		X	
10. BMPs observed.	X		
OVERALL RATING	GOOD	AVERAGE	NEEDS IMPROVEMENT

COMMENTS: - Grease interceptor provided at facility, no grease production on site. Facility washes ~~mat~~ floor mats outside, no grease production on site.

Received by:	Env. Health Specialist: R. Graber	Badge # 53

If additional information is required, contact the Storm Water/Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

mw 9/01

0001709

FOOD FACILITY STORMWATER COMPLIANCE SURVEY

FACILITY DBA Lei's Hawaiian BBQ	FACILITY # 10356	DATE 7-23-07	
ADDRESS 41539 Kalmia St. #120 Murrieta	ACTIVITY 3420	SERVICE CODE: 410	
COMPLIANCE AREAS	YES	NO	N/A
GREASE BARRELS/ INTERCEPTORS			
1. Grease pumped/removed on a regular basis.	X		
2. Grease interceptor located outside facility, maintained properly.	X		
EQUIPMENT CLEANING			
3. The following items are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Grease filters		X	
b. Floor mats		X	
c. Floors (mop water and rinse water)	X		
d. Grills	X		
OUTSIDE AREAS			
4. The following areas are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Sidewalk or outdoor seating	X		
b. Drive thru			X
DUMPSTERS AND RECYCLING CONTAINERS			
5. Food waste bagged and sealed before disposal.	X		
6. Dumpsters and recycling containers are covered.	X		
7. Spilled materials around containers are picked up regularly.	X		
8. Wash water is discharged to the sanitary sewer or is collected for proper disposal.	X		
EMPLOYEE EDUCATION/ AWARENESS			
9. Brochures or posters displayed.		X	
10. BMPs observed.		X	
OVERALL RATING	GOOD	AVERAGE	NEEDS IMPROVEMENT

CITY OF MURRIETA
DEC 0 5 2007
ENGINEERING

COMMENTS: washing grease filters and mats outside. Grease receptacle stored inside the facility.

Received by:	Env. Health Specialist: R. Gibson	Badge # 53

For additional information, please refer to our web site at www.floodcontrol.co.riverside.ca.us or contact the "Only Rain Down the Storm Drain" Pollution Prevention Program of the Cities and County of Riverside at (800) 506-2555.

ONLY RAIN DOWN THE STORM DRAIN

0001710

FOOD FACILITY STORMWATER COMPLIANCE SURVEY

FACILITY DBA It's Greek 2 U Deli & Bakery	FACILITY # 13545	DATE 8-9-07	
ADDRESS 41539 Kalmia Ave. Ste. 116 Murrieta	ACTIVITY 3620	SERVICE CODE: 410	
COMPLIANCE AREAS	YES	NO	N/A
GREASE BARRELS/ INTERCEPTORS			
1. Grease pumped/removed on a regular basis.			X
2. Grease interceptor located outside facility, maintained properly.			X
EQUIPMENT CLEANING			
3. The following items are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Grease filters			X
b. Floor mats	X		
c. Floors (mop water and rinse water)	X		
d. Grills	X		
OUTSIDE AREAS			
4. The following areas are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Sidewalk or outdoor seating	X		
b. Drive thru			X
DUMPSTERS AND RECYCLING CONTAINERS			
5. Food waste bagged and sealed before disposal.	X		
6. Dumpsters and recycling containers are covered.	X		
7. Spilled materials around containers are picked up regularly.	X		
8. Wash water is discharged to the sanitary sewer or is collected for proper disposal.	X		
EMPLOYEE EDUCATION/ AWARENESS			
9. Brochures or posters displayed.		X	
10. BMPs observed.	X		
OVERALL RATING	GOOD	AVERAGE	NEEDS IMPROVEMENT

CITY OF MURRIETA
DEC 05 2007
ENGINEERING DIVISION

COMMENTS: New facility

Received by: Maria Michael	Env. Health Specialist: R. Gribben	Badge # 53

For additional information, please refer to our web site at www.floodcontrol.co.riverside.ca.us or contact the "Only Rain Down the Storm Drain" Pollution Prevention Program of the Cities and County of Riverside at (800) 506-2555.

...ONLY RAIN... DOWN THE STORM DRAIN

0001711

FOOD FACILITY STORMWATER COMPLIANCE SURVEY

FACILITY DBA Juice it up	FACILITY # 13006	DATE 8-9-07	
ADDRESS 24630 Village walk Pl. #E Murrieta	ACTIVITY 2620	SERVICE CODE: 410	
COMPLIANCE AREAS	YES	NO	N/A
GREASE BARRELS/ INTERCEPTORS			
1. Grease pumped/removed on a regular basis.			X
2. Grease interceptor located outside facility, maintained properly.			X
EQUIPMENT CLEANING			
3. The following items are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Grease filters			X
b. Floor mats	X		
c. Floors (mop water and rinse water)	X		
d. Grills			X
OUTSIDE AREAS			
4. The following areas are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Sidewalk or outdoor seating	X		
b. Drive thru			X
DUMPSTERS AND RECYCLING CONTAINERS			
5. Food waste bagged and sealed before disposal.	X		
6. Dumpsters and recycling containers are covered.	X		
7. Spilled materials around containers are picked up regularly.	X		
8. Wash water is discharged to the sanitary sewer or is collected for proper disposal.	X		
EMPLOYEE EDUCATION/ AWARENESS			
9. Brochures or posters displayed.		X	
10. BMPs observed.	X		
OVERALL RATING	GOOD	AVERAGE	NEEDS IMPROVEMENT

COMMENTS: New facility

Received by:	Env. Health Specialist: M. Gribben	Badge # 53

For additional information, please refer to our web site at www.floodcontrol.co.riverside.ca.us or contact the "Only Rain Down the Storm Drain" Pollution Prevention Program of the Cities and County of Riverside at (800) 506-2555.

ONLY RAIN DOWN THE STORM DRAIN

0001712

FOOD FACILITY STORMWATER COMPLIANCE SURVEY

FACILITY DBA Tacos EL Unico	FACILITY # 18036	DATE 8-24-07	
ADDRESS 40250 Murr. Hot Springs	ACTIVITY 3620	SERVICE CODE: 410	
COMPLIANCE AREAS	**YES**	**NO**	**N/A**
GREASE BARRELS/ INTERCEPTORS			
1. Grease pumped/removed on a regular basis.	✓		
2. Grease interceptor located outside facility, maintained properly.	✓		
EQUIPMENT CLEANING			
3. The following items are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Grease filters	✓		
b. Floor mats	✓		
c. Floors (mop water and rinse water)	✓		
d. Grills	✓		
OUTSIDE AREAS			
4. The following areas are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Sidewalk or outdoor seating			✓
b. Drive thru			✓
DUMPSTERS AND RECYCLING CONTAINERS			
5. Food waste bagged and sealed before disposal.	✓		
6. Dumpsters and recycling containers are covered.		✓	
7. Spilled materials around containers are picked up regularly.	✓		
8. Wash water is discharged to the sanitary sewer or is collected for proper disposal.	✓		
EMPLOYEE EDUCATION/ AWARENESS			
9. Brochures or posters displayed.	✓		
10. BMPs observed.	✓		
OVERALL RATING	GOOD	AVERAGE	NEEDS IMPROVEMENT
COMMENTS:			
Received by:	Env. Health Specialist: Stacy Andrson		Badge #

If additional information is required, contact the Storm Water/Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

StormWater Clean Water PROTECTION PROGRAM

mw 9/01

FOOD FACILITY STORMWATER COMPLIANCE SURVEY

FACILITY DBA Wings, Pizza & Things	FACILITY # 10354	DATE 8-24-07	
ADDRESS 40250 Murrieta Hot Springs Ste. 101	ACTIVITY 3620	SERVICE CODE: 410	
COMPLIANCE AREAS	**YES**	**NO**	**N/A**
GREASE BARRELS/ INTERCEPTORS			
1. Grease pumped/removed on a regular basis.			✓
2. Grease interceptor located outside facility, maintained properly.			✓
EQUIPMENT CLEANING			
3. The following items are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Grease filters	✓		
b. Floor mats	✓		
c. Floors (mop water and rinse water)	✓		
d. Grills	✓		
OUTSIDE AREAS			
4. The following areas are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Sidewalk or outdoor seating	✓		
b. Drive thru			✓
DUMPSTERS AND RECYCLING CONTAINERS			
5. Food waste bagged and sealed before disposal.	✓		
6. Dumpsters and recycling containers are covered.		✓	
7. Spilled materials around containers are picked up regularly.	✓		
8. Wash water is discharged to the sanitary sewer or is collected for proper disposal.	✓		
EMPLOYEE EDUCATION/ AWARENESS			
9. Brochures or posters displayed.	✓		
10. BMPs observed.	✓		
OVERALL RATING	GOOD	AVERAGE	NEEDS IMPROVEMENT

COMMENTS:

Received by:	Env. Health Specialist: A. Collins	Badge # 227

If additional information is required, contact the Storm Water/Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

StormWater Clean Water PROTECTION PROGRAM

0001714

FOOD FACILITY STORMWATER COMPLIANCE SURVEY

FACILITY DBA Jenny Craig	FACILITY #	DATE 9-11-07	
ADDRESS 24540 Village Walk Plaza, Mur	ACTIVITY 1607	SERVICE CODE: 410	
COMPLIANCE AREAS	YES	NO	N/A
GREASE BARRELS/INTERCEPTORS			
1. Grease pumped/removed on a regular basis.			✓
2. Grease interceptor located outside facility, maintained properly.			✓
EQUIPMENT CLEANING			
3. The following items are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Grease filters	✓		✓
b. Floor mats	✓		
c. Floors (mop water and rinse water)	✓		
d. Grills			✓
OUTSIDE AREAS			
4. The following areas are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Sidewalk or outdoor seating			✓
b. Drive thru			✓
DUMPSTERS AND RECYCLING CONTAINERS			
5. Food waste bagged and sealed before disposal.	✓		
6. Dumpsters and recycling containers are covered.	✓		
7. Spilled materials around containers are picked up regularly.	✓		
8. Wash water is discharged to the sanitary sewer or is collected for proper disposal.	✓		
EMPLOYEE EDUCATION/AWARENESS			
9. Brochures or posters displayed.	✓		
10. BMPs observed.	✓		
OVERALL RATING	GOOD	AVERAGE	NEEDS IMPROVEMENT

CITY OF MURRIETA
DEC 4 5 2007
RECEIVED

COMMENTS:

Received by: Rochelle Smith	Env. Health Specialist: Stacy Anderson	Badge #

If additional information is required, contact the Storm Water/Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

mw 9/01

0001715

FOOD FACILITY STORMWATER COMPLIANCE SURVEY

FACILITY DBA Subway Sandwiches	FACILITY #	DATE 9-11-07	
ADDRESS 24530 Village Plaza walk #2	ACTIVITY	SERVICE CODE: 410	
COMPLIANCE AREAS Murrieta	YES	NO	N/A
GREASE BARRELS/INTERCEPTORS			
1. Grease pumped/removed on a regular basis.			✓
2. Grease interceptor located outside facility, maintained properly.			✓
EQUIPMENT CLEANING			
3. The following items are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Grease filters			✓
b. Floor mats service	✓		
c. Floors (mop water and rinse water) mop sink	✓		
d. Grills			✓
OUTSIDE AREAS			
4. The following areas are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Sidewalk or outdoor seating			✓
b. Drive thru			✓
DUMPSTERS AND RECYCLING CONTAINERS			
5. Food waste bagged and sealed before disposal.	✓		
6. Dumpsters and recycling containers are covered.	✓		
7. Spilled materials around containers are picked up regularly.	✓		
8. Wash water is discharged to the sanitary sewer or is collected for proper disposal. Management company			✓
EMPLOYEE EDUCATION/AWARENESS			
9. Brochures or posters displayed.	✓		
10. BMPs observed.	✓		
OVERALL RATING	GOOD	AVERAGE	NEEDS IMPROVEMENT

CITY OF MURRIETA
DEC 0 4 2007

COMMENTS:

Received by: H A Pregenzer	Env. Health Specialist: Stacy Anderson	Badge #

If additional information is required, contact the Storm Water/Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

mw 9/01

FOOD FACILITY STORMWATER COMPLIANCE SURVEY

FACILITY DBA Starbuck's Coffee Co.	FACILITY # 18200	DATE 9-11-07	
ADDRESS 27890 Clinton Keith Rd., Murrieta	ACTIVITY 2610	SERVICE CODE: 410	
COMPLIANCE AREAS	**YES**	**NO**	**N/A**
GREASE BARRELS/INTERCEPTORS			
1. Grease pumped/removed on a regular basis.			✓
2. Grease interceptor located outside facility, maintained properly.			✓
EQUIPMENT CLEANING			
3. The following items are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Grease filters			✓
b. Floor mats	✓		
c. Floors (mop water and rinse water)	✓		
d. Grills			✓
OUTSIDE AREAS			
4. The following areas are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Sidewalk or outdoor seating	✓		
b. Drive thru	✓		
DUMPSTERS AND RECYCLING CONTAINERS			
5. Food waste bagged and sealed before disposal.	✓		
6. Dumpsters and recycling containers are covered.		✓	
7. Spilled materials around containers are picked up regularly.	✓		
8. Wash water is discharged to the sanitary sewer or is collected for proper disposal.	✓		
EMPLOYEE EDUCATION/ AWARENESS			
9. Brochures or posters displayed.	✓		
10. BMPs observed.	✓		
OVERALL RATING DEC 0 4 2007	GOOD	AVERAGE	NEEDS IMPROVEMENT

COMMENTS:

Received by:	Env. Health Specialist: A. Collins	Badge # 217

If additional information is required, contact the Storm Water/Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

mw 9/01

0001717

FOOD FACILITY STORMWATER COMPLIANCE SURVEY

FACILITY DBA Smoothie King	FACILITY # 18337	DATE 9-12-07	
ADDRESS 25030 Hancock Ave # 103	ACTIVITY 2620	SERVICE CODE: 410	
COMPLIANCE AREAS	YES	NO	N/A
GREASE BARRELS/ INTERCEPTORS			
1. Grease pumped/removed on a regular basis.			✓
2. Grease interceptor located outside facility, maintained properly.			✓
EQUIPMENT CLEANING			
3. The following items are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Grease filters			✓
b. Floor mats	✓		✓
c. Floors (mop water and rinse water)	✓		
d. Grills			✓
OUTSIDE AREAS			
4. The following areas are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Sidewalk or outdoor seating			✓
b. Drive thru			✓
DUMPSTERS AND RECYCLING CONTAINERS			
5. Food waste bagged and sealed before disposal.		✓	
6. Dumpsters and recycling containers are covered.		✓	
7. Spilled materials around containers are picked up regularly.	✓		
8. Wash water is discharged to the sanitary sewer or is collected for proper disposal.	✓		
EMPLOYEE EDUCATION/ AWARENESS			
9. Brochures or posters displayed.	✓		
10. BMPs observed.	✓		
OVERALL RATING	GOOD	AVERAGE	NEEDS IMPROVEMENT

COMMENTS:

Received by: Ramon Rodriguez	Env. Health Specialist: Stacy Anderson	Badge #

CITY OF MURRIETA
DEC 05 2007

If additional information is required, contact the Storm Water/Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

mw 9/01

FOOD FACILITY STORMWATER COMPLIANCE SURVEY

FACILITY DBA Hana Sushi	FACILITY # 18136	DATE 9-12-07	
ADDRESS 40940 California Oaks #B Murrieta	ACTIVITY 3620	SERVICE CODE: 410	
COMPLIANCE AREAS	**YES**	**NO**	**N/A**
GREASE BARRELS/ INTERCEPTORS			
1. Grease pumped/removed on a regular basis.	✓		
2. Grease interceptor located outside facility, maintained properly.	✓		
EQUIPMENT CLEANING			
3. The following items are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Grease filters	✓		
b. Floor mats	✓		
c. Floors (mop water and rinse water)	✓		
d. Grills	✓		
OUTSIDE AREAS			
4. The following areas are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Sidewalk or outdoor seating			✓
b. Drive thru			✓
DUMPSTERS AND RECYCLING CONTAINERS			
5. Food waste bagged and sealed before disposal.	✓		
6. Dumpsters and recycling containers are covered.	✓		
7. Spilled materials around containers are picked up regularly.	✓		
8. Wash water is discharged to the sanitary sewer or is collected for proper disposal.			✓
EMPLOYEE EDUCATION/ AWARENESS			
9. Brochures or posters displayed.			✓
10. BMPs observed.	✓		
OVERALL RATING	GOOD	AVERAGE	NEEDS IMPROVEMENT

COMMENTS: Poster and brochure provided.

Received by: Jane 410 | Env. Health Specialist: Kristen Burnham | Badge # 451

If additional information is required, contact the Storm Water/Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

0001719

FOOD FACILITY STORMWATER COMPLIANCE SURVEY

FACILITY DBA Asia Seafood Buffet, Inc.	FACILITY # 18359	DATE 10-1-07	
ADDRESS 30825 Alta Murrieta	ACTIVITY 3622	SERVICE CODE: 410	
COMPLIANCE AREAS	**YES**	**NO**	**N/A**
GREASE BARRELS/ INTERCEPTORS			
1. Grease pumped/removed on a regular basis. Weekly	✓		
2. Grease interceptor located outside facility, maintained properly.	✓		
EQUIPMENT CLEANING			
3. The following items are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Grease filters	✓		
b. Floor mats	✓		
c. Floors (mop water and rinse water)	✓		
d. Grills			✓
OUTSIDE AREAS			
4. The following areas are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Sidewalk or outdoor seating		✓	
b. Drive thru		✓	
DUMPSTERS AND RECYCLING CONTAINERS			
5. Food waste bagged and sealed before disposal.	✓		
6. Dumpsters and recycling containers are covered.	✓		
7. Spilled materials around containers are picked up regularly.	✓		
8. Wash water is discharged to the sanitary sewer or is collected for proper disposal.	✓		
EMPLOYEE EDUCATION/ AWARENESS			
9. Brochures or posters displayed.	✓		
10. BMPs observed.	✓		
OVERALL RATING	GOOD	AVERAGE	NEEDS IMPROVEMENT

CITY OF MURRIETA DEC 0 7 2007 RECEIVED

COMMENTS:

Print: Fenny Zheng

Received by:	Env. Health Specialist: D. Bishop	Badge # 74

If additional information is required, contact the Storm Water/Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

0001720

FOOD FACILITY STORMWATER COMPLIANCE SURVEY

FACILITY DBA Cabo Mesquite Fish Grill	FACILITY # 18176	DATE 10-3-07	
ADDRESS 40365 Murrieta Hot Springs Rd C-8	ACTIVITY 3620	SERVICE CODE: 410	
COMPLIANCE AREAS	**YES**	**NO**	**N/A**
GREASE BARRELS/ INTERCEPTORS			
1. Grease pumped/removed on a regular basis. collection box removed	✓		✓
2. Grease interceptor located outside facility, maintained properly. cleaned every two weeks collected as needed			✓
EQUIPMENT CLEANING			
3. The following items are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Grease filters	✓		
b. Floor mats	✓		
c. Floors (mop water and rinse water) (instructed to dump planter in mop sink)	✓	✓	
d. Grills	✓		
OUTSIDE AREAS			
4. The following areas are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Sidewalk or outdoor seating	✓		✓
b. Drive thru			✓
DUMPSTERS AND RECYCLING CONTAINERS			
5. Food waste bagged and sealed before disposal.	✓		
6. Dumpsters and recycling containers are covered.		✓	
7. Spilled materials around containers are picked up regularly.	✓		
8. Wash water is discharged to the sanitary sewer or is collected for proper disposal.	✓		
EMPLOYEE EDUCATION/ AWARENESS			
9. Brochures or posters displayed.	✓		
10. BMPs observed.	✓		
OVERALL RATING	GOOD	AVERAGE	NEEDS IMPROVEMENT

CITY OF MURRIETA
DEC 05 2007

COMMENTS:

Received by:	Env. Health Specialist:	Badge #

If additional information is required, contact the Storm Water/Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

0001721

FOOD FACILITY STORMWATER COMPLIANCE SURVEY

FACILITY DBA Plaza Liquor III	FACILITY # 18349	DATE 10/11/07	
ADDRESS 3364 Wentworth Dr. Hemet	ACTIVITY 2602	SERVICE CODE: 410	
COMPLIANCE AREAS	**YES**	**NO**	**N/A**
GREASE BARRELS/ INTERCEPTORS			
1. Grease pumped/removed on a regular basis.			✓
2. Grease interceptor located outside facility, maintained properly.			✓
EQUIPMENT CLEANING			
3. The following items are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Grease filters			✓
b. Floor mats			✓
c. Floors (mop water and rinse water)	✓		
d. Grills			✓
OUTSIDE AREAS			
4. The following areas are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Sidewalk or outdoor seating			✓
b. Drive thru			✓
DUMPSTERS AND RECYCLING CONTAINERS			
5. Food waste bagged and sealed before disposal.	✓		
6. Dumpsters and recycling containers are covered.	✓		
7. Spilled materials around containers are picked up regularly.	✓		
8. Wash water is discharged to the sanitary sewer or is collected for proper disposal.	✓		
EMPLOYEE EDUCATION/ AWARENESS			
9. Brochures or posters displayed.	✓		
10. BMPs observed.	✓		
OVERALL RATING	GOOD	AVERAGE	NEEDS IMPROVEMENT
COMMENTS:			
Received by:	Env. Health Specialist: M. Ha		Badge # 606

For additional information, please refer to our web site at www.floodcontrol.co.riverside.ca.us or contact the "Only Rain Down the Storm Drain" Pollution Prevention Program of the Cities and County of Riverside at (800) 506-2555.

...ONLY RAIN... DOWN THE STORM DRAIN

0001722

FOOD FACILITY STORMWATER COMPLIANCE SURVEY

FACILITY DBA The Cake Cottage	FACILITY # 36896	DATE 3-17-08	
ADDRESS 39429 Los Alamos Rd D Murrieta	ACTIVITY 3620	SERVICE CODE: 410	
COMPLIANCE AREAS	**YES**	**NO**	**N/A**
GREASE BARRELS/ INTERCEPTORS			
1. Grease pumped/removed on a regular basis.			✓
2. Grease interceptor located outside facility, maintained properly.			✓
EQUIPMENT CLEANING			
3. The following items are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Grease filters			✓
b. Floor mats			✓
c. Floors (mop water and rinse water)	✓		
d. Grills			✓
OUTSIDE AREAS			
4. The following areas are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Sidewalk or outdoor seating	✓		
b. Drive thru			✓
DUMPSTERS AND RECYCLING CONTAINERS			
5. Food waste bagged and sealed before disposal.	✓		
6. Dumpsters and recycling containers are covered.	✓		
7. Spilled materials around containers are picked up regularly.	✓		
8. Wash water is discharged to the sanitary sewer or is collected for proper disposal.	✓		
EMPLOYEE EDUCATION/ AWARENESS			
9. Brochures or posters displayed.	✓		
10. BMPs observed.	✓		
OVERALL RATING	GOOD	AVERAGE	NEEDS IMPROVEMENT

COMMENTS: N/A

Received by:	Env. Health Specialist: S. Peralta	Badge #

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If additional information is required, contact the Storm Water/Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

FOOD FACILITY STORMWATER COMPLIANCE SURVEY

FACILITY DBA Boardz Grill	FACILITY # 36899	DATE 3-31-08	
ADDRESS 39809 Los Alamos	ACTIVITY 3621	SERVICE CODE: 410	
COMPLIANCE AREAS	**YES**	**NO**	**N/A**
GREASE BARRELS/ INTERCEPTORS			
1. Grease pumped/removed on a regular basis.	✓		
2. Grease interceptor located outside facility, maintained properly.	✓		
EQUIPMENT CLEANING			
3. The following items are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Grease filters	✓		
b. Floor mats	✓		
c. Floors (mop water and rinse water)	✓		
d. Grills	✓		
OUTSIDE AREAS			
4. The following areas are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Sidewalk or outdoor seating	✓		
b. Drive thru	✓		
DUMPSTERS AND RECYCLING CONTAINERS			
5. Food waste bagged and sealed before disposal.	✓		
6. Dumpsters and recycling containers are covered.		✓	
7. Spilled materials around containers are picked up regularly.	✓		
8. Wash water is discharged to the sanitary sewer or is collected for proper disposal.	✓		
EMPLOYEE EDUCATION/ AWARENESS			
9. Brochures or posters displayed.	✓		
10. BMPs observed.	✓		
OVERALL RATING	GOOD	AVERAGE	NEEDS IMPROVEMENT

COMMENTS: N/A

Received by: Efrain Torres	Env. Health Specialist: S. Peralta	Badge # 396

CITY OF MURRIETA

If additional information is required, contact the Storm Water/Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

0001724

FOOD FACILITY STORMWATER COMPLIANCE SURVEY

FACILITY DBA Don Chanos	FACILITY # 37284	DATE 4/10/08	
ADDRESS 29910 Murrieta Hot Spnngs Murr	ACTIVITY 48620	SERVICE CODE: 410	
COMPLIANCE AREAS	**YES**	**NO**	**N/A**
GREASE BARRELS/ INTERCEPTORS			
1. Grease pumped/removed on a regular basis.	✓		
2. Grease interceptor located outside facility, maintained properly.	✓		
EQUIPMENT CLEANING			
3. The following items are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Grease filters	✓		
b. Floor mats	✓		
c. Floors (mop water and rinse water)	✓		
d. Grills	✓		
OUTSIDE AREAS			
4. The following areas are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Sidewalk or outdoor seating	✓		
b. Drive thru			✓
DUMPSTERS AND RECYCLING CONTAINERS			
5. Food waste bagged and sealed before disposal.	✓		
6. Dumpsters and recycling containers are covered.	✓		
7. Spilled materials around containers are picked up regularly.	✓		
8. Wash water is discharged to the sanitary sewer or is collected for proper disposal.	✓		
EMPLOYEE EDUCATION/ AWARENESS			
9. Brochures or posters displayed.	✓		
10. BMPs observed.	✓		
OVERALL RATING	GOOD	AVERAGE	NEEDS IMPROVEMENT

COMMENTS:

Received by: Chris Arteaga	Env. Health Specialist: B. Peralta	Badge # 396

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If additional information is required, contact the Storm Water/Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

0001725

FOOD FACILITY STORMWATER COMPLIANCE SURVEY

FACILITY DBA SGC Sushi Japanese Restaurant	FACILITY #	DATE 5.5.08	
ADDRESS 40461 Murrieta Hot Springs Murrieta	ACTIVITY 3621	SERVICE CODE: 410	
COMPLIANCE AREAS	YES	NO	N/A
GREASE BARRELS/ INTERCEPTORS			
1. Grease pumped/removed on a regular basis.	✓		
2. Grease interceptor located outside facility, maintained properly.	✓		
EQUIPMENT CLEANING			
3. The following items are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Grease filters	✓		
b. Floor mats	✓		
c. Floors (mop water and rinse water)	✓		
d. Grills	✓		
OUTSIDE AREAS			
4. The following areas are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Sidewalk or outdoor seating	✓		
b. Drive thru			✓
DUMPSTERS AND RECYCLING CONTAINERS			
5. Food waste bagged and sealed before disposal.	✓		
6. Dumpsters and recycling containers are covered.	✓		
7. Spilled materials around containers are picked up regularly.	✓		
8. Wash water is discharged to the sanitary sewer or is collected for proper disposal.	✓		
EMPLOYEE EDUCATION/ AWARENESS			
9. Brochures or posters displayed.	✓		
10. BMPs observed.	✓		
OVERALL RATING	GOOD	AVERAGE	NEEDS IMPROVEMENT
COMMENTS:			
Received by:	Env. Health Specialist: S. Peralta		Badge # 396

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FOOD FACILITY STORMWATER COMPLIANCE SURVEY

FACILITY DBA Seoul Market	FACILITY # 37160	DATE 5-13-08	
ADDRESS 40250 Murrieta Hot Springs Rd.	ACTIVITY 3620	SERVICE CODE: 410	
COMPLIANCE AREAS	**YES**	**NO**	**N/A**
GREASE BARRELS/ INTERCEPTORS			
1. Grease pumped/removed on a regular basis.			✓
2. Grease interceptor located outside facility, maintained properly.			✓
EQUIPMENT CLEANING			
3. The following items are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Grease filters			✓
b. Floor mats	✓		
c. Floors (mop water and rinse water)	✓		
d. Grills			✓
OUTSIDE AREAS			
4. The following areas are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Sidewalk or outdoor seating			✓
b. Drive thru			✓
DUMPSTERS AND RECYCLING CONTAINERS			
5. Food waste bagged and sealed before disposal.	✓		
6. Dumpsters and recycling containers are covered.	✓		
7. Spilled materials around containers are picked up regularly.	✓		
8. Wash water is discharged to the sanitary sewer or is collected for proper disposal.	✓		
EMPLOYEE EDUCATION/ AWARENESS			
9. Brochures or posters displayed.	✓		
10. BMPs observed.	✓		
OVERALL RATING	(GOOD)	AVERAGE	NEEDS IMPROVEMENT

COMMENTS:

Received by: Sue Lig Kim.	Env. Health Specialist: A. Collins	Badge # 227

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If additional information is required, contact the Storm Water/Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

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0001727

HAZARDOUS WASTE/ HAZARDOUS MATERIALS FACILITY STORM WATER COMPLIANCE SURVEY FORM

FACILITY DBA: Albertson's Gas STN	TELEPHONE: (951) 600-0329	DATE: 5/15/08
ADDRESS: 39224 Winchester Rd	CITY, ZIP: Murrieta ~~Temecula~~ CA 92563	
MAILING ADDRESS (if different from site address)	MAILING CITY, ZIP	
CONTACT: Dianna O'Donnell	FACILITY#: PR0023474	SIC CODE: 5989

Compliance Areas	YES	NO	N/A
***OUTSIDE AREAS (Free of staining & debris; provides good housekeeping; maintained in a manner to prevent runoff.)**		**Requires follow up**	
1. CHEMICAL STORAGE * The outside storage area is kept to minimize the possibility of a release. Chemicals / materials are protected from precipitation / storm water runoff and the containers show no signs of leaking.	✓		
2. DUMPSTER * No liquids are leaking from dumpster; surrounding area is free of trash.	✓		
3. ABOVEGROUND TANKS * No ground staining, no spillage observed and no discharge to storm drain. Tanks are maintained to minimize the possibility of a release (secondary containment).			✓
4. ONSITE STORM DRAIN* Protected from accidental discharge other than water.	✓		
5. POWER WASH OR STEAM CLEAN* (discharge to sewer) Drains to oil/water separator connected to a sanitary sewer and not a septic system. Steam cleaning not discharged to parking lot, storm drain or soil.	✓		
6. PARKING LOT / DRIVE WAY* Free of excess trash, chemical staining or liquids other than water.	✓		
7. OTHER* Non-storm water discharge (i.e. non-hazardous process discharge).			✓
8. MOP WATER TO SANITARY SEWER VIA CLARIFIER. Mop water is not dumped to the soil, parking lot, gutter, or other areas susceptible to storm water drainage.	✓		
9. STORM WATER EDUCATIONAL BROCHURES GIVEN TO FACILITY OR POSTERS DISPLAYED FOR EMPLOYEES. If no, what informational material should be sent to the facility?	✓		
10. IF A SWPPP IS REQUIRED, WAS IT AVAILABLE FOR REVEIW? See storm water handout for industrial facilities.	✓		

OVERALL EVALUATION/ COMMENTS: No Violations Noted

RECEIVED BY: Dianna O'Donnell HAZ MAT SPEC: M. Vargas BADGE #

Agency referred to as indicated on the back of this page.

If additional information is required, contact the Storm Water /Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

CITY OF MURRIETA

Storm Water Clean Water PROTECTION PROGRAM

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FOOD FACILITY STORMWATER COMPLIANCE SURVEY

FACILITY DBA Sky High Party	FACILITY # 37738	DATE 5-20-08	
ADDRESS 26670 Madison Ave Murrieta	ACTIVITY 1601	SERVICE CODE: 410	
COMPLIANCE AREAS	**YES**	**NO**	**N/A**
GREASE BARRELS/ INTERCEPTORS			
1. Grease pumped/removed on a regular basis.			✓
2. Grease interceptor located outside facility, maintained properly.			✓
EQUIPMENT CLEANING			
3. The following items are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Grease filters			✓
b. Floor mats			✓
c. Floors (mop water and rinse water)	✓		
d. Grills			✓
OUTSIDE AREAS			
4. The following areas are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Sidewalk or outdoor seating	✓		
b. Drive thru			✓
DUMPSTERS AND RECYCLING CONTAINERS			
5. Food waste bagged and sealed before disposal.	✓		
6. Dumpsters and recycling containers are covered.	✓		
7. Spilled materials around containers are picked up regularly.			✓
8. Wash water is discharged to the sanitary sewer or is collected for proper disposal.	✓		
EMPLOYEE EDUCATION/ AWARENESS			
9. Brochures or posters displayed.	✓		
10. BMPs observed.	✓		
OVERALL RATING	GOOD	AVERAGE	NEEDS IMPROVEMENT

COMMENTS:

Received by: Phote Smith	Env. Health Specialist: S. Peralta / A. Colleas	Badge #

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If additional information is required, contact the Storm Water/Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

FOOD FACILITY STORMWATER COMPLIANCE SURVEY

FACILITY DBA: Entenmann's Crowheat	FACILITY #: 10034	DATE: 5/23/08	
ADDRESS: 26019 Jefferson Ave. Unit D, Murrieta	ACTIVITY: 2621	SERVICE CODE: 410	
COMPLIANCE AREAS	**YES**	**NO**	**N/A**
GREASE BARRELS/ INTERCEPTORS			
1. Grease pumped/removed on a regular basis.			✓
2. Grease interceptor located outside facility, maintained properly.			✓
EQUIPMENT CLEANING			
3. The following items are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Grease filters			✓
b. Floor mats	✓		
c. Floors (mop water and rinse water)	✓		
d. Grills			✓
OUTSIDE AREAS			
4. The following areas are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Sidewalk or outdoor seating			✓
b. Drive thru			✓
DUMPSTERS AND RECYCLING CONTAINERS			
5. Food waste bagged and sealed before disposal.	✓		
6. Dumpsters and recycling containers are covered.	✓		
7. Spilled materials around containers are picked up regularly.	✓		
8. Wash water is discharged to the sanitary sewer or is collected for proper disposal.			✓
EMPLOYEE EDUCATION/ AWARENESS			
9. Brochures or posters displayed.			✓
10. BMPs observed.	✓		
OVERALL RATING	GOOD	AVERAGE	NEEDS IMPROVEMENT

COMMENTS: Brochure provided.

Received by: [illegible] | Env. Health Specialist: Kristin Burnham | Badge # 451

If additional information is required, contact the Storm Water/Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

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Storm Water Clean Water PROTECTION PROGRAM

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0001730

FOOD FACILITY STORMWATER COMPLIANCE SURVEY

FACILITY DBA Walgreens	FACILITY # 8999	DATE 5/23/08	
ADDRESS 40420 Murrieta Hot Spring Rd, Murrieta	ACTIVITY 1622	SERVICE CODE: 410	
COMPLIANCE AREAS	**YES**	**NO**	**N/A**
GREASE BARRELS/ INTERCEPTORS			
1. Grease pumped/removed on a regular basis.			✓
2. Grease interceptor located outside facility, maintained properly.			✓
EQUIPMENT CLEANING			
3. The following items are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Grease filters			✓
b. Floor mats	✓		
c. Floors (mop water and rinse water)	✓		
d. Grills			✓
OUTSIDE AREAS			
4. The following areas are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Sidewalk or outdoor seating			✓
b. Drive thru			✓
DUMPSTERS AND RECYCLING CONTAINERS			
5. Food waste bagged and sealed before disposal.	✓		
6. Dumpsters and recycling containers are covered.	✓		
7. Spilled materials around containers are picked up regularly.	✓		
8. Wash water is discharged to the sanitary sewer or is collected for proper disposal.	✓		
EMPLOYEE EDUCATION/ AWARENESS			
9. Brochures or posters displayed.			✓
10. BMPs observed.	✓		
OVERALL RATING	(GOOD)	AVERAGE	NEEDS IMPROVEMENT

COMMENTS: Brochure provided.

Received by:	Env. Health Specialist: Kristen Burnham	Badge # 451

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If additional information is required, contact the Storm Water/Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

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0001731

FOOD FACILITY STORMWATER COMPLIANCE SURVEY

FACILITY DBA Murrieta Pizza Factory	FACILITY # 37113	DATE 5·27·08	
ADDRESS 40477 Murrieta Hot Spring, Murrieta	ACTIVITY 36621	SERVICE CODE: 410	
COMPLIANCE AREAS	**YES**	**NO**	**N/A**
GREASE BARRELS/ INTERCEPTORS			
1. Grease pumped/removed on a regular basis.			✓
2. Grease interceptor located outside facility, maintained properly.			✓
EQUIPMENT CLEANING			
3. The following items are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Grease filters	✓		
b. Floor mats	✓		
c. Floors (mop water and rinse water)	✓		
d. Grills	✓		
OUTSIDE AREAS			
4. The following areas are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Sidewalk or outdoor seating	✓		
b. Drive thru			✓
DUMPSTERS AND RECYCLING CONTAINERS			
5. Food waste bagged and sealed before disposal.	✓		
6. Dumpsters and recycling containers are covered.	✓		
7. Spilled materials around containers are picked up regularly.	✓		
8. Wash water is discharged to the sanitary sewer or is collected for proper disposal.	✓		
EMPLOYEE EDUCATION/ AWARENESS			
9. Brochures or posters displayed.	✓		
10. BMPs observed.	✓		
OVERALL RATING	GOOD	AVERAGE	NEEDS IMPROVEMENT
COMMENTS:			
Received by:	Env. Health Specialist: S. Peralta		Badge # 326

If additional information is required, contact the Storm Water/Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

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Storm Water Clean Water PROTECTION PROGRAM

HAZARDOUS WASTE/ HAZARDOUS MATERIALS FACILITY STORM WATER COMPLIANCE SURVEY FORM

FACILITY DBA	TELEPHONE	DATE
KTM OF Temecula	(951) 461-0691	5/27/08
ADDRESS: 46586 Jefferson Ave. STE A	CITY, ZIP: Murrieta CA 92562	
MAILING ADDRESS (if different from site address)	MAILING CITY, ZIP	
CONTACT: Andre Barbosa	FACILITY#: PR0037890	SIC CODE: 3751

Compliance Areas	YES	NO	N/A
***OUTSIDE AREAS (Free of staining & debris; provides good housekeeping; maintained in a manner to prevent runoff.)**		**Requires follow up**	
1. CHEMICAL STORAGE * The outside storage area is kept to minimize the possibility of a release. Chemicals / materials are protected from precipitation / storm water runoff and the containers show no signs of leaking.	✓		
2. DUMPSTER * No liquids are leaking from dumpster; surrounding area is free of trash.	✓		
3. ABOVEGROUND TANKS * No ground staining, no spillage observed and no discharge to storm drain. Tanks are maintained to minimize the possibility of a release (secondary containment).			✓
4. ONSITE STORM DRAIN* Protected from accidental discharge other than water.	✓		
5. POWER WASH OR STEAM CLEAN* (discharge to sewer) Drains to oil/water separator connected to a sanitary sewer and not a septic system. Steam cleaning not discharged to parking lot, storm drain or soil.	✓		
6. PARKING LOT / DRIVE WAY* Free of excess trash, chemical staining or liquids other than water.	✓		
7. OTHER* Non-storm water discharge (i.e. non-hazardous process discharge).			✓
8. MOP WATER TO SANITARY SEWER VIA CLARIFIER. Mop water is not dumped to the soil, parking lot, gutter, or other areas susceptible to storm water drainage.	✓		
9. STORM WATER EDUCATIONAL BROCHURES GIVEN TO FACILITY OR POSTERS DISPLAYED FOR EMPLOYEES. If no, what informational material should be sent to the facility?	✓		
10. IF A SWPPP IS REQUIRED, WAS IT AVAILABLE FOR REVEIW? See storm water handout for industrial facilities.			✓

OVERALL EVALUATION/ COMMENTS: No Violations noted.

RECEIVED BY: [signature] HAZ MAT SPEC: M. Vargas BADGE #

Agency referred to as indicated on the back of this page.

If additional information is required, contact the Storm Water/Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

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Storm Water Clean Water PROTECTION PROGRAM

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FOOD FACILITY STORMWATER COMPLIANCE SURVEY

FACILITY DBA Los 3 Compadres	FACILITY # 37810	DATE 5·27·05	
ADDRESS 29910 Murrieta Hot Springs Murrieta	ACTIVITY 3620	SERVICE CODE: 410	
COMPLIANCE AREAS	YES	NO	N/A
GREASE BARRELS/ INTERCEPTORS			
1. Grease pumped/removed on a regular basis.	✓		
2. Grease interceptor located outside facility, maintained properly.	✓		
EQUIPMENT CLEANING			
3. The following items are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Grease filters	✓		
b. Floor mats	✓		
c. Floors (mop water and rinse water)	✓		
d. Grills	✓		
OUTSIDE AREAS			
4. The following areas are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Sidewalk or outdoor seating	✓		
b. Drive thru			✓
DUMPSTERS AND RECYCLING CONTAINERS			
5. Food waste bagged and sealed before disposal.	✓		
6. Dumpsters and recycling containers are covered.	✓		
7. Spilled materials around containers are picked up regularly.	✓		
8. Wash water is discharged to the sanitary sewer or is collected for proper disposal.	✓		
EMPLOYEE EDUCATION/ AWARENESS			
9. Brochures or posters displayed.	✓		
10. BMPs observed.	✓		
OVERALL RATING	GOOD	AVERAGE	NEEDS IMPROVEMENT

COMMENTS: N/A

Received by: [signature] | Env. Health Specialist: S. Peralta | Badge #

If additional information is required, contact the Storm Water/Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

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HAZARDOUS WASTE/ HAZARDOUS MATERIALS FACILITY STORM WATER COMPLIANCE SURVEY FORM

FACILITY DBA	TELEPHONE	DATE
KTM North America	(951) 600-8007	5/28/08
ADDRESS: 38429 Innovation CT	CITY, ZIP: Murrieta CA 92563	
MAILING ADDRESS (if different from site address)	MAILING CITY, ZIP	
CONTACT: Juan Gonzalez	FACILITY#: PR0037896	SIC CODE: 3751

Compliance Areas	YES	NO	N/A
***OUTSIDE AREAS (Free of staining & debris; provides good housekeeping; maintained in a manner to prevent runoff.)**		**Requires follow up**	
1. CHEMICAL STORAGE * The outside storage area is kept to minimize the possibility of a release. Chemicals / materials are protected from precipitation / storm water runoff and the containers show no signs of leaking.		✓	
2. DUMPSTER * No liquids are leaking from dumpster; surrounding area is free of trash.	✓		
3. ABOVEGROUND TANKS * No ground staining, no spillage observed and no discharge to storm drain. Tanks are maintained to minimize the possibility of a release (secondary containment).			✓
4. ONSITE STORM DRAIN* Protected from accidental discharge other than water.	✓		
5. POWER WASH OR STEAM CLEAN* (discharge to sewer) Drains to oil/water separator connected to a sanitary sewer and not a septic system. Steam cleaning not discharged to parking lot, storm drain or soil.	~~✓~~	~~✓~~	
6. PARKING LOT / DRIVE WAY* Free of excess trash, chemical staining or liquids other than water.	✓		
7. OTHER* Non-storm water discharge (i.e. non-hazardous process discharge).			✓
8. MOP WATER TO SANITARY SEWER VIA CLARIFIER. Mop water is not dumped to the soil, parking lot, gutter, or other areas susceptible to storm water drainage.	✓		
9. STORM WATER EDUCATIONAL BROCHURES GIVEN TO FACILITY OR POSTERS DISPLAYED FOR EMPLOYEES. If no, what informational material should be sent to the facility?	✓		
10. IF A SWPPP IS REQUIRED, WAS IT AVAILABLE FOR REVEIW? See storm water handout for industrial facilities.			✓

OVERALL EVALUATION/ COMMENTS: #1) The Facility has an Outside Waste Storage Bin and Several Fuel / Waste Containers that are not Protected From Precipitation or Secondarily Contained. The Facility shall get all the Fuel Containers inside or Place inside a Storage Locker to prevent any release into the environment.

RECEIVED BY: [signature] | HAZ MAT SPEC: M. Vargas | BADGE #

Agency referred to as indicated on the back of this page.

If additional information is required, contact the Storm Water /Clean Water Protection Program on the Cities and County of Riverside at (800) 506-2555.

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Storm Water Clean Water PROTECTION PROGRAM

0001735

FOOD FACILITY STORMWATER COMPLIANCE SURVEY

FACILITY DBA Mama Rose's Pizzeria	FACILITY # 05908	DATE 5-28-05	
ADDRESS 39621 Los Alamos Rd Murrieta	ACTIVITY 2621	SERVICE CODE: 410	
COMPLIANCE AREAS	**YES**	**NO**	**N/A**
GREASE BARRELS/ INTERCEPTORS			
1. Grease pumped/removed on a regular basis.			✓
2. Grease interceptor located outside facility, maintained properly.			✓
EQUIPMENT CLEANING			
3. The following items are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Grease filters	✓		
b. Floor mats	✓		
c. Floors (mop water and rinse water)	✓		
d. Grills			✓
OUTSIDE AREAS			
4. The following areas are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Sidewalk or outdoor seating	✓		
b. Drive thru			✓
DUMPSTERS AND RECYCLING CONTAINERS			
5. Food waste bagged and sealed before disposal.	✓		
6. Dumpsters and recycling containers are covered.	✓		
7. Spilled materials around containers are picked up regularly.	✓		
8. Wash water is discharged to the sanitary sewer or is collected for proper disposal.	✓		
EMPLOYEE EDUCATION/ AWARENESS			
9. Brochures or posters displayed.	✓		
10. BMPs observed.	✓		
OVERALL RATING	GOOD	AVERAGE	NEEDS IMPROVEMENT
COMMENTS:			
Received by:	Env. Health Specialist: S. Peralta		Badge # 516

If additional information is required, contact the Storm Water/Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

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StormWater Clean Water PROTECTION PROGRAM

mw 9/01

0001736

FOOD FACILITY STORMWATER COMPLIANCE SURVEY

FACILITY DBA Peony Chinese		FACILITY # 3075146	DATE 5-28-05
ADDRESS 39565 Los Alamos Murrieta		ACTIVITY 3621	SERVICE CODE: 410
COMPLIANCE AREAS		YES	NO	N/A
GREASE BARRELS/ INTERCEPTORS				
1. Grease pumped/removed on a regular basis.		✓		
2. Grease interceptor located outside facility, maintained properly.		✓		
EQUIPMENT CLEANING				
3. The following items are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:				
a. Grease filters		✓		
b. Floor mats		✓		
c. Floors (mop water and rinse water)		✓		
d. Grills		✓		
OUTSIDE AREAS				
4. The following areas are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:				
a. Sidewalk or outdoor seating		✓		
b. Drive thru				✓
DUMPSTERS AND RECYCLING CONTAINERS				
5. Food waste bagged and sealed before disposal.		✓		
6. Dumpsters and recycling containers are covered.			✓	
7. Spilled materials around containers are picked up regularly.		✓		
8. Wash water is discharged to the sanitary sewer or is collected for proper disposal.		✓		
EMPLOYEE EDUCATION/ AWARENESS				
9. Brochures or posters displayed.		✓		
10. BMPs observed.		✓		
OVERALL RATING		GOOD	AVERAGE	NEEDS IMPROVEMENT

COMMENTS: Dumpsters & grease receptacle lid open

Received by: [signature]	Env. Health Specialist: S. Peralta	Badge # 3210

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If additional information is required, contact the Storm Water/Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

StormWater Clean Water PROTECTION PROGRAM

mw 9/01

0001737

FOOD FACILITY STORMWATER COMPLIANCE SURVEY

FACILITY DBA Rustico Ristorante Pizza	FACILITY # 08960	DATE 5-28-08	
ADDRESS 29940 Ste 102 Hunter Rd Murrieta	ACTIVITY 8621	SERVICE CODE: 410	
COMPLIANCE AREAS	**YES**	**NO**	**N/A**
GREASE BARRELS/ INTERCEPTORS			
1. Grease pumped/removed on a regular basis.	✓		
2. Grease interceptor located outside facility, maintained properly.	✓		
EQUIPMENT CLEANING			
3. The following items are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Grease filters	✓		
b. Floor mats	✓		
c. Floors (mop water and rinse water)	✓		
d. Grills	✓		
OUTSIDE AREAS			
4. The following areas are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Sidewalk or outdoor seating	✓		
b. Drive thru			✓
DUMPSTERS AND RECYCLING CONTAINERS			
5. Food waste bagged and sealed before disposal.	✓		
6. Dumpsters and recycling containers are covered.		✓	
7. Spilled materials around containers are picked up regularly.	✓		
8. Wash water is discharged to the sanitary sewer or is collected for proper disposal.	✓		
EMPLOYEE EDUCATION/ AWARENESS			
9. Brochures or posters displayed.	✓		
10. BMPs observed.			
OVERALL RATING	GOOD	AVERAGE	NEEDS IMPROVEMENT

COMMENTS: dumpster lid opened.

Received by: [signature]	Env. Health Specialist: S. Peralta	Badge # 396

If additional information is required, contact the Storm Water/Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

CITY OF MURRIETA
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0001738

FOOD FACILITY STORMWATER COMPLIANCE SURVEY

FACILITY DBA: McDonalds	FACILITY #: 07873	DATE: 6-2-08	
ADDRESS: 41200 Murrieta Hot Springs Murrieta	ACTIVITY: 2620	SERVICE CODE: 410	
COMPLIANCE AREAS	**YES**	**NO**	**N/A**
GREASE BARRELS/ INTERCEPTORS			
1. Grease pumped/removed on a regular basis.	✓		
2. Grease interceptor located outside facility, maintained properly.	✓		✓
EQUIPMENT CLEANING			
3. The following items are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Grease filters	✓		
b. Floor mats	✓		
c. Floors (mop water and rinse water)	✓		
d. Grills			✓
OUTSIDE AREAS			
4. The following areas are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Sidewalk or outdoor seating			✓
b. Drive thru			✓
DUMPSTERS AND RECYCLING CONTAINERS			
5. Food waste bagged and sealed before disposal.	✓		
6. Dumpsters and recycling containers are covered.	✓		
7. Spilled materials around containers are picked up regularly.	✓		
8. Wash water is discharged to the sanitary sewer or is collected for proper disposal.	✓		
EMPLOYEE EDUCATION/ AWARENESS			
9. Brochures or posters displayed.	✓		
10. BMPs observed.	✓		
OVERALL RATING	GOOD	AVERAGE	NEEDS IMPROVEMENT

COMMENTS:

Received by: P Ottavia	Env. Health Specialist: S. Peralta	Badge # 32

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Storm Water Clean Water PROTECTION PROGRAM

mw 9/01

0001739

FOOD FACILITY STORMWATER COMPLIANCE SURVEY

FACILITY DBA Panda Express	FACILITY # 08560	DATE 6·2·08	
ADDRESS 25312 Madison Ave Murrieta	ACTIVITY 2620	SERVICE CODE: 410	
COMPLIANCE AREAS	**YES**	**NO**	**N/A**
GREASE BARRELS/ INTERCEPTORS			
1. Grease pumped/removed on a regular basis.	✓		
2. Grease interceptor located outside facility, maintained properly.	✓		
EQUIPMENT CLEANING			
3. The following items are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Grease filters	✓		
b. Floor mats			✓
c. Floors (mop water and rinse water)	✓		
d. Grills			✓
OUTSIDE AREAS			
4. The following areas are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Sidewalk or outdoor seating	✓		
b. Drive thru			✓
DUMPSTERS AND RECYCLING CONTAINERS			
5. Food waste bagged and sealed before disposal.	✓		
6. Dumpsters and recycling containers are covered.		✓	
7. Spilled materials around containers are picked up regularly.			✓
8. Wash water is discharged to the sanitary sewer or is collected for proper disposal.	✓		
EMPLOYEE EDUCATION/ AWARENESS			
9. Brochures or posters displayed.	✓		
10. BMPs observed.	✓		
OVERALL RATING	GOOD	AVERAGE	NEEDS IMPROVEMENT

COMMENTS: Dumpster lids not closed.

Received by: [illegible]	Env. Health Specialist: S. Peralta	Badge # 396

If additional information is required, contact the Storm Water/Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

StormWater Clean Water PROTECTION PROGRAM

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0001740

FOOD FACILITY STORMWATER COMPLIANCE SURVEY

FACILITY DBA Farmer Boys	FACILITY # 7326	DATE 6/3/08	
ADDRESS 41300 Kalmia St. Murrieta	ACTIVITY 3621	SERVICE CODE: 410	
COMPLIANCE AREAS	**YES**	**NO**	**N/A**
GREASE BARRELS/ INTERCEPTORS			
1. Grease pumped/removed on a regular basis.	✓		
2. Grease interceptor located outside facility, maintained properly.	✓		
EQUIPMENT CLEANING			
3. The following items are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Grease filters	✓		
b. Floor mats	✓		
c. Floors (mop water and rinse water)	✓		
d. Grills	✓		
OUTSIDE AREAS			
4. The following areas are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Sidewalk or outdoor seating	✓		
b. Drive thru	✓		
DUMPSTERS AND RECYCLING CONTAINERS			
5. Food waste bagged and sealed before disposal.	✓		
6. Dumpsters and recycling containers are covered.	✓		
7. Spilled materials around containers are picked up regularly.	✓		
8. Wash water is discharged to the sanitary sewer or is collected for proper disposal.			✓
EMPLOYEE EDUCATION/ AWARENESS			
9. Brochures or posters displayed.			✓
10. BMPs observed.	✓		
OVERALL RATING	GOOD	AVERAGE	NEEDS IMPROVEMENT

COMMENTS: New poster and brochure provided.

Received by: Maria Ramirez	Env. Health Specialist: Kristen Burnham	Badge # 451

CITY OF MURRIETA
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If additional information is required, contact the Storm Water/Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water
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0001741

FOOD FACILITY STORMWATER COMPLIANCE SURVEY

FACILITY DBA Carl's Jr.	FACILITY # 56078	DATE 6-3-08	
ADDRESS 40980 California Oaks Rd. Murrieta	ACTIVITY 2621	SERVICE CODE: 410	
COMPLIANCE AREAS	**YES**	**NO**	**N/A**
GREASE BARRELS/ INTERCEPTORS			
1. Grease pumped/removed on a regular basis.	✓		
2. Grease interceptor located outside facility, maintained properly.	✓		
EQUIPMENT CLEANING			
3. The following items are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Grease filters	✓		
b. Floor mats	✓		
c. Floors (mop water and rinse water)	✓		
d. Grills	✓		
OUTSIDE AREAS			
4. The following areas are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Sidewalk or outdoor seating		✓	
b. Drive thru	✓		
DUMPSTERS AND RECYCLING CONTAINERS			
5. Food waste bagged and sealed before disposal.	✓		
6. Dumpsters and recycling containers are covered.			✓
7. Spilled materials around containers are picked up regularly.	✓		
8. Wash water is discharged to the sanitary sewer or is collected for proper disposal.		✓	
EMPLOYEE EDUCATION/ AWARENESS			
9. Brochures or posters displayed.			✓
10. BMPs observed.		✓	
OVERALL RATING	GOOD	(AVERAGE)	NEEDS IMPROVEMENT

COMMENTS: Staff observed hosing off sidewalk with water draining to stormdrain.
New poster and brochure provided.
Wash water of trash compactor observed to leave property and run down street.

Received by: [signature]	Env. Health Specialist: Kristen Burnham	Badge # 451

CITY OF MURRIETA
JUL 14 2008
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If additional information is required, contact the Storm Water/Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

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0001742

FOOD FACILITY STORMWATER COMPLIANCE SURVEY

FACILITY DBA Jalapeños	FACILITY # 3620	DATE 6/6/08	
ADDRESS 29992 Hunter Rd. Murrieta	ACTIVITY 58890	SERVICE CODE: 410	
COMPLIANCE AREAS	**YES**	**NO**	**N/A**
GREASE BARRELS/ INTERCEPTORS			
1. Grease pumped/removed on a regular basis.	✓		
2. Grease interceptor located outside facility, maintained properly.	✓		
EQUIPMENT CLEANING			
3. The following items are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Grease filters	✓		
b. Floor mats	✓		
c. Floors (mop water and rinse water)	✓		
d. Grills			✓
OUTSIDE AREAS			
4. The following areas are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Sidewalk or outdoor seating			✓
b. Drive thru			✓
DUMPSTERS AND RECYCLING CONTAINERS			
5. Food waste bagged and sealed before disposal.	✓		
6. Dumpsters and recycling containers are covered.		✓	
7. Spilled materials around containers are picked up regularly.	✓		
8. Wash water is discharged to the sanitary sewer or is collected for proper disposal.			✓
EMPLOYEE EDUCATION/ AWARENESS			
9. Brochures or posters displayed.			✓
10. BMPs observed.	✓		
OVERALL RATING	GOOD	AVERAGE	NEEDS IMPROVEMENT

COMMENTS: Poster + brochure provided.

Received by:	Env. Health Specialist: Kristen Burnham	Badge # 451

If additional information is required, contact the Storm Water/Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

CITY OF MURRIETA JUL 2008

StormWater Clean Water PROTECTION PROGRAM

mw 9/01

0001743

FOOD FACILITY STORMWATER COMPLIANCE SURVEY

FACILITY DBA Ami Sushi Restaurant	FACILITY # 37779	DATE 6 10 · 08	
ADDRESS 24530 Village Walk St C Murrieta	ACTIVITY 3620	SERVICE CODE: 410	
COMPLIANCE AREAS	YES	NO	N/A
GREASE BARRELS/ INTERCEPTORS			
1. Grease pumped/removed on a regular basis.	✓		
2. Grease interceptor located outside facility, maintained properly.	✓		
EQUIPMENT CLEANING			
3. The following items are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Grease filters	✓		
b. Floor mats	✓		
c. Floors (mop water and rinse water)	✓		
d. Grills			✓
OUTSIDE AREAS			
4. The following areas are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Sidewalk or outdoor seating	✓		
b. Drive thru			✓
DUMPSTERS AND RECYCLING CONTAINERS			
5. Food waste bagged and sealed before disposal.	✓		
6. Dumpsters and recycling containers are covered.		✓	
7. Spilled materials around containers are picked up regularly.	✓		
8. Wash water is discharged to the sanitary sewer or is collected for proper disposal.	✓		
EMPLOYEE EDUCATION/ AWARENESS			
9. Brochures or posters displayed.	✓		
10. BMPs observed.	✓		
OVERALL RATING	GOOD	AVERAGE	NEEDS IMPROVEMENT

COMMENTS: Dumpster lids Not covered

Received by: Chan Al Lin	Env. Health Specialist: S. Peralta	Badge # 3M

If additional information is required, contact the Storm Water/Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

StormWater Clean Water PROTECTION PROGRAM

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0001744

FOOD FACILITY STORMWATER COMPLIANCE SURVEY

FACILITY DBA Donut Star	FACILITY # 5341	DATE 6-11-08	
ADDRESS 40525 Cal Oaks, Murrieta	ACTIVITY 2620	SERVICE CODE: 410	
COMPLIANCE AREAS	YES	NO	N/A
GREASE BARRELS/ INTERCEPTORS			
1. Grease pumped/removed on a regular basis.			✓
2. Grease interceptor located outside facility, maintained properly.			✓
EQUIPMENT CLEANING			
3. The following items are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Grease filters	✓		
b. Floor mats	✓		
c. Floors (mop water and rinse water)	✓		
d. Grills			✓
OUTSIDE AREAS			
4. The following areas are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Sidewalk or outdoor seating	✓		
b. Drive thru			✓
DUMPSTERS AND RECYCLING CONTAINERS			
5. Food waste bagged and sealed before disposal.	✓		
6. Dumpsters and recycling containers are covered.	✓		
7. Spilled materials around containers are picked up regularly.			✓
8. Wash water is discharged to the sanitary sewer or is collected for proper disposal.	✓		
EMPLOYEE EDUCATION/ AWARENESS			
9. Brochures or posters displayed.	✓		
10. BMPs observed.	✓		
OVERALL RATING	GOOD	AVERAGE	NEEDS IMPROVEMENT

COMMENTS:

Received by: [signature]	Env. Health Specialist: S. Peralta	Badge # 3?2

If additional information is required, contact the Storm Water/Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

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mw 9/01

0001745

FOOD FACILITY STORMWATER COMPLIANCE SURVEY

FACILITY DBA Starbucks #6725	FACILITY # 7607	DATE 6-11-08	
ADDRESS 25230 Hancock Ave Murrieta	ACTIVITY 2620	SERVICE CODE: 410	
COMPLIANCE AREAS	**YES**	**NO**	**N/A**
GREASE BARRELS/ INTERCEPTORS			
1. Grease pumped/removed on a regular basis.			✓
2. Grease interceptor located outside facility, maintained properly.			✓
EQUIPMENT CLEANING			
3. The following items are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Grease filters			✓
b. Floor mats	✓		
c. Floors (mop water and rinse water)		✓	
d. Grills			✓
OUTSIDE AREAS			
4. The following areas are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Sidewalk or outdoor seating	✓		
b. Drive thru			✓
DUMPSTERS AND RECYCLING CONTAINERS			
5. Food waste bagged and sealed before disposal.	✓		
6. Dumpsters and recycling containers are covered.	✓		
7. Spilled materials around containers are picked up regularly.	✓		
8. Wash water is discharged to the sanitary sewer or is collected for proper disposal.	✓		
EMPLOYEE EDUCATION/ AWARENESS			
9. Brochures or posters displayed.	✓		
10. BMPs observed.	✓		
OVERALL RATING	GOOD	AVERAGE	NEEDS IMPROVEMENT

COMMENTS: Observed standing mop water in mop bucket

Received by:	Env. Health Specialist: S. Peralta	Badge # 3016

If additional information is required, contact the Storm Water/Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

CITY OF MURRIETA
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0001746

FOOD FACILITY STORMWATER COMPLIANCE SURVEY

FACILITY DBA TORTILLERIA SAN JORGE	FACILITY # 37583	DATE 6-12-08	
ADDRESS 25115 MADISON AVE #104, MURRIETA	ACTIVITY 3621	SERVICE CODE: 410	
COMPLIANCE AREAS	YES	NO	N/A
GREASE BARRELS/ INTERCEPTORS			
1. Grease pumped/removed on a regular basis.	✓		
2. Grease interceptor located outside facility, maintained properly.	✓		
EQUIPMENT CLEANING			
3. The following items are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Grease filters	✓		
b. Floor mats MOP SINK	✓		
c. Floors (mop water and rinse water) MOP SINK			
d. Grills IN PLACE / 3-comp			
OUTSIDE AREAS			
4. The following areas are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Sidewalk or outdoor seating			✓
b. Drive thru			✓
DUMPSTERS AND RECYCLING CONTAINERS			
5. Food waste bagged and sealed before disposal.	✓		
6. Dumpsters and recycling containers are covered.	✓		
7. Spilled materials around containers are picked up regularly.	✓		
8. Wash water is discharged to the sanitary sewer or is collected for proper disposal.	✓		
EMPLOYEE EDUCATION/ AWARENESS			
9. Brochures or posters displayed.	✓		
10. BMPs observed.	✓		
OVERALL RATING	GOOD	AVERAGE	NEEDS IMPROVEMENT

COMMENTS:

Received by:	Env. Health Specialist: Stacy Anderson	Badge # 218476

CITY OF MURRIETA
JUL 14 2008
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If additional information is required, contact the Storm Water/Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

StormWater CleanWater PROTECTION PROGRAM

mw 9/01

0001747

FOOD FACILITY STORMWATER COMPLIANCE SURVEY

FACILITY DBA Brunswick Cal Oaks Bowl	FACILITY # 5679	DATE 6·12·08	
ADDRESS 40440 Cal Oaks Murrieta	ACTIVITY 2021	SERVICE CODE: 410	
COMPLIANCE AREAS	**YES**	**NO**	**N/A**
GREASE BARRELS/ INTERCEPTORS			
1. Grease pumped/removed on a regular basis.			✓
2. Grease interceptor located outside facility, maintained properly.			✓
EQUIPMENT CLEANING			
3. The following items are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Grease filters	✓		
b. Floor mats			✓
c. Floors (mop water and rinse water)	✓		
d. Grills	✓		
OUTSIDE AREAS			
4. The following areas are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Sidewalk or outdoor seating	✓		
b. Drive thru			✓
DUMPSTERS AND RECYCLING CONTAINERS			
5. Food waste bagged and sealed before disposal.	✓	✓ OIC	
6. Dumpsters and recycling containers are covered.		✓	
7. Spilled materials around containers are picked up regularly.	✓		
8. Wash water is discharged to the sanitary sewer or is collected for proper disposal.	✓		
EMPLOYEE EDUCATION/ AWARENESS			
9. Brochures or posters displayed.	✓		
10. BMPs observed.	✓		
OVERALL RATING	GOOD ✓	AVERAGE	NEEDS IMPROVEMENT

COMMENTS: dumpster lids were open.

Received by: Monica Jones	Env. Health Specialist: S. Peralta	Badge # 326

If additional information is required, contact the Storm Water/Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

CITY OF MURRIETA
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Storm Water Clean Water PROTECTION PROGRAM

nw 9/01

0001748

FOOD FACILITY STORMWATER COMPLIANCE SURVEY

FACILITY DBA	Jack in the Box H3248	FACILITY # 5471	DATE 6.12.08	
ADDRESS	39578 Los Alamos, Murrieta	ACTIVITY 2621	SERVICE CODE: 410	
COMPLIANCE AREAS		**YES**	**NO**	**N/A**
GREASE BARRELS/ INTERCEPTORS				
1. Grease pumped/removed on a regular basis.		✓		
2. Grease interceptor located outside facility, maintained properly.		✓		
EQUIPMENT CLEANING				
3. The following items are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:				
a. Grease filters		✓		
b. Floor mats				✓
c. Floors (mop water and rinse water)		✓		
d. Grills				✓
OUTSIDE AREAS				
4. The following areas are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:				
a. Sidewalk or outdoor seating		✓		
b. Drive thru		✓		
DUMPSTERS AND RECYCLING CONTAINERS				
5. Food waste bagged and sealed before disposal.		✓		
6. Dumpsters and recycling containers are covered.		✓		
7. Spilled materials around containers are picked up regularly.		✓		
8. Wash water is discharged to the sanitary sewer or is collected for proper disposal.		✓		
EMPLOYEE EDUCATION/ AWARENESS				
9. Brochures or posters displayed.		✓		
10. BMPs observed.		✓		
OVERALL RATING		GOOD	AVERAGE	NEEDS IMPROVEMENT

COMMENTS:

Received by: Christen Shehata	Env. Health Specialist: S. Peralta	Badge # 3m

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If additional information is required, contact the Storm Water/Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water
Clean Water
PROTECTION PROGRAM

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FOOD FACILITY STORMWATER COMPLIANCE SURVEY

FACILITY DBA Casa Jimenez	FACILITY # 3735	DATE 6.17.08	
ADDRESS 40535 Calif Oaks Rd, Murrieta	ACTIVITY 3627	SERVICE CODE: 410	
COMPLIANCE AREAS	**YES**	**NO**	**N/A**
GREASE BARRELS/ INTERCEPTORS			
1. Grease pumped/removed on a regular basis.			✓
2. Grease interceptor located outside facility, maintained properly.			✓
EQUIPMENT CLEANING			
3. The following items are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Grease filters			✓
b. Floor mats	✓		
c. Floors (mop water and rinse water)	✓		
d. Grills	✓		
OUTSIDE AREAS			
4. The following areas are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Sidewalk or outdoor seating	✓		
b. Drive thru			✓
DUMPSTERS AND RECYCLING CONTAINERS			
5. Food waste bagged and sealed before disposal.	✓		
6. Dumpsters and recycling containers are covered.	✓		
7. Spilled materials around containers are picked up regularly.	✓		
8. Wash water is discharged to the sanitary sewer or is collected for proper disposal.	✓		
EMPLOYEE EDUCATION/ AWARENESS			
9. Brochures or posters displayed.	✓		
10. BMPs observed.	✓		
OVERALL RATING	GOOD	AVERAGE	NEEDS IMPROVEMENT
COMMENTS:			
Received by: Bandelio Salazar	Env. Health Specialist: S. Peralta		Badge #

If additional information is required, contact the Storm Water/Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

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FOOD FACILITY STORMWATER COMPLIANCE SURVEY

FACILITY DBA Subway	FACILITY # 5257	DATE 6-18-08	
ADDRESS 39872 Los Alamos Murrieta	ACTIVITY 2620	SERVICE CODE: 410	
COMPLIANCE AREAS	**YES**	**NO**	**N/A**
GREASE BARRELS/ INTERCEPTORS			
1. Grease pumped/removed on a regular basis.			✓
2. Grease interceptor located outside facility, maintained properly.			✓
EQUIPMENT CLEANING			
3. The following items are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Grease filters			✓
b. Floor mats			✓
c. Floors (mop water and rinse water)	✓		
d. Grills			✓
OUTSIDE AREAS			
4. The following areas are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Sidewalk or outdoor seating	✓		
b. Drive thru			✓
DUMPSTERS AND RECYCLING CONTAINERS			
5. Food waste bagged and sealed before disposal.	✓		
6. Dumpsters and recycling containers are covered.	✓		
7. Spilled materials around containers are picked up regularly.			✓
8. Wash water is discharged to the sanitary sewer or is collected for proper disposal.	✓		
EMPLOYEE EDUCATION/ AWARENESS			
9. Brochures or posters displayed.	✓		
10. BMPs observed.	✓		
OVERALL RATING	GOOD	AVERAGE	NEEDS IMPROVEMENT
COMMENTS:			
Received by: [illegible]	Env. Health Specialist: S. Peralta		Badge # 326

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If additional information is required, contact the Storm Water/Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

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FOOD FACILITY STORMWATER COMPLIANCE SURVEY

FACILITY DBA Submarina	FACILITY # 7322	DATE 10-18-08	
ADDRESS 40970 Cal Oaks Murrieta	ACTIVITY 2620	SERVICE CODE: 410	
COMPLIANCE AREAS	**YES**	**NO**	**N/A**
GREASE BARRELS/ INTERCEPTORS			
1. Grease pumped/removed on a regular basis.			✓
2. Grease interceptor located outside facility, maintained properly.			✓
EQUIPMENT CLEANING			
3. The following items are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Grease filters			✓
b. Floor mats			✓
c. Floors (mop water and rinse water)	✓		
d. Grills			✓
OUTSIDE AREAS			
4. The following areas are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Sidewalk or outdoor seating	✓		
b. Drive thru			✓
DUMPSTERS AND RECYCLING CONTAINERS			
5. Food waste bagged and sealed before disposal.	✓		
6. Dumpsters and recycling containers are covered.	✓		
7. Spilled materials around containers are picked up regularly.			✓
8. Wash water is discharged to the sanitary sewer or is collected for proper disposal.	✓		
EMPLOYEE EDUCATION/ AWARENESS			
9. Brochures or posters displayed.	✓		
10. BMPs observed.	✓		
OVERALL RATING	GOOD	AVERAGE	NEEDS IMPROVEMENT

COMMENTS:

Received by:	Env. Health Specialist: S. Peralta	Badge # 326

CITY OF MURRIETA
JUL 1 1 2008
ENGINEERING DEPT.

If additional information is required, contact the Storm Water/Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

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FOOD FACILITY STORMWATER COMPLIANCE SURVEY

FACILITY DBA: Lowes	FACILITY #: 37861	DATE: 6-20-08	
ADDRESS: 24701 Madison Ave, Murrieta	ACTIVITY: 1601	SERVICE CODE: 410	
COMPLIANCE AREAS	**YES**	**NO**	**N/A**
GREASE BARRELS/ INTERCEPTORS			
1. Grease pumped/removed on a regular basis.			✓
2. Grease interceptor located outside facility, maintained properly.			✓
EQUIPMENT CLEANING			
3. The following items are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Grease filters			✓
b. Floor mats	✓		✓
c. Floors (mop water and rinse water)	✓		✓
d. Grills			✓
OUTSIDE AREAS			
4. The following areas are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Sidewalk or outdoor seating	✓		✓
b. Drive thru			✓
DUMPSTERS AND RECYCLING CONTAINERS			
5. Food waste bagged and sealed before disposal.	✓		
6. Dumpsters and recycling containers are covered.	✓		
7. Spilled materials around containers are picked up regularly.			✓
8. Wash water is discharged to the sanitary sewer or is collected for proper disposal.	✓		
EMPLOYEE EDUCATION/ AWARENESS			
9. Brochures or posters displayed.	✓		
10. BMPs observed.	✓		
OVERALL RATING	GOOD	AVERAGE	NEEDS IMPROVEMENT

COMMENTS:

Received by: Claudia Knuge	Env. Health Specialist: S. Peralta	Badge # 325

If additional information is required, contact the Storm Water/Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

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FOOD FACILITY STORMWATER COMPLIANCE SURVEY

FACILITY DBA Chili's Bar & Grill	FACILITY # 9372	DATE 6 24 08	
ADDRESS 41070 Cal Oaks Rd Murrieta	ACTIVITY 3022	SERVICE CODE: 410	
COMPLIANCE AREAS	YES	NO	N/A
GREASE BARRELS/ INTERCEPTORS			
1. Grease pumped/removed on a regular basis.	✓		✓
2. Grease interceptor located outside facility, maintained properly.			✓
EQUIPMENT CLEANING			
3. The following items are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Grease filters	✓		
b. Floor mats	✓		
c. Floors (mop water and rinse water)	✓		
d. Grills	✓		
OUTSIDE AREAS			
4. The following areas are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Sidewalk or outdoor seating	✓		
b. Drive thru			✓
DUMPSTERS AND RECYCLING CONTAINERS			
5. Food waste bagged and sealed before disposal.	✓		
6. Dumpsters and recycling containers are covered.	✓		
7. Spilled materials around containers are picked up regularly.	✓		
8. Wash water is discharged to the sanitary sewer or is collected for proper disposal.	✓		
EMPLOYEE EDUCATION/ AWARENESS			
9. Brochures or posters displayed.	✓		
10. BMPs observed.	✓		
OVERALL RATING	GOOD	AVERAGE	NEEDS IMPROVEMENT
COMMENTS:			
Received by: [signature]	Env. Health Specialist: S. Peralta		Badge #

CITY OF MURRIETA
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If additional information is required, contact the Storm Water/Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

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4. INDUSTRIAL/COMMERCIAL
(SECTION H.2 of ORDER NO. R9-2004-001), CONT.

3) **Description and number of training efforts conducted over the last year (for industrial/commercial facility operators and/or inspectors).** attendance of Riverside County NPDES training for activities related to DAMP implementation

4)

a. **Training:**

Training	Training Description	Training Dates	Number of Attendees
Municipal	Riv. Co. NPDES to DAMP implementation	11/27/07	1
		Total	**1**

5) **An assessment of program effectiveness based on the measurable goals established in the Permittee's Individual SWMP:** the City relies on the CAP, HMMD, and DEH inspection programs.

6) **Additional Comments/Information:**

Describe the major accomplishments of the Industrial Component over the past year: The Industrial Component appears to be in compliance.

Describe the major accomplishments of the Commercial Component over the past year: The Commercial Component appears to be in compliance.

Summarize the internal and external education and outreach activities the Industrial Component has conducted over the past year: The City relies on the CAP, HMMD, and DEH programs.

Summarize the internal and external education and outreach activities the Commercial Component has conducted over the past year: the City relies on the CAP, HMMD, and DEH programs

4. INDUSTRIAL/COMMERCIAL
(SECTION H.2 of ORDER NO. R9-2004-001), CONT.

Summarize new activities or improvements to be implemented next year as a result of your self assessment of the Industrial Component: continue training and propose additional inspection program.

Summarize new activities or improvements to be implemented next year as a result of your self assessment of the Commerical Component: continue training and propose additional inspection program.

Other comments

5. RESIDENTIAL
(SECTION H.3 of ORDER NO. R9-2004-001)

1) **A description of residential areas that were focused on during the past year:** existing single family residences are the primary focus of Code Enforcement. The City currently performs inspections as they pass through the different areas as part of their daily trips to other sites and responds to phone calls as they are received. All new residential projects, before being accepted for maintenance by the City, are required to submit a video tape inspection of the storm drain and drainage system, ensuring no illicit connections or points of discharge. This process is a good precautionary step for the City involving new residential developments.

2) **Number and type of enforcement actions taken:**

Enforcement and Compliance Responses	Public Projects
Education and information	0
Verbal Warning	0
Written Warning	0
Notice of Non-Compliance	0
Administrative Compliance Order	0
Misdemeanor	0
Infraction (NPDES violations)	46
Citation	0
Referral to SDRWQCB	0
Total	**46**

3) **An assessment of program effectiveness based on the measurable goals established in the Permittee's Individual SWMP:** good

4) **Additional Comments/Information:**

Describe the major accomplishments of the Residential Component over the past year: While on patrol, pro-active response to person illegally discharging, dumping, littering into the residential storm drains, is routinely addressed while on duty.

Summarize the internal and external education and outreach activities the Residential Component has conducted over the past year: internal training and public information pamphlets in the main entrance area to City Hall.

RESIDENTIAL
(SECTION H.3), CONT.

Summarize new activities or improvements to be implemented next year as a result of your self assessment of the Residential Component: coordinate efforts with Construction department.

Other comments

6. EDUCATION
(SECTION I of ORDER NO. R9-2004-001)

1) **Description of education efforts conducted by the Permittee (not collectively with other Permittees) during the previous year:** I asked Mike Brooks if he had anything

Audience	Measures
Permittee Departments and Personnel	Number of Permittee employees trained for: • Construction Inspection: 9 • Industrial/Commercial Inspection: 1 • Municipal Facilities and Activities: 20 • Development Planning: 12
Construction Site Owners and Developers	Outreach events conducted: distribute first notice in August 2007 and second notice September 2007
Industrial/Commercial Owners and Operators	Industrial/Commercial outreach events conducted: None
Residential Community, General Public, Other Public Agencies and Students	Number of Media Impressions in: • Newspaper: None • Mailings: None • Radio/TV: None • Billboards: None • Other: Website • Materials: Pamphlets at main entrance area Number of classroom presentations: none by City Public Education events conducted: Annual Murrieta's birthday bash June 08 and Fireman's barbecue in April 08

2) **Assessment of overall program effectiveness based on the measurable goals established in the Permittee's Individual SWMP:** The City continued to provide training to municipal staff in specific categories (i.e. new development, construction, municipal activities and industrial / commercial) through the implementation agreement with Riverside County Flood Control & Water Conservation District.

3) **Additional Comments/Information:**

Describe the major accomplishments of the Education Component over the past year: None to report

6. EDUCATION
(SECTION I of ORDER NO. R9-2004-001)

Summarize new activities or improvements to be implemented next year as a result of your self assessment of the Education Component: propose adding educational information on the City's Public Access Television Channel.

Other comments

7. ILLICIT DISCHARGE DETECTION AND ELIMINATION
(SECTION J of ORDER NO. R9-2004-001)

1) **Number of illicit discharges, connections and spills reported and/or identified during the reporting period:** Code Enforcement reported 46 NPDES related calls-for-service during the reporting period. The distinguishing between the different types of violations (illicit discharges, illicit connections, and spills) was not tracked. The Code Enforcement officer does address the concern either by follow-up telephone call or a site visit. Code Enforcement issued 53 citations / fines totaling $14,500.

   a) **Illicit Discharges (ID):**
   b) **Illicit Connections (IC):**
   c) **Spills (S):**

2) **Number of illicit discharges or connections investigated during the reporting period and the outcome of the investigations:** Code Enforcement reported 46 NPDES related calls-for-service during the reporting period. The distinguishing between the different types of violations (illicit discharges, illicit connections, and spills) was not tracked. The Code Enforcement officer does address the concern either by follow-up telephone call or a site visit. Code Enforcement issued 53 citations / fines totaling $14,500.

Type	Category	Substance	Outcome of Investigation
ID	Residential	Oil/Grease	
ID	Residential	Oil/Grease	
ID	Residential	Oil/Grease	
ID	Residential	Oil/Grease	
ID	Residential	Oil/Grease	
ID	Residential	Oil/Grease	

3) **Number and types of enforcement actions taken for illicit discharges or connections during the reporting period:**

Enforcement and Compliance Responses	Private Facilities	Public Facilities
Non-monetary penalties		
Stop work authority		
Fines	46	0
Financial Security (amount of Fines assessed)	$14,500	0
Permit/Business License Denial		
Total	**46**	**0**

7. ILLICIT DISCHARGE DETECTION AND ELIMINATION
(SECTION J of ORDER NO. R9-2004-001), CONT.

4) **Number of times your agency's hotline was called during the reporting period, as compared to previous reporting periods.**

	Number of Calls	
	2006-07	**2007-08**
Water Pollution Hotline	84	46

5) **Number and location of dry weather monitoring sites that were monitored during the reporting period:** we could not locate the data from for our dry weather monitoring program. The City of Temecula stated that they performed dry weather testing with the City of Murrieta.

Number of Site(s): two

Location(s): California Oaks Channel and Catt Road

7. ILLICIT DISCHARGE DETECTION AND ELIMINATION
(SECTION J of ORDER NO. R9-2004-001), CONT.

6) **Summary of Illicit Discharge Monitoring Program results, including: 1) All inspection, field screening, and analytical monitoring results; 2) All follow-up and elimination activities; and 3) Any proposed changes to station locations and/or sampling frequencies:** this information was not located.

Date	Location	Monitoring Results	Follow-up and Elimination Activities	Proposed Changes
				No Changes Comment(s):
				No Changes Comment(s):
				No Changes Comment(s):
				No Changes Comment(s):
				No Changes Comment(s):
				No Changes Comment(s):
				No Changes Comment(s):
				No Changes Comment(s):
				No Changes Comment(s):
				No Changes Comment(s):

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7. ILLICIT DISCHARGE DETECTION AND ELIMINATION
(SECTION J of ORDER NO. R9-2004-001), CONT.

7) **An assessment of overall program effectiveness based on the measurable goals established in the Permittee's Individual SWMP:** dry weather testing will be performed in April 2009 and September 2009 for the next reporting year and monitoring data will be included in next annual report.

8) **Additional Comments/Information:**

Describe the major accomplishments of the Illicit Discharge Detection and Elimination Component over the past year: None to report

Summarize the internal and external education and outreach activities the Illicit Discharge Detection and Elimination Component has conducted over the past year: None to report

Summarize new activities or improvements to be implemented next year as a result of your self assessment of the Illicit Discharge Detection and Elimination Component: gather, log and keep monitoring information in a designated area, created a method for distinguishing the different types of Illicit Discharges, and re-evaluate the amount the fine amounts.

Other comments

8. PUBLIC PARTICIPATION

1) **A description of efforts to include the public urban runoff management programs during the reporting period (i.e., river clean-ups, volunteer monitoring, Permittee council meetings related to the SWMP, etc.):** The City distributed educational and promotional material during the Fireman's barbecue April 08 annual birthday bash June 2008. In addition, the City is an active participant in the annual Santa Margarita River watershed clean up. **Attachment 'C'** has a flyer for next fiscal years event.

2) **Additional Comments/Information:**

Assessment of overall program effectivenss based on the measurable goals established in the Permittee's Individual SWMP: it is difficult to gauge if the Public is aware of the goals because they do not provide feedback.

Describe the major accomplishments of the Public Participation Component over the past year: None

Summarize the internal and external education and outreach activities the Public Participation Component has conducted over the past year: public information handouts at City events.

Summarize new activities or improvements to be implemented next year as a result of your self assessment of the Public Participation Component: None to report

Other comments

8. PUBLIC COMPONENT
(SECTION F of ORDER NO. R9-2004-001), CONT.

ATTACHMENT C

Please Join Us!

SANTA MARGARITA RIVER

WATERSHED CLEAN UP

November 1, 2008, 8am-12pm

The 26.2 mile watershed of the Santa Margarita River provides habitat for plants and animals in San Diego and Riverside Counties. Since 1995, volunteers have prevented over 1400 tons of trash from polluting our creeks and entering the Pacific Ocean.

8:00 am Report to one of the staging areas below to pick up
your free Clean Up T-shirt, garbage bags,
and directions to your clean up area.

12:00 pm Free barbecue for volunteers
at Perrit Park in Lakeland Village

Murrieta Staging Areas:

Santa Rosa Plateau Ecological Reserve, 39400 Clinton Keith Road
Murrieta Police Station, 24701 Jefferson Avenue

For more information, contact Carole Bell at (951) 677-6951x223 or cbell@tnc.org
Community Service Hours are available

Sponsored by: Supervisor Bob Buster, CR&R, WM and EMARCD

9. FISCAL ANALYSIS COMPONENT

Fiscal Analysis Component - each Permittee shall include an annual fiscal analysis, for each fiscal year covered by Order No. R9-2004-001, in its Individual Annual Report. This analysis shall evaluate the expenditures (such as capital, operation and maintenance, education, and administrative expenditures) necessary to accomplish the activities of the Permittee's Individual SWMP. The analysis shall include the following:

1) **A report of the previous reporting period's budget and a budget for the upcoming reporting period. To the extent possible, the budgets should be broken down by the following programs:**

Program Element	Fiscal Year 2007-2008		Fiscal Year 2008-2009	
	Capital Expenditures	O&M/Admin Expenditure	Capital Expenditures	O&M/Admin Expenditure
Program Management				
Annual Fee for MS4 NPDES Permit				
Implementation Agreement Shared Cost				
Construction Inspections	**(See**	**Attachment**	**'D')**	
Development Planning				
Industrial and Commercial Inspections				
Illicit Connections & Illegal Discharges Program				
Municipal Facilities and Activities				
Public Education & Outreach				
Monitoring Program				
Other				
Total	**$ 0**	**$ 0**	**$ 0**	**$ 0**

ATTACHMENT D

NPDES (Fund 052)

The National Pollutant Discharge Eliminant System is mandated by the federal government, which requires cities to clean up storm water runoff. Special assessments are collected from property owners on their property tax bills.

Murrieta

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Murrieta

NPDES

FUND SUMMARY

SOURCES

Revenues:		
Taxes		
Licenses and Permits		
Intergovernmental		
Charges For Services	285,000	
Fines and Forfeitures		
Use of Money and Property		
Other Revenue		
Other Financing Sources		
	285,000	
Transfers in From		211,987
Total Sources		496,987

USES

Recommended Appropriations:	
Salaries and Benefits	128,387
Supplies	6,500
Operations and Maintenance	33,000
Services	321,000
Debt Service	
Capital Outlay	
Allocated Costs	
Total Appropriations	488,887
Operating Transfers Out	8,100
Estimated Revenues Over (Under) Appropriations	0
Estimated Fund Balance July 1, 2008	327,598
Additional for General Fund Reserve	
Capital Improvement Projects:	
Recommended Fund Balance June 30, 2009	327,598

Murrieta

Revenue Sources by Type - NPDES

Fiscal Year 2008-2009

Fund Type & Name	Actuals 2005-06	Actuals 2006-07	Budget 2007-08	Adopted 2008-09
OTHER SPECIAL FUNDS				
NPDES (CSA 152)				
Charges for Services Revenue				
RATES & CHARGES	21,125	317,561	280,000	285,000
Transfer In Accounts				
TRSF IN - GENERAL FUND	163,931	166,400	226,100	211,987
TOTAL	185,056	483,961	506,100	496,987

Murrieta

History of Expenditures by Department - NPDES

Fiscal Year 2008-2009

Expenditure Type	Actuals 2005-06	Actuals 2006-07	Budget 2007-08	Adopted 2008-09
OTHER SPECIAL FUNDS				
NPDES (CSA 152)				
Salaries and Wages	0	0	0	128,387
Operating and Maintenance	214,900	186,377	414,601	360,500
Capital Outlay	0	0	1,250	0
Transfers	11,531	45,550	90,250	8,100
TOTAL	**226,431**	**231,927**	**506,101**	**496,987**

Murrieta

NPDES Fund (052)

NPDES (CSA 152) 052

Department No. 0000

BUDGETED EXPENSES		
Operating and Maintenance		$360,500
Salaries and Wages		$128,387
Transfers		$8,100
	TOTAL	$496,987

FINANCING SOURCES		
Charges for Services Revenue		$285,000
Transfer In Accounts		$211,987
General Revenues		$0
	TOTAL	$496,987

PERSONNEL	2005/06	2006/07	2007/08	2008/09
Civil Engineering Assistant	0.00	0.00	0.00	1.00
PW Lead Maintenance Worker	0.00	0.00	0.00	0.50
TOTAL				1.50

Murrieta

NPDES Fund (052)

NPDES (CSA 152) 052

Department No. 0000

6114	MAINTENANCE SUPPLIES	Public Works Maintenance ($5,000)
6183	TRAINING & DEVELOPMENT	Public Works Staff NPDES Trainings ($1,500)
6320	PROMOTIONAL SUPPLIES	Storm Water Program Outreach ($1,500)
6410	CONTRACT SERVICES	Mandated reports programming, NPDES Program Implementation ($30,000)
6410.007	CONTRACT SVCS - UNDERGRO	Open Channel Maintenance Permits ($15,000)
6410.011	CONTRACT SVCS-MUNI FACILIT	Municipal facitilites - BMP ($6,000)
6410.012	CONTRACT SVCS-SWRCB MS4	SWRCB MS4 Permit Fee ($20,000)
6410.013	CONTRACT SVCS-LEGAL COUN	Legal Council Assistance ($10,000)
6410.014	CONTRACT SVCS-IMPLEMENTA	Implementation Agreement ($175,000)
6410.015	CONTRACT SVCS - LAGOON TM	Lagoon TMDL cost sharing ($20,000)
6418	STREET SWEEPING	Sweep Public Streets (Residential & Commercial) ($75,000)
9001	TRSF OUT - GENERAL FUND	Catch basin stencil ($3,000)
		Emergency response ($1,000)
9046	TRSF OUT - VEHICLE FUND	Depreciation for Vactor ($3,100)
		Fuel for Vactor ($1,000)

Murrieta

NPDES Fund (052)

NPDES (CSA 152) 052

Department No. 0000

		2005/06 ACTUAL	2006/07 ACTUAL	2007/08 BUDGET	2008/09 BUDGET	PERCENT CHANGE
	Revenue	185,056	483,961	506,100	496,987	-1.80 %
	Salaries and Wages					
5011	SALARY	0	0	0	86,370	100.00 %
50xx	BENEFITS	0	0	0	42,016	100.00 %
	Salaries and Wages Total:	0	0	0	128,387	100.00 %
	Operating and Maintenance					
6114	MAINTENANCE SUPPLIES	0	997	0	5,000	100.00 %
6160	INCIDENTAL MILEAGE	0	0	190	500	163.16 %
6183	TRAINING & DEVELOPMENT	0	0	488	1,500	207.38 %
6320	PROMOTIONAL SUPPLIES	135	0	0	1,500	100.00 %
6410	CONTRACT SERVICES	0	0	24,783	30,000	21.05 %
6410.007	CONTRACT SVCS - UNDERGROUND/OPEN CH	2,941	0	109,946	15,000	-86.36 %
6410.008	CONTRACT SVCS - UPDATING CONSTRUCT	0	0	8,000	0	-100.00 %
6410.011	CONTRACT SVCS-MUNI FACILITY	0	0	0	6,000	100.00 %
6410.012	CONTRACT SVCS-SWRCB MS4 PERMIT FEE	6,406	7,406	7,406	20,000	170.05 %
6410.013	CONTRACT SVCS-LEGAL COUNCIL ASSISTANCE	0	0	0	10,000	100.00 %
6410.014	CONTRACT SVCS-IMPLEMENTATION AGENT	120,418	121,481	121,188	175,000	44.40 %
6410.015	CONTRACT SVCS - LAGOON TMDL COST SHARING	0	0	25,000	20,000	-20.00 %
6410.016	CONTRACT SVCS - TMDL INV ORDER	0	0	25,000	0	-100.00 %
6418	STREET SWEEPING	85,000	56,493	100,000	75,000	-25.00 %
6999	CONTINGENCY	0	0	600	1,000	66.67 %
	Operating and Maintenance Total:	214,900	186,377	422,601	360,500	-14.69 %
	Capital Outlay	0	0	1,250	0	-100.00 %
	Transfers	11,531	45,550	90,250	8,100	-91.02 %
	GRAND TOTAL	(41,375)	252,033	(1)	0	-143.86 %

9. FISCAL ANALYSIS COMPONENT

(CONT.)

2) **A description of the source(s) of funds that were utilized during the previous fiscal year and the source(s) of funds proposed to meet the necessary expenditures for the subsequent year, including legal restrictions on the use of such funds.**

Source of Funds	Capital Expenditures	Percent of Total Program Funding	Restrictions on Use (if applicable)
CSA 152		27%	
General Fund		73%	

3) **Additional Comments/Information:**

Other comments

10. NON-STORM WATER DISCHARGES

Permittees shall report on any discharge category listed in Requirement B.2 of Order No. R9-2004-001 that was identified as a source of pollutants during the reporting period. For each identified category, the Permittee shall report whether it elected to prohibit the discharge or to require BMPs to reduce pollutants in the discharge to the MEP. If the discharge is not prohibited, the BMPs that will be implemented, or required to be implemented, shall be described in each Permittee's Individual SWMP Annual Report. Last year's responses are noted in red

Category	Prohibited	BMP to be Implemented
Diverted stream flows	☒ Yes ☐ No	Not Applicable
Rising ground waters	☒ Yes ☐ No	Not Applicable
Uncontaminated ground water infiltration [as defined at 40 CFR 35.2005(20)] to MS4s	☒ Yes ☐ No	Not Applicable
Uncontaminated pumped ground water	☐ Yes ☒ No	Analyze water sample for total suspended solids, specific conductance, semiviolatiles and volatiles by EPA method's 624 & 625
Foundation drains	☒ Yes ☐ No	Not Applicable
Springs	☒ Yes ☐ No	Not Applicable
Water from crawl space pumps	☐ Yes ☒ No	Filtered prior to pumped into a catch basin
Footing drains	☒ Yes ☐ No	Not Applicable
Air conditioning condensation	☒ Yes ☐ No	Not Applicable
Flows from riparian habitats and wetlands	☒ Yes ☐ No	Not Applicable
Water line flushing	☐ Yes ☒ No	Filtered prior to pumped into a catch basin
Landscape irrigation	☒ Yes ☐ No	Not Applicable
Discharges from potable water sources not subject to NPDES Permit No. CAG679001, other than water main breaks	☐ Yes ☒ No	Filter prior to pumped into a catch basin
Irrigation water	☒ Yes ☐ No	Not Applicable
Lawn watering	☒ Yes ☐ No	Not Applicable
Individual residential car washing	☒ Yes ☐ No	Not Applicable
Non-emergency fire fighting flows	☒ Yes ☐ No	Not Applicable
Dechlorinated swimming pool discharges	☒ Yes ☐ No	Use Flood Control handout

NON-STORM WATER DISCHARGES (CONT.)

1) **Additional Comments/Information:** Other comments

11. RECEIVING WATER LIMITATIONS

This section includes the report required pursuant to Requirement C.2.a. of Order No. R9-2004-001, if applicable.

Requirement C.2.a. states:

"Upon a determination by either a Permittee or the SDRWQCB that MS4 discharges are causing or contributing to an exceedance of an applicable water quality standard, the Permittee shall promptly notify and thereafter submit a report to the SDRWQCB that describes BMPs that are currently being implemented and additional BMPs that will be implemented to prevent or reduce any pollutants that are causing or contributing to the exceedance of water quality standards. The report may be incorporated in the SWMP Annual Report unless the SDRWQCB directs an earlier submittal. The report shall include an implementation schedule. The SDRWQCB may require modifications to the report;"

Implement a dry weather monitoring and testing program and try to create a reasonable baseline for the applicable water quality standard, compare the data, and make an assessment.

12. ADDITIONAL URBAN RUNOFF DATA

This section is a summary of all urban runoff related data not included in the annual monitoring report (e.g., special investigations).

Additional data was not generated during this reporting period by the City of Murrieta

13. PROPOSED REVISIONS

This section includes proposed revisions to the Individual SWMP, including areas in need of improvement based on the assessment of effectiveness of each program component.

Provide more educational opportunities and monitoring.

Bill Luna
County Executive Officer

Jay E. Orr
Assistant County Executive Officer

Executive Office, County of Riverside

RE: 2007/2008 Annual Progress Report, Santa Margarita River Watershed

MS4 Permit No. CAS0108766
San Diego Regional Water Quality Control Board Order No. R9-2004-001
Fourth Year Submittal

County of Riverside Certification Statement

I Certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based upon my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Gary Christmas

Gary Christmas
Chief Deputy County Executive Officer
Riverside County Executive Office

10/24/08
Date

Robert T. Andersen Administrative Center
4080 Lemon Street • 4th Floor • Riverside, California 92501 • (951) 955-1100 • Fax (951) 955-1105

SANTA MARGARITA WATERSHED NPDES MUNICIPAL STORMWATER PERMIT

(NPDES No. CAS0108766)

ANNUAL REPORTING FORMS

FOR

CITY/COUNTY/DISTRICT FISCAL YEAR 2007 - 2008

I. Executive Summary
1. Development Planning
2. Construction
3. Municipal
4. Industrial/Commercial
5. Residential
6. Education
7. Illicit Discharge Detection and Elimination
8. Public Participation
9. Fiscal Analysis Component
10. Non-Storm Water Discharges
11. Receiving Water Limitations
12. Additional Urban Runoff Data
13. Proposed Revisions

BOARD ORDER NO. R9-2004-001
CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN DIEGO REGION

Executive Summary

The County of Riverside (County), the Riverside County Flood Control and Water Conservation District (District), Coachella Valley Water District (CVWD) and the twenty-six incorporated cities of Riverside County (Cities) operate Municipal Separate Storm Sewer Systems (MS4) that discharge stormwater and urban runoff pursuant to the following National Pollution Discharge Elimination System (NPDES) permits:

- Whitewater River Basin-MS4 Permit No. CAS617002, Whitewater River Basin Regional Water Quality Control Board Order No. R7-2008-001
- Santa Ana River-MS4 Permit No. CAS601833, Santa Ana Regional Water Quality Control Board Order No. R8-2002-0011 (pending renewal)
- Santa Margarita River Watershed-MS4 Permit No. CAS0108766 and San Diego Regional Water Quality Control Board Order No. R9-2004-001;

The County and District serve as the principle permittees and the twenty-six cities plus the Coachella Valley Water District are co-permittees within the three primary watersheds. Collectively the permittees are required as part of the MS4 permit process to develop and implement adaptable management programs to protect surface water quality and to report annually on progress with respect to specific compliance activities.

Demographics

Population

The County of Riverside was incorporated in 1893 out of parts of the San Diego and San Bernardino Counties in Southern California. It is bordered by the San Bernardino, San Diego, Orange, Imperial counties, and La Paz County, Arizona to the East. As of January 2008, with adjustments made for the newly incorporated cities of Menifee (Oct 2008) and Wildomar (July 2008) the California Department of Finance (DOF) estimates the population of Riverside County at 2,088,322 making it the fourth largest county of the fifty-eight counties in the state. This accounts for an increase of 56,700 people since 2007, or a 2.79% increase in population. The County provides governmental services to 5.48% of the state's population. Since the late 1990's the population of Riverside County has sky-rocketed due to of the availability of affordable housing.

Land Area

As well as having the fourth largest population, the County of Riverside is the fourth largest in land mass encompassing 7295.6 square miles. The region is predominantly made up of arid and semi-arid desert lands. Approximately 90% of the land area and one quarter of the population is in the unincorporated rural areas of the County; in comparison to three quarters of the population residing in the urban and suburban cities which accounts for 10% of the land area.

Land Use

Historically the primary land use for the region has been farming. The Coachella Valley is known for having one of the longest growing seasons in the nation. It is the primary producer of dates. Other agricultural products cultivated in the Coachella Valley include fruits and vegetables, especially table grapes, citrus fruits and peppers along with avocados, artichokes, beans, carrots, lettuce, peaches, persimmons, plums, prunes, spinach, strawberries, mangoes, tomatoes corn, cotton, grains (barley, oats and wheat, plus rice fields kept wet or moist in the Salton Sea area), and other vegetable crops. The Coachella Valley is one of the fastest growing areas in Riverside County because of affordable land and mild winter temperatures. Because of the mild winter weather the Coachella Valley has become the recreational Mecca for tennis, golf, and polo enthusiasts. It is also the annual winter-time destination for "snow-birds" (retired individuals who migrate to the desert to escape the harsh winters in the Mid-west and East.

The Central/South portion of Riverside County has been historically known as the "Agri-Empire" where potatoes and other vegetable corps were grown, it is also home to numerous dairy farms. In the Temecula Valley avocado, citrus and most recently vineyards that produce world renowned wines dot the foothills and the valley floor.

In Western Riverside County expansive citrus groves once flourished and by 1895, thanks to the amazingly sweet navel orange, Riverside was listed as the richest city per capita in the nation and the region was referred to as the "Orange Empire". Almost, one hundred years later, most of the orange groves have been replaced with affordable housing.

Salton Sea

The Salton Sea is the largest lake in California. It is jointly contained in Riverside and Imperial counties. The 40 mile long inland sea was formed by accident, and is now a briny agricultural sink. Before the sea formed, the area was a dry depression, below sea level, south of which was one of the most productive agricultural areas in the state. In 1905, an irrigation canal that brought Colorado River water to the valley was overwhelmed by high water from rains along the Colorado River watershed. Before the breach could be dammed the entire flow of the Colorado River drained into the Salton Sink, rapidly filling it up with water. Instead of evaporating over a period of years, today's Salton Sea is maintained, in large part, by agricultural runoff from irrigation practices in the Imperial Valley. Irrigation of these fertile valleys supports the Salton Sea and an industry that helps feed the world. Agricultural fields in the region join with the Salton Sea to support an ecosystem that attracts hundreds of species of birds and other wildlife. It is a crucial link in the Pacific Flyway, and a very important part of the Colorado River's delta.

Western Riverside County Multiple Species Habitat Conservation Plan

The Western Riverside County Multiple Species Habitat Conservation Plan (MSHCP) was adopted in June of 2003, and is a comprehensive, multi-jurisdictional Habitat Conservation Plan (HCP) focusing on conservation of species and their associated habitats in Western Riverside County. This Plan is one of several large, multi-jurisdictional habitat-planning efforts in Southern California with the overall goal of maintaining biological and ecological diversity within a rapidly urbanizing region. Large-scale The MSHCP allow Riverside County and its cities to better control local land-use decisions and maintain a strong economic climate in the region while addressing the requirements of the state and federal Endangered Species Acts.

The MSHCP Plan Area encompasses approximately 1.26 million acres (1,966 square miles); it includes all unincorporated Riverside County land west of the crest of the San Jacinto Mountains to the Orange County line, as well as the jurisdictional areas of the Cities of Temecula, Murrieta, Lake Elsinore, Canyon Lake, Norco, Corona, Riverside, Moreno Valley, Banning, Beaumont, Calimesa, Perris, Hemet, and San Jacinto. This HCP is one of the largest plans ever attempted. It covers multiple species and multiple habitats within a diverse landscape, from urban centers to undeveloped foothills and forests, all under multiple jurisdictions. It extends across many Bioregions as well, including the Santa Ana Mountains, Riverside Lowlands, San Jacinto Foothills, San Jacinto

Mountains, Agua Tibia Mountains, Desert Transition, and San Bernardino Mountains. It provides for a coordinated MSHCP Conservation Area and implementation program to preserve biological diversity and maintain the region's quality of life.

The MSHCP serves as an HCP pursuant to Section 10(a)(1)(B) of the federal Endangered Species Act of 1973 (FESA), as well as a Natural Communities Conservation Plan (NCCP) under the NCCP Act of 2001. The MSHCP is used to allow the participating jurisdictions to authorize "Take" of plant and wildlife species identified within the Plan Area. The United States Fish and Wildlife Service (USFWS) and California Department of Fish and Game (CDFG) (hereafter "Wildlife Agencies") have authority to regulate the Take of Threatened, Endangered, and rare Species. Under the MSHCP, the Wildlife Agencies will grant "Take Authorization" for otherwise lawful actions -- such as public and private Development that may incidentally Take or harm individual species or their Habitat outside of the MSHCP Conservation Area -- in exchange for the assembly and management of a coordinated MSHCP Conservation Area.

Coachella Valley Multiple Species Habitat Conservation Plan

The diverse desert landscape of the Coachella Valley provides habitat for dozens of plant and animal species, some found no where else in the world. One of the fastest growing areas in rapidly expanding Riverside County, the Coachella Valley has a projected population of up to 600,000 over the next 15 years. The Coachella Valley Multiple Species Habitat Conservation Plan (CVMSHCP) provides a regional vision for balanced growth to meet the requirements of federal and state endangered species laws, while promoting enhanced opportunities for recreation, tourism and job growth. The CVMSHCP aims to conserve over 240,000 acres of open space and protect 27 plant and animal species. By providing comprehensive compliance with federal and state endangered species laws, the CVMSHCP not only safeguards the desert's natural heritage for future generations, it allow for more timely construction of roads and other infrastructure that is essential to improving quality of life in the Coachella Valley.

The Coachella Valley Association of Governments (CVAG) serves as the lead agency for plan review and final consideration. Participants include Riverside County, the cities of Cathedral City, Coachella, Indian Wells, Indio, La Quinta, Palm Desert, Palm Springs, Rancho Mirage as well as Coachella Valley Water District and Imperial Irrigation District. The benefits of the plan include:

- Preservation of the Coachella Valley's native desert wildlife and creates a magnificent system of open space parks, trails and reserves,
- Safeguards significant habitat linkages and wildlife corridors that enable animals to move safely from one habitat area to another,
- Assures critical freeway and freeway interchange projects can be built without delays resulting from endangered species conflicts,

- Offers certainty for the business community ultimately making the Coachella Valley a more attractive place for businesses to relocate or expand,
- Ensures the continuation of the Fringe-Toed Lizard permit and provides long-term conservation for this endangered species.
- Approximately 25% of the land proposed for conservation (60,000 acres) has already been acquired.
- Expedites construction of all currently planned road projects in the Coachella Valley in the next 25 years, as well as construction and widening of regional roads such as Indian Avenue, Palm Drive, Gene Autry Trail, Airport Road, and Avenue 66.

The combined effort of the two MSHCPs will effectively preserves one third of the total land mass within Riverside County equating to 2,360 square miles of pristine meadows, forests and desert habitat.

Weather and Precipitation

The County of Riverside continues to suffer drought conditions in most of the watersheds. Rainfall is transitory caused by the different terrain with coastal mountains, fertile inland valleys, the Cleveland National Forest, and large expanses of arid desert at or below sea level. Above average rainfall was noted in the City of Temecula which is in the Santa Margarita Watershed, and yet only 64% of normal rainfall was noted in the City of Riverside (50 miles to the North) which is within the Santa Ana Watershed. Rainfall in the Whitewater River Basin watershed is limited to a very short period during the winter months and occasional late afternoon monsoonal moisture in the summer months. Of particular note was the observance of four tornados that touched down and cause minor damage near the City of Moreno Valley, May 22, 2008. See photo below of two tornados.

Two tornados near the City of Moreno Valley May 22, 2008-Press Enterprise

Rainfall for the 2007-2008 Season

The 2007-2008 season included periods of near normal rainfall mixed with long periods of very dry weather. The late summer and fall of 2007 was seasonally dry until the last day of November when a very wet storm dropped copious rainfall across the entire region. Many stations recorded their greatest daily precipitation of the season. The early winter held close to normal through January. Then the latter half of winter and spring turned out to be among the driest periods on record. What happened? No one knows for sure, but the best theory among the experts is that the La Niña prevailed, bringing California less than normal rainfall in general. During December and January, however, a Madden-Julian Oscillation (MJO) contributed to greater rainfall. Season totals indicate no discernable pattern; some stations recorded only two-thirds of seasonal rainfall while other stations recorded slightly above normal rainfall. In addition, most storms during the season did not produce uniform precipitation across the region. *Coast to Cactus Weather Examiner-National Weather Service-San Diego, Volume 15, Number 3, July 2008.*

Location	Rainfall	Normal	% of Normal
Riverside	6.87	10.72	64
Palm Springs	5.40	5.23	103
Temecula	16.52	13.09	126

Economic Outlook

The County has experienced rapid population and economic growth since 2000, increasing in population by over 30% from 2000-2007. Job and labor force growth was likewise strong, increasing by 3.6% and 3.7% annually, respectively on average from 1999-2006. However, employment growth slowed in 2007 to 1.4% and unemployment increased to 6.2%, compared to 5.0% in 2006, rising to 7.7% in May 2007. The construction and real estate-related sectors have seen significant job losses in the Riverside-San Bernardino region, shedding 13% and 4% respectively, in 2007.

The population and job growth fueled residential and commercial construction, resulting in extraordinary assessed value (AV) gains averaging 15.5% annually from fiscal 2002-2008. For fiscal 2009 AV growth slowed dramatically to just 1.5%, with gains from new construction and property sales ($20 billion) largely offset by the county assessor's reduction of the AV of over 200,000 properties ($16 billion). The County is projecting no AV increase through fiscal 2011. Residential construction in recent years was further supported by the availability of sub-prime mortgages and other new loan products, which are defaulting at record levels and pressuring home prices. Commercial and industrial real estate development has mitigated the decline in the housing market somewhat, but that sector is starting to soften as well, exhibiting lower absorption rates and rising vacancy rates.

On a positive note, several years of strong economic and tax base growth coupled with good cost controls enabled the county to steadily add to its fund balance while also building flexibility into its budget. Audited results for fiscal

2007 show a remarkable third year of a general fund surplus over $100 million, bringing the total fund balance to $571 million, or 26% of expenditures and transfers out. The county's 2007 fiscal year-end unreserved fund balance rose to $483 million, a strong 22% of expenditures and transfers out (up from 13% in fiscal 2005), providing an important financial cushion as the county adjusts to slower or negative revenue growth. As the outlook for the county's economy changed throughout fiscal 2008, the county took action to limit the long-term impact on its financial position. Fitch notes that the county's sound budgetary achievement while also including substantial capital and other one-time spending, also avoided incorporating unusually strong tax performance into recurring expenditures.

For fiscal 2008, the county projects a drawdown on reserves and designations of about $100 million, and the budget for fiscal 2009 includes the use of a net amount of about $63 million in reserves or designations. At these reduced levels, Fitch believes the reserve levels remain consistent with the rating category, although deterioration beyond the budgeted level could lead to a rating downgrade. Departments have already been directed to reduce their spending targets for fiscal 2010 by at least 8%. Fitch views the county's budget policies, which include a reserve for economic uncertainties sized at 15% of discretionary revenues and a contingency reserve at 4% of discretionary revenues, as positive and effective in retaining sound finances. Both are fully funded in its fiscal 2009 budget.

The county's tax base is diverse. The top 10 taxpayers contribute just 1.9% of property tax revenues; however, four of the top 10 taxpayers are homebuilders reflecting their important role in the economy. In spite of the current housing downturn, long term prospects for economic growth remain positive in the county due to the availability of affordable land and the county's location along major transportation corridors and near major seaports and a cargo-oriented airport.

The county's direct debt burden is low, equaling just $534 per capita and 0.45% of market value. Including overlapping debt, debt ratios remain moderate, with issuance offset by population and AV gains. Overall debt totals about $3,896 per capita and is about 3.3% of market value.

The county's pension system is well funded and the county took action in August 2007 to reduce its exposure to other post employment benefits (OPEB), eliminating the implicit subsidy to retirees and reducing its OPEB liability to about $50 million (with a $1.5 million annual required contribution (ARC)) from $237 million (with a $16 million ARC). In addition, the county has prudently set up an OPEB Trust with Cal-PERS and budgeted $10 million in fiscal 2008 and $5 million in fiscal 2009 to begin funding its OPEB liability. ***Source: Fitches Ratings, August 27, 2008.***

In an attempt to hold the line on county departmental spending the Riverside County Executive Office is recommending to the Board of Supervisors a minimum of a 10% reduction in budget for FY09/10. That is in addition to the 5% budget reduction already established for FY08/09.

Property tax assessed value projections

The Assessor-Clerk-Recorder reports continued declines in the residential home market and a significant reduction in the amount of new construction throughout the county. Sales data indicate that as of October 2008, market values have declined to the same levels as March 2003. This reduction in values, after adding current new construction, would indicate an assessment roll reduction. Early analysis indicates that 2009 assessed values could decline five percent. Property transfers are currently on line to exceed the 80,000 transfers for FY 08/09; almost 60 percent of those transfers involve foreclosure and bank owned property sales, which further reduce assessed values.

The Assessor's evaluation of the currently declining market indicates that over 321,000 properties are in the target range to be reviewed for possible reductions. This would include the 275,000 properties reviewed for FY 08/09 of which over 219,000 were reduced. Sales analysis as of October 2008 does not yet indicate a leveling of home values. Data suggest that property-tax revenue through FY 11/12 will not meet the current growth projections (represented by the dashed line in Graph 1) used to estimate revenue as part of the county's long-range budget plan. Therefore, we are lowering projections for assessed-value growth in the out years, as the heavy red line in Graph 1 represents, resulting in a projection of negative AV growth for FY 09/10.

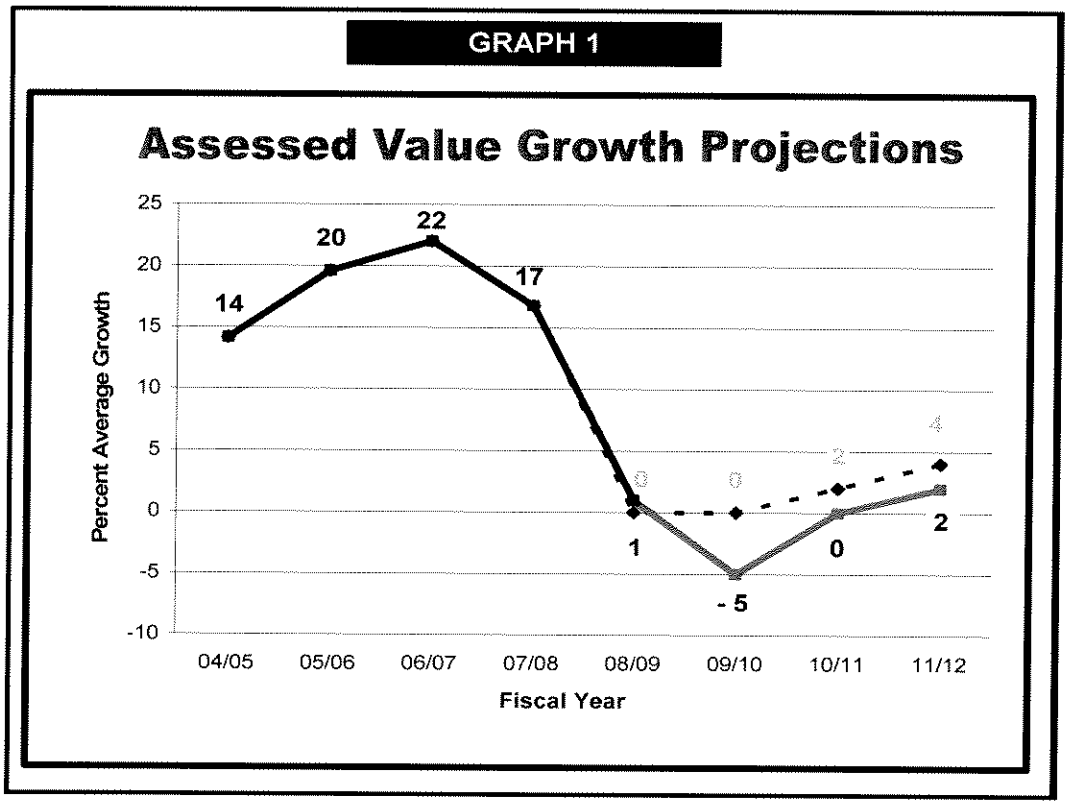

Economic Development

Riverside County isn't immune from national economic challenges, but despite these challenges Riverside County has prospered in many areas. The health care, telecommunications, and education industries have expanded and continue to expand, communities within the county are still expected to have pockets of short-term growth, the Inland Empire's (Riverside and San Bernardino Counties') total personal income is estimated to increase 2.5%, and taxable retail sales are estimated to be $41 billion during this calendar year, $2 billion more than Orange County.

Housing in Riverside County is abundant and affordable. To create awareness of the buyer's market and EDA's housing programs EDA has launched www.RCHomeLink.com. This website offers information on valuable home programs and tools to help people find a home within Riverside County.

EDA recognizes the importance of keeping Riverside County a place with safe, healthy communities. One aspect of this means doing our part to turn Riverside County "green" by conserving the county's precious natural resources.

EDA has embraced the notion that efficiency is "green". EDA's divisions are managed in highly efficient ways including key factors such as budgets, resources, and time. Leadership in Energy and Environmental Design (LEED) criteria are being incorporated into the County's capital improvement projects.

With regard to sustainability, water-wise landscaping is being implemented into agency redevelopment projects. Already in the works, are several projects that use solar panels to increase energy efficiency and conservation. The use of solar paneling is a new effort to conserve energy and it will be increasingly implemented in future projects. ***-Robin Zempfer, Assistant County Executive Officer/EDA***

Decline in Residential Building Permits

Housing construction has come to a near standstill as builders and developers react to an unexpected severe drop in buying. The number of residential building permits is highly correlated to the inflow of domestic migration patterns and the housing production in the County. During the mid 1990's the number of residential building permits issued were low as a result of the economic downturn. After 2000 the number of building permits surged, driven by the high demand for affordable housing. However, with the sub-prime loan meltdown and an explosive foreclosure rate the number of residential building permits issued during 2007-2008 has plummeted to a low of 9,957 residential building permits. This is a significant drop from the 21,205 residential building permits that were issued in the previous twelve months, accounting for a 53% decrease.

> **Press Enterprise:** John Husing a local economist, in his annual economic forecast hosted by the Lake Elsinore Valley Chamber of Commerce, said

the sour housing market is at the heart of the Inland region's economic woes, which he called the worst in more than 40 years.

Not withstanding this time of economic uncertainty, the County's NPDES MS4 stormwater program through it intra-departmental approach will continue to monitor new development projects and provide inspections of those projects that are in-process throughout the county.

With the continued concern that housing projects may be abandoned, the County took steps to inform builders and developers of the requirement to maintain Best Management Practices (BMPs) for sediment and erosion control. Building inspectors have been out early to evaluate whether projects are in compliance with the stormwater requirements. Those projects where BMPs were determined to be inadequate were brought back into compliance.

Leadership in Energy and Environmental Design (LEED) Certification

The Leadership in Energy and Building Design (LEED ™) "green building" rating system is a nationally accepted benchmark for the design, construction and operation of green buildings. LEED gives building owners and operators the tools they need to have an immediate and measurable impact on their buildings' performance in five key areas:

- Sustainable site development,
- Water savings,
- Energy efficiency,
- Materials selection , and
- Indoor air quality.

The County of Riverside's Facilities Management Department and Economic Development Agency are on the cutting edge as it incorporates LEED criteria into capital improvement projects (CIP).

As an example, in November 2007, Riverside County's first LEED certified building held its grand opening. The Woodcrest Library, designed to blend into the natural landscape of the community, is a model of sustainable site development. Some of the "green" features designed into the new library and its site include low-water native landscaping, a permeable parking lot to reduce and utilize storm run-off, a water-wise demonstration garden, and a building design which uses and directs ambient lighting from roof and windows to reduce the use of artificial light.

Other significant projects that will include "green building" criteria include the new Transportation Land Management Agency Maintenance Yard in Jurupa and the County's proposed Hub Jail project that will house approximately 7,200 in-mates once the plan is built out.

Transportation Land Management Agency

Building and Safety Department

Business Registration and Licensing Program

In an attempt to augment the Compliance Assistance Program (CAP) performed by the Department of Environmental Health and move toward a more robust inspection program for industrial and commercial activities related to stormwater management, the County's Building and Safety Department has been tasked with developing an inspection program to address nuisance runoff, ensure maintenance of BMPs, and continued compliance with the MS4 permitting requirements in the unincorporated portions of the county.

Since the inception of the Business Registration and Licensing Program, over 10,000 businesses have been registered. The first round of inspections will be used to evaluate the risk and impact to stormwater flows and any contribution to urban runoff. Educational materials on BMPs and other stormwater related materials will be distributed to ensure that the regulated community is aware of their requirements under the MS4 permit. Violations observed during these preliminary inspections will be corrected by using progressive enforcement techniques including notice of violations, administrative enforcement and referral to the environmental crimes task force for recalcitrant and gross violators. Additionally, for the most egregious violators referrals will be made to the regional boards for enforcement assistance.

Excerpt from Ordinance 857 Section 13. ***Water Quality Inspections and Enforcement; Additional License Fees.*** A license inspector, code enforcement officer or peace officer employed by the County may enter free of charge, at any time, any place of business for which a business license is required by this ordinance and inspect the premises, grounds, facilities and structures located therein for compliance with water quality requirements imposed by Riverside County Ordinance Nos. 457 and 754, California Water Code §§ 13000 et seq. (Porter-Cologne Water Quality Control Act), Title 33 U.S.C. §§ 1251 et seq. (Clean Water Act) and any applicable state or federal regulations promulgated thereto, and any related administrative orders or permits issued in connection therewith. Failure to maintain the business premises, grounds, facilities and structures located therein in compliance with water quality requirements is a violation of this ordinance. The County may initiate enforcement actions against business license holders whose business premises are found upon inspection to be in violation of water quality requirements. The business license holder shall be liable to the County for an additional license inspection and enforcement fee based on the hourly rates provided in Section 10 of this ordinance.

The CAP will continue to be utilized by the cities until such time that the industrial/commercial inspection program is integrated through an MOU process with the County's Building & Safety Department or the cities independently establish their own inspection program.

In addition, Department of Code Enforcement staff has been trained to recognize violations of the NPDES Stormwater MS4 permit and are able to issue cease and desist orders and notices of violation for non-compliance matters.

Code Enforcement Department

The County of Riverside's Code Enforcement Department has taken a more hands-on approach to community policing and outreach. The Code Enforcement staff ascribes to the "Broken Window" theory, which holds that ignoring the little problems such as graffiti, litter, and shattered glass creates a sense of irreversible decline that leads people to abandon the community or to stay away. Partnerships with the Board of Supervisors, Economic Development Agency, Waste Management Department , Department of Environmental Health, Flood Control and Water Conservation District, community groups, trash haulers, Community Action, graffiti abatement and Sheriff's Department have lead to increased community awareness and has diminished blight throughout the unincorporated portions of the county. With programs that address community clean up & tire collection events, tackling issues such as inoperable/abandon vehicles, noise, illegal dumping, un-permitted grading, and substandard construction, all lead to a sense of community. The Code Enforcement Department has also implemented a community Improvement planning process in economically underserved communities throughout the County. The community improvement plan is used to address conditions that otherwise lead to blighted conditions. As examples "The Posting", a monthly newsletter and the community improvement plan for the community of Thermal is attached for your review.

Transportation Department

The County's Transportation department is an integral player as it relates to the construction and maintenance of publicly owned roads, right of ways, and MS4 facilities. One of the tools used by the Transportation Department to ensure compliance of MS4 facilities within a private development is through the formation of Landscape and Lighting Maintenance Districts (LLMDs). Each LLMD is responsible for ensuring that structural BMPs are routinely cleaned and maintained. The Transportation Department is the primary entity for cleaning and maintenance of publicly owned MS4's that are in their right of way. Another function of the Transportation Department is the mapping of MS4 facilities that are owned and operated by the Department. The County has completed the GIS mapping for the Santa Margarita Watershed and continues to finalize mapping in the Santa Ana Watershed. Once the mapping in the Santa Ana Watershed is completed they will be tasked with mapping the Whitewater River Basin Watershed. GIS mapping continues to be a fluid process and is modified as new areas are developed. Street sweeping is performed in some areas of the county depending on whether it is part of the LLMD, county provided, city provided, or part of a franchise trash hauler agreement.

Planning Department

The Planning Department is the entry point for private residential and commercial development review for the County unincorporated areas. State requirements for Notice of Intent (NOI) and Waste Discharge ID Number (WDID) and Notice of Termination (NOT) are checked for during the plan review process. Construction BMPs identified in Stormwater Pollution Prevention Plan (SWPPP) must be implemented. Through local ordinances aspects of the project SWPPP are inspected to ensure compliance with the MS4 requirements. Projects that meet minimum criteria are subject to the submission of a Water Quality Management Plan (WQMP), which is synonymous with a Standard Urban Stormwater Mitigation Plan (SUSMP). The draft WQMP is reviewed by the Riverside County Flood Control and Water Conservation District (District) for substantial conformity. Adjustments are called out and modifications are made to the WQMP prior to the final submission. The WQMP will address post construction BMPs, maintenance and monitoring.

Environmental Programs Division (EPD)

The Environmental Programs Division (EPD) is responsible for overseeing implementation programs for three regional habitat conservation plans and insuring consistency with the County's existing land development process. The EPD provides for an Expedited Review Process (ERP) for the Western Riverside County MSHCP

Expedited Review Process (ERP)

Property owners who intend to install a mobile home or build a single-family home on an existing legal lot will be required to go through the ERP if their property is located within a Criteria Cell established through the Riverside County MSHCP.

The initial ERP is free and will be conducted by trained staff within the Riverside County Environmental Programs Department. An ERP will determine the appropriate location of a building footprint and access roads. Habitat assessments for plant and/or animal species may also be required.

While the MSHCP does not prevent the construction of a single-family home or the installation of a mobile home on an existing legal lot, the results of the ERP may require that building footprints, access roads and other ancillary structures be located on the least sensitive portion of your property.

Habitat Evaluation and Acquisition Negotiation Strategy (HANS)

The HANS Process applies to property which may be needed for inclusion in the MSHCP Conservation Area or subjected to other MSHCP Criteria and shall be implemented by the County and those cities that have agreed to implement the HANS process.

Under the incentive-based MSHCP program, the Western Riverside County Regional Conservation Authority (RCA), the County, cities, or various State and federal agencies may obtain interests in property needed to implement the MSHCP over time (interest may be obtained in fee, conservation easement, deed restriction, land exchange, flood control easement or other type of interest acceptable to the RCA, the County, cities, acquiring state and/or federal agency, and property owner). Fee ownership of property may not be required. If it is determined that all or a portion of property is needed for inclusion in the MSHCP conservation area, various incentives may be available to the property owner in lieu of or in addition to monetary compensation in exchange for the conveyance of a property interest. These incentives may include, but shall not be limited to, the waiver and/or reduction of certain development fees, monetary compensation for entering into an option agreement, fast track processing, density bonuses, clustering, density transfers (and property reassessment and tax credits if determined to be feasible). The incentives are intended to provide a form of compensation to property owners who convey their property. As a property interest is obtained, it will become part of the MSHCP conservation area.

The establishment of Criteria Area boundaries is intended to facilitate the process by which the County or cities will evaluate property that may be needed for inclusion in the MSHCP conservation area. The Criteria Area is an area significantly larger than what will be the MSHCP Conservation Area, within which property will be evaluated using MSHCP conservation criteria. The Criteria Area is an analytical tool which assists in determining which properties to evaluate for acquisition and conservation under the MSHCP and does not impose land use restrictions.

The Process ensures that an early determination will be made of what properties are needed for the MSHCP conservation area, that the owners of property needed for the MSHCP conservation area are compensated, and that owners of land not needed for the MSHCP conservation area shall receive "Take Authorization" for covered species adequately conserved through the permits issued to the County and cities pursuant to the MSHCP.

Development of property outside of the MSHCP conservation area (both within and outside of the Criteria Area) shall receive "Take Authorization" provided that payment of a mitigation fee is made (or any credit for land conveyed is obtained) and compliance with *Section 6.0* of the MSHCP occurs. Payment of the mitigation fee and compliance with the requirements of *Section 6.0* are intended to provide full mitigation under the California Environmental Quality Act (CEQA), National Environmental Policy Act (NEPA), Federal Endangered Species Act, and California Endangered Species Act for impacts to the species and habitats covered by the MSHCP pursuant to agreements with the U.S. Fish and Wildlife Service, the California Department of Fish and Game and/or any other appropriate participating regulatory agencies and as set forth in the Implementing agreement for the MSHCP. However, it is recognized that the MSHCP cannot provide mitigation for projects regulated by entities or agencies not participating in the MSHCP.

All proposed discretionary Development projects within the Criteria Area shall be subject to review under the HANS process and monitored through a uniform computerized tracking system. However, the issuance of a grading permit or site preparation permit for an individual single family home or mobile home on an existing legal lot shall not be subject to review under the HANS process but shall be subject to review under the procedures described in the *Expedited Review Process for Single-Family Homes or Mobile Homes To Be Located on an Existing Lot Within the Criteria Area*. This HANS process will not be construed as a limitation on the County's or the cities' ability to approve or deny a development application except that a project consistent with this HANS process may not be denied solely because a development application does not comply with the MSHCP Conservation Criteria.

Community Health Agency

Department of Environmental Health

District Environmental Services (DES) Division

Changes in program delivery as it relates to the CAP are evolving. With the increased program implementation of the commercial industrial inspection program (CIIP) by the Department of Building and Safety, the CAP program will cease to exist in the unincorporated portions of the County. As the CIIP program becomes more proficient and accepted it is likely that an MOU agreement between the cities and the County will be signed to phase in the CIIP and phase out the CAP or the cities will institute their own CIIP.

Environmental Resources Management (ERM) Division

Local Enforcement Agency (LEA)

As part of the franchise trash haulers agreement some jurisdictions in the unincorporated portions of the county require mandatory trash pickup and street sweeping.

Sewage Spills and Septic Systems

All sewage spills greater than 1000 gallons are managed through the Department and reports are submitted to the affected Regional Water Quality Control Board. Smaller spills are handled on a case by case basis with reports on file with the department. Spill reports are also made to the Governor's Office of Emergency Services.

Septic system construction is managed through plan check activities. Septic system moratoriums in coordination with the Santa Ana Regional Water Quality Control Board have been instituted in Cherry Valley and Quail Valley where high groundwater has infiltrated an area and caused the failure of a septic system or

where high levels of metals, nitrates, nutrients or bacteria from septic systems may have contaminated a source of drinking water.

Hazardous Materials Management (HMM) Division

The Hazardous Materials Management Division inspects businesses that generate hazardous waste, store hazardous materials and/or operate underground storage tanks to store fuels, solvents, corrosive materials, or other hazardous constituents. They are also the primary emergency response mechanism along with the County Fire Department for on-highway spills and other hazardous materials incidents involving commercial and industrial facilities. The Division is also part of the Environmental Crimes Task Force which is a coordinated inter-agency environmental crime investigatory group comprised of local, state and federal agencies spearheaded by the Riverside County District Attorney's Office. This group takes on investigatory actions as it relates to environmental criminal activities that could result in a misdemeanor or felony conviction.

Capital Improvement Projects (CIP)

To ensure that all projects have adequate funding and all environmental requirements such as CEQA, stormwater management and air quality criteria are considered, the County Executive Office formed a Capital Improvement Projects Oversight and Review Committee. The makeup of the committee includes representatives from the Executive Office with finance, NPDES, construction expertise, Director of Facilities Management, Director of Economic Development Agency, Communications/Information Technology. All proposed CIPs must go through this review process.

The following departments within the County organizational structure have construction authority for CIPs:

Facilities Management (FM) Department

The Facilities Management (FM) Department awards contracts for construction, approves design, reviews projects for CEQA compliance and stormwater quality during the construction phase and WQMP post construction BMPs. Once the construction is completed they work with the departments in the development of facility pollution prevention plans. FM also provides maintenance of all county owned building and is responsible for management of BMPs. All future buildings, designed and constructed, will have elements of LEED and BMPs incorporated into the project.

Economic Development Agency/Redevelopment Agency (EDA/RDA)

The Economic Development Agency awards contracts for construction related to development and redevelopment. Contract language requires early on adoption

of LEED concepts, WQMP and post construction BMPs. In many instances EDA/RDA is the funding authority for new development construction destined to become CIPs. Depending on the project EDA/RDA staff act as project managers and oversee the overall project from preliminary design concepts, contract award, architectural and landscape design, construction, to final project completion. If the project is a building for county operations then FM takes over lead for deferred maintenance including management of post construction BMPs.

Regional Parks and Open Space District

The Riverside County Regional Park and Open-Space District was created by the electorate in November 1990 by a 64% vote and formed on January 29, 1991. The District is an independent agency governed by the Board of Supervisors, which sits as the District Board of Directors. The Park District presently employs approximately 100 staff who bring to their jobs a high degree of dedication to the public and a wide variety of skills and abilities.

At the present time, the district manages and operates more than 44,000 acres which includes forty parks, reserves, historic or archaeological sites and ninety miles of regional trails. The staff includes professionals in the fields of accounting and finance, biology, building and grounds maintenance, carpentry and construction, ecology, as well as environmental restoration.

Additional fields include historic preservation, interpretation, landscape architecture, museum and curatorial management, park planning, personnel administration, recreation, security, trails planning and construction, weddings and special events, wildlife habitat management, and a host of other disciplines.

Waste Resources Management Department

The mission of the Riverside County Waste Management Department is to provide for the protection of the general public health and welfare by efficient management of Riverside County's solid waste system through:

- provision of facilities and programs which meet or exceed all applicable local, State, Federal and land use regulations;
- utilization of up-to-date technological improvements;
- development and maintenance of a system that is balanced economically, socially and politically; and,
- economically feasible recovery of waste materials.

The Waste Management Department currently operates 6 landfills; an additional privately owned and operated landfill is located in Western Riverside County. In addition to the landfills there are 8 privately owned and operated transfer stations.

Recycling and Specialty Programs

Household Hazardous Waste (HHW)-Residential Program

The County of Riverside established the Household Hazardous Waste Program in October 1988 with the formation of a mobile community HHW collection program. This HHW program has evolved and is comprised of a combination of three permanent HHW collection centers, two Antifreeze, Battery, Oil and Paint (latex only) ABOP collection centers and temporary collection events at 16 locations throughout the County.

Conditionally Exempt Small Quantity Generator (CESQG) -Business Program

As an enhancement to the HHW program and to encourage small businesses to properly handle their hazardous waste the County provides the CESQG program as an affordable and legal solution for the proper disposal of hazardous waste. The program is on an appointment only basis and a hazardous waste disposal contractor comes to the business to ensure proper labeling and documentation is provided.

Universal and e-Waste

Universal Wastes are hazardous wastes that are generated by several sectors of society, rather than a single industry or type of business. Universal Wastes contain harmful chemicals, which, if put in the trash may harm people or the environment. E-waste include:

- ***Common Batteries*** - AA, AAA, C & D Cell and button batteries (e.g. hearing aid and watch batteries). Automotive type batteries are not Universal Waste. When they become waste, they are regulated under a different law.
- ***Fluorescent Tubes, Bulbs and Other Mercury Containing Lamps*** - Fluorescent light tubes and bulbs, Hi Intensity discharge (HID), metal halide, sodium and neon bulbs.
- ***Electronic Devices*** - Televisions, computer monitors computers, printers, VCR's, cell phones, telephones, radios, and microwave ovens.
- ***Mercury-Containing Devices*** - Thermostats, switches, thermometers, dental amalgam, pressure and vacuum gauges, novelty items, counterweights and dampers, and medical devices known as dilators.
- ***Non-Empty Aerosol Cans that Contain Hazardous Materials***. (Labeled Toxic, Flammable, or Corrosive)

Riverside County's Backyard Composting Program:

This program has been developed to aid the residents of Riverside County in composting their organic material, so that we can all recycle more and discard less.

Composting harnesses the natural process of decomposition by turning organic matter (such as fruit and vegetable wastes, grass clippings, leaves, and some animal manure's) into a useful product for your landscape or garden. Composting can also improve hard, depleted soils, so that flowers, vegetables, and fruit trees can thrive in a nutrient-rich environment. Composting also improves the soil by boosting its fertility, its moisture-holding capabilities, and its texture.

Composted material is actually rather expensive to buy. But anyone with a little extra room in a garden, a little extra time, and a good source of compostable materials can produce good, high quality compost in as little as 4 weeks - absolutely free! By composting, you return the earth's nutrients back to the soil, where your plants absorb them, thereby becoming healthier. Healthy plants are far more resistant to diseases and pests. Instead of throwing away your organic waste, compost them! You will cut down your trash collection service, and you will be prolonging the life of Riverside County's rapidly depleting landfill space!

Sharps

Hypodermic needles, lances, and other sharp material associated with medical treatment can be collected in sharps containers and brought to the HHW collection centers for proper disposal. Sharps containers can be obtained from your HHW collection center or local pharmacy.

Construction Activities

The Waste Management Department's construction and industrial activities include maintenance of county operated landfills and stabilization of closed landfills. This includes the requirement to prevent and mitigate stormwater or other discharges including sediment, solid waste and liquids from entering an MS4 system.

Flood Control and Water Conservation District (District)

The Control and Water Conservation District (District) operates and maintains major flood control facilities such as dams, flood basins, levees, open channels and major underground storm drains. In most cases, the District does not maintain storm drain inlets or pipes less than 36 inches in diameter. These smaller facilities are typically maintained by City or County Transportation Department crews. The engineering design of all projects constructed by the District is performed under the direct supervision of, one of the District's two design teams. They are responsible for coordinating all activities involved in moving projects forward from the conceptual planning phase to the actual start of construction

The construction section administers all District construction contracts and inspects the construction of all flood control projects to be accepted for operation and maintenance by the District.

In addition, as part of the plan review process for private development and CIPs within the county, the District's planning section review and make recommendations on WQMP submittals.

Local Ordinances

The County of Riverside has enacted the following ordinances to address stormwater issues and related activities. The text for each of the ordinances can be found at http://www.clerkoftheboard.co.riverside.ca.us/ords.htm

ORDINANCE 348
Land Use Ordinance of Riverside County
Amended through Ordinance No. 348.4574

ORDINANCE 427
Regulating Land Application of Manure
Amended through Ordinance No. 427.3

ORDINANCE 492
Regulating Food Establishments and Food Facilities
Amended through 492.9 and Incorporating by Reference Ordinance 725

ORDINANCE 541
Related to the Removal of Rubbish
Amended through Ordinance 541.5

ORDINANCE 615
Relating to Establishments where Hazardous Waste is Generated, Stored, Handled, Disposed, Treated or Recycled
Amended through Ordinance 615.3

ORDINANCE 617
Regulating Underground Storage Tank Systems containing Hazardous Substances
Amended through Ordinance 617.4

ORDINANCE 650
Regulating the Discharge of Sewage in the Unincorporated Areas of Riverside County
Amended through Ordinance 650.5 and Incorporating Ordinance No. 725

ORDINANCE 657
Regulating the Collection, Transfer, and Removal of Solid Waste
Amended through 657.6

ORDINANCE 689
Prohibiting the Unlawful Dumping of Trash
Amended through 689.1

ORDINANCE 725
Establishing Procedures and Penalties for Violations of Riverside County Ordinances and Providing for Reasonable Costs Related to Enforcement
Amended through 725.12 and Incorporating by Reference Ordinance 640.

ORDINANCE 745
Providing for the Comprehensive Collection and Disposal of Solid Waste in Specified Unincorporated Areas of Riverside County
Amended through Ordinance 745.2

ORDINANCE 754
Establishing Stormwater/Urban Runoff Management and Controls
Amended through Ordinance 754.2

ORDINANCE 772
Declaring as a Fire Hazard Abandoned or Neglected Orchards, Groves or Vineyards, and Ancillary weeds and Debris and Providing for their Abatement

ORDINANCE 812
Prohibiting the Land Application of Class B Sewage and Sludge
Amended through Ordinance 812.1 and Incorporating by Reference Ordinance 725

ORDINANCE 830
Regulating the Land Application of Class A Sewage Sludge For Agricultural Activities
Amended through Ordinance 830.1 and Incorporating by Reference Ordinance 725.

ORDINANCE 843
Regulating the Discharge of Waste into the Public Sewer System for the Highgrove Community

ORDINANCE 856
Establishing a Septic Tank Prohibition for Specified Areas of Quail Valley Requiring the Connection of Existing Septic systems to Sewer

ORDINANCE 857
Regarding the Establishment of a Business Registration and Licensing Program

ORDINANCE 859
Establishing Water-efficient Landscape Requirements
Amended through Ordinance 859.1

ORDINANCE 871
Prohibiting the Installation of Specified Septic Systems in Cherry Valley

Organizational Structure

The organizational structure for the County is decentralized yet collaborative in nature. The voting public elects the County Board of Supervisors. The Board of Supervisors appoints the County Executive Officer who appoints his Executive Team and County Department Heads. The Executive Office under the direction of the Chief Deputy County Executive Officer oversees the coordination of the NPDES stormwater Program and general government county departments. Those Departments designated in blue have construction authority. The Flood Control and Water Conservation District acts as the Principle Permittee along with the County Executive Office for the County departments. The Planning Department highlighted in blue is the intake point for private residential and commercial development projects. The departments highlighted in green have inspection authority. Those programs highlighted in yellow provide advisory and coordination roles. See organization chart on next page.

Organizational Chart

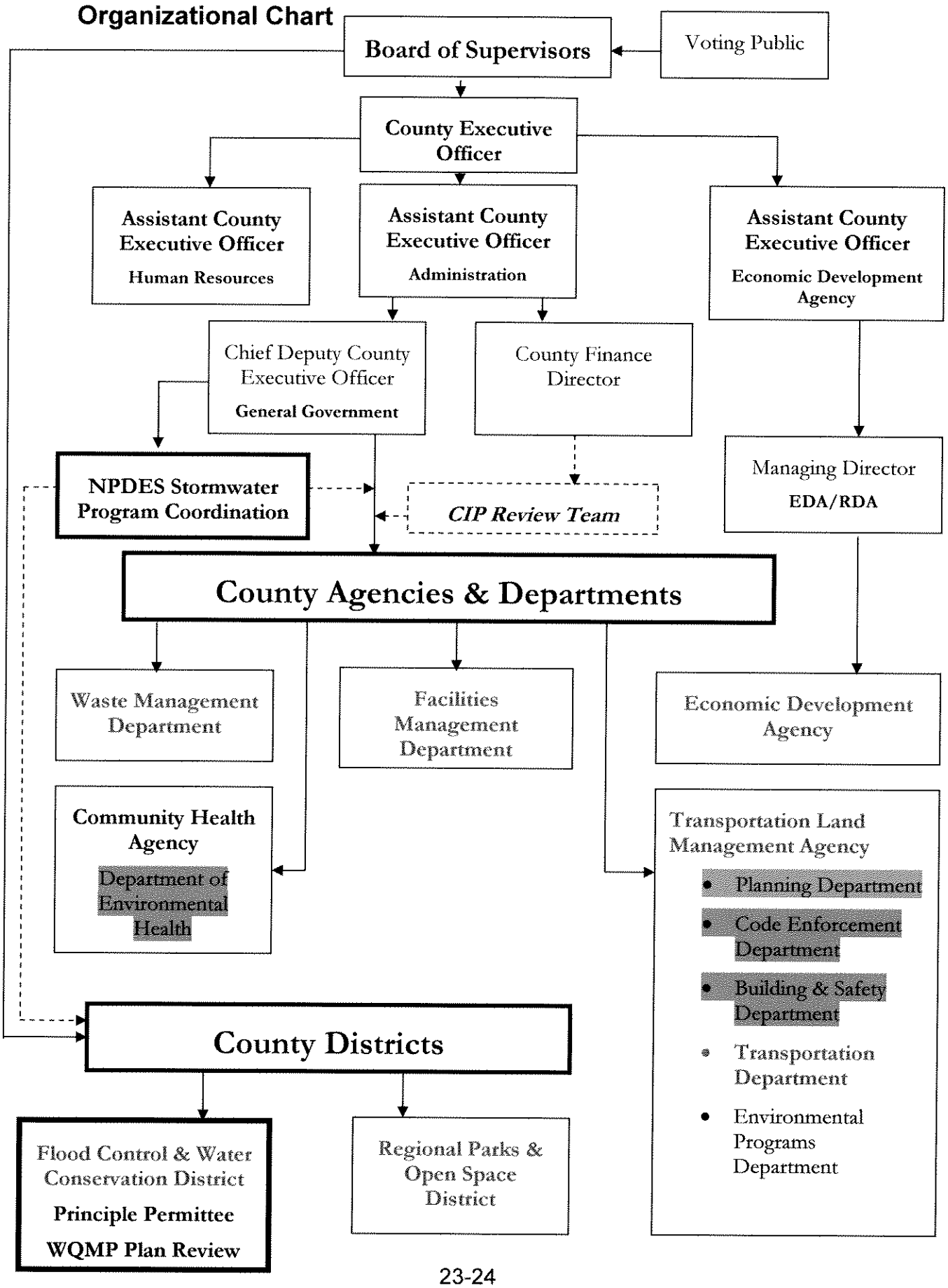

Concluding Remarks

The County of Riverside's NPDES Stormwater Program is a collaborative and evolving partnership between county departments, the District, CVWD, and the 26 participating co-permittees (cities), in coordination with the three Regional Water Quality Control Boards. Program consistency is the goal with the acknowledgement that differences in climate, hydrology, geology, and jurisdictional philosophy exist between the three primary watersheds. This unique program diversity with overlapping jurisdictional authority makes for an interesting regulatory dynamic.

The NPDES stormwater program staff believes that building partnerships between the public and private sector is vital for program implementation efforts to be effective. Lines of communication need to be open so that dialog on stormwater issues can be debated and consensus reached. It is difficult, at best, to educate the public on stormwater issues when most of the streams and channels in Riverside County are ephemeral and have been dry for almost three years.

Many of our local residents have never ventured beyond their community boundaries. As an example, many individuals in our multi-cultural communities have never been to the Pacific Ocean, seen lakes or rivers, or understand how an ecosystem works. To these community members the only interface with water resources is the faucet that delivers water to their sink and the toilet for discharging waste. They do not understand the underground infrastructure made up of pipes and channels that deliver drinking water to their homes or the two separate systems that handle stormwater and sewage. Many people have the misconception that the sanitary sewer and the stormwater system are the same. So, tried and true public education tools have been modified so that regionalism can be incorporated into the stormwater message.

New development and challenges from urban and industrial runoff continue to have an impact on stormwater program implementation. In this time of economic uncertainty, financing for the operation and long term maintenance of post construction best management practices (BMPs) and the use of low impact development (LID) techniques that are built to maximum extent practical (MEP) standards is difficult to achieve without some funding mechanism and maintenance entity. For existing development this is a daunting task because of the Proposition 218 mandate for a two thirds majority vote to approve a new tax.

As cities mature and areas for new development become scarce the challenge for in-fill projects through redevelopment will become a new reality. Each of these projects will have their own set of circumstances that will need to be confronted when new innovative and emerging stormwater technology is blended with existing infrastructure and as regulations become more stringent with time.

1. DEVELOPMENT PLANNING
(SECTION F of ORDER NO. R9-2004-001)

1) **Description of any amendments to the General Plan or the development project approval process:** The County has taken steps to modify the plan review process for Capital Improvement Projects (CIPs) to more closely mirror that of industrial and commercial private development. The following steps have been taken:

   a) All CIP proposed projects over $100,000 are reviewed by the CIP review team where a determination is made whether stormwater quality will be impacted by the project.

   b) If proposed projects have an impact on stormwater quality and meet the criteria for a WQMP, the requirement for a WQMP will be included as part of the architectural design.

   c) Review of the WQMP will be provided by the Flood Control and Water Conservation District planning section or private third party evaluator.

   d) Inspection of SWPPPs, WQMPs and overall compliance of MS4 requirements for the CIP will be provided by either Facilities Management (FM), Environmental Compliance section, Economic Development Agency (EDA) Project Managers, or Building and Safety)Environmental Compliance(B&SEC section.

   e) FM, EDA, B&SEC staff have received training and will continue to receive training on NPDES stormwater requirements to ensure that quality inspections are performed on CIPs.

   f) Post construction BMPs for CIPs will be operated and maintained by Facilities Management maintenance staff for those buildings owned by the County.

2) **Number of grading permits issued:** 604 permits were issued for the Santa Margarita Watershed

3) **Number of developments conditioned to meet SUSMP requirements:** See Flood Control and Water Conservation District report for planning cases conditioned for Water Quality Management Plan (WQMP) or SUSMP requirements

4) **Attach one example of a development project that was conditioned to meet SUSMP requirements and a description of the required BMPs:** See Flood Control and Water Conservation District Report

5) **Description of any updates to the environmental review process:** None

6) **Description and number of training efforts conducted during the reporting period (for staff, developers, contractors, etc.), including the number of staff trained.**

   a) **Training:** See Flood Control and Water Conservation District Report on Training

Training	Training Description	Training Dates	Number of Attendees
	-	-	-

1. DEVELOPMENT PLANNING
(SECTION F of ORDER NO. R9-2004-001), CONT.

		Total	**-**

b) **Summarize the educational and outreach activities the Development Planning Component has conducted over the past year:** Each development project conditioned for approval is required to obtain copies of public education materials, sign an affidavit stating that they will distribute stormwater related materials to the property owners. The affidavit is filed with the development's individual file. In addition the county attempts to keep the general public and the development community (Building Industry Association) informed of all training and educational opportunities. There are numerous training partners include the University of California Extension, Building Industry Association, and private consultants. The County also provides a public information kiosk located at the Transportation Land Management Agency (TLMA) counter services area. Stormwater information is provided and NPDES requirements are posted.

7) **An assessment of program effectiveness based on the measurable goals established in the Permittee's Individual SWMP:** Overall program effectiveness correlation is not well defined in the current SWMP. However, the following activities continue to be a priority:

a) Training continues to be a priority, with improved training quality, examples of emerging technology and accessibility to municipal employees being improved year to year

b) Low Impact Development (LID), hydromodification and LEED ™ certification and requirements for WQMP/SUSMP direct how landscape based post construction BMPs are incorporated into design criteria. The end result being that projects that have WQMP as part of the project design are better equipped to handle runoff such that some level of treatment is obtained for pollutants of concern and/or infiltration is achieved.

c) Work continues to progress on the Flood Control and Water Conservation District's plan to establish a fee based community facilities district. Until this mechanism is in place the County will continue to utilize lighting and landscape maintenance districts (LLMDs) or require Home Owners Associations (HOAs) and Property Owners Associations (POAs) to provide maintenance of post construction BMPs.

d) Since the 2007 audit by Regional Board staff the County has instituted an equivalent process for municipal capital improvement projects to ensure that WQMP requirements are included in the design of all new county infrastructure.

8) **Additional Comments/Information:**

1. DEVELOPMENT PLANNING
(SECTION F of ORDER NO. R9-2004-001), CONT.

Describe the major accomplishments of the Development Planning Component over the past year. (General Plan or ordinance revisions, procedure/approval process changes, SUSMP guidance material): Because of the economic downturn, drought conditions and reduction in construction activity, emphasis has been placed on incorporating drought tolerant landscaping and being water wise by reducing watering times and converting to micro-irrigation techniques. Ordinance 859.1 was enacted April 25, 2008 and specifies that new development shall have the following:

1) Landscaping has been installed in conformance with approved planting and irrigation plans;
2) Smart irrigation controllers are set according to an irrigation schedule;
3) The irrigation system has been adjusted to maximize irrigation efficiency and eliminate overspray and runoff; and
4) A copy of the irrigation schedule has been given to the property owner.

Summarize new activities or improvements to be implemented next year as a result of your self assessment of the Development Planning Component: Refinement of the WQMP requirements will continue with the inclusion of inspection of post construction BMPs after they have been operating over a period time to ensure that they are working and providing adequate protection. This inspection element will be done by the Department of Building and Safety, Environmental Compliance Section.

1. DEVELOPMENT PLANNING
(SECTION F of ORDER NO. R9-2004-001), CONT.

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2. CONSTRUCTION
(SECTION G of ORDER NO. R9-2004-001)

1) **Number of inspections conducted:** A total of 451 Single Family, 133 Tract and 20 Commercial NPDES inspections were conducted by the Department of Building and Safety, Environmental Compliance Division during the 2007-08 Storm Season.

   Table 1: 2007-08 Storm Season Construction Site Inventory, provides a complete list of all inspections conducted in all Water Board Regions of Riverside County.

   Attachment A: 2007-08 Storm Season Final Statistics, is included in this report as a summary of all construction sites inspected in Riverside County listed by the Regional Water Quality Control Board responsible, end of storm season compliance percentage, number of inspections conducted and the date of the last inspection.

2) **Number and type of enforcement actions related to construction sites:**

Enforcement and Compliance Responses	Private Projects	Public Projects
Non-monetary Penalties	--	--
Stop Work Authority [SFR= 17-(11-Remain, 6 Expired), Tr=1, Comm=0]	17	--
Fines	--	--
Financial Security	--	--
Permit/Certificate of Occupancy Denial	--	--
Referral to SDRWQCB [SFR= 17-(11-Remain, 6 Expired), Tr=1, Comm=0]	17	--
Total	**34**	**--**

   See Attachment B: 2007-08 Storm Season- Sites Where Enforcement Was Taken, for a detailed list of the sites where enforcement action was taken in Riverside County this storm season. The statistics provided in the table above were derived from this attachment.

3) **Description of modifications made to the construction and grading approval process:** The Department construction and grading approval process has not been significantly modified since our last annual report was filed. Standard NPDES Construction Notes are still required to be included on the County approved grading plans for projects with more than one acre of disturbance. Projects with less than one acre of disturbance are still required to install erosion and sediment controls, but not to the same extent as those projects involving more than one acre. The Department still ensures that proof of the filing of a NOI is provided when necessary and that the site WDID is noted.

2. CONSTRUCTION
(SECTION G of ORDER NO. R9-2004-001), CONT.

4) **Description and number of training efforts conducted during the reporting.**

a) **Training: Building and Safety**

Training	Training Description	Training Dates	Number of Attendees
Building + Safety Staff	General Grading + NPDES Training	05/08/07	4
AEI-CASC Engineering	WQMP Inspection + Plan-check	01/23/08	20
Construction Teamsters Training	HAZWOPER Recertification Annual Training	06/25/08	7
Building + Safety Staff	Construction NPDES Training	08/20/08	6
Inland Erosion Control	BMP Installation, Trends in Industry	08/25/08	2
		Total	**39**

Training: Transportation

Training	Training Description	Training Dates	Number of Attendees
Riverside County – Flood Control	NPDES Water Quality Management Plan Training	11/9/07 4/16/08	14
AEI-CASC	NPDES General Training	11/28/07 2/13/08	7
Elena Chemical Company	NPDES – Herbicide Training	5/22/08	2
University of Riverside, California	Storm Water Regulations and Management	4/10/08 5/29/08	1
Riverside County – Flood Control	NPDES Construction Training	9/24/07 4/22/08	58
		Total	**82**

Training: Facilities Management and EDA

Training	Training Description	Training Dates	Number of Attendees
FM and EDA staff	General Grading + NPDES Training	05/08/07	11

b) **Summarize any additional education and outreach activities conducted for project applicants, contractors, developers, property owners, and/or responsible parties in support of the Construction Component:**

2. CONSTRUCTION
(SECTION G of ORDER NO. R9-2004-001), CONT.

Building and Safety Department: During NPDES construction inspections, staff spends a substantial amount of time meeting with developers, owners etc., discussing the educational material that is available for the development of site SWPPPs and the installation and continued maintenance of site erosion and sediment control measures. Educational material such as brochures and posters are freely distributed for use and reference by all interested parties to assist with compliance of NPDES rules and regulations. Pre-storm season site inspections are conducted beginning in September of the year. Although pre-storm season inspections are conducted on single family residential, commercial and tract construction sites, the pre-season inspection is used to provide the smaller builder especially (single family residential builders, or owner-builders) with an ample amount of time to prepare for the upcoming rainy season. This storm season marks the second season in a row that pre-storm season inspections of single family residential projects will be conducted. Approximately 232 initial pre-storm season inspections were conducted during the 2007-08 Storm season. The number of initial inspections conducted indicates the number of builders and developers the County has assisted during our inspection process through our NPDES education outreach activities.

Transportation Department: For FY 07/08, fifty-eight (58) employees attended NPDES Construction training. The Transportation Department is very diligent in educating staff in NPDES in order to be in compliance with the NPDES requirements.

Facilities Management and Economic Development Agency: Inspection employees have attended training and continue to hone skills in NPDES stormwater requirements.

Regional Parks and Open Space District: Staff have attended construction training and are encouraged to attend additional training opportunities on site design, LID, hydromodification as it relates to park settings.

5) **An assessment of program effectiveness based on the measurable goals established in the Permittee's Individual SWMP:**

A. **Building and Safety:** The categories shown below provide the total number of construction projects disturbing one acre or more that were inspected for NPDES compliance by Riverside County during the 2007-08 Storm Season.

1) Single Family Residential (SFR)- 232

2) Commercial Projects (Comm.)- 10

3) Tract Projects (Tr)- 39

Transportation Department: For FY 07/08, the majority of the Transportation Department's new construction projects occurred in Santa Ana region and Whitewater region. Some of the construction projects are continuing from FY 05/06 and /or to the next FY 08/09. There were a total of five (5) construction projects in Santa Ana region, four (4) construction projects in Whitewater region, and one (2) construction projects in Santa Margarita region for FY 07/08.

The NPDES Construction Inspection Program requires that High priority projects be inspected once every two weeks. Medium priority projects are required to be inspected once each month,

2. CONSTRUCTION
(SECTION G of ORDER NO. R9-2004-001), CONT.

and Low priority projects are required to be inspected once during the wet season (October 1st thought May 31st).

6) **Additional Comments/Information:**

Describe the major accomplishments of the Constrution Component over the past year:

The figures provided in the table below represent the inspection accomplishments achieved regarding the Santa Margarita NPDES sites inspected, inspections conducted, sites finaled, expirations, Stop Work Orders Issued and Stop Work Order Remaining In Effect during the 2007-08 Storm Season.

Site Category	Number/Sites Inspected	Inspections Conducted	Sites Finaled	Sites Expired	Stop Work Orders Issued	Stop Work Orders That Remain In Effect
Single Family Residential	183	451	56	27	17	11
Commercial	10	20	3	-	-	-
Tract	39	133	8	4	1	-
TOTAL	**232**	**604**	**67**	**31**	**18**	**11**

Summarize new activities or improvements to be implemented next year as a result of your self assessment of the Construction Component:

Building and Safety:

- The Department has decided to use County staff to conduct NPDES Construction inspections instead of using the services of a consultant as previously done. It is felt that more control will be realized by using County staff for conducting NPDES inspections from the inspection time required and frequency of inspections aspects. Additionally based on the current economic down-turn being experienced and the desire and need to justify the retention of staff, retaining NPDES construction inspections in-house appears to be the only approach available at this time.

- As documented in Question 4., above County inspection staff has received a significant amount of training in order to be able to conduct construction inspections. Providing staff with every opportunity to conduct inspections uniformly has been stressed in order to ensure a coordinated approach is taken regarding the inspection process.

- The Riverside County Construction Inspection form has been modified to exclude the site estimate "percentage of compliance" that was used for a number of years and replacing it with a site "in compliance", "not in compliance" and "gross not in

2. CONSTRUCTION
(SECTION G of ORDER NO. R9-2004-001), CONT.

compliance" evaluation system instead. See Attachment C: NPDES Construction Inspection Form.

Transportation Department: Consultant companies have been utilized to conduct NPDES Construction and Municipal Inspections for FY 07/08. AEI-CASC, GeoPacifica and URS have provided services to the Transportation Land Management Agency-Transportation Department. Building and Safety Environmental Compliance staff provides NPDES Construction Inspections to new development in unincorporated areas of the County. For FY 08/09, URS will continue to assist the Transportation Department with construction inspections for public road construction activities.

Facilities Management and EDA: Environmental compliance and inspection staff for both departments have received training that is equivalent to that for inspections for new private development. This parallel track in training and inspection for CIPs signifies a commitment for NPDES stormwater program support.

Regional Parks and Open Space District: several employees have received training on construction BMPs so that for future parks projects NPDES stormwater requirements are taken into account.

3. MUNICIPAL
(SECTION H.1 of ORDER NO. R9-2004-001)

Number of inspections conducted at existing municipal facilities: The Transportation Department utilized consultant services to conduct Municipal site inspections. GeoPacifica and URS conducted site inspections for FY 07/08. There were (twelve) 12 Road Yards inspections and (eleven) 11 Material Sites inspections. During the inspections, the most common deficiencies were: oil/grease stain on the ground from leaking equipment pieces, needed repairs to existing berms, trash and debris needing removal on a more frequent basis, and additional protection to stockpiles

1) **Number and type of enforcement actions related to municipal sites:**

Enforcement and Compliance Responses	Number
Education and Information	-
Verbal warning	-
Written warning	-
Other:	-
Total	**0**

2) **Number of catch basins and inlets that were inspected and the number that were cleaned:**

	Number Inspected	Number Cleaned
Catch Basins and Inlets	1211	1210

3. MUNICIPAL
(SECTION H.1 of ORDER NO. R9-2004-001), CONT.

4) **Assessment of the amount and type of debris removed from catch basins, streets, and open channels, including an identification of problem areas that generate the most pollutants:**

Facility	Type of Debris	Amount (tons)	Problem Areas that Generate Most Pollutants
Catch Basin Cleaning Program	Vegetative Litter	3.74	
	Anthropogenic Litter	5.06	
	Sediment	11.90	
	Other man-made debris		
Total		**20.7**	**tons (wet weight)**
Street Sweeping Program (i)	Vegetative Litter	232.30	
	Anthropogenic Litter	77.43	
	Sediment	1,238.91	
	Other man-made debris		
Total		**1,548.64**	**tons (wet weight)**
Roadside Litter Removal Program	Vegetative Litter		
	Anthropogenic Litter	7.34	
	Sediment		
	Other man-made debris		
Total		**7.34**	**tons (wet weight)**
Code Enforcement CleanUp Program (ii)	Vegetative Litter		
	Anthropogenic Litter	640.52	
	Sediment		
	Other man-made debris		
Total		**640.52**	**tons (wet weight)**

0001819

3. MUNICIPAL
(SECTION H.1 of ORDER NO. R9-2004-001), CONT.

4) **Assessment of effectiveness of BMPs that have been implemented for municipal facilities and activities:**

BMP Code	Description	Used	Notes
SC-10	Non-Stormwater Discharges	☒ Yes ☐ No	
SC-11	Spill Prevention, Control and Clean-up	☒ Yes ☐ No	
SC-20	Vehicle and Equipment Fueling	☒ Yes ☐ No	
SC-21	Vehicle and Equipment Cleaning	☒ Yes ☐ No	
SC-22	Vehicle and Equipment Repair	☒ Yes ☐ No	
SC-30	Outdoor Loading/Unloading of Materials	☒ Yes ☐ No	
SC-31	Outdoor Liquid Container Storage	☒ Yes ☐ No	
SC-32	Outdoor Equipment Maintenance	☒ Yes ☐ No	
SC-33	Outdoor Storage of Raw Materials	☒ Yes ☐ No	
SC-34	Waste Handling and Disposal	☒ Yes ☐ No	
SC-35	Safe Alternative Products	☒ Yes ☐ No	
SC-40	Contaminated or Erodible Areas	☒ Yes ☐ No	
SC-41	Building and Grounds Maintenance	☒ Yes ☐ No	
SC-42	Building Repair and Construction	☒ Yes ☐ No	
SC-43	Parking/Storage Area Maintenance	☒ Yes ☐ No	
SC-44	Drainage System Maintenance	☒ Yes ☐ No	
SC-60	Housekeeping Practices	☒ Yes ☐ No	
SC-61	Safe Alternative Products	☒ Yes ☐ No	
SC-70	Road and Street Maintenance	☐ Yes ☐ No	N/A
SC-71	Plaza and Sidewalk Cleaning	☐ Yes ☐ No	N/A
SC-72	Fountain and Pool Maintenance	☒ Yes ☐ No	
SC-73	Landscape Maintenance	☒ Yes ☐ No	
SC-74	Drainage System Maintenance	☒ Yes ☐ No	
SC-75	Waste Handling and Disposal	☒ Yes ☐ No	
SC-76	Water and Sewer Utility Maintenance	☐ Yes ☐ No	N/A

Assessment of the effectiveness of BMPs that have been implemented for municipal facilities and activities.

0001820

3. MUNICIPAL
(SECTION H.1 of ORDER NO. R9-2004-001), CONT.

5) **Description and number of training efforts conducted over the last year (for municipal facility operators and/or inspectors).**

a) **Training: Transportation Department**

Training	Training Description	Training Dates	Number of Attendees
Riverside County – Flood Control	NPDES Municipal Training	11/27/07 4/15/08	2
		Total	**2**

Summarize the internal and external education and outreach activities the Municipal Component has conducted over the past year: Training has been offered by Flood Control and internal staff. All required staff attended training during FY 07/08. The department is very interested in educating staff in NPDES. For FY 08/09, the Transportation Department will send additional staff as appropriate for further training as more training opportunities become available.

An assessment of program effectiveness based on the measurable goals established in the Permittee's Individual SWMP: Catch Basin Inspections and Cleaning were conducted during the dry season for FY 07/08 in Santa Margarita Region as required by the MS4 Permit.

6) **Additional Comments/Information:**

Describe the major accomplishments of the Municipal Component over the past year: Staff documented inspections and removed approximately 20.7 tons of litter. Dump tickets were collected to verify projected weight of debris removed from catch basins. In addition, each district Road Maintenance Supervisor and Assistant Supervisor visually inspects pipes, storm drain such as inlets, outlets, culverts, swales and channels frequently. Special attention is paid to the drainage facilities located within traditional or known problem areas

Summarize new activities or improvements to be implemented next year as a result of your self assessment of the Municipal Component: The Code Enforcement Department through their community improvement planning process and community cleanup activities have made significant progress toward removing blighted conditions from our rural communities. Through these programs the overall water quality is improved by trash removal and community awareness.

4. INDUSTRIAL/COMMERCIAL
(SECTION H.2 of ORDER NO. R9-2004-001), CONT.

1) **Number of inspections conducted:**

Category		Number of Inspections	
Industrial Facilities	**DES**	**HAZMAT**	**B&S**
High Priority Facilities	0	46	20
Medium Priority Facilities	0	38	11
Low Priority Facilities	0	19	1
Commercial Facilities			
High Priority Facilities	0	60	82
Medium Priority Facilities	0	60	110
Low Priority Facilities	589	34	101
Total	**589**	**257**	**325**

2) **Number and type of enforcement actions taken:**

Enforcement and Compliance Responses	Industrial	Commercial
Non-Monetary Penalties	--	--
Fines	--	--
Bonding Requirements	--	--
Permit Denial	--	--
Referral to SDRWQCB	--	--
Total	**0**	**0**

3) **Description and number of training efforts conducted over the last year (for industrial/commercial facility operators and/or inspectors).**

a. **Training for Building & Safety Department Staff:**

Training	Training Description	Training Dates	Number of Attendees
Detailed Training- AEI-CASC Engineering	WQMP Inspection and Plan Check	01/23/08	20
Construction Teamsters Training	HAZWOPER Recertification Annual Training	06/25/08	7
Special/Detailed Training-Building + Safety Staff	Inspection training specifically for Industrial/ Commercial NPDES Inspections	07/30/08	20
Special/Detailed Training-Building + Safety Staff	Inspection training specifically for Industrial/ Commercial NPDES Inspections	08/20/08	10

4. INDUSTRIAL/COMMERCIAL
(SECTION H.2 of ORDER NO. R9-2004-001), CONT.

Special/Detailed Training- Building + Safety Staff	Inspection training specifically for Industrial/ Commercial NPDES Inspections	09/08/08	10
		Total	**67**

b. **Training for Department of Environmental Health Staff**

Training	Training Description	Training Dates	Number of Attendees
NPDES Training at Flood Control	Stormwater Compliance for NPDES	4/15/08	24
NPDES Training at Flood Control	Stormwater Compliance for NPDES	11/27/07	25
UST Training	Compliance with UST regulations to prevent unauthorized releases	5/20/08	24
Hazardous materials handler training	Compliance with hazardous materials storage regulations	10/17/07	29
		Total	**102**

4) **An assessment of program effectiveness based on the measurable goals established in the Permittee's Individual SWMP:**

The County of Riverside Industrial/Commercial NPDES Inspection Program (I/C NPDES IP) is brand new. Once Industrial/Commercial inspections are undertaken by this Department, an assessment of the effectiveness of our Program will be presented. The Department of Environmental Health has been providing assistance during the permit term as it relates to the Compliance Assistance Program (CAP). Overall, educational materials have been provided to the majority of industrial and commercial businesses that are inspected by the Department of Environmental Health's Hazardous Materials Management Division and the food establishments inspected by the District Environmental Services Division. In addition, to assist cities meet their inspection goal the CAP provides surveys that are sent to the NPDES stormwater coordinators for each of the cities except for the cities of Corona, Riverside and Moreno Valley which have industrial waste inspectors.

The Building and Safety I/C NPDES IP will focus on the county unincorporated areas and the CAP provided by the Department of Environmental Health will continues in the cities until such time that an MOU between the cities and B&SEC can be negotiated or each of the cities establish their own I/C NPDES IP.

The business community overall seems to be aware of general NPDES requirements with more sophistication at larger industrial/commercial facilities that have environmental compliance personnel on site.

4. INDUSTRIAL/COMMERCIAL
(SECTION H.2 of ORDER NO. R9-2004-001), CONT.

5) **Additional Comments/Information:**

(A) Describe the major accomplishments of the Industrial Component over the past year:

The major accomplishment for the combined Industrial/Commercial Component this past year was the continued registration of approximately 10,000 businesses located in the unincorporated area of Riverside County. Since last reporting year the total of businesses registered has approximately doubled. Although the Environmental Health Department conducted what should be considered a majority of the Industrial/Commercial NPDES inspections reported in Question 1), above, Department of Building and Safety Environmental Compliance Division Inspectors began conducting NPDES inspections of sites. It is anticipated that a significant number of Initial NPDES Industrial/Commercial Inspections will be completed in time to be included in our next annual report.

(B) Describe the major accomplishments of the Commercial Component over the past year:

Please refer to Answer (A), above for the accomplishments of the Commercial Component.

(C) Summarize the internal and external education and outreach activities the Industrial Component has conducted over the past year:

The combined Industrial/Commercial internal, external educational and outreach activities centered around the training and readying of Environmental Compliance staff for beginning the Industrial/Commercial NPDES Inspections. As previously mentioned in Part 2.Construction, a significant amount of time and effort has been expended ensuring that inspection staff received proper training in order to be able to confidently conduct Industrial/Commercial NPDES Inspections. Being able to inspect Industrial/Commercial business sites uniformly was stressed since the same inspector may not be conducting a follow-up inspection of the site that he or she originally inspected.

(D) Summarize the internal and external education and outreach activities the Commercial Component has conducted over the past year:

Please refer to Answer (C), above for the educational and outreach activities of the Commercial Component.

(E) Summarize new activities or improvements to be implemented next year as a result of your self assessment of the Industrial Component:

No new activities or improvements are being contemplated at this time. Refinements to our Industrial/Commercial NPDES Inspection Program may be required when field inspections by our Environmental Compliance Division staff begin in earnest.

4. INDUSTRIAL/COMMERCIAL
(SECTION H.2 of ORDER NO. R9-2004-001), CONT.

(F) Summarize new activities or improvements to be implemented next year as a result of your self assessment of the Commerical Component:

Please refer to Answer (E), above for the new activities or improvements that will be implemented within the Commercial Component.

5. RESIDENTIAL
(SECTION H.3 of ORDER NO. R9-2004-001)

1) **A description of residential areas that were focused on during the past year:** The Flood Control and Water Conservation District, Code Enforcement Department and the Waste Management Department provide several programs to enhance residential involvement

   Flood Control District: The flood Control District provides various opportunities for public education throughout the year as well as follow-ups on complaints that are located within their right of way. See Flood Control and Water Conservation District Report

   Code Enforcement: Community Improvement Programs, Community Cleanup activities, Code complaint investigations and enforcement actions,

   Waste Management Department: Household hazardous waste community collection program for disposal of household generated hazardous waste such as paint, pesticides, batteries, solvents, universal waste, used oil, coolant, and other hazardous materials.

2) **Number and type of enforcement actions taken:** See attached Code Enforcement Actions Spread sheet for countywide activities.

Enforcement and Compliance Responses	Public Projects
Education and information	
Verbal Warning	
Written Warning	
Notice of Non-Compliance	
Administrative Compliance Order	
Misdemeanor	
Infraction	
Citation	
Referral to SDRWQCB	
Total	

3) **An assessment of program effectiveness based on the measurable goals established in the Permittee's Individual SWMP:** Educational materials are provided to new homeowners located in new housing tracts.

4) **Additional Comments/Information:** The Waste Management Department has taken over the Household Hazardous Waste (HHW) Community Collection Program and made significant

RESIDENTIAL
(SECTION H.3), CONT.

strides toward improving services to the residential community. A new state of the art HHW collection center in at the Robert Nelson Transfer Station in Riverside will be having its ribbon cutting ceremony on October 29, 2008. See handout for collection events located at various locations throughout the year..

Describe the major accomplishments of the Residential Component over the past year: Code Enforcement Community Improvement Plan and community cleanup activities. See newsletter attached.

Summarize the internal and external education and outreach activities the Residential Component has conducted over the past year: See Flood Control and Water Conservation District Educational Summary

Summarize new activities or improvements to be implemented next year as a result of your self assessment of the Residential Component:

As the Community Improvement Planning effort continues it is anticipated that significant progress will be made to empower residents to be more proactive in their communities and be informed on issues including pollution prevention and water quality.

6. EDUCATION
(SECTION I of ORDER NO. R9-2004-001)

1) **Description of education efforts conducted by the Permittee (not collectively with other Permittees) during the previous year:** See Report from Flood Control and Water Conservation District

Audience	Measures
Permittee Departments and Personnel	Number of Permittee employees trained for: • Construction Inspection: • Industrial/Commercial Inspection: • Municipal Facilities and Activities: • Development Planning:
Construction Site Owners and Developers	Outreach events conducted:
Industrial/Commercial Owners and Operators	Industrial/Commercial outreach events conducted:
Residential Community, General Public, Other Public Agencies and Students	Number of Media Impressions in: • Newspaper: • Mailings: • Radio/TV: • Billboards: • Other: • Materials: Number of classroom presentations: Public Education events conducted:

2) **Assessment of overall program effectiveness based on the measurable goals established in the Permittee's Individual SWMP:** See Flood Control & Water Conservation District Report

3) **Additional Comments/Information:**

1) **Describe the major accomplishments of the Education Component over the past year:** See Flood Control and Water Conservation District Report.

6. EDUCATION
(SECTION I of ORDER NO. R9-2004-001)

Summarize new activities or improvements to be implemented next year as a result of your self assessment of the Education Component:

The County departments' partner with the Flood Control and Water Conservation District on all educational opportunities and share costs and time at community events with their "Only Rain in the Drain" campaign.

7. ILLICIT DISCHARGE DETECTION AND ELIMINATION
(SECTION J of ORDER NO. R9-2004-001)

1) **Number of illicit discharges, connections and spills reported and/or identified during the reporting period:**

   1) **Illicit Discharges (ID):** 25 Countywide
   2) **Illicit Connections (IC):** See Flood Control and Water Conservation District Report
   3) **Spills (S):** 3-Sewage Spills >1000 gallons in Santa Margarita Watershed

2) **Number of illicit discharges or connections investigated during the reporting period and the outcome of the investigations:**

Type	Category	Substance	Outcome of Investigation
ID	various	Various	25 cases countywide. Return to compliance and cleanup completed
ID	various	various	275 cases countywide of illegal dumping of various commodities and wastes reported by Code Enforcement and Environmental Health. Proper disposal accomplished and investigation continuing on 72 cases.
ID	POTW	sewage	3 cases-9/25/2007 51,000 gals 9/29/2007 75,000 gals 12/4/2007 50,000 gals Responsible party required cleanup and referrals made to SDRWQCB.

3) **Number and types of enforcement actions taken for illicit discharges or connections during the reporting period:** Countywide

Enforcement and Compliance Responses	Private Facilities	Public Facilities
Non-monetary penalties	25	3
Stop work authority		
Fines		
Financial Security		
Permit/Business License Denial		
Total	**25**	**3**

7. ILLICIT DISCHARGE DETECTION AND ELIMINATION
(SECTION J of ORDER NO. R9-2004-001), CONT.

4) **Number of times your agency's hotline was called during the reporting period, as compared to previous reporting periods.** See Flood Control and Water Conservation District Report for data on water pollution hotline.

	Number of Calls	
	2006-07	**2007-08**
Water Pollution Hotline		

5) **Number and location of dry weather monitoring sites that were monitored during the reporting period:** See Flood Control and Water Conservation District Report

Number of Site(s):

Location(s):

7. ILLICIT DISCHARGE DETECTION AND ELIMINATION
(SECTION J of ORDER NO. R9-2004-001), CONT.

6) **Summary of Illicit Discharge Monitoring Program results, including: 1) All inspection, field screening, and analytical monitoring results; 2) All follow-up and elimination activities; and 3) Any proposed changes to station locations and/or sampling frequencies:** See Flood Control and Water Conservation District Report

Date	Location	Monitoring Results	Follow-up and Elimination Activities	Proposed Changes
				No Changes Comment(s):
				No Changes Comment(s):
				No Changes Comment(s):
				No Changes Comment(s):
				No Changes Comment(s):
				No Changes Comment(s):
				No Changes Comment(s):
				No Changes Comment(s):
				No Changes Comment(s):
				No Changes Comment(s):

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7. ILLICIT DISCHARGE DETECTION AND ELIMINATION
(SECTION J of ORDER NO. R9-2004-001), CONT.

7) **An assessment of overall program effectiveness based on the measurable goals established in the Permittee's Individual SWMP:** See Flood Control and Water Conservation District Report.

As IC\IDs are identified follow-up investigations are initiated and as appropriate progressive enforcement action is taken to ensure abatement of conditions. In difficult cases and need for additional regulatory authority RWQCB staff and other regulatory agencies are notified for assistance.

8) **Additional Comments/Information:**

Describe the major accomplishments of the Illicit Discharge Detection and Elimination Component over the past year: Continued enhancements in Code Enforcement and Building & Safety training to advance stormwater compliance.

Summarize the internal and external education and outreach activities the Illicit Discharge Detection and Elimination Component has conducted over the past year: See Flood Control and Water Conservation Report.

Summarize new activities or improvements to be implemented next year as a result of your self assessment of the Illicit Discharge Detection and Elimination Component: As program matures higher level training for staff to identify complex stormwater issues will be introduced. Inspections of industrial commercial facilities with a focus on BMP O & M and site visits to ensure that IC/ID is disconnected from the storm drain system will be enhanced.

Reporting on monitoring results from the Flood Control and Water Conservation District does not effectively correlate with IC\ID investigations. With transition of Flood Control staff and bringing on of a sub contractor to provide support on monitoring will help to enhance how IC/ID will correlate with monitoring data, that can in turn be used to track sources of IC/ID activity and provide a better mechanism for enforcement.

8. PUBLIC PARTICIPATION

2) **A description of efforts to include the public urban runoff management programs during the reporting period (i.e., river clean-ups, volunteer monitoring, Permittee council meetings related to the SWMP, etc.):** See Flood Control and Water Conservation District Report.

3) **Additional Comments/Information:**

Assessment of overall program effectivenss based on the measurable goals established in the Permittee's Individual SWMP: Attendance at TAC, MSC, WQMP, CIP, WQMC, IRWMP, CASQA and other related meetings is a forum for open discussion, program coordination and countywide consistency.

4) **Describe the major accomplishments of the Public Participation Component over the past year:** See Flood Control and Water Conservation District Report.

5) **Summarize the internal and external education and outreach activities the Public Participation Component has conducted over the past year:** See Flood Control and Water Conservation District Report.

Summarize new activities or improvements to be implemented next year as a result of your self assessment of the Public Participation Component: See Flood Control and Water Conservation District Report.

9. FISCAL ANALYSIS COMPONENT

Fiscal Analysis Component - each Permittee shall include an annual fiscal analysis, for each fiscal year covered by Order No. R9-2004-001, in its Individual Annual Report. This analysis shall evaluate the expenditures (such as capital, operation and maintenance, education, and administrative expenditures) necessary to accomplish the activities of the Permittee's Individual SWMP. The analysis shall include the following:

1) **A report of the previous reporting period's budget and a budget for the upcoming reporting period. To the extent possible, the budgets should be broken down by the following programs:**

Program Element	Fiscal Year 2007-2008		Fiscal Year 2008-2009	
	Capital Expenditures	O&M/Admin Expenditure	Capital Expenditures	O&M/Admin Expenditure
Program Management		$725,000		$750,000
Annual Fee for MS4 NPDES Permit		$30,000		$40,000
Implementation Agreement Shared Cost		$150,000		$190,000
Construction Inspections		$485,000		$485,000
Development Planning		$30,000		$30,000
Industrial and Commercial Inspections		$175,000		$175,000
Illicit Connections & Illegal Discharges Program		$1,610,000		$1,610,000
Municipal Facilities and Activities		$174,900		$180,000
Catch basin Cleaning	$330,0000	$954,585		$796,272
GAIS mapping		$553,847		$359,483
Street Sweeping		$525,518		$681,753
Public Education & Outreach				
Monitoring Program		$685,000		
Other Roadside litter removal		$416,552		$2,106,250
Total	**$ 330,000***	**$6,515,402***	**$ 0**	**7,403,798***

* Direct costs only. The total does not include ancillary costs in combination with other related program activities, that is estimated between $17,000,000- $18,000,000.

9. FISCAL ANALYSIS COMPONENT
(CONT.)

2) **A description of the source(s) of funds that were utilized during the previous fiscal year and the source(s) of funds proposed to meet the necessary expenditures for the subsequent year, including legal restrictions on the use of such funds.**

Source of Funds	Capital Expenditures	Percent of Total Program Funding	Restrictions on Use (if applicable)
General Fund	22%	N/A	Catch basin cleanout, Inspection, MS4 mapping, road side litter removal
CSA 152		N/A	Benefit assessment for street sweeping
Gas Tax		N/A	Road maintenance activities
Development Revenue Fees		100%	WQMP review
Lighting landscape and Maintenance Distict		N/A	Designated areas within the LLMD
Developer Fees	100 %	N/A	Project specific
Capital Projects	2%	N/A	Project specific

3) **Additional Comments/Information:**

Overall, the direct and indirect cost for program implementation of NPDES related activities are in the range of $17,000,000-18,000,000 countywide. Program costs continue to increase while revenues and taxes are decreasing. Each watershed requires additional quantification of activities, tracking and need for funding with no additional projected income foreseen. In this period of economic recession, general fund dollars are diminishing with a projected 20% decrease anticipated in the County's general fund for the next 3 years. It is imperative that the County continues to closely monitor and contain program costs and work with the three Regional Boards to ensure economic considerations are taken into account when planning any new program requirements.

10. NON-STORM WATER DISCHARGES

Permittees shall report on any discharge category listed in Requirement B.2 of Order No. R9-2004-001 that was identified as a source of pollutants during the reporting period. For each identified category, the Permittee shall report whether it elected to prohibit the discharge or to require BMPs to reduce pollutants in the discharge to the MEP. If the discharge is not prohibited, the BMPs that will be implemented, or required to be implemented, shall be described in each Permittee's Individual SWMP Annual Report.

Category	Prohibited	BMP to be Implemented
Diverted stream flows	☐ Yes ☐ No	Not Applicable
Rising ground waters	☐ Yes ☐ No	Not Applicable
Uncontaminated ground water infiltration [as defined at 40 CFR 35.2005(20)] to MS4s	☐ Yes ☐ No	Not Applicable
Uncontaminated pumped ground water	☐ Yes ☐ No	Not Applicable
Foundation drains	☐ Yes ☐ No	Not Applicable
Springs	☐ Yes ☐ No	Not Applicable
Water from crawl space pumps	☐ Yes ☐ No	Not Applicable
Footing drains	☐ Yes ☐ No	Not Applicable
Air conditioning condensation	☐ Yes ☐ No	Not Applicable
Flows from riparian habitats and wetlands	☐ Yes ☐ No	Not Applicable
Water line flushing	☐ Yes ☐ No	Not Applicable
Landscape irrigation	☐ Yes ☐ No	Not Applicable
Discharges from potable water sources not subject to NPDES Permit No. CAG679001, other than water main breaks	☐ Yes ☐ No	Not Applicable
Irrigation water	☐ Yes ☐ No	Not Applicable
Lawn watering	☐ Yes ☐ No	Not Applicable
Individual residential car washing	☐ Yes ☐ No	Not Applicable
Non-emergency fire fighting flows	☐ Yes ☐ No	Not Applicable
Dechlorinated swimming pool discharges	☐ Yes ☐ No	Not Applicable

1) **Additional Comments/Information:** Ordinance 859.1 Water Efficient Landscape and Water Requirements became effective 4/25/2008.

0001837

11. RECEIVING WATER LIMITATIONS

This section includes the report required pursuant to Requirement C.2.a. of Order No. R9-2004-001, if applicable.

Requirement C.2.a. states:

"Upon a determination by either a Permittee or the SDRWQCB that MS4 discharges are causing or contributing to an exceedance of an applicable water quality standard, the Permittee shall promptly notify and thereafter submit a report to the SDRWQCB that describes BMPs that are currently being implemented and additional BMPs that will be implemented to prevent or reduce any pollutants that are causing or contributing to the exceedance of water quality standards. The report may be incorporated in the SWMP Annual Report unless the SDRWQCB directs an earlier submittal. The report shall include an implementation schedule. The SDRWQCB may require modifications to the report;"

See Flood control and Water Conservation Report.

The County relies on the Flood Control and Water Conservation District to conduct water quality monitoring. The District advises the permittees of any pollutants of concern that have been identified and corrective actions are taken through a cost share agreement. This process is evolving and requires additional work. Flood Control staff have transitioned out of the program and new staff are being trained. In addition, a sub contractor is being brought on to perform a revised monitoring program that will enhance monitoring and enforcement for IC/ID which ultimately will be more protective of water quality.

12. ADDITIONAL URBAN RUNOFF DATA

This section is a summary of all urban runoff related data not included in the annual monitoring report (e.g., special investigations).

See Flood Control and Water Conservation District Report.

13. PROPOSED REVISIONS

This section includes proposed revisions to the Individual SWMP, including areas in need of improvement based on the assessment of effectiveness of each program component.

See Flood Control and Water Conservation District Report.

1) Enhancements to inspection of industrial commercial businesses by the Department of Building and Safety for unincorporated portions of the County. **Expected improvement or effectiveness:**

    a) Industrial/commercial education and awareness improved

    b) O & M of BMPs better managed

    c) Decrease in pollutants of concern coming off of industrial/commercial sites.

2) WQMP requirements for Capital Improvement Projects (CIPs) more closely monitored and mirror that of private commercial development. **Expected improvement or effectiveness:**

    a) BMPs included at inception of project (architectural design)

    b) O& M of BMPs better managed

    c) Decrease in pollutants of concern coming from CIPs

3) Continue to enhance GIS mapping to include post construction BMPs from new development and relationship to existing MS4 maps. **Expected improvement or effectiveness:**

    a) Better correlation of new BMPs with existing MS4 infrastructure.

    b) Use as a tool for potential impacts and planning purposes for BMP sizing criteria.

4) Assist new cities of Menifee and Wildomar as they transition from unincorporated area.

    a) Plan check and new development review taken over by cities.

Building and Safety Target List Of Commercial and Industrial Sites

Household Hazardous Waste or HHW, are unwanted materials that are flammable, reactive, poisonous, or corrosive. These items are banned from the landfill and must be disposed of at an HHW Collection Facility or event.

0001842

Common Acceptable Items include:

- Batteries
- Fluorescent Bulbs
- Electronic Devices
- Mercury-Containing Devices
- Sharps
- Paints and Thinners
- Cleaners
- Solvents
- Pesticides
- Yard Chemicals
- Automotive Fluids
- Small & BBQ Propane Tanks
- Swimming Pool Chemicals
- Hobby Chemicals

Items which CANNOT be accepted include:

- Ammunition
- Asbestos or Remediation Waste
- Compressed Gas Cylinders Greater Than 40 Pounds
- Explosives
- Infectious or Medical Waste, except Sharps
- Radioactive Waste
- Business Waste
- Waste Generated Outside of Riverside County.

Material must be secured from tipping, labeled and sealed during transport. State law limits the amount of waste to 5 gallons or 50 pounds per visit.

The Riverside County Waste Management Department Mission Statement

To provide for the protection of the general public health and welfare by efficient management of Riverside County's solid waste system through:

- Provision of facilities and programs which meet or exceed all applicable local, State, Federal and land use regulations;
- Utilization of up-to-date technological improvements;
- Development and maintenance of a system that is balanced economically, socially and politically; and
- Economically feasible recovery of waste materials.

For more program information, visit www.rivcowm.org or call 1-800-304-2226

RECYCLE
USED OIL FILTERS

Zero Waste - You Make It Happen!

This publication was funded by a grant from the California Integrated Waste Management Board.

What to do with Household Hazardous Waste *in Riverside County*

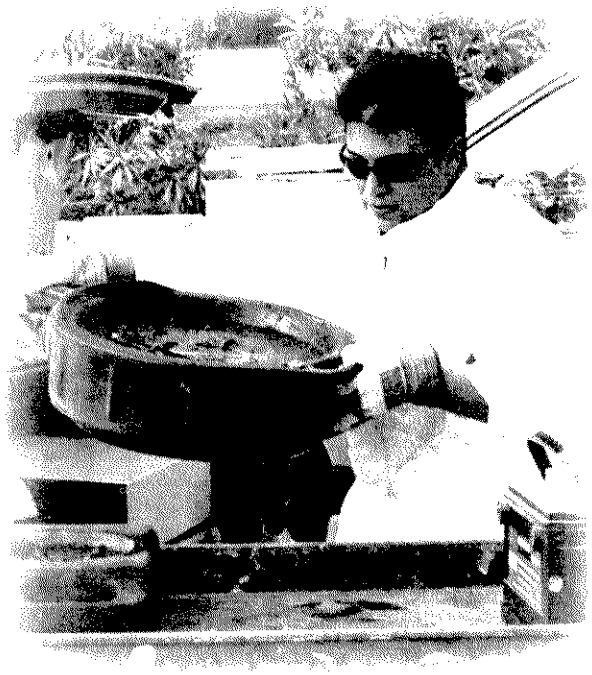

Riverside County
Waste Management Department

Permanent HHW Facilities

Lake Elsinore City Maintenance Facility
521 N. Langstaff Street, near Sumner
Open 1st Sat. of the month, except in Dec. & Jan.
From 9:00 AM to 2:00 PM

Pedley Area - County Road Yard
6851 Van Buren Boulevard, near Clay Street
Open NON-holiday Sat's, from 9 AM to 2 PM

Beaumont Area *(Open in 2008)*
Lamb Canyon Landfill
16411 Lamb Canyon Road
Open NON-holiday Sat's, from 9 AM to 2 PM

Palm Springs Area *(Open in 2008)*
Wastewater Treatment Plant
4575 E. Mesquite Ave.
Open NON-holiday Sat's,
October - May from 9 AM to 2 PM
June - September from 7 AM to 12Noon

Riverside Area *(Open in 2008)*
East of Robert A. Nelson Transfer Station
1830 Agua Mansa Rd.
Open NON-holiday Sat's, from 9 AM to 2 PM

Temporary HHW Sites are set up

throughout the County and throughout the year. For locations, dates, and times, please call 1-800-304-2226 or visit www.rivcowm.org.

ABOP Locations, (or those that take ONLY Antifreeze, Batteries, Oil, and Paint)

Murrieta Area - County Road Yard
25315 Jefferson Avenue
Open NON-Holiday Sat's, from 9 AM - 2 PM

Palm Springs Area - Fire Dept. Training Area
3000 E. Alejo Road
Open NON-holiday Sat's,
October - May from 9 AM to 2 PM
June - September from 7 AM to 12 Noon

Recycle Park at Lamb Canyon Landfill

Recycle Park is designed to divert usable and recyclable materials from the waste stream, while also providing a location for disposing of Household Hazardous Waste and other items banned from the landfill. Though it is currently in the construction phase, once completed, it will feature:

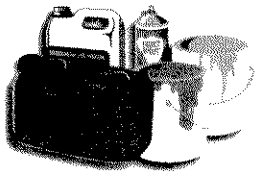

Household Hazardous Waste Collection:
providing a new permanent facility for the area.

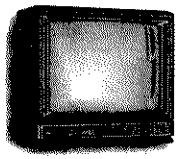

Consumer Electronics Drop-Off:
of unwanted televisions, computer, and other electronic devices.

Tire Drop Off:
from cars, passenger trucks, and RVs

Appliance Recycling:
for major appliances, including items with Freon.

Reuse Exchange Store:
where visitors can purchase used items.

Trash Disposal Pad:
which is an area where visitors can safely unload unusable refuse away from heavy equipment.

0001843

printed on recycled paper

0001844

2008
County of Riverside Backyard Composting Program

Presented by
Riverside County Waste
Management Department
14310 Frederick Street
Moreno Valley, CA 92553
1) 486-3200 or (800) 366-SAVE
www.rivcowm.org

approximately 3 feet wide x 3 feet deep x 3 feet tall. Take the time to consider your options and the style of composting that is most convenient for you. Compost bins can either be homemade or purchased.

Biostack Bin

This bin is manufactured by Smith & Hawken. It stacks for easy turning of material, has large air slots that offer good ventilation, and the lid keeps the material from drying out or getting too wet. (28" x 28" x 34"h)

Price: $50.00

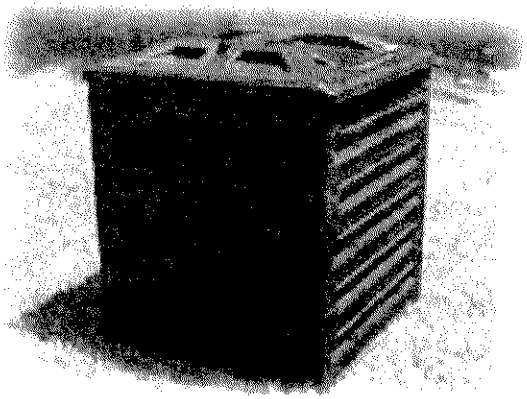

Presto Bin

This bin is a good inexpensive way to start composting. Bolt the bin together, fill it, and when you need to turn it, lift the bin up and scoop the material back in. (2.5' X 10' plastic sheet makes a round bin)

Price: $12.00

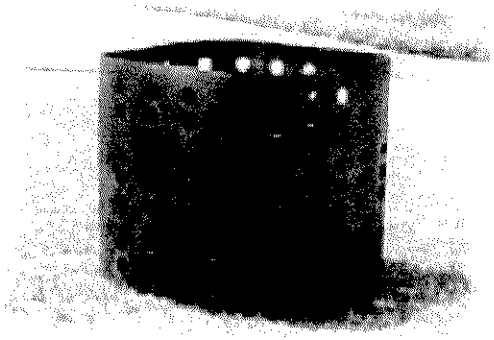

Volunteer Master Composters Needed!

Become a volunteer Master Composter with the Riverside County Backyard Composting Program!

You will be part of an elite group of Volunteer Master Composters who will:

*Help with all aspects of the program
*Become a home Compost Expert through the extensive 6 Saturday training course.
*Teach your family, friends, neighbors and fellow County residents "How to Compost"

Classes forming now. To sign up for the class or for more information please call: (951) 486-3200 or (800) 366-SAVE or visit www.rivcowm.org

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Backyard Composting Program Description

The program will cover the following topics:

The Biology of Composting

How to compost

What to compost

How to use compost

Alternatives to composting

- Grass Cycling
- Vermicomposting

Tools that make composting easy:

- Bins
- Pitch Fork
- Gloves

Troubleshooting

Question and Answer Period

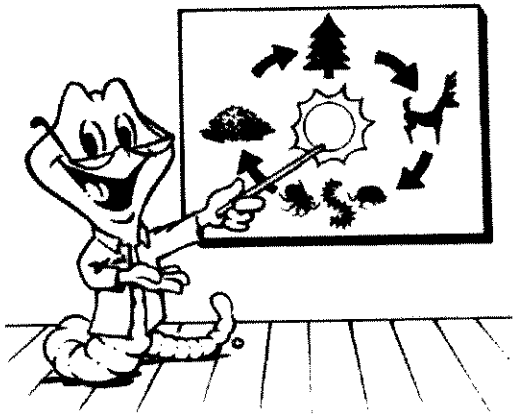

WORKSHOP ADDRESSES

Banning
Banning Community Center
789 N. San Gorgonio Ave.

Beaumont
Gymnasium/Multi Purpose Room
550 East 6th Street

Blythe*
Todd Park,
(Front of Senior Center)
445 N. Broadway

Cathedral City
Cathedral City Public Library
33520 Date Palm Dr

Corona
Corona Public Library
650 South Main Street

Hemet
Hemet Public Library
300 E. Latham Ave.

Glen Avon
Glen Avon Public Library
9244 Galena St.

Idyllwild*
Idyllwild Town Hall
25929 Cedar St.
(Outside Patio Area/non-accessibility)

Indio
Indio Public Library
200 Civic Center Mall

Jurupa
Jurupa Mountains Cultural Center
7621 Granite Hill Dr.
(non-accessibility)

Lake Elsinore
Lake Elsinore Library
600 W. Graham Ave.

If you require reasonable accommod
least one week b

Environmental Resources

California Department of Conservation
(800) 732-9253
www.consrv.ca.gov

California Integrated Waste Management Board
(916) 341-6000
www.ciwmb.ca.gov

Earth's 911 Recycling, Used Motor Oil & Filters
(800) 253-2687
or www.cleanup.org

Integrated Pest Control
www.imp.ucdavis.edu
or www.laspilitas.com

Riverside County Flood Control District
(800) 506-2555
www.floodcontrol.co.riverside.ca.us

Riverside County Waste Management Department
(Landfills & Recycling Information)
(951) 486-3200 or (800) 366 SAVE
Household Hazardous Waste (HHW)
Hotline (800) 304-2226
www.rivcowm.org

Smart Gardening tips
www.smartgardening.com

UCCE Riverside County Master Gardeners
Hotline (951) 683-6491

Water Conservation
www.h2ouse.net

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RIVERSIDE COUNTY CELEBRATES... APRIL 2008

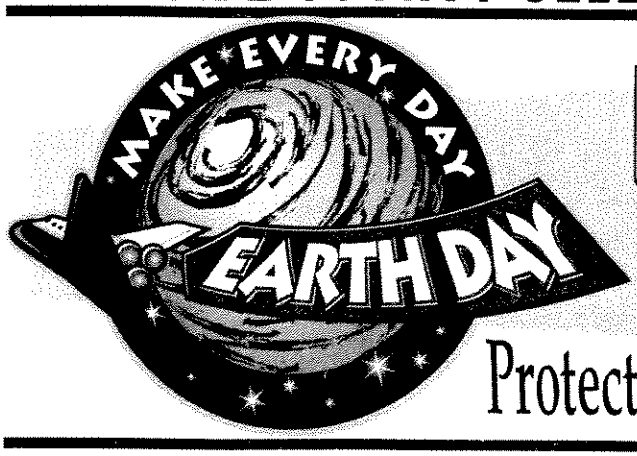

EARTH DAY EVERYDAY

Protect Our Children and Our Future

SPRING GARDENING AND SUMMER FUN GREEN TIPS

Water Conservation

Here are a few tips to reducing your water use, yet producing a lush garden:

- Use drought tolerant (less thirsty) plants in your garden.
- Establish a two to four inch layer of mulch for better water penetration.
- Improve your soil by composting to aid the soil's ability to resist evaporation.
- Plant trees, they help to reduce plant and soil moisture loss.
- Group like plants.
- Plant grass only where you need it.
- Periodically check your irrigation system for leaks or breaks in the line.
- Use drip and low irrigation systems.

The Storm Drain Story:

When it rains, many pollutants and debris found on our streets, sidewalks, parking lots, driveways and gutters flow into the storm drain. The storm drain then receives these flows and discharges them into the nearest body of water (such as a stream, creek, pond, lake or river). Storm drain flows DO NOT go to treatment plants like the home waste water discharged into your sewer system does. Pollutants and debris such as aluminum cans, trash, pet waste, motor oil, fertilizer, green waste and paint are just a few of the contaminants found in the storm drain.

The following tips are offered to help you make the right choice for both your pocket and the environment.

- **Garden Chemicals**: Overuse of garden chemicals can be harmful to humans, aquatic and wildlife when mixed with water from either rain flows or over irrigation. Consider the many natural alternatives suggested at www.pesticide.org.
- **Sediments**: Soil runoff from flower or vegetable gardens, horse farms, or development that find their way into the storm drain can harm local aquatic habitants. Plant grass and other rapid growth to hold dirt particles together.
- **Yard Waste**: Lawn and garden clippings, if not swept up, are blown into the street and end up in the storm drains. The clippings then mix with other debris and over time create offensive curbside odors that in time will affect a stream or pond. Sweep up excess lawn clippings, leaves and other yard waste. Place green waste leftovers in a recycling bin or look into the benefits of composting.
- **Scoop the Poop!** Animal droppings contain bacteria and nutrients that flourish in water promoting the growth of algae in our streams and lakes. Pet waste is also the cause of spreading organisms such as salmonella and giardia that move from the animal into the environment through flies, insects, wind and dust. When walking your pet(s), use a trash bag to pick up the waste and dispose of it into a waste receptacle. (Bring extra bags to share with other dog owners)

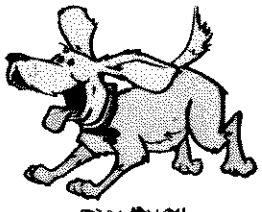

Report any illegal storm drain disposal in your Riverside County Community to (800) 506-2555.

Continue your GREEN education with these helpful links.....

Integrated Pest Management	**www.ipm.ucdavis.edu**
Metropolitan Water District , Heritage Garden Program	**www.bewaterwise.com**
Western Municipal Water District	**www.wmwd.com**
Riverside County Flood Control District	**www.rcflood.org**
State Water Resource Conservation Board	**http://www.swrcb.ca.gov/watershed/links.html**

04545141M816

Last year, more than 24,000 residents have properly disposed of over 1,890,000 pounds of Household Hazardous Waste. Thank you for participating in this valuable Riverside County Program.

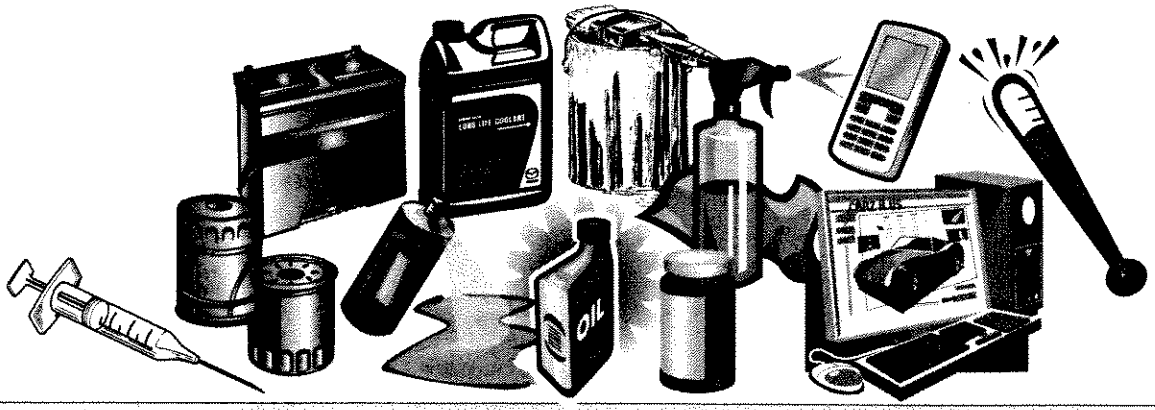

What Is Household Hazardous Waste?

Many products used in our home contain hazardous materials. Your home and garage may seem safe, but look again. To know whether or not a product is hazardous, check the label. **Unwanted products labeled Corrosive, Flammable, or Toxic warn of potential hazards** if the chemical product is misused, spilled or disposed of improperly. Typical products found throughout the house that may be hazardous are as follows:

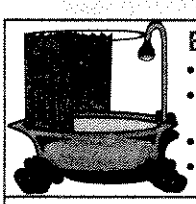

BATHROOM

- Chlorine Bleach
- Deodorizer/ Air Freshener
- Disinfectant
- Nail Polish Remover
- Shoe Dye
- Mercury Thermometer
- Toilet, Tub & Tile Cleaner

GARDENING

- Fertilizer
- Fungicide
- Insecticides
- Pesticides
- Moss Killer
- Slug And Snail Poison
- Weed Killer/Herbicides

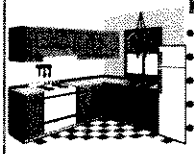

KITCHEN

- Microwave Oven
- Aerosol Cans
- Aluminum Cleaner
- Ammonia
- Drain Opener
- Floor Care Products
- Furniture Polish
- Oven Cleaner
- Rodent Poison

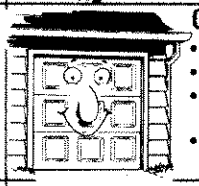

GARAGE

- Antifreeze
- Auto Batteries
- Transmission & Brake Fluid
- Carburetor Cleaner
- Chrome Polish
- Gas, Diesel Fuel
- Engine Degreaser
- Motor Oil
- Oil Filters

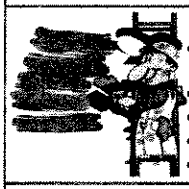

WORKSHOP

- Fiberglass & Epoxy Resins
- Glue
- Gun Cleaner
- Paint Latex/Oil Based
- Paint Stripper
- Paint Thinner/ Turpentine
- Photo Chemicals
- Varnish
- Wood Preservative
- Caulking
- Fluorescent Lamps

MISCELLANEOUS

- Artists' Paints
- Flea Powder
- All Batteries
- Kerosene/Lamp Oil
- Lighter Fluid
- Moth Balls/ Flakes
- Pool/Spa Chemicals
- Rug Cleaner
- Spot Remover w/Solvent
- Cell Phones
- TV's
- Computers
- Mercury Devices
- Consumer Electronics
- Sharps-Needles
- BBQ Propane Tanks

UNIVERSAL WASTES (a category of Household Hazardous Waste)

- Aerosol Cans (non-empty label toxic or flammable)
- Batteries (AA, AAA, C & D cell) all single use.
- Cell phone
- Computer
- Computer Monitor (up to 3)
- Dental amalgam
- Fluorescent Bulbs
- Fluorescent Tubes
- Microwave oven
- Printer
- Radio
- Telephone
- Thermometer
- Thermostat
- TV's and VCR's (up to 3)

CURRENT HHW SCHEDULE AVAILABLE HTTP://WWW.RIVCOWM.ORG OR 1-800-304-2226

RESTRICTIONS:

- County of Riverside residents only
- No explosives/ammunition
- No radioactive materials
- No tires
- No business or non-profit organization waste
- No appliances
- No medical waste
- No 30 or 55-gallon drums

CAUTION:

- You may bring up to **5 gallons** or **50 lbs.** of a chemical hazardous waste maximum per car/per trip.
- Container shall be marked and secured to prevent leaks. Do not mix waste products.
- Containers holding gasoline will not be returned.

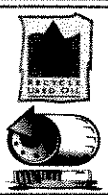

HOUSEHOLD HAZARDOUS WASTE INFORMATION
HOTLINE 1-800-304-2226 For current schedule: WWW.RIVCOWM.ORG
RIVERSIDE COUNTY WASTE MANAGEMENT DEPARTMENT (951)486-3200

This insert has been funded through a cooperative effort from Riverside County Waste Management Department, the cities and County of Riverside Storm Water/Clean Water Protection Program, the California Department of Conservation, and the California Integrated Waste Management Board. Zero Waste - You Make It Happen!

CHANGING OIL TOO OFTEN?

Check your vehicles owner's manual to see what the manufacturer suggests for the oil change frequency.

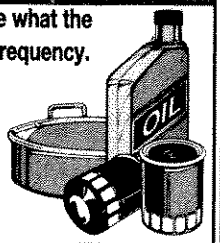

- Contact your curbside trash service for curbside pick-up of used oil and filters.
- Recycle used oil and filter at Certified Collection Centers in your community.
- Never leave abandoned oil or other hazardous waste- IT'S ILLEGAL!

FREE 1.5 qt. Drainer Container

USED OIL CERTIFIED COLLECTION CENTERS
1-800-253-2687 OR WWW.CLEANUP.ORG

Free 15 qt. drainer containers are available at the HHW collection events and facilities while supplies last.

COMPOST

FREE WORKSHOP SCHEDULE — **SATURDAYS 10:00 AM**

Date	Area	Location
April 19	Riverside	Landscapes Southern California Style Garden
April 26	Palm Desert	San Nicholas Garden City of Palm Desert
May 31	Beaumont	City of Beaumont Gymnasium
June 21	Hemet	Hemet Public Library
June 28	Glen Avon	Glen Avon Public Library
July 12	Banning	Banning Community Center
July 19	Wildomar	Mission Trail library
July 26	Idyllwild	Town Hall
August 9	Sun City	Kay Ceniceros Senior Center
August 16	Jurupa	Jurupa Mountains Cultural Center
August 23	Norco	Norco Public Library
September 20	Indio	Indio Public Library
September 27	Temecula	Grace Mellman Community Library

Biostack Bin

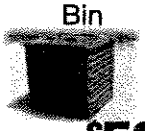

$50

Presto Bin

$12

Become a Master Composter Volunteer May 2008

Backyard Composting Program
(951) 486-3200

PROPER DISPOSAL OF MEDICATIONS

Most medications can be disposed of in regular trash. **Do Not Flush** unused medications down the toilet and into the waste water treatment system. Always remove personal identification from medication bottles and containers. Sharps and needles may be taken to a household hazardous waste event or facility.

LIQUID & PILLS

Empty medication into coffee grounds or kitty litter and dispose of with regular trash.

INHALER

Empty container by expelling all propellant. Dispose of small empty cylinder in trash.

SHARPS/NEEDLES

Must be placed and secured in an approved sharps disposal container and brought to any Household Hazardous Waste Event or Facility.
FREE approved containers are available at the HHW events, while supplies last.

BUSINESS HAZARDOUS WASTE

Businesses that need to dispose of hazardous waste must use a licensed hazardous waste transporter or contractor and retain documentation provided by the waste company. There are several methods of disposal for businesses. Resources are listed: http://www.rivcowm.org/hhw/disposal.html or (951) 486-3200.

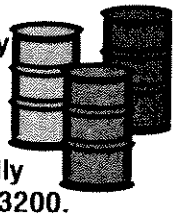

- **Drop-off Universal Waste** — **For a list of hazardous waste contractors serving Riverside County http://www.rivcowm.org/hhw/transporters.html**
- **Mail-Back** — **Order prepaid shipping boxes for disposal of universal waste**
- **Pick-up** — **Hazardous Waste Transporters will pick-up at your site.**
- **CESQG Program** — **Cost effective County sponsored disposal program for Conditionally Exempt Small Quantity Generators www.rivcowm.org or (951) 486-3200.**

California Penal Code Section 374.8(b) Any person who knowingly causes any hazardous substance to be deposited on any road, street, highway, alley, or any land of another . . . is punishable by prison in county jail for not more than one year, or a fine of no less than $50 and not more than $10,000 or by both fine and imprisonment.

California Health and Safety Code Section 25189(c) Any person who intentionally disposes or causes the disposal of any hazardous or extremely hazardous waste at a point which is not authorized according to the provisions of this chapter shall be subject to a civil penalty of not less than one thousand dollars ($1,000) or more than twenty-five thousand dollars ($25,000) for each violation.

For more business waste regulations info: www.rivcoeh.org or www.dtsc.ca.gov

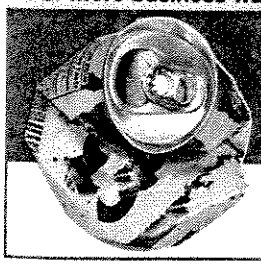

RECYCLE. IT'S GOOD FOR THE BOTTLE. IT'S GOOD FOR THE CAN.

To find a Beverage Container Recycler in your area, please call 1-800-RECYCLE or www.bottlesandcans.com.

?KNOW THE ANSWERS TO THE QUESTIONS?

REDUCE the use of Pesticides and Fertilizers and **REUSE** or share leftover chemicals and **RECYCLE** them safely.

False ***Storm drains and Sewers are one in the same system.***
Actually, they are different systems. Sewer systems capture all the waste water from the home washer, sink, bath, etc., and flows to a treatment plant. Street flows into the storm drain do not get treated and flow directly into the nearest body of water.

False ***Storm drains are designed to catch debris and all water that flows in the street.***
The primary purpose of storm drains is to carry rain water away from developed areas to prevent flooding. Debris and pollutants should be kept off the street.

False ***Riverside County is mostly desert and therefore has a limited number of creeks, rivers, lakes, streams, etc.***
Riverside County has sufficient number of creeks and streams and although you might not be able to see your nearest body of water, they are there. Water flows into a gutter or ditch that lead to a storm drain, feeding directly into a nearby water body.

False ***Residents that live on unimproved streets do not have to worry about harming their local environment by way of the storm drain.***
Pollutants can find their way through natural groundwater basins. Groundwaters are established from rain or snow that soaks into the ground or water in the sands and silt flowing underneath the earth's surface. Groundwater is literally defenseless to the pollutants that are discarded on the earth's porous surfaces.

False ***A small amount of polluted discharge into the storm drain will not impact the environment.***
Even small amounts of soap, fertilizers, oil and chemicals will harm an aquatic environment. Chemicals are still toxic and can kill or harm plants and animals.

True ***It is very important to report any illegal storm drain disposal in your Riverside County Community to 1-800-506-2555.***

GUIDELINES FOR PROPERLY MAINTAINING YOUR POOL, SPA AND FOUNTAIN WATER

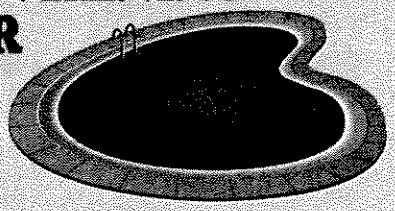

Discharging pool waters into the sanitary sewer system.
Please check with your water agency for disposal guidelines or regulations. Requirements can differ from area to area.

The back flush from cleaning *Pool Filters* should be steered for disposal to a sanitary sewer, on-site septic tank, drainage field system or a seepage pit.

Chemical Storage and Handling: **Use only the amount of chemicals indicated on the package and store safely in a covered area.**

Proper Disposal of Pool Chemicals: **Bring unwanted pool or household chemicals to a Household Hazardous Waste Collection Event or offer the leftover to a friend. Call 1-800-506-2555 to obtain current dates and locations.**

Printed and delivered by the PennySaverUSA.com. (800)995-3333 04545141M816.4

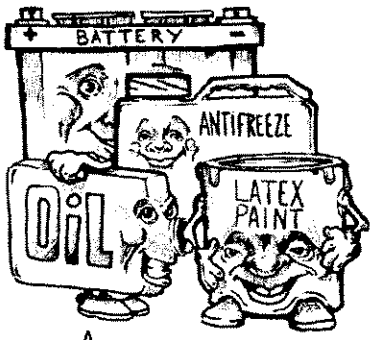

ABOP Centers

Antifreeze, Batteries, Oil (and Filters), and Paint (Latex) ONLY
Collection Center
SATURDAY 9:00 am to 2:00 pm (see details for each)
LIMIT: 5 gallons or 50 lbs. (per trip)
CLOSED: During inclement weather and hazardous conditions.

RECYCLE USED OIL

HOLIDAY CLOSURE DATES:
07/05/08, 08/30/08, 11/29/08, 12/27/08

Accepting: Cooking Oil

Murrieta Area
County Road Yard
25315 Jefferson Ave. (92562)
TB 928 C6 (cross Murrieta Hot Springs Rd.)
NON-Holiday Saturdays
9:00 AM to 2:00 PM.

Palm Springs Area
Fire Department Training Center
3000 E. Alejo Rd. (92262)
TB 786 H1 (cross Civic Dr.)
NON-Holiday Saturdays. Oct - May 9:00 AM to 2:00 PM
NON-Holiday Saturdays. Jun - Sept 7:00 AM to 12:00 PM

RECYCLE **USED OIL FILTERS**

Proper Disposal of Medication and Sharps

Most medications are not considered hazardous waste and can be disposed of in regular trash. Remove personal information from containers before disposal.

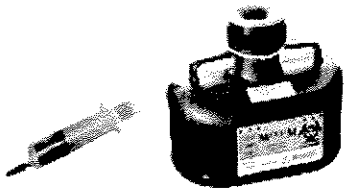

Liquid.....Empty liquid medication onto absorbent paper towels or rags and throw IN TRASH.

Pill.....Crush pills, mix with coffee grounds or kitty litter, and dispose of mixture IN TRASH.

Inhaler.....Empty container, expel propellant, and toss empty cylinder IN TRASH.

Sharps/Needles.....Must be placed in a secure approved sharps container and brought to a Household Hazardous Waste collection for disposal. FREE Approved containers are available while supply lasts. If a container is not available, put sharps in rigid plastic jug (bleach bottle), tighten lid, secure with tape, and place label "SHARPS/NEEDLES".
ALWAYS BRING SHARPS TO HHW PERMANENT FACILITY OR TEMPORARY EVENT.

Small Business Hazardous & Universal Waste

Conditional Exempt Small Quantity Generator (CESQG) **1-800-952-5566**

What is a CESQG? Businesses that generate up to 27 gallons or 220 lbs. of hazardous waste, or 2.2 lbs of extremely hazardous waste per month are called CESQG's. These businesses are required to use a licensed hazardous waste hauler to manifest and transport their waste. The most common CESQG's are painters, print shops, auto shops, builders, churches, schools, non-profit groups and property managers.

What is the CESQG Program? This Program is a hazardous waste pick-up disposal service for eligible businesses/non-profit organizations in the County of Riverside. This Program provides small quantity generators with a legal and affordable way to dispose of their waste with all legal documentation provided as part of the service.

How do I get service? To arrange an appointment for the **CESQG** Program, call **1-800-952-5566**.
A disposal fee will be charged based on the type and amount of waste picked-up.

Storm Water Pollution Prevention - ONLY RAIN DOWN THE STORM DRAIN

What is the #1 reason water bodies such as creeks, rivers, and lakes get dirty? It's from pollutants that flow into storm drains then make their way to your favorite water recreational facility. The storm drain system is designed to prevent flooding and is not connected to a treatment facility.

Call **1-800-506-2555** to report storm drain disposal or obtain more information.
You can also email us at **flood.fcndes@co.riverside.ca.us** or visit **www.floodcontrol.co.riverside.ca.us**

Household Hazardous Waste Collection Locations

Permanent Sites
(All Hazardous Waste Types)

Agua Mansa Area (HHW)
FACILITY OPENS - October 4, 2008
Agua Mansa HHW Facility
1780 Agua Mansa Rd. (92509)
TB 866 E4 (cross Market St.)
Open Non Holiday Saturdays.
9:00 AM to 2:00 PM

Lake Elsinore Area (HHW)
City Maintenance Facility
521 N. Langstaff St. (92530)
TB 866 E4 (cross Sumner)
Open 1st Saturday each month except
January, September, and December
9:00 AM to 2:00 PM

Pedley Area (HHW)
FACILITY CLOSURE - end of September 2008
County Road Yard
6851 Van Buren Blvd.(92503)
TB 684 E6 (at Clay St.)
NON-Holiday Saturdays.
9:00 AM to 2:00 PM

Palm Desert Area (HHW)
(Open to Palm Desert Residents ONLY)
41-800 Corporate Way (92260)
Behind Post Office on Hovley Lane
TB 818 H5 (between Portola & Cook)
NON-Holiday Saturdays.
9:00 AM to 1:00 PM
(760) 340-2113

Temporary Event Locations
(See Schedule for Dates &Times)

Aguanga Area
Cottonwood Fire Station
44222 Sage Rd. (92536)
TB 981 J4 (cross North of Hwy 79)

Anza Area
Anza Transfer Station
40329 Terwilliger Rd. (92539)
TB 965 E3 (cross South Of Hwy 371)

Banning Area
Repplier Park
789 N. San Gorgonio Ave. (92220)
TB 722 B2 (cross Wilson St.)

Blythe Area
County Administration Center
260 N. Broadway St. (92225)
TB 5491 E6 (cross Murphy St.)

Cathedral City Area
Vacant lot near City Hall
East of City Hall on Buddy Rogers Ave.
TB 787 E7 (cross Van Fleet & Buddy Rogers)

Corona Area
City Corporate Yard
760 Corporation Yard Way (92880)
TB 743 C4 (cross Cota St.)

Hemet Area
County Road Yard
595 N. Juanita St. (92543)
TB 811 A6 (cross Oakland Ave.)

Indio Area
Date Festival Fairgrounds
46-350 Arabia St. (Gate #6) (92201)
TB 5470 F2 (cross Dr. Carreon Blvd.)

La Quinta Area
Parking Lot next to Fritz Burns Park
South Side of Ave. 52 (92253)
TB 849 F7 (cross Desert Club Dr.)

Moreno Valley Area
City Maintenance Facility
15670 Perris Blvd. (92251)
TB 747 G2 (cross N. of Iris Ave.)

Norco Area
Norco Community Center
3900 Acacia Ave. (92860)
TB 713 E3 (cross Taft at Hamner Ave.)

Oasis Area
Oasis Landfill
84-505 84th Avenue (92274)
TB 5772 H3 (cross Hwy 86)

Palm Springs Area
Fire Department Training Center
3000 E. Alejo Rd. (92262)
TB 786 H1 (cross Civic Dr.)

Pinyon Pines Area
Pinon Flats Transfer Station
TB 907 H7 See Page 906 (cross South End of Pinon Flats Road)

Riverside Area
City Corporate Yard
8095 Lincoln Ave. (92504)
TB 715 D5 (cross St. Lawrence St.)

Temecula Area
City Public Works Parking Lot
43200 Business Park Dr. (92590)
TB 958 G6 (across from City Hall)

All sites will accommodate multiple trips if storage capacity allows
COLLECTION SITES MAY BE CLOSED DURING INCLEMENT WEATHER

TB = Thomas Bros. Guide

Household Hazardous Waste Collection Program
July thru December 2008
What is Household Hazardous Waste?
All The Items Listed Below And More!

Household Hazardous Waste Collection Sites will take ALL Household Hazardous Waste

Before transporting waste to the collection event or facility, please use this checklist to make sure you have done the following:

- ☐ **Have I used up every product to the fullest extent possible?**
- ☐ **Have I offered good, usable products I can't use to my neighbor, family or friends?**
- ☐ **Have I kept the amount of chemical waste to less than 5 gallons or 50 pounds for transportation? (State Law maximum transportation limitation.)**
- ☐ **Are any of the containers leaking? (If they are, place them in a container or material that will not allow the leak to spread and place securely in the vehicle for safe transport.)**
- ☐ **Is the waste in its original container or is it properly labeled as to the contents? (The contents of the container must be the same as stated on the label. If not, cover up the label and write the name of its content.)**
- ☐ **Are the items placed in a sturdy container, such as cardboard or wooden box, for transporting? (Wrap glass bottles in newspaper to prevent breakage.) Containers with flammable liquid will not be returned.**
- ☐ **Is the box placed in the trunk of your car or in the bed of your pickup truck and secured to prevent movement? (Keep items away from passengers.)**

Follow directions once you reach the event site. You will be asked to turn off your motor and stay in your vehicle. The site staff will unload the material from your vehicle.

THIS EVENT IS FOR RESIDENTIAL USE ONLY. PHOTO DOCUMENTATION WILL BE MADE OF EXCESSIVE OR SUSPECTED NON-RESIDENTIAL LOADS COMING TO EVENT.

The following waste CANNOT be accepted at ANY Riverside County HHW collection facility:

Ammunition, Appliances, Asbestos or other Remediation Waste, Compressed Gas Cylinders greater than 40 pounds Explosives, Infectious or Medical Waste other than Home-Generated Sharps, Radioactive Waste, Non-Residentially Generated Waste, Waste Generated Outside of Riverside County.

If you have any of the above wastes please call (951) 486-3200 for assistance.

ACCEPTABLE MATERIALS

BATHROOM

*Chlorine Bleach	*Deodorizer/Air Freshener	*Disinfectant	*Mercury Devices
*Nail Polish Remover	*Shoe Dye	*Toilet, Tub & Tile Cleaner	*Hair Dye

KITCHEN

*Aerosol Cans	*Aluminum Cleaner	*Ammonia	*Drain Opener
*Floor Care Products	*Furniture Polish	*Oven Cleaner	*Microwave Oven

WORKSHOP & HOBBY

*Caulking	*Gun Cleaner	*Fiberglass & Epoxy Resins	*Paint Latex/Oil Based
*Paint Stripper	*Paint Thinner/Turpentine	*Photo Chemicals	*Varnish
*Wood Preservative	*Glue	*Roof Coating	*Hobby Chemicals

GARDENING

*Fertilizer	*Fungicide	*Insecticides/Pesticides	*Aerosol Insecticides
*Slug and Snail Poison	*Weed Killer/Herbicides	*Rodent Bait/Poison	*BBQ Propane Tanks

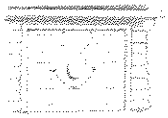

GARAGE

*Antifreeze	*Auto Batteries	*Carburetor Cleaner	*Chrome Polish
*Engine Degreaser	*Gas, Diesel Fuel	*Motor Oil	*Oil Filters
*Transmission & Brake Fluid	*Fluorescent Tubes/Bulbs	*Old TV's & Computers	*Rodent Poison

MISCELLANEOUS

*Artist's Paints	*Camp Propane Tanks	*All Batteries	*Flea Powder
*Kerosene/Lamp Oil	*Lighter Fluid	*Moth Balls/Flakes	*Pool/Spa Chemicals
*Rug Cleaner	*Sharps/Needles	*Spot Remover w/Solvent	*Electronic Devices

Printed on 100% Recycle Post Consumer Paper

Household Hazardous Waste Schedule

ALL SITES ARE OPEN FROM 9:00 am to 2:00 pm
CLOSED: During Inclement Weather or other Hazardous Conditions

Facilities are closed on Holiday Weekends unless otherwise scheduled
Maximum Chemical Load: 5 gallons or 50 lbs. (per trip)
July - December 2008

Date	Location
07/05/08	HOLIDAY CLOSURE
07/12/08	Lake Elsinore
07/12/08	Pedley
07/19/08	Pedley
07/26/08	Pedley
08/02/08	Lake Elsinore
08/02/08	Pedley
08/09/08	Pedley
08/16/08	Pedley
08/23/08	Pedley
08/30/08	HOLIDAY CLOSURE
09/06/08	Lake Elsinore
09/06/08	Pedley
09/06/08	Riverside
09/13/08	Pedley
09/13/08	Temecula
09/19/08	Corona
09/20/08	Corona
09/20/08	Pedley
09/27/08	Anza
09/27/08	La Quinta
09/27/08	Pedley

Date	Location
10/04/08	Agua Mansa
10/04/08	Lake Elsinore
10/04/08	Norco
10/04/08	Oasis
10/10/08	Moreno Valley
10/11/08	Moreno Valley
10/11/08	Agua Mansa
10/18/08	Agua Mansa
10/18/08	Aguanga
10/18/08	Blythe
10/24/08	Palm Springs
10/25/08	Palm Springs
10/25/08	Agua Mansa
10/31/08	Cathedral City
11/01/08	Cathedral city
11/01/08	Agua Mansa
11/01/08	Lake Elsinore
11/08/08	Agua Mansa
11/15/08	Agua Mansa
11/15/08	Banning
11/15/08	Pinyon Pines
11/21/08	Hemet
11/22/08	Hemet

Date	Location
11/22/08	Agua Mansa
11/29/08	HOLIDAY CLOSURE
12/5/08	Corona
12/6/08	Corona
12/6/08	Agua Mansa
12/13/08	Agua Mansa
12/13/08	Indio
12/20/08	Agua Mansa
12/20/08	Anza
12/27/08	HOLIDAY CLOSURE

Holiday Closure Dates

July 5, 2008
August 30, 2008
November 29, 2008
December 27, 2008

Changing Oil Too Often?

Review your owner's manual for
manufacturer's suggested oil change frequency!

RECYCLE USED OIL FILTERS

Zero Waste - You Make It Happen!
Funded by a Grant from the
California Integrated Waste Management Board.

Additional Hazardous Waste Services Available
in the following Cities:

Indian Wells
760-346-2489 x227

Palm Springs
Rancho Mirage
1-800-449-7587

CESQG
Conditionally
Exempt Small
Quantity
Generators

Hazardous Waste
Disposal for
Small Businesses
1-800-952-5566

Dry Cleaners

Printe

Painters

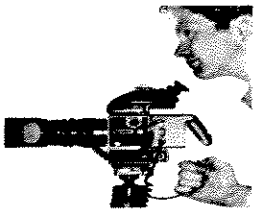

Photographers

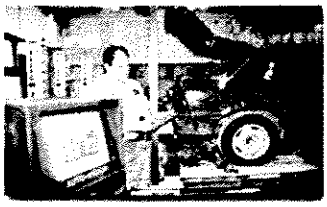

Auto Repa

What is a CESQG?
Businesses that generate small quantities of hazardous waste, 27 gallons or 220 lbs.,or 2.2 lbs. of extremely hazardous waste per month are called "Conditionally Exempt Small Quantity Generators", or CESQGs.

What is the CESQG Program?
The CESQG Program is a mobile hazardous waste pick-up disposal service for eligible businesses in the County of Riverside. Trained staff will come to your business and assist you in properly labeling and marking your hazardous waste for proper disposal. All legal documentation is provided as part of the service. By introducing this program, the County of Riverside provides small quantity generators with a ***legal and affordable*** solution to hazardous waste disposal.

Who can use this service?
The most common CESQGs in the County of Riverside are dry cleaners, painters, home improvement contractors, furniture refinishers, print shops,

Riverside County
Waste Management Department

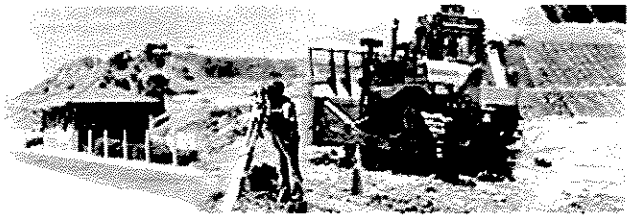

COMPOSTING
FAQ's
HAZ. WASTE - RESIDENTIAL
HAZ. WASTE - BUSINESS
LANDFILL INFORMATION
Landfill Directions/Hours
Landfill Deferred Payment
Landfill Fees
Landfill Fees Espanol
Landfill Feedback Form
Landfill Site Rules Eng/Esp
LANDFILL PROGRAMS
QUESTIONS ABOUT YOUR WASTE
RECYCLING
OTHER

Can't find an answer to your question here? Email Questions

Problem with the web site, please email the Webmaster

CESQG Program

photo-finishing, auto shops, photographers, educational and vocational shops, builders, landscapers, non profit organizations, (including city governments/agencies, school districts and churches) and property managers, but there are many others. When you call, be ready to describe the types and amounts of waste your business generates in a typical month.

If you generate hazardous waste on a regular basis, you must:

- Telephone 1-800-952-5566
- Obtain an EPA ID # from the State by calling 1-800-618-6942
- Manage hazardous waste in accordance with all applicable local, state and federal laws and regulations.

How do I get service?
To arrange an appointment for the **CESQG Program, call 1-800-952-5566**. The CESQG Program coordinator will schedule your appointment based on geographical area. Be ready to describe the type and amount of hazardous waste your business is ready to dispose of, and the types and size(s) of containers that the waste is in.

What happens to your hazardous waste?
Hazardous waste collected by the CESQG Program is transported to a state permitted processing facility. The waste is further processed at this point and packaged for off-site recycling (oil filters, oil, latex paint, antifreeze, and batteries) or destructive incineration (pesticides, corrosives, flammables, oil based paint).

What if your business does not qualify?

Call the County of Riverside, Hazardous Materials Management Division for assistance with Hazardous Waste Generator Program at **(951) 358-5055**. If you reduce the amount of waste you generate each month to 27 gallons or less, you may qualify in the future.

Why is the County of Riverside collecting hazardous waste?
Small Quantity Generators often have difficulty disposing of small quantities of hazardous waste. Hazardous waste companies usually have a minimum amount of waste that they will pick up, or charge a minimum fee for service. Typically, the minimum fee exceeds the cost of disposal for the hazardous

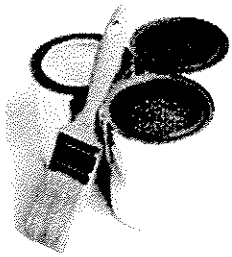

waste. This leaves the small quantity generator in a difficult situation. Some respond by storing hazardous waste until it becomes economical for the hazardous waste transporter to pick it up, putting the business out of compliance by exceeding regulatory accumulation time limits. Other businesses simply store their hazardous wastes indefinitely, creating an unsafe work environment and exceeding accumulation time limits. Yet other businesses attempt to illegally dispose of their waste at household hazardous waste collection facilities, which are not legally permitted to accept commercial wastes, nor are prepared to provide legal documentation for commercial hazardous waste disposal. In answer to the problems identified above, the County of Riverside, Hazardous Materials Management Division instituted the Conditionally Exempt Small Quantity Generator Program. The program provides businesses and institutions the opportunity to dispose of small quantities of hazardous waste in an environmentally responsible manner at a fraction of the cost of direct contracting with a hazardous waste management firm. Some of the most common materials covered under the service are: solvents, flammable solids and liquids, detergents, propane tanks and aerosol cans. Car and truck products, such as motor oil, lubricants, oil filters, and antifreeze. Lawn care products, such as pesticides, herbicides, fungicides, and fertilizers. Paint and paint-related materials, such as stains, varnishes, roofing tar, adhesives, joint compounds, and other petroleum-based products. Photo-chemical liquids, acids, bases, neutral oxidizers, and swimming pool chemicals.

Payment for Services

The CESQG Program will prepare an invoice for your business at the time of service. Thedriver will ask you to sign and date the invoice. You must be prepared to make payment for these waste disposal services at the time of service. This invoice/receipt will serve as legal documentation of proper management of the hazardous waste generated by your business

Registration Fee $45.00 Per Appointment

Waste Stream	Cost to CESQG	Management Method
Flammable Liquids and Solids	$1.50/lb	Incineration
Pesticide Liquids and Solids	$1.50/lb	Incineration
Acid/Base Liquids and Solids	$1.50/lb	Incineration
Aerosols	$2.00/lb	Incineration
Oil Base Paint	$1.00/lb	Fuels Blending
Oxidizing Liquids and Solids	$2.50/lb	Incineration
Potassium Nitrate Fertilizers	$2.50/lb	Incineration
Non-RCRA Liquids	$1.50/lb	Incineration
Non-RCRA Solids	$1.50/lb	Incineration
Latex Paint	$0.50/lb	Recycling
Used Motor Oil	$1.00 gallon	Recycling
Used Oil Filters	$0.50 each	Recycling
Used Antifreeze	$2.00 gallon	Recycling
Lead/Acid Batteries	$0.50 each	Recycling
Small Alkaline, Ni-Cd or Sealed Lead Acid Batteries	$0.65/lb	Recycling
Empty drum disposal	$25.00 each	Recycling or landfill
Mercury	$14.00/lb	Recycling
Fluorescent Tubes	$0.25/foot	Recycling

All Other Wastes—Highly reactive, explosives, gas cylinders, biological, radioactives and asbestos are priced on a case by case basis (cost plus 10%).

For Program Information 1-800-952-5566

CESQG
Conditionally Exempt Small Quantity Generators

County of Riverside
Waste Management Department
14310 Frederick St.
Moreno Valley, CA 92553
1-800-304-2226
www.rivcowm.org

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RIVERSIDE COUNTY WASTE MANAGEMENT DEPARTMENT
RECYCLING AND HOUSEHOLD HAZARDOUS WASTE PROGRAM

REUSE, RECYCLING AND DISPOSAL RESOURCES For Universal Wastes

Riverside County
Waste Management Department

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This publication is provided as a public service and is not an endorsement of these companies or their services. The Department is not responsible for any errors or omissions in this listing. If you wish to be listed in any subsequent updated publications, please send an e-mail to Diane Christensen at dchristensen@co.riverside.ca.us listing your recycling business name, address, contact person, and website or e-mail address for an interview.

The information provided comes directly from the individual company or resource websites. Please contact the individual company or resource directly for the most current information available or if you have any questions about their services.

March 14, 2006

Fact Sheet
June 2003

Managing Universal Waste in California

DEPARTMENT OF TOXIC SUBSTANCES CONTROL

Rules for Managing Some Common Wastes

DTSC is one of six Boards and Departments within the California Environmental Protection Agency. DTSC's mission is to restore, protect and enhance the environment, to ensure public health, environmental quality and economic vitality, by regulating hazardous waste, conducting and overseeing cleanups, and developing and promoting pollution prevention.

State of California

California Environmental Protection Agency

Introduction

New laws adopted since 2000 created California's "Universal Waste Rule" to simplify how we manage many common hazardous wastes. The Department of Toxic Substances Control (DTSC) has developed this fact sheet to provide information about these laws.

What are universal wastes?

Universal wastes are hazardous wastes that are more common and pose a lower risk to people and the environment than other hazardous wastes. Federal and State regulations identify universal wastes and provide simple rules for handling, recycling, and disposing of them. The regulations, called the "Universal Waste Rule," are in the California Code of Regulations, title 22, division 4.5, chapter 23. All citations in this fact sheet refer to the California Code of Regulations, title 22, division 4.5, unless otherwise indicated.

All universal wastes are hazardous wastes and, without the new rules, they would have to be managed under the same stringent standards as other hazardous wastes. Also, universal wastes are generated by a wide variety of people rather than by the industrial businesses that primarily generate other hazardous wastes.

Not all waste products of a particular type are hazardous waste and universal waste. For example, waste thermometers that contain mercury are universal wastes but waste thermometers that contain alcohol are neither hazardous waste nor universal waste.

Hazardous Wastes
- Most are generated by industrial businesses
- Subject to detailed management standards

Universal Wastes
- Lower risk than other hazardous wastes
- Generated by a wide variety of people
- Reduced management requirements

Note: Wastes that do not contain hazardous substances are not universal wastes even if they are similar to universal wastes.

The energy challenge facing California is real. Every Californian needs to take immediate action to reduce energy consumption. For a list of simple ways you can reduce demand and cut your energy costs, see our web site at www.dtsc.ca.gov.

What items are designated as universal wastes?

The following items are universal wastes when they are no longer useful or are discarded:

1. **Mercury thermostats.** These thermostats contain small glass capsules of mercury, a shiny liquid metal, to make electrical contact. Modern electronic thermostats do not contain mercury.

2. **Batteries.** Universal waste batteries include rechargeable nickel-cadmium batteries, silver button batteries, mercury batteries, small sealed lead acid batteries (burglar alarm and emergency light batteries), most alkaline batteries, carbon-zinc batteries, and any other batteries that exhibit a characteristic of a hazardous waste (§§66261.20 through 66261.24).

   NOTE: Spent automotive-type lead acid storage batteries are not universal waste. They are hazardous wastes that require management as specified in chapter 16, article 7.

3. **Lamps.** Universal waste lamps include fluorescent tubes, high intensity discharge lamps, sodium vapor lamps, and any other lamps that exhibit a characteristic of a hazardous waste. Some fluorescent tubes will not be considered hazardous waste, or universal waste, until 2004. For more information regarding which tubes are currently considered hazardous and non-hazardous, call the information numbers listed at the end of this document.

The Four Hazardous Waste Characteristics

An unwanted material may be considered hazardous if it has any of the following properties:

Toxicity (poisonous)
Reactivity (can explode)
Ignitability (can catch fire)
Corrosivity (acidic or alkaline)

4. **Non-empty aerosol cans.** The Legislature added non-empty aerosol cans to the list of universal wastes in 2001. This fact sheet does not address management of non-empty aerosol cans. For information, see Health and Safety Code section 25201.16.

5. **Mercury switches.** Two different types of mercury switches are universal wastes:

   - Motor vehicle light switches that contain mercury. Health and Safety Code section 25214.6 designates motor vehicle light switches (automatic hood and trunk light switches) containing mercury as universal wastes once they are removed from vehicles. As of January 2005, vehicles that contain the switches will also be considered hazardous waste until the mercury light switches are removed.

   - Non-automotive mercury switches and products that contain them, when they are recycled as scrap metal. These switches include thermostats and tip switches in portable heaters, washing machine out-of-balance switches, silent wall switches, and other mercury-containing switches and products containing them. As of February 9, 2006, all discarded products that contain mercury switches will be universal wastes.

6. **Mercury thermometers,** including fever thermometers.

7. **Pressure or vacuum gauges** that contain mercury such as U tube manometers, barometers, and sphygmomanometers (blood pressure meters.)

8. **Dilators and weighted tubing.** These medical devices contain mercury.

9. **Rubber flooring** that contains mercury. Older gymnasium floors that were poured in place to form indoor tracks and gymnastic areas frequently contain mercury.

10. **Novelties** that contain mercury or mercury batteries such as some singing greeting cards, flashing athletic shoes, jewelry, and other devices. As of January 1, 2004, all novelties with added mercury are considered hazardous and universal wastes.

11. **Mercury gas flow regulators.** These older gas flow regulators are managed exclusively by natural gas utilities.

12. **Counterweights and dampers,** including devices that use pouches of high density mercury to dampen shaking on hunting bows and snow skis or to absorb recoil on shotguns.

13. **Dental amalgam** tooth filling materials including waste amalgam, bits and pieces from chairside traps, and spent wastewater filters.

14. **Consumer electronic devices**. Electronics that exhibit hazardous characteristics such as some cell phones, game consoles, and computers (ch. 11, art. 3).

15. **Cathode ray tubes.** Waste cathode ray tubes (CRTs), such as television picture tubes and non-flat panel computer monitors, are universal wastes with special management standards. This fact sheet does not address managing waste CRTs; see the DTSC fact sheet entitled Managing Waste Cathode Ray Tubes at: www.dtsc.ca.gov/LawsRegulationsPolicies/CRTs/index.html.

16. **Gauges.** Vacuum and pressure gauges that contain mercury, including blood pressure gauges, barometers, and manometers

Do these regulations apply to me?

If you generate universal wastes, you must comply with these regulations. However, two exemptions temporarily allow people to dispose of some universal wastes in the regular trash. *These exemptions only apply to waste lamps, thermostats, batteries, and consumer electronic devices.*

Households: Universal waste batteries, thermostats, lamps, and consumer electronic devices generated by people maintaining their private household are exempt. They may be disposed of in the trash unless forbidden by the local solid waste authorities. This exemption will end on February 8, 2006.

Conditionally exempt small quantity universal waste generators: The smallest commercial hazardous waste generators may temporarily dispose of their universal waste batteries, thermostats, lamps, and consumer electronic devices in the trash, unless forbidden by the local solid waste authorities. These exemptions will end on February 8, 2006. To qualify for this exemption, you must meet the following conditions:

From February 9, 2002 until February 8, 2004:

- Generate less than 100 kilograms (220 pounds) of total federally regulated hazardous waste, including all universal wastes (except CRTs) in any calendar month; and
- Generate less than 1 kilogram (2.2 pounds) of any waste identified as an acutely hazardous waste in chapter 11; and
- Remain in compliance with Code of Federal Regulations, title 40, section 261.5.

From February 9, 2004 until February 8, 2006:

- You must meet the above requirements, and
- During this period, you may dispose of no more than 30 universal waste lamps and no more than 20 pounds of universal waste batteries in the regular trash in any calendar month. Mercury thermostats must be recycled or disposed of as hazardous waste.

Temporary and Conditional Universal Waste Exemptions

are in place for batteries, thermostats, lamps, and consumer electronic devices ***only.*** *These exemptions do not apply to CRTs (TV and computer glass), non-empty aerosol cans, or most universal wastes containing mercury.*

Household universal waste is exempt until February 2006.

Small business universal waste is exempt until 2006, if certain conditions are met.

Permanent Household and Conditionally Exempt Small Quantity Universal Waste Generator exemption: Households and the smallest commercial universal waste generators only have to follow the recycling and hazardous waste disposal parts of the universal waste rule. They are not subject to rules for training, accumulation, packaging, their universal wastes.

Where may I send universal wastes?

Many universal wastes must be recycled. Except for households and small generators that are temporarily exempt, everyone must send the universal wastes listed below directly to an authorized recycling facility or to a universal waste consolidator for shipment to an authorized recycling facility.

Universal wastes that must be recycled:

- lamps
- mercury switches
- mercury thermometers
- mercury gauges
- dialators and weighted tubing
- gas flow regulators
- counterweights and dampers
- cathode ray tubes (TV and computer glass)

If you do not recycle these wastes, then you must manage them as hazardous waste rather than as universal waste. This includes notifying DTSC, using a manifest and a registered hazardous waste hauler, complying with shorter accumulation times, and shipping only to an authorized destination facility.

Universal Waste Category	Effective	Recycling Required?	Hazard
Novelty items with mercury	2004	No	Mercury
Lamps with mercury	Most Current All: 2004	Yes	Mercury
Vehicle light switches with mercury	2005	Yes	Mercury
Non-automotive mercury switches	2006	Yes	Mercury
Mercury thermostats	Current	No	Mercury
Mercury thermometers	Current	Yes	Mercury
Dental amalgam	Current	Yes	Mercury
Rubber flooring	Current	No	Mercury
Pressure or vacuum gauges	Current	Yes	Mercury
Dilators and weighted tubing	Current	Yes	Mercury
Gas flow regulators	Current	Yes	Mercury
Counterweights and dampers	Current	Yes	Mercury
Cathode ray tubes	Current	Yes	Lead
Consumer electronic devices	Current	No	Lead and other metals
Waste batteries	Current	No	Toxic and corrosive
Aerosol cans (non-empty)	Current	No	Reactive, Toxic and Ignitable

Send all other universal wastes to one of three types of destinations:

- another location for consolidation or storage:

  - a business with many locations can designate one location as the consolidation point for the universal wastes from all of its locations

  - universal wastes may be sent to a business that specializes in collecting, consolidating, and shipping universal wastes to a destination facility

- a hazardous waste recycling facility
- a hazardous waste land disposal facility for universal wastes that are not required to be recycled (see table on page 4.)

Unless you are exempt from these rules, you may **not** send universal waste to a municipal solid waste (garbage) landfill or to a non-hazardous waste recycling center.

Disposal at any unauthorized disposal site such as roadsides or ditches is illegal and a serious crime as well as a serious environmental threat.

What rules must I follow to manage my universal wastes?

Unless you are exempt, you must follow the rules for either *large quantity handlers of universal waste* or for *small quantity handlers of universal waste*.

Large quantity handlers of universal waste have more than 5,000 kilograms (5.5 tons) of universal waste at one place at one time. They must follow more stringent standards for handling their universal waste. Generally, only a universal waste collection business will accumulate that much universal waste at once.

Most individuals and businesses are small quantity handlers of universal waste. The rules they follow are in sections 66273.10 through 66273.21. A summary of the requirements is below; however, small quantity handlers of universal waste must comply with the full regulations, not just this short summary.

<u>If you are a small quantity handler of universal waste:</u>

- Send all universal waste to a facility authorized to collect, recycle or dispose of universal waste.
- Do not dispose of universal waste to the trash
- Do not accumulate more than 5,000 kilograms of universal waste at any one time.
- You do not need a hazardous waste identification number.
- Do not store universal waste for longer than one year after generating or receiving the waste. If you think you need more time, contact your Certified Unified Program Agency (CUPA) well before your oldest universal waste will be held for one year (§66273.15).
- Document the length of time you have accumulated universal waste from the date you accepted it from someone else, discarded it yourself after it was "used up," or decided to discard it (§66273.15(c)). The regulations contain several options for documenting accumulation time.
- Label or mark universal wastes, or containers or packages of universal waste, to identify their types. The regulations provide several options for labeling. The purpose of labeling is to ensure that emergency response personnel or an inspector can identify the universal waste (§66273.14).
- Generally, you may not treat universal waste except when cleaning up releases or managing specific wastes as provided in section 66273.13 (for example, removing mercury ampules from thermostats or removing electrolyte from batteries) (§66273.11). Treatment includes any activity that changes the characteristics of the waste.
- Clean up any releases such as leaking batteries or broken fluorescent tubes. Repackage the damaged universal waste and manage it as universal waste. Manage any other materials generated, such as cleanup supplies and contaminated soil, as hazardous wastes if they are identified as hazardous waste (§§66273.13 and 66273.17).
- Train employees in proper universal waste management including handling, packaging, storing and labeling the universal waste, as well as how to respond to releases (§66273.16). This training may be accomplished by simply giving employees written instructions or posting these instructions in the universal waste management areas of the building.

- Determine whether the universal waste is a hazardous material under the United States Department of Transportation (U.S. DOT) rules. For U.S. DOT hazardous materials, properly mark the packaging and placard the transportation vehicle. The applicable U.S. DOT regulations are in Title 49 Code of Federal Regulations, Parts 171 through 180 (§66273.18).
- Prepare proper shipping papers such as a bill of lading. A Uniform Hazardous Waste Manifest is not necessary for universal waste shipments (§66273.18).
- You may transport universal waste in your own vehicle or may use any common carrier allowed by U.S. DOT and California law to transport non-hazardous waste. You are not required to use a registered hazardous waste hauler to transport universal waste (§66273.18).
- Ship the universal waste to another small quantity handler of universal waste, a large quantity handler of universal waste, or a destination facility. When shipping or receiving universal waste, specific rules apply regarding accepting shipments containing hazardous wastes that are not universal wastes and shipments that are rejected (§66273.18).
- Keep records of all shipments and receipts of universal waste for three years (§66273.19).
- When sending universal waste outside the country, comply with regulations addressing universal waste export (§66273.20).

Disclaimer

This fact sheet does not replace or supersede statutes or regulations. All universal waste handlers must follow the hazardous waste control statutes and regulations, including the universal waste regulations, and must comply with the detailed standards applicable to their activities.

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For further information about managing universal waste, please contact DTSC's regional Public and Business Liaisons at (800) 72TOXIC (1-800-728-6942) or visit www.dtsc.ca.gov.

DTSC Headquarters
(916) 323-2678
1001 I Street
Sacramento, CA 94812-0806

Sacramento Office
(916) 255-3617
8800 Cal Center Drive
Sacramento, CA 95826-3268

Berkeley Office
(510) 540-3739
700 Heinz Avenue, 2nd Floor
Berkeley, CA 94710-2721

Glendale Office
(818) 551-2830
1011 North Grandview Avenue
Glendale, CA 91201-2205

Cypress Office
(714) 484-5400
5796 Corporate Avenue
Cypress, CA 90630-4732

Clovis Office
(559) 297-3901
1515 Tollhouse Road
Clovis, CA 93611-0522

San Diego Office
(619) 278-3734
2878 Camino del Rio South, Suite 402
San Diego, CA 92108-3847

UNIVERSAL WASTE
MAIL-BACK RECYCLING SERVICES

Onyx Environmental Services
https://www.onyxes.com/OnyxPak/index.jsp

Proper recycling is easy with OnyxPak. When you have lamps, ballasts, batteries, mercury devices or computer monitors to dispose of simply order an OnyxPak. OnyxPak makes it easy to recycle small quantities and to comply with today's changing regulations. Our prepaid packaging allows you to conveniently manage lighting and electronic waste. One price includes everything you need - packaging, freight, insurance, liability protection and certificates of recycling.

We stock a variety of fiber drums, boxes and pails that will meet your needs. Simply fill, seal and return via the prepaid shipping label. Your boxes, drums or pails will be delivered to one of four fully permitted Onyx facilities, where your waste will be recycled to the highest standards in the industry. That's compliance with confidence!

Benefits of OnyxPak

Low cost compliance. Price includes packaging, return shipping and recycling.

Minimize the need to sort, count and store lighting and electronic waste.

Easy process for recycling your lamps and ballasts. Simply go to our ordering page or call toll-free (800) 556-5267.

Access to recycling expertise. Customer service representatives are standing by, ready to assist you.

Receive confirmation that your lighting and electronic waste was recycled. Onyx will send you a certificate of recycling.

For larger or bulk quantities, we offer competitive pricing, containers and documentation for sorting, storing and shipping your lighting and electronic wastes. When it comes time to recycle, we'll even arrange for transportation.

Contact us today to request a bulk quote.

Lighting Resources, Inc.
http://www.lightingresourcesinc.com/hs_services.html

Corporate Offices
805 E. Francis Street
Ontario, CA 91761

DID YOU KNOW ?

Lighting Resources saves you money, time, non-compliance fines, and citations through regulatory and proper recycling of all light bulbs covered under 40CFR 273 Universal Waste Rule and the new regulations coming into enforcement on January 01, 2000.

We are the only vendor who handles your full fixtures, saving you time and money from sorting lamps and ballasts on the job site.

***Lighting Resources** isn't just fluorescent light bulbs anymore!*

We also help your facilities with many other types of Universal and Hazardous Waste for proper compliance, de-manufacturing, recycling, and incineration. Don't let your facility be exposed to non-compliance

Other waste streams managed:
All monitors for LEAD & CADMIUM, i.e., CRTs TV/Video, medical, electronic. All computer equipment. We accept all types of light bulbs, lumination devices, and batteries including: lithium, mercury, Ni-cad, magnesium, sealed lead acid, etc. We handle mercury switches--thermometers, blood pressure machines, mercury tubes, elemental mercury, fuses, and devices--as well as transformers, capacitors, starters and mercury seals, appliances, motors, compressors, freon, catalytic converters, cooler units, A/C units, etc.

How to save money, time, and NON-COMPLIANCE:

1. Fax our office for pickups and materials. We arrange transportation and freight within 1-2 days once shipments are ready.

2. We are the only company who has this program. You can **MAIL** your UHW to us. (Caution--some UHWs cannot be mailed.)

3. Send your wastes on your own carrier. Fax the Bill of Ladings to us so we can be prepared. We always confirm receipt of goods and provide Certificates of Recycling and proper disposal.

Call our office for any other waste, recycling, or incineration needs.

AERC Recycling Solutions
http://www.aercrecycling.com/pps/index1.html

AERC Home Page

FLUORESCENT & HID LAMPS

BALLAST RECYCLING

MERCURY DEVICES

BATTERY RECYCLING

RecycleKits

COMPETITIVE • COMPLIANT • COST-EFFECTIVE

PEACE OF MIND WITH
ONE STOP SHOPPING

A Comprehensive and Convenient Pollution Prevention Program Offering Complete Compliance With All Federal, State and Local Regulations

COMPOUNDS & SOLUTIONS
COMPUTER RECYCLING
ACCEPTABLE MATERIALS LIST
PRODUCT SALES & MORE
PRE-PAID RETURN PROGRAM
MERCURY SPILL KITS
NEWS ARCHIVES
CONTACT AERC
MERCURY LINKS & ARTICLES
ONLINE FORMS

EPA

WHY RECYCLE

- Mercury is a toxic metal that is hazardous to both the environment and human health.
- An ounce of mercury contaminates a lake for centuries.
- 100 fluorescent lamps contain approximately 4 grams of mercury.
- Ballasts contain polychlorinated biphenyls (PCB's) which is a hazardous waste.
- Batteries contain heavy metals and corrosive components.
- Computer monitors contain toxic lead in the glass and circuits.

UNIVERSAL WASTE RULE (UWR)

The EPA issued the UWR in 1995 to reduce the amount of hazardous waste items entering municipal solid waste. It encourages recycling and proper disposal of certain wastes. Regulatory and administrative burdens for managing wastes were also streamlined. Numerous states have moved forward with the inclusion of electronic scrap (e-scrap) into the UWR. In addition, numerous states have banned monitors from landfills.

AERC PRE-PAID RETURN PROGRAM

AERC offers a comprehensive recycling service for commercial, institutional, municipal, and governmental waste generators.

1. Order Your Recycle Kit Order your kit by going to the RecycleKits website or by calling your AERC representative. You will need to know what quantities of the specific material you will be recycling. Prepayment includes recycling fees, container and FedEx freight. Certificates of Recycling and Process available upon request. AERC offers a comprehensive recycling service for commercial, institutional, municipal, and government waste generators.

2. Shipping Guidelines Put the material you're recycling into the designed container and follow the packaging instructions. Complete the enclosed labels and affix the prepaid shipping labels to the container.

FedEx Ground will not accept any package with the a PPRP label that has been changed, altered or tampered with in any way.

Give this package to the FedEx Ground driver during a routine delivery. Do not call FedEx Ground for a pickup if you are already set up for daily pick-ups. If you are not set-up for daily pick-ups you will need to call FedEx Ground as (888)777-6040 to schedule a pick-up.

3. AERC Recycles Your Waste AERC recycles your waste at one of its four fully permitted facilities. After your waste has been processed, a Certificate of Recycling or Process can be provided upon request.

ADVANTAGES OF AERC'S PPRP PROGRAM

- One price includes everything you need.
- Convenience for small quantity generators with storage limitations.
- Reduces the chances of facility contamination by minimizing volumes of waste on-site.
- Allows each facility to purchase recycling services based on its individual

needs.
- Allows for proper management with minimal handling of waste.
- Eliminates the need to fill out complicated shipping documents
- Reduces administrative burden without reducing control.
- Establishes standard operating procedures from facility to facility
- Allows one phone call to provide recycling services for the entire month, quarter or year.

ACCEPTABLE MATERIALS FOR AERC'S PRE-PAID RETURN PROGRAM

ACCEPTABLE *LAMPS* FOR THE PPRP PROGRAM

- Straight Fluorescent Lamps
- U-Tubes, Circular Lamps
- Shattershields, Coated Lamps
- High Intensity Discharge Lamps

ACCEPTABLE *BALLAST* FOR THE PPRP PROGRAM

- Non-PCB Lighting Ballast

ACCEPTABLE *BATTERIES* FOR THE PPRP PROGRAM

- Alkaline (non-mercury)
- NiCad (dry)
- Carbon Zinc (non-mercury)
- Nickel Iron
- Nickel Metal Hydride
- Zinc Air

ACCEPTABLE *ELECTRONIC SCRAP* FOR THE PPRP PROGRAM

- CPU's
- Monitors
- Keyboards
- Printers
- Miscellaneous wires and components

For service in:

The Western Region:

Western Regional Sales Manager: Frank Cassara
(510) 290-1462, Fax (510) 429-1498

Northern California:

Regional Sales Manager: Andrea Rodriguez
(510) 429-1129, (408) 390-1582, Fax (510) 429-1498

Southern California

Regional Sales Manager: Robert Hewitt
(760) 929-8718, (949) 400-3350, Fax (760) 929-8728

Earth Protection Services
http://www.earthpro.com/

Corporate Headquarters:
10 S. 48th Ave., Suite #4
Phoenix, AZ 85043
Phone: 800-414-0443 - Fax: 602-353-9285
Mailing Address: P.O. Box 23820
Phoenix, AZ 85063-3820
Send E-mail to EPSI earthpro@fiberpipe.net

See website for complete information on EPSI Pak mail back services.

Bethlehem Apparatus
http://www.bethlehemlamprecycling.com/

Mercury Waste Solutions, Inc.
http://www.lamptracker.com/new/LampTracker.pdf

Air Cycle Corporation
http://www.lamprecycling.com/pdf/EasyPak.pdf
Air Cycle Corporation
2000 S. 25th Avenue, Suite C
Broadview, IL 60155
Tel: (800) 909-9709
Fax: (708) 344-7875

Toxco
http://www.biggreenbox.com/StoreFront.bok
http://www.toxco.com/

TV, MONITORS, CRT, AND CONSUMER ELECTRONICS RECYCLING

Computer monitors, Cathode Ray Tube (CRT) devices, televisions, etc. cannot be buried in landfills because of components that can damage our environment. These items need to be taken to a recycler for proper handling and recycling.

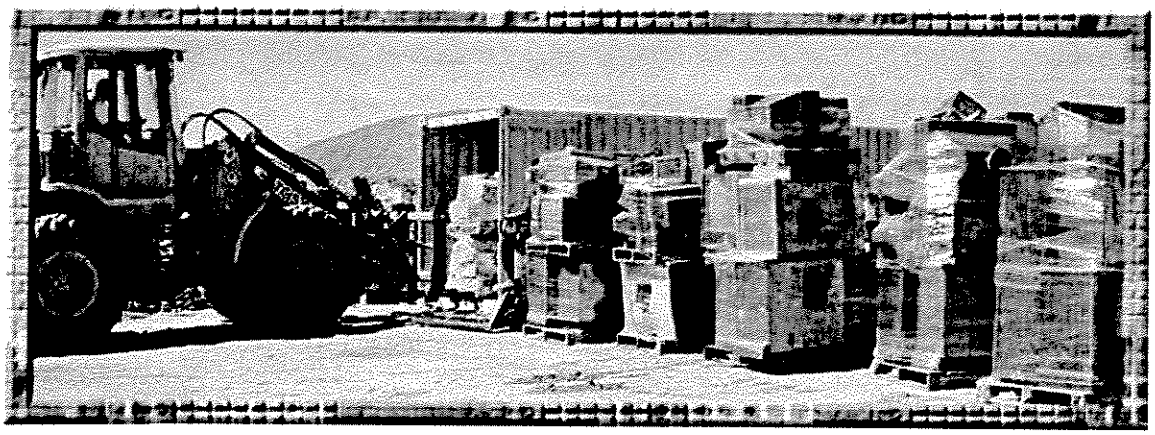

Working Computer Devices

Computer Components that are in good working condition, but no longer meet your current needs, may have another use to others. Local organizations that reuse and refurbish computer parts and electronics may be interested in your unwanted items. Please contact these programs to see if the items are acceptable for their reuse programs.

Gold Diggers	(951) 791-2481	Hemet
Goodwill - Magnolia Center	(951) 688-0035	Riverside
Goodwill - La Sierra	(951) 684-1160	Riverside
Goodwill - Moreno Valley	(951) 485-9240	Moreno Valley
Goodwill - Cathedral City	(760) 202-1544	Cathedral City
Lions Club	(951) 845-7614	Beaumont
R.O.P.	(760) 863-3300	Indio
Students in Free Enterprise (SIFE)	(951) 785-2255	Riverside

Broken and Non-Working Monitors, TV, and CRT Devices

Components that are broken and don't have any usefulness, should be taken to a recycler or electronics recycling collection for disassembly and processing. Contact your city hall or waste hauler for special collection events in your area.

The Riverside County Waste Management Department has added electronics recycling collections to their current residential Household Hazardous Waste Events. For more information go to www.rivcowm.org or call (800) 304-2226.

The California Integrated Waste Management Board maintains a list of certified recyclers http://www.ciwmb.ca.gov/Electronics/Collection/

Goodwill - Magnolia Center	(951) 688-0035	Riverside
Goodwill - La Sierra	(951) 684-1160	Riverside
Goodwill - Cathedral City	(760) 202-1544	Cathedral City

Riverside County landfills will accept residential TV, monitors, CRT's, and other consumer electronic devices for recycling. Residents may bring in up to 2 CRT type devices per trip. A minimum fee of $8.00 will be charged for loads up to 800 lbs. or $31.91 per ton prorated for heavier loads (new fees effective 7/1/06). Electronic waste from businesses is not accepted at the landfills at this time. Please contact the handlers on the following list.

Large Quantity CRT Handlers

Computer Recyclers of America	(760) 599-9131
Chase Electronics, Inc.	(610) 449-8160
Edom Hill Transfer Station	(760) 251-3649
Electronics Partners Corp.	(415) 541-5346
Envirocycle	(909) 519-3276
E-Recycling of So. Cal.	(562) 634-8372
Gold N' West	(951) 340-1501
Goodwill Industries	(323) 223-1211
Industrial Recycling Services	(951) 301-5252
Nxtcycle	(602) 442-7900
SoCal Computer Recycling, Inc.	(310) 978-2790
U. S. Dept of Justice, UNICOR	(330) 424-7448 x1313
UPS	(678) 746-7021
Waste Management, Inc.	(951) 280-5430

If you would like to be added to our listing, please contact jmorelan@co.riverside.ca.us. These lists are provided as a public service and are not an endorsement of these companies or their services. The Department is not responsible for any errors or omissions on these listings.

Riverside County Waste Management Department
Household Hazardous Waste Collection Program
FY 2007/2008 Activities in
Santa Margarita Watershed

Location	Service Dates	Number of Service Days in FY 2006/2007	Cost	Number of HHW Vehicles	Number of E-Waste Vehicles	Total Vehicles	Batteries (Auto) (lbs) 45#/unit	Nicad/ Lithium Batteries (lbs)	Waste Oil (lbs) 8.5 lb/gal	Anti-Freeze (lbs) 8.5 lb/gal	Latex Paint (lbs) 10 lb/gal	Oil Filters (lbs)	Alkaline Batteries (lbs)	Mercury (lbs)	Propane (lbs)	Paint Related (lbs)	Fluor. Tubes (lbs) 0.2 lbs/linear foot	Flam. Solid/Liq (lbs)	Reuse (lbs)	Poison (lbs)	Acid (lbs)	Base (lbs)	Oxidizer (lbs)	Other (lbs)	Aerosols (lbs)	Asbestos (lbs)	Sharps (lbs)	CRTs (lbs)	Misc E-waste (lbs)	Total Pounds Shipped
Murrieta ABOP HHW Collection Facility																														
	All non-holiday Saturdays	44	$ 22,331	1,708	0	1,708	15,885	0	30,260	3,230	30,260	750	1,370																	81,755
Temporary HHW Collection Facility (THHWCF) Events																														
Aguanga	10/20/2007	1	$ 2,500	12	6	18	328	13	1,200	0	0	49	8	0	206	49	0	55	0	0	0	0	0	11	30	228	0	600	300	3,077
Aguanga	6/21/2008	1	$ 2,625	29	2	31	1,200	0	6,800	1,275	200	25	5	0	130	200	0	200	0		5			0	10	0	0	1,250	2,040	13,340
Subtotal		**2**	**$ 5,125**	**41**	**8**	**35**	**1,528**	**13**	**8,000**	**1,275**	**200**	**74**	**13**	**0**	**336**	**249**	**0**	**255**	**0**	**0**	**5**	**0**	**0**	**11**	**40**	**228**	**0**	**656**	**0**	**12,883**
Anza	9/29/2007	1	$ 11,858	154	19	173	6,808	0	6,163	0	500	44	103	12	945	3,096	56	2,413	0	16	115	65		0	180	0	33	8,320	4,000	32,869
Anza	12/15/2007	1	$ 5,775	75	21	96	2,267	16	2,193	213	600	18	36	0	318	660	0	1,103	1	254	52	5	0	0	70	0	5	11,320	2,260	21,391
Anza	3/29/2008	1	$ 10,753	133	19	152	2,153	18	4,250	0	2,000	60	42	0	273	993	34	2,711	0	217	122	115		5	110	0	18	6,050	14,720	33,891
Subtotal		**3**	**$ 28,386**	**362**	**59**	**421**	**11,228**	**34**	**12,606**	**213**	**3,100**	**122**	**181**	**12**	**1,536**	**4,749**	**90**	**6,227**	**1**	**487**	**289**	**185**	**0**	**5**	**360**	**0**	**56**	**25,690**	**20,980**	**88,150**
Pinyon Pines	11/17/2007	1	$ 2,500	45	6	51	2,379	19	1,020	0	500	11	32	0	129	228	25	686	0	205	11	26	0	0	28	0	0	1,000	680	6,979
Pinyon Pines	5/10/2008	1	$ 2,625	29	3	32	234	0	510	0	300	44	0	0	138	215	6	438	0		45	29		0	40	0	11	1,000	3,840	6,850
Subtotal		**2**	**$ 5,125**	**74**	**9**	**83**	**2,613**	**19**	**1,530**	**0**	**800**	**55**	**32**	**0**	**267**	**443**	**31**	**1,124**	**0**	**205**	**56**	**55**	**0**	**0**	**68**	**0**	**11**	**2,000**	**4,520**	**13,829**
Temecula	9/15/2007	1	$ 24,332	316	75	391	2,593	81	1,360	638	6,000	45	448	9	832	2,579	113	4,478	0	613	153	196	125	0	481	0	106	7,200	5,160	33,210
Temecula	1/26/2008	1	$ 16,251	201	22	223	922	42	850	340	2,600	51	160	5	437	2,118	57	2,561	0	272	67	137	14		472	0		4,240	3,080	18,425
Temecula	5/10/2008	1	$ 35,089	434	55	489	1,971	70	1,700	213	7,782	41	366	6	724	4,132	159	3,490	10	1,281	220	96	18	31	499	0	154	4,700	0	27,662
Subtotal		**3**	**$ 71,302**	**926**	**181**	**1,103**	**7,104**	**158**	**6,290**	**893**	**17,159**	**179**	**876**	**21**	**1,639**	**14,757**	**387**	**10,269**	**477**	**4,110**	**596**	**842**	**713**	**28**	**1,459**	**0**	**250**	**22,412**	**18,607**	**109,226**
TOTAL THHWCF		**10**	**$ 109,938**	**1,403**	**257**	**1,642**	**22,473**	**224**	**28,426**	**2,381**	**21,259**	**430**	**1,102**	**33**	**3,778**	**20,198**	**508**	**17,875**	**478**	**4,802**	**946**	**1,082**	**713**	**44**	**1,927**	**228**	**317**	**50,758**	**44,107**	**224,088**
TOTAL AMOUNTS FROM ALL HHW FACILITY TYPES IN SANTA MARGARITA WATERSHED																														
		54	**$ 132,269**	**3,111**	**257**	**3,350**	**38,358**	**224**	**58,686**	**5,611**	**51,519**	**1,180**	**2,472**	**33**	**3,778**	**20,198**	**508**	**17,875**	**478**	**4,802**	**946**	**1,082**	**713**	**44**	**1,927**	**228**	**317**	**50,758**	**44,107**	**305,843**

Building & Safety Storm Season Statistics

Street Address	Township Range Sec. No	City	Tract Map Or Assessor Parcel Map See No B	Acreage	Wetlands See Note E	Project Type	Project Priority	No. of Inspections	WQID No. (General Permit) 1 B	Grading Permit No (s) 1 A	Other Permits Needed Grading Construction Septic-or-Way etc	Contact Name	Mailing Address	City	Zip	Phone Number	Name (24 hour)	Phone Number (24 hour)	Stop Work Order	Notice of Violation	Written Warning	Verbal Warning	Satisfactory	No Work Observed	No Answer to Site	Lease Have Over Acre	Construction Notice	Inspection Date	Inspr. District	Inspr. No	Legal	Single Family	Permit Complete	Report Board Notified	Date
45620 Tyler Drive	3S 4E 14	Temecula	P.O. Box 266	2.8	1	Grading Permit	Low	3	733-6338320	961 678 3438 760 315 0039	Bernice Sanchez	Rocket Grading	P.O. Box 266	Temecula	92593	951 817 3400	Robert Sandoz	951 817 3400										09/07/07	1001	2	55%			
42500 Tulipan Road	7S 3E 8	Murrieta	P.O. Box 2	2.8	1	Grading Permit	High	2	951-699-2171	909 699 2171	Ed Hubbelson	Hidden Valley Ag Pro	P.O. Box 2	Murrieta	92563	909 699 2171	Ed Hubbelson	951 699 2171										07/02/07	1001	1	55%			
30231 Hidden Valley Road	5S 2W 3	Murrieta	PM 10130	2.8	1	Grading Permit	High	2	951-677-7761	951 677 7761	Bob Lucas	Hidden Valley Ag Pro	P.O. Box 2	Murrieta	92563	951 677 7761	Bob Lucas	951 677 7761										07/02/07	1001	1	55%			
30355 County Line Road	6S 2W 3	Murrieta	PM 10130	2.8	1	Grading Permit	High	2	951-677-7761	951 677 7761	Bob Lucas	Hidden Valley Ag Pro	P.O. Box 2	Murrieta	92563	951 677 7761	Bob Lucas	951 677 7761										07/02/07	1001	1	55%			
30355 Sunset Avenue	6S 2W 3	Murrieta	PM 10130	2.8	1	Grading Permit	High	2	951-677-7761	951 677 7761	Bob Lucas	Hidden Valley Ag Pro	P.O. Box 2	Murrieta	92563	951 677 7761	Bob Lucas	951 677 7761										07/02/07	1001	1	55%			
31351 Mountain Road	6S 2W 3	Murrieta	PM 10130	2.8	1	Grading Permit	High	2	951-677-7761	951 677 7761	Bob Lucas	Hidden Valley Ag Pro	P.O. Box 2	Murrieta	92563	951 677 7761	Bob Lucas	951 677 7761										07/02/07	1001	1	55%			
45620 Tyler Drive	3S 4E 14	Temecula	P.O. Box 266	2.8	1	Grading Permit	Low	3	733-6338320	961 678 3438 760 315 0039	Bernice Sanchez	Rocket Grading	P.O. Box 266	Temecula	92593	951 817 3400	Robert Sandoz	951 817 3400										09/07/07	1001	2	55%			
42500 Tulipan Road	7S 3E 8	Murrieta	PM 10130

| | | |

3210 Mangular Avenue	773, J-1	Corona	APN 275-050-008 SFF	>1	Unknown	Grading Permit	Medium	1	unknown	BGR 041702	Corey Addison	Fontana	92335	909 833 8383	909 997 0454										APN 275-050-008	10/03/07	Unknown	1	0%											
17208 Palm Street	746, E-7	Riverside	APN 273-220-001 SFF	>1	1	Grading Permit	Medium	1	833C335473	BGR 041733	Delgado Arturo	18444 Marigold Street	Bloomington	92316	909 315 3643										APN 273-220-001	10/03/07	RG01	1	0%	10/9/2007	Y									
14364 Meadowlands Drive	745, D-4	Riverside	APN 271-150-050 SFF	>1	1	Grading Permit	Medium	1	833C338141	BGR 051069	Home Tech Steel	1100 Irvine Blvd., Suite 195	Tustin	92780	949 559 4982										APN 271-150-050	10/02/07	RG01	1	1%	10/9/2007	Y									
16200 Rocky Glen Road	805, H-4	Perris	APN 289-350-032 SFF	>1	1	Grading Permit	Medium	1	833C332658	BGR 050554	Tom & Randee Rocke	5920 Jones Avenue	Riverside	92505	909 689 4934	Randee Rocke	951 377 5787								APN 289-350-032	10/05/07	RG01	1	N/a											
14310 Meadowlands Drive	745, D-4	Riverside	APN 271-150-051 SFF	>1	1	Grading Permit	Medium	1	833C338141	BGR 065061	Home Tech Steel	1100 Irvine Blvd., Suite 195	Tustin	92780	949 559 4982					12/27/07					APN 271-150-051	10/02/07	RG01	1	1%	10/9/2007	Y									
14980 Gavilan Springs Ranch Roa	805, E-4	Perris	APN 289-160-033 SFF	>1	Unknown	Grading Permit	Medium	1	unknown	BGR 051317	Richard & Shirley Duhamel	14974 Gavilan Springs Ranch Road	Perris	92570	951 657 0627										APN 289-160-033	10/04/07	Unknown	1	0%	10/9/2007	Y									
18022 Ferrari	716, B-7	Riverside	APN 276-010-040 SFF	>1	1	Grading Permit	Medium	1	833C337912	BGR 051529	Ryan Theodore	9421 Tudor Lane	Garden Grove	92841	714 563 5095, 714 210 1313										APN 286-170-035	10/04/07	RG01	1	25%	10/9/2007	Y									
15756 Via Barranca	775, G-6/9	Perris	APN 287-290-057 SFF	>1	1	Grading Permit	Medium	1	833C340423	BGR 051550	Raymond Gong	18033 Clarke Court	Riverside	92508	951 789 0543										APN 276-010-040	10/01/07	RG01	1	50%	10/9/2007	Y									
20915 Lakemount Court	775, F-6	Perris	APN 287-060-022 SFF	>1	1	Grading Permit	Medium	1	410C340718	BGR 060252	Christopher Barden	9353 Ohio Street	Downey	90250	562 869 6330										APN 287-290-057	10/04/07	RG01	1	5%	10/9/2007	Y									
La Sierra - Riverside	744, H-6	Riverside	TR 30473	>1	1	Grading Permit	Medium	1	833C336675	BGR 050092	Bill & Naiani Trawick	954 Dalton Road	Riverside	92501	909 770 2684										APN 287-060-022	10/04/07	RG01	1	5%											
13230 Orange Street	713, I-C	Mira Loma	TR 30820	>1	1	Grading Permit	Medium	1	833C326014	BGR 040517	CG Homes, LLC	2935 11th Street	Santa Monica	905405	310 452 0966	Mr. Ashby	Bill Bent	951 232 4395		10/11/07						10/02/07	RG01	1	30%	10/11/2007	Y									
5580 Hamner Avenue	834, E-4	Mira Loma	TR 30466-1	>1	1	Grading Permit	Medium	1	833C336936	BGR 040713	Warmington Homes	James Skinner	3990 Pullman Street, Suite A	Costa Mesa	92626	714 434 4326	James Comelio, Rick Hanson	714.240.5833, 714.240.7148							APN 134-240-021	10/03/07	RG01	1	30%	10/11/2007	Y									
30415 Patton Road	869, B-1	Winchester	TR 31592	>1	1	Grading Permit	Medium	3	833C338944	BGR 050964	Lennar Communities	Hal McCutchan	391 North Main Street, #301	Corona	92880	951.817.3600	Steve Weaver	951 377 6433								10/30/07	RG01	1	50%											
14701 Schleisman Road	712, h-1	Corona	TR31309	) acers, d	1	Grading Permit	Medium	2	636C335304	BGR 050627	Lennar Communities	Hal McCutchan	20980 Country Center Drive, # 110	Temecula		951.630.5150	Janny Pascarik, Ernie Mansfie	949 283 1974							APN 461-170-002	10/01/07	RG01	3	45%	10/11/2007	Y									
34990 Leon Road	899, B-6	Winchester	TR 30696, PM 14390	>1	1	Grading Permit	High	3	833C330934	BGR 041309	Lennar Communities	Hal McCutchan	391 North Main Street, #301	Corona	92880	951.817.3600	Ernie Mansfield	951.453.1198							APN 144-020-004	10/03/07	RG01	2	45%	10/11/2007	Y									
8507 Kendra Lane	712, J-5	Mira Loma	TR 30825	>1	1	Grading Permit	Medium	1	833C331865	BGR 050673	Lennar Communities	Hal McCutchan	20980 Country Center Drive, # 110	Temecula	92591	951.719.3449	n Stuster, Ken Gunter, Tom C	951.538.2214, 951.232.1829, 951.453.1193							APN 467-140-019	10/05/07	RG01	3	35%	10/11/2005										
17474 La Sierra Avenue	744, J-6	Riverside	TR 31695	>1	1	Grading Permit	Medium	1	833C331443	BGR 040892	Lennar Communities	Hal McCutchan	391 North Main Street, #301	Corona	92880	951.817.3500	Tony Anderson	951.712.8300							APN 130-080-009	10/03/07	RG01	1	20%	10/11/2007										
33260 Menifee Road	899, G-1	Menifee	TR 30349	>1	1	Grading Permit	Medium	1	833C331063	BGR 041297	Van Daele Development	Steven King	2900 Adams Street, # C-25	Riverside	92504	951.354.2121	Mike Ashfort	951.850.3096							APN 289-050-014	10/02/07	RG01	1	20%	10/11/2005										
8001 Slate Creek Road	713, A-2	Corona	TR 30735	>1	1	Grading Permit	Medium	1	833C322484	BGR 041513	Meritage Homes	Charles Weeks	19600 Fairchild Road, #270	Irvine	92612	949.250.6600	Edward Nava	949.254.6764							APN 359-130-037	10/05/07	RG01	1	80%											
28358 Menifee Road	838, G&H-	Romoland	TR 32664	>1	1	Grading Permit	Medium	3	833C342408	BGR 060857	Standard Pacific Homes	Brittany Boshers	255 E. Rincon Street, #200	Corona	92879	909.372.8500	Mike Magana	909 376 8139							APN 130-060-015	10/03/07	RG01	1	N/a											
29044 Simpson Road	838, G-5	Romoland	TR 34180-1	36 of 357	1	Grading Permit	High	1	833C343142	BGR 061003	Standard Pacific Homes	Brittany Boshers	255 E. Rincon Street, #200	Corona	92879	909.372.8500	Tim Hampton, Kevin Fulmer	909.821.9885, 951.202.8285							APN 333-180-025	10/01/07	RG01	3	40%	10/11/2007										
26813 Amanda Avenue	839, F-3	Hemet	TR 30351	>1	1	Grading Permit	Medium	3	833C338203	BGR 042073	Standard Pacific Homes	Brittany Boshers	255 E. Rincon Street, #200	Corona	92879	909.372.8500	Tim Hampton, Kevin Fulmer	909.821.9885, 951.202.8285							APN 333-180-006	10/01/07	RG01	1	40%	10/11/2007										
Wooden Gate Way	713, C-1	Mira Loma	TR 30895	>1	1	Grading Permit	Medium	1	833C329410	BGR 050437	Osborne Development Corporation	Robert Osborne, Jr.	30001 Contentico	Rancho Santa Mar	92688	909.888.3822	Jay Heaton, Richard Felley	951.201.1492, 951.218.5168							APN 456-250-016	10/05/07	RG01	1	40%	10/11/2007										
30145 Ridgeway Street	838, J-3	Romoland	TR 28801	-32 acres	1	Grading Permit	Medium	2	833C314614	BGR 010786	Warmington Homes	James Skinner	3990 Pullman Street	Costa Mesa	92626	714.557.7411	Mark Stevens	714.240.5696							APN 152-040-009	10/03/07	RG01	1	N/a											
35323 Pourroy Road	899, E-5	Temecula	TR 29114	>1	2	Grading Permit	High	3	833C318451	BGR 020669	Heller Development	Joel Heller	8453 Reseda Blvd	Northridge	91324	818.727.2656	Matt Hines, Tim Harrison	760.578.9688, 760.403.8486							APN 459-030-007	10/01/07	RG01	2	15%	10/11/2007										
34844 Pourroy Road	839	Winchester	TR 30066	>1	2	Grading Permit	High	3	833C323139	BGR 030378	Barratt American	Michael Armstrong	5950 Priestly Drive	Carlsbad	92008	760.431.0800	Winder, Sam Gonzalez, Allen	951.288.3882, 760.809.5402, 760.613.5742							APN 467-240-043	10/02/07	TG01	3	65%											
90805 Olive Avenue	839, A-7	Winchester	TR 30266	26 75 Ac	1	Grading Permit	High	3	833C338740	BGR 030557	Brookfield Homes	Dale Gleed	12865 Pointe Del Mar, # 200	Del Mar	92014	858.481.8500	Bob May	858.922.9735							APN 467-260-056	10/02/07	TG01	3	35%	10/11/2007										
7325 Archibald Avenue	712, J-2	Corona	TR 30480	>1	1	Grading Permit	High	3	833C323494	BGR 031038	Pulte Homes Corporation	Angie Bartel	2 Technology Drive	Irvine	92618	949.254.2687	Pedro Plascencia, Rick Bigham	949.929.3302, 949.307.5659							APN 461-180-029	10/01/07	RG01	3	55%											
36444 Pourroy Road	929, E-1	Winchester	TR 29214	>1	2	Grading Permit	High	3	833C328074	BGR 031552	KB Home	Michael Freeman	801 Corporate Center Drive, #201	Pomona	91768	909.802.1109	y, Dick Holke, Louie Clark, Mi	7985, 909.322.5131, 951.453.8821, 909.322.5630							APN 134-140-012	10/03/07	RG01	3	45%	10/11/2007										
8105 Pigeon Pass Road	646, E-7	Highgrove	TR 29597	of 1006-6	1	Grading Permit	High	2	833C327881	BGR 040744	Shea Homes	Michael O'Melveny	10350 Santa Monica Blvd	Los Angeles	90025	930.759.9709	Hinton, Rod Plunkett, Mike G	51.453.5920, 951.739.9700, 951.538.4688							APN 958-040-001	10/02/07	TG01	3	50%	10/11/2007										
35755 Briggs Road	899, A-6	Murrieta	TR 29484	>1	1	Grading Permit	High	3	833C331219	BGR 041136	Spring Mountain Ranch, SMR Ventures, L	Klas Mendenhall	675 Mount Vernon Avenue	Riverside	92507	619.478.7979	Dave Hauck	661.510.3228							APN 257-180-009	10/04/07	RG01	2	25%	10/11/2007										
35998 Garbani Road	869, C-6	Menifee	TR 30142	>1	1	Grading Permit	High	2	833J300632	BGR 041628	D. R. Horton	Steve Rowland	119 N. Maple Street, Suite A	Corona	92880	909.272.9000	ith, Chris Mulvania, Albert R	51.538.2473, 951.538.0776, 760.497.3608							APN 467-230-028	10/05/07	RG01	3	55%											
35821 Craig Avenue	867, J-5	Menifee	TR 29636	-71 Acres	1	Grading Permit	High	2	833J300565	BGR 041755	KB HOME COASTAL, INC.	Michael Freeman	26201 Ynez Road, # 104	Temecula	92591	951.587.3306	Bob Weinck, Scott Mackie	619.954.6941, 619.520.6541							APN 306-200-013	10/05/07	RG01	2	65%											
29181 Simpson Road	838, H-6	Menifee	TR 31582	>1	1	Grading Permit	High	3	833C338918	BGR 050203	Capital Pacific Homes	Mark Mullin	200 South Main Street, Suite 300	Corona	2882-22	951.279.1446	Perry Wagoner, Greg Lubbock	951.240.6049, 909.578.4235							APN 358-230-001	10/05/07	RG01	2	50%	10/11/2007										
31256 Pat Road	899, C-4	Winchester	TR 32185	>1	2	Grading Permit	High	3	833C337019	BGR 050961	Shea Homes, L.P.	Michael O'Melveny	1250 Corona Pointe Court, Ste 600	Corona	92879	951.739.9700	Dave Hinton	951.453.5920							APN 333-200-048	10/01/07	RG01	3	45%	10/11/2007										
Southeast Winchester Road & Jea	899, E-5		TR 30049	11.66 Acr	2	Grading Permit	High	3	833C337213	BGR 050039	Beazer Homes	Darius Fatakia	1800 E. Imperial Hwy, Suite 200	Brea	92821	714.285.2900	Kevin Brickley, Jim Allen	714.231.7386, 714.240.3689							APN 467-150-047	10/02/07	TG01	3	65%											
14762 Schleisman Road	712, H-2	Corona	TR 31826	:110 Acre	1	Grading Permit	High	3	833C337126	BGR 050846	Brookfield Homes	Michael Armstrong	5950 Priestly Drive, Suite 101	Carlsbad	2008-85	760.931.0800	ain, Allen Tritten-off sales, Tim	50.609.7485, 760.613.5742, 760.809.7176							APN 467-240-031, 045, 04	10/02/07	TG01	3	50%	10/11/2007										
7380 Hellman Drive	712, H-2	Corona	TR 31476	-57 Acres	1	Grading Permit	High	3	833C339260	BGR 051864	Shea Homes	Michael O'Melveny	1250 Corona Pointe Court, #600	Corona	92879	951.739.9700	zow, Kevin Crawford, Darrell	51.712.6591, 714.412.9437, 951.712.7625							APN 144-060-003	10/03/07	RG01	3	50%	10/11/2007										
9370 Smiley Blvd.	688, B-3	Moreno Valley	TR 29837	>1	2	Grading Permit	High	2	833C326670	BGR 060037	Heathside Homes	Steven Ritz	6 Executive Circle, Suite 250	Irvine	92614	949.250.7700	Marc DeMello	951.204.1985							APN 144-060-001	10/03/07	RG01	3	25%	10/11/2007										
7360 Hellman Drive	712, H-2	Corona	TR 31476	>1	1	Grading Permit	High	4	833C333060	BGR 051864	Dynamic Homes, Inc.	Henry Melendez	1050 Lakes Drive, # 150	West Covina	91790	626.931.1411	Pride, Nikki Giverson, Miguel	909.810.3711, 909.556.5355							APN 471-270-006	10/04/07	RG01	2	15%	10/11/2007										
22935 Rider Street	777, D-4	Perris	TR 30592	>1	1	Grading Permit	Medium	1	833J300218	BGR 030844	Al Ratan		44930 Via Renaissance	Temecula	92592	951.587.6711									APN 936-150-012	09/21/07	TG01	1	50%		Y									
22595 Palomar Road	927, E-1	Wildomar	TR 30839	>1	1	Grading Permit	Medium	1	833C324054	BGR 030869	Shawn & Charlotte Singer		4095 Fruit Street	La Verne	91750	909.591.1284									APN 287-110-013	10/11/07	RG01	0%		4/3/2006	Y									
22489 Palomar Road	927, C-1	Wildomar	TR 30839	>1	2	Grading Permit	Medium	1	833C324054	BGR 030869	Six Rock Ridge, LLC	Clyde Hoeldtke	31812 Via Pato	Coto De Caza	92679	949.230.8961	Clyde Hoeldtke	949.230.8961							APN 928-100-006	10/09/07	TG01	1	0%	2/21/2007	Y									
29021 Holland Road	869, G-5	Menifee	TR 30948	>1	1	Grading Permit	Medium	1	833C328827	BGR 040037	Donald Rapstine		2964 Dartmouth Circle	Corona Hills	92879	909.272.1197, 909 702 3759									APN 289-150-015	11/01/07	RG01	1	60%		Y									
Palomar Road & Arrow Wood Way	868, F-5	Menifee	TR 31148	>1	1	Grading Permit	Medium	1	833C341891	BGR 031412	Goran Silaver		4421 Hobbs Road	La Canada	91011	818.790.7344									APN 929-350-002	10/08/07	TG01	1	40%	10/18/2007	Y									
26490 Chambers Avenue	838, A-4	Sun City	TR 30507	>1	1	Grading Permit	Medium	1	833J300387	BGR 031436	Oyewole Akinyemi		6006 Vera Street	Riverside	2504-159	951.354.6545									APN 276-040-003	10/08/07	RG01	1	5%	10/17/2007	Y									
31100 Pat Road	899, C-4	Winchester	TR 30599	>1	1	Grading Permit	Medium	1	833C328827	BGR 040037	David Hazell		32052 Virginia Way	Laguna Beach	92651	949.499.9197									APN 934-260-008	10/11/07	TG01	1	N/a											
35111 Leon Road	890, C-5	Menifee	TR 30791	>1	2	Grading Permit	Medium	1	833C335196	BGR 040848	Jim Smith		22170 Hunters Run Court	Wildomar	92595	909.821.8068									APN 365-220-019	10/09/07	TG01	1	N/a											
29428 Lake Hills Drive	388, K-6	Menifee	TR 30705	>1	1	Grading Permit	Medium	1	833J300550	BGR 041150	Andre Ocampo		34925 El Dorado Road	Lake Elsinore	92530	714.715.1842									APN 355-150-002	10/08/07	RG01	1	50%	10/17/2007	Y									
34491 Washington Street	899, F-4	Murrieta	TR 29962	>1	2	Grading Permit	Medium	2	833C331498	BGR 041232	Anthony & Karolyn Polo		42200 Hacienda Drive	Murrieta	92562	951.719.3115									APN 932-340-013	10/11/07	TG01	1	10%	12/6/2006	Y									
31315 Evans Road	868, B-5	Menifee	TR 30554	>1	1	Grading Permit	Medium	1	833J300189	BGR 041273	Robert & Lisa Mantilla		43479 Paisano Court	Temecula	92592	909.261.6590									APN 935-110-016	12/02/07	TG01	1	25%	3/13/2006	Y									
35525 Leon Road	899, B-6	Winchester	TR 30694	>1	1	Grading Permit	Medium	1	833C330934	BGR 041306	Ron & Elin Pendleton		32305 Crooked Arrow Drive	Wildomar	92595	951.245.0730									APN 930-310-009	10/10/07	Unknown	1	0%	2/21/2007	Y									
27448 Finale Court	868, D-4	Menifee	TR 30902	>1	1	Grading Permit	Medium	1	833J300211	BGR 041577	Tim Housenolder, c/o Rev. Development		420 McKinley Avenue, Suite 111-140	Corona	92874										APN 935-260-008	10/12/07	TG01	1	0%	12/7/2006	Y									
30995 Los Alamos Road	899, A-1	Winchester	TR 30695	>1	1	Grading Permit	Medium	1	833C330934	BGR 050008	Tim & Debbie Loafs		40955 Avenida La Cresta	Murrieta	92562	951.852.5920	Francis & William Hurney								APN 930-300-010	10/08/07	TG01	1	0%	1/25/2007	Y									
32530 Murriet Road	698, A-1	Murrieta	TR 30694	>1	1	Grading Permit	Medium	1	833J300550	BGR 050268	Tim & Debbie Loafs		40955 Avenida La Cresta	Murrieta	92562	951.852.5920		951.696.7799							APN 930-300-010	10/10/07	TG01	1	0%	10/18/2007	Y									
Viaggio Circle	684, H-1	Jurupa	TR 31875, COC06032	>1	1	Grading Permit	Medium	1	833C336992	BGR 051044	Raymond & Hilda Diaz		10311 Hendrick Avenue	Riverside	92505	951.689.7009									APN 266-320-002	10/08/07	RG01	1	55%		Y									
41870 Summit Peak Circle	956, C-4	Murrieta	APN 932-370-045SFR	>1	2	Grading Permit	Medium	1	833C331489	BGR 050585	Larry Dalton		8 Theatre Lane	Aliso Viejo	92656	949.360.9081									APN 382-080-015	10/09/07	RG01	0%	3/12/2007	Y									
41905 Summit Peak Circle	956, C-4	Murrieta	APN 932-370-013SFR	>1	2	Grading Permit	Medium	1	833C331489	BGR 050587	Roger Cude		31438 Santiago Road	Temecula	92592	951.302.0364	Jeff Brand, Brand Construction	760.908.6026							APN 936-050-017	10/12/07	TG01	1	N/a											
28200 Via Peregrino	978, F-1	Temecula	APN 940-070-002SFR	>1	2	Grading Permit	Medium	1	833C336584	BGR 051216	Kevin Wolf		14340 Elsworth Street, # 108	Moreno Valley	92553	951.656.0332, 951.658.0513									APN 276-040-002	10/08/07	RG01	1	60%											
37480 Via Vista Grande	927, C-3	Murrieta	APN 928-230-004SFR	>1	2	Grading Permit	Medium	1	833C343124	BGR 051518	Kevin Wolf		14340 Elsworth Street, # 108	Moreno Valley	92553	951.656.0332, 951.658.0513									APN 276-040-002	10/08/07	RG01	1	60%											
38175 Via Vista Grande	927, C-3	Murrieta	APN 928-230-007SFR	>1	2	Grading Permit	Medium	1	833C338575	BGR 051516	Richard Demille		6111 North Oakbank Drive	Azusa	91702	626.963.5639									APN 931-070-013	10/10/07	TG01	1	1%	3/21/2007	Y									
21855 Via Vista Grande	927, C-3	Murrieta	APN 928-230-016SFR	>1	2	Grading Permit	Medium	1	833C338574	BGR 051515	Mazen Sheikhly,		P.O. Box 192	Laguna Beach	92652	714.313.3752									APN 385-170-011	10/08/07	TG01	1	0%	10/17/2007	Y									
17986 Hombre Lane	926, E-7	Murrieta	APN 932-300-017SFR	>1	2	Grading Permit	Medium	1	833C341365	BGR 051711	Cheryl Huber		30737 Calle Pina Colada	Temecula	92591		Bret Sanders	951.712.9977							APN 934-020-005	10/12/07	TG01	1	0%	4/3/2007	Y									
19435 Avenida Presa	956, G-6	Murrieta	APN 932-160-054SFR	>1	2	Grading Permit	Medium	1	833C343817	BGR 060147	Brehm Brandon	Kevin Canning	2714 Loker Avenue W., # 300	Carlsbad	92008	760.448.2420	Curt VanDoren, Ernie Pierce	858.518.6574, 760.691.5492							APN 156-060-014	10/12/07	RG01	2	30%	10/19/2007	Y									
20200 Avenida Del Tiendas	927, B-7	Murrieta	APN 930-090-008SFR	>1	2	Grading Permit	Medium	1	833C343434	BGR 060297	K. Hovnanian Forcast Homes, Inc.	Arina Walton	800 North Haven	Ontario	91761	909.937.3270	, Rich Grise, John Steward, C	6617, 909.376.7333 951.634.2333, 951.372.9351							APN 351-020-009	10/10/07	RG01	3	35%	10/19/2007	Y									
21110 Camino De Jagador	926, A-4	Murrieta	APN 928-270-028SFR	>1	2	Grading Permit	Medium	1	833C344460	BGR 060771	Century Vintage Homes-Crowell Santa Ri	David Cooper	1535 South D Street	San Bernardino	92408	909.381.6001	Shawn Denison	909.721.7011							APN 390-060-025	10/18/07	RG01	2	10%	10/18/2007	Y									
28200 Via Peregrino	978, F-1	Temecula	APN 940-070-003SFR	>1	2	Grading Permit	Medium	1	833C336584	BGR 051216	KB HOME COAST, INC.	Michael Freeman	26201 Ynez Road, # 104	Temecula	92592	951.587.3300	Steve Alda	619.954.3124							APN 276-010-040	10/09/07	RG01	3	5%	10/18/2007	Y									
27480 Via Vista Grande	927, C-3	Murrieta	APN 928-230-004SFR	>1	2	Grading Permit	Medium	1	833C343124	BGR 051518	Beazer Homes	Darius Fatakia	1100 Town & Country, #100	Orange	92868	714.285.2900	Kevin Brickley, Jim Allen	714.231.7386, 714.231.6055							APN 273-300-006	10/09/07	RG01	3	5%	10/18/2007	Y									
38175 Via Vista Grande	927, C-3	Murrieta	APN 928-230-007SFR	>1	2	Grading Permit	Medium	1	833C338575	BGR 051516	Centex Homes	Steve Moffatt	2280 Wardlow Circle, # 150	Corona	92880	909.479.9311	Teresa Jakeway, Dave Lermia	951.520.6969, 951.538.7466							APN 362-180-029	10/11/07	TG01	2	35%	10/11/2007	Y									
21855 Via Vista Grande	927, C-3	Murrieta	APN 928-230-016SFR	>1	2	Grading Permit	Medium	1	833C338574	BGR 051515	KB Home	Michael Freeman	26201 Ynez Road, # 104	Temecula	92591	951.587.3300	Bob Weirich	619.954.6941							APN 364-200-001	10/11/07	RG01	1	55%											
17986 Hombre Lane	926, E-7	Murrieta	APN 932-300-017SFR	>1	2	Grading Permit	Medium	1	833C341365	BGR 051711	Van Daele Development	Brice Kittle	2900 Adams Street, # C-25	Riverside	92504	951.354.2121	Bob Surprise, Shane Chilton	951.850.3100, 951.850.3120, 3110							APN 273-300-006	10/09/07	RG01	3	50%	10/18/2007	Y									
19435 Avenida Presa	956, G-6	Murrieta	APN 932-160-054SFR	>1	2	Grading Permit	Medium	1	833C343817	BGR 060147	Griffin Communities	Don Benny	110 North Lincoln Avenue, 2nd Floor	Corona	92882	951.898.1234	Lou Messina, Don Benny	951.545.9556, 909.941.5062							APN 376-410-005	10/11/07	TG01	2	50%	10/19/2007	Y									
20200 Avenida Del Tiendas	927, B-7	Murrieta	APN 930-090-008SFR	>1	2	Grading Permit	Medium	1	833C343434	BGR 060297	Lennar Homes	Hal McCutchan	20980 Country Center Drive, # 110	Temecula	92591	951.719.3449	Bill Rosas, Mike Lusvk	714.296.9896, 951.712.8616							APN 462-020-047	10/11/07	RG01	1	55%											
21110 Camino De Jagador	926, A-4	Murrieta	APN 928-270-028SFR	>1	2	Grading Permit	Medium	1	833C344460	BGR 060771	Gallery Homes of Partners	Rick Hauser	31618-1 Railroad Canyon Road	Canyon Lake	92561	951.244.7713	uaar, Dave Meed, Carl Bachle	760.691.5492, 951.294.1716, 951.294.1331, 951.294.1106							APN 136-110-017	10/12/07	RG01	2	45%	10/19/2007	Y									
28200 Via Peregrino	978, F-1	Temecula	APN 940-070-002SFR	>1	2	Grading Permit	Medium	1	833C336584	BGR 051216	Audie Murphy Ranch, LLC	Dennis Chapman	1522 Brookhollow Drive, Suite 1	Santa Ana	92705	951.279.1800	tauck, Pat Celella, Robert Cru	39.772.7974, 714.393.1370, 951.712.2351							APN 358-090-001	10/10/07	RG01	3	55%											
27480 Via Vista Grande	927, C-3	Murrieta	APN 928-230-004SFR	>1	2	Grading Permit	Medium	1	833C343124	BGR 051518	Grante Homes		2 Park Plaza, # 700	Irvine	92614	949.250.6229	John Ward	909.578.4980							APN 372-050-004	10/08/07	RG01	2	15%	10/18/2007	Y									
38175 Via Vista Grande	927, C-3	Murrieta	APN 928-230-007SFR	>1	2	Grading Permit	Medium	1	833C338575	BGR 051516	Starfield Southwest Investments, LLC	Steven Peck	2 Ada, Suite 200	Irvine	2819-73-	949.790.5400	Steven Stout, Jay Gates	951.634.7056, 951.201.0601							APN 290-140-061	10/12/07	RG01	1	40%	10/19/2007	Y									
21855 Via Vista Grande	927, C-3	Murrieta	APN 928-230-016SFR	>1	2	Grading Permit	Medium	1	833C338574	BGR 051515	Pauba Ridge, LLC	Elliott Leonard	42380 Business Park Drive, Suite 107	Temecula	92590	949.515.4911	Elliott Leonard	951.506.3811							APN 927-420-001	10/11/07	TG01	1	40%	10/19/2007	Y									
17986 Hombre Lane	926, E-7	Murrieta	APN 932-300-017SFR	>1	2	Grading Permit	Medium	1	833C341365	BGR 051711	Trimark Pacific Homes	Raul Padilla	10815 Rancho Bernardo Road, Space 110	San Diego	92127	858.217.2720	Raul Padilla	619.778.6993							APN 372-050-034	10/06/07	Unknown	1	15%	10/18/2007	Y									
19435 Avenida Presa	956, G-6	Murrieta	APN 932-160-054SFR	>1	2	Grading Permit	Medium	1	833C343817	BGR 060147	Pulte Homes Corporation	Angie Bartel	2 Technology Drive	Irvine	92618	949.797.4400									APN 952-250-046	10/05/07	TG01	1	N/

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29161 Simpson Road	638, H-6	Menifee	TR 31582	>1	1	Grading Permit	High	5	833C338918	BGR 050203	Shea Homes, L.P.		1250 Corona Pointe Court, Ste 600	Corona	92879	951.739.9700	Dave Hinton	951.453.5920	APN 333-200-046	11/02/07	RG01	5	65%					
25355 Newport Road	867, H-3		TR 31391	~514acres	1	Grading Permit	High	5	833C338544	BGR 050227	Audie Murphy Ranch, LLC	Dennis Chapman	1522 Brookhollow Drive, Suite 1	Santa Ana	92705	951.279.1800	Chuck, Pat Celella, Robert Ch	09.772.7974, 714.393.1370, 951.712.2351	APN 358-090-001	11/07/07	RG01	5	55%					
44511 Morgan Hill Drive	980, A-2	Temecula	TR 30885	~167acres	2	Grading Permit	High	3	833C318784	BGR 050099	McMillin Morgan Hill, LLC	Dennis Bowman	2750 Womble Road	San Diego	92106	600.781.0401	Paul Manning, Mike Owsley	619.971.6565, 619.719.8691	APN 952-240-014	11/06/07	TG01	3	35%	11/19/2007				
28300 Garbani Road	868, F-5	Menifee	TR 28206	g 79 Bac	1	Grading Permit	High	3	833C300634	BGR 050967	Granite Homes	Scott Nelson	2 Park Plaza, # 700	Irvine	92614	949.250.9229	Simon Horton, Bobby Eskina	951.377.6990, 951.757.2625	APN 372-050-004	11/05/07	RG01	3	55%					
29044 Simpson Road	638, G-5	Romoland	TR 34180-1	26.26 of	1	Grading Permit	High	3	833C343142	BGR 061003	Standard Pacific Homes	Brittany Boshers	255 E. Rincon Street, #200	Corona	92879	951.898.5500	Tim Hampton	909.821.9885	APN 333-180-008	11/02/07	RG01	3	65%					
31949 Rouge Lane	868, F-5	Menifee	TR 28206-2	>1	Unknown	Grading Permit	High	2	unknown	BGR 070203	Trinmark Pacific Homes	Raul Padilla	10815 Rancho Bernardo Road, Space 110	San Diego	92127	619.772.8293	Raul Padilla	619.772.8293	APN 372-650-034	11/06/07	RG01	2	55%					
25500 Clinton Keith Rd.	896, A-7	Menifee	TR 23946	>1	2	Grading Permit	Medium	2	3S319739, 833C328	BGR 020918	KB HOME COASTAL, INC	Michael Freeman	26201 Ynez Road, # 104	Temecula	92591	951.587.3310	Todd Brittain	619.572.4463	APN 362-180-010	11/09/07	TG01	2	65%					
38365 Inovation Court	928, J-5	Temecula	PP 18731	>1	2	Grading Permit	Medium	2	933C327224	BGR 040612	Goodman Development, LLC	Scott Goodman	17032 Palm Dale Street, Suite C	Huntington Beach	92647	714.842.5370	Chase(office in unit 801 next	951.782.1479	APN 957-330-019	11/09/07	TG01	2	N/a					
17474 La Sierra Avenue	744, J-6	Riverside	TR 31695	>1	1	Grading Permit	Medium	2	833C331443	BGR 040892	Van Daele Development	Brice Kittle	2900 Adams Street, # C-25	Riverside	92504	951.351.1483	Mike Axelrod	951.850.3096	APN 269-050-014	0/26 & 11/08/	RG01	2	85%					
33261 Calalico Expressway	777, D-2	Perris	CUP 3370	>1	1	Grading Permit	Medium	2	833C338772	BGR 041100	Pinnacle Communities, Inc.	Ali Mazarei	236 S. Craig Drive	Orange	92869	714.715.1685	Bill Walters, Brian Collins, Mar	909.380.9044, 909.821.6152	APN 317-110-034	11/08/07	RG01	2	65%					
39020 Patton Road	839, D-7	Winchester	TR 30808	>1	1	Grading Permit	Medium	1	833C300244	BGR 041783	Fieldstone Communities	Judy Rosen	2 Ada, Suite 200	Irvine	92618	951.277.2564	Jay Cates	951.203.9601	APN 461-180-048	0/22 & 10/29/0	RG01	1	60%					
29770 Dawson Road	838, C-3	Romoland	TR 29777	>1	1	Grading Permit	Medium	1	833I300236	BGR 051053	Ashby Financial Company, Inc	Vien Tran	470 E. Harrison Street	Corona	2879-13	951.898.1692	Jimmy	951.898.1692	APN 331-170-029	11/06/07	RG01	1	60%					
9356 Bellgrave Avenue	684, C-1	Riverside	PM 19676-1	>1	1	Grading Permit	Medium	2	833C336291	BGR 051396	Ralph Smith		8443 Donna Way	Riverside	92509	909.888.0018	Sean Wybert	818.472.2671	APN 170-371-047	11/09/07	RG01	2	30%	11/21/2007				
21911 Hansen Avenue	775, B-7	Nuevo	TR 32252	>1	1	Grading Permit	Medium	1	833C343078	BGR 051541	Nuevo Holdings 31, LLC		310 Avenue F	Redondo Beach	90277	310.721.2886	UNKNOWN		APN 427-130-005	11/06/07	RG01	1	N/a					
32550 McVicar Street	927, D-1	Wildomar	TR 25122	>1	2	Grading Permit	Medium	1	833C332012	BGR 060089	Rancho Fortunado, LLC	Anna	1105 Quail Street	Newport Beach	92660	949.955.3832	Steve Howard		APN 380-060-012,013,014	11/07/07	TG01	1	45%	11/21/2007				
36243 Inland Valley Drive	927, G-1	Wildomar	PUP 5568R2	>1	2	Grading Permit	Medium	1	933C335595	BGR 060105	Universal Health Services of Inland		645 Verdemont Circle	Simi Valley	93065				APN 380-250-008	11/07/07	TG01	1	55%					
28462 Mapes Road	808, E-6 &	Romoland	TR 31652	>1	1	Grading Permit	Medium	1	833C344185	BGR 060346	Griffin Communities	Stacie Sassaman	110 North Lincoln Avenue, 2nd Floor	Corona	92562	909.898.1234			APN 337-340-017	11/06/07	RG01	1	20%	11/21/2007				
11290 Cantu Galleano Ranch Roa	683, G-1	Mira Loma	PP 18686 S2	>1	1	Grading Permit	Medium	2	836C326357	BGR 060357	Industrial Development International, Inc.	Ray Weaver	3424 Peachtree NE, #1500	Atlanta	30326		Ray Weaver(Kaiima), Mark Bus	323.864.0362, 323.346.5182	APN 156-340-025	11/09/07	RG01	2	55%					
11311 Harrell Street	643, G-7	Mira Loma	PM 29913	>1	1	Grading Permit	Medium	1	3C326357, 836C348	BGR 060358	Industrial Development International, Inc.	Ray Weaver	3424 Peachtree NE, #1500	Atlanta	30326		Ray Weaver(Kaiima), Mark Bus	323.864.0362, 323.346.5182	APN 156-340-025	11/09/07	RG01	2	20%	11/21/2007				
36312 Hidden Springs Road	927, F-1	Wildomar	CUP 34424PM 34144	>1	2	Grading Permit	Medium	2	833C340754	BGR 060395	CK-HS Partners LLC	Jim Chase	1046 North Staulding Avenue	Los Angeles	90046	949.678.5846	Luis Guerrero	714.412.0399	APN 380-110-038	11/07/07	TG01	2	65%					
22425 Palomar Street	927, D & E	Wildomar	TR 32078	>1	2	Grading Permit		1	933C344275	BGR 060940	Meekler Company, Inc.	Casey Bodwell	26772 Vista Terrace	Lake Forest	92630	949.450.1000	Harry Heineken	949.633.5721	APN 380-140-001	11/08/07	TG01	1	5%	11/21/2007				
27464 Sobatta Street	641, G-3	Hemet	TR 33323	>1	Unknown	Grading Permit		1	unknown	BGR 070009	Lakshmana Koka		4539 Ferngreen Drive	Hemet	92545	951.929.4872			APN 555-530-019	11/07/07	Unknown	1	25%	11/21/2007				
28818 Lindenberger Road	868, H-1	Menifee	TR 30757	>1	Unknown	Grading Permit		1	unknown	BGR 070280	Forecast Homes	Anna Walton	3536 Concours Street, #3000	Ontario	91764	909.987.3786	UNKNOWN		APN 334-250-014	11/07/07	Unknown	1	60%					
13724 Pine View Drive	656 F-7	Yucaipa	APN 407-320-063,64,6	>1	Unknown	Grading Permit	Medium	2	unknown	BGR 030919	Neal T. Baker Enterprises		1875 Business Center Drive	San Bernardino	92408	909.884.7241	Terry Talley	909.884.7241	APN 407-320-063,64,65	11/15/07	Unknown	2	30%	11/26/2007	Y			
16045 Whispering Spur Drive	745, F-4	Riverside	APN 273-450-032SFR	>1	1	Grading Permit	Medium	1	833C339687	BGR 050966	Victor & Letty Chamretsky		15905 Calumet Court	Riverside	92506	951.780.4400	UNKNOWN		APN 273-450-032	11/14/07	RG01	1	2%	11/26/2007	Y			
14380 Meadowlands Drive		Riverside	APN 271-151-022SFR	>1	1	Grading Permit	Medium	1	833C338141	BGR 051058	Hometech Steel		1100 Irvine Blvd., Suite 195	Tustin	92780	949.559.4962	UNKNOWN	12/19/07	APN 271-151-022	11/15/07	RG01	1	0%	11/26/2007	Y			
8055 Smiley Blvd	698, B-1	Moreno Valley	APN 471-150-022 SFR	>1	1	Grading Permit	Medium	1	836C336405	BGR 051236	Timothy Young		3700 Piedmont Drive	Hiland	92346	909.864.3808	Tim Young, Mike Iler	909.864.3808, 909.721.0049	APN 471-150-022 SFR	11/15/07	RG01	1	10%	11/26/2007	Y			
40856 Helms Way	927, A-6	Murrieta	APN 931-300-008SFR	>1	2	Grading Permit	Medium	1	933C343708	BGR 051682	Daniel Gauseposhi		23228 Jacquin Ridge	Murrieta	92562	951.677.8014			APN 931-300-008	11/12/07	TG01	1	0%N/A	11/26/2007	Y			
14505 Crystal View Terrace	716, B-7	Riverside	APN 276-040-002 SFF	>1	1	Grading Permit	Medium	1	833C339237	BGR 060275	Kevin Wolf		14340 Elsworth Street, # 108	Moreno Valley	92553	951.656.0332			APN 276-040-002	11/14/07	RG01	1	75%		Y			
14517 Crystal View Terrace	716, B-7	Riverside	APN 276-040-003SFR	>1	1	Grading Permit	Medium	1	833C339237	BGR 060276	Kevin Wolf		14340 Elsworth Street, # 108	Moreno Valley	92553	951.656.0332			APN 276-040-002	11/14/07	RG01	1	75%		Y			
14522 Crystal View Terrace	716, B-7	Riverside	APN 276-040-002SFR	>1	1	Grading Permit	Medium	1	833C339237	BGR 060278	Kevin Wolf		14340 Elsworth Street, # 108	Moreno Valley	92553	951.656.0332			APN 276-040-002	11/14/07	RG01	1	75%		Y			
14510 Crystal View Terrace	716, B-7	Riverside	APN 276-040-002SFR	>1	1	Grading Permit	Medium	1	833C339237	BGR 060279	Kevin Wolf		14340 Elsworth Street, # 108	Moreno Valley	92553	951.656.0332			APN 276-040-002	11/14/07	RG01	1	75%		Y			
14308 Merlot Court		Riverside	APN 276-040-012SFR	>1	1	Grading Permit	Medium	1	833C319042	BGR 060712	Dennis Wagener		6150 Quail Valley Court			951.656.7500			APN 276-040-012	11/14/07	RG01	1	0%	11/26/2007	Y			
21150 Oak Knoll Drive	805, E-1	Perris	APN 286-190-007SFR	>1	1	Grading Permit	Medium	1	833C348025	BGR 060801	Cherise Valenzuela	Unknown	P.O. Box 6157	Corona	92878	951.264.7095			APN 286-190-007	11/15/07	RG01	1	2%	11/26/2007	Y			
40445 La Cresta Highlands Circle	956 D-1	Murrieta	APN 932-300-004SFR	>1	1	Grading Permit	Medium	1	833C348548	BGR 061141	Henry & Pamela Smith		2083 East Washington Avenue	San Jacinto	92582	949.680.0735	UNKNOWN		APN 932-300-004	11/12/07	RG01	1	0%	11/26/2007	Y			
36500 Via Majorca	928, J-4	Murrieta	APN 928-286-018SFR	>1	2	Grading Permit	Medium	1	933C346248	BGR 061244	Mr. Dean Morgan	Unknown	40960 California Oaks Road, Suite 266	Murrieta	92562	951.600.9466	UNKNOWN		APN 928-280-018	11/12/07	TG01	1	10%	11/26/2007	Y			
25252 Phillips Road	807, D-7	Perris	APN 342-270-029SFR	>1	Unknown	Grading Permit	Medium	1	unknown	BGR 061248	Luis & Raquel Gonzales	Unknown	30105 Via Amante	Menifee	92584	951.672.0201	UNKNOWN		APN 342-270-029	11/15/07	Unknown	1	0%	11/26/2007	Y			
21829 Ridgedale Drive	805, D-1	Perris	APN 286-230-025SFR	>1	1	Grading Permit	Medium	1	933C345932	BGR 070169	Marv & Tanya Durrant	Unknown	1815 Moreno Avenue	Corona	92879	951.737.2607	UNKNOWN		APN 286-230-025	11/15/07	RG01	1	0%	11/26/2007	Y			
20343 Stone Pointe Court	926, H-2	Murrieta	APN 928-100-007SFR	>1	2	Grading Permit	Medium	1	933C347174	BGR 070290	Epic Homes	Clyde Hoeldtke	38082 Silver Fox Court	Murrieta	92562	949.230.6961			APN 928-100-007	11/12/07	TG01	1	5%	11/26/2007	Y			
35323 Pourroy Road	899, E-5	Temecula	TR 29114	>1	2	Grading Permit	High	6	933C318451	BGR 020689	Barratt American	Michael Armstrong	5950 Priestly Drive	Carlsbad	92008	760.431.0800	Vinder, Sam Gonzalez, Allen	760.331.9739, 760.809.5402, 760.613.5742	APN 467-240-031	11/13/07	TG01	6	55%					
36705 Colve Avenue	839, A-7	Winchester	TR 30266	126.75acr	1	Grading Permit	High	5	833C338740	BGR 030557	Pulte Homes Corporation	Angie Bartel	2 Technology Drive	Irvine	92618	949.254.2687	Pedro Plascencia, Rick Bighan	949.929.3302, 949.307.5559	APN 461-160-029	11/15/07	RG01	5	55%					
36444 Pourroy Road	929, E-1	Winchester	TR 29214	>1	2	Grading Permit	High	6	933C326074	BGR 031552	Shea Homes, LTD	Michael O'Melveny	10950 Santa Monica Blvd.	Los Angeles	90025	909.739.9709	Hinton, Rod Plunkett, Mike G	31.453.5920, 951.739.9700, 951.538.4688	APN 958-040-001	11/13/07	TG01	6	80%					
35756 Briggs Road	899, A-6	Murrieta	TR 29484	>1	2	Grading Permit	High	5	833C331219	BGR 041136	Gil Homes	Steve Rowland	119 N. Maple Street, Suite A	Corona	92880	909.272.9000	seph, Chris Mulvania, Albert R	31.538.2473, 951.538.0776, 760.497.3608	APN 467-230-026	11/15/07	RG01	5	65%					
34980 Leon Road	899, B-6	Winchester	TR 30696 PM 14390	>1	1	Grading Permit	High	6	833C330934	BGR 041309	Lennar Homes of California	Hal McCutchan	40980 Country Center Drive, # 110	Temecula	92591	951.719.3449	n Suster, Ken Gunter, Tom C	31.538.2214, 951.232.1829, 951.453.1193	APN 467-140-019	11/16/07	RG01	6	75%					
29998 Garbani Road	868, C-6	Menifee	TR 30142	>1	1	Grading Permit	High	4	833I300632	BGR 041628	KB HOME COASTAL, INC	Michael Freeman	26201 Ynez Road, # 104	Temecula	92591	951.587.3306	Bob Weirich, Pat Roberts	619.954.6941, 619.520.6541	APN 360-200-013	11/16/07	RG01	4	65%					
35251 Craig Avenue	867, J-5	Menifee	TR 29635	~71acres	2	Grading Permit	High	4 & 5	833I300565	BGR 041755	Capital Pacific Homes	Mark Mullin	200 South Main Street, Suite 300	Corona	2882-22	951.279.1446	Perry Wagoner, Greg Lubbock	951.240.6049, 909.578.4235	APN 358-230-001	0/30 & 11/16/	RG01	4 & 5	75%					
31256 Pat Road	899, C-4	Winchester	TR 32185	>1	1	Grading Permit	High	6	933C337019	BGR 050661	Beazer Homes	Darius Fatakia	1800 E. Imperial Hwy, Suite 200	Brea	92821	714.285.2900	Kevin Brickley, Jim Allen	714.231.7386, 714.240.3889	APN 467-150-047	11/13/07	TG01	6	65%					
Southeast Winchester Road & Jea	899, E-5		TR 32049	11.66acre	2	Grading Permit	High	6	933C337213	BGR 050839	Barratt American	Michael Armstrong	5950 Priestly Drive, Suite 101	Carlsbad	2008-88	760.931.0800	dan, Allen Tritten-off sites, Tim	30.809.7465, 760.613.5742, 760.809.7176	APN 467-240-031, 045, 04	11/13/07	TG01	6	70%					
7360 Hellman Drive	712, H-2	Corona	TR 31476	>1	1	Grading Permit	High	6	833C333060	BGR 051664	Heartheide Homes	Steven Ritz	6 Executive Circle, Suite 250	Irvine	92614	949.250.7700	Marc DeMello	951.204.1965	APN 144-060-001	11/14/07	RG01	6	80%					
9370 Smiley Blvd	698, B-3	Moreno Valley	TR 28037	>1	1	Grading Permit	High	5	836C326010	BGR 060037	Dynamic Homes, Inc	Henry Melendez	1050 Lakes Drive, # 150	West Covina	91790	626.931.1411	Chevo	909.964.3819	APN 471-270-006	0/31 & 11/15/	RG01	4	60%					
28358 Menifee Road	838, G-6	Romoland	TR 32664	~63acres	1	Grading Permit	High	5	833C342408	BGR 060657	Standard Pacific Homes	Brittany Boshers	255 E. Rincon Street, #200	Corona	92879	951.898.5500	Tim Hampton, Kevin Fullmer	909.821.9885, 951.202.8285	APN 333-190-025	11/15/07	RG01	5	65%					
13572 Schlesiman Road	683, D-7	Mira Loma	TR 31386	>1	1	Grading Permit	Medium	1	833C329511	BGR 031617	John Laing Homes	Fred Farr	255 E. Rincon Street, #200	Corona	92879	909.808.4622	Mike Jackson	951.268.9156	APN 134-100-033	11/15/07	RG01	1	N/a					
9500 Harmer Avenue	683, E-6	Corona	TR 31496	>1	1	Grading Permit	Medium	1	833C327964	BGR 040203	Diversified Pacific Development Group	Enterprise Broaderu	1621 Civic Center Drive	Rancho Cucamonga	91730	909.481.1150	John Stemler	909.772.0995	APN 134-110-011	11/15/07	RG01	1	75%					
6050 Harrison Avenue	683, A-5	Corona	TR 31580	>1	1	Grading Permit	Medium	1	833C326919	BGR 040340	John Laing Homes	Fred Farr	255 E. Rincon Street, #200	Corona	92879	909.272.5139	Bill Lyons	951.515.7629	APN 164-010-003	11/16/07	RG01	1	65%					
31200 Algarve	899, C-6	Winchester	TR 28297	>1	2	Grading Permit	High	2	933C331135	BGR 040570	Ryland Homes	Jason Jones	5740 Fleet Street, #200	Carlsbad	92008	760.931.4444	John Fagan, Jerry Schnell	619.843.7112, 951.538.3937	APN 467-250-032	11/14/07	TG01	2	N/a					
31300 Algarve	899, C-5	Winchester	TR 28298	>1	2	Grading Permit	High	2	3C327476, 933C331	BGR 040571	Ryland Homes	Jason Jones	5740 Fleet Street, #200	Carlsbad	92008	760.931.4444	John Fagan, Jerry Schnell	619.843.7112, 951.538.3937	APN 467-250-035	11/14/07	TG01	2	80%					
16110 Albertan Street	745, G-4	Riverside	TR 31522	>1	1	Grading Permit	Medium	1	833C330905	BGR 041424	John & Diane Hanna		16197 Kraemeria Avenue	Riverside	92504	951.453.4926	John Hanna	951.203.4601	APN 273-060-018	11/13/07	RG01	1	45%	11/27/2007				
12493 Blackhorse Street	663, E-6	Mira Loma	TR 31496	>1	1	Grading Permit	Medium	1	833C327964	BGR 050354	KB Home	Joseph Manfredi	801 Corporate Center Drive, #201	Pomona	91768	909.350.0791	Jeff Milne	909.917.9213	APN 152-010-012	11/15/07	RG01	1	60%					
Victoria & Lyon	744, F-4	Riverside	TR 32128	>1	1	Grading Permit	Medium	1	833C338200	BGR 050435	KB Home Coastal	Stephen Bills	3 Jenner, Suite 100	Irvine	92618		Shawn Travis	858.518.6414	APN 136-030-012	11/13/07	RG01	1	65%					
3796 Porch Street	744, A-4	Riverside	TR 31522	>1	1	Grading Permit	Medium	1	833C335327	BGR 051112, 051537	Centex Homes	Steve Moffatt	27101 Puerta Real, #300	Mission Viejo	92691	760.535.2624	Jorde Carne	760.535.2624, 951.737.3987	APN 135-482-063	11/15/07	RG01	1	65%					
8715 Wilnevilla Avenue	643, F-6	Mira Loma	TR 32136	>1	1	Grading Permit	Medium	1	833C336562	BGR 051127	Brehm Builders	Kevin Canning	2714 Loker Avenue W., # 300	Carlsbad	92010	760.448.2420	Itenhofer (offsite) Patrick Bird	951.377.4976, 760.427.8422	APN 152-020-002	11/13/07	RG01	1	60%					
13215 Orange Street	713, C-1	Corona	TR 32125	>1	1	Grading Permit	Medium	1	833C332199	BGR 051226	Pinnacle Communities, Inc.	Raquel Marcos	7080 Calina Lane	Corona	92880	951.278.8500	Mike Danna	949.279.0047	APN 152-040-002	11/13/07	RG01	1	55%					
17450 Nandina Avenue	745, A-6	Riverside	TR 32172	23.12acre	1	Grading Permit	Medium	1	833C339190	BGR 051451	Fairron Company	Dylan Bird	34700 Pacific Coast Highway	Capistrano Beach	92624	949.218.1722	Hugo Toledo, Rene Gomez	760.808.4280, 760.803.6280	APN 273-320-002	11/13/07	RG01	1	60%					
Pat's Ranch Road & Highway 15	683, F-6	Mira Loma	TR 32535 / PP 19631	>1	1	Grading Permit	Medium	1	833C338341	BGR 051528	Vermola Marketplace	Jeff Kinrade	6429 Pat's Ranch Road	Mira Loma	91752	951.520.8940	Jeff Kinrade	562.225.6269		11/16/07	RG01	1	65%					
27100 Newport Road	868, E-2	Menifee	CUP 03475	~68acres	1	Grading Permit	High	3	833C345236	BGR 060293	Donahue Schriber Realty Group	Jerry Wierenga	P.O. Box 4549	Carlsbad	92018	714.966.6436	Jerry Wierenga	951.733.8870	APN 360-080-012	11/14/07	RG01	3	65%					
Horsethief Canyon Drive	835, B-3	Glen Ivy	TR 31210	>1	1	Grading Permit	Medium	1	933C328969	BGR 060322	KB Home	Joseph Manfredi	3 Jenner, Suite 100	Irvine	92618	949.789.1978			APN 391-140-006	11/16/07	RG01	1	N/a					
8840 Edinburgh Road	643, D-7	Corona	TR 31386	>1	1	Grading Permit	Medium	1	833C332266	BGR 060382	Van Daele Development	Brice Kittle	2900 Adams Street, # C-25	Riverside	92504	951.354.2121	Sam Rave	951.850.3108	APN 164-020-008	11/15/07	RG01	1	10%	11/27/2007				
Newport Road		Menifee	PM 34275 / TR 33647	>1	1	Grading Permit	High	3	833C340961	BGR 060293	Pardee Homes		1385 Old Temescal Road	Corona	92881	951.818.3400	Tom Mike	619.520.5099	APN 360-080-0011, 010	11/15/07	RG01	3	60%					
31300 Algarve	899, C-6	Winchester	TR 28298	>1	2	Grading Permit	High	2	3C327476, 933C331	BGR 040571	Ryland Homes	Jason Jones	5740 Fleet Street, #200	Carlsbad	92008	760.931.4444	John Fagan, Jerry Schnell	619.843.7112, 951.538.3937	APN 467-250-035	11/14/07	TG01	2	80%					
38265 County Line Road	683, H-7	Menifee	TR 27956	>1	1	Grading Permit	Medium	1	833C337734	BGR 041289	Dickinson & Son	George Dickinson	606 N. Larchmont Blvd. #46	Los Angeles	90004	323.463.1168	Bruce Dickinson, William Clark	231.590.3230, 909.208.7262	APN 431-310-002	11/28/07	RG01	8	65%					
33659 Swarthout Lane	979, J-5	Temecula	APN 917-260-060SFR	>1	2	Grading Permit	Medium	2	933C332736	BGR 030638	Sandra & Chris Besanson	Unknown	P.O. Box 286	Temecula		951.676.3438			APN 917-260-060	11/16/07	TG01	2	60%					
46623 Marmot Road	962, G-1	Aguanga	APN 571-630-010 SFR	>1	2	Grading Permit	Medium	2	933C330729	BGR 040156	Edward & Jacqualin Herrera	Unknown	19798 Normandie Avenue	Torrance	90502	310.329.6762	UNKNOWN		APN 571-630-010 SFR	11/19/07	TG01	2	30%	11/29/2007	Y			
34563 Sycamore Springs Road	901, C-4	Hemet	APN 470-180-005SFR	>1	2	Grading Permit	Medium	2	933C330664	BGR 040520	Nikki Kemp	Nikki Kemp	43980 Mahlon Vail Circle	Temecula	92592	951.677.0086	Nikki Kemp	951.787.0088	APN 470-180-025 SFR	11/20/07	RG01	2	20%	11/30/2007	Y			
46349 De Portola Road	900, J-2	Temecula	APN 470-330-025SFR	1.78acre	2	Grading Permit	Medium	2	933C330668	BGR 041310	Kim Fernandez		2824 La Cresta Avenue	Anaheim		714.412.3116	UNKNOWN		APN 470-330-025SFR	11/19/07	TG01	2	75%		Y			
34780 Rawson Road	900, B-2	Winchester	APN 467-100-020 SFR	>1	2	Grading Permit	Medium	2	933C332430	BGR 042074	John & Laura Edwards	Unknown	43688 El Faro Place	Temecula	92592	951.302.3317	PRP Construction Inc.	951.302.2835	APN 467-100-020 SFR	11/19/07	RG01	2	N/a		Y			
35879 Belle Chaine Loop	960, D-7	Temecula	APN 927-140-033 SFR	>1	2	Grading Permit	Medium	2	933C342794	BGR 050038	Michael & Jill Wright	Unknown	35879 Belle Chaine Loop	Temecula		858.756.8543	UNKNOWN		APN 927-140-033 SFR	11/21/07	TG01	2	40%	11/30/2007	Y			
23447 Sky Mesa Road	809, B-2	Menifee	APN 429-230-029 SFR	1.24acre	2	Grading Permit	Medium	2	933C332925	BGR 050155	Greg & Connie Dexter		25491 Connecticut Drive	Quail Valley	92587	951.244.2300			APN 429-230-029 SFR	11/21/2007	RG01	2	80%		Y			
42445 Sabina Drive	901, H-6	Hemet	APN 569-260-042 SFF	>1	2	Grading Permit	Medium	2	933C333079	BGR 050181	Spot & Chilly Trust	Unknown	29423 Ulmer Street	Lake Elsinore	92530	951.678.9417	UNKNOWN		APN 569-260-042 SFR	11/20/07	RG01	2	35%	11/30/2007	Y			
37810 Ladera Vista	960, H-2	Temecula	APN 927-250-006SFR	>1	2	Grading Permit	Medium	2	933C332078	BGR 050225	Mark & Colleen Uyekawa	Unknown	24415 Paseo De Toronto	Yorba Linda	92887	714.813.6633	UNKNOWN		APN 927-250-006	11/21/07	TG01	2	40%	11/30/2007	Y			
25355 Newport Road	867, H-3		TR 31391	~514acres	1	Grading Permit	High	6	833C338544	BGR 050227	Audie Murphy Ranch, LLC	Dennis Chapman	1522 Brookhollow Drive, Suite 1	Santa Ana	92705	951.279.1800	Chuck, Pat Celella, Robert Ch	09.772.7974, 714.393.1370, 951.712.2351	12/4/07	APN 358-090-001	11/07/07	RG01	5	25%	12/4/2007				
41405 Mark Trail	961, E-5	Hemet	APN 470-210-039 SFF	>1	1	Grading Permit	Medium	2	833C334652	BGR 050669	Karen Adams		41405 Mark Trail	Hemet	92544	951.492.1811	Karen Adams	951.492.1811	APN 470-210-039 SFR	11/20/07	RG01	2	80%		Y			
33845 Rice Road	839, E-7	Winchester	APN 461-200-002 SFF	>1	Unknown	Grading Permit	Medium	2	unknown	BGR 050917	Sylvester Feichtinger		41361 Kalmia Street, Suite 300	Murrieta	92562	951.326.1473	UNKNOWN		APN 461-200-002 SFR	11/21/07	Unknown	2	75%		Y			
36670 Ravena Lane	931, G-7	Hemet	APN 571-130-039 SFR	2.80acre	1	Grading Permit	Medium	2	833C338567	BGR 051393	Raymond Moon		32410 Beechwood Lane	Lake Elsinore	92530	951.678.7884	UNKNOWN		APN 571-130-039SFR	11/19/07	RG01	2	60%		Y			
36036 Pauba Road	960, E-7	Temecula	APN 927-150-024SFR	>1	2	Grading Permit	Medium	2	933C339009	BGR 051538	Ken Calvo		32294 Corte Las Cruces	Temecula	92592	909.322.2168	UNKNOWN		APN 927-150-024	11/20/07	TG01	2	5%	11/30/2007	Y			
41200 De Portola Road	930, h-5	Temecula	APN 924-230-011 SFF	>1	2	Grading Permit	Medium	2	933C338739	BGR 051675	Samone & Thomas Mulvihill	Unknown	16025 Canyon Creek Road	Cerritos	90703	562.229.0316	UNKNOWN		APN 924-230-011 SFR	11/20/07	TG01	2	N/a		Y			
45240 Los Caballos Road	980, C-3	Temecula	APN 927-180-007 SFF	>1	2	Grading Permit	Medium	2	933C339829	BGR 060195	Tom Cornell	Unknown	45288 Saint Tasbury St	Temecula	92592	951.252.3621, 951.252.3590	UNKNOWN		APN 927-180-007	11/20/07	TG01	2	85%		Y			
22250 Polley Street	779, C-3	Perris	APN 429-320-027 SFF	1.92acre	1	Grading Permit	Medium	2	933

29044 Simpson Road	838, G-5	Romoland	TR 34180-1	26.26 of 2	1	Grading Permit	High	4	833C343142	BGR 061003	Standard Pacific Homes	Brittany Boshers	255 E. Rincon Street, #200	Corona	92879	951.898.3500	Tim Hampton	909.821.9885			APN 333-180-006	11/26/07	RG01	4	65%				
31949 Rouge Lane	868, F-5	Menifee	TR 28206-2	>1	Unknown	Grading Permit	High	3	unknown	BGR 070203	Trimark Pacific Homes	Raul Padilla	10815 Rancho Bernardo Road, Space 110	San Diego	92127	858.217.2720	Raul Padilla	619.778.8993			APN 372-050-034	11/19/07	Unknown	3	50%	12/11/2007			
23305 Rider Street	777, D-4	Perris	TR 30592	>1	1	Grading Permit	Medium	2	833J300218	BGR 030644	Cathes Homes	Kevin Bridges	1105 Quail Street	Newport Beach	92660		Jeff Pace/Classic Pacific - G.C	714.681.4503	12/17/07		APN 317-210-018	11/30/07	RG01	2	40%	12/18/2007			
19046 Carpintria Drive	778, E-2	Perris	TR 29545	>1	1	Grading Permit	Medium	2	833C335700	BGR 021291	Forecast Homes	Anna Walton	3536 Concours Street, #100	Ontario	91764	909.381.0868	Jason Mock	951.232.5178			APN 321-130-014	1/21 & 11/30/0	RG01	1	70%				
26813 Amanda Avenue	839, F-3	Hemet	TR 30351	>1	1	Grading Permit	High	3	833J300203	BGR 042073	Osborne Development Corporation	Robert Osborne, Jr	30001 Comenico	Rancho Santa Mar	92688	909.888.3822	Jay Heaton, Richard Felley	951.201.1492, 951.218.5166			APN 458-250-016	11/4 & 11/29/0	RG01	3	60%				
19265 Castlerock Trail	776, J-2	Perris	TR 23234	>1	1	Grading Permit	Medium	2	833C303845	BGR 050560	Stonewood Housing Partners	William Lilly	177 Riverside Avenue, Ste. F	Newport Beach	92663	949.650.7500	Rich Ballard, Alex Ballard	951.757.7013, 951.757.7002			APN 318-100-029	11/26/07	RG01	2	80%				
16250 Gallery Heights Drive	745, D-4	Riverside	TR 28767 R/	>1	1	Grading Permit	High	3	833C325417	BGR 030792,050930	Gallery Heights Partners	Rick Houser	31610-2 Railroad Canyon Road	Canyon Lake	92587	909.244.7713	Marc Mone	951.294.1106			APN 273-060-020	11/28/07	RG01	1	60%				
26360 Horsethief Canyon Road	835, C-3 &	Corona	TR 31485	>1	1	Grading Permit	Medium	1	833C328869	BGR 051141	KB Home	Michael Freeman	3 Jenner, Suite 100	Irvine	92618	949.789.1978	Erick Scheck	949.885.3631			APN 391-480-019, 391-10(	11/28/07	RG01	1	N/a				
17305 Washington Street	745, J-6	Riverside	TR 32477	>1	1	Grading Permit	High	1	833C339509	BGR 051777	Keystone Riverside 64, LLC	Leo Sferenio	5333 Mission Center, Suite 360	San Diego	92108	619.299.4855	Mark Reel				APN 273-290-008	11/26/07	RG01	1	35%	12/18/2007			
27922 Via Peregrino	978, F-1	Temecula	TR 24831	>1	2	Grading Permit	Medium	2	833C333440	BGR 051222	Ray Gray	P.O. Box 538	Fallbrook	92088	760.731.7265	Ray Gray	760.731.7265				APN 940-050-007	11/21/07	TG01	2	45%	12/17/2007			
32536 Murriet Road	886, A-1	Menifee	TR 30605	>1	1	Grading Permit	Medium	2	833J300538, 833C338	BGR 050280	Gallery Estates Partners, LLC	Rick Houser	31610-2 Railroad Canyon Road	Canyon Lake	92587	951.244.7713	Eric Houser, Carl Bacher	951.377.7990, 951.244.1716	12/18/07		APN 360-180-005	12/05/07	RG01	2	40%	10/30/2007			
30145 Ridgeway Street	838, J-3	Romoland	TR 28801	~32acres	1	Grading Permit	Medium	3 & 4	833S314614	BGR 010786, BGR 030457	Heller Development	Joel Heller	8453 Reseda Blvd.	Northridge	91324	818.727.2656	(G mgr), Dave Henline (Super	30.955.7700, 780.834.5455, 760.403.8627	12/18/07		APN 459-030-007	2/04 & 12/06/0	RG01	3 & 4	30%	10/11/2007			
Victoria Grove Parkway	744, J-6	Riverside	TR 29386-3	>1	1	Grading Permit	Unknown	1	833S313228	BGR 060272	Victoria Grove, LLC		7 Upper Newport Plaza, #100	Newport Beach	92660						APN 270-390-004	11/28/07	RG01	1	N/a				
27100 Newport Road	868, E-2	Menifee	CUP 28475	~66acres	1	Grading Permit	High	4	833C345326	BGR 060293	Donahue Schriber Realty Group	Jerry Wierenga	P.O. Box 4549	Carlsbad	92015	714.956.6436	Jerry Wierenga, Harold Chapm	951.733.8870, 951.692.6607			APN 360-060-012	11/26/07	RG01	4	80%				
45055 Rio Linda Road	979, G-3	Temecula	TR 30347	>1	2	Grading Permit	Medium	2	833445R, 833C334	BGR 060324, 060325	McMillin Morgan Hill, LLC	Dennis Bowman	2750 Womble Road	San Diego	92106	800.781.1401	Paul Manning, David Stanley	619.971.6565, 619.954.7407			APN 952-240-009	11/30/07	TG01	2	40%	12/17/2007			
12785 Magnolia Avenue	744, B-4	Riverside	PM 16814, PP 21157	>1	1	Grading Permit	Medium	1	833C343472	BGR 060780	Magnolia Development, LLC		2681 Saturn Street	Brea	92821	714.528.0600					APN 139-270-006	11/28/07	RG01	1	N/a				
7856 Mission Road	644, G-7	Riverside	TR 31390-1-2	>1	1	Grading Permit	High	1	833C341676	BGR 060828	AMS Development	Kirk Wallace	P.O. Box 8842	Rancho Santa Fe	92067	858.832.1363	Kirk Wallace	626.255.6275			APN 183-020-022	11/26/07	RG01	1	40%	12/17/2007			
28120 Via Santa Rosa	978, B-2	Temecula	APN 940-200-002 SFF	>1	2	Grading Permit	Medium	2	833C336765	BGR 051468	Not mailed-owner in quarantine-no valid address										APN 940-200-002	12/06/07	TG01	2	60%				
39770 Anza Road	959, J-1	Temecula	APN 942-250-026 SFF	>1	2	Grading Permit	Medium	2	833C332715	BGR 030583	Robert & Kathleen Morrin		11723 Ranchito Street	El Monte	91732	626.443.5683					APN 942-250-026	12/07/07	TG01	2	35%	12/18/2007	Y		
38295 County Line Road	650, J-7	Yucaipa	APN 401-310-003 SFF	>1	2	Grading Permit	Medium	2	836C327734	BGR 031316	George Dickinson		606 N. Larchmont Blvd. #46	Los Angeles	90004	323.463.1181	Bruce Dickinson	213.590.9230			APN 401-310-003 SFR	12/04/07	RG01	2	65%		Y		
24966 Keisel Road	687, F-1	Colton	APN 471-060-013SFR	>1	2	Grading Permit	Medium	2	836C326855	BGR 031477	Lili Lu or Bill Gomez		3061 Canyon Vista	Colton	92324	909.825.8693	Terry	909.331.2366			APN 471-060-013SFR	12/04/07	RG01	2	15%	12/18/2007	Y		
46225 Sandia Creek Road	977, H-4	Temecula	APN 936-290-011 SFF	>1	2	Grading Permit	Medium	2	833C325690	BGR 040065	Paul Wilson		15461 Woodard Road	San Jose	92124	408.377.1710					APN 936-290-011 SFR	12/07/07	TG01	2	1%	12/18/2007	Y		
28182 Via Peregrino	978, F-1	Temecula	APN 940-040-005 SFF	>1	2	Grading Permit	Medium	2	833C333590	BGR 050422	Le Hung		31501 Sagecrest Drive	Lake Elsinore	92532	me 951.245.1894, Cell 951.764.3974					APN 940-040-005	12/06/07	TG01	2	30%	12/18/2007	Y		
45290 Via Renaissance	978, E-3	Temecula	APN 939-150-012 SFF	>1	2	Grading Permit	Medium	2	833C318217	BGR 050621	Al Rattan		11930 Via Renaissance	Temecula	92592	951.587.6711					APN 939-150-012	12/07/07	TG01	2	15%	12/18/2007	Y		
44995 Via Renaissance	978, D-3	Temecula	APN 939-150-014 SFF	>1	2	Grading Permit	Medium	2	833C318217	BGR 050654	Renaissance Properties		1024 South Main Street	Corona	92882	951.587.6711	Shawn	951.538.9316			APN 939-150-014	12/07/07	TG01	2	10%	12/18/2007	Y		
42172 Angelis Peak Court	956, C-5	Murrieta	APN 932-280-037 SFF	>1	2	Grading Permit	Medium	2	833C340294	BGR 050937	Dr. Gregory Uwejahara		11940 Dapple Way	San Diego	92128	858.663.0463					APN 932-280-037	12/06/07	TG01	2	5%	12/18/2007	Y		
42165 Angels Peak Court	956, C-5	Murrieta	APN 932-280-036 SFF	>1	2	Grading Permit	Medium	2	833C340294	BGR 050938	Scott & Jill Hardy		30305 Del Ray Road	Temecula	92592	951.816.9053	John Jagoda	951.733.6632			APN 932-280-036	12/06/07	TG01	2	0%	12/18/2007	Y		
28242 Via Peregrino	978, F-1	Temecula	APN 940-040-006 SFF	>1	2	Grading Permit	Medium	2	833C335612	BGR 050946	Nitham Khanfar		P.O. Box 1308, Postal code 133	Sultanate of Oman		cell #019589-922-9670					APN 940-040-006	12/06/07	TG01	2	20%	12/18/2007	Y		
42075 Calle Corriente	956, E-6	Murrieta	APN 932-260-010 SFF	>1	2	Grading Permit	Medium	2	833C337561	BGR 051427	Bruce Lamprecht		P.O. Box 3026	La Habra	90632	562.694.1189	Al Barnett	909.615.6397			APN 932-260-010	12/06/07	TG01	2	55%				
44682 La Cuesta	976, E-2	Temecula	APN 922-020-013 SFF	>1	2	Grading Permit	Medium	2	833C340291	BGR 051787	Klattbaik & Kathlee Rittikaidachar		P.O. Box 892784	Temecula	92589						APN 932-080-013	12/05/07	TG01	2	0%	12/18/2007	Y		
39825 Bella Vista Road	960, E-7	Temecula	APN 941-200-014 SFF	>1	2	Grading Permit	Medium	2	833C342010	BGR 060383	Vanessa & Tom Cruse		39819 Longleaf Street	Temecula	92591	951.304.7900, 951.695.1532					APN 941-200-014 SFR	12/07/07	TG01	2	35%	12/18/2007	Y		
24552 Via Selva	977, H-6	Temecula	APN 937-180-004 SFF	>1	2	Grading Permit	Medium	2	833C340286	BGR 060663	Bill Worden		36364 Oak Tree Loop	Murrieta	92562	951.461.8863					APN 937-160-004	12/07/07	TG01	2	75%		Y		
22301 Rosary Avenue	808, H-1	Nuevo	APN 309-120-009SFR	>1	1	Grading Permit	High	2	833J300463	BGR 040404	Princess West Homes, LLC	Asher Eshaghpour	611 Wilshire Blvd., Suite 804	Los Angeles	90017	213.622.2259	Jesse James	909.226.2277			APN 309-120-009	12/06/07	RG01	2	45%	12/19/2007	Y		
31300 Aspenwood	899, C-6	Winchester	TR 28296	>1	2	Grading Permit	High	3	3C327476, 833C331	BGR 040571	Ryland Homes	Jason Jones	5740 Fleet Street, #200	Carlsbad	92008	760.931.4444	John Fajardo, Jerry Schell	619.843.7112, 951.538.3937			APN 467-250-035	12/05/07	TG01	2	75%				
31315 Evans Road	868, B-5	Menifee	TR 30654	>1	1	Grading Permit	Medium	2	833J300169	BGR 041273	Evans Court, L.P./Sonrise Builders, Inc.	Georgia Hamilton	32823 Highway 79 South	Temecula	92592	951.296.5070	John Melton, Jose Torres, H	2468, 951.757.9045, 951.630.2961, 951.232.5369			APN 360-160-004	12/05/07	RG01	2	45%	12/19/2007			
29611 Newport Road	868, B-3	Sun City	TR 28767	>1	1	Grading Permit	Medium	3	833J300092	BGR 041963, 060862	Pacific Communities Builder, Inc.	David Chambers	1000 Dove Street, # 100	Newport Beach	92660	949.660.8988	Dan Luna	949.300.6498			APN 360-020-035	11/30/07	RG01	3	30%	12/18/2007			
24670 Sherman Road	868, E-7	Romoland	TR 25951	>1	2	Grading Permit	Medium	2	833J300514	BGR 050654	Pacific Communities Builder, Inc.	David Chambers	1000 Dove Street, # 100	Newport Beach	92660	949.660.8988	Mark Maranda	949.697.6398			APN 327-130-005	12/05/07	RG01	2	60%				
35491 Yamas Drive	927, G-1	Wildomar	PP 19223/PM 32166	>1	2	Grading Permit	Medium	2	833C337466	BGR 050702	Western National Advisors	Dan Roberson	8 Executive Circle	Irvine	92614	949.254.1051	Tommy Wedin	949.254.1051			APN 360-250-018	12/05/07	TG01	2	30%	12/19/2007			
26641 Newport Road	868, B-3	Sun City	TR 28790	>1	1	Grading Permit	Medium	3	833J300092	BGR 051367	Pacific Communities Builder, Inc.	David Chambers	1000 Dove Street, # 100	Newport Beach	92660	949.660.8988	Dan Luna	949.300.6498			APN 360-020-035	11/30/07	RG01	3	40%	12/18/07			
8170 28th Street	645, E-6	Riverside	CUP 3434	>1	1	Grading Permit	Medium	2	833C339560	BGR 051733	Alpha Materials	Donald Oaks	5433 28th Street	Riverside	92509	951.275.8020					APN 178-020-001	12/03/07	RG01	1	20%	12/19/2007			
30750 Evans Road	886, B-4	Menifee	TR 28791	>1	1	Grading Permit	Medium	2	833J300092	BGR 051869	Pacific Communities Builder, Inc.	David Chambers	1000 Dove Street, # 100	Newport Beach	92660	949.660.8988	Dan Luna, John Galdi	949.300.6498, 949.394.5335			APN 360-040-029	11/30/07	RG01	2	55%				
6993 Hammer Avenue	683, E-7	Mira Loma	PP 19515	>1	1	Grading Permit	Medium	1	833C342053	BGR 060406	Hammer-HEC, LLC		301 Shipyard Way	Newport Beach	92663	949.723.9500					APN 164-520-017	12/04/07	RG01	1	N/a				
42745 Mayberry Avenue	841, H-1	Hemet	TR 32458	>1	1	Grading Permit	Medium	1	833C338290	BGR 060522	Osborne Development Corporation	Robert Osborne, Jr	30001 Comenico	Rancho Santa Mar	92688	949.888.3822	Randy	951.205.4033			APN 552-080-017, 018	12/06/07	RG01	1	25%	12/18/2007			
4545 Rubis Street	684, B-1	Riverside	PP 21417	>1	1	Grading Permit	Medium	1	833C340284	BGR 061063	RNM Enterprises, LP	Dwayne Gleason	1100 Beach Blvd	Stanton	90680	714.527.7239	Dwayne Gleason, John Cairns	714.747.4907, 951.818.6729			APN 170-340-017, 018	12/03/07	RG01	1	30%	12/19/2007			
14380 Meadowlands Drive	745, D-4	Riverside	APN 271-151-022SFR	>1	1	Grading Permit	Medium	2	833C338141	BGR 051058	Hometech Steel	Abbas Golbakhsh	1100 Irvine Blvd., Suite 195	Tustin	92780	949.559.4982	UNKNOWN		12/27/07		APN 271-151-022	12/19/07	RG01	2	10%	10/9/2007	Y		
14364 Meadowlands Drive	745, D-4	Riverside	APN 271-150-050 SFF	>1	1	Grading Permit	Medium	2	833C338141	BGR 051059	Hometech Steel	Abbas Golbakhsh	1100 Irvine Blvd., Suite 195	Tustin	92780	949.559.4982	UNKNOWN		12/27/07		APN 271-150-050	12/19/07	RG01	2	10%	10/9/2007	Y		
14310 Meadowlands Drive	745, D-4	Riverside	APN 271-150-051 SFF	>1	1	Grading Permit	Medium	2	833C338141	BGR 051061	Hometech Steel	Abbas Golbakhsh	1100 Irvine Blvd., Suite 195	Tustin	92780	949.559.4982	UNKNOWN		12/27/07		APN 271-150-051	12/19/07	RG01	2	10%	10/9/2007	Y		
27464 Sobaba Street	641, G-3	Hemet	TR 33323	>1	Unknown	Grading Permit	Medium	1	unknown	BGR 070009	Lakshmana Koka		4530 Ferngreen Drive	Hemet	92545	951.929.4872			1/7/08		APN 555-530-019	01/04/08	Unknown	1	10%	1/7/2008			
27802 Via Peregrino	978, F-1	Temecula	TR 24831	>1	2	Grading Permit	Medium	2	833C333440	BGR 051222	Randy Gibson	Randy Gibson	41860 Sixth Street	Temecula	92590	951.676.0696	Randy Gibson	951.676.0696			APN 940-050-007	11/21/07	TG01	2	45%	12/17/2007			
29061 Turtle Rock Court	837, D-7	Quail Valley	TR 30390	>1	1	Grading Permit	High	5	833C338974	BGR 030293	K. Hovnanian Forecast Homes, Inc.	Anna Walton	1500 South Haven, Suite 100	Ontario	91716	909.937.3270	J. Rich Grier, John Steward, C	9617, 909.376.7033, 951.634.2333, 951.377.9351			APN 351-020-009	12/28/07	RG01	5	65%				
34844 Poutroy Road	839	Winchester	TR 30069-1	>1	2	Grading Permit	High	7	833C323139	BGR 031652	Brookfield Homes	Dale Gleed	12865 Pointe Del Mar, # 200	Del Mar	92014	858.481.8500	Bob May	858.922.8375			APN 467-260-056	12/14/07	TG01	7	60%				
30805 Olive Avenue	839, A-7	Winchester	TR 20366	~26.75acr	1	Grading Permit	High	6	833C338740	BGR 030557	Pulte Homes Corporation	Angie Bartel	2 Technology Drive	Irvine	92618	949.254.2687	Pedro Plascencia, Rick Bighan	949.929.3302, 949.307.5559			APN 461-160-029	12/27/07	RG01	6	65%				
35755 Briggs Road	899, A-6	Murrieta	TR 29484	>1	1	Grading Permit	High	7	833C331219	BGR 041136	D.R. Horton	Steve Rowland	119 N. Maple Street, Suite A	Corona	92880	909.272.9000	Josh, Chris Mulvana, Albert R	951.538.2473, 951.538.0778, 760.497.3608			APN 467-230-028	12/26/07	RG01	7	70%				
34950 Leon Road	899, E-6	Winchester	TR 30696, PM 14390	>1	1	Grading Permit	High	6	833C330934	BGR 041309	Lennar Homes of California	Hal McCutchan	40980 Country Center Drive, # 110	Temecula	92591	951.719.3440	n Suster, Ken Gunter, Tom Co	951.538.7214, 951.232.1828, 951.543.1193			APN 467-140-016	12/14/07	RG01	6	50%	1/8/2008			
26996 Garbani Road	868, C-6	Menifee	TR 30142	>1	1	Grading Permit	High	6	833J300632	BGR 041628	KB HOME COASTAL, INC.	Michael Freeman	26201 Ynez Road, # 104	Temecula	92591	951.587.3306	Bob Weirich, Pat Roberts	619.954.6941, 619.520.6541			APN 360-200-013	12/28/07	RG01	6	60%				
36821 Craig Avenue	867, J-5	Menifee	TR 30636	~71acres	1	Grading Permit	High	6	833J300565	BGR 041755	Capital Pacific Homes	Mark Mullin	200 South Main Street, Suite 300	Corona	92882-22	951.279.1445	Perry Wagoner, Greg Lubbock	951.240.6949, 909.578.4235			APN 358-230-001	12/28/07	RG01	6	90%	1/8/2008			
31380 Simpson Road	839, B-6	Winchester	TR 30869	~52.8acres	1	Grading Permit	High	3	833J300250	BGR 041871	Griffin Communities	Don Benny	110 North Lincoln Avenue, 2nd Floor	Corona	92882	951.858.1234	Lou Messina, Don Benny	951.545.0956, 909.841.5062			APN 467-020-047	12/01/07	RG01	3	95%				
29161 Simpson Road	839, H-6	Menifee	TR 31582	>1	1	Grading Permit	High	7	833C338918	BGR 050203	Shea Homes, L.P.	Michael O'Melveny	1250 Corona Pointe Court, Ste 600	Corona	92879	951.739.9700	Rod Plunkett	951.538.3745			APN 333-200-048	12/28/07	RG01	7	70%				
44511 Morgan Hill Drive	980, A-2	Temecula	TR 30885	~187acre	2	Grading Permit	High	6	833C318784	BGR 050699	McMillin Morgan Hill, LLC	Dennis Bowman	2750 Womble Road	San Diego	92106	800.781.0401	Paul Manning, Doug Maher	619.971.6565, 619.933.3547			APN 952-240-014	12/18/07	TG01	6	65%				
30415 Patton Road	869, B-1	Winchester	TR 31800	~50acre	1	Grading Permit	High	8	833C330304	BGR 050814	Bluestone Communities	Scott Gale	4100 Newport Place, Ste. 730	Newport Beach	92660	949.475.4118	Scott Gale	951.538.4332			APN 386-190-001	12/28/07	RG01	8	50%	1/8/2008			
14300 Schleisman Road	712, H-1	Corona	TR 30871	>1	1	Grading Permit	High	4	833C342539	BGR 051109	Pardee Homes	David Graves	1385 Old Temescal Road	Corona	92881	946.757.8444	Roland Phillips, Phil Garcia	949.678.8492, 951.538.6494			APN 454-160-006	12/20/07	RG01	4	N/a				
13201 Schleisman Road	683, C-6	Mira Loma	TR 30931	>1	1	Grading Permit	High	4	833C337223	BGR 051181	Centex Homes	Steve Moffatt	1265 Corona Pointe Court	Corona	92879	951.479.1147	Don Pruett, Teresa Jakeway	951.538.4484, 951.520.6959			APN 164-050-006	12/20/07	RG01	4	65%				
5240 Hammer Avenue	713, J-2	Mira Loma	PM 31645	>1	1	Grading Permit	High	2	833C340861	BGR 051845	Lewis Operating Corporation	Scott Crawford	1156 North Mountain Avenue	Upland	91785	909.946.7596	Avila, Terry Van Curler, Scott	39.618.5706, 951.903.3349, 909.379.4202			APN 160-020-006	12/20/07	RG01	2	65%				
28358 Menifee Road	838, G-6	Romoland	TR 32664	~63acres	1	Grading Permit	High	2	833C342408	BGR 060857	Standard Pacific Homes	Brittany Boshers	255 E. Rincon Street, #200	Corona	92879	951.898.3500	Tim Hampton, Kevin Fulmer	909.821.9885, 951.202.8285			APN 333-190-025	12/27/07	RG01	2	75%				
31949 Rouge Lane	868, F-5	Menifee	TR 28206-2	>1	Unknown	Grading Permit	High	4	unknown	BGR 070203	Trimark Pacific Homes	Raul Padilla	10815 Rancho Bernardo Road, Space 110	San Diego	92127	858.217.2720	Raul Padilla	619-778-8993	1/9/08		APN 372-050-034	12/18/07	Unknown	4	50%	1/9/2008			
26300 Garbani Road	868, F-5	Menifee	TR 28206	jg 79.6 a	1	Grading Permit	High	5	833J300634	BGR 050987	Granite Homes	Scott Nelson	2 Park Plaza, # 700	Irvine	92614	949.250.9229	Simon Horton, Bobby Eskina	951.377.6990, 951.757.2625	1/9/08		APN 372-050-004	12/18/07	RG01	5	35%	1/9/2008			
24727 Santiago Canyon Road		Glen Ivy	TR 31908	~94.3acre	1	Grading Permit	High	5	833C334910	BGR 060778	Starfield Sycamore Investments, LLC	Steven Stout	2 Ada, Suite 200	Irvine	2819-23	949.790.5400	Steve Stout, Jay Gates	951.634.7956, 951.201.0601	1/9/08	1/22/2008	APN 290-140-061	12/21/07	RG01	5	50%	1/9/2008			
46225 Sandia Creek Road	977, H-4	Temecula	APN 936-290-011 SFF	>1	2	Grading Permit	Medium	3	833C325690	BGR 040065	Forecast Homes	Martin Flores	Unknown	Unknown	90260	310.999.4718	UNKNOWN		1/9/08		APN 936-290-011 SFR	01/07/08	TG01	3	2%	1/9/2008	Y		
40200 Sierra Maria Road	956, H-2	Murrieta	APN 931-310-010 SFF	>1	2	Grading Permit	Medium	2	833C333979	BGR 060174	Tim & Debbie Loats		40955 Avenida La Cresta	Murrieta	92562	951.852.5920	UNKNOWN		1/14/08		APN 931-310-010	12/21/07	TG01	2	0%	10/15/2007	Y		
8333 Gambier Court	774, A-7	Corona	APN 262-050-019 SFF	>1	Unknown	Grading Permit	Medium	2	unknown	BGR 031197	Jesse Ramirez	Unknown	934 West Olive Street	Corona	92882	909.737.8753	UNKNOWN				APN 282-060-019	12/20/07	Unknown	2	1%	10/9/2007	Y		
18025 Valle Pacifico Drive	806, C-5	Perris	APN 311-343-003 SFF	>1	1	Grading Permit	Medium	2	833C338458	BGR 040042	Tom Parks	Unknown	22571 County Square	Perris	92571		UNKNOWN				APN 343-020-003	12/18/07	RG01	2	0% n/a	12/18/2007	Y		
29485 Cherryl Drive	867, F-1	Quail Valley	APN 341-190-004 SFF	>1	2	Grading Permit	Medium	2	833C328009	BGR 040463	Dotorico Guzmann		237 East Heald Avenue	Lake Elsinore	92530		UNKNOWN				APN 341-190-004	12/18/07	TG01	2	2%	1/10/2007	Y		
15225 Gavilan Springs Ranch Roa	805, E-3	Perris	APN 289-150-015 SFF	>1	1	Grading Permit	Medium	2	833C329908	BGR 040705	Donald Rapstine		2964 Dartmouth Circle	Corona	92879	909.272.3387, 909.702.3759	UNKNOWN				APN 289-150-015	12/21/07	RG01	2	55%				
14403 Malta Place	775, E-7	Perris	APN 266-240-007 SFF	>1	1	Grading Permit	Medium	2	833C330788	BGR 041406	Sherron & William (Don) Trawick	Don Trawick	14403 Malta Place	Perris		208.691.1864	Don Trawick, Bill Trawick	208.691.1864, 909.770.2684			APN 266-240-007	12/20/07	RG01	2	60%				
5210 Mangular Avenue	772, J-1	Corona	APN 275-050-008 SFF	>1	Unknown	Grading Permit	Medium	2	unknown	BGR 041702	Corey Addison		10266 Elm Avenue	Fontana	92335	909.833.5383, 909.897.0454	UNKNOWN				APN 275-050-008	12/20/07	Unknown	2	0% n/a				
5316 Golden West Avenue	685, A-3	Riverside	APN 182-210-011 SFF	>1	Unknown	Grading Permit	Medium	2	unknown	BGR 040717	Margarito Martinez, Miguel Lamas	Unknown	1886 105th Street	Riverside	92507	909.907.2589	UNKNOWN				APN 182-210-011	12/19/07	Unknown	2	2%	10/9/2007	Y		
17258 Palm Street	745, E-7	Riverside	APN 273-220-001 SFF	>1	1	Grading Permit	Medium	2	833C335473	BGR 041733	Delgado Alturo	Unknown	18444 Marigold Street	Bloomington	92316	909.315.3843	UNKNOWN				APN 273-220-001	12/19/07	RG01	2	0%	10/9/2007	Y		
35205 El Nopal Road	899, B-6	Lake Elsinore	APN 366-160-002 SFF	>1	1	Grading Permit	Medium	2	833C339547	BGR 050367	Andro Ocampo	Unknown	34923 El Dorado Road	Lake Elsinore	92530	714.715.1842	UNKNOWN				APN 385-160-002	12/21/07	RG01	2	50%	10/17/2007	Y		
25661 Walden Road	898, A-1	Menifee	APN 362-040-005 SFF	>1	1	Grading Permit	Medium	2	833C335727	BGR 050947	Warren & Cheryl Bain	Unknown	33890 Vinca Lane	Murrieta	92563	951.764.8247	UNKNOWN				APN 362-040-005	12/18/07	RG01	2	10%	10/10/2007	Y		
20915 Sultanta Drive	775, E-6	Perris	APN 286-170-035 SFF	>1	1	Grading Permit	Medium	2	833C341862	BGR 051334	Ryan Theodore	Unknown	9421 Tudor Lane	Garden Grove	92841	714.563.5996	UNKNOWN				APN 286-170-035	12/20/07	RG01	2	35%	10/9/2007	Y		
21309 King Court	927, A-6	Murrieta	APN 930-230-011 SFF	>1	2	Grading Permit	Medium	2	833C338139	BGR 051622	Toshio Okano		16 Stone Brook	Irvine	92620	714.720.9538, 714.669.1852	Peter Ford	951.989.1852			APN 930-230-011	12/21/07	TG01	2	50%	10/18/2007	Y		
19661 Nandina Avenue	746, E-6	Riverside	APN 266-320-002 SFF	>1	1	Grading Permit	Medium	2	833C340491	BGR 051884	Raymond & Hilda Diaz	Unknown	10311 Hendrick Avenue	Riverside	92505	951.689.7009	UNKNOWN				APN 266-320-002	12/19/07	RG01	2	60%				
15756 Via Barranca	775, G-6/9	Perris	APN 287-290-057 SFF	>1	1	Grading Permit	Medium	2	833C340423	BGR 060021	Christopher Barden		9353 Ohio Street	Downey	90250	562.869.6330	UNKNOWN				APN 287-290-057	12/20/07	RG01	2	15%	10/9/2007	Y		
29915 Lakemount Court	775, F-6	Perris	APN 287-060-022 SFF	>1	1	Grading Permit	Medium	2	410C340716	BGR 060252	Bill & Natani Trawick	Unknown	954 Dalton Road	Riverside	92501	909.770.2684	UNKNOWN				APN 287-060-022	12/20/07	RG01	2	50%	10/10/2007	Y		
33850 Los Covotes Road	896, A-6	Lake Elsinore	APN 370-010-011 SFF	>1	1	Grading Permit	Medium	2	833C343737	BGR 060843	Maren Sheakhy	Unknown	P.O. Box 192	Laguna Beach	92652	714.313.3752	UNKNOWN				APN 385-170-011

6701 Harrison Avenue	683, A-7	Mira Loma	TR 31728	>	1	Grading Permit	Medium	2	833C336035	BGR 050458	Centex Homes	Steven Moffatt	1265 Corona Pointe Court	Corona	92879	951.479.9396	Brent Brown, Leah Curry	951.712.9443, 951.750.8710			APN 144-030-001	01/02/08	RG01	2	50%	1/24/2008			
16887 Skyland Court	744, E-4	Riverside	TR 28815	>1	1	Grading Permit	Medium	2	833C338961	BGR 051861	Warmington Homes	David Salgado	3090 Pullman Street, Suite A	Costa Mesa	92626	714.434.4343	David Salgado, Chris Monnrev	714.240.4154, 714.240.3814			APN 140-310-022	01/04/08	RG01	2	55%				
30900 Evans Road	868, B-4	Menifee	TR 28793	>1	1	Grading Permit	Medium	2	833J300092	BGR 051871	Pacific Communities Builder, Inc.	David Chambers	1000 Dove Street, # 100	Newport Beach	92660	949.660.8988	John Gaidi, Dan Luna	949.394.5335, 949.300.6496			APN 360-040-029	12/20/07	RG01	2	25%	1/24/2008			
26240 Holland Road	868, B-4	Menifee	TR 28794	>1	1	Grading Permit	Medium	2 & 3	833J300092	BGR 051872	Pacific Communities Builder, Inc.	David Chambers	1000 Dove Street, # 100	Newport Beach	92660	949.660.8988	John Gaidi, Dan Luna	949.394.5335, 949.300.6496			APN 360-040-029	12/20/07	RG01	2 & 3	0%	1/24/2008			
40390 Bruce Lane	961, A-1	Temecula	APN 915-240-096SFR	>1	2	Grading Permit	Medium	2	933C327245	BGR 040986	Bruce & Dulce Manning		41892 Enterprise Circle South, Suite E	Temecula	92590	951.609.3832, 951.303.5965	UNKNOWN				APN 915-240-096	01/03/08	TG01	2	0%	11/7/2007	Y		
38175 Via Vista Grande	927, C-3	Murrieta	APN 928-230-007SFR	>1	2	Grading Permit	Medium	2	933C338575	BGR 051516	Jack Eitzen/Caroline Cocciardi		P.O. Box 998	Saratoga	95071	408.656.2009	Scott Kunkel	951.375.0120			APN 928-230-007	01/02/08	TG01	2	1%	10/30/2007	Y		
38185 Via Vista Grande	927, C-3	Murrieta	APN 928-230-016SFR	>1	2	Grading Permit	Medium	2	933C338574	BGR 051518	Jack Eitzen/Caroline Cocciardi		P.O. Box 998	Saratoga	95071	408.656.2009	Scott Kunkel	951.375.0120			APN 928-230-016	01/02/08	TG01	2	1%	10/30/2007	Y		
40200 Avenida Del Tiendas	927, B-7	Murrieta	APN 330-090-005SFR	>1	2	Grading Permit	Medium	2	933C343434	BGR 060297	Carl Monfile		42431 Chiadon Trail	Murrieta	92562	951.473.9578	UNKNOWN				APN 930-090-008	12/31/07	TG01	2	55%				
21203 Paseo Montana	926, H-3	Murrieta	APN 928-170-040SFR	>1	2	Grading Permit	Medium	2	937C342139	BGR 060810	Lilly Mannire		197 Village Green Road	Murrieta	92024	760.753.0698	UNKNOWN				APN 928-170-040	12/31/07	TG01	2	55%				
17401 Via Abril	976, B-1	Murrieta	APN 932-020-015SFR	>1	2	Grading Permit	Medium	2	933C343250	BGR 060944	Kevin Metcalfe		6706 Nadeau Lane	Riverside	92509	951.681.3882	UNKNOWN				APN 932-020-019	01/04/08	TG01	2	80%				
56624 Gain Road	904, J-4	Anza	APN 573-260-024SFR	>1	2	Grading Permit	Medium	2	unknown	BGR 060967	Jeff Loosen		35110 Avenida La Cresta	Murrieta	92562	951.514.9289	UNKNOWN				APN 573-260-024	01/02/08	TG01	2	0%	11/7/2007	Y		
42342 Via Del Monte	959, H-5	Temecula	APN 952-330-004SFR	>1	2	Grading Permit	Medium	2	933C343316	BGR 061076	John Lewis		33560 Linda Rosea Road	Temecula	92592	951.694.0362, 951.640.6562	UNKNOWN				APN 952-330-004	01/02/08	TG01	2	20%	11/7/2007	Y		
38752 Ruth Road	931, E-4	Hemet	APN 915-340-023SFR	>1	1	Grading Permit	Medium	2	933C347856	BGR 061162	Richard & Tammi Howard		32041 Merlot Court	Temecula	92591	619.9773251	Todd Keesler	951.672.0924			APN 915-340-023	01/02/08	RG01	2	0%	11/7/2007	Y		
39115 Abutilers Road	898, H-6	Murrieta	APN 392-350-007SFR	>1	2	Grading Permit	Medium	2	unknown	BGR 061174	Robert LaFond		28720 Lee Lane	Murrieta	92563	951.932.3201	UNKNOWN				APN 392-350-007	01/03/08	TG01	2	1%	11/7/2007	Y		
25040 Terrens Drive	957, G-7	Murrieta	APN 935-200-012SFR	>1	2	Grading Permit	Medium	2	933C341901	BGR 061184	Stan & Sheila Simmons		32372 Casalino Court	Temecula	92592	951.693.0700	UNKNOWN				APN 935-200-012	12/31/07	TG01	2	1%	11/7/2007	Y		
33810 Stage Road	901, A-3	Temecula	APN 470-380-037SFR	>1	2	Grading Permit	Medium	2	933C334997	BGR 061193	Ricardo Zarate		2875 Giese Court	Escondido	92508	760.747.8455	UNKNOWN				APN 470-380-037	01/03/08	TG01	2	20%	11/7/2007	Y		
41141 Reid Road	959, G-3	Murrieta	APN 951-090-004SFR	>1	2	Grading Permit	Medium	2	933C344737	BGR 061246	Kevin Scott		46169 Jon William Way	Temecula	92592	858.699.3858	UNKNOWN				APN 951-090-004	01/04/08	TG01	2	55%				
40275 Via Caballos	956, G-1	Murrieta	APN 929-160-027SFR	>1	2	Grading Permit	Medium	2	933C345112	BGR 061261	Jack Eitzen/Reggie Ragsdale		41865 Dahlias Way	Murrieta	92562	408.656.2009, 951.837.1532	Brad Hollie	951.534.4874			APN 929-160-027	12/31/07	TG01	2	25%	10/30/2007	Y		
19049 Vista Del Cielo	926, F-6	Murrieta	APN 929-120-009SFR	>1	2	Grading Permit	Medium	2	933C345746	BGR 070003	Kim & Karen Markuson		1 Porter	Irvine	92620	949.633.9907	UNKNOWN				APN 929-120-009	01/04/08	TG01	2	0% NA				
18300 Alta Cresta Circle	956, C-2	Murrieta	APN 932-340-007SFR	>1	2	Grading Permit	Medium	2	933C327160	BGR 070186	Anthony & Karolyn Polo		P.O. Box 2497	Temecula	92593	951.719.3115	UNKNOWN				APN 932-340-007	01/04/08	TG01	2	0%	11/7/2007	Y		
32265 Nevaeo Springs Road		Wildomar	APN 366-220-004SFR	>1	2	Grading Permit	Medium	2	933C346259	BGR 070233	Lonnie Silva		26100 Newport Road, Apt. A-112 , P.O. Box 1	Menifee	92584	951.375.0222	UNKNOWN				APN 366-220-004	01/04/08	TG01	2	0%	11/7/2007	Y		
23795 Serrano Road	977, F-3	Temecula	APN 934-180-006SFR	>1	2	Grading Permit	Medium	2	933C345858	BGR 061068	Bryan Moyes		P.O. Box 432	Twin Peaks	2391-04	909.744.4981	UNKNOWN				APN 934-180-006	01/07/08	TG01	2	15%	11/13/2007	Y		
40390 Hidden Meadow Circle	956, E-1	Murrieta	APN 932-320-046SFR	>1	2	Grading Permit	Medium	2	933C344056	BGR 060109	Huey R. & Chip Huynh		3843 Francis Avenue	Chino	91710	909.851.5663	UNKNOWN				APN 932-320-046	01/09/08	TG01	2	N/a				
45141 Calle Cuesta	978, H-3	Temecula	APN 940-170-020SFR	>1	1	Grading Permit	Medium	2	933C345139	BGR 060138	Bob Brown		27701 Creekhill Court	Murrieta	92563	951.775.1541	UNKNOWN				APN 940-170-020	01/07/08	RG01	2	10%	11/13/2007	Y		
40385 Calle Bandido	956, E-1	Murrieta	APN 932-320-045SFR	>1	1	Grading Permit	Medium	2	933C345557	BGR 070026	Eric Lewis		24088 Huntridge Drive	Murrieta	92562	951.695.3000	UNKNOWN				APN 932-320-045	01/09/08	RG01	2	10%	11/13/2007	Y		
36395 Camino Miguel	931, A-6	Temecula	APN 915-210-050SFR	>1	2	Grading Permit	Medium	2	933C345646	BGR 070042	Mike Mullen		39101 Aqua Vista Road, Unit C	Murrieta	92563	951.966.5688	UNKNOWN				APN 915-210-050	01/11/08	TG01	2	5%	11/7/2007	Y		
24010 Oak Circle Drive	897, E-4	Wildomar	APN 367-270-018SFR	>1	2	Grading Permit	Medium	2	933C346669	BGR 070051	Elisa Carrison & Anibal Reyes		2918 South Colonial Avenue	Ontario	91761	909.923.0286	Randy Boettner	909.714.3932			APN 367-270-018	01/09/08	TG01	2	20%	11/14/2007	Y		
47585 Via Vaquero Road	976, C-5	Murrieta	APN 938-150-004SFR	>1	2	Grading Permit	Medium	2	933C328922	BGR 070174	Dennis Reiger/DCR Investments		P.O Box 10458	San Bernardino	92423	562.921.3969	UNKNOWN				APN 938-150-004	01/07/08	TG01	2	0% N/a	11/13/2007	Y		
44060 La Cruz Drive	978, B-1	Temecula	APN 936-240-014SFR	>1	2	Grading Permit	Medium	2	933C329124	BGR 070175	Wahbeh Wahbah c/o Mobil Service		12800 Roecrans Avenue	Norwalk	90650	562.921.3969	UNKNOWN				APN 936-240-014	01/07/08	TG01	2	0%	11/13/2007	Y		
43800 La Cruz Drive	978, A-1	Temecula	APN 936-070-012SFR	>1	2	Grading Permit	Medium	2	933C346953	BGR 070153	Alan & Denise Parker		28095 Calle Catrona	Temecula	92592	951.699.2196	UNKNOWN				APN 936-070-012	01/10/08	TG01	2	30%				
42500 Camino De Peterson	957, D-5	Temecula	APN 935-130-005SFR	>1	2	Grading Permit	Medium	2	933C346787	BGR 070276	Anthony Ritenour		32145 Corte Carmona	Temecula	92592	760.644.2620	UNKNOWN				APN 935-130-005	01/10/08	TG01	2	1%	11/14/2007	Y		
41280 Chaparral Drive	960, F-1	Temecula	APN 927-230-015SFR	>1	2	Grading Permit	Medium	2	933C346543	BGR 070250	Greg Sponsellor		26135 La Piedra Road	Menifee	92584	951.212.7820	UNKNOWN				APN 927-230-015	01/11/08	TG01	2	55%				
35902 Los Nogales Road	960, C-2	Temecula	APN 927-480-006SFR	>1	2	Grading Permit	Medium	2	933C347309	BGR 070347	Susan Williams		36201 Augusta Drive	Murrieta	92563	951.719.0710	UNKNOWN				APN 927-480-006	01/11/08	TG01	2	60%				
39370 Camino De Magnolia	930, C-6	Temecula	APN 942-060-010SFR	>1	2	Grading Permit	Medium	2	933C346663	BGR 070143	Mario Regalado Lopez		39370 Camino De Magnolia	Temecula	92592	951.235.5740, 951.308.2628	UNKNOWN				APN 942-060-010	01/11/08	TG01	2	0%	11/14/2007	Y		
17508 Washington Street	745, H-6	Riverside	TR 30011	~19acres	1	Grading Permit	High	7	833C333585	BGR 030917	KB Home Coastal	Michael Freeman	26201 Ynez Road, # 104	Temecula	92592	951.578.3300	Steve Alldis	619.954.3124			APN 273-300-006	01/03/08	RG01	7	60%				
25985 La Estrella Street	897, H-5	Wildomar	TR 30656	>1	2	Grading Permit	High	4	833C327134	BGR 031136	Beazer Homes	Darius Fatakia	1100 Town & Country, Suite 100	Orange	92866	714.285.2900	Kevin Brickley	714.231.7385			APN 362-180-028	01/04/08	TG01	4	70%				
28305 Newport Road	868, G-2	Menifee	TR 30422	~250acre	1	Grading Permit	High	4	833J300563	BGR 040779	Centex Homes	Steve Moffatt	2280 Wardlow Circle, # 150	Corona	92880	909.479.9311	Jose Diaz, Teresa Jakeway	6425, 951.712.7534, 951.520.6959, 951.538.7466			APN 364-200-001	01/04/08	RG01	4	50%	1/25/2008			
23820 Cart Road		Wildomar	TR 30155	>50	2	Grading Permit	High	4	933C333979	BGR 041659	Van Daele Development	Brice Kittle	2900 Adams Street, # C-25	Riverside	92504	951.354.2121	Bob Surprise, Shane Chilton	951.850.3122, 951.850.3110			APN 376-410-005	01/04/08	TG01	4	50%	1/25/2008			
31380 Simpson Road	839, B-6	Winchester	TR 30969	~52.8acre	1	Grading Permit	High	4	833J300250	BGR 041871	Griffin Communities	Don Benny	110 North Lincoln Avenue, 2nd Floor	Corona	92882	951.858.1234	Lou Messina, Don Benny	951.545.9556, 909.841.5062			APN 462-020-047	01/02/08	RG01	4	55%	1/2/2008			
28613 Amanda Avenue	839, F-3	Hemet	TR 30351	>1	1	Grading Permit	High	4	833J300203	BGR 042073	Osborne Development Corporation	Robert Osborne, Jr	30001 Comerico	Rancho Santa Mar	92688	909.888.3027	Jay Hoerner, Richard Felley	951.201.1462, 951.718.5168			APN 458-250-016	01/02/08	RG01	4	55%				
16680 King Avenue, 16577 Ponde	745, H-6	Riverside	TR 27887	>1	1	Grading Permit	High	7	833C329292	BGR 050040	Gallery Ranch Partners	Rick Houser	31618-1 Railroad Canyon Road	Canyon Lake	92581	951.244.7713	Houser, Carl Belcher, David M	951.377.7690, 951.294.1716, 951.294.1331			APN 273-230-024	01/03/08	RG01	7	65%				
27100 Newport Road	868, D-2	Menifee	CUP 03475	~68.8acre	1	Grading Permit	High	4	833C345236	BGR 060293	Donahue Schriber Realty Group	Jerry Wierenga	P.O. Box 4549	Carlsbad	92018	714.966.8436	Harold Chapman	951.692.6927			APN 360-080-012	01/02/08	RG01	4	70%				
17756 Mockingbird Canyon Road	745, E-6	Riverside	TR 29100	~200acre	1	Grading Permit	High	7	833C337322	BGR 041051	Pulte Homes	Michael Freeman	26201 Ynez Road, # 104	Temecula	92591	951.578.3300	Bob Wenrich	619.954.6941			APN 273-300-006	01/08/08	RG01	7	75%				
44511 Morgan Hill Drive	980, A-2	Temecula	APN 951-070-017SFR	>1	2	Grading Permit	High	7	933C318784	BGR 050699	McMillin Morgan Hill, LLC	Dennis Bowman	2750 Womble Road	San Diego	92106	800.781.0401	Paul Manning, Mike Owsley	619.971.6565, 619.719.8691			APN 951-070-017	01/08/08	RG01	7	65%				
9370 Smiley Blvd.	688, B-3	Moreno Valley	TR 26837	>1	1	Grading Permit	High	6	836C326070	BGR 060037	Dynamic Homes, Inc.	Henry Melendez	1050 Lakes Drive, # 150	West Covina	91790	626.931.1411	Migel	909.706.8291			APN 471-270-006	01/11/08	RG01	6	55%				
8245 Bedford Motorway	804, A-2	Corona	TR 32041/PP 17888	>1	1	Grading Permit	Medium	2	833C319260	BGR 020716	Corona Hills Land Company, LLC	Jay Kellogg	3536 Concours Street, #300	Ontario	91764	909.987.7788	Lee Dotson	951.906.9121			APN 282-170-001	01/07/08	RG01	2	50%	1/28/2006			
33991 Temecula Creek Road	979, H-1	Temecula	TR 30050	>1	2	Grading Permit	Medium	2	35317225, 9335319	BGR 040140	Warmington Homes	James Skinner	5740 Fleet Street, #110	Carlsbad	92008	760.931.7800	Neal Keating	760.473.5434			APN 952-210-003	01/09/08	TG01	2	85%				
33925 Monte Verde Road	979, H-5	Temecula	TR 29473	>1	2	Grading Permit	Medium	2	933C326459	BGR 030792	Pulte Homes Corporation	Angie Bartel	2 Technology Drive	Irvine	92618	949.797.4400	Rick Bigham	760.803.5250			APN 952-250-046	01/08/08	TG01	2	50%	1/28/2008			
26159 Redfox Road	868, A-5	Menifee	TR 30064	>1	1	Grading Permit	Medium	2	933C0137, 833C338	BGR 031940	Forecast Homes	Anna Walton	3536 Concours Street, Suite 100	Ontario	91764	909.376.6786	Chris Ramsey, Mike Harrison	951.377.9351, 951.545.9975			APN 360-140-001	01/08/08	RG01	2	60%				
Grand Avenue	927, B-1	Wildomar	TR 30207	>1	2	Grading Permit	Medium	2	933C329870	BGR 060040	D.R. Horton	Frank Ipo	119 N. Maple Street, Suite A	Corona	92880	951.272.9600	Frank Gonzales, Tim Johnson	951.545.0112, 951.232.0069			APN 362-240-001	01/09/08	TG01	2	75%				
31200 Algarve	899, C-6	Winchester	TR 28297	>1	2	Grading Permit	Medium	3	933C331135	BGR 040570	Ryland Homes	Jason Jones	5740 Fleet Street, #200	Carlsbad	92008	760.931.4444	John Fagan, Jerry Schell	619.843.7112, 951.538.3937			APN 467-250-032	01/08/0	TG01	3	N/a				
31300 Algarve	899, C-6	Winchester	TR 28298	>1	2	Grading Permit	Medium	5	933C331135	BGR 040571	Ryland Homes	Jason Jones	5740 Fleet Street, #200	Carlsbad	92008	760.931.4444	John Fagan, Jerry Schell	619.843.7112, 951.538.3937			APN 467-250-035	01/3 & 01/8/0	TG01	5	80%				
33260 Menifee Road	898, G-1	Menifee	TR 30349	>1	2	Grading Permit	Medium	2	833C331063	BGR 041257	Meritage Homes	Charlie Weeks	19600 Fairchild Road, #270	Irvine	92612	949.250.9600	Edward Nava	949.254.5764			APN 359-130-037	01/09/08	RG01	2	80%				
31375 Evans Road	868, B-5	Menifee	TR 30654	>1	1	Grading Permit	Medium	2	833J300169	BGR 041273	LCI, Inc.	Georgia Hamilton	32823 Temecula Parkway, #100	Temecula	92592	951.553.7660	Barry Thomas	909.503.5561			APN 360-160-004	01/10/08	RG01	3	65%				
8875 Archibald Avenue	712, J-1/8	Corona	TR 31622	>1	1	Grading Permit	Medium	2	833C333814	BGR 041509	Capital Pacific Homes	Mark Mullin	200 South Main Street, Suite 300	Corona	92882	951.279.2447	Jay Clegg	951.323.1403			APN 144-020-014	01/11/08	RG01	2	80%				
33925 Monte Verde Road	979, H-5	Temecula	TR 29473-1	>1	2	Grading Permit	Medium	2	933C326168	BGR 041514	Pinnacle Communities, Inc.	Raquel Marcos	15 Enterprise, Suite 200	Aliso Viejo	92656	949.609.0746	John Briggs	951.991.0559, 949.279.0233			APN 952-250-012	01/08/08	TG01	2	N/a				
8267 Sanctuary Drive	804, A-2	Corona	TR 30241	>1	1	Grading Permit	Medium	2	833C331904	BGR 041636	KB Home	Joseph Manfredi	3 Jenner, Suite 100	Irvine	92618	949.790.9100	Randy Nolte	949.254.2666			APN 282-210-054	01/07/08	RG01	2	40%	1/28/2006			
NW Corner of Archibald & Schleisi	712, J-1/8	Corona	TR 31931	>1	1	Grading Permit	Medium	2	833C333909	BGR 041825	Capital Pacific Homes	Mark Mullin	200 South Main Street, Suite 300	Corona	92882	951.279.2447	Jay Clegg	951.323.1403			APN 134-030-032	01/11/08	RG01	2	65%				
4040 Pedley Road	644, E-7	Riverside	PP 19295	>1	1	Grading Permit	Medium	1	833C334965	BGR 050484	Toe Flight Commercial, Ltd.		20271 SW Birch Street, #200	Newport Beach	92660	949.756.6666	UNKNOWN				APN 169-040-015	01/10/08	RG01	1	N/a				
8507 Kendra Lane	712, J-5	Mira Loma	TR 30825	>1	1	Grading Permit	Medium	2	833C331965	BGR 050673	Lennar Homes	Hal McCutchan	391 North Main Street, #301	Corona	92880	951.817.3500	UNKNOWN				APN 130-060-009	01/11/08	RG01	2	N/a				
Newport Road	868, D-3	Menifee	PM 34275 / TR 33647	~210acre	1	Grading Permit	Medium	2	833C340961	BGR 060283	Pardee Homes	Erika Horn	1385 Old Temescal Road	Corona	92881	951.817.3400	Dave Jones	909.772.8637			APN 380-080-012,013,014	1/2/08 & 1/8/0	RG01	5	55%				
38155 Via Vista Grande	927, C-3	Murrieta	APN 928-230-016SFR	>1	2	Grading Permit	Medium	2	933C338574	BGR 051518	Jack Eitzen/Caroline Cocciardi		P.O. Box 998	Saratoga	95071	408.656.2009	Scott Kunkel	951.375.0120		1/30/08	APN 928-230-016	01/02/08	TG01	2	1%	10/30/2007	Y		
24312 Citrus Avenue	777, F-6	Perris	PP 20103	>1	1	Grading Permit	Medium	2	933C33552	BGR 051759	Guthrie-Leach, LLC		4225 Garner Road	Riverside	92501	951.781.0640	Jerry Powers	951.657.6675, cell 951.453.2335		1/30/08	APN 305-170-007	12/18/07	RG01	1	30%				
24312 Citrus Avenue	777, F-6	Perris	PP 20103	>1	1	Grading Permit	Medium	2	933C33552	BGR 051759	Guthrie-Leach, LLC		4225 Garner Road	Riverside	92501	951.781.0640	Jerry Powers	951.657.6675, cell 951.453.2335		1/30/08	APN 305-170-007	01/15 & 01/28/0	RG01	2 & 3	30%				
8405 Archibald Avenue	712, H-4/	Mira Loma	TR 31961	>1	1	Grading Permit	Medium	2	833C342961	BGR 060974	Standard Pacific Homes	Brittany Boshers	255 E. Rincon Street, #200	Corona	92879	951.372.8500	Mike Magana	909.378.8139		2/4/08	APN 130-030-026	01/11/08	RG01	2	20%	10/22/2007	Y		
33911 Sweetwater Canyon Road		Menifee	APN 384-080-013SFR	>1	2	Grading Permit	Medium	2	933C340022	BGR 060041	Sweetwater Trust / Kathi Shannon		1927 Harbor Blvd., # 704	Costa Mesa	92627	949.422.4092	UNKNOWN			2/4/08	APN 384-080-013	02/01/08	RG01	2	?	11/16/2007	Y		
33911 Sweetwater Canyon Road		Menifee	APN 384-080-015SFR	>1	2	Grading Permit	Medium	2	933C340022	BGR 060042	Keller Trust / Kathi Shannon		1927 Harbor Blvd., # 704	Costa Mesa	92627	949.422.4092	UNKNOWN			2/4/08	APN 384-080-015	02/01/08	RG01	2	?	11/16/2007	Y		
44511 Morgan Hill Drive	980, A-2	Temecula	TR 30885	~167acre	2	Grading Permit	High	6	933C318784	BGR 050699	McMillin Morgan Hill, LLC	Dennis Bowman	2750 Womble Road	San Diego	92106	800.781.0401	Paul Manning, Mike Owsley	619.971.6565, 619.719.8691			APN 951-090-017	01/26/08	TG01	6	50%				
16455 Lake Pointe Drive	744, G-5	Riverside	TR 28816	>50acre	1	Grading Permit	High	6	833S314727	BGR 000890	Brehm Builders	Kevin Canning	2714 Loker Avenue W., # 300	Carlsbad	92008	760.448.2420	Van Cort/Doren, Ernie Pierce	858.518.8574, 760.801.5492			APN 140-050-014	01/08/08	RG01	6	55%				
23751 Spencer Butte	806, A-5	Gavilan Hills	TR 27557	>1	1	Grading Permit	High	8	833C332457	BGR 030687	Century Vintage Homes-Crowell Santa Ro	David Cooper	1535 South D Street	San Bernardino	92408	909.381.6007	UNKNOWN				APN 390-060-025	01/15/08	RG01	8	75%				
28305 Newport Road	868, G-2	Menifee	TR 30422	~250acre	1	Grading Permit	High	6	833J300563	BGR 040779	Centex Homes	Steve Moffatt	2280 Wardlow Circle, # 150	Corona	92880	909.479.9311	Jose Diaz, Teresa Jakeway	6425, 951.712.7534, 951.520.6959, 951.538.7466			APN 364-200-001	01/16/08	RG01	6	75%				
2061 McCallister Avenue	795, A-4	Riverside	TR 30337	>1	1	Grading Permit	High	1	833C334540	BGR 042062	Lennar Homes	Hal McCutchan	40980 Country Center Drive, # 110	Temecula	92591	951.687.7929	Mike Lewick	951.712.8616			APN 136-110-017	01/18/08	RG01	1	80%				
26813 Amanda Avenue	839, F-3	Hemet	TR 30351	>1	1	Grading Permit	High	3	833J300203	BGR 042073	Osborne Development Corporation	Robert Osborne, Jr	30001 Comerico	Rancho Santa Mar	92688	909.888.3027	Richard Felley	951.218.5168			APN 458-250-016	01/17/08	RG01	5	55%				
16680 King Avenue, 16577 Ponde	745, H-6	Riverside	TR 27887	>1	1	Grading Permit	High	9	833C329292	BGR 050040	Gallery Ranch Partners	Rick Houser	31618-1 Railroad Canyon Road	Canyon Lake	92581	951.244.7713	Houser, Carl Belcher, Dave M	951.377.7690, 951.294.1716, 951.294.1331			APN 273-230-024	01/17/08	RG01	5	65%				
30415 Patton Road	869, B-1	Winchester	TR 31892	>50acre	1	Grading Permit	High	9	833C339344	BGR 050964	Gallery Heights Partners	Rick Houser	31618-1 Railroad Canyon Road	Canyon Lake	92581	951.244.7713	Houser, Carl Belcher, Dave M	951.294.1332			APN 273-060-020	01/15/08	RG01	9	40%	1/31/2008			
14300 Schleisman Road	712, H-1	Corona	TR 30871	>1	1	Grading Permit	High	5	833C342539	BGR 051106	Bluestone Communities	Scott Gale	4100 Newport Place, Ste. 730	Newport Beach	92660	949.475.4118	Scott Gale, Josh Mahaney-Sto	(49 475 4118, 951.538.4332, 951.634.2130			APN 461-170-002	01/17/08	RG01	9	55%				
13201 Schleisman Road	683, C-6	Mira Loma	TR 30931	>	1	Grading Permit	High	6	833C337223	BGR 051181	Brehm Builders	David Graves	1385 Old Temescal Road	Corona	92881	949.757.9444	Roland Phillips, Phil Garcia	949.678.9492, 951.538.6494			APN 144-060-005	01/14/08	RG01	5	85%				
5240 Hanover Avenue	713, d-2	Mira Loma	PM 31645	>1	1	Grading Permit	High	4	833C340861	BGR 051645	Centex Homes	Steven Moffatt	1265 Corona Pointe Court	Corona	92879	951.479.1147	Don Pruett, Teresa Jakeway	951.538.4484, 951.520.6959			APN 164-050-006	01/14/08	RG01	5	80%				
24727 Santiago Canyon Road		Glenn Ivy	TR 31606	~94.3acre	1	Grading Permit	High	6	833C334910	BGR 060779	Lewis Operating Corporation	Scott Crawford	1158 North Mountain Avenue	Upland	91785	909.946.7596	Tom De Avila, Scott Crawford	909.618.5706, 909.379.4202			APN 160-020-006	01/14/08	RG01	4	50%	1/31/2008			
17825 Canyon Wood Drive	745, H-7	Riverside	TR 29622	>1	1	Grading Permit	Medium	3	833C318616	BGR 020602	Starfield Development Investments, LLC	Steven Stout	2 Ada, Suite 200	Irvine	2819-23c	949.790.8400	Steve Stout, Jay Gates	951.634.7966, 951.201.0601			APN 290-140-061	01/16/08	RG01	5	80%				
27638 Regent Lane	838, D-6	Menifee	TR 29072	>1	1	Grading Permit	Medium	2	33J300310, 8333389	BGR 030906	William Lyon Homes	Gene Stoelk	4490 Von Karman	Newport Beach	92658	949.833.3600	John Belman	951.232.6325			APN 273-320-024	01/14/08	RG01	3	30%	2/5/2008			
24120 Warm Springs Road	804, C-6	Corona	TR 31742	>1	1	Grading Permit	Medium	2	833C325859	BGR 031178	Pulte Homes Corporation	Angie Bartel	18401 Von Karman Avenue, #200	Irvine	92612						APN 334-100-016	01/18/08	RG01	2	50%	2/5/2008			
Palomar Road & Arrow Wood Road	868, F-5	Menifee	TR 31145	>1	1	Grading Permit	Medium	2	833C341891	BGR 031412	Shea Homes for Active Adults	Michael O'Melveny	24120 Warm Springs Road	Corona	92883	909.277.7000	Miguel Martinez	951.712.7445				01/14/08	RG01	2	N/a				
26490 Chambers Avenue	838, A-4	Sun City	TR 30507	>1	1	Grading Permit	Medium	2	833J300387	BGR 031436	Richmond Homes	Russell Borders	570 Rancheros Drive # 101	San Marcos	92069	760.891.3600	UNKNOWN				APN 372-040-030	01/16/08				2/5/2008			
8972 Cuyamaca Street	804, C-6	Corona	TR 31862	>1	1	Grading Permit	Medium	2	833C318862	BGR 040033	John Laing Homes	Fred Farr	255 E. Rincon Street, #200	Corona	92879	909.272.5106	Mike Jackson, Lori Brown	951.258.9156, 951.856.3965			APN 335-110-025	01/15/08	RG01	2	75%				
20500 Grand Avenue	896, J-6	Wildomar	TR 29513

31200 Algarve	899, C-6	Winchester	TR 28297	>1	2	Grading Permit	High	4	933C331135	BGR 040570	Ryland Homes		5740 Fleet Street, #200	Carlsbad	92008	760.931.4444	John Fagan, Jerry Schel	619.843.7112, 951.538.3937	APN 487-250-032	01/23/08	TG01	4	50%					
31300 Algarve	899, C-6	Winchester	TR 28298	>1	2	Grading Permit	High	6	3C327476, 933C331	BGR 040571	Ryland Homes		5740 Fleet Street, #200	Carlsbad	92008	760.931.4444	John Fagan, Jerry Schel	619.843.7112, 951.538.3937	APN 487-250-035	01/23/08	TG01	6	50%	2/13/2008				
27500 Sun City Blvd	838, B-3	Sun City	TR 31017	>1	1	Grading Permit	Medium	2	833C339022	BGR 051195	Ron Hungate	Ron Hungate	28751 Rancho California Road, Ste. 104	Temecula	92590	951.699.7464	Jamiee Hungate	951.970.4960	APN 331-080-029	01/23/08	RG01	2	55%					
26631 Newport Road	868, B-3	Sun City	TR 28789	>1	1	Grading Permit	Medium	3	833J300092	BGR 051386	Pacific Communities Builder, Inc.	David Chambers	1000 Dove Street, # 100	Newport Beach	92660	949.660.8988	Dan Luna, John Galdi	949.300.6496, 949.394.5335	APN 360-020-035	01/25/08	RG01	3	65%					
26240 Holland Road	868, B-4	Menifee	TR 28790	>1	1	Grading Permit	Medium	4	833J300092	BGR 051387	Pacific Communities Builder, Inc.	David Chambers	1000 Dove Street, # 100	Newport Beach	92660	949.660.8988	Dan Luna, John Galdi	949.300.6496, 949.394.5335	APN 360-040-029	01/25/08	RG01	4	50%	12/18/2007				
26240 Holland Road	868, B-4	Menifee	TR 28786	>1	1	Grading Permit	Medium	4	833J300092	BGR 051873	Pacific Communities Builder, Inc.	David Chambers	1000 Dove Street, # 100	Newport Beach	92660	949.660.8988	Dan Luna, John Galdi	949.300.6496, 949.394.5335	APN 360-040-029	01/25/08	RG01	4	75%					
37111 High Vista Drive	929, D-2	Murrieta	TR 34324	>1	2	Grading Permit	Medium	1	933I16463, 933C348	BGR 061313	Taylor Morrison Homes	Natalie Jessop	15 Cushing	Irvine	92618		Robby James (Super)	909.841.0143	APN 963-091-001	01/22/08	TG01	1	30%	2/13/2008				
35323 Pourroy Road	899, E-5	Temecula	TR 29114	>1	2	Grading Permit	High	8	933S318451	BGR 020689	Barratt American	Michael Armstrong	5950 Priestly Drive	Carlsbad	92008	760.431.0800	Winder, Sam Gonzalez, Allen	30.931.9739, 760.809.5402, 760.613.5742	APN 467-240-043	01/25/08	TG01	8	65%					
34844 Pourroy Road	839	Winchester	TR 30069-1	>1	2	Grading Permit	High	8	933C323139	BGR 031652	Brookfield Homes	Dale Gleed	12865 Pointe Del Mar, # 200	Del Mar	92014	858.481.8500	Jeff Moore, Bob May	858.401.3883, 858.922.9375	APN 467-260-056	01/25/08	TG01	8	50%	2/14/2008				
30825 Olive Avenue	839, A-7	Winchester	TR 30266	>1	2	Grading Permit	High	9	933C336740	BGR 030557	Pulte Homes Corporation	Angie Bartel	2 Technology Drive	Irvine	92618	949.254.2687	Pedro Plascencia, Rick Bighan	949.929.3302, 949.307.5559	APN 461-160-029	01/22/08	RG01	9	65%					
7325 Archibald Avenue	712, J-2	Corona	TR 30480	>1	1	Grading Permit	High	8	833C323494	BGR 031038	KB Home	Michael Freeman	801 Corporate Center Drive, #201	Pomona	91768	909.620.1109	y, Dick Hoke, Louie Clark, Mi	7986, 909.322.5131, 951.453.7601, 951.453.8821	APN 134-140-012	01/23/08	RG01	8	65%					
36444 Pourroy Road	929, E-1	Winchester	TR 29214	>1	2	Grading Permit	High	8	933C326074	BGR 031552	Shea Homes, LTD.	Michael O'Melveny	10350 Santa Monica Blvd	Los Angeles	90025	909.739.9700	Hinton, Rod Plunkett, Mike G	951.453.5920+, 951.739.9700, 951.538.4688	APN 958-040-001	01/25/08	TG01	8	60%					
35755 Brioche Road	899, A-6	Murrieta	TR 29484	>1	1	Grading Permit	High	8	933C331219	BGR 041136	D.R. Horton	Steve Rowland	119 N. Maple Street, Suite A	Corona	92880	909.272.9000	sph, Chris Mulvania, Albert R	31.538.2473, 951.538.0776, 760.497.3606	APN 467-230-028	01/25/08	RG01	8	75%					
34980 Leon Road	889, B-6	Winchester	TR 30696/PM 14390	>1	1	Grading Permit	High	9	833C330694	BGR 041309	Lennar Homes of California	Hal McCutchan	40980 Country Center Drive, # 110	Temecula	92591	951.719.3449	Geoffrey Fender	951.830.4239	APN 467-140-019	01/25/08	RG01	9	55%					
29161 Simpson Road	838, H-6	Menifee	TR 31582	>1	1	Grading Permit	High	9	833C338918	BGR 050203	Shea Homes, L.P.	Michael O'Melveny	1250 Corona Pointe Court, Ste 600	Corona	92879	951.739.9000	Dave Hinton	951.453.5920	APN 339-200-048	01/25/08	RG01	9	80%					
31256 Pat Road	899, C-4	Winchester	TR 32185	>1	2	Grading Permit	High	8	933C337019	BGR 050661	Beazer Homes	Darius Fatakia	1800 E. Imperial Hwy, Suite 200	Brea	92821	714.255.2900	Kevin Brickley, Jim Allen	714.231.7386, 714.240.3889	APN 467-150-047	01/23/08	TG01	8	60%					
Southwest Winchester Road & Jea	899, E-5		TR 32049	11.66acres	2	Grading Permit	High	8	933C331213	BGR 051833	Barratt American	Michael Armstrong	5950 Priestly Drive	Carlsbad	92008	760.431.0800	Mike Carter	760.809.7265	APN 467-240-031, 045, 04	01/25/08	TG01	8	55%					
14762 Schlessman Road	712, H-2	Corona	TR 31826	~110acres	1	Grading Permit	High	7	833C337126	BGR 050846	Shea Homes	Michael O'Melveny	1250 Corona Pointe Court, Ste 600	Corona	92879	951.739.9700	ow, Kevin Crawford, Darrell	51.712.6591, 714.412.9437, 951.712.7625	APN 144-060-003	01/23/08	RG01	7	80%					
7360 Heilman Drive	712, H-2	Corona	TR 31476	>1	1	Grading Permit	High	7	833C333060	BGR 051664	Heathrade Homes	Steven Ritz	6 Executive Circle, Suite 250	Irvine	92614	949.250.7700	Marc DeMello	951.204.1985	APN 144-060-001	01/23/08	RG01	7	65%					
9370 Smiley Blvd.	888, B-3	Moreno Valley	TR 28837	>1	1	Grading Permit	High	9	836C335070	BGR 060037	Dynamic Homes, Inc.	Henry Melendez	1050 Lakes Drive, # 150	West Covina	91790	626.931.1411	Bleu Pride, Nikki Giverson	909.810.3711, 909.556.5356	APN 471-270-006	01/23/08	RG01	9	45%	2/14/2008				
27100 Newport Road	868, D-2	Menifee	CUP 03475	~68.8acre	1	Grading Permit	High	7	833C345236	BGR 060293	Donahue Schriber Realty Group	Jerry Wierenga	P.O. Box 4549	Carlsbad	92019	714.966.9436	arold Chapman, Jerry Wieren	951.692.6607, 951.733.8870	APN 360-080-012	01/24/08	RG01	7	50%	2/14/2008				
28358 Menifee Road	836, G-6	Romoland	TR 32664	~63acres	1	Grading Permit	High	9	833C342408	BGR 060857	Standard Pacific Homes	Brittany Boshers	255 E. Rincon Street, #200	Corona	92879	951.898.5500	Tim Hampton, Kevin Fulmer	909.621.9885, 951.202.8285	APN 333-190-025	01/22/08	RG01	9	75%					
29644 Simpson Road	838, G-5	Romoland	TR 34180-1	26 of 35	1	Grading Permit	High	6&7	833C343142	BGR 061003	Standard Pacific Homes	Brittany Boshers	255 E. Rincon Street, #200	Corona	92879	951.898.5500	Tim Hampton	909.621.9885	APN 333-180-006	/21/07 & 1/22/	RG01	6 & 7	65%					
31440 Winchester Road	899, D-5	Winchester	TR 31330	>1	1	Grading Permit	Medium	2	833C327026	BGR 040254	John Laing Homes	Fred Farr	255 E. Rincon Street, #100	Corona	2879-13	909.272.5115	Mike Kelly, Tony Villa	951.258.6364, 951.515.6220	APN 467-240-014	01/30/08	RG01	2	70%					
32010 Patton Road	839, D-7	Winchester	TR 30322	>1	1	Grading Permit	Medium	2	833J300243	BGR 040619	Fieldstone Communities	Bobbi McBratney	5465 Morehouse Drive, #250	San Diego	92121	858.546.8061	Jay Cates	951.201.0601	APN 451-200-008	01/31/08	RG01	2	75%					
35111 Leon Road	899, C-5	Menifee	TR 30791	>1	2	Grading Permit	Medium	3	833C335156	BGR 040848	Capital Pacific Homes	Mark Mullins	200 South Main Street, Suite 300	Corona	92885	951.279.2447	an Grasmick, Greg Lubble - o	909.917.7072, 909.578.4235	APN 467-240-035	/17/08 & 01/28/	TG01	3	65%					
39020 Patton Road	839, D-7	Winchester	TR 30806-1	>1	1	Grading Permit	Medium	3	833J300244	BGR 041763	Fieldstone Communities	Jack Dimond	2 Ada, Suite 200	Irvine	92618	951.277.2564	Jay Cates	951.201.0601	APN 461-180-048	01/31/08	RG01	3	60%					
31910 Patton Road	869, D-1	Winchester	TR 30809	>1	1	Grading Permit	Medium	2	833J300304	BGR 041868	Winchester Menifee Land	Frank Ipo	144 N. Glendale Avenue, #222	Glendale	91206	818.247.5335	Glen Hutchens	951.926-2830	APN 451-160-036	01/31/08	RG01	2	10%	11/8/2007				
28611 Newport Road	868, B-3	Sun City	TR 28787	>1	1	Grading Permit	Medium	5	833J300092	BGR 041963, 060882	Pacific Communities Builder, Inc.	David Chambers	1000 Dove Street, # 100	Newport Beach	92660	949.660.8988	Dan Luna	949.300.6496	APN 360-020-035	01/28/08	RG01	5	75%					
32080 Wesley Drive	897, B-6	Lake Elsinore	TR 30667	>1	1	Grading Permit	Medium	2	833C331954	BGR 042089	Wildomar Ranches, LLC	Jeffrey Monster	702 Randolph Avenue	Costa Mesa	92626	714.557.9004	Jim Diaz	951.232.9244	APN 369-190-001	01/28/08	RG01	2	50%	11/8/2007				
32125 Patton Road	869, B-1	Winchester	TR 31142	>1	1	Grading Permit	Medium	2	833J300346	BGR 050050	Ashbrook Communities	John Hagan	1545 Faraday Avenue	Carlsbad	92008	760.804.6868, Ext. 233	UNKNOWN		APN 451-210-001	01/29/08	RG01	2	30%	2/19/2008				
34990 Elliot Road	899, D-5	Winchester	TR 32171	>1	2	Grading Permit	Medium	3	933C332826	BGR 050158	John Laing Homes	Fred Farr	255 E. Rincon Street, Suite 100	Corona	2879-13	951.272.5127	Terry Toby	951.515.6274	APN 467-160-018	01/30/08	TG01	2	50%	2/19/2008				
29163 Simpson Road	838, G-5	Menifee	TR 31455	>1	1	Grading Permit	Medium	2	833C338918	BGR 050204	Shea Homes, L.P.	Michael O'Melveny	2080 Wardlow Circle, # 150	Corona	92880	951.739.9716	Rod Plunkett	951.538.3745, 951.245.8073	APN 333-200-004	01/29/08	RG01	2	60%					
6405 Archibald Avenue	712, J-4&5	Mira Loma	TR 31643	>1	1	Grading Permit	Medium	3	833C341793	BGR 060423	Standard Pacific Homes	Brittany Boshers	255 E. Rincon Street, #200	Corona	92879	951.372.6500	Mike Kloet	909.621.9341	APN 130-030-017	01/24/08	RG01	2	70%					
7868 Mission Road	644, G-7	Riverside	TR 33675-1-2	>1	1	Grading Permit	Medium	4	833C341676	BGR 060828	AMS Development	Kirk Wallace	P.O. Box 8942	Rancho Santa Fe	92067	858.832.1393	Kirk Wallace	626.255.6275	APN 183-020-022	/24/08 & 01/28/	RG01	4	25%	12/17/2007				
78500 Varner Road	819	Thousand Palms	PP 15252, PP 19050	>1	1	Grading Permit	Medium	2	833S339928	BGR 031397	Michael Oliphant Enterprise, Inc.		80241 Barcelona	Indio	92201		Steve Phillips	760.360.3812	APN 653-410-018	01/21/08	RG01	2	10%	2/6/2008				
16045 Whispering Spur Drive	745, F-4	Riverside	APN 273-450-032SFR	>1	2	Grading Permit	Medium	2	833C339687	BGR 050888	Victor & Letty Chamberlay		15905 Calumet Court	Riverside	92506	951.780.4400	UNKNOWN		APN 273-450-032	01/29/08	RG01	2	70%		Y			
40850 Helms Way	927, A-6	Murrieta	APN 931-300-006SFR	>1	2	Grading Permit	Medium	2	933C343708	BGR 051682	Daniel Gauspohl		23228 Jaequin Ridge	Murrieta	92562	951.677.8014	UNKNOWN		APN 831-300-008	01/28/08	RG01	2	Na		Y			
14505 Crystal View Terrace	716, B-7	Riverside	APN 276-040-002SFR	>1	1	Grading Permit	Medium	2	833C339237	BGR 060275	Kevin Wolf		14340 Elsworth Street, # 108	Moreno Valley	92553	951.656.0332	UNKNOWN		APN 276-040-002	01/29/08	RG01	2	75%		Y			
14517 Crystal View Terrace	716, B-7	Riverside	APN 276-040-002SFR	>1	1	Grading Permit	Medium	2	833C339237	BGR 060276	Kevin Wolf		14340 Elsworth Street, # 108	Moreno Valley	92553	951.656.0332	UNKNOWN		APN 276-040-002, lot 2	01/29/08	RG01	2	60%		Y			
14522 Crystal View Terrace	716, B-7	Riverside	APN 276-040-002SFR	>1	1	Grading Permit	Medium	2	833C339237	BGR 060278	Kevin Wolf		14340 Elsworth Street, # 108	Moreno Valley	92553	951.656.0332	UNKNOWN		APN 276-040-002, Lot 3	01/29/08	RG01	2	55%		Y			
14552 Crystal View Terrace	716, B-7	Riverside	APN 276-040-002SFR	>1	1	Grading Permit	Medium	2	833C339237	BGR 060279	Kevin Wolf		14340 Elsworth Street, # 108	Moreno Valley	92553	951.656.0332	UNKNOWN		APN 276-040-002, Lot 4	01/29/08	RG01	2	65%		Y			
14308 Merlot Court		Riverside	APN 276-040-012SFR	>1	1	Grading Permit	Medium	2	833C319042	BGR 060712	Dennis Wagoner		6150 Quail Valley Court	Riverside		951.656.7600	UNKNOWN		APN 276-040-012	01/29/08	RG01	2	0%	11/26/2007	Y			
21150 Oak Knoll Drive	805, E-1	Perris	APN 286-190-007SFR	>1	1	Grading Permit	Medium	2	833C348025	BGR 060601	Cherise Valenzuela		P.O. Box 6197	Corona	92878	951.264.7095	Andrew Valenzuela	951.272.8379	APN 286-190-007	01/30/08	RG01	2	60%		Y			
40445 La Cresta Highlands Circle	956, D-1	Murrieta	APN 932-300-004SFR	>1	1	Grading Permit	Medium	2	833C345548	BGR 061141	Henry & Pamela Smith		2983 East Washington Avenue	San Jacinto	92582	949.660.0735	UNKNOWN		APN 932-300-004	01/28/08	RG01	2	0%	11/26/2007	Y			
40550 Gregg Way	961, A-1	Temecula	APN 915-560-026SFR	>1	1	Grading Permit	Medium	2	933C326761	BGR 061181	Patricia Samuels		5068 Parkglen Avenue	Los Angeles	90043	951.677.4646	UNKNOWN		APN 915-560-026	01/31/08	TG01	2	55%		Y			
38500 Via Majorca	926, J-4	Murrieta	APN 928-280-018SFR	>1	2	Grading Permit	Medium	2	933C346246	BGR 061244	Dean Morgan		40960 California Oaks Road, Suite 266	Murrieta	92562	951.600.6496	UNKNOWN		APN 928-280-018	01/28/08	TG01	2	55%		Y			
28252 Phillips Road	807, D-7	Perris	APN 342-270-029SFR	>1	Unknown	Grading Permit	Medium	2	unknown	BGR 061248	Luis & Raquel Gonzales	Unknown	30105 Via Amante	Menifee	92584	951.672.0401	UNKNOWN		APN 342-270-029	01/30/08	Unknown	0	0%	11/26/2007	Y			
38810 Via Carmelo	931, B-7	Temecula	APN 951-550-034SFR	>1	2	Grading Permit	Medium	2	933C345693	BGR 061278	Franklin & Jackie Shay	Unknown	3969 Redford	Hemet	92545	951.658.5273	UNKNOWN		APN 915-550-034	01/31/08	TG01	2	2%	11/16/2007	Y			
28155 Sycamore Mesa Road	958, E-7	Temecula	APN 939-550-005SFR	>1	2	Grading Permit	Medium	2	933C345518	BGR 070162	Randy Chipman c/o LRC Land Development	Unknown	42280 Calle Lagatija	Temecula	92592	951.303.9333	UNKNOWN		APN 939-040-005	01/30/08	TG01	2	0%	11/16/2007	Y			
21629 Ridgedale Drive	805, D-1	Perris	APN 286-230-025SFR	>1	1	Grading Permit	Medium	2	833C345932	BGR 070169	Mary & Tanya Durment	Unknown	1815 Moreno Avenue	Corona	92879	951.737.2607	UNKNOWN		APN 286-230-025	01/30/08	RG01	2	65%					
20343 Stone Pointe Court	926, H-2	Murrieta	APN 926-100-007SFR	>1	2	Grading Permit	Medium	2	933C347174	BGR 070290	Clyde Hoeldtke c/o Epic Homes	Unknown	38082 Silver Fox Court	Murrieta	92562	949.230.6961	UNKNOWN		APN 926-100-007	01/28/08	TG01	2	2%	11/26/2007	Y			
27050 Via Valvasea	978, D-1	Murrieta	APN 936-210-004SFR	>1	2	Grading Permit	Medium	2	933C347114	BGR 070297	Kevin & Jill Yackley		24251 Broad Oak Street	Murrieta	92562	951.813.3196	Kevin Yackley		APN 936-210-004	01/30/08	TG01	2	55%					
16455 Lake Pointe Drive	744, G-5	Riverside	PP 28816	>50acres	1	Grading Permit	High	7	833S314727	BGR 000890	Brehm Builders	Kevin Canning	2714 Loker Avenue W., # 300	Carlsbad	92008	760.448.2420	Curt VanDoren, Ernie Pierce	858.518.8574, 760.801.5492	APN 140-060-014	01/29/08	RG01	7	75%					
23751 Spencer Butte	506, A-5	Gavilan Hills	TR 27557	>1	1	Grading Permit	High	9	833C332457	BGR 030687	Centurv Vintage Homes-Crowell Santa Ri	David Cooper	1535 South D Street	San Bernardino	92408	909.381.6007	Bud Brown, Michael Reed	909.772.4464, 909.381.6007	APN 390-060-025	01/31/08	RG01	9	75%					
26985 La Estrella Street	897, H-6	Wildomar	TR 30656	>1	1	Grading Permit	High	6	933C32134	BGR 031136	Beazer Homes	Darius Fatakia	1100 Town & Country, #100	Orange	92868	714.285.2900	Michael Connolly	Fax 951.677.8715, 714.231.5904	APN 362-180-029	02/01/08	TG01	6	75%					
17756 Mockingbird Canyon Road	745, E-5	Riverside	TR 22100	~200acre	1	Grading Permit	High	9	833C337322	BGR 041051	KB Home	Michael Freeman	26201 Ynez Road, # 104	Temecula	92591	951.587.3300	Bob Weirich	619.857.4944	APN 273-300-006	01/31/08	RG01	7	75%					
23820 Catt Road		Wildomar	TR 30155	>50acres	2	Grading Permit	High	6	933C339379	BGR 041659	Van Daele Development	Brice Kittle	2900 Adams Street, # C-25	Riverside	92504	951.354.2121	Bob Surprise	951.850.3122	APN 376-410-005	02/01/08	TG01	6	50%	1/25/2008				
31380 Simpson Road	839, B-6	Winchester	TR 30665	~52.8acre	1	Grading Permit	High	6	833J300250	BGR 041871	Griffin Communities	Don Benny	110 North Lincoln Avenue, 2nd Floor	Corona	92882	951.898.1234	Lou Messina, Don Benny	951.545.9556	APN 462-020-047	/23/08 & 2/1/0	RG01	6	65%					
2061 McCallister Avenue	795, A-4	Riverside	TR 30337	>1	1	Grading Permit	High	7	833C334540	BGR 042062	Lennar Homes	Hal McCutchan	40980 Country Center Drive, # 110	Temecula	92591	951.697.7509	Jy Marrs, Chris Curtel, Mike Li	951.830.5114, 951.712.8616	APN 136-110-017	01/29/08	TG01	7	80%					
16250 Gallery Heights Drive	745, G-4	Riverside	TR 28767	>1	3	Grading Permit	High	3	833C325417	BGR 030372, 050630	Gallery Heights Partners	Rick Houser	31610-2 Railroad Canyon Road	Canyon Lake	92587	909.244.7713	Clay Howell	951.294.1332	APN 273-300-020	01/28/08	RG01	7	60%					
14300 Schlesiman Road	721, H-1	Corona	TR 30971	>1	1	Grading Permit	High	6	833C342539	BGR 051109	Pardee Homes	David Graves	1365 Old Temescal Road	Corona	92881	949.757.8444	Roland Phillips, Phil Garcia	949.678.9492, 951.536.6494	APN 144-060-006	01/30/08	RG01	6	70%					
13201 Schlesiman Road	683, C-3	Mira Loma	TR 30931	>1	1	Grading Permit	High	7	833C337223	BGR 051181	Centex Homes	Steven Moffatt	1265 Corona Pointe Court	Corona	92879	951.479.1147	Don Pruett, Teresa Jakeway	951.538.4484, 951.520.6959	APN 184-050-006	01/30/08	RG01	7	70%					
5240 Hammer Avenue	713, d-2	Mira Loma	PM 31845	>1	1	Grading Permit	High	5	833C340661	BGR 051845	Lewis Operating Corporation	Scott Crawford	1156 North Mountain Avenue	Upland	91785	909.946.7596	Avila, Terry Van Curter, Scott	36.618.5706, 951.903.3349, 909.379.4202	APN 160-020-006	01/30/08	RG01	7	50%	1/31/2008				
24727 Santiago Canyon Road		Glen Ivy	TR 31906	~94.3acre	1	Grading Permit	High	7	833C334910	BGR 060778	Starfield Sycamore Investments, LLC	Steven Stout	2 Ada, Suite 200	Irvine	2819-23	949.790.5400	Steve Stout, Jay Gates	951.634.7956, 951.201.0601	APN 290-140-061	01/29/08	RG01	7	55%					
31200 Algarve	899, C-6	Winchester	TR 28297	>1	2	Grading Permit	High	5	933C331135	BGR 040570	Ryland Homes	Jason Jones	1250 Corona Pointe Court, Ste 100	Corona	92879	760.931.4444	John Fagan	619.843.7112	APN 467-250-032	02/06/08	TG01	5	55%					
31300 Algarve	899, C-6	Winchester	TR 28298	>1	2	Grading Permit	High	7	3C327476, 933C331	BGR 040571	Ryland Homes	Jason Jones	1250 Corona Pointe Court, Ste 100	Corona	92879	760.931.4444	John Fagan	619.843.7112	APN 467-250-035	02/05/08	TG01	5	50%	12/13/2007				
34491 Washington Street	899, F-4	Murrieta	TR 28962	>1	2	Grading Permit	Medium	5	933C331498	BGR 041232	Van Daele Development	Brice Kittle	2900 Adams Street, # C-25	Riverside	92504	951.354.2121	Jeff Horne	951.203.4484	APN 467-170-048	/30/08 & 2/08/	TG01	5	65%					
29150 Rouse Road	838, G-4	Romoland	TR 31795	>1	2	Grading Permit	Medium	2	3J300394, 833C339	BGR 041278	Standard Pacific Homes	Brittany Boshers	255 East Rincon, Suite 200	Corona	92879	909.372.8500	ampton, Andy Ladera, Ruben	09.621.9885, 909.772.5197, 951.538.4994	APN 333-170-001	02/04/08	TG01	2	55%					
28300 Garbani Road	868, G-6	Menifee	TR 31383	>1	1	Grading Permit	Medium	2	833C338836	BGR 041444	Beazer Homes	Darius Fatakia	1100 Town & Country, Suite 100	Orange	92868	714.285.2900	John Ames, Kevin Brickley	714.493.1752, 714.231.7386	APN 372-050-017	02/01/08	RG01	2	45%	2/21/2008				
30110 Scott Road	868, J-4	Murrieta	TR 31347	>1	1	Grading Permit	Medium	3	833C323419	BGR 041610	Keystone Development, LLC	James Hevenston	5333 Mission Center, Suite 560	San Diego	2108-13	619.295.4805, Ext. 314	Leo Stizan (in office ext. 314	619.296.4805, Ext. 314	APN 466-230-017	02/04/08	RG01	2	55%					
35605 Iodine Springs Road	897, G-7	Wildomar	TR 31479	>1	1	Grading Permit	Medium	2	833C337463	BGR 050027	Heritage Pacific Homes	Jim Odle	5924 Balfour Court, #100	Carlsbad	92008	760.633.3271	Jeff Knight		APN 362-240-032	02/05/08	RG01	2	45%	2/21/2008				
22971 Markham Street	683, A-7		TR 31726	>1	1	Grading Permit	Medium	3	833C336036	BGR 050355	Centex Homes	Steven Moffatt	1265 Corona Pointe Court	Corona	92879	951.479.9396	Dave Milloy, Teresa Jakeway	951.453.4416, 951.520.6959	APN 144-030-001	02/01/08	RG01	3	80%					
8701 Harrison Avenue	683, A-7	Mira Loma	TR 31726	>1	1	Grading Permit	Medium	3	833C339035	BGR 050459	Centex Homes	Steven Moffatt	1265 Corona Pointe Court	Corona	92879	951.479.9396	Dave Milloy, Teresa Jakeway	951.453.4416, 951.520.6959	APN 144-030-001	02/01/08	RG01	3	75%					
27440 Benton Pond Drive	388, K-9	Romoland	TR 31795-2	>1	2	Grading Permit	Medium	2	3C338821, 833C340	BGR 051803	Woodside Homes of California, Inc.	Paul Kruse	23121 Antonio Parkway, # 120	Rancho Santa Mar	92688	949.858.4980	Ken Clark, Ramses	951.712.2200, 951.203.9039	APN 333-170-039	02/04/08	RG01	3	60%					
30750 Evans Road	868, B-4	Menifee	TR 28792	>1	1	Grading Permit	Medium	1	3C339017, 833J300	BGR 051870	Pacific Communities Builder, Inc.	David Chambers	1000 Dove Street, # 100	Newport Beach	92660	949.660.8988	John Galdi, Dan Luna	949.394.5335, 949.300.6496	APN 467-260-057	02/06/08	TG01	1	65%					
30900 Evans Road	868, B-4	Menifee	TR 28793	>1	1	Grading Permit	Medium	5	3J300092, 833C339	BGR 051871	Pacific Communities Builder, Inc.	David Chambers	1000 Dove Street, # 100	Newport Beach	92660	949.660.8988	John Galdi, Dan Luna	949.394.5335, 949.300.6496	APN 360-040-029	02/07/08	RG01	5	55%					
26240 Holland Road	868, B-4	Menifee	TR 28794	>1	1	Grading Permit	Medium	5	3J300092, 833C339	BGR 051872	Pacific Communities Builder, Inc.	David Chambers	1000 Dove Street, # 100	Newport Beach	92660	949.660.8988	John Galdi, Dan Luna	949.394.5335, 949.300.6496	APN 360-040-029	02/07/08	RG01	5	75%					
27019 North Bay Lane	836, G-4	Romoland	TR 31795-4	>1	1	Grading Permit	Medium	2	3J300394, 833C339	BGR 060216	Lennar Homes	Hal McCutchan	40980 Country Center Drive, # 110	Temecula	92591	951.719.3449	Jack Porter, Area Manager	951.232.0468	APN 331-280-004	02/04/08	RG01	2	75%					
Newport Road	868, D-3	Menifee	PM 34275 / TR 33647	~210acre	1	Grading Permit	Medium	11	833C340961	BGR 060293	Pardee Homes	Erika Horn	1365 Old Temescal Road	Corona	92881	951.817.3400	Dave Jones	909.772.6637	APN 380-080-012,013,014	23/08 & 02/05/	RG01	11	40%	2/21/2008				
13724 Pine View Drive	650, F-7	Yucaipa	APN 407-320-063 64.6	>1	Unknown	Grading Permit	Medium	3	unknown	BGR 030619	Neal Tyler Enterprises		1675 Business Center Drive	San Bernardino	92408	909.884.7241	Terry Talley	909.884.7241	APN 407-320-063	02/04/08	Unknown	3	60%		Y			
38265 County Line Road	650, J-7	Yucaipa	APN 401-310-003 SFR	>1	2	Grading Permit	Medium	3	836C327734	BGR 031310	George Dickinson		606 N. Larchmont Blvd. #48	Los Angeles	90004	323.463.1181	Bruce Dickinson	213.590.3230	APN 401-310-003 SFR	02/04/08	RG01	3	65%		Y			
46823 Marmot Road	962, G-1	Aguanga	APN 571-630-010 SFR	>1	2	Grading Permit	Medium	3	933C330729	BGR 040156	Edward & Jacqualin Herrera		19798 Normandie Avenue	Torrance	90502	310.329.6762	UNKNOWN		APN 571-630-010 SFR	02/07/08	TG01	3	N/a		Y			
46849 De Portola Road	900, J-2	Temecula	APN 470-330-025SFR	1.78acre	2	Grading Permit	Medium	3	933C330688	BGR 041310	Kim Ramirez		2624 La Cresta Avenue	Anaheim		714.412.9116	UNKNOWN		APN 470-330-025 SFR	02/05/08	TG01	3	75%		Y			
34780 Ravison Road	900, B-2	Winchester	APN 467-100-020 SFR	>1	2	Grading Permit	Medium	3	933C332430	BGR 042074	Laura & Jon Edwards		43688 El Faro Place	Temecula	92592

41200 Granado Place	958	A-4	Temecula	APN 935-030-013 SFF	>1	2	Grading Permit	Medium	3	933C340949	BGR 060256	Newport Development Group	4540 Campus Drive, Suite 100	Newport Beach	92660	714.355.6699	UNKNOWN	APN 935-030-013	02/15/08	TG01	3	10%	2/27/2008	Y
19110 Avenida Bosque	956	D-6	Murrieta	APN 931-160-005 SFF	>1	2	Grading Permit	Medium	3	933C340041	BGR 060281	David Vu	13091 Lariat Lane	Santa Ana	92705	714.633.0879	UNKNOWN	APN 931-160-005	02/11/08	TG01	3	20%	12/10/2007	Y
43602 De Luz Road	977	E-4	Temecula	APN 935-190-007 SFF	>1	2	Grading Permit	Medium	3	933C340697	BGR 060290	Lawrence Butts	1508 Black Walnut Drive	San Marcos	92061	760.803.1223	UNKNOWN	APN 935-190-007	02/15/08	TG01	3	55%		Y
24552 Via Selva	977	H-6	Temecula	APN 937-180-004 SFF	>1	2	Grading Permit	Medium	3	933C340286	BGR 060663	Bill Worden	38366 Oak Tree Loop	Murrieta	92562	951.461.8863	UNKNOWN	APN 937-180-004	02/15/08	TG01	3	60%		Y
25040 Terreno Drive	957	G-7	Murrieta	APN 935-200-012SFR	>1	2	Grading Permit	Medium	3	933C341901	BGR 061184	Stan & Sheila Simmons	32372 Cassino Court	Temecula	92592	951.693.0700	Stan Simmons 951.973.7393	APN 935-200-012	29/08 & 2/13/	TG01	3	70%		Y
37698 Via Vista Grande(north)	927	C-3	Murrieta	APN 928-210-003 SFR	>1	2	Grading Permit	Medium	3	933C340723	BGR 060639	Majestic Group	26111 Ynez Road, Suite C-4	Temecula	92592	951.506.8966	Osman Qureshi 951.237.0362	APN 928-210-003	02/13/08	TG01	3	5%	12/10/2007	Y
37800 Via Vista Grande(south)	927	C-3	Murrieta	APN 928-240-006 SFF	>1	2	Grading Permit	Medium	3	933C340793	BGR 060640	Majestic Group	26111 Ynez Road, Suite C-4	Temecula	92592	951.506.8966	Osman Qureshi 951.237.0362	APN 928-240-006	2/13/2008	TG01	3	5%	12/10/2007	Y
15975 Diablo Road	726	J-1	North Palm Spring	WCS 00116	>1	Unknown	Grading Permit	Medium	2	unknown	BGR 070256	Dillon Wind, LLC	1125 NW Couch, Suite 700	Portland	97209		Mark Beutler	APN 668-100-005	01/21/08	Unknown	2	75%		
35455 Lake Pointe Drive	744	G-5	Riverside	TR 28816	>50acres	1	Grading Permit	High	8	833S314727	BGR 060890	Brehm Builders	Kevin Canning	2714 Loker Avenue W., # 300	Carlsbad	92008	760.448.2420	Curt VanDoren, Ernie Pierce 858.518.8574, 760.801.5492	APN 140-050-014	02/11/08	RG01	6	60%		
29081 Turtle Rock Court	837	D-7	Quail Valley	TR 30330	>1	2	Grading Permit	High	6	833C338874	BGR 030233	K. Hovnanian Forcast Homes, Inc.	Anna Walton	1500 South Haven, Suite 100	Ontario	91761	909.937.3270	J. Rich Grise, John Steward, Ch 909.376.7033, 951.634.2333, 951.377.9351	APN 351-020-009	02/15/08	RG01	6	65%		
23751 Spencer Butte	806	A-5	Gavilan Hills	TR 27557	>1	1	Grading Permit	High	10	833C332457	BGR 030687	Century Vintage Homes-Crowell Santa Ri	David Cooper	1535 South D Street	San Bernardino	92408	909.381.8067	Bud Brown, Michael Reed 909.772.4464, 909.381.6007	APN 390-060-025	02/14/08	RG01	10	75%		
25085 La Estrella Street	897	H-7	Wildomar	TR 30056	>1	2	Grading Permit	High	7	933C307134	BGR 031136	Beazer Homes	Darius Fatakia	1800 E. Imperial Hwy. Suite 200	Brea	92821	714.285.2900	Kevin Brickley 714.231.7386	APN 362-180-029	02/13/08	TG01	7	60%		
35305 Newport Road	868	G-2	Menifee	TR 30422	>250acre	1	Grading Permit	High	7	833J000563	BGR 040779	Center Homes	Steve Moffatt	2280 Wardlow Circle, # 150	Corona	92880	909.479.9311	J. Jose Diaz, Teresa Jakeway, 5425, 951.712.7534, 951.520.6959, 951.538.7466	APN 364-200-001	02/13/08	RG01	7	70%		
17766 Mockingbird Canyon Road	745	E-5	Riverside	TR 22100	>200acre	2	Grading Permit	High	10	833C337322	BGR 041051	KB Home	Michael Freeman	26201 Ynez Road, # 104	Temecula	92591	951.587.3300	Bob Wenrich 619.954.6941	APN 273-330-008	02/14/08	RG01	10	80%		
23820 Catt Road			Wildomar	TR 30155	>50acres	2	Grading Permit	High	7	933J333979	BGR 041659	Van Daele Development	Brice Kittle	2900 Adams Street, # C-25	Riverside	92504	951.354.2121	Bob Surprise, Shane Chilton 951.850.3122, 951.850.3110	APN 376-410-005	02/13/08	TG01	7	55%		
2061 McCallister Avenue	795	A-4	Riverside	TR 30337	>1	2	Grading Permit	High	8	833C334540	BGR 042062	Lennar Homes	Hal McCutchan	40980 Country Center Drive, # 110	Temecula	92591	951.687.7929	Randy Marrs, Chris Curiell 951.830.5154, 951.687.2583	APN 136-110-017	02/11/08	RG01	8	80%		
16880 King Avenue, 16577 Ponde	745	H-6	Riverside	TR 27867	>1	2	Grading Permit	High	10	833C329292	BGR 050040	Gallery Ranch Partners	Rick Houser	31618-1 Railroad Canyon Road	Canyon Lake	92587	951.244.7713	Houser, Carl Bachler, Dave M 951.377.7690, 951.294.1716, 951.294.1331	APN 273-200-024	02/14/08	RG01	10	50%	2/26/2008	Y
25355 Newport Road	867	H-3		TR 31391	-514acre	1	Grading Permit	High	7	833C338544	BGR 050227	Audie Murphy Ranch, LLC	Dennis Chapman	1522 Brookhollow Drive, Suite 1	Santa Ana	92705	951.279.1800	Hauck, Pat Celella, Robert Ch 909.772.7974, 714.393.1370, 951.712.2351	APN 358-060-001	30/06 & 2/15/	RG01	7	75%		
16250 Gallery Heights Drive	745	G-4	Riverside	TR 28767 R1	>1	1	Grading Permit	High	4	833C325417	BGR 050630	Gallery Heights Partners	Rick Houser	31610-2 Railroad Canyon Road	Canyon Lake	92587	909.244.7713	Clay Howell 951.294.1332	APN 273-060-020	02/14/08	RG01	4	80%		
14300 Schleisman Road	712	H-1	Corona	TR 30671	>1	1	Grading Permit	High	6	833C342539	BGR 051109	Pardee Homes	David Graves	1385 Old Temescal Road	Corona	92881	949.757.8444	Roland Phillips, Phil Garcia 949.678.9492	APN 144-060-006	02/12/08	RG01	6	80%		
17305 Washington Street	745	J-6	Riverside	TR 32477	>1	1	Grading Permit	High	2	833C339506	BGR 051777	Keystone Riverside 64, LLC	Leo Sterono	5333 Mission Center, Suite 360	San Diego	92108	619.299.4855	Mark Rael Unknown	APN 273-290-008	01/15/08	RG01	2	35%	12/17/2007	
17306 Washington Street	745	J-6	Riverside	TR 32477	>1	1	Grading Permit	High	2	833C339509	BGR 051777	Keystone Riverside 64, LLC	Leo Sterono	5333 Mission Center, Suite 360	San Diego	92108	619.299.4855	Mark Rael Unknown	APN 273-290-008	02/14/08	RG01	3	45%	12/17/2007	
13201 Schleisman Road	683	C-6	Mira Loma	TR 30931	>1	1	Grading Permit	High	8	833C337223	BGR 051181	Centex Homes	Steven Moffatt	1265 Corona Pointe Court	Corona	92879	951.479.1147	Don Pruett, Teresa Jakeway 951.538.4484, 951.520.6959	APN 164-050-006	02/12/08	RG01	8	75%		
5240 Harmer Avenue	713	B-2	Mira Loma	PM 31645	>1	1	Grading Permit	High	6	833C340661	BGR 051845	Lewis Operating Corporation	Scott Crawford	1156 North Mountain Avenue	Upland	91785	909.946.7596	Tim De Avila, Scott Crawford 909.618.5706, 909.379.4202	APN 160-020-005	02/12/08	RG01	7	50%	1/31/2008	
24727 Santiago Canyon Road			Glen Ivy	TR 31908	-94.3acre	1	Grading Permit	High	8	833C334910	BGR 060278	Starfield Sycamore Investments, LLC	Steven Stout	2 Ada, Suite 200	Irvine	2819-23	949.3790.54	Steve Stout, Jay Gates 951.634.7956, 951.201.0601	APN 290-140-061	02/11/08	RG01	6	50%		
35323 Pourroy Road	899	E-5	Temecula	TR 29114	>1	2	Grading Permit	High	10	933S318451	BGR 020689	Barratt American	Michael Armstrong	5950 Priestly Drive, Suite 101	Carlsbad	92008	760.431.0800	Winder, Sam Gonzalez, Allen 51.288.3882, 760.809.5402, 760.613.5742	APN 467-240-043	02/18/08	TG01	10	65%		
36444 Pourroy Road	929	E-2	Winchester	TR 29214	>1	2	Grading Permit	High	10	933C326074	BGR 031552	Shea Homes	Michael O'Melveny	10350 Santa Monica Blvd.	Los Angeles	90025	909.739.9707	Hinton, Rod Plunkett, Mike G 951.453.5920, 951.739.9700, 951.538.4686	APN 958-040-001	02/18/08	TG01	10	75%		
36755 Briggs Road	839	Winchester	TR 30969-1	>1	2	Grading Permit	High	10	933C323139	BGR 031652	Brookfield Homes	Dale Gleed	12865 Pointe Del Mar, # 200	Del Mar	92014	858.481.8500	UNKNOWN	APN 467-240-056	02/18/08	TG01	10	55%		
34980 Leon Road	899	B-6	Murrieta	TR 29484	>1	2	Grading Permit	High	10	933C331219	BGR 041136	D.R. Horton	Steve Rowland	119 N. Maple Street, Suite A	Corona	92880	909.272.9000	UNKNOWN	APN 467-230-028	02/20/08	RG01	10	70%		
26996 Garbani Road	868	C-6	Menifee	TR 30666 PM 14390	>1	2	Grading Permit	High	11	933C336534	BGR 041309	Lennar Homes	Hal McCutchan	40980 Country Center Drive, # 110	Temecula	92591	951.719.3449	In Suster, Ken Gunter, Tom C 951.538.2214, 951.232.1829, 951.453.1139	APN 467-140-019	02/20/08	RG01	11	60%		
29161 Simpson Road	838	H-6	Menifee	TR 31582	>1	2	Grading Permit	High	8	833J000632	BGR 041628	KB Home	Michael Freeman	26201 Ynez Road, # 104	Temecula	92591	951.587.3306	Weirich, Pat Roberts, Tim Ro 19.954.6941, 619.520.6941, 951.891.5248	APN 360-200-013	02/20/08	RG01	8	50%	2/28/2008	
31256 Pat Road	899	C-4	Winchester	TR 32185	>1	2	Grading Permit	High	10	933C338915	BGR 050203	Shea Homes, L.P.	Michael O'Melveny	1250 Corona Pointe Court, Suite 600	Corona	92879	951.739.9700	Dave Hinton 951.453.5920	APN 333-200-048	02/22/08	RG01	11	60%		
41300 Camino Del Vino	960	E-3	Temecula	TR 31674	>1	2	Grading Permit	Medium	10	933C337019	BGR 050661	Beazer Homes	Darius Fatakia	1800 E. Imperial Hwy. Suite 200	Brea	92821	714.285.2900	Kevin Brickley, Jim Allen 714.231.7386, 714.240.3889	APN 467-150-047	02/18/08	TG01	10	60%		
35222 Winchester Road	899	E-5	Winchester	TR 30049	11.66acre	2	Grading Permit	High	9	933C337541	BGR 050764	D.J Conner	Daniel Conner	1629 Monroe Street	Riverside	92504	951.780.3268	UNKNOWN	APN 927-670-003	02/12/08	TG01	3	25%	2/28/2008	
28300 Garbani Road	868	F-5	Menifee	TR 28206	ss 79.8 a	1	Grading Permit	High	8	933J000634	BGR 050987	Barratt American	Michael Armstrong	5950 Priestly Drive, Suite 101	Carlsbad	92008	760.931.0800	Jan, Allen Tritten-off sites, Tim 30.609.7485, 760.809.7176, 760.613.5742	APN 467-240-031, 045, 04	02/18/08	TG01	5	75%		
9356 Bellgrave Avenue	684	C-1	Riverside	PM 19676-1	>1	1	Grading Permit	Medium	3	933C336291	BGR 051396	Granite Homes	Pat Donahue	2 Park Plaza, # 700	Irvine	92614	949.250.9229	Simon, Horton, Bobby Eskina 951.377.6990, 951.757.2625	APN 372-090-004	02/21/08	RG01	6	75%		
27100 Newport Road	868	D-2	Menifee	CUP 03475	-66.4acre	1	Grading Permit	High	8	833C345236	BGR 060293	Ralph Smith	8443 Donna Way	Riverside	92509	909.888.0018	Sean Wybert 818.472.2671	APN 170-231-047	02/15/08	RG01	3	N/a		
28358 Menifee Road	838	G-6	Romoland	TR 32664	-5acres	1	Grading Permit	High	11	833C342406	BGR 060857	Donahue Schriber Realty Group	P.O. Box 4549	Carlsbad	92018	714.966.6436	Harold Chapman 951.692.6807, Cell 415.269.2962	APN 360-080-012	02/21/08	RG01	8	50%	2/14/2008	
29044 Simpson Road	838	G-5	Romoland	TR 34180-1	26.26 of	1	Grading Permit	High	9	933C341142	BGR 061300	Standard Pacific Homes	Brittany Boshers	255 East Rincon, Suite 200	Corona	92879	951.898.5500	Tim Hampton, Kevin Fulmer 909.821.9885, 951.202.8285	APN 333-190-025	02/22/08	RG01	11	75%		
4040 Pedley Road	644	E-7	Riverside	PP 19295	>1	1	Grading Permit	Medium	1	933C334965	BGR 060454	Standard Pacific Homes	Brittany Boshers	255 East Rincon, Suite 200	Corona	92879	951.898.5500	Tim Hampton 909.821.9885	APN 333-180-008	02/22/08	RG01	9	60%		
26954 Keller Road	897	J-3	Menifee	APN 364-080-016SFR	>1	Unknown	Grading Permit	Medium	1	unknown	BGR 070695	Jacobsen Family Holdings, LLC	Douglas Jacobsen	21800 Burbank Blvd., Suite 330	Woodland Hills	91367	UNKNOWN	APN 169-040-015	01/10/08	RG01	1	N/a		
22425 Palomar Street	927	D & E	Wildomar	TR 30287	>1	2	Grading Permit	Medium	1	933C344275	BGR 060940	Hushine Corporation		1927 Harbor Blvd. # 704	Costa Mesa	92627	949.422.4128	UNKNOWN	APN 384-080-016	02/26/08	Unknown	1	0%	3/3/2006	Y
17474 La Sierra Avenue	744	J-6	Riverside	TR 31695	>1	1	Grading Permit	Medium	4	933C331443	BGR 040692	Meritex Company, Inc.		22951 Mill Creek Drive, Suite B	Laguna Hills	92653	949.581.0401	Harry Heineken 949.533.5721	APN 380-140-001	02/22/08	TG01	2	40%	11/21/2007	
16110 Albarian Street	745	G-4	Riverside	TR 31322	>1	1	Grading Permit	Medium	2	933C330695	BGR 041424	Van Daele Development	Brice Kittle	2900 Adams Street, # C-25	Riverside	92504	951.354.2121	Mike Axelrod 951.850.3096	APN 269-050-014	02/19/08	RG01	4	45%	2/28/2008	
44050 Whittier Avenue	842	A-1	Hemet	TR 31130	>1	1	Grading Permit	Medium	3	933J000234	BGR 041533	John & Diana Hanna	John Hanna	16197 Krameria Avenue	Riverside	92504	951.453.4606	John Hanna 951.453.4604	APN 273-060-018	02/19/08	RG01	2	50%	11/27/2007	
Victoria & Lyon	744	F-4	Riverside	TR 32128	>1	1	Grading Permit	Medium	3	933C338200	BGR 050435	Elias & Cynthia Marana	Elias Marana	40620 Starlight Mesa Drive	Hemet	92544	951.277.0834	Elias Marana 951.905.8123	APN 553-070-011	02/20/08	RG01	3	60%		
25870 Meridian Street	811	F-5	Hemet	TR 31825	>1	1	Grading Permit	Medium	3	933J000424	BGR 050680	KB Home	Stephen Sills	3 Jenner, Suite 100	Irvine	92618		Ricky Arellano 619.572.5996	APN 136-030-012	02/19/08	RG01	7	60%		
26770 Dawson Road	836	C-3	Romoland	TR 29777	>1	1	Grading Permit	Medium	3	833J000236	BGR 051053	Osborne Development Corporation	Robert Osborne, Jr.	30601 Comerico	Rancho Santa Mar	92688	949.888.3820	Randy Schweitzer 951.205.4033	APN 551-210-007	02/22/08	RG01	3	70%		
6715 Winesville Avenue	643	F-6	Mira Loma	TR 32136	>1	1	Grading Permit	Medium	2	933C336582	BGR 051127	Ashby Financial Company, Inc.	Vien Tran	470 E. Harrison Street	Corona	2879-13	951.896.1692	Jimmy 951.898.1692	APN 331-170-029	02/20/08	RG01	2	50%	3/3/2008	
13215 Orange Street	713	C-1	Corona	TR 32125	>1	1	Grading Permit	Medium	2	933C332199	BGR 051226	Brehm Builders	Kevin Canning	2714 Loker Avenue W., # 300	Carlsbad	92010	760.448.2420	Ron Boehm, Aaron Florez 858.518.3773, 858.518.2633	APN 152-020-002	02/18/08	RG01	2	50%	2/28/2008	
17455 Nandina Avenue	745	A-6	Riverside	TR 30172	23.12acre	1	Grading Permit	Medium	2	933C339190	BGR 051451	Pinnacle Communities, Inc.	Raquel Marcos	7080 Calina Lane	Corona	92880	951.278.8500	Mike Danna 949.279.0047	APN 152-040-022	02/18/08	RG01	2	65%		
42655 E. Florida Avenue	811	G-7	Hemet	PP 18786	>1	1	Grading Permit	Medium	2	933J000483	BGR 051495	Flatiron Company	Dylan Bird	34700 Pacific Coast Highway	Capistrano Beach	92624	949.218.1122	Rene Gomez 760.803.6280	APN 273-320-002	02/19/08	RG01	2	50%	3/3/2008	
Pat's Ranch Road & Highway 15	683	F-6	Mira Loma	TR 32535 / PP 19631	>1	1	Grading Permit	Medium	2	933C338431	BGR 051528	Church of the Nazarene of Hemet	Jacque Russell	42655 E. Florida Avenue	Hemet	92544	951.927.8717	Jacque Russell 951.522.2719	APN 551-220-068	02/22/08	RG01	2	50%		
32625 Cert Street	697	B-6	Wildomar	TR 32206	>1	2	Grading Permit	Medium	3	933C339825	BGR 051540	Vernola Marketplace	Jeff Kinrade	6429 Pat's Ranch Road	Mira Loma	91752	951.520.8940	UNKNOWN	APN	02/18/08	RG01	2	N/a		
21911 Hansen Avenue	779	B-7	Nuevo	TR 32064	>1	1	Grading Permit	Medium	2	933C343078	BGR 051541	Fieldstone Communities	Steve Bradley	2 Ada, Suite 200	Irvine	92618	UNKNOWN	APN 368-080-032	02/20/08	TG01	2	75%		
Corner of McVicar Street & Palomi	927	D-1	Wildomar	TR 25122	>1	2	Grading Permit	Medium	2	933C332012	BGR 060089	Nuevo Holdings 31, LLC		310 Avenue F	Redondo Beach	90277	310.721.2896	UNKNOWN	APN 427-130-008	02/20/08	RG01	2	N/a		
36243 Inland Valley Drive	927	G-1	Wildomar	PUP 30282	>1	2	Grading Permit	Medium	3	933C335566	BGR 060105	Rancho Forturado, LLC	Anna	1105 Quail Street	Newport Beach	92660	949.955.3832	Steve Howard	APN 360-080-012 013,014	02/21/08	TG01	2	40%	11/21/2007	
Newport Road	868	D-3	Menifee	PM 34275 / TR 33647	-210acre	1	Grading Permit	High	12	933C340961	BGR 060293	Universal Health Services of Inland	Timothy Reilly	645 Verdemont Circle	Simi Valley	93065		Mike Stout 858.229.4784	APN 380-250-008	02/21/08	TG01	2	55%		
36321 Hidden Springs Road	927	F-1	Wildomar	CUP 3474/PM 34144	>1	2	Grading Permit	Medium	2	933C340745	BGR 060395	Pardee Homes	Erika Horn	1385 Old Temescal Road	Corona	92881	951.817.3400	Dave Jones 909.772.8637	APN 360-080-012 013,014	02/20/08	RG01	12	45%	2/21/2008	
29532 Lapis Lane	869	B-1 &	Winchester	TR 33145	>1	Unknown	Grading Permit	Medium	2	unknown	BGR 060447	CK-HS Partners LLC	Jim Chase	1045 N. Spaulding Avenue	Los Angeles	90046	949.678.5646	Luis Guerrero 714.412.0399	APN 380-110-038	02/21/08	TG01	2	N/a		
42749 Mayberry Avenue	841	H-1	Hemet	TR 32458	>1	1	Grading Permit	Medium	4	833C338290	BGR 060522	Barratt American	Michael Armstrong	5950 Priestly Drive, Suite 101	Carlsbad	92008	760.431.0800	UNKNOWN	APN 461-190-078, 072	02/19/08	Unknown	2	N/a		
22401 Juniper Flats Road	779	E-1	Nuevo	PUP 88451	>1	2	Grading Permit	Medium	2	833C328719	BGR 061038, 041518	Osborne Development Corporation	Robert Osborne, Jr.	30601 Comerico	Rancho Santa Mar	92688	949.888.3820	Randy Schweitzer 951.205.4033	APN 552-030-017, 018	02/20/08	RG01	4	50%	12/19/2007	
28818 Lindenberger Road	966	H-1	Menifee	TR 30757	>1	Unknown	Grading Permit	Medium	2	unknown	BGR 070280	Intelstat Global Service Corporation	Jeffrey Chandler	22401 Juniper Flats Road	Nuevo	92567	909.928.3885	Jennis Nestor, Jeffrey Chandl 951.928.3446, 310.525.5965	APN 429-040-019	02/21/08	RG01	6	60%		
9977D Anza Road	959	J-1	Temecula	APN 942-250-026 SFF	>1	2	Grading Permit	Medium	3	933C322715	BGR 030583	RC Hobbs Company	Anna Walton	1110 East Chapman Avenue, #206	Orange	92866	714.633.8100, Ext. 239	Bryan Raney 714.471.2113	APN 334-250-014	02/20/08	Unknown	2	40%	3/3/2006	
39512 Calle Cabernet	929	H-7	Temecula	APN 943-270-009 SFF	>1	2	Grading Permit	Medium	3	933C329256	BGR 040562	Robert & Kathleen Akrin		11723 Rancho Street	El Monte	91732	626.443.5691	Hurley McCaghren 951.970.5608	APN 868-100-005	01/21/08	Unknown	2	75%		
17545 Esquerra Court	976	C-1	Murrieta	APN 931-050-037 SFF	>1	2	Grading Permit	Medium	3	933C3442	BGR 040656	Richard & Mary Hanson		27530 Sierra Madre Drive	Murrieta	925630	909.246.9410	UNKNOWN	APN 140-050-014	02/11/08	RG01	6	60%		
34296 Calle Vista	959	J-5	Temecula	APN 951-190-002 SFF	>1	2	Grading Permit	Medium	3	933C334442	BGR 052254	Robert Zagarella		41971 Maranta Road, Apt 158	Temecula	92591	951.506.0203	UNKNOWN	APN 351-020-009	02/15/08	RG01	6	65%		
28182 Via Peregrino	976	F-1	Temecula	APN 940-040-005 SFF	>1	2	Grading Permit	Medium	3	933C333590	BGR 050442	Mike Erickson, Ahmed Nassir		861 Pinewood Drive	Oceanside	92057	909.296.5620, 951.587.1287	UNKNOWN	APN 390-060-025	02/14/08	RG01	10	75%		
45290 Via Renaissance	978	E-3	Temecula	APN 939-150-012 SFF	>1	2	Grading Permit	Medium	3	933C318217	BGR 050821	Le Hung		31501 Sagecrest Drive	Lake Elsinore	92532	951.245.1884, cell 951.784.3974	UNKNOWN	APN 940-040-005	02/19/08	TG01	3	20%	12/18/2007	Y
44995 Via Renaissance	978	D-3	Temecula	APN 939-150-024 SFF	>1	2	Grading Permit	Medium	3	933C318217	BGR 050854	Renaissance Properties	Unknown	1024 S. Main Street	Corona	92882	951.587.6711	UNKNOWN	APN 939-150-012	02/18/08	TG01	3	2%	12/18/2007	Y
42172 Angels Peak Court	956	C-5	Murrieta	APN 932-260-037 SFF	>1	2	Grading Permit	Medium	3	933C340294	BGR 050937	Renaissance Properties		1024 S. Main Street	Corona	92882	951.587.6711	Shawn 951.538.9316	APN 939-150-014	02/18/08	TG01	3	10%	12/18/2007	Y
42185 Angels Peak Court	956	C-5	Murrieta	APN 932-260-036 SFF	>1	2	Grading Permit	Medium	3	933C340294	BGR 050938	Dr. Gregory Uviegbara		11940 Dapple Way	San Diego	92128	858.663.6663	UNKNOWN	APN 932-250-037	02/19/08	TG01	3	5%	12/18/2007	Y
28242 Via Peregrino	978	F-1	Temecula	APN 940-040-006 SFF	>1	2	Grading Permit	Medium	3	933C335612	BGR 050946	Scott & Jill Hardy		30305 Del Ray Road	Temecula	92592	951.816.9053	John Jasoda 951.733.9532	APN 932-280-036	02/19/08	TG01	3	40%	12/18/2007	Y
26120 Via Santa Rosa	978	B-2	Temecula	APN 940-200-002 SFF	>1	2	Grading Permit	Medium	3	933C336765	BGR 051468	Nitham Khanfar		P.O. Box 1308, Postal code 133	Sultanate of Oman		cell #019689-922-9670		APN 940-040-006	02/18/08	TG01	3	55%		Y
39702 Sperry Court	959	A-1	Temecula	APN 943-190-031 SFF	>1	2	Grading Permit	Medium	3	933C337579	BGR 051883	Nasir Ahmed		24006 Madison, # 1511	Murrieta	92562	207.577.0444	Osman Qureshi 951.237.0362	APN 940-200-002	02/21/08	TG01	3	30%	3/4/2008	Y
16300 Avenida Bosque	956	E-4	Murrieta	APN 931-070-012 SFF	>1	2	Grading Permit	Medium	3	933C341662	BGR 051885	Stephen Welby		39450 Solidago Road	Temecula	92591	951.676.7778	UNKNOWN	APN 943-190-031	02/20/08	TG01	3	75%		Y
27630 Via Fuerte	978	E-3	Temecula	APN 939-130-001 SFF	>1	2	Grading Permit	Medium	3	933C335752	BGR 060058	Jack Dell		18300 Avenida Bosque	Murrieta	92562	949.838.7699	Steve Fulgham 951.837.1209	APN 931-070-012	02/21/08	TG01	3	75%		Y
27690 Via Fuerte	978	E-3	Temecula	APN 939-130-002 SFF	>1	2	Grading Permit	Medium	3	933C335752	BGR 060060	Steve Helfer		1210 Calle Toledo	San Clemente	92672	714.366.2545	Gary Burchett, Contractor 909.322.9505	APN 939-130-001	02/19/08	TG01	3	15%	3/4/2008	Y
30825 Bella Vista Road	960	E-7	Temecula	APN 941-200-014 SFF	>1	2	Grading Permit	Medium	3	933C342010	BGR 060383	Steve Helfer		1210 Calle Toledo	San Clemente	92672	714.366.2545	Gary Burchett, Contractor 909.322.9505	APN 939-130-002	02/19/08	TG01	3	15%	3/4/2008	Y
36320 Via Pais Bonita	960	E-3	Temecula	APN 941-270-027 SFF	>1	2	Grading Permit	Medium	3	933C34751	BGR 060884	Vanessa & Tom Cruise		39619 Longleaf Street	Temecula	92591	951.304.7900, 951.695.1532	UNKNOWN	APN 941-200-014 SFR	02/21/08	TG01	3	65%		Y
40001 Via Casata	926	F-7	Murrieta	APN 929-360-004 SFF	>1	2	Grading Permit	Medium	3	933C335005	BGR 070207	John Gabriel		P.O. Box 891995	Temecula	92589	951.440.2066	UNKNOWN	APN 941-270-027	02/21/08	TG01	2	75%		Y
42875 Calle Bandido	956	E-2	Murrieta	APN 932-310-036 SFF	>1	2	Grading Permit	Medium	3	933C348975	BGR 070490	Anthony & Susan Monaco		13421 Windy Grove Drive	Rancho Cucamon	91730	909.581.0610	UNKNOWN	APN 929-360-004	02/22/08	TG01	1	0%	3/4/2008	Y
40455 Hidden Meadow Circle, 40	956	E-1	Murrieta	APN 932-310-002 SFF	>1	2	Grading Permit	Medium	3	933C344434	BGR 070560	John Gilbert		P.O. Box 295	El Segundo	90245	310.469.1644, 951.894.1966	UNKNOWN	APN 932-310-036	02/22/08	TG01	1	0%	3/4/2008	Y
16455 Lake Pointe Drive	744	G-5	Riverside	TR 28816	>50acres	1	Grading Permit	High	9	833S314727	BGR 000890	Jim & Rebecca Engle		40455 Hidden Meadow Circle	Murrieta	92563	951.656.9546	UNKNOWN	APN 932-310-002	02/22/08	TG01	1	10%	3/4/2008	Y
23751 Spencer Butte	806	A-5	Gavilan Hills	TR 27557	>1	1	Grading Permit	High	10	833C332457	BGR 030687	Brehm Builders	Kevin Canning	2714 Loker Avenue W., # 300	Carlsbad	92008	760.448.2420	Curt VanDoren, Ernie Pierce 858.518.8574, 760.801.5492	APN 140-050-014	02/29/08	RG01	6	60%		
25085 La Estrella Street	897	H-6	Wildomar	TR 30056	>1	2	Grading Permit	High	8	933C337134	BGR 031136	Century Vintage Homes-Crowell Santa Ri	David Cooper	1535 South D Street	San Bernardino	92408	909.381.6007	Bud Brown, Michael Reed 909.772.4464	APN 390-060-025	02/26/08	RG01	11	70%		
29305 Newport Road	868	G-2	Menifee	TR 30422	>250acre	1	Grading Permit	High	8	833J000563	BGR 040779	Beazer Homes	Darius Fatakia	1800 E. Imperial Hwy. Suite 200	Brea	92821	714.285.2900	Kevin Brickley 714.231.7386	APN 362-180-029	02/27/08	TG01	6	60%		
17756 Mockingbird Canyon Road	745	E-5	Riverside	TR 22100	>200acre

7325 Archibald Avenue	712, J-2	Corona	TR 30480	>1	1	Grading Permit	High	9	833C323494	BGR 031038	KB Home	Michael Freeman	801 Corporate Center Drive, #201	Pomona	91768	909 802.1109	Louie Clark, Dan McGhee	951.453.6821, 951.453.7601			APN 134-140-012	03/04/08	RG01	9	75%			
36444 Pourroy Road	929, E-1	Winchester	TR 29214	>1	2	Grading Permit	High	11	833C329074	BGR 031552	Shea Homes, LTD	Michael O'Melveny	10350 Santa Monica Blvd.	Los Angeles	90025	909.739.9709	Hinton, Rod Plunkett, Mike G	951.453.5620, 951.739.9700, 951.538.4688			APN 958-040-001	03/07/08	TG01	11	70%			
35755 Briggs Road	899, A-6	Murrieta	TR 29484	>1	1	Grading Permit	High	11	833C331219	BGR 041136	D.R. Horton	Steve Rowland	119 N. Maple Street, Suite A	Corona	92880	909.272.9000	Iulvania, Tom Ralph, Albert R	951.538.0776, 951.538.2473, 760.497.3608			APN 467-230-028	03/05/08	RG01	11	70%			
34980 Leon Road	899, B-6	Winchester	TR 30656/PM 14390	>1	1	Grading Permit	High	12	833C330934	BGR 041309	Hal McCutchan	40980 Country Center Drive, # 110	Temecula	92591	951.719.3449	n Sueler, Ken Gunter, Tom C	951.538.2214, 951.232.1829, 951.453.1193			APN 467-140-019	03/05/08	RG01	12	65%			
26813 Amanda Avenue	639, F-3	Hemet	TR 30351	>1	1	Grading Permit	High	6	833C300302	BGR 042073	Osborne Development Corporation	Robert Osborne, Jr	30001 Comercio	Rancho Santa Mar	92688	909.888.3822	Jay Heaton, Richard Felley	951.201.1492, 951.218.5160			APN 458-250-016	03/06/08	RG01	6	75%			
29161 Simpson Road	838, H-6	Menifee	TR 31560	>1	1	Grading Permit	High	12	833C339918	BGR 050203	Shea Homes, L.P.	Michael O'Melveny	1250 Corona Pointe Court, Suite 600	Corona	92879	951.739.9700	Dave Hinton	951.453.5920			APN 333-200-048	03/06/08	RG01	12	80%			
31256 Pat Road	606, A-5	Winchester	TR 32185	>1	2	Grading Permit	High	11	833C337019	BGR 050661	Beazer Homes	Darius Fatakia	1800 E. Imperial Hwy, Suite 200	Brea	92821	714.258.2900	Kevin Brickley, Jim Allen	714.231.7368, 714.240.3889			APN 467-150-047	03/07/08	TG01	11	70%			
14701 Schlesiman Road	712, H-1	Corona	TR 31309	>1	1	Grading Permit	High	6	836C335304	BGR 050827	Lennar Communities	Hal McCutchan	391 North Main Street, #301	Corona	92880	951.817.3600	Ernie Mansfield	951.453.1196			APN 144-020-004	03/04/08	RG01	6	75%			
Southeast Winchester Road & Jea	899, E-5		TR 29946	11.66acre	2	Grading Permit	High	10	833C337213	BGR 050639	Barratt American	Michael Armstrong	5950 Priestly Drive, Suite 101	Carlsbad	2008-86	760.931.0800	dan, Allen Tritton-off sites, Tim	30.809.7485, 760.809.7175, 760.613.5742			APN 467-240-031, 045, 04	03/07/08	TG01	10	75%			
14782 Schlesiman Road	712, H-2	Corona	TR 31826	~110acre	1	Grading Permit	High	8	833C337128	BGR 050646	Shea Homes	Michael O'Melveny	1250 Corona Pointe Court, Suite 600	Corona	92879	951.739.9700	zow, Kevin Crawford, Darrell V	51.712.6591, 714.412.9437, 951.712.7525			APN 144-060-003	03/04/08	RG01	8	85%			
30415 Patton Road	869, B-1	Winchester	TR 31892	>50acres	1	Grading Permit	High	10	833C339344	BGR 050964	Bluestone Communities	Scott Gale	4100 Newport Place, Ste. 730	Newport Beach	92660	949.475.4115	Scott Gale	951.538.4332			APN 461-170-002	06/ 2/21/08	3/	RG01	10	60%		
14300 Schlesiman Road	712, H-1	Corona	TR 30971	>1	1	Grading Permit	High	6	833C342539	BGR 051109	Pardee Homes	David Graves	1385 Old Temescal Road	Corona	92881	949.757.8444	Roland Phillips	949.678.9492			APN 144-060-006	03/03/08	RG01	8	80%			
5240 Hamner Avenue	713, d-2	Mira Loma	PM 31645	>1	1	Grading Permit	High	7	833C340661	BGR 051845	Lewis Operating Corporation	Scott Crawford	1156 North Mountain Avenue	Upland	91785	909.946.7596	Tom De Avila, Scott Crawford	909.619.5706, 909.379.4202			APN 160-020-006	03/05/08	RG01	7	50%	1/31/2008		
7380 Hellman Drive	712, H-2	Corona	TR 31476	>1	1	Grading Permit	High	8	833C333060	BGR 051864	Heathrade Homes	Steven Ritz	6 Executive Circle, Suite 250	Irvine	92614	949.250.7700	Mark DeMello	951.204.1995			APN 144-060-001	03/04/08	RG01	8	85%			
28358 Menifee Road	838, G-6	Romoland	TR 32664	~63acres	1	Grading Permit	High	12	833C342408	BGR 060857	Standard Pacific Homes	Brittany Boshers	255 E. Rincon Street, # 200	Corona	92879	951.858.5500	Tim Hampton, Kevin Fulmer	909.621.9885, 951.202.6285			APN 333-190-025	03/06/08	RG01	12	80%			
29044 Simpson Road	838, G-5	Romoland	TR 34182C	26 of 35	1	Grading Permit	High	10	833C343142	BGR 061003	Standard Pacific Homes	Brittany Boshers	255 E. Rincon Street, # 200	Corona	92879	951.858.5500	Tim Hampton	909.621.9885			APN 333-160-008	03/06/08	RG01	10	65%			
30145 Ridgeway Street	838, J-3	Romoland	TR 28801	~32acres	1	Grading Permit	Medium	8	833C314614	BGR 010786, BGR 030457	Heller Development	Clint Compton	15000 7th Street	Victorville	92395	760.497.6941	mith (G Mar), Clint Compton (	760.955.7700, 760.497.6941			APN 459-030-007	02/14/08	RG01	8	65%			
Campbell Ranch & Mayhern Canyo	368, K-9	Corona	TR 29320	>1	1	Grading Permit	Medium	3	833C335918	BGR 010012, 050524	Starfield Sycamore Investments, LLC	Steve Stout	2 Ada, Suite 200	Irvine	92618	949.790.5400	Steve Stout, Jay Gates	951.634.7958, 951.201.0601			APN 290-130-040, 290-140	03/05/08	RG01	3	70%			
7950 Harrison Avenue	713, B-2	Mira Loma	TR 30762	>1	1	Grading Permit	Medium	3	833C326917	BGR 031450	Trimark Pacific Homes	James Kindell	3400 Central Avenue, # 335	Riverside	92506	949.753.7725	Jim Kindell	951.965.2991			APN 134-230-012	03/04/08	RG01	3	85%			
6661 Archibald Avenue	712, J-1	Corona	TR 30893	>1	1	Grading Permit	Medium	3	unknown	BGR 040265	Trimark Pacific Homes	James Kindell	3400 Central Avenue, # 335	Riverside	92506		Jim Kindell	951.965.2991			APN 144-020-005	03/04/08	RG01	3	60%			
31100 Pat Road	899, C-4	Winchester	TR 30599	>1	1	Grading Permit	Medium	3	833C328827	BGR 040337	Beazer Homes	Darius Fatakia	1100 Town & Country, #100	Orange	92868	714.285.2900	Kevin Brickley, Matt Bergman	714.231.7386, 714.231.6055			APN 967-180-020	03/06/08	RG01	3	70%			
19230 Orange Street	713, C-1	Mira Loma	TR 30920	>1	1	Grading Permit	Medium	3	833C326014	BGR 040517	Warmington Homes	James Skinner	3090 Pullman Street, Suite A	Costa Mesa	92626	714.434.4326	Jaime Cornejo, Rick Hanson	714.240.5833, 714.240.7148			APN 134-240-021	03/04/08	RG01	3	60%			
31200 Algarve	899, C-6	Winchester	TR 28297	>1	2	Grading Permit	Medium	6	833C331135	BGR 040570	Ryland Homes		1250 Corona Pointe Court, Suite 100	Corona	92879	760.931.4444	John Fagan, Jerry Schell	619.843.7112, 951.538.3937			APN 467-250-032	03/06/08	TG01	6	N/a			
31300 Algarve	899, C-6	Winchester	TR 28298	>1	2	Grading Permit	High	8	3C327476, 833C331	BGR 040571	Ryland Homes	Jason Jones	1250 Corona Pointe Court, Suite 100	Corona	92879	760.931.4444	John Fagan, Jerry Schell	619.843.7112, 951.538.3937			APN 467-250-035	03/06/08	TG01	8	85%			
7538 Morning Mist Drive	713, B-2	Mira Loma	TR 28742	>1	1	Grading Permit	Medium	4	833C328530	BGR 041082	MBK Homes, Ltd.	Patti Gillespie	175 Technology Drive, #200	Irvine	92618	909.789.8300	Jeremy Johnson	951.840.7903			APN 152-030-002, -005,	04/08 & 03/06/	RG01	4	65%			
34751 Winchester Road	899, D-4	Winchester	TR 30996	>1	2	Grading Permit	Medium	3	3C331169, 9000001	BGR 041598	Beazer Homes	Darius Fatakia	1100 Town & Country, #100	Orange	92868	714.285.2900	Kevin Brickley, Matt Bergman	714.231.7386, 714.231.6055			APN 467-160-027	03/06/08	TG01	3	60%			
11220 Jasmine Way	388, K-10	Corona	TR 29335-2	>1	1	Grading Permit	Medium	2	833C332084	BGR 050584	Fieldstone Communities	Steve Bradley	2 Ada, Suite 200	Irvine	92618	949.790.5400	Jim Lane	909.621.6534			APN 290-140-021	03/07/08	RG01	2	80%			
7651 Stonegate Drive	713, B-2	Mira Loma	TR 30762-1	>1	1	Grading Permit	Medium	3	833C326517	BGR 050885	MBK Homes, Ltd	Patti Gillespie	175 Technology Drive, #200	Irvine	92618	949.789.8300	Jeremy Johnson	951.840.7903			APN 134-240-010, -012	03/04/08	RG01	3	75%			
Clover Circle	388, K-10	Glen Ivy	TR 30440-1 & -2	>1	1	Grading Permit	Medium	3	833C335969	BGR 051277	Fieldstone Communities	Steven Stout	2 Ada, Suite 200	Irvine	92618	949.790.5400	Shawn Flaherty	714.713.1246			APN 290-110-033	03/07/08	RG01	3	80%			
NW Corner of Wacker Drive & Sar	643, J-7	Mira Loma	PP 19763	>1	1	Grading Permit	Medium	3	836C345179	BGR 051993	Crown Business Centers	Richard Glover	3151 Airway Avenue, Ste. U-2	Costa Mesa	92626	714.918.0515	Richard Glover	949.547.4320			APN 156-200-021	03/05/08	RG01	3	N/a			
5840 20th Street	645, F-6	Riverside	PM 4995/PP19738	>1	1	Grading Permit	Medium	2	833C345045	BGR 051707	MPRM Properties	Damien Deocales	P.O. Box 5550	Riverside	92517	626.813.3768	Jay Millard, Jeff Scranton	909.877.1518, 951.809.9635 PM			APN 175-180-020	03/05/08	RG01	2	65%			
6170 26th Street	845, E-6	Riverside	CUP 3434	>1	2	Grading Permit	Medium	2	833C339560	BGR 051733	Alpha Materials	Donald Oaks	5433 28th Street	Riverside	92509	951.275.8920	Donald Oaks	951.830.0403			APN 178-020-001	03/05/08	RG01	2	N/a			
Santiago Canyon Road	388, K-9	Corona	TR 30440-1 & -2	>1	1	Grading Permit	Medium	3	833C338923	BGR 060033	Richmond American	Monica Sierra	1305 Corona Pointe Court	Corona	92879	951.898.5306	Caine Taulsui, Mark Teagno	951.232.0143, 951.543.0006			APN 289-130-038	03/07/08	RG01	3	70%			
25341 Noble Canyon Street	388, K-9	Glen Ivy	TR 30440-3	>1	1	Grading Permit	Medium	3	833C340167	BGR 060303	Christopher Homes	Chris Randall	19 Corporate Plaza Drive	Newport Beach	92660	949.721.8200	Ryan Shookley	03/07/08	RG01	3	APN 290-140-021	03/07/08	RG01	3	50%	3/17/2008		
45055 Rio Linda Road	979, G-3	Temecula	TR 30947	>1	2	Grading Permit	Medium	3	3C334495, 933C334	BGR 060324, 060325	McMillin Morgan Hill, LLC	Dennis Bowman	2750 Womble Road	San Diego	92106	800.781.1401	Paul Manning, David Stanley	619.971.6565, 619.954.7407			APN 952-240-009	03/06/08	TG01	3	60%			
4545 Ruble Street	684, B-1	Riverside	PP 21472	>1	1	Grading Permit	Medium	2	833C343684	BGR 061093	RNVS Enterprises, LP	Dwayne Gleason	1100 Beach Blvd	Stanton	90680	714.527.2239	John Cairns	951.818.6729			APN 170-340-017, 018	03/05/08	RG01	2	65%			
18300 Avenida Del Bosque	956, E-4	Murrieta	APN 931-070-012 SFF	>1	2	Grading Permit	Medium	3	833C341662	BGR 051885	KB Home		39100 Vista Del Bosque	Murrieta	92562	949.838.7699	Steve Fulsham	951.837.1299			APN 931-070-012	02/21/08	TG01	3	75%			
35225 Gavilan Springs Ranch Roa	805, E-3	Perris	APN 289-150-015 SFF	>1	1	Grading Permit	Medium	3	833C329968	BGR 040705	D.R. Horton	Steve Rowland	119 N. Maple Street, Suite A	Corona	92880	909.272.9000	Iulvania, Tom Ralph, Albert R	951.538.0776, 951.538.2473, 760.497.3608			APN 289-150-015	03/07/08	RG01	3	70%		Y	
5316 Golden West Avenue	695, A-3	Riverside	APN 182-210-011 SFF	>1	Unknown	Grading Permit	Medium	3	unknown	BGR 040717	Lennar Homes of California	Hal McCutchan	40980 Country Center Drive, # 110	Temecula	92591	951.719.3449	n Sueler, Ken Gunter, Tom C	951.538.2214, 951.232.1829, 951.453.1193			APN 182-210-011	03/05/08	Unknown	3	N/a		Y	
14403 Malta Place	775, E-7	Perris	APN 286-240-007 SFF	>1	1	Grading Permit	Medium	3	833C330768	BGR 041408	Shertron & Willard Homes	Tawnick	14403 Malta Place	Perris		208.691.1864	Don Tawick, Bill Tawick	208.691.1864, 909.770.2684			APN 286-240-007	03/05/08	RG01	3	N/a		Y	
35205 El Nopal Road	899, B-6	Lake Elsinore	APN 385-160-002 SFF	>1	1	Grading Permit	Medium	3	833C337524	BGR 041996	Oyewole Akinwemi		6006 Vera Street	Riverside	2504-15	951.354.6546	Gary Johnson	951.545.7761			APN 276-040-003	03/06/08	RG01	3	15%	10/17/2007	Y	
37137 Calle De Loro		Murrieta	APN 928-020-010 SFF	>1	2	Grading Permit	Medium	3	833C339547	BGR 050367	Andre Ocampo		34925 El Dorado Road	Lake Elsinore	92530	714.715.1842	UNKNOWN				APN 385-160-002	03/07/08	RG01	3	25%	10/17/2007	Y	
25661 Waldon Road	898, A-1	Murrieta	APN 362-040-005 SFF	>1	1	Grading Permit	Medium	3	833C334846	BGR 050503	Gary Marshall		27514 Littlewood Drive	Menifee	92025	310.418.7499	UNKNOWN				APN 928-020-010	03/04/08	TG01	1	15%	3/18/2008	Y	
20015 Suttanna Drive	775, E-6	Perris	APN 286-170-035 SFF	>1	1	Grading Permit	Medium	3	833C335727	BGR 050974	Warren & Cheryl Bain		33890 Vinca Lane	Murrieta	92563	951.764.8247	UNKNOWN				APN 362-040-005	03/04/08	RG01	3	10%	10/10/2007	Y	
19022 Ferrari	716, B-7	Riverside	APN 276-010-040 SFF	>1	1	Grading Permit	Medium	3	833C339712	BGR 051329	Theodore Ryan	Unknown	9421 Tudor Lane	Garden Grove	92841	714.563.5095, 714.210.1313	UNKNOWN				APN 286-170-035	03/06/08	RG01	3	60%		Y	
21309 King Court	927, A-6	Murrieta	APN 930-230-011 SFF	>1	2	Grading Permit	Medium	3	833C338189	BGR 051622	Raymond Gong		18033 Clarke Court	Riverside	92508	951.789.0543	UNKNOWN				APN 276-010-040	03/06/08	RG01	3	65%		Y	
19681 Nandina Avenue	746, E-6	Riverside	APN 266-320-002 SFF	>1	1	Grading Permit	Medium	1	833C340491	BGR 051884	Toshio Okano		16 Stone Brook	Irvine	92620	714.720.8256, 714.669.1852	Peter Ford	951.698.1830			APN 930-230-011	03/07/08	TG01	3	25%	10/18/2007	Y	
15758 Via Barranca	775, G-6	Perris	APN 297-290-057 SFF	>1	1	Grading Permit	Medium	3	833C340423	BGR 060021	Raymond & Hilda Diaz		10311 Hendrick Avenue	Riverside	92505	951.689.7009	UNKNOWN				APN 266-320-002	03/05/08	RG01	3	65%		Y	
20915 Lakemount Court	775, E-6	Perris	APN 287-060-022 SFF	>1	Unknown	Grading Permit	Medium	3	419C340716	BGR 060252	Christopher Barden	Unknown	9353 Otto Street	Downey	90250	562.869.6330	UNKNOWN				APN 287-290-057	03/06/08	RG01	3	40%	10/9/2007	Y	
35850 Los Coyotes Road, Gate C	896, A-6	Lake Elsinore	APN 385-170-011 SFF	>1	1	Grading Permit	Medium	3	833C343737	BGR 060643	Bill & Nelen Trawick	Unknown	954 Dalton Road	Riverside	92501	909.770.2684	UNKNOWN				APN 287-060-022	03/06/08	Unknown	3	35%	10/10/2007	Y	
23440 Juniper Flats Road	809, F-3	Homeland	APN 429-200-041 SFF	>1	1	Grading Permit	Medium	3	833C347641	BGR 070113	Mazen Sheikhly		P.O. Box 192	Laguna Beach	92652	714.313.3752	UNKNOWN				APN 385-170-011	03/07/08	RG01	3	10%	10/17/2007	Y	
41475 Anza Road	960, A-4	Temecula	APN 951-270-006 SFF	>1	1	Grading Permit	Medium	3	833C347814	BGR 070454	Randy & Maria Reynolds		2315 Shasta Place	San Jacinto	92583	951.925.8829	Clint Koone	951.200.9724			APN 429-200-041	03/04/08	RG01	1	15%	3/18/2008	Y	
18455 Lake Pointe Drive	744, Q-5	Riverside	TR 28816	>50acres	1	Grading Permit	High	10	833C314727	BGR 000890	Trevor & Amber Preston		40959 Del Monte Street	Temecula	92592	951.676.3246	UNKNOWN				APN 951-270-006	03/04/08	TG01	1	15%	3/18/2008	Y	
29081 Turtle Rock Court	837, D-7	Quail Valley	TR 30330	>1	1	Grading Permit	High	7	833C338674	BGR 030233	Brehm Builders	Kevin Canning	2714 Loker Avenue W, # 300	Carlsbad	92008	760.448.2420	Curt VanDoren, Ernie Pierce	858.518.8574, 760.801.5492			APN 140-050-014	03/13/08	RG01	10	75%			
16250 Gallery Heights Drive	745, G-4	Riverside	TR 28767 R1	>1	1	Grading Permit	High	6	833C325417	BGR 050630	K. Hovnanian Forcast Homes, Inc.	Anna Walton	1500 South Haven, Suite 100	Ontario	91761	909.937.3270	r, Rich Grise, John Steward, C	9617, 909.376.7033, 951.634.2333, 951.377.9351			APN 140-050-014	03/13/08	RG01	7	80%			
23751 Spencer Butte	606, A-5	Gavilan Hills	TR 27557	>1	1	Grading Permit	High	12	833C332457	BGR 030687	Gallery Heights Partners	Rick Houser	31610-2 Railroad Canyon Road	Canyon Lake	92587	909.244.7713	Clay Howell	951.294.1332			APN 290-130-040	03/13/08	RG01	7	60%			
25085 La Estrella Street	897, H-7	Wildomar	TR 30656	>1	2	Grading Permit	High	9	833C327134	BGR 031136	Century Vintage Homes-Crowell Santa Re	David Cooper	1535 South D Street	San Bernardino	92408	909.381.6007	Steven Denniston	909.721.7011			APN 290-060-025	03/14/08	RG01	12	70%			
29305 Newport Road	868, G-2	Menifee	TR 30422	~250acre	1	Grading Permit	High	9	833J300563	BGR 040779	Beazer Homes	Darius Fatakia	1800 E. Imperial Hwy, Suite 200	Brea	92821	714.258.2900	Kevin Brickley	714.231.7386			APN 362-180-029	03/10/08	TG01	9	80%			
17756 Mockingbirt Canyon Road	745, E-5	Riverside	TR 22100	200acre	1	Grading Permit	High	12	833C337322	BGR 040901	Center Homes	Steve Moffatt	2280 Wardlow Circle, # 750	Corona	92880	909.479.9111	s, Jose Diaz, Teresa Jakeway,	5425, 951.712.7534, 951.520.6959, 951.538.7466			APN 364-200-001	03/10/08	RG01	9	65%			
23820 Catt Road		Wildomar	TR 30155	>50	2	Grading Permit	High	9	833C333979	BGR 041659	KB Home	Michael Freeman	3610 Inland Valley Drive	Wildomar	92595	951.677.1300	Weirich, Scott Mackie--Erosio	619.954.6941, 858.431.6957			APN 273-300-006	03/14/08	RG01	12	75%			
31380 Simpson Road	839, B-6	Winchester	TR 30989	~52 acre	1	Grading Permit	High	6	833J300250	BGR 041871	Van Daele Development	Brice Kittle	2900 Adams Street, # C-25	Riverside	92504	951.354.2121	Bob Surprise, Shane Chilton	951.852.1122, 951.313.3110			APN 376-410-005	03/08/08	RG01	9	80%			
2061 McCallister Avenue	785, A-4	Riverside	TR 30337	>1	1	Grading Permit	High	10	833C334540	BGR 042062	Griffin Communities	Don Benn	110 N. Lincoln Avenue, 2nd Floor	Corona	92882	951.898.1234	Lou Messina, Don Benny	951.545.9556, 909.841.5062			APN 462-020-047	03/10/08	RG01	8	65%			
16880 King Avenue, 16577 Ponde	745, H-6	Riverside	TR 27887	>1	1	Grading Permit	High	12	833C329292	BGR 050040	Lennar Homes	Hal McCutchan	40980 Country Center Drive, # 110	Temecula	92591	951.687.7972	Randy Marrs, Chris Curiel	951.830.5154, 951.687.2553			APN 136-110-017	03/13/08	RG01	10	80%			
25365 Newport Road	867, H-3		TR 31391	~514acre	1	Grading Permit	High	9	833C338544	BGR 050227	Gallery Ranch Partners	Rick Houser	31616-1 Railroad Canyon Road	Canyon Lake	92587	951.244.7713	Holser, Carl Bachler, Dave M	51.377.7690, 951.244.7114, 951.294.1331			APN 273-200-024	03/14/08	RG01	12	75%			
4451 Morgan Hill Drive	980, A-2	Temecula	TR 30665	~187acre	1	Grading Permit	High	11	833C318754	BGR 050599	Audie Murphy Ranch, LLC	Dennis Chapman	1522 Brookhollow Drive, Suite 1	Santa Ana	92705	951.279.1800	auck, Pat Celella, Robert Ch	29, 772.7974, 714.993.1370, 951.712.2351			APN 356-080-001	03/12/08	RG01	9	80%			
28300 Garbani Road	868, F-5	Menifee	TR 28206	g, 79 ac	1	Grading Permit	High	9	833J300634	BGR 050867	McMillin Morgan Hill, LLC	Dennis Bowman	2750 Womble Road	San Diego	92106	800.781.0401	Paul Manning, Mike Owsley	619.971.6565, 619.719.6691			APN 952-240-014	03/12/08	TG01	11	80%			
14300 Schlesiman Road	712, H-1	Corona	TR 30971	>1	1	Grading Permit	High	9	833C342539	BGR 051109	Granite Homes	Pat Donahue	17991 Cartwright Road	Irvine	92614	949.250.9229	John Ward	909.578.4980			APN 357-050-004	/27/08 & 3/10/	RG01	9	75%			
13201 Schlesiman Road	683, C-6	Mira Loma	TR 30991	>1	1	Grading Permit	High	9	833C337223	BGR 051181	Pardee Homes	David Graves	1385 Old Temescal Road	Corona	92881	949.757.8444	Roland Phillips	949.678.9492			APN 144-060-006	03/12/08	RG01	9	80%			
5240 Hamner Avenue	713, d-2	Mira Loma	PM 31645	>1	1	Grading Permit	High	8	833C340661	BGR 051845	Centex Homes	Steve Moffatt	1265 Corona Pointe Court	Corona	92879	951.479.1141	Don Pruett, Teresa Jakeway	951.538.4484, 951.520.6959			APN 164-050-006	03/12/08	RG01	9	80%			
27100 Newport Road	868, D-2	Menifee	CUP 03475	~66 acre	1	Grading Permit	High	9	833C335236	BGR 060293	Lewis Operating Corporation	Scott Crawford	1156 North Mountain Avenue	Upland	91785	909.946.7596	Tom De Avila, Scott Crawford	909.619.5706, 909.379.4202			APN 160-020-006	03/12/08	RG01	8	80%			
24707 Santiago Canyon Road		Glen Ivy	TR 31908	~94 acre	1	Grading Permit	High	10	833C334910	BGR 060778	Donahue Schriber Realty Group	Jerry Wierenga	P.O. Box 4549	Carlsbad	92018	714.966.5436	Harold Chapman	951.692.8807, cell 415.269.2962			APN 360-080-012	03/11/08	RG01	9	50%	3/11/2008		
28499 Milkway	837, J-7	Sun City	TR 28289	>1	1	Grading Permit	Medium	3	833C321599	BGR 000991	Starfield Sycamore Investments, LLC	Steven Stout	2 Ada, Suite 200	Irvine	2819-23	949.790.5400	Steve Stout, Jay Gates	951.634.7958, 951.201.0601			APN 290-140-061	03/13/08	RG01	10	55%			
30145 Ridgeway Street	838, J-3	Romoland	TR 28801	~32acres	1	Grading Permit	Medium	3	833C314614	BGR 010786, BGR 030457	Secured Equities, Corporation	James Hampton	22672 Lambert Street, # 614	Lake Forest	92630		Brad Herrington	951.757.4343			APN 339-020-033	03/13/08	RG01	3	85%			
30525 Bradley Road	868, C-4	Menifee	TR 28590	>1	1	Grading Permit	Medium	3	833J300067	BGR 011090	Heller Development	Clint Compton	15000 7th Street	Victorville	92395	760.497.6941	mith (G Mar), Clint Compton (	760.955.7700, 760.497.6941			APN 456-030-007	03/14/08	RG01	9	50%	3/21/2008		
32750 Briggs Road	898, J-1	Menifee	TR 29486	>1	1	Grading Permit	Medium	3	833C327894	BGR 020013	Forecast Homes	Anna Walton	3536 Concours Street, # 100	Ontario	91764	909.483.7320	James Albraight, Chris Ramse	909.721.7404, 951.377.9351			APN 386-040-026	03/13/08	RG01	9	80%			
28491 Watson Road	838, E-7	Romoland	TR 29495	>1	1	Grading Permit	Medium	3	3J300063, 833J300	BGR 020233	Richmond American	Russell Borders	100 San Marcos Blvd. #100	San Marcos	92069	760.891.3600	Bob Bechtold	714.412.7053			APN 466-200-026	03/13/08	RG01	3	70%			
26159 Redfox Road	868, A-5	Menifee	TR 30064	>1	1	Grading Permit	Medium	3	3J300137, 833C338	BGR 031040	Fiesta Development	Vien Tran	470 E. Harrison Street	Corona	92879	951.898.1692	Jeering, Chris Vassale, Adam	39.376.3185, 909.772.8744, 951.538.3742			APN 329-100-003	03/14/08	RG01	3	70%			
26460 Chambers Avenue	838, A-4	Sun City	TR 30020	>1	1	Grading Permit	Medium	3	833J300387	BGR 031436	Forecast Homes	Anna Walton	3536 Concours Street, # 100	Ontario	91764	909.483.7320	Chris Ramsey, Mike Harrisor	951.377.9351, 951.545.9975			APN 329-140-001	03/14/08	RG01	3	65%			
6221 Archibald Avenue	713, A-3	Corona	TR 29677	>1	1	Grading Permit	Medium	3	833C327284	BGR 040082	John Laing Homes	Fred Farr	255 East Rincon, Suite 100	Corona	92879	909.272.8500	Mike Jackson, Lori Brown	951.258.9156, 951.858.3965			APN 335-110-025	03/13/08	RG01	3	65%			
5580 Hamner Avenue	643, E-4	Corona	TR 30466-1	>1	1	Grading Permit	Medium	3	833C336936	BGR 040713	Standard Pacific Homes	Brittany Boshers	255 East Rincon Street, # 200	Corona	92879	909.272.8500	Dean Hengstad	951.538.5633			APN 130-020-010	03/12/08	RG01	3	65%			
Moreka Summit Road - Greenhor	604, E-6	Glen Ivy	TR 29307	>1	1	Grading Permit	Medium	3	833C335201	BGR 041025	Lennar Communities	Hal McCutchan	391 North Main Street, #301	Corona	92880	951.817.3600	Mike Jenike	951.712.8715			APN 160-020-003	03/11/08	RG01	3	65%			
35263 Menifee Road	868, G-1	Menifee	TR 30349	>1	1	Grading Permit	Medium	3	833C331063	BGR 041257	KB Home	Michael Freeman	36310 Inland Valley Drive	Wildomar	2595-75	949.790.9100	UNKNOWN				APN 290-050-008	03/12/08	RG01	3	40%	1/24/2008		
6681 Archibald Avenue	712, J-4&5	Corona	TR 30913	>1	1	Grading Permit	Medium	4	833C330275	BGR 041597	Meritage Homes	Charles Weekly	19600 Fairchild Road, #270	Irvine	92612	949.250.6600	Edward Nava	949.254.6764			APN 359-130-037	03/14/08	RG01	3	80%			
6400 Hamner Avenue	683, E-6	Corona	TR 31606	>1	1	Grading Permit	Medium	3	833C331360	BGR 041628	Lennar Communities	Hal McCutchan	30135 Technology Drive, Suite 100	Murrieta	92563	951.712.8300	Tony Anderson	949.252.5653			APN 130-020-014	03/12/08	RG01	4	60%			
Indian Truck & Santiago Canyon R	388, K-10	Glen Ivy	PM 34635/CUP

35525 Leon Road	899, E-6	Winchester	TR 30694	>1	1	Grading Permit	Medium	3	833C333934	BGR 041308	Lennar Homes of California, Inc.	Hal McCutchan	40960 Country Center Drive, # 110	Temecula	92591	951.719.3449	Geoff Fender, Ken Gunter	951.830.4239, 951.296.0587		APN 467-230-019	03/21/08	RG01	3	70%						
6875 Archibald Avenue	712, J-1, 6	Corona	TR 31622	>1	1	Grading Permit	Medium	3	833C333814	BGR 041509	Capital Pacific Homes	Mark Mullins	200 South Main Street, Suite 300	Corona	92882	951.279.2470	Jay Clagg	951.323.1403		APN 144-020-014	03/18/08	RG01	3	80%						
NW Corner of Archibald & Schleisman Rd	712, J-1, 6	Mira Loma	TR 31931	>1	1	Grading Permit	Medium	3	833C33999	BGR 041825	Capital Pacific Homes	Mark Mullins	200 South Main Street, Suite 300	Corona	92882	951.279.2470	Jay Clagg	951.323.1403		APN 134-030-032	03/18/08	RG01	3	80%						
37418 Harvest Drive	929, D-2	Murrieta	TR 28685-2	>1	2	Grading Permit	Medium	3	833C332345	BGR 041985	Ryland Homes	Jason Jones	1250 Corona Pointe Court, Suite 100	Corona	92879	760.931.4444	Russ Bennette, Allan Tatum	760.536.2929, 760.533.0213		APN 958-280-001	03/21/08	TG01	3	60%						
30995 Los Alamos Road	899, A-4	Winchester	TR 30695	>1	1	Grading Permit	Medium	3	833C330934	BGR 050008	Lennar Homes of California, Inc	Hal McCutchan	40960 Country Center Drive # 110	Temecula	92591	951.719.3449	Geoff Fender, Ken Gunter	951.830.4239, 951.232.1829		APN 467-230-022	03/21/08	RG01	3	45%	2/5/2008				
27440 Benton Pond Drive	386, K-9	Romoland	TR 31795-2	>1	2	Grading Permit	Medium	3	21, 833C342276, 83	BGR 051803	Woodside Homes of California, Inc.	Paul Kruss	23121 Antonio Parkway, # 120	Rancho Santa Mar	92688	949.858.4980	Ken Clark, Ramses Gonzalez	951.712.2769, 951.232.9039		APN 333-170-039	03/20/08	RG01	3	65%					
27019 North Bay Lane	838, G-4	Romoland	TR 31795-4	>1	1	Grading Permit	Medium	3	3,833C334, 833C330	BGR 060216	Lennar Homes	Hal McCutchan	40960 Country Center Drive, # 110	Temecula	92591	951.719.3449	Jack Porter, Area Manager	951.232.0466		APN 331-280-004	03/20/08	RG01	3	65%					
18275 Serengeti Drive	976, D-2	Murrieta	APN 932-070-020SFR	>1	2	Grading Permit	Medium	3	933C346224	BGR 061258	Keith & Penny Butler		6470 Hawarden Drive	Riverside	92506	951.333.3950	Keith Butler	951.333.3950		APN 932-070-020	03/21/08	TG01	3	15%	11/13/2007	Y			
23795 Serrano Road	977, F-3	Temecula	APN 934-180-008SFR	>1	2	Grading Permit	Medium	3	933C345856	BGR 061068	Ryan Moves		P.O. Box 432	Twin Peaks	2391-04	909.744.4981	UNKNOWN			APN 934-180-008	03/19/08	RG01	3	45%	11/13/2008	Y			
45141 Calle Cuesta	978, H-3	Temecula	APN 940-170-020SFR	>1	1	Grading Permit	Medium	3	933C345139	BGR 060138	Bob Brown		27701 Creekbrush Court	Murrieta	92563	951.775.1541	UNKNOWN			APN 940-170-020	03/18/08	RG01	3	N/a		Y			
17401 Via Abril	976, B-1	Murrieta	APN 932-020-019SFR	>1	2	Grading Permit	Medium	3	933C343250	BGR 060944	Kevin Metcalfe		6705 Nadeau Lane	Riverside	92509	951.681.3682	UNKNOWN			APN 932-020-019	03/19/08	TG01	3	75%		Y			
16900 Hombre Avenue	956, F-3	Murrieta	APN 931-100-004SFR	>1	2	Grading Permit	Medium	3	933C343772	BGR 061020	Nancy Salisbury & Mike McMillan		28459 Old Town Front Street, Suite 225	Temecula	92590	951.212.1710	Kelly Sullivan	951.600.8388		APN 931-100-004	03/19/08	TG01	3	70%		Y			
40385 Calle Bandido	956, E-1	Murrieta	APN 932-320-045SFR	>1	2	Grading Permit	Medium	3	933C345557	BGR 070026	Eric Lewis		24288 Huntridge Drive	Murrieta	92562	9513665 3	UNKNOWN			APN 932-320-045	03/21/08	RG01	3	2%	11/13/2007	Y			
39395 Camino Miguel	931, A-6	Temecula	APN 915-210-050SFR	>1	2	Grading Permit	Medium	3	933C345646	BGR 070040	Mike Mullen		39101 Aqua Vista Road, Unit C	Murrieta	92563	951.966.5888	UNKNOWN			APN 951-210-050	03/18/08	TG01	3	60%		Y			
38154 Wallace Road	931, F-3	Hemet	APN 915-330-021SFR	>1	1	Grading Permit	Medium	3	933C344490	BGR 070047	Ben Allen		38154 Wallace Road	Hemet	92544	951.473.4684	UNKNOWN			APN 915-330-021	03/21/08	RG01	3	N/a		Y			
24010 Oak Circle Drive	897, E-4	Wildomar	APN 367-270-018SFR	>1	2	Grading Permit	Medium	3	933C346869	BGR 070201	Elisa Carroon & Arthur Reyes		2918 South Colonial Avenue	Ontario	91761	909.923.0286	Randy Boehmer	909.714.3932		APN 367-270-018	03/21/08	TG01	3	30%	11/14/2008	Y			
43600 La Cruz Drive	978, a-1	Temecula	APN 936-070-012SFR	>1	2	Grading Permit	Medium	3	933C346980	BGR 070193	Alan & Denise Parker		20995 Calle Cerrina	Temecula	92590	951.699.2196	UNKNOWN			APN 936-070-012	03/20/08	TG01	3	20%	11/14/2008	Y			
42190 Voyager Road	901, C-7	Hemet	APN 915-480-015SFR	>1	2	Grading Permit	Medium	3	933C346230	BGR 070201	John Wilkes		35195 Sawb Court	Sage	92544	951.926.3741	UNKNOWN			APN 915-480-015	03/18/08	TG01	3	70%		Y			
42500 Camino De Patterson	957, D-5	Temecula	APN 935-130-005SFR	>1	2	Grading Permit	Medium	3	933C346787	BGR 070276	Anthony Ritenour		32145 Corte Carmona	Temecula	92592	760.644.2620	UNKNOWN			APN 935-130-005	03/20/08	TG01	3	1%	11/14/2007	Y			
33810 Stage Road	901, A-3	Temecula	APN 470-380-037SFR	>1	2	Grading Permit	Medium	3	933C334997	BGR 061193	Ricardo Zarate		2875 Giese Court	Escondido	92026	760.747.8455	UNKNOWN			APN 470-380-037	03/17/08	TG01	3	65%		Y			
29115 Abutters Road	898, H-6	Murrieta	APN 392-350-007SFR	>1	Unknown	Grading Permit	Medium	3	unknown	BGR 061174	Robert LaFond		28720 Lee Lane	Murrieta	92503	951.532.3026	UNKNOWN			APN 392-350-007	03/17/08	Unknown	3	10%	11/7/2007	Y			
32265 Navajo Springs Road		Wildomar	APN 365-220-004SFR	>1	2	Grading Permit	Medium	3	933C346259	BGR 070233	Lonnie Silva		26100 Newport Road, Apt. A-112	P.O. Box 1	Menifee	951.375.0222	UNKNOWN			APN 365-220-004	03/17/08	TG01	3	10%	11/7/2007	Y			
7868 Mission Road	644, G-7	Riverside	TR 30695-1-2	>1	1	Grading Permit	High	6	833C341676	BGR 060628	AMS Development	Kirk Wallace	P.O. Box 6940	Rancho Santa Fe	92067	858.832.1363	Kirk Wallace	626.255.6275		APN 183-020-022	04/02/08	RG01	6	30%	3/27/2008				
16810 Van Buren	745, H-6	Riverside	CUP 03480	>1	Unknown	Grading Permit	Medium	1	unknown	BGR 070836	Huang Mau Hsu		190 South Donna Court	Anaheim Hills	92807	909.992.0668	UNKNOWN			APN 275-141-001	04/03/08	Unknown	1	25%	4/3/2008				
16455 Lake Pointe Drive	744, G-5	Riverside	TR 28816	>50acres	1	Grading Permit	High	11	833S314727	BGR 000690	Brehm Builders	Kevin Canning	2714 Loker Avenue W., # 300	Carlsbad	92008	760.448.2420	Curt VanDoren, Ernie Pierce	858.528.6574, 760.801.5492		APN 140-050-014	03/27/08	RG01	11	60%					
29081 Turtle Rock Court	837, D-7	Quail Valley	TR 30330	>1	1	Grading Permit	High	12	833C338874	BGR 030233	K. Hovnanian Forecast Homes, Inc.	Anna Walton	1500 South Haven, Suite 100	Ontario	91761	909.937.3270	r. Rich Grise, John Steward, C	8617, 909.376.7033, 951.634.2333, 951.377.9351		APN 351-020-009	03/24/08	RG01	12	60%					
16250 Gallery Heights Drive	745, G-4	Riverside	TR 28767R1	>1	1	Grading Permit	High	12	833C325417	BGR 030372, 050830	Gallery Heights Partners	Rick Houser	31610-2 Railroad Canyon Road	Canyon Lake	92587	909.244.7713	Clay Howell	951.294.1332		APN 273-060-020	03/26/08	RG01	7	70%					
23751 Spencer Suite	806, A-5	Gavilan Hills	TR 27557	>1	1	Grading Permit	High	13	833C332457	BGR 030687	Century Vintage Homes-Crowell Santa Ro	David Cooper	1535 South D Street	San Bernardino	92408	909.381.6007	Shawn Denison	909.721.7011		APN 390-060-025	03/26/08	RG01	13	75%					
25085 La Estrella Street	897, H-6	Wildomar	TR 30695	>1	2	Grading Permit	High	10	833C327134	BGR 031136	Beazer Homes	Darius Fatakia	1800 E. Imperial Hwy, Suite 200	Brea	92821	714.285.2900	Kevin Brickley	714.231.7386		APN 362-180-029	03/25/08	TG01	10	80%					
29305 Newport Road	868, G-2	Menifee	TR 30422	>20acres	1	Grading Permit	High	10	833C300563	BGR 040779	Center Homes	Steve Moffatt	2280 Wardlow Circle, # 150	Corona	92880	909.479.9311	Teresa Jakeway	3425, 951.712.7534, 951.520.6959, 951.538.7466		APN 364-200-001	03/25/08	RG01	10	65%					
17756 Mockingbird Canyon Road	745, E-5	Riverside	TR 22100	>200acre	1	Grading Permit	High	13	833C337322	BGR 041051	KB Home	Michael Freeman	26201 Ynez Road, # 104	Temecula	92591	951.587.3300	Bob Weirich	619.954.6941		APN 273-300-006	03/26/08	TG01	13	70%					
23820 Catt Road		Wildomar	TR 30155	>50acres	1	Grading Permit	High	10	833C333979	BGR 041659	Van Daele Development	Brice Kittle	2900 Adams Street, # C-25	Riverside	92504	951.354.2121	Bob Surprise, Shane Chilton	951.850.3122, 951.850.3110		APN 376-410-005	03/25/08	TG01	10	80%					
31380 Simpson Road	839, B-6	Winchester	TR 30989	>52 acre	1	Grading Permit	High	9	833C300250	BGR 041871	Griffin Communities	Don Berry	110 North Lincoln Avenue, 2nd Floor	Corona	92882	951.898.1234	Lou Messina, Don Berry	951.545.9556, 909.841.5062		APN 462-020-047	03/25/08	RG01	9	65%					
2061 McCallister Avenue	795, A-4	Riverside	TR 30337	>1	1	Grading Permit	High	11	833C334540	BGR 042062	Lennar Homes	Hal McCutchan	40960 Country Center Drive, # 110	Temecula	92591	951.687.7929	Randy Marrs, Chris Curiel	951.830.5154, 951.687.2583		APN 136-110-017	03/27/08	RG01	11	60%					
16660 King Avenue, 16577 Ponde	745, H-6	Riverside	TR 27887	>1	1	Grading Permit	High	13	833C329292	BGR 050040	Gallery Ranch Partners	Rick Houser	31618-1 Railroad Canyon Road	Canyon Lake	92581	951.244.7713	Holser, Carl Bachlor, Dave M	51.377.7690, 951.294.1716, 951.294.1331		APN 273-200-024	03/26/08	RG01	13	50%	4/4/2008				
25355 Newport Road	867, H-3		TR 31391	-514acre	1	Grading Permit	High	10	833C338544	BGR 050227	Audie Murphy Ranch, LLC	Dennis Chapman	1522 Brookhollow Drive, Suite 1	Santa Ana	92705	951.279.1800	Hauck, Pat Celella, Robert Ch	09.772.7974, 714.393.1370, 951.712.2351		APN 358-090-001	03/24/08	RG01	10	80%					
28300 Garbani Road	868, F-5	Menifee	TR 28206	g 79.6ac	1	Grading Permit	High	10	833I300634	BGR 050987	Granite Homes	Pat Donahue	2 Park Plaza, # 700	Irvine	92614	949.250.9229	Simon Horton, Bobby Elkins	951.377.6990, 951.757.2625		APN 272-050-004	03/25/08	RG01	10	80%					
Newport Road	868, D-3	Menifee	PM 34275 / TR 33647	-210acre	1	Grading Permit	High	14	833C342539	BGR 051100	Pardee Homes	David Graves	1385 Old Temescal Road	Corona	92881	949.757.8444	Roland Phillipp	949.678.9492		APN 380-080-012,013,014	03/24/08	RG01	13	65%					
13201 Schleisman Road	683, C-6	Mira Loma	TR 30931	>1	1	Grading Permit	High	10	833C337223	BGR 051181	Certex Homes	Steven Moffatt	1265 Corona Pointe Court	Corona	92879	951.479.1147	Don Pruett, Teresa Jakeway	951.538.4464, 951.520.6959		APN 144-060-006	04/10/08	RG01	10	85%					
5240 Harmer Avenue	713, D-2	Mira Loma	PM 31645	>1	1	Grading Permit	High	9	833C340661	BGR 051861	Lewis Operating Corporation	Scott Crawford	1156 North Mountain Avenue	Upland	91785	909.946.7596	Tom De Avila, Scott Crawford	909.618.5706, 909.379.4202		APN 162-100-025	04/10/08	RG01	10	80%					
Newport Road	868, D-3	Menifee	PM 34275 / TR 33647	-210acre	1	Grading Permit	High	14	833C340661	BGR 060293	Pardee Homes	Erika Horn	1385 Old Temescal Road	Corona	92881	951.817.3400	Dave Jones	909.772.8637		APN 380-080-012,013,014	04/08/08	RG01	14	65%					
27100 Newport Road	868, D-2	Menifee	CUP 03475	-68.8acre	1	Grading Permit	High	11	833C345236	BGR 060293	Donahue Schriber Realty Group	Jerry Wierenga	P.O. Box 4549	Menifee	92018	714.966.6436	Harold Chapman	951.692.6607, 415.269.2962		APN 380-080-012,013,014	04/08/08	RG01	11	50%	2/14/2008				
24727 Santiago Canyon Road		Glen Ivy	TR 31906	94.3acre	1	Grading Permit	High	12	833C334910	BGR 060778	Starfield Sycamore Investments, LLC	Steven Stout	2 Ada, Suite 200	Irvine	2819-23	949.790.5400	Steve Stout, Jay Gates	951.634.7956, 951.201.0601		APN 290-140-061	04/11/08	RG01	12	75%					
22565 Palomar Road	927, E-1	Wildomar	TR 30839	>1	2	Grading Permit	Medium	4	833C324054	BGR 030989	Silver Oaks Communities	Carla Franks	1105 Quail Street	Newport Beach	92660	949.955.3832	Doug Sweeney	949.795.6321		APN 380-140-003	04/11/08	TG01	4	65%					
22489 Palomar Road	927, C-1	Wildomar	TR 30939	>1	2	Grading Permit	Medium	4	833C324054	BGR 030990	Silver Oaks Communities	Carla Franks	1105 Quail Street	Newport Beach	92660	949.955.3832	Doug Sweeney	949.795.6321		APN 380-140-002	04/11/06	TG01	4	75%					
52500 Tollgate Road	844, A-1	Idyllwild	PP 10130	>1	2	Grading Permit	Medium	3	833C339365	BGR 031058	Idyllwild Arts Foundation	Ed Huddleston	P.O. Box 32	Idyllwild	92549	951.659.2171	Ed Huddleston	951.659.2171, ext. 2269		APN 557-120-001	04/04/08	RG01	3	70%					
7650 Harrison Avenue	713, B-2	Mira Loma	TR 30762	>1	1	Grading Permit	Medium	4	833C332917	BGR 031450	Trimark Pacific Homes	James Kindell	3400 Central Avenue, # 335	Riverside	92506	949.753.7725	Jim Kindell	951.965.2991		APN 134-230-012	04/09/08	RG01	4	85%					
11440 Winchester Road	899, D-5	Winchester	TR 31330	>1	1	Grading Permit	Medium	3	833C327026	BGR 040254	John Long Homes	Fred Farr	255 East Rincon Street, #100	Corona	2879-13	909.272.5115	Damon Tennaka	951.258.6449		APN 467-240-014	04/11/08	RG01	3	50%	4/23/2008				
6651 Archibald Avenue	712, J-1	Corona	TR 30893	>1	Unknown	Grading Permit	Medium	4	unknown	BGR 040265	Trimark Pacific Homes	James Kindell	3400 Central Avenue, # 335	Riverside	92506	949.753.7725	Jim Kindell	951.965.2991		APN 144-020-005	04/09/08	Unknown	4	80%					
32010 Patton Road	839, D-7	Winchester	TR 30322	>1	1	Grading Permit	Medium	3	833I300243	BGR 040619	Fieldstone Communities	Bobbi McBrathney	5465 Morehouse Drive, #250	San Diego	92121	858.546.8081	Jay Cates	951.201.0601		APN 461-200-008	04/03/08	RG01	3	75%					
7538 Morning Mist Drive	713, B-2	Mira Loma	TR 28742	>1	1	Grading Permit	Medium	5	833C335530	BGR 041082	MBK Homes, Ltd.	Patti Gillespie	175 Technology Drive, #200	Irvine	92618	909.769.8300	Jeremy Johnson	951.840.7903		APN 152-030-002, -005	04/09/08	RG01	5	70%					
31490 Jean Nicholas Road	899, C-5	Winchester	TR 31118	>1	2	Grading Permit	Medium	4	833C337363	BGR 041450	Silver Oaks Communities	Carla Franks	1105 Quail Street	Newport Beach	92660	949.955.3832ext 201	Doug Sweeney	949.795.6321		APN 467-160-047	04/11/08	TG01	4	50%	2/5/2008				
39020 Patton Road	839, B-7	Winchester	TR 30808-1	>1	1	Grading Permit	Medium	3	833I300244	BGR 041763	Fieldstone Communities	Jack Dimond	2 Ada, Suite 200	Irvine	92618	951.277.2564	Jay Cates	951.201.0601		APN 461-180-043	04/03/08	RG01	3	85%					
39020 Patton Road	839, B-7	Winchester	TR 30808-2	>1	1	Grading Permit	Medium	2	833I300244	BGR 041764	Rancon Winchester Valley, LLC	Jim Roberts	41391 Kalmia Street	Murrieta	92562	951.696.0600	Frank Iao	951.696.0600ext 307		APN 461-180-048	04/03/08	RG01	2	65%					
34990 Elliot Road	899, D-5	Winchester	TR 32171	>1	2	Grading Permit	Medium	4	833C332826	BGR 050158	Lennar Homes	Fred Farr	255 East Rincon Street, Suite 100	Corona	2879-13	951.272.6127	Damon Tennaka	951.258.6449		APN 467-160-018	04/11/08	TG01	3	55%					
7651 Stonegate Drive	713, B-2	Mira Loma	TR 30762-1	>1	1	Grading Permit	Medium	4	833C326971	BGR 050885	MBK Homes, Ltd	Patti Gillespie	175 Technology Drive, #200	Irvine	92618	949.789.8300	Jeremy Johnson	951.840.7903		APN 134-230-012	04/09/08	RG01	4	75%					
44300 Sage Road	981, J-1	Aguanga	PP 18891	>1	1	Grading Permit	Medium	3	833C323862	BGR 050905	Aguanga Christian Fellowship Church	Pastor Michael Murph	414 Devonshire Glen	Escondido	92027	760.310.1971	UNKNOWN	UNKNOWN		APN 581-150-008	04/04/08	TG01	3	60%					
26037 Bolder Ridge Drive		Menifee	TR 30812	Unknown	Unknown	Grading Permit	Medium	4	unknown	BGR 061271	Gallery Boulders Partners	Rick Houser	31618-1 Railroad Canyon Road	Canyon Lake	92587	951.244.7713	David Meade	951.294.1331, fax 951.244.7714		APN 360-200-036	03/17/08	Unknown	5	80%					
Craig Avenue & Antelope Road	868, F-5	Menifee	TR 32628	>1	1	Grading Permit	Medium	3	833C345306	BGR 070055	BC Christensen Ranch, LLC	Lee James	17140 Bernardo Center Drive, Suite 360	San Diego	92128	858.217.3144	Bill Schmoll	858.217.2835		APN 372-050-002 -020	03/18/08 & 04/10/	RG01	3	60%					
27757 Aspel Road		Sun City	PP 21558	>1	Unknown	Grading Permit	Medium	1	unknown	BGR 070798	A.G. Spanos Companies	Jon Lucas	41593 Winchester Road, Suite 212A	Temecula	92590	951.693.0624	Scott Boersma, Jon Lucas	951.840.0191, 951.693.0624		APN 333-230-006	04/10/08	Unknown	1	40%	4/23/2008				
72063 Del Norte Way	788, D-1	Thousand Palms	PM 30439	>1	3	Grading Permit	Medium	3	733S318790	BGR 020946	White Brothers Investments Company	John Burke	1445 North Sunrise Way, Suite 104	Palm Springs	92262	760.323.2741	Terry Welland	909.322.7242		APN 650-020-004	04/10/06	IG01	3	60%					
38265 County Line Road	650, J-7	Yucaipa	APN 401-310-003 SFR	>1	1	Grading Permit	Medium	4	unknown	BGR 031310	Neal T. Baker Enterprises		1875 Business Center Drive	San Bernardino	92408	909.884.7241	Terry Talley	909.884.7241		APN 407-320-063,64,65	04/07/08	Unknown	4	70%		Y			
73500 Varner Road	819	Thousand Palms	PP 15752, PP 19050	>1	3	Grading Permit	Medium	3	833C305928	BGR 031397	George Dickinson		606 North Larchmont Blvd., #46	Los Angeles	90004	323.463.1181	Bruce Dickinson	213.590.3230		APN 401-310-003 SFR	04/07/08	RG01	4	40%		Y			
24968 Keissel Road	687, F-1	Colton	APN 471-060-013SFR	>1	2	Grading Permit	Medium	4	836C326655	BGR 031477	Lil Liu Lu Bill Gomes		P.O. Box 13390	Palm Desert	2255-33	760.341.5297	Steve Phillips	760.360.3812		APN 653-410-016	04/11/08	RG01	3	50%	2/6/2008				
46225 Sandia Creek Road	977, H-4	Temecula	APN 936-290-011 SFR	>1	2	Grading Permit	Medium	3	933C325890	BGR 040065	Martin Flores/Armando Leandro		3061 Cameron Vista	Colton	92324	909.831.2206	Tony	909.331.2066		APN 467-160-013SFR	04/09/08	RG01	4	5%	12/18/2007	Y			
41260 Hermitage Drive	819, H-4	Indio	PP 19940/TR 30483	>1	3	Grading Permit	Medium	3	733C330805	BGR 070052	BVN Homes, Inc.	Eric Erwin	5305 E. Second Street, Suite 204	Long Beach	90803	562.433.1286	Eric Erwin, Phil Larson	760.898.2416, 951.314.9384		APN 936-290-011 SFR	05/08 & 04/08/	TG01	4	75%					
54850 Jackson Street	5530, H-3	Coachella	TR 31279	>1	3	Grading Permit	Medium	3	733C340217	BGR 041140	Temple Development	Mark Temple	610 South Belardo Road, Suite 1200	Palm Springs	92264	760.323.5310	Mark Temple, John Hubbard	760.774.3294, 760.774.8536		APN 467-160-013SFR	04/11/08	IG01	3	55%					
46349 De Portola Road	900, J-2	Temecula	APN 470-330-025SFR	1.78acre	2	Grading Permit	Medium	3	933C330668	BGR 041310	Kim Ramsey		2824 La Cresta Avenue	Anaheim		714.412.3118	UNKNOWN	UNKNOWN		APN 653-290-002	04/11/08	IG01	3	45%	2/6/2008				
29250 Rio Del Sol Road	788, C-1	Thousand Palms	CUP 3252	>1	3	Grading Permit	Medium	3	733I016928	BGR 041507	Ben Wilcox/ Southern California Recycli	Ben Wilcox	29250 Rio Del Sol Road	Thousand Palms	92276	760.343.0499	Ben Wilcox, Ted Dumas	714.715.0281, 760.343.0499		APN 470-330-025 SFR	04/07/08	TG01	4	65%					
65115 Johnson Street	5592, C-6	Mecca	TR 31027	>1	3	Grading Permit	Medium	3	733C330409	BGR 060137	Coachella Valley Housing Coalition	Ed Brock	45-701 Monroe Street, Suite G Plaza 1	Indio	92201	760.347.3157	wavic Rutowski, Britni Edward	347.3157 Ext. 256 / ext. 227, 619.610.1939		APN 470-380-037	04/10/08	IG01	3	65%					
213447 Sky Mesa Road	809, B-2	Homeland	APN 429-320-029 SFR	>1	2	Grading Permit	Medium	4	833C332925	BGR 050155	Greg & Connie Dexter		28491 Connecticut Drive	Quail Valley	92587	951.244.2302	UNKNOWN	Unknown		APN 429-320-029 SFR	04/07/08	RG01	4	70%					
41405 Mark Trail	901, E-5	Hemet	APN 470-210-039 SFR	>1	1	Grading Permit	Medium	4	833C334652	BGR 050699	Karen Adams		41405 Mark Trail	Hemet	92544	951.492.1811	Karen Adams	951.492.1811		APN 470-210-039 SFR	04/08/08	RG01	4	65%		Y			
34200 Chase School Road	788, J-5	Thousand Palms	PUP 00866	>1	3	Grading Permit	Medium	3	733C334922	BGR 051781	Xavier College Preparatory High School	Doede Rover	P.O. Box 1775	Palm Desert	92261	760.346.4741	Craig White	619.520.8526		APN 653-290-002	04/11/08	IG01	3	75%					
8055 Smiley Blvd	688, B-1	Moreno Valley	APN 471-150-022 SFR	>1	2	Grading Permit	Medium	4	836C336405	BGR 051236	Timothy Young		3700 Piedmont Drive	Hilard	92346	909.864.3808	Timothy Young, Mike Ber	909.864.3808, 909.721.0049		APN 471-150-022	04/09/08	RG01	4	20%	11/26/2007	Y			
78910 Darby Road	819, H-3	Indio	TR 32671	>1	3	Grading Permit	Medium	3	733C340166	BGR 060050	D.A. Martin, Inc	Dennis Martin	P.O. Box 12735	Palm Desert	92255	760.779.5199	Dennis Martin, Doug Blagden	760.779.5199, 760.567.9742		APN 609-441-067	04/11/08	IG01	3	60%					
41865 Calle Bandido	926, E-4	Murrieta	APN 931-070-013 SFR	>1	2	Grading Permit	Medium	2	933C342085	BGR 060547	Richard Demille		6111 North Oakbank Drive	Azusa	91702	626.963.5839, 818.489.4592	UNKNOWN	Unknown		APN 931-070-013 SFR	05/08 & 04/09/	TG01	2	65%		Y			
21150 Oak Knoll Drive	805, E-1	Perris	APN 286-190-007SFR	>1	2	Grading Permit	Medium	3	833C348025	BGR 060601	Cherae Valenzuela		P.O. Box 6197	Corona	92878	951.264.7095	Andrew Valenzuela	951.272.9379		APN 286-190-007	04/09/08	RG01	3	55%		Y			
40275 Via Caballos	956, G-1	Murrieta	APN 929-160-027SFR	>1	2	Grading Permit	Medium	4	933C345112	BGR 061261	Jack Eitzen, Reggie Ragsdale		41865 Dahlias Way	Murrieta	92562	408.656.2009, 951.837.1532	Brad Hollis	951.534.4874		APN 929-160-027	05/08 & 04/09/	TG01	4	55%		Y			
21629 Ridgedale Drive	806, D-1	Perris	APN 286-230-025SFR	>1	2	Grading Permit	Medium	3	833C345932	BGR 070169	Mary & Tanya Durment		1815 Moreno Avenue	Corona	92879	951.737.2607	UNKNOWN	Unknown		APN 286-230-025	04/09/08	RG01	3	30%	4/28/2008	Y			
15975 Diablo Road	726, J-1	North Palm Springs	WCS 00116	>1	1	Grading Permit	Medium	3	unknown	BGR 070256	Southern California Edison		2244 Walnut Grove Avenue	Rosemead	91770	714.934.0610	UNKNOWN	Unknown		APN 668-100-005	04/10/08	Unknown	3	N/a					
17525 Diablo Road		North Palm Springs	PP 17817/PP 20967	>1	Unknown	Grading Permit	Medium	3	unknown	BGR 070501	Dillon Wind, LLC		1125 NW Couch, Suite 700	Portland	97209	503.793.7256	UNKNOWN	Unknown		APN 668-292-005	04/10/08	Unknown	3	N/a					

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25213 Sophie Street	807, D-7	Perris	APN 345-230-026 SFR	>1	1	Grading Permit	Medium	2	833C348843	BGR 070841	Warren Jacobs	2789 Las Palmas Avenue	Escondido	92025	951.318 4000	UNKNOWN	APN 345-230-026	05/01/08	RG01	2	15%	3/10/2008	Y
29081Turtle Rock Court	837, D-7	Quail Valley	TR 30330	>1	1	Grading Permit	High	15	833C338874	BGR 030233	K. Hovnanian Forcast Homes, Inc	Anna Walton	1500 South Haven, Suite 100	Ontario	91761	909.937.3270	APN 351-020-009	05/07/08	RG01	15	65%		
16250 Gallery Heights Drive	745, G-4	Riverside	TR 28767R1	>1	1	Grading Permit	High	10	833C325417	BGR 050630	Gallery Heights Partners	Rick Houser	31610-2 Railroad Canyon Road	Canyon Lake	92587	909.244.7713	APN 273-060-020	05/08/08	RG01	10	70%		
8405 Archibald Avenue	712, H-4	Mira Loma	TR 31961	>1	1	Grading Permit	Medium	4	833C342961	BGR 060274	Standard Pacific Homes	Wendy Fisher	255 East Rincon Street, #200	Corona	92879	951.372.8500	APN 130-020-026	05/14/08	RG01	4	55%		
23751 Spencer Butte	806, A-5	Gavilan Hills	TR 27557	>1	1	Grading Permit	High	16	833C332457	BGR 030687	Century Vintage Homes-Crowell Santa Ro	David Cooper	1535 South D Street	San Bernardino	92408	909.381.6007	APN 390-060-025	05/08/08	RG01	16	70%		
29085 La Estrella Street	897, H-7	Wildomar	TR 30656	>1	2	Grading Permit	High	13	833C337134	BGR 031136	Beazer Homes	Darius Fatakia	1800 E. Imperial Hwy, Suite 200	Brea	92821	714.285.2900	APN 362-180-029	05/09/08	TGO1	13	60%		
29305 Newport Road	868, G-2	Menifee	TR 30422	~250acre	1	Grading Permit	High	13	833C300563	BGR 040779	Centex Homes	Steve Moffatt	2280 Wardlow Circle, # 150	Corona	92880	909.479.9311	APN 364-200-001	05/06/08	RG01	13	65%		
17756 Mockingbird Canyon Road	745, E-5	Riverside	TR 22100	~200acre	1	Grading Permit	High	16	833C337322	BGR 041051	KB Home	Michael Freeman	26201 Ynez Road, # 104	Temecula	92591	951.587 3300	APN 273-300-006	05/08/08	RG01	16	80%		
23820 Catt Road		Wildomar	TR 30155	>50acre	2	Grading Permit	High	13	833C333979	BGR 041659	Van Daele Development	Brice Kittle	2900 Adams Street, # C-25	Riverside	92504	951.354.2121	APN 378-410-005	05/09/08	TGO1	13	55%		
31380 Simpson Road	839, B-6	Winchester	TR 30989	52 Acre	1	Grading Permit	High	12	833J300250	BGR 041871	Griffin Communities	Don Benny	110 North Lincoln Avenue, 2nd Floor	Corona	92882	951.898.1234	APN 462-020-047	05/06/08	RG01	12	65%		
16880 King Avenue, 16577 Ponde	745, H-6	Riverside	TR 27887	>1	1	Grading Permit	High	16	833C329292	BGR 050040	Gallery Ranch Partners	Rick Houser	31618-1 Railroad Canyon Road	Canyon Lake	92587	951.244.7713	APN 273-290-024	05/08/08	RG01	16	55%		
25355 Newport Road	867, H-3	Canyon Lake	TR 31391	~514acre	1	Grading Permit	High	13	833C338544	BGR 050227	Audie Murphy Ranch, LLC	Dennis Chapman	1522 Brookhollow Drive, Suite 1	Santa Ana	92705	951.279.1800	APN 358-090-001	05/07/08	RG01	13	60%		
28300 Garbani Road	868, F-5	Menifee	TR 28206	sq. 79.8 a	1	Grading Permit	High	13	833C300634	BGR 050967	Granite Homes	Pat Donahue	3 Park Plaza, # 700	Irvine	92614	949.250.9229	APN 372-030-004	05/08/08	RG01	13	65%		
14300 Schlesiman Road	712, H-1	Corona	TR 30971	>1	1	Grading Permit	High	12	833C342539	BGR 051109	Pardee Homes	David Graves	1385 Old Temescal Road	Corona	92881	949 757 8444	APN 144-060-006	05/06/08	RG01	12	85%		
13201 Schlesiman Road	683, C-6	Mira Loma	TR 30931	>1	1	Grading Permit	High	12	833C337223	BGR 051181	Centex Homes	Steven Moffatt	1265 Corona Pointe Court	Corona	92879	951.479 1147	APN 164-050-006	05/05/08	RG01	12	80%		
5240 Hamner Avenue	713, D-2	Mira Loma	PM 31645	>1	1	Grading Permit	High	11	833C340861	BGR 051845	Lewis Operating Corporation	Scott Crawford	1156 North Mountain Avenue	Upland	91785	909.946.7596	APN 160-020-006	05/05/08	RG01	11	75%		
27100 Newport Road	868, D-2	Menifee	CUP 03475	-68.8acre	1	Grading Permit	High	13	833C345236	BGR 060293	Donahue Schriber Realty Group	Jerry Weirenga	P.O. Box 4549	Carlsbad	92018	714.966.6436	APN 360-080-012	05/07/08	RG01	13	55%		
Newport Road & Haun Road	868, D-3	Menifee	PM 34275 / TR 33647	~210acre	1	Grading Permit	High	16	833C340961	BGR 060293	Pardee Homes	Erika Horn	1385 Old Temescal Road	Corona	92881	951.817 3400	APN 365-080-012	05/07/08	RG01	16	65%		
24727 Santiago Canyon Road		Glen Ivy	TR 31906	94.3acre	1	Grading Permit	High	14	833C334910	BGR 060778	Starfield Sycamore Investments, LLC	Steven Stout	2 Ada, Suite 200	Irvine	2819-234	949.970.5400	APN 290-140-061	05/09/08	RG01	14	75%		
Campbell Ranch & Mayhem Canyo	388, K-9	Corona	TR 29320	>1	1	Grading Permit	Medium	4	833C335918	BGR 010012, 050524	Starfield Sycamore Investments, LLC	Steven Stout	2 Ada, Suite 200	Irvine	2819-234	949.970.5400	APN 290-130-025	05/07/08	RG01	4	70%		
8221 Archibald Avenue	713, A-3	Corona	TR 29677	>1	1	Grading Permit	Medium	4	833C327288	BGR 040082	Standard Pacific Homes	Wendy Fisher	255 East Rincon Street, Suite 100	Corona	92879	909.372 8500	APN 130-020-010	05/06/08	RG01	4	60%		
20500 Grand Avenue	896, J-6	Wildomar	TR 29513	~48acre	1	Grading Permit	Medium	3	833J300371	BGR 040172	Wildomar-Riverside, L.P. / Brehm Commur	Kevin Canning	2714 Loker Avenue W., # 300	Carlsbad	92008	760.448.2420	APN 382-150-033	05/13/08	RG01	3	60%		
3580 Hamner Avenue	643, E-4	Mira Loma	TR 30488-1	>1	1	Grading Permit	Medium	4	833C336938	BGR 040713	Lennar Communities	Hal McCutchan	391 North Main Street, #301	Corona	92880	951.817 3600	APN 160-030-003	05/14/08	RG01	4	80%		
35111 Leon Road	899, C-5	Menifee	TR 30791	>1	2	Grading Permit	Medium	4	833C335156	BGR 040848	Capital Pacific Homes	Mark Mullins	200 South Main Street, Suite 300	Corona	92882	951.279.2447	APN 467-240-035	05/08/08	TGO1	4	55%		
31526 Sherman Road	868, D-6	Menifee	TR 31724	>1	1	Grading Permit	Medium	3	833J300352	BGR 041049	Capital Pacific Homes	Mark Mullins	200 South Main Street, Suite 300	Corona	92882	951.279.2447	APN 380-260-004	05/06/08	RG01	3	55%		
34491 Washington Street	899, F-4	Murrieta	TR 29962	>1	2	Grading Permit	Medium	6	833C331498	BGR 041232	Van Daele Development	Brice Kittle	2900 Adams Street, # C-25	Riverside	92504	951.354.2121	APN 467-170-046	05/15/08	TGO1	6	30%	5/29/2008	
33260 Menifee Road	898, G-1	Menifee	TR 30349	>1	1	Grading Permit	Medium	4	833C331063	BGR 041257	Standard Pacific Homes	Charles Weeks	19600 Fairchild Road, #270	Irvine	92612	949.250.6600	APN 356-130-037	05/13/08	RG01	4	75%		
Reflection Road	638, G-4	Romoland	TR 31795-3	>1	1	Grading Permit	Medium	4	3J300394, 833C339	BGR 041278	Standard Pacific Homes	Wendy Fisher	255 East Rincon Street, Suite 100	Corona	92879	909.372 8500	APN 333-170-001	05/06/08	RG01	4	80%		
9650 Harrison Avenue	643, B-7	Corona	TR 31725	>1	1	Grading Permit	Medium	4	833C33203	BGR 051196, 041489	William Lyon Homes	Gene Stroiek	4490 Von Karman	Newport Beach	92660	949.476.5467	APN 144-040-006	05/05/08	RG01	4	85%		
5400 Hamner Avenue	583, E-6	Corona	TR 31606	>1	1	Grading Permit	Medium	4	833C331360	BGR 041608	William Lyon Homes	Gene Stroiek	4490 Von Karman	Newport Beach	92660	949.476.5467, 949 833.3600	APN 152-010-011	05/14/08	RG01	4	60%		
39020 Patton Road	839, B-7, C	Winchester	TR 30808-2	>1	1	Grading Permit	Medium	3	833J300244	BGR 041764	Rancon Winchester Valley, LLC	Jim Roberts	41391 Kalmia Street	Murrieta	92562	951.696.0600	APN 461-180-048	05/08/08	RG01	3	65%		
29211 Holland Road	868, G-4	Menifee	TR 31629	>1	1	Grading Permit	Medium	3	3J300457, 833C338	BGR 042072	D.R. Horton	Frank Igo	5927 Priestly Drive, Suite 200	Carlsbad	92008	760 497 3269	APN 372-080-008	05/06/08	RG01	3	65%		
27410 Garbani Road	868, D-6	Menifee	TR 31831	>1	1	Grading Permit	Medium	3	833C339662	BGR 050103	Capital Pacific Homes	Mark Mullins	200 South Main Street, Suite 300	Corona	92882	909.279.2447	APN 360-250-010	05/06/08	RG01	3	75%		
32530 Murriet Road	896, A-1	Menifee	TR 30664	>1	1	Grading Permit	Medium	6	3J300595, 833C338	BGR 050289	Gallery Estates Partners, LLC	Rick Houser	31610-2 Railroad Canyon Road	Canyon Lake	92587	951.244.7713	APN 390-310-001 -005	05/06/08	RG01	6	75%		
11220 Jasmine Way	388, K-10	Corona	TR 28335-2	>1	1	Grading Permit	Medium	3	833C332084	BGR 050584	Fieldstone Communities	Steve Bradley	2 Ada, Suite 200	Irvine	92618	949 790.5400	APN 290-140-021	05/07/08	RG01	3	45%	5/29/2008	
Clover Circle	388, K-10	Glen Ivy	TR 30440-1 & -2	>1	1	Grading Permit	Medium	4	833C336989	BGR 051277	Fieldstone Communities	Steven Stout	2 Ada, Suite 200	Irvine	92618	949.790.5400	APN 290-110-033	05/07/08	RG01	4	65%		
21272 Canyon Drive	897, A-4	Wildomar	TR 31345	>1	1	Grading Permit	Medium	4	833J300321	BGR 051437	The Pit Stop Holdings	Michael Rubino	1110 East Chapman Avenue, #206	Orange	92866	714.633.6100	APN 367-020-008	05/15/08	RG01	4	35%	5/29/2008	
Santiago Canyon Road	388, K-9	Corona	TR 30440	>1	1	Grading Permit	Medium	4	833C333923	BGR 041853, 060033	Richmond American	Monica Sierra	1305 Corona Pointe Court	Corona	92879	951.898.5306	APN 290-130-038	05/07/08	RG01	4	75%		
27019 North Bay Lane	638, G-4	Romoland	TR 31795-4	>1	1	Grading Permit	Medium	4	3J300394, 833C339	BGR 060216	Lennar Homes	Hal McCutchan	40980 Country Center Drive, # 110	Temecula	92591	951.719.3449	APN 331-280-004	05/09/08	RG01	4	65%		
Swallow Lane	388, K-9	Glen Ivy	TR 30440-3	>1	1	Grading Permit	Medium	4	833C340187	BGR 060303	Chesmar Homes	Chris Randall	19 Corporate Plaza Drive	Newport Beach	92660	949.721.8200	APN 290-140-021	05/07/08	RG01	4	70%		
8405 Archibald Avenue	712, J-4&E	Mira Loma	TR 31643	>1	1	Grading Permit	Medium	4	833C341793	BGR 060423	Standard Pacific Homes	Wendy Fisher	255 East Rincon Street, #200	Corona	92879	951.372.8500	APN 130-130-017	05/14/08	RG01	4	60%		
28635 Bavaria Drive	838, D-6 &	Sun City	PM 18445	>1	1	Grading Permit	Medium	2	833C339193	BGR 061077	Kensington West, LLC	Eddy Primero	22861 Tindaya	Mission Viejo	92692	949.830.0322	APN 336-009-004	05/09/08	RG01	2	5%	5/29/2008	
30951 Hanover Lane		Menifee	PP 22338	>1	1	Grading Permit	Medium	3	833C349773	BGR 070206	Fairfield Holland Rd., LP	Corey Ladd	5510 Moorehouse Drive, Suite 200	San Diego	92121	858.457.2123	APN 296-140-021	05/07/08	RG01	4	70%		
34875 Pourroy Road	899, D-5	Winchester	TR 35200/PP 22850	>1	1	Grading Permit	Medium	3	833C349772	BGR 070378	Fairfield Winchester 1800, LP	Jay Scott	5510 Moorehouse Drive, Suite 200	San Diego	92121	858 457.2123	APN 450-040-037	05/15/08	TGO1	3	70%		
35323 Pourroy Road	899, E-5	Temecula	TR 29114	>1	2	Grading Permit	High	16	833C318341	BGR 020669	Barratt American	Michael Armstrong	5950 Priestly Drive, Suite 101	Carlsbad	92008	760.431.0800	APN 457-240-043	05/12/08	TGO1	16	60%		
32605 Olive Avenue	839, A-7	Winchester	TR 30068	26.75acr	1	Grading Permit	High	17	833C338740	BGR 030557	Pulte Homes Corporation	Angie Saxon	2 Technology Drive	Irvine	92688	949.245.2687	APN 461-160-029	05/14/08	RG01	17	60%		
36444 Pourroy Road	929, E-1	Winchester	TR 29214	>1	2	Grading Permit	High	15	833C326074	BGR 031552	Shea Homes, LTD.	Michael O'Meleny	10350 Santa Monica Blvd.	Los Angeles	90025	909.739.9709	APN 966-040-001	05/12/08	TGO1	15	60%		
34844 Pourroy Road	839	Winchester	TR 30069-1	c. current	2	Grading Permit	High	16	833C323139	BGR 031552	Brookfield Homes	Dale Gleed	12865 Pointe Del Mar, # 200	Del Mar	92014	858.481.8500	APN 467-260-056	05/12/08	TGO1	16	60%		
31300 Algarve	899, C-6	Winchester	TR 28296	>1	2	Grading Permit	High	10	833C331135	BGR 040571	Ryland Homes	Jason Jones	1250 Corona Pointe Court, Suite 100	Corona	92879	760.931.4444	APN 467-250-035	05/13/08	TGO1	10	75%		
35755 Brigus Road	899, A-6	Murrieta	TR 29454	>1	2	Grading Permit	High	16	833C331219	BGR 041136	D.R. Horton	Steve Rowland	119 N. Maple Street, Suite A	Corona	92880	909.727.9900	APN 467-230-026	05/15/08	RG01	16	55%		
34960 Leon Road	899, B-6	Winchester	TR 30699/PM 14390	>1	2	Grading Permit	High	17	833C330934	BGR 041309	Lennar Homes of California	Hal McCutchan	40980 Country Center Drive, # 110	Temecula	92591	951.719.3449	APN 467-140-019	05/16/08	RG01	17	75%		
26998 Garbani Road	868, C-6	Menifee	TR 30142	>1	1	Grading Permit	High	14	833J300632	BGR 041628	KB Home	Michael Freeman	26201 Ynez Road, # 104	Temecula	92591	951.576.3306	APN 360-200-013	05/16/08	RG01	14	95%		
28621 Craig Avenue	867, J-5	Menifee	TR 29636	~71acre	1	Grading Permit	High	15	833J300565	BGR 041755	Capital Pacific Homes	Mark Mullin	200 South Main Street, Suite 300	Corona	2882.72	909.279.1446	APN 358-230-001	05/15/08	RG01	15	80%		
26813 Amanda Avenue	839, F-3	Hemet	TR 30351	>1	1	Grading Permit	High	11	833J300203	BGR 042073	Osborne Development Corporation	Robert Osborne, Jr	30001 Cornerico	Rancho Santa Mar	92688	909.888.3822	APN 458-250-016	05/14/08	RG01	11	55%		
29161 Simpson Road	838, H-6	Menifee	TR 31582	>1	1	Grading Permit	High	17	833C338918	BGR 050203	Shea Homes, LP	Michael O'Meleny	1250 Corona Pointe Court, Suite 600	Corona	92879	951.739.9700	APN 333-200-048	05/14/08	RG01	17	70%		
4451 Morgan Hill Drive	960, A-2	Temecula	TR 30885	~167acre	2	Grading Permit	High	14	833C318784	BGR 050899	McMillin Morgan Hill, LLC	Dennis Bowman	2750 Womble Road	San Diego	92106	800.781.0401	APN 952-240-014	05/16/08	TGO1	14	80%		
35725 Paulua Road	960, D-5	Temecula	TR 32962	56.77acre	2	Grading Permit	High	7	833C343127	BGR 060782	Paulua Ridge, LLC	Elliott Leonard	42380 Business Park Drive, Suite 107	Temecula	92590	949.515.4911	APN 927-420-001	05/16/08	TGO1	7	65%		
Southeast Winchester Road & Jea	899, E-5		TR 32049	11.66acre	2	Grading Permit	High	15	833C337213	BGR 050839	Barratt American	Michael Armstrong	5950 Priestly Drive, Suite 101	Carlsbad	2008-68	760.931.0800	APN 467-240-031, 045, 04	05/12/08	TGO1	15	75%		
30415 Patton Road		Winchester	TR 31892	>1	1	Grading Permit	High	16	833C339344	BGR 050964	Bluestone Communities	Scott Gale	4100 Newport Place, Ste. 730	Newport Beach	92660	949.475.4118	APN 461-170-002	05/14/08	RG01	16	80%		
26358 Menifee Road	838, G-6	Romoland	TR 32664	~63acre	1	Grading Permit	High	17	833C342408	BGR 050957	Standard Pacific Homes	Wendy Fisher	255 East Rincon Street, #200	Corona	92879	951.898.5500	APN 333-190-025	05/15/08	RG01	17	80%		
29044 Simpson Road	838, G-5	Romoland	TR 34180-1	26acres	1	Grading Permit	High	15	833C343142	BGR 061903	Standard Pacific Homes	Wendy Fisher	255 East Rincon Street, #200	Corona	92879	951.898.5500	APN 333-180-008	05/15/08	RG01	15	55%		
23350 La Vella Road	977, F-2	Temecula	APN 934-030-007 SFR	>1	2	Grading Permit	Medium	2	933C345284	BGR 070495	Charles & Susan Deardorf		4 Spring Lane	Fairfax	94930	415.457.5264	APN 934-030-007	05/06/08	TGO1	2	0%		
27836 Regent Lane	839, D-6 &	Menifee	TR 29072	>1	3	Grading Permit	Medium	3	3J300310, 833338	BGR 020875	Pulte Homes Corporation	Angie Saxon	18401 Von Karman Avenue, #200	Irvine	92612		APN 290-110-033	05/09/08	TGO1	2	50%		Y
22301 Rosary Avenue	808, H-1	Nuevo	TR 29534	>1	3	Grading Permit	Medium	3	833J300463	BGR 050633	Princess West Homes, LLC	Asher Eshaghpour	611 Wilshire Blvd., Suite 804	Los Angeles	90017	213.622.2250	APN 306-120-009	05/06/08	RG01	3	55%		
21400 Grand Avenue	927, B-1	Wildomar	TR 30297	>1	2	Grading Permit	Medium	4	933C329870	BGR 040452	D.R. Horton	Frank Igo	119 N. Maple Street, Suite A	Corona	92880	951.272.9000	APN 382-240-001	05/09/08	TGO1	4	60%		
37418 Harvest Drive	929, D-2	Murrieta	TR 28995-2	>1	2	Grading Permit	Medium	4	933C332345	BGR 050906	Ryland Homes	Jason Jones	1250 Corona Pointe Court, #200	Corona	92879		APN 958-280-001	05/06/08	TGO1	4	60%		
32125 Patton Road	869, B-1	Winchester	TR 31142	>1	2	Grading Permit	Medium	3	833J300245	BGR 050950	Ashbrook Communities	John Hagan	1545 Faraday Avenue	Carlsbad	92008	760.804.6868 ext. 233	APN 461-210-001	05/08/08	RG01	3	65%		
37137 Calle De Loro		Murrieta	APN 926-020-010 SFR	>1	2	Grading Permit	Medium	2	933C334848	BGR 050903	Gary Marshall		27514 Littlewood Drive	Rancho Palos Ver	90275	310.418.7499	UNKNOWN	APN 928-020-010	05/05/08	TGO1	2	25%	3/18/2008	Y
41300 Camino Del Vino	960, E-3	Temecula	TR 31674	>1	3	Grading Permit	Medium	3	933C337541	BGR 050764	D.J. Conner, Inc.(Daniel Conner)		1629 Monroe Street	Riverside	92504	951.780.3256	APN 927-670-003	05/09/08	TGO1	3	55%		
41267 Calle Azul	990, D-3	Murrieta	APN 932-350-005 SFR	>1	2	Grading Permit	Medium	2	933C341158	BGR 061107	Greg Whitehead		P.O. Box 77815	Corona	92877	951.245.1610	UNKNOWN	APN 932-350-005	05/05/08	TGO1	2	1%	3/10/2008	
37111 High Vista Drive	929, D-2	Murrieta	TR 34324	>1	2	Grading Permit	Medium	2	3S316463, 933C348	BGR 061313	Taylor Morrison Homes	Natalie Jessop	15 Cushing	Irvine	92618	949.341.1200	UNKNOWN	APN 963-091-001	05/06/08	TGO1	2	85%		
46454 De Portola Road	670, H-1	Temecula	APN 470-330-033 SFR	>1	2	Grading Permit	Medium	2	933C348750	BGR 070022	Kirk & Laura Bates		27459 Rosebay Court	Temecula	92591	951.699.1371	UNKNOWN	APN 470-330-033	05/06/08	TGO1	2	10%	3/10/2008	Y
23440 Juniper Flats Road	809, F-1	Hemet	APN 429-200-041 SFR	>1	2	Grading Permit	Medium	2	933C347541	BGR 070113	Randy & Mary Reynolds		2315 Shasta Place	San Jacinto	92583	951.925.8629	UNKNOWN	APN 429-200-041	05/05/08	RG01	2	55%		
41479 Anza Road	980, A-4	Temecula	APN 951-270-006 SFR	>1	2	Grading Permit	Medium	2	933C347814	BGR 070458	Trevor & Amber Preston		40989 Del Monte Street	Temecula	92592	951.676.3246	UNKNOWN	APN 951-270-006	05/06/08	TGO1	2	15%	3/18/2008	Y
26490 Chambers Avenue	838, A-4	Sun City	TR 30507	>1	1	Grading Permit	Medium	4	833J300387	BGR 031438	John Laing Homes	Fred Farr	255 East Rincon Street, #100	Corona	92879	909.272.5106	Mike Jackson, Lori Brown	951.258.9156, 951.858.3905	05/16/08	RG01	4	75%		
8972 Cuyamaca Street	804, C-6	Corona	TR 31960	>1	3	Grading Permit	Medium	3	833C318862	BGR 040033	Shea Homes for Active Adults	Michael O'Meleny	24120 Warm Springs Road	Corona	92883	909.277.7000	Roy Duran	951.712.7653	05/15/08	RG01	3	80%		
31100 Pat Road	899, C-4	Winchester	TR 30699	>1	1	Grading Permit	Medium	4	833C328827	BGR 040337	Beazer Homes	Darius Fatakia	1800 E. Imperial Hwy, Suite 200	Brea	92821	714.285.2900	Kevin Brickley, Matt Bergman	714.231.5386, 714.231.6055	05/14/08	RG01	4	60%		
16402 La Sierra Avenue	744, H-4	Riverside	TR 30295	>1	1	Grading Permit	Medium	4	833C325413	BGR 040694	KB Home	Michael Freeman	36310 Inland Valley Drive	Wildomar	2565-75	909.587.3300	Ricky Arellano	619-672.5996	05/14/08	RG01	4	70%		
Whisper Heights Pkwy	899, D-4	Winchester	TR 30996	>1	1	Grading Permit	Medium	4	3C331169, 90000001	BGR 041598	Beazer Homes	Darius Fatakia	1800 E. Imperial Hwy, Suite 200	Brea	92821	714.285.2900	Matt Bergman, Kevin Brickley	714.231.6055, 714.231.7386	05/16/08	TGO1	4	55%		
44300 Sage Road	961, J-1	Temecula	PP 18890	>1	1	Grading Permit	Medium	4	933C323860	BGR 050405	Aquanga Chinese Fellowship Church	Pastor Michael Murph	414 Devonshire Circle	Escondido	92027	760.310.1971	UNKNOWN	APN 591-180-008	05/15/08	TGO1	4	70%		
6715 Wineville Avenue	643, F-6	Mira Loma	TR 32136	>1	3	Grading Permit	Medium	3	933C336582	BGR 051121	Brehm Builders	Kevin Canning	2714 Loker Avenue W., # 300	Carlsbad	92010	760.448.2420	Ron Boehm, Aaron Florez	858 518.3773, 858.518.2533	05/12/08	RG01	3	75%		
13215 Orange Street	713, C-1	Corona	TR 32125	>1	1	Grading Permit	High	11	933C332199	BGR 051226	Pinnacle Communities, Inc.	Raquel Marcos	7080 Galina Lane	Corona	92880	951.278.8500	Mike Danna	949.279.0047	05/14/08	RG01	3	40%	6/3/2008	
16110 Alberian Street	745, G-4	Riverside	TR 31322	>1	1	Grading Permit	High	13	933C330695	BGR 051265	John & Kathy Hanna		16197 Krameria Avenue	Riverside	92504	951.453.4608	John Hanna	951.453.4608	05/12/08	RG01	3	20%	11/27/2007	
17455 Nandina Avenue	745, A-6	Riverside	TR 32172	23.12acre	1	Grading Permit	High	3	933C339190	BGR 051451	Flatiron Company	Dylan Bird	34700 Pacific Coast Highway	Capistrano Beach	92624	949.218.1722	Rene Gomez	760.603.6280	05/12/08	RG01	3	30%	2/19/2008	
Indian Truck & Santiago Canyon R	368, K-10	Glen Ivy	PM 34639/CUP 3472	>1	1	Grading Permit	High	14	933C335548	BGR 061624	Starfield Sycamore Investments, LLC	Steve Stout	2 Ada, Suite 200	Irvine	92618	949.790.5400	Jay Calea	951.201.0601	05/15/08	RG01	3	75%		
14710 Schlesiman	713, A-1	Mira Loma	PP 19968	>1	1	Grading Permit	Medium	4	933C337254	BGR 051665	Enclave Holding Company, LLC	Mina Buyer	1156 North Mountain Avenue	Upland	91785	909.946.7520	Terry Van Curler	951.903.3349	05/14/08	RG01	4	75%		
4545 Ruble Street	684, B-1	Riverside	PP 21472	>1	1	Grading Permit	Medium	3	933C343984	BGR 061083	RNVS Enterprises, LP	Dwayne Grayson	1100 Beach Blvd.	Stanton	90680	714.527.2236	John Carine	951.818.6729	05/13/08	RG01	3	60%		
11311 Harrell Street	643, G-7	Mira Loma	PM 29913	>1	1	Grading Permit	Medium	4	836C326357	BGR 060358	Industrial Development International, Inc	Ray Weaver	3424 Peachtree NE, #1500	Atlanta	30326		Mark Bush (Ray's Asst.) Ray Weaver(c	323.348.5182, 323.846.0362	05/13/08	RG01	4	35%	6/3/2008	
42749 Mayberry Avenue	941, H-1	Hemet	TR 32458	>1	3	Grading Permit	Medium	5	833C338290	BGR 060522	Osborne Development Corporation	Robert Osborne, Jr	30001 Cornerico	Rancho Santa Mar	92688	949.888.3822	Randy Schweitzer	951.205.4033	05/15/08	RG01	5	55%		
7868 Mission Road	644, G-7	Riverside	TR 33675-1-2	>1	1	Grading Permit	High	8	833C341076	BGR 060828	Mark Bowman	Kirk Wallace	P.O. Box 8942	Rancho Santa Fe	92067	858.832.1383	858.259.6275	858.259.6275	05/14/08	RG01	6	85%		
28845 Jurupa Flats Road		Homeland	TR 28477	>1	2	Grading Permit	Medium	2	833J300468	BGR 040182	Juniper Tree, LLC	Scott Woodside	41391 Kalmia Street, Suite 210	Murrieta	92562	951.757.8199	Bill Bridges	949.400.5409	05/13/08	RG01	2	15%	2/22/2008	
22420 Palomar Street	897, D-7	Wildomar	TR 31353	>1	2	Grading Permit	Medium	3	933C341328	BGR 041328	Meeker Company, Inc.	Casey Bodwell	23332 Mill Creek Drive, Suite 155	Laguna Hills	92653	951.609.3888	Harry Heineken	949.533.5721	05/12/08	TGO1	3	15%	11/8/2007	
29500 Clinton Keith Rd.	896, A-7	Wildomar	TR 22944	>1	2	Grading Permit	Medium	6	3S319739, 933C328	BGR 020918	KB Home	Michael Freeman	36310 Inland Valley Drive	Wildomar	2565-75	951.587.3310	Mike Hanbauer	909.322.5300	05/19/08	TGO1	5	65%		
7650 Harrison Avenue	713, B-2	Mira Loma	TR 30782	>1	1	Grading Permit	Medium	4	833C332697	BGR 031455	Trimark Pacific Homes	James Kindell	3400 Central Avenue, # 335	Riverside	92506	949.753.7725	Jim Kindell	951.965.2961	05/21/08	RG01	5	70%		
31440 Winchester Road	899, D-5	Winchester	TR 31330	>1	1	Grading Permit	Medium	4	833C327026	BGR 040254	John Laing Homes	Fred Farr	255 E. Rincon Street, # 200	Corona	2879-13	909.272.5226	Damon Tennaka	951.258.6449	05/22/08	RG01	4	65%		
6651 Archibald Avenue	712, J-1	Mira Loma	TR 30693	>1	1	Grading Permit	Medium	4	833C327219	BGR 040265	Trimark Pacific Homes	James Kindell	85 Argonaut, Suite 205	Aliso Viejo	92656	818.706.9797	Jim Kindell	951.965.2961	05/23/08	RG01	5	65%		
17474 La Sierra Avenue	744, J-6	Riverside	TR 31695	>1	1	Grading Permit	Medium	3	833C331443	BGR 040892	Van Daele Development	Brice Kittle

34844 Pourroy Road	839	Winchester	TR 30069-1	5 current	2	Grading Permit	High	17	933C323139	BGR 031652	Brookfield Homes	Dale Gleed	12865 Pointe Del Mar, # 200	Del Mar	92014	858.481.8500	Greg McDonald	858 922 9340	APN 467-260-056	05/28/08	TG01	17	75%						
30805 Olive Avenue	839, A-7	Winchester	TR 30266	126.75acr	1	Grading Permit	High	18	833C338740	BGR 030557	Pulte Homes Corporation	Angie Saxon	2 Technology Drive	Irvine	92618	949.254.2687	Pedro Plascencia, Rick Bishara	949.929.3302, 949.307.5559	APN 461-160-029	05/30/08	RG01	18	80%						
35444 Pourroy Road	929, E-1	Winchester	TR 29214	>1	2	Grading Permit	High	16	933C328074	BGR 031552	Shea Homes, LTD.	Michael O'Melveny	10350 Santa Monica Blvd.	Los Angeles	90025	909.739.9709	Hinton, Rod Plunkett, Mike G	31.453.5920, 951.739.9700, 951.538.4668	APN 958-040-001	05/28/08	TG01	18	70%						
31300 Algarve	899, C-6	Winchester	TR 28298	>1	2	Grading Permit	High	11	933C331135	BGR 040571	Ryland Homes	Jason Jones	1250 Corona Pointe Court, Suite 100	Corona	92879	760.931.4444	John Fagan	619.640.7112	APN 467-250-035	05/28/08	TG01	11	50%	6/10/2008					
35755 Briggs Road	896, A-6	Murrieta	TR 29484	>1	1	Grading Permit	High	17	933C331219	BGR 041136	O.R. Horton	Steve Rowland	119 N. Maple Street, Suite A	Corona	92880	909.272.9000	Iulvania, Tom Ralph, Albert R	951.538.0776, 951.536.2473, 760.497.3608	APN 467-230-028	05/27/08	RG01	17	55%						
34980 Leon Road	899, B-6	Winchester	TR 30696/PM 14390	>1	1	Grading Permit	High	18	933C330934	BGR 041309	Lennar Homes	Hal McCutchen	40980 Country Center Drive, # 110	Temecula	92591	951.719.3449	n Suster, Ken Gunter, Tom C	951.538.2214, 951.232.1839, 951.453.1193	APN 467-140-019	05/29/08	RG01	18	80%						
26998 Garbani Road	868, C-6	Menifee	TR 30142	>1	1	Grading Permit	High	15	833J300632	BGR 041628	KB Home	Michael Freeman	26301 Ynez Road, # 104	Temecula	92591	951.587.3306	Bob Weinich, Pat Roberts	619.954.6941, 619.520.6541	APN 360-200-013	05/29/08	RG01	15	80%						
29161 Simpson Road	838, H-6	Menifee	TR 31562	>1	2	Grading Permit	High	16	833J300565	BGR 041755	Capital Pacific Homes	Mark Mullin	200 South Main Street, Suite 300	Corona	2582-22	951.279.1446	Perry Wagoner, Greg Lubbock	951.240.6049, 909.578.4235	APN 358-230-001	05/27/08	RG01	16	60%						
31296 Pat Road	899, C-4	Winchester	TR 32185	>1	2	Grading Permit	High	16	933C337019	BGR 050661	Shea Homes, L.P.	Michael O'Melveny	1250 Corona Pointe Court, Suite 600	Corona	92879	951.739.9700	Dave Hinton	951.453.5920	APN 333-200-048	05/28/08	RG01	18	70%						
44511 Morgan Hill Drive	980, A-2	Temecula	TR 30885	~187acre	2	Grading Permit	High	15	933C318784	BGR 050699	Beazer Homes	Darius Fatakia	1800 E. Imperial Hwy, Suite 200	Brea	92821	714.285.2900	Kevin Brickley, Jim Allen	714.231.7386, 714.240.3889	APN 467-150-047	05/30/08	TG01	16	80%						
Southeast Winchester Road & Jea	899, E-5	TR 30049	11.66acre	2	Grading Permit	High	16	933C337213	BGR 050839	McMillin Morgan Hill, LLC	Dennis Bowman	2750 Womble Road	San Diego	92106	600.781.0401	Paul Manning, Mike Owsley	619.971.6565, 619.719.8891	APN 952-240-014	05/29/08	TG01	15	85%						
35725 Paube Road	960, D-5	Temecula	TR 32682	56.77acre	2	Grading Permit	High	8	933C341127	BGR 060782	Barratt American	Michael Armstrong	5950 Priestly Drive, Suite 101	Carlsbad	2008-88	760.931.0800	Mike Carter	760.809.7085	APN 467-240-031, 045, 04	05/30/08	TG01	16	75%						
26358 Menifee Road	838, G-6	Romoland	TR 32664	~63acres	1	Grading Permit	High	16	833C342408	BGR 060857	Pauba Ridge, LLC	Elliott Leonard	42380 Business Park Drive, Suite 107	Temecula	92590	949.515.4911	Elliott Leonard	951.506.3811, cell 714.287.3600	APN 927-420-001	05/29/08	TG01	8	65%						
29044 Simpson Road	838, G-5	Romoland	TR 34160-1	26 of 35	1	Grading Permit	High	16	933C343142	BGR 061003	Standard Pacific Homes	Wendy Fisher	255 East Rincon Street, #200	Corona	92879	951.898.5500	Tim Hampton, Kevin Fulmer	909.621.9885, 951.202.8288	APN 333-190-025	05/27/08	RG01	18	60%						
28499 Milkway	837, J-7	Sun City	TR 28859	>1	1	Grading Permit	Medium	5	833C321589	BGR 000991	Standard Pacific Homes	Wendy Fisher	255 East Rincon Street, #200	Corona	92879	951.898.5500	Tim Hampton	909.621.9885	APN 333-180-008	05/27/08	RG01	16	55%						
17825 Canyon Wood Drive	745, H-7	Riverside	TR 29622	>1	1	Grading Permit	Medium	5	833S318616	BGR 020602	Secured Equities, Corporation	James Herrington	22672 Lambert Street, # 614	Lake Forest	92630		Brad Herrington	951.757.4543	APN 339-020-033	05/28/08	RG01	5	60%						
26159 Redfox Road	868, A-5	Menifee	TR 30064	>1	1	Grading Permit	Medium	5	3J300137, 833C338	BGR 031040	William Lyon Homes	Gene Stroiek	4490 Von Karman	Newport Beach	92658	949.833.3600	John Batman	951.232.6325	APN 273-320-024	05/27/08	RG01	5	50%	2/5/2008					
3390 Country Village Road	644, A-6	Mira Loma	PP 18138	>1	1	Grading Permit	Medium	4	836C332341	BGR 031372	Forecast Homes	Menifee	800 North Haven	Ontario	91764	909.376.6786	Chris Ramsey, Mike Harrison	951.377.9351, 951.545.9975	APN 360-140-001	05/30/08	RG01	5	40%	5/27/2008					
8681 Archibald Avenue	712, J-4&5	Corona	TR 30913	>1	1	Grading Permit	Medium	5	833C330275	BGR 041597	Alliance Residential Company	Clay Gomes	2040 Main Street, Suite 235	Irvine	92614		Clay Gomes	949.678.0909	APN 173-020-050	05/28/08	RG01	4	60%						
38370 Winchester Road	928, J-5	Temecula	PM 30017	>1	2	Grading Permit	Medium	1	933C332915	BGR 050139	Lennar Homes	Hal McCutchan	391 North Main Street, #301	Corona	92880	951.817.3500	Tony Anderson	951.712.8300	APN 130-030-014	05/30/08	RG01	5	60%						
34996 Elliot Road	899, D-5	Winchester	TR 32171	>1	2	Grading Permit	Medium	4	933C332626	BGR 050158	Temecula Self Storage, Inc.	Steve Foley	22205 Shady Rim Circle	Lake Forest	92630	949.768.0855	Steve Foley	949.677.9716	APN 967-330-038	05/29/08	TG01	1	60%						
29163 Simpson Road	838, G-6	Menifee	TR 31455	>1	1	Grading Permit	Medium	4	833C336918	BGR 050204	John Laing Homes	Fred Farr	255 East Rincon Street, Suite 100	Corona	2879-13	951.272.5127	Damon Tennaka	951.258.6449	APN 467-180-018	05/29/08	TG01	4	80%						
19265 Castlerock Trail	776, J-2	Perris	TR 23234	>1	1	Grading Permit	Medium	5	833C303645	BGR 050560	Shea Homes, L.P.	Michael O'Melveny	2280 Wardlow Circle, # 150	Corona	92880	951.739.9718	Rod Plunkett	951.538.3745, 951.246.9073	APN 333-200-004	05/30/08	RG01	4	60%						
16867 Skyland Court	744, E-4	Riverside	TR 28815	>1	1	Grading Permit	Medium	4	833C338961	BGR 051861	Stonewood Housing Partners	William Lilly	177 Riverside Avenue, Ste. F	Newport Beach	92663	951.757.7900	Rich Ballard, Alex Ballard	951.757.7013, 951.757.7002	APN 318-100-029	05/27/08	RG01	4	55%						
22740 Temescal Canyon Road	804, D-4	Corona	PM 28834-1	>1	1	Grading Permit	Medium	3	833C341742	BGR 060011	Warmington Homes	David Salgado	3090 Pullman Street, Suite A	Costa Mesa	92626	714.434.4343	David Salgado, Chris Monnres	714.240.4154, 714.240.3814	APN 140-310-022	05/27/08	RG01	4	55%						
Murrieta Road	868, A-4	Menifee	TR 30812	>1	2	Grading Permit	Medium	6	933C344521	BGR 061271	Clendenen Development Company	Darrell Clendenen	1215 Pomona Road, Suite D	Corona	92882	951.271.0736	Darrell Clendenen	951.271.0736	APN 283-110-051	05/27/08	RG01	3	60%						
24487 Pinelop Road	927, G-2	Wildomar	PP 22254	>1	2	Grading Permit	Medium	3	933C346173	BGR 070155	Gallery Boulders Partners	Charlene Kussner	31616-1 Railroad Canyon Road	Canyon Lake	92587	951.244.7713	David Meade	951.294.1331, fax 951.244.7714	APN 360-020-036	05/30/08	TG01	6	50%	6/12/2008					
8392 Granite Hill Drive	644, F-4	Riverside	PM 35445, PP 18492-1	>1	Unknown	Grading Permit	Medium	2	unknown	BGR 070386	Southern California Edison	Bill Green	P.O. Box 800	Rosemead	1770-08	626.674.5639	Bill Green	626.674.5639	APN 360-200-008	5/15 & 06/28/	TG01	3	70%						
43510 Foolish Pleasure Road	963, B-7	Aguanga	PM 17967	>1	2	Grading Permit	Medium	1	C350931, 933C, 35	BGR 070965	Willis Clark Trust	Thomas Searles	3851 Pyrite Street	Riverside	92506	949.798.0270	Thomas Searles	949.798.0270	APN 173-180-013	05/28/08	Unknown	2	0%	5/22/2008					
Southeast Winchester Road & Jea	899, E-5	TR 30049	11.66acre	2	Grading Permit	High	16	933C337213	BGR 050839	Sandy Chung	Chung Jean Yong	12811 Joesphine Street	Garden Grove	2841-46	714.636.9133	UNKNOWN	Unknown	APN 580-100-040, 039,03	05/29/08	TG01	1	0%	6/10/2008						
35323 Pourroy Road	899, E-5	Temecula	TR 29114	>1	2	Grading Permit	High	17	933C316451	BGR 020689	The Thomas Seaman Company	Gregg Foster	2 Park Plaza, Suite 480	Irvine	92614	949.222.0551	Mike Carter	760.809.7085	APN 467-240-031, 045, 04	05/30/08	TG01	16	75%						
28491 Watson Road	838, E-1	Romoland	TR 29406	>1	1	Grading Permit	Medium	5	3J000063, 833J300	BGR 020233	The Thomas Seaman Company	Gregg Foster	2 Park Plaza, Suite 480	Irvine	92614	949.222.0551	Winder, Sam Gonzalez, Allen	951.288.3882, 760.809.5402, 760.613.5742	APN 467-240-043	05/30/08	TG01	17	50%	6/10/2008					
18818 Linderberger Road	868, H-1	Menifee	TR 30757	>1	Unknown	Grading Permit	Medium	4	unknown	BGR 070280, 031258	Pinnacle Development	Vinh Tran	470 E. Harrison Street	Corona	92879	951.898.1692	Ron Deering	909.376.3185	APN 329-100-003	05/30/08	RG01	5	55%						
27446 Finale Court	868, D-4	Menifee	TR 30902	>1	1	Grading Permit	Medium	4	833J300211	BGR 041577	The RC Hobbs Company	Anna Walton	1110 East Chapman Avenue, #206	Orange	92866	714.633.8100 Ext. 239	Bryan Raney	714.473.2113	APN 334-250-014	05/30/08	Unknown	4	30%	2/20/2008					
20th Street	645, F-6	Riverside	PM 22503	>1	1	Grading Permit	Medium	2	833C333947	BGR 050001	Woodside Homes of California, Inc.	Paul Kruss	23121 Antonio Parkway, # 120	Rancho Santa Mar	92688	949.858.4980	Eric Klingensmith	951.232.6749	APN 360-210-034	05/27/08	RG01	4	55%						
Knabe Road		Corona	PM 30626	>1	1	Grading Permit	Medium	1	833C333781	BGR 050547	Rubicoux Commercial Development	Eddie Rodriguez	7402 Newhall Avenue	Hesperia	92345	951.351.3155	Eddie Rodriguez	760.792.7535	APN 175-160-027	05/28/08	RG01	2	25%	5/5/2008					
Viaggio Circle	684, H-1	Jurupa	TR 31875	>1	1	Grading Permit	Medium	3	833C336992	BGR 051044	Coulsouville Development		341 2nd Street, Suite 1	San Bernardino	92401	909.381.0868	UNKNOWN		APN 282-140-006	05/29/08	RG01	1	80%						
5840 20th Street	645, F-6	Riverside	PM 29905/PP19738	>1	1	Grading Permit	Medium	3	833C345045	BGR 051707	Far West Industries	Sean Starr	2922 Daimler Street	Santa Ana	92705	949.324.1970	Sean Starr, Brian	909.578.4853, 818.481.7230	APN 183-310-020	05/28/08	RG01	3	55%						
23151 Palomar Street	927, F-2	Wildomar	PM 32159/PP 19224	>1	2	Grading Permit	Medium	1	933C338034	BGR 060010	MPRM Properties	Damien Deocales	P.O. Box 5550	Riverside	92517	626.618.3708	Jay Millard, Jeff Scranton	909.677.1518, 951.809.9836 PM	APN 175-160-020	05/27/08	RG01	3	40%	6/12/2008					
37800 Via Vista Grande(south)	927, C-3	Murrieta	APN 928-240-006 SFF	>1	2	Grading Permit	Medium	5	933C340723	BGR 060640	Duffwine, Inc.	Edward Duffwine	38550 Calle De Companero	Murrieta	92562	951.677.2366	Ed Duffwine	951.677.2366	APN 380-170-020	05/27/08	TG01	1	75%						
1350 Brown Avenue	645, G-5	Riverside	PM 24088/PP20520	>1	1	Grading Permit	Medium	4	833C333631	BGR 060742	Murrieta Vista Grande, LLC		2831 County Wood Lane	West Covina	91791	714.401.0868	Said Aziz	714.401.0868	APN 928-240-006	8, 05/23/06, 0	TG01	5	70%		Y				
7868 Maskon Road	644, G-7	Riverside	TR 33675-1-2	>1	1	Grading Permit	High	9	833C341676	BGR 060828	Aqua Mansa Center, LLC	Dave Clark	2801 West Pacific Coast Highway, #200	Newport Beach	92663	949.515.4000, 949.675.4000	Dennis Navens	909.721.7086	APN 175-210-024	05/27/08	RG01	4	N/a						
22401 Juniper Flats Road	779, E-7	Nuevo	PUP 96451	>1	1	Grading Permit	Medium	3	833C326719	BGR 061038, 041518	AMS Development	Kirk Wallace	P.O. Box 8842	Rancho Santa Fe	92067	858.832.1383	Kirk Wallace, Josh Mahaney	626.255.6275, 951.634.2130	APN 163-020-022	05/28/08	RG01	9	65%						
Craig Avenue & Antelope Road	868, F-5	Menifee	TR 32628	>1	1	Grading Permit	Medium	3	833C345309	BGR 070055	Intellelat Global Service Corporation	Jeffrey Chandler	22401 Juniper Flats Road	Nuevo	92567	909.928.3995	Jennis Nestor, Jeffrey Chandl	951.928.3446, 310.525.5985	APN 429-040-019	05/30/08	RG01	1	55%						
3030 & 3090 Grapevine Street	643, H-5	Mira Loma	PM 29787	>1	1	Grading Permit	Medium	3	833C349657	BGR 070613	BC Christensen Ranch, LLC	Lee James	17140 Bernardo Center Drive, Suite 380	San Diego	92128	858.217.3144	Bill Schmidt	918.240.2835	APN 372-250-002,-020	05/29/08	RG01	3	35%	6/12/2008					
30080 Wesley Drive	897, B-6	Lake Elsinore	TR 30097	>1	1	Grading Permit	Medium	3	833C331954	BGR 042089	Panattoni Development	David Hawkins	34 Tesla, Suite 200	Irvine	92618	949.474.7830	David Hawkins	909.831.3012	APN 156-360-044	05/28/08	RG01	1	50%	6/12/2008					
25945 Jurupa Flats Road		Homeland	TR 28477	>1	1	Grading Permit	Medium	2	833J300489	BGR 040182	Wildomar Ranches, LLC	Jeffrey Marsteen	702 Randolph Avenue, Suite A	Costa Mesa	92626	714.557.9004	Jim Diaz	951.232.9244	APN 369-190-001	05/21/08	RG01	3	65%						
5840 20th Street	645, F-6	Riverside	PM 29905/PP19738	>1	1	Grading Permit	Medium	3	833C345045	BGR 051707	Juniper Tree, LLC	Joe Morreale	68845 Perez Road, Suite H-30	Cathedral City	92234	951.757.8199	Bill Bridges	949.400.5409	APN 457-140-021	06/13/08	RG01	2	15%	2/22/2008					
											POMA Automated Fueling	Jim Teabeau	P.O. Box 479	Bloomington	92316	626.813.3708	Jay Millard, Jeff Scranton	909.677.1518, 951.809.9835 PM	APN 175-160-020	05/27/08	RG01	3	40%	6/12/2008					

Attachment A: 2007-08 Storm Season Final Statistics SM

Legal Description	Regional Water Quality Control Board Responsible	End of Storm Season Percent Compliance	Number of Inspections Conducted	Date Last Inspection Processed
APN 341-190-004	SM	2%	2	12/18/07
APN 365-220-004	SM	10%	3	03/17/08
APN 365-220-019	SM	CLD	1	10/09/08
APN367-270-018	SM	30%	3	03/21/08
APN382-280-009	SM	0%	1	04/28/08
APN386-090-002	SM	15%	3	03/28/08
APN392-350-007	SM	CLD	3	03/17/08
APN470-330-025	SM	65%	4	04/08/08
APN470-330-033	SM	10%	2	05/06/08
APN470-380-037	SM	65%	3	03/17/08
APN571-630-010	SM	30%	3	02/07/08
APN571-630-029	SM	CLD	1	08/27/07
APN572-280-011	SM	CLD	1	08/27/07
APN577-470-006	SM	NoWork	2	01/23/08
APN577-470-007	SM	NoWork	2	01/23/08
APN580-020-050	SM	0%	1	02/25/08
APN580-160-008	SM	CLD	2	11/27/08
APN584-040-023	SM	CLD	2	11/27/08
APN904-560-010	SM	NoWork	2	01/25/08
APN915-190-023	SM	CLD	3	03/23/08
APN915-210-050	SM	60%	3	03/18/08
APN915-240-036	SM	30%	1	02/27/08
APN915-240-096	SM	75%	3	03/14/08
APN915-330-021	SM	CLD	3	03/21/08
APN915-370-020	SM	CLD	3	03/26/08
APN915-370-057	SM	CLD	2	01/23/08
APN915-370-058	SM	0%	3	03/26/08
APN915-400-020	SM	70%(SWO)	4	02/26/08
APN915-440-007	SM	Expired	2	01/15/08
APN915-440-043	SM	CLD	1	08/28/07
APN915-460-001	SM	CLD	1	08/28/07
APN915-480-015	SM	70%	3	03/18/08
APN915-550-034	SM	30%	3	03/27/08
APN915-550-045	SM	80%	3	03/27/08
APN915-560-033	SM	0%	1	02/25/08
APN915-560-034	SM	0%	1	02/28/08

APN917-140-015	SM	CLD	1	08/29/08
APN917-260-060	SM	CLD	2	11/19/07
APN917-260-083	SM	CLD	1	11/14/08
APN918-020-022	SM	70%	4	04/30/08
APN924-230-011	SM	Expired	3	02/11/08
APN927-100-043	SM	CLD	1	08/29/07
APN927-100-070	SM	2%	1	02/27/08
APN927-140-033	SM	CLD	4	04/17/08
APN927-150-024	SM	85%	4	04/15/08
APN927-180-007	SM	CLD	4	04/15/08
APN927-220-018	SM	CLD	1	08/30/07
APN927-250-015	SM	CLD	2	01/11/08
APN927-250-008	SM	30%	4	04/12/08
APN927-280-011	SM	0%(SWO)	2	01/22/08
APN927-390-045	SM	60%	3	03/11/08
APN927-480-006	SM	60%	2	01/11/08
APN927-520-016	SM	CLD	2	01/24/08
APN927-640-004	SM	EXP	4	04/15/08
APN927-660-031	SM	CLD	1	10/24/07
APN927-690-019	SM	CLD	1	08/30/07
APN928-020-010	SM	CLD	2	05/05/08
APN928-100-003	SM	CLD	1	09/05/07
APN928-100-006	SM	StopWorkOrder	1	10/09/07
APN928-100-007	SM	CLD	3	03/31/08
APN928-170-016	SM	Expired	4	04/16/08
APN928-170-040	SM	60%	3	03/13/08
APN928-210-003	SM	75%	4	04/16/08
APN928-230-004	SM	25%	2	12/27/07
APN928-230-007	SM	50%	4	03/13/08
APN928-230-016	SM	50%(SWO)	4	03/13/08
APN928-240-006	SM	70%(SWO)	5	05/28/08
APN928-240-014	SM	Expired	4	04/17/08
APN928-240-015	SM	CLD	1	09/13/07
APN928-270-028	SM	Expired	3	03/11/08
APN928-280-018	SM	65%	3	03/31/08
APN928-310-007	SM	20%	2	04/28/08
APN929-020-012	SM	55%(SWO)	2	03/12/08
APN929-060-009	SM	CLD	1	09/13/07
APN929-090-009	SM	CLD	1	09/13/07
APN929-120-029	SM	Expired	2	01/04/08
APN929-160-027	SM	55%	4	04/09/08
APN929-290-010	SM	CLD	1	09/13/07
APN929-290-002	SM	15%	4	04/17/08
APN929-350-002	SM	CLD	1	10/09/07
APN929-360-004	SM	10%	2	04/29/08

APN930-090-008	SM	CLD	2	12/31/07
APN930-150-002	SM	55%	3	03/11/08
APN930-190-028	SM	10%	2	11/30/07
APN930-200-010	SM	StopWorkOrder	1	10/09/08
APN930-230-011	SM	25%	3	03/07/08
APN930-310-009	SM	StopWorkOrder	1	10/10/08
APN930-330-002	SM	StopWorkOrder	2	01/10/08
APN931-040-014	SM	35%	4	04/18/08
APN931-050-011	SM	75%	4	04/18/08
APN931-070-012	SM	50%	4	04/21/08
APN931-070-013	SM	65%(SWO)	2	04/10/08
APN931-100-004	SM	CLD	3	03/19/08
APN931-100-007	SM	CLD	3	02/14/08
APN931-120-013	SM	EXP	1	09/14/07
APN931-160-005	SM	EXP	4	04/17/08
APN931-290-016	SM	CLD	2	11/30/07
APN931-300-010	SM	EXP	2	01/28/08
APN931-310-010	SM	StopWorkOrder	3	03/07/08
APN932-020-019	SM	75%	3	03/19/08
APN932-020-024	SM	70%	3	03/28/08
APN932-040-006	SM	CLD	1	09/17/07
APN932-050-037	SM	25%	3	04/23/08
APN932-070-020	SM	15%	3	03/21/08
APN932-080-013	SM	EXP	4	04/23/08
APN932-160-054	SM	CLD	3	03/11/08
APN932-240-006	SM	0%	3	03/11/08
APN932-260-009	SM	EXP	1	09/18/07
APN932-26+0-010	SM	CLD	2	12/06/07
APN932-260-065	SM	0%	1	02/28/08
APN932-280-036	SM	20%	4	04/23/08
APN932-280-037	SM	35%	4	04/23/08
APN932-300-004	SM	EXP	3	03/31/08
APN932-300-017	SM	20%	3	03/10/08
APN932-300-018	SM	60%	4	04/21/08
APN392-310-002	SM	10%	2	04/29/08
APN932-310-007	SM	0%	3	03/28/08
APN932-310-014	SM	CLD	1	09/19/07
APN932-310-036	SM	30%	2	04/29/08
APN932-320-046	SM	EXP	2	01/09/08
APN932-340-001	SM	CLD	3	03/12/08
APN932-340-004	SM	CLD	2	12/28/07
APN932-340-007	SM	CLD	3	03/17/08
APN932-340-013	SM	StopWorkOrder	1	10/11/07
APN932-340-017	SM	EXP	1	05/07/08
APN932-350-005	SM	1%	2	05/05/08

APN932-350-025	SM	0%	3	03/28/08
APN932-370-006	SM	EXP	4	04/21/08
APN932-370-014	SM	5%	3	03/10/08
APN932-370-024	SM	EXP	2	12/28/07
APN932-370-034	SM	CLD	3	03/12/08
APN932-370-046	SM	5%	3	03/10/08
APN934-020-005	SM	StopWorkOrder	1	10/12/07
APN934-030-007	SM	0%	2	05/06/08
APN934-180-008	SM	45%	3	03/19/08
APN934-260-008	SM	CLD	1	10/11/07
APN935-030-013	SM	EXP	4	04/22/08
APN935-110-016	SM	StopWorkOrder	1	10/12/07
APN935-130-005	SM	1%	3	03/20/08
APN935-190-007	SM	70%	4	04/22/08
APN935-200-012	SM	55%	4	04/18/08
APN935-260-0028	SM	StopWorkOrder	1	10/12/07
APN935-290-012	SM	40%	1	04/30/08
APN935-400-008	SM	70%	3	03/27/08
APN936-050-017	SM	CLD	1	10/12/07
APN936-070-012	SM	CLD	3	03/20/08
APN936-150-015	SM	40%	4	04/23/08
APN936-210-004	SM	55%	3	04/03/08
APN936-240-014	SM	EXP	3	03/19/08
APN936-290-011	SM	75%	4	04/08/08
APN937-070-021	SM	80%	3	03/31/08
APN937-160-004	SM	70%	4	04/22/08
APN938-150-004	SM	NoWork	2	01/07/08
APN939-040-0065	SM	CLD	2	01/30/08
APN939-130-001	SM	EXP	4	04/28/08
APN939-130-002	SM	EXP	3	04/28/08
APN939-150-012	SM	EXP	4	04/24/08
APN939-150-014	SM	EXP	4	04/24/08
APN940-040-005	SM	30%	4	04/24/08
APN940-040-006	SM	65%	4	04/24/08
APN940-070-002	SM	30%	4	04/24/08
APN940-090-006	SM	StopWorkOrder	1	09-24-07
APN940-090-007	SM	EXP	1	09-24-07
APN940-200-001 Lot 4	SM	StopWorkOrder	1	09/26/07
`APN940-200-001 Lot1	SM	EXP	4	04/25/08
APN940-200-001 Lot 2	SM	EXP	1	09/26/07
APN940-200-002 Lot 8	SM	EXP	1	09/26/07

APN940-210-001	SM	EXP	1	09/26/07
APN940-210-001	SM	CLD	1	09/26/07
APN940-210-012	SM	CLD	1	09/26/07
APN941-070-005	SM	CLD	1	09/28/07
APN941-200-014	SM	50%	4	04/25/08
APN941-270-027	SM	CLD	2	02/21/08
APN942-060-010	SM	15%	3	03/26/08
APN942-250-026	SM	40%	4	04/25/08
APN943-120-018	SM	CLD	1	09/28/07
APN943-270-009	SM	CLD	3	02/20/08
APN943-190-031	SM	EXP	4	04/25/08
APN943-190-037	SM	CLD	1	09/28/07
APN951-090-004	SM	CLD	2	01/04/08
APN951-190-002	SM	EXP	4	04/25/08
APN951-270-006	SM	15%	2	05/06/08
APN952-330-004	SM	50%	3	03/14/08
CUP03474-PM31444	SM	CLD	3	02/21/08
PM17967	SM	0%	1	05/29/08
PM30017	SM	60%	1	05/29/08
P[M32159-PP19224	SM	75%	1	05/27/08
PP18731	SM	CLD	2	11/09/07
PP18891	SM	70%	4	05/15/08
PP19223-PM32166	SM	CLD	4	04/21/08
PP22254	SM	70%	3	05/28/08
PP24261	SM	15%	1	01/30/08
PUP556R2	SM	55%	3	04/21/08
TR24831	SM	EXP	4	04/24/08
TR25122	SM	EXP	4	05/29/08
TR25994	SM	60%	4	05/06/08
TR27603	SM	40%	3	02/28/08
TR28297	SM	CLD	6	03/06/08
TR28298	SM	50%	11	05/28/08
TR28695	SM	60%	4	05/09/08
TR28695	SM	CLD	1	09/21/07
TR29114	SM	50%	17	05/30/08
TR29214	SM	70%	16	05/28/08
TR29408	SM	50%	4	04/28/08
TR29473-1	SM	CLD	2	01/08/08
TR29473	SM	CLD	3	03/17/08
TR29991	SM	30%	6	05/15/08
TR30052	SM	CLD	3	03/17/08
TR30069-1	SM	75%	17	05/28/08

TR30155	SM	55%	13	05/07/08
TR30297	SM	60%	4	05/09/08
TR30347	SM	50%	6	05/23/08
TR30656	SM	60%	14	05/20/08
TR30791	SM	55%	4	05/08/08
TR30839	SM	65%	4	04/11/08
TR30885	SM	85%	15	05/29/08
TR30939	SM	75%	4	04/11/08
TR31118	SM	50%	4	04/11/08
TR31175	SM	CLD	1	10/19/07
TR31329	SM	CLD	1	10/29/07
TR31331	SM	CLD	1	11/1/07
TR31353	SM	15%	3	05/12/08
TR31674	SM	55%	3	05/09/08
TR31837	SM	EXP	3	05/08/08
TR32049	SM	75%	16	05/30/08
TR32078	SM	EXP	3	04/24/08
TR32171	SM	80%	4	05/29/08
TR32206	SM	85%	3	04/24/08
TR32185	SM	80%	16	05/30/08
TR32982	SM	65%(SWO)	8	05/27/08
TR34324	SM	65%	2	05/08/08
TR35200	SM	70%	1	05/15/08

Attachment B: 2007-08 Storm Season – Sites Where Enforcement Was Taken

LEGAL	RWQCB	% COMPLIANCE IMPROVEMENT	VERIFICATION NO. & DATE STOP WORK ORDER WAS ISSUED		VERIFICATION NO. & DATE STOP WORK ORDER RESCINDED		COMMENT REGARDING ACTION TAKEN
STOP WORK ORDERS							
APN 271-150-005	SA	1-10%	2	12/27/07			Remains In Effect
APN 271-150-051	SA	1-10%	2	12/27/07			Remains In Effect
APN 271-151-022	SA	0-10%	2	12/19/07			Remains In Effect
APN 276-400-012	SA	0%	3	04/10/08			Expired/No Action
APN 287-110-013	SA	0%	1	04/03/08			Expired/No Action
APN 384-080-015	SA	0%	2	02/04/08			Remains In Effect
APN 384-080-013	SA	0%	2	02/04/08			Remains In Effect
APN 384-080-016	SA	0%	2	05/05/08			Remains In Effect
APN 544-170-005	SA	25%	3	03/05/08			
APN 571-130-040	SA	0%	3	03/31/08			Expired/No Action
PP 20103	SA	30%	5	02/06/08			Remains In Effect
TR 25316	SA	25%	5	11/19/07			Remains In Effect
TR 25745	SA	25%	5	11/19/07			Remains In Effect
TR 26837	SA	50%	11	03/27/08			Remains In Effect
TR 28206-2	SA	50%	6	01/09/08			Remains In Effect
TR 28206	SA	35-70%	5	01/09/08	8	02/21/08	
TR 28786	SA	30-75%	3	01/17/08	4	02/13/08	
TR 29597	SA	10%	4	01/14/07			Remains In Effect
TR 29777	SA	40%	3	05/27/08			Remains In Effect
TR 30473	SA	30-70%	1	10/11/07	2	03/19/08	
TR 30592	SA	40%	2	12/18/07			Remains In Effect
TR 30664	SA	40-70%	2	12/19/07	3	02/13/08	
TR 31391	SA	25-80%	6	12/04/07	7	01/11/08	
TR 31961	SA	20-75%	2	02/14/07	3	02/15/08	
TR 33323	SA	10%	2	01/07/08			Remains In Effect
APN 915-400-020	SM	0-70%	3	01/15/08	4	02/26/08	
APN 927-280-011	SM	1%	2	01/22/08	1	04/28/08	
APN 928-100-006	SM	0%	1	10/09/07			Expired/No Action
APN 928-230-016	SM	0-65%	4	03/13/08	3	02/07/08	
APN 928-240-006	SM	5-70%	5	05/07/08	4	05/28/08	
APN 930-200-010	SM		1	01/26/07			Remains In Place
APN 930-310-009	SM		1	02/27/07			
APN 930-330-002	SM		2	01/15/08			Remains In Effect
APN 931-070-013	SM	1-65%	1	02/02/07	2	04/10/08	
APN 931-310-010	SM	0%	2	01/11/08			Remains In Effect
APN 932-340-013	SM	10%	1	10/18/07			Expired/No Action
APN 934-020-005	SM	0%	1	04/30/07			Remains In Effect
APN 935-110-016	SM	25%	1	03/13/06			Expired/No Action
ANP 935-260-008	SM		1	12/26/06			Remains In Effect
APN 940-090-006	SM		1	05/11/07			Remains In Effect
APN 940-200-001	Lot 4 SM		1	05/11/07			Remains In Effect
TR 32982	SM	40-65%	4	12/06/07	7	05/10/08	
TR 26686	CR	0%	3	05/05/08			Remains In Effect
TR 29151	CR	25%	3	05/29/08			

BUSINESS REGISTRATION AND LICENSING PROGRAM

In November 2006, the Riverside County Board of Supervisors approved Ordinance No. 857 creating a Business Registration and Licensing Program. The ordinance requires that businesses within the unincorporated area of Riverside County obtain a business license. The ordinance includes information regarding the contents of the application form, license issuance protocol, description of license fee, license inspections, water quality inspections and enforcement, and business license enforcement procedures.

The ordinance requires all businesses to register; however, some businesses are exempt from paying fees. Fee exemptions will be granted for various agricultural activities, certain residential businesses, places of worship, specific non-profit, and any business exempt by virtue of constitutional law.

Business license fees will not exceed the reasonable cost of providing an inventory of county businesses and the required registration information. No business license fee charged under the provisions of this ordinance shall be construed as a business license tax.

A business registration form designed to ascertain pertinent information regarding the businesses will be mailed to every known business within unincorporated area of Riverside County. In addition, businesses have the ability to access the County of Riverside's website for an on-line registration and payment system. For more information regarding business registration requirements, please contact the Business Registration and License Program Office at 951-955-1400, or on the website: www.rctlma.org.buslic

FEE EXEMPTIONS

Pursuant to Ordinance No. 857, some businesses are exempt from paying fees; however, they must register within 60 days of being notified by the County in order to maintain their exempt status. Exemptions apply to the following:

Residential Facility: Apartments, rooming houses, residential care homes, and family day care homes.

Church, Temple or Places of Worship: Churches, temples or other places of worship, for worship, religious education, or the social affairs of the religious group. **NOTE:** This exemption shall not apply to other activities, including, but not limited to, day schools, social service programs or Church-owned or operated business enterprises.

Home Occupations: Home occupations that are not subject to compliance with water quality restrictions. If your business affects water quality, it will not be exempt from the registration fee.

Agriculture: Agricultural pursuits consisting of the growing of crops, raising of livestock, and dairying, the purchase and storage of substances, materials, supplies, animal feeds and produce, and the marketing of farm products. **NOTE:** A business license shall be required in connection with any of the following: 1) retail nurseries, 2) retail greenhouses; and 3) wholesaling, processing, storage or manufacturing use which involves the collection of products of multiple farms or ranches .

Federal or State Law: Any businesses that are legally recognized as exempt by the U. S. Constitution or applicable statutes, or by the State of California.

Non-Profit Organizations: Any non-profit organizations that are legally recognized as tax exempt pursuant to the provisions of 26 U.S.C. Section 501 (c)(3).

RIVERSIDE COUNTY BUSINESS REGISTRATION AND LICENSING PROGRAM

4080 Lemon St.
P.O. Box 1208
Riverside, Ca 92503
www.rctlma.org/buslic
(951) 955-1400

0001898

Frequently Asked Questions?

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WHAT IS THE PURPOSE OF THE BUSINESS REGISTRATION AND LICENSING PROGRAM?

This program provides a comprehensive inventory of businesses in unincorporated area of Riverside County, enhances public safety and helps achieve compliance with federal, state and local water quality regulations.

HOW DOES THE BUSINESS REGISTRATION PROGRAM BENEFIT BUSINESS OWNERS AND THE GENERAL PUBLIC?

There are a two major benefits to the business community and general public from the business registration program:

Public Safety

The program gives county law enforcement and fire personnel a better understanding of the business community and its processes and alerts them to potential hazards, making them more effective responding to protect residents and property. .

Water Quality

The business registration program requires that specific business types be identified, prioritized and inspected for storm water management requirements. It will ensure that those businesses have implemented best management practices to prevent illicit discharges into the storm water system that could ultimately harm water quality.

HOW MUCH WILL THE BUSINESS LICENSE COST?

License fees charged pursuant to this ordinance are as follows:

License fee (first year):	**$45**
Annual renewal fee:	**$30**
Change of name/ location:	**$30**
Duplic[illegible] license:	**$30**

WHO IS REQUIRED TO HAVE A LICENSE?

Every person conducting business as defined in Riverside County Ordinance 857 in unincorporated areas of Riverside County must obtain a business license. A separate license must be obtained for each physical location. Any person who does not obtain the required license is subject to the procedures and penalties set forth in the ordinance.

WHAT IF I OPERATE A MOBILE BUSINESS?

A business license is required for the following mobile businesses: mobile automobile or other motor vehicle washing; pest control services; mobile carpet; drape or furniture cleaning; concrete mixing or cutting; masonry; painting and coating; landscaping; pool and fountain cleaning; and portable toilet servicing.

WHAT IF MY BUSINESS ALSO CONDUCTS BUSINESS IN ANOTHER CITY OR COUNTY?

You might need a separate business license to conduct business in any city or county. Most California cities and counties have a business license ordinance. Each jurisdiction, however, has it's own filing fee and requirements. Check with the appropriate jurisdiction for its' fees.

HOW LONG IS THIS LICENSE GOOD FOR?

Your license is current for one calendar year from the effective date of license issuance. Renewal fees are due 30 days prior to the expiration date on the license.

DO STATE LICENSED CONTRACTORS NEED A BUSINESS LICENSE?

Any person licensed as a contractor by the State Contractors Board must obtain a business license if they are physically located within the unincorporated areas of the County.

DO I NEED A LICENSE IF I WORK OUT OF MY HOME?

Yes, home-based businesses also requir registration. Most home occupations are exemp from paying registration fees. The fee exemptio shall not apply to those home occupations that ar subject to comply with water quality requirement Please refer to the brochure's fee exemption sectio or go to our website at: www.rctlma.org/buslic.

IF I AM A NONPROFIT BUSINESS, DO I HAVE T REGISTER?

You are required to register, but are exempt fror paying fees if your organization is legally recognize as tax exempt pursuant to the provisions of Interna Revenue Code Section 501 (C) (3) and you exemption is filed within 60 days of notification c the County's registration requirement.

DO I NEED A LICENSE FOR GROWING OR PRODUCING AGRICULTURAL PRODUCTS?

Yes, all agricultural businesses must registe however, some agricultural activities may be exemp from fees. Refer to the fee exemption section o this brochure or go to www.rctlma.org/buslic.

WHAT IS THE APPLICATION PROCEDURE?

The process to obtain a business license takes onl a few minutes and may be completed by mail or o the web based registration system. Using th internet, go to the county business registratio website at: www.rctlma.org/buslic where you will fin online instructions, a registration application an convenient payment system.

IF I AM EXEMPT FROM FEES, DO I STILL HAVE T REGISTER?

Yes. Business that are exempt from paying fees st must register within 60 days of notification.

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COUNTY OF RIVERSIDE

Department of Building and Safety

BUSINESS REGISTRATION AND LICENSING PROGRAM

James J. Miller
Director

January 31, 2007

Martha's Gift Shoppe
ATTN: ACCOUNTS PAYABLE
PO BOX 456
GOTHAM, CA 99999-9999

Dear Business Owner,

Your business has been identified as being located within the unincorporated area of the County of Riverside. The County has recently enacted Ordinance 857 requiring all businesses within the unincorporated areas to register and obtain a business license. The purpose of this program is to create a comprehensive inventory and data base of all businesses. This inventory will be used to assist the County in complying with Federal clean water regulations and to improve public safety services and economic development outreach to the business community.

Included with this letter are the Business License Application, a brochure about the program, the Declaration of Exemption, and a return envelope. **The first time filing fee for the Business License is $45 with an annual renewal fee of $30.** *Also, for your convenience, you can register and pay on line at www.rctlma.org/buslic*. All applications must be returned within 60 days of receipt of this letter or you may be subject to late filing fees.

If you have any questions, please contact the Business License and Registration Program Division at (951) 955-1400 or visit the web page at *www.rctlma.org/buslic*. Thank you.

Respectfully,

Ed Nicholls
County of Riverside
Business Registration and Licensing Division

4080 Lemon Street 12th Floor Riverside, CA 92502 951-955-1400 FAX 951-955-2023
MAIL: P.O. Box 1208, Riverside, CA 92502-1208

County of Riverside
Environmental Compliance Division
NPDES Construction Inspection Form

Tract/Plot/APN No: _____
Grading Permit No: _____
WDID Number: _____
Size/Site (Acres Disturbed): _____
Owner/Applicant: _____
Address: _____
_____

Date: _____ ECI: _____
Thomas Bros: _____
Weather Condition: _____
Contact Person: _____
Phone Number: _____
Email: _____
Site Address: _____

Site Priority Level
☐ **Low** ☐ **Medium** ☐ **High**

Revised Priority Level
☐ **Low** ☐ **Medium** ☐ **High**

Inactive ☐ **Active** ☐

Yes	No	
		1 Storm Water Pollution Prevention Plan:
☐	☐	A) Current SWPPP document on job site?
		2. Best Management Practices:
☐	☐	A) Erosion Control BMPs installed, maintained and effective?
☐	☐	B) Sediment Control BMPs installed, maintained and effective?
☐	☐	C) Wind Erosion Control BMPs installed, maintained and effective?
☐	☐	D) Tracking Control BMPs installed, maintained and effective?
☐	☐	E) Non-Stormwater Management BMPs installed, maintained and effective?
☐	☐	F) Waste management and materials pollution control BMPs installed, maintained and effective?
		3. Non-Stormwater Discharges:
☐	☐	A) Is the site free from evidence of non-storm water discharges?
☐	☐	B) Is the site free from the potential to create a non-storm water discharge?
☐	☐	C) Is there an effective combination of BMPs installed?

Enforcement:

In Compliance ☐ Non-Compliance ☐ Gross Non-Compliance ☐

☐ Verbal ☐ Written ☐ NOV ☐ Stop Work Order ☐ RWQCB Notified

**This inspection is based solely upon the observations made by the inspector at the time of the inspection.*

Comments: _____

_____
_____
_____
_____ Follow Up Date: _____

**See back for additional comments.*

Date:	Action:

BUSINESS REGISTRATION

RIVERSIDE COUNTY

The person, firm or corporation named below is granted this registration certificate pursuant to the provisions of RIVERSIDE COUNTY Ordinance 857. Issuance of certificate is not an endorsement, nor certification of compliance with other ordinances or laws, nor an assurance that the proposed use is in conformance with the county zoning regulations. This certificate is issued without verification that the taxpayer is subject to or exempt from licensing by the State of California.

Business Name: El Comal

Business Location: 29580 1/2 Nuevo Rd
Nuevo, CA 92567-9575

1st Owner Name: Jose Guadalupe Benitez

2nd Owner Name:

EL COMAL
29580 1/2 NUEVO RD
NUEVO, CA 92567-9575

BUSINESS LICENSE #: **004096**

Business Type: 00024

Description: Restaurants No Alcohol

Effective Date:

Expiration Date: -

TO BE POSTED IN A CONSPICUOUS PLACE

NOT TRANSFERABLE

0001902

0001903

COUNTY OF RIVERSIDE

P. O. Box 1208, Riverside, CA 92502-1208 • (951) 955-1400

E-Mail: rctlma.org/buslic

BUSINESS REGISTRATION APPLICATION

• Please review and edit entire application •

REGISTRATION DUE DATE

03/08/2007

BUSINESS REGISTRATION NO. 021427

Business Name and Location
Fogh & Nicholls Mercedes
1234 E Rodeo Dr
Gotham, CA 99999-9999

Mailing Address
FOGH & NICHOLLS MERCEDES
ATTN: ACCOUNTS PAYABLE
P O BOX 456
GOTHAM CA 99999-9999

Phone No. (951) 687-6876 x6
Fax No.
Start Date 01/31/2007
Rate Type 01
Email Address: Ed@Home.Com
Website: Jakcie@Mercedes.Org
State License No. 1242222
License Type
Expiration Date
APN 897-8979-797
Federal ID No. 98-7897979
State ID No. 877-8587-6
Resale No. SREHY-768768868

Description of Business

Ownership: ☐ Corporation ☐ Ltd Liability ☐ Sole Proprietor ☐ Partnership ☐ Trust

Owners, Partners, or Corporate Officers - Please make any necessary corrections.

Name Jackie T. Fogh
Address --ON FILE--
Title Owner
Phone #1 (909) 725-3727
Phone #2 (951) 687-6888

Name Ed W. Nicholls
Address --ON FILE--
Title Owner
Phone #1 (909) 455-7677
Phone #2 (909) 674-6546

Emergency Contact - Please make any necessary corrections.

Name Ed W Nicholls **Title** Owner **Phone No.** (909) 455-7677
Address --ON FILE

FOR YOUR CONVENIENCE YOU MAY CONFIRM YOUR INFORMATION, REGISTER YOUR BUSINESS, AND PAY ON OUR WEBSITE:

WWW.RCTLMA.ORG/BUSLIC

OR, YOU MAY COMPLETE THIS APPLICATION BY VERIFYING THE INFORMATION AND RETURN WITH YOUR CHECK FOR $45.00 IN THE ENCLOSED ENVELOPE

PLEASE COMPLETE THE FOLLOWING:

No. of Employees #

Registration Fee $ 45.00

TOTAL AMOUNT DUE $ 45.00

I declare under penalty of perjury that the information contained in this application is true and correct.

Signature of Owner or Representative Date

Table 1- 2007-08 Storm Season Industrial Commercial Target List Of Industries

	Account	Firm Name	Firm Address	Firm City State Zip	SIC Code	Priority
Santa Margarita Watershed						
1	000020	Bobs Mobile Home Sales	28455 Highway 74	Romoland, CA 92585-0000	5561001	High
2	000122	Auto Zone West, Inc	30121 Antelope Rd	Menifee, CA 92584-8062	5531004	High
3	000135	Paul's Truck Repair	28504 El Toro Rd	Lake Elsinore, CA 92532-1926	7538001	High
4	000175	Dan Copp Crushing	27050 Watson Rd	Sun City, CA 92585-9792	3272001	High
5	000177	Kenny Shober Transport, Inc	46750 Rainbow Canyon Rd	Temecula, CA 92592-5927	4213001	High
6	000432	Valley Auto	58581 Highway 371	Anza, CA 92539-0000	5541006	High
7	000438	Star Auto Parts	41007 Florida Ave	Hemet, CA 92544-4830	5531004	High
8	000489	John L Mc Grath	31265 Murrieta Rd	Sun City, CA 92584-9706	7538001	High
9	000547	Barbara J Bradford	43873 Barbara Trl Aguanga 9	Anza, CA 92539-0000	1781001	High
10	000548	Unland Machinery	25801 5th St	Hemet, CA 92544-5303	7699001	High
11	000578	Jim Foley Trucking, Inc.	26048 Wickerd Rd	Menifee, CA 92584-9542	4212001	High
12	000580	Active Drilling & Pump Supply	23641 California Ave	Hemet, CA 92545-2132	1781002	High
13	000606	Annies Truck Stop	27666 Highway 74	Romoland, CA 92585-0000	5812036	High
14	000653	B & B Nurserytown	25260 Sultanas Rd	Homeland, CA 92548-9648	5193001	High
15	000687	Louie's Nursery	27985 Wickerd Rd	Menifee, CA 92584-9030	5261005	High
16	000750	Sun City Tire	28200 Bradley Rd	Sun City, CA 92586-3022	7539001	High
17	000753	Queens Rv Supplies Service	16831 Grand Ave	Lake Elsinore, CA 92530-1426	5561001	High
18	000806	Uni Mart	31880 Highway 74	Homeland, CA 92348-0000	5541006	High
19	000816	Golden Office Trailers	18257 Grand Ave	Lake Elsinore, CA 92530	2451003	High
20	000846	Bens Mobile Auto Repair	19661 Magnolia Ave	Lakeview, CA 92567-9536	7539001	High
21	000857	Father & Son Refinishing	21288 Macarthur	Nuevo, CA 92567	7532007	High
22	000870	Palm Valley Shell	41735 Florida Ave	Hemet, CA 92544-4948	5541006	High
23	000889	Road Runner Sire Service	24081 Minton Rd	Homeland, CA 92548-9474	7534001	High
24	000895	Ben's Welding	42805 Hiatt Ln	Hemet, CA 92544-9528	7692001	High
25	000910	Pottery Yard	45271 Florida Ave	Hemet, CA 92544-5612	3269002	High
26	000933	Patton Racing Engines, Inc	42646 Chambers Ave	Hemet, CA 92544-8451	7538004	High
27	000937	Lake Elsinore Transmission	18979 Grand Ave	Lake Elsinore, CA 92530-6260	7537001	High
28	000966	Boat Works	32501 Highway 74	Hemet, CA 92545-9555	7538002	High
29	000972	Hilsa Beck S Green Houses	28415 Moreland Rd	Romoland, CA 92585-9099	181001	High
30	000974	M & P Specialties	20661 Grand Ave	Wildomar, CA 92595-9442	5571001	High

Table 1- 2007-08 Storm Season Industrial Commercial Target List Of Industries

31	000983	Dawson Racing Headers	22110 Rae Dr	Nuevo, CA 92567-9683	7539001	High
32	001101	Forest Wood Fiber Products	28737 Hwy 74	Lake Elsinore, CA 92532	2499001	High
33	001131	Southland Aquatic Management	30770 Old Windmill Rd	Menifee, CA 92584-9168	7532001	High
34	001171	Alignment Balancing & Brake Svc	43877 Florida Ave	Hemet, CA 92544-5368	7534005	High
35	001292	Alta Nursery Inc	21700 Alessandro Ave	San Jacinto, CA 92583-2810	5261001	High
36	001400	Bobco Auto Body	18225 Eucalyptus Ave	Lake Elsinore, CA 92532-1983	7532001	High
37	001518	North County Supply	26561 Winchester Rd	Hemet, CA 92545-9404	5261001	High
38	001519	R W Martin Inc	37260 Sky Canyon Dr	Murrieta, CA 92563-2500	3728006	High
39	001532	Whited Cemetery Service	26250 Palomar Rd	Romoland, CA 92585-9710	3272035	High
40	001533	R V M D	25620 Garbani Rd	Menifee, CA 92584-8555	5561005	High
41	001538	The Soco Group #80	27181 McCall Blvd	Sun City, CA 92586-3315	5541001	High
42	001547	Chem Tech	31813 Bottlebrush St	Winchester, CA 92596-8829	5169001	High
43	001569	French Valley Chevron	30616 Benton Rd	Winchester, CA 92596-0000	5541002	High
44	001587	Matthews International Corp	580 S State St	San Jacinto, CA 92583	3366003	High
45	001887	Michael Ray Taylor	25800 Nubs Ct	Menifee, CA 92584-8677	7353001	High
46	001889	Richdon Metals	33408 Demit Rd	Homeland, CA 92548-9769	1542027	High
47	002051	Sedco Pier	33320 Mission Trl	Wildomar, CA 92595-8426	5271003	High
48	002361	Hearts Home Farm	32643 Highway 74	Hemet, CA 92545-9633	7011003	High
49	002502	Lizzy Anne's Garden Center	57475 Highway 371 Unit C & I	Anza, CA 92539-0000	5261001	High
50	002624	First Step Greenhouse Inc	43315 Calle Rocinante	Temecula, CA 92592-9561	5261005	High
51	002662	David Clark Nursery	45342 Cameron Rd	Temecula, CA 92592	5261001	High
52	002742	Regal Plant Growers & Brokering	25720 Waldon Rd	Menifee, CA 92584-9053	181001	High
53	002749	Winchester Wild West Arena	32150 Grand Ave	Winchester, CA 92596-9426	7999001	High
54	002771	3 D R	26049 Lawton Ct	Hemet, CA 92544-6270	1761001	High
55	002802	Canyon Lake Nursery	30510 Murrieta Rd	Menifee, CA 92584-9044	5261001	High
56	002854	Paloma Valley Materials	26735 Newport Rd	Menifee, CA 92584-9227	5261001	High
57	002890	Asian Fruits And Trees	32490 Avalon Ln	Menifee, CA 92584-8773	5261001	High
58	002961	Ruiz Nursery Services	27911 Lindell Rd	Lake Elsinore, CA 92532-7312	5261001	High
59	003047	Fowler Trucking	37420 Calle De Lobo	Murrieta, CA 92562-9203	4213001	High
60	003281	Gaston Tires	22304 Sequoia Cir	Wildomar, CA 92595-8150	5531008	High
61	003371	Sunny Hills Towing	42500 Sage Rd	Aguanga, CA 92536-9772	7549010	High
62	003483	East West Truck & Equip Repair	31071 Reservoir Ave	Nuevo, CA 92567-9079	7538001	High

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63	003554	Ideal Conversions	6876 Red Cardinal Ct	Corona, CA 92880-8983	7538001	High
64	003647	Mobile R V	462515 Golden Stage Ranch	Aguanga, CA 92536-0000	5271001	High
65	003710	Sunstate Equipment	25201 Trumble Rd	Romoland, CA 92585-9664	7353001	High
66	003721	4 Brothers Tires	16817 Grand Ave	Lake Elsinore, CA 92530-1426	7534005	High
67	003781	Marvs Small Engine Repair	39644 Howard Rd	Anza, CA 92539-9180	7699022	High
68	003800	VIP Motoring	32695 Clinton Keith Rd	Wildomar, CA 92595-8512	5521001	High
69	003804	Dave's Heavy Equipment Svc & Rep	20704 Cashew St	Wildomar, CA 92595-8985	5046001	High
70	003878	Village Equipment Rentals Inc	18374 Grand Ave	Lake Elsinore, CA 92530-6105	7359001	High
71	003936	Hart To Hart Auto	43121 Quincy Ct	Hemet, CA 92544-1726	5093008	High
72	003964	Carisa Tire Shop	31559 Highway 74	Homeland, CA 92570-0000	5014004	High
73	003965	C R Gann Demolition	31521 Park Ave	Nuevo, CA 92567-9213	1795001	High
74	003967	S T I Inc Trucking And Materials	15080 Golondrina St	Lake Elsinore, CA 92530-6936	4212001	High
75	004083	K W Palms & Cycads	28481 El Toro Rd	Lake Elsinore, CA 92532-1924	5261001	High
76	004146	Sanner Racing	33140 Tranquil Ln	Wildomar, CA 92595-9428	5531004	High
77	004150	Sualez Tires	44023 Florida Ave	Hemet, CA 92544-5443	5531002	High
78	004269	Quality Dental Upholstery	21915 Valley Rd	Nuevo, CA 92567-0000	7641001	High
79	004272	Cal Native Plants Llc	25735 Garbani Rd	Menifee, CA 92584-9476	5261001	High
80	004320	Ly Gas & Mini Market	17595 Grand Ave	Lake Elsinore, CA 92530	5541006	High
81	004342	Cordyl Truss	27345 Highway 74	Romoland, CA 92585-0000	2439002	High
82	004375	Aguanga Waterwell Services, Inc	46450 Highway 79	Aguanga, CA 92536-9325	1781001	High
83	004398	Express Auto Trader	17631 Grand Ave	Lake Elsinore, CA 92530-5913	5521001	High
84	004401	Rock Buggy Supply	25299 Sultanas Rd	Homeland, CA 92548-9648	5531001	High
85	004438	Sticky Black Fish	44015 Williamson Rd	Aguanga, CA 92536-9590	7299001	High
86	004440	Green Acres Ranch Inc	35750 De Portola Rd	Temecula, CA 92592-9011	5261001	High
87	004459	Take Heart Farm	36610 Judi Ln	Hemet, CA 92544-9256	291001	High
88	004503	Broken Tree Ranch	43480 Chapman Rd	Anza, CA 92539-9310	5261001	High
89	004563	S K Auto Sales	38855 Cobblestone Cir	Murrieta, CA 92563-6253	5521003	High
90	004616	Western Home Partners Llc	22105 Woodcreek Ln	Wildomar, CA 92595-8240	5211003	High
91	004627	Carter's Car Care	41070 Via Del Toronjo	Temecula, CA 92592-8256	7532001	High
92	004647	Mystic Lake Gardens	22177 Polley St	Nuevo, CA 92567-8942	7331001	High
93	004707	Winchester Ranch Market	28340 Highway 79	Winchester, CA 92596-0000	5411003	High
94	004732	Dolphin Transfer	25485 Pierson Rd	Homeland, CA 92548-9763	4212011	High

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95	004787	Bobs Trailer Supply	44219 Florida Ave	Hemet, CA 92544-5470	5561004	High
96	004792	Miles Motors	15171 Kingsway Dr	Lake Elsinore, CA 92530-5560	5511005	High
97	004801	Empire Offroad	36915 Rancho Kiel Rd	Winchester, CA 92596-8936	5531004	High
98	004802	J Z Auto Trucking	30605 San Anselmo Dr	Murrieta, CA 92563-7873	5521001	High
99	004863	J B Equipment Repair & Maintenanc	24028 Juniper Flats Rd	Homeland, CA 92548-9776	7699002	High
100	004927	Precision Works Racing Engines	33167 Mackay Ave	Lake Elsinore, CA 92530-1479	7538004	High
101	004973	Sun City Fuels	29950 Murrieta Rd	Sun City, CA 92584-8536	5541001	High
102	004974	Tri-State Materials	31885 Highway 79	Winchester, CA 92596-0000	5211001	High
103	005005	High Countree Nursery	38460 Bailiff Rd	Anza, CA 92539-0000	5261001	High
104	005116	B & B Metals Inc	41665 Thornton Ave	Hemet, CA 92544-8202	5093016	High
105	005146	Lake Precision Llc	33132 Zellar St	Lake Elsinore, CA 92530-5739	5084035	High
106	005155	C & T Auto, Inc	33480 Mission Trl	Wildomar, CA 92595-8427	5012017	High
107	005357	Rhino Glass	23778 Elsinore Ln	Quail Valley, CA 92587-9121	7536001	High
108	005358	Amoreena Lara Dirt Works	42700 Acacia Ave	Hemet, CA 92544-5167	7699049	High
109	005359	J W Kenitzer Enterprises	40491 Green Oaks Dr	Temecula, CA 92592-8795	4212001	High
110	005365	Nuevo Tires Shop	29580 Nuevo Rd	Nuevo, CA 92567-9575	5531008	High
111	005371	Hemet Car Wash	41241 Florida Ave	Hemet, CA 92544-4805	7542003	High
112	005450	A Mart Gas	56245 Highway 371	Anza, CA 92539-0000	5541003	High
113	005520	Pookys Tire Service	28600 Ashby Ln	Nuevo, CA 92567-9357	5014003	High
114	005535	Tire Stop	32920 Mission Trl	Lake Elsinore, CA 92530-4656	5013009	High
115	005552	Mohr & Associates	35911 Covington Dr	Wildomar, CA 92595-7739	5012004	High
116	005580	Montecito Nursery	24251 Juniper Springs Rd	Homeland, CA 92548-9377	5261001	High
117	005679	Swanson Group Sales Co	35150 Pashal Pl	Wildomar, CA 92595-9515	5031008	High
118	005680	A & J Grading Contractors Inc	830 Shiraz Dr	Hemet, CA 92545	1794004	High
119	005707	Len's Clear View	35293 Begonia Ln	Winchester, CA 92596-8986	3731018	High
120	005708	Molinas Automotive	27966 E Hwy #74	Romoland, CA 92530-0000	7538001	High
121	005721	Noe Ramirez	32883 Ascot Way	Menifee, CA 92584-0000	5261001	High
122	005808	French Valley Palms	36141 Maddalena Rd	Winchester, CA 92596-9792	5261001	High
123	005817	Marks Gm Truck & Auto Repair	25831 Craig Ave	Menifee, CA 92584-9340	7538002	High
124	006130	Six Nations Trucking	33727 Cherry St	Wildomar, CA 92595-8496	4212001	High
125	006182	Technics Touch Llc	32272 Poinsettia Ct	Winchester, CA 92596-8996	3999001	High
126	006228	J & Ms Smog & Auto Repair	31200 Highway 74	Homeland, CA 92548-0000	7549002	High

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127	006331	K S Auto Service	29770 Bradley Rd #A	Sun City, CA 92586-6519	1521001	High
128	006340	Coyote Rentals & Sales Inc	32420 Central St	Wildomar, CA 92595-9746	7359001	High
129	006407	Munguias Auto Wholesale	29706 Squaw Valley Dr	Sun City, CA 92586-3477	5012001	High
130	006468	C&R Complete Automobile Services	24519 Conejo Dr Unit B	Quail Valley, CA 92587-9218	7622004	High
131	006520	My Garage Adv Transmission Inc	21952 Walnut Dr	Wildomar, CA 92595-8945	7538001	High
132	006535	Albertsons Fuel Center #6734	39224 Winchester Rd	Murrieta, CA 92563-3506	5541003	High
133	006537	Racer X Auto & Truck Accessories 1	27162 Petunia Ct	Sun City, CA 92586-2001	5531002	High
134	006555	Advanced Emissions Spclst Inc	29770 Bradley Rd Ste C	Sun City, CA 92586-6519	7533003	High
135	006579	B & B Auto Llc	29770 Bradley Rd Ste B	Sun City, CA 92586-6519	7538001	High
136	006671	Joe Chebat	29770 Bradley Rd Ste I	Sun City, CA 92586-6519	7538001	High
137	006693	M & T Color Farms	59775 Grandon Rd	Anza, CA 92539-9493	5261001	High
138	006695	Sun's Lube & Repairs	29770 Bradley Rd Ste G	Sun City, CA 92586-6519	7538001	High
139	006721	Johnson Grading	40760 Brook Trails Way	Aguanga, CA 92536-9123	1794004	High
140	006740	Larsen Equipment	45195 El Reposo Rd	Aguanga, CA 92536-9642	7538001	High
141	006746	Protect A Home Termite & Pest Con	49189 Thoroughbred Ct	Aguanga, CA 92536-9853	7342001	High
142	006759	Anza Valley Backhoe Service	37790 Jack Ln	Anza, CA 92539-9012	1794001	High
143	007655	Loken Transport Service	24960 California Ave	Hemet, CA 92545-2226	4789001	High
144	007846	Bagby Enterprises Inc	33951 Sage Rd	Hemet, CA 92544-9524	1611001	High
145	007958	Temecula Stoneworks	41550 Cherimoya Rd	Hemet, CA 92544-9796	3281001	High
146	008068	Alejandrino Flower Growers	43275 Ginter Rd	Hemet, CA 92544-9089	5261001	High
147	008153	Baxendale Nursery Inc	24010 Juniper Flats Rd	Homeland, CA 92548-9731	181009	High
148	008315	Studio Equipment Services Inc	17550 Rodeo Rd	Lake Elsinore, CA 92530-7524	7359001	High
149	008391	Chester Equipment Rentals	29377 3rd St	Lake Elsinore, CA 92532-2338	7359001	High
150	008482	Roberts Backhoe Service Inc	32987 Turtle Dove Dr	Lake Elsinore, CA 92530-6185	1794001	High
151	008607	Chaparral Concepts, Inc	26290 Hayden Ln	Menifee, CA 92584-9377	7692001	High
152	008666	Cleveland Equipment Inc	28665 Tulita Ln	Menifee, CA 92584-9031	7353001	High
153	008812	Rapid Towing	33220 Bailey Park Blvd	Menifee, CA 92584-9615	7549010	High
154	009379	Barrys Tractor Service	21763 Corso Alto Ave	Nuevo, CA 92567-9477	1794004	High
155	009384	Gm Trucking	22120 Horseshoe Trl	Nuevo, CA 92567-9384	4212001	High
156	009417	Allstate Equipment Rental	29914 13th St	Nuevo, CA 92567-9400	1794001	High
157	009420	Select Redimix	30048 12th St	Nuevo, CA 92567-9531	3531001	High
158	009429	Beccera Express	30670 Jojoba	Nuevo, CA 92567-9678	4212001	High

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159	011516	Grove Lumber & Building Sups	27126 Watson Rd	Romoland, CA 92585-9792	5211001	High
160	011519	Phillip Howells Welding	27625 Mapes Rd	Romoland, CA 92585-9748	7692001	High
161	011521	Gosch Towing & Recovery	27789 Jackson Ave	Romoland, CA 92585-9208	7549010	High
162	011527	Sp&m Welding And Hydraulics	27921 Monroe Ave	Romoland, CA 92585-9514	7692001	High
163	011562	Nelson Landscape Pest Mgt	23713 Elsinore Ln	Sun City, CA 92587-9277	7342001	High
164	011602	Medallion Pest Elimination	25940 Whitman Rd	Sun City, CA 92586-5302	7342001	High
165	011728	Chivas Trucking Co	27715 Ellis Ave	Sun City, CA 92585-9355	4212001	High
166	011750	Transparent Window Films	27851 Bradley Rd Ste 109	Sun City, CA 92586-2213	7549012	High
167	011857	Courtesy Security Services	29091 Snead Dr	Sun City, CA 92586-3184	7381011	High
168	012033	K H K Dynamics	35125 Calle Nopal	Temecula, CA 92592-9477	7538001	High
169	012053	Glenoaks Nursery And Tree Farm	36275 Glen Oaks Rd	Temecula, CA 92592-8002	5261001	High
170	012091	Macks Water Trucks	39220 Gray Squirrel Rd	Temecula, CA 92592-8462	4212001	High
171	012120	Moore Heat	40077 Parado Del Sol Dr	Temecula, CA 92592-8940	7359001	High
172	012492	Fink Motor Transport	20726 Grand Ave	Wildomar, CA 92595-9491	4214001	High
173	012506	Diamond W Contractors, Inc	21285 Shoemaker Ln	Wildomar, CA 92595-9756	1629001	High
174	012528	Pablin Trucking	28840 Stone Ln	Sun City, CA 92585-9109	4212001	High
175	012557	Stafford Bakery Distributing	22670 Sunnybrook Dr	Wildomar, CA 92595-8328	4213001	High
176	012603	Mark Cohen Trucking	31705 Central St	Wildomar, CA 92595-7747	4212001	High
177	012604	Bob Goodwin	31935 Cash Ln	Wildomar, CA 92595-9766	7538001	High
178	012615	F & Y Transport	P.O. Box #7	Wildomar, CA 92595	4212011	High
179	012616	Tri Power Engineering , Inc	20390 Lorena Ln	Wildomar, CA	8711001	High
180	012669	Farm Mutual Water Company	33383 Mill Pond Dr	Wildomar, CA 92595-8191	4941001	High
181	012687	Conoco Phillips #2705093	33982 Mission Trl	Wildomar, CA 92595-8165	5411002	High
182	012717	Diamond Valley Pest Control, Inc	35135 Momat Ave	Wildomar, CA 92595-9507	7342007	High
183	012755	Simply Dents	36540 Villa Del Sol	Wildomar, CA 92595-9779	7538001	High
184	012784	Kraftswerk	32981 9th St	Winchester, CA 92596-9402	7537001	High
185	012791	Micro Mobile Tire Service	33976 Sidney Cir	Winchester, CA 92596-9561	5531001	High
186	012985	Rays Mobil Auto Detailing	25815 Waldon Rd	Menifee, CA 92584	7542001	High
187	013047	Hixson Backhoe Service	37345 Apple Gate Rd	Murrieta, CA 92563	7353003	High
188	013078	Street Machines By Stedman	45292 Florida Ave	Hemet, CA 92544	3711004	High
189	013221	Richardsons R V Centers	26776 Encanto Dr	Sun City, CA 92585	5561001	High
190	013292	Stauffer Lawn Equipment	32368 Mission Trl	Lake Elsinore, CA 92530	5261004	High

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191	013847	United Parcel Service	25285 Sherman Rd	Romoland, CA 92585	4215005	High
192	013906	Star Auto Parts	41007 E Florida Ave	Hemet, CA 92544	5531004	High
193	013992	Jim Foley Trucking	31860 Scott Rd	Winchester, CA 92596	4212011	High
194	014034	Alexander Water Well	44100 Highway 79	Aguanga, CA 92536	1781001	High
195	014102	Ladd Associates, Inc	26330 Dawson Rd	Romoland, CA 92585	1629001	High
196	014165	Shell Service Station	25725 Lincoln Ave	Hemet, CA 92544	5411002	High
197	014720	Sage Ranch	4695 E Benton Rd	Hemet, CA 92544	181011	High
198	014971	Karls Dump Truck & Tractor Service	45080 E Florida Ave	Hemet, CA 92544	4212001	High
199	015203	Lua Trucking	18938 Mermack Ave	Lake Elsinore, CA 92532	4213002	High
200	015282	Arrow Lift Rentals	29840 2nd St	Lake Elsinore, CA 92532	3537024	High
201	015570	Elsinore Valley Garage	33033 Walls St	Lake Elsinore, CA 92530	7538006	High
202	016152	Romo Gas Mart	27682 Highway 74	Romoland, CA 92585	5411002	High
203	016445	Saddleback Car Wash	28100 Bradley Rd	Sun City, CA 92586	7542001	High
204	016603	Mission Trail Car Wash	32554 Mission Trl	Lake Elsinore, CA 92530	7542001	High
205	016714	Elsinore Valley Limousine	32880 Sheila Ln	Wildomar, CA 92595	4111002	High
206	016789	Anza Muffler & Brake	38955 Contreras Rd	Anza, CA 92539	7533004	High
207	016862	Erickson Leasing	30141 Antelope Rd N	Menifee, CA 92584	7352001	High
208	021436	Menace Motorcycle Inc	15573 Grand Ave	Lake Elsinore, CA 92530	5571006	High
209	021442	Party Production Rentals	38372 Innovation Ct 201-B	Murrieta, CA 92563	7359011	High
210	021471	Any Make Transmissions & Mufflers	26277 Vista Pl	Hemet, CA 92545	7533003	High
211	021526	Roger Dale Leclerc	32365 Mesa Drive	Lake Elsinore, CA 92530	3441015	High
212	021539	Airmech Inc	37552 Winchester Rd	Murrieta, CA 92563	4581004	High
213	021549	Mark Mc Kee	26388 Katharin	Hemet, CA 92544	7692001	High
214	021580	Husk I T T Corporation	1580 Industrial Ave	Norco, CA 92860	2992006	High
215	021594	Hemet Valley R V	41491 E Florida Ave	Hemet, CA 92545	5561005	High
216	021818	Provenance Fighter Sales Inc	37350 Sky Canyon Dr Bldg32a	Murrieta, CA 92562	4581004	High
217	022065	Pacific Crest Aviation, Inc	37552 Winchester Rd	Murrieta, CA 92563	4522006	High
218	022076	S.E.A. Iron & Metals	31721 Hwy 74	Homeland, CA 92548	5093018	High
219	022115	Tesoro West Coast Company, L L C	23905 Catt Rd	Wildomar, CA 92595	5541003	High
220	022122	Mr. Frank's Final Finish	44455 Meadow Grove St	Hemet, CA 92544	3423084	High
221	022124	R&D Mobile Audio	29980 Technology Dr Ste #4	Murrieta, CA 92563	5531002	High
222	022180	Summit Equipment Rentals	33390 Bailey Park Blvd	Menifee, CA 92584	7353001	High

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223	022240	Mercado's Nursery	32551 Sage Rd	Hemet, CA 92544	5261001	High
224	022297	Today's Trailer Sales L L C	26125 Cordoba Dr	Hemet, CA 92545	5599006	High
225	022322	Pastor Sotelo	19007 Janisse Ln	Lake Elsinore, CA 92530	7359011	High
226	022521	Mesa Homes	35375 Hwy 74	Hemet, CA 92545	2451001	High
227	022522	Debbie Borden DBA Wesco Express	25965 Kansas St	Hemet, CA 92544	4215001	High
228	022541	Canyon Battery	33520 Almond St	Wildomar, CA 92595	4173003	High
229	022585	Truly Custom Automotive	32370 Central St Ste B	Wildomar, CA 92595	5013005	High
230	022612	Williamson Mobile Detailing	30508 Watson Rd	Homeland, CA 92548	7542005	High
231	022625	Hemet Yamaha	41491 E Florida Ave	Hemet, CA 92544	5571006	High
232	022652	A To Z Auto Transports	27958 Hide Away Ct	Romoland, CA 92585	4212011	High
233	022660	Green Valley Growers	27085 Bristol Ln	Menifee, CA 92584	181011	High
234	022669	Campos Materials	27250 Watson Road	Romoland, CA 92585	5211018	High
235	022719	Cemex Construction Materials, L.P	24740 Juniper Flats Road	Homeland, CA 92348	1221012	High
236	022720	Shamrock Sand & Rock, L L C	41751 Hwy 79	Aguanga, CA 92536	1221012	High
237	022722	Moonlight Flatbed Towing	45036 Promise Rd	Lake Elsinore, CA 92532-1500	7549010	High
238	022729	Dan Copp Crushing	46848 Pala Rd	Temecula, CA 92592	1221012	High
239	022784	J W Transport	33672 Magnetite St	Menifee, CA 92584	4212001	High
240	022796	Championhaulers.Com L L C	31705 Central	Wildomar, CA 92595	5561006	High
241	022808	Pronzini Auto Transport	29772 Lamprey St	Sun City, CA 92586	4212001	High
242	022824	Sano Systems	38340 Innovation Ct #603	Murrieta, CA 92563	5013014	High
243	022840	A & R Auto Electric	22015 Canyon Dr	Wildomar, CA 92595	7539008	High
244	022847	Craig Smith Perfomance	29683 New Hub Dr	Menifee, CA 92586	3751001	High
245	022856	Sharp Auto Sales	25569 Mesa Edge Ct	Sun City, CA 92585	5012001	High
246	022900	On Time Delivery	33806 Breckenridge Tr	Wildomar, CA 92595	4215005	High
247	022920	Quality Auto Equipment	36677 Oak Meadows Place	Murrieta, CA 92502	5531001	High
248	022921	Hook-Upz Auto Sound & Accessorie	31251 Hwy 74	Homeland, CA 92548	5531001	High
249	022984	Rytych Truck Specialties	28831 Glencoe Ln	Menifee, CA 92584	7539001	High
250	023011	Canyon Lake Auto Repair	29410 Goetz Rd	Quail Valley, CA 92587	7538001	High
251	023017	Memories Party Rentals	23332 Alta Oaks Drive	Wildomar, CA 92595	7359011	High
252	023019	Tan Auto Repair	29770 Bradley Rd Ste	Sun City, CA 92586	7538002	High
253	023071	J C Big Rig Series	26420 Wheat St	Sun City, CA 92585	7538001	High
254	023077	Water Bro's	33209 Old Hwy 74	Hemet, CA 92545	4212011	High

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255	023109	Robert L Jones Auto Wholesale	37522 La Encina Cir	Murrieta, CA 92562	5012004	High
256	023142	Osment Equipment Rentals Inc	30902 Via Bonica	Lake Elsinore, CA 92530	7359001	High
257	023220	Streamline Muffler & Fabrication	29770 Bradley Rd Ste B	Sun City, CA 92586	7538002	High
258	023234	Discount Cleanup	22036 Amado Ln	Wildomar, CA 92595	4212014	High
259	023241	Diamond Valley Delivery	26723 Amanda	Hemet, CA 92545	4212001	High
260	023253	Coast To Coast Transportation	29878 Salmon Street	Menifee, CA 92584	4213002	High
261	023258	Dependable Equipment Rental And (	25461 Auld St	Hemet, CA 92544	7353001	High
262	023268	Ernie's Automotive Mobile Mech.	17731 Grand Ave	Lake Elsinore, CA 92530	7538002	High
263	023295	Attack A Crack Windshield	P O Box 1314	Nuevo, CA 92567	7536002	High
264	023344	Performance R V Mobile Service	29404 Woodbine Ln	Menifee, CA 92584	5561005	High
265	023432	B C M Works	28349 Winchester Rd	Winchester, CA 92596	7538002	High
266	023445	Columbia Water Gardens	27430 Columbia St	Hemet, CA 92544	5261001	High
267	023468	Fix My Ride	43430 E Florida Ave F171	Hemet, CA 92544	7538001	High
268	023482	Reflections	662 White Oak St	San Jacinto, CA 92582	7542001	High
269	023554	Perry's Performance Mobile Auto Re	33941 Windmill Rd	Wildomar, CA 92595	7539001	High
270	023722	So Cal Auto Brokers	22820 Ramona Ave	Nuevo, CA 92567	5521004	High
271	023752	P T & Son Auto Transport And Towir	29694 Williamette Way	Sun City, CA 92586	4212001	High
272	023797	Mark Brown Trucking	32974 Via Curvado	Murrieta, CA 92563	4212011	High
273	023824	Net Trans	30009 West Lake Dr	Menifee, CA 92584	4119001	High
274	023830	R & R Auto Group	29410 Goetz Rd	Quail Valley, CA 92587	5521001	High
275	023867	Ultimate Auto	27718 Boulder Ridge Dr	Menifee, CA 92584	5521001	High
276	023873	Mountain British	32391 Ortega Hwy	Lake Elsinore, CA 92530	5015003	High
277	023886	Performance Carbon Products	31430 Park Blvd	Nuevo, CA 92567	5561005	High
278	023897	Arco Am/Pm	33986 Orange St	Wildomar, CA 92595	5411002	High
279	023910	J & B Transport	29805 Peacock Mountain Dr	Menifee, CA 92584	4173003	High
280	023916	Wendy Lesa Aragon	32125 Navajo Springs	Wildomar, CA 92595	5261005	High
281	024012	Quality One Clean Up & Haul	22150 Polley St	Nuevo, CA 92567	4212010	High
282	024132	Bobby's Welding And Repair	24075 Keen Rd	Homeland, CA 92548	7692001	High
283	024133	Classic Cars And Marine	29683 New Hub Dr Ste A	Sun City, CA 92586	7538002	High
284	024173	Fresh West	33436 Orchard St	Wildomar, CA 92595	5531002	High
285	024245	Hydro 4 Life	40811 Gibbel Rd	Hemet, CA 92544	5015001	High
286	024288	Executive Detailing	21145 Walker Dr	Nuevo, CA 92567	7542005	High

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287	024301	Zach's Motors	31650 Serrento Dr	Murrieta, CA 92563	5511001	High
288	024378	Suburban Propane No 1654	38471 Kirby Rd	Hemet, CA 92543	5984005	High
289	024449	Professional Demolition	24155 Pico Ave	Sun City, CA 92585	5093001	High
290	024493	Bear Creek Termite Control	34946 Lyn Ave	Hemet, CA 92545	7342009	High
291	024510	Farona	30028 13th St	Nuevo, CA 92567	5521001	High
292	024528	The Auto Shop	29970 Technology Dr	Murrieta, CA 92563	7538001	High
293	024588	Mountain View Tire & Service, Inc.	30664 Benton Rd	Winchester, CA 92596	7538001	High
294	024594	Continental Oil	36228 Hidden Springs Rd	Wildomar, CA 92595	5541001	High
295	024678	Schweizer Transportation, Inc	15080 Golondrina St	Lake Elsinore, CA 92530-6936	4212001	High
296	024681	Green's Auto Electric	44998 Terwilliger Rd	Anza, CA 92539	7538001	High
297	024722	Zugof Auto Dealer	35916 Burgundy Ct	Winchester, CA 92596	5511001	High
298	024745	Extreme Toy Rentals Company	29051 Carmel Rd	Sun City, CA 92586	7519003	High
299	024771	K C Auto Dealer	35916 Burgundy St	Winchester, CA 92596	5511001	High
300	024831	Castro Brothers Welding	23200 Olivas Ave	Nuevo, CA 92567	7692001	High
301	024871	Sharp Fabrication	28527 Hwy 74 Ste A	Lake Elsinore, CA 92532	7692004	High
302	024883	Worasing Recycling	29616 Nuevo Rd	Nuevo, CA 92567	5093018	High
303	024884	Top Tech Auto & Sons	27271 Ethanac Rd	Sun City, CA 92585	7538001	High
304	024915	D.S.G. Pickup And Delivery	28377 Encanto Dr B102	Sun City, CA 92586	4215005	High
305	025129	First Class Towing & Recovery, Inc	21135 Grand Ave	Wildomar, CA 92595	7549010	High
306	025190	Temecula House Of Imports	29980 Technology Dr Ste. 1	Murrieta, CA 92563	5521001	High
307	025096	Berk's Family" Plumbing Heating & A	38415 Innovation Crt Ste E	Murrieta, CA 92563	1711001	Medium
308	000022	J & R Machine Co	33610 Dial Rd	Wildomar, CA 92595-7966	3599001	Medium
309	000028	A & J Grocery Outlet	27388 Sun City Blvd Ste D	Sun City, CA 92586-2569	5411001	Medium
310	000089	D & N Enterprises	27691 Lindell Rd	Lake Elsinore, CA 92532-7332	3999001	Medium
311	000164	J K Industries Inc	27242 Terrytown Rd	Sun City, CA 92586-3210	1794001	Medium
312	000172	Farrell Horticulture	30755 Old Windmill Rd	Menifee, CA 92584-9169	5992004	Medium
313	000180	Secard Pools	27232 Watson Rd	Romoland, CA 92585-9792	1799045	Medium
314	000195	Target T-0678	30251 Antelope Rd	Menifee, CA 92584-8045	5311001	Medium
315	000213	Taco Bell	43466 Florida Ave	Hemet, CA 92544-5219	5812019	Medium
316	000231	Panda Express	39112 Winchester Rd Ste 108	Murrieta, CA 92563-3500	5812019	Medium
317	000248	Lake Skinner Store	37701 Warren Rd	Winchester, CA 92596-9663	5411002	Medium
318	000277	Guckenheimer Enterprises Inc	19600 6th St	Lakeview, CA 92567-8401	5812001	Medium

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319	000336	Paulson Manufacturing Corp	46752 Rainbow Canyon Rd	Temecula, CA 92592-5927	3851007	Medium
320	000405	The Lookout Roadhouse	32107 Ortega Hwy	Lake Elsinore, CA 92530-6568	5812001	Medium
321	000482	Dan's Feed & Seed Pet Supply	27388 Sun City Blvd Ste G	Sun City, CA 92586-2569	5999001	Medium
322	000540	W P Herder Sales	47111 Sandia Creek Dr	Temecula, CA 92590-4108	5172001	Medium
323	000614	De Jongs Dairy	31910 Corydon Rd	Wildomar, CA 92595-9590	5451006	Medium
324	000624	Stater Bros #75	41849 State Highway 74	Hemet, CA 92544-5066	5411006	Medium
325	000626	Stater Bros #83	27160 Sun City Blvd	Sun City, CA 92586-5505	5411001	Medium
326	000629	Stater Bros #111	25904 Newport Rd	Sun City, CA 92584-9130	5411006	Medium
327	000630	Stater Bros #119	43396 Florida Ave	Hemet, CA 92544-5220	5411006	Medium
328	000631	Stater Bros #174	36010 Hidden Springs Rd	Wildomar, CA 92595-7622	5411001	Medium
329	000632	Stater Bros #177	30712 Benton Rd	Winchester, CA 92596-0000	5411006	Medium
330	000646	Skip S Anza Valley Liquor	56376 Highway 371	Anza, CA 00000-0000	5411002	Medium
331	000651	Buchanans Service	29780 Nogues Rd	Nuevo, CA 92567-9674	1711003	Medium
332	000707	Sun City Gift & Hardware	28250 Bradley Rd	Sun City, CA 92586-3022	5251006	Medium
333	000709	Nick's Supply	27150 Shadel Rd Spc 13	Sun City, CA 92586-3302	5182007	Medium
334	000716	Southwest Territories	47479 Rainbow Oaks Dr	Temecula, CA 92592-2937	3911001	Medium
335	000759	S P S Feeds	60710 Coyote Canyon Rd	Anza, CA 92539-9460	5191001	Medium
336	000771	Dennis Does It	55780 Pine Tree Ln	Anza, CA 92539-0000	7349001	Medium
337	000785	Sun City Family Restaurant	26824 Cherry Hills Blvd	Sun City, CA 92586-2505	5812001	Medium
338	000817	Anza Gas Service	56380 Highway 371	Anza, CA 92539-0000	5984005	Medium
339	000877	Holzer Electric	56480 Highway 371 #2	Anza, CA 92539-0000	1731007	Medium
340	000896	Litelines Inc	27856 Keller Rd	Menifee, CA 92584-9645	3646001	Medium
341	000919	Sierra Heating & Air Conditioning	41115 Via Fernando	Temecula, CA 92592-8542	1711001	Medium
342	000920	Monks Air Conditioning	30530 Murrieta Rd	Menifee, CA 92584-9044	1711003	Medium
343	000921	Ferns Fence Co	1000 N State St	Hemet, CA 92543	1799001	Medium
344	000922	Emanuel Custom Upholstery	27130 Shadel Rd	Sun City, CA 92586-3320	7641001	Medium
345	000943	J & R Heating & Air Conditioning	30555 Aaron Rd	Menifee, CA 92584	1711003	Medium
346	000978	Haas Enterprises	38550 Ganson Pl	Temecula, CA 92592-8607	5999001	Medium
347	000981	Datatronics Inc	28151 Highway 74	Romoland, CA 92585-0000	3699001	Medium
348	000997	China Wok Express & Donut Llc	26100 Newport Rd Ste 1-10	Sun City, CA 92584-9095	5812008	Medium
349	001008	Lightning Mfg Corp	33145 Vail St	Lake Elsinore, CA 92530-6101	3429001	Medium
350	001046	Mancilla Electric Tool Repair	9108 Mission Blvd	Glen Avon, CA 92509-0000	7629006	Medium

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351	001064	Marietta Liquor	27985 Bradley Rd	Sun City, CA 92586-2273	5921001	Medium
352	001086	Airco A C & Heating Services	24955 Ball Rd	Romoland, CA 92585-8805	7299001	Medium
353	001161	Michael's Pizza	21465 Palomar St Ste 8	Wildomar, CA 92595-7764	5812033	Medium
354	001189	Gi's Grocery Outlet	31180 Highway 74 #D	Homeland, CA 92548-0000	5411001	Medium
355	001222	Freddys Tacos	21465 Palomar St	Wildomar, CA 92595-7766	5812038	Medium
356	001223	Hyland Cooling & Heating	30951 Sarabia St	Lake Elsinore, CA 92530-6911	1711001	Medium
357	001241	Round Up Feed	20651 Palomar St	Wildomar, CA 92595-9283	5411001	Medium
358	001246	Exotic Materials	36570 Briggs Rd	Murrieta, CA 92563-2387	3812001	Medium
359	001256	Carls Jr #290	43350 Florida Ave	Hemet, CA 92544-5220	5812019	Medium
360	001272	C & S Machine	18975 Nichols Rd # A	Lake Elsinore, CA 92532-2235	3599018	Medium
361	001345	Clark Heating & A C	41940 Crest Dr	Hemet, CA 92544-8393	7623002	Medium
362	001350	Champion Coatings	42600 Pradera Way	Temecula, CA 92590-3530	2851009	Medium
363	001380	Advance Technical Systems	24825 Picnic Ln	Wildomar, CA 92595-7855	5131002	Medium
364	001388	Del Taco L L C #760	36164 Hidden Springs Rd	Wildomar, CA 92595-7617	5812019	Medium
365	001389	Del Taco L L C #785	28055 Scott Rd	Murrieta, CA 92563-7428	5812019	Medium
366	001426	All Wire Communication	49500 Sky Harbor Rd	Aguanga, CA 92536-9260	1731013	Medium
367	001446	Venture Iii Designs	24751 Split Rail Rd	Wildomar, CA 92595-9266	5712004	Medium
368	001454	Circle K # 736	56621 Highway 371	Anza, CA 92539	5411002	Medium
369	001455	Circle K #837	17671 Grand Ave	Lake Elsinore, CA 92530	5411002	Medium
370	001462	Circle K #6003	29955 Haun Rd	Sun City, CA 92586	5411002	Medium
371	001491	Robert E Dawson	32800 Los Encinos Rd	Temecula, CA 92592-2970	7629008	Medium
372	001516	Thornton Winery	32575 Rancho California Rd	Temecula, CA 92591	2084004	Medium
373	001529	Als Custom Upholstery	54940 Scouts Ln	Anza, CA 92539-0000	7532001	Medium
374	001543	Reliable Refrigeration	36514 Sauterne St	Winchester, CA 92596-8907	7623003	Medium
375	001550	Martek Automation	38415 Innovation Ct Ste G	Murrieta, CA 92563-2570	3599001	Medium
376	001560	Bob's Canvas Inc	38780 Sky Canyon Dr	Murrieta, CA 92563-2537	5999001	Medium
377	001583	Diamond Valley Marina	2615 Angler Ave	Hemet, CA 92545-0000	5411002	Medium
378	001604	Pizza Hut	25795 Stanford St	Hemet, CA 92544-4958	5812033	Medium
379	001652	Greenery	28600 Capano Bay	Menifee, CA 92584-8427	5193006	Medium
380	001661	Awb Enterprises	33320 Gafford St	Wildomar, CA 92595-8290	3861037	Medium
381	001670	Amerimax Building Products	28921 E Highway 74	Romoland, CA 92585-0000	3499001	Medium
382	001674	Bob Sheets Custom Shutters	33085 Vail St	Lake Elsinore, CA 92530-6101	3442017	Medium

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383	001679	Forms & Cards For Less	20400 Palomar Rd	Wildomar, CA 92595-9396	2759006	Medium
384	001683	Menifee Pizza Factory	25908 Newport Rd Ste G	Sun City, CA 92584-9133	5812033	Medium
385	001697	Hideaway	32392 Mission Trl	Lake Elsinore, CA 92530-4576	5813015	Medium
386	001704	Sierra Textile Company	36580 Penfield Ln Ste 101	Winchester, CA 92596-8624	2399001	Medium
387	001705	Venus Burgers	26900 Newport Rd	Menifee, CA 92584-9222	5812019	Medium
388	001722	Dominos Pizza	26920 Cherry Hills Blvd	Sun City, CA 92586-2574	5812033	Medium
389	001783	Marcellos Pizza	29618 Nuevo Rd #B3 & B4	Nuevo, CA 92567-0000	5812033	Medium
390	001792	All Cities Glass And Mirror	27851 Bradley Rd #145	Sun City, CA 92586-2286	1793001	Medium
391	001798	Arriba Enterprises Dba Arriba Mexica	25980 Highway 243	Idyllwild, CA 92549-0000	5812036	Medium
392	001811	K C Works	28151 Orangegrove Ave	Menifee, CA 92584-8889	3949042	Medium
393	001848	Diamondback Fire And Rescue	35080 Linda Rosea Rd	Temecula, CA 92592-9529	5049001	Medium
394	001917	Calif Rare Fruit Growers le Chap	22711 Pebblestone Dr	Nuevo, CA 92567-8901	179001	Medium
395	001921	Round Up Liquor	20651 Palomar Rd # A	Wildomar, CA 92595-9283	5541003	Medium
396	001954	Acomco Inc	32915 Wells Pl	Wildomar, CA 92595-8281	1731014	Medium
397	001967	Boston Billies	26850 Cherry Hills Blvd	Sun City, CA 92586-2567	5812001	Medium
398	001976	Electrical Work	20481 Via Palo Pinto	Murrieta, CA 92562-9135	1731007	Medium
399	001983	Carls Jr	26100 Newport Rd	Sun City, CA 92584-9095	5812001	Medium
400	002012	International Gourmet	32907 Mesa Dr	Lake Elsinore, CA 92530-4642	4813001	Medium
401	002074	Marks T V	35400 Corey Cir	Temecula, CA 92592-8120	5731001	Medium
402	002104	Creative Upholstery Designs	32726 Wesley St	Wildomar, CA 92595-9780	7641001	Medium
403	002182	Certified Sign	29215 Calle De Caballos	Romoland, CA 92585-9605	3993001	Medium
404	002191	All Phase Refrig & Air Cond	26771 Garbani Rd	Wildomar, CA 92595-9009	1711003	Medium
405	002244	Value Motors	41455 Billy Joe Ln	Temecula, CA 92592-9265	5531004	Medium
406	002254	Kristi's Korner The Country Store	32692 Ortega Hwy	Lake Elsinore, CA 92530-6561	5411001	Medium
407	002271	Finish Line Vinyl Signs And Stickers	41300 Polly Butte Rd	Hemet, CA 92544-9654	3993011	Medium
408	002292	Wine Country Flower Farm, Inc.	36580 Rancho Califoria Rd	Temecula, CA 92591	5992002	Medium
409	002327	Wendys	27925 Encanto Dr	Sun City, CA 92586-3306	5812001	Medium
410	002346	Miramonte Winery	33410 Rancho California Rd	Temecula, CA 92591-4928	5813006	Medium
411	002405	Sign Shop	33094 Red Rock Cir	Menifee, CA 92584-8744	3993001	Medium
412	002414	Skip Edmunson Corporation	25110 Trumble Rd	Romoland, CA 92585-9657	3599018	Medium
413	002476	Falkner Winery	40620 Calle Contento	Temecula, CA 92591-5041	2084001	Medium
414	002558	Bestech Machinery	23905 Clinton Keith Rd Ste 11	Wildomar, CA 92595-7899	5085029	Medium

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415	002640	Valle Vista Ace Home Center	42951 Florida Ave	Hemet, CA 92544-5129	5251001	Medium
416	002692	Innovative Plastics	38435 Innovation Ct Ste 103	Murrieta, CA 92563-2566	3089073	Medium
417	002699	Dairy Queen	Mazestone/Hwy371	Anza, CA 92539-0000	5812019	Medium
418	002732	Clearwater Pool & Spa Service	58215 Bliss Rd	Anza, CA 92539-9553	7389114	Medium
419	002760	Sunshine Custom Canvas	45525 Highway 79 South #305	Aguanga, CA 92536-0000	2394005	Medium
420	002761	Empire Pre Cast, Inc.	19473 Grand Ave	Lake Elsinore, CA 92530-6341	3272001	Medium
421	002784	Central Mechanical Co	25681 Floyd Ave	Sun City, CA 92585-9030	1711003	Medium
422	002842	Paloma Valley Homes	33780 Briggs Rd	Menifee, CA 92584-9403	5271004	Medium
423	002891	Mountain View Pool Service	28310 Vista Del Valle	Hemet, CA 92544	7389114	Medium
424	002901	Mickeys Liquor	44161 Florida Ave	Hemet, CA 92544-5470	5921001	Medium
425	002936	Dolittle And Sitmore Electric Co. Inc.	33146 Rudolph Ln	Wildomar, CA 92595-9677	1731007	Medium
426	002976	Evergreen Equine Products, Inc	32415 Yates Rd	Winchester, CA 92596-9347	5191008	Medium
427	003036	Carnitas Express	26900 Newport Rd #17	Menifee, CA 92584-9222	5812036	Medium
428	003120	Taco Bell #19532	30115 Antelope Rd	Menifee, CA 92584-8062	5812019	Medium
429	003152	Icenogle Machine Inc	32631 Grand Ave	Winchester, CA 92596-9639	3599001	Medium
430	003184	Bumsteer Restaurant & Sports Bar	33040 Simpson Ave	Winchester, CA 92596-0000	5812036	Medium
431	003196	Woods & Displays By George	42180 Avery Canyon Rd	Hemet, CA 92544-9329	2541001	Medium
432	003241	Personal Touch	24161 Gunther Rd	Romoland, CA 92585-9204	1731001	Medium
433	003246	Trail Too	41823 Florida Ave	Hemet, CA 92544-5066	5813002	Medium
434	003258	Donaldsons	27016 Ramona Vista Way	Hemet, CA 92544-8276	5722001	Medium
435	003275	R & S Enterprises	28301 Encanto Dr Apt#87	Sun City, CA 92586	5999001	Medium
436	003335	S & H Racing Products	37802 Avenida De Laura	Winchester, CA 92596-9603	5013001	Medium
437	003398	King Enterprise Clinic Serv Co	40926 Reden Ct	Hemet, CA 92544-7300	3993006	Medium
438	003414	Jackys Donut Hut	27388 Sun City Blvd Ste E	Sun City, CA 92586-2569	2051003	Medium
439	003499	Craig's Plumbing Service	40575 Mayberry Ave	Hemet, CA 92544-6215	1711016	Medium
440	003531	Accurate Repair Company	59800 La Cima Rd	Anza, CA 92539-0000	7349011	Medium
441	003562	A American Self Storage	44820 Florida Ave	Hemet, CA 92544-5527	4225004	Medium
442	003608	T W Envrnmtl Enterprise Systems (T	15470 Gavilan Springs Ranch	Perris, CA 92570-0000	7299001	Medium
443	003627	The Land Stewards	26333 Dawson Rd	Sun City, CA 92585-9795	1799001	Medium
444	003650	L & L Industries	32086 White Spruce Ct	Wildomar, CA 92595-8017	5169001	Medium
445	003667	Randy Martin Limburg	25215 Carancho Rd	Temecula, CA 92590-4078	5431004	Medium
446	003672	Powerheads	35260 Bayless Rd	Wildomar, CA 92595-9070	3599018	Medium

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447	003681	Daily Donuts	41831 State Highway 74	Hemet, CA 92544-5066	2051003	Medium
448	003862	Palumbo Family Vineyards	40150 Barksdale Ln	Temecula, CA 92592-9122	2084004	Medium
449	003865	Homeland Donuts	31170 Highway 74 Ste A	Homeland, CA 92548-0000	2051003	Medium
450	003879	Champion Self Storage	24590 Berea Rd	Menifee, CA 92584-0000	4225004	Medium
451	003899	Temecula Valley Orthotics	36243 Inland Valley Dr Ste 30	Wildomar, CA 92595-9547	3842001	Medium
452	003919	Action Sign N Banner	32030 White Spruce Ct	Wildomar, CA 92595-8017	3993011	Medium
453	003934	Mac's Cart Shop	29567 Naranja Dr	Canyon Lake, CA 92587-9467	3799010	Medium
454	003956	Datin Custom Fabrication Inc	40351 Walnut St	Hemet, CA 92544-9649	3465001	Medium
455	003992	Jack Clifford's Performance Products	22850 Sheffield Ct	Wildomar, CA 92595-8106	5961001	Medium
456	004004	Designs In Lines	17574 Cottrell Blvd	Lake Elsinore, CA 92530-5864	3993001	Medium
457	004021	Crosscreek Golf Club	43860 Glenn Meadows Rd	Temecula, CA 92590-4911	7992001	Medium
458	004024	E Unlimited	34846 Borchard Rd	Lake Elsinore, CA 92530-6322	5199006	Medium
459	004040	Heritage Well Service	42050 Wildwood Ln	Aguanga, CA 92536-9261	3533008	Medium
460	004041	Dale Chavez Company Inc	36165 La Bonita Donna	Temecula, CA 92592-9506	5112006	Medium
461	004058	Delta Services	580 Third St Unit G	Lake Elsinore, CA 92530	5251001	Medium
462	004145	Nuevo Donuts & Ice Cream	29618 Nuevo Rd #2	Nuevo, CA 92567-9202	2051003	Medium
463	004154	Sweetflowers	28875 Biarritz Ct	Menifee, CA 92584-8186	7359001	Medium
464	004180	Mac Fabrication	25190 Menifee Rd	Romoland, CA 92585-9717	3444001	Medium
465	004199	M & B Ranch Growers	42966 Avenida Gato	Hemet, CA 92544-0000	1531004	Medium
466	004216	Mc Donalds	28000 Bradley Rd	Sun City, CA 92581	5812019	Medium
467	004231	C Cs Collectibles	17100 Alta Vis	Lake Elsinore, CA 92530-5724	5719001	Medium
468	004236	Fresh Cut Subs	43384 Florida Ave Ste E	Hemet, CA 92544-5299	5812008	Medium
469	004251	Rock Creek Cabinets	36132 Capri Dr	Winchester, CA 92596-8738	5712003	Medium
470	004264	Lea's Mini Mart	17139 Grand Ave	Lake Elsinore, CA 92530-5713	5411002	Medium
471	004283	J & I Homes & Development	33440 Mission Trl	Wildomar, CA 92595-8427	5271001	Medium
472	004336	Crockett Electric	28684 Midsummer Ln	Menifee, CA 92584-8002	1731001	Medium
473	004343	M & M Air Conditioning Inc	33812 Zieders Rd	Menifee, CA 92584	1711001	Medium
474	004345	Quick Mini Market	15373 Grand Ave	Lake Elsinore, CA 92530-5528	5411002	Medium
475	004361	Lsc Performance Ind	18975 Nichols Rd Ste C	Lake Elsinore, CA 92532-2229	3599018	Medium
476	004379	Paradise Fountain Store	33959 Highway 74	Hemet, CA 92545-9419	5999001	Medium
477	004405	Crivello Ristorante Italiano	32475 Clinton Keith Rd Ste 11	Wildomar, CA 92595-8664	5812036	Medium
478	004533	Freedom Storage, L L C	30630 Highway 74	Homeland, CA 92548-0000	4225004	Medium

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479	004547	Easy Living Homes	34135 Cameron Dr	Hemet, CA 92544-8927	5271004	Medium
480	004703	Los Jilbertos Taco Shop Wildomar	23971 Clinton Keith Rd # A-1(	Wildomar, CA 92595-7896	5812019	Medium
481	004713	Nuview Tile Co	20685 Hansen Ave	Nuevo, CA 92567-9512	3469001	Medium
482	004718	J P Machine Tool Service	29882 Avenida De Real	Sun City, CA 92586-3545	1796008	Medium
483	004720	A & A Sign & Crane Inc.	33124 Turner St	Lake Elsinore, CA 92530-6170	3537011	Medium
484	004754	Hwy 74 Liquor	31190 Highway 74	Homeland, CA 92548-0000	5921001	Medium
485	004761	Diamond Valley Market	32230 Sage Rd	Hemet, CA 92544-9519	5411003	Medium
486	004785	Vincen Teos Mexican Food	26825 Newport Rd	Menifee, CA 92584-9219	5812036	Medium
487	004789	Anza Lock And Safe	57131 Hwy 371	Anza, CA 92539-9599	7699040	Medium
488	004806	Doffo Wines	36083 Summitville St	Temecula, CA 92592-8349	2084006	Medium
489	004820	Eppers Electric	36865 Hidden Trail Ct	Winchester, CA 92596-9228	1731001	Medium
490	004854	Burrline Llc	35560 De Portola Rd	Temecula, CA 92592-9004	119007	Medium
491	004882	Bella Vista Winery	41220 Calle Contento	Temecula, CA 92592-9306	2084004	Medium
492	004888	Excel Transporation Cars	25730 Lynn Cir	Hemet, CA 92544-5375	5012001	Medium
493	004900	Big Al's Place	29618 Nuevo Rd Ste A	Nuevo, CA 92567-9202	5812036	Medium
494	004905	K & C Enterprises	30443 Napa St	Menifee, CA 92584-8324	3699033	Medium
495	004910	J'S Market	21465 Palomar St Ste 1 & 2	Wildomar, CA 92595-0000	5411002	Medium
496	004929	Extreme Glass Maintenance	29629 Camino Cristal	Menifee, CA 92584	7699001	Medium
497	004952	Los Primos Mexican Food	39252 Winchester Rd Ste 119	Murrieta, CA 92563-3511	5812019	Medium
498	004976	Rongs Chinese Restaurant	27388 Sun City Blvd Ste A	Sun City, CA 92586-2569	5812001	Medium
499	004993	Doors & Windows	34860 Western Way	Wildomar, CA 92595-7917	3442019	Medium
500	005014	Cahuilla Mountain Market	53071 Highway 371	Anza, CA 92539-0000	5411001	Medium
501	005117	Lorraine Hart Dental	29325 Sparkling Dr	Menifee, CA 92584-8480	5047006	Medium
502	005152	Agape Pool And Spa Service And Re	35533 Yellowstone St	Winchester, CA 92596-8766	7389114	Medium
503	005182	Coastline Candles	28641 Chaparral Dr	Menifee, CA 92584-8363	3999023	Medium
504	005190	Marlex Customs	27311 Pachea Trl	Hemet, CA 92544-8120	2434003	Medium
505	005210	Buzzard Bar	38120 E Benton Rd	Temecula, CA 92592-8102	5813001	Medium
506	005219	Fcp	23100 Baxter Rd	Wildomar, CA 92595-9699	3448001	Medium
507	005248	Becks Mobile Hose	35051 Orange St	Wildomar, CA 92595-9691	1771010	Medium
508	005306	Clinton Keith Self Storage	24781 Clinton Keith Rd	Wildomar, CA 92595-8157	4225002	Medium
509	005313	Harvest Valley Inn	31393 Allen Ave	Homeland, CA 92548-9605	5812036	Medium
510	005353	Priceless Ponies	39660 Via Cacho	Temecula, CA 92592-8115	7999074	Medium

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511	005366	Excalibur Market	32510 Mission Trl	Lake Elsinore, CA 92530-4518	5411002	Medium
512	005382	Aguanga General Store	45560 Highway 79	Aguanga, CA 92536-0000	5999001	Medium
513	005412	San Jose Water Conserv Corp	37750 Bearing Cir	Temecula, CA 92592-8586	3261014	Medium
514	005488	Espresso Systems Inc	30093 Chateau Cuvaison	Murrieta, CA 92563-4826	5812010	Medium
515	005491	Cartier Construction	29901 Moondance Way	Sun City, CA 92586-3615	1522001	Medium
516	005502	Flores Pre-Cast	33260 Stoneman St	Lake Elsinore, CA 92530-6384	3999001	Medium
517	005553	Barbees Garage And Fabrication	22051 Grove Rd	Wildomar, CA 92595-8930	3449001	Medium
518	005594	Stanford Liquor	41817 Florida Ave	Hemet, CA 92544-5066	5921003	Medium
519	005599	Foote Enterprises L L C	36650 Glen Oaks Rd	Temecula, CA 92592-8564	5182001	Medium
520	005616	China Garden Restaurant	43430 Florida Ave Ste B	Hemet, CA 92544-5298	5812036	Medium
521	005622	I E Aquarium And Exotic Fish	29632 Cool Meadow Dr	Menifee, CA 92584-8586	3499004	Medium
522	005690	Ohana Hawaiian Bbq	39028 Winchester Rd Ste 113	Murrieta, CA 92563-3508	5812036	Medium
523	005692	Sunshine Market	41560 Terwilliger Rd # Sp19	Anza, CA 92539-9659	5411002	Medium
524	005813	Pbr Hay Sales	60650 Yucca Valley Rd	Anza, CA 92539-9523	5191014	Medium
525	005858	Solomon Molina Gonzalez	31180 Highway 74	Homeland, CA 92548-0000	5812036	Medium
526	005860	Don Alfredo	21465 Palomar St Ste 9	Wildomar, CA 92595-7764	5411003	Medium
527	005881	California Cabinet Centers	24255 Conejo Dr	Quail Valley, CA 92587-9225	5211005	Medium
528	005896	Tummyts L L C	31584 Adour Way	Winchester, CA 92596-8914	2399001	Medium
529	005904	Decor A Door & Window Inc	33983 Windmill Rd	Wildomar, CA 92595-8871	1793001	Medium
530	005917	Maurice Carrie Vineyard & Winery	34225 Rancho California Rd	Temecula, CA 92591-5056	2084001	Medium
531	005944	Kwik Stop Liquor Market	32395 Clinton Keith Rd Ste 10	Wildomar, CA 92595-8511	5921001	Medium
532	005947	Los Ninos Taqueria Authentic Mexica	27192 Sun City Blvd Ste F	Sun City, CA 92586-2577	5812036	Medium
533	005948	Mikar Inc	32625 Auld Rd	Winchester, CA 92596-9622	1521014	Medium
534	005999	Wildomar Farm Plow Boys Market	22055 Palomar St	Wildomar, CA 92595-9645	5499001	Medium
535	006067	Diamond Valley Lake Market & Liquo	33040 Simpson Rd Ste 110	Winchester, CA 92596-0000	5411003	Medium
536	006074	Keyways Vineyard And Winery L L C	37338 De Portola Rd	Temecula, CA 92592-9024	2084004	Medium
537	006090	Pacific Freeform, Llc	38415 Innovation Ct Unit M	Murrieta, CA 92563-2600	7389108	Medium
538	006117	Mario's	27856 US Highway 74	Sun City, CA 92585-9729	5421006	Medium
539	006157	K C Lund Pattern Welded Steel	34960 Orange St	Wildomar, CA 92595-9781	3421023	Medium
540	006175	Dannco Construction Services	20680 Bell Ave	Nuevo, CA 92567-9781	1771001	Medium
541	006187	Submarina	39040 Sky Canyon Dr Ste 101	Murrieta, CA 92563-2502	5812043	Medium
542	006218	Original Massimo Pizza Inc	32475 Clinton Keith Rd Ste 11	Wildomar, CA 92595-8664	5812033	Medium

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543	006254	Knighten Electric	29832 Berea Rd	Menifee, CA 92584-8642	1731007	Medium
544	006291	Menifee Foods Inc	26035 Newport Rd	Menifee, CA 92584-0000	5812036	Medium
545	006300	Pam's Donuts & Ice Cream	21465 Palomar St Ste 5	Wildomar, CA 92595-7764	5812010	Medium
546	006309	Juice It Up	30628 Benton Rd Ste 204	Winchester, CA 92596-0000	5812008	Medium
547	006319	Safety Solutions	34602 Sagebrush Ln	Winchester, CA 92596-8891	5211007	Medium
548	006377	Chinese Bistro	28490 Highway 74	Romoland, CA 92260-0000	5812036	Medium
549	006472	Bobs Pitstop Pub	26900 Newport Rd Ste 101	Sun City, CA 92584-9224	5812036	Medium
550	006495	Submarina Of Menifee	26045 Newport Rd	Menifee, CA 92584-0000	5812043	Medium
551	006499	Washboard	21025 North Dr	Nuevo, CA 92567-9571	7699065	Medium
552	006534	Albertsons #6791	26100 Newport Rd Ste B	Sun City, CA 92584-9095	5411001	Medium
553	006548	Desert Rose Cafe	34846 Monte Vista Dr	Wildomar, CA 92595-7004	5812006	Medium
554	006560	Mainwaring Machining Inc	51030 Deer Mountain Way	Anza, CA 92539-9682	3599018	Medium
555	006574	Del Taco #1006	30604 Benton Rd	Winchester, CA 92596-8467	5812019	Medium
556	006577	Cathay Chinese Food	30724 Benton Rd Ste C304	Winchester, CA 92596-8466	5812036	Medium
557	006596	H.K. Foods Inc	30628 Benton Rd # B202	Winchester, CA 92596-8467	5812019	Medium
558	006666	Yellow Basket Of Menifee Inc	29966 Haun Rd	Menifee, CA 92586	5812001	Medium
559	006697	Menifee Ranch Self Storage	30125 Hwy 74	Romoland, CA 92585	4225004	Medium
560	006726	Bryant Kennedy Construction	42375 Wildwood Ln	Aguanga, CA 92536-9142	1771001	Medium
561	006754	M J Martin Construction	50830 Tule Peak Rd	Aguanga, CA 92536-9191	1521001	Medium
562	006778	Anza Valley Plumbing & Heating	44450 Tule Fire Rd	Anza, CA 92539	1711001	Medium
563	006787	R & M Concrete	59509 Rimrock Canyon Rd	Anza, CA 92539-9484	1771001	Medium
564	006788	Golden State Millwrights	60500 Coyote Canyon Rd	Anza, CA 92539-9454	1796001	Medium
565	007690	Qwik Korner Deli Grocery	25760 New Chicago Ave	Hemet, CA 92544-7219	5411001	Medium
566	007736	Four Stars Mobile Home Wash	26600 Franklin Ave	Hemet, CA 92545-9535	7349001	Medium
567	007738	J D L Builders Inc	26615 Lore Heights Ct	Hemet, CA 92544-7594	1751001	Medium
568	007743	Pacific Raingutters	1042 Enterprise Ave	San Jacinto, CA 92582	3444001	Medium
569	007745	Adams Steam	26654 Franklin Ave	Hemet, CA 92545-9535	7217001	Medium
570	007764	A 1 Quick Dry	27030 Ramona Vista Way	Hemet, CA 92544-8276	7217001	Medium
571	007774	Total Landscape	27195 Terra Vista	Hemet, CA 92544-8280	782001	Medium
572	007794	Ed Autenreith Electric	27576 Big Springs Rnch Rd	Hemet, CA 92544-8114	1731001	Medium
573	007804	Creative Ceramics	28111 Rawlings Rd	Hemet, CA 92544-8315	5945002	Medium
574	007813	Rain Gutter Systems	29870 Ballinger Rd	Hemet, CA 92544-9440	1761001	Medium

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575	007814	Malibu Pools	30226 Amber Ln	Hemet, CA 92543-9608	1799001	Medium
576	007893	Dan Marana Construction	40560 Starlight Mesa Dr	Hemet, CA 92544-9352	1799001	Medium
577	007901	Werhanowicz Window & Door	40678 E Benton Rd	Hemet, CA 92544-9368	1751001	Medium
578	007903	Ed's Handyman Services	40711 Vera Ct	Hemet, CA 92544-6254	1521001	Medium
579	007904	J H Dandy Building/ Remodeling	40781 Brock Ave	Hemet, CA 92544-6291	1521014	Medium
580	007912	Flint Construction	40965 Lela May Ave	Hemet, CA 92544-6287	1521001	Medium
581	007921	Hemet Valley Air Conditioner	41105 Torrey Pine Ct	Hemet, CA 92544-6376	1711001	Medium
582	007931	G & R Electric Company	41236 Torrey Pine Ct	Hemet, CA 92544-6366	1731001	Medium
583	007943	Mark Peel Construction	42580 Morningside Ct	Hemet, CA 92544-4951	1521001	Medium
584	007944	La Duke Bros Concrete	41350 Rainbow Ct	Hemet, CA 92544-7473	1771001	Medium
585	008014	Bret Pardo General Contractor	42030 Liberty Dr	Hemet, CA 92544-6403	1522001	Medium
586	008017	Troy Vanderwende Construction	42096 Abbott Ln	Hemet, CA 92544-8401	1521001	Medium
587	008028	U-store-it Mini Warehouse Co	465 E Florida Ave	Hemet, CA 92544-5072	4225004	Medium
588	008040	Goorsky Inc Snap On Tools	42592 Mayberry Ave	Hemet, CA 92544-6565	5251001	Medium
589	008052	Quality Heating & A C	42915 Masonic Dr	Hemet, CA 92544-4045	1711001	Medium
590	008059	Higher Ground Restoration Inc	43041 State Highway 74	Hemet, CA 92544-5149	1521014	Medium
591	008107	Emilio Pacheco	43928 C St	Hemet, CA 92544-5320	1711001	Medium
592	008113	Gehrings Carpet Cleaning	44179 Compiegne Dr	Hemet, CA 92544-9114	7217001	Medium
593	008140	Performance Pumping	45654 State Highway 74	Hemet, CA 92544-5607	7699068	Medium
594	008144	Chimney Cricket Chimney Sweep	45915 Willowbrook Rd	Hemet, CA 92544-5636	7349001	Medium
595	008156	Homeland Pet Hotel	24750 Juniper Flats Rd	Homeland, CA 92548-9421	752001	Medium
596	008306	Thee Plumbing Co	17155 Monterey Rd	Lake Elsinore, CA 92530-7531	1711001	Medium
597	008340	Cartier Electric	18361 Honey Ln	Lake Elsinore, CA 92532-2041	1731001	Medium
598	008390	Lake Electric	29147 Allan St	Lake Elsinore, CA 92532-2312	1731001	Medium
599	008397	Deamer Appliance Service	30830 Sarabia St	Lake Elsinore, CA 92530-6913	7629001	Medium
600	008490	A Touch Of Glass	33086 Blackwell Blvd	Lake Elsinore, CA 92530-5946	5231001	Medium
601	008501	Lakeside Pools & Spas, Inc	33186 Blanche Dr	Lake Elsinore, CA 92530-1464	5999036	Medium
602	008505	Infinity Construction	33211 Blanche Dr	Lake Elsinore, CA 92530-1410	1521001	Medium
603	008509	Williams Plumbing Service	33244 Blanche Dr	Lake Elsinore, CA 92530-1408	1711001	Medium
604	008515	All American Appliance Service	17655 Grand Ave	Lake Elsinore, CA 92530-5729	5722001	Medium
605	008516	Supreme Engineering	33710 Stoneman St	Lake Elsinore, CA 92530-6375	3599001	Medium
606	008582	Armstrong Demolition	25280 Barnes Ln	Menifee, CA 92584-9495	1799001	Medium

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607	008587	Rudolpho G Rodriguez	25675 Nikki Ln	Menifee, CA 92584-9742	1799001	Medium
608	008618	Plaza Cleaners	26900 Newport Rd Ste 121H	Menifee, CA 92584-9223	7216001	Medium
609	008624	G & M Carpet Cleaning	27097 Fitzgerald Pl	Menifee, CA 92584-9470	7217001	Medium
610	008665	Sip N Chew	28651 Meadow View Dr	Menifee, CA 92584-8505	5046001	Medium
611	008683	Self Storage Security	28917 Capano Bay	Menifee, CA 92584-9385	4225001	Medium
612	008732	Richard Phillips Ldscp Cnstr	30080 Golden Jay Ln	Menifee, CA 92584-8766	782001	Medium
613	008735	Subway #12405	30123 Antelope Rd Ste A	Menifee, CA 92584-8068	5812001	Medium
614	008738	Quality Custom Pools Inc	30138 Marne Way	Menifee, CA 92584-8949	1799001	Medium
615	008742	G C Landscape Inc	30231 Marne Way	Menifee, CA 92584-8154	781001	Medium
616	008766	MH Designs	31047 Larchwood St	Menifee, CA 92584-8703	1751001	Medium
617	008769	Dannys Ceramic Tile	31135 Willowood Way	Menifee, CA 92584-8730	1743001	Medium
618	008776	L E Seward Construction Company	26100 Newport Road A-12	Menifee, CA 92584-9707	1522001	Medium
619	008804	Willie Arkeilpane	33250 Bellamy Ln	Menifee, CA 92584-9035	5147001	Medium
620	008806	Auto Boat & R V Storage	33255 Zeiders Rd	Menifee, CA 92584-9614	4225001	Medium
621	008808	Mackenzie Landscape A Cal Corp	33380 Bailey Park Blvd	Menifee, CA 92584-9585	782001	Medium
622	008811	E & E Drywall Inc	25790 Trumble Rd	Sun City, CA 92585	1742001	Medium
623	009201	Charles M Bonar	19885 Tenaja Rd	Murrieta, CA 92562-8636	2434001	Medium
624	009204	Cook Drywall Corporation	20695 Avenida De Arboles	Murrieta, CA 92562-9244	1742001	Medium
625	009222	Lynn M Llewellyn	30452 Clover Crest Ct	Murrieta, CA 92563-6826	1731001	Medium
626	009224	Stover Electric	30465 Stargazer Way	Murrieta, CA 92563-6815	1731001	Medium
627	009233	Security Builders	34500 Briggs Rd	Murrieta, CA 92563-2335	1521001	Medium
628	009239	Antaya Development Corp	35987 Avenida La Cresta	Murrieta, CA 92562-7327	1522001	Medium
629	009251	Vanzanten Construction	37951 Calle De Lobo	Murrieta, CA 92562-7111	1542001	Medium
630	009252	Gerald E Martin	37980 Via Huerta	Murrieta, CA 92562-2301	851001	Medium
631	009253	Model Masonry	38000 Via Baya	Murrieta, CA 92562-8524	1741001	Medium
632	009272	Dls Constructors Inc	38700 Sky Canyon Dr Ste C	Murrieta, CA 92563-2557	1623001	Medium
633	009293	Bruin Painting Corp	38820 Sky Canyon Dr Ste B	Murrieta, CA 92563-2540	1721001	Medium
634	009295	B.P. John Recycling, Inc	28700 Mathews Rd	Romoland, CA 92585	5093001	Medium
635	009310	Mompos Oil Company Inc	39315 Calle De Suenos	Murrieta, CA 92562-7309	1522001	Medium
636	009361	Kenneth A Armstrong	19950 6th St	Nuevo, CA 92567-9352	783001	Medium
637	009362	Fierros Farrier Service	20365 Hansen Ave	Nuevo, CA 92567-9225	7699001	Medium
638	009368	Dominguez General Construction	21200 Wosslick Ave	Nuevo, CA 92567-9187	1623001	Medium

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639	009376	Global Landscape Svcs	21500 Y Ave	Nuevo, CA 92567-9685	781001	Medium
640	009386	Servpro Of Moreno Valley	22729 Pebblestone Dr	Nuevo, CA 92567-8901	7349001	Medium
641	009396	John Harrison Horseshoein	28595 Nuevo Valley Dr	Nuevo, CA 92567-9601	3462001	Medium
642	009402	Karen Berkey	29305 San Jacinto Rd	Nuevo, CA 92567-9602	7349001	Medium
643	009424	Collins Roofing & Repair	30332 Nuevo Rd	Nuevo, CA 92567-9026	1761001	Medium
644	009427	Munoz Construction	30545 10th St	Nuevo, CA 92567-9363	1771001	Medium
645	009438	Byers Painting	31070 Christine Ln	Nuevo, CA 92567-9758	1721001	Medium
646	009443	My Way Quality Home Remodeling	31240 Contour Ave	Nuevo, CA 92567-9031	1521001	Medium
647	009444	Dunamis Electric Co	31261 Montgomery Ave	Nuevo, CA 92567-9732	1731001	Medium
648	009446	R Bond Construction	31367 Janis Ln	Nuevo, CA 92567-9525	1799001	Medium
649	009456	Stone Concrete Cutting	33200 Meyer Rd	Nuevo, CA 92567-9507	1771001	Medium
650	009643	Uneek Entertainment	15260 Via Barranca	Perris, CA 92570-9669	781004	Medium
651	009747	Heartz Roofing Inc	20220 Pear Cir	Perris, CA 92570-7510	1761001	Medium
652	009776	J L R Development Inc	20875 Mauricio St	Perris, CA 92570-8645	6552001	Medium
653	009869	Jet Setters Baker And Sons Enginee	22201 Fisher St	Perris, CA 92570-8042	1522001	Medium
654	009901	Inland Paving	22930 Markham St	Perris, CA 92570-7962	1611001	Medium
655	010998	Rick's Backhoe	21467 Wren Dr	Nuevo, CA 92557-9331	1794001	Medium
656	011158	The Ortiz Company	33090 Orchard St	Wildomar, CA 92595	1521001	Medium
657	011510	Eller Brothers Trucking	25280 Antelope Rd Ste B	Romoland, CA 92585-9215	4221001	Medium
658	011515	H & M Self Storage	26850 Encanto Dr	Romoland, CA 92585-9727	4225004	Medium
659	011523	P W Call Carpentery	27835 Baroni Rd	Romoland, CA 92585-9734	1751001	Medium
660	011541	Nick Smit	22090 San Jacinto Ave	San Jacinto, CA 92583-2718	1522014	Medium
661	011552	Hendrickson Backhoe Service	40270 Martinez Rd	San Jacinto, CA 92583-2747	7359001	Medium
662	011557	Dynasty Pools	23367 Casa Bonita Ave	Sun City, CA 92587-8912	1799045	Medium
663	011569	Frost's Ameri-Clean, Inc	23991 Vista Way	Sun City, CA 92587-9507	7217001	Medium
664	011578	J L Electric	24540 Conejo Dr	Sun City, CA 92587-8929	1731001	Medium
665	011580	Henry Ramos	24765 Las Flores Dr	Sun City, CA 92587-9222	1731001	Medium
666	011588	Michael M Zeoli General Contr	25586 Orion Ct	Sun City, CA 92586-3802	1522001	Medium
667	011593	Patios Unlimited	25773 Bundy Canyon Rd	Sun City, CA 92584-9307	1521001	Medium
668	011600	New Look Cleaners	25908 Newport Rd Ste H	Sun City, CA 92584-9133	7216001	Medium
669	011678	Vicek Enterprises Inc	27200 Embassy St	Sun City, CA 92586-2057	1542001	Medium
670	011684	Fletches Clocks And Watches	27250 Murrieta Rd Spc 338	Sun City, CA 92586-3718	7631001	Medium

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671	011702	Cromar Painting	27555 Mapes Rd	Sun City, CA 92585-8807	1721001	Medium
672	011711	Osegueras Landscaping	27606 Monroe Ave	Sun City, CA 92585-9435	781001	Medium
673	011734	All Around Excavating	27753 Cold Springs Rd	Sun City, CA 92587-9275	1794001	Medium
674	011761	Henderson Tile	27888 Doreen Dr	Sun City, CA 92586-2315	1743001	Medium
675	011812	M A W Electrical & Plumbing	28270 Watson Rd	Sun City, CA 92585-9246	1711001	Medium
676	011843	Can 2 H V A C	28840 Triple Crown Rd	Sun City, CA 92585-9726	1711001	Medium
677	011848	Brad Jones Construction	28939 Phoenix Way	Sun City, CA 92586-3855	1521001	Medium
678	011891	Bradleys Custom Masonry	29643 McGalliard Rd	Sun City, CA 92586-3419	1741001	Medium
679	011893	Mark Pellerin	29653 Ashdale Way	Sun City, CA 92587-9511	1799045	Medium
680	011907	Todds Fencing, Inc	30400 Los Alamos Rd	Murrieta, CA 92563	1799001	Medium
681	011918	Discount Gutters	29816 Killington Dr	Sun City, CA 92586-4422	1761001	Medium
682	011921	Lucio Maintenance	29846 Killington Dr	Sun City, CA 92586-4422	782001	Medium
683	011925	Calscape Landscaping Inc	28825 Galaxy Way	Sun City, CA 92586	781001	Medium
684	011940	Rudys Maintenance	31390 Melvin St	Sun City, CA 92584-9047	782001	Medium
685	011942	C G Backhoe & Services Inc	33325 Bailey Park Blvd	Sun City, CA 92584-9585	1794001	Medium
686	011946	Irri-scape Construction Inc	20182 Carancho Rd	Temecula, CA 92590-4348	782001	Medium
687	011947	Cal West Drywall	20755 Carancho Rd	Temecula, CA 92590-4242	1742001	Medium
688	011950	Brandywood Winery	23433 De Anza Rd	Temecula, CA 92590-4170	2084001	Medium
689	011967	Diversified Masters	29243 Ridgeline Ct	Temecula, CA 92590-3380	1794001	Medium
690	012002	Pick Up Stix Inc	32240 State Highway 79 105	Temecula, CA 92592-3898	5812001	Medium
691	012004	Paradise Associates Inc	32625 Los Encinos Rd	Temecula, CA 92592-2977	1623001	Medium
692	012009	Gonzo Construction	33175 Linda Rosea Rd	Temecula, CA 92592-8233	1521001	Medium
693	012011	Brite Installation	33491 Madera De Playa	Temecula, CA 92592-9291	1751001	Medium
694	012022	Pacific Breeze Contractors Services,	34410 Loi Ln	Temecula, CA 92592-9115	1799011	Medium
695	012027	Martin Development Inc	34860 Monte Verde Rd	Temecula, CA 92592-9685	1531001	Medium
696	012037	Cota Electric	35280 Los Nogales Rd	Temecula, CA 92592-9377	1731001	Medium
697	012039	Stewart Electric	35350 Linda Rosea Rd	Temecula, CA 92592-9532	1731001	Medium
698	012047	Goodno Construction Inc	35712 Linda Rosea Rd	Temecula, CA 92592-9541	1521001	Medium
699	012058	A To Roh Construction	36747 Calle Bartizon	Temecula, CA 92592-8524	1742001	Medium
700	012068	Howland Plumbing	38295 Rock Creek Cir	Temecula, CA 92592-8281	1711001	Medium
701	012070	Temecula Fence Co, Inc	32840 Wolf Store Rd Ste A	Temecula, CA 92592-8469	1799001	Medium
702	012076	Gerry Breid Plumbing Co	38718 Celita Cir	Temecula, CA 92592-8576	1711001	Medium

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703	012084	T R H Concrete Construction	38970 Yuma Ln	Temecula, CA 92592-8737	1771001	Medium
704	012088	Precision Drywall Inc	39015 Colt Rd	Temecula, CA 92592-8585	1742001	Medium
705	012090	Full House Construction	39110 Calle Cordova	Temecula, CA 92592-8716	1611001	Medium
706	012098	Old Time Plastering	39360 Calle Contento	Temecula, CA 92591-5037	1742001	Medium
707	012101	California Concrete Constructi	39480 Norbro Ct	Temecula, CA 92592-8435	4225001	Medium
708	012107	Underground Connection Group	39755 Beaujolais Ct	Temecula, CA 92592-8230	7389001	Medium
709	012113	Jeff Lee	39845 Berenda Rd	Temecula, CA 92591-5020	782001	Medium
710	012115	Mosby Enterprises	39893 Calle Breve	Temecula, CA 92592-9451	1711001	Medium
711	012119	Rowland Tile	40063 Bella Vista Rd	Temecula, CA 92592-8228	1743001	Medium
712	012122	Rancho Water Welldrilling	40245 Hobby Horse Rd	Temecula, CA 92592-8374	1781001	Medium
713	012130	Pro Circuit Electric Inc	41260 Calle De Maya	Temecula, CA 92592-9008	1731001	Medium
714	012143	Ram Tile	42250A Via De Los Fideos	Temecula, CA 92590-3142	1771001	Medium
715	012144	T Cat Corp	42253 Renaldo Way	Temecula, CA 92592-9520	3531056	Medium
716	012153	Island Growers	43401 Anza Rd	Temecula, CA 92592-9590	5261001	Medium
717	012177	Sutcliffe Electric	43136 Sandia Creek Dr	Temecula, CA 92590-4149	1731001	Medium
718	012185	Greg Davis	47290 Pinecrest St	Temecula, CA 92592-2940	1521001	Medium
719	012189	Rossi Concrete Inc	47423 Rainbow Canyon Rd	Temecula, CA 92592-5952	1771001	Medium
720	012195	Sand Dollar Construction, Inc.	48815 De Luz Rd	Temecula, CA 92590-4403	1521001	Medium
721	012484	Artistic Bathtub	20616 Sydney Ct	Wildomar, CA 92595-9253	1799001	Medium
722	012489	Dunrite Tile & Coping	20699 Grand Ave	Wildomar, CA 92595-9442	1743001	Medium
723	012503	Marshall's Custom Woodworks	21255 Bundy Canyon Rd	Wildomar, CA 92595-8773	2521001	Medium
724	012504	Evergreen Lawn Service	21266 Illinois St	Wildomar, CA 92595-9753	782001	Medium
725	012507	P K Mechanical Systems Inc	21335 Bundy Canyon Rd	Wildomar, CA 92595-8774	1711001	Medium
726	012522	Jack Mead Electric, Inc.	21590 Cedar St	Wildomar, CA 92595-7723	1731001	Medium
727	012524	Nicks Electric	21686 Walnut Dr	Wildomar, CA 92595-8956	1731001	Medium
728	012535	Carl W. Bremer	21976 Canyon Dr	Wildomar, CA 92595-9178	1742001	Medium
729	012536	Fog Coat Corp	22010 Highland St	Wildomar, CA 92595-8659	1721001	Medium
730	012545	Vernon A Willette	43540 Cowboy Country Trail	Aguanga, CA 92536	1521001	Medium
731	012547	Busy Bee Electrical	26525 Scott Rd	Menifee, CA 92584	1731001	Medium
732	012548	Jubala Construction Company	22440 Lemon St	Wildomar, CA 92595-8386	1542001	Medium
733	012549	Bundy Canyon Super Storage	22460 Bundy Canyon Rd	Wildomar, CA 92595-8488	4225001	Medium
734	012561	A & M Electric	22780 Hunwut Dr	Wildomar, CA 92595-9696	1731001	Medium

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735	012565	Prowall Construction	22837 Showut Ave	Wildomar, CA 92595-9526	1521001	Medium
736	012569	Wood Doctor Construction, Inc.	22939 Akwo Cir	Wildomar, CA 92595-9777	1521001	Medium
737	012572	Franks Electrical	23004 Wing Elm Cir	Wildomar, CA 92595-8652	1731001	Medium
738	012574	Senske Electric	23093 Trillium Dr	Wildomar, CA 92595-8562	1731001	Medium
739	012578	T.D. Nicholas, Inc	23195 Crooked Arrow Dr	Wildomar, CA 92595-8367	1521001	Medium
740	012596	Martha Sweetland	24380 Oak Circle Dr	Wildomar, CA 92595-8821	7219001	Medium
741	012599	Rays Carpentry Service	24710 Butterchurn Rd	Wildomar, CA 92595-9148	1751001	Medium
742	012601	Leggett Masonry	35937 Devonshire Lane	Wildomar, CA 92595	1741001	Medium
743	012627	Taylor Made Tile	32565 Buckhorn Rd	Wildomar, CA 92595-8255	1743001	Medium
744	012633	Henrys Lawn Service	32769 Almond St	Wildomar, CA 92595-8350	782001	Medium
745	012639	Home Paramedic's	32848 Trailwood Ct	Wildomar, CA 92595-8275	1522008	Medium
746	012640	Mr Fix It	32855 Elm St	Wildomar, CA 92595-8543	1521001	Medium
747	012643	Boyes And Son General Contractors	32910 Batson Ln	Wildomar, CA 92595-9233	1799001	Medium
748	012645	Bishop Construction	32931 Bryant St	Wildomar, CA 92595-9228	1521001	Medium
749	012648	Pitts Bros Construction	32973 Batson Ln	Wildomar, CA 92595-9233	1623001	Medium
750	012657	Stark Industries	33145 Rudolph Ln	Wildomar, CA 92595-9677	3444001	Medium
751	012670	Stein Htg Air	33415 Shay Ln	Wildomar, CA 92595-8864	1711001	Medium
752	012677	Xtreme Heating & Air Condition	38340 Innovation Ct Suite 602	Murrieta, CA 92563	1711001	Medium
753	012679	Carl J Fuess Construction	33824 Harvest Way	Wildomar, CA 92595-9154	1522001	Medium
754	012680	Bravo Tile & Stone	33859 Canyon Ranch Rd	Wildomar, CA 92595-8493	5039001	Medium
755	012696	Armies Demolition Grading	34348 Hidden Glen Cir	Wildomar, CA 92595-9800	1795001	Medium
756	012699	Bruscato Masonry	34381 Almond St	Wildomar, CA 92595-8954	1741001	Medium
757	012708	J W Roofing	34675 Jennifer Dr	Wildomar, CA 92595-8696	1761001	Medium
758	012715	Allan Jude Hodges	34860 Cherry St	Wildomar, CA 92595-9794	1771001	Medium
759	012723	Sundance Pool Care	35386 Woshka Ln	Wildomar, CA 92595-9535	1799045	Medium
760	012726	Custom Dirt Work, Inc	35570 Iodine Springs Rd	Wildomar, CA 92595-8625	1794001	Medium
761	012733	D M Imbriaco Co	35654 Ruth Ave	Wildomar, CA 92595-8004	1799001	Medium
762	012740	Charo Chicken	36068 Hidden Springs Rd	Wildomar, CA 92595-7622	5812001	Medium
763	012762	R B Backhoe & Dump Truck Servi	31049 Wickerd Rd	Winchester, CA 92596-9230	1794001	Medium
764	012769	Air Dynamics Heating & A/c	31411 Frans Hals Dr	Winchester, CA 92596-9395	1711001	Medium
765	012772	All Valley Overhead Door	32265 Keller Rd	Winchester, CA 92596-9441	3442009	Medium
766	012774	Miller Enterprises	32480 Yates Rd	Winchester, CA 92596-9347	1531001	Medium

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767	012775	G M Kraus & Son	32490 Holland Rd	Winchester, CA 92596-9697	1521001	Medium
768	012777	Winchester Cheese Co	32605 Holland Rd	Winchester, CA 92596-9696	2022005	Medium
769	012785	Keith Koons Horse Shoeing	33481 Simpson Rd	Winchester, CA 92596-9725	7699033	Medium
770	012788	Diverscape Inc	33800 Coventry Ln	Winchester, CA 92596-9355	5193006	Medium
771	012795	Hydro Grow	36018 Bergen St	Winchester, CA 92596-9151	782001	Medium
772	012800	Primo Stone	36575 Pourroy Rd	Winchester, CA 92596-9072	5211001	Medium
773	012839	West Coast Turf	31755 Winchester Rd	Winchester, CA 92596	181017	Medium
774	012886	Carpet Cleaning Professionals	55630 Rock Canyon Rd	Anza, CA 92539	7217003	Medium
775	012976	Precision Sports	29910 Ohana Cir	Lake Elsinore, CA 92532	3949075	Medium
776	013036	Sun City Mini Storage	27460 McCall Blvd	Sun City, CA 92586	4225004	Medium
777	013049	Baily Vineyard & Winery, Inc.	36150 Pauba Rd	Temecula, CA 92592	2084004	Medium
778	013123	Belzona Systems Of Calif	42810 Calle Montecillo Dr	Temecula, CA 92590	5099001	Medium
779	013396	Stadium Pizza	32395 Clinton Keith Rd B2	Wildomar, CA 92595	5812036	Medium
780	013406	Asplundh Tree Expert	28851 Murrieta Rd	Sun City, CA 92586	783006	Medium
781	013513	Xerox	45515 Bautista Canyon Rd	Hemet, CA 92544	5044001	Medium
782	013536	Tacos Elsinore Mexican Food	19980 Grand Ave L	Lake Elsinore, CA 92530	5812019	Medium
783	013538	Raised Donuts & Bagels	32475 Clinton Keith Rd 107	Wildomar, CA 92595	5999001	Medium
784	013546	Wayne Carr Construction	33800 Beverly Dr	Hemet, CA 92545	1521001	Medium
785	013679	Arthur S Mc Collum Construction	29616 Nuevo Rd A-4	Nuevo, CA 92567	1521001	Medium
786	013690	Dans Pet Supply	27388 Sun City Blvd G	Sun City, CA 92586	5199038	Medium
787	013722	Craftsmen Plumbing, Inc.	27915 Ethanac Rd	Romoland, CA 92585	1711014	Medium
788	013816	Dominos Pizza	33982 Mission Trl C	Wildomar, CA 92595	5812038	Medium
789	013996	Inland Erosion Control Service	33325 Bailey Park Blvd	Menifee, CA 92584	1799001	Medium
790	014103	Mcmorran & Sons	26350 Meridian St	Hemet, CA 92544	1521001	Medium
791	014262	Chris Burgers	28325 Winchester Rd	Winchester, CA 92596	5812036	Medium
792	014277	Van Roekel Vineyards & Winery	34567 Rancho Rd	Temecula, CA 92591	2084004	Medium
793	014357	Cathay Chinese Food	30141 Antelope Rd F	Menifee, CA 92584	5812019	Medium
794	014368	Ultimate Sports Pizza	23905 Clinton Keith Rd 101	Wildomar, CA 92595	5812033	Medium
795	014375	Prompt Cleaners	23905 Clinton Keith Rd 119	Wildomar, CA 92595	7211004	Medium
796	014378	Triple Star Construction, Inc	29697 New Hub Dr D	Sun City, CA 92586	1522001	Medium
797	014400	Karl Scanlan Company, Inc	33291 Bailey Park Blvd	Menifee, CA 92584	1521002	Medium
798	014423	Warmington Homes California	44016 Horizon View St	Temecula, CA 92592	1521003	Medium

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799	014491	S W Homes	40843 S Tanforan Ct	Aguanga, CA 92536	1522015	Medium
800	014523	Architectural Woodworking	38435 Innovation Ct 104	Murrieta, CA 92563	2434003	Medium
801	014541	Hb Parkco Const	33861 Waite St B Mission Tra	Wildomar, CA 92595	1521004	Medium
802	014568	Hart Winery	41300 Avenida Biona	Temecula, CA 92591	5182001	Medium
803	014593	Aviation Sales California, Inc	37552 Winchester Rd #16	Murrieta, CA 92563	3721002	Medium
804	014599	New Cal Dev	38720 Sky Canyon Dr A	Murrieta, CA 92563	5122006	Medium
805	014600	Pueblo Viejo Mexican Food	30141 Antelope Rd L	Menifee, CA 92584	5812008	Medium
806	014607	Davids Produce	19980 Grand Ave M	Lake Elsinore, CA 92530	5431003	Medium
807	014666	Alta Ii Cleaners	32475 Clinton Keith Rd 109	Wildomar, CA 92595	7212001	Medium
808	014727	Dunn Rite Carpet Care Co	29193 Allan St	Lake Elsinore, CA 92531	7217003	Medium
809	014832	Valley Pizza & Pasta	19980 Grand Ave N	Lake Elsinore, CA 92530	5812033	Medium
810	014896	Aim Inspection Service	33845 Bethel Ave	Hemet, CA 92545	1731002	Medium
811	014909	Kiewit Pacific Co	26245 Dawson Rd	Romoland, CA 92585	1521001	Medium
812	014916	Rancho West Landscape	33150 Zeiders Rd	Menifee, CA 92584	781004	Medium
813	014962	Ocotillo Restaurant & Cantina	33668 Highway 74	Hemet, CA 92545	5812018	Medium
814	014965	Copperwood Homes, L L C	28175 Whittier Ave	Winchester, CA 92596	1521003	Medium
815	014976	Ability Septic & Sewer	7980 Reche Canyon Rd	Colton, CA 92324	1711005	Medium
816	014990	I C I Paints #274	41604 Dale St E	Anza, CA 92539	5231001	Medium
817	014991	Servicemaster Professionals	43041 E Florida Ave	Hemet, CA 92544	1521006	Medium
818	014997	South Coast Winery Resort & Spa	34843 Ranch Calif Rd	Temecula, CA 92591	2084004	Medium
819	015022	Whitneys Drinking Water	21190 Sedco Blvd	Lake Elsinore, CA 92530	5149005	Medium
820	015064	Craftsmen Plumbing Heating & Cool	39525 Calle Portillo	Temecula, CA 92592	1711014	Medium
821	015068	Laan's Tree Service	37865 Avenida Armada	Temecula, CA 92592	783006	Medium
822	015102	Alternative Fire Protection, Inc.	28701 N Frontage Rd	Lake Elsinore, CA 92532	3569038	Medium
823	015193	Temecula Olive Oil Co	46780 Highway 371	Aguanga, CA 92536	5499001	Medium
824	015258	Staten Const Co	45925 Jojoba Rd	Aguanga, CA 92536	1521003	Medium
825	015281	A A A Restoration, Inc.	29850 2nd St	Lake Elsinore, CA 92532	1521001	Medium
826	015283	Super 7 Food Store & Liquor	16005 Grand Ave J-L	Lake Elsinore, CA 92530	5411002	Medium
827	015308	Karmichaels Cabinetry, Inc.	29160 Geotz Rd	Canyon Lake, CA 92587	2434002	Medium
828	015370	Rafter T Tack & Treasures	57131 Highway 371	Anza, CA 92539	5399001	Medium
829	015586	Chinese Restaurant Buffet	41525 E Florida Ave	Hemet, CA 92543	5812005	Medium
830	015597	Pollys Restaurant	26660 Encanto Dr	Sun City, CA 92586	5812038	Medium

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831	015766	Beckman Coulter	30475 Grand Ave	Winchester, CA 92596	7299001	Medium
832	015770	Casework Specialities	33055 Briggs Rd	Menifee, CA 92584	2434002	Medium
833	015945	D N S Contractors	40125 Arave Cir	Hemet, CA 92543	1791003	Medium
834	015946	A C S Electric	27237 La Prada Way	Sun City, CA 92586	1731001	Medium
835	015993	Valley Electric T B Inc.	18487 Grand Ave	Lake Elsinore, CA 92530	1731001	Medium
836	015998	Rancho Drilling	57136 Highway 371	Anza, CA 92539	1781001	Medium
837	016020	Stellar Enterprises, Inc.	29054 Goetz Rd	Canyon Lake, CA 92587	1742001	Medium
838	016105	North County Sand & Gravel	26227 Sherman Rd	Romoland, CA 92585	1442001	Medium
839	016125	Accurate Leak Locators	29075 Celestial Dr	Menifee, CA 92584	1711001	Medium
840	016153	International Flow Technologies	30230 Los Alamos Rd	Murrieta, CA 92563	1623011	Medium
841	016166	Taco Bell #22691	39056 Winchester Rd	Murrieta, CA 92563	5812019	Medium
842	016200	Valley Mart & Deli	19980 Grand Ave A	Lake Elsinore, CA 92530	5411002	Medium
843	016548	Richmond American Homes	31825 Palomar Rd	Menifee, CA 92584	1521017	Medium
844	016604	Extra Storage	33400 Mission Trl	Wildomar, CA 92595	4225004	Medium
845	016672	Martins Market	37505 Benton Rd	Temecula, CA 92592	5999001	Medium
846	016703	Winchester Ranch Market	28340 Winchester Rd	Winchester, CA 92596	5411003	Medium
847	016721	Polo Cleaners	29910 Murrieta Hot Spgs Rd C	Murrieta, CA 92563	7212004	Medium
848	016735	U-Store-It No 465	42255 E Florida Ave	Hemet, CA 92544-5072	4225004	Medium
849	021472	Today's Trailers Llc	26125 Cordoba Dr	Hemet, CA 92545	3799005	Medium
850	021517	Alfredo Mosqueda	25588 Driftview Cir	Menifee, CA 92584	1799053	Medium
851	021522	Moto X Kidz	23941 Vista Way	Quail Valley, CA 92587	2396020	Medium
852	021523	William Downing Construction	37527 La Encina Cir	Murrieta, CA 92562	1521001	Medium
853	021525	Larios Builders Inc.	53235 Pony Trail	Anza, CA 92539	8741005	Medium
854	021544	Nationwide Awards	27781 Deerskin Dr	Sun City, CA 92585	5094016	Medium
855	021546	Datatronic Distribution, Inc.	28151 Highway 74	Romoland, CA 92585	5065027	Medium
856	021653	Antonios Pizza	43384 E Florida	Hemet, CA	5812036	Medium
857	021681	Meridiene Corporation	3286 Willowvail Circle	Temecula, CA 92592	7349008	Medium
858	021685	Precision Products	29137 Beryl St	Menifee, CA 92584	5065001	Medium
859	021710	Aunt Laurie's Mobile Pet Salon	14903 Toft Dr	Lake Elsinore, CA 92530	752007	Medium
860	021735	Drips Pool Connection	29103 Patelli Way	Romoland, CA 92585	7389114	Medium
861	021788	Shane Construction Inc	Po Box 1550	Wildomar, CA 92595	1771001	Medium
862	021817	Capital Construction	29031 Lakehurst Ct	Romoland, CA 92585	1522001	Medium

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863	021877	Sky Canyon Cleaners	39040 Sky Canyon Dr Ste 103	Murrieta, CA 92563	7212001	Medium
864	021900	James Cary	28810 Murrieta Rd	Sun City, CA 92586-2734	1799001	Medium
865	021949	Bleu Stone Paving Ltd.	33275 Wesley St	Wildomar, CA 92595	1741001	Medium
866	021954	W L Homes Llc Dba John Laing Hon	26189 Leos Tr	Sun City, CA 92586	1531001	Medium
867	021964	Vital Arc Enterprises	31442 Janelle Ln	Winchester, CA 92596	1799001	Medium
868	022010	T I C - The Industrial Company	26226 Antelope Rd	Romoland, CA 92585	1541001	Medium
869	022043	Young Electric Sign Company	41675 Reagan Way	Murrieta, CA 92562	3993006	Medium
870	022092	Alfa Construction Inc	32848 Starlight St	Wildomar, CA 92595	1521001	Medium
871	022112	E Z M Handyman Service	21100 State St #116	San Jacinto, CA 92583	7699001	Medium
872	022141	Inside Skies, Llc	31400 Scenic Hills Dr	Winchester, CA 92596	5063021	Medium
873	022176	Clear Valley Pool & Spa Service	33578 Poppy Ln	Murrieta, CA 92563	7389114	Medium
874	022186	M I A Motocross Inspired Apparel	34641 Agonis Wy	Winchester, CA 92596	5699011	Medium
875	022192	All American Electric	33601 Stagecoach Rd	Nuevo, CA 92567	1731001	Medium
876	022199	Gyro & Kabob Greek Restaurant	39252 Winchester Rd # 113	Murrieta, CA 92563	5812036	Medium
877	022202	Unleashed Machining And Welding	25773 Bundy Canyon Rd	Menifee, CA 92584	3599018	Medium
878	022244	Denise Nelson Training Stables	54550 Mitchell Rd	Anza, CA 92539	752012	Medium
879	022397	Trammell Distributions,	39201 Stoyview Circle	Murrieta, CA 92563	5145008	Medium
880	022481	B Alicei Custom Draperies	29975 Technology Dr B102	Murrieta, CA 92563	2391001	Medium
881	022505	Oak Mountain Winery	36522 Via Verde	Temecula, CA 92592	2084006	Medium
882	022538	America Interlocking Pavers, Inc.	18938 Mermack Ave	Lake Elsinore, CA 92530	1741007	Medium
883	022568	Innovative Concrete	25675A Nikki Lane	Menifee, CA 92584	1771001	Medium
884	022577	El Molino Market	23987 Cypress Pl	Canyon Lake, CA 92587	5411003	Medium
885	022579	Arctic Cool	23180 Corbett Ln	Nuevo, CA 92567	5033005	Medium
886	022586	Absolutely Clean Pool Service	25617 Mesa Edge Ct	Sun City, CA 92585	7389114	Medium
887	022613	South Coast Framers, Inc.	42380 Zevo Dr	Temecula, CA 92590	1751003	Medium
888	022649	American Eagle Plumbing & Drain S	33481 Furrow Ct	Wildomar, CA 92595	1711016	Medium
889	022658	Cunningham's Upholstery & Carpet (	20761 Union St	Wildomar, CA 92595	7217003	Medium
890	022673	Steve Whalen Electric	29073 Gooseneck Tr	Menifee, CA 92584	1731007	Medium
891	022682	Puro Digital	24815 Kentman Ct	Wildomar, CA 92595	2754005	Medium
892	022685	The Original Chili Roaster & Salsa C	29187 Woodbine Ln	Menifee, CA 92584	5812001	Medium
893	022740	All Concrete	25543 Farming Rd	Menifee, CA 92584	3272001	Medium
894	022747	Pueblo Electrical Services, Inc	27640 Commerce Center Dr #	Temecula, CA 92590	1731001	Medium

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895	022791	Alba's Hay & Grain	45195 Hwy 371	Aguanga, CA 92536	5191014	Medium
896	022793	Medina Handyman	145 Morton Ave	Lake Elsinore, CA 92530	1521001	Medium
897	022794	7 Eleven # 33595 A	32060 Clinton Keith Rd	Wildomar, CA 92595	5541001	Medium
898	022798	La Cereza	34567 Rancho California Rd	Temecula, CA 92591	2084001	Medium
899	022820	Contemporary Concrete	30136 Destiny Dr	Murrieta, CA 92563	1771001	Medium
900	022826	Neat & Complete Handyman Service	27950 Baroni Rd	Romoland, CA 92585	8322019	Medium
901	022830	Handyman Now	26680 Rim Rd	Hemet, CA 92544	8322019	Medium
902	022835	Rebel's Custom Fabrication	26350 Steinhott Ave	Hemet, CA 92545	3498012	Medium
903	022836	The Lopez Group Contractors	29971 Nuevo Rd	Nuevo, CA 92567	1623001	Medium
904	022850	Waterless Car Wash Supplies	24650 Rooster Rd	Wildomar, CA 92595	5087006	Medium
905	022861	Just Stringin' Along	22947 Wing Elm Circle	Wildomar, CA 92595	3199019	Medium
906	022864	Applied Perfection Painting	38120 Hill St	Anza, CA 92539	1721004	Medium
907	022873	Jr's Resurface Options	29620 Camino Cristal	Menifee, CA 92584	1521006	Medium
908	022890	Hi Tech Carpet Dyeing	26835 Wildflower St	Menifee, CA 92584	7217003	Medium
909	022898	Direct Signs	39252 Winchester Rd Ste#107	Murrieta, CA 92563	3993001	Medium
910	022905	Ortega Oaks Candy Store	34950 Ortega Highway	Lake Elsinore, CA 92530	5411002	Medium
911	022907	Husky Home Theaters	21834 Heliotrope Ln	Wildomar, CA 92595	5064001	Medium
912	022936	Sgt Pile	34444 Waltham Place	Winchester, CA 92596	7299001	Medium
913	022950	Statewide Landscape Services, Inc.	36420 Winter Cherry Road	Winchester, CA 92596-8649	781004	Medium
914	022991	Diversified Dimensions	27250 Murrieta Road 226	Sun City, CA 92586	1521009	Medium
915	023036	Enticing Sweets	31136 Old Trail Circle	Murrieta, CA 92563	2051003	Medium
916	023050	R C A Construction	36217 Coffee Tree Pl	Murrieta, CA 92562	1521003	Medium
917	023058	Preferred Services Heating & A/C	43431 Peace Cir	Hemet, CA 92544	1711001	Medium
918	023064	Diner 371	57331 Highway 371	Anza, CA 92539	5812019	Medium
919	023065	Catalina Pools & Spas	30572 Via Bonica	Lake Elsinore, CA 92530	1799045	Medium
920	023075	Allstate Security Services Inc.	27707 Moonridge Dr	Sun City, CA 92585	1731002	Medium
921	023087	C E C S Builder Services	28584 Heathergreen Way	Menifee, CA 92584	1521001	Medium
922	023093	Gonzalez Landscaping	26056 Naumann Ave	Homeland, CA 92548	781004	Medium
923	023100	MD Group LLC	32100 Clinton Keith Rd Ste I	Wildomar, CA 92595	5812036	Medium
924	023101	Dirtyworks Septic Service	32625 Ascot Way	Menifee, CA 92584	7699068	Medium
925	023105	Gil Contracting	32295 Mission Trl Ste 8313	Lake Elsinore, CA 92530	1623003	Medium
926	023143	M P K Laundromat	17566 Grand Ave	Lake Elsinore, CA 92530	7215005	Medium

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927	023145	Osment Grading & Excavating,Inc.	30902 Via Bonica	Lake Elsinore, CA 92530	1611006	Medium
928	023156	Lou Mello Ent.	27190 Stark St	Sun City, CA 92586	5399001	Medium
929	023165	J W H Electrical Contracting	29847 Kartka Ridge Ln	Sun City, CA 92586	1521001	Medium
930	023166	Journey Transportation Corporation	35664 Verde Vista Way	Wildomar, CA 92595	4789001	Medium
931	023178	Mario's Firewood	46491 E Florida Ave	Hemet, CA 92544	5099007	Medium
932	023185	Inland Empire Cleaners, Inc.	30724 Benton Rd # C	Winchester, CA 92596-8470	7212001	Medium
933	023201	Indy's Upholstery	25725 Rolling Hills Dr	Menifee, CA 92584	7641005	Medium
934	023202	Team Heating & A C, Inc	42266 Remington Ave	Temecula, CA 92590	1711001	Medium
935	023210	Ironworx	33825 Stage Rd	Temecula, CA 92592	3446009	Medium
936	023219	Hawaiian Spicy B B Q	29910 Murrieta Hot Springs R	Murrieta, CA 92563	5812019	Medium
937	023230	Mike Seablom Services	29662 Mt. Bachelor Way	Sun City, CA 92586	1521001	Medium
938	023238	Powertek	42076 Carnegie Ave	Hemet, CA 92544	7699001	Medium
939	023266	B A H R	45120 S Hwy 79 205	Aguanga, CA 92536	1521007	Medium
940	023283	Aloto Gelato	43384 E Florida Ave Ste B	Hemet, CA 92544	5812010	Medium
941	023298	M & F Property Maintenance	22675 Palomar Rd	Nuevo, CA 92567	4212004	Medium
942	023315	Delicious Delivery	26485 Baldy Peak Dr	Sun City, CA 92586	5812009	Medium
943	023317	C R S Commercial Residential Servi	29132 Sundial Cir	Menifee, CA 92584	1711001	Medium
944	023321	Extreme Backhoe Service	33081 Willard St	Winchester, CA 92596	1629072	Medium
945	023329	D D I Inc	6139 Andalusia Ave	Riverside, CA 92509	1522002	Medium
946	023333	Bradybilt Industries	24416 Cottonwood St	Menifee, CA 92584	3822001	Medium
947	023373	Ivan Velazquez	19691 Date St	Nuevo, CA 92567	7349011	Medium
948	023391	Budget Tree Care	33136 Lime Street	Lake Elsinore, CA 92530	783001	Medium
949	023399	Sanford And Son 2007	44518 E Florida Ave	Hemet, CA 92544	5199053	Medium
950	023401	M.A.I. Home Improvement	33994 Canyon Ranch Rd	Wildomar, CA 92595	1521016	Medium
951	023406	Arrow Packaging Machinery Corp.	33570 Porcelain Ct	Winchester, CA 92596	7699001	Medium
952	023423	Secure Fiber Technologies, L L C	36108 Lipizzan Lane	Wildomar, CA 92595	1731007	Medium
953	023424	J. E. Welding	22882 Penasco Cir	Nuevo, CA 92567	1799053	Medium
954	023443	Valee D'Brume Too	29955 Technology Dr Ste 109	Murrieta, CA 92563	2051003	Medium
955	023476	The Feed Shed	28348 11th St	Lake Elsinore, CA 92532	5191005	Medium
956	023477	Martinez Bros.	26040 Barrington Ct	Sun City, CA 92586	1721004	Medium
957	023480	Thailand Hot House	329611/2 Cedar Dr	Lake Elsinore, CA 92530	5812025	Medium
958	023485	Topline Golf Carts	38540 Celita Cir	Temecula, CA 92592	5088008	Medium

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959	023486	Anza Nails	56310 Highway 371	Anza, CA 92539	7231009	Medium
960	023545	Thermal Works	28955 Camino Alcala	Menifee, CA 92584	5075001	Medium
961	023563	Harvest Valley Handyman Service	30733 Alicante Drive	Homeland, CA 92548	1521001	Medium
962	023567	Alba Locks	30720 Stern Dr	Menifee, CA 92584	7699040	Medium
963	023596	Miguel Duran's Landscaping & Maine	28001 Winged Foot Dr	Sun City, CA 92586	781004	Medium
964	023612	Vande Mortel Construction	24922 Terreno Dr	Temecula, CA 92590	1522004	Medium
965	023613	Caunan Construction & Managemen	34859 Frederick St Ste 101	Wildomar, CA 92595	1521001	Medium
966	023617	Time Changer's Marine Services	40591 Wheeler Dr	Hemet, CA 92544	7694006	Medium
967	023636	Richard Jason Hieb Construction & D	1839 Cognac Ct	San Jacinto, CA 92583	1542009	Medium
968	023674	Casa Jimenez	31199 Hwy 74	Homeland, CA 92548	5812036	Medium
969	023683	Cougar Vinyard And Winery	39870 De Portola Rd	Temecula, CA 92592	2084004	Medium
970	023687	Martin's Plastic Machinery Service	16785 Gaucho Rd	Lake Elsinore, CA 92530	7699042	Medium
971	023694	West Coast Iron & Erection, Inc	30340 Haun Rd	Menifee, CA 92584	1791009	Medium
972	023725	Nortel Installations & Maintenance In	33200 Windtree Ave	Wildomar, CA 92595	1522001	Medium
973	023727	Full Service Construction	28875 Broken Arrow Cir	Menifee, CA 92584	1521006	Medium
974	023742	Salvador Alba	1455 State St #348	Hemet, CA 92543	781004	Medium
975	023747	M.R. Complete Handyman Serices	23443 Vista Way	Quail Valley, CA 92587	1521006	Medium
976	023761	Secret Sweets	33681 Mill Pond Dr	Wildomar, CA 92595	5812009	Medium
977	023763	Penguin Mechanical, Inc	20250 Paseo Montana	Murrieta, CA 92562	1711001	Medium
978	023767	House Service Technology's	28721 Tulita Lane	Menifee, CA 92584	1521001	Medium
979	023782	Metzger's Electrical Cont	23055 Beech St	Hemet, CA 92545	1731007	Medium
980	023800	All Season Turf	29005 San Jacinto Ave	Nuevo, CA 92567	1799003	Medium
981	023804	Nogales Landscaping	27629 Harrison Ave	Romoland, CA 92585	782001	Medium
982	023805	Dahl Electric	33204 Sherwood St	Lake Elsinore, CA 92530	1731001	Medium
983	023810	Ortega Oaks Country Store	34950 Ortega Highway	Lake Elsinore, CA 92530	5441002	Medium
984	023827	La Cresta Mexican Grill	23865 Clinton Keith Rd #2	Wildomar, CA 92595	5812036	Medium
985	023850	Strongarm Complete, Inc	27574 Ethan Allen Wy	Sun City, CA 92585	1799005	Medium
986	023853	Eddie Felix	19801 Hansen Ave	Nuevo, CA 92567	1752003	Medium
987	023854	D. R. Horton, Inc	21464 Windstone Dr	Murrieta, CA 92563	1521017	Medium
988	023878	Joses Tractors	28430 Lakeview Ave	Nuevo, CA 92567	7699023	Medium
989	023889	Clockmasters	28936 Escalante Rd	Quail Valley, CA 92587	7631002	Medium
990	023909	Integrity Contractors, Inc	27535 Tabb Ln	Menifee, CA 92584-9521	1521001	Medium

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991	023912	A&E Electrical Services	25850 Chambers Ave	Sun City, CA 92586	1731007	Medium
992	023942	B & M Interior Painting, Inc.	31345 Drake Cir	Menifee, CA 92584	1721005	Medium
993	023964	Agustin Ahumada General Contracti	27706 Boulder Ridge Dr	Menifee, CA 92584	1521001	Medium
994	023968	County Wide Services, Inc.	40215 Reed Valley Rd	Aguanga, CA 92536	7217003	Medium
995	023979	Starbucks Coffee Co No 6709	39028 Winchester Rd 115	Temecula, CA 92591	5812010	Medium
996	023984	Classic Installs, Inc	22475 Baxter Rd	Wildomar, CA 92595	7629003	Medium
997	023994	Menifee Cleaners	30141 Antelope Rd Ste E	Menifee, CA 92584	7212001	Medium
998	024043	Temecula Iron Works	45712 Gene Rd	Aguanga, CA 92536	3446009	Medium
999	024053	S D C Lawn Care	27846 Moonridge Dr	Sun City, CA 92585	782006	Medium
1000	024080	Wiens Cellars	35055 Via Del Ponte	Temecula, CA 92592	2084006	Medium
1001	024096	Los Altos Meat Market, Inc	43880 E Florida Ave	Hemet, CA 92544	5411001	Medium
1002	024102	Metal Communications	38101 Via Lobato	Temecula, CA 92592	3446009	Medium
1003	024107	Monster Enterprises	23274 Vista Way	Sun City, CA 92587	1521014	Medium
1004	024109	R. Coles #1 Repairs	27753 Calle De Leon	Romoland, CA 92585	1521016	Medium
1005	024115	Alwood Construction	35163 Golden Poppy Ct	Winchester, CA 92596	1521017	Medium
1006	024116	Smith Tough Man's Clean-Up	30972 Contour Ave	Nuevo, CA 92567	1799010	Medium
1007	024140	Movement Skateboards	33436 Orchard St	Wildomar, CA 92532	3949067	Medium
1008	024146	Don Chanos Authentic Mexican Foo	29910 Murrieta Hot Springs R	Murrieta, CA 92563	5812036	Medium
1009	024147	West Coast Power Providers	26700 Junipero Rd	Sun City, CA 92585	8741005	Medium
1010	024163	Rubber Side Down Concession	25828 Columbia St	Hemet, CA 92544	5812020	Medium
1011	024165	Artistic Welding	31727 McWade Ave	Homeland, CA 92548	1799033	Medium
1012	024182	Charlie's Handyman Services	43850 Bonny Ln	Aguanga, CA 92536	7699001	Medium
1013	024193	Lauzon Concrete, Inc	38176 Calle De Lobo	Murrieta, CA 92562	1771004	Medium
1014	024203	Albetos Restaurant	41995 E Florida Ave B	Hemet, CA 92544	5812036	Medium
1015	024218	North County Pump	32800 Los Encinos	Temecula, CA 92592	1541009	Medium
1016	024220	Winchester Store	28535 Winchester Rd	Winchester, CA 92596	5411006	Medium
1017	024223	Western Seven Corporation	38800 Sky Canyon Dr	Murrieta, CA 92563-2540	1623011	Medium
1018	024236	The Handy Man Group	30660 Adobe Ridge Cir	Menifee, CA 92584	1521006	Medium
1019	024237	Kaylee Dogs	27921 Niagara Ct	Sun City, CA 92586	5812025	Medium
1020	024246	All Crete Concrete Pumping	25543 Farmington Rd	Menifee, CA 92584	1799001	Medium
1021	024272	Quality Services And Maintenance	22603 Lost Rd	Wildomar, CA 92595	1521016	Medium
1022	024295	O A Construction, Inc	15403 Grand Ave #S	Lake Elsinore, CA 92530	1771008	Medium

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1023	024311	El Pueblo Mexican Food	26100 Newport Rd 1-3	Menifee, CA 92584	5812038	Medium
1024	024312	Robert M Powers	22301 Lemon St	Wildomar, CA 92595	1799001	Medium
1025	024332	Corban Electric & Data, Inc.	25087 Springbrook Way	Menifee, CA 92584	1731007	Medium
1026	024334	Arby's 8229	23937 Clinton Keith Rd	Wildomar, CA 92595	5812038	Medium
1027	024342	Grapevine Connection Sales And Ma	29112 Celestial Dr	Menifee, CA 92584	5149040	Medium
1028	024349	Royal Energy	35226 Golden Poppy Ct	Winchester, CA 92596	5149040	Medium
1029	024385	Mission Completed Stone And Tile	30690 Golden Pond Pl	Menifee, CA 92584	1743007	Medium
1030	024393	The Quality Of A Lamp	33070 Victoria Brooke Lane	Lake Elsinore, CA 92530	3645008	Medium
1031	024413	I Ramirez	28945 Blanik Rd	Nuevo, CA 92567	782004	Medium
1032	024425	Longo's Home Services	28777 Mill Bridge Dr	Menifee, CA 92584	1521006	Medium
1033	024454	McGee Drain Cleaning & Plumbing	25870 Stanford St	Hemet, CA 92544	1711016	Medium
1034	024464	Murrieta Glass	32803 Sexton St	Wildomar, CA 92595	5231002	Medium
1035	024475	Homestyle Eats Event Services	28373 Portsmouth Dr	Sun City, CA 92586	5812009	Medium
1036	024483	Affordable Yard Service	41939 Briarwood Ave	Hemet, CA 92544	781004	Medium
1037	024486	A Good Plumbing, Inc	35861 Salida Del Sol	Wildomar, CA 92595	1711016	Medium
1038	024487	Ultrasone, Inc	20602 Fox Den Rd	Wildomar, CA 92595	3679011	Medium
1039	024490	Precision Rock Popping	23158 Harbor Seal Ct	Wildomar, CA 92595	1629061	Medium
1040	024532	Fireplace Mantels	27701 Murrieta Rd #156	Sun City, CA 92586	1799001	Medium
1041	024534	Downey Decal And Graphics, Inc	27470 Keller Rd	Menifee, CA 92584	3993001	Medium
1042	024536	Ambassador Energy, Inc.	39100 Vista Del Bosque	Murrieta, CA 92562	1799001	Medium
1043	024566	Gordon Nagy Manufacturing	58445 Johnson Rd	Anza, CA 92539	3949001	Medium
1044	024582	R B Home Care	28584 Moon Shadow Dr	Menifee, CA 92584	1799001	Medium
1045	024586	Las Palmas Taco Shop	28539 Winchester Rd	Winchester, CA 92596	5812038	Medium
1046	024607	Anastacio Lawn Service	26426 Girard St	Hemet, CA 92544	782001	Medium
1047	024609	Outside The Box	20621 Cashew St	Wildomar, CA 92595	2396018	Medium
1048	024618	Service Plus Incorporation	31995 Corte De Pinos	Winchester, CA 92596	1521014	Medium
1049	024623	Pitkin Landscaping & Design, Inc	34452 Calac Rd	Temecula, CA 92592	1521001	Medium
1050	024649	C M A Grading	32325 S Pasadena St C-312	Wildomar, CA 92595	1611006	Medium
1051	024658	Pizza Factory Wildomar	34830 Monte Vista Dr #101	Wildomar, CA 92595	5812033	Medium
1052	024665	T L C Painting Brush & Co	31408 Hamburg Cir	Winchester, CA 92596	1721005	Medium
1053	024698	S W S Storage	33868 Mission Trl	Wildomar, CA 92595	4225001	Medium
1054	024703	Tidal Wave Pressure Wash	31715 Waterfall Way	Murrieta, CA 92563	7299001	Medium

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1055	024713	Troy Plumbing And Repipe, Inc	30142 Haun Rd	Menifee, CA 92584	1711016	Medium
1056	024715	Lorenzo's Lawn Maintenance Etc	29296 Uller Ln	Nuevo, CA 92567	782001	Medium
1057	024736	North County Synthetics	32379 Park Pl	Temecula, CA 92592	5099001	Medium
1058	024833	Sopranos The Club	39252 Winchester Dr #145	Murrieta, CA 92563	5812036	Medium
1059	024841	Green It Up Sprinkler Service	27345 El Rancho Dr	Sun City, CA 92586	782001	Medium
1060	024857	The Orange Blossom Tea House	17130 Cole Ave	Riverside, CA 92508	5499008	Medium
1061	024874	Renzoni Vineyards	37350 De Portola Rd	Temecula, CA 92592	2084006	Medium
1062	024893	Walk On Wood, Hardwood Floors	27919 Antelope Rd	Sun City, CA 92585	1752007	Medium
1063	024903	Sanchez Gardening & Service	25083 Niagra Court	Hemet, CA 92544	782010	Medium
1064	024928	P X M General Construction, Inc	27833 Pointe Breeze Dr	Sun City, CA 92585	1521001	Medium
1065	024931	Puroclean Professional Restoration S	33905 Pauba Rd	Temecula, CA 92592	1521017	Medium
1066	024954	C M Backhoe Service	28447 Moreland Rd	Sun City, CA 92586	1794003	Medium
1067	024959	Superior Quality Corporation	16350 Grand Ave	Lake Elsinore, CA 92530	1521001	Medium
1068	024998	Veterans	24940 Cologne Dr	Hemet, CA 92544	2396020	Medium
1069	025046	Charlotte's Plumbing Corp.	34629 Foxberry Rd	Winchester, CA 92596	1711015	Medium
1070	025055	Sieverding Backhoe Service	35649 Country Park Dr	Wildomar, CA 92595	1794001	Medium
1071	025090	Sunshine Market	41560 Terwilliger Rd Space 19	Anza, CA 92539	5411002	Medium
1072	025097	Monte De Oro Winery, L L C	35820 Rancho California Rd	Temecula, CA 92591	2084004	Medium
1073	025111	M & A Inc	36127 Pansy St	Winchester, CA 92596	1752006	Medium
1074	025207	J N L Builder	17721 Rodeo Rd	Lake Elsinore, CA 92530	1522015	Medium
1075	025222	Jim's Backflow Service	27790 Lake St	Hemet, CA 92544	3432002	Medium
1076	025245	Great Escape Patios	33515 Hidden Hollow Dr	Wildomar, CA 92595	1521001	Medium
1077	025261	Carlos General Construction	28032 Hillpionte Dr	Sun City, CA 92585	1521001	Medium
1078	025273	Seatec Communications, Inc	27415 Meridian St	Hemet, CA 92544	1731005	Medium
1079	000015	Tekoa Inc	49380 Sky Harbor Rd	Aguanga, CA 92536-9409	5961001	Low
1080	000030	M B Designs	28143 Long Meadow Dr	Menifee, CA 92584-7748	1721001	Low
1081	000031	Mastermind Creations Inc	32155 Joshua Dr	Wildomar, CA 92595-8403	5961001	Low
1082	000034	Affordable Portables	30145 Antelope Rd	Menifee, CA 92584-8065	5999037	Low
1083	000042	Best Pharmacy/Longs #715	26930 Cherry Hills Blvd	Sun City, CA 92586-2574	5912001	Low
1084	000046	Allensworth Company	26221 Nova Ln	Sun City, CA 92585-9486	1791001	Low
1085	000076	Michael Lynn Norris	22021 Grove Rd	Wildomar, CA 92595-8930	5961008	Low
1086	000090	Mr Ump	20848 Cashew St	Wildomar, CA 92595-8996	5091001	Low

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1087	000095	Hartman Printing	31013 Orange Ave	Nuevo, CA 92567-9630	2759001	Low
1088	000105	The Tack Of The Town	21575 Grand Ave	Wildomar, CA 92595-9684	5191012	Low
1089	000109	Fred Kincaid	25182 Avenida Madrid	Homeland, CA 92548-9333	5947001	Low
1090	000136	D M S Covers	44555 La Cruz Dr	Temecula, CA 92590-3952	5714005	Low
1091	000193	Forms Systems & Management, Inc.	35275 Shuis Cir	Wildomar, CA 92595-8566	2761001	Low
1092	000218	Unimark Graphic Identification	24460 Woodshed Way	Wildomar, CA 92595-9104	5199001	Low
1093	000234	New Light Publishing	30319 Conn Creek Cir	Murrieta, CA 92563-4843	2711001	Low
1094	000275	Quality Supplies Mr Copy	33642 View Crest Dr	Wildomar, CA 92595-8340	5999001	Low
1095	000296	A I E Inc	37552 Winchester Rd # B81-1	Murrieta, CA 92563-2500	1521002	Low
1096	000303	Hemet High Student Store	41701 Stetson Ave	Hemet, CA 92544-7518	5999001	Low
1097	000320	Ramona Bowl Gift Shop	27400 Ramona Bowl Rd	Hemet, CA 92544-8108	7922001	Low
1098	000386	Muzquiz Dental Laboratory	27880 Vista Del Valle	Hemet, CA 92544-8317	8072001	Low
1099	000397	S H S A Gift Shop	36485 Inland Valley Dr	Wildomar, CA 92595-9681	5999001	Low
1100	000500	Marian L Lawell	40726 Mayberry Ave	Hemet, CA 92544-6247	5945003	Low
1101	000538	John A Biggs Jr	33150 Howard Rd	Menifee, CA 92584-9633	279004	Low
1102	000581	Michael J Lindner	42357 Whittier Ave	Hemet, CA 92544-6536	5063001	Low
1103	000611	Anza Lions Club	56612 Highway 371	Anza, CA 92306-0000	5812001	Low
1104	000676	Sun City Veterinary Clinic	27994 Bradley Rd Ste J	Sun City, CA 92586-2240	742001	Low
1105	000698	Fredrick James Zadick	37625 Bautista Rd	Anza, CA 92539-0000	7699001	Low
1106	000703	Phyllis Ellen Buck	46840 Calle Jardin	Temecula, CA 92590-3150	5999001	Low
1107	000743	Sun City Bicycles	26100 Newport Rd Ste A2	Menifee, CA 92584-9095	5941001	Low
1108	000755	Westel Communications	39560 Milkweed Way	Temecula, CA 92592-8492	5731001	Low
1109	000767	Dutch Mill Trading Co Inc	36687 Van Gaale Ln	Winchester, CA 92596-9336	5947001	Low
1110	000768	Michael Edward Clark	29341 Blalock Pl	Winchester, CA 92596	5932002	Low
1111	000807	Sunshine Pet Center	26900 Newport Rd #14	Menifee, CA 92584-9222	5999027	Low
1112	000809	Chuck Macias Goods	21948 Carnation Ln	Wildomar, CA 92595-7813	7629001	Low
1113	000833	Euro Craft	44217 Gallipoli Pl	Hemet, CA 92544-9107	5949008	Low
1114	000871	Winchester Feed	28543 Winchester Rd	Winchester, CA 92596-9573	5191001	Low
1115	000900	Jeremiah Films II Inc	42190 Cactus Valley Rd	Hemet, CA 92544-9580	5044012	Low
1116	000927	An T Qs Stuff & Things	38855 Highway 79	Aguanga, CA 92536-9627	5932002	Low
1117	001007	Abbotts Automatic Garage Doors	32920 Highway 74	Hemet, CA 92545-9515	5211010	Low
1118	001035	Sun City Hearing Service	28125 Bradley Rd # Rd140	Sun City, CA 92586-2248	5999021	Low

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1119	001047	Mom & Pop's Frame Shop	29800 Bradley Rd Ste 108	Sun City, CA 92586-6523	5999001	Low
1120	001048	Darmar/Coloriffic	42976 Mayberry Ave	Hemet, CA 92544-6591	5999001	Low
1121	001055	Starpine Rocks & Gifts	26541 Ridgemoor Rd	Sun City, CA 92586-2731	5947004	Low
1122	001057	Avl Animal Hospital, Inc.	43800 Whittier Ave	Hemet, CA 92544-6556	742005	Low
1123	001069	T K Video	27388 Sun City Blvd Ste H	Sun City, CA 92586-2569	7841001	Low
1124	001081	Key Communications	41327 Shadow Mountain Way	Hemet, CA 92544-8279	7629001	Low
1125	001125	Rising Star Ind Etal	29595A Grechen LN	Romoland, CA 92585-9682	5063001	Low
1126	001134	A L Milams Trading Post	22420 Spur Brook RD	Wildomar, CA 92595-7301	5932013	Low
1127	001144	Appliance Doctor	21020 North Dr	Nuevo, CA 92567-9571	7629003	Low
1128	001152	Hairy Situation	20137 Grand Ave	Wildomar, CA 92595-9370	7231001	Low
1129	001159	Chinese Health Institute	26201 Camas Dr	Hemet, CA 92544-6202	7338001	Low
1130	001162	Kirk Van Orsdel	Not Available To The Public		5999029	Low
1131	001193	Paperwork Plus	29696 Via Naravilla	Sun City, CA 92586-3596	7378001	Low
1132	001194	Menifee Valley Animal Clinic	26900 Newport Rd Ste 105	Menifee, CA 92584-9224	742001	Low
1133	001220	Jeff Tandy Gun Finishing	45829 Emerson St	Hemet, CA 92544-6760	5941001	Low
1134	001229	Shady Oak Furnishings Etc	33789 Windmill Rd	Wildomar, CA 92595-8875	5712001	Low
1135	001268	E M S I	41900 Parado Del Sol Dr	Temecula, CA 92592-8401	7629001	Low
1136	001282	James J Maryea & Associates	39463 Napa Creek Dr	Murrieta, CA 92563-6879	2759001	Low
1137	001291	Petes Music	29800 Bradley Rd	Sun City, CA 92586-6520	5736001	Low
1138	001298	Indian Motorcycle News	32606 Hartley St	Lake Elsinore, CA 92530-6941	2721003	Low
1139	001309	Hammond Dental Lab	25647 Farmington Rd	Sun City, CA 92584-9356	8072001	Low
1140	001315	Lyman Glass Sculptures	21771 Victorian Ln	Wildomar, CA 92595-8212	5199024	Low
1141	001357	J Anne Originals	28841 Golden Dawn St	Menifee, CA 92584-9140	2335001	Low
1142	001385	Courtesy Distributing Co	31780 Briggs Rd	Sun City, CA 92584-9595	5961012	Low
1143	001395	Bridal Accents By Florentina	38435 Innovation Ct Ste 107	Murrieta, CA 92563-2566	5621002	Low
1144	001396	Owen Enterprises	40239 Calle Cordova	Temecula, CA 92592-9082	5999001	Low
1145	001409	Dandy Mailboxes	23905 Clinton Keith Rd Ste 11	Wildomar, CA 92595-7899	7389085	Low
1146	001412	Dipak Doshi	41421 Florida Ave	Hemet, CA 92544-4951	7841002	Low
1147	001438	Across The River Antiques	24305 Conejo Dr	Quail Valley, CA 92587-9233	5932010	Low
1148	001477	Aslan Gold	30767 Lajoe St	Menifee, CA 92584-8348	5944001	Low
1149	001489	Lila Dene Dh Enterprises	30181 Calle Belcanto	Menifee, CA 92584-8144	5999001	Low
1150	001513	H.L. Bud Shields	22125 Rosary Ave	Nuevo, CA 92567-9411	7699023	Low

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1151	001548	J J Mobil Screen Service	45120 Highway 79 Lot 658	Aguanga, CA 92536-9706	2431033	Low
1152	001573	Supercuts 90470	30724 Benton Rd Ste C303	Winchester, CA 92596-8466	7241003	Low
1153	001599	Troxell Communications	26100 Newport Rd Ste A12 #	Menifee, CA 92584-9072	5731001	Low
1154	001611	Lincare Inc	27994 Bradley Rd Ste H	Sun City, CA 92586-2240	7352001	Low
1155	001646	Block Graphics	28401 Matthews Rd	Romoland, CA 92585-9655	7336006	Low
1156	001655	Business Systems & Products	28387 Edgewater Cir	Menifee, CA 92584-8022	5943004	Low
1157	001796	Superior Hearing Aid Service	28071 Bradley Rd	Sun City, CA 92586-2207	5999021	Low
1158	001850	Magdalena Zepeda	31075 Electric Ave	Nuevo, CA 92567-9532	5094008	Low
1159	001901	Crown Of Glory Hair Salon	27600 Encanto Dr	Sun City, CA 92586-3304	7231001	Low
1160	001903	Gw Artistry	43850 Tompkins Cir	Aguanga, CA 92536-0000	3952001	Low
1161	002030	California Arabian Costumes	25480 Craig Ave	Menifee, CA 92584-9263	2389006	Low
1162	002042	Estate Sales	28009 Lemonwood Dr	Menifee, CA 92584-8819	5719001	Low
1163	002050	Sun City Florist & Gifts	26820 Cherry Hills Blvd Ste 6	Sun City, CA 92586-2531	5992002	Low
1164	002080	Blink Photo	35375 Briggs Rd	Murrieta, CA 92563-2340	7335001	Low
1165	002107	Diversified Business Machines	21795 Camellia Ln	Wildomar, CA 92595-7803	7378002	Low
1166	002116	Blockbuster Video	26910 Newport Rd	Menifee, CA 92584-9080	5735004	Low
1167	002158	Hughes Information Systems	24910 Rocky Peak Rd	Sun City, CA 92585-9206	5734001	Low
1168	002164	Janice Lynn Remland	38095 Avenida Bravura	Temecula, CA 92592-8932	5632002	Low
1169	002226	Metal And Clay	26989 Dartmouth St	Hemet, CA 92544-7555	5944003	Low
1170	002228	Trina's Stained Glass Studio	27738 Encanto Dr	Sun City, CA 92586-4521	5231001	Low
1171	002233	Comfort Shoe Center	26890 Cherry Hills Blvd	Sun City, CA 92586-2568	5661001	Low
1172	002294	China Closet Com	32803 Seattle Slew Cir	Menifee, CA 92584-7849	5947006	Low
1173	002303	Portrait Productions	28301 Northmoore Pl	Menifee, CA 92584-6907	5947001	Low
1174	002308	Furry Foods	34355 Olive Grove Rd	Wildomar, CA 92595-9127	5999026	Low
1175	002355	Masterpiece Onlimited	29723 Gretchen Ln	Romoland, CA 92585-9568	5944003	Low
1176	002358	Sunglass Man	25903 Riverview Dr	Hemet, CA 92544-5631	3851003	Low
1177	002368	Bill Mitchell Jeweler	45953 Bentley St	Hemet, CA 92544-6752	5094001	Low
1178	002388	Tricopolis Records	33261 Adelfa St	Lake Elsinore, CA 92530-5777	5736001	Low
1179	002415	Health Zone Natural Foods	280163 Bradley Rd	Sun City, CA 92586-0000	5499005	Low
1180	002461	Dan Willard Bailey	25841 Whitman Rd	Sun City, CA 92586-2333	5719001	Low
1181	002484	Image Makers Salon Inc	23905 Clinton Keith Rd Ste 11	Wildomar, CA 92595-7899	7231004	Low
1182	002497	Harris Orthodontic Lab	27851 Bradley Rd Ste 195	Sun City, CA 92586-2284	8072001	Low

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1183	002613	Hair Reflections	43384 Florida Ave Ste C	Hemet, CA 92544-5299	7231004	Low
1184	002644	Johnson & Johnson Hearing Aid Cer	26916 Cherry Hills Blvd	Sun City, CA 92586	5999021	Low
1185	002663	Anna Maria Brown	22822 Sheffield Ct	Wildomar, CA 92595-8106	5947001	Low
1186	002667	Affordable Caskets Inc	41030 Quail Rd	Hemet, CA 92544-8106	5961001	Low
1187	002672	J & M Enterprises	27701 Murrieta Rd Spc 203	Sun City, CA 92586-2366	5699012	Low
1188	002682	Machine Cuisine	26308 Kathy Ln	Hemet, CA 92544-6409	5962001	Low
1189	002686	Phyllis Joan Hook	29518 Winding Brook Dr	Menifee, CA 92584-7715	7389058	Low
1190	002754	Al's Jewelers	26804 Cherry Hills Blvd	Sun City, CA 92586-2505	5094001	Low
1191	002774	Hydrascope Engineering	55900 Bach Rd	Anza, CA 92539-8955	8711003	Low
1192	002864	Cowper Family Vineyards Wines L L	37165 Delgado Way	Temecula, CA 92592-8896	2084001	Low
1193	002875	R C Vending	24168 Marley Cir	Romoland, CA 92585-7104	7359018	Low
1194	002892	Studio 54 Salon	36068 Hidden Springs Rd Ste	Wildomar, CA 92595-7622	7231006	Low
1195	002902	Newport Rideshop	26900 Newport Rd Ste 107	Menifee, CA 92584-9224	5941005	Low
1196	002985	B G E	18920 Vista De Montanas	Murrieta, CA 92562-9323	5045001	Low
1197	002999	T S Registration Services	5850 Etiwanda Ave Ste 211	Mira Loma, CA 91752-2200	5661001	Low
1198	003065	Curves	26900 Newport Rd Ste 103	Menifee, CA 92584-9223	7991001	Low
1199	003098	Longs Drugs #502	43418 Florida Ave	Hemet, CA 92544-5219	5912004	Low
1200	003101	Walgreens	30251 Murrieta Rd	Menifee, CA 92584-8385	5912001	Low
1201	003102	Walgreens #6126	27975 Bradley Rd	Sun City, CA 92586-2273	5912001	Low
1202	003104	Walgreens #1080	43200 State Highway 74	Hemet, CA 92544-5142	5912003	Low
1203	003144	O B One Computer Service Inc	22010 Polley St	Nuevo, CA 92567-8951	7378001	Low
1204	003166	Phil's Liquidation	31846 Highway 74	Homeland, CA 92548-0000	5331002	Low
1205	003242	Duke Enterprises	29097 Bedrock Ct	Nuevo, CA 92567-8909	3999001	Low
1206	003247	Jo Berbiglia	40330 Parado Del Sol Dr	Temecula, CA 92592-8990	5949003	Low
1207	003266	Tri Point Dental Lab	28693 Villa Ct	Romoland, CA 92585-7101	8072001	Low
1208	003278	Just Class Hair Design	28236 Bradley Rd	Sun City, CA 92586-3022	7231001	Low
1209	003292	Rite Aid #5730	25906 Newport Rd	Sun City, CA 92584-9130	5912001	Low
1210	003299	Y Not Wicker	33870 E Grand	Hemet, CA 92543-0000	5947001	Low
1211	003316	Hollywood Video #005-429	29910 Murrieta Hot Springs R	Temecula, CA 92589-0000	7841003	Low
1212	003317	Hollywood Video #005-444	26025 Newport Rd Ste F	Menifee, CA 92584-0000	7841003	Low
1213	003321	Dee's Fashion Outlet	28572 Corvus Way	Sun City, CA 92586-2274	5621001	Low
1214	003357	Anthonys Custom Upholstery	26010 McCall Blvd Ste F	Sun City, CA 92586-1983	7641001	Low

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1215	003466	Bear Creek Hair Studio	32475 Clinton Keith Rd Ste 11	Wildomar, CA 92595-8664	7231001	Low
1216	003517	Sun City Sewing	28061 Bradley Rd	Sun City, CA 92586-2274	5949001	Low
1217	003570	B L J Industries	28126 Sunwood Pl	Menifee, CA 92584-8704	3672003	Low
1218	003576	Rs Instruments & Service	15155 Kingsway Dr	Lake Elsinore, CA 92530-5560	8734001	Low
1219	003652	Insight Publishing	26151 Carancho Rd	Temecula, CA 92590-4204	2721007	Low
1220	003682	Durhams Antique Repair And Sales	27294 Pinckney Way	Sun City, CA 92586-3211	7641002	Low
1221	003729	Daniel H Oplinger	32056 Chagall Ct	Winchester, CA 92596-9023	5736002	Low
1222	003775	Hats Off Hair Design	27136 Shadel Rd	Sun City, CA 92586-3320	7231001	Low
1223	003786	Stowaway Spacemaker Systems	31111 Larchwood St	Menifee, CA 92584-8707	5719001	Low
1224	003843	Creative Graphic Solutions	35378 Kish Cir	Wildomar, CA 92595-9500	3577009	Low
1225	003848	Crafts In Wonderland	115 S Spring St #12	Lake Elsinore, CA 92530-4170	3944001	Low
1226	003869	C C Titus C C T V	22406 Grove Rd	Wildomar, CA 92595-8926	5999001	Low
1227	003883	Glen Oaks Guest Retreat, Inc.	35601 Glen Oaks Rd	Temecula, CA 92592	8093001	Low
1228	003904	Print Connection	35675 Glen Oaks Rd	Temecula, CA 92592-8485	5085028	Low
1229	003945	Eclypse Books	35278 Glen Ln	Wildomar, CA 92595-9065	5932003	Low
1230	003994	Thomas' Martial Arts	30627 Menifee Rd	Menifee, CA 92584-8111	7999053	Low
1231	004000	Preferred Telecommunications	21065 Hicks St	Perris, CA 92570-9395	7629013	Low
1232	004077	Dangkhoabags Dk & Bags	31382 Janelle Ln	Winchester, CA 92596-8700	5699001	Low
1233	004094	Mail Stop & Shop Inc	41827 Florida Ave	Hemet, CA 92544-5042	7389085	Low
1234	004100	Pacific Crest Landscape Materials	31031 Geary St	Menifee, CA 92584-9491	5999001	Low
1235	004153	Front Row Video	25908 Newport Rd Ste E	Sun City, CA 92584-9133	5735002	Low
1236	004156	Longshadow Rancho	39847 Calle Contento	Temecula, CA 92591-5039	2084001	Low
1237	004159	Bonnie Schvaneveldt	24501 Antelope Rd	Romoland, CA 92585-9142	5932002	Low
1238	004165	Angels Unique Gifts	22411 Horseshoe Trl	Nuevo, CA 92567-8994	5719014	Low
1239	004175	Julie Anne Adams	30269 Oise Dr	Menifee, CA 92584-8971	5999001	Low
1240	004209	Treasured Wood Crafts	53675 Glendora Rd	Aguanga, CA 92536-9040	5945005	Low
1241	004234	Benlyn Enterprises	40966 Mayberry Ave	Hemet, CA 92544-6218	7389055	Low
1242	004260	Curves For Women	29614 Nuevo Rd	Nuevo, CA 92567-9108	7991007	Low
1243	004262	Acorn To Oak	30873 Anderson Cir	Menifee, CA 92584-8335	5712001	Low
1244	004279	K C Engraving	27140 Sesame St	Hemet, CA 92544-8803	2759035	Low
1245	004298	Vickies Vessels	35928 Burgundy Ct	Winchester, CA 92596-9826	5092001	Low
1246	004364	Outsource Ltd	39155 Calle Anita	Temecula, CA 92592-8207	5137001	Low

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1247	004396	Ag Starlite	52811 Browns Rocky Rd	Anza, CA 92539-9044	5999030	Low
1248	004432	Puma Applied Science	32600 Flight Way	Winchester, CA 92596-9799	3721012	Low
1249	004449	Wet Pets	26878 Cherry Hills Blvd	Sun City, CA 92586-2568	5999001	Low
1250	004463	Glenn Susumu Fujii	42200 Altanos Rd	Temecula, CA 92592-9167	5699012	Low
1251	004482	Sun Valley Dental Laboratory	39508 Bainbridge Cir	Murrieta, CA 92563-6833	8072001	Low
1252	004499	Fashion Statement	28085 Bradley Rd	Sun City, CA 92586-2207	5621001	Low
1253	004553	Yakut Vineyards Inc	39820 Calle Contento	Temecula, CA 92591-5039	2084004	Low
1254	004556	Billy Carl Adams	44725 Florida Ave Spc 157	Hemet, CA 92544-5590	5192001	Low
1255	004557	Brokenarm, Inc	39252 Winchester Rd Ste 107	Murrieta, CA 92563-3510	7389086	Low
1256	004559	White Rose Millennium Press Anza	39651 Bautista Rd	Anza, CA 92539-0000	2731006	Low
1257	004593	Hair Depot	17307 Grand Ave	Lake Elsinore, CA 92530-5873	7231001	Low
1258	004599	Jen's Skin Care	28823 Sunburst Dr	Menifee, CA 92584-8208	7231007	Low
1259	004603	M V P Awards Inc	27132 Shadel Rd	Sun City, CA 92586-3320	5999041	Low
1260	004619	Kimberlite Publishing	44091 Olive Ave	Hemet, CA 92544-2609	2731001	Low
1261	004765	Snack Time Vending	31205 Geary St	Menifee, CA 92584-9488	5962005	Low
1262	004777	A & S Feed	28485 Reservoir Ave	Nuevo, CA 92567	5999026	Low
1263	004856	Sun City Smoke Shop	26100 Newport Rd Ste A20	Menifee, CA 92584-9072	5993003	Low
1264	004867	Flowers By Cynthia	35667 Larkspur Dr	Wildomar, CA 92595-8565	5992003	Low
1265	004872	Gavies Plant Maintenance	22705 Penasco Cir	Nuevo, CA 92567-9612	5992001	Low
1266	004883	Beebower Engraving Services	38560 Alessandro	Anza, CA 92539-0000	7389055	Low
1267	004889	Valley Musicians Repair	39789 Vista Rd	Hemet, CA 92543-9321	7699001	Low
1268	005022	Simply Sight & Sound Inc	25662 Mesa Edge Ct	Sun City, CA 92585-8969	1731008	Low
1269	005032	Trapito Inturias	28618 Avenida Estrella	Quail Valley, CA 92587-8855	7641001	Low
1270	005086	Exotic Tan	23905 Clinton Keith Rd Ste 10	Wildomar, CA 92595-7898	7299035	Low
1271	005092	Computer Cabbies	34610 Rebecca St	Winchester, CA 92596-9562	7378003	Low
1272	005100	E Z Snacks	26216 Fairlane Dr	Sun City, CA 92586-1904	5962004	Low
1273	005112	Yellow Tee	28006 Panorama Hills Dr	Menifee, CA 92584-7403	5941011	Low
1274	005133	Ink 4 Less	39536 Almaden Cir	Murrieta, CA 92563-4855	7378002	Low
1275	005169	Reality Of Dreams	28416 Panorama Hills Dr	Menifee, CA 92584-7407	5999001	Low
1276	005179	Rays Mobile Screen Service	34756 Farm Rd	Wildomar, CA 92595-9291	3442015	Low
1277	005242	Wilderness Lakes	30605 Briggs Rd	Menifee, CA 92584-9594	7033001	Low
1278	005258	Bookbutton Company	39255 Grassy Rd	Temecula, CA 92592-8535	7389001	Low

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1279	005289	Mobility For You L L C	28087 Bradley Rd	Sun City, CA 92586-2275	7389001	Low
1280	005295	Great Clips For Hair	36004 Hidden Springs Rd	Wildomar, CA 92595-7678	7231001	Low
1281	005315	Bellezza Salon	29966 Haun Rd Ste 2A	Menifee, CA 92584-0000	7231002	Low
1282	005349	Bear Creek Beauty Supply & Salon	36068 Hidden Springs Rd Ste	Wildomar, CA 92595-7680	5122006	Low
1283	005368	Western Steam Systems	28819 Lakeview Ave	Nuevo, CA 92567-9138	5999001	Low
1284	005393	Little Flower Image Maker	22756 Valley Vista Cir	Wildomar, CA 92595-8335	5992002	Low
1285	005395	K L S Enterprises	39535 Bainbridge Cir	Murrieta, CA 92563-6833	5999003	Low
1286	005478	A Self Expressions	32944 Turtle Dove Dr	Lake Elsinore, CA 92530-6186	7336007	Low
1287	005538	Diaz Interiors	33881 Canyon Ranch Rd	Wildomar, CA 92595-8493	7641001	Low
1288	005558	J Whitney Design	33806 Star Hill St	Temecula, CA 92592-5527	5944003	Low
1289	005592	Amy Dawnelle Custom Portraits	25460 Sun City Blvd	Sun City, CA 92586-3843	7221005	Low
1290	005628	Mohammad I Tahiry	36029 Capri Dr	Winchester, CA 92596-8737	5999001	Low
1291	005642	A Drapes & Blinds 2	32340 Bilton Way	Wildomar, CA 92595-9375	5714003	Low
1292	005657	Toadstone Cottage	33966 Madera De Playa	Temecula, CA 92592-9200	5947001	Low
1293	005677	M C R Unlimited	29771 Evans Rd	Sun City, CA 92586-3605	7378003	Low
1294	005710	Leroan Hunte	30575 Phillip Rd	Nuevo, CA 92567-9563	752006	Low
1295	005757	Ronni's Resale And Gift Boutique	27388 Sun City Blvd Ste C	Sun City, CA 92586-2569	5947001	Low
1296	005758	Valley Equipment	41330 Rainbow Ct	Hemet, CA 92544-7473	7699001	Low
1297	005797	Forget Me Not Flowers	42946 Whittier Ave	Hemet, CA 92544-6539	5992001	Low
1298	005815	Fly N Iron Industries	33955 Windmill Rd	Wildomar, CA 92595-8871	5699001	Low
1299	005920	Star Cuts Salon & Day Spa	29955 Technology Dr Ste C-1	Murrieta, CA 92563-0000	7231001	Low
1300	006015	Clearly Better Water	32800 Starlight St	Wildomar, CA 92595-8084	5499010	Low
1301	006049	Publish Writers Inc	25859 Avenida Del Oro	Temecula, CA 92590-3976	2731001	Low
1302	006082	C V S Pharmacy #8848	30736 Benton Rd	Winchester, CA 92596-8466	5912001	Low
1303	006093	Babynicknacks	35461 El Diamante Dr	Wildomar, CA 92595-7848	5137003	Low
1304	006143	Sm's Smoke Shop	43430 Florida Ave Ste C	Hemet, CA 92544-5298	5993003	Low
1305	006176	Mikimu Essentials	29834 Prell Ct	Menifee, CA 92584-7557	5944003	Low
1306	006184	The Fight Lab Inc	30033 Technology Dr Ste 101	Murrieta, CA 92563-2640	7999053	Low
1307	006222	Tactical Airsoft Center	32934 Virgo Way	Wildomar, CA 92595-8056	5999001	Low
1308	006274	Cool Cat Promo Biz	22716 Porter St	Nuevo, CA 92567	2396020	Low
1309	006283	Scarcellas Beauty Supply	30724 Benton Rd Ste C307	Winchester, CA 92596-8470	7231004	Low
1310	006312	Jennifur E Studios	27404 Partridge Ct	Sun City, CA 92585-9346	5999003	Low

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1311	006316	Headquarterz	25908 Newport Rd Ste F	Sun City, CA 92584-9133	7231004	Low
1312	006365	Fast Track Fitness And Physical The	36320 Inland Valley Dr Ste 20	Wildomar, CA 92595-0000	8049015	Low
1313	006391	Gallant Medical Supply	27740 Encanto Dr	Sun City, CA 92586-4521	7352001	Low
1314	006394	The Ups Store 5143	26025 Newport Rd Ste A	Menifee, CA 92584-0000	5113022	Low
1315	006399	A L A Vending	35887 Covington Dr	Wildomar, CA 92595-7738	5962005	Low
1316	006438	Hope Plaza Pharmacy	29798 Haun Rd Ste 100	Menifee, CA 92584-0000	5912001	Low
1317	006441	Jae Rose Photography	28951 Escalante Rd	Quail Valley, CA 92587	7335001	Low
1318	006497	Crazy House Jumpers	35786 Ruby Ct	Winchester, CA 92596-9083	7999004	Low
1319	006521	Glechele' Products	27811 Cliff Top Ct	Sun City, CA 92585-3905	5399001	Low
1320	006556	Yolandas Hair Salon	29550 Nuevo Rd Ste D	Nuevo, CA 92567-9575	7231001	Low
1321	006580	Golden Haircuts	27192 Sun City Blvd Ste D	Sun City, CA 92586-2577	7231001	Low
1322	006598	Greenglides	29617 Camino Delores	Sun City, CA 92586-3568	7217001	Low
1323	006601	Sunsational Sunglasses	35470 Date Palm St	Winchester, CA 92596-8716	5999001	Low
1324	006614	Accent Stone & Tile Design	27630 Connie Way	Sun City, CA 92586-2301	5713003	Low
1325	006628	Pawsnclaws, Inc	42480 Wilson Valley Rd	Aguanga, CA 92536-9619	752001	Low
1326	006631	James Chen	30125 Via Del Fierro	Menifee, CA 92584-8927	7629008	Low
1327	006635	Precision Chem Dry	30983 Orange Ave	Nuevo, CA 92567-9630	7217003	Low
1328	006649	Glows International, Inc.	31139 Mystic Ln	Menifee, CA 92584-8285	5961001	Low
1329	006686	Deborah Jean Esparza	31243 Eastridge Ave	Menifee, CA 92584-7913	5932001	Low
1330	006687	Sanity Under Pressure	25453 Rockford St	Hemet, CA 92544-1720	5651001	Low
1331	006691	Adaptive Business Systems Inc	24065 Oak Circle Dr	Wildomar, CA 92595-7773	7379001	Low
1332	007659	Spraggs Pool Service	25040 Jutland Dr	Hemet, CA 92544-9116	7389114	Low
1333	007667	Kozma Auction Service Inc	25221 Wagner Way	Hemet, CA 92544-1724	7389007	Low
1334	007739	The Computer Guru	26624 Wind Ave	Hemet, CA 92545-9718	7378001	Low
1335	007783	Hitech Security	27284 Dartmouth St	Hemet, CA 92544-8213	7382002	Low
1336	007918	Zanadu Farms	41035 Cactus Valley Rd	Hemet, CA 92544-9336	7999048	Low
1337	007922	Menas Beauty Salon	41107 Vinton Pl	Hemet, CA 92544-7441	7231001	Low
1338	007972	Steven J. Simpson O.D	41705 State Highway 74	Hemet, CA 92544-4948	8042002	Low
1339	007992	Randmar Inc. DBA Curves of Diamo	41859 State Highway 74	Hemet, CA 92544-5090	7991001	Low
1340	008006	Ron White Communications	41939 El Camino Dr	Hemet, CA 92544-7583	1731001	Low
1341	008010	C R Fitzsimmons Computer	41995 State Highway 74	Hemet, CA 92544-5018	7378001	Low
1342	008075	Nail Pro	43384 Highway 74 Ste D	Hemet, CA 92544-5299	7231001	Low

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1343	008081	Basco Access Control Systems	43430 Florida Ave Ste F	Hemet, CA 92544-5298	7382001	Low
1344	008299	Weekend Paradise R V Park Inc	16006 Grand Ave	Lake Elsinore, CA 92530-1469	7033001	Low
1345	008360	Vacation Exchange	19230 Elena Dr	Lake Elsinore, CA 92530-6310	4724001	Low
1346	008388	Discount Hauling & Cleanup Svc	29042 Allan St	Lake Elsinore, CA 92532-2316	4953001	Low
1347	008465	Mikes Floor Cleaning	32770 Magdaleno Ct	Lake Elsinore, CA 92530-6938	7349001	Low
1348	008492	Hernandez Janitorial Service	33120 Stoneman St	Lake Elsinore, CA 92530-6383	7349001	Low
1349	008644	Ralph Lopez	28235 Mariners Way	Menifee, CA 92584-8008	782001	Low
1350	008702	Burr Communications	29630 Camino Pepita	Menifee, CA 92584-8849	4899001	Low
1351	008716	Gonzales Patrick & Edivina Me	29798 Haun Rd Ste 106	Menifee, CA 92584	8011001	Low
1352	009259	A+ Pool Service	21727 Pink Ginger Ct	Wildomar, CA 92595	7389114	Low
1353	009949	David Kiefer	32440 Lakeview Terrace	Lake Elsinore, CA 92530	1731001	Low
1354	011200	Video Flicks	7712 Limonite Ave	Riverside, CA 92509-5314	7841001	Low
1355	011520	Harley Kruldhof Enterprises	27671 Calle De Leon	Romoland, CA 92585-9414	4785004	Low
1356	011531	Curves International Inc	28480 State Highway 74 Ste D	Romoland, CA 92585	7991001	Low
1357	011605	Salon Elegance	26010 McCall Blvd Ste D	Sun City, CA 92586-1983	7231001	Low
1358	011636	Nicks	26816 Cherry Hills Blvd	Sun City, CA 92586-2505	7241001	Low
1359	011650	Sun City Barber & Beauty Shop	26912 Cherry Hills Blvd	Sun City, CA 92586-2505	7241001	Low
1360	011674	Media Com	27192 Sun City Blvd Ste A	Sun City, CA 92586-2577	4841001	Low
1361	011681	Lowrys Interiors	27160 Newport Road	Menifee, CA 92584-9345	5714001	Low
1362	011694	Sun City Nails	27388 Sun City Blvd Ste F	Sun City, CA 92586-2569	7231009	Low
1363	011701	R & M Coils	27547 Terrytown Rd	Sun City, CA 92586-3217	5999001	Low
1364	011719	America's Best Value Inn	27680 Encanto Dr	Sun City, CA 92586-3304	7011001	Low
1365	011721	Retail Cleaning Specialists	27695 Harrison Ave	Sun City, CA 92585-9552	7349001	Low
1366	011757	Dorothys Beauty Salon	27851 Bradley Rd Ste 170	Sun City, CA 92586-2245	7231001	Low
1367	011765	Super 8 Motel	27955 Encanto Dr	Sun City, CA 92586-3306	7011001	Low
1368	011773	Canine Beauty Salon	27994 Bradley Rd Ste K	Sun City, CA 92586-2240	752007	Low
1369	011787	Ely's Destiny Hair Design	28067 Bradley Road	Sun City, CA 92586-2275	7231001	Low
1370	011833	Oscar M Cortes Woodcarving	28630 Goetz Rd	Sun City, CA 92587-8802	5945001	Low
1371	011898	Loretta Bs	29680 Via Naravilla	Sun City, CA 92586-3596	7389001	Low
1372	011919	Jean Cooper	29826 Buena Tierra	Sun City, CA 92586-3507	5999001	Low
1373	011932	Dora Zschokke	27136 Shadel Rd	Sun City, CA 92586	7231001	Low
1374	011986	Lacquer Nails	31829 US Highway 79	Temecula, CA 92592-5870	7231001	Low

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1375	012057	Hair Design By Brenda	36705 Summitville St	Temecula, CA 92592-7305	7231001	Low
1376	012073	Precious Porciline Petting Parlor	38580 Mesa Rd	Temecula, CA 92592-8652	8422001	Low
1377	012089	Helen Daniels	39100 Loren Way	Temecula, CA 92592-8796	5499001	Low
1378	012135	Briar Rose Winery Bed Breakfast	41720 Calle Cabrillo	Temecula, CA 92592-9201	7011003	Low
1379	012498	Gannett Satellite Info Network	20926 Cashew St	Wildomar, CA 92595-8152	5999001	Low
1380	012521	Jolie Day Spa	21545 Palomar St	Wildomar, CA 92595-9684	7991010	Low
1381	012552	Agape Home	22495 Spur Brook Dr	Wildomar, CA 92595-8326	7349001	Low
1382	012655	Pet Stylist	33134 Hidden Hollow Dr	Wildomar, CA 92595-8705	752007	Low
1383	012700	J And L Primitives	34508 The Farm Rd	Wildomar, CA 92595-9293	3524001	Low
1384	012734	J V House Cleaning Service	35681 Sunflower Way	Wildomar, CA 92595-8684	7699001	Low
1385	012798	Maracom Packaging	36340 Breitner Way	Winchester, CA 92596-9294	8743001	Low
1386	013024	David W Cavner Fantascenes Photo	15598 Multiview Dr	Perris, CA 92570	7335003	Low
1387	013127	Richard G. Kennedy D D S Inc	28125 Bradley Rd 210	Sun City, CA 92586	8021001	Low
1388	013160	Winchester Dental Center	33040 Simpson Ave 104	Winchester, CA 92596	8021002	Low
1389	013283	Nalorn N. Sengamphan D.D.S., Inc	27851 Bradley Rd 155	Sun City, CA 92586	8049005	Low
1390	013317	Sunshine Pet Center	26900 Newport Rd 114	Menifee, CA 92584	5999027	Low
1391	013377	Purnima K Patel Md	36243 Inland Valley Dr 160	Wildomar, CA 92595	8011001	Low
1392	013404	Dental Care	25908 Newport Rd C	Menifee, CA 92584	8021001	Low
1393	013414	Randy Jacobs Dermatology	27640 Encanto Dr B	Sun City, CA 92586	8011005	Low
1394	013422	Bobs Blinds A Partnership	29800 Bradley Rd 105	Sun City, CA 92586	7349001	Low
1395	013509	Bear Creek Dental Group	36068 Hidden Springs Rd H	Wildomar, CA 92595	8021004	Low
1396	013520	Lake Nails	26100 Newport Rd 1-16	Menifee, CA 92584	7231001	Low
1397	013530	Miller Jones Mortuary & Crematory	26770 Murrieta Rd	Sun City, CA 92585	7261005	Low
1398	013537	Chiropractic Works	32475 Clinton Keith Rd 108	Wildomar, CA 92595	8041001	Low
1399	013539	Bear Creek Travel	32395 Clinton Keith Rd B5	Wildomar, CA 92595	4724001	Low
1400	013656	Eagles Tax Depot	21535 Palomar St B	Wildomar, CA 92595	7291003	Low
1401	013672	Susan M Danek Md	29798 Haun Rd #302	Sun City, CA 92586	8011015	Low
1402	013677	Richard Lam Md	27994 Bradley Rd C	Sun City, CA 92586	8011001	Low
1403	013678	Bradley Plaza Medical Ctr	27994 Bradley Rd F	Sun City, CA 92586	8011012	Low
1404	013695	Law Office Of Steve Odom	27851 Bradley Rd 165	Sun City, CA 92586	9222002	Low
1405	013696	J's Barbershop	29800 Bradley Rd 104	Sun City, CA 92586	7241001	Low
1406	013824	Payless Shoesource No 4333	30141 Antelope Rd D	Menifee, CA 92584	5661001	Low

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1407	013893	Sunny Nails	30123 Antelope Rd B	Menifee, CA 92584	7231009	Low
1408	013905	Doll House Beauty Shop	33330 Mission Trl	Wildomar, CA 92595	7231001	Low
1409	013913	Lees Acupuncture	27851 Bradley Rd 150	Sun City, CA 92586	8049002	Low
1410	013927	Superstar Video	41421 E Florida Ave	Hemet, CA 92544	5735001	Low
1411	013978	James and Darlene Kuhn	30141 Antelope Road Suite D	Menifee, CA 92584	7389077	Low
1412	014184	Orthopedic Medical Practice	36243 Inland Valley Dr 100	Wildomar, CA 92595	8011012	Low
1413	014229	General Nutrition No 3353	30141 Antelope Rd I	Menifee, CA 92584	5912005	Low
1414	014247	Western Business Systems	22105 Woodcreek Ln	Lake Elsinore, CA 92532	7389001	Low
1415	014374	Menifee Tae Kwondo Academy	29800 Bradley Rd 122	Sun City, CA 92586	7999053	Low
1416	014379	Sun City Coin Gold & Silver	26010 Mc Call Blvd	Sun City, CA 92586	5999014	Low
1417	014415	Girdhari S. Purohit Md, Inc	26960 Cherry Hills Blvd E	Sun City, CA 92586	8011001	Low
1418	014436	Toad Studios	32750 Brechtel St	Lake Elsinore, CA 92530	7389096	Low
1419	014438	Victorian Carriage	37140 Bautista Rd	Anza, CA 92539	7999001	Low
1420	014516	Advance Alert Security Systems	23830 Carancho Rd	Temecula, CA 92590	7382001	Low
1421	014531	Family Affair Hair	21465 Palomar St 4	Wildomar, CA 92595	7231002	Low
1422	014583	Evans Brown Mortuary No 4632	27010 Encanto Dr	Romoland, CA 92585	7261004	Low
1423	014668	Lake Elsinore Video	33982 Mission Trl Ab	Wildomar, CA 92595	5735005	Low
1424	014876	Sun Leisure Motel	27350 Highway 74	Romoland, CA 92585	7011001	Low
1425	014902	My Moms Nuts	29851 Nogues Rd	Nuevo, CA 92567	5145002	Low
1426	014946	Clark Forensic Services	15200 Cobre St	Lake Elsinore, CA 92530	7381007	Low
1427	015024	Quest Diagnostics No 6814363	36243 Inland Valley Dr 260	Wildomar, CA 92595	8071007	Low
1428	015030	Quest Diagnostics No 6814356	29798 Haun Rd #201	Sun City, CA 92586	8071007	Low
1429	015047	Beckman Coulter	36585 Inland Valley Dr	Wildomar, CA 92595	5999001	Low
1430	015063	Vision Experience Of Wildomar	23905 Clinton Keith Rd 115	Wildomar, CA 92595	8042002	Low
1431	015241	Anza Barber & Beauty	56565 Highway 371 B	Anza, CA 92539	7231001	Low
1432	015259	Family Hair Center	30141 Antelope Rd H	Menifee, CA 92584	7231010	Low
1433	015298	J P Tek Consultants	29171 Del Monte Dr	Sun City, CA 92586	7371001	Low
1434	015312	Playland Recreations	16730 Grand Ave	Lake Elsinore, CA 92530	7032001	Low
1435	015509	Loma Vista Bed & Breakfast	33350 La Serena Way	Temecula, CA 92591	7011003	Low
1436	015522	Aladdin Bail Bonds	39252 Winchester Rd 102	Murrieta, CA 92563	7389014	Low
1437	015566	Postal Annex	29910 Murrieta Hot Spgs Rd #	Murrieta, CA 92563	7389077	Low
1438	015608	Inland Valley Retina Medical Assoc	29950 Haun Rd 202	Menifee, CA 92584	8011001	Low

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1439	015610	Bedazzled Salon	26900 Newport Rd 113	Menifee, CA 92584	7231004	Low
1440	015615	Pediatric Partners	26900 Newport Rd 111	Menifee, CA 92584	8011014	Low
1441	015616	Menifee Valley Optometry, P C	29950 Haun Rd 206	Sun City, CA 92586	8042002	Low
1442	015620	Menifee Dental Group	29950 Haun Rd 302	Sun City, CA 92586	8021004	Low
1443	015627	Photography By Carolyn	26900 Newport Rd 119	Menifee, CA 92584	7221008	Low
1444	015645	Garden Path Floral Designs	34564 Mesa Butte	Temecula, CA 92592	5992002	Low
1445	015649	Mascot Graphics	28328 Evening Star Dr	Romoland, CA 92585	7336006	Low
1446	015689	Aaaudio Waves	33980 Mission Trl Hf	Wildomar, CA 92595	5064023	Low
1447	015723	Paragon Steel Detailing, Inc.	39871 Beaujolais Ct	Temecula, CA 92592	7389035	Low
1448	015908	Country Cupboard	37641 Benton Rd	Temecula, CA 92592	3269004	Low
1449	016061	Menifee Valley Medical Center	28000 McCall Blvd	Sun City, CA 92586	8062001	Low
1450	016085	Mielke Enterprises, Inc	34040 Ortega Hwy	Lake Elsinore, CA 92530	7033004	Low
1451	016091	Tinseltown Video, Inc	39252 Winchester Rd 135	Murrieta, CA 92563	7841004	Low
1452	016160	East Murrieta Dental Group	39209 Winchester Rd 100	Murrieta, CA 92563	8021004	Low
1453	016170	Menifee Valley Dental Group	26910 Newport Rd	Sun City, CA 92586	8021001	Low
1454	016354	Nail Palace	23905 Clinton Keith Rd 103	Wildomar, CA 92595	7231009	Low
1455	016421	Nail Crave	19980 Grand Ave F	Lake Elsinore, CA 92530	7231009	Low
1456	016460	Valley Medical Center	41511 E Florida Ave	Hemet, CA 92544	8071007	Low
1457	016609	Wildomar Senior Leisure Community	32325 S Pasadena St	Wildomar, CA 92595	8059010	Low
1458	016697	Bionic Computers	41901 Stetson Ave	Hemet, CA 92544	7378003	Low
1459	016700	Homeland Barber & Beauty	31736 Highway 74	Homeland, CA 92548	7241001	Low
1460	016723	Merle Norman Cosmetics	29910 Murrieta Hot Spgs Rd E	Murrieta, CA 92562	5999015	Low
1461	016747	Soboba Water Co	26851 Lake St	Hemet, CA 92544	4941001	Low
1462	016868	Haircutters	39252 Winchester Rd 101	Murrieta, CA 92563	7231010	Low
1463	016878	Supercuts	29910 Murrieta Hot Spgs Rd J	Murrieta, CA 92563	7231004	Low
1464	021461	Professional Estate & Moving Sales	28607 Milky Way	Sun City, CA 92586-3816	5999006	Low
1465	021478	Menifee Valley Family Dental	29798 Haun Rd Ste 303	Sun City, CA 92586	8021004	Low
1466	021485	Kims Cleaning Service	28591 Chaucer Rd	Menifee, CA 92584	7349008	Low
1467	021519	Advanced Dermatology	29798 Haun Rd Ste 204	Sun City, CA 92586-6540	8011005	Low
1468	021528	A Maze In Time	34801 Glory Ln	Wildomar, CA 92595	7999001	Low
1469	021529	Greg Fink Photos	21581 Darby St	Wildomar, CA 92595	7335003	Low
1470	021535	Aqua Pool Supply	33175 Highway 79 South A #2	Temecula, CA 92592	5999036	Low

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1471	021623	Circle Of Life Pet Crematorium, L L (	43800 Whittier Ave #C	Hemet, CA 92544	7261002	Low
1472	021665	French Valley Vision Assoc Inc	30688 Benton Rd Ste B101	Winchester, CA 92596	8042002	Low
1473	021717	Anza Medical Center	56030 Highway 371	Anza, CA 92539	8011001	Low
1474	021800	Estrella Video	17139 Ste B Grand Ave	Lake Elsinore, CA 92530	7841004	Low
1475	021816	Temecula Valley Radiation Oncology	36320 Inland Valley Dr Ste 10	Wildomar, CA 92595	8049001	Low
1476	021823	Von Chase Publishing Company	31488 Hamburg Circle	Winchester, CA 92596	2741016	Low
1477	021829	My Print Shoppe, L L C	38397 Innovation Ct Ste 102	Murrieta, CA 92563	7379001	Low
1478	021830	Quick Scan Inc	33509 View Point Dr	Wildomar, CA 92595	7381005	Low
1479	021846	Sparkling Maid Cleaning	29930 Nuevo Rd	Nuevo, CA 92567	7349008	Low
1480	021874	Indoor Rain, Inc	29990 Technology Dr #15	Murrieta, CA 92567	5722012	Low
1481	021894	Glamis Superstore.Com	31640 El Cariso Truck Trail	Lake Elsinore, CA 92530	5961001	Low
1482	021895	Super Rx, Inc #6174	36010 Hidden Springs Rd	Wildomar, CA 92595	5912001	Low
1483	021896	Super Rx, Inc #6177	30712 Benton Rd	Winchester, CA 92596	5912001	Low
1484	021898	Doza Designs Llc	31956 Honeysuckle Cir	Winchester, CA 92596	7549012	Low
1485	021903	A Plus Walk In Urgent Care	29955 Technology Dr Ste 111	Murrieta, CA 92563	8099001	Low
1486	021934	Massage By Leanna	29498 Desert Terrace Dr	Menifee, CA 92584	7299028	Low
1487	021941	Lic Robert Blair Certified Therapeutic	28006 Crystal Spring Dr	Menifee, CA 92584	8049013	Low
1488	021951	J & D.V	29097 Promenade Rd	Menifee, CA 92584	5731001	Low
1489	021963	Pattie J. Dimmette, M.D., A.P.C.	36450 Inland Valley Dr Ste 10	Wildomar, CA 92595	8011001	Low
1490	021989	R M Zaret Marketing Research	35536 Parkwood Ct	Wildomar, CA 92595	7331006	Low
1491	022009	Chryto's Creations	27193 Frost Ct	Menifee, CA 92584	5699001	Low
1492	022026	M F W Technologies Inc	38372 Innovation Ct #103	Murrieta, CA 92563	7382004	Low
1493	022070	Leon Cleaning Services	30162 Marne Way	Menifee, CA 92584	7349010	Low
1494	022082	Inland Psychiatric Medical Grp Inc	36243 Inland Valley Dr #50	Wildomar, CA 92595	8011018	Low
1495	022089	Temecula Valley Imaging Medical Ce	36243 Inland Valley Dr	Wildomar, CA 92595	8099001	Low
1496	022090	Temecula Valley Imaging Medical Ce	26926 Cherry Hills Blvd Ste A	Sun City, CA 92586	8099001	Low
1497	022108	The Orchard	29015 Garland Ln	Menifee, CA 92584	7389031	Low
1498	022138	All Yours Photography	26750 Dartmouth St	Hemet, CA 92544-7545	7335003	Low
1499	022173	Crafts From The Blue Barn Loft	40240 Reed Valley Rd	Aguanga, CA 92536	5947001	Low
1500	022184	K & Y Transportation Service	27768 Point Breeze Dr	Romoland, CA 92585	4119001	Low
1501	022185	Michele Marie Salon Salon	26658 Jefferson Ave Ste 103	Murrieta, CA 92562	7231006	Low
1502	022233	TSB Enterprise	32049 Old Country Ct	Winchester, CA 92596	1521006	Low

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1503	022252	Max Altman Camera	32260 Pink Carnation Ct	Winchester, CA 92596	5946001	Low
1504	022269	Virgils Home Inspection	525 N Gilbert #73	Hemet, CA 92543	7299001	Low
1505	022290	C Z C, Inc.	7121 Magnolia Ave Ste L	Riverside, CA 92504	8093001	Low
1506	022387	Designs By Thomas	35398 Glen Ln	Wildomar, CA 92595	5199023	Low
1507	022495	Baker Enterprises	43555 Carefree Dr	Temecula, CA 92592	5961004	Low
1508	022496	Shopannamore.Com	25715 Lynn Circle	Hemet, CA 92544	5137001	Low
1509	022502	Smarty Beans	29287 Meandering Cir	Menifee, CA 92584	5961001	Low
1510	022504	Sparklee Pool Service	29515 Cheryl Dr	Quail Valley, CA 92587	7389114	Low
1511	022519	Kai Kreations	29059 Light Sails Ct	Romoland, CA 92585	5651001	Low
1512	022537	Trim And Tone	25378 Mammoth Lakes Cr	Menifee, CA 92584	7231007	Low
1513	022552	MC Fashion Import Export	35785 Rosedown Ln	Wildomar, CA 92595	7299001	Low
1514	022561	CCC Productions	35471 Daffodil Cir	Winchester, CA 92596	7299030	Low
1515	022567	Gitana	35932 Devonshire Ln	Wildomar, CA 92595	4731002	Low
1516	022589	Postnet Postal & Business Services	36068 Hidden Springs Rd Ste	Wildomar, CA 92595	7331007	Low
1517	022591	Apple Medical And Urgent Care, Inc.	28401 Bradley Rd #A	Sun City, CA 92586	8011001	Low
1518	022599	Funhouse Productions	39497 Calle De Suenos	Murrieta, CA 92562	5999001	Low
1519	022600	Systemic Din	39497 Calle De Suenos	Murrieta, CA 92562	2741012	Low
1520	022630	Academy Flix	28653 Eickhoff Ave	Menifee, CA 92584-8321	7841004	Low
1521	022637	I.E. Culture, Inc.	29409 Lake Hills Dr	Romoland, CA 92585	7389122	Low
1522	022644	Nephrology Associates Medical Grp,	3660 Park Sierra Dr Ste 208	Riverside, CA 92505	8011015	Low
1523	022655	Rite Aid 6486	1180 N State St	San Jacinto, CA 92583-6318	5912001	Low
1524	022656	Rite Aid 6481	32450 Clinton Keith Road	Wildomar, CA 92595-8662	5912001	Low
1525	022671	Loring Studios	571-I Crane St Ste A	Lake Elsinore, CA 92530	7335004	Low
1526	022672	Luxe Deluxe II	41587 Cherry Branch Ave	Murrieta, CA 92562	5944001	Low
1527	022677	Fitness 19	23877 Clinton Keith Rd Ste J	Wildomar, CA 92595	7991001	Low
1528	022681	The Computer Mechanics	26071 Lawton Ct	Hemet, CA 92544	7378003	Low
1529	022697	D L P Cleaning Services	35495 Azalea Circle	Winchester, CA 92596	7349008	Low
1530	022700	Stranded Stones	29638 Camino Cristal	Menifee, CA 92584	5944001	Low
1531	022746	Hedges Vending	32325 Duclair Rd	Winchester, CA 92596	5962005	Low
1532	022752	Ace Tae Kwon Do Academy	29910 Murrieta Hot Springs R	Murrieta, CA 92563	7999053	Low
1533	022780	Flanagan's Antique Doors	35901 Burgundy Ct	Winchester, CA 92596	5932010	Low
1534	022782	Realknotz	24819 Sunset Vista Ave	Menifee, CA 92584	5137001	Low

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1535	022800	Beyond The Horizon Ent	28777 Murrieta	Sun City, CA 92586	2761007	Low
1536	022803	Menifee Now L L C	31419 Shadow Ridge Dirve	Menifee, C 92584	5192003	Low
1537	022804	Roxy's Bowtique	43532 Tylman Street	Temecula, CA 92592	5949001	Low
1538	022814	Premier Inspection Services	31897 Odyssey Dr	Winchester, CA 92596	7299001	Low
1539	022819	G E M V W	29590 Merjanian Rd	Menifee, CA 92584	5399001	Low
1540	022822	Mountain Communities Telephone D	27925 Starfall Way	Murrieta, CA 92563	2741018	Low
1541	022825	Alta Cleaning Solutions	26475 Arboretum Way #2204	Murrieta, CA 92563	7349007	Low
1542	022842	Tint Styles	29770 Bradley Rd Ste F-1	Sun City, CA 92584	7549012	Low
1543	022855	Arniskido	28785 Moonrise Wy	Menifee, CA 92584	7999053	Low
1544	022877	Crafts 4 Us	31549 Electric Ave	Nuevo, CA 92567	5092002	Low
1545	022884	H & H Window Cleaning	29557 Oakbridge Dr	Sun City, CA 92586	7349016	Low
1546	022895	Black Cat Distributing	39252 Winchester Rd #10725	Murrieta, CA 92563	7319004	Low
1547	022896	Alyssa Kenny	29955 Technology Dr #103	Murrieta, CA 92563	7231006	Low
1548	022915	Shannon Edmonds Photography	33305 Windmill Rd	Wildomar, CA 92595	7221008	Low
1549	022919	K P A Mapping	25596 Gala Cir	Romoland, CA 92585	7299001	Low
1550	022922	Everlasting Happy Life	21295 Maple Ave	Wildomar, CA 92595	7299001	Low
1551	022927	Cruz Unlimited	32675 Lemon Drop St.	Menifee, CA 92584	5651002	Low
1552	022929	American Cleaning Crew	31805 Hwy 79 South Ste 210	Temecula, CA 92592	7349008	Low
1553	022939	Temecula Sash & Door	26111 Ynez Rd B-28	Temecula, CA 92591	5211007	Low
1554	022942	American Cleaning Crew	31805 Hwy 79 Ste 210	Temecula, CA 92592	7349008	Low
1555	022956	Inland Vacation And Travel Club	29610 Central Ave	Nuevo, CA 92567	4724001	Low
1556	022960	Dr Kimberly Minesinger	32100 Clinton Keith Rd Ste D	Wildomar, CA 92595-5838	8011001	Low
1557	022967	Extreme Wiring	2779 Cindy Ln	Hemet, CA 92545	7299001	Low
1558	022975	Electric Beach Tanning	41857 E Florida St	Hemet, CA 92544	7299035	Low
1559	023004	Karate Learning Center	235 S Lyon Ave #69	Hemet, CA 92543	7999053	Low
1560	023015	French Quarter Lingerie	27168 Sun City Blvd	Sun City, CA 92586	5632011	Low
1561	023016	Jani-King	40965 Reden Court	Hemet, CA 92544	7349008	Low
1562	023031	Platinum Concepts	27730 Balboa Ct	Sun City, CA 92585	4812003	Low
1563	023039	Fatal Star	35275 Golden Poppy Ct	Winchester, CA 92596	5137003	Low
1564	023042	Anza Waste Services	38915 Western Hills Road	Anza, CA 92539	4953005	Low
1565	023046	Bounce U	38415 Innovation Ct Ste N	Murrieta, CA 92563	7996004	Low
1566	023057	Kevin Helton Photography	24906 Rainbarrel Rd	Wildomar, CA 92595	7221002	Low

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1567	023061	E&C FunWear	35195 Slater Ave	Winchester, CA 92596	5699001	Low
1568	023066	Looking Good Beauty Supply	30141 Antelope Rd # K	Menifee, CA 92584	7231004	Low
1569	023073	D & A Used Bikes	21165 Vine St	Wildomar, CA 92595	5941005	Low
1570	023082	Laura's Housecleaning	20995 Alameda Del Monte	Wildomar, CA 92595	7349007	Low
1571	023083	Diamond Florist	33040 Simpson Rd # 102	Winchester, CA 92596	5992002	Low
1572	023085	Lori's Cleaning & Organizing	22475 Spur Brook Dr	Wildomar, CA 92595	7349008	Low
1573	023091	Newport Tan And Day Spa	29966 Haun Rd # B & C	Menifee, CA 92584	7299035	Low
1574	023092	R & S House Cleaning	26056 Naumann Ave	Homeland, CA 92548	7349008	Low
1575	023113	Dollar Discount	43372-B State Highway 74	Hemet, CA 92544	5331002	Low
1576	023133	Media Displayz	33270 Hollister Dr	Lake Elsinore, CA 92530	7336006	Low
1577	023146	Fred Rau Adventure Tours	26150 Sunnywoon St	Sun City, CA 92586	4725001	Low
1578	023157	Bombshell Boutique	32100 Clinton Kieth Rd Ste G	Wildomar, CA 92595	5137001	Low
1579	023159	South America Trading	30129 Shoreline Dr	Menifee, CA 92584	7299001	Low
1580	023176	5 & 2 Enterprises, Inc	31586 Mill Creek Dr	Menifee, CA 92584	7338002	Low
1581	023180	Design & Drafting Services	29100 Blue Spruce Cir	Menifee, CA 92584	7389035	Low
1582	023181	Sterling Business Enterprises	17810 Grand Ave # C	Lake Elsinore, CA 92530-6001	7389001	Low
1583	023182	Ian Herron	31760 McWade Ave	Homeland, CA 92548	4724003	Low
1584	023186	Inland Vacation & Travel Club	29610 Central Ave	Nuevo, CA 92567	4724003	Low
1585	023205	Enticing Sweets	31136 Old Trail Cir	Murrieta, CA 92563	5999001	Low
1586	023214	Massage Envy	23885 Clinton Keith Rd # 103	Wildomar, CA 92595	7299028	Low
1587	023224	Silver Cross Corporation	27231 Kepler St	Menifee, CA 92584	7389001	Low
1588	023240	The Squeaky Cleaner	17616 Sutherland Ave	Lake Elsinore, CA 92530	7349007	Low
1589	023242	Johnny On The Spot Pressure Wash	35957 Camelot Cir	Wildomar, CA 92595	7299001	Low
1590	023244	O.E.P.S.	22356 Sequoia Cir	Wildomar, CA 92595	7389075	Low
1591	023246	Creative Nails	32100 Clinton Keith Rd #C	Wildomar, CA 92592	7231004	Low
1592	023248	Spiffy Clean	27255 Airstream Way	Sun City, CA 92585	7349008	Low
1593	023275	Randy Jacobs, Dermatology, Inc.	27640 Encanto Dr Ste B	Sun City, CA 92586	8011001	Low
1594	023277	Deborah L. Zolnoski	29623 Tierra Shores Lane	Menifee, CA 92584	5999003	Low
1595	023284	Rose Cook	33280 Newport Road	Winchester, CA 92596	5651002	Low
1596	023296	W.A. Systems	27701 Goetz Street	Quail Valley, CA 92587	7378003	Low
1597	023308	Top Notch Design	18081 Carmela Ct	Lake Elsinore, CA 92532	7389035	Low
1598	023316	Machinery & Equipment Appraisals,	39632 Clos Du Val	Murrieta, CA 92563	7389004	Low

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1599	023325	Simply Publications	60221 Yucca Valley Rd	Anza, CA 92359	7371001	Low
1600	023340	Pink Pepper Tree	28881 Hillside Drive	Menifee, CA 92584	5621001	Low
1601	023341	Anza Postal Place	53250 Hwy 371	Anza, CA 92539	7389085	Low
1602	023350	Secure Connect	29277 Harley Ct	Nuevo, CA 92567	7382001	Low
1603	023352	A E M Sales	34501 Stage Rd	Temecula, CA 92592	5961001	Low
1604	023359	Patio Shoppers, Inc	21535 Palomar St Ste A & B	Wildomar, CA 92595	5712009	Low
1605	023368	Aynn's Classic Affairs	29604 Squaw Valley Dr	Sun City, CA 92586	5621002	Low
1606	023378	J T Microelectronics Sales	31076 Robertson St	Homeland, CA 92548-9719	5734005	Low
1607	023379	I E Web Services	41591 Florida Ave Ste F-1	Hemet, CA 92544	7371008	Low
1608	023392	Longs Drug Stores #768	36243 Inland Valley Dr #130	Wildomar, CA 92595	5912003	Low
1609	023402	Unique Property Maintenance	24038 Safiro Ct	Wildomar, CA 92595	7349008	Low
1610	023412	Kaiser Permanente Pharmacy # 514	36450 Inland Valley Dr	Wildomar, CA 92595	5912003	Low
1611	023413	Anza Immigration & Divorce Typing (	52300 Kess Rd	Anza, CA 92539	7291001	Low
1612	023439	City Street Advertising	29025 Oak Creek Rd	Menifee, CA 92584	7312004	Low
1613	023440	Hummingbird Creations	27678 Vista Rd	Romoland, CA 92585	5949001	Low
1614	023441	Jirah Print & Graphics	26803 Summerwood Cir	Menifee, CA 92584	7336006	Low
1615	023446	Casa Vieja Antiques	23480 Baxter Rd	Wildomar, CA 92595	5932002	Low
1616	023450	Centro Bienestar Y Salud	29616-A-2 Nuevo Rd	Nuevo, CA 92567	7299001	Low
1617	023452	Phil Carlyle Appraisals	26011 Kentia Palm Dr	Homeland, CA 92548	7389004	Low
1618	023456	Just Us Girls Window Washing	26640 Charles Ct	Hemet, CA 92544	7349016	Low
1619	023457	H B Diamond Services, Inc.	29773 Gifhorn Court	Menifee, CA 92584	7349008	Low
1620	023472	Lorraine Aleman	29315 Cinnamon Wood Way	Menifee, CA 92584	7231006	Low
1621	023483	Asset Aquisition Judgement Recover	44034 D St	Hemet, CA 92544	7299001	Low
1622	023489	O" Video +"	18445 Grand Ave	Lake Elsinore, CA 92530	7841001	Low
1623	023490	Jake Home Services	29843 Avenida De Serano	Sun City, CA 92586	7349011	Low
1624	023497	Digital Advantage	33550 Harvest Way East	Wildomar, CA 92595	7299001	Low
1625	023513	Humble Beginnings	28898 Champions Dr	Menifee, CA 92584	5961001	Low
1626	023514	Inland Empire Studio	28065 Bradley Rd	Sun City, CA 92586	7299036	Low
1627	023524	Optimal Home Care & Staffing L L C	35036 Slater Ave	Winchester, CA 92896	7361008	Low
1628	023556	Access Hygiene	31356 Highland Ct	Menifee, CA 92584	8049005	Low
1629	023559	Steven's Card Ministry	26697 Garrett Ryan Court	Hemet, CA 92544	7334003	Low
1630	023564	Old World Treasure Chest	28130 Orange Grove Ave	Menifee, CA 92584	5399001	Low

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1631	023575	Southern California Permanente Me	36450 Inland Valley Dr	Wildomar, CA 92595	8011001	Low
1632	023577	Signzdirect.Com	36068 Hidden Springs Rd Ste	Wildomar, CA 92595	7334002	Low
1633	023582	Steven's Card Ministry	26697 Garrett Ryan Ct	Hemet, CA 92544	7372003	Low
1634	023584	Aroma Madness	34850 Killarney Ln	Wildomar, CA 92595	5961001	Low
1635	023585	Livingwater's Medical Clinic, Inc	56480 State Highway 371	Anza, CA 92539	8011001	Low
1636	023586	Anza Community Medical Center Co	56480 State Highway 371	Anza, CA 92539	8011001	Low
1637	023589	Sinister Industries Clothing	29573 Tierra Shores Ln	Menifee, CA 92584	5137041	Low
1638	023592	F & A Landscape And Janitorial Serv	33291 Windtree Ave	Wildomar, CA 92595	7349008	Low
1639	023602	Pave Pets	26145 Columbia St	Hemet, CA 92544	5999026	Low
1640	023621	Unique Expressions	26826 Madera Ct	Menifee, CA 92584	7299001	Low
1641	023622	Local Errand Girl	33580 Tamerron Way	Wildomar, CA 92595	7299001	Low
1642	023629	A.K.A Cork And Barrel	39320 Hwy 79 Ste E	Aguanga, CA 92536	5945003	Low
1643	023631	Intel Global Service Corporation	22401 Juniper Flats Rd	Nuevo, CA 92567	4899001	Low
1644	023635	Nick's Pool & Spa Repair	24265 Rosita Dr	Wildomar, CA 92595	7389114	Low
1645	023653	Ready Communications	41376 Thornton Ave	Hemet, CA 92544	5961001	Low
1646	023654	V T I Service	41376 Thornton Ave	Hemet, CA 92544	7389001	Low
1647	023661	S L Programming Services, Inc	29170 Allan St	Lake Elsinore, CA 92532	7371008	Low
1648	023665	Court Security Products	39201 Memory Dr	Murrieta, CA 92563	5999001	Low
1649	023666	French Valley Tax Service	37345 Applegate Road	Murrieta, CA 92563	7291001	Low
1650	023667	Pro Contact Marketing	32194 Perigord Road	Winchester, CA 92596	7311001	Low
1651	023676	Epiphany Bookstore	34215 Kooden Road	Winchester, CA 92596	5192001	Low
1652	023679	Hemet Signs	27196 Wedgewood Dr	Hemet, CA 92544	5199023	Low
1653	023709	Southwest Hair Design	32395 Highway 74	Hemet, CA 92545	7231004	Low
1654	023717	Whirlwind Pressure Washing	33723 Arthur Rd	Winchester, CA 92596	7349016	Low
1655	023720	Hidden Eye Security	42320 Via Nortada Way	Temecula, CA 92590	7382001	Low
1656	023734	Plastics And More Sales	23293 Trillium Drive	Wildomar, CA 92595	5963001	Low
1657	023751	Hopkinsgiftworldandbaskets.Com	27263 Family Cir	Sun City, CA 92586	5199023	Low
1658	023756	A Flower Boutique	29990 Technology # 13	Murrieta, CA 92563	5992001	Low
1659	023762	Foxi Moxi	31961 Honeysuckle Circle	Winchester, CA 92596	5961001	Low
1660	023769	Menifee Valley Athletic Club,Inc.	29700 Bradley Road	Sun City, CA 92586	7991006	Low
1661	023770	Walker Physical Therapy, Inc.	29650 Bradley Road	Sun City, CA 92586	8049015	Low
1662	023777	Starbright Home Care, L L C	33310 Windtree Ave	Wildomar, CA 92595	8082002	Low

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1663	023806	Whatever...	28090 Leona St	Lake Elsinore, CA 92532	7336006	Low
1664	023807	Great White Smile	39039 Gray Squirrel Rd	Temecula, CA 92592	7299001	Low
1665	023814	K T M North America, Inc	38429 Innovation Ct	Murrieta, CA 92563	7948007	Low
1666	023817	Advanced Mart	28591 Milky Way	Sun City, CA 92586	5961004	Low
1667	023818	Cecilia Hallett Photography	31607 Silex Ct	Winchester, CA 92596	7221005	Low
1668	023842	Brightstar Healthcare	29737 New Hub Dr	Sun City, CA 92586	8082001	Low
1669	023868	Taxes By Lillian Duran	24429 Paseo Arroyo Dr	Quial Valley, CA 92587	7291001	Low
1670	023869	R H Sincere Home Inspections	24429 Paseo Arroyo Dr	Quial Valley, CA 92587	7389001	Low
1671	023870	Liberty Protection Agency	24429 Paseo Arroyo Dr	Quial Valley, CA 92587	7381010	Low
1672	023874	Kess Industries	52300 Kess Rd	Anza, CA 92539	5719014	Low
1673	023879	Old Fashioned Cleaning Services	43130 Sampson Ct	Hemet, CA 92544	7349008	Low
1674	023903	Menifee Mafia Photography	28621 Moon Shadow Dr	Menifee, CA 92584	7221004	Low
1675	023919	Bridal Budget Boutique	27905 California Ave	Hemet, CA 92545	5621002	Low
1676	023921	Visage Corrective Skin Care	24181 Rosita Dr	Wildomar, CA 92595	7299001	Low
1677	023923	Primetime Publishers	26164 Corte Tecolote	Hemet, CA 92544	5961001	Low
1678	023948	Dr. Beef Pc Repair	25083 Battery Ct	Hemet, CA 92544	7378003	Low
1679	023971	Professional Judgment Recovery	31004 Desert View Court	Menifee, CA 92584	7322003	Low
1680	023981	Mary Ann Spinelli	36970 Calle Arruza	Temecula, CA 92592	5932002	Low
1681	023990	Sign And Signwalker Promotions	30081 Mt Menifee St	Sun City, CA 92585	7312003	Low
1682	023993	Libby's Literacy World	29215 Mesa Crest Way	Menifee, CA 92584	5942001	Low
1683	023999	Sheri Silkotch Interiors	60780 Coyote Cyn Rd	Anza, CA 92539	7389057	Low
1684	024001	Stephanie Ann's Simply Sweet Desig	29735 Brookfield Dr	Sun City, CA 92586	5961014	Low
1685	024007	Harvest Valley Computers	26426 Melba Ave	Homeland, CA 92548	7379001	Low
1686	024011	Diane Lopez Photography	28963 Escalante Rd	Quail Valley, CA 92587	7221001	Low
1687	024029	Nephrology Associates Medical Grou	28125 Bradley Rd	Sun City, CA 92586	8011015	Low
1688	024030	Wildomar Dental Care	32100 Clinton Keith Rd #E	Wildomar, CA 92595	8021001	Low
1689	024039	Valley's Best Window Cleaning	33408 Mill Pond Dr	Wildomar, CA 92595	7349016	Low
1690	024054	Crystal Cove Tropical Fish	34878 Monte Vista Dr #114	Wildomar, CA 92595	5199020	Low
1691	024060	Elva's Beauty Salon	31636 Highway 74	Homeland, CA 92548	7231001	Low
1692	024074	Your Dollar Store, Inc	39040 Sky Canyon Dr Ste 110	Murrieta, CA 92563	5399004	Low
1693	024077	Lagor Speciality Inspections	31009 Sunset	Nuevo, CA 92567	7389001	Low
1694	024078	Redbox Automated Retail, L L C	39140 Winchester Rd	92565	7841002	Low

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1695	024079	Kids 4 Fitness	30371 Dawnridge Ct	Menifee, CA 92584	7991001	Low
1696	024083	Sterdy Products	31668 Haute Ct	Winchester, CA 92596	5399004	Low
1697	024091	Core Prosthetics Lab, Inc	29723 New Hub Dr Ste A	Sun City, CA 92586	3842054	Low
1698	024106	Paintworx	25462 Pegasus Rd	Sun City, CA 92586	7299001	Low
1699	024110	R. Coles #1 Inspections	27753 Calle De Leon	Romoland, CA 92585	7389001	Low
1700	024111	Shear Envy Salon	23905 Clinton Keith Rd Ste. 1	Wildomar, CA 92595	7231004	Low
1701	024113	Joe Armstrong	25462 Pegasus Rd	Sun City, CA 92586	7299001	Low
1702	024124	Clean Mom Cleaning Service	33289 Baldwin Blvd	Lake Elsinore, CA 92530	7349007	Low
1703	024126	D & J Marketing & Sales L L C	58215 Bliss Rd	Anza, CA 92539	5941010	Low
1704	024130	Bitsy Birdie	35617 Loggins Court	Winchester, CA 92596	5961001	Low
1705	024131	Entertainment Sporting And Special	31961 Haleblian Rd	Menifee, CA 92584	7299001	Low
1706	024134	Redbox Automated, L L C	26100 Newport Rd B	Menifee, CA 92584	7841003	Low
1707	024152	# 1 Nails & Spa	32395 Clinton Keith Rd B7	Wildomar, CA 92595	7231009	Low
1708	024175	Out Heavens Window	36414 Pistachio Dr	Winchester, CA 92596	5961001	Low
1709	024176	Aby's Efficient Srevices	27025 Geary St	Sun City, CA 92585	7349008	Low
1710	024180	The Bag Man, Us	28914 Emerald Key Ct	Menifee, CA 92584	5961001	Low
1711	024181	Direct Response Medicine	31611 Poppy St	Winchester, CA 92596	4899001	Low
1712	024187	Ron And Jamie Yary Consulting	38886 Calle De Companero	Murrieta, CA 92562	7299001	Low
1713	024188	Team D Photography	27850 Blackhawk Rd	Sun City, CA 92585	7221008	Low
1714	024208	S N L Enterprizez	26151 Calvert Ave	Hemet, CA 92545	5961001	Low
1715	024217	Photography By Don	26123 Brandywine Dr	Sun City, CA 92586	7221005	Low
1716	024233	Second Chance Textile, L L C	29553 Naranja Dr	Quail Valley, CA 92587	5932005	Low
1717	024247	Innovative Audio	21540 Victorian Ln	Wildomar, CA 92595	5731001	Low
1718	024271	Green Belly Organics	25288 Red Fern Cir	Menifee, CA 92584	5961001	Low
1719	024280	My Little Gift Shop	28835 Long Rd	Nuevo, CA 92567	5961001	Low
1720	024319	Within Reach Computing	29164 Escalante Rd	Sun City, CA 92587	7378003	Low
1721	024337	Royal Waters	33450 Maple Tree Ln	Wildomar, CA 92595	5699001	Low
1722	024343	M Cotten Technologies	27978 Red Dawn Dr	Sun City, 92585	7379002	Low
1723	024350	Wonder Nails And Spa	36004 Hidden Springs Rd	Wildomar, CA 92595	7231006	Low
1724	024353	C.D. Jones, Notary Signing Agent	25068 Babbling Brook Circle	Menifee, CA 92584	7389074	Low
1725	024354	Envy Wake Boat Rentals L L C	27622 Watercrest Dr	Sun City, CA 92585	7999015	Low
1726	024367	Creative Design Solutions	28426 Champions Dr	Menifee, CA 92584	7389058	Low

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1727	024374	Airbrush By Darkman	28715 Mission Dr	Menifee, CA 92584	7336001	Low
1728	024375	Olsen Advertizing	36491 Yamas Dr #307	Wildomar, CA 92595	7311001	Low
1729	024382	McCormick Family Matters	38980 Lorrenzo Lane	Hemet, CA 92544	5961001	Low
1730	024383	Xoom P C	27127 Early Dawn Rd	Menifee, CA 92584	5961001	Low
1731	024390	Madco Inspections	49880 Watomi Court	Aguanga, CA 92536	7389001	Low
1732	024396	Body Comforts Therapeutic Massag	38607 Ruth Rd	Hemet, CA 92544	7299028	Low
1733	024400	Lizzie Accessories	18120 Tereticornis Ave	Lake Elsinore, CA 92532	5199023	Low
1734	024404	L & V Maintenance	22958 Via Santana	Nuevo, CA 92567	7349008	Low
1735	024415	John & Donna Scoggins	44853 Orpington Ave	Hemet, CA 92544	7299001	Low
1736	024419	Latara's Hair And Accessories	25069 Rhine St	Hemet, CA 92544	7231008	Low
1737	024421	J A T Accessories And More	25971 Emmanuel Ln	Hemet, CA 92544	5947001	Low
1738	024422	A J T Tax Services	25971 Emmanuel Ln	Hemet, CA 92544	7291001	Low
1739	024431	Zuniga's Transportation Services	27865 Patti Lane	Sun City, CA 92585	7389001	Low
1740	024438	Menifee Valley Chiropractic	26820 Cherry Hills Blvd Ste. 4	Sun City, CA 92586	8041002	Low
1741	024442	Mountain Goju Karate Center	58075 Horton Hills Rd	Anza, CA 92539	7999053	Low
1742	024459	Redbox Automated Retail, L L C	23893 Clinton Keith Rd	Wildomar, CA 92595	7841003	Low
1743	024460	Redbox Automated Retail, L L C	39050 Winchester Rd	Murrieta, CA 92563	7841003	Low
1744	024467	Ultra Clean Blinds	26835 Wildflower St	Menifee, CA 92584	7349015	Low
1745	024477	Ju Ju Bee's Embroidering	31111 Robertson St	Homeland, CA 92548	7389038	Low
1746	024480	Sauna Shack	56400 Hwy 371	Anza, CA 92539	7299035	Low
1747	024481	United Ornamental Supply	30911 Sherman Rd	Menifee, CA 92584	5199038	Low
1748	024491	Comfort 4 Home	26835 Wildflower St	Menifee, CA 92584	5961001	Low
1749	024496	C T Graffix Design Studio	29860 Morning Breeze Dr	Menifee, CA 92584	7336006	Low
1750	024500	Hirra's Fantasy	30830 Stern Dr	Menifee, CA 92584	5651002	Low
1751	024505	Evolutiontackle.Com	26933 Winter Harbor Ct	Sun City, CA 92585	5961001	Low
1752	024517	Take A Break	24871 Loire Ct	Hemet, CA 92544	7349008	Low
1753	024521	Mis Raizes/My Roots Printing Graph	26050 Wheat St	Sun City, CA 92585	7336006	Low
1754	024523	Smile Design Center	29955 Technology Dr Ste C-1	Murrieta, CA 92563	8021004	Low
1755	024529	Nise' Mya Unique Art	28531 Nevada Dr	Quail Valley, CA 92587	5999003	Low
1756	024541	The Corner Merchant	27592 Calle Haberio	Sun City, CA 92585	5961001	Low
1757	024565	Squid Ink Screen Printer	42890 Linda Via	Temecula, CA 92592	2759044	Low
1758	024574	Healing Touch	29950 Haun Rd #203	Menifee, CA 92584	7991010	Low

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1759	024579	Simply Fresh Cleaning Service	22475 Spur Brook Dr	Wildomar, CA 92595	7349007	Low
1760	024584	Aj's Pool Service	29040 Rocky Summit Dr	Quail Valley, CA 92587	7389114	Low
1761	024585	Sew Creations By Candy	21046 Cashew St	Wildomar, CA 92595	5131026	Low
1762	024589	David A Kaylor P E Inc	38935 Sugar Pine Way	Murrieta, CA 92563	5699001	Low
1763	024590	Best Buy Blinds &Shutters	32741 Starlight St	Wildomar, CA 92595	5714003	Low
1764	024614	Bella Sorella's Salon	32295 Clinton Keith Rd #102	Wildomar, CA 92595	7231008	Low
1765	024636	M.O.S. Video	16005 Grand Ave Ste. H	Lake Elsinore, CA 92530	7841003	Low
1766	024640	Selby's Helping Hands	33215 Taylor St	Winchester, CA 92596	8082001	Low
1767	024641	William Slade Hardee Jr. D.M.D. Inc	39252 Winchester Rd Suite 1	Murrieta, CA 92563	8021004	Low
1768	024645	Riverside Model Homes In Wildomar	36515 Hidden Springs Rd	Wildomar, CA 92595	5712008	Low
1769	024651	Pacific Sun	20895 1/2 Warren Rd	Perris, CA 92570	7349001	Low
1770	024661	Innovations Virtual Assistance	29584 Castlewood Dr	Menifee, CA 92584	7299001	Low
1771	024677	Global Response Trade	30909 Central Park Dr	Murrieta, CA 92563	5999001	Low
1772	024679	Sister Spokesmodel	32838 Virgo Way	Wildomar, CA 92595	7363007	Low
1773	024690	White's Discount Carpet	41421 E Florida Ave	Hemet, CA 92544	5713002	Low
1774	024709	Diamond Valley Home Services, L L	30250 Stephanie St	Hemet, CA 92543	7349001	Low
1775	024733	Powell Property Maintenance	42125 Chenopod Dr	Hemet, CA 92544	7349001	Low
1776	024741	Boomerang Kidz	31229 Boulder Ct	Murrieta, CA 92563	5651002	Low
1777	024752	Photography By Debra	34419 Hickory Ln	Wildomar, CA 92595	7335004	Low
1778	024766	Richards Respiratory Consulting	32725 Mira St	Menifee, CA 92584	7299001	Low
1779	024770	Dezineworks	41241 Via Anita	Temecula, CA 92592	7336001	Low
1780	024772	D & D Woodworks	31265 Wolfskill Ave	Nuevo, CA 92567	5945005	Low
1781	024773	Your Electronics Superstore	22933 Nan Street	Wildomar, CA 92595	5961001	Low
1782	024775	Rik-Rak & Ruffles	31945 Pony Cart Turn	Wildomar, CA 92595	5949010	Low
1783	024784	So Cal Verve	33045 Rose Quartz Circle	Menifee, CA 92584	5961001	Low
1784	024789	Muehter's Computers	31535 Contour Ave	Nuevo, CA 92567	7378003	Low
1785	024800	Allen And/Or Pamela Partch	39215 Via Las Sintras	Murrieta, CA 92562	5122024	Low
1786	024803	Going My Way Carpools	29859 Warm Sands Dr	Menifee, CA 92584	4729003	Low
1787	024823	Aussi Home & Ground Service	41800 Crest Dr	Hemet, CA 92544	7299001	Low
1788	024852	Penny Washington	92700 Bradley Rd	Menifee, CA 92586	7299028	Low
1789	024855	M M Registration Services	C29616 Nuevo Rd A-2	Nuevo, CA 92567	7389001	Low
1790	024869	Capture The Moment	36232 Corsica Cir	Winchester, CA 92596	5112002	Low

Table 1- 2007-08 Storm Season Industrial Commercial Target List Of Industries

1791	024873	L & M Home/Offices Cleaning Svs.	25915 Warwick Rd	Sun City, CA 92586	7349008	Low
1792	024876	Clear Vision Window Washing	32116 Old Country Ct	Winchester, CA 92596	7349016	Low
1793	024885	The Castle W C I , L L C	35250 Loma Ventoso Ln	Temecula, CA 92592	7011003	Low
1794	024898	Theodore Tuttle Permits	Not Available	Hemet, CA 92546	7389001	Low
1795	024905	Southwestern Transportation	27680 Camden Way	Sun City, CA 92381	4789001	Low
1796	024913	Quest International Language Servic	32368 Picasso Ct	Winchester, CA 92596	7389130	Low
1797	024922	Linda's Hairstyling	36068 Hidden Springs Rd #G	Wildomar, CA 92595	7231004	Low
1798	024927	Sylvia's Office Services	26755 China Dr	Sun City, CA 92585	7338007	Low
1799	024956	Holatours, L L C	41194 Mayberry Ave	Hemet, CA 92544	4724001	Low
1800	024957	Rain Or Shine	30435 Lacuns St	Murrieta, CA 92563	7699001	Low
1801	024973	D.N.A. Residential Clean-Up	43364 Marlene St	Hemet, CA 92544	7349001	Low
1802	024974	Henson Unlimited	30542 Covecrest Cir	Menifee, CA 92584	7349011	Low
1803	024982	Glass And Plastic Photography	24980 Cheyenne Circle	Wildomar, CA 92595	7299013	Low
1804	024992	Integrity Property Services	36600 Cheval Dr	Winchester, CA 92596	7699003	Low
1805	025008	Executive Massage Consultants	38311 De Portola Rd	Temecula, CA 92592	7299028	Low
1806	025013	Adrenaline Airsoft	35795 Glissant Dr	Winchester, CA 92596	5961001	Low
1807	025017	Bloomerz Flowers	33980-2 Mission Trail Rd Unit	Wildomar, CA 92595	5992003	Low
1808	025021	National Business Investigations, Inc	21535 Palomar St Ste # 1	Wildomar, CA 92595	7381011	Low
1809	025024	Amarand	19805 Tenaja Rd	Murrieta, CA 92562	5999003	Low
1810	025025	Wine Country Trails By Horseback, I	37342 Mesa Road	Temecula, CA 92592	7999001	Low
1811	025045	Denninger's 24 Handyman Service	22843 Kuka Circle	Wildomar, CA 92595	7349001	Low
1812	025052	Robert Kirk Olsen, Photographer	Not Available Online		7221002	Low
1813	025060	Spotless Professional House Cleanir	25650 Malaga Rd	Romoland, CA 92585	7349007	Low
1814	025069	24/7 R E O Field Services	29088 Foghorn Ct	Sun City, CA 92585	7299001	Low
1815	025078	M G Arts	22970 Timber Ridge Ct	Wildomar, CA 92595	7336006	Low
1816	025082	Southern California Gamers, L L C	24305 Prielipp Rd	Wildomar, CA 92595	7999008	Low
1817	025085	Executive Cleaning & Janitorial Serv	34 Villa Valtelena	Lake Elsinore, CA 92532	7349008	Low
1818	025091	Mobile Nail Services	32778 Kendal Court	Menifee, CA 92584	7231004	Low
1819	025116	Melissa Palomo Photography	33207 Pederson St	Lake Elsinore, CA 92530	7221002	Low
1820	025118	The Shirey Group	37695 Lanik Ln	Anza, CA 92539	7389001	Low
1821	025120	Hopes Chest Co	29363 Coral Island Ct	Romoland, CA 92585	5632002	Low
1822	025123	Mrs. D M A C Printing	33085 Evergreen St	Lake Elsinore, CA 92530	2741001	Low

Table 1- 2007-08 Storm Season Industrial Commercial Target List Of Industries

1823	025131	O'Keefe Jewelry & Gemstones	25680 Echo Valley Rd	Homeland, CA 92548	5944001	Low
1824	025140	Blue Ocean Pools	38340 Innovation Ct Ste 607	Murrieta, CA 92563	5999036	Low
1825	025144	Dalstarr Weddings & Events	29428 Pyrite St	Menifee, CA 92584	7299001	Low
1826	025153	Blessings Bridal	33689 Mill Pond Dr	Wildomar, CA 92595	5621002	Low
1827	025160	For Healthy Smile At You Service	35391 Date Palm St	Winchester, CA 92596	8021001	Low
1828	025161	Quality Ink 4 Less	35391 Date Palm St	Winchester, CA 92596	5999001	Low
1829	025164	Joy Jam Cor	36491 Yamas Dr	Wildomar, CA 92595	7349008	Low
1830	025171	Blanton Cleaning Service	26850 Columbia St	Hemet, CA 92544	7349008	Low
1831	025174	J. Francis Miley Photography	31696 Alder Ct	Winchester, CA 92596	7335001	Low
1832	025185	Racetech B M X	32115 Fern St	Winchester, CA 92596	5961001	Low
1833	025187	Health Plus Medical Group, Inc.	26900 Newport Rd #110	Menifee, CA 92584	8011001	Low
1834	025246	Singh Communications	28377 Clinton Keith Rd J1	Wildomar, CA 92595	5731001	Low
1835	025258	Singh Commications	30724 Benton Rd C306	Winchester, CA 92596	5731001	Low
1836	025259	Vida Of The Valley Home Health	35050 Slater Ave	Winchester, CA 92596	8082001	Low
1837	025282	A L A Beauty Salon	23200 Gunther Rd	Sun City, CA 92585	7231004	Low

Environmental Health Inspection Log Food Program

2007-2008 EH Food Facility Inspections

RECORD_ID	DBA	Site Address	CITY	ACTIVITY_DATE	Watershed
	SANTA ANA WATERSHED				
PR0003512	BAKER'S BURGERS	529 BEAUMONT AVE	BEAUMONT	8/15/07	1
PR0017927	BEAUMONT PURIFIED WATER STORE	750 BEAUMONT AVE	Beaumont	8/7/07	1
PR0035492	Dollar Tree	1486 E 2nd ST	Beaumont	10/19/07	1
PR0035621	El Pollo Loco	1496 E 2nd ST	Beaumont	10/19/07	1
PR0035805	Popeye's Chicken	501 N 5th ST	Beaumont	11/19/07	1
PR0018249	Rite Aid #6529	895 Oak Valley	Beaumont	10/29/07	1
PR0009365	SUBWAY #38185	1540 E 2ND ST	BEAUMONT	10/11/07	1
PR0004439	DUARTE FUEL	501 HIGHLAND SPRINGS AVE	BEAUMONT	2/20/08	1
PR0036258	Holiday Inn Express Hotel	1864 Oak Valley Village Cir	Beaumont	1/31/08	1
PR0035517	Pitaya's Mexican Grill	986 Beaumont AVE	Beaumont	1/31/08	1
PR0036610	Seven Days Market	1111 Beaumont Ave	Beaumont	3/24/08	1
PR0036250	Toluca's Mexican Food	892 Oak Valley Pkwy Ste E	Beaumont	2/7/08	1
PR0009669	APPLEBEE'S	1585 E 6TH ST	BEAUMONT	4/29/08	1
PR0002678	BURGER KING #9912	1695 E 6TH ST	BEAUMONT	5/14/08	1
PR0036293	East Valley F & B Inc	36211 Champions Dr	Beaumont	6/27/08	1
PR0037428	Maya Market Produce	1150 E Sixth St	Beaumont	5/12/08	1
PR0037213	Moondog Family Restaurant	174 Beaumont Ave	Beaumont	4/21/08	1
PR0037088	Plaza Liquor Market	727 Beaumont Ave	Beaumont	4/8/08	1
PR0009214	EAT ON TIME, INC	1007 CALIMESA BLVD H	CALIMESA	7/16/07	1
PR0018210	THE DONUT HOUSE	1129 CALIMESA BLVD	Calimesa	9/7/07	1
PR0035628	Calimesa Inn Motel	1205 Calimesa Blvd	Calimesa	10/3/07	1
PR0007789	S & N LIQUOR	526 MYRTLEWOOD DR	CALIMESA	10/17/07	1
PR0036157	Thai Chili	1009 Calimesa Blvd A	Calimesa	12/5/07	1
PR0037720	West Coast Whoopies & Cupcakes	1007 Calimesa Blvd # H	Calimesa	6/18/08	1
PR0006924	CANYON LAKE RESTAURANT & LODGE FAC	31512 RAILROAD CANYON RD	CANYON LAKE	6/5/08	1
PR0035725	H2O TO GO +	10366 BEAUMONT AVE	Cherry Valley	11/5/07	1
PR0017987	Crown Deli	505 S Corona Mall 3	Corona	7/31/07	1
PR0018166	Sweet Bob's Bar-b-Que	718 N Main ST	Corona	9/4/07	1
PR0036289	Goodfellas Cafe	1090 Pomona Rd	Corona	12/18/07	1
PR0036289	Goodfellas Cafe	1090 Pomona Rd	Corona	12/18/07	1
PR0036187	Home Depot #601	490 McKinley St	Corona	11/29/07	1
PR0036247	Millcreek	103 N Lincoln Ave	Corona	12/18/07	1
PR0036247	Millcreek	103 N Lincoln Ave	Corona	12/18/07	1
PR0002097	MIQUEL JR. WEST END	1570 W 6TH ST	CORONA	12/26/07	1
PR0036047	See's Candies	2690 Tuscany St 108	Corona	11/21/07	1
PR0036104	Taps	2745 Lakeshore Dr	Corona	12/4/07	1
PR0002057	TAQUERIAS GUADALAJARA	1353 W 6TH ST	CORONA	12/14/07	1
PR0002057	TAQUERIAS GUADALAJARA	1353 W 6TH ST	CORONA	12/17/07	1
PR0018155	THE RETREAT COUNTRY CLUB	8007 SOFTWINDS DR	Corona	10/2/07	1

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PR0036076	Trader Joe's	2790 Cabot Dr	Corona	11/21/07		1
PR0036588	Aloha Hawaiian BBQ	2150 California Ave 104	Corona		2/20/08	1
PR0036434	Blackwood American Grill	980 Montecito Dr	Corona		2/5/08	1
PR0037079	Charo Chicken	140 W Ontario 104	Corona		3/5/08	1
PR0036473	Citrus City Grille	2765 Lakeshore Dr	Corona		1/18/08	1
PR0036713	Golden China	1185 Magnolia Ave #G	Corona		2/27/08	1
PR0036472	Hana Teriyaki	1191 Magnolia Ave Ste E	Corona		2/26/08	1
PR0036587	It's a Grind Coffeehouse	3833 Bedford Canyon Rd 103	Corona		3/18/08	1
PR0018220	Kabob Hutt	165 Washburn	Corona		3/11/08	1
PR0036890	La Torta Del Mediodia	219 E 3rd St	Corona		3/12/08	1
PR0036718	Marui Sushi	2347 California Ave #101	Corona		3/11/08	1
PR0036094	South HIlls Community Church	2585 S Main St	Corona		1/16/08	1
PR0036477	Squeeze	469 Magnolia Ave #105	Corona		2/15/08	1
PR0036877	The Flamebroiler	440 River Rd H	Corona		3/17/08	1
PR0037410	Abundia's Producto	488 N Main St C-18	Corona		4/28/08	1
PR0037821	Corona Fresh Produce	408 S Main St	Corona		5/29/08	1
PR0037289	Cresta Verde Golf Course	1295 Cresta Rd	Corona		4/21/08	1
PR0036145	European Personal Chef	480 N Main St	Corona		4/29/08	1
PR0036993	Giorgio's Pizza	341 S Lincoln Ste E	Corona		4/3/08	1
PR0037048	Ochoa's Carniceria	508 S Smith Ave A108	Corona		4/16/08	1
PR0036803	The Counter	2785 Cabot Dr 110A	Corona		4/2/08	1
PR0010406	MIMIS CAFE	1778 W FLORIDA AVE	HEMET		8/14/07	1
PR0035622	Eddible Arrangements #732	2887 W Florida AVE	Hemet	11/15/07		1
PR0035698	Fresh & Easy	1709 W Florida AVE	Hemet	11/8/07		1
PR0035696	Ganooz Grinders	3221 W Florida AVE	Hemet	11/15/07		1
PR0035822	GREEK BOYS BURGERS	1031 W FLORIDA AVE	Hemet	11/9/07		1
PR0018349	PLAZA LIQUOR III	3364 WENTWORTH DR	Hemet	10/11/07		1
PR0035564	Red Brick Pizza	2569 W Florida AVE	Hemet	10/2/07		1
PR0005454	TACOS DON JOSE	301 E FLORIDA AVE D	HEMET	11/19/07		1
PR0035620	Yoko Bowl	2232 W Florida AVE	Hemet	12/10/07		1
PR0004854	7-ELEVEN #33571	104 N SAN JACINTO ST	HEMET		2/5/08	1
PR0036252	Dollar Mart	537 N San Jacinto St	Hemet		1/11/08	1
PR0004127	FRANKLIN'S LIQUOR	571 N SAN JACINTO ST	HEMET		2/11/08	1
PR0036720	Las Morelianas	1287 E Florida Ave	Hemet		3/24/08	1
PR0004974	LITTLE CAESAR'S PIZZA #5855	1336 E FLORIDA AVE	HEMET		2/5/08	1
PR0037214	El Tapatio	1027 W Florida Ave	Hemet		5/1/08	1
PR0036767	Las Bonitas	124 S Harvard St	Hemet		5/29/08	1
PR0036666	Philly on the Run	137 N Harvard St	Hemet		4/10/08	1
PR0037083	Valley Farmer's Market	2537 S San Jacinto Ave	Hemet		5/2/08	1
PR0036874	Casa Jimenez	31199 Hwy 74	Homeland		6/4/08	1
PR0017934	PAPA JOHN'S PIZZA	18285 COLLIER AVE H	Lake Elsinore		7/25/07	1

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PR0018135	The Breakfast Club	19980 Grand AVE M	Lake Elsinore		9/11/07	1
PR0010401	TREVI ENTERTAINMENT CENTER	32250 MISSION TRL	LAKE ELSINORE		7/24/07	1
PR0035606	4-Kids Nutritional Center	31861 Riverside Dr D	Lake Elsinore	10/16/07		1
PR0035653	Casa J's Mexican Grill	31715 Mission Trail	Lake Elsinore	10/25/07		1
PR0035762	Flour Fusion	133 N Main ST	Lake Elsinore	11/29/07		1
PR0035809	IHOP	18248 COLLIER AVE	Lake Elsinore	11/7/07		1
PR0035648	Maui Wowi Hawaiian	17600 Collier AVE 147C	Lake Elsinore	10/16/07		1
PR0018347	THE LINKS AT SUMMERLY	29381 VILLAGE PKWY	Lake Elsinore	10/15/07		1
PR0035699	The Rolling Stop	15883 Grand AVE	Lake Elsinore	10/16/07		1
PR0035807	CIRCLE K SHELL ELIAS KHAWAM	31587 CANYON ESTATES	Lake Elsinore		1/2/08	1
PR0036481	Papa John's Pizza	120 E Ramona Expressway #D	Lake Elsinore		2/19/08	1
PR0004713	7-11 FOOD, INC. #27155"D"	257 RAILROAD CANYON RD	LAKE ELSINORE		6/2/08	1
PR0010389	ARCHIBALD'S	29285 CENTRAL AVE	LAKE ELSINORE		6/9/08	1
PR0009300	CHILI'S #1189	29233 CENTRAL	LAKE ELSINORE		6/2/08	1
PR0009872	DEL TACO #1020	29245 CENTRAL AVE	LAKE ELSINORE		6/5/08	1
PR0005182	DEL TACO #238	16810 LAKESHORE DR	LAKE ELSINORE		6/9/08	1
PR0005053	DONUT STAR	16738 LAKESHORE DR	LAKE ELSINORE		6/17/08	1
PR0005022	EL RANCHITO TACO SHOP	32251 MISSION TRL	LAKE ELSINORE		6/4/08	1
PR0008905	EL REMO TACOS & TORTAS	16776 LAKESHORE DR B	LAKE ELSINORE		6/4/08	1
PR0009514	FARMER BOYS	18288 COLLIER AVE	LAKE ELSINORE		6/18/08	1
PR0010195	GOLDEN CHOPSTIX	18285 COLLIER AVE # M	LAKE ELSINORE		6/10/08	1
PR0005026	IN-N-OUT BURGER #54	330 RAILROAD CANYON RD	LAKE ELSINORE		6/10/08	1
PR0004237	LAKE ELSINORE MARKET	15887 GRAND AVE	LAKE ELSINORE		5/28/08	1
PR0007530	LAKE ELSINORE MARKET - DELI	15887 GRAND AVE	LAKE ELSINORE		5/28/08	1
PR0005659	LATTE EXPRESS	351 RAILROAD CANYON RD B	LAKE ELSINORE		6/11/08	1
PR0004539	LITTLE CAESAR'S PIZZA	31703 RIVERSIDE DR	LAKE ELSINORE		6/26/08	1
PR0004486	MCDONALD'S	31650 MISSION TRL	LAKE ELSINORE		6/11/08	1
PR0036241	McDonalds Restaurant	18283 Collier Ave	Lake Elsinore		6/10/08	1
PR0009203	PANDA EXPRESS	29555 CENTRAL AVE	LAKE ELSINORE		6/10/08	1
PR0009161	REBECCA'S FOODS	500 CHANEY ST B	LAKE ELSINORE		5/28/08	1
PR0008610	RUDY'S TACOS	16331 LAKESHORE DR H	LAKE ELSINORE		6/4/08	1
PR0005337	S.S. BURGER BASKET	16820 LAKESHORE DR	LAKE ELSINORE		6/24/08	1
PR0007811	STARBUCKS #6675	31800 GRAPE ST A	LAKE ELSINORE		6/19/08	1
PR0010426	TACONES FLAVOR GRILL	17600 COLLIER AVE 147A	LAKE ELSINORE		6/4/08	1
PR0005129	TAQUERIA NAYARIT	31735 RIVERSIDE DR D	LAKE ELSINORE		6/2/08	1
PR0035699	The Rolling Stop	15883 Grand AVE	Lake Elsinore		5/28/08	1
PR0035635	VINEYARD CHRISTIAN FELLOWSHIP	17470 GRAND AVE	Lake Elsinore		5/24/08	1
PR0008640	WETZEL'S PRETZELS	17600 COLLIER AVE 182A	LAKE ELSINORE		6/2/08	1
PR0018134	Carino's Italian Grill	12447 Limonite AVE	Mira Loma		8/14/07	1
PR0013629	SPORT CHALET	12399 LIMONITE	MIRA LOMA		8/8/07	1
PR0035605	Carl's Jr	6221 Pats Ranch RD	Mira Loma	10/9/07		1

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PR0036203	Del Taco #1045	6269 Pats Ranch Rd	Mira Loma	12/12/07		1
PR0036177	Edwards 14 Eastvale	12285 Limonite Ave	Mira Loma	12/20/07		1
PR0036270	On The Border	12269 Limonite Ave	Mira Loma		1/8/08	1
PR0008395	$1 DOLLAR PLUS STORE	24459 SUNNYMEAD BLVD	MORENO VALLEY		8/16/07	1
PR0035491	Alberto's Mexican Food	24840 Sunnymead BLVD	Moreno Valley		9/19/07	1
PR0017988	Canton Chinese	12625 Frederick ST I7	Moreno Valley		8/14/07	1
PR0018189	La Fuente #5	23960 Ironwood AVE A	Moreno Valley		8/23/07	1
PR0018054	La Rosa Bakery #3	24467 Sunnymead BLVD	Moreno Valley		8/16/07	1
PR0018023	Regency Theatres	12625 Frederick ST	Moreno Valley		8/21/07	1
PR0018223	Tacos La Bufadora	244939 Sunnymead BLVD	Moreno Valley		8/16/07	1
PR0035524	Classy B's Market & Liquor	23750 Alessandro BLVD Q101	Moreno Valley	10/2/07		1
PR0035702	DALIA'S PIZZA #23	24100 ALESSANDRO BLVD STE C2	Moreno Valley	10/26/07		1
PR0035895	DONUT STOP	14420 ELSWORTH ST 119	Moreno Valley	11/15/07		1
PR0035639	Jack in the Box #5394	27030 Fir AVE	Moreno Valley	11/6/07		1
PR0036110	Jamba Juice	27130 Eucalyptus Ave B	Moreno Valley	12/17/07		1
PR0018370	MOTHERS NUTRITIONAL CENTER	23591 SUNNYMEAD BLVD C	Moreno Valley	10/12/07		1
PR0018022	OISHII SUSHI	23581 SUNNYMEAD RANCH PKWY	Moreno Valley	12/6/07		1
PR0018340	QUICK STOP SUBS	14420 ELSWORTH ST 117	Moreno Valley	10/12/07		1
PR0036042	Round Table Pizza	27140 Ecucalyptus Ave A	Moreno Valley	12/17/07		1
PR0036405	Agua Pura	25155 Sunnymead Blvd	Moreno Valley		2/5/08	1
PR0036221	Bravo Burgers	21635 Eucalyptus Ave	Moreno Valley		2/4/08	1
PR0006521	BURGER TOWN USA	23260 SUNNYMEAD BLVD	MORENO VALLEY		3/31/08	1
PR0036736	Cardenas	14930 Perris Blvd	Moreno Valley		3/24/08	1
PR0036005	Centenario	24175 Hemlock Ave	Moreno Valley		1/9/08	1
PR0036285	Chili's Grill & Bar	27050 Fir Ave	Moreno Valley		2/20/08	1
PR0036371	Coldstone Creamery	12625 Fredrick St I 829	Moreno Valley		2/19/08	1
PR0036193	Daystreet Market	12125 Day St F	Moreno Valley		2/20/08	1
PR0036176	Discovery Christian Church	27555 Alessandro Blvd	Moreno Valley		1/23/08	1
PR0036480	Family Fish Market	13373 Perris Blvd #E414	Moreno Valley		3/5/08	1
PR0036236	Fastrip Food Store	23991 Sunnymead Blvd	Moreno Valley		1/4/08	1
PR0036237	H2 Gelato	24905 Sunnymead Blvd Ste C	Moreno Valley		1/29/08	1
PR0036942	Hoggs Gourmet Grill	12625 Frederick St E9	Moreno Valley		3/24/08	1
PR0036231	Kimbertos Mexican Food	24840 Sunnymead Blvd	Moreno Valley		1/17/08	1
PR0036183	Los Equipales Mexican Grill	23750 Alessandro Blvd 103	Moreno Valley		2/6/08	1
PR0018031	Panda Express	12610 Day ST	Moreno Valley		2/4/08	1
PR0035820	Peppers Lounge Sports Bar	12125 Day ST Ste 301	Moreno Valley		3/14/08	1
PR0036465	Quizno's #11109	22420 Cactus Ave	Moreno Valley		2/21/08	1
PR0036810	See's Candies	27120 Eucalyptus Ave Ste C	Moreno Valley		3/28/08	1
PR0035787	Starbucks	27110 Eucalyptus AVE	Moreno Valley		1/2/08	1
PR0036648	Subway Sandwiches #38258	27110 Eucalyptus Ave E	Moreno Valley		3/4/08	1
PR0036194	Sweet Bob's Bar-b-que	23639 Sunnymead Blvd	Moreno Valley		1/7/08	1

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PR0036107	Tierra Caliente	25211 Sunnymead Blvd	Moreno Valley		1/25/08	1
PR0036123	Veronica's Place	24170 Sunnymead Blvd	Moreno Valley		1/17/08	1
PR0036724	Zen Chinese Kitchen	27170 Eucalyptus Ave Ste E	Moreno Valley		3/5/08	1
PR0036521	Alessandro School	23301 Dracaea Ave	Moreno Valley		5/9/08	1
PR0037355	Asian Imports Market	22920 Alessandro Blvd D & E	Moreno Valley		4/14/08	1
PR0037220	Best Thai Cuisine	25155 Sunnymead Blvd GB	Moreno Valley		6/10/08	1
PR0036592	Best Western Moreno Hotel & Suites	24840 Elder Ave	Moreno Valley		4/16/08	1
PR0036944	Caliente Restaurant Bar & Grill	23040 Alessandro Blvd	Moreno Valley		4/21/08	1
PR0037740	California Baguette	12125 Day St H302	Moreno Valley		6/9/08	1
PR0037334	Circuit City	12530 Day St	Moreno Valley		4/10/08	1
PR0038006	Fresh Wave Frozen Yogurt	12625 Frederick St #E7	Moreno Valley		6/19/08	1
PR0005298	HENDRICK RANCH ELEMENTARY SCHOOL	25570 BRODIAEA AVE	MORENO VALLEY		4/25/08	1
PR0037472	Howie's Game Shack	22500 Town Circle #2126	Moreno Valley		4/23/08	1
PR0036823	Joe's Italian Restaurant	22308 Alessandro Blvd	Moreno Valley		4/28/08	1
PR0037716	Joker Tacos	22574 Alessandro Blvd	Moreno Valley		5/23/08	1
PR0037804	La Buena Market	21942 Alessandro Blvd	Moreno Valley		5/23/08	1
PR0037126	Like In Italy	12625 Frederick St k4	Moreno Valley		5/19/08	1
PR0037855	Lowe's	12400 Day St	Moreno Valley		6/12/08	1
PR0037732	Max' Burger	23260 Sunnymead Blvd	Moreno Valley		6/20/08	1
PR0003068	MORENO ELEMENTARY SCHOOL	26700 COTTONWOOD AVE	MORENO VALLEY		4/25/08	1
PR0037835	Tacos Don Juilo	12125 Day St K409	Moreno Valley		6/12/08	1
PR0037661	Taqueria La Paz	22920 Alessandro Blvd # A	Moreno Valley		5/19/08	1
PR0037594	Tijuana's Tacos	24578 Sunnymead Blvd #F	Moreno Valley		6/9/08	1
PR0037193	Tropicana Juices	12125 Day St V213	Moreno Valley		4/14/08	1
PR0010338	BOB'S MURRIETA PIZZA CO	41539 KALMIA ST 109	MURRIETA		7/23/07	1
PR0018136	Hana Shushi	40940 California Oaks B	Murrieta		9/12/07	1
PR0018330	BOOSTER JUICE	3699 HAMNER AVE E	Norco		9/4/07	1
PR0005880	COWGIRL CAFE - NORCO	2859 HAMNER AVE	NORCO		9/7/07	1
PR0018332	LITTLE BIT OF CUBA	3699 HAMNER AVE F	Norco		9/4/07	1
PR0018167	Saul's Kitchen	2822 Hamner AVE	Norco		8/21/07	1
PR0036095	Bradley's LLC	1161 Hidden Valley Pkwy 112	Norco	11/29/07		1
PR0035607	Hickory Joe's Smokehouse BBQ	120 Hidden Valley STE D	Norco	11/26/07		1
PR0037570	Bada Bing Pizza	960 Sixth St #105A	Norco		5/22/08	1
PR0038002	Black Horse Tavern	1825 Hamner Ave Sp # A-E	Norco		6/27/08	1
PR0037554	Christa's Sandwichboard &	996 Mountain Ave	Norco		5/15/08	1
PR0036978	Pizza Time	3719 Hamner Ave	Norco		4/28/08	1
PR0036665	Carnitas Uruapan	80705 Hwy 86	Oasis		3/11/08	1
PR0018077	C & P Hawaiian BBQ	2560 N Perris BLVD F10	Perris	10/23/07		1
PR0035945	WIN CO FOODS #62	3150 N CASE RD	Perris	11/21/07		1
PR0036225	Carls Jr #692	3150 Case Rd	Perris		1/2/08	1
PR0037006	Juanita's Mexican Food	19248 Harvill Ave C	Perris		2/25/08	1

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PR0036329	Las Islas Marias	502 S D St	Perris		2/4/08	1
PR0035709	SCHULER SANDWICH & CATERING	3404 INDIAN	Perris		1/10/08	1
PR0036368	Starbucks	3150 Case Rd	Perris		3/17/08	1
PR0036496	Starbucks Coffee	120 E Ramona Expressway A	Perris		2/19/08	1
PR0036772	Subway #35882	3150 Case Rd H-3	Perris		3/17/08	1
PR0036771	Arco Travel Zone Center	23261 Cajalco Expressway	Perris		4/23/08	1
PR0037496	El Platano Macho	391 Wilkerson Ave Ste C	Perris		4/30/08	1
PR0037424	La Fiesta Restaurant	403 S D St	Perris		5/6/08	1
PR0037163	Los Primos	3150 Case Rd H2	Perris		4/9/08	1
PR0037085	Ono Hawaiian BBQ	3150 Case Rd 4	Perris		4/17/08	1
PR0002383	CHRISTY'S DONUTS	8151 ARLINGTON AVE M	RIVERSIDE		8/22/07	1
PR0006362	CINEMA STAR 14	121 ALESSANDRO BLVD	RIVERSIDE		7/19/07	1
PR0017933	DRAGONFLY PIZZA	3375 IOWA AVE H	Riverside		7/24/07	1
PR0009845	DREAM DINNERS ARLINGTON	7001 INDIANA AVE STE 1	RIVERSIDE		8/6/07	1
PR0018093	El Michoacano	5700 Van Buren BLVD	Riverside		9/17/07	1
PR0018310	FATBURGER RIVERSIDE	1223 UNIVERSITY AVE 120	Riverside		9/24/07	1
PR0018356	GOLDEN SPOON FROZEN YOGURT	19348 VAN BUREN BLVD 104	Riverside		9/17/07	1
PR0018033	Inland Fastrip	10306 Arlington AVE	Riverside		7/25/07	1
PR0018351	JOJOS DONUTS	4812 TYLER ST	Riverside		9/20/07	1
PR0008701	JUICE IT UP	3540 RIVERSIDE PLAZA DR	RIVERSIDE		8/13/07	1
PR0017978	La Mexicana Market	3123 Madison ST	Riverside		8/6/07	1
PR0018221	Lake Hills Elementary School	16346 Village Meadow DR	Riverside		9/25/07	1
PR0018118	McDonalds	8875 Limonite AVE	Riverside		9/27/07	1
PR0018007	Mission Square Cafe	3750 University AVE M	Riverside		8/29/07	1
PR0005546	N & W ANTONIOUS PIZZA #8	195 ALESSANDRO BLVD	RIVERSIDE		8/13/07	1
PR0005993	OISHII SUSHI	6133 MAGNOLIA AVE	RIVERSIDE		7/23/07	1
PR0008446	ONO HAWAIIAN BBQ	2721 CANYON SPRINGS PKWY 101	RIVERSIDE		9/25/07	1
PR0010437	PIER 1 IMPORTS	2800 CAMPUS PKWY 101	RIVERSIDE		7/19/07	1
PR0003233	PRETZELMAKER	2271 GALLERIA TYLER	RIVERSIDE		7/30/07	1
PR0009956	RIVERSIDE MEDICAL CLINIC MAIN PLACE C	7117 BROCKTON AVE	RIVERSIDE		7/5/07	1
PR0002957	ROYAL ORCHID THAI RESTAURANT	1450 UNIVERSITY AVE	RIVERSIDE		7/9/07	1
PR0018105	Subway #40328	1280 W Blaine ST B	Riverside		8/17/07	1
PR0018106	The Wok Experience	6390 Van Buren BLVD 101	Riverside		9/17/07	1
PR0018043	Tony's Eatery & Melody Bar	3812 Pierce ST N	Riverside		8/9/07	1
PR0005824	USA GAS #241	3950 TYLER ST	RIVERSIDE		7/10/07	1
PR0018067	We Olive	3639 Riverside Plaza DR 502	Riverside		9/24/07	1
PR0035767	ALBERTOS MEXICAN FOOD	9111 MAGNOLIA AVE	Riverside	12/11/07		1
PR0035927	BAP ZIP	1201 UNIVERSITY AVE 110B	Riverside	11/15/07		1
PR0018052	Baskin Robbins	7024 Magnolia AVE	Riverside	11/28/07		1
PR0035642	Carlos OBriens Restaurant & Cantina	10102 Indiana AVE	Riverside	10/31/07		1
PR0002740	CENTER LIQUOR	285 IOWA AVE	RIVERSIDE	11/6/07		1

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PR0035705	Chicka-Fil-A	2885 Canyon Springs PKWY	Riverside	10/23/07		1
PR0002404	EL MORO DE CUMPAS	10323 CYPRESS AVE	RIVERSIDE	10/16/07		1
PR0036010	John's Incredible Pizza Company	6187 Valley Springs Pkwy	Riverside	12/4/07		1
PR0017958	La Cascada	3635 University AVE	Riverside	11/19/07		1
PR0035688	La Michoancana Market	4110 Victoria AVE	Riverside	10/11/07		1
PR0018034	Lounge Thirty Three	3639 Riverside Plaza DR 530	Riverside	10/3/07		1
PR0018100	Mediterannian Palace Grill & Cafe	1223 Universi VE 140	Riverside	10/1/07		1
PR0018119	Mothers Nutritional Center	2308 University AVE	Riverside	10/18/07		1
PR0035556	Mothers Nutritional Center	6115 Van Buren BLVD	Riverside	10/23/07		1
PR0002594	MR. TACO III	4111 MAIN ST	RIVERSIDE	11/26/07		1
PR0035926	RIVERSIDE CHRISTIAN MIDDLE SCHOOL	8223 CALIFORNIA AVE	Riverside	12/6/07		1
PR0018362	STOKOE ELEMENTARY SCHOOL	4501 AMBS DR	Riverside	10/10/07		1
PR0018361	STOKOE ELEMENTARY SCHOOL	4501 AMBS DR	Riverside	10/29/07		1
PR0018114	The Outlaw Cafe	3607 10th ST	Riverside	12/5/07		1
PR0036043	The Pita Pit	3740 Iowa Ave 103	Riverside	12/4/07		1
PR0018344	U.S. DONUT	4786 LA SIERRA AVE	Riverside	11/8/07		1
PR0036287	AMC Tyler 16	3775 Tyler Ave SP 2-B	Riverside		1/8/08	1
PR0036103	Aztecas Mexican Cuisine	2002 Iowa Ave 105	Riverside		3/13/08	1
PR0036433	Boys Burgers #3	10737 Magnolia Ave	Riverside		2/4/08	1
PR0036484	Choice Burgers	10947 Magnolia Ave	Riverside		2/4/08	1
PR0036068	Christos Best Burgers	3812 Pierce St	Riverside		1/24/08	1
PR0017946	CP's Place	1355 E Alessandro BLVD 101	Riverside		() 2/26/08	1
PR0035898	Cuban Cafe	5180 Arlington AVE	Riverside		1/31/08	1
PR0036304	D'Tomato's Pizza Cafe	4250 Van Buren Blvd	Riverside		1/25/08	1
PR0036596	El Toro Market	10775 Hole Ave	Riverside		2/22/08	1
PR0036286	Elephant Bar Restaurants	3775 Tyler St	Riverside		1/24/08	1
PR0036759	Fresh & Easy #1057	8765 Trautwein Rd	Riverside		3/4/08	1
PR0036705	Galerie De Fleurs	3660 Mission Inn Ave	Riverside		3/20/08	1
PR0036212	George the Greek	10020 Arlington Ave	Riverside		1/3/08	1
PR0036044	Golden Chopstix	2712 Canyon Springs Pkwy A3	Riverside		1/9/08	1
PR0036419	Goodwin's Organic Foods & Drinks	191 W Big Springs Rd	Riverside		2/4/08	1
PR0035952	Granzianos Pizza Italian Restaurant	9185 Jurupa RD	Riverside		[] 2/21/08	1
PR0036363	Hawthorne Elementary School	2700 Irving Ave	Riverside		[] 2/6/08	1
PR0018363	HOOTERS OF MORENO VALLEY	6225 VALLEY SPRINGS PKWY 17	Riverside		1/8/08	1
PR0036222	Jason's Deli	2555 Canyon Springs Pkwy	Riverside		1/9/08	1
PR0036582	Jazz-n-Java	497 E Alessandro Blvd A	Riverside		() 2/21/08	1
PR0035914	JOANN FABRIC & CRAFT STORES #1156	3570 ADAMS ST	Riverside		[] 2/15/08	1
PR0036283	Joey's Brooklyn Bagelry	8304 Limonite Ave Ste A	Riverside		3/4/08	1
PR0035880	Joey's Seafood & Grill	2585 Canyon Springs PKWY	Riverside		1/9/08	1
PR0036551	L & L Hawaiian Barbecue	2585 Canyon Springs Pkwy E	Riverside		3/18/08	1
PR0036505	Life Cafe	1242 University Ave 5	Riverside		2/15/08	1

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PR0036544	Little Caesars Pizza #5936	19069 Van Buren Blvd 101	Riverside	3/26/08	1
PR0036370	Los Oskars Mexican Restaurant	765 W Blaine St	Riverside	2/7/08	1
PR0036364	Middle Eastern Bakery	10120 Indiana Ave	Riverside	3/7/08	1
PR0036136	Mirage Cafe	10330 Hole Ave	Riverside	3/11/08	1
PR0036719	Mongolian Grill	2269 Galleria @ Tyler	Riverside	3/4/08	1
PR0007916	MR CHINA EXPRESS	6160 ARLINGTON AVE C-12	RIVERSIDE	1/16/08	1
PR0036695	Panda Express	11090 Magnolia Ave	Riverside	3/4/08	1
PR0035878	Papi's Tacos Al Carbon	11860 Magnolia AVE	Riverside	1/3/08	1
PR0035858	Patricia Beatty School	4261 Latham AVE	Riverside	1/10/08	1
PR0002287	PHO VIN	10051 MAGNOLIA AVE # B1	RIVERSIDE	1/16/08	1
PR0018000	Phood on Main	3700 Main ST	Riverside	1/17/08	1
PR0036612	Pineapple Joes	195 E Alessandro Blvd	Riverside	2/29/08	1
PR0036685	Popeyes Chicken	9825 Magnolia Ave	Riverside	2/15/08	1
PR0036686	Popeyes Chicken	6390 Van Buren Blvd 100	Riverside	1/31/08	1
PR0036015	Ramiro's Cocina Mexicana	9418 Magnolia Ave	Riverside	1/3/08	1
PR0036825	Rubio's Fresh Mexican Grill	2694 Canyon Springs Pkwy	Riverside	3/26/08	1
PR0036135	Smoky Canyon BBQ	5225 Canyon Crest Dr 9	Riverside	1/14/08	1
PR0036332	Subway #38686	5236 Arlington Ave	Riverside	2/11/08	1
PR0036284	Subway Sandwiches	1242 University Ave Ste 13	Riverside	1/8/08	1
PR0003883	SUBWAY SANDWICHES & SALADS #11289	195 ALESSANDRO BLVD	RIVERSIDE	1/28/08	1
PR0018121	Tin Lizzy's Cookie Cafe	4620 Pine ST	Riverside	2/6/08	1
PR0036559	Water Retail	767 W Blaine St #D	Riverside	3/24/08	1
PR0036561	Wienerschnitzel	18641 Van Buren Blvd	Riverside	3/26/08	1
PR0036259	Yard House Riverside	3775 Tyler St 2A	Riverside	2/5/08	1
PR0017919	YO MAMAS SOUL FOOD CATERING	4020 JEFFERSON ST	Riverside	[] 1/28/08	1
PR0037219	76 Gas Station	4890 Van Buren Blvd	Riverside	4/4/08	1
PR0037841	American Donuts #6	3355 Iowa Ave	Riverside	5/29/08	1
PR0037509	Arco Nuts & Candy LLC	11750 Sterling Ave #B	Riverside	4/28/08	1
PR0037817	Arlington Arco	8970 Arlington Ave	Riverside	6/9/08	1
PR0037380	Berrysweet Riverside	3740 Iowa Ave #108	Riverside	5/23/08	1
PR0038034	Bobo Thai Restaurant	6736 Brockton Ave	Riverside	6/19/08	1
PR0037105	Bueno Burrito/Pizza Perfecto	2646 E Alessandro Blvd	Riverside	[] 5/28/08	1
PR0036399	Canyon Springs Shell	6189 Day St	Riverside	[] 5/7/08	1
PR0002589	CENTRAL SHELL	3498 CENTRAL AVE	RIVERSIDE	5/12/08	1
PR0006983	CHINA STAR SUPER BUFFET	11066 MAGNOLIA AVE	RIVERSIDE	6/25/08	1
PR0036934	Ciavaglia's Gourmet To Go	19530 Van Buren Blvd G5	Riverside	4/11/08	1
PR0036950	City Cuisine Taste	2586 Main St	Riverside	4/3/08	1
PR0037007	Cold Stone Creamery	3243 Arlington Ave	Riverside	4/8/08	1
PR0037232	Frankies Restaurant	7700 Limonite Ave	Riverside	4/30/08	1
PR0037741	Frucci RS	1242 University Ave #4	Riverside	6/3/08	1
PR0037360	Fruyu	3312 La Sierra Ste 103	Riverside	4/23/08	1

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PR0037446	Fugu's Sushi Bar & Grill	1299 University Ave #104	Riverside	4/23/08	1
PR0037169	G.E.T. Catering	6166 Brockton Ave	Riverside	6/13/08	1
PR0037719	Gelato Di Roma	5786 Mission Blvd	Riverside	5/28/08	1
PR0037803	J W North HS Student Store	1550 3rd St	Riverside	6/9/08	1
PR0037666	Little Beijing Restaurant	5800 Van Buren Blvd # 112	Riverside	6/18/08	1
PR0037854	Lowe's	9851 Magnolia Ave	Riverside	6/9/08	1
PR0037739	Lucky Buffet	1445 University Ave	Riverside	5/20/08	1
PR0037003	Maui Wowi Hawaiian	19348 Van Buren Blvd 103	Riverside	5/7/08	1
PR0002834	MI LINDO MICHOACAN RESTAURANT	993 CENTER ST	RIVERSIDE	5/19/08	1
PR0036412	Milano's Pizza	2847 Mary St	Riverside	4/2/08	1
PR0037192	Mongolian BBQ	1242 University Ave 7	Riverside	4/8/08	1
PR0007294	OK TOFU HOUSE	10436 MAGNOLIA AVE	RIVERSIDE	5/13/08	1
PR0036987	On The Corner Sandwich Shop	16781 Van Buren Blvd	Riverside	4/8/08	1
PR0037852	Oriental Cuisine	10411 Magnolia Ave #C	Riverside	6/12/08	1
PR0037704	Pacific Grill	2257 Galleria At Tyler	Riverside	5/15/08	1
PR0036919	Panaderia Guadalajara	10959 Magnolia Ave	Riverside	4/9/08	1
PR0036424	Peking Express	2995 Van Buren Blvd A6	Riverside	4/1/08	1
PR0037319	Pho Star Bowl	10051 Magnolia Ave Ste B1	Riverside	5/27/08	1
PR0037826	Raincross Cafe	3900 Main St	Riverside	6/4/08	1
PR0006028	REID PARK LITTLE LEAGUE	801 N ORANGE	RIVERSIDE	6/12/08	1
PR0037286	Riverside Ice Cream	10391 Arlington Ave	Riverside	4/8/08	1
PR0037579	Riverside Thai Cuisine	11860 Magnolia Ave #T	Riverside	5/14/08	1
PR0037724	Rubidoux High School	4250 Opal St	Riverside	5/28/08	1
PR0037723	Rubidoux High School	4250 Opal St	Riverside	5/28/08	1
PR0037524	Shakey's Pizza Restaurant	3767 Iowa Ave	Riverside	4/23/08	1
PR0037209	Starbucks Coffee #11236	5130 Arlington Ave Ste 100	Riverside	[] 4/23/08	1
PR0037269	Sub Shack	11840 Magnolia Ave F	Riverside	() 4/9/08	1
PR0037981	Super Mex	3444 Arlington Ave	Riverside	6/26/08	1
PR0037037	Swirl Frozen Yogurt	1400 University Ave A156	Riverside	4/9/08	1
PR0037358	Taj Mahal of India	5523-29 Van Buren Blvd	Riverside	6/27/08	1
PR0037270	Tapioca Express	767 W Blaine St A	Riverside	4/24/08	1
PR0037419	The Auld Dubliner	3775 Tyler St #3B	Riverside	5/7/08	1
PR0037899	The Garden Cafe 1	6060 Magnolia Ave	Riverside	6/4/08	1
PR0037359	The Grove	191 W Big Spring Rd	Riverside	6/23/08	1
PR0037833	Tony Eatery	3812 Pierce St N	Riverside	5/29/08	1
PR0037660	Tortas Sinaloa	3961 Chicago Ave # B	Riverside	() 6/23/08	1
PR0036826	University Cafe	1400 University Ave A109	Riverside	5/9/08	1
PR0037397	University EL Pollo Loco	2200 University Ave	Riverside	4/17/08	1
PR0037008	Waterpia 1 - Water & Ice Cream	3973 Chicago Ave	Riverside	() 5/9/08	1
PR0037063	World Liquor	6811 Arlington Ave	Riverside	4/4/08	1
PR0037118	Worthingtons	3587 University Ave	Riverside	4/14/08	1

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PR0036018	Uncommon Grounds	23844 Hwy 74	Romoland	11/28/07		1
PR0018218	Heritage High School	26000 Briggs RD	Romoland		2/5/08	1
PR0010385	CARLS JR #122	1171 N STATE ST	SAN JACINTO		8/13/07	1
PR0010405	DEL TACO #1035	1231 N STATE ST	SAN JACINTO		7/24/07	1
PR0017941	Figaro's Pizza	2241 W Esplande 101	San Jacinto		9/26/07	1
PR0018074	Panda Express #1500	1270 N State ST	San Jacinto		9/17/07	1
PR0035568	Charo Chicken	1211 N State ST	San Jacinto	11/2/07		1
PR0035568	Charo Chicken	1211 N State ST	San Jacinto	12/11/07		1
PR0035739	Donut Pantry Cafe	318 S Pico AVE	San Jacinto	12/6/07		1
PR0018318	JUICE IT UP	1211 N STATE ST B	San Jacinto	10/19/07		1
PR0018353	MR YOU CHINESE FOOD	2281 W ESPLANADE	San Jacinto	10/29/07		1
PR0035938	PAPA RAMAZANI PIZZA	500 S STATE ST 213	San Jacinto	11/19/07		1
PR0035724	Quiznos Sub #9243	2281 W Explanade AVE 104B	San Jacinto	11/20/07		1
PR0035738	Rite Aid	1180 N State ST	San Jacinto	12/5/07		1
PR0018260	Starbucks	1211 N State ST	San Jacinto	10/19/07		1
PR0005512	STATER BROS. MARKET #121	1537 S SAN JACINTO AVE	SAN JACINTO	10/10/07		1
PR0035658	Subway	1261 N State ST A	San Jacinto	11/2/07		1
PR0007137	Z-BEST PIZZA	1467 S SAN JACINTO	SAN JACINTO	10/4/07		1
PR0036693	El Pollo Loco #1881	18815 San Jacinto	San Jacinto		3/24/08	1
PR0036389	Frugos Yogurt	1261 N State St Ste C	San Jacinto		() 2/11/08	1
PR0036388	Little Beiging Restaurant	1261 N State St Ste B	San Jacinto		2/11/08	1
PR0036383	Moreno Foods Catering	426 N Scoveil #B	San Jacinto		2/21/08	1
PR0018302	NET ODYSSEY	2551 S SAN JACINTO ST	San Jacinto		2/6/08	1
PR0037609	El Pulpo Loco	426 W Esplanade Ave # 204	San Jacinto		[] 5/15/08	1
PR0036585	Fresh & Easy Market	2211 W Esplande Ave	San Jacinto		5/2/08	1
PR0037663	La Fuente Water Store	517 E Main St	San Jacinto		6/11/08	1
PR0036418	Los Partales Taco Shop #2	1191 N State Ave Ste A	San Jacinto		4/8/08	1
PR0036570	Mariscos Mar y Sol	718 S San Jacinto	San Jacinto		4/7/08	1
PR0010310	FRAN & PATTI'S PAST TIME	28089 BRADLEY RD	SUN CITY		7/10/07	1
PR0006493	CHINA WOK EXPRESS & DONUT	26100 NEWPORT RD 110	SUN CITY		5/27/08	1
PR0003427	MCDONALD'S RESTAURANTS	28000 BRADLEY RD	SUN CITY		6/10/08	1
PR0004809	NENA'S PIZZA	27192 SUN CITY BLVD H	SUN CITY		[] 5/29/08	1
	TOTAL SANTA ANA WATERSHED					**399**
	SANTA MARGARITA WATERSHED					
PR0035804	7-Eleven	1210 N State ST	Aguanga	12/10/07		2
PR0004472	FOX CINEPLEX THEATER	60 RAMSEY ST W	BANNING	10/3/07		2
PR0017926	IT'S GREEK 2 U DELI & BAKERY	41539 KALMIA AVE 116	Murrieta		8/9/07	2
PR0018172	Jenny Craig	24540 Village Walk PL	Murrieta		9/11/07	2
PR0018006	Juice It Up	24530 Village Walk PL E	Murrieta		8/9/07	2
PR0010356	LEI'S HAWAIIAN BBQ	41539 KALMIA ST 120	MURRIETA		7/23/07	2
PR0018337	SMOOTHIE KING	25030 HANCOCK AVE 103	Murrieta		9/12/07	2

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PR0018200	Starbucks Coffee	27890 Clinton Keith RD	Murrieta		9/11/07	2
PR0018269	Subway	24530 Village Walk Plaza D	Murrieta		9/11/07	2
PR0018036	Tacos El Unico	40250 Murrieta Hot Springs RD 117	Murrieta		8/24/07	2
PR0010354	WINGS PIZZA N THINGS	40250 MURRIETA HOT SPGS 101	MURRIETA		8/24/07	2
PR0035740	Bake & Bite Bakery	39400 Murrieta Hot Springs RD	Murrieta	11/1/07		2
PR0018176	Cabo Mesquite	40365 Murrieta Hot Springs RD C-8	Murrieta	10/3/07		2
PR0035677	FULL BELLY DELI	26760 JEFFERSON AVE	Murrieta	12/4/07		2
PR0018181	Gyro & Kabob	39252 Winchester RD 113	Murrieta	11/26/07		2
PR0018173	It's A Grind Coffee House #CA1189	24520 Village Walk PL Ste F	Murrieta	11/7/07		2
PR0035763	Pole Position Raceway	41810 McAlby CT	Murrieta	11/6/07		2
PR0035735	Sopranos The Club	39252 Winchester RD	Murrieta	11/7/07		2
PR0035912	Subway #34052	27890 Clinton Keith Rd A-2	Murrieta	11/20/07		2
PR0036899	Board'z Grill	39809 Los Alamos D	Murrieta		3/31/08	2
PR0036311	In N Out Burger	39697 Avenida Acacias	Murrieta		1/31/08	2
PR0036896	The Cake Cottage	39429 Los Alamos Rd D	Murrieta		3/17/08	2
PR0036617	Valle D Brume Too	29955 Technology	Murrieta		3/10/08	2
PR0005234	WOOMI SUSHI JAPANESE RESTAURANT	39832 LOS ALAMOS RD	MURRIETA		1/4/08	2
PR0037779	Ami Sushi Restaurant	24530 Village Walk Pl #A	Murrieta		6/10/08	2
PR0003679	BRUNSWICK CAL OAKS BOWL	40440 CALIFORNIA OAKS RD	MURRIETA		6/12/08	2
PR0005678	CARL'S JR.	40980 CALIFORNIA OAKS RD	MURRIETA		6/3/08	2
PR0003735	CASA JIMENEZ	40535 CALIFORNIA OAKS RD	MURRIETA		6/17/08	2
PR0009372	CHILIS GRILL & BAR	41070 CALIFORNIA OAKS RD	MURRIETA		6/24/08	2
PR0037284	Don Chanos	29910 Murrieta Hot Springs Rd	Murrieta		4/10/08	2
PR0005341	DONUT STAR	40525 CALIFORNIA OAKS RD E-7	MURRIETA		6/11/08	2
PR0010034	ENTENMANN OROWEAT	26019 JEFFERSON AVE STE D	MURRIETA		5/23/08	2
PR0007326	FARMER BOYS RESTAURANT	41300 KALMIA ST	MURRIETA		6/3/08	2
PR0005411	JACK IN THE BOX #3248	39878 LOS ALAMOS RD	MURRIETA		6/12/08	2
PR0008890	JALAPENOS MEXICAN GRILL	29992 HUNTER RD 108	MURRIETA		6/6/08	2
PR0037810	Los 3 Compadres	29910 Murrieta Hot Springs Rd	Murrieta		5/27/08	2
PR0037861	Lowe's #1576	24701 Madison Ave	Murrieta		6/20/08	2
PR0005908	MAMA ROSES PIZZERIA	39621 LOS ALAMOS RD B	MURRIETA		5/28/08	2
PR0007873	MCDONALD'S	41200 MURRIETA HOT SPGS	MURRIETA		6/2/08	2
PR0037713	Murrieta Pizza Factory	40477 Murrieta Hot Springs Rd # D3	Murrieta		5/27/08	2
PR0008560	PANDA EXPRESS	25312 MADISON AVE	MURRIETA		6/2/08	2
PR0003746	PEONY CHINESE CUISINE	39525 LOS ALAMOS RD	MURRIETA		5/28/08	2
PR0008460	RUSTICO RISTORANTE & PIZZERIA	29940 HUNTER RD -102	MURRIETA		5/28/08	2
PR0037160	Seoul Market	40250 Murrieta Hot Springs Rd 120	Murrieta		5/13/08	2
PR0037351	SGC Sushi Japanese Restaurant	40461 Murrieta Hot Springs Rd Ste J-2	Murrieta		5/5/08	2
PR0037738	Sky High Party Zone	26670 Madison Ave	Murrieta		5/20/08	2
PR0007607	STARBUCKS #6725	25030 HANCOCK AVE	MURRIETA		6/11/08	2
PR0007322	SUBMARINA	40970 CALIFORNIA OAKS RD	MURRIETA		6/18/08	2

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PR0005257	SUBWAY #4246	39872 LOS ALAMOS RD	MURRIETA		6/18/08	2
PR0037583	Tortilla San Jorce	25115 Madison Ave #104	Murrieta		6/12/08	2
PR0008999	WALGREEN #01995	40420 MURRIETA HOT SPRINGS RD	MURRIETA		5/23/08	2
PR0010473	BRUEGGER'S BAGELS	39584 WINCHESTER RD 1	TEMECULA		8/8/07	2
PR0010277	CALLAWAY VINEYARD & WINERY	32720 RANCHO CALIFORNIA RD	TEMECULA		9/17/07	2
PR0018243	Dominos	31165 S Hwy 79	Temecula		9/12/07	2
PR0018231	Kepani Island Grill	26550 Ynez RD C	Temecula		9/27/07	2
PR0010394	LONGS DRUG STORE	31021 S HWY 79	TEMECULA		8/14/07	2
PR0010381	MAURICE CARRIE WINERY	34225 RANCHO CALIFORNIA RD	TEMECULA		9/17/07	2
PR0018035	Qdoba Mexican Grill #452	32965 S Hwy 79	Temecula		8/9/07	2
PR0018019	Spuntino	31891 Rancho California RD	Temecula		8/10/07	2
PR0010467	TACOS TIJUANA MEXICAN GRILL	43810 BUTTERFIELD STAGE RD F10	TEMECULA		8/8/07	2
PR0018048	Tamarindo Grill	31915 Rancho California RD 300	Temecula		8/9/07	2
PR0018358	THE BARLEY HOUSE	31045 S HWY 79 101	Temecula		9/12/07	2
PR0035506	Chilie Peppers Mexican Eatery	31093 Highway 79 S A	Temecula	10/24/07		2
PR0035799	DINNER STUDIO	41789 NICOLE LN	Temecula	10/30/07		2
PR0035934	EDIBLE ARRANGEMENTS	27548 YNEZ RD I-11	Temecula	11/15/07		2
PR0035518	Francesia Italian Kitchen	31165 Hwy 79 S	Temecula	11/6/07		2
PR0018241	Frankie's Steak & Seafood	41789 Nicole LN 1	Temecula	10/10/07		2
PR0018242	Golden Bowl	31069 S Hwy 79	Temecula	10/9/07		2
PR0035507	Haagen-Dazs	40820 Winchester RD 2460	Temecula	10/30/07		2
PR0018288	HART WINERY	41300 AVENIDA BIONA	Temecula	12/17/07		2
PR0035645	Henry's Market Place	39606 Winchester RD	Temecula	11/1/07		2
PR0018099	Leonesse Cellars	38311 De Portola RD	Temecula	[] 10/4/07		2
PR0018360	LITTLE TOKYO SUSHI & TERIYAKI	43053 MARGARITA RD STE	Temecula	[] 10/5/07		2
PR0035764	Lollicups Coffee & Tea	29073 Overland DR	Temecula	10/30/07		2
PR0035921	LUCHO'S PERUVIAN RESTAURANT	39650 WINCHESTER RD STE C	Temecula	11/15/07		2
PR0035566	Tapache Deli	30571 Hwy. 79 S C	Temecula	10/22/07		2
PR0018225	Wings N Things	31045 S Hwy 79 104	Temecula	10/4/07		2
PR0036564	Allie's Tapas Au Vin	41653 Margarita Rd	Temecula		2/21/08	2
PR0036489	Cocoanut Cove	32459 Temecula Pkwy D101	Temecula		2/6/08	2
PR0036492	Lopez Market	28266 Old Town Front St	Temecula		2/27/08	2
PR0005774	PANADERIA TEMECULA	26485 YNEZ RD O	TEMECULA		2/27/08	2
PR0005357	PRESTOS	30590 RANCHO CALIFORNIA RD	TEMECULA		1/3/08	2
PR0036191	Street Rod Diner	27405 Jefferson Ave	Temecula		2/1/08	2
PR0036836	Wing'n Out	39650 Winchester Rd Ste A	Temecula		3/20/08	2
PR0005901	CHINA SUPER BUFFET	27624 JEFFERSON AVE	TEMECULA		5/29/08	2
PR0008924	DIPPIN DOTS	26479 YNEZ A	TEMECULA		5/23/08	2
PR0037473	E-1X Distributors	43357 Business Park Dr Ste #104	Temecula		5/20/08	2
PR0037278	El Take Out Burger	39760 Winchester Rd	Temecula		4/15/08	2
PR0037143	Hana Sushi	27576 Ynez Rd H-15	Temecula		() 4/7/08	2

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PR0007211	LONGS DRUG STORE #550	40365 WINCHESTER RD	TEMECULA		[] 5/23/08	2
PR0037828	Los Tacos	32065 Temecula Pkwy	Temecula		6/13/08	2
PR0037859	Lowe's #775	40390 Winchester Rd	Temecula		6/12/08	2
PR0037677	Michaels Stores Inc	27471 Ynez Rd	Temecula		5/20/08	2
PR0037485	Rodrigo's Mexican Grill	39562 Winchester Rd	Temecula		5/20/08	2
PR0004495	SIZZLER #649	27717 JEFFERSON AVE	TEMECULA		() 6/9/08	2
PR0007034	STARBUCKS #5949	27315 JEFFERSON AVE K	TEMECULA		6/9/08	2
PR0003736	SUB - MARINA	26491 YNEZ RD	TEMECULA		6/2/08	2
PR0037159	The Hot Dog Shoppe	43810 Butterfield Rd	Temecula		4/24/08	2
PR0037494	The Yogurt Factory	39694 Winchester Rd Ste A	Temecula		4/28/08	2
PR0006609	TJ MAXX #702	26427 YNEZ RD	TEMECULA		5/23/08	2
PR0037436	White Lime Frozen Yogurt	41493 Margarita Rd	Temecula		4/28/08	2
PR0037903	Youme	28120 Jefferson Ave #207	Temecula		() 6/17/08	2
PR0010456	FIGARO'S PIZZA	36100 HIDDENSPRINGS RD	WILDOMAR		7/24/07	2
PR0018304	STARBUCKS	32080 CLINTON KEITH RD	Wildomar		9/12/07	2
PR0035584	7-Eleven	32060 Clinton Keith Rd	Wildomar	11/7/07		2
PR0036257	Tacos Tijuana Mexican Grill	32100 Clinton Kieth Rd	Wildomar		1/8/08	2
PR0036190	Thrifty Payless	32450 Clinton Keith Rd	Wildomar		1/8/08	2
PR0037584	Arby's	23937 Clinton Keith Rd	Wildomar		6/10/08	2
PR0008721	DEL TACO #760	36164 HIDDEN SPRINGS RD	WILDOMAR		() 6/2/08	2
PR0007317	GOLDEN SPOON FROZEN YOGURT	23905 CLINTON KEITH RD #117	WILDOMAR		5/23/08	2
PR0007206	MCDONALD'S	23819 CLINTON KEITH RD	WILDOMAR		() 6/26/08	2
PR0007302	SUBWAY #24263	23905 CLINTON KEITH Rd BLDG 118	WILDOMAR		5/23/08	2
TOTAL						**112**
	SANTA MARGARITA WATERSHED					
	WHITEWATER RIVER WATERSHED					
PR0004385	BANNING VILLAGE MARKET	266 N SAN GORGONIO AVE	BANNING		7/19/07	3
PR0003502	EL CHARRO AUTHENTIC MEXICAN FOOD	3505 W RAMSEY ST	BANNING		8/29/07	3
PR0004179	ARCO AM/PM	2228 W RAMSEY ST	BANNING		2/1/08	3
PR0005118	BANNING SHELL	780 E RAMSEY ST	BANNING		2/1/08	3
PR0036302	Buddy's West Side Pitt	41 W Ramsey	Banning		3/17/08	3
PR0006535	CAROLS KITCHEN	789 N SAN GORGORINO	BANNING		3/4/08	3
PR0003821	DONUT DE-LITE	6350 W RAMSEY ST H	BANNING		1/30/08	3
PR0003610	EDDIE'S LIQUOR	1449 W RAMSEY ST	BANNING		2/25/08	3
PR0003502	EL CHARRO AUTHENTIC MEXICAN FOOD	3505 W RAMSEY ST	BANNING		1/31/08	3
PR0004751	FARMHOUSE	6261 JOSHUA PALMER	BANNING		3/11/08	3
PR0005002	GUS JR. #7	3559 W RAMSEY ST	BANNING		3/11/08	3
PR0004177	JACK'S MARKET	62 N 8TH ST	BANNING		3/4/08	3
PR0007279	ORCHID FRESH WOK-N-GRILL	6250 W RAMSEY ST I & J	BANNING		3/4/08	3
PR0010217	PAPA JOHNS PIZZA	6350 W RAMSEY ST	BANNING		3/4/08	3
PR0003501	22ND ST. LIQUOR	2185 W RAMSEY ST	BANNING		5/14/08	3
PR0037475	Fisherman's Market Express	2271 W Ramsey St	Banning		5/14/08	3

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PR0004572	LOGAN'S LIQUOR & DELI	310 E RAMSEY ST	BANNING		4/7/08	3
PR0037526	Super Subs+	112A N San Gorgonio Ave	Banning		5/14/08	3
PR0007045	STARBUCKS #5904	48750 SEMINOLE DR 105	CABAZON		8/30/07	3
PR0005989	ARCO AM/PM	300 N FERN	CABAZON		3/20/08	3
PR0003341	CABAZON COUNTRY STORE	50386 MAIN ST	CABAZON		3/20/08	3
PR0018281	Carniceria Rancho Grande Restaurant	68300 Ramon RD 10	Cathedral City	12/5/07		3
PR0017924	JACK IN THE BOX #5397	68020 VISTA CHINO	Cathedral City	12/5/07		3
PR0035684	Leon's Bar & Grill	36200 Date Palm DR	Cathedral City	12/5/07		3
PR0018090	El Alteno Restaurant	49613 Harrison ST C101	Coachella		8/15/07	3
PR0018005	Quiznos Sub	83097 Ave 48 ST D1A	Coachella		7/19/07	3
PR0018110	Senor Cool	83101 Avenue 48	Coachella		8/15/07	3
PR0036229	Sizzler	49211 Grapefruit Blvd Ste 7	Coachella	12/20/07		3
PR0036323	Little Caesars Pizza	50057 Harrison Ste H	Coachella		1/9/08	3
PR0037853	Azusenas Gorditas	52565 Harrison St #108	Coachella		6/12/08	3
PR0010416	FIREROCK TAVERN	11000 PALM DR	DESERT HOT SPRING		7/10/07	3
PR0009824	WE ARE SPA	18000 LONG CANYON RD	DESERT HOT SPRING		7/10/07	3
PR0018206	RESTAURANTE CIELA MAR Y TIERRA	82204 HWY 111 F	Indio		8/27/07	3
PR0018140	Yogurt Time	44100 Jefferson 403	Indio		9/6/07	3
PR0036052	Blue Coyote Bar & Grill	44100 Jefferson 400	Indio	12/7/07		3
PR0003576	DEL TACO #7	81566 HWY 111	INDIO	10/29/07		3
PR0035800	EL DESTINO NIGHTCLUB	83-085 INDIO BLVD	Indio	11/19/07		3
PR0036084	Fresh & Easy Neighborhood Market	82900 Avenue 42	Indio	12/27/07		3
PR0036204	Rite Aid	82451 Hwy 111 Bldg C	Indio	12/19/07		3
PR0035694	SUNFLOWER CATERING	83711 PEACH ST	Indio	12/21/07		3
PR0036242	Panda Express	82451 Hwy 111 Bldg B	Indio		1/23/08	3
PR0036397	Walgreens #10703	82900 Avenue 42 Bldg D	Indio		2/11/08	3
PR0037589	Domino's Pizza	42151 Worldmark Wy Bldg #17	Indio		5/28/08	3
PR0037016	Rite Aid	47985 Monroe St A	Indio		4/1/08	3
PR0010474	HOMEWOOD SUITES BY HILTON-LA QUINTA	45200 WASHINGTON AVE	LA QUINTA		9/6/07	3
PR0035958	ANDALUSIA COUNTRY CLUB	58830 MARBELLA	La Quinta	11/29/07		3
PR0036105	Brandini Toffee	78045 Calle Cadiz	La Quinta	12/20/07		3
PR0036087	Chipotle Mexican Grill #1094	79174 Hwy 111 101	La Quinta	11/27/07		3
PR0006284	CITRUS CLUB HOUSE	50502 MANDARINA	LA QUINTA	11/13/07		3
PR0035963	COST PLUS WORLD MARKET	78983 HWY 111	La Quinta	12/6/07		3
PR0018366	JUST JAVA	46520 WASHINGTON ST	La Quinta	10/24/07		3
PR0018203	TORTILLA EXPRESS	79255 HWY 111 G	La Quinta	12/6/07		3
PR0036606	Bouchee Fine Foods	46600 Washington St Ste 1	La Quinta		3/13/08	3
PR0036566	COSI	46660 Washington St Ste 8-9	La Quinta		3/13/08	3
PR0035742	Port of Subs #165	46520 Washington ST 2	La Quinta		1/9/08	3
PR0037097	Cooking With Class La Quinta	47875 Caleo Bay A107	La Quinta		4/29/08	3
PR0036998	The Dinner Afare	79485 Hwy 111 2	La Quinta		5/13/08	3

2007-2008 EH Food Facility Inspections

PR0036794	Wienerschnitzel #783	79630 Hwy 111	La Quinta		4/1/08	3
PR0017937	Milano Pizza	91275 Avenue 66	Mecca		7/24/07	3
PR0017936	Plaza Garibaldi Restauarant	91275 Avenue 66	Mecca		7/24/07	3
PR0036303	Fiesta Nutrition	91275 Ave 66 Ste 8	Mecca		1/7/08	3
PR0037527	Mecca's Juice It Up	90480 Ave 66th	Mecca		6/3/08	3
PR0018213	PRONTO FOOD MART & MEXICAN GRILL	78010 COUNTRY CLUB DR 400	Palm Desert		8/31/07	3
PR0035586	Stater Bros. #181	78210 Varner RD	Palm Desert	10/24/07		3
PR0036398	Mango Tree	73010 El Paseo	Palm Desert		2/5/08	3
PR0005571	NO DA TE RESTAURANT	73655 EL PASEO STE# T&M	PALM DESERT		1/15/08	3
PR0004805	PASTRY SWAN BAKERY	73560 EL PASEO	PALM DESERT		2/5/08	3
PR0006040	RALPHS #27	74884 COUNTRY CLUB DR	PALM DESERT		2/26/08	3
PR0006153	CORK TREE	74950 COUNTRY CLUB DR	PALM DESERT		4/3/08	3
PR0037862	Oroweat/ Entemmanns	77885 Las Montanas Rd #C	Palm Desert		6/3/08	3
PR0018123	Keybar California	535 S Palm Canyon DR	Palm Springs		9/14/07	3
PR0005380	LOS CHILAKYLES MEXICAN CUISINE	611 S PALM CANYON DR STE 13	PALM SPRINGS		8/6/07	3
PR0018153	THAT'S AMORE	540 S INDIAN CANYON	Palm Springs		8/6/07	3
PR0035703	Angelina's	425 S Sunrise WY F1	Palm Springs		1/22/08	3
PR0036090	Del Taco #1040	102 N Sunrise Wy	Palm Springs		3/24/08	3
PR0037715	Cost Plus World Market	2465 E Palm Canyon #4	Palm Springs		6/18/08	3
PR0037832	McDonalds	2465 E Palm Canyon Dr #13	Palm Springs		6/16/08	3
PR0037824	Michaels	2465 E Palm Canyon Dr #3	Palm Springs		6/18/08	3
PR0037874	Quizno's Sub	2465 E Palm Canyon Dr #1210	Palm Springs		6/16/08	3
PR0036996	Taco Del Mar	425 S Sunrise Wy	Palm Springs		6/19/08	3
PR0036361	8 Eatery	40101 Montery Ave C-2	Rancho Mirage		3/24/08	3
PR0036506	La Palapa Bar & Grill	69930 Hwy 111 Ste 120	Rancho Mirage		3/27/08	3
TOTAL	**WHITEWATER RIVER WATERSHED**					**82**

HAZ MAT NPDES Surveys
7/01/2007- 6/30/2008

RECORD #	DBA	Site Address	CITY	ACTIVITY DATE
Santa Ana Watershed				
PR0025411	Arco #9719/Prestige Stations #9719	401 E 6th St	Beaumont	5/22/08
PR0030264	AT&T Mobility (12313)	14625 Mount David	Beaumont	3/25/08
PR0025109	Beaumont Gas Mart	1696 E 6th St	Beaumont	5/19/08
PR0026147	Calif Hwy Patrol/San Gorgonio Pass	195 Highland Springs Ave	Beaumont	9/5/07
PR0021672	Cherry Valley Automotive	655 E 5th St Ste.B	Beaumont	6/12/08
PR0033863	Del Taco	435 E 4th St	Beaumont	5/12/08
PR0033261	Mc Donalds	501 Beaumont Ave	Beaumont	6/11/08
PR0030934	Precision Stampings Inc	500 Egan Ave	Beaumont	1/11/08
PR0025133	Robertson's Ready Mix	452 W Luis Estrada Rd	Beaumont	6/19/08
PR0025385	Southern California Gas Company	251 E 1st St #1	Beaumont	10/16/07
PR0033568	T-Mobile USA, Inc	550 E 6th St	Beaumont	4/1/08
PR0033569	T-Mobile USA, Inc	16411 1/2 Lamb Cyn Rd	Beaumont	4/2/08
PR0033567	T-Mobile USA, Inc	910 Western Knolls Ave	Beaumont	4/2/08
PR0022077	Tranny Mikes Inc-OOB OOB	655 E 5th St # A	Beaumont	4/16/08
PR0025247	Verizon/Beaumont	861 Beaumont Ave	Beaumont	5/6/08
PR0034354	Wendy's #9415 Wendy's #9415	525 Highland Sprgs Ave	Beaumont	6/13/08
PR0025112	Arco #1958/Gopal Krishna Co., Inc.	1216 Calimesa Blvd	Calimesa	5/22/08
PR0034711	AT&T Mobility (48195)	9525 Sharon Way	Calimesa	3/25/08
PR0022906	G & M Oil Co/Chevron #80	499 Sandalwood	Calimesa	1/8/08
PR0033565	T-Mobile USA, Inc	9480 Calimesa Blvd	Calimesa	4/1/08
PR0028235	Verizon/Calimesa CO	1010 Calimesa Blvd	Calimesa	4/1/08
PR0034280	T-Mobile USA, Inc	38989 Cherry Valley Blvd	Cherry Valley	4/1/08
PR0019579	6th Street Shell	1825 W 6th St	Corona	2/13/08
PR0021806	A-1 Precision Screw Products	1441 Pomona Rd Ste.8	Corona	12/10/07
PR0023126	Albertsons #6796 Albertsons #6796	1260 E Ontario Ave	Corona	8/30/07
PR0035877	Alchemy Auto Painting	1052 Railroad St	Corona	10/2/07
PR0019630	Arco #9706/Prestige Stations Inc.,	624 W 6th St	Corona	12/17/07
PR0037523	AutoZone #5554	1014 W 6th St	Corona	3/20/08
PR0019236	Bosch Auto Group Bosch Auto Group	2683 Wardlow Rd	Corona	5/7/08
PR0036575	California Wire Products Corp	1128 Bradford Cir	Corona	1/9/08
PR0037343	Cardinale Way VW/Hyundai	2603 Wardlow Rd	Corona	4/4/08
PR0019170	Chevron #99010 Corona Mall	309 S Main St	Corona	7/2/07
PR0019172	Chevron Green River #90236	4710 Green River Rd	Corona	7/23/07
PR0023024	Chevron Service Station	130 W Foothill Pkwy	Corona	4/10/08
PR0027507	Chevron SS #1433/91582	2270 Frontage Rd	Corona	7/13/07
PR0021570	Choice Auto Painting & Body	110 N Washburn Cir #5	Corona	5/1/08
PR0019227	City of Corona Fleet Services Div.	849 W 6th St	Corona	10/29/07
PR0024877	Convenience Retailers LLC #2700522	19570 Temescal Canyon Rd	Corona	10/2/07
PR0019221	Corona Lube PitStop	410 River Rd # A	Corona	1/3/08

0001978

HAZ MAT NPDES Surveys
7/01/2007- 6/30/2008

PR0019224	Corona Nissan	2575 Wardlow Rd	Corona	6/4/08
PR0024890	Corona Regional Medical	800 S Main St	Corona	5/1/08
PR0019408	Corona/NorcoUnified School District	300 Buena Vista Ave Section 1	Corona	10/19/07
PR0022239	Dry Clean Express - OOB	341 S Lincoln Ave # H	Corona	9/10/07
PR0019275	Econo Lube N'Tune	135 N Washburn Cir	Corona	12/17/07
PR0035009	EVMWD Bolo Liftstation	27010 Bolo Ct	Corona	8/14/07
PR0035029	EVMWD Horsethief Liftstation	26600 Horsethief Rd	Corona	8/14/07
PR0034093	EVMWD Lemon Grove Pump Station	27697 Kachina Ct	Corona	9/5/07
PR0034059	EVMWD Mayhew Well	25050 Maitri Rd #D	Corona	9/5/07
PR0034048	EVMWD Station 71 Well	25150 Maitri Rd	Corona	9/5/07
PR0019464	ExxonMobil Oil Corporation #11406	1580 W 6th St	Corona	9/17/07
PR0024332	Hayden Industrial Products	1531 Pomona Rd	Corona	12/20/07
PR0019348	Hillcrest Contracting, Inc.	1467 Circle City Dr	Corona	7/10/07
PR0037040	Inland Pumping Service, Inc	341 Grant St	Corona	3/4/08
PR0019577	Jagged Edge Corp #68804	4721 Green River Rd	Corona	1/8/08
PR0027702	John Livacich Produce	13485 Magnolia Ave	Corona	1/23/08
PR0022311	Laidlaw Transit Inc-OOB OOB	300 Buena Vista Ave Section #	Corona	10/19/07
PR0019481	Meggitt Airdynamics	2616 Research Dr Ste.A	Corona	9/11/07
PR0027670	Pacifica Foods	13415 Estelle St	Corona	4/1/08
PR0022996	Quality Toyota	1700 W 6th St	Corona	9/12/07
PR0019636	Quality Toyota Truck Center	1685 W 6th St	Corona	9/12/07
PR0021576	R.W. Lyall & Company, Inc.	2665 Research Dr	Corona	9/11/07
PR0019622	Shell Oil Products US #120936	230 S Lincoln Ave	Corona	1/31/08
PR0036339	Skanska		Corona	11/28/07
PR0022936	T & T Enterprises	901 E 3rd St #B5	Corona	8/2/07
PR0019634	Total Auto Care	159 N Maple St E #D&E	Corona	10/1/07
PR0023899	Town & Country Cleaners	140 W Ontario Ave #102	Corona	6/30/08
PR0023026	UBS Printing Group, Inc. UBS Printing G	2577 Research	Corona	9/4/07
PR0026757	US Foodservice	1283 Sherborn St #102	Corona	4/17/08
PR0019145	Victor Buick - GMC Truck	2525 Wardlow Rd	Corona	6/18/08
PR0019669	Village Grove Cleaners	1246 Border Ave	Corona	8/21/07
PR0022822	VIP Transport Inc	2703 Wardlow Rd	Corona	8/24/07
PR0032666	Western Riv/Rgnl Wastewater Treatmt	14634 River Rd	Corona	7/3/07
PR0019723	Arco #5750/Prestige Stations #5380	33440 Hwy 74	Green Acres	5/15/08
PR0035781	A & Sons Auto Electric	1200 W Florida Ave #S	Hemet	8/22/07
PR0024307	Access First Urgent Care Access First U	1525 W Florida Ave	Hemet	8/15/07
PR0025117	Arco #5555/Prestige Stations #5265	500 Stetson Ave	Hemet	5/5/08
PR0028005	Arco #5593	298 Sanderson Ave	Hemet	8/28/07
PR0025410	Arco #9722/Prestige Stations #9722	2105 E Florida Ave	Hemet	5/2/08
PR0028006	Arco/Orange Tree Fresh Fruits & Nut	690 N State St	Hemet	10/1/07
PR0035289	Bellas Steak House	4270 E Florida Ave	Hemet	8/20/07
PR0025407	Betancourt Service Center	202 N State St	Hemet	1/15/08

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HAZ MAT NPDES Surveys
7/01/2007- 6/30/2008

PR0020284	Big O Tires	1200 W Florida Ave #A	Hemet	12/17/07
PR0019787	Canyon Motorhome & Travel Trailer	1050 Cawston Ave #A	Hemet	2/11/08
PR0025167	Chevron #90863	903 W Florida Ave	Hemet	12/11/07
PR0035996	Chevron Extra Mile Hemet East Ctr	43510 E Florida Ave	Hemet	10/11/07
PR0025268	City Of Hemet (City Yard)	3777 Industrial Ave #B	Hemet	5/8/08
PR0025267	City of Hemet Fire Station #1	450 E Latham Ave	Hemet	5/8/08
PR0025420	ConocoPhillips Co #251836	501 E Florida Ave	Hemet	6/13/08
PR0028113	Convenience Retailers LLC #2705034	41995 E Florida Ave #C	Hemet	7/9/07
PR0025199	County Of Riverside TLMA Road Yard	595 N Juanita St	Hemet	6/24/08
PR0020121	D & R Automotive	1200 W Florida Ave #Q	Hemet	10/10/07
PR0022892	Extreme Performance Auto & Repair	1200 W Florida Ave C&D	Hemet	12/5/07
PR0025329	Gas Mart	1005 W Florida Ave	Hemet	6/24/08
PR0026133	Gas Plus-Hemet	5771 W Florida Ave	Hemet	12/17/07
PR0028227	Gosch Automotive Group	450 Carriage Cir	Hemet	9/24/07
PR0024057	Harbor Freight Tools #15	1200 W Florida Ave Ste.U	Hemet	12/11/07
PR0032740	Hemet Dairy Queen And Food Mart	3291 W Florida Ave	Hemet	9/25/07
PR0025373	Hemet Shell #68542	1704 W Florida Ave	Hemet	1/17/08
PR0026673	Hemet Shell Gas Station	44462 E Florida Ave	Hemet	6/3/08
PR0025382	Hemet Texaco-OOB OOB	1701 W Florida Ave	Hemet	6/25/08
PR0025274	Hemet Valley Hospital Medical Ctr	1117 E Devonshire Ave	Hemet	12/6/07
PR0035782	Hunter Hill Farm	38210 E Benton Rd	Hemet	8/2/07
PR0026718	Just 4 Fun 76	1111 S Sanderson Ave	Hemet	4/1/08
PR0031063	K-Mart #7047	220 W Stetson Ave	Hemet	11/29/07
PR0025187	L & L Market L & L Market	395 W Stetson Ave	Hemet	4/3/08
PR0028321	Lake Hemet Municipal Water District	42525 E Stetson Ave	Hemet	7/19/07
PR0034329	Landmark Hemet Golf Club	7575 World Cup Ave	Hemet	5/5/08
PR0034182	McDonald's #30904	1231 S Sanderson Ave #A	Hemet	7/26/07
PR0035262	Palm Harbor Homes	429 W Esplanade Ave Ste G	Hemet	7/31/07
PR0025372	Palm Valley Shell	41735 E Florida Ave	Hemet	6/25/08
PR0034437	Pizza Hut #503	25795 Stanford	Hemet	2/7/08
PR0036692	Platinum Car Wash & Lube, Inc	5771 W Florida Ave	Hemet	6/25/08
PR0022688	Pro-Tech Auto Repair	1200 W Florida Ave K-M	Hemet	8/23/07
PR0025346	Qwik Korner	25760 New Chicago Ave Ste.A	Hemet	3/25/08
PR0033842	Regal Entertainment Group	2369 W Florida Ave	Hemet	4/29/08
PR0028290	RTA	700 Scaramella Cir	Hemet	8/14/07
PR0025139	Saint George Spirit	636 W Florida Ave	Hemet	6/10/08
PR0025114	Seven Eleven #33571	104 N San Jacinto St	Hemet	12/3/07
PR0025170	State Chevron State Chevron	1101 S State St	Hemet	11/28/07
PR0022155	The House Of Portraits The House Of Pc	540 N San Jacinto St # D	Hemet	1/16/08
PR0021844	Triple J Auto Machine	301 W Esplanade Ave	Hemet	8/16/07
PR0028618	U-Haul Center Of Hemet	380 N State St	Hemet	5/7/08
PR0023938	V J Graphics	960 N State	Hemet	2/7/08

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HAZ MAT NPDES Surveys
7/01/2007- 6/30/2008

PR0025249	Verizon California, Inc. Hemet Co.	120 S Juanita St	Hemet	6/26/08
PR0028237	Verizon/Hemet PY	331 E Menlo Ave # E16	Hemet	11/2/07
PR0034181	Wal-Mart #1853	1231 S Sanderson Ave	Hemet	7/26/07
PR0031230	Washburn Grove Management-OOB OO	43790 Citrus View Dr	Hemet	8/6/07
PR0025166	West Florida Valero	3308 W Florida Ave	Hemet	1/24/08
PR0032819	WW Feed & Supply	26120 Cordoba Dr	Hemet	11/8/07
PR0033561	T-Mobile USA, Inc	31250 Neer St	Homeland	4/2/08
PR0025417	Uni-Mart	31880 Hwy 74	Homeland	10/29/07
PR0032709	AT&T Mobility (12374)	24400 Rocky Point Rd	Idyllwild	3/24/08
PR0034750	AT&T Mobility (48205)	50485 Hwy 74	Idyllwild	3/24/08
PR0034749	New Cingular Wireless CA	47806 Hwy 74 #B	Idyllwild	3/24/08
PR0025341	Pine Cove Market Gas	23235 Hwy 243	Idyllwild	6/26/08
PR0021435	4 Brothers Tire Shop 4 Brothers Tire Shc	16817 Grand Ave	Lake Elsinore	3/26/08
PR0019062	A & M Automotive	31760 Mission Tr #B	Lake Elsinore	3/17/08
PR0022615	Arco Am/Pm	19930 Collier Ave	Lake Elsinore	2/27/08
PR0023871	AutoZone #5558	30870 Riverside Dr	Lake Elsinore	3/24/08
PR0019121	Big O Tires	150 Campbell St Ste.A	Lake Elsinore	12/6/07
PR0023980	Canyon Hills Chevron	25361 Railroad Canyon Rd	Lake Elsinore	8/30/07
PR0019165	Chevron SS# 1418/90802	31640 Mission Tr	Lake Elsinore	1/16/08
PR0019174	Chevron SS# 1447/200238	18451 Dexter Ave	Lake Elsinore	7/17/07
PR0019821	Circle K Stores Inc, #2700837	17671 Grand Ave	Lake Elsinore	1/3/08
PR0023801	CM Wash Equipment	534 3rd St	Lake Elsinore	3/20/08
PR0022113	Convenience Retailers LLC #2705739	31805 Grape St	Lake Elsinore	8/28/07
PR0024009	Costco Gasoline #746	29325 Central Ave	Lake Elsinore	4/2/08
PR0019120	Downs Energy	501 N Spring St	Lake Elsinore	4/23/08
PR0019273	E Z Products Co	17999 Collier Ave	Lake Elsinore	10/18/07
PR0019409	Elsinore Car Wash & Gas Corp	200 W Graham Ave	Lake Elsinore	9/12/07
PR0019289	Elsinore High School	21800 Canyon Dr	Lake Elsinore	9/25/07
PR0019293	Elsinore Valley Rentals & Ready Mix	31275 Fraser Dr	Lake Elsinore	11/15/07
PR0034094	EVMWD Horsethief I Pump Station	26665 Hostettler Rd	Lake Elsinore	9/5/07
PR0019333	Express Tire/ Economy Tire	300 Diamond Dr	Lake Elsinore	2/29/08
PR0019459	ExxonMobil Oil Corp #11443	31702 Mission Tr	Lake Elsinore	1/15/08
PR0019461	ExxonMobil Oil Corporation #10626	29300 Central Ave	Lake Elsinore	4/16/08
PR0036278	Firestone Complete Auto Care #2238/01:	31748 Mission Trl	Lake Elsinore	11/28/07
PR0038233	Inter-Block Retaining Systems	14500 Temescan Canyon Rd	Lake Elsinore	6/16/08
PR0019173	Lake Elsinore Chevron	16830 Lakeshore Dr	Lake Elsinore	12/20/07
PR0022228	Lake Elsinore Ford Used Car Center	158 Campbell St	Lake Elsinore	12/10/07
PR0022212	Lakeshore Gas Mart	16851 Lakeshore Dr	Lake Elsinore	11/29/07
PR0019419	Ly's Gas & Mini Market	17595 Grand Ave	Lake Elsinore	8/14/07
PR0019430	Marlars Auto Service	300 W Graham Ave	Lake Elsinore	2/28/08
PR0021723	National Automotive & Machine	28290 Trellis Ln	Lake Elsinore	1/31/08
PR0035260	Phoenix Electroformed Products, Inc	31951 Corydon St Ste 130	Lake Elsinore	3/20/08

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HAZ MAT NPDES Surveys
7/01/2007- 6/30/2008

PR0030623	SCE Skylark/Valley Substation		Lake Elsinore	11/14/07
PR0028106	Lakeview Valero	19560 Lakeview Ave	Lakeview	11/15/07
PR0034666	EMWD El Centro Lift Station	32775 Sussex Stake St	Menifee	9/7/07
PR0034667	EMWD Newport Lift Station	3329 Newport Rd	Menifee	9/7/07
PR0026189	Menifee Car Wash	26825 Newport Rd	Menifee	6/3/08
PR0026098	Menifee Mart, Inc	26925 Newport Rd	Menifee	12/11/07
PR0020257	New Look Cleaners	25908 Newport Rd #H	Menifee	12/5/07
PR0024282	Pacific States Engineering	30125 Wickerd Rd	Menifee	8/6/07
PR0025253	Verizon/Murrieta PY	32477 Haun Rd	Menifee	11/16/07
PR0019061	A & K Railroad Materials	12180 Mission Blvd Sect 1	Mira Loma	2/21/08
PR0019069	Abacherli Backhoe Service	5111 Dodd St	Mira Loma	7/17/07
PR0022619	Adesa California, LLC	11625 Nino Wy	Mira Loma	6/5/08
PR0030269	AT&T Mobility (12329)	12180 Mission Blvd Sect 2	Mira Loma	2/21/08
PR0031340	AutoZone #5562	11020 Limonite Ave	Mira Loma	10/24/07
PR0035486	Bergandi	3575 Grapevine St	Mira Loma	8/23/07
PR0021615	Blue Star Metals	3840 Wacker Dr	Mira Loma	6/18/08
PR0033432	Borders Group Inc	11625 Venture Dr	Mira Loma	10/2/07
PR0029915	C. R. England & Sons	11033 Harrel St	Mira Loma	10/29/07
PR0022987	Cal-Mold	3900 Hamner Ave	Mira Loma	8/14/07
PR0036200	Carl's Jr #268	6221 Pats Ranch Rd	Mira Loma	11/16/07
PR0027516	Circle K Stores, Inc. #337	10597 Jurupa Rd	Mira Loma	6/9/08
PR0021939	Continental Plumbing, Inc.	11165 Thurston Ln	Mira Loma	7/3/07
PR0027900	Convenience Retailers LLC #2705204	6190 Etiwanda Ave	Mira Loma	5/30/08
PR0019239	Crossroads Truck Inc	12421 Riverside Dr #D	Mira Loma	3/24/08
PR0027783	Dayco Industries	10215 San Sevaine Wy	Mira Loma	7/16/07
PR0033584	Dean Roberts Sales	5462 Etiwanda Ave	Mira Loma	10/16/07
PR0032662	Diversified Sales Service Corp. Diversifie	3777 Deforest Cir	Mira Loma	7/16/07
PR0033377	Everfilt	3167 Progress Cir	Mira Loma	5/7/08
PR0021924	FMI International	3355 Dulles Dr	Mira Loma	7/18/07
PR0019312	Food Gas N Go Mini Mart	3710 Etiwanda Ave	Mira Loma	5/27/08
PR0023059	Goose Creek Golf Club	11418 68th St	Mira Loma	7/12/07
PR0024330	Hadley Auto Transport-OOB OOB	4500 Etiwanda Ave # B	Mira Loma	8/29/07
PR0033597	Home Depot #1084	6140 Hamner Ave	Mira Loma	10/18/07
PR0036928	Indoor Kart Racing	3215 Corridor Dr	Mira Loma	2/13/08
PR0031493	JRC Sales	10491 Old Limonite Ave	Mira Loma	4/10/08
PR0022964	Jurupa Auto Center	10606 Jurupa Rd Sect1	Mira Loma	11/14/07
PR0019389	Jurupa Valley High School	10551 Bellegrave Ave	Mira Loma	7/12/07
PR0032423	K-Swiss Sport Shoes Inc.	3177 Space Ctr	Mira Loma	1/9/08
PR0033626	Levecke Corp	10810 Inland Ave	Mira Loma	9/12/07
PR0024369	Metal Container Corp Metal Container Co	10980 Inland Ave	Mira Loma	7/26/07
PR0019447	Mira Loma Auto Repair	5350 S Etiwanda Ave	Mira Loma	9/13/07
PR0024375	Mitchell Rubber Products	10220 San Sevaine Wy	Mira Loma	6/26/08

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HAZ MAT NPDES Surveys
7/01/2007- 6/30/2008

PR0023675	Multisource PRP, Inc	3836 Wacker Dr	Mira Loma	6/18/08
PR0023588	Owens Corning OEM	11150 Inland Ave	Mira Loma	8/23/07
PR0037346	Pacific Motor Trucking, Co.	4500 Etiwanda Ave #B	Mira Loma	3/26/08
PR0026463	Poma Automated Fueling	11074 Inland Ave	Mira Loma	1/15/08
PR0023049	Prevost Car Inc	3384 Deforest Cir	Mira Loma	7/13/07
PR0033496	Public Worldwide	3147 Progress Cir	Mira Loma	5/12/08
PR0037375	Quiksilver, Inc	11310 Cantu Galleano Ranch F	Mira Loma	3/27/08
PR0034748	R & V Sheet Metal	3197 Grapevine St	Mira Loma	8/14/07
PR0036624	R. Dugan Construction, Inc	6157 Marlatt St	Mira Loma	1/15/08
PR0036226	Regal Entertainment Group-Eastvale	12285 Limonite Ave	Mira Loma	11/27/07
PR0036152	Schneider Logistics-Building #1	4250 Hamner Ave	Mira Loma	11/5/07
PR0036155	Schneider Logistics-Building #2	12400 Riverside Dr	Mira Loma	11/5/07
PR0036156	Schneider Logistics-Building #3	4000 Hamner Ave	Mira Loma	11/5/07
PR0036154	Schneider Logistics-Building #4	11900 Riverside Dr	Mira Loma	11/5/07
PR0036158	Schneider Logistics-Building #5	4100 Hamner Ave	Mira Loma	11/5/07
PR0023365	Southwest Material Handling, Inc	3725 Nobel Ct	Mira Loma	3/19/08
PR0033901	Sprint Nextel (CA7209-Galleano)	12180 Mission Blvd Sect 3	Mira Loma	2/21/08
PR0030513	Sprint PCS, RV-049	12180 Mission Blvd	Mira Loma	2/26/08
PR0024324	Swan Lake Mobilehome Park	5800 Hamner Ave	Mira Loma	8/16/07
PR0019201	Swift Transportation	11888 Mission Blvd	Mira Loma	4/7/08
PR0034255	T-Mobile USA, Inc	12180 Mission Blvd Sect 4	Mira Loma	2/13/08
PR0034582	Target #T1961	12471 Limonite Ave	Mira Loma	1/25/08
PR0033494	The Complete Logistics Co	11450 Philadelphia St	Mira Loma	1/30/08
PR0030883	The Penn Companies The Penn Compar	11199 Inland Ave	Mira Loma	11/1/07
PR0022166	Valley Detroit Diesel Allison	11300 Inland Ave	Mira Loma	11/6/07
PR0019307	Vanny's Auto Service	5070 Etiwanda Ave	Mira Loma	7/18/07
PR0030182	Verizon Wireless Creekside	12423 Riverside Dr	Mira Loma	10/29/07
PR0023775	Vons Fuel Center #2688	6110 Hamner Ave	Mira Loma	4/28/08
PR0023318	W W Grainger W W Grainger	4700 Hamner Ave	Mira Loma	9/10/07
PR0031102	Western Flatrolled Steel/Processing	3030 Dulles Dr	Mira Loma	7/17/07
PR0018378	American Cleaners	12278 Perris Blvd	Moreno Valley	4/8/08
PR0026821	Arco #82311	23501 Alessandro Blvd	Moreno Valley	7/27/07
PR0024409	Arco #82581	16466 Perris Blvd	Moreno Valley	8/2/07
PR0027349	Arco #9718/Prestige Stations #9718	22990 Alessandro Blvd	Moreno Valley	4/25/08
PR0026892	Arco #9723/Prestige Stations #9723	24991 Sunnymead Blvd	Moreno Valley	4/7/08
PR0026190	Arco AM/PM # 06555-OOB OOB	23145 Hemlock Ave	Moreno Valley	4/7/08
PR0034209	AT&T Mobility (12358)	12380 Quincy #B	Moreno Valley	3/25/08
PR0034639	AT&T Mobility (24403)	12975 McGehee Dr #A	Moreno Valley	3/25/08
PR0034712	AT&T Mobility (44430)	11441 Heacock St	Moreno Valley	3/25/08
PR0035246	AutoZone #5565	23510 Sunnymead Blvd	Moreno Valley	3/12/08
PR0035549	Bond Glass & Body Shop	12470 Back Wy	Moreno Valley	9/6/07
PR0034500	CDF-Moreno Valley Coll. Fire Stn 91	16110 Lasselle St	Moreno Valley	10/25/07

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HAZ MAT NPDES Surveys
7/01/2007- 6/30/2008

PR0024447	Chevron SS# 1480/200908	22520 Cactus Ave	Moreno Valley	2/11/08
PR0024454	Chevron SS#1419/97568	12431 Heacock St	Moreno Valley	2/6/08
PR0024458	Circle K #1775	24051 John F Kennedy Dr	Moreno Valley	2/21/08
PR0027216	Costco Wholesale#455	12700 Day St	Moreno Valley	5/1/08
PR0026669	County Of Riverside Waste Managemnt	14290 Frederick St	Moreno Valley	4/24/08
PR0024502	Easter Market	29010 Alessandro Blvd	Moreno Valley	10/25/07
PR0026980	EMWD Cactus Pumping Plant	27010 Cactus Ave	Moreno Valley	3/11/08
PR0026976	EMWD Cottonwood Pumping Plant	13400 Redlands Blvd	Moreno Valley	3/11/08
PR0026981	EMWD Heacock Pumping Station	14510 Heacock St	Moreno Valley	3/11/08
PR0030478	EMWD Hidden Sprgs Pumping Plant	22571 Greenridge Dr	Moreno Valley	3/11/08
PR0026983	EMWD Moreno #1 Pumping Plant	16015 Perris Blvd	Moreno Valley	3/11/08
PR0026984	EMWD Moreno II Pumping Plant	24999 Cottonwood Ave	Moreno Valley	3/20/08
PR0026985	EMWD Nason & Elder Pumping Plant	26790 Elder Ave	Moreno Valley	3/20/08
PR0026978	EMWD Nason And Dracea	13249 Nason St	Moreno Valley	3/20/08
PR0026977	EMWD Redlands & Ironwood Pump. Plt	12005 Redlands Blvd	Moreno Valley	3/20/08
PR0024625	ExxonMobil Oil Corporation #12985	24440 Alessandro Blvd	Moreno Valley	12/10/07
PR0018761	ExxonMobil Oil Corporation #15903	12625 Frederick St	Moreno Valley	11/15/07
PR0026992	Fastrip Food Store #13-896	23991 Sunnymead Blvd	Moreno Valley	9/24/07
PR0034752	H & S Bros Enterprises, Inc	12611 Moreno Beach Dr	Moreno Valley	1/16/08
PR0018642	Hall's Engine And Radiator	24747 Sunnymead Blvd	Moreno Valley	1/31/08
PR0018941	Heacock Shell #68566	12301 Heacock St	Moreno Valley	1/8/08
PR0034961	Hometown Buffet #727	22500 Town Cir	Moreno Valley	7/24/07
PR0034549	In-N-Out Burgers, Inc	23035 Hemlock Ave	Moreno Valley	4/8/08
PR0024740	Iris Shell #68567	15980 Perris Blvd	Moreno Valley	1/8/08
PR0035041	JC Penney	22450 Town Cir	Moreno Valley	6/25/08
PR0022156	Jiffy Lube	12300 Heacock St	Moreno Valley	5/20/08
PR0035840	KFC	12280 Heacock St	Moreno Valley	4/8/08
PR0024276	King Auto Repair	12576 Heacock St	Moreno Valley	3/12/08
PR0024411	Moreno Gas Mart	24994 Alessandro Blvd	Moreno Valley	6/6/08
PR0027158	Moreno Valley Community Hosp-OOB O	27300 Iris Ave	Moreno Valley	8/16/07
PR0034986	Moreno Valley Mall	22500 Town Cir #1206	Moreno Valley	6/25/08
PR0037761	Moreno Valley Union, Inc	25020 Alessandro Blvd	Moreno Valley	5/23/08
PR0030881	Moreno Valley Unocal	22470 Cactus Ave	Moreno Valley	2/7/08
PR0030791	Old Quaker Paint Company-OOB OOB	24210 Postal Ave	Moreno Valley	9/20/07
PR0035255	Painted Rhino	14310 Veterans Way	Moreno Valley	5/13/08
PR0024707	Robertson's Ready Mix Inc	12890 Day St Section A	Moreno Valley	1/16/08
PR0024022	Ross Stores, Inc-Distribution Ctr	17800 Perris Blvd	Moreno Valley	11/6/07
PR0037976	Ryder Integrated Logistics	25300 Globe Ave	Moreno Valley	6/4/08
PR0034965	Serta Mattress	23532 Brodiaea Ave	Moreno Valley	1/30/08
PR0024732	Seven Eleven #23520(2111)	23021 Sunnymead Blvd	Moreno Valley	7/9/07
PR0026643	Seven Eleven Store #33157	15020 Perris Blvd	Moreno Valley	6/9/08
PR0026643	Seven Eleven Store #33157	15020 Perris Blvd	Moreno Valley	5/2/08

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HAZ MAT NPDES Surveys
7/01/2007- 6/30/2008

PR0031360	Stater Bros. Market #099	24595 Alessandro Blvd	Moreno Valley	5/7/08
PR0031369	Stater Bros. Markets #082	24931 Sunnymead Blvd	Moreno Valley	5/7/08
PR0032902	Sunnymead Shell	24840 Sunnymead Blvd	Moreno Valley	6/17/08
PR0027307	Sunnymead Shell	23050 Sunnymead Blvd	Moreno Valley	8/8/07
PR0034210	T-Mobile USA, Inc	23520 Cactus Ave	Moreno Valley	4/2/08
PR0034211	T-Mobile USA, Inc	26930 Fir Ave #A	Moreno Valley	4/2/08
PR0034226	T-Mobile USA, Inc	18051 Gilman Springs Rd	Moreno Valley	4/2/08
PR0034797	T-Mobile USA, Inc (CM-203)	12975 McGehee Dr #B	Moreno Valley	4/1/08
PR0031292	U Haul Center of Moreno Valley	23730 Sunnymead Blvd	Moreno Valley	12/5/07
PR0035166	US Energy	14419 Veterans Way	Moreno Valley	4/24/08
PR0024788	Valero	12400 Perris Blvd	Moreno Valley	6/19/08
PR0024548	Verizon California Inc /Edgemont CO	22400 Alessandro Blvd	Moreno Valley	7/23/07
PR0034359	Verizon Wireless	25052 Alessandro Blvd	Moreno Valley	6/18/08
PR0034450	Verizon Wireless (Arnold Way)	21941 Alessandro Blvd	Moreno Valley	6/18/08
PR0030092	Verizon Wireless (Grahm/Dracaea)	23300 Cottonwood Ave #A	Moreno Valley	6/18/08
PR0024549	Verizon/Sunnymead CO	12656 Perris Blvd	Moreno Valley	7/23/07
PR0034809	Wal-Mart Supercenter #5193	12721 Moreno Beach Dr	Moreno Valley	7/24/07
PR0025294	Lake Hemet Campground Lake Hemet C	56570 Hwy 74	Mountain Center	8/29/07
PR0034947	New Cingular Wireless CA Site#48206	61600 Devils Ladder Rd	Mountain Center	3/24/08
PR0023684	A & J Mobile Truck Repair	2231 Hamner Ave	Norco	9/20/07
PR0030674	A & Y Company, Inc.	1613 Industrial Ave	Norco	7/10/07
PR0030254	Al Garcia's Truck Repair	2553 Hamner Ave	Norco	8/2/07
PR0027454	Apro #31	1488 6th St	Norco	10/18/07
PR0027447	Arco #5556/Prestige Stations #5272	3700 Hamner Ave	Norco	10/4/07
PR0027922	Arco #9708/Prestige Stations #9708	2600 Hamner Ave	Norco	12/6/07
PR0022498	Buggy World-OOB OOB	1950 S Four Wheel Dr # I	Norco	12/6/07
PR0031566	Caliber Collision Centers	2000 S Four Wheel Dr Ste.B	Norco	4/2/08
PR0023045	Car Spa	996 Mountain Ave	Norco	4/8/08
PR0033407	CC Paintball	2085 River Rd #B	Norco	10/3/07
PR0030555	Chevron SS #1883/203621	1501 6th St	Norco	1/17/08
PR0033218	Circle City Roofing	454 6th St	Norco	9/17/07
PR0033829	Circle K #341	790 6th St	Norco	8/21/07
PR0033713	Circle K 76 #2700336	1510 4th St	Norco	8/22/07
PR0033827	D. Burke Mechanical Corp	1925 Tandem Wy	Norco	10/1/07
PR0033495	Dennys #7156 Dennys #7156	1360 Hamner Ave	Norco	8/24/07
PR0019260	Dick White Radiator	396 6th St	Norco	12/20/07
PR0036926	Frahm Dodge Resale	2185 Hamner Ave	Norco	2/27/08
PR0034453	Goodyear	2935 Hamner Ave	Norco	7/3/07
PR0035240	H & R Motorsports	1666 Industrial Ave	Norco	7/10/07
PR0034489	Hot Rods Speed & Custom	1103 Hamner Ave	Norco	8/7/07
PR0034496	Industrial Process Equipment, Inc	1700 Industrial Ave	Norco	7/9/07
PR0034390	JFP Company	2078 2nd St	Norco	7/24/07

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HAZ MAT NPDES Surveys
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PR0034106	Jiffy Lube	2925 Hamner Ave	Norco	7/3/07
PR0034104	Kragen Auto Parts #1616	1050 Hamner Ave	Norco	8/22/07
PR0023403	Leon Turner Drywall	360 Buckskin Ln	Norco	8/22/07
PR0035903	Linden Stevens, DDS	1675 Hamner AVE Ste 4	Norco	10/9/07
PR0033392	Naval Surface Warfare Center	2300 5th St	Norco	2/21/08
PR0037462	No Pork Motorsports, Inc	2585 Hamner Ave Ste.B	Norco	4/3/08
PR0019489	Norco Automotive Norco Automotive	2551 Hamner Ave	Norco	8/2/07
PR0029760	Norco Equipment Rentals, LLC	1246 6th St	Norco	8/22/07
PR0019249	Norco Lube and Tune	813 6th St	Norco	8/21/07
PR0025009	Norco Ranch, Inc	1811 Mountain Ave	Norco	3/19/08
PR0033232	Norco Shell #68572	125 Hidden Valley Pkwy	Norco	3/18/08
PR0035879	Norco Valley Dental	2574 Hamner AVE	Norco	10/3/07
PR0030333	Parts Source	3311 Hamner Ave	Norco	9/13/07
PR0034563	Polly's Bakery Cafe	1799 Hamner Ave	Norco	10/2/07
PR0035998	Power Boats, Inc	938 Hamner Ave	Norco	9/24/07
PR0027826	Premier Plumbing Company	2259 Hamner Ave	Norco	12/10/07
PR0027778	Pulido's Body Shop-OOB	2535 Hamner Ave	Norco	4/24/08
PR0035267	R & DE Automotive, Inc R & DE Automot	1414 6th St	Norco	9/21/07
PR0027837	R & R Auto Radiator-OOB OOB	2533 Hamner Ave	Norco	8/7/07
PR0033455	Se-Gi Products, Inc	1900 2nd St	Norco	8/7/07
PR0024079	SOS Marketing Inc	1810 Town And Country Dr	Norco	1/30/08
PR0027812	Specialty Fabrication	1662 Industrial Ave	Norco	7/12/07
PR0037463	Total Auto Care	1950 S Four Wheel Dr #I	Norco	4/3/08
PR0035902	Troy A. Gromis, DDS, Inc	1675 Hamner AVE Ste 6	Norco	10/9/07
PR0027763	Valero Gas Norco	3840 Hamner Ave	Norco	3/26/08
PR0033859	Weld Rite	1623 Industrial Ave #A	Norco	7/10/07
PR0036906	Wienerschnitzel	3645 Hamner Ave	Norco	2/6/08
PR0024287	Wilkinson Tool Co	1622 Industrial Ave	Norco	7/12/07
PR0035744	Wingstop	140 Hidden Valley Pkwy Ste.J	Norco	9/26/07
PR0035784	J & R Environmental, Inc	31654 Meadow Blossom Rd	Nuevo	8/27/07
PR0022857	A & R Automotive A & R Automotive	121 E 1st St	Perris	5/1/08
PR0027976	A-G Sod Farms Inc	45 E Morgan St	Perris	3/19/08
PR0037034	A1 Auto Parts, Inc	23900 Hwy 74	Perris	4/11/08
PR0020238	AA Automotive-OOB OOB	28000 Hwy 74 # A	Perris	3/26/08
PR0021657	American Transportation American Trans	24755 W Hwy 74	Perris	3/26/08
PR0026191	APRO, LLC	1500 Patricia Ln	Perris	8/22/07
PR0028606	Arco #9721/Prestige Stations #9721	268 E 4th St	Perris	5/21/08
PR0033028	Arlington Sheet Metal Corp.	23332 Cajalco Rd	Perris	4/10/08
PR0034041	AutoZone #5570	401 E 4th St	Perris	2/26/08
PR0024239	Best for Less Tires	4164 N Perris Blvd	Perris	3/13/08
PR0035003	Briseno Tires	25218 Hwy 74	Perris	3/19/08
PR0026172	C R & R, Inc.	1706 Goetz Rd	Perris	5/22/08

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HAZ MAT NPDES Surveys
7/01/2007- 6/30/2008

PR0038130	Cardenas Markets #4	2560 N Perris Blvd Ste H	Perris	6/23/08
PR0035244	Cass Construction, Inc	23120 Oleander Ave	Perris	3/19/08
PR0025172	Chevron SS #1446/99947	428 S Redlands Ave	Perris	1/3/08
PR0025334	CK Gas and Mart, Inc.	216 S Perris Blvd	Perris	10/30/07
PR0019858	Dick Evans Transportation Inc	336 Ellis Ave	Perris	5/1/08
PR0023993	Dr. Transmission	425 W Rider St #C10	Perris	10/11/07
PR0029653	Econo Lube N'Tune #97	2309 N Perris Blvd	Perris	6/10/08
PR0035065	Eggleton Trucking	560 Marham Ave	Perris	3/24/08
PR0036565	El Jalapeno Market	26517 Hwy 74	Perris	1/14/08
PR0031341	EMWD - Operations & Maintenance Ctr	2270 Trumble Rd	Perris	5/6/08
PR0033070	EMWD Follico Well #57	2730 Perris Blvd	Perris	4/2/08
PR0035186	EMWD Goetz Booster	102 Goetz Rd	Perris	4/2/08
PR0033945	EMWD Good Hope Pumping Plant	410 W Third St	Perris	4/2/08
PR0033873	EMWD Harvill Booster Plant	21865 A St	Perris	4/2/08
PR0033946	EMWD Lake Perris Lift Station		Perris	4/16/08
PR0033894	EMWD Murrieta Road Booster Plant	3054 Murrieta Rd	Perris	4/2/08
PR0033895	EMWD Perry Well #56	303 Perry St	Perris	3/20/08
PR0033729	EMWD-Perris WTP	3394 Evans Rd	Perris	5/13/08
PR0024120	Extec, Inc	1090 W Oleander Ave	Perris	3/27/08
PR0025309	ExxonMobil Oil Corporation #10747	3995 Perris Blvd	Perris	1/23/08
PR0025313	ExxonMobil Oil Corporation #11503	1675 N Perris Blvd	Perris	11/16/07
PR0028202	Ferrellgas	801 S D St	Perris	4/17/08
PR0030028	Fredlov, Inc.	1278 W Nance St	Perris	4/10/08
PR0036835	Garcia Juarez Construction Company	4517 Wade Ave	Perris	3/13/08
PR0028226	Golden West Homes	3100 N Perris Blvd	Perris	12/14/07
PR0034228	Jack in the Box #0154	500 E 4th St	Perris	2/26/08
PR0035245	Jeff Carpenter, Inc Jeff Carpenter, Inc	1380 W Oleander Ave	Perris	7/25/07
PR0038064	Jiffy Lube #3294	118 E Ramona Expressway	Perris	6/17/08
PR0026692	Joe's Circle K & 76	19248 Harvill Ave	Perris	9/19/07
PR0022125	Mario Repair Mario Repair	102 S D St	Perris	5/1/08
PR0019983	Max Equipment Rental	350 W Mapes Rd	Perris	4/10/08
PR0031313	Meadowbrook Market	27215 Hwy 74	Perris	3/26/08
PR0029779	Modtech, Inc.	2830 Barrett Ave	Perris	6/2/08
PR0027174	MWD/Perris Power Plant	27500 Ramona Expwy	Perris	2/26/08
PR0025320	National RV, Inc-OOB OOB	3411 N Perris Blvd	Perris	11/8/07
PR0028384	OK Service Sales Inc	240 E 1st St	Perris	11/21/07
PR0031262	One Stop Batteries	24215 1/2 Hwy 74	Perris	1/14/08
PR0037692	Paul Furman-OOB OOB	16111 Cajalco Rd	Perris	4/29/08
PR0037301	Peed Equipment Co.	25911 Hwy 74 Ste.B	Perris	3/31/08
PR0025377	Perris Shell	490 E San Jacinto Ave	Perris	10/12/07
PR0026139	Perris Shell #68585	4039 N Perris Blvd	Perris	2/5/08
PR0024037	Perris Transmission	3553 N Perris Blvd Ste 1	Perris	2/15/08

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HAZ MAT NPDES Surveys
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PR0035836	Pizza Hut	1675 N Perris Blvd	Perris	3/19/08
PR0024295	Pump Doctor, LLC	27410 Hwy 74	Perris	3/19/08
PR0026614	Safar & Safar Brothers', Inc	4040 N Perris Blvd	Perris	1/29/08
PR0035189	Temp Power Systems	480 Oleander Ave	Perris	3/18/08
PR0025419	Vazirian, Inc	33 W Nuevo Rd	Perris	1/30/08
PR0036843	Verizon Wireless (Antelope)	27931 Ramona Expressway	Perris	6/18/08
PR0036527	Verizon Wireless (Clay Pot)	3977 N Perris Blvd	Perris	6/18/08
PR0032679	Verizon Wireless (Nuevo Site)	300 Metz Rd	Perris	6/23/08
PR0025255	Verizon/Service Group	120 E Third St	Perris	10/9/07
PR0020278	Wal-Mart #1747	2560 N Perris Blvd	Perris	7/23/07
PR0028246	Verizon/Quail Valley CO	29655 Goetz Rd	Quail Valley	10/9/07
PR0022985	1 Hour Express Cleaners	10491 Magnolia Ave # C	Riverside	1/30/08
PR0018685	5-Point Auto Service	11096 Hole Ave	Riverside	6/17/08
PR0018390	Aamco Transmissions	3595 Market St	Riverside	11/8/07
PR0019640	Abrasive Blasting	5465 24th St	Riverside	9/20/07
PR0018391	Accuturn Corp	6510 Box Springs Blvd #A	Riverside	12/18/07
PR0018686	Ace Lube N Tune	10190 Hole Ave	Riverside	1/28/08
PR0023538	Acorn Technology Corporation	1960 Chicago Avenue #E9/F	Riverside	1/24/08
PR0018648	Acura Of Riverside	8001 Auto Dr	Riverside	11/21/07
PR0034389	Adams Cart Track Adams Cart Track	5292 24th St	Riverside	9/19/07
PR0018394	Adams Service	11035 Wells Ave	Riverside	4/14/08
PR0018396	Advanced Import Auto Repair	7304 Indiana Ave #3	Riverside	2/19/08
PR0024734	AGA, LLC	1308 University Ave	Riverside	4/30/08
PR0018399	Al's Machine & Auto Repair-OOB OOB	10785 Hole Ave	Riverside	2/7/08
PR0019082	Alcorn Fence Co	6445 Pedley Rd	Riverside	4/28/08
PR0018447	Alfonso Auto Repair	3159 Kluk Ln	Riverside	11/2/07
PR0018432	All City Automotive	7664 Indiana Ave	Riverside	2/20/08
PR0018401	All Tech Tune Up	8651 Indiana Ave # N&O	Riverside	2/28/08
PR0018402	All Tune and Lube	6000 Arlington Ave	Riverside	11/5/07
PR0026114	Allsup's Convenience Store	1703 Main St	Riverside	4/16/08
PR0018405	Alpha Cleaners	3430 La Sierra Ave #A	Riverside	12/11/07
PR0018888	Alvarez Mercury Lincoln, Inc. Alvarez Me	8051 Auto Dr	Riverside	12/3/07
PR0023611	AME Manufacturing, Inc-OOB OOB	5867 Jasmine St	Riverside	2/26/08
PR0018412	Aquarius Water Equipment	12799 Magnolia Ave	Riverside	10/30/07
PR0023509	Arco	3685 Valley Way	Riverside	3/18/08
PR0018425	Arco #5168 Prestige Stations 0665	3659 Central Ave	Riverside	5/22/08
PR0018419	Arco #5679/Prestige Stations #5347	11887 Magnolia Ave	Riverside	5/7/08
PR0018421	Arco #6345/Prestige Stations #6345	2624 E Alessandro Blvd	Riverside	6/19/08
PR0018989	Arco #9710/prestige Stations #9710	4930 Van Buren Blvd	Riverside	8/23/07
PR0018990	Arco #9711/prestige Stations #9711	3399 Van Buren Blvd	Riverside	4/24/08
PR0018991	Arco #9712/prestige Stations #9712	3570 Central Ave	Riverside	5/21/08
PR0018993	Arco #9714/Prestige Stations #9714	1294 University Ave	Riverside	6/10/08

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HAZ MAT NPDES Surveys
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PR0026411	Arco Am/Pm Mini Mart	17905 Van Buren Blvd	Riverside	8/8/07
PR0032544	Arco/Churches Chicken	10015 Bellegrave Ave	Riverside	6/10/08
PR0018760	Arlington Smog Pro-OOB OOB	8970 Arlington Ave	Riverside	5/9/08
PR0023651	Armex APR	7545 Jurupa Ave #E&F	Riverside	3/7/08
PR0027457	Arts Rainbow Transmission	9990 Mission Blvd	Riverside	2/8/08
PR0026828	Astro Seal Inc	827 Palmyrita Ave #B	Riverside	5/7/08
PR0035745	Autlan Auto Repair	3761 Arora ST	Riverside	9/27/07
PR0022069	Automotive Technical Services	3265 Van Buren Blvd #A&B	Riverside	4/21/08
PR0036027	AutoZone #5547	1947 University Ave	Riverside	10/23/07
PR0037629	AutoZone #5576	6047 Magnolia Ave	Riverside	4/9/08
PR0023835	AutoZone #5578	3400 La Sierra Ave #E	Riverside	12/12/07
PR0018449	Bauman's Tow Service Inc	1944 Spruce St	Riverside	1/16/08
PR0030780	Bear Forest Products	4685 Brookhollow Cir #1	Riverside	10/9/07
PR0022825	Ben Clymer's The Bodyshop Ben Clymer	12295 Magnolia Ave	Riverside	3/17/08
PR0022067	Big O Tires	11820 Magnolia Ave	Riverside	3/11/08
PR0018463	Bloch & Shelton Garage	3764 Comer Ave	Riverside	11/6/07
PR0018464	Blue Banner Co Inc	2601 3rd St	Riverside	10/30/07
PR0023983	Blue Rhino	1750 Agua Mansa Rd	Riverside	7/10/07
PR0023539	BMW of Riverside	3060 Adams St	Riverside	6/30/08
PR0023037	Box Springs Station	5720 Sycamore Canyon Blvd	Riverside	6/4/08
PR0024069	Brake Masters	9450 Indiana Ave	Riverside	2/22/08
PR0018452	British Sports & Imports-OOB OOB	4481 Brockton Ave	Riverside	3/5/08
PR0018475	Brookhurst Mill	3315 Van Buren Blvd	Riverside	3/6/08
PR0018995	Bud's Tire and Wheel, Inc	8651 Indiana Ave #F&M	Riverside	2/22/08
PR0018871	Burke's Automotive Repair	3757 Comer Ave	Riverside	11/6/07
PR0022840	Burrtec Waste Industries, Inc.	1830 Agua Mansa Rd	Riverside	7/10/07
PR0031541	Burrtec Waste Industries,Agua Mansa	1850 Agua Mansa Rd	Riverside	5/12/08
PR0018683	Caliber Collision Centers	6634 Indiana Ave	Riverside	11/7/07
PR0018709	California Citrus	859 Center St	Riverside	10/16/07
PR0018489	California Highway Patrol	8118 Lincoln Ave	Riverside	9/5/07
PR0024312	Carpenter Co	7809 Lincoln Ave	Riverside	11/7/07
PR0027492	CDF-West Riverside 18	7545 Mission Blvd	Riverside	1/31/08
PR0022505	CDG Materials/Trencher West	5971 Jurupa Ave	Riverside	3/11/08
PR0023807	Central City Enterprises	5935 Rickenbacker Ave	Riverside	6/3/08
PR0018987	Central Shell	3498 Central Ave	Riverside	1/9/08
PR0019031	Champion Auto Service	10206 Hole Ave #100	Riverside	2/7/08
PR0021677	Chevron	2200 Alessandro Blvd	Riverside	1/11/08
PR0018513	Chevron 94702, Eli's	3476 Van Buren Blvd	Riverside	7/26/07
PR0019019	Circle K #2705693	9501 Indiana Ave	Riverside	6/2/08
PR0024874	Circle K #5063	8190 Mission Blvd	Riverside	12/20/07
PR0027899	Circle K #5203	6290 Mission Blvd	Riverside	3/27/08
PR0025062	Circle K #5245	6105 Clay St	Riverside	3/17/08

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HAZ MAT NPDES Surveys
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PR0025063	Circle K #5247	5804 Mission Blvd	Riverside	2/7/08
PR0018522	Circle K #801	18965 Van Buren Blvd	Riverside	6/9/08
PR0018962	Circle K Store, #2705248	3950 Pierce St UnitA	Riverside	3/31/08
PR0018524	City Body & Frame City Body & Frame	2910 14th St	Riverside	11/5/07
PR0022772	Cleaners Club, Inc	11660 Sterling Ave	Riverside	4/7/08
PR0019335	Cole Equipment Inc	2830 Rubidoux Blvd	Riverside	5/19/08
PR0019020	ConocoPhillips Co #255856	1395 Blaine St	Riverside	3/25/08
PR0018544	Corona College Heights Orange Assoc	8000 Lincoln Ave	Riverside	12/13/07
PR0018545	Country Club Cleaners-OOB OOB	4812 La Sierra Ave	Riverside	12/11/07
PR0036901	County of Riverside Fleet Services	5293 Mission Blvd	Riverside	2/5/08
PR0037620	Cruzen Automotive	3419 Arlington Ave	Riverside	4/10/08
PR0023742	CVS Pharmacy #9849	8280 Magnolia Ave	Riverside	5/5/08
PR0021994	D.P. Auto	3265 Van Buren Boulevard #E-	Riverside	4/14/08
PR0037038	Dalcar Auto Repair	2391 Main St	Riverside	3/4/08
PR0022225	Day Street Shell	6189 Day St	Riverside	4/29/08
PR0018678	Dealer Services of Riverside	7726 California Ave	Riverside	11/1/07
PR0022383	Dental Care Of Riverside	1325 Blaine St	Riverside	12/3/07
PR0034754	DHL Express	17101 Heacock St #A	Riverside	6/12/08
PR0023128	Direct Home Delivery Service, Inc.	9470 Mission Blvd #F	Riverside	1/30/08
PR0022488	DriveTime Car Sales, Inc	8341 Indiana Ave	Riverside	2/25/08
PR0036922	Dunn-Edwards Paints	2550 Canyon Springs Pkwy #B	Riverside	3/12/08
PR0024374	Duracoat Products Inc	5361 Via Ricardo	Riverside	5/8/08
PR0018638	E-Z Lube #116 E-Z Lube #116	7437 Arlington Ave	Riverside	11/15/07
PR0018637	E-Z Lube #117 E-Z Lube #117	3417 Arlington Ave	Riverside	5/15/08
PR0030074	Econo Fence Company	5261 Pedley Rd	Riverside	5/6/08
PR0018586	Econo Lube N'Tune #17-OOB OOB	3398 Mission Inn Ave	Riverside	3/18/08
PR0018590	Ed Martin Garage Inc	6672 Indiana Ave	Riverside	4/4/08
PR0019283	EJay Components Inc	6471 Mission Blvd	Riverside	1/31/08
PR0019589	Engineered Air Systems, Inc.	4298 Campbell St #1	Riverside	10/11/07
PR0020070	Erwin Plastics Custom Injection	4776 Felspar	Riverside	10/16/07
PR0018764	Exxon Mobil Oil Corporation	7290 Arlington Ave	Riverside	5/12/08
PR0018763	ExxonMobil Oil Corporation	1147 University Ave	Riverside	2/26/08
PR0018772	ExxonMobil Oil Corporation #10773	3399 Adams St	Riverside	6/6/08
PR0027762	ExxonMobil Oil Corporation #12342	6824 Valley Wy	Riverside	4/4/08
PR0023487	Fairway Landscape & Irrigation, Inc	4223 Alamo St	Riverside	12/4/07
PR0018604	Fastrip Food Store #16	10306 Arlington Ave	Riverside	11/29/07
PR0021737	Fiberglass Reinforced Products	12350 Doherty St	Riverside	12/18/07
PR0018606	Firestone Store #2256	4199 Market St	Riverside	11/7/07
PR0021854	Fleetwood Enterprises	7007 Jurupa Ave	Riverside	3/10/08
PR0027634	Fleetwood Motor Homes	5300 Via Ricardo	Riverside	12/6/07
PR0027633	Fleetwood Motor Homes Of CA	2350 Fleetwood Dr	Riverside	12/6/07
PR0021265	Fletchall's Empire Auto Works	10180 Hole Ave #600	Riverside	1/24/08

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HAZ MAT NPDES Surveys
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PR0023411	Food 4 Less #343	4250 Van Buren Blvd #B	Riverside	5/29/08
PR0019254	Food Express	4720 Brookhollow Cir	Riverside	5/8/08
PR0024025	Friendly Automotive Service	3399 Arlington Ave	Riverside	5/15/08
PR0037782	Future Tech Metals	2926 Rubidoux Blvd	Riverside	4/29/08
PR0018743	G & M Oil Co. #29	8283 Arlington Ave	Riverside	5/8/08
PR0023366	G.T. Fast Mart	7494 Indiana Ave	Riverside	5/28/08
PR0024818	Gas N' Go	8790 Mission Blvd	Riverside	3/11/08
PR0018507	Gasco Oil	5305 Arlington Ave	Riverside	5/15/08
PR0024538	GBS Enterprise, Inc	2720 14th St	Riverside	5/12/08
PR0025050	Glen Avon Shell #68537	10171 Mission Blvd	Riverside	1/28/08
PR0023323	Gutierrez Auto Repair	12490 Magnolia Ave #F	Riverside	3/17/08
PR0018903	H & L's Armstrong Transmission	8651 Indiana Avenue # R&S	Riverside	2/28/08
PR0018540	H & R Construction Parts, Inc	5924 Fremont St	Riverside	1/22/08
PR0027038	Hertz Equipment Rental	929 W La Cadena Dr	Riverside	4/14/08
PR0018556	HI-Rel Corporation	7575 Jurupa Ave	Riverside	6/11/08
PR0027449	High Desert Oil Co Inc #596	8677 Limonite Ave	Riverside	5/27/08
PR0018653	Highlander Cleaners	3566 Adams St	Riverside	11/5/07
PR0018518	Holmes Body Shop - Riverside, Inc.	3860 Buchanan Ave	Riverside	12/13/07
PR0022948	Home Depot #6619	3323 Madison St	Riverside	3/11/08
PR0022437	Hydra Force Inc	7383 Orangewood Dr	Riverside	1/29/08
PR0018658	Ideal Cleaners	3951 Beatty Dr	Riverside	11/14/07
PR0018767	Imperial Stations, Inc. #3	3315 14th St	Riverside	12/12/07
PR0022792	Indiana Car Care	8651 Indiana #J	Riverside	2/22/08
PR0018661	Industrial Engineering & Equipment	6734 Doolittle Ave # C	Riverside	1/23/08
PR0019365	Inland Concrete Enterprises	2434 Rubidoux Blvd	Riverside	5/19/08
PR0031287	Inland Empire Foods	5425 Wilson St	Riverside	10/5/07
PR0018936	Inland Gas	6011 Magnolia Ave	Riverside	6/5/08
PR0021826	Inland Rovers	10180 Hole Ave #100	Riverside	1/24/08
PR0018673	Insta Lube & Tune-OOB OOB	4399 Main St	Riverside	6/3/08
PR0022805	Irish Cleaners	11130 Magnolia Ave #F	Riverside	1/30/08
PR0023693	Irvine Pipeline Co., Inc	5959 Jasmine St	Riverside	2/28/08
PR0037367	Jack's Auto Repair	2989 Tenth St	Riverside	3/31/08
PR0021518	Jiffy Lube	2634 Alessandro Blvd	Riverside	3/17/08
PR0035542	Jim's Auto Repair	9764 Magnolia ST	Riverside	8/30/07
PR0023995	JRW Equipment, Inc	6890 Doolittle Ave #A	Riverside	6/10/08
PR0027705	Jurupa Community Services District Juru	10124 Limonite Ave	Riverside	12/4/07
PR0018692	Jurupa Radiator Service	6611 Jurupa Ave	Riverside	3/10/08
PR0037448	K-Mart #3106	7200 Arlington Ave	Riverside	3/31/08
PR0036577	K-Mart #7175	7840 Limonite Ave	Riverside	1/10/08
PR0036754	Kentucky Fried Chicken	7970 Limonite Ave	Riverside	1/29/08
PR0030948	Kragen Auto Parts #769	8702 Limonite Ave	Riverside	1/14/08
PR0019435	Kretschmar & Smith Inc	6293 Pedley Rd	Riverside	4/17/08

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HAZ MAT NPDES Surveys
7/01/2007- 6/30/2008

PR0018707	L & M Friction Materials Inc	2993 14th St	Riverside	5/8/08
PR0018711	La Sierra Plaza Cleaners	3862 La Sierra Ave	Riverside	12/11/07
PR0018741	Laidlaw Transit Inc	10365 Keller Ave Section #A	Riverside	1/28/08
PR0022943	Lubrication/Environmental Equipment Lu	12315 Doherty St	Riverside	12/19/07
PR0019439	Luke's Transmissions, Inc	6133 Mission Blvd	Riverside	1/24/08
PR0019068	Lukes Auto Body	6105 W Mission Blvd	Riverside	1/24/08
PR0036335	Magnolia Machine Shop	3023 Kansas Ave	Riverside	11/27/07
PR0023994	Main Auto Sales Main Auto Sales	5943 Republic St	Riverside	2/7/08
PR0035851	Malcolm Smith Motorcylcles	7599 Indiana Ave	Riverside	2/20/08
PR0034740	March Fueling Services-OOB OOB	17305 Heacock Ave	Riverside	5/29/08
PR0024398	Merit Oil Company	1751 3rd St	Riverside	6/12/08
PR0022204	Metal Container Corporation	7155 Central Ave	Riverside	11/16/07
PR0022869	MGM Shell	3873 Pyrite St	Riverside	5/15/08
PR0018757	Military Department	2501 Fairmount Ct	Riverside	6/17/08
PR0022834	Miller's Fab & Weld Corporation	6100 Industrial Ave	Riverside	6/10/08
PR0023547	MLM Truck & Auto Repair - OOB	2989 10th St	Riverside	9/4/07
PR0018792	Moon's Transmission & Automotive	11881 Magnolia Ave #30	Riverside	10/1/07
PR0022984	Moreno's General Auto Repair	4791 Doane Ave # C	Riverside	12/14/07
PR0023634	Morgan Corporation	7888 Lincoln Ave #A	Riverside	6/27/08
PR0018794	Moss Motors	8151 Auto Dr	Riverside	12/4/07
PR0019583	Mostamand, Inc	6100 Clay St	Riverside	3/26/08
PR0027173	MWD/Lake Mathews Reservoir	18250 La Sierra Ave	Riverside	3/4/08
PR0018858	Najjar Lube Centers Inc	3693 La Sierra Ave	Riverside	12/12/07
PR0022028	Nolbert's Auto Service	5942 Republic St	Riverside	4/17/08
PR0036547	O'Connell Racing, LLC	6141 Quail Valley Ct	Riverside	1/2/08
PR0027920	Oglebay Norton Industrial	2157 Avalon St	Riverside	10/9/07
PR0022773	Old Quaker / Sherwin Williams	8625 Indiana Ave	Riverside	2/25/08
PR0023129	Otwell's Auto And Tire Care	7304 Indiana Ave # 1	Riverside	2/11/08
PR0021185	Pacific Auto Body Pacific Auto Body	10369 Arlington Ave	Riverside	11/14/07
PR0018816	Pacific Bell LB-690	3073 Adams St	Riverside	11/16/07
PR0018635	Pacific Consolidated Industries	12201 Magnolia Ave	Riverside	4/4/08
PR0018817	Palm Cleaners	10247 Magnolia Ave	Riverside	1/29/08
PR0022295	Parkview Ctr For Occupational Med	9041 Magnolia Ave #107	Riverside	5/5/08
PR0036678	Patron Auto Repair	4779 Hiers Ave	Riverside	1/23/08
PR0018826	Pepsi Bottling Group	6659 Sycamore Canyon Blvd	Riverside	8/2/07
PR0018827	Performance Auto Care	11883 Magnolia Ave # 40	Riverside	3/17/08
PR0018806	Photoworld	1039 Galleria At Tyler	Riverside	1/16/08
PR0023655	Pierce Automotive	10941 Hole Ave	Riverside	2/8/08
PR0018831	Pine Center Cleaners	4644 Pine St	Riverside	4/7/08
PR0023429	Platinum One Enterprises, Inc.	2225 Via Cerro Ave #A	Riverside	11/27/07
PR0023545	Plaza Cleaners	8304 Limonite Ave Ste.G	Riverside	5/7/08
PR0018833	Plaza Cleaners	6786 Brockton Ave	Riverside	3/11/08

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HAZ MAT NPDES Surveys
7/01/2007- 6/30/2008

PR0018838	Poma Automated Fueling-Site 6	3020 E La Cadena Dr Ste A	Riverside	1/16/08
PR0022030	Precision Motion	2805 Chicago Ave	Riverside	5/14/08
PR0018841	Precision Technology-OOB OOB	3147 Durahart St	Riverside	1/23/08
PR0022614	Quality Transmissions & Auto Repair	7010 Jurupa Rd	Riverside	12/17/07
PR0019033	Quicklane/Fritts Ford	7990 Auto Dr	Riverside	1/24/08
PR0018866	Rapid Gas #37	6020 Arlington Ave	Riverside	8/27/07
PR0018619	RBS Petrol, Inc	4975 Van Buren Blvd	Riverside	6/5/08
PR0027231	RCR Companies	12620 Magnolia Ave	Riverside	1/22/08
PR0022867	Ritz Camera & Image	9590 Magnolia Ave	Riverside	5/5/08
PR0022195	Riverside Aerial Labs, Inc	6865 Flight Rd	Riverside	1/16/08
PR0018439	Riverside Auto Auction	6446 Fremont St A & C	Riverside	11/28/07
PR0036679	Riverside Auto Service & Sales	4778 Hiers Ave	Riverside	1/23/08
PR0018415	Riverside Better Gas, Inc	6287 Day St	Riverside	5/29/08
PR0018880	Riverside Carburetor & Electric Inc	4600 Palm Ave	Riverside	4/7/08
PR0019555	Riverside Cement Company	1500 A-Rubidoux Blvd Section	Riverside	10/3/07
PR0025922	Riverside City/Lincoln Maint Yard Riversi	8095 Lincoln Ave	Riverside	12/7/07
PR0018418	Riverside Gas Mart	4196 Van Buren Blvd	Riverside	5/8/08
PR0018601	Riverside Lube Express	11850 Magnolia Ave	Riverside	5/6/08
PR0018891	Riverside Medical Clinic Riverside Medic	3660 Arlington Ave	Riverside	1/23/08
PR0018857	Riverside Metro Auto Center	8330 Indiana Ave	Riverside	2/25/08
PR0024404	Riverside Mini-Mart Inc	1855 Columbia Ave	Riverside	5/8/08
PR0030146	Riverside Mining Limited	3500 Pyrite St	Riverside	5/7/08
PR0018770	Riverside Ultramar	1360 W Blaine St	Riverside	6/16/08
PR0018904	Rizzco Automotive, Inc	6110 Jurupa Ave	Riverside	3/10/08
PR0022693	Robertson Ready Mix	6120 20th St	Riverside	9/18/07
PR0035876	Rubidoux Auto Service & Smog	5407 Mission BLVD	Riverside	10/1/07
PR0022266	Sacto Auto Repair	11009 Hole Ave	Riverside	2/8/08
PR0018923	Sam's Cleaners	4549 La Sierra Ave	Riverside	12/12/07
PR0018624	Saturn of Riverside	8101 Auto Dr	Riverside	12/3/07
PR0019502	SBC/Pacific Bell LB-150	4821 Pedley Rd	Riverside	3/25/08
PR0030615	SCE Glen Avon/Valley Substation		Riverside	5/14/08
PR0030621	SCE Rubidoux/Valley Substation	4059 Riverview Dr	Riverside	5/14/08
PR0018931	Seven Eleven #16552(2111)	16970 Van Buren Blvd	Riverside	5/13/08
PR0025893	Seven Eleven #16825 (2111)	6060 Camino Real	Riverside	10/31/07
PR0018633	Shell Oil Products US	3261 Iowa Ave	Riverside	12/27/07
PR0036340	Sherwin-Williams Company	1560 Linden St	Riverside	11/28/07
PR0022139	Sierra Aluminum Architectural	2235 Via Cerro	Riverside	12/4/07
PR0018881	Singh Chevrolet	8200 Auto Dr	Riverside	12/5/07
PR0024328	Skanska	1995 Agua Mansa Rd	Riverside	6/11/08
PR0023521	Skip Fordyce Motorcycle Inc.	7688 Indiana Ave	Riverside	2/25/08
PR0018953	Southern California Gas Company	4495 Howard Ave	Riverside	11/1/07
PR0018621	Sparkman's Garage	5958 Jasmine St	Riverside	2/27/08

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HAZ MAT NPDES Surveys
7/01/2007- 6/30/2008

PR0032927	Sprint Nextel	6446 Canal St	Riverside	1/31/08
PR0030740	Sprint Nextel (CA5231-Pedley Hills)	7171 Sedona Dr	Riverside	1/9/08
PR0033127	Sprint Nextel (CA6722-Market)	2255 Via Cerro	Riverside	9/25/07
PR0018946	Subaru of Riverside	7840 Indiana Ave	Riverside	2/14/08
PR0021550	Supershine Auto Wash	3898 Opal St	Riverside	4/10/08
PR0022149	Swift Concrete Transport	2532 Rubidoux Blvd	Riverside	5/28/08
PR0037623	T-Mobile USA Site (IE24064A)		Riverside	4/17/08
PR0034253	T-Mobile USA, Inc	3470 Country Village Rd	Riverside	2/4/08
PR0034254	T-Mobile USA, Inc	7621 Granite Hill Dr #A	Riverside	10/16/07
PR0034252	T-Mobile USA, Inc	3310 Muriel Dr	Riverside	2/27/08
PR0029754	Ta Rivard, Inc.	5494 Pedley Rd	Riverside	5/5/08
PR0018516	The Chopper Place	4791 Doane Ave Ste.A	Riverside	12/13/07
PR0022487	The Glidden Co. #29/75-771-0-100	6655 Indiana Ave	Riverside	11/5/07
PR0023636	The Masonry Group, LP	8188 Lincoln Ave #100	Riverside	1/28/08
PR0018930	Top Quality #2 Top Quality #2	285 Iowa Ave	Riverside	1/31/08
PR0018998	Toro Company The #174668	5825 Jasmine St	Riverside	11/21/07
PR0035214	Total Airport Service, Inc	17305 Heacock Ave Ste.A	Riverside	5/29/08
PR0023176	Towne Center Cleaners	6139 Magnolia Ave	Riverside	4/8/08
PR0019001	Toyota Pros & Muffler	11881 Magnolia Ave #20	Riverside	3/12/08
PR0021596	Transmission & Repair Specialist Transn	2945 14th St	Riverside	4/9/08
PR0018617	Truck Town	2748 14th St	Riverside	5/14/08
PR0021696	Ultimate Performance Auto	8584 Limonite Ave	Riverside	1/11/08
PR0019018	Union 76	2278 Main St	Riverside	5/27/08
PR0018582	Union 76	350 Stephens Ave	Riverside	5/5/08
PR0019013	United Parcel Service	1391 Spruce St	Riverside	9/7/07
PR0023330	V & G Body Shop	12510 Magnolia Ave #C	Riverside	6/4/08
PR0018771	Valero	10290 Magnolia Ave	Riverside	5/6/08
PR0025001	Valero-OOB OOB	5599 Mission Blvd	Riverside	9/17/07
PR0019029	Valley Printers Inc	2180 Iowa Ave	Riverside	11/13/07
PR0027953	Varner Construction, Inc.	1893 Brown Ave	Riverside	10/10/07
PR0019665	Vega's Radiator/Muffler	5451 Mission Blvd	Riverside	9/27/07
PR0034628	Verizon Wireless March ARB	22550 Van Buren Blvd A	Riverside	6/18/08
PR0036001	Verizon Wirless (Country Village)	10251 Country Village Dr	Riverside	10/23/07
PR0024319	Vertis, Incorporated	7190 Jurupa Ave	Riverside	3/7/08
PR0023725	VM International	2950 Jefferson St #C&D	Riverside	3/5/08
PR0018850	Walden Structures, Inc	3100 Jefferson Ave	Riverside	4/17/08
PR0027960	Walker Evans Enterprises	2304 Fleetwood Dr	Riverside	11/14/07
PR0023043	Wayne's Rebuilders & Auto Parts Wayne	1710 Main St	Riverside	3/20/08
PR0027400	Western Municipal Water District	16451 El Sobrante Rd	Riverside	1/16/08
PR0019046	Wiest Rentals & Sales	3890 Pierce St	Riverside	6/18/08
PR0021790	WLW German Car Service-OOB OOB	11883 Magnolia Ave # 45	Riverside	5/6/08
PR0032608	Arco AM/PM	26050 Menifee Rd	Romoland	5/28/08

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HAZ MAT NPDES Surveys
7/01/2007- 6/30/2008

PR0021919	Asphalt & Concrete Recycling	25630 Trumble Rd	Romoland	4/17/08
PR0028087	Chaney's Auto Repair	27411 Ethanac Rd	Romoland	3/19/08
PR0028180	EMWD Vista Pumping Plant	24510 Menifee Rd	Romoland	4/16/08
PR0025284	Grove Lumber	27126 Watson Rd	Romoland	7/18/07
PR0024247	Hertz Equipment Rental	25110 Trumble Rd # B	Romoland	12/12/07
PR0028391	Orco Block Company Inc	26380 Palomar Rd	Romoland	4/10/08
PR0026043	Robertson Ready Mix	27050 Watson Rd	Romoland	1/16/08
PR0020163	Santa Fe Auto Salvage	27687 Jackson Ave	Romoland	3/27/08
PR0020179	Skip Edmunson Corporation	25110 Trumble Rd	Romoland	4/4/08
PR0034823	Spanky's Portable Services, Inc	27762 Hwy 74	Romoland	3/19/08
PR0028630	UPS - Hemet Center	25283 Sherman Rd	Romoland	9/7/07
PR0019070	Accent Autobody Frame & Paint	4060 Riverview Dr	Rubidoux	5/14/08
PR0033384	Autozone Store #5580	3782 Riverview Dr	Rubidoux	5/13/08
PR0030846	U.S. Rubber Recycling, Inc	2225 Via Cerro # B	Rubidoux	12/13/07
PR0036482	Acosta Auto Repair	1015 S San Jacinto Ave	San Jacinto	1/29/08
PR0025106	Agri-Empire	630 7th St	San Jacinto	11/1/07
PR0023796	Alfredo Auto Repair	700 S State St #B	San Jacinto	4/29/08
PR0028003	Arco #5543-OOB OOB	833 N Ramona Blvd	San Jacinto	2/21/08
PR0028008	Arco #82553	687 S San Jacinto Ave	San Jacinto	8/13/07
PR0025164	Chevron SS #1483/200374	720 W Ramona Expwy	San Jacinto	1/8/08
PR0024308	Diesel Tech	1685 S State St #C	San Jacinto	8/8/07
PR0028223	Excel Rental Center	1005 S State St	San Jacinto	7/12/07
PR0025231	Fastrip Food Store #12-777	692 S San Jacinto Ave	San Jacinto	12/18/07
PR0030300	Mike McComas's Auto Body Repair	1363 S Buena Vista St	San Jacinto	1/11/08
PR0025316	Mt San Jacinto Community College	1499 N State St	San Jacinto	11/1/07
PR0022381	Pirot's Auto Repair	1685 S State St #A	San Jacinto	8/7/07
PR0032537	Talley Metal Fabrication	989 W 7th St	San Jacinto	7/2/07
PR0028110	Valero Shop 'N' Go Food Stores	697 S State St	San Jacinto	7/12/07
PR0025258	Verizon California, Inc. San Jacint	699 N State St	San Jacinto	6/26/08
PR0028230	Wright Septic Tank Pumping	511 N Dillon Ave	San Jacinto	10/24/07
PR0024252	Amerc, Inc	26443 Hull St	Sun City	5/27/08
PR0034542	CDF-Sun City FS7	27860 Bradley Rd	Sun City	8/2/07
PR0026663	Circle K Union 76 #6003	29955 Haun Rd	Sun City	4/28/08
PR0027316	EMWD EMWD	26905 Barnett Rd	Sun City	9/7/07
PR0028186	EMWD Murrieta Booster	25877 Murrieta Rd	Sun City	9/7/07
PR0033921	EMWD Sun City WRF	29285 Valley Blvd #A	Sun City	9/7/07
PR0030463	SCE Newcomb/Valley Substation		Sun City	9/4/07
PR0025393	Valero #80	27181 McCall Blvd	Sun City	6/9/08
PR0025378	Valero 24-7 Valero 24-7	26730 McCall Blvd	Sun City	2/25/08
PR0028251	Verizon/Sun City CO	29310 Bradley Rd	Sun City	6/4/08
PR0025260	Verizon California, Inc. Valle Vist	25705 Fairview Ave	Valle Vista	6/26/08
PR0019090	Arco #5644/Prestige Stations-OOB OOB	33986 Orange St	Wildomar	7/9/07

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HAZ MAT NPDES Surveys
7/01/2007- 6/30/2008

PR0023744	Bear Creek Service Station, Inc	36228 Hidden Springs Rd	Wildomar	8/7/07
PR0023319	Clinton Keith Chevron	23805 Clinton Keith Rd #1	Wildomar	9/5/07
PR0034668	EMWD Palomar Recycled Water Pump S	21442 Palomar St	Wildomar	9/7/07
PR0036681	Grease Monkey Wildomar	32120 Clinton Keith Rd	Wildomar	2/14/08
PR0019968	IMM Auto Repair Inc	21299 Palomar Rd	Wildomar	5/1/08
PR0019568	Round Up Liquor & Deli	20651 Palomar St	Wildomar	11/27/07
PR0023473	USA Station #68238	23905 Catt Rd	Wildomar	8/22/07
PR0035070	Carl's Jr #1519	30604 Benton Rd	Winchester	9/19/07
PR0032774	CDF-Winchester Station 34	32665 Haddock St	Winchester	8/7/07
PR0032699	County Of Riverside Lake Skinner Re	37701 Warren Rd # B	Winchester	7/31/07
PR0024187	CVS Pharmacy #8848	30736 Benton Rd	Winchester	7/16/07
PR0034395	French Valley Chevron	30616 Benton Rd	Winchester	10/9/07
PR0029588	Stiefel Dairy	32750 Holland Rd	Winchester	8/27/07
Total				
Santa Margarita Watershed				
PR0034651	AT&T Mobility (25866)	42730 Hwy 79 #A	Aguanga	3/24/08
PR0034922	AT&T Mobility (41559)	45525 Hwy 79	Aguanga	3/24/08
PR0035122	AT&T Mobility (42493)	46900 Hwy 371	Aguanga	3/24/08
PR0025388	Stagecoach Inn	43851 Hwy 79	Aguanga	4/22/08
PR0026209	A Mart Gas	56245 Hwy 371	Anza	5/8/08
PR0034653	AT&T Mobility (12409)	39110 Contreras Rd #A	Anza	3/24/08
PR0035121	AT&T Mobility (57526)	54752 Cave Rock Rd	Anza	3/24/08
PR0025185	Circle K #2700736 Circle K #2700736	56621 Hwy 371	Anza	4/7/08
PR0021858	Dignitary Downs, LLC	42250 Terwilliger Rd	Anza	6/17/08
PR0033570	T-Mobile USA, Inc	54752 Cave Rock Rd	Anza	4/2/08
PR0020269	Valley Auto	58581 Hwy 371 (Cahuilla Rd)	Anza	10/16/07
PR0021687	Wilson Auto Repair	37750 N Aurora Ln	Anza	4/7/08
PR0026665	7 Eleven #33062	41260 Murrieta Hot Sprgs Rd	Murrieta	11/14/07
PR0030227	Agriscape	37760 Borel Rd	Murrieta	8/3/07
PR0023474	Albertson's #6734	39224 Winchester Rd	Murrieta	5/15/08
PR0029945	Arco 5934/Prestige Stations #5471	41240 Kalmia St	Murrieta	3/11/08
PR0026202	California Oaks Shell	40981 California Oaks Rd	Murrieta	6/19/08
PR0034876	Carl's Jr #1520	28023 Scott Rd	Murrieta	8/7/07
PR0026180	Chevron #209519	24625 Madison Ave	Murrieta	1/9/08
PR0025165	Chevron Stations Inc. #1484/201241	40500 California Oaks Rd	Murrieta	1/9/08
PR0035284	Chick-fil-A	24794 Madison Ave	Murrieta	8/8/07
PR0023082	Convenience Retailers LLC #2705793	41010 California Oaks Rd	Murrieta	1/18/08
PR0026622	County of Riv SW County Justice/Juv	30755 Auld Rd #1311	Murrieta	8/29/07
PR0025375	County of Riv SW Justice/Detention	30755 Auld Rd #1307	Murrieta	8/29/07
PR0028577	County Of Riverside Fleet Services	30755 V-Auld Rd	Murrieta	8/23/07
PR0034665	EMWD Chittamwood Lift Station	36384 Chittamwood Pl	Murrieta	9/7/07
PR0035032	EVMWD Greer Ranch Liftstation	23696 Clinton Keith Rd	Murrieta	8/28/07

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HAZ MAT NPDES Surveys
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PR0034053	EVMWD Greer Ranch Pump Station	35915 Evandel	Murrieta	8/28/07
PR0035013	EVMWD Robards Liftstation	26323 Madison Ave	Murrieta	8/28/07
PR0030006	EVMWD/Cal Oaks Pump Station	24281 Hancock Ave	Murrieta	8/28/07
PR0025974	Excaliber Fuels #5	40648 California Oaks Rd	Murrieta	11/27/07
PR0028197	Exotic Electro-Optics, Inc	36570 Briggs Rd	Murrieta	8/16/07
PR0032908	Express System & Engineering	41357 Date St	Murrieta	9/28/07
PR0025310	ExxonMobil Oil Corporation #10923	39850 Los Alamos Rd	Murrieta	6/10/08
PR0035751	French Valley Aviation, Inc.	37552 Winchester Rd	Murrieta	9/6/07
PR0034247	Innovative Engineering Solutions	26200 Adams Ave	Murrieta	8/8/07
PR0023898	J & S Auto Collision, LLC	26586 Jefferson Ave Ste C	Murrieta	9/28/07
PR0032440	John Deere Landscapes, Inc	26713 Madison Ave	Murrieta	7/31/07
PR0032428	Kinch's Radiator & Air Conditioning	41214 Sandalwood Cir	Murrieta	8/17/07
PR0037896	KTM North America	38429 Innovation Ct	Murrieta	5/28/08
PR0037890	KTM of Temecula	26586 Jefferson Ave SteA	Murrieta	5/27/08
PR0025932	Los Alamos Shell #68568	39614 Los Alamos Rd	Murrieta	1/16/08
PR0026296	Madison Shell #68569	25336 Madison Ave	Murrieta	1/10/08
PR0034504	McDonald's	39196 Winchester Rd	Murrieta	8/7/07
PR0026711	Murrieta 76	39460 Murrieta Hot Springs Rd	Murrieta	11/2/07
PR0029692	Murrieta Auto Collision	26793 Madison Ave #107	Murrieta	8/23/07
PR0026674	MVUSD Transportation Facility	41870 Mc Alby Ct	Murrieta	7/23/07
PR0026685	Ralphs Grocery Company #118	23801 Washington Ave	Murrieta	11/15/07
PR0034132	RCWD Avenida Escala Pump Station	42011 Avenida Escala	Murrieta	9/26/07
PR0034133	RCWD Avocado Mesa Pump Station	19265 Avocado Mesa Rd	Murrieta	9/26/07
PR0028439	RCWD Baldaray Pump Station	35850 Avenida La Cresta	Murrieta	9/26/07
PR0029747	RCWD Bear Creek Sewage Lift Station	33158 Clinton Keith Rd	Murrieta	8/22/07
PR0029746	RCWD Cal Oaks Sewage Lift #1	42533 Tenaja Rd #1	Murrieta	8/22/07
PR0029742	RCWD California Oaks Pump Station	41135 California Oaks Rd	Murrieta	9/26/07
PR0034893	RCWD Cole Creek Pump Station	42533 Tenaja Rd #2	Murrieta	9/26/07
PR0029749	RCWD Joaquin Pump Station	42545 Tenaja Rd	Murrieta	9/26/07
PR0030292	RCWD Santa Rosa Water Treatment Plt	26266 Washington Ave	Murrieta	8/22/07
PR0028443	RCWD Well #145	42150 Guava St	Murrieta	9/26/07
PR0034248	Robertson's Ready Mix	26190 Adams Ave	Murrieta	8/8/07
PR0026701	Sam's Club #4822	40500 Murrieta Hot Sprgs Rd	Murrieta	10/10/07
PR0030472	SCE Auld /Valley Substation		Murrieta	9/4/07
PR0023832	Seven Eleven #33484	28015 Scott Rd	Murrieta	4/10/08
PR0026742	Seven-Eleven #33552	40210 Murrieta Hot Springs Rd	Murrieta	7/9/07
PR0032366	Sprint Nextel (CA6066-French Valley	35975 Briggs Rd	Murrieta	7/17/07
PR0034636	Taco Bell #22691	39056 Winchester Rd	Murrieta	8/7/07
PR0035157	The Chop Shop-OOB OOB	26765 Madison Ave #104	Murrieta	8/23/07
PR0024083	The Truck Shop	41214 Sandalwood Cir #B	Murrieta	8/17/07
PR0030708	USA Station #68168	39055 Winchester Rd	Murrieta	4/16/08
PR0023528	Valley Collision	26793 Madison Ave #103	Murrieta	8/23/07

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HAZ MAT NPDES Surveys
7/01/2007- 6/30/2008

PR0028243	Verizon/Murrieta CO	24961 Washington Ave	Murrieta	6/4/08
PR0032350	Verizon/Temecula	41611 Reagan Ave	Murrieta	9/28/07
PR0033622	Vons Fuel Center #2660	29910 Murrieta Hot Sprgs Rd #	Murrieta	9/5/07
PR0023269	Wal-Mart #2952	41200 Murrieta Hot Sprgs Rd	Murrieta	7/23/07
PR0032912	SCP Distributors, LLC	41675 Cherry St	Murrieta	8/7/07
PR0029775	EMWD Gold Triangle #2 EMWD Gold Tr	38868 Jackson St	Murrieta Hot Sprg	9/7/07
PR0029709	EMWD Golden Triangle Well EMWD Go	38952 Jackson St	Murrieta Hot Sprg	9/7/07
PR0030456	EMWD Las Brisas EMWD Las Brisas	27000 Camino Las Positas	Murrieta Hot Sprg	9/7/07
PR0024340	Abbott Cardiovascular Systems	26531 Ynez Rd	Temecula	5/22/08
PR0035574	AC Smog & Auto Service	27886 Del Rio RD	Temecula	11/26/07
PR0023778	Affordable Auto & Truck-OOB OOB	43271 Via Angeles	Temecula	1/14/08
PR0022162	Albertson's #6706	30530 Rancho California Rd	Temecula	5/29/08
PR0023349	All Day Smog & Tune	28730 Via Montezuma #102	Temecula	1/18/08
PR0033100	American Battery Corp.	41675 Enterprise Cir S	Temecula	4/28/08
PR0024046	Any Make Transmissions & Mufflers	28671 Calle Cortez #H	Temecula	2/28/08
PR0022434	APD Technologies, Inc	42066 Avenida Alvarado #F	Temecula	11/13/07
PR0034479	Apria Healthcare	42600 Rio Nedo	Temecula	4/1/08
PR0025115	Arco #05500	41555 Winchester Rd	Temecula	12/12/07
PR0025892	Arco #5695/Prestige Stations #5354	44239 Margarita Rd	Temecula	6/24/08
PR0026102	Arco #5928/Prestige Stations #5472	27691 Ynez Rd	Temecula	7/30/07
PR0026207	Arco #6305/Prestige Stations #6305	40212 Winchester Rd	Temecula	8/30/07
PR0037755	Arm Automotive	42011 Avenida Alvarado Ste.B	Temecula	6/18/08
PR0036173	Arrow Recycling Solutions, Inc	42015 Remington Ave	Temecula	1/4/08
PR0031294	AT&T Mobility (12389)	27740 Jefferson Ave #315	Temecula	12/6/07
PR0034658	AT&T Mobility (12405)	33504 Hwy 79 South	Temecula	12/6/07
PR0034649	AT&T Mobility (24413)	47835 Pechanga Pkwy #B	Temecula	12/6/07
PR0034652	AT&T Mobility (25864)	34410 Calac Rd #B	Temecula	12/6/07
PR0035158	AT&T Mobility (36311)	44501 Rainbow Canyon Rd #B	Temecula	12/6/07
PR0035159	AT&T Mobility (48062)	40940 County Center Dr	Temecula	12/6/07
PR0035155	AT&T Mobility (48245)	39200 Camino Sierra Rd	Temecula	12/6/07
PR0022053	Auto Werkes	28822 S Front St #104	Temecula	2/27/08
PR0021257	Automotive Specialties	41976 Avenida Alvarado	Temecula	10/11/07
PR0022668	AutoZone #5582	31837 S Hwy 79 #A-1	Temecula	10/3/07
PR0034466	Baja Fresh #86	40688 Winchester Rd	Temecula	2/20/08
PR0037587	BBK Performance	27440 Bostik Ct	Temecula	4/24/08
PR0024258	Best For Less Tires	28715 Via Montezuma	Temecula	8/2/07
PR0034026	Burger King	32110 S Hwy 79	Temecula	7/26/07
PR0023112	C & H Office Equipment Inc	27480 Colt Ct	Temecula	10/11/07
PR0021645	Cadillac GM Specialist	28671 Calle Cortez #T&O	Temecula	10/12/07
PR0028328	Califonia Auto Collision	28093 Jefferson Ave	Temecula	9/13/07
PR0019781	California Highway Patrol	27685 Commerce Center Dr	Temecula	9/20/07
PR0034464	California Pizza Kitchen	40820 Winchester Rd #1000	Temecula	4/22/08

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PR0034463	Carl's Jr	44515 Bedford Ct	Temecula	11/26/07
PR0025145	CEMEX USA	29065 Front St	Temecula	11/27/07
PR0035893	Cerdafide Automotive	43062 Via Dos Picos #B	Temecula	10/12/07
PR0019797	Channell Commercial Corp	26040 Ynez Rd	Temecula	10/3/07
PR0025176	Chevron #1814/91870	28900 Rancho California Rd	Temecula	9/10/07
PR0025173	Chevron Jefferson Street	27560 Jefferson Ave	Temecula	11/27/07
PR0021260	Chevron SS #1492/201596	40635 Winchester Rd	Temecula	1/8/08
PR0022008	Chevron SS #1838/204029 Chevron SS	31669 Hwy 79	Temecula	1/15/08
PR0037543	Chivvas Auto Repair & Mufflers	28733 Via Montezuma Ste.M	Temecula	4/21/08
PR0030402	City of Temecula Community Rec. Ctr	30875 Rancho Vista Rd	Temecula	1/3/08
PR0033763	City of Temecula-City Hall	43200 Business Park Dr	Temecula	1/4/08
PR0036490	City of Temecula-Field Operation Mainte	43230 Business Park Dr	Temecula	1/4/08
PR0026626	Costco Wholesale Corp. #491	26610 Ynez Rd	Temecula	3/19/08
PR0019840	Creekside Gas And Food Mart	29115 Front St	Temecula	2/26/08
PR0023506	CVS Pharmacy #8896	33205 Hwy 79	Temecula	4/16/08
PR0031068	Dan's Feed & Seed, Inc	41065 1st St	Temecula	11/26/07
PR0032807	Downs Energy	43040 Rancho Wy #200	Temecula	1/3/08
PR0026466	Downs Energy	27985 Diaz Rd	Temecula	8/16/07
PR0034506	Drake Enterprises	39390 Colleen Way	Temecula	5/19/08
PR0023328	Dynamic Imaging	41662 N Enterprise Cir	Temecula	10/9/07
PR0019870	Econo Lube N'Tune #181	27685 Jefferson Ave	Temecula	10/3/07
PR0027161	Edwards Temecula 15 Cinemas	40750 Winchester Rd	Temecula	9/13/07
PR0023919	Elite Cleaners	40573 Margarita Rd	Temecula	7/18/07
PR0022909	Excel Rental Center	28115 Del Rio Rd #A	Temecula	7/12/07
PR0023111	Executive Cleaners	43053 Margarita Rd #109-	Temecula	12/4/07
PR0025311	ExxonMobil Oil Corporation #10193	44520 Bedford Ct	Temecula	4/9/08
PR0025307	ExxonMobil Oil Corporation #10840	29500 Rancho California Rd	Temecula	4/1/08
PR0026642	ExxonMobil Oil Corporation #19137	33165 Hwy 79	Temecula	10/10/07
PR0019773	Flowserve	27455 Tierra Alta Wy	Temecula	2/13/08
PR0033923	Friday's	40830 Winchester Rd	Temecula	9/19/07
PR0026638	Front St. Service Station LP	44987 Front St	Temecula	10/15/07
PR0021509	George Certified Auto Repair George Ce	43094 Via Dos Picos # A	Temecula	1/10/08
PR0031027	Hazit Mini Mart	44564 Pechanga Pkwy	Temecula	7/17/07
PR0037880	HVAC Coatings, Inc	27665 Commerce Center Dr	Temecula	5/23/08
PR0032085	Hydro-Scape Products, Inc	41581 N Enterprise Cir	Temecula	4/1/08
PR0036991	Imaging Alternative, Inc	28046 Del Rio Rd	Temecula	2/28/08
PR0034580	Intense Cycles	42380 Rio Nedo	Temecula	1/9/08
PR0025283	International Rectifier/Hexfet	41915 Business Park Dr	Temecula	8/14/07
PR0033959	Islands	40497 Margarita Rd	Temecula	9/17/07
PR0033898	Jack in the Box #3391	32055 S Hwy 79	Temecula	7/26/07
PR0032517	JC Penney Corp #2783-9	40640 Winchester Rd	Temecula	9/13/07
PR0024007	Jeff Smith Motorsports	27470 Commerce Center Dr #E	Temecula	1/29/08

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PR0025387	Jiffy Lube #1878	30690 Rancho California Rd	Temecula	5/8/08
PR0024301	John Hine Temecula Mazda John Hine T	42050 DLR Dr	Temecula	9/19/07
PR0030793	K-Mart #3828	26471 Ynez Rd	Temecula	12/18/07
PR0034277	KFC/Long John Silver	32425 S Hwy 79	Temecula	7/26/07
PR0024304	Kirk Machine & Tool	42143 Avenida Alvarado #C	Temecula	8/8/07
PR0023863	Kragen Auto Parts #0483	41125 Winchester Rd #C	Temecula	10/9/07
PR0034410	La Cocina Bar & Grill La Cocina Bar & Gı	32459 Hwy 79 Ste D103	Temecula	4/29/08
PR0031231	Lawrence Lasagna	30885 Nicolas Rd	Temecula	3/17/08
PR0020017	Long's Drug #301	30640 Rancho California Rd	Temecula	7/19/07
PR0023106	Lowe's Home Center #775	40390 Winchester Rd	Temecula	3/27/08
PR0022318	M&M Tire	41670 Winchester Rd	Temecula	3/25/08
PR0035571	Maaco Collision Repair and Painting	27561 Commerce Center DR	Temecula	5/6/08
PR0036065	Maurice Carrie Winery	34225 Rancho California Rd	Temecula	7/19/07
PR0020027	McMillan Farm Management	35350 Rancho California Rd	Temecula	1/15/08
PR0033114	Micro Crystal Technology, Inc.	43095 Blackdeer Loop	Temecula	5/22/08
PR0023441	Milgard Windows	26879 Diaz Rd	Temecula	8/22/07
PR0021291	Millipore Corporation	28820 Single Oak Dr	Temecula	4/16/08
PR0019798	Millipore Corporation	28835 Single Oak Dr	Temecula	4/16/08
PR0022970	Minegar Contracting	27705 Commerce Center Dr	Temecula	6/3/08
PR0028337	Motor Winding Associates	42355 Rio Nedo St	Temecula	1/31/08
PR0037186	Mount Palomar Winery	33820 Rancho California Rd	Temecula	3/17/08
PR0022908	Murrieta Development Company	42540 Rio Nedo St	Temecula	1/10/08
PR0024011	N/C Industries	42147 Roick Dr	Temecula	1/31/08
PR0036657	Next Level Automotive	42387 Avenida Alvarado # 112	Temecula	1/23/08
PR0034468	No Limit Paintball	27326 Jefferson Ave #12	Temecula	4/28/08
PR0023230	OREQ	42306 Remington Ave	Temecula	1/29/08
PR0022988	Pacific Electric Inc	42640 Rio Nedo St	Temecula	2/20/08
PR0022595	Palomar Village Shell	42197 Margarita Rd	Temecula	8/8/07
PR0032681	Paradise Chevrolet	27360 Ynez Rd	Temecula	7/20/07
PR0028401	Paulson Manufacturing Corp	46752 Rainbow Canyon Rd	Temecula	7/18/07
PR0021897	Photo Galleria	40820 Winchester Rd #2530	Temecula	8/30/07
PR0035273	Ponte Winery	35053 Rancho California Rd	Temecula	8/6/07
PR0037018	Potamus Press Design	27625 Jefferson Ave #107	Temecula	6/18/08
PR0023969	Rainbow Service Station-OOB OOB	30535 Hwy 79	Temecula	8/22/07
PR0023259	Ramona Tire	40385 Winchester Rd	Temecula	2/13/08
PR0028438	Rancho Blueprint Rancho Blueprint	41750 Winchester Rd # I	Temecula	1/24/08
PR0020137	Rancho California Auto Collision	27535 Enterprise Cir W	Temecula	2/26/08
PR0037134	Rancho Drivetrain Engineering/RDE	41740 Enterprise Cir # 106	Temecula	3/11/08
PR0022097	Rancho Shell #68623	29750 Rancho California Rd	Temecula	1/8/08
PR0028462	RCWD Well #109/143	31955 Hwy 79	Temecula	5/7/08
PR0028455	RCWD Well #119	30996 Loma Linda Rd	Temecula	5/7/08
PR0028460	RCWD Well #120	31633 Deportola Rd	Temecula	5/7/08

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PR0028496	RCWD Well #122	45395 Pechanga Pkwy	Temecula	5/7/08
PR0028490	RCWD Well #124	43880 Anza Rd	Temecula	5/7/08
PR0028472	RCWD Well #125	35523 Deportola Rd	Temecula	5/7/08
PR0028467	RCWD Well #141	34275 Hwy 79	Temecula	5/7/08
PR0028453	RCWD Well #217	30505 Deportola Rd	Temecula	5/7/08
PR0034131	RCWD Well #231	31615 Loma Linda Rd	Temecula	5/12/08
PR0028468	RCWD Well #234	34380 Hwy 79	Temecula	5/7/08
PR0034135	RCWD Winchester Park Sewage Lift St	27370 Diaz Rd	Temecula	8/22/07
PR0022596	Rebel Rents, Inc-OOB OOB	28115 Del Rio Rd # C	Temecula	7/17/07
PR0034398	Red Brick Pizza Red Brick Pizza	32195 Hwy 79 # B	Temecula	8/2/07
PR0023344	Redhawk Lube & Auto Repair	44260 Apis Rd #B	Temecula	7/31/07
PR0026186	Redhawk Shell #68622	44260 Redhawk Pkwy	Temecula	5/28/08
PR0022620	Rite Aid #5469	31797 Hwy 79	Temecula	12/4/07
PR0021804	Ritz Camera #773	40820 Winchester Rd #2130	Temecula	8/30/07
PR0037647	Sams Environmental Cleaners	43810 Butterfield Stage Rd	Temecula	4/29/08
PR0023387	Saturn Of Temecula	27430 Ynez Rd	Temecula	1/17/08
PR0022796	Sav On Drug #6753	31960 Temecula Pkwy	Temecula	4/16/08
PR0023449	Scott's Temecula Operations Scott's Ten	42375 Remington Ave	Temecula	1/29/08
PR0022971	Seven Eleven #33613	44260 Apis Rd #A	Temecula	3/25/08
PR0034465	Seven-Eleven #33074	44535 Bedford Ct	Temecula	11/26/07
PR0033897	Siggy's	31970 S Hwy 79	Temecula	7/26/07
PR0025399	SKS, Inc	41981 Avenida Alvarado	Temecula	6/12/08
PR0037075	SoCal Vettes & Hot Rods	28860 Front St #B-2	Temecula	2/27/08
PR0023257	Steve's Pro Kool	41976 Avenida Alvarado Ste.A	Temecula	10/11/07
PR0032139	Stuart Cellars	33515 Rancho California Rd	Temecula	4/29/08
PR0036378	Techstar Motors of Temecula	28710 Via Montezume # A	Temecula	12/18/07
PR0037602	Temecula 76	28903 Rancho California Rd	Temecula	6/10/08
PR0025397	Temecula Car Wash	29766 Rancho California Rd	Temecula	3/31/08
PR0023745	Temecula Valley Choppers	28860 Front St # B-5	Temecula	2/27/08
PR0021369	Temecula Valley Imaging	27699 Jefferson Ave #110	Temecula	9/17/07
PR0026058	Temecula Valley School District	40516 Roripaugh Rd	Temecula	11/27/07
PR0037078	Temecula Valley V-Twin	42387 Avenida Alvarado # 110	Temecula	3/11/08
PR0035276	The Olive Garden #1678	29025 Overland Dr	Temecula	8/8/07
PR0023131	The Picture People The Picture People	40820 Winchester Rd # 2205	Temecula	4/22/08
PR0032590	The Promenade	40820 Winchester Rd #1700	Temecula	4/22/08
PR0022127	The Sherwin-Williams Company	41662 N Enterprise Cir #A	Temecula	9/19/07
PR0030005	Thornton Winery Culbertsons	32575 Rancho California Rd	Temecula	7/19/07
PR0028611	Town Center Cleaners	29588 Rancho California Rd #H	Temecula	7/18/07
PR0020246	Transducer Techniques Inc	42480 Rio Nedo	Temecula	2/20/08
PR0037542	Transmission Plus-OOB OOB	28733 Via Montezume # G	Temecula	4/21/08
PR0034494	Tropitone Furniture Co	42202 Sarah Way	Temecula	1/9/08
PR0022236	Truck & Auto Fleet Services	28733 Via Montezuma #I	Temecula	1/18/08

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PR0023092	Unocal 76	40720 Winchester Rd	Temecula	3/17/08
PR0022663	Vail Ranch Veterinary Hospital	31821 S Hwy 79 #C-1	Temecula	4/22/08
PR0021324	VCA El Rancho Animal Hospital	41670 Winchester Rd	Temecula	3/25/08
PR0025257	Verizon/Rancho California CO	41963 Moreno Rd	Temecula	10/4/07
PR0026507	Verizon/Redhawk CO	32505 Hwy 79	Temecula	10/4/07
PR0022998	Vineyard Veterinary Clinic	30680 Rancho California Rd #\	Temecula	5/29/08
PR0030897	Vista Paint Corporation	27250 Madison Ave Ste.F	Temecula	4/24/08
PR0023676	Wal-Mart #2708	32225 Hwy 79	Temecula	7/24/07
PR0024271	Walker Wood Products, Inc	43195 Business Park Dr	Temecula	7/24/07
PR0037885	Western Plastics	41995 Remington Ave	Temecula	5/27/08
PR0038133	Wilson Creek Winery & Vineyard	35960 Rancho California Rd	Temecula	6/24/08
PR0037091	Ynez Shell Food Mart/Car Wash	26680 Ynez Rd	Temecula	10/16/07
Total				
Whitewater River Watershed				
PR0025312	22nd Street Shell	2192 W Ramsey St	Banning	6/12/08
PR0025110	Arco #1935	2228 W Ramsey St	Banning	10/25/07
PR0025349	Banning Food Mart Banning Food Mart	775 E Ramsey St	Banning	2/13/08
PR0025374	Banning Shell	780 E Ramsey St	Banning	11/28/07
PR0019742	City of Banning Fleet Maintenance	176 E Lincoln St	Banning	9/6/07
PR0025130	County Of Riverside Fleet Services	1628 S Hargrave St	Banning	8/29/07
PR0025415	County Of Riverside/Twin Pines Rnch	49500 Twin Pines Rd	Banning	4/21/08
PR0019859	Dick's Tire Mart	1481 W Ramsey St	Banning	6/5/08
PR0025238	G & M Oil #25	3230 W Ramsey St	Banning	6/25/08
PR0025237	G & M Oil Co., Inc #20	827 W Ramsey St	Banning	1/25/08
PR0020113	Poma Automated Fueling Inc	5840 Joshua Palmer Wy	Banning	2/26/08
PR0024256	Trench Shoring Company	1184 W Lincoln St SteA	Banning	4/3/08
PR0025246	Verizon/Service Group	160 W Hays St	Banning	5/6/08
PR0022956	Zimmerman Woodworking, Inc.	1184 W Lincoln St	Banning	5/15/08
PR0028730	Bermuda Dunes Airport	79880 Avenue 42	Bermuda Dunes	7/16/07
PR0028731	Bermuda Dunes Country Club Bermuda	42360 Adams St	Bermuda Dunes	1/3/08
PR0023367	Golf Ventures West	79833 Country Club Dr	Bermuda Dunes	3/27/08
PR0037298	J. H. Thompson & Sons, Inc.	79639 Country Club Dr #2	Bermuda Dunes	3/27/08
PR0031389	Nuevo Engineering Inc. Nuevo Engineeri	79811 Country Club Dr	Bermuda Dunes	5/13/08
PR0029042	Verizon/California Bermuda Dunes CO	42540 Washington St	Bermuda Dunes	7/31/07
PR0020689	Walgreens #4757	42010 Washington St	Bermuda Dunes	6/2/08
PR0028865	Alpine McIntyre, L.L.C.	8750 Peter D McIntyre Ave	Blythe	10/31/07
PR0029311	Amerigas Propane LP	13250 W Hobson Way	Blythe	7/19/07
PR0030997	Arco	400 S Lovekin Blvd	Blythe	10/24/07
PR0029488	B B Travel Center	17970 W Hobson Way	Blythe	11/7/07
PR0028723	Barnes & Berger	15091 S Intake Blvd	Blythe	7/11/07
PR0029350	Blythe Colorado River KOA	14100 Riviera Dr	Blythe	10/31/07
PR0028780	Blythe Freeway Chevron #91045	321 S Lovekin Blvd	Blythe	2/25/08

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PR0029388	Blythe Freeway Shell	201 S Lovekin Blvd	Blythe	1/22/08
PR0028741	Blythe Municipal Golf Course	4321 W Wells Rd	Blythe	3/27/08
PR0035292	Blythe Production & Water Treatment	554 Ranchette Rd	Blythe	8/28/07
PR0029329	Brian's Blythe Shell - Dairy Queen	401 S Lovekin Blvd	Blythe	9/11/07
PR0033899	Carl's Jr #769	160 S Lovekin Blvd	Blythe	11/28/07
PR0028776	Chaney Auto Recycling Service Chaney /	17045 S Lovekin Blvd	Blythe	10/25/07
PR0029452	Chevron 7th Street	761 E Hobson Way	Blythe	3/19/08
PR0034367	City of Blythe Airport Maintenance	16720 W Hobson Way	Blythe	8/23/07
PR0030419	City Of Blythe Well #11 City Of Blythe W	495 Murphy St	Blythe	10/2/07
PR0020016	Con-Way Western Express	12555 Mesa Dr	Blythe	7/24/07
PR0028877	D & L Auto Parts Inc D & L Auto Parts In	401 W Hobson Way	Blythe	7/24/07
PR0022229	E-Z Lube-OOB OOB	345 E Hobson Way	Blythe	8/9/07
PR0028801	E-Z Mart East	945 E Hobson Way	Blythe	9/6/07
PR0032989	Esperanza Ranch	10651 Neighbors Blvd	Blythe	3/25/08
PR0028973	EZ Stop	220 S Lovekin Blvd	Blythe	2/6/08
PR0030017	Fisher Ranch		Blythe	2/13/08
PR0029062	Fisher Ranch Corporation Fisher Ranch	10600 Ice Plant Rd	Blythe	8/29/07
PR0029059	Fisher Ranch-Mixed Melon Cooler	14500 S Lovekin Blvd	Blythe	8/29/07
PR0028990	Fisher Ranch-North Shop B&C Block Fisher Ranch-North Shop B&C Blo		Blythe	2/13/08
PR0028991	Fisher Ranch-South Shop Fisher Ranch-	11551 28th Ave	Blythe	2/13/08
PR0029050	Harvest Fuels	10955 Seeley Ave	Blythe	12/19/07
PR0029116	Joe H Ulmer	21071 S Intake Blvd	Blythe	9/6/07
PR0030217	JR Norton Ventures Ltd Partnership		Blythe	3/25/08
PR0029819	Julian Farm	13680 W Wells Rd	Blythe	3/31/08
PR0034717	K-Mart #3881	1455 W Hobson Way	Blythe	11/28/07
PR0020728	K.C. Automotive	14700 S Broadway Ste B	Blythe	7/19/07
PR0028824	Larry Green Auto Center Blythe, Inc	350 S Broadway	Blythe	7/11/07
PR0029491	Lovekin 76	301 S Lovekin Blvd	Blythe	10/25/07
PR0029159	Lovekin Liquor & Deli	310 S Lovekin Blvd	Blythe	9/11/07
PR0031126	Mesa Drive Fuel	13015 Mesa Dr	Blythe	12/19/07
PR0029226	Nish Noroian Farms	583 S Lovekin Blvd	Blythe	9/13/07
PR0025764	Palo Verde Irrigation District	180 W 14th Ave	Blythe	2/7/08
PR0030199	Palo Verde Valley Disposal Service	14701 S Broadway	Blythe	8/8/07
PR0029729	Pratt Apiaries	13510 W Riverside Dr	Blythe	9/6/07
PR0029331	Quik Chek East	8991 E Hobson Way	Blythe	12/20/07
PR0029328	Quik Chek West- Larry's Quik Chek	14021 W Hobson Way	Blythe	12/20/07
PR0029332	R & R Mini Mart	490 W Chanslor Way	Blythe	9/6/07
PR0029515	Rio Rancho 2000 LLC	9401 22nd Ave	Blythe	3/27/08
PR0029351	Robinson Farms	461 W 14th Ave	Blythe	9/13/07
PR0025825	Southern California Gas Company	13100 W 14th Ave	Blythe	10/18/07
PR0034803	Sun Services Mining, Inc		Blythe	3/31/08
PR0029481	Triple-Will Farms	2875 N Lovekin Blvd	Blythe	10/18/07

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PR0030310	Tyson/Ichida Farms		Blythe	9/11/07
PR0033415	WAPA-DSWR-Buck Blvd Substation		Blythe	8/8/07
PR0030091	Western Area Power Administration	5m W Blythe Us 60	Blythe	8/8/07
PR0028855	Wolfe Enterprises	17240 W Hobsonway	Blythe	7/3/07
PR0031441	AT&T Mobility (12396)	13522 Apache Tr	Cabazon	3/25/08
PR0026484	Cabazon Arco	300 N Fern St	Cabazon	9/11/07
PR0025147	Cabazon Truck Stop	50876 Seminole Dr	Cabazon	10/24/07
PR0026489	Chevron Stations #1886/207497	48320 Seminole Dr	Cabazon	5/5/08
PR0019750	Robertson's Ready Mix	13990 Apache Tr	Cabazon	1/7/08
PR0033566	T-Mobile USA, Inc	50256 Main St #A	Cabazon	4/1/08
PR0029413	Southern California Gas Company		Cactus City	3/4/08
PR0037963	Aiden Cleaners	27765 Landau Blvd #100	Cathedral City	6/2/08
PR0029570	Arco #05884/Prestige Stations #5417	67625 E Palm Canyon Dr	Cathedral City	7/2/07
PR0028695	Arco #5476/Prestige Stations 5192	27900 Date Palm Dr #1	Cathedral City	11/6/07
PR0032546	Arco AM/PM	36001 Date Palm Dr	Cathedral City	10/9/07
PR0030062	Arco Am/Pm - Ramon Canyon Car Wash	68500 Ramon Rd	Cathedral City	6/4/08
PR0028722	Bankside Drive Auto Body & Wheel Bank	36365 Bankside Dr	Cathedral City	5/9/08
PR0036310	Car Troubles	68416 Perez Rd Ste E	Cathedral City	11/28/07
PR0025494	Cathedral City/City Of, Fire Dept	32100 Desert Vista Rd	Cathedral City	7/10/07
PR0028794	Chevron-Ramon Service Center	68010 Ramon Rd	Cathedral City	6/10/08
PR0028874	Crystal Chrysler Jeep Dodge Center	36444 Auto Park Dr	Cathedral City	5/5/08
PR0022466	Doctor V Auto Clinic Doctor V Auto Clinic	68416 Perez Rd	Cathedral City	11/28/07
PR0029207	ExxonMobil Oil Corporation #12997	68990 Ramon Rd	Cathedral City	10/31/07
PR0029206	ExxonMobil Oil Corporation #12999	28051 Date Palm Dr	Cathedral City	11/30/07
PR0028910	FinishMaster, Inc. #220	36055 Cathedral Canyon Dr	Cathedral City	6/9/08
PR0029000	Frazee Paint & Wallcoverings	36555 Bankside Dr Ste.A	Cathedral City	6/3/08
PR0021415	International Motors & Smog	68795 Ramon Rd	Cathedral City	7/23/07
PR0038005	Jessup Buick Pontiac & GMC	68080 Perez Rd	Cathedral City	5/8/08
PR0029160	Jiffy Lube #2822-OOB OOB	68815 Ramon Rd	Cathedral City	7/23/07
PR0026121	Kangaroo Food Mart	28201 Date Palm Dr	Cathedral City	7/10/07
PR0029149	Larry's Radiator & Muffler Larry's Radiatc	36839 Bankside Dr	Cathedral City	5/28/08
PR0029379	Market Place Shell	34021 Date Palm Dr	Cathedral City	3/11/08
PR0037263	Midas Cathedral City	68275 Ramon Rd	Cathedral City	3/26/08
PR0032993	Pacific Collision Centers	36705 Perez Rd	Cathedral City	8/15/07
PR0029277	Palm Springs Oil #12	68855 Ramon Rd	Cathedral City	3/19/08
PR0029279	Palm Springs Oil #13	68450 Ramon Rd	Cathedral City	3/19/08
PR0020918	Phil's Immediate Care Auto Repair/O Phi	68900 "B" St	Cathedral City	7/3/07
PR0023340	R.G.'s Smog Tech	68727 Aliso Rd	Cathedral City	5/14/08
PR0023727	Rembrandt's Paint and Body, Inc	36400 Bankside Dr	Cathedral City	5/14/08
PR0022540	RG Auto Repairs	31955 Avenida El Pueblo	Cathedral City	5/8/08
PR0020989	Sentinel Car Service	36839 Bankside Dr	Cathedral City	6/2/08
PR0029371	Seven Eleven #16525(2171)	67510 Ramon Rd	Cathedral City	3/27/08

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PR0034565	Sherwin-Williams Paint Store	68743 Perez Rd #D-1	Cathedral City	8/15/07
PR0030660	The Pep Boys-Manny, Moe & Jack #844	31505 Date Palm Dr	Cathedral City	5/13/08
PR0029636	Transmission Clinic of the Desert	34820 Date Palm Dr	Cathedral City	3/28/08
PR0029501	United Rentals #554	36025 Cathedral Canyon Dr	Cathedral City	6/3/08
PR0028790	Valero California Retail Co #3667	69123 Ramon Rd	Cathedral City	10/15/07
PR0029275	Valero California Retail Co #3768	67890 E Palm Canyon Dr	Cathedral City	7/24/07
PR0034564	Vista Paint	68956 Perez Rd	Cathedral City	3/19/08
PR0037265	Xpress Lube	68280 Ramon Rd	Cathedral City	3/26/08
PR0032124	Chiriaco Summit Chevron	62450 Chiriaco Rd	Chiriaco Summit	3/19/08
PR0020310	Ajax Auto Wreckers Inc	84851 Avenue 48	Coachella	1/18/08
PR0029727	Anaya's Transmission	85811 Grapefruit Blvd	Coachella	1/3/08
PR0028697	Arco #5826/Prestige Stations #5364	48055 Grapefruit Blvd	Coachella	8/30/07
PR0037614	Burrtec Waste & Recycling	53600 Polk St	Coachella	4/25/08
PR0037650	Cardenas #18	50037 Harrison St	Coachella	4/30/08
PR0023046	Desert Automotive Specialist	84993 Avenue 48	Coachella	2/22/08
PR0035988	Duran's Auto	84969 Avenue 48	Coachella	11/5/07
PR0029407	El Toro Loco #3	52051 Grapefruit Blvd	Coachella	5/22/08
PR0024219	Ernie Ball, Inc	53973 Polk St	Coachella	5/1/08
PR0030967	Fastrip Foodstore #652	51893 Harrison St	Coachella	11/16/07
PR0034129	Food 4 Less #517 Fuel Center	49245 Grapefruit Blvd	Coachella	12/6/07
PR0028784	G&M Oil #148	45760 Dillon Rd	Coachella	11/7/07
PR0022937	Jack In The Box #3523 QS#7712	46651 Dillon Rd	Coachella	1/8/08
PR0029132	Kenny Strickland Inc.	50021 Harrison St	Coachella	6/9/08
PR0025474	KSC & Son Corporation	52138 Highway 86	Coachella	8/28/07
PR0029152	Lee Escher Oil Co Inc-OOB OOB	85119 Leoco Ln	Coachella	5/1/08
PR0023119	Love's Travel Stop #207	45761 Dillon Rd	Coachella	1/4/08
PR0029167	Manuels V.W. Repair	84943 Avenue 48	Coachella	6/30/08
PR0037291	Norals Fabrication	49600 Oates Ln	Coachella	3/24/08
PR0028691	SoCo - Coachella Beacon	50980 Highway 86	Coachella	3/17/08
PR0021035	Stan's Repair Shop	84540 Mitchell Dr	Coachella	8/8/07
PR0034193	The Vineyards	44790 Dillon Rd	Coachella	2/27/08
PR0036621	Valley Scrap, Inc	48100 Harrison St	Coachella	1/23/08
PR0024224	Albertson's #6643	83053 Avenue 48	Coachella	3/18/08
PR0029221	MWD/Eagle Mountain Pumping	15500 Kaiser Truck Rd	Desert Center	4/28/08
PR0029223	MWD/Julian Hinds Pump Plant	100 Hayfield Rd	Desert Center	4/28/08
PR0029414	Southern California Gas Company	I-10 Rice Rd	Desert Center	3/4/08
PR0029453	Stanco	44250 Ragsdale Rd	Desert Center	7/12/07
PR0028700	Arco #06502/Lu Mini Inc.	12775 Palm Dr	Desert Hot Sprgs	11/15/07
PR0028738	Blair Station R V	71875 Dillon Rd	Desert Hot Sprgs	1/2/08
PR0030933	Blue Beyond Fisheries	17955 Bubbling Wells Rd	Desert Hot Sprgs	4/21/08
PR0029016	Car Care	13020 Palm Dr	Desert Hot Sprgs	2/4/08
PR0028970	Expressway Market Inc.	17001 Palm Dr	Desert Hot Sprgs	6/10/08

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PR0029804	G & M Oil Co. #122 G & M Oil Co. #122	13900 Palm Dr	Desert Hot Sprgs	2/7/08
PR0029014	Harvey's Golden Lantern Market	70041 Dillon Rd	Desert Hot Sprgs	2/21/08
PR0033653	Jack in the Box #5328/Quick #7734	22600 Palm Dr	Desert Hot Sprgs	9/20/07
PR0034719	K-Mart #4857	14011 Palm Dr	Desert Hot Sprgs	12/4/07
PR0029147	Landells Aviation	69873 Silvermoon Trl	Desert Hot Sprgs	11/8/07
PR0029228	Palm Drive RV Auto Center	12425 Palm Dr	Desert Hot Sprgs	2/21/08
PR0031917	Palm Gas Mart	22755 Palm Dr	Desert Hot Sprgs	11/1/07
PR0033291	Von's SS#2177	14030 Palm Dr	Desert Hot Sprgs	3/4/08
PR0029533	Western Golf Car Manufacturing	69391 Dillon Rd	Desert Hot Sprgs	2/5/08
PR0037451	R & A Auto Repair	66350 Dillon Rd Ste.A	Desert Hot Spring:	4/21/08
PR0037103	Rolax 2 Auto and Tires	66465 Flora Ave	Desert Hot Spring:	3/6/08
PR0023198	The Reserve Club	74001 Reserve Dr	Indian Wells	1/24/08
PR0034470	Toscana Country Club-Golf Mainten.	76361 Hovley Ln E	Indian Wells	4/29/08
PR0028658	A C Houston Lumber Co	83490 Indio Blvd	Indio	1/7/08
PR0023889	AA Equipment	45050 Golf Center Pkwy #A	Indio	2/11/08
PR0037580	All Around Autobody	81837 Oleander Ave #27	Indio	4/21/08
PR0036933	Anaya's Transmission & Auto Repair	43441 Monroe St	Indio	2/25/08
PR0025847	Apple Market #5	80631 Indio Blvd	Indio	12/18/07
PR0022706	Applied Pathology Med. Associates	81715 Dr Carreon Blvd #A-2	Indio	4/30/08
PR0034460	Associated Ready Mix	35100 Dillon Rd Ste.B	Indio	2/5/08
PR0034089	AutoZone #5557	82220 US Highway 111	Indio	5/1/08
PR0028726	Benlo RV II	84420 Cabazon Rd	Indio	8/17/07
PR0034767	Cal Ply	42805 Madio St	Indio	8/15/07
PR0030045	California Highway Patrol	79650 Varner Rd	Indio	9/6/07
PR0028769	Carr & Carr Inc	45242 Commerce St	Indio	6/19/08
PR0028804	Circle K #2701274 Circle K #2701274	44046 Jackson St	Indio	2/27/08
PR0028813	Circle K 76 #2700538	43955 Clinton St	Indio	8/20/07
PR0028821	Clark's Travel Center	82253 Indio Blvd	Indio	2/11/08
PR0037266	CM Building Materials, Inc	83311 Avenue 45	Indio	3/26/08
PR0033225	Coachella Valley Buick Pontiac GMC	78960 Varner Rd	Indio	1/24/08
PR0034456	Coachella Valley Collision Center	42900 Madio St	Indio	10/15/07
PR0033862	Coachella Valley Mosquito & Vector	43420 Trader Pl	Indio	1/28/08
PR0036498	Coachella Valley Printing	46167 Van Buren St	Indio	1/8/08
PR0025894	Convenience Retailers #2701740	43502 Monroe St	Indio	3/12/08
PR0028817	Convenience Retailers LLC #2708680	80976 US Highway 111	Indio	6/23/08
PR0028853	County Of Riverside Administration	82675 Hwy 111	Indio	8/28/07
PR0020491	County Of Riverside Jail	46057 Oasis St	Indio	8/28/07
PR0031545	Demo Unlimited	81750 Avenue 50	Indio	4/17/08
PR0022322	Desert Valley Auto Collision	81837 Oleander Ave #44	Indio	4/21/08
PR0024012	Desert View Tree Service	36255 Dune Palms Rd	Indio	4/23/08
PR0023123	Design By Kelly	83888 Avenue 45	Indio	3/12/08
PR0030314	Earl Scheib of CA, Inc	83533 Hwy 111 #A	Indio	7/5/07

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PR0028965	Elm's Equipment Rental, Inc.	81531 Industrial Pl	Indio	1/7/08
PR0028963	Empire Polo Club	81800 Avenue 51	Indio	5/15/08
PR0020585	Escher Auto Haus	82955 Avenue 50	Indio	4/1/08
PR0032610	ExxonMobil Oil Corporation #19004	79985 US Highway 111	Indio	4/9/08
PR0034911	Ferguson	81925 Industrial Pl	Indio	8/15/07
PR0028873	Fiesta Ford Lincoln Mercury	78990 Varner Rd	Indio	1/8/08
PR0032937	Food 4 Less #765	82124 US Highway 111	Indio	2/28/08
PR0023769	From Transmission Auto Repair	83480 Avenue 45 #1	Indio	3/26/08
PR0028779	G&M Oil #147	82003 US Highway 111	Indio	11/14/07
PR0029454	Gas-N-Save	81485 Miles Ave	Indio	11/15/07
PR0029022	Granite Construction Company Granite C	38155 Monroe St	Indio	1/15/08
PR0034768	Guy Evans Contractor Services	82585 Showcase Pkwy	Indio	1/22/08
PR0030096	Hadley, Inc.	47382 Madison St	Indio	4/21/08
PR0020660	Han's Auto Repair	83575 Peach St	Indio	3/17/08
PR0030754	Hill's Cabinet Manufacturing Inc	83680 Citrus Ave	Indio	4/1/08
PR0037369	Home Depot #6874	42100 Jackson St	Indio	4/3/08
PR0029077	Hydrex Pest Control Hydrex Pest Control	83155 Avenue 44	Indio	5/15/08
PR0034454	I-10 Toyota I-10 Toyota	78650 Varner Rd	Indio	3/25/08
PR0032947	I-10 Toyota Scion	78980 Varner Rd	Indio	3/21/08
PR0020684	Imperial Sign Co Inc	46120 Calhoun St	Indio	6/30/08
PR0020390	Indio Auto Store	83170 US Highway 111	Indio	2/22/08
PR0037065	Indio Fashion Mall	82227 Hwy 111 #A-2	Indio	3/10/08
PR0029093	Indio Golf Club	82040 Avenue 42	Indio	6/26/08
PR0037137	Indio Maintenance Facility	47335 Oasis St	Indio	3/12/08
PR0020699	Indio Motor Machine & Supply Inc	45761 Flower St	Indio	3/31/08
PR0037402	Indio Nursing and Rehab	47763 Monroe Ave	Indio	4/7/08
PR0020558	J. C. Auto Repair And Towing	43660 Jackson St	Indio	3/27/08
PR0037837	Jiquilpan Auto Repair-OOB OOB	83333 Hwy 111	Indio	5/15/08
PR0025671	John F Kennedy Hospital	47111 Monroe St	Indio	12/18/07
PR0032606	K-Mart #7551 K-Mart #7551	81691 US Highway 111	Indio	12/5/07
PR0036960	Kiko's Auto Repair	45116 Commerce St #8	Indio	2/27/08
PR0033227	Kirkpatrick Landscaping Services	43752 Jackson St	Indio	8/16/07
PR0033144	Kragen Auto Parts #4111 Kragen Auto P.	81710 US Highway 111	Indio	2/28/08
PR0032394	L & G Desert Store	49900 Jackson St	Indio	12/10/07
PR0037838	L and L Automotive, Inc.	83333 Hwy 111 #B	Indio	5/16/08
PR0030626	Larsen Justice Ctr/State of CA	46200 Oasis St	Indio	2/26/08
PR0036990	Long's Drugs #015	46900 Monroe St Bldg E	Indio	2/28/08
PR0037136	Lupian Auto Repair	83816 Avenue 45	Indio	3/12/08
PR0020788	Martinez Auto Repair	84169 Indio Blvd	Indio	3/10/08
PR0020420	Master's Auto Body	79500 Varner Rd	Indio	3/18/08
PR0029380	Monroe Shell Monroe Shell	43411 Monroe St	Indio	10/30/07
PR0025978	Monroe Street 76	43401 Monroe St	Indio	4/7/08

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PR0021842	Motorcycles Plus	84417 Indio Blvd	Indio	3/17/08
PR0029241	One Stop Shoppe	84051 Indio Blvd	Indio	3/17/08
PR0023984	Outdoor Resort Indio Owners Assoc	80394 Avenue 48	Indio	3/26/08
PR0024135	Palmer Automotive & Electric	45435 Van Buren # 8	Indio	4/18/08
PR0036921	Panda Express	82451 Hwy 111 #B	Indio	2/22/08
PR0036641	Penske Truck Leasing Co, LP	84035 Cabazon Rd	Indio	1/24/08
PR0020909	Pepsi Cola Bottling Group	83801 Citrus Ave	Indio	8/2/07
PR0037578	Perfect Kolors	81837 Oleander Ave #35	Indio	4/22/08
PR0037793	PHB Contracting, Inc	81824 Trader Pl Ste B	Indio	4/22/08
PR0029504	Praxair Distribution Inc.	84481 Cabazon Rd #B	Indio	4/30/08
PR0032540	Precision Works	81101 Indio Blvd	Indio	3/10/08
PR0037370	Pump It Up-OOB OOB	82740 Atlantic Ave	Indio	4/3/08
PR0037700	Rancho Casa Blanca	84136 Avenue 44	Indio	5/5/08
PR0035206	RDO Equipment Co	83300 Avenue 45	Indio	1/24/08
PR0024027	Rey's Auto Repair	44903 Golf Center Pkwy #8	Indio	1/2/08
PR0037066	Rite Aid	47985 Monroe St	Indio	3/10/08
PR0037302	Riverside County Fair and National Date	82503 Hwy 111	Indio	3/31/08
PR0037618	RSC Equipment Rental	84235 Cabazon Rd	Indio	4/29/08
PR0034675	Shadow Hills Golf Club, Inc	80875 Avenue 40	Indio	2/28/08
PR0033117	Shadow Lake Estates	83004 N Shore Dr	Indio	12/20/07
PR0021899	Stans Auto Tech	83580 Peach St	Indio	3/10/08
PR0036645	Stater Bros. Markets #94	81056 Hwy 111	Indio	6/4/08
PR0037893	Sun City Shadow Hills Firesation #4	81025 Avenue 40	Indio	4/21/08
PR0028984	Suzuki 111	83407 US Highway 111	Indio	1/22/08
PR0037577	Tek Cart	81824 Trader Pl Bldg D	Indio	4/22/08
PR0025851	Texaco Station Mitchell's	81201 Indio Blvd	Indio	12/18/07
PR0032946	The New Paradise Volkswagen	79050 Varner Rd	Indio	1/9/08
PR0031152	The Plantation Golf Club	51440 Monroe St	Indio	2/25/08
PR0036932	Time Warner Cable	83473 Avenue 45	Indio	2/25/08
PR0021076	Top's " N" Barricades Inc Top's " N" Barri	44631 Jackson St	Indio	9/4/07
PR0029486	U-Haul Center Of Indio	83491 US Highway 111	Indio	4/10/08
PR0029353	Unicars Honda Automobile	78970 Varner Rd	Indio	3/25/08
PR0029415	Union Pacific Railroad - Indio Yard	45050 Pacific St	Indio	6/10/08
PR0029502	United Rentals #62	83525 Date Ave	Indio	1/3/08
PR0029280	Valero California Retail Co #3770	81831 US Highway 111	Indio	7/19/07
PR0024117	Valley V Twin	82780 Indio Blvd	Indio	4/18/08
PR0036959	Walgreens 3E Company/Regulatory Dep	82900 Avenue 42	Indio	2/27/08
PR0037916	Walgreens #9781	82955 Avenue 48 #B	Indio	5/30/08
PR0037102	Water Tech	45252 Commerce St	Indio	3/11/08
PR0029537	White's Steel, Inc.	82880 Requa Ave	Indio	6/17/08
PR0033418	A-1 Aggregates		Indio Hills	2/5/08
PR0034186	Angelus Block Co	88100 Fargo Cyn Rd	Indio Hills	2/20/08

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PR0028431	Coachella Valley Aggregates	88120 Fargo Cyn Rd	Indio Hills	2/20/08
PR0034678	Desert Redi-Mix	86600 Fargo Cyn Rd	Indio Hills	2/20/08
PR0034219	Orco Block Co	35240 Dillon Rd	Indio Hills	2/5/08
PR0031417	R-C Sand & Gravel	35100 Dillon Rd	Indio Hills	2/5/08
PR0029107	Superior Ready Mix Concrete, L.P.	35905 Dillon Rd	Indio Hills	2/14/08
PR0034220	Yeager/Skanska(Coachella Hot Plant)	88200 Fargo Cyn Rd	Indio Hills	2/27/08
PR0034090	AutoZone #5560	78792 Highway 111	La Quinta	2/21/08
PR0033274	Carl's Jr	78672 Highway 111	La Quinta	3/6/08
PR0029786	CDF-Fire Dept 70	54001 Madison St	La Quinta	3/6/08
PR0028857	CDF-La Quinta Fire Station #32 CDF-La	78136 Francis Hack Ln	La Quinta	3/6/08
PR0023380	Circle K 76 #2705911 Circle K 76 #2705	78364 Highway 111	La Quinta	2/4/08
PR0025680	Citrus Golf Maintenance	78752 Avenue 52	La Quinta	7/10/07
PR0024081	Costco Gasoline #638	79795 Hwy 111	La Quinta	11/13/07
PR0034017	Del Taco	78468 Highway 111	La Quinta	2/21/08
PR0033951	Desert Sands Unified School-Admin.	47950 Dune Palms Rd	La Quinta	1/8/08
PR0037042	Express Cleaners	79410 Hwy 111 #105	La Quinta	3/6/08
PR0032570	G&M Oil #146	79513 Highway 111	La Quinta	11/14/07
PR0031443	Home Depot #6630	79900 Highway 111	La Quinta	8/10/07
PR0025653	Imperial Irrigation District	81600 Avenue 58	La Quinta	8/10/07
PR0036869	Kennedy Grocery	56400 Monroe St	La Quinta	2/20/08
PR0029583	La Quinta Shell	78998 Highway 111	La Quinta	4/29/08
PR0037107	Lampost Pizza	78772 Hwy 111	La Quinta	3/11/08
PR0037067	Leslie's Pool Supplies	78595 Hwy 111 #150	La Quinta	3/10/08
PR0032143	Lowe's #208	78865 Highway 111	La Quinta	9/18/07
PR0029313	PGA West Weiskope/Nick Priv. Course	80202 Avenue 58	La Quinta	3/11/08
PR0030528	Quarry At La Quinta, The	1 Quarry Ln	La Quinta	3/17/08
PR0030545	Rancho La Quinta Country Club	79301 Cascadas Cir	La Quinta	12/4/07
PR0026759	Sam's Club #4941	79315 Highway 111	La Quinta	3/12/08
PR0036642	Stater Bros. Markets #128	78630 Hwy 111	La Quinta	3/11/08
PR0033723	Target #1867	78935 Highway 111	La Quinta	3/11/08
PR0033470	The Pool Store	78600 Highway 111	La Quinta	2/21/08
PR0032627	USA Station #68144	79490 Highway 111	La Quinta	1/24/08
PR0029033	Verizon/La Quinta CO	78150 Avenida La Fonda	La Quinta	7/19/07
PR0029144	Village Station-OOB OOB	77985 Calle Montezuma	La Quinta	4/21/08
PR0033701	Wal-Mart Supercenter #1805	79295 Highway 111	La Quinta	7/26/07
PR0020400	Bob's Auto & Light Truck Repair	65180 Dillon Rd	N Palm Sprgs	3/5/08
PR0031916	Chevron Service Station #207512	6600 N Indian Ave	N Palm Sprgs	2/5/08
PR0029496	Convenience Retailers #2705699	19995 Indian Ave	N Palm Sprgs	2/13/08
PR0023122	A & S Automotive	75135 Sheryl Ave Ste.E	Palm Desert	12/10/07
PR0023601	A. G. Auto Care	74894 Lennon Pl #D-2	Palm Desert	1/2/08
PR0036958	A.J. Marral	74872 Velie Wy #1&2	Palm Desert	2/27/08
PR0038106	Albertson's #6559	74590 Highway 111	Palm Desert	6/19/08

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PR0026577	Arco #06508/Prestige Stations-OOB OOI	78355 Varner Rd	Palm Desert	9/25/07
PR0023415	Arco #06546	74950 Gerald Ford Dr	Palm Desert	8/9/07
PR0030534	AVIS Rent a Car System, Inc.	74881 Hovley Ln E	Palm Desert	6/5/08
PR0028717	Avondale Golf Club-Golf Maintenance	75800 Avondale Dr	Palm Desert	4/10/08
PR0036731	Bad Habit Motor Sports-OOB OOB	74830 Velie Wy	Palm Desert	1/28/08
PR0023560	Bali Cleaners	77940 Country Club Dr #7-1	Palm Desert	4/16/08
PR0028746	Breeze Air Conditioning, Inc.	75145 St Charles Pl	Palm Desert	5/22/08
PR0037558	Bristol Farms	73101 Country Club Dr	Palm Desert	4/22/08
PR0029528	Burrtec Waste & Recycling Services	41575 Eclectic St	Palm Desert	6/10/08
PR0031274	Cam Stone's Automotive-OOB OOB	74867 Velie Dr # A	Palm Desert	2/20/08
PR0022762	Cardiff Limousine	75255 Sheryl Ave	Palm Desert	4/17/08
PR0037323	Carl's Jr #7747	36879 Cook St	Palm Desert	4/1/08
PR0038045	Champion Collision Center	34801 Spyder Cir	Palm Desert	6/26/08
PR0028778	Chaparral Country Club Chaparral Count	50 N Camino Arroyo	Palm Desert	4/11/08
PR0020450	Chevron Stations Incorporated	72801 Highway 111	Palm Desert	2/19/08
PR0022665	Costco Wholesale #0441	72800 Dinah Shore Dr #B	Palm Desert	2/14/08
PR0028851	Country Club Cleaners	73111 Country Club Dr #B-5	Palm Desert	1/7/08
PR0025928	CVWD Palm Desert Satellite WRP #10	75525 Hovley Ln	Palm Desert	10/23/07
PR0038000	DeMille Marble & Granite-OOB OOB	42005 Cook St	Palm Desert	6/6/08
PR0035830	Desert Springs Villas	1091 Pinehurst Ln	Palm Desert	10/10/07
PR0023779	Doctor Diesel	74895 Avenue 42 #2	Palm Desert	1/28/08
PR0035238	Eagle Cleaners Eagle Cleaners	74600 Hwy 111	Palm Desert	7/10/07
PR0023015	Edmund's Jaguar/ Rolls Royce Serv.	41951 Corporate Wy #E	Palm Desert	1/3/08
PR0020821	ExxonMobil Oil Corporation	73611 Highway 111	Palm Desert	10/1/07
PR0029209	ExxonMobil Oil Corporation #10440	78005 Country Club Dr	Palm Desert	12/13/07
PR0029208	ExxonMobil Oil Corporation #11431	73001 Country Club Dr	Palm Desert	1/7/08
PR0032925	ExxonMobil Oil Corporation #18824	75000 Gerald Ford Dr	Palm Desert	10/15/07
PR0037639	EZ Lube #137	74180 Highway 111	Palm Desert	4/29/08
PR0032455	G&M Oil #145	78415 Varner Rd	Palm Desert	11/7/07
PR0029049	Harv's Car Wash	75015 Sheryl Ave	Palm Desert	3/12/08
PR0029071	Hovley Center Tire	74894 Avenue 42	Palm Desert	1/15/08
PR0029766	Indian Ridge Country Club #475	40200 El Dorado Dr	Palm Desert	6/23/08
PR0020361	K & C Mowers	74841 Velie Dr #H	Palm Desert	3/12/08
PR0037028	Kim's Automotive	74877 Joni Dr #7	Palm Desert	2/28/08
PR0032647	Lino's Mercedes Service Inc	74875 Hovley Ln E	Palm Desert	1/2/08
PR0038107	Little Folk Visuals	39620 Enterpreneur Ln	Palm Desert	6/20/08
PR0037344	Manor Care	74350 Country Club Dr	Palm Desert	4/2/08
PR0021102	Marty's Tire Plus, Inc	74849 Joni Dr #A	Palm Desert	3/3/08
PR0037502	Monterey Palms	44610 Monterey Ave	Palm Desert	4/8/08
PR0029018	Mountain View Tire & Service Inc	44420 Town Center Way	Palm Desert	3/14/08
PR0036202	Napa Auto Parts	42100 Beacon Hill	Palm Desert	11/27/07
PR0033816	Navajo Cleaners	40205 Washington St	Palm Desert	3/27/08

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PR0030109	Ocean Pool Mart	41961 Beacon Hill	Palm Desert	11/27/07
PR0025864	Palm Desert 76	73801 Highway 111	Palm Desert	10/23/07
PR0029252	Palm Desert Greens Country Club	73750 Country Club Dr	Palm Desert	4/22/08
PR0028787	Palm Desert Shell	77920 Avenue Of The States	Palm Desert	3/10/08
PR0023147	Palm Desert Transmission	74872 Velie Wy # 6	Palm Desert	2/20/08
PR0023404	Palm Springs Harley-Davidson Shop	39101 Leopard St	Palm Desert	4/11/08
PR0034958	Palms to Pines Automotive & Smog	74725 Joni Dr D & E	Palm Desert	3/3/08
PR0037400	PDNB	73745 El Paseo	Palm Desert	4/3/08
PR0037321	Rite Aid #06461	39155 Washington St	Palm Desert	4/1/08
PR0023942	Sears #2798	44430 Town Center Wy	Palm Desert	3/14/08
PR0031358	Short Stop Mobil Store	74478 Highway 111	Palm Desert	1/15/08
PR0031181	Silver Hanger Cleaners	73409 Highway 111	Palm Desert	4/23/08
PR0029412	Southern California Gas Company	75095 Mayfair Dr	Palm Desert	10/25/07
PR0029421	Spencer Auto Body And Paint, Inc.	74818 Joni Dr	Palm Desert	4/7/08
PR0038177	Stater Bros. #181	78210 Varner Rd	Palm Desert	6/26/08
PR0038217	Sullivan's Shutter Factory	73760 Spyder Cir	Palm Desert	6/26/08
PR0036277	The Classic Club Golf Maintenance	75200 Classic Club Blvd	Palm Desert	12/6/07
PR0020930	The Printing Place The Printing Place	41651 Corporate Wy	Palm Desert	1/7/08
PR0031290	The Private Collection	74757 Joni Dr #4	Palm Desert	3/13/08
PR0020605	USA Station #68184	72300 Highway 111	Palm Desert	5/6/08
PR0029037	Verizon/California Palm Desert Ctrl	73766 Highway 111	Palm Desert	3/14/08
PR0037274	Vista Paint	77920 Wolf Dr	Palm Desert	3/19/08
PR0034886	Wal-Mart Supercenter #5096	34500 Monterey Ave	Palm Desert	7/25/07
PR0037322	Walgreens	78218 Varner Rd	Palm Desert	4/1/08
PR0029057	Hertz Service Center	2992 W Civic Dr	Palm Sprgs	10/15/07
PR0029336	Hi-Tech Automotive Machine	658 S William Rd	Palm Sprgs	7/23/07
PR0029387	North Palm Canyon Shell	2796 N Palm Canyon Dr	Palm Sprgs	10/25/07
PR0020886	Palm Springs Oil #8/ Chevron USA	670 Palm Canyon Dr	Palm Sprgs	9/25/07
PR0029285	Palm Springs Plating	345 Del Sol Rd	Palm Sprgs	6/18/08
PR0029385	Palm Springs Service	4875 E Ramon Rd	Palm Sprgs	9/12/07
PR0034610	Wal-Mart Supercenter #1832	5601 E Ramon Rd	Palm Sprgs	7/24/07
PR0029205	Yousef's Shell Station	1708 N Palm Canyo Dr	Palm Sprgs	10/25/07
PR0028852	County Of Riverside Administration	3255 E Tahquitz Canyon Way	Palm Springs	8/28/07
PR0024305	Albertson's #6586 Albertson's #6586	40101 Monterey Ave	Rancho Mirage	4/3/08
PR0037401	Brighton Gardens of Rancho Mirage	72201 Country Club Dr	Rancho Mirage	4/7/08
PR0037726	Century 15 at the River	71800 Hwy 111 #A137	Rancho Mirage	5/7/08
PR0029217	Club At Morningside, The	84 Mayfair Dr	Rancho Mirage	4/14/08
PR0020953	Country Villa Rancho Mirage Health	39950 Vista Del Sol	Rancho Mirage	8/16/07
PR0038027	Desert Cardiology Center	39000 Bob Hope Dr	Rancho Mirage	6/11/08
PR0020564	Duncan Emmons Auto Body	71446 Highway 111	Rancho Mirage	5/6/08
PR0030123	Home Depot #667	34249 Monterey Ave	Rancho Mirage	4/3/08
PR0037915	Las Casuelas Nuevas	70050 Hwy 111	Rancho Mirage	5/28/08

HAZ MAT NPDES Surveys
7/01/2007- 6/30/2008

PR0030365	Longs Drug Store #153-OOB OOB	42370 Bob Hope Dr	Rancho Mirage	4/14/08
PR0033255	McDonald's #25647	34101 Monterey Ave	Rancho Mirage	4/3/08
PR0037710	Mimi's Cafe #69	71861 Hwy 111	Rancho Mirage	5/6/08
PR0029196	Mission Hills Country Club	34600 Mission Hills Dr	Rancho Mirage	6/12/08
PR0037501	Monarch of Rancho Mirage	34560 Bob Hope Dr	Rancho Mirage	4/8/08
PR0030255	Pavilions #3218 Pavilions #3218	36101 Bob Hope Dr Sect 2	Rancho Mirage	4/8/08
PR0029341	Rancho Mirage City Hall	69825 Highway 111	Rancho Mirage	5/8/08
PR0037226	Rancho Mirage Hand Car Wash	69800 Hwy 111	Rancho Mirage	3/21/08
PR0034794	Rancho Mirage Public Library	71100 Highway 111	Rancho Mirage	5/8/08
PR0034620	The Institute of Critical Care Med.	35100 Bob Hope Dr	Rancho Mirage	4/8/08
PR0033469	The Pool Store	72877 Dinah Shore Dr	Rancho Mirage	4/8/08
PR0029535	The Westin Mission Hills Resort	71501 Dinah Shore Dr	Rancho Mirage	7/5/07
PR0031392	The Westin Mission Hills Resort	71333 Dinah Shore Dr	Rancho Mirage	7/3/07
PR0029195	The Westin Mission Hills Resort/No The	33105 Los Alamos Dr	Rancho Mirage	7/10/07
PR0029105	Valero California Retail Co #3769	70255 Highway 111	Rancho Mirage	7/24/07
PR0037416	Walgreens #9641	72027 Dinah Shore Dr	Rancho Mirage	4/8/08
PR0033313	Wendy's	72837 Dinah Shore Dr	Rancho Mirage	4/8/08
PR0037227	CDF-Fire Station 44	13987 Main St	Ripley	3/25/08
PR0036930	J & J Market	25709 Neighbors Blvd	Ripley	2/25/08
PR0029026	Helena Chemical Company Helena Cher	60995 Pierce St	Thermal	10/9/07
PR0029403	McKeever Waterwell & Pump Service	82550 Avenue 60	Thermal	11/7/07
PR0031447	OM Contracting, Inc.	88532 Avenue 58	Thermal	11/7/07
PR0031048	Arco #06306/Prestige Stations #6306	32975 Monterey Ave	Thousand Palms	2/14/08
PR0028814	Circle K #2700564	73010 Ramon Rd	Thousand Palms	8/23/07
PR0030326	Desert Automotive Warehouse	72182 Corporate Way	Thousand Palms	3/14/08
PR0028909	Dewey Pest Control	72395 Varner Rd	Thousand Palms	11/8/07
PR0028993	Flying J. Travel Plaza	72235 Varner Rd	Thousand Palms	5/15/08
PR0028793	Oasis Chevron Food Mart	72276 Ramon Rd	Thousand Palms	2/4/08
PR0035593	The Club at Shenandoah Springs	32050 Desert Moon Dr	Thousand Palms	4/8/08
PR0029376	Thousand Palms Mobil	72275 Ramon Rd	Thousand Palms	11/14/07
PR0029202	Valero California Retail Co #3761	72360 Ramon Rd	Thousand Palms	10/30/07
Total				

Total Site Visits - 1,452

0002012

Training Logs

0002014

NPDES STORMWATER QUALITY TRAINING FOR
WQMP Training
Coachella Valley Water District

Meeting of: Tuesday, April 22 - 13:00 - 17:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signature
1	Jim	ayres	Riverside County	Economic Development	(760) 863-2552	
2	Tony	Bagato	City of Palm Desert	Planning	(760) 346-0611	
3	Roland	Bustamante	CVWD	Service (Inspection)	(760) 398-2661	
4	ARACELI	CASTRO	Riverside County	Economic Development		
5	Leland	Cole	City of Rancho Mirage	Public Works / Engineering	(760) 770-3224	
6	Adrienne	Dunfee	City of Indio	Public Works/Engineering Services	(760) 391-4000	
7	Grant	Eklund	City of Indio	Public Works/Engineering Services	(760) 391-4018	
8	Jaime	Engler	City of Indio	Public Works/Engineering Services	(760) 391-4000	
9	Tommy	Fowlkes	CVWD	Development Services	(760) 398-2661	
10	Bob	French	City of Calimesa	Public Works	(909) 798-9801	
11	Wilfred	Gonzalez	CVWD	Water Resources	(760) 398-2651	
12	Melissa	Grisa	City of Palm Desert	Planning	(760) 346-0611	
13	Phuong	Hunter	City of Moreno Valley	Public Works	(951) 413-3470	Phuong Hunter
14	Jeramy	Jackson	City of Moreno Valley	Public Works	(951) 616-4564	
15	Julien	Kim	City of Banning	Planning	(951) 922-3167	
16	LIZA	LIZARRAGA	Riverside County	Economic Development	(760) 863-2552	
17	Dominick	Lombardi	Riverside County	EDA	(951) 955-6622	
18	Gabriel	Martin	Riverside County	Economic Development Agency	(951) 955-1918	
19	Mike	McCabe	City of Calimesa	Public Works	(909) 795-9801	
20	LEONARD Bryan	ST. SAUVER McKinney	City of La Quinta	Public Works	(760) 777-7045 777-7048	
21	rick	minjares	City of Palm Springs	public works and engineering	(760) 323-8253	

0002015

NPDES STORMWATER QUALITY TRAINING FOR
WQMP Training
Coachella Valley Water District

Meeting of: Tuesday, April 22 - 13:00 - 17:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
22	Allison	Powell	City of Indio	Public Works/Engineering Services	(760) 391-4000	Allison Powell
23	Tom	Rafferty	City of Indio	Public Works/Engineering Services	(760) 391-4000	
24	Juan	Raya	City of Indio	Public Works/Engineering Services	(760) 391-4000	
25	ANNA	RODRIGUEZ	Riverside County	Economic Development	(760) 863-2552	Anna Rodriguez
26	LEAH	RODRIGUEZ	Riverside County	Economic Development	(760) 863-2552	Leah Z Rodriguez
27	Carol	Templeton	City of Palm Springs	Engineering	(760) 323-8253	Carol Templeton
28	JOAQUIN	TIJERINA	Riverside County	Economic Development	(760) 863-2552	
29	Alana	Townsend	City of Palm Desert	Public Works	(760) 346-0611	Alana Townsend
30	Jianhong	Xiong	Other	Plan check consultant to RCFCWCD	(858) 207-5077	
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0002016

NPDES STORMWATER QUALITY TRAINING FOR
WQMP Training
Coachella Valley Water District

Meeting of: Tuesday, April 22 - 13:00 - 17:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
43						
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0002017

NPDES STORMWATER QUALITY TRAINING FOR
Construction Training
Riverside County Flood Control & Water Conservation District

Meeting of: Thursday, April 17 - 09:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
1	Sanaa	Azar	Riverside County	Economic Development Agency	(951) 955-9137	
2	stacey	baumgartner	Riverside County	Code Enforcement	(951) 955-8802	
3	Frank	Bell	Riverside County	Waste Management	(951) 486-3226	
4	mike	blanco	City of Norco	Public Works		
5	dale	bonham	City of Norco	Public Works		
6	George	Boyden	Riverside County	Transportation Department	(951) 955-1095	
7	DON	BUCHANAN	City of Riverside	PUBLIC WORKS	(951) 712-4970	
8	Eduardo	Castellanos	Riverside County	Waste Management	(951) 486-3226	
9	Raymond	Cruz	City of Canyon Lake	Special Enforcement		
10	dan	cuthbertson	City of Norco	Public Works		
11	Dwight "Kelley"	Donovan	Riverside County	Transportation Department	(951) 955-6817	
12	Joseph	Dunlap	Riverside County	Transportation Department	(951) 955-1095	
13	etita	faiva	Riverside County	Code Enforcement	(951) 955-8802	
14	Leo	Ferrando	City of Riverside	Public Utilities-Water Construction	(951) 826-5694	
15	john	game	Riverside County	Code Enforcement	(951) 955-8802	
16	Nimrod	Garay	Riverside County	Waste Management		
17	Brandon	German	City of Riverside	Building & Safety Division	(951) 826-5955	
18	SEAN	GILL	City of Riverside	PUBLIC WORKS	(951) 826-5892	
19	Jeff	Gow	Riverside County	Waste Management		
20	anthony	green	Riverside County	Code Enforcement	(951) 955-8802	

0002018

NPDES STORMWATER QUALITY TRAINING FOR
Construction Training
Riverside County Flood Control & Water Conservation District

Meeting of: Thursday, April 17 - 09:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
21	Tom	Hall	City of Corona	Public Works	(951) 739-4816	
22	Habib	Hariri	City of Riverside	Public Utilities-Water Construction	(951) 826-5304	
23	jason	heagstedt	Riverside County	Code Enforcement	(951) 955-8802	
24	Joseph	Hickman	Riverside County	Waste Management	(951) 486-3226	
25	BARNEY	HUNTER	City of Riverside	PUBLIC WORKS	(951) 712-3947	
26	Al	Ignacio	City of Beaumont	public works	(951)377-5700	
27	William "Bill"	Jackson	Riverside County	Transportation Department	(951) 955-1095	
28	Xavier	Jacobo	City of Riverside	Public Utilities-Water Construction	(951) 538-3461	
29	Mirek	Jaroslawski	City of Corona	Public Works	(951) 739-4824	
30	David	Jones	RCFC & WCD	Maintenance	(951) 955-1234	
31	John	Kennedy	Riverside County	Transportation Department	(951) 955-1095	
32	mike	kulick	City of Norco	Public Works	(951)545-7881	
33	Vikki	Kuntz	Riverside County	Facilities Management	(951) 955-0166	
34	Brian	Ladnier	City of Corona	Public Works	(951) 279-3647	
35	JACK	LYNN	City of Riverside	PUBLIC WORKS	(951) 712-2321	
36	lori	lyon	Riverside County	Code Enforcement	(951) 955-8802	
37	Joseph	Martinez	Riverside County	Transportation Department	(951) 955-1095	
38	Ibrahim	mASSOUD	City of Riverside	Pubic Works/Engineering	(951) 826-5805	
39	Benjamin	Matye	Riverside County	Waste Management		
40	Charles	McBride	City of Riverside	Public Utilities-Water Construction	(951) 826-2182	

0002019

NPDES STORMWATER QUALITY TRAINING FOR
Construction Training
Riverside County Flood Control & Water Conservation District

Meeting of: Thursday, April 17 - 09:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
41	tom	mcmullen	Riverside County	Code Enforcement	(951) 955-8802	
42	Richard	Messer	City of Canyon Lake	Special Enforcement		
43	jennifer	morris	Riverside County	Code Enforcement	(951) 955-8802	J. Morris
44	Gabriel	Munoz	Riverside County	Transportation Department	(951) 955-1095	
45	Stewart	Noble	City of Riverside	Public Utilities-Water Construction	(951) 538-6970	
46	Dave	Ochs	City of Beaumont	public works		
47	lanee	padilla	Riverside County	Code Enforcement	(951) 955-8802	
48	JACK	PALOMAREZ	City of Riverside	PUBLIC WORKS	(951) 712-4972	
49	Mike	Parsons	City of Beaumont	public works		
50	julio	pineda	Riverside County	Code Enforcement	(951) 955-8802	
51	DORU	POPA	City of Riverside	PUBLIC WORKS	(951) 826-5341	
52	Jeff	Potts	City of Corona	Public Works	(951) 736-2442	
53	Kaniz	Quazi	Riverside County	Waste Management	(951) 486-3226	
54	MANNY	RIVAS	City of Riverside	PUBLIC WORKS	(951) 534-3331	
55	JUAN	ROJAS	City of Riverside	PUBLIC WORKS	(951) 538-3037	
56	mike	romero	Riverside County	Code Enforcement	(951) 955-8802	
57	Luana	Roth	Riverside County	Transportation Department	(951) 955-1095	
58	Richard	Rupert	City of Canyon Lake	Special Enforcement	(951) 834-6774	
59	Paul	Russell	Riverside County	Transportation Department	(951) 955-1095	
60	gladys	sanchez	Riverside County	Code Enforcement	(951) 955-8802	

NPDES STORMWATER QUALITY TRAINING FOR
Construction Training
Riverside County Flood Control & Water Conservation District

Meeting of: Thursday, April 17 - 09:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
61	Tamrat	Seyoum	City of Riverside	Public Utilities-Water Construction	(951) 826-5672	
62	Todd	Shibata	Riverside County	Waste Management	(951) 486-3226	
63	Karl	Shrader	City of Beaumont	public works		
64	Dave	Shreve	City of Corona	Public Works	(951) 817-5706	
65	DANIEL	SIMMONS	City of Riverside	PUBLIC WORKS	(951) 712-4952	
66	Nick	Sison	Riverside County	Transportation Department	(951) 955-1095	
67	Randy	Taylor	Riverside County	Waste Management		
68	Travis	Taylor	Riverside County	Waste Management	(951) 486-3226	
69	Dave	Thibault	City of Beaumont	public works		
70	Cesar	Tolentino	Riverside County	Transportation Department	(951) 955-1095	
71	nicole	wapner	Riverside County	Code Enforcement	(951) 955-8802	
72	Sarah	Watrous	Riverside County	Waste Management		
73	Edward	Wee Eng	Riverside County	Waste Management	(951) 486-3211	
74	Gregory	Yates	City of Riverside	Electric	(951) 826-2335	
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0002021

NPDES STORMWATER QUALITY TRAINING FOR
Construction Training
Riverside County Flood Control & Water Conservation District

Meeting of: Wednesday, April 16 - 09:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
1	Raymond	Aguilar	City of Riverside	Public Utilities - Water Operation	(951) 351-6350	
2	Ron	Allen	City of Beaumont	public works		
3	Art	Anaya	City of Riverside	Public Utilities - Water Operation	(951) 351-6350	
4	richard	arriola	Riverside County	Code Enforcement	(951) 955-8802	
5	Freeman "Joe"	Axtell	Riverside County	Transportation Department	(951) 955-1095	
6	Michael	Baggett	City of Riverside	Public Utilities - Water Field	(951) 351-6350	
7	Keith	Barnett	Riverside County	Transportation Department	(951) 955-1095	
8	Cliff	Bellinghausen	City of Riverside	Public Utilities - Water Operation	(951) 351-6318	
9	Daniel	Bertotti	City of Riverside	Public Utilities - Water Field	(951) 351-6350	
10	cyndi	black	Riverside County	Code Enforcement	(951) 955-8802	
11	ALAN	BOSIA	City of Riverside	PUBLIC WORKS	(951) 826-5599	
12	Mike	Call	Riverside County	Transportation Department	(951) 955-1095	
13	Paul	Castillo	Riverside County	Transportation Department	(951) 955-1095	
14	Carlos	Castro	City of Riverside	Public Utilities - Water Field	(951) 351-6350	
15	FRED	CERDA	City of Riverside	PUBLIC WORKS	(951) 712-4966	
16	Jessica	Chin	City of Riverside	Public Works	(951) 826-5760	
17	Christopher	Collins	City of Riverside	Public Utilities - Water Field	(951) 351-6350	
18	John	Contrado	City of Corona	Public Works	(951) 279-3512	
19	Bob	Cordova	City of Riverside	Public Utilities - Water Field	(951) 351-6350	
20	Chris	Cuenca	City of Riverside	Public Utilities - Water Field	(951) 351-6350	
21	Jackie	Cunningham	City of Riverside	Public Utilities - Water Operation	(951) 351-6350	

0002022

NPDES STORMWATER QUALITY TRAINING FOR
Construction Training
Riverside County Flood Control & Water Conservation District

Meeting of: Wednesday, April 16 - 09:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
22	DANNY	CWIAK	City of Riverside	PUBLIC WORKS	(951) 377-5514	
23	Ken	Dagenais	City of Corona	Public Works	(951) 736-2456	
24	TIM	DEXTER	City of Riverside	PUBLIC WORKS	(951) 712-4974	
25	Pete	Diaz	City of Riverside	Public Utilities - Water Field	(951) 351-6350	
26	jacob	dietrich	Riverside County	Code Enforcement	(951) 955-8802	
27	ryan	dolan	Riverside County	Code Enforcement	(951) 955-8802	
28	TONY	DUPRE	City of Riverside	PUBLIC WORKS	(951) 826-5990	
29	wayne	Durant	Riverside County	Code Enforcement	(951) 955-8802	
30	Fred	Ehemann	City of Riverside	Public Utilities - Water Operation	(951) 351-6350	
31	travis	engelking	Riverside County	Code Enforcement	(951) 955-8802	
32	Mark	Ensign	City of Riverside	Public Utilities - Water Field	(951) 351-6350	
33	Eric	Escobar	City of Riverside	Public Utilities-Water Construction	(951) 826-2253	
34	RAY	GARCIA	City of Riverside	PUBLIC WORKS	(951) 712-4962	
35	Thomas	Garcia	City of Riverside	Public Utilities - Water Field	(951) 351-6350	
36	Richard	Gastelum	City of Riverside	Public Utilities - Water Field	(951) 351-6350	
37	Paul	Gearhart	City of Riverside	Public Utilities - Water Field	(951) 351-6350	
38	Jim	Henke	City of Riverside	Public Utilities-Water Construction	(951) 538-3451	
39	Michele	Hindersinn	City of Corona	Public Works	(951) 736-2248	
40	BARNEY	HUNTER	City of Riverside	PUBLIC WORKS	(951) 712-3947	
41	David	Hylkema	Riverside County	Transportation Department	(951) 955-1095	
42	Joe	Janda	City of Beaumont	public works		

NPDES STORMWATER QUALITY TRAINING FOR
Construction Training
Riverside County Flood Control & Water Conservation District

Meeting of: Wednesday, April 16 - 09:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
43	Todd	Jorgenson	City of Riverside	Public Utilities-Water Construction	(951) 826-5581	
44	wendell	jose	Riverside County	Code Enforcement	(951) 955-8802	
45	david	jurden	Riverside County	Code Enforcement	(951) 955-8802	
46	Bradley	Kelvington	City of Riverside	Public Utilities - Water Field	(951) 351-6350	
47	Prem	Kumar	City of Moreno Valley	Public Works	(951) 413-3116	
48	jonathan	lance	Riverside County	Code Enforcement	(951) 955-8802	
49	Eric	Lohr	Riverside County	Transportation Department	(951) 955-1095	
50	Ivan	Mendoza	Riverside County	Transportation Department	(951) 955-1095	
51	Jesse	Mendoza	Riverside County	Transportation Department	(951) 955-1095	
52	Dave	Mitchell	City of Corona	Public Works	(951) 279-3510	David Mitchell
53	manolito	molina	Riverside County	Code Enforcement	(951) 955-8802	
54	VICTOR	MOORE	City of Riverside	PUBLIC WORKS	(951) 232-7139	
55	Mike	Neal	City of Beaumont	public works	951 377 5514	
56	karen	nguyen	Riverside County	Code Enforcement	(951) 955-8802	
57	Trai	Nguyen	Riverside County	Transportation Department	(951) 955-1095	
58	Robert	Ochoa	City of Riverside	Public Utilities - Water Field	(951) 351-6350	
59	Kenneth	Olson	City of Riverside	Public Utilities - Water Ops	(951) 351-6350	
60	Robert	Owen	City of Beaumont	public works	(951) 538-6269	
61	diana	parra	Riverside County	Code Enforcement	(951) 955-8802	
62	samantha	phillips	Riverside County	Code Enforcement	(951) 955-8802	
63	james	pike	Riverside County	Code Enforcement	(951) 955-8802	

0002024

NPDES STORMWATER QUALITY TRAINING FOR
Construction Training
Riverside County Flood Control & Water Conservation District

Meeting of: Wednesday, April 16 - 09:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
64	Michael	Roth	Santa Ana Regional Board	Storm Water	(951) 320-2027	
65	Rosario	Ruvalcaba	City of Corona	Public Works	(951) 739-4813	
66	Daniel	Slayych	Riverside County	Transportation Department	(951) 955-1095	
67	David	Sotelo	City of Riverside	Building & Safety Division	(951) 826-5752	4-16-08
68	Claudia	Steiding	Riverside County	Facilities Management	(951) 955-8174	
69	Luis	Tapia	City of Riverside	Public Utilities-Water Construction	(951) 538-3456	
70	Chris	Trinidad	City of Beaumont	public works		
71	Juan	Vargas	City of Riverside	Public Utilities - Water Field	(951) 351-6350	
72	marcella	villanueva	Riverside County	Code Enforcement	(951) 955-8802	
73	Steven	Wann	Riverside County	Transportation Department	(951) 955-1095	
74	George	Yassa	Riverside County	Transportation Department	(951) 955-1095	
75	Darren	Young	City of Corona	Public Works	(951) 736-2304	
	Randy	Taylor	RivCo WasteMgt		951-247-1734	Randy Taylor

0002025

NPDES STORMWATER QUALITY TRAINING FOR
Municipal Training
Riverside County Flood Control & Water Conservation District

Meeting of: Tuesday, April 15 - 13:00 - 16:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signature
1	Archie	Ammons	City of Moreno Valley	Public Works	(951) 413-3167	
2	Steve	Armitage	City of Banning	Street		
3	Jose	Arrollo	Riverside County	EDA	(951) 696-0100	Jose Arrollo
4	John	Baioa	City of Moreno Valley	Public Works	(951) 413-3167	John Baioa
5	Jim	Butler	City of Moreno Valley	Parks Maintenance		Jim Butler
6	Kevin	Carranza	City of San Jacinto	Parks Division		
7	Rudy	Casados	City of Moreno Valley	Parks Maintenance		Rudy Casados
8	Jim	Cash	City of San Jacinto	Water Division		
9	Jessica	Chin	City of Riverside	Public Works	(951) 826-5760	
10	Arlene	Chun	RCFC & WCD	Flood	(951) 955-1330	Arlene Chun
11	Gourley	Collins	City of Banning	Street		
12	Mark	Cooper	Riverside County	EDA	(951) 696-0100	
13	Gayle	Cuneo	RCFC & WCD	Maintenance	(951) 955-1311	Gayle Cuneo
14	Mihai	Dan	City of Indian Wells	Public Works	(760) 776-0237	
15	Ralph	Durrett	City of San Jacinto	Wastewater Division		Ralph Durrett
16	Elizabeth	Escatel	City of La Quinta	Building & Safety	(760) 777-7110	Elizabeth Escatel
17	Gary	Garcia	Riverside County	EDA	(951) 696-9199	
18	Tony	Garcia	City of Moreno Valley	Parks Maintenance		
19	George	Gemberling	Riverside County	Facilities Management	(951) 955-4875	
20	Frank	Gonzalez	City of Moreno Valley	Parks Maintenance		

0002026

NPDES STORMWATER QUALITY TRAINING FOR
Municipal Training
Riverside County Flood Control & Water Conservation District

Meeting of: Tuesday, April 15 - 13:00 - 16:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signature
21	Phil	Hallberg	City of San Jacinto	Building	(951) 537-6382	
22	Albert	Hatzenbuhler	City of Norco	Public Works		
23	Ruben	Huerta	City of Moreno Valley	Public Works	(951) 413-3167	
24	Rafael	Islas	Riverside County	EDA	(951) 696-0100	
25	Jeramy	Jackson	City of Moreno Valley	Public Works	(951) 616-4564	
26	Tom	Lara	City of Banning	Street		
27	Craig	Leyland	City of San Jacinto	Wastewater Division		
28	Ruben	Macias	City of Banning	Street		
29	Edgar	Marquez	City of Moreno Valley	Public Works		
30	howard	martin	City of Norco	Public Works		
31	Steve	Martin	Riverside County	EDA	(951) 696-0100	
32	Juan	Martinez	City of Moreno Valley	Parks Maintenance		
33	Jackie	Misuraca	City of La Quinta	Building & Safety	(760) 777-7021	
34	Jeffrey	Mitchell	Riverside County	Waste Management		
35	Daniel	Monto	City of Moreno Valley	Public Works	(951) 413-3485	
36	George	Munoz	City of La Quinta	Building & Safety	(760) 777-7099	
37	Jim	Nickell	Riverside County	Waste Management		
38	Nibardo	Orozco	City of Moreno Valley	Public Works		
39	Ann	Orr	Riverside County	EDA	(951) 696-0100	
40	David	Ortega	RCFC & WCD	NPDES Section	(951) 955-4390	

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NPDES STORMWATER QUALITY TRAINING FOR
Municipal Training
Riverside County Flood Control & Water Conservation District

Meeting of: Tuesday, April 15 - 13:00 - 16:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signature
41	Randy	Parker	City of Moreno Valley	Parks Maintenance		
42	Jake	Parr	City of Norco	Public Works		
43	Javier	Plazola	Riverside County	EDA	(951) 696-0100	
44	Tim	Plumb	Riverside County	Facilities Management	(951) 955-4806	
45	Ward	Pratt	Riverside County	Facilities Management	(951) 600-6830	
46	Dean	Ristow	City of Moreno Valley	Parks Maintenance	(951) 413-3702	
47	Paul	Russell	Riverside County	Transportation Department	(951) 955-1095	
48	Russell	Saudert	Riverside County	EDA	(951) 696-0100	
49	Grant	Searl	City of San Jacinto	Water Division		
50	Steven	Selbert	Riverside County	Facilities Management	(760) 863-8004	
51	Todd	Shibata	Riverside County	Waste Management		
52	Tim	Stockton	City of San Jacinto	Street/Storm Water		
53	Carl	Szoyka	City of Banning	Street	(951) 922-3286	
54	Steve	Thomas	Riverside County	EDA	(951) 696-0100	
55	Kurt	Van Dusen	Riverside County	Waste Management		
56	Barry	Verdusco	City of Moreno Valley	Public works dept	(951) 413-3498	
57	Mark	Virgil	City of Moreno Valley	Public Works	(951) 413-3167	
58	Gary	Wagner	City of Moreno Valley	Parks Maintenance		
59	Matt	Wicks	City of San Jacinto	Water Division		
60	Chris	Wiggins	City of Indian Wells	Public Works	(760) 776-0237	

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NPDES STORMWATER QUALITY TRAINING FOR
Municipal Training
Riverside County Flood Control & Water Conservation District

Meeting of: Tuesday, April 15 - 13:00 - 16:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signature
61	Terry	Woodruff	Riverside County	EDA	(951) 696-0100	[illegible]
62	Frank	Zaldivar	City of San Jacinto	Street/Storm Water		[illegible]
63	Daniel	Olea	County	Waste		[illegible]
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NPDES STORMWATER QUALITY TRAINING FOR
Municipal Training
Murrieta City Hall

Meeting of: Thursday, January 17 - 13:00 - 16:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
1	Joey	Alfaro	City of Murrieta	Community Services Department	(951) 461-6124	
2	Mike	Almodovar	City of Murrieta	Public Works Maintenance	(951) 461-6400	
3	Alberto	Aspe	City of Murrieta	Community Services Department	(951) 461-6124	
4	Damien	Avalos	City of Murrieta	Community Services Department	(951) 461-6124	
5	Mike	Bigay	City of Murrieta	Community Services Department	(951) 461-6124	
6	John	Bivens	City of Canyon Lake	Code Enforcement	(951) 244-2955	
7	Kast	Bob	City of Murrieta	Community Services Department	(951) 461-6124	
8	Robert	Bohan	City of Canyon Lake	Code Enforcement	(951) 244-2955	
9	Mark	Bollschweiler	City of Murrieta	Public Works Maintenance	(951) 461-6400	
10	Mike	Brooks	City of Murrieta	Public Works Maintenance	(951) 461-6400	
11	Mike	Burris	City of Murrieta	Public Works Maintenance	(951) 461-6400	
12	Dino	Camberos	City of Temecula	TCSD	(951) 694-6480	
13	Ryan	Castillo	City of Temecula	Public Works	(951) 694-6411	
14	Danny	Cover	City of Moreno Valley	Special Districts	(951) 413-3503	
15	Dave	Davis	City of Temecula	Public Works	(951) 694-6411	
16	Danny	Dawley	City of Corona	Public Works	(951) 736-2301	
17	George	De La Rosa	City of Temecula	TCSD	(951) 694-6480	
18	Juan	Del Val	City of Murrieta	Community Services Department	(951) 461-6124	
19	Jose	Diaz	City of Temecula		(951) 694-6400	
20	Shawn	Dullanty	City of Murrieta	Community Services Department	(951) 461-6124	

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NPDES STORMWATER QUALITY TRAINING FOR
Municipal Training
Murrieta City Hall

Meeting of: Thursday, January 17 - 13:00 - 16:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
21	Mark	Durbin	City of Murrieta	Community Services Department	(951) 461-6124	
22	Phil	Esnayra	City of Murrieta	Community Services Deaprtment	(951) 461-6124	
23	Gus	Gonzales	City of Temecula	Public Works	(951) 694-6411	
24	Larry	Gross	City of Murrieta	Community Services Department	(951) 461-6124	
25	Jay	Haecker	City of Murrieta	Community Services Department	(951) 461-6124	
26	Kevin	Harrington	City of Temecula	CSD	(951) 694-6400	
27	Dave	Hendry	City of Murrieta	Public Works Maintenance	(951) 461-6400	
28	Juan	Jaime	City of Temecula	Public Works	(951) 694-6411	
29	Paul	Johnson	City of Canyon Lake	Code Enforcement	(951) 244-2955	
30	Ken	Jones	City of Murrieta	Public Works Maintenance	(951) 461-6400	
31	Jim	Keezell	City of Riverside	Public Works	(951) 351-6247	
32	Mark	Levis	City of Temecula	Public Works	(951) 694-6411	
33	Perry	Ludwig	City of Temecula	Public Works	(951) 694-6411	
34	John	Maisey	City of Temecula	TCSD	(951) 694-6480	
35	Danny	Marks	City of Murrieta	Community Services Department		
36	Anthony	Martinez	City of Temecula	TCSD	(951) 694-6480	
37	Jason	Morrell	City of Murrieta	Public Works Maintenance	(951) 461-6400	
38	Jose	Munoz	City of Murrieta	Community Services Department	(951) 461-6124	
39	Mario	Munoz	City of Temecula	TCSD	(951) 694-6480	
40	Farida	Naceem	City of Murrieta	Public Works Maintenance	(951) 461-6400	

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NPDES STORMWATER QUALITY TRAINING FOR
Municipal Training
Murrieta City Hall

Meeting of: Thursday, January 17 - 13:00 - 16:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
41	Steve	Nickerson	City of Murrieta	Public Works Maintenance	(951) 461-6400	
42	Karl	Nordgren	City of Temecula		(951) 694-6400	
43	Flint	Norman	City of Temecula	Public Works	(951) 694-6411	
44	Chris	Payne	City of Temecula	Public Works	(951) 694-6411	
45	Sheri	Peek	City of Moreno Valley	Animal Services	(951) 413-3787	
46	Blanca	Price	City of Temecula	TCSD	(951) 694-6480	
47	Larry	Romine	City of Temecula	Public Works	(951) 694-6411	
48	Sarah	Russell	City of Murrieta	Public Works Maintenance	(951) 461-6400	
49	Rosa	Santana	City of Murrieta	Community Services Department	(951) 461-6124	
50	Dave	Sarian	City of Murrieta	Community Services Department	(951) 461-6124	
51	Ralph	Scharffenberg	City of Moreno Valley	Public Works / Special Districts	(951) 413-3472	
52	Rick	Serven	City of Temecula	TCSD	(951) 694-6480	
53	Richard	Shea	City of Temecula	TCSD	(951) 694-6400	
54	Matt	Sheftick	City of Corona	Public Works-Fleet	(951) 736-2307	
55	Stuart	Sheldon	City of Moreno Valley	Public Works	(951) 413-3483	
56	Jim	Smith	City of Temecula	Public Works	(951) 694-6411	
57	Charlie	Soto	City of Murrieta	Community Services Department	(951) 461-6124	
58	Steve	Sterling	City of Temecula	TCSD	(951) 694-6480	
59	Ron	Stuart	City of Murrieta	Community Services Department	(951) 461-6124	
60	Rick	Thompson	City of Murrieta	Community Services Department	(951) 461-6124	

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NPDES STORMWATER QUALITY TRAINING FOR
Municipal Training
Murrieta City Hall

Meeting of: Thursday, January 17 - 13:00 - 16:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
61	Dave	Thurman	City of Temecula	TCSD	(951) 694-6480	
62	Rodney	Tidwell	City of Temecula	Public Works	(951) 694-6411	
63	Nick	Vaughn	City of Murrieta	Public Works Maintenance	(951) 461-6400	
64	Bruce	Wedeking	City of Temecula	TCSD	(951) 694-6480	
65	Randy	West	City of Temecula	Public Works	(951) 694-6400	
66	Matt	Wiechec	City of Temecula	TCSD	(951) 694-6480	
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NPDES STORMWATER QUALITY TRAINING FOR
Construction Training
Coachella Valley Water District

Meeting of: Monday, November 19 - 09:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
1	Ronald	Alexander	CVWD	Domestic Water	(760) 398-2651	
2	Raphael	Alvarada	City of La Quinta	Public Works	(760) 777-7079	Raphael Alvarado
3	Agustin	Arellano	City of La Quinta	Public Works	(760) 777-7083	
4	Chad	Austin	CVWD	Stormwater	(760) 398-2651	Chad Austin
5	Tim	Batten	City of La Quinta	Public Works	(760) 777-7079	Tim Batten
6	Adolfo	Cabrera	City of La Quinta	Public Works	(760) 777-7083	
7	John	Collins	CVWD	Operations		
8	Eric	Crystal	CVWD	Stormwater	(760) 398-2651	
9	Scott	Davenport	CVWD	Operations		Scott Davenport
10	Paul	Goble	City of La Quinta	Public Works	(760) 777-7087	
11	David	Hamner	CVWD	Construction	(760) 398-2651	David Hamner
12	Fidel	Lara	CVWD	Stormwater	(760) 398-2651	
13	Francisco	Lara	CVWD	Stormwater	(760) 398-2652	
14	Antonio	Maciel	CVWD	Construction	(760) 398-2651	
15	Richard	Madrid	CVWD	Domestic Water	(760) 398-2651	
16	Bill	McAteer	City of Temecula	Public Works	(951) 694-6411	
17	Bryan	McKinney	City of La Quinta	Public Works	(760) 777-7045	
18	Alex	Menjivar	CVWD	Stormwater	(760) 398-2651	
19	Mike	Payment	City of La Quinta	Public Works		Michael Payment
20	Miguel	PeÃ±a	City of Indio	PW/IWA	(760) 391-4140	

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NPDES STORMWATER QUALITY TRAINING FOR
Construction Training
Coachella Valley Water District

Meeting of: Monday, November 19 - 09:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
21	Demetrio	Pecina	City of La Quinta	Public Works	(760) 777-7053	
22	Allison	Powell	City of Indio	PW/Engineering Services	(760) 391-4000	Allison Powell
23	Joshua	Rakes	CVWD	Stormwater	(760) 398-2651	
24	Juan	Raya	City of Indio	PW/Engineering Services	(760) 391-4000	
25	Juan	Rey	City of La Quinta	Public Works	(714) 412-8911	
26	Ed	Rivas	CVWD	Domestic Water	(760) 398-2651	
27	Michael	Roth	Santa Ana Regional Board	Storm Water	(951) 320-2027	
28	Michael	Roth	Santa Ana Regional Board	RWQCB	(951) 320-2027	
29	Jeff	Sodia	CVWD	Domestic Water	(760) 398-2651	
30	John	Soto	CVWD	Operations	(760) 398-2651	
31	James	Staight	City of La Quinta	Public Works	(760) 777-7053	
32	Lance	Young	CVWD	Operations		
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NPDES STORMWATER QUALITY TRAINING FOR
Construction Training
Coachella Valley Water District

Meeting of: Monday, November 19 - 09:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
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NPDES STORMWATER QUALITY TRAINING FOR
Construction Training
Murrieta City Hall

Meeting of: Thursday, January 17 - 09:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
1	Steve	Allen	Riverside County	Transportation Department	(951) 955-6790	
2	Venita	Anderson	City of Murrieta	Code Enforcement	(951) 461-6337	
3	William	Anderson	Riverside County	Transportation		
4	DOUG	ARMSTRONG	City of Temecula	PUBLIC WORKS	(951) 694-6411	
5	Amer	Attar	City of Temecula	Public Works	(951) 694-6411	
6	WILLIAM	BECERA	City of Temecula	PUBLIC WORKS	(951) 694-6411	
7	Matthew	Beile	City of Temecula	Public Works	(951) 694-6411	
8	Tracy	Bravo	Riverside County	Transportation		
9	Greg	Butler	City of Temecula	Public Works	(951) 694-6411	
10	Victor	Casillas	Riverside County	Transportation Department	(760) 778-2491	
11	Sara	Cervantes	Riverside County	Code Enforcement	951-955-0105	
12	TOM	COLE	City of Temecula	PUBLIC WORKS	(951) 694-6411	
13	Sylvester	Collins	City of Moreno Valley	Maintenance & Operations		
14	Paul	Cornell	Riverside County	Facilities Management	(951) 955-0168	
15	Marc	Crispin	Riverside County	Facilities Management	(951) 955-0167	
16	Jose	Cruz	Riverside County	Code Enforcement	951-955-0105	
17	Mayra	De La Torre	City of Temecula	Public Works	(951) 694-6411	
18	Lisa	Elder	Riverside County	Transportation Permit Section	(951) 850-0078	
19	Brett	Farlow	Riverside County	Code Enforcement	951-955-0105	
20	Lanker	Figueroa	City of Murrieta	Public Works Inspection	(951) 461-6075	

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NPDES STORMWATER QUALITY TRAINING FOR
Construction Training
Murrieta City Hall

Meeting of: Thursday, January 17 - 09:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
21	Roger	Flores	Riverside County	Transportation		Roger Flores
22	Katheline	Fong	Santa Ana Regional Board	RWQCB	(951) 774-0114	Katheleen Fong
23	Carol	Forrey	Riverside County	Code Enforcement	951-955-0105	
24	Angela	Frazier	Riverside County	Code Enforcement	951-955-0105	
25	Albert	Garcia	City of Moreno Valley	Maintenance & Operations		
26	Brandon	Garcia	Riverside County	Transportation Department	(760) 778-2491	
27	Kevin	Gillette	Riverside County	Transportation Permit Section	(951) 236-6080	
28	Jeff	Gullett	Riverside County	Transportation		
29	Cesar	Gutierrez	Riverside County	Transportation Permit Section	(951) 640-3221	
30	Phil	Hallberg	City of San Jacinto	Community Development	(951) 487-7330	
31	Cory	Hammond	City of Murrieta	Public Works Inspection	(951) 461-6075	
32	Morgan	Haun	City of Moreno Valley	Maintenance & Operations		
33	Jack	Hodson	City of Temecula	Public Works	(951) 694-6411	
34	Warren	Huang	Riverside County	Facilities Management	(951) 955-4897	
35	Mike	Hudson	City of Temecula	Public Works	(951) 694-6411	
36	REZA	JAMES	City of Temecula	PUBLIC WORKS	(951) 694-6411	
37	Jeff	Johnson	City of Murrieta	Public Works Inspection	(951) 461-6075	
38	David	Jones	RCFC & WCD	Maintenance	(951) 850-5497	
39	Jason	Jones	City of Murrieta	Code Enforcement	(951) 461-6337	
40	Carlos	Juarez	City of Moreno Valley	Maintenance & Operations	951 652-6656	

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NPDES STORMWATER QUALITY TRAINING FOR
Construction Training
Murrieta City Hall

Meeting of: Thursday, January 17 - 09:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
41	Timothy	Kearns	Riverside County	Facilities Management	(951) 955-9467	
42	Charles	Kolb	City of Moreno Valley	Maintenance & Operations		
43	Salvador	Lopez	Riverside County	Transportation		
44	Ed	Lotz	RCFC & WCD	Flood Control	(951) 955-1200	
45	Gabriel	Martin	Riverside County	Economic Development Agency	(951) 955-1918	
46	Andy	McDonel	City of Moreno Valley	Maintenance & Operations		
47	Linda	Mejia	City of Murrieta	Code Enforcement	(951) 461-6337	
48	Julie	Meyer	Riverside County	Transportation Permit Section	(951) 961-7584	
49	Lawrence	Meza	City of Moreno Valley	Maintenance & Operations		
50	Rigo	Morales	City of Moreno Valley	Maintenance & Operations	(951) 243-5527	
51	Farida	Naceem	City of Murrieta	Public Works / Engineering	(951) 461-6075	
52	George	Nelson	City of Murrieta	Code Enforcement	(951) 461-6337	
53	Brian	Noone	Riverside County	Code Enforcement	951-955-0105	
54	Avlin	Odviar	City of Temecula	Public Works	(951) 694-6411	
55	Richard	Ott	Riverside County	Transportation	(951) 955-6899	
56	Ismael	Pando	City of Hemet	Public Works	(951) 765-2360	
57	MARIANNE	PARKER	City of Temecula	CODE ENFORCEMENT	(951) 694-6400	
58	Ernest	Precie	City of Moreno Valley	Maintenance & Operations		
59	Donald	Raymond	Riverside County	Transportation Department	(760) 778-2491	
60	Tom	Rheiner	RCFC & WCD	Special Projects	(951) 955-2349	

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NPDES STORMWATER QUALITY TRAINING FOR
Construction Training
Murrieta City Hall

Meeting of: Thursday, January 17 - 09:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
61	Keith	Ross	Riverside County	Code Enforcement	951-955-0105	Keith Ross
62	Melvyn	Sayre	Riverside County	Transportation	(951) 955-6899	
63	Chris	Spence	City of Moreno Valley	Maintenance & Operations		
64	Jane	Tate	Riverside County	Code Enforcement	951-955-0105	
65	Jeremy	Wagner	Riverside County	Code Enforcement	951-955-0105	
66	Ron	Welch	Riverside County	Code Enforcement	951-955-0105	R Welch
67	Art	Wilson	City of Moreno Valley	Maintenance & Operations		Arthur L Wilson
68	Jim	Witt	City of Murrieta	Code Enforcement	(951) 461-6337	Jim Witt
69	Dan	York	City of Temecula	Public Works	(951) 694-6411	
70	Dan	York	City of Temecula	Public Works	(951) 694-6411	
71	ERIC	MAHER	CITY OF MURRIETA	PUBLIC WORKS	" 8137221	
72		~~Flores~~	~~County of Riv~~	~~Road Dept.~~	~~955-6044~~	~~Roman Flores~~
73	Lisa	DICKSON	City of Murrieta	Code Enforcemen		Lisa Dickson
74	Linda	MESIA	City of Murrieta	Code Enf.	461-6351	Linda Mesia
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0002040

NPDES STORMWATER QUALITY TRAINING FOR
Municipal Training
Riverside County Flood Control & Water Conservation District

Meeting of: Wednesday, November 28 - 09:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
1	Danny	Astorga	City of San Jacinto	Public Works - Streets/Storm Water	(951) 487-7386	Danny Astorga
2	Tom	Baier	City of Moreno Valley	Maintenance & Operations		Thomas Baier
3	Erwin	Barton	City of Moreno Valley	Maintenance & Operations	951-413-3160	Erwin Barton
4	Craig	Bone	City of Moreno Valley	Maintenance & Operations	(951) 764-5759	
5	Scott	Bryant	Riverside County	Waste Management	(951) 486-3226	
6	Dennis	Buckle	City of Moreno Valley	Maintenance & Operations		
7	Margie	Cabrera	City of Corona	Public Works-Fleet	(951) 279-3523	Margie Cabrera
8	Richard	Castellano	City of Hemet	Public Works	(951) 765-3712	Richard Castellano
9	Gordon	Cawthon	City of Corona	Public Works-Fleet	(951) 279-3523	
10	George	Chang	City of Moreno Valley	Maintenance & Operations	951 413-3160	George Chang
11	Deby	Conrad	City of La Quinta	Building & Safety	(760) 777-7022	Deby Conrad
12	FELROS	DEVERA	City of Beaumont	Engineering	(951) 541-3982	
13	Gary	Dewees	City of Corona	Parks and Community Services	(951) 279-3754	Gary DeWees
14	Michelle	Douglas	City of Riverside	Fire	(951) 826-5582	Michelle Douglas
15	Brian	Durfee	City of Moreno Valley	Maintenance & Operations	(951) 413-3160	
16	Walt	Edmiston	City of Corona	Parks and Community Services	(951) 279-3753	
17	LaDonna	Eldridge	City of Corona	Parks and Community Services	(951) 739-4982	LaDonna Eldridge
18	Crestino	Esparza	City of Hemet	Public Works	(951) 765-3712	Crestino Esparza
19	Alfred	Fierro	City of Moreno Valley	Maintenance & Operations	(951) 413 3160	Alfred Fierro
20	Jesse	Fierro	City of Riverside	Public Works	(951) 351-6247	Jesse Fierro

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NPDES STORMWATER QUALITY TRAINING FOR
Municipal Training
Riverside County Flood Control & Water Conservation District

Meeting of: Wednesday, November 28 - 09:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
21	Katheline	Fong	Santa Ana Regional Board	RWQCB	(951) 774-0114	Kathleen Fong
22	Nimrod	Garay	Riverside County	Waste Management	(951) 486-3226	Ngaray
23	Alex	Garcia	City of San Jacinto	Public Works - Streets/Storm Water	(951) 487-7386	Alex Garcia
24	Valin	Gray	City of Moreno Valley	Special Districts	(951) 413-3498	Valin Gray
25	Jerry	Gregory	Riverside County	Waste Management	(951) 486-3226	Jerry L. Gregory
26	Art	Groeneveld	City of Corona	Parks and Community Services	(951) 279-3567	[illegible]
27	Mark	Halman	City of San Jacinto	Public Works - Streets/Storm Water	(951) 487-7386	[illegible]
28	John	Holmes	City of San Jacinto	Public Works - Streets/Storm Water	(951) 487-7386	John Holmes
29	George	Jackson	City of Corona	Parks and Community Services	(951) 739-4991	[illegible]
30	Mark	Kaminski	City of Corona	Public Works-Fleet	(951) 279-3523	[illegible]
31	Scott	Kraak	Riverside County	Waste Management	(951) 486-3226	[illegible]
32	Lyndon	Lorance	City of Norco	Public Works	(951) 270-5607	Lyndon Lorance
33	Ramon	Lozano	Riverside County	Waste Management	(951) 486-3226	Ramon Lozano
34	Ruben	Macias	City of Banning	Street	(951) 922-3286	Ruben Macias
35	Tony	Macias	City of Moreno Valley	Maintenance & Operations	951-413-3116	Tony Macias
36	Billy	Mandap	City of Moreno Valley	Maintenance & Operations	951-697-6574	[illegible]
37	Joshua	Martinez	City of Hemet	Public Works	(951) 765-3712	[illegible]
38	Jim	Mikkelson	Riverside County	Waste Management	(951) 486-3226	[illegible]
39	Jeffrey	Mitchell	Riverside County	Waste Management	(951) 486-3226	[illegible]
40	brian	olsen	City of Norco	Public Works	(951) 270-5607	[illegible]

0002042

NPDES STORMWATER QUALITY TRAINING FOR
Municipal Training
Riverside County Flood Control & Water Conservation District

Meeting of: Wednesday, November 28 - 09:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
41	Sergio	Ortiz	City of San Jacinto	Community Development	(951) 487-7330	
42	Alex	Palacios	City of Corona	Parks and Community Services	(951) 279-3754	
43	Ron	~~Pease~~ LOWE	City of Hemet	Public Works	(951) 765-3712	
44	Art	Rose	City of Hemet	Public Works	(951) 765-3712	
45	John	Russo	City of Hemet	Public Works	(951) 765-3712	
46	Leon	Schrader	City of Moreno Valley	Fleet Services	(951) 413-3166	
47	David	Serna	City of Moreno Valley	Maintenance & Operations		
48	Matt	Sheftick	City of Corona	Public Works-Fleet	(951) 736-2307	
49	Vince	Smith	City of Moreno Valley	Fleet Services	(951) 413-3166	
50	Stephen	Szueber	City of Corona	Public Works-Fleet	(951) 736-2302	
51	Ted	Teagarden	City of Corona	Parks and Community Services	(951) 279-3754	Ted Teagarden
52	Brian	Thompson	City of Moreno Valley	Maintenance & Operations	951-413-3160	
53	David	Thompson	City of Hemet	Public Works	(951) 765-3712	
54	Joshua	Tiley	City of Moreno Valley	Maintenance & Operations	(951) 204-5174	
55	Scott	Tyma	City of Hemet	Public Works	(951) 765-3712	
56	Paul	Valdez	City of Riverside	Public Works	(951) 351-6247	Paul Valdez
57	Tom	Van Dorn	City of San Jacinto	Community Development	(951) 487-7330	T. Van D.
58	Larry	Williams	City of Moreno Valley	Public Works	(951) 413-3165	Larry Williams
59	Jeff	Woodley	City of Banning	Street	(951) 922-3286	Jeff Woodley
60	Kimberly	Zottneck	City of Riverside	Fire Department	(951) 826-5478	Kimberly Zottneck

0002043

NPDES STORMWATER QUALITY TRAINING FOR
Municipal Training
Riverside County Flood Control & Water Conservation District

Meeting of: Wednesday, November 28 - 09:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
61	RON	DeHOOP	CITY OF CORONA	PARKS	453-2265	
62	Scott	Bryant	Court of Riv	Waste	9122383	
63	Kathy	Swanson	City of Riverside	Landscaping	237-8408	
64	NAM	LUU	CITY OF CORONA	PARKS	739-4966	
65	Kevin	McClintock	City of Riv.	PW Streets	453-4590	K. McClintock
66	ANA	CRUZ	CITY OF BEAUMONT	PW Dept.	951-769-6999	
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69						
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0002044

NPDES STORMWATER QUALITY TRAINING FOR
Industrial/Commercial Training
Riverside County Flood Control & Water Conservation District

Meeting of: Tuesday, April 15 - 09:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signature
1	Michael	Almandinger	City of Beaumont	Building & Safety	(951) 572-3234	
2	Thomas	Arcee	City of Beaumont	Building & Safety	(951) 572-3234	
3	Martha	Bahia	Riverside County	Environmental Health	(951) 358-5055	
4	Bruce	Bailey	Riverside County	Environmental Health	(951) 273-9143	
5	Brad	Ballen	Riverside County	Environmental Health	(760) 863-8976	
6	Rizaldy	Baluyot	Riverside County	Facilities Management	(951) 955-4889	
7	Daniel	Barba	City of San Jacinto	Code Enforcement	(951) 537-6367	
8	Carolyn	Brown	Riverside County	Environmental Health	(951) 766-6524	
9	Justin	Brown	Riverside County	Waste Management		
10	Scott	Bryant	Riverside County	Waste Management		
11	Sandy	Bunchek	Riverside County	Environmental Health	(951) 273-9143	
12	Jeff	Bustamante	Riverside County	Environmental Health	(951) 766-6524	
13	Jessica	Chin	City of Riverside	Public Works	(951) 826-5760	
14	Joseph	Contaoi	Riverside County	Waste Management		
15	Nicholas	Crain	Riverside County	Environmental Health	(951) 766-6524	
16	Rodney	Cruze	City of Riverside	PW/Sewerage	(951) 351-6011	
17	Mike	Daly	Riverside County	Environmental Health	(951) 766-6524	
18	Vidal (Tim)	Evans	Riverside County	Waste Management		
19	Nimrod	Garay	Riverside County	Waste Management		
20	Donald	Gerber	Riverside County	Waste Management		

0002045

NPDES STORMWATER QUALITY TRAINING FOR
Industrial/Commercial Training
Riverside County Flood Control & Water Conservation District

Meeting of: Tuesday, April 15 - 09:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
21	Gerald	Gregory	Riverside County	Waste Management		
22	Richard	Guerrero	Riverside County	Environmental Health	(951) 273-9143	
23	Brian	Hawkinson	Riverside County	Waste Management		
24	Joseph	Hickman	Riverside County	Waste Management		
25	Michele	Hindersinn	City of Corona	Public Works		
26	Steve	Hooper	City of Riverside	Public Works		
27	Mark	Hunt	Riverside County	Waste Management		
28	Dave	Huster	City of San Jacinto	Building	(951) 537-6381	
29	Rob	Istik	Riverside County	Waste Management	951-247-1323	
30	Jeramy	Jackson	City of Moreno Valley	Public Works	(951) 616-4564	
31	Keith	Jones	Riverside County	Environmental Health	(951) 358-5055	
32	Kevin	Joyce	Riverside County	Waste Management		
33	Tim	King	City of Riverside	Public Works		
34	Marcus	Leso	City of Riverside	Public Works		
35	Michael	McKinley	Riverside County	Waste Management		
36	Gary	Merk	City of Riverside	Code Enforcement	(951) 826-5224	
37	Jim	Mikkelson	Riverside County	Waste Management		
38	Lisa	Mitchell	Riverside County	Environmental Health	(951) 273-9143	
39	Paul	Mitchell	Riverside County	Environmental Health	(951) 358-5055	
40	Gino	Monterroso	Riverside County	Environmental Health	(951) 273-9143	

0002046

NPDES STORMWATER QUALITY TRAINING FOR
Industrial/Commercial Training
Riverside County Flood Control & Water Conservation District

Meeting of: Tuesday, April 15 - 09:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
41	George	~~Muñoz~~ Muñoz	City of Riverside	Public Works		George A. Muñoz
42	Jessica	Nguyen	Riverside County	Waste Management		Jessica Nguyen
43	Jim	Nickell	Riverside County	Waste Management	312-7315	Jim Nickell
44	Dan	Olea	Riverside County	Waste Management		Danny Olea
45	LIONEL	ORNELAS	City of Corona	WATER&POWER/SC	(951) 279-3668	[illegible]
46	Sergio	Ortiz	City of San Jacinto	Building	(951) 537-6377	[illegible]
47	Neil	Ozonur	Riverside County	Environmental Health	(951) 273-9143	[illegible]
48	Christine	Parsons	Riverside County	Environmental Health	(951) 273-9143	[illegible]
49	Allen	Pielin	City of Riverside	Public Works	(951) 351-6072	[illegible]
50	Kaniz	Quazi	Riverside County	Waste Management		
51	Noah	Rau	Riverside County	Waste Management		Noah Rau
52	Jim	Ray	Riverside County	Environmental Health	(760) 863-8976	Jim A. Ray
53	Michael	Ray	Riverside County	Waste Management		[illegible]
54	~~Larry~~ Scott	~~Redmond~~ King	City of Riverside	Building & Safety Division	(951) 826-5261	Scott King
55	John	Riddell	Riverside County	Environmental Health	(760) 863-8976	John Riddell
56	Bobby	Riggs	Riverside County	Environmental Health	(760) 863-8976	[illegible]
57	Larry	Salazar	City of Riverside	Public Works		[illegible]
58	Bernie	Schleicher	Riverside County	Environmental Health	(951) 273-9143	[illegible]
59	Joseph	Schupp	Riverside County	Waste Management	486-3220	[illegible]
60	Paul	Shaffer	City of Corona	DWP/Source Control	(951) 279-3592	[illegible]

0002047

NPDES STORMWATER QUALITY TRAINING FOR
Industrial/Commercial Training
Riverside County Flood Control & Water Conservation District

Meeting of: Tuesday, April 15 - 09:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
61	Michael	Shalhub	Riverside County	Environmental Health	(760) 323-1048	
62	Carolinn	Shay	Riverside County	Environmental Health	(760) 863-8976	
63	Todd	Shibata	Riverside County	Waste Management		
64	Cindy	Snavely-Peck	City of Riverside	Public Works		
65	Doug	Thompson	Riverside County	Environmental Health	(951) 358-5055	
66	Manny	Vargas	Riverside County	Environmental Health	(951) 461-0284	
67	Michael	Walling	Riverside County	Environmental Health	(760) 863-8976	
68	Kelly	Winters	Riverside County	Environmental Health	(951) 461-0284	
69	Mohamed	Worayeth	Riverside County	Transportation Department	(858) 207-5086	
70	Kevin	Yang	Riverside County	Environmental Health	(760) 863-8976	
71	Michael	Yasmer	City of Riverside	Public Works		
72	Juan	Yepez	Riverside County	Waste Management		
73	Evangelina	Zapien	Riverside County	Waste Management	9512471674	
74	Claudia	Steiding	Riverside County	Facilities Management	7558174	
75						

0002048

NPDES STORMWATER QUALITY TRAINING FOR
Construction Training
Coachella Valley Water District

Meeting of: Tuesday, November 20 - 09:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
1	Ron	Alexander	CVWD	Domestic Water	(760) 398-2651	
2	Jim	Arender	City of La Quinta	Public Works		
3	Richard	Bennet	CVWD	Domestic	(760) 398-2651	
4	Stephanie	Blanco	Riverside County	Waste Management	(951) 486-3226	Stephanie Blanco
5	Wayne	Campbell	City of La Quinta	Building & Safety	(760) 777-7098	Wayne Campbell
6	Ruben	Castaneda	City of La Quinta	Public Works	(760) 777-7083	
7	Marques	Crews	Riverside County	Waste Management	(951) 486-3226	
8	Dennis	Cross	CVWD	Stormwater	(760) 398-2651	
9	Alfonzo	Cruz	CVWD	Domestic	(760) 398-2651	
10	Elizabeth	Escatel	City of La Quinta	Building & Safety	(760) 777-7017	
11	Dan	Fewings	CVWD	Domestic	(760) 398-2651	Dan Fewings
12	Gabe	Garza	CVWD	Domestic	(760) 398-2651	
13	Beto	Gonzales	City of La Quinta	Public Works	(760) 777-7083	
14	Christopher	Green	Riverside County	Waste Management	(951) 486-3226	
15	Scott	Hamilton	City of La Quinta	Public Works	(760) 777-7053	
16	David	Hamner	CVWD	Construction	(760) 398-2651	
17	Steve	Kochell	City of La Quinta	Public Works	(760) 777-7053	
18	James	Lindsey	City of La Quinta	Public Works	(760) 777-7052	
19	Joey	Lucas	CVWD	Domestic	(760) 398-2651	
20	Antonio	Maciel	CVWD	Construction	(760) 398-2651	

0002049

NPDES STORMWATER QUALITY TRAINING FOR
Construction Training
Coachella Valley Water District

Meeting of: Tuesday, November 20 - 09:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
21	Tony	Maciel	CVWD	Service	(760) 398-2651	
22	Richard	Madrid	CVWD	Domestic Water	(760) 398-2651	R. A. MADRID
23	Alex	Martinez	City of La Quinta	Public Works	(760) 777-7053	
24	Scott	McCue	CVWD	Stormwater	(760) 398-2651	
25	Patrick	McDaniel	CVWD	Stormwater	(760) 398-2651	
26	Fernando	Mecate	CVWD	Stormwater	(760) 398-2651	Fernando Mecate
27	Jim	Mikkelson	Riverside County	Waste Management	(951) 486-3226	
28	Jackie	Misuraca	City of La Quinta	Building & Safety	(760) 777-7021	
29	Joe	Morales	CVWD	Domestic	(760) 398-2651	
30	Jim	Nickell	Riverside County	Waste Management	(951) 486-3226	
31	Noah	Rau	Riverside County	Waste Management	(951) 486-3226	
32	Ed	Rivas	CVWD	Domestic Water	(760) 398-2651	
33	Joe	Schupp	Riverside County	Waste Management	(951) 486-3226	
34	Jeff	Sodia	CVWD	Domestic Water	(760) 398-2651	
35	Daniel	Valenzuela	City of La Quinta	Public Works	(760) 777-7096	
36	Patrick	Watson	Riverside County	Transportation Department	(760) 863-8267	
37	Bob	Wilson	City of La Quinta	Public Works		RWilson
38	Ed	Wimmer	City of La Quinta	Public Works	(760) 777-7088	
39	Tony	Woods	CVWD	Stormwater	(760) 398-2651	
40	DAN	YORK	City of Temecula	PUBLIC WORKS	(951) 694-6411	

0002050

NPDES STORMWATER QUALITY TRAINING FOR
Construction Training
Coachella Valley Water District

Meeting of: Tuesday, November 20 - 09:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
41	Mike	Lynch	City of Banning	Water	922-3330	
42	David	Martinez	" "	Water	922-3330	
43	Bill	Russell	"	"	951 922-3330	
44	Warren	Wooldridge	"	"	"	
45	Gabriel	Novello	" "	Water	"	
46	CHRIS	BREEN	COUNTY RIV.	WASTE	(951) 522-0860	
47	MARIVES	GREWS	COUNTY RIV.	WASTE	(951) 314-7752	
48	SCOTT	HAMILTON	LA QUINTA	PUBLIC WORK	760 777-7053	
49	Octo	Gonzales	LA QUINTA	Public works	(760) 777-705	
50	Ruben	Castanon	La Quinta	Public works	(760) 777-7050	
51	JAMES	Lindsey	LQ	Public Works	777-7059	
52	Jim	Mikkelsen	RCWMD	Waste Mngmt	951-486-3200	
53	RICHARD	BENNETT	CVWD	DOMESTIC	760 902 1050	
54	JOHN	LUCAS	CVWD	DOMESTIC	760 832-1410	
55	Joe	Schopf	County Riverside	Waste-	951-323-4171	
56	James	Mickeli	County of Riv.	waste	951 312-7315	
57	JUAN	RAYA	CITY OF INDIO	ENGINEERING	391-4017	
58	Jim	Hoffman	CVWD	Stormwater	—	
59	RENE'	LUNA	CVWD	STORMWATER	398-2661	
60						

0002051

NPDES STORMWATER QUALITY TRAINING FOR
WQMP Training
Riverside County Flood Control & Water Conservation District

Meeting of: Wednesday, April 16 - 13:00 - 17:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
1	James	Achuff	City of Indio	Public Works/Engineering Services	(760) 391-4019	
2	JOHN	ASHLOCK	Riverside County	TRANSPORTATION	(951) 955-8162	
3	Lori	Askew	City of Norco	Engineering	(951) 270-5678	
4	Vanessa	Batista	City of Riverside	Planning	(951) 826-5371	
5	~~Jessica~~ Elaine	~~Chin~~ Hsieh	City of Riverside	Public Works	(951) 826-~~5760~~ 5286	
6	Daniel	Cortez	City of Riverside	Planning	(951) 826-2354	
7	Charles	de Chambeau	RCFC & WCD	Flood	(951) 955-1298	
8	Mekbib	Degaga	RCFC & WCD	Flood	(951) 955-1214	
9	Laurie	Dobson-Correa	Riverside County	Transportation Department	(951) 955-1095	
10	Lisa	Elder	Riverside County	Transportation Department	(951) 955-1095	
11	Andrew	Emery	City of Riverside	Parks, Recreation & Community Services	(951) 826-2021	
12	John	Farley	Other	City of Riverside Public Utilities/Water	951-826-5705	
13	Kevin	Gillette	Riverside County	Transportation Department	(951) 955-1095	
14	Cesar	Guiterrez	Riverside County	Transportation Department	(951) 955-1095	
15	Diana	Hernandez	RCFC & WCD	Planning Division	(951) 955-9412	
16	Michele	Hindersinn	City of Corona	Public Works		
17	Steve	Hooper	City of Riverside	Public Works		
18	Andrew "Andy"	Huneck	Riverside County	Transportation Department	(951) 955-1095	
19	Tim	King	City of Riverside	Public Works		
20	David	Krell	Other	City of Riverside Public Utilities/Water	(951) 826-5434	
21	Maria	Lamping	City of Riverside	Public Works Engineering	(951) 826-5146	
22	ERIC	LOMELI	RCFC & WCD	DESIGN 1	(951) 955-8601	

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NPDES STORMWATER QUALITY TRAINING FOR
WQMP Training
Riverside County Flood Control & Water Conservation District

Meeting of: Wednesday, April 16 - 13:00 - 17:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
23	Roldan	Lopez	City of Indio	Public Works/Engineering Services	(760) 391-4000	
24	Steve	Loriso	City of Norco	Contract Plan Check	(909) 594-9702	
25	Ernest	Marquez	Other	City of Riverside Public Utilities/Water	(951) 826-5409	
26	Ibrahim	Massoud	City of Riverside	Pubic Works/Engineering	(951) 826-5805	
27	Ward	Maxwell	Riverside County	Transportation	(951) 955-6790	
28	Margie	McDowell	Other	City of Riverside Public Utilities/Water	(951) 826-5822	
29	Claudia	Mendoza	Riverside County	Transportation Department	(951) 955-1095	
30	Max	Mendoza	City of Riverside	Water Operations	(951) 351-6320	
31	Rick	Mendoza	Other	City of Riverside Public Utilities/Water		
32	Julie	Meyer	Riverside County	Transportation Department	(951) 955-1095	
33	Kevin	Munns	Other	City of Riverside Public Utilities/Water		
34	Mary	Nevarez	Other	City of Riverside Public Utilities/Water		
35	Douglas	Norfolk	City of Norco	Engineering	(951) 545-7894	
36	Gloria	Perez	Riverside County	EDA	(951) 955-9056	
37	Allen	Pielin	City of Riverside	Public Works		
38	Tony	Resendez	Riverside County	EDA	(951) 955-5781	
39	Tom	Rheiner	RCFC & WCD	Special Projects	(951) 955-2349	
40	Marcia	Rose	Riverside County	Transportation Department	(951) 955-1095	
41	Randy	Sheppeard	RCFC & WCD	ERS	(951) 955-1306	
42	Cindy	Snavely-Peck	City of Riverside	Public Works		
43	Jason	Swenson	RCFC & WCD	ERS	(951) 955-8082	

0002053

NPDES STORMWATER QUALITY TRAINING FOR
WQMP Training
Riverside County Flood Control & Water Conservation District

Meeting of: Wednesday, April 16 - 13:00 - 17:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
44	Tesfu	Tadesse	Riverside County	Transportation	(951) 955-3789	
45	KEVIN	TSANG	Riverside County	TRANSPORTATION	(951) 955-6828	
46	Teresa	Tung	RCFC & WCD	ERS	(951) 955-1233	
47	Vince	Vasallo	Other	City of Riverside Public Utilities/Water		
48	Mark	Westover	City of Moreno Valley	Public Works	(951) 413-3114	
49	Michael	Yasmer	City of Riverside	Public Works		
50	Mary	Zambon	Riverside County	Transportation Department	(951) 955-1095	
51	Denny	Nanney	RCFC & WCD	NPDES	951-955-1325	
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0002054

NPDES STORMWATER QUALITY TRAINING FOR
WQMP Training
Riverside County Flood Control & Water Conservation District

Meeting of: Thursday, November 29 - 13:00 - 17:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
1	SALEEM	BAIG	Riverside County	TRANSPORTATION	(951) 955-6874	
2	Monte	Bowers	RCFC & WCD	plan check consultant	(858) 451-6100	
3	Maleek	Howard	RCFC & WCD	Design 2	(951) 955-4408	
4	Rizaldy	Baluyot	Riverside County	Facilities Management	(951) 955-4889	
5	Farshid	Mohammadi	City of Riverside	Public Works	(951) 826-5515	
6	Dale	Anderson	RCFC & WCD	Planning Division	(951) 955-1345	
7	Joyce	Winge	RCFC & WCD	plan check consultant	(858) 451-6100	
8	Steven	Horn	Riverside County	Facilities Management	(951) 697-8269	
9	Henry	Olivo	Riverside County	Flood Control	(951) 955-8215	
10	Everett	Duckworth	Riverside County	Flood Control	(951) 955-1215	
11	Anabella	Hedman	RCFC & WCD	plan check consultant	(858) 869-4851	
12	Samandra	benjamin	Riverside County	TRANSPORTATION	(951) 955-0342	
13	Kent	Allen	RCFC & WCD	Construction	(951) 955-1288	
14	Mike	Emberton	City of San Jacinto	Public Works - Streets/Storm Water	(951) 487-7386	
15	Victor	Vasquez	City of San Jacinto	Public Works - Streets/Storm Water	(951) 487-7386	
16	Dane	Winkelman	Riverside County	Facilities Management	(951) 955-5997	
17	Yolanda	Macalalad	City of Corona	Public Works	(951) 279-3748	
18	Lori	Wolfe	RCFC & WCD	Plan Check	(714) 402-9645	
19	David	Cooper	RCFC & WCD	plan check consultant	(858) 735-1352	
20	Kahlil	Amin	RCFC & WCD	Design 2	(951) 955-1260	

0002055

NPDES STORMWATER QUALITY TRAINING FOR
WQMP Training
Riverside County Flood Control & Water Conservation District

Meeting of: Thursday, November 29 - 13:00 - 17:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
21	Barry	Mulcock	City of San Jacinto	Public Works - Streets/Storm Water	(951) 487-7386	
22	Mirtha	Liedl	Riverside County	Waste Management	(951) 486-3226	
23	Sung Key	Ma	Riverside County	Waste Management	(951) 486-3226	
24	Ryan	Ross	Riverside County	Waste Management	(951) 486-3226	
25	Stephanie	Blanco	Riverside County	Waste Management	(951) 486-3226	
26	Glen	Drogin	RCFC & WCD	Plan Check	(760) 327-0917	
27	Mike	Cairns	RCFC & WCD	Plan Check	858 866 0128	
28	Lombardo	Detrinidad	RCFC & WCD	Plan Check	858 866 0128	
29	Ken	Horsley	RCFC & WCD	Plan Check	858-866-0128	
30	Laura	Klages	RCFC & WCD	plan check consultant	(619) 977-8811	
31	DALE	WEST	City of Temecula	PLANNING	(951) 694-6400	
32	Claudio	Padres	RCFC & WCD	Design II	(951) 955-1329	
33	Ponce	Yambot	City of Beaumont	Public Works	(951) 769-6999	
34	Bill	Bryant	City of San Jacinto	Public Works - Streets/Storm Water	(951) 487-7386	
35	Ben	Haskell	City of San Jacinto	Public Works - Streets/Storm Water	(951) 487-7386	
36	Wills	Mark	RCFC	Development Review	951-955-1214	
37	Frank	Coyle	Facilities management	Associate Planning	951 697 8300	
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0002056

NPDES STORMWATER QUALITY TRAINING FOR
Municipal Training
Riverside County Flood Control & Water Conservation District

Meeting of: Tuesday, November 27 - 13:00 - 16:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
1	Benjamin	Aborita	Riverside County	Waste Management	(951) 486-3226	
2	Erik	Aguilar	City of Corona	Public Works	(951) 736-2301	
3	Ronald J	Baxter	Riverside County	Regional Parks	(951) 637-6984	
4	Dan	Bogan	Riverside County	Parks	(951) 906-9334	
5	R.W.	Broos	City of Hemet	Public Works	(951) 765-3712	
6	Kenneth	Brown	City of Corona	Public Works-Fleet	(951) 736-2307	
7	Steve	Bustillos	City of Corona	Public Works	(951) 736-2301	
8	Jessica	Chin	City of Riverside	Public Works	(951) 826-5760	
9	Gary	Costin	Riverside County	Transportation Department	(951) 737-2310	
10	Jay	Crane	City of Hemet	Public Works	(951) 765-3712	
11	Gayle	Cuneo	RCFC & WCD	Maintenance	(951) 955-1311	
12	Vincent	Denman	City of Corona	Public Works-Fleet	(951) 736-2306	
13	Kirk	Devries	City of Moreno Valley	Fleet Services	(951) 413-3166	
14	Jesse	Encino	City of Corona	Public Works	(951) 736-2301	
15	Robert	Filiar	City of Riverside	Public Works	(951) 351-6247	
16	Walter	Firlit	City of Moreno Valley	Fleet Services	(951) 413-3166	
17	Zachary	Foster	City of Moreno Valley	Special Districts	(951) 413-3484	
18	Gil	Gonzalez	City of San Jacinto	Public Works - Streets/Storm Water	(951) 487-7386	
19	Michael	Greisinger	City of Corona	Public Works-Fleet	(951) 279-3523	
20	Fernando	Gutierrez	City of Corona	Public Works	(951) 736-2301	

0002057

NPDES STORMWATER QUALITY TRAINING FOR
Municipal Training
Riverside County Flood Control & Water Conservation District

Meeting of: Tuesday, November 27 - 13:00 - 16:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
21	Pavel	Horn	City of Catherdal City	Engineering	(760) 770-0329	
22	Dave	Huster	City of San Jacinto	Community Development	(951) 487-7330	
23	Anna	Knott	City of Riverside	Public Works	(951) 351-6247	
24	Steve	Kupsak	City of Moreno Valley	Parks and Community Services	(951) 413-3702	
25	Cristina	Leal	City of Catherdal City	Engineering	(760) 770-0327	
26	Kevin	McClintock	City of Riverside	Public Works	(951) 351-6247	
27	Steve	Mucelli	City of Hemet	Public Works	(951) 765-3712	
28	David	Navarro	City of Corona	Public Works	(951) 736-2301	
29	Geneva	Nelson	RCFC & WCD	Maint.	(951) 955-1558	
30	Geneva	Nelson	RCFC & WCD	Maint.	(951) 955-1558	
31	Lee	Olvera	City of Corona	Public Works-Fleet	(951) 279-3523	
32	Travis	Peterson	City of Hemet	Public Works	(951) 765-3712	
33	Janet	Purchase	City of Riverside	Public Works	(951) 351-6247	
34	James	Rath	City of Riverside	Public Works	(951) 351-6247	
35	Anthony	Rivera	City of Corona	Public Works-Fleet	(951) 279-3523	
36	Ruben	Rodriguez	Riverside County	Riverside Co Regional Park and Open Space District	(951) 906-9326	
37	Bob	Rooker	City of Corona	Public Works-Fleet	(951) 736-2485	
38	Alfonso	Ruiz	City of Corona	Public Works	(951) 736-2301	
39	Mario	Ruvalcaba	City of Corona	Public Works	(951) 736-2301	
40	Steve	Schmidt	City of Corona	Public Works	(951) 736-2301	

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NPDES STORMWATER QUALITY TRAINING FOR
Municipal Training
Riverside County Flood Control & Water Conservation District

Meeting of: Tuesday, November 27 - 13:00 - 16:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signature
41	Jeff	Smith	City of Riverside	Public Works	(951) 351-6247	
42	Kevin	Smith	Riverside County	Park and Open Space District	(951) 677-6951	
43	Mark	Squires	Riverside County	Waste Management	(951) 486-3226	
44	Kathy	Swanson	City of Riverside	Public Works	(951) 351-6247	
45	Guy	Tanaka	City of Riverside	Public Works	(951) 351-6247	
46	Loren	Thoe	City of Corona	Public Works	(951) 736-2301	
47	Rene	Upson	City of San Jacinto	Community Development	(951) 487-7330	
48	Andre	Valenciana	City of Corona	Public Works	(951) 736-2301	
49	Barry	Verdusco	City of Moreno Valley	Public Works Dept	(951) 413-3498	
50	Linda	Wieczorek	City of Moreno Valley	Administrative Services/Animal Services	(951) 413-3799	
51	Kim	Williams	City of Riverside	Public Works	(951) 351-6247	
52	Alfonso	Zubia	City of San Jacinto	Public Works - Streets/Storm Water	(951) 487-7386	
53	Robert	Florez	City of Moreno Valley	P/W	951) 413-3421	
54	Tony	Silvas	City of Moreno Valley	P/W	951 413-3488	
55	Lee	Mendoza	City of Corona	Parks Department	951-736-3770	
56	Frank	Zaudivian	City San Jacinto	Stormwater		
57	Rick	DeGen	City of Corona	Parks & Community Services	951-736-2245	
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NPDES STORMWATER QUALITY TRAINING FOR
Municipal Training
Riverside County Flood Control & Water Conservation District

Meeting of: Tuesday, November 27 - 13:00 - 16:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
1	Benjamin	Aborita	Riverside County	Waste Management	(951) 486-3226	
2	Erik	Aguilar	City of Corona	Public Works	(951) 736-2301	
3	Ronald J	Baxter	Riverside County	Regional Parks	(951) 637-6984	
4	Dan	Bogan	Riverside County	Parks	(951) 906-9334	
5	R.W.	Broos	City of Hemet	Public Works	(951) 765-3712	
6	Kenneth	Brown	City of Corona	Public Works-Fleet	(951) 736-2307	
7	Steve	Bustillos	City of Corona	Public Works	(951) 736-2301	
8	Jessica	Chin	City of Riverside	Public Works	(951) 826-5760	
9	Gary	Costin	Riverside County	Transportation Department	(951) 737-2310	
10	Jay	Crane	City of Hemet	Public Works	(951) 765-3712	
11	Gayle	Cuneo	RCFC & WCD	Maintenance	(951) 955-1311	
12	Vincent	Denman	City of Corona	Public Works-Fleet	(951) 736-2306	
13	Kirk	Devries	City of Moreno Valley	Fleet Services	(951) 413-3166	
14	Jesse	Encino	City of Corona	Public Works	(951) 736-2301	
15	Robert	Filiar	City of Riverside	Public Works	(951) 351-6247	
16	Walter	Firlit	City of Moreno Valley	Fleet Services	(951) 413-3166	
17	Zachary	Foster	City of Moreno Valley	Special Districts	(951) 413-3484	
18	Gil	Gonzalez	City of San Jacinto	Public Works - Streets/Storm Water	(951) 487-7386	
19	Michael	Greisinger	City of Corona	Public Works-Fleet	(951) 279-3523	
20	Fernando	Gutierrez	City of Corona	Public Works	(951) 736-2301	
	TIM	King	City of Riverside	Environmental Compliance	(951) 712-2525	

0002060

NPDES STORMWATER QUALITY TRAINING FOR
Municipal Training
Riverside County Flood Control & Water Conservation District

Meeting of: Tuesday, November 27 - 13:00 - 16:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
21	Pavel	Horn	City of Catherdal City	Engineering	(760) 770-0329	
22	Dave	Huster	City of San Jacinto	Community Development	(951) 487-7330	
23	Anna	Knott	City of Riverside	Public Works	(951) 351-6247	
24	Steve	Kupsak	City of Moreno Valley	Parks and Community Services	(951) 413-3702	
25	Cristina	Leal	City of Catherdal City	Engineering	(760) 770-0327	
26	Kevin	McClintock	City of Riverside	Public Works	(951) 351-6247	
27	Steve	Mucelli	City of Hemet	Public Works	(951) 765-3712	
28	David	Navarro	City of Corona	Public Works	(951) 736-2301	
29	Geneva	Nelson	RCFC & WCD	Maint.	(951) 955-1558	
30	Geneva	Nelson	RCFC & WCD	Maint.	(951) 955-1558	
31	Lee	Olvera	City of Corona	Public Works-Fleet	(951) 279-3523	
32	Travis	Peterson	City of Hemet	Public Works	(951) 765-3712	
33	Janet	Purchase	City of Riverside	Public Works	(951) 351-6247	
34	James	Rath	City of Riverside	Public Works	(951) 351-6247	
35	Anthony	Rivera	City of Corona	Public Works-Fleet	(951) 279-3523	
36	Ruben	Rodriguez	Riverside County	Riverside Co Regional Park and Open Space District	(951) 906-9326	
37	Bob	Rooker	City of Corona	Public Works-Fleet	(951) 736-2485	
38	Alfonso	Ruiz	City of Corona	Public Works	(951) 736-2301	
39	Mario	Ruvalcaba	City of Corona	Public Works	(951) 736-2301	
40	Steve	Schmidt	City of Corona	Public Works	(951) 736-2301	
	AL	PIELIN	CITY OF RIVERSIDE	PUBLIC WORKS	951 351-6072	
	Mike	Yasmer	"	"	951-351-6145	

0002061

NPDES STORMWATER QUALITY TRAINING FOR
Municipal Training
Riverside County Flood Control & Water Conservation District

Meeting of: Tuesday, November 27 - 13:00 - 16:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
41	Jeff	Smith	City of Riverside	Public Works	(951) 351-6247	
42	Kevin	Smith	Riverside County	Park and Open Space District	(951) 677-6951	
43	Mark	Squires	Riverside County	Waste Management	(951) 486-3226	
44	Kathy	Swanson	City of Riverside	Public Works	(951) 351-6247	
45	Guy	Tanaka	City of Riverside	Public Works	(951) 351-6247	
46	Loren	Thoe	City of Corona	Public Works	(951) 736-2301	
47	Rene	Upson	City of San Jacinto	Community Development	(951) 487-7330	
48	Andre	Valenciana	City of Corona	Public Works	(951) 736-2301	
49	Barry	Verdusco	City of Moreno Valley	Public Works Dept	(951) 413-3498	
50	Linda	Wieczorek	City of Moreno Valley	Administrative Services/Animal Services	(951) 413-3799	
51	Kim	Williams	City of Riverside	Public Works	(951) 351-6247	
52	Alfonso	Zubia	City of San Jacinto	Public Works - Streets/Storm Water	(951) 487-7386	
53	Tino	Torrez	City of Riverside	Collections		
54	Kathleen	Fong	Regional Board			
55	Rolando	Espejo	PCI	Environmental	9514790860	
56	Leonardo	Gutierrez	City of Riverside	Public Works		
57	Richard	Nugent	City of Riverside	Public Works		
58	Chris	Cordova	City of Beaumont	Building Dept.	9511769852 9	
59	Celina	Cabrera	City of Beaumont	Code Enf.	951 572-3234	Celina Cabrera
60	Brandon	Gronlund	City of Riverside	Public Works		
61	Jose	Chavez	Riverside County	DES	760 320 1048	
	Teresa	Wills	Riv. Co	DES	760 320 1048	

Jeff's Class

0002062

NPDES STORMWATER QUALITY TRAINING FOR
WQMP Training
Riverside County Flood Control & Water Conservation District

Meeting of: Wednesday, November 28 - 13:00 - 17:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
1	Daisy	Barreto	RCFC & WCD	Planning Division - Plan Check 2 Section Engineering Services	(951) 955-1269	Daisy Barreto
2	Jessica	Chin	City of Riverside	Public Works		
3	Tony	Colarossi	City of La Quinta	Public Works	(760) 777-7089	Tony Colarossi
4	Ana Dalia	Cruz	City of Beaumont	Public Works	(951) 769-6999	
5	Donald	Delgadillo	RCFC & WCD	Planning Division - Plan Check 2 Section	(951) 955-4683	
6	Robert	Florez	City of Moreno Valley	Public Works	(951) 413-3471	
7	Kathleen ~~Katheline~~	Fong	Santa Ana Regional Board	RWQCB	(951) 774-0114	Kathleen Fong
8	Josh	Frohman	City of Moreno Valley	Land Development	(951) 413-3251	Josh Frohman
9	Jeff	Fulton	RCFC & WCD	Plan Check	(760) 479-2939	
10	Kyle	Galleup	RCFC & WCD	Planning	(951) 955-4050	
11	Komy	Ghods	RCFC & WCD	Design and Construction	(951) 955-2511	
12	Vicente	Giron	City of Moreno Valley	Public Works/Land Development	(951) 413-3120	Vicente B. Giron
13	Brian	Guillot	City of Banning	Planning	(951) 922-4842	
14	Imad	Guirguis	RCFC & WCD	Planning	(951) 955-1282	
15	Clement	Jimenez	City of Moreno Valley	Public Works - Land Development	(951) 413-3121	
16	Vikki	Kuntz	Riverside County	Facilities Management	(951) 955-0166	
17	Ed	Lara	City of Corona	Public Works	(951) 739-4825	
18	Debra	Leight	City of Riverside	Community Development-Planning Division	(951) 826-5874	
19	Ed	Lotz	RCFC & WCD	Flood Control	(951) 955-1200	Ed Lotz
20	Maria	Macario	Santa Ana Regional Board	Inland Stormwater	(951) 321-4583	Maria E. Macario

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NPDES STORMWATER QUALITY TRAINING FOR
WQMP Training
Riverside County Flood Control & Water Conservation District

Meeting of: Wednesday, November 28 - 13:00 - 17:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
21	Alberto	Martinez	RCFC & WCD	Development Review	(951) 955-1917	
22	Randy	McDaniel	City of Riverside	Park Planning	(951) 826-2006	
23	Rachel	McLure	City of Riverside	Parks, Recreation, and Community Services	(951) 826-2028	
24	Amy	McNeill	RCFC & WCD	Design	(951) 955-1268	
25	Edward	Perez	RCFC & WCD	Plan Check	(714) 750-7275	
26	Derek	Petersen	RCFC & WCD	Plan Check	(619) 920-6430	
27	Edwin	Quinonez	RCFC & WCD	Design	(951) 955-8627	
28	Michael	Roth	Santa Ana Regional Board	RWQCB	(951) 320-2027	
29	Mark	Sambito	City of Moreno Valley	Public Works/Land Development	(951) 413-3120	
30	Michael	Schuman	City of Moreno Valley	Public Works / Land Developement	(951) 413-3126	
31	Mike	Shetler	Riverside County	Executive Office	(951) 955-1186	
32	Emily	Stadnik	City of Corona	Public Works	(951) 817-5741	
33	Mark	Wills	RCFC & WCD	Development Review	(951) 955-1214	
34	Mike	Wong	RCFC & WCD	Design	(951) 955-1205	
35	Cenk	Yavas	Riverside County	Plan Check	(714) 750-7275	
36	Leonard	Albano	City of Riverside	Public Works	(951) 826-5769	
37	Claudia	Steiding	County Riverside	DOFM	(951) 955-8174	
38	Dan	York	City of Temecula	Public Works	951.694.6411	
39	Tim	Tuttell	RCFC	NPDES	(951) 955-8602	
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NPDES STORMWATER QUALITY TRAINING FOR
Industrial/Commercial Training
Riverside County Flood Control & Water Conservation District

Meeting of: Tuesday, November 27 - 09:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
1	Tony	Alcala	City of Calimesa	Public Works	909-795-9801	
2	Charles	Allessi	City of Riverside	Public Works (Sewer Division)		
3	Sandy	Arnett	Riverside County	Department of Environmental Health	(951) 766-2824	
4	Bonnesa	Arpa	Riverside County	Department of Environmental Health	(951) 766-2824	
5	Xente	Baker	City of Corona	Fire	(951) 736-2257	
6	Heidi	Barrios	Riverside County	Department of Environmental Health	(951) 766-2824	
7	Johnny	Bennett	City of Riverside	Public Works (Sewer Division)	(951) 351-6178	
8	Christina	Bowser	City of Beaumont	Code Enforcement	(951) 769-8520 (951) 572-3234	
9	Andrea	Briones	Riverside County	DES	(951) 358-5172	
10	Celina	Cabrera	City of Beaumont	Code Enforcement	(951) 572-3234	
11	Elizabeth	Capps	Riverside County	Environmental Health	(951) 273-9140	
12	Mary	Cartagena	Riverside County	Environmental Health	(951) 358-5172	
13	Brent	Casey	Riverside County	DES	(951) 358-5172	
14	Alex	Chang	City of Riverside	Public Works (Sewer Division)		
15	Jose	Chavez	Riverside County	Environmental Health		
16	Jessica	Chin	City of Riverside	Public Works		
17	Chris	Cordova	City of Beaumont	Code Enforcement	(951) 769-8529 (951) 572-3234	
18	Jerome	Coyazo	City of Riverside	Public Works (Sewer Division)		
19	Sarah	Crossman	Riverside County	DES	(951) 358-5172	
20	Ana Dalia	Cruz	City of Beaumont	Public Works	951-769-6999	

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NPDES STORMWATER QUALITY TRAINING FOR
Industrial/Commercial Training
Riverside County Flood Control & Water Conservation District

Meeting of: Tuesday, November 27 - 09:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
21	Sandi	DeLao	Riverside County	DES	(951) 358-5172	
22	Fritzy	Devera	Riverside County	Environmental Health	(951) 358-5172	
23	David	Duffy	City of Corona	Fire	(951) 736-2459	
24	Rolando	Espejo	City of Riverside	Environmental	(951) 479-0860	
25	Katheline	Fong	Santa Ana Regional Board	RWQCB	(951) 774-0114	Kathleen Fong
26	Ralph	Fregoso	Riverside County	DES	(951) 358-5172	
27	Bob	French	City of Calimesa	Public Works	909-795-9801 ext. 235	
28	Brandon	Gronlund	City of Riverside	Public Works (Sewer Division)		
29	Leonard	Gutierrez	City of Riverside	Public Works (Sewer Division)		
30	Michael	Gutierrez	City of Corona	Fire	(951) 736-2218	
31	My	Ha	Riverside County	Department of Environmental Health	(951) 766-2824	
32	Steven	Hooper	City of Riverside	Public Works	(951) 351-6076	
33	Antonio	Islas	Riverside County	DES	(951) 358-5172	
34	Rick	Jackson	City of Riverside	Public Works (Sewer Division)		
35	Kristine	Kim	Riverside County	Environmental Health		
36	Tim	King	City of Riverside	Environmental Compliance	(951) 712-2525	
37	Marcus	Leso	City of Riverside	Public Works	(951) 351-6145	
38	Jeff	Lojeski	Riverside County	Environmental Health	(951) 358-5172	
39	Alberto	Lopez	Riverside County	Department of Environmental Health	(951) 766-2824	
40	Kristin	Lorge	Riverside County	Department of Environmental Health	(951) 766-2824	

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NPDES STORMWATER QUALITY TRAINING FOR
Industrial/Commercial Training
Riverside County Flood Control & Water Conservation District

Meeting of: Tuesday, November 27 - 09:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
41	Jim	Madril	City of Riverside	Public Works (Sewer Division)		
42	Jenay	Marcotte	Riverside County	Environmental Health	(951) 358-5172	Eugenie Marcotte
43	Mike	McCabe	City of Calimesa	Public Works	909-795-9801	
44	Pete	McKay	City of Riverside	Public Works (Sewer Division)		
45	David	Moran	Riverside County	Environmaental Health Department	(951) 358-5172	D Moran
46	Anthony	Moreno	City of La Quinta	Building & Safety	(760) 777-7034	Anthony Moreno
47	George	Munoz	City of Riverside	Public Works	(951) 351-6145	George A. Muñoz
48	Farida	Naceem	City of Murrieta	Public Works	951-461-6075	Farida Y. Naceem
49	Richard	Nugent	City of Riverside	Public Works (Sewer Division)		
50	Cynthia	Overby	City of Beaumont	Code Enforcement	(951) 572-3234	Cynthia Overby
51	Roger	Pauley	City of Riverside	Public Works (Sewer Division)		
52	Allen	Pielin	City of Riverside	Public Works	(951) 351-6072	Allen Pielin
53	Lester	Powell	Riverside County	DES	(951) 358-5172	
54	Kimberly	Powers	City of Corona	Fire	(951) 279-3775	
55	Roy	Reed	City of Riverside	Public Works (Sewer Division)		Roy E. Reed
56	Greg	Reyes	Riverside County	Environmental Health	(951) 358-5172	
57	Addi	Rodriguez	City of Riverside	Public Works (Sewer Division)		
58	Jose	Rodriguez	City of Riverside	Public Works (Sewer Division)		
59	Jason	Roy	Riverside County	Department of Environmental Health	(951) 766-2824	
60	Enrique	Rueda	Riverside County	Environmental Health	(951) 273-9140	

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NPDES STORMWATER QUALITY TRAINING FOR
Industrial/Commercial Training
Riverside County Flood Control & Water Conservation District

Meeting of: Tuesday, November 27 - 09:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
61	Larry	Salazar	City of Riverside	Public Works	(951) 351-6145	
62	Dena	Sampel	Riverside County	Environmental Health		
63	Cindi	Schmitz	City of Corona	Fire	(951) 736-2464	C. Schmitz
64	Cindy	Snavely-Peck	City of Riverside	Public Works	(951) 351-6145	
65	Jim	Steele	City of Riverside	Public Works (Sewer Division)		
66	Daisy	Tepetitla	Riverside County	Environmental Health		Daisy E. Tepetitla
67	Eric	Tighe	City of Riverside	Public Works (Sewer Division)		
68	Tino	Torrez	City of Riverside	Public Works (Sewer Division)		
69	Jess	Trinidad	Riverside County	Environmental Health		
70	Teresa	Wills	Riverside County	Environmental Health	(760) 320-1048	
71	Michael	Yasmer	City of Riverside	Public Works	(951) 351-6145	
72	ALDO	LICITRA	CITY OF TEMECULA	"		
73	Celina	Cabrera	City of Beaumont	Building/ Code	951 572-3234	Celina Cabrera
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NPDES STORMWATER QUALITY TRAINING FOR
Construction Training
Riverside County Flood Control & Water Conservation District

Meeting of: Monday, September 24 - 08:00 - 11:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
1	Jessica	Chin	City of Riverside	Public Works	(951) 826-5760	
2	Paul	Russel	Riverside County	Transportation	(951) 955-6884	
3	Dave	Carrico	City of San Jacinto	Public Works - Streets/Storm Water	(951) 487-7386	
4	Jose	Vilchis	City of San Jacinto	Public Works - Streets/Storm Water	(951) 487-7386	
5	Rene	Upson	City of San Jacinto	Code Enforcement	(951) 487-7330	
6	Tom	Van Dorn	City of San Jacinto	Code Enforcement	(951) 487-7330	
7	Phil	Hallberg	City of San Jacinto	Code Enforcement	(951) 487-7330	
8	Lonny	Young	City of Riverside	Public Works	(951) 826-5294	
9	KENT	ALLEN	RCFC & WCD	DESIGN AND CONSTRUCTION	(951) 955-1288	
10	RAY	DUNN	RCFC & WCD	DESIGN AND CONSTRUCTION	(951) 955-1315	
11	TIM	FAGG	RCFC & WCD	DESIGN AND CONSTRUCTION	(951) 955-1236	
12	GENE	LEWIS	RCFC & WCD	DESIGN AND CONSTRUCTION	(951) 955-8561	
13	BRENT	MYTINGER	RCFC & WCD	DESIGN AND CONSTRUCTION	(951) 955-8519	
14	Erik	Sydow	Riverside County	Economic Development Agency	(951) 955-8274	
15	Gabriel	Martin	Riverside County	Economic Development Agency	(951) 955-1918	
16	Susan	James	City of Riverside	Park, Recreation and Community Services	(951) 826-2015	
17	Vic	Olmeda	Riverside County	Building and Safety	(951) 955-2095	
18	James	Stratton	Riverside County	Building and Safety	(951) 955-1835	
19	Alan	Bosia	City of Riverside	Public Works	(951) 826-5599	
20	Jack	Palomarez	City of Riverside	Public Works	951-7124972	
21	Sean	Gill	City of Riverside	Public Works	951-826-5892	
22	Eddie	Godinez	City of Moreno Valley	Land Development	(951) 413-3127	
23	Mosallam	Almasri	City of Moreno Valley	Land Development	(951) 413-3113	

51	Joe	Schupp	Riverside County	Waste Management		
52	Nate	Viste	Riverside County	Waste Management		
53	Edward	Wee Eng	Riverside County	Waste Management		
54	Bob	French	City of Calimesa	Public Works	(909) 795-9801	
55	Mike	McCabe	City of Calimesa	Public Works	(909) 795-9801	
56	Tony	Alcala	City of Calimesa	Public Works	(909) 795-9801	
57	dave	Thibault	City of Beaumont	Public Works	(951) 377-5315	
58	Dave	Ochs	City of Beaumont	Public Works	(951) 377-5315	
59	Mike	Neal	City of Beaumont	Public Works		
60	Ron	Allen	City of Beaumont	Public Works		
61	DENNIS	HANSEN	CITY OF NORCO	BUILDING INSPECT.		
62	DONALD	GERBER	COUNTY OF RIV	WASTE MGMT	951 486 3200	
63	MARK	BERG	CITY OF NORCO	BUILDING	951 270 5637	
64	ELMER	DATUIN	RIV. CO.	TRANSPORTATION	951-955 6762	
65	DAN	CUTHBERTSON	CITY OF NORCO	PUBLIC WORKS	951 735 3500	

66 MIKE RCFCWCD ~~909-991~~ 909-902-0978 Mike Rivera

24	Danny	Astorga	City of Moreno Valley	Land Development	(951) 413-3119	
25	Glen	Cox	City of Riverside	Public Util - Water Field Dep	(951) 351-6350	
26	Robert	Lucas	City of Riverside	Public Util - Water Field Dep	(951) 351-6350	
27	William	Ryan	City of Riverside	Public Util - Water Field Dep	(951) 351-6350	
28	Al	Orozco	City of Riverside	Public Util - Water Field Dep	(951) 351-6350	
29	Richard	Plogger	City of Riverside	Public Util - Water Field Dep	(951) 351-6350	
30	Duprice	Tillman	City of Riverside	Public Util - Water Field Dep	(951) 351-6350	
31	Miguel	Perez	City of Riverside	Public Util - Water Field Dep	(951) 351-6350	
32	Bradley	Kelvington	City of Riverside	Public Util - Water Field Dep	(951) 351-6350	
33	Daniel	Bertotti	City of Riverside	Public Util - Water Field Dep	(951) 351-6350	
34	Luis H.	Tapia	City of Riverside	Water Engineering	(951) 538-3456	
35	Stewart	Noble	City of Riverside	Water Engineering	(951) 826-5142	
36	dan	cuthbertson	City of Norco	Public Works	(951) 270-5607	
37	Justin	Brown	Riverside County	Waste Management		
38	Eduardo	Castellanos	Riverside County	Waste Management		
39	Art	Fuentes	Riverside County	Waste Management		
40	Brian	Hawkinson	Riverside County	Waste Management		
41	Joseph	Hickman	Riverside County	Waste Management		
42	Rob	Istik	Riverside County	Waste Management	247-1323	
43	Kevin	Joyce	Riverside County	Waste Management		
44	Scott	Kraak	Riverside County	Waste Management	951/986-3273	
45	Ben	Matye	Riverside County	Waste Management		
46	Jessica	Nguyen	Riverside County	Waste Management	951 486 3253	
47	Dan	Olea	Riverside County	Waste Management		
48	Mario	Ramirez	Riverside County	Waste Management		
49	Noah	Rau	Riverside County	Waste Management	951 486-3202	
50	Michael	Ray	Riverside County	Waste Management	951 486 1414	

Capital Improvement Projects

Project Title	Board Approval	Project Cost Low Range	Project Cost (High Range)
800 MHz Radio Project	3.19 4/12/05, 3.42b 1/30/07, 3.20 2/17/07	$ 100,000,000	$ 100,000,000
Downtown Law Building	3.19 5/2/06	$ 139,000,000	$ 171,000,000
CHA Building Expansion	3.18 1/23/07	$ 66,405,000	$ 49,139,700
Co. Riverside Enterprise Solution for Prop. Tax (CREST)	3.39 6/19/07	$ 20,000,000	$ 30,000,000
Ben Clark Electrical Infrastructure Project	3.39 1/30/07	$ 5,100,000	$ 12,285,350
Eastvale Community Center & Child Care	3.17 8/5/07 3.28 2/26/08	$ 10,000,000	$ 10,000,000
Desert Hot Springs Family Care Center Construction	3.34 4/18/06	$ 8,190,761	$ 8,190,761
RCRMC Emerg. Rm, Trauma, Fast Track Design & Programming	3.50 7/31/07 3.16 3/25/08	$ 8,640,000	$ 8,640,000
Thermal Fire Station Replacement	3.27 7/31/07	$ 5,000,000	$ 7,000,000
North Shore Fire Station Replacement	4.5 12/12/06 4.3 10/2/07	$ 2,500,000	$ 4,000,000
Jurupa Valley Aquatic Center	4.1 10/4/05	$ 23,545,000	$ 23,545,000
Mecca Fire Station Replacement	4.3 2/6/07 4.1 12/7/07	$ 2,000,000	$ 3,500,000
TLMA Pedley Yard Construction	4.5 7/11/06	$ 5,000,000	$ 5,500,000
Sun City Fire Station Replacement	3.17 7/31/07	$ 4,000,000	$ 6,000,000
Fleet Services Fueling & Car Wash Construction	3.23 6/6/06	$ 2,950,000	$ 2,950,000
Lake Riverside Fire Station Replacement	3.17 7/31/07	$ 4,000,000	$ 4,000,000
Edward Dean Museum Gardens - Legacy Gardens	3.149 7/31/07	$ 1,000,000	$ 1,000,000
Sun City Library Expansion & Rehabilitation	3.12 10/23/07	$ 2,000,000	$ 3,000,000
Microwave Equipment Replacement	1.0-6/5/06 & 3.54-6/27/06	$ 1,188,209	$ 1,188,209
Lakeview Nuevo Dental Clinic	4.3 4/24/07	$ 1,000,000	$ 1,000,000
Indio Public Defender Remodel (see FM Indio CAC DA/PD building)	3.18 5/2/06	$ 1,000,000	$ 1,900,000
Auditor - Remodel 3rd Floor CAC	3.29 1/31/06	$ 850,000	$ 1,000,000
ACR Air Conditioning System for Data Room	3.18 3/18/08 3.27 10/30/07	$ 640,197	$ -
ACR Electronic Content Mgmt System (ECMS)	3.6-7/17/07	$ 2,000,000	$ 3,000,000
Hemet Family Care Center Architectural Agreement	1.0 6/5/06 3.9 12/5/07	$ 637,318	$ 637,318
Desert Hot Springs Family Care Architectural Services	3.34-4/18/06 & 1.0-6/5/06	$ 308,000	$ 308,000
San Jacinto Valley Animal Shelter Construction	3.15 5/8/07	$ 14,075,000	$ 15,475,000
Riverside Metro Animal Shelter	3.71 8/9/05	$ 38,500,000	$ 42,878,800
Blythe Animal Shelter Replacement	3.39 1/30/07 3.17 3/25/08	$ 2,100,000	$ 2,240,000
Fairgrounds - Entry and Marketing Office	3.16 9/13/05	$ 2,000,000	$ 2,000,000
Indio Hills Community Center	3.20 11/8/05 3.19 6/27/06 3.10 3/25/08	$ 1,000,000	$ 1,000,000
Perris Valley Big League Dreams Sports Park	3.54 1/15/08	$ 25,000,000	$ 25,000,000
Romoland/Homeland Comm Cntr, Park & Child Care	4.2 7/17/07 3.18 7/17/07	$ 18,000,000	$ 18,000,000
Eller Park	4.4 12/12/06	$ 2,500,000	$ 2,500,000
El Cerrito Sports Park	4.4 4/1/08	$ 18,600,000	$ 18,600,000
Vernola Park	4.5 5/24/05 9.1 5/24/05	$ 5,185,000	$ 5,185,000
Mecca Boys & Girls Club	4.6 12/5/06	$ 15,000,000	$ 20,000,000
Hub Jail Construction Project	3.21 2/5/08 3.38 4/1/08	$ -	$ -
Facilities Management HQ Relocation Arctl Services	3.23 6/5/07	$ 300,000	$ 300,000
Indio CAC/DA & Public Defender Archt. Services	3.27 3/11/08	$ 1,448,649	$ 1,448,649
Ben Clark On-Site Water Line	3.14 4/1/08	$ -	$ -
Ben Clark Water District Improvements	3.28 3/11/08	$ 450,000	$ 450,000
Southwest Justice Center Parking Lot Exp Archtl Agmt	3.22 2/5/08	$ 190,800	$ 190,800
Perris Fueling Facility and Car Wash	3.62 1/29/08	$ 1,500,000	$ 1,500,000
New Public Law Library	9.10 2/26/08	$ 2,382,450	$ 2,382,450
Cabazon Fire Station Replacement	3.17 7/31/07	$ 4,683,000	$ 4,700,000
Ripley Fire Station Replacement	3.9 10/3/06	$ 3,150,000	$ 3,150,000
Eastvale/Hamner 27 Fire Station Land Acquisition	3.10 1/15/08 3.28 2/26/08	$ 998,000	$ 998,000
Glen Oaks Fire Station Design & Construction	3.34 2/26/08	$ 3,484,700	$ 3,484,700
Thousand Palms Fire Station Replacement	3.63 9/27/06, 4.4 4/25/06, 4.5 7/3/07, 4.1 2/26/08	$ 7,000,000	$ 7,000,000
Cabazon Fueling Station	3.6 5/24/05, 4.4 4/24/07	$ 5,174,000	$ 5,174,000
HR - Remodel 7th Floor CAC	3.29-1/31/06 & 3.19-9/18/07 & 3.62 1/29/08	$ 750,000	$ 3,900,000
Rubidoux Community Library	3.6 1/6/04	$ 15,013,483	$ 15,013,483
Home Gardens Library Expansion	4.4 2/27/07 4.4 11/19/07, 4.4 2/26/08	$ 2,300,000	$ 2,300,000
Indio MH Treatment Center and Chiller Project	3.19 3/18/08	$ -	$ -
MH Behavioral Health Information System	1.0 6/6/05	$ 3,500,000	$ 3,500,000
Probation Client Mgmt System Replacement (IT)	3.15 11/21/2006	$ 800,000	$ 800,000
Van Horn Youth Cntr - Replacement of Air Conditioning	3.20 4/1/08	$ -	$ -
North Mountain Communications Site (Acquisition)	3.22 11/29/06	$ 130,000	$ 180,000
RCRMC Pharmacy Clean Room Remodel	3.17 3/13/07 3.19 4/1/08	$ 122,000	$ 122,000
Mental Health Expansion Design	3.50 7/31/07	$ 500,000	$ 500,000
Plant Operations & Warehouse Design	3.50 7/31/07	$ 150,000	$ 150,000
Nursing Education Building Programming	3.50 7/31/07	$ 450,000	$ 450,000
Center of Excellence Design	3.50 7/31/07	$ 900,000	$ 900,000
Comprehensive Hospital IT	3.50 9/4/07	$ 63,600,000	$ 63,600,000
Remodel of In-patient Treatment County Farm Rd	3.31 2/26/08	$ 105,761.00	$ 105,761.00
Hub Jail Phase 1 1200 beds, quick chill, laundry	3.21 2/27/07, 1.0 5/21/07, 3.38 4/1/08	$ 363,690,000	$ 363,690,000
Cove Communities Sheriff Station	3.24 6/5/07	$ 30,000,000	$ 35,000,000
Thermal Sheriff Station and Aviation Center	3.1 12/06/05, 4.1 5/9/06 4.6 4/1/08	$ 45,000,000	$ 48,000,000

Hub Jail Phase 2 600 beds	3.21 2/27/07, 1.0 5/21/07	$ 142,880,000	$ 142,880,000
71 MA Indio Tenant Improvement CIP Loan	3.3 9/4/07	$ 1,000,000	$ 1,000,000
Home Gardens Code Enforcement Office	4.7 2/26/08	$ 3,000,000	$ 3,075,000
Woodcrest Library	3.31 8/29/06	$ 5,708,694	$ 6,000,000
Thermal Revitalization	4.2 to 4.5 3/25/08		-
Green= Projects in White Water River Watershed			
Yellow= Projects in Santa Ana Watershed			
Purple= Projects in Santa Margarita Watershed			

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WQMP Subdivision Statistics

Riverside County WQMP Checklist

Checklist for Identifying Projects Requiring a Project-Specific WQMP within Santa Ana and Santa Margarita Regions

Section I: Project Details

Project Number:	Project Size in Acres:
Project Name:	% of Impervious Surface Prior to Construction:
Project Location or APN:	% of Impervious Surface After Project Completion:
Project Description:	Est. Construction Start Date:
	Est. Construction Completion:
	Project Runoff Discharges into: (Provide name of waterbody)
Watershed location: ☐ Santa Ana ☐ Santa Margarita	

Pollutants of Concern (Check all that apply)

- ☐ Sediment / Turbity
- ☐ Nutrients
- ☐ Organic Compounds
- ☐ Trash & Debris
- ☐ Oxygen Demanding Substance
- ☐ Bacteria & Viruses
- ☐ Oil & Grease
- ☐ Pesticides (Non Soil Bond)
- ☐ Metals
- ☐ Other (describe):_____

Proposed Treatment BMPs (Check all that apply)

- ☐ Bio-swale
- ☐ Detention Basin
- ☐ Retention Basin
- ☐ Sand filter or Filtration
- ☐ Water Quality Inlets
- ☐ *Proprietary Devices (describe) _____
- ☐ Wet Ponds or Wetlands

*Proprietary devices are generally not approved for county maintained facilities

Section II: General Criteria

Proposed Project Consists of or Includes:	YES	NO
1. Significant Redevelopment: The addition, creation or replacement of at least 5,000 sq ft or more of impervious surface on an existing developed site or new site.		
2. Residential development of 10 or more dwelling units.		
3. Commercial or Industrial development greater than 100,000 sq ft.		
4. Automotive repair shops.		
5. Restaurants where the project site is 5,000 square feet or more.		
6. Parking lots of 5,000 sq ft or more.		

Section III: Santa Ana Region Specific Criteria

Proposed Project Consists of or Includes:	YES	NO
7. Developments creating 2,500 sq ft or more of impervious surface. Adjacent to (within 200 ft) or discharging directly into areas designated in the Basin Plan as waters supporting habitats necessary for the survival and successful maintenance of plant or animal species designated under state or federal law are rare, threatened, or endangered species (denoted in the Basin Plan as the "RARE" beneficial use) or waterbodies listed on the CWA Section 303(d) list of Impaired Waterbodies. "Discharging directly to" means Urban Runoff from subject Development or Redevelopment site flows directly into aforementioned waterbodies. Urban Runoff is considered a direct discharge unless it first flows through a) a municipal separate storm sewer system (MS4) that has been formally accepted by and is under control and operation of a municipal entity; b) a separate conveyance system where there is co-mingling of flows with off-site sources; or c) a tributary or segment of a water body that is not designated with "RARE" beneficial uses nor listed on the 303(d) list before reaching the water body or segment designated as RARE or 303(d).		
8. Hillside development that creates 10,000 sq ft or more of impervious surface(s), including developments in areas with known erosive soil conditions or where natural slope is 25% or more.		

Section IV: Santa Margarita Region Specific Criteria

Proposed Project Consists of or Includes:	YES	NO
9. Environmental Sensitive Areas (ESAs). All development located within or directly adjacent to or discharging directly to an ESA (where discharges from the development or redevelopment will enter receiving waters within the ESA), which either creates 2,500 sq ft of impervious surface on a proposed project site or increases the area of imperviousness of a proposed project site to 10% or more of its naturally occurring condition. "Directly adjacent" means situated within 200 ft of the ESA. "Discharging directly to" means outflow from a drainage conveyance system that is composed entirely of flows from subject development or redevelopment site, and not commingled with flows from adjacent lands.		
10. Hillside development that creates 5,000 sq ft.		
11. Streets, roads, highways, and freeways. Includes any paved surface that is 5,000 sq ft or greater used for the transportation of automobiles, trucks, motorcycles, and other vehicles.		
12. Retail Gasoline Outlets (RGOs). Includes RGOs that meet the following criteria: (a) 5,000 sq ft or more, or (b) a projected Average Daily Traffic (ADT) or 100 or more vehicles.		

DETERMINATION: Circle appropriate determination.

Any questions answered "Yes" → Project Requires a project-specific WQMP.
All questions are answered "No" → Project requires incorporation of Site Design BMPs and Source Control BMPs imposed project development.

Approved by: _____
(Environmental Compliance Unit)

Submitted by: _____
Project Manager (print name)

Date: _____

Date: _____

Contact Phone #: _____

Water Quality Management Plan(WQMP) or Standard Urban Stormwater Mitigation Plan (SUSMP) Requirements

Three watersheds with distinct differences in permitting requirements:

- **Santa Margarita Watershed-Regulated by the San Diego Regional Water Quality Control Board**- John Robertus-Executive Officer/Michael McCann Asst. EO
  - Most stringent of the three Regional Boards
  - 4th year of 5 year permit
  - Next permit negotiations 2009-2010
  - Stepping up enforcement on municipalities
  - Inspection audit by joint US EPA contractor and Regional Board staff

- **Santa Ana River Watershed-Regulated by the Santa Ana Regional Water Quality Control Board**-Gerald Thibeault- Executive Officer/Kurt Berchtold Asst. EO
  - San Jacinto sub-watershed-most stringent requirements within the Santa Ana Region
  - New permit adoption-pending (year 6 of 5 year permit) will mirror more closely to Ventura Co. or Orange Co. Permit
  - Stepping up enforcement on municipalities

- **Whitewater River Watershed-Regulated by the Colorado River Basin Regional Water Quality Control Board**-Robert Perdue-Executive Officer/ Jose Angel Asst. EO.
  - Currently Supplement A is in effect
  - New permit adoption- May 2008
  - WQMP requirements will be new to this region and will mirror Santa Ana watershed requirements with slight modifications for unique characteristics of the watershed.
  - Stepping up enforcement on municipalities, added 3 enforcement staff.

WQMP or SUSMP is required to manage stormwater and urban flows after construction and describes the site design, source control and treatment control best management practices (BMPs) that will be implemented and maintained throughout the life of the project to prevent and minimize water pollution that can be cause by stormwater or urban runoff. Must occur during the architectural design phase to be effective.

Stormwater Pollution Prevention Plan (SWPPP)- Required of all construction projects during the construction phase to have BMPs in place to prevent stormwater or waste water generated during construction from entering a receiving water. Includes sediment and erosion control.

Low Impact Development (LID) architectural and landscape techniques that are used to minimize impervious surfaces on completed projects. Utilizes engineered sizing criteria for source and treatment control BMPs.

Leadership in Energy and Environmental Design (LEED) Certified
LEED certification provides independent, third-party verification that a building project meets the highest green building and performance measures. All certified projects receive a LEED plaque, which is the nationally recognized symbol demonstrating that a building is environmentally responsible, profitable and a healthy place to live and work. Even Though a project is LEED certified does not necessarily mean that the project has met WQMP requirements and sizing criteria.

Administrative Civil Liability (ACL) $10,000 per day per violation and Where there is a discharge, any portion of which is not susceptible to cleanup or is not cleaned up, and the volume discharged but not cleaned up exceeds 1,000 gallons, an additional liability not to exceed ten dollars ($10) times the number of gallons by which the volume discharged but not cleaned up exceeds 1,000 gallons.

Q.6--My project is in the Santa Margarita Region[1], does it require a Project-Specific WQMP?

Mark **yes** in the checklist if projects is a new development that meets the project categories or locations in question,
or
Mark **yes** in the checklist if your redevelopment* projects creates, adds or replaces** at least 5,000 square feet of impervious surfaces on an already developed site for the project categories or locations in question

If any question is answered "Yes," your project requires a Project-Specific WQMP.
If all questions are answered "No," your project does **NOT** require a Project-Specific WQMP.

Does your proposed project include:	**Yes**	**No**
1. Housing subdivisions of 10 or more dwelling units. This category includes single-family homes, multi-family homes, condominiums, and apartments.		
2. Commercial developments greater than 100,000 square feet. This category is defined as any development on private land that is not for heavy industrial or residential uses where the land area for development is greater than 100,000 square feet. The category includes, but is not limited to: hospitals; laboratories and other medical facilities; educational institutions; recreational facilities; municipal facilities; commercial nurseries; multi-apartment buildings; car wash facilities; mini-malls and other business complexes; shopping malls; hotels; office buildings; public warehouses; automotive dealerships; airfields; and other light industrial facilities		
3. Automotive repair shops (SIC codes[2] 5013, 5014, 5541, 7532-7534, or 7536-7539.)		
4. Restaurants (SIC code 5812), where the land area for development is greater than 5,000 square feet. Restaurants where land development is less than 5,000 square feet shall meet all SUSMP requirements except for structural treatment BMP and WQMP volume sizing and flow rate requirements		
5. Hillside developments that creates 10,000 square feet or more of impervious area including developments in areas with known erosive soil conditions or where natural slope is 25 % or more		
6. Parking Lots 5,000 square feet or more of impervious area		
7. Retail gasoline outlets of 5,000 square feet or more with projected average daily traffic of 100 or more vehicles per day.		
8. Street, roads, highways, and freeways, which include any paved surface that is 5,000 square feet or greater used for the transportation of automobiles, trucks, motorcycles, and other vehicles.		
9. Environmentally Sensitive Areas (ESAs). All development located within or directly adjacent to or discharging directly to an ESA (where discharges from the development or redevelopment will enter receiving waters within the ESA), which either creates 2,500 square feet of impervious surface on a proposed project site or increases the area of imperviousness of a proposed project site to 10% or more of its naturally occurring condition. "Directly adjacent" means situated within 200 feet of the ESA. "Discharging directly to" means outflow from a drainage conveyance system that is composed entirely of flows from the subject development or redevelopment site, and not commingled with flows from adjacent lands.		

* Significant Redevelopment includes, but is not limited to:

- the expansion of a building footprint or addition or replacement of a structure;
- structural development including an increase in gross floor area and/or exterior construction or remodeling;
- replacement of impervious surface that is not part of a routine maintenance activity;
- land disturbing activities related with structural or impervious surfaces.
- Where Significant Redevelopment results in an increase of less than 50 percent of the existing impervious surfaces of an existing developed site, and the existing developed site received its discretionary land use approvals prior to the adoption of the WQMP (7/13/05 in Santa Margarita Region), the WQMP would apply only to the addition, and not the existing development.

** Replacement not part of routine maintenance activity is considered a significant development.

[1] Projects in the Santa Ana Watershed have different requirements see question 7. Projects in the Whitewater Watershed are not subjected to WQMP requirements, but instead use Supplement A to the 1993 Drainage Area Management Plan (DAMP).

[2] Information regarding SIC codes can be found at http://www.osha.gov/pls/imis/sicsearch.html

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Q.7-- My project is in the Santa Ana Region[1], does it require a Project-Specific WQMP?

If any question is answered "Yes," your project requires a Project-Specific WQMP. If all questions are answered "No," your project is does **NOT** require a Project-Specific WQMP.		
Does your proposed project include:	**Yes**	**No**
1. All **Significant Redevelopment projects;** defined as the addition or creation of 5,000 or more square feet of impervious surface on an existing developed site. This includes, but is not limited to: • construction of additional buildings and/or structures, • extension of the existing footprint of a building, • construction of impervious or compacted soil parking lots. • Where Significant Redevelopment results in an increase of less than fifty percent of the existing impervious surfaces of an existing developed site, and the existing developed site received its discretionary land use approvals prior to the adoption of the WQMP (12/31/2004 in Santa Ana Region; 7/13/05 in Santa Margarita Region), the WQMP would apply only to the addition, and not the existing development. Significant Redevelopment does not include routine maintenance activities that are conducted to maintain original line and grade, hydraulic capacity, the original purpose of the constructed facility or emergency actions required to protect public health and safety;		
2. Residential development of 10 units or more, including Single Family and Multi-Family Dwelling Units, Condominiums, or Apartments		
3. Industrial and commercial development where the land area represented by the proposed map or permit is 100,000 square feet, or more, including, but not limited to, non-residential developments such as hospitals, educational institutions, recreational facilities, mini-malls, hotels, office buildings, warehouses, light industrial, and heavy industrial facilities;		
4. Automotive repair shops (with standard industrial classification ("SIC") codes[2] 5013, 7532, 7533, 7534, 7537, 7538, and 7539).		
5. Restaurants (SIC Code 5812) where the project site is 5,000 square feet, or more.		
6. Hillside developments that creates 10,000 square feet or more of impervious area including developments in areas with known erosive soil conditions or where natural slope is 25 % or more		
7. Parking lots of 5,000 square feet or more of impervious surface exposed to storm water. Parking lot is defined as a site or facility for the temporary storage of motor vehicles.		
8. Developments creating 2,500 square feet, or more, of impervious surface that is adjacent to (within 200 feet) or discharging directly into areas designated in the Basin Plan as waters supporting habitats necessary for the survival and successful maintenance of plant or animal species designated under state or federal law as rare, threatened, or endangered species (defined in the Basin Plan as "RARE") or waterbodies listed on the CWA Section 303(d) list of Impaired Waterbodies within the Permit Area.		

[1] For projects in the Santa Ana Watershed; additional requirement exist for the San Diego (a.k.a. Santa Margarita) watershed, see question 6. Projects in the Colorado River (a.k.a. Whitewater River) Watershed are not subjected to WQMP requirements, but instead use Supplement A to the 1993 Drainage Area Management Plan (DAMP).

[2] Information regarding SIC codes can be found at http://www.osha.gov/pls/imis/sicsearch.html

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Watershed Map for Riverside County

A watershed is an area that, because of topographic slope, contributes water to a specified surface water drainage system, s
or river. Riverside County encompasses portions of three major watersheds: the Santa Ana, the Santa Margarita and the Wh
the map below you can click on any of the watershed areas to learn more about each watershed area. For additional informa
- WATERS EnviroMapper.

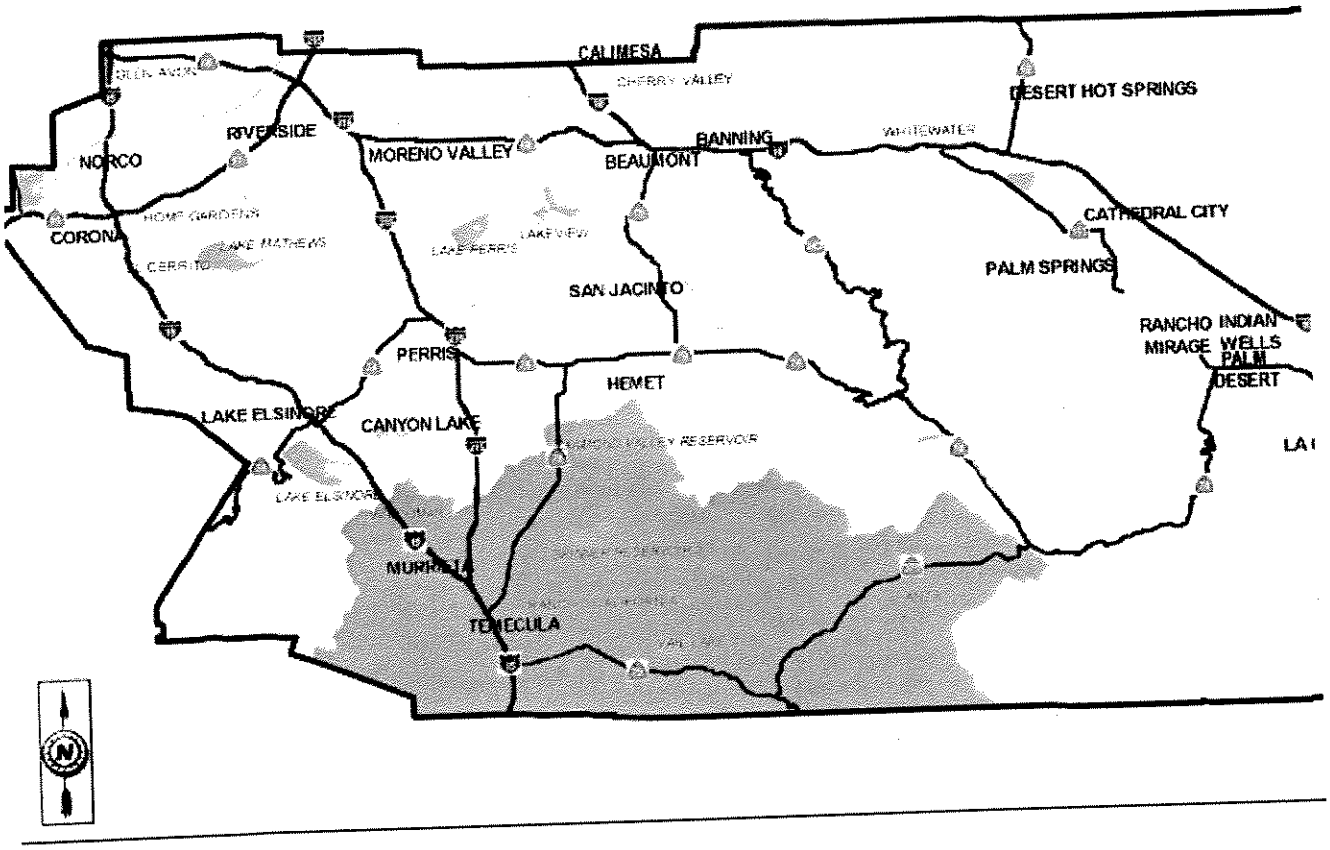

- Santa Ana River
- Santa Margarita
- Whitewater

WQMP REQUIREMENT	Submittal Requirement	
	Preliminary	Final
Title Page		
The Title Page includes the following:		
Name of project	X	X
Tract, Parcel, or Use number	X	X
Design Review Number (PAxx-xxxx) – Must use the same number for P-WQMP and F-WQMP.	X	X
Owner/Developer name	X	X
Owner/Developer address, telephone & FAX number	X	X
Consulting/Engineering firm that prepared WQMP. RCE must sign and seal the document (CA B&P Code)	X	X
Consulting/Engineering firm address, telephone & FAX number	X	X
Name and title of preparer	X	X
Date WQMP was prepared/revised	X	X
Signed / Sealed by Engineer. RCE must sign and seal the document (CA B&P Code)	X	X
Owner's Certification		
A signed and notarized certification statement, in which the project owner acknowledges and accepts the provisions of the WQMP The owner's signature must be notarized (Include the notary's acknowledgement in document behind the Owner's Certification page).	X	X
Table of Contents		
Include a Table of Contents, including a list of all figures and appendices	X	X
Section I, Project Description		
Provide the project description completely and accurately describing where facilities will be located, what activities will be conducted and where, what kinds of materials and products will be used and/or stored, how and where materials will be delivered, and what kinds of wastes will be generated.	X	X
Identify the project owner and WQMP preparer	X	X
Identify project location including:		
• Site address;	X	X
• Planning area/community name;	X	X
• APN number(s);	X	X
• Thomas Bros. map pages and corresponding grid(s) and year of Map;	X	X
• Project watershed and sub-watershed.	X	X
Provide project size to the nearest 1/10 acre	X	X
Provide Standard Industrial Classification (SIC) Code which best describes the facilities operations. Refer to the SIC web for additional help. http://www.osha.gov/pls/imis/sicsearch.html	X	X
Indicate whether a Home Owner's Association or Property Owner's Association will be formed	X	X
Identify additional permits/approvals required for the project including: • State Department of Fish and Game, 1601 Streambed Alteration Agreement; • State Water Resources Control Board, Clean Water Act (CWA) section 401 Water Quality Certification; • US Army Corps of Engineers, CWA section 404 permit; • US Fish and Wildlife, Endangered Species Act section 7 biological opinion; • City permits (i.e.: Grading and Building) • SWRCB General Construction Permit	X	X
See Appendix A for Conditions of Approval.		

WQMP REQUIREMENT	Submittal Requirement	
	Preliminary	Final
See Appendix B for Site specifics. – Vicinity Map, Receiving Waters Exhibit, & Site Plan		
See Appendix G for mechanisms to ensure operations and maintenance of BMPs.		
Section II, Site Characterization		
Identify land use designation or zoning.	X	X
Identify current property use	X	X
Identify proposed property use.	X	X
Identify the availability of a soils report (Note: A soils report is required if infiltration BMPs are utilized.)	X – only if infiltration	X – only if infiltration
Identify the availability of a Phase 1 Site Assessment (Note: If prepared, a remediation summary and use restrictions must be attached in Appendix H.)		X
Receiving waters have been identified including:		
• 303(d) list impairments; (see www.waterboards.ca.gov/tmdl/docs/2002reg8303dlist.pdf), and TMDL adopted impairments. Contact City or refer to the City's web site for additional Guidelines and assistance with completion of table.	X	X
• Designated beneficial uses; (see Table 3-1 of WQMP for Santa Ana River Basin at www.waterboards.ca.gov/santaana/pdf/R8BPlan.pdf)	X	X
• Proximity to RARE beneficial use	X	X
Section III. Pollutants of Concern		
Note: Information required under "a." and "b." of Section III in the template can be found in the table required under "Site Characterization". Repeating the information for this section is not needed, however the analysis that uses the information is required within this section.		
Identify / list expected and potential pollutants associated with Urban Runoff from the proposed project and compare them with pollutants identified as causing an impairment of Receiving Waters, if any.	X	X
Identify / list the Pollutant(s) of Concern (POC) associated with project.	X	X
Discuss the presence / absence of legacy pesticides, nutrients, or hazardous substances in the site's soils as a result of past uses	X	X
Section IV. Hydrologic Conditions of Concern		
Indicate whether Condition A, B or C exempts the project specific WQMP from addressing the issue of Hydrologic Conditions of Concern, or indicate which method is used to mitigate HCOCs.	X	X
Substantiate selected Condition or Methodology.		X
Section V. Best Management Practices		
V1. Site Design BMPs		
Table 1. Site Design BMPs, is complete	X	X
Provide narrative describing site design concepts incorporated into the project plans.	X	X
If a particular Site Design BMP concept is found to be not applicable, provides a brief explanation as to why the concept cannot be implemented	X	X
Provides narrative describing how each individual BMP will be implemented and maintained including inspection and maintenance frequency, inspection criteria and the responsible entity or party.		X
Site Design BMPs will be shown on the WQMP Site Plan included in Appendix B.		
V2. Source Control BMPs		

WQMP REQUIREMENT	Submittal Requirement	
	Preliminary	Final
Table 2. Source Control BMPs, is complete.	X	X
Completion of the source control table is required in the P-WQMP Narrative description is required in the F-WQMP. Provide narrative describing how each individual BMP will be implemented and maintained including inspection and maintenance frequency, inspection criteria and the responsible entity or party.	X	X
V3. Treatment Control BMPs		
Table 3. Treatment Control BMPs is complete. Provide narrative description of BMP being proposed	X	X
"For identified pollutants of concern [Section II] that are **causing an impairment in receiving waters,**" has the applicant proposed one or more Treatment Control BMPs of medium or high effectiveness?	X	X
Provide detailed descriptions on the location, implementation (including sizing criteria), installation, and long-term O&M of planned Treatment Control BMPs.		X
Provide a copy of the property/project soils report if infiltration-based Treatment Control BMPs are utilized.		X
Treatment Control BMPs will be shown on the WQMP Site Plan included in Appendix B.		
Supporting Calculations for Treatment Control BMPs are included in Appendix F.	X	X
V4. Equivalent Treatment Control Alternatives		
Provide narrative describing equivalent treatment control alternatives or states "not applicable"	X	X
V5. Regionally-Based Treatment Control BMPs		
Provide narrative describing regionally-based treatment control BMPs or states "not applicable".	X	X
Section VI. Operation and Maintenance (O&M) Responsibility for Treatment Control BMPs – In the P-WQMP, A statement from the Preparer that identifies a commitment to provide detail in the F-WQMP (e.g. "O&M detail to be provided in the F-WQMP") is required.		
Identify each BMP that requires O&M.		X
Provide a thorough description of O&M activities, the O&M process, and the handling and placement of any wastes.		X
Provide BMP start-up dates.		X
Provide a schedule of the frequency of O&M for each BMP.		X
Identify the parties responsible for O&M and provides a written agreement with the entities responsible for O&M. (i.e.: Covenant and Agreement, HOA, POA, CC&Rs, formation of assessment or maintenance district, etc.) Copies of these supporting documents will be included in Appendix G.		X
Identify self-inspection and record-keeping requirements for BMPs including responsible parties.		X
Provide thorough description of water quality monitoring including constituents and frequency, if applicable.		X
Section VII. Funding – In the P-WQMP, A statement from the Preparer that identifies a commitment to provide detail in the F-WQMP (e.g. "Funding detail to be provide in the F-WQMP") is required.		

WQMP REQUIREMENT	Submittal Requirement	
	Preliminary	Final
Identify the funding source(s) for the operation and maintenance of each Treatment Control BMP. Where a public agency is identified as the funding source and responsible party for Treatment Control BMPs, a copy of the written agreement stating the public agency's acceptance of these responsibilities will be provided in Appendix G.		X
Appendix A (Section I)		
Include a complete copy of the final Conditions of Approval.		X
Appendix B (Sections I and V)		
Include a Vicinity Map identifying the project site and surrounding planning areas in sufficient detail to allow plotting on base mapping. (a separate 8 1/2 x 11 page is preferred)	X	X
Include a Site Plan depicting the following project features: Plan must be full size, (D or E size sheet)		
Locate and identify of all site design BMPs.	X	X
Locate and identify of all source control BMPs.		X
Locate and identify of all Treatment Control BMPs.	X	X
Landscaped areas.	X	X
Paved areas and intended uses.	X	X
Number and type of structures and intended uses. (i.e.: buildings, tenant spaces, dwelling units, community facilities such as pools, recreations facilities, tot lots, etc.)	X	X
Infrastructure (i.e.: streets, storm drains, etc.)that will revert to public agency ownership and operation.		X
Identify existing and proposed public and private storm drainage facilities including catch basins and other inlet/outlet structures. (Existing and proposed drainage facilities should be clearly differentiated.)	X	X
Provide Receiving Waters Exhibit, which Identifies project flows from the Project site to the Pacific Ocean.	X	X
Location of points where onsite (or tributary offsite) flows exit the property/project site.	X	X
Proposed drainage areas boundaries, including tributary offsite areas, for each location where flows exits the property/project site. (Each tributary area should be clearly denoted.)	X	X
Pre- and post-project topography	X	X
See Appendix G for mechanisms to ensure operations and maintenance of BMPs.		
Appendix C (Section IV)		
Include supporting detail (i.e., engineering studies, calculations, and reports) related to Hydrologic Conditions of Concern, if applicable. This detail must relate to the HCOC Condition or Methodology selected. (e.g., Condition A substantiation detail required will most likely differ from Condition C substantiation requirements.)		X
Appendix D (Section V)		
Include copies of the educational materials that will be used in implementing the project-specific WQMP		X

WQMP REQUIREMENT	Submi[redacted] Prelimin[redacted]
Appendix E (Sections II and V)	
Include the required Soils Report and Percolation / Infiltration testing report, with borings if infiltration BMPs are proposed. Note: The City recommends the use of the ASTM Double-Ring Infiltrometer test method. At least 2 Borings per treatment control BMP location is required in the P-WQMP At least 5 Borings per treatment control BMP location is required in the F-WQMP. The Borings must be at least 10 ft below the BMP bottom. Percolation / infiltration test results must be used when sizing treatment control BMP.	X
Appendix F (Section V)	
Include supporting engineering calculations for Treatment Control BMP sizing and Treatment Control BMP design details Indicate "Preliminary" in the P-WQMP Use of Riverside County Worksheets is required.	X
Appendix G (Sections I and VI)	
Include copies of the CC&Rs, Covenant and Agreements, and/or other mechanisms used to ensure the ongoing operation, maintenance, funding, transfer and implementation of the project-specific WQMP requirements.	
Appendix H (Section II)	
Include a Phase 1 Environmental Site Assessment - Summary of Site Remediation Conducted and Use Restrictions, if applicable.	

INSTRUCTIONS

Section I
This checklist should be used for projects located in Santa Ana or Santa Margarita regions. Provide details about the project to further analyze project for water quality purposes.

Project Number: Please provide the project number for your project.

Project Name: Please provide the name of your project.

Project Location or APN: Please provide an address, APN or any other information that helps locate the project.

Project Description: Provide a brief description of the project scope and include purpose/usage of the project. For example, "construction of 2 large buildings for office space usage that will accommodate approximately 400 employees."

Watershed Location: Please mark the box next to the watershed the project is located in.
Project Size in Acres: Please provide in acres the total project size.

% of Impervious Surface Prior to Construction: Please provide an approximation of existing conditions of the site where project will be constructed. Provide an approximation of how much of the project site is impervious. For example, if the site prior to construction has a concrete slab that makes up 30% of the total project size, then 30% is the answer for this question.

% of Impervious Surface After Project Completion: Please provide an approximation of the total impervious surface after project completion. For example, if after the project is completed the entire project site will be impervious due to the construction of buildings, parking lots, and concrete sidewalks, the answer to this question would 100%.

Est. Construction Start Date: Provide the date construction is estimated to begin.

Est. Construction Completion: Provide the date construction is estimated to end.

Project Runoff Discharges Into: Provide the name of the receiving water body that will be impacted by the project's runoff, also includes nuisance flows.

Pollutants of Concern: All projects will generate pollutants. Please check all pollutants that will be generated from the use of the project after project completion.

Proposed Treatment BMPs: During the initial planning of the project, treatment Best Management Practices (BMPs) need to be identified as early as possible to ensure that the project incorporates these concepts. Please check all the proposed BMPs to be used for the project.

Section II: General Criteria Specific questions will be asked to assist the Environmental Compliance Unit in determining if a Water Quality Management Plan is required for the project. Please answer all the questions.

Definitions

1. **Significant Redevelopment:** Significant Redevelopment: This includes, but is not limited to, construction of additional buildings and/or structures, extension of the existing footprint of a building, construction of impervious or compacted soil parking lots. Does not include routine maintenance activities that are conducted to maintain original line and grade, hydraulic capacity, the original purpose of the constructed facility or emergency actions required to protect public health and safety. [Note: Where redevelopment results in an increase of less than 50% of the impervious surfaces of a previously existing development, and the existing development was not subject to WQMP requirements, the requirement for treatment control BMPs [MS4 Permit requirement F.2.b(3)] applies only to the addition, and not the entire development.]

2. **Residential development of 10 or more dwelling units.** Including single family and multi-family dwelling units, condominiums, or apartments.

3. **Commercial or Industrial development greater than 100,000 sq ft.:** Defined as any development 100,000 square feet or more including, but not limited to: hospitals; laboratories and other medical facilities; educational institutions; recreational facilities; municipal facilities; commercial nurseries; multi-apartment buildings; car wash facilities, mini-malls and other business complexes; shopping malls; hotels; office buildings; public warehouses, automotive dealerships; airfields; and other light industrial facilities. Santa Ana also includes light industrial and heavy industrial facilities. Land area is based on acreage disturbed.

4. **Automotive Repair Shops**:
   Includes facilities characterized by any one of the following Standard Industrial Classification (SIC) codes for:
   Santa Ana 5013, 7532, 7533, 7534, 7537, 7538 and 7539;
   and
   Santa Margarita 5013, 5014, 7532-34, 7536-39.

   Descriptions of SIC codes can be found at http://www.osha.gov/pls/imis/sicsearch.html.

5. **Restaurants:** Santa Ana defines restaurants as SIC code 5812.

   Santa Margarita further defines restaurants as a facility that sells prepared foods and drinks for consumption, including stationary lunch counters and refreshment stands selling prepared foods and drinks for immediate consumption (SIC code 5812), where the land area for development is greater than 5,000 sq ft. Restaurants where land development is less than 5,000 sq ft shall meet all WQMP requirements except for treatment control BMPs [MS4 Permit requirement F.2.b(3)] and peak flow management [MS4 Permit requirement F.2.b(2)(a)].

6. **Parking Lots**: Exposed to Urban Runoff, where "parking lot" is defined as a site or facility for the temporary parking or storage of motor vehicles.

SECTION III: Santa Ana Region Specific Criteria

Complete this section only if the project is in the Santa Ana watershed region.

7. **Developments creating 2,500 sq ft or more of impervious surface**. The Basin Plan for the Santa Ana River Basin, which has beneficial uses for Receiving Waters listed in Chapter 3, can be viewed or downloaded from www.swrcb.ca.gov/rwqcb8/pdf/R8BPlan.pdf . The Basin Plan for the Santa

Ana River Basin, which has beneficial uses for Receiving Waters listed in Chapter 3, can be viewed or downloaded from www.swrcb.ca.gov.rwqcb8/pdf/R8BPlan.pdf. The most recent CWA Section 303(d) list can be found at www.swrcb.ca.gov/tmdl/303d_lists.html.

8. **Hillside development that creates 10,000 sq ft** or more of impervious surface(s) including developments in areas with known erosive soil conditioners or where natural slope is 25% or more.

SECTION IV: Santa Margarita Region Specific Criteria

Complete this section only if the project is in the Santa Margarita watershed region.

9. **Environmental Sensitive Areas (ESAs).** Areas in which plant or animal life or their habitats are either rare or especially valuable because of their special nature or role in an ecosystem and which would easily be disturbed or degraded by human activities and developments. ESAs subject to urban runoff requirements include, but are not limited to: all CWA Section 303(d) impaired water bodies; areas designated as Areas of Special Biological Significance by the Basin Plan; water bodies designated with a RARE beneficial use in the Basin Plan; areas within the Western Riverside County Multi-Species Habitat Conservation Plan area that contain rare or especially valuable plant or animal life or their habitat; and any other equivalent environmentally sensitive areas that the Permittees have identified. The Basin Plan for the San Diego Basin (beneficial uses listed in Chapter 2) can be viewed or download from www.swrcb.ca.gov.rwqcb9/programs/basinplan.html. The most recent CWA Section 303(d) list can be found at www.swrcb.ca.gov/tmdl/303d_lists.html.

10. **Hillside development that creates 5,000 sq ft.** Any development that creates greater than 5,000 square feet of impervious surface which is located in an area with known erosive soil conditions, where the development will include grading on any natural slope that is 25% or greater.

11. **Streets, roads, highways, and freeways**. Includes any paved surface that is 5,000 square feet or greater used for the transportation of automobiles, trucks, motorcycles, and other vehicles.

12. **Retail Gasoline Outlets (RGOs).**

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Riverside County Flood Control and Water Conservation District Subdivision Cases Recieved Date from 7/1/2005 1/9/08 for Santa Margarita Watershed, cleared for grading

	Case Number	Ext	Amend	Studies	Received Date	Plan Due Date	Response Date	Plan Check	WQMP	Status
9	PP-21352		3		06/27/2007	07/05/2007	06/28/2007	Jennifer Gale	Y	Approved
10	PP-21591			WQ1	07/24/2007		08/30/2007	Shaheen Mooman	Y	Approved
11	PP-21893		2		08/31/2007	09/20/2007	09/20/2007	Shaheen Mooman	Y	Approved
12	PP-22254		1		01/23/2007	02/08/2007	02/13/2007	Kris Flanigan	Y	Approved
13	PP-22263			WQ1	07/13/2007		07/20/2007	Shaheen Mooman	Y	Approved
14	PP-22278		1		04/12/2007	04/26/2007	04/26/2007	Kris Flanigan	Y	Approved
15	PP-22352		2		09/14/2007	10/04/2007	11/15/2007	Kris Flanigan	Y	Approved
16	PP-22372		2		10/03/2007	10/25/2007	11/19/2007	Kamyar Ghods	Y	Approved
17	PP-22461			WQ1	10/02/2007		11/14/2007	Kamyar Ghods	Y	Approved
18	PP-22521				03/05/2007	03/22/2007	04/12/2007	Shaheen Mooman	Y	Approved
19	PP-22698			WQ2	10/26/2007	11/15/2007	11/26/2007	Shaheen Mooman	Y	Approved
20	TR-31444		4		01/19/2006	01/20/2006	01/20/2006	Kris Flanigan	Y	Approved
21	TR-31474		2		07/27/2005	08/18/2005	08/17/2005	Eric Russell	Y	Approved
22	TR-32011		2		02/27/2007	03/22/2007	06/26/2007	Michele Martin	Y	Approved
23	TR-32227		3a		11/15/2006		11/28/2006	Jennifer Gale	Y	Approved
24	TR-32290		3		10/17/2005	11/03/2005	10/26/2005	Jennifer Gale	Y	Approved
25	TR-32564		1		09/22/2005	10/13/2005	09/27/2005	Shaheen Mooman	Y	Approved
26	TR-32778			WQ3	03/29/2007		04/19/2007	Jennifer Gale	Y	Approved
27	TR-32813		5		11/21/2006	12/14/2006	12/13/2006	Kamyar Ghods	Y	Approved
28	TR-32952		3		09/21/2005	10/13/2005	09/27/2005	Shaheen Mooman	Y	Approved
29	TR-33300			SS3	02/15/2006		03/13/2006	Amy Johnson	Y	Approved
30	TR-33307			WQ3	12/29/2005		02/08/2006	Amy Johnson	Y	Approved
31	TR-33423			WQ2	01/24/2006		04/04/2006	Amy Johnson	Y	Approved
32	TR-34395				03/28/2006	04/20/2006	04/19/2006	Michele Martin	Y	Approved
33	TR-34466		2		12/21/2006	01/11/2007	01/25/2007	Kamyar Ghods	Y	Approved

0002089

Riverside County Flood Control and Water Conservation District Subdivision Cases Recieved Date from 7/1/2005 1/9/08 for Santa Margarita Watershed

	Case Number	Ext	Amend	Studies	Received Date	Plan Due Date	Response Date	Engineer Name	WQMP	Status
1	CUP-03474			WQ3	01/23/2006		01/26/2006	David Garcia	Y	Approved
2	PM-33691			SS2	11/28/2007		12/21/2007	Michele Martin	Y	Approved
3	PM-34144		2		01/23/2006		01/26/2006	David Garcia	Y	Approved
4	PP-17015		2		08/15/2005	09/08/2005	12/22/2005	Eric Russell	Y	Approved
5	PP-19414		3	WQ2	02/03/2006	02/23/2006	03/03/2006	Shaheen Mooman	Y	Approved
6	PP-21337			WQ1	05/15/2006	05/25/2006	06/01/2006	Jennifer Gale	Y	Approved
7	PP-22515		1		05/23/2007	06/14/2007	05/29/2007	Shaheen Mooman	Y	Approved
8	PUP-00705	R4		WQ1	05/04/2006		05/16/2006	Michele Martin	Y	Approved
9	TR-31314	R1			09/26/2007	10/18/2007	10/22/2007	Kris Flanigan	Y	Approved
10	TR-31736		4		11/01/2006	11/16/2006	12/01/2006	Michele Martin	Y	Approved
11	TR-31871		3	EXfl	08/17/2006		08/22/2006	Eric Russell	Y	Approved
12	TR-31896		5		05/15/2006	06/01/2006	05/16/2006	Shaheen Mooman	Y	Approved
13	TR-32289		3		10/17/2005	11/03/2005	10/26/2005	Jennifer Gale	Y	Approved
14	TR-32535	R.	3		08/28/2006	09/05/2006	09/01/2006	Kris Flanigan	Y	Approved
15	TR-32594		3		04/21/2006	05/11/2006	06/09/2006	Shaheen Mooman	Y	Approved
16	TR-32627	M1			08/06/2007	08/29/2007	08/27/2007	Jennifer Gale	Y	Approved
17	TR-32988		5		03/14/2006	03/30/2006	11/28/2006	Amy Johnson	Y	Approved

Cases Conditioned with a WQMP, Not Yet Submitted for Plan Check

1	CUP-03467		3	WQ2	09/20/2007	09/27/2007	09/25/2007	Kris Flanigan	Y	Approved
2	PM-33456		2		01/02/2008	01/24/2008	01/08/2008	Shaheen Mooman	Y	Approved
3	PM-33967				12/26/2007	01/17/2008	01/09/2008	Albert Martinez	Y	Approved
4	PM-35180			WQ1	04/12/2007	04/26/2007	04/26/2007	Kris Flanigan	Y	Approved
5	PM-35219			WQ1	10/02/2007		11/14/2007	Kamyar Ghods	Y	Approved
6	PM-35518		2		09/14/2007	10/04/2007	11/15/2007	Kris Flanigan	Y	Approved
7	PP-18966		4		11/01/2006	11/16/2006	12/05/2006	Michele Martin	Y	Approved
8	PP-19442		2		08/11/2005	09/01/2005	10/31/2005	Amy Johnson	Y	Approved
9	PP-21352		3		06/27/2007	07/05/2007	06/28/2007	Jennifer Gale	Y	Approved
10	PP-21591			WQ1	07/24/2007		08/30/2007	Shaheen Mooman	Y	Approved
11	PP-21893		2		08/31/2007	09/20/2007	09/20/2007	Shaheen Mooman	Y	Approved
12	PP-22254		1		01/23/2007	02/08/2007	02/13/2007	Kris Flanigan	Y	Approved
13	PP-22263			WQ1	07/13/2007		07/20/2007	Shaheen Mooman	Y	Approved
14	PP-22278		1		04/12/2007	04/26/2007	04/26/2007	Kris Flanigan	Y	Approved
15	PP-22352		2		09/14/2007	10/04/2007	11/15/2007	Kris Flanigan	Y	Approved
16	PP-22372		2		10/03/2007	10/25/2007	11/19/2007	Kamyar Ghods	Y	Approved

0002090

Riverside County Flood Control and Water Conservation District Subdivision Cases Recieved Date from 7/1/2005 1/9/08 for Santa Margarita Watershed

	Case Number	Ext	Amend	Studies	Received Date	Plan Due Date	Response Date	Engineer Name	WQMP	Status
17	PP-22461			WQ1	10/02/2007		11/14/2007	Kamyar Ghods	Y	Approved
18	PP-22521				03/05/2007	03/22/2007	04/12/2007	Shaheen Mooman	Y	Approved
19	PP-22698			WQ2	10/26/2007	11/15/2007	11/26/2007	Shaheen Mooman	Y	Approved
20	TR-31444		4		01/19/2006	01/20/2006	01/20/2006	Kris Flanigan	Y	Approved
21	TR-31474		2		07/27/2005	08/18/2005	08/17/2005	Eric Russell	Y	Approved
22	TR-32011		2		02/27/2007	03/22/2007	06/26/2007	Michele Martin	Y	Approved
23	TR-32227		3a		11/15/2006		11/28/2006	Jennifer Gale	Y	Approved
24	TR-32290		3		10/17/2005	11/03/2005	10/26/2005	Jennifer Gale	Y	Approved
25	TR-32564		1		09/22/2005	10/13/2005	09/27/2005	Shaheen Mooman	Y	Approved
26	TR-32778			WQ3	03/29/2007		04/19/2007	Jennifer Gale	Y	Approved
27	TR-32813		5		11/21/2006	12/14/2006	12/13/2006	Kamyar Ghods	Y	Approved
28	TR-32952		3		09/21/2005	10/13/2005	09/27/2005	Shaheen Mooman	Y	Approved
29	TR-33300			SS3	02/15/2006		03/13/2006	Amy Johnson	Y	Approved
30	TR-33307			WQ3	12/29/2005		02/08/2006	Amy Johnson	Y	Approved
31	TR-33423			WQ2	01/24/2006		04/04/2006	Amy Johnson	Y	Approved
32	TR-34395				03/28/2006	04/20/2006	04/19/2006	Michele Martin	Y	Approved
33	TR-34466		2		12/21/2006	01/11/2007	01/25/2007	Kamyar Ghods	Y	Approved

Riverside County Flood Control and Water Conservation District Subdivision Cases Recieved Date from 7/1/2005 1/9/08 for Santa Margarita Watershed, cleared for grading

	Case Number	Ext	Amend	Studies	Received Date	Plan Due Date	Response Date	Plan Check	WQMP	Status
1	CUP-03474			WQ3	01/23/2006		01/26/2006	Lori/Kent	Y	cleared for grading & building permits issued
2	PP-17015		2		08/15/2005	09/08/2005	12/22/2005	Lori/Kent	Y	cleared for grading & building permits issued

Riverside County Flood Control and Water Conservation District Subdivision Cases Recieved Date from 7/1/2005 1/9/08 for Santa Margarita Watershed, not approved by the BOS, plan check in process

1	PM-33691			SS2	11/28/2007		12/21/2007	Michele Martin	Y	not BOS approved
2	TR-32988		5		03/14/2006	03/30/2006	11/28/2006	Amy Johnson	Y	not BOS approved
3	PUP-00705	R4		WQ1	05/04/2006		05/16/2006	Michele Martin	Y	not submitted yet
4	TR-31736		4		11/01/2006	11/16/2006	12/01/2006	Michele Martin	Y	not submitted yet
5	TR-32594		3		04/21/2006	05/11/2006	06/09/2006	Shaheen Mooman	Y	not submitted yet
6	PP-19414		3	WQ2	02/03/2006	02/23/2006	03/03/2006	Shaheen Mooman	Y	still in plan check
7	PP-21337			WQ1	05/15/2006	05/25/2006	06/01/2006	Jennifer Gale	Y	still in plan check
8	PP-22515		1		05/23/2007	06/14/2007	05/29/2007	Shaheen Mooman	Y	still in plan check
9	TR-31314	R1			09/26/2007	10/18/2007	10/22/2007	Kris Flanigan	Y	still in plan check
10	TR-31871		3	EXfl	08/17/2006		08/22/2006	Eric Russell	Y	still in plan check
11	TR-31896		5		05/15/2006	06/01/2006	05/16/2006	Shaheen Mooman	Y	still in plan check
12	TR-32289		3		10/17/2005	11/03/2005	10/26/2005	Jennifer Gale	Y	still in plan check
13	TR-32535	R.	3		08/28/2006	09/05/2006	09/01/2006	Cenk/Don	Y	still in plan check
14	TR-32627	M1			08/06/2007	08/29/2007	08/27/2007	Jennifer Gale	Y	still in plan check

Cases Conditioned with a WQMP, Not Yet Submitted for Plan Check

1	CUP-03467		3	WQ2	09/20/2007	09/27/2007	09/25/2007	Kris Flanigan	Y	Approved
2	PM-33456		2		01/02/2008	01/24/2008	01/08/2008	Shaheen Mooman	Y	Approved
3	PM-33967				12/26/2007	01/17/2008	01/09/2008	Albert Martinez	Y	Approved
4	PM-35180			WQ1	04/12/2007	04/26/2007	04/26/2007	Kris Flanigan	Y	Approved
5	PM-35219			WQ1	10/02/2007		11/14/2007	Kamyar Ghods	Y	Approved
6	PM-35518		2		09/14/2007	10/04/2007	11/15/2007	Kris Flanigan	Y	Approved
7	PP-18966		4		11/01/2006	11/16/2006	12/05/2006	Michele Martin	Y	Approved
8	PP-19442		2		08/11/2005	09/01/2005	10/31/2005	Amy Johnson	Y	Approved

Transportation Department Summary

SANTA MARGARITA ATTACHMENT A

BACKGROUND

The Transportation Department's NPDES activities for Fiscal Year (FY) 07/08 included the Roadside Litter Removal Program, Catch Basin Inspection & Cleaning Program, Code Enforcement Clean up Program, and the enhancement to the integrated approach in the continued development of the MS4 map.

The Roadside Litter Removal Program has a crew of seven (7) employees that provides roadside clean up efforts. The funding for this Program is provided by each of the five Supervisorial Districts within the County. The crew collects roadside litter from ten (10) linear miles of designated roadways in each of the five Supervisorial Districts. Ten (10) linear miles are cleaned on a rotating basis, allowing for problems areas to be re-addressed every ten (10) weeks. Cumulatively, this program cleans approximately 60 linear miles quarterly. This effort has proven successful in reducing the amount of debris and anthropogenic litter entering the catch basins, nearby streams and waterbodies within the different watersheds. Roughly, 17.85 road miles were cleaned in the Santa Margarita watershed, and approximately 7.34 tons of anthropogenic litter was removed under this program for FY 07/08.

The Catch Basin Inspection & Cleaning Program has a crew of four (4) employees and one (1) vacant position that will be filled in the future. The funding for this Program is provided by the County Executive Office. This Program performs inspection and maintenance on storm drainage facilities. The crew inspects and maintains catch basins, inlets, outlets, culverts, channels, swales, detention basins and other drainage infrastructures to ensure maximum storm water diversion from rights-of-way, while simultaneously maintaining the National Pollutant Discharge Elimination System standards. For FY 07/08, approximately 5.06 tons of anthropogenic litter, 3.74 tons of vegetative litter, and 11.90 tons of sediment litter were removed from the Santa Margarita watershed under this Program.

The Code Enforcement Clean up Program has three crew totaling seventeen (17) employee positions. The funding for this Program is provided by Code Enforcement Department. The crew carries out wide-ranging clean ups. The Santa Margarita watershed falls within Supervisorial District 1 and 3. For FY 07/08, the approximate tonnage of litter removed from each Supervisorial District is summarized in the following table:

Supervisorial District	Tons of Litter Removed
District 1	285.04
District 3	355.48
Total	**640.52**

ROAD REPAIR AND STREET SWEEPING

For FY 07/08, the Transportation Department received a total of 1701 complaint calls countywide for general road repair and maintenance, of which a total of 212 complaints were within the Santa Margarita Region involving the following issues:

Type of Complaint	Number of Complaints
a. Flooding-road shoulder, ditch damage	31
b. Ditches gutter, culvert drains, clean out	8
c. Drainage low spots, ponding floods	3
d. Mud gravel, dirt, rock, snow, swept/cleared	16
e. Trash, debris, object removed or cleared	15
f. Trees, palm fronds and branches	14
g. Weed, grass, brushes and tumbleweeds	9
h. Graffiti	2
i. Potholes or large holes	40
j. Improvements, grading paving & resurfacing	73
k. Road sidewalk, curb gutter damage & repair	1
Total	**212**

Currently, all streets in County Service Area (CSA) 152 are swept. New development projects within the County (with curb and gutter) are required to annex into CSA 152 in order to receive street sweeping services. These services are contracted out and roadways are swept at least once a month, and in some cases more frequently. Whenever possible, the Department has increased the frequency of street sweeping to twice a month. During FY 07/08, a total of 13,398 curb miles were swept. In comparison to last fiscal year, FY 06/07, a total of 12,664 curb miles were swept, which represents a 5.80% increase.

The amount of debris removed from street sweeping activities decreased this year. For FY 06/07, approximately 1,753 tons of debris were removed from streets, in comparison to this FY 07/08, approximately 1,548 tons of debris were removed. It represents 11.67% decrease in amount of debris removed. In general, for FY07/08 less anthropogenic, vegetative and sediment littler were removed from street sweeping activities.

FISCAL EXPENDITURES FOR FY 07/08

Total FY 07/08 expenditures for NPDES activities which includes MS4 Mapping, Catch Basin Inspection & Cleaning Program and Code Enforcement Clean Up Program & Roadside Litter Removal Program were $2,645,102. Future costs are expected to increase as the program expands. The following table summarizes the NPDES program expenditures funded by the County General Funds and other related activities and fund sources:

Program/Activity	Funding Source	FY 07/08 Expenditures
Overlay, Sealing	Gas Tax	$3,503,962
Storm Damage	Gas Tax, FEMA	$18,051
Municipal Inspections	General Funds	$2,420
Street Sweeping CSA 152	County Assessment Area 152	$681,753
Street Sweeping (Non-CSA 152)	Waste Haulers (ISS Sweeping)	$141,204
	Environmental Health (Burrtec Waste Industries, Inc.)	$71,376
MS4 Mapping	General Funds	$241,910
Catch Basin Inspection & Cleaning Program – Santa Margarita	General Funds	$296,942
Code Enforcement Clean Up Program & Roadside Litter Removal Program	Code Enforcement, General Funds	$2,106,250

TRAINING

The Transportation Department is very supportive of NPDES training. A total of eighty-three (83) Transportation staff attended NPDES training offered by Flood Control, AEI-CASC Consulting and Elena Chemical Company during FY 07/08. Furthermore, two (2) employees attended the California Stormwater Quality Association (CASQA) annual conference; two (2) employees attended the Urban Water Institute annual conference, and one (1) employee attended a Stormwater Regulation and Management class at University California, Riverside.

ILLICIT CONNECTION/ILLEGAL DISCHARGE (IC/ID)

The Riverside County Transportation Department, as part of its normal duties, conducts routine maintenance of the storm drain facilities. The Highway Operations Division provides the County with coverage concerning illegal connections or illegal discharges within the storm drain systems such as inlets, outlets, culverts, swales and channels which ultimately make their way to facilities owned by Riverside County Flood Control

District. The Transportation Department District Road Maintenance Supervisors and Assistant Supervisors visually inspect the storm drain infrastructure on a regular basis as part of their daily routine. They look for evidence of illegal discharge or illicit connections. They pay close attention to facilities located within areas of concern, or areas that historically have had issues. This could involve areas where illegal dumping has occurred or other maintenance issues need to be addressed, which would require additional follow-up. These issues could necessitate additional assistance from the County illegal dumping cleanup programs and/or Code Enforcement investigation.

The Transportation Department Permit Engineer also sends a letter to property owners that encroach upon County right-of-way with illegal connections or other obstructions, and if needed is reported to Code Enforcement. The Permit Engineer is responsible for reviewing encroachment applications along County road right-of-way. If the illegal connection is not remedied in a timely manner, it is removed by the County and billed to the owner of the property.

In summary, for FY 07/08, Code Enforcement supervised the following three (3) types of illicit discharges, connections and spills:

a. There were 894 cases of illegal grading or grading without permit in which 618 are currently opened and 276 are closed. They were discharge of soil and sediments.

b. There were 321 cases of illegal dumping in which 249 are currently opened and 72 are closed. They were a variety of materials from hazmat, tires, green waste, construction debris, and household waste.

c. There were 43 NPDES investigations in which 28 are currently opened and 15 are closed. The NPDES violations were for illegal pool water discharges and the cleaning of pool filters into gutters.

SANTA MARGARITA ATTACHMENT A

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Code Enforcement Statistics

NPDES Open FY0708

	Case #	Status*	Case Type	Case Name	APN	City	Date Opened
1	SE075873	Open	NPDES	STORM DRAIN DUMPING: CONCRETE	362681029	WILDOMAR	July 16, 2007
		Concrete debris dumped into storm drain.					
2	SE077037	Closed	NPDES	NPDES Violation	309332006	NUEVO	August 23, 2007
		Draining pool into storm drain.					
3	CV078414	Closed	Grading	NPDES RCC.15.12.020	165252009		October 4, 2007
		NPDES violation unfounded upon investigation.					
4	SE079235	Closed	NPDES	Hazardous Materials	160100080	MIRA LOMA	November 1, 2007
		Possible hazardous material down the storm drain from the pool.					
5	SE079283	Closed	NPDES	NPDES	427061078	NUEVO	November 2, 2007
		Draining pool into storm drain.					
6	SE0800048	Closed	NPDES	Draining Cement in storm drain	144553010	CORONA	January 18, 2008
		Cement run off being put into storm drain.					
7	SE0800072	Open	NPDES	NPDES	449211004	HEMET	January 29, 2008
		Draining contaminated pool water into storm drain.					
8	SE0800090	Open	NPDES	NPDES	609201005		January 31, 2008
		NPDES					
9	CV0801093	Closed	Grading	NPDES-PM10	609201005		January 31, 2008
		Grading without permit where dirt eroding and dust problems were evident.					
10	CV0801094	Open	Zoning Violation	NPDES	607351003		January 31, 2008
		NPDES					
11	SE0800091	Open	NPDES	NPDES	609201005		January 31, 2008
		NPDES					
12	CV0801095	Closed	Grading	NPDES	607040055		January 31, 2008
		Construction site failed to maintain BMP for blowing sand.					
13	SE0800092	Open	NPDES	NPDES	727371018		January 31, 2008
		NPDES					
14	SE0800139	Closed	NPDES	NPDES	164040004	CORONA	February 13, 2008
		Draining pool into storm drain.					
15	SE0800378	Closed	NPDES	NPDES	144190010	CORONA	April 7, 2008
		Draining pool into storm drain.					
16	CV0803894	Open	Grading	NPDES/PM 10	609441060	INDIO	April 30, 2008
		NPDES /PM 10					
17	CV0803914	Open	Grading	NPDES/ PM 10	609441070	INDIO	April 30, 2008
		Construction site failed to maintain BMP for blowing sand.					
18	CV0803915	Open	Grading	NPDES/ PM 10	609441067		April 30, 2008
		Construction site failed to maintain BMP for blowing sand.					

NPDES Closed FY0708

	Case #	Case Type	Case Name	APN	Address	Street	City	Date Closed
1	SE070713	NPDES	NPDES	650151032	31278	LAS FLORES	THOUSAND PLMS	July 16, 2007
		NPDES violation unfounded upon investigation.						
2	SE079283	NPDES	NPDES	427061078	31087	WATER	NUEVO	November 2, 2007
		Draining pool into storm drain.						
3	SE079235	NPDES	Hazardous Materials	160100080	11498	PARKCENTER	MIRA LOMA	November 13, 2007
		Possible hazardous material down the storm drain from the pool.						
4	SE0800048	NPDES	Draining Cement in storm drain	144553010	6681	HEATHGROVE	CORONA	January 22, 2008
		Cement run off being put into storm drain.						
5	SE077037	NPDES	NPDES Violation	309332006	29094	COBBLESTONE	NUEVO	February 4, 2008
		Draining pool into storm drain.						
6	SE0800139	NPDES	NPDES	164040004	12884	OAKDALE	CORONA	March 25, 2008
		Draining pool into storm drain.						
7	CV0801095	Grading	NPDES	607040055	78180	Avenue 41	Indio	March 26, 2008
		Construction site failed to maintain BMP for blowing sand.						
8	SE0800378	NPDES	NPDES	144190010	7411	CLEMENTINE	CORONA	April 8, 2008
		Draining pool into storm drain.						
9	SE0800453	NPDES	NPDES pool water in gutter	144370052	13816	HAIDER	CORONA	May 13, 2008
		Draining pool into storm drain.						
10	SE0800470	NPDES	NPDES	144371021	7680	BLUE MIST	CORONA	May 14, 2008
		Draining pool into storm drain.						
11	SE0800484	NPDES	BLOWING SAND; PM-10	607040038	40825	YUCCA	INDIO	May 14, 2008
		Draining pool into storm drain.						
12	CV0801093	Grading	NPDES-PM10	609201005	79801	Avenue 42	Bermuda Dunes	May 19, 2008
		Grading without permit where dirt eroding and dust problems were evident. A retaining wall was in progress by construction crew.						
13	CV078414	Grading	NPDES RCC.15.12.020	165252009	6021	Natchez	Riverside	June 2, 2008
		NPDES violation unfounded upon investigation.						
14	SE0800562	NPDES	NPDES	351271016	23682	CANYON HEIGHTS	CANYON LAKE	June 13, 2008
		NPDES violation unfounded upon investigation.						
15	SE0800555	NPDES	NPDES violation	165252009	33213	FRIARTUCK	LAKE ELSINORE	June 27, 2008
		Soil erosion into street from bank owned home.						

0002105

Illegal Grading Open FY0708

	Case #	Current Status*	Case Type	CASENAME	APN	Date Opened
1	CV075494	Open	Grading	GRADING WITHOUT PERMIT	382400006	July 3, 2007
2	CV075500	Closed	Grading	Grading Without Permit	941120024	July 3, 2007
3	CV075504	Open	Grading	Grading w/out a permit(s)	259140005	July 3, 2007
4	CV075512	Closed	Grading	GRADING WITHOUT PERMIT	245260012	July 3, 2007
5	CV075522	Closed	Grading	GRADING WITHOUT PERMIT	472190014	July 5, 2007
6	CV075523	Open	Grading	GRADING WITHOUT PERMIT	915440027	July 5, 2007
7	CV075630	Open	Grading	GRADING WITHOUT PERMIT	434240002	July 9, 2007
8	CV075637	Closed	Grading	GRADING WITHOUT PERMIT	318260058	July 9, 2007
9	CV075717	Closed	Grading	Blowing Sand PM 10	255040016	July 11, 2007
10	CV075723	Closed	Grading	Grading w/o permit(s)	413380017	July 11, 2007
11	CV075741	Closed	Grading	Grading without permits	965450003	July 11, 2007
12	CV075770	Open	Grading	Grading Without Permit	351102019	July 12, 2007
13	CV075771	Open	Grading	Grading Without Permit	964110024	July 12, 2007
14	CV075786	Closed	Grading	GRADING W/OUT PERMIT	245-100-040	July 13, 2007
15	CV075832	Open	Grading	GRADING WITHOUT PERMIT	290140061	July 16, 2007
16	CV075839	Open	Grading	GRADING WITHOUT PERMIT	271071016	July 16, 2007
17	CV075904	Open	Grading	GRADING WITHOUT PERMIT	322090014	July 17, 2007
18	CV075908	Open	Grading	GRADING WITHOUT PERMIT	380250001	July 17, 2007
19	CV075918	Open	Grading	Grading w/o Permits	259280028	July 17, 2007
20	CV075924	Closed	Grading	Stock Piling	161151007	July 17, 2007
21	CV075953	Closed	Grading	Grading w/o permit(s)	309170068	July 18, 2007
22	CV075984	Open	Grading	Grading Without Permit	915560007	July 19, 2007
23	CV075988	Open	Grading	GRADING WITHOUT PERMIT	935390009	July 19, 2007
24	CV075989	Closed	Grading	GRADING WITHOUT PERMIT	935390010	July 19, 2007
25	CV075990	Closed	Grading	Stock Piling	278080001	July 19, 2007
26	CV075991	Open	Grading	GRADING WITHOUT PERMIT	939040006	July 19, 2007
27	CV075992	Open	Grading	GRADING WITHOUT PERMIT	939040005	July 19, 2007
28	CV076003	Open	Grading	Grading without permits.	964110010	July 19, 2007
29	CV076005	Open	Grading	Grading without permits	964110023	July 19, 2007
30	CV076012	Open	Grading	Grading without permits	964110013	July 19, 2007
31	CV076024	Closed	Grading	Grading Without Permit	966080003	July 20, 2007
32	CV076096	Closed	Grading	GWP stock piling	317270001	July 23, 2007
33	CV076102	Closed	Grading	GRADING WITHOUT PERMIT	750170024	July 23, 2007
34	CV076113	Closed	Grading	Grading Without Permit	941120014	July 23, 2007
35	CV076146	Open	Grading	GRADING WITHOUT PERMIT	928180007	July 24, 2007
36	CV076184	Open	Grading	GRADING WITHOUT PERMIT	750170010	July 25, 2007

0002106

Illegal Grading Open FY0708

	Case #	Current Status*	Case Type	CASENAME	APN	Date Opened
73	CV077062	Closed	Grading	Grading without permits	341114009	August 24, 2007
74	CV077071	Closed	Grading	Multiple Violations	174150009	August 24, 2007
75	CV077082	Open	Grading	GRADING WITHOUT PERMIT	286240017	August 27, 2007
76	CV077089	Open	Grading	Grading without permits	915680010	August 27, 2007
77	CV077091	Closed	Grading	Grading without permit	277152005	August 27, 2007
78	CV077094	Open	Grading	Stock Piling	167171002	August 27, 2007
79	CV077107	Open	Grading	Grading Without Permit	951140012	August 27, 2007
80	CV077149	Closed	Grading	Grading without permits	941150020	August 28, 2007
81	CV077150	Closed	Grading	Grading without Permit	277152005	August 28, 2007
82	CV077215	Closed	Grading	GRADING WITHOUT PERMIT	391120028	August 29, 2007
83	CV077283	Open	Grading	GRADING WITHOUT PERMIT	391120019	August 30, 2007
84	CV077310	Closed	Grading	Grading w/o Permits	402130017	August 31, 2007
85	CV077311	Open	Construction Without a Permit	Grading w/out Permits	514273051	August 31, 2007
86	CV077322	Open	Grading	Grading Without Permit	917260081	August 31, 2007
87	CV077324	Open	Grading	Grading Without Permit	576210014	August 31, 2007
88	CV077326	Open	Grading	Grading Without Permit	358190008	August 31, 2007
89	CV077345	Closed	Grading	Grading w/o permit-stockpiling	295-230-007	September 4, 2007
90	CV077407	Open	Grading	Grading w/out Permits	345100021	September 6, 2007
91	CV077467	Closed	Grading	Grading without Permit	295-230-007	September 7, 2007
92	CV077494	Open	Grading	Grading without a permit(s)	455250001	September 10, 2007
93	CV077496	Open	Grading	Grading without a Permit	466130043	September 10, 2007
94	CV077515	Open	Grading	grading without a permit	336420007	September 10, 2007
95	CV077542	Closed	Grading	Grading without Permit	650072032	September 10, 2007
96	CV077563	Open	Grading	Grading w/o permit(s)	347090044	September 11, 2007
97	CV077566	Closed	Grading	GRADING WITHOUT PERMIT	935070017	September 11, 2007
98	CV077572	Closed	Grading	Grading w/out a permit	403280020	September 11, 2007
99	CV077590	Closed	Grading	Grading w/out a permit	666230012	September 12, 2007
100	CV077605	Closed	Grading	Grading Without Permit	584310002	September 12, 2007
101	CV077616	Closed	Grading	Grading w/o permit(s)	403280014	September 12, 2007
102	CV077685	Closed	Grading	GRADING WITHOUT PERMIT	362240037	September 13, 2007
103	CV077729	Open	Grading	GRADING WITHOUT PERMIT	289550027	September 17, 2007
104	CV077736	Closed	Grading	GRADING WITHOUT PERMIT	273210041	September 17, 2007
105	CV077749	Open	Grading	Grading without permits	577190019	September 17, 2007
106	CV077751	Open	Grading	Grading w/o permit(s)	520030001	September 17, 2007
107	CV077756	Open	Grading	Grading without permits	941180027	September 17, 2007
108	CV077781	Open	Grading	Grading w/out Permits	458080046	September 18, 2007

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Illegal Grading Open FY0708

	Case #	Current Status*	Case Type	CASENAME	APN	Date Opened
145	CV078466	Open	Grading	Grading w/o Permit	723084008	October 5, 2007
146	CV078514	Closed	Grading	STOCKPILING	365200024	October 10, 2007
147	CV078532	Open	Grading	Grading Without Permit	584250021	October 11, 2007
148	CV078547	Open	Grading	GRADING WITHOUT PERMIT	322070027	October 11, 2007
149	CV078618	Open	Grading	GRADING WITHOUT PERMT	764290004	October 15, 2007
150	CV078622	Closed	Grading	GRADING WITHOUT PERMIT	767270007	October 15, 2007
151	CV078665	Open	Grading	GRADING WITHOUT PERMIT	371170011	October 15, 2007
152	CV078666	Open	Grading	GRADING WITHOUT PERMIT	371170011	October 15, 2007
153	CV078677	Closed	Grading	GRADING WITHOUT PERMIT	333131011	October 15, 2007
154	CV078736	Closed	Grading	Grading without Permit	650323003	October 16, 2007
155	CV078768	Closed	Grading	Grading Without Permits	333152001	October 16, 2007
156	CV078769	Closed	Grading	Grading Without Permit	333152002	October 16, 2007
157	CV078770	Closed	Grading	Grading without Permits	333151003	October 16, 2007
158	CV078773	Closed	Grading	Grading without Permits	333151008	October 16, 2007
159	CV078774	Closed	Grading	Grading without Permits	333151011	October 16, 2007
160	CV078775	Closed	Grading	Grading without Permits	333152004	October 16, 2007
161	CV078776	Closed	Grading	Grading without Permits	333152009	October 16, 2007
162	CV078777	Closed	Grading	Grading without Permits	333152010	October 16, 2007
163	CV078778	Closed	Grading	Grading without Permits	333152005	October 16, 2007
164	CV078781	Closed	Grading	Grading without Permits	333152008	October 16, 2007
165	CV078782	Closed	Grading	Grading without Permits	333151009	October 16, 2007
166	CV078784	Closed	Grading	Grading without Permits	333151006	October 16, 2007
167	CV078785	Closed	Grading	Grading without Permits	333151012	October 16, 2007
168	CV078792	Closed	Grading	Grading without Permits	333151002	October 16, 2007
169	CV078815	Closed	Grading	Grading w/out Permits	455320025	October 17, 2007
170	CV078828	Closed	Grading	Grading Without Permit	927280007	October 17, 2007
171	CV078883	Open	Grading	GRADING WITHOUT PERMIT	362040047	October 19, 2007
172	CV078887	Open	Grading	GRADING WITHOUT PERMIT	560180018	October 19, 2007
173	CV078911	Open	Grading	Grading without a Permit	463021002	October 22, 2007
174	CV078925	Open	Grading	Grading without a Permit	555300022	October 22, 2007
175	CV078953	Closed	Grading	GRADING WITHOUT PERMIT	333131010	October 23, 2007
176	CV078983	Open	Grading	Grading without Permit	178330018	October 23, 2007
177	CV078987	Open	Grading	GRADING WITHOUT PERMIT	927340023	October 24, 2007
178	CV078994	Closed	Grading	Grading w/out permit(s)	402050015	October 24, 2007
179	CV079004	Open	Grading	Grading without permits	583260069	October 24, 2007
180	CV079008	Closed	Grading	GRADING WITHOUT PERMIT	581050016	October 25, 2007

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Illegal Grading Open FY0708

	Case #	Current Status*	Case Type	CASENAME	APN	Date Opened
217	CV079552	Open	Grading	GRADING WITHOUT PERMIT	932050009	November 13, 2007
218	CV079565	Open	Grading	Grading without permits	915350036	November 13, 2007
219	CV079571	Open	Grading	Grading without Permits	162070020	November 13, 2007
220	CV079611	Open	Grading	GRADING WITHOUT PERMIT	367350013	November 14, 2007
221	CV079619	Closed	Grading	GRADING WITHOUT PERMIT	391700020	November 14, 2007
222	CV079638	Closed	Grading	GRADING WITHOUT PERMIT	385200008	November 14, 2007
223	CV079650	Closed	Grading	Grading Without Permit	340050024	November 15, 2007
224	CV079656	Closed	Grading	GRADING WITHOUT PERMIT	366260001	November 15, 2007
225	CV079657	Closed	Grading	GRADING WITHOUT PERMIT	366230008	November 15, 2007
226	CV079666	Closed	Grading	GRADING WITHOUT PERMIT	385160005	November 15, 2007
227	CV079671	Open	Grading	GRADING WITHOUT PERMIT	999999999	November 15, 2007
228	CV079672	Open	Grading	GRADING WITHOUT PERMIT	999999999	November 15, 2007
229	CV079681	Closed	Grading	Grading without permits	915080020	November 15, 2007
230	CV079758	Open	Grading	GRADING WITHOUT PERMIT	915490038	November 20, 2007
231	CV079776	Open	Grading	Stock Piling	160262017	November 21, 2007
232	CV079787	Closed	Grading	Grading w/out Permits	322100005	November 21, 2007
233	CV079827	Open	Grading	GRADING WITHOUT PERMIT	940090007	November 26, 2007
234	CV079871	Open	Grading	Grading without permits	351083016	November 27, 2007
235	CV079872	Open	Grading	Grading without permits	351083014	November 27, 2007
236	CV079902	Closed	Grading	GRADING WITHOUT PERMIT	930230028	November 28, 2007
237	CV079908	Closed	Grading	Stock Piling	277343005	November 28, 2007
238	CV079920	Closed	Grading	Grading without Permit	607121022	November 28, 2007
239	CV079933	Closed	Grading	GRADING WITHOUT A PERMIT	271080032	November 28, 2007
240	CV079936	Open	Grading	Grading without Permit	628390002	November 28, 2007
241	CV079939	Open	Grading	GRADING WITHOUT PERMIT	928240033	November 29, 2007
242	CV079950	Open	Grading	Surface Mine Without Permit	358090015	November 29, 2007
243	CV079962	Closed	Grading	Grading Without Permit	569260038	November 29, 2007
244	CV079965	Closed	Grading	Grading Without Permit	569260039	November 29, 2007
245	CV079967	Open	Grading	Grading Without Permit	964050032	November 29, 2007
246	CV0710084	Open	Grading	Grading without Permit	628400043	December 3, 2007
247	CV0710098	Open	Grading	Grading Without Permit	915220018	December 4, 2007
248	CV0710099	Open	Construction Without a Permit	Grading Without Permit	915220018	December 4, 2007
249	CV0710105	Closed	Grading	Grading without permit	177080012	December 4, 2007
250	CV0710108	Open	Grading	Grading without a Permit	472060019	December 4, 2007
251	CV0710109	Open	Grading	GRADING WITHOUT PERMIT	915230053	December 4, 2007
252	CV0710113	Closed	Grading	GRADING WITHOUT PERMIT	290140032	December 4, 2007

Illegal Grading Open FY0708

	Case #	Current Status*	Case Type	CASENAME	APN	Date Opened
289	CV0710432	Open	Grading	GRADING WITHOUT A PERMIT	609062023	December 17, 2007
290	CV0710450	Closed	Grading	GWP-STOCK PILING:6FT PILE DIRT	245152008	December 17, 2007
291	CV0710455	Closed	Grading	Grading without a Permit	360040001	December 17, 2007
292	CV0710489	Open	Grading	GRADING WITHOUT A PERMIT	321432001	December 18, 2007
293	CV0710514	Open	Grading	GWP - Grading Without Permit	470070002	December 18, 2007
294	CV0710520	Closed	Grading	Grading without a Permit	564187010	December 18, 2007
295	CV0710528	Open	Grading	Grading w/out a permit(s)	429290038	December 18, 2007
296	CV0710535	Closed	Grading	Grading without a Permit	545060010	December 18, 2007
297	CV0710542	Closed	Grading	Grading without a Permit	472060010	December 18, 2007
298	CV0710550	Closed	Grading	Grading without Permits	277161003	December 19, 2007
299	CV0710554	Open	Grading	Grading w/out Permits	309140046	December 19, 2007
300	CV0710569	Open	Grading	GRADING WITHOUT A PERMIT	318270012	December 19, 2007
301	CV0710571	Open	Grading	GWP- STOCKPILING	321020019	December 19, 2007
302	CV0710632	Closed	Grading	GRADING WITHOUT A PERMIT	271270022	December 20, 2007
303	CV0710638	Closed	Grading	Grading w/out Permit	657424012	December 20, 2007
304	CV0710646	Open	Grading	GRADING WITHOUT PERMIT	380170004	December 20, 2007
305	CV0710656	Open	Grading	Grading without a Permit	331110039	December 21, 2007
306	CV0710657	Open	Grading	Grading without a Permit	331110023	December 21, 2007
307	CV0710712	Closed	Grading	GRADING WITHOUT PERMIT	382320010	December 27, 2007
308	CV0710725	Open	Grading	Grading without permits.	943020018	December 27, 2007
309	CV0710797	Open	Grading	GRADING WITHOUT PERMIT	932270018	December 28, 2007
310	CV0710798	Open	Grading	GRADING WITHOUT PERMIT	932270017	December 28, 2007
311	CV0800006	Closed	Grading	GRADING WITHOUT PERMIT	371120010	January 2, 2008
312	CV0800029	Closed	Grading	GRADING WITHOUT A PERMIT	321040021	January 3, 2008
313	CV0800033	Open	Grading	GWP - stockpiling	405060013	January 4, 2008
314	CV0800034	Closed	Grading	Grading without permit	927280011	January 4, 2008
315	CV0800036	Closed	Grading	Grading without permits	927490019	January 4, 2008
316	CV0800042	Closed	Grading	GWP	321050027	January 4, 2008
317	CV0800064	Open	Grading	GRADING WITHOUT PERMIT	942080039	January 7, 2008
318	CV0800080	Closed	Grading	Grading without Permit(s)	426340001	January 7, 2008
319	CV0800082	Open	Grading	GRADING WITHOUT A PERMIT	321432009	January 7, 2008
320	CV0800104	Open	Grading	GRADING WITHOUT PERMIT	927510019	January 8, 2008
321	CV0800105	Open	Grading	GRADING WITHOUT PERMIT	942080039	January 8, 2008
322	CV0800108	Open	Grading	GRADING WITHOUT PERMIT	951270003	January 8, 2008
323	CV0800109	Open	Grading	Grading w/out a Permit(s)	544270006	January 8, 2008
324	CV0800116	Open	Grading	Grading without a Permit	569340008	January 8, 2008

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Illegal Grading Open FY0708

	Case #	Current Status*	Case Type	CASENAME	APN	Date Opened
361	CV0800892	Closed	Grading	Grading Without Permit	951110003	January 24, 2008
362	CV0800921	Open	Grading	GRADING WITHOUT PERMIT	931170007	January 28, 2008
363	CV0800925	Open	Grading	Grading without Permits	161291005	January 28, 2008
364	CV0800932	Closed	Grading	Grading without a Permit	553150047	January 28, 2008
365	CV0800950	Closed	Grading	GRADING WITHOUT PERMIT	351074018	January 28, 2008
366	CV0800988	Open	Grading	GRADING WITHOUT PERMIT	341170002	January 29, 2008
367	CV0801015	Open	Grading	GRADING WITHOUT PERMIT	285310010	January 30, 2008
368	CV0801024	Open	Grading	GRADING WITHOUT PERMIT	581120010	January 30, 2008
369	CV0801032	Open	Grading	GRADING WITHOUT PERMIT	951030052	January 31, 2008
370	CV0801054	Open	Grading	GRADING WITHOUT PERMIT	571080035	January 31, 2008
371	CV0801077	Open	Grading	Grading without a Permit	545060010	January 31, 2008
372	CV0801078	Open	Grading	Grading without Permits	167232002	January 31, 2008
373	CV0801087	Open	Grading	Grading Without Permit	927440007	January 31, 2008
374	CV0801093	Closed	Grading	NPDES-PM10	609201005	January 31, 2008
375	CV0801095	Closed	Grading	NPDES	607040055	January 31, 2008
376	CV0801107	Closed	Grading	Grading Without Permit	942190013	February 1, 2008
377	CV0801108	Closed	Grading	Grading Without Permit	942070035	February 1, 2008
378	CV0801109	Open	Grading	Grading Without Permit	941190036	February 1, 2008
379	CV0801111	Open	Grading	Grading without a Permit	472020009	February 4, 2008
380	CV0801112	Closed	Grading	Grading Without Permit	941190030	February 4, 2008
381	CV0801125	Closed	Grading	GRADING WITHOUT A PERMIT	274090017	February 4, 2008
382	CV0801152	Open	Grading	Grading Without Permit	915630002	February 5, 2008
383	CV0801154	Open	Grading	GRADING WITHOUT PERMIT	376320001	February 5, 2008
384	CV0801160	Open	Grading	Grading Without Permit	581100012	February 5, 2008
385	CV0801161	Open	Grading	Grading Without Permit	581120006	February 5, 2008
386	CV0801165	Open	Grading	Grading Without Permit	581070005	February 5, 2008
387	CV0801180	Open	Grading	Grading Without Permit	927300013	February 5, 2008
388	CV0801184	Open	Grading	Grading Without Permit	360320007	February 5, 2008
389	CV0801186	Closed	Grading	Grading Without Permit	927280040	February 5, 2008
390	CV0801215	Closed	Grading	Grading Without Permit	928350031	February 6, 2008
391	CV0801220	Closed	Grading	GRADING WITHOUT PERMIT	167232001	February 6, 2008
392	CV0801223	Closed	Grading	GWP/Stock Piling	449112048	February 6, 2008
393	SE0800112	Open	Illegal Dumping	Grading without a Permit		February 6, 2008
394	CV0801249	Open	Grading	Illegal Grading	941300009	February 6, 2008
395	CV0801256	Open	Grading	Grading Without Permit	472180028	February 6, 2008
396	CV0801270	Closed	Grading	Grading Without Permit	381140008	February 6, 2008
				GRADING WITHOUT PERMIT		

Illegal Grading Open FY0708

	Case #	Current Status*	Case Type	CASENAME	APN	Date Opened
433	CV0802000	Open	Grading	Grading without permits	333131034	March 6, 2008
434	CV0802001	Open	Grading	Grading without permits	333131032	March 6, 2008
435	CV0802002	Open	Grading	Grading without permits.	915380016	March 6, 2008
436	CV0802045	Open	Grading	GRADING WITHOUT PERMIT	367270008	March 7, 2008
437	CV0802051	Open	Grading	GRADING WITHOUT PERMIT	763310014	March 7, 2008
438	CV0802090	Closed	Grading	GRADING W/O A PERMIT	317090013	March 10, 2008
439	CV0802128	Closed	Grading	GRADING WTIHOUT PERMIT	569330012	March 10, 2008
440	CV0802129	Closed	Grading	GRADING WITHOUT PERMIT	571210016	March 10, 2008
441	CV0802131	Open	Grading	GRADING WITHOUT PERMIT	315242009	March 10, 2008
442	CV0802137	Open	Grading	GRADING WITHOUT PERMITS	360230002	March 10, 2008
443	CV0802153	Closed	Grading	Grading without permits	924140010	March 10, 2008
444	CV0802157	Closed	Grading	GRADING WITHOUT PERMIT	569190009	March 10, 2008
445	CV0802171	Open	Grading	GRADING WITHOUT PERMIT	935260025	March 10, 2008
446	CV0802199	Closed	Grading	GRADING WITHOUT PERMIT	929200008	March 11, 2008
447	CV0802227	Open	Grading	GRADING WITHOUT PERMIT	383201032	March 11, 2008
448	CV0802228	Open	Grading	GRADING WITHOUT PERMIT	383201033	March 11, 2008
449	CV0802229	Open	Grading	GRADING WITHOUT PERMIT	383201034	March 11, 2008
450	CV0802234	Open	Grading	Grading without Permit	628330012	March 11, 2008
451	CV0802239	Open	Grading	GRADING WITHOUT PERMIT	929020012	March 12, 2008
452	CV0802252	Open	Grading	Grading w/o permit(s)	656254007	March 12, 2008
453	CV0802259	Open	Grading	Grading w/out a permit(s)	427380007	March 12, 2008
454	CV0802269	Open	Grading	Grading without a permit	434170023	March 13, 2008
455	CV0802270	Open	Grading	Grading without a Permit	583250008	March 13, 2008
456	CV0802307	Closed	Grading	PM10 VIOLATION-AG PROPERTY	757090025	March 14, 2008
457	CV0802336	Open	Grading	GRADING WITHOUT PERMIT	930270004	March 17, 2008
458	CV0802340	Open	Grading	Grading Without Permit	915550057	March 17, 2008
459	CV0802343	Open	Grading	Grading Without Permit	915630004	March 17, 2008
460	CV0802347	Closed	Grading	Grading w/o permit(s)	349380004	March 17, 2008
461	CV0802469	Open	Grading	GRADING WITHOUT PERMIT	285020003	March 19, 2008
462	CV0802479	Closed	Grading	GRADING WITHOUT PERMIT	366033028	March 19, 2008
463	CV0802488	Closed	Grading	Grading Without Permit	915220012	March 19, 2008
464	CV0802496	Open	Grading	GRADING WITHOUT PERMIT	571280018	March 19, 2008
465	CV0802529	Closed	Grading	GRADING WITHOUT PERMIT	942180001	March 20, 2008
466	CV0802558	Open	Grading	Grading without Permits	647190006	March 20, 2008
467	CV0802571	Open	Grading	Grading without pemits	571520012	March 21, 2008
468	CV0802572	Open	Grading	Grading without permits	571520004	March 21, 2008

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	Case #	Current Status*	Case Type	CASENAME	APN	Date Opened
505	CV0803508	Closed	Grading	GWP	544240033	April 17, 2008
506	CV0803565	Closed	Grading	Grading w/o permit(s)	347130026	April 18, 2008
507	CV0803600	Open	Grading	GRADING	274240015	April 21, 2008
508	CV0803611	Open	Grading	GRADING WITHOUT PERMIT	915720020	April 21, 2008
509	CV0803649	Open	Grading	GRADING WITHOUT PERMIT	931070013	April 23, 2008
510	CV0803653	Open	Grading	Grading without permits	942130016	April 23, 2008
511	CV0803654	Open	Grading	Grading Without Permit	470390020	April 23, 2008
512	CV0803656	Open	Grading	Grading Without Permit	470390014	April 23, 2008
513	CV0803677	Open	Grading	GRADING WITHOUT PERMIT	937070018	April 23, 2008
514	CV0803705	Open	Grading	Grading Without Permit	927320081	April 24, 2008
515	CV0803781	Open	Grading	Grading w/o permits	917050006	April 25, 2008
516	CV0803782	Open	Grading	GRADING WITHOUT PERMIT	935260020	April 25, 2008
517	CV0803785	Closed	Grading	GRADING WITHOUT PERMIT	931100004	April 25, 2008
518	CV0803836	Open	Grading	Excessive Outside Storage	545294012	April 28, 2008
519	CV0803839	Open	Grading	grading without a permit	529150030	April 28, 2008
520	CV0803845	Closed	Grading	Grading w/out permit(s)	347130017	April 29, 2008
521	CV0803858	Open	Grading	Grading Without Permit	358180018	April 29, 2008
522	CV0803880	Open	Grading	Grading w/o permit(s)	423140006	April 30, 2008
523	CV0803882	Open	Grading	Grading w/o permit(s)	423140008	April 30, 2008
524	CV0803894	Open	Grading	NPDES/PM 10	609441060	April 30, 2008
525	CV0803914	Open	Grading	NPDES/ PM 10	609441070	April 30, 2008
526	CV0803915	Open	Grading	NPDES/ PM 10	609441067	April 30, 2008
527	CV0803919	Open	Grading	NPDES/ PM 10	609441040	April 30, 2008
528	CV0803976	Open	Grading	Grading Without Permit	571350003	May 1, 2008
529	CV0803993	Open	Grading	Grading without permits	951230013	May 1, 2008
530	CV0803997	Open	Grading	Grading without pemits	927280025	May 1, 2008
531	CV0804101	Open	Grading	Grading Without Permit	951060011	May 6, 2008
532	CV0804112	Open	Grading	BLOWING SAND	659020027	May 6, 2008
533	CV0804117	Closed	Grading	GRADING WITHOUT PERMIT	943230001	May 6, 2008
534	CV0804121	Open	Grading	GRADING WITHOUT PERMIT	285370018	May 6, 2008
535	CV0804127	Open	Grading	GRADING WITHOUT PERMIT	470060025	May 7, 2008
536	CV0804137	Open	Grading	Grading without Permit	628380032	May 7, 2008
537	CV0804152	Open	Grading	GRADING WITHOUT PERMIT	273090021	May 7, 2008
538	CV0804158	Open	Grading	GRADING WITHOUT PERMIT	548120001	May 7, 2008
539	CV0804179	Open	Grading	GWP	457290039	May 7, 2008
540	CV0804191	Open	Grading	GRADING W/OUT PERMIT	273090021	May 7, 2008

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	Case #	Current Status*	Case Type	CASENAME	APN	Date Opened
577	CV0804644	Open	Grading	Grading w/out Permits	660110038	May 28, 2008
578	CV0804646	Open	Grading	GRADING	286130014	May 28, 2008
579	CV0804660	Closed	Grading	GRADING - NATURAL WATER FLOW	273180037	May 28, 2008
580	CV0804667	Open	Grading	GWP	325120014	May 28, 2008
581	CV0804775	Open	Grading	GRADING WITHOUT PERMIT	575240034	May 29, 2008
582	CV0804802	Open	Grading	GRADING WITHOUT PERMIT	390280016	May 30, 2008
583	CV0804822	Open	Grading	GRADING WITHOUT PERMIT	385180018	June 2, 2008
584	CV0804880	Open	Grading	Grading without permits		June 3, 2008
585	CV0804907	Open	Grading	GRADING WITHOUT PERMITS	636140039	June 3, 2008
586	CV0804911	Open	Grading	GRADING WITHOUT PERMIT	358180018	June 3, 2008
587	CV0804942	Open	Grading	GRADING WITHOUT PERMIT	458260003	June 3, 2008
588	CV0805009	Open	Grading	GRADING WITHOUT PERMIT	391160003	June 6, 2008
589	CV0805031	Open	Grading	GRADING WITHOUT PERMIT	940020007	June 9, 2008
590	CV0805032	Open	Grading	GRADING WITHOUT PERMIT	940020008	June 9, 2008
591	CV0805064	Open	Grading	GRADING/GRUBBING W/O PERMITS	607050017	June 10, 2008
592	CV0805065	Open	Grading	GRADING/GRUBBING W/O PERMITS	607050018	June 10, 2008
593	CV0805066	Open	Grading	GRADING/GRUBING W/O PERMITS	607050019	June 10, 2008
594	CV0805089	Open	Grading	GRADING WITHOUT PERMIT	651072079	June 10, 2008
595	CV0805119	Open	Grading	GRADING WITHOUT PERMIT	382300004	June 10, 2008
596	CV0805224	Open	Grading	Grading Without Permit	915710013	June 12, 2008
597	CV0805265	Open	Grading	GRADING WITHOUT PERMIT	351271016	June 13, 2008
598	CV0805268	Closed	Grading	GRADING WITHOUT PERMIT	351020044	June 13, 2008
599	CV0805335	Closed	Grading	GRADING WITHOUT PERMIT	943170017	June 16, 2008
600	CV0805344	Open	Grading	Grading Without Permits	519190029	June 16, 2008
601	CV0805355	Open	Grading	Grading w/out Permits	309170068	June 17, 2008
602	CV0805356	Open	Grading	Grading without permit	563323017	June 17, 2008
603	CV0805377	Open	Grading	EXCESSIVE OUTSIDE STORAGE	563323017	June 17, 2008
604	CV0805378	Open	Grading	GRADING WITHOUT PERMIT	391170016	June 17, 2008
605	CV0805381	Closed	Grading	Grading / Dirt Ramps on Parcel	381252003	June 17, 2008
606	CV0805386	Open	Grading	GRADING WITHOUT PERMIT	575250007	June 17, 2008
607	CV0805413	Open	Grading	Grading without permit	282040009	June 17, 2008
608	CV0805471	Open	Grading	GRADING WITHOUT PERMIT	371240001	June 19, 2008
609	CV0805473	Closed	Grading	GRADING WITHOUT PERMIT	932220035	June 19, 2008
610	CV0805479	Open	Grading	GRADING WITHOUT PERMIT	387212083	June 19, 2008
611	CV0805488	Open	Grading	Grading w/out Permits	257220008	June 20, 2008
612	CV0805503	Closed	Grading	GRADING WITHOUT A PERMIT	317270001	June 23, 2008

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Illegal Grading Closed FY0708

	Case #	Case Type	Case Name	APN	Date Closed
1	CV075512	Grading	GRADING WITHOUT PERMIT	245260012	July 9, 2007
2	CV075988	Grading	GRADING WITHOUT PERMIT	935390009	July 20, 2007
3	CV075991	Grading	GRADING WITHOUT PERMIT	939040006	July 20, 2007
4	CV075992	Grading	GRADING WITHOUT PERMIT	939040005	July 20, 2007
5	CV075717	Grading	Blowing Sand PM 10	255040016	July 24, 2007
6	CV075918	Grading	Grading w/o Permits	259280028	July 30, 2007
7	CV075500	Grading	Grading Without Permit	941120024	August 8, 2007
8	CV076544	Grading	Grading without Permit	648200017	August 8, 2007
9	CV076290	Grading	GRADING WITHOUT PERMIT	319141012	August 15, 2007
10	CV075953	Grading	Grading w/o permit(s)	309170068	August 28, 2007
11	CV076529	Grading	GRADING WITHOUT PERMIT	581050016	August 28, 2007
12	CV076800	Grading	Grading W/O Permit	951090025	August 30, 2007
13	CV076102	Grading	GRADING WITHOUT PERMIT	750170024	August 30, 2007
14	CV077062	Grading	Grading without permits	341114009	September 6, 2007
15	CV077345	Grading	Grading w/o permit-stockpiling	295-230-007	September 7, 2007
16	CV077467	Grading	Grading without Permit	295-230-007	September 7, 2007
17	CV075522	Grading	GRADING WITHOUT PERMIT	472190014	September 10, 2007
18	CV077036	Grading	GRADING WITHOUT PERMIT	931360006	September 11, 2007
19	CV076207	Grading	Grading Without Permit	951080024	September 14, 2007
20	CV076559	Grading	GWP - stock piling	295220002	September 17, 2007
21	CV077605	Grading	Grading Without Permit	584310002	September 24, 2007
22	CV077094	Grading	Stock Piling	167171002	September 24, 2007
23	CV077749	Grading	Grading without permits	577190019	September 24, 2007
24	CV077150	Grading	Grading without Permit	277152005	September 25, 2007
25	CV076412	Grading	Grading without permit	162062018	September 26, 2007
26	CV075990	Grading	Stock Piling	278080001	September 28, 2007
27	CV077310	Grading	Grading w/o Permits	402130017	October 2, 2007
28	CV076113	Grading	Grading Without Permit	941120014	October 2, 2007
29	CV076319	Grading	GRADING WITHOUT PERMIT	319062022	October 16, 2007
30	CV078050	Grading	Construction without permits	559040011	October 16, 2007
31	CV077566	Grading	GRADING WITHOUT PERMIT	935070017	October 23, 2007
32	CV078828	Grading	Grading Without Permit	927280007	October 31, 2007
33	CV079140	Grading	Grading without permits	583260069	October 31, 2007
34	CV076024	Grading	Grading Without Permit	966080003	October 31, 2007
35	CV079210	Grading	GRADING WITHOUT PERMIT	367320009	November 1, 2007
36	CV079209	Grading	GRADING WITHOUT PERMIT	367320008	November 7, 2007

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Illegal Grading Closed FY0708

	Case #	Case Type	Case Name	APN	Date Closed
73	CV0710212	Grading	GRADING WITHOUT PERMIT	938020016	January 2, 2008
74	CV0710105	Grading	Grading without permit	177080012	January 3, 2008
75	CV0800006	Grading	GRADING WITHOUT PERMIT	371120010	January 4, 2008
76	CV077794	Grading	Grading Without Permit	915220012	January 7, 2008
77	CV079776	Grading	Stock Piling	160262017	January 7, 2008
78	CV0800105	Grading	GRADING WITHOUT PERMIT	942080039	January 8, 2008
79	CV0710528	Grading	Grading w/out a permit(s)	429290038	January 8, 2008
80	CV078357	Grading	Grading witout permits	545051003	January 9, 2008
81	CV0710365	Grading	GRADING WITHOUT A PERMIT	280130009	January 11, 2008
82	CV079681	Grading	Grading without permits	915080020	January 11, 2008
83	CV078815	Grading	Grading w/out Permits	455320025	January 14, 2008
84	CV079933	Grading	GRADING WITHOUT A PERMIT	271080032	January 15, 2008
85	CV0800425	Grading	Grading without permits	999999999	January 16, 2008
86	CV0710371	Grading	GRADING WITHOUT PERMIT	928130005	January 16, 2008
87	CV0800294	Grading	GRADING WITHOUT PERMIT	928230015	January 16, 2008
88	CV078171	Grading	GWP	130030009	January 23, 2008
89	CV077091	Grading	Grading without permit	277152005	January 25, 2008
90	CV0710535	Grading	Grading without a Permit	545060010	January 28, 2008
91	CV0710542	Grading	Grading without a Permit	472060010	January 28, 2008
92	CV079223	Grading	GRADING WITHOUT PERMIT	391210009	January 29, 2008
93	CV075741	Grading	Grading without permits	965450003	January 30, 2008
94	CV078163	Grading	GRADING WITHOUT PERMIT	931080011	January 30, 2008
95	CV0710179	Grading	GRADING WITHOUT PERMIT	940090006	January 31, 2008
96	CV0800193	Grading	GRADING	273050011	February 4, 2008
97	CV0800377	Grading	GRADING WITHOUT A PERMIT	245260012	February 5, 2008
98	CV0801032	Grading	GRADING WITHOUT PERMIT	951030052	February 6, 2008
99	CV0801107	Grading	Grading Without Permit	942190013	February 6, 2008
100	CV077616	Grading	Grading w/o permit(s)	403280014	February 7, 2008
101	CV078736	Grading	Grading without Permit	650323003	February 11, 2008
102	CV0710113	Grading	GRADING WITHOUT PERMIT	290140032	February 14, 2008
103	CV079393	Grading	Grading w/out permit(s)	402230020	February 14, 2008
104	CV076931	Grading	Grading w/out Permits	455230043	February 15, 2008
105	CV0710638	Grading	Grading w/out Permit	657424012	February 21, 2008
106	CV079965	Grading	Grading Without Permit	569260039	February 21, 2008
107	CV0710406	Grading	GRADING WITHOUT PERMIT	366240076	February 22, 2008
108	CV077590	Grading	Grading w/out a permit	666230012	February 25, 2008

Illegal Grading Closed FY0708

	Case #	Case Type	Case Name	APN	Date Closed
145	CV0802131	Grading	GRADING WITHOUT PERMIT	315242009	March 21, 2008
146	CV0801374	Grading	GRADING WITHOUT A PERMIT	321170010	March 21, 2008
147	CV0802171	Grading	GRADING WITHOUT PERMIT		March 24, 2008
148	CV0802582	Grading	Grading without permits	583100020	March 24, 2008
149	CV0802583	Construction Without a Permit	Grading without permits	583100020	March 24, 2008
150	CV0802239	Grading	GRADING WITHOUT PERMIT	929020012	March 25, 2008
151	CV0801112	Grading	Grading Without Permit	941190030	March 25, 2008
152	CV076244	Grading	GRADING WITHOUT PERMIT	271072046	March 25, 2008
153	CV076242	Grading	GRADING WITHOUT PERMIT	271080046	March 25, 2008
154	CV0801095	Grading	NPDES	607040055	March 26, 2008
155	CV0801903	Grading	Grading Without Permit	569260085	March 27, 2008
156	CV0802759	Grading	GRADING WITHOUT PERMIT	647100004	March 31, 2008
157	CV077149	Grading	Grading without permits	941150020	March 31, 2008
158	CV079358	Grading	Grading Without Permit	560180018	March 31, 2008
159	CV0802791	Grading	GRADING WITHOUT PERMIT	383042020	April 2, 2008
160	CV0802128	Grading	GRADING WTIHOUT PERMIT	569330012	April 2, 2008
161	CV0802157	Grading	GRADING WITHOUT PERMIT	569190009	April 2, 2008
162	CV0802129	Grading	GRADING WITHOUT PERMIT	571210016	April 3, 2008
163	CV0802870	Grading	GWP	297071003	April 3, 2008
164	CV0801975	Grading	Grading W/O a permit	315070035	April 3, 2008
165	CV0802610	Grading	GRADING WITHOUT PERMIT	571520012	April 3, 2008
166	CV0802347	Grading	Grading w/o permit(s)	349380004	April 9, 2008
167	CV0801308	Grading	Grading without a Permit	360190002	April 14, 2008
168	CV076316	Grading	GRADING WITHOUT PERMIT	319062019	April 14, 2008
169	CV0802307	Grading	PM10 VIOLATION-AG PROPERTY	757090025	April 15, 2008
170	CV0800457	Grading	GRADING WITHOUT PERMIT	648130011	April 17, 2008
171	CV0710361	Grading	Grading without Permit	609061006	April 17, 2008
172	CV0801902	Grading	GRADING WITHOUT PERMIT	387140031	April 18, 2008
173	CV0802711	Grading	Grading Without Permit	941060020	April 22, 2008
174	CV079787	Grading	Grading w/out Permits	322100005	April 23, 2008
175	CV0802879	Grading	EOS	271200015	April 23, 2008
176	CV0710455	Grading	Grading without a Permit	360040001	April 23, 2008
177	CV0801802	Grading	Grading without a Permit	358180017	April 23, 2008
178	CV0803443	Grading	Grading Without Permit	942130017	April 24, 2008
179	CV075989	Grading	GRADING WITHOUT PERMIT	935390010	April 25, 2008
180	CV0802848	Grading	GRADING	269060013	April 25, 2008

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Illegal Grading Closed FY0708

	Case #	Case Type	Case Name	APN	Date Closed
217	CV0804660	Grading	GRADING - NATURAL WATER FLOW	273180037	May 30, 2008
218	CV0801297	Grading	Grading Without Permit	942070020	May 30, 2008
219	CV078414	Grading	NPDES RCC.15.12.020	165252009	June 2, 2008
220	CV0804626	Grading	Grading Without Permit	583120089	June 2, 2008
221	CV078396	Grading	Grading without permits	943120020	June 3, 2008
222	CV0804530	Grading	GRADING WITHOUT PERMIT	932350027	June 4, 2008
223	CV0800643	Grading	GRADING WITHOUT PERMIT	323020042	June 4, 2008
224	CV0804534	Grading	GRADING WITHOUT PERMIT	932350005	June 5, 2008
225	CV0804532	Grading	GRADING WITHOUT PERMIT	932350025	June 5, 2008
226	CV0710550	Grading	Grading without Permits	277161003	June 5, 2008
227	CV079317	Grading	GRADING WITHOUT PERMIT	351053011	June 5, 2008
228	CV076485	Grading	Grading w/o permit(s)	422120017	June 5, 2008
229	CV0804152	Grading	GRADING WITHOUT PERMIT	273090021	June 6, 2008
230	CV0805265	Grading	GRADING WITHOUT PERMIT	351271016	June 13, 2008
231	CV0804907	Grading	GRADING WITHOUT PERMITS	636140039	June 16, 2008
232	CV0804452	Grading	BLOWING SAND; PM-10	607040038	June 16, 2008
233	CV0805381	Grading	Grading / Dirt Ramps on Parcel	381252003	June 17, 2008
234	CV079902	Grading	GRADING WITHOUT PERMIT	930230028	June 18, 2008
235	CV077982	Grading	GRADING WITHOUT PERMIT	287090001	June 19, 2008
236	CV076096	Grading	GWP stock piling	317270001	June 23, 2008
237	CV0801792	Grading	Grading without a permit(s)	323080002	June 23, 2008
238	CV0800825	Grading	Grading w/o permit(s)	256072011	June 24, 2008
239	CV0805473	Grading	GRADING WITHOUT PERMIT	932220035	June 25, 2008
240	CV0710712	Grading	GRADING WITHOUT PERMIT	382320010	June 25, 2008
241	CV0805268	Grading	GRADING WITHOUT PERMIT	351020044	June 26, 2008
242	CV0804234	Grading	GRADING WITHOUT PERMIT	336520009	June 26, 2008
243	CV077071	Grading	Multiple Violations	174150009	June 27, 2008
244	CV0804310	Grading	Grading/Stock piling	183080006	July 2, 2008
245	CV0800034	Grading	Grading without permit	927280011	July 7, 2008
246	CV0802529	Grading	GRADING WITHOUT PERMIT	942180001	July 7, 2008
247	CV0804117	Grading	GRADING WITHOUT PERMIT	943230001	July 7, 2008
248	CV0802604	Grading	GRADING WITHOUT PERMIT	290432001	July 9, 2008
249	CV0802728	Grading	GRADING WITHOUT A PERMIT	647360003	July 10, 2008
250	CV0710217	Grading	GRADING WITHOUT PERMIT	386172011	July 11, 2008
251	CV0802479	Grading	GRADING WITHOUT PERMIT	366033028	July 14, 2008
252	CV0805503	Grading	GRADING WITHOUT A PERMIT	317270001	July 15, 2008

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Illegal Dumping Open FY0708

	Case #	Current Status*	Case Type	APN	Location Description	Case Opened
1	SE075435	Closed	Illegal Dumping		Ave 72nd E/of Sea View Way; North Shore	July 2, 2007
2	SE075443	Closed	Illegal Dumping		Beacon Dr & Club View (North Shore)	July 2, 2007
3	SE075479	Closed	Illegal Dumping	283140007	Lawson & Hunt 283140007	July 2, 2007
4	SE075480	Closed	Illegal Dumping	283140009	Lawson & Hunt; Temescal Canyon	July 2, 2007
5	SE075526	Closed	Illegal Dumping		Olive & Leon	July 5, 2007
6	SE075529	Closed	Illegal Dumping		Dodd & 60th; Mira Loma	July 5, 2007
7	SE075530	Closed	Illegal Dumping	178300010	178300010	July 5, 2007
8	SE075534	Closed	Illegal Dumping		Olive & Leon	July 5, 2007
9	SE075538	Closed	Illegal Dumping		W/of Creag Rd. N/of SH 74 (Ethanac Rd)	July 6, 2007
10	SE075542	Closed	Illegal Dumping		Canal & Pacific	July 6, 2007
11	SE075551	Open	Illegal Dumping		N/of Ave 30th off of Sierra Del Sol; Thousand Palms	July 9, 2007
12	SE075669	Open	Illegal Dumping		Park Canyon & Dawson Canyon; TemescalCanyon	July 10, 2007
13	SE075724	Closed	Illegal Dumping		Polk s/of Church; Thermal	July 11, 2007
14	SE075733	Closed	Illegal Dumping		Wallace s/of 60 Fwy	July 11, 2007
15	SE075779	Open	Illegal Dumping		Park Canyon & Dawson Canyon; Temescal Canyon	July 13, 2007
16	SE075809	Open	Illegal Dumping	727030001	727030001	July 13, 2007
17	SE075825	Closed	Illegal Dumping		Opal/Canal; Rubidoux	July 14, 2007
18	SE075886	Closed	Illegal Dumping		Ave 62nd / East of Van Buren	July 16, 2007
19	SE075928	Closed	Illegal Dumping		Benton & Pourroy; French Valley	July 18, 2007
20	SE075937	Closed	Illegal Dumping		Park Canyon & Dawson Canyon	July 18, 2007
21	SE075945	Closed	Illegal Dumping		Ave 70th / Cleveland; NorthShore	July 18, 2007
22	SE075962	Closed	Illegal Dumping		Smerber / Quail Hill	July 18, 2007
23	SE075976	Closed	Illegal Dumping		Ave 72 East of Beacon (North Shore)	July 19, 2007
24	SE076059	Closed	Illegal Dumping		Lindsey N/of Granite Hill (Glen Avon)	July 23, 2007
25	SE076060	Closed	Illegal Dumping		Via Cerro / Fleetwood; Rubidoux	July 23, 2007
26	SE076163	Closed	Illegal Dumping	287150028	287150028	July 25, 2007
27	SE076183	Open	Illegal Dumping		Ave 47 & Tyler (Cochella)	July 25, 2007
28	SE076258	Closed	Illegal Dumping		66Th Ave E/of Grant (Mecca)	July 30, 2007
29	SE076269	Closed	Illegal Dumping	327110012	327110012	July 30, 2007
30	SE076326	Closed	Illegal Dumping		Mountain & Briggs	July 31, 2007
31	SE076438	Closed	Illegal Dumping		Menifee Rd & Nuevo Rd (Nuevo)	August 2, 2007
32	SE076459	Closed	Illegal Dumping	321020021	321020021	August 4, 2007
33	SE076652	Closed	Illegal Dumping		Jackson / Ave 60th; Thermal	August 10, 2007
34	SE076663	Closed	Illegal Dumping		70th Ave West of Cleveland Ave, North Shore	August 12, 2007
35	SE076700	Closed	Illegal Dumping	290050003	290050003	August 13, 2007
36	SE076739	Closed	Illegal Dumping		Temescal / Indian Truck Trail	August 14, 2007
37	SE076747	Open	Illegal Dumping		Temescal Cyn Rd. N/of Indian Truck Trail	August 15, 2007
38	SE076778	Open	Illegal Dumping	166120030	166120030	August 15, 2007
39	SE076858	Closed	Illegal Dumping		Soto & Scenic	August 17, 2007

Illegal Dumping Open FY0708

	Case #	Current Status*	Case Type	APN	Location Description	Case Opened
79	SE078404	Open	Illegal Dumping		Williams & Anita (Quail Valley)	October 4, 2007
80	SE078462	Closed	Illegal Dumping		47th & Tyler; Coachella	October 4, 2007
81	SE078463	Closed	Illegal Dumping		Tyler Ln & Tyler St (Coachella)	October 4, 2007
82	SE078464	Closed	Illegal Dumping	347250001	347250001	October 5, 2007
83	SE078465	Open	Illegal Dumping		1 lot E/of 670 Hwy 74 / Navajo	October 5, 2007
84	SE078507	Open	Illegal Dumping		Cambern St & 3rd St (Lake Elsinore)	October 9, 2007
85	SE078536	Closed	Illegal Dumping		Terra Cotta & Harrison	October 11, 2007
86	SE078580	Closed	Illegal Dumping		Francis & Washington	October 12, 2007
87	SE078608	Closed	Illegal Dumping	159221023	159221023	October 13, 2007
88	SE078611	Closed	Illegal Dumping		Ben Nevis w/of Pedley	October 13, 2007
89	SE078642	Closed	Illegal Dumping		Dale Killer E/of Ave 64 (Mecca)	October 15, 2007
90	SE078797	Open	Illegal Dumping		South of Avenue 63 & Lincoln	October 17, 2007
91	SE078799	Closed	Illegal Dumping			October 17, 2007
92	SE078878	Open	Illegal Dumping		Indian Cyn Rd & 19th Ave	October 18, 2007
93	SE078962	Open	Illegal Dumping		NW corner of Sagebrush & Yaqui (DHS)	October 23, 2007
94	SE078964	Open	Illegal Dumping	657220022	657220022	October 23, 2007
95	SE078986	Closed	Illegal Dumping		Reche Cyn & Smiley (Moreno Valley)	October 24, 2007
96	SE079001	Closed	Illegal Dumping	179022010	179022010 (Rebecca St & La Rue St)	October 24, 2007
97	SE079067	Closed	Illegal Dumping		30th & Sierra	October 26, 2007
98	SE079224	Closed	Illegal Dumping	372040044	372040044	October 31, 2007
99	SE079269	Closed	Illegal Dumping		Garboni & Menifee (Menifee)	November 1, 2007
100	SE079282	Closed	Illegal Dumping		Granite Hill W/of Pyrite (Rubidoux)	November 2, 2007
101	SE079289	Closed	Illegal Dumping			November 2, 2007
102	SE079336	Closed	Illegal Dumping		Avenida Estrella & Avenida Gaviota	November 5, 2007
103	SE079339	Closed	Illegal Dumping	259280021	Reche Canyon Rd & Center St.	November 6, 2007
104	SE079346	Closed	Illegal Dumping	552120014	S/of Mayberry W/of New Chicago.	November 6, 2007
105	SE079385	Closed	Illegal Dumping		Harrison Ave btwn Ave 58 & Ave 60	November 6, 2007
106	SE079388	Open	Illegal Dumping		63rd & Pierce (Thermal)	November 7, 2007
107	SE079425	Closed	Illegal Dumping	378281022	378281022	November 8, 2007
108	SE079463	Open	Illegal Dumping		Hwy 79 cross of Anza.	November 8, 2007
109	SE079515	Closed	Illegal Dumping		58th & Felspar (Pedley)	November 9, 2007
110	SE079548	Closed	Illegal Dumping		Van Buren S/of 62nd (Thermal)	November 9, 2007
111	SE079557	Closed	Illegal Dumping	461190079	Leon Rd & Domenigoni Pky (Winchester)	November 13, 2007
112	SE079558	Open	Illegal Dumping	461190079	Leon Rd & Domenigoni Pky (Winchester)	November 13, 2007
113	SE079569	Closed	Illegal Dumping	331140006	Parcel E/of 27625 Ethanac (Sun City)	November 13, 2007
114	SE079647	Closed	Illegal Dumping		41st & Adams (Bermuda Dunes)	November 15, 2007
115	SE079667	Closed	Illegal Dumping		Paramount E/of Laurel (Rubidoux)	November 15, 2007
116	SE079685	Closed	Illegal Dumping		Cross Hill Dr& Winters Rd; Quail Valley	November 15, 2007
117	SE079691	Closed	Illegal Dumping	179060007	179060007	November 15, 2007

Illegal Dumping Open FY0708

	Case #	Current Status*	Case Type	APN	Location Description	Case Opened
157	SE0800027	Closed	Illegal Dumping		Dillon & Tinker	January 10, 2008
158	SE0800028	Closed	Illegal Dumping		20th W/of Palm Dr.	January 10, 2008
159	SE0800030	Closed	Illegal Dumping		Markham & Day	January 10, 2008
160	SE0800031	Closed	Illegal Dumping		Dirt extension E/of Van Buren S/of Ave 62	January 10, 2008
161	SE0800039	Open	Illegal Dumping		Calhoun N/of Ave 53	January 15, 2008
162	SE0800065	Open	Illegal Dumping	361202001	361202001	January 24, 2008
163	SE0800066	Closed	Illegal Dumping		San Timoteo Cyn NE/of Entranz BL	January 24, 2008
164	SE0800084	Open	Illegal Dumping		Markham & Day (Mead Valley)	January 30, 2008
165	SE0800089	Open	Illegal Dumping	245300003	Porter & Iris; Woodcrest	January 31, 2008
166	SE0800095	Closed	Illegal Dumping	748280009	748280009	February 1, 2008
167	SE0800101	Closed	Illegal Dumping		Cajalco w/o Seaton	February 1, 2008
168	SE0800107	Closed	Illegal Dumping	462020049	Mathews/Leon	February 2, 2008
169	SE0800109	Open	Illegal Dumping	519190005	519190005	February 6, 2008
170	SE0800117	Closed	Illegal Dumping	764140003	SE corner Jackson & Airport	February 7, 2008
171	SE0800119	Closed	Illegal Dumping		Francis & Washington	February 7, 2008
172	SE0800129	Closed	Illegal Dumping		Pittman/Garbani	February 9, 2008
173	SE0800155	Closed	Illegal Dumping		Archibald & River Rd	February 14, 2008
174	SE0800215	Closed	Illegal Dumping		Greenwald/Little Valley	February 19, 2008
175	SE0800216	Closed	Illegal Dumping		East dirt extension of Wagner off Bennet	February 19, 2008
176	SE0800217	Closed	Illegal Dumping		East dirt extension of Wagner off Bennet	February 19, 2008
177	SE0800218	Closed	Illegal Dumping		Betty Rd N/W of SH 74 road right-of-way	February 20, 2008
178	SE0800220	Closed	Illegal Dumping		30th & Sierra	February 20, 2008
179	SE0800221	Open	Illegal Dumping		Reche Canyon Rd & Smiley Blvd NW corner	February 22, 2008
180	SE0800223	Closed	Illegal Dumping	341060009	Goetz Rd.	February 22, 2008
181	SE0800241	Closed	Illegal Dumping	256072014	256072014	March 4, 2008
182	SE0800242	Open	Illegal Dumping		41st/Adams	March 4, 2008
183	SE0800243	Closed	Illegal Dumping		El Hermanos N/of Temescal Cyn Rd	March 4, 2008
184	SE0800244	Closed	Illegal Dumping		Temescal Canyon/Mayhew	March 4, 2008
185	SE0800250	Open	Illegal Dumping		Sultana/Via Barranca	March 5, 2008
186	SE0800255	Open	Illegal Dumping		Canal & Alta	March 7, 2008
187	SE0800272	Open	Illegal Dumping		Eugene	March 10, 2008
188	SE0800274	Closed	Illegal Dumping		Ridgedale/Burwood Dr.	March 11, 2008
189	SE0800275	Open	Illegal Dumping			March 12, 2008
190	SE0800276	Open	Illegal Dumping		Country Village/Philadelphia	March 12, 2008
191	SE0800280	Open	Illegal Dumping	315231019	315231019	March 13, 2008
192	SE0800281	Closed	Illegal Dumping	462020049	Grand/Leon	March 15, 2008
193	SE0800283	Closed	Illegal Dumping		30th/Sierra	March 15, 2008
194	SE0800297	Closed	Illegal Dumping		Little Valley/Greenwald	March 17, 2008
195	SE0800300	Closed	Illegal Dumping	255170008	255170008	March 18, 2008

Illegal Dumping Open FY0708

	Case #	Current Status*	Case Type	APN	Location Description	Case Opened
235	SE0800532	Open	Illegal Dumping	657290002		June 5, 2008
236	SE0800533	Open	Illegal Dumping	657290011	On Palm cross of 20th Ave	June 5, 2008
237	SE0800541	Open	Illegal Dumping		Hammond x/of 3rd	June 6, 2008
238	SE0800544	Closed	Illegal Dumping		2nd and Cahuilla	June 7, 2008
239	SE0800551	Closed	Illegal Dumping		4th and Hammond	June 7, 2008
240	SE0800554	Closed	Illegal Dumping		Center & Oriole	June 9, 2008
241	SE0800556	Closed	Illegal Dumping		Briggs and Holand Rd	June 10, 2008
242	SE0800567	Closed	Illegal Dumping		Ave 66 x/of Hwy 111	June 13, 2008
243	SE0800568	Closed	Illegal Dumping		Lincoln x/of Ave 76	June 13, 2008
244	SE0800583	Open	Illegal Dumping		Hwy 111 e/of Overture	June 16, 2008
245	SE0800584	Closed	Illegal Dumping	183080006		June 17, 2008
246	SE0800591	Open	Illegal Dumping		Sage Rd x/of Cactus Valley road	June 18, 2008
247	SE0800593	Open	Illegal Dumping			June 18, 2008
248	SE0800594	Open	Illegal Dumping		999 Vista Del Sol	June 19, 2008
249	SE0800600	Closed	Illegal Dumping		S/W Ave 64 and Dale Kiler	June 24, 2008

* Status as of August 11, 2008

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Illegal Dumping Closed FY0708

	Case #	Case Type	APN	Location Description	Street	City	Case Closed
1	SE076739	Illegal Dumping		Temescal / Indian Truck Trail	Temescal		September 11, 2007
2	SE076858	Illegal Dumping		Soto & Scenic	Soto		September 28, 2007
3	SE075733	Illegal Dumping		Wallace s/of 60 Fwy	Wallace		October 4, 2007
4	SE077910	Illegal Dumping		Market & Agua Mansa	Market		October 10, 2007
5	SE075530	Illegal Dumping	178300010	178300010			October 12, 2007
6	SE075529	Illegal Dumping		Dodd & 60th; Mira Loma	Dodd		October 12, 2007
7	SE077389	Illegal Dumping	183112047	Rubidoux			November 3, 2007
8	SE079515	Illegal Dumping		58th & Felspar (Pedley)			November 9, 2007
9	SE077079	Illegal Dumping		Avalon & 24th	Avalon		November 10, 2007
10	SE075962	Illegal Dumping		Smerber / Quail Hill	Smerber		November 10, 2007
11	SE077486	Illegal Dumping		Avalon W/of 20th (Pedley)			November 10, 2007
12	SE075542	Illegal Dumping		Canal & Pacific	Canal		November 10, 2007
13	SE078611	Illegal Dumping		Ben Nevis w/of Pedley	Ben Nevis		November 10, 2007
14	SE078404	Illegal Dumping		Williams & Anita (Quail Valley)			November 13, 2007
15	SE078290	Illegal Dumping		Pedley & Granite Hill (Glen Avon)			November 13, 2007
16	SE075534	Illegal Dumping		Olive & Leon	Olive		November 17, 2007
17	SE077069	Illegal Dumping		McCall & Valley	McCall		November 17, 2007
18	SE077721	Illegal Dumping		Magnolia & Grand (Lakeland Village)			November 17, 2007
19	SE079707	Illegal Dumping		6th & C St			November 20, 2007
20	SE077580	Illegal Dumping		S/Clay & Limonite			November 27, 2007
21	SE078608	Illegal Dumping	159221023	159221023	MARTIN	MIRA LOMA	December 4, 2007
22	SE079425	Illegal Dumping	378281022	378281022			December 5, 2007
23	SE075825	Illegal Dumping		Opal/Canal; Rubidoux	Opal		December 28, 2007
24	SE076060	Illegal Dumping		Via Cerro / Fleetwood; Rubidoux	Via Cerro		January 17, 2008
25	SE078799	Illegal Dumping			45th.		January 17, 2008
26	SE0710436	Illegal Dumping		Thompson & Washington (Winchester)			January 18, 2008
27	SE079667	Illegal Dumping		Paramount E/of Laurel (Rubidoux)			January 25, 2008
28	SE076663	Illegal Dumping		70th Ave West of Cleveland Ave, North Shore	70th		January 28, 2008
29	SE076059	Illegal Dumping		Lindsey N/of Granite Hill (Glen Avon)			January 29, 2008
30	SE0800030	Illegal Dumping		Markham & Day	Markham		February 1, 2008
31	SE079713	Illegal Dumping		Thompson & Washington	Washington		February 9, 2008
32	SE079269	Illegal Dumping		Garboni & Menifee (Menifee)			February 9, 2008
33	SE079557	Illegal Dumping	461190079	Leon Rd & Domenigoni Pky (Winchester)			February 9, 2008
34	SE0800084	Illegal Dumping		Markham & Day (Mead Valley)			February 13, 2008
35	SE0800024	Illegal Dumping		Ave 63 & Lincoln			February 16, 2008
36	SE078462	Illegal Dumping		47th & Tyler; Coachella	47th		February 16, 2008

Illegal Dumping Closed FY0708

	Case #	Case Type	APN	Location Description	Street	City	Case Closed
73	SE076438	Illegal Dumping		Menifee Rd & Nuevo Rd (Nuevo)			March 10, 2008
74	SE076269	Illegal Dumping	327110012	327110012	GUNTHER	ROMOLAND	March 10, 2008
75	SE079685	Illegal Dumping		Cross Hill Dr& Winters Rd; Quail Valley	Cross Hill		March 10, 2008
76	SE0800031	Illegal Dumping		Dirt extension E/of Van Buren S/of Ave 62			March 10, 2008
77	SE076326	Illegal Dumping		Mountain & Briggs	Mountain		March 10, 2008
78	SE077188	Illegal Dumping		Reche Vista & Redlands Blvd	Reche Vista		March 10, 2008
79	SE078036	Illegal Dumping	246150008	246150008	LA CADENA	RIVERSIDE	March 11, 2008
80	SE077115	Illegal Dumping	345150017	Ethanac & Theda (Perris)			March 11, 2008
81	SE078986	Illegal Dumping		Reche Cyn & Smiley (Moreno Valley)			March 11, 2008
82	SE077470	Illegal Dumping		Cleveland Rd & Ave 70 (North Shore)			March 11, 2008
83	SE079339	Illegal Dumping	259280021	Reche Canyon Rd & Center St.			March 11, 2008
84	SE0800066	Illegal Dumping		San Timoteo Cyn NE/of Entranz BL			March 18, 2008
85	SE077074	Illegal Dumping		Hall & Rick Ln			March 18, 2008
86	SE0800221	Illegal Dumping		Reche Canyon Rd & Smiley Blvd NW corner	Reche Canyon		March 18, 2008
87	SE0800242	Illegal Dumping		41st/Adams			March 18, 2008
88	SE079647	Illegal Dumping		41st & Adams (Bermuda Dunes)			March 19, 2008
89	SE0710402	Illegal Dumping	295260016	295260016			March 21, 2008
90	SE079691	Illegal Dumping	179060007	179060007	AVALON	RIVERSIDE	March 21, 2008
91	SE079282	Illegal Dumping		Granite Hill W/of Pyrite (Rubidoux)			March 21, 2008
92	SE0710411	Illegal Dumping		Bellgrave & Delicious (East Vale)			March 21, 2008
93	SE077158	Illegal Dumping		Watson & Creag	Watson		March 27, 2008
94	SE0800297	Illegal Dumping		Little Valley/Greenwald			March 27, 2008
95	SE0710407	Illegal Dumping		Benton Rd & Sunrise Rd			March 27, 2008
96	SE0800004	Illegal Dumping		47870 Doe Canyon Rd.	Doe Canyon		March 27, 2008
97	SE0710418	Illegal Dumping	729080022	68th & Garfield			March 27, 2008
98	SE0800095	Illegal Dumping	748280009	748280009			March 27, 2008
99	SE078463	Illegal Dumping		Tyler Ln & Tyler St (Coachella)			March 27, 2008
100	SE0800119	Illegal Dumping		Francis & Washington	Francis		March 27, 2008
101	SE079224	Illegal Dumping	372040044	372040044			March 30, 2008
102	SE075526	Illegal Dumping		Olive & Leon	Olive		March 30, 2008
103	SE075538	Illegal Dumping		W/of Creag Rd. N/of SH 74 (Ethanac Rd)	Creag		March 30, 2008
104	SE075928	Illegal Dumping		Benton & Pourroy; French Valley	Benton		March 30, 2008
105	SE0800028	Illegal Dumping		20th W/of Palm Dr.	20th		March 31, 2008
106	SE0710410	Illegal Dumping		N/E of Pacific & Canal			March 31, 2008
107	SE0710433	Illegal Dumping		Sierra Del Sol & 30th Ave			March 31, 2008
108	SE0710434	Illegal Dumping		Sierra Del Sol & 30th Ave			March 31, 2008

0002124

Illegal Dumping Closed FY0708

	Case #	Case Type	APN	Location Description	Street	City	Case Closed
146	SE0800129	Illegal Dumping		Pittman/Garbani			April 22, 2008
147	SE0710415	Illegal Dumping	333020006	McCall & Sherman			April 22, 2008
148	SE0800107	Illegal Dumping	462020049	Mathews/Leon			April 23, 2008
149	SE0800387	Illegal Dumping		Leon Rd & Armstrong Rd	Leon		May 7, 2008
150	SE0800383	Illegal Dumping		Hemet St and Hwy 74			May 7, 2008
151	SE0800406	Illegal Dumping	246150008	246150008	LA CADENA	RIVERSIDE	May 8, 2008
152	SE0710405	Illegal Dumping		E/of Adams & Francis Wy			May 13, 2008
153	SE0800460	Illegal Dumping		Valley & Mission	Valley		May 20, 2008
154	SE0800360	Illegal Dumping		Monroe n/of Airport Vista Santa Rosa			May 21, 2008
155	SE0800411	Illegal Dumping					May 22, 2008
156	SE0800454	Illegal Dumping		6357 La Mesa			May 23, 2008
157	SE0800432	Illegal Dumping		Rider w/ of Una	Rider		May 23, 2008
158	SE0800281	Illegal Dumping	462020049	Grand/Leon			May 28, 2008
159	SE0800439	Illegal Dumping		Bellgrade and Delicious			May 29, 2008
160	SE0800344	Illegal Dumping		McCall/Valley			May 29, 2008
161	SE0800223	Illegal Dumping	341060009	Goetz Rd.			May 30, 2008
162	SE0800435	Illegal Dumping		Decker / Oleander	Decker		May 30, 2008
163	SE0800524	Illegal Dumping		Polk s/of Airport			June 4, 2008
164	SE0800544	Illegal Dumping		2nd and Cahuilla			June 7, 2008
165	SE0800493	Illegal Dumping	267132001	267132001			June 11, 2008
166	SE0800541	Illegal Dumping		Hammond x/of 3rd			June 13, 2008
167	SE0800413	Illegal Dumping	579210029	579210029	RAMSEY	ANZA	June 16, 2008
168	SE0800409	Illegal Dumping		Pauba n/of Los Corralitos, Temecula	Pauba		June 20, 2008
169	SE0800423	Illegal Dumping	469160023	S/of Sage St			June 21, 2008
170	SE0800567	Illegal Dumping		Ave 66 x/of Hwy 111			June 23, 2008
171	SE0800551	Illegal Dumping		4th and Hammond			June 23, 2008
172	SE0800568	Illegal Dumping		Lincoln x/of Ave 76			June 24, 2008
173	SE0800448	Illegal Dumping		266140030	BARTON	RIVERSIDE	July 8, 2008
174	SE0800457	Illegal Dumping	469160013	Sage X/of Cactus			July 22, 2008
175	SE0800584	Illegal Dumping	183080006				July 29, 2008
176	SE0800554	Illegal Dumping		Center & Oriole	Center		August 7, 2008
177	SE0800556	Illegal Dumping		Briggs and Holand Rd			August 7, 2008
178	SE0800600	Illegal Dumping		S/W Ave 64 and Dale Kiler			August 8, 2008

0002125

MAPS

0002127

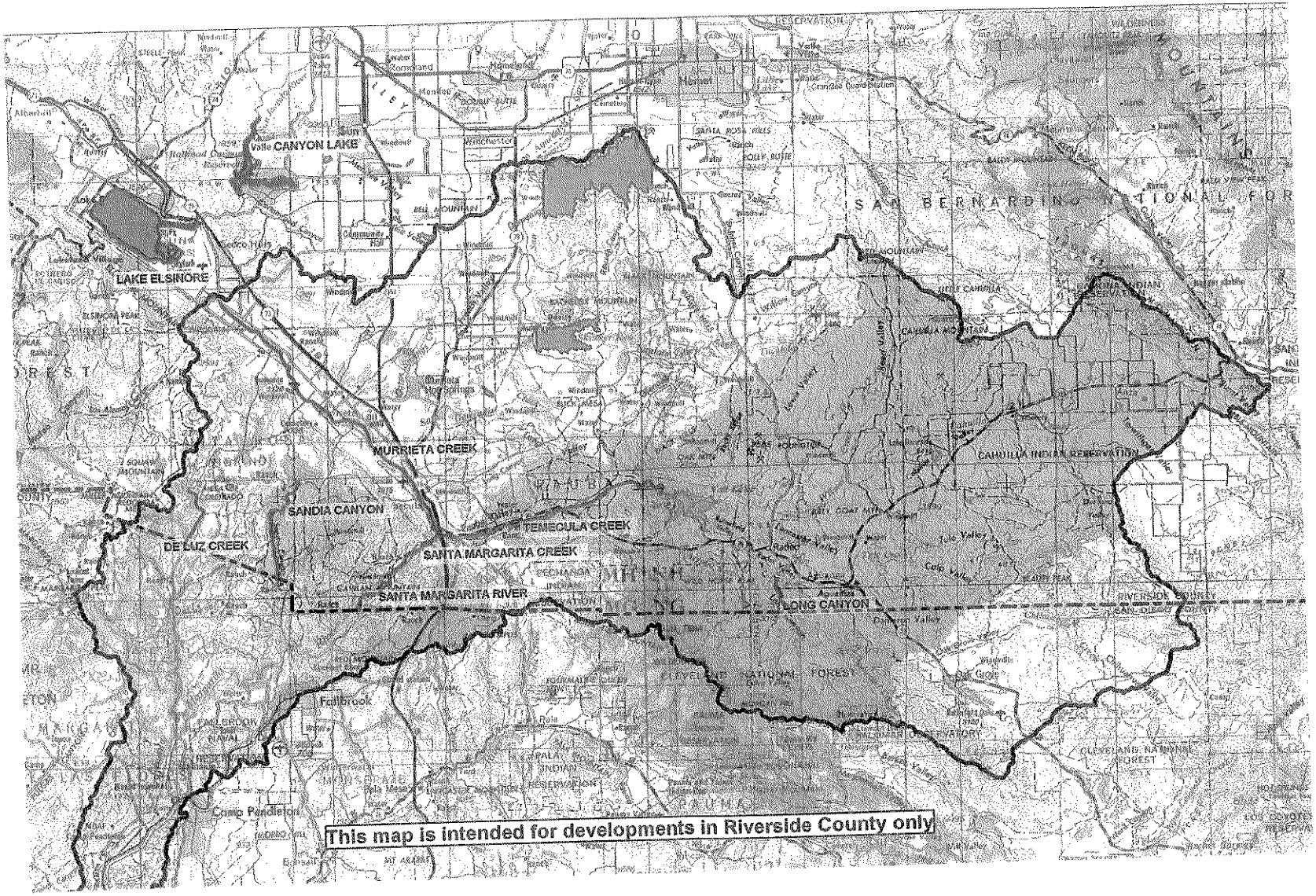
CANYON LAKE
LAKE ELSINORE
MURRIETA CREEK
SANDIA CANYON
TEMECULA CREEK
DE LUZ CREEK
SANTA MARGARITA CREEK
SANTA MARGARITA RIVER
LONG CANYON
Fallbrook
Camp Pendleton
SAN BERNARDINO NATIONAL FOR
CAHUILLA INDIAN RESERVATION
RIVERSIDE COUNTY
This map is intended for developments in Riverside County only

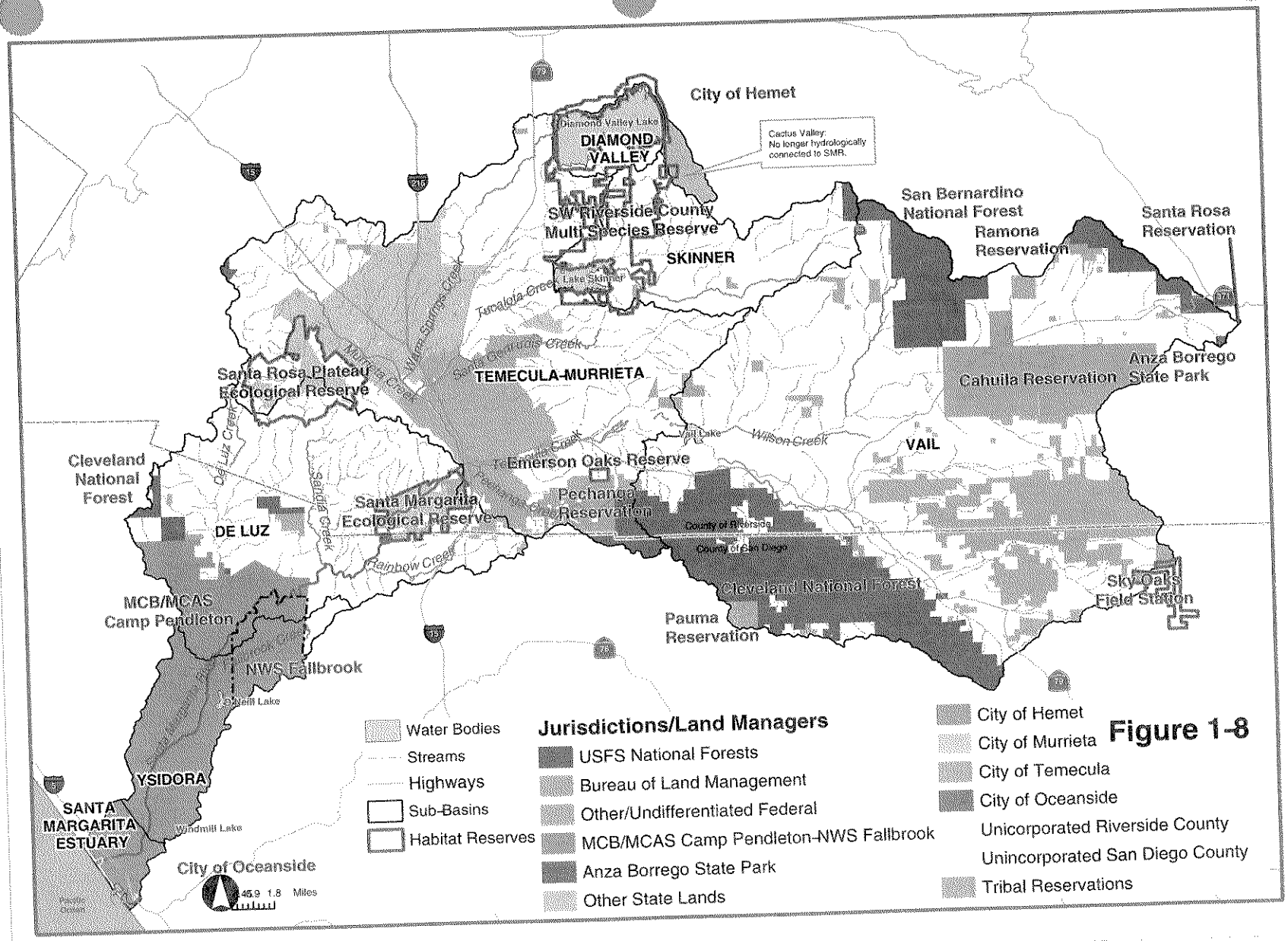
City of Hemet
Diamond Valley Lake
DIAMOND VALLEY
Cactus Valley: No longer hydrologically connected to SMR.
SW Riverside County Multi Species Reserve
SKINNER
Lake Skinner
San Bernardino National Forest
Ramona Reservation
Santa Rosa Reservation
Anza Borrego State Park
Cahuila Reservation
Santa Rosa Plateau Ecological Reserve
TEMECULA-MURRIETA
Vail Lake
Wilson Creek
VAIL
Cleveland National Forest
De Luz Creek
Emerson Oaks Reserve
Santa Margarita Ecological Reserve
Pechanga Reservation
DE LUZ
County of Riverside
County of San Diego
Rainbow Creek
Cleveland National Forest
Sky Oaks Field Station
MCB/MCAS Camp Pendleton
Pauma Reservation
NWS Fallbrook
Lake Fallbrook
YSIDORA
SANTA MARGARITA ESTUARY
Windmill Lake
City of Oceanside
0 0.9 1.8 Miles
Water Bodies
Streams
Highways
Sub-Basins
Habitat Reserves
Jurisdictions/Land Managers
USFS National Forests
Bureau of Land Management
Other/Undifferentiated Federal
MCB/MCAS Camp Pendleton-NWS Fallbrook
Anza Borrego State Park
Other State Lands
City of Hemet
City of Murrieta
City of Temecula
City of Oceanside
Unicorporated Riverside County
Unincorporated San Diego County
Tribal Reservations

Figure 1-8

Santa Margarita Watershed 2007

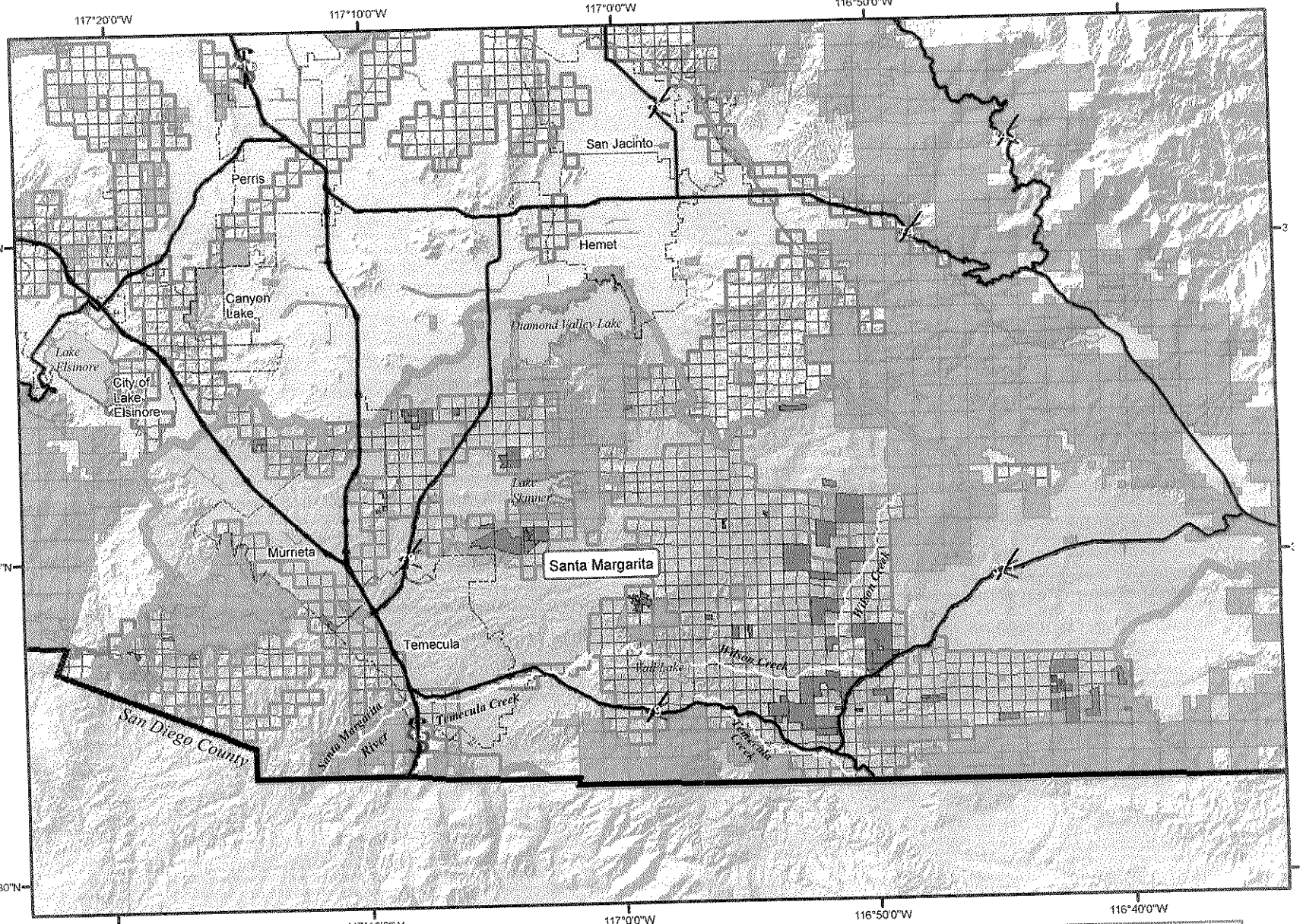

9/7/2007

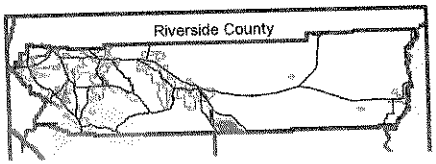

0 1 2 4 6 Miles

Santa Margarita Watershed

Creeks & Rivers

MSHCP Criteria Cells

City Boundaries

Highways

Waterbodies

Conserved Lands within Santa Margarita Watershed for Riverside County

MSHCP Conserved Lands 11,132 Acres Approx.

Public/Quasi-Public Conserved Lands 72,295 Acres Approx.

Note: Acreage increase in PQP lands is the result of PQP Baseline Correction per USFWS & DFG 09/2007

0002129

NPDES Progress Map

Santa Margarita Watershed

As of 2/6/2007

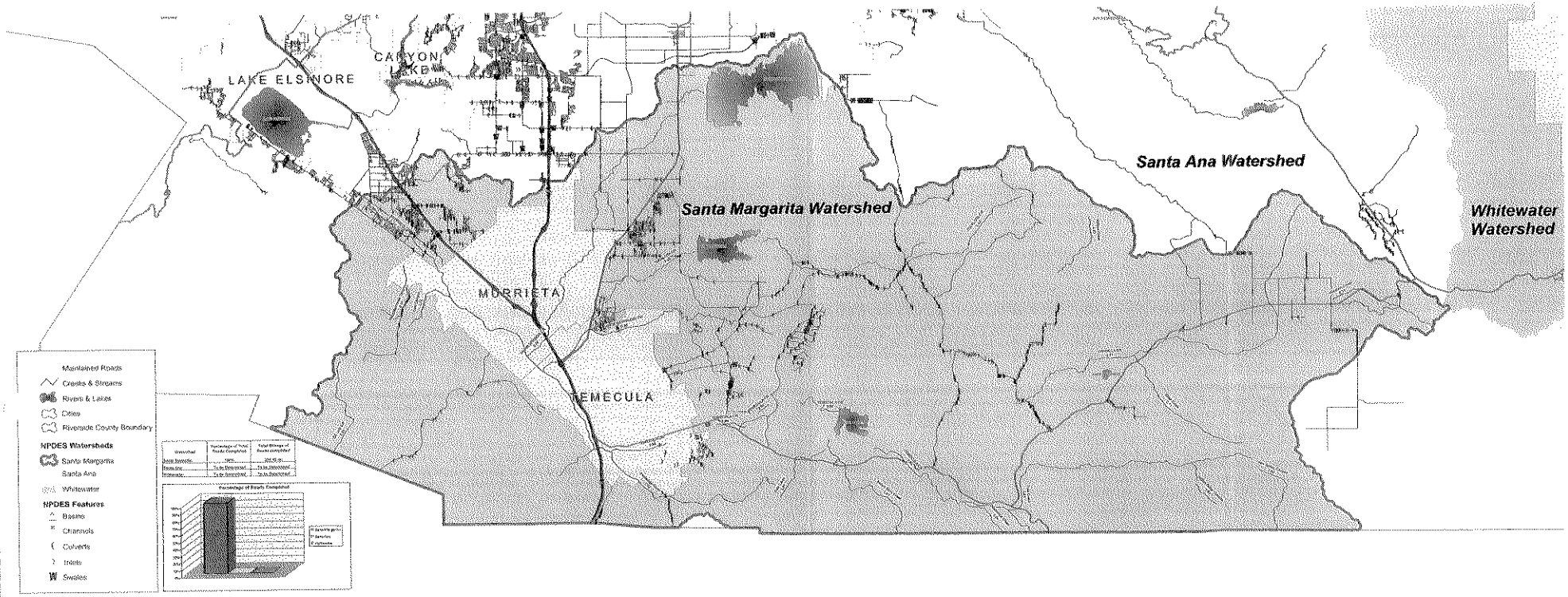

Data Collected By John Morris and Cesar Gutierrez.
As of 2/6/2007

Watershed	Basin Points	Basins	Channel Points	Channels	Culvert Points	Culverts	Inlet Points	Inlets	Swale Points	Swales	Total Maintained Road	Road Checked	% Completed
Santa Margarita	22		16		778		992		22		285.18 mi	285.18 mi	100.0%
Santa Ana			5		138		126				157.72 mi	In Progress	In Progress
Whitewater							14				592.46 mi	To be Determined	To be Determined
Total	**22**	**2**	**21**	**9**	**916**	**406**	**1092**	**1092**	**22**	**11**			

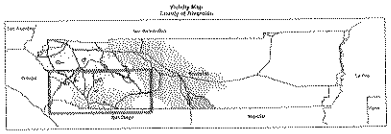

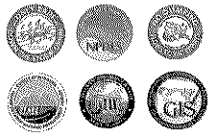

Example of a Basin

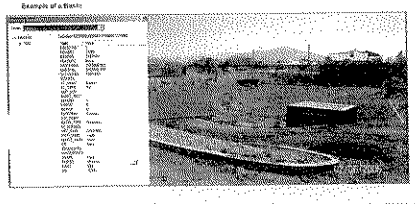

Example of a Channel

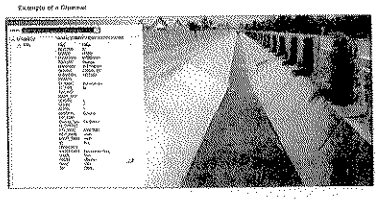

Example of a Culvert

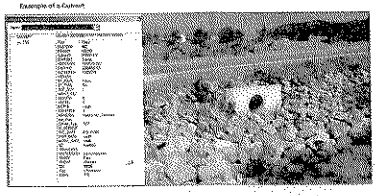

Example of an Inlet

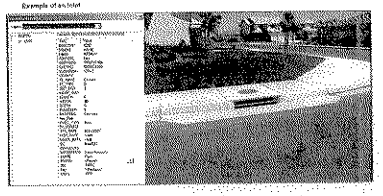

Example of a Swale

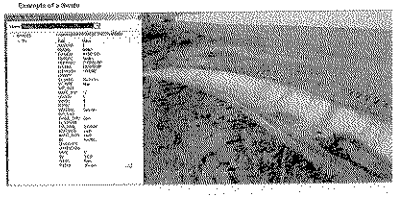

0002130

City of Menifee

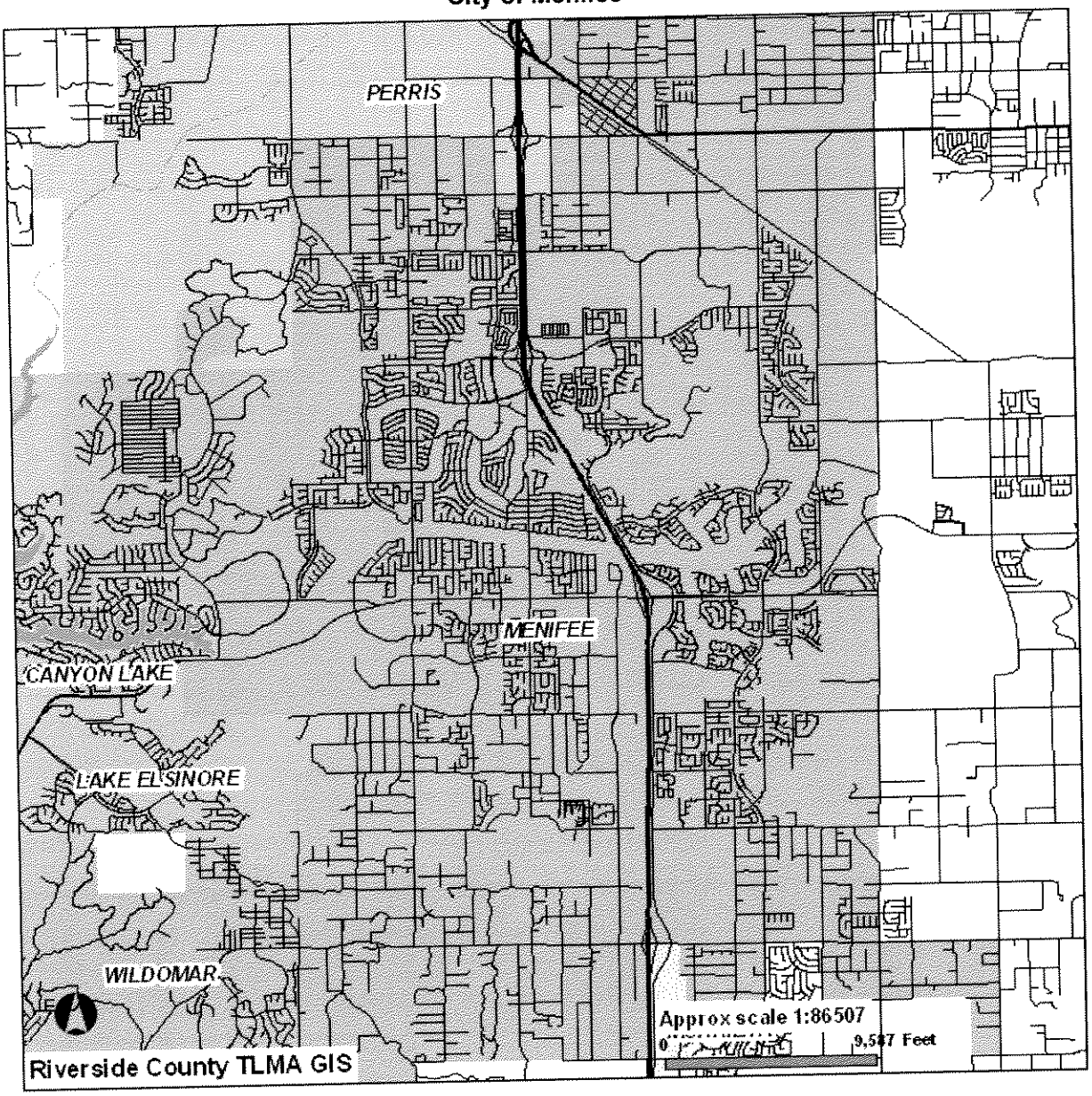

LEGEND

- HIGHWAYS
- STREETS
- WATER BODIES
- CANYON LAKE
- LAKE ELSINORE
- MENIFEE
- MURRIETA
- PERRIS
- WILDOMAR

IMPORTANT
This information is made available through the Riverside County Geographic Information System. The information is for reference purposes only. It is intended to be used as base level information only and is not intended to replace any recorded documents or other public records. Contact appropriate County Department or Agency if necessary. Reference to recorded documents and public records may be necessary and is advisable.

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Boundary Map

City of Wildomar

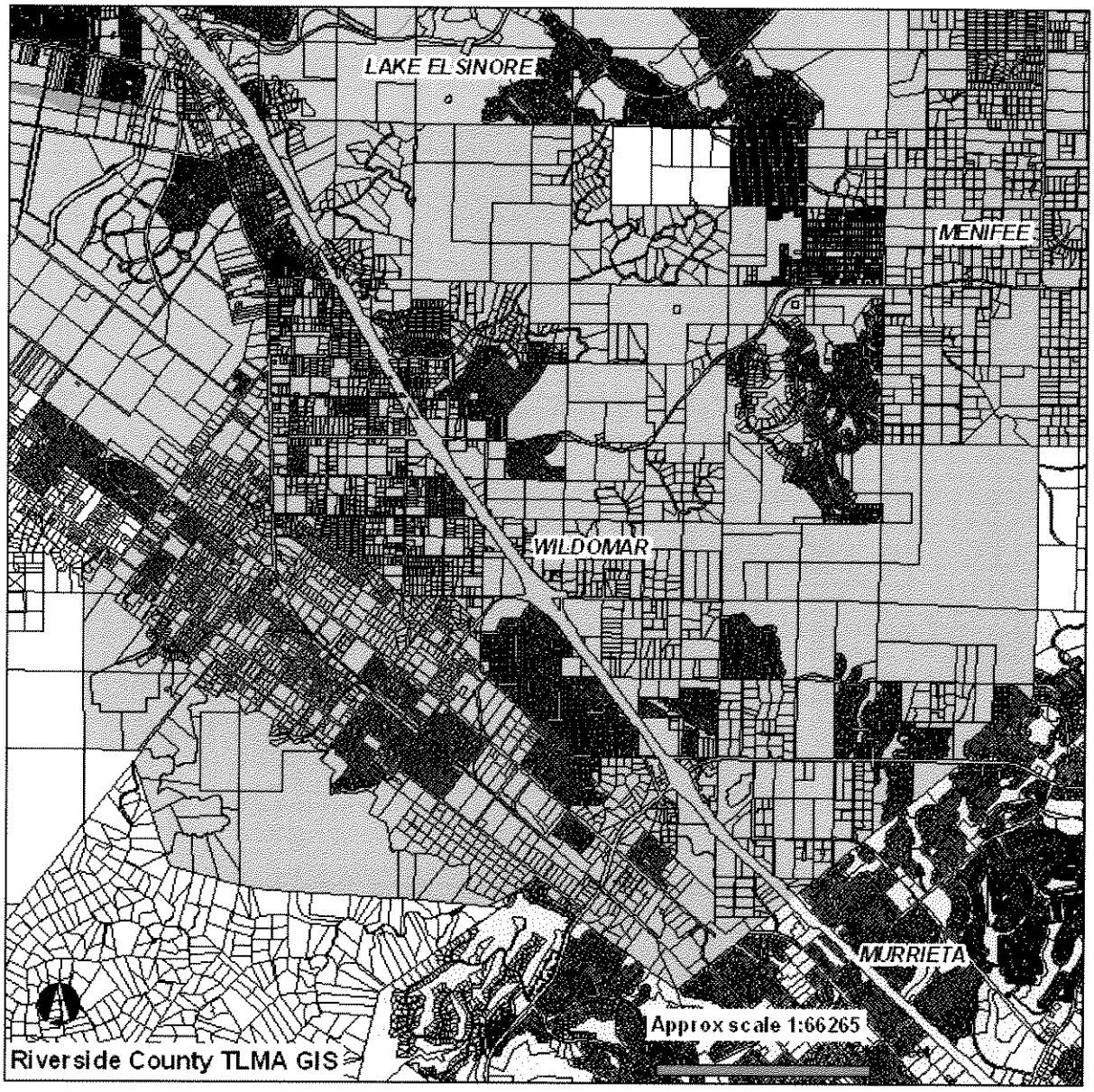

LEGEND

- PARCELS
- WATER BODIES
- LAKE ELSINORE
- MENIFEE
- MURRIETA
- WILDOMAR

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Boundary Map

IC/ID
Sampling Station
Data
From Flood Control

IC/ID Station Name	Date	TDS (mg/L)	Sp. Cond. (µmhos/cm)	Turbidity (NTU)	pH	T (°C)	DO (mg/L)
Empire Creek	06/15/07	-	1740	10	7.80	22.8	7.58
	08/27/07	-	1850	10	7.66	19.0	4.93
Pechanga Creek	06/15/07	DRY. No field measurements.					
	08/27/07						
Pechanga Road Storm Channel	06/15/07	-	1090	10	8.90	23.4	9.40
	08/27/07	-	1150	10	8.93	23.3	8.30
Temecula Creek	06/15/07	-	1280	32	8.21	22.3	8.48
	08/27/07	-	1350	10	7.92	23.1	8.35
California Oaks Channel							
Catt Road							
Pechanga Creek @ Pala Road	8/27/07	DRY. No field measurements.					
	5/29/08						
Benton Creek @ Van Gaele Lane	8/28/07	900	1400	**41.2**	8	22.1	15.5
	5/29/08	-	1200000	-	8.2	17.1	14.63
Tucaloca Creek (u/s MHS Road)	8/28/07	Too shallow to accurately measure field measurements.					
	5/29/08*	1100	1700000	2.3 (lab)	9.3	24.8	14.63
Murrieta Creek @ Clinton Keith Rd.	8/28/07	2800	4300	**220**	8.6	26.1	17.31
	5/29/08	-	2600000	11.8	8.1	14.1	12.55
Redhawk Channel	8/28/07*	**1100**	1700	**72.9**	9.2	33.1	14.51
	5/29/07*	900	1300	-	**10.3**	26.8	11.23
Long Canyon Channel	8/28/07	900	1300	**57.4**	8.3	24.9	15.13
	5/29/08	700	1000	9.8	8.6	20.4	16.34
Santa Gertrudis Chnl. near Murrieta	8/28/07	Too shallow to accurately measure field measurements.					
	5/29/08	Too shallow to accurately measure field measurements.					
Warm Springs Creek near Murrieta	8/28/07	DRY. No field measurements.					
	5/29/08	Too shallow to accurately measure field measurements.					

* Samples taken for analytical testing.

Benton Creek, sampling date 8/28/07 – Field turbidity exceeded 125% BPO (1.25*20 NTU). Field observations at the site revealed ponded water with amphibious life. Picture taken during site visit reveals plant life at channel bottom. Plant and amphibious life at site may have contributed to high turbidity reading. All other field parameters do not indicate an illicit connection or illegal discharge.

Tucaloca Creek, sampling date 5/29/08 – samples were taken for chemical analysis as there was adequate flow at site for sample collection. Field turbidity meter was not working; however, lab results were below the BPO of 20 NTU. Field observations include heavy vegetation and sediment in the channel bottom (photo).

Murrieta Creek @ Clinton Keith Rd, sampling date 8/28/07 – Field turbidity exceeded 125% BPO (1.25*20 NTU). Field observations include pond scum on water surface and ponded conditions. Water was murky and had a greenish tint (photo). As there was no flow and the ponded water infiltrated 100 feet upstream of Clinton Keith, observed conditions would have contributed to the high field turbidity reading.

Redhawk Channel, sampling date 8/28/07 – Field turbidity exceeded 125% BPO (1.25*20NTU) and TDS exceeded 125% BPO (1.25*750NTU). There was adequate flow to collect samples for laboratory analysis. Flow was clear with a slight yellow tint and very little floatables or settleables (photo). Lab turbidity (4.8 NTU) was below BPO; however, lab TDS slightly exceeded 125% BPO. Lab pH neutral. Redhawk is in a predominately-residential area and rules out discharges from industries that would most likely produce elevated turbidity and TDS flows. Nutrient levels are normal for the watershed and MBAS results are below BPO.

Redhawk Channel, sampling data 5/29/08 – Elevated field pH, exceeding pH criteria (9.5). There was adequate flow to collect samples for laboratory analysis. Lab pH measurement did not exceed criteria. Flow had a light green to yellow tint, clear in clarity with very little floatables and settleables (photo).

Long Canyon Channel, sampling data 8/28/07 – Field turbidity > 125% BPO (1.25*20 NTU). Site had ponded conditions; no flow – inadequate for sampling. Photo taken at site visit shows heavy vegetation and sediment at bottom of channel. These factors may contribute to the elevated field turbidity.

08 28 2007 11:03

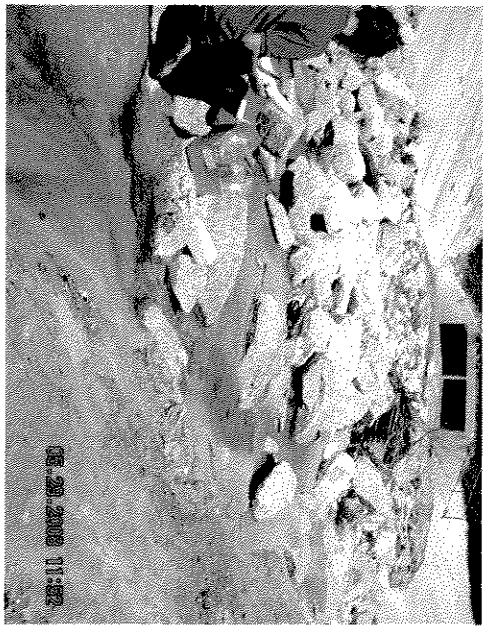
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Code Enforcement Program Newsletter

Riverside County Code Enforcement

July 2007

Volume 1, Issue 7

The Posting

A TLMA Code Enforcement Monthly Newsletter

Mission Statement

"To enhance public safety and improve the quality of life in Riverside County, through proactive and timely code enforcement actions."

Director Jay E. Orr

Mr. Orr Returns to Sacramento

On Tuesday, June 26th, AB 679 passed through the Senate Public Safety Committee and is now on its way to the Senate floor. Jay Orr attended the committee hearing and provided compelling testimony which contributed to it successfully passing out of the Public Safety committee. This bill will add a civil fine of $100.00 to an illegal dumping infraction conviction and a $200.00 civil fine to a misdemeanor conviction for the same offense. A special thanks is due to Assemblyman John Benoit for his diligent work on this important piece of legislation. ***Jim Monroe***

State Capitol

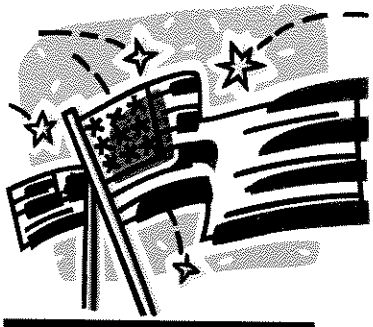

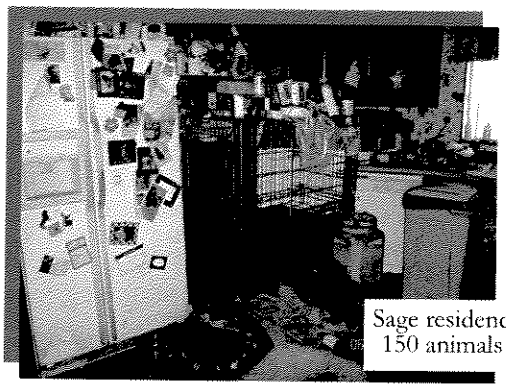

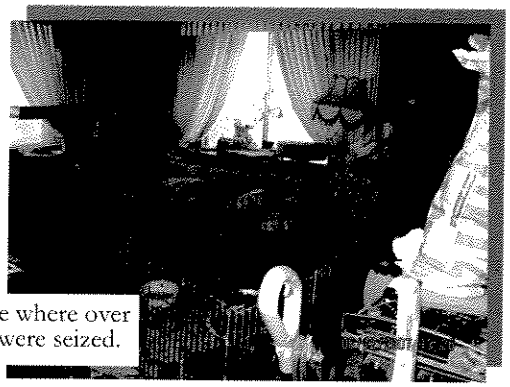

Sage residence where over 150 animals were seized.

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District 3 Code Enforcement Partners with Animal Control

Code Enforcement officers from District 3 have fostered a strong working relationship with Animal Control. In early June, Animal Control had assisted Code Enforcement in impounding a female dog and her three puppies. The dogs were discovered by Senior Officer Mary Overholt and Officer Brian Noone under a fire damaged mobile home they were inspecting in Valle Vista.

On another occasion, Animal Control impounded 4 dogs in Hemet as Code Enforcement officers were responding to a complaint of an abandoned and vacant residence. The house was being vandalized and was a public safety concern in the neighborhood. The dogs were impeding the Code Officers from conducting their investigation; therefore, Animal Control impounded the dogs.

On June 22, 2007, it was Code Enforcement's turn to return the favor. Senior Officer Mary Overholt and Officer Alejandro Rodriguez-Barrios assisted Animal Control as they served a Warrant in the Sage area. Over 150 animals, mostly dogs, were seized by Animal Control from a local resident. The animals were kept in filthy and inhumane conditions on the property. They also found 10 dead animals in a freezer. The officers found several violations such as a substandard mobile home and recreational vehicle, an unpermitted second dwelling, excessive outside storage, and an illegal kennel.

Hector Viray & Mary Overholt

A Four Hour Success in District 5

Community service offers a natural bond and strong community connection among Cabazon residents. Over 75 volunteers signed up to participate in the Spring 2007 Cabazon Community Cleanup/Tire Collection Event on Saturday, June 2, 2007. The event was held at James Venable Community Center from 8am-12noon and in just as few as 4 hours, 84 community residents arrived and disposed of 28 tons of trash and 240 tires. The Community Cleanup/Tire Collection Event was a success!

Community resident Ernie Irby said, "This is great for our community, we would like to thank all those who were involved in the coordination of this event. I am ecstatic about the number of residents that utilized the event and did not participate in any illegal dumping".

The County of Riverside Board of Supervisors, along with Western Riverside Council of Governments hosted a roadside litter pickup in conjunction with this event and provided food and drinks for all volunteers. Special thanks to CR&R Waste & Recycling Services, County of Riverside Waste Management Department and Economic Development Agency, Family Services Association, Banning Unified School District, Moreno Valley C.A.R.E. Team, Cabazon SET Free Group, Cabazon Fire Station 24, and community resident Dave Newton for all their hard work and support. At the end of such a hard and dirty task, all volunteers felt good. They knew that they'd made a difference and made a place they love a little bit better. A great time was enjoyed by all. ***Chaka Osborne***

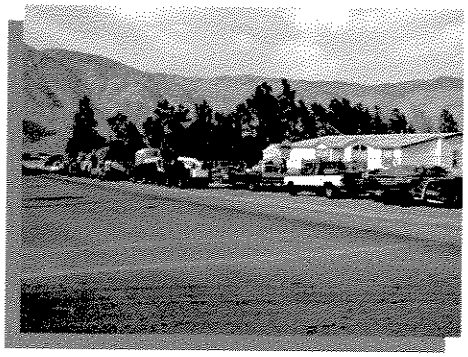

Many Thanks

Code Enforcement is often a thankless job but here are a few welcome notes of appreciation:

•May 17th letter from a couple in 5th District. "I want you to know how pleased I was with the service and attitude of Anthony Green, Code Enforcement Officer, when he gave us a Notice of Violation. He was very clear...[and] provided helpful information and support throughout the process. As I look "forward" to paying my county taxes in the future, I will remember the service and consideration given by your department."

•June 24th message from a resident in Sky Country (2nd District). He called to say he was very happy with Code Enforcement's work on his case. Travis Engelking was the investigating officer.

•June 27 phone call from a Sun City resident (3rd District). A very ecstatic resident called to say thank you for the elevated and responsive enforcement efforts along Newport Road. Technicians Anita Bustillos and Ariana Meza are assigned to parking enforcement in that area.

Excellent job all! ***Brian Black***

Vending Sweep in District 2

As a result of several public complaints of illegal vending in and around public schools in the communities of El Cerrito and Eastvale, an enforcement operation was quickly planned. The June 15th operation targeted ice cream trucks and push cart vendors selling illegal fireworks and other potentially dangerous items. The following agencies assisted in addressing these complaints: Code Enforcement SET team and Jurupa officers, Dept. of Environmental Health, and Riverside County Sheriff's Department. The team was ordered to patrol the areas and make enforcement contacts with vendors. The vendors were cited, and/or warned, and under the authority of RCO 853 items were seized and destroyed. The operation resulted in 10 contacts, 6 citations, 4 verbal warnings to vendors exceeding the scope of their permits, and over 500 lbs. of illegal vending merchandise was seized by Code and EH. In the future officers will continue the illegal vending enforcement as needed. Ongoing assessment and surveillance will continue.

Special thanks to Ed and Tita for working and developing the new Property Impound Receipt form.

Mickey Parmele

More Illegal Vending in District 2

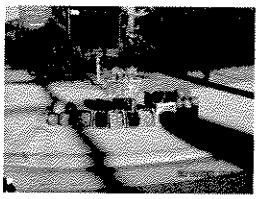

On June 22 and 23 the Sheriff's Department's Jurupa Valley Station, lead by Sergeant Steve Brown, initiated an Illegal Food Vendor Sweep in the communities of Rubidoux, Sunnyslope, Pedley, Glen Avon, Mira Loma, and Eastvale. Joining the Sheriff in this sweep were Officers Game, Torres, Gregorio, and Pineda from Code Enforcement's Special Enforcement Team and Officer Baumgartner from District 2 Code Enforcement Office and Riverside County Environmental Health. The purpose of the sweep was to address the ongoing problem of roadside vending and illegal roadside kitchens that present immediate health and safety issues in the community.

Using the new Vending Ordinance, recently enacted by the County Board of Supervisors, the Task Force began contacting vendor's set up throughout the targeted communities. During this operation Code Enforcement and Environmental Health issued 53 citations for violations of numerous County Ordinances. The sweep seized 1,435 pounds of illegal food which was destroyed. Vending equipment valued at $12,000.00 was impounded. $2,337.00 in U.S. currency was seized as evidence as a direct result of illegal food sales.

The Sheriff's Department, Code Enforcement, and Environmental Health are planning future operations throughout the county in the coming months. The purpose of these sweeps is to provide for a safe and healthy community and to pursue those who continue to violate the public health standards and place our citizens at risk. ***SET***

Riverside County Code Enforcement

September 2007

Volume 1, Issue 9

The Posting

A TLMA Code Enforcement Monthly Newsletter

Director Jay E. Orr

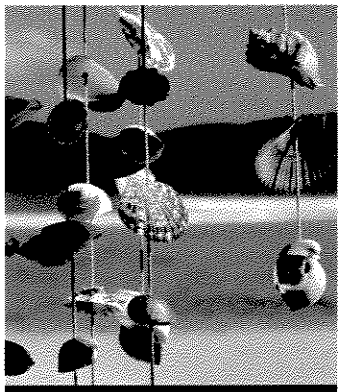

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Un-permitted Business in District 4

Mission Fiber is a company that had started a business for storing recycling waste material without the proper permits. The company moved onto seven acres where there is a substandard structure, occupied RV, and approximately two hundred thousand square feet of loose and bundled material piled fourteen feet in height. Code staff has had meetings with the company representatives and they are working with Code Enforcement to come into compliance.

This business is one block outside of the city limits of Blythe. Due to the amount of material this could be a very dangerous fire hazard. There is no water on site and the closest fire hydrant is a quarter of a mile away. If this material catches on fire it would be a catastrophe for the city of Blythe as the wind direction blows towards the city.

Mission Fiber has been issued four notice of violations and directed to remove all the material, obtain the proper permits and a CUP for their operation. At this time Mission fiber has moved in two 10,000 gallon water tanks for fire and dust control.

Mission Fiber has removed about ten percent of the material. We are looking for the property to be cleaned by the end of October. Code Enforcement makes a trip once a week to see how much progress is being made and if they are still hand raking the property to remove all of the loose material. This material is being shipped to Long Beach and loaded up on a ship and sent to China. ***Allan Haeberle***

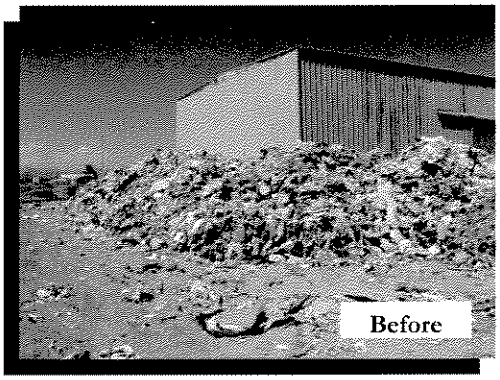

Before

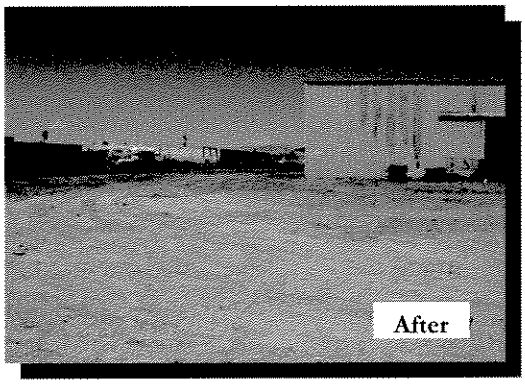

After

Harvest Valley Cleanup in District 5

Community volunteers teamed up with 5th District Code staff and the Community Improvement Team to assist over 150 residents with the disposal of trash at the Harvest Valley Community Cleanup on Saturday, August 11, 2007. Not only did the Community Cleanup collect over 41.44 tons of trash, the Harvest Valley Community stepped up to the challenge of finding a sponsor for the recycling of tires. Thanks to their effort and the generosity of Edison Mission Group and Waste Management of the Inland Empire, the cleanup also yielded an impressive 11.35 tons of tires. Code Enforcement's Special Enforcement Team was also present and issued a citation to an illegal vendor. This is a shining example of how Code Enforcement's many facets come together with communities and private business to make a difference! Great job to all! ***Community Improvement***

11.35 tons of tires

Trash & Trailers in District 5

A game of hide the trailer! Code Enforcement Officer Jacob Dietrich worked with a reporting party regarding a squatter who took up camp in Meadowbrook. They were occupying a travel trailer on an unimproved lot over 35 acres in size. Officer Dietrich left a Notice of Violation on the trailer and at the first follow-up found that the trailer was gone. A few days later the reporting party called Officer Dietrich and let him know that the trailer was moved to another portion of the same lot. Officer Dietrich returned to the property and found where the trailer was moved to. He made contact with the occupant, issued an Administrative Citation and let them know that they needed to leave the area. With due diligence, the trailer was finally removed from the lot!

Code Enforcement Officer Rich Arriola worked diligently on an Accumulated Rubbish case in Good Hope. The tenants worked hard and cleaned the property that was full of rubbish and storage items in 60 days. Officer Arriola was able to close his case with full compliance! ***T. Towner***

Accumulated Rubbish in Good Hope

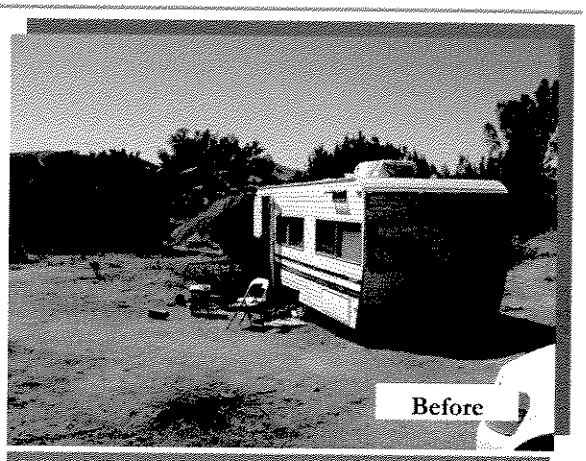

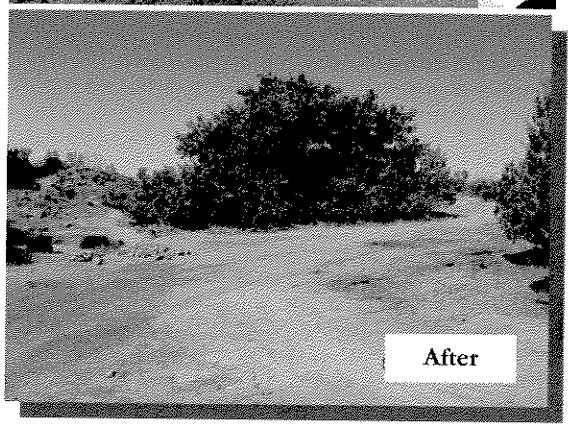

The trailer was finally removed

Imminent Threat in District 2

On August 17, 2007, two substandard structures were demolished by the property owner after a field Notice of Violation was posted stating property / structures were deemed a threat to public safety.

District 2 Code Enforcement Supervisor, Mickey Parmele, requested that his officers conduct a field training exercise to enhance their knowledge on procedures to effectively abate a threat to public safety. Officers and Field Training Officers (FTO) set out to investigate the rapidly deteriorating conditions of two properties located on Bellegrave, cross of Wineville, in Mira Loma and to take initial steps, to verify the "Priority One" status of both substandard structures.

Both properties showed ongoing signs of illegal dumping, trespassing, graffiti, and eroding structures without secured fencing. Each property posed a potential danger due to being open and accessible to the general public. The properties posed a threat of falling into 4' wide and 10' deep holes in the floors, walls and roofs collapsing, and other hazardous conditions to public health and safety.

We were able to contact the property owner, due to a phone number found in the LMS permits system.

An immediate meeting was scheduled with the owner of both properties to discuss the importance of the "Priority One" situation and the procedures of the Notice Of Summary Abatement Of Public Nuisance. The document was hand delivered by Senior Officer J.Palmer and Officer T.Engelking. Understanding the severity of the imminent danger, the owner fenced both properties and demolished both structures immediately. ***Mickey Parmele***

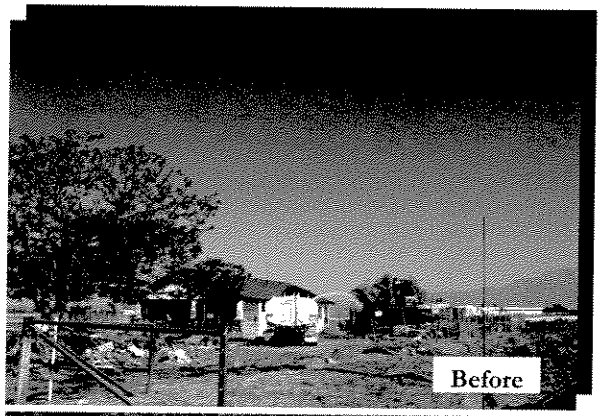

Dangerous Condition Removed in District 2

Newport Road in District 3

Responding to complaints made by Supervisor Jeff Stone's office from his constituents, Special Enforcement Team and Neighborhood Enforcement Team members saturated the area of Newport Road in the community of Menifee. All in efforts to address several private commercial trucks parked along Newport Rd. advertising work for hire.

Officers arrived at the location and witnessed several commercial trucks parked along the road. Private pickup trucks were seen abruptly turning onto the shoulder to contact the truck drivers in what appeared to be shopping for services. The private trucks would then reenter the roadway in the same abrupt fashion, in total disregard for eastbound traffic on Newport Rd. These advertising trucks created a public nuisance, as well as an unsafe hazard for drivers traveling. In addition, to these commercial trucks, there were several other free standing temporary signs advertising various commercial services.

Supervisor M. Acueto, Senior Officer S. Bennallack, Senior Officer M. Sanders, Officer L. Nichols, Officer S. Stoll, Officer E. Delgado, Officer Ron Welch, Officer E. Torres, Technician Anita Bustillos, and Technician Ariana Meza took aggressive Enforcement action throughout the week of 09/10/07 citing all of the violators with both infraction and administrative notices of violations.

Enforcement investigative efforts identified truck drivers who admitted using their trucks as an advertising billboard in violation of RCC 17.254.030, as well as un-permitted temporary signs on Newport Road between Lindenberger Street and Goetz Road.

The operation concluded with 6 criminal citations, 67 Notice of Violations for a total of 108 signs that were posted illegally. As of this printing there is total compliance at this location.

Manny Acueto

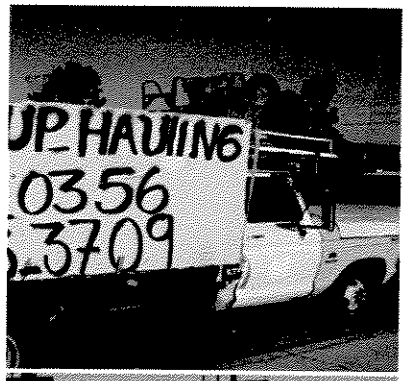

Great Work in District 4

Our desert staff is doing great work out in Thousand Palms. Officer Lorena Diaz investigated a case on Ramon Road in Thousand Palms for accumulated rubbish and a homeless encampment on a vacant lot. The lot had been trashed with over 1000 square feet of waste material and several transients had built a tarp and plywood shelter to live in. Through active communication with the Sheriff's Department and the property owner, the entire property was cleaned up and the transients have moved on. The case was open for exactly two months from beginning to end. The property owner then wrote a letter to the County thanking Officer Lorena Diaz for her professionalism and assistance in the matter.

Brian Black

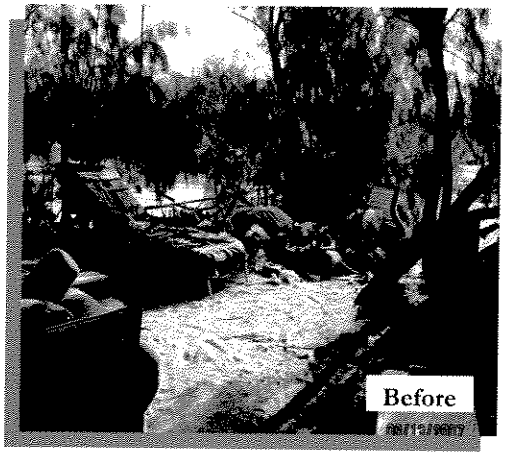

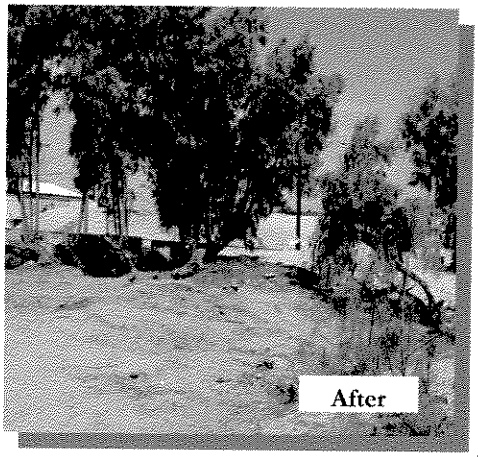

County Agencies and property owners work together for compliance

Letter from DPSS

The Posting is a great community tool! Being with another county agency I like being kept up to date on what is happening in the district that I work in. It gives me pride to see such good things happening and the hard work being done by a fellow county agency. Since I work so often and closely with Code, it is fun to see articles written by my co-workers and "friends". As a constituent, it is great to see where my tax dollars are going, the cleanup that is happening in my neighborhood, and the incredible pictures showing what can be done to make our neighborhoods a better place! Thank you for keeping me "posted"!

Dorothy Miller
DPSS (CARE Program)

Riverside County Code Enforcement

October 2007

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District 5

The 'Ole' Watering Hole has been demolished! A nearby neighbor, let Code Enforcement Officer Tom McMullen in on a little bit of history regarding a graffiti-ridden, substandard structure, on Highway 74, in the Good Hope area. The building was known to be the local hot spot in the 70's & 80's where the locals came together for fun and dancing. The building had become an eyesore and public nuisance that could be seen as you drove down Highway 74. In September, the property owners took responsibility and had the structure demolished and the lot cleaned.

Newly promoted Code Enforcement Officer Lanee Padilla and Code Enforcement Officer Charlene Smith, responded to a complaint received regarding a "messy" property on Flynn St. in the Highgrove area. The officers were able to make contact with the property owner and explained the violation and compliance measures required. Property owner cooperated and complied in two weeks! ***T. Towner***

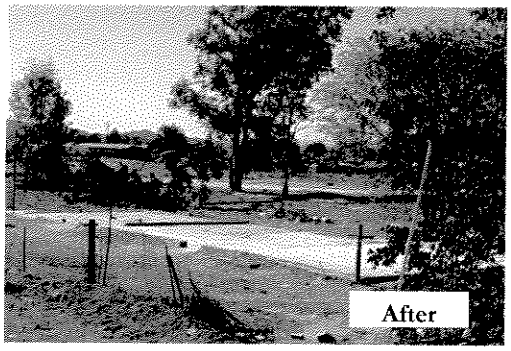

This building on Highway 74 has been removed

Marine Drive in District 3

In collaboration with Hemet Sheriff's Department, the Code Enforcement's Community Improvement Program coordinated a cleanup of Marine Drive. This small cul-de-sac of apartment complexes was surrounded with unusable appliances, old furniture, broken toys, trash and rubbish.

Even with the threat of rain, all agencies were ready. Corporal Edwards and his deputies went door-to-door in the early morning reminding tenants of the cleanup. Code Enforcement Officer Brian Noone was invaluable by encouraging the tenants to keep coming back, and had a positive attitude the entire day. Code Enforcement Technician Dawn Burnett showed up early, set up, and spent a large part of the day raking and picking up weeds. Graffiti on the surrounding walls and signs was removed by Graffiti Busters during the cleanup.

A special thanks to retired volunteers Gerald Dayton and Edde Ashley. Without the help of our community volunteers our cleanups would not be as successful as they are.

The tenants were very happy for the cleanup. Overall it was a very successful day, disposing of 9.58 tons.

Becky Mitchell

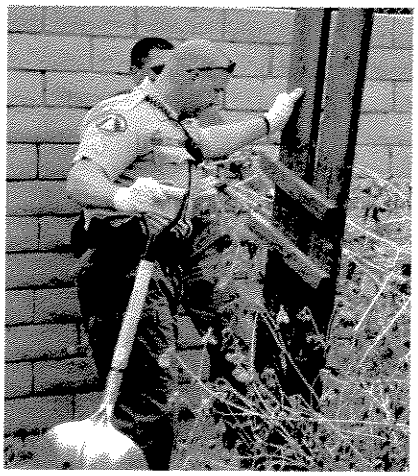

Corporal Edwards and Deputy Jerry Barba cleaning up Marine Dr.

SET

Officers with Riverside County Code Enforcement's Special Enforcement Team, along with Deputies from the Lake Elsinore Sheriff's Station Community Action Team, conducted a high visibility enforcement operation targeting habitual properties and those properties identified by the community and enforcement personnel (Top Right), which could evolve into blighted parcels.

Enforcement actions led to numerous notices and infraction citations being issued for violations ranging from excessive outside storage and accumulated rubbish to inoperative vehicles, construction without permits, and occupied recreational vehicles. Compliance for these violations will be verified in 30 days. One vehicle was removed during the operation, identified as abandoned on private property. One non-permitted "End Use Waste Tire Facility" was identified and enforcement action was initiated. Compliance for this Waste Tire Facility will be verified in 30 days. Two illegal dumping cases were investigated, one resulting in a four count misdemeanor case for dumping demolition rubble, and the second involved the dumping of hazardous substances. This investigation is continuing. ***Marr Christian***

Excessive trash & debris

District 3

A long standing case is in the process of being resolved with the help of County Counsel, TLMA Purchasing, and Fleet Services. Lisa Traczyk, County Counsel, successfully negotiated a settlement agreement with the tenants and property owners of a thirty-two acre parcel that was in multiple violations of County of Riverside ordinances (left). The tenants vacated the property after months of posturing and exercising their due process through the judicial system. The property owners agreed to pay for a supervised abatement conducted by the County of Riverside Code Enforcement Department. Heavy equipment, high sided transport trucks, and numerous employees started the cleanup on this project that is estimated to take four weeks. What was once a tilapia farm operated by Coca-Cola (legal use) is now piles of rubbish being hauled away. Approximately 1,219,680 square feet of rubbish and outside storage will be abated. It is one of the largest abatements in recent history. Thank you Annette Paturzo, Agency Program Supervisor, and Walter Mack, Procurement Contract Specialist, for your diligence in assisting with all of the behind the scenes paperwork and contracts. ***Mike Sanders***

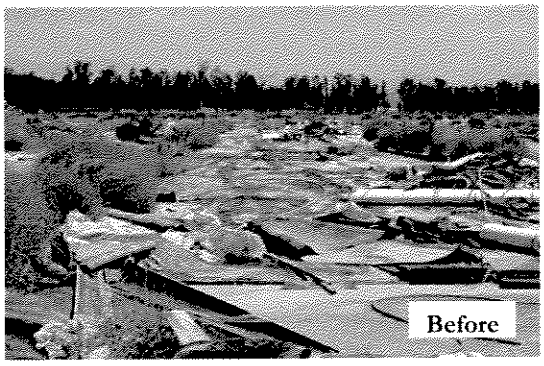

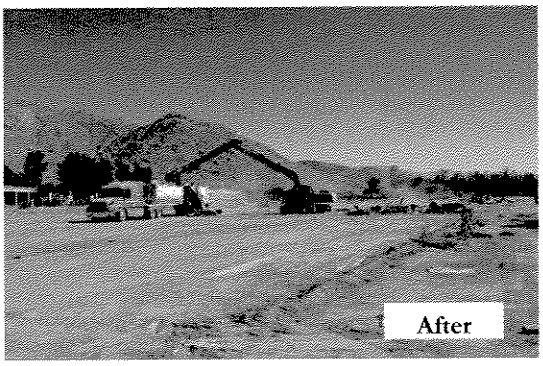

Approx. 1,219,680 square feet of rubbish

Mead Valley - District 3

On September 22, Code Enforcement participated along with over 50 other agencies at the Annual Mead Valley Health & Safety Fair. Despite the rain, hundreds of Mead Valley residents came out to the Mead Valley Community Center and received free health and dental screenings on site. Animal Control's mobile clinic was offering pet adoptions and discount spay/neuter vouchers to residents. Supervisor Bob Buster thanked Code Enforcement for all of their hard work and outreach efforts in Mead Valley and the rest of District 1. Code Enforcement's Neighborhood Enforcement and Community Improvement Teams discussed community concerns and provided resource information to residents. The team used the opportunity to educate the public on the health and safety risks common code violations pose to families and communities. Overall, the event was successful and enjoyed by all who attended. ***Angel Olivo***

From right to left are, Angela Boone-Porcher, Jose Cruz, Terrence Wiggins, Angel Olivo, of Code Enforcement and Patricia Buckey, EDA, 1st District Supervisor Bob Buster, and Alice Goshen, EDA.

Updates for Code

We welcome Senior Officers Hector Viray, Mary Overholt, and Cynthia Black to our Administration team. Senior Officer Viray will be working on our policies and procedures and the development of a set of general orders as well as other special projects as assigned. Senior Officer Overholt will be working on special project assignments supporting the Field Operations Division. Senior Officer Black will be leading our litigation support unit. She will be coordinating all civil litigations, abatements and warrants with County Counsel and will be working on other administrative projects as assigned.

We are pleased to announce the promotion of the following personnel to the rank of Senior Code Enforcement Officer:

Wayne O'Gara who will assume a leadership role in the District 3 South County office.

Marcella Villanueva who will assume a leadership role in the District 2 Jurupa office.

In addition, we have hired the following personnel as Senior Code Enforcement Officers:

Greg Flannery will be assuming an acting supervisory role in our District 1 office in Lake Elsinore. Greg is a proven leader having built the Code Enforcement program from the ground up at the city of Hemet. Greg also has over 14 years experience with the city of Montclair as a Deputy Fire Marshall and Police Officer.

Kenneth King will be assuming a leadership role in our District 4 East team in the Indio office. Senior Officer King brings with him over 7 years of proven leadership ability with the Town of Apple Valley and the County of San Bernardino. He is also a Reserve Deputy Sheriff with the County of San Bernardino.

Lionel Martinez has accepted a leadership position with our District 4 West team in the Indio office. Senior Officer Martinez has over 10 years of Code Enforcement Officer experience with the cities of Hemet and Lake Elsinore. Lionel has extensive experience in the building codes and has achieved a Level II Reserve Deputy status with the Riverside County Sheriff's Department.

The following Code Enforcement Officer appointments have been added to our work force. This will bring our total Officer/Senior roster to 84 personnel.

Ryan Dolan - Assigned to our Special Enforcement Team. Ryan comes to us from the Riverside County Waste Management Department where he worked as a load checker and hazardous waste investigator.

Rusty Hannah - Assigned to our Indio Neighborhood Enforcement Team. Rusty comes to us from the County Building and Safety Department and brings extensive knowledge of the Building Codes.

Brenda Hannah - Assigned to our Indio Neighborhood Enforcement Team. Brenda comes to us from the County Building and Safety Department and has experience in Building and Grading Inspections. She is also well versed in the Planning Department Land Use processes.

Adam Hermanson - Assigned to the Special Enforcement Team in the desert. Adam has over 7 years experience with the County Sheriff and is currently enrolled in a college degree program with a major in Criminal Justice.

Jon Kirchoff - Assigned to our Neighborhood Enforcement Team in District 1, Lake Elsinore office. Jon has over 7 years experience in law enforcement and is currently working on a Bachelor's degree in Criminal Justice.

Nina Morales - Assigned to our Neighborhood Enforcement Team in Indio. Nina was recently promoted from a Code Enforcement Technician. Nina holds a Reserve Officer Level I certificate and is currently enrolled in an Administration of Justice degree program.

Jennifer Morris - Assigned to our Neighborhood Enforcement Team in District 5. Jennifer comes to us by way of the Waste Management department. She brings with her a broad knowledge of hazardous materials handling and investigation.

Karen Nguyen - Assigned to the Special Enforcement Team. Karen has over 4 years experience as a Code Enforcement Officer for the cities of Westminister and Anaheim. She possesses a Bachelor's degree in Criminal Justice from Cal State Fullerton and is fluent in Vietnamese.

Lanee Padilla - Assigned to our Neighborhood Enforcement Team in the fifth district. Lanee has recently promoted from the position of Code Enforcement Technician. Lanee has a background with the Animal Services Department and holds an AA degree in Administration of Justice.

Samantha Phillips - Assigned to our Special Enforcement Team. Samantha comes to us from the Animal Services Department. She also has gained experience in parking enforcement from the city of Corona.

Michael Romero - Assigned to the Neighborhood Enforcement Team in District 2. Michael was recently promoted from the position of Code Enforcement Technician in which he held for about 1 year. Michael has prior experience working with the Animal Services Department.

Roy Ryder - Assigned to the Neighborhood Enforcement Team in the 4th District. Roy has over 3 years experience as a Deputy Sheriff and possesses a Bachelor's degree in Psychology.

Gladys Sanchez - Assigned to our Neighborhood Enforcement Team in Jurupa. Gladys has over 7 years experience with the Sheriff's department and can read and speak Spanish fluently.

Britt Starkweather - Assigned to our Neighborhood Enforcement Team in the 5th District. Britt brings over 8 years of Code Enforcement experience with him from the cities of San Bernardino and Rialto.

Jane Tate - Assigned to the Neighborhood Enforcement Team in our District 1 office in Mead Valley. Jane came from the Building and Safety Department where she worked as a building/ Valley. Jane came from the Building and Safety Department where she worked as a Building/ Grading Inspector for the last 4 years.

Nicole Wapner - Assigned to the Neighborhood Enforcement Team in District 2. Nicole has over 9 years experience in the Animal Control field where she recently held the position as Senior Animal Control Officer.

Ron Welch - Assigned to the Neighborhood Enforcement Team in the 3rd District. Ron comes to us from the Building and Safety Department. Ron possesses a certification as a building inspector and plans examiner and has over 17 years working in the Building industry.

AB 679 the bill which will add a fine to an illegal dumping conviction is waiting to be signed into law by Governor Schwarzenegger.

Current Office Space Projects - District 4 - 1000 Palms - We have acquired about 6500 square feet of office space in 1000 Palms where we plan to relocate our Indio staff. The space will accommodate both of our District 4 neighborhood enforcement teams as well as a contingent of special enforcement team members.

District 5 - Moreno Valley - We are in negotiations to acquire about 3000 square feet of office space in the Festival Shopping Center in Moreno Valley. This space is in close proximity to our current office. The new space will accommodate our district 5 neighborhood enforcement team. We are also attempting to acquire an additional 1500 square feet of office space adjacent to our existing facility to accommodate future growth in our department.

District 2 - Rubidoux Fleet Services - We have acquired about 500 square feet of office space in the new Fleet Services building to temporarily house a group of our Special enforcement team members.

James P. Monroe

Riverside County Code Enforcement

November 2007
Volume 1, Issue 11

The Posting

A TLMA Code Enforcement Monthly Newsletter

Director Jay E. Orr

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Abatement in District 5

The community of Good Hope has been distraught over a property located on the corner of Mountain & Palm due to it's unsightly accumulation of rubbish, debris, inoperable vehicles, occupied trailers, vagrants, and substandard sheds. Code Enforcement notified the property owner of the problems, and the owner assured us that he would take responsibility to have the property cleaned. Attempts to accomplish the clean-up were made, but never finished. Code Enforcement Officer Tom McMullen followed due process and took the case to the Board of Supervisors to request approval for abatement. Approval was granted and early this month Code Enforcement was able to hire a Contractor and the clean-up was completed.

Thanks and praise were received from the Good Hope residents for a job well done! ***T. Towner***

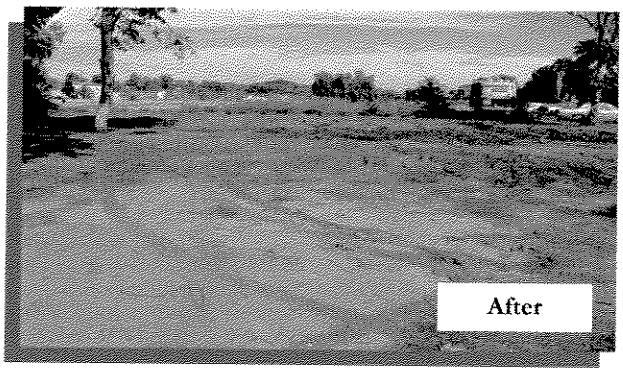

This property in Good Hope is no longer a problem.

Contract Services in District 5

The County of Riverside Code Enforcement Department is providing contract code enforcement services to the City of Desert Hot Springs (DHS). An agreement between the City and the County came into effect on September 18, 2007. Code Enforcement staff met with City staff and developed the scope of duties for the contracted services. On October 24, 2007, Code Enforcement Officer Danny Pike started the services and conducted initial inspections in the commercial district of the City of DHS. The inspections consisted of a check of the landscaping, signage, trash enclosures, verifying current business licensing, and overall appearance of the business. The following day Officer Pike assisted in removing a homeless camp in the business district that became troublesome to the local businesses and residents with the criminal activity, trash, and debris. We are developing a successful partnership to supplement the City's efforts to make it a safer community.

T. Towner

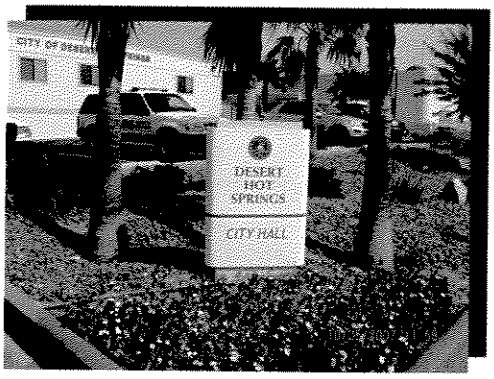

The County and City working together!

Summary Abatement in District 2

I responded to a complaint for a reported substandard structure on a vacant lot in El Cerrito on Carmelita Ave. Upon my arrival, I found a residence and garage with multiple steel I-beams going through them resting on stacked 4x4 pieces of wood approximately 5 ft. off the ground! The residence and garage was moved from its original foundation onto this vacant parcel. The garage appeared to have been once attached to the residence and was torn off during the move. The property was unfenced and accessible to anyone who wished to explore the area. I also encountered an occupied RV on the property sitting 30 feet away from the residence. The RV had electrical and water hookups from a neighboring house.

The residence and the garage were both posted as substandard. Supervisor Mickey Parmele immediately called Deputy Counsel Bruce Fordon when he saw the pictures taken of the conditions. All persons involved agreed that a Summary Abatement to fence in the substandard structures was needed as quickly as possible. Sr. Officer Palmer and I gathered all the documents and exhausted all means, including driving to the property owners home in District 1, to make contact. Contact was made through acquisition of a telephone number however, the property owner did not have the means to correct the violation immediately.

With the help of Sup. Parmele and Sr. Officer Palmer, I met a fencing contractor at the property who secured the substandard structures with a gated 6 ft. high fence. The occupied RV was removed the same day. The abatement process has begun to remove the structures completely.

Jonathan Lance

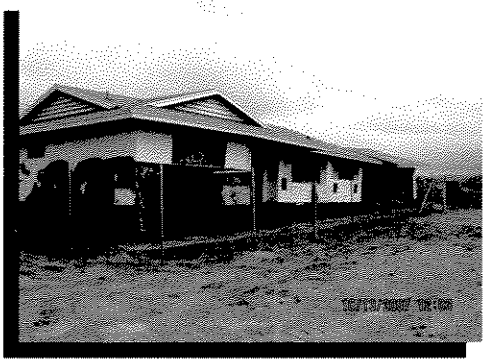

Summary abatement was necessary on this substandard structure

New Staff to Expand Plans

This month marked the graduation of close to 25 staff members from our enhanced Basic Code Enforcement Academy. The new officers are now involved in their field training programs. The addition of new staff to our offices will greatly enhance our ability to respond faster to all our customers and keep cases on track for faster compliance. These new staff members will also play an important part in the year to come as we expand our comprehensive Community Improvement Plans to more and more communities. Our program in the 4th District community of Mecca has been very successful thus far. Its success has led to the recent development and implementation of a plan for the Quail Valley community in District 3. In the very near future we will begin work on plans for Home Gardens in District 2 and Mead Valley in District 1. We are finding success with these programs through working together with all of our stakeholders and the community. ***Brian Black***

Inspection Warrant in District 2

On October 18, Jurupa Code Enforcement served an Inspection Warrant on a repeat violator on Bellegrave Ave. in the Glen Avon area.

Twelve Code Officers were joined by 10 Sheriff Deputies, four R.A.I.D. (Riverside Auto-Theft Interdiction Detail) investigators, four Animal Control Officers, and one investigator from the U.S. Dept. of Agriculture. Three properties covering almost four acres were inspected.

We identified and inventoried a total of 222 inoperative vehicles, eight substandard structures, three unpermitted structures, one substandard double-wide mobile home, prohibited fencing, and approximately 50,000 square feet of outside storage. Officers completed the inventory, taking photographs, and posting notices in about four hours.

The property owners were not home, but Sr. Officer Jim Palmer was contacted by the family attorney. He said he knew most of the cars on the property were junk and should be cleared off the property. He said the property owner was willing to comply, and they "just needed a little time." The inspection was concluded without injury or incident.

Jim Palmer

About 50,000 square feet of outside storage

222 inoperative vehicles

Big Cleanup Day in District 1 Yields over 80 Tons!

Over a year ago, District 1 officers told me that the Wildomar and Lakeland Village areas could use a community cleanup and tire collection event. On October 20, that cleanup and tire collection event finally happened! The cleanup yielded an impressive 42.85 tons of trash and metals and 10.71 tons of tires. In addition, approximately 210 e-waste items (computers and televisions) were accepted. Despite the large turnout of over 220 residents, the 308 loads were accepted in a timely and organized manner. Kudos to Ed Campos and CR&R Waste and Recycling Services for their generosity, hard work, and dedication to community spirit.

That same day, Riverside County Code Enforcement joined Riverside County Flood Control, Riverside County Waste Management, and CR&R Waste and Recycling Services for the annual Santa Margarita Watershed Cleanup. The event had over 100 community volunteers arrive bright, early, and eager to help clean up areas of the Santa Rosa Plateau being littered and dumped upon. I went along with one of these groups to an area off of Corona Cala Camino in Murrieta, which has one of the most beautiful views in our County. Some say you can see to the Pacific Ocean on a clear day. As beautiful as this place was, it was littered with cigarette butts, fast food wrappers, and other trash. The group made speedy work of getting it all picked up. All together these agency partners and volunteers collected over 27.68 tons of trash, tires, and appliances. After the cleanup, Code Enforcement's own Mark Slocum and Brett Farlow fired up the barbecue grills and made hamburgers and hot dogs for the hungry and well-deserving crews. Great job to all who played a part in this wonderful and worthwhile event! See you next year!

Angel Olivo

Supervisor Mark Slocum on the grill!

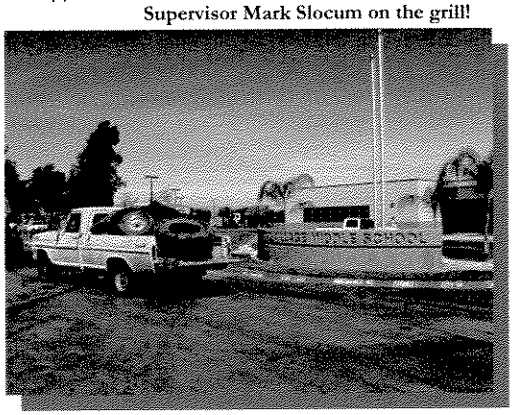

Lakeland Village Middle School hosted a successful cleanup

National Red Ribbon Week in District 2

National Red Ribbon Week is a national campaign of anti-drug education and drug abuse awareness. This week, celebrated October 23-31, encourages individuals, families, and communities to take a stand against abuse of alcohol, tobacco, and illegal drug use. The campaign also educates communities on the positive alternative lifestyle choices available to youth and adults.

The Department of Code Enforcement and Troth Street Elementary School partnered together to make a difference in District 2 at the Information Fair and Library Open House Event. Upon invitation by Librarian Doris Sanchez, our Department provided educational materials on the importance of clean communities. We also offered available resources and showed support for healthy, drug-free lifestyles. The planning and working together is as important as Red Ribbon week itself because it creates a sense of community and shared values. The event was a great success and the families in attendance were very grateful for our Department's presence. Thanks to all who participated!

Chaka Osborne

Banner at Troth Elementary

Educational materials available to the public at the Red Ribbon Week event.

Relay for Life Wrap Up

On June 23rd and 24th 2007, the American Cancer Society held their 2nd Annual Rubidoux Relay for Life Event, to remember those that have passed away from cancer and to honor and encourage those who have either overcome or are currently suffering from some type of cancer.

With the help of Kirstin Lockmiller, daughter of the late Supervising Code Enforcement Officer David C. Christenson, and her husband Steve, our team raised a top fundraising amount of $3,375.75 in Dave's memory. This year's event brought in a net profit of $20,372.77 that will go towards research for finding a cure and for special programs.

Planning has already begun for next year's Relay, which will be held on May 3rd and 4th, 2008. If you are interested in becoming involved, please contact Margie Scott at (951) 453-2118.

Sue Rush

American Cancer Society
Relay For Life
A Team Event to Fight Cancer

Riverside County Code Enforcement

December 2007
Volume 1, Issue 12

The Posting

A TLMA Code Enforcement Monthly Newsletter

Director Jay E. Orr

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Quail Valley Improvement Plan Kick-Off

In the month of November, Code Enforcement kicked off its Quail Valley Improvement Plan. On November 3rd, we hosted a Community Improvement Fair. It was a fun-filled day with over 500 in attendance. The Economic Development Agency (MARS) provided air jumpers and activities to keep children busy while parents went booth-to-booth collecting information for home and community improvement. Code Enforcement's Community Improvement Program team was available to provide informational brochures and pamphlets and to help serve popcorn, hot dogs, nachos, and drinks to the community. Senior Officer Wayne O'Gara, Officer Jason Heagstedt, and Technician Anita Bustillos were also there to answer questions.

Outside agencies joined in on this event as well. Those agencies who attended were: Riverside Sheriff's Department's ROVE (Recreation Off-Road Vehicle Enforcement) Team, EDA - Housing Development, EDA - MARS – Community Services Division, Riverside County Fire Department (Quail Valley Station), and Environmental Health.

Two weekends later, on November 17th, we had a community cleanup. Prior to the event, officers went door-to-door to residents who could be in violation of excessive rubbish and notified them of the event. The event flyer was also mailed to all residents. The event was more successful than expected. There were 30-50 cars in line at all times from 7:00 a.m.–12:00 p.m. Waste Management worked diligently all day to roll over the bins as fast as they could. Even with the constant turn over, there was not enough room for all of the trash that was being brought in. Supervisor Jeff Stone did not want anyone turned away so we unloaded all of the loads of trash in a huge pile in the parking lot. Waste Management worked overtime to bring us additional bins so we could clean up the pile before the end of the day.

Thank you to all of the Quail Valley resident volunteers, Youth Authority, and to the high school volunteers. A special thanks to Ted Metzker, Dave Hyatt, and Wes Purvis, who not only provided their tractors for the cleanup, but also helped in the planning and worked the event. They also stayed well beyond the closing time to clean up what was left behind. There was over 94 tons of garbage collected that morning.

These events have proven to be successful. We have had voluntary compliance in code issues, have more community members at meetings, and had over 15 new volunteers sign up for the Quail Valley Crime Watch Program. ***Becky Mitchell***

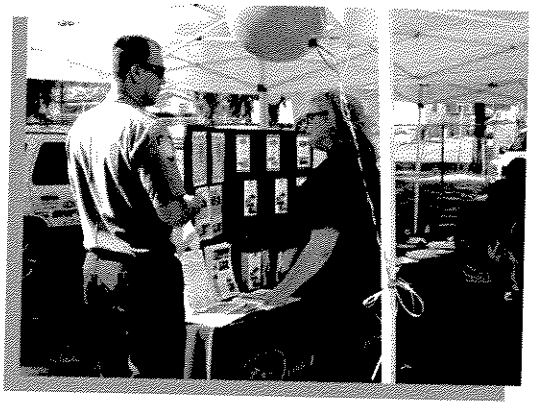

The Community Improvement Fair offered information, food, and fun for the entire community.

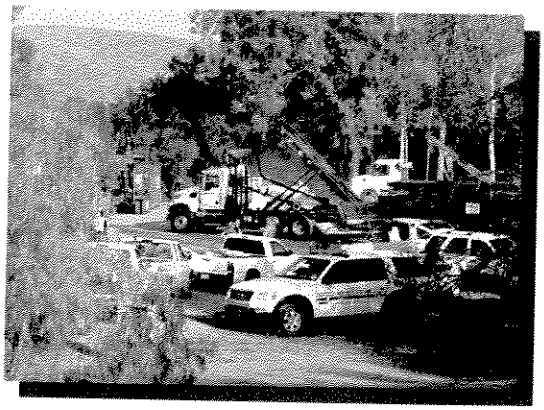

Bins were filled and replaced many times at the Quail Valley Cleanup.

Neighborhood Watch Picnic in District 5

Over 200 residents of Cabazon, Whitewater, and Windy Point assembled at the James Venable Community Center for the Annual I-10 Corridor Neighborhood Watch Community Picnic on Saturday, November 17, 2007.

With the continued support of Riverside County Fifth District Supervisor Marion Ashley, attendees enjoyed free food, refreshments, and activities such as a raffle of donated prizes, face painting, balloon hats, basket weaving, and a bouncer for the kids. Several booths were set up with representatives from the Board of Supervisors 5th District, CHP, Code Enforcement, CARE Team, Riverside County Sheriff, local churches, and Family Service Association.

David Newton, President of the I-10 Corridor Neighborhood Watch, expressed, "We are very proud of the working relationship we enjoy with Code Enforcement" and "The I-10 Corridor Neighborhood Watch looks forward to the coming year, and to the continued working relationship we enjoy with each Riverside County government agency that has partnered with us in our efforts to reduce crime and improve the quality of life in our three small communities."

Tracey Towner & Laura Gilbert

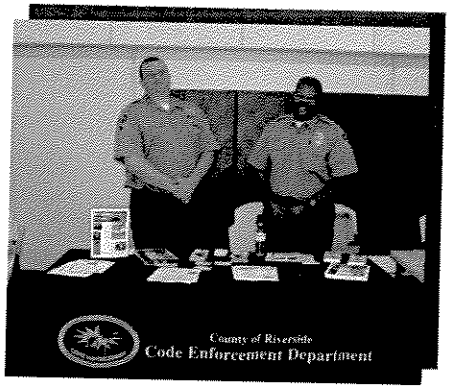

Officers James Pike and Anthony Green greeted residents

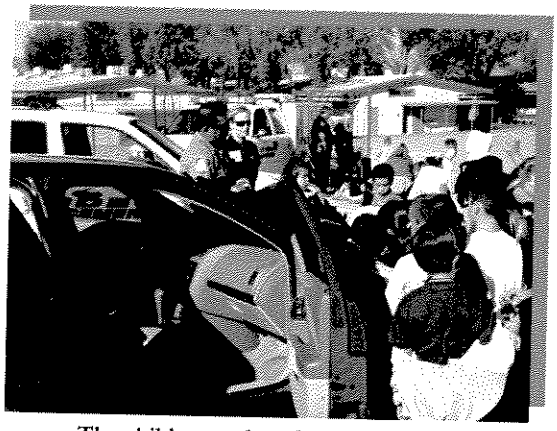

The children gathered around to listen at Highgrove Elementary

Gang Awareness & Career Day in District 5

Code Enforcement was invited to initially give a presentation to 2nd and 3rd grade classrooms for "Gang Awareness & Career Day" at Highgrove Elementary School. At the last minute, the elementary school requested a full display, which included cars, uniformed officers, and a presentation. The event was very gratifying as our presentation put a smile on the kids faces as they proudly wore their Junior Code Enforcement Officer sticker badges.

I would like to thank Laura Gilbert, who provided handouts, and Stacy Baumgartner for bringing a Code Enforcement unit with all the bells and whistles. I would like to give a special "thank you" to Marr Christian for assisting in coordinating the last minute request for a Code Enforcement patrol unit.

Manuel Acueto

Voluntary Compliance in District 2

I am sure a lot of you cruising down Bellegrave Avenue had seen this dilapidated building on the corner of Martin and thought to yourselves, "Wow, this could be potentially dangerous" – especially for the students from the high school across the street. The property owner has since voluntarily demolished the sub-standard structure.

In September, the Jurupa Office received a complaint on a run down building in Mira Loma. Officer B. Pollard contacted the property owner, made an inspection appointment, and found the building to be sub-standard. A month later on the follow-up inspection the sub-standard building was still in violation. Officer Pollard informed the property owner that we will prepare the case for abatement. In the beginning of November 2007, on another follow-up inspection, the sub-standard building had been demolished. The empty lot is now very thankful for the "facelift".

Mickey Parmele

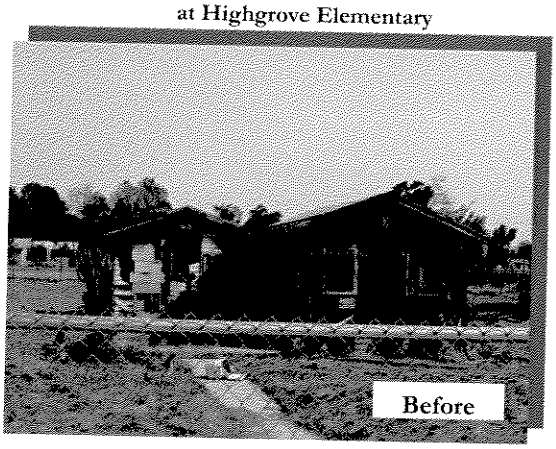

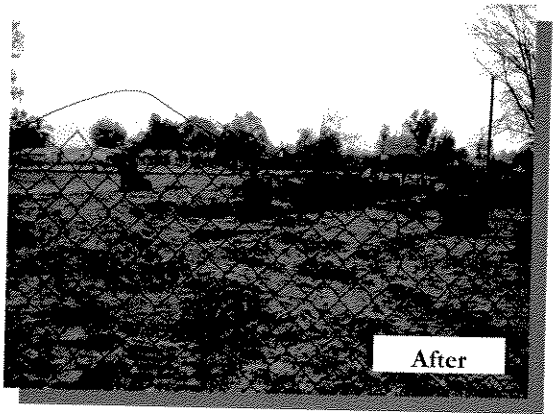

Success in Mecca

Results from Code Enforcement's efforts in Mecca are becoming very noticeable. We are at the height of our education/outreach program conducting two community meetings and two community education workshops in the month of November. Staff and the community are seeing the difference!

As such, below is a summary of key areas from our recent reassessment windshield survey to check on our progress. The numbers were compared with the first survey with very exciting results.

Decrease of:
24% Accumulated Rubbish
30% Inoperative Vehicle
59% Substandard Structure
78% Excessive Animals

In addition to the reduction in violations within the community, we have seen a shift in how Code Enforcement is perceived. Through our most recent meetings and events the community has developed a good understanding about our efforts and what we are working to accomplish. As such, we have been invited to participate in the Mecca Holiday Parade alongside the Fire Department. Working proactively to build relationships within the community, we have shown how effective our efforts can be and the amazing impact we can have on a community.

We would like to take a moment and say thank you to all our partners that have made our efforts such a success. In addition to Supervisor's Wilson's Office and the other government agencies, these partners include, but are not limited to: Our Lady of Guadalupe Catholic Church, The Apostolic Church, Mecca Elementary School, United Farm Workers, Mecca Citizen-Manual, Desert Mirage, Chandi AM/PM, and many others.

We look forward to our continued progress and successfully working with these great partners to make a difference in Mecca.
Kenneth King

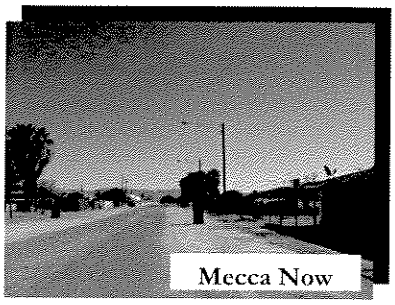

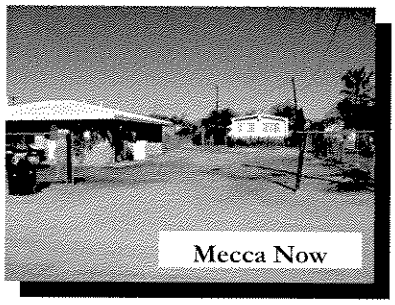

The streets and homes in Mecca are becoming clean and clear

Accumulated Rubbish Leads to Fire in District 3

Green waste chips being used for hill erosion control ignited from spontaneous combustion and burst into flames at the start of last month's windy fire week. The property owner had allowed his buddy to dump this commercial green waste on the property for the last five years. Fire crews from CAL FIRE, an attack helicopter, and water tenders, from as far away as the City of Corona, were needed to supply water to this fire. The fire scorched palm trees, melted insulation on electrical lines, and the smoke could be seen for miles. Fire crews were on scene for two full days to ensure the fire was extinguished and would not ignite again with the high winds and dry conditions. ***W. O'Gara***

It took fire crews two full days to extinguish this fire

Did You Know?

- The Code Enforcement Department has responsibility in the enforcement of over 20 different County Ordinances.
- 8,069 inoperable vehicles were removed from properties throughout Riverside County. 1,111 of those vehicles were removed from unincorporated communities!
- In order to retain an inoperable vehicle on your property, you must store it inside of a completely enclosed and permitted building such as a garage.
- Code Enforcement has been contracted by the State's Integrated Solid Waste Management Board to conduct inspections at over 500 waste tire facilities throughout Riverside County.

James Monroe

Riverside County Code Enforcement

January/February 2008
Volume 2, Issue 1 & 2

The Posting

A TLMA Code Enforcement Monthly Newsletter

Director Jay E. Orr

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A Community Comes Together to Help

In District 4 we had a great example of the community coming together in response to a Code Enforcement case.

Within 14 days of our first notice of violation, the property owner was able to use volunteers from the community to remove the accumulated rubbish and fire debris from her yard. Two years ago this detached structure burnt down, unfortunately the property owner had no money or insurance. Her kids had to play in the front yard near the street due to the nails, sharp edges, and soot from the fire debris. After my first visit to the property the owner started a great chain of events. As members of the community heard of her need for help, they stepped up and offered their time and services. The property owner received assistance from approximately 20 people and donations from the following organizations: Indio Boy's and Girl's Club (volunteers), Indio Apostolic Church (volunteers), S & S Concrete (clean up supplies), Manuel Razo Construction (crew), & Burrtec Waste Disposal (large dumpster).

It took 2 hours to clean up this property. The owner said she received a great Christmas present now that her kids could play in the backyard since it is safe again. She thanked Riverside County Code Enforcement for our kindness. But the community deserves the praise!

Rusty Hannah

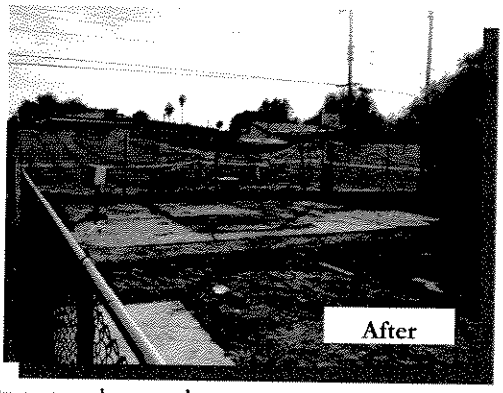

Neighbors help property owner clean yard

Stolen Trailer Recovered in District 2

In late October, Technician Carol Lucero began citing a commercial trailer for a commercial vehicle parking violation. After several subsequent citations for the same violation, Technician Lucero became suspicious. She contacted the Riverside Sheriff's Department, and together they discovered the trailer had been stolen in early October.

The owner of the trailer was contacted, and he came to claim the trailer. The owner received an early Christmas gift when he found all of the merchandise still in the trailer. The value of the merchandise was estimated at about $160,000.

The five parking citations will be dismissed.

Jim Palmer

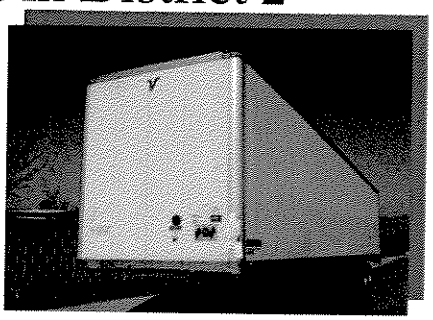

Trailer and merchandise recovered

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County Departments Working Together

It was almost 4:00 o'clock and the day was just winding down when Code Enforcement District 2 office received a call from their own Special Enforcement Team (S.E.T.). SET called to request assistance on a bust for an illegal rodeo and fiesta currently underway in an unincorporated area of Riverside County. The District 2 office immediately jumped into gear to coordinate efforts with S.E.T., Riverside County Sheriff (RSO), and Environmental Health. Following a briefing from each department and their roles in the operation, the teams arrived at the location of Dodd and Limonite.

Upon arriving at the rodeo/fiesta, Code Enforcement estimated the gathering of at least 750 to 1,000 participants. With traffic posing the initial problem, Officers D. Payne, M. Romero, and W. Jose took quick initiative and began directing traffic to a safe flow. Following S.E.T. and R.S.O., Code Enforcement Officers M. Villanueva, J. Palmer, D. Parra, and T. Engelking split into pairs and proceeded onto the property to conduct their investigation with officer safety in mind.

Upon investigation, a number of violations were discovered including: construction without permit (stalls and patio covers), excessive animals (over one hundred cattle and horses), excessive outside storage, and unpermitted land use for the rodeo/fiesta. Environmental Health seized 350 pounds of food and food related containers. In coordination with the Sheriff's Department, S.E.T. directed the evacuation of all rodeo patrons in a calm and orderly fashion.

With the cooperation of the property owner, the rodeo/fiesta was shut-down in just over 3 hours. This is just another example of a well-organized and quick response by multiple Riverside County departments serving the health and safety of the public. ***Mickey Parmele***

Rodeo/fiesta event with between 750-1000 people

Departments working together

Teamwork in District 3

On December 10, 2007, one of the largest cases that I know of was closed due to compliance. Many of you know of the case as Cross Roads. The case involved a property located on the south west corner of East Benton Rd. and Sage Rd. There were a total of 36 occupied and substandard recreational vehicles, 15 substandard, unpermitted structures, and 14 substandard mobile homes. Approximately 180 people occupied the various structures on the property. In addition to these violations, there were various land use violations to include a rehabilitation center and an automotive paint shop, just to name a few. Due to the fact that many of the recreational vehicles, mobile homes, and structures were grafted together, it took a team of nine officers about six hours to go through the entire property and properly identify all of the individual structures and the hundreds of hazardous defects.

It took teamwork to win this battle. Not just teamwork from the officers and staff directly involved in the investigation but throughout the entire Code Enforcement organization, County Counsel, and Supervisor Stone's office, and many of the social services organizations within the county. Even though the people living there were displaced from this location, all of them were provided help with placement and counseling.

For me, the case was not just about the large amount of code violations on the property, it was about being a conduit of change, to show that we were no longer the same old code enforcement agency that was afraid to tackle the difficult cases. It was about many people throughout the county coming together as a team and solving a problem. And most importantly, it was about making a difference in my community and helping the 180 people who were being taken advantage of by the individual who was supposedly providing rehab services to them. I'm certain that as time passes and the case is sent to be archived, I will never forget the 2-week-old child that was being raised in a 100 square foot substandard motor home with no toilet, air conditioning or heat, and crawling with ants. ***Mark Slocum***

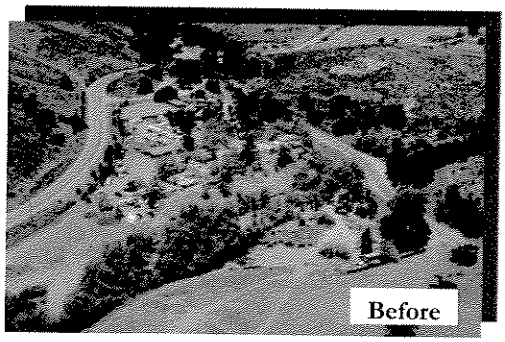

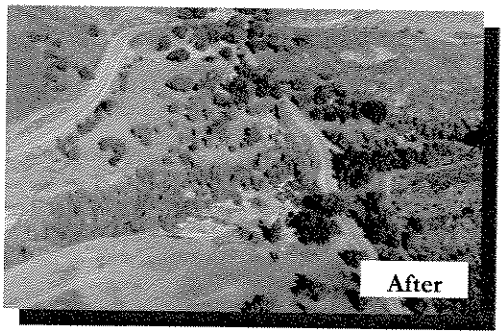

This entire community of substandard structures was removed

Chronic Litter

The Code Enforcement Department was contacted regarding the chronic litter along the fence line of the Blythe Municipal Airport. The site was inspected and the litter appeared to be from nearby businesses. This area is open and generally has a strong gusting winds traveling across the airport runways and open terrain. Unfortunately, this causes litter to travel into areas where aircraft are accessing and leaving the airport. This poses a safety issue and a FAA violation. The business owners were contacted. The situation explained. The cooperation was outstanding. Case closed. ***G.Gianos***

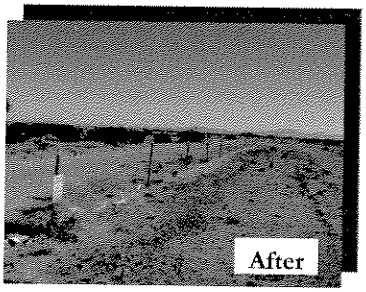

Litter removed near Blythe Municipal Airport

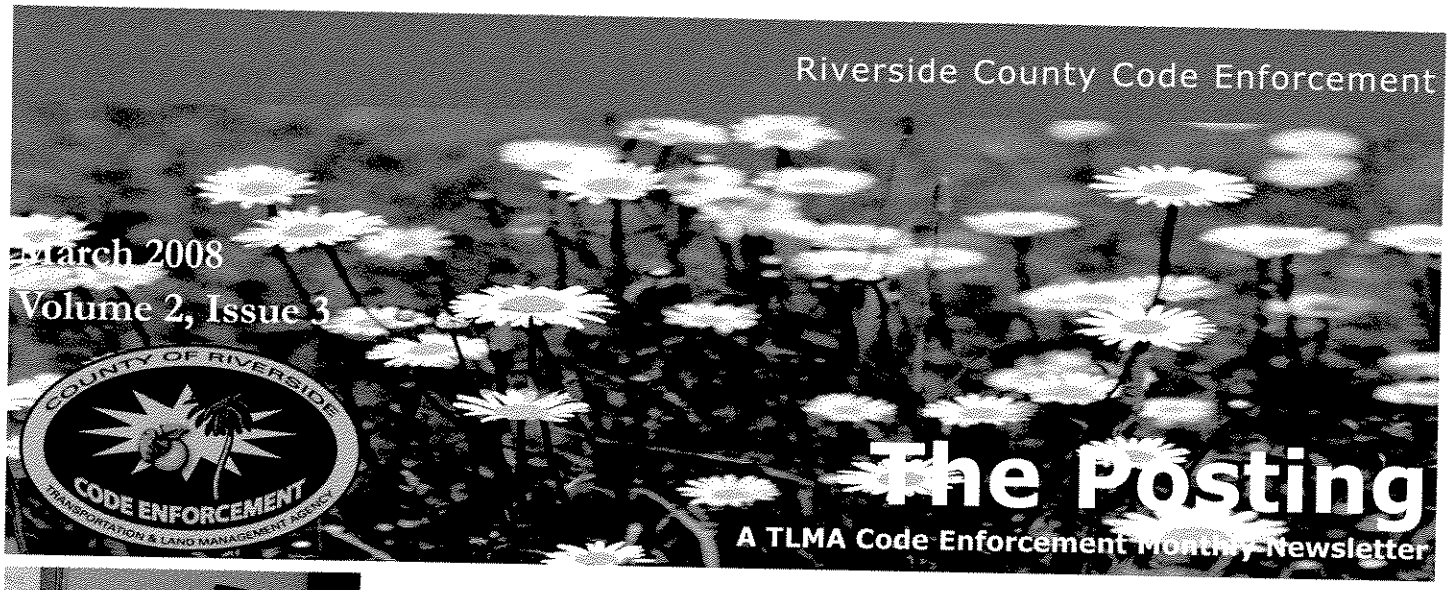

Director Jay E. Orr

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What is a Code Enforcement Officer?

What is a Code Enforcement Officer? There are many answers to that question. In some circumstances, people who have concerns in their neighborhood often find a minor violation to report to Code Enforcement and expect us to solve the entire problem.

One example is the case of sex offender group homes. People are not happy with the current state law that allows for these homes in their neighborhoods. They will call Code Enforcement to report violations that might exist on the property, in the hopes that this will make the entire problem disappear.

In these types of cases and others, people expect Code Enforcement to act in the capacity of Parole Officer, Mediator, Building Inspector, and Police Officer. They believe that we will resolve issues in their community by means of addressing code enforcement violations alone. In some cases, we are able to make the desired impact as a result of our enforcement. In others, we bring the property into compliance, but the underlying issue or concern still remains.

So what role does Code Enforcement fill in the community? Although we are not any of the occupations above, my answer has always been that Code Enforcement is in the "Life Safety" business. Whether it is to ensure the proper operating conditions of commercial activities so that they do not have a negative or hazardous effect on the community, or simply working an accumulated rubbish or vehicle abatement case. All of these have safety consequences.

A reminder of how Code Enforcement affects life safety issues was a recent incident in Long Beach where three children died in a fire of an unpermitted residence in a detached garage. Although the Fire Department was quick to respond, all three girls died, in part, due to the lack of egress because the fire blocked the only exit.

In addition to issues with the lack of egress, we often deal with the increased fuel loads and hazards associated with accumulated rubbish and inoperable vehicles. As seen in these before and after pictures of a recent case, District 4 staff worked in North Shore, you can appreciate the hazards this would have caused a fire or ambulance crew responding to this address in an emergency.

In addition to the blight and public nuisance conditions these materials create, they also pose serious life safety risks. Inoperative vehicles can make it difficult for firefighters to approach a structure; accumulated rubbish can increase the fuel load, heat and rate of the spread of a fire. Also, material such as waste tires, car batteries, paint, and oil, all of which emit toxic fumes during a fire, may increase the obstacles emergency responders face.

So what is a Code Enforcement Officer? We will always wear many hats, but without a doubt one of the most important ones is acting in our life safety role.

Kenneth King

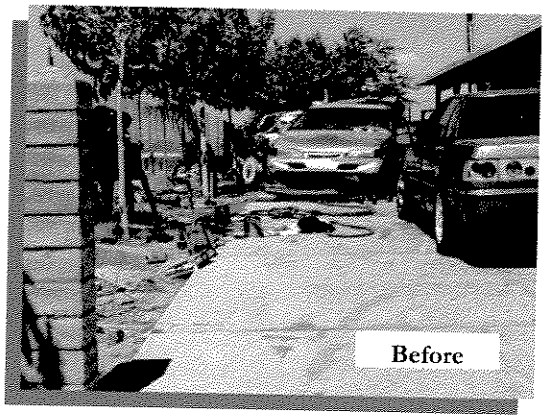

Before

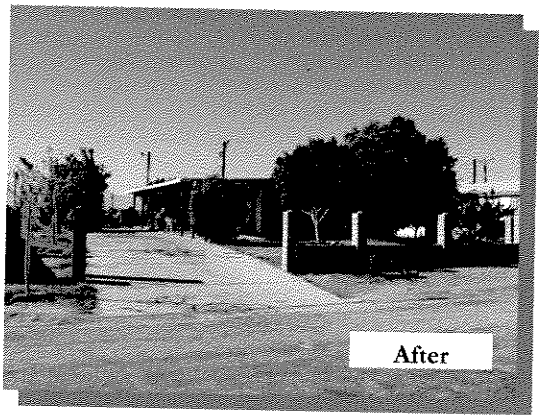

After

Quail Valley is Cleaning Up

Team 3 N.E.T. Officers are working full force in the Quail Valley project. Since the Neighborhood Clean-up in November, officers have been addressing all the issues in Quail Valley. They have been making contact with property owners as well as tenants and educating them on the importance of keeping their property clean. One property which was of concern, was a large 3 acre lot that was accessible for dumpers and transients. There was 9,825 square feet of items ranging from spas, household trash, furniture, tires, green waste, and trailers. In several conversations with the property owner we let her know our concern and the importance of making it difficult for people to enter the property. Then she took the necessary steps to have the property cleaned and blocked the entrance. Thanks to all the officers, and a big thanks to the property owner for a job well done.

Roy Ryder

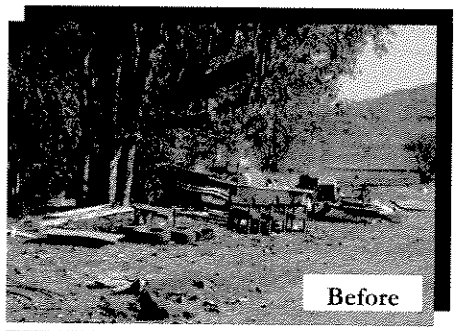

Quail Valley property cleared of violations

Officer Introduced in Highgrove

Officer Lanee Padilla

On January 22, 2008, Code Enforcement Officer Lanee Padilla was introduced at the Highgrove Community Service Authority (CSA) 126 meeting as the officer servicing the communities of Highgrove, San Timoteo Canyon, and Reche Canyon.

Senior Code Enforcement Officer Mike Bowles presented a report of code activity and introduced information regarding the development of a Community Impact Plan for the Highgrove area that would promote education, outreach, enforcement, and partnership with the community and Code Enforcement.

Michael Bowles II

Trash Abatement Ordinance Changes

Ordinance number 541.5 was enacted by the Board on June 12, 2007, to address the problem of accumulated rubbish on private property throughout the county's unincorporated communities. Once the rubbish is identified by a Code Enforcement Officer, a notice is mailed to the property owner and posted on the property providing the owner a 30 day window of opportunity to remove the rubbish from their property or request a hearing before the Board of Supervisors. Should the owner fail to remove the rubbish or request a hearing within the prescribed time frame, Code Enforcement can, without further notice, contract with a rubbish removal vendor for the removal of the trash. Once the trash is removed, the owner will receive a bill for the trash removal which will include Code Enforcement administrative costs (time to investigate and process the case file). If the bill is not paid within the given time, the County will record a Notice of Abatement Lien against the property and submit the costs to the Auditor-Controller's office for inclusion as a special tax assessment against the property.

In the last year, the County removed more than 10,000 tons of trash from public and private property at an expense of over $1,358,473. In a continued effort to cut down on the incidents of illegal dumping, Code Enforcement operates a pro-active enforcement program including manned and unmanned surveillance operations. Last year, our Special Enforcement Team issued 110 infractions, 104 misdemeanors, and assisted in the issuance of 6 felony citations. To date, our conviction rate holds steady at 98%.

The Board of Supervisors, in enacting Ordinance 541.5, found that the unregulated and improper allowance of rubbish or other material that is dangerous or injurious to a neighboring property or to the health or welfare of residents in the vicinity of any real property throughout the unincorporated territory of the County of Riverside poses a danger. This is not only because it is unsightly and negatively impacts property values, but also because it provides areas for occupation by vermin or wild animals, is a fire hazard, and is potentially toxic to persons, and the environment. Therefore, the accumulation of rubbish is deemed a Public Nuisance and poses a hazard to the safety of land owners, residents, users of public highways, and to the general public.

Together with cooperative property owners taking a more aggressive approach of monitoring the condition of their property, along with Code Enforcement's dumping surveillance program, we can make a difference in our communities and take a giant bite out of illegal dumping!

James Monroe

Riverside County Code Enforcement

April 2008

Volume 2, Issue 4

The Posting

A TLMA Code Enforcement Monthly Newsletter

Director Jay E. Orr

Mission: St. Anthony's Mobile Home Park

Due to recent complaints on a wide variety of issues, Code Enforcement and Environmental Health staff met on February 9, 2008, to conduct an evaluation of the St. Anthony's Mobile Home Park in Mecca. The goal of this project was to evaluate the current status and condition of the mobile home park. Then it would be decided if any future action would be taken regarding these complaints.

Using the successful model from our Mecca Community Impact Plan, we were able to identify and work with Community Partners and Stakeholders. Senior Officer Hector Herrera made contact with El Poder Popular and residents the day before our evaluation. Over 60 residents showed up to a quick meeting where Hector explained what we would be doing the next day and our intentions to work with them in developing strategies for dealing with the issues they face. After completing our initial evaluation, we have found the core issues are: access to the park, trash removal, water quality, and hazards.

Community Improvement put together a clean up day and a resource fair that following weekend. We had to act fast to help these residents. It was a huge success; everyone came out and participated. Burrtec provided over 8 - 40 ft. roll off bins for the disposal of trash, bulky items, and e-waste. As a result, we were able to remove over 22 tons of trash. Environmental Health gave out information on water safety and the hazards of illegal vending. Animal Services gave out information on pet spay and neuter programs and their hotline. EDA provided information and applications for the mobile home replacement program and mobile home loan/grant program.

All departments and sponsors worked as a team to gain the trust of the people, as well as to encourage residents to keep their living area safe and clean. All residents of St. Anthony's Mobile Home Park appreciated our services and help! We are aware that this is only scratching the surface of the issues affecting mobile home and RV parks in the county, but we are dedicated to continue this mission countywide.

Betty Sanchez
District 4

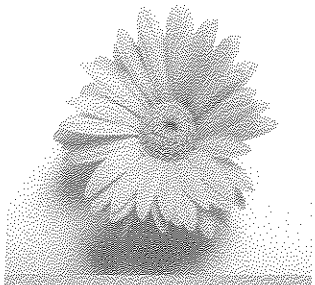

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Officer Rusty Hannah gives out Junior Code Enforcement stickers to children in the neighborhood

Over 60 residents showed up to a quick meeting in the community

Sub-Standard Tree House?

On February 6, 2008, Officer Jamison Cole responded to a residence in the Lake Elsinore area to investigate an alleged violation of Substandard Structures.

What Officer Cole found was a couple of travel trailers parked on the property as well as a large storage container and an additional amount of personal items being stored outside of the container. The travel trailers were not being occupied as there was no evidence (utility hookups, personal items, food, or bedding) present. She advised the property owner that the additional personal items outside the container were in excess of the allowable amount of 200 square feet and needed to be reduced.

As she walked with the property owner around the yard, Officer Cole noticed a tree house that appeared to be very dilapidated and in need of some serious TLC. She asked the property owner if it was being used at all, and she was told that the property owner's small children were actively using it. She continued to tell Officer Cole that she had concerns for her children's safety but was unable to keep them out of the tree house. She said that her husband was going to fix it but had not had the time with the wet weather and his long work hours. She asked if Officer Cole had any suggestions and Jamison said, "I think I might be able to help."

Officer Cole took photos of the tree house (less than 120 square feet) and posted a Notice of Violation for a substandard structure, placed a DO NOT ENTER sign, and then wrapped it in yellow caution tape. This going the extra mile to prevent injury to the children was exactly what was needed to help Mom keep the youngsters out of the tree house. They wouldn't listen to Mom or Dad, but they would listen to the Code Enforcement Officer.

Within a couple of days the property owners were able to remove the dangerous tree house and prevent any injuries to the kids. Mom and Dad did have to promise to replace it later this summer, but the concern for the children's safety was eliminated due to the "Thinking Outside of the Box" attitude of Code Enforcement Jamison Cole!

Greg Flannery
District 1

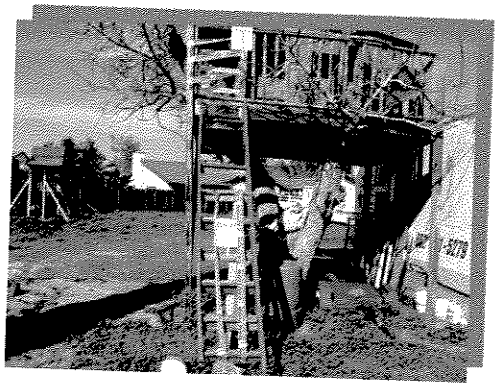

This tree house was marked off limits to the children

My Community, My Customers, My Job

On a February evening, I was on patrol in my area prior to attending a crime watch meeting. I came around a dark corner on Canyon Drive and encountered six loose cattle roaming the streets. The cattle were heading toward Goetz Road; a street without lights and packed with vehicles on their way home. I called for assistance from a Crime Watch member to assist in diverting the cattle away from Goetz. I then notified CHP and Animal Services. The cattle continued to head toward Goetz Rd. Finally, a vehicle pulled alongside of me and claimed to be the owner of the loose cattle. I found out where the cattle came from and, with the assistance of the Quail Valley Crime Watch, was able to get the cattle back into the property safely. It pays to have members of the community as contacts in simple incidents that could have a tragic outcome.

Another good example of Code Enforcement's close involvement in Quail Valley was when I received a call on my cell phone. The call came from a community member concerning possible illegal dumping. I started the investigation within a hour of the phone call. Nothing pointed me to the suspect other than a community member who noticed an individual loading a trailer the night before. Upon my finding, I notified members of the SET Team and before the day ended a confession was made by the suspect. I called my community member and thanked them for the assistance. Without these relationships in my community a lot of incidents would be unresolved.

Jason Heagstedt
District 3

Mobile Home Disappears

A complaint was received regarding an abandoned mobile home on the corner of State Highway 79 and California Ave. in the unincorporated area of Beaumont. Officer Jennifer Morris and Sr. Officer Regina Keyes responded to the location and found that the mobile home was on the road right-of-way area. They proceeded to post the mobile home substandard, and Officer Morris contacted CalTrans and other agencies to have the mobile home removed from the area. When conducting a follow-up investigation in the area, Officer Morris was pleased to find that mobile home had vanished from the roadside. Another public nuisance gone!

Michael Bowles
District 5

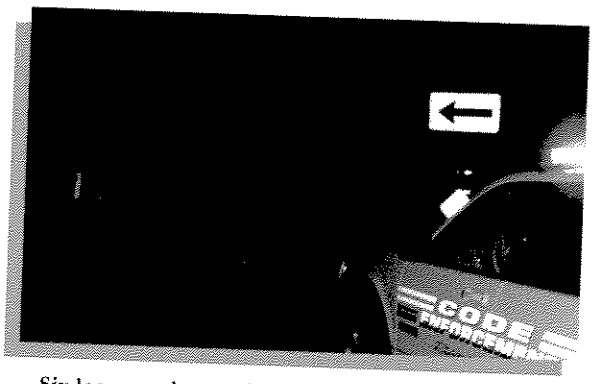

Six loose cattle roaming the streets in Quail Valley

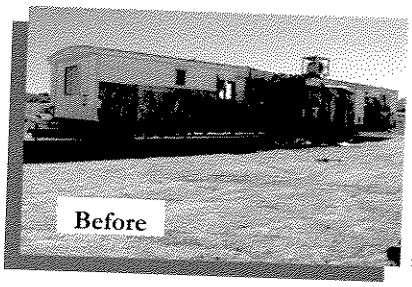

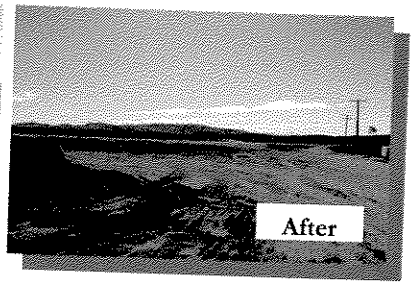

This mobile house was removed from the roadside in Beaumont

Looking Back and Looking Forward

April will see the widespread distribution of our first Code Enforcement Department Annual Report. This report documents the tremendous growth of our first year as a Department. It also highlights some of our strengths and readily provides the basis for our claim that we are the premier code enforcement agency on the west coast.

We are moving forward. We are identifying issues and stepping up to respond to the needs of the community. We are expanding our Community Impact Plans to more communities, we are working on a foreclosure and transitional housing program, and continually improving our processes to increase our efficiency and effectiveness.

One of the new programs recently introduced in District 1 was our Service FIRST Program. This is modeled after a successful example from a neighboring jurisdiction, and has been modified specifically for our mission in Code Enforcement. Service FIRST is just that. We understand that providing good service drives all our efforts. FIRST is an acronym for Focused on Compliance, Investigate and Document, Responsive to the Community, Sense of Appropriate Urgency, and Teamwork and Collaboration. In the Service FIRST logo, we have three rings encircling these concepts which represent the Neighborhood Enforcement Teams, Special Enforcement Teams, and Community Improvement all working closely together with one goal.

The measure of the impact of our efforts is difficult to calculate. I feel a shift where people are starting to recognize the value of the service we provide. People don't have to call 9-1-1 everyday, but almost everyone drives by that junk car, trash on the side of the road, or illegal business every single day.

Another measure of the impact is the fact that this newsletter is distributed to well over 2,500 people each month and growing. Now with our new website at www.rctlma.org/ce/, which now has this newsletter online, we will be able to carry our message to even more people who need this information about our services. This webpage also has information on how to file a complaint, contact us, and other brochures and information.

We have had a terrific start to this year, and I look forward to continuing this great work of Code Enforcement with the wonderful people of Riverside County and the fine professionals in this Department.

Kenneth King
District 2

Rubbish Removed

In just 65 days Code Enforcement Officer Jennifer Morris was able to get voluntary compliance from the property owner who had over 10,839 square feet of accumulated rubbish. Officer Morris initially met with the property owner, explained the violation, abatement process, and the cost at the end of the case. The property owner assured Officer Morris that the property would be cleaned up. Upon her follow up inspection she met with the property owner and observed that all the accumulated rubbish had been removed. The property owner stated that he had taken everything to the landfill or scrap yard. Thanks to the property owner for all their hard work.

Regina Keyes
District 5

Did You Know?

- Code Enforcement processed more than 10,600 complaints this year.
- Code Enforcement staff attended more than 300 community meetings this year.
- The amount of outside storage of materials is dependent upon the size and zoning designation of your property. Contact your local Code Enforcement office to find out how much outside storage you can legally have on your property.
- Vending merchandise including perishable and non-perishable items from the street or within 40 feet of a street in the unincorporated Riverside County is a violation and the merchandise is subject to seizure. Contact your local Code Enforcement office for more information regarding the street vending laws in the county.

James Monroe

Riverside County Code Enforcement

May 2008
Volume 2, Issue 5

The Posting

A TLMA Code Enforcement Monthly Newsletter

Director Jay E. Orr

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Homeland, Romoland, Green Acres Cleanup

In March, Code Enforcement held a community cleanup for the Homeland, Romoland, and Green Acres communities. The goal of the community cleanup was to provide the residents the opportunity to enhance the appearance of the community and get involved. The event was held at the Romoland Elementary School. The Romoland Unified School District continues to support and play a vital role in improving the quality of life for their students, parents, and the surrounding communities.

The Harvest Valley Community Council has been a continuous sponsor of this event each year. The Council has done a tremendous job in providing numerous volunteers, refreshments, getting the word out to the community, collecting tires throughout the community, assisting seniors and the disabled, keeping Highway 74 free and clear of debris, and making sure that the overall event becomes a success. Many thanks to the Harvest Valley Community Council, local businesses, community leaders, and volunteers. A total of 216 vehicles were served for a total of 98.81 tons of trash and tires collected.

Chaka Osborne (5)

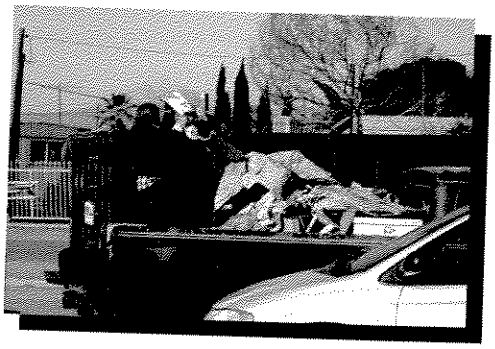

Many hands make light work

What the Community is Saying...

"I appreciate the cleanup & increasing higher standards" **-Henry Mussenden**

"Very helpful, we appreciate it! An opportunity to get rid of some tires." **-Mike Allison**

"It's time people cleanup the trash; we cannot even ride our horses without risk. Thank you Department of Code Enforcement" **-Jim & Kim Kresin**

"My family and I have lived here for six years and we spend a lot of our weekends picking up trash around the Juniper Flats area in Homeland. This is really cool that your Department is doing this." **-Micah Moore**

A Special Thank You To:

County of Riverside Supervisor Marion Ashley's Office & Staff • County Waste Management Department – Lambs Canyon Landfill • Waste Management, Inc. - Julie Reyes & all drivers • WRCOG for providing cleanup supplies • TMG Communications • Hamshaw Farms • ACE/AHERN • Homeland Donut • Volunteers Kathy Woods, Alec Glaha, Garrick Stein, Lee Tankesley, G. Hoffarth, Mary Plum, Phil Michelsen, Bob Dulce, Ieene Harris, Margarete Hinckley, Bannie Hoffarth, and Yvonne Mendoza

Amendment Expedites Abatement

The Riverside County Board of Supervisors recently amended the ordinance (Ord. 541.5) that regulates the removal of rubbish including green waste. This ordinance was amended to protect the health and welfare of residents from possible fire hazards, by expediting the process in which flammable material can be removed from vacant parcels.

Rubbish is defined as, but is not limited to, any items consisting of trash, litter, garbage, waste, junk, debris, discarded items, refuse, construction, landscape or demolition materials, cans, bottles, barrels, bricks, boxes, crates, cartons, containers, packaging, wood, plastics, metal, visqueen, paper, cardboard, appliances, vehicle parts, tires, discarded mattresses, equipment, furniture, carcass of a dead animal, ordinary household garbage, discards, green waste, or other dangerous, nauseous or offensive material of any kind.

Although Notices of Violation are still necessary and required, the time frames have been significantly reduced to gain compliance. This ordinance will allow County officials the ability to move quickly and abate these violations.

Two communities that will be positively affected by this change are Pine Cove and Idyllwild. These mountain communities have recent drought conditions that have resulted in tight water conservation and a high fire concern.

The Code Enforcement Department for the Idyllwild / Pine Cove areas can be reached by telephone at 951-791-3600 or fax to 951-791-3606. Complaints can also be filed through the Internet or general information can be found at www.rctlma.org.

Michael Sanders (3)

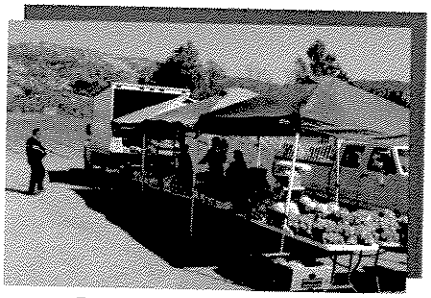

Large scale illegal vending

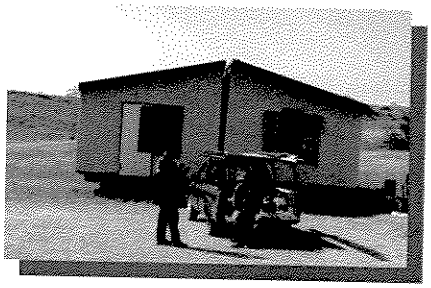

Officer caught suspects in the midst of dumping a mobile home

Weekend Enforcement

In mid March, Officers in the 3rd District started working weekends. We have focused our enforcement activity in the Wine Country and the Aguanga area and have expanded beyond the normal weekend parking enforcement. We are handling regular casework along with high visibility patrol. It's amazing how many people are surprised and glad to see us in their neighborhoods during the weekends. "Glad to see you and you are welcome to come on my property any time," said Dorian Linkogle from the Briar Rose Winery.

It has become apparent that many violators were taking advantage of the lack of weekend coverage. To date, we have observed several businesses operating outside their conditions of approval and conducting business in an unsafe manner. In one situation, I observed several patrons of a winery scramble to their vehicles, which were parked in a fire lane, as I drove onto the property. We have also become a force multiplier for the Special Enforcement Team in that my officers have observed everything from illegal dumping to illegal vending.

Mark Slocum (3)

Compliance in 3 Hours

On an April afternoon, Supervisor Ken King and I arrived at a property in Rubidoux. There was over 800 cubic feet of accumulated rubbish sitting outside the front gate. We made contact with the tenant and we were able to get voluntary compliance in three hours. The house was in foreclosure and the tenants needed to vacate the house by the next week.

We were able to offer the tenant an application for the CDBG funds and supply them with a roll off dumpster. Angelica Olivo, Community Improvement Specialist, arrived and assisted the tenants with completing an application. Supervisor Joe Quinones from Burrtec was driving by the property at the time and arranged for a dumpster to be delivered within 20 minutes.

Neighbors and friends came out to help the tenant load all the trash into the dumpsters. The removal of approximately 3.5 tons of trash that consisted of furniture, crates, car seats, household trash, and other miscellaneous items was removed in three hours.

Although it does not always happen, it was nice to see everyone come together and make a positive impact in the community in such a short time.

Gladys Sanchez (2)

About 3.5 tons removed

The Double Deuce

Acting upon a complaint, Code Enforcement Tech Trish Silva, contacted the Riverside County Natural Resources Manager Brian Shomo, about a reported abandoned vehicle that was seen in a very remote area within District 1.

Due to the extremely remote area, Code Tech Silva felt that it would be best to do some research regarding the potential of the area being in a sensitive ecological cell location before she just tromped all over the area with a tow truck to remove the old car. After nearly a 1 hour 4X4 trek into the back woods, the vehicle was located and identified as an abandoned, burned out, rusted piece of junk. There was no means of identification anywhere on the hunk of metal that was once a car. Trish took photos and left the location to contact Statewide Towing.

Based upon the location of the abandoned vehicle, it was determined that an Army 6X6 Truck (a real all wheel drive ride) would be the only way to reach and remove the clunker. After receiving approval for the use of the special Army Truck, called a Double Deuce, Code Tech Silva, recruited Code Enforcement Officer III Sara Cervantes to assist in leading the assault on the rusted hull they sought on their mission.

The Double Deuce followed the Code Enforcement vehicle up into the remote location, with all wheels screaming and the black diesel smoke marking the route. Some wildlife and poisonous snakes were encountered on the way, with no resulting casualties reported. Once they arrived at the location of the abandoned vehicle, the Double Deuce hooked up to the shell, and with a blast of the air horn and a shout from the driver "Let's Roll", off they went for their last leg of the journey.

The Officers were focused and Statewide Towing was determined to yank that junk off the mountain. Though it was a bit out of the ordinary, and took a little more planning than usual, the problem was solved. MISSION ACCOMPLISHED!

Greg Flannery (1)

This rusted vehicle was removed by the Double Deuce

Thank You 10,000+ Tons

In March, Riverside County Board of Supervisors recognized County Departments and Private Industries for their hard work and efforts in the removal of over 10,000 tons of trash in Riverside County in 2007. This is equivalent to over 5 miles of dumpsters. That amount would line the highway from downtown Riverside to San Bernardino County.

Riverside County Code Enforcement started the cleanup campaign in 2006. It is a collaborative effort between County departments and private agencies.

At the March 25th Board Meeting, Master of Ceremonies, Supervisor Marion Ashley, Supervisor John Tavaglione, and Code Enforcement Director Jay Orr presented the Recognition Awards to Department Heads and Independent Business Owners. Certificates of Appreciation were also given to 227 staff members from those agencies.

Congratulations and thank you to everyone who participated in making 2007 a very successful year! Thank you also to T.O.M., the trashcan mascot, who made a surprise appearance.

Becky Mitchell

Jaime Hurtado, Legislative Assistant to Supervisor Marion Ashley, with T.O.M., the trashcan mascot

Transportation Department Crew

The departments and businesses that received awards:

•**Burrtec** - Mark Bartholomew, Division Director •**Burrtec of the Desert** - Mike Veto, Director of Municipal Services
•**CR&R Waste Industries** - Ed Campos, Vice President/General Manager •**Department of Code Enforcement** - Jay Orr, Director
•**Department of Environmental Health** - Gary Root, Director •**Transportation Department** - George A. Johnson, Director
•**Department of Waste Mgmt** - Hans Kernkamp, General Manager •**Desert Valley Disposal** - Rick Wade, General Manager
•**Flood Control** - Warren "Dusty" Williams •**Interstate Sweeping** - Glen Drew, Owner/General Manager
•**Rubidoux Community Services District** - David Lopez, Manager •**Crowson Management** - Glenn Crowson, General Manager
•**Waste Management, Inc.** - Alex Braichovich, Director of Government Affairs
•**Western Regional Council of Goverment** - Barbara Spoonhour, Program Manager

Riverside County Code Enforcement

June 2008
Volume 2, Issue 6

Director Jay E. Orr

A New Phase for Code Enforcement

The beginning of the second quarter of 2008 marked a new phase for Riverside County Code Enforcement. This phase began with a radio campaign to introduce the department and the various ways we can be of assistance to the community. These commercial spots give examples of numerous violations and invite the community to call in and get informed on how they can be in compliance. Currently, the campaign airs in English on KFRG 95.1 FM and on KOLA 99.9 FM, and in Spanish on KRQB "Que Buena" 96.1 FM and on KAEH "La Maquina Musical" 100.9 FM.

During the month of May, Code Enforcement officers made history, as they became guests of the 30-minute local show "Despierta Nuestro Valle" ("Wake Up Our Valley") on the Univision channel in the desert communities of District 4. Code Enforcement representatives were officers Lucero Iniguez and Adam Hermanson. They did a wonderful job in highlighting the organization. They touched upon the history of Code Enforcement, types of violations, how to comply, and, of course, where the Department is going.

Officers Iniguez & Hermanson are guests on Univision program

The Department continues its growth under the leadership of our Director Jay E. Orr, as two offices were opened in Thousand Palms (District 4) and Home Gardens (District 2). This demonstrates that Riverside County Code Enforcement grows side-by-side with the community. It also shows that officers and staff are working hard to form an alliance with the community to improve the quality of life together in Riverside County.

Grace Escobar (CIP)

What's Inside:

Thousand Palms 2, 3

Ordinances Approved 4
Occupied RV
Officers Honored
Visual Blight

Voluntary Compliance 5
Abated
Dumping Suspect

Teamwork 6
Removing Vehicles
Excessive Rubbish

Structure Removed 7
Room Addition Gone
Desert Hot Springs
Quail Valley

Did You Know?

- Generally speaking, most residentially zoned properties require the front 20 feet, the side five feet, and the rear 10 feet of your property to be free and clear of all building obstructions. Exemptions do apply to this rule.
- You can install a chain-link or wood fence that is no higher than six feet without a building permit.
- You need to obtain a building permit before you re-roof your house.
- You are limited to the amount of outside storage of materials you can store in your backyard. Depending on the zoning and size of your property, you may be able to store from 0 to 200 square feet (with a maximum height of three feet) of materials.

James Monroe (Admin.)

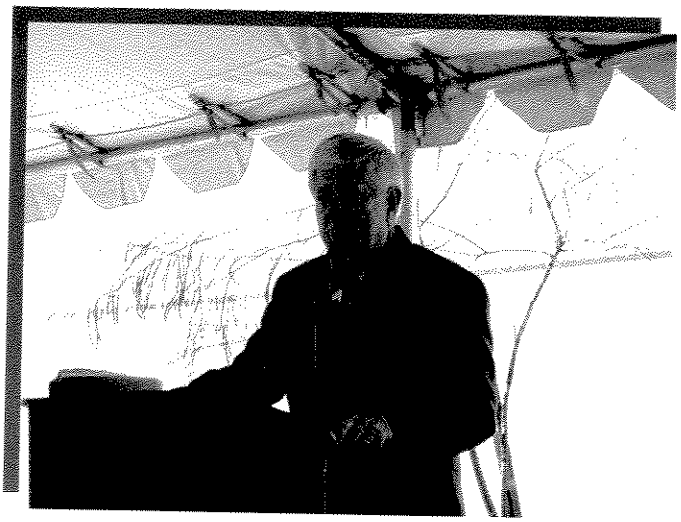

District 4 Supervisor Roy Wilson offers opening remarks

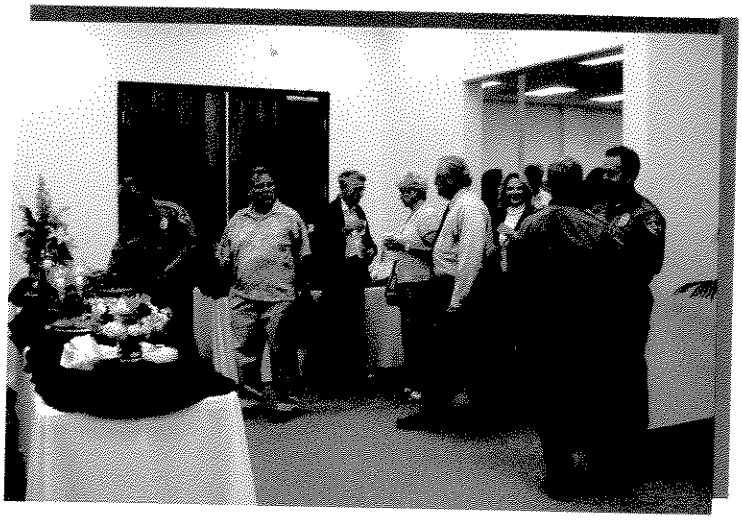

Guests and officers gather for refreshments

Director Jay E. Orr with Code Enforcement staff on opening day

Guests are led on a tour of the office by Beatriz Sanchez, Community Improvement Specialist for District 4

Special Thanks:

4th District Supervisor Roy Wilson, The Board of Supervisors and Staff, The Executive Office, TLMA, Facilities Management, Economic Development Agency, Sheriff's Department, Fire Department, Community Councils for Thousand Palms, Sky Valley, Desert Edge, Indio Hills, Bermuda Dunes, Vista Santa Rosa, Thermal, Mecca, Oasis, North Shore, Ripley, Mesa Verde, Community Leaders, and Special Guests.

Voluntary Compliance

A complaint was received regarding excessive outside storage. The property contained a travel trailer with an attached awning. The travel trailer was possibly occupied at one time by the evidence of a picnic table with benches under a dilapidated patio-type cover, a fire pit made with blocks and rocks, a half-filled water container, and fire wood under the tongue of the trailer.

There were also other miscellaneous items around and beneath the trailer. The door was secured by a blue string wrapped around the door knob to the bottom of the door. In addition, through the window on the door of the trailer, a large bag of charcoal was visible, and an upper cabinet door was open with condiments inside.

Appropriate notices were posted on the trailer and mailed to the property owner. A phone call was received from the property owner in response to the notices. The property owner stated the trailer was used for weekend get-a-ways. After educating the owner of the importance of voluntary compliance, he assured me he would have the property cleaned. When the follow-up was conducted, it was observed that the travel trailer had been removed, along with the accumulated rubbish. The property owner was thanked for his cooperation.

Providing property owners with the information needed to comply helps Code Enforcement achieve voluntary compliance. And that is always a good thing!

Jeannie Chamberlain (3)

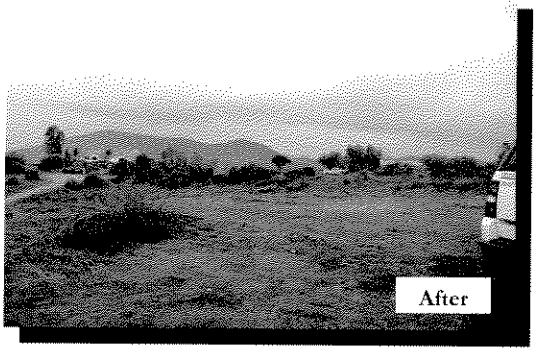

This trailer was being used for weekend get-a-ways

Abated

This property is a vacant lot located in the Wagon Wheel area of Good Hope. It is a deep lot measuring several acres wide. A large amount of accumulated rubbish, sheds, and a sub-standard structure have existed on the property for quite some time.

In March, Code Enforcement and their contract services abated the violations on the lot by executing a pre-existing Findings of Fact. This is one more success in the Good Hope area. ***Tom McMullen (5)***

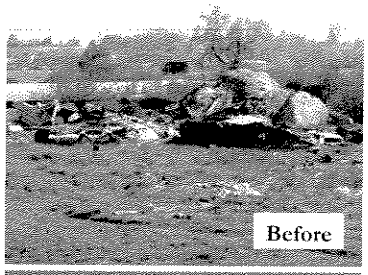

Vacant lot cleared

Dumping Suspect or Car Thief?

While Code Enforcement Officer Angela Frazier was on weekend patrol in Wine Country, she observed a white pickup truck driving erratically in the Santa Gertrudis Creek area. Believing she had spotted an illegal dumper, Officer Frazier called for back-up and officers Heagstedt, Forrey, and Sr. Officer O'Gara responded to assist.

When Code Enforcement officers arrived, the vehicle was located in the water under the trees in the Santa Gertrudis Creek. Officers were staged to the north, south, east and west of the suspect vehicle. Riverside Sheriff's Department (RSD) dispatch was called to determine if they had any interest in the vehicle. Dispatch called back within moments to confirm the location and to advise that they had deputies en route, along with RSD helicopter STAR 90 for air cover.

Officer Frazier returned to the intersection of Anza and Vino Roads to lead the RSD ground units to the scene. While Code Enforcement officers waited for their arrival, the suspect was observed opening and closing the vehicle doors several times and, at one point, was seen changing his clothes inside the vehicle.

As RSD ground and air support arrived, the suspect was observed exiting the vehicle and running eastbound into the creek and trees. Star 90 was able to direct the ground units to the location of the fleeing suspect. Code Enforcement officers maintained their positions while deputies and K9 searched the creek and woods for the suspect. When the suspect could not be located, deputies advised Code Enforcement that the vehicle was stolen and thanked Officer Frazier for her discovery and prompt response.

Deputies remained at the scene in hopes that the suspect would "break from cover," and they would be able to take him into custody. A check of the case status Monday morning revealed that the suspect was still at large.
Wayne O'Gara (3)

Structure Removed

Code Enforcement observed a substandard structure in Thermal. Upon further research, it was discovered the property had been sold to a new owner. The new owner was notified and within two months he had completely cleaned and cleared the property of the substandard structure. The case was closed for voluntary compliance.

Rusty Hannah (4)

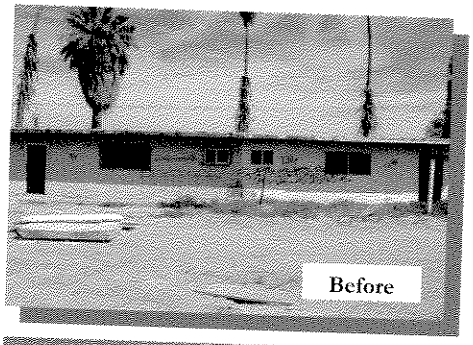

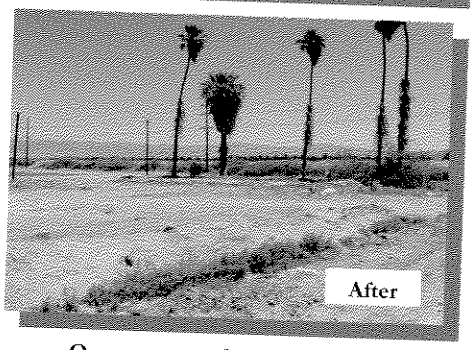

Owner removed old structure

Please use your waste hauler for regular trash service

Room Addition Gone

A complaint opened the door for District 1 Code officer's to make contact with a property owner that had put up an illegal structure. Without the required building permits, you never know if a building is going to be strong enough to handle a windy day in Mead Valley. Officer Jon Kirchoff responded to the location and made contact with the property owner. He advised the owner that a building permit was needed for the additional structure. Officer Kirchoff issued him a Notice of Violation. The property owner questioned the officer and, after some persuasive dialogue, he agreed to remove the illegal building. Officer Kirchoff did a re-inspection a few days later and found the problem was resolved.

Greg Flannery (1)

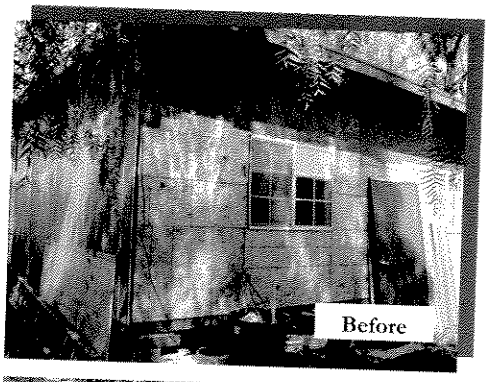

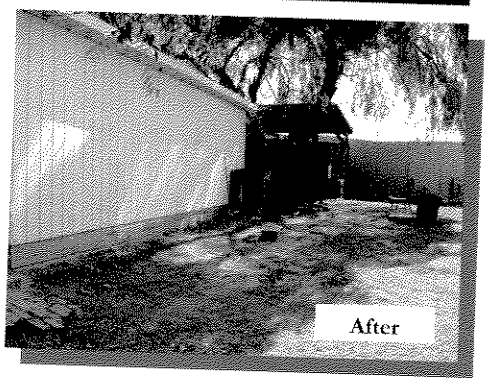

Illegal structure

Desert Hot Springs Cleanup

Many residents walk their trash over

Trash and debris, electronics, green waste, and various other household items were removed from private properties, roadways, illegal dump sites, dirt roads, and other parts of the community.

Total:
4 bins = 11 tons
48 vehicles served

"What a great service you guys are providing to our small desert community. Thank you."
Bruce Schwartz, Resident

Chaka Osborne (5)

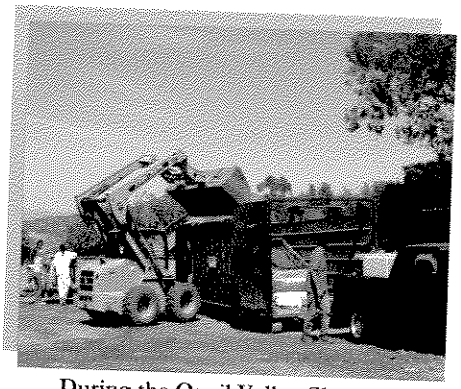

During the Quail Valley Cleanup 194 vehicles were served within 4 hours. Twenty-six "roll-offs" were filled totaling 55.4 tons of trash.

Quail Valley Cleanup

What the Community is Saying...

"This cleanup has been improved over past cleanups. It's nice to be able to drop off more than one load and not have to wait for hours." **-Resident**

"Thank you very much... I love you guys." **-Donna (elderly resident)**

"We just moved in and are trying to get our yard cleared out. This has been very helpful."
-Veronica Jimenez

"After two cleanups in the last year, we have finally finished cleaning up our place. Thank you."
-Resident

Becky Mitchell (3)

Riverside County Code Enforcement

2008

2, Issue 7

The Posti

A TLMA Code Enfo Monthly Newsletter

Director Jay E. Orr

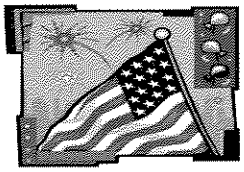

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Addressing Concerns 3
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Cabazon Days

Preparing for the Worst 5
Highgrove Days
Ripley's Believe It or Not

Mead Valley Cleanup 6
Good Hope &
Meadowbrook Cleanup
Jurupa Valley Cleanup

Fireworks 7
Active Duty Officer

1000 Palms Cleanup 8

Home Gardens Improvement Fair & Grand Opening Celebration

The Improvement Fair on May 31st was the first event of its kind in Home Gardens. Code Enforcement was hoping to create an opportunity to share with residents what we do and the upcoming events and programs that can assist them with voluntary compliance. Community Improvement Specialists sought local merchant and corporate support to make this event possible. Home Gardens and corporate merchants demonstrated their commitment to their communities. Items donated included use of the venue, hot dogs, Pepsi, ice, raffle prizes, and a jumper. Code Enforcement Officers went door to door inviting the community to the event. They received overwhelming support and words of praise from the community, who was excited that we would soon be opening the doors of our Home Gardens Code Enforcement office.

Code Enforcement Director Jay Orr with Father Guadalupe Ruiz and Madre Estrella of Our Lady of Tepeyac Church

Children join in the fun!

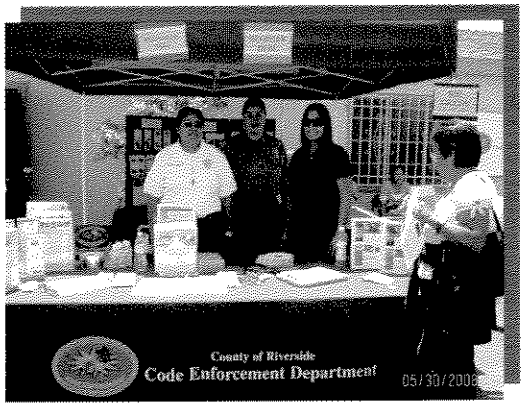

Officers educate the public

At the Code Enforcement registration booth, Home Gardens' residents could learn about Code Enforcement, Riverside County Codes & Ordinances, and pickup flyers on upcoming events and programs like the Home Gardens Cleanup, Household Hazardous Waste Collection, Voluntary Inspection Program and the Home Gardens Voluntary Abatement Program. Over 30 Residents signed up to be on a waiting list for the free program and over 160 families signed in and entered the free raffle for prizes donated from local Home Gardens merchants.

Angel Olivo, CIS (2)

Addressing Neighborhood Concerns

With the growing rate of abandoned and foreclosed homes on the rise in Riverside County, communities are seeing their fair share of these properties.

Recently, Officers were alerted to an abandoned residence in Sun City, a 55 and Older Community. They found household belongings stacked near the front door, and a damaged, partially opened garage door. Concerned residents stated people were leaving the house early in the morning on foot, and returning late at night, often in a taxi cab.

Supervisor Mark Slocum along with Senior Officers Wayne O'Gara and Lionel Martinez, as well as Officers Jason Heagstedt and Roy Ryder, visited the location. Upon their arrival, they were greeted by many neighbors in the community, who voiced their concerns and questions about the abandoned residence.

Supervisor Slocum and Senior O'Gara took the time to address their concerns. Meanwhile, other officers placed the household items in the garage and secured the abandoned residence to detour unwanted guests from visiting the site.

Though this is only a small step, we were able to reassure the neighbors that we care and are looking out for their safety and the best interest of their community.

Let's commend these District 3 officers for thinking outside the box and for caring about this neighborhood and its residents.

Roy Ryder (1)

A big improvement in Sun City!

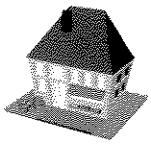

County Abatement Completed!

This property on Lopez is a vacant lot that exists in the Wagon Wheel area of Good Hope. It is a deep lot that is several acres large.

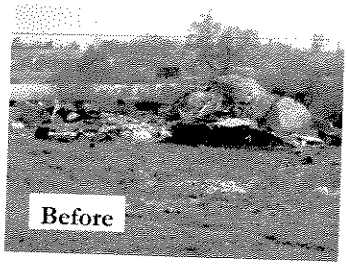

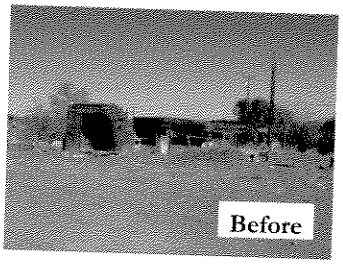

This property is victim to a large amount of accumulated rubbish, sheds, and a sub-standard structure.

The property itself is not occupied but serves as one more example of blight in the community. In March, Code Enforcement, with their contract services, abated the violations on the lot.

Tom McMullen (5)

One more success in the Good Hope area!

DID YOU KNOW?

- Inoperable or non-running vehicles must be stored inside of a completely enclosed building such as a garage.
- The number of farm animals such as horses, cows, sheep, or goats that you can keep on your property depends on the zoning and the size of your property.
- You must obtain approval from the Planning Department before you begin any business or commercial use on your property.
- You cannot lawfully install a mobile home that is over 10 years in age.

James Monroe, Administration

1000 Palms Community Cleanup

The Thousand Palms Cleanup was a huge success. More than 70 curbside pickups yielded nearly 23 tons of trash. In addition, over 45 Residents came out to drop off their bulky items which yielded 17 tons of trash. We had 13 volunteers, thanks to Karen of the community council, who organized to get us volunteers to clean the main corridor of Thousand Palms (Ramon Rd. between Varner Rd. and Monterey). The volunteers came from the Faith Community Church located here in Thousand Palms.

The community really came together. We had the contributions of the local businesses. Costco donated all the supplies for the bar-b-q, condiments, and water. Sam's Club donated the meats and buns for the hamburgers and hot dogs. Casa De Pasta donated 1 free dinner for two. Carl's Jr. donated 16 free famous star hamburger certificates, Del Taco donated 57 Free Kid's Meal certificates, Domino's Pizza donated five large 2-topping pizza certificates, and Taqueria San Miguel donated three $15.00 Gift Certificates and that's not all. Classic Party Rentals donated tables and chairs, a 15 x 15 canopy, and even came out to install it. Rodarte Ice Distribution donated ice for all the coolers and beverages.

One resident stopped to see if we could help her. She had bought new appliances and wanted to get rid of her old ones but didn't know how to unhook them. When she first came to me, I said, "Let's see what we can do." I asked Burrtec supervisor Roy Villareal and he said, "No problem. We will have two men in a pick up follow you and we'll take care of it." She was so grateful. Just another way on how these clean-ups benefit the community. Cleaner yards, cleaner streets, and happier residents.

Betty Sanchez, CIS (4)

Volunteers came out to help!

Residents unload greenwaste

July Calendar

4th

Independence Day
(all County offices closed)

19th

Winchester Cleanup
7 am - 12 pm

Tips for staying cool:
Wear a hat
Drink water
Stay in the shade
Wear lightweight clothing
Stay in an air-conditioned place

We welcome you to visit our website at www.rctlma.org/ce where you can:

- View *The Posting*
- Download Code Enforcement flyers & brochures
- Report a violation
- Tell us how we're doing...we'd love to hear from you!

Code Enforcement District Office Numbers

District 1 (951) 245-3186
District 2 (951) 275-8739
District 3 (951) 600-6140
District 4 (760) 343-4150
District 5 (951) 485-5840

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4080 Lemon Street, 12th Floor
Riverside, CA 92502
Phone: 951-955-2004
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Dawn Burnett
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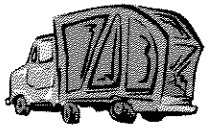
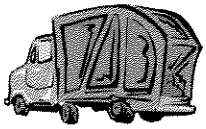
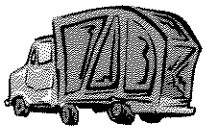

Mead Valley Community Cleanup

Volunteers help the community unload their vehicles

It was Community Clean-up Day again in Mead Valley! Residents attended and showed all their community pride by assisting with the removal of debris from private property and community property. This event was all about creating and maintaining a safe environment for children, families, and businesses. As always, Tomas Rivera Middle School and the Val Verde Unified School District continued to show its support by allowing the use of its facility and the assistance of its awesome staff.

Trash and debris, electronics, greenwaste, and various other household items removed from private properties, roadways, illegal dumping locations, dirt roads, and other parts of the community totaled:

25 Bins = 45.95 tons
23 Dump Passes = 20.92 tons
171 Vehicles = 66.87 Tons

One resident said, "I learned that I have "bulky item pick-ups" through my hauler, free of charge! So not only did I get to dump for free, I learned something new! Thanks!"

Angela Boone-Porcher, CIS (1)

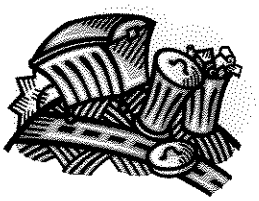

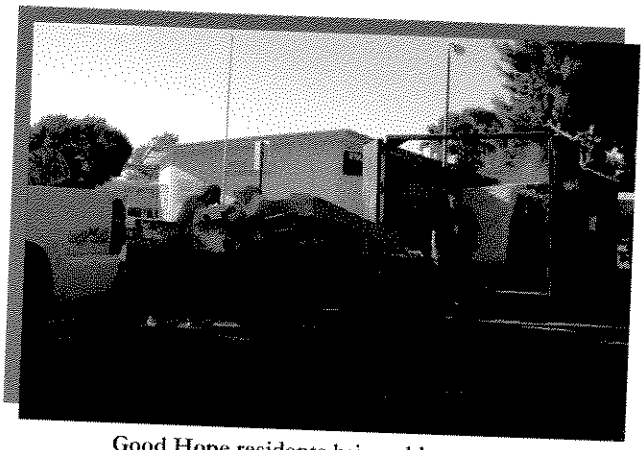

Good Hope residents bring old mattresses and other items to discard

Good Hope & Meadowbrook

Due to mandatory trash services, increased educational workshops, and frequent community cleanup events, our Department has seen a decrease in the amount of household trash being brought in to the community cleanups in this area. The community has been actively involved and wants to live in a nice and clean community. Special thanks to residents in both communities and to all community leaders!

Both locations combined:

139 vehicles = 41.54 tons
50% decrease from last year!

Chaka Osborne, CIS (5)

Hector Ruiz, with Riverside County EDA Graffiti Busters, paints over unsightly graffiti on campus

Burrtec was ready for every load

Jurupa Valley Cleanup

After months of planning, the Jurupa Valley Cleanup took place at beautiful Patriot High School. Despite the heat, the Jurupa Cleanup drew over 230 loads of trash from residents from all over Jurupa Valley.

Burrtec Waste Industries turned out in force and was prepared to handle the largest of loads from its customers. All tires and e-waste accepted at the cleanup will ultimately be recycled and diverted from our landfills.

Staff from Environmental Health, Economic Development Agency, Code Enforcement, 2nd District BOS staff and Supervisor John Tavaglione were all present and helped to make the Jurupa Valley cleanup a success.

Angel Olivo, CIS (2)

Riverside County
Code Enforcement: Mecca Improvement Plan
2007-2008

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Presented by:
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Code Enforcement Mecca Improvement Plan

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CODE ENFORCEMENT DEPARTMENT
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Scope of Problem

History: Mecca has been and continues to be a vibrant housing community for farm workers migrating through the Coachella Valley. Population dynamics for the Mecca community tend to correlate to the ebb and flow of the agricultural seasons. During the latter part of 1999, a "house-in-place policy" was instituted based in part on the sensitivity to the housing needs of this migrant population. For the past 8 years, in strict accordance to policy, Code Enforcement has been only reactive to the various code violations existing in Mecca based on a "danger to life and limb" and "health and safety" priorities. To date, the lack of "pro-active" enforcement has created a very challenging and complicated code issue, which we are now prepared to deal with in a thoughtful and systematic approach.

During the past 8 years, Riverside Code Enforcement has been reacting to complaints and has responded to issues including:

- Illegal vending
- Illegal Dumping
- Construction without permit
- Active installation of RV's and un-permitted mobile homes.
- Dangerous collapsing structures
- Open excavation and unfenced pools
- Excessive animals
- Dangerous exposed electrical
- Junk Vehicles

Objective: The Indio Code Enforcement Office has completed a Windshield Survey of approximately 968 properties. The results demonstrate the following statistics, which reflect the severity of the growing code violations in the community of Mecca:

				Total	618
Accumulated Rubbish / Excessive Outside Storage	22	0	18	79	**119**
Unpermitted Land Use – 2nd Unit	2	0	58	52	**112**
Occupied RV	0	0	0	25	**25**
Inoperative Vehicles	21	1	21	34	**77**
Construction Without Permits	58	2	12	114	**186**
Substandard Structure	3	0	11	15	**29**
Illegal Dumping	2	0	3	1	**6**
Grading/Stockpiling	0	0	0	3	**3**
Excessive Animals	4	0	0	5	**9**
Unpermitted Fencing Material	10	0	0	26	**36**
Missing Address	9	0	0	3	**12**
Contractor's Storage Yard	0	0	0	2	**2**
Shipping Containers	0	0	0	1	**1**
Illegal Business	0	0	0	3	**1**
Total	**131**	**3**	**123**	**363**	**618**

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It is the goal of the Code Enforcement Department to provide a visual improvement in this community while instilling community pride. The Code Enforcement Department will initiate a Spanish Media Campaign that will run concurrently with a multi-phase improvement program combining public education, resources, community partnerships, and enforcement. Based on the history of Code Enforcement's involvement and number of possible code violations in Mecca, an attainable success average rate of **30%** annually has been established. This attainable goal is based on the average compliance achieved on similar types of code violations countywide**.Furthermore, our department is committed to prepare a quarterly report that will be submitted to BOS, Project Partners, and members of the Housing Review Committee.

** Percentage is based upon the average compliance rates of similar violations.

Spanish Media Campaign:

The Spanish Media Campaign will initiate immediately and run concurrently throughout the implementation this plan. Due to the population fluctuations in this community, a seasonal long-term approach to cover all the major topics listed below will be put into action, therefore, reaffirming the same issues and topics in a cyclical form continuously.

Partners (Define Roles/Inform of the following agencies' resources):	
Interested Community Groups	**STAKEHOLDERS**
Housing Review Committee	SUPERVISOR ROY WILSON Coachella Valley Housing Coalition California Rural Legal Assistance Housing and Urban Development Desert Alliance Community Empowerment Catholic Charities Senator Denise Moreno Ducheny's office
County Departments	SUPERVISOR ROY WILSON Riverside County Sheriff Economic Development Agency (Graffiti Hotline, Demolition Grant, Façade Grant, Home Repair, Etc.) Animal Control Child Protective Services Adult Protective Services Office on Aging Building and Safety Riverside County Counsel Code Enforcement Fire Department
Community Council Members	Sal Alejos Maria Rios Jaime Gonzales Maria Machuca Jose Romero
Other Representatives	Crowson Management CSD United Farm Workers Mecca Citizen-Manuel Desert Mirage Chandi AM/PM Coahuilla Elementary School Nuestra Senora de Guadalupe Saul Martinez Elementary School Toro Canyon Middle School

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Partners (Define Roles/Inform of the following agencies' resources):	
	Desert Mirage High School Habitat for Humanity
Media Outlets	• 96.7FM-Adolfo Iniguez (Need to set up schedule for radio talk show) Weekly/long-term plan • El Informador • KUNA, Spanish news station • KESQ, English news station • Abriendo Puertas (Spanish Talk Show Time Warner) • Tu Comunidad (Spanish Talk Show in Univision) Public Service Announcements: • Time Warner • T.V. Azteca

Media Topics	**Approach to Target Market (District Wide)**
• Illegal Dumping • Excessive Outside Storage • Accumulated Rubbish • Excessive Garage Sales • Inoperable "Junk" Vehicles • Excessive Animals • Illegal Vending • Public Intoxication/Urination • Garage Sales (Permanent)	*Key Points to address on talk show(s) and all educational materials:* • What is the ordinance? • Why is the ordinance important to them? How does it affect them (Negatively/Positively) Focus on health and safety • How does the public comply? (Resources available) • Consequences of not complying- Penalties & • Who do we call for more information and/or to report the activity?

Code Staff TV/Radio Contacts	**Phone Number**
Susana Orozco, Community Improvement Supervisor	(951) 955-2856 Desk (951) 368-7790 Cell
Hector Herrera, Senior Code Enforcement Officer	(760) 863-7180 Office (760) 272-8192 Cell

"No Rock Left Unturned" Cleanup policy

Code staff will proactively implement this plan in Mecca, and as graffiti or illegal dumping is observed, not only will our department enforce these activities, but will also refer for immediate cleanup. Code staff will report Roadside Dumping and Graffiti to Southern Coachella Valley Services District for immediate cleanup. In addition, our department will follow up to ensure that these activities are abated. This approach will ensure that the community is kept clean and local Mecca residents build little toleration for these unsightly activities.

Mecca Project Area

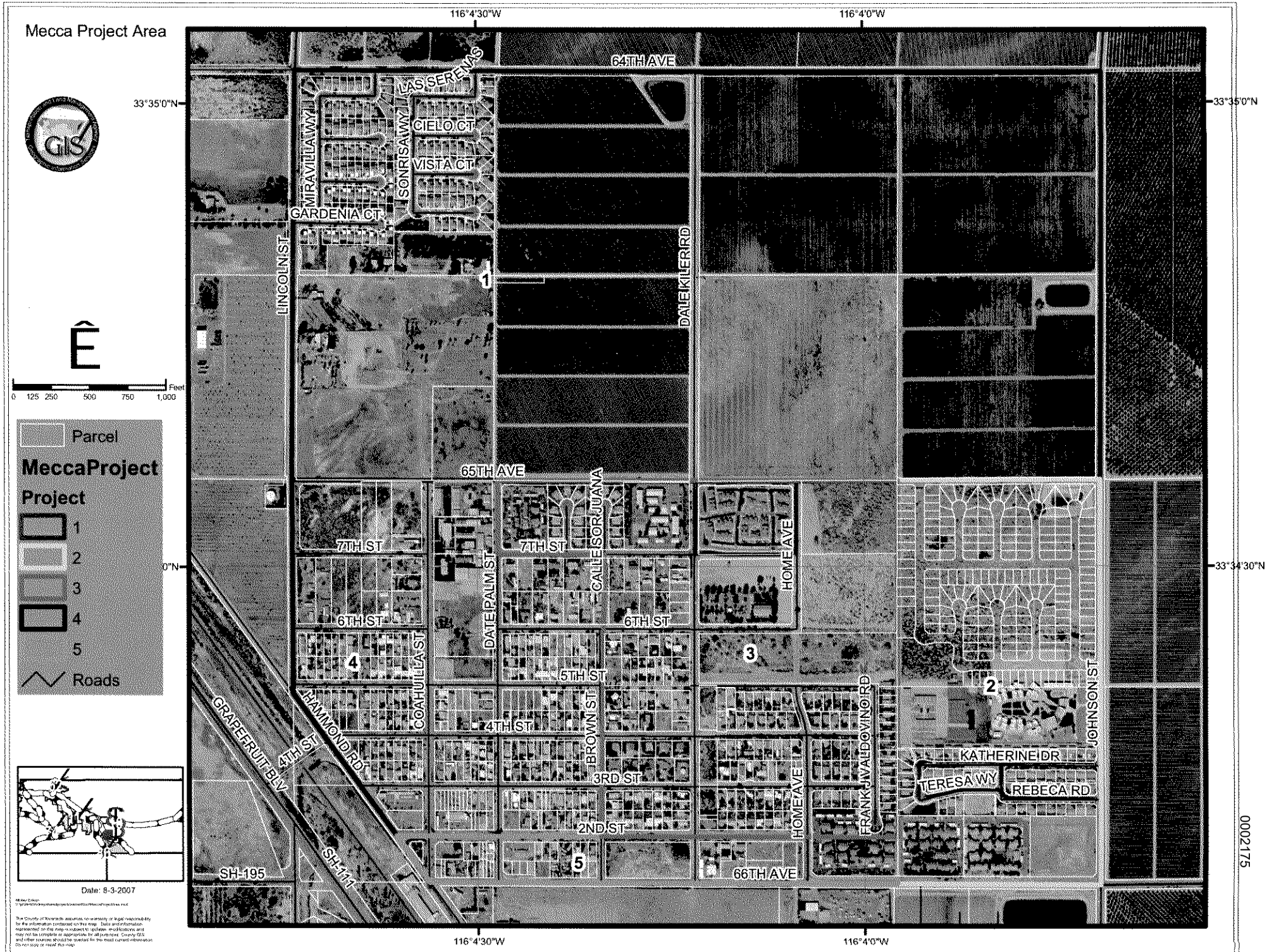

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PHASE I: Improvement Project Area I

All properties within the boundaries of **West-** 65th Ave, **East-** 64th Ave, **North-**Lincoln St., **South-**Johnson St.
Total number of properties: **192**
21.10% of all Mecca Code Violations exist in this area

Improvement Project Plan:

Area I, consist of 80% farmland and is the fourth of the newest residential developments in Mecca. During our windshield survey, the department concludes that there are several signs of possible gang activity in this area. Gang activity is apparent through prominent gang-affiliated graffiti, posted gang signs on properties, and the highly visible public activity during the day. As one of the newest developments in this community, the code violations are not as severe as those found in other sections of this community, but the "Mecca Trend" is beginning to evolve, thus a proactive approach must be taken to address the code violations before they become worse. Through a partnership with the Riverside County Sheriff's Department, Code Enforcement will initiate proactive enforcement activities in the parameters of Improvement Project area 1 to address all health and safety code violations, specifically Building without permits and Excessive Outside-Storage. In addition, our efforts will expand to address the illegal dumping occurring in and around all of the farmlands within this section, including all roads that surround the entire community of Mecca.

Code/ Community Issue	Approach	Tools	Partners	Code Staff
Building without permits	· Notices to all violators · Administrative Citations for those who do not comply	• Notice of Violations/Immediate Action for new unpermitted construction • Administrative Citations	• Riverside County Sheriff's Department • Building and Safety	• Dave Lawless • Marr Christian
Trash, Debris and Excessive Outside Storage	• Notices to all violators • Administrative Citations for those who do not comply	• Notice of Violations/Immediate Action for new unpermitted construction • Administrative Citations	• Southern Coachella Valley Services District • Riverside County Sheriff's Department	• Dave Lawless • Marr Christian
Illegal Dumping	• Misdemeanor Infractions for all violators • Refer for Cleanup	• Reporting Hotline Magnets for public	• Riverside County Sheriff's Department • Riverside County Fire Department	• Dave Lawless • Marr Christian
Graffiti	• Refer for Cleanup	• Hotline Phone Number	• Riverside County Sheriff's Department	• Dave Lawless • Marr Christian

Mecca Project Area 1

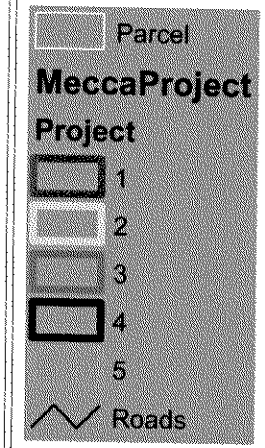

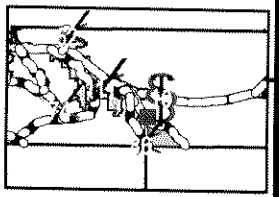

Date: 8-3-2007

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Improvement Project Area I – Vehicles in Front Yard; Trash

Improvement Project Area I – Junk Vehicles; Excess Outside Storage

Improvement Project Area I – Graffiti on stop sign

Improvement Project Area I – Graffiti on service pedestal

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PHASE II: Project Area II

All properties within the boundaries of **West**-66th Ave, **East**- 65th Ave, **North**-Emilia Way, **South**-Lincoln St.
Total number of properties: 275
0.50% of all Mecca Code Violations exist in this area

Improvement Project Plan:

Area II, consist of the second and third newest developments in Mecca, one that is still in the construction stages. These new developments are under the management of the Coachella Valley Housing Coalition (CVHC), which is stringent in its living standards for applicant homeowners. This has allowed for the community pride that is prominent in these developments, with minimal, if any existing code violations. In order to maintain these living conditions, CVHC has requested that one of our Code Staff members provide the program applicants and current homeowners a "*How to keep your property Code-free and Safe*" workshop. These maintenance workshops will be available in both English and Spanish and will be provided by a Community Improvement Specialist. The remainder of the area is comprised of Low-Income Apartments adjacent to Ave 66 and the second elementary school in the area. In addition to providing the maintenance workshops, illegal dumping education will be offered to applicants, homeowners, and/or tenants, by collaborating with CVHC and the management group of the Low-Income Apartments.

Code/ Community Issue	Approach	Tools	Partners	Code Staff
Illegal Dumping	·Educate applicants, homeowners, and/or tenants on the consequences of illegal dumping as well as how to report it, if they witness it.	• Reporting Hotline Magnets • Radio/TV • Educational Flyers (English/Spanish) • October '07 Community Cleanup Flyer	• Coachella Valley Housing Coalition • Low Income Apartment Complexes Management Company • Johnson Elementary	• Hector Herrera • Susana Orozco
Code Enforcement Maintenance Workshops	·Offered to applicants, homeowners, and/or tenants of the housing developments and complexes.	• PowerPoint, equipment, and handouts.	• Coachella Valley Housing Coalition • Low Income Apartment Complexes Management Company • Johnson elementary	• Hector Herrera • Susana Orozco
Graffiti	• Refer for Cleanup	• Hotline Phone Number	• Riverside County Sheriff's Department	• Dave Lawless • Marr Christian

Mecca Project Area 2

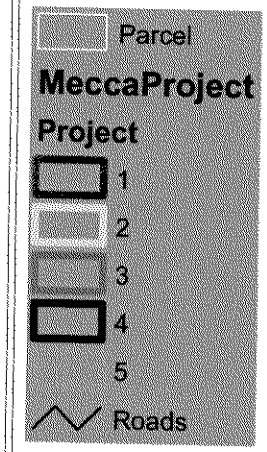

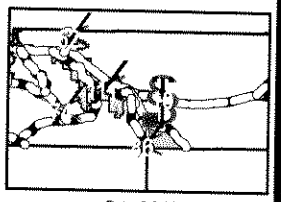

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116°4'0"W

33°34'30"N

7TH ST

6TH ST

5TH ST

4TH ST

3RD ST

2ND ST

66TH AVE

HOME AVE

FRANK JVALDOVINO RD

EMILIA WY

TERESA WY

KATHERINE DR

REBECA RD

JOHNSON ST

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Improvement Project Area II – Violation-free apartment complex

Improvement Project Area II – Violation-free apartment complex

Improvement Project Area II – Commercial Truck Parked on the Street

Improvement Project Area II – Some properties remain violation-free

Improvement Project Area II – Junk Vehicles beginning to appear

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PHASE III: Project Area III

All properties within the boundaries of **West-**2nd St.& 7th, **East-** 65th Ave, **North-**Calle Sor Juana & Date Palm St., **South**-Emilia Way.

Total number of properties: 203

19.80% of all Mecca Code Violations exist in this area

Improvement Project Plan:

Area III, consist of primarily residential properties and exudes a higher level of community pride then other areas in this project. This project area contains the Farm Worker Housing, managed by The Riverside County Economic Development Agency (EDA) and the only Catholic Church in this community. Due to the apparent level of community pride, an educational and resource approach will be taken initially. Although this area seems to have a higher level of pride, possible code violations exist to include vacant lots (posing a fire threat and prone to illegal dumping); outside storage; inoperable vehicles; and illegal dumping. Roaming animals are also present in this area and may pose a health concern to the residents of Mecca. Several partners will play a key role in the public education component and its success. These partners include EDA, members of the Housing Review Committee, local Catholic Church, Habitat for Humanity, Fire Department, Mecca Family Resource Center, Mecca Community Council, Office on Aging, and Mecca CBOs as well as local residents and businesses. Our primary objective is voluntary compliance through public education and the availability of resources. If this objective is not successfully met, our department will expand our initial approach to a "House-in-place-Policy*" style of enforcement. Lastly, by collaborating with EDA, our department will offer Illegal Dumping education to farm worker tenants that reside in the farm worker housing complexes in this area.

Code/ Community Issue	Approach	Tools	Partners	Code Staff
Vacant Lots with overgrown weeds	Identify Property owners and notify them through the Fire Department	• Notice • List of property owners for mailing notices	• Riverside County Fire Department	• Dave Lawless • Hector Herrera • Susana Orozco
Excessive Outside Storage	• Door-to-door canvassing to offer education and resources • Community Cleanup October '07 • TOM Site Information • Recycling Programs	• Flyers for Cleanup '07 & TOM site schedule • Recycling guides • Informational handout on consequences of not voluntarily complying • Citations • Abatement	• SCVSD • EDA • Environmental Health • Waste Management Department • Burrtec • Community Council • All partners listed on Media Campaign List	• Dave Lawless • Hector Herrera • Lucero Iniguez • Susana Orozco
Inoperable Vehicles	• Door-to-door canvassing to offer "Junk your Clunker" program • Flyers and posters place in local	• Flyers • Release Forms • Posters • Abatement	• Local Businesses • Local elementary schools • All partners listed on Media Campaign List	• Dave Lawless • Hector Herrera • Lucero Iniguez • Susana Orozco

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Code/ Community Issue	Approach	Tools	Partners	Code Staff
	businesses • Flyer sent home via children at local schools			
Illegal Dumping	• Door-to-door canvassing educate on illegal dumping and what the county is doing to combat it • Radio/TV • Consequences of Illegal dumping for violators and the community	• Hand pieces to outline consequences • Magnetized with hotline number to report illegal dumpers • Phone numbers to call for cleanup • Citations • Arrests	• SCVSD • All partners listed on Media Campaign list	• Dave Lawless • Marr Christian • Hector Herrera • Lucero Iniguez • Susana Orozco
Illegal 2nd Units	• Identify all housing resources by partnering with Housing Review committee stakeholders • Offer EDA Housing programs to residents	• Combined list of all housing resources and eligibility criteria for these programs • Warnings • Citations • Abatement	• Housing Review Committee • Habitat for Humanity • EDA	• Dave Lawless • Susana Orozco
Roaming Animals	• Report to Animal Services	• Report to Hotline	• Animal Services	• Dave Lawless • Marr Christian • Hector Herrera • Susana Orozco
Graffiti	• Refer for Cleanup	• Hotline Phone Number	• Riverside County Sheriff's Department	• Dave Lawless • Marr Christian

Mecca Project Area 3

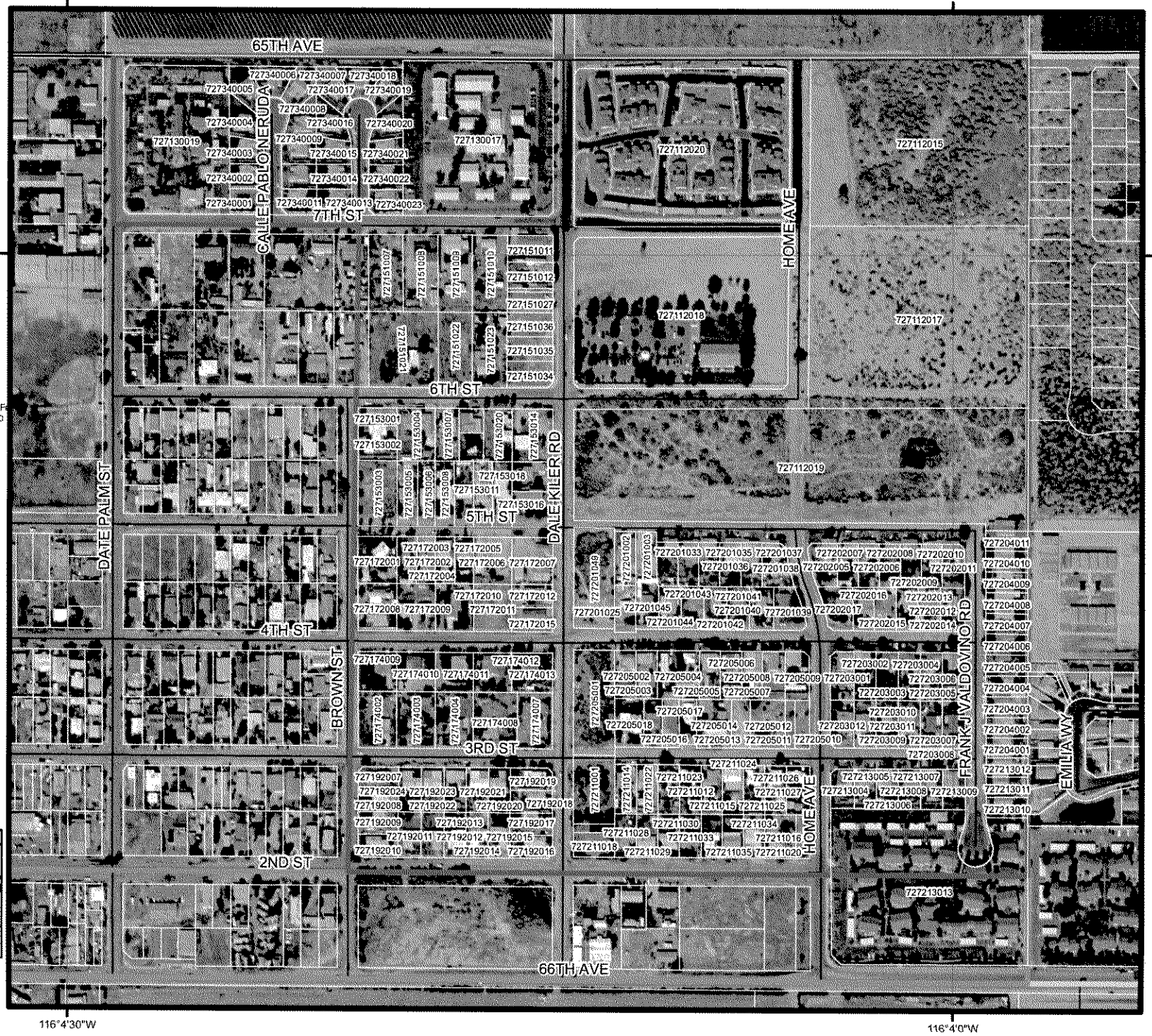
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Improvement Project Area III – Farm Worker Housing Complex

Improvement Project Area III – Trash Accumulation and Littering

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PHASE IV: Project Area IV

All properties within the boundaries of **West-**2nd St., **East-** 65th Ave & 7th St., **North-**4th St. & Lincoln St., **South**-Brown St. & Date Palm St.

Total number of properties: 256

58.60% of all Mecca Code Violations exist in this area

Improvement Project Plan:

Area IV, also known, as the "Mecca Triangle" will require comprehensive collaborative effort. This area is the hub of the community where several local residents congregate at all hours of the day. Due to its highly active nature, this area is home to several community issues ranging from criminal to third-world country living conditions. The following contain some of these identified issues and our department's approach as well as the key partners who will assist in helping bring these issues to a manageable level and help make this community a safe and livable place.

Code/ Community Issue(s)	Approach	Tools	Partners	Code Staff
Illegal Vending, gambling, public urination and intoxication	Full Enforcement	· Warnings · Citations · Arrests	• Riverside County Sheriff's Department • Environmental Health	• Dave Lawless • Marr Christian • Hector Herrera
Overnight Rental of Spaces in local parking lot	Full Enforcement	· Warnings · Citations	• Riverside County Sheriff's Department	• Dave Lawless • Marr Christian • Hector Herrera
Vagrants	Full Enforcement	· Alternative Housing Resources · Warnings · Citations · Arrests	• Riverside County Sheriff's Department	• Dave Lawless • Marr Christian • Hector Herrera • Susana Orozco
Roaming Animals	Report to Animal Services	· Hotline	• Animal Services	• Dave Lawless • Marr Christian • Hector Herrera • Susana Orozco
Frequent/Permanent Garage sales	Full Enforcement	· Warnings · Citations	• Community Council to identify properties and trends	• Dave Lawless • Hector Herrera • Lucero Iniguez • Susana Orozco
Substandard Mobile Homes	• Door to Door Canvassing • "Housing-in-Place policy"	· Alternative Housing Resources · Warnings · Citations · Abatement	• EDA • Building and Safety	• Dave Lawless • Hector Herrera • Lucero Iniguez • Susana Orozco
Illegal 2nd Units	• Door to Door Canvassing "Housing-in-Place policy"	· Alternative Housing Resources · Warnings · Citations · Abatement	• Housing Review Committee • Habitat for Humanity • EDA • Building and Safety	• Dave Lawless • Hector Herrera • Lucero Iniguez • Susana Orozco

CODE ENFORCEMENT DEPARTMENT
COUNTY OF RIVERSIDE
4080 LEMON STREET, 12TH FLOOR
RIVERSIDE, CALIFORNIA 92501
(951) 955-2004 ▪ FAX (951) 955-2023

JAY E. ORR
DIRECTOR

Code/ Community Issue(s)	Approach	Tools	Partners	Code Staff
			• Planning	
Garage Conversions	• Door to Door Canvassing "Housing-in-Place policy"	· Alternative Housing Resources · Warnings · Citations	• Fire Department • Building and Safety	• Dave Lawless • Hector Herrera • Susana Orozco
Illegal Home businesses	• Door to Door Canvassing	· Home Occupation Flyer	• Building and Safety • Planning	• Dave Lawless • Hector Herrera • Susana Orozco
Illegal Street parking	• Proactive enforcement • Radio/TV	· Warnings · Citations · Impoundment	• Riverside County Sheriff's Department	• Dave Lawless • Marr Christian • Hector Herrera
Construction without permits	• Door to Door Canvassing	· Warnings · Citations	• Building and Safety	• Dave Lawless • Hector Herrera • Lucero Iniguez
Upkeep of Newest Housing Development in Mecca	• Offer EDA Housing programs to residents	· Resource List to new tenants	• EDA • All partners of Housing Review Committee	• Dave Lawless • Susana Orozco

Mecca Project Area 4

116°4'30"W
33°34'30"N
65TH AVE
7TH ST
6TH ST
5TH ST
4TH ST
3RD ST
2ND ST
LINCOLN ST
DATE PALM ST
COAHUILLA ST
HAMMOND RD
BROWN ST
GRAPEFRUIT BLV
SH-195
SH-111
CALLE PABLO NERUDA
CALLE SOR JUANA
727120010
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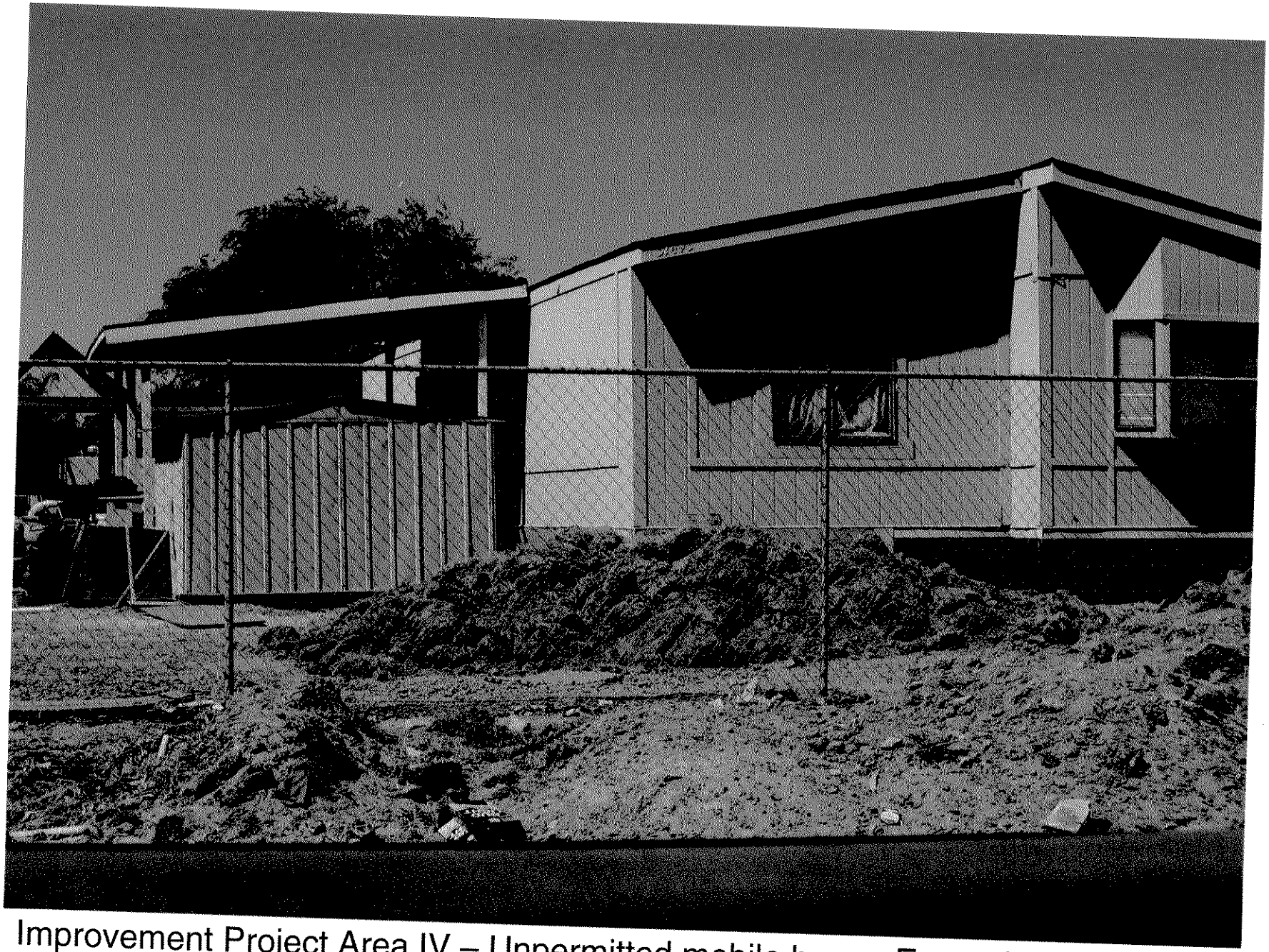

Improvement Project Area IV – Unpermitted mobile home; Excessive outside storage; Lack of landscaping

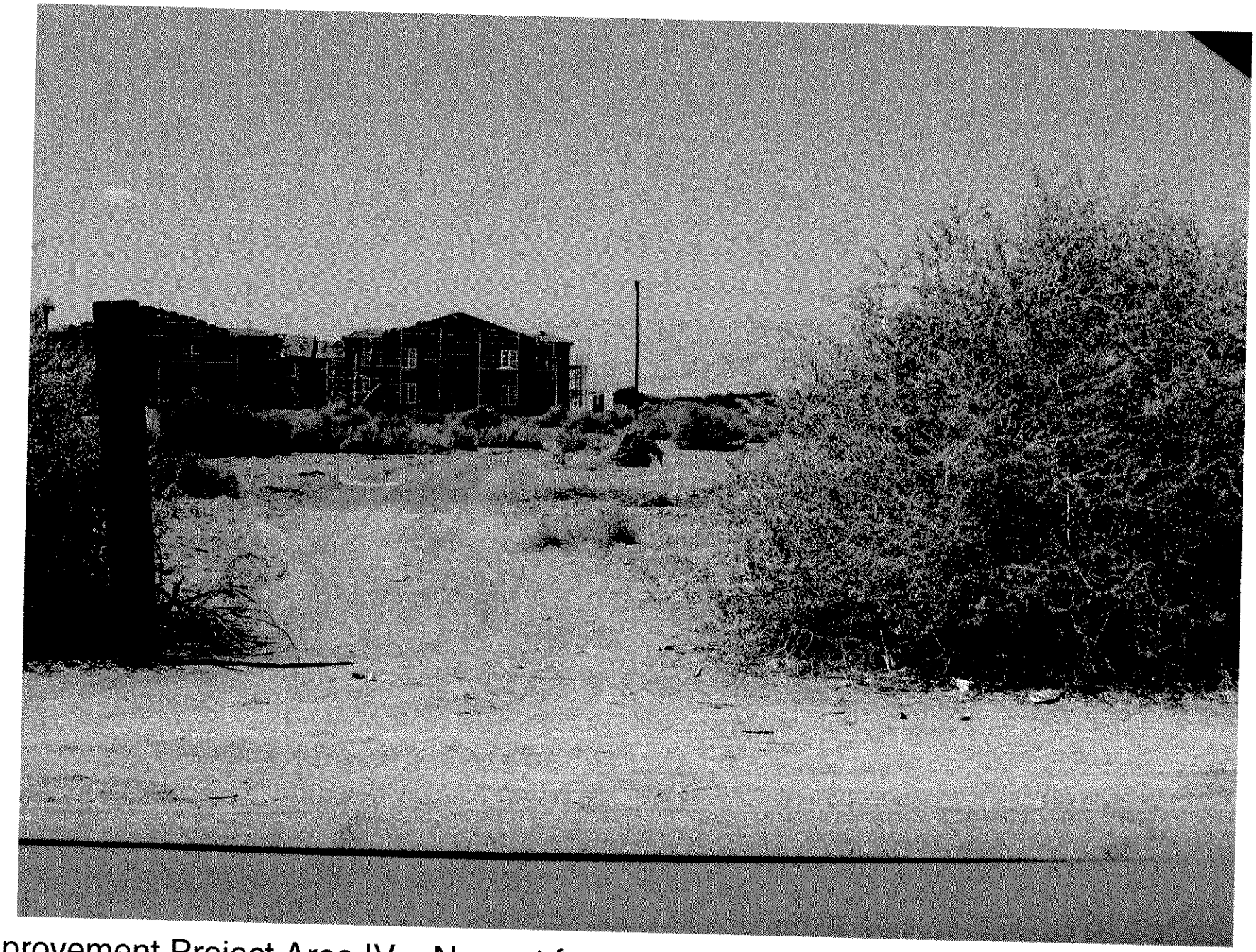

Improvement Project Area IV – Newest farm worker housing complex under construction

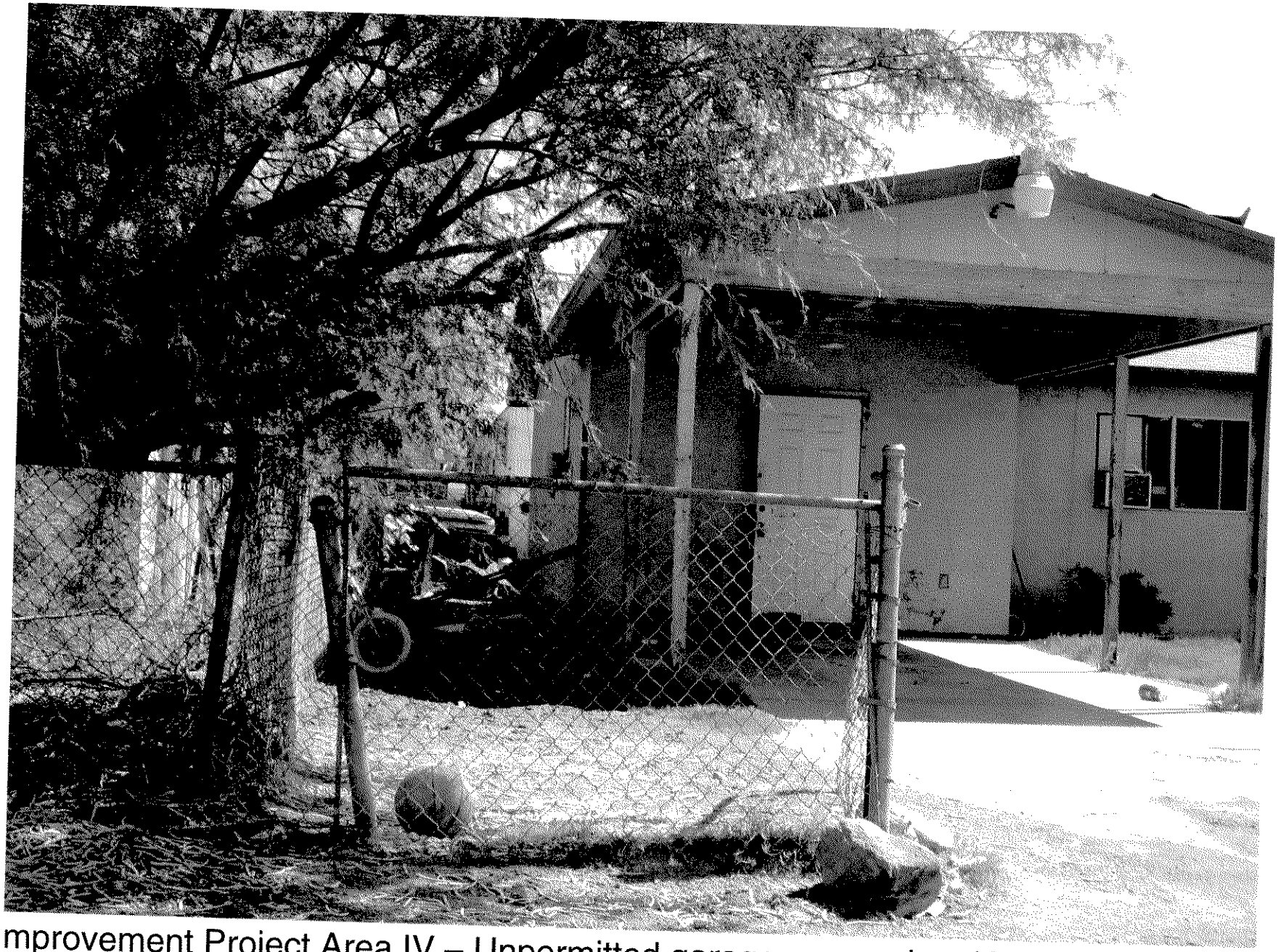

Improvement Project Area IV – Unpermitted garage conversion; Unpermitted carport; Excessive outside storage; Illegal 2nd Unit in rear

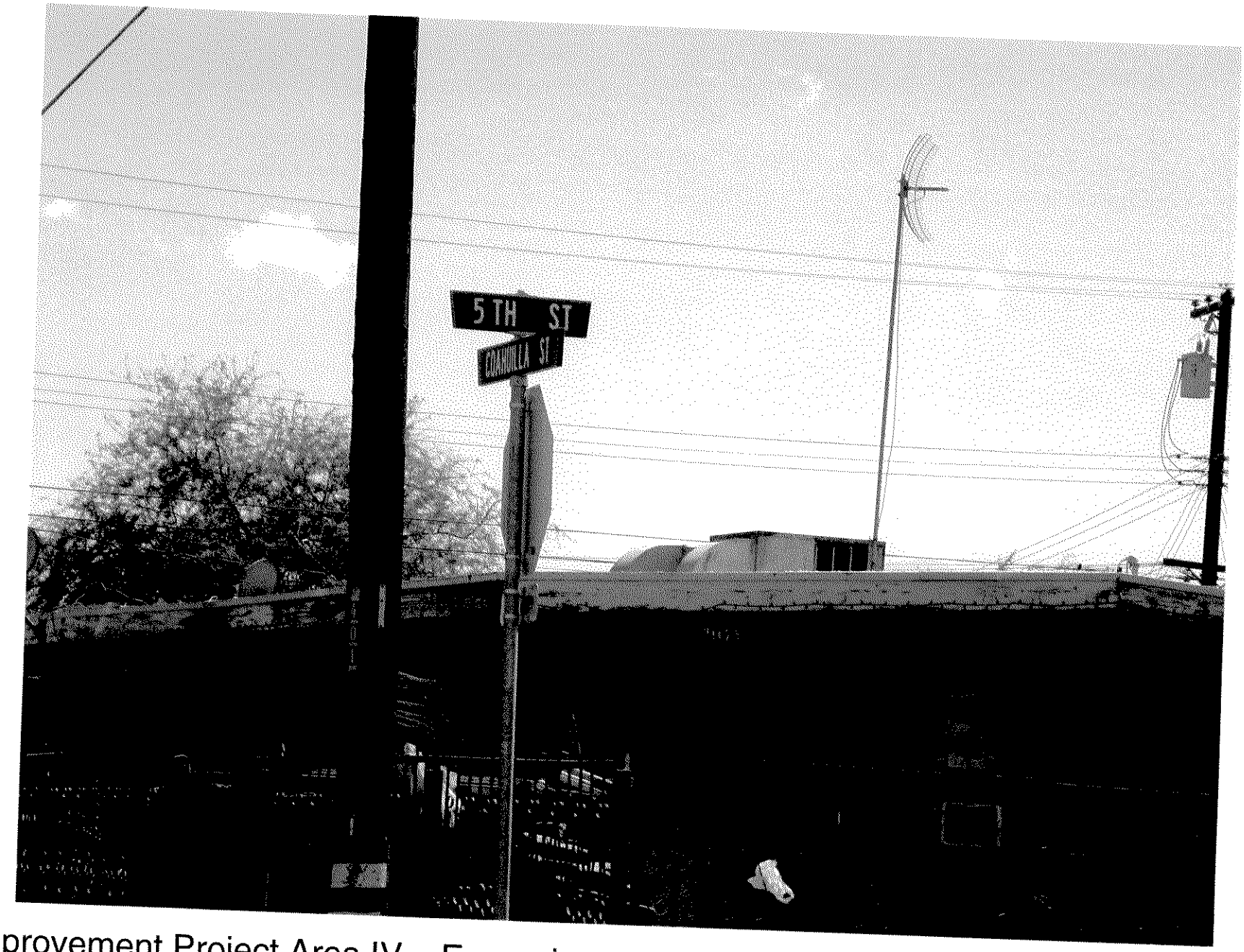

Improvement Project Area IV – Excessive outside storage; House needs maintenance

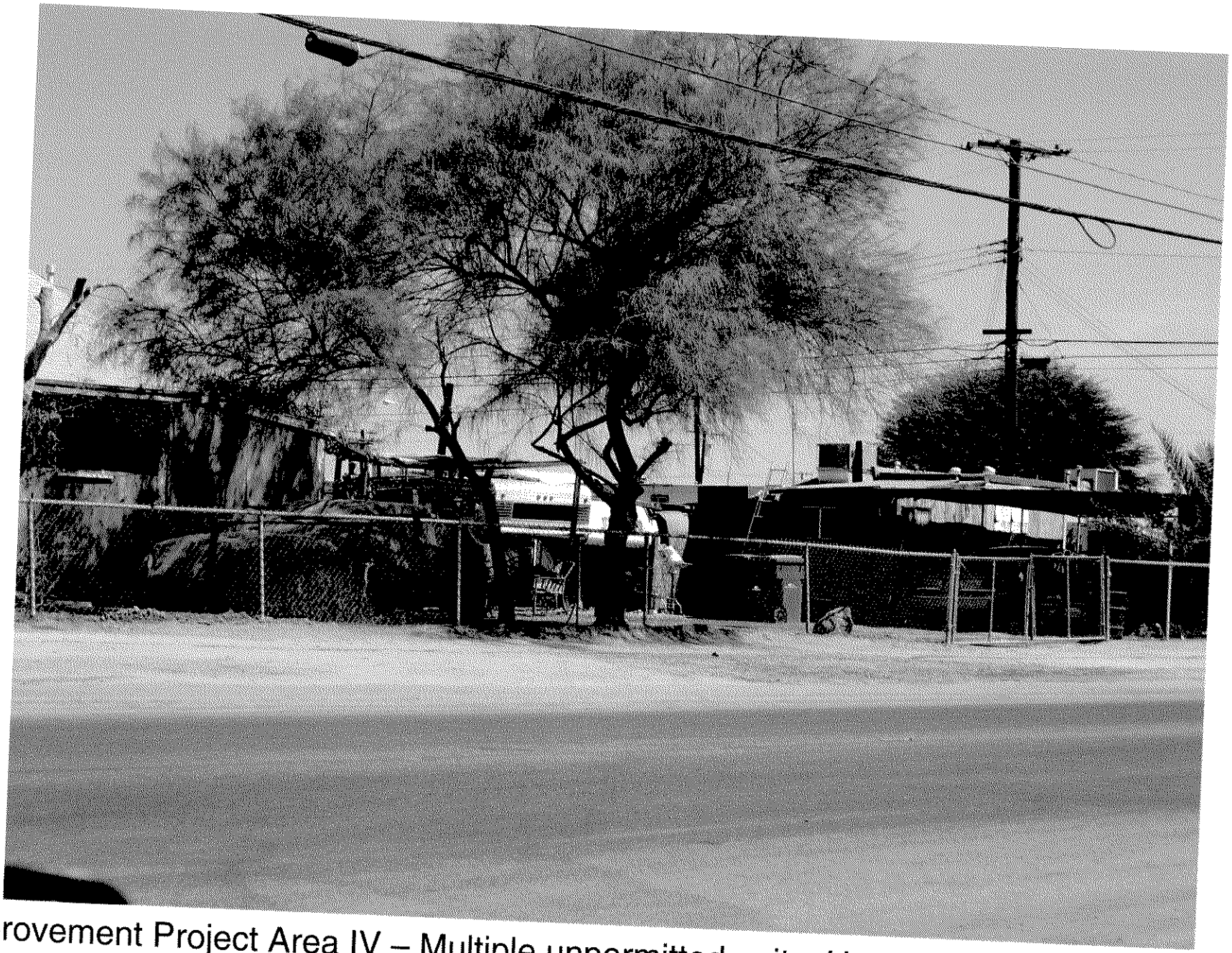

Improvement Project Area IV – Multiple unpermitted units; House needs maintenance; Unpermitted construction

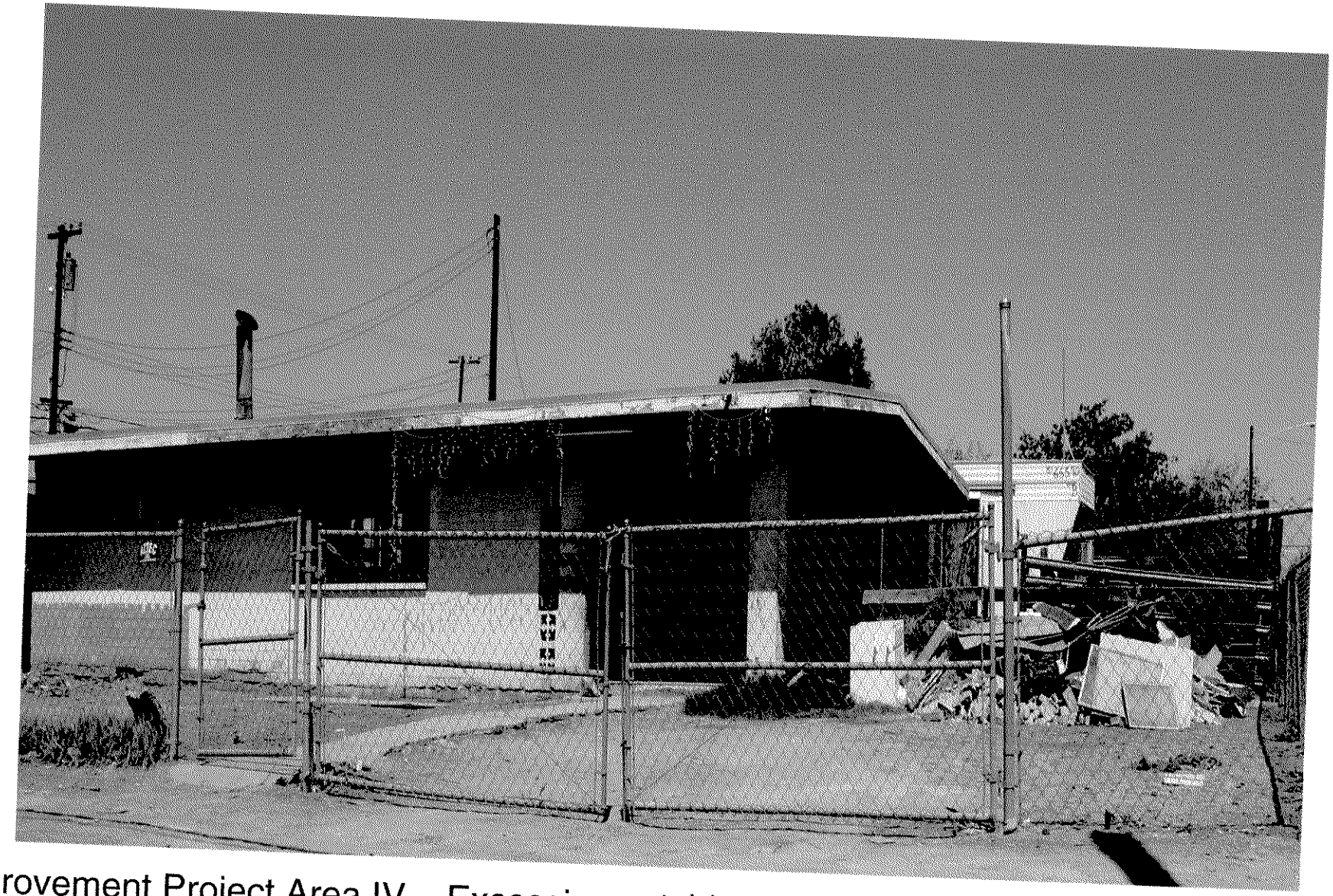

Improvement Project Area IV – Excessive outside storage; House needs maintenance; Unpermitted 2nd unit

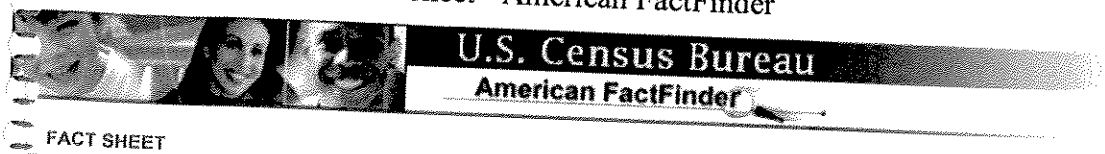

FACT SHEET

Mecca CDP, California

View a Fact Sheet for a **race, ethnic, or ancestry group**

Census 2000 Demographic Profile Highlights:

General Characteristics - show more >>	Number	Percent	U.S.		
Total population	5,402			map	brief
Male	3,042	56.3	49.1%	map	brief
Female	2,360	43.7	50.9%	map	brief
Median age (years)	22.6	(X)	35.3	map	brief
Under 5 years	571	10.6	6.8%	map	
18 years and over	3,250	60.2	74.3%		
65 years and over	199	3.7	12.4%	map	brief
One race	5,220	96.6	97.6%		
White	1,302	24.1	75.1%	map	brief
Black or African American	6	0.1	12.3%	map	brief
American Indian and Alaska Native	55	1.0	0.9%	map	brief
Asian	40	0.7	3.6%	map	brief
Native Hawaiian and Other Pacific Islander	0	0.0	0.1%	map	brief
Some other race	3,817	70.7	5.5%	map	
Two or more races	182	3.4	2.4%	map	brief
Hispanic or Latino (of any race)	5,295	98.0	12.5%	map	brief
Household population	5,290	97.9	97.2%	map	brief
Group quarters population	112	2.1	2.8%	map	
Average household size	5.04	(X)	2.59	map	brief
Average family size	4.97	(X)	3.14	map	
Total housing units	1,059			map	
Occupied housing units	1,049	99.1	91.0%		brief
Owner-occupied housing units	479	45.7	66.2%	map	
Renter-occupied housing units	570	54.3	33.8%	map	brief
Vacant housing units	10	0.9	9.0%	map	

Social Characteristics - show more >>	Number	Percent	U.S.		
Population 25 years and over	2,494				
High school graduate or higher	441	17.7	80.4%	map	brief
Bachelor's degree or higher	40	1.6	24.4%	map	
Civilian veterans (civilian population 18 years and over)	33	1.0	12.7%	map	brief
Disability status (population 5 years and over)	702	14.6	19.3%	map	brief
Foreign born	3,209	59.6	11.1%	map	brief
Male, Now married, except separated (population 15 years and over)	1,038	49.5	56.7%		brief
Female, Now married, except separated (population 15 years and over)	861	55.7	52.1%		brief
Speak a language other than English at home (population 5 years and over)	4,498	93.4	17.9%	map	brief

Economic Characteristics - show more >>	Number	Percent	U.S.		
In labor force (population 16 years and over)	2,352	65.9	63.9%		brief
Mean travel time to work in minutes (workers 16 years and over)	26.0	(X)	25.5	map	brief
Median household income in 1999 (dollars)	22,973	(X)	41,994	map	
Median family income in 1999 (dollars)	21,250	(X)	50,046	map	
Per capita income in 1999 (dollars)	6,389	(X)	21,587	map	
Families below poverty level	411	43.0	9.2%	map	brief
Individuals below poverty level	2,413	45.5	12.4%	map	

Housing Characteristics - show more >>	Number	Percent	U.S.		
Single-family owner-occupied homes	363				brief
Median value (dollars)	79,700	(X)	119,600	map	brief
Median of selected monthly owner costs	(X)	(X)			brief
With a mortgage (dollars)	764	(X)	1,088	map	
Not mortgaged (dollars)	221	(X)	295		

(X) Not applicable.

Source: U.S. Census Bureau, Summary File 1 (SF 1) and Summary File 3 (SF 3)

The letters PDF or symbol indicate a document is in the Portable Document Format (PDF). To view the file you will need the Adobe® Acrobat® Reader, which is available for **free** from the Adobe web site.

THE EASTERN COACHELLA VALLEY SOCIAL CHANGE COLLABORATIVE
MECCA FAMILY & FARMWORKERS SERVICE CENTER &
DESERT ALLIANCE FOR COMMUNITY EMPORWERMENT

Con Orgullo Presenta

2ND ANNUAL

FIESTA CAMPESINA

SAVE THE DATE!

When: *Wednesday, September 26, 2007*
Time: *2:00pm - 7:00pm*
Location: *Mecca Family Service Center & Community Health Clinic (Front Courtyard)*

Contact Person:
Maria G. Machuca
760-863-7860
mamachuc@riversidedpss.org

Registration and Details to Follow

0002205

Mecca, Thermal, Oasis, & Vista Santa Rosa Communities

Trashbuster Day

Join your neighbors and make your community a showstopper!

Show our Community Pride!
Let's clean up and show we Care!

Southern Coachella Valley Community Services District is providing dumpsters at:

- **Mecca: 4th Street & Hammond**
- **TOM Site: Hwy 111 & Avenue 63**

Saturday, October 13, 2006 8:00 AM-12:00 PM

Proof of Residency will be required upon arrival. Ex: Driver's License or Current Utility Bill

THESE ITEMS WILL BE ACCEPTED

Bulky items that will not fit in your trash bin

Examples:
- Washers
- Dryers
- Refrigerators
- Furniture
- Tree Trimmings
- Lawn Furniture

And more....

Look for this box and recycle your old CELL PHONE!!!

Please direct all questions on acceptable items to:
Burrtec Inc. (877) 505-6445
Crowson Management 760-399-5771

STOP These items will NOT be accepted

Tires
T.V's and computer monitors
Latex, Oil, or Water based Paint
Empty Drums
Batteries (Lead/Acid Only)
Computers
Solvents/Gasoline
Transmission/brake fluids
Weed killers/herbicides
Bleach/tub & tile cleaners
Other Hazardous Waste
Microwaves
Pesticides
Motor Oil
Fertilizers
Anti-Freeze
Motor Parts
Pool chemicals
Rodent poisons
Engines

For information on how to dispose of these items, contact:
Burrtec Inc. (877) 505-6445
Crowson Management 760-399-5771

Sponsored by SUPERVISOR ROY WILSON's office , Burrtec Inc., The Southern Coachella Valley Community Services District!

Mecca, Thermal, Oasis, & Vista Santa Rosa Communities

Trashbuster Day

¡Una a sus vecinos y haga nuestra comunidad una sensación!

¡Muestre su Orgullo en su Comunidad!
¡Limpiemos y mostremos devoción!

Southern Coachella Valley Community Services District proporciona contenedores de basura en:

- **Mecca: 4th Street y Hammond**
- **TOM Site: Hwy 111 y Avenida 63**

Sábado, 7 de Octubre del 2006 8:00 AM a 12:00 mediodía

La prueba de la Residencia se requerirá a su llegada. Ex: Permiso de conducir o Cuenta Actual de Utilidad

ACEPTAREMOS:

EJEMPLOS:

Lavadoras
Secadoras
Refrigeradores
Muebles
Escombros del jardín
Muebles de Jardín
Y Mas

Busque esta caja y recicle su TELEFONO CELULAR!!!!

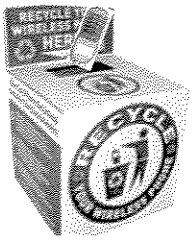

Para mas información, llame a:
Burrtec Inc. (877) 505-6445
Crowson Management 760-399-5771

STOP

Estos artículos no se aceptarán:

Llantas
Pintura/Solventes
Insecticidas
Aceite de motor
Materiales Peligrosos
Partes de Automóvil:
Incluyendo transmisión y motor
Microondas
Fertilizantes
Pilas de Plomo o Acido
Gasolina
Decolorante
Líquidos de Transmisión y Frenos

Para mas información, llame a:
Burrtec Inc. (877) 505-6445
Crowson Management 760-399-5771

¡Patrocinado por la oficina del SUPERVISOR ROY WILSON, Burrtec Inc., y Southern Coachella Valley Community Services District!

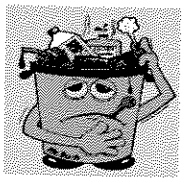

Household Hazardous Waste Collection Program
July - December 2007

What is Household Hazardous Waste?

All The Items Listed Below And More!

Household Hazardous Waste Collection Sites will take ALL Household Hazardous Waste

Before transporting waste to the collection event or facility, please use this checklist to make sure you have done the following:

- ☐ **Have I used up every product to the fullest extent possible?**
- ☐ **Have I offered good, usable products I can't use to my neighbor, family or friends?**
- ☐ **Does the amount of waste I want to transport exceed 5 gallons or 50 pounds of chemical waste? (State Law Required transportation limitation.)**
- ☐ **Are any of the containers leaking? (If they are, place them in a container or material that will not allow the leak to spread and place securely in the vehicle for safe transport.)**
- ☐ **Is the waste in its original container or is it properly labeled as to the contents? (The contents of the container must be the same as stated on the label. If not, cover up the label and write the name of its content.)**
- ☐ **Are the items placed in a sturdy container, such as cardboard or wooden box, for transporting? (Wrap glass bottles in newspaper to prevent breakage.)**
- ☐ **Is the box placed in the trunk of your car or in the bed of your pickup truck and secured to prevent movement? (Keep items away from passengers.)**

Follow directions once you reach the event site. You will be asked to turn off your motor and stay in your vehicle. The site staff will unload the material from your vehicle.

THIS EVENT IS FOR RESIDENTIAL USE ONLY. PHOTO DOCUMENTATION WILL BE MADE OF EXCESSIVE OR SUSPECTED NON-RESIDENTIAL LOADS COMING TO EVENT.

The following waste CANNOT be accepted at ANY Riverside County HHW collection facility:
Ammunition, Asbestos or other Remediation Waste, Compressed Gas Cylinders Greater than 40 pounds
Explosives, Infectious or Medical Waste other than Home-Generated Sharps, Radioactive Waste,
Non-Residentially Generated Waste, Waste Generated Outside of Riverside County.

If you have any of the above wastes please call (951) 486-3200 for assistance.

Acceptable Materials

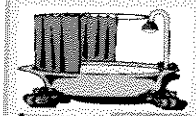

BATHROOM
*Chlorine bleach
*Nail polish remover
* Deodorizer/Air freshener
*Shoe Dye
*Disinfectant
*Toilet, Tub & Tile cleaner
*Mercury Devices

KITCHEN
*Aerosol cans
*Floor care products
*Aluminum cleaner
*Furniture polish
*Ammonia
*Oven cleaner
*Drain opener
*Microwave Oven

WORKSHOP
*Caulking
*Paint stripper
*Wood preservative
*Gun cleaner
*Paint Thinner/Turpentine
*Glue
*Fiberglass & Epoxy Resins
*Photo chemicals
*Paint latex/oil based
*Varnish

GARDENING
*Fertilizer
*Slug and snail poison
*Fungicide
*Weed killer/herbicides
*Insecticides/Pesticides
*Aerosol Cans
*Moss Killer

GARAGE
*Antifreeze
*Engine degreaser
*Transmission & Brake fluid
*Auto Batteries
*Gas, Diesel fuel
*Fluorescent Tubes
*Carburetor cleaner
*Motor Oil
*Rodent Poison
*Chrome polish
*Oil filters

MISCELLANEOUS
*Artist's paints
*Kerosene/lamp oil
*Rug cleaner
*BBQ propane tanks
*Lighter fluid
*Sharps
*Batteries
*Moth balls/flakes
*Spot remover w/solvent
*Flea powder
*Pool/spa chemicals
*Electronic Devices

Household Hazardous Waste Schedule

ALL SITES ARE OPEN FROM 9:00 am to 2:00 pm
CLOSED: During Inclement Weather or other Hazardous Conditions

Facilities are closed on Holiday Weekends unless otherwise scheduled

Maximum Chemical Load: 5 gallons or 50 lbs. (Per trip)

July - December 2007

Date	Location
July 07, 2007	Lake Elsinore
July 07, 2007	Pedley
July 14, 2007	Pedley
July 21, 2007	Pedley
July 28, 2007	Pedley
Aug. 04, 2007	Lake Elsinore
Aug. 04, 2007	Pedley
Aug. 11, 2007	Pedley
Aug. 18, 2007	Pedley
Aug. 25, 2007	Pedley
Sep. 01, 2007	Lake Elsinore (Only)
Sep. 08, 2007	Pedley
Sep. 08, 2007	Riverside
Sep. 15, 2007	Pedley
Sep. 15, 2007	Temecula
Sep. 21, 2007	Corona
Sep. 22, 2007	Corona
Sep. 22, 2007	Pedley
Sep. 29, 2007	Anza
Sep. 29, 2007	La Quinta
Sep. 29, 2007	Pedley
Oct. 06, 2007	Lake Elsinore
Oct. 06, 2007	Norco
Oct. 06, 2007	Pedley
Oct. 12, 2007	Moreno Valley
Oct. 13, 2007	Moreno Valley
Oct. 13, 2007	Pedley

Date	Location
Oct. 20, 2007	Aguanga
Oct. 20, 2007	Pedley
Oct. 20, 2007	Blythe
Oct. 26, 2007	Palm Springs
Oct. 27, 2007	Palm Springs
Oct. 27, 2007	Oasis
Oct. 27, 2007	Pedley
Nov. 02, 2007	Cathedral City
Nov. 03, 2007	Cathedral City
Nov. 03, 2007	Lake Elsinore
Nov. 03, 2007	Pedley
Nov. 10, 2007	HOLIDAY CLOSURE
Nov. 16, 2007	Hemet
Nov. 17, 2007	Hemet
Nov. 17, 2007	Pinyon Pines
Nov. 17, 2007	Banning
Nov. 17, 2007	Pedley
Nov. 24, 2007	HOLIDAY CLOSURE
Nov. 30, 2007	Corona
Dec. 01, 2007	Corona
Dec. 01, 2007	Pedley
Dec. 08, 2007	Riverside
Dec. 08, 2007	Pedley
Dec. 15, 2007	Anza
Dec. 15, 2007	Indio
Dec. 15, 2007	Pedley
Dec. 22, 2007	HOLIDAY CLOSURE
Dec. 29, 2007	HOLIDAY CLOSURE

Zero Waste - You make it happen!

RECYCLE USED OIL

Funded by a Grant from the California Integrated Waste Management Board.

Holiday Closure Dates

September 1, 2007 (except Lake Elsinore)
November 10, 2007
November 24, 2007
December 22, 2007
December 29, 2007

Household Hazardous Waste Collection Locations

Permanent Facilities
(All Hazardous Waste Types)

Lake Elsinore Area (HHW)
City Maintenance Facility
521 N. Langstaff St. (92530)
TB 866 E4 (cross Sumner)
Open 1st Saturday each month except December and January, 9:00 AM to 2:00 PM

Palm Desert Area (HHW)
(Open to Palm Desert Residents ONLY)
41-800 Corporate Way (92260)
Behind Post Office on Hovley Lane
TB 818 H5 (between Portola & Cook)
(760) 340-2113
NON-Holiday Saturdays. 9:00 AM to 1:00 PM

Pedley Area (HHW)
County Road Yard
6851 Van Buren Blvd.(92503)
TB 684 E6 (at Clay St.)
NON-Holiday Saturdays. 9:00 AM to 2:00 PM

Temporary Event Locations
(See Schedule for Dates &Times)

Aguanga Fire Station
44222 Sage Rd. (92536)
Cottonwood Fire Station
TB 981 J4 (cross North of Hwy 79)

Anza Transfer Station
40329 Terwilliger Rd. (92539)
TB 965 E3 See Page 964 (cross South Of Hwy 371 & adjacent to the Cahuilla Reservation)

Banning Area
Repplier Park
789 N San Gorgonio Ave. (92220)
TB 722 B2 (cross Wilson St.)

Blythe Area
County Administration Center
260 N. Broadway St. (92225)
TB 5491 E6 (cross Murphy St.)

Cathedral City Area
68-700 Avenida Lalo Guerrero (92234)
TB 787 E7 (cross Van Fleet & Buddy Rogers)

Corona Area
City Corporate Yard
730 Corporate Yard Way (92880)
TB 743 C4 (cross Cota St.)

Hemet Area
County Road Yard
595 N. Juanita St. (92543)
TB 811 A6 (cross Oakland Ave.)

Indio Area
Date Festival Fairgrounds
46-350 Arabia St. (Gate #6) (92201)
TB 5470 F2 (cross Dr. Carreon Blvd.)

La Quinta Area
Parking Lot South Side of Ave. 52
78106 Francis Hack Ln. (92253)
TB 849 F7 (cross Desert Club Dr.)

Moreno Valley Area
City Maintenance Facility
15670 Perris Blvd. (92251)
TB 747 G2 (cross N. of Iris Ave.)

Norco Area
Norco Community
3900 Acacia Ave.(92860)
TB 713 E3 (cross Taft at Hamner Ave.)

Oasis Area
Oasis Landfill
84-505 84th Avenue (92274)
TB 5772 H3 (cross Highway 86)

Palm Springs Area
Fire Department Training Center
3000 E. Alejo Rd. (92262)
TB 786 H1 (cross Civic Dr.)
Palm Springs Seniors 1-800-449-7587

Pinyon Pines Area
Pinon Flats Transfer Station
TB 907 H7 See Page 906 (cross South End of Pinon Flats Road)

Riverside Area
City Corporate Yard
8095 Lincoln Ave.(92503)
TB 715 D5 (cross St. Lawrence St.)

Temecula Area
43200 Business Park Dr. (92590)
City Public Works Parking Lot Across from City Hall
TB 958 G6

All sites will accommodate multiple trips if storage capacity allows
COLLECTION SITES MAY BE CLOSED DURING INCLEMENT WEATHER

TB = Thomas Bros. Guide

Household Hazardous Waste Information (800) 304-2226 or www.rivcowm.org

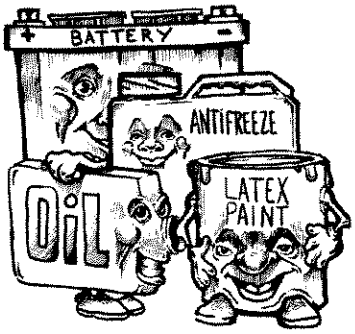

ABOP Centers

Antifreeze, Batteries, Oil (and Filters), and Paint (Latex) ONLY Collection Center

SATURDAY 9:00 am to 2:00 pm (see details for each)

CLOSED: During Inclement weather and hazardous conditions.

RECYCLE USED OIL

HOLIDAY CLOSURE DATES:
9/1/07, 11/10/07, 11/24/07, 12/22/07, and 12/29/07

RECYCLE USED OIL FILTERS

Accepting: Cooking Oil

Murrieta Area
County Road Yard
25315 Jefferson Ave. (92562)
TB 928 C6 (cross Murrieta Hot Springs Rd.)
NON-Holiday Saturday's 9:00 AM to 2: 00 PM.

Palm Springs Area
Fire Department Training Center
3000 E. Alejo Rd. (92262)
TB 786 H1 (cross Civic Dr.)
NON-Holiday Saturdays. Oct - May 9:00 AM to 2:00 PM
NON-Holiday Saturdays. Jun - Sept 7:00 AM to 12:00 PM

Proper Disposal of Medication and Sharps

Most medications are not considered hazardous waste and can be disposed of in regular trash. Remove personal information from containers.

Liquid Empty liquid medication onto absorbent paper towels or rags and throw in trash.

Pill Crush pills, mix with coffee grounds or kitty litter, and dispose of mixture in

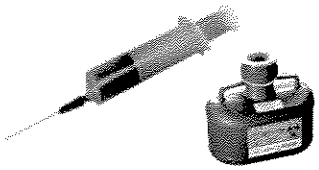

Inhaler Empty container, expel propellant, and toss empty cylinder in trash.

Sharps/ Needles Must be placed in a secure approved sharps container and brought to a Household Hazardous Waste collection for disposal. FREE Approved containers are available while supply lasts. If a container is not available, put sharps in rigid plastic jug (bleach bottle), tighten lid, secure with tape, and place label "SHARPS/NEEDLES". **ALWAYS BRING SHARPS TO HHW EVENT.**

Small Business Waste

Conditional Exempt Small Quantity Generator (CESQG) 1-800-952-5566

What is a CESQG? Businesses that generate up to 27 gallons or 220 lbs. of hazardous waste, or 2.2 lbs of extremely hazardous waste per month are called CESQG's. These businesses are required to use a licensed hazardous waste hauler to manifest and transport their waste. The most common CESQG's are painters, print shops, auto shops, builders, churches, schools, non-profit groups and property managers.

What is the CESQG Program? This Program is a hazardous waste pick-up disposal service for eligible businesses/non-profit organizations in the County of Riverside. This Program provides small quantity generators with a legal and affordable way to dispose of their waste with all legal documentation provided as part of the service.

How do I get service? To arrange an appointment for the **CESQG** Program, call 1 (800) 952-5566. A disposal fee will be charged based on the type and amount of waste.

Storm Water

ONLY RAIN DOWN THE STORM DRAIN

What is the #1 reason water bodies such as creeks, rivers, and lakes get dirty? It's from pollutants that flow into storm drains then make their way to your favorite water recreational facility. The storm drain system is designed to prevent flooding and is not connected to a treatment facility.

Call **1-800-506-2555** to report storm drain disposal or obtain more information.
You can also email us at **flood.fcndes@co.riverside.ca.us** or visit **www.floodcontrol.co.riverside.ca.us**

TOTAL TONS October '06 to NOW: 742

Cleanup Date	Community/ APN	Targeted Location	Tonnage Collected
	Mecca	Ave. 60 East of Polk Street (North Side)	
	Mecca	67-105 Hwy 111 (St. Anthony MHP)	
4/4/07	Mecca	Vargas Rd. South of Ave. 62	
4/4/07	Mecca	Vargas Rd. South of Ave. 62	14.23
4/11/07	Mecca	Vargas Rd. South of Ave. 62	15.42
	Mecca	South of Avenue 62 and West of Polk Street	12.95
	Mecca	Ave 68 East of Hammond Rd	
4/4/07	Mecca	Date Palm St. (unpaved ext. between Ave. 63 & Ave. 64)	
4/4/07	Mecca	Johnson St. near Ave. 64	22.51
	Thousand Palms	Datil Road between Sierra Del Sol & Calle Helene	84.36
6/1/07	Thousand Palms	San Miguelito Drive by Ramon & Datil	
	Bermuda Dunes	Alley between Ave 42 and Runaway Bay Drive	12.39
		Oakado Lane	
	Thousand Palms	Vacant Land @ Vista Del Sol and Ramon Rd	
	Thousand Palms	Vacant Land @ Varner Rd and Jack Ivey Drive	
	Thousand Palms	Vacant Land @ dead end of 30th Ave by Monte Vista Wy	
4/4/07	Mecca	70th Street	
4/26/07	Mecca	70th Street	42.86
5/2/07	Mecca	70th Street	1.41
5/2/07	Mecca	70th Street	1.07
5/2/07	Mecca	70th Street	1.08
5/2/07	Mecca	70th Street	2.65
5/2/07	Mecca	70th Street	2.82
5/2/07	Mecca	70th Street	2.71
5/2/07	Mecca	70th Street	2.75
5/2/07	Mecca	70th Street	2.03
5/2/07	Mecca	70th Street	1.41
4/4/07	Mecca	Cleveland	4.01
4/11/07	Mecca	Hammond Rd	12.47
4/16/07	Mecca	Hammond Rd	9.9
4/18/07	Mecca	Hammond Rd	15.27
4/18/07	Mecca	Hammond Rd	15.45
5/10/07	Mecca	Hammond Rd	5.7
5/10/07	Mecca	Hammond Rd	2.11
5/10/07	Mecca	Hammond Rd	0.49
5/10/07	Mecca	Hammond Rd	1.8
5/10/07	Mecca	Hammond Rd	0.66
5/10/07	Mecca	Hammond Rd	1.17
4/11/07	Thermal	Fillmore St.	12.82
4/11/07	Mecca	Polk St	8.21
4/11/07	Ripley near Blythe	Buchanon St	9.09
4/18/07	Ripley near Blythe	Buchanon St	9.41
6/1/07		Buchanan St	2.59
4/11/07	Ripley near Blythe	Commercial	13.61
4/11/07	Ripley near Blythe	Commercial	40.43
4/16/07	Ripley near Blythe	Washington Avenue	78.14
4/16/07	Ripley near Blythe	Esparanza Avenue	22.39
4/18/07	Ripley near Blythe	Esparanza Avenue	6.89
4/18/07	Ripley near Blythe	Esparanza Avenue	4.71
4/18/07	Ripley near Blythe	Esparanza Avenue	4.65
4/25/07	Bermuda Dunes	Adams Street	1.08
4/25/07	Bermuda Dunes	Adams Street	2.65
4/25/07	Bermuda Dunes	Adams Street	2.82
4/25/07	Bermuda Dunes	Adams Street	2.75
4/26/07	Bermuda Dunes	Adams Street	4.01
4/26/07	Bermuda Dunes	Adams Street	1.07
4/25/07	Bermuda Dunes	42nd Street	3.31
4/25/07	Bermuda Dunes	42nd Street	6.62

Cleanup Date	Community/ APN	Targeted Location	Tonnage Collected
4/25/07	Bermuda Dunes	42nd Street	3.85
4/25/07	Bermuda Dunes	42nd Street	0.36
4/25/07	Bermuda Dunes	42nd Street	0.28
4/25/07	Bermuda Dunes	42nd Street	4.47
4/25/07	Bermuda Dunes	42nd Street	1.08
4/25/07	Bermuda Dunes	42nd Street	2.37
4/25/07	Bermuda Dunes	42nd Street	10.91
5/10/07	Bermuda Dunes	42nd Street Alley	1.59
5/10/07	Bermuda Dunes	42nd Street Alley	5.97
5/10/07	Bermuda Dunes	42nd Street Alley	4.69
5/10/07	Bermuda Dunes	42nd Street Alley	0.87
5/10/07	Bermuda Dunes	42nd Street Alley	0.87
5/10/07	Bermuda Dunes	Savanna Lamar Alley Way	10.09
5/10/07	Bermuda Dunes	Savanna Lamar Alley Way	5.97
5/10/07	Bermuda Dunes	Savanna Lamar Alley Way	3.29
5/10/07	Bermuda Dunes	Savanna Lamar Alley Way	4.52
5/29/07	Blythe	Vernon Road	4.81
6/1/07	Blythe	Vernon Road	22.39
6/1/07		Varner Rd. @ Monterey	22.59
6/1/07		Airport Blvd	13.29
6/1/07	Indio Alleys	Carver Tract	24.31
8/6/07	North Shore	North Shore	38.02
			26.09

Code Enforcement
Mecca Improvement Plan
Staff Contact List

Staff Name	Staff Title	Staff Phone Number
Dave Lawless	Supervising Code Enforcement Officer	760.863.7591 – Office 760.272.8137 - Cell
Hector Herrera	Senior Code Enforcement Officer	760.863.7155 – Office 760.272.8192 - Cell
Vicki Haeberle	Code Enforcement Officer III	760.863.7216 – Office 760.578.2218 - Cell
Lucero Iniguez	Code Enforcement Officer II	760.863.7696 – Office 760.578.3017 - Cell
Marr Christian	Supervising Code Enforcement Officer	951-955-2004 - Office 951-830-8955 - Cell
Susana Orozco	Community Improvement Supervisor	951.955.2856 – Office 951.368.7790 - Cell

Examples of Miscellaneous Committee Agendas

CIP TEAM AGENDA
Executive Office, Conference Room D
May 11, 2008 3:30 p.m.
(BOS Date 5/20/08)

1. Call to Order

2. Forms 11

306 Housing Authority – Replacement of Heat and Air Conditioning at the Midway Capri Apartments in the City of Perris

308 FM – Mid-County Hub Jail Facility and Sheriff Related Capital Improvement Projects – Approval of Sole Source Award

324 FM – First Amendment to Lease – Code Enforcement, Thousand Palms

329 FM – Policy for Use of the Conference Center Facilities Located within the Monroe Conference Center and Proposal of Facility Rental Rates – Board Policy H-28

330 E0 – National Pollution Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) Program, Memorandum of Agreement for the Santa Margarita Watershed pursuant to Investigative Order R9-2006-0076 issued by the San Diego Regional Water Quality Control Board.

336 FM – Larry D. Smith Correctional Facility Expansion No. 3 Utility Service Infrastructure – Approve Plans and Specifications

357 RDA – Approval of Architectural Agreement for the proposed Cabazon Civic Center

357C EDA – Findings for the proposed Cabazon Civic Center

3. Items for Discussion

4. Open Agenda

5. Next Meeting Date

CIP TEAM AGENDA
Executive Office, Conference Room D
February 19, 2008 9:00 a.m.

1. Call to Order

2. Forms 11

952 RDA – Adoption of RDA Resolution No. 2008-009, Notice of Intent to Purchase Real Property within the Home Gardens Sub Area, APNs 135-022-003, 135-022-028, and 135-022-030, 2nd District

910 FM – Architectural Services Agreement-Riverside County Regional Medical Center Emergency Treatment Services Facility Expansion

921 FM – Perris Fueling Facility and Car Wash

929 EO/Fire – Reprogramming of Development Impact Fee (DIF) Allocation for the Glen Oaks Fire Station and revisions to the DIF Public Facilities Needs list

948 RDA – Approval of Plans and Specifications for Thousand Palms Fire Station and Training Center

967 EO – National Pollution Discharge Elimination System (NPDES) Municipal Separate Stormwater Sewer System (MS4) Permit Implementation Agreement for the Whitewater Watershed-Colorado River Basin Region

968 RDA – Home Gardens Library Expansion Project

981 FM – Architectural Services Agreement – Indio District Attorney and Public Defender Renovation Project

983 EO – Adoption of Resolution No. 2008-080, a Revision to Resolution No. 2005-144, Establishing Administrative Procedures Concerning the Implementation of the Development Impact Fee Program under Ordinance No. 659

984 FM – Resolution No. 2008-032, Authorization to Purchase Real Property in the Unincorporated Eastvale Area of Western Riverside County

100 FM – Larry D. Smith Correctional Facility Expansion No. 3

101 FM – Resolution No. 2008-111, a Resolution of Necessity Regarding Facilities for a new Public Law Library and County Office Space related to the Administrative of Justice

3. Items for Discussion

4. Open Agenda

5. Next Meeting Date

RIVERSIDE COUNTY STORMWATER MANAG
MANAGEMENT STEERING COMM
SANTA ANA & SANTA MARGARITA R

MEETING AGENDA

(Lunch Served)

11:30 a.m. * – 12:30 p.m. February 21, 2008

Room C/D

Riverside County Administrative Office, Fourth Floor

4080 Lemon Street, Riverside, CA 92501

* meeting to begin at 11:30 a.m. or immediately following the WRCOG TAC meeting should i

1. Welcome and Self Introduction – Dusty Williams, RCFC& WCD
2. Review February 21, 2008 Agenda and Approval of October 18, 2007 Meetin
3. Dusty Williams, RCFC& WCD
   - Santa Ana/Santa Margarita Program Status - Jason Uhley, RCFC& WCD
   - Legislative Update
   - Permit Renewal Update
   - Audits/NOVs
4. Presentation: Review of current programs and what to expect moving forward – Jason Uhley, RCFC& WCD
5. TMDL Development - Jason Uhley, RCFC& WCD
   - Lake Elsinore and Canyon Lake Nutrient TMDL
   - Middle Santa Ana River Watershed Bacteria Indicator TMDL
   - Canyon Lake Bacteria Indicator TMDL
6. New Agenda Items/Schedule Next MSC Meetings - Jason Uhley, RCFC& WCD
   - April 17th*, August 21st*, Oct 16th*

*Tentative meeting dates pending WRCOG 2008 schedule

RIVERSIDE COUNTY STORMWATER MANAGEMENT PROGRAM
MANAGEMENT STEERING COMMITTEE
SANTA ANA/SANTA MARGARITA REGIONS

MEETING MINUTES
for
October 18, 2007

I. ***Attendees:***

Benjie Cho	RCFC&WCD
Steve Stump	RCFC&WCD
Charlene Warren	RCFC & WCD
Mike Shetler	Riverside County Executive Office
Joe Aklufi	City of Beaumont
Lori Moss	City of Canyon Lake
Cordell Chavez	City of Corona
Duane Baker	City of ~~Corona~~ Hemet
Kent Wegelin	City of Moreno Valley
Jeff Allred	City of Norco
Tom Boyd	City of Riverside
Barry McClellan	City of San Jacinto

II. ***Welcome and Self Introductions – Steve Stump***
Steve Stump welcomed everyone to the meeting and initiated self introductions of attendees.

III. ***Review October 18, 2007 Agenda and Approval of September 20, 2007 Meeting Minutes – Steve Stump***
There were no changes to the agenda. Meeting minutes were approved.

Handouts Provided:

- Agenda for October 18, 2007
- Minutes for September 20, 2007
- Letter to Santa Ana Regional Board – Re: Support for Low Impact Design (LID) Testing and Demonstration Facility dated October 10, 2007
- Santa Ana Regional Board – Notice of California Environmental Quality Act (CEQA) Scoping Meeting dated August 27, 2007

IV. ***Santa Ana/Santa Margarita Program Status – Benjie Cho***

- **District LID testing project has been approved** – Benjie Cho informed attendees that a $475,000 grant was received from SAWPA's Proposition 13 Allocation for LID testing project. The District will be retrofitting its compound to incorporate the LID demonstration and testing facility. A brief discussion ensued among the group regarding LID testing. For more information regarding the LID demonstration and testing facility, please refer to the handout provided at the meeting (Letter to Regional Board Re: Support for Low Impact Design Testing and Demonstration Facility).

- ***Permit Renewal Update*** – Benjie reported that the draft permit is due to be released by the Santa Ana Regional Board in approximately 4 weeks. Steve asked attendees if they would like a presentation of what's contained in the draft Permit. The group was very interested in both a review of existing programs as well as a summary of new permit requirements. Discussion ensued briefly between Tom Boyd, Benjie, and Steve regarding Permit issues

Santa Ana/Santa Margarita Region MS4 Permits

Jason E. Uhley, P.E.
Riverside County Flood Control & Water Conservation District

Presentation Outline

- MS4 101
- Santa Ana/Santa Margarita Watershed Overview
- MS4 Compliance Structure
- Individual Program Components
  1. Current
  2. Likely Future
- TMDLs, Grants, and other related issues

Glossary of Acronyms

- BMP – Best Management Practice
- CASQA – California Stormwater Quality Association
- CWA – Clean Water Act
- CWC – California Water Code
- DAMP – Drainage Area Management Plan
- IC/ID – Illegal Discharge/Illicit Connection
- LIP – Local Implementation Plan
- MS4 – Municipal Separate Storm Sewer System
- NPDES - National Pollutant Discharge Elimination System

Glossary of Acronyms

- RWQCB – Regional Water Quality Control Board
- SAR – Santa Ana Region
- SMR – Santa Margarita Region
- SWMP – Storm Water Management Plan
- SWPPP – Storm Water Pollution Prevention Plan
- TMDL – Total Maximum Daily Load
- WDID – Waste Discharge Identification Number
- WQMP – Water Quality Management Plan

Introduction to NPDES MS4 Permits

- Required by Federal Clean Water Act
- Issued by RWQCB on behalf of USEPA
- Five-year term
- Designed to regulate discharges of Urban Runoff from MS4s to Waters of U.S.
  1. Manage non-stormwater discharges from urban areas
  2. Mitigate impacts of Urban Stormwater Runoff on Waters of the U.S.
- Violations can be assessed at $25,000 per day

Introduction to NPDES MS4 Permits

Typical Permit Compliance Programs Address:

- Legal Authority
- Elimination of Illegal Connections/Discharges
- Construction Inspection
- Business Inspection
- Municipal Facility and Activity BMPs
- New Development BMPs
- Public Education and Outreach
- Watershed Monitoring/Annual Reporting

Introduction to NPDES MS4 Permits

Issued within RWQCB jurisdiction on Countywide Basis

- Santa Ana Region – Santa Ana RWQCB
- Santa Margarita Region – San Diego RWQCB
- Whitewater River Region – Colorado RWQCB

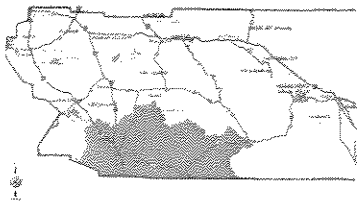

General Watershed Information

	Santa Margarita	Santa Ana
Total Area	740 sq. mi.	2,800 sq. mi.
Riv. Co. Area	540 sq. mi.	1,400 sq. mi.
Riv. Co. Population	260,000	1,240,000
Murrieta Population	95,500	1,500
Watershed-Wide Non-Urban Land Use	93%	86%
Hydrologic Modification	Yes	Yes
Impairments	Nutrients, Metals, Turbidity	Nutrients, Turbidity, Pathogens

Status of NPDES MS4 Permits

	Santa Margarita MS4	Santa Ana MS4
Term	Third-Term	Third-Term
Permit Adopted	July 14, 2004	October 25, 2002
Annual Reports Due	October 31	November 30
Permit Expiration	July 14, 2009	October 25, 2007
Initiate ROWD	July 2008	October 2006
ROWD due	Jan 2009	April 17, 2007
Likely Permit Draft	Fall 2009	February/March 2008

Typical Permittee Structure

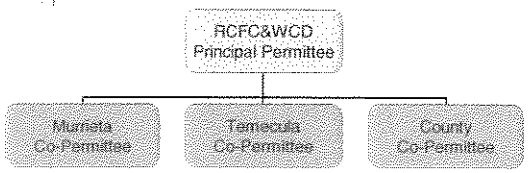

Principal Permittee coordinates development and implementation of Regional Compliance Programs and acts as primary point of contact with Regional Board

Co-Permittees develop and implement local programs, provide information to District for regional programs and reports, and contribute towards regional program implementation

Duties

	Principal Permittee	Co-Permittee
Program Development	Coordinate & Facilitate Regional Approach to LIP	Provide Input/Support, Develop LIP
Watershed SWMP/DAMP	Maintain, Implement and Report	Implement, and Provide Requested Information/Input
Individual SWMP	Answer Questions	Maintain, Implement and Report
Industrial Inspections	Compliance Assistance Program (CAP)	Follow Up Inspections, address Facilities beyond CAP
Public Education	Develop Materials, Implement Student Outreach, Media Outreach, Training	Address local education and outreach, ensure staff are trained
IC/ID	Maintain 1-800 #, HAZMAT Response, HHW/ABOP	Address Complaints, IC/ID Monitoring.
Monitoring	Implement Watershed Monitoring	Provide Support When Requested
Federal/State/Local Issues	Monitor Issues, Report	Input/Recommendations

RWQCB Compliance Philosophy

San Diego RWQCB mandates compliance documentation and reporting at each level of implementation:

- Watershed SWMP – Watershed Wide or Jointly Funded Activities
- Individual SWMP – Individual Permittee Activities

Santa Ana RWQCB preferred consolidated compliance documentation and reporting:

- DAMP – Documents all activities programmatically

NOTE: Santa Ana RWQCB being driven to San Diego Approach by TMDLs

SMR Permit Compliance Documentation and Reporting

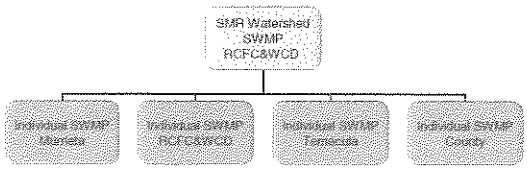

SMR Watershed SWMP documents watershed-wide/regional program implementation.

Individual SWMPs provide local compliance program documentation.

Looming Issues

Short Term

- SD RWQCB Audit Results
- SMR Pesticides TRE
- SMR ROWD

Long Term (new MS4 permits)

- Addition of Urban Retrofit requirements to SMR Watershed SWMP
- Effectiveness Analysis
- Post Construction BMP Tracking and Inspection
- Hydromodification/LID BMPs
- Expanding Monitoring Programs
- TMDLs
  - Urban Retrofit
  - In-Lake Remediation for DLLE

What we need

Build better relationship with the Board

Need Riverside County representatives on the RWQCB

Strong support from cities on MS4 Permit subcommittees and related Task Forces

Things for the Cities to Watch

- Abandoned Private Construction sites
- Keep finger on public works projects and municipal facilities
- Documentation, documentation, documentation

Specific Permit Programs

Legal Authority	Santa Margarita	Santa Ana
Prohibit IC/ID Through Ordinance	Y	Y
Enforce Ordinances	Y	Y
Ordinances Specific to Pollutants of Concern	N	Y*
Document Enforcement	Y	Y
Legal Certification	Y	Y
Cooperative Agreement	Y	Y

* SAR wants specific sources abatable via ordinances based on local conditions

Specific Permit Programs

Illicit Discharges	Santa Margarita	Santa Ana
SAR Coordination	Y	Y
Complaint Tracking Protocols	Y	Y
Informal Dry Weather Monitoring Sites	Y	N
SAR Regional Board Notification of Hazardous/Human Health IC/ID	Y	Y
Incorporate De-Minimis Discharge Permit Requirements	N	Y
Proactive Municipal IC/ID Focus	N	N
County Pre HAZMAT Partnership*	N	N
Dumping	Y	Y

* Regional Program sponsored by District to facilitate rapid response to hazardous materials spills to MS4

Specific Permit Programs

Permittee Facilities	Santa Margarita	Santa Ana
Minimum BMP Requirements	Y	Y
Facility On-Site PPP	Y	Y
Annual PPP Inspections	Y	Y
Annual MS4 Facility Map Updates*	Y	Y
Incorporate Construction Permit	N	Y
Reporting	Y	Y

* SMR requires MS4 Map to define sub-watersheds for each system

Specific Permit Programs

Development Planning	Santa Margarita	Santa Ana
Review/Update CEQA Process	Y	Y
Municipal 404/401 determination as part of WQMP Review	Y	N
Review/Update General Plan	Y	Y
Minimum BMP Control Requirements for New Development	Y	Y

Specific Permit Programs

Development Planning	Santa Margarita	Santa Ana
Minimum BMP Requirements for all developments	Y	Y
WQMP/SUSMP	Y*	Y
Guaranteed Maintenance Mech.	Y	Y
BMP Tracking*	N	N
BMP Inspections	N	N
Reporting	Y	Y

* SMR requires WQMP for Roads, SAR wants to add Streets and Roads

Specific Permit Programs

Development Planning	Santa Margarita	Santa Ana
Grandfather provision for conditioned developments prior to WQMP/SUSMP regs?	N*	Y
LID Requirement	N	N
Hydromodification **	N	N
BMP Design Manual	N	N

*SMR requires WQMP for projects that as of July 14, 2005 have not pulled grading permits.
** Required to have Numeric Criteria as part of ROWD

Specific Permit Programs

Construction Inspection	Santa Margarita	Santa Ana
Minimum BMPs	Y*	Y
Enforceable Ordinance	Y	Y
Phased Municipal SWPPPs**	N	N
Specific Enforcement Tools	Y	N***
Inspections	Y	Y
Reporting	Y	Y

* SMR requirements are more prescriptive.
** Both Boards want municipal equivalents to a SWPPP with more proactive BMP requirements
*** SAR Wants more proactive use of bonds and stop work orders

Specific Permit Programs

Industrial/Comm. Insp.	Santa Margarita	Santa Ana
Require Compliance Assistance Program	N	Y
Inspect Mobile Facilities	N	Y
Inspections Beyond CAP and Mobile Facilities	Y	N*
Database of Facilities	Y	Y
Minimum BMPs	Y	Y
Enforcement	Y	Y
Reporting	Y	Y

*Cities with POTW are required to incorporate stormwater inspection into POTW Pretreatment Inspection Program.

Specific Permit Programs

Public Education	Santa Margarita	Santa Ana
Municipal Planning, Inspection, Maintenance Worker and Engineering Staff Training?	Y	Y
Media Outreach (TV, Radio Billboard)	N	Y
Mix BMP Residential Outreach	Y	N
Adult Outreach	Y	Y
Student Outreach	Y	Y
Web/Phone Resources	Y	Y
Pollutant/Waterbody Specific Outreach	Y	Y
Local Outreach Requirements*	Y	Y
Reporting	Y	Y

*Most Public Education Programs implemented by RCFC on behalf of Permittees

Specific Permit Programs

Monitoring/Reporting	Santa Margarita	Santa Ana
Watershed Wet/Dry Chemical Monitoring	Y	Y
Bioassessment	Y	N
Toxicity Monitoring	Y	N*
Composite Sampling	Y	N
Regional Monitoring / Special Studies	Y**	Y
BMP Effectiveness Analysis	Y	Y
Reporting	Y	Y

* Some Toxicity Monitoring Required
** Develop criteria for hydromodification

Specific Permit Programs

Program Mgmt /Other	Santa Margarita	Santa Ana
City Manager MSC	N	Y
Intercounty Coordination Meetings	Y	N
Fiscal Reporting*	Y	Y
Individual SWMPs	Y	N
TMDL	N	N
Audits	Y	Y
Reporting	Y	Y

*SD RWQCB likely to require metrics for fiscal analysis

TMDLs and BPA Amendments

- Santa Ana RWQCB TMDLs
  - Lake Elsinore/Canyon Lake Nutrient TMDL
  - Canyon Lake Pathogen TMDL (Pending)
- San Diego RWQCB TMDLs
  - Santa Margarita Lagoon Nutrient TMDL
- Other RWQCB Projects of Note
  - SA RWQCB SWQTF REC 1 Standards Review
  - SD RWQCB REC 1 Standards Review

Program Implementation

Intergovernmental Coordination

Statewide - CASQA

- Board Member – Steve Stump
- Legislative Committee Chair – Jason Uhley

Regional

- SMR EMT (Bureau Workgroup)
- SMR Monitoring Group (Bureau Workgroup)
- Upper SMR IRWMP

Program Implementation

Regional Monitoring Programs

Monitoring and Science Subcommittee

Southern California Monitoring Coalition

Southern California Coastal Water Research Project

MEETING AGENDA

NPDES
SANTA ANA / SANTA MARGARITA
TECHNICAL COMMITTEE

10:00 a.m. – 12:00 p.m. Thursday, January 31, 2008
Riverside County Flood Control District
1995 Market Street
Riverside, CA 92501

I. Introductions

II. Agenda Changes

III. Review of Minutes: December 20, 2007

IV. Announcements
- A. Annual Reports
- B. Training Update
- C. Permit Renewal Update

V. Public Education Program – Florence Mowrer

VI. TMDL Progress Report – Jason Uhley
- A. Middle Santa Ana River Bacteria Indicator TMDL Update
  - Next Meeting – Thursday, February 28, 2008 from 1:30 p.m. to 4:00 p.m.
- B. Lake Elsinore/Canyon Lake TMDL
  - January 29, 2008 LE/CL TMDL Meeting
  - Next Meeting – To Be Determined
- C. San Diego Lagoons TMDL/Investigation Order
  - January 29, 2008 Monitoring Group Meeting
  - Next Meeting – To Be Determined
- D. Lagoons TMDL NNE Study Bureau Workgroup

VII. Santa Ana/Santa Margarita Region Programs – Jason Uhley
- A. Stormwater Quality Standards Task Force Update
  - Next Meeting - Thursday, February 28, 2008 from 9:30 a.m. to 1:30 p.m.

IX. Open Discussion
- A. Santa Ana RWQCB
- B. San Diego RWQCB
- C. U.S. EPA – Region IX
- D. Round Table

X. New Agenda Items/Schedule Next Meeting – February 28, 2008

P8/117683

Storm Water
Clean Water
PROTECTION PROGRAM

Member Agencies:

Banning
Beaumont
Calimesa
Canyon Lake
Cathedral City
Coachella
Coachella Valley Water District
Corona
County of Riverside
Desert Hot Springs
Hemet
Indian Wells
Indio
La Quinta
Lake Elsinore
Moreno Valley
Murrieta
Norco
Palm Desert
Palm Springs
Perris
Rancho Mirage
Riverside City
Riverside County Flood Control District
San Jacinto
Temecula

NPDES
SANTA ANA / SANTA MARGARITA
TECHNICAL COMMITTEE
Meeting Minutes
for
December 20, 2007

I. *Attendees:*

Arlene Chun	Riverside County Flood Control District
David Garcia	Riverside County Flood Control District
Penny Nanney	Riverside County Flood Control District
Tina Tuason	Riverside County Flood Control District
Charlene Warren	Riverside County Flood Control District
Mike Shetler	Riverside County Executive Office
Adriana Soares	Riverside County Transportation
Keith Elliott	CRWQCB – Santa Ana Region
Michael Roth	CRWQCB – Santa Ana Region
John Wilder	City of Beaumont
Mike McCabe	City of Calimesa
Bob French	City of Calimesa
Jack Porter	City of Canyon Lake
Michele Hindersinn	City of Corona
Jeff Potts	City of Corona
Linda Nixon	City of Hemet
Phoung Hunter	City of Moreno Valley
Kent Wegelin	City of Moreno Valley
Farida Naceem	City of Murrieta
Lori Askew	City of Norco
Jessica Chin	City of Riverside
Mike Yasmer	City of Riverside
Mike Emberton	City of San Jacinto
Aldo Licitra	City of Temecula
Bob Collacott	URS Corporation
Frank Tolerico	CONTECH Stormwater

VII. ***TMDL Progress Report – Arlene Chun***

A. **Middle Santa Ana River Bacteria Indicator TMDL Update**

- **Next Meeting - Thursday, January 24, 2008 – 1:30 p.m. to 4:00 p.m.**
  Arlene reported on the following items related to the Middle Santa Ana River Bacteria Indicator TMDL:
  - Urban Source Evaluatio Plan available
  - Plan due to be implemented in 2009
  - Plan needs to be reviewed by Permittees
  - Task Force Agreement signed by Regional Board on November 30th

B. **Lake Elsinore/Canyon Lake TMDL**

- **Next Meeting – Tuesday, January 29, 2008 from 1:30 p.m. to 4:00 p.m.**
  Arlene announced that the next Lake Elsinore/Canyon Lake TMDL meeting was scheduled for January 29th.

C. **San Diego Lagoons TMDL/Investigation Order**

- **Lagoons TMDL NNE Study Bureau Workgroup**
  Tina Tuason noted that there was a short conference call among the Bureau of Reclamation, Camp Pendleton, Riverside County, CDM and the cities of Murrieta and Temecula. Tina noted that the third 13267 Order addendum from the Regional Board was issued. Revised estimates for sampling and inlet surveys are estimated to cost $10,500. Funds must be received prior to the purchase request being made and funding must be received by January 21st. The MOA will be signed by the participating agencies around January 15, 2008. The monitoring teams are waiting to mobilize during the on-set of at least 1/2" of rain. The inlet sampling locations have been identified in compliance with the order. The ocean inlet sampling point will be as close as safely possible to where the lagoon dumps into the ocean. Based on a conversation with the RWQCB, data is not required in January and will be submitted to the Regional Board on April 1, 2008. A conference call is scheduled for February 19th.

VIII. ***Santa Ana/Santa Margarita Region Programs – Arlene Chun***

A. **Stormwater Quality Standards Task Force Update**
Next Meeting: Thursday January 24, 2008 from 9:30 a.m. to 1:30 p.m.
Arlene reported that the topic of the November 15, 2007 Stormwater Quality Standards Task Force meeting was the Basin Plan Amendment. The Plan is tentatively scheduled to go before the Board November 2008.

IX. ***Open Discussion***

A. ***Santa Ana RWQCB*** – Mike Roth noted that the Regional Board is looking to conduct a presentation during a future TAC meeting regarding post construction BMPs.

B. ***San Diego RWQCB –***

C. ***U.S. EPA – Region IX –***

D. ***Round Table –***

Riverside County Flood Control and Water Conservation District
1995 Market Street • Riverside, CA 92501 • (951) 955-1200 • FAX (951) 788-9965

pc\50373

NPDES Santa Ana/Santa Margarita Technical Committee

- Updates in Bold - 12/17/07

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CASQA
CALIFORNIA STORMWATER QUALITY ASSOCIATION

Water Quality NEWSFLASH

DEDICATED TO THE ADVANCEMENT OF STORMWATER QUALITY MANAGEMENT, SCIENCE AND REGULATION

December 31, 2007 *Number 2007-09*

Municipal Regional Stormwater NPDES Permit (MRP) - *Proposed Order to address Bay Area stormwater* – This proposed permit (tentative order) combines the previous six Phase I municipal separate storm sewer system (MS4) permits into a single regional permit covering 77 municipalities in five Bay Area counties. Beginning in 2005, Regional Water Board staff worked with the Bay Area Stormwater Management Agencies Association (BASMAA) through a steering committee and also through various work groups on individual MRP components. The Board issued a preliminary draft MRP in November 2006 and an administrative draft in May 2007.

The proposed permit contains the usual receiving water limitations: "The discharge shall not cause or contribute to a violation of any applicable water quality standard for receiving waters." As in other MS4 permits, permittees would achieve compliance by implementing specified best management practices rather than focusing on water quality at the point of discharge. Persistent exceedances of water quality standards would be addressed by notifying the Board and improving or adding BMPs. This process would be required once during the permit cycle and is generally called the "iterative approach."

Proposed required BMPs include the "C.3" requirements: numeric treatment sizing standards for new development and redevelopment (5,000 or 10,000 sq ft thresholds for specified categories); mandatory integration of Low Impact Development (LID) principles into project design; and, hydro-modification controls (more advanced than elsewhere in state), which differ by county. Section C.3 also includes a proposed requirement specifying that runoff from new projects discharging to 303(d) listed waterbodies not exceed predevelopment levels for listed pollutants. This may be difficult to implement: the Bay is listed for dioxin – a ubiquitous constituent in stormwater.

The proposed permit also requires significantly more water quality monitoring compared to the most current Bay Area permits and specific control actions to address the new mercury TMDL and the proposed PCBs TMDL. The proposed permit is very prescriptive, even specifying the number of community involvement and public outreach events. Record-keeping requirements are substantial. For example, the permittees would need to report annually on types of sweepers used, swept curb miles, volume or weight of materials removed, sweeper operator training, etc.

Another innovation is the emphasis on trash control – an increasingly concern of Bay Area environmental NGOs. The proposed permit identifies high, medium, and low priority streets and specifies the frequency of street sweeping for each. Most residential streets are likely to be low priority and would need to be swept at least twice before the onset of the rainy season. New sweeping equipment would need to meet technical specifications.

Comments are due by February 29, 2008. The first hearing will be held March 11. The permit will likely be further revised prior to the adoption hearing to be held later in the spring.

Water Quality NewsFlash is a bi-weekly update of stormwater and related news for CASQA members, co-sponsored by Caltrans Stormwater Program as a public education and outreach partnership. *Verify information before taking action on these bulletins.* Contact CASQA at info@casqa.org or (650) 366-1042 with questions. Posted online in the members-only section at: www.casqa.org. © 2007 California Stormwater Quality Association.

CASQA
CALIFORNIA STORMWATER QUALITY ASSOCIATION

Water Quality NEWSFLASH

DEDICATED TO THE ADVANCEMENT OF STORMWATER QUALITY MANAGEMENT, SCIENCE AND REGULATION

January 28, 2008 *Number 2008-02*

CASQA Meeting – *Federal and State Regulatory updates* – The January 11 meeting included presentations on water quality issues from the USEPA and the State Water Resources Control Board. Alexis Strauss, Director of USEPA's Water Division described key issues of concern to the agency. The first is timely renewal of the State's stormwater permits. Currently half of the 28 major stormwater permits are expired. The second issue is ensuring that stormwater permits address the TMDLs being prepared by the Regional Water Boards. USEPA sees TMDLs as a key catalyst for water quality improvement. Ms. Strauss referred to USEPA's November 22, 2002, memo on implementing TMDLs in stormwater permits. In this memo, USEPA "recommends that for NPDES-regulated municipal and small construction storm water discharges effluent limits should be expressed as best management practices (BMPs) or other similar requirements, rather than as numeric effluent limits."

The third issue is measuring and enhancing stormwater program effectiveness. Ms. Strauss also thanked CASQA for preparing the *Municipal Stormwater Program Effectiveness Assessment Guidance* document. She also referred to a National Academy of Sciences project – "Reducing Stormwater Discharge Contributions to Water Pollution." A key goal of the project is to clarify the mechanisms by which pollutants in stormwater discharges affect ambient water quality. The project will define the elements of a *protocol* to link pollutants in stormwater discharges to ambient water quality criteria. The NAS project committee met in December in Irvine with participation by CASQA and other interested parties.

Another USEPA issue is enforcement; USEPA's enforcement priorities for the coming year are sand & gravel operations, ports, and implementing a new MS4 inspection protocol. A new USEPA priority initiated in 2007 is green infrastructure. (A later NewsFlash issue will address this issue in more depth including requirements for *maximum extent technically feasible* (METF) hydraulic controls.)

Jonathan Bishop, Chief Deputy Director of the State Water Board, described the Board's goals for the coming year. These include updating the Strategic Plan (workshop Feb. 6). In the proposed plan, stormwater is targeted for augmenting water supplies through groundwater recharge, particularly using low-impact development (LID) approaches. The draft proposes "including incentives for stormwater permits that encourage cities and counties to implement LID/Smart growth." Consistency between the Regional Water Boards in their regulation of stormwater is also a goal of the plan. As part of this consistency effort, the State Water Board plans to develop a statewide stormwater permit for large municipalities by December 2009.

Mr. Bishop indicated that the long-awaited statewide Construction General Permit is currently targeted for February or March. It will include numeric limits for only pH and sediment. Other Board goals for this year include increasing the efficiency of the TMDL development process and issuing a general exception to the Ocean Plan's ban on stormwater discharges into Areas of Special Biological Significance (ASBS).

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Water Quality Management Committee

Meeting Agenda
March 17, 2008
10:00-12:00
Riverside County Executive Office-Conference Room A

1. **Self Introductions**

2. **New San Diego Regional Board Contact** –Benjamin Neill 858.467.2983
   WRC Engineer C, Northern Watershed Unit, bneill@waterboards.ca.gov

3. **Department updates and discussion points**
   - ***a. Environmental Health***
     - Septic Systems
     - Survey Program
   - ***b. Building and Safety***
     - Business Registration
     - Grading inspections/BMPs
     - Proposed Industrial/Commercial Inspection Program
   - ***c. Transportation Department***
     - CIP Municipal Projects
     - Quarterly Status Report
   - ***d. Facilities Management***
     - CIP/ Municipal Projects
   - ***e. EDA/RDA***
     - CIP Municipal Projects

4. **Flood Control and Water Conservation District Updates**
   a. MS4 permit status -Whitewater, Santa Ana, Santa Margarita
      - US EPA comments to OC MS4 permit (San Diego RWQCB)
   b. TMDLs- Middle Santa Ana River, Lake Elsinore/Canyon Lake
   c. 13267 order-Santa Margarita Lagoon
   d. Coachella Valley Stormwater Channel

5. **RFQ for consultant/engineering services** (WQMPs, water quality monitoring, public education, and general regulatory assistance)

6. **IRWM Progress (Prop 50, Prop 84, Prop 1E)**
   a. SAWPA
   b. Rancho Water District
   c. Mission Springs Water District-DAC

7. **IC/ ID complaints**

8. **Non-agenda items and round table discussion.**

9. **Next meeting date <u>April 21, 2008</u>**

Mar 17, 2008

Water Quality Management Committee mtg.

Mike Shetler	E/O
Glen Thuja	Trans
Chuck Strey	EH-ERMD
Mary Cartwright	EH-DES
Ward Komers	~~EH-HAZMAT~~ B/S
Doug Thompson	EH-HAZMAT
Martha Bahia	EH-HAZMAT
Mark Brewer	Parks
Roger Miller	B/S
Gabriel Martin	EDA
Ardiéna Soares	Trans
David Garcia	Flood
Claudia Stieding	FM

Riverside County
Environmental Compliance Division

2007-08 NPDES Pre-Storm Season Meeting

October 16, 2007

MEETING AGENDA

1. Welcome to all the first time attendees and to those who joined us during our previous pre-storm season meeting. This is our third annual pre-storm season meeting. We thank you for taking time out of your busy schedule to join us!
2. Self introductions and the jurisdiction or company you are affiliated with.
3. Our meeting structure today will be very informal. Please feel free to share your thoughts.
4. Logistics of this meeting room. Parking validation is available before you leave.
5. Plan on wrapping up our meeting up by 12:00 PM or sooner.
6. Opening comments and summary of "The 2006-07 Storm Season for the County of Riverside"- Roger Miller and Steve Dondalski.
7. Comments concerning "The NPDES Consultant's Point Of View For The 2006-07 Storm Season"- Mike Malone (Geopacifica).
8. Comments regarding the County Industrial/Commercial NPDES Inspection Program and our new Business Registration Program- Ed Nicholls. Additional, supporting comments by Chandra Santiago (AEI-CASC Engineering).
9. Open discussion featuring all attendees.
10. Meeting summary.
11. Riverside County Flood Control is once again offering no-cost NPDES Training covering the following subject matter: Construction Inspection, Industrial/Commercial Facility Training and Water Quality Management Plan Training. Training sessions will be held at the Flood Control District in Riverside, in Temecula or in Palm Springs. The training sessions are being offered the first weeks of October. If you are interested please let me know and I will be happy to provide registration information and exact dates and locations. Seating is usually limited so the sooner you register the better.
12. Meet the same time next year for our next Pre-Season NPDES Meeting?

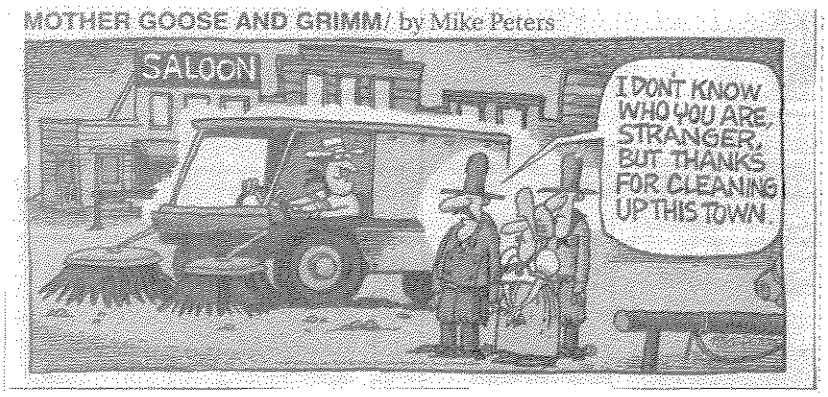

2006-07 Storm Season De-Briefing Meeting Notes

1. This storm season (2006-07) the County issued 2-3 Com-Tr Stop Work Orders. However we did issue a bushel-basket full of Stop Work Orders to single family (SFR) developers. We found that when we really 'sat' on the SFR developers and threatened to issue a SWO in two weeks, the SFR developer typically came around and made the corrections that were required for compliance.
   - We have once again found that SFR developers still lack the knowledge regarding NPDES. This is not only true for the "mom and pop builder", but for the engineers as well who support these folks during their construction activity. Obviously the engineer should be the expert the developer can rely on for assistance in this regard. Too many times the County finds that this is not the case. In too many instances a site SWPPP has not been developed. And even if the SWPPP was developed, it may not have been implemented in the field for the protection of the development.
   - There still appears to be a huge disconnect with the SFR developers at the time of slope planting and irrigation installation. The cost of maintaining slope planting is beginning to take a toll. It is felt that the current economic situation may be the biggest culprit in this regard. Another thought is the water availability situation. This is really becoming a matter of great concern. If a "good" rainy season does not materialize this storm season, we are in for some tough times ahead and the homeowner may not have any control of being able to irrigate or not. This may be an issue that is driven by water availability. We are going to have to be sensitive to this issue and work with SFR homeowners.

2. The County would like to challenge the RWQCBs to visit every project issued a WDID at least once each storm season. The local jurisdiction is continuously in the field each storm season we keep "calling wolf" and "the wolf" never shows up. Developers are starting to think our cautions are simply idle threats and will never be backed up with an actual field visit by the RWQCB. Since the RWQCBs more than likely do not have the resources necessary to visit every site, please consider visiting at least one site per developer each storm season.
   - If the RWQCBs cannot visit all construction sites, you can still assist us by making the commitment to visit one selected construction site per developer this storm season. This action on the part of the RWQCBs would assist us by showing first-hand the commitment the Boards have to NPDES compliance on the part of all developers throughout the County area. County staff will support the RWQCBs by providing the physical location of any construction site that is difficult to locate. We always remain interested in being available for a co-NPDES field inspection with any Regional Board that has a desire to do so. The coordination on any activity of this sort or it the location of a site is hard to find please contact Roger Miller of this Office at (951) 955- 0886.

3. The County Storm Season August Start-up Time is still considered to be an excellent tool in our NPDES arsenal. The early start-up time provides us the opportunity to visit our jobsites and advise the developer of the up-coming storm season. We conduct a normal site NPDES Verification and even issue the site our developer "dreaded" estimate of the percentage of compliance.
   - Riverside County NPDES site verifications began August 20, 2007. We hope to be able to visit all of our current construction sites including SFR, Com and Tr sites prior to the beginning of the official storm season October 1, 2007.

Information Bulletin

Septic Tank Failures During Rains/Flood Conditions

COUNTY OF RIVERSIDE • COMMUNITY HEALTH AGENCY
DEPARTMENT OF ENVIRONMENTAL HEALTH

INFORMATIONAL BULLETIN NO. 93-01A

DISTRICT ENVIRONMENTAL SERVICES DIVISION

SEPTIC TANK FAILURE DURING EXCESSIVE RAINS/FLOOD CONDITIONS

When rainwater or drainage water ponds over leach fields or flooding saturates the ground in leach line/seepage pit areas, this maximum saturation causes the septic system waste plumbing to become sluggish or to back up or cease to operate when commodes/toilets are flushed and waste fixtures are utilized. If the septic system was properly operating prior to flooding/ground saturation household waste water should not overflow onto the surface of the ground.

When backup within the residence occurs or in the event of overflow onto the surface of the ground the following must be accomplished until the area flooding or ground saturation dissipates:

- If system backup is slow or sluggish but still operating: minimize the amount of liquids and solids usage.
- Backup or visible overflow onto ground surface: stop all water usage. When flooding/ground water saturation diminishes the septic system should again operate normally.

WHEN BACKUP OCCURS:

- If the septic tank is above the ground saturation or flooding area, the septic tank can be pumped by a permitted liquid waste hauler/pumper (see telephone directory yellow pages). The septic tank can be utilized as a holding tank and will accept household waste water and not overflow into leach lines until full. Most septic tanks are 1,000 gals or larger - minimum individual waste water production per person per day i.e. showers, dish washing, laundry, etc. average 50 gals minimum to 100 gals per 24 hour period.
    - The total period to fill the septic tank (now a holding tank) can be calculated i.e. for example 4 persons X 50 gals equals 200 gals/day. It would then take approximately 5 days to fill the tank completely before another pumping.
- If the septic tank system is completely inundated by flood/saturation such that no waste water will be accepted the following is suggested:
    - In this case pumping the tank (as indicated above) will not be effective as it will fill as fast as it is pumped.
    - Procure and use a portable chemical toilet: Small units found in camping/RV/hardware outlets. Larger ones such as those seen at temporary events and construction sites may be utilized. Consult the yellow pages in local telephone directories.
    - Utilize the functional facilities of a motor home/camping trailer or those of a neighboring home.
- Overflowing or the dumping of raw sewage is to be avoided. When it occurs on the scene in an isolated homeowner environment, treat it as follows:
    - Cover/saturate the affected area with one of the following chemicals, (easily procured at local retail outlets) hypochlorite (plain chlorinated lime), calcium hypochlorite or plain household bleach. Where solids are visible a layer of soil must be placed as cover after the distribution of the above chemicals.
- Your septic system if properly working prior to the flooding, ponding, ground saturation should operate normally after the ground saturation subsides to below the leach field area. This may take time in some areas.

For further information call our Land Development office at (951) 955-8980

*Document available in an alternate format upon request

French Valley Airport

Monthly Reporting Logs

General Industrial Permit

ATTACHMENT 5

Airport California Monitoring Group
California Stormwater General Permit
July 2007 Annual Report Certification

Name: **Robin Zimpfer**

Title: **Assistant County Executive Officer/EDA**

Airport: **French Valley Airport**

WDID #: **933S006139**

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to ensure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted, is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

Signature: Robin Zimpfer

Date: 5-17-07

ANNUAL COMPREHENSIVE SITE COMPLIANCE EVALUATION CERTIFICATION

Airport Name & WDID #: FRENCH VALLEY 933S006139

Name: DAVE ENGLISH

Title: AIRPORT MAINT. SUPV.

Certification -

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to ensure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted, is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

Signature: Dave English

Date: 5-15-08

ACSCE REPORT SUMMARY FORM

Airport Name & WDID #: FRENCH VALLEY

Inspectors: DAVE ENGLISH

Date: 5-15-08

Are all the Storm Water Visual Observation Forms for the wet season months complete?
Yes ☒ No ☐
If No, complete observations.

Were any pollutants observed in the storm water discharges? Yes ☐ No ☒
If Yes, list corrective action taken: _____

Are all the Non-Storm Water Visual Observations complete? Yes ☒ No ☐
If No, complete observations.

Were any unauthorized non-storm water discharges observed? Yes ☐ No ☒
If Yes, list source of discharge and corrective action taken: _____

Were all possible authorized storm water discharges observed? Yes ☒ No ☐
If No, explain: _____

Were all Site BMPs in place and determined to be adequate? Yes ☒ No ☐
If No, List corrective action taken: _____

Does the above information or the results of the ACSCE inspections warrant changes to the Airport SWPPP? Yes ☐ No ☒
If Yes, Summarize SWPPP changes to be made: _____

If the SWPPP is to be revised, please list revision schedule: _____

Based on the above information and the results of the ACSCE are there any incidents of Airport non-compliance? Yes ☐ No ☒

If Yes, List corrective action taken: _____

Summarize any Airport corrective action taken based on the ACSCE results: _____

FORM 2 - RECORD OF WET SEASON MONITORING

(Complete this form once per month between October 1 and May 30)

Step 1: Airport: FRENCH VALLEY 9335006139
Inspector's Name: DAVE ENGLISH
Signature: [signature]
Title: MAINT SUPV.
Date: 11-3-07

Step 2: This Form is proof that you complied with monthly wet weather inspection requirements for the following month (circle one):

(October) November December January February March April May.

Step 3: Did a "qualifying storm event" occur during the month (circle one)? Yes (No)
[*A "qualifying storm event" is a rain (or snow) event that occurs during daylight facility operating hours and is preceded by at least three working days without a storm water discharge.*]

Step 4a: **If you answered "No" to Step 3,** initial here indicating that no observable qualifying storm event occurred: DRE

or

Step 4b(1): **If you answered "Yes" to Step 3,** complete the following Inspection Chart or complete Step 4b(2) below:

Outfall Number	Date/ Time:	**Floating or Suspended Material?** Yes _____ No _____	**Turbidity or Discoloration?** Yes _____ No _____
		If yes, describe:	If yes, describe:
		Odors? Yes _____ No _____	**Oil and Grease Sheen Present?** Yes _____ No _____
		If yes, describe:	If yes, describe:

Outfall Number	Date/ Time:	**Floating or Suspended Material?** Yes _____ No _____	**Turbidity or Discoloration?** Yes _____ No _____
		If yes, describe:	If yes, describe:
		Odors? Yes _____ No _____	**Oil and Grease Sheen Present?** Yes _____ No _____
		If yes, describe:	If yes, describe:

Step 4b(2): If you failed to observe the qualifying storm event (and cannot complete the Inspection Chart), explain why:

_____

_____

FORM 2 - RECORD OF WET SEASON MONITORING

(Complete this form once per month between October 1 and May 30)

Step 1: Airport: FRENCH VALLEY 9335006139
Inspector's Name: DAVE ENGLISH
Signature: Dave English
Title: Maint. Supv.
Date: 11-24-07

Step 2: This Form is proof that you complied with monthly wet weather inspection requirements for the following month (circle one):

October (November) December January February March April May.

Step 3: Did a "qualifying storm event" occur during the month (circle one)? Yes (No)
[*A "qualifying storm event" is a rain (or snow) event that occurs during daylight facility operating hours and is preceded by at least three working days without a storm water discharge.*]

Step 4a: **If you answered "No" to Step 3,** initial here indicating that no observable qualifying storm event occurred: DRE

or

Step 4b(1): **If you answered "Yes" to Step 3,** complete the following Inspection Chart or complete Step 4b(2) below:

Outfall Number	Date/ Time:	**Floating or Suspended Material?** Yes _____ No _____	**Turbidity or Discoloration?** Yes _____ No _____
		If yes, describe:	If yes, describe:
		Odors? Yes _____ No _____	**Oil and Grease Sheen Present?** Yes _____ No _____
		If yes, describe:	If yes, describe:

Outfall Number	Date/ Time:	**Floating or Suspended Material?** Yes _____ No _____	**Turbidity or Discoloration?** Yes _____ No _____
		If yes, describe:	If yes, describe:
		Odors? Yes _____ No _____	**Oil and Grease Sheen Present?** Yes _____ No _____
		If yes, describe:	If yes, describe:

Step 4b(2): If you failed to observe the qualifying storm event (and cannot complete the Inspection Chart), explain why:

_____

_____

FORM 2 - RECORD OF WET SEASON MONITORING

(Complete this form once per month between October 1 and May 30)

Step 1: Airport: FRENCH VALLEY 9335006139
Inspector's Name: DAVE ENGLISH
Signature: [signature]
Title: MAINT. SUPV.
Date: 12-19-07

Step 2: This Form is proof that you complied with monthly wet weather inspection requirements for the following month (circle one):

October November (December) January February March April May.

Step 3: Did a "qualifying storm event" occur during the month (circle one)? (Yes) No
[*A "qualifying storm event" is a rain (or snow) event that occurs during daylight facility operating hours and is preceded by at least three working days without a storm water discharge.*]

Step 4a: **If you answered "No" to Step 3,** initial here indicating that no observable qualifying storm event occurred: _____

or

Step 4b(1): **If you answered "Yes" to Step 3,** complete the following Inspection Chart or complete Step 4b(2) below:

Outfall Number	Date/ Time:	Floating or Suspended Material?	Turbidity or Discoloration?
1	12/19 9 AM	Yes ____ No X If yes, describe:	Yes ____ No X If yes, describe:
		Odors? Yes ____ No X If yes, describe:	Oil and Grease Sheen Present? Yes ____ No X If yes, describe:
Outfall Number	Date/ Time:	Floating or Suspended Material?	Turbidity or Discoloration?
2	12/19 9:15 AM	Yes ____ No X If yes, describe:	Yes ____ No X If yes, describe:
		Odors? Yes ____ No X If yes, describe:	Oil and Grease Sheen Present? Yes ____ No X If yes, describe:

Step 4b(2): If you failed to observe the qualifying storm event (and cannot complete the Inspection Chart), explain why:

_____

_____

Outfall Number	Date/ Time:	Floating or Suspended Material?	Turbidity or Discoloration?
3	12/19	Yes ____ No X If yes, describe:	Yes ____ No X If yes, describe:
	9:30 AM	Odors? Yes ____ No X If yes, describe:	Oil and Grease Sheen Present? Yes ____ No X If yes, describe:

Outfall Number	Date/ Time:	Floating or Suspended Material?	Turbidity or Discoloration?
4	12/19	Yes ____ No X If yes, describe:	Yes ____ No X If yes, describe:
	9:45 AM	Odors? Yes ____ No X If yes, describe:	Oil and Grease Sheen Present? Yes ____ No X If yes, describe:

Outfall Number	Date/ Time:	Floating or Suspended Material?	Turbidity or Discoloration?
5	12/19	Yes ____ No X If yes, describe:	Yes ____ No X If yes, describe:
	10 AM	Odors? Yes ____ No X If yes, describe:	Oil and Grease Sheen Present? Yes ____ No X If yes, describe:

Outfall Number	Date/ Time:	Floating or Suspended Material?	Turbidity or Discoloration?
		Yes ____ No ____ If yes, describe:	Yes ____ No ____ If yes, describe:
		Odors? Yes ____ No ____ If yes, describe:	Oil and Grease Sheen Present? Yes ____ No ____ If yes, describe:

FORM 2 - RECORD OF WET SEASON MONITORING

(Complete this form once per month between October 1 and May 30)

Step 1: Airport: FRENCH VALLEY 9335006139
Inspector's Name: DAVE ENGLISH
Signature: Dave E
Title: MAINT. SUPV.
Date: 1-28-08

Step 2: This Form is proof that you complied with monthly wet weather inspection requirements for the following month (circle one):

October **November** **December** **(January)** **February** **March** **April** **May.**

Step 3: Did a "qualifying storm event" occur during the month (circle one)? (Yes) No
[*A "qualifying storm event" is a rain (or snow) event that occurs during daylight facility operating hours and is preceded by at least three working days without a storm water discharge.*]

Step 4a: **If you answered "No" to Step 3,** initial here indicating that no observable qualifying storm event occurred: _____

or

Step 4b(1): **If you answered "Yes" to Step 3,** complete the following Inspection Chart or complete Step 4b(2) below:

Outfall Number	Date/ Time:	Floating or Suspended Material? Yes ____ No X	Turbidity or Discoloration? Yes ____ No X
1	1/28 8 AM	If yes, describe:	If yes, describe:
		Odors? Yes ____ No X	Oil and Grease Sheen Present? Yes ____ No X
		If yes, describe:	If yes, describe:

Outfall Number	Date/ Time:	Floating or Suspended Material? Yes ____ No X	Turbidity or Discoloration? Yes ____ No X
2	1/28 8:15 AM	If yes, describe:	If yes, describe:
		Odors? Yes ____ No X	Oil and Grease Sheen Present? Yes ____ No X
		If yes, describe:	If yes, describe:

Step 4b(2): If you failed to observe the qualifying storm event (and cannot complete the Inspection Chart), explain why:

_____

_____

FORM 2 - RECORD OF WET SEASON MONITORING

(Complete this form once per month between October 1 and May 30)

Step 1: Airport: FRENCH VALLEY 9335006139
Inspector's Name: DAVE ENGLISH
Signature: Dave English
Title: MAINT. SUPV.
Date: 2-21-08

Step 2: This Form is proof that you complied with monthly wet weather inspection requirements for the following month (circle one):

October **November** **December** **January** **February** **March** **April** **May.**

Step 3: Did a "qualifying storm event" occur during the month (circle one)? Yes No
[*A "qualifying storm event" is a rain (or snow) event that occurs during daylight facility operating hours and is preceded by at least three working days without a storm water discharge.*]

Step 4a: **If you answered "No" to Step 3,** initial here indicating that no observable qualifying storm event occurred: _____

or

Step 4b(1): **If you answered "Yes" to Step 3,** complete the following Inspection Chart or complete Step 4b(2) below:

Outfall Number	Date/ Time:	Floating or Suspended Material? Yes ____ No X	Turbidity or Discoloration? Yes ____ No X
1	2/21 1PM	If yes, describe:	If yes, describe:
		Odors? Yes ____ No X	Oil and Grease Sheen Present? Yes ____ No X
		If yes, describe:	If yes, describe:

Outfall Number	Date/ Time:	Floating or Suspended Material? Yes ____ No X	Turbidity or Discoloration? Yes ____ No X
2	2/21 1:15 PM	If yes, describe:	If yes, describe:
		Odors? Yes ____ No X	Oil and Grease Sheen Present? Yes ____ No X
		If yes, describe:	If yes, describe:

Step 4b(2): If you failed to observe the qualifying storm event (and cannot complete the Inspection Chart), explain why:

_____

_____

Outfall Number	Date/ Time:	Floating or Suspended Material?	Turbidity or Discoloration?
3	1/28 8:30 AM	Yes ____ No X If yes, describe:	Yes ____ No X If yes, describe:
		Odors? Yes ____ No X If yes, describe:	Oil and Grease Sheen Present? Yes ____ No X If yes, describe:

Outfall Number	Date/ Time:	Floating or Suspended Material?	Turbidity or Discoloration?
4	1/28 8:45 AM	Yes ____ No X If yes, describe:	Yes ____ No X If yes, describe:
		Odors? Yes ____ No X If yes, describe:	Oil and Grease Sheen Present? Yes ____ No X If yes, describe:

Outfall Number	Date/ Time:	Floating or Suspended Material?	Turbidity or Discoloration?
5	1/28 9AM	Yes ____ No X If yes, describe:	Yes ____ No X If yes, describe:
		Odors? Yes ____ No X If yes, describe:	Oil and Grease Sheen Present? Yes ____ No X If yes, describe:

Outfall Number	Date/ Time:	Floating or Suspended Material?	Turbidity or Discoloration?
		Yes ____ No ____ If yes, describe:	Yes ____ No ____ If yes, describe:
		Odors? Yes ____ No ____ If yes, describe:	Oil and Grease Sheen Present? Yes ____ No ____ If yes, describe:

FORM 2 - RECORD OF WET SEASON MONITORING

(Complete this form once per month between October 1 and May 30)

Step 1: Airport: FRENCH VALLEY 9335006139
Inspector's Name: DAVE ENGLISH
Signature: [illegible]
Title: MAINT. SUPV.
Date: 3-31-08

Step 2: This Form is proof that you complied with monthly wet weather inspection requirements for the following month (circle one):

October **November** **December** **January** **February** **March** **April** **May.**

Step 3: Did a "qualifying storm event" occur during the month (circle one)? Yes **No**
[*A "qualifying storm event" is a rain (or snow) event that occurs during daylight facility operating hours and is preceded by at least three working days without a storm water discharge.*]

Step 4a: **If you answered "No" to Step 3,** initial here indicating that no observable qualifying storm event occurred: DRE

or

Step 4b(1): **If you answered "Yes" to Step 3,** complete the following Inspection Chart or complete Step 4b(2) below:

Outfall Number	Date/ Time:	**Floating or Suspended Material?** Yes _____ No _____	**Turbidity or Discoloration?** Yes _____ No _____
		If yes, describe:	If yes, describe:
		Odors? Yes _____ No _____	**Oil and Grease Sheen Present?** Yes _____ No _____
		If yes, describe:	If yes, describe:

Outfall Number	Date/ Time:	**Floating or Suspended Material?** Yes _____ No _____	**Turbidity or Discoloration?** Yes _____ No _____
		If yes, describe:	If yes, describe:
		Odors? Yes _____ No _____	**Oil and Grease Sheen Present?** Yes _____ No _____
		If yes, describe:	If yes, describe:

Step 4b(2): If you failed to observe the qualifying storm event (and cannot complete the Inspection Chart), explain why:

_____

_____

FORM 2 - RECORD OF WET SEASON MONITORING

(Complete this form once per month between October 1 and May 30)

Step 1: Airport: FRENCH VALLEY 9335006139
Inspector's Name: DAVE ENGLISH Title: MAINT. SUPV.
Signature: Dave English Date: 4-30-08

Step 2: This Form is proof that you complied with monthly wet weather inspection requirements for the following month (circle one):

October November December January February March (April) May.

Step 3: Did a "qualifying storm event" occur during the month (circle one)? Yes (No)
[*A "qualifying storm event" is a rain (or snow) event that occurs during daylight facility operating hours and is preceded by at least three working days without a storm water discharge.*]

Step 4a: **If you answered "No" to Step 3,** initial here indicating that no observable qualifying storm event occurred: DRE

or

Step 4b(1): **If you answered "Yes" to Step 3,** complete the following Inspection Chart or complete Step 4b(2) below:

Outfall Number	Date/ Time:	**Floating or Suspended Material?** Yes _____ No _____	**Turbidity or Discoloration?** Yes _____ No _____
		If yes, describe:	If yes, describe:
		Odors? Yes _____ No _____	**Oil and Grease Sheen Present?** Yes _____ No _____
		If yes, describe:	If yes, describe:

Outfall Number	Date/ Time:	**Floating or Suspended Material?** Yes _____ No _____	**Turbidity or Discoloration?** Yes _____ No _____
		If yes, describe:	If yes, describe:
		Odors? Yes _____ No _____	**Oil and Grease Sheen Present?** Yes _____ No _____
		If yes, describe:	If yes, describe:

Step 4b(2): If you failed to observe the qualifying storm event (and cannot complete the Inspection Chart), explain why:

_____

_____

FORM 2 - RECORD OF WET SEASON MONITORING

(Complete this form once per month between October 1 and May 30)

Step 1: Airport: FRENCH VALLEY 9335006139
Inspector's Name: DAVE ENGLISH
Signature: Dave English
Title: Maint. Supv.
Date: 5-15-08

Step 2: This Form is proof that you complied with monthly wet weather inspection requirements for the following month (circle one):

October **November** **December** **January** **February** **March** **April** **May.**

Step 3: Did a "qualifying storm event" occur during the month (circle one)? Yes No
[*A "qualifying storm event" is a rain (or snow) event that occurs during daylight facility operating hours and is preceded by at least three working days without a storm water discharge.*]

Step 4a: **If you answered "No" to Step 3,** initial here indicating that no observable qualifying storm event occurred: DRE

or

Step 4b(1): **If you answered "Yes" to Step 3,** complete the following Inspection Chart or complete Step 4b(2) below:

Outfall Number	Date/ Time:	**Floating or Suspended Material?** Yes _____ No _____	**Turbidity or Discoloration?** Yes _____ No _____
		If yes, describe:	If yes, describe:
		Odors? Yes _____ No _____	**Oil and Grease Sheen Present?** Yes _____ No _____
		If yes, describe:	If yes, describe:

Outfall Number	Date/ Time:	**Floating or Suspended Material?** Yes _____ No _____	**Turbidity or Discoloration?** Yes _____ No _____
		If yes, describe:	If yes, describe:
		Odors? Yes _____ No _____	**Oil and Grease Sheen Present?** Yes _____ No _____
		If yes, describe:	If yes, describe:

Step 4b(2): If you failed to observe the qualifying storm event (and cannot complete the Inspection Chart), explain why:

_____

_____

Airport California Monitoring Group

FORM 1 - RECORD OF NON-STORM WATER DISCHARGE MONITORING

THIS FORM SHOULD BE FILLED OUT AT LEAST ONCE FOR EACH QUARTERLY MONITORING PERIOD OF EACH YEAR. INSPECTIONS SHOULD BE SEPARATED BY AT LEAST 6 WEEKS AND NO MORE THAN 18 WEEKS.

Step 1: Complete the following:

Airport Name: FRENCH VALLEY 9335006139

Inspector Name: DAVE ENGLISH

Signature: Dave English Date: 9-3-07

Quarterly Monitoring Period (circle one):

(1) July-September **(2) October-December** **(3) January-March** **(4) April-June**

Step 2: How many outfalls are located at the airport? 5

Step 3: Please inspect each outfall. Did you observe any discharges or recent evidence of a discharge at any outfall? Yes ____ No X

Step 4: For any outfalls with discharges or evidence, provide the following information about the outfall:

Outfall No.	Date/ Time:	Evidence of recent discharge:	Source of actual discharge:
		Action taken/comments:	Characteristics: ___ odor ___ turbidity ___ clear ___ floating material ___ oil sheen Action Taken/comments:

Outfall No.	Date/ Time:	Evidence of recent discharge:	Source of actual discharge:
		Action taken/comments:	Characteristics: ___ odor ___ turbidity ___ clear ___ floating material ___ oil sheen Action Taken/comments:

Outfall No.	Date/ Time:	Evidence of recent discharge:	Source of actual discharge:
		Action taken/comments:	Characteristics: ___ odor ___ turbidity ___ clear ___ floating material ___ oil sheen Action Taken/comments:

Airport California Monitoring Group

FORM 1 - RECORD OF NON-STORM WATER DISCHARGE MONITORING

THIS FORM SHOULD BE FILLED OUT AT LEAST ONCE FOR EACH QUARTERLY MONITORING PERIOD OF EACH YEAR. INSPECTIONS SHOULD BE SEPARATED BY AT LEAST 6 WEEKS AND NO MORE THAN 18 WEEKS.

Step 1: Complete the following:

Airport Name: FRENCH VALLEY 9335006139

Inspector Name: DAVE ENGLISH

Signature: Dave E Date: 12-18-07

Quarterly Monitoring Period (circle one):

(1) July-September **(2) October-December** **(3) January-March** **(4) April-June**

Step 2: How many outfalls are located at the airport? 5

Step 3: Please inspect each outfall. Did you observe any discharges or recent evidence of a discharge at any outfall? Yes ____ No X

Step 4: For any outfalls with discharges or evidence, provide the following information about the outfall:

Outfall No.	Date/ Time:	Evidence of recent discharge:	Source of actual discharge:
		Action taken/comments:	Characteristics: ___ odor ___ turbidity ___ clear ___ floating material ___ oil sheen Action Taken/comments:

Outfall No.	Date/ Time:	Evidence of recent discharge:	Source of actual discharge:
		Action taken/comments:	Characteristics: ___ odor ___ turbidity ___ clear ___ floating material ___ oil sheen Action Taken/comments:

Outfall No.	Date/ Time:	Evidence of recent discharge:	Source of actual discharge:
		Action taken/comments:	Characteristics: ___ odor ___ turbidity ___ clear ___ floating material ___ oil sheen Action Taken/comments:

Airport California Monitoring Group

FORM 1 - RECORD OF NON-STORM WATER DISCHARGE MONITORING

THIS FORM SHOULD BE FILLED OUT AT LEAST ONCE FOR EACH QUARTERLY MONITORING PERIOD OF EACH YEAR. INSPECTIONS SHOULD BE SEPARATED BY AT LEAST 6 WEEKS AND NO MORE THAN 18 WEEKS.

Step 1: Complete the following:

Airport Name: FRENCH VALLEY 9335006139

Inspector Name: DAVE ENGLISH

Signature: Dave English Date: 3-18-08

Quarterly Monitoring Period (circle one):
(1) July-September **(2) October-December** **(3) January-March** **(4) April-June**

Step 2: How many outfalls are located at the airport? 5

Step 3: Please inspect each outfall. Did you observe any discharges or recent evidence of a discharge at any outfall? Yes ____ No X

Step 4: For any outfalls with discharges or evidence, provide the following information about the outfall:

Outfall No.	Date/ Time:	Evidence of recent discharge:	Source of actual discharge:
		Action taken/comments:	Characteristics: ___ odor ___ turbidity ___ clear ___ floating material ___ oil sheen Action Taken/comments:

Outfall No.	Date/ Time:	Evidence of recent discharge:	Source of actual discharge:
		Action taken/comments:	Characteristics: ___ odor ___ turbidity ___ clear ___ floating material ___ oil sheen Action Taken/comments:

Outfall No.	Date/ Time:	Evidence of recent discharge:	Source of actual discharge:
		Action taken/comments:	Characteristics: ___ odor ___ turbidity ___ clear ___ floating material ___ oil sheen Action Taken/comments:

Airport California Monitoring Group

FORM 1 - RECORD OF NON-STORM WATER DISCHARGE MONITORING

THIS FORM SHOULD BE FILLED OUT AT LEAST ONCE FOR EACH QUARTERLY MONITORING PERIOD OF EACH YEAR. INSPECTIONS SHOULD BE SEPARATED BY AT LEAST 6 WEEKS AND NO MORE THAN 18 WEEKS.

Step 1: Complete the following:

Airport Name: FRENCH VALLEY 93350006139

Inspector Name: DAVE ENGLISH

Signature: [signature] Date: 5-15-08

Quarterly Monitoring Period (circle one):

(1) July-September **(2) October-December** **(3) January-March** **(4) April-June**

Step 2: How many outfalls are located at the airport? 5

Step 3: Please inspect each outfall. Did you observe any discharges or recent evidence of a discharge at any outfall? Yes ____ No X

Step 4: For any outfalls with discharges or evidence, provide the following information about the outfall:

Outfall No.	Date/ Time:	Evidence of recent discharge:	Source of actual discharge:
		Action taken/comments:	Characteristics: ___ odor ___ turbidity ___ clear ___ floating material ___ oil sheen Action Taken/comments:

Outfall No.	Date/ Time:	Evidence of recent discharge:	Source of actual discharge:
		Action taken/comments:	Characteristics: ___ odor ___ turbidity ___ clear ___ floating material ___ oil sheen Action Taken/comments:

Outfall No.	Date/ Time:	Evidence of recent discharge:	Source of actual discharge:
		Action taken/comments:	Characteristics: ___ odor ___ turbidity ___ clear ___ floating material ___ oil sheen Action Taken/comments:

INDUSTRIAL ACTIVITY AREA OBSERVATION FORM

Airport Name & WDID #: FRENCH VALLEY 933S006139

Inspector Name: DAVE ENGLISH

Date: 3-19-08

List Activity to be Inspected: FVA FUEL FARM

New Activity ☐ Existing Activity ☒

Describe Activity: STORAGE OF AIRCRAFT FUEL TO LOAD FUEL TRUCKS

List BMPs Implemented: EMPLOYEE TRAINING, ABSORBENT MATERIAL ON HAND

List Equipment Designated: ABSORBENT MATERIAL

List Containment Structures: CONCRETE BASIN

Any Evidence of Pollutants Entering Storm Drain? Yes ☐ No ☒

If Yes, List Corrective Action:

List Activity to be Inspected: R.W. MARTIN

New Activity ☐ Existing Activity ☒

Describe Activity: AIRCRAFT MAINT. + STORAGE

List BMPs Implemented: WASTE OIL TANK, ABSORBENT MATERIAL ON HAND
EMPLOYEE TRAINING

List Equipment Designated: ABSORBENT MATERIAL, WASTE OIL TANK

List Containment Structures: NONE

Any Evidence of Pollutants Entering Storm Drain? Yes ☐ No ☒

If Yes, List Corrective Action:

INDUSTRIAL ACTIVITY AREA OBSERVATION FORM

Airport Name & WDID #: FRENCH VALLEY 933S006139

Inspector Name: DAVE ENGLISH

Date: 3-19-08

List Activity to be Inspected: AIRCRAFTERS MAINT.

New Activity ☐ Existing Activity ☒

Describe Activity: AIRCRAFT MAINTENANCE

List BMPs Implemented: WASTE OIL TANK, ABSORBENT MATERIAL ON HAND EMPLOYEE TRAINING

List Equipment Designated: ABSORBENT MATERIAL, WASTE OIL TANK

List Containment Structures: NONE

Any Evidence of Pollutants Entering Storm Drain? Yes ☐ No ☒

If Yes, List Corrective Action:

List Activity to be Inspected: FRENCH VALLEY HANGARS SELF SERVE

New Activity ☐ Existing Activity ☒

Describe Activity: SELF SERVE, AIRCRAFT FUELING

List BMPs Implemented: ABOVE GROUND TANK WITH SECONDARY CONTAINMENT ABSORBENT MATERIAL

List Equipment Designated: ABSORBENT, MATERIAL, CONCRETE SECONDARY Containment

List Containment Structures: CONCRETE BASIN W/ RAIN DRAINS

Any Evidence of Pollutants Entering Storm Drain? Yes ☐ No ☒

If Yes, List Corrective Action:

INDUSTRIAL ACTIVITY AREA OBSERVATION FORM

Airport Name & WDID #: FRENCH VALLEY 933S006139

Inspector Name: DAVE ENGLISH

Date: 3-19-08

List Activity to be Inspected: FRENCH VALLEY AVIATION FBO HANGAR

New Activity ☐ Existing Activity ☒

Describe Activity: AIRCRAFT STORAGE + MAINTENANCE

List BMPs Implemented: WASTE OIL STORAGE TANK, OIL ABSORBENT MATERIAL ON HAND, EMPLOYEE TRAINING

List Equipment Designated: WASTE OIL TANK, ABSORBENT MATERIAL

List Containment Structures: NONE

Any Evidence of Pollutants Entering Storm Drain? Yes ☐ No ☒

If Yes, List Corrective Action:

List Activity to be Inspected: F.V.A. FUEL TRUCKS

New Activity ☐ Existing Activity ☒

Describe Activity: AIRCRAFT REFUELING

List BMPs Implemented: EMPLOYEE TRAINING, OIL ABSORBENT MATERIAL ON HAND

List Equipment Designated: ABSORBENT MATERIAL

List Containment Structures: NONE

Any Evidence of Pollutants Entering Storm Drain? Yes ☐ No ☒

If Yes, List Corrective Action:

BMP EVALUATION AND OBSERVATION FORM

COMPLETE ONE FORM FOR EACH ACTIVITY AREA

Airport Name & WDID #: FRENCH VALLEY 933S006139

Date: 3-19-08

Inspector(s): DAVE ENGLISH

Industrial Activity or Activity Area to be Inspected: F.V.A. FUEL TRUCKS

Is the activity identified accurately and in accordance with the SWPPP ?

☒ YES ☐ NO

If No, list changes that have occurred: _____

Best Management Practices Status

BMP	Description	BMP in Place	BMP Functioning Properly	BMP Adequate
EMPLOYEE TRAINING	EMPLOYEES TRAINED TO CLEAN SPILLS AS THEY OCCUR AND ON PROPER USE OF EQUIP	☒ Yes ☐ No	☒ Yes ☐ No	☒ Yes ☐ No
ABSORBENT MATERIAL	ABSORBENT MATERIAL ON HAND TO CLEAN UP SPILLS AS THEY OCC	☒ Yes ☐ No	☒ Yes ☐ No	☒ Yes ☐ No
		☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No
		☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No
		☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No

Any "No" responses must be documented below with an explanation and a schedule for corrective action or completion:

BMP EVALUATION AND OBSERVATION FORM

COMPLETE ONE FORM FOR EACH ACTIVITY AREA

Airport Name & WDID #: FRENCH VALLEY 933S006139

Date: 3-19-08

Inspector(s): DAVE ENGLISH

Industrial Activity or Activity Area to be Inspected: F.V.A FBO HANGAR

Is the activity identified accurately and in accordance with the SWPPP ?

☒ YES ☐ NO

If No, list changes that have occurred: _____

Best Management Practices Status

BMP	Description	BMP in Place	BMP Functioning Properly	BMP Adequate
EMPLOYEE TRAINING	EMPLOYEES TRAINED TO CLEAN UP SPILLS AS THEY OCCUR	☒ Yes ☐ No	☒ Yes ☐ No	☒ Yes ☐ No
ABSORBENT MATERIAL	OIL ABSORBENT MATERIAL ON HAND TO CLEAN UP SPILLS AS THEY OCCUR	☒ Yes ☐ No	☒ Yes ☐ No	☒ Yes ☐ No
WASTE OIL TANK	WASTE OIL TANK TO STORE USED OIL	☒ Yes ☐ No	☒ Yes ☐ No	☒ Yes ☐ No
		☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No
		☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No

Any "No" responses must be documented below with an explanation and a schedule for corrective action or completion:

_____

BMP EVALUATION AND OBSERVATION FORM

COMPLETE ONE FORM FOR EACH ACTIVITY AREA

Airport Name & WDID #: FRENCH VALLEY 933S006139

Date: 3-19-08

Inspector(s): DAVE ENGLISH

Industrial Activity or Activity Area to be Inspected: R. W. MARTIN

Is the activity identified accurately and in accordance with the SWPPP ?

☒ YES ☐ NO

If No, list changes that have occurred: _____

Best Management Practices Status

BMP	Description	BMP in Place	BMP Functioning Properly	BMP Adequate
EMPLOYEE TRAINING	EMPLOYEES TRAINE TO CLEAN UP SPILLS AS THEY OCCUR	☒ Yes ☐ No	☒ Yes ☐ No	☒ Yes ☐ No
ABSORBENT MATERIAL	ABSORBENT MATERIAL ON HAND TO CLEAN UP SPILLS AS OCCUR	☒ Yes ☐ No	☒ Yes ☐ No	☒ Yes ☐ No
WASTE OIL TANK	WASTE OIL TANK TO STORE USED OIL	☒ Yes ☐ No	☒ Yes ☐ No	☒ Yes ☐ No
		☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No
		☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No

Any "No" responses must be documented below with an explanation and a schedule for corrective action or completion:

_____

BMP EVALUATION AND OBSERVATION FORM

COMPLETE ONE FORM FOR EACH ACTIVITY AREA

Airport Name & WDID #: FRENCH VALLEY 933S006139

Date: 3-19-08

Inspector(s): DAVE ENGLISH

Industrial Activity or Activity Area to be Inspected: P.V.A FUEL FARM

Is the activity identified accurately and in accordance with the SWPPP ?

☒ YES ☐ NO

If No, list changes that have occurred: _____

Best Management Practices Status

BMP	Description	BMP in Place	BMP Functioning Properly	BMP Adequate
EMPLOYEE TRAINING	EMPLOYEES TRAINED TO CLEAN UP SPILLS AND PROPER USE OF EQUIPMENT	☒ Yes ☐ No	☒ Yes ☐ No	☒ Yes ☐ No
ABSORBENT MATERIAL	ABSORBENT MATERIAL ON HAND TO CLEAN UP SPILLS AS THEY OCCUR	☒ Yes ☐ No	☒ Yes ☐ No	☒ Yes ☐ No
SECONDAR CONTAINMENT	CONCRETE RETENSION BASIN TO CONTAIN SPILLS	☒ Yes ☐ No	☒ Yes ☐ No	☒ Yes ☐ No
		☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No
		☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No

Any "No" responses must be documented below with an explanation and a schedule for corrective action or completion:

BMP EVALUATION AND OBSERVATION FORM

COMPLETE ONE FORM FOR EACH ACTIVITY AREA

Airport Name & WDID #: FRENCH VALLEY 833S006139

Date: 3-19-03

Inspector(s): DAVE ENGLISH

Industrial Activity or Activity Area to be Inspected: EV.H SELF SERVE

Is the activity identified accurately and in accordance with the SWPPP ?

☒ YES ☐ NO

If No, list changes that have occurred: _____

Best Management Practices Status

BMP	Description	BMP in Place	BMP Functioning Properly	BMP Adequate
ABSORBENT MATERIAL ON HAND	TO CLEAN UP SPILLS AS THEY OCCUR	☒ Yes ☐ No	☒ Yes ☐ No	☒ Yes ☐ No
SECONDARY CONTAINMENT	CONCRETE RETENSION BASIN WITH RAIN PLUGS	☒ Yes ☐ No	☒ Yes ☐ No	☒ Yes ☐ No
		☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No
		☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No
		☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No

Any "No" responses must be documented below with an explanation and a schedule for corrective action or completion:

BMP EVALUATION AND OBSERVATION FORM

COMPLETE ONE FORM FOR EACH ACTIVITY AREA

Airport Name & WDID #: FRENCH VALLEY 933S006139

Date: 3-19-08

Inspector(s): DAVE ENGLISH

Industrial Activity or Activity Area to be Inspected: AIRCRAFTERS

Is the activity identified accurately and in accordance with the SWPPP ?

☒ YES ☐ NO

If No, list changes that have occurred: _____

Best Management Practices Status

BMP	Description	BMP in Place	BMP Functioning Properly	BMP Adequate
WASTE OIL TANK	WASTE OIL TANK TO STORE USE MOTOR OIL	☒ Yes ☐ No	☒ Yes ☐ No	☒ Yes ☐ No
ABSORBENT MATERIAL	ABSORBENT MATERIAL TO CLEAN UP SPILLS AS THEY OCCUR	☒ Yes ☐ No	☒ Yes ☐ No	☒ Yes ☐ No
EMPLOYEE TRAINING	EMPLOYE TRAINING TO CLEAN UP SPILLS	☒ Yes ☐ No	☒ Yes ☐ No	☒ Yes ☐ No
		☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No
		☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No

Any "No" responses must be documented below with an explanation and a schedule for corrective action or completion:

Outfall Number	Date/ Time:	Floating or Suspended Material?	Turbidity or Discoloration?
3	2/21	Yes ____ No X If yes, describe:	Yes ____ No X If yes, describe:
	1:30 PM	Odors? Yes ____ No X If yes, describe:	Oil and Grease Sheen Present? Yes ____ No X If yes, describe:

Outfall Number	Date/ Time:	Floating or Suspended Material?	Turbidity or Discoloration?
4	2/21	Yes ____ No X If yes, describe:	Yes ____ No X If yes, describe:
	1:45 PM	Odors? Yes ____ No X If yes, describe:	Oil and Grease Sheen Present? Yes ____ No X If yes, describe:

Outfall Number	Date/ Time:	Floating or Suspended Material?	Turbidity or Discoloration?
5	2/21	Yes ____ No X If yes, describe:	Yes ____ No X If yes, describe:
	2 PM	Odors? Yes ____ No X If yes, describe:	Oil and Grease Sheen Present? Yes ____ No X If yes, describe:

Outfall Number	Date/ Time:	Floating or Suspended Material?	Turbidity or Discoloration?
		Yes ____ No ____ If yes, describe:	Yes ____ No ____ If yes, describe:
		Odors? Yes ____ No ____ If yes, describe:	Oil and Grease Sheen Present? Yes ____ No ____ If yes, describe:

Miscellaneous

Educational Materials

PE.com

Riverside area Watershed Cleanup needs volunteers

10:00 PM PDT on Thursday, September 25, 2008

By JENNIFER WHITAKER
The Press-Enterprise

Keep Riverside Clean and Beautiful is looking for volunteers for the Inner-coastal and Watershed Cleanup Day set for Oct. 4 at the Riverside County Flood Control District. Hundreds of volunteers are expected to help pick up trash and paint out graffiti along the Santa Ana River.

Volunteers will receive community service hours, T-shirts and a barbecue lunch provided by the Arlington Rotary.

"Our mission here is to promote volunteerism through beautifying the city," said Connie Librenjak, Executive Director of Keep Riverside Clean and Beautiful. "It's not just about the service hours or the free T-shirts and lunch, but it's about building a sense of community pride."

The event is part of a 12th annual Southern California watershed clean up held this month and next by Trails4All that stretches from San Clemente to Anaheim and Irvine. Riverside has been participating for five years.

Librenjak said she expects about 300 volunteers from high school and college students to church groups and families.

"We love volunteers of all ages, and we appreciate everybody that comes out," she said.

Story continues below

2007 / Special to The Press-Enterprise

PE.com

Cleaning Up Others Trash

07:12 AM PDT on Monday, September 29, 2008

BOB PRATTE

A dark hulk loomed on Bautista Canyon Road as I pedaled my bicycle Thursday at daybreak in the Valle Vista citrus groves east of Hemet.

When I rolled up, I was surprised to see a massive pile of garbage that must have been dumped in the dark, right on the asphalt. The giant pile of leaves, old hunks of plywood, five-gallon buckets of paint, a wheelbarrow, battered chairs and lots of assorted household junk covered one lane of the two-lane road.

It was the worst instance of roadside dumping I've seen. It also provided the opportunity for a surprising good deed.

Like others cruising through the beautiful citrus groves of Valle Vista, I grumble when I see old washing machines and discarded couches.

Illegal dumping creates lots of work. When making trash-hauling agreements in unincorporated Riverside County, garbage companies are required to clean up illegal dumping along county-maintained roads. Cities have their own procedures.

Reports of illegal dumping within 20 feet of county-maintained roads can be made by calling the Department of Environmental Health at 951-955-8982.

mydesert.com

September 23, 2008

County wins state award for water conservation

Riverside County's efforts to address the region's water shortage were recognized today by the state American Planning Association at its conference in Hollywood. The county's new water conservation landscaping ordinance received the organization's award for Outstanding Best Practices.

With an eye toward conservation and spurred by a looming state crisis, Riverside County developed a plan to reduce water consumption by 20 percent while preserving the natural desert landscape.

"We've come up with a model that reduces water use without sacrificing landscape aesthetics," said Supervisor Marion Ashley, who has served as a board member for local water agencies and has been recognized for his leadership in water conservation.

"We are proud of this recognition and hope that it encourages others throughout the state to address this issue."

Landscaping can account for more than 60 percent of a household's water consumption. New housing tracts and commercial developments now have to use drought-tolerant plants, water-efficient irrigation systems, and landscape smaller areas. These measures are expected to reduce landscaping water use by 20 percent.

The Board of Supervisors implemented the ordinance in April, long before a county-imposed 2010 deadline to implement water-use guidelines. The ordinance is supplemented by a landscaping guide that details for developers the new irrigation requirements and allowed plants.

Homeowners interested in using water-efficient landscaping guidelines or who would like more information on water-wise rebates, should visit www.bewaterwise.com.

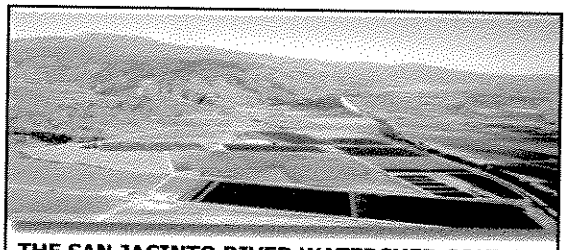

THE SAN JACINTO RIVER WATERSHED COUNCIL

Prop 50- Integrated, Regional Watershed Management Plan (IRWMP) for the San Jacinto Watershed

Riverside County Planning Commission
April 30, 2008

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Introduction

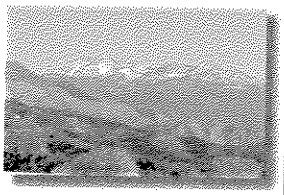

- The San Jacinto River Watershed Council is a non-profit organization
- The SJRWC began in 2001 through the efforts of the EMARCD and SJBRCD
- Incorporated and 501 (c) 3 established in 2003
- Grassroots, broad-based stakeholder involvement

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Our Current Board

- **Phil Williams**, President, Water Agency/EVMWD
- **Bruce Scott**, Treasurer, Landowner/Farmer
- **Steve Stump**, Secretary, County/RCFC&WCD
- **Mark Norton**, Federal/State/Regional/SAWPA
- **Brad Scott**, Dairy/Owner
- **Terry Wold**, Environmental/Community/Sierra Club
- **Harold Arres**, Tribal/Soboba Band of Luiseno Indians
- **Open**, At-Large
- **Renee Latu**, At-Large/SAWA

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Prop 50 Planning Grant

- Region defined: The San Jacinto Watershed-780 square miles
- Lead entity: The San Jacinto River Watershed Council
- Teaming partner: Riverside County Flood Control & Water Conservation District
- Expands SAWPA's IWMP
- Specific focused component for SJ Watershed
- 47.9% of SJ Watershed living in disadvantaged communities(2000 Census data)

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Project Components

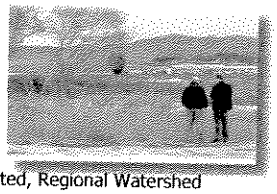

- San Jacinto Integrated, Regional Watershed Management Plan
  (Prop 50, Chapter 8 Planning Grant)
- Specific studies in the plan:
  - Septic System Management Plan
  - San Jacinto River- Gap Feasibility Study
  - Watershed/Waterbody Monitoring-Canyon Lake
  - Sediment Nutrient Flux and Oxygen Demand Study for Canyon Lake with In-lake Alternatives

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Key Stakeholder Participation

- **RCFC&WCD**
  -Managed technical components of the Gap Feasibility Study, Septic Management Plan
- **WORKGROUPS**
  -IRWMP
  -Gap Feasibility
  -Septic Management Plan
  -Watershed Monitoring & Sediment Study with In-lake Alternatives (LESJWA TAC & Task Force/TMDL components)
  -More than 80 Individual Watershed stakeholders participated

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The San Jacinto Watershed Component of
the Santa Ana Integrated Watershed Plan

Key Stakeholder Participation

- WRIME Groundwater component

  Our original grant did not have funding to address groundwater in the detail we would have liked. The Hemet/San Jacinto Management Plan participants developed this component. They are: Eastern Municipal Water District, Lake Hemet Municipal Water District, the City of Hemet and the City of San Jacinto.

- SAWPA

  Mark Norton was of great value throughout the process and in particular with the strategy development component. Jeff Beehler assisted in coordinating the gap key players.

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The Plan

- Identified 10 Resource Management Strategies and Associated Sub-objectives
  - Improve surface and groundwater quality
  - Ensure the long-term viability of water supplies
  - Provide adequate stormwater and flood control
  - Protect, enhance, and create habitat for wildlife
  - Manage land use to protect natural resources and watershed character
  - Promote water recycling
  - Expand water conservation programs
  - Enhance opportunities for parks, recreation and open space
  - Weigh environmental justice concerns in watershed decision-making
  - Explore opportunities to address climate change issues with watershed projects

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5 Main Watershed Priorities

- Multiple benefit projects
- Environmental justice concerns/disadvantaged communities
- Projects to lower TMDL load allocations
- Prevent nonpoint source pollution from failing septic systems
- Assist agriculture and dairy in implementing BMPs to reduce nutrients in surface water and to meet salt offset requirements for groundwater.

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110 Projects

Planning	33
Regulatory Compliance	31
Improvement	76
Research and Monitoring	18
Educational	12

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Resource Management Strategy

10 RESOURCE MANAGEMENT STRATEGIES	# OF PROJECTS
Water Quality	87
Water Supply	48
Stormwater and Flood Control	42
Habitat	48
Land use	3
Water recycling	23
Water conservation	14
Parks, Recreation and open space	37
Environmental justice	90
Climate change	19

*note that most projects meet more than one RMS

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Final Product

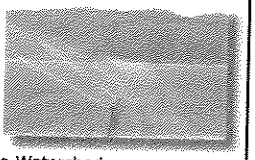

- IRWMP for the San Jacinto Watershed
- Grant completion 4/2/08
- 110 projects identified totaling over $1.3 billion
- Monthly meetings over past 2.5 years to coordinate the plan effort
- 4 specific analyses completed assisting stakeholders and meeting compliance requirements. Baseline data on gap area collected.

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The San Jacinto Watershed Component of the Santa Ana Integrated Watershed Plan

The Final Product-continued

- Specific Analyses
  - Canyon Lake Monitoring
    *This met a TMDL Watershed compliance requirement-Benefit to all stakeholders
  - Sediment Study with In-lake Alternative Recommendations
    *This met a TMDL Watershed compliance requirement-Benefit to all stakeholders
    Additional funding ($18,000) provided to develop model to provide level of confidence to RWQCB for recommended alternatives.

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The Final Product-continued

- Specific Analyses
- San Jacinto River Gap Feasibility Study
  - Hydrology and Habitat linkage components
  - *Obtained additional grant funding $80,000 to do additional work through USBR for Sediment Transport Analysis. Final report in March 2008.
- Septic System Management Plan
  Scope changed due to pending AB885 Guidelines. Cities will have to still do additional tasks to meet TMDL requirement.
  - Identifies septics and problem areas in the entire watershed based upon proximity to waterbodies.

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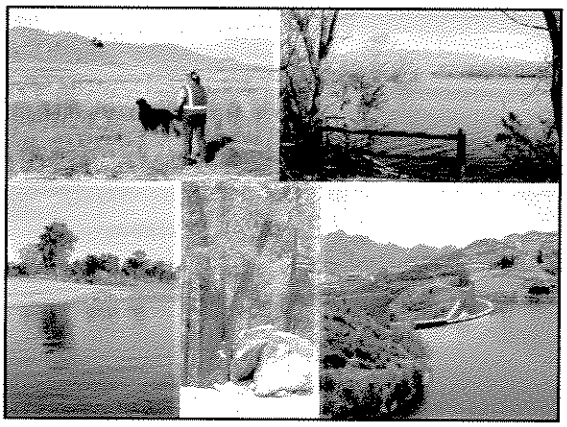

The San Jacinto River Watershed Council
P.O. Box 1378
San Jacinto, CA 92581-1378

Dear Friend of the San Jacinto Watershed,

This "Guidebook for Living in the San Jacinto Watershed," our free gift to you, is full of useful tips, suggestions and resources to make it easy for you to both save money and do your part for a healthier environment.

- Small changes in our daily lives can make a big difference in protecting our natural resources.
- Conserving water is far less expensive than importing it-or building costly desalination plants.
- Reducing our use of pollutants means cleaner waterbodies.
- Preserving natural open space in our watershed saves vanishing wildlife and allows more rainfall to soak into the ground for future water needs.
- You can make a difference! Volunteer! Get involved! Let elected officials and candidates know that you care about the environment.

The San Jacinto River Watershed Council is a locally based non-profit organization that addresses water issues in the San Jacinto Watershed and is supported by donations from interested and concerned stakeholders like you. The Council is an open forum of the entire watershed and strives to represent all stakeholders. It can be characterized as broad-based in its representation and holistic in its approach to issues of watershed management and planning. We strive to facilitate stakeholder cooperation in order to identify the watershed's most pressing problems and forge solutions that integrate efforts aimed toward water supply, flood control, groundwater management, open space preservation, habitat protection, and pollution prevention with an overall goal to provide protection, restoration and enhancement of watershed related resources. Some of our current activities include:

- Development of a San Jacinto Integrated Regional Watershed Plan
- Stakeholder outreach-including such efforts as this FREE publication!
- Assistance in the implementation of the Lake Elsinore/Canyon Lake TMDL which will improve water quality
- Applying for grants available only to non-profit organizations that will help address water resource and water quality problems
- Coordination and integration of other regional studies and plans
- Development of work groups to address critical watershed issues such as: the "gap" issue on the San Jacinto River, the need for sewers in the Quail Valley area, and TMDLs.
- Assistance in developing strategies to control nutrients & pathogens negatively impacting water bodies

This guide is yours to enjoy FREE of charge. But if you would like, please send a donation in any amount to help us continue our program to secure a sustainable water supply, preserve and enhance open space and improve the environment right here where you live.

Sincerely,

The San Jacinto River Watershed Council
Board of Directors

00002280

Guidebook for Living in the
San Jacinto Watershed

SJRWC

San Jacinto River Watershed Council
P.O. Box 1378
San Jacinto, CA 92581-1378

Guidebook for Living in the
San Jacinto Watershed

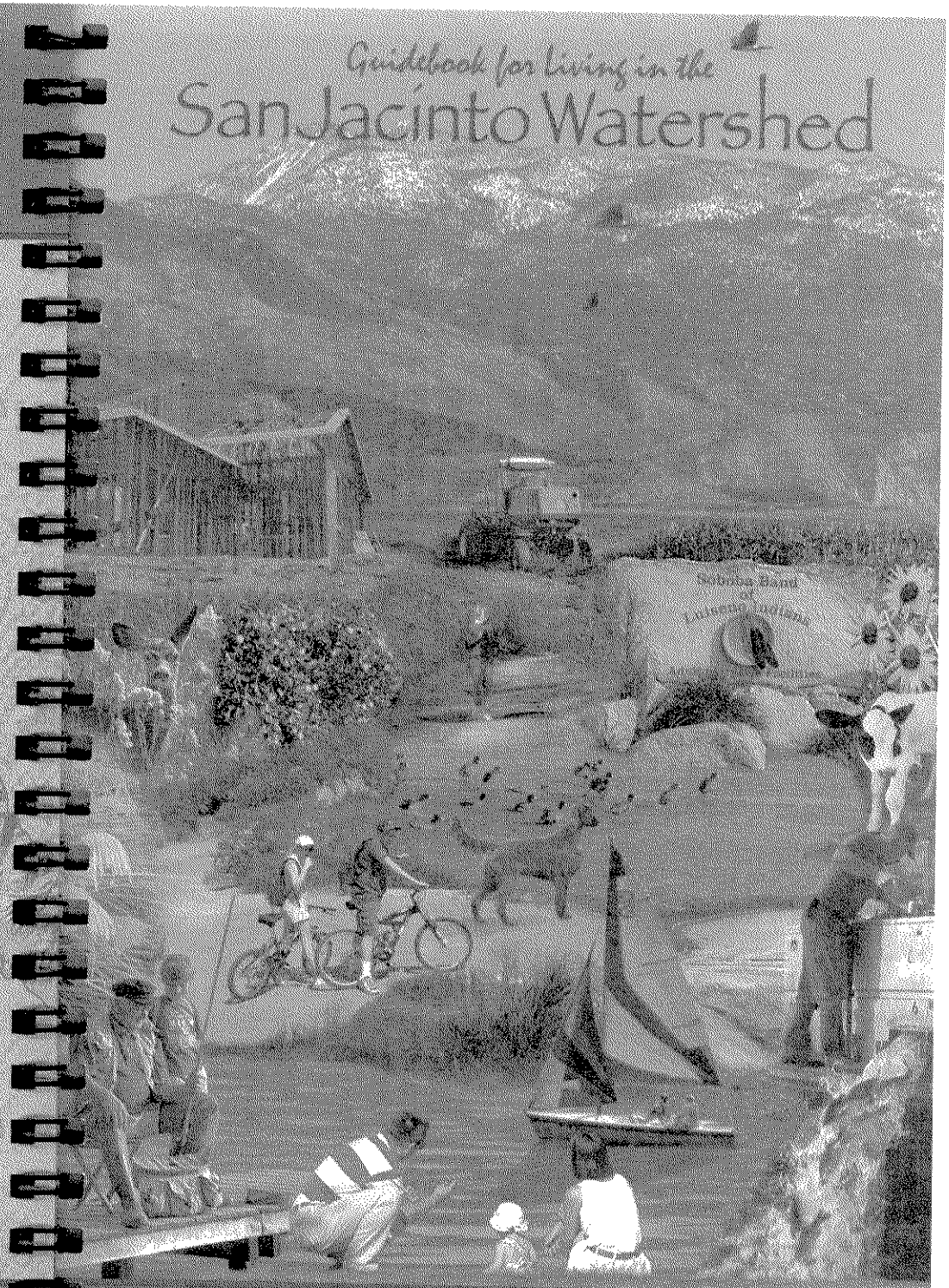

A Guide for Residents of the
San Jacinto Watershed and Surrounding Communities

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The San Jacinto River Watershed Council recognizes the following organizations and agencies as partners in creating *The Guidebook for Living in the San Jacinto Watershed, A Guide for Residents of the San Jacinto Watershed and Surrounding Communities*. From providing funding to lending technical expertise, these organizations have contributed to preserving the natural resources of the San Jacinto Watershed:

Bureau of Reclamation, California Environmental Protection Agency Environmental Justice Small Grants Program • City of Lake Elsinore • Eastern Municipal Water District • Elsinore Valley Municipal Water District • Lake Elsinore and San Jacinto Watersheds Authority • Lewis Planned Communities and the Garrett Group • Milk Producers Environmental Fund • Riverside County Farm Bureau • Riverside County Flood Control and Water Conservation District, Santa Ana Watershed Association, Santa Ana Watershed Project Authority • Soboba Band of Luiseño Indians and Western Municipal Water District.

The San Jacinto Guidebook is based upon the Arroyo Seco "Living Lightly in Our Watersheds: A Guide for Residents of Arroyo Seco and surrounding communities." The Arroyo Seco book was based upon earlier concepts from the Topanga Watershed Committee and the Malibu Creek Advisory Council. We wish to thank the Topanga Watershed Committee, the Malibu Creek Watershed Advisory Council, and the Arroyo Seco Watershed Committee.

Adaptation of text reprinted from the "Living Lightly In Our Watersheds Guide" with permission from the Arroyo Seco Watershed Committee.

This book is also available in Spanish. Please contact the San Jacinto River Watershed Council for additional information.

Prepared by:
The San Jacinto River Watershed Council

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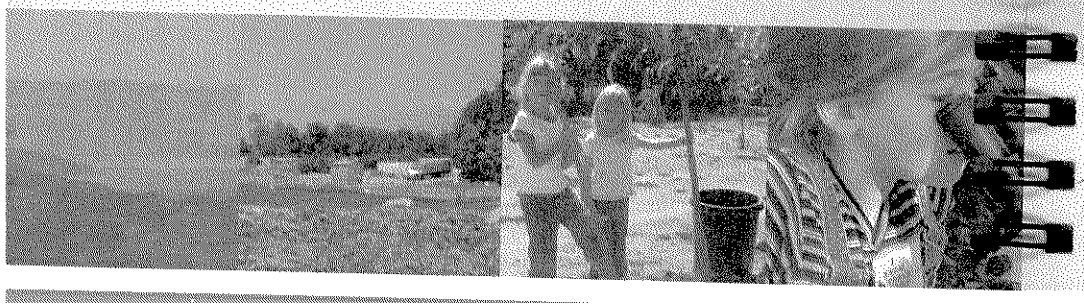

Welcome to

The Guidebook for Living in the San Jacinto Watershed

Dear Friends,

There's a spot along the Ernie Maxwell Scenic Hiking Trail, just east of Idyllwild, where much of the San Jacinto River Watershed may be taken in at a single glance. Here in the shadow of Tahquitz Peak, the mountains, ridges and hilltops that form the upper boundaries of our watershed surround you. Lake Hemet and Garner Valley lie just south. Below the Lake lies the canyon of the south fork of the San Jacinto River winding northwest toward the Soboba Indian Reservation, the Badlands and that ephemeral jewel, Mystic Lake. Along the trace of the Canyon and just west of Mystic Lake are the dairy lands and the San Jacinto Wildlife Area, one of the best indicators of the health of our watershed. Further west and just beyond our view lie Canyon Lake and Lake Elsinore, where much of how we all live is reflected in the quality of those aquatic environments.

These stops along the energy highway that comprise our watershed are but a glimpse of the real complexity that underlies the environment in which we all live and work. It's the droplets of water, particles of soil, molecules of oxygen, photons of sunlight, bacteria, insects, flowering plants, birds, mountain lions and all of us – all are related, connected by lifelines and knotted together in a network. We now better understand that when we work together locally for environmental quality, the integrity of the network can be maintained and we can achieve stability, the most fundamental property of a functioning watershed and sustainable communities.

And we have come together: citizens, local, state and federal agencies as members of the non-profit San Jacinto River Watershed Council to coordinate efforts and share resources to develop and implement watershed management strategies that will make western Riverside County a great place to live and work.

This booklet, Guidebook for Living in the San Jacinto Watershed, was developed to inform you of the work of all of our members, what you can do to help reduce pollution and conserve resources, and how you can become involved in and support the work of the Council.

Enjoy!!

Jim Gilmore, President
San Jacinto River Watershed Council

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County of Riverside

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(951) 471-4270
Fax (951) 471-4288

Wendy Kolk

Dear Friends of the San Jacinto River:

Among the many reasons to reside in or visit Riverside County is the high quality of life available to an active population. Within that portion of just the San Jacinto River Watershed, the variety of activities offered takes a lifetime to enjoy fully. You can hike high in the cool mountains. You can water-ski, fish or sail on several lakes. You can tour public gardens or grow your own flower and herb gardens year-round. You can be as active or passive as you prefer.

The San Jacinto River Watershed has it all. The best way to enjoy your lifestyle is to "live lightly" in our communities. That's what this guidebook offers you—opportunities for enjoyment and the obligation to be part of the conservation ethic that reduces pollution, keeps our air and water clean, and endorses our priority to maintain bountiful green space. We can all do our parts to ensure that the watershed will be a valued destination for new generations.

Many individuals from private, governmental and volunteer organizations contributed their expertise to this guidebook. We know you'll find this guidebook helpful in understanding the San Jacinto River Watershed and appreciating what it has to offer.

Sincerely,

Bob Buster, Chairman
Supervisor, First District

Jeff Stone
Supervisor, Third District

Marion Ashley
Supervisor, Fifth District

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Imagine THE SAN JACINTO WATERSHED

as a clean and protected environment that is the source of community pride. Parks, bicycle trails, places to walk under a green canopy of trees, clean air, water and wildlife habitat are all a part of what the future holds for the watershed.

With your support, the vision is becoming a reality.

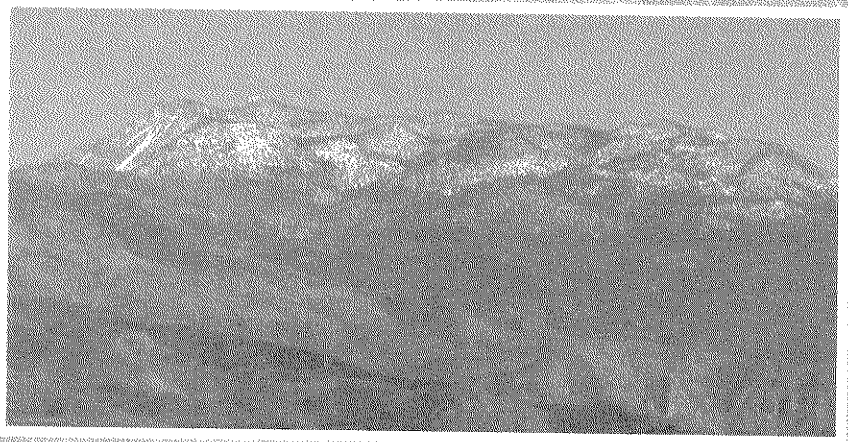

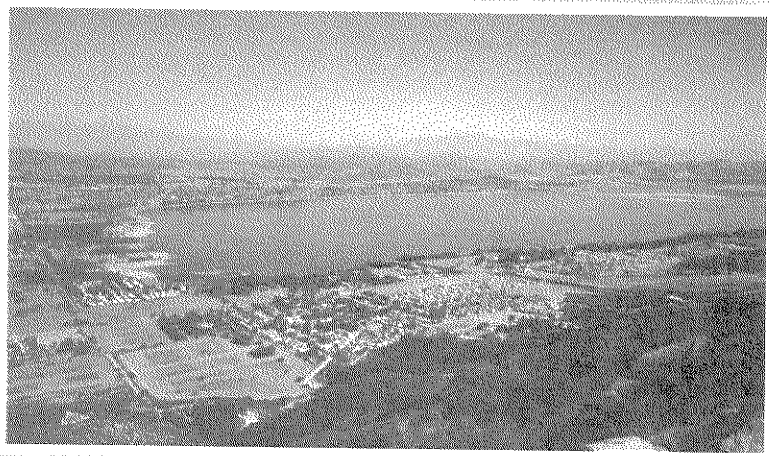

What is a Watershed?

A watershed is an area of land from which all rainfall drains to a common point. All land is part of a watershed. As rainwater and melting snow run downhill, they carry sediment and other materials into our streams, lakes and groundwater.

The San Jacinto Watershed upstream of Canyon Lake covers 718 square miles in the western half of Riverside County. There are two main watercourses in the watershed, San Jacinto River and Salt Creek.

The San Jacinto drains the western slopes of the San Jacinto Mountains and flows through the communities of San Jacinto and Perris before entering Canyon Lake. Salt Creek is tributary to the San Jacinto River and flows into Canyon Lake from the east. Discharges from the Canyon Lake Dam flow southwest in the San Jacinto River to Lake Elsinore and, then flows northwest in Temescal Wash to the Santa Ana River, which flows to the Pacific Ocean.

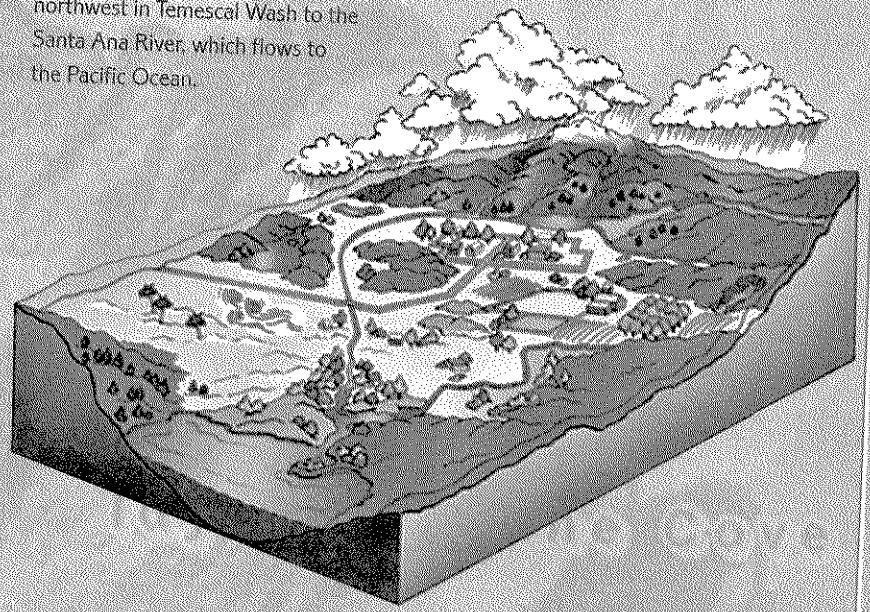

FOUR WATERSHED

The earth's surface rocks as well as minerals, species and life, allowing moisture, minerals, and organic material to be used and released by all life in developing our cities and communities, we have changed the underlying conditions of the land on which they are built. Where once water, air and nutrients could enter the soil and circulate freely, we now have increasingly larger areas of hard surfaces that rapidly concentrate rain and pollutants. We have also introduced plants and animals into areas where they were not previously found. This dramatically changing the make-up of our regional biological communities. Learning to work with the natural cycles that have sustained the earth will help ensure that good, clean air, and water, and beautiful, green, open space will be available to future generations.

To keep every cog and wheel is the first requirement of a good watch.

— Alan Perlis

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A Watershed Approach

People working together to protect public health and the environment - community by community, watershed by watershed.

Carol M. Browner, Administrator
U.S. Environmental Protection Agency
June 1996

Rainfall travels from the mountains to the ocean. Water, air, plants and animals move freely across political boundaries. Strategies for improving water quality and availability, increasing flood protection, protecting our lakes and preserving open space for recreation and wildlife are more effective when pursued collectively over a whole watershed. Agencies, organizations, politicians, and individuals should cross over city lines, joining together with neighbors in their watersheds to work toward these important goals. This watershed-based approach not only promises better and more cost-effective results, it also serves to unite neighborhoods, further enriching our lives.

To this end, The San Jacinto River Watershed Council has produced this environmental guide, *"Guidebook for Living in the San Jacinto Watershed,"* for communities in and around the San Jacinto watershed.

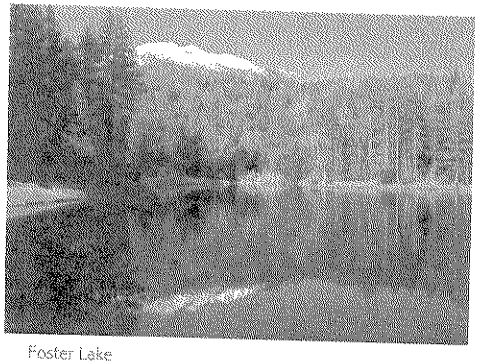

Foster Lake

Mystic Lake after a large storm event

CONTACT

FOR MORE INFORMATION ON WATERSHEDS:

- The San Jacinto River Watershed Council- www.sawpa.org/sjrwc/
- LESJWA- www.mywatersheds.com

The San Jacinto Watershed

The San Jacinto Watershed is a 780 square mile watershed with diverse and unique geographical, cultural, and ecological significance. Let's take a journey (see map page vi) to better understand how water flows through our watershed.

At the top of our watershed, in the San Jacinto Mountain communities of Idyllwild, Pine Cove Fern Valley and Garner Valley, rain and snow fall on steep, rocky slopes. Water and sediments wash from the slopes, and move down the mountain and canyons into the headwaters of the San Jacinto River. Lake Hemet, on the South Fork of the river, captures significant quantities of mountain runoff. In wetter years, Lake Hemet overflows, drastically increasing the flow in the river as it exits the mountains into the San Jacinto Valley near the community of Valle Vista.

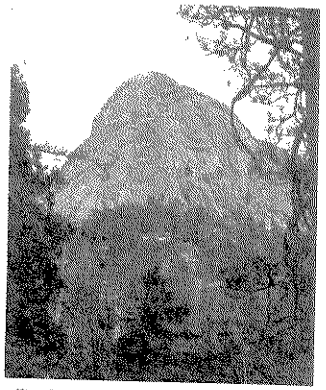

The 8,828-foot Tahquitz Peak, a granite dome in the San Jacinto Wilderness is a favorite with climbers.

East of the city of San Jacinto, in the rolling foothills of the San Jacinto Mountains, is the 7,000 acre Soboba Indian Reservation, home of the Soboba Band of Luiseño Indians. The reservation extends into the broad level floodplain at the southeast edge of the San Jacinto Valley. Two other mountain streams, Indian Creek and Poppet Creek, flow through the reservation. Water is and always has been a cornerstone of the Soboba band.

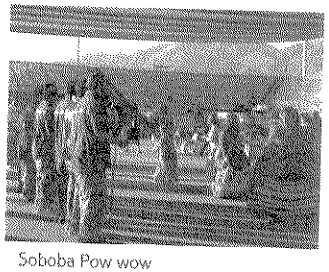

Soboba Pow wow

The San Jacinto Valley holds a rich and diverse agricultural history. On the south end of the valley are several thousand acres of citrus orchards located in the foothills near Bautista Creek. On the northern half of the San Jacinto Valley the San Jacinto River flows through a large dairy and agricultural community. In the early 1900's, farmers co-opted in building a leveed diversion channel to keep the river from flooding into a large depression at the north edge of the valley known as Mystic Lake. During heavy storm events the levees are overwhelmed, and the river breaks out to flow into Mystic Lake.

Agriculture in the San Jacinto Valley

Today, Mystic Lake is part of the 19,100 acre San Jacinto Wildlife Area owned by the California

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Department of Fish and Game. This conservation area is comprised of the 9,100 acre Potrero Unit, on the Potrero Creek Drainage east of Lamb Canyon Road, and the 10,000 acre Davis Road Unit, which surrounds Mystic Lake in the northern San Jacinto Valley. When Mystic Lake fills and overflows just east of Lake Perris, water flows into the lower reach of the San Jacinto River, which cuts southwesterly across the Perris Valley. Urban runoff from Moreno Valley, Perris, and the communities of Lakeview, Nuevo, Romoland adds to the flow of the water in the river as it makes its way westward toward Canyon Lake.

Salt Creek, a major San Jacinto River tributary, collects runoff from the southern portion of our watershed which includes Hemet, San Jacinto, and the Winchester, Menifee Valley, and Sun City communities. These flows are conveyed to the east bay of Canyon Lake. Runoff from communities near Quail Valley also flows into Canyon Lake.

Canyon Lake, surrounded by a private gated community, flows over its dam during moderate and wet storm seasons. Spillway flows then traverses a short reach of the San Jacinto River within Railroad Canyon until they reach the river's final destination - Lake Elsinore. Lake Elsinore, with the spectacular Cleveland National Forest as a mountain backdrop, is the largest natural freshwater lake in Southern California.

On average, every 7 to 14 years, large storm events occur on our watershed. Spectacular views of the river result, but also flooding. Sediment and pollution, if not controlled, move down its course, seriously impacting the health of the downstream lakes. It is with this in mind that we remind everyone to treat this naturally fragile watershed system with care and respect as you enjoy its miles of ever changing beauty.

Duck pond on the San Jacinto Wildlife area.

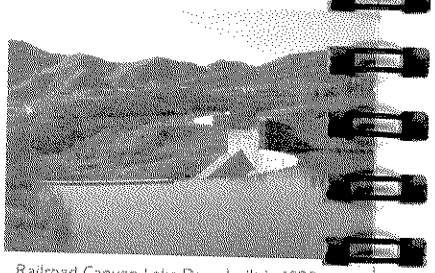

Railroad Canyon Lake Dam, built in 1928, created Canyon Lake, a water supply reservoir.

Lake Elsinore with the Cleveland National Forest as a mountain backdrop.

Parks and Public Space

The quality of life for the residents who call the San Jacinto watershed their home relies upon the presence of beautiful, peaceful parks, and abundant open space.

WHAT YOU CAN DO

to keep our parks safe and beautiful:

- Keep your dogs on a leash and clean up after them.
- Do not feed the wildlife. Human food is not healthy for birds, squirrels, and other animals.
- Take only pictures, leave only footprints.
- No fires in undesignated areas. Follow all other local rules and regulations.
- If you live near an open, green space, park or hillside, keep your cat indoors. Chances are they will live longer and the birds, bugs and lizards will thank you!

Slow down and take some time to get to know and enjoy the treasures of our region. See the fold-out map, page vii.

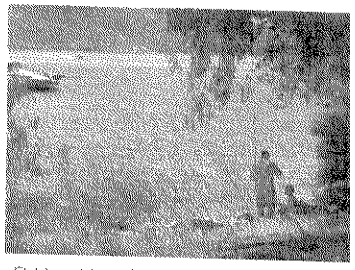

Fishing at Lake Perris.

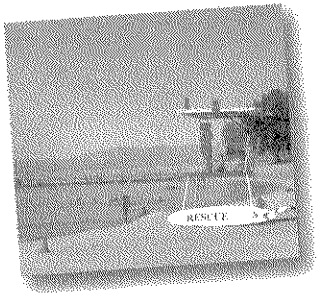

Lake Perris State Recreation Area and the San Jacinto Wildlife area are two wildlife treasures in the upper watershed full of outdoor activities for you and your family.

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Environmental Challenges

Stormwater Pollution

Trash, bacteria, pesticides, fertilizers and oil wash into streets and storm drains and contaminate our streams, groundwater, and lakes. Fertilizers and other non-natural sources of nutrients such as grass clippings stimulate the growth of plants, disrupt local water- and land-based communities of plants, and cause severe impairment of our lakes. Each person, simply by changing a few every-day habits, can effect positive change across the watershed.

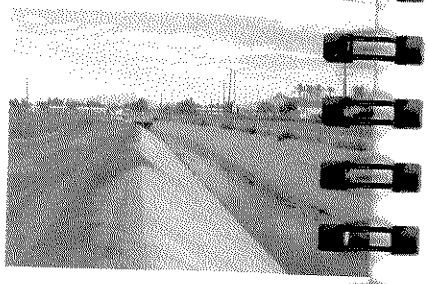

WHAT YOU CAN DO

to reduce stormwater pollution:

- Pick up trash and litter around your yard and home.
- Sweep rather than hose down driveways.
- Reduce use of toxic chemicals in and around your home and use only as directed on the label.
- Dispose of unwanted household hazardous wastes, antifreeze, batteries, oil and paint at official collection stations. Call (800) 506-2555.
- Clean up pet waste.
- Wash your car at a car wash to keep detergents out of the streets.
- Report illegal dumping and stormwater pollution to (800) 506-2555.

Why clean up after your pet?

Pet waste that is left exposed to the elements eventually washes into the storm drains, channels and creeks and down to the lakes .

Pet waste degrades the environment and water quality by:

- Increasing nitrogen and phosphorus in the water, resulting in excessive algae growth.
- Increasing the amount of bacteria and viruses in the water.
- Making neighborhoods and parks less healthy and enjoyable for all users.

PLEASE CLEAN UP AFTER YOUR PET!

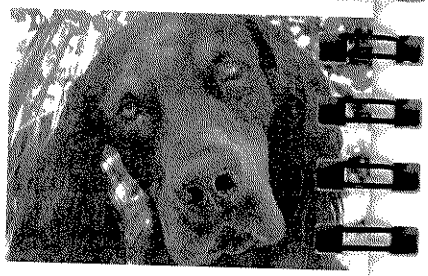

Invasive Plants

Ever since Spanish colonial times, mankind has brought foreign plants, "exotics," to the New World, sometimes by accident, but more usually as fodder or ornament. In our watershed, many drought-tolerant ornamentals are well-behaved, but some escape our yards and create problems. Once growing in the wild, all of them, however attractive, such as Scotch broom in the mountains and fountain grass on the roadside, crowd out native plants to which our native birds and insects are adapted.

A very invasive plant. Arundo Donax

Other plants not only out-compete the natives, but do further damage. Invasive annual grasses grow quickly and dry to tinder, making meadows and scrubland more prone to fire. Eucalyptus grow fast, are brittle, extremely flammable and prone to disease, as are oleanders. Castor-oil plant is poisonous, and tocolote has many irritating burrs.

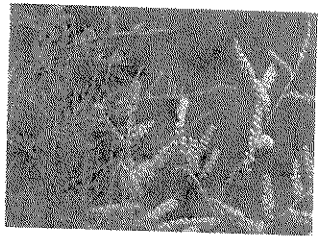

Tamarisk

Possibly the worst invasives in the watershed are the giant reed, Arundo, and the Tamarisk tree. These water-thirsty foreigners deplete the water table and form monoculture stands where no bird sings. There is a current effort underway – at a cost of millions of dollars – to eradicate Arundo from the Santa Ana and San Jacinto watersheds.

WHAT YOU CAN DO

to control invasive plants:

- Get to know the plants that are problematic in your area and avoid using them.
- Use native plants from our local area. (See page 15 for species.)
- When you see problem exotics for sale in the nurseries, tell them why you want natives instead.

DID YOU KNOW

The National Parks Conservation Association considers the invasion of national parks by non-native species among the most significant causes of biodiversity loss in parks.

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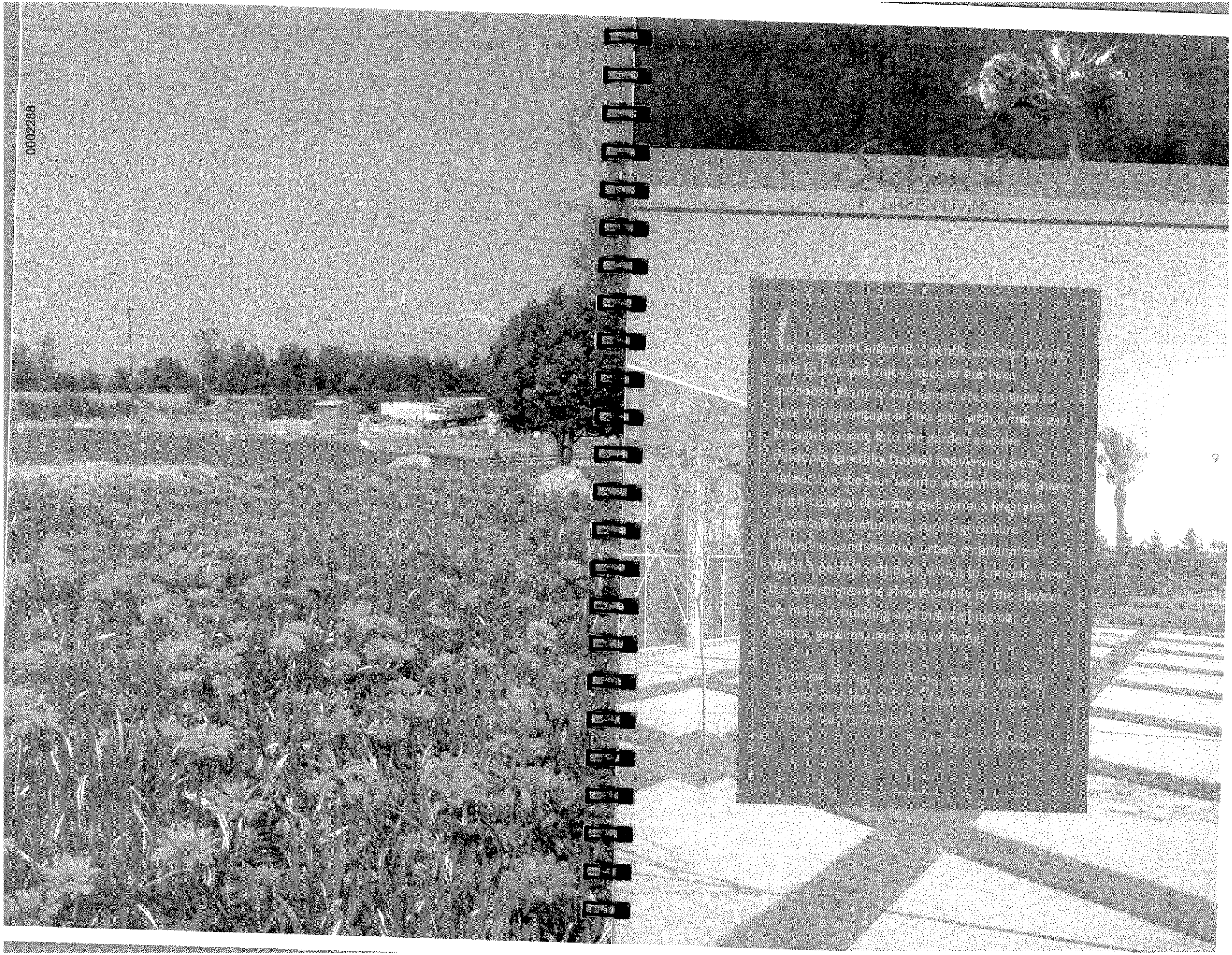

GREEN LIVING

In southern California's gentle weather we are able to live and enjoy much of our lives outdoors. Many of our homes are designed to take full advantage of this gift, with living areas brought outside into the garden and the outdoors carefully framed for viewing from indoors. In the San Jacinto watershed, we share a rich cultural diversity and various lifestyles—mountain communities, rural agriculture influences, and growing urban communities. What a perfect setting in which to consider how the environment is affected daily by the choices we make in building and maintaining our homes, gardens, and style of living.

"Start by doing what's necessary, then do what's possible and suddenly you are doing the impossible."

St. Francis of Assisi

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Water Conservation

An effective way to minimize environmental damage and promote a safe and reliable water supply is through conservation. This is particularly important since over half of our drinking water is brought in from distant places such as northern California and the Colorado River. Water conservation efforts add up, reducing our need to import water and increasing the availability and quality of local water resources. Water-conserving appliances and plumbing fixtures save water *and* money.

WHAT YOU CAN DO

to conserve household water:

- Replace high volume flush toilets. *Savings:* up to 8,500 gallons per year for the average single-family household.
- Use a low-flow showerhead. *Savings:* more than 14,600 gallons a year per household.
- When it's time for a new washing machine or dishwasher, buy a water-saving model. Water-wise machines use 1/3 less water and half the energy, and require less detergent and washing additives.
- Fix all leaky faucets and plumbing joints.
- Run your dishwasher and clothes washer only when fully loaded.

Outdoor Water Conservation

Our yearly rainfall averages from fifteen to twenty inches but can be as little as eight inches. Most rain falls between October and March with long, hot, dry summers. This amount and seasonal cycle of moisture simply cannot sustain most traditional landscapes and lawns. According to the Western Municipal Water District, more than 60% of residential water use is for outdoor landscaping and pools in the inland region.

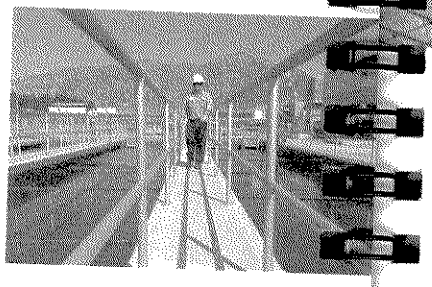

CONTACT

ASK YOUR CITY OR WATER PROVIDER FOR ADDITIONAL CONSERVATION TIPS AND REBATES

- Eastern Municipal Water District, www.emwd.org
- Elsinore Valley Municipal Water District www.evmwd.com
- Idyllwild Water District www.idyllwildwater.org
- Lake Hemet Municipal Water District, www.lhmwd.org
- Nuevo Water Company 951.928.1832
- Western Municipal Water District, www.wmwd.org www.bewaterwise.com

WHAT YOU CAN DO

to conserve landscape water:

- Consider using a weather-based irrigation controller that irrigates according to historic or real-time weather patterns in your neighborhood.
- During the winter, turn your controller off and water only when winter rains are infrequent.
- During the hotter and drier seasons, water less frequently and more deeply to encourage stronger, healthier plants.
- Check for broken and misaligned sprinkler heads often. This problem causes excessive runoff and landscape failures.
- Lawns are very thirsty. Use them for functional areas only.
- Consider using native plants best adapted to the southern California climate. (see page 15).
- Use drip and low-volume irrigation for garden beds and pots. Group plants with similar water needs.
- Sweep paths and driveways rather than using a hose.
- Place mulch and clippings from your own garden around your plants and trees to reduce evaporation and keep the roots cooler.
- Do not cut your lawn too low – taller grass reduces evaporation.
- Water your yard at cooler and less windy times of the day to reduce water loss through evaporation. Early morning is best.

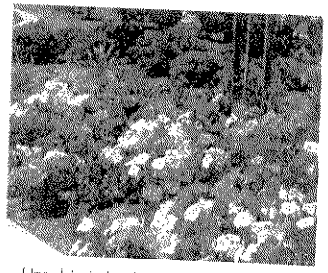

Use drip irrigation.

The beautiful green lawn in front of EVMWD's office is artificial turf. No water required! A great way to conserve water.

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Landscaping

Another important way to help the environment and save water is by creating a 'California-friendly' yard. There are many drought-tolerant plants that will help with the latter, but amongst these, California natives from local stock have several advantages.

WHAT YOU CAN DO

- Good habitat for native birds, butterflies and other animals – food, water, shelter and nest materials – is best provided by species that have evolved together. Welcome a wide variety of local wildlife by using native plants.
- Carefully chosen native plants require little or no supplemental water once established. They can co-exist with local pests, so that they seldom need chemical treatments or fertilizer, both of which can pollute. Chemical compounds can endanger your family's health, as well as killing beneficial insects and birds, and cause stormwater pollution.
- Native plants require only an occasional clean-up pruning to thrive.
- Gardening with natives may help support declining local communities if the plants selected are grown from local parent stock – the specialist nurseries mentioned on page 13 can help you with your selection. California has more rare and threatened species than any other state except Hawaii.

Why Use Natives?

Our sense of belonging increases with an appreciation for the remarkable adjustments the native plants and animals have made to the home we share. The colors of the mountains, slopes and valley – the deep green of the forests, the grey-greens of the sages and the grey-brown of the rocks – all contribute to a special sense of place.

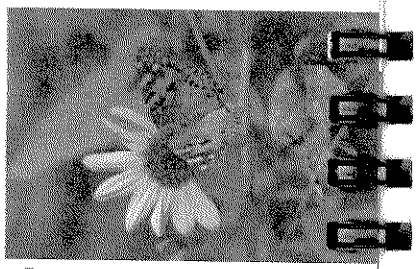

Tortoiseshell Butterfly on Sunflower.

Bee Pollinating Plants.

Toyon

Compared to natives, exotic plants (from outside our region) have not evolved with our native birds, butterflies and insects. As a result, they can be devastated by pests or disease or, conversely, spread out of control and reduce native diversity. They do not provide the natural food sources that the native plants do for our local insects, and, if these decline, we lose the building blocks of the local food web, causing in turn the decline of the many local birds which depend on them.

Other Things You Can Do:

- Use permeable surfaces for walkways, patios and driveways that let water soak into the ground; this replenishes the water table and reduce runoff.
- Reduce green waste by choosing plants that will not grow larger than the amount of space you have for them.
- Use clippings from your own garden as use a mulch or in your own compost pile.

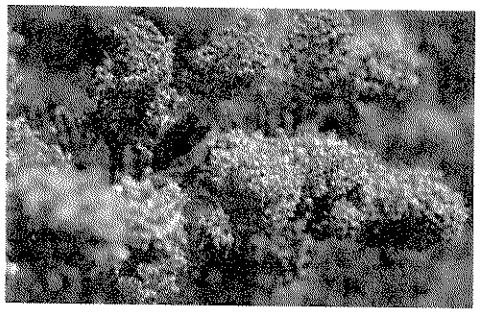

Ceanothus, California Lilac

Fremontia

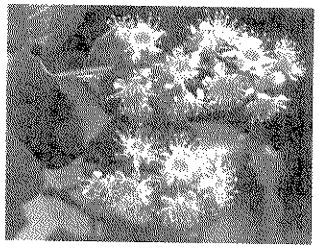

Holly-leaved Cherry

- California Native Plant Society www.cnps.org
- Rancho Santa Ana Botanic Garden Claremont (909) 625-8767 www.rsabg.org
- UC Riverside Botanic Gardens Riverside (951) 787-4650 www.gardens.ucr.edu
- Mockingbird Nurseries, Inc Riverside (951) 780-9571
- Tree of Life Nursery San Juan Capistrano (949) 728-0685 www.treeoflifenursery.com
- Western Municipal Water District Landscapes Southern California Style (951) 789-3987

0002291

Trees and Urban Forestry

Why are our cities so hot? The average temperatures in cities can be between 2 and 10 degrees hotter than the surrounding countryside. This phenomenon is called the urban heat island effect and is due to the replacement of plants with asphalt, concrete, and building surfaces that absorb and store heat. Planting trees is an effective way to help beautify and cool our cities and homes, reducing our dependence on fossil fuels.

Trees improve air quality by collecting and filtering dust and other pollution particles, absorbing carbon dioxide, and releasing oxygen. They improve water quality and reduce flooding by intercepting rainfall and increasing its absorption into the ground.

WHAT YOU CAN DO

to have healthy trees

- Plan ahead carefully when planting trees, considering the mature size of the tree.
- Allow leaf litter to accumulate and even add more mulch to the surrounding soil, but do not let it pile up against the trunk, which can lead to disease.
- Loosen ties and stakes as soon as you plant, and remove them as soon as possible.
- Protect the trunk from damage, such as from a weed trimmer.
- Never cut main branches or the central stem back to stubs. This practice, though common in our area, severely stresses and can injure a tree.

Trees improve the health of our watershed. Trees increase groundwater infiltration, filter particulates from the air, shade our homes and provide many other benefits.

California Native Plants for Your Home Garden:

COMMON NAME	SCIENTIFIC NAME
Trees	
Western Redbud	*Cercis occidentalis*
Western Sycamore	*Platanus racemosa*
Coast Live Oak	*Quercus agrifolia*
Elderberry	*Sambucus mexicana*
California Bay	*Umbellularia californica*
Mesa Oak	*Quercus engelmannii*
Shrubs	
Chamise	*Artemisia californica*
Manzanita	*Arctostaphylos species eg. glauca*
California Lilac	*Ceanothus species eg. crassifolius*
California Sunflowers	*Encelia californica or E. farinosa*
Fremontia, Flannel Bush	*Fremontodendron californica*
Toyon	*Heteromeles arbutifolia*
Holly-leafed Cherry	*Prunus ilicifolia*
Coffeeberry	*Rhamnus californica*
Lemonadeberry	*Rhus integrifolia*
Sugar Bush	*Rhus ovata*
Perennials and Groundcovers	
Manzanita (low)	*Arctostaphylos eg. uva-ursi*
California Lilac (low)	*Ceanothus eg. 'Emerald Carpet'*
California Fuchsia	*Epilobium canum or Zauschneria californica*
Wild Buckwheat	*Eriogonum fasciculatum*
Coral Bells	*Heuchera species*
Douglas Iris	*Iris douglasiana*
Sticky Monkeyflower	*Mimulus aurantiacus*
Deer Grass	*Muhlenbergia rigens*
Showy Penstemon	*Penstemon spectabilis*
California Sages	*Salvia apiana or S. mellifera*
Wild Grape	*Vitis californica*
Annuals	
California Poppy	*Eschscholzia californica*
Arroyo Lupine	*Lupinus succulentus*
Desert Bells	*Phacelia minor*
Chia	*Salvia columbariae*

Note: *Most of these thrive in Inland Empire sun and with little supplemental water, though many will look better in summer with monthly irrigation in the early morning. Take care, however, some nursery-bred varieties of these species may need regular garden water.*

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WHAT YOU CAN DO

to help when you must drive:

- Make your next vehicle cleaner-fueled and more efficient. Electric, natural gas, and hybrid-electric vehicles pollute less and reduce our dependence on oil.
- Combine multiple errands into a single trip.
- Maintain your vehicle, especially tire pressure. Excessive exhaust is harmful to you and the people around you.
- When getting gas, do not top off your tank and wait before removing the nozzle. Fuel spillage adds to air pollution.
- Park in the shade of a building or tree to reduce the evaporation of gasoline from your car.
- Use your ashtray if you are a smoker. Cigarette butts take up to five years to break down in the ocean and can kill fish, birds, seals, and other marine life.

Green Electricity

Green electricity is derived from clean, renewable energy sources such as solar, wind, biomass, and geothermal. Most electricity in the United States comes from coal, oil, nuclear, large hydroelectric, and natural gas plants. The burning of non-renewable fossil fuels contributes to air quality problems and global warming.

WHAT YOU CAN DO

- Use less energy.
- Wear a sweater when it's cool.
- Contact your utility company to learn about your green energy options.
- Let your representatives know that renewable energy sources should be a priority.

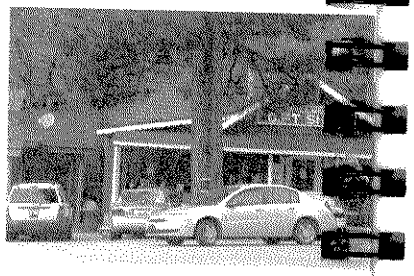

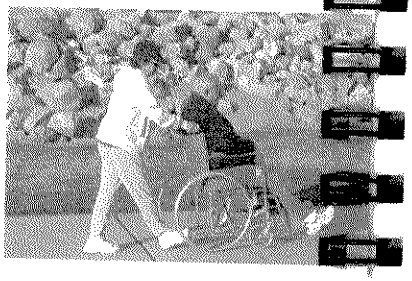

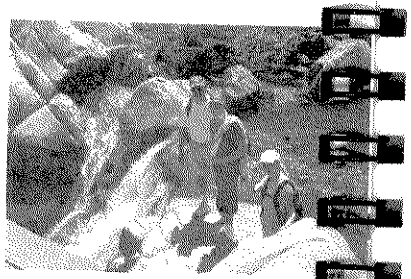

EDUCATE YOURSELF:

- Go Green Power www.gogreenpower.org
- Global green USA www.globalgreen.org
- GreenE, www.greene.org
- California Energy Commission www.energy.ca.gov
- US Department of Energy www.eere.energy.gov

Buying Green

The best way to reduce our impact on the environment is to limit our use of resources. It is helpful to purchase products whose production and use have a reduced impact on the environment. Small changes by many people can make a big difference!

WHAT YOU CAN DO

Purchase products that:

- Use minimal packaging.
- Contain recycled material.
- Contain raw materials derived from renewable sources.
- Can be reused or recycled.
- Are produced locally.
- Do not use products that require special disposal.

SAFE ALTERNATIVES TO COMMON HOUSEHOLD CLEANERS

Try:	Instead of:
• borax and water or baking soda	chlorine bleach
• ½ c. vinegar + 1 qt. water	glass cleaner
• ½ lemon dipped in borax or baking soda	abrasive cleanser
• 1 part lemon juice + 2 parts vegetable oil	furniture polish
• toothpaste or baking soda polish	silver polish

SOURCE: American Oceans Campaign (www.americanoceans.org)

Buy local products.

Using recycled water.

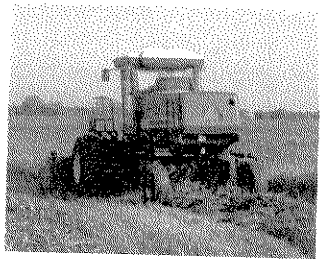

Buy local produce.

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Green Housing Construction

When building or modifying a home keep sound environmental practices in mind. Green construction improves energy efficiency, resource conservation, indoor air quality, and protects the health of your family. In addition to helping the environment, a "green" house can save you money and provide you with a healthier, quieter, and more comfortable home.

Generally, building greener involves one or more of the following:

- Planning to preserve the natural environment
- Site development which reduces erosion, minimizes paved surfaces, and protects vegetation
- Water conservation indoors and outdoors
- Energy efficiency
- Using recyclable materials and air conditioning costs.

Permeable Surfaces

Permeable surfaces such as decomposed (crushed) granite, broken concrete, gravel, mulch and grass or other plants allow water to pass through and soak into the soil beneath, as opposed to running off your yard and contributing to stormwater pollution and flooding.

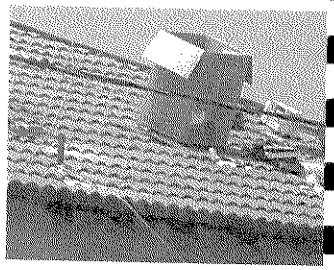

WHAT YOU CAN DO:

- Use bricks, stones, broken concrete, crushed granite or gravel for driveways, paths, and patios.
- Use a contractor who knows and follows regulations concerning construction runoff. Even a small remodel can contribute a large amount of gravel, dirt, and hazardous materials to the storm drain system.
- Investigate the installation of a 'gray water' system–to collect your household's washing water for re-use in the landscape or for flushing toilets–with your local building department officials to determine if they allow residential use of reclaimed water.

WHAT YOU CAN DO:

to increase sustainability in your home:

- Add insulation to your home.
- Use innovative, engineered wood products.
- Use recycled-content building materials whenever possible and ask your contractor to recycle their demolition waste.
- Use adhesives, paints, and cleaners with low volatile organic compounds (VOC) to reduce indoor air pollution.
- Use light colored roofing to reduce home heat absorption, or consider new "green roofs."
- Use double-glazed windows to save on heating and air conditioning costs.
- When building a house use the sun. Orient your house and plan your landscaping to take advantage of winter sun and summer shade.
- Use ceiling fans, whole house fans, and attic ventilation to affordably keep your home comfortable.

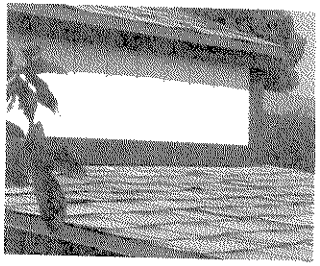

Light–Tiled roof

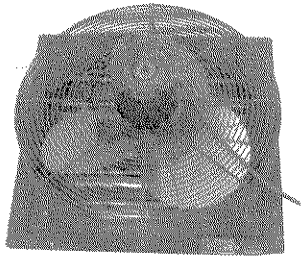

Whole–House fan

Choose a smart sprinkler controller for your home

- A smart sprinkler controller automatically adjusts irrigation schedules in response to changing weather conditions.
- They are also called "weather–based irrigation controllers."
- Smart controllers are a new technology & can be difficult to find.

For more information log onto www.bewaterwise.com for a listing of manufacturers & websites

LEARN MORE:

- Ecohome Network www.ecohome.org
- National Association of Home Builders www.nahb.org
- Home Builders Association www.hba.org
- Urban Land Institute www.uli.org

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Trash and Recycling

Reduce, Reuse, Recycle

As populations grow, cities face increasing problems with waste disposal. Finding ways to dispose of our waste becomes increasingly difficult and expensive. Trash that washes into storm drains is a leading contributor to unhealthy water in our streams, rivers and lakes.

DID YOU KNOW:

- Nearly half of the world's annual commercial wood harvest is used to produce paper.
- Recycling aluminum saves 95% of the energy required to produce it from virgin materials.
- Over 30% of California's solid waste consists of organic materials. Most of this ends up in a landfill, even though it could be composted.
- Materials in landfills can take hundreds of years to degrade.
- Although plastic carries a recycling symbol, very little of it is actually recycled. Discarded plastic washes into the ocean and chokes and kills marine animals including turtles, sea horses, fish, seals, and birds.

Household Hazardous Waste includes metals, chemicals, batteries, and electronics, such as computers and stereos, that can be used or stored in your kitchen, workshop, garage, garden, or bathroom. It is illegal to dispose of household hazardous waste anywhere but at authorized Household Hazardous Waste and/or Antifreeze, Batteries, Oil and Paint (HHW/ABOP) collecton centers. The County of Riverside and local cities sponsor several free collection events throughout the year in the San Jacinto watershed. You can learn more about HHW/ABOP, disposal, and free collection events as www.rivcoeh.org or by calling (800) 506-2555.

Recycle, Recycle,Recycle.

Be creative – reuse or recycle products. This old tree became a work of art.

WHAT YOU CAN DO

to help reduce waste and consume less:

- Use canvas bags or re-use plastic bags when shopping.
- Purchase products with minimal packaging material.
- Buy products that use recycled materials.
- Use both sides of paper. Make your own notepads by saving one-sided scrap paper or mail, cutting in half and securing with a re-usable clip.
- Avoid using plastic unless it is something, like a sturdy cup or bag, that you can re-use.
- Recycle.
- Give away or garage sale useful unwanted items.
- Dispose of hazardous household waste properly (call 800-506-2555 for HHW/ABOP disposal days). Remember that this includes paint, many common cleansers, car fluids, and electronic equipment.
- Use tap water or wash, refill, and reuse water bottles.
- Join a neighborhood clean-up.
- PUT IT IN THE CAN! Pick up a little litter wherever you are, whether in the city or on the trail.

to help reduce green waste:

- Leave grass clippings on your lawn, sometimes called "grasscycling". They provide important nutrients and reduce water loss.
- Choose plants that will be the desired size at maturity to minimize pruning.
- Compost garden and household fruit and vegetable waste.
- Chip clippings, prunings, and raked leaves. They all make great mulch.

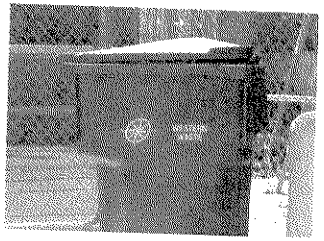

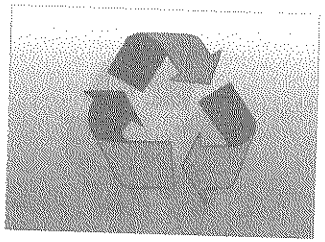

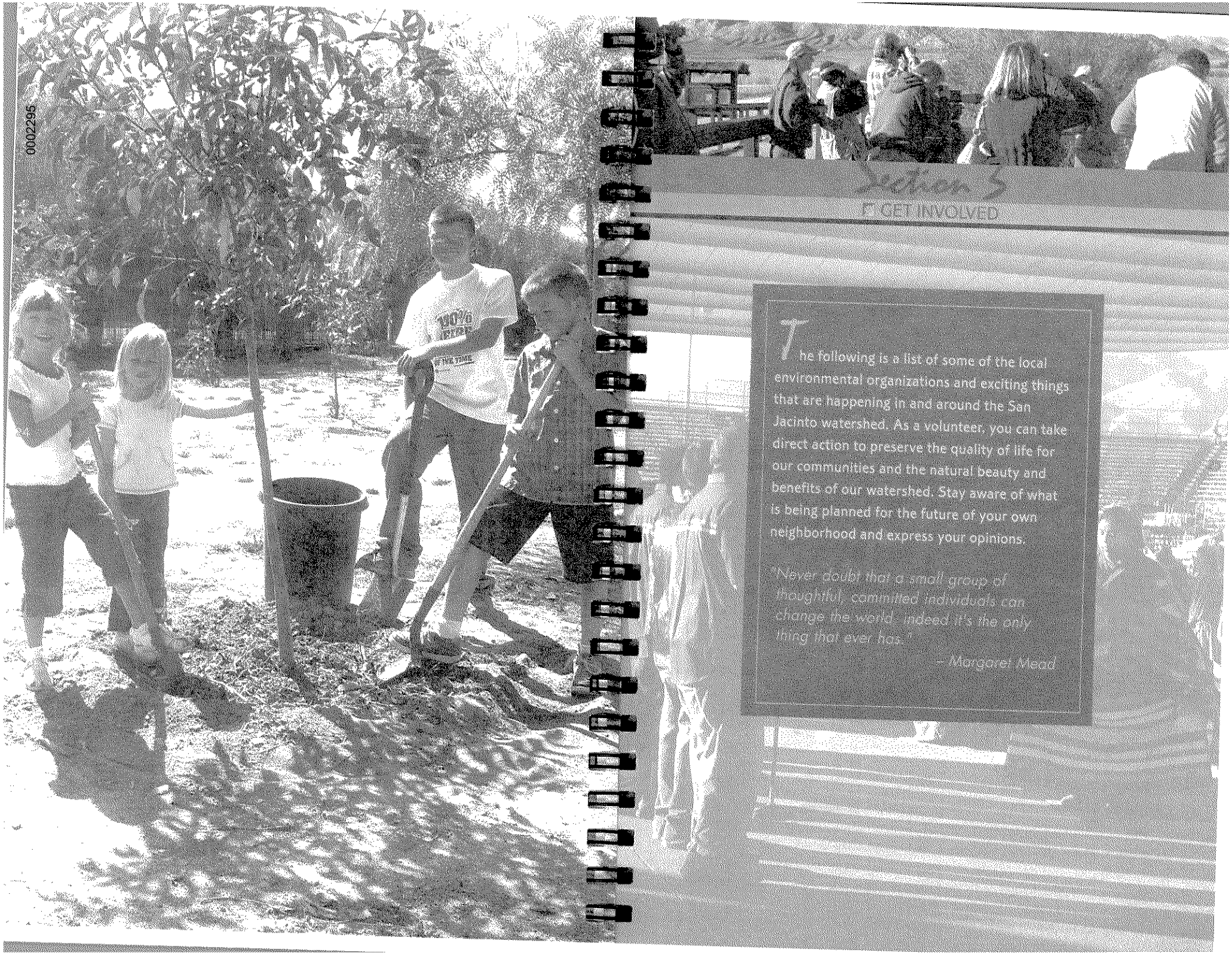

GET INVOLVED

The following is a list of some of the local environmental organizations and exciting things that are happening in and around the San Jacinto watershed. As a volunteer, you can take direct action to preserve the quality of life for our communities and the natural beauty and benefits of our watershed. Stay aware of what is being planned for the future of your own neighborhood and express your opinions.

"Never doubt that a small group of thoughtful, committed individuals can change the world. Indeed it's the only thing that ever has."

— Margaret Mead

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Volunteer Opportunities

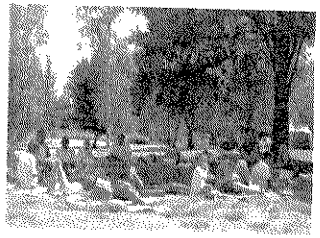

California Native Plant Society
Preservation of native plants and habitat, www.cnps.org.

Center For Community Action and Environmental Justice. P.O. Box 33124 Riverside, CA 92519
Ph. (951) 360-8451, http://www.ccaej.org/

Friends of the Northern San Jacinto Valley
Hiking, reforestation, park clean ups
P.O. Box 9097, Moreno, Valley 92552
Ph. (951) 928-3698, http://www.northfriends.org/

Friends of Nuevo Community Council
PO Box 647, Nuevo CA 92567
http://www.foncee.net/, and info@foncc.net

Lake Elsinore Citizen Committee, Contact: Donna Frances, Ph. (951) 674-1989. Lake Elsinore, *focuses on the recreation and preservation of the lake.

National Wildlife Federation
Backyard and schoolyard habitat program, www.nwf.org.

San Bernardino Valley Audubon Society
P.O. Box 10973, San Bernardino, CA 92423
http://www.sbvas.org

San Jacinto River Watershed Council
Non-profit watershed council
Contact: Pat Boldt, Ph. (951) 808-8531

Santa Rosa Plateau Ecological Reserve/Nature Conservatory, Location: outskirts of Murrieta
Contact: Carol Bell, Ph. (951) 677-6951

Santa Ana Watershed Association, Education, cleanups, Contact: Renee Latu (909) 799-7407 Ext. 105

Sierra Club
San Gorgonio Chapter of environmental activism, hiking, 4079 Mission Inn Ave., Riverside, CA 92501
Ph. (951) 684-6203
http://www.sangorgonio.sierraclub.org/

Western Riverside County Agriculture Coalition
Coalition addresses agricultural environmental issues in the watershed. Comprised of agricultural operators, dairy, and land owners. Contact: Bruce Scott
Ph. (951) 654-5096 or wrcac_mail@yahoo.com

What's Happening in and Around Your Watershed

There are many exciting things happening in and around your watershed. Here are several important developments and projects.

The San Jacinto River Watershed Council

The San Jacinto Watershed Council, a 501 (c) 3 non-profit, grass roots organization, is an open forum of the entire watershed, upper and lower, and strives to represent all stakeholders. The Council Board consists of water agency, County, federal/regional, tribal, dairy, agriculture, environmental and 2 at-large representatives. The Council may be characterized as broad-based in its representation and holistic in its approach to issues of watershed management and planning. Current activities include:

- Prop 50, Chapter 8 Planning Grant for the Development of an Integrated Regional Watershed Management Plan for the San Jacinto Watershed (funded by the State of California, Department of Water Resources)
- Assistance with TMDL Implementation (page 28)
- Education and Outreach…this Guidebook!
- Applying for grants that will help address water resource and water quality problems
- Coordination and integration of other regional studies and plans, and their impacts on the watershed.
- Development of work groups to address critical issues
- Assist development of strategies to control nutrients and pathogens negatively impacting water bodies.

For more information visit our website at www.sawpa.org/sjrwc/, or contact Pat Boldt, SJRWC Executive Director at Mpboldt@aol.com.

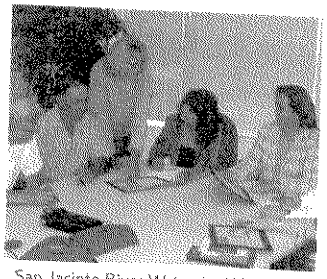

San Jacinto River Watershed Volunteer opportunities

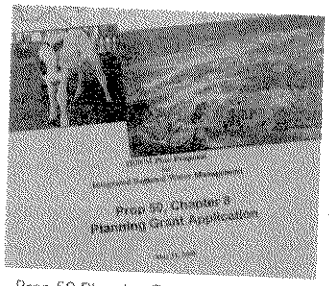

Prop 50 Planning Grants.

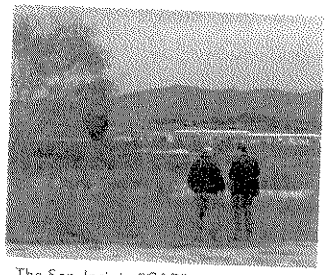

The San Jacinto "GAP" area.

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What is a TMDL?

In our watershed, there are two impaired lakes that do not meet expected water quality standards. Under the Clean Water Act, the Santa Ana Regional Water Quality Control Board (RWQCB) has identified Canyon Lake and Lake Elsinore as needing water quality improvement. Excessive nutrients and pathogens are the primary problems affecting the lakes.

To control the level of nutrient and pathogens entering the lakes, RWQCB has established a new water quality regulation called a Total Maximum Daily Load (TMDL). The TMDL provides an assessment and planning framework for identifying nutrient and pathogen sources, achieving load reductions, and taking actions that are needed to attain the water quality standards. The TMDL also sets target dates for when the water quality standards must be met and an implementation plan to attain it. By compliance to these water quality standards, aquatic life, drinking water and other beneficial uses at the lakes will be protected.

A stakeholder TMDL Task Force has been formed to address the TMDL's affecting our watershed. Specific tasks have been identified to start the process of improving water quality in these two lakes and work is underway. However, the solution will ultimately be dependent on controlling watershed residents contributions of nutrients and pathogens to the lakes.

If you would like additional information regarding the TMDL, please visit www.mywatersheds.com.

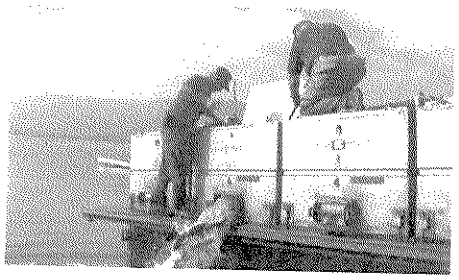

Stocking fish in Lake Elsinore.

Lake Elsinore

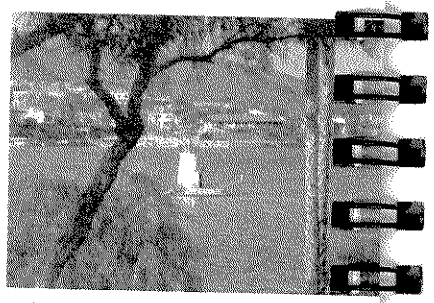

Canyon Lake

The goal of the TMDL is to restore benefical uses to Canyon Lake and Lake Elsinore.

The Multi-Species Habitat Conservation Plan

When Western Riverside County revised its General Plan, the Multi-Species Habitat Conservation Plan (MSHCP) was an important part. Finalized in June 2004, it aims to address the dissatisfaction that all sectors of our County felt with the long and complicated process developers had had to go through to get clearance to build, and the haphazard way species were protected.

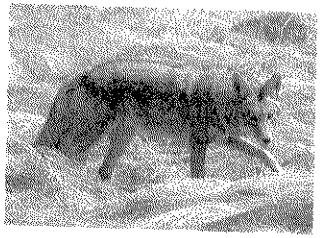

Certain areas are considered important to keep as open space, besides those lands already in public hands. This conserves the habitats for some of our most beautiful and threatened species of wild life and to provide linkages among the conserved areas.

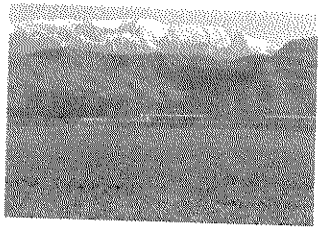

The San Jacinto River is a vital corridor in this Habitat Conservation Plan. Starting in the San Jacinto mountain range, it passes through the Mystic Lake wetlands, then agricultural flood plain, which has been for centuries home to native creatures and the hawks and owls that prey on them. The river flows to the base of the Cleveland range and then, into Lake Elsinore, which is gradually being restored as home for native fish and recreation for humans.

As development continues in our watershed, we must ensure that enough of the "criteria areas" of the MSHCP are conserved, to ensure that our river continues to meander in winter across the valley, nourishing rare plants that are found nowhere else, providing a haven for large and small wildlife, and replenishing our underground water.

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Lake Elsinore And San Jacinto Watersheds Authority

LESJWA improves and maintains the waters within Lake Elsinore, Canyon Lake, and the San Jacinto River Watershed.

LESJWA's membership includes representatives from five member agencies in the area (listed below) working together to improve water quality at Lake Elsinore and Canyon Lake.

- Santa Ana Watershed Project Authority
- City of Lake Elsinore
- City of Canyon Lake
- Elsinore Valley Municipal Water District
- County of Riverside

A few of LESJWA's projects are as follows:

LAKE ELSINORE

- **Supplemental Lake Water** – Improvements made to existing lake supply wells and recycled water treatment will provide supplemental water that will replenish low lake water levels, when necessary.
- **Lake Mixing System** – Large amounts of algae in Lake Elsinore decrease healthy oxygen levels, in turn killing fish and damaging recreational opportunities. Lake mixing helps evenly distribute oxygen throughout the lake to keep it vibrant and healthy.
- **Aeration System** – This subsurface aeration system bubbles air into the water column from pipes on the bottom of the lake to increase lake oxygen levels, which helps lower the amount of algae throughout the lake.
- **Carp Removal** – Carp is a bottom dwelling fish that stirs up silt and unwanted nutrients from lake floors that contribute to the growth of alga blooms which can be harmful to water quality. The removal of carp is vital to the overall health of a lake.

CANYON LAKE

- **Dredging System** – Dredging removes sediment levels from the lake bottom with the use of a self-propelled platform whose suction vacuum sweeps the bottom of the lake floor which improves water quality and water supply.

For additional information visit www.mywatersheds.com

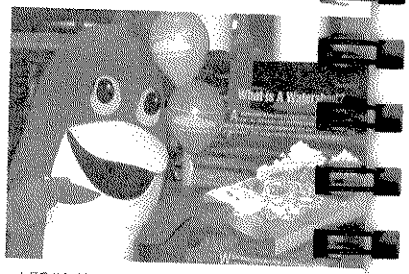

LESJWA's mascot Bessie the Bass explains what a watershed is at the Temecula Water Festival.

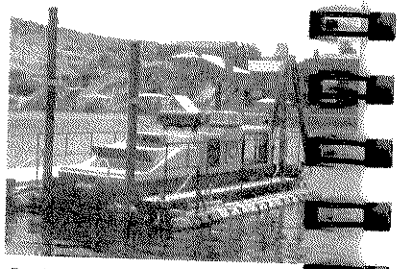

Dredging machine at Canyon Lake

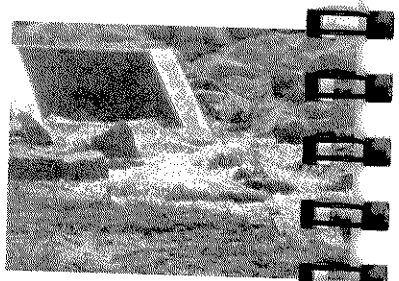

Island Wells water flow at Lake Elsinore.

Ten Fun Ways to Enjoy your Watershed

1. **Take a Hike**...a jaunt, a trek, a strut...just get out and see, hear and smell the world in your back yard.
2. **Stop and Smell the Roses**...the mountains, the hills, the valley, Lupine, Poppies, and Sage.
3. **Spend Some Quality Time with your Pet**...leash your dog or cat (bring a bag for pet wastes). Ride a horse or a mule! Check out the trails together.
4. **Play in the Garden**...add native plants to your garden—Manzanita, California lilac, Toyon, and Sage. Use biological controls instead of pesticides, Conserve water.
5. **Get Down and Dirty**...volunteer with other organizations. Help plant trees, restore habitat, and clean-up your watershed.
6. **Tap into Watershed Consciousness**... the big picture! Remember your street and storm drains lead to the ocean.
7. **Sing, Shout, Get the Word Out!**...let friends, family and officials know how you feel about preserving and restoring the San Jacinto.
8. **Explore your Watershed**...discover the San Jacinto watershed, all 780 miles of diverse plantlife, animals, its human communities, and wonderful cultural gems.
9. **Plan a Bright Future**...participate in San Jacinto watershed planning efforts. Bring a friend. Log onto www.sawpa.org/sjrwc/
10. **You Can Make A Difference!**...embrace our natural resources. Protect habitat and enjoy your watershed.

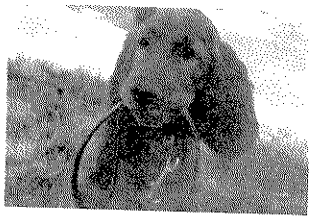

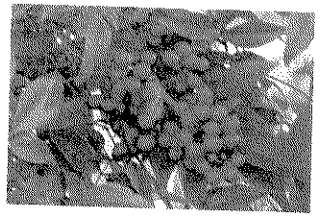

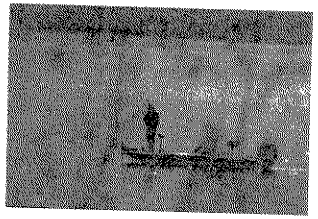

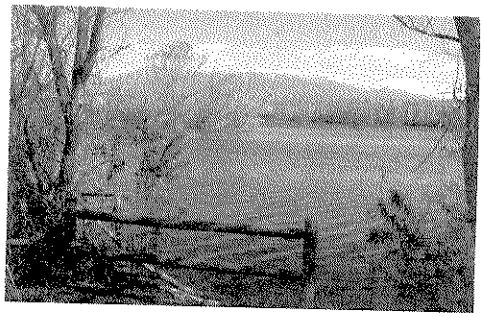

RESOURCES IN YOUR COMMUNITY

We have found this guidebook educational, informative and full of simple actions that you can take to help protect our water supply and preserve our open spaces for your enjoyment and the enjoyment of future generations. We print together the following resources and contacts to help you become more involved in your communities and in the health of your watershed. Remember that your government representatives at all levels—from local to the national—work for you and want to know what you think—express your opinion!

"Power is the ability with leaders and citizens in the exercise and protection of the common welfare, which is the end of all civil society."

— Joseph Warren

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Parks and Open Space

PARKS

Lake Perris State Recreation Area
17801 Lake Perris Drive, Perris, CA 92571
Ph: (951) 657-0676
www.parks.ca.gov/default.asp?page_is+651

Mount San Jacinto State Park
PO Box 308
25905 Highway 243
Idyllwild, CA 92549
Ph: (951) 659-2607
wilderness permits 951-659-2607
www.parks.ca.gov/default.asp?page_id+36

The San Bernardino National Forest
54270 Pinecrest
P.O. Box 518, Idyllwild CA 92549
Ph: (951) 382-2921
wilderness permits 951-659-2117
www.fs.us/r5/sanbernardino
Visitor Information Center
(Corner of Pine Crest and Highway 243 in Idyllwild)
www.parks.ca.gov/default.asp?page_is+651

San Jacinto Wildlife Area
PO Box 1254, 17050 Davis Road
Nuevo, CA 92567
Ph: (951) 928-0580

Riverside County Regional Park & Open Space District
4600 Crestmore Road, Riverside, CA 92509
Ph: (951) 955-4310
reservations 1-800-234-7275 (park)
www.riversidecountyparks.org/

McCall Memorial Park
28500 McCall Park Road
Mountain Center, CA 92561
(951) 659-2311

Lawler Alpine Cabins (youth group lodging only)
19751 Hwy 243 Idyllwild, CA 92549
Ph: (951) 955-4397

Idyllwild Nature Center
25222 Hwy 243, Idyllwild, CA 92549
Ph: (951) 659-3850

Idyllwild Park
5400 Riverside County Playground Rd.,
Idyllwild, CA 92549
Ph: (951) 659-2656

Hurkey Park
56375 Highway 74
Mountain Center, CA 92561
Ph: (951) 659-2050

Simpson Park
28505 Rawlings Road
Hemet, CA
www.cityofhemet.org/parks.htm#simpson

Lakes/Recreation Areas

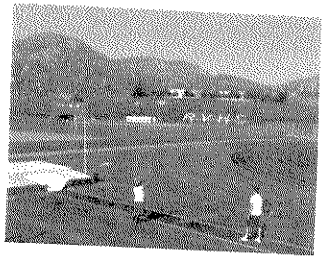

Diamond Valley Reservoir Recreation Area
Now open for boaters and anglers. Additional recreational activities are planned. A Visitor's Center highlighting paleontological discoveries and a scenic viewpoint will be open on varying schedules.
Ph: (800) 211-9863 for days, hours and directions.

Lake Elsinore Recreation Area (LERA)
The lake offers boating, camping and day use areas.
General Lake information: (951) 674-7730
LERA Campground: Ph: (951) 471-1212
LERA Campground reservations: Ph: (800) 416-6992
Seaport Boat launch: Ph: (951) 245-9308
Camping information: Ph: (800) 416-4992

Lake Perris State Recreation Area
Lake Perris offers a variety of water recreation activities including swimming, fishing (shore, pier, and boating), water craft use, sailing, waterskiing and even scuba diving.
17801 Lake Perris Drive, Perris CA 92571
Ph: (951) 657-0676
www.parks.ca.gov/default.asp?page_is+651

EQUESTRIAN TRAILS

Diamond Valley Reservoir Recreation Area
*not currently available/future plans

Lake Perris Recreation Area
17801 Lake Perris Drive
Perris, CA 92571
Ph: (951) 657-0676
www.parks.ca.gov/default.asp?page_is+651

AGRICULTURAL RESOURCES

Milk Producer's Council
Bill Van Dam Ph: (909) 628-6018

Riverside County Farm Bureau
Contact: Steve Pastor Ph: (951) 684-6732
www.riversidecfb.com
pastor@riversidecfb.com

Western Riverside County Agriculture Coalition
Contact: Bruce Scott at (951) 654-5096 or
wrcac_mail@yahoo.com

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Educational Programs and Workshops:

Santa Ana Watershed Association (SAWA)
Provides on-site education, clean up days, and other educational activities, For more information contact: Renee Latu Ph: (909) 799-7407, Ext. 105

The San Jacinto Center for Environmental Education
Provides environmental education at the San Jacinto Wildlife area, Contact: Sue Nash Ph: (909) 228-6710

San Jacinto Basin Resource Conservation District
(951) 654-7733

Western Municipal Water District
Landscapes Southern California Style-A one-acre water conservation demonstration garden, via a self-guided tour of over 250+ plant species and 50 educational stations. Additional information at www.wmwd.com, School educational tours available. Ph: (951) 789-5987

Home and Garden

Green Building:

National Association of Home Builders www.nahb.org
Home Builders Association www.hba.org
Urban Land Institute www.uli.org/
Ecohome Network, Ph: (323) 662-5207, www.ecohome.org

Garden-Native Plants and Invasive Species:

Backyard Composting Program, Ph: (951) 486-3200, for times and locations
California Native Plant Society, www.cnps.org
California Invasive Plant Council, Ph: (510) 525-1502, www.caleppc.org
Riverside County Agricultural Commissioner, Ph: (951) 955-3000
Metropolitan Water District, Heritage Garden Program, www.bewaterwise.com
National Wildlife Federation, Backyard Wildlife Habitat Program Ph: (619) 296-8353, www.nwf.org
Rancho Santa Ana Botanic Garden, Ph: (909) 625-8767 www.rsabg.org
Theodore Payne Foundation Nursery, Ph: (818) 768-1802 www.theodorepayne.org
Tree of Life Nursery, San Juan Capistrano, Ph: (949) 728-0685 www.treeoflifenursery.com

Fire Departments

FOR ALL FIRE EMERGENCIES CALL 911!

Air, Water and Land Resource Agencies and Organizations

GOVERNMENTAL AGENCIES:

South Coast Air Quality Management District (SCAQMD), Regional air quality or to lodge a pollution complaint, Ph: (800) CUT SMOG (288-7664). SCAQMD, list of non-toxic cleaners in our area, [www.aqmd.gov]

California EPA, Air Resources Board, Ph: (800) 363-7664 for pollution complaints and to find out about the health effects of indoor and outdoor air pollution, Ph: (916) 322-2990 for info on air quality programs.

US Environmental Protection Agency, Region 9 Office, Potential sources of indoor air pollution and ways to improve indoor air quality, Ph: (415) 972-3102, (800) 438-4318.

Non-profit Organizations:

Communities for a Better Environment, strategies for improving and protecting air quality, www.cbemw.org.

Environmental Defense Scorecard, air quality and polluters in your community, [www.scorecard.org].

Natural Resources Defense Council, air and energy programs, federal legislation, and publications on air quality, www.nrdc.org.

Websites with Energy Saving Tips:

Flex Your Power, www.flexyourpower.ca.gov
Earth911, www.earth911.org
US Department of Energy, www.eere.energy.gov

Local Electricity and Gas Providers:

Southern California Electric, Ph: (800) 655-4555
Southern California Gas Company, Ph: (800) 427-2000

Air, Water and Land Resource Agencies and Organizations

Renewable Energy Information:

Go Green Power, www.gogreenpower.org
Global Green USA, www.globalgreen.org
GreenE, www.green-e.org
California Energy Commission, www.energy.ca.gov
US Department of Energy, www.eere.energy.gov

Waste, Stormwater and Watershed Management

Lake Elsinore and San Jacinto Watersheds Authority
www.mywatersheds.com

Riverside County Environmental Health Dept. Call 1 (800) 304-2226 for dates and times of free collection events throughout Riverside County, This Department can help you with hazardous waste disposal and pollution issues.

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Santa Ana Watershed Project Authority, www.sawpa.org/

Riverside County Flood Control and Water Conservation District
(951) 955-1200, http://www.floodcontrol.co.riverside.ca.us. This Department can help you with flooding concerns and reporting of storm water pollution.

Riverside County Waste Management Department
Ph: (800) 366-SAVE or (951) 486-3200, http://www.rivcowm.org. This Department can assist you with information about landfills, recycling, and the composting programs.

Riverside County Water Task Force, Supervisor Marion Ashley
Ph: (951) 955-1050, www.district5@rcb05.org

California Regional Water Quality Control Board, Santa Ana Region
Ph: (951) 782-4130, region8info@waterboards.ca.gov

The San Jacinto River Watershed Council
Ph: (951) 808-8531, www.sawpa.org/sjrwc

Bureau of Reclamation
Reclamation is the largest wholesale water supplier in the United States, and the nation's second largest producer of hydroelectric power. Its facilities also provide substantial flood control, recreation, and fish and wildlife benefits. Visit their website at http://www.usbr.gov
Southern California area office, Ph: (951) 695-5310

Government Representatives

UNITED STATES LEGISLATURE:

To find out who your representative and senators are, either call your local city hall, check your telephone book or enter your zip code in the following website: www.congress.org, Federal and State Elected Officials, Cities in Watershed

STATE OF CALIFORNIA

Governor

Arnold Schwarzenegger
Ph: (916) 445-2841 or (213) 897-0322, e-mail: governor@governor.ca.gov

Congressional

Congresswoman Mary Bono, U. S. Congressional District 45
Ph: (202) 225-5330 or (951) 658-2312

Congressman Ken Calvert, U.S. Congressional District 44
Ph: (202) 225-1986 or (951) 784-4300

Congressman Darrell Issa, U. S. Congressional District 49
Ph: (202) 225-3906 or (951) 693-2447

Congressman Jerry Lewis, U.S. Congressional District 41
Ph: (202) 225-5861 or (909) 862-6030

State Assembly

Bill Emmerson, District 63, Ph: (909) 466-9096
John Benoit, District 64, Ph: (951) 369-6644
Russ Bogh, District 65, Ph: (909) 790-4196
Ray Haynes, District 66, Ph: (951) 699-1113

State Senate

Bob Dutton, District 31, Ph: (909) 466-4180
Dennis Hollingsworth, District 36, Ph: (951) 676-1020
Jim Battin, District 37, Ph: (951) 953-9502

SAN JACINTO WATERSHED CITIES AND COMMUNITIES

Cities

City of Beaumont
Ph: (951) 769-8520
www.ci.beaumont.ca.us

City of Canyon Lake
Ph: (951) 244-2955
www.cityofcanyonlake.com

City of Hemet
Ph: (951) 765-2300
www.cityofhemet.org

City of Lake Elsinore
Ph: (951) 674-3124
www.lake-elsinore.org

City of Moreno Valley
Ph: (951) 413-3000
www.ci.moreno-valley.ca.us

City of Murrieta
Ph: (951) 304-2489
www.murrieta.org

City of Perris
Ph: (951) 943-6100
www.cityofperris.org

City of Riverside
Ph: (951) 826-5311
www.riversideca.gov

City of San Jacinto
Ph: (951) 654-7337
www.ci.san-jacinto.ca.us

Community

Idyllwild
Ph: (951) 659-3259
www.idyllwildchamber.com

Quail Valley
Ph: (951) 672-1991 (Menifee Chamber)

Sun City
Ph: (951) 672-9006

Menifee
Ph: (951) 672-1991
www.menifeevalleychamber.com

Romoland
Ph: (951) 672-1991 (Menifee Chamber)

Soboba Band of Luiseño Indians
(951) 654-2765

Winchester
Ph: (951) 926-8972

CONTACT

WATER SUPPLIERS

- Eastern Municipal Water District, www.emwd.org
- Elsinore Valley Municipal Water District, www.evmwd.com
- Idyllwild Water District, www.idyllwildwater.org
- Lake Hemet Municipal Water District, www.lhmwd.org
- Nuevo Water Company, Ph: (951) 928-1832
- Western Municipal Water District, www.wmwd.com

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Special Thanks

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for their contributions to this project

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Pat Boldt, Alison Shilling, Sue Nash

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Joe Garcia, LESJWA, Jim Gilmore, Sue Nash

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Alison Shilling, Sue Nash

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Area, Riverside County Flood Control & Water Conservation
District, Soboba Band of Luiseño Indians, US Forest Service,
Idyllwild Water District, and the City of Moreno Valley

Watershed Map
Elsinore Valley Municipal Water District

Watershed Illustration
LESJWA

About

The San Jacinto River Watershed Council

The San Jacinto River Watershed Council (SJRWC) is a nonprofit organization dedicated to providing educational, scientific, and technical assistance that will help sustain, restore, and enhance the natural resources of the San Jacinto River basin while promoting long-term social and economic vitality to the region. Water is a critical natural resource for our future and for all future generations.

The San Jacinto River Watershed Council is proud to provide this Guidebook for your use. It would not have been possible except for the financial generosity of the following sponsors:

Bureau of Reclamation (BR)
Cal EPA Environmental Justice Small Grants Program
City of Lake Elsinore
Eastern Municipal Water District (EMWD)
Elsinore Valley Municipal Water District (EVMWD)
Lake Elsinore and San Jacinto Watersheds Authority (LESJWA)
Lewis Planned Communities and the Garrett Group
Milk Producers Environmental Fund
Riverside County Farm Bureau (RCFB)
Riverside County Flood Control and Water Conservation District
Santa Ana Watershed Association (SAWA)
Soboba Band of Luiseño Indians
Western Municipal Water District (WMWD)

Household Hazardous Waste Data

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SAN DIEGO REGIONAL
WATER QUALITY
CONTROL BOARD
2008 OCT 31 P 2:39

ONLY RAIN DOWN THE STORM DRAIN
CALL 1-800-506-2555 TO REPORT
ILLEGAL POLLUTING OF STORM DRAINS

2007 – 2008
DISTRICT INDIVIDUAL
ANNUAL PROGRESS REPORT

TO THE
SAN DIEGO REGIONAL WATER QUALITY CONTROL BOARD
AND
UNITED STATES ENVIRONMENTAL PROTECTION AGENCY – REGION IX
(Order No. R9-2004-001, NPDES No. CAS108766)

OCTOBER 31, 2008

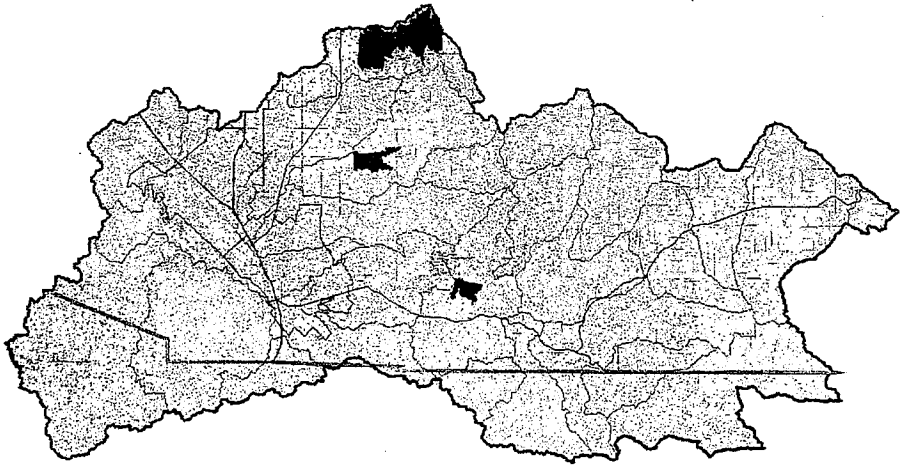

VOLUME 1 of 1

SANTA MARGARITA WATERSHED
RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

NPDES

CERTIFICATION

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Signed: _____

Warren D. Williams
General Manager / Chief Engineer
Riverside County Flood Control
and Water Conservation District

RCFC&WCD

SANTA MARGARITA WATERSHED
NPDES MUNICIPAL STORMWATER PERMIT
(NPDES No. CAS0108766)

INDIVIDUAL ANNUAL REPORT

FOR

DISTRICT
FISCAL YEAR 2007 - 2008

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4. Industrial/Commercial
5. Residential
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8. Public Participation
9. Fiscal Analysis Component
10. Non-Storm Water Discharges
11. Receiving Water Limitations
12. Additional Urban Runoff Data
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Attachment B – WQMP Example conditions
Attachment C – Training Logs
Attachment D – Encroachment / Construction Requirements and Logs
Attachment E – Reports of Collected Debris in MS4
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BOARD ORDER NO. R9-2004-001
CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN DIEGO REGION

EXECUTIVE SUMMARY

This Individual SWMP Annual Report (Annual Report) documents specific urban runoff management programs and activities implemented by the Riverside County Flood Control and Water Conservation District (District) to comply with the requirements of the third-term Municipal Separate Storm Sewer System (MS4) Permit issued to the District by the San Diego Regional Water Quality Control Board (Regional Board) on July 14, 2004 (Board Order R9-2004-001).

This Permit regulates all storm water discharges from MS4's within the Santa Margarita Watershed Region of Riverside County (SMR), thus all of the Municipal governments that own or operate MS4 within the SMR are Co-Permittees on this permit, including:

- The District (serving as principal permittee)
- The County of Riverside
- The City of Murrieta
- The City of Temecula

The goals of this permit are to protect and enhance the quality of surface waters within the watershed to protect their beneficial uses as described in the Basin Plan. As stated above, this report documents the specific activities of the District to reach or maintain water quality objectives within the SMR. It should be noted though that the individual activities of one permittee are not sufficient to have a lasting effect on the regional waters within the watershed, but the joint efforts of all the stakeholders that have authority over the use of the land within the watershed.

To this end, the Third-Term MS4 Permit required each Permittee to develop an Individual Storm Water Management Plan (SWMP) and for all the Permittees to jointly develop a Watershed Storm Water Management Plan. As Principal Permittee, the District was to coordinate the development of the compliance programs. Annual Reports for each of these compliance programs are required and are to be submitted to the Regional Board on October 31st of each calendar year. The reporting period is specified as the preceeding fiscal year. The District specifically prepares this Individual Annual Report and the Watershed Annual Report. In addition, as Principal Permittee, the District is tasked with coordinating the submittal of the Individual SWMP Annual Reports for the other Co-Permittees.

This Annual Report covers the period extending from July 1, 2007 through June 30, 2008. This report specifically responds to reporting requirements specified in Provision III.A.1 of the Monitoring and Reporting Program of the Permit. This includes identifying program progress and effectiveness evaluations.

The District was creeated through a special act of the state legislature and is charged with providing flood protection for the county. Through this goal, the District Constructs, owns and maintains an expansive network of MS4 throughout the County of Riverside including those in the Santa Margarita Watershed, but its enabling act does not provide land-use powers. As such, the District's activities during continue to be limited to MS4 Maintenance Activities, Public Outreach, Training, Water Quality Monitoring and IC/ID activities. The District relies on Combined Legal Authority with the Co-Permittees for all enforcement activities outside of District Right-of-Way. The District however, continues to evaluate and optimize its programs based on the observations of District staff, RWQCB audits and other sources of input. These enhancements include:

EXECUTIVE SUMMARY

Program Enhancements

- Continued Improvement of the Development Planning Program
  - Commitment to initiate development of a GIS system to track post-construction BMPs associated with new developments.
  - Continued work towards the development of a public maintenance and tracking mechanism for post-construction BMPs, including coordination of the District's proposed Low Impact Development (LID) Manual with the efforts currently underway by the California Association of Stormwater Quality Agencies (CASQA) and the Stormwater Monitoring Coalition (SMC).
  - Initiation of an LID BMP testing and demonstration facility to increase municipal, developer and public awareness of low impact development techniques and also collect data necessary to characterize the hydrologic and water quality benefits of those techniques.
  - The District agreed to review Water Quality Management Plans (WQMPs) prepared by the County of Riverside Economic Development Agency and the County Facilities Management Department in an effort to ensure consistency between public works projects and private development projects in the unincorporated County.
  - Continued cooperation with the Southern California Coastal Waters Research Project (SCCWRP) and the SMC to develop appropriate hydromodification guidance for southern California.
  - Development of new guidance to District Design Staff regarding necessary water quality documentation required to support CEQA documents.
- Continued improvement of municipal maintenance programs
  - Initiated development of a new procedure for reporting and addressing hazardous materials spills
  - New procedure to improve BMP implementation associated with major maintenance activities
  - Proposal to incorporate IPM guidance into District contracts for pest management at the District's Corporate Yard in Riverside.
- Continued improvement of the IC/ID programs
  - Continued work on a method to track third-party discharges

These and other compliance activities are addressed in the main body of this report. In addition, the data presented in this report, which aggregates data from the last four years of program implementation, will serve as the basis for the Report of Waste Discharge to be submitted in January 2009.

EXECUTIVE SUMMARY

Program Effectiveness Assessments (PEAs)

The Permit requires the Permittees to develop a long-term strategy to evaluate the effectiveness of the SWMPs. It should be noted that a PEA requires the establishment of a set of baseline conditions using measurable metrics. These baseline conditions can then be used to establish measurable goals based on the selected metrics. Thereafter, effectiveness can be evaluated by comparisons of successive years of measurable metrics against the baseline data and measurable goals.

Where the period of evaluation is characterized by the implementation of new or revised program elements, determinations of program effectiveness will initially be limited to confirmation of program implementation and collection of measurable metrics until baseline conditions can be established. Further, it must be recognized that direct measures of long-term program effectiveness may not be available within the timeframe of the Third-Term Permit. This lack of direct measure confirmation arises because:

- Baseline water quality conditions are not readily established due to the inherent variability of natural systems and stormwater quality;
- Water quality changes in response to program implementation are likely to be very slow;
- Establishing a link between receiving water conditions and program activities is difficult at the watershed scale when programs are being implemented incrementally with the development/redevelopment cycle; and
- .

While program effectiveness assessment is a key step in the iterative process of program implementation, it should be realized that effectiveness assessment itself is a part of the management process that is also evolving. Assessing program effectiveness is recognized as a challenge for program managers across California, and the District continues to support the effort of the California Stormwater Quality Association (CASQA) to develop guidance in this area at a statewide level.

The long-term strategy for assessing program effectiveness will be conducted at two levels.

- Level 1 – Annual Assessments
- Level 2 – Long Term Assessments

At the Annual Assessment Level, the PEA will focus on an annual assessment of program implementation and Permit compliance. These assessments will be addressed by completing the Annual Reporting Forms, which will confirm program implementation, Permit compliance and collection of measurable metrics. Assessments will be included at the end of each Annual Report section as required by the reporting requirements of the Third-Term MS4 Permit. Inferences about the compliance of each program [development, construction, Illicit Connection/Illicit Discharge (IC/ID), etc.] will be drawn from both direct and indirect measures of progress for each program.

At the Long-Term Level, the Permittees will collectively evaluate the measurable metrics, Receiving Water monitoring Data, and IC/ID monitoring data to assess changes in knowledge and behavior, load reductions and improvements in Receiving Water Quality. This analysis will be conducted as

EXECUTIVE SUMMARY

part of the Report of Waste Discharge (ROWD). The results of this assessment will evaluate the need to make significant programmatic revisions to the Permit compliance programs to protect Beneficial Uses of Receiving Waters. This analysis will place more emphasis on using direct measures of progress (monitoring data, long term trend analysis) and will support the review and any revisions to the Riverside County Drainage Area Management Plan (DAMP) and Individual SWMPs using information from the Water Quality Monitoring Program, IC/ID Monitoring Program and measurable metrics that have been collected.

The PEAs included in this report are Level 1 assessments.

For purposes of this Annual Report, the terms "Watershed Stormwater Management Plan (Watershed SWMP)" and "Standard Urban Stormwater Management Plan (SUSMP)" referenced in the cPermit are referred to as the "DAMP" and "Water Quality Management Plan (WQMP)" respectively, to be consistent with terminology previously established and in use by the Permittees. Additional terms and acronyms used in this Annual Report are defined in the glossary included in the DAMP.

1. DEVELOPMENT PLANNING
(SECTION F of ORDER R9-2004-001)

1) Description of any Amendments to the General Plan or the Development Project Approval Process:

The District's enabling act does not provide land-use powers. . It, therefore, does not maintain a General Plan or have direct control over the overall development project approval process. However, at the County of Riverside's request, the District has agreed to review proposed developments in the unincorporated County area for water quality and flood control related impacts and recommend appropriate conditions of approval to the County.

In this role, the District spent the last fiscal year working on the following tasks:

a. Subsequent to the Audits of the County's implementation of Provision F – Development Planning of the Permit, the District has agreed to review WQMPs for Capital Improvement Projects (CIP's) proposed by County Economic Development Agency (EDA) and the Facilities Management Department (FM). This will help to ensure the County's compliance with WQMP requirements and ensure that BMPs for Development Projects sponsored by these departments are appropriately and address and meet MEP for pollutants of concern.

b. District and County staff are working on the development of expanded treatment control BMP design guidance with focus placed on low impact development concepts such as landscape based BMPs. In addition, staff are working on the development of a public funding mechanism to ensure that maintenance of the post-construction BMPs would be fully funded and to identify the County departments or other entity that will be responsible for tracking and maintaining post-construction BMPs.

c. In support of the District's proposed LID BMP Design Manual, the District has initiated a LID BMP Testing and Evaluation Facility. The proposed facility will be constructed via a retrofit of the District's compound in Riverside. The project proposes to construct, test and evaluate a variety of integrated management practices (IMPs) that serve as hydraulic and hydrologic controls consistent with the low impact development (LID) planning and design approach. The project proposes the following Integrated Management Practices (IMPs):

- The replacement of 55,800 sf of existing asphalt pavement & base with new porous asphalt pavement and new porous concrete pavement and sub drain systems.
- The construction of 3 flow-through planter systems.
- The replacement of 165' of storm drain pipe with a vegetated infiltration swale.
- The replacement of 2,800 sf landscaped area with a vegetated infiltration swale.
- The deepening of an existing infiltration basin to facilitate monitoring data collection.

1. DEVELOPMENT PLANNING
(SECTION F of ORDER R9-2004-001)
CONTINUED

In addition, the project proposes the following monitoring and testing components:

- The construction of 7 monitoring vaults with flow metering, discharge pumps and electronic control and recording equipment.
- The evaluation of a standard suite of pollutants for selected runoff events including specific pollutants of concern in the Santa Ana Watershed such as nutrients and pathogens.
- The assessment of each IMP's ability to mitigate increased runoff volumes associated with development.
- The assessment of life-cycle costs of the IMPs
- The assessment of necessary modifications to design standards to improve IMP effectiveness or ease of maintenance

The proposed project will implement a variety of LID Integrated Management Practices (IMPs) that will be used to test and demonstrate the effectiveness of these practices in contributing to storm water capture and management, treating pollutants of concern associated with urban runoff, mitigating the impacts of hydromodification from urban development, and identifying optimum IMP design criteria and standards for LID IMPs in Riverside County. Data collected by this project will be provided to the regional SMC LID Project and will be available to benefit all SMC members.

d. In conformance with Permite requirement F.2.b)9. of the Permit, the District continues to participate in the Stormwater Monitoring Coalition's efforts to develop numeric guidance for addressing Hydrologic Conditions of Concern, including their Hydromodification study and their LID Projects, in conformance with Permit requirement F.2.b)9. of Board Order R9-2004-001. These efforts are further described in the Watershed Annual Report in Appendix G, Section G.7

2) Number of Grading Permits Issued:

Not applicable. The District does not issue grading permits.

1. DEVELOPMENT PLANNING
(SECTION F of ORDER R9-2004-001) CONTINUED

3) Number of Developments Conditioned to meet WQMP Requirements:

The District utilizes a case tracking program (District Land Management Tracking) that tracks project status and produces reports identifying the number of developments conditioned with WQMPs. The following numbers reflect projects reviewed that are recorded as being in the Santa Margarita Watershed. — only FM and EDA depts?

282 Land Use/Development proposals were reviewed by the District for water quality and flood control related impacts.

146 Land Use/Development proposals meet the minimum requirements and were required to prepare a preliminary project specific WQMP,

48 of the Land Use/Development proposals that were required to prepare a preliminary project-specific WQMP were issued 'recommended' Conditions of Approval. The District does not have land use authority, thus these 'recommended' conditions are forwarded to the County who subsequently establishes the conditions of approval for the project.

A summary log of Projects that the District reviewed is contained in Attachment A. Entries marked "approved" are those for which Conditions of Approval were recommended to the County.

4) Attach One Example of a Development Project that was Conditioned to Meet WQMP Requirements and a Description of the required BMPs:

See Attachment B.

5) Description of any Updates to the Environmental Review Process:

In the beginning of the fiscal year, the District reviewed its internal CEQA process and developed a new internal memorandum describing a series of questions that the Design Engineers must answer to assist with preparing CEQA documentation for District projects. The memo incorporated questions relative to NPDES requirements to ensure that District projects were considering appropriate WQMP and Development Planning requirements early in the design process.

A copy of this memo is included in Attachment G.

1. DEVELOPMENT PLANNING
(SECTION F of ORDER R9-2004-001)
CONTINUED

6) **Description and Number of Training Efforts Conducted during the Reporting Period (for staff, developers, contractors, etc.), including the Number of Staff Trained.**

a. **Training:** See Attachment C

Training	Training Description	Training Dates	Number of District Attendees
WQMP	New Development	11/28/07	14
WQMP	New Development	11/29/07	15
WQMP	New Development	12/5/07	1
WQMP	New Development	4/16/08	9
APWA - Hydromod	Hydromodification Management and Continuous Simulation Hydrologic Modeling for Plan Reviewers	4/9/08	5
		Total	**44**

b. **Summarize the Educational and Outreach Activities the Development Planning Component has conducted over the Past Year.**

Priority development projects conditioned by the County are required to obtain copies of appropriate public education and outreach materials from the District's NPDES Public Information Officer or from our website. They are also required to submit an affidavit stating that they will distribute the public education materials to new property owners. This affidavit is recorded in the development's individual file. Additionally, the District has implemented a tracking mechanism to facilitate the accurate reporting of the number of affidavits received each fiscal year.

23 Public Education Affidavits were received during the reporting period.

Additional public education and outreach activities undertaken by the District are considered part of the Regional Public Education Program described in the Watershed Annual Report.

7) **An Assessment of Program Effectiveness Based on the Measurable Goals Established in the Permittee's Individual SWMP:**

As mentioned above, because the District has no land use authority and provides services on the County's behalf, the District has no direct measurable goals for the Development Planning Component. As indicated in the District's Individual SWMP, we collect the metrics described in this report and forward them to the County for analysis as part of the County's Individual SWMP Annual Report.

1. DEVELOPMENT PLANNING
(SECTION F of ORDER R9-2004-001)
CONTINUED

The District has identified the following program areas where, in conjunction with the County, we are evaluating potential ways to improve the effectiveness of post-construction BMP selection and maintenance for the County's Development Planning Program:

a. A long-term public maintenance mechanism for post-construction BMPs within the unincorporated County.

b. Additional post-construction BMP guidance to ensure the effectiveness and efficiency of post-construction BMPs.

This evaluation is on-going. Currently, the District has proposed to spend approximately $1.3 million on BMP testing for the purposes of optimizing the design and verifying the effectiveness of various BMPs. Further details are provided in the Monitoring Annual Report (Appendix G, Section G-7.1 of the Watershed Annual Report)

The District's Development Review operation was also audited by PG Environmental as part of a broader audit of the County's Development Planning Program. Although the District development review process was found adequate, the issue of post-construction BMP tracking and inspection was raised by Regional Board and PG Environmental staff. To support the development of such a program, District staff has committed to working with County staff to develop a GIS-based tracking mechanism for post-construction BMPs. Work on this mechanism will begin in Fiscal Year 2008-2009.

8) Additional Comments/Information:

Describe the Major Accomplishments of the Development Planning Component over the Past Year. (General Plan or ordinance revisions, procedure/approval process changes, SUSMP guidance material):

Major accomplishments of the program are described in responses to questions 1, 3 and 6 of this reporting form.

9) Summarize New Activities or Improvements to be implemented Next Year as a result of your Self Assessment of the Development Planning Component:

The District plans to continue the ongoing development and implementation of the activities described in the responses to question 1 and 7 in this section.

2. CONSTRUCTION
(SECTION G)

NOTE: THIS SECTION IS APPLICABLE TO DISTRICT ADMINISTERED AND ENCROACHMENT PROJECTS ONLY.

1) Number of Inspections Conducted:

District Administered Construction Projects

There were **zero (0)** District administered construction projects within the Permit area within the reporting period.

Encroachment Permits Issued:

There were **ten (10)** encroachment permits issued by the District within the Permit area. Of the 10 encroachment permits issued, **seven (7)** had construction related activities within the District right-of-way.

During the active construction period of these encroachment projects, the District inspects the site as required based on the scope of the work being done. In general, most District encroachment projects last for a month or less and do not involve significant construction activity. Occasionally, more extensive projects, may encroach on the District property for a longer period. A copy of the encroachment permit log, with projects located in the Permit area highlighted in green, is included in Attachment D.

For both construction and encroachment projects, site inspections include verifying that adequate minimum BMPs are in place to comply with Order R9-2004-001 and the General Construction Permit. Inspection reports are not produced during a site visit unless there is a problem which needs to be addressed, at which time a notification is given. There were no significant construction related problems during the reporting period.

2) Number and Type of Enforcement Actions Related to Construction Sites:

Enforcement and Compliance Responses	Private Projects	Public Projects
Non-monetary Penalties	0	0
Stop Work Authority	0	0
Fines	0	0
Financial Security	0	0
Permit/Certificate of Occupancy Denial	0	0
Referral to SDRWQCB	0	0
Total	**0**	**0**

3) Description of Modifications made to the Construction and Grading Approval Process:

No revisions were needed nor made.

2. CONSTRUCTION
(SECTION G)
CONTINUED

NOTE: THIS SECTION IS APPLICABLE TO DISTRICT ADMINISTERED AND ENCROACHMENT PROJECTS ONLY.

4) Description and Number of Training Efforts Conducted during the Reporting Period.

a. Training: (See Attachment C.)

Training	Training Description	Training Dates	Number of District Attendees
Construction	NPDES Training for Construction Inspectors	9/24/07	5
Construction	NPDES Training for Construction Inspectors	9/25/07	5
		Total	**10**

b. Summarize any Additional Education and Outreach Activities Conducted for Project Applicants, Contractors, Developers, Property Owners, and/or other Responsible Parties in Support of the Construction Component:

The District is only directly responsible for administering District Public Works projects; it does not have authority over private development activities. For all District construction projects, the District reviews and approves contractor submitted SWPPP's prior to construction. As stated in the General Construction Permit (Order No. 99-08 DWQ), individuals responsible for SWPPP preparation, implementation, and permit compliance shall be appropriately trained both formally and informally. During the SWPPP review process, the District requires that contractors meet the requirements of the General Construction Permit and requires that training certifications are provided. Additionally, as part of the preconstruction meeting for all District projects, the contractor must attend a NPDES Contractor's Training Presentation given by District staff. In addition, the District's specifications require compliance with the Permit and the General Construction Permit, including appropriate minimum erosion and sediment control BMPs on District Capital Improvement Projects.

Additional contractor education and outreach is implemented through the Regional Public Education Program described in the Watershed SWMP.

10) An Assessment of Program Effectiveness based on the Measurable Goals Established in the Permittee's Individual SWMP:

As indicated in the District's Individual SWMP, the District does not have land-use or police powers, and as such cannot issue grading permits or regulate private construction activities. Therefore, the District's construction program is limited to District projects or those portions of Third-Party Construction Projects that encroach upon District rights-of-way. The District's Individual SWMP, therefore, did not establish specific measurable goals because of the District's limited role in construction activities and limited number of District projects in the Permit area.

2. CONSTRUCTION
(SECTION G)
CONTINUED

NOTE: THIS SECTION IS APPLICABLE TO DISTRICT ADMINISTERED AND ENCROACHMENT PROJECTS ONLY.

Additionally, through a review of our NPDES Training Materials, District NPDES Staff are recommending that District Construction Inspectors attend additional training specific to the Construction General Permit in the future. This is because our inspectors only work on District public works projects that must be in compliance with the Construction General Permit. The District will evaluate potential providers of this training in Fiscal Year 2008-2009 and propose implementation in 2009-2010 (or in conjunction with the roll-out of the new Construction General Permit).

The District's construction program has been found to be effective because our inspectors received training and our construction projects were inspected consistent with permit requirements.

11) Additional Comments/Information:

Attachment D includes the following items:

- Standard specifications related to water quality that are used for District-administered construction projects.
- Standard encroachment permit application and requirements,
- Copies of the District's encroachment permit log.

3. MUNICIPAL
(SECTION H.1 of ORDER R9-2004-001)

1) Number of Inspections Conducted at Existing Municipal Facilities:

Not Applicable – there are no District municipal facilities within the Permit area. However, the District does annually inspect its MS4 consistent with the requirements of the current Permit.

2) Number and Type of Enforcement Actions Related to Municipal Sites:

Enforcement and Compliance Responses	Number
Education and Information	N/A
Verbal Warning	N/A
Written Warning	N/A
Other	
Total	**N/A**

3) Number of Catch Basins and Inlets that were Inspected and the Number that were Cleaned:

	Number Inspected	Number Cleaned
Catch Basins and Inlets	N/A	N/A

NOTE: The District does not operate nor maintain catch basins and inlets within the permit area aside from those that are within District Rights-of-Way. Usually any inlets that are within District R/W are immediately adjacent to a channel, and are maintained as part of routine maintenance of the channels; as such they are not tracked separately. A significant majority of catch basins and inlets are maintained by the municipalities or in rare instances, may be maintained by property owners associations (POAS) or homeowners associations (HOAs).

3. MUNICIPAL
(SECTION H.1 of ORDER R9-2004-001)
CONTINUED

4) **Assessment of the Amount and Type of Debris Removed from Catch Basins, Streets and Open Channels, including an Identification of Problem Areas that Generate the most Pollutants:** (See Attachment E.)

Facility	Type of Debris	Approx. Weight	Problem Areas that Generate Most Pollutants
Catch basins	Vegetative Litter Anthropogenic Litter Sediment Other man-made debris		N/A
Total		**N/A**	**tons (wet weight)**
Streets	Vegetative Litter Anthropogenic Litter Sediment Other man-made debris		N/A
Total		**N/A**	**tons (wet weight)**
Open Channels	Vegetative Litter Anthropogenic Litter Sediment Other man-made debris	45.5 5.2 10,798.5*	N/A
Total		**10,849**	**tons (wet weight)**
Facility Total		**10,849**	**tons (wet weight)**

* 6,153 cy of sediment were removed, tonnage calculated based on an assumed density of 130 lbs/cf.

0002322

3. MUNICIPAL
(SECTION H.1 of ORDER R9-2004-001)
CONTINUED

5) **Assessment of effectiveness of BMPs that have been implemented for municipal facilities and activities:**

BMP Code	Description	Used	Notes
SC-10	Non-Stormwater Discharges	☒ Yes ☐ No	
SC-11	Spill Prevention, Control and Clean-up	☒ Yes ☐ No	
SC-20	Vehicle and Equipment Fueling	☐ Yes ☐ No	N/A
SC-21	Vehicle and Equipment Cleaning	☐ Yes ☐ No	N/A
SC-22	Vehicle and Equipment Repair	☐ Yes ☐ No	N/A
SC-30	Outdoor Loading/Unloading of Materials	☐ Yes ☐ No	N/A
SC-31	Outdoor Liquid Container Storage	☐ Yes ☐ No	N/A
SC-32	Outdoor Equipment Maintenance	☐ Yes ☐ No	N/A
SC-33	Outdoor Storage of Raw Materials	☐ Yes ☐ No	N/A
SC-34	Waste Handling and Disposal	☒ Yes ☐ No	
SC-35	Safe Alternative Products	☒ Yes ☐ No	
SC-40	Contaminated or Erodible Areas	☐ Yes ☐ No	N/A
SC-41	Building and Grounds Maintenance	☒ Yes ☐ No	
SC-42	Building Repair and Construction	☐ Yes ☐ No	N/A
SC-43	Parking/Storage Area Maintenance	☒ Yes ☐ No	
SC-44	Drainage System Maintenance	☒ Yes ☐ No	
SC-60	Housekeeping Practices	☒ Yes ☐ No	
SC-61	Safe Alternative Products	☒ Yes ☐ No	
SC-70	Road and Street Maintenance	☐ Yes ☐ No	N/A
SC-71	Plaza and Sidewalk Cleaning	☐ Yes ☐ No	N/A
SC-72	Fountain and Pool Maintenance	☐ Yes ☐ No	N/A
SC-73	Landscape Maintenance	☒ Yes ☐ No	
SC-74	Drainage System Maintenance	☒ Yes ☐ No	
SC-75	Waste Handling and Disposal	☒ Yes ☐ No	
SC-76	Water and Sewer Utility Maintenance	☐ Yes ☐ No	N/A

Assessment of the effectiveness of BMPs that have been implemented for municipal facilities and activities:

THE DISTRICT DOES NOT OPERATE MUNICIPAL FACILITIES OTHER THAN MS4 IN THE SANTA MARGARITA REGION, THEREFORE THESE RESPONSES ARE LIMITED TO ADDRESSING THE DISTRICT IMPLEMENTATION OF BMP's RELATING AND APPLICABLE TO MS4 MAINTENANCE.

0002323

3. MUNICIPAL
(SECTION H.1 of ORDER R9-2004-001)

6) Description and Number of Training Efforts Conducted over the last year (for Municipal Facility Operators and/or Inspectors).

a. Training:

Note – Because District staff do maintain MS4 in the Santa Margarita Region, District maintenance staff receive municipal NPDES training per the requirement of the NPDES permit. Attendance logs for these trainings are contained in Appendix E of the Watershed Annual Report.

Training	Training Description	Training Dates	Number of District Attendees
Municipal Training	Municipal Site Inspection	11/27/07	6
Municipal Training	Municipal Site Inspection	4/15/08	3
Municipal Training	In-house training for PPE	6/10/08	56
Worker Safety Training (Helena Chemical Company)	BMP implementation during herbicide applications	5/22/08	11
Municipal Training	Hazardous Material Spill Notification and Cleanup	1/8/08	13
Municipal Training	Hazardous Material Spill Notification and Cleanup	1/9/08	9
Pesticide Applicators Seminar, Monterey, CA	SCWSS Annual Conference Southern California Weed Science Society	1/28, 1/29, 1/30, 2008	4
Municipal Training	Hazardous Material Spill Notification and Cleanup	1/17/08	51
		Total	**145**

b. Summarize the Internal and External Education and Outreach Activities the Municipal Component has Conducted over the past year:

In compliance with Order No. R9-2004-001, the District maintains the District's corporate yard Pollution Prevention Plan (PPP), which also address field MS4 maintenance in the Santa Margarita Watershed. The PPP provides the pollution prevention strategy to address facilities and associated activities that may cause stormwater pollution without proper controls.

Staff also review the standard operating procedures for herbicide/pesticide management (product label instructions and Material Safety Data Sheets) that are part of the existing education requirements for applicators. Examples of standard procedures that constitute

3. MUNICIPAL
(SECTION H.1 of ORDER R9-2004-001)
CONTINUED

BMPs include schedules for applications considering weather and nesting seasons, and proper storage and disposal of unused product.

Site and activity assessments are performed annually prior to the storm season including the District's Corporate Yard (not subject to the SMR Permit) and the MS4 within the Permit area. The District does not own nor maintain any facilities in the SMR other than the MS4. The District's Corporate Yard is located in the Santa Ana watershed..

Additionally, District Maintenance staff have attended annual training events conducted by our contracted herbicide provider (Helena Chemical Company). These venues focus on BMP implementation for specific herbicides used by the District. The BMPs and related topics included:

- Anticipated Glyphosate concentration ranges in water samples given average AquaMaster application rates and following label instruction.
- Calculation for determining estimated surfactant concentrations.
- Application techniques for effective results when applying AquaMaster.
- California laboratories that can analyze for Glyphosate, should the need arise.

7) An Assessment of Program Effectiveness Based on the Measurable Goals Established in the Permittee's Individual SWMP:

The following metrics are required to be tracked and reported on by Section 5.6 of the District's Individual SWMP:

- Amount and Types of Debris Removed from Open Channels

  Outside of the MS4, there are no District municipal facilities within the Santa Margarita Watershed. Therefore, the District's municipal program is limited to MS4 maintenance. The type and total amount of debris removed for each fiscal year is as follows:

Fiscal Year	Vegetative Litter	Anthropogenic Litter	Sediment	Total Amount of Debris Removed (tons)
FY 2004-2005	55.9	0	5,763.4	5,819.3
FY 2005-2006	16.0	8.1	7,532.5	7,556.6
FY 2006-2007	10.4	4.7	2,113.0	2,128.1
FY 2007-2008	45.5	5.2	10,798.5	10,849

3. MUNICIPAL
(SECTION H.1 of ORDER R9-2004-001)
CONTINUED

The amount of sediment removed in FY 2006-2007 was lower than other years at 2,113 tons. This is likely due to the relatively dry wet season in FY 2006-2007, which results in a decrease in sediment transport, and thus sediment removal compared to other years.

- Description of Training Efforts

  See Section 3.6) above

Other Measures of Effectiveness

- Although outside of the District's measurable goals, the District did discover the need to develop a procedure to better address hazardous material clean-up and reporting related to illegal dumping and/or District operational activities. Development of a revised procedure was initiated this reporting period and the procedure is expected to be approved in the upcoming fiscal year.
- District Maintenance Supervisors are now required to complete BMP plans for major maintenance activities. These BMP plans identify the BMPs that are to be deployed as part of the maintenance activity.

8) **Additional Comments/Information:**

The District's municipal program in the Permit area is limited to MS4 maintenance. The District reviewed its program to ensure it is continuing to meet or exceed the minimum requirements of Board Order R9-2004-001.

Within FY 2007-2008, the District did not construct any additional MS4 within the SMR. However, the District accepted maintenance responsibilities for several flood control facilities constructed by Developers. Maps showing the location of these new facilities are included in Attachment H of this report. An updated map of all District and City maintained facilities is included in Appendix F of the Watershed Annual Report.

Summarize New Activities or Improvements to be implemented next year as a result of your Self Assessment of the Municipal Component:

As mentioned above, the District reviews its corporate yard Pollution Prevention Plan (PPP) at least annually to determine if any revision is necessary to reflect changes in the facility or changes in the activities conducted. No new activities or improvements are deemed necessary as a result of this assessment beyond changes discussed in Section 7 above.

The District is also going to review its pesticide application contracts (for the Municipal Facility in the Santa Ana Region) to ensure that the contracts require consideration and application (as appropriate) of IPM pest control methods. The contracting language will be based on guidance provided in the Eco-Wise IPM Contracting Toolkit available at:

http://www.ecowisecertified.org/toolkit/

4. INDUSTRIAL/COMMERCIAL
(SECTION H.2) CON'T

The District's enabling act does not provide land-use powers and therefore, individually it has no jurisdiction over industrial or commercial facilities. Through Combined Legal Authority established through an implementation agreement, the District relies on the Co-Permittees for regulation and enforcement related to Industrial and Commercial businesses and activities.

1) Description and Number of Training Efforts conducted over the last year (for Industrial/Commercial Facility Operators and/or Inspectors).

a. Training:

Although the District does not have authority to inspect or regulate industrial/commercial land-uses, District staff that respond to IC/ID complaints or notifications receive training to ensure that they are familiar with appropriate BMPs applicable to the various potential sources of discharges including Industrial/Commercial Operations and Facilities and Construction Sites. This training helps staff effectively respond to IC/ID events and, through discussions with offending parties, recommend BMPs to curtail illicit discharges to the MS4.

Training	Training Description	Training Dates	Number of Attendees
Industrial/Commercial Training	Industrial/Commercial Facility Inspection	11/27/07	N/A*
Industrial/Commercial Training	Industrial/Commercial Facility Inspection	4/15/08	N/A*
		Total	N/A

* District Staff that respond to IC/ID complaints or notifications attend inspection training annually, either for Commercial-Industrial sources or for Construction sources. This year, District IC/ID response staff attended the NPDES Construction Site Inspection training described in ***Section 2. Construction*** of this report.

5. RESIDENTIAL
(SECTION H.3 of ORDER R9-2004-001)

The District's enabling act does not provide land-use powers or authority and therefore individually it has no jurisdiction over residential activities. Through Combined Legal Authority established through an implementation agreement, the District relies on the Co-Permittees for regulation and enforcement related to residential activities.

6. EDUCATION
(SECTION I of ORDER R9-2004-001)

1) Description of Education Efforts conducted by the Permittee (not collectively with other Permittees) during the previous year:

The District and the Co-Permittees jointly fund a watershed-wide Public Education program administered by the District. Since the District does not have any land use authority, it generally does not conduct Educational activities outside of the collective educational efforts for the SMR permittees.

Sections 1 through 4 of this report include an accounting of training that District employees have received training within this reporting period. The training sessions listed in these sections includes Municipal staff training that was conducted by the District on behalf of the Co-Permittees as part of the watershed-wide education program, and training attended that was conducted by others, as available.

District employees responsible for the implementation of the NPDES compliance programs also attended the following Training:

Training	Training by	Date
Program Effectiveness Assessment	CASQA	May 27, 2008

The education and outreach programs described below were implemented as part of the Watershed SWMP requirements. Additional details regarding these programs are available in the Watershed Annual Report.

Education and Outreach efforts were conducted toward the following audiences:

Audience	Measures Impressions are County-wide unless otherwise noted
Permittee Departments and Personnel	Number of District employees trained for: • Construction Inspection: 10 • Industrial/Commercial Inspection: N/A • Municipal Facilities and Activities: 9 • Development Planning: 39
Development Community	Outreach was conducted at the following NPDES Construction Trainings: Sep. 24 & 25, 2007, Nov. 19 & 20, 2007 and Jan. 17, 2008

6. EDUCATION
(SECTION I of ORDER R9-2004-001)
CONTINUED

Industrial/Commercial Owners and Operators	Industrial/Commercial outreach conducted: SGA Home Improvement Stores 8 stores visited and training provided to 12 employees Riverside County Business License Program was instituted on July, 07. A storm water pollution prevention insert was developed and issued to all new license applicants and renewals. Date: 07/07 Inserts distributed: 7,503
Residential Community, General Public, Other Public Agencies and Students	Number of Media Impressions in: • Newspaper/City/County publications 1,300,000 • 800 Line Calls: 1,317 • Website: 3,387 (Does not include County Page) • Radio/TV: 0 • Billboards: 0 • Other: 200 • Materials: 240,000 Number of students: 5,100 Public Education events conducted: 2 # Attendees: 600 Temecula Museum/Flower Show

6. EDUCATION
(SECTION I of ORDER R9-2004-001)
CONTINUED

2) Assessment of Overall Program Effectiveness Based on the Measurable Goals Established in the Permittee's Individual SWMP:

Measurable goals for the public education program are defined in Section 10 of the District's Individual SWMP.

As described in the DAMP, the Permittees have decided to pool their efforts into a single county-wide public education program implemented by the District. Since the District's individual jurisdiction covers the entire Santa Margarita Region, the District does not differentiate between education outreach efforts undertaken individually or as part of the county-wide efforts. Therefore, as stated in Section 10 of the District's Individual SWMP, a description and evaluation of the entire public education program implemented in the Permit area is contained in Sections G and J of the Watershed Annual Report.

Additional Measures of Effectiveness

Beyond the standard NPDES staff training that the District provides, District NPDES employees are constantly updating their knowledge on various topics relevant to their compliance programs. In this manner, this year District NPDES staff attended CASQA's Program Effectiveness Training. This training will help the District develop appropriate measureable goals in the assessment of their individual compliance programs and of the watershed based activities.

3) Additional Comments/Information:

As described above, the District reports all of its implemented education related activities, and an assessment of the public education program in the Watershed Annual Report.

Describe the major accomplishments of the Education Component over the past year.

See Watershed Annual Report.

Summarize new activities or improvements to be implemented next year as a result of your self assessment of the Education Component:

See Watershed Annual Report.

7. ILLICIT DISCHARGE DETECTION AND ELIMINATION
(SECTION J of ORDER R9-2004-001)

1) **Number of Illicit Discharges, Connections and Spills Reported and/or Identified during the Reporting Period:**

The District recorded 70 IC/ID/S reports during FY07-08.

- **Illicit Discharges (ID):** 8
- **Illicit Connections (IC):** 0
- **Spills (S):** 62

a. **Illicit Discharges (ID):** The ID numbers above reflect the number of reports received that constitute the willfull and/or negligent but intentional release of prohibited discharges. ID reports received by the District are included in Attachment F. In addition, Appendix C of the Watershed Annual Report contains a Fire Department HazMat Response Team Report of other IC/ID/S responses acted upon directly by them.

b. **Illicit Connections (IC):** In 1990, the District performed a detailed reconnaissance of its MS4 to identify potential illicit connections. A very small number of connections were identified. Since then, the District maintenance and construction inspectors have been trained to look for and report any illicit connections. In addition, the District requires entities wishing to drain non-stormwater discharges to its facilities to complete a Third-Party Non-Stormwater Discharge Application to ensure the discharge complies with the requirements of R9-2004-001.

c. **Spills (S):** The Spill numbers above reflect the number of reports received that consisted of accidental release of hazardous and/or prohibited discharges. Typically the District is notified of spills through receipt of a copy of the State OES report, and in most cases the spill has already been appropriately responded to when the District receives the report. The District does however, review all spill reports and follow-up on those deemed a threat to water quality. Spill reports received by the District are included in Attachment F. In addition, Appendix C of the Watershed SWMP contains a report of spill responses by the Riverside County Fire Department HazMat Response Team. The District contributes significant funding to the Hazmat team to ensure that they are cognizant of stormwater issues and incorporate appropriate BMPs as part of their hazardous materials response activities.

7. ILLICIT DISCHARGE DETECTION AND ELIMINATION
(SECTION J of ORDER R9-2004-001)
CONTINUED

2) Number of Illicit Discharges or Connections Investigated during the Reporting Period and the Outcome of the Investigations:

All reports received are reviewed/investigated to ensure that they are responded to appropriately and to check for proximity and impact to District Facilities. In many cases such as spills, the District receives reports after the incident has already been appropriately responded to and no further action by the District is necessary. Results of investigations can be found in the IC/ID/S Reports included in Attachment F.

Number of IC/ID/S incidents reviewed/investigated by District: 70
Number of IC/ID/S incidents having potential to impact District facilities: 14**
Number of IC/ID/S incidents directly impacting District facilities: 6*

** "Potential to impact District Facilities" was classified as spills/discharges that were <u>not</u> contained nor cleaned up <u>and</u> were near a District Facility, or were cleaned up but were immediately adjacent to a District Facility.

* "Directly impacting District Facilities" is classified as spills/discharges that are known to have entered a District Facility.

3) Number and Types of Enforcement Actions Taken for Illicit Discharges or Connections during the Reporting Period:

See Summary Report in Attachment F.

Because the District's enabling act does not provide land-use powers, the District relies on combined legal authority with the Co-Permittees to control industrial, commercial or development activities within its jurisdiction. Any enforcement actions resulting from an IC/ID reported to the District would be taken by the respective Co-Permittee with jurisdiction. The District does maintain the ability to regulate third-party activities within its rights-of-way through encroachment permits, construction contracts and other legal agreements.

4) Number of Times your Agency's Hotline was called during the Reporting Period, as Compared to Previous Reporting Periods.

The table below identifies the number of calls that were tracked by our 1-800 hotline. Do to a technical error, the call counters were not used during the FY 2004-2005 reporting period. The calls identified below for FY 2004-2005 only reflect the calls that were diverted to the District's front counter. The District has restored this service with the County Information Technology Department who hosts the hotline. These calls may have been for IC/ID, education outreach or other purposes.

7. ILLICIT DISCHARGE DETECTION AND ELIMINATION
(SECTION J of ORDER R9-2004-001)
CONTINUED

	Number of Calls			
	2004-05	2005-06	2006-07	2007-08
Water Pollution Hotline	100	2015	1648	1317

5) **Number and Location of Dry Weather Monitoring Sites that were Monitored during the Reporting Period:**

The District maintains four IC/ID dry weather monitoring stations. These stations are identified below:

Number of Site(s): 4

Location(s): Santa Gertrudis Channel, Warm Springs Creek, Long Canyon Creek, Redhawk Channel

The exact location of these stations can be found in Section G-3.0 of the Santa Margarita Region Monitoring Annual Report (Appendix G of the Watershed Annual Report).

6) **Summary of Illicit Discharge Monitoring Program results, including: 1) All inspection, field screening and analytical monitoring results 2) All follow-up and elimination activities and 3) Any proposed changes to station locations and/or sampling frequencies:**

The District conducts IC/ID dry weather monitoring at the four tributary stations. As a result, monitoring occurs more frequently than the minimum of two times required under the MRP.

Inspection, Field Screening and Analytical Monitoring Results

All field screening and analytical monitoring results can be found in the Watershed Annual Report, Appendix G (Monitoring Annual Report) Tables G-14 and G-36 for all four tributary stations: Long Canyon Creek, Santa Gertrudis Channel, Redhawk Channel and Warm Springs Creek.

The District has developed numeric field screening criteria to determine whether a follow-up laboratory sample should be collected as summarized below:

- Specific conductance more than 25% higher than BPO
- Total dissolved solids more than 25% higher than BPO
- Turbidity more than 25% higher than long-term average (Avg. = 71.3 NTU)
- pH below 6 or above 9.5
- Dissolved oxygen below 4 mg/L

7. ILLICIT DISCHARGE DETECTION AND ELIMINATION
(SECTION J of ORDER R9-2004-001)
CONTINUED

- Unusually low or high water temperature
- Sensory observations in the area of the discharge that indicates the presence of pollutants (e.g., staining, water sheen, water color and/or odor, algae, foaming)

Below is a summary of the results of the IC/ID investigations conducted by the District.

IC/ID Investigations Conducted by the District

IC/ID Station Name	Date	TDS (mg/L)	Sp. Cond. (µmhos/cm)	Turbidity (NTU)	pH	T (°C)	DO (mg/L)
Redhawk Channel	8/28/07*	**1100**	1700	72.9	9.2	33.1	14.51
	5/29/08*	900	1300	-	**10.3**	26.8	11.23
Long Canyon Channel	8/28/2007	900	1300	57.4	8.3	24.9	15.13
	5/29/2008	700	1000	9.8	8.6	20.4	16.34
Santa Gertrudis Chnl. near Murrieta	8/28/2007	Too shallow to accurately measure field measurements.					
	5/29/2008	Too shallow to accurately measure field measurements.					
Warm Springs Creek near Murrieta	8/28/2007	DRY. No field measurements.					
	5/29/2008	Too shallow to accurately measure field measurements.					

* Samples taken for Analytical Testing
** **Bold** values exceeded field screening criteria

Follow-up and Elimination Activities

Generally, during IC/ID field visits, visual observations and field screening did not indicate the presence of illicit connections or illegal discharges. The two exceptions within the reporting period are summarized on the following page:

7. ILLICIT DISCHARGE DETECTION AND ELIMINATION
(SECTION J of ORDER R9-2004-001)
CONTINUED

Redhawk Channel, sampling date 8/28/07 –

Field TDS exceeded 1100 mg/l. There was adequate flow to collect samples for laboratory analysis and samples were collected. Flow was clear with a slight yellow tint and very little floatables or settleables (photo). Lab turbidity (4.8 NTU) was below BPO; however, lab TDS slightly exceeded 125% BPO. Lab pH was neutral. Redhawk is in a predominately-residential area and rules out discharges from industries that would most likely produce elevated TDS flows. Nutrient levels are normal for the watershed and MBAS results are below BPO. No obvious sources of the exceedance were determined based on the field visit or follow up chemical analysis.

7. ILLICIT DISCHARGE DETECTION AND ELIMINATION
(SECTION J of ORDER R9-2004-001)
CONTINUED

Redhawk Channel, sampling data 5/29/08 –

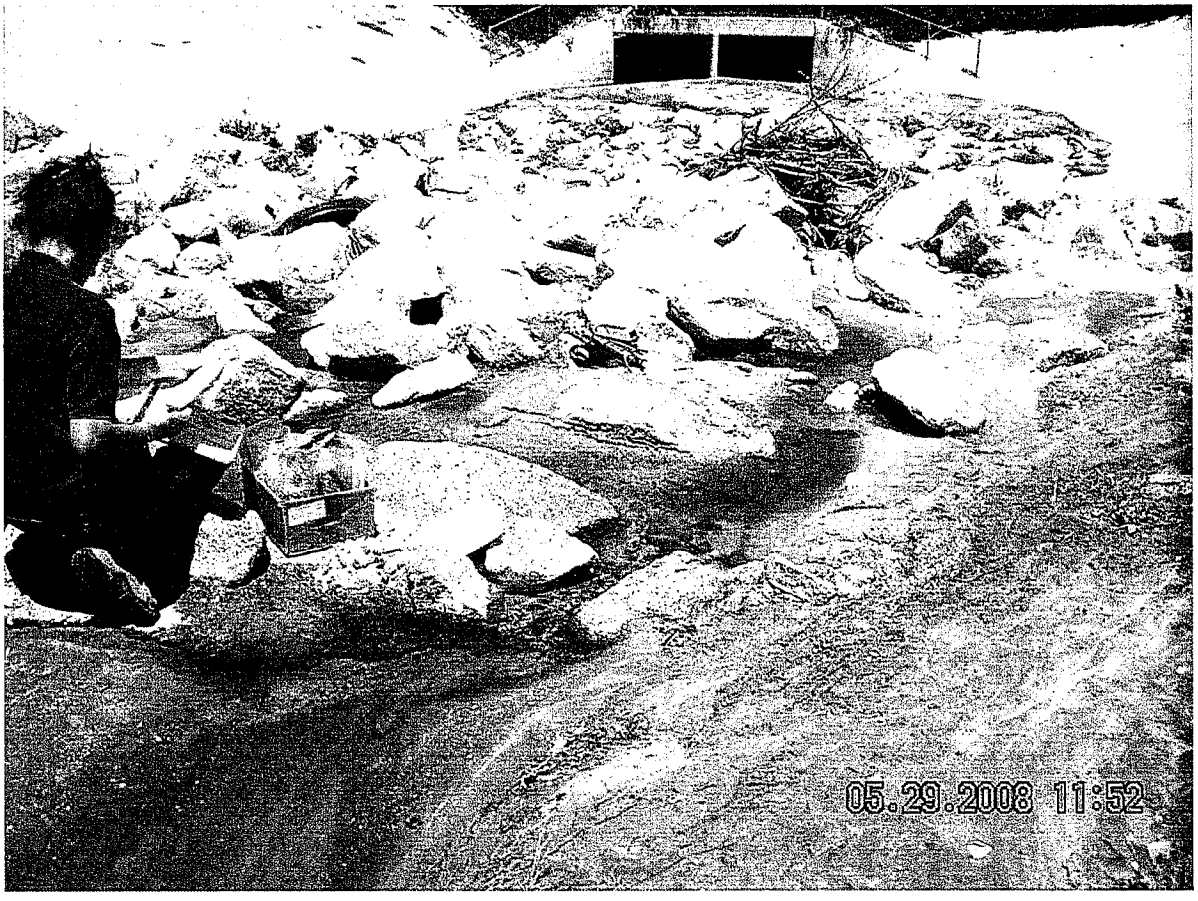

Field Parameters indicated an elevated field pH, exceeding pH criteria (9.5). There was adequate flow to collect samples for laboratory analysis and samples were collected. Lab pH measurement did not exceed criteria therefore no follow-up action was necessary. Flow had a light green to yellow tint, clear in clarity with very little floatables and settleables (photo). No obvious illegal discharges were detected during the field visits.

7. ILLICIT DISCHARGE DETECTION AND ELIMINATION
(SECTION J of ORDER R9-2004-001)
CONTINUED

Proposed changes to station locations and/or sampling frequencies

No changes are proposed to the station locations and/or sampling frequencies at this time. However, the District has committed to reviewing the entire IC/ID program with the RWQCB staff prior to submittal of the ROWD.

7) An Assessment of Overall Program Effectiveness Based on the Measurable Goals Established in the Permittee's Individual SWMP:

The measurable goals are defined in Section 4.4 of the District's Individual SWMP and have been reported upon in response to questions 1 through 5 of this section. The Overall effectiveness of the IC/ID program has been found to be effective based on the responses to these questions,

Based on an analysis of the accumulation of four years of IC/ID data, specific measurable targets will be established in the ROWD as appropriate and possible.

In response to the Los Angeles RWQCB and the Ventura County MS4 Permit, CASQA prepared a letter identify proposed measures and goals to evaluate the effectiveness of the IC/ID Program. The measures are as follows:

- Percent (%) of IC/IDs responded to within 24 hours of receiving notice; and
- Percent (%) of Illegal Connections eliminated or permitted once detected.

The goal identified for each measure was 80%. Based on our FY 2007-2008 IC/ID information, 99% of IC/ID incidents were responded to within 24 hours of receiving notice and zero (0) Illicit Connections were detected. Only one (1) of the seventy (70) reports was not responded to within 24 hours (Complaint No. 1061) which was a report of a previously occurring, permitted non-stormwater discharge of de-chlorinated swimming pool water.

8) Additional Comments/Information:

Describe the major accomplishments of the Illicit Discharge Detection and Elimination Component over the past year:

The District continues to improve its IC/ID program through refinements in its ability to track complaints, enhance its ability to gather important complaint related information through custom GIS graphic user interfaces (developed in late 2005) and efforts to enhance our coordination with other municipal agencies with authority to respond to complaints.

Summarize the internal and external education and outreach activities the Illicit Discharge Detection and Elimination Component has conducted over the past year:

During field investigations of complaint calls, field staff disseminates public education and outreach information to violators and adjacent residents/businesses. Other IC/ID education addressed through the public education program is described in the Watershed SWMP.

7. ILLICIT DISCHARGE DETECTION AND ELIMINATION
(SECTION J of ORDER R9-2004-001)
CONTINUED

Summarize new activities or improvements to be implemented next year as a result of your self assessment of the Illicit Discharge Detection and Elimination Component:

The District will continue to implement the program based on the recent improvements. Additional recommendations may be proposed for next year.

The District is also proposing to establish an electronic third-party discharge electronic reporting form and GIS layer that would allow us to quickly research known third-party discharges to our system as part of complaint call responses. Work on the system was initiated and may take 1-2 years to complete.

Other Comments:

N/A

8. PUBLIC PARTICIPATION

1) **A Description of Efforts to Include the Public Urban Runoff Management Programs during the Reporting Period (i.e., river clean-ups, volunteer monitoring, Permittee council meetings related to the SWMP, etc.):**

   Public involvement programs for this reporting period included:

   a) Technical Advisory Committee meetings held on a monthly basis and are open to the public.

   b) Participation in SMR Executive Management Team and Water Quality Monitoring Committee meetings.

2) **Additional Comments/Information:**

   N/A

9. FISCAL ANALYSIS COMPONENT

Fiscal Analysis Component - each Permittee shall include an annual fiscal analysis, for each fiscal year covered by Order No. R9-2004-001, in its Individual Annual Report. This analysis shall evaluate the expenditures (such as capital, operation and maintenance, education, and administrative expenditures) necessary to accomplish the activities of the Permittee's Individual SWMP. The analysis shall include the following:

1) **A Report of the Previous Reporting Period's Budget and a Budget for the Upcoming Reporting Period. To the Extent Possible, the Budgets should be Broken Down by the following Programs:**

   Expenditures identified below reflect costs incurred by the District for implementing its own NPDES Program and for implementing the Regional Watershed Program. The District does not track its direct implementation costs separately nor does it track costs separately for many permit provisions.

Program Element	Fiscal Year 2007-2008		Fiscal Year 2008-2009	
	Capital Expenditures	O&M/Admin Expenditure	Capital Expenditures	O&M/Admin Expenditure
Program Management	N/A	$362,539	N/A	$534,020
Annual Fee for MS4 NPDES Permit	N/A	0	N/A	$4,000
Implementation Agreement Shared Cost	N/A	N/A	N/A	N/A
Construction Inspections*	N/A	~$10,000	N/A	~$10,000
Development Planning*	N/A	N/A	N/A	N/A
Industrial and Commercial Inspections	N/A	N/A	N/A	N/A
Illicit Connections & Illegal Discharges Program	N/A	N/A	N/A	N/A
Municipal Facilities and Activities	N/A	N/A	N/A	N/A
Public Education & Outreach	N/A	$51,204	N/A	$66,030
Monitoring Program	N/A	$146,722	N/A	$152,600
Other	N/A	$0	N/A	$0
Contributions to Other Programs	N/A	$91,228	N/A	$96,330
Total	**N/A**	**$661,693**	**N/A**	**$862,890**

* Costs are not directly tracked for these Program Elements, however a brief description follows that identifies manpower requirements for those specific Program Elements

Construction Inspection – The District's Construction Inspectors are trained to address construction related NPDES issues associated with District administered construction projects

9. FISCAL ANALYSIS COMPONENT
CONTINUED

(storm drains, channels, levees, basins, etc.). They perform these inspections as part of their normal duties. The District's NPDES Section staff also has an individual assigned to review SWPPPs associated with District administered construction projects. The NPDES staff person also provides a training presentation on NPDES related construction issues at construction project pre-construction meetings for the benefit of the contractor. Costs for Construction Inspection permit obligations for the Santa Margarita Watershed are recovered from the District's ad-valorum tax revenues collected within the Santa Margarita Region of the County.

Development Planning – The District's Development Review staff are responsible for reviewing proposed development projects in the unincorporated Riverside County area for compliance with the SWMP, recommending conditions of approval relative to water quality/NPDES and reviewing preliminary Project-Specific WQMPs and associated plans within the unincorporated County. Costs incurred by the District's Development Review and Plan Check staff for Development Planning permit obligations are recovered via development review and plan check fees charged to the development proponent.

2) A Description of the Source(s) of Funds that were Utilized during the Previous Fiscal Year and the Source(s) of Funds Proposed to Meet the Necessary Expenditures for the Subsequent Year, including Legal Restrictions on the use of such Funds.

Source of Funds	Capital Expenditures	Percent of Total Program Funding	Restrictions on Use (if applicable)
Santa Margarita Watershed Benefit Assessment Fund	$410,267	51.5%	District NPDES compliance costs, excess funds used to fund regional NPDES activities.
Santa Margarita Watershed Permittee Implementation Agreement	$365,787.59	46%	Regional NPDES Compliance Programs.
Zone 7 Ad-Valorem Tax Revenue	~$10,000	1.25%	Costs associated with District's compliance with Municipal Construction component of Board Order R9-2004-001.
Developer Development Review/Plan Check Fees	Unknown	Unknown	Costs associated with review of proposed developments in the unincorporated County for compliance with the Development Planning provisions of Board Order R9-2004-001.
Spending Against Reserves	$0	0%	District NPDES Compliance Costs
Miscellaneous Revenue	~$10,000	1.25%	Interest, Other Misc.
TOTAL	**$796,094.59**	**100%**	

9. FISCAL ANALYSIS COMPONENT
CONTINUED

3) Additional Comments/Information:

The District is working with other stakeholder groups to leverage funds for regional planning objectives including:

Santa Ana Watershed Project Authority – Jointly fund a LID BMP testing and demonstration facility. This effort is described in Appendix G, Section G-7.1 of the Monitoring Annual Report.

Joint Permittee Efforts - Additional efforts to leverage funds are jointly being made with the SMR permittees. These efforts are described in Section H.11 of the Watershed Annual Report.

10. NON-STORM WATER DISCHARGES

Permittees shall report on any discharge category listed in Requirement B.2 of Order No. R9-2004-001 that was identified as a source of pollutants during the reporting period. For each identified category, the Permittee shall report whether it elected to prohibit the discharge or to require BMPs to reduce pollutants in the discharge to the MEP. If the discharge is not prohibited, the BMPs that will be implemented, or required to be implemented, shall be described in each Permittee's Individual SWMP Annual Report.

Category	Prohibited	BMP to be Implemented
Diverted stream flows	☐ Yes ☒ No	Not Applicable, no applications
Rising ground waters	☐ Yes ☒ No	Not Applicable, no applications
Uncontaminated ground water infiltration [as defined at 40CFR35.2005(20)] to MS4s	☐ Yes ☒ No	Not Applicable, no applications
Uncontaminated pumped ground water	☐ Yes ☒ No	Not Applicable, no applications
Foundation drains	☐ Yes ☒ No	Not Applicable, no applications
Springs	☐ Yes ☒ No	Not Applicable, no applications
Water from crawl space pumps	☐ Yes ☒ No	Not Applicable, no applications
Footing drains	☐ Yes ☒ No	Not Applicable, no applications
Air conditioning condensation	☐ Yes ☒ No	Not Applicable, no applications
Flows from riparian habitats and wetlands	☐ Yes ☒ No	Not Applicable, no applications
Water line flushing	☐ Yes ☒ No	Not Applicable, no applications
Landscape irrigation	☐ Yes ☒ No	Not Applicable, no applications
Discharges from potable water sources not subject to NPDES Permit No. CAG679001, other than water main breaks	☐ Yes ☒ No	Not Applicable, no applications
Irrigation water	☐ Yes ☒ No	Not Applicable, no applications
Lawn watering	☐ Yes ☒ No	Not Applicable, no applications
Individual residential car washing	☐ Yes ☒ No	Not Applicable, no applications
Non-emergency fire fighting flows	☐ Yes ☒ No	Not Applicable, no applications
Dechlorinated swimming pool discharges	☐ Yes ☒ No	Not Applicable, no applications

10. NON-STORM WATER DISCHARGES
CONTINUED

Additional Comments/Information:

The District requires a Third-Party Non-Stormwater Discharge Application to be completed for any encroachment involving a non-stormwater discharge into District facilities. The application requires the applicant to characterize the discharge, including a chemical analysis of the flow when possible. Where the discharges would contain contaminants exceeding receiving water standards, BMPs are required or the specific discharge would be prohibited. No evidence has been identified to date that would indicate that a specific class, or classes, of allowable non-stormwater discharges are persistent sources of pollution per Requirement B.2.

11. RECEIVING WATER LIMITATIONS

This section includes the report required pursuant to Requirement C.2.a. of Order No. R9-2004-001, if applicable.

Requirement C.2.a. states:

"Upon a determination by either a Permittee or the SDRWQCB that MS4 discharges are causing or contributing to an exceedance of an applicable water quality standard, the Permittee shall promptly notify and thereafter submit a report to the SDRWQCB that describes BMPs that are currently being implemented and additional BMPs that will be implemented to prevent or reduce any pollutants that are causing or contributing to the exceedance of water quality standards. The report may be incorporated in the SWMP Annual Report unless the SDRWQCB directs an earlier submittal. The report shall include an implementation schedule. The SDRWQCB may require modifications to the report."

Each reporting period, the District collects and reviews monitoring data as part of Appendix G of the Monitoring Annual Report. Based on the results of this monitoring data, pollutants of concern are identified and prioritized. Programs necessary to control these pollutants of concern are also identified in Appendix G and incorporated into the Permittees compliance programs.

12. ADDITIONAL URBAN RUNOFF DATA

This Section is a Summary of all Urban Runoff Related Data not included in the Annual Monitoring Report (e.g., special investigations).

The District did not collect any supplemental data that is not reported in the Annual Monitoring Report.

13. PROPOSED REVISIONS

This Section Includes Proposed Revisions to the Individual SWMP, Including Areas in Need of Improvement Based on the Assessment of Effectiveness of Each Program Component.

The District is currently reviewing the Individual SWMP for any needed updates to ensure that it remains a current and effective document.

Additional proposed revisions to the Individual SWMP are based on the effectiveness analyses for each of the components of this report and are summarized as follows:

13.1 Development Planning

Although the District does not individually have land use authority to regulate development, the District reviews New Development and Significant Redevelopment projects at the request of the County. The District continues to assist the County in the following efforts to improve the effectiveness of post-construction BMP selection and maintenance for its Development Planning Program:

- Create a long-term public maintenance mechanism for post-construction BMPs within the unincorporated County.
- Create a GIS-based tracking mechanism for post-construction BMPs within the unincorporated County. Work on this mechanism will begin in Fiscal Year 2008-2009.
- Develop additional post-construction BMP guidance to ensure the effectiveness and efficiency of post-construction BMPs.

The results of these efforts may require revisions to Section 6 of the District's Individual SWMP to reflect its updated role in this process.

13.2 Construction

The District will evaluate potential providers for training District Construction Inspectors for compliance with the General Construction Permit. This evaluation will happen in Fiscal Year 2008-2009 with anticipated implementation in 2009-2010 (or in conjunction with the roll-out of the new Construction General Permit). Once this additional training is developed, Section 10.0 of the Individual SWMP will be updated accordingly.

13.3 Municipal

- The District is working to develop a procedure to better address hazardous material clean-up and reporting related to illegal dumping and District operational activities. Development of a revised procedure was initiated this reporting period and the procedure is expected to be approved in the upcoming fiscal year. Section 4.2 of the Individual SWMP will be updated to reflect this change once the procedure has been finalized.
- District Maintenance Supervisors are now required to incorporate BMPs into major maintenance activities. These BMP plans identify the BMPs that are to be deployed as part of the maintenance action. Section 5.3 of the Individual SWMP will be updated to reflect this change.

13. PROPOSED REVISIONS

- The District is also going to review its pesticide application contracts (for its Municipal Facility in the Santa Ana Region) to ensure that the contracts require consideration and application (as appropriate) of IPM pest control methods. Once complete, Section 5.3 of the Individual SWMP will be updated as appropriate.

13.4 Education

The District will be providing additional training on the Construction General Permit for District Construction Inspectors as described in the section 13.2 above.

13.5 Illicit Connections / Illicit Discharges

The District is working to establish an electronic third-party discharge electronic reporting form and GIS layer that would allow staff to quickly research known third-party discharges to our system as part of complaint call responses. Work on the system was intiated and may take 1-2 years to complete. Once complete, this system will be documented in Section 4.1 of the Individual SWMP.

ATTACHMENT A

WQMP TRACKING REPORT

Riverside County Flood Control and Water Conservation District

Subdivision Cases Responded Date from 07/01/2007 to 06/30/2008

Case Number	Watershed	Response Date	WQMP	Status
CUP-03578	Santa Margarita	02/26/2008	NO	Approved
PM-30038	Santa Margarita	11/01/2007	NO	Approved
PM-30038	Santa Margarita	03/18/2008	NO	Approved
PM-30298	Santa Margarita	03/25/2008	NO	Approved
PM-31041	Santa Margarita	09/26/2007	NO	Approved
PM-32571	Santa Margarita	09/25/2007	NO	Approved
PM-32586	Santa Margarita	04/01/2008	NO	Approved
PM-32749	Santa Margarita	04/16/2008	NO	Approved
PM-32783	Santa Margarita	07/26/2007	NO	Approved
PM-32783	Santa Margarita	06/03/2008	NO	Approved
PM-32783	Santa Margarita	06/03/2008	NO	Approved
PM-33093	Santa Margarita	05/23/2008	NO	Approved
PM-33237	Santa Margarita	11/26/2007	NO	Approved
PM-33262	Santa Margarita	11/13/2007	NO	Approved
PM-33262	Santa Margarita	02/05/2008	NO	Approved
PM-33278	Santa Margarita	08/30/2007	NO	Approved
PM-33456	Santa Margarita	07/31/2007	NO	Approved
PM-33463	Santa Margarita	08/01/2007	NO	Approved
PM-33657	Santa Margarita	11/08/2007	NO	Approved
PM-33658	Santa Margarita	11/08/2007	NO	Approved
PM-33722	Santa Margarita	07/23/2007	NO	Approved
PM-33789	Santa Margarita	12/20/2007	NO	Approved
PM-33800	Santa Margarita	07/10/2007	NO	Approved
PM-33928	Santa Margarita	08/13/2007	NO	Approved
PM-34218	Santa Margarita	07/26/2007	NO	Approved
PM-34281	Santa Margarita	07/31/2007	NO	Approved
PM-34314	Santa Margarita	02/21/2008	NO	Approved
PM-34340	Santa Margarita	11/21/2007	NO	Approved
PM-34380	Santa Margarita	10/31/2007	NO	Approved
PM-34415	Santa Margarita	09/11/2007	NO	Approved
PM-34415	Santa Margarita	12/05/2007	NO	Approved
PM-34426	Santa Margarita	12/11/2007	NO	Approved
PM-34448	Santa Margarita	08/31/2007	NO	Approved
PM-34498	Santa Margarita	11/13/2007	NO	Approved
PM-34498	Santa Margarita	02/21/2008	NO	Approved
PM-34562	Santa Margarita	05/19/2008	NO	Approved
PM-34579	Santa Margarita	08/06/2007	NO	Approved
PM-34634	Santa Margarita	11/06/2007	NO	Approved
PM-34634	Santa Margarita	02/21/2008	NO	Approved
PM-34828	Santa Margarita	12/11/2007	NO	Approved
PM-34891	Santa Margarita	11/06/2007	NO	Approved
PM-35070	Santa Margarita	11/14/2007	NO	Approved
PM-35108	Santa Margarita	02/21/2008	NO	Approved
PM-35118	Santa Margarita	07/06/2007	NO	Approved
PM-35118	Santa Margarita	04/15/2008	NO	Approved
PM-35139	Santa Margarita	12/19/2007	NO	Approved
PM-35139	Santa Margarita	04/15/2008	NO	Approved
PM-35162	Santa Margarita	11/26/2007	NO	Approved
PM-35164	Santa Margarita	09/26/2007	NO	Approved
PM-35241	Santa Margarita	11/20/2007	NO	Approved
PM-35279	Santa Margarita	12/19/2007	NO	Approved
PM-35287	Santa Margarita	07/16/2007	NO	Approved
PM-35389	Santa Margarita	10/10/2007	NO	Approved
PM-35399	Santa Margarita	07/02/2007	NO	Approved
PM-35427	Santa Margarita	09/19/2007	NO	Approved
PM-35475	Santa Margarita	08/23/2007	NO	Approved
PM-35475	Santa Margarita	02/05/2008	NO	Approved

Riverside County Flood Control and Water Conservation District

Subdivision Cases Responded Date from 07/01/2007 to 06/30/2008

Case Number	Watershed	Response Date	WQMP	Status
PM-35539	Santa Margarita	12/21/2007	NO	Approved
PM-35545	Santa Margarita	11/14/2007	NO	Approved
PM-35545	Santa Margarita	04/22/2008	NO	Approved
PM-35548	Santa Margarita	01/18/2008	NO	Approved
PM-35561	Santa Margarita	07/25/2007	NO	Approved
PM-35565	Santa Margarita	08/01/2007	NO	Approved
PM-35584	Santa Margarita	11/28/2007	NO	Approved
PM-35596	Santa Margarita	04/21/2008	NO	Approved
PM-35656	Santa Margarita	09/17/2007	NO	Approved
PM-35783	Santa Margarita	04/23/2008	NO	Approved
PM-35829	Santa Margarita	04/22/2008	NO	Approved
PP-15820	Santa Margarita	02/04/2008	NO	Approved
PP-15820	Santa Margarita	02/01/2008	NO	Approved
PP-18776	Santa Margarita	07/12/2007	NO	Approved
PP-21447	Santa Margarita	07/11/2007	NO	Approved
PP-21447	Santa Margarita	07/11/2007	NO	Approved
PP-22217	Santa Margarita	10/23/2007	NO	Approved
PP-22271	Santa Margarita	07/10/2007	NO	Approved
PP-22575	Santa Margarita	07/16/2007	NO	Approved
PP-22650	Santa Margarita	09/20/2007	NO	Approved
PP-22650	Santa Margarita	10/15/2007	NO	Approved
PP-23201	Santa Margarita	02/21/2008	NO	Approved
PP-23239	Santa Margarita	02/07/2008	NO	Approved
PP-23279	Santa Margarita	03/06/2008	NO	Approved
PP-23285	Santa Margarita	04/30/2008	NO	Approved
PUP-00778	Santa Margarita	02/01/2008	NO	Approved
PUP-00778	Santa Margarita	02/01/2008	NO	Approved
TR-31444	Santa Margarita	09/11/2007	NO	Approved
TR-31444	Santa Margarita	11/09/2007	NO	Approved
TR-32778	Santa Margarita	06/16/2008	NO	Approved
TR-32778	Santa Margarita	06/16/2008	NO	Approved
TR-32896	Santa Margarita	06/10/2008	NO	Approved
TR-33254	Santa Margarita	06/02/2008	NO	Approved
TR-33840	Santa Margarita	11/06/2007	NO	Approved
TR-35664	Santa Margarita	08/27/2007	NO	Approved
TR-35664	Santa Margarita	11/06/2007	NO	Approved
PM-33789	Santa Margarita	08/01/2007	NO	Denied
PM-33789	Santa Margarita	08/01/2007	NO	Denied
PM-33911	Santa Margarita	06/30/2008	NO	Denied
PM-34452	Santa Margarita	01/15/2008	NO	Denied
PM-34562	Santa Margarita	09/25/2007	NO	Denied
PM-35096	Santa Margarita	10/16/2007	NO	Denied
PM-35096	Santa Margarita	10/16/2007	NO	Denied
PM-35219	Santa Margarita	09/17/2007	NO	Denied
PM-35548	Santa Margarita	07/12/2007	NO	Denied
PM-35656	Santa Margarita	05/09/2008	NO	Denied
PM-35923	Santa Margarita	03/19/2008	NO	Denied
PP-21603	Santa Margarita	06/09/2008	NO	Denied
PP-22650	Santa Margarita	08/10/2007	NO	Denied
PP-22940	Santa Margarita	02/15/2008	NO	Denied
PP-22940	Santa Margarita	02/15/2008	NO	Denied
TR-30284	Santa Margarita	01/30/2008	NO	Denied
TR-31813	Santa Margarita	11/26/2007	NO	Denied
TR-31813	Santa Margarita	11/26/2007	NO	Denied
TR-31813	Santa Margarita	11/26/2007	NO	Denied
TR-32035	Santa Margarita	06/06/2008	NO	Denied
TR-32035	Santa Margarita	06/06/2008	NO	Denied
TR-32323	Santa Margarita	09/25/2007	NO	Denied

Riverside County Flood Control and Water Conservation District

Subdivision Cases Responded Date from 07/01/2007 to 06/30/2008

Case Number	Watershed	Response Date	WQMP	Status
TR-33254	Santa Margarita	07/13/2007	NO	Denied
TR-34150	Santa Margarita	11/01/2007	NO	Denied
TR-35328	Santa Margarita	07/03/2007	NO	Denied
TR-35328	Santa Margarita	07/03/2007	NO	Denied
TR-35876	Santa Margarita	02/06/2008	NO	Denied
PM-32571	Santa Margarita	03/18/2008	NO	No Route
PM-33262	Santa Margarita	04/25/2008	NO	No Route
PM-33278	Santa Margarita	05/23/2008	NO	No Route
PM-33473	Santa Margarita	08/30/2007	NO	No Route
PM-33789	Santa Margarita	03/18/2008	NO	No Route
PM-35070	Santa Margarita	04/29/2008	NO	No Route
PP-15820	Santa Margarita	06/03/2008	NO	No Route
PP-20757	Santa Margarita	06/30/2008	NO	No Route
PP-23239	Santa Margarita	06/24/2008	NO	No Route
PP-21893	Santa Margarita	07/17/2007	NO	Pass
PP-22271	Santa Margarita	07/17/2007	NO	Pass
TR-30284	Santa Margarita	01/30/2008	NO	Pass
TR-30284	Santa Margarita	01/30/2008	NO	Pass
TR-31895	Santa Margarita	10/05/2007	NO	Pass
TR-33840	Santa Margarita	11/06/2007	NO	Pass
TR-33840	Santa Margarita	11/06/2007	NO	Pass
CUP-03467	Santa Margarita	09/25/2007	YES	Approved
CUP-03504	Santa Margarita	02/27/2008	YES	Approved
CUP-03545	Santa Margarita	10/10/2007	YES	Approved
PM-30513	Santa Margarita	08/17/2007	YES	Approved
PM-32094	Santa Margarita	01/16/2008	YES	Approved
PM-33346	Santa Margarita	12/12/2007	YES	Approved
PM-33456	Santa Margarita	01/08/2008	YES	Approved
PM-33691	Santa Margarita	12/21/2007	YES	Approved
PM-33967	Santa Margarita	01/09/2008	YES	Approved
PM-34218	Santa Margarita	02/07/2008	YES	Approved
PM-35219	Santa Margarita	11/14/2007	YES	Approved
PM-35219	Santa Margarita	11/14/2007	YES	Approved
PM-35220	Santa Margarita	03/13/2008	YES	Approved
PM-35518	Santa Margarita	11/15/2007	YES	Approved
PP-21591	Santa Margarita	08/30/2007	YES	Approved
PP-21893	Santa Margarita	09/20/2007	YES	Approved
PP-22249	Santa Margarita	03/03/2008	YES	Approved
PP-22263	Santa Margarita	07/20/2007	YES	Approved
PP-22263	Santa Margarita	07/20/2007	YES	Approved
PP-22352	Santa Margarita	11/15/2007	YES	Approved
PP-22372	Santa Margarita	11/19/2007	YES	Approved
PP-22461	Santa Margarita	11/14/2007	YES	Approved
PP-22461	Santa Margarita	11/14/2007	YES	Approved
PP-22493	Santa Margarita	03/25/2008	YES	Approved
PP-22493	Santa Margarita	03/25/2008	YES	Approved
PP-22698	Santa Margarita	11/26/2007	YES	Approved
PP-22698	Santa Margarita	11/26/2007	YES	Approved
PP-23188	Santa Margarita	05/02/2008	YES	Approved
PP-23188	Santa Margarita	05/02/2008	YES	Approved
PP-23318	Santa Margarita	04/11/2008	YES	Approved
PP-23318	Santa Margarita	04/11/2008	YES	Approved
PP-23318	Santa Margarita	04/11/2008	YES	Approved
PP-23319	Santa Margarita	04/14/2008	YES	Approved
PP-23319	Santa Margarita	04/14/2008	YES	Approved
PP-23320	Santa Margarita	04/24/2008	YES	Approved
PP-23320	Santa Margarita	04/24/2008	YES	Approved
TR-29010	Santa Margarita	06/28/2008	YES	Approved

Riverside County Flood Control and Water Conservation District

Subdivision Cases Responded Date from 07/01/2007 to 06/30/2008

Case Number	Watershed	Response Date	WQMP	Status
TR-30284	Santa Margarita	05/15/2008	YES	Approved
TR-31314	Santa Margarita	10/22/2007	YES	Approved
TR-31314	Santa Margarita	10/22/2007	YES	Approved
TR-32227	Santa Margarita	04/28/2008	YES	Approved
TR-32227	Santa Margarita	04/28/2008	YES	Approved
TR-32627	Santa Margarita	08/27/2007	YES	Approved
TR-32813	Santa Margarita	01/10/2008	YES	Approved
TR-32813	Santa Margarita	01/10/2008	YES	Approved
TR-33987	Santa Margarita	04/24/2008	YES	Approved
TR-33987	Santa Margarita	04/24/2008	YES	Approved
TR-33987	Santa Margarita	04/24/2008	YES	Approved
CUP-03504	Santa Margarita	11/15/2007	YES	Denied
CUP-03504	Santa Margarita	11/15/2007	YES	Denied
CUP-03504	Santa Margarita	01/10/2008	YES	Denied
CUP-03504	Santa Margarita	01/10/2008	YES	Denied
CUP-03545	Santa Margarita	10/10/2007	YES	Denied
CUP-03545	Santa Margarita	10/10/2007	YES	Denied
CUP-03545	Santa Margarita	02/13/2008	YES	Denied
CUP-03556	Santa Margarita	08/01/2007	YES	Denied
CUP-03556	Santa Margarita	08/01/2007	YES	Denied
CUP-03556	Santa Margarita	03/08/2008	YES	Denied
CUP-03572	Santa Margarita	02/25/2008	YES	Denied
PM-29509	Santa Margarita	12/10/2007	YES	Denied
PM-30790	Santa Margarita	05/19/2008	YES	Denied
PM-30790	Santa Margarita	05/19/2008	YES	Denied
PM-30790	Santa Margarita	05/19/2008	YES	Denied
PM-33655	Santa Margarita	02/28/2008	YES	Denied
PM-33691	Santa Margarita	10/18/2007	YES	Denied
PM-33691	Santa Margarita	10/18/2007	YES	Denied
PM-33691	Santa Margarita	10/18/2007	YES	Denied
PM-33817	Santa Margarita	10/11/2007	YES	Denied
PM-34452	Santa Margarita	01/15/2008	YES	Denied
PM-34452	Santa Margarita	01/15/2008	YES	Denied
PM-34452	Santa Margarita	06/09/2008	YES	Denied
PM-34452	Santa Margarita	06/09/2008	YES	Denied
PM-34452	Santa Margarita	06/09/2008	YES	Denied
PM-35096	Santa Margarita	10/16/2007	YES	Denied
PP-12246	Santa Margarita	11/28/2007	YES	Denied
PP-19998	Santa Margarita	05/20/2008	YES	Denied
PP-19998	Santa Margarita	05/20/2008	YES	Denied
PP-19998	Santa Margarita	05/20/2008	YES	Denied
PP-19998	Santa Margarita	05/20/2008	YES	Denied
PP-20375	Santa Margarita	12/03/2007	YES	Denied
PP-20375	Santa Margarita	12/03/2007	YES	Denied
PP-20443	Santa Margarita	02/28/2008	YES	Denied
PP-20574	Santa Margarita	06/02/2008	YES	Denied
PP-20757	Santa Margarita	06/30/2008	YES	Denied
PP-21163	Santa Margarita	10/18/2007	YES	Denied
PP-21163	Santa Margarita	10/18/2007	YES	Denied
PP-21163	Santa Margarita	10/18/2007	YES	Denied
PP-21375	Santa Margarita	12/06/2007	YES	Denied
PP-21375	Santa Margarita	12/06/2007	YES	Denied
PP-21603	Santa Margarita	01/15/2008	YES	Denied
PP-22176	Santa Margarita	12/11/2007	YES	Denied
PP-22256	Santa Margarita	10/16/2007	YES	Denied
PP-22256	Santa Margarita	10/16/2007	YES	Denied
PP-22256	Santa Margarita	10/16/2007	YES	Denied
PP-22461	Santa Margarita	09/17/2007	YES	Denied

Riverside County Flood Control and Water Conservation District

Subdivision Cases Responded Date from 07/01/2007 to 06/30/2008

Case Number	Watershed	Response Date	WQMP	Status
PP-22493	Santa Margarita	01/09/2008	YES	Denied
PP-22763	Santa Margarita	07/16/2007	YES	Denied
PP-22763	Santa Margarita	03/04/2008	YES	Denied
PP-22763	Santa Margarita	03/04/2008	YES	Denied
PP-22940	Santa Margarita	09/14/2007	YES	Denied
PP-22940	Santa Margarita	09/14/2007	YES	Denied
PP-22940	Santa Margarita	09/14/2007	YES	Denied
PP-22940	Santa Margarita	02/15/2008	YES	Denied
PP-23146	Santa Margarita	12/13/2007	YES	Denied
PP-23165	Santa Margarita	01/09/2008	YES	Denied
PP-23188	Santa Margarita	01/04/2008	YES	Denied
PP-23188	Santa Margarita	01/04/2008	YES	Denied
PP-23188	Santa Margarita	03/21/2008	YES	Denied
PP-23215	Santa Margarita	01/30/2008	YES	Denied
PP-23285	Santa Margarita	03/06/2008	YES	Denied
PP-23289	Santa Margarita	03/19/2008	YES	Denied
PP-23289	Santa Margarita	03/19/2008	YES	Denied
PP-23289	Santa Margarita	03/19/2008	YES	Denied
PP-23289	Santa Margarita	05/23/2008	YES	Denied
PP-23326	Santa Margarita	04/22/2008	YES	Denied
PP-23343	Santa Margarita	06/11/2008	YES	Denied
PP-23343	Santa Margarita	06/11/2008	YES	Denied
PP-23376	Santa Margarita	06/02/2008	YES	Denied
PP-23385	Santa Margarita	05/19/2008	YES	Denied
PP-23398	Santa Margarita	06/02/2008	YES	Denied
PP-23398	Santa Margarita	06/02/2008	YES	Denied
PP-23404	Santa Margarita	05/19/2008	YES	Denied
PP-23404	Santa Margarita	05/19/2008	YES	Denied
PP-23404	Santa Margarita	05/19/2008	YES	Denied
PUP-00895	Santa Margarita	06/20/2008	YES	Denied
SMP-00213	Santa Margarita	09/04/2007	YES	Denied
TR-30284	Santa Margarita	10/24/2007	YES	Denied
TR-31667	Santa Margarita	11/14/2007	YES	Denied
TR-32901	Santa Margarita	11/01/2007	YES	Denied
TR-32901	Santa Margarita	11/01/2007	YES	Denied
TR-32988	Santa Margarita	02/15/2008	YES	Denied
TR-33356	Santa Margarita	10/24/2007	YES	Denied
TR-33356	Santa Margarita	10/24/2007	YES	Denied
TR-33987	Santa Margarita	01/08/2008	YES	Denied
TR-33987	Santa Margarita	01/08/2008	YES	Denied
TR-33987	Santa Margarita	01/08/2008	YES	Denied
TR-35161	Santa Margarita	04/25/2008	YES	Denied
TR-35161	Santa Margarita	04/25/2008	YES	Denied
TR-35161	Santa Margarita	04/25/2008	YES	Denied
TR-35924	Santa Margarita	06/11/2008	YES	Denied
TR-35924	Santa Margarita	06/11/2008	YES	Denied
TR-35924	Santa Margarita	06/11/2008	YES	Denied
CUP-03572	Santa Margarita	02/25/2008	YES	Pass
CUP-03572	Santa Margarita	02/25/2008	YES	Pass
PP-20574	Santa Margarita	06/02/2008	YES	Pass
PP-20574	Santa Margarita	06/02/2008	YES	Pass

ATTACHMENT B

WQMP EXAMPLE CONDITIONS

0002357

Project Specific
Water Quality Management Plan

For: **GMX Construction Inc.'s**

Mission Hills Wildomar, LP

DEVELOPMENT NO.	**TRACT 31993**
DESIGN REVIEW NO.	**IP 070027**
PARCEL NO.	**368-030-007, 055 & 056**

RECEIVED
JUN 16 2008
RIVERSIDE COUNTY FLOOD CONTROL
AND WATER CONSERVATION DISTRICT
DEVELOPMENT REVIEW/PLAN CHECK

Prepared for:
Mission Hills Wildomar
15335 Morrison Street, Suite 305
Sherman Oaks, CA 91403
Telephone: (818) 784-8877

Prepared by:
Gary Missirian, RCE
GMX Construction, Inc.
15335 Morrison Street, Suite 305
Sherman Oaks, CA 91403
Telephone: (818) 784-8877

REGISTERED PROFESSIONAL ENGINEER
GARO MISSIRIAN
No. 42608
Exp. 3/31/08
CIVIL
STATE OF CALIFORNIA

WQMP Preparation/Revision Date: January 11, 2008

OWNER'S CERTIFICATION

This project-specific Water Quality Management Plan (WQMP) has been prepared for:

Mission Hills Wildomar, LP

by GMX Construction Inc. for the project known as **Mission Hills** at **the southeast corner of Mission Trail and Como Street in the community of Wildomar, Riverside County.**

This WQMP is intended to comply with the requirements of Riverside County for **MISSION HILLS**, which includes the requirement for the preparation and implementation of a project-specific WQMP.

The undersigned, while owning the property/project described in the preceding paragraph, shall be responsible for the implementation of this WQMP and will ensure that this WQMP is amended as appropriate to reflect up-to-date conditions on the site. This WQMP will be reviewed with the facility operator, facility supervisors, employees, tenants, maintenance and service contractors, or any other party (or parties) having responsibility for implementing portions of this WQMP. At least one copy of this WQMP will be maintained at the project site or project office in perpetuity.

The undersigned is authorized to certify and to approve implementation of this WQMP. The undersigned is aware that implementation of this WQMP is enforceable under Riverside County Water Quality Ordinance.

If the undersigned transfers its interest in the subject property/project, its successor in interest the undersigned shall notify the successor in interest of its responsibility to implement this WQMP.

"I, the undersigned, certify under penalty of law that the provisions of this WQMP have been reviewed and accepted and that the WQMP will be transferred to future successors in interest."

Owner's Signature	JAN. 11, 2008 Date
GARY MISSIRIAN Owner's Printed Name	GEN. PARTNER Owner's Title/Position

Southeast corner of Mission Trail and Como Street
Wildomar, CA 92595
(818) 784-8877

REGISTERED PROFESSIONAL ENGINEER
GARO MISSIRIAN
No. 42608
Exp. 3/31/08
CIVIL
STATE OF CALIFORNIA

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APPENDICES

A. CONDITIONS OF APPROVAL

B. VICINITY MAP, WQMP SITE PLAN, AND RECEIVING WATERS MAP

C. SUPPORTING DETAIL RELATED TO HYDRAULIC CONDITIONS OF CONCERN (IF APPLICABLE)

D. EDUCATIONAL MATERIALS

E. SOILS REPORT (IF APPLICABLE)

F. TREATMENT CONTROL BMP SIZING CALCULATIONS AND DESIGN DETAILS

G. AGREEMENTS – CC&RS, COVENANT AND AGREEMENTS AND/OR OTHER MECHANISMS FOR ENSURING ONGOING OPERATION, MAINTENANCE, FUNDING AND TRANSFER OF REQUIREMENTS FOR THIS PROJECT-SPECIFIC WQMP

H. PHASE 1 ENVIRONMENTAL SITE ASSESSMENT – SUMMARY OF SITE REMEDIATION CONDUCTED AND USE RESTRICTIONS

I. Project Description

Mission Hills Wildomar is a 25-lot subdivision located at the southeastern corner of Mission Trail and Como Street in Wildomar. The area is south of Lake Elsinore and west of the I-15 freeway. Tentative Tract #31993 and Zone Change #6902 are approved for 25 single-family homes and one detention basin. Lot sizes vary from 15,000 SF to 21,000 SF. Suggested house sizes are about 3,000 SF. Currently the property is undeveloped land. There are existing tracts to the north east of the property. There are commercial buildings to the west and single-family houses to the south.

Gross area of the property is 13 acres. Net area of development is 12 acres.

Location of facilities:

Utilities are available on Mission Trail and on Como Street. Storm water on Como and Cashew streets are collected into existing catch basins on Cashew Street and are discharged into a culvert, which crosses Mission Trail. Surface runoff at Mission Trail and Como streets flow north and are intercepted by a curb inlet on Mission Trail which discharges into the same culvert.

Activities and location of activities:

The site will be grubbed, cleared and graded to create 25 building pads followed by installation of underground utilities and curbs and gutters. Erosion control plan has been submitted and approved. Access to the site shall be through existing and paved Como Street, no access will be allowed on Mission Trail. Temporary utilities will be provided from Como Street. There will be a temporary chain link fence surrounding the project site.

Materials Storage and Delivery Areas:

Material storage will be located on the east side of the project along Como Street. Entrance to the site will be through stabilized rock base aggregate to minimize tracking of mud unto paved street. Streets will be swept frequently and prior to rain to abate discharge of any sediment.

Wastes generated by project activities:

Wastes generated by the project during construction will include wood, dried and wet concrete, packaging material and other left over construction debris. A temporary concrete washout will be located near the storage area for concrete trucks to rinse residual concrete wastes. Any maintenance of vehicles or machinery will take place next to the storage area whereby the ground will be covered with a heavy gauge tarpaulin liner and the area will be bermed to control any discharge of pollutants into the storm drains. Overall waste will be minimized and will be properly handled to prevent any accidental discharge or disposal into storm drain or water courses.

Project Owner: **Mission Hills Wildomar, LP**
15335 Morrison Street, Suite 305
Sherman Oaks, CA 91403
Telephone: (818) 784-8877

WQMP Preparer: **Gary Missirian, RCE**
GMX Construction, Inc.
15335 Morrison Street, Suite 305
Sherman Oaks, CA 91403
Telephone: (818) 784-8877

Project Site Address: Southeast corner of Mission Trail and Como Street in the community of Wildomar, Riverside County, California.

Planning Area/ Lake Elsinore Planning Area
Community Name/ Wildomar
Development Name: Mission Hills

APN Number(s): 368-030-007
368-030-055
368-030-056

Thomas Bros. Map: Page 897, Grid A-5

Project Watershed: Santa Ana

Sub-watershed: Lake Elsinore

Project Site Size: 12.1 acres

Standard Industrial Classification (SIC) Code: N/A

Formation of Home Owners' Association (HOA) or Property Owners Association (POA):

Y ☒ N ☐

Additional Permits/Approvals required for the Project

AGENCY	Permit required
State Department of Fish and Game, 1601 Streambed Alteration Agreement	Y ☐ N☒
State Water Resources Control Board, Clean Water Act (CWA) section 401 Water Quality Certification	Y ☐ N☒
US Army Corps of Engineers, CWA section 404 permit	Y ☐ N☒
US Fish and Wildlife, Endangered Species Act section 7 biological opinion	Y ☐ N☒
Other *(please list in the space below as required)*	None Applicable

Appendix A of this project-specific WQMP includes a complete copy of the final Conditions of Approval.

Appendix B of this project-specific WQMP shall include:

1. A Vicinity Map identifying the project site and surrounding planning areas in sufficient detail to allow the project site to be plotted on Co-Permittee base mapping; and
2. A Site Plan for the project. The Site Plan included as part of Appendix B depicts the following project features:

Location and identification of all structural BMPs, including Treatment Control BMPs.

Landscaped areas.

Paved areas and intended uses (i.e., parking, outdoor work area, outdoor material storage area, sidewalks, patios, tennis courts, etc.).

Number and type of structures and intended uses (i.e., buildings, tenant spaces, dwelling units, community facilities such as pools, recreation facilities, tot lots, etc.).

Infrastructure (i.e., streets, storm drains, etc.) that will revert to public agency ownership and operation.

Location of existing and proposed public and private storm drainage facilities (i.e., storm drains, channels, basins, etc.), including catch basins and other inlets/outlet structures. Existing and proposed drainage facilities should be clearly differentiated.

Location(s) of Receiving Waters to which the project directly or indirectly discharges.

Location of points where onsite (or tributary offsite) flows exit the property/project site.

Proposed drainage areas boundaries, including tributary offsite areas, for each location where flows exits the property/project site. Each tributary area should be clearly denoted.

Pre- and post-project topography.

Appendix G of this project-specific WQMP shall include copies of CC&Rs, Covenant and Agreements, and/or other mechanisms used to ensure the ongoing operation, maintenance, funding, transfer and implementation of the project-specific WQMP requirements.

II. Site Characterization

Land Use Designation or Zoning: Low Density Residential

Current Property Use: Undeveloped – Vacant Land

Proposed Property Use: Residential Tract

Availability of Soils Report: Y ☒ N ☐ *Note: A soils report is required if infiltration BMPs are utilized. Attach report in Appendix E.*

Phase 1 Site Assessment: Y ☐ N ☒ *Note: If prepared, attached remediation summary and use restrictions in Appendix H.*

Receiving Waters for Urban Runoff from Site

Receiving Waters	303(d) List Impairments	Designated Beneficial Uses	Proximity to RARE Beneficial Use
Lake Elsinore HU#802.31	Nutrients, Organics, Low Dissolved Oxygen, Sedimentation/Siltation, Unknown Toxicity	MUN, Rec 1, Rec 2, Warm, Wild	None

III. Pollutants of Concern

Potential pollutants associated with Urban Runoff from the proposed project must be identified. Exhibit B of the WQMP provides brief descriptions of typical pollutants associated with Urban Runoff and a table that associates typical potential pollutants with types of development (land use). It should be noted that at the Co-Permittees discretion, the Co-Permittees may also accept updated studies from the California Association of Stormwater Quality Agencies (CASQA), USEPA, SWRCB and/or other commonly accepted agencies/associations acceptable to the Co-Permittee for determination of Pollutants of Concern associated with given land use. Additionally, in identifying Pollutants of Concern, the presence of legacy pesticides, nutrients, or hazardous substances in the site's soils as a result of past uses and their potential for exposure to Urban Runoff must be addressed in project-specific WQMPs. The Co-Permittee may also require specific pollutants commonly associated with urban runoff to be addressed based on known problems in the watershed. The list of potential Urban Runoff pollutants identified for the project must be compared with the pollutants identified as causing an impairment of Receiving Waters, if any. To identify pollutants impairing proximate Receiving Waters, each project proponent preparing a project-specific WQMP shall, at a minimum, do the following:

1. For each of the proposed project discharge points, identify the proximate Receiving Water for each discharge point, using hydrologic unit basin numbers as identified in the most recent version of the Water Quality Control Plan for the Santa Ana River Basin or the San Diego Region.

   Lake Elsinore, Hydrologic Unit Basin Number 802.31

2. Identify each proximate identified above that is listed on the most recent list of Clean Water Act Section 303(d) list of impaired water bodies, which can be found at website www.swrcb.ca.gov/tmdl/303d_lists.html. List all pollutants for which the proximate Receiving Waters are impaired.

   Nutrients, Organics, Low Dissolved Oxygen, Sedimentation/Siltation, Unknown Toxicity

3. Compare the list of pollutants for which the proximate Receiving Waters are impaired with the pollutants expected to be generated by the project.

   Nutrients may be produced through fertilization when landscaping is installed. Pathogens could be present on site during construction due to on site port-o-potties or feral animals present before construction. Hydrocarbons from paved areas may be washed out in post development condition.

Urban Runoff Pollutants:

Pathogens – Pathogens (bacteria and viruses) are ubiquitous microorganisms that thrive under certain environmental conditions. Their proliferation is typically caused by the transport of animal or human fecal wastes from the watershed. Water, containing excessive bacteria and viruses can alter the aquatic habitat and create a harmful environment for human and aquatic life. Also, the decomposition of excess organic waste causes increased growth of undesirable organisms in the water.

Metals - The primary source of metal pollution in Urban Runoff is typically commercially available metals and metal products. Metals of concern include cadmium, chromium, copper, lead, mercury, and zinc. Lead and chromium have been used as corrosion inhibitors in primer coatings and cooling tower systems. Metals are also raw material components in non-metal products such as fuels, adhesives, paints, and other coatings. At low concentrations naturally occurring soil, metals may not be toxic. However, at higher concentrations, certain metals can be toxic to aquatic life. Humans can be impacted from contaminated groundwater resources, and bioaccumulation of metals in fish and shellfish. Environmental concerns, regarding the potential for release of metals to the environment, have already led to restricted metal usage in certain applications.

Nutrients - Nutrients are inorganic substances, such as nitrogen and phosphorus. They commonly exist in the form of mineral salts that are either dissolved or suspended in water. Primary sources of nutrients in Urban Runoff are fertilizers and eroded soils. Excessive discharge of nutrients to water bodies and streams can cause excessive aquatic algae and plant growth. Such excessive production, referred to as cultural eutrophication, may lead to excessive decay of organic matter in the water body, loss of oxygen in the water, release of toxins in sediment, and the eventual death of aquatic organisms.

Pesticides - Pesticides (including herbicides) are chemical compounds commonly used to control nuisance growth or prevalence of organisms. Excessive or improper application of a pesticide may result in runoff containing toxic levels of its active ingredient.

Organic Compounds – Organic compounds are carbon-based. Commercially available or naturally occurring organic compounds are found in pesticides, solvents, and hydrocarbons. Organic compounds can, at certain concentrations, indirectly or directly constitute a hazard to life or health. When rinsing off objects, toxic levels of solvents and cleaning compounds can be discharged to the MS4. Dirt, grease, and grime retained in the cleaning fluid or rinse water may also absorb levels of organic compounds that are harmful or hazardous to aquatic life.

Sediments - Sediments are soils or other surficial materials eroded and then transported or deposited by the action of wind, water, ice, or gravity. Sediments can increase turbidity, clog fish gills, reduce spawning habitat, lower young aquatic organisms survival rates, smoother bottom dwelling organisms, and suppress aquatic vegetation growth.

Trash and Debris – Trash (such as paper, plastic, polystyrene packing foam, and aluminum materials) and biodegradable organic matter (such as leaves, grass cuttings, and food waste) are general waste products on the landscape. The presence of trash and debris may have a significant impact on the recreational value of a water body and aquatic habitat. Excess organic matter can create a high biochemical oxygen demand in a stream and thereby lower its water quality. In addition, in areas where stagnant water exists, the presence of excess organic matter can promote septic conditions resulting in the growth of undesirable organisms and the release of odorous and hazardous compounds such as hydrogen sulfide.

Oxygen-Demanding Substances – This category includes biodegradable organic material as well as chemicals that react with dissolved oxygen in water to form other compounds. Proteins, carbohydrates, and fats are examples of biodegradable organic compounds. Compounds such as ammonia and hydrogen sulfide are examples of oxygen-demanding compounds. The oxygen demand of a substance can lead to depletion of dissolved oxygen in a water body and possibly the development of septic conditions.

Oil and Grease – Oil and grease are characterized as high-molecular weight organic compounds. Primary Sources of oil and grease are petroleum hydrocarbon products, motor products from leaking vehicles, esters, oils, fats, waxes, and high molecular-weight fatty acids. Introduction of the pollutants to the water bodies are very possible due to the wide uses and applications of some of these products in municipal, residential, commercial, industrial, and construction areas. Elevated oil and grease content can decrease the aesthetic value of the water body, as well as the water quality.

IV. Hydrologic Conditions of Concern

Impacts to the hydrologic regime resulting from the Project may include increased runoff volume and velocity; reduced infiltration; increased flow frequency, duration, and peaks; faster time to reach peak flow; and water quality degradation. Under certain circumstances, changes could also result in the reduction in the amount of available sediment for transport; storm flows could fill this sediment-carrying capacity by eroding the downstream channel. These changes have the potential to permanently impact downstream channels and habitat integrity. A change to the hydrologic regime of a Project's site would be considered a hydrologic condition of concern if the change would have a significant impact on downstream erosion compared to the pre-development condition or have significant impacts on stream habitat, alone or as part of a cumulative impact from development in the watershed.

This project-specific WQMP must address the issue of Hydrologic Conditions of Concern unless one of the following conditions are met:

Condition A: Runoff from the Project is discharged directly to a publicly-owned, operated and maintained MS4; the discharge is in full compliance with Co-Permittee requirements for connections and discharges to the MS4 (including both quality and quantity requirements); the discharge would not significantly impact stream habitat in proximate Receiving Waters; and the discharge is authorized by the Co-Permittee.

Condition B: The project disturbs less than 1 acre. The disturbed area calculation should include all disturbances associated with larger plans of development.

Condition C: The project's runoff flow rate, volume, velocity and duration for the post development condition do not exceed the predevelopment condition for the 2 year, 24 hour and 10 year 24 hour rainfall events. This condition can be achieved by minimizing impervious area on a site and incorporating other site design concepts that mimic predevelopment conditions. This condition must be substantiated by hydrologic modeling methods acceptable to the Co-Permittee.

This Project meets the following condition: CONDITION A & C OF THE RIVERSIDE COUNTY WQMP FOR ADDITIONAL REQUIREMENTS.

Supporting engineering studies, calculations, and reports are included in Appendix C.

	2 year – 24 hour		10 year – 24 hour	
	Precondition	**Post-condition**	**Precondition**	**Post-condition**
Discharge (cfs)	0.45	3.15	5.87	7.74
Velocity (fps)	0.034	0.241	0.448	0.590
Volume (cubic feet)	12839	67082	78284	165964
Duration (minutes)	5	5	5	5

V. Best Management Practices

V.1 SITE DESIGN BMPS

Project proponents shall implement Site Design concepts that achieve each of the following:

1) Minimize Urban Runoff
2) Minimize Impervious Footprint
3) Conserve Natural Areas
4) Minimize Directly Connected Impervious Areas (DCIAs)

The project proponent should identify the specific BMPs implemented to achieve each Site Design concept and provide a brief explanation for those Site Design concepts considered not applicable.

A Detention Basin is provided which will retain Q10 and will let Q100 pass. The Basin will be landscaped with native vegetation the upkeep and maintenance of the Basin will be the responsibility of the Home Owners Association, which is formed for this purpose. During dry periods the Basin can be used for recreational purposes.

Table 1. Site Design BMPs

Design Concept	Technique	Specific BMP	Included		
			Yes	No	N/A
Site Design Concept 1	*Minimize Urban Runoff*	Maximize the permeable area (See Section 4.5.1 of the WQMP).	☐	☒	☐
		Incorporate landscaped buffer areas between sidewalks and streets.	☒	☐	☐
		Maximize canopy interception and water conservation by preserving existing native trees and shrubs, and planting additional native or drought tolerant trees and large shrubs.	☒	☐	☐
		Use natural drainage systems.	☒	☐	☐
		Where soils conditions are suitable, use perforated pipe or gravel filtration pits for low flow infiltration.	☐	☒	☐
		Construct onsite ponding areas or retention facilities to increase opportunities for infiltration consistent with vector control objectives.	☒	☐	☐
		Other comparable and equally effective site design concepts as approved by the Co-Permittee (Note: Additional narrative required to describe BMP and how it addresses Site Design concept).	☐	☒	☐

Table 1. Site Design BMPs (Cont.)

Design Concept	Technique	Specific BMP	Included: Yes	Included: No	Included: N/A
Site Design Concept 2	*Minimize Impervious Footprint*	Maximize the permeable area (See Section 4.5.1 of the WQMP).	☒	☐	☐
		Construct walkways, trails, patios, overflow parking lots, alleys, driveways, low-traffic streets and other low -traffic areas with open-jointed paving materials or permeable surfaces, such as pervious concrete, porous asphalt, unit pavers, and granular materials.	☒	☐	☐
		Construct streets, sidewalks and parking lot aisles to the minimum widths necessary, provided that public safety and a walk able environment for pedestrians are not compromised.	☒	☐	☐
		Reduce widths of street where off-street parking is available.	☒	☐	☐
		Minimize the use of impervious surfaces, such as decorative concrete, in the landscape design.	☒	☐	☐
Site Design Concept 3	*Conserve Natural Areas*	Other comparable and equally effective site design concepts as approved by the Co-Permittee (Note: Additional narrative required describing BMP and how it addresses Site Design concept).	☐	☒	☐
		Conserve natural areas (See WQMP Section 4.5.1).	☐	☒	☐
		Maximize canopy interception and water conservation by preserving existing native trees and shrubs, and planting additional native or drought tolerant trees and large shrubs.	☒	☐	☐
		Use natural drainage systems.	☒	☐	☐
		Other comparable and equally effective site design concepts as approved by the Co-Permittee (Note: Additional narrative required describing BMP and how it addresses Site Design concept).	☐	☒	☐

Table 1. Site Design BMPs (Cont.)

Design Concept	Technique	Specific BMP	Included: Yes	Included: No	Included: N/A
Site Design Concept 4	*Minimize Directly Connected Impervious Areas (DCIAs)*	Residential and commercial sites must be designed to contain and infiltrate roof runoff, or direct roof runoff to vegetative swales or buffer areas, where feasible.	☒	☐	☐
		Where landscaping is proposed, drain impervious sidewalks, walkways, trails, and patios into adjacent landscaping.	☒	☐	☐
		Increase the use of vegetated drainage swales in lieu of underground piping or imperviously lined swales.	☒	☐	☐
		Rural swale system: street sheet flows to vegetated swale or gravel shoulder, curbs at street corners, culverts under driveways and street crossings.	☐	☒	☐
		Urban curb/swale system: street slopes to curb; periodic swale inlets drain to vegetated swale/biofilter.	☐	☒	☐
		Dual drainage system: First flush captured in street catch basins and discharged to adjacent vegetated swale or gravel shoulder, high flows connect directly to MS4s.	☐	☒	☐
		Design driveways with shared access, flared (single lane at street) or wheel strips (paving only under tires); or, drain into landscaping prior to discharging to the MS4.	☐	☒	☐
		Uncovered temporary or guest parking on private residential lots may be paved with a permeable surface, or designed to drain into landscaping prior to discharging to the MS4.	☐	☐	☒
		Where landscaping is proposed in parking areas, incorporate landscape areas into the drainage design.	☒	☐	☐
		Overflow parking (parking stalls provided in excess of the Co-Permittee's minimum parking requirements) may be constructed with permeable paving.	☐	☐	☒
		Other comparable and equally effective design concepts as approved by the Co-Permittee (Note: Additional narrative required describing BMP and how it addresses Site Design concept).	☐	☒	☐

Non-applicable Site Design BMPs:

NO GUEST PARKING IS PROVIDED ON INDIVIDUAL LOT.

THERE IS NO OVERFLOWING PARKING.

Project Site Design BMPs:

The Tract is a 25-lot subdivision with almost ½ acre lots. Impervious coverage of each lot may vary from 25 to 30 percent. Open spaces will be landscaped with native shrubs, grass and trees. During construction erosion control will be instituted to plant graded slopes. SWPPP has been prepared and submitted earlier.

Storm water from Berry Circle will be discharged into the detention basin, which will allow sediments and pollutants to settle into the vegetation at basin bottom before the water is discharged into public storm drain. Q10 will be held by the detention basin and will be routed out gradually. Some of the water will be filtered into the ground. Q100 will pass through spillway and through faux wrought iron gate.

Precise grading plans for each lot will direct downspouts and surface run off into landscape areas before discharging them into street gutters. Sidewalks are going to be drained into parkways before discharging into the gutter. Offsite runoffs are going to be collected through v-ditch at the property line and will be discharged into the gutter through grated curb outlet. Gutter flow on Como Street fronting the Tract will be directed into the detention basin before being discharged into public storm drain.

V.2 SOURCE CONTROL BMPS

Table 2. Source Control BMPs

BMP Name	Check One		If not applicable, state brief reason
	Included	Not Applicable	
Non-Structural Source Control BMPs			
Education for Property Owners, Operators, Tenants, Occupants, or Employees	☒	☐	
Activity Restrictions	☒	☐	
Irrigation System and Landscape Maintenance	☒	☐	
Common Area Litter Control	☒	☐	
Street Sweeping Private Streets and Parking Lots	☐	☒	No private streets
Drainage Facility Inspection and Maintenance	☒	☐	
Structural Source Control BMPs			
MS4 Stenciling and Signage	☐	☐	This project will not connect to the MS4.
Landscape and Irrigation System Design	☒	☐	
Protect Slopes and Channels	☒	☐	
Provide Community Car Wash Racks	☐	☒	Residential tract
Properly Design:	☐	☐	
Fueling Areas	☐	☒	No fueling on the tract
Air/Water Supply Area Drainage	☒	☐	
Trash Storage Areas	☒	☐	
Loading Docks	☐	☒	Residential tract
Maintenance Bays	☐	☒	Residential tract
Vehicle and Equipment Wash Areas	☐	☒	Residential tract
Outdoor Material Storage Areas	☐	☒	Residential tract
Outdoor Work Areas or Processing Areas	☐	☒	Residential tract
Provide Wash Water Controls for Food Preparation Areas	☒	☐	

Instructions: *Provide narrative below describing how each* ***included*** *BMP will be implemented, the implementation frequency, inspection and maintenance frequency, inspection criteria, and the entity or party responsible for implementation, maintenance, and/or inspection. The location of each structural BMP must also be shown on the WQMP Site Plan included in Appendix B.*

Non-Structural Source Control BMPs:

Education for Property Owners, Operators, and Employees – Stormwater Pollution Prevention Education will be provided upon purchase of any lot or house in Mission Hills development. Mission Hills Wildomar HOA will be responsible for implementation of the education program.

Activity Restrictions – Activities that could be deleterious to water quality will not be allowed on site. The site will be inspected and maintained weekly. Mission Hills Wildomar HOA will be responsible for implementation of weekly inspections.

Irrigation System and Landscape Maintenance – Automatic timers will be used, where practical, to minimize runoff. The site will be watered at an application rate that does not exceed the infiltration rate of the soil. Sprinkler heads are located to water the landscaping and not concrete or pavement to avoid unnecessary runoff. Watering time will be adjusted seasonally to match plant needs, i.e., more in summer and less in winter. Drip irrigation systems will be used for shrubs and trees when possible. The Design of the irrigation system will apply water uniformly. Drought resistant landscaping will be used where possible. Mission Hills Wildomar, LP will install appropriate irrigation materials to comply with the practices listed above. Mission Hills Wildomar HOA will be responsible for the operation and maintenance of the irrigation system. The system will be inspected every week to verify there are no leaks and that the system is working to its optimal capacity.

Homeowner Trash and Common Area Litter Control – Each individual homeowner will store its trash, recyclables and vegetation in containers provided by trash service provider. Common Area Litter will be collected and stored in containers and placed at the driveway of the detention/recreation area to be picked up the trash haulers. All other waste generated during construction will be collected and stored in metal dumpsters and disposed of in compliance with Federal, State of California, and local laws, regulations, and ordinances. Trash will be disposed of weekly. Mission Hills Wildomar HOA will be responsible for implementation of weekly trash removal and inspection of trash storage areas to prevent it from coming into contact with storm water flows.

Structural Source Control BMPs:

Landscape and Irrigation System Design – Automatic timers will be used, where practical, to minimize runoff. The site will be watered at an application rate that does not exceed the infiltration rate of the soil. Sprinkler heads are located to water the landscaping and not concrete or pavement to avoid unnecessary run-off. Watering time will be adjusted seasonally to match plant needs, i.e., more in summer and less in winter. Drip irrigation systems will be used for shrubs and trees when possible. The Design of the irrigation system will apply water uniformly. Drought resistant landscaping will be used where possible. In common areas Mission Hills Wildomar, LP will install appropriate irrigation materials to comply with the practices listed above. Mission Hills Wildomar HOA will be responsible for the operation and maintenance of the irrigation system in these areas. The system will be inspected weekly to verify there are no leaks and that the system is working to its optimal capacity. Each homeowner will be responsible for the maintenance and upkeep of its irrigation system and shall comply with control BMPs.

Properly Design Trash Storage Areas – All trash container areas at Mission Hills will be paved with an impervious surface, disallow run-on from adjoining areas, divert drainage from adjoining roofs and pavements around the trash areas and contained to prevent off-site transport of trash. Trash dumpsters (containers) will be leak proof and have attached covers or lids. The trash storage areas will be inspected monthly to verify there are no leaks and that all potential pollutants are contained. Each homeowner shall be responsible for its own trash storage area.

Structural Source Control BMPs, NOT being used:

MS4 stenciling and Signage

Protect Slopes and Channels

Provide Community Car Wash Racks

Loading Docks

Maintenance Bays

Vehicle and Equipment Wash Areas

Outdoor material storage areas & Outdoor work areas

Appendix D includes copies of the educational materials that will be used in implementing this project-specific WQMP.

V.3 TREATMENT CONTROL BMPS

The following identified pollutants of concern are not listed in the Treatment Control BMP Selection matrix, will be addressed by Treatment Control BMPs as follow:

Organic Compounds – The proposed BMPs designed for this project have unknown removal efficiency for Organic Compounds. Organic pollutants can only be removed with High Efficiency treatment and costly filtration system. The proposed detention basin will filter some of these pollutants but it would be impossible and cost prohibitive to remove them all in a sever run off event especially hydrocarbons which will float over the surface of water. To minimize organic compound concerns in the run off to the extent feasible, every effort will be made to limit the use of pesticides, solvents and hydrocarbons on the tract.

Trash & Debris – Before the runoff is discharged to receiving waters trash and debris will be capture in the detention basin by trash racks. Each individual homeowner will be instructed by HOA to collect their trash and garbage from their lots so that they will not end up in the runoff.

Bacteria/Virus – The detention basin is designed to hold water for 48-72 hours depending on the storm event during which time water will infiltrate into the ground. This period is not sufficiently long period for bacteria or virus to develop in the stagnant water.

Pesticides – Both of the BMPs designed for this project have unknown removal efficiency for Pesticides. Lake Elsinore is not impaired by this pollutant. The use of pesticides on landscape areas on this tract will be minimal. Most landscaping will take into consideration native plant species and all efforts will be made to choose pesticides if ever used to be biodegradable and non-damaging to the environment.

Supporting engineering calculations for QBMP and/or VBMP, and Treatment Control BMP design details are included in Appendix F.

A copy of the property/project soils report is included in Appendix E.

Table 3: Treatment Control BMP Selection Matrix

Pollutant of Concern	Treatment Control BMP Categories[9]							
	Veg. Swale /Veg. Filter Strips	Detention Basins[2]	Infiltration Basins & Trenches/Porous Pavement[3][10]	Wet Ponds or Wetlands	Sand Filter or Filtration	Water Quality Inlets	Hydrodynamic Separator Systems [4]	Manufactured/ Proprietary Devices
Sediment/Turbidity	H/M	M	H/M	H/M	H/M	L	H/M (L for turbidity)	U
Y ☒ N ☐	☐	☒	☒	☐	☐	☐	☐	☐
Nutrients	L	M	H/M	H/M	L/M	L	L	U
Y ☒ N ☐	☐	☒	☒	☐	☐	☐	☐	☐
Organic Compounds	U	U	U	U	H/M	L	L	U
Y ☒ N ☐	☐	☒	☒	☐	☐	☐	☐	☐
Trash & Debris	L	M	U	U	H/M	M	H/M	U
Y ☒ N ☐	☐	☒	☒	☐	☐	☐	☐	☐
Oxygen Demanding Substances	L	M	H/M	H/M	H/M	L	L	U
Y ☒ N ☐	☐	☒	☒	☐	☐	☐	☐	☐
Bacteria & Viruses	U	U	H/M	U	H/M	L	L	U
Y ☒ N ☐	☐	☒	☒	☐	☐	☐	☐	☐
Oils & Grease	H/M	M	U	U	H/M	M	L/M	U
Y ☒ N ☐	☐	☒	☒	☐	☐	☐	☐	☐
Pesticides (non-soil bound)	U	U	U	U	U	L	L	U
Y ☒ N ☐	☐	☒	☒	☐	☐	☐	☐	☐
Metals	H/M	M	H	H	H	L	L	U
Y ☐ N ☒	☐	☒	☒	☐	☐	☐	☐	☐

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Abbreviations:

L: Low removal efficiency H/M: High or medium removal efficiency U: Unknown removal efficiency

Notes:

(1) Periodic performance assessment and updating of the guidance provided by this table may be necessary.

(2) Includes grass swales, grass strips, wetland vegetation swales, and bioretention.

(3) Includes extended/dry detention basins with grass lining and extended/dry detention basins with impervious lining. Effectiveness based upon minimum 36-48-hour drawdown time.

(4) Includes infiltration basins, infiltration trenches, and porous pavements.

(5) Includes permanent pool wet ponds and constructed wetlands.

(6) Includes sand filters and media filters.

(7) Also known as hydrodynamic devices, baffle boxes, swirl concentrators, or cyclone separators.

(8) Includes proprietary stormwater treatment devices as listed in the CASQA Stormwater Best Management Practices Handbooks, other stormwater treatment BMPs not specifically listed in this WQMP, or newly developed/emerging stormwater treatment technologies.

(9) Project proponents should base BMP designs on the Riverside County Stormwater Quality Best Management Practice Design Handbook. However, project proponents may also wish to reference the California Stormwater BMP Handbook – New Development and Redevelopment (www.cabmphandbooks.com). The Handbook contains additional information on BMP operation and maintenance.

(10) Note: Projects that will utilize infiltration-based Treatment Control BMPs (e.g., Infiltration Basins, Infiltration Trenches, Porous Pavement) must include a copy of the property/project soils report as Appendix E to the project-specific WQMP. The selection of a Treatment Control BMP (or BMPs) for the project must specifically consider the effectiveness of the Treatment Control BMP for pollutants identified as causing an impairment of Receiving Waters to which the project will discharge Urban Runoff.

V.4 EQUIVALENT TREATMENT CONTROL ALTERNATIVES

Not Applicable. Off site treatment of pollutants is not necessary due to the proposed on site bio-retention and filtration.

V.5 REGIONALLY-BASED TREATMENT CONTROL BMPS

Not Applicable. Off site treatment of pollutants is not necessary due to the proposed on site bio-retention and filtration.

VI. Operation and Maintenance Responsibility for Treatment Control BMPs

Operation and maintenance (O&M) requirements for all structural Source Control and Treatment Control BMPs shall be identified in the project-specific WQMP. The project-specific WQMP shall address the following:

- Identification of each BMP that requires O&M:

◆ Landscaping

◆ Education

◆ Street Sweeping

◆ Infiltration Trenches

◆ Filter Strips

◆ Seepage Pits (Dry Wells)

- Thorough description of O&M activities, the O&M process, and the handling and placement of any wastes:

◆ Landscaping – Must be maintained regularly (twice a month at minimum) through cutting, removal of debris and regular watering to keep vegetation flourishing and therefore effective as BMP.

◆ Education – Education on how to prevent the pollution of Storm Water must be provided to each homeowner at the time they purchase a house in the tract.

◆ Street Sweeping – Since streets are dedicated public streets sweeping will be the responsibility of the service district.

◆ Detention Basin – Detention basin will be maintained clean and landscaped with native drought resistant vegetation. All trash and debris must be collected periodically and spillway must be inspected before the start of the rainy season. After each storm event HOA must inspect and check the level of water and the integrity of the surrounding dirt embankment.

◆ Curb Inlets and Catch Basins – All curb inlets and catch basins must be maintained clean and free of vegetation and debris. HOA will be responsible to maintain these structures.

◆ Storm Drain Pipe – Storm Drain Pipe from Berry Circle Cul-de-sac to the detention basin must be maintained clean of all vegetation and debris. It has to be inspected and cleaned before the start of rainy season.

◆ Sump Condition Overflow – There is a sump condition at the end of Berry Circle Cul-de-sac at the driveway entrance leading to detention basin. In case the curb inlet is clogged the runoff water will rise and overflow the sidewalk at this location and will flow into the detention basin through a 4' wide concrete swale built for this purpose in the middle of driveway.

◆ V-Ditch on Tract Boundaries – V-ditch along tract boundaries are built to discharge offsite water onto paved streets. These ditches should be maintained by HOA and should be kept clean of vegetation, debris, rocks, trash, etc.

- BMP start-up dates:

◆ Landscaping – Upon completion of the project's construction

◆ Education – Upon homeowner's purchase of a house.

◆ Street Sweeping – Sweeping of the surrounding streets will be ongoing at the onset of construction project as necessary to keep streets clear of dirt and trash.

◆ Detention Basin and other BMPs - upon completion of construction.

- Schedule of the frequency of O&M for each BMP:

◆ Landscaping – Twice a month, at a minimum.

◆ Education –Upon purchase of property.

◆ Street Sweeping – Twice a month during construction.

◆ Detention Basin – Will receive inspection and maintenance, as needed, after each storm event.

◆ Other BMPs – Inspection, clean up and maintenance before the start of rainy season.

- Identification of the parties (name, address, and telephone number) responsible for O&M, including a written agreement with the entities responsible for O&M. This agreement can take the form of a Covenant and Agreement recorded by the Project Proponent with the County Recorder, HOA or POA CC&Rs, formation of a maintenance district or assessment district or other instrument sufficient to guarantee perpetual O&M. The preparer of this project-specific WQMP should carefully review Section 4.6 of the WQMP prior to completing this section of the project-specific WQMP.

◆ The Mission Hills Wildomar HOA will be responsible for the Operation and maintenance of the above listed BMPs.

- Self-inspections and record-keeping requirements for BMPs (review local specific requirements regarding self-inspections and/or annual reporting), including identification of responsible parties for inspection and record- keeping.

◆ The Mission Hills Wildomar HOA will be responsible for the inspection and record keeping requirements of the above listed BMPs.

- Thorough descriptions of water quality monitoring, if required by the Co-Permittee.

◆ The Mission Hills Wildomar, LP or its contractor or successor or assignee will be responsible for any water quality monitoring necessary, including the collection of samples and monitoring during construction and for one-year post construction.

VII. Funding

A funding source or sources for the O&M of each Treatment Control BMP identified in the project-specific WQMP must be identified. By certifying the project-specific WQMP, the Project applicant is certifying that the funding responsibilities have been addressed and will be transferred to future owners. One example of how to adhere to the requirement to transfer O&M responsibilities is to record the project-specific WQMP against the title to the property.

Mission Hills Wildomar HOA will fund all necessary maintenance.

Appendix A

Conditions of Approval

Board of Supervisors through adoption of:	348.4386
Change of Zone No.	6902
Dated	04/25/06

COUNTY OF RIVERSIDE

TRANSPORTATION AND LAND MANAGEMENT AGENCY

Tony Carstens · Agency Director

Planning Department

Robert C. Johnson · Planning Director

May 8, 2006

Gary Missirian
15335 Morrison St. Suite 305
Sherman Oaks, CA 91403

RE: Tentative Tract Map No. 31993 / Change of Zone No. 6902
Environmental Assessment No. 39325
Regional Team: South County

On **April 4, 2006** the Riverside County Board of Supervisors approved the above referenced cases subject to the attached **FINAL** conditions.

On April 25, 2006, the Riverside County Board of Supervisors adopted Change og Zone No. 6902 through the adoption of 348.4386.

Actions taken on the above referenced cases are considered final.

Sincerely,

RIVERSIDE COUNTY PLANNING DEPARTMENT
Robert C. Johnson, Planning Director

Bulmaro Canseco, Contract Planner

TO:
Transportation Department – Jim Knutson
Surveyor's Office – *Copy of approved Exhibit*
CAC 2nd Floor Land Use Files
Environmental Health Department
Fire Department
Flood Control District
Planning Dept. Murrieta office

02/15/05
Y:\Planning Master Forms\Approval Forms\Ord and Res Adopt.doc

TRACT MAP Tract #: TR31993 Parcel: 368-030-056

APPROVED
APR 04 2006
BY BOARD OF SUPERVISORS

10. GENERAL CONDITIONS

EVERY DEPARTMENT

10. EVERY. 1 MAP - DEFINITIONS INEFFECT

The words identified in the following list that appear in all capitals in the attached conditions of Tentative Tract Map No. 31993 shall be henceforth defined as follows:

TENTATIVE MAP = Tentative Tract Map No. 31993, Amended No. 4, dated August 8, 2005.

FINAL MAP = Final Map or Parcel Map for the TENTATIVE MAP whether recorded in whole or in phases.

10. EVERY. 2 MAP - PROJECT DESCRIPTION INEFFECT

The land division hereby permitted is to subdivide 13.15 acres into 25 single-family residential lots, and one lot to be used as a detention basin. The lots shall have a minimum lot size of 18,000 gross square feet (15,000 net sq. ft.)

10. EVERY. 3 MAP - HOLD HARMLESS INEFFECT

The land divider or any successor-in-interest shall defend, indemnify, and hold harmless the County of Riverside COUNTY), its agents, officers, or employees from any claim, action, or proceeding against the COUNTY, its agents, officers, or employees to attack, set aside, void, or annul an approval of the COUNTY, its advisory agencies, appeal boards, or legislative body concerning the TENTATIVE MAP, which action is brought within the time period provided for in California Government Code, Section 66499.37. The COUNTY will promptly notify the land divider of any such claim, action, or proceeding against the COUNTY and will cooperate fully in the defense. If the COUNTY fails to promptly notify the land divider of any such claim, action, or proceeding or fails to cooperate fully in the defense, the land divider shall not, thereafter, be responsible to defend, indemnify, or hold harmless the COUNTY.

10. EVERY. 4 MAP - 90 DAYS TO PROTEST INEFFECT

The land divider has 90 days from the date of approval of these conditions to protest, in accordance with the procedures set forth in Government Code Section 66020, the imposition of any and all fees, dedications, reservations and/or other exactions imposed on this project as a result

10. GENERAL CONDITIONS

10. EVERY. 4 MAP - 90 DAYS TO PROTEST (cont.) INEFFECT

of the approval or conditional approval of this project.

BS GRADE DEPARTMENT

10.BS GRADE. 1 MAP-GIN INTRODUCTION INEFFECT

Improvement such as grading, filling, over excavation and recompaction, and base or paving which require a grading permit are subject to the included Building and Safety Grading Division conditions of approval.

10.BS GRADE. 2 MAP-G1.2 OBEY ALL GDG REGS INEFFECT

All grading shall conform to the Uniform Building Code, Ordinance 457, and all other relevant laws, rules and regulations governing grading in Riverside County and prior to commencing any grading which includes 50 or more cubic yards, the applicant shall obtain a grading permit from the Building & Safety Department.

10.BS GRADE. 3 MAP-G1.3 DISTURBS NEED G/PMT INEFFECT

Ordinance 457 requires a grading permit prior to clearing , grubbing or any top soil disturbances related to construction grading.

10.BS GRADE. 4 MAP-G1.6 DUST CONTROL INEFFECT

All necessary measures to control dust shall be implemented by the developer during grading.

10.BS GRADE. 5 MAP-G2.5 2:1 MAX SLOPE RATIO INEFFECT

Grade slopes shall be limited to a maximum steepness ratio of 2:1 (horizontal to vertical) unless otherwise approved.

10.BS GRADE. 6 MAP-G2.8MINIMUM DRNAGE GRAD INEFFECT

Minimum drainage grade shall be 1% except on portland cement concrete where 0.35% shall be the minimum.

10.BS GRADE. 7 MAP-G2.9DRNAGE & TERRACING INEFFECT

Provide drainage facilities and terracing in conformance with the Uniform Building Code's chapter on "Excavation and

10. GENERAL CONDITIONS

10.BS GRADE. 7 MAP-G2.9DRNAGE & TERRACING (cont.) INEFFECT

Grading."

10.BS GRADE. 8 MAP-G2.10 SLOPE SETBACKS INEFFECT

Observe slope setbacks from buildings and property lines per the Uniform Building Code - as amended by Ordinance 457.

FIRE DEPARTMENT

10.FIRE. 1 MAP-#50-BLUE DOT REFLECTORS INEFFECT

Blue retroreflective pavement markers shall be mounted on private streets, public streets and driveways to indicate location of fire hydrants. Prior to installation, placement of markers must be approved by the Riverside County Fire Department.

10.FIRE. 2 MAP-#16-HYDRANT/SPACING INEFFECT

Schedule A fire protection approved standard fire hydrants, (6"x4"x2 1/2") located one at each street intersection and spaced no more than 330 feet apart in any direction, with no portion of any lot frontage more than 165 feet from a hydrant. Minimum fire flow shall be 1000 GPM for 2 hour duration at 20 PSI. Shall include perimeter streets at each intersection and spaced 660 feet apart.

FLOOD RI DEPARTMENT

10.FLOOD RI. 1 MAP FLOOD HAZARD REPORT INEFFECT

Tract Map 31993 is a proposal to subdivide 13.15 acres into residential lots and a detention basin in the Sedco area. The site is located on the east corner of Mission Trail and Como Street.

The site lies along the base of a hill with only a small local area along the east tributary to the site. The majority of the site drains northerly towards Como Street. A small portion of the site drains to Mission Trail.

The development of this site would increase peak flow rates and volume of runoff on downstream property owner(s). There is no downstream infrastructure to convey flows from this site safely to Lake Elsinore. The District has

10. GENERAL CONDITIONS

10.FLOOD RI. 1 MAP FLOOD HAZARD REPORT (cont.) INEFFECT

received complaints from downstream property owners due to the lack of drainage infrastructure. Mitigation shall be required to offset the impacts of increased peak flows along with the increase in volume caused by this development. A detention basin is shown on the exhibit. The District has received preliminary calculations for the increased runoff basin dated 8/3/04 and a Percolation Testing report received on October 7, 2004. The information provided appears to adequately address peak flow and increased volume mitigation. An infiltration basin combined with an increased runoff basin is proposed. Percolation tests were conducted on the project site to insure adequate basin drainage.

The proposed basin shall be designed to perform increased runoff mitigation according to the criteria specified in 10. FLOOD RI. 13 and as an infiltration basin designed to the criteria in the Riverside County Stormwater Quality Best Management Practice Design Handbook. The routing calculations for the increased runoff analysis shall address the impact of the dual mitigation function of the basin.

10.FLOOD RI. 2 MAP INFILTERATION BASIN INEFFECT

Unles regional downstream Flood Control facilities are constructed, this tract shall contsruct an "infiltration basin" per the District criteria as found in the Riverside County Stormwater Quality Best Management Practice Design Handbook.

10.FLOOD RI. 3 MAP 10 YR CURB - 100 YR ROW INEFFECT

The 10 year storm flow shall be contained within the curb and the 100 year storm flow shall be contained within the street right of way. When either of these criteria is exceeded, additional drainage facilities shall be installed. The property shall be graded to drain to the adjacent street or an adequate outlet.

10.FLOOD RI. 4 MAP 100 YR SUMP OUTLET INEFFECT

Drainage facilities outletting sump conditions shall be designed to convey the tributary 100 year storm flows. Additional emergency escape shall also be provided.

10. GENERAL CONDITIONS

10.FLOOD RI. 5 MAP PERP DRAINAGE PATTERNS INEFFECT

The property's street and lot grading shall be designed in a manner that perpetuates the existing natural drainage patterns with respect to tributary drainage areas, outlet points and outlet conditions. Otherwise a drainage easement shall be obtained from the affected property owners for the release of concentrated or diverted storm flows. A copy of the recorded drainage easement shall be submitted to the District for review.

10.FLOOD RI. 12 MAP INCREASED RUNOFF INEFFECT

The development of this site will adversely impact downstream property owners by increasing the rate and volume of flood flows. To mitigate this impact, the developer has proposed a detention basin. Although final design of the basin will not be required until the improvement plan stage of this development, the applicant's engineer has submitted a preliminary hydrology and hydraulics study that indicates that the general size, shape, and location of the proposed basin is sufficient to mitigate the impacts of the development.

10.FLOOD RI. 13 MAP INCREASED RUNOFF CRITERIA INEFFECT

The development of this site would increase peak flow rates on downstream properties. Mitigation shall be required to offset such impacts. An increased runoff basin shall be shown on the exhibit and calculations supporting the size of the basin shall be submitted to the District for review. The entire area of proposed development will be routed through a detention facility(s) to mitigate increased runoff.

A complete drainage study including, but not limited to, hydrologic and hydraulic calculations for the proposed detention basin shall be submitted to the District for review and approval.

Storms to be studied will include the 1-hour, 3-hour, 6-hour and 24-hour duration events for the 2-year, 5-year and 10-year return frequencies. Detention basin(s) and outlet(s) sizing will ensure that none of these storm events has a higher peak discharge in the post-development condition than in the pre-development condition. For the 2-year and 5-year events the loss rate will be determined using an AMC I condition. For the 10-year event AMC II

10. GENERAL CONDITIONS

.10.FLOOD RI. 13 MAP INCREASED RUNOFF CRITERIA (cont.) INEFFEC

will be used. Constant loss rates shall be used for the 1-hour, 3-hour and 6-hour events. A variable loss rate shall be used for the 24-hour events.

Low Loss rates will be determined using the following:
1. Undeveloped Condition --> LOW LOSS = 90%
2. Developed Condition --> LOW LOSS = .9 -(.8x%IMPERVIOUS)
3. Basin Site --> LOW LOSS = 10%

Where possible and feasible the on-site flows should be mitigated before combining with off-site flows to minimize the size of the detention facility required. If it is necessary to combine off-site and on-site flows into a detention facility two separate conditions should be evaluated for each duration/return period/before-after development combination studied; the first for the total tributary area (off-site plus on-site), and the second for the area to be developed alone (on-site). It must be clearly demonstrated that there is no increase in peak flow rates under either condition (total tributary area or on-site alone), for each of the return period/duration combinations required to be evaluated. A single plot showing the pre-developed, post-developed and routed hydrographs for each storm considered, shall be included with the submittal of the hydrology study.

No outlet pipe(s) will be less than 18" in diameter. Where necessary an orifice plate may be used to restrict outflow rates. Appropriate trash racks shall be provided for all outlets less than 48" in diameter.

The basin(s) and outlet structure(s) must be capable of passing the 100-year storm without damage to the facility. Embankment shall be avoided in all cases unless site constraints or topography make embankment unavoidable in the judgment of the General Manager-Chief Engineer.

Mitigation basins should be designed for joint use and be incorporated into open space or park areas. Sideslopes should be no steeper than 4:1 and depths should be minimized where public access is uncontrolled.

A viable maintenance mechanism, acceptable to both the County and the District, should be provided for detention facilities. Generally, this would mean a CSA, landscape district, parks agency or commercial property owners

10. GENERAL CONDITIONS

10.FLOOD RI. 13 MAP INCREASED RUNOFF CRITERIA (cont.) (cont.) INEFFECT

association. Residential homeowners associations are discouraged.

10.FLOOD RI. 15 MAP INTERCEPTOR DRAIN CRITERIA INEFFECT

The criteria for maintenance access of terrace/interceptor is as follows: flows between 1-5 cfs shall have a 5-foot wide access road, flows between 6-10 cfs shall be a minimum 6-foot rectangular channel. Terrace/interceptor drains are unacceptable for flows greater than 10 cfs. Flows greater than 10 cfs shall be brought to the street.

10.FLOOD RI. 16 MAP BMP - ENERGY DISSIPATOR INEFFECT

Energy Dissipators, such as rip-rap, shall be installed at the outlet of a storm drain system that discharges runoff flows into a natural channel or an unmaintained facility. The dissipators shall be designed to minimize the amount of erosion downstream of the storm drain outlet.

10.FLOOD RI. 17 MAP BMP - TRASH RACKS INEFFECT

Trash Racks shall be installed at all inlet structures that collect runoff from open areas with potential for large, floatable debris.

PLANNING DEPARTMENT

10.PLANNING. 1 MAP - MAP ACT COMPLIANCE INEFFECT

This land division shall comply with the State of California Subdivision Map Act and to all requirements of County Ordinance No. 460, Schedule A, unless modified by the conditions listed herein.

10.PLANNING. 2 MAP - FEES FOR REVIEW INEFFECT

Any subsequent review/approvals required by the conditions of approval, including but not limited to grading or building plan review or review of any mitigation monitoring requirement, shall be reviewed on an hourly basis, or other appropriate fee, as listed in County Ordinance No. 671. Each submittal shall be accompanied with a letter clearly indicating which condition or conditions the submittal is intended to comply with.

10. GENERAL CONDITIONS

10.PLANNING. 4 MAP - LANDSCAPE MAINTENANCE INEFFECT

The land divider, or any successor-in-interest to the land divider, shall be responsible for maintenance and upkeep of all slopes, landscaped areas and irrigation systems within the land division until such time as those operations are the responsibility of the individual home owners, a homeowners association, or any other successor-in-interest.

10.PLANNING. 7 MAP - NO OFFSITE SIGNAGE INEFFECT

There shall be no offsite signage associated with this land division, except as otherwise provided by Ordinance No. 679.3 (Kiosk Program).

10.PLANNING. 8 MAP - OFFSITE SIGNS ORD 679.4 INEFFECT

No offsite subdivision signs advertising this land ivision/development are permitted, other than those allowed under Ordinance No. 679.4. Violation of this condition of approval may result in no further permits of any type being issued for this subdivision until the unpermitted signage is removed.

10.PLANNING. 9 MAP - RES. DESIGN STANDARDS INEFFECT

The design standards for the subject parcels are as follows:

a. Lots created by this map shall conform to the design standards of the R-1 zone.
b. The front yard setback is 20 feet.
c. Side yards on interior and through lots shall be not less than ten percent of the width of the lot, but not less than three feet in width in any event, and need not exceed a width of five feet. Side yards on corner and reversed corner lots shall be not less than ten feet from the existing street line or from any future street line as shown on any specific plan of highways, whichever is nearer the proposed structure, upon which the main building sides, except that where the lot is less than 50 feet wide the yard need not exceed 20 percent of the width of the lot.
d. The rear yard setback is 20 feet.
e. The minimum width of each lot is 65 feet.
f. The maximum height of any building is three stories or 40 feet.
g. The minimum parcel size is 18,000 gross square feet

10. GENERAL CONDITIONS

10.PLANNING. 9 MAP - RES. DESIGN STANDARDS (cont.) INEFFECT

(15,000 net sq. ft.).

h. No more than 50% of the lot shall be covered by structure.

k. Residential driveway approaches shall be a minimum of 12 feet and a maximum of 30 feet in width, and 20 feet of full height curb is required between driveways within any one property frontage, in accordance with Ord. No. 461, Standard No. 207.

EXCEPT AS ALLOWED BY ORDINANCE NO. 348, THERE SHALL BE NO ENCROACHMENT INTO THE SETBACK.

10.PLANNING. 10 MAP - NPDES COMPLIANCE (1) INEFFECT

Since the project will disturb one (1) acre or more, the land divider/permit holder shall comply with all of the applicable requirements of the National Pollution Discharge Elimination System (NPDES) and shall conform to NPDES Best Management Practices for Stormwater Pollution Prevention Plans during the life of this permit.

10.PLANNING. 13 MAP - ORD NO. 659 (DIF) INEFFECT

Prior to the issuance of either a certificate of occupancy or prior to building permit final inspection, the applicant shall comply with the provisions of Riverside County Ordinance No. 659, which requires the payment of the appropriate fee set forth in the Ordinance. Riverside County Ordinance No. 659 has been established to set forth policies, regulations and fees related to the funding and construction of facilities necessary to address the direct and cummulative environmental effects generated by new development projects described and defined in this Ordinance, and it establishes the authorized uses of the fees collected. The fee shall be paid for each residential unit to be constructed within this land division.

In the event Riverside County Ordinance No. 659 is recinded, this condition will no longer be applicable. However, should Riverside County Ordinance No. 659 be rescinded and superseded by a subsequent mitigation fee ordinance, payment of the appropriate fee set forth in that ordinance shall be required.

10. GENERAL CONDITIONS

10.PLANNING. 14 MAP - ORD 810 OPN SPACE FEE INEFFECT

Prior to the issuance of either a certificate of occupancy or prior to building permit final inspection, the applicant shall comply with the provisions of Riverside County Ordinance No. 810, which requires payment of the appropriate fee set forth in the Ordinance. Riverside County Ordinance No. 810 has been established to set forth policies, regulations and fees related to the funding and acquisition of open space and habitat necessary to address the direct and cumulative environmental effects generated by new development projects described and defined in this Ordinance.

The fee shall be paid for each residential unit to be constructed within this land division.

In the event Riverside County Ordinance No. 810 is rescinded, this condition will no longer be applicable. However, should Riverside County Ordinance No. 810 be rescinded and superseded by a subsequent mitigation fee ordinance, payment of the appropriate fee set forth in that ordinance shall be required.

10.PLANNING. 15 MAP - REQUIRED MINOR PLANS INEFFECT

For each of the below listed items, a minor plot plan application shall be submitted and approved by the County Planning Department pursuant to Section 18.30.a. (1) of County Ordinance No. 348 (Plot Plans not subject to the California Environmental Quality Act and not subject to review by any governmental agency other than the Planning Department) along with the current fee.

1. Final Site Development Plan for each phase of development.

2. Model Home Complex Plan shall be filed and approved for each phase if models change between phases. A final site of development plot plan must be approved prior to approval, or concurrent with a Model Home Complex Plan.

3. Landscaping Plan for typical front yard/slopes/open space. These three plans may be applied for separately for the whole tract or for phases.

4. Landscaping plans totally in the road right-of-Way shall be submitted to the Transportation Department only.

10. GENERAL CONDITIONS

10.PLANNING. 15 MAP - REQUIRED MINOR PLANS (cont.) INEFFECT

5. Each phase shall have a separate wall and fencing plan.

NOTE: The requirements of the above plot plans may be accomplished as one, or, any combination of multiple plot plans required by these conditions of approval. However, each requirement shall be cleared individually with the applicable plot plan condition of approval in the "PRIOR TO BUILDING PERMIT" (80 series) conditions.

10.PLANNING. 16 MAP - GEO NO. 1185 INEFFECT

County Geologic Report (GEO) No. 1185 was prepared for this project (TR31993 by RMA Group, and is entitled "Geologic Fault Investigation of Proposed Residential Property, Southeast Corner of Mission Trail and Como Street, Wildomar, CA", and dated October 15, 2003.

GEO No. 1185 concluded:

1.No faults related to the Wildomar fault zone pass through the site. The potential for future displacement within the site appears unlikely.

2.The potential for liquefaction at the site is considered to be nil.

3.The potential for seismically induced settlement or lurching is low.

4.The potential for seismically induced landslides appears unlikely.

GEO No. 1185 recommended:

1.No fault setback zone required for site.

2.Geologic mapping should be performed during the course of grading in order to verify the findings of GEO No. 1185.

GEO No. 1185 satisfies the requirement for a geologic report and fault study for CEQA/Planning purposes. Final Planning Department approval of GEO NO 1185 is hereby granted for planning purposes. Engineering and other

10. GENERAL CONDITIONS

10.PLANNING. 16 MAP - GEO NO. 1185 (cont.) INEFFEC

Uniform Building Code parameters will be reviewed and additional comments and/or conditions may be imposed by the Building and Safety Department upon application for grading and/or building permits.

10.PLANNING. 17 MAP - DESIGN GUIDELINES INEFFEC

The project shall conform toCountywide Design Standards and Guidelines adopted January 13, 2004.

10.PLANNING. 18 MAP - SUBMIT BUILDING PLANS INEFFEC

The developer shall cause building plans to be submitted to the TLMA- Land Use Setion for review by the Department of Building and Safety - Plan Check Division. Said plans shall be in conformance with the approved TENTATIVE MAP.

10.PLANNING. 21 MAP - NO OFF-ROAD USES ALLOWED INEFFEC

Trail bikes, dune buggies, off-road vehicles and other similar powered apparatus shall not be operated for purposes such as, but not limited to, hill climbing, trail riding, scrambling, racing and riding exhibitions.

10.PLANNING. 22 MAP - WASTE MANAGEMENT INEFFECT

The project proponent shall use the following measures to help reduce the project's potential solid waste impacts and to help in the County's efforts to comply with State Law in diverting solid waste from landfill disposal:

1. Green waste generated by the project should be kept separate from other waste types and either composted onsite or directed to local wood grinding and/or composting operations.

2. The use of mulch and/or compost in the development and maintenance of landscape areas is recommended.

3. Construction and demolition waste should be reduced and/or diverted from landfill disposal by the use of onsite grinders or by directing the materials to recycling facilities.

10. GENERAL CONDITIONS

10.PLANNING. 23 PPA - COMPLY WITH ORD. 655 INEFFECT

All lighting shall comply with any applicable provisions of Riverside County Ordinance No. 655.

10.PLANNING. 24 MAP - TRAIL MAINTENANCE INEFFECT

The land divider, or the land divider's successor-in-interest, shall be responsible for the maintenance of any trail easement required under these conditions until such time as the maintenance is taken over by an appropriate maintenance district.

TRANS DEPARTMENT

10.TRANS. 1 MAP - DRAINAGE 1 INEFFECT

The land divider shall protect downstream properties from damages caused by alteration of the drainage patterns, i.e., concentration or diversion of flow. Protection shall be provided by constructing adequate drainage facilities including enlarging existing facilities and/or by securing a drainage easement. All drainage easements shall be shown on the final map and noted as follows: "Drainage Easement - no building, obstructions, or encroachments by landfills are allowed". The protection shall be as approved by the Transportation Department.

10.TRANS. 2 MAP - DRAINAGE 2 INEFFECT

The land divider shall accept and properly dispose of all off-site drainage flowing onto or through the site. In the event the Transportation Department permits the use of streets for drainage purposes, the provisions of Article XI of Ordinance No. 460 will apply. Should the quantities exceed the street capacity or the use of streets be prohibited for drainage purposes, the subdivider shall provide adequate drainage facilities and/or appropriate easements as approved by the Transportation Department.

10.TRANS. 6 MAP - TS/EXEMPT INEFFECT

The Transportation Department has not required a traffic study for the subject project. It has been determined that the project is exempt from traffic study requirements.

10. GENERAL CONDITIONS

10.TRANS. 7 MAP - STD INTRO 3(ORD 460/461) INEFFECT

With respect to the conditions of approval for the referenced tentative exhibit, the land divider shall provide all street improvements, street improvement plans and/or road dedications set forth herein in accordance with Ordinance 460 and Riverside County Road Improvement Standards (Ordinance 461). It is understood that the tentative map correctly shows acceptable centerline elevations, all existing easements, traveled ways, and drainage courses with appropriate Q's, and that their omission or unacceptablility may require the map to be resubmitted for further consideration. These Ordinances and all conditions of approval are essential parts and a requirement occurring in ONE is as binding as though occurring in all. All questions regarding the true meaning of the conditions shall be referred to the Transportation Department.

10.TRANS. 9 MAP - OFF-SITE PHASE INEFFECT

Should the applicant choose to phase any portion of this project, said applicant shall provide off-site access roads to County maintained roads as approved by the Transportation Department.

20. PRIOR TO A CERTAIN DATE

PLANNING DEPARTMENT

20.PLANNING. 2 MAP - EXPIRATION DATE INEFFECT

The conditionally approved TENTATIVE MAP shall expire three years after the County of Riverside Board of Supervisors original approval date, unless extended as provided by County Ordinance No. 460. Action on a minor change and/or revised map request shall not extend the time limits of the originally approved TENTATIVE MAP. A Land Management System (LMS) hold shall be placed on the TENTATIVE MAP, and a LMS hold shall be placed on any subsequent minor change or revised map, which shall be set to take effect on the expiration date. The LMS hold effective date shall be extended in accordance with any permitted extensions of time. The LMS hold shall be downgraded to a LMS notice upon recordation of the the first phase of the TENTATIVE MAP. The LMS hold or notice shall remain in effect until the recordation of the final phase of the TENTATIVE MAP. If the TENTATIVE MAP expires before the recordation of the

20. PRIOR TO A CERTAIN DATE

20.PLANNING. 2 MAP - EXPIRATION DATE (cont.) INEFFECT

final phase the LMS hold or notice shall remain in effect and no further FINAL MAP recordation shall be permitted.

50. PRIOR TO MAP RECORDATION

E HEALTH DEPARTMENT

50.E HEALTH. 1 MAP - WATER PLAN INEFFECT

A water system shall have plans and specifications approved by the water company and the Department of Environmental Health.

50.E HEALTH. 2 MAP - MONEY INEFFECT

Financial arrangements (securities posted) must be made for the water improvement plans and be approved by County Counsel.

50.E HEALTH. 3 MAP - SEWER PLAN - COUNTY INEFFECT

A sewer system shall have mylar plans and specifications as approved by the District, the County Survey Department and the Department of Environmental Health.

50.E HEALTH. 4 MAP - ANNEX FINALIZED INEFFECT

Annexation proceedings must be finalized with the applicable purveyor for sanitation service.

FIRE DEPARTMENT

50.FIRE. 1 MAP-#43-ECS-ROOFING MATERIAL INEFFECT

Ecs map must be stamped by the Riverside County Surveyor with the following note: All buildings shall be constructed with class "B" material as per the California Building Code.

50.FIRE. 2 MAP-#46-WATER PLANS INEFFECT

The applicant or developer shall furnish one copy of the water system plans to the Fire Department for review. Plans shall be signed by a registered civil engineer, containing a Fire Department approval signature block, and shall conform to hydrant type, location, spacing and

50. PRIOR TO MAP RECORDATION

50.FIRE. 2 MAP-#46-WATER PLANS (cont.) INEFFECT

minimum fire flow. Once plans are signed by the local water company, the originals shall be presented to the Fire Department for signature.

50.FIRE. 3 MAP-#53-ECS-WTR PRIOR/COMBUS INEFFECT

Ecs map must be stamped by the Riverside County Surveyor with the following note: The required water system, including fire hydrants, shall be installed and accepted by the appropriate water agency prior to any combustible building material placed on an individual lot.

FLOOD RI DEPARTMENT

50.FLOOD RI. 2 MAP SUBMIT PLANS INEFFECT

A copy of the improvement plans, grading plans, final map, environmental constraint sheet, BMP improvement plans, and any other necessary documentation along with supporting hydrologic and hydraulic calculations shall be submitted to the District for review. All submittals shall be date stamped by the engineer and include a completed Flood Control Deposit Based Fee Worksheet and the appropriate plan check fee deposit.

50.FLOOD RI. 3 MAP ONSITE EASE ON FINAL MAP INEFFECT

Onsite drainage facilities located outside of road right of way shall be contained within drainage easements shown on the final map. A note shall be added to the final map stating, "Drainage easements shall be kept free of buildings and obstructions".

50.FLOOD RI. 4 MAP OFFSITE EASE OR REDESIGN INEFFECT

Offsite drainage facilities shall be located within dedicated drainage easements obtained from the affected property owners). Document(s) shall be recorded and a copy submitted to the District prior to recordation of the final map. If the developer cannot obtain such rights, the map should be redesigned to eliminate the need for the easement.

50. PRIOR TO MAP RECORDATION

50.FLOOD RI. 5 MAP WRITTEN PERM FOR GRADING INEFFECT

Written permission shall be obtained from the affected property owners allowing the proposed grading and/or facilities to be installed outside of the tract boundaries. A copy of the written authorization shall be submitted to the District for review and approval.

50.FLOOD RI. 9 MAP BMP - MAINT & INSPECT INEFFECT

Unless an alternate viable maintenance entity is established, the CC&R's for the development's Homeowners Association (HOA) shall contain provisions for all structural BMPs to be inspected, and if required, cleaned no later than October 15 each year. The CC&R's shall identify the entity that will inspect and maintain all structural BMP's within the project boundaries. A copy of the CC&R's shall be submitted to the District for review and approval.

PLANNING DEPARTMENT

50.PLANNING. 1 MAP - PREPARE A FINAL MAP INEFFECT

After the approval of the TENTATIVE MAP and prior to the expiration of said map, the land divider shall cause the real property included within the TENTATIVE MAP, or any part thereof, to be surveyed and a FINAL MAP thereof prepared in accordance with the current County Transportation Department - Survey Division requirements, the conditionally approved TENTATIVE MAP, and in accordance with Article IX of County Ordinance No. 460.

50.PLANNING. 2 MAP - FINAL MAP PREPARER INEFFECT

The FINAL MAP shall be prepared by a licensed land surveyor or registered civil engineer.

50.PLANNING. 3 MAP - SURVEYOR CHECK LIST INEFFECT

The County Transportation Department - Survey Division shall review any FINAL MAP and ensure compliance with the following:

A. All lots on the FINAL MAP shall be in substantial conformance with the approved TENTATIVE MAP relative to size and configuration.

50. PRIOR TO MAP RECORDATION

50.PLANNING. 3 MAP - SURVEYOR CHECK LIST (cont.) INEFFECT

B. All lots on the FINAL MAP shall have a minimum lot size of 18,000 gross square feet (15,000 net sq. ft.).

C. All lot sizes and dimensions on the FINAL MAP shall be in conformance with the development standards of the R-1 zone, and with the Riverside County Integrated Project (RCIP).

D. All lots on the FINAL MAP shall comply with the length to width ratios, as established by Section 3.8.C. of County Ordinance No. 460.

E. All knuckle or cul-de-sac lots shall have a minimum of 40 feet of frontage measured at the front lot line.

F. A 10' community trail easement shall be located on the south side of Como Street (north of lots 1 - 4) starting at the southeast corner of the Cashew Street and Como Street intersection heading easterly towards the project's site easterly boundary.

The easement shall be located out of the Right-of-Way.

50.PLANNING. 4 MAP - REQUIRED APPLICATIONS INEFFECT

No FINAL MAP shall record until Change of Zone No. 06902 has been approved and adopted by the Board of Supervisors and has been made effective. This land division shall conform with the development standards of the designation and/or zone ultimately applied to the property.

50.PLANNING. 8 MAP - QUIMBY FEES (1) INEFFECT

The land divider shall submit to the County Planning Department - Development Review Division a duly and completely executed agreement with the County Service Area No. 152 which demonstrates to the satisfaction of the County that the land divider has provided for the payment of parks and recreation fees and/or dedication of land for the TENTATIVE MAP in accordance with Section 10.35 of County Ordinance No. 460.

50.PLANNING. 12 MAP - ECS SHALL BE PREPARED INEFFECT

The land divider shall prepare an Environmental Constraints Sheet (ECS) in accordance with Section 2.2. E. & F. of

50. PRIOR TO MAP RECORDATION

50.PLANNING. 12 MAP - ECS SHALL BE PREPARED (cont.) INEFFECT

County Ordinance No. 460, which shall be submitted as part of the plan check review of the FINAL MAP.

50.PLANNING. 13 MAP - ECS AFFECTED LOTS INEFFECT

The following note shall be placed on the FINAL MAP: "Environmental Constraint Sheet affecting this map is on file in the County of Riverside Transportation Department - Survey Division, in E.C.S. Book ___, Page ___.

50.PLANNING. 20 MAP - ECS NOTE MT PALOMAR LIGH INEFFECT

The following Environmental Constraints Note shall be placed on the ECS:

"This property is subject to lighting restrictions as required by County Ordinance No. 655, which are intended to reduce the effects of night lighting on the Mount Palomar Observatory. All proposed outdoor lighting systems shall be in conformance with County Ordinance No. 655."

50.PLANNING. 28 MAP - COMPLY WITH ORD 457 INEFFECT

The land divider shall provide proof to The Land Management Agency - Land Use Section that all structures for human occupancy presently existing and proposed for retention comply with Ordinance Nos. 457 and 348.

50.PLANNING. 30 MAP - FEE BALANCE INEFFECT

Prior to recordation, the Planning Department shall determine if the deposit based fees for the TENTATIVE MAP are in a negative balance. If so, any unpaid fees shall be paid by the land divider and/or the land divider's successor-in-interest.

50.PLANNING. 33 MAP - CC&R RES POA COM. AREA INEFFECT

The land divider shall (a) notify the Planning Department that the following documents shall be shortly, or have been, submitted to the Office of the County Counsel for the review and approval of that office, and (b) the land divider shall submit to the Office of the County Counsel the following documents:

1. A cover letter identifying the project for which

50. PRIOR TO MAP RECORDATION

50.PLANNING. 33 MAP - CC&R RES POA COM. AREA (cont.) INEFFEC

approval is sought referencing the Planning Department case number(s) (a copy of this cover letter may be sent to the Planning Department to serve as notification) and identifying one individual to represent the land divider if there are any questions concerning the review of the submitted documents; and

2. One (1) copy AND one (1) original, wet signed, notarized and ready for recordation declaration of covenants, conditions, and restrictions; attached to these documents there shall be included a legal description of the property included within the covenants, conditions and restrictions and a scaled map or diagram of such boundaries, both signed and stamped by a California registered civil engineer or licensed land surveyor; and

3. A sample document conveying title to the purchaser of an individual lot or unit which provides that the declaration of covenants, conditions, and restrictions is incorporated therein by reference; and,

4. A deposit equaling three (3) hours of the current hourly fee for the Review of Covenants, Conditions and Restrictions established pursuant to County Ordinance No. 671 at the time the above referenced documents are submitted to the Office of the County Counsel for review and approval.

The declaration of covenants, conditions and restrictions submitted for review shall a) provide for a minimum term of 60 years, b) provide for the establishment of a property owner's association comprised of the owners of each individual lot or unit as tenants in common, c) provide for the ownership of the common area by either the property owner's association or the owners of each individual lot or unit as tenants in common, and d) contain the following provisions verbatim:

"Notwithstanding any provision in this Declaration to the contrary, the following provisions shall apply:

The property owners' association established herein shall manage and continuously maintain the 'common area', more particularly described as the detention basin shown on the tentative map, and shall not sell or transfer the 'common area' or any part thereof, absent the prior written

50. PRIOR TO MAP RECORDATION

50.PLANNING. 33 MAP - CC&R RES POA COM. AREA (cont.) (cont.) INEFFECT

consent of the Planning Department of the County of Riverside or the County's successor-in-interest.

The property owners' association shall have the right to assess the owners of each individual lot or unit for the reasonable cost of maintaining such 'common area', and shall have the right to lien the property of any such owner who defaults in the payment of a maintenance assessment. An assessment lien, once created, shall be prior to all other liens recorded subsequent to the notice of assessment or other document creating the assessment lien.

This Declaration shall not be terminated, 'substantially' amended, or property deannexed therefrom absent the prior written consent of the Planning Director of the County of Riverside or the County's successor-in-interest. A proposed amendment shall be considered 'substantial' if it affects the extent, usage, or maintenance of the 'common area' established pursuant to the Declaration.

In the event of any conflict between this Declaration and the Articles of Incorporation, the Bylaws, or the property owners' association Rules and Regulations, if any, this Declaration shall control."

Once approved, the copy and the original declaration of covenants, conditions and restrictions shall be forwarded by the Office of the County Counsel to the Planning Department. The Planning Department will retain the one copy for the case file, and forward the wet signed and notarized original declaration of covenents, conditions and restrictions to the County Transportation Department - Survey Division - for safe keeping until the final map is ready for recordation. The County Transportation Department - Survey Division - shall record the original declaration of covenants, conditions and restrictions in conjunction with the recordation of the final map.

TRANS DEPARTMENT

50.TRANS. 1 MAP - R & B B D INEFFECT

Prior to the recordation of the final map, or any phase thereof, the project proponent shall pay fees in accordance

50. PRIOR TO MAP RECORDATION

50.TRANS. 1 MAP - R & B B D (cont.) INEFFECT

with Zone A of the Southwest Road and Bridge Benefit District.

50.TRANS. 2 MAP - DEDICATIONS INEFFECT

All internal streets shall be improved within the dedicated right-of-way in accordance with draft County Standard No. 105, Section B. (36'/56')

50.TRANS. 3 MAP - EXISTING MAINTAINED INEFFECT

Mission Trail is a paved County maintained road and shall be improved with concrete curb-and-gutter located 43 feet from centerline and match up asphalt concrete paving; reconstruction; or resurfacing of existing paving as determined by the Transportation Department within a 64 foot half-width dedicated right-of-way in accordance with draft County Standard No. 92 (1 of 2) (43'/64')

50.TRANS. 4 MAP - IMP PLANS INEFFECT

Improvement plans for the required improvements must be prepared and shall be based upon a design profile extending a minimum of 300 feet beyond the project boundaries at a grade and alignment as approved by the Riverside County Transportation Department. Completion of road improvements does not imply acceptance for maintenance by County.

50.TRANS. 5 MAP - PART-WIDTH INEFFECT

Como Street is a paved County maintained road and shall be improved with 32 feet of asphalt concrete pavement within a 45' part-width dedicated right-of-way in accordance with County Standard No. 104, Section A. (20'/30')

50.TRANS. 6 MAP - OFF-SITE INFO INEFFECT

The off-site rights-of-way required for said access road(s) shall be accepted to vest title in the name of the public if not already accepted.

50.TRANS. 9 MAP - EASEMENT INEFFECT

Any easement not owned by a public utility, public entity or subsidiary, not relocated or eliminated prior to final map approval, shall be delineated on the final map in

50. PRIOR TO MAP RECORDATION

50.TRANS. 9 MAP - EASEMENT (cont.) INEFFECT

addition to having the name of the easement holder, and the nature of their interests, shown on the map.

50.TRANS. 10 MAP - ACCESS RESTRICTION INEFFECT

Lot access shall be restricted on Mission Trail and so noted on the final map.

50.TRANS. 11 MAP - STRIPING PLAN INEFFECT

A signing and striping plan is required for this project. The applicant shall be responsible for any additional paving and/or striping removal caused by the striping plan. Traffic signing and striping shall be performed by County forces with all incurred costs borne by the applicant, unless otherwise approved by the County Traffic Engineer.

50.TRANS. 12 MAP - STREET NAME SIGN INEFFECT

The land divider shall install street name sign(s) in accordance with County Standard No. 816 as directed by the Transportation Department.

50.TRANS. 15 MAP - LANDSCAPING INEFFECT

The project proponent shall comply in accordance with landscaping requirements within public road rights-of-way, in accordance with Ordinance 461. Landscaping shall be installed within Mission Trail. Landscaping plans shall be submitted on standard County Plan sheet format (24" X 36"). Landscaping plans shall be submitted with the street improvement plans. If landscaping maintenance to be annexed to County Service Area, or Landscaping and Lighting Maintenance District, landscaping plans shall depict ONLY such landscaping, irrigation and related facilities as are to be placed within the public road rights-of-way.

50.TRANS. 16 MAP - ASSESSMENT DIST INEFFECT

Should this project lie within any assessment/benefit district, the applicant shall, prior to recordation, make application for and pay for their reapportionment of the assessments or pay the unit fees in the benefit district.

50. PRIOR TO MAP RECORDATION

50.TRANS. 18 MAP - SOILS 2 INEFFEC

The developer/owner shall submit a preliminary soils and pavement investigation report addressing the construction requirements within the road right-of-way.

50.TRANS. 19 MAP - INTERSECTION/50' TANGENT INEFFEC

All centerline intersections shall be at 90 degrees, plus or minus 5 degrees, with a minimum 50' tangent, measured from flowline/curbface or as approved by the Transportation Planning and Development Review Division Engineer.

50.TRANS. 23 MAP - STREET SWEEPING INEFFEC

The project proponent shall contact the County Service Area (CSA) Project Manager to file an application for annexation or inclusion into CSA for street sweeping; or enter into a similar mechanism as approved by the Transportation Department.

50.TRANS. 24 MAP - STREETLIGHT PLAN INEFFEC

A separate street light plan is required for this project. Street lighting shall be designed in accordance with County Ordinance 460 and Streetlight Specification Chart found in Specification Section 22 of Ordinance 461. For projects within SCE boundaries use County of Riverside Ordinance 461, Standard No's 1000 or 1001. For projects within Imperial Irrigation District (IID) use IID's pole standard.

50.TRANS. 25 MAP - STREET LIGHTS-CSA/L&LMD INEFFEC

The project proponent shall contact the County Service Area (CSA) Project Manager who determines whether the development is within an existing CSA or will require annexation into the CSA.

If the project is outside boundaries of a CSA, the project proponent shall contact the Transportation Department L&LMD 89-1-C Administrator and submit the following:

1. Completed Transportation Department application

2. Appropriate fees for annexation.

3. (2)Sets of street lighting plans approved by Transportation Department.

50. PRIOR TO MAP RECORDATION

50.TRANS. 25 MAP - STREET LIGHTS-CSA/L&LMD (cont.) INEFFECT

4. "Streetlight Authorization" form from SCE, IID or other electric provider.

50.TRANS. 27 MAP - LANDSCAPING APP. ANNEX INEFFECT

Landscaping within public road rights-of-way shall comply with Transportation Department standards and require approval by the Transportation Department. Assurance of continuing maintenance is required by filing an application for annexation into a County Service Area, Landscaping and Lighting Maintenance District NO. 89-1-Consolidated and/or Assessment District.

50.TRANS. 28 MAP - CLIN.K I-15 POLICY AREA INEFFECT

Prior to the recordation of the final map, or any phase thereof, the project proponent shall pay the Road & Bridge Benefit District and the Transportation Uniform Mitigation (TUMF) fees in accordance with the fee schedule in effect at the time of recordation, pursuant to the Board Policy dated May 25, 2004, Agenda Item 3.45 and Ordinance No. 824.

50.TRANS. 29 MAP - UTILITY PLAN INEFFECT

Electrical power, telephone, communication, street lighting, and cable television lines shall be designed to be placed underground in accordance with ordinance 460 and 461, or as approved by the Transportation Department. The applicant is responsible for coordinating the work with the serving utility company. This also applies to existing overhead lines which are 33.6 kilovolts or below along the project frontage and between the nearest poles offsite in each direction of the project site. A disposition note describing the above shall be reflected on design improvement plans whenever those plans are required. A written proof for initiating the design and/or application of the relocation issued by the utility company shall be submitted to the Transportation Department for verification purposes.

60. PRIOR TO GRADING PRMT ISSUANCE

BS GRADE DEPARTMENT

60.BS GRADE. 1 MAP-G2.1 GRADING BONDS INEFFECT

Grading in excess of 199 cubic yards will require performance security to be posted with the Building and Safety Department. Single Family Dwelling units graded one lot per permit and proposing to grade less than 5,000 cubic yards are exempt.

60.BS GRADE. 2 MAP-G2.3SLOPE EROS CL PLAN INEFFECT

Erosion control- landscape plans, required for manufactured slopes greater than 3 feet in vertical height, are to be signed by a registered landscape architect and bonded per the requirements of Ordinance 457, see form 284-47.

60.BS GRADE. 3 MAP-G2.4GEOTECH/SOILS RPTS INEFFECT

Geotechnical soils reports, required in order to obtain a grading permit, shall be submitted to the Building and Safety Department's Grading Division for review and approval prior to issuance of a grading permit.

All grading shall be in conformance with the recommendations of the geotechnical/soils reports as approved by Riverside County.*

*The geotechnical/soils, compaction and inspection reports will be reviewed in accordance with the RIVERSIDE COUNTY GEOTECHNICAL GUIDELINES FOR REVIEW OF GEOTECHNICAL AND GEOLOGIC REPORTS.

60.BS GRADE. 4 MAP-G2.7DRNAGE DESIGN Q100 INEFFECT

All drainage facilities shall be designed in accordance with Riverside County Flood Control & Water Conservation District's letter regarding this application or, if not specifically addressed in their letter, to accommodate 100 year storm flows.

Additionally, the Building and Safety Department's conditional approval of this application includes an expectation that the conceptual grading plan reviewed and approved for it complies or can comply with any WQMP (Water Quality Management Plan) required by Riverside County Flood Control and Water Conservation District.

60. PRIOR TO GRADING PRMT ISSUANCE

60.BS GRADE. 7 MAP-G2.14OFFSITE GDG ONUS INEFFECT

Prior to the issuance of a grading permit, it shall be the sole responsibility of the owner/applicant to obtain any and all proposed or required easements and/or permissions necessary to perform the grading herein proposed.

60.BS GRADE. 12 MAP-G1.4 NPDES/SWPPP INEFFECT

Prior to issuance of any grading or construction permits - whichever comes first - the applicant shall provide the Building and Safety Department evidence of compliance with the following: "Effective March 10, 2003 owner operators of grading or construction projects are required to comply with the N.P.D.E.S. (National Pollutant Discharge Elimination System) requirement to obtain a construction permit from the State Water Resource Control Board (SWRCB). The permit requirement applies to grading and construction sites of "ONE" acre or larger. The owner operator can comply by submitting a "Notice of Intent" (NOI), develop and implement a STORM WATER POLLUTION PREVENTION PLAN (SWPPP) and a monitoring program and reporting plan for the construction site. For additional information and to obtain a copy of the NPDES State Construction Permit contact the SWRCB at (916) 657-1146.

Additionally, at the time the county adopts, as part of any ordinance, regulations specific to the N.P.D.E.S., this project (or subdivision) shall comply with them.

60.BS GRADE. 13 MAP IMPORT/EXPORT INEFFECT

In instances where a grading plan involves import or export, prior to obtaining a grading permit, the applicant shall have obtained approval for the import/export location from the Building and Safety department. If an Environmental Assessment, prior to issuing a grading permit, did not previously approve either location, a Grading Environmental Assessment shall be submitted to the Planning Director for review and comment and to the Building and Safety Department Director for approval. Additionally, if the movement of import/export occurs using county roads, review and approval of the haul routes by the Transportation Department will be required.

60. PRIOR TO GRADING PRMT ISSUANCE

EPD DEPARTMENT

60.EPD. 1 EPD - 30 DAY BURROWING OWL SUR INEFFEC

Pursuant to Objective 6 of the Species Account for the Burrowing Owl included in the Western Riverside County Multiple Species Habitat Conservation Plan, within 30 days prior to the issuance of a grading permit, a pre-construction presence/absence survey for the burrowing owl shall be conducted by a qualified biologist and the results of this presence/absence survey shall be provided in writing to the County Biologist. If it is determined that the project site is occupied by the Burrowing Owl, take of "active" nests shall be avoided. However, when the Burrowing Owl is present, active relocation outside of the nesting season (March 1 through August 15) by a qualified biologist shall be required. The County Biologist shall be consulted to determine appropriate translocation sites. Occupation of this species on the project site may result in the need to revise grading plans so that take of "active" nests is avoided or alternatively, a grading permit may be issued once the species has been actively relocated.

60.EPD. 2 EPD - GNATCATCHER NESTING SURV INEFFEC

Pursuant to Condition No. 5.b. of Federal Fish and Wildlife Permit TE-088609-0 issued in connection with the Western Riverside County Multiple Species Habitat Conservation Plan, no grading permit may be issued between March 1 and August 15 of any given year unless the applicant for said grading permit provides written documentation to the County Biologist indicating that a focused survey of the project site has been conducted by a permitted biologist and confirms that habitat occupied by the California Gnatcatcher does not exist on said site.

FLOOD RI DEPARTMENT

60.FLOOD RI. 2 MAP SUBMIT PLANS INEFFEC

A copy of the improvement plans, grading plans, BMP improvement plans and any other necessary documentation along with supporting hydrologic and hydraulic calculations shall be submitted to the District for review. The plans must receive District approval prior to the issuance of grading permits. All submittals shall be date stamped by

60. PRIOR TO GRADING PRMT ISSUANCE

60.FLOOD RI. 2 MAP SUBMIT PLANS (cont.) INEFFEC

the engineer and include a completed Flood Control Deposit Based Fee Worksheet and the appropriate plan check fee deposit.

60.FLOOD RI. 3 MAP EROS CNTRL AFTER RGH GRAD INEFFEC

Temporary erosion control measures shall be implemented immediately following rough grading to prevent deposition of debris onto downstream properties or drainage facilities. Plans showing these measures shall be submitted to the District for review.

60.FLOOD RI. 4 MAP OFFSITE EASE OR REDESIGN INEFFEC

Offsite drainage facilities shall be located within dedicated drainage easements obtained from the affected property owners). Document(s) shall be recorded and a copy submitted to the District prior to recordation of the final map. If the developer cannot obtain such rights, the map should be redesigned to eliminate the need for the easement.

60.FLOOD RI. 6 MAP PHASING INEFFEC

If the tract is built in phases, each phase shall be protected from the 1 in 100 year tributary storm flows.

60.FLOOD RI. 8 MAP BMP - FILTRATION INEFFEC

Impervious areas shall be graded or constructed to drain to a filtration BMP or equally effective alternative.This tract has proposed to construct an "Infiltration Basin" per District criteria as found in the Riverside County Stormwater Quality Best Management Hanbook.

PLANNING DEPARTMENT

60.PLANNING. 2 MAP - FEE BALANCE INEFFEC

Prior to issuance of grading permits, the Planning Department shall determine if the deposit based fees are in a negative balance. If so, any outstanding fees shall be paid by the applicant/developer.

60. PRIOR TO GRADING PRMT ISSUANCE

60.PLANNING. 3 MAP - GRADING PLAN REVIEW INEFFECT

The land divider/permit holder shall cause a plan check application for a grading plan to be submitted to the County T.L.M.A - Land Use Division for review by the County Department of Building and Safety - Grading Division. Said grading plan shall be in conformance with the approved tentative map, in ompliance with County Ordinance No. 457, and the conditions of approval for the tentative map.

60.PLANNING. 22 MAP - IF HUMAN REMAINS FOUND INEFFECT

If human remains are encountered, State Health and Safety Code Section 7050.5 states that no further disturbance shall occur until the County Coroner has made a determination of origin and disposition pursuant to Public Resources Code Section 5097.98. The County Coroner shall be notified of the find immediately. If the remains are determined to be prehistoric, the coroner shall notify the Native American Heritage Commission, which will determine and notify the appropriate NATIVE AMERICAN TRIBE who is the most likely descendent. The descendent shall inspect the site of the discovery and make a recommendation as to the appropriate mitigation. After the recommendation has bee made, the property owner, a Native American Tribe representative, and a County representative shall meet to determine the appropriate mitigation measures and corrective actions to be implemented.

60.PLANNING. 23 MAP - REQUIRED APPLICATIONS INEFFECT

No grading permits shall be issued until Change of Zone No. 06902 has been approvd and adopted by the Board of Supervisors and has been made effective.

60.PLANNING. 24 MAP - PLANNING DEPT REVIEW INEFFECT

As part of the plan check review of the proposed grading plan for the subject property, the Department of Building and Safety - Grading Division shall submit a copy of the proposed grading plan, along with the applicable Log/Permit Numbers for reference, to the County Planning Department to be reviewed for compliance with the approved tentative map.

80. PRIOR TO BLDG PRMT ISSUANCE

BS GRADE DEPARTMENT

80.BS GRADE. 1 MAP-G3.1NO B/PMT W/O G/PMT INEFFECT

Prior to issuance of any building permit, the property owner shall obtain a grading permit and/or approval to construct from the Grading Divisin of the Building and Safety Department.

FIRE DEPARTMENT

80.FIRE. 1 MAP-#50C-TRACT WATER VERIFICA INEFFECT

The required water system, including all fire hydrant(s), shall be installed and accepted by the appropriate water agency and the Riverside County Fire Department prior to any combustible building material placed on an individual lot. Contact the Riverside County Fire Department to inspect the required fire flow, street signs, all weather surface, and all access and/or secondary. Approved water plans must be a the job site.

FLOOD RI DEPARTMENT

80.FLOOD RI. 2 MAP SUBMIT PLANS INEFFECT

A copy of the improvement plans, grading plans,BMP improvement plans and any other necessary documentation along with supporting hydrologic and hydraulic calculations shall be submitted to the District for review. The plans must receive District approval prior to the issuance of building permits. All submittals shall be date stamped by the engineer and include a completed Flood Control Deposit Based Fee Worksheet and the appropriate plan check fee deposit.

PLANNING DEPARTMENT

80.PLANNING. 1 MAP - ROOF MOUNTED EQUIPMENT INEFFECT

Roof-mounted mechanical equipment shall not be permitted within the subdivision, however, solar equipment or any other energy saving devices shall be permitted with County Planning Department approval.

80. PRIOR TO BLDG PRMT ISSUANCE

80.PLANNING. 2 MAP - FRONT YARD LANDSCAPING INEFFECT

All front yards shall be provided with landscaping and automatic irrigation, as defined by County Ordinance No. 348.

80.PLANNING. 3 MAP - UNDERGROUND UTILITIES INEFFECT

All utility extensions within a lot shall be placed underground.

80.PLANNING. 9 MAP - CONFORM FINAL SITE PLAN INEFFECT

Final clearance shall be obtained from the County Planning Department - Development Review Division stipulating that the building plans submitted conform to the approved Final Plan of Development.

80.PLANNING. 14 MAP - SCHOOL MITIGATION INEFFECT

Impacts to the Lake Elsinore Unified School District shall be mitigated in accordance with California State law.

80.PLANNING. 16 MAP - FEE BALANCE INEFFECT

Prior to issuance of building permits, the Planning Department shall determine if the deposit based fees are in a negative balance. If so, any outstanding fees shall be paid by the applicant/developer.

80.PLANNING. 19 MAP - FNL SITE DEV PLOT PLAN NOTAPPLY

A plot plan application shall be submitted to the County Planning Department pursuant to Section 18.30.a.(1) of County Ordinance No. 348 (Plot Plans not subject to the California Environmental Quality Act and not subject to review by any governmental agency other than the Planning Department), along with the current fee.

Subdivision development shall conform to the approved plot plan and shall conform to the Countywide Design Guidelines.

The plot plan shall be approved by the Planning Director prior to issuance of building permits for lots included within that plot plan.

The plot plan shall contain the following elements:

80. PRIOR TO BLDG PRMT ISSUANCE

80.PLANNING. 19 MAP - FNL SITE DEV PLOT PLAN (cont.) NOTAPPL

1. A final site plan (40' scale precise grading plan) showing all lots, building footprints, setbacks, mechanical equipment and model assignments on individual lots.

2. Each model floor plan and elevations (all sides).

3. Six (6) sets of photographic or color laser prints (8" x 10") of the sample board and colored elevations shall be submitted for permanent filing and agency distribution after the Planning Department has reviewed and approved the sample board and colored elevations in accordance with the approved Design Manual and other applicable standards. All writing must be legible. Six (6) matrix sheets showing structure colors and texture schemes shall be submitted.

NOTE: The requirements of this plot plan may be incorporated with any minor plot plan required by this subdivision's conditions of approval. However, this FINAL SITE DEVELOPENT plot plan conditon of approval shall be cleared individually.

80.PLANNING. 20 MAP - LANDSCAPE PLOT PLAN INEFFEC

The land divider/permit holder shall file seven (7) sets of a Landscaping and Irrigation Plan to the County Planning Department for review and approval. Said plan shall be submitted to the Department in the form of a plot plan application pursuant to County Ordinance No. 348, Section 18.30.a.(1) (Plot Plans not subject to the California Environmental Quality Act and not subject to review by any governmental agency other than the Planning Department), along with the current fee. The plan shall be in compliance with Section 18.12, Sections 19.300 through 19.304., and the TENTATIVE MAP conditions of approval.

When the proposal is located within the [Valley-Wide Recreation and Park District][Jurupa Conmmunity Services District] or a [County Service Area (CSA)], prior to landscape plan submittal to the Planning Department, the developer/permittee shall show evidence to the Planning Department that the CSA No. 152 has approved said plans.

The plan shall show all common open space areas. The plan

80. PRIOR TO BLDG PRMT ISSUANCE

80.PLANNING. 20 MAP - LANDSCAPE PLOT PLAN (cont.) INEFFECT

shall address all areas and conditions of the tract requiring landscaping and irrigation to be installed including, but not limited to, (slope planting, common area and/or park landscaping, and individual front yard landscaping). Emphasis shall be placed on using plant species that are drought tolerant and low water using. The plans shall provide for the following:

1. Permanent automatic irrigation systems shall be installed on all landscaped areas requiring irrigation. Low water use systems are encouraged.

2. All utility service areas and enclosures shall be screened from view with landscaping and decorative barriers or baffle treatments, as approved by the Planning Department. Utilities shall be placed underground.

3. Any required landscape screening shall be designed to be opaque up to a minimum height of six (6) feet at maturity.

4. Parkways and landscaped building setbacks shall be landscaped to provide visual screening or a transition into the primary use area of the site. Landscape elements shall include earth berming, ground cover, shrubs, and specimen trees in conjunction with meandering sidewalks, benches, and other pedestrian amenities where appropriate as approved by the Planning Department.

5. Landscaping plans shall incorporate the use of specimen accent trees at key visual focal points within the project.

6. Landscaping plans shall incorporate native and drought tolerant plants where appropriate.

7. All specimen trees and significant rock outcroppings on the subject property intended for retention shall be shown on the project's grading plans. Replacement trees for those to be removed shall also be shown.

8. All trees shall be minimum double-staked. Weaker and/or slow-growing trees shall be steel-staked.

9. Multi-programmable irrigation controllers which have enough programs to break up all irrigation stations into hydro zones shall be used. If practical and feasible, rain

80. PRIOR TO BLDG PRMT ISSUANCE

80.PLANNING. 20 MAP - LANDSCAPE PLOT PLAN (cont.) (cont.) INEFFECT

shutoff devices shall be employed to prevent irrigation after significant precipitation. Irrigation systems shall be designed so areas which have different water use requirements are not mixed on the same station (hydro zones). Assistance in implementing a schedule based on plant water needs is available from CIMIS or Mobile Lab. The use of drip irrigation should be considered for all planter areas that have a shrub density that will cause excessive spray interference of an overhead irrigation system. Use flow reducers to mitigate broken heads next to sidewalks, streets, and driveways. (BMP S2)

10. Plants with similar water requirements shall be grouped together in order to reduce excessive irrigation runoff and promote surface filtration, where possible. (BMP S3)

NOTES:

The Landscape plot plan my include the requirements of any other minor plot plan required by the subdivision conditions of approval. However, minor plot plan conditions of approval shall be cleared individually.

Landscaping plans for areas that are totally within the road right-of-way shall be submitted to the Transportation Department ONLY.

80.PLANNING. 23 MAP - MODEL HOME COMPLEX INEFFECT

A plot plan application shall be submitted to the County Planning Department pursuant to Section 18.30.a.(1) of County Ordinance No. 348 (Plot Plans not subject to the California Environmental Quality Act and not subject to review by any governmental agency other than the Planning Department), along with the current fee.

The Model Home Complex plot plan shall contain the following elements:

1. An engineer's scaled plan showing the model home lots, lot numbers, tract number, and north arrow.

2. Show front, side and rear yard setbacks.

80. PRIOR TO BLDG PRMT ISSUANCE

80.PLANNING. 23 MAP - MODEL HOME COMPLEX (cont.) INEFFECT

3. Provide two dementioned off street parking spaces per model and one parking space for office use. The plan must have one accessible parking space.

4. Show detailed fencing plan including height and location.

5. Show typical model tour sign locations and elevation.

6. Six (6) sets of photographic or color laser prints (8" X 10") of the sample board and colored elevations shall be submitted for permaanent filing and agency distribution after the Plannning Department has reviewed and approved the sample board and colored elevations in accordance with the approved Design Manual and other applicable standards. All writing must be legible. Six (6) matrix sheets showing structure colors and texture schemes shall be submitted.

7. Provide a Model Home Complex landscape and irrigation plan.

NOTES:

The Model Home Complex plot plan shall not be approved without Final Site Development Plan approval, or concurrent approval of both. See the Planning Department Model Home Complex application for detailed requirements.

The requirements of this plot plan may be incorporated with any minor plot plan required by the subdivision's conditions of approval. However, this MODEL HOME COMPLEX condition of approval shall be cleared individually.

80.PLANNING. 24 MAP - BUILDING SEPARATION 2 INEFFECT

Building separation between all buildings shall not be less than ten (10) feet. Additional encroachments are only allowed as permitted by County Ordinance No. 348.

80. PRIOR TO BLDG PRMT ISSUANCE

80.PLANNING. 25 MAP - WALLS/FENCING PLANS INEFFECT

The land divider/permit holder shall file seven (7) sets of a Wall/Fencing Plan to the County Planning Department for review and approval. Said plan shall be submitted to the Department in the form of a plot plan application pursuant to County Ordinance No. 348, Section 18.30.a.(1) (Plot Plans not subject to the California Environmental Quality Act and not subject to review by any governmental agency other than the Planning Department), along with the current fee. The plan shall be in compliance with Section 18.12, and the TENTATIVE MAP conditions of approval.

A. The plan shall show all project fencing including, but not limited to, perimeter fencing, side and rear yard fencing, and open space or park fencing. A typical frontal view of all fences shall be shown on the fencing plan.

B. All utility service areas and enclosures shall be screened from view with landscaping or decorative barriers or baffle treatments, as approved by the Planning Department.

C. All wood fencing shall be treated with heavy oil stain to match the natural shade to prevent bleaching from irrigation spray.

D. Front yard return walls shall be constructed of masonry (slump stone or material of similar appearance, maintenance, and structural durability) and shall be a minimum of five feet in height.

E. Side yard gates are required on one side of front yard, and shall be constructed of wrought iron, wood, vinyl or tubular steel. Chain link fencing is not permitted. All construction should be of good quality and sufficient durability with an approved stain or sealant to minimize water staining. (Applicants shall provide specifications that shall be approved by the Planning Department)

F. Except for the desert areas, all lots having rear and/or side yards facing local streets or otherwise open to public view shall have fences or walls constructed of masonry block.

G. Corner lots shall be constructed with wrap-around decorative block wall returns.

80. PRIOR TO BLDG PRMT ISSUANCE

80.PLANNING. 25 MAP - WALLS/FENCING PLANS (cont.) INEFFECT

J. Wrought iron or tubular steel fence sections may be included within tracts where view opportunities and/or terrain warrant its use. Where privacy views is not an issue, tubular steel or wrought iron sections should be constructed in perimeter walls in order to take advantage of casual view opportunities. Another option for permiter fencing is the use of a PVC three rail split rail fence.

K. A six foot (6') decorative block wall shall be constructed along the western and northern property line of Lot 16, the western, southern, and a portion of the northern property line of Lot 17, and along the western property line of Lot 25. The wall along the northern property line of Lot 16 and the southern property line of Lot 17 shall only be for a length from the west end of the property line to location of the return walls for the future homes of Lots 16 and 17. The access gate to the detention basin shall be constructed of wrought iron or tubular steel and located at the return walls for Lots 16 and 17.

L. A six foot (6') block wall shall be constructed along the south property lines of Lots 9-16, and the eastern property lines of Lots 4-5, and 9.

M. A six foot (6') high wrought iron or tubular steel fence shall be constructed on the western property line of the detention basin along Mission Trail and on the northern property line along Como Street

80.PLANNING. 26 MAP - REQUIRED COMMUNITY TRAIL INEFFECT

The Final Site Plan of development shall include the proposed improvements for the 10' community trail that shall be located on the south side of Como Street (north of lots 1 - 4) starting at the southeast corner of the Cashew Street and Como Street intersection heading easterly towards the project's site easterly boundary.

The trail shall be located out of the Right-of-Way.

The material use for the trail shall be decomposed granite or better.

80. PRIOR TO BLDG PRMT ISSUANCE

TRANS DEPARTMENT

80.TRANS. 1 MAP - GARAGE DOORS INEFFECT

Garage door setbacks for all residential zones shall be 24 feet for a conventional door or 20 feet for a roll-up door, measured from the back of the sidewalk to the face of garage door or the face of the curb if no sidewalk is required, or 20 feet from the street right-of-way, whichever setback is greater.

90. PRIOR TO BLDG FINAL INSPECTION

BS GRADE DEPARTMENT

90.BS GRADE. 1 MAP-G4.1E-CL 4:1 OR STEEPER INEFFECT

Plant and irrigate all manufactured slopes steeper than a 4:1 (horizontal to vertical) ratio and 3 feet or greater in vertical height with grass or ground cover; slopes 15 feet or greater in vertical height shall be planted with additional shrubs or trees as approved by the Building & Safety Department's Erosion Control Specialist.

90.BS GRADE. 2 MAP-G4.2 1/2"/FT/3FT MIN INEFFECT

Finish grade shall be sloped to provide proper drainage away from all exterior foundation walls. The slope shall be not less than one-half inch per foot for a distance of not less than 3 feet from any point of exterior foundation. Drainage swales shall not be less than 1 1/2 inches deeper than the adjacent finish grade at the foundation.

FLOOD RI DEPARTMENT

90.FLOOD RI. 2 MAP BMP - EDUCATION INEFFECT

The developer shall distribute environmental awareness education materials on general good housekeeping practices that contribute to protection of stormwater quality to all initial residents. The developer may obtain NPDES Public Educational Program materials from the District's NPDES Section by either the District's website www.floodcontrol.co.riverside.ca.us, e-mail fcnpdes@co.riverside.ca.us, or the toll free number 1-800-506-2555. Please provide Project number, number of units and location of development. Note that there is a five-day minimum processing period requested for all

90. PRIOR TO BLDG FINAL INSPECTION

90.FLOOD RI. 2 MAP BMP - EDUCATION (cont.) INEFFECT

orders.

The developer must provide to the District's PLAN CHECK Department a notarized affidavit stating that the distribution of educational materials to the tenants is assured prior to the issuance of occupancy permits.

PLANNING DEPARTMENT

90.PLANNING. 1 MAP - BLOCK WALL ANTIGRAFFITI INEFFECT

An anti-graffiti coating shall be provided on all block walls, and written verification from the developer shall be provided to both the TLMA - Land Use Division, and the Development Review Division.

90.PLANNING. 5 MAP - LANDSCAPING COMPLIANCE INEFFECT

The land divider/permit holder's landscape architect or other state licensed party responsible for preparing the landscape and irrigation plans shall provide a Compliance Letter to the County Planning Department and the County Department of Building and Safety stating that the landscape and irrigation system has been installed in compliance with the approved landscaping and irrigation plans. The Compliance letter shall be submitted at least three (3) working days prior to final inspection of the structure or issuance of occupancy permit, whichever comes first.

90.PLANNING. 6 MAP - QUIMBY FEES (2) INEFFECT

The land divider/permit holder shall present certification to the Riverside County Planning Department that payment of parks and recreation fees and/or dedication of land for park use in accordance with Section 10.35 of County Ordinance No. 460 has taken place. Said certification shall be obtained from the County of Riverside Executive Office for CSA No. 152.

90.PLANNING. 7 MAP - CONCRETE DRIVEWAYS INEFFECT

The land divider/permit holder shall cause all driveways to be constructed of cement concrete.

90. PRIOR TO BLDG FINAL INSPECTION

90.PLANNING. 8 MAP - FENCING COMPLIANCE INEFFECT

Fencing shall be provided throughout the subdivision in accordance with the approved final site development plans.

90.PLANNING. 9 MAP - ROLL-UP GARAGE DOORS INEFFECT

All residences shall have automatic roll-up garage doors.

90.PLANNING. 10 MAP - REQUIRED COMMUNITY TRAIL INEFFECT

A 10' community trail shall be constructed and fully operational. The community trail shall be located on the south side of Como Street (north of lots 1 - 4) starting at the southeast corner of the Cashew Street and Como Street intersection heading easterly towards the project's site easterly boundary.

The trail shall be located out of the Right-of-Way.

The material use for the trail shall be decomposed granite or better.

TRANS DEPARTMENT

90.TRANS. 1 MAP - 80% COMPLETION INEFFECT

Occupancy releases will not be issued to Building and Safety for any lot exceeding 80% of the total recorded residential lots within any map or phase of map prior to completion of the following improvements:

a) Primary and Alternate (secondary) access roads shall be completed and paved to finish grade according to the limits indicated in the improvement plans and as noted elsewhere in these conditions.

b) Interior roads shall be completed and paved to finish grade according to the limits indicated in the improvement plans and as noted elsewhere in these conditions. All curbs, gutters, sidewalks and driveway approaches shall be installed.

c) Storm drains and flood control facilities shall be completed according to the improvement plans and as noted elsewhere in these conditions. Written confirmation of acceptance for use by the Flood

90. PRIOR TO BLDG FINAL INSPECTION

90.TRANS. 1 MAP - 80% COMPLETION (cont.) INEFFEC

Control District, if applicable, is required.

d) Water system, including fire hydrants, shall be installed and operational, according to the improvement plans and as noted elsewhere in these conditions. All water valves shall be raised to pavement finished grade. Written confirmation of acceptance from water purveyor is required.

e) Sewer system shall be installed and operational, according to the improvement plans and as noted elsewhere in these conditions. All sewer manholes shall be raised to pavement finished grade. Written confirmation of acceptance from sewer purveyor is required.

f) Landscaping and irrigation, water and electrical systems shall be installed and operational in accordance with County Ordinance 461.

90.TRANS. 2 MAP - STREET LIGHTS INSTALL INEFFEC

Install streetlights along the streets associated with development in accordance with the approved street lighting plan and standards of County Ordinance 460 and 461. For projects within Imperial Irrigation District (IID) use (IID's) pole standard.

Street light annexation into L&LMD or similar mechanism as approved by the Transportation Department shall be completed.

It shall be the responsibility of the Developer to ensure that streetlights are energized along the streets of those lots where the Developer is seeking Building Final Inspection (Occupancy).

90.TRANS. 4 MAP - STREET SWEEPING INEFFEC

Street sweeping annexation or inclusion into CSA or similar mechanism as approved by the Transportation Department shall be completed.

90. PRIOR TO BLDG FINAL INSPECTION

90.TRANS. 5 MAP - UTILITY INSTALL INEFFECT

Electrical power, telephone, communication, street lighting, and cable television lines shall be placed underground in accordance with ordinance 460 and 461, or as approved by the Transportation Department. This also applies to existing overhead lines which are 33.6 kilovolts or below along the project frontage and between the nearest poles offsite in each direction of the project site.

A certificate should be obtained from the pertinent utility company and submitted to the Department of Transportation as proof of completion.

PINKS

SUBMITTAL TO THE BOARD OF SUPERVISORS
COUNTY OF RIVERSIDE, STATE OF CALIFORNIA

FROM: TLMA - Planning Department

SUBMITTAL DATE: February 28, 2006

SUBJECT: CHANGE OF ZONE NO. 6902 / TENTATIVE TRACT MAP NO. 31993 – EA39325 – Applicant: GMX Construction, Inc. – Engineer / Representative: GMX Construction, Inc. - First Supervisorial District – Rancho California Zoning Area - Elsinore Area Plan: Community Development: Medium Density Residential (CD-MDR) (2 - 5 Dwelling Units Per Acre) and Medium High Density Residential (CD-MHDR) (5 - 8 Dweilling Units Per Acre) – Location: Southeasterly corner of Mission Trail and Como Street – 13.5 Gross Acres - Zoning: Rural Residential (R-R) - **REQUEST:** The change of zone proposes a change from Rural Residential (R-R) to One Family Dwellings (R-1). The tentative tract map proposes a schedule A subdivision to subdivide 3 lots totaling 13.15 acres into 25 single family residential lots with a minimum lot size of 15,000 net square feet, and one lot to be used as a detention basin.

BACKGROUND: The applicant originally requested to change the project's site zoning classification from Rural Residential (R-R) to One Family Dwellings with a minimum lot size of 18,000 gross acres (R-1-18,000); however, the Planning Commission recommended that for clarification purposes, the project's site zoning designation shall be changed to One Family Dwellings with a minimum lot size of 15,000 net acres (R-1-15,000). The exhibits for the change of zone note such recommendation.

RECOMMENDED MOTION:

The Planning Department recommended Approval; and,
THE PLANNING COMMISSION, UNANIMOUSLY RECOMMENDS:

ADOPTION of the **MITIGATED NEGATIVE DECLARATION** for **ENVIRONMENTAL ASSESSMENT NO. 39325** based on the findings incorporated in the initial study and the conclusion that the project will not have a significant effect on the environment and,

David Mares for
Robert C. Johnson
Planning Director

RCJ:aa

Departmental Concurrence

☐ Policy ☐ Policy
☐ Consent ☐ Consent
Dep't Rec Per Exec. Ofc.:

APPROVED
APR 04 2006
BY BOARD OF SUPERVISORS

ADOPTED
APR 25 2006
BY BOARD OF SUPERVISORS

Prev. Agn. Ref. | District: First | Agenda Number:

TENTATIVE APPROVAL of **CHANGE OF ZONE NO. 06902** from Rural Residential (R-R) to One Family Dwelling (R-1) in accordance with Exhibit #3, based on the findings and conclusions incorporated in the staff report; and,

APPROVAL of **TENTATIVE TRACT MAP NO. 31993**, subject to the attached conditions of approval, and based upon the findings and conclusions incorporated in the staff report.

Appendix B

Vicinity Map, WQMP Site Plan, and Receiving Waters Map

Watershed Map for Riverside County

A watershed is an area that, because of topographic slope, contributes water to a specified surface water drainage system, such as a stream or river. Riverside County encompasses portions of three major watersheds: the Santa Ana, the Santa Margarita and the Whitewater. Using the map below you can click on any of the watershed areas to learn more about each watershed area. For additional information try the EPA - WATERS EnviroMapper.

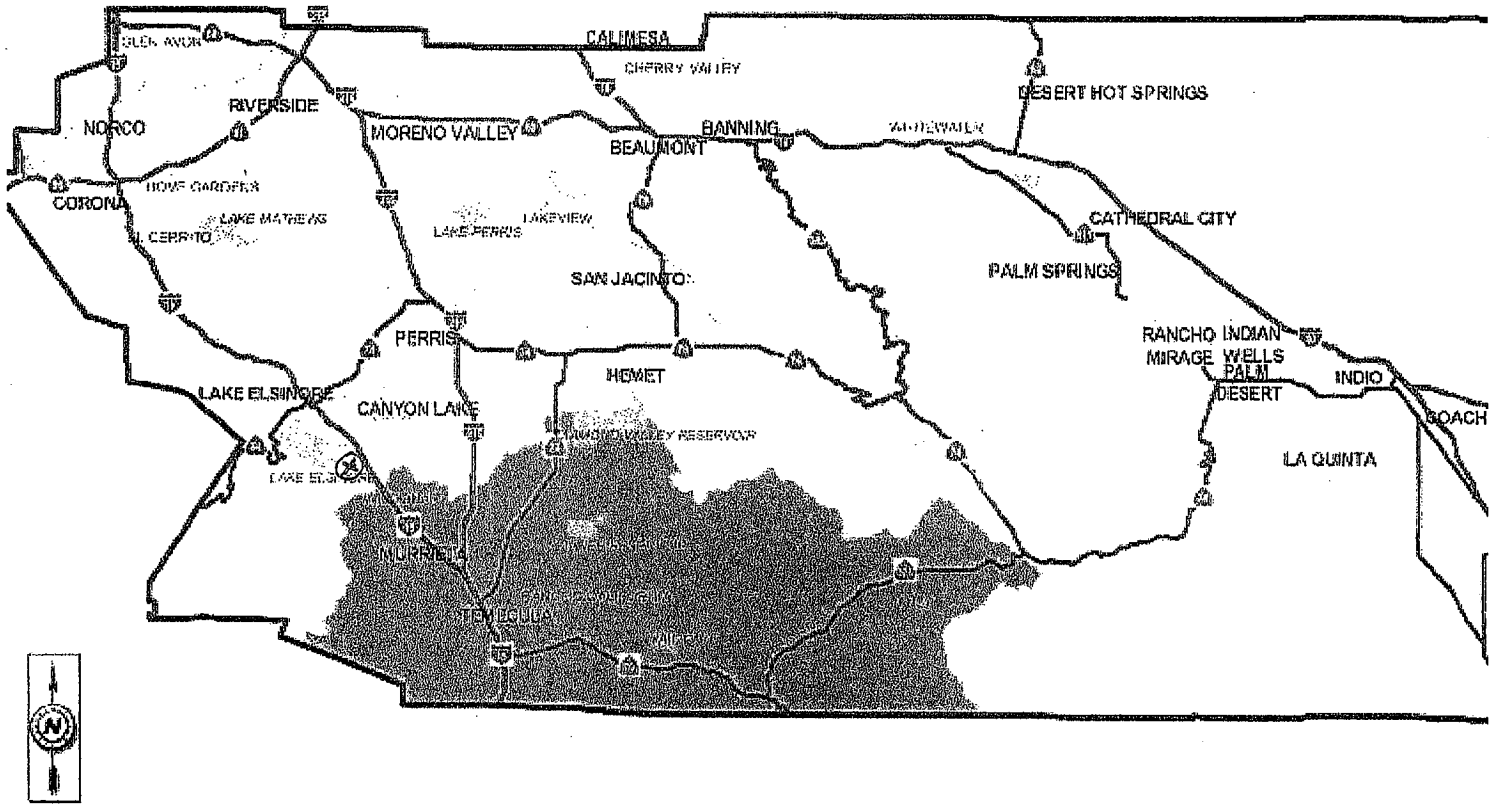

- Santa Ana River
- Santa Margarita
- Whitewater

0002433

Appendix C

Supporting Detail Related to Hydraulic Conditions of Concern

Not Applicable. Detention Basin design addresses Conditions of Concern.

Appendix D

Educational Materials

Appendix E

Soils Report

RMA Group

GEOTECHNICAL CONSULTANTS

GEOTECHNICAL INVESTIGATION
FOR
PROPOSED RESIDENTIAL PROPERTY
SOUTHEAST CORNER OF
MISSION TRAIL AND COMO STREET
WILDOMAR, CA

for

GMX Construction, Inc.
15335 Morrison St.
Suite 305
Sherman Oaks, CA 91403

November 10, 2003

Project No. 03-219-01

RMA Group

GEOTECHNICAL CONSULTANTS

10851 EDISON CT., RANCHO CUCAMONGA, CA 91730 : 909-989-1751 : FAX 909-989-4287

November 10, 2003

GMX, Inc.
15335 Morrison St., Suite 305
Sherman Oaks, CA 91403

Attention: Gary Missirian

Subject: Geotechnical Investigation
Proposed Residential Site
Southeast corner of Mission Trail and Como Street
Wildomar, CA

Gentlemen:

In accordance with your request, a geotechnical investigation has been completed for the above-referenced site. The report addresses both engineering geologic and geotechnical conditions. The results of the investigation are presented in the accompanying report that includes a description of site conditions, results of our field exploration and laboratory testing, conclusions and recommendations.

We appreciate this opportunity to be of continued service to you. If you have any questions regarding this report, please do not hesitate to contact us at your convenience.

Respectfully submitted,

RMA Group

Robert Markoff
Engineering Geologist
CEG 2073

REGISTERED GEOLOGIST
ROBERT M MARKOFF
CEG 2073
CERTIFIED ENGINEERING GEOLOGIST
STATE OF CALIFORNIA

Ed Lyon, P.E.
Vice President
GE 2362

REGISTERED PROFESSIONAL ENGINEER
EDWARD L. F. LYON
No. 2362
Exp. 3-31-05
GEOTECHNICAL
STATE OF CALIFORNIA

GMX, Inc.
Proposed Residential Site
Wildomar, CA
November 10, 2003

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Geology fault data base for southern California. This analysis indicates a mean peak horizontal ground acceleration of 0.65g for a 10% probability of occurrence in 50 years.

2.07.4 Seismic Coefficients and Near Source Factors

The 1997 Uniform Building Code presents seismic data in terms of seismic zones, factors, sources and coefficients, and soil profiles. Utilizing information generated by this investigation and data from the California Division of Mines and Geology (Petersen, Et. al., 1998), the following parameters may be used to determine 1997 UBC seismic coefficients (Ca and Cv) and near-source factors (Na and Nv):

Uniform Building Code Seismic Parameters

Closest Distance to Known Seismic Source:	0.5 km
Seismic Source and Type:	Elsinore fault, Type B
Seismic Zone:	4
Seismic Zone Factor:	0.4
Soil Profile:	S_D

2.08 Flooding Potential

According to the Federal Emergency Management Agency, the site does not lie within the boundaries of a 100 year flood zone. Control of surface runoff originating from within and outside of the site should, of course, be included in design of the project.

3.00 Conclusions and Recommendations

3.01 General Conclusion

Based on specific data and information contained in this report, our understanding of the project and our general experience in engineering geology and geotechnical engineering, it is our professional judgment that the proposed development is geologically and geotechnically feasible. This is provided that the recommendations presented below are fully implemented during design, grading and construction.

3.02 General Earthwork and Grading

Onsite earth materials encountered in this investigation are suitable for placement as fill from a geotechnical perspective. All grading should be performed in accordance with the General Earthwork and Grading Specifications outlined in Appendix C, unless specifically revised or amended below. Recommendations contained in Appendix C are general specifications for typical grading projects and may not be entirely applicable to this project. Earthwork should also be in accordance with all applicable local, state or federal agency requirements.

3.03 Earthwork Shrinkage, Bulking & Subsidence

Shrinkage is the decrease in volume of soil upon removal and recompaction expressed as a percentage of the original in-place volume. Bulking is an increase in volume determined in the same manner. Subsidence occurs as natural ground is densified to receive fill. These factors account for changes in earth volumes that will occur during grading. Our estimates are as follows:

Geologic Unit	Shrinkage Factor	Subsidence
Older Valley Fill (Qov)	2% - 5%	—
Colluvium	10% - 15%	0.10 – 0.15 ft
Pauba Formation (Qps)	3% - 5% (Bulking)	nil

The degree to which fill soils are compacted and variations in the insitu density of existing soils and bedrock will influence earth volume changes. Consequently, some adjustments in grades near the completion of grading could be required to balance the earthwork.

3.04 Removals and Overexcavation

Vegetation, trash and debris should be cleared from the grading area and hauled from the site. Prior to placement of compacted fills, compressible soils will need to be removed to competent natural ground. Within areas to support structures or receive fill, it is estimated the upper 2 to 5 feet, but up to 7 feet locally, of surficial soils (colluvium) will require removal and replacement with compacted fill materials.

In addition to the above requirements, overexcavation will also need to meet the following criteria for the building pad and pavement areas:

- All footing areas, both continuous and spread, shall be undercut, moistened, and compacted as necessary to produce soils compacted to a minimum of 90% relative compaction to a depth equal to the width of the footing below the bottom of the footing or to a depth of 3 feet below the bottom of the footing, whichever is less. Footing areas shall be defined as the area extending from the edge of the footing for a distance of 5 feet.
- All floor slabs and paved areas shall be underlain by a minimum of 1 foot of soil compacted to a minimum of 90% relative compaction.

The exposed soils beneath all overexcavations should be scarified an additional 6 inches, moisture conditioned and compacted to a minimum of 90% relative compaction.

The above recommendations are based on the assumption that soils encountered during field exploration are representative of soils throughout the site. However, there can be unforeseen and unanticipated variations in soils between points of subsurface exploration. Hence, overexcavation

depths must be verified, and adjusted if necessary, at the time of grading. The overexcavated materials may be moisture conditioned and re-compacted as structural fill.

3.05 Rippability and Rock Disposal

Our exploratory trenches were advanced without any major difficulties and no oversize materials were encountered in our subsurface investigation. Accordingly we expect that all earth materials will be rippable with conventional heavy duty grading equipment and oversized materials are not expected.

3.06 Subdrains

Ground water and surface water were not encountered during the course of our investigation and the proposed grading will not fill any large canyons. Consequently, installation of canyon subdrains is not expected to be necessary.

Backdrains or weep holes are recommended for all retaining walls.

3.07 Natural Slopes

Since no landslides are known to be present within the site, natural slopes that will remain adjacent to graded areas within the site are expected to be grossly stable.

3.08 Cut Slopes

Cut slopes excavated in formational materials exposing favorable geologic structure are anticipated to be grossly stable at inclinations of 2:1 (horizontal to vertical) or flatter.

Geologic mapping of cut slopes and backcuts during grading will be necessary to verify the anticipated geologic conditions. Revision of the above recommendations could be necessary if different conditions are exposed during grading.

3.09 Fill Slopes

Fill slopes constructed to the anticipated proposed maximum height of about 20 feet and at an inclinations of 2:1 (horizontal to vertical) are expected to be grossly and surficially stable. This is provided that the slopes are properly keyed, benched and compacted, as indicated in Appendix C.

3.10 Faulting

No faults are known to pass through the property and surface fault rupture within the site is considered unlikely. A geologic fault investigation of the property was conducted concurrent with this investigation. That report, Reference 11, should be reviewed for additional information pertaining to faulting at the site and in the vicinity of the site

3.11 Seismic Design Parameters

The potential damaging effects of regional earthquake activity should be considered in the design of structures. As a minimum, seismic design should be in accordance with the 1997 Uniform Building Code (UBC) and the recommendations of the Structural Engineers Association. The structural engineer and architect should consider the seismic data presented in this report, building types, occupancy category, importance and other appropriate factors when selecting seismic design parameters.

3.12 Secondary Earthquake Hazards

Considering the seismic and geologic conditions as currently known, the potential for secondary seismic hazards at the site is considered to be low. Liquefaction is considered unlikely due to the grain size and density of natural soils, anticipated compaction of the surficial soils and depth to ground water. The potential for seismically induced settlement is low due to the density of the underlying earth materials and anticipated compaction of near surface soils. Seismically induced landsliding is not expected, provided the site is properly graded and developed. Tsunamis and seiches do not pose hazards due to the inland location of the site and lack of nearby bodies of standing water.

3.13 Foundations

Spread footings or continuous wall footings are recommended to support the proposed residences. Continuous footings are recommended for retaining walls, if proposed.

If the recommendations in the section on grading are followed and footings are established in firm native soils or compacted fill materials, footings may be designed using the following allowable soil bearing values:

- Continuous Footings:

  Footings having a minimum width of 12" and a minimum depth of 18" below the lowest adjacent grade – 2,000 pounds per square foot. This value may be increased by 20% for each additional foot of width and/or depth to a maximum value of 4,000 pounds per square foot.

- Spread Footings:

Soil Bearing Values

Footing Loads	Size Depth	Allowable Bearing Pressures
60 kips	24 inches	3,000 psf

- Retaining Wall Footings:

  Footings for retaining walls should be founded a minimum depth of 12 inches and have a minimum width of 12 inches. Footings may be designed using the allowable bearing capacity and lateral resistance values recommended for building footings. However, when calculating passive resistance, the upper 6 inches of the footings should be ignored in areas where the footings will not be covered with concrete flatwork. Reinforcement should be provided for structural considerations as determined by the structural engineer.

The above bearing values represent an allowable net increase in soil pressure over existing soil pressure and may be increased by one-third for short term wind or seismic loads. Maximum expected settlement of footings designed with the recommended allowable soil bearing values is expected to be on the order of 1 inch with differential settlements on the order of ½ inch.

Soils and bedrock materials at the site are granular, non-plastic and non-expansive in nature. Therefore, reinforcement of footings for expansive soil is not required. However, in view of the seismic setting (UBC Seismic Zone 4), nominal reinforcement consisting of one #4 bar placed within 3 inches of the top of footings and another placed within 3 inches of the bottom of footings is recommended. The structural engineer may require heavier reinforcement.

Due to the preliminary nature of the expansion tests performed for this study, we recommend additional testing be performed near the completion of rough grading to verify the test results and recommended foundation design criteria.

3.14 Foundation Setbacks from Slopes

Setbacks for footings adjacent to slopes should conform to the requirements of the Uniform Building Code. Specifically, footings should maintain a horizontal distance or setback between any adjacent slope face and the bottom outer edge of the footing.

For slopes descending away from the foundation the horizontal distance may be calculated by using h/3, where h is the height of the slope. The horizontal setback should not be less than 5 feet, nor need not be greater than 40 feet (per code). Where structures encroach within the zone of h/3 from the top of the slope the setback may be maintained by deepening the foundations. Flatwork and utilities within the zone of h/3 from the top of slope may be subject to lateral distortion caused by gradual down slope creep. Walls, fences and landscaping improvements constructed at the top of descending slopes should be designed with consideration of the potential for gradual down slope creep.

For ascending slopes the horizontal setback required may be calculated by using h/2 where h is the height of the slope. The horizontal setback need not be greater than 15 feet (per code).

3.15 Slabs on Grade

We recommend the use of reinforced slabs on grade for residential structures. These floor slabs should have a minimum thickness of 4 inches and should be divided into squares or rectangles using weakened plane joints (contraction joints), each with maximum dimensions not exceeding 15 feet. Contraction joints should be made in accordance with American Concrete Institute (ACI) guidelines. Reinforcement consisting of #3 bars, 18 inches on center, each direction, should be provided at mid-height of the slab.

A base course capillary break is not required for slabs on grade at the subject site. However, a soil moisture vapor barrier is recommended beneath all floor slabs with moisture sensitive floor coverings. The soil moisture vapor barrier should consist of a minimum of 4 inches of sand and a 10-mil visqueen liner. The liner should be placed with 2 inches of sand below and 2 inches of sand above the liner. The liner should be carefully fitted around service openings and should be properly lapped and sealed with a minimum 6-inch overlap at joints in accordance with the American Concrete Institute's (ACI) guidelines.

3.16 Miscellaneous Concrete Flatwork

Miscellaneous flatwork, driveways, and walkways may be designed with a minimum thickness of 4.0 inches. Miscellaneous flatwork and driveways, should be reinforced with #3 bars, 18 inches on center, each direction at the mid-height of the slab. Control joints should be constructed to create squares or rectangles with a maximum spacing of 15 feet on large slab areas.

Walkways should be separated from foundations with a thick expansion joint filler and reinforced with a minimum of 6x6- 10/10 welded wire mesh placed at mid height in the slab. Control joints should be constructed into walkways at a maximum of 5 feet spacing.

The sub grade soils beneath all miscellaneous concrete flatwork, driveways, and walkways should be compacted to a minimum of 90% relative compaction for a minimum depth of 12 inches. The geotechnical engineer should monitor the compaction of the sub grade soils and perform testing to verify that proper compaction has been obtained.

3.17 Footing Excavation and Slab Preparations

All footing excavations should be observed by the geotechnical consultant to verify that they have been excavated into competent soils. The foundation excavations should be observed prior to the placement of forms, reinforcement steel, or concrete. These excavations should be evenly trimmed and level. Prior to concrete placement, any loose or soft soils should be removed. Excavated soils should not be placed on slab or footing areas unless properly compacted.

Prior to the placement of the moisture barrier and sand, the sub grade soils underlying the slab should be observed by the geotechnical consultant to verify that all under slab utility trenches have been

properly backfilled and compacted, that no loose or soft soils are present, and that the slab sub grade has been properly compacted to a minimum of 90% relative compaction within the upper 12 inches.

3.18 Lateral Loads

Lateral loads may be resisted by soil friction and the passive resistance of the soil. The following parameters are recommended.

- Passive Earth Pressure - equivalent fluid weight of 450 pcf.
- Coefficient of Friction (Soil to footing) – 0.40

Retaining structures should be designed to resist the following lateral active earth pressures:

Surface Slope of Retained Material Horiz. to Vert.	Equivalent Fluid Weight (pcf)
Level	31
5 to 1	32
4 to 1	33
3 to 1	34
2 to 1	40

These active earth pressures are only applicable if the retained earth is allowed to strain sufficiently to achieve the active state. The required horizontal strain to achieve the active state is approximately 0.0025H. Retaining structures should be designed to resist an at rest lateral earth pressure if this horizontal strain can not be achieved.

- At rest lateral earth pressure - 51 pcf

The horizontal compression required to achieve the full passive earth pressure is approximately 4 times the horizontal strain required to reach the active state. The horizontal compression required to reach 1/2 the maximum passive pressure is approximately equal to the horizontal strain required to achieve the active state. The previously recommended passive pressure should be reduced accordingly if the required horizontal compression to achieve full passive pressures can not be achieved.

If any super-imposed loads are anticipated, this office should be notified so that appropriate recommendations for earth pressures may be provided.

3.19 Drainage and Moisture Proofing

Retaining structures should be drained to prevent the accumulation of subsurface water behind the walls. Back drains should be installed behind all retaining walls exceeding 3.0 feet in height. A typical detail for retaining wall back drains is presented in appendix C. All back drains should be outlet to suitable drainage devices.

Moisture proofing should be provided on all stem walls and retaining walls utilized to support structures. Special attention should be given to the design of surface drainage and moisture proofing in areas of depressed floors where the finished floor elevation within the structure lies below the finished pad elevation outside the structure. In these areas consideration should be given to increasing the minimum slope of the surface drainage to a minimum of 5% sloping away from the residence for a minimum distance of 5.0 feet. Moisture proofing should also be provided on all site retaining walls exceeding 3.0 feet in height.

3.20 Cement Type and Corrosion Potential

Soluble sulfate tests indicate that concrete at the subject site will have a negligible exposure to water soluble sulfate in the soil. Our recommendations for concrete exposed to sulfate-containing soils are presented below.

RECOMMENDATIONS FOR CONCRETE EXPOSED TO SULFATE CONTAINING SOILS

Sulfate exposure	Water soluble sulfate(SO_4) in soil (% by wgt)	Sulfate (SO_4) in water (ppm)	Cement type	Normal weight aggregate concrete: Maximum water-cement ratio by weight	Lightweight aggregate concrete: Minimum compressive strength (psi)
Negligible	0.00 - 0.10	0-150	–	–	–
Moderate	0.10 - 0.20	150-1,500	II, IP(MS), IS(MS)	0.50	4,000
Severe	0.20 - 2.00	1,500-10,000	V	0.45	4,500
Very Severe	Over 2.00	Over 10,000	V plus pozzolan	0.45	4,500

The soils were also tested for soils reactivity (pH) and resistivity (ohms). The test results indicate that the soils have a soil reactivity ranging from 7.19 to 8.05 and a resistivity ranging from 2,300 to 4,300 ohms. A neutral or non-corrosive soil has a value ranging from 5.5 to 8.4. Generally, soils that could be considered corrosive to metal have resistivities less than 3000 ohms. Those soils with values less than 1000 ohms can be considered extremely corrosive.

Based on our test results, it is our opinion that the underlying soils at the site have a low to moderate corrosion potential. Protection of buried metal pipes with sand bedding and protective coating may be used to reduce corrosion potential.

3.21 Temporary Slopes

Excavation of utility trenches will require either temporary sloped excavations or shoring. Temporary excavations in existing alluvial soils may be safely made at an inclination of 1:1 (horizontal to vertical) or flatter. If vertical sidewalls are required in excavations greater than 5 feet in depth, the use of cantilevered or braced shoring is recommended. Excavations less than 5 feet in depth may be constructed with vertical sidewalls without shoring or shielding. Our recommendations for lateral earth pressures to be used in the design of cantilevered and/or braced shoring are presented below. These values incorporate a uniform lateral pressure of 72 psf to provide for the normal construction loads imposed by vehicles, equipment, materials, and workmen on the surface adjacent to the trench excavation. However, if vehicles, equipment, materials, etc. are kept a minimum distance equal to the height of the excavation away from the edge of the excavation, this surcharge load need not be applied.

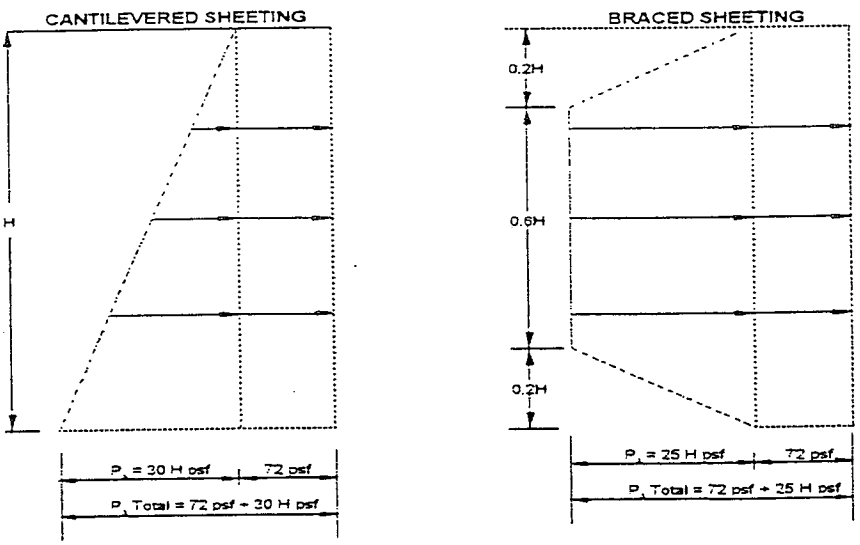

SHORING DESIGN: LATERAL SHORING PRESSURES

Design of the shield struts should be based on a value of 0.65 times the indicated pressure, Pa, for the approximate trench depth. The wales and sheeting can be designed for a value of 2/3 the design strut value.

GMX, Inc.
Proposed Residential Site
Wildomar, CA
November 10, 2003

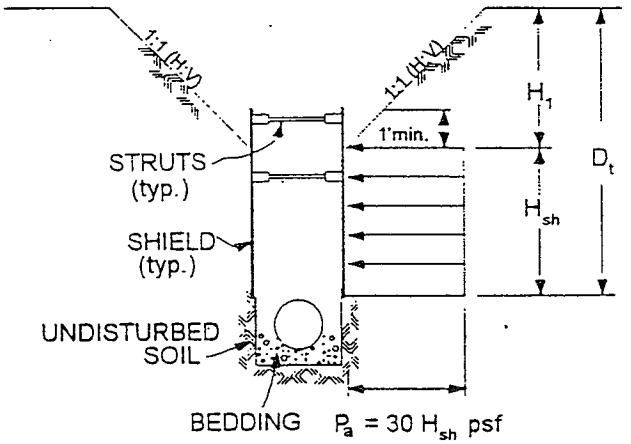

HEIGHT OF SHIELD, H_{sh} = DEPTH OF TRENCH, D_t, MINUS DEPTH OF SLOPE, H_1

TYPICAL SHORING DETAIL

Placement of the shield may be made after the excavation is completed or driven down as the material is excavated from inside of the shield. If placed after the excavation, some overexcavation may be required to allow for the shield width and advancement of the shield. The shield may be placed at either the top or the bottom of the pipe zone. Due to the anticipated thinness of the shield walls, removal of the shield after construction should have negligible effects on the load factor of pipes. Shields may be successively placed with conventional trenching equipment.

Vehicles, equipment, materials, etc. should be set back away from the edge of temporary excavations a minimum distance of 15 feet from the top edge of the excavation. Surface waters should be diverted away from temporary excavations and prevented from draining over the top of the excavation and down the slope face. During periods of heavy rain, the slope face should be protected with sandbags to prevent drainage over the edge of the slope, and a visqueen liner placed on the slope face to prevent erosion of the slope face.

Periodic observations of the excavations should be made by the geotechnical consultant to verify that the soil conditions have not varied from those anticipated and to monitor the overall condition of the temporary excavations over time. If at any time during construction conditions are encountered which differ from those anticipated, the geotechnical consultant should be contacted and allowed to analyze the field conditions prior to commencing work within the excavation.

Cal/OSHA construction safety orders should be observed during all underground work.

3.22 Utility Trench Backfill

The on-site soils are expected to be suitable as trench backfill provided they are screened of organic matter and cobbles over 4 inches in diameter. Trench backfill should be densified to at least 90% relative compaction (ASTM D1557) by mechanical methods.

All utility trench backfill within street right of way, utility easements, under or adjacent to sidewalks, driveways, or building pads should be observed and tested by the geotechnical consultant to verify proper compaction. Trenches excavated adjacent to foundations should not extend within the footing influence zone defined as the area within a line projected at a 1:1 (horizontal to vertical) drawn from the bottom edge of the footing. Trenches crossing perpendicular to foundations should be excavated and backfilled prior to the construction of the foundations. The excavations should be backfilled in the presence of the geotechnical engineer and tested to verify adequate compaction beneath the proposed footing.

Cal/OSHA construction safety orders should be observed during all underground work.

3.23 Pavement Sections

Sand equivalent and R-value tests were performed on anticipated subgrade soils at the site in order to provide information on their soil properties for design of pavement structural sections.

Structural sections were designed using the procedures outlined in "Design Procedures for Flexible Pavements", State of California Planning Manual - Part 7. This procedure uses the principle that the pavement structural section must be of adequate thickness to distribute the load from the design traffic index (TI) to the subgrade soils in such a manner that the stresses from the applied loads do not exceed the strength of the soil (R-value).

Development of the design traffic indexes on the basis of a traffic study is beyond the scope of this report; however, our experience indicates that traffic indexes of 5.0 is typical for residential streets and 6.0 for collector streets. We have provided alternate structural sections for each traffic index. Selection of the final pavement structural section should be based on economic considerations which are beyond the scope of this investigation. Our recommended structural sections are as follows:

- Residential Streets (TI=5.0, R-Value=17)
  4.0 inches of asphaltic concrete over
  6.0 inches of crushed aggregate base
  or
  7.0 inches of asphaltic concrete over
  12.0 inches of compacted native soils

- Collector Streets (TI=6.0, R-Value=17)
  5.0 inches of asphaltic concrete over
  7.0 inches of crushed aggregate base
  or
  9.0 inches of asphaltic concrete over
  12.0 inches of compacted native soils

Prior to paving, the upper 12 inches of subgrade soils should be scarified, adjusted to within 2% of optimum moisture and compacted to a minimum of 90% relative compaction if an aggregate base course is used or to 95% relative compaction if asphalt is placed directly on native soils. All aggregate base courses should be compacted to a minimum of 95% relative compaction. The laboratory standard used to establish the maximum density and optimum moisture shall be ASTM D1557.

The materials and methods used during construction should conform to the latest edition of the Standard Specifications for Public Works Construction (SSPWC). The aggregate base course should conform to the SSPWC Section 200-2.2 for Crushed Aggregate Base.

The asphalt surface course should conform to the SSPWC Section 203-6. If the asphaltic-concrete section is placed in two lifts, the cold joint between lifts should not be designed at the center of the asphaltic-concrete section.

3.24 Plan Review

Once formal grading and foundation plans are prepared for the subject property, this office should review the plans from a geotechnical viewpoint, comment on changes from the plan used during preparation of this report and revise the recommendations of this report where necessary.

3.25 Geotechnical Observation and Testing During Rough Grading

The geotechnical engineer should be contacted to provide observation and testing during the following stages of rough grading:

- During the clearing and grubbing of the site.
- During the demolition of any existing structures, buried utilities or other existing improvements.
- During excavation and over excavation of compressible soils.
- During all phases of rough grading, including over excavation, precompaction, benching, filling operations, and cut slope excavation.
- When any unusual conditions are encountered during grading.

A final geotechnical report summarizing conditions encountered during rough grading should be submitted upon completion of the rough grading operations.

3.26 Post-Grading Geotechnical Observation and Testing

After the completion of rough grading the geotechnical engineer should be contacted to provide additional observation and testing during the following construction activities:

- During all trenching and backfilling operations of buried improvements and utilities within the street right of way, utility easements, and lots to verify proper backfill and compaction of the utility trenches.
- After excavation and prior to placement of reinforcing steel or concrete within footing trenches to verify that footings are properly founded in competent materials.
- During fine or precise grading involving the placement of any fills underlying driveways, sidewalks, walkways, or other miscellaneous concrete flatwork to verify proper placement, mixing and compaction of fills.
- When any unusual conditions are encountered during construction.

4.00 CLOSURE

The findings, conclusions and recommendations in this report were prepared in accordance with generally accepted engineering and geologic principles and practices. No other warranty, either express or implied, is made. This report has been prepared for GMX Construction, Inc. to be used solely for design purposes. Anyone using this report for any other purpose must draw their own conclusions regarding required construction procedures and subsurface conditions.

The geotechnical and geologic consultant should be retained during the earthwork and foundation phases of construction to monitor compliance with the design concepts and recommendations, and to provide additional recommendations as needed. Should subsurface conditions be encountered during construction that are different from those described in this report, this office should be notified immediately so that our recommendations may be re-evaluated.

Appendix F

Treatment Control BMP Sizing Calculations and Design Details

Worksheet 1

Design Procedure for BMP Design Volume

85th percentile runoff event

Designer: GM
Company: GMX
Date: 1/14/08
Project: TRACT 31993
Location: WILDOMAR

1. Create Unit Storage Volume Graph a. Site location (Township, Range, and Section). b. Slope value from the Design Volume Curve in Appendix A. c. Plot this value on the Unit Storage Volume Graph shown on Figure 2. d. Draw a straight line form this point to the origin, to create the graph	T 6S &R 4W Section 37 Slope = 1.15 Is this graph attached? Yes ☒ No ☐	(1) (2)
2. Determine Runoff Coefficient a. Determine total impervious area b. Determine total tributary area c. Determine Impervious fraction i = *(5)* / *(6)* d. Use *(7)* in Figure 1 to find Runoff OR $C = .858i^3 - .78i^2 + .774i + .04$	$A_{impervious}$ = 6 acres A_{total} = 12 acres i = 0.5 C = 0.33	(5) (6) (7) (8)
3. Determine 85% Unit Storage Volume a. Use *(8)* in Figure 1 Draw a Vertical line from *(8)* to the graph, then a Horizontal line to the desired V_u value.	V_u = 0.38 in-acre/acre	(9)
4. Determine Design Storage Volume a. V_{BMP} = *(9)* x *(6)* [in- acres] b. V_{BMP} = *(10)* / 12 [ft- acres] c. V_{BMP} = *(11)* x 43560 [ft^3]	V_{BMP} = 4.56 in-acre V_{BMP} = 0.38 ft-acre V_{BMP} = 16,553 ft^3	(10) (11) (12)

Notes: BASED ON 85% RUNOFF SIZE OF BASIN IS 16,553 ft^3

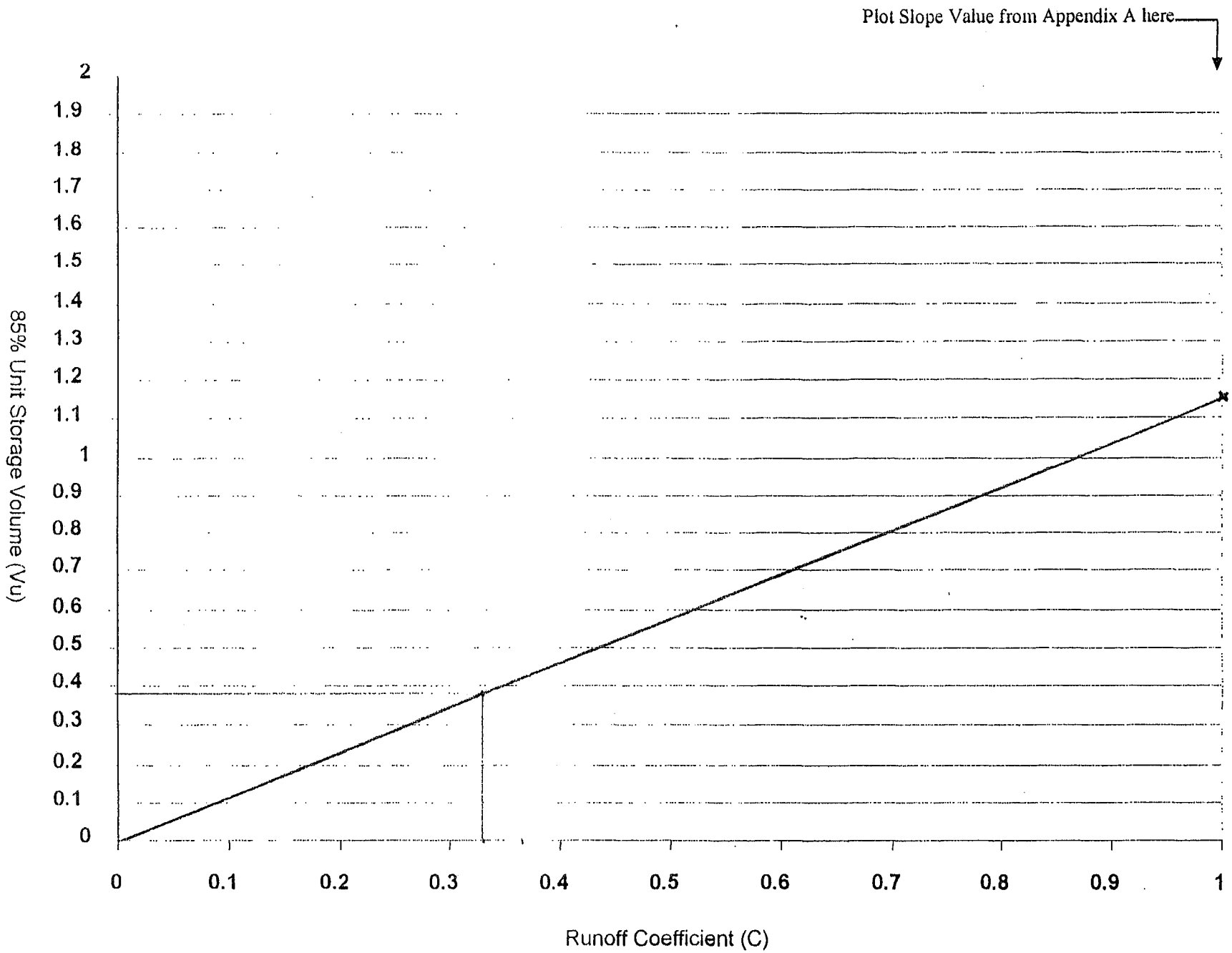

Figure 2 Unit Storage Volume Graph

0002456

3. Using the runoff coefficient found in step 2, determine 85th percentile unit storage volume (V_u) using Figure 2 (created in step 1).

4. Determine the design storage volume (V_{BMP}). This is the volume to be used in the design of selected BMPs presented in this handbook.

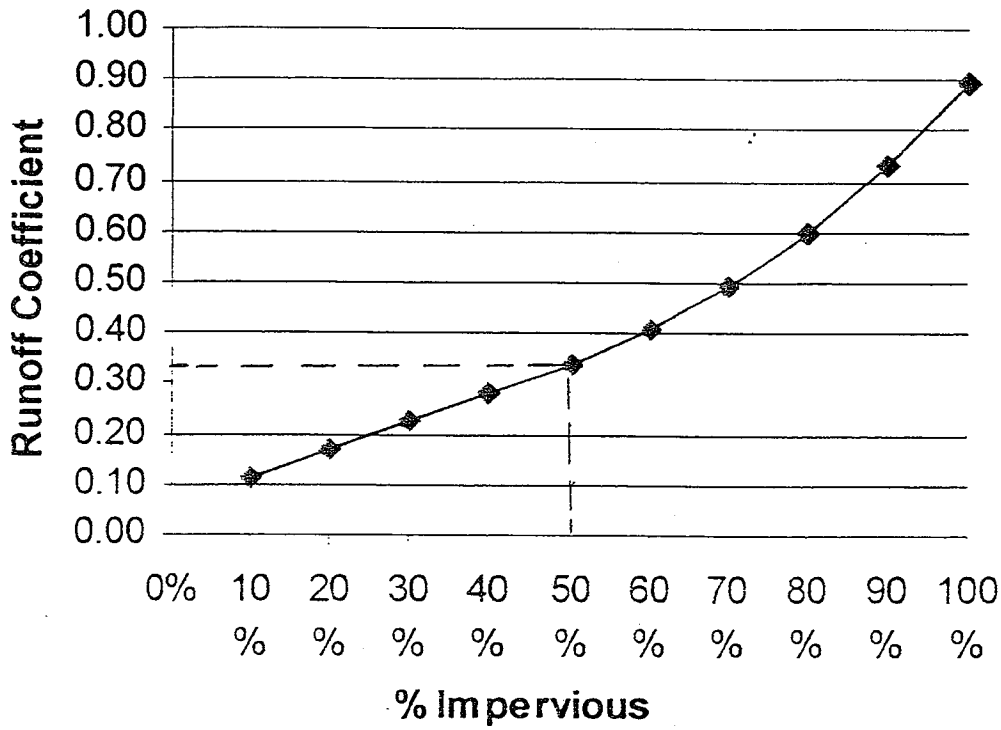

Figure 1. Impervious – Coefficient Curve (WEF/ASCE Method[1])

[1] Imperviousness is the decimal fraction of the total catchment covered by the sum of roads, parking lots, sidewalks, rooftops, and other impermeable surfaces of an urban landscape.

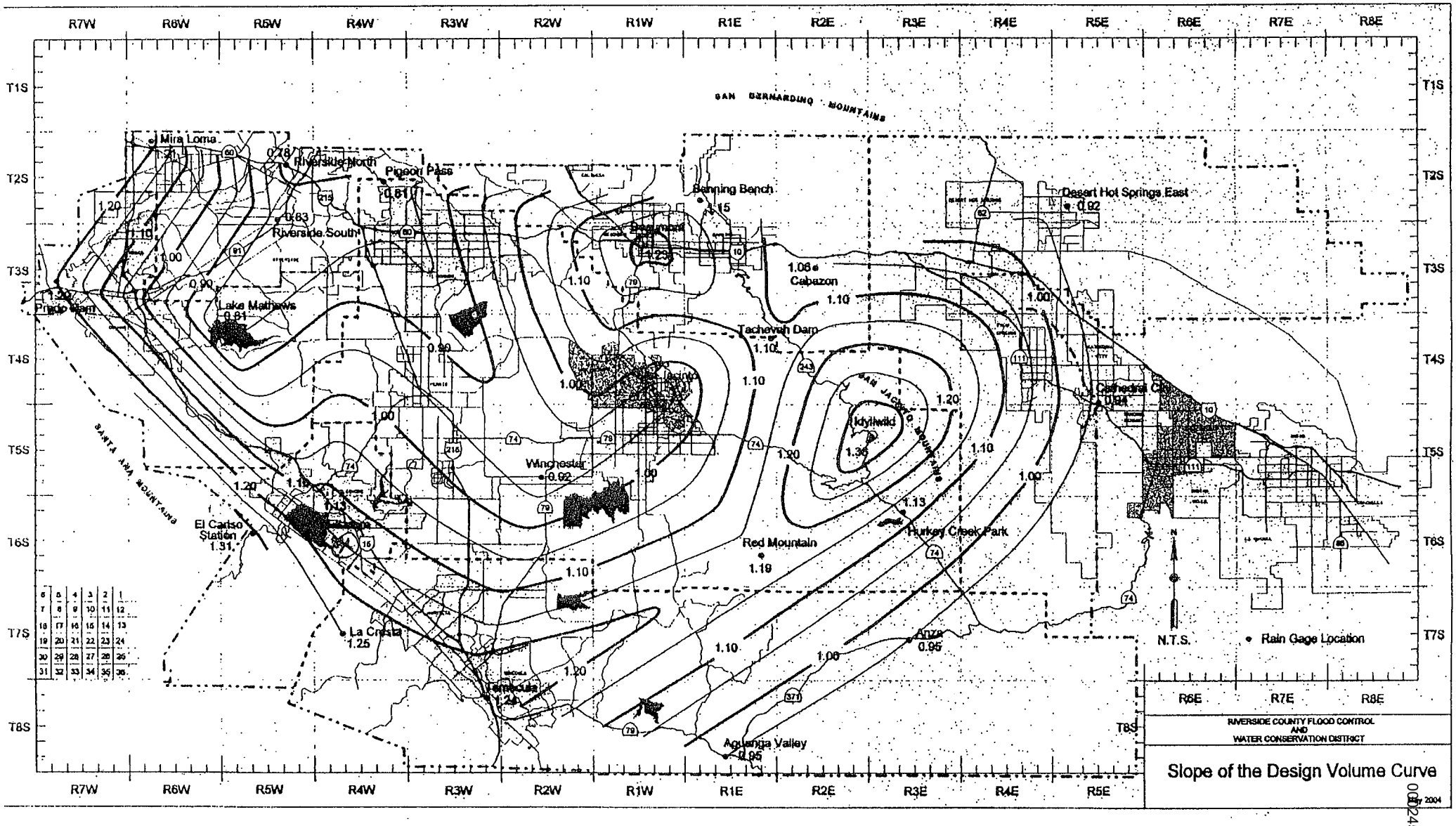
R7W
R6W
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R1W
R1E
R2E
R3E
R4E
R5E
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R7E
R8E
T1S
T2S
T3S
T4S
T5S
T6S
T7S
T8S
SAN BERNARDINO MOUNTAINS
SANTA ANA MOUNTAINS
SAN JACINTO MOUNTAINS
Mira Loma
Riverside North
Pigeon Pass
Riverside South
Lake Mathews
Banning Bench
Beaumont
Cabazon
Desert Hot Springs East
Tachevah Dam
Idyllwild
Cathedral City
Winchester
El Cariso Station
Red Mountain
Hurkey Creek Park
La Cresta
Temecula
Anza
Aguanga Valley
N.T.S.
Rain Gage Location
RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
Slope of the Design Volume Curve

Worksheet 4

Design Procedure Form for Infiltration Basin

Designer: GTM
Company: GMX
Date: 11/14/08
Project: TRACT 31993
Location: WILDOMAR

1. Determine Design Storage Volume (Use Worksheet 1) a. Total Tributary Area (maximum 50) b. Design Storage Volume, V_{BMP}	A_{total} = 12 acres V_{BMP} = 16,553 ft^3
2. Maximum Allowable Depth (D_m) a. Site infiltration rate (I) b. Minimum drawdown time (48 hrs) c. Safety factor (s) d. D_m = [(t) x (I)]/[12s]	I = 0.96 in/hr t = 72 hrs s = 3 D_m = 1.92 ft
3. Basin Surface Area $A_m = V_{BMP} / D_m$	A_m = 8,621 ft^2
4. Vegetation (check type used or describe "other")	✓ Native Grasses ✓ Irrigated Turf Grass ___ Other

Notes:

LGC INLAND, INC.
Geotechnical Consulting

October 4, 2004 Project No. I04596-10

Mr. Gary Missirian
GMX CONSTRUCTION, INC.
15335 Morrison Street, Suite 305
Sherman Oaks, California 91403

Subject: ***Geotechnical Recommendations for Construction of the Proposed Detention Basin, Assessors Parcel Numbers 368-030-056, 055, and 007, Mission Trail and Como Street in the Wildomar Area of Riverside County, California***

References: *LGC Inland, Inc., 2004, Percolation Testing for the Proposed Detention Basin, Assessors Parcel Numbers 368-030-056, 055, and 007, Mission Trail and Como Street in the Wildomar Area of Riverside County, California, Project No. I04596-10, dated September 21.*

Pursuant to your request, LGC Inland, Inc. (LGC) is providing additional recommendations for a higher design percolation rate. As discussed in the referenced report, the in-situ soils are highly variable. If during construction the clayey soils can be overexcavated and replaced with granular soils, then the design rate can be reduced by half. If the percolation rate for Test No. PP-3 is ignored, then the design average rate reduces to 70 minutes per inch (mpi).

We recommend that during rough grading that our field geologist evaluate the in-situ soils having the grading contractor remove any clayey soils and replace them with granular soils. Upon completion of rough grading, additional percolation testing can be performed in order to verify the higher design rate.

An alternate design can consist of construction of 3 to 5 feet diameter dry wells in addition to the detention basin. These dry wells would extend 20 to 40 feet below grade. The dry wells can help to further drain the surface water from the detention basin. With dry wells in addition to the detention basin, water can infiltrate into the soils both into the surface strata and deep strata.

In order to be able to design the dry wells, seepage design consisting of drilling borings to 50 feet, soil sampling and testing, and in-situ testing should be performed. The purpose of these recommendations can assist the designer from having to design a larger detention basin. Construction of a larger detention basin can be avoided with selective grading or dry wells or both.

The opportunity to be of service is appreciated. Should you have any questions regarding the content of this letter, or should you require additional information, please do not hesitate to contact this office at your earliest convenience.

Respectfully submitted,

LGC INLAND, INC.

REGISTERED PROFESSIONAL ENGINEER
STEPHEN MICHAEL POOLE
No. 692
Exp. 9.30.06
GEOTECHNICAL
STATE OF CALIFORNIA

Stephen M. Poole
Principal Engineer, GE 692

SMP/jn/ts

Distribution: (4) Addressee

LGC INLAND, INC.
Geotechnical Consulting

PERCOLATION TESTING FOR THE PROPOSED DETENTION BASIN ASSESSORS PARCEL NUMBERS 368-030-056, 055, AND 007 MISSION TRAIL AND COMO STREET IN THE WILDOMAR AREA OF RIVERSIDE COUNTY, CALIFORNIA

Project No. I04596-10

Dated: September 21, 2004

Prepared For:

Mr. Gary Missirian
GMX CONSTRUCTION, INC.
15335 Morrison Street, Suite 305
Sherman Oaks, California 91403

40935 County Center Drive · Suite A · Temecula, CA 92591 · (951) 719-1076 · Fax (951) 719-1077

SUBSURFACE EXPLORATION AND PERCOLATION TESTING

Subsurface Exploration

Subsurface exploration of the subject site consisted of one (1) deep exploratory test pit, and was conducted on September 10, 2004. The purpose of excavating the deep exploratory test pit included checking for groundwater and evidence of impermeable soil layers. Earth materials encountered within the deep exploratory test pit were classified and logged in general accordance with the visual manual procedures of the Unified Soil Classification System. The approximate location of the deep exploratory test pit is shown on the attached Percolation Test Pit Location Map, Plate 1. A log of the soils encountered within the deep exploratory test pit is presented in Appendix A.

Percolation Testing

On September 10, 2004, four (4) percolation tests were initiated to determined the percolation rate of the proposed detention basin at the subject site. The test method employed was the continuous pre-soak test procedure. The percolation tests were performed in conformance with the guidelines presented in both the referenced booklet and referenced continuous pre-soak test procedure by the RCEHSD.

The percolation tests were conducted in 7- to 8-inch diameter test holes hand excavated at the bottom of 4± to 8±-foot deep backhoe test pits. The percolation pit locations are shown on the attached Percolation Test Pit Location Map, Plate 1. Logs of the soils encountered within the percolation test pits are recorded on the Percolation Test Pit logs (PP-1 through PP-4) and are presented within Appendix A. The percolation test pits and the deep exploratory test pit were located by site topography on the site plan and existing streets. Prior to initiating the percolation tests, each test hole was first cleared of loose soils and 2 inches of ¾-inch gravel was then placed in the bottoms of the test holes. Per the RCEHSD procedures for continuous pre-soak testing, a 5-gallon water bottle filled with clear water was then inverted over each test hole.

Following the pre-soak, if all 5 gallons percolated with the tester present, the test was conducted on the same day. Otherwise, the test was conducted the day after the pre-soak was initiated, but no more than 26 hours after initiating pre-soak. Test holes with water remaining in the 5-gallon bottle after an overnight pre-soak were determined to have rates greater than 60 Minutes Per Inch (MPI), and tests on those test holes were concluded at that time. Otherwise, after presoak the test was conducted by adjusting the water level to 6 inches over the gravel prior to each of four (4) consecutive readings, or a minimum of 2 hours at time intervals that provide not less than 1-inch or more than 3 inches drop in water level. The drop in water level was measured from a fixed initial reference point for each reading. Measurements were made with a precision of ⅛-inch and after each measurement the water level was refilled to the original level within the test hole. Percolation test data recorded in the field are presented in Appendix B, and a summary of the percolation rates for the subject lots is presented on the following page.

PERCOLATION TEST RESULTS

EST # / LOT #	*EX. TEST PIT DEPTH (IN)*	*TEST HOLE DEPTH (FT)*	*PERCOLATION RATE (MPI)*	*SOIL DESCRIPTION*
PP-1	15	4	126	Clayey SAND (SC)
PP-2	15	7	21	Clayey Sandstone
PP-3	15	6	266	Clayey Sandstone
PP-4	15	8	78½	Clayey Sandstone

FINDINGS

Earth Materials

Earth materials encountered at the subject site include Pauba Formation bedrock overlain with a dark brown and medium dense clayey sand (Older Valley Fill), and a 6-inch to 1-foot thick layer of dark brown and medium dense clayey sand (artificial fill) as observed in Percolation Pit 1 and 2. In Percolation Pit 3 and 4, the Pauba Formation bedrock was overlain with 1-foot or less of strong brown loose sand (slopewash). The soils were observed to be dry to slightly moist and loose to dense in condition.

Groundwater

No groundwater was observed within the deep exploratory pit excavated at the subject site. Furthermore, there was no evidence of soil mottling or calcium carbonate concentration observed within the deep exploratory test pit that would have been indicative of a historically high groundwater level.

Percolation Test Results

The measured percolation test rates ranged from 21 to 266 MPI.

CONCLUSIONS AND RECOMMENDATIONS

General

Based on the data presented in this report and using the recommendations set forth, it is the judgment of **LGC** that there is sufficient area at the subject site to support the detention basin.

Detention Basin Design Recommendations

It is recommended that the proposed detention basin use a design percolation rate of 125 MPI. This rate represents the average of the 4 field tests. The soils encountered and the results of our field test are highly variable. During construction of the proposed detention basin, a field geologist or engineer from our office should evaluate the

exposed soils in order to evaluate if any clayey impermeable soils should be removed or be made less dense or less impermeable. The variable soil conditions can be better evaluated when the entire detention basin has been excavated. It can be determined at that time if a large area of the detention basin has impermeable soil conditions or if more permeable soils exist within the detention basin.

INVESTIGATION LIMITATIONS

This report is based upon information provided by the client and on the proposed project and geotechnical data as described herein. The materials encountered on the project site and described in other literature are believed representative of the project area and the conclusions and recommendations contained in this report are presented on that basis. However, soil materials can vary in characteristics between points of exploration, both laterally and vertically, and those variations could affect the conclusions and recommendations contained herein. As such, observation and testing by a geotechnical consultant during the construction phases of the project are essential to confirming the basis of this report. To provide the greatest degree of continuity between the design and construction phases, consideration should be given to retaining LGC for construction services.

This report has been prepared consistent with that level of care being provided by other professionals providing similar services at the same locale and time period. The contents of this report are professional opinions and as such, are not to be considered a guarantee or warranty.

This report should be reviewed and updated after a period of 1-year or if the project concept changes from that described herein. This report has not been prepared for use by parties or projects other than those named or described herein. This report may not contain sufficient information for other parties or other purposes.

The opportunity to be of service is appreciated. Should you have any questions regarding the content of this report, or should you require additional information, please do not hesitate to contact this office at your earliest convenience.

Respectfully submitted,

LGC INLAND, INC.

REGISTERED PROFESSIONAL ENGINEER
STEPHEN MICHAEL POOLE
No. 692
Exp. 12-06
GEOTECHNICAL
STATE OF CALIFORNIA

Stephen M. Poole
Vice President
Principal Engineer, GE 692

AS/SMP/jn

Distribution: (4) Addressee

Attachments: Figure 1 – Site Location Map (Rear of Text)
Figure 2 – Exploratory Test Pit and Percolation Test Pit location Map (Rear of Text)
Appendix A – Log of Exploratory Test Pit and Logs of Percolation Test Pits (Rear of Text)
Appendix B – Percolation Test Results (Rear of Text)

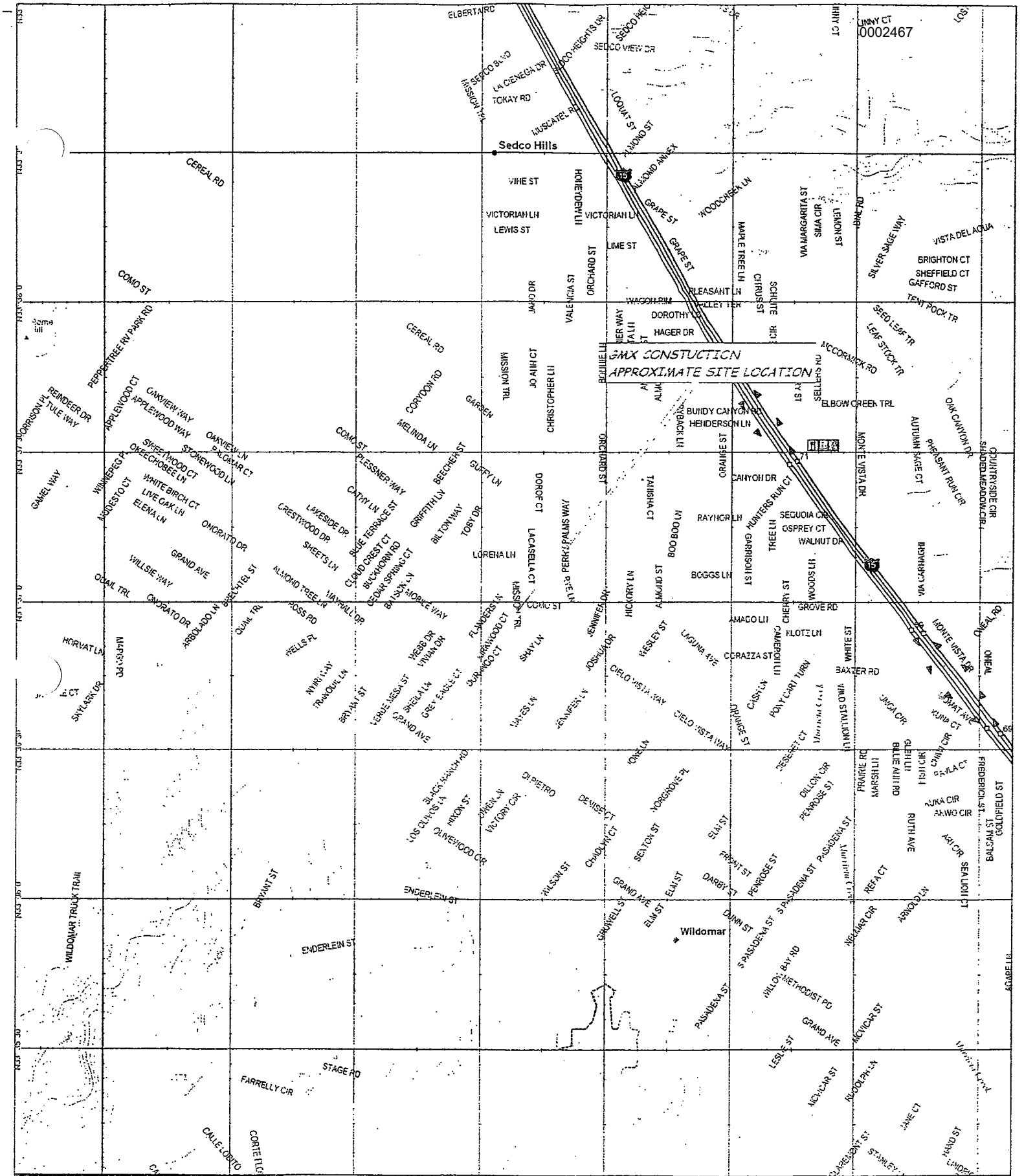

LGC INLAND

FIGURE 1

SITE LOCATION MAP

Project Name	GMX CONSTRUCTION
Project No.	104596-10
Geol./ Eng.	MB/ SMP
Scale	NOT TO SCALE
Date	SEPTEMBER 2004

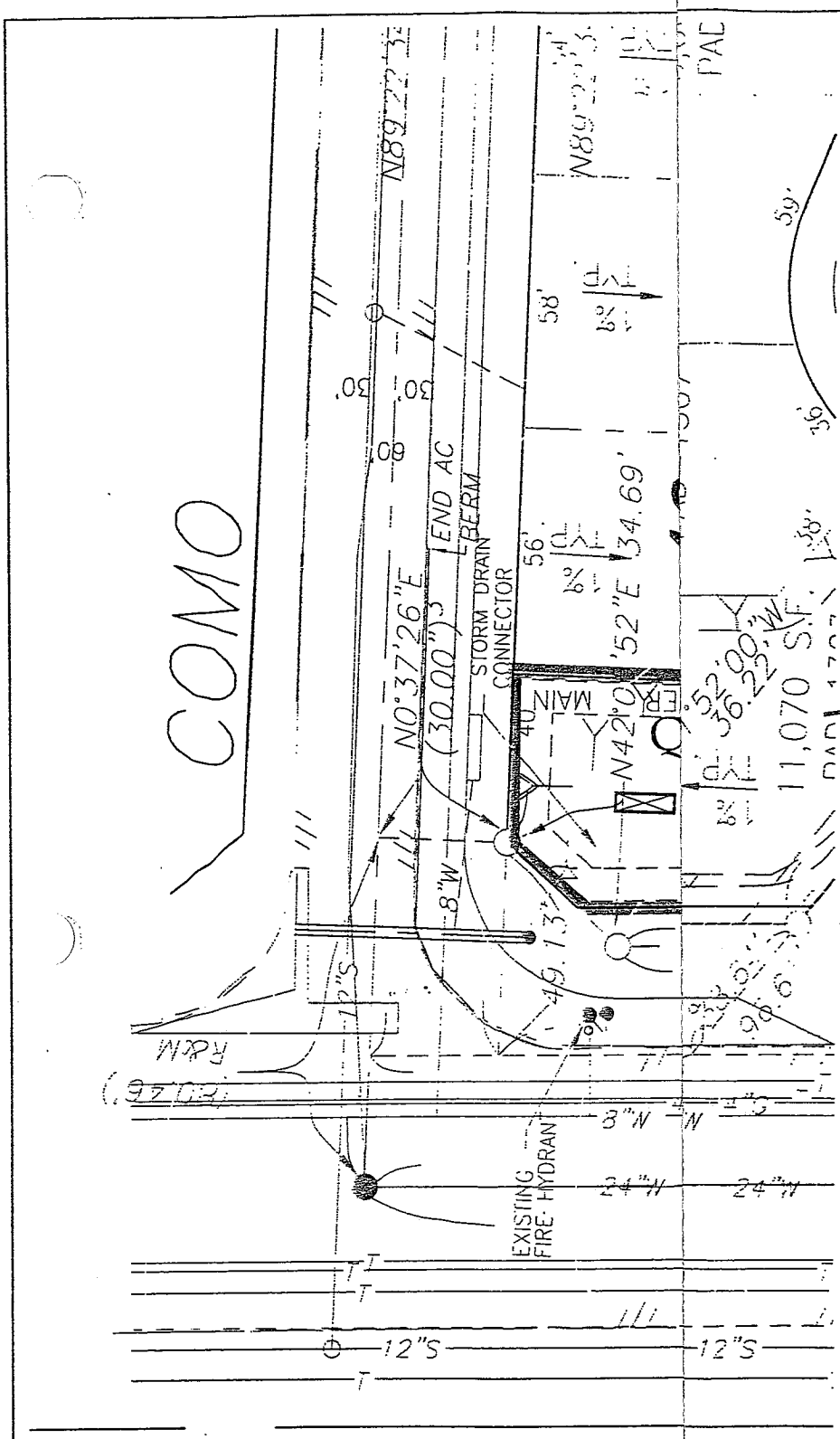

0002468

LEGEND

(Locations are Approximate)

Earth Units

Qov - Older Valley Fill

Qpfs - Pauba Formation

Symbols

- Limits of Report

- Geologic Contact

PP-4
T.D.=8'
NO G.W.

- Percolation Pit

EP-1
T.D.=15'
NO G.W.

- Exploratory Test Pit

LGC INLAND

LGC INLAND

40935 County Center Drive, Suite A
Temecula, California 92591
(951) 719-1076 Fax (951) 719-1077

DETENTION BASIN
-10
MP
EMBER 2004

Appendix G

AGREEMENTS – CC&RS, COVENANT AND AGREEMENTS AND/OR OTHER MECHANISMS FOR ENSURING ONGOING OPERATION, MAINTENANCE, FUNDING AND TRANSFER OF REQUIREMENTS FOR THIS PROJECT-SPECIFIC WQMP

CC&R HAS BEEN SUBMITTED AND APPROVED BY THE COUNTY ATTORNEY. A COPY IS ATTACHED.

ATTACHMENT C

TRAINING LOGS

NPDES STORMWATER QUALITY TRAINING FOR
Construction Training
Riverside County Flood Control & Water Conservation District

Meeting of: Monday, September 24 - 08:00 - 11:00 SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
1	Jessica	Chin	City of Riverside	Public Works	(951) 826-5760	
2	Paul	Russel	Riverside County	Transportation	(951) 955-6884	
3	Dave	Carrico	City of San Jacinto	Public Works - Streets/Storm Water	(951) 487-7386	
4	Jose	Vilchis	City of San Jacinto	Public Works - Streets/Storm Water	(951) 487-7386	
5	Rene	Upson	City of San Jacinto	Code Enforcement	(951) 487-7330	
6	Tom	Van Dorn	City of San Jacinto	Code Enforcement	(951) 487-7330	
7	Phil	Hallberg	City of San Jacinto	Code Enforcement	(951) 487-7330	
8	Lonny	Young	City of Riverside	Public Works	(951) 826-5294	
9	KENT	ALLEN	RCFC & WCD	DESIGN AND CONSTRUCTION	(951) 955-1288	
10	RAY	DUNN	RCFC & WCD	DESIGN AND CONSTRUCTION	(951) 955-1315	
11	TIM	FAGG	RCFC & WCD	DESIGN AND CONSTRUCTION	(951) 955-1236	
12	GENE	LEWIS	RCFC & WCD	DESIGN AND CONSTRUCTION	(951) 955-8561	
13	BRENT	MYTINGER	RCFC & WCD	DESIGN AND CONSTRUCTION	(951) 955-8519	
14	Erik	Sydow	Riverside County	Economic Development Agency	(951) 955-8274	
15	Gabriel	Martin	Riverside County	Economic Development Agency	(951) 955-1918	
16	Susan	James	City of Riverside	Park, Recreation and Community Services	(951) 826-2015	
17	Vic	Olmeda	Riverside County	Building and Safety	(951) 955-2095	
18	James	Stratton	Riverside County	Building and Safety	(951) 955-1835	
19	Alan	Bosia	City of Riverside	Public Works	(951) 826-5599	
20	Jack	Palomarez	City of Riverside	Public Works	951-7124470	
21	Sean	Gill	City of Riverside	Public Works	951-826-5892	
22	Eddie	Godinez	City of Moreno Valley	Land Development	(951) 413-3127	
23	Mosallam	Almasri	City of Moreno Valley	Land Development	(951) 413-3113	

51	Joe	Schupp	Riverside County	Waste Management		
52	Nate	Viste	Riverside County	Waste Management		
53	Edward	Wee Eng	Riverside County	Waste Management		
54	Bob	French	City of Calimesa	Public Works	(909) 795-9801	
55	Mike	McCabe	City of Calimesa	Public Works	(909) 795-9801	
56	Tony	Alcala	City of Calimesa	Public Works	(909) 795-9801	
57	dave	Thibault	City of Beaumont	Public Works	(951) 377-5315	
58	Dave	Ochs	City of Beaumont	Public Works	(951) 377-5315	
59	Mike	Neal	City of Beaumont	Public Works		
60	Ron	Allen	City of Beaumont	Public Works		
61	DENNIS	HARVERD	CITY OF NORCO	BUILDING INSPECT.		
62	DONALD	GERBER	COUNTY OF RIV	WASTE MGMT	951 486 3200	
63	MARK	BERG	CITY OF NORCO	BUILDING	951 270 5637	
64	ELMER	DATWIN	RIV. CO.	TRANSPORTATION	951-955 6762	
65	DAN	CUTHBERTSON	CITY OF NORCO	PUBLIC WORKS	951 735 3500	

66 MIKE RCFC WCD ~~909-909~~ 909-908-0778 Mike Rivera

24	Danny	Astorga	City of Moreno Valley	Land Development	(951) 413-3119	
25	Glen	Cox	City of Riverside	Public Util - Water Field Dep	(951) 351-6350	
26	Robert	Lucas	City of Riverside	Public Util - Water Field Dep	(951) 351-6350	
27	William	Ryan	City of Riverside	Public Util - Water Field Dep	(951) 351-6350	
28	Al	Orozco	City of Riverside	Public Util - Water Field Dep	(951) 351-6350	
29	Richard	Plogger	City of Riverside	Public Util - Water Field Dep	(951) 351-6350	
30	Duprice	Tillman	City of Riverside	Public Util - Water Field Dep	(951) 351-6350	
31	Miguel	Perez	City of Riverside	Public Util - Water Field Dep	(951) 351-6350	
32	Bradley	Kelvington	City of Riverside	Public Util - Water Field Dep	(951) 351-6350	
33	Daniel	Bertotti	City of Riverside	Public Util - Water Field Dep	(951) 351-6350	
34	Luis H.	Tapia	City of Riverside	Water Engineering	(951) 538-3456	
35	Stewart	Noble	City of Riverside	Water Engineering	(951) 826-5142	
36	dan	cuthbertson	City of Norco	Public Works	(951) 270-5607	
37	Justin	Brown	Riverside County	Waste Management		
38	Eduardo	Castellanos	Riverside County	Waste Management		
39	Art	Fuentes	Riverside County	Waste Management		
40	Brian	Hawkinson	Riverside County	Waste Management		
41	Joseph	Hickman	Riverside County	Waste Management		
42	Rob	Istik	Riverside County	Waste Management	247-1323	
43	Kevin	Joyce	Riverside County	Waste Management		
44	Scott	Kraak	Riverside County	Waste Management	951/986-3273	
45	Ben	Matye	Riverside County	Waste Management		
46	Jessica	Nguyen	Riverside County	Waste Management	951 486-3255	
47	Dan	Olea	Riverside County	Waste Management		
48	Mario	Ramirez	Riverside County	Waste Management		
49	Noah	Rau	Riverside County	Waste Management	951 486-3202	
50	Michael	Ray	Riverside County	Waste Management	951 926-1414	

NPDES STORMWATER QUALITY TRAINING FOR
Construction Training
Riverside County Flood Control & Water Conservation District

Meeting of: Tuesday, September 25 - 13:00 - 16:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
1	Ed	Lara	City of Corona	Public Works	(951) 739-4825	
2	Phuong	Hunter	City of Moreno Valley	Land Development	(951) 413-3470	
3	SAM	TERCERO	RCFC & WCD	DESIGN AND CONSTRUCTION	(951) 955-1287	
4	BARRY	TEMPLE	RCFC & WCD	DESIGN AND CONSTRUCTION	(951) 955-1315	
5	MIKE	LUNA	RCFC & WCD	DESIGN AND CONSTRUCTION	(951) 955-8516	
6	GARY	LUNDBERG	RCFC & WCD	DESIGN AND CONSTRUCTION	(951) 955-8518	
7	DARIO	SAMONTE	RCFC & WCD	DESIGN AND CONSTRUCTION	(951) 955-8534	
8	Mike	Malone	Riverside County	Building and Safety	(760) 212-8700	
9	Laurel	Mayo	Riverside County	Building and Safety	(760) 784-5379	
10	Donna	Smith	Riverside County	Building and Safety	(760) 784-0765	
11	Roger	Miller	Riverside County	Environmental Compliance Division	(951) 955-0886	
12	Rusel	Baker	Riverside County	NPDES	(951) 232-7343	
13	Usha	Kurgundd	City of Riverside	Public works	(951) 826-2495	
14	David	Hartman	City of Canyon Lake	Building Department	(951) 244-2955	
15	Gabriel	Gonzalez	City of Moreno Valley	Land Development	(951) 413-3252	
16	Joanna	Dorham	City of Moreno Valley	Land Development	(951) 413-3192	
17	Alex	Ramirez	City of Moreno Valley	Land Development	(951) 413-3123	
18	Robert	Ochoa	City of Riverside	Public Util - Water Field Dep	(951) 351-6350	
19	Mark	Ensign	City of Riverside	Public Util - Water Field Dep	(951) 351-6350	
20	Chris	Cuenca	City of Riverside	Public Util - Water Field Dep	(951) 351-6350	
21	Gregory	Prator	City of Riverside	Public Util - Water Field Dep	(951) 351-6350	
22	Paul	Gearhart	City of Riverside	Public Util - Water Field Dep	(951) 351-6350	
23	Luis	Tapia	City of Riverside	Public Util - Water Engineering	(951) 826-5755	
24	doug	norfolk	City of Norco	Public Works	(951) 270-5607	

25	Dale	Everman	City of Calimesa	Public Works	(909) 795-9801	
26	Scott	Bryant	Riverside County	Waste Management	9513122358	
27	Tim	Evans	Riverside County	Waste Management	(951) 486-3275	
28	Nimrod	Garay	Riverside County	Waste Management		
29	Donald	Gerber	Riverside County	Waste Management		
30	Jeff	Gow	Riverside County	Waste Management		
31	Mark	Hunt	Riverside County	Waste Management	486-3247	
32	Joel	Jimenez	Riverside County	Waste Management		
33	Jim	Nickell	Riverside County	Waste Management		
34	Randy	Taylor	Riverside County	Waste Management		
35	Panda	Workman	Riverside County	Waste Management		
36	Juan	Yepez	Riverside County	Waste Management		
37	Michael	McKinley	Riverside County	Waste Management		
38	Joe	Janda	City of Beaumont	Public Works	377 5360	
39	Karl	Shrader	City of Beaumont	Public Works	924 2755	
40	Al	Ignacio	City of Beaumont	Public Works	(951) 377-5790	
41	Mike	Parsons	City of Beaumont	Public Works	951 760 4910	
42	Chad	Nichols	City of Beaumont	Public Works	(951) 760 9761	
43	Chris	Trinidad	City of Beaumont	Public Works	(951) 445-7532	
44	Charles	McBride	City of Riverside	Water Utilities	(951) 826-2182	
45	Maria	Lamping	City of Riverside	Public Works Engineering	(951) 826-5146	
46	JAMES	HENKE	City of RIVERSIDE	PUBLIC WORKS WATER ENGNR	951 8583451	
47	David	Hartman	Canyon Lake	Building Dept.		
48	Richard	Morales	City of MV		909 578 8222	
49	~~Mike~~	~~Marsh~~				
50	Chuck	Peebles	C of SJ TRI LAKES	Public Works	951-634-2162	
51	James	Hutchison	TRILAKES	"	951-244-4437	

52	Douglas	Norfolk	City Of Norco	Eng. Public Works	951-545-7894	
53	John	Chesworth	City of Moreno Valley	Land Dev.	909 373-7960	
54	Terry	Huemer	City of Perris	Public Works	948-(951)6504	
55	Bob	Anderson	" "	" "	" "	
56	George	Garcia	City of Perris	" "	951 9486504	
57	Tim	Fogg	RCFC	Inspection	951 955 1236	
58	Evangeline	Zapien	RCWMD	engr	9512471674	
59	Robert	Estrada	City of Hemet	Land Dev	951377-0560	
60	Arman	Bulaong	City of Perris	Engr	951-943-6504	

CRAIG WELCH CITY OF NORCO BLDG. 951 549-7921

MARIA LAMPING CITY OF RIVERSIDE PW. ENG 951)826-5146 Maria Lamping

KEVIN JOYCE RCWMD - WASTE MANAGEMENT 951 486-3260

Jessica Chin City of Riverside PW 951 826 5760

USHA KURGUND CITY OF RIVERSIDE PW 951 826 2495

Michael McKinley Waste/County

Juan Lopez WASTE (909) 374-3688

NPDES STORMWATER QUALITY TRAINING FOR
Construction Training
Coachella Valley Water District

Meeting of: Monday, November 19 - 09:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
1	Ronald	Alexander	CVWD	Domestic Water	(760) 398-2651	
2	Raphael	Alvarada	City of La Quinta	Public Works	(760) 777-7079	
3	Agustin	Arellano	City of La Quinta	Public Works	(760) 777-7083	
4	Chad	Austin	CVWD	Stormwater	(760) 398-2651	
5	Tim	Batten	City of La Quinta	Public Works	(760) 777-7079	
6	Adolfo	Cabrera	City of La Quinta	Public Works	(760) 777-7083	
7	John	Collins	CVWD	Operations		
8	Eric	Crystal	CVWD	Stormwater	(760) 398-2651	
9	Scott	Davenport	CVWD	Operations		
10	Paul	Goble	City of La Quinta	Public Works	(760) 777-7087	
11	David	Hamner	CVWD	Construction	(760) 398-2651	
12	Fidel	Lara	CVWD	Stormwater	(760) 398-2651	
13	Francisco	Lara	CVWD	Stormwater	(760) 398-2652	
14	Antonio	Maciel	CVWD	Construction	(760) 398-2651	
15	Richard	Madrid	CVWD	Domestic Water	(760) 398-2651	
16	Bill	McAteer	City of Temecula	Public Works	(951) 694-6411	
17	Bryan	McKinney	City of La Quinta	Public Works	(760) 777-7045	
18	Alex	Menjivar	CVWD	Stormwater	(760) 398-2651	
19	Mike	Payment	City of La Quinta	Public Works		
20	Miguel	PeÃ±a	City of Indio	PW/IWA	(760) 391-4140	

NPDES STORMWATER QUALITY TRAINING FOR
Construction Training
Coachella Valley Water District

Meeting of: Monday, November 19 - 09:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
21	Demetrio	Pecina	City of La Quinta	Public Works	(760) 777-7053	
22	Allison	Powell	City of Indio	PW/Engineering Services	(760) 391-4000	Allison Powell
23	Joshua	Rakes	CVWD	Stormwater	(760) 398-2651	
24	Juan	Raya	City of Indio	PW/Engineering Services	(760) 391-4000	
25	Juan	Rey	City of La Quinta	Public Works	(714) 412-8911	
26	Ed	Rivas	CVWD	Domestic Water	(760) 398-2651	
27	Michael	Roth	Santa Ana Regional Board	Storm Water	(951) 320-2027	
28	Michael	Roth	Santa Ana Regional Board	RWQCB	(951) 320-2027	
29	Jeff	Sodia	CVWD	Domestic Water	(760) 398-2651	
30	John	Soto	CVWD	Operations	(760) 398-2651	
31	James	Staight	City of La Quinta	Public Works	(760) 777-7053	
32	Lance	Young	CVWD	Operations		
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NPDES STORMWATER QUALITY TRAINING FOR
Construction Training
Coachella Valley Water District

Meeting of: Monday, November 19 - 09:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
41						
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NPDES STORMWATER QUALITY TRAINING FOR
Construction Training
Coachella Valley Water District

Meeting of: Tuesday, November 20 - 09:00 - 12:00 SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
1	Ron	Alexander	CVWD	Domestic Water	(760) 398-2651	
2	Jim	Arender	City of La Quinta	Public Works		
3	Richard	Bennet	CVWD	Domestic	(760) 398-2651	
4	Stephanie	Blanco	Riverside County	Waste Management	(951) 486-3226	
5	Wayne	Campbell	City of La Quinta	Building & Safety	(760) 777-7098	
6	Ruben	Castaneda	City of La Quinta	Public Works	(760) 777-7083	
7	Marques	Crews	Riverside County	Waste Management	(951) 486-3226	
8	Dennis	Cross	CVWD	Stormwater	(760) 398-2651	
9	Alfonzo	Cruz	CVWD	Domestic	(760) 398-2651	
10	Elizabeth	Escatel	City of La Quinta	Building & Safety	(760) 777-7017	
11	Dan	Fewings	CVWD	Domestic	(760) 398-2651	DAN FEWINGS
12	Gabe	Garza	CVWD	Domestic	(760) 398-2651	755
13	Beto	Gonzales	City of La Quinta	Public Works	(760) 777-7083	
14	Christopher	Green	Riverside County	Waste Management	(951) 486-3226	
15	Scott	Hamilton	City of La Quinta	Public Works	(760) 777-7053	
16	David	Hamner	CVWD	Construction	(760) 398-2651	
17	Steve	Kochell	City of La Quinta	Public Works	(760) 777-7053	
18	James	Lindsey	City of La Quinta	Public Works	(760) 777-7052	
19	Joey	Lucas	CVWD	Domestic	(760) 398-2651	
20	Antonio	Maciel	CVWD	Construction	(760) 398-2651	

NPDES STORMWATER QUALITY TRAINING FOR
Construction Training
Coachella Valley Water District

Meeting of: Tuesday, November 20 - 09:00 - 12:00 SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
21	Tony	Maciel	CVWD	Service	(760) 398-2651	
22	Richard	Madrid	CVWD	Domestic Water	(760) 398-2651	R. A. MADRID
23	Alex	Martinez	City of La Quinta	Public Works	(760) 777-7053	
24	Scott	McCue	CVWD	Stormwater	(760) 398-2651	
25	Patrick	McDaniel	CVWD	Stormwater	(760) 398-2651	
26	Fernando	Mecate	CVWD	Stormwater	(760) 398-2651	Fernando Mecate
27	Jim	Mikkelson	Riverside County	Waste Management	(951) 486-3226	
28	Jackie	Misuraca	City of La Quinta	Building & Safety	(760) 777-7021	
29	Joe	Morales	CVWD	Domestic	(760) 398-2651	
30	Jim	Nickell	Riverside County	Waste Management	(951) 486-3226	Jim Nickell
31	Noah	Rau	Riverside County	Waste Management	(951) 486-3226	
32	Ed	Rivas	CVWD	Domestic Water	(760) 398-2651	
33	Joe	Schupp	Riverside County	Waste Management	(951) 486-3226	
34	Jeff	Sodia	CVWD	Domestic Water	(760) 398-2651	
35	Daniel	Valenzuela	City of La Quinta	Public Works	(760) 777-7096	
36	Patrick	Watson	Riverside County	Transportation Department	(760) 863-8267	
37	Bob	Wilson	City of La Quinta	Public Works		RWilson
38	Ed	Wimmer	City of La Quinta	Public Works	(760) 777-7088	
39	Tony	Woods	CVWD	Stormwater	(760) 398-2651	
40	DAN	YORK	City of Temecula	PUBLIC WORKS	(951) 694-6411	

NPDES STORMWATER QUALITY TRAINING FOR
Construction Training
Coachella Valley Water District

Meeting of: Tuesday, November 20 - 09:00 - 12:00 SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
41	Mike	Lynch	City of Banning	Water	922-3330	
42	David	Martinez	" "	Water	922-3330	
43	Bill	Russell	"	"	951 922-3330	
44	Warren	Wakefield	" "	"	"	
45	Gabriel	Novello	" "	Water	"	
46	Chris	Green	County Riv.	Waste	(951)522-0860	
47	Marquies	Greene	County Riv.	Waste	(951)314-7752	
48	Scott	Hamilton	La Quinta	Public Work	760 777-7053	
49	Dan	Gonzalez	La Quinta	Public Works	(760)777-7053	
50	Ruben	Castanon	La Quinta	Public Works	(760)777-7050	
51	James	Lindsey	LQ	Public Works	777-7052	
52	Jim	Mikkelson	RCWMD	Waste Mngmt	951-486032	
53	Richard	Bennett	CVWD	Domestic	760 9021050	
54	Joey	Lucas	CVWD	Domestic	760 832-1410	
55	Joe	Schopf	County Riverside	Waste	951-323-1171	
56	James	Waseli	County of Riv.	Waste	951 312-7315	
57	Juan	Raya	City of Indio	Engineering	391-4017	
58	Jim	Horton	CVWD	Stormwater	—	
59	Rene'	Luna	CVWD	Stormwater	398-2661	
60						

NPDES STORMWATER QUALITY TRAINING FOR
Industrial/Commercial Training
Riverside County Flood Control & Water Conservation District

Meeting of: Tuesday, November 27 - 09:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
1	Tony	Alcala	City of Calimesa	Public Works	909-795-9801	
2	Charles	Allessi	City of Riverside	Public Works (Sewer Division)		
3	Sandy	Arnett	Riverside County	Department of Environmental Health	(951) 766-2824	
4	Bonnesa	Arpa	Riverside County	Department of Environmental Health	(951) 766-2824	
5	Xente	Baker	City of Corona	Fire	(951) 736-2257	
6	Heidi	Barrios	Riverside County	Department of Environmental Health	(951) 766-2824	
7	Johnny	Bennett	City of Riverside	Public Works (Sewer Division)	(951) 351-6178	
8	Christina	Bowser	City of Beaumont	Code Enforcement	(951) 572-3234	
9	Andrea	Briones	Riverside County	DES	(951) 358-5172	
10	Celina	Cabrera	City of Beaumont	Code Enforcement	(951) 572-3234	
11	Elizabeth	Capps	Riverside County	Environmental Health	(951) 273-9140	
12	Mary	Cartagena	Riverside County	Environmental Health	(951) 358-5172	
13	Brent	Casey	Riverside County	DES	(951) 358-5172	
14	Alex	Chang	City of Riverside	Public Works (Sewer Division)		
15	Jose	Chavez	Riverside County	Environmental Health		
16	Jessica	Chin	City of Riverside	Public Works		
17	Chris	Cordova	City of Beaumont	Code Enforcement	(951) 769-8529 (951) 572-3234	
18	Jerome	Coyazo	City of Riverside	Public Works (Sewer Division)		
19	Sarah	Crossman	Riverside County	DES	(951) 358-5172	
20	Ana Dalia	Cruz	City of Beaumont	Public Works	951-769-6999	

NPDES STORMWATER QUALITY TRAINING FOR
Industrial/Commercial Training
Riverside County Flood Control & Water Conservation District

Meeting of: Tuesday, November 27 - 09:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
21	Sandi	DeLao	Riverside County	DES	(951) 358-5172	
22	Fritzy	Devera	Riverside County	Environmental Health	(951) 358-5172	
23	David	Duffy	City of Corona	Fire	(951) 736-2459	
24	Rolando	Espejo	City of Riverside	Environmental	(951) 479-0860	
25	Katheline	Fong	Santa Ana Regional Board	RWQCB	(951) 774-0114	Kathleen Fong
26	Ralph	Fregoso	Riverside County	DES	(951) 358-5172	
27	Bob	French	City of Calimesa	Public Works	909-795-9801 ext. 235	
28	Brandon	Gronlund	City of Riverside	Public Works (Sewer Division)		
29	Leonard	Gutierrez	City of Riverside	Public Works (Sewer Division)		
30	Michael	Gutierrez	City of Corona	Fire	(951) 736-2218	
31	My	Ha	Riverside County	Department of Environmental Health	(951) 766-2824	
32	Steven	Hooper	City of Riverside	Public Works	(951) 351-6076	
33	Antonio	Islas	Riverside County	DES	(951) 358-5172	
34	Rick	Jackson	City of Riverside	Public Works (Sewer Division)		
35	Kristine	Kim	Riverside County	Environmental Health		
36	Tim	King	City of Riverside	Environmental Compliance	(951) 712-2525	
37	Marcus	Leso	City of Riverside	Public Works	(951) 351-6145	
38	Jeff	Lojeski	Riverside County	Environmental Health	(951) 358-5172	
39	Alberto	Lopez	Riverside County	Department of Environmental Health	(951) 766-2824	
40	Kristin	Lorge	Riverside County	Department of Environmental Health	(951) 766-2824	

NPDES STORMWATER QUALITY TRAINING FOR
Industrial/Commercial Training
Riverside County Flood Control & Water Conservation District

Meeting of: Tuesday, November 27 - 09:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
41	Jim	Madril	City of Riverside	Public Works (Sewer Division)		
42	Jenay	Marcotte	Riverside County	Environmental Health	(951) 358-5172	Eugenie Marcotte
43	Mike	McCabe	City of Calimesa	Public Works	909-795-9801	
44	Pete	McKay	City of Riverside	Public Works (Sewer Division)		
45	David	Moran	Riverside County	Environmaental Health Department	(951) 358-5172	D Moran
46	Anthony	Moreno	City of La Quinta	Building & Safety	(760) 777-7034	Anthony Moreno
47	George	Munoz	City of Riverside	Public Works	(951) 351-6145	George A. Munoz
48	Farida	Naceem	City of Murrieta	Public Works	951-461-6075	Farida Y. Naceem
49	Richard	Nugent	City of Riverside	Public Works (Sewer Division)		
50	Cynthia	Overby	City of Beaumont	Code Enforcement	(951) 572-3234	Cynthia Overby
51	Roger	Pauley	City of Riverside	Public Works (Sewer Division)		
52	Allen	Pielin	City of Riverside	Public Works	(951) 351-6072	Allen Pielin
53	Lester	Powell	Riverside County	DES	(951) 358-5172	
54	Kimberly	Powers	City of Corona	Fire	(951) 279-3775	
55	Roy	Reed	City of Riverside	Public Works (Sewer Division)		Roy E. Reed
56	Greg	Reyes	Riverside County	Environmental Health	(951) 358-5172	
57	Addi	Rodriguez	City of Riverside	Public Works (Sewer Division)		
58	Jose	Rodriguez	City of Riverside	Public Works (Sewer Division)		
59	Jason	Roy	Riverside County	Department of Environmental Health	(951) 766-2824	
60	Enrique	Rueda	Riverside County	Environmental Health	(951) 273-9140	E. Rueda

NPDES STORMWATER QUALITY TRAINING FOR
Industrial/Commercial Training
Riverside County Flood Control & Water Conservation District

Meeting of: Tuesday, November 27 - 09:00 - 12:00

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	First Name	Last Name	Municipality	Department	Phone No	Signuature
61	Larry	Salazar	City of Riverside	Public Works	(951) 351-6145	
62	Dena	Sampel	Riverside County	Environmental Health		
63	Cindi	Schmitz	City of Corona	Fire	(951) 736-2464	C Schmitz
64	Cindy	Snavely-Peck	City of Riverside	Public Works	(951) 351-6145	
65	Jim	Steele	City of Riverside	Public Works (Sewer Division)		
66	Daisy	Tepetitla	Riverside County	Environmental Health		Daisy E. Tepetitla
67	Eric	Tighe	City of Riverside	Public Works (Sewer Division)		
68	Tino	Torrez	City of Riverside	Public Works (Sewer Division)		
69	Jess	Trinidad	Riverside County	Environmental Health		
70	Teresa	Wills	Riverside County	Environmental Health	(760) 320-1048	
71	Michael	Yasmer	City of Riverside	Public Works	(951) 351-6145	
72	ALDO	LICITRA	CITY OF TEMECULA	"		
73	Celina	Cabrera	City of Beaumont	Building/ Code	951 572-3234	Celina Cabrera
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NPDES STORMWATER QUALITY TRAINING FOR
Municipal Training
Riverside County Flood Control & Water Conservation District

Meeting of: Tuesday, November 27 - 13:00 - 16:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
21	Pavel	Horn	City of Catherdal City	Engineering	(760) 770-0329	
22	Dave	Huster	City of San Jacinto	Community Development	(951) 487-7330	
23	Anna	Knott	City of Riverside	Public Works	(951) 351-6247	
24	Steve	Kupsak	City of Moreno Valley	Parks and Community Services	(951) 413-3702	
25	Cristina	Leal	City of Catherdal City	Engineering	(760) 770-0327	
26	Kevin	McClintock	City of Riverside	Public Works	(951) 351-6247	
27	Steve	Mucelli	City of Hemet	Public Works	(951) 765-3712	
28	David	Navarro	City of Corona	Public Works	(951) 736-2301	
29	Geneva	Nelson	RCFC & WCD	Maint.	(951) 955-1558	
30	Geneva	Nelson	RCFC & WCD	Maint.	(951) 955-1558	
31	Lee	Olvera	City of Corona	Public Works-Fleet	(951) 279-3523	
32	Travis	Peterson	City of Hemet	Public Works	(951) 765-3712	Travis Peterson
33	Janet	Purchase	City of Riverside	Public Works	(951) 351-6247	Janet Purchase
34	James	Rath	City of Riverside	Public Works	(951) 351-6247	
35	Anthony	Rivera	City of Corona	Public Works-Fleet	(951) 279-3523	
36	Ruben	Rodriguez	Riverside County	Riverside Co Regional Park and Open Space District	(951) 906-9326	
37	Bob	Rooker	City of Corona	Public Works-Fleet	(951) 736-2485	
38	Alfonso	Ruiz	City of Corona	Public Works	(951) 736-2301	Alfonso R
39	Mario	Ruvalcaba	City of Corona	Public Works	(951) 736-2301	
40	Steve	Schmidt	City of Corona	Public Works	(951) 736-2301	

NPDES STORMWATER QUALITY TRAINING FOR
Municipal Training
Riverside County Flood Control & Water Conservation District

Meeting of: Tuesday, November 27 - 13:00 - 16:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signature
41	Jeff	Smith	City of Riverside	Public Works	(951) 351-6247	
42	Kevin	Smith	Riverside County	Park and Open Space District	(951) 677-6951	
43	Mark	Squires	Riverside County	Waste Management	(951) 486-3226	
44	Kathy	Swanson	City of Riverside	Public Works	(951) 351-6247	
45	Guy	Tanaka	City of Riverside	Public Works	(951) 351-6247	
46	Loren	Thoe	City of Corona	Public Works	(951) 736-2301	
47	Rene	Upson	City of San Jacinto	Community Development	(951) 487-7330	
48	Andre	Valenciana	City of Corona	Public Works	(951) 736-2301	
49	Barry	Verdusco	City of Moreno Valley	Public Works Dept	(951) 413-3498	
50	Linda	Wieczorek	City of Moreno Valley	Administrative Services/Animal Services	(951) 413-3799	
51	Kim	Williams	City of Riverside	Public Works	(951) 351-6247	
52	Alfonso	Zubia	City of San Jacinto	Public Works - Streets/Storm Water	(951) 487-7386	
53	Robert	Florez	City of Moreno Valley	P/W	951) 413-3421	
54	Tony	Silvas	City of Moreno Valley	P/W	951 413-3488	
55	Lee	Mendoza	City of Corona	Parks Department	951-804-3377	
56	Frank	Zaudivar	City San Jacinto	Stormwater		
57	Rick	DeGen	City of Corona	Parks & Community Services	951-736-2245	
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NPDES STORMWATER QUALITY TRAINING FOR
Municipal Training
Riverside County Flood Control & Water Conservation District

Meeting of: Tuesday, November 27 - 13:00 - 16:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
1	Benjamin	Aborita	Riverside County	Waste Management	(951) 486-3226	
2	Erik	Aguilar	City of Corona	Public Works	(951) 736-2301	
3	Ronald J	Baxter	Riverside County	Regional Parks	(951) 637-6984	
4	Dan	Bogan	Riverside County	Parks	(951) 906-9334	
5	R.W.	Broos	City of Hemet	Public Works	(951) 765-3712	
6	Kenneth	Brown	City of Corona	Public Works-Fleet	(951) 736-2307	
7	Steve	Bustillos	City of Corona	Public Works	(951) 736-2301	
8	Jessica	Chin	City of Riverside	Public Works	(951) 826-5760	
9	Gary	Costin	Riverside County	Transportation Department	(951) 737-2310	
10	Jay	Crane	City of Hemet	Public Works	(951) 765-3712	
11	Gayle	Cuneo	RCFC & WCD	Maintenance	(951) 955-1311	
12	Vincent	Denman	City of Corona	Public Works-Fleet	(951) 736-2306	
13	Kirk	Devries	City of Moreno Valley	Fleet Services	(951) 413-3166	
14	Jesse	Encino	City of Corona	Public Works	(951) 736-2301	
15	Robert	Filiar	City of Riverside	Public Works	(951) 351-6247	
16	Walter	Firlit	City of Moreno Valley	Fleet Services	(951) 413-3166	
17	Zachary	Foster	City of Moreno Valley	Special Districts	(951) 413-3484	
18	Gil	Gonzalez	City of San Jacinto	Public Works - Streets/Storm Water	(951) 487-7386	
19	Michael	Greisinger	City of Corona	Public Works-Fleet	(951) 279-3523	
20	Fernando	Gutierrez	City of Corona	Public Works	(951) 736-2301	
	TIM	King	City of Riverside	Environmental Compliance	(951) 712-2525	

NPDES STORMWATER QUALITY TRAINING FOR
Municipal Training
Riverside County Flood Control & Water Conservation District

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21	Pavel	Horn	City of Catherdal City	Engineering	(760) 770-0329	
22	Dave	Huster	City of San Jacinto	Community Development	(951) 487-7330	
23	Anna	Knott	City of Riverside	Public Works	(951) 351-6247	
24	Steve	Kupsak	City of Moreno Valley	Parks and Community Services	(951) 413-3702	
25	Cristina	Leal	City of Catherdal City	Engineering	(760) 770-0327	
26	Kevin	McClintock	City of Riverside	Public Works	(951) 351-6247	
27	Steve	Mucelli	City of Hemet	Public Works	(951) 765-3712	
28	David	Navarro	City of Corona	Public Works	(951) 736-2301	
29	Geneva	Nelson	RCFC & WCD	Maint.	(951) 955-1558	
30	Geneva	Nelson	RCFC & WCD	Maint.	(951) 955-1558	
31	Lee	Olvera	City of Corona	Public Works-Fleet	(951) 279-3523	
32	Travis	Peterson	City of Hemet	Public Works	(951) 765-3712	
33	Janet	Purchase	City of Riverside	Public Works	(951) 351-6247	
34	James	Rath	City of Riverside	Public Works	(951) 351-6247	
35	Anthony	Rivera	City of Corona	Public Works-Fleet	(951) 279-3523	
36	Ruben	Rodriguez	Riverside County	Riverside Co Regional Park and Open Space District	(951) 906-9326	
37	Bob	Rooker	City of Corona	Public Works-Fleet	(951) 736-2485	
38	Alfonso	Ruiz	City of Corona	Public Works	(951) 736-2301	
39	Mario	Ruvalcaba	City of Corona	Public Works	(951) 736-2301	
40	Steve	Schmidt	City of Corona	Public Works	(951) 736-2301	
	AL	PIELIN	CITY OF RIVERSIDE	PUBLIC WORKS	951 351-6072	
	Mike	Yasmer	"	"	951-351-6143	

NPDES STORMWATER QUALITY TRAINING FOR
Municipal Training
Riverside County Flood Control & Water Conservation District

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	First Name	Last Name	Municipality	Department	Phone No	Signuature
41	Jeff	Smith	City of Riverside	Public Works	(951) 351-6247	
42	Kevin	Smith	Riverside County	Park and Open Space District	(951) 677-6951	
43	Mark	Squires	Riverside County	Waste Management	(951) 486-3226	
44	Kathy	Swanson	City of Riverside	Public Works	(951) 351-6247	
45	Guy	Tanaka	City of Riverside	Public Works	(951) 351-6247	
46	Loren	Thoe	City of Corona	Public Works	(951) 736-2301	
47	Rene	Upson	City of San Jacinto	Community Development	(951) 487-7330	
48	Andre	Valenciana	City of Corona	Public Works	(951) 736-2301	
49	Barry	Verdusco	City of Moreno Valley	Public Works Dept	(951) 413-3498	
50	Linda	Wieczorek	City of Moreno Valley	Administrative Services/Animal Services	(951) 413-3799	
51	Kim	Williams	City of Riverside	Public Works	(951) 351-6247	
52	Alfonso	Zubia	City of San Jacinto	Public Works - Streets/Storm Water	(951) 487-7386	
53	Tino	Torrez	City of Riverside	Collections		
54	Kathleen	Fong	Regional Board			
55	Rolando	Espejo	PCI	Environmental	9514790860	
56	Leonardo	Gutierrez	City of Riverside	Public Works		
57	RICHARD	NUGENT	CITY OF RIVERSIDE	PUBLIC WORKS		
58	CHRIS	CORDOVA	City of Beaumont	Building Dept.	9517698529	
59	Celina	Cabrera	City of Beaumont	Code Enf.	951 572-3234	
60	Brandon	Gronland	City of Riverside	Public Works		
61	Jose	Chavez	Riverside County	DES	760 320 1048	
	Teresa	Wills	Riv. Co	DES	760 320 1048	

NPDES STORMWATER QUALITY TRAINING FOR
Municipal Training
Riverside County Flood Control & Water Conservation District

Meeting of: Wednesday, November 28 - 09:00 - 12:00

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	First Name	Last Name	Municipality	Department	Phone No	Signuature
1	Danny	Astorga	City of San Jacinto	Public Works - Streets/Storm Water	(951) 487-7386	Danny Astorga
2	Tom	Baier	City of Moreno Valley	Maintenance & Operations		Thomas Baier
3	Erwin	Barton	City of Moreno Valley	Maintenance & Operations	951-413-3168	Erwin Barton
4	Craig	Bone	City of Moreno Valley	Maintenance & Operations	(951) 764-5757	
5	Scott	Bryant	Riverside County	Waste Management	(951) 486-3226	
6	Dennis	Buckle	City of Moreno Valley	Maintenance & Operations		
7	Margie	Cabrera	City of Corona	Public Works-Fleet	(951) 279-3523	Margie Cabrera
8	Richard	Castellano	City of Hemet	Public Works	(951) 765-3712	Richard Castellano
9	Gordon	Cawthon	City of Corona	Public Works-Fleet	(951) 279-3523	
10	George	Chang	City of Moreno Valley	Maintenance & Operations	951 413-3160	George Chang
11	Deby	Conrad	City of La Quinta	Building & Safety	(760) 777-7022	Deby Conrad
12	FELROS	DEVERA	City of Beaumont	Engineering	(951) 541-3982	
13	Gary	Dewees	City of Corona	Parks and Community Services	(951) 279-3754	Gary Dewees
14	Michelle	Douglas	City of Riverside	Fire	(951) 826-5582	Michelle Douglas
15	Brian	Durfee	City of Moreno Valley	Maintenance & Operations	(951) 413-3160	
16	Walt	Edmiston	City of Corona	Parks and Community Services	(951) 279-3753	
17	LaDonna	Eldridge	City of Corona	Parks and Community Services	(951) 739-4982	LaDonna Eldridge
18	Crestino	Esparza	City of Hemet	Public Works	(951) 765-3712	Crestino Esparza
19	Alfred	Fierro	City of Moreno Valley	Maintenance & Operations	(951) 413 3160	Alfred Fierro
20	Jesse	Fierro	City of Riverside	Public Works	(951) 351-6247	Jesse Fierro

NPDES STORMWATER QUALITY TRAINING FOR
Municipal Training
Riverside County Flood Control & Water Conservation District

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	First Name	Last Name	Municipality	Department	Phone No	Signuature
21	Katheline	Fong	Santa Ana Regional Board	RWQCB	(951) 774-0114	Kathleen Fong
22	Nimrod	Garay	Riverside County	Waste Management	(951) 486-3226	Ngaray
23	Alex	Garcia	City of San Jacinto	Public Works - Streets/Storm Water	(951) 487-7386	Alex Garcia
24	Valin	Gray	City of Moreno Valley	Special Districts	(951) 413-3498	Valin Gray
25	Jerry	Gregory	Riverside County	Waste Management	(951) 486-3226	Jerry E. Gregory
26	Art	Groeneveld	City of Corona	Parks and Community Services	(951) 279-3567	[illegible]
27	Mark	Halman	City of San Jacinto	Public Works - Streets/Storm Water	(951) 487-7386	[illegible]
28	John	Holmes	City of San Jacinto	Public Works - Streets/Storm Water	(951) 487-7386	John P. Holmes
29	George	Jackson	City of Corona	Parks and Community Services	(951) 739-4991	[illegible]
30	Mark	Kaminski	City of Corona	Public Works-Fleet	(951) 279-3523	[illegible]
31	Scott	Kraak	Riverside County	Waste Management	(951) 486-3226	[illegible]
32	Lyndon	Lorance	City of Norco	Public Works	(951) 270-5607	Lyndon Lorance
33	Ramon	Lozano	Riverside County	Waste Management	(951) 486-3226	Ramon Lozano
34	Ruben	Macias	City of Banning	Street	(951) 922-3286	Ruben Macias
35	Tony	Macias	City of Moreno Valley	Maintenance & Operations	951-443-3125	Tony Macias
36	Billy	Mandap	City of Moreno Valley	Maintenance & Operations	951-697-6574	[illegible]
37	Joshua	Martinez	City of Hemet	Public Works	(951) 765-3712	[illegible]
38	Jim	Mikkelson	Riverside County	Waste Management	(951) 486-3226	[illegible]
39	Jeffrey	Mitchell	Riverside County	Waste Management	(951) 486-3226	[illegible]
40	brian	olsen	City of Norco	Public Works	(951) 270-5607	[illegible]

NPDES STORMWATER QUALITY TRAINING FOR
Municipal Training
Riverside County Flood Control & Water Conservation District

Meeting of: Wednesday, November 28 - 09:00 - 12:00

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	First Name	Last Name	Municipality	Department	Phone No	Signuature
41	Sergio	Ortiz	City of San Jacinto	Community Development	(951) 487-7330	
42	Alex	Palacios	City of Corona	Parks and Community Services	(951) 279-3754	
43	Ron	~~Pace~~ LOWE	City of Hemet	Public Works	(951) 765-3712	
44	Art	Rose	City of Hemet	Public Works	(951) 765-3712	
45	John	Russo	City of Hemet	Public Works	(951) 765-3712	
46	Leon	Schrader	City of Moreno Valley	Fleet Services	(951) 413-3166	
47	David	Serna	City of Moreno Valley	Maintenance & Operations		
48	Matt	Sheftick	City of Corona	Public Works-Fleet	(951) 736-2307	
49	Vince	Smith	City of Moreno Valley	Fleet Services	(951) 413-3166	
50	Stephen	Szueber	City of Corona	Public Works-Fleet	(951) 736-2302	
51	Ted	Teagarden	City of Corona	Parks and Community Services	(951) 279-3754	Ted Teagarden
52	Brian	Thompson	City of Moreno Valley	Maintenance & Operations	951-413-3160	
53	David	Thompson	City of Hemet	Public Works	(951) 765-3712	
54	Joshua	Tiley	City of Moreno Valley	Maintenance & Operations	951-204-5094	
55	Scott	Tyma	City of Hemet	Public Works	(951) 765-3712	
56	Paul	Valdez	City of Riverside	Public Works	(951) 351-6247	Paul Valdez
57	Tom	Van Dorn	City of San Jacinto	Community Development	(951) 487-7330	T. Van D
58	Larry	Williams	City of Moreno Valley	Public Works	(951) 413-3165	Larry Williams
59	Jeff	Woodley	City of Banning	Street	(951) 922-3286	Jeff Woodley
60	Kimberly	Zottneck	City of Riverside	Fire Department	(951) 826-5478	Kimberly Zottneck

NPDES STORMWATER QUALITY TRAINING FOR
Municipal Training
Riverside County Flood Control & Water Conservation District

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	First Name	Last Name	Municipality	Department	Phone No	Signuature
61	RON	DeHOOP	CITY OF CORONA	PARKS	453-2265	
62	Scott	Bryant	County of Riv	Waste	9122383	
63	Kathy	Swanson	City of Riverside	Landscaping	237-8408	
64	NAM	LUU	CITY OF CORONA	PARKS	739-4966	
65	Kevin	McClintock	City of Riv.	PW Streets	453-4590	K. McClintock
66	ANA	CRUZ	CITY OF BEAUMONT	PW Dept.	951-769-6999	
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Jeff's class

NPDES STORMWATER QUALITY TRAINING FOR
WQMP Training
Riverside County Flood Control & Water Conservation District

Meeting of: Wednesday, November 28 - 13:00 - 17:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
1	Daisy	Barreto	RCFC & WCD	Planning Division - Plan Check 2 Section Engineering Services	(951) 955-1269	Daisy Barreto
2	Jessica	Chin	City of Riverside	Public Works		
3	Tony	Colarossi	City of La Quinta	Public Works	(760) 777-7089	Tony Colarossi
4	Ana Dalia	Cruz	City of Beaumont	Public Works	(951) 769-6999	
5	Donald	Delgadillo	RCFC & WCD	Planning Division - Plan Check 2 Section	(951) 955-4683	
6	Robert	Florez	City of Moreno Valley	Public Works	(951) 413-3471	
7	Kathleen Katheline	Fong	Santa Ana Regional Board	RWQCB	(951) 774-0114	Kathleen Fong
8	Josh	Frohman	City of Moreno Valley	Land Development	(951) 413-3251	Josh Frohman
9	Jeff	Fulton	RCFC & WCD	Plan Check	(760) 479-2939	
10	Kyle	Galleup	RCFC & WCD	Planning	(951) 955-4050	
11	Komy	Ghods	RCFC & WCD	Design and Construction	(951) 955-2511	
12	Vicente	Giron	City of Moreno Valley	Public Works/Land Development	(951) 413-3120	Vicente B. Giron
13	Brian	Guillot	City of Banning	Planning	(951) 922-4842	
14	Imad	Guirguis	RCFC & WCD	Planning	(951) 955-1282	Imad M. Guirguis
15	Clement	Jimenez	City of Moreno Valley	Public Works - Land Development	(951) 413-3121	
16	Vikki	Kuntz	Riverside County	Facilities Management	(951) 955-0166	
17	Ed	Lara	City of Corona	Public Works	(951) 739-4825	
18	Debra	Leight	City of Riverside	Community Development-Planning Division	(951) 826-5874	
19	Ed	Lotz	RCFC & WCD	Flood Control	(951) 955-1200	Ed Lotz
20	Maria	Macario	Santa Ana Regional Board	Inland Stormwater	(951) 321-4583	Maria E. Macario

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NPDES STORMWATER QUALITY TRAINING FOR
WQMP Training
Riverside County Flood Control & Water Conservation District

Meeting of: Wednesday, November 28 - 13:00 - 17:00

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	First Name	Last Name	Municipality	Department	Phone No	Signuature
21	Alberto	Martinez	RCFC & WCD	Development Review	(951) 955-1917	
22	Randy	McDaniel	City of Riverside	Park Planning	(951) 826-2006	
23	Rachel	McLure	City of Riverside	Parks, Recreation, and Community Services	(951) 826-2028	
24	Amy	McNeill	RCFC & WCD	Design	(951) 955-1268	
25	Edward	Perez	RCFC & WCD	Plan Check	(714) 750-7275	
26	Derek	Petersen	RCFC & WCD	Plan Check	(619) 920-6430	
27	Edwin	Quinonez	RCFC & WCD	Design	(951) 955-8627	
28	Michael	Roth	Santa Ana Regional Board	RWQCB	(951) 320-2027	
29	Mark	Sambito	City of Moreno Valley	Public Works/Land Development	(951) 413-3120	
30	Michael	Schuman	City of Moreno Valley	Public Works / Land Developement	(951) 413-3126	
31	Mike	Shetler	Riverside County	Executive Office	(951) 955-1186	
32	Emily	Stadnik	City of Corona	Public Works	(951) 817-5741	
33	Mark	Wills	RCFC & WCD	Development Review	(951) 955-1214	
34	Mike	Wong	RCFC & WCD	Design	(951) 955-1205	
35	Cenk	Yavas	Riverside County	Plan Check	(714) 750-7275	
36	Leonard	Albano	City of Riverside	Public Works	(951) 826-5769	
37	Claudia	Steiding	County of Riverside	DOFM	(951) 955-8174	
38	Dan	York	City of Temecula	Public Works	951.694.6411	
39	Tina	Tuson	RCFC	NPDES	(951) 955-8002	
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NPDES STORMWATER QUALITY TRAINING FOR
WQMP Training
Riverside County Flood Control & Water Conservation District

Meeting of: Thursday, November 29 - 13:00 - 17:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
1	SALEEM	BAIG	Riverside County	TRANSPORTATION	(951) 955-6874	
2	Monte	Bowers	RCFC & WCD	plan check consultant	(858) 451-6100	
3	Maleek	Howard	RCFC & WCD	Design 2	(951) 955-4408	
4	Rizaldy	Baluyot	Riverside County	Facilities Management	(951) 955-4889	
5	Farshid	Mohammadi	City of Riverside	Public Works	(951) 826-5515	
6	Dale	Anderson	RCFC & WCD	Planning Division	(951) 955-1345	
7	Joyce	Winge	RCFC & WCD	plan check consultant	(858) 451-6100	
8	Steven	Horn	Riverside County	Facilities Management	(951) 697-8269	
9	Henry	Olivo	Riverside County	Flood Control	(951) 955-8215	
10	Everett	Duckworth	Riverside County	Flood Control	(951) 955-1215	
11	Anabella	Hedman	RCFC & WCD	plan check consultant	(858) 869-4851	
12	Samandra	benjamin	Riverside County	TRANSPORTATION	(951) 955-0342	
13	Kent	Allen	RCFC & WCD	Construction	(951) 955-1288	
14	Mike	Emberton	City of San Jacinto	Public Works - Streets/Storm Water	(951) 487-7386	
15	Victor	Vasquez	City of San Jacinto	Public Works - Streets/Storm Water	(951) 487-7386	
16	Dane	Winkelman	Riverside County	Facilities Management	(951) 955-5997	
17	Yolanda	Macalalad	City of Corona	Public Works	(951) 279-3748	
18	Lori	Wolfe	RCFC & WCD	Plan Check	(714) 402-9645	
19	David	Cooper	RCFC & WCD	plan check consultant	(858) 735-1352	
20	Kahlil	Amin	RCFC & WCD	Design 2	(951) 955-1260	

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NPDES STORMWATER QUALITY TRAINING FOR
WQMP Training
Riverside County Flood Control & Water Conservation District

Meeting of: Thursday, November 29 - 13:00 - 17:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
21	Barry	Mulcock	City of San Jacinto	Public Works - Streets/Storm Water	(951) 487-7386	B Mulcock
22	Mirtha	Liedl	Riverside County	Waste Management	(951) 486-3226	
23	Sung Key	Ma	Riverside County	Waste Management	(951) 486-3226	
24	Ryan	Ross	Riverside County	Waste Management	(951) 486-3226	
25	Stephanie	Blanco	Riverside County	Waste Management	(951) 486-3226	
26	Glen	Drogin	RCFC & WCD	Plan Check	(760) 327-0397	
27	Mike	Cairns	RCFC & WCD	Plan Check	858 866 0128	
28	Lombardo	Detrinidad	RCFC & WCD	Plan Check	858-866-0128	
29	Ken	Horsley	RCFC & WCD	Plan Check	858-866-0128	
30	Laura	Klages	RCFC & WCD	plan check consultant	(619) 977-8811	
31	DALE	WEST	City of Temecula	PLANNING	(951) 694-6400	
32	Claudio	Padres	RCFC & WCD	Design II	(951) 955-1329	
33	Ponce	Yambot	City of Beaumont	Public Works	(951) 769-6999	
34	Bill	Bryant	City of San Jacinto	Public Works - Streets/Storm Water	(951) 487-7386	
35	Ben	Haskell	City of San Jacinto	Public Works - Streets/Storm Water	(951) 487-7386	
36	Wills	Mark	RCFC	Development Review	951-955-1214	Mark Wills
37	Frank	Coyle	Facility management ~~Parks~~	Associate, Planning	951.697.8300	
38						
39						
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NPDES STORMWATER QUALITY TRAINING FOR
WQMP Training
Murrieta City Hall

Meeting of: **Wednesday, December 5, 2007 - 13:00 - 17:00** SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signature
1	Farida	Naceem	City of Murrieta	Public Works / Engineering	(951) 461-6075	
2	Hoang	Nguyen	City of Moreno Valley	Public Works/Land Development	(951) 413-3120	
3	Mayra	De La Torre	City of Temecula	Public Works	(951) 694-6411	
4	William	Becerra	City of Temecula	Public Works	(951) 694-6411	
5	Guy	Pegan	City of Moreno Valley	Public Works/Land Development	(951) 413-3120	
6	Henry	Ngo	City of Moreno Valley	Public Works/Land Development	(951) 413-3120	
7	Steve	Charette	City of Temecula	Public Works	(951) 694-6411	
8	Bill	McAteer	City of Temecula	Public Works	(951) 694-6411	
9	Aldo	Licitra	City of Temecula	Public Works	(951) 694-6411	
10	Greg	Butler	City of Temecula	Public Works	(951) 694-6411	
11	Steve	Beswick	City of Temecula	Public Works	(951) 694-6411	
12	John	Pourkazemi	City of Temecula	Public Works	(951) 694-6411	
13	Amer	Attar	City of Temecula	Public Works	(951) 694-6411	
14	Reza	James	City of Temecula	Public Works	(951) 694-6411	
15	Avlon AVLIN	Odviar	City of Temecula	Public Works	(951) 694-6411	
16	Denise	Bartz	City of Hemet	Public Works Engineering	(951) 765-2366	
17	Jorge	Biagioni	City of Hemet	Public Works Engineering	(951) 765-2362	
18	Kent	Hall	City of Beaumont	Building & Safety	(951) 769-8529	
19	Keith	Elliott	Santa Ana Regional Board	RWQCB	(951) 782-4925	
20	Chris	White	City of Temecula	Public Works	(951) 694-6411	

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NPDES STORMWATER QUALITY TRAINING FOR
WQMP Training
Murrieta City Hall

Meeting of: **Wednesday, December 5, 2007 - 13:00 - 17:00** SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signature
21	Kathleen	Dale	City of Moreno Valley	Planning	(951) 413-3228	
22	Keith	Hightower	City of Beaumont	Code Enforcement	(951) 769-8529	
23	Ernie	Vigil	City of Moreno Valley	Public Works/Land Development	(951) 413-3120	
24	David	McBride	City of Temecula	Public works	(951) 694-6411	
25	Chris	Vlahos	City of Temecula	Public Works	(951) 694-6411	
26	Jon	Salazar	City of Temecula	Public Works	(951) 694-6411	
27	Laura	Bragg	City of Temecula	Public Works	(951) 694-6411	
28	Kavon	Haghighi	City of Temecula	Public Works	(951) 694-6411	
29	Kendra	Hannah-Meistrell	City of Temecula	Public Works	(951) 694-6411	
30	Jerry	Alegria	City of Temecula	Public Works	(951) 694-6411	
31	Carole	Kendrick	City of Hemet	Planning Department	(951) 765-2373	Carole Kendrick
32	Kim	Clinton	City of Banning	Planning	(951) 922-3181	
33	Lynn	Johnson	City of Murrieta	RBF Consulting	(951) 676-8042	
34	Jeff	Hitch	City of Murrieta	Public Works/Engg	(951) 461-6076	
35	William	Bixby	City of Murrieta	Bureau of Veritas	(858) 451-6100	
36	Glen	Parks	City of Murrieta	Bureau of Veritas	(858) 451-6100	
37	Larry	Cooley	City of Murrieta	Bureau of Veritas	(951) 677-5026	
38	Dale	West	City of Temecula	Planning	(951) 694-6400	
39	Cathy	Davis	City of Murrieta	Planning	(951) 304-2489	
40	Aaron	Rintamaki	City of Murrieta	Planning	(951) 304-2489	

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NPDES STORMWATER QUALITY TRAINING FOR
WQMP Training
Murrieta City Hall

Meeting of: **Wednesday, December 5, 2007 - 13:00 - 17:00** SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signature
41	Tammy	Figueroa	City of Murrieta	Planning	(951) 304-2489	
42	Leticia	Newell	City of Murrieta	Planning	(951) 304-2489	
43	Sonia	Pierce	City of Murrieta	Planning	(951) 304-2489	
44	Cynthia	Kinser	City of Murrieta	Planning	(951) 304-2489	
45	Dennis	Watts	City of Murrieta	Planning	(951) 304-2489	

46, FLORENCE MOURER RCFCD P. INFO 951 955 4954 F Mourer

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NPDES STORMWATER QUALITY TRAINING FOR
Construction Training
Murrieta City Hall

Meeting of: Thursday, January 17 - 09:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
1	Steve	Allen	Riverside County	Transportation Department	(951) 955-6790	
2	Venita	Anderson	City of Murrieta	Code Enforcement	(951) 461-6337	
3	William	Anderson	Riverside County	Transportation		
4	DOUG	ARMSTRONG	City of Temecula	PUBLIC WORKS	(951) 694-6411	
5	Amer	Attar	City of Temecula	Public Works	(951) 694-6411	
6	WILLIAM	BECERA	City of Temecula	PUBLIC WORKS	(951) 694-6411	
7	Matthew	Beile	City of Temecula	Public Works	(951) 694-6411	
8	Tracy	Bravo	Riverside County	Transportation		
9	Greg	Butler	City of Temecula	Public Works	(951) 694-6411	
10	Victor	Casillas	Riverside County	Transportation Department	(760) 778-2491	Victor Casillas
11	Sara	Cervantes	Riverside County	Code Enforcement	951-955-0105	
12	TOM	COLE	City of Temecula	PUBLIC WORKS	(951) 694-6411	
13	Sylvester	Collins	City of Moreno Valley	Maintenance & Operations		
14	Paul	Cornell	Riverside County	Facilities Management	(951) 955-0168	
15	Marc	Crispin	Riverside County	Facilities Management	(951) 955-0167	
16	Jose	Cruz	Riverside County	Code Enforcement	951-955-0105	
17	Mayra	De La Torre	City of Temecula	Public Works	(951) 694-6411	
18	Lisa	Elder	Riverside County	Transportation Permit Section	(951) 850-0078	
19	Brett	Farlow	Riverside County	Code Enforcement	951-955-0105	
20	Lanker	Figueroa	City of Murrieta	Public Works Inspection	(951) 461-6075	

NPDES STORMWATER QUALITY TRAINING FOR
Construction Training
Murrieta City Hall

Meeting of: Thursday, January 17 - 09:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
21	Roger	Flores	Riverside County	Transportation		Roger Flores
22	Katheline	Fong	Santa Ana Regional Board	RWQCB	(951) 774-0114	Katherine Fong
23	Carol	Forrey	Riverside County	Code Enforcement	951-955-0105	
24	Angela	Frazier	Riverside County	Code Enforcement	951-955-0105	
25	Albert	Garcia	City of Moreno Valley	Maintenance & Operations		
26	Brandon	Garcia	Riverside County	Transportation Department	(760) 778-2491	
27	Kevin	Gillette	Riverside County	Transportation Permit Section	(951) 236-6080	
28	Jeff	Gullett	Riverside County	Transportation		
29	Cesar	Gutierrez	Riverside County	Transportation Permit Section	(951) 640-3221	
30	Phil	Hallberg	City of San Jacinto	Community Development	(951) 487-7330	
31	Cory	Hammond	City of Murrieta	Public Works Inspection	(951) 461-6075	
32	Morgan	Haun	City of Moreno Valley	Maintenance & Operations		
33	Jack	Hodson	City of Temecula	Public Works	(951) 694-6411	
34	Warren	Huang	Riverside County	Facilities Management	(951) 955-4897	
35	Mike	Hudson	City of Temecula	Public Works	(951) 694-6411	
36	REZA	JAMES	City of Temecula	PUBLIC WORKS	(951) 694-6411	
37	Jeff	Johnson	City of Murrieta	Public Works Inspection	(951) 461-6075	
38	David	Jones	RCFC & WCD	Maintenance	(951) 850-5497	
39	Jason	Jones	City of Murrieta	Code Enforcement	(951) 461-6337	
40	Carlos	Juarez	City of Moreno Valley	Maintenance & Operations	951 652-0056	

NPDES STORMWATER QUALITY TRAINING FOR
Construction Training
Murrieta City Hall

Meeting of: Thursday, January 17 - 09:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
41	Timothy	Kearns	Riverside County	Facilities Management	(951) 955-9467	
42	Charles	Kolb	City of Moreno Valley	Maintenance & Operations		
43	Salvador	Lopez	Riverside County	Transportation		
44	Ed	Lotz	RCFC & WCD	Flood Control	(951) 955-1200	
45	Gabriel	Martin	Riverside County	Economic Development Agency	(951) 955-1918	
46	Andy	McDonel	City of Moreno Valley	Maintenance & Operations		
47	Linda	Mejia	City of Murrieta	Code Enforcement	(951) 461-6337	
48	Julie	Meyer	Riverside County	Transportation Permit Section	(951) 961-7584	
49	Lawrence	Meza	City of Moreno Valley	Maintenance & Operations		
50	Rigo	Morales	City of Moreno Valley	Maintenance & Operations	(951) 243-552	
51	Farida	Naceem	City of Murrieta	Public Works / Engineering	(951) 461-6075	
52	George	Nelson	City of Murrieta	Code Enforcement	(951) 461-6337	
53	Brian	Noone	Riverside County	Code Enforcement	951-955-0105	
54	Avlin	Odviar	City of Temecula	Public Works	(951) 694-6411	
55	Richard	Ott	Riverside County	Transportation	(951) 955-6899	
56	Ismael	Pando	City of Hemet	Public Works	(951) 765-2360	
57	MARIANNE	PARKER	City of Temecula	CODE ENFORCEMENT	(951) 694-6400	
58	Ernest	Precie	City of Moreno Valley	Maintenance & Operations		
59	Donald	Raymond	Riverside County	Transportation Department	(760) 778-2491	
60	Tom	Rheiner	RCFC & WCD	Special Projects	(951) 955-2349	

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NPDES STORMWATER QUALITY TRAINING FOR
Construction Training
Murrieta City Hall

Meeting of: Thursday, January 17 - 09:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
61	Keith	Ross	Riverside County	Code Enforcement	951-955-0105	Keith Ross
62	Melvyn	Sayre	Riverside County	Transportation	(951) 955-6899	
63	Chris	Spence	City of Moreno Valley	Maintenance & Operations		
64	Jane	Tate	Riverside County	Code Enforcement	951-955-0105	
65	Jeremy	Wagner	Riverside County	Code Enforcement	951-955-0105	
66	Ron	Welch	Riverside County	Code Enforcement	951-955-0105	
67	Art	Wilson	City of Moreno Valley	Maintenance & Operations		
68	Jim	Witt	City of Murrieta	Code Enforcement	(951) 461-6337	
69	Dan	York	City of Temecula	Public Works	(951) 694-6411	
70	Dan	York	City of Temecula	Public Works	(951) 694-6411	
71	ERIC	MAHER	CITY OF MURRIETA	PUBLIC WORKS	" 8137201	
72		~~FORD~~	County of Riv	Road Dept.	~~9556044~~	~~Roy~~
73	Gina	DICKSON	City of Murrieta	Code Enforcemen		Gina Dickson
74	Linda	MESIA	City of Murrieta	Code Enf.	461-6351	Linda Mesia
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Page 4 of 4

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NPDES STORMWATER QUALITY TRAINING FOR
Municipal Training
Murrieta City Hall

Meeting of: Thursday, January 17 - 13:00 - 16:00

SIGN-IN SH

	First Name	Last Name	Municipality	Department	Phone No	
1	Joey	Alfaro	City of Murrieta	Community Services Department	(951) 461-6124	
2	Mike	Almodovar	City of Murrieta	Public Works Maintenance	(951) 461-6400	
3	Alberto	Aspe	City of Murrieta	Community Services Department	(951) 461-6124	
4	Damien	Avalos	City of Murrieta	Community Services Department	(951) 461-6124	
5	Mike	Bigay	City of Murrieta	Community Services Department	(951) 461-6124	
6	John	Bivens	City of Canyon Lake	Code Enforcement	(951) 244-2955	
7	Kast	Bob	City of Murrieta	Community Services Department	(951) 461-6124	
8	Robert	Bohan	City of Canyon Lake	Code Enforcement	(951) 244-2955	
9	Mark	Bollschweiler	City of Murrieta	Public Works Maintenance	(951) 461-6400	
10	Mike	Brooks	City of Murrieta	Public Works Maintenance	(951) 461-6400	
11	Mike	Burris	City of Murrieta	Public Works Maintenance	(951) 461-6400	
12	Dino	Camberos	City of Temecula	TCSD	(951) 694-6480	
13	Ryan	Castillo	City of Temecula	Public Works	(951) 694-6411	
14	Danny	Cover	City of Moreno Valley	Special Districts	(951) 413-3503	
15	Dave	Davis	City of Temecula	Public Works.	(951) 694-6411	
16	Danny	Dawley	City of Corona	Public Works	(951) 736-2301	
17	George	De La Rosa	City of Temecula	TCSD	(951) 694-6480	
18	Juan	Del Val	City of Murrieta	Community Services Department	(951) 461-6124	
19	Jose	Diaz	City of Temecula		(951) 694-6400	
20	Shawn	Dullanty	City of Murrieta	Community Services Department	(951) 461-6124	

NPDES STORMWATER QUALITY TRAINING FOR
Municipal Training
Murrieta City Hall

Meeting of: Thursday, January 17 - 13:00 - 16:00

SIGN-IN SH

	First Name	Last Name	Municipality	Department	Phone No	
21	Mark	Durbin	City of Murrieta	Community Services Department	(951) 461-6124	
22	Phil	Esnayra	City of Murrieta	Community Services Deaprtment	(951) 461-6124	
23	Gus	Gonzales	City of Temecula	Public Works	(951) 694-6411	
24	Larry	Gross	City of Murrieta	Community Services Department	(951) 461-6124	
25	Jay	Haecker	City of Murrieta	Community Services Department	(951) 461-6124	
26	Kevin	Harrington	City of Temecula	CSD	(951) 694-6400	
27	Dave	Hendry	City of Murrieta	Public Works Maintenance	(951) 461-6400	
28	Juan	Jaime	City of Temecula	Public Works	(951) 694-6411	
29	Paul	Johnson	City of Canyon Lake	Code Enforcement	(951) 244-2955	
30	Ken	Jones	City of Murrieta	Public Works Maintenance	(951) 461-6400	
31	Jim	Keezell	City of Riverside	Public Works	(951) 351-6247	
32	Mark	Levis	City of Temecula	Public Works	(951) 694-6411	
33	Perry	Ludwig	City of Temecula	Public Works	(951) 694-6411	
34	John	Maisey	City of Temecula	TCSD	(951) 694-6480	
35	Danny	Marks	City of Murrieta	Community Services Department		
36	Anthony	Martinez	City of Temecula	TCSD	(951) 694-6480	
37	Jason	Morrell	City of Murrieta	Public Works Maintenance	(951) 461-6400	
38	Jose	Munoz	City of Murrieta	Community Services Department	(951) 461-6124	
39	Mario	Munoz	City of Temecula	TCSD	(951) 694-6480	
40	Farida	Naceem	City of Murrieta	Public Works Maintenance	(951) 461-6400	

NPDES STORMWATER QUALITY TRAINING FOR
Municipal Training
Murrieta City Hall

Meeting of: Thursday, January 17 - 13:00 - 16:00

SIGN-IN SH

	First Name	Last Name	Municipality	Department	Phone No	
41	Steve	Nickerson	City of Murrieta	Public Works Maintenance	(951) 461-6400	
42	Karl	Nordgren	City of Temecula		(951) 694-6400	
43	Flint	Norman	City of Temecula	Public Works	(951) 694-6411	
44	Chris	Payne	City of Temecula	Public Works	(951) 694-6411	
45	Sheri	Peek	City of Moreno Valley	Animal Services	(951) 413-3787	
46	Blanca	Price	City of Temecula	TCSD	(951) 694-6480	
47	Larry	Romine	City of Temecula	Public Works	(951) 694-6411	
48	Sarah	Russell	City of Murrieta	Public Works Maintenance	(951) 461-6400	
49	Rosa	Santana	City of Murrieta	Community Services Department	(951) 461-6124	
50	Dave	Sarian	City of Murrieta	Community Services Department	(951) 461-6124	
51	Ralph	Scharffenberg	City of Moreno Valley	Public Works / Special Districts	(951) 413-3472	
52	Rick	Serven	City of Temecula	TCSD	(951) 694-6480	
53	Richard	Shea	City of Temecula	TCSD	(951) 694-6400	
54	Matt	Sheftick	City of Corona	Public Works-Fleet	(951) 736-2307	
55	Stuart	Sheldon	City of Moreno Valley	Public Works	(951) 413-3483	
56	Jim	Smith	City of Temecula	Public Works	(951) 694-6411	
57	Charlie	Soto	City of Murrieta	Community Services Department	(951) 461-6124	
58	Steve	Sterling	City of Temecula	TCSD	(951) 694-6480	
59	Ron	Stuart	City of Murrieta	Community Services Department	(951) 461-6124	
60	Rick	Thompson	City of Murrieta	Community Services Department	(951) 461-6124	

NPDES STORMWATER QUALITY TRAINING FOR
Municipal Training
Murrieta City Hall

Meeting of: Thursday, January 17 - 13:00 - 16:00

SIGN-IN SH

	First Name	Last Name	Municipality	Department	Phone No	
61	Dave	Thurman	City of Temecula	TCSD	(951) 694-6480	
62	Rodney	Tidwell	City of Temecula	Public Works	(951) 694-6411	
63	Nick	Vaughn	City of Murrieta	Public Works Maintenance	(951) 461-6400	
64	Bruce	Wedeking	City of Temecula	TCSD	(951) 694-6480	
65	Randy	West	City of Temecula	PUBLIC Works	(951) 694-6400	
66	Matt	Wiechec	City of Temecula	TCSD	(951) 694-6480	
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NPDES STORMWATER QUALITY TRAINING FOR
Construction Training
Riverside County Flood Control & Water Conservation District

Meeting of: Wednesday, April 16 - 09:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
1	Raymond	Aguilar	City of Riverside	Public Utilities - Water Operation	(951) 351-6350	
2	Ron	Allen	City of Beaumont	public works		
3	Art	Anaya	City of Riverside	Public Utilities - Water Operation	(951) 351-6350	
4	richard	arriola	Riverside County	Code Enforcement	(951) 955-8802	
5	Freeman "Joe"	Axtell	Riverside County	Transportation Department	(951) 955-1095	
6	Michael	Baggett	City of Riverside	Public Utilities - Water Field	(951) 351-6350	
7	Keith	Barnett	Riverside County	Transportation Department	(951) 955-1095	
8	Cliff	Bellinghausen	City of Riverside	Public Utilities - Water Operation	(951) 351-6318	
9	Daniel	Bertotti	City of Riverside	Public Utilities - Water Field	(951) 351-6350	
10	cyndi	black	Riverside County	Code Enforcement	(951) 955-8802	
11	ALAN	BOSIA	City of Riverside	PUBLIC WORKS	(951) 826-5599	
12	Mike	Call	Riverside County	Transportation Department	(951) 955-1095	
13	Paul	Castillo	Riverside County	Transportation Department	(951) 955-1095	
14	Carlos	Castro	City of Riverside	Public Utilities - Water Field	(951) 351-6350	
15	FRED	CERDA	City of Riverside	PUBLIC WORKS	(951) 712-4966	
16	Jessica	Chin	City of Riverside	Public Works	(951) 826-5760	
17	Christopher	Collins	City of Riverside	Public Utilities - Water Field	(951) 351-6350	
18	John	Contrado	City of Corona	Public Works	(951) 279-3512	
19	Bob	Cordova	City of Riverside	Public Utilities - Water Field	(951) 351-6350	
20	Chris	Cuenca	City of Riverside	Public Utilities - Water Field	(951) 351-6350	
21	Jackie	Cunningham	City of Riverside	Public Utilities - Water Operation	(951) 351-6350	

NPDES STORMWATER QUALITY TRAINING FOR
Construction Training
Riverside County Flood Control & Water Conservation District

Meeting of: Wednesday, April 16 - 09:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
22	DANNY	CWIAK	City of Riverside	PUBLIC WORKS	(951) 377-5514	
23	Ken	Dagenais	City of Corona	Public Works	(951) 736-2456	
24	TIM	DEXTER	City of Riverside	PUBLIC WORKS	(951) 712-4974	
25	Pete	Diaz	City of Riverside	Public Utilities - Water Field	(951) 351-6350	
26	jacob	dietrich	Riverside County	Code Enforcement	(951) 955-8802	
27	ryan	dolan	Riverside County	Code Enforcement	(951) 955-8802	
28	TONY	DUPRE	City of Riverside	PUBLIC WORKS	(951) 826-5990	
29	wayne	Durant	Riverside County	Code Enforcement	(951) 955-8802	
30	Fred	Ehemann	City of Riverside	Public Utilities - Water Operation	(951) 351-6350	
31	travis	engelking	Riverside County	Code Enforcement	(951) 955-8802	
32	Mark	Ensign	City of Riverside	Public Utilities - Water Field	(951) 351-6350	
33	Eric	Escobar	City of Riverside	Public Utilities-Water Construction	(951) 826-2253	
34	RAY	GARCIA	City of Riverside	PUBLIC WORKS	(951) 712-4962	
35	Thomas	Garcia	City of Riverside	Public Utilities - Water Field	(951) 351-6350	
36	Richard	Gastelum	City of Riverside	Public Utilities - Water Field	(951) 351-6350	
37	Paul	Gearhart	City of Riverside	Public Utilities - Water Field	(951) 351-6350	
38	Jim	Henke	City of Riverside	Public Utilities-Water Construction	(951) 538-3451	
39	Michele	Hindersinn	City of Corona	Public Works	(951) 736-2248	
40	BARNEY	HUNTER	City of Riverside	PUBLIC WORKS	(951) 712-3947	
41	David	Hylkema	Riverside County	Transportation Department	(951) 955-1095	
42	Joe	Janda	City of Beaumont	public works		

NPDES STORMWATER QUALITY TRAINING FOR
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	First Name	Last Name	Municipality	Department	Phone No	Signuature
43	Todd	Jorgenson	City of Riverside	Public Utilities-Water Construction	(951) 826-5581	
44	wendell	jose	Riverside County	Code Enforcement	(951) 955-8802	
45	david	jurden	Riverside County	Code Enforcement	(951) 955-8802	
46	Bradley	Kelvington	City of Riverside	Public Utilities - Water Field	(951) 351-6350	
47	Prem	Kumar	City of Moreno Valley	Public Works	(951) 413-3116	
48	jonathan	lance	Riverside County	Code Enforcement	(951) 955-8802	
49	Eric	Lohr	Riverside County	Transportation Department	(951) 955-1095	
50	Ivan	Mendoza	Riverside County	Transportation Department	(951) 955-1095	
51	Jesse	Mendoza	Riverside County	Transportation Department	(951) 955-1095	
52	Dave	Mitchell	City of Corona	Public Works	(951) 279-3510	
53	manolito	molina	Riverside County	Code Enforcement	(951) 955-8802	
54	VICTOR	MOORE	City of Riverside	PUBLIC WORKS	(951) 232-7139	
55	Mike	Neal	City of Beaumont	public works	951 377 5514	
56	karen	nguyen	Riverside County	Code Enforcement	(951) 955-8802	
57	Trai	Nguyen	Riverside County	Transportation Department	(951) 955-1095	
58	Robert	Ochoa	City of Riverside	Public Utilities - Water Field	(951) 351-6350	
59	Kenneth	Olson	City of Riverside	Public Utilities - Water Ops	(951) 351-6350	
60	Robert	Owen	City of Beaumont	public works	(951) 538-6269	
61	diana	parra	Riverside County	Code Enforcement	(951) 955-8802	
62	samantha	phillips	Riverside County	Code Enforcement	(951) 955-8802	
63	james	pike	Riverside County	Code Enforcement	(951) 955-8802	

NPDES STORMWATER QUALITY TRAINING FOR
Construction Training
Riverside County Flood Control & Water Conservation District

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	First Name	Last Name	Municipality	Department	Phone No	Signuature
64	Michael	Roth	Santa Ana Regional Board	Storm Water	(951) 320-2027	
65	Rosario	Ruvalcaba	City of Corona	Public Works	(951) 739-4813	
66	Daniel	Slayych	Riverside County	Transportation Department	(951) 955-1095	
67	David	Sotelo	City of Riverside	Building & Safety Division	(951) 826-5752	4-16-08
68	Claudia	Steiding	Riverside County	Facilities Management	(951) 955-8174	
69	Luis	Tapia	City of Riverside	Public Utilities-Water Construction	(951) 538-3456	
70	Chris	Trinidad	City of Beaumont	public works		
71	Juan	Vargas	City of Riverside	Public Utilities - Water Field	(951) 351-6350	
72	marcella	villanueva	Riverside County	Code Enforcement	(951) 955-8802	
73	Steven	Wann	Riverside County	Transportation Department	(951) 955-1095	
74	George	Yassa	Riverside County	Transportation Department	(951) 955-1095	
75	Darren	Young	City of Corona	Public Works	(951) 736-2304	
	Randy	Taylor	RivCo WasteMgt		951-247-1724	Randy Taylor

NPDES STORMWATER QUALITY TRAINING FOR
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Riverside County Flood Control & Water Conservation District

Meeting of: Thursday, April 17 - 09:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
1	Sanaa	Azar	Riverside County	Economic Development Agency	(951) 955-9137	
2	stacey	baumgartner	Riverside County	Code Enforcement	(951) 955-8802	
3	Frank	Bell	Riverside County	Waste Management	(951) 486-3226	
4	mike	blanco	City of Norco	Public Works		
5	dale	bonham	City of Norco	Public Works		
6	George	Boyden	Riverside County	Transportation Department	(951) 955-1095	
7	DON	BUCHANAN	City of Riverside	PUBLIC WORKS	(951) 712-4970	
8	Eduardo	Castellanos	Riverside County	Waste Management	(951) 486-3226	
9	Raymond	Cruz	City of Canyon Lake	Special Enforcement		
10	dan	cuthbertson	City of Norco	Public Works		
11	Dwight "Kelley"	Donovan	Riverside County	Transportation Department	(951) 955-6817	
12	Joseph	Dunlap	Riverside County	Transportation Department	(951) 955-1095	
13	etita	faiva	Riverside County	Code Enforcement	(951) 955-8802	
14	Leo	Ferrando	City of Riverside	Public Utilities-Water Construction	(951) 826-5694	
15	john	game	Riverside County	Code Enforcement	(951) 955-8802	
16	Nimrod	Garay	Riverside County	Waste Management		
17	Brandon	German	City of Riverside	Building & Safety Division	(951) 826-5955	
18	SEAN	GILL	City of Riverside	PUBLIC WORKS	(951) 826-5892	
19	Jeff	Gow	Riverside County	Waste Management		
20	anthony	green	Riverside County	Code Enforcement	(951) 955-8802	

NPDES STORMWATER QUALITY TRAINING FOR
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	First Name	Last Name	Municipality	Department	Phone No	Signuature
21	Tom	Hall	City of Corona	Public Works	(951) 739-4816	
22	Habib	Hariri	City of Riverside	Public Utilities-Water Construction	(951) 826-5304	
23	jason	heagstedt	Riverside County	Code Enforcement	(951) 955-8802	
24	Joseph	Hickman	Riverside County	Waste Management	(951) 486-3226	
25	BARNEY	HUNTER	City of Riverside	PUBLIC WORKS	(951) 712-3947	
26	Al	Ignacio	City of Beaumont	public works	(951) 377-5700	
27	William "Bill"	Jackson	Riverside County	Transportation Department	(951) 955-1095	
28	Xavier	Jacobo	City of Riverside	Public Utilities-Water Construction	(951) 538-3461	
29	Mirek	Jaroslawski	City of Corona	Public Works	(951) 739-4824	
30	David	Jones	RCFC & WCD	Maintenance	(951) 955-1234	
31	John	Kennedy	Riverside County	Transportation Department	(951) 955-1095	
32	mike	kulick	City of Norco	Public Works	(951) 545-7881	
33	Vikki	Kuntz	Riverside County	Facilities Management	(951) 955-0166	
34	Brian	Ladnier	City of Corona	Public Works	(951) 279-3647	
35	JACK	LYNN	City of Riverside	PUBLIC WORKS	(951) 712-2321	
36	lori	lyon	Riverside County	Code Enforcement	(951) 955-8802	
37	Joseph	Martinez	Riverside County	Transportation Department	(951) 955-1095	
38	Ibrahim	mASSOUD	City of Riverside	Pubic Works/Engineering	(951) 826-5805	
39	Benjamin	Matye	Riverside County	Waste Management		
40	Charles	McBride	City of Riverside	Public Utilities-Water Construction	(951) 826-2182	

NPDES STORMWATER QUALITY TRAINING FOR
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	First Name	Last Name	Municipality	Department	Phone No	Signuature
41	tom	mcmullen	Riverside County	Code Enforcement	(951) 955-8802	
42	Richard	Messer	City of Canyon Lake	Special Enforcement		
43	jennifer	morris	Riverside County	Code Enforcement	(951) 955-8802	
44	Gabriel	Munoz	Riverside County	Transportation Department	(951) 955-1095	
45	Stewart	Noble	City of Riverside	Public Utilities-Water Construction	(951) 538-6970	
46	Dave	Ochs	City of Beaumont	public works		
47	lanee	padilla	Riverside County	Code Enforcement	(951) 955-8802	
48	JACK	PALOMAREZ	City of Riverside	PUBLIC WORKS	(951) 712-4972	
49	Mike	Parsons	City of Beaumont	public works		
50	julio	pineda	Riverside County	Code Enforcement	(951) 955-8802	
51	DORU	POPA	City of Riverside	PUBLIC WORKS	(951) 826-5341	
52	Jeff	Potts	City of Corona	Public Works	(951) 736-2442	
53	Kaniz	Quazi	Riverside County	Waste Management	(951) 486-3226	
54	MANNY	RIVAS	City of Riverside	PUBLIC WORKS	(951) 534-3331	
55	JUAN	ROJAS	City of Riverside	PUBLIC WORKS	(951) 538-3037	
56	mike	romero	Riverside County	Code Enforcement	(951) 955-8802	
57	Luana	Roth	Riverside County	Transportation Department	(951) 955-1095	
58	Richard	Rupert	City of Canyon Lake	Special Enforcement	(951) 834-6724	
59	Paul	Russell	Riverside County	Transportation Department	(951) 955-1095	
60	gladys	sanchez	Riverside County	Code Enforcement	(951) 955-8802	

NPDES STORMWATER QUALITY TRAINING FOR
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Riverside County Flood Control & Water Conservation District

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	First Name	Last Name	Municipality	Department	Phone No	Signuature
61	Tamrat	Seyoum	City of Riverside	Public Utilities-Water Construction	(951) 826-5672	
62	Todd	Shibata	Riverside County	Waste Management	(951) 486-3226	
63	Karl	Shrader	City of Beaumont	public works		
64	Dave	Shreve	City of Corona	Public Works	(951) 817-5706	
65	DANIEL	SIMMONS	City of Riverside	PUBLIC WORKS	(951) 712-4952	
66	Nick	Sison	Riverside County	Transportation Department	(951) 955-1095	
67	Randy	Taylor	Riverside County	Waste Management		
68	Travis	Taylor	Riverside County	Waste Management	(951) 486-3226	
69	Dave	Thibault	City of Beaumont	public works		
70	Cesar	Tolentino	Riverside County	Transportation Department	(951) 955-1095	
71	nicole	wapner	Riverside County	Code Enforcement	(951) 955-8802	
72	Sarah	Watrous	Riverside County	Waste Management		
73	Edward	Wee Eng	Riverside County	Waste Management	(951) 486-3211	
74	Gregory	Yates	City of Riverside	Electric	(951) 826-2335	
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NPDES STORMWATER QUALITY TRAINING FOR
Construction Training
Coachella Valley Water District

Meeting of: Tuesday, April 22 - 09:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
1	James	Achuff	City of Indio	Public Works/Engineering Services	(760) 391-4019	
2	JIM	AYRES	Riverside County	Economic Development	(760) 863-2552	
3	Hector	Baeza	City of Banning	Water Division		
4	Rizaldy	Baluyot	Riverside County	Facilities Management	(951) 955-4889	
5	Scott	Barnhart	City of Banning	Wastewater Division		
6	Mike	Brown	City of Palm Desert	Public Works	(760) 346-0611	
7	greg	campbell	City of Banning	Water Division	(951) 922-3281	
8	ARACELI	CASTRO	Riverside County	Economic Development	(760) 863-2552	
9	Terry	Cechin	City of Palm Desert	Public Works	(760) 346-0611	
10	Bob	Dage	City of Banning	Water Division		
11	Brett	Daniels	City of Coachella	Environmental Programs	(760) 398-5744	
12	lorena	diaz	Riverside County	Code Enforcement	(951) 955-8802	
13	Adrienne	Dunfee	City of Indio	Public Works/Engineering Services	(760) 391-4000	
14	Jaime	Engler	City of Indio	Public Works/Engineering Services	(760) 391-4000	
15	Ed	Gallardo	City of Palm Desert	Public Works	(760) 346-0611	
16	Kenneth	George	Riverside County	Transportation Department	(951) 955-1095	
17	Matt	Glenn	City of Banning	Water Division		
18	Steve	Grewe	Riverside County	Transportation Department	(951) 955-1095	
19	vicki	haeberle	Riverside County	Code Enforcement	(951) 955-8802	
20	Bobby	Hand	Riverside County	Transportation Department	(951) 955-1095	
21	adam	hermanson	Riverside County	Code Enforcement	(951) 955-8802	

NPDES STORMWATER QUALITY TRAINING FOR
Construction Training
Coachella Valley Water District

Meeting of: Tuesday, April 22 - 09:00 - 12:00

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	First Name	Last Name	Municipality	Department	Phone No	Signature
22	pedro	hernandez	Riverside County	Code Enforcement	(951) 955-8802	
23	hector	herrera	Riverside County	Code Enforcement	(951) 955-8802	
24	lucero	iniguez	Riverside County	Code Enforcement	(951) 955-8802	
25	Jesse	Isaacson	City of Indio	Public Works/Engineering Services	(760) 391-4019	
26	Jeramy	Jackson	City of Moreno Valley	Public Works	(951) 616-4564	
27	Ahmad	Karimi	City of Palm Desert	Public Works	(760) 346-0611	
28	LIZA	LIZARRAGA	Riverside County	Economic Development	(760) 863-2552	
29	Kieran (Pat)	Logan	City of Banning	Water Division		
30	Roldan	Lopez	City of Indio	Public Works/Engineering Services	(760) 391-4000	
31	Bob	Lucas	Riverside County	EDA	(951) 955-9732	
32	lionel	martinez	Riverside County	Code Enforcement	(951) 955-8802	
33	francisco	mendez	Riverside County	Code Enforcement	(951) 955-8802	
34	Robert	Morris	Riverside County	Transportation Department	(951) 955-1095	
35	sara	nunez	Riverside County	Code Enforcement	(951) 955-8802	
36	Bruce	Pelletier	City of Indian Wells	Building and Safety	(760) 776-0237	
37	chinh	pham	City of Banning	Water Division		
38	ANNA	RODRIGUEZ	Riverside County	Economic Development	(760) 863-2552	
39	LEAH	RODRIGUEZ	Riverside County	Economic Development	(760) 863-2552	
40	Leonard	St. Sauver	City of La Quinta	Public Works	(760) 777-7048	
41	Matt	Stevens	City of Banning	Water Division		

NPDES STORMWATER QUALITY TRAINING FOR
Construction Training
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	First Name	Last Name	Municipality	Department	Phone No	Signuature
42	James	Thompson	City of Banning	Public Works	(951) 922-3130	James Thompson
43	Chris	Thornton	City of Banning	Wastewater Division		
44	JOAQUIN	TIJERINA	Riverside County	Economic Development	(760) 863-2552	
45	Claudia	Trembus	City of Palm Springs	Engineering	(760) 323-8253	Claudia Trembus
46	Jon	Tressler	Riverside County	Transportation Department	(951) 955-1095	
47	Jason	Valdez	City of Banning	Water Division		
48	Dan	Varner	City of Indian Wells	Public Works	(760) 776-0237	
49	Derrick	Watkins	City of La Quinta	Public Works	(760) 275-8374	
50	Michael	Wilkey	City of Indio	Public Works/Engineering Services	(760) 391-4000	
51	John	Wilson	Riverside County	Transportation Department	(951) 955-1095	
52	RENE	MARTINEZ	CITY OF P.S.	ENG.	760 323 8253	
53	MICHAEL	MOTT	CITY OF P.S.	ENG	760-323 8553	
54	[redacted]	[redacted]				
55	Roland		CVWD	Service	397-7389	
56	Tommy	Fowlkes	CVWD	Service	398-2661	
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NPDES STORMWATER QUALITY TRAINING FOR
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	First Name	Last Name	Municipality	Department	Phone No	Signuature
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NPDES STORMWATER QUALITY TRAINING FOR
Industrial/Commercial Training
Riverside County Flood Control & Water Conservation District

Meeting of: Tuesday, April 15 - 09:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
1	Michael	Almandinger	City of Beaumont	Building & Safety	(951) 572-3234	
2	Thomas	Arcee	City of Beaumont	Building & Safety	(951) 572-3234	
3	Martha	Bahia	Riverside County	Environmental Health	(951) 358-5055	
4	Bruce	Bailey	Riverside County	Environmental Health	(951) 273-9143	
5	Brad	Ballen	Riverside County	Environmental Health	(760) 863-8976	
6	Rizaldy	Baluyot	Riverside County	Facilities Management	(951) 955-4889	
7	Daniel	Barba	City of San Jacinto	Code Enforcement	(951) 537-6367	
8	Carolyn	Brown	Riverside County	Environmental Health	(951) 766-6524	
9	Justin	Brown	Riverside County	Waste Management		
10	Scott	Bryant	Riverside County	Waste Management		
11	Sandy	Bunchek	Riverside County	Environmental Health	(951) 273-9143	
12	Jeff	Bustamante	Riverside County	Environmental Health	(951) 766-6524	
13	Jessica	Chin	City of Riverside	Public Works	(951) 826-5760	
14	Joseph	Contaoi	Riverside County	Waste Management		
15	Nicholas	Crain	Riverside County	Environmental Health	(951) 766-6524	
16	Rodney	Cruze	City of Riverside	PW/Sewerage	(951) 351-6011	
17	Mike	Daly	Riverside County	Environmental Health	(951) 766-6524	
18	Vidal (Tim)	Evans	Riverside County	Waste Management		
19	Nimrod	Garay	Riverside County	Waste Management		
20	Donald	Gerber	Riverside County	Waste Management		

NPDES STORMWATER QUALITY TRAINING FOR
Industrial/Commercial Training
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	First Name	Last Name	Municipality	Department	Phone No	Signuature
21	Gerald	Gregory	Riverside County	Waste Management		
22	Richard	Guerrero	Riverside County	Environmental Health	(951) 273-9143	
23	Brian	Hawkinson	Riverside County	Waste Management		Brian Hawkinson
24	Joseph	Hickman	Riverside County	Waste Management		
25	Michele	Hindersinn	City of Corona	Public Works		
26	Steve	Hooper	City of Riverside	Public Works		
27	Mark	Hunt	Riverside County	Waste Management		
28	Dave	Huster	City of San Jacinto	Building	(951) 537-6381	
29	Rob	Istik	Riverside County	Waste Management	951-247-1323	
30	Jeramy	Jackson	City of Moreno Valley	Public Works	(951) 616-4564	
31	Keith	Jones	Riverside County	Environmental Health	(951) 358-5055	Keith Jones
32	Kevin	Joyce	Riverside County	Waste Management		
33	Tim	King	City of Riverside	Public Works		
34	Marcus	Leso	City of Riverside	Public Works		
35	Michael	McKinley	Riverside County	Waste Management		
36	Gary	Merk	City of Riverside	Code Enforcement	(951) 826-5224	
37	Jim	Mikkelson	Riverside County	Waste Management		
38	Lisa	Mitchell	Riverside County	Environmental Health	(951) 273-9143	
39	Paul	Mitchell	Riverside County	Environmental Health	(951) 358-5055	
40	Gino	Monterroso	Riverside County	Environmental Health	(951) 273-9143	

NPDES STORMWATER QUALITY TRAINING FOR
Industrial/Commercial Training
Riverside County Flood Control & Water Conservation District

Meeting of: Tuesday, April 15 - 09:00 - 12:00 SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
41	George	~~Muñoz~~ Muñoz	City of Riverside	Public Works		George A. Muñoz
42	Jessica	Nguyen	Riverside County	Waste Management		Jessica Nguyen
43	Jim	Nickell	Riverside County	Waste Management	342-7315	Jim Nickell
44	Dan	Olea	Riverside County	Waste Management		Danny Olea
45	LIONEL	ORNELAS	City of Corona	WATER&POWER/SC	(951) 279-3668	[illegible]
46	Sergio	Ortiz	City of San Jacinto	Building	(951) 537-6377	[illegible]
47	Neil	Ozonur	Riverside County	Environmental Health	(951) 273-9143	[illegible]
48	Christine	Parsons	Riverside County	Environmental Health	(951) 273-9143	[illegible]
49	Allen	Pielin	City of Riverside	Public Works	(951) 351-6072	[illegible]
50	Kaniz	Quazi	Riverside County	Waste Management		
51	Noah	Rau	Riverside County	Waste Management		Noah Rau
52	Jim	Ray	Riverside County	Environmental Health	(760) 863-8976	Jim A. Ray
53	Michael	Ray	Riverside County	Waste Management		[illegible]
54	~~Larry~~ Scott	~~Redmond~~ King	City of Riverside	Building & Safety Division	(951) 826-5261	Scott King
55	John	Riddell	Riverside County	Environmental Health	(760) 863-8976	John Riddell
56	Bobby	Riggs	Riverside County	Environmental Health	(760) 863-8976	B Riggs
57	Larry	Salazar	City of Riverside	Public Works		[illegible]
58	Bernie	Schleicher	Riverside County	Environmental Health	(951) 273-9143	[illegible]
59	Joseph	Schupp	Riverside County	Waste Management	686-3220	[illegible]
60	Paul	Shaffer	City of Corona	DWP/Source Control	(951) 279-3592	[illegible]

NPDES STORMWATER QUALITY TRAINING FOR
Industrial/Commercial Training
Riverside County Flood Control & Water Conservation District

Meeting of: Tuesday, April 15 - 09:00 - 12:00 SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signature
61	Michael	Shalhub	Riverside County	Environmental Health	(760) 323-1048	
62	Carolinn	Shay	Riverside County	Environmental Health	(760) 863-8976	
63	Todd	Shibata	Riverside County	Waste Management		
64	Cindy	Snavely-Peck	City of Riverside	Public Works		
65	Doug	Thompson	Riverside County	Environmental Health	(951) 358-5055	
66	Manny	Vargas	Riverside County	Environmental Health	(951) 461-0284	
67	Michael	Walling	Riverside County	Environmental Health	(760) 863-8976	
68	Kelly	Winters	Riverside County	Environmental Health	(951) 461-0284	
69	Mohamed	Worayeth	Riverside County	Transportation Department	(858) 207-5086	
70	Kevin	Yang	Riverside County	Environmental Health	(760) 863-8976	
71	Michael	Yasmer	City of Riverside	Public Works		
72	Juan	Yepez	Riverside County	Waste Management		
73	Evangelina	Zapien	Riverside County	Waste Management	951 2491674	
74	Claudia	Steiding	Riverside County	Facilities Management	955 8174	
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NPDES STORMWATER QUALITY TRAINING FOR
Municipal Training
Riverside County Flood Control & Water Conservation District

Meeting of: Tuesday, April 15 - 13:00 - 16:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signature
1	Archie	Ammons	City of Moreno Valley	Public Works	(951) 413-3167	
2	Steve	Armitage	City of Banning	Street		
3	Jose	Arrollo	Riverside County	EDA	(951) 696-0100	Jose Arrollo
4	John	Baioa	City of Moreno Valley	Public Works	(951) 413-3167	John Baioa
5	Jim	Butler	City of Moreno Valley	Parks Maintenance		Jim Butler
6	Kevin	Carranza	City of San Jacinto	Parks Division		
7	Rudy	Casados	City of Moreno Valley	Parks Maintenance		Rudy Casados
8	Jim	Cash	City of San Jacinto	Water Division		
9	Jessica	Chin	City of Riverside	Public Works	(951) 826-5760	
10	Arlene	Chun	RCFC & WCD	Flood	(951) 955-1330	Arlene Chun
11	Gourley	Collins	City of Banning	Street		
12	Mark	Cooper	Riverside County	EDA	(951) 696-0100	
13	Gayle	Cuneo	RCFC & WCD	Maintenance	(951) 955-1311	Gayle Cuneo
14	Mihai	Dan	City of Indian Wells	Public Works	(760) 776-0237	
15	Ralph	Durrett	City of San Jacinto	Wastewater Division		Ralph Durrett
16	Elizabeth	Escatel	City of La Quinta	Building & Safety	(760) 777-7110	Elizabeth Escatel
17	Gary	Garcia	Riverside County	EDA	(951) 696-9199	
18	Tony	Garcia	City of Moreno Valley	Parks Maintenance		
19	George	Gemberling	Riverside County	Facilities Management	(951) 955-4875	
20	Frank	Gonzalez	City of Moreno Valley	Parks Maintenance		

NPDES STORMWATER QUALITY TRAINING FOR
Municipal Training
Riverside County Flood Control & Water Conservation District

Meeting of: Tuesday, April 15 - 13:00 - 16:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signature
21	Phil	Hallberg	City of San Jacinto	Building	(951) 537-6382	
22	Albert	Hatzenbuhler	City of Norco	Public Works		
23	Ruben	Huerta	City of Moreno Valley	Public Works	(951) 413-3167	
24	Rafael	Islas	Riverside County	EDA	(951) 696-0100	
25	Jeramy	Jackson	City of Moreno Valley	Public Works	(951) 616-4564	
26	Tom	Lara	City of Banning	Street		
27	Craig	Leyland	City of San Jacinto	Wastewater Division		
28	Ruben	Macias	City of Banning	Street		
29	Edgar	Marquez	City of Moreno Valley	Public Works		
30	howard	martin	City of Norco	Public Works		
31	Steve	Martin	Riverside County	EDA	(951) 696-0100	
32	Juan	Martinez	City of Moreno Valley	Parks Maintenance		
33	Jackie	Misuraca	City of La Quinta	Building & Safety	(760) 777-7021	
34	Jeffrey	Mitchell	Riverside County	Waste Management		
35	Daniel	Monto	City of Moreno Valley	Public Works	(951) 413-3485	
36	George	Munoz	City of La Quinta	Building & Safety	(760) 777-7099	
37	Jim	Nickell	Riverside County	Waste Management		
38	Nibardo	Orozco	City of Moreno Valley	Public Works		
39	Ann	Orr	Riverside County	EDA	(951) 696-0100	
40	David	Ortega	RCFC & WCD	NPDES Section	(951) 955-4390	

NPDES STORMWATER QUALITY TRAINING FOR
Municipal Training
Riverside County Flood Control & Water Conservation District

Meeting of: Tuesday, April 15 - 13:00 - 16:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signature
41	Randy	Parker	City of Moreno Valley	Parks Maintenance		
42	Jake	Parr	City of Norco	Public Works		
43	Javier	Plazola	Riverside County	EDA	(951) 696-0100	
44	Tim	Plumb	Riverside County	Facilities Management	(951) 955-4806	
45	Ward	Pratt	Riverside County	Facilities Management	(951) 600-6830	
46	Dean	Ristow	City of Moreno Valley	Parks Maintenance	(951) 413-3702	
47	Paul	Russell	Riverside County	Transportation Department	(951) 955-1095	
48	Russell	Saudert	Riverside County	EDA	(951) 696-0100	
49	Grant	Searl	City of San Jacinto	Water Division		
50	Steven	Selbert	Riverside County	Facilities Management	(760) 863-8004	
51	Todd	Shibata	Riverside County	Waste Management		
52	Tim	Stockton	City of San Jacinto	Street/Storm Water		
53	Carl	Szoyka	City of Banning	Street	(951) 922-3286	
54	Steve	Thomas	Riverside County	EDA	(951) 696-0100	
55	Kurt	Van Dusen	Riverside County	Waste Management		
56	Barry	Verdusco	City of Moreno Valley	Public works dept	(951) 413-3498	
57	Mark	Virgil	City of Moreno Valley	Public Works	(951) 413-3167	
58	Gary	Wagner	City of Moreno Valley	Parks Maintenance		
59	Matt	Wicks	City of San Jacinto	Water Division		
60	Chris	Wiggins	City of Indian Wells	Public Works	(760) 776-0237	

NPDES STORMWATER QUALITY TRAINING FOR
Municipal Training
Riverside County Flood Control & Water Conservation District

Meeting of: Tuesday, April 15 - 13:00 - 16:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signature
61	Terry	Woodruff	Riverside County	EDA	(951) 696-0100	[illegible]
62	Frank	Zaldivar	City of San Jacinto	Street/Storm Water		[illegible]
63	DANIEL	Olea	County	Waste		[illegible]
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NPDES STORMWATER QUALITY TRAINING FOR
WQMP Training
Riverside County Flood Control & Water Conservation District

Meeting of: Wednesday, April 16 - 13:00 - 17:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
1	James	Achuff	City of Indio	Public Works/Engineering Services	(760) 391-4019	
2	JOHN	ASHLOCK	Riverside County	TRANSPORTATION	(951) 955-8162	
3	Lori	Askew	City of Norco	Engineering	(951) 270-5678	
4	Vanessa	Batista	City of Riverside	Planning	(951) 826-5371	
5	Jessica	Chin	City of Riverside	Public Works	(951) 826-5760	
6	Daniel	Cortez	City of Riverside	Planning	(951) 826-2354	
7	Charles	de Chambeau	RCFC & WCD	Flood	(951) 955-1298	
8	Mekbib	Degaga	RCFC & WCD	Flood	(951) 955-1214	
9	Laurie	Dobson-Correa	Riverside County	Transportation Department	(951) 955-1095	
10	Lisa	Elder	Riverside County	Transportation Department	(951) 955-1095	
11	Andrew	Emery	City of Riverside	Parks, Recreation & Community Services	(951) 826-2021	
12	John	Farley	Other	City of Riverside Public Utilities/Water	[illegible]	
13	Kevin	Gillette	Riverside County	Transportation Department	(951) 955-1095	
14	Cesar	Guiterrez	Riverside County	Transportation Department	(951) 955-1095	
15	Diana	Hernandez	RCFC & WCD	Planning Division	(951) 955-9412	
16	Michele	Hindersinn	City of Corona	Public Works		
17	Steve	Hooper	City of Riverside	Public Works		
18	Andrew "Andy"	Huneck	Riverside County	Transportation Department	(951) 955-1095	
19	Tim	King	City of Riverside	Public Works		
20	David	Krell	Other	City of Riverside Public Utilities/Water		
21	Maria	Lamping	City of Riverside	Public Works Engineering	(951) 826-5146	
22	ERIC	LOMELI	RCFC & WCD	DESIGN 1	(951) 955-8601	

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NPDES STORMWATER QUALITY TRAINING FOR
WQMP Training
Riverside County Flood Control & Water Conservation District

Meeting of: Wednesday, April 16 - 13:00 - 17:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signature
23	Roldan	Lopez	City of Indio	Public Works/Engineering Services	(760) 391-4000	
24	Steve	Loriso	City of Norco	Contract Plan Check	(909) 594-9702	
25	Ernest	Marquez	Other	City of Riverside Public Utilities/Water	(951) 826-5409	
26	Ibrahim	Massoud	City of Riverside	Pubic Works/Engineering	(951) 826-5805	
27	Ward	Maxwell	Riverside County	Transportation	(951) 955-6790	
28	Margie	McDowell	Other	City of Riverside Public Utilities/Water	(951) 826-5822	
29	Claudia	Mendoza	Riverside County	Transportation Department	(951) 955-1095	
30	Max	Mendoza	City of Riverside	Water Operations	(951) 351-6320	
31	Rick	Mendoza	Other	City of Riverside Public Utilities/Water		
32	Julie	Meyer	Riverside County	Transportation Department	(951) 955-1095	
33	Kevin	Munns	Other	City of Riverside Public Utilities/Water		
34	Mary	Nevarez	Other	City of Riverside Public Utilities/Water		
35	Douglas	Norfolk	City of Norco	Engineering	(951) 545-7894	
36	Gloria	Perez	Riverside County	EDA	(951) 955-9056	
37	Allen	Pielin	City of Riverside	Public Works		
38	Tony	Resendez	Riverside County	EDA	(951) 955-5781	
39	Tom	Rheiner	RCFC & WCD	Special Projects	(951) 955-2349	
40	Marcia	Rose	Riverside County	Transportation Department	(951) 955-1095	
41	Randy	Sheppeard	RCFC & WCD	ERS	(951) 955-1306	
42	Cindy	Snavely-Peck	City of Riverside	Public Works		
43	Jason	Swenson	RCFC & WCD	ERS	(951) 955-8082	

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NPDES STORMWATER QUALITY TRAINING FOR
WQMP Training
Riverside County Flood Control & Water Conservation District

Meeting of: Wednesday, April 16 - 13:00 - 17:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
44	Tesfu	Tadesse	Riverside County	Transportation	(951) 955-3789	
45	KEVIN	TSANG	Riverside County	TRANSPORTATION	(951) 955-6828	
46	Teresa	Tung	RCFC & WCD	ERS	(951) 955-1233	
47	Vince	Vasallo	Other	City of Riverside Public Utilities/Water		
48	Mark	Westover	City of Moreno Valley	Public Works	(951) 413-3114	
49	Michael	Yasmer	City of Riverside	Public Works		
50	Mary	Zambon	Riverside County	Transportation Department	(951) 955-1095	
51	Wendy	Kaminski	RCFC&WCD	NPDES	951-955-1300	
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0002533

NPDES STORMWATER QUALITY TRAINING FOR
WQMP Training
Coachella Valley Water District

Meeting of: Tuesday, April 22 - 13:00 - 17:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
1	Jim	ayres	Riverside County	Economic Development	(760) 863-2552	
2	Tony	Bagato	City of Palm Desert	Planning	(760) 346-0611	
3	Roland	Bustamante	CVWD	Service (Inspection)	(760) 398-2661	
4	ARACELI	CASTRO	Riverside County	Economic Development		
5	Leland	Cole	City of Rancho Mirage	Public Works / Engineering	(760) 770-3224	
6	Adrienne	Dunfee	City of Indio	Public Works/Engineering Services	(760) 391-4000	
7	Grant	Eklund	City of Indio	Public Works/Engineering Services	(760) 391-4018	
8	Jaime	Engler	City of Indio	Public Works/Engineering Services	(760) 391-4000	
9	Tommy	Fowlkes	CVWD	Development Services	(760) 398-2661	
10	Bob	French	City of Calimesa	Public Works	(909) 798-9801	
11	Wilfred	Gonzalez	CVWD	Water Resources	(760) 398-2651	
12	Melissa	Grisa	City of Palm Desert	Planning	(760) 346-0611	
13	Phuong	Hunter	City of Moreno Valley	Public Works	(951) 413-3470	
14	Jeramy	Jackson	City of Moreno Valley	Public Works	(951) 616-4564	
15	Julien	Kim	City of Banning	Planning	(951) 922-3167	
16	LIZA	LIZARRAGA	Riverside County	Economic Development	(760) 863-2552	
17	Dominick	Lombardi	Riverside County	EDA	(951) 955-6622	
18	Gabriel	Martin	Riverside County	Economic Development Agency	(951) 955-1918	
19	Mike	McCabe	City of Calimesa	Public Works	(909) 795-9801	
20	LEONARD Bryan	ST. SAUVEUR McKinney	City of La Quinta	Public Works	777-7048 (760) 777-7045	
21	rick	minjares	City of Palm Springs	public works and engineering	(760) 323-8253	

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NPDES STORMWATER QUALITY TRAINING FOR
WQMP Training
Coachella Valley Water District

Meeting of: Tuesday, April 22 - 13:00 - 17:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signature
22	Allison	Powell	City of Indio	Public Works/Engineering Services	(760) 391-4000	
23	Tom	Rafferty	City of Indio	Public Works/Engineering Services	(760) 391-4000	
24	Juan	Raya	City of Indio	Public Works/Engineering Services	(760) 391-4000	
25	ANNA	RODRIGUEZ	Riverside County	Economic Development	(760) 863-2552	
26	LEAH	RODRIGUEZ	Riverside County	Economic Development	(760) 863-2552	
27	Carol	Templeton	City of Palm Springs	Engineering	(760) 323-8253	
28	JOAQUIN	TIJERINA	Riverside County	Economic Development	(760) 863-2552	
29	Alana	Townsend	City of Palm Desert	Public Works	(760) 346-0611	
30	Jianhong	Xiong	Other	Plan check consultant to RCFCWCD	(858) 207-5077	
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NPDES STORMWATER QUALITY TRAINING FOR
WQMP Training
Coachella Valley Water District

Meeting of: Tuesday, April 22 - 13:00 - 17:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
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ATTACHMENT D

ENCROACHMENT / CONSTRUCTION REQUIREMENTS AND ENCROACHMENT LOGS

STANDARD SPECIFICATIONS FOR DISTRICT ADMINISTERED CONSTRUCTION PROJECTS

SECTION 6 - SPECIAL REQUIREMENTS

6.1 National Pollutant Discharge Elimination System (NPDES) –

Determine which watershed then: choose 1, 2 or 3 for construction site ≥1 acres; choose 4, 5 or 6 for construction site <1 acres.

1. Whitewater River Watershed

The Contractor shall comply with the requirements of Board Order No. 01-077 (NPDES No. CAS617002), NPDES Area-Wide Municipal Storm Water Permit, hereafter referred to in this Section as the "Permit", issued by the California Regional Water Quality Control Board (CRWQCB) – Colorado River Basin Region. This Permit regulates both stormwater and non-stormwater discharges associated with Contractor's construction activities. The Contractor shall prepare and implement a Storm Water Pollution Prevention Plan (SWPPP) in accordance with Section 29 "Stormwater and Non-Stormwater Pollution Control" of the Detailed Specifications.

The Contractor's attention is directed to: 1) Section 29.2 "General Requirements" which allows the Engineer to withhold progress payments if the Contractor fails to fully implement Section 29 "Stormwater and Non-Stormwater Pollution Control" or is deemed to be in non-compliance with the provisions of the Permit; 2) Section 29.3 "Stormwater Pollution Prevention Plan Preparation and Approval" which requires that a SWPPP be prepared and approved prior to the Pre-Construction meeting; and 3) Section 29.7 "SWPPP Implementation" which allows the Engineer to suspend construction operations if the Contractor fails to implement the approved SWPPP and any amendments thereto.

2. Santa Ana Watershed

The Contractor shall comply with the requirements of Board Order No. R8-2002-0011 (NPDES No. CAS618033), NPDES Area-Wide Municipal Stormwater Permit, hereafter referred to in this Section as the "Permit", issued by the California Regional Water Quality Control Board (CRWQCB) – Santa Ana Region. This Permit regulates both stormwater and non-stormwater discharges associated with Contractor's construction activities. The Contractor shall prepare and implement a Stormwater Pollution Prevention Plan (SWPPP) in accordance with Section 29 "Stormwater and Non-Stormwater Pollution Control" of the Detailed Specifications.

The Contractor's attention is directed to: 1) Section 29.2 "General Requirements" which allows the Engineer to withhold progress payments if the Contractor fails to fully implement Section 29 "Stormwater and Non-Stormwater Pollution Control" or is deemed to be in non-compliance with provisions of the Permit; 2) Section 29.3 "Stormwater Pollution Prevention Plan Preparation and Approval" which requires that a SWPPP be prepared and approved prior to the Pre-Construction meeting; and 3) Section 29.7 "SWPPP Implementation" which allows the Engineer to suspend construction operations if the Contractor fails to implement the approved SWPPP and any amendments thereto.

3. Santa Margarita Watershed

The Contractor shall comply with the requirements of Board Order No. R9-2004-001 (NPDES No. CAS0108766), NPDES Municipal Separate Storm Sewer Systems (MS4s),

hereafter referred to in this Section as the "Permit", issued by the California Regional Water Quality Control Board (CRWQCB) – San Diego Region and the requirements of Section 5.2 of the District's Santa Margarita Region Storm Water Management Plan, referred to as "District SWMP". The Permit and District SWMP regulates both stormwater and non-stormwater discharges associated with Contractor's construction activities. The Contractor shall prepare and implement a Stormwater Pollution Prevention Plan (SWPPP) in accordance with Section 29 "Stormwater and Non-Stormwater Pollution Control" of the Detailed Specifications.

The Contractor's attention is directed to: 1) Section 29.2 "General Requirements" which allows the Engineer to withhold progress payments if the Contractor fails to fully implement Section 29 "Stormwater and Non-Stormwater Pollution Control" or is deemed to be in non-compliance with provisions of the General Permit; 2) Section 29.3 "Stormwater Pollution Prevention Plan Preparation and Approval" which requires that a SWPPP be prepared and approved prior to the Pre-Construction meeting; and 3) Section 29.7 "SWPPP Implementation" which allows the Engineer to suspend construction operations if the Contractor fails to implement the approved SWPPP and any amendments thereto.

****** Choose 4, 5 or 6 for construction site < 1 acre ******

4. Whitewater River Watershed

The Contractor shall comply with the requirements of Board Order No. 01-077 (NPDES No. CAS617002), NPDES Area-Wide Municipal Storm Water Permit, hereafter referred to in this Section as the "Permit", issued by the California Regional Water Quality Control Board (CRWQCB) – Colorado River Basin Region. This Permit regulates stormwater discharges associated with construction activities performed under the direction of a municipal stormwater permittee. The Contractor shall prepare and implement a Pollution Prevention Plan (PPP) in accordance with Section 29 "Stormwater and Non-Stormwater Pollution Control" of the Detailed Specifications.

The Contractor's attention is directed to: 1) Section 29.2 "General Requirements" which allows the Engineer to withhold progress payments if the Contractor fails to fully implement Section 29 "Stormwater and Non-Stormwater Pollution Control" or is deemed to be in non-compliance with provisions of the Permit; 2) Section 29.3 "Pollution Prevention Plan Preparation and Approval" which requires that a PPP be prepared and approved prior to the Pre-Construction meeting; and 3) Section 29.5 "Pollution Prevention Plan Implementation" which allows the Engineer to suspend construction operations if the Contractor fails to implement the approved PPP and any amendments thereto.

Throughout the term of this contract, the total soil-disturbed area of the project site shall be no more than 1 acre.

5. Santa Ana Watershed

The Contractor shall comply with the requirements of Board Order No. R8-2002-0011 (NPDES No. CAS618033), NPDES Area-Wide Municipal Stormwater Permit, hereafter referred to in this Section as the "Permit", issued by the California Regional Water Quality Control Board (CRWQCB) – Santa Ana Region. This Permit regulates stormwater discharges associated with construction activities performed under the direction of a municipal stormwater permittee. The

Contractor shall prepare and implement a Pollution Prevention Plan (PPP) in accordance with Section 29 "Stormwater and Non-Stormwater Pollution Control" of the Detailed Specifications.

The Contractor's attention is directed to: 1) Section 29.2 "General Requirements" which allows the Engineer to withhold progress payments if the Contractor fails to fully implement Section 29 "Stormwater and Non-Stormwater Pollution Control" or is deemed to be in non-compliance with provisions of the Permit; 2) Section 29.3 "Pollution Prevention Plan Preparation and Approval" which requires that a PPP be prepared and approved prior to the Pre-Construction meeting; and 3) Section 29.5 "Pollution Prevention Plan Implementation" which allows the Engineer to suspend construction operations if the Contractor fails to implement the approved PPP and any amendments thereto.

Throughout the term of this contract, the total soil-disturbed area of the project site shall be no more than 1 acre.

6. Santa Margarita Watershed

The Contractor shall comply with the requirements of Board Order No. R9-2004-001 (NPDES Permit No. CAS0108766) NPDES Municipal Separate Storm Sewer System Permit (MS4s), hereafter referred to in this Section as the "Permit", issued by the California Regional Water Quality Control Board (CRWQCB) – San Diego Region. This Permit regulates stormwater discharges associated with construction activities performed under the direction of a municipal stormwater permittee. The Contractor shall prepare and implement a Pollution Prevention Plan (PPP) in accordance with Section 29 "Stormwater and Non-Stormwater Pollution Control" of the Detailed Specifications.

The Contractor's attention is directed to: 1) Section 29.2 "General Requirements" which allows the Engineer to withhold progress payments if the Contractor fails to fully implement Section 29 "Stormwater and Non-Stormwater Pollution Control" or is deemed to be in non-compliance with provisions of the Permit; 2) Section 29.3 "Pollution Prevention Plan Preparation and Approval" which requires that a PPP be prepared and approved prior to the Pre-Construction meeting; and 3) Section 29.5 "Pollution Prevention Plan Implementation" which allows the Engineer to suspend construction operations if the Contractor fails to implement the approved PPP and any amendments thereto.

Throughout the term of this contract, the total soil-disturbed area of the project site shall be no more than 1 acre.

SECTION 29 – STORMWATER AND NON-STORMWATER POLLUTION CONTROL

For construction site ≥ **1** acre, choose 1, 2 or 3 (SWPPP) **with** Appendix; - **OR** -
For construction site < **1** acre, choose 4 (PPP) – **no** Appendix.

1. Santa Ana Watershed

29.1 Description – The contract item Stormwater and Non-Stormwater Pollution Control shall include preparing, obtaining approval of, amending and implementing the Stormwater Pollution Prevention Plan (SWPPP) as required by the State Water Resources Control Board (SWRCB) and the California Regional Water Quality Control Board (CRWQCB)-Santa Ana Region.

The SWPPP shall identify site specific Best Management Practices (BMPs) to be implemented during and after construction to minimize the potential pollution of stormwater runoff and receiving waters. The identified BMPs shall be practices designed to minimize or eliminate the discharge of pollutants from the construction site and Contractor's construction activities, including, but not limited to:

1. Good housekeeping practices for solid and sanitary/septic waste management, vehicle and equipment cleaning/maintenance, and material handling and storage.

2. Construction procedures such as stabilized construction access points, scheduling/phasing to minimize areas of soil disturbance, soil stabilization and erosion/sediment control.

The SWPPP shall also stipulate an ongoing program for monitoring and maintenance of all BMPs.

29.2 General Requirements – All activities performed by the Contractor for this project shall conform to the requirements of the State-wide National Pollutant Discharge Elimination System (NPDES) General Permit (Permit No. CAS000002) for Discharges of Stormwater Runoff Associated with Construction Activity, hereafter referred to as the "General Permit", issued by the SWRCB. This General Permit regulates both stormwater and non-stormwater discharges associated with Contractor's construction activities. A copy of this General Permit is included as Appendix "D" of these Specifications.

In the event the District incurs any Administrative Civil Liability (fine) imposed by the CRWQCB - Santa Ana Region, as a result of Contractor's failure to fully implement the provisions of this section, "Stormwater and Non-Stormwater Pollution Control", the Engineer may, in the exercise of his sole judgment and discretion, withhold from payments otherwise due Contractor a sufficient amount to cover the Civil Liability. Liability may be in an amount up to $27,500 per day per deemed occurrence.

Also insert *** portion found after 3. verbiage.

2. Santa Margarita Watershed

29.1 Description – The contract item Stormwater and Non-Stormwater Pollution Control shall include preparing, obtaining approval of, amending and implementing the Stormwater Pollution Prevention Plan (SWPPP) as required by the State Water Resources Control Board (SWRCB), the California Regional Water Quality Control Board (CRWQCB)-San Diego Region and by the District's Santa Margarita Region Stormwater Management Plan (District SWMP).

The SWPPP shall identify site specific Best Management Practices (BMPs) to be implemented during and after construction to minimize the potential pollution of stormwater runoff and receiving waters. The identified BMPs shall be practices designed to minimize or eliminate the discharge of pollutants from the construction site and Contractor's construction activities, including, but not limited to:

1. Good housekeeping practices for solid and sanitary/septic waste management, vehicle and equipment cleaning/maintenance, and material handling and storage.

2. Construction procedures such as stabilized construction access points, scheduling/phasing to minimize areas of soil disturbance, soil stabilization and erosion/sediment control.

3. Incorporating the minimum BMPs identified in Section 5.2 of the District's SWMP.

The SWPPP shall also stipulate an ongoing program for monitoring and maintenance of all BMPs.

29.2 General Requirements – All activities performed by the Contractor for this project shall conform to the requirements of the State-wide National Pollutant Discharge Elimination System (NPDES) General Permit (Permit No. CAS000002) for Discharges of Stormwater Runoff Associated with Construction Activity, hereafter referred to as the "General Permit", issued by the SWRCB. This General Permit regulates both stormwater and non-stormwater discharges associated with Contractor's construction activities. A copy of this General Permit is included as Appendix "D" of these Specifications.

In the event the District incurs any Administrative Civil Liability (fine) imposed by the CRWQCB – San Diego Region, as a result of Contractor's failure to fully implement the provisions of this section, "Stormwater and Non-Stormwater Pollution Control", the Engineer may, in the exercise of his sole judgment and discretion, withhold from payments otherwise due Contractor a sufficient amount to cover the Civil Liability. Liability may be in an amount up to $27,500 per day per deemed occurrence.

Also insert *** text portion found after 3. verbiage.

3. Whitewater River Watershed

29.1 Description – The contract item Storm Water and Non-Storm Water Pollution Control shall include preparing, obtaining approval of, amending and implementing the Storm Water Pollution Prevention Plan (SWPPP) as required by the State Water Resources Control Board (SWRCB) and the California Regional Water Quality Control Board (CRWQCB)-Colorado River Basin Region.

The SWPPP shall identify site specific Best Management Practices (BMPs) to be implemented during and after construction to minimize the potential pollution of stormwater runoff and receiving waters. The identified BMPs shall be practices designed to minimize or eliminate the discharge of pollutants from the construction site and Contractor's construction activities, including, but not limited to:

1. Good housekeeping practices for solid and sanitary/septic waste management, vehicle and equipment cleaning/maintenance, and material handling and storage.

2. Construction procedures such as stabilized construction access points, scheduling/phasing to minimize areas of soil disturbance, soil stabilization and erosion/sediment control.

The SWPPP shall also stipulate an ongoing program for monitoring and maintenance of all BMPs.

29.2 General Requirements – All activities performed by the Contractor for this project shall conform to the requirements of the State-wide National Pollutant Discharge Elimination System (NPDES) General Permit (Permit No. CAS000002) for Discharges of Stormwater Runoff Associated with Construction Activity, hereafter referred to as the "General Permit", issued by the SWRCB. This General Permit regulates both stormwater and non-stormwater discharges associated with Contractor's construction activities. A copy of this General Permit is included as Appendix "D" of these Specifications.

In the event the District incurs any Administrative Civil Liability (fine) imposed by the CRWQCB – Colorado River Basin Region, as a result of Contractor's failure to fully implement the provisions of this section, "Stormwater and Non-Stormwater Pollution Control", the Engineer may, in the exercise of his sole judgment and discretion, withhold from payments otherwise due Contractor a sufficient amount to cover the Civil Liability. Liability may be in an amount up to $27,500 per day per deemed occurrence.

Also insert *** text portion found after 3. verbiage.

***** After 29.2 insert the following (same for all watersheds)**

Stormwater and Non-Stormwater Pollution Control work shall conform to the requirements in the latest version of the California Stormwater Quality Association (CASQA) Handbook, entitled **"California Stormwater BMP Handbook – Construction"**. A copy of the "California Stormwater BMP Handbook – Construction", hereafter referred to as the "CASQA Handbook", may be obtained from CASQA, Post Office Box 2105, Menlo Park, California 94026-2105. Telephone: 650.366.1042. Copies of the handbook can also be downloaded from the CASQA Internet site at http://www.cabmphandbooks.com/construction.asp. In addition, a copy of the CASQA Handbook is available for review at the District's office.

The Contractor shall be responsible for all costs and for any liability imposed by law as a result of the Contractor's failure to comply with the requirements set forth in this section, "Stormwater and Non-Stormwater Pollution Control", including but not limited to, compliance with the applicable provisions of the CASQA Handbook, General Permit, Federal, State and local regulations. For the purpose of this paragraph, costs and liabilities include, but are not limited to, fines, penalties and damages whether assessed against the District or the Contractor, including those levied under the Federal Clean Water Act and the State Porter-Cologne Water Quality Act.

The Contractor shall become fully informed of and comply with the applicable provisions of the CASQA Handbook, General Permit, Federal, State and local regulations that govern the Contractor's activities and operation pertaining to both stormwater and non-stormwater discharges from both the project site and areas of disturbance outside the project limits during

construction. The Contractor shall, at all times, keep copies of the General Permit, approved SWPPP and all amendments at the project site. The SWPPP shall be made available upon request of a representative of the SWRCB, CRWQCB, United States Environmental Protection Agency (USEPA) or local stormwater management agency. Requests by the public shall be directed to the Engineer.

The Contractor is solely and exclusively responsible for any arrangements made between the Contractor and other property owners or entities that results in disturbance of areas or construction activities being conducted outside limits of the designated rights-of-way and temporary construction easements as shown on the project drawings.

The Contractor shall, at reasonable times, allow authorized agents of the CRWQCB, SWRCB, USEPA or local stormwater management agency, upon the presentation of credentials and other documents as may be required by law, to:

1. Enter upon the construction site and the Contractor's facilities pertinent to the work;
2. Have access to and copy any records required to be kept as specified in the General Permit;
3. Inspect the construction site, including any offsite staging areas or material storage areas, and related soil stabilization practices and sediment control BMPs; and
4. Sample or monitor for the purpose of ensuring compliance with the General Permit.

The Contractor shall notify the Engineer immediately upon request from regulatory agencies to enter, inspect, sample, monitor or otherwise access the project site or the Contractor's records.

29.3 Stormwater Pollution Prevention Plan Preparation and Approval - The Contractor shall prepare and obtain approval of the SWPPP as part of the Stormwater and Non-Stormwater Pollution Control work for this contract. The SWPPP shall include an appropriate sampling and analysis plan (SAP) as required by Section B, "Monitoring Program and Reporting Requirements", of the General Permit. A guidance document titled "Construction Storm Water Sampling and Analysis Guidance Document" is available from the California Stormwater Quality Association internet site at http://www.cabmphandbooks.com/Construction.asp. The Contractor shall prepare and implement the SWPPP in accordance with the CASQA Handbook and SAP, the General Permit and these Detailed Specifications.

In case of conflict between the CASQA Handbook and these Detailed Specifications, the Detailed Specifications shall govern; in case of conflict between these Detailed Specifications and the General Permit, the latter shall govern.

Within five (5) working days after the award of the contract, the Contractor shall submit two (2) copies of the SWPPP to the Engineer for review and approval. The Contractor shall allow ten (10) working days for the Engineer to review the SWPPP. If revisions are required as

determined by the Engineer, the Contractor shall revise and resubmit the SWPPP within three (3) working days of receipt of the Engineer's comments and shall allow ten (10) working days for the Engineer to review the revisions. The Contractor shall submit four (4) copies of the approved SWPPP to the Engineer prior to the pre-construction meeting. **The Contractor must have an approved SWPPP prior to the pre-construction meeting**.

The objectives of the SWPPP shall be to identify all pollution sources associated with Contractor's construction activities that may adversely affect the quality of stormwater discharges; to identify all non-stormwater discharges; to identify, construct, implement and maintain water pollution control best management practices, hereafter referred to as "BMPs", to reduce to the maximum extent practicable pollutants in both stormwater discharges and authorized non-stormwater discharges from the construction site during construction and to develop a maintenance schedule for BMPs after construction is completed under this contract.

The SWPPP shall incorporate BMPs in each of the following categories:

1. Soil stabilization practices;
2. Sediment control practices;
3. Sediment tracking control practices;
4. Wind erosion control practices; and
5. Non-stormwater management, and waste management and disposal control practices.

Specific objectives and minimum requirements for each category of BMPs are described in the CASQA Handbook. The Contractor shall consider the objectives and minimum requirements presented in the CASQA Handbook for each of the above categories. When minimum requirements are listed for any category, the Contractor shall incorporate one or more of the listed minimum BMPs required into the SWPPP and implement on the project to meet the pollution control objectives for the category. In addition, the Contractor shall consider other BMPs presented in the CASQA Handbook to supplement the minimum BMPs required when necessary to meet the objectives of the SWPPP and maintain compliance with the General Permit. The Contractor shall document the selection process in accordance with the procedure specified in the CASQA Handbook.

The Contractor should not assume that the minimum BMPs required for each category presented in the CASQA Handbook are adequate to meet the pollution control objectives. The Contractor may use other effective BMPs, as approved by the Engineer, in addition to the minimum as required in the CASQA Handbook to achieve the pollution control objectives.

The SWPPP shall include the following items as described in the CASQA Handbook, SAP and General Permit:

1. Title Page;
2. Certification and Approval;
3. Table of Contents;
4. Source Identification;
5. Stormwater and Non-Stormwater Pollution Control Drawings;
6. Erosion Control;

7. Stabilization;
8. Sediment Control;
9. Non-Stormwater Management;
10. Waste Management and Disposal;
11. Maintenance, Inspection and Repair Program;
12. Training;
13. List of Contractors and Subcontractors;
14. Sampling and Analysis Plan;
15. Post-Construction Stormwater Management;
16. Current Inventory of BMP related materials;
17. Mobilization Plan for BMP deployment;
18. A copy of the Notice Of Intent (NOI) form submitted by the District for this project;
19. A copy of the Waste Discharge Identification (WDID) number or proof of mailing of the NOI (provided by the District);
20. A copy of the General Permit;
21. A copy of other applicable Plans/Permits, if any;
22. Construction Site Inspection Checklist;
23. Pre/Post Storm Inspection Checklist;
24. Inspection Log;
25. A copy of the Amendments, if any;
26. Amendment Certification and Approval, if any;
27. Amendment Log;
28. Annual Compliance Certification;
29. BMPs Consideration Checklist; and
30. SWPPP Checklist.

The following notes (or notes of substantially similar intent) that address pollution prevention to the Maximum Extent Practicable during the construction phase of a project on a year-round basis needs to be placed on the Stormwater and Non-Stormwater Pollution Control Drawings:

- Erosion control BMPs shall be implemented and maintained to minimize and/or prevent the entrainment of soil in runoff from disturbed soil areas on construction sites.
- Sediment control BMPs shall be implemented and maintained to prevent and/or minimize the transport of soil from the construction site.
- Stockpiles of soil shall be properly contained to eliminate or reduce sediment transport from the site to streets, drainage facilities or adjacent properties via runoff, vehicle tracking or wind.
- Appropriate BMPs for construction-related materials, wastes, spills or residues shall be implemented to eliminate or reduce transport from the site to streets, drainage facilities or adjoining properties by wind or runoff.
- Runoff from equipment and vehicle washing shall be contained at construction sites and must not be discharged to receiving waters or the local storm drain system.

- All construction contractor and subcontractor personnel are to be made aware of the required best management practices and good housekeeping measures for the project site and any associated construction staging areas.
- At the end of each day of construction activity all construction debris and waste materials shall be collected and properly disposed in trash or recycle bins.
- Construction sites shall be maintained in such a condition that a storm does not carry wastes or pollutants off the site. Discharges other than stormwater (non-stormwater discharges) are prohibited, except as authorized by an individual NPDES permit or the State-wide General Permit for Storm Water Discharges Associated with Construction Activity. Potential pollutants include but are not limited to: solid or liquid chemical spills; wastes from paints, stains, sealants, solvents, detergents, glues, lime, pesticides, herbicides, fertilizers, wood preservatives and asbestos fibers; paint flakes or stucco fragments; fuels, oils, lubricants and hydraulic, radiator or battery fluids; concrete and related cutting or curing residues; floatable wastes; wastes from engine/equipment steam cleaning or chemical degreasing; wastes from street cleaning; and super-chlorinated potable water from line flushing and testing. During construction, disposal of such materials should occur in a specified and controlled temporary area onsite physically separated from potential stormwater runoff, with ultimate disposal in accordance with local, State and Federal requirements.
- Discharging contaminated groundwater produced by dewatering groundwater that has infiltrated into the construction site is prohibited. Discharging of contaminated soils via surface erosion is also prohibited.
- The Contractor is required to notify and obtain approval from the District 10 days prior to any non-stormwater discharge or dewatering associated with Contractor's construction activities.
- Construction sites shall be managed to minimize the exposure time of disturbed soil areas through phasing and scheduling of grading to the extent feasible and the use of temporary and permanent soil stabilization.
- BMPs shall be maintained at all times. In addition, BMPs shall be inspected prior to predicted storm events and following storm events.

29.4 Stormwater Pollution Prevention Plan Amendments - The Contractor shall prepare amendments to the SWPPP, both graphically and in narrative form, whenever there is a change in Contractor's construction activities or operations which may result in the discharge of pollutants to surface waters, groundwaters, municipal storm drain systems, or as deemed necessary by the Engineer. The Contractor shall also amend the SWPPP if it is in violation of any condition of the General Permit, or has not effectively achieved the objective of reducing pollutants in stormwater discharges. Amendments shall show additional BMPs, revised Contractor's construction activities or operations, including those in areas not shown in the initially approved SWPPP, which are required on the project to effectively control water pollution.

Amendments to the SWPPP shall be submitted for review and approval by the Engineer in the same manner specified for the initial approval of the SWPPP. The Contractor shall date and attach all approved amendments to the SWPPP. Upon approval of the amendment, the Contractor shall implement the additional BMPs, revised construction activities or operations.

29.5 Annual Compliance Certification – The Contractor shall certify annually that construction activities are in compliance with the requirements of the General Permit and the approved SWPPP. The certification must be completed by July 1st of each year.

29.6 Non-Compliance Reporting - If the project is in non-compliance at any time, the Contractor shall make a written report to the Engineer within two (2) calendar days of identification of non-compliance activities.

29.7 SWPPP Implementation - Upon approval of the SWPPP, the Contractor shall be responsible throughout the duration of the project for placing, installing, constructing, inspecting and maintaining the BMPs as well as conducting the sampling and analysis plan as included in the SWPPP and any amendments thereto, and for removing and disposing of temporary BMPs. Unless otherwise directed by the Engineer or specified in these Detailed Specifications, the Contractor's responsibility for SWPPP implementation shall continue throughout any temporary suspension of work ordered in accordance with Section 6.05, "TEMPORARY SUSPENSION OF THE WORK", of the General Provisions. Requirements for installation, construction, inspection, maintenance, removal and disposal of BMPs are specified in the Caltrans Handbooks and these Detailed Specifications.

The Engineer may order the suspension of construction operations if the Contractor fails to comply with the requirements of this section, "Stormwater and Non-Stormwater Pollution Control", as determined by the Engineer.

The Contractor will not be compensated for sampling and analysis work because of the Contractor's failure to properly implement, inspect, maintain and repair BMPs in the approved SWPPP and any amendments thereto, or for failing to store construction materials or wastes in watertight containers.

(a) Stormwater Pollution Control - **The Contractor shall implement soil stabilization practices and sediment control BMPs, including minimum requirements as presented in the Caltrans Handbooks, on all disturbed areas of the project site during the rainy season, defined as between October 1st and April 30th. (in the Santa Ana Margarita)**

(a) Stormwater Pollution Control - **The Contractor shall implement soil stabilization practices and sediment control BMPs, including minimum requirements as presented in the Caltrans Handbooks, on all disturbed areas of the project site during the rainy season, although undefined shall be October 15th to April 15th, for purposes of these Detailed Specifications. (in the Whitewater Watershed)**

(a) Stormwater Pollution Control - **The Contractor shall implement soil stabilization practices and sediment control BMPs, including minimum requirements as presented in the Caltrans Handbooks, on all disturbed areas of the project site during the rainy season, defined as between October 1st and May 31st. (in the Santa Ana Watershed)**

Implementation of soil stabilization practices and sediment control BMPs for soil-disturbed areas, including but not limited to, rough graded access roads, slopes, channel inverts, operational inlets and outlets of the project shall be completed no later than ten (10) calendar days prior to the start of the winter season or upon start of applicable Contractor's construction activities for projects which begin either during or within ten (10) calendar days of the rainy season.

The Engineer may require the Contractor, on a case-by-case basis, to reduce the active, soil-disturbed area limit of the project. The Contractor shall demonstrate the ability and preparedness to fully deploy soil stabilization practices and sediment control BMPs to protect soil-disturbed areas of the project site by maintaining an adequate quantity of soil stabilization and sediment control materials onsite to protect exposed, soil-disturbed areas and a detailed plan for the mobilization of sufficient labor and equipment to fully deploy the required BMPs prior to the onset of precipitation and for the duration of the project.

Throughout the rainy season, soil-disturbed areas of the project site shall be considered to be nonactive whenever soil disturbing activities are expected to be discontinued for a period of fifteen (15) calendar days or more. Areas that will become nonactive either during the rainy season or within ten (10) calendar days thereof shall be fully protected with soil stabilization practices such as covering with mulch, temporary seeding, fiber rolls, blankets, etc., within ten (10) calendar days of the discontinuance of soil disturbing activities or prior to the onset of precipitation, whichever is first to occur. Areas that will become nonactive either during the rainy season or within ten (10) calendar days thereof shall be fully protected with sediment control BMPs within ten (10) calendar days of the discontinuance of soil disturbing activities or prior to the onset of precipitation, whichever is first to occur.

Throughout the rainy season, active soil-disturbed areas of the project site shall be fully protected at the end of each day with soil stabilization practices and sediment control BMPs. The Contractor shall monitor the weather forecast on a daily basis. The National Weather Service forecast shall be used, or an alternative weather forecast proposed by the Contractor may be used if approved by the Engineer. If precipitation is predicted prior to the end of the following workday, construction scheduling shall be modified, as required, and the Contractor shall deploy functioning BMPs prior to the onset of the precipitation.

(b) Non-Stormwater Pollution Control - **The Contractor shall implement, year-round and throughout the duration of the project, BMPs included in the SWPPP for sediment tracking, wind erosion, non-stormwater management, and waste management and disposal.**

(c) Inspections and Reporting - The Contractor shall regularly inspect the construction site for BMPs identified in the SWPPP to ensure the proper implementation and functioning of BMPs. The Contractor shall identify corrective actions and time frames to address any damaged BMPs or reinitiate any BMPs that have been discontinued.

At a minimum, the Contractor shall inspect the construction site as follows:

1. Prior to a forecast storm;
2. After any precipitation which causes runoff capable of carrying sediment from the construction site;
3. At 24 hour intervals during extended precipitation events; and
4. At a regular interval of once every 2 weeks.

The construction site inspection checklist provided in the Caltrans Handbooks shall be used to ensure that the necessary BMPs are being properly implemented and are functioning adequately. The Contractor shall submit one copy of each site inspection record to the Engineer.

(d) Maintenance - The Contractor shall maintain construction site BMPs identified in the SWPPP to ensure the proper implementation and functioning of BMPs. If the Contractor or the Engineer identifies a deficiency in the deployment or functioning of an identified BMP, the deficiency shall be corrected by the Contractor immediately, or by a later date and time if requested by the Contractor and approved by the Engineer in writing, but not later than the onset of subsequent precipitation events. The correction of deficiencies shall be at no additional cost to the District.

(e) Training – The Contractor shall describe the types of training that the Contractor's BMP inspection, maintenance and repair personnel have received or will receive that is directly related to stormwater pollution prevention.

29.8 Payment - The contract lump sum price paid for the Stormwater and Non-Stormwater Pollution Control work shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals for doing all the work involved in developing, preparing, obtaining approval of, revising and amending the SWPPP, and installing, constructing, maintaining, removing and disposing of BMPs as shown in the SWPPP, as specified in the Caltrans Handbooks and Sample Contractor's Water Quality SAPs, General Permit and these Detailed Specifications, and as directed by the Engineer.

Payment will be made on a basis of the percentage of work completed on the entire project.

ΞΞΞEnd of insert

4. For construction site < 1 acre (PPP) NO Appendix

29.1 Description - The contract item Stormwater and Non-Stormwater Pollution Control shall include preparing, obtaining approval of, amending and implementing Contractor's Pollution Prevention Plan (PPP). The PPP shall identify site specific Best Management Practices (BMPs) to be implemented during and after construction to minimize the potential pollution of stormwater runoff and receiving waters. The identified BMPs shall be practices designed to

minimize or eliminate the discharge of pollutants from the construction site and Contractor's construction activities, including, but not limited to:

1. Good housekeeping practices for solid and sanitary/septic waste management, vehicle and equipment cleaning/maintenance, and material handling and storage.

2. Construction procedures such as stabilized construction access points, scheduling/phasing to minimize areas of soil disturbance, soil stabilization and erosion/sediment control.

The PPP shall also stipulate an ongoing program for monitoring and maintenance of all BMPs.

29.2 General Requirements – Stormwater and Non-Stormwater Pollution Control work shall conform to the requirements in the latest version of Caltrans Storm Water Quality Handbooks, entitled **"Construction Site Best Management Practices (BMPs) Manual" and "Storm Water Pollution Prevention Plan (SWPPP) and Water Pollution Control Program (WPCP) Preparation Manual"**. Copies of the "Construction Site BMPs Manual" and "SWPPP and WPCP Preparation Manual", hereafter referred to collectively as the "Caltrans Handbooks", may be obtained from the California Department of Transportation Publication Distribution Unit, 1900 Royal Oaks Drive, Sacramento, California, 95815-3800. Telephone: (916) 445-3520. Copies of the Caltrans Handbooks can also be downloaded from the Caltrans internet site at http://www.dot.ca.gov/hq/construc/stormwater/stormwater1.htm. In addition, copies of the Caltrans Handbooks are available for review at the District's office.

In the event the District incurs any Administrative Civil Liability (fine) imposed by the California Regional Water Quality Control Board, as a result of Contractor's failure to fully implement the provisions of this section, "Stormwater and Non-Stormwater Pollution Control", the Engineer may, in the exercise of his sole judgment and discretion, withhold from payments otherwise due Contractor a sufficient amount to cover the Civil Liability. Liability may be in an amount up to $27,500 per day per deemed occurrence.

The Contractor shall be responsible for all costs and for any liability imposed by law as a result of the Contractor's failure to comply with the requirements set forth in this section, "Stormwater and Non-Stormwater Pollution Control", including but not limited to, compliance with the applicable provisions of the Caltrans Handbooks, Federal, State, and local regulations. For the purpose of this paragraph, costs and liabilities include, but are not limited to, fines, penalties and damages whether assessed against the District or the Contractor, including those levied under the Federal Clean Water Act and the State Porter-Cologne Water Quality Act.

The Contractor shall become fully informed of and comply with the applicable provisions of the Caltrans Handbooks, Federal, State and local regulations that govern the Contractor's activities and operation pertaining to both stormwater and non-stormwater discharges from both the project site and areas of disturbance outside the project limits during construction. The Contractor shall, at all times, keep copies of the approved PPP and all amendments at the project site. The PPP shall be made available upon request of a representative of the SWRCB, CRWQCB, United States Environmental Protection Agency (USEPA) or local stormwater management agency. Requests by the public shall be directed to the Engineer.

The Contractor is solely and exclusively responsible for any arrangements made between the Contractor and other property owners or entities that results in disturbance of areas or construction activities being conducted outside limits of the designated rights-of-way and temporary construction easements as shown on the project drawings.

29.3 Pollution Prevention Plan Preparation and Approval - The Contractor shall prepare and obtain approval of the PPP as part of the Stormwater and Non-Stormwater Pollution Control work for this contract. The Contractor shall prepare the PPP in accordance with Section 3, "Preparing a Water Pollution Control Program (WPCP)", of the Caltrans Storm Water Quality Handbooks, entitled "**Storm Water Pollution Prevention Plan (SWPPP) and Water Pollution Control Program (WPCP) Preparation Manual**" and these Detailed Specifications.

In case of conflict between the Caltrans Handbooks and these Detailed Specifications, the Detailed Specifications shall govern.

Within five (5) working days after the award of the contract, the Contractor shall submit two (2) copies of the PPP to the Engineer for review and approval. The Contractor shall allow ten (10) working days for the Engineer to review the PPP. If revisions are required as determined by the Engineer, the Contractor shall revise and resubmit the PPP within three (3) working days of receipt of the Engineer's comments and shall allow ten (10) working days for the Engineer to review the revisions. The Contractor shall submit four (4) copies of the approved PPP to the Engineer prior to the pre-construction meeting. **The Contractor must have an approved PPP prior to the pre-construction meeting.**

The objectives of the PPP shall be to identify all pollution sources associated with Contractor's construction activities that may adversely affect the quality of stormwater discharges and receiving waters; to identify all non-stormwater discharges; to identify, construct, implement and maintain water pollution control best management practices, hereafter referred to as "BMPs", to reduce to the maximum extent practicable pollutants in both stormwater and authorized non-stormwater discharges from the construction site during construction and to develop a maintenance schedule for BMPs after construction is completed under this contract.

The PPP shall incorporate BMPs in each of the following categories:

1. Soil stabilization practices;
2. Sediment control practices;
3. Sediment tracking control practices;
4. Wind erosion control practices; and
5. Non-stormwater management, and waste management and disposal control practices.

Specific objectives and minimum requirements for each category of BMPs are contained in the Caltrans Handbooks. The Contractor shall consider the objectives and minimum requirements presented in the Caltrans Handbooks for each of the above categories. When minimum requirements are listed for any category, the Contractor shall incorporate one or more of the listed minimum BMPs required into the PPP and implement on the project to meet the pollution control objectives for the category. In addition, the Contractor shall consider other

BMPs presented in the Caltrans Handbooks to supplement the minimum BMPs required when necessary to meet the objectives of the PPP. The Contractor shall document the selection process in accordance with the procedure specified in the Caltrans Handbooks.

The Contractor shall not assume that the minimum BMPs required for each category presented in the Caltrans Handbooks are adequate to meet the pollution control objectives. The Contractor may use other effective BMPs, as approved by the Engineer, in addition to the minimum BMPs required in the Caltrans Handbooks to achieve the pollution control objectives.

The PPP shall include all of the following items in the order given below:

1. Title Page;
2. Table of Contents;
3. Project Description and Contractor's Certification;
4. Project Information;
5. Pollution Sources and BMPs;
6. Water Pollution Control Drawings;
7. A copy of the Amendments, if any;
8. Amendment Log;
9. Maintenance, Inspection, and Repair Program;
10. Inspection Log;
11. Construction Site Inspection Checklist;
12. Current Inventory of BMP related materials; and
13. Mobilization Plan for BMP deployment.

The following notes (or notes of substantially similar intent) that address pollution prevention to the Maximum Extent Practicable during the construction phase of a project on a year-round basis needs to be placed on the Stormwater and Non-Stormwater Pollution Control Drawings:

- Erosion control BMPs shall be implemented and maintained to minimize and/or prevent the entrainment of soil in runoff from disturbed soil areas on construction sites.
- Sediment control BMPs shall be implemented and maintained to prevent and/or minimize the transport of soil from the construction site.
- Stockpiles of soil shall be properly contained to eliminate or reduce sediment transport from the site to streets, drainage facilities or adjacent properties via runoff, vehicle tracking or wind.
- Appropriate BMPs for construction-related materials, wastes, spills or residues shall be implemented to eliminate or reduce transport from the site to streets, drainage facilities or adjoining properties by wind or runoff.
- Runoff from equipment and vehicle washing shall be contained at construction sites and must not be discharged to receiving waters or the local storm drain system.
- All construction contractor and subcontractor personnel are to be made aware of the required best management practices and good housekeeping measures for the project site and any associated construction staging areas.

- At the end of each day of construction activity all construction debris and waste materials shall be collected and properly disposed in trash or recycle bins.
- Construction sites shall be maintained in such a condition that a storm does not carry wastes or pollutants off the site. Discharges other than stormwater (non-stormwater discharges) are prohibited, except as authorized by an individual NPDES permit, the State-wide General Permit for Storm Water Discharges Associated with Construction Activity. Potential pollutants include but are not limited to: solid or liquid chemical spills; wastes from paints, stains, sealants, solvents, detergents, glues, lime, pesticides, herbicides, fertilizers, wood preservatives and asbestos fibers; paint flakes or stucco fragments; fuels, oils, lubricants and hydraulic, radiator or battery fluids; concrete and related cutting or curing residues; floatable wastes; wastes from engine/equipment steam cleaning or chemical degreasing; wastes from street cleaning; and super-chlorinated potable water from line flushing and testing. During construction, disposal of such materials should occur in a specified and controlled temporary area onsite physically separated from potential stormwater runoff, with ultimate disposal in accordance with local, State and Federal requirements.
- Discharging contaminated groundwater produced by dewatering groundwater that has infiltrated into the construction site is prohibited. Discharging of contaminated soils via surface erosion is also prohibited.
- The Contractor is required to notify and obtain approval from the District 10 days prior to any non-stormwater discharge or dewatering associated with Contractor's construction activities.
- Construction sites shall be managed to minimize the exposure time of disturbed soil areas through phasing and scheduling of grading to the extent feasible and the use of temporary and permanent soil stabilization.
- BMPs shall be maintained at all times. In addition, BMPs shall be inspected prior to predicted storm events and following storm events.

29.4 Pollution Prevention Plan Amendments - The Contractor shall prepare amendments to the PPP, both graphically and in narrative form, whenever there is a change in Contractor's construction activities or operations which may result in the discharge of pollutants to surface waters, groundwaters, municipal storm drain systems or when deemed necessary by the Engineer. The Contractor shall also amend the PPP if it is not effectively achieving the objectives of reducing pollutants in stormwater discharges. Amendments shall show additional BMPs or revisions to Contractor's construction activities or operations (including any construction activities in areas not included in the initially approved PPP) which are required on the project to effectively control water pollution.

Amendments to the PPP shall be submitted for review and approval by the Engineer in the same manner specified for the initial approval of the PPP. The Contractor shall date and attach all approved amendments to the PPP. Upon approval of the amendment, the Contractor shall implement the additional BMPs, revised construction activities or operations as described therein.

29.5 Pollution Prevention Plan Implementation - Upon approval of the PPP, the Contractor shall be responsible throughout the duration of the project for installing, constructing, inspecting

and maintaining the BMPs included in the PPP and any amendments thereto and for removing and disposing of temporary BMPs. Unless otherwise directed by the Engineer or specified in these Detailed Specifications, the Contractor's responsibility for PPP implementation and maintenance shall continue throughout any temporary suspension of work ordered in accordance with Section 6.05, TEMPORARY SUSPENSION OF THE WORK, of the General Provisions. Requirements for installation, construction, inspection, maintenance, removal and disposal of BMPs are specified in the Caltrans Handbooks and these Detailed Specifications. The Contractor shall implement the PPP in accordance with the Caltrans Handbooks and these Detailed Specifications.

The Engineer may order the suspension of construction operations if the Contractor fails to comply with the requirements of this section, "Stormwater and Non-Stormwater Pollution Control", as determined by the Engineer.

(a) Stormwater Pollution Control - **The Contractor shall implement soil stabilization practices and sediment control BMPs, including minimum requirements as presented in the Caltrans Handbooks, on all disturbed areas of the project site throughout the winter season, defined as between October 15th and April 15th.**

Implementation of soil stabilization practices and sediment control BMPs for soil-disturbed areas, including but not limited to, rough graded access roads, slopes, channel inverts, operational inlets and outlets of the project site shall be completed no later than ten (10) calendar days prior to the start of the winter season or upon start of applicable Contractor's construction activities for projects which begin either during or within ten (10) calendar days of the winter season.

Throughout the term of this contract, the total soil-disturbed area of the project site shall be less than one (1) acre. The Contractor shall demonstrate the ability and preparedness to fully deploy soil stabilization practices and sediment control BMPs to protect soil-disturbed areas of the project site by maintaining an adequate quantity of soil stabilization and sediment control materials onsite to protect exposed, soil-disturbed areas and a detailed plan for the mobilization of sufficient labor and equipment to fully deploy the required BMPs prior to the onset of precipitation and for the duration of the project.

Throughout the winter season, active soil-disturbed areas of the project site shall be fully protected at the end of each day with soil stabilization practices and sediment control BMPs. The Contractor shall monitor the weather forecast on a daily basis. The National Weather Service forecast shall be used or an alternative weather forecast proposed by the Contractor may be used if approved by the Engineer. If precipitation is predicted prior to the end of the following workday, construction scheduling shall be modified, as required, and the Contractor shall deploy functioning control measures prior to the onset of the precipitation.

Throughout the winter season, soil-disturbed areas of the project site shall be considered to be non-active whenever soil disturbing activities are expected to be discontinued for a period of fifteen (15) calendar days or more. Areas that will

become non-active either during the winter season or within ten (10) calendar days thereof shall be fully protected with soil stabilization practices such as covering with mulch, temporary seeding, fiber rolls, blankets, etc. within ten (10) calendar days of the discontinuance of soil disturbing activities or prior to the onset of precipitation, whichever is first to occur. Areas that will become non-active either during the winter season or within ten (10) calendar days thereof shall be fully protected with sediment control BMPs within ten (10) calendar days of the discontinuance of soil disturbing activities or prior to the onset of precipitation, whichever is first to occur.

(b) Non-Stormwater Pollution Control - **The Contractor shall implement, year-round and throughout the duration of the project, BMPs included in the PPP for sediment tracking, wind erosion, non-stormwater management, and waste management and disposal.**

(c) Inspections and Reporting - The Contractor shall regularly inspect the construction site for BMPs identified in the PPP to ensure the proper implementation and functioning of BMPs. The Contractor shall identify corrective actions and time frames to address any deficient BMPs or reinitiate any BMPs that have been discontinued.

At a minimum, the Contractor shall inspect the construction site as follows:

1. Prior to a forecast storm;
2. After any precipitation which causes runoff capable of carrying sediment from the construction site;
3. At 24 hour intervals during extended precipitation events; and
4. At a regular interval of once every 2 weeks.

The construction site inspection checklist provided in the Caltrans Handbooks shall be used to ensure that the necessary BMPs are being properly implemented and are functioning adequately. The Contractor shall submit one copy of each site inspection record to the Engineer.

(d) Maintenance – The Contractor shall maintain construction site BMPs identified in the PPP to ensure the proper implementation and functioning of BMPs. If the Contractor or the Engineer identifies a deficiency in the deployment or functioning of an identified BMP, the deficiency shall be corrected by the Contractor immediately, or by a later date and time if requested by the Contractor and approved by the Engineer in writing, but not later than the onset of subsequent precipitation events. The correction of deficiencies shall be at no additional cost to the District.

(e) Training – The Contractor shall describe the types of training that the Contractor's BMP inspection, maintenance and repair personnel have received or will receive that is directly related to stormwater pollution prevention.

29.6 Payment - The contract lump sum price paid for contract item Stormwater and Non Stormwater Pollution Control shall include full compensation for all direct and indirect costs incurred under this section.

Payment will be made on a basis of the percentage of work completed on the entire project.

ENCROACHMENT PERMIT APPLICATION

51355.1
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RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

ENCROACHMENT PERMIT INFORMATION SHEET

Applicants: Please note that the following information and documents **MUST** be submitted with your application in order for the Riverside County Flood Control and Water Conservation District (District) to begin processing your request for an encroachment permit. Failure to submit all documentation as described below will delay the processing of your application:

1. Completed Check List (attached) with all applicable items addressed.

2. Completed and signed Application Form (attached).

3. Two sets of approved and signed plans for the proposed work.

4. One copy of the District as-built drawing(s) clearly showing the proposed work to be done under the requested encroachment permit. As-built drawings can be purchased from the District's Reproduction Section (951.955.1221).

5. A check or money order written for the appropriate fee amount to be deposited. (Please refer to the attached Encroachment Permit Fee Deposit Requirement Sheet.) Fees will be placed in an individual account and all District costs will be tracked as work is performed. If the balance in the account drops under 25% of the original deposit and the General Manager-Chief Engineer determines that the remaining amount is insufficient to complete the processing of the application (including environmental review, inspection and finalization of the project), the applicant will be required to submit an additional deposit prior to continuing to work on the application or proceeding with any further work on the project. Further inspections will not be scheduled until the additional deposit is submitted. Once a project is completed and accepted by the District, all unused funds will be refunded to the applicant within 60 days. All applicants, including public entities, must submit the required fee.

6. A copy of the approved and filed California Environmental Quality Act (CEQA) document (e.g., Notice of Exemption, Negative Declaration, Mitigated Negative Declaration/Initial Study, Environmental Impact Report and Statement of Overriding Consideration) as prepared by the Lead Agency for the proposed project shall be submitted to the District. The CEQA document is usually available from the City or County Planning Department that originally approved the proposed project. The District, as a CEQA Responsible Agency, must prepare the appropriate CEQA document for the proposed project prior to issuance of the requested encroachment permit.

7. Proof of prior compliance with the approved Western Riverside County Multiple Species Habitat Conservation Plan (MSHCP) must be submitted to the District for proposed projects with the boundaries of the MSHCP. For projects previously approved by the County or Cities, this proof may consist of written documentation from the applicable jurisdiction confirming compliance with the MSHCP. Documentation concerning payment of the MSHCP Mitigation Fee alone is not sufficient. The District must receive written documentation specifically confirming compliance with Sections 6.1.2, 6.1.3, 6.1.4 and 6.3 of the MSHCP as well as the Criteria if the project is located within the Criteria Area/Cell. Encroachment Permits associated with a project not previously reviewed by the County or a City for MSHCP compliance or Encroachment Permits not associated with any project that are located within the boundaries of the MSHCP will need to be reviewed for compliance with the requirements of the MSHCP by the District prior to issuance of the requested Encroachment Permit. The issuance of an Encroachment Permit by the District is a discretionary action subject to compliance with the MSHCP.

8. NPDES REQUIREMENTS: Encroachment permit applications associated with new or redevelopment projects proposing to discharge stormwater or non-stormwater into District facilities must identify the structural and non-structural best management practices (BMPs) to mitigate water quality impacts from the proposed project.

    a. ENCROACHMENT PERMITS WITHIN THE SANTA ANA OR SANTA MARGARITA WATERSHEDS: Projects within the Santa Margarita and Santa Ana watershed regions of Riverside County must meet the requirements of Section 6 of the Riverside County Drainage Area Management Plan (DAMP) for the Santa Margarita and Santa Ana watershed regions of Riverside County (SA/SM DAMP). Encroachment permit applications for projects that meet the definition of new development or significant redevelopment per Section 6 of the SA/SM DAMP may demonstrate compliance by providing proof of completion of a project-specific Water Quality Management Plan (WQMP). Projects that do not meet the definition of new development or significant redevelopment per Section 6 of the SA/SM DAMP must demonstrate compliance with the structural and non-structural BMPs requirements specified for other development projects per the requirements of Section 6.4.4 of the SA/SM DAMP. Submittal of plans identifying the locations of post-construction BMPs can be used to demonstrate compliance with this requirement.

    b. Projects within the Whitewater Region of Riverside County must demonstrate compliance with Supplement A to the Riverside County DAMP for the Whitewater Region (WW DAMP). This may be accomplished by submitting plans demonstrating the location of approved post-construction BMPs, or by submitting conditions of approval requiring compliance with Supplement A.

    c. Encroachment permit applicants not associated with new or redevelopment projects who discharge stormwater or non-stormwater to District facilities must identify the necessary structural and non-structural BMPs to mitigate water quality impacts from the proposed project. The applicant must complete the Application for Third-Party Discharge to the District Facilities. The application form is available on-line at www.floodcontrol.co.riverside.ca.us/waterqualitynpdes.asp. It may be advisable to contact the NPDES representative listed on the form to determine what, if any, water quality sampling data may be needed to process the application.

9. STORM DRAIN CONNECTIONS, BRIDGES AND CULVERT CROSSINGS: Hydrology and hydraulic calculations prepared and signed by a Registered Civil Engineer must be submitted with all applications for storm drain connections, bridges and culvert crossings. The maximum confluence angle at the junction of a lateral storm drain and mainline channel shall be 45 degrees. A hydraulic junction analysis must be done if the lateral flowrate is greater than 25% of the mainline flowrate. The hydraulic grade line, flow rate, and velocity shall be shown on the storm drain profile drawing. Only reinforced concrete pipe (RCP minimum 1500D) will be approved within District right of way.

10. EXCESS MATERIAL REMOVAL: Excess material removal shall be approved by the District's Chief of Operations and Maintenance, prior to submitting the encroachment permit application. An inspection fee for a minimum of $0.35 per cubic yard will take effect when the permit is issued and is payable to the District monthly or as specified in the encroachment permit.

    a. Applicants requesting encroachment permits for the removal of excess material from District facilities must also submit a Storm Water Pollution Prevention Plan (SWPPP) per the requirements of the appropriate Regional Water Control Board. A copy of the SWPPP shall be provided and approved by the District prior to receiving the requested encroachment permit. A SWPPP template and guidance on the preparation of a SWPPP can be downloaded from the California Association of Stormwater Quality Agencies (CASQA) website at http://www.cabmphandbooks.com/Construction.asp.

b. Applicants requesting encroachment permits for the removal of excess material from District facilities must also submit a fugitive dust control plan (DCP) per the requirements of the Air Quality Management District or local ordinances, as required. A copy of the DCP shall be provided and approved by the District prior to receiving the requested encroachment permit. DCP Handbooks for the Coachella Valley region can be downloaded from the Coachella Valley Association of Governments at http://www.cvag.org/depts/hcr.htm.

11. The applicant shall accept full responsibility for obtaining and complying with all applicable provisions of the appropriate regulatory permits. If the requested encroachment permit is for facilities that will be ultimately maintained by the District, the regulatory permits shall address both the construction and maintenance activities of these facilities in compliance with all applicable Federal, State and local regulations. These regulatory permits include, but are not limited to: a Section 404 Permit issued by the U.S. Army Corps of Engineers in compliance with Section 404 of the Clean Water Act, a California State Department of Fish and Game Streambed Alteration Agreement in compliance with the Fish and Game Code Sections 1600 et seq., and a 401 Water Quality Certification or a Report of Waste Discharge Requirements in compliance with Section 401 of the Clean Water Act or State Porter-Cologne Water Quality Act, respectively, from the appropriate Regional Water Quality Control Board. A general permit for discharges shall be obtained from the State Water Resources Control Board or Regional Water Quality Control Board as applicable for discharges of storm water associated with construction activity. The applicant shall also be responsible for complying with all mitigation measures as required under CEQA and all Federal, State, and local environmental rules and regulations. A copy of the above mentioned permits shall be submitted to the District for review and approval for all facilities that will ultimately be maintained by the District prior to District issuance of the requested encroachment permit. For projects that will not be maintained by the District a copy of the above mentioned permits shall be submitted to the District for the encroachment permit file. Mitigation measures may not be placed within District rights of way without prior approval from the General Manager–Chief Engineer.

12. ADDITIONAL DEPOSIT - If the District determines that survey monuments are located in the area of work, an additional deposit will be required to cover the cost of replacing any survey monuments that may be disturbed. District survey crews will replace monuments. A map will be provided to the applicant showing locations of survey monuments involved.

Requirements Due Prior to the Issuance of the Encroachment Permit

Prior to the issuance of the encroachment permit, the applicant or the contractor performing the work shall furnish a certificate of insurance specifying comprehensive liability limits of $2,000,000 per occurrence and $2,000,000 general aggregate. The applicant, the District, the County of Riverside, and any municipal corporation within which the work is to be performed, shall each be named as an additional insured. Alternatively, comprehensive liability limits shall be $1,000,000 per occurrence, with $2,000,000 general aggregate and a minimum of $2,000,000 excess liability. This insurance shall remain in effect for the duration of the work. Please reference the encroachment permit number (shown on your receipt for the initial deposit) on the certificate of insurance.

Additional Information

1. Please contact the District's Permit Engineer at 951.955.1266 if you have any questions or need any additional information.

2. Processing time for a typical encroachment permit (if all required information is submitted with the initial application) is approximately 30 working days.

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RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

ENCROACHMENT PERMIT CHECK LIST

Applicant Name: _____

Address: _____

_____

Contact Number: _____

1. _____ Completed and signed Application Form
2. _____ Check or Money Order written for the appropriate deposit
3. _____ Signed and approved plans for the proposed work (2 Sets)
4. _____ District as-built drawing(s) clearly marked to show the proposed work
5. _____ Copy of the Lead Agency's approved and filed CEQA documents
6. _____ Proof of compliance with the Western Riverside MSHCP (if proposed work is within the MSHCP boundary)
7. _____ Proof of NPDES Compliance
8. _____ Hydrology and Hydraulic Calculations (if for a storm drain connection, bridge or culvert crossing)

Regulatory Permits (if appropriate)

8. _____ Streambed Alteration Agreement from the California Department of Fish and Game
9. _____ Section 404 Authorization from the U.S. Army Corps of Engineers
10. _____ Section 401 Water Quality Certification from the appropriate Regional Water Quality Control Board

Encroachment Permits for the Removal of Excess Material

11. _____ Dust Control Plan
12. _____ Stormwater Pollution Prevention Plan

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RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

ENCROACHMENT PERMIT FEE DEPOSIT REQUIREMENTS
Effective December 23, 2004

Note: Per Ordinance No. 19 the Filing Fee for each encroachment permit shall be $500, with the exception of a permit for access to adjacent properties which shall be $250. This fee is non-refundable and will be deducted from the initial deposit.

STORM DRAIN CONNECTIONS

(a) 0" to 60" diameter

Initial Deposit (including non-refundable Filing Fee)..... $2,000.00

(b) Over 60" will be considered as major construction.
(See below)

ACCESS TO ADJACENT PROPERTY VIA DISTRICT FACILITY WITH TEMPORARY FENCE REMOVAL

(a) Initial Deposit (including non-refundable Filing Fee)..... $750.00

UTILITY CROSSINGS

(a) Underground Initial Deposit (including non-refundable Filing Fee) $2,000.00

(b) Aerial Initial Deposit (including non-refundable Filing Fee)..... $2,000.00

PARALLEL UTILITIES

(a) Underground Initial Deposit (including non-refundable Filing Fee) $2,000.00

(b) Aerial Filing Fee (including non-refundable Filing Fee) $2,000.00

MAJOR CONSTRUCTION

(a) Initial Deposit (including non-refundable Filing Fee)..... $3,000.00

EXCESS MATERIAL REMOVAL

(a) Initial Deposit (including non-refundable Filing Fee)..... $2,000.00
Inspection Fee - Per Cubic Yard Removed $0.35 (Minimum)

MISCELLANEOUS ENCROACHMENT (Any situation not covered above)

(a) Miscellaneous Filing Fee (including non-refundable Filing Fee) $2,000.00

NOTE: NO WORK SHALL COMMENCE WITHIN DISTIRCT RIGHT OF WAY PRIOR TO OBTAINING AN ENCROACHMENT PERMIT. IN SUCH EVENT, THE APPLICANT/OWNER MAY BE REQUIRED TO REMOVE ALL WORK WITHIN DISTRICT RIGHT OF WAY AND RESTORE THE SITE TO PRE-PROJECT CONDITION AT THE APPLICANT/OWNER'S EXPENSE. IF AT THE DESCRETION OF THE GENERAL MANAGER – CHIEF ENGINEER, AN ENCROACHMENT PERMIT IS SUBSEQUENTLY ISSUED THE APPLICANT/OWNER WILL BE REQUIRED TO PAY A $1000 PENALTY FEE (NON-REFUNDABLE) IN ADDITION TO ALL OTHER DEPOSITS WHICH WILL BE REQUIRED AS STIPULATED HEREIN.

51355.1
REV. 01/29/07

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

APPLICATION FOR ENCROACHMENT PERMIT

TO: Riverside County Flood Control
and Water Conservation District
Encroachment Permit Section
1995 Market Street
Riverside, California 92501

Date: _____

The undersigned hereby applies for an encroachment permit to perform the following work within Riverside County Flood Control and Water Conservation District (District) right of way:
Please describe the work proposed to be done within District right of way. (Use extra sheets if necessary.)

_____
_____
_____
_____

Location of proposed work (Specify City, Township, Range, Section):_____
_____

Name and Project Number of District Facility impacted by the proposed work:_____
_____

Estimated duration of construction for proposed project:_____working days.

Applicant agrees to do the work in accordance with all pertinent District rules and regulations and that the proposed work as shown on the attached drawings will be subject to inspection and approval. (Refer to the Encroachment Permit Information Sheet for details on the complete submittal required.)

Applicant acknowledges and understands that construction within District rights of way will, in all likelihood, not be permitted from October 31st through March 31st due to seasonal constraints. Further, Applicant acknowledges that weather and/or flow conditions may necessitate the District, at its sole discretion, to delay or suspend Applicant's work at any time of the year in the interest of public health and safety. Moreover, Applicant appreciates the significance of these seasonal constraints, and understands and agrees to adjust all scheduling accordingly.

Agency Requiring Work (if different than Applicant)	Applicant:
_____	_____
Signature	Signature
_____	_____
Print Name and Title	Print Name and Title
_____	_____
Agency Name	Company Name
_____	_____
Address	Address
_____	_____
_____	_____
Telephone number	Telephone number

ENCROACHMENT PERMIT LOG

DATE	PERMIT NUMBER PERMITTEE	CHANNEL NAME DWG. NO./STS	TRACT OR PARCEL MAP NO. AGENCY PROJECT NAME	FILING FEE PAID	ENTERED DATABASE	PERMIT WRITTEN	INSPECTION FEE PAID	INSURANCE CERT. IN	COMPLETED OR CLOSED	DATABASE UPDATED	AS BUILTS PLOTTED
6/4	5-0-0050-3085 CITY OF BANNING	MONTGOMERY CREEK	30" WATERLINE INSTALLATION	✓	○	✓	✓	○	✓	○	●
6/6	4-0-0110-3086 D.R. HORTON	SALT CREEK 4-786/8	TRACT 32817 2-48" RCP CONNECTIONS	✓	○	○	✓	○	○	○	○
6/11	2-0-0221-3087 SCE	CORONA STORM DRAINS 2-116/7&10	ELECTRICAL DUCT INSTALLATION	✓	○	✓	✓	✓	✓	○	✓
6/19	3-0-0120-3088 WP PARTNERS	4-CORNERS S.D. 3-116/5	24" RCP CONNECTIONS	✓	○	✓	✓	○	✓	○	●
6/28	4-0-0010-3089 PERRIS CONNECTIONS	PERRIS VALLEY 4-31/6	30" RCP CONNECTION	✓	○	○	✓	○	✓ CLOSED	○	N/A
7/3	1-0-0100-3090 RUBIDOUX COMMUNITY SERVICES DISTRICT	SUNNYSLOPE 1-226/4	24" SEWER LINE INSTALLATION & 18" RCP CONNECTION	✓	○	✓	✓	✓	○	○	○
7/18	4-0-0621-3091 IRES PARTNERS	SUNNYMEAD C-1 4-442/4	PARCEL MAP 33126 36" STORM DRAIN	✓	○	✓	✓	✓	✓	○	○
7/23	6-0-0070-3092 DESERT WATER AGENCY	CHINO CANYON LEVEE 6-213/6	8" WELL DRAIN INSTALLATION	✓	○	○	✓	○	○	○	○
7/24	6-0-0050-3093 O&M, L.L.C.	TAHCHEVAH DAM OUTLET 6-212/28	TRACT 24165 36" RCP CONNECTION	✓	○	✓	✓	○	✓ CLOSED	○	N/A
8/13	4-0-0010-3094 PERRIS INDUSTRIAL	PERRIS VALLEY 4-103/5	48" RCP CONNECTION	✓	○	○	✓	○	○	○	○

0002567

DATE	PERMIT NUMBER PERMITTEE	CHANNEL NAME DWG. NO./STS	TRACT OR PARCEL MAP NO. AGENCY PROJECT NAME	FILING FEE PAID	ENTERED DATABASE	PERMIT WRITTEN	INSPECTION FEE PAID	INSURANCE CERT. IN	COMPLETED OR CLOSED	DATABASE UPDATED	AS BUILTS PLOTTED
10/3	4-0-0353-3105 Royal Street Comm.	LASSELLE BASIN 4/399 SHT. 4	CONSTRUCT WIRELESS FACILITY	✓	○	✓	✓	✓	✓	○	N/A
10/3	4-0-0752-3106 Moreno Valley Properties	MORENO ADP CHNL F 4-537/4	REMOVE EXISTING CHANNEL INLET.	✓	○	○	✓	○	✓ CLOSED	○	N/A
10/5	1-0-0335-3107 WASTE MANAGEMENT	WILSON ST. STORM DRAIN AGUA MANSA 1/514 SHT. 19	18" STORM DRAIN CONNECTION	N/A	○	✓	N/A	○	✓	○	○
10/11	4-0-0115-3108 SUNESYS, LLC	BRADLEY RD. 4-550/7	COMMUNICATION DUCT INSTALLATION	✓	○	✓	✓	✓	○	○	○
10/11	1-0-0060-3109 SUNESYS, LLC	LA SIERRA 1-160/4 1-165/2	COMMUNICATION DUCT INSTALLATION	✓	○	✓	✓	✓	○	○	○
10/19	1-0-0044-3110 ALPHA MATERIALS, INC.	PRENDA DAM	EXCESS SEDIMENT REMOVAL	✓	○	✓	✓	✓	✓	○	N/A
10/25	6-0-0060-3111 SCE	TAHQUITZ CREEK 6-240/5	ELECTRICAL CONDUIT INSTALLATION	✓	○	✓	✓	✓	✓	○	○
10/30	1-0-0170-3112 SUNESYS, LLC	ARIZONA 1-447/2	COMMUNICATION DUCT INSTALLATION	✓	○	✓	✓	○	✓	○	○
10/30	7-0-0147-3113 SUNESYS, LLC	TRACT 32050 7-482/2	COMMUNICATION DUCT INSTALLATION	✓	○	✓	✓	○	✓	○	○
11/9	7-0-00237-3114 So. California Edison	Murrieta Valley Storm Drain 7-488/3	30" STORM DRAIN CONNECTION	✓	○	✓	✓	✓	✓	○	○

DATE	PERMIT NUMBER PERMITTEE	CHANNEL NAME DWG. NO./STS	TRACT OR PARCEL MAP NO. AGENCY PROJECT NAME	FILING FEE PAID	ENTERED DATABASE	PERMIT WRITTEN	INSPECTION FEE PAID	INSURANCE CERT. IN	COMPLETED OR CLOSED	DATABASE UPDATED	AS BUILTS PLOTTED
12/7	4-0-0150-3125 MADDLE & ASSOC., INC.	SUN CITY H-H 4-196/sheet 5	TR 33446 36" STORM DRAIN CONNEC.	✓	○	○	✓	○	○	○	○
12/13	4-0-~~0018~~ 0110-3126 INLAND FOUNDATION ENG.	SALT CREEK 4-783/SHEET 7	Soil Boring	✓	○	✓	✓	○	✓	○	N/A
12/17	4-0-0210-3127 PULTE HOME	HEMET 4-205/13	TRACTS 31807 & 31808 TRAP. CHANNEL CONNECTION	✓	○	○	✓	○	○	○	○
12/20	1-0-0230-3128 JURUPA RECREATION & PARKS	JURUPA BASIN 1-347/2	RECREATION & PARK FACILITY	✓	○	○	✓	○	○	○	○
12/20	7-0-0020-3129 EMWD	MURRIETA CREEK 7-265/1	SEWER LINE INSTALLATION	✓	○	✓	✓	●	○	○	○
1/7/08	2-0-0200-3130 SCE	MAIN ST., CORONA 2-143/8	FIBER OPTIC CABLE INSTALLATION	✓	○	○	✓	✓	○	○	○
1/10	6-0-0010-3131 DESERT COVE GOLF RESORT	EAST CATHEDRAL 6-347/16	SHEEP BARRIER FENCE	✓	○	○	✓	✓	○	○	○
1/10	4-0-0211-3132 WEILAND DEVELOPMENT CO.	HEMET LINED 4-853/13	TRACT 32285 18" RCP CONNECTION	✓	○	✓	✓	○	✓ CLOSED	○	○
1/22	CITY OF MORENO VALLEY 4-0-0201/0204-3133	SUNNYMEAD LINES J & H-13 4-275/2 & 4-431/3	LINES J & H-13 MODIFICATIONS	✓	○	○	✓	○	○	○	○
1/23	4-0-0177-3134 MENIFEE VILLAGE, LLC	SALT CREEK LINDENBERGER RD. 4-828/2	TRACT 30705-1 36" RCP CONNECTION	✓	○	✓	✓	●	○	○	○

0002000

DATE	PERMIT NUMBER PERMITTEE	CHANNEL NAME DWG. NO./STS	TRACT OR PARCEL MAP NO. AGENCY PROJECT NAME	FILING FEE PAID	ENTERED DATABASE	PERMIT WRITTEN	INSPECTION FEE PAID	INSURANCE CERT. IN	COMPLETED OR CLOSED	DATABASE UPDATED	AS BUILTS PLOTTED
2/27	5-0-0130-3145 REDEVELOPMENT AGENCY	CABAZON 5-107/2 & 3	12" SEWERLINE INSTALLATION	WAIVED	○	○	WAIVED	○	○	○	○
2/28	4-0-0211-3146 NINE HEMET ACRES	STETSON AVE. 4-207/4	30" RCP CONNECTION	✓	○	○	✓	○	○	○	○
3/3	6-0-0010-3147 CITY OF CATHEDRAL CITY	W. CATHEDRAL CYN. 6-236/3	W. PALM CYN. DR. BRIDGE WIDENING	✓	○	○	✓	○	○	○	○
3/12	4-0-0120-3148 City of San Jacinto	San Jacinto Line-E 4-708/12	TRACT 35166 36" Storm Drain Connection	✓	○	✓	✓	○	✓	○	●
3/13	3-0-0226-3149 HAPPIE BEE COMPANY	McVICKER 3-159/3	BEE HIVES	✓	○	✓	✓	✓	✓	○	N/A
3/17	2-0-0070-3150 LESLIE MAUDE	OAK ST. 	PARKING & LANDSCAPING	✓	○	○	✓	○	○	○	○
4/1	4-0-0010-3151 CITY OF PERRIS	PERRIS VALLEY 4-103/3	ORANGE AVE. CROSSING	✓	○	○	✓	○	○	○	○
4/2	4-0-0011-3152 Ridge Mount Wy LLC	Heacock Channel 4-610/2	Fire Hydrant Relocation	✓	○	✓	✓	✓	✓	○	●
4/8	4-0-0020-3153 DE ANZA TRAIL CABALLEROS	SAN JACINTO RIVER N/A	EQUESTRIAN RIDE	WAIVED	○	✓	N/A	✓	✓	○	N/A
4/10	1-0-0150-3154 CAMP DRESSER & McKEE	ANZA 1-319/4	WATER QUALITY MONITORING	WAIVED	○	✓	N/A	✓	✓	○	●

0002520

DATE	PERMIT NUMBER PERMITTEE	CHANNEL NAME DWG. NO./STS	TRACT OR PARCEL MAP NO. AGENCY PROJECT NAME	FILING FEE PAID	ENTERED DATABASE	PERMIT WRITTEN	INSPECTION FEE PAID	INSURANCE CERT. IN	COMPLETED OR CLOSED	DATABASE UPDATED	AS BUILTS PLOTTED
5/14	4-0-0010-3165 MARC, LLC	PERRIS VALLEY	18" & 24" CONNECTIONS TRACT 35062	✓	○	○	✓	○	○	○	○
5/22	2-0-0200-3166 SUNESYS, LLC	MAIN ST. 2-143/8	FIBER OPTIC CABLE INSTALL.	✓	○	✓	✓	●	○	○	○
5/28	4-0-0311-3167 HEMET UNIFIED SCHOOL	HEMET LINE D 4-552/2&3	3-RCP CONNECTIONS	✓	○	✓	✓	●	○	○	○
6/9	1-0-0150-3168 HALEY & ALDRICH	ANZA 1-302/17	3 SOIL BORINGS	✓	○	✓	✓	●	○	○	○
6/9	2-0-0050-3169 JLC ENGINEERING	TEMESCAL 2-195/2&3	RCB EXTENSION	✓	○	○	✓	○	○	○	○
6/10	4-0-0684-3170 BARONET & CO.	SUNNYHEAD LINE M-4 4-450/2	48" RCP CONNECTION	✓	○	✓	✓	●	○	○	○
6/17	6-0-0150-3171 VANCE CORPORATION	VERBENA ROW 6-262/2	ROW GRADING	✓	○	✓	✓	✓	○	○	○
6/30	1-0-0050-3172 SUNESYS, INC.	SAN SEVAINE 1-449/12	FIBER OPTIC INSTALLATION	✓	○	✓	✓	●	○	○	○
6/30	1-0-0230-3173 SUNESYS, INC.	JURUPA 1-392/2	FIBER OPTIC INSTALLATION	✓	○	✓	✓	●	○	○	○
7/3	1-0-0022-3174 CITY OF RIVERSIDE	THORNTON AVE. S.D. 1-364/14-17	STORM DRAIN REALIGNMENT	✓	○	✓	✓	●	○	○	○

000257

ATTACHMENT E

REPORTS OF COLLECTED DEBRIS IN MS4

Riverside County Flood Control and Water Conservation District

Sediment Removal Santa Margarita Watershed

Filter ((((..\Start Date Actual is after #7/1/07#) And (Start Date is through #6/30/08#)) And (rcfc_activity contains "616")) And (..\rcfc zone contains "7"))

Report Title Sediment Removal Santa Margarita Watershed

Activity Number: 616 **Activity Name:** Sediment Removal

Zone 7 **Quantity:** 6,153.00

Total Quantity: 6,153.00 **Unit:** Cy

Riverside County Flood Control and Water Conservation District

Debris Removal Santa Margarita Watershed

Filter ((((..\Start Date Actual is after #7/1/07#) And (Start Date is through #6/30/08#)) And (rcfc_activity contains "7000")) And (..\rcfc zone contains "7"))

Report Title Debris Removal Santa Margarita Watershed

Activity Number: 7000 **Activity Name:** Debris taken out of Channels

Zone 7 **Quantity:** 45.51

Total Quantity: 45.51 **Unit:** Ton

Riverside County Flood Control and Water Conservation District

Debris Removal Santa Margarita Watershed

Filter ((((..\Start Date Actual is after #7/1/07#) And (Start Date is through #6/30/08#)) And (rcfc_activity contains "404")) And (..\rcfc zone contains "7"))

Report Title Debris Removal Santa Margarita Watershed

Activity Number: 404 **Activity Name:** Trash Pickup

Zone 7 **Quantity:** 5.15

Total Quantity: 5.15 **Unit:** Ton

ATTACHMENT F

IC/ID REPORTS

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1061

Type Illicit Discharge

Received Date 8/28/2007 0:00

APN 921-480-043

First Name David

Last Name Ortega

Complainant Address

Complainant City

Complainant Zip Code

Phone 951 955-4390

Received By David Ortega

Complaint Adderess 27532 Commerce Center Drive

Complaint City Temecula

Complaint Zip Code 92590

Location

Complaint A gentleman was hosing off a coolant unit from this business and the rinseate ran down the parking lot, flowed into the street gutter and went into a storm drain that dumped the water into Long Canyon Wash just upstream of Commerce Center Drive.

Findings 8/28/07: David Ortega, NPDES Section, Riverside County Flood Control (RCFC) District, was performing routine "dry weather" monitoring at Long Canyon Wash when he noticed that water was flowing from this business into Long Canyon Wash just upstream from the monitoring location. Before Mr. Ortega took any field water quality parameters from Long Canyon Wash, he went to the business and spoke to a gentleman who was washing down a coolant unit from an open warehouse door and onto the property's side parking lot. Mr. Ortega noted to the gentleman about the County's Stormwater/Cleanwater program and stated that only rain and irrigation water belongs in the storm drains. The gentleman replied that the coolant being washed down "has only water being washed down". Mr. Ortega noted to the man that his rinseate might wash down metals from this unit into the storm drain because of the visible corrosion on the unit. Mr. Ortega also let the man know that he will be referring this matter to Aldo Licitra from the City of Temecula, an RCFC co-permittee, for a possible further investigation on this matter.

Action 8/28/07: Mr. Ortega took a few photos of the coolant unit being washed down and of the path of rinseate flowing down the property's parking lot, into the street gutter and into a storm drain that is directly above Long Canyon Wash. Mr. Ortega also called Aldo Licitra from the City of Temecula to inform him of this matter. NOTE: Long Canyon Wash at Commerce Center Drive is not an RCFC District maintained facility. Mr. Licitra visited the complaint address later the same day. He noted that this business is not on the City of Temecula's inspection list since it is a children's gymnastics studio. Mr. Licitra spoke to the facility custodian today who had created the discharge and informed him of the violation. He had washed down a portable water-cooled fan used to blow air into the facility. Mr. Licitra provided the custodian some onsite education and gave him a verbal warning to cease any further discharges onto the pavement. The custodian stated that the fan is not washed frequently. Mr. Licitra directed the custodian to perform this type of cleaning activity over his existing landscaping or gravel areas that were on the site in order to infiltrate the wash water. Mr. Licitra did not see any further discharges during a subsequent follow-up drive-by a few days later.

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1177

Type Illicit Discharge

Received Date 12/3/2007 0:00

APN UNKNOWN

First Name Annie

Last Name Le

Complainant Address

Complainant City County (near Temecula)

Complainant Zip Code 92592

Phone 951 302-5265

Received By B Cho

Complaint Adderess

Complaint City County (near Temecula)

Complaint Zip Code 92592

Location Tr 29608, immediately east of the Complaintant's property and south of Temecula Creek

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Complaint This complaint was forwarded from Helio with the District's Planning Section. The tract adjacent to the complaintaint's property has mass graded. Due to rainfall last Friday, sediment form the tract has impacted Annie's backyard. The complaintaints stated that they will contact the Regional Board about the matter.

Findings A District maintained facility (Tememcula Creek Line B proj#: 7-0042) is nearby that drains to Temecula Creek. The Owner is Temecula Ranchos 909-676-3575; The Applicant is High Point Communities 714-481-3020; The Engineer is Ludwig Engineering 909-884-8217.

Action Mark Biloki the District's maintenance supervisor was contacted about the complaint. Mark will have District crews respond to the matter.

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1418

Type Illicit Discharge

Received Date 4/30/2008 0:00

APN 953-222-027

First Name Melanie

Last Name Hastings

Complainant Address

Complainant City Temecula

Complainant Zip Code 92591

Phone 0

Received By David Ortega

Complaint Adderess 41288 Rue Jadot

Complaint City Temecula

Complaint Zip Code 92591

Location

Complaint Complainant is reporting dumping of possible chemicals in to the street gutter by her next door neighbor.

Findings 4/30/08: David Ortega of the NPDES Section at the Riverside County Flood Control (RCFC) District received this complaint call today from Melanie Hastings (complainant). Ms. Hastings stated that her next door neighbor (complaint address) has a dog grooming business that she operates out of her garage. Ms. Hastings said that at various times of the day, she notices a liquid discharge in the street gutter and "it smells really bad, like raw sewage". This discharge is going into a storm drain down the street. Mr. Ortega asked Ms. Hastings is there an active liquid discharge going on right now at the time of her call. Ms. Hastings replied negative.

Action 4/30/08: Mr. Ortega asked Ms. Hastings to call him on his cell phone number, (951) 961-9574, if and when there is an active discharge going on so that either he can get someone from the City of Temecula to come out there to investigate or that he will try to stop by to investigate this complaint himself. 5/1/08: Mr. Ortega spoke to Aldo Licitra of the City of Temecula about this complaint. Mr. Ortega emailed a copy of this complaint call report to Mr. Licitra.

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1447

Type	Illicit Discharge
Received Date	5/12/2008 0:00
APN	916-052-026
First Name	NRC
Last Name	
Complainant Address	
Complainant City	
Complainant Zip Code	
Phone	
Received By	David Ortega
Complaint Adderess	26135 Palmetto Street
Complaint City	Murrieta
Complaint Zip Code	92563
Location	

Complaint Caller is reporting an unknown sheen of a white substance from an unknown source. Caller states that this whitish substance has been flowing down the whole street and around the corner. Caller believes that this substance may be from someone in the neighborhood who may have been painting but he is not sure. Caller is not sure if the material has reached a storm drain or waterway.

Findings 5/12/08: NRC called the Governor's Office of Emergency Services (OES) to report this release. The OES issued a Hazardous Materials Spill Report, Control# 08-3448, concerning this incident. NRC Report# 870675. The OES report states that it is unknown if water and/or drinking water was involved and/or impacted from this release. NRC and the Riverside County Environmental Health Department were notified about this incident. There are two (2) Riverside County Flood Control District facilities that are located about .3 mile away from the complaint address: "Warm Springs Line C Sugarberry" and "Warm Springs VY Torrey Pines Storm Drain".

Action

Riverside for pH analysis. 1600 hours: Mr. Winters arrived at Babcock Labs and checked the samples into the lab. Mr. Winters notified David Ortega of the incident. Case forwarded to the Riverside County D.A.'s Office (Ted Ryan) for follow up. Mr. Winters has a few photos of his sample locations, map of the scene and Babcock Lab results of the samples that were submitted. Sample KW042808-901 pH analysis result is 12.4, Sample KW042808-02 pH analysis result is 11.2, Sample KW042808-03 pH analysis result is 11.3 5/22/08: David Ortega spoke to Samantha Phillips, County Code Enforcement Officer, about this incident. She noted to Mr. Ortega that there was no NOV and/or citation issued to the responsible party (California Pools and Spa) for this incident. She did state because this case was sent to the County D.A.'s Office as a criminal case. Mr. Ortega completed this complaint call report today and fowarded it to J. Uhley and A. Chun at the RCFC District and to Mike Shetler at the Riverside County Executive Office as an "FYI".

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1504

Type	Spill
Received Date	6/22/2008 0:00
APN	964-060-001
First Name	Metropolitan Water District (MWD)
Last Name	
Complainant Address	
Complainant City	
Complainant Zip Code	
Phone	0
Received By	David Ortega
Complaint Adderess	3740 Borel Road
Complaint City	Winchester
Complaint Zip Code	92596
Location	Skinner Filtration Plant

Complaint 4 ounces of chlorine was released from a failed pipe connection.

Findings 6/22/08: MWD called the Governor's Office of Emergency Services (OES) to report this release. The OES issued a Hazardous Materials Spill Report, Control# 08-4447, concerning this incident. The OES report states that no water was involved from this release. The OES report also states that the chlorine was contained and cleaned up by the reporting party (MWD). The Riverside County Environmental Health Department and the Riverside County Spill Hotline were notified about this incident. There are no Riverside County Flood Control District facilities in the area of the complaint address that could have been impacted.

Action

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1495

Type	Spill
Received Date	6/16/2008 0:00
APN	964-060-001
First Name	Metropolitan Water District (MWD)
Last Name	
Complainant Address	
Complainant City	
Complainant Zip Code	
Phone	0
Received By	David Ortega
Complaint Adderess	33740 Borel Road
Complaint City	Winchester
Complaint Zip Code	92596
Location	

Complaint The new chlorine containment system showed a 3.2 ppm reading (of chlorine) for a very short time.

Findings 6/16/08: MWD called the Governor's Office of Emergency Services (OES) to report this release. The OES issued a Hazardous Materials Spill Report, Control# 08-4273, concerning this incident. The OES report states that no water was involved from this release. The OES report also states that at 3 ppm the scrubber system activates. The chlorine was contained and cleaned up by the reporting party (MWD). The Riverside County Environmental Health Department and the Riverside County Spill Hotline were notified about this incident. There are no Riverside County Flood Control District facilities in the area of the complaint address that could have been impacted.

Action

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1494

Type	Spill
Received Date	6/14/2008 0:00
APN	380-170-023
First Name	So. Cal. Edison (SCE)
Last Name	
Complainant Address	
Complainant City	
Complainant Zip Code	
Phone	
Received By	David Ortega
Complaint Adderess	23175 Palomar Street
Complaint City	Wildomar
Complaint Zip Code	92595
Location	

Complaint 2 gallons of mineral oil/unknown PCB was released to the soil from a pole top transformer that failed.

Findings 6/14/08: SCE called the Governor's Office of Emergency Services (OES) to report this release. The OES issued a Hazardous Materials Spill Report, Control# 08-4229, concerning this incident. The OES report states that no water was involved from this release. The OES report also states that the substance was contained. The Riverside County Environmental Health Department was notified about this incident. The nearest Riverside County Flood Control District facility is located about 1 mile to the southeast of the complaint address: "Murrieta Creek MDP Line G at Washington".

Action

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1484

Type	Spill
Received Date	6/8/2008 0:00
APN	964-060-001
First Name	Metropolitan Water District (MWD)
Last Name	
Complainant Address	
Complainant City	
Complainant Zip Code	
Phone	
Received By	David Ortega
Complaint Adderess	33740 Borel Road
Complaint City	Winchester
Complaint Zip Code	92596
Location	

Complaint 1 pint of caustic soda was released from a drain on a delivery truck that leaked at the Skinner Filtration plant.

Findings 6/8/08: MWD called the Governor's Office of Emergency Services (OES) to report this release. The OES issued a Hazardous Materials Spill Report, Control# 08-4086, concerning this incident. The OES report states that no water was involved from this release. The OES report also states that the caustic soda was contained and cleaned up by the reporting party (MWD). The Riverside County Environmental Health Department was notified about this incident. There are no Riverside County Flood Control District facilities in the area of the complaint address that could have been impacted.

Action

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1475

Type	Spill
Received Date	6/1/2008 0:00
APN	957-330-048
First Name	Veeder Root
Last Name	
Complainant Address	
Complainant City	
Complainant Zip Code	
Phone	
Received By	David Ortega
Complaint Adderess	29910-B Murrieta Hot Springs Road
Complaint City	Murrieta
Complaint Zip Code	92563
Location	

Complaint 2 gallons of unleaded fuel was overspilled onto the ground because the auto-shut off on the nozzle failed and while a customer was filling up their tank on pump# 13.

Findings 6/1/08: Veeder Root called the Governor's Office of Emergency Services (OES) to report this release. The OES issued a Hazardous Materials Spill Report, Control# 08-3908, concerning this incident. The OES report states that no water was involved from this release. The OES report also states that the fuel was contained and cleaned up by the reporting party (Veeder Root). The Riverside County Environmental Health Department was notified about this incident. The nearest Riverside County Flood Control District facility is located underground and adjacent to the complaint address: "Santa Gertrudis Lines 200, 600 Stage 1 Murrieta Hot Springs Road".

Action

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1432

Type	Spill
Received Date	5/7/2008 0:00
APN	964-060-001
First Name	Metro. Water District (MWD)
Last Name	
Complainant Address	
Complainant City	
Complainant Zip Code	
Phone	0
Received By	David Ortega
Complaint Adderess	33740 Borel Road
Complaint City	Winchester
Complaint Zip Code	92596
Location	

Complaint 4 ounces of sulfuric acid residual in a hose dripped to the soil from a delivery truck.

Findings 5/7/08: MWD called the Governor's Office of Emergency Services (OES) to report this release. The OES issued a Hazardous Materials Spill Report, Control# 08-3328, concerning this incident. The OES report states that no water was involved from this release. The OES report also states that the sulfuric acid was contained and cleaned up by the reporting party (MWD). The Riverside County Environmental Health Department was notified about this incident. There are no Riverside County Flood Control District facilities in the area of the complaint address that could have been impacted.

Action

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1400

Type	Spill
Received Date	4/21/2008 0:00
APN	963-040-002
First Name	So. Cal. Edison (SCE)
Last Name	
Complainant Address	
Complainant City	
Complainant Zip Code	
Phone	
Received By	David Ortega
Complaint Adderess	31095 Auld Road
Complaint City	French Valley
Complaint Zip Code	92563
Location	

Complaint 1 to 2 gallons of mineral oil (non PCB) was released onto the road when a car struck a pad mounted transformer.

Findings 4/21/08: SCE called the Governor's Office of Emergency Services (OES) to report this release. The OES issued a Hazardous Materials Spill Report, Control# 08-2931, concerning this incident. The OES report states that no water was involved from this release. The OES report also states that the substance was contained and cleaned up by the reporting party (SCE). The Police Department, Sheriff's Office, and Riverside County Haz.-Mat. were on scene concerning this incident. The Riverside County Environmental Health Department was notified about this release. The nearest Riverside County Flood Control District facility is located about .6 mile to the northeast of the complaint address: "Warm Springs Benton Creek Lines 3 and 6".

Action

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1365

Type	Spill
Received Date	3/24/2008 0:00
APN	964-060-001
First Name	Metropolitan Water District (MWD)
Last Name	
Complainant Address	
Complainant City	
Complainant Zip Code	
Phone	0
Received By	David Ortega
Complaint Adderess	33740 Borel Road
Complaint City	Winchester
Complaint Zip Code	92596
Location	Skinner Facility

Complaint 1 quart of fluoride leaked from a delivery truck hose connection.

Findings 3/24/08: MWD called the Governor's Office of Emergency Services (OES) to report this leak. The OES issued a Hazardous Materials Spill Report, Control# 08-2296, concerning this incident. The OES report states that no water was involved from this leak. The OES report also states that the fluoride was contained and cleaned up by the reporting party (MWD). The Riverside County Environmental Health Department was notified about this incident. There are no Riverside County Flood Control District facilities in the area of the complaint address that could have been impacted.

Action

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1361

Type	Spill
Received Date	3/19/2008 0:00
APN	961-370-011
First Name	Eastern Municipal Water District (EMWD)
Last Name	
Complainant Address	
Complainant City	
Complainant Zip Code	
Phone	
Received By	David Ortega
Complaint Adderess	45447 Badger Way
Complaint City	Temecula
Complaint Zip Code	92592
Location	

Complaint Vandalism has caused a sewage leak that has been flowing for the past 60 minutes at approx. 25 gallons per minute.

Findings 3/19/08: EMWD called the Governor's Office of Emergency Services (OES) to report this sewage leak. The OES issued a Hazardous Materials Spill Report, Control# 08-2188, concerning this incident. The OES report states that the reporting party (EMWD) is considered a third party to this leak and they are unsure what product is from. The sewage has spilled into a park. The OES report also states that it is unknown if water was involved from this incident and it is possible that a storm drain has been impacted from this leak. No drinking water has been impacted from this incident. The San Diego RWQCB and the Riverside County Environmental Health Department were notified about this incident. The nearest Riverside County Flood Control District facility is located about .1 mile to the northwest of the complaint address: "Temecula VY Via Del Coronado Storm Drain". NOTE: The complaint APN listed in this report is a reference APN only.

Action

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1356

Type Spill

Received Date 3/17/2008 0:00

APN 964-060-001

First Name Metropolitan Water Dist. (MWD)

Last Name

Complainant Address

Complainant City

Complainant Zip Code

Phone

Received By David Ortega

Complaint Adderess 33740 Borel Road

Complaint City Winchester

Complaint Zip Code 92596

Location

Complaint .5 gallon of caustic soda leaked from a piping flange.

Findings 3/17/08: MWD called the Governor's Office of Emergency Services (OES) to report this leak. The OES issued a Hazardous Materials Spill Report, Control# 08-2111, concerning this incident. The OES report states that no water was involved from this leak. The OES report also states that the system has been isolated and is currently being repaired. The caustic soda was contained and cleaned up by the reporting party (MWD). The Riverside County Environmental Health Department was notified about this incident. There are no Riverside County Flood Control District facilities in the area of the complaint address that could have been impacted from this leak.

Action

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1354

Type	Spill
Received Date	3/13/2008 0:00
APN	964-060-001
First Name	Metro. Water of Southern California (MWD)
Last Name	
Complainant Address	
Complainant City	
Complainant Zip Code	
Phone	
Received By	David Ortega
Complaint Adderess	33740 Borel Road
Complaint City	Winchester
Complaint Zip Code	92596
Location	Skinner Water Plant

Complaint Less than one part per million (ppm) of chlorine was detected when on evaporator overheated.

Findings 3/13/08: MWD called the Governor's Office of Emergency Services (OES) to report this detection of chlorine. The OES issued a Hazardous Materials Spill Report, Control# 08-2042, concerning this incident. The OES report states that no water was involved from this chlorine detection. The OES report also states that the chlorine was contained. The Riverside County Environmental Health Department was notified about this incident. There are no Riverside County Flood Control District facilities in the area of the complaint address that could have been impacted.

Action

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1350

Type	Spill
Received Date	3/11/2008 0:00
APN	947-182-051
First Name	So Cal. Edison (SCE)
Last Name	
Complainant Address	
Complainant City	
Complainant Zip Code	
Phone	0
Received By	David Ortega
Complaint Adderess	
Complaint City	Murrieta
Complaint Zip Code	92562
Location	California Oaks Road & Tarragona Drive

Complaint 30 gallons of capacitor oil spilled due to a car that hit the pad mounted capacitor.

Findings 3/11/08: SCE called the Governor's Office of Emergency Services (OES) to report this spill. The OES issued a Hazardous Materials Spill Report, Control# 08-1964, concerning this incident. The OES report states that no water was involved from this spill. The OES report also states that the capacitor oil was contained and cleaned up by the reporting party (SCE). The Fire Department and the Police Department were on scene concerning this incident. The Riverside County Fire Department and the Riverside County Environmental Health Department were notified about this spill. The nearest Riverside County Flood Control District facility is located about .5 mile to the south of complaint location: "California Oaks Road Jackson Avenue". NOTE: The complaint APN listed in this report is a reference APN only.

Action 3/11/08: A situation update came into the OES concerning this incident. Randy Weidner of SCE advised that the amount spilled was 1 gallon, non PCB's.

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1348

Type	Spill
Received Date	3/10/2008 0:00
APN	964-060-001
First Name	Metro. Water District (MWD)
Last Name	
Complainant Address	
Complainant City	
Complainant Zip Code	
Phone	
Received By	David Ortega
Complaint Adderess	33740 Borel Road
Complaint City	Winchester
Complaint Zip Code	92596
Location	Skinner Plant

Complaint 4 to 5 gallons of Ferric Chloride was released due to a sample valve that was left open.

Findings 3/10/08: MED called the Governor's Office of Emergency Services (OES) to report this release. The OES issued a Hazardous Materials Spill Report, Control# 08-1946, concerning this incident. The OES report states that no water was involved from this release. The OES report also states that the substance was contained and cleaned up by a contractor. The Riverside County Environmental Health Department was notified about this incident. There are no Riverside County Flood Control District facilities in the area of the complaint address that could have been impacted.

Action

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1344

Type	Spill
Received Date	3/7/2008 0:00
APN	964-060-001
First Name	Metropolitan Water District
Last Name	of So. Calif. (MWD)
Complainant Address	
Complainant City	
Complainant Zip Code	
Phone	
Received By	David Ortega
Complaint Adderess	33740 Borel Road
Complaint City	Winchester
Complaint Zip Code	92596
Location	Skinner Water Treatment Plant

Complaint An unknown amount of Ferric Chloride is leaking from the system in a spray form.

Findings 3/7/08: MWD called the Governor's Office of Emergency Services (OES) to report this leak. The OES issued a Hazardous Materials Spill Report, Control# 08-1882, concerning this incident. The OES report states that no water is involved from this leak. The OES report also states that the product is contained within a catchment area. The substance was cleaned up by the reporting party (MWD). The Riverside County Environmental Health Department was notified about this incident. There are no Riverside County Flood Control District facilities in the area of the complaint address that could have been impacted from this leak.

Action

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1339

Type	Spill
Received Date	3/3/2008 0:00
APN	964-060-001
First Name	Metropolitan Water District (MWD)
Last Name	
Complainant Address	
Complainant City	
Complainant Zip Code	
Phone	
Received By	David Ortega
Complaint Adderess	33740 Borel Road
Complaint City	Winchester
Complaint Zip Code	92596
Location	Skinner Plant

Complaint 4 gallons of fluoride leaked from a high flow needle valve.

Findings 3/3/08: MWD called the Governor's Office of Emergency Services (OES) to report this leak. The OES issued a Hazardous Materials Spill Report, Control# 08-1772, concerning this incident. The OES report states that no water was involved from this leak. The OES report also states that the substance was contained and cleaned up by the reporting party (MWD). The Riverside County Environmental Health Department was notified about this incident. There are no Riverside County Flood Control District facilities in the area of the complaint address that could have been impacted from this leak.

Action

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1322

Type	Spill
Received Date	2/21/2008 0:00
APN	964-060-001
First Name	Metropolitan Water District (MWD)
Last Name	
Complainant Address	
Complainant City	
Complainant Zip Code	
Phone	0
Received By	David Ortega
Complaint Adderess	33740 Borel Road
Complaint City	Winchester
Complaint Zip Code	92596
Location	

Complaint Two chlorine detectors activated due to 10 ppm measurement.

Findings 2/21/08: MWD called the Governor's Office of Emergency Services (OES) to report this detection of chlorine. The OES issued a Hazardous Materials Spill Report, Control# 08-1470, concerning this incident. The OES report states that the equipment shut down and cleaned itself. There was no release to the environment. No water was involved from this chlorine detection. The OES report also states that the substance was contained and cleaned up by the reporting party (MWD). The Riverside County Environmental Health Department was notified about this incident. There are no Riverside County Flood Control District facilities in the area of the complaint address that could have been impacted.

Action 2/21/08: A situation updated came into the OES concerning this incident. Paul Miller reporting that some caustic solution came out of their scrubber within the containment system.

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1321

Type	Spill
Received Date	2/20/2008 0:00
APN	964-060-001
First Name	Metropolitan Water Dist. (MWD)
Last Name	
Complainant Address	
Complainant City	
Complainant Zip Code	
Phone	
Received By	David Ortega
Complaint Adderess	33740 Borel Road
Complaint City	Winchester
Complaint Zip Code	92596
Location	Skinner Plant

Complaint 10 gallons of caustic soda solution 20% was released to a roof due to a vent system failure during testing of a scrubber.

Findings 2/20/08: MWD called the Governor's Office of Emergency Services (OES) to report this release. The OES issued a Hazardous Materials Spill Report, Control# 08-1466, concerning this incident. The OES report states that no water and no drinking water was involved and/or impacted from this release. The OES report also states that the substance was contained and cleaned up by a contractor. The Riverside County Environmental Health Department was notified about this incident. There are no Riverside County Flood Control District facilities in the area of the complaint address that could have been impacted from this release.

Action

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1318

Type Spill

Received Date 2/19/2008 0:00

APN 964-060-001

First Name Metropolitan Water District (MWD)

Last Name

Complainant Address

Complainant City

Complainant Zip Code

Phone 0

Received By David Ortega

Complaint Adderess 33740 Borel Road

Complaint City Winchester

Complaint Zip Code 92596

Location Skinner Treatment Plant

Complaint 1 ounce of fluoride was released due to a faulty needle valve on a feed system.

Findings 2/19/08: MWD called the Governor's Office of Emergency Services (OES) to report this release. The OES issued a Hazardous Materials Spill Report, Control# 08-1424, concerning this incident. The OES report states that no water was involved from this release. The OES report also states that the substance was contained and cleaned up by the reporting party (MWD). The Riverside County Environmental Health Department was notified about this incident. There are no Riverside County Flood Control District facilities in the area of the complaint address that could have been impacted.

Action

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1317

Type Spill

Received Date 2/19/2008 0:00

APN 964-060-001

First Name Metropolitan Water Dist. (MWD)

Last Name

Complainant Address

Complainant City

Complainant Zip Code

Phone

Received By David Ortega

Complaint Adderess 33740 Borel Road

Complaint City Winchester

Complaint Zip Code 92596

Location

Complaint 2 pounds of chlorine gas was released due to a broken pressure relief valve.

Findings 2/19/08: MWD called the Governor's Office of Emergency Services (OES) to report this release. The OES issued a Hazardous Materials Spill Report, Control# 08-1417, concerning this incident. The OES report states that no water and no drinking water was involved and/or impacted from this release. The OES report also states that the substance was contained and cleaned up the reporting party (MWD). The Riverside County Environmental Health Department was notified about this incident. There are no Riverside County Flood Control District facilities in the area of the complaint address that could have been impacted.

Action

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1294

Type	Spill
Received Date	2/2/2008 0:00
APN	964-060-001
First Name	Metropolitan Water District (MWD)
Last Name	
Complainant Address	
Complainant City	
Complainant Zip Code	
Phone	
Received By	David Ortega
Complaint Adderess	33740 Borel Road
Complaint City	Winchester
Complaint Zip Code	92596
Location	

Complaint 8 ounces of Ferric chloride was released due to a faulty valve.

Findings 2/2/08: MWD called the Governor's Office of Emergency Services (OES) to report this release. The OES issued a Hazardous Materials Spill Report, Control# 08-1013, concerning this incident. The OES report states that no water was involved from this release. The OES report also states that the substance was contained and cleaned up by the reporting party (MWD). The Riverside County Environmental Health Department was notified about this incident. There are no Riverside County Flood Control District facilities in the area of the complaint address that could have been impacted.

Action

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1290

Type	Spill
Received Date	1/29/2008 0:00
APN	909-290-009
First Name	Eastern Municipal Water District (EMWD)
Last Name	
Complainant Address	
Complainant City	
Complainant Zip Code	
Phone	0
Received By	David Ortega
Complaint Adderess	42565 Avenida Alvarado
Complaint City	Temecula
Complaint Zip Code	92590
Location	

Complaint 52 gallons of caustic 25%, considered to be a low pH adjustment chemical was spilled at the treatment facility.

Findings 1/29/08: EMWD called the Governor's Office of Emergency Services (OES) to report this spill. The OES issued a Hazardous Materials Spill Report, Control# 08-0881, concerning this incident. The OES report states that no water was involved from this spill. The OES report also states that the substance was completely captured by the facility's containment area. A piece of tubing developed a crack causing the release. The Riverside County Environmental Health Department was notified about this incident. The nearest Riverside County Flood Control District facility is located about .8 mile to the northeast of the complaint address: "Murrieta Creek at Winchester Road."

Action

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1284

Type	Spill
Received Date	1/19/2008 0:00
APN	964-060-001
First Name	Metropolitan Water District (MWD)
Last Name	
Complainant Address	
Complainant City	
Complainant Zip Code	
Phone	
Received By	David Ortega
Complaint Adderess	33740 Borel Road
Complaint City	Winchester
Complaint Zip Code	92596
Location	

Complaint 2 ounces of fluoride leaked from a pump head into a containment area.

Findings 1/19/08: MWD called the Governor's Office of Emergency Services (OES) to report this leak. The OES issued a Hazardous Materials Spill Report, Control# 08-0561, concerning this incident. The OES report states that no water was involved from this leak. The OES report also states that the fluoride was contained and cleaned up the reporting party (MWD). The Riverside County Environmental Health Department was notified about this incident. There are no Riverside County Flood Control District facilities in the area of the complaint address that could have been impacted.

Action

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1283

Type	Spill
Received Date	1/18/2008 0:00
APN	569-190-009
First Name	Riverside County HAZMAT
Last Name	
Complainant Address	
Complainant City	
Complainant Zip Code	
Phone	
Received By	David Ortega
Complaint Adderess	
Complaint City	Riverside County
Complaint Zip Code	92544
Location	East Benton Rd., 2.5 miles NE from the intersection of Sage Rd. in a rural area.

Complaint 35 gallons of waste motor oil leaked onto the ground in a field from four, 55-gallon size barrels that were abandoned.

Findings 1/18/08: The Riverside County Haz.-Mat. Division called the Governor's Office of Emergency Services (OES) to report this leak. The OES issued a Hazardous Materials Spill Report, Control# 08-0554, concerning this incident. The OES report states that no water was involved from this leak. The OES report also states that the waste motor oil was contained and cleaned up by the reporting party (Riverside County HAZMAT). The Riverside County Environmental Health Department was notified about this incident. There are no Riverside County Flood Control District facilities in the area of the complaint location that could have been impacted.

Action

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1277

Type	Spill
Received Date	1/16/2008 0:00
APN	964-060-001
First Name	Metropolitan Water Dist. (MWD)
Last Name	
Complainant Address	
Complainant City	
Complainant Zip Code	
Phone	
Received By	David Ortega
Complaint Adderess	33740 Borel Road
Complaint City	Winchester
Complaint Zip Code	92596
Location	

Complaint 1 ounce of sulfuric acid was released, as a few drips, on to the ground while disconnecting a hose from a delivery truck.

Findings 1/16/08: MWD called the Governor's Office of Emergency Services (OES) to report this release. The OES issued a Hazardous Materials Spill Report, Control# 08-0470, concerning this incident. The OES report states that no water and no drinking water was involved and/or impacted from this release. The OES report also states that the sulfuric acid was contained and cleaned up by the reporting party (MWD). There are no Riverside County Flood Control District facilities in the area of the complaint address that could have been impacted.

Action

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1271

Type	Spill
Received Date	1/11/2008 0:00
APN	964-060-001
First Name	Metropolitan Water District (MWD)
Last Name	
Complainant Address	
Complainant City	
Complainant Zip Code	
Phone	
Received By	David Ortega
Complaint Adderess	33740 Borel Road
Complaint City	Winchester
Complaint Zip Code	92596
Location	

Complaint 1 ounce of flourosilic acid dripped in a containment area.

Findings 1/11/08: MWD called the Governor's Office of Emergency Services (OES) to report this release. The OES issued a Hazardous Materials Spill Report, Control# 08-0384, concerning this incident. The OES report states that no water was involved from this release. The OES report also states that an operator found this release on his routine rounds. An absorbent pad was placed on the substance and will be monitored. The Riverside County Environmental Health Department was notified about this incident. There are no Riverside County Flood Control District facilities in the area of the complaint address that could have been impacted.

Action

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1270

Type Spill

Received Date 1/11/2008 0:00

APN 909-290-009

First Name Eastern Municipal Water Dist. (EMWD)

Last Name

Complainant Address

Complainant City

Complainant Zip Code

Phone

Received By David Ortega

Complaint Adderess 42565 Avenida Alvarado

Complaint City Temecula

Complaint Zip Code 92590

Location

Complaint 127 gallons of caustic soda 25% was released due to a failed pump fitting. Substance was released to the secondary containment area.

Findings 1/11/08: EMWD called the Governor's Office of Emergency Services (OES) to report this release. The OES issued a Hazardous Materials Spill Report, Control# 08-0359, concerning this incident. The OES report states that no water was involved from this release. The OES report also states that the substance is contained and isolated; the equipment has been shut down. The substance was cleaned up by a contractor. The Riverside County Environmental Health Department and Riverside County Environmental Health Haz.-Mat. were notified about this incident. The nearest Riverside County Flood Control District facility is located about .8 mile to the northeast of the complaint address: "Murrieta Creek at Winchester Road.

Action

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1265

Type Spill

Received Date 1/8/2008 0:00

APN 964-060-001

First Name Metropolitan Water Dist. (MWD)

Last Name

Complainant Address

Complainant City

Complainant Zip Code

Phone

Received By David Ortega

Complaint Adderess 33740 Borel Road

Complaint City Winchester

Complaint Zip Code 92596

Location Skinner Plant

Complaint 4 ounces of Fluoride spilled from a leaking flange on a transfer pump.

Findings 1/8/08: MWD called the Governor's Office of Emergency Services (OES) to report this spill. The OES issued a Hazardous Materials Spill Report, Control# 08-0274, concerning this incident. The OES report states that no water and drinking water was involved and/or impacted from this spill. The OES report also state that the fluoride was contained and cleaned up by the reporting party (MWD). The Riverside County Environmental Health Department was notified about this incident. There are no Riverside County Flood Control District facilities in the area of the complaint address that could have been impacted.

Action

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1252

Type	Spill
Received Date	12/30/2007 0:00
APN	909-290-009
First Name	Eastern Municipal Water District (EMWD)
Last Name	
Complainant Address	
Complainant City	
Complainant Zip Code	
Phone	
Received By	David Ortega
Complaint Adderess	42565 Avenida Alvarado
Complaint City	Temecula
Complaint Zip Code	92590
Location	

Complaint An unknown amount of secondary treated water was released due to a power glitch that caused the motor operated valves to fault out causing them to close which backed up the treated water into secondary tanks. Crews are still estimating the amount of the spill.

Findings 12/30/07: EMWD called the Governor's Office of Emergency Services (OES) to report this release. The OES issued a Hazardous Materials Spill Report, Control# 07-8014, concerning this incident. The OES report states that it is unknown if any water was involved from this release. The OES report also states that the secondary treated water was contained and cleaned up by the reporting party (EMWD).

Action

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1250

Type Spill

Received Date 12/30/2007 0:00

APN 964-060-001

First Name Metropolitan Water Dist. of So. Cal. (MWD)

Last Name

Complainant Address

Complainant City

Complainant Zip Code

Phone

Received By David Ortega

Complaint Adderess

Complaint City Winchester

Complaint Zip Code 92596

Location Lake Skinner Plant

Complaint 1/4 cup of Flouro Solicic acid is leaking from two tanks at a "drip rate". Tanks are in a catchment area.

Findings 12/30/07: MWD called the Governor's Office of Emergency Services (OES) to report this leak. The OES issued a Hazardous Materials Spill Report, Control# 07-8005, concerning this incident. The OES report states that no water was involved from this leak. The OES report states that the substance was contained and cleaned up by the reporting party (MWD). The Riverside County Environmental Health Department and the Riverside County HAZ-MAT were notified about this incident. There are no Riverside County Flood Control District facilities in the area of the complaint location that could have been impacted from this leak.

Action

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1245

Type	Spill
Received Date	12/25/2007 0:00
APN	964-060-001
First Name	Metro. Water District So. Cal. (MWD)
Last Name	
Complainant Address	
Complainant City	
Complainant Zip Code	
Phone	
Received By	David Ortega
Complaint Adderess	33740 Borel Road
Complaint City	Winchester
Complaint Zip Code	92596
Location	

Complaint 1 ounce of caustic soda was released from a leaking valve that was discovered at an isolated line at the water treatment plant.

Findings 12/25/07: MWD called the Governor's Office of Emergency Services (OES) to report this release. The OES issued a Hazardous Materials Spill Report, Control# 07-7910, concerning this incident. The OES report states that no water was involved from this release. The OES report also states that the caustic soda was contained and cleaned up by the responsible party. The Riverside County Environmental Health Department was notified about this incident. There are no Riverside County Flood Control District facilities in the area of the complaint address that could have been impacted.

Action

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1232

Type	Spill
Received Date	12/17/2007 0:00
APN	376-060-021
First Name	Eastern Municipal Water Dist. (EMWD)
Last Name	
Complainant Address	
Complainant City	
Complainant Zip Code	
Phone	
Received By	David Ortega
Complaint Adderess	21422 South Palomar Road
Complaint City	Wildomar
Complaint Zip Code	92595
Location	

Complaint 25 gallons of sodium bi-sulfite 25% was released due to a broken line possibly caused by freeze.

Findings 12/17/07: EMWD called the Governor's Office of Emergency Services (OES) to report this release. The OES issued a Hazardous Materials Spill Report, Control# 07-7751, concerning this incident. The OES report states that no water was involved from this release. The OES report also states that the substance was contained and cleaned up by the responsible party (EMWD). The Riverside County Environmental Health Department was notified about this incident. The nearest Riverside County Flood Control District facility is located about .25 mile to the south of the complaint address: "Wildomar MDP Channel".

Action

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1229

Type	Spill
Received Date	12/14/2007 0:00
APN	964-060-001
First Name	Metropolitan Water Dist. So. Ca. (MWD)
Last Name	
Complainant Address	
Complainant City	
Complainant Zip Code	
Phone	
Received By	David Ortega
Complaint Adderess	33740 Borel Road
Complaint City	Winchester
Complaint Zip Code	92596
Location	Skinner Filtration Plant

Complaint 1 ounce of flourosilic acid was released due to a laky fitting. The caller (MWD) states that the fitting was on a hard plumb line.

Findings 12/14/07: MWD called the Governor's Office of Emergency Services (OES) to report this release. The OES issued a Hazardous Materials Spill Report, Control# 07-7706, concerning this incident. The OES report states that no water was involved from this release. The OES report also states that the substance was contained and cleaned up by the reporting party (MWD). The Riverside County Environmental Health Department was notified about this incident. There are no Riverside County Flood Control District facilities in the area of the complaint address that could have been impacted.

Action

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1225

Type	Spill
Received Date	12/12/2007 0:00
APN	964-060-001
First Name	Metropolitan Water District (MWD)
Last Name	
Complainant Address	
Complainant City	
Complainant Zip Code	
Phone	
Received By	David Ortega
Complaint Adderess	33740 Borel Road
Complaint City	Winchester
Complaint Zip Code	92596
Location	

Complaint 2 ounces of fluoride was released from a gasket failure on a storage tank.

Findings 12/12/07: The MWD called the Governor's Office of Emergency Services (OES) to report this release. The OES issued a Hazardous Materials Spill Report, Control# 07-7662, concerning this incident. The OES report states that no water and no drinking water was involved and/or impacted from this release. The OES report also states that the fluoride was contained and cleaned up by the reporting party (MWD). The Riverside County Environmental Health Department was notified about this incident. There are no Riverside County Flood Control District facilities in the area of the complaint address that could have been impacted.

Action

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1211

Type Spill

Received Date 12/4/2007 0:00

APN 921-020-079

First Name Eastern Muni. Water Dist. (EMWD)

Last Name

Complainant Address

Complainant City

Complainant Zip Code

Phone 0

Received By David Ortega

Complaint Adderess

Complaint City Temecula

Complaint Zip Code 92590

Location Business Park Drive at Rancho Way

Complaint 50,000 gallons of sewage was released when a contractor hit a 10 inch main line.

Findings 12/4/07: EMWD called the Governor's Office of Emergency Services (OES) to report this release. The OES issued a Hazardous Materials Spill Report, Control# 07-7501, concerning this incident. The OES report states that no water and no drinking water was involved and/or impacted from this release. The OES report also states that the sewage was contained and cleaned up by the reporting party (EMWD). The Riverside County Environmental Health Department was notified about this incident. The nearest Riverside County Flood Control District facility is located about .6 mile to the east of the complaint location: "Murrieta Creek MDP Line A Empire Creek". NOTE: The complaint APN listed in this report is a reference APN only.

Action 12/5/07: David Ortega of the NPDES Section at the Riverside County Flood Control District (RCFC) received an initial notification about this incident today via email from Charles Strey, Senior Public Health Engineer, Riverside County Environmental Health Department. His email stated that a 10 inch force main was inadvertently ruptured by a contractor doing work at Business Park and Rancho Way in the City of Temecula. The spill occurred between 2:30 pm and 3:30 pm on 12/4/07. 50,000 gallons was released, with most of it being retained by quickly constructed earthen dams in the storm drains. None of the sewage reached the creeks or streams. The hardscape areas have been disinfected with sodium hypochlorite, and taping and signage are in place. 12/6/07: Mr. Ortega received a copy of the Sewage Release/Spill Notification via email from Mr. Strey today. Incident# SA-07-13. This report states that the discharge has been stopped and is upstream from known recreation areas, which are not posted by the Riverside County Environmental Health Department. The area of the discharge has been inspected by the Riverside County Environmental Health Department to evaluate contamination. The areas of contamination have been cleaned and disinfected. Most of the spill was recovered and taken to the plant.

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1203

Type	Spill
Received Date	11/30/2007 0:00
APN	583-080-012
First Name	Southern California Edison (SCE)
Last Name	
Complainant Address	
Complainant City	
Complainant Zip Code	
Phone	
Received By	David Ortega
Complaint Adderess	
Complaint City	Aguanga
Complaint Zip Code	92536
Location	Roca Vista Road and Highway 371

Complaint 5 gallons of mineral oil was released due to an equipment failure. PCB will be analyzed.

Findings 11/30/07: SCE called the Governor's Office of Emergency Services (OES) to report this release. The OES issued a Hazardous Materials Spill Report, Control# 07-7404, concerning this incident. The OES report states that no water and no drinking water was involved and/or impacted from this release. The OES report also states that the mineral oil was contained and cleaned up by a contractor. The Riverside County Environmental Health Department was notified about this incident. The nearest Riverside County Flood Control District facility is located about 3 miles to the northwest of the complaint location: "Wilson Creek Sage Road Bridge".

Action

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1196

Type Spill

Received Date 11/27/2007 0:00

APN 480-462-004

First Name Southern California Gas (So.Cal. Gas)

Last Name

Complainant Address

Complainant City

Complainant Zip Code

Phone 0

Received By David Ortega

Complaint Adderess

Complaint City Winchester

Complaint Zip Code 92596

Location South Old Jean Nicholas Road

Complaint 11/27/07 at 1115 hours, a pipeline company installing fiber optics damaged an 8 inch natural gas pipeline. An unknown amount of natural gas was released.

Findings 11/27/07: So. Cal. Gas called the Governor's Office of Emergency Services (OES) to report this release. The OES issued a Hazardous Materials Spill Report, Control# 07-7322, concerning this incident. The OES report states that no water and no drinking water was involved and/or impacted from this release. The OES report also states that the natural gas was contained and cleaned up by the reporting party (So. Cal. Gas). The Fire Department and the Police Department were on scene concerning this incident. The Riverside County Environmental Health Department was notified about this release. The nearest Riverside County Flood Control District facility is located about .3 mile to the northeast of the complaint location: "Warm Springs VY French Valley channel Stage 2". NOTE: The complaint APN listed in this report is a reference APN only.

Action

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1194

Type Spill

Received Date 11/26/2007 0:00

APN 909-290-009

First Name Eastern Municipal Water District (EMWD)

Last Name

Complainant Address

Complainant City

Complainant Zip Code

Phone

Received By David Ortega

Complaint Adderess 42565 Avenida Alvarado

Complaint City Temecula

Complaint Zip Code 92590

Location Temecula Valley Regional Water Reclamation Facility

Complaint 40 gallons of engine oil leaked into a pipe galley from a seal that failed.

Findings 11/26/07: EMWD called the Governor's Office of Emergency Services (OES) to report this leak. The OES issued a Hazardous Materials Spill Report, Control# 07-7289, concerning this incident. The OES report states that no water was involved from this leak. The OES report also states that the engine oil was contained and cleaned up by the reporting party (EMWD). The Riverside County Environmental Health Department, Riverside County HAZMAT and the Company In-House Environmental Regulatory Compliance were notified about this incident. The nearest Riverside County Flood Control District facility is located about .8 mile to the northeast of the complaint address: "Murrieta Creek at Winchester Road."

Action

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1193

Type	Spill
Received Date	11/26/2007 0:00
APN	964-060-001
First Name	Metropolitan Water District (MWD)
Last Name	
Complainant Address	
Complainant City	
Complainant Zip Code	
Phone	0
Received By	David Ortega
Complaint Adderess	33740 Borel Road
Complaint City	Winchester
Complaint Zip Code	92596
Location	Skinner Filtration Plant

Complaint 8 ounces of Fluoride/FSA was released due to a leak from a tank man-way gasket.

Findings 11/26/07: MWD called the Governor's Office of Emergency Services (OES) to report this release. The OES issued a Hazardous Materials Spill Report, Control# 07-7288, concerning this incident. The OES report states that no water and no drinking water was involved and/or impacted from this release. The OES report also states that the substance was contained and cleaned up by the reporting party (MWD). Riverside County Environmental Health was on scene concerning this incident. The Riverside County Environmental Health Department was notified about this release. There are no Riverside County Flood Control District facilities in the area of the complaint address that could have been impacted.

Action

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1188

Type Spill

Received Date 11/21/2007 0:00

APN 964-060-001

First Name Metropolitan Water District (MWD)

Last Name

Complainant Address

Complainant City

Complainant Zip Code

Phone

Received By David Ortega

Complaint Adderess 33740 Borel Road

Complaint City Winchester

Complaint Zip Code 92596

Location

Complaint 12 ounces of Ferric Chloride leaked from a drain valve of a chemical delivery truck.

Findings 11/21/07: MWD called the Governor's Office of Emergency Services (OES) to report this leak. The OES issued a Hazardous Materials Spill Report, Control# 07-7221, concerning this incident. The OES report states that no water was involved from this leak. The OES report also states that the substance was contained and cleaned up by the reporting party (MWD). The Riverside County Environmental Health Department was notified about this incident. There are no Riverside County Flood Control District facilities in the area of the complaint address that could have been impacted.

Action

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1187

Type	Spill
Received Date	11/20/2007 0:00
APN	964-060-001
First Name	Metropolitan Water (MWD)
Last Name	
Complainant Address	
Complainant City	
Complainant Zip Code	
Phone	
Received By	David Ortega
Complaint Adderess	33740 Borel Road
Complaint City	Winchester
Complaint Zip Code	92596
Location	

Complaint 12 ounces of flora silicic acid (FSA) leaked from a manway gasket due to faulty equipment.

Findings 11/20/07: MWD called the Governor's Office of Emergency Services (OES) to report this leak. The OES issued a Hazardous Materials Spill Report, Control# 07-7217, concerning this incident. The OES report states that no water was involved from this leak. The OES report also states that the substance was contained and cleaned up by the reporting party (MWD). The Riverside County Environmental Health Department was notified about this incident. There are no Riverside County Flood Control District facilities in the area of the complaint address that could have been impacted.

Action

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1181

Type	Spill
Received Date	11/16/2007 0:00
APN	964-060-001
First Name	Metropolitan Water District
Last Name	
Complainant Address	
Complainant City	
Complainant Zip Code	
Phone	
Received By	David Ortega
Complaint Adderess	33740 Borel Road
Complaint City	Winchester
Complaint Zip Code	92596
Location	Robert Skinner Filtration Plant

Complaint .5 ounce of aqueous ammonia was released when a driver failed to properly tighten a vent cap on a delivery trailer.

Findings 11/16/07: MWD called the Governor's Office of Emergency Services (OES) to report this release. The OES issued a Hazardous Materials Spill Report, Control# 07-7087, concerning this incident. The OES report states that no water was involved from this release. The OES report also states that the substance was contained and cleaned up by the reporting party (MWD). The Riverside County Environmental Health Department was notified about this incident. There are no Riverside County Flood Control District facilities in the area of the complaint address that could have been impacted.

Action

Brian K

0002623

SAN DIEGO REGIONAL
WATER QUALITY
CONTROL BO
2008 OCT

...ONLY RAIN... DOWN THE STORM DRAIN
CALL 1-800-506-2555 TO REPORT
ILLEGAL POLLUTING OF STORM DRAINS

2007 – 2008 WATERSHED ANNUAL PROGRESS REPORT

TO THE
SAN DIEGO REGIONAL WATER QUALITY CONTROL BOARD
AND
UNITED STATES ENVIRONMENTAL PROTECTION AGENCY – REGION IX
(Order No. R9-2004-001, NPDES No. CAS108766)

OCTOBER 31, 2008

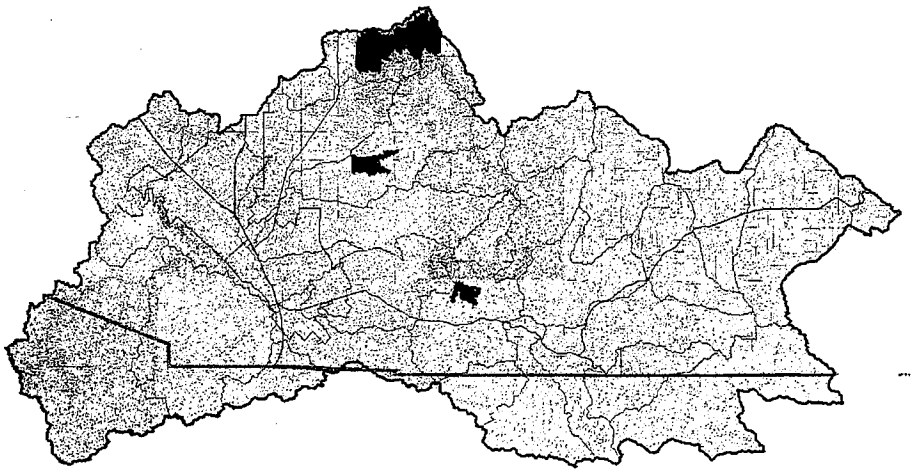

VOLUME 1 of 2

SANTA MARGARITA WATERSHED

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT,
COUNTY OF RIVERSIDE, CITY OF MURRIETA, and CITY OF TEMECULA

NPDES

NPDES Municipal Stormwater Permit
(NPDES No. CAS0108766)

Fiscal Year 2007-2008
Watershed Annual Report

For The

Riverside County
Municipal Co-Permittees:

- *County of Riverside*
- *City of Murrieta*
- *City of Temecula*
- *Riverside County Flood Control and Water Conservation District (District)*

Within the

Santa Margarita Watershed

Board Order No. R9-2004-001
California Regional Water Quality Control Board
San Diego Region

WATERSHED ANNUAL REPORT CERTIFICATION STATEMENT

CITY OF TEMECULA

1989

OLD TRADITIONS ♦ NEW OPPORTUNITIES

SAN DIEGO REGIONAL WATER QUALITY CONTROL BOARD
2008 OCT 31 P 2:37

I certify under penalty of law that this document and all attachments were prepared or reviewed under my direction or supervision in accordance with a system designed to ensure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Signature

Daniel A. York, City Engineer
Name and Title, Printed or Typed

October 30, 2008
Date

CERTIFICATION

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Signed: _____

Warren D. Williams
General Manager / Chief Engineer
Riverside County Flood Control
and Water Conservation District

Bill Luna
County Executive Officer

Jay E. Orr
Assistant County Executive Officer

Executive Office, County of Riverside

RE: 2007/2008 Annual Progress Report, Santa Margarita River Watershed

MS4 Permit No. CAS0108766
San Diego Regional Water Quality Control Board Order No. R9-2004-001
Fourth Year Submittal

County of Riverside Certification Statement

I Certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based upon my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Gary Christmas

Gary Christmas
Chief Deputy County Executive Officer
Riverside County Executive Office

10/24/08
Date

Robert T. Andersen Administrative Center
4080 Lemon Street • 4th Floor • Riverside, California 92501 • (951) 955-1100 • Fax (951) 955-1105

RIVERSIDE COUNTY FLOOD CONTROL & WATER CONSERVATION DISTRICT

2007 – 2008 WATERSHED ANNUAL REPORT

CERTIFICATION STATEMENT

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Patrick A Thomas

Signature

Mr. Patrick A. Thomas / Director of Public Works

Name & Title

10. 30. 08

Date

WATERSHED ANNUAL REPORT CERTIFICATION STATEMENT

I certify under penalty of law that this document and all attachments were prepared or reviewed under my direction or supervision in accordance with a system designed to ensure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Signature

Daniel A. York, City Engineer
Name and Title, Printed or Typed

October 30, 2008
Date

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A. EXECUTIVE SUMMARY

The Watershed Annual Report documents regional Urban Runoff management programs and activities that were implemented to comply with the requirements of Provision K and the Monitoring and Reporting Program (MRP) of the Municipal Separate Storm Sewer System (MS4) Permit issued to the Riverside County Permittees by the San Diego Regional Water Quality Control Board (Regional Board) on July 14, 2004 (Board Order R9-2004-001). This is the third MS4 permit issued for the Santa Margarita Region (SMR) by the Regional Board and is referred to as the "Third-term SMR Permit". This Watershed Annual Report specifically addresses the reporting requirements identified in the Watershed Annual Report section of the MRP to the Third-term SMR Permit. It provides a description of the area-wide and watershed-based programs and activities that the Permittee implemented during the Fiscal Year 2007-2008 reporting period to comply with the Third-term SMR Permit and to reduce pollutants in Urban Runoff to the Maximum Extent Practicable (MEP).

The Third-term MS4 Permit required each Permittee to develop an Individual Storm Water Management Plan (SWMP) and for all the Permittees to jointly develop a Watershed SWMP. These compliance documents, and the programs they describe, were to be completed, submitted to the Regional Board and implemented by July 14, 2005. Annual Reports for each of these documents are required and are to be submitted to the Regional Board on October 31st of each calendar year. The reporting period is specified as the preceding fiscal year. The Riverside County Flood Control and Water Conservation District (District) is specifically required to prepare an Individual SWMP Annual Report and to coordinate the preparation of the Watershed SWMP Annual Report with Riverside County and the Cities of Murrieta and Temecula (Permittees). As Principal Permittee, the District is also tasked with coordinating the submittal of the Individual SWMP Annual Reports for the other Permittees.

This Watershed Annual Report covers the period extending from July 1, 2007 through June 30, 2008.

In general, this Watershed Annual Report provides specific detail regarding implementation of the regional programs described in the Riverside County Drainage Area Management Plan (DAMP). The DAMP serves the dual role of a model Individual SWMP and Watershed SWMP for the purposes of the Third-term MS4 Permit.

On September 8, 2008, the Permittees arranged a meeting with Regional Board Staff to discuss and arrange a mutually acceptable approach to this fourth year annual report and the upcoming permit reapplication through the Report of Waste Discharge (ROWD) which is due on January 15, 2009. As a result of this meeting, a summary was created listing items that would be included in the fourth year annual report (this report) and other items that would be included in the ROWD.

The following is a listing of the items that the Permittees agreed to in this meeting. For those items which are required to be included in the fourth year annual report, references to the locations within this report where the items can be found are provided.

	Issue to be addressed in 4th year annual report	Report Section(s)
1	Include trend Analysis of Monitoring data, including historical data	Appendix G, Section G8.1
2	Include identification of issues that need to be addressed based on monitoring data analyses.	Appendix G, Sections G-8.3 and G-8.4
3	Recommend Initial revisions to monitoring program	Section **I.2.2**, and Appendix G, Section G-8.3
4	Address the requirements in F.2.b.9 of the Permit (Downstream Erosion)	Section H.10, and Appendix G, Section G-7.1

	Issue to be addressed in the ROWD
1	Enhanced MS4 Map
2	Provide programmatic recommendations for issues raised, but not specifically addressed in the fourth year annual report.
3	Include the Names and addresses of the Permittees that operate MS4's, including Wildomar and, if appropriate, Menifee.
4	Names and titles of primary administrative and technical contacts for the Permittees

For purposes of this Watershed Annual Report, the terms "(Watershed SWMP)" and "Standard Urban Stormwater Management Plan (SUSMP)" referenced in the SMR Permit are referred to as the "DAMP" and "Water Quality Management Plan (WQMP)," respectively, to be consistent with terminology established and in use by the Permittees. Additional terms and acronyms used in this Watershed Annual Report are defined in the glossary included in the DAMP.

Figure B-1 shows the SMR, which is the area covered under the SMR Permit. A copy of the Third-term SMR Permit is included as Appendix C of the DAMP.

B. OVERVIEW OF THE UPPER SANTA MARGARITA WATERSHED

B.1. OVERVIEW OF THE SMR

The SMR_is defined as the area delineated by the Riverside-San Diego County boundary line on the south and the Regional Board boundary line on the north, east, and west as shown in Figure B-1. It includes portions of unincorporated County of Riverside and the Cities of Murrieta and Temecula. The newly incorporated cities of Menifee and Wildomar are also shown in Figure B-1 for reference, however, these cities incorporated after the reporting period. Further, the entire SMR lies within the Murrieta Creek and Temecula Creek sub-watersheds.

It is important to recognize that the Clean Water Act exempts agricultural activities from regulation under NPDES. Further, under federal and state law, Permittees do not have legal jurisdiction over stormwater discharges into their respective MS4 from:

- State and Federal facilities,
- Utilities and special districts, and
- Native American tribal lands.

These areas are not included in the SMR. However, the Regional Board requires the Permittees to coordinate with these stakeholders to reduce discharges from their lands. In addition, other point and non-point source discharges otherwise permitted by or under the jurisdiction of the Regional Board may affect water quality in the Murrieta and Temecula Creek watersheds. Current land uses within the SMR are shown on the Watershed Facilities Map in Appendix F.

The area of Riverside County under the jurisdiction of the Regional Board is approximately 548 square miles, which is less than 8 percent of the 7,300 square miles within Riverside County. Not counting the two newly incorporated cities, only 3 of the 24 existing municipalities within Riverside County are under the jurisdiction of the Regional Board.

B.2. CHANGES IN POPULATION

The California Department of Finance estimates that as of January 1, 2008, the total population of the whole of Riverside County was approximately 2,088,322. Of the 2.08 million people, approximately 258,235 persons (approximately 12 percent) reside within the portion of Riverside County under the jurisdiction of the Regional Board. Approximately 57,005 persons[1] reside in the unincorporated area while approximately 201,230 persons reside within the Cities of Murrieta and Temecula[2]

Throughout the Third-term of the SMR Permit (2004-2008), population growth in Riverside County has been significantly higher than in neighboring counties and has also been greater than the average percent change in population in the entire State (4.9%).[2]

Table B-1 shows the population data for years 2004-2008 and the percent change for the neighboring counties and for each of the Permittees between years 2004 and 2008.

Figure B-1: 2008 Population

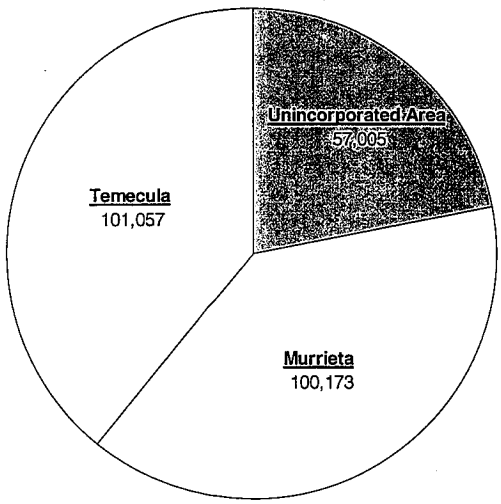

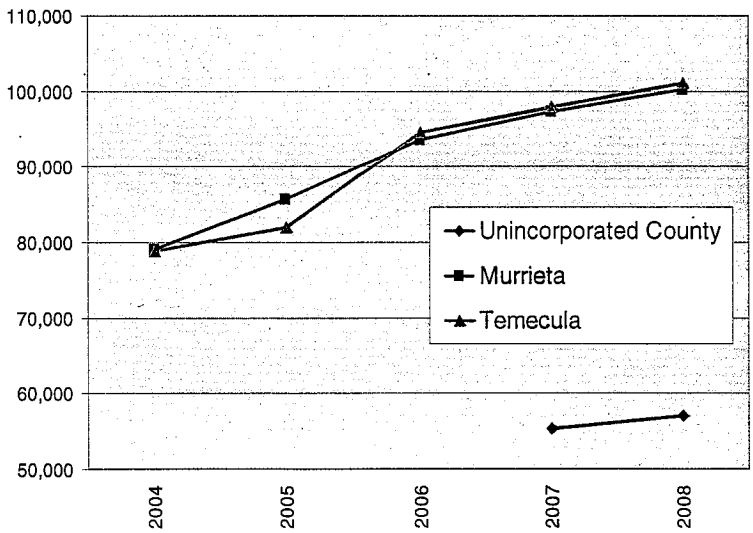

Figure B-2: Population Trends

1 Estimated from 2007 (*Riverside County Progress Report 2007*, Riverside County Center for Demographic Research/TLMA) adding 3.1% growth rate for unincorporated County. (California Department of Finance, May 2008.)

2 California Department of Finance, May 2008.

Table B-1 Population Trends	Year					% Change
	1/1/2004	1/1/2005	1/1/2006	1/1/2007	1/1/2008	2004 - 2008
State	36,271,091	36,728,196	37,195,240	37,662,518	38,049,462	4.90%
Los Angeles County	10,107,451	10,166,417	10,257,994	10,331,939	10,363,850	2.54%
Orange County	3,022,613	3,047,054	3,071,924	3,098,121	3,121,151	3.26%
San Bernardino County	1,897,950	1,950,806	1,993,983	2,028,013	2,055,766	8.32%
San Diego County	3,013,014	3,039,277	3,064,113	3,098,269	3,146,274	4.42%
Riverside County	1,807,858	1,888,311	1,966,607	2,031,625	2,088,322	15.51%
Unincorporated Area	ND	ND	ND	55,291(d)	57,005	ND
Murrieta	79,045	85,648	93,567	97,257	100,173	26.73%
Temecula	78,841	81,921	94,575	97,935	101,057	28.18%

(a)Population estimates obtained from California Department of Finance

(b)ND = No data

(c)Riverside County Progress Report 2007, Riverside County Center for Demographic Research/TLMA.

(d)Derived from the Riverside County Progress Report 2007, Riverside County Center for Demographic Research/TLMA.

Although population growth in the SMR will continue to be greater than in surrounding counties, the percent increase will decline. Table B-2 shows population projections for the year 2010.[3]

3 Southern California Association of Governments, May 2003, and San Diego Association of Governments, May 2003.

Table B-2: Projected Population for 2010

Area	2008	2010 (b)	% Change
Los Angeles County	10,363,850	10,514,663	1.5%
Orange County	3,121,151	3,227,836	3.4%
San Bernardino County	2,055,766	2,177,596	5.9%
San Diego County	3,146,274	3,199,706	1.7%
Riverside County	2,088,322	2,242,744	7.4%
Unincorporated Area	57,005 (a)	62,362	9.4%
Murrieta(c)	100,173	103,726(a)	3.5%
Temecula(c)	101,057	99,387(a)	-1.7%

(a) Derived from the Riverside County Progress Report 2007, Riverside County Center for Demographic Research/TLMA.

(b) Derived from the Riverside County Progress Report 2007, Riverside County Center for Demographic Research/TLMA and P1 Population Projections, California Department of Finance May 28, 2004

(c) Estimated build-out for: Murrieta = 128,000 and Temecula = 125,000. These figures include annexation of parts of County.

B.3. CHANGES IN LAND USE

In 1956, only 0.3 percent of the SMR (less than two square miles) was urbanized.[4] Over half a century later, even with a significant rate of growth in population relative to the State and neighboring counties, approximately 93 percent of the SMR remains in non-urban land uses (rural residential, agriculture, preserves and open space, state lands, federal lands, and tribal lands). Further, almost thirty percent (30%) of the SMR consists of federal, state, and tribal lands[5] that are not under the jurisdiction of the Permittees' MS4 programs. It is projected that the population of Riverside County will increase approximately ten percent (10%) by 2010 with significantly slower growth occurring in the south area of the County. Assuming that the urbanized area increases proportional to population, ninety-two percent (92%) of the SMR would remain in non-urban land uses in 2010.

Changes in land uses from 2007 to 2008 are shown in Table B-3. The land uses listed in the table are based on the Riverside County Assessor Parcel Data, Close of Roll 2006.

It should be noted that the land uses below represent zoned land uses, and changes in zoning designations can cause odd fluctuations in year-to-year date. However, the 2008 numbers do contain discrepencies that will be further evaluated and if, necessary, corrected in the ROWD.

4 State of California Department of Public Works, Division of Water Resources, Bulletin No. 57, Santa Margarita River Investigation, Volume I, June 1956.

5 Riverside County Assessor Parcel Data, Close of Roll 2004.

Table B-3: Land Use	2007 (Acres) Uninc[b]	2007 (Acres) Murrieta	2007 (Acres) Temecula	2007 (Acres) Total	2007 % of Total	2008 (Acres) Uninc[b]	2008 (Acres) Murrieta	2008 (Acres) Temecula	2008 (Acres) Total	2008 % of Total	2007-2008 Change in % of Total
Commercial	820	759	1,243	2,822	0.8%	2,878	3,178	2,284	8,339	2.5%	+1.7%
Industrial	150	196	622	968	0.3%	114	212	637	963	0.3%	0.0%
Urban Residential (< 1 acre)	3,837	4,883	5,243	13,963	4.0%	2,619	4,850	5,187	12,656	3.7%	-0.3%
Parks & Recreation Facilities	827	527	628	1,982	0.6%	1,247	1,182	1,862	4,291	1.3%	+0.7%
Streets & Roads		2,918	3,169	6,087	1.7%	9,057	3,178	3,204	15,439	4.6%	+2.8%
Subtotal – Urban Land Use	**5,634**	**9,283**	**10,905**	**25,822**	**7.4%**	**15,914**	**12,600**	**13,174**	**41,689**	**12.3%**	**+4.9%**
Preserves & Open Space	47,615	5,001	3,002	55,618	15.9%	49,601	3,318	1,222	54,141	16.0%	0.0%
Rural Residential (> 1 acre)	113,708	4,262	3,578	121,548	34.8%	99,886	3,748	3,139	106,773	31.5%	-3.3%
Agriculture	38,159	826	150	39,135	11.2%	35,248	973	169	36,389	10.7%	-0.5%
Highways & Roads	9,665			9,665	2.8%	--	--	--	0	0.0%	-2.8%
Federal/State/Tribal Lands/Non-County Jurisdiction (Exempt)	93,795	1,686	1,657	97,138	27.8%	96,927	1,546	1,604	100,076	29.5%	+1.7%
No Land Use Designation	--	--	--	0	0.0%	--	--	--	0	0.0%	0.0%
Total	**308,576**	**21,058**	**19,292**	**348,926**	**100%**	**297,576**	**22,184**	**19,308**	**339,068**	**100%**	**0.0%**

(a) 2007 figures based upon Riverside County Assessor Parcel Data, Close of Roll 2007. 2008 figures based on County Assessor Parcel Data, Close of Roll, 2008
(b) Uninc = Unincorporated County

0002640

B.4. CONSERVED LANDS

Much of the remaining non-urbanized lands will ultimately be incorporated into the Western Riverside County Multiple Species Habitat Conservation Plan (MSHCP). The MSHCP will result in an conserved area in excess of 500,000 acres and focuses on Conservation of 146 species. The MSHCP Conservation Area includes approximately 347,000 acres on existing Public/Quasi-Public Lands and approximately 153,000 acres of Additional Reserve Land. A large portion of the conserved lands are are in the SMR (at least 145,000 acres). There are around 72,318 acres of existing public or quasi-public lands preserved within the Santa Margarita River watershed area located in Riverside County.

Figure B-2 contains a map of the currently conserved lands within the Santa Margarita Watershed.

Additional information regarding the MSHCP can be found in Section H.3.4, and the current status of the MSHCP can be found in Section J.1.1.a) of this report.

Santa Margarita Watershed 2008

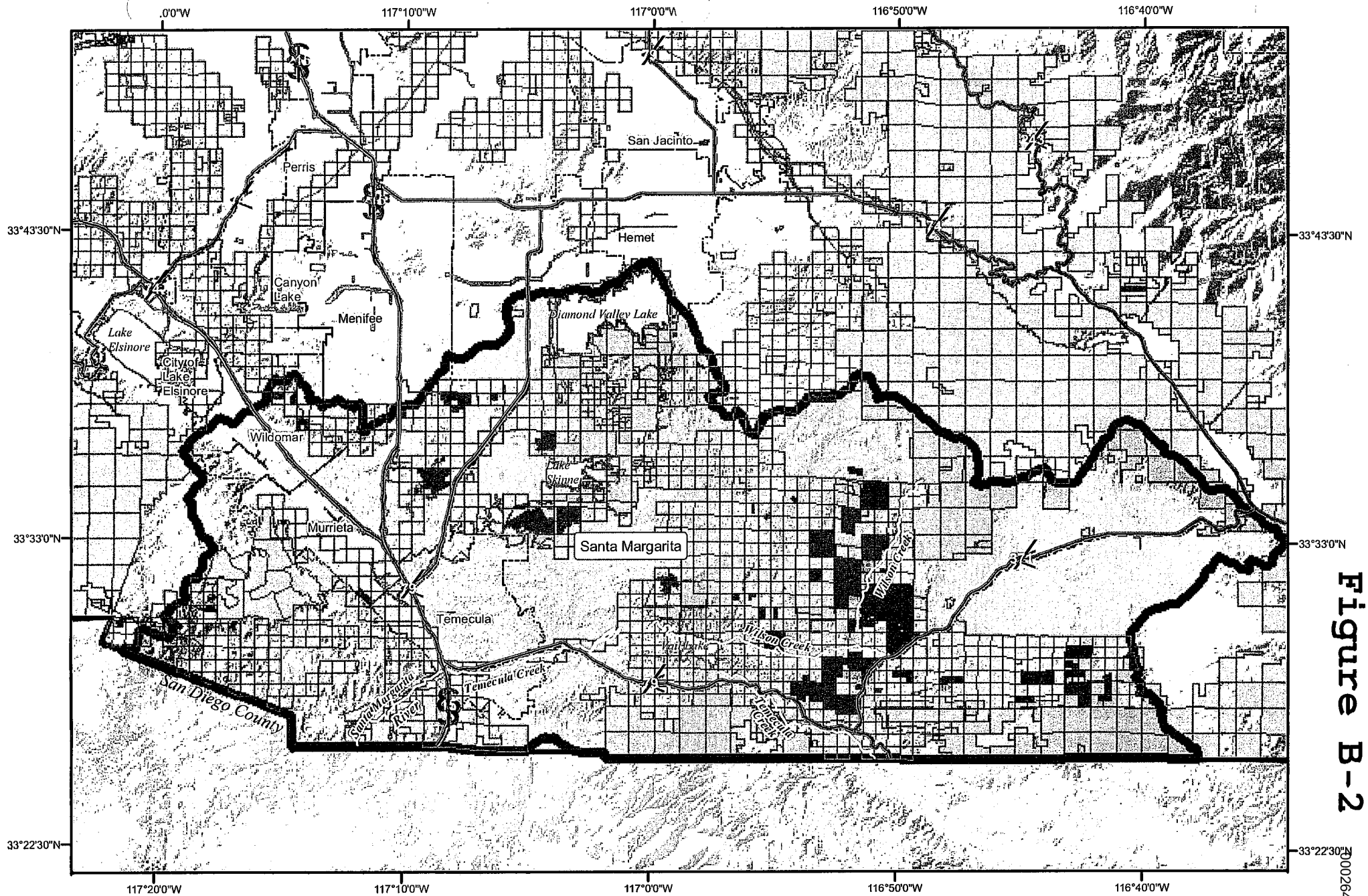

Figure B-2

10/28/2008

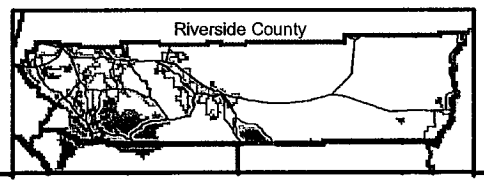

0 1 2 4 6 Miles

Santa Margarita Watershed
Creeks & Rivers
Highways
MSHCP Criteria Cells
Waterbodies
City Boundaries

Conserved Lands within Santa Margarita Watershed for Riverside County

MSHCP Conserved Lands 14,773 Acres Approx.

Public/Quasi-Public Conserved Lands 72,317.54 Acres Approx.

Note: Realigned parcels in AD 161 contribute to change in acreage from 2007. (22.5 Ac m/l)

0002642

C. A DESCRIPTION OF EFFORTS TO COORDINATE WITH OTHER STAKEHOLDERS IN THE SANTA MARGARITA RIVER WATERSHED, INCLUDING SAN DIEGO COUNTY AND THE US MARINE CORPS BASE CAMP PENDLETON.

C.1. INTRODUCTION

The Permittees schedule at least one annual meeting with the San Diego County MS4 Permittees within the Santa Margarita River watershed, Camp Pendleton, U.S. Bureau of Reclamation (Bureau), and others. The purpose of these meetings is to:

- Discuss land use planning;
- Discuss monitoring data and potential management measures to target Focus Area Constituents of Concern;
- Exchange ideas of how to address sources of Focus Area Constituents of Concern and evaluate effectiveness of actions;
- Collaborate with water districts in an effort to reduce irrigation water runoff; and
- Consider grant applications to coordinate and prioritize water quality projects that address Focus Area Constituents of Concern.

These meetings may occur from within the context of another workgroup, such as the Santa Margarita River Executive Management Team, or as separately called meetings, as appropriate.

The District, in consultation with the Permittees, participates in several cooperative activities through formal or informal regional stakeholder workgroups. Stakeholders often include other public and private entities within the Santa Margarita watershed. These efforts can broadly be categorized as management efforts to address stormwater quality issues specific the Santa Margarita River watershed, or broader issues that also pertain to the Santa Margarita River watershed. These efforts may be expanded, reduced or abandoned over time based on budget, changing regulations, program needs, program effectiveness consideration, or other factors.

Coordination between watershed stakeholders has continued to expand. There are now several separate watershed stakeholder groups meeting several times a year to discuss:

- The Lagoon Total Maximum Daily Load (TMDL);
- Watershed based planning issues and a watershed model for the Santa Margarita River;
- Implementation of the Integrated Regional Watershed Management Plan for the Upper Santa Margarita Watershed, and its coordination with the adjacent San Diego and Orange Couny Integrated Regional Watershed Management Plans
- Formation of a Watershed Council
- Coordination of regional monitoring programs within the Santa Margarita Watershed

Several of these efforts are inter-coordinated and have been administered, at stakeholder request, by the Bureau. The Bureau administered efforts are coordinated by the Santa Margarita River Executive Management Team (SMREMT). The IRWM and Watershed Council efforts are conducted outside the management of the Bureau and the SMREMT. In addition, the Permittees continue to coordinate with the Southern California Monitoring Coalition, a cooperative effort between Southern California Counties and Regional Water Quality Control Boards geared towards improving the science of storm water monitoring. Additional information on these efforts is provided below.

C.2. SANTA MARGARITA RIVER EXECUTIVE MANAGEMENT TEAM (SMREMT)

During FY2007-2008, the District continued its participation in the SMREMT. Participants include:

- District,
- U.S. Bureau of Reclamation (Bureau)
- Murrieta County Water District (now Western Municipal Water District)
- Eastern Municipal Water District
- Fallbrook Public Utilities District,
- U.S. Marine Corps Camp Pendleton
- County of San Diego
- Mission Resource Conservation District (MRCD)
- Elsinore-Murrieta-Anza RCD,
- Regional Board
- San Diego State University.

The SMREMT's goal is to identify and address the highest priority water quality concerns in the Santa Margarita watershed, including development of a watershed model to assist with land use planning and TMDL development, coordinating watershed monitoring, and developing formal agreements between interested stakeholders for the purposes of evaluating impairment listing and data gaps in the watershed. Both Urban Runoff and reclaimed water issues are being studied.

Projects include the "Santa Margarita Watershed Supply Augmentation, Water Quality Protection, and Environmental Enhancement Program" (**SMR Study**) which is described in Section H.3.2.

Six (6) meetings were held for the SMREMT within the reporting period.

Copies of meeting Agendas for the SMREMT (where available) are contained in Appendix A.

C.3. LAGOON TMDL WORKGROUP

On July 19, 2006 the Regional Board issued an investigative order (Order R9-2006-0076) to the various stakeholders in the Santa Margarita River Watershed to gather Monitoring data for the development of a Nutrient TMDL for the Santa Margarita Lagoon.

In compliance with this Order, the Permittees have been working with the Regional Board and the other stakeholders in funding and overseeing the development of a comprehensive program to collect data and model the various inputs to the lagoon to be used to develop this TMDL.

Fourteen (14) meetings were held for the Lagoon TMDL Workgroup within the reporting period.

Copies of meeting Agendas for the Lagoon TMDL Workgroup (where available) are contained in Appendix A.

C.4. SANTA MARGARITA WATERSHED WATER QUALITY MONITORING GROUP (WQMG)

The WQMG was established to coordinate the monitoring efforts of various stakeholders in the Santa Margarita Watershed. Many of these stakeholders are also involved in the a broader monitoring coordination effort for of the greater Southern California region through the SMC (described in section C.5. This group generally meets about twice a year or as needed to discuss monitoring issues specific to the Santa Margarita Watershed.

Parties involved in this group are:

- District
- Bureau of Reclamation
- San Diego County,
- Caltrans,
- Camp Pendleton,
- City of Temecula,
- City of Murrieta,
- Eastern Municipal Water District,
- Rancho California Water District,
- Fallbrook Public Utilities District

Four (4) meetings were held for the WQMG within the reporting period.

Copies of meeting Agendas for the WQMG (where available) are contained in Appendix A.

C.5. SOUTHERN CALIFORNIA STORMWATER MONITORING COALITION (SMC)

The SMC was formed in 2001 by cooperative agreement of the Phase I municipal stormwater NPDES lead permittees, the NPDES regulatory agencies in southern California and the Southern California Coastal Water Research Project. The overall goal for the SMC is to establish a Southern California stormwater research and monitoring agenda that would focus on improving stormwater monitoring science, coordinate data collection efforts, and evaluating the effects of stormwater discharges to receiving waters specific to Southern California.

The District participates in the Stormwater Monitoring Coalition (SMC) on behalf of the SMR Permittees. The SMC includes representatives from:

- SWQCB
- Los Angeles RWQCB,
- San Diego RWQCB,
- Santa Ana RWQCB,
- District,
- Los Angeles County,
- Orange County,
- San Bernardino County,
- San Diego County,
- Ventura County,
- Caltrans
- City of Los Angeles.
- Southern California Coastal Waters Research Project (SCCWRP)

The District is currently working with the SMC on several studies including:

- A Hydromodification Study (see Section H.4.1).
- A Low Impact Development Study. (see Section H.4.2).
- Laboratory Intercalibration Study
- LID BMP Study
- Regional Bioassessment Monitoring Program
- Standardization of Toxicity Testing Methods

These studies are further described in Section H of this report. Additionally, the District is also coordinating with the Southern California Coastal Water Research Project (SCCWRP), who facilitates the SMC, to collect data on natural loadings of various pollutants from watersheds throughout Southern California.

Twelve (12) SMC Meetings were held within the Reporting Period.

Copies of meeting agendas (where available) are contained in Appendix A.

The SMC Annual Report is included in Appendix D.

C.6. CALIFORNIA STORMWATER QUALITY ASSOCIATION (CASQA)

CASQA assists the State Water Resources Control Board (SWRCB) and MS4 Permittees throughout California in implementing the federal storm water regulations. In fulfilling this purpose, CASQA recommends objectives and procedures for storm water discharge control programs which:

- Are technically and economically feasible;
- Provide significant environmental benefits and protect water resources;
- Promote the advancement of storm water management technology; and
- Effect compliance with state and federal laws, regulations and policies.

CASQA also holds workshops on and develops methods and materials for important technical issues such as:

- Low Impact Development
- Water Quality BMP's
- Hydromodification
- Green Building
- Monitoring
- Program Effectiveness Assessment
- Pesticides
- Many Others

The Permittees attended CASQA's Annual Conference in Costa Mesa, September 10-12, 2007, where many of these issues were discussed.

The Permittees have strongly supported CASQA's mission and use CASQA's resources to improve compliance programs. Several Riverside County District NPDES staff are actively in various ongoing CASQA programs including:

- Steve Stump, Board Member 2004 - 2008
- Jason Uhley,
  - Legislative Chair
  - Pesticides Committee
- Arlene Chun,
  - Monitoring Committee
  - Pesticides Committee

In addition to attending the CASQA Annual Conference, the District on behalf of the Permittees, attended:

- **Twelve (12)** additional CASQA meetings.

Copies of agendas for these CASQA meetings (where available) are contained in Appendix A.

The CASQA Annual Report is included in Appendix D.

D. AN ASSESSMENT OF WATER QUALITY IN THE SANTA MARGARITA REGION, THIS ASSESSMENT SHALL INCLUDE DATA FROM THE PREVIOUS MONITORING REPORT.

This reporting requirement is addressed in the conclusion of the Monitoring Annual Report (Appendix G).

E. IDENTIFICATION OF WATER QUALITY IMPROVEMENT OR DEGRADATION IN THE SANTA MARGARITA REGION

This reporting requirement is addressed in the conclusion of the Monitoring Annual Report (Appendix G-6.4).

F. A PRIORITIZATION OF WATER QUALITY PROBLEMS AND POTENTIAL SOURCES IN THE SANTA MARGARITA REGION

This reporting requirement is addressed in the conclusion of the Monitoring Annual Report (Appendix G Section G-6.4.1)

G. A DESCRIPTION OF WATERSHED SPECIFIC EDUCATIONAL ACTIVITIES CONDUCTED DURING THE REPORTING PERIOD

G.1. INTRODUCTION

This section provides an overview of watershed specific public education activities **conducted by the Permittees**. Public education materials distributed during this reporting period have been included in Appendix B and are described in this section.

In addition to the Public Education program described in this section, the District, on behalf of the Permittees organizes and coordinates a Training program for municipal employees and inspectors. This training program is described in Section H.8.2 of this report.

G.1.1. Program Overview

The Riverside County NPDES Permittees have established an ongoing watershed based public education and outreach program known as the **Only Rain Down the Storm Drain** pollution prevention program. The specific objectives of the public education program include:

- Fostering a broad public awareness of water pollution concerns;
- Increasing public acceptance of pollution prevention activities to curtail everyday human behaviors that contribute to water quality problems;
- Educating/informing the general public, regulators and key local government and state decision makers on Urban Runoff conditions in Riverside County;
- Promoting stewardship of local water resources.

The Only Rain Down the Storm Drain program implements the public awareness objectives by focusing on three areas of pollutant reduction/prevention:

- Public Behavior;
- Proper Management of Pollutants; and
- Business Specific Education Outreach.

In addition, when attempting to make use of the finite resources available to the Public Education Program, the Permittees use these management goals to ensure that resources are used effectively:

- Focusing on pollutants of concern specific to each watershed region;
- Coordinating public education efforts with adjacent storm water management programs and other related education programs to share resources, coordinate outreach efforts, and avoid costly duplication of effort;
- Adapt public education programs and objectives, based on effectiveness analysis, to address changing MS4 programs and goals, and
- Establish an outreach educational partnership with the staff at the San Diego Regional Water Quality Control Board on at least one event in the Santa Margarita Watershed.

G.1.2. Program Highlights

The public education program was significantly improved this year. Program highlights include:

- Our partnership with the County's Business License Department established last year continues to be successful with providing direct outreach to business owners about behaviors that contribute to water quality problems. Direct outreach is made in the form of an insert that is issued to new business license applicants, and inserted into annual renewal reminders. The insert includes information on the "Only Rain Down the Storm Drain" program and the Toll Free 800 number portal used for reporting illegal storm drain disposal. **This year's effort resulted in 7,503 business transactions.**
- The public education program has updated its survey format and continues its use at various community events. The survey is then tallied to help determine and measure the public's awareness on urban runoff pollution origins.
- The public education web page continues to be revised and improved to incorporate all known urban pollutants, causes and prevention.
- There is also an on-line survey for those who connect to the District's website. A relatively new feature of the program, initial results will be made available in the 08/09 Report.
- The program continues to update its brochures and develop outreach programs specific to the needs of the watersheds within Riverside County. Revisions this year include link updates, and updates to existing brochures and development of new brochures for outdoor activities, landscaping, equestrian, pet waste, septic system management, and car care.
- New HHW-ABOP public service announcement (PSA), as well as rebranding of San Diego County's "Rubber Ducky" & "StormWater Pollution" PSA's.
- Purchase of a new trailer specifically for hauling public education materials to outreach events. The trailer is wrapped with the "Only Rain down the Storm Drain" message and other graphics related to stormwater quality. It is also used as part of the booth at outreach events.
- Initiation of billboard advertising specifically within the Santa Margarita Watershed.
- Development of a new 'Lenticular' magnet that promotes control of fertilizer, pesticides, oil & grease, pet waster and household chemicals.
- Good storm water stewardship practices are promoted at every New Employee County Orientation with each employee receiving clean water information and promotionals supporting the "Only Rain Down the Storm Drain" message. For the 07/08 Year, **a total of 50 County employees** were taught about the **Only Rain Down the Storm Drain** Pollution Prevention Program.

G.2. SANTA MARGARITA POLLUTANTS OF CONCERN

Based on a review of monitoring data collected to date, the current 303(d) List and discussions among the Co-Permittees, the following pollutants of concern are being targeted for this watershed. More discussion on the identification of pollutants of concern can be found in Monitoring Annual Report (Appendix G). Specific outreach activities are identified to address each identified pollutant of concern are as follows:

*G.2.1. **Pesticides** Associated with Urban Pest Control*

- Distribution to the Permittees of guidance published by Eco-Wise to develop standard language to include IPM in municipal pest management contracts.
- The Agricultural Commissioner assists in the distribution of educational material as part of the Pesticide Applicator's License Renewal information package and offers information on training workshops.
- Coordinate with nurseries to distribute material containing messages about the use of pesticides through the Southern California Heritage Gardening guide and spray bottles with printed non-toxic garden and household recipes.
- 'Home Garden Workshops' are conducted at nurseries and garden shows to inform residents on less-toxic alternatives for the garden.
- 'Keep Our Water Clean' film
- The 'Only Rain Down the Storm Drain' presentations conducted by Mission Resource Conservation District discusses the effects of pesticides and fertilizers on local waterways.

In Development

- New Landscape Management brochure
- Municipal and Industrial/Commercial training components focusing on the appropriate use, application, and timing of application of pesticides, and encouraging the use of IPM as a substitute.

G.2.2. Nutrients associated with Urban Development and Land Uses

- The Agricultural Commissioner and UC Riverside Cooperative Extension both assist in the distribution of our materials. In addition, local nurseries distribute our materials, along with the County's FREE Compost Workshop announcement flyer and "How To" Composting book;
- "Keep Our Water Clean" video to cover proper use of fertilizers as well as excess runoff from sprinklers;
- A section of the County's Household Hazardous Waste flyer is dedicated to informing residents about the problem of storm water pollution and provide simple pollution prevention activities;
- The "After the Storm" brochure;
- Storm Water Pollution and the Solutions
- Construction BMP Activities brochure and poster.
- The 'Only Rain Down the Storm Drain' presentations conducted by Mission Resource Conservation District discusses the effects of pesticides and fertilizers on local waterways.

<u>In Development</u>

- New Pet Waste brochure that focuses on pet waste, horse and livestock handling.
- New Landscape Management brochure
- New Equestrian Care brochure
- New Septic System Management brochure

G.2.3. Pathogens associated with Urban Activities

- Construction, municipal, industrial/commercial and new development training focusing on the need to address pathogen sources within the watershed;
- Partnership with SGA Advertising to place pet waste information in pet stores, veterinarian clinics, kennels and pet grooming facilities;
- Coordination with Riverside County Animal Control Department to distribute "What's the Scoop" and "After the Storm" brochures to families adopting pets at shelters;

<u>In Development</u>

- New Equestrian Care brochure
- New Pet Waste brochure that focuses on pet waste, horse and livestock handling.
- New Septic System Management brochure

G.2.4. ***Sedimentation*** *associated with Urban Development and Land Uses*

- Construction, municipal, industrial/commercial and new development training focusing on the need to address sedimentation within the watershed (see also Section H.8.2);
- County Building Inspectors handout both the construction brochure and related poster during site visits.
- Independent storm water education contractors are provided with our construction focused materials for their regularly scheduled Riverside County trainings.
- Informational displays are set up at home improvement store locations for the purpose of educating the Do-It-Yourselfer and the professional home improvement contractor.
- Distribution of dust pans to promote dry cleaning of drive ways and impervious surfaces;
- Construction BMP Poster;
- Adult storm water education presentations include instruction on controlling soil erosion;
- The "After the Storm" brochure;
- General Construction Activities brochure.
- In Development
- New Landscape Management brochure

G.2.5. ***Metals*** *associated with automotive sources*

The primary metallic pollutants within the region are copper from brake pad wear and lead from lost wheel weights. The Permittees are currently coordinating through CASQA (described in Section I.1.5) to educate and promote statewide and national change to these problems that are caused by the societal use of a currently accepted technology.

In addition, the District has developed other outreach materials to focus on other pollutants and pollutant causing activities/businesses commonly associated with urban runoff. These additional outreach materials are described in subsections that follow. Section G.7 specifically describes how outreach methods combine to focus on specific pollutants that may exist within the watershed.

G.3. 24-HOUR WATERSHED-WIDE OUTREACH PORTALS

The Permittees maintain three 24-hour watershed wide portals to receive and distribute information regarding the Only Rain Down the Storm Drain program. These portals include a website, a 1-800 number, an e-mail address and links from the County's main page and other websites to the RCFCD main page for reporting illegal storm drain disposal and obtaining printed materials.

G.3.1. Storm Water Protection Program Website

The District operates a website that provides information on how to report illegal dumping, clogged storm drains and lack of curb markers, as well as provide information opportunities for public participation in program development and general information about Urban Runoff pollution prevention techniques. The website is located at: www.rcflood.org and during the **07/08 Fiscal Year there were 3,387 hits reported.**

There is a link on the County's Main Page advocating reporting illegal storm drain disposal by clicking on the familiar "Only Rain Down the Storm Drain" logo. In an attempt to identify the viewers tracking information to this page, County Information Technology reported that the software had expired and that it was too expensive to replace.

Most of the District's outreach materials have been scanned into an electronic .pdf format and are available for download. Online Order forms and phone numbers are also available to assist itnernet customers in obtaining brochures posters and promotionals that are not currently available online.

The website contains pages specific to the following target audiences:

- General Public/Residents
- Businesses
- Developers
- Contractors
- Schools and Teachers
- Kid's Page

In addition, the website contains links to:

- Assist viewers in locating their watershed
- An online media library
- Material order forms
- 1-800 Toll Free Line to report storm drain pollution
- On line survey

G.3.2. Storm Water Toll Free 1-800 Hotline

On October, 1994, a Toll Free "800" telephone number for reporting suspected Urban Runoff pollution and obtaining pollution prevention information was established. This call line offers easy to understand instructions for connecting to County Environmental Health or Waste Management to obtain grasscycling, composting, or household hazardous waste collection workshop dates and locations. The 24-hour hotline also allows callers to report clogged catch basin inlets, illegal dumping and other illicit discharge violations. Finally, the hotline allows people to order public education materials and/or request storm water presentations for schools or community groups. The Toll Free Hotline number is widely publicized in all public education outreach materials, County telephone directories, and in other appropriate venues and locations.

The 1-800 line transfers callers to appropriate Permittee departments based on caller selections. Callers requesting information on pollution collection activities are transferred to either County Environmental Health or Waste Management depending on their specific selection. Callers reporting illicit discharges are directed to County Code Enforcement, who accepts the calls and then re-directs them to appropriate Permittee Code Enforcement Departments. Calls for public education materials or presentations are routed to the District's front desk, and then to the District's Public Education Staff. The specific text to the hotline is included in this report.

The provider of the Toll Free Hotline, Riverside County Information Technology, tracks the number of incoming calls. The number of Toll Free calls tracked from **June, 07 through May, 08 were 1,317.** The number of residential inquiries originating from the **Santa Margarita Region were 69**. County Communications promises to continue improving and working on its tracking program.

Exhibit A on the next page shows the script implemented for the 1-800 hotline.

Exhibit A

ONLY RAIN DOWN THE STORM DRAIN POLLUTION PREVENTION PROGRAM

TOLL FREE 800 LINE DIALOGUE

Thank you for calling the Only Rain Down the Storm Drain Pollution Prevention Program. To better serve the needs of our County communities, please listen carefully to the following options:

If this is an emergency, or you wish to report a significant release or threatened releases of hazardous material into the storm drain or elsewhere in the environment, please hang up and immediately Dial 911.

For water service connection, disconnection, or any other water utility information, call your local water service provider.

- To report illegal dumping at residential, commercial, industrial or construction sites, please call County Code Enforcement at 951.791-3601, or Press #1 to be directly connected.
- For information regarding Household Hazardous Waste Collection Events, please Press #2.
- To report clogged storm drains, faded or missing storm drain markers, Press #3 (District lobby line)
- For Storm Water Pollution Prevention information and outreach materials, Press #3 (District main line)

(Drop Off Dialogue)

Thank you for your interest in obtaining information on storm drain pollution protection. Basic, construction, industrial, commercial and children's storm water protection outreach packets are available. For a quick response to your request, please slowly and clearly leave your name, address, city and zip code. Also state the type and quantity of the materials you are interested in receiving. Should you need additional assistance, provide your area code and phone number and someone will contact you as soon as possible.

- To inquire about our FREE storm water classroom presentations, workshops, environmental youth group activities and other outreach programs, please press #4.

(Drop Off Dialogue)

The Only Rain Down the Storm Drain public education program offers classroom presentations, workshops, youth group activities, special event opportunities and other programs. For inquiries for the Temecula or Murrieta area, please press #1 (Rings Mission Resource Conservation District 1-760-728-1332)

For inquiries in all other Riverside County areas, Press #2 (Drops to Riverside Resource Conservation District at 951 683-7691)

- For grasscycling and composting information or workshops, please Press #5 (Drops to 951 486-3200) District).
- For additional assistance regarding our storm drain pollution prevention program during regular business office hours, Monday through Thursday from 7:30 am to 5:30 pm and on Friday from 7:30 am to 4:30 pm press #6.

G.3.3. E-mail

The Permittees also maintain an e-mail address that can be used to report illicit discharges or request storm water related public information. The email address is: fcnpdes@rcflood.org

In most cases, public information request e-mails received at this address are responded to within 2 business days. During **Fiscal Year 07/08 the number of e-mails received at the FCNPDES portal was 331 e-mails.**

G.4. COORDINATION WITH OTHER STAKEHOLDERS

The Only Rain Down the Storm Drain Program has used collaborates extensively to leverage available resources. Partnerships have been established with local environmental groups, business organizations, cities, public and private entities. These partnerships help maximize the use of existing distribution outlets, events, programs and materials. Impressions, attendance, and other measures of effectiveness relative to these programs are included in the Measurable Goals portion of this Watershed Annual Report.

To facilitate statewide awareness of storm water public education, educate local and state decision makers, and assist in the development of more effective public education outreach programs, the District participates in the following public education committees:

- Public Information Public Participation Committee (PIPP) – A subcommittee of the California Storm water Quality Association, and
- Western Regional Pollution Prevention Network (WRPPN)

To leverage education outreach resources and coordinate public education activities with other environmental programs, the Permittees closely coordinate and/or have existing partnerships with the following entities/organizations:

- Household Hazardous Waste Information Exchange (HHWIE) copy included;
- Mission Resource Conservation District (MRCD);
- Partnership to provide student education outreach in the Santa Ana and Santa Margarita Watersheds
- Partnership to provide adult education outreach activities in the Santa Ana and Santa Margarita Watersheds
- Partnership to provide support services for public education outreach activities at community events
- California Regional Environmental Education Community Network (CREEC);
- Water Education and Conservation Council (WEAC)
- Public Affairs Network (PAN)
- Riverside County Youth Partnership for Safe Communities
- Santa Margarita River Watershed Management Project, and
- Western Riverside Council of Governments

G. A DESCRIPTION OF WATERSHED SPECIFIC EDUCATIONAL ACTIVITIES (cont'd).

In addition, the Only Rain Down the Storm Drain program also coordinates with the following City/County departments to distribute appropriate storm water education outreach materials:

- City/County/District Front Counters
- County Assessor and Recorder
- County Waste Management
- County Environmental Health Department
- Household Hazardous Waste
- County Agriculture Department
- County Code Enforcement
- County Animal Control
- County Economic Development Agency
- County Fleet Services
- County Housing
- County Human Resources
- County & City Library Systems
- County Safety
- County Parks
- Transportation and Land Management
- County Business License
- City of Temecula Library
- City of Murrieta Library

In general, brochures and promotional items are provided to make the storm water pollution prevention materials visible and accessible to the public at all times in lobbies, training sessions, through customer interactions and new employee orientations.

Finally, the Only Drain Down the Storm Drain program also coordinates with the following state and/or local government or business entities to distribute public education information:

- Western Riverside Council of Governments
- South Coast Air Quality Management District
- Santa Rosa Plateau
- State Bureau of Reclamation
- Metropolitan Water District
- Lake Elsinore/San Jacinto Watershed Authority
- Rancho California Water District
- Valley Greeters
- Department of Water Resources Southern District
- Western Municipal Water District
- City of Riverside Public Utilities
- Eastern Municipal Water District
- Water Education Center (WEC)
- Habitat for Humanity
- SAWPA

G.5. OUTREACH TOOLS TO CHANGE PUBLIC BEHAVIOR

The Only Rain Down the Storm Drain Program conducts a wide range of outreach activities to residents, students, community groups, new home owners, public employees, businesses, and homeowner associations; informing them of how their "everyday activities" may contribute to the pollution of Receiving Waters, and encouraging them to adopt alternatives that will lessen or eliminate pollution-causing behaviors. Program efforts include providing information on pollution prevention techniques and informing residents about the proper disposal of household hazardous wastes, used motor oil, pesticides, pet waste and litter. Public education materials and media emphasizes that all citizens have a role in reducing and preventing the polluting of Receiving Waters. The goal is to present a clear and consistent message that explains the simple connections between people's everyday activities and their impacts upon Receiving Water quality.

As the public education and outreach program continues to be implemented and enhanced, the Permittees hope to broaden public awareness of Urban Runoff quality problems, promote proper disposal of household hazardous waste and motor oil, encourage illegal discharge reporting, foster good stewardship of Receiving Waters, and take personal responsibility for their actions in preventing pollution.

While public education outreach at events indicates that most people are willing to act in an environmentally responsible manner when given simple ways to change their behavior to avoid polluting our water bodies; most are unaware of the sources of pollution from everyday urban land use. The "Only Rain Down the Storm Drain" pollution prevention program using various media forms of media, educates the County's population about modified behaviors to prevent storm water pollution by focusing on residents, general public, students, and home gardeners.

G.5.1. Direct Outreach methods

The Only Rain Down the Storm Drain program interfaces directly with the public via program staff, or through contracts and partnerships at community events, home improvement stores, school education programs, adult education programs and/or by providing classroom based training. *Specific outreach activities, segregated by target audiences, are described below.*

G.5.1.a) General Community Outreach

The Only Rain Down the Storm Drain program participates in various community events to ensure that our message is delivered to the largest possible municipal audience. These community events, also provide an opportunity to survey attendees for and assess their public knowledge of storm water pollution prevention.

In addition, the Only Rain Down the Storm Drain program has partnered with *County Waste Management* to ensure that a minimum number

of Household Hazardous Waste and Antifreeze, Batteries, Oil and Paint Collection Centers and/or Events are held within each of Riverside County's principal watersheds (Santa Margarita, Santa Ana, and Whitewater). These events provide free disposal sites for common pollutants that can impair Receiving Waters.

The program's urban runoff materials and promotionals are also distributed through Community Clean up partnerships with *Riverside County Code Enforcement Administration,* whose undertaking is to achieve voluntary compliance in all phases of community revitalization. Staff works closely with the Community Improvement Specialists, ensuring that residential storm water pollution prevention material packets are on hand for distribution on inspection visits, complaint investigations and at neighborhood or community presentations.

Spill or disposal complaints received either through the Toll Free 800 Line or by electronic mail in the **Santa Margarita area were sixty-nine (69).**

When a complaint warranting an investigation is recieved, the information is entered into a database and then followed up with an NPDES staffinspection. Following the investigation, the inspector then canvasses the area with storm drain pollution prevention brochures, household hazardous waste collection schedule, door hangers and pens.

Finally, the Permittees participated in the annual Santa Margarita Watershed Cleanup Day, with City, County and District staff participating to remove trash and debris from the area watercourses. Following the cleanup activities, the Only Rain Down the Storm Drain Program either conducted outreach or provided informationals and promotionals to the volunteers at the post-event barbecue.

G.5.1.b) School Outreach

Elementary (K-6)

The Mission Resource Conservation District (MRCD) continues to provide a variety of K-6 education programs for the Only Rain Down the Storm Drain Program. The K-6 education program includes materials such as the Water Pollution Prevention Patrol workbook, the Fancy Fin hands-on classroom presentation and accompanying coloring book, various word match and crossword activity sheets and videos. A second story line featuring Fancy Fin and her friend Phinnious J. Green (a Pacific Tree Frog) educate students about point and non-point pollution and their effects on the environment and other creatures in the watershed. School materials are offered to all public and private schools in the Murrieta, Temecula and Wildomar areas, as well as to youth groups such as the Boy and Girl Scouts, Boys and Girls Clubs and Community Recreation Facilities.

Secondary Schools

A video entitled "How to Conduct an Environmentally Friendly Car Wash and Make Money Too" was developed for the "Car Wash Challenge" program. An accompanying flyer is also used which informs students/groups of the potential storm water problems generated from car wash runoff, and provides practical BMPs to minimize or eliminate contaminated runoff. The preparation and planning for a Car Wash Challenge presents too many challenges and therefore retail sales are typically more attractive option for secondary school fundraising.

Nevertheless, church groups, scout troops and other organizations do conduct car wash fundraisers. Thus, the scope of the Car Wash Challenge program has been expanded to include these additional fundraising organizations.

G.5.1.c) Adult Outreach

Valley Greeters is a "Meet and Greet" organization that takes various local business coupons, product samples and general vicinity information to new residents to the Temecula and Murrieta areas. Valley Greeters goes door to door welcoming new residents with local business coupons and a greeting packet containing information on urban runoff problems/solutions and accompanying promotionals. The packet includes residential specific information (After the Storm; What's the Scoop; and HHW Schedule). All of the Only Rain Down the Storm Drain materials are imprinted with the 800 Toll Free # to call to report illegal disposal or to obtain additional information. The young children to the area receive a Fancy Finn coloring book and box of crayons.

Due to the construction recession, Valley Greeters recently closed its doors, but should the economic climate improve, it may resume business.

Adult presentations are given through Community Outreach efforts by County Community Code Enforcement Officers. The Community Officers are provided materials about storm water impacts that could occur from improper application of paint, pesticides or fertilizers to share with their established community partnerships.

The Only Rain Down the Storm Drain program contracts with Mission Resource Conservation District and Riverside/Corona Resource Conservation District to provide urban runoff educational presentations to community groups who call and request such services.

The program's "Home Garden Care Guide" – provided the inspiration for the development of a series of "Home Garden Workshops". The Riverside-Corona ResourcesConservation District (RCRCD) has developed a home garden workshop that encourages the use of alternatives to chemical fertilizers and pesticides in the garden through techniques such as

companion planting, incorporating plans that attract beneficial insects, composting, and mulching. These workshops are put on at various community events and at the request of local nurseries, home owners associations, or other entities. Since requests for Homeowner Garden Workshops have been minimal, considerations are being made to provide the presentations at the major home improvement stores, large venues such as, fairs, home and garden conventions, and special events.

Steve Groner Associates has been retained to prepare and present workshops at major home improvement stores (HIS) throughout Riverside County. These workshops include a handout that educates the store's employees about storm water impacts that could occur from improper application of paint, pesticides or fertilizers. Attendees at the workshop also receive Only Rain Down the Storm Drain information and promotionals to help re-enforce storm water protection message. The employees are then able to share with customers the proper use and disposal of products that are potential storm drain pollutants. Point of purchase displays, tearsheets and counter displays have been installed at strategic locations to educate the public directly.

G.5.2. Brochures

G.5.2.a) Residential Outreach Materials:

After the Storm; Household Hazardous Waste Collection Schedule, Outdoor Activities; Swimming Pool, Jacuzzi and Fountain Maintenance; and What's the Scoop (Dogs, Cats and Equestrian Animal Waste).

G.5.2.b) Other Outreach Materials

In addition to the brochures mentioned above, the program utilizes other effective outreach materials such as, magnets, billboard ads, newspaper supplements, trade programs, flyers, door knob hangers, calendars, promotional items, workbooks, curriculum, shop rags, shelf talkers, tear sheets, posters and print ads to foster interest in the program.

A door hanger is also being utilized to help address problem discharges that are commonly observed in residential settings. The door hanger notifies the recipient that a problem discharge was observed and asks help from recipients to prevent problem discharge by following recommended pollution prevention activities. The door hanger is provided to all cities and is used by various County departments and the NPDES staff, when conducting field or site activities/inspections.

G.5.3. Mailing Inserts

"The Only Rain Down the Storm Drain" Pollution Prevention Program encourages advertising the County's Household Hazardous Waste Collection

events via the use of mail inserts. The inserts are included in various utility bills and special notices.

G.5.4. Media Outreach

The Only Rain Down the Storm Drain program continues to utilize various mass media to reach the public and promote the storm water program. Special newspaper inserts, fliers, and advertisements help increase public awareness of storm water pollution and environmental protection.

- A colorful billboard graphic with a simple storm drain message was designed and posted as close to the Santa Margarita Watershed area as possible. Billboard availability in the Santa Margarita region is limited due to the long term billboard advertising contracts secured by the many area casino properties.
- A relatively new addition to the Public Outreach Program is the hauling trailer, with surrounding graphics. The graphic is a brightly colored text and pictorial clearing stating the "Only Rain Down the Storm Drain" message. This and functions as a moving billboard as it carries materials to special events and large venues throughout Riverside County.
- The E-Z up shelter is imprinted with the Only Rain Down the Storm Drain message

G.5.5. Cooperative Used Oil Program

The Western Riverside Council of Governments (WRCOG) is responsible for administering the Used Oil Block Cycle Grant for ten cities within WRCOG's boundaries. These cities include: Banning, Beaumont, Canyon Lake, Lake Elsinore, Murrieta, Norco, Perris, Riverside, San Jacinto and Temecula. The target audience is the Do It Yourselfers (DIYers).

One of WRCOG's goals is to make it convenient for DIYers to recycle their used oil and to make it easy for them to find a Certified Center accepting used oil. In order for these centers to be certified, they need to apply for certification with the California Integrated Waste Management Board (CIWMB). WRCOG contacts the Non-Certified Centers in the jurisdictions to explain the program and hopefully interest them in becoming certified, the potential for decreasing the amount of illegally dumped motor oil increases with the addition of new Certified Centers within driving distance of the DIYer.

WRCOG also provides used oil containers on a need basis to the Certified Centers for distribution among DIYers at no cost, ensuring that the used oil a customer brings in is in a secure container avoiding spilling and a hazardous situation. **During this fiscal year, 144 motor oil drain containers were distributed and 148,606 gallons of motor oil collected.**

WRCOG also conducts site visits at all certified centers in jurisdictions to ensure center compliance to state and local mandates. This one on one interaction

provides the attention needed to answer questions the centers have. Materials are periodically provided to the centers such as: brochures, magnets, and state regulatory information. **Used oil filters collected during this period, 5,990.**

WRCOG's program also includes public education. This includes hosting booths at large venue events, conducting surveys to see how informed the local community is regarding used oil recycling, distributing brochures in both English and Spanish with information regarding used oil drop-off locations, curbside programs and other local recycling programs. The program also maintains an English and Spanish 800 hotline that can be used to get answers to any recycling question a resident may have regarding, "where the nearest Certified Center is located?" and "where can I find a used oil container?". The phone number is printed on all distributed materials including the oil containers. As mentioned, WRCOG provides brochures into Spanish, as Riverside County has a large Spanish-speaking population that needs to be outreached. By educating this group with the right information concerning used oil recycling, WRCOG hopes an increase in used oil recycling will occur throughout our jurisdictions.

WRCOG provides equal services to all jurisdictions regardless of their grant contribution. The goal is the same with all the jurisdictions, an increase in used oil recycling. WRCOG offers these services to make it more convenient for the DIYers to recycle and result in the increase of recycled used oil.

G.5.6. Western Riverside County Clean Cities Program

WRCOG also participates in large venue events to promote the use of alternative vehicle fuels. Car Care for Clean Air whose objective is to increase public awareness regarding the benefits of proper vehicle maintenance and repair. These events give staff an opportunity to assess how informed the local community is regarding recycling and also allows us to distribute brochures and informational flyers that will assist people in finding the nearest recycling center.

In addition, the County has partnered with WRCOG at these outreach efforts with either materials or a staff member.

G.6. OUTREACH TOOLS TO A BUSINESS SPECIFIC AUDIENCE

The Only Rain Down the Storm Drain program conducts a wide range of outreach activities to businesses; informing them of how their "everyday activities" may contribute to the pollution of Receiving Waters, and encouraging them to adopt alternatives that will lessen or eliminate polluting-causing activities. Program efforts include providing information on pollution prevention techniques and informing businesses about the proper disposal of wastes. Public education materials and media emphasize the theme that all businesses have a role to play in reducing and preventing the polluting of Receiving Waters. The goal is to present a clear and consistent message that explains the simple connections between a business' everyday activities and their impacts upon Receiving Water quality.

Originally, the business outreach program mainly consisted of the development and distribution of formal BMP guidance and to business associations thorough the Business Press, a trade publication. The program has now expanded to include direct outreach to businesses through Riverside County's Business Licensing Program. Discussion of the current Business Specific Outreach tools implemented by the Permittees is discussed below.

G.6.1. Direct Business Outreach Activities

Through the Compliance Assistance Program (CAP), a partnership with County Environmental Health, restaurants and businesses that handle hazardous wastes are inspected for potential storm water impacts from their activities. Each business is provided with educational information specific to their typical business activities.

Within the 07/08 Fiscal Year, the Board of Supervisors passed legislation to require all businesses in Riverside County to obtain a business license. Billing inserts were developed for the County's Transportation and Land Management's, Business License Division and are included in all license renewal notices. New businesses receive their storm water education that is affixed to their application.

The first year of the business license program distributed *979* storm water pollution prevention informationals. The *07/08 Year* resulted in *7,503* urban runoff awareness inserts were issued.

Steve Groner Associates has been retained to prepare and present workshops at major home improvement stores throughout Riverside County. The workshops include a handout educating store employees about storm water impacts that could occur from improper application of paint, pesticides or fertilizers. Attendees at the workshop also receive Only Rain Down the Storm Drain information and promotionals to help re-enforce the urban runoff message. Employees are then able to share with customers the proper use and disposal of products that can contaminate receiving waters. Point of purchase displays, tearsheets and counter displays have been installed at planned locations to provide a brief education to the public directly. SGA's full report can be found at the end of this section.

G.6.2. Brochures

G.6.2.a) Commercial:

After the Storm; Food Facilities; Outdoor Cleaning Activities and Non-Point Source Discharges; Automotive Maintenance & Car Care and Storm Water Pollution and the Solutions. Note: (Future program material revisions include the Outdoor Activity brochure to include broader examples of urban pollution causing activities such as, power washers and mobile vehicle maintenance operators).

G.6.2.b) Industrial:

After the Storm; Outdoor Cleaning Activities and Non-Point Source Discharges; Storm Water Pollution and the Solutions; and Your Facility May Need a Storm Water Permit (this brochure is also scheduled for an update in the 08/09 Year).

G.6.2.c) Construction:

After the Storm; Storm Water Pollution and the Solutions; Outdoor Cleaning Activities and Non-Point Source Discharges; General Construction & Site Supervision

G.6.3. Posters

Best Management Practices (BMP) posters for automotive, food service establishments (available in Spanish) and construction employees are available. The posters address activities associated with the automotive repair industry, and the food/restaurant industry that may pose a threat to water quality. The well written and illustrated posters list recommended storm water recommend storm water BMPs and are designed to serve as reminders for the employees.

G.6.4. Media Outreach

There were no additional Business Media Outreach chosen because of the opportunity to directly reach Riverside County business owners through the County's Business Licensing Program. The results of the outreach effort still attract the attention of general types of business activities that threaten water quality and recommend the County Flood Control's and CASQA website for BMPs that can be implemented to reduce the impact on the environment.

G.6.5. Supplemental Environmental Projects

In an effort to change the behaviors of large storm drain pollution prevention offenders in the County, Environmental Health established a Supplemental Environmental Project (SEP). Once the violator is found guilty of the charges, stiff monetary penalties are then placed. These monetary revenues are then placed in a SEP account that would later be used to develop new programs or enhance existing ones. The following are samples of such outreach efforts from these funds:

- Conoco Phillips SEP resulted in the development of two posters for Fueling Stations and Service Bay Servicing
- Downs Energy SEP resulted in the development of a billboard ad.

To date, there have been no other SEP revenues assigned for this purpose.

G.7. OUTREACH TOOLS SPECIFIC TO POLLUTANTS

The Only Rain Down the Storm Drain program conducts a wide range of outreach activities focusing on reduction of certain pollutants in the Receiving Waters. These outreach activities focus on sources of those pollutants whether it is residential, business, municipal or some other state or federal source. Education materials explain how "everyday activities" of potential sources may contribute to the pollution of Receiving Waters, and encourage the sources to adopt alternative approaches to pollutant management that will lessen or eliminate pollution causing activities. Program efforts include providing information on pollution prevention techniques and informing sources about the proper disposal of pollutants. Public education materials and media emphasize the theme that all citizens/businesses have a role to play in reducing and preventing the polluting of Receiving Waters. The goal is to present a clear and consistent message that explains the simple connections between a business' everyday activities and their impacts upon Receiving Water quality.

Each subsection that follows identifies how existing outreach materials previously described address specific potential pollutant sources in the watershed.

G.7.1. Use of pesticides, fertilizers, and herbicides.

- The Riverside County Agricultural Commissioner's Pesticide Applicator's License renewal information package includes materials on the proper use of pesticides and offers information on training workshops. The license renewal process requires continuing education of applicants and detailed record keeping of pesticide applications. Municipal employees that are responsible for the application of pesticides are encouraged to obtain and maintain credentials as Certified Applicators and/or licensed Pest Control Advisors.
- The available information on the use of pesticides, fertilizers and herbicides has been expanded to include Home Composting Made Easy booklet;

Southern California Heritage Gardening Guide (DVD); spray bottles with non-toxic garden and household recipes. In addition, local nurseries assist in the distribution of this material along with information on the County's FREE Compost Workshops.

- The "Home Garden Workshops" conducted at nurseries and garden shows inform residents on less-toxic alternatives for the garden.
- The "Keep Our Water Clean" film covers proper use of pesticides, fertilizers and herbicides, as well as, excess runoff from sprinklers.
- The ONLY RAIN DOWN THE STORM DRAIN Annual National Pollution Prevention Week insert informs County residents about the problems of storm water pollution and provides clear and simple pollution prevention activities in the garden.
- The ONLY RAIN DOWN THE STORM DRAIN presentations conducted by MRCD discusses the effects of pesticides and fertilizers on local waterways.
- The 2008 Environmental Calendar included a wide array of storm water protection information. It was designed to attract the adult audience by listing best management practices, scheduled special events, household hazardous waste collection sites, used oil collection sites, home garden workshops, citywide clean ups, and each of the watersheds along with geographical information. Steve Groner Associates has been retained to prepare and present employee workshops at major home improvement stores throughout Riverside County. This information is then passed on to the consumer. The workshops include information on BMPs the public should be aware of for pesticide and fertilizer application, use, and storage.

G.7.2. Educate/inform on impacts from littering and improper waste disposal.

- The brochure "*Household Hazardous Waste - A Guide For Proper Disposal Of HHW And The Use Of Environmentally Friendly Products*" informs residents of the effects of improper disposal of HHW and offers recipes for less toxic alternatives to commonly used household products. *This brochure has been tabled* and replaced with a spray bottle promotional imprinted with non-hazardous recipes and accompanied with the After the Storm brochure.
- Through classroom activity books, work sheets, coloring books and presentations, children are taught to put trash in its proper place, to never throw hazardous products in the trash, and to dispose of HHW at an HHW collection event.
- All ONLY RAIN DOWN THE STORM DRAIN brochures and the dual picture frame magnet encourage residents to report illegal dumping to the ONLY RAIN DOWN THE STORM DRAIN toll-free phone number. The magnet design will be changed to a more colorful and original design that will be discussed in the 08/09 Fiscal Year Annual Report in more detail.

- The MRCD adult presentation discuss the various pollutants of concern that contribute to storm water pollution – including trash and debris – residents are reminded to always pick-up waste and dispose of it properly. Requests for adult presentations are few, but groups may be satisfied through outreach events held and attended in the area.
- The door hanger "A Storm Drain Dumping Violation has been found in YOUR neighborhood" informs residents about the effects of improper waste disposal and encourages them to participate in simple, pollution prevention activities.

G.7.3. Educate/inform on impacts from dumping pollutants into storm drainage systems.

- The *"The After the Storm"* brochures informs residents of the negative environmental impacts caused by pollutants allowed to enter storm drains.
- The *"Keep Our Water Clean"* DVD and PSAs inform residents about the problem of storm water pollution and describes pollution prevention activities.
- The school program stresses the message of never dumping anything into a storm drain. Both the Santa Margarita Classroom activity book and the "Fancy Fin" presentation specifically address this issue.
- MRCD works with organized volunteer groups for catch basin marking events throughout the Murrieta and Temecula Valleys. The durable, noticeable storm drain marker reminds residents to NEVER POUR ANYTHING DOWN A STORM DRAIN.
- The *"Only Rain in the Drain"* song, produced by the ONLY RAIN DOWN THE STORM DRAIN program for the elementary school education program, also addresses the improper dumping issue.
- The MRCD adult presentation addresses the issue of improperly dumping pollutants into the storm drain and advises residents that storm drains connect directly – without treatment – to local waterways.
- The "2008 Environmental Calendar" containing various informative editorial reminding users to keep all wastes out of the storm drain system, more specifically, to remember the ONLY RAIN DOWN THE STORM DRAIN slogan.
- The door hanger *"A Storm Drain Dumping Violation has been found in YOUR neighborhood"* informs residents about the effects of dumping pollutants into the storm drains, encourages them to follow simple pollution prevention activities and curtails illegal dumping behavior.
- Steve Groner Associates has been retained to prepare and present employee workshops at major home improvement stores throughout Riverside County, so that employees can properly communicate this message to their customers. The workshops also discuss that paints or paint-related products should never be disposed of in a storm drain or gutter.

G.7.4. Educate on impacts from gasoline, fuel oil, and oil and grease.

- The "*Automotive Maintenance & Car Care*" BMP brochure specifically identifies recommended BMPs that address the problem of gasoline, oil and grease entering into storm drains.
- Nearly all *ONLY RAIN DOWN THE STORM DRAIN* brochures, utility inserts, advertisements, the school program, and audio and video PSAs provide information on the water quality impacts from improper disposal and spills from gasoline, oil and chemicals in a general context.
- The "Keep Our Water Clean" DVD specifically covers the topic of grease and oil from vehicles.
- The ONLY RAIN DOWN THE STORM DRAIN works cooperatively with the Permittees' motor oil recycling programs to distribute information on the "why" and "how to" of used motor oil disposal. The motor oil recycling programs actively distribute the ONLY RAIN DOWN THE STORM DRAIN materials in conjunction with their outreach efforts since both programs are working toward the same goal of environmental protection through pollution prevention.
- The new and improved "*What you should know for . . . Outdoor Cleaning Activities*" brochure informs customers that vehicle fluids pose a threat to local waterways and groundwater resources and provides BMPs to keep these pollutants out of the storm drains.
- The 2008 *"Environmental Calendar"* provided a full page section on recycling motor oil. The calendar included information on the environmental problems spilled motor oil can cause. The State's 1-800-CLEANUP toll free number is provided to locate the nearest motor oil collection center in Riverside County, the calendar also lists the State's Clean Up Website at www.1800cleanup.org.
- Environmental Health Household Hazardous Waste Collection Schedule is provided with all of our storm water related materials and promotionals. The schedule covers the times, dates and locations of both temporary and permanent facilities from September through to June.

G.7.5. Educate/inform on impacts from airborne particles.

- The County of Riverside has an active Employee Rideshare Program, which encourages employees to carpool, vanpool, use transit, cycle or walk to work. Also, the County actively supports the use of zero/low emission vehicles. The County's Fleet Services includes a variety of alternative vehicles including CNG, propane, electric and methanol powered vehicles.
- Various County facilities are installing alternative fuel fueling stations to expand the use of alternative energy vehicles. This is a direct result of the County Board Policy to use alternative fuel vehicles as the "first choice" when purchasing or leasing vehicles.

- The County of Riverside is an active member of the Clean Cities Coalition and provides financial support for various clean air efforts/activities throughout the County.

G.7.6. Educate on the need to keep storm water from contacting potential contaminants.

- The "Storm Water Pollution....What you Should Know" brochures informs residents about keeping storm water from contacting potential contaminants and explains various pollution prevention activities. It also advises residents to keep common storm water pollutants from entering our storm drains.
- The *Automotive Maintenance & Car Care, The Food Service Industry,* and the *General Construction & Site Supervision* BMP brochures all advise facility and site operators to properly manage pollutant sources and prevent polluted storm water from entering storm drains. The brochures also inform owner/operators that local ordinances strictly prohibit the discharge of pollutants to the storm drain system or local waterways without a permit.

G.7.7. Educate on the clean-up and proper disposal of pet waste.

- The "What's the Scoop" and "After the Storm" brochures addresses the need to pick-up animal waste and to dispose of it properly.
- The school activity book and the "Fancy Fin" presentation discuss the proper disposal of pet waste.
- The "Keep Our Water Clean" DVD also addresses the topic of the proper disposal of pet waste and the impacts to our waterways.
- The ONLY RAIN DOWN THE STORM DRAIN adult storm water presentation discusses proper disposal of pet waste and actually includes a DVD showing how bad this problem can be. The slide shows – from a distance – small yellow flags marking pet waste deposits in what is obviously a very popular dog walking area.
- The Pollution Prevention Week is recognized in a flyer type informational and is released every September. Along with other useful BMP's, the flyer does have an article that specifically addresses pet waste under the article "*What's The Scoop . . . Tips For A Healthy Pet And A Healthier Environment*".
- The Earth Day flyers released every April, contains an article on the hazards of pet droppings.
- The *"2008 Environmental Calendar"* reminds us to always "pick up animal waste". The accompanying message informs residents of the effects of pet waste on local waterways.
- The District does not allow the disposal of pet waste or other trash within its facilities. Signage has been installed at access gates to discourage illegal dumping and encourage reporting thereof. At the start of the program, the District purchased "Dogipots," (containers that hold pet waste bags), and

had them installed in County Parks. Upkeep and additional purchases of Dogipots are the responsibility of each County Park staff. The District has also purchased pet leash tags with the storm water hotline number repeating the "Only Rain Down the Storm Drain" message.

G.7.8. Develop programs for landowners on erosion and sediment control practices.

- The "*After the Storm*" brochure and the school program addresses the topic of controlling soil erosion.
- The "*After the Storm*" brochure identifies erosion and sediment loads as a storm water pollutant.
- The ONLY RAIN DOWN THE STORM DRAIN continues to work cooperatively with both MRCD and RCRCD to offer various workshops on the topic and has conducted additional workshops for the needs of the storm water program. These workshops have been offered to both Permittee staff and the general public.
- The ONLY RAIN DOWN THE STORM DRAIN storm water presentation was modified to specifically address soil erosion as it relates to the Santa Margarita Watershed and what homeowners and businesses can do to minimize soil erosion.

G.7.9. Cover contaminants and prevent runoff through polluted areas.

- The BMP brochures for the outdoor, restaurant, automotive and construction industry all include specific BMPs to cover outside work areas; keep dumpster lids closed; prevent run-off at work and material storage areas; cover exposed stockpiles; avoid wash down of paved surfaces that drain to storm drains; and many other BMPs that help prevent pollutants from entering the storm drains.
- The industrial/commercial training workshop included specific segments on covering outside materials to prevent contaminated runoff. The target group for this workshop is staff that is responsible for conducting NPDES Urban Runoff inspections of industrial/commercial facilities.

G.7.10. Educate municipalities/agencies on the need for vehicle inspections.

- As part of the municipal employee-training program, various departments have been instructed to inform employees about the need for vehicle inspections and have been provided with a complete training package to help in this area. Included in the training information are brochures, posters and vehicle air fresheners that Fleet Services personnel have distributed at their garage/work sites.
- Departments and agencies are also encouraged to use alternative fuel vehicles that not only help reduce vehicle emissions but also, in some cases (*e.g.*, electric vehicles), eliminate the use of motor oil and antifreeze. The County

highly encourages its Departments to convert to these types of vehicles, whenever possible.

- The municipal employee training workshops are conducted by AEI-CASC and cover such topics as inspecting vehicles and equipment for fluid leakages.

G.8. PUBLIC EDUCATION MATERIAL

Examples of various the Public Education material the permittees distribute is included in Appendix B of this report.

H. A DESCRIPTION OF ALL AREA-WIDE AND WATERSHED-BASED ACTIVITIES CONDUCTED DURING THE REPORTING PERIOD.

H.1. INTRODUCTION

This section provides a summary of area-wide and watershed-based activities that were conducted during the reporting period, but not specifically described elsewhere in this report. Due to the small percentage of urbanization and small population within the SMR, the Permittees leverage resources by implementing several regional programs which makes these programs both cost effective and protective of water quality. Many of these programs are conducted through the coordination efforts described in Section C of this report.

H.2. PROGRAM MANAGEMENT ACTIVITIES

The Permittees meet regularly to discuss the implementation of the MS4 compliance programs, to disseminate information regarding the current status of the various watershed-wide activities, and to discuss regional, state, and national issues related to stormwater quality. These discussions occur through various formal and informal means including the following established meetings:

H.2.1. Management Steering Committee (MSC) Meetings

The Permittees established the MSC to address Urban Runoff management policies for the Santa Ana Region (SAR) and SMR and to review and approve revisions to the DAMP and the SAR and SMR Implementation Agreements. In addition, the MSC facilitates coordination with related water quality management programs and monitoring and establishes positions relative to legislative and regulatory initiatives. The MSC consists of city managers or equivalent representatives from each of the Co-Permittees and an executive-level representative from the County. The General Manager-Chief Engineer of the District participates on the MSC as Chair. The District provides staff support to the MSC. The MSC meets quarterly or as determined by the Chair. MSC meeting agendas and minutes are included in Appendix A.

H.2.2. Summary of Technical Advisory Committee (TAC) Meetings

A TAC has been established consisting of representatives formally appointed by the city manager or equivalent of each Permittee. The purpose of the TAC is to coordinate the implementation of the DAMP and overall MS4 Permit compliance program. The TAC members also provide technical assistance and support to facilitate coordination with related water quality management programs and monitoring and to respond to legislative and regulatory initiatives. The District chairs and provides staff support to the TAC. TAC meeting agendas and minutes are included in Appendix A.

H.2.3. Other Program Management Activities

In addition to the above meetings to coordinate the ongoing development of the compliance programs, the District attended a CASQA Program Effectiveness Assessment training on May 27, 2008 on behalf of the Permittees. This training is a result of an effort by CASQA to establish a more uniform way to assess the effectiveness of compliance programs, where direct links to water quality benefits cannot be easily established. The permittees will consider CASQA's recommended approach to effectiveness assessment as part of any program changes that are recommended in the ROWD.

H.3. WATERSHED PLANNING ACTIVITIES

The permittees have been active are active in pursuing watershed-based planning efforts including the following studies.

H.3.1. Integrated Regional Watershed Management Plan (IRWMP)

An IRWMP has been developed for the Upper Santa Margarita Watershed through the coordinated efforts of agencies described in Section C.7 of this report.

The IRWMP established nine (9) planning objectives:

- Develop a more reliable and diverse portfolio of water supplies;
- Promote economic, social and environmental sustainability;
- Improve water quality;
- Restore, enhance and maintain habitats and open spaces;
- Promote sustainable floodplain management;
- Promote appropriate recreational opportunities;
- Promote appropriate land use planning;
- Increase stakeholder involvement and stewardship; and
- Maximize implementation of water resources projects.

These planning objectives were then used to evaluate various projects for inclusion for funding. Projects were then selected that support various listed planning objectives.

Status of IRWMP

The IRWMP was finalized on July 31, 2007 and is currently being implemented. Several meetings were held over the course of this reporting period to work with DWR to integrate the San Diego, Orange County and Upper Santa Margarita Watershed IRWM plans. Coordination efforts are ongoing.

H.3.2. Santa Margarita Watershed Study (SMR Study)

The SMR Study, also known as the *'Santa Margarita Watershed Water Supply Augmentation, Water Quality Protection, and Environmental Enhancement Project'* is a project coordinated through the Santa Margarita River Executive Management Team (SMREMT, Section C.2).

One of the main products that will result from the SMR study will be the creation of a watershed model that can be used to facilitate

- Coordinated Land Use Planning,
- TMDL Development,
- BMP Implementation,
- Review of Basin Plan Standards.
- Development of a more reliable and diverse portfolio of water supplies, and
- Increase stakeholder involvement and stewardship.

The status of the SMR Study is included in Section J.1.1.b) of this report.

H.3.3. Special Area Management Plan (SAMP)

The Corps of Engineers, in conjunction with the Permitees, is developing a Special Area Management Plan (SAMP) for both the San Jacinto and Upper Santa Margarita Watersheds. This comprehensive watershed based planning effort will identify, prioritize and protect the highest priority *Waters of the U.S.,* while considering the broader needs of growth and transportation improvements. It will be used to assist Federal, State and local agencies with their regulatory permit decision making processes to protect, restore and enhance aquatic resources, while accommodating various types of development activities and infrastructure projects. The Upper Santa Margarita and San Jacinto watersheds include such resources as woodlands, wetlands, freshwater marshes, vernal pools, streams, lakes and rivers that will be evaluated and protected under the project. The final product of the SAMP will be the establishment of an abbreviated or expedited regulatory permitting process by the Corps under Section 404 of the Clean Water Act. Additionally, the California Department of Fish and Game is preparing a Master Streambed Alteration Agreement in conjunction with the SAMP to provide an expedited permitting process under the State's Section 1600 of the Fish and Game Code.

The $4.5 million in appropriations received since FY 2001 has allowed the Corps to complete a 'Landscape Level Aquatic Resource Delineation' and 'Functional Assessment' to determine the value of waters and wetlands within these watersheds.

The status of the SAMP effort is included in Section J.1.1.b) of this report.

H.3.4. Western Riverside County Multiple Species Habitat Conservation Plan (MSHCP)

The MSHCP is a joint effort of the Santa Margarita Region Permittees, and others stakeholders, to develop a comprehensive land use plan to ultimately conserve the environmental resources and habitat of approximately half of the Santa Margarita Region. Much of the remaining non-urbanized lands will ultimately be incorporated into the MSHCP reserves which requires conservation of 500,000 acres within the County, a large portion of which are in the SMR (at least 150,000 acres in total, or approximately 1/2 of the SMR).

A summary of the status of this effort is described in Section J.1.1.a)

The annual report for the MSHCP is included in Appendix D.

H.4. DEVELOPMENT PLANNING ACTIVITIES

The Permittees are supporting and developing a number of methodologies to advance their capabilities to avert stormwater pollution through creation and implementation of various development planning practices. The findings of these studies will provide the basis for future amendments to the Watershed and Individual SWMPs.

H.4.1. Hydromodification Study

The permittees have implemented numeric criteria to control runoff from new developments and are participating in a regional hydromodification study to increase understanding of hydromodification problems and provide a basis for developing revised criteria if needed.

These activities are described in the Special Studies section of the Monitoring Annual Report (Appendix G, Section G-7.1).

H.4.2. Low Impact Development (LID) Study

The permittees are participating in a study coordinated by the Southern California Monitoring Coalition (SMC, Section C.5) to develop a LID BMP design manual.

This study is described in the Special Studies section of the Monitoring Annual Report (Appendix G, Section G-7.1).

H.4.3. Low Impact Development Testing and Demonstration Facility

In the interest of fostering an increased knowledge and understanding of the implementation, effectiveness and maintenance of various types of LID BMP's, the District will be reconstructing much of the grounds surrounding the District's headquarters to incorporate a Low Impact Development Testing and Demonstration Facility. This project and its benefits are further described in the Monitoring Annual Report (Appendix G, Section G-7.1).

H.4.4. LID BMP Design Manual

The District is currently coordinating with the SMC LID BMP grant project referenced in Section H.4.2 to develop a LID Supplement for the current BMP Design Manual contained in the WQMP. This project and its benefits are further described in the Monitoring Annual Report (Appendix G, Section G-7.1).

H.5. MUNICIPAL ACTIVITIES

Under the prior SMR Permit, the Permittees developed a Municipal Facilities Strategy to identify BMPs for various activities that are typically conducted at municipal facilities. The municipal facilities of concern identified by the Permittees included maintenance yards, vehicle and equipment maintenance areas, waste transfer stations, corporation and storage yards, and parks and recreational facilities. In addition, the Permittees identified BMPs for street sweeping, catch basin cleaning, landscape and swimming pool maintenance activities, MS4 maintenance activities, and the application of pesticides. The Municipal facilities strategy was incorporated into Chapter 5 of the DAMP as part of the permit update process. The following table updates the Public Agency Facilities Matrix contained within the DAMP.

H.5.1. Updated Public Agencies Facilities Matrix

Table H-3 lists the types and numbers of municipal facilities operated by the Permittees.

Table H-3. Public Agency Facilities Matrix

Permittee	Corporate Yards	Parks & Recreation Facilities	Warehouses	Fire Stations	Police Stations	Hazardous Materials Storage	Animal Shelters	Swimming Pools	Water Treatment Facilities
District [a]	--	--	--	--	--	--	--	--	--
County	3	3	--	11	--	1	--	--	--
Murrieta	1	47 [d]	--	4	1	--	--	1	--
Temecula	1	36	--	4 [b]	2 [c]	--	--	2	--

(a) The District has no municipal facilities, other than MS4, in the Santa Margarita Region.

(b) Although within city limits, two of these stations are operated by the City of Temecula, and two are operated by Riverside County Fire Department.

(c) Although within city limits, these stations are operated by the Riverside County Sheriff's Department.

(d) There are forty-four (44) parks and three (3) recreational facilities within City of Murrieta limits.

H.5.2. Updated Drainage Maps

An updated MS4 map is included in Appendix F of this report and Appendix D of the DAMP. A GIS database is also maintained by the District which identifies all receiving waters, all CWA section 303(d) impaired receiving waters, existing and planned land uses, MS4s, major highways, and jurisdictional boundaries. The map incuded in this year's report has been enhanced to better incorporate presentation of the entire drainage system including natural or unmaintained drainages, thus allowing viewers to trace watercourses from their point of initiation all the way to receiving waters. Several other modifications have also been incorporated to improve utility, as requested by RWQCB staff at the September 8, 2008 meeting. Work to improve the maps is ongoing.

H.5.3. Integrated Pesticide Management

The Permittees encourage the use of integrated pesticide management measures and are actively participating in a variety of efforts to more effectively control pesticide useage to protect receiving waters. These efforts are summarized below and many are further described in an attachment to the Monitoring Annual Report. (Included in Appendix G of this report).

- Participation in CASQA's Pesticide SubCommittee
- Working with the guidance published by Eco-Wise to develop standard language to include IPM in municipal pest management contracts.
- Development of Educational Materials that include messages about the proper use of pesticides and encouraging IPM.
- Coordinating with Department of Pesticide Regulation (DPR) to include the Santa Margarita Watershed in an upcoming Pyrethroid Pesticide evaluation.
- Provide input and comments to DPR regarding proposed Pesticide Working Group Studies.
- Peer review of the *'2008 Summary of Pesticide Use Report'* prepared by the UP3 project.
- Presented on urban pesticide issues at the September 2008 Western Regional Urban Pest Ant Workgrouip at UC Riverside.
- Coordinating meetings with the U.C. Extension and the Riverside County Agricultural Commission to help coordinate activities related to pesticide management.

H.6. INDUSTRIAL / COMMERCIAL ACTIVITIES

The industrial and commercial program includes the implementation of the Compliance Assistance Program (CAP), which makes use of existing County Department of Environmental Health site inspections. As the responsible Certified Unified Program Agency (CUPA) in Riverside County, the County Department of Environmental Health is responsible for regularly inspecting all sites within the County that handle hazardous waste. The County Department of Environmental Health also inspects all food service restaurants within the SMR at least annually.

Revisions to the inspection program requirements contained within the Third-term SMR Permit expanded the scope of the overall commercial/industrial inspection program beyond the ability of the CAP to address. Each municipal Permittee now implements a supplemental inspection program for facilities not covered by the CAP. In addition, the Third-term SMR Permit required inventories/databases of facilities, prioritization of industrial and commercial sources relative to the potential to impact water quality, and specified inspection frequencies based upon facility priority.

The revised industrial and commercial sources program continues to have both regional and local jurisdiction components. Although the overall industrial/commercial inspection program has grown beyond the CAP, the CAP still addresses most of the facilities identified in the Third-term SMR Permit. With its low overhead cost, it remains a cost effective approach to mitigating the impacts of industrial and commercial facilities on the MS4 and Receiving Waters.

H.6.1. CAP Summary Report

Under the CAP, County Department of Environmental Health inspectors added a stormwater compliance survey to their regular inspection process. Completed surveys are forwarded to the appropriate Permittees for their records, review and further action, if necessary. The CAP industrial and commercial program has been an effective element of the DAMP. Individual inspection results are contained in each of the Permittee's Annual Reports. Appendix C contains a report of the facilities inspected under the CAP program.

H.7. ILLICIT CONNECTION / ILLICIT DISCHARGE (IC/ID) ACTIVITIES

Each permittee implements their own IC/ID monitoring program. In addition to and complementing these programs, the following watershed based activities are conducted.

H.7.1. Hazmat Response Teams

The HazMat Emergency Response Team is a partnership program with combined efforts from the Riverside County Fire Department and the Hazardous Material Branch of Environmental Health. The HazMat Response Team is staffed daily by firefighters/HazMat specialists at two separate locations. Hazmat 34 is stationed at the Winchester Fire Station and Hazmat 81 is stationed at the Palm Desert Fire Station. The Hazmat Team oversees the NPDES program for the County Fire Department's fire stations and facilities and provides training to the employees of the Fire Department. (See Appendix C, for detailed information regarding HazMat Team Activities.).

H.7.2. Complaint Call Summary Logs

In addition to each permittee's individual programs to handle complaint calls and IC/ID reports, the District receives reports on and ensures proper response to Illicit Connections, Illicit Discharges and Spills throughout the county.

Following is a summary of the total number and nature of complaints fielded by the District within the reporting period.

- Illicit Discharges (ID): 8
- Illicit Connections (IC): 0
- Spills (S): 62
- **Total: 70**

A key component of this public reporting program is the "800" number maintained by the District on behalf of the permittees. As described in Section G.3.2, this "800" telephone number has been established to report activities suspected of causing pollution. The total number of calls received on the 800 Line during the reporting period was 1,317. Please note that hang-ups or disconnects are not included in the total.

Additional Details are provided in the effectiveness assessments summarized in Section J.1.3.d).

H.7.3. Watershed Clean-Up Event Summary

There was no Watershed Clean Up during the 2007/08 Fiscal Year,. Participating members of the watershed clean-up committee determined that resouces were better spent working on adjacent portions of the Santa Ana watershed this year. To encourage the public to keep their communities clean, the

District always participates in watershed clean-up events by providing manpower, clean up equipment and storm water related promotional items and brochures.

H.7.4. Household Hazardous Waste/Antifreeze, Battery, Oil and Latex Paint (HHW/ABOP)

One of the principal components of the Permittees' source control efforts are the HHW and ABOP collection programs conducted by the County's Environmental Health Department. The goal of these programs is to provide convenient alternatives to illegally disposing of wastes into the MS4. Specific quantitiesof materials collected during the reporting period are identified in Section J.1.3.f).

H.8. TRAINING & EDUCATIONAL ACTIVITIES

H.8.1. Public Education

On behalf of the Permittees, the District conducts a watershed wide Public Education Program. This program is fully described in Section G of this report.

H.8.2. NPDES Training

The Permittees jointly fund a training and education program targeted at Municipal staff. This training program is designed to train Municipal employees on the proper use and implementation of BMP's appropriate for their field of work. There are four distinct training courses currently offered. These courses and their targeted audiences are described below:

- Construction Training
  Targeting Staff that conducts:
  - Construction Site Inspections / Enforcement
  - Public Works Construction Activities
  - Grading/Building Permit Review Staff
  - Any staff reviewing or preparing construction project SWPPP's

- Industrial – Commercial Training
  Targeting health, building and code enforcement staff that conducts:
  - Industrial/Commercial Site Inspections / Enforcement for Water Quality Ordinances.
- Municipal Training
  Targeting Municipal Maintenance Workers in:
  - Building Services
  - Parks Department
  - Fleet Services
  - Warehouse/Receiving Personnel
  - Building and Grounds Maintenance

- WQMP Training
  - Planning Staff
  - Engineering Staff
  - Plan Review and Plan Check Staff
  - Grading/Building Permit Review Staff
  - Post Construction BMP Inspectors

Tables of attendance to these trainings are provided in Section J.1.3.e) of this report. AEI-CASC and Brown and Caldwell are contracted by the District to present the training.

H.8.2.a) Construction

Eight (8) Construction training seminars were held on the following dates: September 24, 2007, September 25, 2007, Novermber 19, 2007, November 20, 2007, January 17, 2008, April 16, 2008, April 17, 2008, and April 22, 2008. Copies of the training attendance sheet are included in Appendix E.

H.8.2.b) Industrial/Commercial

Two (2) Industrial/Commercial training seminars were held on the following dates: November 27, 2007, and April 15, 2008. Copies of the training attendance sheet are included in Appendix E.

H.8.2.c) New Development

Five (5) New Development training seminars were held on the following dates: November 28, 2007, November 29, 2007, December 5, 2007, April 16, 2008, and April 22, 2008. Copies of the training attendance sheet are included in Appendix E.

H.8.2.d) Municipal

Four (4) Municipal training seminars were held on the following dates: November 27, 2007, Novermber 28, 2007, January 17, 2008, and April 15, 2008. Copies of the training attendance sheet are included in Appendix E.

H.9. PUBLIC INVOLVEMENT

All major permit compliance programs were developed during the FY 2004 -2005 period, therefore, there were no significant revisions to the DAMP or SMR programs warranting public involvement. However, the Permittees hold the following open meetings to facilitate public involvement.

H.9.1. Open Meetings

TAC meetings are scheduled monthly and are open to the public. The TAC meetings are described in Section H.2.2.

The Bureau of Reclamation, on behalf of the SMREMT has held several publicly noticed meetings to discuss SMR watershed issues and priorities for watershed efforts.

Further, stakeholders provided for public notices, open meetings, and a public comment period during the development of the IRWMP.

H.10. MONITORING ACTIVITIES

On behalf of the Permittees, the District implements a watershed based monitoring program which is fully reported upon in Appendix G of this report.

This program includes direct sampling and analysis for wet and dry weather flows. The program also supports numerous regional special studies that the Permittees participate in to address various water quality problems. These special studies include:

- Hydromodification Guidance
- Toxicity Reduction Evaluation (TRE) for pyrethroid pesticides in the SMR
- Lagoon Investigation Order No. R9-2006-0076
- Development of Local Pesticide Regulatory Activities
- Laboratory Inter-calibration
- Standardization of Toxicity Testing Methods
- Index of Biological Integrity for Low Gradient Streams
- Regional Watershed Monitoring Program

H.11. BUDGET

Expenditures identified below reflect costs incurred by the District for implementing its own NPDES program and to implement the regional watershed programs. The District does not track its direct implementation costs separately. Nor does it track costs separately for many permit provisions. Costs are not directly tracked for the asterisked Program Elements identified below.

Future compliance costs could increase significantly to address TMDL monitoring requirements in future fiscal years.

Program Element	Fiscal Year 2007-2008		Fiscal Year 2008-2009	
	Capital Expenditures	O&M/ Admin Expenditure	Capital Expenditures	O&M/ Admin Expenditure
Program Management	N/A	$362,539	N/A	$534,020
Annual Fee for MS4 NPDES Permit	N/A	0	N/A	$4,000
Implementation Agreement Shared Cost	N/A	N/A	N/A	N/A
Construction Inspections*	N/A	~$10,000	N/A	~$10,000
Development Planning*	N/A	N/A	N/A	N/A
Industrial and Commercial Inspections	N/A	N/A	N/A	N/A
Illicit Connections & Illegal Discharges Program	N/A	N/A	N/A	N/A
Municipal Facilities and Activities	N/A	N/A	N/A	N/A
Public Education & Outreach	N/A	$51,204	N/A	$66,030
Monitoring Program	N/A	$146,722	N/A	$152,600
Other	N/A	$0	N/A	$0
Contributions to Other Programs	N/A	$91,228	N/A	$96,330
Total	**N/A**	**$661,693**	**N/A**	**$862,890**

* Costs are not directly tracked for these Program Elements, however a brief description follows that identifies manpower requirements for those specific Program Elements

H. A DESCRIPTION OF ALL AREA-WIDE AND WATERSHED-BASED ACTIVITIES (cont'd).

A description of the sources of funds that were utilized during the previous fiscal year and the sources of funds proposed to meet the necessary expenditures for the subsequent year, including legal restrictions on the use of such funds are as follows:

Source of Funds	Capital Expenditures	Percent of Total Program Funding	Restrictions on Use (if applicable)
Santa Margarita Watershed Benefit Assessment Fund	$410,267	51.5%	District NPDES compliance costs, excess funds used to fund regional NPDES activities.
Santa Margarita Watershed Permittee Implementation Agreement	$365,787.59	46%	Regional NPDES Compliance Programs.
Zone 7 Ad-Valorem Tax Revenue	~$10,000	1.25%	Costs associated with District's compliance with Municipal Construction component of Board Order R9-2004-001.
Developer Development Review/Plan Check Fees	Unknown	Unknown	Costs associated with review of proposed developments in the unincorporated County for compliance with the Development Planning provisions of Board Order R9-2004-001.
Spending Against Reserves	$0	0%	District NPDES Compliance Costs
Miscellaneous Revenue	~$10,000	1.25%	Interest, Other Misc.
TOTAL	**$796,094.59**	**100%**	

Additional Comments/Information:

The Permittees are working with other stakeholder groups to leverage funds for regional planning objectives including:

Prop 13/40/50 Grant Funds – Working cooperatively with San Diego County, Bureau of Reclamation and other stakeholders to implement a Watershed Management Plan for the Santa Margarita River Watershed. (See Section C.7)

Stormwater Monitoring Coalition – The SMR Permittees are partnering with other participants in the SMC to fund monitoring projects to address high priority water quality issues as described in Section C.5.

Santa Margarita Executive Management Team – Partnering with the Bureau of Reclamation and other Santa Margarita watershed stakeholders to develop water quality models of the Santa Margarita Watershed to help assess pollutant problems and sources within the Santa Margarita Watershed. (See Section C.2)

Mission Resource Conservation District – Partnering with stakeholders in the SMR through the MRCD to implement watershed education, monitoring, and clean up programs.

Santa Ana Watershed Project Authority – Jointly fund a low impact development (LID) BMP testing and demonstration facility for southern California. The facility will be a retrofit of the District's compound in Riverside. Data collected from the facility will be used to update the BMP Design Manual, develop numeric criteria for hydromodification, and provide data for statewide efforts to better define the effectiveness of LID BMPs. The facility will also serve as a regional demonstration facility for southern California MS4 permittees. Additional information regarding this project is available in the Special Project's section of the Monitoring and Reporting Annual Report (Section G-7.1).

Southern California Coastal Watershed Research Project – Jointly fund a regional study the impacts of hydromodification on southern California streams and assess possible mitigation measures. Additional information regarding this project is available in the Special Project's section of the Monitoring and Reporting Annual Report (Section G-7.1).

I. RECOMMENDED ACTIVITIES TO BE CONDUCTED JOINTLY BY THE PERMITTEES TO ADDRESS THE IDENTIFIED WATER QUALITY PROBLEMS

The Permittees have evaluated the effectiveness of the programs and are proposing modifications to Permit Compliance Programs and/or additional studies identified in Appendix G-7.1 and G-8.3 to address the following constituents which have been identified for a focused effort by the Permittees. The constituents below are discussed further in Appendix G (Section G-6.4 and the TRE Status Report) The Permittees regularly make adjustments to their compliance program on an on-going basis as water quality problems are identified or as implementation issues warrant. As such many of the recommended activities have already been initiated during the course of the reporting year.

I.1. POLLUTANT TARGETED ACTIVITIES

This section describes activities that the Permittees plan to implement that are targeted to a particular Water Quality Problem.

I.1.1. Pesticides

I.1.1.a) Complete Toxicity Reduction Evaluation (TRE)

As a result of a Phase I Toxicity Identification Evaluation (TIE), the Permittees are currently working on a TRE to confirm the toxic element observed in the samples collected in the spring and fall of 2007, identify likely sources of the toxic element and propose mitigation measures for those sources. The completed TIEs and the current TRE are described in an attachment to Appendix G.

The final findings of the TRE are expected to be reported in the ROWD. The findings will include any additional BMPs that the Permittees need to implement to control urban sources of pyrethroids.

I.1.1.b) Participate in CASQA Pesticides Subcommittee

The Permittees continued participation in the Pesticides Subcommittee of CASQA provides a forum for the collection and dissemination of information regarding pesticide impacts, a uniform voice for commenting on state and federal regulations and legislation, a forum to identify and resolve monitoring issues, and a forum to comprehensively identify and/or develop methods of reducing the impact pesticides have on our environment.

I.1.1.c) Add Pesticides Component to Training

The District, on behalf of the co-Permittees is currently working with AEI-CASC to develop additional components for the Municipal, Commercial-Industrial and WQMP trainings that address the proper use and application timing for pesticides and encourages the use of IPM.

I.1.1.d) Continue Existing Outreach and Education

The permittees have existing public education and outreach materials that address Pesticides. These are described in Section G.2.1.

I.1.1.e) Develop Additional Educational Materials

The District is updating and modifying its Public Education program on an on-going basis in response to the continuing evolution of the program. As part of this process, the District is currently developing additional materials to further inform the public on the use of integrated pesticide management (IPM) instead of traditional chemical solutions. Specific outreach tools such as the development of a new landscape maintenance brochure (which discusses IPM) are discussed in Section G.2.1.

I.1.1.f) Develop Standard Language for Municipal Pest Management Contracts

The District distributed information developed by Eco-Wise to the Permittees. The information discussed how to amend standard contract language to require the use of IPM where appropriate at municipal facilities (as most municipalities contract out pest control).

I.1.2. Nutrients

I.1.2.a) Continue Education Programs

The permittees have existing programs that address Nutrients. These are described in Section G.2.2 and througout the DAMP.

I.1.2.b) Additional Outreach and Education

The Permittees have initiated or will initiate the development of several new outreach tools to improve management of urban sources of nutrients. These improvements include the development of brochures addressing landscape management, pet waste, equestrian management and septic system management as identified in Section G.2.2.

I.1.3. Pathogens

I.1.3.a) Continue Education Programs

The permittees have existing programs that address Pathogens. These are described in Section G.2.2 and throughout the DAMP.

I.1.3.b) Continue Development of Brochures Addressing Animal Waste

As identified in Section G.2.3, the Permittees are adding to and updating various brochures to include more information on managing septic systems, pet waste and an additional focus on proper equestrian trail use and horse ownership.

I.1.4. Sedimentation

Sedimentation (erosion) is a naturally occuring process that can be exacerbated by construction activities, and the increases in runoff peak, volume and frequency that are commonly associated with impervious cover in urban development. The Permittees have implemented controls into the review and approval process for construction projects and priority projects to address these issues and are involved in numerous additional studies to further ensure that regional waters are not negatively impacted by changes in sediment transport.

I.1.4.a) Continue Education Programs

The permittees have existing programs that address Sedimentation. These are described in Section G.2.4, and throughout the DAMP.

I.1.4.b) Continue the Special Studies described in Section H.4

Section H.4 of this report and Section G-7.1 of the Monitoring Annual Report, which is included as Appendix G of this report, describe numerous additional studies that the Permittees are implementing that will address the issue of sedimentation.

I.1.4.c) Continue to implement the current criteria

Section G-7.1 of the Monitoring Annual Report also describes the current criteria the Permittees implement to control changes in sediment transport.

I.1.5. Metals

The primary urban source of copper and lead in the regions waters are from brake pad wear and lost automotive wheel weights, respectively. The Permittees are currently, and propose to continue coordinating through CASQA to reduce metallic pollutant loads in regional waters by promoting statewide and national change to these national problems that are caused by societal use of currently accepted technologies. To date, several automotive manufacturers have committed to evaluating reformulated break pads and converting from lead to steel tire weights. Additional work needs to be done, however, as there are still several third-party manufacturers who are not participating in the process and who are distributing problematic components to automotive shops and automotive enthusiasts throughout the country.

I.1.5.a) Brake Pad Partnership

The Permittees recommend continued participation through CASQA in Sustainable Conservation's efforts to bring together government regulators, brake pad manufacturers, storm water management agencies and environmentalists to research the impacts of brake wear debris on water quality. Through this effort, the brake pad manufacturers have agreed to bring new products to market within five years if brake pad wear is determined to have significant potential to impair water quality.

I.2. OTHER RECOMMENDED ACTIVITIES

This section describes activities the Permittees' plan to implement activities that address water quality issues as a whole. They do not target any particular pollutant, but will help to either improve the Permittees program to reduce pollutant transport or their ability to monitor and track trends in pollutant loads in regional waters.

I.2.1. Enhanced MS4 Mapping

The District, on behalf of the Permittees, has initiated a revision to the mapping of the MS4 system to ensure that natural watercourses, along with District maintained, and City maintained MS4 facilities are included. The purpose of the revisions is to ensure that one can follow the flow of water from a given tributary to the Santa Margarita River. The Permittees are also working on incorporating drainage boundary information, as appropriate, into the MS4 maps.

I.2.2. Changes to the Monitoring Program

Through the implementation of the monitoring program, and as a result of the Regional Board's Audit of the Monitoring program, the Permittees have identified several improvements that need to be made. These improvements will allow the Permittees to better monitor for and identify pollutants in receiving waters and ensure that the compliance programs are appropriately addressing pollutants of concern.

The Monitoring Annual Report (Section G-8.3 of Appendix G) describes the additional recommended revisions to the Monitoring Program. These recommended revisions are outlined below.

- Re-Evaluate IC/ID Program
- Revise Dry Weather Monitoring Program
- Clarify Mobilization Criteria
- Locate Representative Reference Location
- Improve Reporting
- Clarify Analyte List
- Clarify Triad Method and Follow-up Actions
- Install Permanent Monitoring Equipment at Triad Stations
- Recognize limitations to bacteria sample collection
- Adjust number of wet weather sampling events required.

I.2.3. Web Site Upgrade

Through the Permittee's ongoing efforts to internally assess the efficiency and efficacy of their MS4 compliance programs, it was determined that an overhaul of the District's web site was needed. The District's site contains the public education web site and a technical resource site with the various compliance documents for the program. It was found that information available through the site was often difficult to find and was not user friendly and sometimes was out of date. The Permittees are now reviewing this site to identify and implement needed changes. Changes identified to date include:

- A redesigned main portal that guides the visitor to the appropriate pages for their location of interest within the county.
- A completely redesigned technical information site that will be easier to use and find information
- A review and update of all materials available on the website.
- Dedication of a single staff person to ensure that the correct and up-to-date information is available on the website on an ongoing basis.
- Online posting of annual reports for each of the Permittees.

I.2.4. Changes to the Public Education Program

To ensure that the public education program is continuing to be effective several new and/or revised materials are proposed to be completed and are described in Section **Error! Reference source not found.** of this report.

I.2.5. Changes to the NPDES Training program

The permittees are currently looking into several changes to improve the effectiveness of the NPDES Training program described in Section H.8.2 of this report. Program changes being considered are:

- Abbreviated review courses for municipal staff that have previously attended training on that topic. These abbreviated courses would focus on reviewing the appropriate BMP's for that process, and any new developments or changes in the standards of practice for addressing water quality issues in that field.
- Revisions and formalization to the Training Pre/Post quizzes given to the attendees. This effort should lead to a measure of effectiveness for the training program that would correspond to a Level 2 Outcome according to the CASQA Municipal Stormwater Program Effectiveness Assessment Guide.

J. AN ASSESSMENT OF OVERALL PROGRAM EFFECTIVENESS BASED ON MEASURABLE GOALS ESTABLISHED IN THE DAMP.

The Third-term SMR Permit requires the Permittees to develop both a short-term and a long term strategy for addressing the effectiveness of the Watershed SWMP. This strategy is described in Appendix S of the DAMP. The Watershed SWMP Annual Report FY 2005-2006 was the first year that the newly required Third-term MS4 Permit programs was fully implemented and the effectiveness evaluations required. This Annual Report is a continuation of the program implementation and effectiveness evaluation process.

The strategy for assessment requires the establishment of a set of initial baseline conditions. These baseline conditions can be used to establish measurable goals based on measurable metrics. Thereafter effectiveness can be evaluated by comparisons of successive years of indicator information against the baseline data and measurable goals. Where the period of evaluation is characterized by the implementation of new program elements, determinations of program effectiveness will initially be limited to confirmation of program implementation and collection of measurable metrics until baseline conditions can be properly established. Further, it must be recognized that direct measures of long-term program effectiveness may not be available within the timeframe of the Third Term Permits. This lack of direct measure confirmation arises because:

- Baseline water quality conditions are not readily established;
- Stormwater and dry weather discharge data is inherently variable;
- Water quality changes in response to program implementation are likely to be very slow; and
- It is difficult to establish a link between receiving water condition and program activities at the watershed scale when programs are being implemented incrementally with the development/redevelopment cycle.

While program effectiveness assessment is a key step in the iterative process of program implementation, it should be realized that effectiveness assessment itself is a part of the management process that is also evolving. Assessing program effectiveness is recognized as a challenge for program managers across California, and the Riverside County Stormwater Program is supporting the efforts of CASQA to develop guidance in this area at a statewide level.

To assist with developing and implementing an effective program that will contribute to reduced pollution of our waterways, the District NPDES staff attended CASQA's Program Effectiveness Training. This training will help the District develop appropriate measureable goals in the assessment of their individual compliance programs and of the watershed based activities.

J.1. SHORT TERM MEASURES OF EFFECTIVENESS

The short-term strategy for assessing the effectiveness of the DAMP (Watershed SWMP) requires the development of measurable goals and measures of effectiveness for programs proposed to mitigate the impacts of Focus Area Constituents of Concern. The measures of effectiveness track the year-to-year implementation of the regional programs. The measures of effectiveness also are used as part of the Long-Term Strategy to measure the effectiveness of the Watershed SWMP as described in Provision K.2.m of the Watershed SWMP. Measurable Goals and Measures of Effectiveness for the existing and proposed regional programs are presented below.

J.1.1. Encourage Watershed Based Planning Efforts

SUMMARY EFFECTIVENESS ANALYSIS:

One of the most significant events of the reporting period was the development and implementation of the IRWMP. The IRWMP was adopted on July 31, 2007. Currently, IRWMPs are the gold standard of watershed based planning. The IRWMP was initiated by Rancho California Water District, the County of Riverside and the District. The IRWM stakeholders included Elsinore-Anza-Murrieta Resource Conservation District, the Regional Board, the U.S. Army Corps of Engineers, California Department of Fish and Game, the Cities of Temecula and Murrieta, the Bureau, and several other community organizations. The plan describes the stakeholders goals for the watershed and identifies projects necessary to achieve those goals. Focus was placed on projects that integrated multiple watershed benefits. Based on the IRWMP, several stakeholders submitted an application for Prop 50 IRWM Implementation Grant projects, including the District, who requested the funds to complete the Murrieta Creek Flood Control, Environmental Restoration and Recreation Project. A copy of the IRWM was included in the 2006-2007 Watershed Annual Report.

The Permittees continue to lead efforts to mitigate the impact of new development on water quality in the SMR. The MSCHP effort continues to purchase critical habitat and streambank properties through grants and other funding mechanisms and ensure that new developments appropriately protect natural resources. Approximately 3,902 acres were conserved this last calendar year. The Permittees are also pursuing a Special Area Management Plan, in conjunction with the Regional Board and the USACE for the purposes of identifying and protecting, at a watershed level, high priority Waters of the U.S. In addition, the Permittees are working with the other stakeholders in the watershed to aggressively address the 303(d) listed impairments in the Santa Margarita watershed, through efforts coordinated by the Bureau of Reclamation. The Bureau, with the support of the Permittees, is developing a watershed model and approached the Regional Board regarding developing a third-party TMDL for the nutrient impairments in the Santa Margarita watershed. Finally, the District

continues to develop an enhanced BMP guidance manual, focused on low impact development, landscape based BMPs, capable of addressing the water quality impairments affecting the Santa Margarita watershed. A first draft of this manual is expected in FY2009-10. This project has been delayed to allow the coordinated SMC LID Manual (of which the District is a funding member) to be completed for the permittees to build upon. District staff are directly involved in the development of this statewide guidance and as such is listed in Section H.4.2 and further described in the Special Studies Section of the Monitoring Annual Report (Appendix G, Section G-7.1). In addition, the Permittees are coordinating with SCCWRP to develop a regional southern California approach to addressing hydromodification. The Permittees believe that the combined efforts not only meet but exceed the minimum requirements established by the Watershed SWMP and the measurable goals established for addressing the highest priority Water Quality Problems in the Santa Margarita watershed.

Specific measurable metrics are as follows:

J.1.1.a) Annual Summary Reports of benefits of MSHCP Implementation

There are approximately 72,318 acres of existing public or quasi-public lands that are to be preserved in Riverside County within the Santa Margarita River watershed. Approximately 15,000 additional acres have been purchased since the adoption of the MSHCP. The Criteria Reserve Goals and Objectives will add approximately 70,500 additional acres of permanent habitat reserve lands that the RCA will purchase with mitigation fees generated by the MSHCP.

Yearly reports from Western Riverside County Resource Conservation Authority

Acreages Acquired per Year	Approximate Acres
2003	3,193.4
2004	9.7
2005	355.4
2006	6,701.2
2007	871.9
2008	3,902
Total	**15,033.6**

Note: Prior to the FY 2005-2006 Watershed Annual Report, the above MSCHP acreages were reported on a fiscal year basis. Since acreage information is collected and reported on a calendar basis, areages for subsequent annual reports will continue to be reported on a calendar year basis to ensure accuracy and consistency.

The number of acres acquired per year is dependant upon many factors that are largely dependant upon the economy during that year. As the table above demonstrates, this value can vary significantly from year to year, and merely provides evidence of the Permittees' continued efforts to encourage Watershed based planning and conservation within the watershed.

The MSHCP is described in Section H.3.4 of this report.

J.1.1.b) Annual Summary Report of SAMP Development

During the past two fiscal years the Corps did not receive any funding for the SAMP and all efforts were put on hold. The Corps has received funding this year and the project is once again moving forward. Additionally, the District has teamed up with the Riverside County Transportation and Land Management Agency, The Riverside County Resource Conservation Authority and The Riverside County Transportation Commission to assist the Corps with the final stages of the SAMP which include the completion of the draft EIR/EIS, the development of the expedited permits and the development of the conservation/mitigation areas. The goal is to have the SAMP completed by late 2009.

The SAMP is described in Section H.3.3 of this report.

J.1.1.c) Summary Report of Watershed Stakeholder meetings and agendas.

The Permittees hold or attend several meetings with the various watershed stakeholders. These meetings are described in Section C of this report and agendas for these meetings (as available) are provided in Appendix A.

J.1.1.d) Summary Report on the Status of IRWMP

IRWMP was finalized on July 31, 2007 and is currently being implemented. A grant application was submitted in early August. However, the application was denied by DWR. The IRWM oversight committee is now meeting with its counterparts in San Diego County and Orange County to discuss how to allocate remaining Proposition 84 IRWM funds. The IRWM stakeholder group will reconvene in late 2008 to initiate the process of identifying and accepting new projects for consideration as part of upcoming Proposition 84 grant cycles.

The IRWMP is described in Section H.3.1 of this Report.

J.1.1.e) Summary Report on the Status of the SMR Study

A draft Plan of Study for Phase 4 of the SMR Study has been prepared. The purpose of Phase 4 will be to develop a monitoring program that addresses sustainable water supplies for all aspects of the watershed. This program will coordinate with existing studies, synthesize past and current watershed research, assess data gaps, and develop a watershed water quality monitoring study.

The completed portions of the SMR study include:

Phase 1: Developed a Framework Monitoring Plan (FMP)

Phase 2: Resolved data issues identified in the FMP and refined watershed goals

Phase 3a: Developed a preliminary model addressing water quality issues and evaluated effectiveness of the tool.

Phase 3b: Included tasks to address future TMDLs in the Santa Margarita River Watershed and determine how the model could be refined to support stakeholder driven TMDLs. Various improvements were made to the model as a result of Phase 3a..

The Bureau has continued to schedule ongoing meetings with stakeholders and RWQCB staff to promote the implementation of the SMR Study.

The SMR Study is further described in Section H.3.2 of this report.

J.1.1.f) Summary Report of status of WQMP BMP Guidance

District and County staff are working on the development of expanded low impact development BMP manual for inclusion in the current WQMP BMP Design Manual. The LID manual is intended to support implementation of both low impact development and hydromodification mitigation concepts. In addition, an FAQ, Watershed Impairment Map, and updated template were created for the development and engineering communities. The District has also initiated a retrofit of our Riverside compound to conduct LID BMP testing and demonstration. Construction is scheduled to begin in Summer 2009. See Appendix G - Section G-7.1, Special Studies for more information.

Additionally, the Permittees are continuing to work with the SMC and others to develop enhanced and regionally consistent hydromodification guidance. See Appendix G - Section G-7.1, Special Studies for more information.

J.1.2. Continue to support development of regional science and other studies to further understand and mitigate water quality impairments

SUMMARY OF EFFECTIVENESS ANALYSIS:

The Permittees continue to participate in the development of science necessary to better manage the NPDES MS4 Stormwater Programs. The Permittees are members of the Southern California Monitoring Coalition and participate with SCCWRP on independent regional projects when appropriate (such as a regional study of natural loadings from undisturbed watersheds). The Permittees are also working with local watershed stakeholders to develop models of the watershed to assess sources of pollution and test the effectiveness of proposed BMPs.

Specific studies such as the lab intercalibration studies and Bioassessment Protocol studies currently being conducted by the SMC have directly addressed our goal of standardizing monitoring and sampling analysis protocols. The water quality model being developed in conjunction with the Bureau is expected to provide a useful tool for assessing BMP effectiveness.

J.1.2.a) Annual Status Reports of ongoing studies

The Permittees are active in the studies mentioned above and many additional studies. These studies support the development of regional science that will help the Permittees to be better equipped to mitigate any water quality impairments. Appendix G - Section G-7.1, Special Studies, contains a summary of the current status of all special monitoring studies the Permittees are participating in.

J.1.3. Public Education and Outreach

EFFECTIVENESS ASSESSMENT. The metrics being collected for the Public education program are presented below. Due to the need to establish a baseline condition, a detailed effectiveness analysis of this component is not provided. It is expected that within the ROWD, the Permittees will be able to recommend measurable goals. However, the Permittees would note that overall website hits have been steadily increasing over the fiscal year and that based on public education surveys it initially appears that knowledge regarding our program is increasing. Any identifiable trends in public awareness will be included in the ROWD. In addition, the collection of survey data preliminarily indicates significant knowledge of stormwater related issues among the general public. More detailed analysis will be

provided in future annual reports as trends can be extrapolated. Please note that the Permittees implement a consistent public education program across the County, with specific modifications to focus on watershed issues as necessary. To this end, many of the metrics provided below are Countywide as it is consistent with the implementation of the Public Education Program. It is also infeasible to collect many of these metrics at a finer resolution. SMR specific metrics are provided where appropriate.

J.1.3.a) Track materials distributed

This section includes an accounting of the attendance to outreach events and the number of materials distributed. Many of these metrics are not conducive to trend analysis as variables such as events change from year to year. The Public Education program is continually looking for better and more effective opportinities to present the message of 'Only Rain in the Storm Drain'.

J. ASSESSMENT OF OVERALL PROGRAM EFFECTIVENESS BASED ON MEASURABLE GOALS ESTABLISHED IN THE DAMP (cont'd).

Countywide Education Materials Outreach	Attendance and/or Outreach Materials Distributed				
	FY04-05	FY05-06	FY06-07	FY07-08	FY08-09
Calendars	25,000	20,000	N/A	20,000	
After the Storm Brochure	20,000	60,000	40,000	40,000	
Outdoor Activities Brochure	20,000	25,000	15,000	5,606 Brochure updated	
Construction BMP Brochure	11,450	1,607	6,000	590 Revision pending permit approval	
Car Care Brochure	16,400	1,062	16,000	0 Brochure to be updated	
HHW Schedules	20,000	20,000	20,000	20,000	
What's the Scoop Brochure	17,750	25,000	20,000	20,000	
Pool, Spa and Fountain Brochure	16,900	25,000	14,000	6,620 Brochure updated	
Food Facilities Brochure	7,850	1,379	10,000	185	
Construction Poster	3,700	272	1,200	520 To be updated	
Car Care Poster	2,450	39	1,200	40	
Food Services Poster	4,500	1,650	700	825	
Fueling Station Poster	200	12	100	40	

J. ASSESSMENT OF OVERALL PROGRAM EFFECTIVENESS BASED ON MEASURABLE GOALS ESTABLISHED IN THE DAMP (cont'd).

Countywide Education Materials Outreach	Attendance and/or Outreach Materials Distributed				
	FY04-05	FY05-06	FY06-07	FY07-08	FY08-09
Service Bay Station Poster	200	12	100	40	
Santa Margarita Children's Workbook	3,000	5,500	4,000	2,500	
Fancy Fin Coloring Book	20,000	20,000	40,000	30,000	
Urban Runoff Outreach Survey	200	500	1,500	1,500	
Utility Inserts	84,000	84,000	84,000	84,000	

J. ASSESSMENT OF OVERALL PROGRAM EFFECTIVENESS BASED ON MEASURABLE GOALS ESTABLISHED IN THE DAMP (cont'd).

J.1.3.b) Track public education events attended

This section includes an accounting of the attendance to public education events and/or the number of materials distributed at the event. Many of these metrics are not conducive to trend analysis as variables such as events change from year to year. The Public Education program is continually looking for better and more effective opportinities to present the message of 'Only Rain in the Storm Drain'.

Classroom Presentations and Residential Outreach	Attendance and/or Outreach Materials Distributed				
	FY04-05	FY05-06	FY06-07	FY07-08	FY08-09
School Outreach Presentations by the Mission Resource Conservation District (SMR)	2,310 students 104 classes	136 classes	3,884 students	6,870 students	
Animal Control Outreach	2,490	2,620	2,000	66 stores 57 posters	
Boy & Girls Club Event Temecula, New	N/A	N/A	N/A	9/13/07 1,455 pcs.	
I-215 Conference Temecula	N/A	N/A	9/06 997+	9/19/07 1,200 pcs.	
New Employee Orientation	Aug. 19, 2004 100	2,900	3,000	3,320	
Valley Greeters	Murrieta -990 Temecula - 1,113	674 Temecula 930 Murrieta	216	Shelved pending economy	
Recycling Alley in Murrieta	July 4, 2004 750	N/A	N/A	N/A	
Santa Margarita Clean Up	Sept 25, 2004 400	Nov 12, 2005 350	Oct 14, 2006 200	No Clean Up	
Temecula Car Show	Oct 8. 2004 35,000	Event Cancelled	N/A	N/A	
Murrieta Hot Springs Mobile Home Park, New	N/A	N/A	N/A	4/28/08 1,200 pcs.	
Wildomar Community Celebration	Nov 16, 2004 350	N/A	Nov 9 2006 200	Est. 100	
Temecula Flower Show	Apr 30, 2005 750	N/A	4/28/07 100	4/17/08 650	

J. ASSESSMENT OF OVERALL PROGRAM EFFECTIVENESS BASED ON MEASURABLE GOALS ESTABLISHED IN THE DAMP (cont'd).

Classroom Presentations and Residential Outreach	Attendance and/or Outreach Materials Distributed				
	FY04-05	FY05-06	FY06-07	FY07-08	FY08-09
Temecula Valley Museum, New outreach partnership	N/A	N/A	N/A	6/13/08 6,440 pcs.	
Temecula Water Festival Now at DVL location	May 7, 2005 5,538	N/A	May 5, 2007 500+	450+	
Temecula Public Safety Expo	N/A	Nov 3, 2005 200+	N/A	N/A	
Wildomar Town Hall Meeting	N/A	Dec 3, 2005 300	200	N/A	

Industrial/Commercial Outreach	Attendance and/or Outreach Materials Distributed				
	FY04-05	FY05-06	FY06-07	FY07-08	FY08-09
Business Outreach Packets mailed to new businesses identified in the Business Press	313	1,333	979	7,503	
CAP Food Service Outreach	2,218*	303	237	230+	
Inland Empire Economic Briefing and Business Exposition, sponsored by the Press Enterprise.	4/22/05 500	N/A	997+	1,100+	
Industrial/commercial Training	N/A	N/A	4/15/07 44	60	
HHW Facility Inspections	1,979*	241	237		

* County-wide

J. ASSESSMENT OF OVERALL PROGRAM EFFECTIVENESS BASED ON MEASURABLE GOALS ESTABLISHED IN THE DAMP (cont'd).

Development Activities Outreach	Attendance				
	FY04-05	FY05-06	FY06-07	FY07-08	FY08-09
Public Education - Affidavits	N/A	N/A	10	11	
AEI/CASC Training for Developers	1/31/05 75 - Temecula	6/21/06 64 - Murrieta	10/18/06 - 28 11/19/07 - 31 11/20/07 - 45	4/16, 17 & 22/08 - 131	
BIA Presentation	N/A	Mar. 22, 2006 240	N/A	8/22/07 -20 2/29/08 -1 3/18/08 -2	

J.1.3.c) Track media impressions

This section includes an estimate of the media impressions made during the fiscal year. Many of these metrics are not conducive to trend analysis as variables such as the media outlet change from year to year. The Public Education program is continually looking for better and more effective opportinities to present the message of 'Only Rain in the Storm Drain'.

J. ASSESSMENT OF OVERALL PROGRAM EFFECTIVENESS BASED ON MEASURABLE GOALS ESTABLISHED IN THE DAMP (cont'd).

Media Impressions	Attendance and/or Outreach Materials Distributed				
	FY04-05	FY05-06	FY06-07	FY07-08	FY08-09
Earth Day Flier (Penny Saver)	650,000	685,500	687,500	650,000	
Pollution Prevention Flier (Penny Saver)	650,000	667,000	691,000	670,000	
City of Temecula Newsletter article	32,000	N/A	N/A	32,000	
Billboard	N/A	20,792,700	N/A	32,000	
District Page Hits	N/R	N/R	68,330	170,778	
Public Ed Stormwater Web Page	N/R	7,767	N/R	3,387	
County Website Page	N/R	55,932	N/R	350,000	
Outreach Tablings	N/A	7	9	10	
Tearsheets (hotline & website info)	1,000	1,271	1,471	1,971	
County Postage Stamp "Only Rain Down the Storm Drain" 1-800 number	5,164,844	5,275,142	N/A	N/A	
Chemical Products Shelf Talker	5,200	450	1,800	1,500	
Herbicides and Pesticides Shelf Talker	6,750	300	10,556	15,000	
Paint Products Shelf Talkers	4,700	750	10,556	15,000	
Hazardous Chemicals Shelf Talker	1,650	300	4,025	4,025	
Environmental Calendar	300,000	300,000	150,000	150,000	
HHW Schedules	100,000	15,000	100,000	77,000	
SMART Yellow Pages* Estimated only	100,000	100,000	200,000	100,000	
Business Cards w logo and number*	1,000	N/A	2,000	3,000	
Fact Sheets	N/A	N/A	350	104	
TOTALS	**5,685,144**	**5,756,919**	**479,287**	**365,629**	

J.1.3.d) The Number of Urban Runoff Complaints received through hotlines

It should be noted that complaints received by the District came through phone lines, e-mail requests, and/or mail. The specific method of "entry" of the complaints directed to the District are currently not tracked.

Total Number of Complaints / Reports Received:

During this reporting period, 70 Urban Runoff complaint reports were received by the District which is 11 more than the fifty nine (59) in the previous reporting period.

Of the 70 reports received by the District, 62 (89%) were Spill reports that were received via copy of an State OES report. 5 of the Spill reports involved sewage discharges. The remaining 8 were reported as potential illicit discharges which consited of a variety of activities including improper washing of equipment, concrete and paint wash water, and pool draining.

Copies of these reports are provided in Appendix C.

Additional information regarding these reports can be found in the District's Individual Annual Report..

Total Number of Calls to '800' Hotline	Number of Calls			
	2004-05	2005-06	2006-07	2007-08
Water Pollution Hotline	100	2015	1648	1317

Note: These numbers are for the entire County of Riverside. The number of residential inquiries from the **Santa Margarita area was 69.**

J.1.3.e) The Number of Permittee staff receiving Riverside County NPDES training for activities related to DAMP implementation

The training sessions accounted for in these tables are described in Section H.8.2 of this report.

Municipal	Training Attendance			
	11/27/07	11/28/08	1/17/08	4/15/08
District	2	0	0	3
County	7	6	26	19
Temecula	0	0	29	0
Murrieta	0	0	20	0

Industrial – Commercial	Training Attendance	
	11/27/07	4/15/08
District	0	0
County	28	50
Temecula	1	0
Murrieta	1	0

Construction	Training Attendance							
	2007				2008			
	9/24	9/25	11/19	11/20	1/17	4/16	4/17	4/22
District	5	5	0	0	0	0	0	0
County	24	9	0	11	0	26	33	21
Temecula	0	0	0	0	13	0	0	0
Murrieta	0	0	0	0	9	0	0	0

New Development	Training Attendance				
	11/28/07	11/29/07	12/5/07	4/16/08	4/22/08
District	14	15	1	9	0
County	3	10	0	15	8
Temecula	1	0	19	0	0
Murrieta	0	0	12	0	0

APPENDIX A

MEETING AGENDAS AND NOTES

MSC MEETINGS

RIVERSIDE COUNTY STORMWATER MANAGEMENT PROGRAM
MANAGEMENT STEERING COMMITTEE
SANTA ANA & SANTA MARGARITA REGIONS

MEETING AGENDA

(Lunch Served)
11:30 a.m.* – 12:30 p.m. September 20, 2007
Room C/D
Riverside County Administrative Office, Fourth Floor
4080 Lemon Street, Riverside, CA 92501

* meeting to begin at 11:30 a.m. or immediately following the WRCOG TAC meeting should it end later than 11:30

1. Welcome and Self Introduction – Dusty Williams, RCFC&WCD

2. Review September 20, 2007 Agenda and Approval of May 17, 2007 Meeting Minutes - Dusty Williams, RCFC&WCD

3. Santa Ana/Santa Margarita Program Status - Jason Uhley
   - Legislative Update - Senate Constitutional Amendment 12 (SCA 12)
   - CASQA Conference Update
   - Draft General Construction Permit
   - Permit Renewal Update
   - Audits/NOVs

4. TMDL Development - Jason Uhley
   - Lake Elsinore and Canyon Lake Nutrient TMDL
   - Middle Santa Ana River Watershed Bacteria Indicator TMDL
   - Canyon Lake Bacteria Indicator TMDL

5. New Agenda Items/Schedule Next MSC Meetings
   - October 18th, February 21st* and April 17th*

*Tentative meeting dates pending WRCOG 2008 schedule

P8/115178

RIVERSIDE COUNTY STORMWATER MANAGEMENT PROGRAM
MANAGEMENT STEERING COMMITTEE
SANTA ANA/SANTA MARGARITA REGIONS

MEETING MINUTES
for
September 20, 2007

I. ***Attendees:***

Benjie Cho	RCFC&WCD
Steve Stump	RCFC&WCD
Jason Uhley	RCFC & WCD
Charlene Warren	RCFC & WCD
Alex Gann	Riverside County Executive Office
Mike Shetler	Riverside County Executive Office
Joe Aklufi	City of Beaumont
David Lane	City of Calimesa
Bob Bohan	City of Canyon Lake
Cordell Chavez	City of Corona
Kent Wegelin	City of Moreno Valley
Jeff Allred	City of Norco
Tom Boyd	City of Riverside

II. ***Welcome and Self Introductions – Steve Stump***

Steve Stump welcomed everyone to the meeting and initiated self introductions of attendees.

III. ***Review September 20, 2007 Agenda and Approval of May 17, 2007 Meeting Minutes – Steve Stump***

There were no changes to the agenda. Meeting minutes were approved.

Handouts Provided:

- Agenda for September 20, 2007
- Minutes for May 17, 2007
- Legislative Updates
- Meeting Attendance Sheet

IV. ***Santa Ana/Santa Margarita Program Status – Steve Stump***

- ***Legislative Update*** – Steve provided an update on the following legislative bills:
    - **SB1001** - This bill reduces the number of the Regional Water Quality Control Board members from nine to seven and eliminates the appointment categories. It also allows the State Board to revoke a Regional Board's authority if the State Board concludes that the Regional Board is deficient and does not take appropriate corrective action.
    - **SCA 12** – This bill moves to exempt stormwater and urban runoff fees from Prop 218 (formerly, ACA 10 of previous Legislative Session) to allow municipalities to charge a service fee for stormwater compliance activities.
    - **AB938** – This bill would authorize a county or a city to convene one or more watershed water quality committees, made up of at least one member from various

interests, to develop and facilitate cooperation in achieving local water quality solutions.

- **AB739** – This bill will provide a framework for assessing the success of municipal stormwater management programs. It will also require the State Board and the Department of Water Resources to develop grant criteria for their respective grants, Proposition 84 and 1E, to identify areas to coordinate their grant programs for maximum benefits.

Please see legislative handout included in the meeting agenda packet for more detailed information.

CASQA Conference Update – Benjie Cho provided a brief update on the CASQA Conference held September 10th-12th in Costa Mesa, CA. Benjie noted that there was a continued emphasis on the need of Low Impact Design (LID) and the restructuring of monitoring efforts to make the monitoring data more useful.

Draft General Construction Permit – Benjie reported that the State has been committed to a release of the Permit late October 2007. He explained that this Permit will be a significant expansion of the current Construction Permit, but the Permittees will evaluate the next iteration of the Permit to ensure that the requirements are productive. This Permit will have impacts on not only private construction activities, but municipal construction activities as well.

Permit Renewal Update – Benjie informed attendees that there had been no recent news from the Santa Ana Regional Board regarding the renewal of the Permit.

Audits/NOVs – Benjie gave a brief update on Santa Ana Regional Board Audits and Notice of Violations (NOVs), noting that there had been no recent news from the Regional Board. Benjie noted that NOVs can lead to an Administrative Civil Liability (ACL) if the Regional Board was not satisfied by the municipality's response. Benjie advised the City Managers and city representatives to contact the Regional Board about the status of an NOV, should their city receive one, and proactively work with staff to address any concerns. A lengthy discussion on NOV and ACL processes ensued among the group. Steve provided Regional Board contact information to City Managers and city representatives.

Mike Shetler gave a brief update on the Audit meeting held with the San Diego Regional Board September 20, 2007. He reported that the audits were based on EPAs new audit guidance tool. Benjie committed to provide copies of EPAs guidance to the Cities to help the Cities understand what EPA and the Regional Board's are looking for in a municipal stormwater program.

V. ***TMDL Development – Benjie Cho***

Lake Elsinore/Canyon Lake Nutrient TMDL – Benjie reported that final Implementation Plans have been submitted to the Regional Board and asked that City Managers speak with their NPDES city representatives regarding financial ramifications of these plans.

Middle Santa Ana River Watershed Bacteria Indicator TMDL - Benjie reported that the Middle Santa Ana River Watershed Bacteria Indicator TMDL has been approved by EPA. This TMDL affects the cities of Riverside, Corona, Norco and the County of Riverside.

Canyon Lake Bacteria Indicator TMDL – Benjie advised the group that there is a CEQA Scoping meeting scheduled for October 22, 2007 at EWMD from 2:00 p.m.-5:00 p.m. Benjie further discussed that the stakeholders are anticipating basin plan amendments that would effectively remove the impairment under most circumstances. General discussion ensued about the TMDL process.

VIII. ***New Agenda Items/Schedule Next Meeting***

There were no new agenda items requested for the next meeting.

NEXT MEETING IS SET FOR:
THURSDAY, October 18, 2007 - *11:30 A.M. (Tentative)*
AT
RIVERSIDE COUNTY EXECUTIVE OFFICE, FOURTH FLOOR
4080 Lemon Street, Riverside, CA 92501

Visit the StormWater/Clean Water Protection Program website at:
http://www.co.riverside.ca.us/depts/flood/YouCanHelp.asp.
The Site contains a variety of useful stormwater program information including links to other stormwater management programs and related web sites.

P8/116499

RIVERSIDE COUNTY STORMWATER MANAGEMENT PROGRAM
MANAGEMENT STEERING COMMITTEE
SANTA ANA & SANTA MARGARITA REGIONS

MEETING AGENDA

(Lunch Served)
11:30 a.m.* – 12:30 p.m. October 18, 2007
Room C/D
Riverside County Administrative Office, Fourth Floor
4080 Lemon Street, Riverside, CA 92501

* meeting to begin at 11:30 a.m. or immediately following the WRCOG TAC meeting should it end later than 11:30

1. Welcome and Self Introduction – Steve Stump, RCFC & WCD

2. Review October 18, 2007 Agenda and Approval of September 20, 2007 Meeting Minutes – Steve Stump, RCFC & WCD

3. Santa Ana/Santa Margarita Program Status - Jason Uhley, RCFC & WCD
   - District LID testing project has been approved
   - Permit Renewal Update
   - Audits / Notice Of Violations (NOVs) /Administrative Civil Liabilities (ACLs)

4. TMDL Development - Jason Uhley, RCFC & WCD
   - Lake Elsinore and Canyon Lake Nutrient TMDL
   - Middle Santa Ana River Watershed Bacteria Indicator TMDL
     - Consistent Bacteria spikes with human markers in Box Spring Watershed
   - Canyon Lake Bacteria Indicator TMDL
     - EMWD on Monday October 22, 2007 from 2 to 5 P.M.

5. New Agenda Items/Schedule Next MSC Meetings - Jason Uhley, RCFC & WCD
   - February 21st* and April 17th*

*Tentative meeting dates pending WRCOG 2008 schedule

P8/116490

RIVERSIDE COUNTY STORMWATER MANAGEMENT PROGRAM
MANAGEMENT STEERING COMMITTEE
SANTA ANA/SANTA MARGARITA REGIONS

MEETING MINUTES
for
October 18, 2007

I. ***Attendees:***

Benjie Cho	RCFC&WCD
Steve Stump	RCFC&WCD
Charlene Warren	RCFC & WCD
Mike Shetler	Riverside County Executive Office
Joe Aklufi	City of Beaumont
Lori Moss	City of Canyon Lake
Cordell Chavez	City of Corona
Duane Baker	City of Corona
Kent Wegelin	City of Moreno Valley
Jeff Allred	City of Norco
Tom Boyd	City of Riverside
Barry McClellan	City of San Jacinto

II. ***Welcome and Self Introductions – Steve Stump***

Steve Stump welcomed everyone to the meeting and initiated self introductions of attendees.

III. ***Review October 18, 2007 Agenda and Approval of September 20, 2007 Meeting Minutes – Steve Stump***

There were no changes to the agenda. Meeting minutes were approved.

Handouts Provided:

- Agenda for October 18, 2007
- Minutes for September 20, 2007
- Letter to Santa Ana Regional Board – Re: Support for Low Impact Design (LID) Testing and Demonstration Facility dated October 10, 2007
- Santa Ana Regional Board – Notice of California Environmental Quality Act (CEQA) Scoping Meeting dated August 27, 2007

IV. ***Santa Ana/Santa Margarita Program Status – Benjie Cho***

- **District LID testing project has been approved** – Benjie Cho informed attendees that a $475,000 grant was received from SAWPA's Proposition 13 Allocation for LID testing project. The District will be retrofitting its compound to incorporate the LID demonstration and testing facility. A brief discussion ensued among the group regarding LID testing. For more information regarding the LID demonstration and testing facility, please refer to the handout provided at the meeting (Letter to Regional Board Re: Support for Low Impact Design Testing and Demonstration Facility).

- ***Permit Renewal Update*** – Benjie reported that the draft permit is due to be released by the Santa Ana Regional Board in approximately 4 weeks. Steve asked attendees if they would like a presentation of what's contained in the draft Permit. The group was very interested in both a review of existing programs as well as a summary of new permit requirements. Discussion ensued briefly between Tom Boyd, Benjie, and Steve regarding Permit issues

(hydromodification, construction permits, MS4s, and post construction BMPs). District staff will coordinate the presentation to be conducted at a future MSC meeting.

- ***Audits/Notice of Violations (NOVs)/Administrative Civil Liabilities (ACLs)*** – Benjie recommended that city representatives stay on top of all NOVs, ACLs and audits that they may receive. Jeff Allred discussed the city of Norco's NOV. Steve provided Michael Adackapara, of the Santa Ana Regional Board, telephone number (951.782.3238), should the cities need to contact him regarding issues relating to NOVs and ACLs. Other items of discussion included:

    - NOV/ACL response letters to the Regional Board
    - Negotiating fines assessed by the Regional Board
    - Supplemental Environmental Project (SEP), which, in the settlement of environmental enforcement cases, is a way to require defendants/respondents to achieve and maintain compliance with environmental laws and regulations and where appropriate, pay a penalty and/or given an additional environmental project for their violations.
    - Request for penalties to be used by the Regional Board for projects specifically in the violating city

V. ***TMDL Development – Benjie Cho***

- **Lake Elsinore/Canyon Lake Nutrient TMDL** – Benjie reported that the Implementation Plan for the Lake Elsinore TDML is moving forward and the monitoring plan for Canyon Lake has been released.

- **Middle Santa Ana River Watershed Bacteria Indicator TMDL**
    - **Consistent Bacteria spikes with human markers in Box Spring Watershed** – Benjie noted that there have been consistent exceedances of human markers in the Box Spring Watershed. Steve and several City Managers discussed areas in which water samples are being taken and issues related to sampling such as infiltration and elevated levels of bacteria.
- **Canyon Lake bacteria Indicator TMDL**
    - **EMWD on Monday October 22, 2007 from 2 – 5 p.m.** – Benjie announced that the CEQA Scoping meeting will be held on October 22nd at EMWD.

VIII. ***New Agenda Items/Schedule Next Meeting***

It was requested that the Santa Ana Permit be added as an agenda item for the next MSC meeting.

NEXT MEETING IS SET FOR:
THURSDAY, February 21, 2008 - *11:30 A.M. (Tentative)*
AT
RIVERSIDE COUNTY EXECUTIVE OFFICE, FOURTH FLOOR
4080 Lemon Street, Riverside, CA 92501

Visit the StormWater/Clean Water Protection Program website at:
http://www.co.riverside.ca.us/depts/flood/YouCanHelp.asp.
The Site contains a variety of useful stormwater program information including links to other stormwater management programs and related web sites.

RIVERSIDE COUNTY STORMWATER MANAGEMENT PROGRAM
MANAGEMENT STEERING COMMITTEE
SANTA ANA & SANTA MARGARITA REGIONS

MEETING AGENDA

(Lunch Served)
11:30 a.m.* – 12:30 p.m. February 21, 2008
Room C/D
Riverside County Administrative Office, Fourth Floor
4080 Lemon Street, Riverside, CA 92501

* meeting to begin at 11:30 a.m. or immediately following the WRCOG TAC meeting should it end later than 11:30

1. Welcome and Self Introduction – Dusty Williams, RCFC&WCD

2. Review February 21, 2008 Agenda and Approval of October 18, 2007 Meeting Minutes - Dusty Williams, RCFC&WCD

3. Santa Ana/Santa Margarita Program Status - Jason Uhley, RCFC&WCD
   - Legislative Update
   - Permit Renewal Update
   - Audits/NOVs

4. Presentation: Review of current programs and what to expect moving forward – Jason Uhley, RCFC&WCD

5. TMDL Development - Jason Uhley, RCFC&WCD
   - Lake Elsinore and Canyon Lake Nutrient TMDL
   - Middle Santa Ana River Watershed Bacteria Indicator TMDL
   - Canyon Lake Bacteria Indicator TMDL

6. New Agenda Items/Schedule Next MSC Meetings - Jason Uhley, RCFC&WCD
   - April 17th*, August 21st*, Oct 16th*

*Tentative meeting dates pending WRCOG 2008 schedule

P8/117

RIVERSIDE COUNTY STORMWATER MANAGEMENT PROGRAM
MANAGEMENT STEERING COMMITTEE
SANTA ANA/SANTA MARGARITA REGIONS

MEETING MINUTES
for
February 21, 2008

I. ***Attendees:***

Dusty Williams	RCFC-WCD
Mark Wills	RCFC-WCD
Jason Uhley	RCFC-WCD
David Garcia	RCFC-WCD
Charlene Warren	RCFC-WCD
Joe Aklufi	City of Beaumont
Bob Bohan	City of Canyon Lake
Beth Groves	City of Corona
Cordell Chavez	City of Corona
Duane Baker	City of Hemet
Kent Wegelin	City of Moreno Valley
Jeff Allred	City of Norco
Tom Boyd	City of Riverside
Mike Shetler	Co. of Riverside

II. ***Welcome and Self Introductions – Dusty Williams***

Dusty Williams introduced Mark Wills as the new Chief of Regulatory and gave a brief summary of his background and familiarity with NPDES. Dusty also introduced David Garcia as the new contact person, taking Benjie Cho's position.

III. ***Review February 21, 2008 Agenda and Approval of October 18, 2007 Meeting Minutes – Dusty Williams***

One correction, Duane Baker is from City of Hemet. Meeting minutes were approved.

Handouts Provided:

- Agenda for February 21, 2008
- Minutes for October 18, 2007

IV. ***Santa Ana/Santa Margarita Projram Status – Jason Uhley, RCFC&WCD***

- **Box Spring Channel-** David Garcia gave a presentation on Box Springs Channel. The presentation started with a brief history and purpose of the Bacterial Indicator Urban Source Evaluation Plan and then specifically mentioned Box Spring Channel. The Box Springs Channel sample site has had a consistent human bacterial indicator. The presentation

explained that the Flood Control District and the City of Riverside are taking steps to identify specific activities, operations and processes that may be contributing to the bacterial indicator. The IC/ID work is ongoing and no conclusions have been made. David described pictures of several sites they have looked at both during and after rain events. He pointed out several tributary areas with different flows, possible homeless activities or possible sewer/septic leaks. Additional samples have been taken upstream of the original sample site to try and pinpoint possible sources. We are waiting for results, which will dictate additional actions.

Jason Uhley apologized for arriving late. He closed by stating that the presentation David gave was an example of the new obligations that will fall on the Permittees as part of the TMDLs that have been adopted. The Permittee staff are in the process of finalizing the USEP to identify storm drains contributing human pathogens to the Santa Ana River. The USEP also must identify mitigation strategies for identified sources. Phase One of the USEP was paid for with grants obtained from SAWPA on behalf of the Co-Permittees and by a match from the District. Due to the Middle Santa Ana River Bacteria TMDL USEP requirements, Regional Board staff will expect additional monitoring, follow up action and BMPs employed. These significant additional obligations will fall to individual Permittees to implement.

- **Permit Renewal Update** – Jason noted that the draft Orange County NPDES MS4 Permit issued by the San Diego RWQCB for the southern portion of their County was recently opposed by USEPA. The USEPA asked that the proposed permit be more consistent with another draft NPDES MS4 Permit issued by the Los Angeles RWQCB for Ventura County. The draft Ventura County Permit is highly controversial. This situation may put pressure on Santa Ana Regional Water Board to come up with a permit similar to Ventura County. The draft Santa Ana MS4 Permit for Riverside County is expected sometime this summer.

  Jason noted that the draft Permit will probably contain new requirements for the regulation of new developments, construction and business inspections, public education, monitoring and reporting.

  The Santa Ana permit expired October 2007 but stays in effect until the new permit is adopted.

  Jason noted that the Santa Margarita NPDES MS4 Permit expires next July and the Permittees must submit a permit application, known as a Report of Waste Discharge (ROWD) in December.

- **MSC Presentation** - Jason gave the MSC a presentation on the requirements of the MS4 Permits and issues of concern for the City Managers. The first part of the presentation summarized the history of the MS4 Permits and the typical program elements. Jason identified the following specific items as areas for the City Managers to focus on with their staff:

  1. *Abandoned Construction Sites* - With the development downturn, construction sites may be abandoned by developers. If these sites are not properly stabilized, the Regional Boards may come after the Permittees for potential violations of the MS4 Permit. Jason noted, however, that Permittees have limited enforcement powers ($500/violation) and that calling bonds can be a long and tedious process that leaves sites exposed. Jason recommended that the Permittees make reasonable efforts to work with developers and bank-owners. If a particular developer/bank is not cooperating, Jason recommended that the Permittee staff contact the Regional Board. The Regional Board can enforce at $15,000/day per violation. Jason also recommended that the Permittees be able to adequately document their efforts before contacting the Regional Boards.
  2. *Program Documentation* - The Regional Board grades your annual reports. That is typically their only interaction with your programs. If you don't report something, it didn't happen. It is important that the City Managers make sure that appropriate records of Permit compliance programs are kept. In addition, the Permittee City Managers should review their annual reports to make sure that all efforts to improve water quality are properly documented. Programs related to MSHCP implementation, community events, landscaping ordinances and outreach, and other ancillary programs should be documented in the cover letters transmitting the report, or as part of the appropriate reporting section. With the Permit renewal pending, it's important that we be able to document and demonstrate the full extent of our clean water programs.
  3. *Municipal Facilities and Public Works Projects* - The Achilles heel of most MS4 Programs are Permittees Public Works projects and existing municipal facilities. It is imperative that you direct staff to comply with new development WQMP requirements for Public Works projects and ensure that each municipal facility has, implements, and updates Facility Pollution Prevention Plans. Your NPDES staff should be aware of these obligations, but they may need your assistance in implementing the requirements.
  4. *Funding TMDL Obligations.* The TMDLs issued by the RWQCB will place additional obligations on individual Permittees. These obligations may include additional BMPs such as modifications to ordinances to address sources of bacteria or nutrients, requirements to participate in regional task forces, or requirements to fund regional

BMPs. Failure to comply with these obligations will lead to immediate enforcement by the Regional Board as the TMDLs are high priority issues to them. Individual TMDL obligations will not be addressed by the District on behalf of the Permittees.

5. *Regional Board Appointments* - Jason noted that Riverside County has very poor representation in the Regional Board makeup. Most of the Governor's appointees to the Boards have been from adjacent counties. Jason recommended that City Managers work with their elected officials to identify candidates who may be appropriate for the Board positions. Jason noted that there were 2 positions for members of the public, one for City Council members and one for a County Supervisor. The positions intended for elected officials can be filled by anyone if no appropriate candidates are available.

Discussion ensued, including discussion of possible requirements under future NPDES MS4 Permits. There were also questions regarding the frequency and purpose of the meetings. There was a recommendation that the next permit allow for a reduced meeting frequency when appropriate.

Dusty closed the meeting

V. Schedule Next Meeting

NEXT MEETING IS SET FOR
THURSDAY, April 17, 2008 – 11:30 A.M.
AT
RIVERSIDE COUNTY EXECUTIVE OFFICE, FOURTH FLOOR
4080 Lemon Street, Riverside, CA 92501

Visit the StormWater/Clean Water Protection Program website at:
http://www.co.riverside.ca.us/depts/flood/YouCanHelp.asp.
The Site contains a variety of useful stormwater program information including links to other stormwater management programs and related web sites.

RIVERSIDE COUNTY STORMWATER MANAGEMENT PROGRAM
MANAGEMENT STEERING COMMITTEE
SANTA ANA & SANTA MARGARITA REGIONS

MEETING AGENDA

(Lunch Served)
11:30 a.m.* – 12:30 p.m. April 17, 2008
Room C/D
Riverside County Administrative Office, Fourth Floor
4080 Lemon Street, Riverside, CA 92501

* meeting to begin at 11:30 a.m. or immediately following the WRCOG TAC meeting should it end later than 11:30

1. Welcome and Self Introduction – Dusty Williams, RCFC&WCD

2. Review April 17, 2008 Agenda and Approval of February 21, 2007 Meeting Minutes - Dusty Williams, RCFC&WCD

3. Santa Ana/Santa Margarita Program Status - Jason Uhley, RCFC&WCD
   - Legislative Update
   - Permit Renewal Update
   - Audits/NOVs

4. Board Appointments

5. TMDL Development - Jason Uhley, RCFC&WCD
   - Lake Elsinore and Canyon Lake Nutrient TMDL
   - Middle Santa Ana River Watershed Bacteria Indicator TMDL
   - Canyon Lake Bacteria Indicator TMDL

6. New Agenda Items/Schedule Next MSC Meetings - Jason Uhley, RCFC&WCD
   - August 21st*, Oct 16th*

*Tentative meeting dates pending WRCOG 2008 schedule

P8/117921

RIVERSIDE COUNTY STORMWATER MANAGEMENT PROGRAM
MANAGEMENT STEERING COMMITTEE
SANTA ANA/SANTA MARGARITA REGIONS

MEETING MINUTES
for
April 17, 2008

I. ***Attendees:***

Jason Uhley	RCFC&WCD
Albert Martinez	RCFC&WCD
Joe Aklufi	City of Beaumont
Dave Lane	City of Calimesa
Lori Moss	City of Canyon Lake
Cordell Chavez	City of Corona
Duane Baker	City of Hemet
Kent Wegelin	City of Moreno Valley
Bill Thompson	City of Norco
Tom Boyd	City of Riverside
Barry McClellan	City of San Jacinto
Mike Shetler	County of Riverside

I. ***Welcome and Self Introductions – Jason Uhley***

Jason introduced Albert Martinez as the new contact taking David Garcia's position as the Santa Ana NPDES MS4 Permit Coordinator. David was promoted and now oversees the District's Floodplain Management Section.

II. ***Review April 17, 2008 Agenda and Approval of February 21, 2008 Meeting Minutes – Jason Uhley***

Review minutes of February 21, 2008. Jason noted that he summarized the five main points of his presentation in the MSC Meeting minutes.

Handouts Provided

- Agenda for April 17, 2008
- Minutes for February 21, 2008
- CRWQCB Member Qualification Requirements
- CASQA Newsflash on New Draft of Construction General Permit

III. ***Santa Ana/Santa Margarita Program Status- Jason Uhley, RCFC&WCD***

Legislative Update – ACA 13, a proposed constitutional amendment that would extend voter approval exemptions currently applicable to water, sewer and trash utilities under Prop 218 to storm water programs has made it through the Senate, but it is doubtful it will find support in the Assembly because of the budget climate.

Permit Renewal Update – Permits are stalled because the USEPA stepped into the San Diego Regional Board's proposed adoption and said there was too much disparity between the various NPDES MS4 permit programs. USEPA wanted to see more standardization. As a result, all NPDES MS4 Permits are stalled awaiting a meeting between USEPA and the RWQCB Executive Officers. It is unlikely that the Santa Ana NPDES MS4 Permit will be renewed this year. Consistency issues are also being raised by various entities as part of hearings by the Little Hoover Commission regarding the effectiveness and efficiency of the Regional Boards and State Board.

Audits/NOVs - The City of Lake Elsinore received a Notice of Violation (NOV) as a result of their audit. They have a month to prepare their response. The City of Beaumont also received an NOV on a public works project due to lack of BMPs and not submitting a Notice of Intent (NOI) to the RWQCB. They have until April 25th to submit a revised storm water pollution prevention plan and NOI. A discussion ensued regarding Regional Board and Permittee inspections of the construction sites and the penalties associated with NOVs. Several cities and the County of Riverside are awaiting reports on the results of their audits.

IV. ***Board Appointments*** - A handout regarding the qualification requirements for Regional Board member appointments was provided. The handout also included background information on current Board members. Jason noted that it is important to identify potential Regional Board candidates who have good understanding of municipal government and water quality issues. The Regional Board positions are tied to specific qualifications such as municipal government, county government, water supply or fish and wildlife. Appointments are typically made to fill these specific seats, but the Governor and Senate aren't strictly held to those requirements. There was a brief discussion on the positions available and opening up in the future and what type of decisions these appointees make.

V. ***TMDL Development – Jason Uhley, RCFC&WCD***

- Lake Elsinore and Canyon Lake TMDL - Jason noted that the final budget for the Lake Elsinore and Canyon Lake TMDL would be proposed at the next Task Force Meeting.
- Middle Santa Ana River TMDL - There is an amendment to the existing Task Force Agreement to add the agricultural stakeholders to the Task Force. This amendment will make sure that they are paying for their portion of the TMDL obligation. There are two stakeholders that need to be added to the Task Force from Los Angeles County, Claremont and Pomona. They have resisted participation because they are not regulated by the Santa Ana RWQCB, however the Santa Ana RWQCB is now coordinating with the Los Angeles RWQCB to address this issue.
- Canyon Lake Bacteria Indicator TMDL - The Regional Board wants to remove this bacteria indicator listing from the 303(d) List based on

preliminary data they have collected in the Lake. However, they believe they need additional data to make sure this is the appropriate action. The Board has asked the Lake Elsinore and Canyon Lake TMDL Task Force to pay for this additional monitoring. Details regarding the monitoring plan still need to be worked out. The request will be reconsidered at the next Lake Elsinore and Canyon Lake TMDL Task Force. There was further discussion regarding the monitoring and additional funds.

Jason closed meeting.

VI. Schedule Next Meeting

NEXT MEETING IS SET FOR
AUGUST 21, 2008
AT
RIVESIDE COUNTY EXECUTIVE OFFICE, FOURTH FLOOR
4080 Lemon Street, Riverside, CA 92501

Visit the StormWater/Clean Water Protection Program website at:
http://www.rcflood.org/depts/flood/YouCanHelp.asp.
The Site contains a variety of useful stormwater program information including links to other stormwater management programs and related web sites.

TAC MEETINGS

MEETING AGENDA

NPDES
SANTA ANA / SANTA MARGARITA
TECHNICAL COMMITTEE

10:00 a.m. – 12:00 p.m. Thursday, April 24, 2008
Riverside County Flood Control District
1995 Market Street
Riverside, CA 92501

I. Introductions

II. Agenda Changes

III. Review of Minutes: February 28, 2008

IV. Announcements
- A. MSC Meeting Update
- B. Training Update
- C. Permit Renewal Update
- D. Santa Ana Annual Report
- E. LID Seminar
- F. Hoover Commission
- G. CASQA Call for Papers – Annual Conference – May 23, 2008

V. Public Education Program – Florence Mowrer

VI. TMDL Progress Report – Jason Uhley
- A. Middle Santa Ana River Bacteria Indicator TMDL Update
  - Next Meeting – Thursday, April 17, 2008 from 1:30 p.m. to 4:00 p.m.
- B. Lake Elsinore/Canyon Lake TMDL Update
  - Next Meeting – Tuesday, April 29, 2008, 1:00 p.m.
- C. San Diego Lagoons TMDL/Investigation Order Update
  - Next Meeting – USBR, Wednesday, April 16, 2008 from 1:30 p.m. to 3:30 p.m.

VII. Santa Ana/Santa Margarita Region Programs – Jason Uhley
- A. Stormwater Quality Standards Task Force Update
  - Next Meeting – Thursday, June 5, 2008 from 9:30 a.m. to 1:30 p.m.
- B. General Construction Permit – June 4, 2008 Hearing

VIII. Open Discussion
- A. Santa Ana RWQCB
- B. San Diego RWQCB
- C. U.S. EPA – Region IX
- D. Round Table

X. New Agenda Items/Schedule Next Meeting – May 22, 2008

MEETING AGENDA

NPDES
SANTA ANA / SANTA MARGARITA
TECHNICAL COMMITTEE

10:00 – 12:00 p.m. Thursday, August 23, 2007
Riverside County Flood Control District
1995 Market Street
Riverside, CA 92501

I. Introductions

II. Agenda Changes

III. Review of Minutes: July 26, 2007

IV. Announcements
- A. CASQA Conference
- B. Projected Rain Season
- C. Training
- D. Hydromodification and LID update
- E. Audit Update
- F. Senate Constitutional Amendment 12 (SCA 12)
- G. MSC Meeting

V. Public Education Program – Florence Mowrer

VI. TMDL Progress Report – Jason Uhley
- A. Middle Santa Ana River Bacteria Indicator TMDL Update
  - Next Meeting: Thursday, September 6, 2007 - 1:30 p.m. to 4:00 p.m.
- B. Lake Elsinore/Canyon Lake TMDL
  - Next Meeting: TBA at August 21, 2007 - 1:30 p.m. meeting
  - San Jacinto Septic System Management Plan
- C. San Diego Lagoons TMDL/Investigation Order
- D. TMDL NNE Study Bureau Workgroup

VII. Santa Ana/Santa Margarita Region Programs – Benjie Cho
- A. Stormwater Quality Standards Task Force Update
  - Next Meeting: Thursday, September 6, 2007 - at 9:30 a.m. to 1:30 p.m.
- B. Annual Reports – Santa Margarita

VIII. Report of Waste Discharge / Permit Renewal – Benjie Cho

IX. Open Discussion
- A. Santa Ana RWQCB
- B. San Diego RWQCB
- C. U.S. EPA – Region IX
- D. Round Table

X. New Agenda Items/Schedule Next Meeting – September 27, 2007

MEETING AGENDA

NPDES
SANTA ANA / SANTA MARGARITA
TECHNICAL COMMITTEE

10:00 – 12:00 p.m. Thursday, December 20, 2007
Riverside County Flood Control District
1995 Market Street
Riverside, CA 92501

I. Introductions

II. Agenda Changes

III. Review of Minutes: November 15, 2007

IV. Announcements
- A. Annual Reports
- B. Training Update
- C. Permit Renewal Update

V. Public Education Program – Florence Mowrer

VI. TMDL Progress Report – Jason Uhley
- A. Middle Santa Ana River Bacteria Indicator TMDL Update
  - Next Meeting – Thursday, January 24, 2007 from 1:30 p.m. to 4:00 p.m.
- B. Lake Elsinore/Canyon Lake TMDL
  - Next Meeting – Tuesday, January 29, 2007 from 1:30 p.m. to 4:00 p.m.
- C. San Diego Lagoons TMDL/Investigation Order
  - Lagoons TMDL NNE Study Bureau Workgroup

VII. Santa Ana/Santa Margarita Region Programs – Jason Uhley
- A. Stormwater Quality Standards Task Force Update
  - Next Meeting - Thursday, January 24, 2007 from 9:30 p.m. to 1:30 p.m.

IX. Open Discussion
- A. Santa Ana RWQCB
- B. San Diego RWQCB
- C. U.S. EPA – Region IX
- D. Round Table

X. New Agenda Items/Schedule Next Meeting – *Tentatively set for January 24, 2008*

P8/117308

MEETING AGENDA

NPDES
SANTA ANA / SANTA MARGARITA
TECHNICAL COMMITTEE

10:00 a.m. – 12:00 p.m. Thursday, February 28, 2008
Riverside County Flood Control District
1995 Market Street
Riverside, CA 92501

I. Introductions

II. Agenda Changes

III. Review of Minutes: January 31, 2008

IV. Announcements
- A. MSC Meeting Update
- B. Training Update
- C. Permit Renewal Update
- D. Santa Ana Annual Report
- E. LID Seminar – Moreno Valley, Thursday, March 27th from 10 a.m. – 2 p.m.
- F. ASCE Stormwater Committee
- G. CASQA General Meeting March 14th

V. Public Education Program – Florence Mowrer

VI. TMDL Progress Report – Jason Uhley
- A. Middle Santa Ana River Bacteria Indicator TMDL Update
  - Next Meeting – Thursday, February 28, 2008 from 1:30 p.m. to 4:00 p.m.
- B. Lake Elsinore/Canyon Lake TMDL Update
  - Next Meeting – To Be Determined
- C. San Diego Lagoons TMDL/Investigation Order Update
  - Next Meeting – Conference Call, March 25, 2008, 3:00 p.m.

VII. Santa Ana/Santa Margarita Region Programs – Jason Uhley
- A. Stormwater Quality Standards Task Force Update
  - Next Meeting - Thursday, February 28, 2008 from 9:30 a.m. to 1:30 p.m.

VIII. Open Discussion
- A. Santa Ana RWQCB
- B. San Diego RWQCB
- C. U.S. EPA – Region IX
- D. Round Table

X. New Agenda Items/Schedule Next Meeting – March 27, 2008 to be held in conjunction with LID Seminar in Moreno Valley

MEETING AGENDA

NPDES
SANTA ANA / SANTA MARGARITA
TECHNICAL COMMITTEE

10:00 a.m. – 12:00 p.m. Thursday, January 31, 2008
Riverside County Flood Control District
1995 Market Street
Riverside, CA 92501

I. Introductions

II. Agenda Changes

III. Review of Minutes: December 20, 2007

IV. Announcements
- A. Annual Reports
- B. Training Update
- C. Permit Renewal Update

V. Public Education Program – Florence Mowrer

VI. TMDL Progress Report – Jason Uhley
- A. Middle Santa Ana River Bacteria Indicator TMDL Update
  - Next Meeting – Thursday, February 28, 2008 from 1:30 p.m. to 4:00 p.m.
- B. Lake Elsinore/Canyon Lake TMDL
  - January 29, 2008 LE/CL TMDL Meeting
  - Next Meeting – To Be Determined
- C. San Diego Lagoons TMDL/Investigation Order
  - January 29, 2008 Monitoring Group Meeting
  - Next Meeting – To Be Determined
- D. Lagoons TMDL NNE Study Bureau Workgroup

VII. Santa Ana/Santa Margarita Region Programs – Jason Uhley
- A. Stormwater Quality Standards Task Force Update
  - Next Meeting - Thursday, February 28, 2008 from 9:30 a.m. to 1:30 p.m.

IX. Open Discussion
- A. Santa Ana RWQCB
- B. San Diego RWQCB
- C. U.S. EPA – Region IX
- D. Round Table

X. New Agenda Items/Schedule Next Meeting – February 28, 2008

MEETING AGENDA

NPDES
SANTA ANA / SANTA MARGARITA
TECHNICAL COMMITTEE

10:00 – 12:00 p.m. Thursday, July 26, 2007
Riverside County Flood Control District
1995 Market Street
Riverside, CA 92501

I. Introductions

II. Agenda Changes

III. Review of Minutes: May 24, 2007

IV. Announcements
- A. May 17th MSC Meeting Update
- B. IRWM update
- C. Hydromodification and LID update
- D. Audit Update

V. Public Education Program – Florence Mowrer

VI. TMDL Progress Report – Jason Uhley
- A. Middle Santa Ana River Bacteria Indicator TMDL April 19th Update
  - Future Meetings –August 23, 2007, 1:30 p.m. to 4:00 p.m.
  - Tour of Santa Ana Monitoring Stations April 11th Update
- B. Lake Elsinore/Canyon Lake TMDL
  - Future Meetings – August 8, 2007, 1:30 p.m. to 4:00 p.m.
  - San Jacinto Septic System Management Plan
- C. San Diego Lagoons TMDL/Investigation Order
  - Lagoons TMDL NNE Study Bureau Workgroup

VII. Santa Ana/Santa Margarita Region Programs – Benjie Cho
- A. Stormwater Quality Standards Task Force Update
  - Future Meetings - August 23, 2007, 9:30 p.m. to 1:30 p.m.
- B. Orange County Stormwater Permit Update

VIII. Report of Waste Discharge / Permit Renewal – Benjie Cho

IX. Open Discussion
- A. Santa Ana RWQCB
- B. San Diego RWQCB
- C. U.S. EPA – Region IX
- D. Round Table

X. New Agenda Items/Schedule Next Meeting – August 23, 2007

MEETING AGENDA

NPDES
SANTA ANA / SANTA MARGARITA
TECHNICAL ADVISORY COMMITTEE

10:00 a.m. – 12:00 p.m. Thursday, June 26, 2008
Riverside County Flood Control District
1995 Market Street
Riverside, CA 92501

I. Introductions

II. Agenda Changes

III. Review of Minutes: May 22, 2008

IV. Announcements
   A. Permit Renewal Update
   B. Notice of Violation

V. Public Education Program – Florence Mowrer

VI. TMDL Progress Report – Jason Uhley
   A. Middle Santa Ana River Bacteria Indicator TMDL Update
      - Next Meeting – Thursday, July 17, 2008 from 1:30 p.m. to 4:00 p.m.
   B. Lake Elsinore/Canyon Lake TMDL Update
      - Next Meeting – To Be Determined
   C. San Diego Lagoons TMDL/Investigation Order Update
      - Next Meeting – USBR, Wednesday, July 16, 2008, 1:30 p.m. to 3:30 p.m.

VII. Santa Ana/Santa Margarita Region Programs – Jason Uhley
   A. Stormwater Quality Standards Task Force Update
      - Next Meeting - Thursday, July 17, 2008 from 9:30 a.m. to 1:30 p.m.
      - General Construction Permit

VIII. Open Discussion
   A. Santa Ana RWQCB
   B. San Diego RWQCB
   C. U.S. EPA – Region IX
   D. Round Table

IX. New Agenda Items/Schedule Next Meeting – July 24, 2008

X. Cellular Concrete Solution Presentation – Bill Reynolds

P8/119788

MEETING AGENDA

NPDES
SANTA ANA / SANTA MARGARITA
TECHNICAL ADVISORY COMMITTEE

10:00 a.m. – 12:00 p.m. Thursday, May 22, 2008
Riverside County Flood Control District
1995 Market Street
Riverside, CA 92501

I. Introductions

II. Agenda Changes

III. Review of Minutes: April 24, 2008

IV. Announcements
- A. Whitewater Permit
- B. Permit Renewal Update
- C. Notice of Violation
- D. CASQA Call for Papers Deadline – Annual Conference – Deadline May 23, 2008

V. Public Education Program – Florence Mowrer

VI. TMDL Progress Report – Jason Uhley
- A. Middle Santa Ana River Bacteria Indicator TMDL Update
  - Next Meeting – Thursday, June 5, 2008 from 1:30 p.m. to 4:00 p.m.
- B. Lake Elsinore/Canyon Lake TMDL Update
  - Next Meeting – Tuesday, June 24, 1:00 p.m.
- C. San Diego Lagoons TMDL/Investigation Order Update
  - Next Meeting – USBR, Wednesday, June 18, 2008, 1:30 p.m. to 3:30 p.m.

VII. Santa Ana/Santa Margarita Region Programs – Jason Uhley
- A. Stormwater Quality Standards Task Force Update
  - Next Meeting - Thursday, June 5, 2008 from 9:30 a.m. to 1:30 p.m.
  - General Construction Permit – June 4, 2008 Hearing

VIII. Open Discussion
- A. Santa Ana RWQCB
- B. San Diego RWQCB
- C. U.S. EPA – Region IX
- D. Round Table

IX. New Agenda Items/Schedule Next Meeting – June 26, 2008

MEETING AGENDA

NPDES
SANTA ANA / SANTA MARGARITA
TECHNICAL COMMITTEE

10:00 – 12:00 p.m. Thursday, November 15, 2007
Riverside County Flood Control District
1995 Market Street
Riverside, CA 92501

I. Introductions

II. Agenda Changes

III. Review of Minutes: October 25, 2007

IV. Announcements
- A. Annual Reports
- B. Training Update
- C. Permit Renewal Update

V. Public Education Program – Florence Mowrer

VI. TMDL Progress Report – Jason Uhley
- A. Middle Santa Ana River Bacteria Indicator TMDL Update
  - Next Meeting – Thursday, November 29, 2007 from 1:30 p.m. to 4:00 p.m.
- B. Lake Elsinore/Canyon Lake TMDL
  - Next Meeting – Tuesday, November 27, 2007 from 1:30 p.m. to 4:00 p.m.
- C. San Diego Lagoons TMDL/Investigation Order
  - Lagoons TMDL NNE Study Bureau Workgroup

VII. Santa Ana/Santa Margarita Region Programs – Benjie Cho
- A. Stormwater Quality Standards Task Force Update
  - Next Meeting - Thursday, November 29, 2007 from 9:30 p.m. to 1:30 p.m.

IX. Open Discussion
- A. Santa Ana RWQCB
- B. San Diego RWQCB
- C. U.S. EPA – Region IX
- D. Round Table

X. New Agenda Items/Schedule Next Meeting – December 20, 2007

P8/116888

MEETING AGENDA

NPDES
SANTA ANA / SANTA MARGARITA
TECHNICAL COMMITTEE

10:00 – 12:00 p.m. Thursday, October 25, 2007
Riverside County Flood Control District
1995 Market Street
Riverside, CA 92501

I. Introductions

II. Agenda Changes

III. Review of Minutes: September 27, 2007

IV. Announcements
- A. Annual Reports
- B. Training Update
- C. October 18, 2007 MSC Meeting Update
- D. Legislative Update
- E. Permit Renewal Update

V. Public Education Program – Florence Mowrer

VI. TMDL Progress Report – Jason Uhley
- A. Middle Santa Ana River Bacteria Indicator TMDL Update
  - Next Meeting – Thursday, November 29, 2007 from 1:30 p.m. to 4:00 p.m.
- B. Lake Elsinore/Canyon Lake TMDL
  - Next Meeting – Tuesday, October 30, 2007 from 1:30 p.m. to 4:00 p.m.
- C. San Diego Lagoons TMDL/Investigation Order
  - Lagoons TMDL NNE Study Bureau Workgroup

VII. Santa Ana/Santa Margarita Region Programs – Benjie Cho
- A. Stormwater Quality Standards Task Force Update
  - Next Meeting - Thursday, November 29, 2007 from 9:30 p.m. to 1:30 p.m.

IX. Open Discussion
- A. Santa Ana RWQCB
- B. San Diego RWQCB
- C. U.S. EPA – Region IX
- D. Round Table

X. New Agenda Items/Schedule Next Meeting – November 22, 2007

XI. CONTECH Stormwater Solutions Inc. Presentation

P8/116649

MEETING AGENDA

NPDES
SANTA ANA / SANTA MARGARITA
TECHNICAL COMMITTEE

10:00 – 12:00 p.m. Thursday, September 27, 2007
Riverside County Flood Control District
1995 Market Street
Riverside, CA 92501

I. Introductions

II. Agenda Changes

III. Review of Minutes: August 23, 2007

IV. Announcements
- A. Annual Reports
- B. Training
- C. MSC Meeting Update – September 20, 2007
- D. Legislative Update
- E. Contech Maintenance Demonstration - October 2, 2007, 8:30 a.m. at Orange Crest Promenade
- F. Contech Post TAC Meeting Presentation – October 25, 2007 (following SA/SM TAC Meeting)

V. Public Education Program – Florence Mowrer

VI. TMDL Progress Report – Jason Uhley
- A. Middle Santa Ana River Bacteria Indicator TMDL Update
  - Next Meeting – Thursday, October 11, 2007 from 1:30 p.m. to 4 p.m.
- B. Lake Elsinore/Canyon Lake TMDL
  - September 25, 2007 1:30 p.m. Meeting Update (Next Meeting TBA)
  - Canyon Lake CEQA Scoping Meeting – October 22, 2007 from 2:00 p.m. to 5:00 p.m. at EMWD
- C. San Diego Lagoons TMDL/Investigation Order
  - Lagoons TMDL NNE Study Bureau Workgroup

VII. Santa Ana/Santa Margarita Region Programs – Benjie Cho
- A. Stormwater Quality Standards Task Force Update
  - Next Meeting - Thursday, October 11, 2007 from 9:30 p.m. to 1:30 p.m.

VIII. Open Discussion
- A. Santa Ana RWQCB
- B. San Diego RWQCB
- C. U.S. EPA – Region IX
- D. Round Table

IX. New Agenda Items/Schedule Next Meeting – October 25, 2007

Storm Water Clean Water PROTECTION PROGRAM

Member Agencies:

Banning
Beaumont
Calimesa
Canyon Lake
Cathedral City
Coachella
Coachella Valley Water District
Corona
County of Riverside
Desert Hot Springs
Hemet
Indian Wells
Indio
La Quinta
Lake Elsinore
Moreno Valley
Murrieta
Norco
Palm Desert
Palm Springs
Perris
Rancho Mirage
Riverside City
Riverside County Flood Control District
San Jacinto
Temecula

NPDES
SANTA ANA / SANTA MARGARITA
TECHNICAL COMMITTEE
Meeting Minutes
for
April 24, 2008

I. Attendees:

Arlene Chun	Riverside County Flood Control District
Albert Martinez	Riverside County Flood Control District
Florence Mowrer	Riverside County Flood Control District
Penny Nanney	Riverside County Flood Control District
Tina Tuason	Riverside County Flood Control District
Jason Uhley	Riverside County Flood Control District
Doug Thompson	Riverside County Environmental Health
Mike Shetler	Riverside County Executive Office
Adriana Soares	Riverside County Transportation
Keith Elliott	CRWQCB – Santa Ana Region
Ann Iaali	CRWQCB – Santa Ana Region
Maria Macario	CRWQCB – Santa Ana Region
Mike Roth	CRWQCB – Santa Ana Region
Ben Neill	CRWQCB – San Diego Region
John Wilder	City of Beaumont
Bob French	City of Calimesa
Mike McCabe	City of Calimesa
James Grimm	City of Canyon Lake
Tom Koper	City of Corona
Jeff Potts	City of Corona
Linda Nixon	City of Hemet
Phuong Hunter	City of Moreno Valley
Hoang Nguyen	City of Moreno Valley
Lori Askew	City of Norco
Jesse Powell	City of Perris
Sandy Caldwell	City of Riverside
Jessica Chin	City of Riverside
Mike Yasmer	City of Riverside
Sandy McKay	City of San Jacinto
Aldo Licitra	City of Temecula
Mohamed Worayeth	Bureau Veritas North America, Inc.
Mark Baker	CONTECH Stormwater
Bill Flores	HDR
Jamie Aderhold	J2A Environmental
Robert Collacott	URS Consulting

II. *Introductions*

Jason Uhley welcomed everyone to the April 24, 2008 NPDES Santa Ana/Santa Margarita Technical Advisory Committee Meeting and initiated the self introductions of attendees. James Grimm mentioned he would like to be added to the sign-in sheet and meeting notice list.

III. *Agenda Changes*

Added Agenda Item XI CrystalStream Technologies Presentation.

IV. *Review of Minutes: February 28, 2008*

Jessica Chin asked if meeting minutes could be amended to include proper list of attendees.

Handouts and Materials Provided:

- April 24, 2008 Agenda, February 28, 2008 Minutes, and Roster
- Public Information/Education Report
- CrystalStream Technologies brochures

V. *Announcements*

A. ***MSC Meeting Update*** – This item was not discussed.

B. ***Training Update*** – Training ended on April 22nd. Overall the training went well with good attendance in each training class. The PowerPoint training material is available on-line through the same registration site. The training material will be available for reference. Fall 2008 training should be scheduled around October with training notices sent in September. Sign-in sheets verifying attendance will be e-mailed once they have all been scanned.

C. ***Permit Renewal Update*** – Jason provided an update and gave background information on the efforts of the MS4 Permit Renewal. He then discussed three high priority issues/concerns posed by EPA that include the requirement for incorporation of low impact development criteria into the MS4 Permits, how hydromodication is addressed in the MS4 Permits, and how TMDLs are incorporated into the MS4 Permits. Keith Elliott reported that the Santa Ana Draft Permit is expected to be released by the end of 2008.

D. ***Santa Ana Annual Report*** – The Santa Ana and Santa Margarita Annual Reports will soon be available online. Permittees were sent electronic copies of the compiled reports, asking that they review the report by March 7, 2008 to ensure they are correct before being posted on the District's website.

E. ***LID Seminar*** - In leiu of the March 27, 2008 TAC Meeting, Permittees attended an LID Seminar in Moreno Valley. The seminar was conducted by Larry Coffman of the LID Center in Maryland. Thanks went out to the City of Moreno Valley, ASCE, and Filterra for hosting the seminar.

F. ***Hoover Commission*** – Jason reported that due to all the issues surrounding the State Board, Regional Boards, and Regulatory framework, the Govenor has asked that the Hoover Commission look at the efficiency and effectiveness of the Regional Boards in terms of water quality and water supply. There were 2 workshops scheduled. The 1st workshop focused on comments from State and Federal agencies. The 2nd workshop, being held April 24th, will allow for various stakeholders to speak before the Hoover Commission regarding the State and Regional Boards. A couple of concerns raised before the Commission were funding and the Santa Ana Watershed's task force based regulation development.

Riverside County Flood Control and Water Conservation District
1995 Market Street • Riverside, CA 92501 • (951) 955-1200 • FAX (951) 788-9965

G. ***CASQA Call for Papers – Annual Conference – Deadline May 23, 2008*** – Jason announced that CASQA will be holding a conference in Oakland, CA September 22-24, 2008. He recommended that Permittees consider giving presentations on their NPDES Programs at the conference. The next general CASQA meeting is scheduled for May 9, 2008 in Ontario, CA.

VI. *Public Education Program – Florence Mowrer*

Florence Mowrer provided Permittees a brief update on the efforts of the Public Education Department. The following items were discussed.

- Saftey Kit promotionals
- Air Show being held at the March Air Force Base May 3-4, 2008
- Earth Day flyer (collaboration with Waste Management)
- Pollution Prevention Week flyer to be released in September
- Facility Signs are being offered to Permittees

For more detailed information, please refer to the Public Information Report provided at the meeting.

VII. *TMDL Progress Report – Jason Uhley*

A. Middle Santa Ana River Bacteria Indicator TMDL Update

- Next Meeting - Thursday, April 17, 2008 – 1:30 p.m. to 4:00 p.m.
  Jason reported that there was an attempt to install a bacterial catch basin insert in the City of Canyon Lake. Due to the conditions of the site, the BMP failed. The vendor who supplied the catch basin insert has offered to install at their expense, the same BMP at another location. Permittees interested in having installation done at one of their locations should speak with Jason.

B. Lake Elsinore/Canyon Lake TMDL Update

- Next Meeting – Tuesday, April 29, 2008, 1:00 p.m.
  Jason recommended that Permittees attend this meeting, noting that it is expected that the budget will be finalized at the meeting and there may be some additional discussion regarding the request of the Task Force conducting additional monitoring of Canyon Lake to help support the d-listing process. Keith Elliott inquired as to whether monitoring will be funded in the current budget. Jason informed him that the monitoring phase will be initiated in the 2010-2011 fiscal year.

C. San Diego Lagoons TMDL/Investigation Order Update

- Next meeting – USBR, Wednesday, April 16, 2008 - 1:30 p.m. to 3:30 p.m.
  An automatic field sensor failed during the course of the reporting period. Therefore, the focus of the meeting will be on developing procedures for reporting erroneous data that does not comply with QA/QC procedures.

VIII. *Santa Ana/Santa Margarita Region Programs – Jason Uhley*

A. Stormwater Quality Standards Task Force Update

- Next Meeting: Thursday, June 5, 2008 from 9:30 a.m. to 1:30 p.m.
  Jason informed Permittees that it was important that Task Force members attend this meeting. Comments provided by EPA will be submitted to and reviewed by the Task Force.

Riverside County Flood Control and Water Conservation District
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B. **General Construction Permit – June 4, 2008 Hearing** – The Draft Construction Permit has been released for review and is due to be adopted June 4, 2008. Jason asked that Permittees take a close look at the document. There are several issues in the Permit that could affect municipal projects, the requirement to development storm specific storm pollution plans, and monitoring numeric targets. Once the Permit is adopted, training may be necessary to ensure that appropriate City and County staff are trained and aware of the Permit requirements. On behalf of Permittees, Tina will be submitting comments on the Draft Permit to the State Board.

On May 7, 2008 there will be a General Construction Permit Meeting at 10:00 a.m. at the Metropolitan Water District in Los Angeles, CA. Tina is scheduled to attend the meeting.

IX. ***Open Discussion***

A. ***Santa Ana RWQCB – No discussion***

B. ***San Diego RWQCB*** – Ben Neill announced that there will be a Non-Point Source Conference in San Diego May 5-7. Ben then informed attendees that there was a directive from his Board to be more consistent with the other Regional Boards in terms of the Permits. San Diego Regional Board staff, Regions 4 and 8, as well as EPA have been meeting in an effort to reach thier consistency goals. Ben added that he has received calls regarding who is authorized to develop SWPPPs under the requirements of the new Permit. The development of SWPPPs are not limited to registered professional engineers only. There are other licensed professionals who can develop SWPPPs.

C. ***U.S. EPA – Region IX – Not present***

D. ***Round Table*** – Jason announced that David Garcia was promoted and Albert Martinez has replaced him as the Santa Ana Permit Manager.

X. ***CrystalStream Technologies Presentation – Brent Helm***

Brent Helm of CrystalStream Technologies gave a presentation on services offered by his company.

XI. ***New Agenda Items / Schedule Next Meeting***

If there are any questions or items for the next meeting agenda, please contact the Flood Control District's NPDES Section at 951.955.4375. Suggestions are always welcome.

Please visit the "Only Rain Down the Storm Drain" Public Education Program website at: http://www.floodcontrol.co.riverside.ca.us. The site contains a variety of useful stormwater program information including links to other stormwater management programs and related websites.

NEXT MEETING IS SET FOR:

THURSDAY, May 22, 2008 10:00 A.M.
AT
RIVERSIDE COUNTY FLOOD CONTROL DISTRICT
1995 Market Street
Riverside, CA 92501

Riverside County Flood Control and Water Conservation District
1995 Market Street • Riverside, CA 92501 • (951) 955-1200 • FAX (951) 788-9965

StormWater Clean Water PROTECTION PROGRAM

Member Agencies:

Banning
Beaumont
Calimesa
Canyon Lake
Cathedral City
Coachella
Coachella Valley Water District
Corona
County of Riverside
Desert Hot Springs
Hemet
Indian Wells
Indio
La Quinta
Lake Elsinore
Moreno Valley
Murrieta
Norco
Palm Desert
Palm Springs
Perris
Rancho Mirage
Riverside City
Riverside County Flood Control District
San Jacinto
Temecula

NPDES
SANTA ANA / SANTA MARGARITA
TECHNICAL COMMITTEE
Meeting Minutes
for
August 23, 2007

I. Attendees:

Benjie Cho	Riverside County Flood Control District
Arlene Chun	Riverside County Flood Control District
Florence Mowrer	Riverside County Flood Control District
Tina Tuason	Riverside County Flood Control District
Charlene Warren	Riverside County Flood Control District
Alex Gann	Riverside County Flood Control District
Glenn Higa	Riverside County Transportation
Adrianna Soares	Riverside County Transportation
Keith Elliott	CRWQCB – Santa Ana Region
Mike Roth	CRWQCB – Santa Ana Region
Maria Macario	CRWQCB – Santa Ana Region
Brandi Outwin	CRWQCB – San Diego Region
John Wilder	City of Beaumont
Jack Porter	City of Canyon Lake
Michele Hindersinn	City of Corona
Phoung Hunter	City of Moreno Valley
Kent Wegelin	City of Moreno Valley
Farida Naceem	City of Murrieta
Lori Askew	City of Norco
Jessie Powell	City of Perris
Sandy Caldwell	City of Riverside
Jessica Chin	City of Riverside
Mike Yasmer	City of Riverside
Mike Emberton	City of San Jacinto
Bob Collacott	URS Consulting
Frank Tolerico	CONTECH Stormwater Solutions

II. *Introductions*

Benjie Cho welcomed everyone to the August 23, 2007 NPDES Santa Ana/Santa Margarita Technical Committee Meeting and initiated the self introductions of attendees.

III. *Agenda Changes*

Item H (ASCE Dinner Series) was added under agenda item V (Announcements).

IV. *Review of Minutes: May 24, 2007*

There were no changes to meeting minutes. Minutes were approved.

Handouts and Materials Provided:

- August 23, 2007 Agenda, July 26, 2007 Minutes, Roster
- CASQA Fact Sheet – Senate Constitutional Amendment 12 (SCA 12) 2007, Author: Senator Tom Torlakson (D), 7th Senate District

V. *Announcements*

A. ***CASQA Conference*** - Benjie announced that there would be a CASQA conference September 10th-12th in Costa Mesa. Attendees were advised to contact Bill Busath (City of Sacramento) by August 23, 2007 for hotel government rates. Tina Tuason added that CASQA was in need of moderators for the conference and briefly discussed what the duty of a moderator would consist of. Attendees were advised to visit the CASQA website at http://www.casqa.org/ or contact Kevin McGuillicutty at KMc@roscoemoss.com/323.263.4111 for more information.

B. ***Projected Rain Season*** - Tina noted that through a review of the projected rain season, it is expected that the season will be drier than usual.

C. ***Training*** – Benjie announced that the District would be holding its Annual NPDES Training sometime after October. He added that an effort will be made to offer training in the Murrieta and Desert areas. Registration information will be sent to Permittees via email. (Later in the meeting Benjie discussed that the District would either provide Construction training for Santa Ana Permittees prior to the rainy season or ask for a variance from the Regional Board from that permit requirement).

D. ***Hydromodification and LID Update*** – Benjie provided an update on hydromodification and LID, noting that the Stormwater Monitoring Coalition (SMC) obtained grant dollars to develop a LID manual for the Southern California Counties. Matt Yeager of San Bernardino County will be leading this effort. Benjie then added that on August 29th there would be an LID training session at the Inland Empire Utilities Agency.

E. ***Audit Update*** – Keith Elliott and Maria Macario reported that the audits for the cities of Lake Elsinore and Riverside County will be released after a review from management. San Jacinto and Hemet audits will be released a few weeks after Lake Elsinore and the County. The City of Beaumont is also under review.

F. ***Senate Constitutional Amendment 12 (SCA 12)*** – This amendment will provide extra funding for stormwater programs by allowing municipalities to charge a service fee for stormwater much like water, refuse and sewer fees.

Arlene Chun reported that there was a need for 3 republican Senators in which, a sample resolution template was emailed to Permittees several weeks ago in an effort to solicit the need to their city representatives. Arlene added that the legislative schedule is available on line.

G. ***MSC Meeting*** – Benjie informed the group that the August 16, 2007 MSC meeting was cancelled. The next MSC meeting is scheduled for September 20th.

H. ***ASCE*** – Arlene announced that ASCE Stormwater Committee will begin to host dinner sessions at the San Bernardino Hilton at 6:00 p.m. on September 19, 2007 to discuss NPDES stormwater issues. Cathy Jochai with Caltrans is the scheduled speaker for the September 19th session. Flyers about the dinner sessions were emailed to Permittees. Interested persons can register through PayPal. Please contact Arlene for more information.

VI. ***Public Education Program – Florence Mowrer***

Florence Mowrer reported on the efforts of the District's public education department. Items of discussion included:

- 3 advertising billboards posted in the Pedley, Beaumont and Mira Loma areas
- Ordering of additional Child I.D. Kits
- New and improved plastic distibution bags
- Mood pencils (available at meeting for Permittee taking)
- 2008 Calendar
- Santa Ana Cleanup – October 29th
- Public Ed's new trailer that will aid in the transporting of public education promotionals/materials. The trailer also displays the District's public ed logo and 800 number and will be used as an exhibit to promote public education awareness.

VII. ***TMDL Progress Report – Benjie Cho***

A. **Middle Santa Ana River Bacteria Indicator TMDL Update**

- **Next Meeting: Thursday, September 6, 2007 – 1:30 p.m. to 4:00 p.m.**
  Benjie confirmed the next Middle Santa Ana River Bacteria Indicator TMDL meeting date, adding that would be in attendance.

B. **Lake Elsinore/Canyon Lake TMDL**

- **Next Meeting: TBA at August 21, 2007 – 1:30 p.m. meeting**
  The Lake Elsinore In-Lake Nutrient Reduction Plan and Monitoring Reports were submitted to the Regional Board in draft form. Comments on the reports are due to the Regional Board August by 24th. TMDL issues were briefly discussed.
- **San Jacinto Septic System Management Plan** – This item was not discussed.

C. **San Diego Lagoons TMDL/Investigation Order** – Arlene informed the group that there was a draft released of the Quality Assurance Project Plan and comments are due to Matt Brookshire by August 24th. She added that there is also a final draft of

the Memoranda of Agreement circulating and the Investigative Order kicks off with Monitoring October 1st.

Tina informed attendees that Arlene is now the District's NPDES contact person regarding monitoring.

D. **TMDL NNE Study Bureau Workgroup** – Tina explained what the TMDL NNE Study was. She added that the Bureau of Reclamation is working with the San Diego Region on a third-party TMDL in the Santa Margarita Region. Traditionally, orders are written by the RWQCB. In a third-party order, the Permittees propose the order and the RWQCB comments on that order. Compliance of the order is carried out as normal.

Dell Ross provided an update on the actions of the August 21st NNE meeting with the Santa Margarita Regional Board.

VIII. ***Santa Ana/Santa Margarita Region Programs – Benjie Cho***

A. **Stormwater Quality Standards Task Force Update**

- **Next Meeting: Thursday September 6, 2007 from 9:30 a.m. to 1:30 p.m.** – Benjie informed the group that the next SWQTF meeting was scheduled for September 6th.

B. **Annual Reports ~ Santa Margarita** – Tina reported that a meeting was held prior to the August 23rd TAC meeting to discuss the 2006-2007 Santa Margarita Annual Report. Annual Reporting Forms are due to Tina by September 14th.

Brandi Outwin informed the cities of Murrieta and Temecula that she was in need of the latest version of Individual SWMPs to ensure that she is reviewing the most updated document. She asked that they submitt the documents via CD.

Benjie added that he will be sending out the Annual Reporting Forms for the Santa Ana Region the week of August 27th.

IX. ***Report of Waste Discharge/Permit Renewal – Benjie Cho***

Benjie inquired as to the status of the Permit. Keith informed him that the Permit was still being worked on to fit into a constantly changing state template and incorporating the TMDL language into the Permit. In addition, the Regional Board's SWAMP group is looking at the monitoring portions of the permit.

X. ***Open Discussion***

A. ***Santa Ana RWQCB*** – Keith asked that the District forward the Regional Board a letter requesting a variance from the Permit requirements since training is scheduled after October 1st. Michael Roth discussed with the group his public education concerns with the City of Riverside.

B. ***San Diego RWQCB*** – There were no comments from the San Diego Regional Board.

C. ***U.S. EPA – Region IX*** – There was no U.S. EPA representative present.

D. ***Round Table*** –There were no further comments from attendees.

XI. *New Agenda Items / Schedule Next Meeting*

The next NPDES TAC meeting is scheduled for September 27, 2007. If there are any questions or items for the next meeting agenda, please contact the Flood Control District's NPDES Section at 951.955.4375. Suggestions are always welcome.

Please visit the StormWater/CleanWater Protection Program website at: http://www.floodcontrol.co.riverside.ca.us. The site contains a variety of useful stormwater program information including links to other stormwater management programs and related websites.

NEXT MEETING IS SET FOR:

THURSDAY September 27, 2007 10:00 A.M.
AT
RIVERSIDE COUNTY FLOOD CONTROL DISTRICT
1995 Market Street
Riverside, CA 92501

P8/ 116087

Storm Water Clean Water PROTECTION PROGRAM

Member Agencies:

Banning
Beaumont
Calimesa
Canyon Lake
Cathedral City
Coachella
Coachella Valley Water District
Corona
County of Riverside
Desert Hot Springs
Hemet
Indian Wells
Indio
La Quinta
Lake Elsinore
Moreno Valley
Murrieta
Norco
Palm Desert
Palm Springs
Perris
Rancho Mirage
Riverside City
Riverside County Flood Control District
San Jacinto
Temecula

NPDES
SANTA ANA / SANTA MARGARITA
TECHNICAL COMMITTEE
Meeting Minutes
for
December 20, 2007

I. *Attendees:*

Arlene Chun	Riverside County Flood Control District
David Garcia	Riverside County Flood Control District
Penny Nanney	Riverside County Flood Control District
Tina Tuason	Riverside County Flood Control District
Charlene Warren	Riverside County Flood Control District
Mike Shetler	Riverside County Executive Office
Adriana Soares	Riverside County Transportation
Keith Elliott	CRWQCB – Santa Ana Region
Michael Roth	CRWQCB – Santa Ana Region
John Wilder	City of Beaumont
Mike McCabe	City of Calimesa
Bob French	City of Calimesa
Jack Porter	City of Canyon Lake
Michele Hindersinn	City of Corona
Jeff Potts	City of Corona
Linda Nixon	City of Hemet
Phoung Hunter	City of Moreno Valley
Kent Wegelin	City of Moreno Valley
Farida Naceem	City of Murrieta
Lori Askew	City of Norco
Jessica Chin	City of Riverside
Mike Yasmer	City of Riverside
Mike Emberton	City of San Jacinto
Aldo Licitra	City of Temecula
Bob Collacott	URS Corporation
Frank Tolerico	CONTECH Stormwater

II. *Introductions*

Arlene Chun welcomed everyone to the December 20, 2007 NPDES Santa Ana/Santa Margarita Technical Advisory Committee Meeting and initiated the self introductions of attendees. Tina Tuason introduced David Garcia as the new Permit Manager for the Santa Ana Region.

III. *Agenda Changes*

Arlene added items ***D*** and ***E*** to agenda item ***V - Announcements***.

IV. *Review of Minutes: November 15 , 2007*

There were no changes to meeting minutes. Minutes were approved.

Handouts and Materials Provided:

- December 20, 2007 Agenda, November 15, 2007 Minutes, and Roster
- CASQA News Flash 2007-07
- Fall 2007 Appointments to the Regional Water Quality Control Boards

V. *Announcements*

A. ***Annual Reports*** – Arlene announced that the Santa Ana Annual Report was submitted on November 30, 2007. Digital copies of the report were made available to Permittees during the meeting.

B. ***Training Update*** – Arlene announced that the Construction training was held in September and November at the District. Farida Naceem informed attendees that there would be Construction training from 9:00 a.m.-12:00 p.m. and Municipal training 1:00 p.m.-4:00 p.m. in the Council Chambers of Murrieta City Hall on January 17th. Tina advised attendees that the training classes were full and would work to accommodate those needing training.

C. ***Permit Renewal Update*** – Keith Elliott reported that the Permit is still being reviewed and hopes that it will be availabe to Permittees late January/early February.

D. ***Regional Board Assignments*** – Arlene provided attendees a brief update on Fall 2007 appointments to the Regional Water Quality Control Boards. There were 2 new appointments to Regions 8 and 9 and 3 new appointments to Region 7.

E. ***CASQA*** - Arlene announced that CASQA will be holding their Annual State Conference, January 11, 2008 in San Diego.

VI. *Public Education Program – Arlene Chun*

Arlene reported that the 2008 calendars had arrived as well as the Public Education Department's new trailer. Calendars were made available during the meeting. For public education materials please contact Florence Mowrer or Penny Skog.

Riverside County Flood Control and Water Conservation District
1995 Market Street • Riverside, CA 92501 • (951) 955-1200 • FAX (951) 788-9965

VII. *TMDL Progress Report – Arlene Chun*

A. Middle Santa Ana River Bacteria Indicator TMDL Update

- **Next Meeting - Thursday, January 24, 2008 – 1:30 p.m. to 4:00 p.m.**
  Arlene reported on the following items related to the Middle Santa Ana River Bacteria Indicator TMDL:
  - Urban Source Evaluatio Plan available
  - Plan due to be implemented in 2009
  - Plan needs to be reviewed by Permittees
  - Task Force Agreement signed by Regional Board on November 30th

B. Lake Elsinore/Canyon Lake TMDL

- **Next Meeting – Tuesday, January 29, 2008 from 1:30 p.m. to 4:00 p.m.**
  Arlene announced that the next Lake Elsinore/Canyon Lake TMDL meeting was scheduled for January 29th.

C. San Diego Lagoons TMDL/Investigation Order

- **Lagoons TMDL NNE Study Bureau Workgroup**
  Tina Tuason noted that there was a short conference call among the Bureau of Reclamation, Camp Pendleton, Riverside County, CDM and the cities of Murrieta and Temecula. Tina noted that the third 13267 Order addendum from the Regional Board was issued. Revised estimates for sampling and inlet surveys are estimated to cost $10,500. Funds must be received prior to the purchase request being made and funding must be received by January 21st. The MOA will be signed by the participating agencies around January 15, 2008. The monitoring teams are waiting to mobilize during the on-set of at least 1/2" of rain. The inlet sampling locations have been identified in compliance with the order. The ocean inlet sampling point will be as close as safely possible to where the lagoon dumps into the ocean. Based on a conversation with the RWQCB, data is not required in January and will be submitted to the Regional Board on April 1, 2008. A conference call is scheduled for February 19th.

VIII. *Santa Ana/Santa Margarita Region Programs – Arlene Chun*

A. Stormwater Quality Standards Task Force Update

Next Meeting: Thursday January 24, 2008 from 9:30 a.m. to 1:30 p.m.

Arlene reported that the topic of the November 15, 2007 Stormwater Quality Standards Task Force meeting was the Basin Plan Amendment. The Plan is tentatively scheduled to go before the Board November 2008.

IX. *Open Discussion*

A. ***Santa Ana RWQCB*** – Mike Roth noted that the Regional Board is looking to conduct a presentation during a future TAC meeting regarding post construction BMPs.

B. ***San Diego RWQCB – Not present.***

C. ***U.S. EPA – Region IX – Not present.***

D. ***Round Table – No discussion.***

Riverside County Flood Control and Water Conservation District
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XI. ***New Agenda Items / Schedule Next Meeting***

If there are any questions or items for the next meeting agenda, please contact the Flood Control District's NPDES Section at 951.955.4375. Suggestions are always welcome.

Please visit the "Only Rain Down the Storm Drain" Public Education Program website at: http://www.floodcontrol.co.riverside.ca.us. The site contains a variety of useful stormwater program information including links to other stormwater management programs and related websites.

NEXT MEETING IS SET FOR:

THURSDAY January 31, 2008 10:00 A.M.
AT
RIVERSIDE COUNTY FLOOD CONTROL DISTRICT
1995 Market Street
Riverside, CA 92501

Riverside County Flood Control and Water Conservation District
1995 Market Street • Riverside, CA 92501 • (951) 955-1200 • FAX (951) 788-9965

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NPDES
SANTA ANA/SANTA MARGARITA
TECHNICAL COMMITTEE
February 28, 2008 at 10:08
Revised April 30, 2008

I. Attendees

Arlene Chun	RCFC&WCD
David Garcia	RCFC&WCD
Charlene Warren	RCFC&WCD
Tina Tuason	RCFC&WCD
Mike Shetler	Co. of Riverside Exec. Office
Vicki Kuntz	Co. of Riverside Facilities Mgmt.
Glenn Higa	Co. of Riverside TLMA
Adrianna Soares	Co. of Riverside TLMA
Keith Elliott	CRWQB – Santa Ana Region
Maria Macario	CRWQB – Santa Ana Region
John Wilder	City of Beaumont
James Grimm	City of Canyon Lake
Jeff Potts	City of Corona
Linda Nixon	City of Hemet
Kent Wegelin	City of Moreno Valley
Lori Askew	City of Norco
Sandy Caldwell	City of Riverside
Mike Emberton	City of San Jacinto
Aldo Licitra	City of Temecula

II. Introductions
Mark Wills is the new Chief of Regulatory Division and can be reached at 951.955.8411.

III. Agenda Changes
No changes

IV. Review of Minutes: January 31, 2008

V. Announcements
- The cities need to work with the regional boards to address abandoned construction sites.
- If the cities are implementing programs for water quality that exceed permit requirements, make sure to document that in your annual report.

A. Training update
MS4 training will be April 15th thru April 17th in Riverside. There will be two training seminars here at Flood both on WQMP. Additional training sessions in Coachella Valley will be held April 22nd and will consist of one construction and one WQMP seminar, the WQMP will be more of an introduction and managers will be invited. Tina will add NPDES training information to our web page and registration will be available online. Further, the next TAC meeting will be held at the LID conference in Moreno Valley containing the training packet.

B. Permit Renewal Update
The draft Orange County permit issued by the San Diego RWQCB was considered in February. Revisions to their tentative order included requirements for FETD (Facilities that Extract, Treat and Discharge). They also talked about hydro modification, spill response, watershed, management facility, runoff, fiscal analysis and reporting modifications. The overall concern for the permittees was with FETD's. There were also concerns with unfunded mandates, LID, business plan and Hydro modification. Orange County wanted to simplify reporting and extend program development timeframes. Staff recommended the Board accept and adopt the permit as it stood. The Board did not adopt the tentative order. EPA opposed the Permit as too different from the draft Los Angeles County Permit. The board did not adopt the Permit and directed staff to address outstanding EPA issues. The permit can be brought back anywhere from summer to early fall.
Keith questioned USEPA's concern? Tina noted that they said the permit was not stringent enough and wasn't as prescriptive as the San Diego County permit. USEPA was concerned with the measurable goals, specific requirements for LID and new development with greater than 5% effective impermeable surfaces which must include consideration of hydrologic conditions of concern. There wasn't a means to track the WQMP BMP's to assure they are maintained post to construction. A meeting with the Southern California Regional Board executive officers is tentatively scheduled for mid April to discuss issues that EPA had and to develop a consistent approach within all the regional boards.

C. Santa Ana Annual Reports/Santa Margarita
CD's containing the Cities' annual reports are in electronic form. The electronic versions will be posted on the web. If there is more information that needs to be placed in the electronic reports to be posted on our website please respond to us with changes by Friday, March 7 and that information will be updated in our system. The information you provide will help make our annual report consistent and complete.

D. LID Seminar
Filterra, the City of Moreno Valley and individuals with the ASCE storm water committee are putting together an LID Seminar on March 27 from 10:00 to 2:00, lunch is provided. Arlene has asked that they allow government employees to attend for free and they have agreed. Jason Uhley has sent the okay to hold this meeting in lieu of next month's TAC

Meeting. Larry Coffman is considered the father of LID and works with Neil Weinstein and the LID center in Maryland. He will be the dynamic speaker for this event.

E. ASCE Stormwater Committee
ASCE San Bernardino/Riverside County section has set up a stormwater committee and Arlene has e-mailed the Santa Ana committee to see if you wish to be on a contact list for future dinner meetings, seminar, tours or workshops that are in the works. Please release your contact information to them and you will be added to the list. A handout was passed around regarding Flood Control's next dinner presentation that will be celebrating 70 years of service and be held in Ontario. The deadline is March 5 to sign up. All future presentations are set permanently up until the month of June.

F. CASQA
The CASQA general meeting on March 14 will be in San Francisco. Flood Control will have a video conferencing hosted here in Room 1 for those who will not attend the meeting in San Francisco.

V. Public Education Program

A. There will be a Riverside flower show April 19th and 20th where, in addition to our standard table, we will be posting an article in their flyer. Our outdoor, pets and pool Brochures are being updating. There are more calendars available. There will be a lighted billboard on Warwick Road in Corona that will be coming out. Flood Control has received a new trailer that is wrapped with our very own billboard "Only Rain Down the Storm Drain" and our 1.800 number on all four sides.

VI. TMDL Progress Reports

A. Middle Santa Ana River Bacteria Indicator TMDL Update
There hasn't been a meeting since the last TAC meeting. USAP is currently being reviewed. The Box Springs Channel is one of our sample sites that Flood Control has been looking at. Flood Control went out and took extra samples along with the City of Riverside to see if nutrients, detergents or bacteria have come out of the channel. The results have arrived but Jason has them and is attending another meeting.

B. Lake Elsinore/Canyon Lake TMDL Update
The next meeting is to be determined. The update is to the meeting notes which are on the meeting minutes of the last TAC meeting.

C. San Diego Lagoons TMDL/Investigation Order Update
There is a conference call scheduled for March 25 at 3:00 on water reuse. One of the topics will include discussion of the application of numeric nutrient endpoints to the Santa Margarita Watershed.

VII. Santa Ana/Santa Margarita Region Programs

A Stormwater Quality Standards Task Force Update

The meeting is going on February 28 at SAWPA. The next meeting will address the EPA comments on the draft basin plan amendment.

VIII. Open Discussion

A. Santa Ana RWQCB says the draft permits will be coming out late summer or early fall. The Construction permits should be out as a draft for public review any day now. No word on the industrial permit as of yet.

B. U.S. EPA has no representation

C. Round table has no further discussions

IX. New Agenda Items

No new items.

Storm Water Clean Water PROTECTION PROGRAM

Member Agencies:

Banning
Beaumont
Calimesa
Canyon Lake
Cathedral City
Coachella
Coachella Valley Water District
Corona
County of Riverside
Desert Hot Springs
Hemet
Indian Wells
Indio
La Quinta
Lake Elsinore
Moreno Valley
Murrieta
Norco
Palm Desert
Palm Springs
Perris
Rancho Mirage
Riverside City
Riverside County Flood Control District
San Jacinto
Temecula

NPDES
SANTA ANA / SANTA MARGARITA
TECHNICAL COMMITTEE
Meeting Minutes
for
January 31, 2008

I. Attendees:

Arlene Chun	Riverside County Flood Control District
David Garcia	Riverside County Flood Control District
Florence Mowrer	Riverside County Flood Control District
Penny Nanney	Riverside County Flood Control District
Tina Tuason	Riverside County Flood Control District
Jason Uhley	Riverside County Flood Control District
Charlene Warren	Riverside County Flood Control District
Mike Shetler	Riverside County Executive Office
Adriana Soares	Riverside County Transportation
Mary Bartholomew	CRWQCB – Santa Ana Region
Keith Elliott	CRWQCB – Santa Ana Region
Chuck Griffin	CRWQCB – Santa Ana Region
Michael Roth	CRWQCB – Santa Ana Region
Bob French	City of Calimesa
Mike McCabe	City of Calimesa
Jack Porter	City of Canyon Lake
Michele Hindersinn	City of Corona
Jeff Potts	City of Corona
Linda Nixon	City of Hemet
Phuong Hunter	City of Moreno Valley
Kent Wegelin	City of Moreno Valley
Farida Naceem	City of Murrieta
Lori Askew	City of Norco
Jessica Chin	City of Riverside
Mike Yasmer	City of Riverside
Aldo Licitra	City of Temecula
Mark Baker	CONTECH Stormwater
Mike Kimberlain	Kristar

II. *Introductions*

Jason Uhley welcomed everyone to the January 31, 2008 NPDES Santa Ana/Santa Margarita Technical Advisory Committee Meeting and initiated the self introductions of attendees.

III. *Agenda Changes*

A Regional Board Presentation was added as agenda item VIII. Items D (Audits) and E (District Staff Changes) were added under agenda item IV (Announcements).

IV. *Review of Minutes: December 20 , 2007*

There were no changes to meeting minutes. Minutes were approved.

Handouts and Materials Provided:

- January 31, 2008 Agenda, December 20, 2007 Minutes, and Roster
- Public Information/Education Report
- HHW Schedule January thru June 2008
- What to do with Household Hazardous Waste in Riverside County Brochure

V. *Announcements*

A. ***Annual Reports*** – Jason announced that though the Santa Ana Annual Report was submitted to the Regional Board on time, there were some files that did not make it into the hard copy of the report. An electronic copy, including all files of the Annual Report will be sent to the Regional Board, as well as a letter informing them of the issue. Tina Tuason announced that the Santa Ana and Santa Margarita Annual Reports are in the process of being made available on the District's website. Keith Elliott asked that Tina be sure that the documents posted to the internet are searchable (Optical Character Recognition). Jason noted that District staff would make sure that the main bodies of the reports were searchable, but that there were many attachments and tables that were provided in hard copy. Those attachments and tables would likely not be searchable, but they would at least be easily located in the electronic copies.

B. ***Training Update*** – Tina reported that notice will go out March 2008 for the April 2008 training classes. Classes will be in the Coachella, Murrieta, and Riverside areas. Jason added that due to production/cost related issues, training materials will be available on-line, in which training attendees can print their copies from there. Jason asked Permittees their thoughts regarding this recommended change. Permittees in attendance had no objection.

C. ***Permit Renewal Update*** – Jason addressed Regional Board staff in attendance as to the status of the Permit adoption date. Mike Roth reported that Regional Board staff is working to incorporate the TMDLs into the Permit requirements and there was no set date as to when the Permit will be adopted.

D. ***Audits*** – Jason reported that Tetra Tech conducted an audit on the District, Riverside County, and the cities of Murrieta and Temecula on behalf of the San Diego Regional Board. Jason added that the Board primarily reviewed the New Development, Monitoring, and IC/ID programs.

E. ***District Staff Changes*** – Jason announced that Steve Stump will no longer be Chief of Regulatory and has been assigned as Chief of Operation's and Maintenance. Mark Wills, a prior District NPDES Senior Engineer has been named the new Chief of Regulatory.

Riverside County Flood Control and Water Conservation District
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VI. *Public Education Program – Florence Mowrer*

Florence Mowrer provided Permittees an update on the efforts of the Public Education Department. The following items were addressed:

- District's IT Department working to make public education information more readily available on the web
- Public Education Department trailer in process of being wrapped with "Only Rain Down the Storm Drain " graphics
- HHW Schedule available (schedules provided at meeting)
- 2008 calendar inventory is low
- For the 2009 calendar production, Flo is soliciting photos of different areas in the cities from Permittees
- Water Education Center has become a partner of the Public Education Department
- Development of the construction brochure has been placed on hold
- Brochures addressing swimming pool issues are available

VII. *TMDL Progress Report – Jason Uhley*

A. Middle Santa Ana River Bacteria Indicator TMDL Update

- **Next Meeting - Thursday, February 28, 2008 – 1:30 p.m. to 4:00 p.m.**

  Jason gave an update on the following items relating to the Middle Santa Ana River Bacteria Indicator TMDL:

  - District staff in middle of implementing compliance monitoring and Urban Source Evaluation Plan, which Jason explained to Permittees
  - Results showing only 1 site (Box Springs channel) of testing positive for human contamination

  David Garcia gave a brief presentation regarding an IC/ID investigation of the Box Springs Channel Watershed. David noted that although the investigation was ongoing, no obvious human sources of fecal contamination were discovered.

B. Lake Elsinore/Canyon Lake TMDL

- **January 29, 2008 LE/CL TMDL Meeting**
- **Next Meeting – To Be Determined**
  - Next meeting in April 2008
  - 20 Stakeholders identified and entered into an Implementation Agreement to share costs of TMDL development
  - AG and Dairy Farmers share approximately 40% of costs but have not been identified, therefore monies from these stakeholders have not been received
  - Regional Board to be notified of cost issues in an effort to modify Implementation Agreement schedule
  - Study to be conducted to determine delisting of Canyon Lake TMDL for pathogens
  - Pros and cons of mobilizing for storms

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C. **San Diego Lagoons TMDL/Investigation Order**

- **January 29, 2008 Monitoring Group Meeting**
  The San Diego Regional Board presented the model that will be used to develop the Lagoon TMDLs. The Stakeholders' Advisory Group (SAG) representatives were confirmed and will convene at future dates to coordinate with the Regional Board in development of the TMDLs. Riverside County will be represented by Arlene Chun.
- **Next meeting – To Be Determined**
  Though the meeting date was not announced during the meeting, subsequently Arlene reported that the next meeting is scheduled for Tuesday, March 18, 2008 at 10 a.m. - 12:00 p.m. at the Bureau of Reclamation, Temecula.

D. ***Lagoons TMDL NNE Study Bureau Workgroup*** - MOA is in the process of being approved by respective Councils/Boards. Next meeting is February 19, 2008, 10 a.m. - 12:00 p.m. at the Bureau of Reclamation, Temecula.

VIII. ***Santa Ana/Santa Margarita Region Programs – Jason Uhley***

A. **Stormwater Quality Standards Task Force Update**

- **Next Meeting: Thursday February 28, 2008 from 9:30 a.m. to 1:30 p.m.**
  - Basin Plan Amendment being compiled
  - Water Quality standards being changed on Temescal Canyon Wash

IX. ***Open Discussion***

A. ***Santa Ana RWQCB – No discussion***
B. ***San Diego RWQCB – Not present***
C. ***U.S. EPA – Region IX – Not present***
D. ***Round Table – No discussion***

X. ***Regional Board Presentation – Chuck Griffin***

Chuck Griffin conducted a presentation on the continuing dumping of landowners of waste materials, such as concrete, into creeks of both San Bernardino County and Riverside County (Lytle Creek, San Timoteo Creek, Temescal Canyon).

XI. ***New Agenda Items / Schedule Next Meeting***

If there are any questions or items for the next meeting agenda, please contact the Flood Control District's NPDES Section at 951.955.4375. Suggestions are always welcome.

Please visit the "Only Rain Down the Storm Drain" Public Education Program website at: http://www.floodcontrol.co.riverside.ca.us. The site contains a variety of useful stormwater program information including links to other stormwater management programs and related websites.

NEXT MEETING IS SET FOR:

THURSDAY, February 28, 2008 10:00 A.M.
AT
RIVERSIDE COUNTY FLOOD CONTROL DISTRICT
1995 Market Street
Riverside, CA 92501

Riverside County Flood Control and Water Conservation District
1995 Market Street • Riverside, CA 92501 • (951) 955-1200 • FAX (951) 788-9965

Storm Water Clean Water PROTECTION PROGRAM

Member Agencies:

Banning
Beaumont
Calimesa
Canyon Lake
Cathedral City
Coachella
Coachella Valley Water District
Corona
County of Riverside
Desert Hot Springs
Hemet
Indian Wells
Indio
La Quinta
Lake Elsinore
Moreno Valley
Murrieta
Norco
Palm Desert
Palm Springs
Perris
Rancho Mirage
Riverside City
Riverside County Flood Control District
San Jacinto
Temecula

NPDES
SANTA ANA / SANTA MARGARITA
TECHNICAL COMMITTEE
Meeting Minutes
for
July 26, 2007

I. Attendees:

Benjie Cho	Riverside County Flood Control District
Linda Garcia	Riverside County Flood Control District
Tina Tuason	Riverside County Flood Control District
Jason Uhley	Riverside County Flood Control District
Charlene Warren	Riverside County Flood Control District
Mike Shetler	Riverside County Executive Office
Marianna Hernandez	Riverside County Transportation
Keith Elliott	CRWQCB – Santa Ana Region
Mike Roth	CRWQCB – Santa Ana Region
Brandi Outwin	CRWQCB – San Diego Region
John Wilder	City of Beaumont
Jack Porter	City of Canyon Lake
Michele Colbert	City of Corona
Linda Nixon	City of Hemet
Jerry Jackson	City of Moreno Valley
Lori Askew	City of Norco
Sandy Caldwell	City of Riverside
Mike Emberton	City of San Jacinto
Aldo Licitra	City of Temecula
Frank Tolerico	CONTECH Stormwater Solutions
Mohamed Worayeth	Bureau Veritas North America, Inc.
Mike Kimberlain	Kristar

II. *Introductions*

Jason Uhley welcomed everyone to the July 26, 2007 NPDES Santa Ana/Santa Margarita Techincal Committee Meeting and initiated the self introductions of attendees.

III. *Agenda Changes*

Item E (Conferences) was added under agenda item V (Announcements).

IV. *Review of Minutes: May 24, 2007*

There were no changes to meeting minutes. Minutes were approved.

Handouts and Materials Provided:

- July 26, 2007 Agenda, May 24, 2007 Minutes, Roster

V. *Announcements*

A. ***May 17th MSC Meeting Update*** - Benjie informed the group that during the May 17th MSC Meeting City Managers were updated on the status of the TMDLs.

B. ***IRWM Update*** - Jason provided an update on the efforts of the 4 IRWM plans that the Department of Water Resources has been working to award grant proposals.

1. San Jacinto IRWM – This IRWM has been in progress for sometime. Work will soon begin to build the outline and text of the document.
2. Santa Margarita IRWM – Over the course of the past 4 months Stakeholders led by Rancho California Water District have been working on the Upper Santa Margarita Watershed IRWM. Several projects in the IRWM will be available for Prop 50 funds and the remainder will be eligible for future Prop 84 planning and implementation dollars in the near future. Brandi Outwin inquired about whether or not the Lower Santa Margarita River Watershed will be included in the Upper Santa Margarita IRWM. Jason responded that several attempts have been made, however at this time the 2 indivdual plans (the Upper and Lower Santa Margarita River) will remain seperate.
3. Coachella Valley IRWM – Development of an IRWM for the Whitewater Watershed is currently being discussed among interested parties.
4. SAWPA Santa Ana IRWM – District staff and the cities of Riverside and Corona have been attending Watershed Pillar meetings to help define strategies, goals and objectives for the watershed.

C. ***Hydromodification and LID Update*** – Jason reported that San Diego County is working on their Hydromodification and LID Plan (a meeting is scheduled for July 26th). District staff has been coordinating with San Diego County on these efforts. Jason added that Dan Cloak who wrote the Contra Costa Low Impact Design manual is scheduled to conduct a presentation August 2nd at 11:00 a.m. at the District on the Contra Costa experiences with developing a LID and hydromodification plan. Jason added the District is working to install various types of Low Impact Development BMPs through out the District compound. Funding details still need to be worked out. The purpose would be to develop BMP monitoring and testing data. Brandi offered San Diego Regional Board's assistance with these efforts.

D. ***Audit Update*** – Mike Roth reported that the Regional Board is working to have the audit reports complete by September 7th.

E. ***Conferences*** – Jason provided Permittees a summary of his attendance at the monitoring conference in San Diego and the TMDL conference in Washington he attended. Jason noted that the monitoring conference in Sacramento covered the use of various hydrologic models to address TMDL modeling. One of the key points of the conference was appropriate use of the models. It was noted that there is significant error associated with many of the models due to lack of data, erroneous data, modeling assumptions, user error and many other factors. Many presenters recommended that the models may be more appropriately used to evaluate relative change caused by implementation of management measures.

Jason also noted that he attended a TMDL conference in Seattle, Washington. The conference focused on implementation of Use Attainability Analysis and Adaptive Implementation in the TMDL process. Jason noted that US EPA strongly supported the use of both in the development of TMDLs and said EPA recommended that state regulators take a common sense approach for implementation. In addition, Jason noted that the other focus of the conference seemed to be efforts to implement nutrient and pathogen TMDLs. The Santa Ana RWQCB MSAR TMDL and SWQTF efforts appear to be on the cutting edge of efforts nationwide based on the presentations. Jason also noted that there were at least two other lakes, including Clear Lake and another lake in Oregon that appeared to have similar issues to Lake Elsinore.

Discussion ensued among the group regarding issues surrounding TMDLs.

VI. ***Public Education Program – Tina Tuason***

There was no public education report for the month of July. Tina Tuason announced that the public education backpacks used by the District's Public Education department has had a positive impact on the counties of Orange and Los Angeles, who too have begun to use the backpacks as public education awareness promotionals.

VII. ***TMDL Progress Report – Jason Uhley***

A. **Middle Santa Ana River Bacteria Indicator TMDL April 19th Update**

Future Meetings ~ August 23, 2007, 1:30 p.m. to 4:00 p.m. - Jason announced that the next TMDL meeting for the Middle Santa Ana River Bacteria Indicator TMDL is scheduled for August 23rd. He added that the monitoring plan is near completion.

- **Tour of Santa Ana Monitoring Stations April 11th Update** – There was no discussion on this item.

B. **Lake Elsinore/Canyon Lake TMDL**

- **Future Meetings ~ August 8, 2007, 1:30 p.m. - 4:00 p.m. -** Jason announced that the next TMDL meeting for the Lake Elsinore/Canyon Lake TMDL is scheduled for August 8th. He then discussed the two plans that Permittees are to develop for the TMDL, the Lake Elsinore Nutrient Management Plan and the Canyon Lake In Lake Monitoring Program.

*****Please note that the August 8rd meeting has been rescheduled from August 8th to August 21st. Meeting time remains set as 1:30 p.m. to 4:30 p.m. at EVMWD.*

- **San Jacinto Septic System Management Plan** – There was no discussion on this item.

C. **San Diego Lagoons TMDL/Investigation Order**

- **Lagoons TMDL NNE Study Bureau Workgroup** – Linda Garcia updated attendees on the San Diego Lagoon TMDL noting that the draft agreement had been released for review and the next step is to get the agreement signed. Further discussion ensued on the following items:

  - The Numeric Nutrient Endpoints (NNE) study prepared by Tetra Tech has been finalized and will be ready in the month of August.
  - A Stakeholder field visit to the Santa Margarita lagoon to evaluate sampling locations which is scheduled for July 30th.
  - San Diego Regional Board is working on a Basin Plan Amendment to address natural background sources of bacteria in an effort to exempt them from being regulated. In turn, a stakeholder committee has been formed by the San Diego Regional Board consisting of representatives from each of the major watersheds. Jason has been appointed the representative for the Santa Margarita Watershed.
  - Regional Board has asked for technical comments on the Basin Plan Amendment by August 9th, which Jason will be evaluating and providing those comments.

VIII. ***Santa Ana/Santa Margarita Region Programs – Benjie Cho***

A. **Stormwater Quality Standards Task Force Update**

- **Future Meetings – August 23, 2007 from 9:30 a.m. to 1:30 p.m.** – Draft of Basin Plan Amendment language to be sent to EPA for approval sent to stakeholders.

*******Please note that the August 23rd meeting has been rescheduled from August 23rd to September 6th. Meeting time remains set as 9:30 a.m. to 1:30 p.m. at SAWPA.***

B. **Orange County Stormwater Permit Update** – A revised copy of the Permit was released in early July. Brandi stated that the Permit is scheduled to go before the Board for approval in September and there had been no comments on the Permit from Permittees to date.

Keith Elliott added that it is anticipated that the the Santa Ana Regional Board's Orange County MS4 Permit will be released in 2007 and adopted in 2008. A draft of the Permit should be available by early October 2007.

IX. ***Report of Waste Discharge/Permit Renewal Workgroup – Benjie Cho***

This item was discussed as part of the Orange County Stormwater Permit Update.

X. ***Open Discussion***

A. ***Santa Ana RWQCB*** – There were no comments from the Santa Ana Regional Board.

B. ***San Diego RWQCB*** – There were no comments from the San Diego Regional Board.

C. ***U.S. EPA – Region IX*** – There was no U.S. EPA representative present.

D. ***Round Table*** – Aldo Licitra announced that there would be a CASQA conference September 10th - 12th in Costa Mesa. Jason recommended that Permittees try attending the conference in efforts to stay up to speed on regulatory programs.

XI. ***New Agenda Items / Schedule Next Meeting***

The next NPDES TAC meeting is scheduled for August 23, 2007. If there are any questions or items for the next meeting agenda, please contact the Flood Control District's NPDES Section at 951.955.4375. Suggestions are always welcome.

Please visit the StormWater/CleanWater Protection Program website at: http://www.floodcontrol.co.riverside.ca.us. The site contains a variety of useful stormwater program information including links to other stormwater management programs and related websites.

NEXT MEETING IS SET FOR:

THURSDAY August 23, 2007 10:00 A.M.
AT
RIVERSIDE COUNTY FLOOD CONTROL DISTRICT
1995 Market Street
Riverside, CA 92501

P8/

Storm Water Clean Water PROTECTION PROGRAM

Member Agencies:

Banning
Beaumont
Calimesa
Canyon Lake
Cathedral City
Coachella
Coachella Valley Water District
Corona
County of Riverside
Desert Hot Springs
Hemet
Indian Wells
Indio
La Quinta
Lake Elsinore
Moreno Valley
Murrieta
Norco
Palm Desert
Palm Springs
Perris
Rancho Mirage
Riverside City
Riverside County Flood Control District
San Jacinto
Temecula

NPDES
SANTA ANA / SANTA MARGARITA
TECHNICAL COMMITTEE
Meeting Minutes
for
May 22, 2008

I. ***Attendees:***

Albert Martinez	Riverside County Flood Control District
Tina Tuason	Riverside County Flood Control District
Jason Uhley	Riverside County Flood Control District
Doug Thompson	Riverside County Flood Control District
Charlene Warren	Riverside County Flood Control District
Mike Shetler	Riverside County Executive Office
Steve Horn	Riverside County Facilities Management
Claudia Steiding	Riverside County Facilities Management
Adriana Soares	Riverside County Transportation
Keith Elliott	CRWQCB – Santa Ana Region
Ann Iaali	CRWQCB – Santa Ana Region
Maria Macario	CRWQCB – Santa Ana Region
Mike Roth	CRWQCB – Santa Ana Region
Bob French	City of Calimesa
Mike McCabe	City of Calimesa
James Grimm	City of Canyon Lake
Michele Hindersinn	City of Corona
Jeff Potts	City of Corona
Linda Nixon	City of Hemet
Kent Wegelin	City of Moreno Valley
Jessica Chin	City of Riverside
Tim King	City of Riverside
Al Pielin	City of Riverside
Mark Baker	CONTECH Stormwater
Bob Collacott	URS Corporation

II. *Introductions*

Jason Uhley welcomed everyone to the May 22, 2008 NPDES Santa Ana/Santa Margarita Technical Advisory Committee Meeting and initiated the self introductions of attendees. Tina Tuason asked that Permittees review the roster and sign in sheets to make sure the correct information is listed for their cities. NPDES city/county contact information and updates should be forwarded to Charlene Warren at CharleneWarren@rcflood.org.

III. *Agenda Changes*

Items E and F were added under Agenda Item V - Announcements.

IV. *Review of Minutes: April 24, 2008*

Doug Thompson was listed under Agenda Item I – Attendees as a representative of the District. Correction: He is a representative of County Environmental Health.
Agenda Item VIII B - Notes that the General Construction Permit is due to be adopted June 4, 2008. Correction: June 4th is not the adoption date of the Permit but rather a hearing date.

Handouts and Materials Provided:

- May 22, 2008 Agenda, April 24, 2008 Minutes, and Roster
- CASQA NewsFlash #s 2008-07 ~ 2008-10
- Clean Water Summit Partners – No Drugs Down the Drain! Campaign (May 2008)

V. *Announcements*

A. ***Whitewater Permit*** – The Colorado Region MS4 Permit was adopted May 21, 2008.

B. ***Permit Renewal Update*** – Keith Elliott reported that there was no set date as to when the Permit will be adopted but it will be closer to the end of 2008.

C. ***Notice of Violation*** – The County of Riverside received an NOV from the Santa Ana Regional Board. The District, County and cities of Murrieta and Temecula also received an NOV from the San Diego Regional Board regarding the Monitoring Program. City, County and District staff are working to respond to the NOVs.

D. ***CASQA Call for Papers – Annual Conference – Deadline May 23, 2008*** – Jason announced that the deadline to submit Call for Papers to CASQA for the annual conference is tomorrow (May 23rd). The District will be supporting two presentations at the Conference. The first regards the Middle Santa Ana River Bacteria Monitorning Program and the other regards the Pesticides Monitoring and Toxicity Testing ongoing in the Santa Margarita Watershed. He recommended that Permittees consider giving presentations on their NPDES Programs at the conference.

E. ***District Staffing Issues*** - Tina will be rotating from the NPDES Section to the Development Review Section July 3rd. Claudio Padres will be taking over as the new Santa Margarita Region Permit Manager.

F. ***Rain Predicted this Weekend*** – Jason announced that rain was predicted for the weekend and advised Permittees to talk to their construction inspectors to make sure they are watching any construction sites that may be active at the time.

VI. *Public Education Program – Jason Uhley*

Jason provided a brief update on the efforts of the Public Education Program. Discussion included:

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- Air Show at March Air Force Base – District staff was in attendance distributing public education information and received a substantial number of survey forms from the public.

- Several New Brochures to Focus on Outreach – Horse, garden, pet waste management and outdoor activities brochures to be developed/updated. Brochures are hoped to be available by the end of the fiscal year.

VII. *TMDL Progress Report – Jason Uhley*

A. Middle Santa Ana River Bacteria Indicator TMDL Update

- Next Meeting - Thursday, June 5, 2008 – 1:30 p.m. to 4:00 p.m.
  Jason reported that Stephan Wuertz will be giving a presentation and summary on his analysis of the bacteriodes data that has been collected by the TMDL Task Force for the Middle Santa Ana River TMDL. He will also be providing an analysis of the data. Dr. Stanley Grant will also be giving a presentation on his study of the outfall of the RP1 treatment plant in Riverside.

  Jason also discussed the human bacteriodes that had been detected in the Box Springs Channel. It was determined that a sewer cross connection on Riverside Community College property may be the source of the bacteriodes. The District, Riverside Community College and the City of Riverside are working together to abandon the cross connection and eliminate the contamination in the channel.

B. Lake Elsinore/Canyon Lake TMDL Update

- Next Meeting – Tuesday, June 24, 2008, 1:00 p.m.
  The Request for Qualifications (RFQ) is out for watershed monitoring. The District has received and is evaluating three proposals from interested parties. Keith Elliott stated that he was under the impression that monitoring would begin in 2010, when additional stations would need to be monitored. Jason informed him that Permittees felt that it would be more appropriate to have a consultant begin working on the existing monitoring program in an effort to get them familiar with the monitoring sites and procedures as well as the fact that staffing changes and losses have overwhelmed the District's NPDES Section in their monitoring efforts.

C. San Diego Lagoons TMDL/Investigation Order Update

- Next Meeting – USBR, Wednesday, June 18, 2008 - 1:30 p.m. to 3:30 p.m.
  There was a failure with one of the continuous monitoring sondes used by SDSU, resulting in data that was not able to be used. The Lagoon Task Force is now developing procedures to quality control data to make sure erroneous data is not submitted to the Regional Board.

VIII. *Santa Ana/Santa Margarita Region Programs – Jason Uhley*

A. Stormwater Quality Standards Task Force Update

- Next Meeting: Thursday, June 5, 2008 from 9:30 a.m. to 1:30 p.m.
  Permittees were informed that this will be a important meeting to attend in as the future of the Task Force may be determined. District staff will be in attendance of the meeting.

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B. **General Construction Permit – June 4, 2008 Hearing –** The Draft Construction Permit is out for review and a hearing is scheduled for June 4th. Tina will be working closely with Barbara Klos of URS to submit comments on the Draft Permit to the State Board. There last workshop for the Permit was held May 21st in Sacramento. A draft of the comment letter will be forwarded to Permittiees prior to its submittal. Permittees were asked to provide their thoughts on the comment letter.

IX. ***Open Discussion***

A. ***Santa Ana RWQCB*** – Maria reported that the online copy of the Regional Board Basin Plan had been updated on their website.

B. ***San Diego RWQCB – Not present***

C. ***U.S. EPA – Region IX – Not present***

D. ***Round Table*** – No discussion.

X. ***New Agenda Items / Schedule Next Meeting***

There were no agenda item requests from the group.

If there are any questions or items for the next meeting agenda, please contact the Flood Control District's NPDES Section at 951.955.4375. Suggestions are always welcome.

Please visit the "Only Rain Down the Storm Drain" Public Education Program website at: http://www.floodcontrol.co.riverside.ca.us. The site contains a variety of useful stormwater program information including links to other stormwater management programs and related websites.

NEXT MEETING IS SET FOR:

THURSDAY, June 26, 2008 10:00 A.M.
AT
RIVERSIDE COUNTY FLOOD CONTROL DISTRICT
1995 Market Street
Riverside, CA 92501

Riverside County Flood Control and Water Conservation District
1995 Market Street • Riverside, CA 92501 • (951) 955-1200 • FAX (951) 788-9965

Storm Water Clean Water PROTECTION PROGRAM

Member Agencies:

Banning
Beaumont
Calimesa
Canyon Lake
Cathedral City
Coachella
Coachella Valley Water District
Corona
County of Riverside
Desert Hot Springs
[illegible]net
Indian Wells
Indio
La Quinta
Lake Elsinore
Moreno Valley
Murrieta
Norco
Palm Desert
Palm Springs
Perris
Rancho Mirage
Riverside City
Riverside County Flood Control District
San Jacinto
[illegible]ecula

NPDES
SANTA ANA / SANTA MARGARITA
TECHNICAL COMMITTEE
Meeting Minutes
for
November 15, 2007

I. Attendees:

Tina Tuason	Riverside County Flood Control District
Jason Uhley	Riverside County Flood Control District
Charlene Warren	Riverside County Flood Control District
Maria Macario	CRWQCB – Santa Ana Region
John Wilder	City of Beaumont
Jack Porter	City of Canyon Lake
Michele Hindersinn	City of Corona
Jeff Potts	City of Corona
Linda Nixon	City of Hemet
Phoung Hunter	City of Moreno Valley
Kent Wegelin	City of Moreno Valley
Farida Naceem	City of Murrieta
Lori Askew	City of Norco
Sandy Caldwell	City of Riverside
Jessica Chin	City of Riverside
Mike Yasmer	City of Riverside
Aldo Licitra	City of Temecula
Bob Collacott	URS Corporation
Dell Ross	EMARCD

II. *Introductions*

Jason Uhley welcomed everyone to the November 15, 2007 NPDES Santa Ana/Santa Margarita Technical Advisory Committee Meeting and initiated the self introductions of attendees.

III. *Agenda Changes*

There were no changes to the agenda.

IV. *Review of Minutes: October 25, 2007*

There were no changes to meeting minutes. Minutes were approved.

Handouts and Materials Provided:

- November 15, 2007 Agenda, October 27, 2007 Minutes, and Roster
- CASQA News Flash 2007-05
- CASQA Update, November 12, 2007
- CASQA Meeting Notice & Agenda, November 16, 2007
- Hydromodification and SUSMP Public Workshop
- RCFC&WCD Associate Engineer Air/Water Quality Control job recruitment flyer

V. *Announcements*

A. ***Annual Reports*** – Jason provided a brief update on the status of the Annual Report, noting that the report was coming along fine. He briefly discussed MS4 mapping and the Annual Report tables. An Annual Report status sheet will be emailed to Permittees.

B. ***Training Update*** – Tina informed attendees that the November 19th Industrial Commercial training class at CVWD had been canceled due to low enrollment and an additional WQMP training class was opened for November 29th at the District. Tina added that classes were filling up quickly and advised Permittees to get their employees signed up as soon as possible. Training attendance rosters will be emailed to Permittees prior to training.

C. ***Permit Renewal Update*** - Maria Macario stated that she was uncertain as to the exact date of when the draft Permit would be released.

VI. *Public Education Program – Florence Mowrer*

Tina reported that the 2008 calendars were expected to arrive any day and can be requested via email. Please contact Florence Mowrer or Penny Skog for public education materials.

VII. *TMDL Progress Report – Benjie Cho*

A. **Middle Santa Ana River Bacteria Indicator TMDL Update**

- **Next Meeting - Thursday, November 29, 2007 – 1:30 p.m. to 4:00 p.m.**
  Jason announced that the next meeting would be held November 29th. He added that SAWPA had released a Urban Source Evaluation Plan for review. Santa Ana Permittees were asked to review the document to assure they are comfortable with specifically, Section 4 of the document.

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B. **Lake Elsinore/Canyon Lake TMDL**

- **Next Meeting – Tuesday, November 27, 2007 from 1:30 p.m. to 4:00 p.m.**
  Jason announced that the next meeting for the Lake Elsinore/Canyon Lake TMDL was scheduled for November 27th. The highest priority item for the Task Force at this time is the Canyon Lake Bacteria TMDL. The Regional Board has asked the Task Force to fund a monitoring program to monitor bacteria concentration in Canyon Lake. A follow up meeting will be scheduled with the Regional Board to discuss what the monitoring program should reflect. Jason also discussed the possibility of delisting Canyon Lake.

C. **San Diego Lagoons TMDL/Investigation Order**

- **Lagoons TMDL NNE Study Bureau Workgroup**
  The County of Riverisde and cities of Temecula and Murrieta has released the final agreement and is awaiting approval of the agreement by your respective governing bodies. Jason added that the Bureau of Reclamation on behalf of the Rancho California Water District and Camp Pendleton is conducting a study of the lower part of the Santa Margarita River.

VIII. ***Santa Ana/Santa Margarita Region Programs – Benjie Cho***

A. **Stormwater Quality Standards Task Force Update**
Next Meeting: Thursday November 29, 2007 from 9:30 a.m. to 1:30 p.m.
Jason announced that the next meeting was scheduled for November 29th. Jason noted that the topic of discussion will be the draft report prepared for EPA identifying the direction the Task Force is headed in terms of the Basin Plan Amendment. Work is still being conducted on the Temescal Creek Use Attainability Analysis.

IX. ***Open Discussion***

A. ***Santa Ana RWQCB –***

B. ***San Diego RWQCB –***

C. ***U.S. EPA – Region IX –***

D. ***Round Table*** – Jason informed attendees that Benjie Cho's last day with the District would be December 5, 2007. Jason also informed attendees that he, himself will be out of the office for approximately 3 weeks on paternity leave.

XI. ***New Agenda Items / Schedule Next Meeting***

If there are any questions or items for the next meeting agenda, please contact the Flood Control District's NPDES Section at 951.955.4375. Suggestions are always welcome.

Please visit the "Only Rain Down the Storm Drain" Public Education Program website at: http://www.floodcontrol.co.riverside.ca.us. The site contains a variety of useful stormwater program information including links to other stormwater management programs and related websites.

NEXT MEETING IS SET FOR:

THURSDAY December 20, 2007 10:00 A.M.
AT
RIVERSIDE COUNTY FLOOD CONTROL DISTRICT
1995 Market Street
Riverside, CA 92501

Riverside County Flood Control and Water Conservation District
1995 Market Street • Riverside, CA 92501 • (951) 955-1200 • FAX (951) 788-9965

Storm Water Clean Water PROTECTION PROGRAM

Member Agencies:

Banning
Beaumont
Calimesa
Canyon Lake
Cathedral City
Coachella
Coachella Valley Water District
Corona
County of Riverside
Desert Hot Springs
Hemet
Palm Wells
Indio
La Quinta
Lake Elsinore
Moreno Valley
Murrieta
Norco
Palm Desert
Palm Springs
Perris
Rancho Mirage
Riverside City
Riverside County Flood Control District
San Jacinto
Temecula

NPDES
SANTA ANA / SANTA MARGARITA
TECHNICAL COMMITTEE
Meeting Minutes
for
October 25, 2007

I. Attendees:

Benjie Cho	Riverside County Flood Control District
Tina Tuason	Riverside County Flood Control District
Jason Uhley	Riverside County Flood Control District
Charlene Warren	Riverside County Flood Control District
Doug Thompson	Riverside County Environmental Health
Mike Shetler	Riverside County Executive Office
Adrianna Soares	Riverside County Transportation
Keith Elliott	CRWQCB – Santa Ana Region
Brandi Outwin	CRWQCB – San Diego Region
John Wilder	City of Beaumont
Bob French	City of Calimesa
Mike McCabe	City of Calimesa
Jack Porter	City of Canyon Lake
Michele Hindersinn	City of Corona
Jeff Potts	City of Corona
Linda Nixon	City of Hemet
Phoung Hunter	City of Moreno Valley
Kent Wegelin	City of Moreno Valley
Farida Naceem	City of Murrieta
Lori Askew	City of Norco
Jessica Chin	City of Riverside
Mike Yasmer	City of Riverside
Aldo Licitra	City of Temecula
Laura Klages	Bureau Veritas North America, Inc.
Mike Kimberlain	Kristar
Vaiko Allen	CONTECH Stormwater Solutions
Frank Tolerico	CONTECH Stormwater Solutions

II. *Introductions*

Jason Uhley welcomed everyone to the October 25, 2007 NPDES Santa Ana/Santa Margarita Technical Advisory Committee Meeting and initiated the self introductions of attendees.

III. *Agenda Changes*

Item F - Recruitment/Changes was added under agenda item V – Announcements.

IV. *Review of Minutes: September 27, 2007*

There were no changes to meeting minutes. Minutes were approved.

Handouts and Materials Provided:

- October 25, 2007 Agenda, September 27, 2007 Minutes, and Roster
- HHW Schedule and ABOP Centers flyers

V. *Announcements*

A. ***Annual Reports*** –Tina Tuason announced that the Santa Margarita Annual Report is due to the San Diego Regional Board October 31, 2007. She added that she had received the cities submittals and any MS4 mapping information not already submitted should be forwarded to Bill Rhoades of the District ASAP. Also, the District's report was approximately 90%-95% complete. Tina mentioned that the individual annual reports require wet signatures by Friday, October 26, 2007. The Annual Report will be submitted to SDRWQCB and EPA.

Benjie announced that the Santa Ana Annual Report is due to the Santa Ana Regional Board November 30, 2007.

B. ***Training Update*** – Tina announced that Fall training information was sent to Permittees via email October 25, 2007. Training locations are in Coachella, Murrieta, and Riverside. There will be no Construction training held in the Riverside area.

Tina reported that the District had received good comments about AEI-CASCs training classes from participants. AEI-CASC has been retained to conduct all training classes for the District.

Jason added that this would be the first set of training classes for the fiscal year. He then dicussed Permit requirements in regards to training and advised Permittees to get their new employees scheduled for training.

C. ***October 18, 2007 MSC Meeting Update*** - Benjie provided a summary of the following topics discussed at the October 18, 2007 MSC Meeting:

- District's LID Project
- Monitoring results from the Santa Ana TMDL
- Audits/NOVs/ACLs
- The City Managers requested a presentation on the Renewal General Construction Permit and and the Santa Ana Municipal NPDES Permit

D. ***Legislative Update*** – Jason provided an update on the following legislative bills:

- SB1001 – This bill reduces the number of Regional Water Quality Control Board members from nine to seven and eliminates the appointment categories. It also allows the State Board to revoke a Regional Board's authority if the State Board concludes that the Regional Board is deficient and does not take appropriate corrective action.

  AB739 – This bill will provide the framework for assessing the success of municipal stormwater programs. It will also require the State Board and the Department of Water Resources to develop grant criteria for their respective grants, Proposition 84 and 1E, to identify areas to coordinate their grant programs for maximum benefits. For more information please go to http://www.leginfo.ca.gov/bilinfo.html.

E. ***Permit Renewal Update*** - Permittees and Regional Board staff discussed the following regarding the Permit Renewal:

- Orange County audits being reviewed
- NOV issued to the City of Beaumont
- Riverside County, Lake Elsinore, and San Bernardino County audits being focused on the Santa Ana Regional Board
- The release order of the draft Permits will be Orange, then San Bernardino, and finally Riverside County.

F. ***Recruitment/Changes*** – The following announcements were made regarding District recruitments and NPDES representative changes:

- District has advertised to recruit for a chemical/water quality specialist position
- Benjie will be leaving the District to work for the County Transportation Department. His last day will be December 5, 2007.
- Michael Rawson (District's Assistant Chief Engineer) will be retiring on December 5, 2007
- Brandi Outwin will be leaving the San Diego Regional Board and will be working for the Santa Ana Regional Board. Jimmy Smith will be the San Diego Regional Board contact for NPDES related issues. Tina thanked Brandi for her participation in the TAC meetings

VI. ***Public Education Program – Florence Mowrer***

Tina provided the following update on the efforts of the District's Public Education Department.

- Pet IDs similar to the Child IDs promotionals provided by the public education department are available to Permittees.
- "Only Rain Down the Storm Drain" stickers are available.
- Public Education Events – Animal Friends of the Valley Spooktacular Pet Parade October 27th in Temecula and Tire Collection Event October 27th in Mead Valley (public ed. materials were provided to these agencies for distribution).

- The 2008 calendars are in production.

VII. *TMDL Progress Report – Benjie Cho*

A. Middle Santa Ana River Bacteria Indicator TMDL Update

- **Next Meeting - Thursday, November 29, 2007 – 1:30 p.m. to 4:00 p.m.**
  Jason reported that monitoring for the Middle Santa Ana River Bacteria Indicator TMDL has been in place for approximately 3 months and monitoring data is being collected for the TMDL. Jason discussed exceedances in the Box Springs watershed, and the need for a source evaluation. The next meeting is scheduled for November 29th.

B. Lake Elsinore/Canyon Lake TMDL

- **Next Meeting – Tuesday, October 30, 2007 from 1:30 p.m. to 4:00 p.m.**
  Jason announced that the next meeting for the Lake Elsinore/Canyon Lake TMDL was scheduled for October 30th.

Canyon Lake Pathogen TMDL – Jason informed attendees that this TMDL is currently in the implementation mode and briefly discussed the following items:

- CEQA Scoping meeting October 22nd
- Regional Board's decision not to move forward with TMDL
- E. coli data shows the lake is in compliance
- Monitoring data will continue to be collected (to be discussed at next meeting)

C. San Diego Lagoons TMDL/Investigation Order

- **Lagoons TMDL NNE Study Bureau Workgroup**
  Jason updated attendees on the following items relating to the San Diego Lagoons TMDL/Investigation Order:

  - Third Adendum to the TMDL issued by the Regional Board about two weeks ago which added survey work to be done at the mouth of the lagoon
  - Cost estimates/Cost Share Agreement in final draft form
  - Meeting with San Diego Regional Board 2 weeks ago regarding the Santa Margarita River TMDL (to start in about 2 years, not a high priority for Regional Board)
  - Study draft provided by Bureau of Reclamation
  - NNE based on determination

VIII. *Santa Ana/Santa Margarita Region Programs – Benjie Cho*

A. Stormwater Quality Standards Task Force Update

Next Meeting: Thursday November 29, 2007 from 9:30 a.m. to 1:30 p.m. – Benjie announced that the next meeting date for the Stormwater Quality Standards Task Force is scheduled for November 29th. The following items were discussed:

- Changes to REC 1 standards that would eliminate the need for dry weather Canyon Lake TMDL
- A strawman Basin Plan Amendment is available

- First draft of technical support document released for Temescal

IX. ***Open Discussion***

A. ***Santa Ana RWQCB*** – Michael Roth announced that on October 30th, several members of the Regional Board will be going on a field trip in Huntington Garden to learn about how cactus can help in landscaping for water conservation in which he extended an invitation to Permittees. Meeting at RCRCD November 13th from 8-noon regarding plant selection for water conservation, eroision control, and low impact development.

B. ***San Diego RWQCB*** – Brandi informed attendees that Tetratech now goes by PG Environmental. She added that the Regional Board is waiting for audit evaluation reports from PG Environmental.

Brandi encouraged Permittees to follow up on Permit fire requirements due to the recent fires throughout the area to make sure they are in compliance with the Permit.

C. ***U.S. EPA – Region IX*** – There was no U.S. EPA representative present.

D. ***Round Table*** – Jason informed attendees that CASQA has been working with the California Department of Pesticide Regulation for changing labeling requirements for a number of pesticides.

XI. ***New Agenda Items / Schedule Next Meeting***

Due to the Thanksgiving holiday the next NPDES TAC meeting is scheduled for November 15, 2007. If there are any questions or items for the next meeting agenda, please contact the Flood Control District's NPDES Section at 951.955.4375. Suggestions are always welcome.

Please visit the "Only Rain Down the Storm Drain" Public Education Program website at: http://www.floodcontrol.co.riverside.ca.us. The site contains a variety of useful stormwater program information including links to other stormwater management programs and related websites.

NEXT MEETING IS SET FOR:

THURSDAY November 15, 2007 10:00 A.M.
AT
RIVERSIDE COUNTY FLOOD CONTROL DISTRICT
1995 Market Street
Riverside, CA 92501

P8/116945

Storm Water Clean Water PROTECTION PROGRAM

Member Agencies:

Banning
Beaumont
Calimesa
Canyon Lake
Cathedral City
Coachella
Coachella Valley Water District
Corona
County of Riverside
Desert Hot Springs
Hemet
Indian Wells
Indio
La Quinta
Lake Elsinore
Moreno Valley
Murrieta
Norco
Palm Desert
Palm Springs
Perris
Rancho Mirage
Riverside City
Riverside County Flood Control District
San Jacinto
Temecula

NPDES
SANTA ANA / SANTA MARGARITA
TECHNICAL COMMITTEE
Meeting Minutes
for
September 27, 2007

I. Attendees:

Benjie Cho	Riverside County Flood Control District
Florence Mowrer	Riverside County Flood Control District
Penny Nanney	Riverside County Flood Control District
Tina Tuason	Riverside County Flood Control District
Jason Uhley	Riverside County Flood Control District
Charlene Warren	Riverside County Flood Control District
Mike Shetler	Riverside County Flood Control District
Glenn Higa	Riverside County Transportation
Adrianna Soares	Riverside County Transportation
Mike Roth	CRWQCB – Santa Ana Region
Maria Macario	CRWQCB – Santa Ana Region
Brandi Outwin	CRWQCB – San Diego Region
John Wilder	City of Beaumont
Bob French	City of Calimesa
Mike McCabe	City of Calimesa
Bob Bohan	City of Canyon Lake
Michele Hindersinn	City of Corona
Jeff Potts	City of Corona
Linda Nixon	City of Hemet
Phoung Hunter	City of Moreno Valley
Kent Wegelin	City of Moreno Valley
Farida Naceem	City of Murrieta
Lori Askew	City of Norco
Jessie Powell	City of Perris
Dion Castrol	City of Riverside
Jessica Chin	City of Riverside
Mike Yasmer	City of Riverside
Mike Emberton	City of San Jacinto
Aldo Licitra	City of Temecula
Jamie Aderhold	J2A Environmental
Bob Collacott	URS Consulting
Frank Tolerico	CONTECH Stormwater Solutions

II. *Introductions*

Jason Uhley welcomed everyone to the September 27, 2007 NPDES Santa Ana/Santa Margarita Technical Committee Meeting and initiated the self introductions of attendees.

III. *Agenda Changes*

There were no changes to the agenda.

IV. *Review of Minutes: August 23, 2007*

There were no changes to meeting minutes. Minutes were approved.

Handouts and Materials Provided:

- September 27, 2007 Agenda, August 23, 2007 Minutes, Roster

V. *Announcements*

A. ***Annual Reports*** – Benjie Cho announced that the Santa Ana Annual Report is due November 30, 2007. Annual reporting forms were emailed to Permittees are due back to Benjie by October 8th.

B. ***Training*** – Benjie reported that to meet Permit requirements, Construction training was provided on September 24th and 25th. He added that there would be additional training scheduled by Tina Tuason in the upcoming weeks. Attendance sign-in sheets will be provided to Permittees. Attendees engaged in a brief discussion regarding training.

C. ***MSC Meeting Update - September 20, 2007*** ~ Benjie provided a brief summary of the September 20, 2007 MSC meeting. Items of discussion at the MSC meeting included:

- Legislative Bills
- Audits/NOVs/ACLs
- Draft Construction Permit

Jason added that City Managers were put on notice that Santa Ana Permit was currently pending.

D. ***Legislative Update*** – Jason provided an update on the following legislative bills:

- Senate Constitutional Amendment (SCA) 12 – This bill moves to exempt stormwater and urban runoff fees from Prop 218 (formerly, ACA 10 of previous Legislative Session) to allow municipalities to charge a service fee for stormwater compliance activities. No action has been taken on this bill.
- SB1001 Establishes Regional Boards of 5 members with minimum 10 years experience in improving water quality. Members must have experience/degree in biological science, public sector finance, urban planning, public health, and environmental justice.
- AB739 would require the State Water Resources Control Board (SWRCB) to develop a comprehensive framework for evaluating the effectiveness of municipal stormwater management programs by promoting the use of quantifiable measures. It would also require the SWRCB and Regional Water Quality Control Boards (RWQCB) to include requirements for evaluating and

reporting on stormwater management program effectiveness in municipal stormwater permits issued under the federal Clean Water Act and the state's Porter-Cologne Water Quality Control Act; and

Establish criteria by which the State Water Resources Control Board (SWRCB) and the Department of Water Resources (DWR) award grants for stormwater management projects funded by Proposition 1-E flood bonds and Prop 84 resources bonds approved by voters at the November 2006 election.

For more information please go to http://www.leginfo.ca.gov/bilinfo.html.

E. ***Contech Maintenanace Demonstration October 2, 2007 8:30 a.m. at Orange Crest Promenade*** – Jason announced Contech's Maintenance Demonstration October 2, 2007 at the Orange Crest Promenade. Information regarding the demonstration was previously emailed to Permittees.

F. ***Contect Post TAC Meeting Presentation – October 25, 2007 (following SA/SM TAC Meeting)*** – Jason announced that Contect will be conducting a presentation October 25, 2007 immediately following the TAC meeting. Lunch to be provided.

G. ***CASQA Conference*** – Jason reported on the CASQA conference held from September 10th – 12th. Topics of the conference were:

- Low Impact Design (LID)
- General Construction Permit
- Hydromodification
- Program Implementation
- BMPs in watersheds
- TMDLs

Jason added that an effort is being made to hold a future CASQA conference in the Desert area.

VI. *Public Education Program – Florence Mowrer*

Florence Mowrer reported on the efforts of the District's public education department. She noted that she was currently working on the annual reports. Items of discussion included:

- Conservation District efforts to work with teachers to conduct presentation and increase presentation numbers
- Revamp of outreach education program to California teaching standards
- Efforts to pass message of stormwater pollution prevention
- Billboard in Lake Elsinore to go up October 1, 2007
- Curb markers available

Flo further expressed the need to educate the public on stormwater pollution prevention. She added that on October 3rd and 4th Riverside Convention Center will be having Step 8 conference in which the District's public education department will participating in to distribute public education materials/promotionals and promote public awareness. An

invitation was extended to Permittees to visit events that the public education department participates in.

VII. *TMDL Progress Report – Benjie Cho*

A. Middle Santa Ana River Bacteria Indicator TMDL Update

- **Next Meeting - Thursday, October 11, 2007 – 1:30 p.m. to 4:00 p.m.**
  Jason stated that EPA has approved the TMDL. He stated that Permittees have entered into an Implementation Agreement to implement the TMDL. Pat Boldt has organized a coalition of Agricultural operators to join Permittees in the Implementation Agreement. Jason added that an amendment will be made to the Implementation Agreement to include Agricultural operators within the next several months. Jason recommended that cities who are affected by the Middle Santa Ana River TMDL attend the October 11th meeting.

B. Lake Elsinore/Canyon Lake TMDL

- **September 25, 2007 – 1:30 p.m. Meeting Update (Next Meeting TBA)**
- **Canyon Lake CEWA Scoping Meeting – October 22, 2007 from 2:00 p.m. to 5:00 p.m. at EMWD**

Jason informed attendees that this TMDL is currently in the implementation mode. He added that Tim Moore presented his draft Lake Elsinore Nutrient Sediment Reduction Plan at the last TMDL - TAC meeting. Though this is a plan representing one task, it includes a schedule to completely modify all other tasks that are identified in the TMDL. Jason recommended that Permittees review the plan and provide comments by Friday, September 28th. Other items of discussion included:

- TMDL requirements
- Development of a pollutant trading plan
- Sediment reduction for Canyon Lake
- Design issues with the aeration system
- The plan proposes new biological monitoring requirements
- Costs associated with TMDL
- New bacteria TMDL proposed for Canyon Lake

C. San Diego Lagoons TMDL/Investigation Order

- **Lagoons TMDL NNE Study Bureau Workgroup**

There is a requirement for stakeholders in the the Santa Margarita Watershed to monitor the Santa Margarita Lagoon to collect data necessary to develop a TMDL. Jason noted that initiation of water quality monitoring is soon to begin.

There is also a Santa Margarita River Nutrient TMDL that has been proposed. There is a Regional Board meeting scheduled for October 4th to discuss this TMDL.

Tina Tuason reported that the contract has been awarded and monitoring is due to begin in the Santa Margarita region October 1st. The next meeting is scheduled for November 13th at 10:00 a.m. at the Bureau of Reclamation in Temecula.

D. **TMDL NNE Study Bureau Workgroup** – There was no discussion on this item.

VIII. ***Santa Ana/Santa Margarita Region Programs – Benjie Cho***

A. **Stormwater Quality Standards Task Force Update**

- **Next Meeting: Thursday October 11, 2007 from 9:00 a.m. to 1:30 p.m.** – Benjie informed the group that the next SWQTF meeting was scheduled for October 11th. He then discussed REC 1 and REC 2 uses, proposed basin plan amendment change from fecal coliform to e. coli and draft language.

Jason informed the group that the District is working to facilitate a LID testing and monitoring site on District grounds. The focus on the design and contruction will be to facilitate the collection of monitoring and testing data.

Annual Reports ~ Santa Margarita – There was a pre-meeting prior to the NPDES September 27th TAC meeting to discuss the Santa Margarita Annual Report.

IX. ***Report of Waste Discharge/Permit Renewal – Benjie Cho***

There was no discussion on this item.

X. ***Open Discussion***

A. ***Santa Ana RWQCB*** – Maria Macario reported that review of the audits were still being conducted.

B. ***San Diego RWQCB*** – Brandi Outwin reported on the recent audits of Murrieta, Temecula, County and the District conducted by the San Diego Regional Board. She noted that the San Diego Regional Board only provided the Permittees one week's notice of the audit. In addition, Brandi mentioned that Tetratech is promoting techniques for short-notice inspections and this may become the norm moving forward and future notice may be same day.

C. ***U.S. EPA – Region IX*** – There was no U.S. EPA representative present.

D. ***Round Table*** –There were no further comments from attendees.

XI. ***New Agenda Items / Schedule Next Meeting***

The next NPDES TAC meeting is scheduled for September 27, 2007. If there are any questions or items for the next meeting agenda, please contact the Flood Control District's NPDES Section at 951.955.4375. Suggestions are always welcome.

Please visit the StormWater/CleanWater Protection Program website at: http://www.floodcontrol.co.riverside.ca.us. The site contains a variety of useful stormwater program information including links to other stormwater management programs and related websites.

NEXT MEETING IS SET FOR:

THURSDAY October 25, 2007 10:00 A.M.
AT
RIVERSIDE COUNTY FLOOD CONTROL DISTRICT
1995 Market Street
Riverside, CA 92501

P8/ 116667

SMREMT MEETINGS

Meeting Agenda

SANTA MARGARITA RIVER WATERSHED
EXECUTIVE MANAGEMENT TEAM

January 15, 2008
1:30 – 3:30 PM

U.S. Bureau of Reclamation
Southern California Area Office
Conference Room
27708 Jefferson Avenue, Suite 202
Temecula, CA 92590
(951) 695-5310

1. Welcome, Introductions and Agenda Review

2. Discussion of the Draft SMR Phase 4 Plan of Study

   Proposed Tasks
   Proposed Schedule
   Proposed Cost Sharing

3. Next Steps

4. Next meetings

   February 19, 2008
   March 18, 2008
   April 15, 2008

SANTA MARGARITA RIVER WATERSHED EXECUTIVE MANAGEMENT TEAM

April 16, 2008
1:30 – 3:30 PM

U.S. Bureau of Reclamation
Southern California Area Office
27708 Jefferson Avenue, Suite 202
Temecula, CA 92590
(951) 695-5310

1:30	**Introductions**
1:35	**Discussion** 1. March 19 2008 Meeting Minutes 2. Update on Lagoon and Mainstem monitoring projects 3. Stakeholder Meeting 4. Recycled water & irrigation return flows 5. Phase 4 POS Draft MOA Cost Allocation Agency Budget Status Next Steps
3:30	**Next Meetings** May 21 2008 June 18 2008

Meeting Agenda

SANTA MARGARITA RIVER WATERSHED
EXECUTIVE MANAGEMENT TEAM

August 20, 2008
10:00 – 12:00 PM

U.S. Bureau of Reclamation
Southern California Area Office
27708 Jefferson Avenue, Suite 202
Temecula, CA 92590
(951) 695-5310

1. Introductions

2. General Update
   a. WQMG
   b. Stakeholder Meeting
   c. Studies – Lagoon & Mainstem
   d. Phase 4

3. MOA Review

4. Phase 4 Scope of Work

5. Next Steps / Meeting

Meeting Agenda

SANTA MARGARITA RIVER WATERSHED
EXECUTIVE MANAGEMENT TEAM

March 19, 2008
1:30 – 3:30 PM

U.S. Bureau of Reclamation
Southern California Area Office
27708 Jefferson Avenue, Suite 202
Temecula, CA 92590
(951) 695-5310

1. Welcome, Introductions and Agenda Review

2. SMR Phase 4
   a. Plan of Study
   b. Flow Chart –lays out the work with specific products
   c. Draft cost estimate

3. What's next?
   a. With committed non-Federal cost sharing
      1.) Conduct Phase 4 effort
   b. Without cost non-Federal cost sharing
      1.) ?

4. Next EMT meetings

   April 16, 2008
   May 21, 2008
   ??????????

LAGOON MEETINGS

Meeting Agenda

Santa Margarita River Watershed
Executive Order Lagoon TMDL Sampling

February 19, 2008
10:00 AM to 12:00 PM

U.S. Bureau of Reclamation
Southern California Area Office
27708 Jefferson Avenue, Suite 202
Temecula, CA 92590
(951) 695-5310

1. Introductions
2. Stakeholder Update
   a. MOA Schedule
   b. Funding
3. RWQCB Update
4. Monitoring Update
5. Q&A / Next Steps
6. Next Meeting:

   April 15 2008 – 10:00 AM to 12:00 PM

Meeting Agenda

Santa Margarita River Watershed

Executive Order Lagoon TMDL Sampling

May 20, 2008
10:00 AM to 12:00 PM

U.S. Bureau of Reclamation
Southern California Area Office
27708 Jefferson Avenue, Suite 202
Temecula, CA 92590
(951) 695-5310

1. Introductions
2. Stakeholder Update
3. Data Submittal QA/QC Review
4. Monitoring Update
5. Bathymetry Update
6. Next Meeting:

   June 17 2008 – 10:00 AM to 12:00 PM

Meeting Agenda

Santa Margarita River Watershed

Executive Order Lagoon TMDL Sampling

July 15, 2008
10:00 AM to 12:00 PM

U.S. Bureau of Reclamation
Southern California Area Office
27708 Jefferson Avenue, Suite 202
Temecula, CA 92590
(951) 695-5310

1. Introductions

2. Contractor Update

   a. Index 3
   b. Inlet Survey
   c. Field & Lab data – QA
   d. Bathymetry: 2007 aerial v. 2002 work

3. MOA / Next invoices

4. Other

5. Next Meeting:

   August 19 2008 – 10:00 AM to 12:00 PM

Meeting Agenda

Santa Margarita River Watershed
Executive Order Lagoon TMDL Sampling
August 21, 2007

U.S. Bureau of Reclamation
Southern California Area Office
27708 Jefferson Avenue, Suite 202
Temecula, CA 92590
(951) 695-5310

1. Introductions, Update and Agenda Review (5 min)
2. Discussion of QAPP (30 min)
3. Break (Optional - 5 min)
4. Discussion of QAPP (30 min)
5. Identify remaining comments on Cost Share and MOU (10 min)
6. Other issues / Overview of initial schedule of activities (10 min)
7. Next meeting October 16, 2007 10:00 AM – 11:30 AM
8. Called meeting if needed September 18, 2007 10:00 AM – 11::30 AM

Meeting Agenda

Santa Margarita River Watershed
Executive Order Lagoon TMDL Sampling
October 16, 2007

U.S. Bureau of Reclamation
Southern California Area Office
27708 Jefferson Avenue, Suite 202
Temecula, CA 92590
(951) 695-5310

1. Introductions, Update and Agenda Review
2. Update on SD RWQCB & SCCWRP meetings
3. Discuss 3rd Addendum to the Investigative Order
4. MOA Discussion
5. Additional Comments / Questions / Discussion
6. Next Meetings:

   December 18 2007 – 10:00 AM to 12:00 PM
   February 19 2008 – 10:00 AM to 12:00 PM
   April 15 2008 – 10:00 AM to 12:00 PM

Meeting Agenda

Santa Margarita River Watershed
Executive Order Lagoon TMDL Sampling

November 20, 2007
10:00 AM to 12:00 PM

U.S. Bureau of Reclamation
Southern California Area Office
27708 Jefferson Avenue, Suite 202
Temecula, CA 92590
(951) 695-5310

1. Introductions
2. 3rd Addendum Status
3. Fieldwork Update
4. MOA Discussion
5. Q & A
6. Next Meetings:

   December 18 2007 – 10:00 AM to 12:00 PM
   February 19 2008 – 10:00 AM to 12:00 PM
   April 15 2008 – 10:00 AM to 12:00 PM

Meeting Agenda

Santa Margarita River Watershed
Executive Order Lagoon TMDL Sampling

December 18, 2007
10:00 AM to 12:00 PM

U.S. Bureau of Reclamation
Southern California Area Office
27708 Jefferson Avenue, Suite 202
Temecula, CA 92590
(951) 695-5310

1. Introductions
2. 3rd Addendum Update
3. RWQCB: 12062007 Meeting Summary
4. MOA Discussion
5. December - January Monitoring Efforts
6. Next Meetings:

   February 19 2008 – 10:00 AM to 12:00 PM
   April 15 2008 – 10:00 AM to 12:00 PM

Meeting Agenda

Santa Margarita River Watershed
Executive Order Lagoon TMDL Sampling
July 17, 2007

U.S. Bureau of Reclamation
Southern California Area Office
27708 Jefferson Avenue, Suite 202
Temecula, CA 92590
(951) 695-5310

1. Introductions and Agenda Review
2. Discussion of the final SCWWRPS Work Plan
3. Discussion of Initial schedule of activities
4. Discussion of Proposed Sampling plan and data monitoring
5. Discussion of Cost sharing
6. Discussion of MOU
7. Other issues
8. Next meeting – August 21, 2007

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<#>Southern California Coastal Water Research Project (SCCWRP)¶
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WQMG MEETINGS

Santa Margarita River Watershed
Water Quality Monitoring Group

Subj: Notes from Meeting at Executive Management Team on March 19. 2008

Meeting Purpose: To share water quality-related information and discuss the group's Strategic Plan

Attendees:
USBR – Greg Krzys
Pechanga – Helen Rain Waqui
Stetson Engineers – Scott Thomas - consultant
Camp Pendleton – Brian Shin
Camp Pendleton – Larry Carlson -consultant-OWR
RCFC&WCD – Arlene Chun
San Diego County – Joanna Wisniewska, Jaime Jensen
EMA RCD – Pam Nelson, Bob Wheeler, Vicki Long
Mission RCD – Judy Mitchell, Beth Principe
Watermaster – Chuck Binder
UCSD – John Helley
WMWD – Fahkri Manghi
League of Women Voters – Charlotte Fox

1. Greg Krzys led introductions and reviewed the agenda.

2. Greg provided an update on the Lagoon TMDL monitoring activities. Monitoring started October 1. Index period sampling took place in early February. There was a meeting of the Lagoon TMDL Group with RWQCB staff two weeks ago to discuss project status. One concern is that the group may need to perform a costly bathymetric survey of the lagoon inlet.

3. Scott Thomas provided an update on the Mainstem Monitoring program. The first 2 quarterly sampling events took place during November and February. The index period sampling for nutrients took place during late January and early February, in coordination with the Lagoon monitoring. A handout was provided to the group listing the key watershed management questions that guide the monitoring program. The WQ database is nearing completion, and the first semi-annual report is due in April.

4. Joanna Wisniewska provided a presentation on the TMDL monitoring on rainbow Creek. The program has been ongoing since 2004, sampling 13 stations. The county is determining concentrations of constituents as well as loading. Preliminary results show elevated phosphorus levels near agricultural operations. Larry Carlson stated that high nitrate levels in groundwater may drive surface water nitrogen levels for many years regardless of TMDL-mandated actions taken to reduce anthropogenic

Santa Margarita River Watershed
Water Quality Monitoring Group

contributions. However, Joanna did state that the stream appears to be phosphorus-limited, rather than N-limited.

5. Joanna also provided a presentation on a periphyton study in Rainbow Creek. The study sampled benthic algae, floating macroalgae, and water quality at 10 sites during four quarterly events spanning 2005-2006, including a reference site on Stone Creek. Multiple regression analyses were somewhat inconclusive, and it appears that more data are needed. Findings show that total phosphorus levels correlate with algae, however total nitrogen vary inversely with algae, which is unexpected.

6. Pam Nelson discussed the grant application submitted to CALFED and the Department of Conservation to fund a Watershed Coordinator, whose job it would be to form a Watershed Council and to update and implement the existing Watershed Management Plan. The applicants should know during April if grant funding has been approved. Scott mentioned that the watershed Coordinator would likely be heavily involved in obtaining grant funding and conducting outreach.

7. Scott reviewed the potential reference streams chosen during the January meeting. These include the following:

   - Upper Watershed
     - Cahuilla Creek above Reservation (Tributary to Temecula Creek)
     - Wilson Creek (Reed Valley) (Tributary to Vail Lake/Temecula Creek)
     - Cottonwood Creek (upper) (Tributary to Temecula Creek)
     - **Chihuahua Creek above ranches (Tributary to Temecula Creek)**
     - **Arroyo Seco (Aqua Tibia Wilderness. Tributary to Temecula Creek)**
   - Middle Watershed
     - **Cole Creek (Santa Rosa Plateau. Tributary to Murrieta Creek)**
     - **Slaughterhouse Creek (Santa Rosa Plateau. Tributary to Murrieta Creek)**
     - Pechanga Creek above Reservation (Tributary to Temecula Creek)
     - Tucalota Creek east of RV park (Tributary to Lake Skinner/Murrieta Cr.)
   - Lower Watershed
     - **Adobe Creek (Santa Rose Plateau. Tributary to Sandia Creek))**
     - **Roblar Creek (Tributary to Deluz Creek)**
     - **Stone Creek (Tributary to SMR Mainstem)**

   Pam Nelson discussed her preliminary investigation of Upper Watershed sites. Several locations on Chihuahua Creek show promise. Cottonwood Creek access appears limited by private property. Arroyo Seco appears very promising. Arlene Chun stated that the MS4 program samples Cole, Adobe, and Slaughterhouse Creeks already. The mainstem monitoring project is currently sampling on Roblar Creek, with some basic data collected on Stone Creek. It appears at this point that the most promising subset of reference creeks are those highlighted in BOLD in the list above. More work will be done to refine the list.

Santa Margarita River Watershed
Water Quality Monitoring Group

8. Scott reviewed the group's Strategic Plan goals and objectives. Having completed the plan, the group now must decide which actions to take to realize the goals. The group does not have a budget at this time and most members are limited in the amount of time they can spend working to carry out the plan. The following goals (including some of the objectives nested within them) appear feasible at this point without an infusion of funding:

   - Goal #3 – Assist EMT in answering the watershed management questions.
   - Goal #4 – Provide technical water quality advice, education, and outreach to watershed stakeholders.

   UCSD and some other members are ready to assist in using science to answer some of the management questions and raise our level of understanding of the watershed. Many of the member agencies are sharing data for inclusion in the WQ database. There was discussion regarding Objective 4.D - Designate a subcommittee to monitor watershed land use planning and notify Group of potential water quality issues. The RCDs have volunteered to take on this task. Objective 4.A. regarding an Lessons Learned program may not require very much funding and may add great value, providing a consolidation of our growing knowledge of water quality and related issues in the waterhsed.

9. Greg and Scott discussed the upper watershed tour scheduled for May 17th. The tour will focus on areas above Vail Lake that were not covered very well during the last tour in 2005. The preliminary itinerary includes the following sites:

   - Vail Lake
   - Arroyo Seco
   - Temecula Creek
   - Chihuahua Creeek
   - Sunrise Summit and Shadow Mountain Vineyard (lunch)
   - Cottonwood Creek
   - Terwilliger Valley
   - Cahuilla Creek
   - Wilson Creek
   - Tucolota Creek

10. Greg announced that the Prop 84 funding may infuse $93 million for SOCAL, however none of that is currently earmarked for SMR projects.

11. Action Items:

    a. Next meeting is in conjunction with watershed tour on May 17th.
    b. Scott Thomas to plan logistics for the tour.

Santa Margarita River Watershed
Water Quality Monitoring Group

c. Scott Thomas and Pam Nelson to investigate/ground truth potential sampling sites on reference streams.
d. MRCD and EMA-RCD to monitor watershed land use planning and notify Group of potential water quality issues associated with proposed plans and projects.

Santa Margarita River Watershed
Water Quality Monitoring Group

Meeting Agenda
10:00 a.m. – 12:00 p.m.
January 15, 2008
U.S. Bureau of Reclamation

1. Welcome, Introductions and Review Agenda - USBR

2. Discuss Monitoring Programs
   a. Lagoon - USBR
   b. Mainstem - Stetson

3. Provide Update on SMR WQ Database - Stetson

4. Discuss Impacts of Recent Storms - Stetson

5. Discuss Regulatory Issues – SD RWQCB

6. Provide IRWMP Updates
   a. Rancho California – USBR/EMA RCD
   b. SD County – Mission RCD

7. Update on Watershed Coordinator Grant – EMA RCD/Stetson

8. Continuing Discussion of Strategic Plan (Mission, Vision, Goals) – Stetson
   a. Discuss Role of WQMG Relative to Executive Management Team
   b. Review Mission & Choose Among 3 Competing Visions

9. Review Set of Proposed Reference Water Bodies in Watershed - Stetson
   a. Upper Watershed
   b. Middle Watershed
   c. Lower Watershed

10. Discuss Plan for Upper Watershed Tour – Stetson

11. Discuss Potential Locations for Weather Stations in Middle and Upper Watershed - UCSD

12. Next Steps - USBR
    a. Identify Subject Matter for Future Meetings
       - Review Mainstem Monitoring Semi-annual Report
       - Continuing Review of Strategic Plan – Goals
       - Review results of Conceptual Modeling
    b. Set Date for Next Meeting - March 18th

Santa Margarita River Watershed
Water Quality Monitoring Group

Meeting Agenda
9:30 – 12:00 p.m. September 18, 2007
U.S. Bureau of Reclamation
27708 Jefferson Road, Suite 202
Temecula, CA 92591

Meeting Purpose:

1. Update on water quality program and project developments in the watershed
2. Where do we go from here?

Agenda:

1. Welcome, Introductions and Agenda Review (5 min)

2. Prior meeting Re-Cap: Model Development (5 min)

3. Proposition 84: update (10 min)

4. Update on watershed projects (10 min)
   Projects:
   - Lagoon TMDL
   - Main Stem Water Quality Data Collection (Camp Pendleton-Reclamation)
   - Watershed Council (EMA-RCD)
   - Watershed Restoration (EMA-RCD)

5. Mini Presentations (20 min)
   - Periphyton Bioassessment
   - Nutrient Numeric Endpoint Case Study

6. Break (10 min)

7. Where do we go from here? (80 min)
   - Review & comment on Mission, Vision & Goals
   - What are the short term priorities & issues (next 6 months)?
   - What are the long term priorities & issues?
   - What are the data needs for short & long-term monitoring?
   - What are the current data gaps?
   - Sampling Needs: who, what, where & when?
   - Develop a list or library of past watershed studies/monitoring projects

8. Next Steps (10 min)
   - Identify subject matter for next meeting
   - Review FY 2008 meeting schedule

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Board Room¶
42135 Winchester Rd¶

Comment [NR1]: Need to determine location – that Library Room was nice for a large group.

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(951) 296-6900¶

Comment [NR2]: Need to revise but should be include the following:
▪Stakeholder input on options available for path forward
▪Discuss data availability
▪Update group on activities of last year

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We should provide water and soft drinks for break.

Santa Margarita River Watershed
Water Quality Monitoring Group

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Meeting Agenda
10:00 a.m. – 12:00 p.m.
November 13, 2007
U.S. Bureau of Reclamation

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Rancho California Water District
Board Room¶
42135 Winchester Rd¶

Comment [NR1]: Need to determine location – that Library Room was nice for a large group.

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(951) 296-6900¶

1. Welcome, Introductions and Agenda Review

2. Monitoring Updates

   a. Lagoon
   b. Mainstem
   c. SMR WQ database

3. RWQCB Meeting

4. Subcommittee Update

5. New Issues

   a. Fire and Monitoring
   b. Reference Sites
   c. Watershed Tour

6. Next Steps
   - Identify subject matter for next meeting
   - Review FY 2008 meeting schedule

Comment [NR2]: Need to revise but should be include the following:
- Stakeholder input on options available for path forward
- Discuss data availability
- Update group on activities of last year

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Comment [JST3]: We may want to have maps and posters mounted on the side walls to aid discussion.

We should provide water and soft drinks for break.

SOUTHERN CALIFORNIA STORMWATER MONITORING COALITION (SMC)

Minutes of the
Stormwater Monitoring Coalition of Southern California

September 18, 2007
At the Riverside County Flood Control District

Attendees:	
Jaime Avila	State Water Resources Control Board
Donna Chen	City of Los Angeles
Arlene Chun	Riverside County Flood Control District
Chris Crompton	County of Orange Resources and Development Management Dept.
Karl Dreher	Caltrans
Ken Schiff	Southern California Coastal Water Research Project
Jimmy Smith	San Diego Regional Water Control Board
Maged Soliman	Los Angeles County Dept of Public Works
Xavier Swamikannu	Los Angeles Regional Water Quality Control Board
David Thomas	Ventura County Watershed Protection Division
Jason Uhley	Riverside County Flood Control District
Naresh Varma	San Bernardino County Flood Control District
Joann Weber	San Diego County Dept. Environmental Health
Matt Yeager	San Bernardino County Flood Control District

Chris Crompton began the meeting at 10:15 AM with roundtable introductions. The objectives of the day included: 1) introductions; 2) status of the SMC website; 3) SMC Annual Report; 4) agreements; 5) ongoing project updates; 6) next step on implementation of the regional bioassessment monitoring program; 7) future project discussion; 8) committee member items; and 9) next meeting date.

Chris addressed the second agenda item on the SMC website. Orange County had volunteered to host the web site and has purchased the domain name *SoCalSMC.org* and *SoCalSMC.com* for the next 10 years. Staff turnover at Orange County had slowed the web site development a little bit. However, the web page was intended to be simple so web design and implementation should be done within about 1 month. Jason offered to have his graphic artist review and clean up whatever ideas are preferred. The action item for this topic was:

- Send your ideas on logos to Chris and he will distribute to the group by Oct 5th

Ken presented the third agenda item on the 2006-2007 Annual Report that was distributed the week prior to the meeting. Small edits were recommended, but overall the report was well received. This report can be used by those agencies that wish to include it in their annual reports of waste discharge. The action item from this topic was:

- Ken will make the edits and distribute to the group

Chris addressed the third item on agreements. There were four agreements discussed. The first agreement was the Master Agreement. Only three agencies had not signed the agreement as of this date, but all were in process and signatures were expected within one month. Once this agreement is final, then the other agreements can move forward for

Stormwater Monitoring Coalition Steering Committee
Meeting Agenda
June 16, 2008
10:00 a.m. – 12:30 p.m. (Pacific Time)
at
Riverside County Flood Control and Water Conservation District
1995 Market Street, Riverside, CA 92501
http://maps.yahoo.com/maps_result?addr=1995+Market+Street%2C&csz=Riverside%2CCA+92501&country=us&new=1&name=&qty=
Conference Call In: (913) 227-1219, Code 425157

1. Introductions, meetings and announcements

2. Agreements – Chris Crompton
   a. Renewal of SMC Master Agreement D06-049
   b. Status of review of Low Impact Development (LID) Agreement D06-051
   c. Status of SMC Research Agenda Agreement D07-025
   d. Toxicity amendment to laboratory intercalibration study
   e. Implementation of regional bioassessment program

3. Ongoing project updates (as necessary)
   a. LID project status – Matt Yeager (SB County Flood)
   b. Hydromodification project status – Ken Schiff for Eric Stein (SCCWRP)
   c. Post-fire monitoring – Ken Schiff for Eric Stein
   d. Other projects

4. Future projects
   a. Follow-up discussion on proposed projects for 2008
      i. BMP effectiveness testing
      ii. Trash and debris monitoring approaches and protocols
      iii. New intercalibration constituents
      iv. Stormwater data compilation study
   b. SMC members are invited to present future projects for consideration

5. Committee member items

6. Next Meeting

Stormwater Monitoring Coalition Steering Committee
Meeting Agenda
September 18, 2007
10:00 a.m. – 2:00 p.m. (Pacific Time)
at
Riverside County Flood Control and Water Conservation District
1995 Market Street, Riverside, CA 92501
http://maps.yahoo.com/maps_result?addr=1995+Market+Street%2C&csz=Riverside%2CCA+92501&country=us&new=1&name=&qty=
Conference Call In: (To be provided)

1. Introductions

2. Status of SocalSMC website – Chris Crompton (Orange County)

3. SMC Annual Report – Ken Schiff (SCCWRP)

4. Agreements – Chris Crompton
   a. Renewal of SMC Master Agreement D06-049 and addition of new parties
   b. Review/approval of EPA ORD Memorandum of Understanding
   c. Status of review of Low Impact Development (LID) Agreement D06-051
   d. Status of SMC Research Agenda Agreement D07-025
   e. Toxicity amendment to laboratory intercalibration study

5. Ongoing project updates (as necessary)
   a. LID project status – Matt Yeager (SB County Flood)
   b. Laboratory intercalibration project – Ken Schiff
   c. Hydromodification project status – Eric Stein (SCCWRP)
   d. Pilot project on electronic data reporting – Ken Schiff
   e. SMC participation in development of procedures and guidance for stormwater toxicity in the Los Angeles Region – Ken Schiff (SCCWRP) and Xavier Swamikannu (Los Angeles Regional Board)
   f. Other projects

6. Next step on implementation of regional bioassessment program – Ken Schiff
   Note – This will be a time certain item at 1:00 p.m.

7. Future project discussion
   SMC members are invited to present future projects for consideration as SMC projects

8. Committee member items

9. Next Meeting

Minutes of the
Stormwater Monitoring Coalition of Southern California

March 11, 2008
At the Riverside County Flood Control District

Attendees:	
Arne Anselm	Ventura County Watershed Protection Div
Michael Borst	US EPA ORD
Arlene Chun	Riverside County Flood Control District
Chris Crompton	County of Orange Resources and Development Management Dept.
Karl Dreher	Caltrans
Bruce Fujimoto	State Water Resources Control Board
Emilie Reyes	State Water Resources Control Board
Ken Schiff	Southern California Coastal Water Research Project
Jimmy Smith	San Diego Regional Water Control Board
Eric Stein	Southern California Coastal Water Research Project
Martha Sutula	Southern California Coastal Water Research Project
Maged Soliman	Los Angeles County Dept of Public Works
Xavier Swamikannu	Los Angeles Regional Water Quality Control Board
Jason Uhley	Riverside County Flood Control District
Naresh Varma	San Bernardino County Flood Control District
Jo Ann Weber	San Diego County Dept. Environmental Health
Frank Wu	Los Angeles County Dept of Public Works
Matt Yeager	San Bernardino County Flood Control District
Charlie Yu	City of Los Angeles

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1. Introductions, meetings and announcements

   Chris Crompton began the meeting at 10:00 AM with roundtable introductions. The objectives of the day included: 1) introductions; 2) update of the SMC website; 3) agreements; 4) ongoing project updates; 5) future projects; 6) committee member items; 7) next meeting date.

2. Update of SocalSMC website and logo

   Chris addressed the first agenda item on the SMC website. He demonstrated an example web site designed by his staff. The Executive Committee liked the design. A request was made to add an additional link for proposals.

   The action item for this topic was:

   - **Chris will work on making the web site live**

3. Agreements

Chris addressed the second item on agreements. There were six agreements discussed:

a. Renewal of SMC Master Agreement D06-049

The first agreement was the Master Agreement. Only one agency had not signed the agreement as of this date, but it was to be on the April Board agenda for signature.

b. Status of review of Low Impact Development (LID) Agreement D06-051

The third agreement was the Low Impact Development (LID) study. The third and final draft had been mailed out and no members found exceptions; the agreement now only waits on the Master Agreement before going out for signature.

c. Status of SMC Research Agenda Agreement D07-025

The final draft had been mailed out and no members found exceptions; the agreement now only waits on the Master Agreement before going out for signature.

d. Toxicity amendment to laboratory intercalibration study

No progress had been made on this agreement since the last meeting.

e. Implementation of regional bioassessment program

The Steering Committee had finalized the Scope of Work. Chris is working on the draft agreement now.

The action item from this topic was:

- **Chris will mail out the first draft of the Bioassessment agreement for comments and commitments**

4. Ongoing project updates

a. Electronic data reporting project deliverables

b. LID project status

The update on Low Impact Development (LID) was given by Matt Yeager. The goal of this multi-year project is to evaluate the effectiveness of various LID technologies. It is funded by a SWRCB Prop 50 grant and has several external partners including the LID Center, CASQA, and the Santa Clara Stormwater Program.

Since the last SMC meeting, Matt had added a geological engineer to the technical advisory committee (TAC), which was a discipline he needed. He is preparing a monitoring and quality assurance plan now. The last LID training was in San Diego

February 25-27. Matt is also ramping up the monitoring portion of the project. His intent is to start with a focus on changes in flows and hydromodification.

Matt also reported that he is working on coordination aspects of the project. There are several other entities involved in this topic including WALUP, the SMC hydromodification study, the Ventura County LGC, San Diego/UC Cooperative Extension, Alluvial Fan Task Force, and the Landscape Alliance.

Ken brought up the fact that the Ocean Protection Council is holding a public workshop on LID at SCCWRP on March 26. The Steering Committee agreed that Matt should present the SMC project.

The action item from this topic was:

- **Ken will try to get Matt on the Workshop agenda**

c. Hydromodification project status

The project update was given by Eric. The hydromodification study is funded by a SWRCB Prop 50 Grant with and is being conducted by SCCWRP and Colorado State University. There are over two dozen sites distributed from Ventura to San Bernardino to San Diego that have been sampled. The initial project deliverable, a literature survey, had been drafted and was in review by the TAC. This document forms the foundation for the remaining portions of the project. The next deliverable is a workplan for mapping at risk stream reaches to the effects of hydromodification, which is expected by summer.

d. Update on the bacterial reference watershed project

The update was also given by Eric. The project had been completed, the results have been presented to the project TAC, and the final technical has been posted on the SCCWRP web site.

The action items from this topic were:

- **Eric should give a presentation at the next SMC Steering Committee meeting**
- **The report should also be placed on the SMC web site**

5. Potential future projects

Four potential projects were discussed:

a. The first potential future project was on trash and debris was given by Arne. His project description included five elements including: a literature review, methods evaluation, beneficial use impacts, source identification methodology, and BMP evaluation. All of these elements resonated with the Steering Committee. It was thought additional resources could be garnered by a partnership with solid waste management.

The action item from this topic was:

- **Arne was to approach the solid waste management agency about interest in a collaboration or funding**

b. The second future project was on BMP effectiveness. Karl Dreher presented his existing BMP effectiveness studies at Caltrans. These included three types of linear infiltration devices and examined size, cost, and efficiency in load reduction. Mike Borst also presented the work he has been doing at EPA. EPA has been focusing on LID elements such as green walls/roofs and porous pavement as part of their Green infrastructure research program. Like Caltrans, their monitoring has focused largely on load reduction.

The action items for this topic were:

- **Matt, Jason, and Mike are to connect on BMP effectiveness monitoring on the green BMPs being installed at RFCD**
- **Matt is to work with Karl to ensure monitoring comparability between the SMC LID project and Caltrans BMP effectiveness project**

c. The third potential future project was for development of a region fire response monitoring program, presented by Eric Stein. The goal of this project was to develop a coordinated regional monitoring program for assessing the effects of post-fire runoff on constituent loading and stream water quality. SCCWRP has already written a project proposal to the County of San Diego for potential FEMA funding. Additional collaborators were mentioned including the USGS and USDA.

The action item for this topic was:

- **Wait for outcome of proposal**

d. The Fourth potential future project is a stormwater data compilation study presented by Eric. Data compilation was a project in the SMC research agenda. Several preliminary steps had already been taken including development of standardizing data transfer formats and data exchange protocols. This project represents the next step in the process, which is compiling the agency monitoring data to estimate cumulative runoff inputs and assess differences in space (i.e., compare watersheds) or time (i.e., compare different types of storms). This project would be completed funded by SCCWRP and the only member agency contributions would be minimal staff time to interact with SCCWRP. SCCWRP would start compiling data on nutrients linking wet weather inputs measured by the SMC member agencies with the Bight'08 regional monitoring program. This would eventually expand into other constituents in future years.

The action item from this topic was:

- **Eric to prepare a short written description of the project for distribution to the SMC**

The next meeting was scheduled for June 16th, 10:00 AM to 12:30 PM, at Riverside County Flood Control District. The meeting adjourned at 12:30 PM.

IRWM MEETINGS

San Diego IRWM Funding Area Planning Coordination Group

Discussion Meeting Notes
June 9, 2008
Rancho California Water District

Attendees:

Cathy Pieroni, City of San Diego
Marilyn Thoms, County of Orange
Jason Uhley, Riverside County Flood
Alyson Watson, RMC Water San Diego
Anna Aljabiry, DWR
Perry Louck, Rancho California WD
Mary Anne Skorpanich, County of Orange
Mark Stadler, San Diego County WA
Norm Shopay, DWR
Daniel Cozad, IPM Inc.

Opening and Introductions

Perry Louck, RCWD started out the meeting with introductions but most folks know each other well by this point.

DRAFT

Regional (Funding Area) Progress and Successes Update

Upper Santa Margarita Watershed will be holding stakeholder meetings soon and expanding the IRWM efforts to address Prop 84 issues beginning in July. Increasing water rights issues are occurring in the upper portion of the Santa Margarita with the DAC Community with actions by the Pechanga and Cahuilla/Ramona Bands.

South Orange County has completed the first invoice to the state on Round 1 of Prop 50 IRWM and are working with integrating other efforts into the IRWM including Aliso Creek. They are also beginning some countywide DAC work with the cities and environmental justice community.

San Diego was awarded funding in Round 2 of Prop 50 IRWM. The Water Authority is the lead agency; each of the three RWMG members will administer several of the projects that have been funded. Some projects will have revised budgets. DWR has requested that $6.4 million be shifted within the Prop. 50, Chapter 8 budget. If this shift occurs, San Diego will receive $25 million in IRWM funding; otherwise, it will receive $20.7 million. The Regional Advisory Committee meets June 11, 2008 and future meetings will invite the funding area planning entities.

The RWMG agencies are amending their agreement MOU and their support contract with RMC Water to extend both to 2011. They are looking at expanding and reworking governance, perhaps using the CUWCC model related to dues and participation. They may add at-large RAC members, including the other San Diego funding area members.

DWR Presentation and Discussion Regional Acceptance Program
DWR is working to put a guidance document together for Regional Acceptance Criteria. The want to focus on the planning efforts and getting the regions coordinated more than funding allocation. Discussion ensued on several issues related to basis for communities of interest and planning areas by hydrological and other criteria.

While they work on the guidelines they asked the group to send a letter to Anna if we wanted to participate with them as a pilot area. The group agreed this would be an excellent region to test in a pilot because the group is working well together and there is adequate diversity to support fertile testing of plan integration and development.

IPM will provide a draft letter (attached) for all to review.

The process will likely include submitting a draft for region description, a preliminary meeting and discussion with DWR and a final document and public comment period prior to approval. All were encouraged to look beyond prop 84 funding as they review the region and several mentioned they were. OC has a local tax increment for IRWM projects and transportation impacts.

DWR indicated there could be integration with the Planning Grant process. DWR will want to know how much money is needed for planning for the region and how much for implementation projects.

DRAFT

Guidelines will not be completed before late summer so there is likely time to get acceptance before applying for implementation funding. Other basins that are coordinated include Mojave/Antelope and funding is likely faster when the coordination is robust. Issues to be discussed are how all the areas benefit and where the benefits of the projects fall. The San Diego IRWM has very broad partners on the Colorado and state project systems.

DWR began discussion about where the different groups and regions fit and worked now. Who benefits where – US/Mexico – local or regional project – North South – Cities on east of mountains. Etc. DWR wants to see both who can plan together and what the point or benefit of that planning? DWR would appreciate having the entire funding area plan together if it made sense. They suggested looking at the projects to focus on those that have regional benefit.

Interregional Cooperation and Allocation
The group discussed their progress on planning and funding issues.

a. Reviewing both population and land area and funding comparisons
   - Funding area next steps were discussed and <are we missing some words here?>
   - Planning for Disadvantaged Communities
   - Land vs population and agriculture?
   - Consider a phased approach Now-Then-Later

b. Cross boundary project coordination is a commitment
c. DWR recommended a pot for projects that benefit the entire region. We should consider whether this is appropriate for our funding area. Orange County does this for Arundo removal and water conservation.
d. Regional acceptance submittals should include the planning framework – how will it all come together
e. Consider how separate planning efforts will integrate
f. Do not forget Mexico San Diego planning for IBWC
g. Integration benefits – make it simple and use the Education opportunity – application

Further discussion of the spatial and population allocation formulas ensued and San Diego provided a map and allocation from the area of land (attached). Population from the January 2007 data should be provided for evaluation prior to July 1 for processing by all.

Cathy reminded the group that the RWQCB meeting is scheduled for June 25. The meeting starts at 9:00 a.m. and the IRWM efforts are Agenda Item #9. The link to the agenda is shown below:

http://www.swrcb.ca.gov/sandiego/board_info/agendas/2008/jun_25/jun_25.shtml

The presentation time is only 20 minutes. All areas are invited and may bring highlights information to share.

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Next Meeting
The next meeting is scheduled for July 14th 2008 at Rancho, if teleconference facilities cannot be accomplished.

San Diego IRWM Funding Area Planning Coordination Group

Discussion Meeting Notes
February 4, 2008
Rancho California Water District

Attendees:

Cathy Pieroni, City of San Diego
Perry Louck, Rancho California WD
Jeffery Passek, City of San Diego
Jason Uhley, Riverside County Flood
Tom Rosales South OC Water Authority
Daniel Cozad, IPM Inc.
Karl Seckel, Municipal WD of OC
Marilyn Thoms, County of Orange
Mike Shetler, County of Riverside
Jon Van Rhyn, County of San Diego
Mark Stadler San Diego County WA

Opening and Introductions

Daniel introduced Perry Louck and Perry welcomed the group to Rancho California Water District and each attendee introduced themselves and their role in the IRWM process.

Goals and Ground Rules

A brief description of goals included:

- Move forward quickly and allow funding of projects with Prop 84 funds
- Avoid DWR having to decide or compete between the three areas and their projects
- Coordinate and work together to identify projects that could be of value across plans, work to identify funding for highly ranked projects
- The Group recognizes that the San Diego Subregion as defined in proposition 84 was intended to include the entire Santa Margarita and San Juan Watersheds. As such the Group wishes to allocate the $91 million for projects in a equitable manner.
- Reach consensus on a plan and agreement to present to DWR

The following ground rules were discussed and agreed:

- All representatives attending are representatives of larger groups and boards, all decisions are made in these larger groups or governing boards
- These decisions and agreements are intended for Prop 84 funding.
- The three groups represent the authorized and all known Regional Water Management groups intending to apply for Proposition 84 funding in the San Diego Funding Area, notwithstanding coastal groups that may apply for separate funds, if available.

Overview of IRWM Areas, Efforts and Status
An overview of efforts in the three IRWM planning regions in the San Diego funding region was discussed. Individual regions are at similar levels of planning with all having an approved plan and working on updating their plan. All planning regions have governance for the Regional Water Management Group and Stakeholder Committees.

All groups have applied for at least one round of funding; Orange County has applied for Round 1 and Round 2.

South OC has a contract with the State Board and is invoicing Round 1 Prop 50 funds. In OC their IRWM is coordinated with Measure M transportation and resources funding. OC has three Water Management Groups that work in the different regions of the County.

Rancho and Riverside prepared a plan quickly to get underway. The speed worked because Rancho had recent planning for water, Riverside had recent storm water and habitat plans. The plan was approved in June and Rancho applied for Round 2 funding.

San Diego has 300 projects in their list all projects are prioritized. The top tier projects were ranked and 21were submitted in accordance with Proposition 50 guidelines for Round 2 funding. The remaining lower priority projects may be eligible for future funding as opportunities arise; these projects will be ranked based on funding requirements of those programs. The RWMG funds the efforts now with advanced governance and funding coming in the future. A 27 member advisory committee provides review and recommendation.

Understanding the Regions and Boundaries
Each region talked about the differences and similarities of the regions and connections between the regions. Boundaries are significant; Mexico Border projects cannot be funded. Santa Margarita watershed drains into SD and OC watersheds from Riverside. USMC Camp Pendleton is in the San Diego Plan. This is water served to San Diego and a desalination site in SD plan that could serve other areas too.

Upper and Lower Santa Margarita are connected but litigation and other watershed management issues are significant impediments to planning together. Coordination and cooperation among the two are significantly easier to move forward in the short term. Counties of Riverside and San Diego have similar issues with the San Diego Regional Water Quality Control Board due to MS4 permits, South OC as well. South OC could be part of Santa Ana or standalone as well as part of San Diego.

Funding Areas Cooperation and Fund Allocation
The group discussed the need for continued coordination and cooperation in the funding region in addition to the obvious opportunity to work out allocation.

Analysis of Proposition 84 Funding Allocation Based on Population

Regional Board Region No.	Regional Board Region Name	Hydrologic Region Name	Population [1]	Total Prop. 84 Allocation [2]	Total Prop. 84 Allocation Minus $25 Million per Region [3]	% of Total Population	% of Prop. 84 Funds	Difference Between Pop. % and Allocation %	Per Capita Prop. 84 Funding Allocation
1	North Coast	North Coast	644,000	$37,000,000	$12,000,000	1.88%	1.78%	-0.10%	$19
2	SF Bay	SF Bay	6,106,000	$138,000,000	$113,000,000	17.84%	16.74%	-1.10%	$19
3	Central Coast	Central Coast	1,459,200	$52,000,000	$27,000,000	4.26%	4.00%	-0.26%	$19
4	LA	South Coast	10,162,302	$215,000,000	$190,000,000	29.68%	28.15%	-1.54%	$19
8	Santa Ana		4,774,716	$114,000,000	$89,000,000	13.95%	13.19%	-0.76%	$19
9	San Diego		3,488,892	$91,000,000	$66,000,000	10.19%	9.78%	-0.41 %	$19
5	Central Valley	Sacramento River	2,593,000	$190,000,000	$165,000,000	18.03%	24.44%	6.41%	$27
		San Joaquin River	1,700,000						
		Tulare Lake	1,880,000						
6	Lahontan	North Lahontan	99,000	$27,000,000	$2,000,000	2.40%	0.30%	-2.10%	$2
		South Lahontan	721,490						
7	Colorado River Basin	Colorado River	606,000	$36,000,000	$11,000,000	1.77%	1.63%	-0.14%	$181
			34,234,600	$900,000,000	$675,000,000	100.00%	100.00%	0.00%	

1 Sources: *CA Water Plan Update 2005* used for regions 1,2, 3, 5, 6, 7. GIS data used to determine South Coast population breakdown between regions 4,8,9 : (*CA Water Plan* total pop. = 18,223,000 vs. GIS = 18,425,910).

2 Prop. 84 total is $1 billion ($900 million allocated + $100 million unallocated).

3 Each region was first given $25 million, remaining money ($675 million) was then allocated based on population.

Prop. 84 Region 9 Allocation Based on Population [4]

	Population in Reg. 9	% of Reg. 9 Pop.	Prop 84 Allocation
San Diego County	2,757,512	79.04%	$71,923,577
South Orange County	536,916	15.39%	$14,004,262
Riverside County	194,464	5.57%	$5,072,162
Totals	3,488,892	100.00%	$91,000,000

4 Population information for Region 9 based on GIS data.

San Diego IRWM Funding Region Coordination Meeting

February 4, 2008 – 1:30 -3:30 PM

Hosted By
Rancho California Water District
42135 Winchester Road, Temecula, CA 92590
MAP

Agenda

A. **Welcome and Introductions** (Perry Louck, RCWD and Mike Shetler, Co of Riverside

B. **Goals and Ground Rules**

C. **Overview of IRWM Areas, Efforts and Status (see map)**
   1. Upper Santa Margarita Watershed
   2. South Orange County
   3. San Diego

D. **Interregional Cooperation**
   1. Understanding the Regions
   2. Cross Border Projects
   3. Funding Area Cooperation

E. **Next Meeting**
   Schedule Next Meeting – Potential Meeting Date Monday, March 3??

CASQA MEETINGS

CASQA Pesticides Subcommittee

DRAFT Agenda
Nov. 1, 2007
10:00 a.m. - Noon

1. Review/amend agenda (Dave, 5 mins.)

2. Announcements and updates (All, 5 mins) --Any announcements from participants --quick updates on committee related topics (as needed, may include DPR Urban Pest Management Workgroup, Structural Pest Control Board, Ecowise,
etc.)
--DPR urban monitoring plan
--Org. chart - how CASQA fits into the "pesticides world"

3. Pyrethroids Reevaluation (Kelly, 30 mins)
Goal: To receive an update on general activities including DPR's thoughts after receiving CASQA's letter. To determine how to handle the sediment toxicity testing proposal currently available for review (comments due 12/7).
--Reevaluation update (Kelly)
--Discuss PWG Sediment toxicity proposal (Kelly, all)
--Context
--Scientific issues
--Policy issues
--Should CASQA prepare comments? (and if so, logistics)

4. Pesticides TMDLs list (Dave R., 10 mins)
Goal: To review and finalize our list of California pesticide TMDLs (We are assembling this list for our own purposes, and for the CASQA Watershed subcommittee, which is trying to track all TMDLs)

5. Anticipated regulatory activities in 2008 (Kelly, Dave, 30 mins)
Goal: To obtain information about anticipated EPA and DPR activities and to determine priorities for 2008.
--DPR Pyrethroids reevaluation next steps (Kelly, Dave) --EPA re-registration and registration review schedule (spreadsheet) (Kelly)
--EPA urban model development (Kelly)
--TMDLs - should we be following them? - would we comment on any?
--303(d) list update - should we follow - would we comment?

6. Budget (Dave, 20 mins)
Goal: To determine subcommittee's recommendations for our budget in 2008 (Budget decisions we make are recommendations to the EPC, which balances the many demands on CASQA's limited funds)

7. Next meeting (Dave, 5 mins)
--Set date & time for next subcommittee teleconference --Make list of items for discussion --Items for next time (not included due to length of agenda):
--subcommittee roster update
--Next steps on sharing PCO contracting resources with CASQA members

Our next teleconference meeting will be:

Thursday November 29th at 3:30 p.m.

Please mark this time on your calendars. Call-in information will be distributed with an agenda prior to the meeting.

Major topics include:
--Review of a draft CASQA letter to DPR on the pyrethroid manufacturer's proposal to eliminate some sediment toxicity testing (notably the chronic toxicity testing) and modify other testing that DPR is requiring --the latest on DPR's and manufacturer's next steps on the reevaluation, and --planning our next steps to press for timely and effective actions by DPR and the manufacturers to end the pyrethroid-related toxicity in urban creeks.

Kelly Moran
TDC Environmental

P.S. If possible, I urge members to call into (or attend in person) the Urban Pesticides Committee meeting on Tuesday at 10 a.m. The DPR update on the reevaluation should be quite interesting (it is at 10:15); it would be helpful for members to ask questions about the next steps, including *when* actions will occur. Also, if you're interested in better understanding how pesticides move through urban environments, I'll be going through the graphics that we included in our letter to DPR starting at 1:15 (comments welcome!). If you can't find the info in your email box, you can get the agenda and call-in information on the
web: http://www.up3project.org/documents/upc agenda 11-13-07.pdf

CASQA Pesticides Subcommittee

DRAFT Agenda
Tuesday April 1st 1:30 p.m.

1. Review/amend agenda (Dave, 5 mins.)

2. Announcements and updates (All, 10 mins) --Any announcements from participants

3. Review draft letter to DPR on pyrethroid wash-off studies proposed by PWG (Kelly and all) --pyrethroid manufacturers have proposed two studies: one to measure pyrethroid wash-off from grass and a second to measure wash-off from impervious surface --discuss relationship to other work on this topic --discuss relationship to overall approach to pyrethroid reevaluation --draft letter will be forwarded to subcommittee soon

4. Update on pyrethroids data compilation (Armand, 5-10 mins.)

5. Next meeting (Dave, 5 mins)
--Set date & time for next subcommittee teleconference --Make list of items for discussion (these may include pyrethroid reevaluation, possible responses from DPR to out letters, next steps on meeting with pyrethroids manufacturers, supplemental funding for subcommittee activities)

CASQA Pesticides SubCommittee

Meeting Notes
May 2, 2008

On the call: Kelly Moran, Jason Uhley, Jim Scanlin, Armand Ruby, Jamison Crosby, Dave Renfrew, Brad Eggleston

1. Review/amend agenda
   - No changes

2. Announcements and updates
   - Announcements
     - Letters to EPA on pyrethroids tetramethrin (submitted) and sumethrin (in review by Board/EPC)
     - EPA cypermethrin decision – similar to permethrin, reflects CASQA's comments.
     - Call with EPA on swimming pools – more accomplished than anticipated. EPA is working on methods to model pool discharges, which would allow them to identify (and hopefully mitigate) water quality problems from swimming pool biocides.
       - **Action item**: Kelly will circulate a nifty sheet prepared by Linda Garcia that explains the simple calculation to estimate creek concentrations of pesticides when pools are discharged.
     - Dave's upcoming meetings with EPA – Dave Tamayo will be in Washington DC in late May for the U.S. EPA advisory committee called the "Pesticide Program Dialog Committee." He plans several other meetings with EPA pesticides staff to share information about pesticides in urban runoff.
     - Presentation to National Structural IPM/water quality group – Dave and Kelly presented an overview of the pyrethroids water quality issue, the connection to structural pest control, and how IPM can be an important part to solving this problem to a national workgroup via teleconference.
     - Next week's CASQA meeting in Ontario – The pesticide subcommittee's work will be featured at the meeting

3. Pesticide monitoring data compilation (Armand, 20 mins.)
   - Armand is researching and tracking down all pyrethroids monitoring data in California urban areas and urban-impacted streams.
   - He is preparing a summary of data, spreadsheet with annotated references, and a list of references.
   - Armand will circulate his work product for review on or before May 15th.

4. DPR's Urban monitoring Plan (Armand and all, 5 mins.)

- DPR provided responses to CASQA's comments. These responses were not all we had hoped—but nonetheless we should be pleased that DPR provided us with an opportunity for review (which is very unusual for DPR).
- Dry season monitoring is starting. No agencies have been contacted in regard to partnering in the sampling for either wet weather or dry weather.
- DPR issued a request for bids for doing the wet weather monitoring in San Diego. The document and the responses to bidders' questions have some information about their plan (i.e., sampling locations, sampling methods) that was not in the final monitoring plan.
    - **Action item**: Armand will circulate the request for bids and the response to bidder questions to the subcommittee.
- Members expressed concern about the lack of a plan for communication with DPR as the monitoring proceeds. It was agreed that the subcommittee should invite DPR to provide an update at the July subcommittee meeting. Possible questions were discussed, including:
    - What specific sampling locations have been selected?
    - When will sediment samples be collected? What is collection technique?
    - Have they prepared a SAP/QAPP or equivalent?
    - Do they wish to partner with municipalities to collect samples?

5. Next Steps on Pyrethroids Reevaluation (Kelly and all 15 mins)
    - PWG and DPR contacts – Dave contacted John Sanders (DPR) and Kelly contacted Jim Wells (PWG) to request a first meeting be set up. Both responded positively.
    - State Water Board supported our letter, including the meeting request.
    - Agenda topics for meeting with PWG – Dave sent an email with a list of suggested topics (based in part on our letter and in part on PWG's letter to us). This list included a review of the conceptual model for pyrethroids in urban runoff, discussion of urban runoff modeling example(s), presentation by PWG of their overall plan for the urban runoff part of the reevaluation, and sharing of relevant scientific information (i.e., our most recent monitoring data, their recent reports to DPR).
    - Identify our participants in meeting with PWG – Dave R., Armand, and Jamison all volunteered to participate. Jim indicated that Arleen Feng should also be able to participate. Kelly & Dave T. will also participate.
    - Due to persistent ringing on the telephone line, the subcommittee postponed discussion of additional details of preliminary meeting planning.

6. CASQA Conference (Dave, Jason, 10 mins.)
    - Discuss possibility of doing a session at the conference –this was postponed to email and to the next call due to the noise on the teleconference line.
    - Possible topics might include:
        1) status of pesticides regulation/management (overview)
        2) DPR activities
        3) Local studies

4) BMP programs
   - **Action item**: Kelly will initiate an email dialog on topics/speakers.

7. Supplemental funding for subcommittee activities (Dave, 5 mins)
   - Dave is drafting a fundraising letter. He will be discussing this with the Board and the EPC.
   - It would be very helpful for someone to volunteer to take meeting notes.
     - **Action Item:** Please consider whether you would be willing to volunteer to do the notes for subcommittee meetings.

8. Next meeting
   - **Monday May 19, 1:30 p.m. (via teleconference)**
   - Items for discussion:
     - Plan for participation in CASQA conference (abstracts due Friday May 23)
     - Review and discuss draft pyrethroid monitoring data compilation
     - DPR Pyrethroid Reevaluation—continue planning for a meeting with PWG to share information about modeling, monitoring, and our regulatory context
     - Discuss efforts to obtain supplemental funding
     - Inviting DPR to provide an update on its urban monitoring project on the July call.

CASQA Stormwater Program
Effectiveness Assessment Training
Spring 2008
Agenda

Introductions	CASQA Board Member/ Executive Director	9:00 a.m.
Overview and Objectives of Workshop	Karen Ashby	9:15 a.m.
Principals of Effectiveness Measurement	Chris Sommers	9:30 a.m.
Break		9:45 a.m.
Exercise #1 – Impact or Implementation	Karen Ashby	9:50 a.m.
Break		10:40 a.m.
Exercise #2 - Using Effectiveness Measurement Tools	Karen Ashby	10:45 a.m.
Lunch		12:00 noon
Exercise #3 – Interpreting Results	Chris Sommers	1:00 p.m.
Break		2:00 p.m.
Exercise #4 – Water Quality Assessments	Chris Sommers	2:05 p.m.
Survey		2:50 p.m.
Break		2:55p.m.
Workshop Wrap-up ❑ Summary ❑ Survey Results ❑ Q&A	Chris Sommers / Karen Ashby	3:05 p.m.
Adjourn		3:30 p.m.

CASQA Pesticides SubCommittee

Meeting Notes
January 8, 2008

On the call: Dave Tamayo, Kelly Moran, Jason Uhley, Armand Ruby, Ron Manwill, Brandt Jorgensen, Arleen Feng, Dave Renfrew

1. Review/amend agenda
   - No changes

2. Announcements and updates
   - Announcements
     - PWG requested meeting with Kelly and Arleen to discuss water quality agency comments, primarily CASQA recommendation to develop urban runoff models

3. DPR's urban monitoring plan
   - Goal: To agree on revisions to a draft letter that will help DPR create a strong, cost-effective monitoring program.
     - A draft letter and DPR's draft monitoring plan were circulated prior to the meeting.
     - The subcommittee discussed the major issues that members had identified in their review, including:
       - Key management question
       - Background/introduction length & content
       - Dry weather discharges
       - Sampling at storm drains
       - Partnerships with urban runoff programs for sample collection
       - Grab samples
       - Including herbicides
   - **Action Item:** Armand Ruby will be revising the draft letter based on the discussion during today's call. He intends to circulate it to the EPC & Board by the morning of January 14th, and will coordinate with Geoff to finalize the letter for delivery to DPR early in the week of the 22nd. He will use his notes from today's discussion to revise the letter.

4. Next meeting
   - **<u>Thursday February 21st, 10:30 a.m. (via teleconference)</u>**
   - Items for discussion:
     - DPR Pyrethroid Reevaluation: PWG meeting; DPR response to our letter on the PWG runoff proposal (if received)
     - Next steps on DPR urban monitoring plan
     - Supplemental funding for subcommittee activities

CASQA Pesticides SubCommittee

Meeting Notes
April 1, 2008

On the call: Dave Tamayo, Kelly Moran, Jason Uhley, Arlene Chun, Armand Ruby, Ron Manwill, Jamison Crosby, Brandt Jorgenson, Dave Renfrew

1. Review/amend agenda
   - No changes

2. Announcements and updates
   - Announcements
     - A call with U.S. EPA on swimming pool discharges is tomorrow. CASQA representatives are participating in order to educate EPA about the fact that pools are discharged to storm drains and to encourage them to identify impacts and mitigation measures for pool biocides.
     - Dave Tamayo was appointed to the national U.S. EPA Office of Pesticide Programs advisory committee called the Pesticide Program Dialog Committee. This is the only external stakeholder advisory committee to the Office of Pesticides.

3. Review draft letter on PWG's washoff proposals
   - Pyrethroid manufacturers have proposed two studies: one to measure pyrethroid wash-off from grass and a second to measure wash-off from impervious surfaces. A draft letter to DPR commenting on both proposals was circulated prior to the meeting.
   - The Subcommittee discussed the letter and gave directions for revisions, which are reflected in the letter.

4. Update on pyrethroids data compilation
   - Armand will circulate the draft compilation in advance of our next teleconference meeting.

5. Next meeting
   - **Friday May 2, 10:00 a.m. (via teleconference)**
   - Items for discussion:
     - DPR Pyrethroid Reevaluation—update and planning for a meeting with PWG to share information about modeling, monitoring, and our regulatory context
     - Discuss efforts to obtain supplemental funding
     - Review and discuss draft pyrethroid monitoring data compilation

CASQA Pesticides SubCommittee

Meeting Notes
May 2, 2008

On the call: Kelly Moran, Jason Uhley, Jim Scanlin, Armand Ruby, Jamison Crosby, Dave Renfrew, Brad Eggleston

1. Review/amend agenda
   - No changes

2. Announcements and updates
   - Announcements
     - Letters to EPA on pyrethroids tetramethrin (submitted) and sumethrin (in review by Board/EPC)
     - EPA cypermethrin decision – similar to permethrin, reflects CASQA's comments.
     - Call with EPA on swimming pools – more accomplished than anticipated. EPA is working on methods to model pool discharges, which would allow them to identify (and hopefully mitigate) water quality problems from swimming pool biocides.
       - **Action item**: Kelly will circulate a nifty sheet prepared by Linda Garcia that explains the simple calculation to estimate creek concentrations of pesticides when pools are discharged.
     - Dave's upcoming meetings with EPA – Dave Tamayo will be in Washington DC in late May for the U.S. EPA advisory committee called the "Pesticide Program Dialog Committee." He plans several other meetings with EPA pesticides staff to share information about pesticides in urban runoff.
     - Presentation to National Structural IPM/water quality group – Dave and Kelly presented an overview of the pyrethroids water quality issue, the connection to structural pest control, and how IPM can be an important part to solving this problem to a national workgroup via teleconference.
     - Next week's CASQA meeting in Ontario – The pesticide subcommittee's work will be featured at the meeting

3. Pesticide monitoring data compilation (Armand, 20 mins.)
   - Armand is researching and tracking down all pyrethroids monitoring data in California urban areas and urban-impacted streams.
   - He is preparing a summary of data, spreadsheet with annotated references, and a list of references.
   - Armand will circulate his work product for review on or before May 15th.

4. DPR's Urban monitoring Plan (Armand and all, 5 mins.)

- DPR provided responses to CASQA's comments. These responses were not all we had hoped—but nonetheless we should be pleased that DPR provided us with an opportunity for review (which is very unusual for DPR).
- Dry season monitoring is starting. No agencies have been contacted in regard to partnering in the sampling for either wet weather or dry weather.
- DPR issued a request for bids for doing the wet weather monitoring in San Diego. The document and the responses to bidders' questions have some information about their plan (i.e., sampling locations, sampling methods) that was not in the final monitoring plan.
    - **Action item**: Armand will circulate the request for bids and the response to bidder questions to the subcommittee.
- Members expressed concern about the lack of a plan for communication with DPR as the monitoring proceeds. It was agreed that the subcommittee should invite DPR to provide an update at the July subcommittee meeting. Possible questions were discussed, including:
    - What specific sampling locations have been selected?
    - When will sediment samples be collected? What is collection technique?
    - Have they prepared a SAP/QAPP or equivalent?
    - Do they wish to partner with municipalities to collect samples?

5. Next Steps on Pyrethroids Reevaluation (Kelly and all 15 mins)
    - PWG and DPR contacts – Dave contacted John Sanders (DPR) and Kelly contacted Jim Wells (PWG) to request a first meeting be set up. Both responded positively.
    - State Water Board supported our letter, including the meeting request.
    - Agenda topics for meeting with PWG – Dave sent an email with a list of suggested topics (based in part on our letter and in part on PWG's letter to us). This list included a review of the conceptual model for pyrethroids in urban runoff, discussion of urban runoff modeling example(s), presentation by PWG of their overall plan for the urban runoff part of the reevaluation, and sharing of relevant scientific information (i.e., our most recent monitoring data, their recent reports to DPR).
    - Identify our participants in meeting with PWG – Dave R., Armand, and Jamison all volunteered to participate. Jim indicated that Arleen Feng should also be able to participate. Kelly & Dave T. will also participate.
    - Due to persistent ringing on the telephone line, the subcommittee postponed discussion of additional details of preliminary meeting planning.

6. CASQA Conference (Dave, Jason, 10 mins.)
    - Discuss possibility of doing a session at the conference –this was postponed to email and to the next call due to the noise on the teleconference line.
    - Possible topics might include:
        1) status of pesticides regulation/management (overview)
        2) DPR activities
        3) Local studies

4) BMP programs
   - **Action item**: Kelly will initiate an email dialog on topics/speakers.

7. Supplemental funding for subcommittee activities (Dave, 5 mins)
   - Dave is drafting a fundraising letter. He will be discussing this with the Board and the EPC.
   - It would be very helpful for someone to volunteer to take meeting notes.
     - **Action Item:** Please consider whether you would be willing to volunteer to do the notes for subcommittee meetings.

8. Next meeting
   - **Monday May 19, 1:30 p.m. (via teleconference)**
   - Items for discussion:
     - Plan for participation in CASQA conference (abstracts due Friday May 23)
     - Review and discuss draft pyrethroid monitoring data compilation
     - DPR Pyrethroid Reevaluation—continue planning for a meeting with PWG to share information about modeling, monitoring, and our regulatory context
     - Discuss efforts to obtain supplemental funding
     - Inviting DPR to provide an update on its urban monitoring project on the July call.

CASQA Pesticides SubCommittee

Meeting Notes
May 19, 2008

On the call: Kelly Moran, Dave Tamayo, Jason Uhley, Jim Scanlin, Armand Ruby, Jamison Crosby, Brad Eggleston

1. Review/amend agenda
   - No changes

2. Announcements and updates
   - Announcements
     - Letter to EPA on pyrethroid sumethrin submitted. Do members want copies? Agreed that circulation to subcommittee not needed—finding final letters on CASQA web site is fine.
     - Dave is participating in meetings with U.S. EPA Office of Pesticides this week
     - Pentachlorophenol—Penta is a wood preservative used almost exclusively in utility poles. EPA "revised" risk assessment is being circulated for comments & risk mitigation. Dioxins contamination in penta is a concern. EPA did not assess urban runoff. Possible conference call with EPA staff to discuss.
     - Two response letters were received from DPR—one on sediment toxicity testing, one on urban runoff. Kelly is evaluating them. We will schedule discussion for our next meeting.
     - County of Riverside received a Notice of Violation (NOV) for not completing a toxicity identification evaluation (TIE) and developing a Toxicity Reduction Evaluation (TRE) in what the San Diego Water Board believes to be a timely manner. The toxicity was found to be pyrethroid-related toxicity. Riverside County's understanding of the definition of the words regarding timely action in their permit was different than the understanding of the Water Board.
       - **Action item**: Jason will circulate the applicable portions of their permit and the NOV to the subcommittee.

3. Pesticide monitoring data compilation
   - Armand researched pyrethroids monitoring data in California urban areas and urban-impacted streams. He prepared a summary of data, spreadsheet with annotated references, and a list of references.
   - Armand reviewed and the subcommittee discussed Armand's draft documents. Comments will be reflected in Armand's revised documents.
   - The subcommittee discussed possible risks of sharing the data compilation. Since all studies are public, risks seem limited and benefits seem high. Subcommittee should recommend public distribution of this information by CASQA.

SAN DIEGO
HYDROMOD MEETINGS

INTERIM HYDROMODIFICATION CRITERIA WILL BE IN EFFECT IN SAN DIEGO COUNTY STARTING MARCH 24, 2008

APWA
www.apwa.net

THE SAN DIEGO AND IMPERIAL COUNTIES CHAPTER OF THE
AMERICAN PUBLIC WORKS ASSOCIATION (APWA)

ANNOUNCE A SEMINAR DISCUSSING

HYDROMODIFICATION MANAGEMENT AND CONTINUOUS SIMULATION HYDROLOGIC MODELING FOR PLAN REVIEWERS

Hydromodification refers to the change in the natural watershed hydrologic processes and runoff characteristics (i.e., interception, infiltration, overland flow, interflow and groundwater flow) caused by urbanization or other land use changes that result in increased stream flows and sediment transport.

Pursuant to the San Diego Regional Water Quality Control Board "Municipal Permit" Order No. R9-2007-0001 adopted on January 24, 2007, the Municipal Storm Water Copermittees are required to prepare a Hydromodification Management Plan (HMP) and incorporate its requirements into their Standard Urban Storm Water Mitigation Plans (SUSMPs).

Interim Hydromodification Criteria will be in effect in San Diego County starting March 24, 2008!

The seminar will discuss available **hydrologic modeling software** that may be used to perform the **continuous simulation hydrologic computer modeling** required for hydromodification management planning and design in San Diego County:

HEC-HMS: The widely used and accepted United States Army Corps of Engineers model HEC-HMS (Hydrologic Engineering Center – Hydrologic Modeling System) has two different ways of performing continuous simulations. Mr. Marty Teal of WEST Consultants, Inc. will present a brief overview of hydrologic modeling using HEC-HMS, a description of the capabilities and limitations of the program, and discussion of the two ways to perform continuous simulations. Modeling of Low Impact Development (LID) and hydromodification management facilities will also be addressed. Particular attention will be given to review of HEC-HMS submissions and items that merit the greatest scrutiny by reviewers.

HSPF: HSPF (Hydrological Simulation Program – Fortran) is a continuous simulation hydrology program developed for the United States Environmental Protection Agency. Mr. Doug Beyerlein and Mr. Joe Brascher of Clear Creek Solutions, Inc. will present a brief introduction to continuous simulation hydrologic modeling using HSPF, HSPF UCI and WDM files, and HSPF PERLND, IMPLND, and FTABLE components. The presentation will demonstrate how to use HSPF to represent and size different types of hydromodification management facility designs. The presentation will show plan reviewers how to check to see if a HSPF run is reasonable, and will also show how they can use the HSPF-based San Diego Hydrology Model (SDHM) to make that review easy.

The presentations will be geared toward plan review.

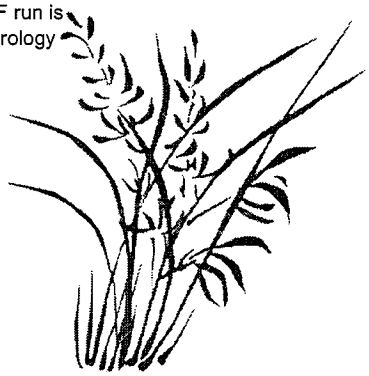

Seminar Endorsed by:

The County of San Diego

Wednesday
April 9, 2008

Metropolitan Operations Center II (MOC II)
9192 Topaz Way
San Diego, CA 92123

8:00 a.m. to 4:30 p.m.

Registration: **Starts at 7:15 a.m.**

Cost: **$150/each includes morning refreshments and box lunch - NO REFUNDS**

Contact Info: **Dennis Bowling or Katie Clevenger at (619) 291-0707 (Rick Engineering Company)**

TO REGISTER

Seating is limited, please register before **March 31, 2008.**

To ensure your reservation, **mail this form in with non-refundable check payable to APWA,**
c/o Katie Clevenger, 5620 Friars Road, San Diego, CA 92110.

Name _____

Agency/Company _____

Address (City, State, Zip) _____

E-mail _____ Phone _____

San Diego Regional Stormwater Copermittees
Hydromodification Management Plan Technical Advisory Committee

Meeting Minutes

Wednesday, February 20, 2007
1:00 – 4:00 p.m.
City of San Diego
Metro Biosolids Conference Room
San Diego, CA

ATTENDEES:

Allen	Vaikko	Contech Stormwater Solutions
Agahi	Sara	County of San Diego
Batta	James	City of San Diego
Beighly	Ed	San Diego State University
Borak	Livia	San Diego Coastkeeper
Bowling	Dennis	APWA (San Diego and Imperial Counties) – Rick Engineering
Chang	Howard	Chang Consultants
Chavez	Servero	BDS Engineering
Cloak	Dan	Dan Cloak Environmental Consulting
Collison	Andy	PWA
Dadkhah	Arsalan	City of National City
Edwards	George	Orange County Stormwater Program
Flake	Michael	Brown & Caldwell
Franz	Karen	SD Coastkeeper
Garcia	David	Riverside County Flood Control TWCD
Gardiner	Nancy	Brown & Caldwell
Haghgoo	Sassan	City of San Marcos
Hawk	Rob	City of San Diego
Justus	Jeff	ASLA, Schmidt Design Group, Inc.
Kunichige	Ross	BDS Engineering
Maher	Masih	City of Encinitas
Molloy	Scott	BIA
Moore	Matt	URS for Port of San Diego
Mosolgo	Eric	RBF/BIA
Nabong	Jim	City of San Diego
Najera	Crystal	City of Encinitas
Nakagaiva	Jim	City of Imperial Beach
Ogawa	Mikhail	Representing City of San Marcos
Ratta	Jamal	City of San Diego
Reichard	Eric	US Geological Survey
Sattler	Erik	Spear & Associates/ North County Civil Engineers & Land Surveyors
St.Clair	Ken	City of San Marcos
Tam Sing	Garret	State of California, Dept. of Water Resources
Teal	Marty	WEST Consultants
Walker	Tory	NCCE&LSA – Tory Walker Engineering, Inc.

I. Introductions and Rules (Mikhail Ogawa, Representing City of San Marcos)

Mikhail Ogawa has agreed to assume the role of Coordinator for the HMP Technical Advisory Committee. He opened the meeting, and then all TAC members and representatives of the Co-permittees and general public introduced themselves.

II. Purpose of TAC (Dennis Bowling, Rick Engineering)

Dennis Bowling has offered to serve as the Facilitator of the TAC meetings. He introduced himself, then outlined the purpose and "ground rules" for the TAC. The purpose of the TAC is to bring together a group of professionals that can assist the Project Team with Hydromodification Management Plan (HMP) development. The HMP must incorporate a set of tools that will work on all projects, large and small. The ground rules include (1) Ensuring that all TAC participants have a voice; (2) All TAC participants will have the opportunity to "hold the floor" to make points; (3) TAC participants should limits their comments to 5 minutes; (4) Once all of the TAC members have been given the opportunity to speak, the audience will have a few minutes to discuss the topic at hand; and (5) The objective will be to reach consensus on each issue, including voting if necessary. Sara Agahi added that this group is technical only, and will not be making any policy decision (the Co-permittee HMP Workgroup will be responsible for making policy).

Sara explained that the Regional Board municipal storm water permit that was adopted in January 2007 requires the development of the HMP and set an early deadline for an Interim HMP that applies to projects disturbing ≥50 acres. The Co-permittees received a 2-month extension for developing the Interim HMP, to March 25, 2008, due to the 2007 firestorms. The Co-permittees must develop and submit a complete Draft HMP by January 24, 2009. They will then have 6 months following receipt of comments from the Regional Board to modify ordinances and implement the HMP.

III. Hydromodification Management Plan Consultant Team Presentation (Dan Cloak and Andy Collison)

Nancy Gardiner introduced the Consultant Project Team, which includes Brown and Caldwell as the prime, Philip Williams & Associates (for geomorphology), and Dan Cloak (for programmatic development and LID support). This is the same team that developed the HMP for Contra Costa County, which was approved by the San Francisco Bay Regional Board.

Dan Cloak then presented a PowerPoint presentation describing the team's approach to developing the HMP and Model SUSMP update.

Dan described the history of Low Impact Development (LID) in California. He noted that LID is really not a new concept, as it was used in the well-known Village Homes development project in Davis in 1978. In 1994, the Bay Area Stormwater Management Agencies Association (BASMAA) sponsored *Start at the Source*, a document describing the application of LID principles. Throughout the 1990s, more attention bean to be focused on flow control and ways of designing impervious surfaces to control runoff.

In the early years, NPDES storm water permits focused on the characterization of urban runoff and reduction of pollutant loads. BMPs focused more on "end of the pipe treatment" with the philosophy of "do what you can, where you can." After the publication of *Start at the Source*, and Tom Scheueler's 1994 landmark article "Importance of Imperviousness," more people became aware of the impact of increased runoff frequency on small streams. More people realized that you need peak flow control over a range of storm sizes, thus indicating the need to do continuous hydrologic simulation modeling. In Prince George's County, MD, LID developed as an alternative to treatment

detention basins. The idea was to preserve site hydrology and natural functions. LID was also referred to as "site design," "bioretention facilities," and "rain gardens." In Portland, OR, a new manual was developed that included standard designs and a formula for sizing LID facilities. The *Bellflower* decision refined the MEP standard. Finally, the San Francisco Regional Board added hydrograph modification management requirements in its permits.

To address the HMP requirements, Contra Costa County considered LID as a means to achieve compliance with both NPDES treatment and flow control requirements. The Contra Costa approach also focuses public resources on helping small developments, infill projects, and redevelopment projects comply with NPDES requirements. As a result, the Contra Costa HMP facilitates the use of LID, such as the incorporation of bioretention areas into residential subdivisions. This can even be achieved in hillside areas with historical landslide areas by lining the bioretention areas to prevent deep infiltration.

The ultimate goal in developing an HMP is to create an implementable development review process. Integration of LID principles would ideally be discussed at the pre-application meeting, where issues such as design, layout, and long-term O&M responsibility would be discussed and resolved. The concept would be to create a regulatory compliance approach that includes ordinances that provide Countywide consistency, empowers municipal reviewers, and provides a mechanism for updates. It should provide options and flexibility, as well as design criteria and specifications.

Dan showed some examples, including basic designs for a swale, planter box, and dry well (where soils permit). He then described the process for sizing treatment controls. Specifically, the concept is to delineate drainage areas within the site, then make assumptions for sizing (e.g., assume rainfall rate is 0.2 inches per hour and planting medium infiltration rate of 5 inches per hour, then calculate the required BMP sizing as 0.2 in./5 in. = .04, or 4 percent of the site area. Dan noted that most LID controls are designed such that they provide several inches of reservoir storage.

Dan then described how LID can also provide flow control. He described a process he applied in Contra Costa County whereby 300 years of rainfall record were simulated over a hypothetical 1-acre site. The pre-project condition was analyzed and compared to the 100 percent impervious condition. These scenarios were analyzed for different soil types (A, B, C, and D). The LID controls were added to the model to evaluate their effects. This analysis showed that it is possible to shift curves down by applying LID controls.

In terms of the applicability of this concept in San Diego, Dan noted that we need to translate stream flow objectives into criteria for individual development sites and create easy-to-implement criteria for smaller developments and redevelopment sites. Reasonably-sized LID facilities provide the option to apply site-specific hydrologic analysis.

Next, Andy Collison of PWA presented an overview of "HMP Basics." The overall concept is to manage increases in the frequency and duration of runoff in order to prevent channel degradation. The permit specifically requires the use of continuous simulation modeling because it is a more geomorphologically appropriate method to evaluate the impacts of flow - for any given recurrence interval, peak flow and flow duration tend to increase with development.

Channel morphology changes in response to changes in flows and sediment load. However, the majority of erosion occurs over a specific range of flows rather than all flow conditions. You must assess all flows in order to define the range of conditions that causes the most erosion. The issue of defining the limits of flow conditions that must be managed is a controversial one, and different

stakeholders will likely have differing opinions about what the "correct" limits are – thus, need input from the TAC on this.

The analysis involves looking at the frequency of flows, as compared to the amount of suspended solids. It has been found that most geomorphic "work" (changes in channel conditions) occurs around the Q2 event. Therefore, flow controls should target that range of flows that do the most work. The RWQCB Order requires that the HMP must define a range of flows to be controlled. This can be accomplished through curve matching over a range of conditions. However, this involves quite a lot of modeling. Alternatively, using LID doesn't require modeling (the San Francisco Board accepted this premise, it is not certain that the San Diego Board will concur).

Different regulatory approaches toward HMP in California have resulted in different approaches to defining thresholds, and the lower value has tended to be more difficult to establish. For example, Santa Clara and Contra Costa set a lower threshold of 0.1Q2, while Los Angeles set an interim lower threshold of Q2.

- Question (Masih Maher): Is there a manual that describes the methodology for doing this?
    - Response (Dennis Bowling): There will be an APWA workshop for plan checkers on April 9th to address this topic.

- Question (Sassan Haghgoo): As far as the model is concerned, what is the definition of a "stream?"
    - Response (Andy Collison): This is a question for the Regional Board. Sara added that a USGS blue line stream would seem to qualify, but that we do need input from the Regional Board.

- Comment (Masih Maher): In some situations, a stream may have a very large watershed draining into it.

- Question (Tory Walker): Is consultant team planning to tie into long-term San Diego histogram data like in the Bay Area?
    - Response (Andy Collison): Yes. However, flow conditions in San Diego may be different than in the Bay Area, so we may want to focus more on the Q5, as studies indicate that more geomorphic work occurs here during less frequent flows. Ultimately for the Interim HMP, we came with interim standard range of 0.2Q5 – Q10.

- Question (Eric Mosolgo): Do you have an estimate of the percentage of work that is done over that range?
    - Response (Andy Collison): Not yet, but we will eventually.

- Question (Tory Walker): When are you going to know more about the 2 watersheds on which you based the Interim HMP (such as the amount of development going on there)?
    - Response (Andy Collison): There will be more data gathering through the early stages of this project.

- Comment (Howard Chang): I would like to hear about how you will address the linkage with sediment supply (which is connected with soil loss in the watershed). Even if you control flow, you will have downstream erosion. This has been shown in Calleguas Creek and on studies in Orange County where there was major stream destabilization, period. Anytime you

cut off the sediment load you will get downstream erosion. The "tolerance" of the system depends on the percentage of urbanization.

- Response (Andy Collison): Acknowledged that Dr. Chang has a point. This point has generally not been addressed in other HMPs, but it is a valid issue. The San Diego project will attempt to address the sediment issue.

Andy reiterated the point that LID will be taken into account in the HMP, so developers would receive credit. There will also be exemptions for conditions such as drainage into hardened channels, storm drains discharging directly into the Bay, and channels in watersheds that are >70 percent impervious.

Question for the TAC (Andy Collison): The consultant team would like input from the TAC about local streams that have good pre- and post-development channel morphologies. Alternatively, we could use a theoretical approach in which we build multiple synthetic watersheds and multiple receiving water channels and run them through HSPF models. Then we could add hypothetical developments and test the response under various flow control thresholds. We could also discharge that runoff through sediment transport models.

- Comment (Howard Chang): You would need to quantify sediment production and sediment supply in the watershed.
  - Response (Andy Collison): Agreed that this is scientifically true, as PWA is doing some work in LA County and has found that half the problem (with downstream erosion) is due to a reduction in sediment load and the other half is due to increase in flow. Tory Walker suggested looking into some of the work underway in South Orange County and Newport Beach.

- Question (Marty Teal): "real watersheds" are site-specific. How confident are you that the synthetic model will be representative?
  - Response (Andy Collison): The idea is to capture typical conditions. Also, the models can simulate a range of conditions. How it would work is as follows. We will create a synthetic watershed in HSPF and model a range of flows. Then model a range of representative receiving waters using a sediment transport model (HEC-RAS 4.0 or USDA-Concepts). We would then take the continuous output from HSPF and apply to channels to see if erosion occurs, then correlate flow controls. It is possible we could end up with more than one set of thresholds for different conditions.

IV. Questions for the TAC/RWQCB

Andy posed two questions for the TAC to consider, as follows:

- How much receiving channel erosion is tolerable?
- How should we treat aggrading channels?

Tolerable Erosion

As a starting point for "tolerable erosion," we could look at a histogram of "geomorphologic work" and control the peak, +/- 1 Standard Deviation. This question has been addressed in other HMPs by conducting a stochastic analysis to determine the probability of channel enlargement.

- Comment (Howard Chang): You could look at some of the channel stabilization studies in Sorrento Creek. Some work has also been done in Lake Forest (Orange County), which has turned out to be very expensive.

- Question (Vaikko Allen): It is true that we don't have to consider antecedent conditions, right?
  - Response (Andy Collison): That is correct.

- Question (Vikko Allen): What about using other criteria, such as Index of Biological Integrity (IBI) as a way to evaluate impacts?
  - Response (Dennis Bowling): We need to be very careful about what limits we specify, as they are very difficult to change once numbers are out there. Dan Cloak also noted that we will also have to work with the RWQCB, which was quite an involved process in the Bay Area. Tory Walker added that the San Diego RWQCB is quite different from the Bay Area RWQCB and often sets requirements that are difficult to meet.

- Comment (Masih Maher): In Escondido Creek, there is invasive arrundo which slows down the runoff and causes flooding. However, if you remove all of the arrundo, you will cause erosion – Escondido Creek is aggrading.

- Comment (Vaikko Allen): We may want to consider using a cost-benefit approach – for example, if you control 90 percent of the erosion, it will cost $X; if you control 80 percent of the erosion, it will cost $Y.

- Comment (Jim Nakagaiva): The Tijuana River watershed drains into Imperial Beach. How can you control a river that drains a watershed that is mostly in Mexico?

<u>Aggrading Channels</u>
Dan Cloak pointed out that in Contra Costa County; it was negotiated that if a channel is hardened, tidal, or aggrading, then the developer can get an exemption. Some of the Bay Area cities had maps showing where these areas are located. However, aggrading streams are not always mapable. Andy Collison added that the requirements will have much greater impacts in small watersheds (e.g., 1-3 mi^2) and less impact in larger watersheds.

- Comment (Tory Walker): Under the new permit requirements, both municipalities and developers are significantly burdened. We are also in a recession, and fees are high. Dennis Bowling added that a "one size fits all" approach may not work.

- Question (Sara Agahi): There is a provision in the permit that the Co-permittees must address cumulative impacts in the watershed. Was this addressed in Contra Costa County?
  - Response (Dan Cloak): No, this issue was not addressed. The sediment cut-off issue was not addressed either. Dennis Bowling cautioned that we should not go beyond what the permit requires.

- Question (Vaikko Allen): How would you address cumulative impact?
  - Response (Andy Collison): You would need to consider thresholds in the context of the development taking place in the watershed, and this may change through time.

- Question (Sara Agahi): In the San Francisco Bay area, there was not coordination with flood control – and I think there should be here in San Diego. How best can we connect flood control and water quality?
  - Response (Andy Collison): The sediment issue could provide a nexus. Dan added that we might be able to include multi-objective projects. Eric Mosolgo said that he

has experience working on some of these projects, and added that you can tell where streams are aggrading based on where there is vegetative growth. And Collison pointed out that obviously, flood control and water quality control target different sized storm events. Finally, Tory Walker cautioned that we should be careful in setting the upper limit of flow control, as the RWQCB may want to increase it.

V. Co-permittee Deliverables (Sara Agahi)

Sara briefly reiterated the schedule for submittal of the deliverables to the RWQCB.

VI. Set Next Meeting Date (Sara Agahi)

The group discussed the fact that the next meeting will depend on the needs established through the overall project schedule and would be determined at a later date.

VII. Adjourn

APPENDIX B

PUBLIC EDUCATION MATERIAL

DOWN THE STORM DRAIN
WELCOME
Help!
Riverside County Flood Control
Water Conservation District
06.04.2006

Only Rain Down the Storm Drain Posters

Titles include,

- 'Maintaining A Storm Water Friendly Gas Station,'
- 'Storm water & the Construction Industry,'
- 'Maintaining Storm Water Friendly Service Bays & Car Washes,'
- 'A Menu of Activities… to Keep Our Water Clean'
- 'Keep Your Shop in Tune… and Protect our Waterway!'

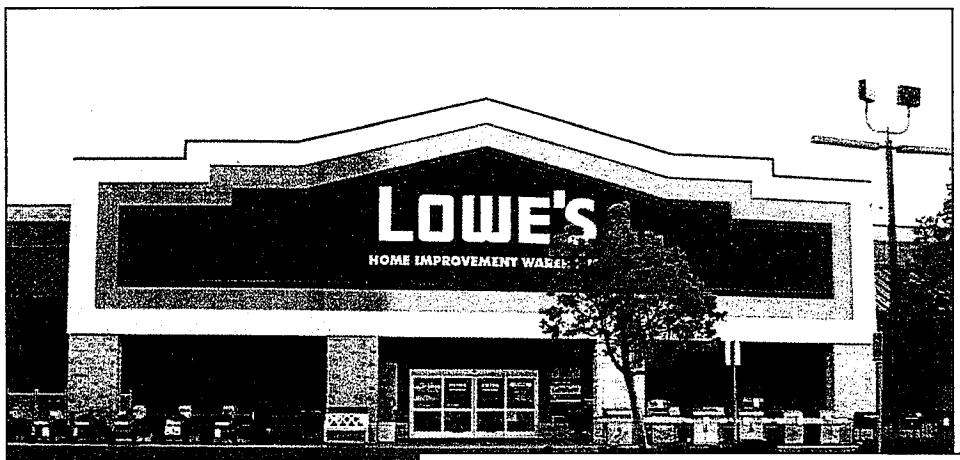

The Home Improvement Store (HIS) Outreach and Education program trains employees on the proper disposal of pesticides, fertilizers and paint. The information is then passed from the employee to the consumer with confidence. Shelf talkers offer information about area hazardous waste disposal locations. (Lowe's Temecula)

Home Improvement Training at the Lowe's in the City of Murrieta. Store staff have the ability to encourage residents, businesses, developers to refer to printed resources when additional information is desired on storm water pollution prevention and proper household hazardous waste disposal.

All visited home improvement stores, garden centers/nurseries, paint stores and hardware stores are provided with the following:

- Tear sheets
- Fact sheets
- Storm Water Pollution Prevention Brochures
- Outdoor Cleaning Brochures,

2007-2008 STORMWATER EDUCATION PROGRAM PRESENTATIONS
Storm Water/Clean Water Protection Program
Riverside County Flood Control

Date	School/Organization	City	# of Presentations	Grade Level	Presentation Type	Funding Source
August 28, 2007	Callie Kirkpatrick	Menifee	2	K	Stormwater	Riverside Flood
August 29, 2007	Ridgemoor	Sun City	5	2	Stormwater	Riverside Flood
August 30, 2007	Callie Kirkpatrick	Menifee	1	K	Stormwater	Riverside Flood
September 6, 2007	Menifee Middle	Menifee	4	6/7	Stormwater	Riverside Flood
September 11, 2007	Ridgemoor	Sun City	3	5	Stormwater	Riverside Flood
September 12, 2007	Rail Ranch	Murrieta	3	2	Stormwater	Riverside Flood
September 13, 2007	Rail Ranch	Murrieta	3	2	Stormwater	Riverside Flood
September 19, 2007	Freedom Crest	Menifee	2	2	Stormwater	Riverside Flood
September 24, 2007	Monte Vista Elementary	Murrieta	5	3	Stormwater	Riverside Flood
September 25, 2007	Monte Vista Elementary	Murrieta	4	3	Stormwater	Riverside Flood
September 26, 2007	French Valley Elementary	Winchester	7	2	Stormwater	Riverside Flood
September 27, 2007	French Valley Elementary	Winchester	4	3/5	Stormwater	Riverside Flood
October 1, 2007	Crowne Hill Elementary	Temecula	4	4	Stormwater	Riverside Flood
October 4, 2007	E. Hale Curran	Murrieta	4	1	Stormwater	Riverside Flood
October 8, 2007	Elsinore Middle School	Lake Elsinore	4	6	Stormwater	Riverside Flood
October 9, 2007	Abby Reinke Elementary	Temecula	4	2	Stormwater	Riverside Flood
October 10, 2007	Monte Vista Elementary	Murrieta	6	5	Stormwater	Riverside Flood
October 10, 2007	Abby Reinke Elementary	Temecula	4	2	Stormwater	Riverside Flood
October 11, 2007	Railroad Canyon Elementary	Lake Elsinore	4	4/5	Stormwater	Riverside Flood
October 12, 2007	Evans Ranch Elementary	Menifee	4	2	Stormwater	Riverside Flood
October 15, 2007	Oak Meadows	Murrieta	2	2	Stormwater	Riverside Flood
October 16, 2007	Donald Graham Elementary	Wildomar	4	4/5	Stormwater	Riverside Flood
October 18, 2007	Oak Meadows	Murrieta	2	2	Stormwater	Riverside Flood
October 19, 2007	Oak Meadows	Murrieta	2	2	Stormwater	Riverside Flood
October 29, 2007	Sparkman	Temecula	4	K	Stormwater	Riverside Flood
October 30, 2007	Murrieta Elementary	Murrieta	3	3	Stormwater	Riverside Flood
November 1, 2007	Murrieta Elementary	Murrieta	3	3	Stormwater	Riverside Flood
November 2, 2007	Murrieta Elementary	Murrieta	2	3	Stormwater	Riverside Flood
November 5, 2007	Thompson Middle School	Murrieta	2	7/8	Stormwater	Riverside Flood
November 6, 2007	Luiseno Elementary	Temecula	4	4	Stormwater	Riverside Flood
November 7, 2007	E. Hale Curran	Murrieta	3	2	Stormwater	Riverside Flood
November 8, 20[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]water	Riverside Flood

PRESENTATI

The Mission Resource Conservation District staff had accomplished the following in outreach education:

With 170 storm water presentations given, at an estimated 30 children per classroom, there were at minimum 5,100 students provided storm water pollution prevention information and associated materials.

2007-2008 STORMWATER EDUCATION PROGRAM PRESENTATIONS
Storm Water/Clean Water Protection Program
Riverside County Flood Control

Date	School/Organization	City	# of Presentations	Grade Level	Presentation Type	Funding Source
June 2, 2008	Tony Tobin Elementary	Temecula	4	2	Stormwater	Riverside Flood
June 3, 2008	Tony Tobin Elementary	Temecula	3	2	Stormwater	Riverside Flood
June 18, 2008	Oak Meadows	Murrieta	1	3&5	Stormwater	Riverside Flood
		TOTAL COMPLETED PRESENTATIONS TO DATE	229			

The 2008 Calendar offered pictorials of recreational and scenic areas in Riverside County. Each graphic provides a brief description and location of the area, along with Best Management Practice tips. The 20,000 calendars printed were distributed through the County and City Library Systems.

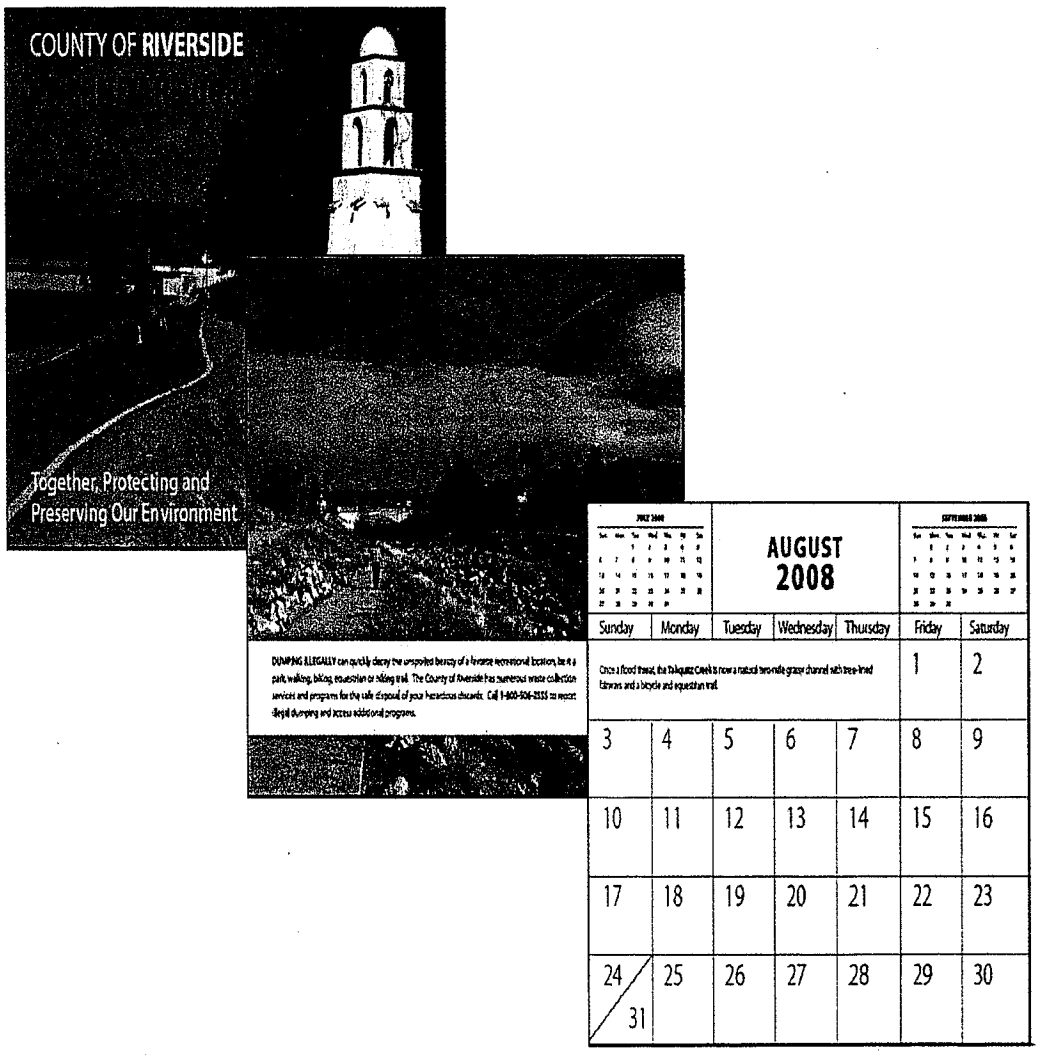

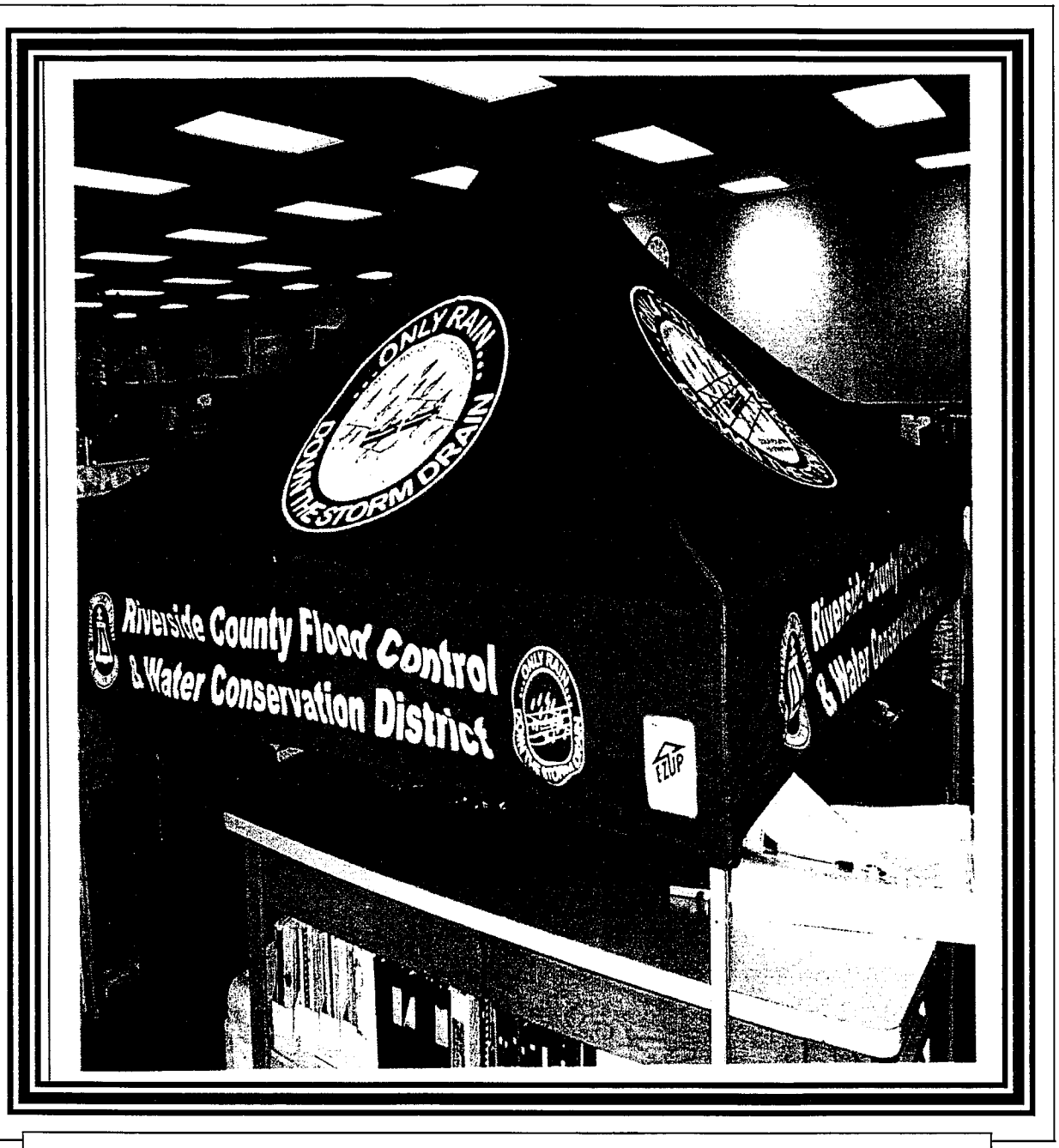

Our 10 x 10 EZ Up is imprinted with the Only Rain Down the Storm Drain logo and is taken to all of our outside event commitments. The logo is easily recognizable and the 800 Toll Free number to call for reporting the illegal disposal into the storm drain is also clearly visible.

SURVEY FOR MEASURING AWARENESS AND EFFECTIVENESS

DO YOU KNOW HOW TO PROTECT OUR STREAMS, RIVERS and LAKES?

City_____ Zip Code_____ Age_____ Sex ☐ F ☐ M Date: _____

1) Water that leaves your lawn from **Irrigation (water sprinklers), Car washing** and **Rain** flows down streets and/or storm drains and then directly to...

☐ Sewage Treatment Plants ☐ Streams, rivers & lakes

2) Which of the following can LEGALLY be disposed into the storm drain? (*Circle all that apply*)

- **Useable Household Chemicals**
- **Yard waste/clippings/leaves**
- **Paint**
- **Cigarette butts**
- **Empty Household Chemicals containers**
- **Pet Waste**
- **Motor Oil / antifreeze**
- **None of these**

3) Do you feel you are well informed and aware of illegal dumping into the storm drain and its impact in your community or streams, rivers and lakes?

☐ Yes ☐ No

HOW DID YOU DO?

1) Water that leaves your lawn from irrigation, washing your car, or rainwater runoff can pickup motor oil and grease from vehicles, excess fertilizer from your lawn, bacteria from pet waste, and excess pesticides from your yard. These pollutants can be carried down streets and storm drains directly to our streams, lakes, and rivers without treatment! That is why we must take care to properly dispose of waste, maintain our vehicles, and use fertilizers, pesticides and other chemicals only as specified on their labels.

2) It is illegal to dispose of any chemical, constituent or waste into a storm drain! Report illegal disposal of chemicals, constituents, or waste to storm drains at **1(800) 506-2555.** You may properly dispose of many of the wastes listed above by doing the following things:

- **Usable and empty household chemicals, paint, motor oil** – Properly dispose these at Household Hazardous Waste and/or Antifreeze, Batteries, Oil and Paint disposal facilities and events. Call **1 (800) 506-2555** for information on disposal locations and special drop off events near you.
- **Pet waste** – Carefully pick up and dispose in the nearest trash receptacle.
- **Grass, clippings, leaves and yard waste** – Collect and dispose in green waste bins or composting areas that are designed to prevent the compost from mixing with excess irrigation water and/or rainwater runoff.

3) Would you like to learn more about protecting our streams, rivers and lakes or wish to report on a illegal storm drain disposal in your area or request a classroom or group demonstration.....

Visit www.floodcontrol.co.riverside.ca.us/stormwater or call **1 (800) 506-2555.**

Remember...Only Rain Down the Storm Drain!

This is the newest version of an older and lengthier survey used to poll attendees at events for measuring storm water pollution prevention awareness and effectiveness. The General Public is more receptive to completing this survey because, it's brief, to the point and informative. Once the survey has been filled out, the responder is given the perforated portion below to review his/her answers and the top portion is entered into a data base for review and assessment. Below are the data results from the March Air Show who reside in the Santa Margarita Watershed area.

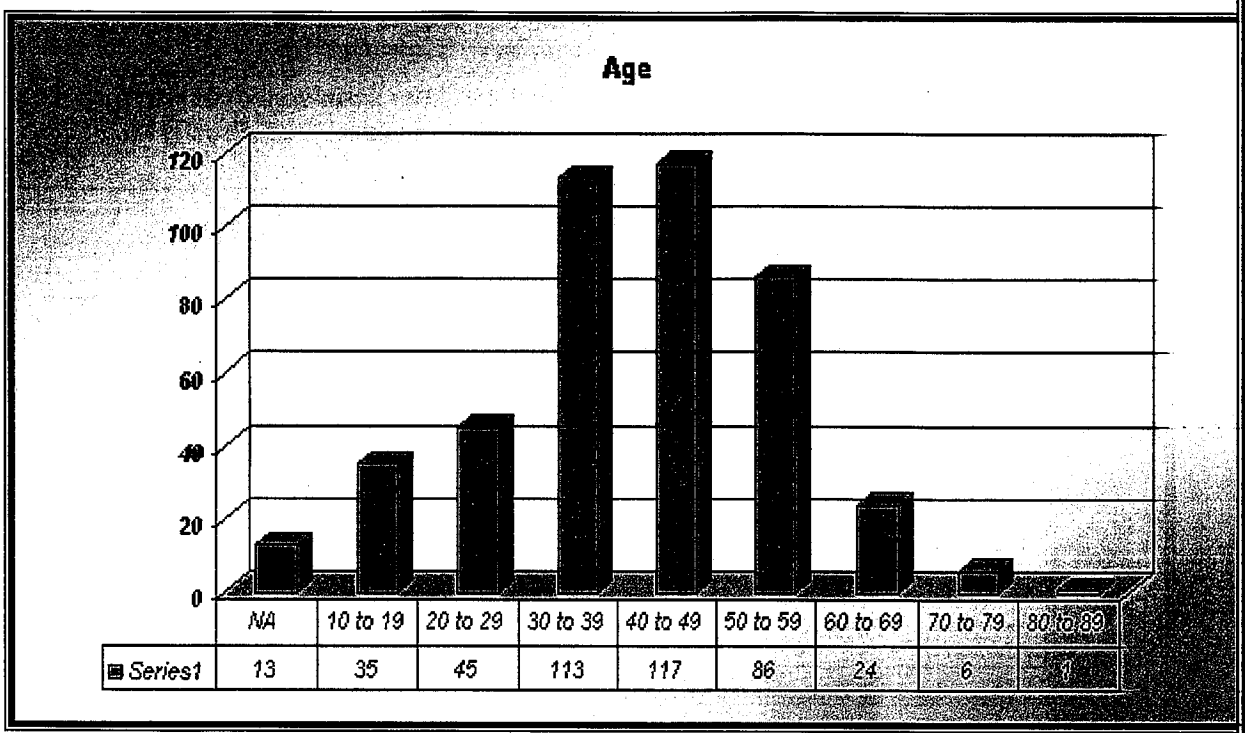

The demographic age and gender breakdown from completed and submitted surveys.

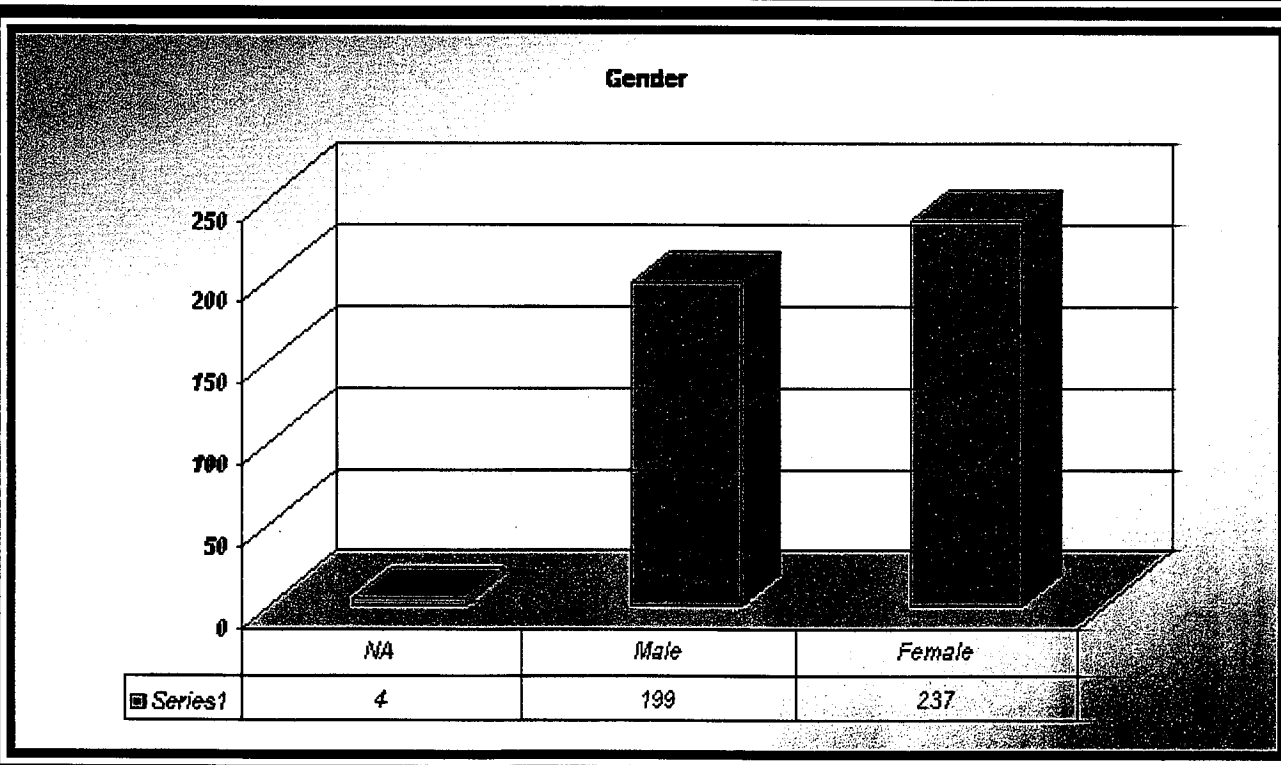

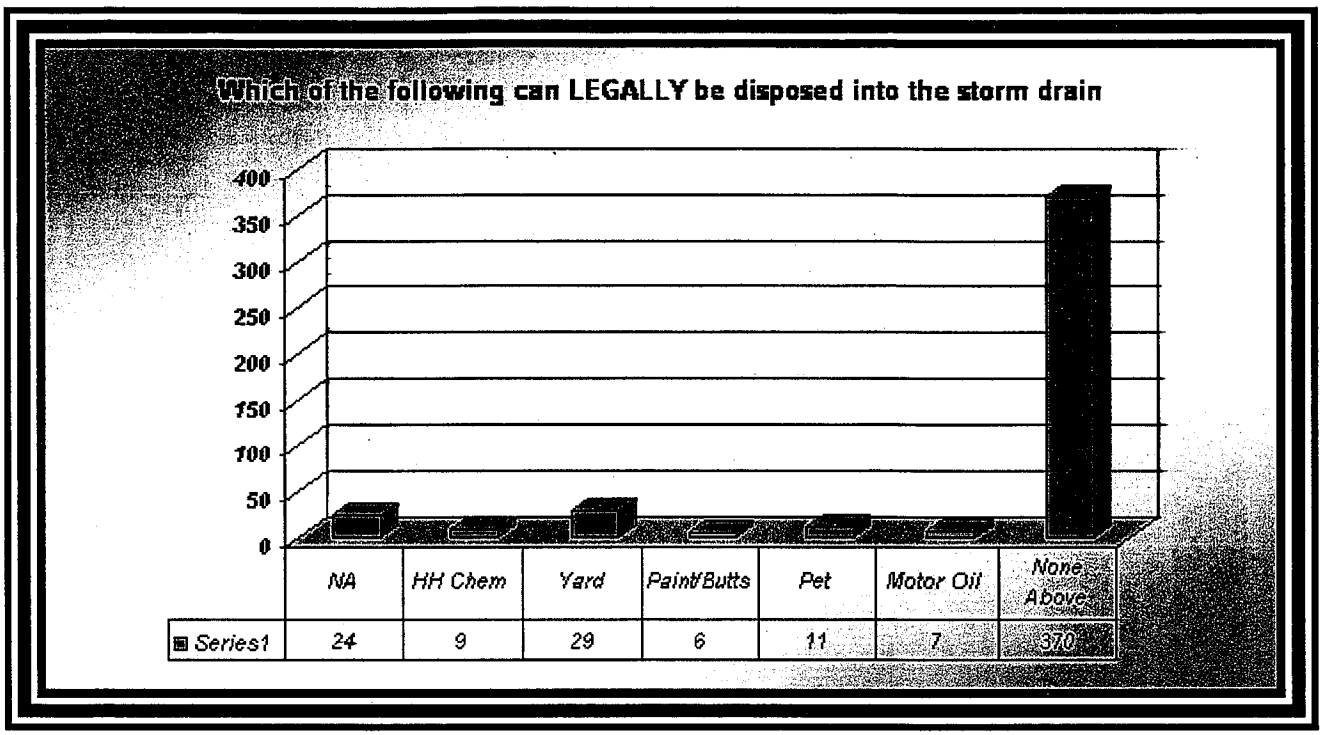
Which of the following can LEGALLY be disposed into the storm drain
400
350
300
250
200
150
100
50
0
NA
HH Chem
Yard
Paint/Butts
Pet
Motor Oil
None Above
Series1
24
9
29
6
11
7
370

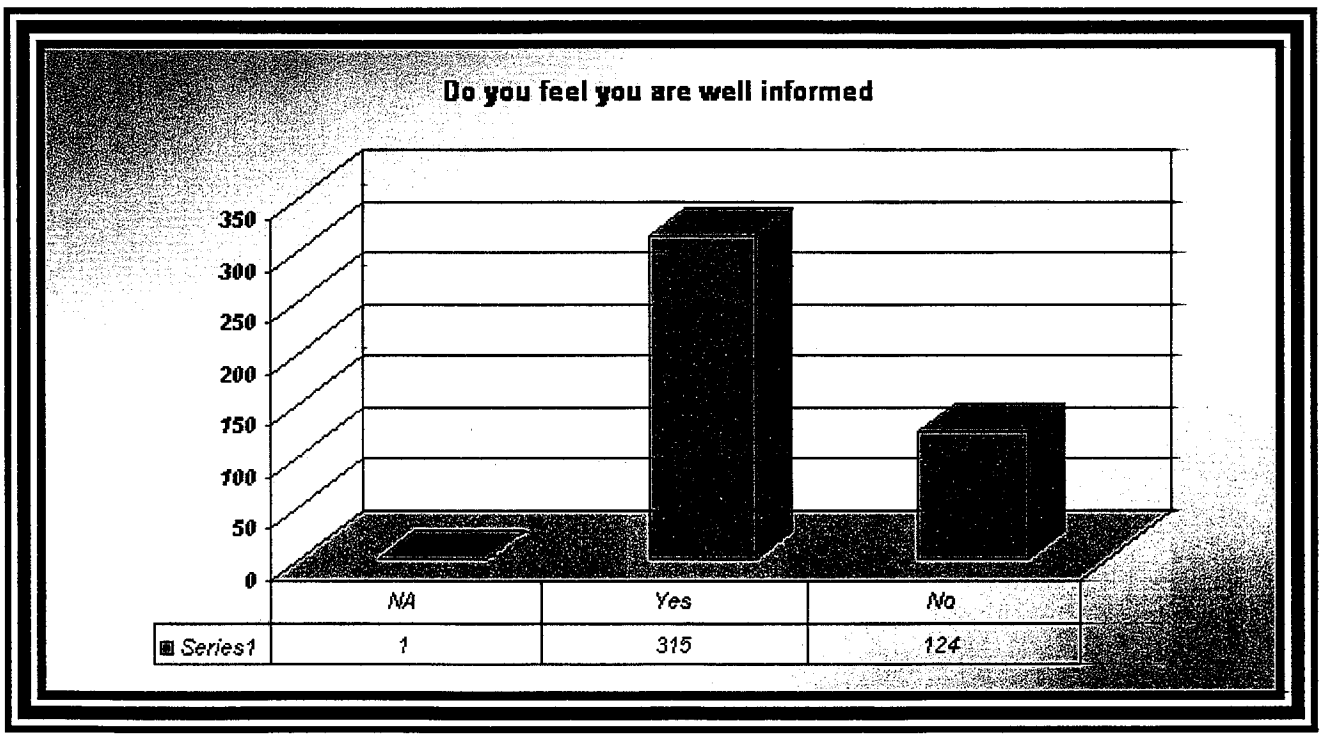
Do you feel you are well informed
350
300
250
200
150
100
50
0
NA
Yes
No
Series1
1
315
124

APPENDIX C

ADDITIONAL REPORTS ON WATERSHED BASED ACTIVITIES

RIVERSIDE COUNTY FIRE DEPARTMENT

210 West San Jacinto Avenue • Perris, California 92570 • (951) 940-6900 • Fax (951) 940-6910

John Hawkins
Fire Chief

Proudly serving the unincorporated areas of Riverside County and the Cities of:

Banning
❖
Beaumont
❖
Calimesa
❖
Canyon Lake
❖
Coachella
❖
Desert Hot Springs
❖
Indian Wells
❖
Indio
❖
Lake Elsinore
❖
La Quinta
❖
Moreno Valley
❖
Palm Desert
❖
Perris
❖
Rancho Mirage
❖
San Jacinto
❖
Temecula

Board of Supervisors

Bob Buster, District 1

John Tavaglione, District 2

Jim Venable, District 3

Roy Wilson, District 4

Marion Ashley, District 5

August 28, 2008

To: Riverside County Flood Control and Water Conservation District
NPDES Section

Re: 2007/2008 Annual Report on Hazardous Materials Emergency Response Team Activities

Attached is the Annual Report on Hazardous Materials Response Team activities for FY 2007/2008. Responses included in this annual summary are for the Santa Ana, Santa Margarita and Whitewater Rivers and the respective Regional Boards. Should you require clarification or further information, please contact us at your convenience.

Respectfully submitted,

Kyle P. Ferris
Fire Apparatus Engineer/Hazmat Specialist
Hazardous Materials Response Team 34
(951) 926 3591

2007/08 Annual Report
Riverside County Fire Department
Hazardous Materials Emergency Response Team Activities

Santa Ana, Santa Margarita and Whitewater Regions

August 28, 2008

Prepared for

Riverside County Flood Control and Water Conservation District

Cal Fire/Riverside County Fire Department
210 West San Jacinto Street
Perris, CA 92570

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7.0	Incident Summary	7

1.0 Summary

This report addresses the Riverside County Fire Department's Hazardous Materials Response Team activities for the period of July 1, 2007 to June 30, 2008. The report details program development, public outreach efforts, municipal staff training, runoff prevention measures, and call summary. Hazardous Material Response Team activities included in this report were actual hazardous material releases that potentially threatened the watersheds of the Santa Ana, Santa Margarita, and Whitewater Rivers overseen by the Riverside County Flood Control and Water Conservation District.

2.0 Introduction to the Hazardous Materials Response Team

The 2007/2008 Annual Report on Hazardous Materials Emergency Response Team Activities summarizes responses to environmental emergencies for the purpose of controlling the release of toxic materials and minimizing the impact on public safety and the environment. The Riverside County Fire Department Hazardous Materials Response Team, established in 1986, continues with its mission of providing service within Riverside County through a partnership program that combines the efforts from Cal Fire/Riverside County Fire Department and the Hazardous Material Branch of Riverside County Environmental Health.

The Hazardous Materials Response Team responds to environmental emergencies within the County of Riverside and proves mutual aid to Imperial County. An additional responsibility of the HMRT is oversight and coordination of the NPDES Storm Water Discharge Permit for Riverside County Fire Department facilities. The HMRT oversees maintenance and implementation of the Storm Water Pollution Prevention Program (SWPPP) for county fire stations and facilities which includes the implementation of Best Management Practices (BMPs) municipal employee training and Riverside County Fire Fighting Agencies BMPs.

Riverside County Fire Department is one of the largest fire departments within California in both geographic coverage and firefighting personnel, providing emergency service to Riverside County and the cities of Banning, Beaumont, Calimesa, Coachella, Desert Hot Springs, Indian Wells, Indio, La Quinta, Moreno Valley, Palm Desert, Perris, Rancho Mirage, San Jacinto, and Temecula. The Riverside County Fire Department operates 96 fire stations with over 1200 employees.

3.0 Program Management and Development

With the continued development and population growth of Riverside County, total numbers of emergency incidents are increasing. Riverside County Fire Department is committed to meeting the demand for public service and has developed plans and contingencies for continued expansion through placement of new facilities and additional personnel. With the increase in the total number of emergency incidents, there is a related increase in Hazardous Materials related incidents. The Hazardous Material Response Team is meeting this increase in service with the following program developments:

- FY 2001/2002, this year saw the development of two dedicated Hazardous Materials Response Teams, consisting of five Firefighter/Hazardous Material Technicians per team. Team One is located in Winchester, CA and Team Two is located in Palm Desert, CA.

- FY 2002/2003, the purchase of three new hazardous materials response vehicles, consisting of two support trucks, and a tractor-trailer main unit. The main unit was assigned to Hazmat Team 1 and one support truck is assigned to each team. There have been additional purchases of equipment and monitors to ensure a full compliment of tools for both teams.

- FY 2003/2004, two Mass Decontamination Response Trailers, capable of treating 200 patients per hour, were purchased with grant money and placed in-service for both teams. A change in the designators for the Hazardous Materials Response Teams was made; "Hazmat 1" and "Hazmat 2" became "Hazmat 34" and "Hazmat 81", to reflect the geographic locations of the Hazmat Response teams, improving communications and organization.

- FY 2004/2005, participating fire departments within Riverside County developed Best Management Practices (BMPs) that are intended to be used by fire fighting agencies for urban runoff management. These BMPs are a requirement of the Riverside County Municipal Stormwater permit (section XI.B) adopted by the Santa Ana Regional Water Quality Control Board (SARWQCB). Due to an operational need the two response teams were combined into one team and separated into three locations.

- FY 2005/2006, the Hazardous Materials Response Team was reorganized into two distinct teams, Hazmat 34 at Winchester Fire Station 34 and Hazmat 81 at North Bermuda Dunes Fire Station 81. Daily on duty staff is 10 Hazardous Materials Specialists providing service to the county.

- FY 2006/2007, approximately $25000.00 was expended on Vetter air bags to replace older complements and add to the capabilities of Hazmat 81. Vetter air bags are a significant tool that can be used to occlude accidental discharges from impacting the storm water system. Further developments, the installation of MDTs (mobile data terminals) in all front line fire equipment, and Riverside County environmental health officer vehicles. This allows for improvements in locating and responding to incidents, orthographic mapping of incidents and integrating technology which the ability to access the Health Department's Business Response Plans. A $400,000 purchase has been approved to replace the main Hazmat Response Team vehicle at Station 81 and it is scheduled to be placed in service in FY 2007/2008.

- FY 2007/2008, with the growing needs of Hazardous Materials Response, the Hazardous Materials Response Team was granted additional staffing at each station. Winchester Fire Station 34 and Bermuda Dunes Fire Station 81 each have a Paramedic Engine with Hazmat trained people on them. This increased the daily staffing to 16 Hazardous Materials Technicians and Specialist to provide service to the county.

4.0 Public Education

The Hazardous Materials Response Team is available for public education, and dedicates time to provide information and education regarding environmental safety and Storm Water Pollution Prevention. Both teams have participated in public relation and education events during FY 2007/2008 on an average of 1- 2 per month. Hazmat Response Team personnel are made available to provide information and education through direct public contact, and materials. These events have included:

- The Riverside County Fair held annually at Indio, CA.

- Educational presentations at public schools, grades K through 12.

- Safety fairs held at the cities of La Quinta, Hemet, Perris, Moreno Valley, and Temecula.

- Public events within Riverside County.

Public information and education is provided through materials that the Hazardous Materials Response Team hands out during the various events that are attended during the year and information that team members provide during equipment displays.

- "Household Hazardous Waste Collection Site Schedule" (schedule) Riverside County Environmental Health.
- "Household Hazardous Waste" (pamphlet), Stormwater Cleanwater Protection Program.
- "Stormwater Pollution, What You Should Know" (pamphlet) Stormwater Cleanwater Protection Program.
- "Stormwater Pollution, Outdoor Cleaning Activities" (pamphlet) Stormwater Cleanwater Protection Program.
- "Storm Drains Flow directly to our Waterways" (poster) Stormwater Cleanwater Protection Program.

5.0 Municipal Employee Training

Successful Storm Water Pollution Prevention is dependent upon a standard operation policy and effective education of department employees. Team members from the Hazardous Material Response Team are available to train and educate the approximately 1200 Riverside County Fire Department personnel on the Storm Water Pollution Prevention Program and the National Pollution Discharge Elimination System. In previous years, the training was conducted at individual fire stations, or during employee orientation at Clark Training Center.

To comply with NPDES permit requirements for municipal employee training, and to ensure a consistent training program, Riverside County Fire Department produced a video training program that is distributed to all 95 fire department facilities to compliment the SWPPP manuals that are available for reference at the facilities. Employees are encouraged to view the program on an annual basis. The training covers BMPs, (best management practices) that apply to municipal facilities.

Fire Station/Municipal Facility Activities

- Dispensing of Fuel.
- Vehicle and equipment parking and storage.
- Vehicle and equipment maintenance.
- Vehicle and equipment washing and cleaning.

1/1/2008	524	4500 Kirby Dr. Rubidoux, CA 92509	Santa Ana
1/3/2008	749	31002 Melmore Ln. Menifee, CA 92584	Margarita
1/3/2008	890	1198 W. Ramsey St. Banning, CA 92220	Santa Ana
1/10/2008	2928	Hwy 60 x/of Pyrite Riverside, CA 92509	Santa Ana
1/11/2008	3522	32568 Hislop Way Temecula, CA 92592	Margarita
1/16/2008	4941	27700 Ironwood Ave. Moreno Valley, CA 92555	Santa Ana
1/18/2008	5456	42800 Stanley Rd. Sage, CA 92544	Margarita
1/18/2008	5532	41600 E. Benton Rd. Sage, CA 92544	Margarita
1/20/2008	6172	41867 Enterprise Cir. Temecula, CA 92590	Margarita
1/21/2008	6488	Hwy 60 x/of Pedley Glen Avon, CA 92509	Santa Ana
1/23/2008	7124	Cherry Valley Blvd x/of I 10 92223	Santa Ana
1/25/2008	7756	45000 Pechanga Pkwy. Temecula, CA 92592	Margarita
1/25/2008	7815	16302 Cajalco Rd. Perris, CA 92504	Santa Ana
1/31/2008	9637	24000 Revere Pl. Moreno Valley, CA 92551	Santa Ana
1/31/2008	9655	23000 El Baquero Rd. Perris, CA 92570	Santa Ana
2/5/2008	11492	2000 Avalon St. Rubidoux, CA 92509	Santa Ana
2/6/2008	11787	21788 Glen View Dr. Moreno Valley, CA 92557	Santa Ana
2/9/2008	12815	14000 Davis Rd. Moreno Valley, CA 92555	Santa Ana
2/10/2008	13109	12255 Pigeon Pass Rd. Moreno Valley, CA 92557	Santa Ana
2/11/2008	13549	61500 Burnt Valley Rd. Anza, CA 92539	Margarita
2/22/2008	17057	3998 Perris Blvd. Perris, CA 92571	Santa Ana
2/22/2008	17130	23400 Cajalco Rd. Mead Valley, CA 92570	Santa Ana
2/23/2008	17548	8900 Perris Blvd. Moreno Valley, CA 92557	Santa Ana
2/25/2008	18004	30800 Bradley Rd. Menifee, CA 92584	Margarita
2/25/2008	18078	29800 Ramona Exwy. Nuevo, CA 92583	Santa Ana
3/3/2008	20368	29998 Alessandro Blvd. Moreno Valley, CA 92555	Santa Ana
3/11/2008	22823	21798 Nuevo Rd. Perris, CA 92570	Santa Ana
3/11/2008	22854	21000 Pinewood Mead Valley, CA 92570	Santa Ana
3/11/2008	22882	21426 Austin St. Wildomar, CA 92595	Margarita
3/15/2008	24183	36698 Moser Murrieta, CA 92883	Margarita
3/27/2008	28046	23862 Cedar Creek Moreno Valley, CA 92557	Santa Ana
3/27/2008	28101	12857 Frederick St. Moreno Valley, CA 92553	Santa Ana
4/2/2008	29796	29796 Margarita Rd. Murrieta, CA 92563	Margarita
4/10/2008	32306	4250 Hamner Ave. Glen Avon, CA 92509	Santa Ana
4/11/2008	32482	31000 Alessandro Blvd. Moreno Valley, CA 92555	Santa Ana
4/12/2008	32791	3216 Ash St. Lake Elsinore, CA 92530	Margarita
4/14/2008	33443	348 Railroad Canyon Rd. Lake Elsinore, CA 92532	Margarita
4/17/2008	34535	17641 Santa Rosa Mine Rd. Good Hope, CA 92570	Santa Ana
4/18/2008	34731	23290 Alessandro Blvd. Moreno Valley, CA 92553	Santa Ana
4/29/2008	38453	I 15 x/of Hwy 60 Glen Avon, CA 91752	Santa Ana
5/2/2008	39250	6398 Ridgeview Mira Loma, CA 92509	Santa Ana
5/2/2008	39319	23000 Menifee Rd. Nuevo, CA 92567	Santa Ana
5/5/2008	40339	6000 Bain St. Mira Loma, CA 91752	Santa Ana
5/6/2008	40469	28000 Brodiea Ave. Moreno Valley, CA 92553	Santa Ana
5/8/2008	41059	3650 Daly St. West Riverside, CA 92509	Santa Ana
5/13/2008	42477	10200 San Sevaine Way Glen Avon, CA 91752	Santa Ana
5/13/2008	42490	17500 Harvill Ave. Perris, CA 92570	Santa Ana

5/13/2008	46639	26419 Ynez Rd. Temecula, CA 92591	Margarita
5/15/2008	43160	24051 John F. Kennedy Dr. Moreno Valley, CA 92553	Santa Ana
5/15/2008	43364	5000 Capary Rd. Rubidoux, 92509	Santa Ana
5/19/2008	44654	10500 60th St. Mira Loma, CA 91752	Santa Ana
5/19/2008	44731	8000 Redlands Blvd. Moreno Valley, CA 92373	Santa Ana
5/19/2008	44748	I 215 x/of Oleander Rd. Perris, CA 92571	Santa Ana
5/20/2008	45096	24433 Juniper Flats Rd. Homeland, CA 92548	Santa Ana
5/21/2008	45261	597 Rodeo Dr. Rubidoux, CA 92509	Santa Ana
5/27/2008	47027	1034 Ramsey St. Banning, CA 92220	Santa Ana
5/28/2008	47329	28300 Newport Rd. Menifee, CA 92586	Margarita
6/4/2008	49478	32832 Thompson Winchester, CA 92596	Margarita
6/10/2008	51405	16905 Bundy Rd. Riverside, CA 92518	Santa Ana
6/11/2008	51802	25758 Sundance Ln. Sun City, CA 92585	Margarita
6/22/2008	55194	11850 Vista De Cerros Dr. Moreno Valley, CA 92555	Santa Ana
6/29/2008	57316	19088 Tule Way Lake Elsinore, CA 92530	Margarita

HMRT 81 FLOOD CONTROL CALLS FY07/08

8/5/2007	68289	17463 Ben Mar North Palm Springs, CA 92240	Whitewater
8/7/2007	68874	I 10 x/of Hwy 62 Whitewater, CA 92282	Whitewater
8/20/2007	72830	I 10 x/of Haugen Leman Wy, San Gorgonio, CA 92282	Whitewater
8/28/2007	75281	Seeley x/of Lovekin Rd. Blythe, CA 92225	Whitewater
9/11/2007	79748	71000 Ramon Rd. Indian Wells, CA 92270	Whitewater
9/20/2007	82221	Hwy 86S x/of 62nd Ave. Mecca, CA 92254	Whitewater
9/29/2007	84943	45761 Dillion Rd. Coachella, CA 92201	Whitewater
10/1/2007	85606	Pavon Rd. Indio, CA 92201	Whitewater
10/9/2007	88121	61 Ave. x/of Pierce St. Mecca, CA 92254	Whitewater
10/11/2007	88614	80996 Fred Waring Dr. Indio 92201	Whitewater
10/21/2007	91637	46400 Washington ST. La Quinta, CA 92260	Whitewater
10/24/2007	93057	77543 Burrus Ct. Palm Desert, CA 92260	Whitewater
10/28/2007	94450	Ave. 42nd x/of Country Club Dr. Palm Desert, CA 92203	Whitewater
10/29/2007	94710	47800 Madison Ct. Indio, CA 92201	Whitewater
11/6/2007	97270	79107 Bermuda Dunes Dr. Bermuda Dunes, CA 92203	Whitewater
11/10/2007	98473	82211 Miles Ave Indio , CA 92203	Whitewater
12/1/2007	104934	3500018500 35th Ave. Blythe, CA 92225	Whitewater
12/2/2007	105132	47600 Eisenhower Dr. La Quinta, CA 92253	Whitewater
12/4/2007	106073	I 10 x/of Jackson Indio, CA 92203	Whitewater
12/5/2007	106267	Bob Hope Dr. x/of Frank Sinatra Rancho Mirage, CA 92270	Whitewater
12/18/2007	110286	68499 Cathedral Canyon Dr. Cathedral City, CA 92234	Whitewater
12/27/2007	113052	74590 Hwy 111 Palm Desert, CA 92260	Whitewater
1/3/2008	762	68000 Grant St. Mecca, CA 92254	Whitewater
1/8/2008	2368	49922 Bonita Cabazon, CA 92230	Whitewater
1/22/2008	6848	Ave. 50 x/of Eisenhower Dr. La Quinta 92253	Whitewater
2/1/2008	8000	8500 North Intake Blvd. Blythe, CA 92225	Whitewater
2/3/2008	10378	N. Indian Cyn. x/of Tamarisk Rd. Palm Springs, CA 92262	Whitewater
2/8/2008	12352	78700 Hwy 111 La Quinta, CA 92253	Whitewater

IC/ID REPORTS RECEIVED BY DISTRICT

NPDES Complaints Database

Illicit Discharges

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1061

Type	Illicit Discharge
Received Date	8/28/2007 0:00
APN	921-480-043
First Name	David
Last Name	Ortega
Complainant Address	
Complainant City	
Complainant Zip Code	
Phone	951 955-4390
Received By	David Ortega
Complaint Adderess	27532 Commerce Center Drive
Complaint City	Temecula
Complaint Zip Code	92590
Location	

Complaint A gentleman was hosing off a coolant unit from this business and the rinseate ran down the parking lot, flowed into the street gutter and went into a storm drain that dumped the water into Long Canyon Wash just upstream of Commerce Center Drive.

Findings 8/28/07: David Ortega, NPDES Section, Riverside County Flood Control (RCFC) District, was performing routine "dry weather" monitoring at Long Canyon Wash when he noticed that water was flowing from this business into Long Canyon Wash just upstream from the monitoring location. Before Mr. Ortega took any field water quality parameters from Long Canyon Wash, he went to the business and spoke to a gentleman who was washing down a coolant unit from an open warehouse door and onto the property's side parking lot. Mr. Ortega noted to the gentleman about the County's Stormwater/Cleanwater program and stated that only rain and irrigation water belongs in the storm drains. The gentleman replied that the coolant being washed down "has only water being washed down". Mr. Ortega noted to the man that his rinseate might wash down metals from this unit into the storm drain because of the visible corrosion on the unit. Mr. Ortega also let the man know that he will be referring this matter to Aldo Licitra from the City of Temecula, an RCFC co-permittee, for a possible further investigation on this matter.

Action 8/28/07: Mr. Ortega took a few photos of the coolant unit being washed down and of the path of rinseate flowing down the property's parking lot, into the street gutter and into a storm drain that is directly above Long Canyon Wash. Mr. Ortega also called Aldo Licitra from the City of Temecula to inform him of this matter. NOTE: Long Canyon Wash at Commerce Center Drive is not an RCFC District maintained facility. Mr. Licitra visited the complaint address later the same day. He noted that this business is not on the City of Temecula's inspection list since it is a children's gymnastics studio. Mr. Licitra spoke to the facility custodian today who had created the discharge and informed him of the violation. He had washed down a portable water-cooled fan used to blow air into the facility. Mr. Licitra provided the custodian some onsite education and gave him a verbal warning to cease any further discharges onto the pavement. The custodian stated that the fan is not washed frequently. Mr. Licitra directed the custodian to perform this type of cleaning activity over his existing landscaping or gravel areas that were on the site in order to infiltrate the wash water. Mr. Licitra did not see any further discharges during a subsequent follow-up drive-by a few days later.

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1177

Type Illicit Discharge

Received Date 12/3/2007 0:00

APN UNKNOWN

First Name Annie

Last Name Le

Complainant Address

Complainant City County (near Temecula)

Complainant Zip Code 92592

Phone 951 302-5265

Received By B Cho

Complaint Adderess

Complaint City County (near Temecula)

Complaint Zip Code 92592

Location Tr 29608, immediately east of the Complaintant's property and south of Temecula Creek

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Complaint This complaint was forwarded from Helio with the District's Planning Section. The tract adjacent to the complaintaint's property has mass graded. Due to rainfall last Friday, sediment form the tract has impacted Annie's backyard. The complaintaints stated that they will contact the Regional Board about the matter.

Findings A District maintained facility (Tememcula Creek Line B proj#: 7-0042) is nearby that drains to Temecula Creek. The Owner is Temecula Ranchos 909-676-3575; The Applicant is High Point Communities 714-481-3020; The Engineer is Ludwig Engineering 909-884-8217.

Action Mark Biloki the District's maintenance supervisor was contacted about the complaint. Mark will have District crews respond to the matter.

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1418

Type	Illicit Discharge
Received Date	4/30/2008 0:00
APN	953-222-027
First Name	Melanie
Last Name	Hastings
Complainant Address	
Complainant City	Temecula
Complainant Zip Code	92591
Phone	0
Received By	David Ortega
Complaint Adderess	41288 Rue Jadot
Complaint City	Temecula
Complaint Zip Code	92591
Location	

Complaint Complainant is reporting dumping of possible chemicals in to the street gutter by her next door neighbor.

Findings 4/30/08: David Ortega of the NPDES Section at the Riverside County Flood Control (RCFC) District received this complaint call today from Melanie Hastings (complainant). Ms. Hastings stated that her next door neighbor (complaint address) has a dog grooming business that she operates out of her garage. Ms. Hastings said that at various times of the day, she notices a liquid discharge in the street gutter and "it smells really bad, like raw sewage". This discharge is going into a storm drain down the street. Mr. Ortega asked Ms. Hastings is there an active liquid discharge going on right now at the time of her call. Ms. Hastings replied negative.

Action 4/30/08: Mr. Ortega asked Ms. Hastings to call him on his cell phone number, (951) 961-9574, if and when there is an active discharge going on so that either he can get someone from the City of Temecula to come out there to investigate or that he will try to stop by to investigate this complaint himself. 5/1/08: Mr. Ortega spoke to Aldo Licitra of the City of Temecula about this complaint. Mr. Ortega emailed a copy of this complaint call report to Mr. Licitra.

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1447

Type	Illicit Discharge
Received Date	5/12/2008 0:00
APN	916-052-026
First Name	NRC
Last Name	
Complainant Address	
Complainant City	
Complainant Zip Code	
Phone	
Received By	David Ortega
Complaint Adderess	26135 Palmetto Street
Complaint City	Murrieta
Complaint Zip Code	92563
Location	

Complaint Caller is reporting an unknown sheen of a white substance from an unknown source. Caller states that this whitish substance has been flowing down the whole street and around the corner. Caller believes that this substance may be from someone in the neighborhood who may have been painting but he is not sure. Caller is not sure if the material has reached a storm drain or waterway.

Findings 5/12/08: NRC called the Governor's Office of Emergency Services (OES) to report this release. The OES issued a Hazardous Materials Spill Report, Control# 08-3448, concerning this incident. NRC Report# 870675. The OES report states that it is unknown if water and/or drinking water was involved and/or impacted from this release. NRC and the Riverside County Environmental Health Department were notified about this incident. There are two (2) Riverside County Flood Control District facilities that are located about .3 mile away from the complaint address: "Warm Springs Line C Sugarberry" and "Warm Springs VY Torrey Pines Storm Drain".

Action

Riverside for pH analysis. 1600 hours: Mr. Winters arrived at Babcock Labs and checked the samples into the lab. Mr. Winters notified David Ortega of the incident. Case forwarded to the Riverside County D.A.'s Office (Ted Ryan) for follow up. Mr. Winters has a few photos of his sample locations, map of the scene and Babcock Lab results of the samples that were submitted. Sample KW042808-901 pH analysis result is 12.4, Sample KW042808-02 pH analysis result is 11.2, Sample KW042808-03 pH analysis result is 11.3 5/22/08: David Ortega spoke to Samantha Phillips, County Code Enforcement Officer, about this incident. She noted to Mr. Ortega that there was no NOV and/or citation issued to the responsible party (California Pools and Spa) for this incident. She did state because this case was sent to the County D.A.'s Office as a criminal case. Mr. Ortega completed this complaint call report today and fowarded it to J. Uhley and A. Chun at the RCFC District and to Mike Shetler at the Riverside County Executive Office as an "FYI".

NPDES Complaints Database

Spills

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1504

Type	Spill
Received Date	6/22/2008 0:00
APN	964-060-001
First Name	Metropolitan Water District (MWD)
Last Name	
Complainant Address	
Complainant City	
Complainant Zip Code	
Phone	0
Received By	David Ortega
Complaint Adderess	3740 Borel Road
Complaint City	Winchester
Complaint Zip Code	92596
Location	Skinner Filtration Plant

Complaint 4 ounces of chlorine was released from a failed pipe connection.

Findings 6/22/08: MWD called the Governor's Office of Emergency Services (OES) to report this release. The OES issued a Hazardous Materials Spill Report, Control# 08-4447, concerning this incident. The OES report states that no water was involved from this release. The OES report also states that the chlorine was contained and cleaned up by the reporting party (MWD). The Riverside County Environmental Health Department and the Riverside County Spill Hotline were notified about this incident. There are no Riverside County Flood Control District facilities in the area of the complaint address that could have been impacted.

Action

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1494

Type	Spill
Received Date	6/14/2008 0:00
APN	380-170-023
First Name	So. Cal. Edison (SCE)
Last Name	
Complainant Address	
Complainant City	
Complainant Zip Code	
Phone	
Received By	David Ortega
Complaint Adderess	23175 Palomar Street
Complaint City	Wildomar
Complaint Zip Code	92595
Location	

Complaint 2 gallons of mineral oil/unknown PCB was released to the soil from a pole top transformer that failed.

Findings 6/14/08: SCE called the Governor's Office of Emergency Services (OES) to report this release. The OES issued a Hazardous Materials Spill Report, Control# 08-4229, concerning this incident. The OES report states that no water was involved from this release. The OES report also states that the substance was contained. The Riverside County Environmental Health Department was notified about this incident. The nearest Riverside County Flood Control District facility is located about 1 mile to the southeast of the complaint address: "Murrieta Creek MDP Line G at Washington".

Action

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1475

Type	Spill
Received Date	6/1/2008 0:00
APN	957-330-048
First Name	Veeder Root
Last Name	
Complainant Address	
Complainant City	
Complainant Zip Code	
Phone	
Received By	David Ortega
Complaint Adderess	29910-B Murrieta Hot Springs Road
Complaint City	Murrieta
Complaint Zip Code	92563
Location	

Complaint 2 gallons of unleaded fuel was overspilled onto the ground because the auto-shut off on the nozzle failed and while a customer was filling up their tank on pump# 13.

Findings 6/1/08: Veeder Root called the Governor's Office of Emergency Services (OES) to report this release. The OES issued a Hazardous Materials Spill Report, Control# 08-3908, concerning this incident. The OES report states that no water was involved from this release. The OES report also states that the fuel was contained and cleaned up by the reporting party (Veeder Root). The Riverside County Environmental Health Department was notified about this incident. The nearest Riverside County Flood Control District facility is located underground and adjacent to the complaint address: "Santa Gertrudis Lines 200, 600 Stage 1 Murrieta Hot Springs Road".

Action

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1400

Type	Spill
Received Date	4/21/2008 0:00
APN	963-040-002
First Name	So. Cal. Edison (SCE)
Last Name	
Complainant Address	
Complainant City	
Complainant Zip Code	
Phone	
Received By	David Ortega
Complaint Adderess	31095 Auld Road
Complaint City	French Valley
Complaint Zip Code	92563
Location	

Complaint 1 to 2 gallons of mineral oil (non PCB) was released onto the road when a car struck a pad mounted transformer.

Findings 4/21/08: SCE called the Governor's Office of Emergency Services (OES) to report this release. The OES issued a Hazardous Materials Spill Report, Control# 08-2931, concerning this incident. The OES report states that no water was involved from this release. The OES report also states that the substance was contained and cleaned up by the reporting party (SCE). The Police Department, Sheriff's Office, and Riverside County Haz.-Mat. were on scene concerning this incident. The Riverside County Environmental Health Department was notified about this release. The nearest Riverside County Flood Control District facility is located about .6 mile to the northeast of the complaint address: "Warm Springs Benton Creek Lines 3 and 6".

Action

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1361

Type	Spill
Received Date	3/19/2008 0:00
APN	961-370-011
First Name	Eastern Municipal Water District (EMWD)
Last Name	
Complainant Address	
Complainant City	
Complainant Zip Code	
Phone	
Received By	David Ortega
Complaint Adderess	45447 Badger Way
Complaint City	Temecula
Complaint Zip Code	92592
Location	

Complaint Vandalism has caused a sewage leak that has been flowing for the past 60 minutes at approx. 25 gallons per minute.

Findings 3/19/08: EMWD called the Governor's Office of Emergency Services (OES) to report this sewage leak. The OES issued a Hazardous Materials Spill Report, Control# 08-2188, concerning this incident. The OES report states that the reporting party (EMWD) is considered a third party to this leak and they are unsure what product is from. The sewage has spilled into a park. The OES report also states that it is unknown if water was involved from this incident and it is possible that a storm drain has been impacted from this leak. No drinking water has been impacted from this incident. The San Diego RWQCB and the Riverside County Environmental Health Department were notified about this incident. The nearest Riverside County Flood Control District facility is located about .1 mile to the northwest of the complaint address: "Temecula VY Via Del Coronado Storm Drain". NOTE: The complaint APN listed in this report is a reference APN only.

Action

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1354

Type	Spill
Received Date	3/13/2008 0:00
APN	964-060-001
First Name	Metro. Water of Southern California (MWD)
Last Name	
Complainant Address	
Complainant City	
Complainant Zip Code	
Phone	
Received By	David Ortega
Complaint Adderess	33740 Borel Road
Complaint City	Winchester
Complaint Zip Code	92596
Location	Skinner Water Plant

Complaint Less than one part per million (ppm) of chlorine was detected when on evaporator overheated.

Findings 3/13/08: MWD called the Governor's Office of Emergency Services (OES) to report this detection of chlorine. The OES issued a Hazardous Materials Spill Report, Control# 08-2042, concerning this incident. The OES report states that no water was involved from this chlorine detection. The OES report also states that the chlorine was contained. The Riverside County Environmental Health Department was notified about this incident. There are no Riverside County Flood Control District facilities in the area of the complaint address that could have been impacted.

Action

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1348

Type	Spill
Received Date	3/10/2008 0:00
APN	964-060-001
First Name	Metro. Water District (MWD)
Last Name	
Complainant Address	
Complainant City	
Complainant Zip Code	
Phone	
Received By	David Ortega
Complaint Adderess	33740 Borel Road
Complaint City	Winchester
Complaint Zip Code	92596
Location	Skinner Plant

Complaint 4 to 5 gallons of Ferric Chloride was released due to a sample valve that was left open.

Findings 3/10/08: MED called the Governor's Office of Emergency Services (OES) to report this release. The OES issued a Hazardous Materials Spill Report, Control# 08-1946, concerning this incident. The OES report states that no water was involved from this release. The OES report also states that the substance was contained and cleaned up by a contractor. The Riverside County Environmental Health Department was notified about this incident. There are no Riverside County Flood Control District facilities in the area of the complaint address that could have been impacted.

Action

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1339

Type	Spill
Received Date	3/3/2008 0:00
APN	964-060-001
First Name	Metropolitan Water District (MWD)
Last Name	
Complainant Address	
Complainant City	
Complainant Zip Code	
Phone	
Received By	David Ortega
Complaint Adderess	33740 Borel Road
Complaint City	Winchester
Complaint Zip Code	92596
Location	Skinner Plant

Complaint 4 gallons of fluoride leaked from a high flow needle valve.

Findings 3/3/08: MWD called the Governor's Office of Emergency Services (OES) to report this leak. The OES issued a Hazardous Materials Spill Report, Control# 08-1772, concerning this incident. The OES report states that no water was involved from this leak. The OES report also states that the substance was contained and cleaned up by the reporting party (MWD). The Riverside County Environmental Health Department was notified about this incident. There are no Riverside County Flood Control District facilities in the area of the complaint address that could have been impacted from this leak.

Action

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1321

Type	Spill
Received Date	2/20/2008 0:00
APN	964-060-001
First Name	Metropolitan Water Dist. (MWD)
Last Name	
Complainant Address	
Complainant City	
Complainant Zip Code	
Phone	
Received By	David Ortega
Complaint Adderess	33740 Borel Road
Complaint City	Winchester
Complaint Zip Code	92596
Location	Skinner Plant

Complaint 10 gallons of caustic soda solution 20% was released to a roof due to a vent system failure during testing of a scrubber.

Findings 2/20/08: MWD called the Governor's Office of Emergency Services (OES) to report this release. The OES issued a Hazardous Materials Spill Report, Control# 08-1466, concerning this incident. The OES report states that no water and no drinking water was involved and/or impacted from this release. The OES report also states that the substance was contained and cleaned up by a contractor. The Riverside County Environmental Health Department was notified about this incident. There are no Riverside County Flood Control District facilities in the area of the complaint address that could have been impacted from this release.

Action

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1317

Type	Spill
Received Date	2/19/2008 0:00
APN	964-060-001
First Name	Metropolitan Water Dist. (MWD)
Last Name	
Complainant Address	
Complainant City	
Complainant Zip Code	
Phone	
Received By	David Ortega
Complaint Adderess	33740 Borel Road
Complaint City	Winchester
Complaint Zip Code	92596
Location	

Complaint 2 pounds of chlorine gas was released due to a broken pressure relief valve.

Findings 2/19/08: MWD called the Governor's Office of Emergency Services (OES) to report this release. The OES issued a Hazardous Materials Spill Report, Control# 08-1417, concerning this incident. The OES report states that no water and no drinking water was involved and/or impacted from this release. The OES report also states that the substance was contained and cleaned up the reporting party (MWD). The Riverside County Environmental Health Department was notified about this incident. There are no Riverside County Flood Control District facilities in the area of the complaint address that could have been impacted.

Action

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1290

Type	Spill
Received Date	1/29/2008 0:00
APN	909-290-009
First Name	Eastern Municipal Water District (EMWD)
Last Name	
Complainant Address	
Complainant City	
Complainant Zip Code	
Phone	0
Received By	David Ortega
Complaint Adderess	42565 Avenida Alvarado
Complaint City	Temecula
Complaint Zip Code	92590
Location	

Complaint 52 gallons of caustic 25%, considered to be a low pH adjustment chemical was spilled at the treatment facility.

Findings 1/29/08: EMWD called the Governor's Office of Emergency Services (OES) to report this spill. The OES issued a Hazardous Materials Spill Report, Control# 08-0881, concerning this incident. The OES report states that no water was involved from this spill. The OES report also states that the substance was completely captured by the facility's containment area. A piece of tubing developed a crack causing the release. The Riverside County Environmental Health Department was notified about this incident. The nearest Riverside County Flood Control District facility is located about .8 mile to the northeast of the complaint address: "Murrieta Creek at Winchester Road."

Action

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1283

Type	Spill
Received Date	1/18/2008 0:00
APN	569-190-009
First Name	Riverside County HAZMAT
Last Name	
Complainant Address	
Complainant City	
Complainant Zip Code	
Phone	
Received By	David Ortega
Complaint Adderess	
Complaint City	Riverside County
Complaint Zip Code	92544
Location	East Benton Rd., 2.5 miles NE from the intersection of Sage Rd. in a rural area.

Complaint 35 gallons of waste motor oil leaked onto the ground in a field from four, 55-gallon size barrels that were abandoned.

Findings 1/18/08: The Riverside County Haz.-Mat. Division called the Governor's Office of Emergency Services (OES) to report this leak. The OES issued a Hazardous Materials Spill Report, Control# 08-0554, concerning this incident. The OES report states that no water was involved from this leak. The OES report also states that the waste motor oil was contained and cleaned up by the reporting party (Riverside County HAZMAT). The Riverside County Environmental Health Department was notified about this incident. There are no Riverside County Flood Control District facilities in the area of the complaint location that could have been impacted.

Action

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1271

Type	Spill
Received Date	1/11/2008 0:00
APN	964-060-001
First Name	Metropolitan Water District (MWD)
Last Name	
Complainant Address	
Complainant City	
Complainant Zip Code	
Phone	
Received By	David Ortega
Complaint Adderess	33740 Borel Road
Complaint City	Winchester
Complaint Zip Code	92596
Location	

Complaint 1 ounce of flourosilic acid dripped in a containment area.

Findings 1/11/08: MWD called the Governor's Office of Emergency Services (OES) to report this release. The OES issued a Hazardous Materials Spill Report, Control# 08-0384, concerning this incident. The OES report states that no water was involved from this release. The OES report also states that an operator found this release on his routine rounds. An absorbent pad was placed on the substance and will be monitored. The Riverside County Environmental Health Department was notified about this incident. There are no Riverside County Flood Control District facilities in the area of the complaint address that could have been impacted.

Action

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1265

Type	Spill
Received Date	1/8/2008 0:00
APN	964-060-001
First Name	Metropolitan Water Dist. (MWD)
Last Name	
Complainant Address	
Complainant City	
Complainant Zip Code	
Phone	
Received By	David Ortega
Complaint Adderess	33740 Borel Road
Complaint City	Winchester
Complaint Zip Code	92596
Location	Skinner Plant

Complaint 4 ounces of Fluoride spilled from a leaking flange on a transfer pump.

Findings 1/8/08: MWD called the Governor's Office of Emergency Services (OES) to report this spill. The OES issued a Hazardous Materials Spill Report, Control# 08-0274, concerning this incident. The OES report states that no water and drinking water was involved and/or impacted from this spill. The OES report also state that the fluoride was contained and cleaned up by the reporting party (MWD). The Riverside County Environmental Health Department was notified about this incident. There are no Riverside County Flood Control District facilities in the area of the complaint address that could have been impacted.

Action

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1250

Type	Spill
Received Date	12/30/2007 0:00
APN	964-060-001
First Name	Metropolitan Water Dist. of So. Cal. (MWD)
Last Name	
Complainant Address	
Complainant City	
Complainant Zip Code	
Phone	
Received By	David Ortega
Complaint Adderess	
Complaint City	Winchester
Complaint Zip Code	92596
Location	Lake Skinner Plant

Complaint 1/4 cup of Flouro Solicic acid is leaking from two tanks at a "drip rate". Tanks are in a catchment area.

Findings 12/30/07: MWD called the Governor's Office of Emergency Services (OES) to report this leak. The OES issued a Hazardous Materials Spill Report, Control# 07-8005, concerning this incident. The OES report states that no water was involved from this leak. The OES report states that the substance was contained and cleaned up by the reporting party (MWD). The Riverside County Environmental Health Department and the Riverside County HAZ-MAT were notified about this incident. There are no Riverside County Flood Control District facilities in the area of the complaint location that could have been impacted from this leak.

Action

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1232

Type	Spill
Received Date	12/17/2007 0:00
APN	376-060-021
First Name	Eastern Municipal Water Dist. (EMWD)
Last Name	
Complainant Address	
Complainant City	
Complainant Zip Code	
Phone	
Received By	David Ortega
Complaint Adderess	21422 South Palomar Road
Complaint City	Wildomar
Complaint Zip Code	92595
Location	

Complaint 25 gallons of sodium bi-sulfite 25% was released due to a broken line possibly caused by freeze.

Findings 12/17/07: EMWD called the Governor's Office of Emergency Services (OES) to report this release. The OES issued a Hazardous Materials Spill Report, Control# 07-7751, concerning this incident. The OES report states that no water was involved from this release. The OES report also states that the substance was contained and cleaned up by the responsible party (EMWD). The Riverside County Environmental Health Department was notified about this incident. The nearest Riverside County Flood Control District facility is located about .25 mile to the south of the complaint address: "Wildomar MDP Channel".

Action

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1225

Type	Spill
Received Date	12/12/2007 0:00
APN	964-060-001
First Name	Metropolitan Water District (MWD)
Last Name	
Complainant Address	
Complainant City	
Complainant Zip Code	
Phone	
Received By	David Ortega
Complaint Adderess	33740 Borel Road
Complaint City	Winchester
Complaint Zip Code	92596
Location	

Complaint 2 ounces of fluoride was released from a gasket failure on a storage tank.

Findings 12/12/07: The MWD called the Governor's Office of Emergency Services (OES) to report this release. The OES issued a Hazardous Materials Spill Report, Control# 07-7662, concerning this incident. The OES report states that no water and no drinking water was involved and/or impacted from this release. The OES report also states that the fluoride was contained and cleaned up by the reporting party (MWD). The Riverside County Environmental Health Department was notified about this incident. There are no Riverside County Flood Control District facilities in the area of the complaint address that could have been impacted.

Action

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1203

Type	Spill
Received Date	11/30/2007 0:00
APN	583-080-012
First Name	Southern California Edison (SCE)
Last Name	
Complainant Address	
Complainant City	
Complainant Zip Code	
Phone	
Received By	David Ortega
Complaint Adderess	
Complaint City	Aguanga
Complaint Zip Code	92536
Location	Roca Vista Road and Highway 371

Complaint 5 gallons of mineral oil was released due to an equipment failure. PCB will be analyzed.

Findings 11/30/07: SCE called the Governor's Office of Emergency Services (OES) to report this release. The OES issued a Hazardous Materials Spill Report, Control# 07-7404, concerning this incident. The OES report states that no water and no drinking water was involved and/or impacted from this release. The OES report also states that the mineral oil was contained and cleaned up by a contractor. The Riverside County Environmental Health Department was notified about this incident. The nearest Riverside County Flood Control District facility is located about 3 miles to the northwest of the complaint location: "Wilson Creek Sage Road Bridge".

Action

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1194

Type	Spill
Received Date	11/26/2007 0:00
APN	909-290-009
First Name	Eastern Municipal Water District (EMWD)
Last Name	
Complainant Address	
Complainant City	
Complainant Zip Code	
Phone	
Received By	David Ortega
Complaint Adderess	42565 Avenida Alvarado
Complaint City	Temecula
Complaint Zip Code	92590
Location	Temecula Valley Regional Water Reclamation Facility

Complaint 40 gallons of engine oil leaked into a pipe galley from a seal that failed.

Findings 11/26/07: EMWD called the Governor's Office of Emergency Services (OES) to report this leak. The OES issued a Hazardous Materials Spill Report, Control# 07-7289, concerning this incident. The OES report states that no water was involved from this leak. The OES report also states that the engine oil was contained and cleaned up by the reporting party (EMWD). The Riverside County Environmental Health Department, Riverside County HAZMAT and the Company In-House Environmental Regulatory Compliance were notified about this incident. The nearest Riverside County Flood Control District facility is located about .8 mile to the northeast of the complaint address: "Murrieta Creek at Winchester Road."

Action

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1188

Type	Spill
Received Date	11/21/2007 0:00
APN	964-060-001
First Name	Metropolitan Water District (MWD)
Last Name	
Complainant Address	
Complainant City	
Complainant Zip Code	
Phone	
Received By	David Ortega
Complaint Adderess	33740 Borel Road
Complaint City	Winchester
Complaint Zip Code	92596
Location	

Complaint 12 ounces of Ferric Chloride leaked from a drain valve of a chemical delivery truck.

Findings 11/21/07: MWD called the Governor's Office of Emergency Services (OES) to report this leak. The OES issued a Hazardous Materials Spill Report, Control# 07-7221, concerning this incident. The OES report states that no water was involved from this leak. The OES report also states that the substance was contained and cleaned up by the reporting party (MWD). The Riverside County Environmental Health Department was notified about this incident. There are no Riverside County Flood Control District facilities in the area of the complaint address that could have been impacted.

Action

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1181

Type	Spill
Received Date	11/16/2007 0:00
APN	964-060-001
First Name	Metropolitan Water District
Last Name	
Complainant Address	
Complainant City	
Complainant Zip Code	
Phone	
Received By	David Ortega
Complaint Adderess	33740 Borel Road
Complaint City	Winchester
Complaint Zip Code	92596
Location	Robert Skinner Filtration Plant

Complaint .5 ounce of aqueous ammonia was released when a driver failed to properly tighten a vent cap on a delivery trailer.

Findings 11/16/07: MWD called the Governor's Office of Emergency Services (OES) to report this release. The OES issued a Hazardous Materials Spill Report, Control# 07-7087, concerning this incident. The OES report states that no water was involved from this release. The OES report also states that the substance was contained and cleaned up by the reporting party (MWD). The Riverside County Environmental Health Department was notified about this incident. There are no Riverside County Flood Control District facilities in the area of the complaint address that could have been impacted.

Action

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1131

Type	Spill
Received Date	10/25/2007 0:00
APN	964-060-001
First Name	Metropolitan Water District (MWD)
Last Name	
Complainant Address	
Complainant City	
Complainant Zip Code	
Phone	0
Received By	David Ortega
Complaint Adderess	33740 Borel Road
Complaint City	Winchester
Complaint Zip Code	92596
Location	

Complaint 8 ounces of hydraulic oil was released from a delivery truck that had a faulty hydraulic line.

Findings 10/25/07: MWD called the Governor's Office of Emergency Services (OES) to report this release. The OES issued a Hazardous Materials Spill Report, Control# 07-6536, concerning this incident. The OES report states that no water was involved from this release. The OES report also states that the hydraulic oil was contained and cleaned up by the reporting party (MWD). The Riverside County Environmental Health Department was notified about this incident. There are no Riverside County Flood Control District facilities in the area of the complaint address that could have been impacted.

Action

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1117

Type	Spill
Received Date	10/19/2007 0:00
APN	964-060-001
First Name	Metro Water of So Cal (MWD)
Last Name	
Complainant Address	
Complainant City	
Complainant Zip Code	
Phone	0
Received By	David Ortega
Complaint Adderess	33740 Borel Road
Complaint City	Winchester
Complaint Zip Code	92596
Location	

Complaint .25 cup of ammonia leaked from a truck making a delivery.

Findings 10/19/07: MWD called the Governor's Office of Emergency Services (OES) to report this leak. The OES issued a Hazardous Materials Spill Report, Control# 07-6389, concerning this incident. The OES report states that no water was involved from this leak. The OES report also states that the ammonia was contained and cleaned up by the reporting party (MWD). The Riverside County Environmental Health Department was notified about this incident. There are no Riverside County Flood Control District facilities in the area of the complaint address that could have been impacted.

Action

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1097

Type	Spill
Received Date	10/11/2007 0:00
APN	964-060-001
First Name	Metropolitan Water Dist. (MWD)
Last Name	
Complainant Address	
Complainant City	
Complainant Zip Code	
Phone	
Received By	David Ortega
Complaint Adderess	33740 Borel Road
Complaint City	Winchester
Complaint Zip Code	92596
Location	Skinner Filtration Plant

Complaint 16 ounces of caustic soda, sodium hydroxide was released when a delivery driver disconnected the discharge hose from the receiving tank and vented pressure from the trailer. This caused liquid to spray onto the roof of the tank farm.

Findings 10/11/06: MWD called the Governor's Office of Emergency Services (OES) to report this release. The OES issued a Hazardous Materials Spill Report, Control# 07-6175, concerning this incident. The OES report states that this release occurred on 10/6/07. No water was involved from this incident. The OES report also states that the substance was contained and cleaned up by a contractor. The Riverside County Environmental Health Department was notified about this release. There are no Riverside County Flood Control District facilities in the area of the complaint address that could have been impacted.

Action

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1078

Type	Spill
Received Date	9/29/2007 0:00
APN	909-290-009
First Name	Eastern Municipal Water District (EMWD)
Last Name	
Complainant Address	
Complainant City	
Complainant Zip Code	
Phone	
Received By	David Ortega
Complaint Adderess	42565 Avenida Alvarado
Complaint City	Temecula
Complaint Zip Code	92590
Location	Temecula Valley Regional Water Reclamation Facility

Complaint 75,000 gallons of tertiary effluent (recycled water) was released when a fitting on a utility water line failed.

Findings 9/29/07: EMWD called the Governor's Office of Emergency Services (OES) to report this release. The OES issued a Hazardous Materials Spill Report, Control# 07-5945, concerning this incident. The OES report states that no drinking water was impacted from this release. It is unknown if any water was involved from this incident. The nearest Riverside County Flood Control (RCFC) District facility is located about .8 mile to the northeast of the complaint address: "Murrieta Creek at Winchester Road."

Action 10/1/07: David Ortega of the NPDES Section of the RCFC received a Sewage Release/Spill Notification via email today from Charles Strey, Senior Public Health Engineer, Riverside County Health Services Agency, Dept. of Environmental Health. Incident No. SA-07-10 states that the discharge has been stopped and is upstream from known recreation areas, which are not posted by the County's Department of Environmental Health. The area of the discharge will not be inspected by the County's Department of Environmental Health to evaluate contamination. Areas of contamination do not require cleaning (tertiary treated water).

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1040

Type	Spill
Received Date	9/10/2007 0:00
APN	900-070-005
First Name	Eastern Muni. Water Dist. (EMWD)
Last Name	
Complainant Address	
Complainant City	
Complainant Zip Code	
Phone	0
Received By	David Ortega
Complaint Adderess	
Complaint City	Murrieta
Complaint Zip Code	92563
Location	Auld Road near Winchester Road

Complaint A blockage caused an unknown clear liquid from a sewer line.

Findings 9/10/07: EMWD called the Governor's Office of Emergency Services (OES) to report this release. The OES issued a Hazardous Materials Spill Report, Control# 07-5483, concerning this incident. The OES report states that no drinking water was impacted from this release, however, a small unknown creek (possibly Benton Creek) was involved from this incident. The OES report also states that the sewage was contained and cleaned up by the reporting party (EMWD). The Riverside County Environmental Health Department was notified about this release. The nearest Riverside County Flood Control District facility is about .6 mile to the south of the complaint location: "Warm Springs Hunter Road Storm Drain Stage 4".

Action 9/10/07: The OES received a situation update concerning this release. Per Al Javier of the EMWD, the release was not from an active line. Release was from a line under construction. Substance released was de-watering ground water, not sewage.

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1036

Type	Spill
Received Date	9/7/2007 0:00
APN	
First Name	Metropolitan Water Dist. (MWD)
Last Name	
Complainant Address	
Complainant City	
Complainant Zip Code	
Phone	
Received By	David Ortega
Complaint Adderess	33740 Borel Road
Complaint City	Winchester
Complaint Zip Code	92396
Location	

Complaint 3 gallons of aqueous ammonia was released when a driver erroneously drained fill lines into sump.

Findings 9/7/07: MWD called the Governor's Office of Emergency Services (OES) to report this release. The OES issued a Hazardous Materials Spill Report, Control# 07-5436, concerning this incident. The OES report states that no water was involved from this release. The OES report also states that the aqueous ammonia was contained and cleaned up by the reporting party (MWD). The Riverside County Environmental Health Department was notified about this incident. There are no Riverside County Flood Control District facilities in the area of the complaint address that could have been impacted.

Action

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1024

Type	Spill
Received Date	8/29/2007 0:00
APN	964-060-001
First Name	Metro Water District (MWD)
Last Name	
Complainant Address	
Complainant City	
Complainant Zip Code	
Phone	
Received By	David Ortega
Complaint Adderess	33740 Borel Road
Complaint City	Winchester
Complaint Zip Code	92596
Location	

Complaint .5 lbs. of chlorine leaked when leak alarms and scrubber start during low pressure testing.

Findings 8/29/07: MWD called the Governor's Office of Emergency Services (OES) to report this leak. The OES issued a Hazardous Materials Spill Report, Control# 07-5208, concerning this incident. The OES report states that no water and no drinking water was involved and/or impacted from this leak. The Riverside Environmental Health Department was notified about this incident. There are no Riverside County Flood Control District facilities in the area of the complaint address that could have been impacted.

Action

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1013

Type	Spill
Received Date	8/28/2007 0:00
APN	575-050-045
First Name	Hemet School
Last Name	
Complainant Address	
Complainant City	
Complainant Zip Code	
Phone	0
Received By	David Ortega
Complaint Adderess	57430 Mitchell
Complaint City	Anza
Complaint Zip Code	92539
Location	

Complaint 4 cups of diesel spilled when a driver was filling the bus and the fuel came out of the hose.

Findings 8/28/07: Hemet School called the Governor's Office of Emergency Services (OES) to report this spill. The OES issued a Hazardous Materials Spill Report, Control# 07-5166, concerning this incident. The OES report states that no water was involved from this spill. The OES report also states that the diesel was contained and cleaned up by the reporting party (Hemet School). The Riverside County Environmental Health Department was notified about this incident. There are no Riverside County Flood Control District facilities in the area of the complaint address that could have been impacted from this spill.

Action

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 996

Type	Spill
Received Date	8/14/2007 0:00
APN	915-060-010
First Name	Stan Marsh So. Cal. Edison
Last Name	
Complainant Address	
Complainant City	
Complainant Zip Code	
Phone	0
Received By	David Ortega
Complaint Adderess	37950 Warren Road
Complaint City	Winchester
Complaint Zip Code	92596
Location	

Complaint 59 gallons of mineral oil/ non-PCB was released due to a transformer failure.

Findings 8/14/07: Stan Marsh So. Cal. Edison called the Governor's Office of Emergency Services (OES) to report this release. The OES issued a Hazardous Materials Spill Report, Control# 07-4867, concerning this incident. The OES report states that no water was involved from this release. The OES report also states that the mineral oil was contained and cleaned up by a contractor. The Riverside County Environmental Health Department was notified about this incident. There are no Riverside County Flood Control District facilities in the area of the complaint address that could have been impacted from this release. NOTE: The complaint APN listed in this report is a reference APN only.

Action

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 953

Type	Spill
Received Date	7/15/2007 0:00
APN	961-010-035
First Name	Sala Thai Cuisine
Last Name	
Complainant Address	
Complainant City	
Complainant Zip Code	
Phone	
Received By	David Ortega
Complaint Adderess	31333 Highway 79
Complaint City	Temecula
Complaint Zip Code	92592
Location	

Complaint 175 gallons of sewage spilled due to a grease blockage.

Findings 7/15/07: Sala Thai Cuisine called the Governor's Office of Emergency Services (OES) to report this spill. The OES issued a Hazardous Materials Spill Report, Control# 07-4234, concerning this incident. The OES report states that no water was involved from this spill. The OES report also states that the sewage was contained and cleaned up by a contractor. The Riverside County Environmental Health Department and Eastern Municipal Water District were notified about this incident. The nearest Riverside County Flood Control District facility is located about .4 mile to the southeast of the complaint address: "Temecula VY Via Del Coronado Storm Drain".

Action

CAP Food Facility Inspections

RECORD_ID	DBA	Site Address	CITY	ACTIVITY_DATE
PR0007322	SUBMARINA	40970 CALIFORNIA OAKS RD	MURRIETA	6/18/08
PR0005257	SUBWAY #4246	39872 LOS ALAMOS RD	MURRIETA	6/18/08
PR0037861	Lowe's #1576	24701 Madison Ave	Murrieta	6/20/08
PR0009372	CHILIS GRILL & BAR	41070 CALIFORNIA OAKS RD	MURRIETA	6/24/08
PR0009956	RIVERSIDE MEDICAL CLINIC MAIN PLACE O	7117 BROCKTON AVE	RIVERSIDE	7/5/07
PR0002957	ROYAL ORCHID THAI RESTAURANT	1450 UNIVERSITY AVE	RIVERSIDE	7/9/07
PR0005824	USA GAS #241	3950 TYLER ST	RIVERSIDE	7/10/07
PR0006362	CINEMA STAR 14	121 ALESSANDRO BLVD	RIVERSIDE	7/19/07
PR0010437	PIER 1 IMPORTS	2800 CAMPUS PKWY 101	RIVERSIDE	7/19/07
PR0005993	OISHII SUSHI	6133 MAGNOLIA AVE	RIVERSIDE	7/23/07
PR0017933	DRAGONFLY PIZZA	3375 IOWA AVE H	Riverside	7/24/07
PR0018033	Inland Fastrip	10306 Arlington AVE	Riverside	7/25/07
PR0003233	PRETZELMAKER	2271 GALLERIA TYLER	RIVERSIDE	7/30/07
PR0009845	DREAM DINNERS ARLINGTON	7001 INDIANA AVE STE 1	RIVERSIDE	8/6/07
PR0017978	La Mexicana Market	3123 Madison ST	Riverside	8/6/07
PR0018043	Tony's Eatery & Melody Bar	3812 Pierce ST N	Riverside	8/9/07
PR0008701	JUICE IT UP	3540 RIVERSIDE PLAZA DR	RIVERSIDE	8/13/07
PR0005546	N & W ANTONIOUS PIZZA #8	195 ALESSANDRO BLVD	RIVERSIDE	8/13/07
PR0018105	Subway #40328	1280 W Blaine ST B	Riverside	8/17/07
PR0002383	CHRISTY'S DONUTS	8151 ARLINGTON AVE M	RIVERSIDE	8/22/07
PR0018007	Mission Square Cafe	3750 University AVE M	Riverside	8/29/07
PR0018093	El Michoacano	5700 Van Buren BLVD	Riverside	9/17/07
PR0018356	GOLDEN SPOON FROZEN YOGURT	19348 VAN BUREN BLVD 104	Riverside	9/17/07
PR0018106	The Wok Experience	6390 Van Buren BLVD 101	Riverside	9/17/07
PR0018351	JOJOS DONUTS	4812 TYLER ST	Riverside	9/20/07
PR0018310	FATBURGER RIVERSIDE	1223 UNIVERSITY AVE 120	Riverside	9/24/07
PR0018067	We Olive	3639 Riverside Plaza DR 502	Riverside	9/24/07
PR0018221	Lake Hills Elementary School	16346 Village Meadow DR	Riverside	9/25/07
PR0008446	ONO HAWAIIAN BBQ	2721 CANYON SPRINGS PKWY 101	RIVERSIDE	9/25/07
PR0018118	McDonalds	8875 Limonite AVE	Riverside	9/27/07
PR0018100	Mediterannian Palace Grill & Cafe	1223 University AVE 140	Riverside	10/1/07
PR0018034	Lounge Thirty Three	3639 Riverside Plaza DR 530	Riverside	10/3/07
PR0018362	STOKOE ELEMENTARY SCHOOL	4501 AMBS DR	Riverside	10/10/07
PR0035688	La Michoancana Market	4110 Victoria AVE	Riverside	10/11/07
PR0002404	EL MORO DE CUMPAS	10323 CYPRESS AVE	RIVERSIDE	10/16/07
PR0018119	Mothers Nutritional Center	2308 University AVE	Riverside	10/18/07
PR0035705	Chicka-Fil-A	2885 Canyon Springs PKWY	Riverside	10/23/07
PR0035556	Mothers Nutritional Center	6115 Van Buren BLVD	Riverside	10/23/07
PR0018361	STOKOE ELEMENTARY SCHOOL	4501 AMBS DR	Riverside	10/29/07
PR0035642	Carlos OBriens Restaurant & Cantina	10102 Indiana AVE	Riverside	10/31/07
PR0002740	CENTER LIQUOR	285 IOWA AVE	RIVERSIDE	11/6/07
PR0018344	U.S. DONUT	4786 LA SIERRA AVE	Riverside	11/8/07
PR0035927	BAP ZIP	1201 UNIVERSITY AVE 110B	Riverside	11/15/07
PR0017958	La Cascada	3635 University AVE	Riverside	11/19/07
PR0002594	MR. TACO III	4111 MAIN ST	RIVERSIDE	11/26/07
PR0018052	Baskin Robbins	7024 Magnolia AVE	Riverside	11/28/07
PR0036010	John's Incredible Pizza Company	6187 Valley Springs Pkwy	Riverside	12/4/07
PR0036043	The Pita Pit	3740 Iowa Ave 103	Riverside	12/4/07

CAP Food Facility Inspections

RECORD_ID	DBA	Site Address	CITY	ACTIVITY_DATE	
PR0018114	The Outlaw Cafe	3607 10th ST	Riverside	12/5/07	
PR0035926	RIVERSIDE CHRISTIAN MIDDLE SCHOOL	8223 CALIFORNIA AVE	Riverside	12/6/07	
PR0035767	ALBERTOS MEXICAN FOOD	9111 MAGNOLIA AVE	Riverside	12/11/07	
PR0036212	George the Greek	10020 Arlington Ave	Riverside	1/3/08	
PR0035878	Papi's Tacos Al Carbon	11860 Magnolia AVE	Riverside	1/3/08	
PR0036015	Ramiro's Cocina Mexicana	9418 Magnolia Ave	Riverside	1/3/08	
PR0036287	AMC Tyler 16	3775 Tyler Ave SP 2-B	Riverside	1/8/08	
PR0018363	HOOTERS OF MORENO VALLEY	6225 VALLEY SPRINGS PKWY 17	Riverside	1/8/08	
PR0036284	Subway Sandwiches	1242 University Ave Ste 13	Riverside	1/8/08	
PR0036044	Golden Chopstix	2712 Canyon Springs Pkwy A3	Riverside	1/9/08	
PR0036222	Jason's Deli	2555 Canyon Springs Pkwy	Riverside	1/9/08	
PR0035880	Joey's Seafood & Grill	2585 Canyon Springs PKWY	Riverside	1/9/08	
PR0035858	Patricia Beatty School	4261 Latham AVE	Riverside	1/10/08	
PR0036135	Smoky Canyon BBQ	5225 Canyon Crest Dr 9	Riverside	1/14/08	
PR0007916	MR CHINA EXPRESS	6160 ARLINGTON AVE C-12	RIVERSIDE	1/16/08	
PR0002287	PHO VIN	10051 MAGNOLIA AVE # B1	RIVERSIDE	1/16/08	
PR0018000	Phood on Main	3700 Main ST	Riverside	1/17/08	
PR0036068	Christos Best Burgers	3812 Pierce St	Riverside	1/24/08	
PR0036286	Elephant Bar Restaurants	3775 Tyler St	Riverside	1/24/08	
PR0036304	D'Tomato's Pizza Cafe	4250 Van Buren Blvd	Riverside	1/25/08	
PR0003883	SUBWAY SANDWICHES & SALADS #11289	195 ALESSANDRO BLVD	RIVERSIDE	1/28/08	
PR0017919	YO MAMAS SOUL FOOD CATERING	4020 JEFFERSON ST	Riverside	[] 1/28/08	
PR0035898	Cuban Cafe	5180 Arlington AVE	Riverside	1/31/08	
PR0036686	Popeyes Chicken	6390 Van Buren Blvd 100	Riverside	1/31/08	
PR0036433	Boys Burgers #3	10737 Magnolia Ave	Riverside	2/4/08	
PR0036484	Choice Burgers	10947 Magnolia Ave	Riverside	2/4/08	
PR0036419	Goodwin's Organic Foods & Drinks	191 W Big Springs Rd	Riverside	2/4/08	
PR0036259	Yard House Riverside	3775 Tyler St 2A	Riverside	2/5/08	
PR0036363	Hawthorne Elementary School	2700 Irving Ave	Riverside	[] 2/6/08	
PR0018121	Tin Lizzy's Cookie Cafe	4620 Pine ST	Riverside	2/6/08	
PR0036370	Los Oskars Mexican Restaurant	765 W Blaine St	Riverside	2/7/08	
PR0036332	Subway #38686	5236 Arlington Ave	Riverside	2/11/08	
PR0035914	JOANN FABRIC & CRAFT STORES #1156	3570 ADAMS ST	Riverside	[] 2/15/08	
PR0036505	Life Cafe	1242 University Ave 5	Riverside	2/15/08	
PR0036685	Popeyes Chicken	9825 Magnolia Ave	Riverside	2/15/08	
PR0035952	Granzianos Pizza Italian Restaurant	9185 Jurupa RD	Riverside	[] 2/21/08	
PR0036582	Jazz-n-Java	497 E Alessandro Blvd A	Riverside	() 2/21/08	
PR0036596	El Toro Market	10775 Hole Ave	Riverside	2/22/08	
PR0017946	CP's Place	1355 E Alessandro BLVD 101	Riverside	() 2/26/08	
PR0036612	Pineapple Joes	195 E Alessandro Blvd	Riverside	2/29/08	
PR0036759	Fresh & Easy #1057	8765 Trautwein Rd	Riverside	3/4/08	
PR0036283	Joey's Brooklyn Bagelry	8304 Limonite Ave Ste A	Riverside	3/4/08	
PR0036719	Mongolian Grill	2269 Galleria @ Tyler	Riverside	3/4/08	
PR0036695	Panda Express	11090 Magnolia Ave	Riverside	3/4/08	
PR0036364	Middle Eastern Bakery	10120 Indiana Ave	Riverside	3/7/08	
PR0036136	Mirage Cafe	10330 Hole Ave	Riverside	3/11/08	
PR0036103	Aztecas Mexican Cuisine	2002 Iowa Ave 105	Riverside	3/13/08	
PR0036551	L & L Hawaiian Barbecue	2585 Canyon Springs Pkwy E	Riverside	3/18/08	

CAP Food Facility Inspections

RECORD_ID	DBA	Site Address	CITY	ACTIVITY_DATE
PR0036705	Galerie De Fleurs	3660 Mission Inn Ave	Riverside	3/20/08
PR0036559	Water Retail	767 W Blaine St #D	Riverside	3/24/08
PR0036544	Little Caesars Pizza #5936	19069 Van Buren Blvd 101	Riverside	3/26/08
PR0036825	Rubio's Fresh Mexican Grill	2694 Canyon Springs Pkwy	Riverside	3/26/08
PR0036561	Wienerschnitzel	18641 Van Buren Blvd	Riverside	3/26/08
PR0036424	Peking Express	2995 Van Buren Blvd A6	Riverside	4/1/08
PR0036412	Milano's Pizza	2847 Mary St	Riverside	4/2/08
PR0036950	City Cuisine Taste	2586 Main St	Riverside	4/3/08
PR0037219	76 Gas Station	4890 Van Buren Blvd	Riverside	4/4/08
PR0037063	World Liquor	6811 Arlington Ave	Riverside	4/4/08
PR0037007	Cold Stone Creamery	3243 Arlington Ave	Riverside	4/8/08
PR0037192	Mongolian BBQ	1242 University Ave 7	Riverside	4/8/08
PR0036987	On The Corner Sandwich Shop	16781 Van Buren Blvd	Riverside	4/8/08
PR0037286	Riverside Ice Cream	10391 Arlington Ave	Riverside	4/8/08
PR0036919	Panaderia Guadalajara	10959 Magnolia Ave	Riverside	4/9/08
PR0037269	Sub Shack	11840 Magnolia Ave F	Riverside	() 4/9/08
PR0037037	Swirl Frozen Yogurt	1400 University Ave A156	Riverside	4/9/08
PR0036934	Ciavaglia's Gourmet To Go	19530 Van Buren Blvd G5	Riverside	4/11/08
PR0037118	Worthingtons	3587 University Ave	Riverside	4/14/08
PR0037397	University EL Pollo Loco	2200 University Ave	Riverside	4/17/08
PR0037360	Fruyu	3312 La Sierra Ste 103	Riverside	4/23/08
PR0037446	Fugu's Sushi Bar & Grill	1299 University Ave #104	Riverside	4/23/08
PR0037524	Shakey's Pizza Restaurant	3767 Iowa Ave	Riverside	4/23/08
PR0037209	Starbucks Coffee #11236	5130 Arlington Ave Ste 100	Riverside	[] 4/23/08
PR0037270	Tapioca Express	767 W Blaine St A	Riverside	4/24/08
PR0037509	Arco Nuts & Candy LLC	11750 Sterling Ave #B	Riverside	4/28/08
PR0037232	Frankies Restaurant	7700 Limonite Ave	Riverside	4/30/08
PR0036399	Canyon Springs Shell	6189 Day St	Riverside	[] 5/7/08
PR0037003	Maui Wowi Hawaiian	19348 Van Buren Blvd 103	Riverside	5/7/08
PR0037419	The Auld Dubliner	3775 Tyler St #3B	Riverside	5/7/08
PR0036826	University Cafe	1400 University Ave A109	Riverside	5/9/08
PR0037008	Waterpia 1 - Water & Ice Cream	3973 Chicago Ave	Riverside	() 5/9/08
PR0002589	CENTRAL SHELL	3498 CENTRAL AVE	RIVERSIDE	5/12/08
PR0007294	OK TOFU HOUSE	10436 MAGNOLIA AVE	RIVERSIDE	5/13/08
PR0037579	Riverside Thai Cuisine	11860 Magnolia Ave #T	Riverside	5/14/08
PR0037704	Pacific Grill	2257 Galleria At Tyler	Riverside	5/15/08
PR0002834	MI LINDO MICHOACAN RESTAURANT	993 CENTER ST	RIVERSIDE	5/19/08
PR0037739	Lucky Buffet	1445 University Ave	Riverside	5/20/08
PR0037380	Berrysweet Riverside	3740 Iowa Ave #108	Riverside	5/23/08
PR0037319	Pho Star Bowl	10051 Magnolia Ave Ste B1	Riverside	5/27/08
PR0037105	Bueno Burrito/Pizza Perfecto	2646 E Alessandro Blvd	Riverside	[] 5/28/08
PR0037719	Gelato Di Roma	5786 Mission Blvd	Riverside	5/28/08
PR0037724	Rubidoux High School	4250 Opal St	Riverside	5/28/08
PR0037723	Rubidoux High School	4250 Opal St	Riverside	5/28/08
PR0037841	American Donuts #6	3355 Iowa Ave	Riverside	5/29/08
PR0037833	Tony Eatery	3812 Pierce St N	Riverside	5/29/08
PR0037741	Frucci RS	1242 University Ave #4	Riverside	6/3/08
PR0037826	Raincross Cafe	3900 Main St	Riverside	6/4/08

CAP Food Facility Inspections

RECORD_ID	DBA	Site Address	CITY	ACTIVITY_DATE
PR0037899	The Garden Cafe 1	6060 Magnolia Ave	Riverside	6/4/08
PR0037817	Arlington Arco	8970 Arlington Ave	Riverside	6/9/08
PR0037803	J W North HS Student Store	1550 3rd St	Riverside	6/9/08
PR0037854	Lowe's	9851 Magnolia Ave	Riverside	6/9/08
PR0037852	Oriental Cuisine	10411 Magnolia Ave #C	Riverside	6/12/08
PR0006028	REID PARK LITTLE LEAGUE	801 N ORANGE	RIVERSIDE	6/12/08
PR0037169	G.E.T. Catering	6166 Brockton Ave	Riverside	6/13/08
PR0037666	Little Beijing Restaurant	5800 Van Buren Blvd # 112	Riverside	6/18/08
PR0038034	Bobo Thai Restaurant	6736 Brockton Ave	Riverside	6/19/08
PR0037359	The Grove	191 W Big Spring Rd	Riverside	6/23/08
PR0037660	Tortas Sinaloa	3961 Chicago Ave # B	Riverside	() 6/23/08
PR0006983	CHINA STAR SUPER BUFFET	11066 MAGNOLIA AVE	RIVERSIDE	6/25/08
PR0037981	Super Mex	3444 Arlington Ave	Riverside	6/26/08
PR0037358	Taj Mahal of India	5523-29 Van Buren Blvd	Riverside	6/27/08
PR0010473	BRUEGGER'S BAGELS	39584 WINCHESTER RD 1	TEMECULA	8/8/07
PR0010467	TACOS TIJUANA MEXICAN GRILL	43810 BUTTERFIELD STAGE RD F10	TEMECULA	8/8/07
PR0018035	Qdoba Mexican Grill #452	32965 S Hwy 79	Temecula	8/9/07
PR0018048	Tamarindo Grill	31915 Rancho California RD 300	Temecula	8/9/07
PR0018019	Spuntino	31891 Rancho California RD	Temecula	8/10/07
PR0010394	LONGS DRUG STORE	31021 S HWY 79	TEMECULA	8/14/07
PR0018243	Dominos	31165 S Hwy 79	Temecula	9/12/07
PR0018358	THE BARLEY HOUSE	31045 S HWY 79 101	Temecula	9/12/07
PR0010277	CALLAWAY VINEYARD & WINERY	32720 RANCHO CALIFORNIA RD	TEMECULA	9/17/07
PR0010381	MAURICE CARRIE WINERY	34225 RANCHO CALIFORNIA RD	TEMECULA	9/17/07
PR0018231	Kepani Island Grill	26550 Ynez RD C	Temecula	9/27/07
PR0018099	Leonesse Cellars	38311 De Portola RD	Temecula	[] 10/4/07
PR0018225	Wings N Things	31045 S Hwy 79 104	Temecula	10/4/07
PR0018360	LITTLE TOKYO SUSHI & TERIYAKI	43053 MARGARITA RD STE	Temecula	[] 10/5/07
PR0018242	Golden Bowl	31069 S Hwy 79	Temecula	10/9/07
PR0018241	Frankie's Steak & Seafood	41789 Nicole LN 1	Temecula	10/10/07
PR0035566	Tapache Deli	30571 Hwy. 79 S C	Temecula	10/22/07
PR0035506	Chilie Peppers Mexican Eatery	31093 Highway 79 S A	Temecula	10/24/07
PR0035799	DINNER STUDIO	41789 NICOLE LN	Temecula	10/30/07
PR0035507	Haagen-Dazs	40820 Winchester RD 2460	Temecula	10/30/07
PR0035764	Lollicups Coffee & Tea	29073 Overland DR	Temecula	10/30/07
PR0035645	Henry's Market Place	39606 Winchester RD	Temecula	11/1/07
PR0035518	Francesia Italian Kitchen	31165 Hwy 79 S	Temecula	11/6/07
PR0035934	EDIBLE ARRANGEMENTS	27548 YNEZ RD I-11	Temecula	11/15/07
PR0035921	LUCHO'S PERUVIAN RESTAURANT	39650 WINCHESTER RD STE C	Temecula	11/15/07
PR0018288	HART WINERY	41300 AVENIDA BIONA	Temecula	12/17/07
PR0005357	PRESTOS	30590 RANCHO CALIFORNIA RD	TEMECULA	1/3/08
PR0036191	Street Rod Diner	27405 Jefferson Ave	Temecula	2/1/08
PR0036489	Cocoanut Cove	32459 Temecula Pkwy D101	Temecula	2/6/08
PR0036564	Allie's Tapas Au Vin	41653 Margarita Rd	Temecula	2/21/08
PR0036492	Lopez Market	28266 Old Town Front St	Temecula	2/27/08
PR0005774	PANADERIA TEMECULA	26485 YNEZ RD O	TEMECULA	2/27/08
PR0036836	Wing'n Out	39650 Winchester Rd Ste A	Temecula	3/20/08
PR0037143	Hana Sushi	27576 Ynez Rd H-15	Temecula	() 4/7/08

CAP Food Facility Inspections

RECORD_ID	DBA	Site Address	CITY	ACTIVITY_DATE	
PR0037278	El Take Out Burger	39760 Winchester Rd	Temecula	4/15/08	
PR0037159	The Hot Dog Shoppe	43810 Butterfield Rd	Temecula	4/24/08	
PR0037494	The Yogurt Factory	39694 Winchester Rd Ste A	Temecula	4/28/08	
PR0037436	White Lime Frozen Yogurt	41493 Margarita Rd	Temecula	4/28/08	
PR0037473	E-1X Distributors	43357 Business Park Dr Ste #104	Temecula	5/20/08	
PR0037677	Michaels Stores Inc	27471 Ynez Rd	Temecula	5/20/08	
PR0037485	Rodrigo's Mexican Grill	39562 Winchester Rd	Temecula	5/20/08	
PR0008924	DIPPIN DOTS	26479 YNEZ A	TEMECULA	5/23/08	
PR0007211	LONGS DRUG STORE #550	40365 WINCHESTER RD	TEMECULA	[] 5/23/08	
PR0006609	TJ MAXX #702	26427 YNEZ RD	TEMECULA	5/23/08	
PR0005901	CHINA SUPER BUFFET	27624 JEFFERSON AVE	TEMECULA	5/29/08	
PR0003736	SUB - MARINA	26491 YNEZ RD	TEMECULA	6/2/08	
PR0004495	SIZZLER #649	27717 JEFFERSON AVE	TEMECULA	() 6/9/08	
PR0007034	STARBUCKS #5949	27315 JEFFERSON AVE K	TEMECULA	6/9/08	
PR0037859	Lowe's #775	40390 Winchester Rd	Temecula	6/12/08	
PR0037828	Los Tacos	32065 Temecula Pkwy	Temecula	6/13/08	
PR0037903	Youme	28120 Jefferson Ave #207	Temecula	() 6/17/08	
PR0010456	FIGARO'S PIZZA	36100 HIDDENSPRINGS RD	WILDOMAR	7/24/07	
PR0018304	STARBUCKS	32080 CLINTON KEITH RD	Wildomar	9/12/07	
PR0035584	7-Eleven	32060 Clinton Keith Rd	Wildomar	11/7/07	
PR0036257	Tacos Tijuana Mexican Grill	32100 Clinton Kieth Rd	Wildomar	1/8/08	
PR0036190	Thrifty Payless	32450 Clinton Keith Rd	Wildomar	1/8/08	
PR0007317	GOLDEN SPOON FROZEN YOGURT	23905 CLINTON KEITH RD #117	WILDOMAR	5/23/08	
PR0007302	SUBWAY #24263	23905 CLINTON KEITH Rd BLDG 118	WILDOMAR	5/23/08	
PR0008721	DEL TACO #760	36164 HIDDEN SPRINGS RD	WILDOMAR	() 6/2/08	
PR0037584	Arby's	23937 Clinton Keith Rd	Wildomar	6/10/08	
PR0007206	MCDONALD'S	23819 CLINTON KEITH RD	WILDOMAR	() 6/26/08	
BEAUMONT					

Hazardous Materials Facility Inspection

RECORD	DBA	Site Address	CITY	ACTIVITY DATE
PR0034651	AT&T Mobility (25866)	42730 Hwy 79 #A	Aguanga	3/24/08
PR0034922	AT&T Mobility (41559)	45525 Hwy 79	Aguanga	3/24/08
PR0035122	AT&T Mobility (42493)	46900 Hwy 371	Aguanga	3/24/08
PR0025388	Stagecoach Inn	43851 Hwy 79	Aguanga	4/22/08
PR0020269	Valley Auto	58581 Hwy 371 (Cahuilla Rd)	Anza	10/16/07
PR0034653	AT&T Mobility (12409)	39110 Contreras Rd #A	Anza	3/24/08
PR0035121	AT&T Mobility (57526)	54752 Cave Rock Rd	Anza	3/24/08
PR0033570	T-Mobile USA, Inc	54752 Cave Rock Rd	Anza	4/2/08
PR0025185	Circle K #2700736 Circle K #2700736	56621 Hwy 371	Anza	4/7/08
PR0021687	Wilson Auto Repair	37750 N Aurora Ln	Anza	4/7/08
PR0026209	A Mart Gas	56245 Hwy 371	Anza	5/8/08
PR0021858	Dignitary Downs, LLC	42250 Terwilliger Rd	Anza	6/17/08
PR0026742	Seven-Eleven #33552	40210 Murrieta Hot Springs Rd	Murrieta	7/9/07
PR0032366	Sprint Nextel (CA6066-French Valley	35975 Briggs Rd	Murrieta	7/17/07
PR0026674	MVUSD Transportation Facility	41870 Mc Alby Ct	Murrieta	7/23/07
PR0023269	Wal-Mart #2952	41200 Murrieta Hot Sprgs Rd	Murrieta	7/23/07
PR0032440	John Deere Landscapes, Inc	26713 Madison Ave	Murrieta	7/31/07
PR0030227	Agriscape	37760 Borel Rd	Murrieta	8/3/07
PR0034876	Carl's Jr #1520	28023 Scott Rd	Murrieta	8/7/07
PR0034504	McDonald's	39196 Winchester Rd	Murrieta	8/7/07
PR0032912	SCP Distributors, LLC	41675 Cherry St	Murrieta	8/7/07
PR0034636	Taco Bell #22691	39056 Winchester Rd	Murrieta	8/7/07
PR0035284	Chick-fil-A	24794 Madison Ave	Murrieta	8/8/07
PR0034247	Innovative Engineering Solutions	26200 Adams Ave	Murrieta	8/8/07
PR0034248	Robertson's Ready Mix	26190 Adams Ave	Murrieta	8/8/07
PR0028197	Exotic Electro-Optics, Inc	36570 Briggs Rd	Murrieta	8/16/07
PR0032428	Kinch's Radiator & Air Conditioning	41214 Sandalwood Cir	Murrieta	8/17/07
PR0024083	The Truck Shop	41214 Sandalwood Cir #B	Murrieta	8/17/07
PR0029747	RCWD Bear Creek Sewage Lift Station	33158 Clinton Keith Rd	Murrieta	8/22/07
PR0029746	RCWD Cal Oaks Sewage Lift #1	42533 Tenaja Rd #1	Murrieta	8/22/07
PR0030292	RCWD Santa Rosa Water Treatment Plt	26266 Washington Ave	Murrieta	8/22/07
PR0028577	County Of Riverside Fleet Services	30755 V-Auld Rd	Murrieta	8/23/07
PR0029692	Murrieta Auto Collision	26793 Madison Ave #107	Murrieta	8/23/07
PR0035157	The Chop Shop-OOB OOB	26765 Madison Ave #104	Murrieta	8/23/07
PR0023528	Valley Collision	26793 Madison Ave #103	Murrieta	8/23/07

Hazardous Materials Facility Inspection

RECORD	DBA	Site Address	CITY	ACTIVITY DATE
PR0035032	EVMWD Greer Ranch Liftstation	23696 Clinton Keith Rd	Murrieta	8/28/07
PR0034053	EVMWD Greer Ranch Pump Station	35915 Evandel	Murrieta	8/28/07
PR0035013	EVMWD Robards Liftstation	26323 Madison Ave	Murrieta	8/28/07
PR0030006	EVMWD/Cal Oaks Pump Station	24281 Hancock Ave	Murrieta	8/28/07
PR0026622	County of Riv SW County Justice/Juv	30755 Auld Rd #1311	Murrieta	8/29/07
PR0025375	County of Riv SW Justice/Detention	30755 Auld Rd #1307	Murrieta	8/29/07
PR0030472	SCE Auld /Valley Substation		Murrieta	9/4/07
PR0033622	Vons Fuel Center #2660	29910 Murrieta Hot Sprgs Rd #B	Murrieta	9/5/07
PR0035751	French Valley Aviation, Inc.	37552 Winchester Rd	Murrieta	9/6/07
PR0034665	EMWD Chittamwood Lift Station	36384 Chittamwood Pl	Murrieta	9/7/07
PR0034132	RCWD Avenida Escala Pump Station	42011 Avenida Escala	Murrieta	9/26/07
PR0034133	RCWD Avocado Mesa Pump Station	19265 Avocado Mesa Rd	Murrieta	9/26/07
PR0028439	RCWD Baldaray Pump Station	35850 Avenida La Cresta	Murrieta	9/26/07
PR0029742	RCWD California Oaks Pump Station	41135 California Oaks Rd	Murrieta	9/26/07
PR0034893	RCWD Cole Creek Pump Station	42533 Tenaja Rd #2	Murrieta	9/26/07
PR0029749	RCWD Joaquin Pump Station	42545 Tenaja Rd	Murrieta	9/26/07
PR0028443	RCWD Well #145	42150 Guava St	Murrieta	9/26/07
PR0032908	Express System & Engineering	41357 Date St	Murrieta	9/28/07
PR0023898	J & S Auto Collision, LLC	26586 Jefferson Ave Ste C	Murrieta	9/28/07
PR0032350	Verizon/Temecula	41611 Reagan Ave	Murrieta	9/28/07
PR0026701	Sam's Club #4822	40500 Murrieta Hot Sprgs Rd	Murrieta	10/10/07
PR0026711	Murrieta 76	39460 Murrieta Hot Springs Rd	Murrieta	11/2/07
PR0026665	7 Eleven #33062	41260 Murrieta Hot Sprgs Rd	Murrieta	11/14/07
PR0026685	Ralphs Grocery Company #118	23801 Washington Ave	Murrieta	11/15/07
PR0025974	Excaliber Fuels #5	40648 California Oaks Rd	Murrieta	11/27/07
PR0026180	Chevron #209519	24625 Madison Ave	Murrieta	1/9/08
PR0025165	Chevron Stations Inc. #1484/201241	40500 California Oaks Rd	Murrieta	1/9/08
PR0026296	Madison Shell #68569	25336 Madison Ave	Murrieta	1/10/08
PR0025932	Los Alamos Shell #68568	39614 Los Alamos Rd	Murrieta	1/16/08
PR0023082	Convenience Retailers LLC #2705793	41010 California Oaks Rd	Murrieta	1/18/08
PR0029945	Arco 5934/Prestige Stations #5471	41240 Kalmia St	Murrieta	3/11/08
PR0023832	Seven Eleven #33484	28015 Scott Rd	Murrieta	4/10/08
PR0030708	USA Station #68168	39055 Winchester Rd	Murrieta	4/16/08
PR0023474	Albertson's #6734	39224 Winchester Rd	Murrieta	5/15/08
PR0037890	KTM of Temecula	26586 Jefferson Ave SteA	Murrieta	5/27/08

Hazardous Materials Facility Inspection

RECORD	DBA	Site Address	CITY	ACTIVITY DATE
PR0037896	KTM North America	38429 Innovation Ct	Murrieta	5/28/08
PR0028243	Verizon/Murrieta CO	24961 Washington Ave	Murrieta	6/4/08
PR0025310	ExxonMobil Oil Corporation #10923	39850 Los Alamos Rd	Murrieta	6/10/08
PR0026202	California Oaks Shell	40981 California Oaks Rd	Murrieta	6/19/08
PR0029775	EMWD Gold Triangle #2 EMWD Gold Triangle #2	38868 Jackson St	Murrieta Hot Sprgs	9/7/07
PR0029709	EMWD Golden Triangle Well EMWD Golden Tria	38952 Jackson St	Murrieta Hot Sprgs	9/7/07
PR0030456	EMWD Las Brisas EMWD Las Brisas	27000 Camino Las Positas	Murrieta Hot Sprgs	9/7/07
PR0023983	Blue Rhino	1750 Agua Mansa Rd	Riverside	7/10/07
PR0022840	Burrtec Waste Industries, Inc.	1830 Agua Mansa Rd	Riverside	7/10/07
PR0018513	Chevron 94702, Eli's	3476 Van Buren Blvd	Riverside	7/26/07
PR0018826	Pepsi Bottling Group	6659 Sycamore Canyon Blvd	Riverside	8/2/07
PR0026411	Arco Am/Pm Mini Mart	17905 Van Buren Blvd	Riverside	8/8/07
PR0018989	Arco #9710/prestige Stations #9710	4930 Van Buren Blvd	Riverside	8/23/07
PR0018866	Rapid Gas #37	6020 Arlington Ave	Riverside	8/27/07
PR0035542	Jim's Auto Repair	9764 Magnolia ST	Riverside	8/30/07
PR0023547	MLM Truck & Auto Repair - OOB	2989 10th St	Riverside	9/4/07
PR0018489	California Highway Patrol	8118 Lincoln Ave	Riverside	9/5/07
PR0019013	United Parcel Service	1391 Spruce St	Riverside	9/7/07
PR0025001	Valero-OOB OOB	5599 Mission Blvd	Riverside	9/17/07
PR0022693	Robertson Ready Mix	6120 20th St	Riverside	9/18/07
PR0034389	Adams Cart Track Adams Cart Track	5292 24th St	Riverside	9/19/07
PR0019640	Abrasive Blasting	5465 24th St	Riverside	9/20/07
PR0033127	Sprint Nextel (CA6722-Market)	2255 Via Cerro	Riverside	9/25/07
PR0035745	Autlan Auto Repair	3761 Arora ST	Riverside	9/27/07
PR0019665	Vega's Radiator/Muffler	5451 Mission Blvd	Riverside	9/27/07
PR0018792	Moon's Transmission & Automotive	11881 Magnolia Ave #30	Riverside	10/1/07
PR0035876	Rubidoux Auto Service & Smog	5407 Mission BLVD	Riverside	10/1/07
PR0019555	Riverside Cement Company	1500 A-Rubidoux Blvd Section 1	Riverside	10/3/07
PR0031287	Inland Empire Foods	5425 Wilson St	Riverside	10/5/07
PR0030780	Bear Forest Products	4685 Brookhollow Cir #1	Riverside	10/9/07
PR0027920	Oglebay Norton Industrial	2157 Avalon St	Riverside	10/9/07
PR0027953	Varner Construction, Inc.	1893 Brown Ave	Riverside	10/10/07
PR0019589	Engineered Air Systems, Inc.	4298 Campbell St #1	Riverside	10/11/07
PR0018709	California Citrus	859 Center St	Riverside	10/16/07
PR0020070	Erwin Plastics Custom Injection	4776 Felspar	Riverside	10/16/07

Hazardous Materials Facility Inspection

RECORD	DBA	Site Address	CITY	ACTIVITY DATE
PR0034254	T-Mobile USA, Inc	7621 Granite Hill Dr #A	Riverside	10/16/07
PR0036027	AutoZone #5547	1947 University Ave	Riverside	10/23/07
PR0036001	Verizon Wirless (Country Village)	10251 Country Village Dr	Riverside	10/23/07
PR0018412	Aquarius Water Equipment	12799 Magnolia Ave	Riverside	10/30/07
PR0018464	Blue Banner Co Inc	2601 3rd St	Riverside	10/30/07
PR0025893	Seven Eleven #16825 (2111)	6060 Camino Real	Riverside	10/31/07
PR0018678	Dealer Services of Riverside	7726 California Ave	Riverside	11/1/07
PR0018953	Southern California Gas Company	4495 Howard Ave	Riverside	11/1/07
PR0018447	Alfonso Auto Repair	3159 Kluk Ln	Riverside	11/2/07
PR0018402	All Tune and Lube	6000 Arlington Ave	Riverside	11/5/07
PR0018524	City Body & Frame City Body & Frame	2910 14th St	Riverside	11/5/07
PR0018653	Highlander Cleaners	3566 Adams St	Riverside	11/5/07
PR0022487	The Glidden Co. #29/75-771-0-100	6655 Indiana Ave	Riverside	11/5/07
PR0018463	Bloch & Shelton Garage	3764 Comer Ave	Riverside	11/6/07
PR0018871	Burke's Automotive Repair	3757 Comer Ave	Riverside	11/6/07
PR0018683	Caliber Collision Centers	6634 Indiana Ave	Riverside	11/7/07
PR0024312	Carpenter Co	7809 Lincoln Ave	Riverside	11/7/07
PR0018606	Firestone Store #2256	4199 Market St	Riverside	11/7/07
PR0018390	Aamco Transmissions	3595 Market St	Riverside	11/8/07
PR0019029	Valley Printers Inc	2180 Iowa Ave	Riverside	11/13/07
PR0018658	Ideal Cleaners	3951 Beatty Dr	Riverside	11/14/07
PR0021185	Pacific Auto Body Pacific Auto Body	10369 Arlington Ave	Riverside	11/14/07
PR0027960	Walker Evans Enterprises	2304 Fleetwood Dr	Riverside	11/14/07
PR0018638	E-Z Lube #116 E-Z Lube #116	7437 Arlington Ave	Riverside	11/15/07
PR0022204	Metal Container Corporation	7155 Central Ave	Riverside	11/16/07
PR0018816	Pacific Bell LB-690	3073 Adams St	Riverside	11/16/07
PR0018648	Acura Of Riverside	8001 Auto Dr	Riverside	11/21/07
PR0018998	Toro Company The #174668	5825 Jasmine St	Riverside	11/21/07
PR0036335	Magnolia Machine Shop	3023 Kansas Ave	Riverside	11/27/07
PR0023429	Platinum One Enterprises, Inc.	2225 Via Cerro Ave #A	Riverside	11/27/07
PR0018439	Riverside Auto Auction	6446 Fremont St A & C	Riverside	11/28/07
PR0036340	Sherwin-Williams Company	1560 Linden St	Riverside	11/28/07
PR0018604	Fastrip Food Store #16	10306 Arlington Ave	Riverside	11/29/07
PR0018888	Alvarez Mercury Lincoln, Inc. Alvarez Mercury Lir	8051 Auto Dr	Riverside	12/3/07
PR0022383	Dental Care Of Riverside	1325 Blaine St	Riverside	12/3/07

Hazardous Materials Facility Inspection

RECORD	DBA	Site Address	CITY	ACTIVITY DATE
PR0018624	Saturn of Riverside	8101 Auto Dr	Riverside	12/3/07
PR0023487	Fairway Landscape & Irrigation, Inc	4223 Alamo St	Riverside	12/4/07
PR0027705	Jurupa Community Services District Jurupa Com	10124 Limonite Ave	Riverside	12/4/07
PR0018794	Moss Motors	8151 Auto Dr	Riverside	12/4/07
PR0022139	Sierra Aluminum Architectural	2235 Via Cerro	Riverside	12/4/07
PR0018881	Singh Chevrolet	8200 Auto Dr	Riverside	12/5/07
PR0027634	Fleetwood Motor Homes	5300 Via Ricardo	Riverside	12/6/07
PR0027633	Fleetwood Motor Homes Of CA	2350 Fleetwood Dr	Riverside	12/6/07
PR0025922	Riverside City/Lincoln Maint Yard Riverside City/l	8095 Lincoln Ave	Riverside	12/7/07
PR0018405	Alpha Cleaners	3430 La Sierra Ave #A	Riverside	12/11/07
PR0018545	Country Club Cleaners-OOB OOB	4812 La Sierra Ave	Riverside	12/11/07
PR0018711	La Sierra Plaza Cleaners	3862 La Sierra Ave	Riverside	12/11/07
PR0023835	AutoZone #5578	3400 La Sierra Ave #E	Riverside	12/12/07
PR0018767	Imperial Stations, Inc. #3	3315 14th St	Riverside	12/12/07
PR0018858	Najjar Lube Centers Inc	3693 La Sierra Ave	Riverside	12/12/07
PR0018923	Sam's Cleaners	4549 La Sierra Ave	Riverside	12/12/07
PR0018544	Corona College Heights Orange Assoc	8000 Lincoln Ave	Riverside	12/13/07
PR0018518	Holmes Body Shop - Riverside, Inc.	3860 Buchanan Ave	Riverside	12/13/07
PR0018516	The Chopper Place	4791 Doane Ave Ste.A	Riverside	12/13/07
PR0022984	Moreno's General Auto Repair	4791 Doane Ave # C	Riverside	12/14/07
PR0022614	Quality Transmissions & Auto Repair	7010 Jurupa Rd	Riverside	12/17/07
PR0018391	Accuturn Corp	6510 Box Springs Blvd #A	Riverside	12/18/07
PR0021737	Fiberglass Reinforced Products	12350 Doherty St	Riverside	12/18/07
PR0022943	Lubrication/Environmental Equipment Lubrication	12315 Doherty St	Riverside	12/19/07
PR0024874	Circle K #5063	8190 Mission Blvd	Riverside	12/20/07
PR0018633	Shell Oil Products US	3261 Iowa Ave	Riverside	12/27/07
PR0036547	O'Connell Racing, LLC	6141 Quail Valley Ct	Riverside	1/2/08
PR0018987	Central Shell	3498 Central Ave	Riverside	1/9/08
PR0030740	Sprint Nextel (CA5231-Pedley Hills)	7171 Sedona Dr	Riverside	1/9/08
PR0036577	K-Mart #7175	7840 Limonite Ave	Riverside	1/10/08
PR0021677	Chevron	2200 Alessandro Blvd	Riverside	1/11/08
PR0021696	Ultimate Performance Auto	8584 Limonite Ave	Riverside	1/11/08
PR0030948	Kragen Auto Parts #769	8702 Limonite Ave	Riverside	1/14/08
PR0018449	Bauman's Tow Service Inc	1944 Spruce St	Riverside	1/16/08
PR0018806	Photoworld	1039 Galleria At Tyler	Riverside	1/16/08

Hazardous Materials Facility Inspection

RECORD	DBA	Site Address	CITY	ACTIVITY DATE
PR0018838	Poma Automated Fueling-Site 6	3020 E La Cadena Dr Ste A	Riverside	1/16/08
PR0022195	Riverside Aerial Labs, Inc	6865 Flight Rd	Riverside	1/16/08
PR0027400	Western Municipal Water District	16451 El Sobrante Rd	Riverside	1/16/08
PR0018540	H & R Construction Parts, Inc	5924 Fremont St	Riverside	1/22/08
PR0027231	RCR Companies	12620 Magnolia Ave	Riverside	1/22/08
PR0018661	Industrial Engineering & Equipment	6734 Doolittle Ave # C	Riverside	1/23/08
PR0036678	Patron Auto Repair	4779 Hiers Ave	Riverside	1/23/08
PR0018841	Precision Technology-OOB OOB	3147 Durahart St	Riverside	1/23/08
PR0036679	Riverside Auto Service & Sales	4778 Hiers Ave	Riverside	1/23/08
PR0018891	Riverside Medical Clinic Riverside Medical Clinic	3660 Arlington Ave	Riverside	1/23/08
PR0023538	Acorn Technology Corporation	1960 Chicago Avenue #E9/F	Riverside	1/24/08
PR0021265	Fletchall's Empire Auto Works	10180 Hole Ave #600	Riverside	1/24/08
PR0021826	Inland Rovers	10180 Hole Ave #100	Riverside	1/24/08
PR0019439	Luke's Transmissions, Inc	6133 Mission Blvd	Riverside	1/24/08
PR0019068	Lukes Auto Body	6105 W Mission Blvd	Riverside	1/24/08
PR0019033	Quicklane/Fritts Ford	7990 Auto Dr	Riverside	1/24/08
PR0018686	Ace Lube N Tune	10190 Hole Ave	Riverside	1/28/08
PR0025050	Glen Avon Shell #68537	10171 Mission Blvd	Riverside	1/28/08
PR0018741	Laidlaw Transit Inc	10365 Keller Ave Section #A	Riverside	1/28/08
PR0023636	The Masonry Group, LP	8188 Lincoln Ave #100	Riverside	1/28/08
PR0022437	Hydra Force Inc	7383 Orangewood Dr	Riverside	1/29/08
PR0036754	Kentucky Fried Chicken	7970 Limonite Ave	Riverside	1/29/08
PR0018817	Palm Cleaners	10247 Magnolia Ave	Riverside	1/29/08
PR0022985	1 Hour Express Cleaners	10491 Magnolia Ave # C	Riverside	1/30/08
PR0023128	Direct Home Delivery Service, Inc.	9470 Mission Blvd #F	Riverside	1/30/08
PR0022805	Irish Cleaners	11130 Magnolia Ave #F	Riverside	1/30/08
PR0027492	CDF-West Riverside 18	7545 Mission Blvd	Riverside	1/31/08
PR0019283	EJay Components Inc	6471 Mission Blvd	Riverside	1/31/08
PR0032927	Sprint Nextel	6446 Canal St	Riverside	1/31/08
PR0018930	Top Quality #2 Top Quality #2	285 Iowa Ave	Riverside	1/31/08
PR0034253	T-Mobile USA, Inc	3470 Country Village Rd	Riverside	2/4/08
PR0036901	County of Riverside Fleet Services	5293 Mission Blvd	Riverside	2/5/08
PR0018399	Al's Machine & Auto Repair-OOB OOB	10785 Hole Ave	Riverside	2/7/08
PR0019031	Champion Auto Service	10206 Hole Ave #100	Riverside	2/7/08
PR0025063	Circle K #5247	5804 Mission Blvd	Riverside	2/7/08

Hazardous Materials Facility Inspection

RECORD	DBA	Site Address	CITY	ACTIVITY DATE
PR0023994	Main Auto Sales Main Auto Sales	5943 Republic St	Riverside	2/7/08
PR0027457	Arts Rainbow Transmission	9990 Mission Blvd	Riverside	2/8/08
PR0023655	Pierce Automotive	10941 Hole Ave	Riverside	2/8/08
PR0022266	Sacto Auto Repair	11009 Hole Ave	Riverside	2/8/08
PR0023129	Otwell's Auto And Tire Care	7304 Indiana Ave # 1	Riverside	2/11/08
PR0018946	Subaru of Riverside	7840 Indiana Ave	Riverside	2/14/08
PR0018396	Advanced Import Auto Repair	7304 Indiana Ave #3	Riverside	2/19/08
PR0018432	All City Automotive	7664 Indiana Ave	Riverside	2/20/08
PR0035851	Malcolm Smith Motorcylcles	7599 Indiana Ave	Riverside	2/20/08
PR0024069	Brake Masters	9450 Indiana Ave	Riverside	2/22/08
PR0018995	Bud's Tire and Wheel, Inc	8651 Indiana Ave #F&M	Riverside	2/22/08
PR0022792	Indiana Car Care	8651 Indiana #J	Riverside	2/22/08
PR0022488	DriveTime Car Sales, Inc	8341 Indiana Ave	Riverside	2/25/08
PR0022773	Old Quaker / Sherwin Williams	8625 Indiana Ave	Riverside	2/25/08
PR0018857	Riverside Metro Auto Center	8330 Indiana Ave	Riverside	2/25/08
PR0023521	Skip Fordyce Motorcycle Inc.	7688 Indiana Ave	Riverside	2/25/08
PR0023611	AME Manufacturing, Inc-OOB OOB	5867 Jasmine St	Riverside	2/26/08
PR0018763	ExxonMobil Oil Corporation	1147 University Ave	Riverside	2/26/08
PR0018621	Sparkman's Garage	5958 Jasmine St	Riverside	2/27/08
PR0034252	T-Mobile USA, Inc	3310 Muriel Dr	Riverside	2/27/08
PR0018401	All Tech Tune Up	8651 Indiana Ave # N&O	Riverside	2/28/08
PR0018903	H & L's Armstrong Transmission	8651 Indiana Avenue # R&S	Riverside	2/28/08
PR0023693	Irvine Pipeline Co., Inc	5959 Jasmine St	Riverside	2/28/08
PR0037038	Dalcar Auto Repair	2391 Main St	Riverside	3/4/08
PR0027173	MWD/Lake Mathews Reservoir	18250 La Sierra Ave	Riverside	3/4/08
PR0018452	British Sports & Imports-OOB OOB	4481 Brockton Ave	Riverside	3/5/08
PR0023725	VM International	2950 Jefferson St #C&D	Riverside	3/5/08
PR0018475	Brookhurst Mill	3315 Van Buren Blvd	Riverside	3/6/08
PR0023651	Armex APR	7545 Jurupa Ave #E&F	Riverside	3/7/08
PR0024319	Vertis, Incorporated	7190 Jurupa Ave	Riverside	3/7/08
PR0021854	Fleetwood Enterprises	7007 Jurupa Ave	Riverside	3/10/08
PR0018692	Jurupa Radiator Service	6611 Jurupa Ave	Riverside	3/10/08
PR0018904	Rizzco Automotive, Inc	6110 Jurupa Ave	Riverside	3/10/08
PR0022067	Big O Tires	11820 Magnolia Ave	Riverside	3/11/08
PR0022505	CDG Materials/Trencher West	5971 Jurupa Ave	Riverside	3/11/08

Hazardous Materials Facility Inspection

RECORD	DBA	Site Address	CITY	ACTIVITY DATE
PR0024818	Gas N' Go	8790 Mission Blvd	Riverside	3/11/08
PR0022948	Home Depot #6619	3323 Madison St	Riverside	3/11/08
PR0018833	Plaza Cleaners	6786 Brockton Ave	Riverside	3/11/08
PR0036922	Dunn-Edwards Paints	2550 Canyon Springs Pkwy #B-F	Riverside	3/12/08
PR0019001	Toyota Pros & Muffler	11881 Magnolia Ave #20	Riverside	3/12/08
PR0022825	Ben Clymer's The Bodyshop Ben Clymer's The B	12295 Magnolia Ave	Riverside	3/17/08
PR0025062	Circle K #5245	6105 Clay St	Riverside	3/17/08
PR0023323	Gutierrez Auto Repair	12490 Magnolia Ave #F	Riverside	3/17/08
PR0021518	Jiffy Lube	2634 Alessandro Blvd	Riverside	3/17/08
PR0018827	Performance Auto Care	11883 Magnolia Ave # 40	Riverside	3/17/08
PR0023509	Arco	3685 Valley Way	Riverside	3/18/08
PR0018586	Econo Lube N'Tune #17-OOB OOB	3398 Mission Inn Ave	Riverside	3/18/08
PR0023043	Wayne's Rebuilders & Auto Parts Wayne's Rebui	1710 Main St	Riverside	3/20/08
PR0019020	ConocoPhillips Co #255856	1395 Blaine St	Riverside	3/25/08
PR0019502	SBC/Pacific Bell LB-150	4821 Pedley Rd	Riverside	3/25/08
PR0019583	Mostamand, Inc	6100 Clay St	Riverside	3/26/08
PR0027899	Circle K #5203	6290 Mission Blvd	Riverside	3/27/08
PR0018962	Circle K Store, #2705248	3950 Pierce St UnitA	Riverside	3/31/08
PR0037367	Jack's Auto Repair	2989 Tenth St	Riverside	3/31/08
PR0037448	K-Mart #3106	7200 Arlington Ave	Riverside	3/31/08
PR0018590	Ed Martin Garage Inc	6672 Indiana Ave	Riverside	4/4/08
PR0027762	ExxonMobil Oil Corporation #12342	6824 Valley Wy	Riverside	4/4/08
PR0018635	Pacific Consolidated Industries	12201 Magnolia Ave	Riverside	4/4/08
PR0022772	Cleaners Club, Inc	11660 Sterling Ave	Riverside	4/7/08
PR0018831	Pine Center Cleaners	4644 Pine St	Riverside	4/7/08
PR0018880	Riverside Carburetor & Electric Inc	4600 Palm Ave	Riverside	4/7/08
PR0023176	Towne Center Cleaners	6139 Magnolia Ave	Riverside	4/8/08
PR0037629	AutoZone #5576	6047 Magnolia Ave	Riverside	4/9/08
PR0021596	Transmission & Repair Specialist Transmission &	2945 14th St	Riverside	4/9/08
PR0037620	Cruzen Automotive	3419 Arlington Ave	Riverside	4/10/08
PR0021550	Supershine Auto Wash	3898 Opal St	Riverside	4/10/08
PR0018394	Adams Service	11035 Wells Ave	Riverside	4/14/08
PR0021994	D.P. Auto	3265 Van Buren Boulevard #E-F	Riverside	4/14/08
PR0027038	Hertz Equipment Rental	929 W La Cadena Dr	Riverside	4/14/08
PR0026114	Allsup's Convenience Store	1703 Main St	Riverside	4/16/08

Hazardous Materials Facility Inspection

RECORD	DBA	Site Address	CITY	ACTIVITY DATE
PR0019435	Kretschmar & Smith Inc	6293 Pedley Rd	Riverside	4/17/08
PR0022028	Nolbert's Auto Service	5942 Republic St	Riverside	4/17/08
PR0037623	T-Mobile USA Site (IE24064A)		Riverside	4/17/08
PR0018850	Walden Structures, Inc	3100 Jefferson Ave	Riverside	4/17/08
PR0022069	Automotive Technical Services	3265 Van Buren Blvd #A&B	Riverside	4/21/08
PR0018990	Arco #9711/prestige Stations #9711	3399 Van Buren Blvd	Riverside	4/24/08
PR0019082	Alcorn Fence Co	6445 Pedley Rd	Riverside	4/28/08
PR0022225	Day Street Shell	6189 Day St	Riverside	4/29/08
PR0037782	Future Tech Metals	2926 Rubidoux Blvd	Riverside	4/29/08
PR0024734	AGA, LLC	1308 University Ave	Riverside	4/30/08
PR0023742	CVS Pharmacy #9849	8280 Magnolia Ave	Riverside	5/5/08
PR0022295	Parkview Ctr For Occupational Med	9041 Magnolia Ave #107	Riverside	5/5/08
PR0022867	Ritz Camera & Image	9590 Magnolia Ave	Riverside	5/5/08
PR0029754	Ta Rivard, Inc.	5494 Pedley Rd	Riverside	5/5/08
PR0018582	Union 76	350 Stephens Ave	Riverside	5/5/08
PR0030074	Econo Fence Company	5261 Pedley Rd	Riverside	5/6/08
PR0018601	Riverside Lube Express	11850 Magnolia Ave	Riverside	5/6/08
PR0018771	Valero	10290 Magnolia Ave	Riverside	5/6/08
PR0021790	WLW German Car Service-OOB OOB	11883 Magnolia Ave # 45	Riverside	5/6/08
PR0018419	Arco #5679/Prestige Stations #5347	11887 Magnolia Ave	Riverside	5/7/08
PR0026828	Astro Seal Inc	827 Palmyrita Ave #B	Riverside	5/7/08
PR0023545	Plaza Cleaners	8304 Limonite Ave Ste.G	Riverside	5/7/08
PR0030146	Riverside Mining Limited	3500 Pyrite St	Riverside	5/7/08
PR0024374	Duracoat Products Inc	5361 Via Ricardo	Riverside	5/8/08
PR0019254	Food Express	4720 Brookhollow Cir	Riverside	5/8/08
PR0018743	G & M Oil Co. #29	8283 Arlington Ave	Riverside	5/8/08
PR0018707	L & M Friction Materials Inc	2993 14th St	Riverside	5/8/08
PR0018418	Riverside Gas Mart	4196 Van Buren Blvd	Riverside	5/8/08
PR0024404	Riverside Mini-Mart Inc	1855 Columbia Ave	Riverside	5/8/08
PR0018760	Arlington Smog Pro-OOB OOB	8970 Arlington Ave	Riverside	5/9/08
PR0031541	Burrtec Waste Industries,Agua Mansa	1850 Agua Mansa Rd	Riverside	5/12/08
PR0018764	Exxon Mobil Oil Corporation	7290 Arlington Ave	Riverside	5/12/08
PR0024538	GBS Enterprise, Inc	2720 14th St	Riverside	5/12/08
PR0018931	Seven Eleven #16552(2111)	16970 Van Buren Blvd	Riverside	5/13/08
PR0022030	Precision Motion	2805 Chicago Ave	Riverside	5/14/08

Hazardous Materials Facility Inspection

RECORD	DBA	Site Address	CITY	ACTIVITY DATE
PR0030615	SCE Glen Avon/Valley Substation		Riverside	5/14/08
PR0030621	SCE Rubidoux/Valley Substation	4059 Riverview Dr	Riverside	5/14/08
PR0018617	Truck Town	2748 14th St	Riverside	5/14/08
PR0018637	E-Z Lube #117 E-Z Lube #117	3417 Arlington Ave	Riverside	5/15/08
PR0024025	Friendly Automotive Service	3399 Arlington Ave	Riverside	5/15/08
PR0018507	Gasco Oil	5305 Arlington Ave	Riverside	5/15/08
PR0022869	MGM Shell	3873 Pyrite St	Riverside	5/15/08
PR0019335	Cole Equipment Inc	2830 Rubidoux Blvd	Riverside	5/19/08
PR0019365	Inland Concrete Enterprises	2434 Rubidoux Blvd	Riverside	5/19/08
PR0018991	Arco #9712/prestige Stations #9712	3570 Central Ave	Riverside	5/21/08
PR0018425	Arco #5168 Prestige Stations 0665	3659 Central Ave	Riverside	5/22/08
PR0027449	High Desert Oil Co Inc #596	8677 Limonite Ave	Riverside	5/27/08
PR0019018	Union 76	2278 Main St	Riverside	5/27/08
PR0023366	G.T. Fast Mart	7494 Indiana Ave	Riverside	5/28/08
PR0022149	Swift Concrete Transport	2532 Rubidoux Blvd	Riverside	5/28/08
PR0023411	Food 4 Less #343	4250 Van Buren Blvd #B	Riverside	5/29/08
PR0034740	March Fueling Services-OOB OOB	17305 Heacock Ave	Riverside	5/29/08
PR0018415	Riverside Better Gas, Inc	6287 Day St	Riverside	5/29/08
PR0035214	Total Airport Service, Inc	17305 Heacock Ave Ste.A	Riverside	5/29/08
PR0019019	Circle K #2705693	9501 Indiana Ave	Riverside	6/2/08
PR0023807	Central City Enterprises	5935 Rickenbacker Ave	Riverside	6/3/08
PR0018673	Insta Lube & Tune-OOB OOB	4399 Main St	Riverside	6/3/08
PR0023037	Box Springs Station	5720 Sycamore Canyon Blvd	Riverside	6/4/08
PR0023330	V & G Body Shop	12510 Magnolia Ave #C	Riverside	6/4/08
PR0018936	Inland Gas	6011 Magnolia Ave	Riverside	6/5/08
PR0018619	RBS Petrol, Inc	4975 Van Buren Blvd	Riverside	6/5/08
PR0018772	ExxonMobil Oil Corporation #10773	3399 Adams St	Riverside	6/6/08
PR0018522	Circle K #801	18965 Van Buren Blvd	Riverside	6/9/08
PR0018993	Arco #9714/Prestige Stations #9714	1294 University Ave	Riverside	6/10/08
PR0032544	Arco/Churches Chicken	10015 Bellegrave Ave	Riverside	6/10/08
PR0023995	JRW Equipment, Inc	6890 Doolittle Ave #A	Riverside	6/10/08
PR0022834	Miller's Fab & Weld Corporation	6100 Industrial Ave	Riverside	6/10/08
PR0018556	HI-Rel Corporation	7575 Jurupa Ave	Riverside	6/11/08
PR0024328	Skanska	1995 Agua Mansa Rd	Riverside	6/11/08
PR0034754	DHL Express	17101 Heacock St #A	Riverside	6/12/08

Hazardous Materials Facility Inspection

RECORD	DBA	Site Address	CITY	ACTIVITY DATE
PR0024398	Merit Oil Company	1751 3rd St	Riverside	6/12/08
PR0018770	Riverside Ultramar	1360 W Blaine St	Riverside	6/16/08
PR0018685	5-Point Auto Service	11096 Hole Ave	Riverside	6/17/08
PR0018757	Military Department	2501 Fairmount Ct	Riverside	6/17/08
PR0034628	Verizon Wireless March ARB	22550 Van Buren Blvd A	Riverside	6/18/08
PR0019046	Wiest Rentals & Sales	3890 Pierce St	Riverside	6/18/08
PR0018421	Arco #6345/Prestige Stations #6345	2624 E Alessandro Blvd	Riverside	6/19/08
PR0023634	Morgan Corporation	7888 Lincoln Ave #A	Riverside	6/27/08
PR0023539	BMW of Riverside	3060 Adams St	Riverside	6/30/08
PR0022909	Excel Rental Center	28115 Del Rio Rd #A	Temecula	7/12/07
PR0031027	Hazit Mini Mart	44564 Pechanga Pkwy	Temecula	7/17/07
PR0022596	Rebel Rents, Inc-OOB OOB	28115 Del Rio Rd # C	Temecula	7/17/07
PR0023919	Elite Cleaners	40573 Margarita Rd	Temecula	7/18/07
PR0028401	Paulson Manufacturing Corp	46752 Rainbow Canyon Rd	Temecula	7/18/07
PR0028611	Town Center Cleaners	29588 Rancho California Rd #K1	Temecula	7/18/07
PR0020017	Long's Drug #301	30640 Rancho California Rd	Temecula	7/19/07
PR0036065	Maurice Carrie Winery	34225 Rancho California Rd	Temecula	7/19/07
PR0030005	Thornton Winery Culbertsons	32575 Rancho California Rd	Temecula	7/19/07
PR0032681	Paradise Chevrolet	27360 Ynez Rd	Temecula	7/20/07
PR0023676	Wal-Mart #2708	32225 Hwy 79	Temecula	7/24/07
PR0024271	Walker Wood Products, Inc	43195 Business Park Dr	Temecula	7/24/07
PR0034026	Burger King	32110 S Hwy 79	Temecula	7/26/07
PR0033898	Jack in the Box #3391	32055 S Hwy 79	Temecula	7/26/07
PR0034277	KFC/Long John Silver	32425 S Hwy 79	Temecula	7/26/07
PR0033897	Siggy's	31970 S Hwy 79	Temecula	7/26/07
PR0026102	Arco #5928/Prestige Stations #5472	27691 Ynez Rd	Temecula	7/30/07
PR0023344	Redhawk Lube & Auto Repair	44260 Apis Rd #B	Temecula	7/31/07
PR0024258	Best For Less Tires	28715 Via Montezuma	Temecula	8/2/07
PR0034398	Red Brick Pizza Red Brick Pizza	32195 Hwy 79 # B	Temecula	8/2/07
PR0035273	Ponte Winery	35053 Rancho California Rd	Temecula	8/6/07
PR0024304	Kirk Machine & Tool	42143 Avenida Alvarado #C	Temecula	8/8/07
PR0022595	Palomar Village Shell	42197 Margarita Rd	Temecula	8/8/07
PR0035276	The Olive Garden #1678	29025 Overland Dr	Temecula	8/8/07
PR0025283	International Rectifier/Hexfet	41915 Business Park Dr	Temecula	8/14/07
PR0026466	Downs Energy	27985 Diaz Rd	Temecula	8/16/07

Stormwater Quality Management Products

CASQA Municipal Stormwater Program Effectiveness Assessment Guidance

The CASQA Municipal Stormwater Program Effectiveness Assessment Guidance document *(fig. 1)* assists stormwater program managers in designing and conducting program effectiveness assessments using a range of assessment methods.

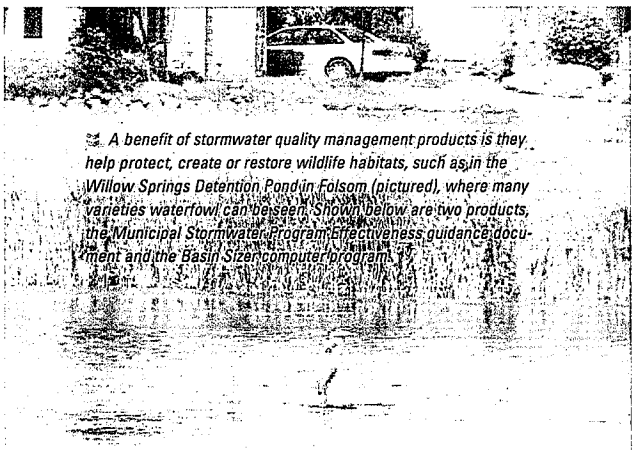

A benefit of stormwater quality management products is they help protect, create or restore wildlife habitats, such as in the Willow Springs Detention Pond in Folsom (pictured), where many varieties waterfowl can be seen. Shown below are two products, the Municipal Stormwater Program Effectiveness guidance document and the Basin Sizer computer program.

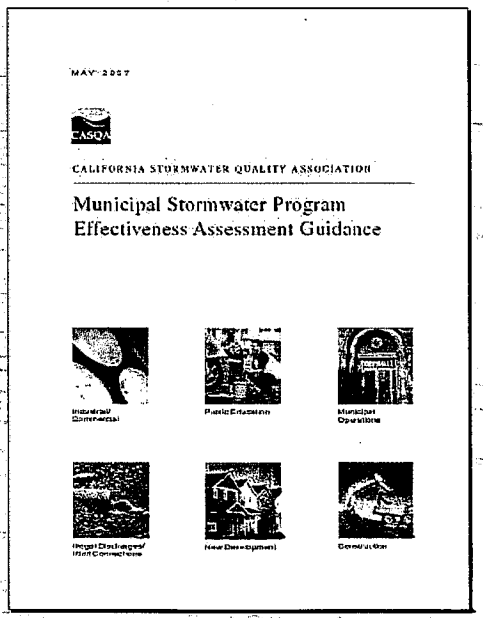

Figure 1

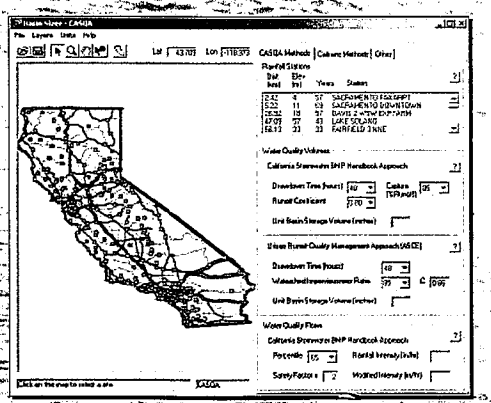

Figure 2

PHOTO BY CARMEL BROWN

The guidance also describes how to use these methods based on program-specific goals and desired outcomes. The guidance reflects the current state of knowledge regarding municipal stormwater program effectiveness assessment planning, methods, measures, and analyses.

Basin Sizer Program

Basin Sizer *(fig. 2)* is a computer program that automates computation of water quality volumes (WQV) and water quality flows (WQF) for the design of treatment controls in California. The Basin Sizer is based on procedures described in the CASQA BMP Handbook.

CASQA Stormwater Monitoring and Research Priorities - 2007

Taking the useful information generated in the 2006 project, CASQA reformatted the work product into an organized, updateable technical reference that will serve as a useful resource for MS4 NPDES permittees in California. Additionally the tool identifies studies and projects for potential funding and support based on the expressed needs of the CASQA membership.

Expanded Members Only Content at CASQA's Website

CASQA expanded the Members Only section of its website to provide more information on stormwater issues directly to CASQA members. The section contains valuable information and serves as a place to share ideas, discuss options, and find other members. In the Members Only section you will find: a Members Forum, a bulletin board style area that allows members to participate in open discussion; a Resource area, where you can find recent and archived CASQA documents in an easy-to-sort format; and a Member Services section where you can edit your profile, and find a members directory.

Water Quality NewsFlash

The popular Water Quality NewsFlash is now published under CASQA sponsorship. Previously a Caltrans publication intended for its staff, NewFlash provides a bi-weekly summary of current water quality issues of interest to stormwater practitioners.

CASQA Comment Letters

Tracking and reviewing proposed regulatory and legislative initiatives remains a significant focus of CASQA efforts. Subcommittees analyze these initiatives and provide summaries to members and submit formal comments to regulatory agencies. In 2007, CASQA submitted comment letters on the construction general permit, the water quality enforcement policy, pesticide regulatory decisions, Ocean Plan, and local permits with potential precedent setting issues. All the comment letters are available in the Members Only section of the website.

Financial Summary

The California Stormwater Quality Association was incorporated as a non-profit organization in the State of California on July 26, 2002 to assist entities that are charged with stormwater quality management responsibilities for the development and implementation of stormwater quality goals and programs within the state of California. Operations commenced January 1, 2003.

CASQA is organized and operated exclusively for charitable and educational purposes within the meaning of Section 501(c)(3) of the Internal Revenue Code. CASQA follows Financial Accounting Standards Board Statement (SEAS) No. 117, Financial Statements of Not-for-Profit Organizations, for presentation of its financial statements.

The financial summary below for the year ended December 31, 2005 is drawn from the REPORT ON AUDIT OF FINANCIAL STATEMENTS for the year ended December 31, 2005 and 2004 (Burr, Pilger & Mayer, LLP).

CASQA is organized and operated exclusively for charitable and educational purposes.

STATEMENT OF ASSETS AND LIABILITIES

Assets	$	300,913
Liabilities	$	42,920
Net Assets	$	257,993

REVENUES $501,910

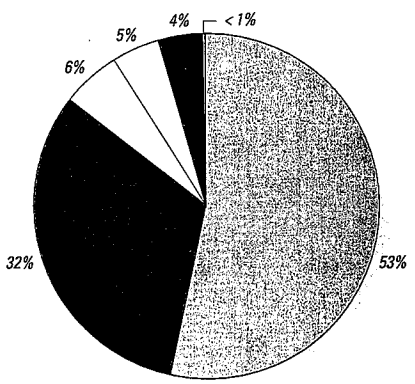

- Membership
- Conference
- BMP Handbooks
- Investment Interest
- General Membership Meetings
- Contributions

EXPENSES $583,734

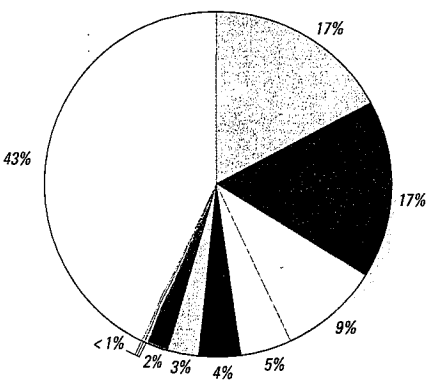

- Effectiveness Assessment Guidance
- Conference
- Policy & Permitting Subcommittee
- Monitoring & Science Research Priorities
- General Membership Meetings
- BMP Handbook Production/Shipping
- BMP Basin Sizer Program
- Pesticides Subcommittee
- CASQA Awards
- Executive Program Committee
- Supporting Services - General & Administrative

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Sediment Quality Advisory Committee Representative,
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Bill Busath* / Maureen Daggett
Fee Stakeholder Group Representative,
City of Sacramento / ECMS

EXECUTIVE PROGRAM COMMITTEE AT-LARGE MEMBERS

Jill Bicknell* and John Fusco*
Santa Clara Valley Urban Runoff Pollution Prevention Program

Dan Lafferty
Los Angeles County

Kevin McGillicuddy†
Roscoe-Moss

Mark Grey† and Kathryn Hubbard†
Building Industry Association of Southern California

Scott McGowen and Karl Dreher
Caltrans

Kerry Schmitz
County of Sacramento

Mack Walker†
Larry Walker Associates

Gerhardt Hubner / Arne Anselm
Ventura County Watershed Protection District

Drew Kleis
City of San Diego

EXECUTIVE PROGRAM COMMITTEE ADVISORS

Eugene Bromley
USEPA

Bruce Fujimoto
State Water Board

Member affiliations listed in italics
** EPC members also on the CASQA Board of Directors (minimum of 2 required)*
† EPC members who are affiliate members (minimum of 1/3 of filled vacancies required)

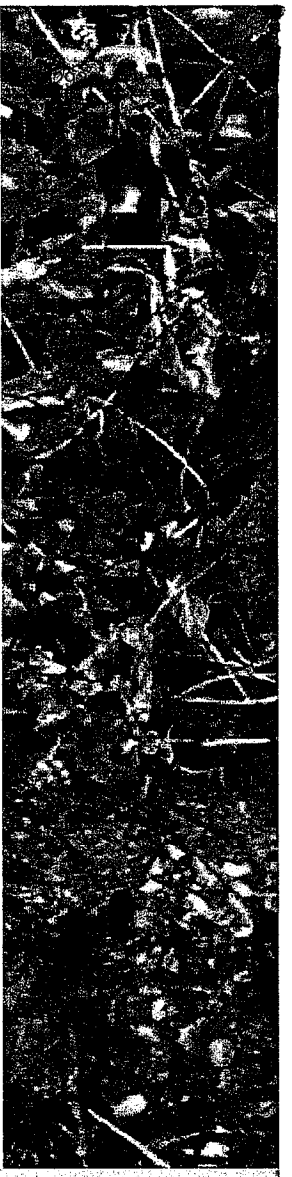

California Stormwater Quality Association | P.O. Box 2105, Menlo Park, California 94026-2105 | 650.366.1042 | www.casqa.org | info@casqa.org

CASQA

CALIFORNIA STORMWATER QUALITY ASSOCIATION™

SMC ANNUAL REPORT

ANNUAL REPORT 2007-2008

Stormwater Monitoring Coalition Of Southern California

September 2, 2008

INTRODUCTION

As a result of the increasing regulatory focus and the lack of scientific knowledge base, both stormwater regulators and municipal stormwater management agencies throughout southern California have developed a collaborative working relationship. The goal of this relationship is to develop the technical information necessary to better understand stormwater mechanisms and impacts, and then develop the tools that will effectively and efficiently improve stormwater decision-making. As individuals and agency representatives, there was early recognition that these issues are oftentimes not localized, but typically cross watershed and jurisdictional boundaries. This relationship culminated in a formal letter of agreement, signed in 2000, by all of the Phase I municipal stormwater NPDES lead permittees and the NPDES regulatory agencies in southern California to create the Stormwater Monitoring Coalition (SMC) (Table 1).

Table 1. List of member agencies in the Stormwater Monitoring Coalition.

California Regional Water Quality Control Board, Los Angeles Region
California Regional Water Quality Control Board, San Diego Region
California Regional Water Quality Control Board, Santa Ana Region
California Department of Transportation, Caltrans
City of Long Beach
City of Los Angeles, Watershed Protection Division
County of Orange, Public Facilities and Resources Dept.
County of San Diego Stormwater Management Program
Los Angeles County Department of Public Works
Riverside County Flood Control and Water Conservation District
San Bernardino County Flood Control District
Southern California Coastal Water Research Project
State Water Resources Control Board
US Environmental Protection Agency, Office of Research and Development
Ventura County Watershed Protection District

The first project supported by the SMC was to develop a five-year Research Agenda. The research agenda, published in 2001, consisted of 15 unique projects that the SMC ranked, prioritized, and then funded on a voluntary basis. The SMC has made tremendous progress implementing the Research Agenda. Ten of the 15 projects have been started and virtually all have been completed.

The value of the SMC to its member agencies is at least four-fold. The first is the ability to share costs for implementing projects. Cost reductions for SMC member agencies can be significant since collaborative projects can reduce costs by more than 90% relative to footing the bill alone. In addition, the majority of projects have nonmember agency cost-matching. Just for the projects described in this report, there has been nearly one million dollars in grant awards, cost-match, or in-kind services. The second value to member agencies is the ability to stretch their agency's skill base. Stormwater management requires a wide variety of knowledge including regulatory policy, engineering, hydrology, biology, chemistry, toxicity, and microbiology, to name a few. Many member

agencies have limited staff and, by working together, garner the additional skills that are not sustainable within each agency. A third asset of membership is the ability to communicate. Discussions among member agencies provide context and a richness of ideas for application to local issues back home. Similarly, discussion between regulatory and regulated agencies in an informal setting leads to more effective implementation of management activities. Finally, projects conducted under the SMC umbrella have nearly always resulted in some management action. Often, it is difficult for a single agency to affect the current course of regulatory management. Because SMC projects are initiated and vetted through all of the regulated and regulatory management agencies, the results are adopted quickly into the management framework including alterations to NPDES permits.

The SMC has been expanding its role beyond just technical projects by emphasizing outreach and communication. This has occurred through three main venues. The first venue is the establishment of an SMC web site [add URL here]. The goal of this web site is to showcase the SMC, but to also provide an outlet for each of the products developed by the agency. The second venue is through the development of project specific Technical Advisory Committees (TACs). The TACs are valuable for involving outside experts, but also for including technical staff of the individual agencies. The third venue for outreach is through training and workshops. These have initiated as a result of project specific needs such as LID technology for City Planners or the Hydromodification Workshop associated with CASQA Annual Meetings.

What perhaps is most telling about the value of the SMC is the renewal of the original letter of agreement during the 2007-08 fiscal year. This recommitment for another five years demonstrates the positive nature of the organization and its ability to provide a service that crosses regulatory-regulated boundaries. Moreover, the organization's appeal has been recognized by others and has resulted in four new member agencies; the California Department of Transportation (Caltrans), the City of Los Angeles, the State Water Resources Control Board, and the US Environmental Protection Agency (Table 1). The SMC welcomes these new members and looks forward to working together.

PROJECT ACCOMPLISHMENTS

Building A Regionally Consistent and Integrated Freshwater Stream Bioassessment Monitoring Program

Status: 100% complete
Project budget: $280,000

Assessment of freshwater biological communities represents a potentially powerful tool for evaluating the effects of discharges in southern California creeks and streams. Bioassessments integrate the effects of multiple stressors, including chemical pollutants and physical alterations in receiving waters. The value of biological assessments is that they are closer to many of the defined beneficial uses of receiving waters (i.e. aquatic life, warm water habitat, cold water habitat) than chemically-derived water quality objectives.

The goal of this study is to build a regionally consistent bioassessment monitoring program. This project will be completed in three phases including: 1) building a monitoring infrastructure; 2) calibrating and validating a regional assessment tool; and 3) designing an integrated, coordinated regional monitoring program. The first phase focuses on creating a monitoring infrastructure so that multiple agencies are properly trained, data are collected in comparable manners, and data can be efficiently shared. The second phase focuses on developing an assessment tool that is robust enough to be used by all agencies across the region. This will enable a consistent approach for evaluating the status of freshwater biological communities and provide the answers regarding community impacts to managers in meaningful and understandable terms. The third phase focuses on creating a study design that most efficiently answers specific questions of interest at large regional scales. Addressing some questions at regional scales can provide cost efficiency for addressing reference condition, cumulative impacts, and when nested within a local sampling design, provides unparalleled information for providing context to local monitoring data.

Our main collaborator on this project is the California Department of Fish and Game (CDF&G). The project is 50% funded by the SWRCB, whose main desire is to ensure integration with the Surface Water Ambient Monitoring Program (SWAMP). This will provide further value to SMC member agencies. To help accomplish this project, an SMC Technical Subcommittee was formed.

All three phases have been implemented by the SMC. The first goal towards monitoring infrastructure is complete. SMC member agencies have used training, workshops, field audits, enhanced laboratory quality assurance activities, and written or collated information management and field protocol documents. Of particular note, SMC member agencies have helped to create a network of laboratory taxonomists called the Southwestern Association of Freshwater Invertebrate Taxonomists that will be important in standardizing and ensuring the quality of laboratory identifications. The second task to evaluate an assessment tool is complete. The southern California index of biological integrity (SC IBI) was tested in 15 low gradient streams of varying levels of impact. It was clear from this study that the IBI is not the best assessment tool for describing impact in these habitats. The low gradient project was so successful that the Working Group helped SCCWRP and CDFG to prepare a State Consolidated Grant proposal to test the SC IBI in another important habitat; non-perennial streams. Finally, the Working Group has designed an integrated, collaborative Regional Watershed Monitoring program. The goal of the Regional Watershed Monitoring program is to increase the effectiveness of existing NPDES monitoring programs by integrating among permittees and SWAMP to achieve a large-scale assessment of watershed condition. The cost of implementing this program would be negligible because the Working Group identified significant redundancies and inefficiencies in existing monitoring programs that could be reprogrammed towards a regional design. Finally, the Working Group has found additional partners to help contribute to the regional monitoring program including the Wetland Recovery Project (WRP), other RWQCBs, and other NPDES permittees.

Working Group consisting mostly of laboratory managers has been formed to assist in the study.

The SMC has successfully finished the first task of the study. The intercalibration of TSS, nutrients, and trace metals was based on customized certified reference materials just for our project and runoff samples from different land use types. Gratifyingly, most of the laboratories that participated previously successfully completed the second iteration. An objective laboratory scoring system, which consists of letter scores for each laboratory, has been developed and was used for the contract language in task 3.

Pending formal agreement signatures, the working group is prepared to implement further constituents and the addition of toxicity testing to the intercalibration.

Bacterial Reference Watershed Study
Status: 100% complete
Project budget: $165,000 + in-kind services

High fecal indicator bacteria levels are one of the most common surface water impairments in southern California. Frequent exceedences of bacterial water quality standards have resulted in development of Total Maximum Daily Loads (TMDL) as a regulatory mechanism to address bacterial contamination in several southern California watersheds.

Current water quality standards for freshwater use fecal coliforms or E. coli as an indicator of fecal contamination because their presence is well correlated with the many waterborne disease-causing organisms or pathogens. However, fecal coliforms and E. coli are naturally present in the intestines of warm-blooded. Consequently, fecal contamination of surface waters can result from numerous sources of fecal pollution, including human sewage, manure from livestock operations, indigenous wildlife and urban runoff. In undeveloped areas wildlife, such as small and large mammals and birds, has the potential to be a significant source of fecal bacteria to surface waters.

In recognition of the potential for natural sources to affect bacteria levels in surface waters, several TMDLs either allow or require development of numeric targets that account for natural bacteria levels. For example, the Malibu Creek Bacteria TMDL requires responsible jurisdictions to monitor unimpaired streams in the local watershed during dry weather, dry winter weather, and wet weather for at least one full year in order to develop a representative numeric target for allowable bacteria exceedence days. Several similar studies are currently being considered or proposed in Ventura, Los Angeles, Orange, and San Diego counties; however, there is currently no coordination between these proposed studies.

The objective of this project is to assess natural bacteria levels in numerous streams throughout southern California in order to provide a regional characterization of background bacteria concentrations. Bacterial indicators were measured from

unimpaired streams in 12 southern California watersheds weekly for one full year. These data were used to investigate background levels, frequency of exceedences of relevant water quality standards, and spatial and temporal patterns.

This project is a partnership of numerous SMC agencies who are participating via in-kind contributions. Three regional water quality control boards, six storm water agencies, and several cities cooperated on field data collection and laboratory analysis. Following laboratory and field intercalibration, samples were collected weekly between May 2006 and May 2007. Overall, the 30-day geometric mean exceedences of freshwater standards were 2% for *E. coli* and 14% for *enterococci*. There were clear seasonal patterns with exceedences being most common during July and August. The project report ftp://ftp.sccwrp.org/pub/download/PDFs/542_FIB_ReferenceBacti.pdf was completed in January 2008.

Hydromodification Study
Status: 35% complete
Project budget: $1,137,440 ($1,137,440 State Prop 50 Grant)

The process of urbanization has the potential to affect stream courses by altering watershed hydrology. Development and redevelopment can increase the amount of impervious surfaces on formerly undeveloped landscapes. This reduces the capacity of remaining pervious surfaces to capture and infiltrate rainfall and, as a result, a larger percentage of rainfall becomes runoff during any given storm. In addition, runoff reaches the stream channel much more efficiently, so peak discharge rates post-development are higher compared to predevelopment for an equivalent rainfall event. This process has been termed hydromodification.

Hydromodification can result in adverse effects to stream habitat, surface water quality, and water supply. The stream erosion that results from the increased peak flow can threaten infrastructure, homes, and businesses. Intermittent and ephemeral streams that possess riparian and wetland habitat are at particular risk from effects of hydromodification. Streams in semi-arid regions are especially vulnerable to urbanization due to a prevalence of sand bed channels, lack of vegetative reinforcement, and relatively large net changes in water and sediment supply associated with stormwater runoff. Recent studies by the SMC have indicated that intermittent and ephemeral streams in southern California degrade at lower levels of watershed urbanization than streams in the eastern US.

In response to the effects of hydromodification, state and local agencies are developing standards and management approaches to control and/or mitigate the effects of hydromodification on natural and semi-natural stream courses. Successful implementation of these regulatory programs requires development of tools to better assess hydromodification effects and develop appropriate mitigation and management strategies.

Western Riverside County Regional Conservation Authority

MULTIPLE SPECIES HABITAT CONSERVATION PLAN

Annual Report 2007

APPENDIX E

TRAINING ATTENDANCE SHEETS

NEW DEVELOPMENT TRAINING

0002931

NPDES STORMWATER QUALITY TRAINING FOR
WQMP Training
Riverside County Flood Control & Water Conservation District

Meeting of: Wednesday, April 16 - 13:00 - 17:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
1	James	Achuff	City of Indio	Public Works/Engineering Services	(760) 391-4019	
2	JOHN	ASHLOCK	Riverside County	TRANSPORTATION	(951) 955-8162	
3	Lon	Askew	City of Norco	Engineering	(951) 270-5678	
4	Vanessa	Batista	City of Riverside	Planning	(951) 826-5371	
5	Jessica	Chin	City of Riverside	Public Works	(951) 826-5760	
6	Daniel	Cortez	City of Riverside	Planning	(951) 826-2354	
7	Charles	de Chambeau	RCFC & WCD	Flood	(951) 955-1298	
8	Mekbib	Degaga	RCFC & WCD	Flood	(951) 955-1214	
9	Laurie	Dobson-Correa	Riverside County	Transportation Department	(951) 955-1095	
10	Lisa	Elder	Riverside County	Transportation Department	(951) 955-1095	
11	Andrew	Emery	City of Riverside	Parks, Recreation & Community Services	(951) 826-2021	
12	John	Farley	Other	City of Riverside Public Utilities/Water		
13	Kevin	Gillette	Riverside County	Transportation Department	(951) 955-1095	
14	Cesar	Guiterrez	Riverside County	Transportation Department	(951) 955-1095	
15	Diana	Hernandez	RCFC & WCD	Planning Division	(951) 955-9412	
16	Michele	Hindersinn	City of Corona	Public Works		
17	Steve	Hooper	City of Riverside	Public Works		
18	Andrew "Andy"	Huneck	Riverside County	Transportation Department	(951) 955-1095	
19	Tim	King	City of Riverside	Public Works		
20	David	Krell	Other	City of Riverside Public Utilities/Water		
21	Maria	Lamping	City of Riverside	Public Works Engineering	(951) 826-5146	
22	ERIC	LOMELI	RCFC & WCD	DESIGN 1	(951) 955-8601	

0002932

NPDES STORMWATER QUALITY TRAINING FOR
WQMP Training
Riverside County Flood Control & Water Conservation District

Meeting of: Wednesday, April 16 - 13:00 - 17:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
23	Roldan	Lopez	City of Indio	Public Works/Engineering Services	(760) 391-4000	
24	Steve	Loriso	City of Norco	Contract Plan Check	(909) 594-9702	
25	Ernest	Marquez	Other	City of Riverside Public Utilities/Water	(951) 826-5409	
26	Ibrahim	Massoud	City of Riverside	Pubic Works/Engineering	(951) 826-5805	
27	Ward	Maxwell	Riverside County	Transportation	(951) 955-6790	
28	Margie	McDowell	Other	City of Riverside Public Utilities/Water	(951) 826-5822	
29	Claudia	Mendoza	Riverside County	Transportation Department	(951) 955-1095	
30	Max	Mendoza	City of Riverside	Water Operations	(951) 351-6320	
31	Rick	Mendoza	Other	City of Riverside Public Utilities/Water		
32	Julie	Meyer	Riverside County	Transportation Department	(951) 955-1095	
33	Kevin	Munns	Other	City of Riverside Public Utilities/Water		
34	Mary	Nevarez	Other	City of Riverside Public Utilities/Water		
35	Dougias	Norfolk	City of Norco	Engineering	(951) 545-7894	
36	Gloria	Perez	Riverside County	EDA	(951) 955-9056	
37	Allen	Pielin	City of Riverside	Public Works		
38	Tony	Resendez	Riverside County	EDA	(951) 955-5781	
39	Tom	Rheiner	RCFC & WCD	Special Projects	(951) 955-2349	
40	Marcia	Rose	Riverside County	Transportation Department	(951) 955-1095	
41	Randy	Sheppeard	RCFC & WCD	ERS	(951) 955-1306	
42	Cindy	Snavely-Peck	City of Riverside	Public Works		
43	Jason	Swenson	RCFC & WCD	ERS	(951) 955-8082	

0002933

NPDES STORMWATER QUALITY TRAINING.FOR
WQMP Training
Riverside County Flood Control & Water Conservation District

Meeting of Wednesday, April 16 - 13:00 - 17:00

SIGN IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
44	Tesfu	Tadesse	Riverside County	Transportation	(951) 955-3789	
45	KEVIN	TSANG	Riverside County	TRANSPORTATION	(951) 955-6828	
46	Teresa	Tung	RCFC & WCD	ERS	(951) 955-1233	
47	Vince	Vasallo	Other	City of Riverside Public Utilities/Water		
48	Mark	Westover	City of Moreno Valley	Public Works	(951) 413-3114	
49	Michael	Yasmer	City of Riverside	Public Works		
50	Mary	Zambon	Riverside County	Transportation Department	(951) 955-1095	
51	[illegible]	[illegible]	RCFC WCD	NPDES	[illegible]	[illegible]
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0002934

NPDES STORMWATER QUALITY TRAINING FOR
WQMP Training
Coachella Valley Water District

Meeting of: Tuesday, April 22 - 13:00 - 17:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
1	Jim	ayres	Riverside County	Economic Development	(760) 863-2552	
2	Tony	Bagato	City of Palm Desert	Planning	(760) 346-0611	
3	Roland	Bustamante	CVWD	Service (Inspection)	(760) 398-2661	
4	ARACELI	CASTRO	Riverside County	Economic Development		
5	Leland	Cole	City of Rancho Mirage	Public Works / Engineering	(760) 770-3224	
6	Adrienne	Dunfee	City of Indio	Public Works/Engineering Services	(760) 391-4000	
7	Grant	Eklund	City of Indio	Public Works/Engineering Services	(760) 391-4018	
8	Jaime	Engler	City of Indio	Public Works/Engineering Services	(760) 391-4000	
9	Tommy	Fowlkes	CVWD	Development Services	(760) 398-2661	
10	Bob	French	City of Calimesa	Public Works	(909) 798-9801	
11	Wilfred	Gonzalez	CVWD	Water Resources	(760) 398-2651	
12	Melissa	Grisa	City of Palm Desert	Planning	(760) 346-0611	
13	Phuong	Hunter	City of Moreno Valley	Public Works	(951) 413-3470	
14	Jeramy	Jackson	City of Moreno Valley	Public Works	(951) 616-4564	
15	Julien	Kim	City of Banning	Planning	(951) 922-3167	
16	LIZA	LIZARRAGA	Riverside County	Economic Development	(760) 863-2552	
17	Dominick	Lombardi	Riverside County	EDA	(951) 955-6622	
18	Gabriel	Martin	Riverside County	Economic Development Agency	(951) 955-1918	
19	Mike	McCabe	City of Calimesa	Public Works	(909) 795-9801	
20	LEONARD Bryan	ST. SAUVER McKinney	City of La Quinta	Public Works	(760) 777-7045 777-7048	
21	rick	minjares	City of Palm Springs	public works and engineering	(760) 323-8253	

0002935

NPDES STORMWATER QUALITY TRAINING FOR
WQMP Training
Coachella Valley Water District

Meeting of: Tuesday, April 22 - 13:00 - 17:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signature
22	Allison	Powell	City of Indio	Public Works/Engineering Services	(760) 391-4000	
23	Tom	Rafferty	City of Indio	Public Works/Engineering Services	(760) 391-4000	
24	Juan	Raya	City of Indio	Public Works/Engineering Services	(760) 391-4000	
25	ANNA	RODRIGUEZ	Riverside County	Economic Development	(760) 863-2552	
26	LEAH	RODRIGUEZ	Riverside County	Economic Development	(760) 863-2552	
27	Carol	Templeton	City of Palm Springs	Engineering	(760) 322-8259	
28	JOAQUIN	TIJERINA	Riverside County	Economic Development	(760) 863-2552	
29	Alana	Townsend	City of Palm Desert	Public Works	(760) 346-0611	
30	Jianhong	Xiong	Other	Plan check consultant to RCFCWCD	(858) 207-5077	
31						
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Jeff's class

NPDES STORMWATER QUALITY TRAINING FOR
WQMP Training
Riverside County Flood Control & Water Conservation District

Meeting of: Wednesday, November 28 - 13:00 - 17:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
1	Daisy	Barreto	RCFC & WCD	Planning Division - Plan Check 2 Section Engineering Services	(951) 955-1269	Daisy Barreto
2	Jessica	Chin	City of Riverside	Public Works		
3	Tony	Colarossi	City of La Quinta	Public Works	(760) 777-7089	Tony Colarossi
4	Ana Dalia	Cruz	City of Beaumont	Public Works	(951) 769-6999	
5	Donald	Delgadillo	RCFC & WCD	Planning Division - Plan Check 2 Section	(951) 955-4683	
6	Robert	Florez	City of Moreno Valley	Public Works	(951) 413-3471	
7	Kathleen Katheline	Fong	Santa Ana Regional Board	RWQCB	(951) 774-0114	Kathleen Fong
8	Josh	Frohman	City of Moreno Valley	Land Development	(951) 413-3251	Josh Frohman
9	Jeff	Fulton	RCFC & WCD	Plan Check	(760) 479-2939	
10	Kyle	Galleup	RCFC & WCD	Planning	(951) 955-4050	
11	Komy	Ghods	RCFC & WCD	Design and Construction	(951) 955-2511	
12	Vicente	Giron	City of Moreno Valley	Public Works/Land Development	(951) 413-3120	Vicente B. Giron
13	Brian	Guillot	City of Banning	Planning	(951) 922-4842	
14	Imad	Guirguis	RCFC & WCD	Planning	(951) 955-1282	
15	Clement	Jimenez	City of Moreno Valley	Public Works - Land Development	(951) 413-3121	
16	Vikki	Kuntz	Riverside County	Facilities Management	(951) 955-0166	
17	Ed	Lara	City of Corona	Public Works	(951) 739-4825	
18	Debra	Leight	City of Riverside	Community Development-Planning Division	(951) 826-5874	
19	Ed	Lotz	RCFC & WCD	Flood Control	(951) 955-1200	Ed Lotz
20	Maria	Macario	Santa Ana Regional Board	Inland Stormwater	(951) 321-4583	Maria C. Macario

0002936

NPDES STORMWATER QUALITY TRAINING FOR
WQMP Training
Riverside County Flood Control & Water Conservation District

Meeting of: Wednesday, November 28 - 13:00 - 17:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
21	Alberto	Martinez	RCFC & WCD	Development Review	(951) 955-1917	
22	Randy	McDaniel	City of Riverside	Park Planning	(951) 826-2006	
23	Rachel	McLure	City of Riverside	Parks, Recreation, and Community Services	(951) 826-2028	
24	Amy	McNeill	RCFC & WCD	Design	(951) 955-1268	Amy McNeill
25	Edward	Perez	RCFC & WCD	Plan Check	(714) 750-7275	
26	Derek	Petersen	RCFC & WCD	Plan Check	(619) 920-6430	
27	Edwin	Quinonez	RCFC & WCD	Design	(951) 955-8627	
28	Michael	Roth	Santa Ana Regional Board	RWQCB	(951) 320-2027	Michael Roth
29	Mark	Sambito	City of Moreno Valley	Public Works/Land Development	(951) 413-3120	
30	Michael	Schuman	City of Moreno Valley	Public Works / Land Developement	(951) 413-3126	
31	Mike	Shetler	Riverside County	Executive Office	(951) 955-1186	
32	Emily	Stadnik	City of Corona	Public Works	(951) 817-5741	
33	Mark	Wills	RCFC & WCD	Development Review	(951) 955-1214	
34	Mike	Wong	RCFC & WCD	Design	(951) 955-1205	Mike M. Wong
35	Cenk	Yavas	Riverside County	Plan Check	(714) 750-7275	
36	Leonard	Albano	City of Riverside	Public works	(951) 826-5769	
37	Claudia	Steiding	County Riverside	DOFM	(951) 955-8174	C. Steiding
38	Dan	York	City of Temecula	Public Works	951.694.6411	
39	Tim	Tuesson	RCFC	NPDES	(951) 955-8002	
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NPDES STORMWATER QUALITY TRAINING FOR
WQMP Training
Riverside County Flood Control & Water Conservation District

Meeting of: Thursday, November 29 - 13:00 - 17:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
1	SALEEM	BAIG	Riverside County	TRANSPORTATION	(951) 955-6874	
2	Monte	Bowers	RCFC & WCD	plan check consultant	(858) 451-6100	
3	Maleek	Howard	RCFC & WCD	Design 2	(951) 955-4408	
4	Rizaldy	Baluyot	Riverside County	Facilities Management	(951) 955-4889	
5	Farshid	Mohammadi	City of Riverside	Public Works	(951) 826-5515	
6	Dale	Anderson	RCFC & WCD	Planning Division	(951) 955-1345	
7	Joyce	Winge	RCFC & WCD	plan check consultant	(858) 451-6100	
8	Steven	Horn	Riverside County	Facilities Management	(951) 697-8269	
9	Henry	Olivo	Riverside County	Flood Control	(951) 955-8215	
10	Everett	Duckworth	Riverside County	Flood Control	(951) 955-1215	
11	Anabella	Hedman	RCFC & WCD	plan check consultant	(858) 869-4851	
12	Samandra	benjamin	Riverside County	TRANSPORTATION	(951) 955-0342	
13	Kent	Allen	RCFC & WCD	Construction	(951) 955-1288	
14	Mike	Emberton	City of San Jacinto	Public Works - Streets/Storm Water	(951) 487-7386	
15	Victor	Vasquez	City of San Jacinto	Public Works - Streets/Storm Water	(951) 487-7386	
16	Dane	Winkelman	Riverside County	Facilities Management	(951) 955-5997	
17	Yolanda	Macalalad	City of Corona	Public Works	(951) 279-3748	
18	Lori	Wolfe	RCFC & WCD	Plan Check	(714) 402-9645	
19	David	Cooper	RCFC & WCD	plan check consultant	(858) 735-1352	
20	Kahlil	Amin	RCFC & WCD	Design 2	(951) 955-1260	

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NPDES STORMWATER QUALITY TRAINING FOR
WQMP Training
Riverside County Flood Control & Water Conservation District

Meeting of: Thursday, November 29 - 13:00 - 17:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
21	Barry	Mulcock	City of San Jacinto	Public Works - Streets/Storm Water	(951) 487-7386	B Mulcock
22	Mirtha	Liedl	Riverside County	Waste Management	(951) 486-3226	
23	Sung Key	Ma	Riverside County	Waste Management	(951) 486-3226	
24	Ryan	Ross	Riverside County	Waste Management	(951) 486-3226	
25	Stephanie	Blanco	Riverside County	Waste Management	(951) 486-3226	
26	Glen	Drogin	RCFC & WCD	Plan Check	(909) 391-0947	
27	Mike	Cairns	RCFC & WCD	Plan Check	858 866 0128	
28	Lombardo	Detrinidad	RCFC & WCD	Plan Check	858-866-0128	
29	Ken	Horsley	RCFC & WCD	Plan Check	858-866-0128	
30	Laura	Klages	RCFC & WCD	plan check consultant	(619) 977-8811	
31	DALE	WEST	City of Temecula	PLANNING	(951) 694-6400	
32	Claudio	Padres	RCFC & WCD	Design II	(951) 955-1329	
33	Ponce	Yambot	City of Beaumont	Public Works	(951) 769-6999	
34	Bill	Bryant	City of San Jacinto	Public Works - Streets/Storm Water	(951) 487-7386	
35	Ben	Haskell	City of San Jacinto	Public Works - Streets/Storm Water	(951) 487-7386	
36	Wills	Mark	RCFC	Development Reviews	951-955-1214	Mark Wills
37	Frank	Coyle	Facilities management	Associate, Planning	951-697-8300	
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NPDES STORMWATER QUALITY TRAINING FOR
WQMP Training
Murrieta City Hall

Meeting of: **Wednesday, December 5, 2007 - 13:00 - 17:00** SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signature
1	Farida	Naceem	City of Murrieta	Public Works / Engineering	(951) 461-6075	Farida Z. Naceem
2	Hoang	Nguyen	City of Moreno Valley	Public Works/Land Development	(951) 413-3120	Hoang Nguyen
3	Mayra	De La Torre	City of Temecula	Public Works	(951) 694-6411	Mayra De La Torre
4	William	Becerra	City of Temecula	Public Works	(951) 694-6411	[illegible]
5	Guy	Pegan	City of Moreno Valley	Public Works/Land Development	(951) 413-3120	[illegible]
6	Henry	Ngo	City of Moreno Valley	Public Works/Land Development	(951) 413-3120	Henry Ngo
7	Steve	Charette	City of Temecula	Public Works	(951) 694-6411	S Charette
8	Bill	McAteer	City of Temecula	Public Works	(951) 694-6411	[illegible]
9	Aldo	Licitra	City of Temecula	Public Works	(951) 694-6411	Aldo Licitra
10	Greg	Butler	City of Temecula	Public Works	(951) 694-6411	[illegible]
11	Steve	Beswick	City of Temecula	Public Works	(951) 694-6411	Steve W. Beswick
12	John	Pourkazemi	City of Temecula	Public Works	(951) 694-6411	J. Pourkazemi
13	Amer	Attar	City of Temecula	Public Works	(951) 694-6411	[illegible]
14	Reza	James	City of Temecula	Public Works	(951) 694-6411	Reza James
15	Avlon AVLIN	Odviar	City of Temecula	Public Works	(951) 694-6411	Avlon R. Odviar
16	Denise	Bartz	City of Hemet	Public Works Engineering	(951) 765-2366	[illegible]
17	Jorge	Biagioni	City of Hemet	Public Works Engineering	(951) 765-2362	[illegible]
18	Kent	Hall	City of Beaumont	Building & Safety	(951) 769-8529	Kent Hall
19	Keith	Elliott	Santa Ana Regional Board	RWQCB	(951) 782-4925	
20	Chris	White	City of Temecula	Public Works	(951) 694-6411	Chris White

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NPDES STORMWATER QUALITY TRAINING FOR
WQMP Training
Murrieta City Hall

Meeting of: **Wednesday, December 5, 2007 - 13:00 - 17:00** SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signature
21	Kathleen	Dale	City of Moreno Valley	Planning	(951) 413-3228	
22	Keith	Hightower	City of Beaumont	Code Enforcement	(951) 769-8529	
23	Ernie	Vigil	City of Moreno Valley	Public Works/Land Development	(951) 413-3120	
24	David	McBride	City of Temecula	Public works	(951) 694-6411	
25	Chris	Vlahos	City of Temecula	Public Works	(951) 694-6411	
26	Jon	Salazar	City of Temecula	Public Works	(951) 694-6411	
27	Laura	Bragg	City of Temecula	Public Works	(951) 694-6411	
28	Kavon	Haghighi	City of Temecula	Public Works	(951) 694-6411	
29	Kendra	Hannah-Meistrell	City of Temecula	Public Works	(951) 694-6411	
30	Jerry	Alegria	City of Temecula	Public Works	(951) 694-6411	
31	Carole	Kendrick	City of Hemet	Planning Department	(951) 765-2373	Carole Kendrick
32	Kim	Clinton	City of Banning	Planning	(951) 922-3181	
33	Lynn	Johnson	City of Murrieta	RBF Consulting	(951) 676-8042	
34	Jeff	Hitch	City of Murrieta	Public Works/Engg	(951) 461-6076	
35	William	Bixby	City of Murrieta	Bureau of Veritas	(858) 451-6100	
36	Glen	Parks	City of Murrieta	Bureau of Veritas	(858) 451-6100	
37	Larry	Cooley	City of Murrieta	Bureau of Veritas	(951) 677-5026	
38	Dale	West	City of Temecula	Planning	(951) 694-6400	
39	Cathy	Davis	City of Murrieta	Planning	(951) 304-2489	
40	Aaron	Rintamaki	City of Murrieta	Planning	(951) 304-2489	

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NPDES STORMWATER QUALITY TRAINING FOR
WQMP Training
Murrieta City Hall

Meeting of: **Wednesday, December 5, 2007 - 13:00 - 17:00** SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signature
41	Tammy	Figueroa	City of Murrieta	Planning	(951) 304-2489	
42	Leticia	Newell	City of Murrieta	Planning	(951) 304-2489	
43	Sonia	Pierce	City of Murrieta	Planning	(951) 304-2489	
44	Cynthia	Kinser	City of Murrieta	Planning	(951) 304-2489	
45	Dennis	Watts	City of Murrieta	Planning	(951) 304-2489	

46. FLORENCE MOWRER RCFCD P. INFO 951 955 4954 F Mowrer

NPDES STORMWATER QUALITY TRAINING FOR
Municipal Training
Riverside County Flood Control & Water Conservation District

Meeting of: Tuesday, April 15 - 13:00 - 16:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signature
1	Archie	Ammons	City of Moreno Valley	Public Works	(951) 413-3167	
2	Steve	Armitage	City of Banning	Street		
3	Jose	Arrollo	Riverside County	EDA	(951) 696-0100	
4	John	Baioa	City of Moreno Valley	Public Works	(951) 413-3167	
5	Jim	Butler	City of Moreno Valley	Parks Maintenance		
6	Kevin	Carranza	City of San Jacinto	Parks Division		
7	Rudy	Casados	City of Moreno Valley	Parks Maintenance		
8	Jim	Cash	City of San Jacinto	Water Division		
9	Jessica	Chin	City of Riverside	Public Works	(951) 826-5760	
10	Arlene	Chun	RCFC & WCD	Flood	(951) 955-1330	
11	Gourley	Collins	City of Banning	Street		
12	Mark	Cooper	Riverside County	EDA	(951) 696-0100	
13	Gayle	Cuneo	RCFC & WCD	Maintenance	(951) 955-1311	
14	Mihai	Dan	City of Indian Wells	Public Works	(760) 776-0237	
15	Ralph	Durrett	City of San Jacinto	Wastewater Division		
16	Elizabeth	Escatel	City of La Quinta	Building & Safety	(760) 777-7110	
17	Gary	Garcia	Riverside County	EDA	(951) 696-9199	
18	Tony	Garcia	City of Moreno Valley	Parks Maintenance		
19	George	Gemberling	Riverside County	Facilities Management	(951) 955-4875	
20	Frank	Gonzalez	City of Moreno Valley	Parks Maintenance		

NPDES STORMWATER QUALITY TRAINING FOR
Municipal Training
Riverside County Flood Control & Water Conservation District

Meeting of: Tuesday, April 15 - 13:00 - 16:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signature
21	Phil	Hallberg	City of San Jacinto	Building	(951) 537-6382	
22	Albert	Hatzenbuhler	City of Norco	Public Works		
23	Ruben	Huerta	City of Moreno Valley	Public Works	(951) 413-3167	
24	Rafael	Islas	Riverside County	EDA	(951) 696-0100	
25	Jeramy	Jackson	City of Moreno Valley	Public Works	(951) 616-4564	
26	Tom	Lara	City of Banning	Street		
27	Craig	Leyland	City of San Jacinto	Wastewater Division		
28	Ruben	Macias	City of Banning	Street		
29	Edgar	Marquez	City of Moreno Valley	Public Works		
30	howard	martin	City of Norco	Public Works		
31	Steve	Martin	Riverside County	EDA	(951) 696-0100	
32	Juan	Martinez	City of Moreno Valley	Parks Maintenance		
33	Jackie	Misuraca	City of La Quinta	Building & Safety	(760) 777-7021	
34	Jeffrey	Mitchell	Riverside County	Waste Management		
35	Daniel	Monto	City of Moreno Valley	Public Works	(951) 413-3485	
36	George	Munoz	City of La Quinta	Building & Safety	(760) 777-7099	
37	Jim	Nickell	Riverside County	Waste Management		
38	Nibardo	Orozco	City of Moreno Valley	Public Works		
39	Ann	Orr	Riverside County	EDA	(951) 696-0100	
40	David	Ortega	RCFC & WCD	NPDES Section	(951) 955-4390	

NPDES STORMWATER QUALITY TRAINING FOR
Municipal Training
Riverside County Flood Control & Water Conservation District

Meeting of: Tuesday, April 15 - 13:00 - 16:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signature
41	Randy	Parker	City of Moreno Valley	Parks Maintenance		
42	Jake	Parr	City of Norco	Public Works		
43	Javier	Plazola	Riverside County	EDA	(951) 696-0100	
44	Tim	Plumb	Riverside County	Facilities Management	(951) 955-4806	
45	Ward	Pratt	Riverside County	Facilities Management	(951) 600-6830	
46	Dean	Ristow	City of Moreno Valley	Parks Maintenance	(951) 413-3702	
47	Paul	Russell	Riverside County	Transportation Department	(951) 955-1095	
48	Russell	Saudert	Riverside County	EDA	(951) 696-0100	
49	Grant	Searl	City of San Jacinto	Water Division		
50	Steven	Selbert	Riverside County	Facilities Management	(760) 863-8004	
51	Todd	Shibata	Riverside County	Waste Management		
52	Tim	Stockton	City of San Jacinto	Street/Storm Water		
53	Carl	Szoyka	City of Banning	Street	(951) 922-3286	
54	Steve	Thomas	Riverside County	EDA	(951) 696-0100	
55	Kurt	Van Dusen	Riverside County	Waste Management		
56	Barry	Verdusco	City of Moreno Valley	Public works dept	(951) 413-3498	
57	Mark	Virgil	City of Moreno Valley	Public Works	(951) 413-3167	
58	Gary	Wagner	City of Moreno Valley	Parks Maintenance		
59	Matt	Wicks	City of San Jacinto	Water Division		
60	Chris	Wiggins	City of Indian Wells	Public Works	(760) 776-0237	

NPDES STORMWATER QUALITY TRAINING FOR
Municipal Training
Riverside County Flood Control & Water Conservation District

Meeting of: Tuesday, April 15 - 13:00 - 16:00 SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signature
61	Terry	Woodruff	Riverside County	EDA	(951) 696-0100	[illegible]
62	Frank	Zaldivar	City of San Jacinto	Street/Storm Water		[illegible]
63	Daniel	Olea	County	Waste		[illegible]
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NPDES STORMWATER QUALITY TRAINING FOR
Municipal Training
Murrieta City Hall

Meeting of: Thursday, January 17 - 13:00 - 16:00

SIGN-IN SH

	First Name	Last Name	Municipality	Department	Phone No	
1	Joey	Alfaro	City of Murrieta	Community Services Department	(951) 461-6124	
2	Mike	Almodovar	City of Murrieta	Public Works Maintenance	(951) 461-6400	
3	Alberto	Aspe	City of Murrieta	Community Services Department	(951) 461-6124	
4	Damien	Avalos	City of Murrieta	Community Services Department	(951) 461-6124	
5	Mike	Bigay	City of Murrieta	Community Services Department	(951) 461-6124	
6	John	Bivens	City of Canyon Lake	Code Enforcement	(951) 244-2955	
7	Kast	Bob	City of Murrieta	Community Services Department	(951) 461-6124	
8	Robert	Bohan	City of Canyon Lake	Code Enforcement	(951) 244-2955	
9	Mark	Bollschweiler	City of Murrieta	Public Works Maintenance	(951) 461-6400	
10	Mike	Brooks	City of Murrieta	Public Works Maintenance	(951) 461-6400	
11	Mike	Burris	City of Murrieta	Public Works Maintenance	(951) 461-6400	
12	Dino	Camberos	City of Temecula	TCSD	(951) 694-6480	
13	Ryan	Castillo	City of Temecula	Public Works	(951) 694-6411	
14	Danny	Cover	City of Moreno Valley	Special Districts	(951) 413-3503	
15	Dave	Davis	City of Temecula	Public Works.	(951) 694-6411	
16	Danny	Dawley	City of Corona	Public Works	(951) 736-2301	
17	George	De La Rosa	City of Temecula	TCSD	(951) 694-6480	
18	Juan	Del Val	City of Murrieta	Community Services Department	(951) 461-6124	
19	Jose	Diaz	City of Temecula		(951) 694-6400	
20	Shawn	Dullanty	City of Murrieta	Community Services Department	(951) 461-6124	

NPDES STORMWATER QUALITY TRAINING FOR
Municipal Training
Murrieta City Hall

Meeting of: Thursday, January 17 - 13:00 - 16:00

SIGN-IN SH

	First Name	Last Name	Municipality	Department	Phone No	
21	Mark	Durbin	City of Murrieta	Community Services Department	(951) 461-6124	
22	Phil	Esnayra	City of Murrieta	Community Services Deaprtment	(951) 461-6124	
23	Gus	Gonzales	City of Temecula	Public Works	(951) 694-6411	
24	Larry	Gross	City of Murrieta	Community Services Department	(951) 461-6124	
25	Jay	Haecker	City of Murrieta	Community Services Department	(951) 461-6124	
26	Kevin	Harrington	City of Temecula	CSD	(951) 694-6400	
27	Dave	Hendry	City of Murrieta	Public Works Maintenance	(951) 461-6400	
28	Juan	Jaime	City of Temecula	Public Works	(951) 694-6411	
29	Paul	Johnson	City of Canyon Lake	Code Enforcement	(951) 244-2955	
30	Ken	Jones	City of Murrieta	Public Works Maintenance	(951) 461-6400	
31	Jim	Keezell	City of Riverside	Public Works	(951) 351-6247	
32	Mark	Levis	City of Temecula	Public Works	(951) 694-6411	
33	Perry	Ludwig	City of Temecula	Public Works	(951) 694-6411	
34	John	Maisey	City of Temecula	TCSD	(951) 694-6480	
35	Danny	Marks	City of Murrieta	Community Services Department		
36	Anthony	Martinez	City of Temecula	TCSD	(951) 694-6480	
37	Jason	Morrell	City of Murrieta	Public Works Maintenance	(951) 461-6400	
38	Jose	Munoz	City of Murrieta	Community Services Department	(951) 461-6124	
39	Mario	Munoz	City of Temecula	TCSD	(951) 694-6480	
40	Farida	Naceem	City of Murrieta	Public Works Maintenance	(951) 461-6400	

NPDES STORMWATER QUALITY TRAINING FOR
Municipal Training
Murrieta City Hall

Meeting of: Thursday, January 17 - 13:00 - 16:00

SIGN-IN SH

	First Name	Last Name	Municipality	Department	Phone No	
41	Steve	Nickerson	City of Murrieta	Public Works Maintenance	(951) 461-6400	
42	Karl	Nordgren	City of Temecula		(951) 694-6400	
43	Flint	Norman	City of Temecula	Public Works	(951) 694-6411	
44	Chris	Payne	City of Temecula	Public Works	(951) 694-6411	
45	Sheri	Peek	City of Moreno Valley	Animal Services	(951) 413-3787	
46	Blanca	Price	City of Temecula	TCSD	(951) 694-6480	
47	Larry	Romine	City of Temecula	Public Works	(951) 694-6411	
48	Sarah	Russell	City of Murrieta	Public Works Maintenance	(951) 461-6400	
49	Rosa	Santana	City of Murrieta	Community Services Department	(951) 461-6124	
50	Dave	Sarian	City of Murrieta	Community Services Department	(951) 461-6124	
51	Ralph	Scharffenberg	City of Moreno Valley	Public Works / Special Districts	(951) 413-3472	
52	Rick	Serven	City of Temecula	TCSD	(951) 694-6480	
53	Richard	Shea	City of Temecula	TCSD	(951) 694-6400	
54	Matt	Sheftick	City of Corona	Public Works-Fleet	(951) 736-2307	
55	Stuart	Sheldon	City of Moreno Valley	Public Works	(951) 413-3483	
56	Jim	Smith	City of Temecula	Public Works	(951) 694-6411	
57	Charlie	Soto	City of Murrieta	Community Services Department	(951) 461-6124	
58	Steve	Sterling	City of Temecula	TCSD	(951) 694-6480	
59	Ron	Stuart	City of Murrieta	Community Services Department	(951) 461-6124	
60	Rick	Thompson	City of Murrieta	Community Services Department	(951) 461-6124	

NPDES STORMWATER QUALITY TRAINING FOR
Municipal Training
Murrieta City Hall

Meeting of: Thursday, January 17 - 13:00 - 16:00

SIGN-IN SH

	First Name	Last Name	Municipality	Department	Phone No	
61	Dave	Thurman	City of Temecula	TCSD	(951) 694-6480	
62	Rodney	Tidwell	City of Temecula	Public Works	(951) 694-6411	
63	Nick	Vaughn	City of Murrieta	Public Works Maintenance	(951) 461-6400	
64	Bruce	Wedeking	City of Temecula	TCSD	(951) 694-6480	
65	Randy	West	City of Temecula	PUBLIC Works	(951) 694-6400	
66	Matt	Wiechec	City of Temecula	TCSD	(951) 694-6480	
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NPDES STORMWATER QUALITY TRAINING FOR
Municipal Training
Riverside County Flood Control & Water Conservation District

Meeting of: Tuesday, November 27 - 13:00 - 16:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
21	Pavel	Horn	City of Catherdal City	Engineering	(760) 770-0329	
22	Dave	Huster	City of San Jacinto	Community Development	(951) 487-7330	
23	Anna	Knott	City of Riverside	Public Works	(951) 351-6247	
24	Steve	Kupsak	City of Moreno Valley	Parks and Community Services	(951) 413-3702	
25	Cristina	Leal	City of Catherdal City	Engineering	(760) 770-0327	
26	Kevin	McClintock	City of Riverside	Public Works	(951) 351-6247	
27	Steve	Mucelli	City of Hemet	Public Works	(951) 765-3712	
28	David	Navarro	City of Corona	Public Works	(951) 736-2301	
29	Geneva	Nelson	RCFC & WCD	Maint.	(951) 955-1558	
30	Geneva	Nelson	RCFC & WCD	Maint.	(951) 955-1558	
31	Lee	Olvera	City of Corona	Public Works-Fleet	(951) 279-3523	
32	Travis	Peterson	City of Hemet	Public Works	(951) 765-3712	
33	Janet	Purchase	City of Riverside	Public Works	(951) 351-6247	
34	James	Rath	City of Riverside	Public Works	(951) 351-6247	
35	Anthony	Rivera	City of Corona	Public Works-Fleet	(951) 279-3523	
36	Ruben	Rodriguez	Riverside County	Riverside Co Regional Park and Open Space District	(951) 906-9326	
37	Bob	Rooker	City of Corona	Public Works-Fleet	(951) 736-2485	
38	Alfonso	Ruiz	City of Corona	Public Works	(951) 736-2301	
39	Mario	Ruvalcaba	City of Corona	Public Works	(951) 736-2301	
40	Steve	Schmidt	City of Corona	Public Works	(951) 736-2301	

NPDES STORMWATER QUALITY TRAINING FOR
Municipal Training
Riverside County Flood Control & Water Conservation District

Meeting of: Tuesday, November 27 - 13:00 - 16:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signature
41	Jeff	Smith	City of Riverside	Public Works	(951) 351-6247	
42	Kevin	Smith	Riverside County	Park and Open Space District	(951) 677-6951	
43	Mark	Squires	Riverside County	Waste Management	(951) 486-3226	
44	Kathy	Swanson	City of Riverside	Public Works	(951) 351-6247	
45	Guy	Tanaka	City of Riverside	Public Works	(951) 351-6247	
46	Loren	Thoe	City of Corona	Public Works	(951) 736-2301	
47	Rene	Upson	City of San Jacinto	Community Development	(951) 487-7330	
48	Andre	Valenciana	City of Corona	Public Works	(951) 736-2301	
49	Barry	Verdusco	City of Moreno Valley	Public Works Dept	(951) 413-3498	
50	Linda	Wieczorek	City of Moreno Valley	Administrative Services/Animal Services	(951) 413-3799	
51	Kim	Williams	City of Riverside	Public Works	(951) 351-6247	
52	Alfonso	Zubia	City of San Jacinto	Public Works - Streets/Storm Water	(951) 487-7386	
53	Robert	Florez	City of Moreno Valley	P/W	951) 413-3421	
54	Tony	Silvas	City of Moreno Valley	P/W	951 413-3488	
55	Lee	Mendoza	City of Corona	Parks Department	951-736-3777	
56	Frank	Landman	City San Jacinto	Stormwater		
57	Rick	DeGen	City of Corona	Parks & Community Services	951-736-2245	
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NPDES STORMWATER QUALITY TRAINING FOR
Municipal Training
Riverside County Flood Control & Water Conservation District

Meeting of: Tuesday, November 27 - 13:00 - 16:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
1	Benjamin	Aborita	Riverside County	Waste Management	(951) 486-3226	
2	Erik	Aguilar	City of Corona	Public Works	(951) 736-2301	
3	Ronald J	Baxter	Riverside County	Regional Parks	(951) 637-6984	
4	Dan	Bogan	Riverside County	Parks	(951) 906-9334	
5	R.W.	Broos	City of Hemet	Public Works	(951) 765-3712	
6	Kenneth	Brown	City of Corona	Public Works-Fleet	(951) 736-2307	
7	Steve	Bustillos	City of Corona	Public Works	(951) 736-2301	
8	Jessica	Chin	City of Riverside	Public Works	(951) 826-5760	
9	Gary	Costin	Riverside County	Transportation Department	(951) 737-2310	
10	Jay	Crane	City of Hemet	Public Works	(951) 765-3712	
11	Gayle	Cuneo	RCFC & WCD	Maintenance	(951) 955-1311	
12	Vincent	Denman	City of Corona	Public Works-Fleet	(951) 736-2306	
13	Kirk	Devries	City of Moreno Valley	Fleet Services	(951) 413-3166	
14	Jesse	Encino	City of Corona	Public Works	(951) 736-2301	
15	Robert	Filiar	City of Riverside	Public Works	(951) 351-6247	
16	Walter	Firlit	City of Moreno Valley	Fleet Services	(951) 413-3166	
17	Zachary	Foster	City of Moreno Valley	Special Districts	(951) 413-3484	
18	Gil	Gonzalez	City of San Jacinto	Public Works - Streets/Storm Water	(951) 487-7386	
19	Michael	Greisinger	City of Corona	Public Works-Fleet	(951) 279-3523	
20	Fernando	Gutierrez	City of Corona	Public Works	(951) 736-2301	
	TIM	King	City of Riverside	Environmental Compliance	(951) 712-2525	

NPDES STORMWATER QUALITY TRAINING FOR
Municipal Training
Riverside County Flood Control & Water Conservation District

Meeting of: Tuesday, November 27 - 13:00 - 16:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
21	Pavel	Horn	City of Catherdal City	Engineering	(760) 770-0329	
22	Dave	Huster	City of San Jacinto	Community Development	(951) 487-7330	
23	Anna	Knott	City of Riverside	Public Works	(951) 351-6247	
24	Steve	Kupsak	City of Moreno Valley	Parks and Community Services	(951) 413-3702	
25	Cristina	Leal	City of Catherdal City	Engineering	(760) 770-0327	
26	Kevin	McClintock	City of Riverside	Public Works	(951) 351-6247	
27	Steve	Mucelli	City of Hemet	Public Works	(951) 765-3712	
28	David	Navarro	City of Corona	Public Works	(951) 736-2301	
29	Geneva	Nelson	RCFC & WCD	Maint.	(951) 955-1558	
30	Geneva	Nelson	RCFC & WCD	Maint.	(951) 955-1558	
31	Lee	Olvera	City of Corona	Public Works-Fleet	(951) 279-3523	
32	Travis	Peterson	City of Hemet	Public Works	(951) 765-3712	
33	Janet	Purchase	City of Riverside	Public Works	(951) 351-6247	
34	James	Rath	City of Riverside	Public Works	(951) 351-6247	
35	Anthony	Rivera	City of Corona	Public Works-Fleet	(951) 279-3523	
36	Ruben	Rodriguez	Riverside County	Riverside Co Regional Park and Open Space District	(951) 906-9326	
37	Bob	Rooker	City of Corona	Public Works-Fleet	(951) 736-2485	
38	Alfonso	Ruiz	City of Corona	Public Works	(951) 736-2301	
39	Mario	Ruvalcaba	City of Corona	Public Works	(951) 736-2301	
40	Steve	Schmidt	City of Corona	Public Works	(951) 736-2301	
	AL	PIELIN	CITY OF RIVERSIDE	PUBLIC WORKS	951 351-6072	
	Mike	Yasmer	"	"	951-351-6147	

NPDES STORMWATER QUALITY TRAINING FOR
Municipal Training
Riverside County Flood Control & Water Conservation District

Meeting of: Tuesday, November 27 - 13:00 - 16:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
41	Jeff	Smith	City of Riverside	Public Works	(951) 351-6247	
42	Kevin	Smith	Riverside County	Park and Open Space District	(951) 677-6951	
43	Mark	Squires	Riverside County	Waste Management	(951) 486-3226	
44	Kathy	Swanson	City of Riverside	Public Works	(951) 351-6247	
45	Guy	Tanaka	City of Riverside	Public Works	(951) 351-6247	
46	Loren	Thoe	City of Corona	Public Works	(951) 736-2301	
47	Rene	Upson	City of San Jacinto	Community Development	(951) 487-7330	
48	Andre	Valenciana	City of Corona	Public Works	(951) 736-2301	
49	Barry	Verdusco	City of Moreno Valley	Public Works Dept	(951) 413-3498	
50	Linda	Wieczorek	City of Moreno Valley	Administrative Services/Animal Services	(951) 413-3799	
51	Kim	Williams	City of Riverside	Public Works	(951) 351-6247	
52	Alfonso	Zubia	City of San Jacinto	Public Works - Streets/Storm Water	(951) 487-7386	
53	Tino	Torrez	City of Riverside	Collections		
54	Kathleen	Fong	Regional Board			
55	Rolando	Espejo	PCI	Environmental	951 479 0860	
56	Leonardo	Gutierrez	City of Riverside	Public Works		
57	Richard	Nugent	City of Riverside	Public Works		
58	Chris	Cordova	City of Beaumont	Building Dept.	951 769 8529	
59	Celina	Cabrera	City of Beaumont	Code Enf.	951 572-3234	
60	Brandon	Gronland	City of Riverside	Public Works		
61	Jose	Chavez	Riverside County	RCES	760 320 1048	
	Teresa	Wills	Riv. Co	DES	760 320 1048	

NPDES STORMWATER QUALITY TRAINING FOR
Municipal Training
Riverside County Flood Control & Water Conservation District

Meeting of: Wednesday, November 28 - 09:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
1	Danny	Astorga	City of San Jacinto	Public Works - Streets/Storm Water	(951) 487-7386	Danny Astorga
2	Tom	Baier	City of Moreno Valley	Maintenance & Operations		Thomas Baier
3	Erwin	Barton	City of Moreno Valley	Maintenance & Operations	951-413-3168	Erwin Barton
4	Craig	Bone	City of Moreno Valley	Maintenance & Operations	(951) 764-5757	
5	Scott	Bryant	Riverside County	Waste Management	(951) 486-3226	
6	Dennis	Buckle	City of Moreno Valley	Maintenance & Operations		
7	Margie	Cabrera	City of Corona	Public Works-Fleet	(951) 279-3523	Margie Cabrera
8	Richard	Castellano	City of Hemet	Public Works	(951) 765-3712	Richard Castellano
9	Gordon	Cawthon	City of Corona	Public Works-Fleet	(951) 279-3523	
10	George	Chang	City of Moreno Valley	Maintenance & Operations	951 413-3160	George Chang
11	Deby	Conrad	City of La Quinta	Building & Safety	(760) 777-7022	Deby Conrad
12	FELROS	DEVERA	City of Beaumont	Engineering	(951) 541-3982	
13	Gary	Dewees	City of Corona	Parks and Community Services	(951) 279-3754	Gary DeWees
14	Michelle	Douglas	City of Riverside	Fire	(951) 826-5582	Michelle Douglas
15	Brian	Durfee	City of Moreno Valley	Maintenance & Operations	(951) 413-3160	
16	Walt	Edmiston	City of Corona	Parks and Community Services	(951) 279-3753	
17	LaDonna	Eldridge	City of Corona	Parks and Community Services	(951) 739-4982	LaDonna Eldridge
18	Crestino	Esparza	City of Hemet	Public Works	(951) 765-3712	Crestino Esparza
19	Alfred	Fierro	City of Moreno Valley	Maintenance & Operations	(951) 413 3160	Alfred Fierro
20	Jesse	Fierro	City of Riverside	Public Works	(951) 351-6247	Jesse Fierro

NPDES STORMWATER QUALITY TRAINING FOR
Municipal Training
Riverside County Flood Control & Water Conservation District

Meeting of: Wednesday, November 28 - 09:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
21	Katheline	Fong	Santa Ana Regional Board	RWQCB	(951) 774-0114	Kathleen Fong
22	Nimrod	Garay	Riverside County	Waste Management	(951) 486-3226	Ngaray
23	Alex	Garcia	City of San Jacinto	Public Works - Streets/Storm Water	(951) 487-7386	Alex Garcia
24	Valin	Gray	City of Moreno Valley	Special Districts	(951) 413-3498	Valin Gray
25	Jerry	Gregory	Riverside County	Waste Management	(951) 486-3226	Jerry E. Gregory
26	Art	Groeneveld	City of Corona	Parks and Community Services	(951) 279-3567	[illegible]
27	Mark	Halman	City of San Jacinto	Public Works - Streets/Storm Water	(951) 487-7386	[illegible]
28	John	Holmes	City of San Jacinto	Public Works - Streets/Storm Water	(951) 487-7386	John W. Holmes
29	George	Jackson	City of Corona	Parks and Community Services	(951) 739-4991	[illegible]
30	Mark	Kaminski	City of Corona	Public Works-Fleet	(951) 279-3523	[illegible]
31	Scott	Kraak	Riverside County	Waste Management	(951) 486-3226	[illegible]
32	Lyndon	Lorance	City of Norco	Public Works	(951) 270-5607	Lyndon Lorance
33	Ramon	Lozano	Riverside County	Waste Management	(951) 486-3226	Ramon Lozano
34	Ruben	Macias	City of Banning	Street	(951) 922-3286	Ruben Macias
35	Tony	Macias	City of Moreno Valley	Maintenance & Operations	951-413-3165	Tony Macias
36	Billy	Mandap	City of Moreno Valley	Maintenance & Operations	951-697-2579	[illegible]
37	Joshua	Martinez	City of Hemet	Public Works	(951) 765-3712	[illegible]
38	Jim	Mikkelson	Riverside County	Waste Management	(951) 486-3226	[illegible]
39	Jeffrey	Mitchell	Riverside County	Waste Management	(951) 486-3226	[illegible]
40	brian	olsen	City of Norco	Public Works	(951) 270-5607	[illegible]

NPDES STORMWATER QUALITY TRAINING FOR
Municipal Training
Riverside County Flood Control & Water Conservation District

Meeting of: Wednesday, November 28 - 09:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
41	Sergio	Ortiz	City of San Jacinto	Community Development	(951) 487-7330	
42	Alex	Palacios	City of Corona	Parks and Community Services	(951) 279-3754	
43	Ron	~~Peace~~ LOWE	City of Hemet	Public Works	(951) 765-3712	
44	Art	Rose	City of Hemet	Public Works	(951) 765-3712	
45	John	Russo	City of Hemet	Public Works	(951) 765-3712	
46	Leon	Schrader	City of Moreno Valley	Fleet Services	(951) 413-3166	
47	David	Serna	City of Moreno Valley	Maintenance & Operations		
48	Matt	Sheftick	City of Corona	Public Works-Fleet	(951) 736-2307	
49	Vince	Smith	City of Moreno Valley	Fleet Services	(951) 413-3166	
50	Stephen	Szueber	City of Corona	Public Works-Fleet	(951) 736-2302	
51	Ted	Teagarden	City of Corona	Parks and Community Services	(951) 279-3754	Ted Teagarden
52	Brian	Thompson	City of Moreno Valley	Maintenance & Operations	951-413-3160	Brian Thompson
53	David	Thompson	City of Hemet	Public Works	(951) 765-3712	
54	Joshua	Tiley	City of Moreno Valley	Maintenance & Operations	(951) 209-5994	
55	Scott	Tyma	City of Hemet	Public Works	(951) 765-3712	
56	Paul	Valdez	City of Riverside	Public Works	(951) 351-6247	Paul Valdez
57	Tom	Van Dorn	City of San Jacinto	Community Development	(951) 487-7330	T. Van Dorn
58	Larry	Williams	City of Moreno Valley	Public Works	(951) 413-3165	Larry Williams
59	Jeff	Woodley	City of Banning	Street	(951) 922-3286	Jeff Woodley
60	Kimberly	Zottneck	City of Riverside	Fire Department	(951) 826-5478	Kimberly Zottneck

NPDES STORMWATER QUALITY TRAINING FOR
Municipal Training
Riverside County Flood Control & Water Conservation District

Meeting of: Wednesday, November 28 - 09:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
61	RON	DeHOOP	CITY OF CORONA	PARKS	453-2265	
62	Scott	Bryant	Court of Riv	Waste	3122383	
63	Kathy	Swanson	City of Riverside	Landscaping	237-8408	
64	NAM	LUU	CITY OF CORONA	PARKS	739-4966	
65	Kevin	McClintock	City of Riv.	PW Streets	453-4590	K. McClintock
66	ANA	CRUZ	CITY OF BEAUMONT	PW Dept.	951-769-6999	
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NPDES STORMWATER QUALITY TRAINING FOR
Industrial/Commercial Training
Riverside County Flood Control & Water Conservation District

Meeting of: Tuesday, April 15 - 09:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signature
1	Michael	Almandinger	City of Beaumont	Building & Safety	(951) 572-3234	
2	Thomas	Arcee	City of Beaumont	Building & Safety	(951) 572-3234	
3	Martha	Bahia	Riverside County	Environmental Health	(951) 358-5055	
4	Bruce	Bailey	Riverside County	Environmental Health	(951) 273-9143	
5	Brad	Ballen	Riverside County	Environmental Health	(760) 863-8976	
6	Rizaldy	Baluyot	Riverside County	Facilities Management	(951) 955-4889	
7	Daniel	Barba	City of San Jacinto	Code Enforcement	(951) 537-6367	
8	Carolyn	Brown	Riverside County	Environmental Health	(951) 766-6524	
9	Justin	Brown	Riverside County	Waste Management		
10	Scott	Bryant	Riverside County	Waste Management		
11	Sandy	Bunchek	Riverside County	Environmental Health	(951) 273-9143	
12	Jeff	Bustamante	Riverside County	Environmental Health	(951) 766-6524	
13	Jessica	Chin	City of Riverside	Public Works	(951) 826-5760	
14	Joseph	Contaoi	Riverside County	Waste Management		
15	Nicholas	Crain	Riverside County	Environmental Health	(951) 766-6524	
16	Rodney	Cruze	City of Riverside	PW/Sewerage	(951) 351-6011	
17	Mike	Daly	Riverside County	Environmental Health	(951) 766-6524	
18	Vidal (Tim)	Evans	Riverside County	Waste Management		
19	Nimrod	Garay	Riverside County	Waste Management		
20	Donald	Gerber	Riverside County	Waste Management		

NPDES STORMWATER QUALITY TRAINING FOR
Industrial/Commercial Training
Riverside County Flood Control & Water Conservation District

Meeting of: Tuesday, April 15 - 09:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
21	Gerald	Gregory	Riverside County	Waste Management		
22	Richard	Guerrero	Riverside County	Environmental Health	(951) 273-9143	
23	Brian	Hawkinson	Riverside County	Waste Management		Brian Hawkinson
24	Joseph	Hickman	Riverside County	Waste Management		
25	Michele	Hindersinn	City of Corona	Public Works		
26	Steve	Hooper	City of Riverside	Public Works		
27	Mark	Hunt	Riverside County	Waste Management		
28	Dave	Huster	City of San Jacinto	Building	(951) 537-6381	
29	Rob	Istik	Riverside County	Waste Management	951-247-1323	
30	Jeramy	Jackson	City of Moreno Valley	Public Works	(951) 616-4564	
31	Keith	Jones	Riverside County	Environmental Health	(951) 358-5055	Keith Jones
32	Kevin	Joyce	Riverside County	Waste Management		
33	Tim	King	City of Riverside	Public Works		
34	Marcus	Leso	City of Riverside	Public Works		
35	Michael	McKinley	Riverside County	Waste Management		
36	Gary	Merk	City of Riverside	Code Enforcement	(951) 826-5224	
37	Jim	Mikkelson	Riverside County	Waste Management		
38	Lisa	Mitchell	Riverside County	Environmental Health	(951) 273-9143	
39	Paul	Mitchell	Riverside County	Environmental Health	(951) 358-5055	
40	Gino	Monterroso	Riverside County	Environmental Health	(951) 273-9143	

NPDES STORMWATER QUALITY TRAINING FOR
Industrial/Commercial Training
Riverside County Flood Control & Water Conservation District

Meeting of: Tuesday, April 15 - 09:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
41	George	~~Muñoz~~ Muñoz	City of Riverside	Public Works		George A. Muñoz
42	Jessica	Nguyen	Riverside County	Waste Management		Jessica Nguyen
43	Jim	Nickell	Riverside County	Waste Management	312-7315	Jim Nickell
44	Dan	Olea	Riverside County	Waste Management		Danny Olea
45	LIONEL	ORNELAS	City of Corona	WATER&POWER/SC	(951) 279-3668	Lionel Ornelas
46	Sergio	Ortiz	City of San Jacinto	Building	(951) 537-6377	Sergio Ortiz
47	Neil	Ozonur	Riverside County	Environmental Health	(951) 273-9143	[illegible]
48	Christine	Parsons	Riverside County	Environmental Health	(951) 273-9143	Christine Parsons
49	Allen	Pielin	City of Riverside	Public Works	(951) 351-6072	Allen Pielin
50	Kaniz	Quazi	Riverside County	Waste Management		
51	Noah	Rau	Riverside County	Waste Management		Noah Rau
52	Jim	Ray	Riverside County	Environmental Health	(760) 863-8976	Jim D. Ray
53	Michael	Ray	Riverside County	Waste Management		[illegible]
54	~~Larry~~ Scott	~~Redmond~~ King	City of Riverside	Building & Safety Division	(951) 826-5261	Scott King
55	John	Riddell	Riverside County	Environmental Health	(760) 863-8976	John Riddell
56	Bobby	Riggs	Riverside County	Environmental Health	(760) 863-8976	B Riggs
57	Larry	Salazar	City of Riverside	Public Works		[illegible]
58	Bernie	Schleicher	Riverside County	Environmental Health	(951) 273-9143	Bernie Schleicher
59	Joseph	Schupp	Riverside County	Waste Management	486-3220	[illegible]
60	Paul	Shaffer	City of Corona	DWP/Source Control	(951) 279-3592	[illegible]

NPDES STORMWATER QUALITY TRAINING FOR
Industrial/Commercial Training
Riverside County Flood Control & Water Conservation District

Meeting of: Tuesday, April 15 - 09:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signature
61	Michael	Shalhub	Riverside County	Environmental Health	(760) 323-1048	
62	Carolinn	Shay	Riverside County	Environmental Health	(760) 863-8976	
63	Todd	Shibata	Riverside County	Waste Management		
64	Cindy	Snavely-Peck	City of Riverside	Public Works		
65	Doug	Thompson	Riverside County	Environmental Health	(951) 358-5055	
66	Manny	Vargas	Riverside County	Environmental Health	(951) 461-0284	
67	Michael	Walling	Riverside County	Environmental Health	(760) 863-8976	
68	Kelly	Winters	Riverside County	Environmental Health	(951) 461-0284	
69	Mohamed	Worayeth	Riverside County	Transportation Department	(858) 207-5086	
70	Kevin	Yang	Riverside County	Environmental Health	(760) 863-8976	
71	Michael	Yasmer	City of Riverside	Public Works		
72	Juan	Yepez	Riverside County	Waste Management		
73	Evangelina	Zapien	Riverside County	Waste Management	951 2411674	
74	Claudia	Steiding	Riverside County	Facilities Management	955 8174	
75						

NPDES STORMWATER QUALITY TRAINING FOR
Industrial/Commercial Training
Riverside County Flood Control & Water Conservation District

Meeting of: Tuesday, November 27 - 09:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
1	Tony	Alcala	City of Calimesa	Public Works	909-795-9801	
2	Charles	Allessi	City of Riverside	Public Works (Sewer Division)		
3	Sandy	Arnett	Riverside County	Department of Environmental Health	(951) 766-2824	
4	Bonnesa	Arpa	Riverside County	Department of Environmental Health	(951) 766-2824	
5	Xente	Baker	City of Corona	Fire	(951) 736-2257	
6	Heidi	Barrios	Riverside County	Department of Environmental Health	(951) 766-2824	
7	Johnny	Bennett	City of Riverside	Public Works (Sewer Division)	(951) 351-6178	
8	Christina	Bowser	City of Beaumont	Code Enforcement	(951) 769-8524 (951) 572-3234	
9	Andrea	Briones	Riverside County	DES	(951) 358-5172	
10	Celina	Cabrera	City of Beaumont	Code Enforcement	(951) 572-3234	
11	Elizabeth	Capps	Riverside County	Environmental Health	(951) 273-9140	
12	Mary	Cartagena	Riverside County	Environmental Health	(951) 358-5172	
13	Brent	Casey	Riverside County	DES	(951) 358-5172	
14	Alex	Chang	City of Riverside	Public Works (Sewer Division)		
15	Jose	Chavez	Riverside County	Environmental Health		
16	Jessica	Chin	City of Riverside	Public Works		
17	Chris	Cordova	City of Beaumont	Code Enforcement	(951) 769-8524 (951) 572-3234	
18	Jerome	Coyazo	City of Riverside	Public Works (Sewer Division)		
19	Sarah	Crossman	Riverside County	DES	(951) 358-5172	
20	Ana Dalia	Cruz	City of Beaumont	Public Works	951-769-6999	

NPDES STORMWATER QUALITY TRAINING FOR
Industrial/Commercial Training
Riverside County Flood Control & Water Conservation District

Meeting of: Tuesday, November 27 - 09:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
21	Sandi	DeLao	Riverside County	DES	(951) 358-5172	
22	Fritzy	Devera	Riverside County	Environmental Health	(951) 358-5172	
23	David	Duffy	City of Corona	Fire	(951) 736-2459	
24	Rolando	Espejo	City of Riverside	Environmental	(951) 479-0860	
25	Katheline	Fong	Santa Ana Regional Board	RWQCB	(951) 774-0114	Kathleen Fong
26	Ralph	Fregoso	Riverside County	DES	(951) 358-5172	
27	Bob	French	City of Calimesa	Public Works	909-795-9801 ext. 235	
28	Brandon	Gronlund	City of Riverside	Public Works (Sewer Division)		
29	Leonard	Gutierrez	City of Riverside	Public Works (Sewer Division)		
30	Michael	Gutierrez	City of Corona	Fire	(951) 736-2218	
31	My	Ha	Riverside County	Department of Environmental Health	(951) 766-2824	
32	Steven	Hooper	City of Riverside	Public Works	(951) 351-6076	
33	Antonio	Islas	Riverside County	DES	(951) 358-5172	
34	Rick	Jackson	City of Riverside	Public Works (Sewer Division)		
35	Kristine	Kim	Riverside County	Environmental Health		
36	Tim	King	City of Riverside	Environmental Compliance	(951) 712-2525	
37	Marcus	Leso	City of Riverside	Public Works	(951) 351-6145	
38	Jeff	Lojeski	Riverside County	Environmental Health	(951) 358-5172	
39	Alberto	Lopez	Riverside County	Department of Environmental Health	(951) 766-2824	
40	Kristin	Lorge	Riverside County	Department of Environmental Health	(951) 766-2824	

NPDES STORMWATER QUALITY TRAINING FOR
Industrial/Commercial Training
Riverside County Flood Control & Water Conservation District

Meeting of: Tuesday, November 27 - 09:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
41	Jim	Madril	City of Riverside	Public Works (Sewer Division)		
42	Jenay	Marcotte	Riverside County	Environmental Health	(951) 358-5172	Eugenie Marcotte
43	Mike	McCabe	City of Calimesa	Public Works	909-795-9801	
44	Pete	McKay	City of Riverside	Public Works (Sewer Division)		
45	David	Moran	Riverside County	Environmaental Health Department	(951) 358-5172	D Moran
46	Anthony	Moreno	City of La Quinta	Building & Safety	(760) 777-7034	Anthony Moreno
47	George	Munoz	City of Riverside	Public Works	(951) 351-6145	George R. Muñoz
48	Farida	Naceem	City of Murrieta	Public Works	951-461-6075	Farida Y. Naceem
49	Richard	Nugent	City of Riverside	Public Works (Sewer Division)		
50	Cynthia	Overby	City of Beaumont	Code Enforcement	(951) 572-3234	Cynthia Overby
51	Roger	Pauley	City of Riverside	Public Works (Sewer Division)		
52	Allen	Pielin	City of Riverside	Public Works	(951) 351-6072	Allen Pielin
53	Lester	Powell	Riverside County	DES	(951) 358-5172	
54	Kimberly	Powers	City of Corona	Fire	(951) 279-3775	
55	Roy	Reed	City of Riverside	Public Works (Sewer Division)		Roy E. Reed
56	Greg	Reyes	Riverside County	Environmental Health	(951) 358-5172	
57	Addi	Rodriguez	City of Riverside	Public Works (Sewer Division)		
58	Jose	Rodriguez	City of Riverside	Public Works (Sewer Division)		
59	Jason	Roy	Riverside County	Department of Environmental Health	(951) 766-2824	
60	Enrique	Rueda	Riverside County	Environmental Health	(951) 273-9140	E. Rueda

NPDES STORMWATER QUALITY TRAINING FOR
Industrial/Commercial Training
Riverside County Flood Control & Water Conservation District

Meeting of: Tuesday, November 27 - 09:00 - 12:00

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	First Name	Last Name	Municipality	Department	Phone No	Signuature
61	Larry	Salazar	City of Riverside	Public Works	(951) 351-6145	
62	Dena	Sampel	Riverside County	Environmental Health		
63	Cindi	Schmitz	City of Corona	Fire	(951) 736-2464	C. Schmitz
64	Cindy	Snavely-Peck	City of Riverside	Public Works	(951) 351-6145	
65	Jim	Steele	City of Riverside	Public Works (Sewer Division)		
66	Daisy	Tepetitla	Riverside County	Environmental Health		Daisy E. Tepetitla
67	Eric	Tighe	City of Riverside	Public Works (Sewer Division)		
68	Tino	Torrez	City of Riverside	Public Works (Sewer Division)		
69	Jess	Trinidad	Riverside County	Environmental Health		
70	Teresa	Wills	Riverside County	Environmental Health	(760) 320-1048	
71	Michael	Yasmer	City of Riverside	Public Works	(951) 351-6145	
72	ALDO	LICITRA	CITY OF TEMECULA	"		
73	Celina	Cabrera	City of Beaumont	Building/ Code	951 572-3234	Celina Cabrera
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NPDES STORMWATER QUALITY TRAINING FOR
Construction Training
Riverside County Flood Control & Water Conservation District

Meeting of: Wednesday, April 16 - 09:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
1	Raymond	Aguilar	City of Riverside	Public Utilities - Water Operation	(951) 351-6350	
2	Ron	Allen	City of Beaumont	public works		
3	Art	Anaya	City of Riverside	Public Utilities - Water Operation	(951) 351-6350	
4	richard	arriola	Riverside County	Code Enforcement	(951) 955-8802	
5	Freeman "Joe"	Axtell	Riverside County	Transportation Department	(951) 955-1095	
6	Michael	Baggett	City of Riverside	Public Utilities - Water Field	(951) 351-6350	
7	Keith	Barnett	Riverside County	Transportation Department	(951) 955-1095	
8	Cliff	Bellinghausen	City of Riverside	Public Utilities - Water Operation	(951) 351-6318	
9	Daniel	Bertotti	City of Riverside	Public Utilities - Water Field	(951) 351-6350	
10	cyndi	black	Riverside County	Code Enforcement	(951) 955-8802	
11	ALAN	BOSIA	City of Riverside	PUBLIC WORKS	(951) 826-5599	
12	Mike	Call	Riverside County	Transportation Department	(951) 955-1095	
13	Paul	Castillo	Riverside County	Transportation Department	(951) 955-1095	
14	Carlos	Castro	City of Riverside	Public Utilities - Water Field	(951) 351-6350	
15	FRED	CERDA	City of Riverside	PUBLIC WORKS	(951) 712-4966	
16	Jessica	Chin	City of Riverside	Public Works	(951) 826-5760	
17	Christopher	Collins	City of Riverside	Public Utilities - Water Field	(951) 351-6350	
18	John	Contrado	City of Corona	Public Works	(951) 279-3512	
19	Bob	Cordova	City of Riverside	Public Utilities - Water Field	(951) 351-6350	
20	Chris	Cuenca	City of Riverside	Public Utilities - Water Field	(951) 351-6350	
21	Jackie	Cunningham	City of Riverside	Public Utilities - Water Operation	(951) 351-6350	

NPDES STORMWATER QUALITY TRAINING FOR
Construction Training
Riverside County Flood Control & Water Conservation District

Meeting of: Wednesday, April 16 - 09:00 - 12:00

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	First Name	Last Name	Municipality	Department	Phone No	Signuature
22	DANNY	CWIAK	City of Riverside	PUBLIC WORKS	(951) 377-5514	
23	Ken	Dagenais	City of Corona	Public Works	(951) 736-2456	
24	TIM	DEXTER	City of Riverside	PUBLIC WORKS	(951) 712-4974	
25	Pete	Diaz	City of Riverside	Public Utilities - Water Field	(951) 351-6350	
26	jacob	dietrich	Riverside County	Code Enforcement	(951) 955-8802	
27	ryan	dolan	Riverside County	Code Enforcement	(951) 955-8802	
28	TONY	DUPRE	City of Riverside	PUBLIC WORKS	(951) 826-5990	
29	wayne	Durant	Riverside County	Code Enforcement	(951) 955-8802	
30	Fred	Ehemann	City of Riverside	Public Utilities - Water Operation	(951) 351-6350	
31	travis	engelking	Riverside County	Code Enforcement	(951) 955-8802	
32	Mark	Ensign	City of Riverside	Public Utilities - Water Field	(951) 351-6350	
33	Eric	Escobar	City of Riverside	Public Utilities-Water Construction	(951) 826-2253	
34	RAY	GARCIA	City of Riverside	PUBLIC WORKS	(951) 712-4962	
35	Thomas	Garcia	City of Riverside	Public Utilities - Water Field	(951) 351-6350	
36	Richard	Gastelum	City of Riverside	Public Utilities - Water Field	(951) 351-6350	
37	Paul	Gearhart	City of Riverside	Public Utilities - Water Field	(951) 351-6350	
38	Jim	Henke	City of Riverside	Public Utilities-Water Construction	(951) 538-3451	
39	Michele	Hindersinn	City of Corona	Public Works	(951) 736-2248	
40	BARNEY	HUNTER	City of Riverside	PUBLIC WORKS	(951) 712-3947	
41	David	Hylkema	Riverside County	Transportation Department	(951) 955-1095	
42	Joe	Janda	City of Beaumont	public works		

NPDES STORMWATER QUALITY TRAINING FOR
Construction Training
Riverside County Flood Control & Water Conservation District

Meeting of: Wednesday, April 16 - 09:00 - 12:00

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	First Name	Last Name	Municipality	Department	Phone No	Signuature
43	Todd	Jorgenson	City of Riverside	Public Utilities-Water Construction	(951) 826-5581	
44	wendell	jose	Riverside County	Code Enforcement	(951) 955-8802	
45	david	jurden	Riverside County	Code Enforcement	(951) 955-8802	
46	Bradley	Kelvington	City of Riverside	Public Utilities - Water Field	(951) 351-6350	
47	Prem	Kumar	City of Moreno Valley	Public Works	(951) 413-3116	
48	jonathan	lance	Riverside County	Code Enforcement	(951) 955-8802	
49	Eric	Lohr	Riverside County	Transportation Department	(951) 955-1095	
50	Ivan	Mendoza	Riverside County	Transportation Department	(951) 955-1095	
51	Jesse	Mendoza	Riverside County	Transportation Department	(951) 955-1095	
52	Dave	Mitchell	City of Corona	Public Works	(951) 279-3510	
53	manolito	molina	Riverside County	Code Enforcement	(951) 955-8802	
54	VICTOR	MOORE	City of Riverside	PUBLIC WORKS	(951) 232-7139	
55	Mike	Neal	City of Beaumont	public works	951 377 5514	
56	karen	nguyen	Riverside County	Code Enforcement	(951) 955-8802	
57	Trai	Nguyen	Riverside County	Transportation Department	(951) 955-1095	
58	Robert	Ochoa	City of Riverside	Public Utilities - Water Field	(951) 351-6350	
59	Kenneth	Olson	City of Riverside	Public Utilities - Water Ops	(951) 351-6350	
60	Robert	Owen	City of Beaumont	public works	(951) 538-6269	
61	diana	parra	Riverside County	Code Enforcement	(951) 955-8802	
62	samantha	phillips	Riverside County	Code Enforcement	(951) 955-8802	
63	james	pike	Riverside County	Code Enforcement	(951) 955-8802	

NPDES STORMWATER QUALITY TRAINING FOR
Construction Training
Riverside County Flood Control & Water Conservation District

Meeting of: Wednesday, April 16 - 09:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
64	Michael	Roth	Santa Ana Regional Board	Storm Water	(951) 320-2027	
65	Rosario	Ruvalcaba	City of Corona	Public Works	(951) 739-4813	
66	Daniel	Slayych	Riverside County	Transportation Department	(951) 955-1095	
67	David	Sotelo	City of Riverside	Building & Safety Division	(951) 826-5752	4-16-08
68	Claudia	Steiding	Riverside County	Facilities Management	(951) 955-8174	
69	Luis	Tapia	City of Riverside	Public Utilities-Water Construction	(951) 538-3456	
70	Chris	Trinidad	City of Beaumont	public works		
71	Juan	Vargas	City of Riverside	Public Utilities - Water Field	(951) 351-6350	
72	marcella	villanueva	Riverside County	Code Enforcement	(951) 955-8802	
73	Steven	Wann	Riverside County	Transportation Department	(951) 955-1095	
74	George	Yassa	Riverside County	Transportation Department	(951) 955-1095	
75	Darren	Young	City of Corona	Public Works	(951) 736-2304	

Randy Taylor RivCo WasteMgt 951-247-1734 Randy Taylor

NPDES STORMWATER QUALITY TRAINING FOR
Construction Training
Riverside County Flood Control & Water Conservation District

Meeting of: Thursday, April 17 - 09:00 - 12:00

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	First Name	Last Name	Municipality	Department	Phone No	Signuature
1	Sanaa	Azar	Riverside County	Economic Development Agency	(951) 955-9137	
2	stacey	baumgartner	Riverside County	Code Enforcement	(951) 955-8802	
3	Frank	Bell	Riverside County	Waste Management	(951) 486-3226	
4	mike	blanco	City of Norco	Public Works		
5	dale	bonham	City of Norco	Public Works		
6	George	Boyden	Riverside County	Transportation Department	(951) 955-1095	
7	DON	BUCHANAN	City of Riverside	PUBLIC WORKS	(951) 712-4970	
8	Eduardo	Castellanos	Riverside County	Waste Management	(951) 486-3226	
9	Raymond	Cruz	City of Canyon Lake	Special Enforcement		
10	dan	cuthbertson	City of Norco	Public Works		
11	Dwight "Kelley"	Donovan	Riverside County	Transportation Department	(951) 955-6817	
12	Joseph	Dunlap	Riverside County	Transportation Department	(951) 955-1095	
13	etita	faiva	Riverside County	Code Enforcement	(951) 955-8802	
14	Leo	Ferrando	City of Riverside	Public Utilities-Water Construction	(951) 826-5694	
15	john	game	Riverside County	Code Enforcement	(951) 955-8802	
16	Nimrod	Garay	Riverside County	Waste Management		
17	Brandon	German	City of Riverside	Building & Safety Division	(951) 826-5955	
18	SEAN	GILL	City of Riverside	PUBLIC WORKS	(951) 826-5892	
19	Jeff	Gow	Riverside County	Waste Management		
20	anthony	green	Riverside County	Code Enforcement	(951) 955-8802	

NPDES STORMWATER QUALITY TRAINING FOR
Construction Training
Riverside County Flood Control & Water Conservation District

Meeting of: Thursday, April 17 - 09:00 - 12:00

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	First Name	Last Name	Municipality	Department	Phone No	Signuature
21	Tom	Hall	City of Corona	Public Works	(951) 739-4816	
22	Habib	Hariri	City of Riverside	Public Utilities-Water Construction	(951) 826-5304	
23	jason	heagstedt	Riverside County	Code Enforcement	(951) 955-8802	
24	Joseph	Hickman	Riverside County	Waste Management	(951) 486-3226	
25	BARNEY	HUNTER	City of Riverside	PUBLIC WORKS	(951) 712-3947	
26	Al	Ignacio	City of Beaumont	public works	(951) 377-5740	
27	William "Bill"	Jackson	Riverside County	Transportation Department	(951) 955-1095	
28	Xavier	Jacobo	City of Riverside	Public Utilities-Water Construction	(951) 538-3461	
29	Mirek	Jaroslawski	City of Corona	Public Works	(951) 739-4824	
30	David	Jones	RCFC & WCD	Maintenance	(951) 955-1234	
31	John	Kennedy	Riverside County	Transportation Department	(951) 955-1095	
32	mike	kulick	City of Norco	Public Works	(951) 545-7881	
33	Vikki	Kuntz	Riverside County	Facilities Management	(951) 955-0166	
34	Brian	Ladnier	City of Corona	Public Works	(951) 279-3647	
35	JACK	LYNN	City of Riverside	PUBLIC WORKS	(951) 712-2321	
36	lori	lyon	Riverside County	Code Enforcement	(951) 955-8802	
37	Joseph	Martinez	Riverside County	Transportation Department	(951) 955-1095	
38	Ibrahim	mASSOUD	City of Riverside	Pubic Works/Engineering	(951) 826-5805	
39	Benjamin	Matye	Riverside County	Waste Management		
40	Charles	McBride	City of Riverside	Public Utilities-Water Construction	(951) 826-2182	

NPDES STORMWATER QUALITY TRAINING FOR
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Riverside County Flood Control & Water Conservation District

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	First Name	Last Name	Municipality	Department	Phone No	Signuature
41	tom	mcmullen	Riverside County	Code Enforcement	(951) 955-8802	
42	Richard	Messer	City of Canyon Lake	Special Enforcement		
43	jennifer	morris	Riverside County	Code Enforcement	(951) 955-8802	
44	Gabriel	Munoz	Riverside County	Transportation Department	(951) 955-1095	
45	Stewart	Noble	City of Riverside	Public Utilities-Water Construction	(951) 538-6970	
46	Dave	Ochs	City of Beaumont	public works		
47	lanee	padilla	Riverside County	Code Enforcement	(951) 955-8802	
48	JACK	PALOMAREZ	City of Riverside	PUBLIC WORKS	(951) 712-4972	
49	Mike	Parsons	City of Beaumont	public works		
50	julio	pineda	Riverside County	Code Enforcement	(951) 955-8802	
51	DORU	POPA	City of Riverside	PUBLIC WORKS	(951) 826-5341	
52	Jeff	Potts	City of Corona	Public Works	(951) 736-2442	
53	Kaniz	Quazi	Riverside County	Waste Management	(951) 486-3226	
54	MANNY	RIVAS	City of Riverside	PUBLIC WORKS	(951) 534-3331	
55	JUAN	ROJAS	City of Riverside	PUBLIC WORKS	(951) 538-3037	
56	mike	romero	Riverside County	Code Enforcement	(951) 955-8802	
57	Luana	Roth	Riverside County	Transportation Department	(951) 955-1095	
58	Richard	Rupert	City of Canyon Lake	Special Enforcement	(951) 834-6774	
59	Paul	Russell	Riverside County	Transportation Department	(951) 955-1095	
60	gladys	sanchez	Riverside County	Code Enforcement	(951) 955-8802	

NPDES STORMWATER QUALITY TRAINING FOR
Construction Training
Riverside County Flood Control & Water Conservation District

Meeting of: Thursday, April 17 - 09:00 - 12:00

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	First Name	Last Name	Municipality	Department	Phone No	Signuature
61	Tamrat	Seyoum	City of Riverside	Public Utilities-Water Construction	(951) 826-5672	
62	Todd	Shibata	Riverside County	Waste Management	(951) 486-3226	
63	Karl	Shrader	City of Beaumont	public works		
64	Dave	Shreve	City of Corona	Public Works	(951) 817-5706	
65	DANIEL	SIMMONS	City of Riverside	PUBLIC WORKS	(951) 712-4952	
66	Nick	Sison	Riverside County	Transportation Department	(951) 955-1095	
67	Randy	Taylor	Riverside County	Waste Management		
68	Travis	Taylor	Riverside County	Waste Management	(951) 486-3226	
69	Dave	Thibault	City of Beaumont	public works		
70	Cesar	Tolentino	Riverside County	Transportation Department	(951) 955-1095	
71	nicole	wapner	Riverside County	Code Enforcement	(951) 955-8802	
72	Sarah	Watrous	Riverside County	Waste Management		
73	Edward	Wee Eng	Riverside County	Waste Management	(951) 486-3211	
74	Gregory	Yates	City of Riverside	Electric	(951) 826-2335	
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NPDES STORMWATER QUALITY TRAINING FOR
Construction Training
Coachella Valley Water District

Meeting of: Tuesday, April 22 - 09:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
1	James	Achuff	City of Indio	Public Works/Engineering Services	(760) 391-4019	
2	JIM	AYRES	Riverside County	Economic Development	(760) 863-2552	
3	Hector	Baeza	City of Banning	Water Division		
4	Rizaldy	Baluyot	Riverside County	Facilities Management	(951) 955-4889	
5	Scott	Barnhart	City of Banning	Wastewater Division		
6	Mike	Brown	City of Palm Desert	Public Works	(760) 346-0611	
7	greg	campbell	City of Banning	Water Division	(951) 922-3281	
8	ARACELI	CASTRO	Riverside County	Economic Development	(760) 863-2552	
9	Terry	Cechin	City of Palm Desert	Public Works	(760) 346-0611	
10	Bob	Dage	City of Banning	Water Division		
11	Brett	Daniels	City of Coachella	Environmental Programs	(760) 398-5744	
12	lorena	diaz	Riverside County	Code Enforcement	(951) 955-8802	
13	Adrienne	Dunfee	City of Indio	Public Works/Engineering Services	(760) 391-4000	
14	Jaime	Engler	City of Indio	Public Works/Engineering Services	(760) 391-4000	
15	Ed	Gallardo	City of Palm Desert	Public Works	(760) 346-0611	
16	Kenneth	George	Riverside County	Transportation Department	(951) 955-1095	
17	Matt	Glenn	City of Banning	Water Division		
18	Steve	Grewe	Riverside County	Transportation Department	(951) 955-1095	
19	vicki	haeberle	Riverside County	Code Enforcement	(951) 955-8802	
20	Bobby	Hand	Riverside County	Transportation Department	(951) 955-1095	
21	adam	hermanson	Riverside County	Code Enforcement	(951) 955-8802	

NPDES STORMWATER QUALITY TRAINING FOR
Construction Training
Coachella Valley Water District

Meeting of: Tuesday, April 22 - 09:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signature
22	pedro	hernandez	Riverside County	Code Enforcement	(951) 955-8802	
23	hector	herrera	Riverside County	Code Enforcement	(951) 955-8802	
24	lucero	iniguez	Riverside County	Code Enforcement	(951) 955-8802	
25	Jesse	Isaacson	City of Indio	Public Works/Engineering Services	(760) 391-4019	
26	Jeramy	Jackson	City of Moreno Valley	Public Works	(951) 616-4564	
27	Ahmad	Karimi	City of Palm Desert	Public Works	(760) 346-0611	
28	LIZA	LIZARRAGA	Riverside County	Economic Development	(760) 863-2552	
29	Kieran (Pat)	Logan	City of Banning	Water Division		
30	Roldan	Lopez	City of Indio	Public Works/Engineering Services	(760) 391-4000	
31	Bob	Lucas	Riverside County	EDA	(951) 955-9732	
32	lionel	martinez	Riverside County	Code Enforcement	(951) 955-8802	
33	francisco	mendez	Riverside County	Code Enforcement	(951) 955-8802	
34	Robert	Morris	Riverside County	Transportation Department	(951) 955-1095	
35	sara	nunez	Riverside County	Code Enforcement	(951) 955-8802	
36	Bruce	Pelletier	City of Indian Wells	Building and Safety	(760) 776-0237	
37	chinh	pham	City of Banning	Water Division		
38	ANNA	RODRIGUEZ	Riverside County	Economic Development	(760) 863-2552	
39	LEAH	RODRIGUEZ	Riverside County	Economic Development	(760) 863-2552	
40	Leonard	St. Sauver	City of La Quinta	Public Works	(760) 777-7048	
41	Matt	Stevens	City of Banning	Water Division		

NPDES STORMWATER QUALITY TRAINING FOR
Construction Training
Coachella Valley Water District

Meeting of: Tuesday, April 22 - 09:00 - 12:00

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	First Name	Last Name	Municipality	Department	Phone No	Signuature
42	James	Thompson	City of Banning	Public Works	(951) 922-3130	James Thompson
43	Chris	Thornton	City of Banning	Wastewater Division		
44	JOAQUIN	TIJERINA	Riverside County	Economic Development	(760) 863-2552	
45	Claudia	Trembus	City of Palm Springs	Engineering	(760) 323-8253	Claudia Trembus
46	Jon	Tressler	Riverside County	Transportation Department	(951) 955-1095	
47	Jason	Valdez	City of Banning	Water Division		
48	Dan	Varner	City of Indian Wells	Public Works	(760) 776-0237	
49	Derrick	Watkins	City of La Quinta	Public Works	(760) 275-8374	
50	Michael	Wilkey	City of Indio	Public Works/Engineering Services	(760) 391-4000	
51	John	Wilson	Riverside County	Transportation Department	(951) 955-1095	
52	RENE	MARTINEZ	CITY OF P.S.	ENG	760 323 8253	
53	MICHAEL	MOTT	CITY OF P.S.	ENG	760-323-8553	
54	~~[illegible]~~	~~[illegible]~~				
55	Roland		CVWD	Service	397-7389	
56	Tommy	Fowlkes	CVWD	Service	398-2661	
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NPDES STORMWATER QUALITY TRAINING FOR
Construction Training
Murrieta City Hall

Meeting of: Thursday, January 17 - 09:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
1	Steve	Allen	Riverside County	Transportation Department	(951) 955-6790	
2	Venita	Anderson	City of Murrieta	Code Enforcement	(951) 461-6337	
3	William	Anderson	Riverside County	Transportation		
4	DOUG	ARMSTRONG	City of Temecula	PUBLIC WORKS	(951) 694-6411	
5	Amer	Attar	City of Temecula	Public Works	(951) 694-6411	
6	WILLIAM	BECERA	City of Temecula	PUBLIC WORKS	(951) 694-6411	
7	Matthew	Beile	City of Temecula	Public Works	(951) 694-6411	
8	Tracy	Bravo	Riverside County	Transportation		
9	Greg	Butler	City of Temecula	Public Works	(951) 694-6411	
10	Victor	Casillas	Riverside County	Transportation Department	(760) 778-2491	
11	Sara	Cervantes	Riverside County	Code Enforcement	951-955-0105	
12	TOM	COLE	City of Temecula	PUBLIC WORKS	(951) 694-6411	
13	Sylvester	Collins	City of Moreno Valley	Maintenance & Operations		
14	Paul	Cornell	Riverside County	Facilities Management	(951) 955-0168	
15	Marc	Crispin	Riverside County	Facilities Management	(951) 955-0167	
16	Jose	Cruz	Riverside County	Code Enforcement	951-955-0105	
17	Mayra	De La Torre	City of Temecula	Public Works	(951) 694-6411	
18	Lisa	Elder	Riverside County	Transportation Permit Section	(951) 850-0078	
19	Brett	Farlow	Riverside County	Code Enforcement	951-955-0105	
20	Lanker	Figueroa	City of Murrieta	Public Works Inspection	(951) 461-6075	

NPDES STORMWATER QUALITY TRAINING FOR
Construction Training
Murrieta City Hall

Meeting of: Thursday, January 17 - 09:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
21	Roger	Flores	Riverside County	Transportation		Roger Flores
22	Katheline	Fong	Santa Ana Regional Board	RWQCB	(951) 774-0114	Katheleen Fong
23	Carol	Forrey	Riverside County	Code Enforcement	951-955-0105	
24	Angela	Frazier	Riverside County	Code Enforcement	951-955-0105	
25	Albert	Garcia	City of Moreno Valley	Maintenance & Operations		
26	Brandon	Garcia	Riverside County	Transportation Department	(760) 778-2491	
27	Kevin	Gillette	Riverside County	Transportation Permit Section	(951) 236-6080	
28	Jeff	Gullett	Riverside County	Transportation		
29	Cesar	Gutierrez	Riverside County	Transportation Permit Section	(951) 640-3221	
30	Phil	Hallberg	City of San Jacinto	Community Development	(951) 487-7330	
31	Cory	Hammond	City of Murrieta	Public Works Inspection	(951) 461-6075	
32	Morgan	Haun	City of Moreno Valley	Maintenance & Operations		
33	Jack	Hodson	City of Temecula	Public Works	(951) 694-6411	
34	Warren	Huang	Riverside County	Facilities Management	(951) 955-4897	
35	Mike	Hudson	City of Temecula	Public Works	(951) 694-6411	
36	REZA	JAMES	City of Temecula	PUBLIC WORKS	(951) 694-6411	
37	Jeff	Johnson	City of Murrieta	Public Works Inspection	(951) 461-6075	
38	David	Jones	RCFC & WCD	Maintenance	(951) 850-5497	
39	Jason	Jones	City of Murrieta	Code Enforcement	(951) 461-6337	
40	Carlos	Juarez	City of Moreno Valley	Maintenance & Operations	951 652-0656	

NPDES STORMWATER QUALITY TRAINING FOR
Construction Training
Murrieta City Hall

Meeting of: Thursday, January 17 - 09:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
41	Timothy	Kearns	Riverside County	Facilities Management	(951) 955-9467	
42	Charles	Kolb	City of Moreno Valley	Maintenance & Operations		
43	Salvador	Lopez	Riverside County	Transportation		
44	Ed	Lotz	RCFC & WCD	Flood Control	(951) 955-1200	
45	Gabriel	Martin	Riverside County	Economic Development Agency	(951) 955-1918	
46	Andy	McDonel	City of Moreno Valley	Maintenance & Operations		
47	Linda	Mejia	City of Murrieta	Code Enforcement	(951) 461-6337	
48	Julie	Meyer	Riverside County	Transportation Permit Section	(951) 961-7584	
49	Lawrence	Meza	City of Moreno Valley	Maintenance & Operations		
50	Rigo	Morales	City of Moreno Valley	Maintenance & Operations	(951) 243-5527	
51	Farida	Naceem	City of Murrieta	Public Works / Engineering	(951) 461-6075	
52	George	Nelson	City of Murrieta	Code Enforcement	(951) 461-6337	
53	Brian	Noone	Riverside County	Code Enforcement	951-955-0105	
54	Avlin	Odviar	City of Temecula	Public Works	(951) 694-6411	
55	Richard	Ott	Riverside County	Transportation	(951) 955-6899	
56	Ismael	Pando	City of Hemet	Public Works	(951) 765-2360	
57	MARIANNE	PARKER	City of Temecula	CODE ENFORCEMENT	(951) 694-6400	
58	Ernest	Precie	City of Moreno Valley	Maintenance & Operations		
59	Donald	Raymond	Riverside County	Transportation Department	(760) 778-2491	
60	Tom	Rheiner	RCFC & WCD	Special Projects	(951) 955-2349	

14

NPDES STORMWATER QUALITY TRAINING FOR
Construction Training
Murrieta City Hall

Meeting of: Thursday, January 17 - 09:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
61	Keith	Ross	Riverside County	Code Enforcement	951-955-0105	Keith Ross
62	Melvyn	Sayre	Riverside County	Transportation	(951) 955-6899	[illegible]
63	Chris	Spence	City of Moreno Valley	Maintenance & Operations		[illegible]
64	Jane	Tate	Riverside County	Code Enforcement	951-955-0105	[illegible]
65	Jeremy	Wagner	Riverside County	Code Enforcement	951-955-0105	[illegible]
66	Ron	Welch	Riverside County	Code Enforcement	951-955-0105	[illegible]
67	Art	Wilson	City of Moreno Valley	Maintenance & Operations		Arthur L Wilson
68	Jim	Witt	City of Murrieta	Code Enforcement	(951) 461-6337	Jim Witt
69	Dan	York	City of Temecula	Public Works	(951) 694-6411	[illegible]
70	Dan	York	City of Temecula	Public Works	(951) 694-6411	
71	ERIC	MAKER	CITY OF MURRIETA	PUBLIC WORKS	" 8137231	
72		~~FORES~~	County of Riv	Road Dept.	~~9556849~~	~~Roger Tom~~
73	Gina	DICKSON	City of Murrieta	Code Enforcemen		Gina Dickson
74	Linda	MEJIA	City of Murrieta	Code Enf.	461-6331	Linda Mejia
75						

NPDES STORMWATER QUALITY TRAINING FOR
Construction Training
Riverside County Flood Control & Water Conservation District

Meeting of: Monday, September 24 - 08:00 - 11:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
1	Jessica	Chin	City of Riverside	Public Works	(951) 826-5760	
2	Paul	Russel	Riverside County	Transportation	(951) 955-6884	
3	Dave	Carrico	City of San Jacinto	Public Works - Streets/Storm Water	(951) 487-7386	
4	Jose	Vilchis	City of San Jacinto	Public Works - Streets/Storm Water	(951) 487-7386	
5	Rene	Upson	City of San Jacinto	Code Enforcement	(951) 487-7330	
6	Tom	Van Dorn	City of San Jacinto	Code Enforcement	(951) 487-7330	
7	Phil	Hallberg	City of San Jacinto	Code Enforcement	(951) 487-7330	
8	Lonny	Young	City of Riverside	Public Works	(951) 826-5294	
9	KENT	ALLEN	RCFC & WCD	DESIGN AND CONSTRUCTION	(951) 955-1288	
10	RAY	DUNN	RCFC & WCD	DESIGN AND CONSTRUCTION	(951) 955-1315	
11	TIM	FAGG	RCFC & WCD	DESIGN AND CONSTRUCTION	(951) 955-1236	
12	GENE	LEWIS	RCFC & WCD	DESIGN AND CONSTRUCTION	(951) 955-8561	
13	BRENT	MYTINGER	RCFC & WCD	DESIGN AND CONSTRUCTION	(951) 955-8519	
14	Erik	Sydow	Riverside County	Economic Development Agency	(951) 955-8274	
15	Gabriel	Martin	Riverside County	Economic Development Agency	(951) 955-1918	
16	Susan	James	City of Riverside	Park, Recreation and Community Services	(951) 826-2015	
17	Vic	Olmeda	Riverside County	Building and Safety	(951) 955-2095	
18	James	Stratton	Riverside County	Building and Safety	(951) 955-1835	
19	Alan	Bosia	City of Riverside	Public Works	(951) 826-5599	
20	Jack	Palomarez	City of Riverside	Public Works	951 - 7124976	
21	Sean	Gill	City of Riverside	Public Works	951-826-5892	
22	Eddie	Godinez	City of Moreno Valley	Land Development	(951) 413-3127	
23	Mosallam	Almasri	City of Moreno Valley	Land Development	(951) 413-3113	

51	Joe	Schupp	Riverside County	Waste Management		
52	Nate	Viste	Riverside County	Waste Management		
53	Edward	Wee Eng	Riverside County	Waste Management		
54	Bob	French	City of Calimesa	Public Works	(909) 795-9801	
55	Mike	McCabe	City of Calimesa	Public Works	(909) 795-9801	
56	Tony	Alcala	City of Calimesa	Public Works	(909) 795-9801	
57	dave	Thibault	City of Beaumont	Public Works	(951) 377-5315	
58	Dave	Ochs	City of Beaumont	Public Works	(951) 377-5315	
59	Mike	Neal	City of Beaumont	Public Works		
60	Ron	Allen	City of Beaumont	Public Works		
61	DENNIS	HUNTERS	CITY OF NORCO	BUILDING INSPECT.		
62	DONALD	GERBER	COUNTY OF RIV	WASTE MGMT	951 486 3200	
63	MARK	BERG	CITY OF NORCO	BUILDING	951 2705637	
64	ELMER	DATWIN	RIV. CO.	TRANSPORTATION	951-955 6762	
65	DAN	CUTHBERTSON	CITY OF NORCO	PUBLIC WORKS	951 735 3500	

66 MIKE RCFCWCD ~~909-991~~ 909-902-0978 Mike Lerma

24	Danny	Astorga	City of Moreno Valley	Land Development	(951) 413-3119	
25	Glen	Cox	City of Riverside	Public Util - Water Field Dep	(951) 351-6350	
26	Robert	Lucas	City of Riverside	Public Util - Water Field Dep	(951) 351-6350	
27	William	Ryan	City of Riverside	Public Util - Water Field Dep	(951) 351-6350	
28	Al	Orozco	City of Riverside	Public Util - Water Field Dep	(951) 351-6350	
29	Richard	Plogger	City of Riverside	Public Util - Water Field Dep	(951) 351-6350	
30	Duprice	Tillman	City of Riverside	Public Util - Water Field Dep	(951) 351-6350	
31	Miguel	Perez	City of Riverside	Public Util - Water Field Dep	(951) 351-6350	
32	Bradley	Kelvington	City of Riverside	Public Util - Water Field Dep	(951) 351-6350	
33	Daniel	Bertotti	City of Riverside	Public Util - Water Field Dep	(951) 351-6350	
34	Luis H.	Tapia	City of Riverside	Water Engineering	(951) 538-3456	
35	Stewart	Noble	City of Riverside	Water Engineering	(951) 826-5142	
36	dan	cuthbertson	City of Norco	Public Works	(951) 270-5607	
37	Justin	Brown	Riverside County	Waste Management		
38	Eduardo	Castellanos	Riverside County	Waste Management		
39	Art	Fuentes	Riverside County	Waste Management		
40	Brian	Hawkinson	Riverside County	Waste Management		
41	Joseph	Hickman	Riverside County	Waste Management		
42	Rob	Istik	Riverside County	Waste Management	247-1323	
43	Kevin	Joyce	Riverside County	Waste Management		
44	Scott	Kraak	Riverside County	Waste Management	951/926-3273	
45	Ben	Matye	Riverside County	Waste Management		
46	Jessica	Nguyen	Riverside County	Waste Management	951 486 3255	
47	Dan	Olea	Riverside County	Waste Management		
48	Mario	Ramirez	Riverside County	Waste Management		
49	Noah	Rau	Riverside County	Waste Management	951 486-3202	
50	Michael	Ray	Riverside County	Waste Management	951 926-1414	

NPDES STORMWATER QUALITY TRAINING FOR
Construction Training
Riverside County Flood Control & Water Conservation District

Meeting of: Tuesday, September 25 - 13:00 - 16:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
1	Ed	Lara	City of Corona	Public Works	(951) 739-4825	
2	Phuong	Hunter	City of Moreno Valley	Land Development	(951) 413-3470	
3	SAM	TERCERO	RCFC & WCD	DESIGN AND CONSTRUCTION	(951) 955-1287	
4	BARRY	TEMPLE	RCFC & WCD	DESIGN AND CONSTRUCTION	(951) 955-1315	
5	MIKE	LUNA	RCFC & WCD	DESIGN AND CONSTRUCTION	(951) 955-8516	
6	GARY	LUNDBERG	RCFC & WCD	DESIGN AND CONSTRUCTION	(951) 955-8518	
7	DARIO	SAMONTE	RCFC & WCD	DESIGN AND CONSTRUCTION	(951) 955-8534	
8	Mike	Malone	Riverside County	Building and Safety	(760) 212-8700	
9	Laurel	Mayo	Riverside County	Building and Safety	(760) 784-5379	
10	Donna	Smith	Riverside County	Building and Safety	(760) 784-0765	
11	Roger	Miller	Riverside County	Environmental Compliance Division	(951) 955-0886	
12	Rusel	Baker	Riverside County	NPDES	(951) 232-7343	
13	Usha	Kurgundd	City of Riverside	Public works	(951) 826-2495	
14	David	Hartman	City of Canyon Lake	Building Department	(951) 244-2955	
15	Gabriel	Gonzalez	City of Moreno Valley	Land Development	(951) 413-3252	
16	Joanna	Dorham	City of Moreno Valley	Land Development	(951) 413-3192	
17	Alex	Ramirez	City of Moreno Valley	Land Development	(951) 413-3123	
18	Robert	Ochoa	City of Riverside	Public Util - Water Field Dep	(951) 351-6350	
19	Mark	Ensign	City of Riverside	Public Util - Water Field Dep	(951) 351-6350	
20	Chris	Cuenca	City of Riverside	Public Util - Water Field Dep	(951) 351-6350	
21	Gregory	Prator	City of Riverside	Public Util - Water Field Dep	(951) 351-6350	
22	Paul	Gearhart	City of Riverside	Public Util - Water Field Dep	(951) 351-6350	
23	Luis	Tapia	City of Riverside	Public Util - Water Engineering	(951) 826-5755	
24	doug	norfolk	City of Norco	Public Works	(951) 270-5607	

25	Dale	Everman	City of Calimesa	Public Works	(909) 795-9801	
26	Scott	Bryant	Riverside County	Waste Management	951 312 2353	
27	Tim	Evans	Riverside County	Waste Management	(951) 486-3275	
28	Nimrod	Garay	Riverside County	Waste Management		
29	Donald	Gerber	Riverside County	Waste Management		
30	Jeff	Gow	Riverside County	Waste Management		
31	Mark	Hunt	Riverside County	Waste Management	486-3247	
32	Joel	Jimenez	Riverside County	Waste Management		
33	Jim	Nickell	Riverside County	Waste Management		
34	Randy	Taylor	Riverside County	Waste Management		
35	Panda	Workman	Riverside County	Waste Management		
36	Juan	Yepez	Riverside County	Waste Management		
37	Michael	McKinley	Riverside County	Waste Management		
38	Joe	Janda	City of Beaumont	Public Works	377 5360	
39	Karl	Shrader	City of Beaumont	Public Works	924 2755	
40	Al	Ignacio	City of Beaumont	Public Works	(951) 377-5790	
41	Mike	Parsons	City of Beaumont	Public Works	951 760 4910	
42	Chad	Nichols	City of Beaumont	Public Works	(951) 760 9766	
43	Chris	Trinidad	City of Beaumont	Public Works	(951) 445-2532	
44	Charles	McBride	City of Riverside	Water Utilities	(951) 826-2182	
45	Maria	Lamping	City of Riverside	Public Works Engineering	(951) 826-5146	
46	JAMES	HENKE	City of RIVERSIDE	PUBLIC WORKS WATER ENGNR	951 8583451	
47	David	Hartman	Canyon Lake	Building Dept.		
48	Richard	Moorlag	City of MV		909 587 8222	
49	~~Mike~~	~~Marvin~~				
50	Chuck	Peebles	C of SJ TRI LAKES	Public Works	951-639-2162	
51	James	Hutchinson	TRILAKES	"	951-244-4437	

52	Douglas	Norfolk	City Of Norco	Engr. Public Works	7894 951-545-	
53	John	Chiswith	City of Moreno Valley	Land Devl	909 373-796	
54	Terry	Huemer	City of Perris	Public Works	943- (951) 6504	
55	Bob	Anderson	" "	" "	" "	
56	George	Garcia	City of Perris	" "	951 943 6504	
57	Tim	Fogg	RCFC	INSPECTION	951 955 1236	
58	Evangeline	Zapien	RCWMD	engr	951 247 1179	
59	Robert	Estrada	City of Moval	Land Dev	951 377-0567	
60	ARMAN	BULAONG	City of Perris	Engr	951-943-6504	

CRAIG WELCH CITY OF NORCO BLDG. 951 549-7921

MARIA LAMPING CITY OF RIVERSIDE PW. ENG 951) 826-5146 Maria Lamping

KEVIN JOYCE RCWMD - WASTE MANAGEMENT 951 486-3260

Jessica Chin City of Riverside PW 951 826 5760

USHA KURGUND CITY OF RIVERSIDE PW 951 826 2495

Michael McKinley Waste/County

Juan Lopez WASTE (909) 374-3688

NPDES STORMWATER QUALITY TRAINING FOR
Construction Training
Coachella Valley Water District

Meeting of: Monday, November 19 - 09:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
1	Ronald	Alexander	CVWD	Domestic Water	(760) 398-2651	
2	Raphael	Alvarada	City of La Quinta	Public Works	(760) 777-7079	
3	Agustin	Arellano	City of La Quinta	Public Works	(760) 777-7083	
4	Chad	Austin	CVWD	Stormwater	(760) 398-2651	
5	Tim	Batten	City of La Quinta	Public Works	(760) 777-7079	
6	Adolfo	Cabrera	City of La Quinta	Public Works	(760) 777-7083	
7	John	Collins	CVWD	Operations		
8	Eric	Crystal	CVWD	Stormwater	(760) 398-2651	
9	Scott	Davenport	CVWD	Operations		
10	Paul	Goble	City of La Quinta	Public Works	(760) 777-7087	
11	David	Hamner	CVWD	Construction	(760) 398-2651	
12	Fidel	Lara	CVWD	Stormwater	(760) 398-2651	
13	Francisco	Lara	CVWD	Stormwater	(760) 398-2652	
14	Antonio	Maciel	CVWD	Construction	(760) 398-2651	
15	Richard	Madrid	CVWD	Domestic Water	(760) 398-2651	
16	Bill	McAteer	City of Temecula	Public Works	(951) 694-6411	
17	Bryan	McKinney	City of La Quinta	Public Works	(760) 777-7045	
18	Alex	Menjivar	CVWD	Stormwater	(760) 398-2651	
19	Mike	Payment	City of La Quinta	Public Works		
20	Miguel	PeÃ±a	City of Indio	PW/IWA	(760) 391-4140	

NPDES STORMWATER QUALITY TRAINING FOR
Construction Training
Coachella Valley Water District

Meeting of: Monday, November 19 - 09:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
21	Demetrio	Pecina	City of La Quinta	Public Works	(760) 777-7053	
22	Allison	Powell	City of Indio	PW/Engineering Services	(760) 391-4000	Allison Powell
23	Joshua	Rakes	CVWD	Stormwater	(760) 398-2651	
24	Juan	Raya	City of Indio	PW/Engineering Services	(760) 391-4000	
25	Juan	Rey	City of La Quinta	Public Works	(714)412-8911	
26	Ed	Rivas	CVWD	Domestic Water	(760) 398-2651	
27	Michael	Roth	Santa Ana Regional Board	Storm Water	(951) 320-2027	
28	Michael	Roth	Santa Ana Regional Board	RWQCB	(951) 320-2027	
29	Jeff	Sodia	CVWD	Domestic Water	(760) 398-2651	
30	John	Soto	CVWD	Operations	(760) 398-2651	
31	James	Staight	City of La Quinta	Public Works	(760) 777-7053	
32	Lance	Young	CVWD	Operations		
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NPDES STORMWATER QUALITY TRAINING FOR
Construction Training
Coachella Valley Water District

Meeting of: Tuesday, November 20 - 09:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
1	Ron	Alexander	CVWD	Domestic Water	(760) 398-2651	
2	Jim	Arender	City of La Quinta	Public Works		
3	Richard	Bennet	CVWD	Domestic	(760) 398-2651	
4	Stephanie	Blanco	Riverside County	Waste Management	(951) 486-3226	
5	Wayne	Campbell	City of La Quinta	Building & Safety	(760) 777-7098	
6	Ruben	Castaneda	City of La Quinta	Public Works	(760) 777-7083	
7	Marques	Crews	Riverside County	Waste Management	(951) 486-3226	
8	Dennis	Cross	CVWD	Stormwater	(760) 398-2651	
9	Alfonzo	Cruz	CVWD	Domestic	(760) 398-2651	
10	Elizabeth	Escatel	City of La Quinta	Building & Safety	(760) 777-7017	
11	Dan	Fewings	CVWD	Domestic	(760) 398-2651	Dan Fewings
12	Gabe	Garza	CVWD	Domestic	(760) 398-2651	755
13	Beto	Gonzales	City of La Quinta	Public Works	(760) 777-7083	
14	Christopher	Green	Riverside County	Waste Management	(951) 486-3226	
15	Scott	Hamilton	City of La Quinta	Public Works	(760) 777-7053	
16	David	Hamner	CVWD	Construction	(760) 398-2651	
17	Steve	Kochell	City of La Quinta	Public Works	(760) 777-7053	
18	James	Lindsey	City of La Quinta	Public Works	(760) 777-7052	
19	Joey	Lucas	CVWD	Domestic	(760) 398-2651	
20	Antonio	Maciel	CVWD	Construction	(760) 398-2651	

NPDES STORMWATER QUALITY TRAINING FOR
Construction Training
Coachella Valley Water District

Meeting of: Tuesday, November 20 - 09:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
21	Tony	Maciel	CVWD	Service	(760) 398-2651	
22	Richard	Madrid	CVWD	Domestic Water	(760) 398-2651	R. A. MADRID
23	Alex	Martinez	City of La Quinta	Public Works	(760) 777-7053	
24	Scott	McCue	CVWD	Stormwater	(760) 398-2651	
25	Patrick	McDaniel	CVWD	Stormwater	(760) 398-2651	
26	Fernando	Mecate	CVWD	Stormwater	(760) 398-2651	Fernando Mecate
27	Jim	Mikkelson	Riverside County	Waste Management	(951) 486-3226	
28	Jackie	Misuraca	City of La Quinta	Building & Safety	(760) 777-7021	
29	Joe	Morales	CVWD	Domestic	(760) 398-2651	
30	Jim	Nickell	Riverside County	Waste Management	(951) 486-3226	
31	Noah	Rau	Riverside County	Waste Management	(951) 486-3226	
32	Ed	Rivas	CVWD	Domestic Water	(760) 398-2651	
33	Joe	Schupp	Riverside County	Waste Management	(951) 486-3226	
34	Jeff	Sodia	CVWD	Domestic Water	(760) 398-2651	
35	Daniel	Valenzuela	City of La Quinta	Public Works	(760) 777-7096	
36	Patrick	Watson	Riverside County	Transportation Department	(760) 863-8267	
37	Bob	Wilson	City of La Quinta	Public Works		RWilson
38	Ed	Wimmer	City of La Quinta	Public Works	(760) 777-7088	
39	Tony	Woods	CVWD	Stormwater	(760) 398-2651	
40	DAN	YORK	City of Temecula	PUBLIC WORKS	(951) 694-6411	

NPDES STORMWATER QUALITY TRAINING FOR
Construction Training
Coachella Valley Water District

Meeting of: Tuesday, November 20 - 09:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
41	Mike	Lynch	City of Banning	Water	922-3330	
42	David	Martinez	" "	Water	922-3330	
43	Brad	Russell	"	"	951 922-3330	
44	Warren	Wooldridge	"	"	"	
45	Gabriel	Novello	" "	Water	"	
46	Chris	Green	County Riv.	Waste	(951)522-0860	
47	Marquies	Gregg	County Riv.	Waste	(951)314-7752	
48	Scott	Hamilton	La Quinta	Publicwork	760 777-7053	
49	Tito	Gonzalez	LA Quinta	Publicworks	(760)777-705	
50	Ruben	Castanedo	La Quinta	Public works	(760)777-7059	
51	James	Lindsey	LQ	Public Works	777-7059	
52	Jim	Mikkelson	RCWMD	waste Mngmt	951-400-3200	
53	Richard	Bennett	CVWD	Domestic	760 902 1050	
54	Joey	Lucas	CVWD	Domestic	760 832-1410	
55	Joe	Schopf	County Riverside	Waste	951-323-1171	
56	James	Mitchell	County of Riv	waste	951 312-7315	
57	Juan	Raya	City of Indio	Engineering	391-4017	
58	Jim	Hoffman	CVWD	Stormwater	—	
59	Renee'	Luna	CVWD	Stormwater	398-2661	
60						

APPENDIX G

MONITORING ANNUAL REPORT

The Monitoring Annual Report is included under separate cover as

Watershed Annual Report

Volume 2 of 2

(Appendix G)

WARREN D. WILLIAMS
General Manager-Chief Engineer

0002995

1995 MARKET STREET
RIVERSIDE, CA 92501
951.955.1200
FAX 951.788.9965
www.rcflood.org

123267

RIVERSIDE COUNTY FLOOD CONTROL
AND WATER CONSERVATION DISTRICT

January 15, 2009

Mr. John Robertus, Executive Officer
California Regional Water Quality
Control Board – San Diego Region
9174 Sky Park Court, Suite 100
San Diego, California 92123

Dear Mr. Robertus:

Re: Report of Waste Discharge for the Santa Margarita River Region of Riverside County Order No. R9-2004-001, NPDES No. CAS0108766

This letter and the enclosures comprise the Report of Waste Discharge (ROWD) for the area-wide municipal separate storm sewer system (MS4) National Pollutant Discharge Elimination System (NPDES) Permit No. CAS0108766, San Diego Regional Water Quality Control Board Order No. R9-2004-001. This ROWD is an application for renewal of the area-wide MS4 NPDES Permit for Riverside County Flood Control and Water Conservation District (RCFC&WCD), the County of Riverside (County), and the incorporated cities of Riverside County within the upper Santa Margarita River watershed (Menifee, Murrieta, Temecula, and Wildomar) collectively referred to herein as "Permittees."

Order No R9-2004-001 does not specify the requirements of the ROWD. However, the attached ROWD includes the following information:

- Applicant information, including Permittee contacts, legal authorities, description of the Permit Area, and funding sources;
- Overview of the upper Santa Margarita River watershed, including population, land use, Receiving Waters, and the MS4;
- Changes in land use and/or population over the 2004 MS4 Permit term and projections for changes over the next MS4 Permit term;
- Highlights of the Permittee compliance programs over the 2004 MS4 Permit term;
- Evaluations of the Permittees existing compliance programs based on water quality data collected to date; and

- Activities the Permittees propose to undertake during the next MS4 Permit term, including implementation of Low Impact Development (LID) requirements and compliance assessments and targets.

In addition, the ROWD includes an assessment of the economic conditions and the projected impact of these conditions on sources of compliance program funding. Based on this assessment, it appears that the major challenge facing the Permittees over the next MS4 Permit term will be maintaining existing compliance programs. In 2004 both the Permittees and the San Diego Regional Water Quality Control Board (Regional Board) staff invested significant time and resources in the development of the current MS4 NPDES Permit (hereinafter referred to as the 2004 MS4 Permit) which define the current compliance program. The Permittees believe, with exceptions outlined in the ROWD, that the existing Permit is protective of water quality and should be reissued as is.

Permittee representatives met with Regional Board staff on September 8, 2008 to obtain guidance for preparation of the ROWD. In that meeting, Regional Board staff provided their expectations regarding the ROWD. Based on the Permittee internal discussions and discussions with Regional Board staff, the Permittees propose to maintain the provisions of the 2004 MS4 Permit and DAMP with limited modifications to reflect:

- Updated references to related orders by the San Diego Regional Board and State Water Resources Control Board (State Board);
- Identification of impairments to Receiving Waters in the Santa Margarita Region;
- Evolution of compliance programs;
- Further standardization and definition of terms;
- Deletion of requirements in the 2004 MS4 Permit that described the development of compliance program elements which were incorporated into the 2005 DAMP;
- Implementation of LID/Hydromodification requirements for New Development projects;
- Implementation of compliance assessments and action levels;
- Necessary modifications to the Watershed SWMP and Individual SWMPs for the 2004 - 2009 MS4 Permit term; and
- Regional Board staff comments made during the term of the 2004 MS4 Permit, including comments received during the September 8th ROWD coordination meeting.

Especially given the existing and projected economic conditions, the Permittees goal is to work with the Regional Board staff to further refine the provisions of the 2004 MS4 Permit to enhance the effectiveness of existing compliance programs within available funding. In addition, the Permittees will work with the Regional Board staff to ensure that the requirements and expectations of the fourth term MS4 NPDES Permit are clear and unambiguous and that the focus is on addressing identified water quality problems in the Receiving Waters

We look forward to working with the Regional Board staff in the renewal of the area-wide MS4 NPDES Permit. If you have any questions, please call Jason Uhley at 951.955.1273 or Claudio Padres at 951.955.8602.

Very truly yours,

WARREN D. WILLIAMS
General Manager-Chief Engineer

Enclosures: ROWD (one hard copy and one CD)

c: Santa Margarita River Region MS4 Permittees, w/CD
Eugene Bromley, USEPA Region IX, w/CD
James Smith, CRWQCB – San Diego Region
Ben Neill, CRWQCB – San Diego Region
David Huff, Riverside County Office of Legal Counsel, w/CD
Robert Collacott, URS, w/CD

CP:JU:bjp

REPORT OF WASTE DISCHARGE

Submitted To

SAN DIEGO REGIONAL WATER QUALITY CONTROL BOARD
(Order No. R9-2004-001)

and

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY – REGION IX
(NPDES No. CAS0108766)

JANUARY 15, 2009

SANTA MARGARITA RIVER REGION

RIVERSIDE COUNTY

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT,
COUNTY OF RIVERSIDE, CITY of MENIFEE, CITY of MURRIETA,
CITY of TEMECULA, and CITY of WILDOMAR

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1.0 Executive Summary

On July 14, 2004 the San Diego Regional Water Quality Control Board (Regional Board) adopted Order No. R9-2004-001, an area-wide National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) permit (2004 MS4 Permit); this permit expires on July 14, 2009. A Report of Waste Discharge (ROWD) for renewal of the 2004 MS4 Permit must be submitted no later than 180 days in advance of the expiration date (i.e., by January 15, 2009).

This ROWD is an application for renewal of the 2004 MS4 Permit (NPDES No. CAS0108766) for the MS4 owned and operated by the Riverside County Flood Control and Water Conservation District (District), the County of Riverside (County), and the incorporated cities of Riverside County within the upper Santa Margarita River watershed (collectively, the Permittees). The newly incorporated cities of Menifee and Wildomar are included in this application as a Notice of Intent to participate in the updated MS4 Permit.

The content of this document is structured to identify:

- Information about the applicants (Section 3.0),
- Information on the area to be covered under the MS4 Permit (Section 4.0),
- An overall evaluation of the Permittees' existing programs based on water quality trends (Section 5.0),
- Accomplishments and recommendations for the Permittees' regionally implemented programs (Section 6.0) and
- Accomplishments and recommendations for the programs implemented as part of the Individual Stormwater Management Plans (SWMPs) (Section 7.0).

The Riverside County Drainage Area Management Plan (DAMP) documents the model implementation plan from which each of the existing Permittees has developed their respective Individual SWMP to implement the DAMP. In addition a Watershed SWMP has been developed to describe the programs that will be implemented regionally. The Annual Reports submitted to date describe the implementation of these SWMPs and document how they have evolved over time.

This ROWD builds on these Annual Reports by highlighting the major accomplishments of these programs, evaluating the long-term effectiveness of the programs and recommending revisions to the programs to enhance the efficiency and effectiveness of the programs to manage Urban Runoff to protect Receiving Water quality. To promote clarity of intent, terms defined in the 2004 MS4 Permit are capitalized in this ROWD.

Due to the impacts of the current economic recession on Permittee budgets and the effectiveness of existing Urban Runoff management programs, the Permittees' primary focus during the next MS4 Permit term will be on maintaining existing compliance programs in the face of significant cuts in basic municipal programs and services. Riverside County is one of the areas most affected by the mortgage crisis and the Santa Margarita Region is one of the most impacted areas of Riverside County. This crisis is having significant impacts on Permittee resources and projections for a deepening recession promises to exacerbate these impacts. Further, monitoring data indicates that the existing compliance programs have been effective in maintaining water quality. This ROWD focuses on maintaining the fundamental

structure and content of the Riverside County DAMP and the Individual SWMPs. However, the Permittees have identified several enhancements and/or alterations to their programs that can be implemented to continue to increase the effectiveness of these programs, without increasing costs.

1.1 Highlights of Program Implementation

Sections 6 and 7 of this ROWD describe the numerous accomplishments of the Permittees programs during the 2004 MS4 Permit term. Some highlights of the major accomplishments for the Permittees include:

- Development and implementation of a Water Quality Management Plan (WQMP) that addresses post-construction Urban Runoff management for New and Significant Re-Development.
- Development and implementation of the Watershed SWMP and the Permittee's Individual SWMPs.
- Development of handbook to standardize post-construction Best Management Practice (BMP) selection and design in Riverside County. Ongoing updates to the handbook include a plan to incorporate and promote low impact development design concepts.
- Development and enhancements to the design template for developing project-specific WQMPs
- Development of a Frequently Asked Question (FAQ) document to assist developers and plan review staff in understanding WQMP requirements and expectations.
- Development of coordinated BMP manual for firefighting agencies.
- Development, implementation and maintenance of Permittee databases to track construction sites 1-acre or larger. In addition, the Permittees have standardized a construction reporting spreadsheet used for Annual Reports, updated inspection forms, and enhanced the construction outreach program.
- Creation of Permittee databases to track industrial and commercial facilities.
- Creation and maintenance of the Storm Water Protection website that offers educational resources and free brochures targeting residents, businesses, developers, contractors, and elementary school children.
- Partnership with the Mission Resource Conservation District to provide an educational outreach programs targeting both schools and adults.
- Continued participation in the Consolidated Program for Water Quality Monitoring (Consolidated Monitoring Program) that includes collection of water quality samples at MS4 outfalls and Receiving Waters.
- Participation in regional and statewide monitoring efforts such as the Southern California Monitoring Committee (SMC), Southern California Coastal Water Commission and National Water Resources Institute.
- Participation in the California Stormwater Quality Association (CASQA), including the leadership roles of Officer, Director, and Legislative Chair.
- Development of the Upper Santa Margarita Region Integrated Regional Watershed Management Plan

- Continued partnership and coordination with the Bureau of Reclamation on a watershed plan and water quality model for the Santa Margarita watershed
- Continued participation in the Santa Margarita Lagoon nutrient Total Maximum Daily Load (TMDL) development process
- Participated in a stakeholder workgroup process led by Regional Board staff to revise REC 1 Basin Plan requirements for TMDLs

1.2 Summary Evaluation of Program Implementation

The trend analysis presented in Section G-8.2 of the FY 2007/2008 Watershed Annual Report and reviewed in Section 5.3 of this ROWD indicates that after almost 14 years of active Permittee involvement in MS4 Permit related Urban Runoff management programs, the significant increase in population (over 300 percent) and associated rapid urbanization that the area has experienced has not resulted in any statistically significant increases in Pollutant concentrations in Receiving Waters in the Santa Margarita Region. This indicates that the Permittees MS4 programs are and have been protective of Receiving Water quality. Pyrethroid pesticides, the one Pollutant that does appear to be linked to urbanization, has been addressed through a Toxicity Reduction Evaluation process, outreach programs, and Permittee participation to address pyrethroid pesticides and other pesticide sources at the state and federal level.

To enhance the effectiveness of the MS4 Permit compliance programs, the Permittees have agreed to implement compliance program revisions as described in sections 6 and 7 of this ROWD.

1.3 Summary of Major Recommendations for Program Revision

As described in section 3.4 of this ROWD, the Permittees are facing unprecedented fiscal impacts resulting from the national and state economic crises. The impacts on the Permittees are especially severe due to the disproportionate impact of home foreclosures in the Santa Margarita Region coupled with plummeting sales tax revenue. Unfortunately, it is anticipated that the economic conditions will persist for a significant portion of the term of the next MS4 Permit. During this period, the Permittee's MS4 compliance programs will increasingly compete with more fundamental public services for finite and dwindling resources. The challenge and priority for the Permittees will be to maintain the existing compliance programs in the face of cuts in basic programs and services.

Nevertheless, and although the various programs implemented as part of the Watershed SWMP and the Riverside County DAMP have been determined to be effective overall, Sections 6 and 7 of this ROWD identify certain areas wherein the Permittees are proposing changes to improve the effectiveness, efficiency, and transparency of these programs.

The program revisions recommended in this ROWD reconfigure existing programs in a manner that will increase the Permittees' overall ability to protect Urban Runoff quality, while limiting additional costs that would make these revisions cost-prohibitive in light of the current and foreseeable economy. Some of the major recommendations include:

Enhance Program Effectiveness Assessments and Incorporate Action Levels (Section 6.1.2.1)

The Permittees have carefully evaluated their MS4 Permit compliance programs and annual reporting forms. Based on this review the Permittees determined that:

- The overarching goal of the program is to ensure that Urban Runoff does not cause or contribute to non-attainment of Beneficial Uses in the upper Santa Margarita River watershed;
- Permittee compliance programs are process based and, consistent with the Maximum Extent Practical (MEP) approach, are incrementally adjusted as part of the annual reports and comprehensively reevaluated and if necessary, revamped as part of each ROWD;
- Monitoring data should be used to drive long term program assessments and assess goal attainment as part of the ROWD; and
- Process based Municipal Action Levels (MALs) should be used to evaluate annual program implementation to ensure that programs are implemented to the MEP and identify the needs for incremental adjustments.

The Permittees have proposed revised Effectiveness Assessment metrics and MALs for use in Permittee Annual Reports consistent with the aforementioned findings and as described further in Section 6.1.2.1. The MALs are intended to function as triggers, or minimum bars that if breached, would require the Permittees to evaluate the appropriate program elements to determine if adjustments are necessary to attain the MEP standard. The Permittee proposal will not only add transparency to the Permittees compliance programs but assist Permittees in evaluating and adjusting their Permit compliance programs to assist in attaining Water Quality Standards. Further, the proposed effectiveness assessment metrics can be implemented without significantly increasing the Permittees' program costs.

Revisions to the IC/ID Program (Section 7.8.2)

During the 2007/2008 MS4 Program audits conducted by PG Environmental and Regional Board staff, several questions were raised regarding the Permittees existing Illicit Connection/Illegal Discharge(IC/ID) field monitoring programs. The Permittees have evaluated the Regional Board and PG Environmental staff's comments and proposed a revised IC/ID Program based on the following:

- Random selection of MS4 outfalls throughout the Santa Margarita Region;
- Rotating MS4 outfall sites annually to maximize coverage of the MS4;
- Partnering one District staff person with one city/county code enforcement officer for data collection to ensure consistency in sampling procedure/collection and quick response to detected IC/ID events.

Implementation of a Post-Construction Treatment Control BMP Inspection Program (Section 7.2.2.6)

Consistent with Regional Board staff's request to consider development of a post-construction Treatment Control BMP inspection program, the Permittees have developed a proposal that they plan to implement when economic conditions allow. This proposal would enhance the existing business and Permittee facility inspection programs described in the Riverside County DAMP by incorporating inspections and maintenance verification of Treatment Control BMPs. Treatment Control BMPs constructed as part of residential developments, or other developments not captured by the Permittees' existing business inspections would be addressed through an annual self-certification program.

Revisions to the Dry Weather Monitoring Program (Section 6.4.4.1)

The Permittees have committed to participating in the Regional Watershed Monitoring Program developed in conjunction with the Southern California Coastal Water Research Project (SCCWRP). Six annual monitoring events were scheduled for the upper Santa Margarita River watershed. Consistent with the agreement reached by SCCWRP, Permittee, and Regional Board staff, three of these sites would be collected by the Permittees and three through the Surface Water Ambient Monitoring Program (SWAMP). The costs for implementing the three sites to be implemented by the Permittees would be offset by reducing the Permittees existing dry weather triad monitoring events (three stations) from twice a year to annually.

Development of a LID Manual (Section 7.2.2.1)

The Permittees have committed to develop a Low Impact Development (LID) Implementation Manual based on the LID Manual currently being developed by the SMC and CASQA.

Hydromodification Management Plan (Section 7.2.2.2)

The Permittees have committed to develop a revised hydromodification management plan based on the findings of the final SCCWRP Hydromodification Management report currently under development.

Participate in a Watershed Based TMDL for the Santa Margarita Lagoon (Section 6.4.4.7)

The Permittees understand that, due to economic conditions, State funding for the Santa Margarita Lagoon watershed-based TMDL has been withdrawn. As described in Section 3.4, economic conditions are also impacting the Permittees' funding sources and the Permittees are struggling to maintain sufficient resources to fund their existing compliance programs. Therefore, the Permittees cannot currently support committing additional funds toward a third party TMDL effort. The Permittees are, however, agreeable to discussing with the Regional Board a elimination or reduction of various required compliance activities that are not measurably enhancing the their ability to attain Water Quality Standards, which in turn could allow the Permittees to redirect some of their existing resources into the third party TMDL effort. Some program elements that could be considered for discussion are described in Section 6.4.4.7.

Pyrethroid Pesticide BMP Implementation

The Permittees have committed to implementing several BMPs to address possible urban sources of pyrethroid pesticides. In addition the Permittees have committed to working through CASQA to facilitate regulatory change in pyrethroid pesticide use to curtail potential causes of receiving water impairment.

Adjustments to the Monitoring Program

The Permittees have proposed additional revisions to the monitoring program to streamline implementation and increase its utility.

2.0 Introduction

The Regional Board adopted Order No. R9-2004-001 (NPDES No. CAS0108766), an area-wide NPDES MS4 permit (2004 MS4 Permit) on July 14, 2004. This ROWD is a required component for renewal of the 2004 MS4 Permit. The 2004 MS4 Permit authorizes discharges of Urban Runoff from the MS4 owned and operated by the Permittees.

Capitalized terms used in this ROWD are defined in the glossary of the Riverside County DAMP. The Riverside County DAMP serves as the model compliance document used by the Permittees to develop the Watershed and Individual SWMPs. To save costs and increase the effectiveness of the MS4 Permit compliance programs, the Permittees will maintain the Riverside County DAMP as the primary document that describes Permittee compliance programs. The Permittees individual and regional compliance programs are then described in more detail in the Individual and Watershed SWMPs.

This ROWD has been written and formatted to address the requirements outlined in United States Environmental Protection Agency (USEPA) *Interpretative Policy Memorandum on Reapplication Requirements for Municipal Separate Storm Sewer Systems* contained in the Federal Register, Volume 61, page 41698 (61 FR 41698), and to include commitments made in the various compliance documents, annual reports and in meetings with the Regional Board.

Additionally, as discussed in the meeting with Regional Board staff on September 9, 2008 and as supported by the above mentioned USEPA guidance, this ROWD relies on the fourth year Annual Reports to document the programs implemented by the Permittees. The fourth year Annual Report also includes a comprehensive evaluation of Permittee monitoring data to date and includes preliminary recommendations for Permittee compliance programs based on that data. As part of the ROWD process, the Permittees have reassessed their existing programs that are described in the Annual Reports, the monitoring conclusions and program recommendations contained in the fourth year Annual Reports, and in this ROWD, are making additional recommendations for revisions to improve the efficiency and effectiveness of these programs at improving and protecting the quality of our Receiving Waters.

The following sections of the ROWD are summarized as follows:

Section 3.0 - Information about the Permittees, their legal authority to implement the existing and proposed programs, the Permit Area, and the Permittee's funding sources and economic outlook relative to continued funding of the MS4 Permit compliance programs.

Section 4.0 – Information about the upper Santa Margarita River watershed, including physiography and geology, hydrology, climate, population, land use, surface water bodies and their Beneficial Uses and Impairments, and the MS4. This information provides context for the MS4 Permit compliance program in the Santa Margarita Region.

Section 5.0 – An overall evaluation of the Permittees existing programs based on water quality data collected to date and proposed compliance program modifications.

Section 6.0 – Evaluation of regional compliance programs, including a summary of accomplishments and proposed program revisions.

Section 7.0 – Evaluation of compliance programs individually implemented by the Permittees, including a summary of accomplishments and proposed program revisions.

3.0 Applicant Information

3.1 Permittee Contact Information

Table 1 provides the contact information for each of the Permittees in the Santa Margarita Region.

Table 1. Permittee Contact Information

	Primary Contact	Staff Contact	Address
District	Warren D. Williams General Manager, Chief Engineer 951.955.1275	Jason Uhley Engineering Project Manager 951.955.1273 juhley@rcflood.org	1995 Market Street Riverside, CA 92501
City of Menifee[1]	George Wentz City Manager 951.672.6777	Addison Smith Building Official 951.672.6777	29683 New Hub Drive, Suite C Menifee, CA 92586
City of Murrieta	Patrick A. Thomas Director of Public Works 951.304.2489	Bill Woolsey 951.461.6073 WWoolsey@murrieta.org	1 Town Center 24601 Jefferson Avenue Murrieta, CA 92562
City of Temecula	Daniel A. York City Engineer 951.694.6411	Aldo Licitra 951.694.6411 aldo.licitra@cityoftemecula.org	43200 Business Park Drive Temecula, CA 92589
City of Wildomar[1]	John Danielson City Manager 951.677.7751	Michael Kashiwagi, P.E. Director of Municipal Services (916) 683-3340 X 15 (Office) (916) 206-2238 (Cell) Local Cell 909.200.0523	23873 Clinton Keith Road, Suite 111 Wildomar, CA 92595
County of Riverside	Gary Christmas Chief Deputy County Executive Officer	Mike Shetler Senior Management Analyst 951.955.1110 mshetler@rceo.org	4080 Lemon Street, Suite 400 Riverside, CA 92501

3.2 Statement of Legal Authority

The Co-Permittees have adopted ordinances regarding the management of Urban Runoff. The ordinances provide the Permittees with the legal authority to implement the requirements of the 2004 MS4 Permit and 40 CFR Section 122.26(d)(2)(i)(A-F). The Permittees also provided certification of adequate legal authority to comply with the 2004 MS4 Permit and to implement the Riverside County DAMP to the

[1] As the Cities of Menifee and Wildomar are recently incorporated, the County of Riverside is currently handling their stormwater and MS4 permitting issues. Once these cities are fully established and staffed, updated contact information will be provided to the Board. The cities will assume responsibility for their programs on October 1, 2009.

Regional Board. However, it is noted that the newly incorporated cities of Menifee and Wildomar will submit their certifications following adoption of the updated MS4 Permit.

However, there are limitations to the authority the Permittees have for enforcement actions. The Permittees do not have legal authority over discharges into their respective MS4 facilities that originate from agricultural activities, state and federal facilities, utilities and special districts, Native American tribal lands, wastewater management agencies and other point and non-point source discharges otherwise permitted by, or under the jurisdiction of, the Regional Board or USEPA. Examples of non-point sources of Pollutants not under the control of the Permittees include materials from operation of internal combustion engines, atmospheric deposition, brake pad wear, tire wear, residues from lawful application of pesticides, nutrient runoff from agricultural activities, and leaching of naturally occurring minerals from local geography.

Also, the Permittees do not have the authority to enforce the provisions of California's General Permit for Storm Water Discharges Associated with Industrial Activities (General Permit-Industrial) or California's General Permit for Storm Water Discharges Associated with Construction Activity (General Permit-Construction). The State Water Resources Control Board (State Board) issues these NPDES permits, and neither the State Board nor the Regional Board has the authority under the Clean Water Act to delegate responsibility for administering these NPDES permit programs to the Permittees. However, the Permittees' local storm water and erosion control ordinances may address items similar to those identified in these statewide NPDES permits.

3.3 Permit Area

The Permit Area is defined as the urbanized area serviced by the Permittee's MS4 facilities. The Permit Area is located within the area delineated by the County boundary line on the south and the limits of the jurisdiction of the San Diego Regional Board on the north, east, and west. It is important to recognize that the Clean Water Act exempts agricultural activities from regulation under NPDES and the Permittees do not have legal jurisdiction over storm water discharges into their MS4 facilities from:

- California and federal facilities,
- Areas under the jurisdiction of San Diego County,
- Utilities and special districts, and
- Native American tribal lands.

These areas are not included in the Permit Area. In addition, other point and non-point source discharges otherwise permitted by or under the jurisdiction of the Regional Board or USEPA may affect water quality in the Murrieta and Temecula Creek watersheds.

The area of Riverside County under the jurisdiction of the Regional Board is less than 8 percent of the 7,300 square miles within Riverside County. Of the 27 municipalities within the whole of Riverside County, only five include areas under the jurisdiction of the Regional Board.

3.4 Funding Sources and Economic Projections

3.4.1 Funding Sources

The costs incurred by the Permittees in implementing the SWMPs fall into two broad categories:

- **Shared Costs**. These are costs that fund activities performed mostly by the District under the Implementation Agreements. These activities include coordinating the overall storm water program, coordinating other interagency cooperative efforts such as the Compliance Assistance Program (CAP), participating in CASQA activities, representing Permittees at meetings of the Regional Board or State Board and other public forums; preparing and submitting compliance reports and other reports required under the MS4 Permit, conducting Urban Runoff monitoring and public education outreach programs, responding to Water Code Section 13267 requests, providing other program documentation, and coordinating consultant studies, Permittee meetings, and training seminars.
- **Individual Permittee Costs for Individual SWMP Implementation**. These are costs incurred by each Permittee for implementing within its jurisdiction the BMPs (drainage facility inspections for illicit connections, drainage facility maintenance, drain inlet/catch basin stenciling, emergency spill response, street sweeping, litter control, public education, construction activity inspection, development of implementation plans, etc.) comprising the Individual SWMPs.

Historically, the Permittees have employed several funding methods to finance their MS4 Permit compliance activities. Unfortunately, the mortgage crisis, collapse of the housing market, and the economic recession has resulted in the cessation of virtually all development activity and has significantly reduced property and sales tax revenue. Property tax revenues have been reduced by the high level of foreclosure activity, reduced property values and a significant decline in assessed valuations. Property tax revenues have been further reduced by homeowner requests for reassessments to reflect the reduced property values. The impact of these economic conditions on the Permittees in the Santa Margarita Region has been particularly severe. As a result, the aggregate funding available to the Permittees has been severely reduced, and it is anticipated that this condition will continue well into and possibly throughout the next Permit term. The funding methods historically used and the effects of the economic situation on the availability of funds through these sources are summarized as follows:

- **Santa Margarita Watershed Benefit Assessment Area**. In 1991, the District established the Santa Margarita Watershed Benefit Assessment Area to fund its MS4 Permit compliance activities. Currently, the Benefit Assessment revenues fund the District's share of the area-wide MS4 Permit program activities and the District's individual compliance activities as a Permittee. Under the Benefit Assessment each parcel is taxed based on the impervious area of each parcel at a set rate established by District Ordinance 14. This rate has not been increased since 1991 due to Proposition 218. In 2007/08 the Santa Margarita Benefit Assessment generated approximately $410,000 dollars in revenue.

  Outlook: The District expects at best to maintain, if not see temporary reductions in Benefit Assessment revenues due to the significant number of homes that are not paying property tax due to foreclosure. Pursuant to Article 13.D of the California Constitution, an increase in the established Benefit Assessment rate to compensate for these reductions requires approval of 2/3

of the voters or 50 percent of the property owners and is highly unlikely given the current economic climate. Revenues will not increase until the development industry recovers.

- **General Fund /Other Revenues**. The County and the cities utilize general fund revenue to finance most of their MS4 Permit compliance activities. General fund revenue is generated by property tax, sales tax, and auto license taxes.

  Outlook: The Permittees expect a continued reduction in th**e funds** available through General Fund / Other Revenues through at least FY 2009 /2010. Although optimistic that conditions will begin to stabilize toward the end of 2009, the Permittees cannot speculate as to when revenues will recover to previous levels.

- **Fees**. Several Permittees charge fees for services such as inspections, plan check, and other recoverable costs related to compliance with the 2004 MS4 Permit. These fees cover both the direct and indirect costs associated with conducting these inspections/reviews including associated compliance tracking and reporting.

  Outlook: It is notable that, with the virtual collapse of the development industry in the Santa Margarita Region, the fees received by the Permittees have been significantly reduced. With this reduced level of fee-based income, maintenance of the existing inspection and plan review programs will place an increased burden on overall funding of the compliance programs. The Permittees do not expect revenues from fees to recover until the development industry recovers. Even with recovery of the development industry, it is anticipated that over the long-term, revenues from fees will be reduced for the City of Temecula and the County due to the reduced area remaining for development within their jurisdictions.

- **Grants.** The Permittees have actively pursued and, as available, used Grants to fund compliance programs.

  Outlook: In December the state's budget crisis resulted in a directive to state agencies from the Department of Finance to halt projects that rely on bond funds, including those funded by Prop 40, Prop 50, or Prop 84. The State of California is the primary source of grant funding for water quality projects. Future availability of funds to resume grant-funded projects is uncertain.

It is clear that the current economic climate and that of the foreseeable future is creating a significant burden upon the Permittees that will make the continuance of all existing MS4 Permit compliance programs increasingly difficult. New funding sources or alternative combinations of funding sources will likely be required to ensure continued funding of even the current MS4 Permit compliance programs.

3.4.2 Economic Projections

According to Chicago Title, Southwest Riverside County has experienced a very significant increase in supply of single-family residential units on the market. As a result, housing price indicators are very negative. In the majority of the Southwest Riverside submarket, the pending price is less than the closing price indicating general price weakness. The October, 2008 count of bank owned (REO) properties for Riverside County as a whole was 12,078. The number of home in foreclosure was 23,480. The presence of high levels of REO properties will continue to negatively affect home prices. In addition, the level of foreclosures is increasing.

With regard to other sectors of the economy, Riverside County has taken a serious turn for the worst in 2008, with projections indicating that the severe downturn will continue through 2009 at the very least.

The economic difficulties being faced in the Southwest Riverside submarket is the result of the dramatic downturn in the housing market in this area, the national financial turmoil, the worldwide credit crisis, and the increasing consumer debt crisis. According to Beacon Economics, a respected economics consulting firm in Los Angeles, Inland Southern California is clearly at the epicenter of this economic turmoil, with extremely high rates of unemployment at present. Unemployment rates in Inland Southern California are expected to reach 12.4 percent before this deep recession is over. Housing prices are expected to continue their precipitous decline from their peak levels in the two Inland Southern California counties through at least 2011. According to Dataquick, median home prices in Riverside County peaked at $415,000 in January 2007. At the end of this cycle, the median home price in Riverside County is expected to be $198,000. Figure 1 depicts the median housing price in Riverside County over the period 1990 to August 2008.

Figure 1. Riverside County Median Housing Price (1990 – August 2008)

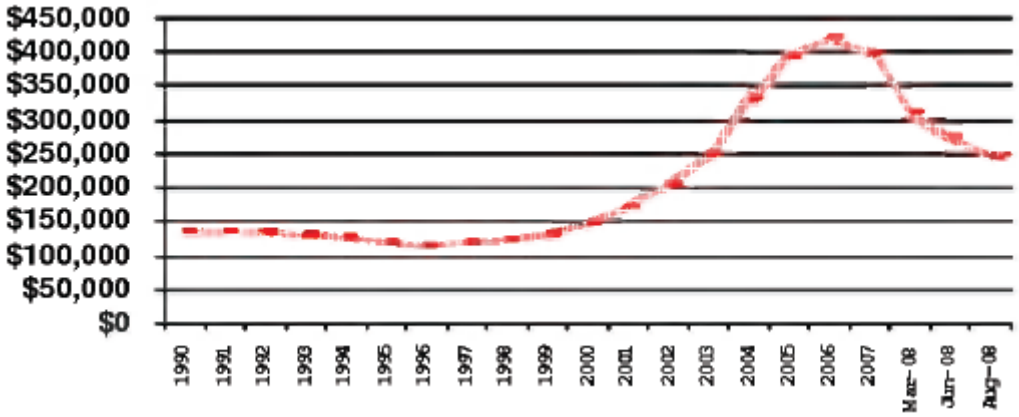

Source: Riverside County Center for Demographic Research. 2008. Riverside County Progress Report, pg 14.

Local Government sales tax revenues remained fairly stagnant through 2006 and began to decline in early 2007, according to Beacon. By the second quarter of 2008, taxable sales in Riverside County declined by 7.7 percent. The decline is expected to continue with taxable sales possibly bottoming out by 2010. Recovery of these reduced revenue streams will likely not occur within the next permit term.

As a direct outcome of the current economy and the economic outlook into the next MS4 Permit term, the number of New Developments proposals has plummeted and any significant rebound is not forecast. New and redevelopment projects will likely remain minimal. As shown in Figure 2, the number of housing units being added each year has dropped below the levels seen at any point in time during the 2004 MS4 Permit. These numbers will likely continue to decrease for a significant portion of the new MS4 Permit term.

Figure 2. Riverside County Housing Units Added (1990 – 2008)

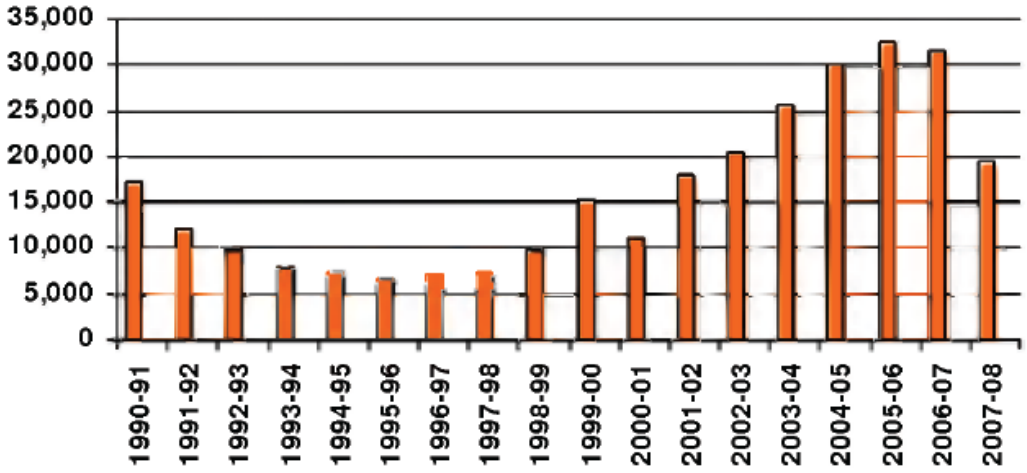

Source: Riverside County Center for Demographic Research. 2008. Riverside County Progress Report, pg 12.

These economic issues and projections directly affect and limit both:

1. The need for including enhanced new and re-development requirements in the new MS4 Permit, and
2. The Permittees ability to fund, and even seek new funding sources for additional MS4 Permit requirements for new and re-development projects.

Therefore, as described in Section 7.2, the Permittees are not recommending and cannot financially support any significant increases to their Development Planning activities. Permittee specific projections are as follows:

3.4.2.1 County of Riverside

The County is operating with a structural deficit of $12 million and plans a 25 percent budget reduction from FY 2008/2009 through FY 2011/2012. The County's current budget of $4.7 billion represents a 5 percent reduction from the previous year and next year's budget is expected to be cut by 10 percent. These cuts are directly associated with the overall decline in property values and the high number of foreclosures. There are concerns about having to use discretionary funds to meet State mental health and social service mandates. In addition, the County is dependent on funds from federal and state sources. If during this time of economic crisis federal and state funding sources are reduced or eliminated, any unfunded State and Federal programs will be terminated. Only core County programs will continue.

The primary source of general fund revenue is from property taxes and sales tax. With the unprecedented number of foreclosures, reduced property values, and declining sales tax revenue, general fund revenue is in a downward spiral. Another source of funding is through the Solid Waste Tipping Fees paid at the County landfills. Volume is down 15 percent since 2006 with anticipated downward trend to 40 percent reduction in solid waste through 2014. Programs that are partially funded through tipping fee allotments will be impacted. Due to the declining economy the recycling market has collapsed. Virtually no recyclable materials are being shipped for reprocessing. This loss of revenue and increased disposal costs is further impacting the general fund.

Cuts of 25 percent for all Net County Cost general fund programs will translate into reduction of County services and elimination of unfunded state and federal programs. Only core value programs will be provided (including public safety and fee programs)

The County has instituted a hiring freeze and required each department to create a report outlining the projected effects of the budget cuts. The County currently employs over 20,000 people, and layoffs are expected to result from the findings of these departmental reports. It is anticipated that this will impact program delivery for stormwater related activities. No County department will be able to sustain current staffing levels as they try to meet the 25 percent budget reduction strategy.[2] [3]

3.4.2.2 City of Menifee

The newly incorporated City of Menifee FY 2008/2009 initial budget was estimated from their comprehensive fiscal analysis that was submitted to the Local Agency Formation Commission during the incorporation process. Because of the economic uncertainty, and the fact that the City is only now beginning to staff positions, it is unknown what the immediate impact of the fiscal crisis will be. The County is responsible for assisting the City in meeting its MS4 Permit compliance requirements during the first year of incorporation which expires October 1, 2009. Currently, the level of property tax revenue that will be available to the City is uncertain. Funding for MS4 Permit compliance requirements was not explicitly budgeted. A financial hardship currently exists because of the costs associated with incorporation.

3.4.2.3 City of Murrieta

The City of Murrieta's FY 2008/2009 budget did not increase compared to FY 2007/2008. Adjustments were made to reflect less revenue and to absorb any operating costs. However, budget cuts are anticipated for FY 2009/2010 because the immediate economic outlook is not good. There have been approximately 2,000 home foreclosures within the City. Sales tax revenue is estimated to drop 12.5 percent, property tax revenue will drop, and the State took approximately $525,000 out of redevelopment funds. Murrieta did not receive any vehicle licensing fees from the State and it appears likely that the State will take more revenue from the Cities to solve its budget problems. New NPDES requirements that increase compliance costs will create a financial hardship for the City.

3.4.2.4 City of Temecula

Various ongoing tax and investment revenues adopted in the City of Temecula's FY 2008-09 general fund revenues are projected to decrease from FY 2007-08. Sales and use tax revenues are expected to decrease in FY 2008-09 compared to FY 2007-08. This decrease is primarily the result of the decline in general consumer goods, electronic retail, and auto sales. Property tax revenue is also expected to decrease due to decreases in supplemental tax receipts attributed to the impact of the housing crisis. Investment interest revenue is also anticipated to decrease due to a decline in interest rates.

As a result of the 2008/2009 State budget, Temecula's redevelopment agency will have to shift existing funds from property taxes to the State's Education Revenue Augmentation Fund coffer for schools and

[2] "The Realities of Recession in California: A Statewide Report by U.S. Senator Barbara Boxer, December, 2008, p. 18.

[3] Riverside County Executive Office, January, 2008.

colleges. As such, the amount due from the Temecula Redevelopment Agency is expected to be $898,685. As the State of California continues to address its budget deficit, the City of Temecula faces the possibility of additional revenue shifts to State coffers, further losing future revenue streams and threatening existing service levels.

In addition, a Press-Enterprise article dated December 9, 2008, reported that "Between 25 and 30 part-time Temecula employees will be without work in the new year as City officials deal with a lack of revenue and less work to go around." Furthermore, "the city is not immune to the economic slowdown, which has forced its neighbors to lay off workers and slash spending to counter drops in sales tax receipts and building permit fees. In May, the City's Finance Director reported that revenues were down $3 million compared to two years ago."

With these current and projected reductions in revenue and staff, additional requirements in the MS4 Permit or upcoming TMDL-related requirements, without any corresponding cost-equivalent offsets, will exceed the City's ability to effectively implement these new requirements and will begin to compromise the City's existing efforts to manage the existing MS4 Permit requirements.

3.4.2.5 City of Wildomar

The newly incorporated City of Wildomar FY 2008/2009 initial budget was estimated from their comprehensive fiscal analysis that was submitted to the Local Agency Formation Commission during the incorporation process. Because of the economic uncertainty, and the fact that the City is only now beginning to staff positions, it is unknown what the immediate impact of the fiscal crisis will be. The County is responsible for assisting the City in meeting its MS4 Permit compliance requirements the first year of incorporation that expires July 1, 2009. Currently, the level of property tax revenue that will be available to the City is uncertain. Funding for MS4 Permit compliance requirements was not explicitly budgeted. A financial hardship currently exists because of the costs associated with incorporation.

4.0 Overview of the Upper Santa Margarita River Watershed

4.1 Physiography and Geology

The upper Santa Margarita River watershed is defined as that portion of the Santa Margarita River watershed above the confluence of Murrieta and Temecula Creeks and includes the City of Temecula and portions of the Cities of Menifee, Murrieta, Wildomar, unincorporated County areas, portions of the Cleveland and San Bernardino National Forests, the Cahuilla, Ramona, Pauma, and Pechanga Indian Reservations and properties under the jurisdiction of Caltrans and a variety of special districts. The watershed is bounded by several mountain ranges, including the Santa Ana and Santa Margarita mountains to the North and the Palomar Mountains to the South. The upper Santa Margarita watershed includes areas in Riverside and San Diego Counties and encompasses approximately 588 square miles.

The upper Santa Margarita watershed includes two major sub-basins, drained by Temecula and Murrieta Creeks. Temecula Creek has a drainage area of 366 square miles, with steep rugged topography in the Palomar and Thomas Mountain areas and rolling hills below. The upper 316 square miles of this basin is controlled by Vail Lake (completed in 1949). Murrieta Creek has a drainage area of 222 square miles, with over 50 square miles controlled by Skinner Reservoir (completed in 1974). Although the watershed area is somewhat smaller and less rugged than the Temecula Basin, flood flows have the potential to create greater damage as they flow through the Cities of Temecula and Murrieta.

Temecula and Murrieta Creeks join along the Elsinore fault zone at the head of Temecula Canyon to form the Santa Margarita River. The Temecula Canyon is approximately five miles long, and is a steep, narrow, and rocky canyon. The San Diego-Riverside county line crosses through the Temecula Canyon. From here, the river traverses 27 miles to the Pacific Ocean.[4]

4.1.1 Watershed Characteristics

Over 50 percent of the Santa Margarita watershed has been controlled by the construction of Vail Dam in 1949 and Skinner Reservoir in 1974, which created a significant storage capacity in the upper watershed.[5] [6] 52 percent of the upper Santa Margarita River watershed is controlled by the dams. Due to this storage capacity, peak flow rates during major flow events for both existing and future land use conditions will be lower than under natural conditions.[7] [8]

[4] Santa Margarita Watershed Study: Hydrologic and Watershed Processes, Phillips, Williams and Associates, Ltd., October 26, 1998, page 1.

[5] Santa Margarita Watershed Study: Hydrologic and Watershed Processes, Phillips, Williams and Associates, Ltd., October 26, 1998, page 14.

[6] Philip Williams & Associates, Santa Margarita Watershed Study: Hydrology and Watershed Processes, October 26, 1998, p. 14.

[7] Philip Williams & Associates, Santa Margarita Watershed Study: Hydrology and Watershed Processes, October 26, 1998, p. 20.

[8] Santa Margarita Watershed Study: Hydrologic and Watershed Processes, Phillips, Williams and Associates, Ltd., October 26, 1998, page 20.

4.1.2 Stream Flow Characteristics

Murrieta and Temecula Creeks are perennial interrupted streams, i.e., they include reaches in which the flow is continuous and others where flow is ephemeral. The areas of perennial flow are located in mountain area tributaries outside of the urbanized areas serviced by the MS4s. The perennial flows disappear by seepage into the sands and gravels and resurface upstream of the confluence of Murrieta and Temecula Creeks. The creeks in the urbanized areas of the watershed, located primarily in the valley, are ephemeral and flows are only observed during and immediately after significant storm events. During major storms, after initial wetting, periods of intense rainfall result in rapid increases in stream flow in steep foothill and mountain areas.[9] "Runoff in streams in the watershed is derived primarily from rainfall, and as a result, stream flows exhibit monthly and seasonal variations similar to those shown by the precipitation records. Absence of snow pack in the tributary watershed results in a rapid decrease in flow of streams at the conclusion of the winter precipitation season. Following severe storms, discharge in the larger streams often increases in a few hours time from practically no flow to a rate of thousands of cubic feet per second. Stream flows vary greatly from month to month and from season to season."[10]

Rising groundwater is currently observed in Murrieta Creek below its confluence with the Santa Gertrudis Channel. This is consistent with the observations with the rising groundwater conditions observed by the State of California in 1956.[11] Rising groundwater is also observed in Temecula Creek approximately one quarter mile upstream of the Interstate 15 bridge. In 1956, the State of California observed more extensive rising groundwater conditions occurring as far upstream as the Highway 79 bridge. Based on the virtual absence of non-storm water flows and the rising groundwater conditions in lower Murrieta and Temecula Creeks observed prior to development of the watershed, there is no evidence that the rising groundwater is due to Urban Runoff nor that Urban Runoff has affected the quality of rising groundwater. However, use and disposal of reclaimed water and agricultural and landscape irrigation in the watershed may affect groundwater quality. Until October 2002, the Rancho California Water District augmented the flow of the Santa Margarita River with reclaimed water at a point about five miles upstream from the Temecula gauging station. Since that time, the Rancho California Water District has diverted reclaimed water to the Santa Ana watershed and instead discharged imported water at a location downstream of the confluence of Murrieta and Temecula Creeks in order to meet water supply obligations to Camp Pendleton.

For the average annual event, it is estimated that approximately 89 percent of the volume of runoff in the Santa Margarita Region is due to non-urban land uses not regulated under the federal storm water program. For the 100-year 24-hour event, 93 percent of the volume of runoff will be due to non-urban land uses. These estimates are based on the assumption that precipitation is constant across the watershed. However, precipitation (and resultant runoff volumes) in the non-urbanized upland areas is as much as four times greater than that from the urbanized valley areas.[12]

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[9] Riverside Flood Control and Water Conservation District, "Hydrologic Data for 1975-76 Season," March 1982, p. 49.

[10] State of California Department of Public Works, Division of Water Resources, Bulletin No. 57, Santa Margarita River Investigation, Volume I, June 1956, p. 48.

[11] State of California Department of Public Works Division of Water Resources, Bulletin No. 57, "Santa Margarita River Investigation," Volume I, June 1956, p. 48.

[12] State of California Department of Public Works, Division of Water Resources, Bulletin No. 57, Santa Margarita River Investigation, Volume I, June 1956, p. 11

4.2 Climate

"The climate of the Santa Margarita River watershed is typically Mediterranean, being characterized by warm dry summers and cool rainy winters. About 75 percent of the precipitation occurs during the four-month period from December through March. Mean annual depth of precipitation ranges from less than 10 inches near Vail Reservoir to over 40 inches west of Palomar Observatory, varying with elevation and topographic influences."[13] Precipitation increases with increases in elevation to the summit of the Coastal range. Shading effects of the Coastal range lead to a marked decrease of precipitation throughout the lower portions of the Inland area. Precipitation increases again farther away from the Coastal range in the northeastern area of the Inland area.[14] The significant and varied orographic features also make rainfall prediction particularly challenging in the urbanized portion of the watershed.

4.3 Population and Land Use

4.3.1 Population

The California Department of Finance estimates that as of January 1, 2008, the total population of Riverside County was about 2,088,322. Of the 2.1 million people, approximately 272,621 persons (or 13 percent) reside within the portion of Riverside County under the jurisdiction of the San Diego Regional Board. As shown in Figure 3, approximately 51,314 persons[15] reside in the unincorporated area while approximately 221,307 persons reside within the cities of Menifee, Murrieta, Temecula and Wildomar.

Figure 3. Santa Margarita Region Population by Permittee (2008)

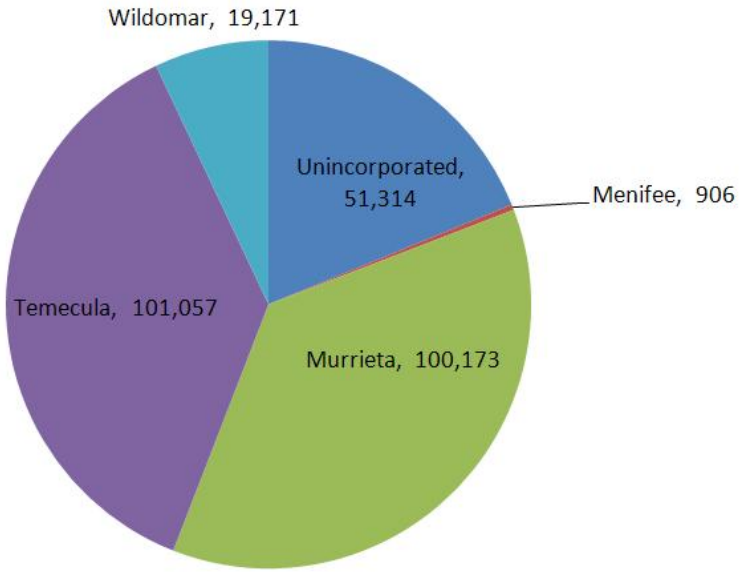

[13] State of California Department of Public Works, Division of Water Resources, Bulletin No. 57, Santa Margarita River Investigation, Volume I, June 1956, p. 11.

[14] State of California Department of Public Works, Division of Water Resources, Bulletin No. 57, Santa Margarita River Investigation, Volume I, June 1956, p. 38.

[15] Population estimate for the portion of unincorporated Riverside County within the Santa Margarita River watershed developed by the County TLMA GIS Demographics Unit based on the 2000 Census.

Although the second term and 2004 MS4 Permits covered a period of time that saw a significant amount of growth, due to the current and foreseeable economic conditions described in Section 3.4.2 of this report and decreasing areas available for development, growth during the next MS4 Permit term will be quite limited. In fact, the projected growth rate through 2015 will be significantly less than has been seen since the early 1990s. Figure 4 shows the combined populations of the Cities of Murrieta and Temecula since 1997 and projected through 2015. Similar trends are expected for the unincorporated areas and the portions of the cities of Wildomar and Menifee within the watershed.

Figure 4. Cities of Murrieta and Temecula Combined Population (1997 – 2015)

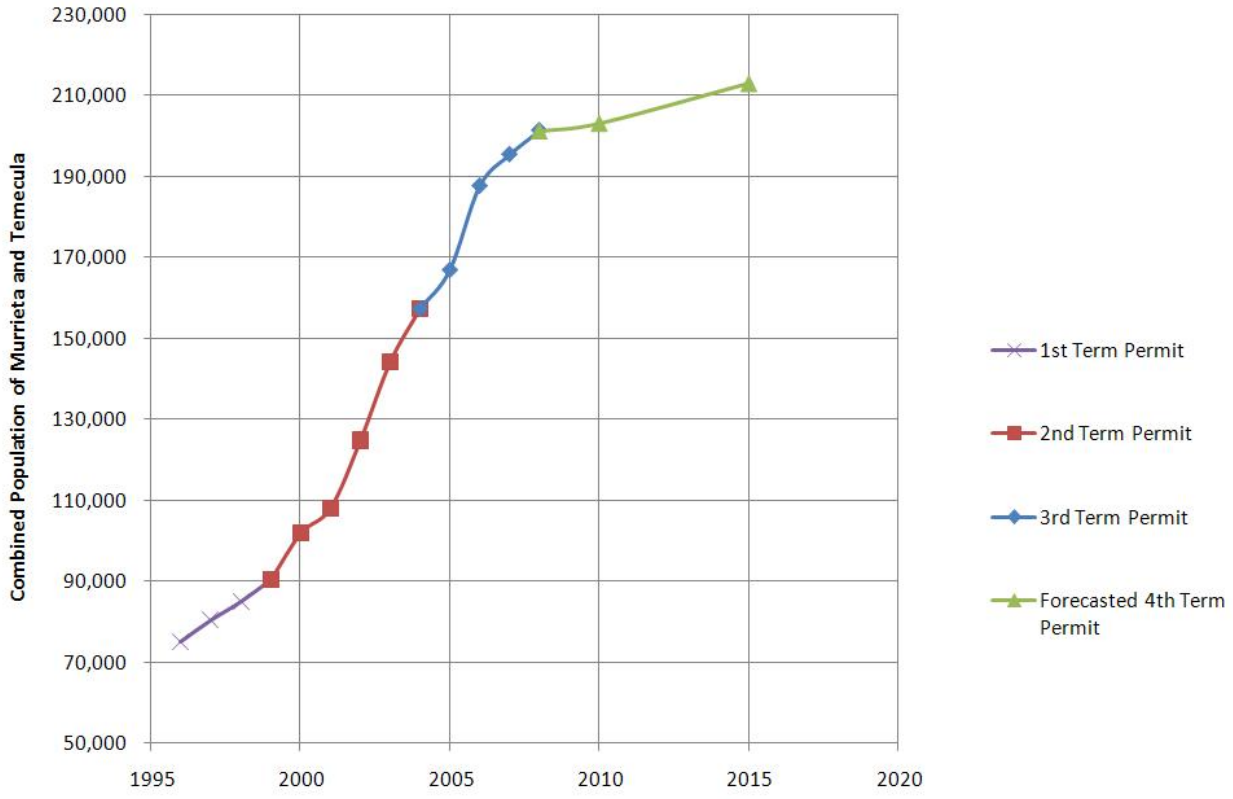

Source: Riverside County Center for Demographic Research. 2008. Riverside County Progress Report, pgs 92 & 124.

Figure 4 clearly demonstrates the dramatic reduction in growth that is expected for the term of the next MS4 Permit when compared to previous permit terms.[16] Establishing trend lines for the population in these cities further demonstrates that the growth rate (population added per year) will be lower than the previous growth rate by approximately 86 percent.

[16] 2008 Riverside County Progress Report

Table 2 shows population projections for the all of the Permittees into the year 2015.

Table 2. Population of Santa Margarita Region Co-Permittees

Co-Permittee	Year			Change (2009 to 2015)
	Estimate 2008 (a)	Estimate 2009 (b)	Projected 2015 (b)	
City of Menifee	906[c]	927[c]	5,232[c]	464%
City of Murrieta	100,173	102,277	109,715	7.3%
City of Temecula	101,057	101,356[d]	103,150	1.8%
City of Wildomar	19,171[c]	19,589[c]	20,127[c]	2.7%
Unincorporated County of Riverside	51,314[c]	52,436[c]	53,793[c]	2.6%
Total	272,621	276,585	292,017	5.6%

Notes:

(a) Unless otherwise noted, populations were obtained from the State of California, Department of Finance, E-4 Population Estimates for Cities, Counties and the State, May 2008.

(b) Unless otherwise noted, projected populations were obtained from Riverside County Center for Demographic Research. Riverside County Progress Report, 2008

(c) Data provided by County of Riverside, Executive Office.

(d) Data provided by City of Temecula.

Since the District is not a general purpose government, it is not included in this listing. Although the current population of the City of Menifee in the Permit Area is small, it is anticipated that the population will increase as it annexes unincorporated areas. Similarly, it is anticipated that the cities of Murrieta and Temecula will gain population as they annex unincorporated areas. It is not anticipated that Wildomar will see significant population increases as it is bounded on all sides by other cities and lands reserved under the MSHCP.

4.3.2 Land Use

Land uses in Riverside County within the Santa Margarita Region include open space, residential, commercial, light industrial, heavy industrial, and agriculture. The agricultural land uses include row crops, nurseries, citrus groves and vineyards, dairies, ranches, poultry and hog farms, and other agricultural related uses with one single-family residence allowed per 10 acres (County of Riverside General Plan, Land Use Element 2003). The conversion of agricultural lands and open space to other "developed" land uses has been ongoing and will continue, although at a much lower rate than previously experienced. Land uses in the Santa Margarita Region are shown in Table 3. These land uses are based on the County of Riverside Assessor Parcel Data, current as of February 2006. It should be noted that the land uses below represent ***zoned*** land uses rather than ***actual*** land uses. This overstates the actual area of urban land use in the Santa Margarita Region. Also, changes in zoning designations can cause odd fluctuations in year-to-year date.

A map of the zoned land uses is provided in Appendix A.

In 1956, only 0.3 percent of the Santa Margarita River watershed (less than two square miles) was urbanized.[17] Although there has been a significant rate of growth in population relative to the State and

[17] State of California Department of Public Works, Division of Water Resources, Bulletin No. 57, Santa Margarita River Investigation, Volume I, June 1956.

neighboring counties, half a century later, approximately 88 percent of the Santa Margarita River watershed remains as non-urban land uses (rural residential, agriculture, preserves and open space, state lands, federal lands, and tribal lands). Further, almost one-third of the upper Santa Margarita River watershed consists of federal, state, and tribal lands that are not under the jurisdiction of the Permittees' MS4 programs. It is projected that the population of Riverside County will increase approximately 5.6 percent by 2015. If the urbanized area increases proportional to population, 87 percent of the upper Santa Margarita River watershed would remain in non-urban land uses in 2015.

Table 3. 2009 Santa Margarita Region Land Uses

Urban Land Use	Acreage[(a)]	% of Land Use Subtotal	% of Total Land Use
Commercial	8,339	20.0%	2.5%
Industrial	963	2.3%	0.3%
Urban Residential (< 1 acre)	12,656	30.4%	3.7%
Parks & Recreation Facilities	4,291	10.3%	1.3%
Streets & Roads	15,439	37.0%	4.6%
Subtotal – Urban Land Use	41,688		12.3%
Non Urban Land Uses			
Preserves & Open Space	54,141	18.2%	16.0%
Rural Residential (> 1 acre)	106,773	35.9%	31.5%
Agriculture	36,389	12.2%	10.7%
Federal/State/Tribal Lands/Non-County Jurisdiction	100,076	33.7%	29.5%
Subtotal Non Urban Land Use	297,379		87.7%
Total Urban & Non Urban Land Use	339,067		100%

(a) As reported in the FY 2007/2008 Watershed Annual Report.

4.3.3 Conserved Lands

The Western Riverside County Multiple Species Habitat Conservation Plan (MSHCP) was adopted in June of 2003. It is a comprehensive, multi-jurisdictional Habitat Conservation Plan focusing on conservation of species and their associated habitats in western Riverside County. The MSHCP is one of several large, multi-jurisdictional habitat planning efforts in southern California with the overall goal of maintaining biological and ecological diversity within a rapidly urbanizing region. The MSHCP will allow Riverside County and its cities to better control local land-use decisions and maintain a strong economic climate in the region while addressing the requirements of the state and federal Endangered Species Acts. Further, as floodplains and streams tend to support critical habitat, the MSHCP will preserve many of the remaining natural streams and establish significant buffer areas between those systems and urban land uses.

Much of the remaining non-urbanized lands in the Santa Margarita Region will ultimately be incorporated into the MSHCP. The MSHCP will result in a conserved area in excess of 500,000 acres and focuses on conservation of 146 species. The MSHCP Conservation Area includes approximately 347,000 acres on

existing Public/Quasi-Public Lands and approximately 153,000 acres of Additional Reserve Land. A large portion of the conserved lands are in the upper Santa Margarita watershed (at least 145,000 acres). There are approximately 72,318 acres of existing public or quasi-public lands preserved within the upper Santa Margarita River watershed area located in Riverside County.

4.3.4 Anticipated Development 2009-2015

Proposed development during the next MS4 Permit term is an important indicator of potential new Urban Runoff sources. To the extent possible, the Permittees have identified significant New Development projects that, if constructed, will result in the conversion of primarily undeveloped land to developed land. This section describes the expected development within Permittee cities. Consistent with the current and forecasted economic conditions and population estimates, and as supported by the population information and forecasts presented in Section 4.3.1, the Permittees anticipate that the term of the upcoming MS4 Permit will be a time of little development. Following are summaries of anticipated development during the upcoming MS4 Permit.

4.3.4.1 County of Riverside

Projected trends for the County of Riverside's land use can be referenced in the Riverside County General Plan. Maps depicting the areas of future development and type of land use can be found in the General Plan maps that are accessible at http://www.rctlma.org/generalplan/area_maps.html.

- With the incorporation of the cities of Wildomar and Menifee the remaining unincorporated County area to be built out in the Santa Margarita Region during the upcoming MS4 Permit term is going to be considerably smaller.
- It is anticipated that, over the next five years, additional annexations will occur in each of the four city areas (Temecula, Murrieta, Wildomar and Menifee) that will further reduce the unincorporated County area in the Santa Margarita Region.
- The unincorporated County area in the upper Santa Margarita River watershed (east of Temecula, Menifee and Murrieta) will remain in rural, open space and additional MSHCP land uses. In addition, due to drought conditions and depletion of aquifers the prospects of New Development is unlikely. Water districts in the region cannot offer "will serve" letters to provide for water resources they do not have. Infrastructure for water supply and municipal water treatment, MS4 and flood control facilities are virtually non-existent in this area.
- Due to downturn in economy, Development Impact Fees (DIF) and Transportation Uniform Mitigation Fees (TUMF) are and will continue to be significantly under funded. This reduction in transportation funding will result in fewer road and infrastructure projects during the term of the upcoming MS4 Permit. The Transportation Department has projected limited projects for the Santa Margarita Region. The Clinton Keith Road widening project is still in the planning stages. Due to budgetary constraints, unless projects are fully funded through County finance mechanisms (TUMF, DIF, state and federal pass through from bonds and grants) most projects will be put on hold through 2012.

4.3.4.2 City of Menifee

Projected development trends for the City of Menifee are unknown, sphere of influence and annexation opportunities will allow for limited growth once the economic uncertainty of the region is resolved.

4.3.4.3 City of Murrieta

The area north of Clinton Keith Road along the east side of the I-215 freeway should see some construction towards the end of the next MS4 Permit term. Grading for the construction of a hospital has started along the freeway and it is anticipated that supporting development will follow once the hospital is open. Overall the Planning Department is receiving few applications for New Development projects. For example, a Planning Commission meeting scheduled for January 2009 has been cancelled because there are no New Development items to discuss. In light of the current and foreseeable economic conditions, the City does not anticipate any substantial New Development activity for the next few years, with limited growth possibly resuming toward the end of the next MS4 Permit term.

4.3.4.4 City of Temecula

The City of Temecula is currently experiencing a significant leveling trend in development. Throughout 2008, fewer applications were being processed than in previous years. As such, Temecula does not anticipate processing any substantial number of New Development applications within the next MS4 Permit term. It is anticipated that applications from hereon will be limited to smaller in-fill and redevelopment projects. In addition, proposed annexation areas will be limited to areas that will be set aside mostly for conservation. As Temecula is on the verge of build-out, approximately 1 percent of developable land remains available throughout the City for New Development.

4.3.4.5 City of Wildomar

Projected trends for the City of Wildomar are unknown, sphere of influence opportunities will allow for limited growth once the economic uncertainty of the region is resolved.

4.4 Surface Water Bodies, Beneficial Uses, and Impairments

Approximately eight percent of Riverside County drains into surface water bodies within the jurisdiction of the Regional Board. Those surface water bodies (or portions thereof) are listed in Sections 4.4.1 and 4.4.2.

Rivers and Streams

- Santa Margarita River (Hydrologic Unit Basin Number 2.22)
  - Murrieta Creek
    - Slaughterhouse Canyon
  - Cole Canyon
    - Warm Springs Creek
      - Diamond Valley Reservoir
  - Santa Gertrudis Creek
    - Tucalota Creek
    - Lake Skinner
  - Temecula Creek (Hydrologic Unit Basin Number 2.92)
    - Iron Spring Canyon
  - Temecula Creek (Hydrologic Unit Basin Number 2.84)
    - Tule Creek
      - Million Dollar Canyon
    - Cottonwood Creek
  - Vail Lake
    - Wilson Creek
      - Cahuilla Creek (Hydrologic Unit Basin Number 2.73)
        - Hamilton Creek
      - Cahuilla Creek (Hydrologic Unit Basin Number 2.71)
        - Elder Creek
    - Arroyo Seco Creek
    - Kolb Creek
  - Temecula Creek (Hydrologic Unit Basin Number 2.52)
    - Pechanga Creek
- Santa Margarita River (Hydrologic Unit Basin Number 2.21)
  - DeLuz Creek

4.4.1 Beneficial Uses

The upper Santa Margarita River watershed supports a variety of ecosystems and provides many Beneficial Uses (Table 4)[18]. The ultimate goal of the Riverside County DAMP and the Watershed and Individual SWMPs is to manage Urban Runoff in a manner protective of the Beneficial Uses of these Receiving Waters.

Table 4. Beneficial Uses of Receiving Waters
Upper Santa Margarita River Watershed

Beneficial Use	Murrieta Creek	Cole Canyon	Warm Springs Creek	Santa Gertrudis Creek	Long Valley	Temecula Creek	Santa Margarita River
Municipal and Domestic Supply	X	X	X	X	X	X	X
Agricultural Supply	X	X	X	X	X	X	X
Industrial Service Supply	X	X	X	X	X	X	X
Industrial Process Supply	X	X	X	X	X	X	
Ground Water Recharge	X					X	
Contact Water Recreation				X	X	X	X
Non-contact Water Recreation	X	X	X	X	X	X	X
Warm Freshwater Habitat	X	X	X	X	X	X	X
Cold Freshwater Habitat							X
Wildlife Habitat	X	X	X	X	X	X	X
Rare, Threatened or Endangered Species							X

4.4.2 Current Water Quality Concerns and Issues

Urban Runoff discharged to MS4s in Riverside County ultimately flows to various surface water bodies (inland streams, lakes, and reservoirs) and typically carries Pollutants that originate from numerous dispersed and uncontrolled sources. Examples of Pollutants that may be present in Urban Runoff are fertilizer, heavy metals, nutrients, petroleum products, sediment, bacteria, chemicals, and litter.

Because the upper Santa Margarita River watershed is large and has many land uses, the water quality concerns in sub-watersheds vary. However, each land use can potentially contribute Pollutants to nearby streams, rivers, and lakes. The infrastructure that supports people's activities (e.g., roads, parks, MS4, and wastewater collection and treatment facilities) may contribute to water quality concerns if not properly managed. Other sources of stormwater runoff, including agricultural areas, are exempt from the requirements of the NPDES permitting program established under the Clean Water Act. In addition, some Pollutants, such as total suspended solids, may be found at elevated levels in runoff from non-urban land uses. Further, certain activities that generate Pollutants present in Urban Runoff are beyond the ability of the Permittees to eliminate. Examples of these include operation of internal combustion engines, atmospheric deposition, brake pad wear, tire wear, residues from lawful application of pesticides, nutrient runoff from agricultural activities, and leaching of naturally occurring minerals from local geography.

[18] www.waterboards.ca.gov/rwqcb9/programs/

As required by Section 303(d) of the Clean Water Act, the State Board maintains a list all waters in the State that do not meet the Water Quality Standards established in the Basin Plans prepared by the Regional Boards for protection of Beneficial Uses. This list, referred to as the "303(d) List," details the Pollutant or stressor on each named water body, the potential source of Pollution, estimated affected area, as well as a priority for development of the associated TMDL. A TMDL is a plan that identifies how much Pollutant load a specific Impaired Waterbody can sustain without impacts to its Beneficial Uses. In addition to identifying the maximum Pollutant load, a TMDL is used to develop implementation plans to meet Water Quality Standards for a designated water body. Table 5 summarizes the 2006 303(d) List of Impaired Waterbodies within the upper Santa Margarita River watershed, as well as the year in which a TMDL is proposed for approval. No TMDLs have been established for Receiving Waters in the upper Santa Margarita River watershed.

Table 5. 2006 303(d) Listings for the Santa Margarita Region

Water Body	Pollutant	Potential Sources	Area Affected	Proposed TMDL Completion
Santa Margarita River (Upper)	Phosphorus	Urban runoff/storm sewers Unknown nonpoint source Unknown point source	18 miles	2019
Murrieta Creek	Iron Manganese Nitrogen Phosphorous	Source unknown Source unknown Source unknown Urban runoff/storm sewers Unknown nonpoint source Unknown point source	12 miles 12 miles 12 miles 12 miles	2019 2019 2019 2019
Temecula Creek	Nitrogen Phosphorus Total dissolved solids	Source unknown Source unknown	44 miles 44 miles	2019 2019

Table G-35 of Appendix G to the Annual Report 2007-2008 additionally identifies pyrethroid pesticides (bifenthrin and permethrin), bacteria (E. coli and fecal coliform), lead, and sediment (turbidity) as Pollutants of Concern in the upper Santa Margarita River watershed that warrant focused attention by Permittee implementation programs. These constituents have been detected intermittently or persistently at Triad and Tributary monitoring stations.

4.5 Municipal Separate Storm Sewer System

A map depicting the MS4 facilities owned and operated by the Permittees is provided in Appendix B.

5.0 Program Evaluation Based on Water Quality Trends

The overall effectiveness of the Permittees programs is assessed based on the analysis of water quality data obtained as part of the Consolidated Monitoring Program. Approximately 14 years of data have been collected through this program and have been cumulatively analyzed in the fourth-year monitoring Annual Report.

5.1 Inherent Limitations to Analyzing Water Quality Data

There are inherent limitations to analyzing water quality data from storm water. Storm water runoff is very different from mechanical wastewater or water treatment processes that usually incorporate water quality monitoring. Discharges from mechanical processes such as treated wastewater effluent and industrial discharges usually:

- Come from a single or a few readily identifiable sources;
- Are generally consistent in flow rate and chemical character from day to day; and
- Can be easily instrumented.

Conversely, Urban Runoff non-point source flows, such as those collected and analyzed as part of the MS4 Permit monitoring programs usually:

- Come from multitudes of unidentifiable or hidden sources, many of which are non-Urban in nature:
  - State, federal or tribal lands
  - Natural leaching of soils
  - Wildlife
  - Aerial deposition
  - Wildfires
- Vary widely in flow rate in response to precipitation events
- Vary widely in chemical character at any given moment due to:
  - Unidentified episodic issues related to natural phenomena
  - Magnitude of rainfall and extent of contributing area
  - Potential one-time illicit discharges that were not identified at the time of sampling
  - Unforeseen or unidentified consequences of changes in numerous land use policies (fire management, development, etc)
- Are subject to significant natural random variation; and
- Cannot be easily instrumented due to the wide variation in depth and velocity and associated impacts of natural or unnatural aggradation and degredation of natural stream beds.

Because ephemeral storm water flows are, by their very nature, particularly random in character, it may take many years before monitoring data trends can be detected or to determine the effectiveness of an

Urban Runoff control measure. Power analyses were conducted for fecal coliform, metals, and nutrients at the stations monitored in the Santa Ana Region during the 2005/06 reporting period. Power analysis is used to determine how many years of monitoring would be required to detect a given trend in the data. This tool was developed by the SCCWRP. Based on the results, for biennial monitoring, and having an 80 percent chance of detecting a change in concentration, it would take about 5-10 years of data collection to detect a change of 50 percent in concentration, 10-15 years of data to detect a 25 percent change, and 15-30+ years of data to detect a 10 percent change. It is expected that results would be similar for other parameters measured in the monitoring program in the Santa Margarita Region.

5.2 Focus Area Constituents of Concern

During the 2004 MS4 Permit term, monitoring data indicated that one or more receiving water samples have been found to contain the following constituents at levels that exceeded Basin Plan Objectives (BPO). As such they have been identified as constituents of concern.

- Nutrients (Ammonia as N, Phosphorus
- Pyrethroid Pesticides (Permethrin, Bifenthrin)
- Pathogen Indicators (E.coli, Fecal Coliform)
- Lead
- Turbidity (lab)

5.3 Analysis of Water Quality Trends

As discussed in the 2008 Santa Margarita Region Annual Monitoring Report, the results of the trend analysis and regression calculations indicate that there are no statistically significant trends in the water quality monitoring data. The lack of trends in the data presented in the Annual Monitoring Report contrasts with the rapid population growth over the same time frame. As discussed in the Annual Monitoring Report, population growth from 1990 to 2008 was approximately 300 percent for the Santa Margarita Region. This significant growth in population and resulting urban land use area contrasts sharply with the lack of statistically significant increases in concentrations of constituents of concern that would otherwise be expected in stormwater runoff from urbanized areas.

These results demonstrate and can be attributed to the effectiveness of the Permittees' programs at addressing the Focus Area Constituents of Concern, which are targeted and designed to prevent the discharge of these constituents into the Receiving Waters.

5.3.1 Recommended Compliance Program Modifications to Address Focus Area Constituents of Concern

Based on the analysis described above and in Appendix G of the 2008 Watershed Annual Report, no significant program modifications are necessary to continue to protect and improve the quality of the Receiving Waters.

Although the Permittees programs have been shown to be protective of Receiving Water quality, through continual evaluation of the programs being implemented and on-going water quality monitoring, additional measures are being proposed as part of this ROWD to address changing conditions and ensure

the ongoing effectiveness of the programs. Recommended changes to ensure the ongoing effectiveness of the Permittees programs are described in Sections 6 and 7 of this report.

6.0 Evaluation and Recommendations for Regionally Implemented Programs

6.1 Program Management

The District is the Principal Permittee for each of the three MS4 permits issued by the three Regional Boards that have jurisdiction in Riverside County. As Principal Permittee, the District performs management functions including coordination with the Regional Boards, preparation of compliance documents and Annual Reports, participation in studies and external cooperative efforts and dissemination of information to the Permittees. The Permittees implement some compliance programs that are common to all of the Permittees and which are implemented on a Countywide or regional basis to increase cost effectiveness and efficiency. Typically, the District also manages Countywide and regional programs.

6.1.1 Program Management Accomplishments and Programmatic Improvements

During the term of the 2004 MS4 Permit the following accomplishments were achieved.

- Updated the Implementation Agreement that sets forth the responsibilities of the Principal Permittee and the Co-Permittees.
- Revised the Riverside County DAMP to reflect requirements in the 2004 MS4 Permit, which served as a model document for the Permittees Watershed and Individual SWMPs.
- Developed Santa Margarita Region Watershed SWMP
- Participated in the Santa Margarita River Executive Management Team (SMREMT) to identify and address the highest priority water quality concerns in the Santa Margarita watershed, including development of a watershed model to assist with land use planning and TMDL development, coordinating watershed monitoring, and developing formal agreements between interested stakeholders for the purposes of evaluating impairment listing and data gaps in the watershed.
- Continued progress with the SMREMT on a uniform watershed plan and model for the Santa Margarita Watershed through the Santa Margarita Watershed Supply Augmentation, Water Quality Protection, and Environmental Enhancement Program.
- Participated in the Santa Margarita Lagoon TMDL workgroup in funding and overseeing the development of a comprehensive program to collect data and model the various inputs to the lagoon to be used to develop a TMDL to address nutrients.
- Participated in the Santa Margarita Watershed Water Quality Monitoring Group to coordinate the monitoring efforts of various stakeholders in the Santa Margarita watershed.
- Participated in the SMC to improve stormwater monitoring science, coordinate data collection efforts, and evaluate the effects of stormwater discharges to receiving waters specific to Southern California.
- Participated actively in various efforts of CASQA.

- Participated in the completion of an Integrated Regional Water Management Plan for the upper Santa Margarita Watershed to help pave the way for greater watershed-wide coordination and management of water resources within the upper watershed as a whole, as well as adjoining watershed and regional planning efforts.
- Participated in the development and implementation of the MSHCP for Western Riverside County which contains a comprehensive land use plan that ultimately conserves the environmental resources and habitat of approximately half of the Santa Margarita Region.
- Participated in the development of a Special Area Management Plan (SAMP) to further manage receiving waters at a watershed scale for the upper Santa Margarita Watershed by identifying, prioritizing and protecting the highest priority Waters of the U.S., while considering the broader needs of growth and transportation improvements.
- Developed and updated methods to track program effectiveness such as resident surveys, tracking hotline inquiries, and web counters.
- Enhanced Public Education program through development of new outreach materials and programs.

6.1.2 Proposed Revisions to Regional Program Management

6.1.2.1 Enhanced Program Effectiveness Assessments and Municipal Action Levels

To ensure that the Permittee's programs continue to be effective at managing the effects of Urban Runoff on Receiving Water quality, the Permittees will revise the Program Effectiveness Assessments for both the Individual SWMP and the Watershed SWMP as part of their implementation of the new MS4 Permit. An assessment strategy based on the CASQA Municipal Stormwater Program Effectiveness Assessment Guidance has been established including the establishment of:

- Measurable goals for each component,
- Measurable metrics to assess progress toward those goals,
- CASQA Effectiveness Levels for each metric; to indicate the level at which each metric can demonstrate the effectiveness of the Permittee's programs at addressing each goal.
- Timeframes in which the Permittees expect to be able to assess effectiveness using each metric.
- Municipal Action Levels (MALs) for appropriate metrics to ensure a minimum level of program implementation and identify shortcomings that could affect the Permittee's progress toward the established goals. The MALs would not be permit compliance measures, but triggers for further Permittee evaluation of the affected compliance program.

If a MAL for a metric is exceeded, the Permittees will review implementation of that program component to identify the cause of the exceedance and identify needed adjustments to avoid future exceedances. The findings of these reviews and any recommended adjustments to the Permittees programs will be reported in the corresponding section of the Annual Report submitted the following year. Further research is particularly needed to establish appropriate Municipal Action Levels for the various program areas.

After a review of the stormwater program, the Permittees have established an initial Assessment Methodology for each component including preliminary goals, measurable metrics, effectiveness levels,

timeframes and MALs for each. These initial assessment methodologies are included in tabular format in Appendix C. Although the Permittees believe the basic proposal is viable, The Permittees will review and finalize these Assessment Methodologies and associated metrics within one year following adoption of the new MS4 Permit as additional data and analysis is necessary to support specific action levels.

6.1.2.2 Revised Reporting Format

The Permittees recommend substantial revisions to the MS4 Permit requirements for the layout of the Annual Report. The Permit requires substantial duplication of reporting, which either increases the volume of the Annual Report, or requires substantial cross-referencing. In either case, it is confusing to write, and most likely, confusing to read. The Permittees recommend a meeting with Regional Board staff in the development of the new MS4 Permit to discuss methods to streamline and clarify reporting requirements.

6.1.2.3 Maintain Enhanced Watershed / MS4 Map

The Permittees are in the process of collecting data to support an enhanced MS4 facilities map. Updates completed to date are provided in the map in Appendix B. This enhanced map demonstrates initial efforts to identify the locations of:

- Receiving Waters
- MS4 facilities
- Areas of historical perennial flows
- Known blow off locations
- Wastewater storage ponds
- Sub-drainage areas
- Known non-Permittee facilities
- 36-inch diameter and larger outfalls

This map will be used to help in the tracking of IC/ID events and issues and continued updates will be submitted with the Annual Reports. The Permittees will continue to enhance this map over the next MS4 Permit term. As described in the Annual Report, the District is in the process of upgrading their web page that offers public access the District's various NPDES activities. Along with these web site upgrades, additional layers will be added to the Web-based GIS map.

6.1.2.4 Elimination of the Watershed SWMP as a separate compliance document from the Riverside County DAMP

The Santa Margarita Region is comprised of only a single watershed. Further, the Permittees' regional compliance programs are described in the Riverside County DAMP. Maintenance of a separate and duplicative Watershed SWMP is confusing, cumbersome, and does not contribute to protection of Receiving Water quality. The Permittees request that the next MS4 Permit be drafted in a fashion that allows the Permittees to maintain the Riverside County DAMP as the primary document describing regional compliance programs for western Riverside County including the Santa Margarita Region. Any

necessary changes for requirements included in the new MS4 Permit will be updated /added to the Riverside County DAMP.

6.2 Permittee Training Programs

6.2.1 Summary

The Permittees jointly fund comprehensive training and education programs for Permittee staff. These training programs are designed to train Permittee employees on the proper use and implementation of BMPs appropriate for their field of work. There are four distinct training courses currently offered including Construction Inspection, Municipal Maintenance, Industrial-Commercial Facility Inspection, and New Development Planning.

6.2.2 NPDES Training Program Accomplishments and Programmatic Improvements

- Evaluated and tested various knowledge retention methods.
- Performed Training Enhancement Analysis study (2005-2006)
- Created an on-line training registration web page where attendees can also obtain training materials.
- Annually updated training materials to address Pollutants of Concern (2005-2007)
- Added component to training to address proper use, application and timing of application of Pesticides (2007-2008)
- Began developing a formalized testing and effectiveness analysis approach (2008)

Highlights
Municipal Training: **14** Training Sessions; **900** Attendees
Construction Training: **22** Training Sessions; **626** Attendees
Industrial-Commercial Training: **11** Training Sessions; 426 Attendees
New Development Training: **13** Training Sessions; **345** Attendees

6.2.3 Long-Term Effectiveness Assessment

Throughout the term of the 2004 MS4 Permit the Permittees have evaluated and implemented various quizzes as part of the NPDES training courses. These efforts were intended to assess the retention of knowledge of the attendees and, as described in Provision K.2.m of the Watershed SWMP, serve as a component of the assessment of the long term effectiveness of the Watershed SWMP.

The quizzes used to assess employees' retention of knowledge have evolved over time as the Permittees found what worked and what did not. Quiz questions that were found to be confusing or misleading were refined or eliminated. Thus, a question-by-question analysis of the results is not possible. Instead, results from a number of the training courses with reasonably comparable quizzes were aggregated and an average score (percent correct) was established for each of these training sessions. The results of this analysis are presented in Figure 5.

Figure 5. Training Pre-Test and Post-Test Analysis

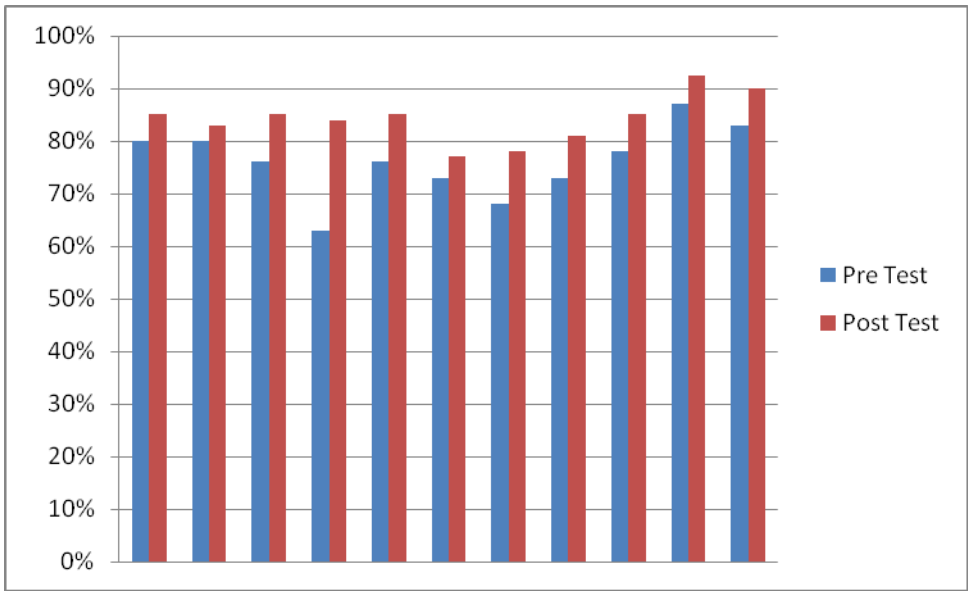

Although the required random-sample nature of this analysis is not conducive to the analysis of trends across time, two findings become evident from this analysis:

1. Permittee inspection, maintenance and planning staff generally have a high level of understanding of issues related to stormwater Pollution in their field of work.
2. Average scores on quizzes administered after the training sessions were always higher than scores on quizzes administered before the training session.

Finding 1 above can be attributed to the Permittee's proactive efforts to ensure that their employees are aware of the issues in their field of work that could contribute to stormwater Pollution. This includes annual attendance at the NPDES training courses, and on-the-job training, reminders and meetings. This fact alone is a strong indicator of the effectiveness of the Permittees training programs.

Finding 2 above demonstrates that after attending the NPDES training courses, the attendees have a higher level of understanding of the issues in their field of work related to stormwater Pollution. This indicates that the training materials, delivery and content were effective.

Based on these analyses, general feedback from the training programs, and the overall effectiveness of the Permittees' programs (as described in Section 5.3 herein) the Permittees believe their training programs to be effective. Nevertheless, the following revisions to the training programs have been identified and are proposed for implementation with the new permit to ensure ongoing effectiveness.

6.2.4 Proposed Revisions

6.2.4.1 Continued focus on Focus Area Pollutants of Concern

The Permittees commit to continue to revise the Permittee training programs to focus on Pollutants of Concern.

6.2.4.2 Standardized Effectiveness Quizzes

Over the course of the 2004 MS4 Permit, the Permittees have evaluated various methods of assessing the retention of knowledge and are now recommending a standardized approach to assessing the effectiveness of the training program.

The Permittees plan to create standardized quizzes to assess the retention of knowledge and increased understanding as a result of the Permittees' training sessions. This includes establishing core messages that the Permittees want to impart upon the attendees and, creating clear and understandable quiz questions for each core message.

This approach will help the Permittees identify if any core training messages are not being retained by attendees and to subsequently modify the training. The Permittees also hope that this approach will yield results that will, over time, demonstrate that the knowledge among Permittee staff of issues related to storm water Pollution is increasing, thus clearly demonstrating that the NPDES Training program is effective.

As a necessary part of this effort, a database to track responses will also be created.

6.2.4.3 Attendance Tracking Mechanism

At each training session a sign-in sheet is provided to track attendance to the session. Included in the sign-in sheet is an indication of the Permittee that each attendee is representing. After each training session, these sign-in sheets are scanned to PDF files and sent to each Permittee for their records. This approach requires that each Permittee manually review the sign-in sheets to determine who and how many of their staff attended the training.

The District, on behalf of the Permittees, is currently investigating various form scanning and recognition software packages to determine the feasibility of creating a sign-in sheet that, when scanned, will automatically transfer the attendance list into a database. This would facilitate tracking of staff attendance by each Permittee. At this time the District has not determined if a feasible and cost efficient program is available that will accomplish their needs.

6.3 Public Education

6.3.1 Summary

To leverage finite resources, the Permittees jointly fund a public education program. The District implements this program to disseminate information about Urban Runoff issues and to provide education on how activities may impact Receiving Waters.

The Permittees have established an ongoing watershed-based public education and outreach program known as the **Only Rain Down the Storm Drain** Pollution Prevention Program. The specific objectives of this program include:

- Fostering a broad public awareness of water Pollution concerns;
- Increasing public acceptance of Pollution Prevention activities to curtail everyday human behaviors that contribute to water quality problems;
- Educating/informing the general public, regulators and key local government and state decision makers on Urban Runoff conditions in Riverside County; and
- Promoting stewardship of local water resources.

The **Only Rain Down the Storm Drain** Program implements the public awareness objectives by focusing on three areas of Pollutant reduction/prevention:

- Public behavior;
- Proper management of Pollutants; and
- Business specific education outreach.

In addition, when attempting to make use of the finite resources available to the Public Education Program, the Permittees use these management goals to ensure that resources are used effectively:

- Focusing on Pollutants of Concern specific to each watershed region;
- Coordinating public education efforts with adjacent storm water management programs and other related education programs to share resources, coordinate outreach efforts, and avoid duplication of effort; and
- Adapt public education programs and objectives, based on effectiveness analysis, to address changing MS4 program requirements and objectives.

6.3.2 Public Education Program Accomplishments and Programmatic Improvements

The Public Education Program has developed and distributed the following educational materials during the 2004 MS4 Permit term:

- *After the Storm* – a citizen's guide to understanding MS4 Pollution in your neighborhood or when performing daily activities.
- *Automotive Maintenance & Car Care* – guidelines for keeping your auto shop or retail fuel facility in environmental shape.

- *Outdoor Cleaning Activities* – guideline for outdoor cleaning activities and wastewater disposal.
- *Pools, Spas and Fountains* –Environmental maintenance suggestions for pool, spa, and fountain owners.
- *What's the Scoop* – tips for a healthy pet and a healthier environment.
- *Household Hazardous Waste* – A schedule of collection locations for proper disposal of HHW.
- *Stormwater Pollution Found in Your Neighborhood* – door hanger.
- *Equestrian Management* – Recommendations for BMPs related to equestrian activities.
- *Spray Bottles* – Including directions to make environmental friendly recipes for pest control and household cleaning

The Permittees also initiated development of the following outreach materials

- *Landscaping and Gardening Brochure* – Initiated development a new brochure to address outdoor residential landscaping and gardening activities.
- *Septic System Management Brochure* – initiated development of a brochure to assist with septic system management.

In addition to the information provided on the Storm Water Protection website, the Public Education and Outreach Program has:

- Updated the Public Education and Outreach Program web page.
- Tested and/or implemented several new Public Education and Outreach Program effectiveness tracking mechanisms including call tracking, web counters, testing, and bilingual surveys.
- Enhanced the toll free storm water Pollution reporting hot line to include public education information and support for the public and other interested stakeholders.
- Obtained a trailer with "**Only Rain Down the Storm Drain**" graphics specifically designed for transporting materials to outreach events. It is also used as part of the booth at outreach events.
- Initiated billboard advertising within the Santa Margarita Region.
- Worked with the Mission Resource Conservation District to implement presentations to elementary and middle schools and staff to raise public awareness of Urban Runoff management issues and source control methods and to encourage volunteers, partners, and groups to gather annually for a trash and debris clean-up day in the Santa Margarita Region.
- Developed special newspaper and billing inserts, fliers and advertisements to raise public awareness of Urban Runoff management issues and source control methods. A radio advertising campaign was also developed and implemented for a time.
- Developed and presented workshops regarding household hazardous waste use and proper disposal at major home improvement stores throughout Riverside County.
- Placed advertisements in the Penny Saver and Bargain Bulletin to raise public awareness of Urban Runoff management.

- In cooperation with certain County Service Areas or other programs, pet waste signs with bag dispensers have been installed at various parks to help encourage the proper disposal of animal waste.
- Cooperated with the Western Riverside Council of Government in the Used Oil Block Cycle Grant that decreases the amount of illegally dumped motor oil by promoting the addition of new Certified Oil Collection Centers.
- Established a partnership with County Environmental Health whereby businesses cited by Environmental Health for violations of ordinances related to stormwater issues may be allowed to implement a Supplemental Environmental Project in conjunction with the **Only Rain Down the Storm Drain** program.

6.3.3 Long-Term Effectiveness Assessment

Effectiveness metrics of the Public Education and Outreach Program during the 2004 MS4 Permit term are presented in Section J.1.3 of the FY 2007/2008 Watershed Annual Report. The data indicates that overall impressions have continually exceeded the number of residents in the watershed, HHW/ABOP pounds of waste collected and pounds of waste collected per person have steadily increased over the term of the 2004 MS4 Permit.

In 2005, the **Only Rain Down the Storm Drain** program developed and implemented a survey to be distributed at Public Outreach events to assess the public's level of knowledge related to stormwater Pollution. This original "long" survey contained 13 questions in both English and Spanish as shown in Figure 6.

This survey was used for fiscal years 2005-06 and 2006-07. Through this period of implementation it was found that the survey took too much time to complete and reduced the level of response from event attendees. Therefore, the survey was subsequently revised to a shorter version with revised questions for the 2007-08 fiscal year. The revised "Short" survey that is currently used is shown in Figure 7.

Figure 6. Original "Long" Survey Utilized at Public Outreach Events

Zip Code_____ **Age**_____ **Sex F**__ **M**__ **Date:**_____

THINK YOU KNOW ABOUT STORM DRAIN POLLUTION PREVENTION?

1. Where do you think **storm drain** contents go or flow to? __Treatment Plant __Streams, rivers & lakes

2. Where do you think **sewer pipes** contents go or flow to? __Treatment Plant __Streams, rivers & lakes

3. Are storm drains and sewers part of the same or separate systems? __Same __Separate __Don't know

4. Have you ever been to a Household Hazardous Waste **(HHW)** Collection Event? __Yes __No

5. Did you know that **A.B.O.P.** Antifreeze, Batteries, Oil, and Latex Paint locations and mobile **HHW** Collection Events provide safe havens for the disposal of pollutants? __Yes __No

6. If you have a lawn or garden, where do you (or your gardener) dispose of the green waste (grass, clippings or other)? **(Check all that apply)**

   ☐Trash/garbage ☐Compost/Mulch pile ☐Take to compost facility
   ☐Leave on lawn ☐Removed by gardener ☐Other:_____

7. Where is the best location to wash your vehicles?
   (Check only one)

   ☐Pavement (driveway, street) ☐Dirt Area
   ☐Lawn or Grass ☐Other_____

8. Do you change the motor oil in your vehicle yourself? __Yes __No

   If **Yes**, where do you dispose of it? **(Check all that apply)**

   __in the garbage __at a curbside collection program
   __down the storm drain __collection center (Jiffy Lube, Kragen, etc.)
   __pour it on the ground __Other_____

9. If you have a pet, how often do you pick up after your pet?
   9. a) in your yard? **9. b)** when you walk the pet?

   ☐Always ☐Sometimes ☐Never ☐Always ☐Sometimes ☐Never

10. Do you think, anything ,other than rainwater, that flows into the storm drains (i.e., trash, chemicals, pet waste, etc.) considered a pollutant? __Yes __No

11. Have you seen or heard the slogans "Only Rain Down the Drain" or "Only Rain Down the Storm Drain"?
    __Yes __No If yes, where? __Radio __Newspaper __ Flier __Billboard __Street Fair, Festival, etc.

12. Are there State laws and local ordinances which STRICTLY PROHIBIT the dumping of pollutants **(EVERYTHING, EXCEPT RAIN WATER)** into the storm drain systems or waterways? ___Yes ___No

13. After this booth visit, have you increased your understanding of storm drain pollution prevention? __Yes __No

Thank you for your time and input… Remember, YOU can do your part by calling our Toll Free Line (1-800-506-2555) to report illegal storm drain pollutant disposal anywhere in Riverside County, or to get more information about storm drain pollution protection to help promote "ONLY RAIN DOWN THE STORM DRAIN".

Figure 7. Revised "Short" Survey Utilized at Public Outreach Events

DO YOU KNOW HOW TO PROTECT OUR STREAMS, RIVERS and LAKES?

City_____ **Zip Code**_____ **Age**_____ **Sex** □ **F** □ **M** **Date:** _____

1) Water that leaves your lawn from **Irrigation (water sprinklers), Car washing** and **Rain** flows down streets and/or storm drains and then directly to…

☐ Sewage Treatment Plants ☐ Streams, rivers & lakes

2) Which of the following can LEGALLY be disposed into the storm drain? (*Circle all that apply*)

- **Useable Household Chemicals**
- **Yard waste/clippings/leaves**
- **Paint**
- **Cigarette butts**
- **Empty Household Chemicals containers**
- **Pet Waste**
- **Motor Oil / antifreeze**
- **None of these**

3) Do you feel you are well informed and aware of illegal dumping into the storm drain and its impact in your community or streams, rivers and lakes?

☐ **Yes** ☐ **No**

HOW DID YOU DO?

1) Water that leaves your lawn from irrigation, washing your car, or rainwater runoff can pickup motor oil and grease from vehicles, excess fertilizer from your lawn, bacteria from pet waste, and excess pesticides from your yard. These pollutants can be carried down streets and storm drains directly to our streams, lakes, and rivers without treatment! That is why we must take care to properly dispose of waste, maintain our vehicles, and use fertilizers, pesticides and other chemicals only as specified on their labels.

2) It is illegal to dispose of any chemical, constituent or waste into a storm drain! Report illegal disposal of chemicals, constituents, or waste to storm drains at **1(800) 506-2555.** You may properly dispose of many of the wastes listed above by doing the following things:

- **Usable and empty household chemicals, paint, motor oil** – Properly dispose these at Household Hazardous Waste and/or Antifreeze, Batteries, Oil and Paint disposal facilities and events. Call **1 (800) 506-2555** for information on disposal locations and special drop off events near you.
- **Pet waste** – Carefully pick up and dispose in the nearest trash receptacle.
- **Grass, clippings, leaves and yard waste** – Collect and dispose in green waste bins or composting areas that are designed to prevent the compost from mixing with excess irrigation water and/or rainwater runoff.

3) Would you like to learn more about protecting our streams, rivers and lakes or wish to report on a illegal storm drain disposal in your area or request a classroom or group demonstration……

Visit www.rcflood.org or call **1 (800) 506-2555.**

Remember…Only Rain Down the Storm Drain!

Results have been tabulated for all of the "Long" surveys received and they have been analyzed to determine trends in public awareness. The "Short" survey has been used at two events to date, one of which was quite recent and its results have not yet been tabulated. Using the "Long" survey results, nine questions were used to assess any trends in public awareness. The remaining questions were determined to be either confusing or not applicable to the intent of the assessment. The results of this assessment of survey results are shown in Figure 8.

Figure 8. Assessment of Survey Results (2005-06 vs. 2006-07)

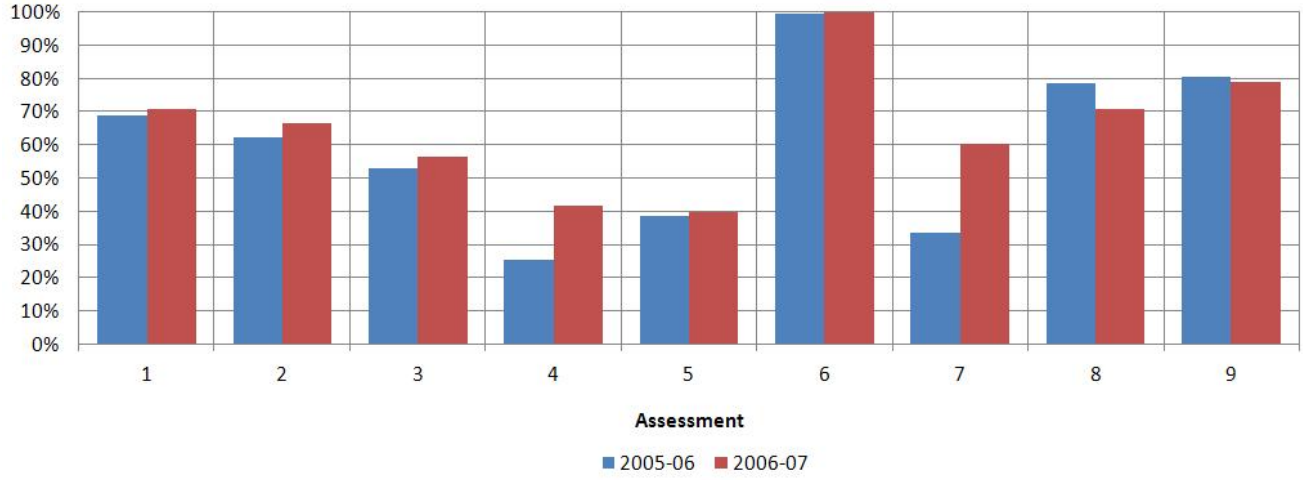

The results shown in the chart in Figure 8 are percent of survey takers that responded as described below:

- Assessment 1: Percent of respondents that understood that storm drains do not go to treatment plants.
- Assessment 2: Percent of respondents that understood that sewer lines go to treatment plants.
- Assessment 3: Percent of respondents that understood that sanitary sewers and storm drains are separate systems.
- Assessment 4: Percent of respondents that had attended a Household Hazardous Waste collection event.
- Assessment 5: Percent of respondents that understood that the best place to wash a car is on the lawn or grass.
- Assessment 6: Percent of respondents that change their own oil that reported that they properly dispose of it.
- Assessment 7: Percent of respondents that have heard of the "Only Rain Down the Storm Drain" program.
- Assessment 8: Percent of respondents that dumping of anything except storm water is a violation of laws and ordinances.
- Assessment 9: Percent of respondents that felt that visiting the Outreach Booth at the event increased their understanding of storm drain Pollution Prevention.

Although implementation of the "Long" survey was limited before it was modified to its current form, the results available do indicate an increase in understanding of these basic principles and can be attributed to the effectiveness of the Permittee's Public Education program. As additional survey results are collected and tabulated, further analysis will be performed to ensure the ongoing effectiveness of the program.

6.3.4 Proposed Revisions

To better address residential sources of pesticides, the Permittees are proposing to coordinate with the University of California Extension Program to enhance the implementation of the U.C. Extension's Master Gardener program in the Santa Margarita Region. Along with information regarding use of drought tolerant landscaping techniques and appropriate methods of fertilizer and irrigation application, the U.C. Master Gardeners also provide residents with information on integrated pest management techniques that minimize pesticide application. The Permittees are proposing to establish an agreement with the U.C. Extension's Master Gardener program in fiscal year 2010-2011 to support master gardener hotline staffing, local presentation and other outreach by the U.C. Master Gardeners.

In addition, through the Permittee's ongoing efforts to internally assess the efficiency and efficacy of their MS4 compliance programs, it was determined that an overhaul of the District's web site was needed. The District's web site contains the public education web site and a technical resource site with the various compliance documents for the program. It was found that information available through the site was often difficult to find and was not user friendly and sometimes was out of date. The Permittees are now reviewing this site to identify and implement needed changes

6.4 Receiving Water Monitoring Program

6.4.1 Summary

A Summary of the Monitoring Program is contained in Appendix G of the Watershed Monitoring Report.

6.4.2 Monitoring Program Accomplishments and Programmatic Improvements

The Monitoring Program accomplished the following goals during the term of the 2004 MS4 Permit:

- Subcontracted monitoring data collection and analysis to MACTEC, Inc. to enhance data collection and reporting capabilities.
- Developed and implemented a Triad Monitoring Program (bioassessment, Toxicity and chemical monitoring) consistent with the goals of the SMC Model Monitoring Program
- Developed watershed boundaries and land use information for all monitoring stations
- Updated the format and technical content of the monitoring Annual Report
- Added fire map information to assist with assessing potential Pollutant sources
- Enhanced monitoring data databases to be compatible with SCCWRP/SMC standard reporting protocols.
- Enhanced monitoring methods to incorporate use of automatic sampling equipment where appropriate

- Conducted several Toxicity Identification Evaluations that led to the identification of pyrethroid pesticides as a cause of wet weather Toxicity in Murrieta and Temecula Creeks and a Toxicity Reduction Evaluation that identified additional BMPs necessary to control sources of pyrethroid pesticides.
- Coordination with the CASQA Pesticide Committee on comments and presentations to California Department of Pesticide Regulation, UC Riverside and others regarding the impacts of pyrethroid pesticides and the need to change regulatory requirements regarding the use of pyrethroid pesticides.
- Participation in or coordination of several BMP studies, including coordination of new development BMP treatment studies (as required by conditions of approval) and the District's LID BMP Demonstration and Testing Facility.
- Continued to update and enhance the Consolidated Monitoring Program to incorporate new monitoring collection methods and data analysis protocols.

6.4.2.1 Participation in Regional Monitoring Efforts

- Participation in the monitoring programs to support development of the Santa Margarita Lagoon TMDL.
- Continued participation in regional and statewide Monitoring and Science efforts such as the Southern California Monitoring Committee to develop:
  - Lab inter-calibration of chemical, bioassessment and Toxicity testing methods
  - Testing methods for bioassessment and Toxicity in Southern California streams
  - Bacterial Reference Watershed Study
  - A storm water research needs report for southern California
- Partnered with SCCWRP on developing hydromodification guidance for Southern California including participation in a series of hydromodification workshops for a CASQA conference.
- Coordination with SCCWRP on the development of the Regional Watershed Monitoring Program for Southern California.

6.4.3 Effectiveness Assessment

The Watershed Monitoring Program was evaluated as part of the Regional Board audits in 2007-2008. As a result of those audits several enhancements were made to the monitoring program, including update of constituent lists, subcontracting of data collection to a monitoring consultant with automatic sampling capabilities, and updates to the Consolidated Monitoring Program and Monitoring Annual Report formats. The Permittees believe that as a result of these changes, the overall monitoring program is effective. However, the revisions presented in section 6.4.4 are recommended to increase monitoring data utility or overall program effectiveness.

6.4.4 Proposed Revisions to Monitoring Program

In updating the Monitoring and Reporting Program, the Permittees request that Regional Board staff meet with them to discuss the following proposed modifications to the monitoring program:

6.4.4.1 Revise Dry Weather Monitoring Program

As noted in Section G.7 (Special Studies) of Appendix G of the FY 2007-2008 Watershed Monitoring Annual Report, the Permittees participated in a SMC Study to develop a regional approach to watershed assessment. The Permittees, in conjunction with Regional Board staff, committed to participating in the resulting watershed monitoring program. The Permittees agreed to monitor three rotating dry weather stations identified for the Santa Margarita Region. Additionally, three stations are to be collected by Regional Board (or SCCWRP staff) using SWAMP funds, and the remaining three will be located in the Santa Ana Watershed region of Riverside County. In exchange for the commitment to participate in the program, the Regional Board staff agreed to reduce the current dry weather monitoring requirements in the new MS4 Permit from two (2) events annually to (1) event annually for each Triad monitoring stations. This would effectively eliminate three existing dry weather samples. The Permittees recommend a meeting with Regional Board staff to discuss these options prior to the release of the draft Permit.

6.4.4.2 Clarify Analyte List

As described in Section G-8.1.5 of the 2008 Monitoring Report (Appendix G of the FY 2007/2008 Watershed Annual Report), 168 analytes have never been detected in samples collected under the current program. The Permittees request that requirements to analyze for these constituents be eliminated unless or until a reason to believe they may be present in stormwater arises.

Basin Plan Objectives are expressed in terms of total metals, while California Toxics Rule (CTR) criteria are expressed in terms of dissolved metals. Although the Permittees do not support comparison of stormwater data to CTR values, the Permit requires it. The Permittees recommend deletion of this requirement. However, if this language is to remain, in order to properly compare results for metals to both sets of objectives, both total and dissolved fractions will be analyzed by the laboratory for the following metals: arsenic, cadmium, chromium (III), chromium (VI), copper, lead, mercury, nickel, selenium, silver, and zinc.

6.4.4.3 Clarify Mobilization Criteria

The District is proposing the following amendment to the monitoring mobilization criteria based on experience and the difficulties faced collecting the first storm and the analysis of the USEPA criteria specific to the Temecula National Weather Service weather station (Consolidated Monitoring Program, Section 4.C.2):

> "Note: If the QPF indicates that more than 0.3-inch is predicted for any 6-hour period, mobilization for sampling will occur."

The District's experience over the past three years indicates that intensities greater than 0.3" in six hours are likely to produce runoff and would warrant mobilization, even on a dry watershed. Further, these mobilization criteria are consistent with EPA-833-B-92-001 guidance regarding minimum depths/durations for storm sampling.

The Permittees recommend that the Regional Board amend the MS4 Permit to reflect these Mobilization Criteria. Due to issues with stream gauges operated by the United States Geological Survey (USGS), the Permittees have concluded that preparing post-storm forensics based on USGS data is not of significant value. A simple test of comparing Quantitative Precipitation Forecast (QPF) reports with actual rainfall and the mobilization criteria should be sufficient to determine compliance with the MS4 Permit.

Mobilization criteria should also reflect practical limitations to storm water monitoring by excluding national holiday periods (Thanksgiving, Christmas, and New Year's Day in particular) and quantifying the probability and the lead time between the forecast and actual rainfall that must be met in order to mobilize.

6.4.4.4 Reduce Wet Weather Events

As was noted in the audits, the Permittees have experienced consistent difficulty collecting three storm events in the upper Santa Margarita River watershed. The Permittees also noted that the San Diego County MS4 Permit only requires the collection of samples from two wet weather events. The Permittees request that the monitoring program for Riverside County be revised to require collection of two storm events. This would not only reduce opportunities for unavoidable non-compliance, it would also be a prudent cost saving measure that would not alter the overall effectiveness of the Permittees monitoring programs.

6.4.4.5 Clarify Triad Method and Follow-up Actions

The MS4 Permit included an early draft of the Triad method envisioned by the Model Monitoring Program (MMP) developed by the SMC. The result was a misapplication of the final Triad approach envisioned by the MMP. Toxicity is currently required to be sampled for at the Triad stations during wet weather events, but not during dry weather when the bioassessments occur. According to the SMC MMP, the three components of the Triad approach (chemistry, Toxicity, and bioassessment) should be conducted at the same time. Bioassessments cannot be conducted during wet weather due to safety concerns and the planning necessary. For this reason the MMP recommends the full triad for dry weather and only chemistry and Toxicity for wet weather.

In an effort to be proactive and supportive of good science, the Permittees have taken the following actions to ensure proper application of the Triad approach:

- Beginning with the 2007-2008 season, Toxicity sampling will be conducted during dry weather, at the same time as the bioassessments and dry weather chemistry sampling events are conducted. Thus, the full Triad approach will be conducted during dry weather. Wet weather monitoring will focus on Toxicity and chemistry. This action will modify the current program to be consistent with the MMP approach.
- The 2006-2007 Annual Report established the framework for proper application of the Triad method (full triad for dry weather, chemistry and Toxicity only for wet weather) by adding new tables (G-21 through G-27), in anticipation of properly applying the Triad method in the 2007-2008 Annual Report.

The Permittees further recommend clarifying the definitions of "persistent", "consistent", and "magnitude" as used in the MS4 Permit to be consistent with the intent of the MMP. In addition, the MS4 Permit inappropriately limits Triad analysis by defining a "fair" Index of Biological Integrity scores as automatically indicative of benthic alteration. This limitation needs to be corrected to prevent Permittee

resources from being inappropriately diverted to expensive source assessment studies. The MMP (and the SMC) envision that watersheds will be prioritized for follow up action based on their relative quality to one another. The envisioned analysis would compare watersheds from throughout southern California. The Permittees support this coordinated and comprehensive approach to addressing water quality.

6.4.4.6 Recognize Limitations of Laboratory Analysis of Bacteria

Babcock Labs prefers to accept bacteria samples between the hours of 7:00 a.m. and 4:00 p.m. during normal business days, and 9:00 a.m. and 12:00 p.m. on weekends. Although Babcock will accept bacteria samples outside those hours, acceptance is contingent upon payment of substantial overtime rates to ensure laboratory staff availability to receive and analyze the samples.

The timing of bacteria sample collection, particularly within the context of automatic sampling, will require consideration of the sample's four-hour holding time and available laboratory receiving hours. The Permittees request that the Permit be modified to only require collection of bacteria samples such that they can be delivered during the regular working hours of the lab to avoid excessive laboratory costs.

6.4.4.7 Participate in a Watershed Based TMDL for the Santa Margarita Lagoon

The Permittees understand that, due to economic conditions, State funding for the Santa Margarita Lagoon Watershed-Based TMDL has been withdrawn. As described in section 3.4, these economic conditions are also impacting the Permittee's funding sources and they are struggling to maintain resources to fund existing compliance programs. The Permittees currently cannot support additional expenditures associated with assisting in funding a watershed-based TMDL effort. However, the Permittees are agreeable to discussing a re-prioritization of compliance activities in order to reallocate existing Permittee resources for this purpose. For example, where current MS4 Permit compliance programs elements are not measurably enhancing attainment of Water Quality Standards, the Permittees would consider reduction or elimination of those requirements to support reallocation of the associated funding to the development of the watershed based TMDL. Program elements that may be considered for discussion include:

- Toxicity/Pyrethroid Monitoring – Under the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA) local regulation of pesticides, including pyrethroid pesticides is pre-empted. The Permittees are expending significant resources at the State and Federal level to facilitate regulatory changes in the allowable uses of pyrethroid pesticides, which have been implicated in causing toxicity in receiving waters throughout California. The Permittees have also recognized pyrethroid pesticides as a Pollutant of Concern for the upper Santa Margarita River watershed. The Permittees believe that public education and outreach regarding use and more stringent regulation/management of pesticides, including pyrethroid pesticides, represents the most effective means of controlling pesticides in Urban Runoff. However, continued Toxicity tests, Toxicity Identification Evaluations, and direct monitoring for pyrethroid pesticides are not likely to enhance the Permittee's ability to reduce/eliminate pyrethroid pesticides in Receiving Waters. Greater Receiving Water quality benefits may be realized by reallocating the resources currently allocated to these activities to the development of the watershed-based TMDL.

- Reduction in General Monitoring Requirements – The Permittees continue to expend significant resources on Receiving Water and outfall monitoring and the benefits of these monitoring activities are limited. Further, these costs have more than doubled over the term of the 2004 MS4

Permit due to audit findings recommending the implementation of automatic sampling equipment. Revised MS4 Permit requirements that provide for a simplified monitoring program may allow cost savings to be reallocated from data collection and processing to development of the watershed-based TMDL.

- Watershed/Individual Annual Reporting – The current Annual Reporting requirements are time, labor and cost-intensive exercises. Revised MS4 Permit requirements that provide for a simplified Annual Report requirements would not necessarily produce substantial cost savings (because is the reports are typically produced in-house); however, they would free up staff resources to assist with TMDL development.
- IC/ID Monitoring – Although the Permittees support regular visual inspection of MS4 facilities to identify IC/IDs, field measurements and sampling has not proven to be effective for this purpose. Although sampling of identified IC/IDs for later enforcement purposes may be appropriate, IC/IDs that have been identified and eliminated in the Santa Margarita Region typically result from visual observations and subsequent follow-up efforts by Permittee staff, not field measurements and water quality samples. Revised MS4 Permit requirements that provide for visual inspections of MS4 facilities to identify IC/IDs may yield cost savings that could be reallocated to development of the watershed-based TMDL.

There may be additional opportunities for modification of MS4 Permit requirements to focus the expenditure of Permittee funds on those activities that are most effective at protecting Receiving Water quality. Although the resources available for Permittee compliance activities are finite, the Permittees are supportive of modifications to the MS4 Permit that, while working within available funding limitations, enhance their ability to protect and enhance the quality of Receiving Waters.

7.0 Evaluation and Recommendations for Individual SWMP Programs

The Riverside County DAMP is a programmatic document developed by the Permittees in the Santa Ana and Santa Margarita Regions. It outlines the major programs and policies that the Permittees individually and/or collectively implement to manage Urban Runoff for the protection of Receiving Waters in Western Riverside County, including the Santa Margarita Region. The Riverside County DAMP provides a model for the development of a Permittees' Individual SWMPs in the Santa Margarita Region.

The Permittees continue to support a uniform approach to the implementation of MS4 Permit compliance programs in order to facilitate increased transparency and understanding for residents, regulated entities, and Permittee staff. For this reason, the discussions below focus on programmatic changes to the compliance programs that are necessary to maintain the effectiveness of the model compliance programs described in the Riverside County DAMP. Upon adoption of the new MS4 Permit, the Riverside County DAMP and Individual SWMPs will be revised accordingly.

7.1 Program Management

There are typically multiple Permittee departments that are responsible for implementing the elements of the Individual SWMPs. Each Permittee has designated an NPDES Coordinator who coordinates the overall Permittee compliance programs, collects and analyzes compliance program data, develops and maintains the Individual SWMPs, compiles and submits necessary reports, coordinates with other Permittees, stakeholders and Regional Board staff, and conducts other necessary duties as assigned.

To facilitate inter-Permittee coordination and funding of regional compliance activities such as the Public Education and Monitoring programs, the Permittees have entered into an Implementation Agreement that defines the roles and responsibilities of each Permittee and assigns cost shares for regional programs defined in the agreement. The Implementation Agreement also requires each Permittee to designate an NPDES Coordinator who is also responsible for representing the Permittee's interest at Permittee coordination meetings such as the monthly Santa Ana/Santa Margarita Technical Advisory Committee.

The Permittees in the Santa Margarita and Santa Ana Regions participate in a Management Steering Committee made up of the City Managers, County Executive Officer, and the District's Chief Engineer; or their assigned alternate. Participation in the Management Steering Committee is not mandatory; however, it provides a management-level forum to address Urban Runoff management policies for the Permit Area and coordination of the review, and necessary revisions to the Riverside County DAMP and Implementation Agreement. In addition, the Management Steering Committee promotes a higher level of awareness of the MS4 Permit compliance program by each Permittee's senior management staff.

7.1.1 Accomplishments and Programmatic Improvements

Collectively, the Permittees Program Management activities have achieved:

- Development of the Riverside County DAMP, WQMP and Individual SWMPs following adoption of the 2004 MS4 Permit.
- Revised the Implementation Agreement to account for necessary program enhancements resulting from the new MS4 Permit.

- Established and held monthly meetings of a Technical Advisory Committee comprising of each Permittee's NPDES coordinator, to discuss and coordinate response to issues that arise through the ongoing implementation of the Riverside County DAMP-based programs.
- Voluntarily participate in a Management Steering Committee comprised of Permittee upper management (City Manager or equivalent) to provide a forum to discuss major policy issues related to MS4 Permit compliance program implementation. This also helps the major decision makers within each organization to stay abreast of the status of the implementation of the Riverside County DAMP and aware of upcoming issues and approaches taken by other Permittees.
- Enhanced enforcement and compliance elements of the Riverside County DAMP.
- Developed the Integrated Regional Watershed Management Plan (IRWMP) for the Upper Santa Margarita Watershed.
- Continued progress with the Bureau of Reclamation, San Diego County and other stakeholders on a uniform watershed plan and model for the Santa Margarita River watershed.

7.1.2 Recommended Revisions and Enhancements to Program Management Efforts

7.1.2.1 Assessment Metrics and Municipal Action Levels

To ensure that the Permittee's programs continue to be effective at managing the impact of Urban Runoff on Receiving Water quality, the Permittees will revise the Program Effectiveness Assessments for both the Individual SWMP and the Watershed SWMP following adoption of the new MS4 Permit. These planned changes are further described in Section 6.1.2.1 of this ROWD. The Permittees also recommend streamlining of the reporting forms to focus on the revised Program Effectiveness Assessments.

7.1.2.2 Revised Reporting Format

As a result of continued program effectiveness assessment, following adoption of the new MS4 Permit, the Permittees will update annual reporting forms to incorporate specific reporting requirements for the effectiveness assessment metrics and to remove inappropriate, outdated, or ineffective reporting requirements.

7.2 Development Planning

This program element links each Permittee's General Plan, environmental review process, and development approval and permitting processes to the later phases of detailed design, construction and operation. The development approval and permitting processes carries forth project-specific requirements in the form of conditions of approval, project plans, and design specifications that support tracking, inspection, and enforcement actions.

7.2.1 Development Planning Program Element Accomplishments and Programmatic Improvements

During the term of the 2004 MS4 Permit, the development planning program accomplishments and programmatic improvements included:

- Developed the WQMP to address post construction stormwater runoff quality for New and Significant Re-Development Projects.
- Development of a FAQ for WQMP projects to assist with implementing the WQMP program.
- Developed and subsequently enhanced a BMP design guidance manual to standardize the construction of post construction BMPs.
- Participation in the SMC efforts to develop a LID manual.
- Participation in SCCWRP's hydromodification studies to develop scientifically based hydromodification design guidance for Southern California.
- Enhanced online watershed maps to assist developers and the public with identifying areas tributary to Impaired Waterbodies.
- Adopted and implemented a MSHCP to ensure the regional-scale protection of habitat and natural resources in the approval process for New Developments.

7.2.2 Proposed Revisions to the Development Planning Program Element

7.2.2.1 Low Impact Development

The Permittees will revise the Riverside County Storm Water Quality Best Management Practice Design Handbook to (1) better incorporate LID design concepts, and (2) incorporate guidance to describe how developments can offset Treatment Control and hydromodification impacts with LID concepts including infiltration, evapo-transpiration, reuse, and onsite stormwater management. These revisions will follow the completion of the SMC LID BMP Manual and SCCWRPs Hydromodification Study. See the FY 2007-2008 Watershed Annual Report, Appendix G, Section G.7.2 for additional detail.

7.2.2.2 Hydromodification

As committed to in the 2004 WQMP (now Appendix O to the Riverside County DAMP), the Permittees have developed numeric guidance for hydromodification and are now working with SCCWRP to develop enhanced hydromodification guidance for Southern California. The Permittees will use the completed guidance to update the WQMP, BMP Design Handbook and other guidance as necessary to effectively mitigate hydromodification impacts. See the FY 2007-2008 Watershed Annual Report, Appendix G, Section G.7.2 for additional detail.

7.2.2.3 BMP Design Criteria

The Permittees will revise the Riverside County Storm Water Quality Best Management Practice Design Handbook to incorporate additional design guidance to clarify those Treatment Control BMPs that are effective at removing sediment-bound pesticides such as pyrethroid pesticides (consistent with the recommendations of the Toxicity Reduction Evaluation contained in Appendix D.

7.2.2.4 TMDLs

The Permittees will revise the DAMP to identify and include BMPs that are necessary to mitigate the impacts of Urban Runoff on Impaired Waterbodies.

7.2.2.5 Roads

The Permittees believe that standard WQMP requirements for public works road projects create potential avenues for unavoidable non-compliance. The Permittees would like to review this priority development category with Regional Board Staff to develop a better system to manage public works road projects.

7.2.2.6 Inspect and Verify Maintenance of Post Construction Treatment Control BMPs to Ensure Ongoing Effectiveness

As economic conditions allow, the Permittees propose to implement the following approach to inspect and/or verify maintenance of Treatment Control BMPs implemented on Priority Development Projects to ensure their ongoing effectiveness. The development of the program described below will require the Permittee resources that are unavailable in the current economic climate, particularly considering that it would likely require the Permittees to abandon the CAP in lieu of a local Permittee inspection program. The resources that will be required to ramp up new inspection programs are unavailable and may not become available during the term of the new MS4 Permit; however when the economy recovers sufficiently the Permittees propose to implement the program described below.

Integrated Management Practice (IMP) Exemption:

For the purposes of this program, IMPs include BMPs that are landscape based or otherwise serve an additional purpose other than Treatment Control. IMPs will be exempted from Inspection and Maintenance Tracking / Certification requirements if solely through the regular maintenance of the feature's secondary (non-treatment) functions and with Permittee concurrence, it can reasonably be expected that the treatment efficacy of the IMP will be ensured in perpetuity. An example that may satisfy this exemption would be a grassy swale that is mowed as part of regular landscape maintenance, whereas a BMP with a media filter which requires periodic resetting or replacement to maintain treatment effectiveness would not be exempted.

Priority Development projects will be exempted from all Treatment Control BMP Inspection and Maintenance Tracking / Certification requirements if they completely meet their Treatment Control requirements by implementing only IMPs that meet these criteria.

Priority Industrial and Commercial

The following requirements will apply to new priority Commercial and Industrial developments subject to the Permit's Commercial and Industrial business inspection requirements.

- Inspection

  Sites will be inspected per the Individual SWMPs current inspection frequency requirements that are based on the potential of the site to contribute to water quality impairments. At these inspections, in addition to the normal inspection requirements, all Treatment Control BMPs at the site will be inspected. In other words, all Treatment Control BMPs at high-priority facilities will be inspected annually; Treatment Control BMPs at medium-priority facilities will inspected biennially and Treatment Control BMPs at low-priority facilities will be inspected once during the term of the MS4 Permit. Improperly maintained BMPs may subject the maintenance entity to license suspension or administrative citations.

- Proof of Maintenance

  Maintenance records demonstrating compliance with the O&M procedures in the WQMP must be available for review at the time of the inspection. Failure to demonstrate that the BMPs have been maintained appropriately may result in license suspension or other enforcement actions.

Other Priority Developments

The following requirements will apply to new priority residential developments and businesses not otherwise subject to the Permit's Commercial and Industrial business inspection requirements.

- Proof of Maintenance and Self Certification

  The maintenance entity identified in the WQMP will be required to submit maintenance records including a signed certification to the Co-Permittee. The frequency of these submittals will be based on the relative maintenance requirements of the Treatment Control BMPs implemented on that site. BMPs will be categorized into groups as having High, Medium or Low maintenance requirements. If a WQMP project utilizes high-maintenance Treatment Control BMPs it will be categorized as a High-priority residential development, etc. High-Priority residential developments will be required to submit records annually, Medium – biennially, and Low – once every five years. Failure to report will result in administrative citations against the maintenance entity.

Permittee Projects and Permittee Maintained Treatment Control BMPs

This requirement will be included as part of the existing Permittee facility inspection program and inspected per the frequency requirements specified in the Riverside County DAMP.

7.3 Private Development Construction Activities

The Permittees have reviewed their ordinances to ensure that they are adequate to control discharges to the MS4 from construction sites to the MEP. For construction projects that will disturb one acre or more, the Permittees require proof of compliance with the General Permit-Construction prior to issuance of building/grading permits (a copy of the Notice of Intent filed with the State Board). Each of the Co-Permittees provides training for their construction inspectors regarding the proper installation and

maintenance of erosion and sediment control BMPs. Education and outreach to the building industry (developers, construction contractors, engineering firms, etc.) regarding managing discharges from construction sites is also incorporated into the "**Only Rain Down the Storm Drain** Pollution Prevention Program," the Permittees' area-wide public education and outreach program.

7.3.1 Private Development Construction Activities Program Element Accomplishments and Programmatic Improvements

- The Permittees annually distribute construction activities posters to construction sites as part of construction outreach program.
- A standardized construction activity reporting spreadsheet was developed for the Annual Reports.
- The construction inspection forms were updated.
- The Co-Permittees developed and maintained inventory databases of construction sites 1-acre or larger for which they have issued a building or grading permit.
- Prioritized inspections to help target construction activities that present the highest risk to water quality.

Highlights
Conducted over **17,000** construction site inspections
Initiated over **3,800** enforcement actions to gain compliance
626 attendees to NPDES Construction training

7.3.2 Proposed Revisions to the Private Development Construction Activities Program Element

The Permittees are not proposing revisions to their existing construction inspection programs at this time. As previously described, the Permittees expect that development activity will be greatly reduced during the term of the new MS4 Permit. Regional Board staff has however raised the issue of abandoned construction sites. Regulation of abandoned construction sites has proven challenging due to bankruptcy of project proponents, non-responsiveness or inability to locate underlying investment banks that actually own the developments, and the practical limitations encountered by the Permittees in calling bonds. As the Regional Board has enforcement capabilities that often surpass those of the Permittees, to ensure that this issue is effectively addressed the Permittees ask for the close cooperation and support of the Regional Board. Nonetheless, the Permittees are committed to continuing the use of their IC/ID programs, code enforcement tools, and other ordinance authorities to control, to the extent allowable under law, abandoned parcels that are not properly stabilized.

7.4 Existing Development – Permittee Facilities and Activities

The Municipal Facilities Strategy which has been consolidated into Section 5 of the Riverside County DAMP provides guidance for identifying potential storm water Pollutant sources and for selecting appropriate BMPs for implementation at identified facilities of concern owned and operated by the Permittees. The Permittees are implementing the provisions of the Municipal Facilities Strategy within their respective jurisdictions via processes described in their Individual SWMPs. To assist the Permittees in implementing this program, training focused on storm water regulatory requirements and BMPs related

to Permittee maintenance facilities and roadway maintenance activities were conducted twice annually during the 2004 MS4 Permit term.

7.4.1 Permittee Facilities and Activities Program Element Accomplishments and Programmatic Improvements

- The District coordinated preparation of GIS-based maps for Permittee MS4 facilities. The MS4 maps are updated annually with new information provided by the Permittees as part of the Annual Reporting process.
- Development of a GIS Browser that allows interested parties to view MS4 Facilities from the District's website.
- Updated Model Facilities Pollution Prevention Plan for Permittee facilities not requiring coverage under the Industrial General Permit.

Highlights
900 attendees to Municipal NPDES training

7.4.2 Proposed Revisions to Permittee Facilities and Activities Program Element

7.4.2.1 FPPP Guidance

The Permittees commit to developing a revised WQMP template for Permittee projects that better facilitates translation of WQMP BMP requirements into Facility Pollution Prevention Plans, where appropriate.

7.4.2.2 Integrated Pest Management

The Permittees commit to including Ecowise's standardized language for contracted pesticide management services in Permittee pesticide management contracts.

7.5 Commercial and Industrial Sources

The Principal Permittee and the County have implemented the CAP through which the County Department of Environmental Health makes use of existing inspection programs to address storm water compliance survey/inspections of restaurants and facilities that must secure a hazardous materials permit for either storing, handling or generating hazardous materials. As the responsible Certified Unified Program Agency in Riverside County, the County Department of Environmental Health is responsible for regularly inspecting all sites within the County that handle hazardous waste. The CAP is implemented in those cities and unincorporated areas that do not maintain an individual industrial/commercial inspection program through other mechanisms such as POTW waste pre-treatment programs or business license inspection programs.

Revisions to the inspection program requirements contained within the 2004 MS4 Permit expanded the scope of the overall commercial/industrial inspection program beyond the ability of the CAP to address. Each Co-Permittee now implements a supplemental inspection program for facilities not covered by the CAP. In addition, the 2004 MS4 Permit required inventories/databases of facilities, prioritization of

industrial and commercial sources relative to the potential to impact water quality, and specified inspection frequencies based upon facility priority.

The revised industrial and commercial sources program continues to have both regional and local jurisdiction components. Although the overall industrial/commercial inspection program has grown beyond the CAP, the CAP still addresses most of the facilities identified in the 2004 MS4 Permit. With its low overhead cost, it remains a cost effective approach to mitigating the impacts of industrial and commercial facilities on the MS4 and Receiving Waters.

7.5.1 Commercial and Industrial Program Element Accomplishments and Programmatic Improvements

- Reviewed and updated several educational brochures for distribution to inspected facilities.
- Developed outreach posters for gas and automotive service stations.
- Developed standardized inspection reporting forms for Annual Reports.
- Updated food service surveys.
- Extended the agreement with the County's Department of Environmental Health executed in 1999 for the area-wide CAP for the inspection of commercial and industrial facilities through June 30, 2009.
- Created Permittee databases for the inspected commercial and industrial facilities.
- Revised the Riverside County DAMP to reflect development of the industrial and commercial facility database that contains the following information: facility name, address, city, zip code, and Standard Industrial Classification (SIC) codes.
- Provided public education information regarding NPDES storm water permits to any new businesses listed in the Press Enterprise.

Highlights
3,974 inspections of Industrial and Commercial facilities
Over **1000** enforcement actions taken
426 attendees to Municipal NPDES training

7.5.2 Proposed Revisions to Commercial and Industrial Sources Program Element

The expected future expansion of the Commercial and Industrial Inspection Program to address Treatment Control BMPs as described in Section 7.2.2.6 would likely result in an expansion of the CAP that is beyond the ability of Environmental Health staff to accommodate and still achieve their own mandated inspection requirements. The Permittees are therefore proposing to amend the Riverside County DAMP and Individual SWMPs to recognize not only the CAP inspection program but also Permittee specific alternative programs that may develop during the term of the next MS4 Permit.

7.6 Residential Sources

The residential program focuses on educating residents about activities that can potentially contribute to beneficial use impairment. The residential program outreach is focused on Pollutants of Concern. The residential program is primarily implemented through the Regional Public Education Program; however, each Permittee typically conducts additional outreach. In those cases where residential Illegal Discharges are identified, appropriate code enforcement actions are also taken.

7.6.1 Accomplishments and Programmatic Improvements

The residential program achieved the following accomplishments during the term of the 2004 MS4 Permit:

- Developed several new outreach brochures and tools to promote changes in knowledge and behavior regarding activities that potentially generated Pollutants of Concern including landscape and gardening brochure, spray bottles with non-toxic pest control or cleaner recipes, septic system management brochure, updated outdoor activities brochure, and pet waste brochure.
- Implemented billboard advertising promoting "**Only Rain Down the Storm Drain**" message
- Purchased a new trailer to transport public education materials. The trailer is wrapped in graphics supporting the "**Only Rain Down the Storm Drain**" message.
- Point of Sale Outreach Programs to customers of hardware stores regarding paint, pesticides and fertilizers.
- Partnership with Valley Greeters to deliver "**Only Rain Down the Storm Drain**" information to new residents in the Santa Margarita Region.
- Promotion and participation in the annual Santa Margarita Watershed Clean Up Day.
- Continued supplemental support of the HHW/ABOP waste collection programs
- Continued update and revision of the public education information page
- Continued implementation and enhancement of school outreach programs conducted by Mission Resource Conservation District
- Reproduction and distribution of the After the Storm poster

7.6.2 Recommended Revisions

Although the Permittees continue to annually assess and modify outreach materials and programs, the Permittees are not recommending any substantive revisions to this program element at this time.

7.7 Public Education and Outreach

Although the bulk of public education and outreach activities are conducted by the District on behalf of the Permittees, the Permittees also conduct outreach activities. These activities include providing informational pamphlets at counters, conducting presentations for local businesses or developers, maintaining a stormwater page or appropriate stormwater links on their individual websites, conducting employee training programs, and attending various public events.

7.7.1 Public Education and Outreach Program Element Accomplishments and Programmatic Improvements

The Public Education and Outreach Program Element had the following accomplishments and improvements over the term of the 2004 Permit (not including those identified in Section 7.6.1):

- Use of a CEQA-style public participation process to develop the Riverside County DAMP, SWMPs, and WQMP
- Duplication and use of the USEPA construction site poster to educate construction site operators
- Distribution of stormwater outreach information to various businesses and construction sites through code enforcement, and building and grading inspectors
- Development and distribution of a automotive shop BMP poster
- Advertisements in the Business Press
- Update of the outdoor activities brochure for mobile operators

7.7.2 Recommended Changes

Although the Permittees continue to annually assess and modify outreach materials and programs, the Permittees are not recommending any substantive revisions to this program element at this time.

7.8 Elimination of Illicit Connections and Illegal Discharges

The Riverside County DAMP describes the discharge limitations and prohibitions applicable to the Permittee's MS4 (Section 4.1), procedures to be implemented when persistent exceedances of Water Quality Standards are identified (Section 4.2), responding to and reporting Illegal Discharges (Section 4.4), enforcement measures for IC/IDs (Section 4.5), measures to control litter (Section 4.6), measures to manage sanitary wastes (Section 4.7), and programs to promote collection and proper disposal of hazardous waste (Section 4.8).

7.8.1 IC/ID Program Element Accomplishments and Programmatic Improvements

- Developed Sanitary Sewer Overflow Procedures in coordination with the sanitary sewer operators in the Santa Ana and Santa Margarita Regions and implemented annual updates to Sanitary Sewer Overflow Procedures to ensure proper contact information for outside agencies.
- Established an electronic tracking system for NPDES complaints received through the toll free "Report Storm Water Pollution" hotline, OES or otherwise reported to the District.
- Enhanced public outreach regarding illegal dumping including brochures for: Outdoor Activities, Fountains & Swimming Pools, and Pet Waste, establishment of a Santa Margarita watershed Clean-Up Day and coordination with the County of Riverside Trash Task Force.

- Initiated a cooperative program with the County Environmental Health Department to promote Environmental Enhancement Projects in lieu of fines for environmental crime cases. This initiative resulted in a billboard advertising campaign and BMP posters addressing appropriate BMPs for gas stations and garages.
- Established IC/ID Monitoring Program

Highlights
1,263 potential IC/ID reports received and responded to
Over **5,500** calls received on stormwater pollution hotlines
94 IC/ID Monitoring events
5 monitoring events where field screening exceeding criteria

7.8.2 Proposed Revisions to IC/ID Program Element

The Permittees re-evaluated their existing IC/ID monitoring programs as part of this ROWD. The Permittees believe that the overall monitoring program is effective. However, the Permittees plan to revise their approach to the implementation of the Illicit Discharge monitoring program to increase monitoring data utility or overall program effectiveness.

7.8.2.1 Revise IC/ID Monitoring Program

The Permittees plan to revise their approach to the implementation of the IC/ID monitoring program. The goals of the recommended revisions are to:

- Relocate the IC/ID monitoring sites at MS4 outfalls.
- Distribute the monitoring sites throughout the Santa Margarita Region to detect Illicit Discharges closer to their source before they become excessively diluted.
- Increase efficiency and consistency in sampling resulting in enhanced data quality.
- Enhance response time to identify IC/IDs.

A model Illicit Discharge monitoring plan that accomplishes these goals is described below; a final plan will be incorporated into updated compliance documents with the new MS4 Permit.

7.8.2.2 Model Illicit Discharge Monitoring Plan

The Municipal Permittees will identify MS4 outfalls that could be used for monitoring sites based on maps of the MS4 facilities. This list of preliminary sites will be then field checked to determine the accessibility of the sites and feasibility for inclusion in the IC/ID monitoring program. Inaccessible sites or sites determined to be otherwise infeasible will be removed from the list.

Each Municipal Permittee except Menifee will then divide the list of the viable sites within their jurisdiction into groups of four. As Menifee only has one MS4, it will only monitor that one site. Each group of four sites will be monitored for a period of one year, twice during the dry season. Once all sites have been monitored for a year, sites will be repeated.

A monitoring team will be formed including one District and one Municipal Permittee staff member. The District staff will perform all monitoring/screening activities. The Municipal Permittee staff will be available to assist and will be responsible for initiating any necessary follow-up actions. This approach will provide consistency in screening and monitoring data collection and will allow the Municipal Permittee with jurisdiction over the tributary land use to be immediately aware of exceedances and initiate appropriate follow-up actions.

REPORT OF WASTE DISCHARGE

Submitted To

SAN DIEGO REGIONAL WATER QUALITY CONTROL BOARD
(Order No. R9-2004-001)

and

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY – REGION IX
(NPDES No. CAS0108766)

JANUARY 15, 2009

SANTA MARGARITA RIVER REGION

RIVERSIDE COUNTY

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT,
COUNTY OF RIVERSIDE, CITY of MENIFEE, CITY of MURRIETA,
CITY of TEMECULA, and CITY of WILDOMAR

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1.0 Executive Summary

On July 14, 2004 the San Diego Regional Water Quality Control Board (Regional Board) adopted Order No. R9-2004-001, an area-wide National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) permit (2004 MS4 Permit); this permit expires on July 14, 2009. A Report of Waste Discharge (ROWD) for renewal of the 2004 MS4 Permit must be submitted no later than 180 days in advance of the expiration date (i.e., by January 15, 2009).

This ROWD is an application for renewal of the 2004 MS4 Permit (NPDES No. CAS0108766) for the MS4 owned and operated by the Riverside County Flood Control and Water Conservation District (District), the County of Riverside (County), and the incorporated cities of Riverside County within the upper Santa Margarita River watershed (collectively, the Permittees). The newly incorporated cities of Menifee and Wildomar are included in this application as a Notice of Intent to participate in the updated MS4 Permit.

The content of this document is structured to identify:

- Information about the applicants (Section 3.0),
- Information on the area to be covered under the MS4 Permit (Section 4.0),
- An overall evaluation of the Permittees' existing programs based on water quality trends (Section 5.0),
- Accomplishments and recommendations for the Permittees' regionally implemented programs (Section 6.0) and
- Accomplishments and recommendations for the programs implemented as part of the Individual Stormwater Management Plans (SWMPs) (Section 7.0).

The Riverside County Drainage Area Management Plan (DAMP) documents the model implementation plan from which each of the existing Permittees has developed their respective Individual SWMP to implement the DAMP. In addition a Watershed SWMP has been developed to describe the programs that will be implemented regionally. The Annual Reports submitted to date describe the implementation of these SWMPs and document how they have evolved over time.

This ROWD builds on these Annual Reports by highlighting the major accomplishments of these programs, evaluating the long-term effectiveness of the programs and recommending revisions to the programs to enhance the efficiency and effectiveness of the programs to manage Urban Runoff to protect Receiving Water quality. To promote clarity of intent, terms defined in the 2004 MS4 Permit are capitalized in this ROWD.

Due to the impacts of the current economic recession on Permittee budgets and the effectiveness of existing Urban Runoff management programs, the Permittees' primary focus during the next MS4 Permit term will be on maintaining existing compliance programs in the face of significant cuts in basic municipal programs and services. Riverside County is one of the areas most affected by the mortgage crisis and the Santa Margarita Region is one of the most impacted areas of Riverside County. This crisis is having significant impacts on Permittee resources and projections for a deepening recession promises to exacerbate these impacts. Further, monitoring data indicates that the existing compliance programs have been effective in maintaining water quality. This ROWD focuses on maintaining the fundamental

structure and content of the Riverside County DAMP and the Individual SWMPs. However, the Permittees have identified several enhancements and/or alterations to their programs that can be implemented to continue to increase the effectiveness of these programs, without increasing costs.

1.1 Highlights of Program Implementation

Sections 6 and 7 of this ROWD describe the numerous accomplishments of the Permittees programs during the 2004 MS4 Permit term. Some highlights of the major accomplishments for the Permittees include:

- Development and implementation of a Water Quality Management Plan (WQMP) that addresses post-construction Urban Runoff management for New and Significant Re-Development.
- Development and implementation of the Watershed SWMP and the Permittee's Individual SWMPs.
- Development of handbook to standardize post-construction Best Management Practice (BMP) selection and design in Riverside County. Ongoing updates to the handbook include a plan to incorporate and promote low impact development design concepts.
- Development and enhancements to the design template for developing project-specific WQMPs
- Development of a Frequently Asked Question (FAQ) document to assist developers and plan review staff in understanding WQMP requirements and expectations.
- Development of coordinated BMP manual for firefighting agencies.
- Development, implementation and maintenance of Permittee databases to track construction sites 1-acre or larger. In addition, the Permittees have standardized a construction reporting spreadsheet used for Annual Reports, updated inspection forms, and enhanced the construction outreach program.
- Creation of Permittee databases to track industrial and commercial facilities.
- Creation and maintenance of the Storm Water Protection website that offers educational resources and free brochures targeting residents, businesses, developers, contractors, and elementary school children.
- Partnership with the Mission Resource Conservation District to provide an educational outreach programs targeting both schools and adults.
- Continued participation in the Consolidated Program for Water Quality Monitoring (Consolidated Monitoring Program) that includes collection of water quality samples at MS4 outfalls and Receiving Waters.
- Participation in regional and statewide monitoring efforts such as the Southern California Monitoring Committee (SMC), Southern California Coastal Water Commission and National Water Resources Institute.
- Participation in the California Stormwater Quality Association (CASQA), including the leadership roles of Officer, Director, and Legislative Chair.
- Development of the Upper Santa Margarita Region Integrated Regional Watershed Management Plan

- Continued partnership and coordination with the Bureau of Reclamation on a watershed plan and water quality model for the Santa Margarita watershed
- Continued participation in the Santa Margarita Lagoon nutrient Total Maximum Daily Load (TMDL) development process
- Participated in a stakeholder workgroup process led by Regional Board staff to revise REC 1 Basin Plan requirements for TMDLs

1.2 Summary Evaluation of Program Implementation

The trend analysis presented in Section G-8.2 of the FY 2007/2008 Watershed Annual Report and reviewed in Section 5.3 of this ROWD indicates that after almost 14 years of active Permittee involvement in MS4 Permit related Urban Runoff management programs, the significant increase in population (over 300 percent) and associated rapid urbanization that the area has experienced has not resulted in any statistically significant increases in Pollutant concentrations in Receiving Waters in the Santa Margarita Region. This indicates that the Permittees MS4 programs are and have been protective of Receiving Water quality. Pyrethroid pesticides, the one Pollutant that does appear to be linked to urbanization, has been addressed through a Toxicity Reduction Evaluation process, outreach programs, and Permittee participation to address pyrethroid pesticides and other pesticide sources at the state and federal level.

To enhance the effectiveness of the MS4 Permit compliance programs, the Permittees have agreed to implement compliance program revisions as described in sections 6 and 7 of this ROWD.

1.3 Summary of Major Recommendations for Program Revision

As described in section 3.4 of this ROWD, the Permittees are facing unprecedented fiscal impacts resulting from the national and state economic crises. The impacts on the Permittees are especially severe due to the disproportionate impact of home foreclosures in the Santa Margarita Region coupled with plummeting sales tax revenue. Unfortunately, it is anticipated that the economic conditions will persist for a significant portion of the term of the next MS4 Permit. During this period, the Permittee's MS4 compliance programs will increasingly compete with more fundamental public services for finite and dwindling resources. The challenge and priority for the Permittees will be to maintain the existing compliance programs in the face of cuts in basic programs and services.

Nevertheless, and although the various programs implemented as part of the Watershed SWMP and the Riverside County DAMP have been determined to be effective overall, Sections 6 and 7 of this ROWD identify certain areas wherein the Permittees are proposing changes to improve the effectiveness, efficiency, and transparency of these programs.

The program revisions recommended in this ROWD reconfigure existing programs in a manner that will increase the Permittees' overall ability to protect Urban Runoff quality, while limiting additional costs that would make these revisions cost-prohibitive in light of the current and foreseeable economy. Some of the major recommendations include:

Enhance Program Effectiveness Assessments and Incorporate Action Levels (Section 6.1.2.1)

The Permittees have carefully evaluated their MS4 Permit compliance programs and annual reporting forms. Based on this review the Permittees determined that:

- The overarching goal of the program is to ensure that Urban Runoff does not cause or contribute to non-attainment of Beneficial Uses in the upper Santa Margarita River watershed;
- Permittee compliance programs are process based and, consistent with the Maximum Extent Practical (MEP) approach, are incrementally adjusted as part of the annual reports and comprehensively reevaluated and if necessary, revamped as part of each ROWD;
- Monitoring data should be used to drive long term program assessments and assess goal attainment as part of the ROWD; and
- Process based Municipal Action Levels (MALs) should be used to evaluate annual program implementation to ensure that programs are implemented to the MEP and identify the needs for incremental adjustments.

The Permittees have proposed revised Effectiveness Assessment metrics and MALs for use in Permittee Annual Reports consistent with the aforementioned findings and as described further in Section 6.1.2.1. The MALs are intended to function as triggers, or minimum bars that if breached, would require the Permittees to evaluate the appropriate program elements to determine if adjustments are necessary to attain the MEP standard. The Permittee proposal will not only add transparency to the Permittees compliance programs but assist Permittees in evaluating and adjusting their Permit compliance programs to assist in attaining Water Quality Standards. Further, the proposed effectiveness assessment metrics can be implemented without significantly increasing the Permittees' program costs.

Revisions to the IC/ID Program (Section 7.8.2)

During the 2007/2008 MS4 Program audits conducted by PG Environmental and Regional Board staff, several questions were raised regarding the Permittees existing Illicit Connection/Illegal Discharge(IC/ID) field monitoring programs. The Permittees have evaluated the Regional Board and PG Environmental staff's comments and proposed a revised IC/ID Program based on the following:

- Random selection of MS4 outfalls throughout the Santa Margarita Region;
- Rotating MS4 outfall sites annually to maximize coverage of the MS4;
- Partnering one District staff person with one city/county code enforcement officer for data collection to ensure consistency in sampling procedure/collection and quick response to detected IC/ID events.

Implementation of a Post-Construction Treatment Control BMP Inspection Program (Section 7.2.2.6)

Consistent with Regional Board staff's request to consider development of a post-construction Treatment Control BMP inspection program, the Permittees have developed a proposal that they plan to implement when economic conditions allow. This proposal would enhance the existing business and Permittee facility inspection programs described in the Riverside County DAMP by incorporating inspections and maintenance verification of Treatment Control BMPs. Treatment Control BMPs constructed as part of residential developments, or other developments not captured by the Permittees' existing business inspections would be addressed through an annual self-certification program.

Revisions to the Dry Weather Monitoring Program (Section 6.4.4.1)

The Permittees have committed to participating in the Regional Watershed Monitoring Program developed in conjunction with the Southern California Coastal Water Research Project (SCCWRP). Six annual monitoring events were scheduled for the upper Santa Margarita River watershed. Consistent with the agreement reached by SCCWRP, Permittee, and Regional Board staff, three of these sites would be collected by the Permittees and three through the Surface Water Ambient Monitoring Program (SWAMP). The costs for implementing the three sites to be implemented by the Permittees would be offset by reducing the Permittees existing dry weather triad monitoring events (three stations) from twice a year to annually.

Development of a LID Manual (Section 7.2.2.1)

The Permittees have committed to develop a Low Impact Development (LID) Implementation Manual based on the LID Manual currently being developed by the SMC and CASQA.

Hydromodification Management Plan (Section 7.2.2.2)

The Permittees have committed to develop a revised hydromodification management plan based on the findings of the final SCCWRP Hydromodification Management report currently under development.

Participate in a Watershed Based TMDL for the Santa Margarita Lagoon (Section 6.4.4.7)

The Permittees understand that, due to economic conditions, State funding for the Santa Margarita Lagoon watershed-based TMDL has been withdrawn. As described in Section 3.4, economic conditions are also impacting the Permittees' funding sources and the Permittees are struggling to maintain sufficient resources to fund their existing compliance programs. Therefore, the Permittees cannot currently support committing additional funds toward a third party TMDL effort. The Permittees are, however, agreeable to discussing with the Regional Board a elimination or reduction of various required compliance activities that are not measurably enhancing the their ability to attain Water Quality Standards, which in turn could allow the Permittees to redirect some of their existing resources into the third party TMDL effort. Some program elements that could be considered for discussion are described in Section 6.4.4.7.

Pyrethroid Pesticide BMP Implementation

The Permittees have committed to implementing several BMPs to address possible urban sources of pyrethroid pesticides. In addition the Permittees have committed to working through CASQA to facilitate regulatory change in pyrethroid pesticide use to curtail potential causes of receiving water impairment.

Adjustments to the Monitoring Program

The Permittees have proposed additional revisions to the monitoring program to streamline implementation and increase its utility.

2.0 Introduction

The Regional Board adopted Order No. R9-2004-001 (NPDES No. CAS0108766), an area-wide NPDES MS4 permit (2004 MS4 Permit) on July 14, 2004. This ROWD is a required component for renewal of the 2004 MS4 Permit. The 2004 MS4 Permit authorizes discharges of Urban Runoff from the MS4 owned and operated by the Permittees.

Capitalized terms used in this ROWD are defined in the glossary of the Riverside County DAMP. The Riverside County DAMP serves as the model compliance document used by the Permittees to develop the Watershed and Individual SWMPs. To save costs and increase the effectiveness of the MS4 Permit compliance programs, the Permittees will maintain the Riverside County DAMP as the primary document that describes Permittee compliance programs. The Permittees individual and regional compliance programs are then described in more detail in the Individual and Watershed SWMPs.

This ROWD has been written and formatted to address the requirements outlined in United States Environmental Protection Agency (USEPA) *Interpretative Policy Memorandum on Reapplication Requirements for Municipal Separate Storm Sewer Systems* contained in the Federal Register, Volume 61, page 41698 (61 FR 41698), and to include commitments made in the various compliance documents, annual reports and in meetings with the Regional Board.

Additionally, as discussed in the meeting with Regional Board staff on September 9, 2008 and as supported by the above mentioned USEPA guidance, this ROWD relies on the fourth year Annual Reports to document the programs implemented by the Permittees. The fourth year Annual Report also includes a comprehensive evaluation of Permittee monitoring data to date and includes preliminary recommendations for Permittee compliance programs based on that data. As part of the ROWD process, the Permittees have reassessed their existing programs that are described in the Annual Reports, the monitoring conclusions and program recommendations contained in the fourth year Annual Reports, and in this ROWD, are making additional recommendations for revisions to improve the efficiency and effectiveness of these programs at improving and protecting the quality of our Receiving Waters.

The following sections of the ROWD are summarized as follows:

Section 3.0 - Information about the Permittees, their legal authority to implement the existing and proposed programs, the Permit Area, and the Permittee's funding sources and economic outlook relative to continued funding of the MS4 Permit compliance programs.

Section 4.0 – Information about the upper Santa Margarita River watershed, including physiography and geology, hydrology, climate, population, land use, surface water bodies and their Beneficial Uses and Impairments, and the MS4. This information provides context for the MS4 Permit compliance program in the Santa Margarita Region.

Section 5.0 – An overall evaluation of the Permittees existing programs based on water quality data collected to date and proposed compliance program modifications.

Section 6.0 – Evaluation of regional compliance programs, including a summary of accomplishments and proposed program revisions.

Section 7.0 – Evaluation of compliance programs individually implemented by the Permittees, including a summary of accomplishments and proposed program revisions.

3.0 Applicant Information

3.1 Permittee Contact Information

Table 1 provides the contact information for each of the Permittees in the Santa Margarita Region.

Table 1. Permittee Contact Information

	Primary Contact	Staff Contact	Address
District	Warren D. Williams General Manager, Chief Engineer 951.955.1275	Jason Uhley Engineering Project Manager 951.955.1273 juhley@rcflood.org	1995 Market Street Riverside, CA 92501
City of Menifee[1]	George Wentz City Manager 951.672.6777	Addison Smith Building Official 951.672.6777	29683 New Hub Drive, Suite C Menifee, CA 92586
City of Murrieta	Patrick A. Thomas Director of Public Works 951.304.2489	Bill Woolsey 951.461.6073 WWoolsey@murrieta.org	1 Town Center 24601 Jefferson Avenue Murrieta, CA 92562
City of Temecula	Daniel A. York City Engineer 951.694.6411	Aldo Licitra 951.694.6411 aldo.licitra@cityoftemecula.org	43200 Business Park Drive Temecula, CA 92589
City of Wildomar[1]	John Danielson City Manager 951.677.7751	Michael Kashiwagi, P.E. Director of Municipal Services (916) 683-3340 X 15 (Office) (916) 206-2238 (Cell) Local Cell 909.200.0523	23873 Clinton Keith Road, Suite 111 Wildomar, CA 92595
County of Riverside	Gary Christmas Chief Deputy County Executive Officer	Mike Shetler Senior Management Analyst 951.955.1110 mshetler@rceo.org	4080 Lemon Street, Suite 400 Riverside, CA 92501

3.2 Statement of Legal Authority

The Co-Permittees have adopted ordinances regarding the management of Urban Runoff. The ordinances provide the Permittees with the legal authority to implement the requirements of the 2004 MS4 Permit and 40 CFR Section 122.26(d)(2)(i)(A-F). The Permittees also provided certification of adequate legal authority to comply with the 2004 MS4 Permit and to implement the Riverside County DAMP to the

[1] As the Cities of Menifee and Wildomar are recently incorporated, the County of Riverside is currently handling their stormwater and MS4 permitting issues. Once these cities are fully established and staffed, updated contact information will be provided to the Board. The cities will assume responsibility for their programs on October 1, 2009.

Regional Board. However, it is noted that the newly incorporated cities of Menifee and Wildomar will submit their certifications following adoption of the updated MS4 Permit.

However, there are limitations to the authority the Permittees have for enforcement actions. The Permittees do not have legal authority over discharges into their respective MS4 facilities that originate from agricultural activities, state and federal facilities, utilities and special districts, Native American tribal lands, wastewater management agencies and other point and non-point source discharges otherwise permitted by, or under the jurisdiction of, the Regional Board or USEPA. Examples of non-point sources of Pollutants not under the control of the Permittees include materials from operation of internal combustion engines, atmospheric deposition, brake pad wear, tire wear, residues from lawful application of pesticides, nutrient runoff from agricultural activities, and leaching of naturally occurring minerals from local geography.

Also, the Permittees do not have the authority to enforce the provisions of California's General Permit for Storm Water Discharges Associated with Industrial Activities (General Permit-Industrial) or California's General Permit for Storm Water Discharges Associated with Construction Activity (General Permit-Construction). The State Water Resources Control Board (State Board) issues these NPDES permits, and neither the State Board nor the Regional Board has the authority under the Clean Water Act to delegate responsibility for administering these NPDES permit programs to the Permittees. However, the Permittees' local storm water and erosion control ordinances may address items similar to those identified in these statewide NPDES permits.

3.3 Permit Area

The Permit Area is defined as the urbanized area serviced by the Permittee's MS4 facilities. The Permit Area is located within the area delineated by the County boundary line on the south and the limits of the jurisdiction of the San Diego Regional Board on the north, east, and west. It is important to recognize that the Clean Water Act exempts agricultural activities from regulation under NPDES and the Permittees do not have legal jurisdiction over storm water discharges into their MS4 facilities from:

- California and federal facilities,
- Areas under the jurisdiction of San Diego County,
- Utilities and special districts, and
- Native American tribal lands.

These areas are not included in the Permit Area. In addition, other point and non-point source discharges otherwise permitted by or under the jurisdiction of the Regional Board or USEPA may affect water quality in the Murrieta and Temecula Creek watersheds.

The area of Riverside County under the jurisdiction of the Regional Board is less than 8 percent of the 7,300 square miles within Riverside County. Of the 27 municipalities within the whole of Riverside County, only five include areas under the jurisdiction of the Regional Board.

3.4 Funding Sources and Economic Projections

3.4.1 Funding Sources

The costs incurred by the Permittees in implementing the SWMPs fall into two broad categories:

- **Shared Costs**. These are costs that fund activities performed mostly by the District under the Implementation Agreements. These activities include coordinating the overall storm water program, coordinating other interagency cooperative efforts such as the Compliance Assistance Program (CAP), participating in CASQA activities, representing Permittees at meetings of the Regional Board or State Board and other public forums; preparing and submitting compliance reports and other reports required under the MS4 Permit, conducting Urban Runoff monitoring and public education outreach programs, responding to Water Code Section 13267 requests, providing other program documentation, and coordinating consultant studies, Permittee meetings, and training seminars.
- **Individual Permittee Costs for Individual SWMP Implementation**. These are costs incurred by each Permittee for implementing within its jurisdiction the BMPs (drainage facility inspections for illicit connections, drainage facility maintenance, drain inlet/catch basin stenciling, emergency spill response, street sweeping, litter control, public education, construction activity inspection, development of implementation plans, etc.) comprising the Individual SWMPs.

Historically, the Permittees have employed several funding methods to finance their MS4 Permit compliance activities. Unfortunately, the mortgage crisis, collapse of the housing market, and the economic recession has resulted in the cessation of virtually all development activity and has significantly reduced property and sales tax revenue. Property tax revenues have been reduced by the high level of foreclosure activity, reduced property values and a significant decline in assessed valuations. Property tax revenues have been further reduced by homeowner requests for reassessments to reflect the reduced property values. The impact of these economic conditions on the Permittees in the Santa Margarita Region has been particularly severe. As a result, the aggregate funding available to the Permittees has been severely reduced, and it is anticipated that this condition will continue well into and possibly throughout the next Permit term. The funding methods historically used and the effects of the economic situation on the availability of funds through these sources are summarized as follows:

- **Santa Margarita Watershed Benefit Assessment Area**. In 1991, the District established the Santa Margarita Watershed Benefit Assessment Area to fund its MS4 Permit compliance activities. Currently, the Benefit Assessment revenues fund the District's share of the area-wide MS4 Permit program activities and the District's individual compliance activities as a Permittee. Under the Benefit Assessment each parcel is taxed based on the impervious area of each parcel at a set rate established by District Ordinance 14. This rate has not been increased since 1991 due to Proposition 218. In 2007/08 the Santa Margarita Benefit Assessment generated approximately $410,000 dollars in revenue.

  Outlook: The District expects at best to maintain, if not see temporary reductions in Benefit Assessment revenues due to the significant number of homes that are not paying property tax due to foreclosure. Pursuant to Article 13.D of the California Constitution, an increase in the established Benefit Assessment rate to compensate for these reductions requires approval of 2/3

of the voters or 50 percent of the property owners and is highly unlikely given the current economic climate. Revenues will not increase until the development industry recovers.

- **General Fund /Other Revenues**. The County and the cities utilize general fund revenue to finance most of their MS4 Permit compliance activities. General fund revenue is generated by property tax, sales tax, and auto license taxes.

  Outlook: The Permittees expect a continued reduction in th**e funds** available through General Fund / Other Revenues through at least FY 2009 /2010. Although optimistic that conditions will begin to stabilize toward the end of 2009, the Permittees cannot speculate as to when revenues will recover to previous levels.

- **Fees**. Several Permittees charge fees for services such as inspections, plan check, and other recoverable costs related to compliance with the 2004 MS4 Permit. These fees cover both the direct and indirect costs associated with conducting these inspections/reviews including associated compliance tracking and reporting.

  Outlook: It is notable that, with the virtual collapse of the development industry in the Santa Margarita Region, the fees received by the Permittees have been significantly reduced. With this reduced level of fee-based income, maintenance of the existing inspection and plan review programs will place an increased burden on overall funding of the compliance programs. The Permittees do not expect revenues from fees to recover until the development industry recovers. Even with recovery of the development industry, it is anticipated that over the long-term, revenues from fees will be reduced for the City of Temecula and the County due to the reduced area remaining for development within their jurisdictions.

- **Grants.** The Permittees have actively pursued and, as available, used Grants to fund compliance programs.

  Outlook: In December the state's budget crisis resulted in a directive to state agencies from the Department of Finance to halt projects that rely on bond funds, including those funded by Prop 40, Prop 50, or Prop 84. The State of California is the primary source of grant funding for water quality projects. Future availability of funds to resume grant-funded projects is uncertain.

It is clear that the current economic climate and that of the foreseeable future is creating a significant burden upon the Permittees that will make the continuance of all existing MS4 Permit compliance programs increasingly difficult. New funding sources or alternative combinations of funding sources will likely be required to ensure continued funding of even the current MS4 Permit compliance programs.

3.4.2 Economic Projections

According to Chicago Title, Southwest Riverside County has experienced a very significant increase in supply of single-family residential units on the market. As a result, housing price indicators are very negative. In the majority of the Southwest Riverside submarket, the pending price is less than the closing price indicating general price weakness. The October, 2008 count of bank owned (REO) properties for Riverside County as a whole was 12,078. The number of home in foreclosure was 23,480. The presence of high levels of REO properties will continue to negatively affect home prices. In addition, the level of foreclosures is increasing.

With regard to other sectors of the economy, Riverside County has taken a serious turn for the worst in 2008, with projections indicating that the severe downturn will continue through 2009 at the very least.

The economic difficulties being faced in the Southwest Riverside submarket is the result of the dramatic downturn in the housing market in this area, the national financial turmoil, the worldwide credit crisis, and the increasing consumer debt crisis. According to Beacon Economics, a respected economics consulting firm in Los Angeles, Inland Southern California is clearly at the epicenter of this economic turmoil, with extremely high rates of unemployment at present. Unemployment rates in Inland Southern California are expected to reach 12.4 percent before this deep recession is over. Housing prices are expected to continue their precipitous decline from their peak levels in the two Inland Southern California counties through at least 2011. According to Dataquick, median home prices in Riverside County peaked at $415,000 in January 2007. At the end of this cycle, the median home price in Riverside County is expected to be $198,000. Figure 1 depicts the median housing price in Riverside County over the period 1990 to August 2008.

Figure 1. Riverside County Median Housing Price (1990 – August 2008)

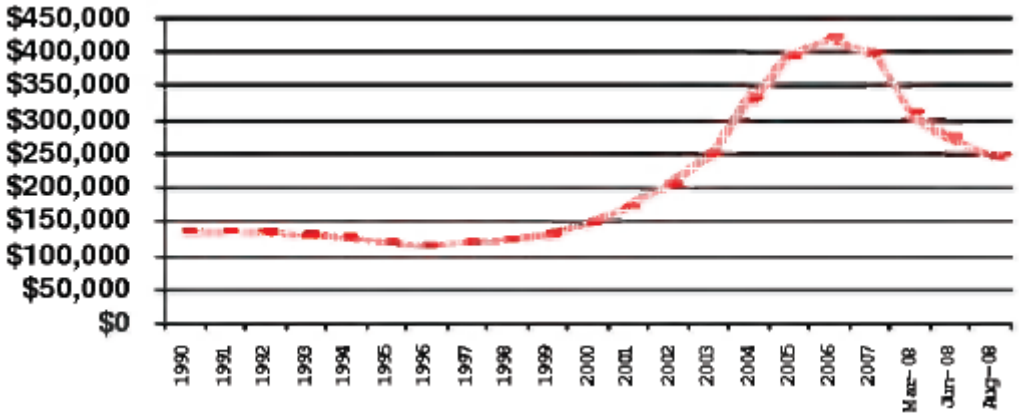

Source: Riverside County Center for Demographic Research. 2008. Riverside County Progress Report, pg 14.

Local Government sales tax revenues remained fairly stagnant through 2006 and began to decline in early 2007, according to Beacon. By the second quarter of 2008, taxable sales in Riverside County declined by 7.7 percent. The decline is expected to continue with taxable sales possibly bottoming out by 2010. Recovery of these reduced revenue streams will likely not occur within the next permit term.

As a direct outcome of the current economy and the economic outlook into the next MS4 Permit term, the number of New Developments proposals has plummeted and any significant rebound is not forecast. New and redevelopment projects will likely remain minimal. As shown in Figure 2, the number of housing units being added each year has dropped below the levels seen at any point in time during the 2004 MS4 Permit. These numbers will likely continue to decrease for a significant portion of the new MS4 Permit term.

Figure 2. Riverside County Housing Units Added (1990 – 2008)

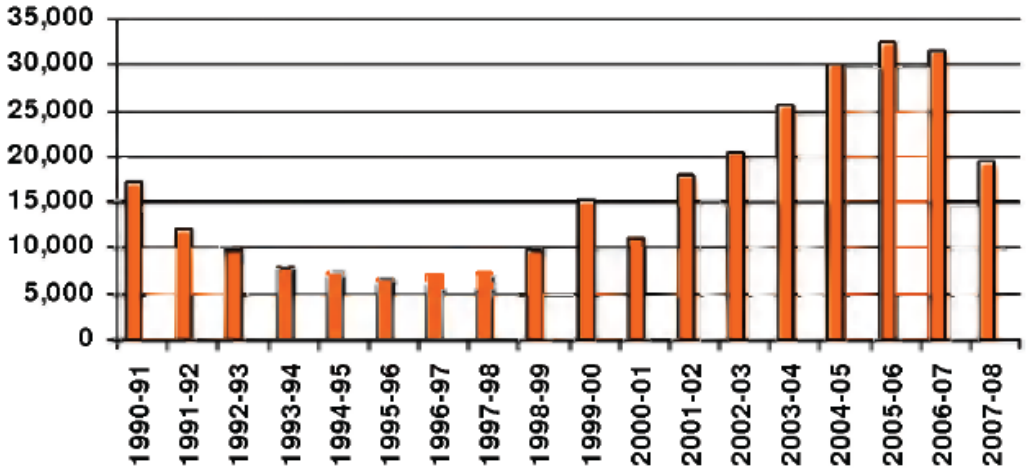

Source: Riverside County Center for Demographic Research. 2008. Riverside County Progress Report, pg 12.

These economic issues and projections directly affect and limit both:

1. The need for including enhanced new and re-development requirements in the new MS4 Permit, and
2. The Permittees ability to fund, and even seek new funding sources for additional MS4 Permit requirements for new and re-development projects.

Therefore, as described in Section 7.2, the Permittees are not recommending and cannot financially support any significant increases to their Development Planning activities. Permittee specific projections are as follows:

3.4.2.1 County of Riverside

The County is operating with a structural deficit of $12 million and plans a 25 percent budget reduction from FY 2008/2009 through FY 2011/2012. The County's current budget of $4.7 billion represents a 5 percent reduction from the previous year and next year's budget is expected to be cut by 10 percent. These cuts are directly associated with the overall decline in property values and the high number of foreclosures. There are concerns about having to use discretionary funds to meet State mental health and social service mandates. In addition, the County is dependent on funds from federal and state sources. If during this time of economic crisis federal and state funding sources are reduced or eliminated, any unfunded State and Federal programs will be terminated. Only core County programs will continue.

The primary source of general fund revenue is from property taxes and sales tax. With the unprecedented number of foreclosures, reduced property values, and declining sales tax revenue, general fund revenue is in a downward spiral. Another source of funding is through the Solid Waste Tipping Fees paid at the County landfills. Volume is down 15 percent since 2006 with anticipated downward trend to 40 percent reduction in solid waste through 2014. Programs that are partially funded through tipping fee allotments will be impacted. Due to the declining economy the recycling market has collapsed. Virtually no recyclable materials are being shipped for reprocessing. This loss of revenue and increased disposal costs is further impacting the general fund.

Cuts of 25 percent for all Net County Cost general fund programs will translate into reduction of County services and elimination of unfunded state and federal programs. Only core value programs will be provided (including public safety and fee programs)

The County has instituted a hiring freeze and required each department to create a report outlining the projected effects of the budget cuts. The County currently employs over 20,000 people, and layoffs are expected to result from the findings of these departmental reports. It is anticipated that this will impact program delivery for stormwater related activities. No County department will be able to sustain current staffing levels as they try to meet the 25 percent budget reduction strategy.[2] [3]

3.4.2.2 City of Menifee

The newly incorporated City of Menifee FY 2008/2009 initial budget was estimated from their comprehensive fiscal analysis that was submitted to the Local Agency Formation Commission during the incorporation process. Because of the economic uncertainty, and the fact that the City is only now beginning to staff positions, it is unknown what the immediate impact of the fiscal crisis will be. The County is responsible for assisting the City in meeting its MS4 Permit compliance requirements during the first year of incorporation which expires October 1, 2009. Currently, the level of property tax revenue that will be available to the City is uncertain. Funding for MS4 Permit compliance requirements was not explicitly budgeted. A financial hardship currently exists because of the costs associated with incorporation.

3.4.2.3 City of Murrieta

The City of Murrieta's FY 2008/2009 budget did not increase compared to FY 2007/2008. Adjustments were made to reflect less revenue and to absorb any operating costs. However, budget cuts are anticipated for FY 2009/2010 because the immediate economic outlook is not good. There have been approximately 2,000 home foreclosures within the City. Sales tax revenue is estimated to drop 12.5 percent, property tax revenue will drop, and the State took approximately $525,000 out of redevelopment funds. Murrieta did not receive any vehicle licensing fees from the State and it appears likely that the State will take more revenue from the Cities to solve its budget problems. New NPDES requirements that increase compliance costs will create a financial hardship for the City.

3.4.2.4 City of Temecula

Various ongoing tax and investment revenues adopted in the City of Temecula's FY 2008-09 general fund revenues are projected to decrease from FY 2007-08. Sales and use tax revenues are expected to decrease in FY 2008-09 compared to FY 2007-08. This decrease is primarily the result of the decline in general consumer goods, electronic retail, and auto sales. Property tax revenue is also expected to decrease due to decreases in supplemental tax receipts attributed to the impact of the housing crisis. Investment interest revenue is also anticipated to decrease due to a decline in interest rates.

As a result of the 2008/2009 State budget, Temecula's redevelopment agency will have to shift existing funds from property taxes to the State's Education Revenue Augmentation Fund coffer for schools and

[2] "The Realities of Recession in California: A Statewide Report by U.S. Senator Barbara Boxer, December, 2008, p. 18.

[3] Riverside County Executive Office, January, 2008.

colleges. As such, the amount due from the Temecula Redevelopment Agency is expected to be $898,685. As the State of California continues to address its budget deficit, the City of Temecula faces the possibility of additional revenue shifts to State coffers, further losing future revenue streams and threatening existing service levels.

In addition, a Press-Enterprise article dated December 9, 2008, reported that "Between 25 and 30 part-time Temecula employees will be without work in the new year as City officials deal with a lack of revenue and less work to go around." Furthermore, "the city is not immune to the economic slowdown, which has forced its neighbors to lay off workers and slash spending to counter drops in sales tax receipts and building permit fees. In May, the City's Finance Director reported that revenues were down $3 million compared to two years ago."

With these current and projected reductions in revenue and staff, additional requirements in the MS4 Permit or upcoming TMDL-related requirements, without any corresponding cost-equivalent offsets, will exceed the City's ability to effectively implement these new requirements and will begin to compromise the City's existing efforts to manage the existing MS4 Permit requirements.

3.4.2.5 City of Wildomar

The newly incorporated City of Wildomar FY 2008/2009 initial budget was estimated from their comprehensive fiscal analysis that was submitted to the Local Agency Formation Commission during the incorporation process. Because of the economic uncertainty, and the fact that the City is only now beginning to staff positions, it is unknown what the immediate impact of the fiscal crisis will be. The County is responsible for assisting the City in meeting its MS4 Permit compliance requirements the first year of incorporation that expires July 1, 2009. Currently, the level of property tax revenue that will be available to the City is uncertain. Funding for MS4 Permit compliance requirements was not explicitly budgeted. A financial hardship currently exists because of the costs associated with incorporation.

4.0 Overview of the Upper Santa Margarita River Watershed

4.1 Physiography and Geology

The upper Santa Margarita River watershed is defined as that portion of the Santa Margarita River watershed above the confluence of Murrieta and Temecula Creeks and includes the City of Temecula and portions of the Cities of Menifee, Murrieta, Wildomar, unincorporated County areas, portions of the Cleveland and San Bernardino National Forests, the Cahuilla, Ramona, Pauma, and Pechanga Indian Reservations and properties under the jurisdiction of Caltrans and a variety of special districts. The watershed is bounded by several mountain ranges, including the Santa Ana and Santa Margarita mountains to the North and the Palomar Mountains to the South. The upper Santa Margarita watershed includes areas in Riverside and San Diego Counties and encompasses approximately 588 square miles.

The upper Santa Margarita watershed includes two major sub-basins, drained by Temecula and Murrieta Creeks. Temecula Creek has a drainage area of 366 square miles, with steep rugged topography in the Palomar and Thomas Mountain areas and rolling hills below. The upper 316 square miles of this basin is controlled by Vail Lake (completed in 1949). Murrieta Creek has a drainage area of 222 square miles, with over 50 square miles controlled by Skinner Reservoir (completed in 1974). Although the watershed area is somewhat smaller and less rugged than the Temecula Basin, flood flows have the potential to create greater damage as they flow through the Cities of Temecula and Murrieta.

Temecula and Murrieta Creeks join along the Elsinore fault zone at the head of Temecula Canyon to form the Santa Margarita River. The Temecula Canyon is approximately five miles long, and is a steep, narrow, and rocky canyon. The San Diego-Riverside county line crosses through the Temecula Canyon. From here, the river traverses 27 miles to the Pacific Ocean.[4]

4.1.1 Watershed Characteristics

Over 50 percent of the Santa Margarita watershed has been controlled by the construction of Vail Dam in 1949 and Skinner Reservoir in 1974, which created a significant storage capacity in the upper watershed.[5] [6] 52 percent of the upper Santa Margarita River watershed is controlled by the dams. Due to this storage capacity, peak flow rates during major flow events for both existing and future land use conditions will be lower than under natural conditions.[7] [8]

[4] Santa Margarita Watershed Study: Hydrologic and Watershed Processes, Phillips, Williams and Associates, Ltd., October 26, 1998, page 1.

[5] Santa Margarita Watershed Study: Hydrologic and Watershed Processes, Phillips, Williams and Associates, Ltd., October 26, 1998, page 14.

[6] Philip Williams & Associates, Santa Margarita Watershed Study: Hydrology and Watershed Processes, October 26, 1998, p. 14.

[7] Philip Williams & Associates, Santa Margarita Watershed Study: Hydrology and Watershed Processes, October 26, 1998, p. 20.

[8] Santa Margarita Watershed Study: Hydrologic and Watershed Processes, Phillips, Williams and Associates, Ltd., October 26, 1998, page 20.

4.1.2 Stream Flow Characteristics

Murrieta and Temecula Creeks are perennial interrupted streams, i.e., they include reaches in which the flow is continuous and others where flow is ephemeral. The areas of perennial flow are located in mountain area tributaries outside of the urbanized areas serviced by the MS4s. The perennial flows disappear by seepage into the sands and gravels and resurface upstream of the confluence of Murrieta and Temecula Creeks. The creeks in the urbanized areas of the watershed, located primarily in the valley, are ephemeral and flows are only observed during and immediately after significant storm events. During major storms, after initial wetting, periods of intense rainfall result in rapid increases in stream flow in steep foothill and mountain areas.[9] "Runoff in streams in the watershed is derived primarily from rainfall, and as a result, stream flows exhibit monthly and seasonal variations similar to those shown by the precipitation records. Absence of snow pack in the tributary watershed results in a rapid decrease in flow of streams at the conclusion of the winter precipitation season. Following severe storms, discharge in the larger streams often increases in a few hours time from practically no flow to a rate of thousands of cubic feet per second. Stream flows vary greatly from month to month and from season to season."[10]

Rising groundwater is currently observed in Murrieta Creek below its confluence with the Santa Gertrudis Channel. This is consistent with the observations with the rising groundwater conditions observed by the State of California in 1956.[11] Rising groundwater is also observed in Temecula Creek approximately one quarter mile upstream of the Interstate 15 bridge. In 1956, the State of California observed more extensive rising groundwater conditions occurring as far upstream as the Highway 79 bridge. Based on the virtual absence of non-storm water flows and the rising groundwater conditions in lower Murrieta and Temecula Creeks observed prior to development of the watershed, there is no evidence that the rising groundwater is due to Urban Runoff nor that Urban Runoff has affected the quality of rising groundwater. However, use and disposal of reclaimed water and agricultural and landscape irrigation in the watershed may affect groundwater quality. Until October 2002, the Rancho California Water District augmented the flow of the Santa Margarita River with reclaimed water at a point about five miles upstream from the Temecula gauging station. Since that time, the Rancho California Water District has diverted reclaimed water to the Santa Ana watershed and instead discharged imported water at a location downstream of the confluence of Murrieta and Temecula Creeks in order to meet water supply obligations to Camp Pendleton.

For the average annual event, it is estimated that approximately 89 percent of the volume of runoff in the Santa Margarita Region is due to non-urban land uses not regulated under the federal storm water program. For the 100-year 24-hour event, 93 percent of the volume of runoff will be due to non-urban land uses. These estimates are based on the assumption that precipitation is constant across the watershed. However, precipitation (and resultant runoff volumes) in the non-urbanized upland areas is as much as four times greater than that from the urbanized valley areas.[12]

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[9] Riverside Flood Control and Water Conservation District, "Hydrologic Data for 1975-76 Season," March 1982, p. 49.

[10] State of California Department of Public Works, Division of Water Resources, Bulletin No. 57, Santa Margarita River Investigation, Volume I, June 1956, p. 48.

[11] State of California Department of Public Works Division of Water Resources, Bulletin No. 57, "Santa Margarita River Investigation," Volume I, June 1956, p. 48.

[12] State of California Department of Public Works, Division of Water Resources, Bulletin No. 57, Santa Margarita River Investigation, Volume I, June 1956, p. 11

4.2 Climate

"The climate of the Santa Margarita River watershed is typically Mediterranean, being characterized by warm dry summers and cool rainy winters. About 75 percent of the precipitation occurs during the four-month period from December through March. Mean annual depth of precipitation ranges from less than 10 inches near Vail Reservoir to over 40 inches west of Palomar Observatory, varying with elevation and topographic influences."[13] Precipitation increases with increases in elevation to the summit of the Coastal range. Shading effects of the Coastal range lead to a marked decrease of precipitation throughout the lower portions of the Inland area. Precipitation increases again farther away from the Coastal range in the northeastern area of the Inland area.[14] The significant and varied orographic features also make rainfall prediction particularly challenging in the urbanized portion of the watershed.

4.3 Population and Land Use

4.3.1 Population

The California Department of Finance estimates that as of January 1, 2008, the total population of Riverside County was about 2,088,322. Of the 2.1 million people, approximately 272,621 persons (or 13 percent) reside within the portion of Riverside County under the jurisdiction of the San Diego Regional Board. As shown in Figure 3, approximately 51,314 persons[15] reside in the unincorporated area while approximately 221,307 persons reside within the cities of Menifee, Murrieta, Temecula and Wildomar.

Figure 3. Santa Margarita Region Population by Permittee (2008)

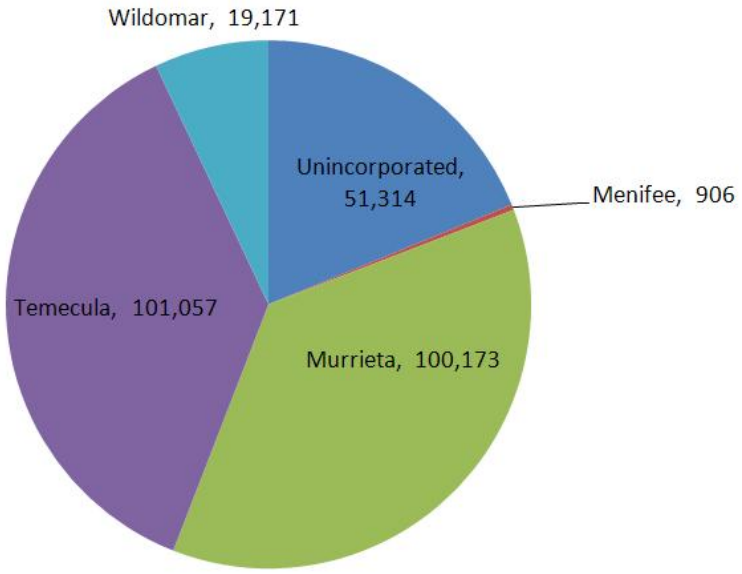

[13] State of California Department of Public Works, Division of Water Resources, Bulletin No. 57, Santa Margarita River Investigation, Volume I, June 1956, p. 11.

[14] State of California Department of Public Works, Division of Water Resources, Bulletin No. 57, Santa Margarita River Investigation, Volume I, June 1956, p. 38.

[15] Population estimate for the portion of unincorporated Riverside County within the Santa Margarita River watershed developed by the County TLMA GIS Demographics Unit based on the 2000 Census.

Although the second term and 2004 MS4 Permits covered a period of time that saw a significant amount of growth, due to the current and foreseeable economic conditions described in Section 3.4.2 of this report and decreasing areas available for development, growth during the next MS4 Permit term will be quite limited. In fact, the projected growth rate through 2015 will be significantly less than has been seen since the early 1990s. Figure 4 shows the combined populations of the Cities of Murrieta and Temecula since 1997 and projected through 2015. Similar trends are expected for the unincorporated areas and the portions of the cities of Wildomar and Menifee within the watershed.

Figure 4. Cities of Murrieta and Temecula Combined Population (1997 – 2015)

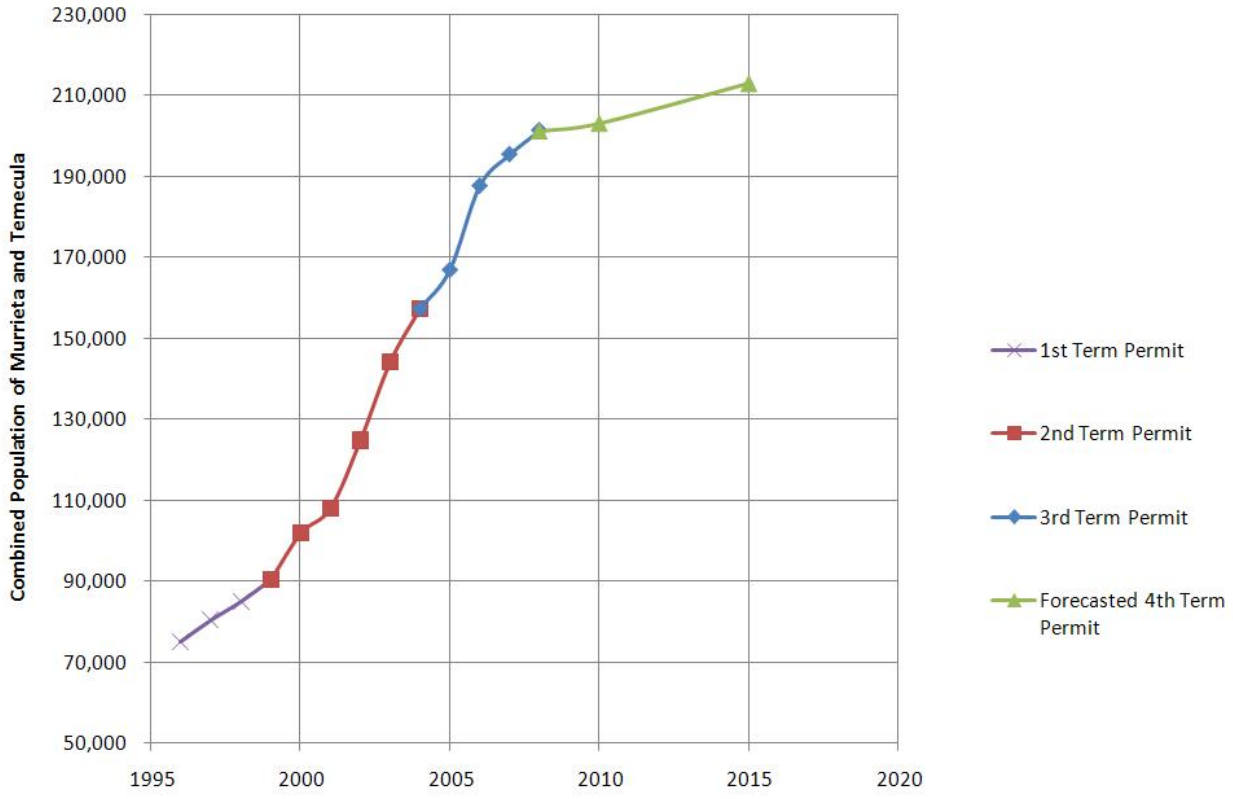

Source: Riverside County Center for Demographic Research. 2008. Riverside County Progress Report, pgs 92 & 124.

Figure 4 clearly demonstrates the dramatic reduction in growth that is expected for the term of the next MS4 Permit when compared to previous permit terms.[16] Establishing trend lines for the population in these cities further demonstrates that the growth rate (population added per year) will be lower than the previous growth rate by approximately 86 percent.

[16] 2008 Riverside County Progress Report

Table 2 shows population projections for the all of the Permittees into the year 2015.

Table 2. Population of Santa Margarita Region Co-Permittees

Co-Permittee	Year			Change (2009 to 2015)
	Estimate 2008 (a)	Estimate 2009 (b)	Projected 2015 (b)	
City of Menifee	906[c]	927[c]	5,232[c]	464%
City of Murrieta	100,173	102,277	109,715	7.3%
City of Temecula	101,057	101,356[d]	103,150	1.8%
City of Wildomar	19,171[c]	19,589[c]	20,127[c]	2.7%
Unincorporated County of Riverside	51,314[c]	52,436[c]	53,793[c]	2.6%
Total	272,621	276,585	292,017	5.6%

Notes:

(a) Unless otherwise noted, populations were obtained from the State of California, Department of Finance, E-4 Population Estimates for Cities, Counties and the State, May 2008.

(b) Unless otherwise noted, projected populations were obtained from Riverside County Center for Demographic Research. Riverside County Progress Report, 2008

(c) Data provided by County of Riverside, Executive Office.

(d) Data provided by City of Temecula.

Since the District is not a general purpose government, it is not included in this listing. Although the current population of the City of Menifee in the Permit Area is small, it is anticipated that the population will increase as it annexes unincorporated areas. Similarly, it is anticipated that the cities of Murrieta and Temecula will gain population as they annex unincorporated areas. It is not anticipated that Wildomar will see significant population increases as it is bounded on all sides by other cities and lands reserved under the MSHCP.

4.3.2 Land Use

Land uses in Riverside County within the Santa Margarita Region include open space, residential, commercial, light industrial, heavy industrial, and agriculture. The agricultural land uses include row crops, nurseries, citrus groves and vineyards, dairies, ranches, poultry and hog farms, and other agricultural related uses with one single-family residence allowed per 10 acres (County of Riverside General Plan, Land Use Element 2003). The conversion of agricultural lands and open space to other "developed" land uses has been ongoing and will continue, although at a much lower rate than previously experienced. Land uses in the Santa Margarita Region are shown in Table 3. These land uses are based on the County of Riverside Assessor Parcel Data, current as of February 2006. It should be noted that the land uses below represent ***zoned*** land uses rather than ***actual*** land uses. This overstates the actual area of urban land use in the Santa Margarita Region. Also, changes in zoning designations can cause odd fluctuations in year-to-year date.

A map of the zoned land uses is provided in Appendix A.

In 1956, only 0.3 percent of the Santa Margarita River watershed (less than two square miles) was urbanized.[17] Although there has been a significant rate of growth in population relative to the State and

[17] State of California Department of Public Works, Division of Water Resources, Bulletin No. 57, Santa Margarita River Investigation, Volume I, June 1956.

neighboring counties, half a century later, approximately 88 percent of the Santa Margarita River watershed remains as non-urban land uses (rural residential, agriculture, preserves and open space, state lands, federal lands, and tribal lands). Further, almost one-third of the upper Santa Margarita River watershed consists of federal, state, and tribal lands that are not under the jurisdiction of the Permittees' MS4 programs. It is projected that the population of Riverside County will increase approximately 5.6 percent by 2015. If the urbanized area increases proportional to population, 87 percent of the upper Santa Margarita River watershed would remain in non-urban land uses in 2015.

Table 3. 2009 Santa Margarita Region Land Uses

Urban Land Use	Acreage[(a)]	% of Land Use Subtotal	% of Total Land Use
Commercial	8,339	20.0%	2.5%
Industrial	963	2.3%	0.3%
Urban Residential (< 1 acre)	12,656	30.4%	3.7%
Parks & Recreation Facilities	4,291	10.3%	1.3%
Streets & Roads	15,439	37.0%	4.6%
Subtotal – Urban Land Use	41,688		12.3%
Non Urban Land Uses			
Preserves & Open Space	54,141	18.2%	16.0%
Rural Residential (> 1 acre)	106,773	35.9%	31.5%
Agriculture	36,389	12.2%	10.7%
Federal/State/Tribal Lands/Non-County Jurisdiction	100,076	33.7%	29.5%
Subtotal Non Urban Land Use	297,379		87.7%
Total Urban & Non Urban Land Use	339,067		100%

(a) As reported in the FY 2007/2008 Watershed Annual Report.

4.3.3 Conserved Lands

The Western Riverside County Multiple Species Habitat Conservation Plan (MSHCP) was adopted in June of 2003. It is a comprehensive, multi-jurisdictional Habitat Conservation Plan focusing on conservation of species and their associated habitats in western Riverside County. The MSHCP is one of several large, multi-jurisdictional habitat planning efforts in southern California with the overall goal of maintaining biological and ecological diversity within a rapidly urbanizing region. The MSHCP will allow Riverside County and its cities to better control local land-use decisions and maintain a strong economic climate in the region while addressing the requirements of the state and federal Endangered Species Acts. Further, as floodplains and streams tend to support critical habitat, the MSHCP will preserve many of the remaining natural streams and establish significant buffer areas between those systems and urban land uses.

Much of the remaining non-urbanized lands in the Santa Margarita Region will ultimately be incorporated into the MSHCP. The MSHCP will result in a conserved area in excess of 500,000 acres and focuses on conservation of 146 species. The MSHCP Conservation Area includes approximately 347,000 acres on

existing Public/Quasi-Public Lands and approximately 153,000 acres of Additional Reserve Land. A large portion of the conserved lands are in the upper Santa Margarita watershed (at least 145,000 acres). There are approximately 72,318 acres of existing public or quasi-public lands preserved within the upper Santa Margarita River watershed area located in Riverside County.

4.3.4 Anticipated Development 2009-2015

Proposed development during the next MS4 Permit term is an important indicator of potential new Urban Runoff sources. To the extent possible, the Permittees have identified significant New Development projects that, if constructed, will result in the conversion of primarily undeveloped land to developed land. This section describes the expected development within Permittee cities. Consistent with the current and forecasted economic conditions and population estimates, and as supported by the population information and forecasts presented in Section 4.3.1, the Permittees anticipate that the term of the upcoming MS4 Permit will be a time of little development. Following are summaries of anticipated development during the upcoming MS4 Permit.

4.3.4.1 County of Riverside

Projected trends for the County of Riverside's land use can be referenced in the Riverside County General Plan. Maps depicting the areas of future development and type of land use can be found in the General Plan maps that are accessible at http://www.rctlma.org/generalplan/area_maps.html.

- With the incorporation of the cities of Wildomar and Menifee the remaining unincorporated County area to be built out in the Santa Margarita Region during the upcoming MS4 Permit term is going to be considerably smaller.
- It is anticipated that, over the next five years, additional annexations will occur in each of the four city areas (Temecula, Murrieta, Wildomar and Menifee) that will further reduce the unincorporated County area in the Santa Margarita Region.
- The unincorporated County area in the upper Santa Margarita River watershed (east of Temecula, Menifee and Murrieta) will remain in rural, open space and additional MSHCP land uses. In addition, due to drought conditions and depletion of aquifers the prospects of New Development is unlikely. Water districts in the region cannot offer "will serve" letters to provide for water resources they do not have. Infrastructure for water supply and municipal water treatment, MS4 and flood control facilities are virtually non-existent in this area.
- Due to downturn in economy, Development Impact Fees (DIF) and Transportation Uniform Mitigation Fees (TUMF) are and will continue to be significantly under funded. This reduction in transportation funding will result in fewer road and infrastructure projects during the term of the upcoming MS4 Permit. The Transportation Department has projected limited projects for the Santa Margarita Region. The Clinton Keith Road widening project is still in the planning stages. Due to budgetary constraints, unless projects are fully funded through County finance mechanisms (TUMF, DIF, state and federal pass through from bonds and grants) most projects will be put on hold through 2012.

4.3.4.2 City of Menifee

Projected development trends for the City of Menifee are unknown, sphere of influence and annexation opportunities will allow for limited growth once the economic uncertainty of the region is resolved.

4.3.4.3 City of Murrieta

The area north of Clinton Keith Road along the east side of the I-215 freeway should see some construction towards the end of the next MS4 Permit term. Grading for the construction of a hospital has started along the freeway and it is anticipated that supporting development will follow once the hospital is open. Overall the Planning Department is receiving few applications for New Development projects. For example, a Planning Commission meeting scheduled for January 2009 has been cancelled because there are no New Development items to discuss. In light of the current and foreseeable economic conditions, the City does not anticipate any substantial New Development activity for the next few years, with limited growth possibly resuming toward the end of the next MS4 Permit term.

4.3.4.4 City of Temecula

The City of Temecula is currently experiencing a significant leveling trend in development. Throughout 2008, fewer applications were being processed than in previous years. As such, Temecula does not anticipate processing any substantial number of New Development applications within the next MS4 Permit term. It is anticipated that applications from hereon will be limited to smaller in-fill and redevelopment projects. In addition, proposed annexation areas will be limited to areas that will be set aside mostly for conservation. As Temecula is on the verge of build-out, approximately 1 percent of developable land remains available throughout the City for New Development.

4.3.4.5 City of Wildomar

Projected trends for the City of Wildomar are unknown, sphere of influence opportunities will allow for limited growth once the economic uncertainty of the region is resolved.

4.4 Surface Water Bodies, Beneficial Uses, and Impairments

Approximately eight percent of Riverside County drains into surface water bodies within the jurisdiction of the Regional Board. Those surface water bodies (or portions thereof) are listed in Sections 4.4.1 and 4.4.2.

Rivers and Streams

- Santa Margarita River (Hydrologic Unit Basin Number 2.22)
  - Murrieta Creek
    - Slaughterhouse Canyon
  - Cole Canyon
    - Warm Springs Creek
      - Diamond Valley Reservoir
  - Santa Gertrudis Creek
    - Tucalota Creek
    - Lake Skinner
  - Temecula Creek (Hydrologic Unit Basin Number 2.92)
    - Iron Spring Canyon
  - Temecula Creek (Hydrologic Unit Basin Number 2.84)
    - Tule Creek
      - Million Dollar Canyon
    - Cottonwood Creek
  - Vail Lake
    - Wilson Creek
      - Cahuilla Creek (Hydrologic Unit Basin Number 2.73)
        - Hamilton Creek
      - Cahuilla Creek (Hydrologic Unit Basin Number 2.71)
        - Elder Creek
    - Arroyo Seco Creek
    - Kolb Creek
  - Temecula Creek (Hydrologic Unit Basin Number 2.52)
    - Pechanga Creek
- Santa Margarita River (Hydrologic Unit Basin Number 2.21)
  - DeLuz Creek

4.4.1 Beneficial Uses

The upper Santa Margarita River watershed supports a variety of ecosystems and provides many Beneficial Uses (Table 4)[18]. The ultimate goal of the Riverside County DAMP and the Watershed and Individual SWMPs is to manage Urban Runoff in a manner protective of the Beneficial Uses of these Receiving Waters.

Table 4. Beneficial Uses of Receiving Waters
Upper Santa Margarita River Watershed

Beneficial Use	Murrieta Creek	Cole Canyon	Warm Springs Creek	Santa Gertrudis Creek	Long Valley	Temecula Creek	Santa Margarita River
Municipal and Domestic Supply	X	X	X	X	X	X	X
Agricultural Supply	X	X	X	X	X	X	X
Industrial Service Supply	X	X	X	X	X	X	X
Industrial Process Supply	X	X	X	X	X	X	
Ground Water Recharge	X					X	
Contact Water Recreation				X	X	X	X
Non-contact Water Recreation	X	X	X	X	X	X	X
Warm Freshwater Habitat	X	X	X	X	X	X	X
Cold Freshwater Habitat							X
Wildlife Habitat	X	X	X	X	X	X	X
Rare, Threatened or Endangered Species							X

4.4.2 Current Water Quality Concerns and Issues

Urban Runoff discharged to MS4s in Riverside County ultimately flows to various surface water bodies (inland streams, lakes, and reservoirs) and typically carries Pollutants that originate from numerous dispersed and uncontrolled sources. Examples of Pollutants that may be present in Urban Runoff are fertilizer, heavy metals, nutrients, petroleum products, sediment, bacteria, chemicals, and litter.

Because the upper Santa Margarita River watershed is large and has many land uses, the water quality concerns in sub-watersheds vary. However, each land use can potentially contribute Pollutants to nearby streams, rivers, and lakes. The infrastructure that supports people's activities (e.g., roads, parks, MS4, and wastewater collection and treatment facilities) may contribute to water quality concerns if not properly managed. Other sources of stormwater runoff, including agricultural areas, are exempt from the requirements of the NPDES permitting program established under the Clean Water Act. In addition, some Pollutants, such as total suspended solids, may be found at elevated levels in runoff from non-urban land uses. Further, certain activities that generate Pollutants present in Urban Runoff are beyond the ability of the Permittees to eliminate. Examples of these include operation of internal combustion engines, atmospheric deposition, brake pad wear, tire wear, residues from lawful application of pesticides, nutrient runoff from agricultural activities, and leaching of naturally occurring minerals from local geography.

[18] www.waterboards.ca.gov/rwqcb9/programs/

As required by Section 303(d) of the Clean Water Act, the State Board maintains a list all waters in the State that do not meet the Water Quality Standards established in the Basin Plans prepared by the Regional Boards for protection of Beneficial Uses. This list, referred to as the "303(d) List," details the Pollutant or stressor on each named water body, the potential source of Pollution, estimated affected area, as well as a priority for development of the associated TMDL. A TMDL is a plan that identifies how much Pollutant load a specific Impaired Waterbody can sustain without impacts to its Beneficial Uses. In addition to identifying the maximum Pollutant load, a TMDL is used to develop implementation plans to meet Water Quality Standards for a designated water body. Table 5 summarizes the 2006 303(d) List of Impaired Waterbodies within the upper Santa Margarita River watershed, as well as the year in which a TMDL is proposed for approval. No TMDLs have been established for Receiving Waters in the upper Santa Margarita River watershed.

Table 5. 2006 303(d) Listings for the Santa Margarita Region

Water Body	Pollutant	Potential Sources	Area Affected	Proposed TMDL Completion
Santa Margarita River (Upper)	Phosphorus	Urban runoff/storm sewers Unknown nonpoint source Unknown point source	18 miles	2019
Murrieta Creek	Iron Manganese Nitrogen Phosphorous	Source unknown Source unknown Source unknown Urban runoff/storm sewers Unknown nonpoint source Unknown point source	12 miles 12 miles 12 miles 12 miles	2019 2019 2019 2019
Temecula Creek	Nitrogen Phosphorus Total dissolved solids	Source unknown Source unknown	44 miles 44 miles	2019 2019

Table G-35 of Appendix G to the Annual Report 2007-2008 additionally identifies pyrethroid pesticides (bifenthrin and permethrin), bacteria (E. coli and fecal coliform), lead, and sediment (turbidity) as Pollutants of Concern in the upper Santa Margarita River watershed that warrant focused attention by Permittee implementation programs. These constituents have been detected intermittently or persistently at Triad and Tributary monitoring stations.

4.5 Municipal Separate Storm Sewer System

A map depicting the MS4 facilities owned and operated by the Permittees is provided in Appendix B.

5.0 Program Evaluation Based on Water Quality Trends

The overall effectiveness of the Permittees programs is assessed based on the analysis of water quality data obtained as part of the Consolidated Monitoring Program. Approximately 14 years of data have been collected through this program and have been cumulatively analyzed in the fourth-year monitoring Annual Report.

5.1 Inherent Limitations to Analyzing Water Quality Data

There are inherent limitations to analyzing water quality data from storm water. Storm water runoff is very different from mechanical wastewater or water treatment processes that usually incorporate water quality monitoring. Discharges from mechanical processes such as treated wastewater effluent and industrial discharges usually:

- Come from a single or a few readily identifiable sources;
- Are generally consistent in flow rate and chemical character from day to day; and
- Can be easily instrumented.

Conversely, Urban Runoff non-point source flows, such as those collected and analyzed as part of the MS4 Permit monitoring programs usually:

- Come from multitudes of unidentifiable or hidden sources, many of which are non-Urban in nature:
  - State, federal or tribal lands
  - Natural leaching of soils
  - Wildlife
  - Aerial deposition
  - Wildfires
- Vary widely in flow rate in response to precipitation events
- Vary widely in chemical character at any given moment due to:
  - Unidentified episodic issues related to natural phenomena
  - Magnitude of rainfall and extent of contributing area
  - Potential one-time illicit discharges that were not identified at the time of sampling
  - Unforeseen or unidentified consequences of changes in numerous land use policies (fire management, development, etc)
- Are subject to significant natural random variation; and
- Cannot be easily instrumented due to the wide variation in depth and velocity and associated impacts of natural or unnatural aggradation and degredation of natural stream beds.

Because ephemeral storm water flows are, by their very nature, particularly random in character, it may take many years before monitoring data trends can be detected or to determine the effectiveness of an

Urban Runoff control measure. Power analyses were conducted for fecal coliform, metals, and nutrients at the stations monitored in the Santa Ana Region during the 2005/06 reporting period. Power analysis is used to determine how many years of monitoring would be required to detect a given trend in the data. This tool was developed by the SCCWRP. Based on the results, for biennial monitoring, and having an 80 percent chance of detecting a change in concentration, it would take about 5-10 years of data collection to detect a change of 50 percent in concentration, 10-15 years of data to detect a 25 percent change, and 15-30+ years of data to detect a 10 percent change. It is expected that results would be similar for other parameters measured in the monitoring program in the Santa Margarita Region.

5.2 Focus Area Constituents of Concern

During the 2004 MS4 Permit term, monitoring data indicated that one or more receiving water samples have been found to contain the following constituents at levels that exceeded Basin Plan Objectives (BPO). As such they have been identified as constituents of concern.

- Nutrients (Ammonia as N, Phosphorus
- Pyrethroid Pesticides (Permethrin, Bifenthrin)
- Pathogen Indicators (E.coli, Fecal Coliform)
- Lead
- Turbidity (lab)

5.3 Analysis of Water Quality Trends

As discussed in the 2008 Santa Margarita Region Annual Monitoring Report, the results of the trend analysis and regression calculations indicate that there are no statistically significant trends in the water quality monitoring data. The lack of trends in the data presented in the Annual Monitoring Report contrasts with the rapid population growth over the same time frame. As discussed in the Annual Monitoring Report, population growth from 1990 to 2008 was approximately 300 percent for the Santa Margarita Region. This significant growth in population and resulting urban land use area contrasts sharply with the lack of statistically significant increases in concentrations of constituents of concern that would otherwise be expected in stormwater runoff from urbanized areas.

These results demonstrate and can be attributed to the effectiveness of the Permittees' programs at addressing the Focus Area Constituents of Concern, which are targeted and designed to prevent the discharge of these constituents into the Receiving Waters.

5.3.1 Recommended Compliance Program Modifications to Address Focus Area Constituents of Concern

Based on the analysis described above and in Appendix G of the 2008 Watershed Annual Report, no significant program modifications are necessary to continue to protect and improve the quality of the Receiving Waters.

Although the Permittees programs have been shown to be protective of Receiving Water quality, through continual evaluation of the programs being implemented and on-going water quality monitoring, additional measures are being proposed as part of this ROWD to address changing conditions and ensure

the ongoing effectiveness of the programs. Recommended changes to ensure the ongoing effectiveness of the Permittees programs are described in Sections 6 and 7 of this report.

6.0 Evaluation and Recommendations for Regionally Implemented Programs

6.1 Program Management

The District is the Principal Permittee for each of the three MS4 permits issued by the three Regional Boards that have jurisdiction in Riverside County. As Principal Permittee, the District performs management functions including coordination with the Regional Boards, preparation of compliance documents and Annual Reports, participation in studies and external cooperative efforts and dissemination of information to the Permittees. The Permittees implement some compliance programs that are common to all of the Permittees and which are implemented on a Countywide or regional basis to increase cost effectiveness and efficiency. Typically, the District also manages Countywide and regional programs.

6.1.1 Program Management Accomplishments and Programmatic Improvements

During the term of the 2004 MS4 Permit the following accomplishments were achieved.

- Updated the Implementation Agreement that sets forth the responsibilities of the Principal Permittee and the Co-Permittees.
- Revised the Riverside County DAMP to reflect requirements in the 2004 MS4 Permit, which served as a model document for the Permittees Watershed and Individual SWMPs.
- Developed Santa Margarita Region Watershed SWMP
- Participated in the Santa Margarita River Executive Management Team (SMREMT) to identify and address the highest priority water quality concerns in the Santa Margarita watershed, including development of a watershed model to assist with land use planning and TMDL development, coordinating watershed monitoring, and developing formal agreements between interested stakeholders for the purposes of evaluating impairment listing and data gaps in the watershed.
- Continued progress with the SMREMT on a uniform watershed plan and model for the Santa Margarita Watershed through the Santa Margarita Watershed Supply Augmentation, Water Quality Protection, and Environmental Enhancement Program.
- Participated in the Santa Margarita Lagoon TMDL workgroup in funding and overseeing the development of a comprehensive program to collect data and model the various inputs to the lagoon to be used to develop a TMDL to address nutrients.
- Participated in the Santa Margarita Watershed Water Quality Monitoring Group to coordinate the monitoring efforts of various stakeholders in the Santa Margarita watershed.
- Participated in the SMC to improve stormwater monitoring science, coordinate data collection efforts, and evaluate the effects of stormwater discharges to receiving waters specific to Southern California.
- Participated actively in various efforts of CASQA.

- Participated in the completion of an Integrated Regional Water Management Plan for the upper Santa Margarita Watershed to help pave the way for greater watershed-wide coordination and management of water resources within the upper watershed as a whole, as well as adjoining watershed and regional planning efforts.
- Participated in the development and implementation of the MSHCP for Western Riverside County which contains a comprehensive land use plan that ultimately conserves the environmental resources and habitat of approximately half of the Santa Margarita Region.
- Participated in the development of a Special Area Management Plan (SAMP) to further manage receiving waters at a watershed scale for the upper Santa Margarita Watershed by identifying, prioritizing and protecting the highest priority Waters of the U.S., while considering the broader needs of growth and transportation improvements.
- Developed and updated methods to track program effectiveness such as resident surveys, tracking hotline inquiries, and web counters.
- Enhanced Public Education program through development of new outreach materials and programs.

6.1.2 Proposed Revisions to Regional Program Management

6.1.2.1 Enhanced Program Effectiveness Assessments and Municipal Action Levels

To ensure that the Permittee's programs continue to be effective at managing the effects of Urban Runoff on Receiving Water quality, the Permittees will revise the Program Effectiveness Assessments for both the Individual SWMP and the Watershed SWMP as part of their implementation of the new MS4 Permit. An assessment strategy based on the CASQA Municipal Stormwater Program Effectiveness Assessment Guidance has been established including the establishment of:

- Measurable goals for each component,
- Measurable metrics to assess progress toward those goals,
- CASQA Effectiveness Levels for each metric; to indicate the level at which each metric can demonstrate the effectiveness of the Permittee's programs at addressing each goal.
- Timeframes in which the Permittees expect to be able to assess effectiveness using each metric.
- Municipal Action Levels (MALs) for appropriate metrics to ensure a minimum level of program implementation and identify shortcomings that could affect the Permittee's progress toward the established goals. The MALs would not be permit compliance measures, but triggers for further Permittee evaluation of the affected compliance program.

If a MAL for a metric is exceeded, the Permittees will review implementation of that program component to identify the cause of the exceedance and identify needed adjustments to avoid future exceedances. The findings of these reviews and any recommended adjustments to the Permittees programs will be reported in the corresponding section of the Annual Report submitted the following year. Further research is particularly needed to establish appropriate Municipal Action Levels for the various program areas.

After a review of the stormwater program, the Permittees have established an initial Assessment Methodology for each component including preliminary goals, measurable metrics, effectiveness levels,

timeframes and MALs for each. These initial assessment methodologies are included in tabular format in Appendix C. Although the Permittees believe the basic proposal is viable, The Permittees will review and finalize these Assessment Methodologies and associated metrics within one year following adoption of the new MS4 Permit as additional data and analysis is necessary to support specific action levels.

6.1.2.2 Revised Reporting Format

The Permittees recommend substantial revisions to the MS4 Permit requirements for the layout of the Annual Report. The Permit requires substantial duplication of reporting, which either increases the volume of the Annual Report, or requires substantial cross-referencing. In either case, it is confusing to write, and most likely, confusing to read. The Permittees recommend a meeting with Regional Board staff in the development of the new MS4 Permit to discuss methods to streamline and clarify reporting requirements.

6.1.2.3 Maintain Enhanced Watershed / MS4 Map

The Permittees are in the process of collecting data to support an enhanced MS4 facilities map. Updates completed to date are provided in the map in Appendix B. This enhanced map demonstrates initial efforts to identify the locations of:

- Receiving Waters
- MS4 facilities
- Areas of historical perennial flows
- Known blow off locations
- Wastewater storage ponds
- Sub-drainage areas
- Known non-Permittee facilities
- 36-inch diameter and larger outfalls

This map will be used to help in the tracking of IC/ID events and issues and continued updates will be submitted with the Annual Reports. The Permittees will continue to enhance this map over the next MS4 Permit term. As described in the Annual Report, the District is in the process of upgrading their web page that offers public access the District's various NPDES activities. Along with these web site upgrades, additional layers will be added to the Web-based GIS map.

6.1.2.4 Elimination of the Watershed SWMP as a separate compliance document from the Riverside County DAMP

The Santa Margarita Region is comprised of only a single watershed. Further, the Permittees' regional compliance programs are described in the Riverside County DAMP. Maintenance of a separate and duplicative Watershed SWMP is confusing, cumbersome, and does not contribute to protection of Receiving Water quality. The Permittees request that the next MS4 Permit be drafted in a fashion that allows the Permittees to maintain the Riverside County DAMP as the primary document describing regional compliance programs for western Riverside County including the Santa Margarita Region. Any

necessary changes for requirements included in the new MS4 Permit will be updated /added to the Riverside County DAMP.

6.2 Permittee Training Programs

6.2.1 Summary

The Permittees jointly fund comprehensive training and education programs for Permittee staff. These training programs are designed to train Permittee employees on the proper use and implementation of BMPs appropriate for their field of work. There are four distinct training courses currently offered including Construction Inspection, Municipal Maintenance, Industrial-Commercial Facility Inspection, and New Development Planning.

6.2.2 NPDES Training Program Accomplishments and Programmatic Improvements

- Evaluated and tested various knowledge retention methods.
- Performed Training Enhancement Analysis study (2005-2006)
- Created an on-line training registration web page where attendees can also obtain training materials.
- Annually updated training materials to address Pollutants of Concern (2005-2007)
- Added component to training to address proper use, application and timing of application of Pesticides (2007-2008)
- Began developing a formalized testing and effectiveness analysis approach (2008)

Highlights
Municipal Training: **14** Training Sessions; **900** Attendees
Construction Training: **22** Training Sessions; **626** Attendees
Industrial-Commercial Training: **11** Training Sessions; 426 Attendees
New Development Training: **13** Training Sessions; **345** Attendees

6.2.3 Long-Term Effectiveness Assessment

Throughout the term of the 2004 MS4 Permit the Permittees have evaluated and implemented various quizzes as part of the NPDES training courses. These efforts were intended to assess the retention of knowledge of the attendees and, as described in Provision K.2.m of the Watershed SWMP, serve as a component of the assessment of the long term effectiveness of the Watershed SWMP.

The quizzes used to assess employees' retention of knowledge have evolved over time as the Permittees found what worked and what did not. Quiz questions that were found to be confusing or misleading were refined or eliminated. Thus, a question-by-question analysis of the results is not possible. Instead, results from a number of the training courses with reasonably comparable quizzes were aggregated and an average score (percent correct) was established for each of these training sessions. The results of this analysis are presented in Figure 5.

Figure 5. Training Pre-Test and Post-Test Analysis

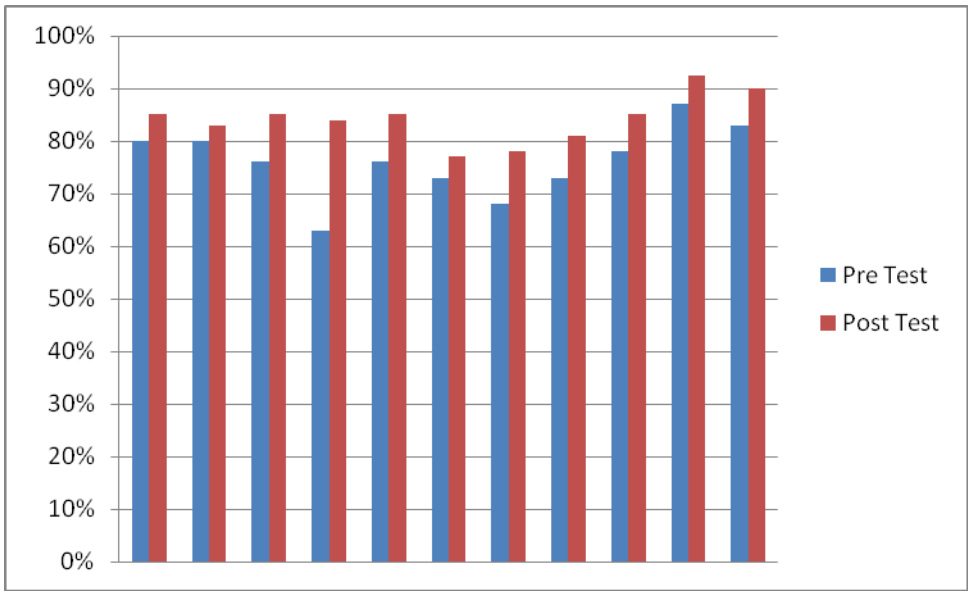

Although the required random-sample nature of this analysis is not conducive to the analysis of trends across time, two findings become evident from this analysis:

1. Permittee inspection, maintenance and planning staff generally have a high level of understanding of issues related to stormwater Pollution in their field of work.
2. Average scores on quizzes administered after the training sessions were always higher than scores on quizzes administered before the training session.

Finding 1 above can be attributed to the Permittee's proactive efforts to ensure that their employees are aware of the issues in their field of work that could contribute to stormwater Pollution. This includes annual attendance at the NPDES training courses, and on-the-job training, reminders and meetings. This fact alone is a strong indicator of the effectiveness of the Permittees training programs.

Finding 2 above demonstrates that after attending the NPDES training courses, the attendees have a higher level of understanding of the issues in their field of work related to stormwater Pollution. This indicates that the training materials, delivery and content were effective.

Based on these analyses, general feedback from the training programs, and the overall effectiveness of the Permittees' programs (as described in Section 5.3 herein) the Permittees believe their training programs to be effective. Nevertheless, the following revisions to the training programs have been identified and are proposed for implementation with the new permit to ensure ongoing effectiveness.

6.2.4 Proposed Revisions

6.2.4.1 Continued focus on Focus Area Pollutants of Concern

The Permittees commit to continue to revise the Permittee training programs to focus on Pollutants of Concern.

6.2.4.2 Standardized Effectiveness Quizzes

Over the course of the 2004 MS4 Permit, the Permittees have evaluated various methods of assessing the retention of knowledge and are now recommending a standardized approach to assessing the effectiveness of the training program.

The Permittees plan to create standardized quizzes to assess the retention of knowledge and increased understanding as a result of the Permittees' training sessions. This includes establishing core messages that the Permittees want to impart upon the attendees and, creating clear and understandable quiz questions for each core message.

This approach will help the Permittees identify if any core training messages are not being retained by attendees and to subsequently modify the training. The Permittees also hope that this approach will yield results that will, over time, demonstrate that the knowledge among Permittee staff of issues related to storm water Pollution is increasing, thus clearly demonstrating that the NPDES Training program is effective.

As a necessary part of this effort, a database to track responses will also be created.

6.2.4.3 Attendance Tracking Mechanism

At each training session a sign-in sheet is provided to track attendance to the session. Included in the sign-in sheet is an indication of the Permittee that each attendee is representing. After each training session, these sign-in sheets are scanned to PDF files and sent to each Permittee for their records. This approach requires that each Permittee manually review the sign-in sheets to determine who and how many of their staff attended the training.

The District, on behalf of the Permittees, is currently investigating various form scanning and recognition software packages to determine the feasibility of creating a sign-in sheet that, when scanned, will automatically transfer the attendance list into a database. This would facilitate tracking of staff attendance by each Permittee. At this time the District has not determined if a feasible and cost efficient program is available that will accomplish their needs.

6.3 Public Education

6.3.1 Summary

To leverage finite resources, the Permittees jointly fund a public education program. The District implements this program to disseminate information about Urban Runoff issues and to provide education on how activities may impact Receiving Waters.

The Permittees have established an ongoing watershed-based public education and outreach program known as the **Only Rain Down the Storm Drain** Pollution Prevention Program. The specific objectives of this program include:

- Fostering a broad public awareness of water Pollution concerns;
- Increasing public acceptance of Pollution Prevention activities to curtail everyday human behaviors that contribute to water quality problems;
- Educating/informing the general public, regulators and key local government and state decision makers on Urban Runoff conditions in Riverside County; and
- Promoting stewardship of local water resources.

The **Only Rain Down the Storm Drain** Program implements the public awareness objectives by focusing on three areas of Pollutant reduction/prevention:

- Public behavior;
- Proper management of Pollutants; and
- Business specific education outreach.

In addition, when attempting to make use of the finite resources available to the Public Education Program, the Permittees use these management goals to ensure that resources are used effectively:

- Focusing on Pollutants of Concern specific to each watershed region;
- Coordinating public education efforts with adjacent storm water management programs and other related education programs to share resources, coordinate outreach efforts, and avoid duplication of effort; and
- Adapt public education programs and objectives, based on effectiveness analysis, to address changing MS4 program requirements and objectives.

6.3.2 Public Education Program Accomplishments and Programmatic Improvements

The Public Education Program has developed and distributed the following educational materials during the 2004 MS4 Permit term:

- *After the Storm* – a citizen's guide to understanding MS4 Pollution in your neighborhood or when performing daily activities.
- *Automotive Maintenance & Car Care* – guidelines for keeping your auto shop or retail fuel facility in environmental shape.

- *Outdoor Cleaning Activities* – guideline for outdoor cleaning activities and wastewater disposal.
- *Pools, Spas and Fountains* –Environmental maintenance suggestions for pool, spa, and fountain owners.
- *What's the Scoop* – tips for a healthy pet and a healthier environment.
- *Household Hazardous Waste* – A schedule of collection locations for proper disposal of HHW.
- *Stormwater Pollution Found in Your Neighborhood* – door hanger.
- *Equestrian Management* – Recommendations for BMPs related to equestrian activities.
- *Spray Bottles* – Including directions to make environmental friendly recipes for pest control and household cleaning

The Permittees also initiated development of the following outreach materials

- *Landscaping and Gardening Brochure* – Initiated development a new brochure to address outdoor residential landscaping and gardening activities.
- *Septic System Management Brochure* – initiated development of a brochure to assist with septic system management.

In addition to the information provided on the Storm Water Protection website, the Public Education and Outreach Program has:

- Updated the Public Education and Outreach Program web page.
- Tested and/or implemented several new Public Education and Outreach Program effectiveness tracking mechanisms including call tracking, web counters, testing, and bilingual surveys.
- Enhanced the toll free storm water Pollution reporting hot line to include public education information and support for the public and other interested stakeholders.
- Obtained a trailer with "**Only Rain Down the Storm Drain**" graphics specifically designed for transporting materials to outreach events. It is also used as part of the booth at outreach events.
- Initiated billboard advertising within the Santa Margarita Region.
- Worked with the Mission Resource Conservation District to implement presentations to elementary and middle schools and staff to raise public awareness of Urban Runoff management issues and source control methods and to encourage volunteers, partners, and groups to gather annually for a trash and debris clean-up day in the Santa Margarita Region.
- Developed special newspaper and billing inserts, fliers and advertisements to raise public awareness of Urban Runoff management issues and source control methods. A radio advertising campaign was also developed and implemented for a time.
- Developed and presented workshops regarding household hazardous waste use and proper disposal at major home improvement stores throughout Riverside County.
- Placed advertisements in the Penny Saver and Bargain Bulletin to raise public awareness of Urban Runoff management.

- In cooperation with certain County Service Areas or other programs, pet waste signs with bag dispensers have been installed at various parks to help encourage the proper disposal of animal waste.
- Cooperated with the Western Riverside Council of Government in the Used Oil Block Cycle Grant that decreases the amount of illegally dumped motor oil by promoting the addition of new Certified Oil Collection Centers.
- Established a partnership with County Environmental Health whereby businesses cited by Environmental Health for violations of ordinances related to stormwater issues may be allowed to implement a Supplemental Environmental Project in conjunction with the **Only Rain Down the Storm Drain** program.

6.3.3 Long-Term Effectiveness Assessment

Effectiveness metrics of the Public Education and Outreach Program during the 2004 MS4 Permit term are presented in Section J.1.3 of the FY 2007/2008 Watershed Annual Report. The data indicates that overall impressions have continually exceeded the number of residents in the watershed, HHW/ABOP pounds of waste collected and pounds of waste collected per person have steadily increased over the term of the 2004 MS4 Permit.

In 2005, the **Only Rain Down the Storm Drain** program developed and implemented a survey to be distributed at Public Outreach events to assess the public's level of knowledge related to stormwater Pollution. This original "long" survey contained 13 questions in both English and Spanish as shown in Figure 6.

This survey was used for fiscal years 2005-06 and 2006-07. Through this period of implementation it was found that the survey took too much time to complete and reduced the level of response from event attendees. Therefore, the survey was subsequently revised to a shorter version with revised questions for the 2007-08 fiscal year. The revised "Short" survey that is currently used is shown in Figure 7.

Figure 6. Original "Long" Survey Utilized at Public Outreach Events

Zip Code_____ **Age**_____ **Sex F**__ **M**__ **Date:**_____

THINK YOU KNOW ABOUT STORM DRAIN POLLUTION PREVENTION?

1. Where do you think **storm drain** contents go or flow to? __Treatment Plant __Streams, rivers & lakes

2. Where do you think **sewer pipes** contents go or flow to? __Treatment Plant __Streams, rivers & lakes

3. Are storm drains and sewers part of the same or separate systems? __Same __Separate __Don't know

4. Have you ever been to a Household Hazardous Waste **(HHW)** Collection Event? __Yes __No

5. Did you know that **A.B.O.P.** Antifreeze, Batteries, Oil, and Latex Paint locations and mobile **HHW** Collection Events provide safe havens for the disposal of pollutants? __Yes __No

6. If you have a lawn or garden, where do you (or your gardener) dispose of the green waste (grass, clippings or other)? **(Check all that apply)**

   ☐Trash/garbage ☐Compost/Mulch pile ☐Take to compost facility
   ☐Leave on lawn ☐Removed by gardener ☐Other:_____

7. Where is the best location to wash your vehicles?
   (Check only one)

   ☐Pavement (driveway, street) ☐Dirt Area
   ☐Lawn or Grass ☐Other_____

8. Do you change the motor oil in your vehicle yourself? __Yes __No

   If **Yes**, where do you dispose of it? **(Check all that apply)**

   __in the garbage __at a curbside collection program
   __down the storm drain __collection center (Jiffy Lube, Kragen, etc.)
   __pour it on the ground __Other_____

9. If you have a pet, how often do you pick up after your pet?
   9. a) in your yard? **9. b)** when you walk the pet?

   ☐Always ☐Sometimes ☐Never ☐Always ☐Sometimes ☐Never

10. Do you think, anything ,other than rainwater, that flows into the storm drains (i.e., trash, chemicals, pet waste, etc.) considered a pollutant? __Yes __No

11. Have you seen or heard the slogans "Only Rain Down the Drain" or "Only Rain Down the Storm Drain"?
    __Yes __No If yes, where? __Radio __Newspaper __ Flier __Billboard __Street Fair, Festival, etc.

12. Are there State laws and local ordinances which STRICTLY PROHIBIT the dumping of pollutants **(EVERYTHING, EXCEPT RAIN WATER)** into the storm drain systems or waterways? ___Yes ___No

13. After this booth visit, have you increased your understanding of storm drain pollution prevention? __Yes __No

Thank you for your time and input… Remember, YOU can do your part by calling our Toll Free Line (1-800-506-2555) to report illegal storm drain pollutant disposal anywhere in Riverside County, or to get more information about storm drain pollution protection to help promote "ONLY RAIN DOWN THE STORM DRAIN".

Figure 7. Revised "Short" Survey Utilized at Public Outreach Events

DO YOU KNOW HOW TO PROTECT OUR STREAMS, RIVERS and LAKES?

City_____ **Zip Code**_____ **Age**_____ **Sex** □ **F** □ **M** **Date:** _____

1) Water that leaves your lawn from **Irrigation (water sprinklers), Car washing** and **Rain** flows down streets and/or storm drains and then directly to…

☐ Sewage Treatment Plants ☐ Streams, rivers & lakes

2) Which of the following can LEGALLY be disposed into the storm drain? (*Circle all that apply*)

- **Useable Household Chemicals**
- **Yard waste/clippings/leaves**
- **Paint**
- **Cigarette butts**
- **Empty Household Chemicals containers**
- **Pet Waste**
- **Motor Oil / antifreeze**
- **None of these**

3) Do you feel you are well informed and aware of illegal dumping into the storm drain and its impact in your community or streams, rivers and lakes?

☐ **Yes** ☐ **No**

HOW DID YOU DO?

1) Water that leaves your lawn from irrigation, washing your car, or rainwater runoff can pickup motor oil and grease from vehicles, excess fertilizer from your lawn, bacteria from pet waste, and excess pesticides from your yard. These pollutants can be carried down streets and storm drains directly to our streams, lakes, and rivers without treatment! That is why we must take care to properly dispose of waste, maintain our vehicles, and use fertilizers, pesticides and other chemicals only as specified on their labels.

2) It is illegal to dispose of any chemical, constituent or waste into a storm drain! Report illegal disposal of chemicals, constituents, or waste to storm drains at **1(800) 506-2555.** You may properly dispose of many of the wastes listed above by doing the following things:

- **Usable and empty household chemicals, paint, motor oil** – Properly dispose these at Household Hazardous Waste and/or Antifreeze, Batteries, Oil and Paint disposal facilities and events. Call **1 (800) 506-2555** for information on disposal locations and special drop off events near you.
- **Pet waste** – Carefully pick up and dispose in the nearest trash receptacle.
- **Grass, clippings, leaves and yard waste** – Collect and dispose in green waste bins or composting areas that are designed to prevent the compost from mixing with excess irrigation water and/or rainwater runoff.

3) Would you like to learn more about protecting our streams, rivers and lakes or wish to report on a illegal storm drain disposal in your area or request a classroom or group demonstration……

Visit www.rcflood.org or call **1 (800) 506-2555.**

Remember…Only Rain Down the Storm Drain!

Results have been tabulated for all of the "Long" surveys received and they have been analyzed to determine trends in public awareness. The "Short" survey has been used at two events to date, one of which was quite recent and its results have not yet been tabulated. Using the "Long" survey results, nine questions were used to assess any trends in public awareness. The remaining questions were determined to be either confusing or not applicable to the intent of the assessment. The results of this assessment of survey results are shown in Figure 8.

Figure 8. Assessment of Survey Results (2005-06 vs. 2006-07)

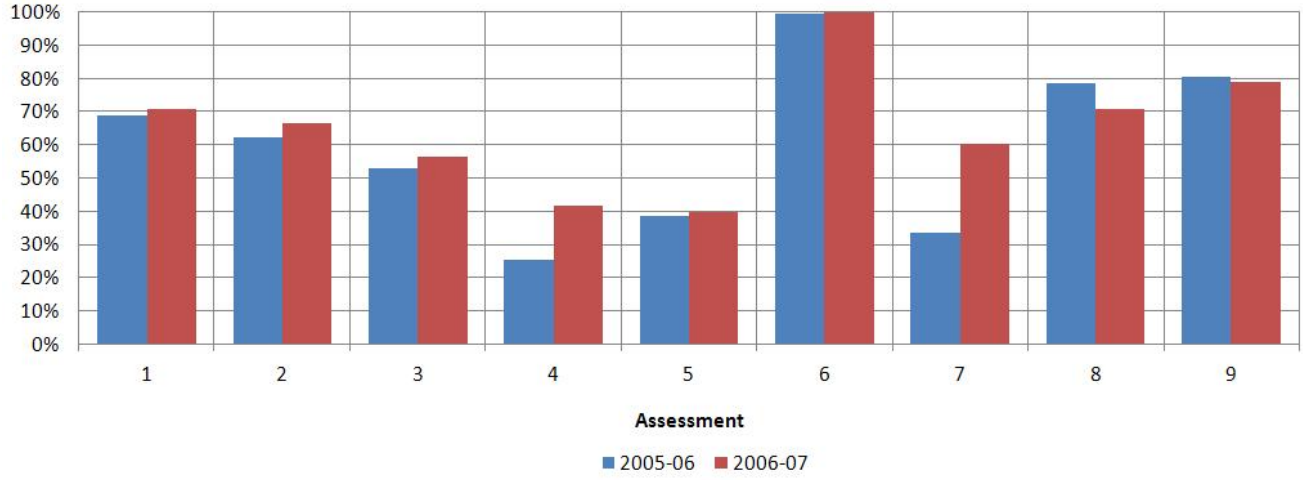

The results shown in the chart in Figure 8 are percent of survey takers that responded as described below:

- Assessment 1: Percent of respondents that understood that storm drains do not go to treatment plants.
- Assessment 2: Percent of respondents that understood that sewer lines go to treatment plants.
- Assessment 3: Percent of respondents that understood that sanitary sewers and storm drains are separate systems.
- Assessment 4: Percent of respondents that had attended a Household Hazardous Waste collection event.
- Assessment 5: Percent of respondents that understood that the best place to wash a car is on the lawn or grass.
- Assessment 6: Percent of respondents that change their own oil that reported that they properly dispose of it.
- Assessment 7: Percent of respondents that have heard of the "Only Rain Down the Storm Drain" program.
- Assessment 8: Percent of respondents that dumping of anything except storm water is a violation of laws and ordinances.
- Assessment 9: Percent of respondents that felt that visiting the Outreach Booth at the event increased their understanding of storm drain Pollution Prevention.

Although implementation of the "Long" survey was limited before it was modified to its current form, the results available do indicate an increase in understanding of these basic principles and can be attributed to the effectiveness of the Permittee's Public Education program. As additional survey results are collected and tabulated, further analysis will be performed to ensure the ongoing effectiveness of the program.

6.3.4 Proposed Revisions

To better address residential sources of pesticides, the Permittees are proposing to coordinate with the University of California Extension Program to enhance the implementation of the U.C. Extension's Master Gardener program in the Santa Margarita Region. Along with information regarding use of drought tolerant landscaping techniques and appropriate methods of fertilizer and irrigation application, the U.C. Master Gardeners also provide residents with information on integrated pest management techniques that minimize pesticide application. The Permittees are proposing to establish an agreement with the U.C. Extension's Master Gardener program in fiscal year 2010-2011 to support master gardener hotline staffing, local presentation and other outreach by the U.C. Master Gardeners.

In addition, through the Permittee's ongoing efforts to internally assess the efficiency and efficacy of their MS4 compliance programs, it was determined that an overhaul of the District's web site was needed. The District's web site contains the public education web site and a technical resource site with the various compliance documents for the program. It was found that information available through the site was often difficult to find and was not user friendly and sometimes was out of date. The Permittees are now reviewing this site to identify and implement needed changes

6.4 Receiving Water Monitoring Program

6.4.1 Summary

A Summary of the Monitoring Program is contained in Appendix G of the Watershed Monitoring Report.

6.4.2 Monitoring Program Accomplishments and Programmatic Improvements

The Monitoring Program accomplished the following goals during the term of the 2004 MS4 Permit:

- Subcontracted monitoring data collection and analysis to MACTEC, Inc. to enhance data collection and reporting capabilities.
- Developed and implemented a Triad Monitoring Program (bioassessment, Toxicity and chemical monitoring) consistent with the goals of the SMC Model Monitoring Program
- Developed watershed boundaries and land use information for all monitoring stations
- Updated the format and technical content of the monitoring Annual Report
- Added fire map information to assist with assessing potential Pollutant sources
- Enhanced monitoring data databases to be compatible with SCCWRP/SMC standard reporting protocols.
- Enhanced monitoring methods to incorporate use of automatic sampling equipment where appropriate

- Conducted several Toxicity Identification Evaluations that led to the identification of pyrethroid pesticides as a cause of wet weather Toxicity in Murrieta and Temecula Creeks and a Toxicity Reduction Evaluation that identified additional BMPs necessary to control sources of pyrethroid pesticides.
- Coordination with the CASQA Pesticide Committee on comments and presentations to California Department of Pesticide Regulation, UC Riverside and others regarding the impacts of pyrethroid pesticides and the need to change regulatory requirements regarding the use of pyrethroid pesticides.
- Participation in or coordination of several BMP studies, including coordination of new development BMP treatment studies (as required by conditions of approval) and the District's LID BMP Demonstration and Testing Facility.
- Continued to update and enhance the Consolidated Monitoring Program to incorporate new monitoring collection methods and data analysis protocols.

6.4.2.1 Participation in Regional Monitoring Efforts

- Participation in the monitoring programs to support development of the Santa Margarita Lagoon TMDL.
- Continued participation in regional and statewide Monitoring and Science efforts such as the Southern California Monitoring Committee to develop:
  - Lab inter-calibration of chemical, bioassessment and Toxicity testing methods
  - Testing methods for bioassessment and Toxicity in Southern California streams
  - Bacterial Reference Watershed Study
  - A storm water research needs report for southern California
- Partnered with SCCWRP on developing hydromodification guidance for Southern California including participation in a series of hydromodification workshops for a CASQA conference.
- Coordination with SCCWRP on the development of the Regional Watershed Monitoring Program for Southern California.

6.4.3 Effectiveness Assessment

The Watershed Monitoring Program was evaluated as part of the Regional Board audits in 2007-2008. As a result of those audits several enhancements were made to the monitoring program, including update of constituent lists, subcontracting of data collection to a monitoring consultant with automatic sampling capabilities, and updates to the Consolidated Monitoring Program and Monitoring Annual Report formats. The Permittees believe that as a result of these changes, the overall monitoring program is effective. However, the revisions presented in section 6.4.4 are recommended to increase monitoring data utility or overall program effectiveness.

6.4.4 Proposed Revisions to Monitoring Program

In updating the Monitoring and Reporting Program, the Permittees request that Regional Board staff meet with them to discuss the following proposed modifications to the monitoring program:

6.4.4.1 Revise Dry Weather Monitoring Program

As noted in Section G.7 (Special Studies) of Appendix G of the FY 2007-2008 Watershed Monitoring Annual Report, the Permittees participated in a SMC Study to develop a regional approach to watershed assessment. The Permittees, in conjunction with Regional Board staff, committed to participating in the resulting watershed monitoring program. The Permittees agreed to monitor three rotating dry weather stations identified for the Santa Margarita Region. Additionally, three stations are to be collected by Regional Board (or SCCWRP staff) using SWAMP funds, and the remaining three will be located in the Santa Ana Watershed region of Riverside County. In exchange for the commitment to participate in the program, the Regional Board staff agreed to reduce the current dry weather monitoring requirements in the new MS4 Permit from two (2) events annually to (1) event annually for each Triad monitoring stations. This would effectively eliminate three existing dry weather samples. The Permittees recommend a meeting with Regional Board staff to discuss these options prior to the release of the draft Permit.

6.4.4.2 Clarify Analyte List

As described in Section G-8.1.5 of the 2008 Monitoring Report (Appendix G of the FY 2007/2008 Watershed Annual Report), 168 analytes have never been detected in samples collected under the current program. The Permittees request that requirements to analyze for these constituents be eliminated unless or until a reason to believe they may be present in stormwater arises.

Basin Plan Objectives are expressed in terms of total metals, while California Toxics Rule (CTR) criteria are expressed in terms of dissolved metals. Although the Permittees do not support comparison of stormwater data to CTR values, the Permit requires it. The Permittees recommend deletion of this requirement. However, if this language is to remain, in order to properly compare results for metals to both sets of objectives, both total and dissolved fractions will be analyzed by the laboratory for the following metals: arsenic, cadmium, chromium (III), chromium (VI), copper, lead, mercury, nickel, selenium, silver, and zinc.

6.4.4.3 Clarify Mobilization Criteria

The District is proposing the following amendment to the monitoring mobilization criteria based on experience and the difficulties faced collecting the first storm and the analysis of the USEPA criteria specific to the Temecula National Weather Service weather station (Consolidated Monitoring Program, Section 4.C.2):

> "Note: If the QPF indicates that more than 0.3-inch is predicted for any 6-hour period, mobilization for sampling will occur."

The District's experience over the past three years indicates that intensities greater than 0.3" in six hours are likely to produce runoff and would warrant mobilization, even on a dry watershed. Further, these mobilization criteria are consistent with EPA-833-B-92-001 guidance regarding minimum depths/durations for storm sampling.

The Permittees recommend that the Regional Board amend the MS4 Permit to reflect these Mobilization Criteria. Due to issues with stream gauges operated by the United States Geological Survey (USGS), the Permittees have concluded that preparing post-storm forensics based on USGS data is not of significant value. A simple test of comparing Quantitative Precipitation Forecast (QPF) reports with actual rainfall and the mobilization criteria should be sufficient to determine compliance with the MS4 Permit.

Mobilization criteria should also reflect practical limitations to storm water monitoring by excluding national holiday periods (Thanksgiving, Christmas, and New Year's Day in particular) and quantifying the probability and the lead time between the forecast and actual rainfall that must be met in order to mobilize.

6.4.4.4 Reduce Wet Weather Events

As was noted in the audits, the Permittees have experienced consistent difficulty collecting three storm events in the upper Santa Margarita River watershed. The Permittees also noted that the San Diego County MS4 Permit only requires the collection of samples from two wet weather events. The Permittees request that the monitoring program for Riverside County be revised to require collection of two storm events. This would not only reduce opportunities for unavoidable non-compliance, it would also be a prudent cost saving measure that would not alter the overall effectiveness of the Permittees monitoring programs.

6.4.4.5 Clarify Triad Method and Follow-up Actions

The MS4 Permit included an early draft of the Triad method envisioned by the Model Monitoring Program (MMP) developed by the SMC. The result was a misapplication of the final Triad approach envisioned by the MMP. Toxicity is currently required to be sampled for at the Triad stations during wet weather events, but not during dry weather when the bioassessments occur. According to the SMC MMP, the three components of the Triad approach (chemistry, Toxicity, and bioassessment) should be conducted at the same time. Bioassessments cannot be conducted during wet weather due to safety concerns and the planning necessary. For this reason the MMP recommends the full triad for dry weather and only chemistry and Toxicity for wet weather.

In an effort to be proactive and supportive of good science, the Permittees have taken the following actions to ensure proper application of the Triad approach:

- Beginning with the 2007-2008 season, Toxicity sampling will be conducted during dry weather, at the same time as the bioassessments and dry weather chemistry sampling events are conducted. Thus, the full Triad approach will be conducted during dry weather. Wet weather monitoring will focus on Toxicity and chemistry. This action will modify the current program to be consistent with the MMP approach.
- The 2006-2007 Annual Report established the framework for proper application of the Triad method (full triad for dry weather, chemistry and Toxicity only for wet weather) by adding new tables (G-21 through G-27), in anticipation of properly applying the Triad method in the 2007-2008 Annual Report.

The Permittees further recommend clarifying the definitions of "persistent", "consistent", and "magnitude" as used in the MS4 Permit to be consistent with the intent of the MMP. In addition, the MS4 Permit inappropriately limits Triad analysis by defining a "fair" Index of Biological Integrity scores as automatically indicative of benthic alteration. This limitation needs to be corrected to prevent Permittee

resources from being inappropriately diverted to expensive source assessment studies. The MMP (and the SMC) envision that watersheds will be prioritized for follow up action based on their relative quality to one another. The envisioned analysis would compare watersheds from throughout southern California. The Permittees support this coordinated and comprehensive approach to addressing water quality.

6.4.4.6 Recognize Limitations of Laboratory Analysis of Bacteria

Babcock Labs prefers to accept bacteria samples between the hours of 7:00 a.m. and 4:00 p.m. during normal business days, and 9:00 a.m. and 12:00 p.m. on weekends. Although Babcock will accept bacteria samples outside those hours, acceptance is contingent upon payment of substantial overtime rates to ensure laboratory staff availability to receive and analyze the samples.

The timing of bacteria sample collection, particularly within the context of automatic sampling, will require consideration of the sample's four-hour holding time and available laboratory receiving hours. The Permittees request that the Permit be modified to only require collection of bacteria samples such that they can be delivered during the regular working hours of the lab to avoid excessive laboratory costs.

6.4.4.7 Participate in a Watershed Based TMDL for the Santa Margarita Lagoon

The Permittees understand that, due to economic conditions, State funding for the Santa Margarita Lagoon Watershed-Based TMDL has been withdrawn. As described in section 3.4, these economic conditions are also impacting the Permittee's funding sources and they are struggling to maintain resources to fund existing compliance programs. The Permittees currently cannot support additional expenditures associated with assisting in funding a watershed-based TMDL effort. However, the Permittees are agreeable to discussing a re-prioritization of compliance activities in order to reallocate existing Permittee resources for this purpose. For example, where current MS4 Permit compliance programs elements are not measurably enhancing attainment of Water Quality Standards, the Permittees would consider reduction or elimination of those requirements to support reallocation of the associated funding to the development of the watershed based TMDL. Program elements that may be considered for discussion include:

- Toxicity/Pyrethroid Monitoring – Under the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA) local regulation of pesticides, including pyrethroid pesticides is pre-empted. The Permittees are expending significant resources at the State and Federal level to facilitate regulatory changes in the allowable uses of pyrethroid pesticides, which have been implicated in causing toxicity in receiving waters throughout California. The Permittees have also recognized pyrethroid pesticides as a Pollutant of Concern for the upper Santa Margarita River watershed. The Permittees believe that public education and outreach regarding use and more stringent regulation/management of pesticides, including pyrethroid pesticides, represents the most effective means of controlling pesticides in Urban Runoff. However, continued Toxicity tests, Toxicity Identification Evaluations, and direct monitoring for pyrethroid pesticides are not likely to enhance the Permittee's ability to reduce/eliminate pyrethroid pesticides in Receiving Waters. Greater Receiving Water quality benefits may be realized by reallocating the resources currently allocated to these activities to the development of the watershed-based TMDL.

- Reduction in General Monitoring Requirements – The Permittees continue to expend significant resources on Receiving Water and outfall monitoring and the benefits of these monitoring activities are limited. Further, these costs have more than doubled over the term of the 2004 MS4

Permit due to audit findings recommending the implementation of automatic sampling equipment. Revised MS4 Permit requirements that provide for a simplified monitoring program may allow cost savings to be reallocated from data collection and processing to development of the watershed-based TMDL.

- Watershed/Individual Annual Reporting – The current Annual Reporting requirements are time, labor and cost-intensive exercises. Revised MS4 Permit requirements that provide for a simplified Annual Report requirements would not necessarily produce substantial cost savings (because is the reports are typically produced in-house); however, they would free up staff resources to assist with TMDL development.
- IC/ID Monitoring – Although the Permittees support regular visual inspection of MS4 facilities to identify IC/IDs, field measurements and sampling has not proven to be effective for this purpose. Although sampling of identified IC/IDs for later enforcement purposes may be appropriate, IC/IDs that have been identified and eliminated in the Santa Margarita Region typically result from visual observations and subsequent follow-up efforts by Permittee staff, not field measurements and water quality samples. Revised MS4 Permit requirements that provide for visual inspections of MS4 facilities to identify IC/IDs may yield cost savings that could be reallocated to development of the watershed-based TMDL.

There may be additional opportunities for modification of MS4 Permit requirements to focus the expenditure of Permittee funds on those activities that are most effective at protecting Receiving Water quality. Although the resources available for Permittee compliance activities are finite, the Permittees are supportive of modifications to the MS4 Permit that, while working within available funding limitations, enhance their ability to protect and enhance the quality of Receiving Waters.

7.0 Evaluation and Recommendations for Individual SWMP Programs

The Riverside County DAMP is a programmatic document developed by the Permittees in the Santa Ana and Santa Margarita Regions. It outlines the major programs and policies that the Permittees individually and/or collectively implement to manage Urban Runoff for the protection of Receiving Waters in Western Riverside County, including the Santa Margarita Region. The Riverside County DAMP provides a model for the development of a Permittees' Individual SWMPs in the Santa Margarita Region.

The Permittees continue to support a uniform approach to the implementation of MS4 Permit compliance programs in order to facilitate increased transparency and understanding for residents, regulated entities, and Permittee staff. For this reason, the discussions below focus on programmatic changes to the compliance programs that are necessary to maintain the effectiveness of the model compliance programs described in the Riverside County DAMP. Upon adoption of the new MS4 Permit, the Riverside County DAMP and Individual SWMPs will be revised accordingly.

7.1 Program Management

There are typically multiple Permittee departments that are responsible for implementing the elements of the Individual SWMPs. Each Permittee has designated an NPDES Coordinator who coordinates the overall Permittee compliance programs, collects and analyzes compliance program data, develops and maintains the Individual SWMPs, compiles and submits necessary reports, coordinates with other Permittees, stakeholders and Regional Board staff, and conducts other necessary duties as assigned.

To facilitate inter-Permittee coordination and funding of regional compliance activities such as the Public Education and Monitoring programs, the Permittees have entered into an Implementation Agreement that defines the roles and responsibilities of each Permittee and assigns cost shares for regional programs defined in the agreement. The Implementation Agreement also requires each Permittee to designate an NPDES Coordinator who is also responsible for representing the Permittee's interest at Permittee coordination meetings such as the monthly Santa Ana/Santa Margarita Technical Advisory Committee.

The Permittees in the Santa Margarita and Santa Ana Regions participate in a Management Steering Committee made up of the City Managers, County Executive Officer, and the District's Chief Engineer; or their assigned alternate. Participation in the Management Steering Committee is not mandatory; however, it provides a management-level forum to address Urban Runoff management policies for the Permit Area and coordination of the review, and necessary revisions to the Riverside County DAMP and Implementation Agreement. In addition, the Management Steering Committee promotes a higher level of awareness of the MS4 Permit compliance program by each Permittee's senior management staff.

7.1.1 Accomplishments and Programmatic Improvements

Collectively, the Permittees Program Management activities have achieved:

- Development of the Riverside County DAMP, WQMP and Individual SWMPs following adoption of the 2004 MS4 Permit.
- Revised the Implementation Agreement to account for necessary program enhancements resulting from the new MS4 Permit.

- Established and held monthly meetings of a Technical Advisory Committee comprising of each Permittee's NPDES coordinator, to discuss and coordinate response to issues that arise through the ongoing implementation of the Riverside County DAMP-based programs.
- Voluntarily participate in a Management Steering Committee comprised of Permittee upper management (City Manager or equivalent) to provide a forum to discuss major policy issues related to MS4 Permit compliance program implementation. This also helps the major decision makers within each organization to stay abreast of the status of the implementation of the Riverside County DAMP and aware of upcoming issues and approaches taken by other Permittees.
- Enhanced enforcement and compliance elements of the Riverside County DAMP.
- Developed the Integrated Regional Watershed Management Plan (IRWMP) for the Upper Santa Margarita Watershed.
- Continued progress with the Bureau of Reclamation, San Diego County and other stakeholders on a uniform watershed plan and model for the Santa Margarita River watershed.

7.1.2 Recommended Revisions and Enhancements to Program Management Efforts

7.1.2.1 Assessment Metrics and Municipal Action Levels

To ensure that the Permittee's programs continue to be effective at managing the impact of Urban Runoff on Receiving Water quality, the Permittees will revise the Program Effectiveness Assessments for both the Individual SWMP and the Watershed SWMP following adoption of the new MS4 Permit. These planned changes are further described in Section 6.1.2.1 of this ROWD. The Permittees also recommend streamlining of the reporting forms to focus on the revised Program Effectiveness Assessments.

7.1.2.2 Revised Reporting Format

As a result of continued program effectiveness assessment, following adoption of the new MS4 Permit, the Permittees will update annual reporting forms to incorporate specific reporting requirements for the effectiveness assessment metrics and to remove inappropriate, outdated, or ineffective reporting requirements.

7.2 Development Planning

This program element links each Permittee's General Plan, environmental review process, and development approval and permitting processes to the later phases of detailed design, construction and operation. The development approval and permitting processes carries forth project-specific requirements in the form of conditions of approval, project plans, and design specifications that support tracking, inspection, and enforcement actions.

7.2.1 Development Planning Program Element Accomplishments and Programmatic Improvements

During the term of the 2004 MS4 Permit, the development planning program accomplishments and programmatic improvements included:

- Developed the WQMP to address post construction stormwater runoff quality for New and Significant Re-Development Projects.
- Development of a FAQ for WQMP projects to assist with implementing the WQMP program.
- Developed and subsequently enhanced a BMP design guidance manual to standardize the construction of post construction BMPs.
- Participation in the SMC efforts to develop a LID manual.
- Participation in SCCWRP's hydromodification studies to develop scientifically based hydromodification design guidance for Southern California.
- Enhanced online watershed maps to assist developers and the public with identifying areas tributary to Impaired Waterbodies.
- Adopted and implemented a MSHCP to ensure the regional-scale protection of habitat and natural resources in the approval process for New Developments.

7.2.2 Proposed Revisions to the Development Planning Program Element

7.2.2.1 Low Impact Development

The Permittees will revise the Riverside County Storm Water Quality Best Management Practice Design Handbook to (1) better incorporate LID design concepts, and (2) incorporate guidance to describe how developments can offset Treatment Control and hydromodification impacts with LID concepts including infiltration, evapo-transpiration, reuse, and onsite stormwater management. These revisions will follow the completion of the SMC LID BMP Manual and SCCWRPs Hydromodification Study. See the FY 2007-2008 Watershed Annual Report, Appendix G, Section G.7.2 for additional detail.

7.2.2.2 Hydromodification

As committed to in the 2004 WQMP (now Appendix O to the Riverside County DAMP), the Permittees have developed numeric guidance for hydromodification and are now working with SCCWRP to develop enhanced hydromodification guidance for Southern California. The Permittees will use the completed guidance to update the WQMP, BMP Design Handbook and other guidance as necessary to effectively mitigate hydromodification impacts. See the FY 2007-2008 Watershed Annual Report, Appendix G, Section G.7.2 for additional detail.

7.2.2.3 BMP Design Criteria

The Permittees will revise the Riverside County Storm Water Quality Best Management Practice Design Handbook to incorporate additional design guidance to clarify those Treatment Control BMPs that are effective at removing sediment-bound pesticides such as pyrethroid pesticides (consistent with the recommendations of the Toxicity Reduction Evaluation contained in Appendix D.

7.2.2.4 TMDLs

The Permittees will revise the DAMP to identify and include BMPs that are necessary to mitigate the impacts of Urban Runoff on Impaired Waterbodies.

7.2.2.5 Roads

The Permittees believe that standard WQMP requirements for public works road projects create potential avenues for unavoidable non-compliance. The Permittees would like to review this priority development category with Regional Board Staff to develop a better system to manage public works road projects.

7.2.2.6 Inspect and Verify Maintenance of Post Construction Treatment Control BMPs to Ensure Ongoing Effectiveness

As economic conditions allow, the Permittees propose to implement the following approach to inspect and/or verify maintenance of Treatment Control BMPs implemented on Priority Development Projects to ensure their ongoing effectiveness. The development of the program described below will require the Permittee resources that are unavailable in the current economic climate, particularly considering that it would likely require the Permittees to abandon the CAP in lieu of a local Permittee inspection program. The resources that will be required to ramp up new inspection programs are unavailable and may not become available during the term of the new MS4 Permit; however when the economy recovers sufficiently the Permittees propose to implement the program described below.

Integrated Management Practice (IMP) Exemption:

For the purposes of this program, IMPs include BMPs that are landscape based or otherwise serve an additional purpose other than Treatment Control. IMPs will be exempted from Inspection and Maintenance Tracking / Certification requirements if solely through the regular maintenance of the feature's secondary (non-treatment) functions and with Permittee concurrence, it can reasonably be expected that the treatment efficacy of the IMP will be ensured in perpetuity. An example that may satisfy this exemption would be a grassy swale that is mowed as part of regular landscape maintenance, whereas a BMP with a media filter which requires periodic resetting or replacement to maintain treatment effectiveness would not be exempted.

Priority Development projects will be exempted from all Treatment Control BMP Inspection and Maintenance Tracking / Certification requirements if they completely meet their Treatment Control requirements by implementing only IMPs that meet these criteria.

Priority Industrial and Commercial

The following requirements will apply to new priority Commercial and Industrial developments subject to the Permit's Commercial and Industrial business inspection requirements.

- Inspection

  Sites will be inspected per the Individual SWMPs current inspection frequency requirements that are based on the potential of the site to contribute to water quality impairments. At these inspections, in addition to the normal inspection requirements, all Treatment Control BMPs at the site will be inspected. In other words, all Treatment Control BMPs at high-priority facilities will be inspected annually; Treatment Control BMPs at medium-priority facilities will inspected biennially and Treatment Control BMPs at low-priority facilities will be inspected once during the term of the MS4 Permit. Improperly maintained BMPs may subject the maintenance entity to license suspension or administrative citations.

- Proof of Maintenance

  Maintenance records demonstrating compliance with the O&M procedures in the WQMP must be available for review at the time of the inspection. Failure to demonstrate that the BMPs have been maintained appropriately may result in license suspension or other enforcement actions.

Other Priority Developments

The following requirements will apply to new priority residential developments and businesses not otherwise subject to the Permit's Commercial and Industrial business inspection requirements.

- Proof of Maintenance and Self Certification

  The maintenance entity identified in the WQMP will be required to submit maintenance records including a signed certification to the Co-Permittee. The frequency of these submittals will be based on the relative maintenance requirements of the Treatment Control BMPs implemented on that site. BMPs will be categorized into groups as having High, Medium or Low maintenance requirements. If a WQMP project utilizes high-maintenance Treatment Control BMPs it will be categorized as a High-priority residential development, etc. High-Priority residential developments will be required to submit records annually, Medium – biennially, and Low – once every five years. Failure to report will result in administrative citations against the maintenance entity.

Permittee Projects and Permittee Maintained Treatment Control BMPs

This requirement will be included as part of the existing Permittee facility inspection program and inspected per the frequency requirements specified in the Riverside County DAMP.

7.3 Private Development Construction Activities

The Permittees have reviewed their ordinances to ensure that they are adequate to control discharges to the MS4 from construction sites to the MEP. For construction projects that will disturb one acre or more, the Permittees require proof of compliance with the General Permit-Construction prior to issuance of building/grading permits (a copy of the Notice of Intent filed with the State Board). Each of the Co-Permittees provides training for their construction inspectors regarding the proper installation and

maintenance of erosion and sediment control BMPs. Education and outreach to the building industry (developers, construction contractors, engineering firms, etc.) regarding managing discharges from construction sites is also incorporated into the "**Only Rain Down the Storm Drain** Pollution Prevention Program," the Permittees' area-wide public education and outreach program.

7.3.1 Private Development Construction Activities Program Element Accomplishments and Programmatic Improvements

- The Permittees annually distribute construction activities posters to construction sites as part of construction outreach program.
- A standardized construction activity reporting spreadsheet was developed for the Annual Reports.
- The construction inspection forms were updated.
- The Co-Permittees developed and maintained inventory databases of construction sites 1-acre or larger for which they have issued a building or grading permit.
- Prioritized inspections to help target construction activities that present the highest risk to water quality.

Highlights
Conducted over **17,000** construction site inspections
Initiated over **3,800** enforcement actions to gain compliance
626 attendees to NPDES Construction training

7.3.2 Proposed Revisions to the Private Development Construction Activities Program Element

The Permittees are not proposing revisions to their existing construction inspection programs at this time. As previously described, the Permittees expect that development activity will be greatly reduced during the term of the new MS4 Permit. Regional Board staff has however raised the issue of abandoned construction sites. Regulation of abandoned construction sites has proven challenging due to bankruptcy of project proponents, non-responsiveness or inability to locate underlying investment banks that actually own the developments, and the practical limitations encountered by the Permittees in calling bonds. As the Regional Board has enforcement capabilities that often surpass those of the Permittees, to ensure that this issue is effectively addressed the Permittees ask for the close cooperation and support of the Regional Board. Nonetheless, the Permittees are committed to continuing the use of their IC/ID programs, code enforcement tools, and other ordinance authorities to control, to the extent allowable under law, abandoned parcels that are not properly stabilized.

7.4 Existing Development – Permittee Facilities and Activities

The Municipal Facilities Strategy which has been consolidated into Section 5 of the Riverside County DAMP provides guidance for identifying potential storm water Pollutant sources and for selecting appropriate BMPs for implementation at identified facilities of concern owned and operated by the Permittees. The Permittees are implementing the provisions of the Municipal Facilities Strategy within their respective jurisdictions via processes described in their Individual SWMPs. To assist the Permittees in implementing this program, training focused on storm water regulatory requirements and BMPs related

to Permittee maintenance facilities and roadway maintenance activities were conducted twice annually during the 2004 MS4 Permit term.

7.4.1 Permittee Facilities and Activities Program Element Accomplishments and Programmatic Improvements

- The District coordinated preparation of GIS-based maps for Permittee MS4 facilities. The MS4 maps are updated annually with new information provided by the Permittees as part of the Annual Reporting process.
- Development of a GIS Browser that allows interested parties to view MS4 Facilities from the District's website.
- Updated Model Facilities Pollution Prevention Plan for Permittee facilities not requiring coverage under the Industrial General Permit.

Highlights
900 attendees to Municipal NPDES training

7.4.2 Proposed Revisions to Permittee Facilities and Activities Program Element

7.4.2.1 FPPP Guidance

The Permittees commit to developing a revised WQMP template for Permittee projects that better facilitates translation of WQMP BMP requirements into Facility Pollution Prevention Plans, where appropriate.

7.4.2.2 Integrated Pest Management

The Permittees commit to including Ecowise's standardized language for contracted pesticide management services in Permittee pesticide management contracts.

7.5 Commercial and Industrial Sources

The Principal Permittee and the County have implemented the CAP through which the County Department of Environmental Health makes use of existing inspection programs to address storm water compliance survey/inspections of restaurants and facilities that must secure a hazardous materials permit for either storing, handling or generating hazardous materials. As the responsible Certified Unified Program Agency in Riverside County, the County Department of Environmental Health is responsible for regularly inspecting all sites within the County that handle hazardous waste. The CAP is implemented in those cities and unincorporated areas that do not maintain an individual industrial/commercial inspection program through other mechanisms such as POTW waste pre-treatment programs or business license inspection programs.

Revisions to the inspection program requirements contained within the 2004 MS4 Permit expanded the scope of the overall commercial/industrial inspection program beyond the ability of the CAP to address. Each Co-Permittee now implements a supplemental inspection program for facilities not covered by the CAP. In addition, the 2004 MS4 Permit required inventories/databases of facilities, prioritization of

industrial and commercial sources relative to the potential to impact water quality, and specified inspection frequencies based upon facility priority.

The revised industrial and commercial sources program continues to have both regional and local jurisdiction components. Although the overall industrial/commercial inspection program has grown beyond the CAP, the CAP still addresses most of the facilities identified in the 2004 MS4 Permit. With its low overhead cost, it remains a cost effective approach to mitigating the impacts of industrial and commercial facilities on the MS4 and Receiving Waters.

7.5.1 Commercial and Industrial Program Element Accomplishments and Programmatic Improvements

- Reviewed and updated several educational brochures for distribution to inspected facilities.
- Developed outreach posters for gas and automotive service stations.
- Developed standardized inspection reporting forms for Annual Reports.
- Updated food service surveys.
- Extended the agreement with the County's Department of Environmental Health executed in 1999 for the area-wide CAP for the inspection of commercial and industrial facilities through June 30, 2009.
- Created Permittee databases for the inspected commercial and industrial facilities.
- Revised the Riverside County DAMP to reflect development of the industrial and commercial facility database that contains the following information: facility name, address, city, zip code, and Standard Industrial Classification (SIC) codes.
- Provided public education information regarding NPDES storm water permits to any new businesses listed in the Press Enterprise.

Highlights
3,974 inspections of Industrial and Commercial facilities
Over **1000** enforcement actions taken
426 attendees to Municipal NPDES training

7.5.2 Proposed Revisions to Commercial and Industrial Sources Program Element

The expected future expansion of the Commercial and Industrial Inspection Program to address Treatment Control BMPs as described in Section 7.2.2.6 would likely result in an expansion of the CAP that is beyond the ability of Environmental Health staff to accommodate and still achieve their own mandated inspection requirements. The Permittees are therefore proposing to amend the Riverside County DAMP and Individual SWMPs to recognize not only the CAP inspection program but also Permittee specific alternative programs that may develop during the term of the next MS4 Permit.

7.6 Residential Sources

The residential program focuses on educating residents about activities that can potentially contribute to beneficial use impairment. The residential program outreach is focused on Pollutants of Concern. The residential program is primarily implemented through the Regional Public Education Program; however, each Permittee typically conducts additional outreach. In those cases where residential Illegal Discharges are identified, appropriate code enforcement actions are also taken.

7.6.1 Accomplishments and Programmatic Improvements

The residential program achieved the following accomplishments during the term of the 2004 MS4 Permit:

- Developed several new outreach brochures and tools to promote changes in knowledge and behavior regarding activities that potentially generated Pollutants of Concern including landscape and gardening brochure, spray bottles with non-toxic pest control or cleaner recipes, septic system management brochure, updated outdoor activities brochure, and pet waste brochure.
- Implemented billboard advertising promoting "**Only Rain Down the Storm Drain**" message
- Purchased a new trailer to transport public education materials. The trailer is wrapped in graphics supporting the "**Only Rain Down the Storm Drain**" message.
- Point of Sale Outreach Programs to customers of hardware stores regarding paint, pesticides and fertilizers.
- Partnership with Valley Greeters to deliver "**Only Rain Down the Storm Drain**" information to new residents in the Santa Margarita Region.
- Promotion and participation in the annual Santa Margarita Watershed Clean Up Day.
- Continued supplemental support of the HHW/ABOP waste collection programs
- Continued update and revision of the public education information page
- Continued implementation and enhancement of school outreach programs conducted by Mission Resource Conservation District
- Reproduction and distribution of the After the Storm poster

7.6.2 Recommended Revisions

Although the Permittees continue to annually assess and modify outreach materials and programs, the Permittees are not recommending any substantive revisions to this program element at this time.

7.7 Public Education and Outreach

Although the bulk of public education and outreach activities are conducted by the District on behalf of the Permittees, the Permittees also conduct outreach activities. These activities include providing informational pamphlets at counters, conducting presentations for local businesses or developers, maintaining a stormwater page or appropriate stormwater links on their individual websites, conducting employee training programs, and attending various public events.

7.7.1 Public Education and Outreach Program Element Accomplishments and Programmatic Improvements

The Public Education and Outreach Program Element had the following accomplishments and improvements over the term of the 2004 Permit (not including those identified in Section 7.6.1):

- Use of a CEQA-style public participation process to develop the Riverside County DAMP, SWMPs, and WQMP
- Duplication and use of the USEPA construction site poster to educate construction site operators
- Distribution of stormwater outreach information to various businesses and construction sites through code enforcement, and building and grading inspectors
- Development and distribution of a automotive shop BMP poster
- Advertisements in the Business Press
- Update of the outdoor activities brochure for mobile operators

7.7.2 Recommended Changes

Although the Permittees continue to annually assess and modify outreach materials and programs, the Permittees are not recommending any substantive revisions to this program element at this time.

7.8 Elimination of Illicit Connections and Illegal Discharges

The Riverside County DAMP describes the discharge limitations and prohibitions applicable to the Permittee's MS4 (Section 4.1), procedures to be implemented when persistent exceedances of Water Quality Standards are identified (Section 4.2), responding to and reporting Illegal Discharges (Section 4.4), enforcement measures for IC/IDs (Section 4.5), measures to control litter (Section 4.6), measures to manage sanitary wastes (Section 4.7), and programs to promote collection and proper disposal of hazardous waste (Section 4.8).

7.8.1 IC/ID Program Element Accomplishments and Programmatic Improvements

- Developed Sanitary Sewer Overflow Procedures in coordination with the sanitary sewer operators in the Santa Ana and Santa Margarita Regions and implemented annual updates to Sanitary Sewer Overflow Procedures to ensure proper contact information for outside agencies.
- Established an electronic tracking system for NPDES complaints received through the toll free "Report Storm Water Pollution" hotline, OES or otherwise reported to the District.
- Enhanced public outreach regarding illegal dumping including brochures for: Outdoor Activities, Fountains & Swimming Pools, and Pet Waste, establishment of a Santa Margarita watershed Clean-Up Day and coordination with the County of Riverside Trash Task Force.

- Initiated a cooperative program with the County Environmental Health Department to promote Environmental Enhancement Projects in lieu of fines for environmental crime cases. This initiative resulted in a billboard advertising campaign and BMP posters addressing appropriate BMPs for gas stations and garages.
- Established IC/ID Monitoring Program

Highlights
1,263 potential IC/ID reports received and responded to
Over **5,500** calls received on stormwater pollution hotlines
94 IC/ID Monitoring events
5 monitoring events where field screening exceeding criteria

7.8.2 Proposed Revisions to IC/ID Program Element

The Permittees re-evaluated their existing IC/ID monitoring programs as part of this ROWD. The Permittees believe that the overall monitoring program is effective. However, the Permittees plan to revise their approach to the implementation of the Illicit Discharge monitoring program to increase monitoring data utility or overall program effectiveness.

7.8.2.1 Revise IC/ID Monitoring Program

The Permittees plan to revise their approach to the implementation of the IC/ID monitoring program. The goals of the recommended revisions are to:

- Relocate the IC/ID monitoring sites at MS4 outfalls.
- Distribute the monitoring sites throughout the Santa Margarita Region to detect Illicit Discharges closer to their source before they become excessively diluted.
- Increase efficiency and consistency in sampling resulting in enhanced data quality.
- Enhance response time to identify IC/IDs.

A model Illicit Discharge monitoring plan that accomplishes these goals is described below; a final plan will be incorporated into updated compliance documents with the new MS4 Permit.

7.8.2.2 Model Illicit Discharge Monitoring Plan

The Municipal Permittees will identify MS4 outfalls that could be used for monitoring sites based on maps of the MS4 facilities. This list of preliminary sites will be then field checked to determine the accessibility of the sites and feasibility for inclusion in the IC/ID monitoring program. Inaccessible sites or sites determined to be otherwise infeasible will be removed from the list.

Each Municipal Permittee except Menifee will then divide the list of the viable sites within their jurisdiction into groups of four. As Menifee only has one MS4, it will only monitor that one site. Each group of four sites will be monitored for a period of one year, twice during the dry season. Once all sites have been monitored for a year, sites will be repeated.

A monitoring team will be formed including one District and one Municipal Permittee staff member. The District staff will perform all monitoring/screening activities. The Municipal Permittee staff will be available to assist and will be responsible for initiating any necessary follow-up actions. This approach will provide consistency in screening and monitoring data collection and will allow the Municipal Permittee with jurisdiction over the tributary land use to be immediately aware of exceedances and initiate appropriate follow-up actions.

Appendix A
2008 Land Use Map

SANTA MARGARITA WATERSHED

COUNTY OF RIVERSIDE, CALIFORNIA

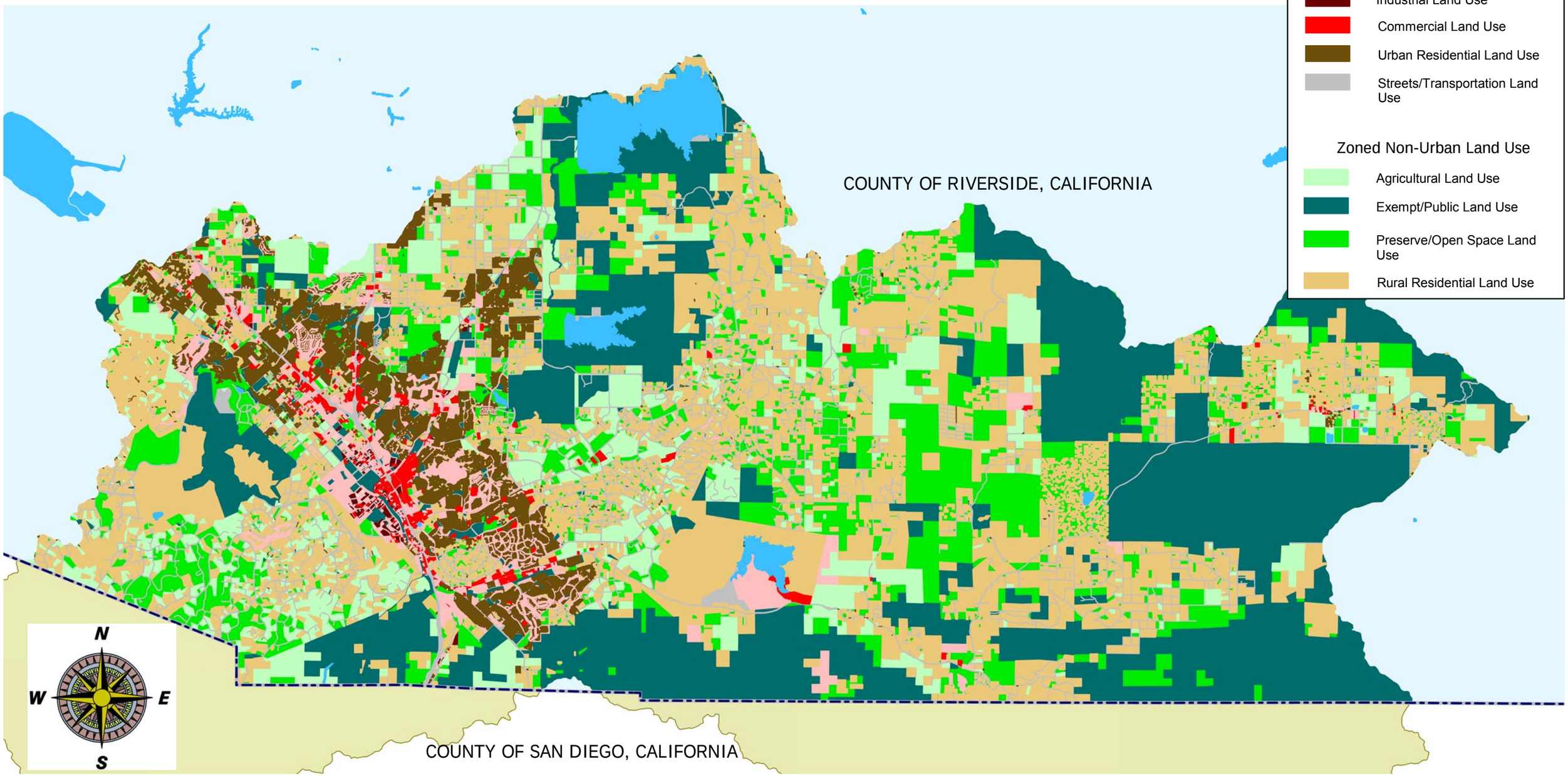

SANTA MARGARITA WATERSHED
WITH ZONED LAND USES
DELINEATED

(REVISED 14 JAN 09)

SANTA MARGARITA WATERSHED

WITHIN RIVERSIDE COUNTY, CALIFORNIA

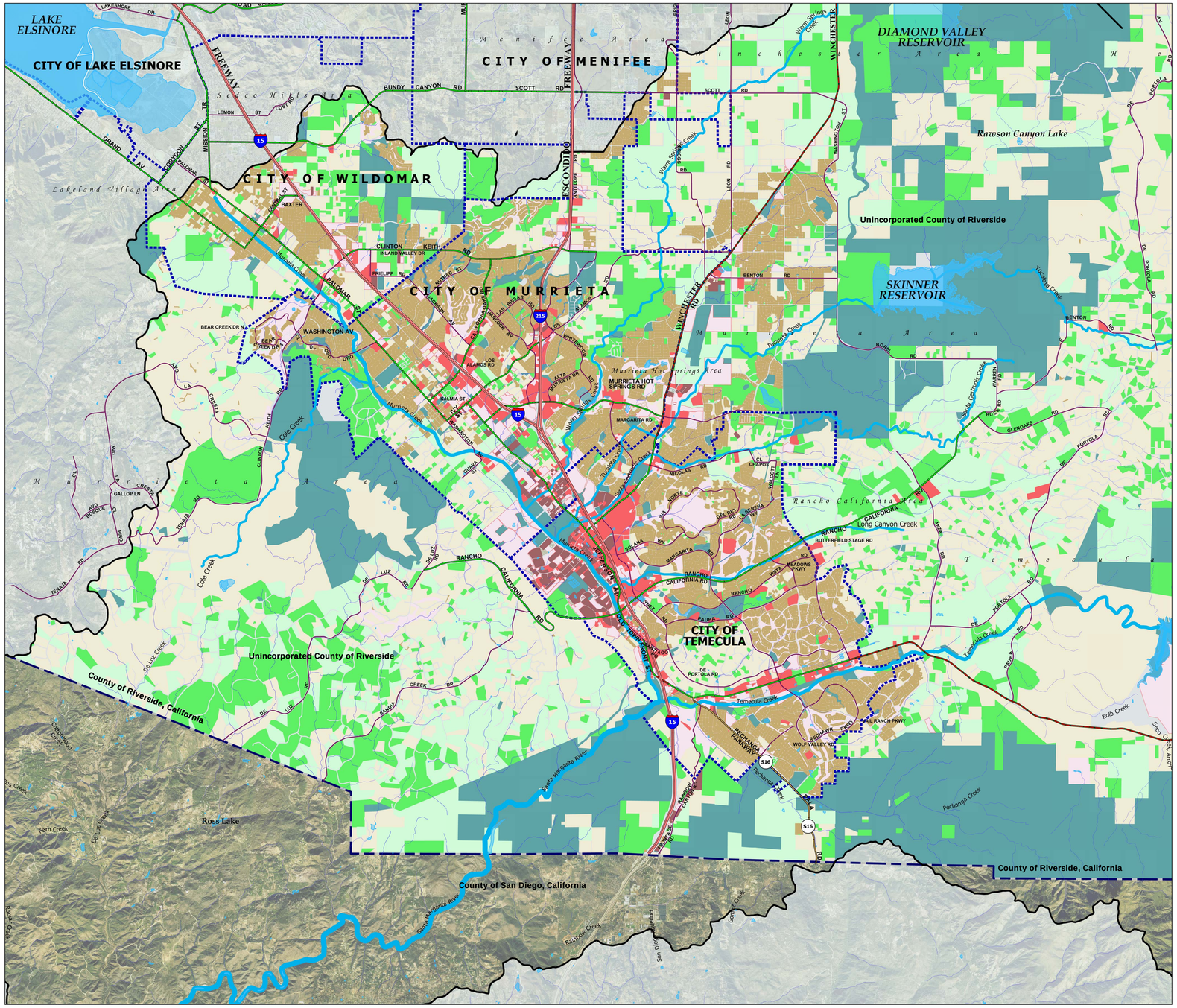

Legend

- US Freeways
- State Highways
- County Roads
- Primary Arterial Roads
- Secondary Collector Roads
- Waterbodies
- Watercourses
- Railroads
- Incorporated Areas
- Santa Margarita Watershed Boundary
- County of Riverside Boundary

Zoned Urban Land Use

- Commercial Land Use
- Industrial Land Use
- Parks/Recreation Land Use
- Urban Land Use
- Street/Roads Lands Use

Zoned Non-Urban Land Use

- Agricultural Land Use
- Exempt Land Use
- Preserve/Open Space Land Use
- Rural Residential Land Use

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT GEOGRAPHIC INFORMATION SYSTEM

1:50,000

4 Statute Miles

5 Kilometers

The graphical and tabular information shown on this document may be derived from a variety of public agency and/or private commercial sources such as Riverside County Transportation and Land Management Agency, Thomas Brothers Mapping, the Stephen P. Teale Data Center, GIS Technology Center, State of California, the United States Geologic Survey and the United States National Atlas. These sources may possess varying levels of accuracy and precision and this product is meant only as a guide to the relative position and scale of the depicted features. This GIS document is in no case to be interpreted as fundamental or decisive for purposes of land surveying, field engineering, plan drafting, code enforcement, land boundary determination and/or land acquisition.

SANTA MARGARITA REGION OF RIVERSIDE COUNTY ZONED LAND USE

(REVISED 13JAN09)

Appendix B
Santa Margarita Region MS4 Facility Maps

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

RIVERSIDE, CALIFORNIA

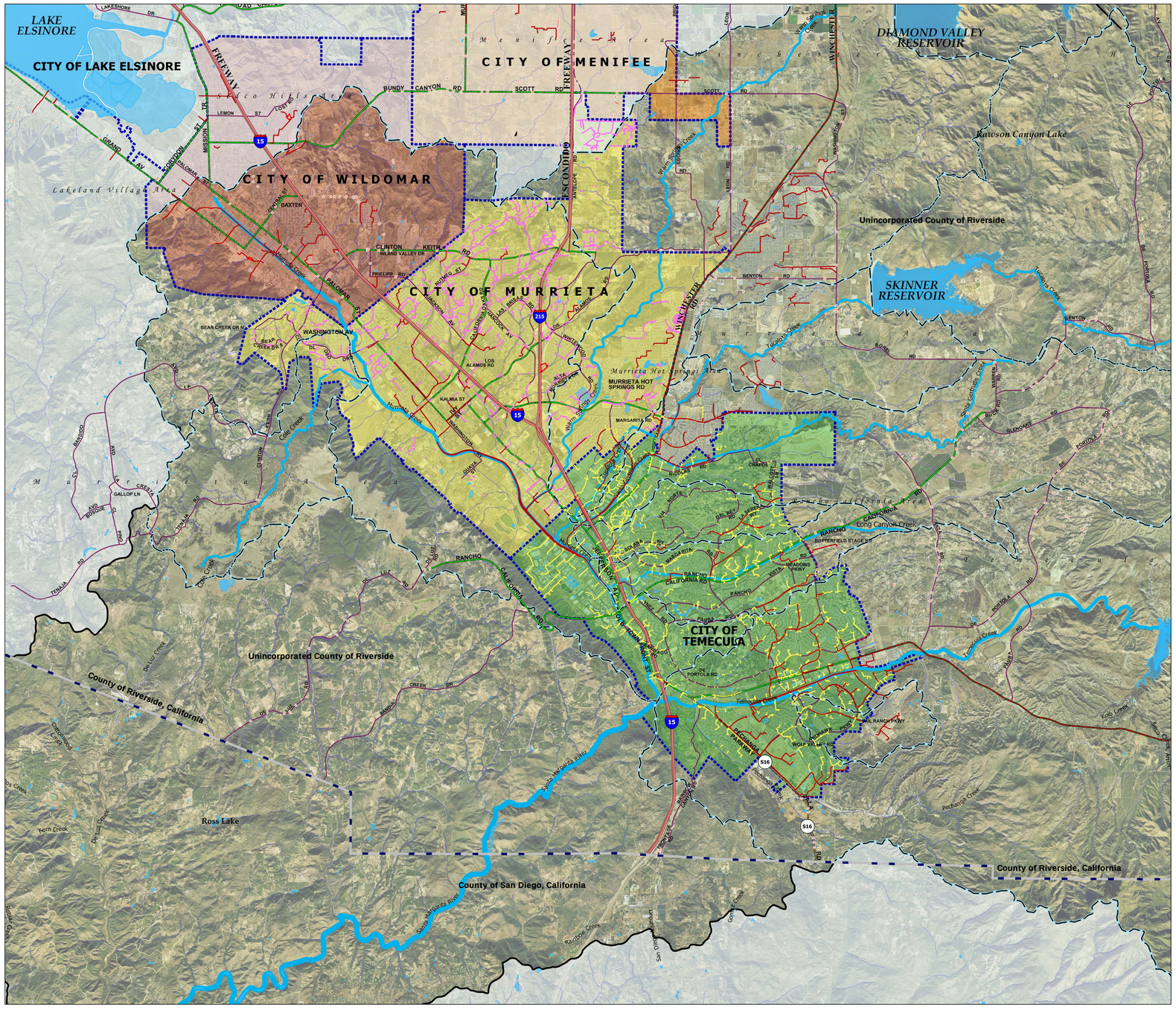
LAKE ELSINORE
CITY OF LAKE ELSINORE
CITY OF MENIFEE
CITY OF WILDOMAR
CITY OF MURRIETA
CITY OF TEMECULA
DIAMOND VALLEY RESERVOIR
Lawson Canyon Lake
SKINNER RESERVOIR
Unincorporated County of Riverside
Ross Lake
County of Riverside, California
County of San Diego, California
Lakeland Village Area
Murrieta Hot Springs Area
Murrieta Area
Temecula Area
Western California Area
Menifee Area
Winchester Area
Salt Creek
Murrieta Creek
Tenaja Creek
Temecula Creek
Santa Margarita River
Long Canyon Creek
Pechanga Creek
Rainbow Creek
Gopher Creek
Kolb Creek
Rancho California Rd
Murrieta Hot Springs Rd
Winchester Rd
Washington Av
Pala Rd
Rancho California Rd
Ynez Rd
Margarita Rd
Jefferson Av
Pechanga Pkwy
Rancho California Rd
Temecula Pkwy
Rancho California Rd
Pala Rd
Rancho California Rd
Ynez Rd
Jefferson Av
Margarita Rd
Pechanga Pkwy

Appendix C
Initial Assessment Methodologies based on CASQA approach

Construction Component Effectiveness Assessments

Goals

I Ensure that all Construction Sites have applicable permits from the Permittee.

II Increase the percentage of Construction Sites that are in compliance with Permittee building and grading permits

III Place additional focus on Construction Sites during Wet Season

IV Ensure that construction inspection staff are properly trained and informed of the issues related to stormwater quality

Goal Addressed	Measureable Metrics Collected / Compiled Annually	Highest Potential CASQA Effectiveness Level	Effectiveness Assessment Timeframe	Outcome required to support Effectiveness Level	Can a Reasonable Municipal Action Level be developed?
I	% of active construction sites that are discovered without building/grading permits	2	Permit Term	Decreasing Trend or minimal %	Y
II	% of active High/Medium priority sites subjected to enforcement beyond verbal/written warnings	3	Permit Term	Decreasing Trend or minimal %	N
II, III	% of active High/Medium priority sites subjected to enforcement beyond verbal/written warnings **during wet season**	3	Permit Term	Decreasing Trend or minimal %	N
II	% of enforcement actions that reached each level of enforcement	3	Permit Term	Trend toward lower levels	N
III	% of active permitted construction sites provided wet weather reminders	2	Annually	N/A	Y
IV	% of construction inspectors receiving annual training	1	Annually	N/A	Y

Development Planning Component Effectiveness Assessments

Goals

I Develop Design Guidance for Low Impact Development (LID) BMPs

III Encourage the use of LID-Based Treatment Control BMPs

IV Ensure that appropriate planning staff are trained in WQMP requirements

Goal Addressed	Measureable Metrics Collected / Compiled Annually	Highest Potential CASQA Effectiveness Level	Effectiveness Assessment Timeframe	Outcome required to support Effectiveness Level	Can a Reasonable Municipal Action Level be developed?
I	Status of SMC LID BMP Design Manual	1	Within Permit Term	Completion	Y
II	% of WQMP projects that met the exemption requirements for inspection and maintenance reporting by implementing only LID-Based Treatment Control BMPs	3	Permit Term	Increasing Trend	N
III	% of applicable planning staff that attended WQMP training.	1	Annually	N/A	Y

Permittee Facilities and Activities Program Effectiveness Assessments

Goals

I	Ensure that Permittee Facilities have adequate BMPs implemented and that they are properly maintained
II	Ensure that Channels and Inlets are kept free from trash and debris
III	Encourage the use of Integrated Pest Management (IPM) on Permittee Facilities
IV	Maintain an updated GIS map of the MS4 system
V	Ensure the Permittee facility operators and maintenance workers are properly trained in issues related to water quality.

Goal Addressed	Measureable Metrics Collected / Compiled Annually	Highest Potential CASQA Effectiveness Level	Effectiveness Assessment Timeframe	Outcome required to support Effectiveness Level	Can a Reasonable Municipal Action Level be developed?
I	% of facilities with appropriate BMPs identified	1	Annually	N/A	Y
I	% of Facilities provided reminders of appropriate BMPs	2	Annually	N/A	Y
I	% of annual facility inspections finding deficiencies in BMP implementation that require follow-up actions	3	Permit Term	Decreasing Trend or minimal %	Y
I	Average % of deficiencies identified in the previous year's inspections that were addressed.	3	Permit Term	Increasing Trend or high %	Y
II	Estimated Tons of Waste removed from Streets	4	Annually	N/A	N
II	Estimated Tons of Waste removed from Inlets	4	Annually	N/A	N
II	Estimated Tons of Waste removed from Open Channels	5	Annually	N/A	N
III	% of Pest Control Contracts that include language promoting or requiring IPM	1	Annually	N/A	N
IV	% of new Permittee-maintained MS4 facilities added to GIS Map	1	Annually	N/A	Y
V	% of Permittee Facility and MS4 operators and maintenance staff that attended training.	1	Annually	N/A	Y

Industrial-Commercial Facilities Program Effectiveness Assessments

Goals

I Maintain an updated and prioritized list of Industrial and Commercial Facilities

II Ensure the each Industrial and Commercial Facility has implemented BMPs that are appropriate for the activities and features at that facility

III Ensure that implemented BMPs are properly maintained to ensure their effective operation

IV Implement enforcement measures as necessary to reduce the occurance and recurrance of violations

V Ensure that inspectors are appropriately trained to identify problem areas and BMPs maintenance issues.

Goal Addressed	Measureable Metrics Collected / Compiled Annually	Highest Potential CASQA Effectiveness Level	Timeframe to Determine Effectiveness	Outcome required to support Effectiveness Level	Can a Reasonable Municipal Action Level be developed?
I	% of new facilities added to database and prioritized	1	Annually	N/A	Y
II	% of inspected facilities with adequate Minimum BMPs in place at time of inspection	3	Permit Term	Increasing Trend or High %	N
III	% of inspected WQMP facilities subject to Post Construction Treatment Control BMP Inspection, with adequately maintained Treatment Control BMP	3	Permit Term	Increasing Trend or High %	N
IV	% of inspected High/Medium priority facilities that were subjected to enforcement beyond verbal/written warnings	3	Permit Term	Decreasing Trend or Low %	N
IV	% of enforced sites that are repeat offenders	3	Permit Term	Decreasing Trend or Low %	N
IV	% / Number of enforcement actions that reached each level of enforcement	3	Permit Term	Trend toward lower enforcement	N
V	Percent of applicable inspectors that attended training	1	Annually	N/A	Y

Residential Program Effectiveness Assessments

Goals

I Raise awareness among residents of activities that may be contributing to stormwater pollution
II Increase public awareness of BMPs for residential activities
III Increase public participation in hazardous material collection events
IV Increase public involvement in keeping the watershed clean
V Encourage the use of Alternative Pest Control Methods

Goal Addressed	Measureable Metrics Collected / Compiled Annually	Highest Potential CASQA Effectiveness Level	Timeframe to Determine Effectiveness	Outcome required to support Effectiveness Level	Can a Reasonable Municipal Action Level be developed?
I	Number of outreach events to Schools	1	Annually	N/A	N
II	Number and type of educational materials distributed that target residential activities	1	Annually	N/A	Y
I, II	Results of Public Ed Surveys	2	Permit Term	Increasing or high level of Knowledge	Y
III	Gallons of Used Oil Collected through Used Oil Block Cycle Grant	4	Annually	N/A	Y
III	Total Pounds collected at HHW/ABOP events	4	Annually	N/A	Y
III	Total Number of participants at HHW/ABOP events	3	Annually	Increasing Trend	Y
IV	Pounds of trash removed through Watershed Cleanup Events	4	Annually (as events occur)	NA	N
V	Number of Home Improvement stores provided outreach and customer educational information for pesticide use	2	Annually	Increasing Trend	Y

Detection and Elimination of Illicit Discharges and Connections Effectiveness Assessments

I Revise and enhance IC/ID Monitoring Program
II Reduce the occurance of Illicit Connections and Discharges
III Increase public reporting of improper disposal into MS4
IV Ensure the IC/ID reports are reviewed and responded to in a timely manner
V Ensure the confirmed IC/ID events are eliminated as quickly as possible
VI Ensure the IC/ID response staff are trained to identify potential sources of Illicit Discharges and recommend BMPs to prevent such discharges

Goal Addressed	Measureable Metrics Collected / Compiled Annually	Highest Potential CASQA Effectiveness Level	Timeframe to Determine Effectiveness	Outcome required to support Effectiveness Level	Can a Reasonable Municipal Action Level be developed?
I	Revise IC/ID Monitoring Program to screen random MS4 outfalls	1	N/A	N/A	N
II	% of IC/ID Monitoring events with sampleable flow	1	Permit Term	N/A	N
II	% of IC/ID Monitoring events that exceeded criteria and required follow-up	5	Permit Term	Decreasing Trend or low %	N
III	Number of IC/ID reports received	2	Annually	Increasing Trend	N
IV	% of IC/ID reports responded to within 1 business day of receipt	1	Annually	N/A	Y
V	% of confirmed and source-identified IC/ID incidents that required enforcement beyond verbal or written wardnings to eliminate	3	Permit Term	Decreasing Trend or minimal %	N
V	% of each type / level of enforcement	3	Permit Term	Trend toward lower levels	N
VI	% of IC/ID response staff receiving training	1	Annually	N/A	Y

Appendix D
Toxicity Reduction Evaluation for Pyrethroid Pesticides

Riverside County Flood Control and Water Conservation District

Riverside County – Santa Margarita Region Pyrethroid Source Identification Toxicity Reduction Evaluation

Final Phase II Report
January 2009

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Executive Summary

This document is the Phase II report for the Santa Margarita Region (SMR) Pyrethroid Source Identification Toxicity Reduction Evaluation (TRE) conducted by the SMR Permittees to identify the source(s) of toxicity in the SMR and develop a plan to reduce the toxicity. This report documents the Permittees' ongoing and proposed efforts to identify and reduce sources of pyrethroid pesticide toxicity associated with urban runoff.

Data gathered under this TRE was compared to data from neighboring counties. Based on available data, problems with pyrethroid-induced toxicity in urban runoff are common among municipalities in Southern California, and methods for addressing the problems are comparable.

A literature review was conducted to determine appropriate source control and treatment control BMPs for reducing the concentration and load of pyrethroids in storm water runoff. The literature source, the estimated potential for reducing pyrethroid-induced toxicity, and possible concerns about implementing the BMP are summarized.

Based on the results of the literature review, BMPs are evaluated for applicability and potential effectiveness in the SMR watershed. Many of the most effective and appropriate BMPs are currently being implemented by the Permittees.

A search for pending legislation did not identify any pending legislation pertaining to pyrethroid pesticides.

The most effective strategy to prevent water quality impacts from legal pesticide uses was identified as state or federal regulatory change involving effective labeling and use restrictions. The Permittees propose a five year plan to continue, review, and enhance current activities to reduce pyrethroid-induced toxicity.

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1.0 Introduction

This document is the Phase II report for the Santa Margarita Region (SMR) Pyrethroid Source Identification Toxicity Reduction Evaluation (TRE) conducted by the County of Riverside, the City of Murrieta, the City of Temecula, and the Riverside County Flood Control and Water Conservation District (District, collectively Permittees). The Phase I Status Report (RCFCWCD, 2008) contains the work plan for Phase II and an outline of the topics in this report, as well as additional background information. This Phase II report is divided into six sections.

Section 1 describes the purpose of the TRE and provides an overview of the approach taken by the Permittees. Section 1 also contains a discussion of the regulatory framework of the TRE, a brief project background, a description of the Santa Margarita watershed, pyrethroid pesticide background and usage, and management questions and objectives.

Section 2 describes available pyrethroid and toxicity data from other counties in Southern California, and compares the data to data from Riverside County. The data and comparisons are included to demonstrate that the problems and solutions relating to pyrethroid pesticides facing the Permittees are similar to those of neighboring counties in the region.

Section 3 presents the results of the literature review conducted for this study of pesticide reduction Best Management Practices (BMPs).

Section 4 discusses potential pesticide reduction BMPs, the status of the Permittees implementation of the BMPs, and, when applicable, examples of the implementation of the BMPs in other municipalities. Section 4 also contains a table summarizing the potential BMPs, their advantages and disadvantages, and relative cost.

Section 5 discusses pending legislation relating to pyrethroid pesticides.

Section 6 presents the five-year course of action the Permittees propose to follow to reduce pyrethroid-induced toxicity in the SMR.

1.1 Purpose and Overview of Approach

The purpose of the TRE is to identify the source(s) of toxicity in the SMR and develop a plan to reduce the toxicity. The results of Phase I of the TRE are contained in the TRE Status Report (Riverside, 2008). This Phase II report for the TRE study documents the Permittees' ongoing and proposed efforts to identify and reduce sources of pyrethroid pesticide toxicity associated with urban runoff. The goal of Phase II is to establish a course of action and develop modifications to the Permittee's Storm Water Management Plans (SWMPs) to more effectively control the sources of toxicity that were identified in Phase I of the TRE. The Permittees will incorporate the course of action and SWMP modifications into the Report of Waste Discharge (ROWD) that will be submitted to the RWQCB in January 2009.

Phase II activities included:

- A comparison of toxicity and chemistry results to data from adjacent Phase I municipal separate storm sewer system (MS4) permit areas, including San Diego County and Orange County.
- A literature review of current studies and a survey of pesticide reduction BMPs.
- A search for pending legislation regarding pyrethroid pesticides.
- Development of a proposed course of action for the Permittees.

A literature review was conducted of BMP information available from the Urban Pesticide Pollution Prevention (UP3) Project and other pesticide management programs and documents. Information on relevant BMPs was compiled and evaluated to identify potential BMPs that are available to mitigate urban sources of pyrethroids. Existing Permittee programs, such as outreach, regulation, and BMP implementation, were then evaluated for improvement opportunities.

The proposed course of action was determined with consideration of the adequacy of data collection (sufficient precipitation and runoff to collect adequate data) and pending

regulatory actions by California Department of Pesticide Regulation (DPR), and the United States Environmental Protection Agency (EPA).

Land uses in Riverside County are comparable to those in neighboring Orange County and San Diego County, and pyrethroid pesticide-induced toxicity has been observed in those counties. The Permittees are committed to identifying and addressing water quality issues with methods consistent with those used by other stakeholders in Southern California. To this end, data gathered under this TRE was compared to data from neighboring counties, and current pesticide reduction programs used by municipalities throughout California were reviewed.

Source control and treatment control BMPs were researched and evaluated for potential effectiveness in reducing pyrethroid pesticide-induced toxicity in the Santa Margarita watershed. Many of the most effective BMPs are currently implemented by the Permittees, and several have been implemented within the previous Permit term (2004-2008). A proposed five-year course of action for the Permittees was developed by combining the results of the research with the existing programs.

1.2 Regulatory Framework

At the federal level, the authority to regulate pesticide manufacture and use is assigned to the United States Environmental Protection Agency (EPA) under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA). In California, pesticide use is regulated at the state level by the DPR. In the SMR, the Permittees are required under the Clean Water Act to control discharges of pollutants, including pesticides that produce water toxicity, to and from their MS4 under the National Pollutant Discharge Elimination System (NPDES).

This TRE was performed as required by Monitoring and Reporting Program (MRP) R9-2004-001.

The MRP, Section II. A. I. 4, states:

> *"When results from the chemistry, toxicity, and bioassessment monitoring…indicate urban runoff-induced degradation, Permittees shall evaluate the extent and causes of urban runoff pollution in receiving waters and prioritize management actions to eliminate or reduce sources. Toxicity Identification Evaluations (TIEs) shall be used to determine the cause of the toxicity, and Toxicity Reduction Evaluations (TREs) shall be used to identify sources and implement management actions to reduce pollutants in urban runoff causing toxicity."*

As local regulation of pesticide use is generally preempted by federal and state law, the Permitttees' authorities are limited to addressing illegal disposal of pesticides, promoting public education, setting the example for minimum pesticide use, and coordinating with the federal and state agencies to facilitate regulatory changes at the state and federal level.

1.3 Project Background

Phase I of the TRE consisted of the toxicity monitoring begun in 2004 and the Toxicity Identification Evaluations (TIE) was initiated in the spring of 2007. The Phase I Status Report (RCFCWCD, 2008) provides a full project background. Toxicity monitoring at Temecula Creek and Murrieta Creek was initiated in 2004 using EPA protocol with the following indicator species: *Ceriodaphnia dubia*, *Selenastrum capricornutum*, and *Hyalella azteca*. Toxicity testing during the 2004-2008 reporting period indicated persistent wet weather toxicity to *Hyalella* in both Temecula Creek and Murrieta Creek. Toxicity was not observed to either *Ceriodaphnia* or *Selenastrum* in any of the samples collected over the four annual reporting periods beginning in the fall of 2004.

Toxicity Identification Evaluations (TIEs) were conducted on the wet weather samples collected from Temecula Creek and Murrieta Creek beginning in April 2007, in accordance with Table 2 of the MRP. The TIEs indicated that pyrethroids were the primary source of toxicity and biological degradation in both Murrieta Creek and Temecula Creek.

As a result of the toxicity and TIEs, storm water monitoring for pyrethroids was initiated in 2007-2008. Results indicate that the pyrethroids permethrin and/or bifenthrin are present in wet weather water samples taken at Murrieta Creek and Temecula Creek.

To further assess the impacts of pyrethroid pesticides the Permittees instituted Dry Weather Toxicity Testing and direct measurement of pyrethroid pesticide concentrations in dry weather water samples during the 2007-2008 reporting period. Toxicity and pyrethroid pesticides were not detected in dry weather water samples at either Murrieta Creek or Temecula Creek.

Phase I of the TRE concluded with the Phase I Status Report. The Phase I Status Report included studies to better characterize patterns and sources of toxicity and to evaluate the hypothesis that the *Hyalella* toxicity is due to pyrethroids.

Bifenthrin and permethrin appear to be the primary toxic elements in Temecula Creek and Murrieta Creek. While bifenthrin and permethrin were applied to both agricultural and non-agricultural land uses, the major sources of pyrethroid toxicity in the SMR are non-agricultural activities. Permethrin was applied more than any other pyrethroid pesticide in the urban landscape. Bifenthrin and permethrin application rates were one and three orders of magnitude higher for structural control applications than agricultural applications in Riverside County. Structural control appears to represent 93% of the total pyrethroids use for Riverside County.

The Status Report outlined the plan for Phase II of the TRE, and this report presents the results of Phase II.

1.4 Watershed Description

The SMR encompasses approximately 750 square miles in southwestern Riverside and northern San Diego Counties (see Figure 1-1). The upper (northeast) portion of the SMR is in Riverside County with the remainder in San Diego County. The SMR is subdivided into the Temecula Creek and Murrieta Creek sub-watersheds and has an arid Mediterranean climate. Creeks in the SMR are ephemeral. Flow in Temecula Creek and in Murrieta Creek results almost exclusively from groundwater during the dry season. It is rare to find flow during dry weather at the tributary stations, and usually this flow infiltrates before reaching Temecula Creek or Murrieta Creek (2006-2007 Monitoring Annual Report). While the ephemeral streams in the SMR are technically receiving waters, the term "Receiving Waters" as used in this TRE Status Report refers exclusively to Murrieta Creek and Temecula Creek.

The Santa Margarita River is formed by the confluence of Murrieta Creek and Temecula Creek. The confluence is located in Riverside County, approximately five miles northeast of San Diego County. The Santa Margarita River flows from Riverside County into San Diego County through the community of Fallbrook and Marine Corps Base Camp Pendleton. The lower estuary and river are protected by Camp Pendleton and are much less developed than surrounding areas in Southern California. The Santa Margarita River is able to support a relative abundance of wildlife and habitats in part because of its undeveloped state.

Figure 1-1

Riverside County Santa Margarita Watershed

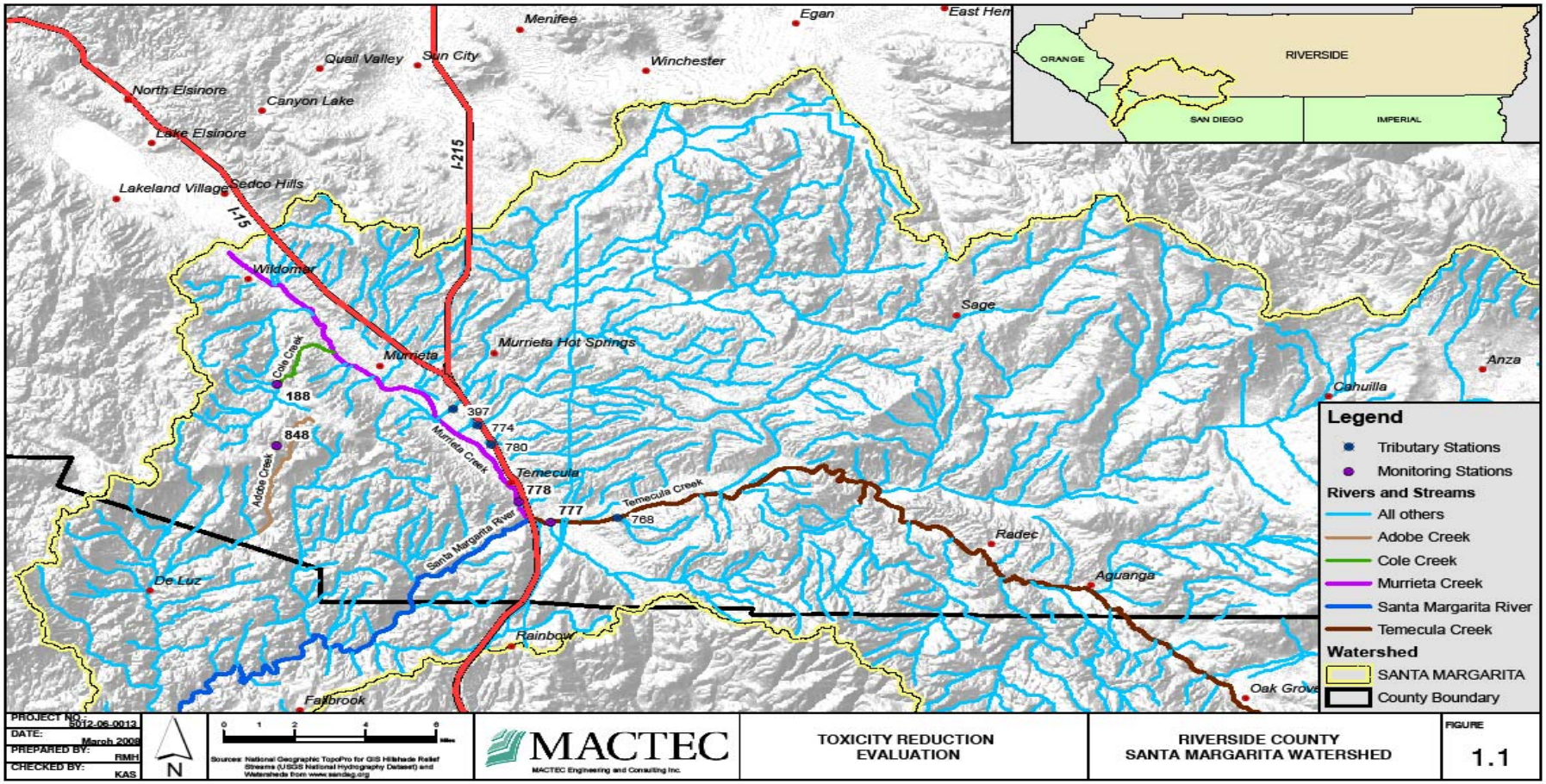

As presented in Table 1-1, the total population in the SMR of Riverside County is significantly less than adjacent watersheds covered under similar Phase I MS4 NPDES permits.

Table 1-1

San Diego Region Populations

Jurisdiction	Population
Orange County	3,002,048
San Diego County	2,941,454
SMR/Riverside County	250,483
Unincorporated	55,291
Murrieta	97,257
Temecula	97,935

1.5 Pyrethroid Pesticide Background and Usage

A statewide compilation of the presence and effects of pyrethroid pesticides in urban surface waters, prepared in July 2008 and presented at the 2008 California Association of Stormwater Quality Agencies (CASQA) Conference, outlined the rise in pyrethroid use and its increased presence in urban waterways (Ruby, 2008). A comprehensive survey of pesticide use in Sacramento, San Diego, and Orange Counties also concluded that, as the older pesticides chlorpyrifos and diazinon have been phased out, pyrethroid pesticides have seen increased usage (Wilen, 2005). The Urban Pesticide Pollution Prevention (UP3) Project confirms that pyrethroids are the cause of toxicity in numerous California waterways, particularly in urban waterways. The UP3 Project (www.up3project.org) publishes an annual review of new scientific findings on pesticides in urban surface water (TDC, 2007). Since 2005, the reviews have consistently indicated that pyrethroid use continues to increase and that pyrethroids are found to be the cause of toxicity in urban waterways. The pyrethroid use information is confirmed by data published by the DPR.

Pyrethrins are natural insecticides that are derived from an extract of chrysanthemum flowers. Pyrethroids are synthetic versions of pyrethrins. These chemicals act on the nervous system of insects. Commercial pyrethroid pesticides often contain a synergist that works by restricting the enzymes insects use to detoxify pyrethroids. While pyrethroids have been shown to be one of the least poisonous insecticides to mammals, the effects depend on the level of exposure, the health of the animal, and the environmental circumstances.

Pyrethroids applied in urban areas enter the storm drainage system of the MS4 by surface runoff and are transported directly to receiving waters. Other potential urban sources are runoff from irrigation with reclaimed water, application overspray, and atmospheric deposition. Pyrethroids transported via the MS4, from whatever source, are considered to be non-point discharges. Agriculture, nursery, and urban/suburban uses are the main categories of sources of pyrethroids in the receiving waters of the SMR.

Outdoor structural pest control is the predominant urban use of pyrethroids in most watersheds. However, in the SMR, the acreage dedicated to agricultural land use exceeds the urban land use area by approximately 2:1. Pyrethroid insecticides are applied to a variety of crops in the SMR and California throughout the year. According to the DPR, pyrethroids are commonly used on fruit and nut trees, row crops, and in nurseries. Six of the primary pyrethroids used in California agriculture, in order of decreasing amount applied in 2003, are permethrin, esfenvalerate, lambda-cyhalothrin, cyfluthrin, bifenthrin, and cypermethrin. Therefore, agricultural sources of pyrethroids were considered.

TIE methods for pyrethroids are still being developed. Effective methods require the ability to measure low concentrations of pyrethroids, and this remains a challenge. Fortunately, the development of TIE methods for pyrethroids is progressing and moving towards standardization (San Francisco Estuary Project, 2007). TIEs are planned for storm water samples collected during 2008-2009 when toxicity is evident.

1.6 Management Questions and Objectives

This TRE is designed to confirm the toxic element observed in the samples collected in the Santa Margarita Region, identify likely sources of the toxic element, and propose mitigation measures for those sources. TIEs identified pyrethroids pesticides as the likely toxic element. As the MRP specifies that a TRE must be conducted following toxicant identification through a TIE, Phase I of the TRE focused on the pyrethroids identified as the source of toxicity in the 2007 TIEs. To support this TRE, the Permittees commissioned additional wet and dry weather toxicity testing, water column pyrethroid testing, additional TIEs to verify the persistence of pyrethroids as the toxicant. Based on the resulting information, the TRE evaluates the specific sources of toxicity and likely mitigation.

This TRE study assumes that pyrethroid sources and resultant toxicity patterns in the SMR are similar to those in neighboring counties, in particular San Diego and Orange Counties. Under this assumption, the Permittees hypothesized that pyrethroids would be detected in samples at most if not all monitoring locations, that the samples would exhibit toxicity to *Hyalella*, and that TIEs would indicate pyrethroids as the cause of the toxicity. Unlike other regions, dry weather toxicity is not expected in the SMR, as dry weather flows are supported primarily by groundwater.

Based on this assumption, this TRE was designed to provide information to help answer the following five management questions related to the toxicity:

1) Is the pyrethroid toxicity persistent in Temecula Creek and Murrieta Creek?
2) Does the toxicity occur during dry weather?
3) Are there any obvious sources of illicit discharge of pyrethroids that can be abated?
4) What are the likely sources of pyrethroid toxicity in the SMR?
5) What potential management measures are available to the Permittees to mitigate the impacts of pyrethroid pesticide application?

Answers to the first four questions are detailed in the Phase I Status Report. Briefly, toxicity is persistent in the creeks during wet weather, but is not evident in dry weather samples. No

obvious sources of illicit discharge were found. The likely primary source of pyrethroids is structural control performed by pest control operators (PCOs). The final question is addressed during Phase II and is the focus of this report.

2.0 Data Comparison

An assumption of this TRE study is that pyrethroid sources and resultant toxicity patterns in the SMR are analogous to those in similar counties, in particular neighboring San Diego and Orange Counties. To verify this assumption, it was necessary to compare data collected in SMR to data collected in other locations. As part of the 2008 CASQA pyrethroids data compilation, monitoring results were summarized from studies that investigated the presence and effects of pyrethroid pesticides in urban areas of California (Ruby, 2008). The CASQA summary listed the frequency of detection of various pyrethroid pesticides and results of toxicity testing for different indicator species. Results from various northern and Southern California locations were detailed, including results of water column studies from Orange, San Diego and Sacramento Counties.

Pyrethroids, as a class of chemicals, have an affinity for particles and they are considered to be relatively hydrophobic; they are therefore commonly found in sediments of waterways downstream of their application sites. The initial toxicity studies leading to the identification of pyrethroids as pervasive environmental contaminants in California were performed on sediment samples by Don Weston and his colleagues at the University of California, Berkeley (Weston et al., 2005; Amweg et al., 2006). Recently, improvements in analytical methods for pyrethroids in water, and modification of toxicity studies to more effectively test for pyrethroid-based toxicity in water, have lead to increasing evidence of the presence of pyrethroids in water column samples, and toxic effects in the water matrix (see citations for Orange and San Diego County in Ruby, 2008).

Extensive work has been performed on the environmental presence and effects of pyrethroids in urban areas of the neighboring Orange and San Diego counties; however, much of this work has been performed on sediment samples. Although the sediment monitoring results do not correspond directly with the SMR water column test results, sediments are considered to be effective integrators of contaminants from the contributing storm water flows. The deposited sediments are produced as particles settle out from the passing water over some

period of time, and tend to accumulate until they are washed away by higher-velocity flows. Summaries of the relevant sediment study results are therefore included in the discussion that follows.

In Orange County, an ongoing study being performed by UC Davis, in conjunction with UC Riverside and the Orange County UC Cooperative Extension, has consistently found bifenthrin and permethrin in water column runoff samples from residential areas (Haver et al., 2007; Oki, personal communication). In samples from four residential sites they have detected bifenthrin in 100% of samples, with the number of samples varying from 48 to 57 per site (Oki, personal communication). In sediment samples collected in recent years from the Santa Ana Region of Orange County, bifenthrin is commonly detected (32 of 56 samples) and permethrin less frequently so (4 of 56 samples), with sediment toxicity to *Hyalella* common (39 of 54 samples tested were moderately or highly toxic; see summary in Ruby, 2008).

In a 2005 study of six Orange County residential storm drainages and seven tributary streams draining commercial/residential land uses, bifenthrin was detected in 95% of dry weather samples and 100% of wet weather samples (Budd et al., 2007). Because treatment of nursery products is mandatory to control Red Imported Fire Ants, an older DPR study, conducted in 1999-2002, found occasional detects of bifenthrin in urban runoff samples, along with frequent detects in nursery runoff from several Orange County sites.

In San Diego County, under NPDES Permit monitoring conducted since 2004, pyrethroids have been commonly detected in water samples from several receiving waters, and toxicity to *Hyalella* has been increasingly observed in water samples (see summary in Ruby, 2008). Bifenthrin was detected in 12 of 15 samples collected from 2005-2006 and 2006-2007; detection frequency was 100% in samples from Chollas Creek, Agua Hedionda, and Tecolote Creek. Toxicity to *Hyalella* was observed in 22 of 57 samples tested over the three year period, 2004-2007. In a TIE study performed on Chollas Creek samples during 2005-2006,

67% of samples were acutely toxic to *Hyalella*, and the toxicity was found to be likely due to pyrethroids.

In a 2004-2005 study performed by UC Davis and others, sediments from Switzer Creek at its outlet to San Diego Harbor were found to be highly toxic; bifenthrin and permethrin were detected at high concentrations, and a sediment TIE identified pyrethroids as the likely cause of the observed toxicity (Anderson et al., in press). As part of a statewide survey of urban waterways, sediments were tested from several receiving waters in San Diego County. All were found to be highly toxic to *Hyalella* (Holmes et al., in press).

To further compare the pyrethroid sources and toxicity patterns in the SMR to other counties, the CASQA data summary was analyzed to select the studies which reported results for the same constituents and effects identified in the SMR, specifically permethrin, bifenthrin, and toxicity to *Hyalella.* The total number of detections for the different monitoring locations was divided by the total number of samples taken at the sites to calculate the percentage of samples with detectable concentrations of pyrethroids. This normalized metric allowed for comparison of the various datasets.

While permethrin is among the more commonly-used pyrethroids, it is much less toxic to aquatic life than bifenthrin (TDC, 2007). For the purposes of this assessment, bifenthrin detection frequency and frequency of toxic effects were used as the metrics for comparison.

Comparative results for bifenthrin are summarized in Figure 2-1. Data were available for two creeks in Sacramento County and three locations in San Diego County, in addition to the data collected for SMR. Two samples were taken at the Sacramento County sampling locations. For San Diego County, each creek was sampled three times except for Chollas Creek, which was sampled six times. The SMR was sampled a total of eight times. In most cases, bifenthrin was detected in over 80% of samples. Only at Elk Grove Creek in Sacramento County was bifenthrin detected at a notably lower percentage.

Figure 2-1

Percentage of Samples with Bifenthrin Detections

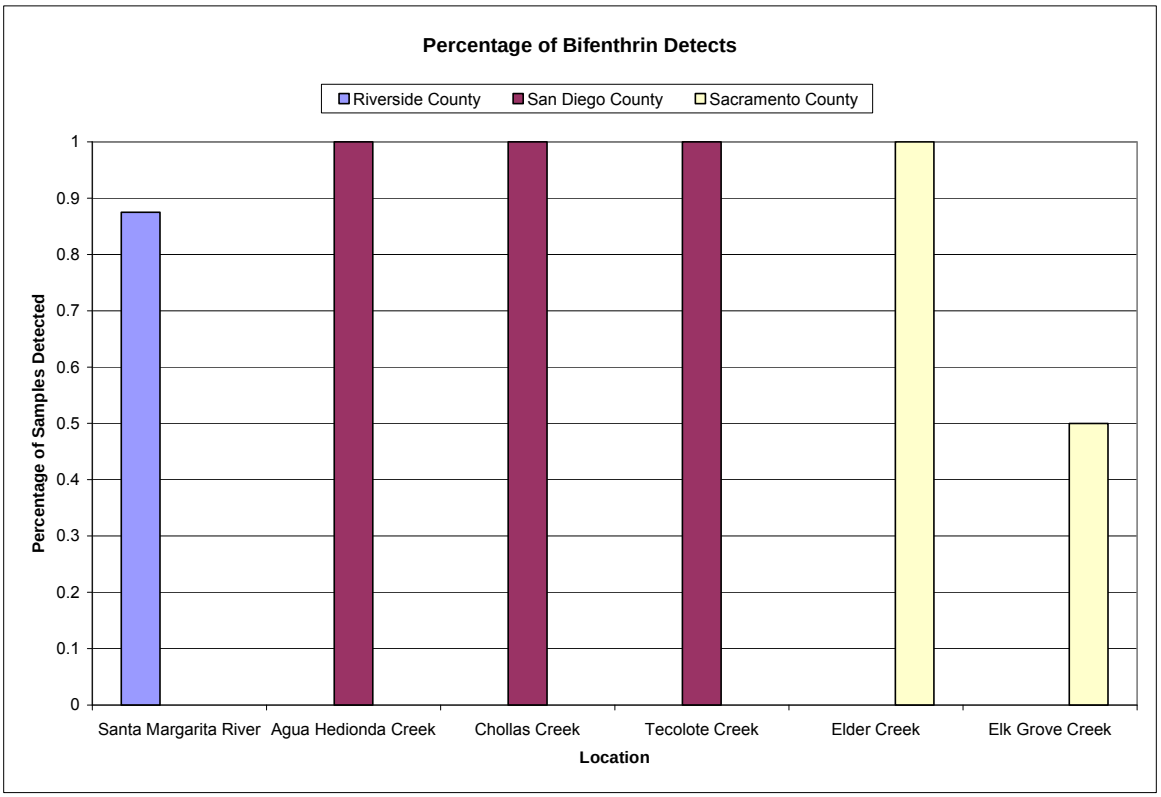

Toxicity to *Hyalella* was documented in water samples from San Diego County, along with the SMR. Toxicity testing was performed on samples from seven San Diego County water bodies. The sample sets ranged from three to nine toxicity tests (Aqua Hedionda, San Dieguito River, Tijuana River, and Chollas Creek). In the SMR, a total of eight toxicity tests were performed on samples from Murrieta Creek and Temecula Creek. The results for frequency of acute toxicity from the SMR were within the range of the results for similar sites in San Diego County (see Figure 2-2).

After comparing the results from different locations, the assumption that pyrethroid sources and resultant toxicity patterns in the SMR are similar to those in similar counties appears to be valid.

Figure 2-2

Percentage of Samples with Acute Toxicity to *Hyalella*

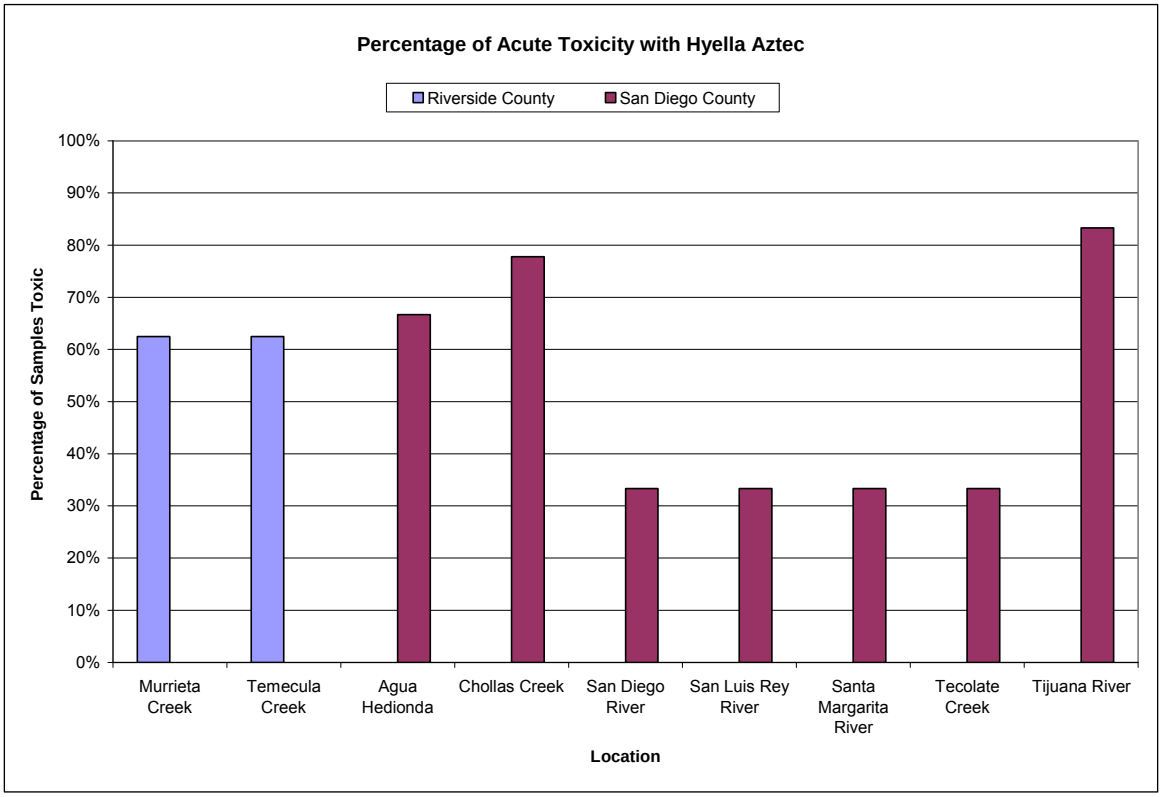

3.0 Literature Review

A literature review was conducted during December, 2008 to determine appropriate BMPs for reducing the concentration and load of pyrethroids in storm water runoff. An initial search was made of the Urban Pollution Prevention Program (UP3) website (www.up3program.org) for potential examples of BMP strategies implemented specifically for pyrethroids. The United States Environmental Protection Agency website and the CASQA website were also reviewed for pyrethroid specific BMPs. Widespread use of pyrethroids is relatively recent, and there has been little direct evaluation of BMPs for pyrethroids. Further research was conducted on general storm water BMPs, and their potential for pyrethroid reduction was evaluated based on the design of the BMP and the chemical behavior of pyrethroids.

To identify pending legislation that may be related to pyrethroid pesticides, web searches were conducted on the websites for DPR, the California legislature, the EPA, and the Library of Congress. However, no pending legislation was identified as relevant to pyrethroid pesticides.

Table 3-1 below presents the findings of the literature review. BMPs are categorized as either source control or treatment control, and within each category they are sorted by type. The literature source, a summary of the BMP, the estimated potential for reducing pyrethroid-induced toxicity, and possible concerns about implementing the BMP are provided. See Section 4 for further information about each type of BMP.

Table 3-1
Literature Review Matrix

Type of BMP	Literature Source	Summary	Ability to Reduce Toxicity Caused by Pyrethroids	Storm Water Concerns
Source Control				
Regulatory	Pesticides of Interest for Urban Surface Water Quality. Urban Pesticides Use Trends Annual Report. July 2008.	Suggests regulatory changes as a result of increased toxicity due to pyrethroid use	Potentially High	Supplementary to other BMPs, Will take years to show results
Regulatory	Improving Urban Pesticide Regulatory Activities to Protect Water Quality – Annual Update 2007. November 2007.	Discusses recent state and federal regulatory pesticide activities on an annual basis	Potentially High	Supplementary to other BMPs, Will take years to show results
Regulatory	California Department of Pesticide Regulation. http://www.cdpr.ca.gov/docs/registration/reevaluation/chemicals/pyrethroids.htm. 2007.	The reevaluation of the widespread presence of synthetic pyrethroid residues in the sediment of both agricultural and urban dominated California waterways at levels toxic to Hyalella azteca (H. azteca).	Potentially High	Supplementary to other BMPs, Will take years to show results
Integrated Pest Management (IPM)	Building Maintenance - Structural Integrated Pest Management. June 2008.	Promotes reduction in pesticide use through use of municipality IPM and hiring of PCO's trained in IPM	Potentially High	Does not eliminate all uses of pyrethroids
IPM	California Stormwater BMP Handbook. January 2003.	Promotes prevention of pesticide use through use hiring of PCOs that use IPM as an alternative	Potentially High	Does not eliminate all uses of pyrethroids
IPM	City of Santa Monica Toxics Use Reduction Program Integrated Pest Management. June 1997.	Overview of IPM program initiated by the City of Santa Monica	Potentially High	Does not eliminate all uses of pyrethroids
IPM	National Management Measures to Control Nonpoint Source Pollution from Urban Areas. November 2005.	EPA document discussing management practices to help reduce pesticide use	Potentially High	Does not eliminate all uses of pyrethroids
IPM	National Pollutant Discharge Elimination System (NPDES) Phase II BMP & Measureable Goal Examples. February 2008.	Provides examples and goals of good housekeeping BMPs	Potentially High	Does not eliminate all uses of pyrethroids
IPM	The Monterey Bay Green Gardener Program "sample curriculum". www.green-gardener.org/about. Accessed December 2008.	Informs the public and landscapers about the green gardener program and how to get involved	Potentially High	Does not eliminate all uses of pyrethroids

Table 3-1 (continued)
Literature Review Matrix

Type of BMP	Literature Source	Summary	Ability to Reduce Toxicity Caused by Pyrethroids	Storm Water Concerns
Source Control				
IPM	Western IPM Center. www.wripmc.org. Last updated 12/23/2008.	Pest management information specific to region, state, or territory.	Potentially High	Does not directly address pyrethroids
IPM	EcoWise Certified. www.ecowisecertified.com. Accessed December 2008.	Information on IPM program design, developing contracts for structural IPM, and pilot program aimed at developing IPM certification.	Potentially High	Does not directly address pyrethroids
IPM	Our Water Our World. www.ourwaterourworld.org. Copyright 2008.	Contains assorted fact sheets on specific pests and methods to manage them without using hazardous materials.	Potentially High	Addresses pyrethroids in water pollution fact sheet.
IPM	UP3 Project. www.up3project.org. November 2008.	Provides tools to municipalities to reduce municipal pesticide use and to conduct outreach to their communities on less-toxic methods of pest control	Potentially High	Addresses pyrethroids toxic impact on water bodies.
IPM	State of California Green California. www.green.ca.gov/EPP/building/structipm.htm. Accessed December 2008.	Provides information on structural IPM.	Potentially High	Addresses pyrethroids impact on storm water.
IPM	San Francisco Department of the Environment. http://www.sfenvironment.org/our_programs/topics.html?ti=1. Accessed December 2008.	Contains information regarding key components of integrated pest management.	Potentially High	Addresses pyrethroids impact on storm water.
Low Impact Development	Low-Impact Development Design Strategies: An Integrated Approach. June 1999.	Discusses LID design strategies and successes, including storm water controls	Potentially High	Does not directly address Pyrethroids
Low Impact Development	Low Impact Development Handbook: Stormwater Management Strategies. December 2007.	Reviews many LID techniques appropriate for Southern California's climate	Potentially High	Does not directly address Pyrethroids
Public Outreach	County of Los Angeles Department of Public WorksStorm Water/Urban Runoff Public Education Model Program. Fiscal Year 2002.	Provides Los Angeles specific examples of Public Outreach and Education	Potentially High	Change is up to individuals, needs cumulative effect

Table 3-1 (continued)
Literature Review Matrix

Type of BMP	Literature Source	Summary	Ability to Reduce Toxicity Caused by Pyrethroids	Storm Water Concerns
Source Control				
Public Outreach	Drainage Area Management Plan - Santa Ana and Santa Margarita Regions. July 2005.	Discusses local outreach actions conducted by the Permittees	Potentially High	Change is up to individuals, needs cumulative effect
Public Outreach	Environmental Justice Pilot Project Pest Management Assessment: Soil Fumigant and Organophosphate Insecticide Use and Alternatives - Parlier, Fresno County, California. October 2007.	Study of Agricultural pesticide use in Fresno area, including use of reduced risk pesticides	Potentially High	Unknown potential water quality and toxicity issues
Public Outreach	National Management Measures to Control Nonpoint Source Pollution from Urban Areas. November 2005.	EPA document discussing management practices to help reduce pesticide use	Potentially High	Change is up to individuals, needs cumulative effect
Public Outreach	National Pollutant Discharge Elimination System (NPDES) Phase II BMP & Measureable Goal Examples. February 2008.	Provides examples and goals of public outreach BMPs	Potentially High	Change is up to individuals, needs cumulative effect
Public Outreach	Pesticides of Interest for Urban Surface Water Quality. Urban Pesticides Use Trends Annual Report. July 2008.	Contains recommendations for public education based on analysis of pyrethroid use trends	Potentially High	Change is up to individuals, needs cumulative effect
Treatment Control				
Extended Detention Basin	Santa Clara Valley Urban Runoff Pollution Prevention Program Commercial Site Design Examples. February 2007.	Shows examples of different structural treatment methods and their effectiveness	Moderate	Improper maintenance could lead to other water quality issues
Extended Detention Basin	California Stormwater BMP Handbook. January 2003.	Reviews extended detention basin BMP methods, concerns, and goals	Moderate	Improper maintenance could lead to other water quality issues
Extended Detention Basin	Ventura Countywide Stormwater Quality Management Program Technical Guidance Manual for Stormwater Quality Control Measures. July 2002.	Reviews many BMP methods and contains information specific to Southern California	Moderate	Improper maintenance could lead to other water quality issues

Table 3-1 (continued)
Literature Review Matrix

Type of BMP	Literature Source	Summary	Ability to Reduce Toxicity Caused by Pyrethroids	Storm Water Concerns
Treatment Control				
Infiltration Basin	California Stormwater BMP Handbook. January 2003.	Reviews infiltration basin BMP methods, concerns, and goals	Potentially High	Improper maintenance could lead to other water quality issues
Infiltration Basin	Ventura Countywide Stormwater Quality Management Program Technical Guidance Manual for Stormwater Quality Control Measures. July 2002.	Reviews infiltration basin BMP methods, concerns, and goals	Potentially High	Improper maintenance could lead to other water quality issues
Infiltration Trench	California Stormwater BMP Handbook. January 2003.	Reviews infiltration trench methods of BMP methods, concerns, and goals	Potentially High	Improper maintenance could lead to other water quality issues
Infiltration Trench	Ventura Countywide Stormwater Quality Management Program Technical Guidance Manual for Stormwater Quality Control Measures. July 2002.	Reviews infiltration trench methods of BMP methods, concerns, and goals	Potentially High	Improper maintenance could lead to other water quality issues
Media Filter	California Stormwater BMP Handbook. January 2003.	Reviews media filter BMP methods, concerns, and goals	Potentially High	Improper maintenance could lead to other water quality issues
Media Filter	Ventura Countywide Stormwater Quality Management Program Technical Guidance Manual for Stormwater Quality Control Measures. July 2002.	Reviews many BMP methods and contains information specific to Southern California	Potentially High	Improper maintenance could lead to other water quality issues
Pervious Pavement	California Stormwater BMP Handbook. January 2003.	Reviews pervious pavement BMP methods, concerns, and goals	Potentially High	Improper maintenance could lead to other water quality issues
Pervious Pavement	Low Impact Development Handbook: Stormwater Management Strategies. December 2007.	Discusses LID strategies for assistance in storm water management	Potentially High	May contaminate groundwater

4.0 BMP Analysis

Based on the literature review and the findings of Phase I of the TRE, BMPs were evaluated for their applicability to the SMR. Because the toxicity appears to be principally a wet weather phenomenon, and because the Permittees' jurisdiction includes the urbanized area of the watershed, the analysis focused on BMPs designed to reduce the amount of storm water pollution caused by urban runoff.

The potentially applicable BMPs are divided into Source Control and Treatment Control BMPs and are discussed in detail below. Through the Permittee's proactive efforts to protect the quality of the receiving waters and their beneficial uses, many programs addressing these broad categories are either already in place or are actively being developed. The implementation status for each specific BMP is discussed. Examples of BMP implementation by other municipalities in the region are included as a tool for evaluating the consistency of the Permittees' program with other programs in the region.

4.1 Source Control BMPs

Source control BMPs are designed to curtail pollution at the source before it has the opportunity to enter the storm drain system and pollute waterways. They are generally the preferred type of BMP because reduction of pollution occurs at the source, before runoff has become contaminated (CASQA, 2003). The types of broad categories of source control BMPs that identified as most appropriate for the Santa Margarita watershed are: pursuing regulatory change, implementing IPM strategies including LID, and public outreach and education.

4.1.1 Regulatory Action

Status: Currently being implemented by the Permittees.

Pesticide manufacturers are required to receive approval by USEPA and California DPR for specific pesticide uses, and both agencies can impose use restrictions to prevent unwanted impacts on the environment and public health. At the federal level, a fundamental regulatory disconnect exists between pesticide approval (registration) under FIFRA and water pollution control programs under the Clean Water Act. This has resulted in a repeating pattern, in which a) pesticides are approved for use without sufficient consideration of potential environmental effects, b) water quality and other ecological impacts accrue, c) use restrictions are applied to the offending products (sometimes involving widespread bans on use), and d) new pesticides are approved for use, with subsequent environmental impacts.

In 1962 Rachel Carson published *Silent Spring*, documenting the widespread ecological consequences of pesticide applications. The federal government responded by banning the use of DDT and other organochlorine pesticides, based on extensive evidence of environmental impacts through the process of bioaccumulation. The ban has lead to dramatic recoveries in affected populations of bald eagles and other species; however, the legacy of these long-lasting pesticides near-shore dumping areas in Los Angeles County and elsewhere remains (IWS, 2007).

Eventually the organochlorine pesticides were replaced principally by organophosphate pesticides, especially in urban uses. In the mid-1990s municipal storm water monitoring programs began to document that commonly-used organophosphate pesticides, especially diazinon and chlorpyrifos, were present at toxic levels and causing toxicity to aquatic organisms, principally the common water flea, *Ceriodaphnia*. Although not bioaccumulative, diazinon and chlorpyrifos were discovered to cause widespread toxicity in urban runoff and local receiving waters (TDC, 2001). USEPA subsequently banned most urban uses of diazinon and chlorpyrifos, although EPA's main motivation involved human health effects

on the pesticide applicators, and water quality was not an important factor in those decisions. Again, the ban was also immediately effective, reflected in reduced concentrations of diazinon and chlorpyrifos in urban water samples, and fewer occurrences of organophosphate-based water column toxicity (c.f., references in Ruby, 2008 for San Diego County Municipal Copermittees Annual Urban Runoff Monitoring Reports). But pesticide manufacturers simply replaced the OP pesticides in their products with other active ingredients, principally pyrethroids. Shortly thereafter, researchers and municipal storm water programs began documenting toxic effects from the new pyrethroid products. The pyrethroid impacts were first documented in sediments, and the affected test organism shifted from *Ceriodaphnia* to the sediment-dwelling *Hyalella*.

In the cases of both organochlorine (DDT) and organophosphate (diazinon, chlorpyrifos) pesticides, federal limitations or bans on uses were effective in ameliorating the associated environmental impacts. In both cases, however, new pesticide products were approved for use that then caused related but different impacts to the environment. Therefore it is clear that the most effective strategy for preventing environmental impacts from pesticide use involves implementing an effective process of pesticide approval and registration that comprehensively accounts for and mitigates against such impacts.

For more than ten years CASQA and various other California state and local agencies have promoted better regulation of pesticides at the federal level, encouraging use restrictions as the most effective means of source control. California water quality agencies have sent comment letters to USEPA and DPR on guidance pertaining to the application of pesticides to surface waters and on recommended environmental hazard statements for residential outdoor pesticides (TDC, 2007). These efforts are beginning to show some modest signs of success. In a recent letter to stakeholders, EPA outlined an approach to provide better cooperation between the Office of Pesticide Programs (OPP) and the Office of Water (OW), to allow for “environmentally protective and scientifically defensible effects assessment judgments about contaminants that are or may be found in ambient water”. The Riverside County Permittees plan to continue their support of these efforts through ongoing

participation in the CASQA Pesticides Subcommittee, the Urban Pesticide Pollution Prevention (UP3) Project, and the Urban Pesticide Committee. The Permittees also plan to request that the RWQCB become involved in advocating for more effective pesticide regulation at the state and federal levels.

The Permittees are members of a CASQA subcommittee that addresses pesticide uses impacting stormwater discharges. Effort focuses on providing input to the USEPA and the California Department of Pesticide Regulation (DPR) to improve pesticides regulations so that they more fully protect water quality and are better aligned with the Clean Water Act and California Water Code. (RCFCWCD, 2008). CASQA has also been active in supporting DPR's ongoing reevaluation of allowable pyrethroid pesticide uses (TDC, 2007).

Increasingly, the regulatory response to the water quality impacts resulting from *legal uses of approved pesticides* has been for regional water boards to impose limitations on the allowable loadings of pesticides to impaired waters through the TMDL process. Local agencies have little or no jurisdiction over sales or use of these pesticide products, and therefore do not have the full authority needed to perform loading reductions in resulting TMDLs. An effective regulatory solution must occur at the state and federal levels, to regulate allowable pesticide uses to effectively prevent such water quality impacts.

Current legislation requires users of certain pesticides to be trained, often certified, in the use of those pesticides and to report the amounts applied (State of California, 2008). A similar regulatory approach could be used to promote pesticide alternatives, such as for PCOs to train and certify their technicians in the use of IPM methods (Quarles, 2002). The Permittees are considering supporting regulatory action by the state to include IPM training for PCOs in the requirements for certification and training on the use of pesticides.

Environmentally sensitive and flexible zoning ordinances may be adopted to facilitate the use of LID principles, thereby encouraging private developers to use LID principles (Prince Georges County, 1999). Additional land use restrictions or alternatives to present zoning

laws may help reduce urban storm water runoff, potentially reducing pyrethroid loadings in receiving waters. The Permittees plan to continue promoting LID implementation through interagency communications and cooperation.

4.1.2 Integrated Pest Management

Status: Currently being implemented by the Permittees.

IPM is "a decision-making process for managing pests that uses monitoring to determine pest injury levels, and combines biological, cultural, mechanical, physical, and chemical tools and other management practices to control pests in a safe, cost effective, and environmentally sound manner that contributes to the protection of public health" (Carlsen, 2008). IPM can further be described as an approach to solving pest problems by using information about the pest and landscape to eradicate the pest's habitat in a manner that poses the least risk to humans (Ecology Action, 2007). IPM has many different aspects that help to reduce pests and in turn cause a reduction in pesticide use, including green gardening and structurally integrated pest management (SIPM). BMPs that are typically used as part of an IPM strategy are described in the following sub-sections.

4.1.2.1 Green Gardening

Status: Not currently being implemented by the Permittees, program under consideration and will be enacted in the near future.

The Green Gardener program, implemented through landscapers, promotes environmentally responsible landscaping to reduce the use and need for pesticides. In general, education of gardening and landscape maintenance staff is beneficial for pest reduction as part of an IPM program. It provides alternative methods to landscapers, such as reducing outdoor sources of ants by elimination of their food and water sources through management of honeydew producing insects and plants associated with them (UC Davis, 2007). The Green Gardener

program encourages businesses to participate in environmentally sound landscape maintenance. Healthy landscapes are more resistant to pests (Ecology Action, 2007). Pests that do not have a suitable habitat will leave to find a more hospitable environment. When the pests leave, then there is a lessened need for pesticide applications and lower risk of pyrethroids entering storm water.

The County of Santa Barbara implemented a Green Gardener Program, in which landscapers are encouraged to take a class at the local city college, covering subjects such as IPM strategies and environmentally beneficial landscaping to obtain a "Green Gardener" card. They are then placed on the Green Gardener list, which is then promoted to the public by the County (County of Santa Barbara, 2008). The program benefits both parties; gardeners receive education and advertising at a nominal cost, and the County receives the benefit of more environmentally-friendly landscaping and a reduction in the use of pesticides. Municipalities may promote this type of program by contracting with landscaping companies that have their employees trained in green gardening practices.

Encouraged by the success of the Santa Barbara Green Gardener Program, the Monterey Bay area instituted a similar program. "The goal of the program was to educate and certify local gardeners in resource efficient and pollution prevention landscape management practices" (Ecology Action, 2007). With the support of the State of California Water Resources Control Board, more municipalities are likely to follow (Ecology Action, 2007).

4.1.2.2 Pest Control Contracting

Status: Currently partially implemented by the Permittees.

Many municipalities contract pesticide applications to professional PCOs. Contracting only with PCOs that have IPM training and certification can help realize IPM models and goals. The recently completed EcoWise Certified IPM Contracting Tool Kit (www.EcoWiseCertified.org), provides resources for municipal agencies to use in developing such a program. The EcoWise IPM Tool Kit includes:

- Elements to consider when developing an IPM policy
- Roles and responsibilities of the agency or business in an IPM program
- How to hire and work with a professional IPM service provider

The Took Kit also includes the EcoWise IPM Process along with a number of other helpful resources and sample documents.

Because PCOs are responsible for the majority of pesticides applied in urban areas, distribution of information regarding less-toxic alternatives, lower-use application techniques, and proper disposal, practices to professional applicators is an essential component of the Permitee's pesticide control effort. The Permittees currently distribute information to PCOs through the Public Outreach and Education Program (see Section 4.1.3).

The City of Palo Alto's Regional Water Quality Control Plant includes IPM requirements in their contracts with PCOs (City of Palo Alto, 2008). The City of Santa Monica, as a part of their SIPM program, specified IPM requirements in their PCO contracts (Raphael, 1997). Use of PCOs with IPM training and certification by municipalities encourages local PCOs to invest in IPM training and certification, which in turn, allows their expertise in IPM to expand beyond just the municipality itself (Quarles, 2002). Education of PCOs, hiring only PCOs that have IPM training, and contracting specifically for IPM by local agencies may

create more public awareness and reduce the use of pyrethroids in the Santa Margarita watershed.

4.1.2.3 Structurally Integrated Pest Management Program

Status: Currently being implemented by the Permittees, with additional programs under consideration.

SIPM is a program that controls the access of pests to buildings and the potential food sources within them by protecting the structure itself from pests, with minimal use of pesticides. The Permittees intend to lead by example, sharing success through public outreach programs and encouraging individuals and businesses to do the same. SIPM is a long term solution offering positive potential impacts on budget, reduction of pests and, reduction of pyrethroid pesticide use. Note that SIPM should not be confused with category of pesticide use referred to as structural pest control. SIPM is a BMP designed to reduce the use of pesticides in a structural pest control program.

The City of Santa Monica implemented an SIPM program and experienced a reduction in pests and in the use of pesticides. In addition, Santa Monica reduced pest management costs by 30% (State of California, 2008). California law requires a SIPM strategy for all state-owned buildings and schools (State of California, 2008). The three main aspects of a SIPM strategy are facility design and LID, monitoring, and facility maintenance.

<u>Facility Design</u>

Status: Currently being implemented by the Permittees.

Facility design can play a large role in the exclusion of potential pests. "A facility's planning, design, and construction provides an opportunity to incorporate features that help to exclude pests, minimize pest habitat, and promote proper sanitation" (NIH, 1999). It can also reduce

storm water runoff (NAHB, 2008). Exclusion of pests helps reduce pest infestations and in turn the need for pyrethroid pesticide use. For example, ensuring that the design holds plants and mulch several inches away from the foundation of a building may assist the reduction of ant populations immediately adjacent to the building (UC Davis, 2007). A reduction in storm water runoff may also reduce the amount of pyrethroids that enter receiving waters. Facility designs can incorporate aspects of LID, as discussed below. New development and redevelopment may incorporate designs that aid in the exclusion of pests and the reduction of urban runoff, which may contribute to a reduction of pollutant loads, including pyrethroids.

Pest Monitoring

Status: Currently in not use by the Permittees, program under consideration.

Monitoring structures and adjacent areas may help prevent pest infestations and quickly identify potential problems. Traps, visual inspections, and staff interviews assist in the identification of areas and conditions that may foster pest activity (NIH, 1999). Monitoring for ants, for example, may consist of simple inspections of facilities such as looking under sinks and along pipes and electrical wires (UC Davis, 2007). The City of Santa Monica, as a part of their SIPM, provided training to all general staff, purchasing, carpenters and custodial staff. Specific presentations were given to groups, such as the custodial staff, who learned about products used in control of ant and cockroach populations and general sanitation. The staff is trained in the identification of potential pest infestations and habitat conditions that may foster pest activity (Raphael, 1997). Early identification of pest infestations can increase the effectiveness of specific treatments and reduce the overall need for pesticide use.

Sanitation and Facility Maintenance

Status: Currently not being implemented by the Permittees, program under consideration.

Proper sanitation includes reducing clutter and pest habitat and incorporating proper facility and waste management practices. Records of maintenance and housekeeping conditions may help track pest problems and assist in the determination of whether corrective action is needed or has been taken in a timely manner (NIH, 1999). Sanitation and facility maintenance involves the housekeeping staff, the building maintenance staff, and the landscaping staff.

Improper storage of waste may affect urban runoff, and it may create a hospitable environment for pests, particularly ants. Initial, low-cost steps that municipalities may take to improve waste handling are: controlling litter, keeping waste collection areas clean, and insuring proper disposal of pyrethroid pesticide products, if used, and educating employees and the public. Simple solutions such as rinsing out soda bottles and emptying trash daily prove effective to reduce insect infestations, particularly ants (UC Davis, 2007). An important component of an SIPM monitoring program is regular inspections of solid waste containers for structural damage or leaks (CASQA, 2004).

Educating custodial staff, such as was done in the City of Santa Monica, can reduce the amount of improperly disposed pesticides (Raphael, 1997). Designating staff members to perform a daily checklist of areas around the structure to ensure cleanliness and proper storage of waste can assist the efforts to reduce potential pest infestations and leakage of hazardous waste (CASQA, 2004).

Building maintenance staff also benefit from education and acceptance of responsibility for pest management. Maintenance crews can contribute to an SIPM strategy by securing the structure, such as caulking holes and cracks, assisting in the removal of clutter, and installing

door sweeps (State of California, 2008). Caulking holes in structures can prove effective in keeping ants out of facilities (UC Davis, 2007). Upkeep on building maintenance helps reduce potential pest habitat, and thus may reduce the need for application of pyrethroid pesticides.

Reduction of pest habitat around structures may reduce pest populations in and around structures. Marin County, as part of its integrated pest management program, has reduced rat habitat around the local Civic Center and in turn has seen suppression of the rat population (Carlsen, 2008). Programs similarly tailored to ants may result in a positive effect of pest reduction within the SMR. For example, banding tree trunks with tanglefoot or similar sticky substances can keep ants away from trees (UC Davis, 2007). Education and training may be provided to Permittee landscaping crews to assist in proper vegetation removal and, when necessary, pesticide use. Landscaping crews may be informed that pyrethroid pesticides or any less toxic pesticides are to be used only when a pest problem arises to an intolerable level, that they are not administered when a wet weather event is expected and only when low wind speeds are present (CASQA, 2004). Education of landscaping crews to remove pest habitat may reduce the need for pyrethroid use thus reducing the potential risk of pyrethroids entering storm water runoff.

Also, utilizing low water using vegetation and alternative landscaping techniques such as xeriscaping or naturescaping are efforts that landscape crews can take to reduce pyrethroids in urban runoff. Landscaping crews may also help preserve the water efficiency of the landscape through properly timed fertilizing, weeding, pruning, and pest control. For example, proper collection and disposal of yard clippings can prevent loose vegetation that has possibly been treated with pyrethroid pesticides from entering waterways or storm water drainage systems such as MS4s (CASQA, 2004). Reduction in pest habitat and proper landscaping maintenance may help reduce pest problems, and thus the need for pyrethroid pesticides.

4.1.3 Public Outreach and Education

Status: Currently being implemented by the Permittees.

Public Outreach and Education programs inform the public about storm water issues, proper use and disposal of publically available chemicals, and alternatives to pyrethroid pesticides. Reaching out to the public and providing information about the dangers of pyrethroids pesticides encourages citizens to make educated decisions about pesticide use. It also may accelerate state and federal regulatory changes regarding pyrethroid use through public promotion of such changes. According to the EPA, public education and awareness can be a "key component" in any BMP program for storm water management (EPA, 2008).

The District has enacted a public outreach program to help reduce the potential for pyrethroid pesticides to contaminate receiving waters. This program has initiated: distribution of educational materials to hardware store employees, active participation and distribution of outreach for HHW/ABOP facilities to provide for free venues to dispose of excess pesticides, and distribution of EPA and CalEPA materials to the public. The District also promotes the use of less toxic pesticides, provides education on storm water issues in public schools, and has enacted a multimedia campaign to control urban sources of pyrethroid pesticides (RCFCWCD, 2005).

<u>Education and Outreach to Businesses</u>

Status: Currently being implemented by the Permittees.

Distribution of information regarding pesticides to businesses, particularly hardware stores, is crucial for reducing pyrethroid use and misuse at its source. Education on pyrethroid runoff to local hardware stores may assist local hardware store employees to educate their customers on alternative methods of pest control. An Orange County survey from 2001 found that 55% of pest control products were purchased at hardware stores (Wilen, 2001). In

2006, Riverside County had 177,562 pounds of reported non-agricultural usage of pyrethroid pesticides (RCFCWCD, 2008). Reduction in usage may lead to a reduction of pyrethroids in urban storm water runoff. Educating hardware store employees about urban water quality impacts of pyrethroid pesticides may help reduce the usage and thus the toxicity of runoff in the Santa Margarita Watershed resulting from pyrethroid use, as employees have the ability to recommend alternative methods of pest management to their customers.

Education of nursery employees about pyrethroid management and IPM techniques may also yield significant source control benefits. In general, nursery employees tend to be more knowledgeable about pesticides than employees at hardware stores (Wilen, 2001). Nurseries that use and sell pyrethroids offer the highest return on outreach resources, while those nurseries that have chosen alternate pest management methods serve as examples of IPM in practice. In a recent Riverside County survey, one nursery stated that they do not use pesticides and if their nursery does experience a pest infestation, it is treated naturally (RCFCWCD, 2008). Such nurseries are likely to encourage their clients and customers to use the same methods. Education and outreach can lead to cooperation and sharing of successful and unsuccessful methods of IPM and ultimately reduce pyrethroid pesticide use and toxicity of storm water runoff.

Businesses not in the industry of pesticide sales may also benefit from outreach. The District directs outreach efforts to all businesses; those in the business of selling or using pesticides, and those that are not. The District has coordinated with the County's Business License Department to include an educational insert of the "Only Rain Down the Storm Drain" program to new business license applicants and annual renewal reminders (CRWQCBSD, 2008). Informing companies on proper disposal of hazardous materials such as pesticides is crucial to prevent pyrethroid containers from being improperly disposed of, leaking, and then contributing to storm water pollution.

Several Southern California cities conduct general business outreach as well. Cities such as Carson, Gardena, Inglewood, and Lomita distribute informational pamphlets on storm water

pollution relating to landscaping and gardening practices to general businesses (DCWMAC, 2007). Such information informs businesses of alternate methods of pest control beyond pesticide use and imparts knowledge about storm water quality issues. Thus, dissemination of educational materials to local businesses is intended to help reduce pyrethroid runoff by ensuring proper disposal of pesticides and encouraging alternate methods of pest control.

Educational and Outreach to the General Public

Status: Currently being implemented by the Permittees.

The District distributes educational materials within the Santa Margarita Region such as EPA sponsored pamphlets in order to promote reduced use of pyrethroid pesticides and educate the public about alternate practices of pest management. The public purchases retail pesticides and uses them, presumably, according to the manufacturer's instructions and in compliance with regulations listed on the packaging, including proper disposal of empty containers in the municipal waste stream. However, even when used properly, retail pesticides have the potential to contaminate urban runoff, and homeowners may be unaware of the downstream consequences of pesticide use. Depending on the landscaping practices in a neighborhood, promoting alternative pest management strategies and educating the public on storm water quality and pesticide use may be the most beneficial way to reduce the source of pyrethroids in urban runoff (Wilen, 2005).

The District distributes educational materials within other public outreach programs and maintains pest management information on the internet. The District also distributes brochures to educate the public on lawn and garden maintenance, fertilization, and pesticide and household chemical use (RCFCWCD, 2005). These educational materials provide public education on alternative pest control methods, limiting individual use of pyrethroids, and proper disposal of pesticide containers.

Many municipalities perform storm water outreach at festivals and public events by participating in the events and by distributing brochures. The Cities of Lawndale and Torrance plan and attend public festivals and rent booth space to educate the public about storm water quality and the use of pyrethroids (DCWMAC, 2007). Cities including Carson, Gardena, Inglewood, and Lomita distribute informational pamphlets on storm water pollution relating to household activities and landscaping and gardening practices to the general public (DCWMAC, 2007). The District participates in events such as the Children's Groundwater Festival, the Southern California Fair, the Community Water Festival, and the Santa Margarita Watershed Clean Up (RCFCWCD, 2005). The Permittees, as well as other municipalities within California, participate in public events and distribute informative materials as a portion of their current public outreach programs.

Education on proper disposal of pesticides

Status: Currently being implemented by the Permittees.

Improper disposal of pesticides is a potential contributor to storm water contamination. Empty containers be disposed of in the municipal waste stream are not likely to contribute to storm water pollution, however, unused pesticides may enter the MS4 by leaking in transit. In Orange County in 2001, 54.5% of people surveyed claimed to have disposed of unwanted pesticides in the municipal waste stream, and 78.6% did not know the location of a household waste disposal site (Wilen, 2001). The District has created a partnership with Riverside County Waste Management to provide educational programs and materials on proper disposal of unwanted waste, including pesticide containers (RCFCWCD, 2005).

Multimedia Outreach

Status: *Currently being implemented by the Permittees.*

The EPA suggests using multiple media sources to promote and educate on storm water impacts, particularly through public service messages (EPA, 2007). Mass media has proven to be a key source of pollution prevention information for the general public (LADPW, 2002). The District currently participates in a multimedia advertising campaign including: maintaining a website that provides information, distributing mailing inserts regarding water quality issues through various county entities, and billboard advertising campaigns. Many other municipalities, such as the Cities of Palo Alto and Lawndale, also use the world wide web to provide information to the public (City of Palo Alto, 2008) (DCWMAC, 2007).

Public School Programs

Status: *Currently being implemented by the Permittees.*

A storm water education program for public schools is a concept supported by the EPA (EPA, 2007). The County of Los Angeles has incorporated public school educational programs into its outreach program (LADPW, 2002). The District focuses storm water education efforts on elementary school students (RCFCWCD, 2005). For example, sixth-grade students at Warm Springs Middle School were given an interactive presentation regarding storm water pollution with an enviroscape model that excited and engaged the students; a presentation that has been given over 150 times during the 2003-2004 school year (Jamescourie, 2004). Educational programs in public schools are intended to produce long-term benefits to storm water runoff quality.

Education on Lower Risk Alternative Pesticides

Status: Currently being implemented by the Permittees.

Part of Public outreach includes suggesting less toxic alternatives to pyrethroid pesticides, such as those listed on the Our Water Our World website (www.ourwaterourworld.org). Lower risk pesticides have reduced impacts on human health, lessened toxicity to non-target organisms, decreased potential for water contamination, and lower pest resistance potential (Matteson et al., 2007). The District distributes materials associated with the "Our Water Our World" organization (RCFCWCD, 2008).

However, some of the lower risk pesticides are toxic to beneficial arthropods and still have the potential to pollute surface and ground water (Matteson et al., 2007). Pyrethroids were developed as a less toxic alternative from organophosphate pesticides (Quarles, 2002). In the Santa Margarita Watershed, there was a decrease in water toxicity to *Ceriodaphnia* and an increase in toxicity to *Hyalella* as organophosphate pesticides such as chlorpyrifos and diazinon and were replaced by pyrethroids (RCFCWCD, 2008). The effects on storm water runoff of lower risk pesticides must be carefully evaluated before they are promoted as effective solutions to urban storm water runoff pollution.

4.1.4 Low Impact Development (LID)

Status: Currently being implemented by the Permittees.

LID involves environmentally-friendly building and development designs that mitigate impacts to land and water. LID functions by managing storm water at its source, incorporating a variety of runoff control techniques, using natural features as design features, and protecting natural resources (NAHB, 2008). Municipalities that promote LID have the potential to reduce municipal infrastructure and maintenance costs while balancing growth needs with environmental protection (NAHB, 2008). LID practices include "small scale,

decentralized treatment practices" that include conservation of open space, a reduction of impervious surfaces, and the incorporation of water controls (NAHB, 2008). Reduction of urban runoff volumes may reduce the loadings of pyrethroids to receiving waters in urban areas.

In 2007, EPA implemented a retrofit of the agency headquarters in Washington, D.C., incorporating LID designs to assist with storm water retention (EPA, 2007). Retention of storm water on the land helps prevent pollutants from entering streams and rivers (EPA, 2007). One of the main goals of the EPA LID retrofit was to demonstrate several LID techniques and encourage government agencies and developers to use them (EPA, 2007). LID may be used in conjunction with IPM programs, which would reduce the amount of pesticides used and minimize the urban storm water runoff of pyrethroids. The County of San Diego's most recent MS4 permit requires implementation of LID techniques (County of San Diego, 2007); this appears likely to continue as a trend with other permits in the region as they are renewed. The incorporation of LID principles into development regulations in the Santa Margarita watershed provides a potential solution to runoff of pyrethroids into receiving waters.

4.2 Treatment Control BMPs

Treatment Control BMPs are typically structural devices engineered with the intent to remove pollutants from storm water. Treatment BMPs require construction and long term maintenance, but can be extremely effective (CASQA, 2003). Although treatment BMP's have not been thoroughly investigated specifically for reduction of pyrethroids, some methods may be useful. Pyrethroids bind tightly to soil particles so there is a high probability that pyrethroids would be removed with suspended solids when they pass through treatment BMPs. In addition, pyrethroids degrade over time; permethrin, for example, has a half life in soil of about 30 days and about 10 days on certain plant life. Because pyrethroids have low mobility in soil, infiltration-based treatment BMPs have a low probability of contributing to groundwater contamination (NPTN, 1997).

From the list of available treatment BMP's identified in Table 3-1, the types of treatment BMPs feasible for pyrethroid treatment in the Santa Margarita Watershed, considering the climate, local vegetation, and soil types present are: pervious pavement, media filters, extended detention basins, infiltration basins, and infiltration trenches.

These BMPs and their potential to remove pyrethroids from storm water runoff are described below.

4.2.1 Pervious Pavement

Status: Currently being implemented by Permittees under LID program.

Pervious or porous pavement is "a system comprising a load-bearing, durable surface together with an underlying layered structure that temporarily stores water prior to infiltration or drainage to a controlled outlet" (CASQA, 2003). Pervious surfaces include grass, gravel, and porous concrete and asphalt (CASQA, 2003). The multi layer system assists in preventing pyrethroid pollution by providing a stable structure for pyrethroids to bind to and degrade, thus helping to prevent their transport in to receiving waters. Silts that are deposited within the pavement may need infrequent controlled waste disposal (CASQA, 2003).

The advantage of porous pavement is that urban runoff is reduced while treatment is provided and it is an effective drainage solution in confined urban areas. However, porous pavement is not a viable option on high traffic or high speed roads due to safety issues. There is a small chance that it may contaminate groundwater. It is fairly easy to replace, should there be a clog or damaged area, as small areas can individually be paved (CASQA, 2003). The use of pervious pavement appears to be a growing trend.

4.2.2 Media Filter

Status: Currently being implemented by Permittees via sand filters.

Storm water media filters are usually two-chambered including a pretreatment settling basin and a filter bed filled with sand or other absorptive filtering media. As storm water flows into the first chamber, large particles settle out, and then finer particles and other pollutants are removed as storm water flows through the filtering media in the second chamber. Media filters are highly effective at removing sediment from storm water flows (CASQA, 2003). They are appropriate in low flow areas, particularly with sandy soil. Washington D.C. and Austin, TX have both successfully implemented media filters to treat storm water (VCSQMP, 2002). They "are well suited to Southern California because they do not require vegetation and require less space than other treatment control measures with similar removal efficiencies when a partial treatment sedimentation basin is used" (VCSQMP, 2002).

However, media filters clog easily when exposed to high sediment loads and may decrease in effectiveness after being in use for a few years (CASQA, 2003). A media filter is not appropriate for areas with erosive soil upstream from the treatment filter (VCSQMP, 2002). The lack of abundant native vegetation in the Santa Margarita watershed contributes to a high potential for erosion, so media filters may not be effective in the long term due to clogging. When clogging does occur, media filters may become a nuisance due to mosquito or midge breeding in pooled waters (CASQA, 2003).

4.2.3 Extended Detention Basin

Status: Currently not being implemented by the Permittees for pyrethroid reduction.

An extended detention basin (EDB) is a permanent basin "formed by excavation and/or construction of embankments to temporarily detain the Stormwater Quality Design Volume

(SQDV) of storm water runoff to allow sedimentation of particulates to occur before the runoff is discharged"(VCSQMP, 2002). EDBs are constructed with an outlet at the bottom that allows for a slow, time-controlled release. The ultimate goal of EDBs is to level off peak storm water runoff rates (VCSQMP, 2002). Santa Clara Valley and the City of Palo Alto have noted that their detention basins have helped with the reduction of pollutants (EOA, 2004) (City of Palo Alto, 2008). Pyrethroids could be removed in the basin through settling of particulates.

Extended detention basins can serve multiple purposes as they provide for significant trash removal as well (CASQA, 2003). Maintenance is needed to ensure that the pond fully drains after large wet weather events, to avoid creation of standing pools causing mosquito or other vector habitats (CASQA, 2003). Extended detention basins are most effective when used in conjunction with other control measures, and are only moderately successful at removal of sediment. EDBs require relatively large amounts of land and therefore may not be feasible in urban areas of the Santa Margarita watershed (VCSQMP, 2002). There are no available examples of test results from municipalities using an extended detention basin for reduction of pyrethroid pesticides.

4.2.4 Infiltration Basin

Status: Currently not being implemented by the Permittees for pyrethroid reduction.

An infiltration basin is a shallow impoundment that is designed to infiltrate storm water and utilize the natural ability of soil to remove pollutants in storm water runoff (CASQA, 2003). Infiltration basins store runoff until it eventually enters the soil and infiltrates into the water table (CASQA, 2003). The soil present in the Santa Margarita Region is extremely pervious and may work well with an infiltration basin treatment structure.

Since pyrethroids adsorb onto soil, pyrethroids are likely to be removed from the storm water into the soil. However, there is a slight possibility that they may be resuspended into the

groundwater. Monitoring of pilot sites would be required to determine if there is transport of pyrethroids to the water table.

As with detention basins, maintenance is needed to ensure that the basin fully drains after large wet weather events to avoid creation of standing pools causing mosquito or other vector habitats. Infiltration basins may fail if the storm water volume is greater than the design volume (VCSQMP, 2002). Since infiltration basins require a large amount of open space, installation in urban areas is problematic. There are no available examples of test results from municipalities using infiltration basins for reduction of pyrethroid pesticides.

4.2.5 Infiltration Trench

Status: Currently not being implemented by the Permittees for pyrethroid reduction.

An infiltration trench is a long and narrow ditch that collects storm water runoff by storing it in the voids in a rock bed and allowing it to infiltrate to the soil matrix (CASQA, 2003). Infiltration trenches are extremely effective at removing fine sediment particles and associated pollutants (CASQA, 2003). Naturally pervious soils are required (VCSQMP, 2002). The Santa Margarita watershed has naturally pervious soils, which would allow for the removal of pyrethroids from the water and into the sandy soil.

Infiltration trenches are typically used in conjunction with grass lined channels or grass filter areas located upstream for maximum removal of sediment and larger particles (VCSQMP, 2002). Due to the arid environment in the Santa Margarita Region, grass lined channels, or even vegetated strips, would require irrigation to maintain the vegetation. If the infiltration trench clogs, it can become a source for mosquito breeding. There are no available examples of test results from municipalities using infiltration trenches for reduction of pyrethroid pesticides.

4.3 BMP Evaluation

A summary of the relative advantages, disadvantages and costs of the various BMPs identified in Sections 4.1 and 4.2 above is presented in Table 6.1 below. The table includes advantages, disadvantages, and the relative cost of implementing the BMPs.

Table 6.1
BMP Comparison Table

BMP Technology	Advantages	Disadvantages	Relative Cost*
Source Control			
Regulatory Change	Reduces the availability of pyrethroids on the market	May take years to achieve full effect	$
Integrated Pest Management	Engages businesses and the public in environmentally sound gardening practices	Need to ensure that employees are following protocols	$
	Has been implemented in various locations throughout CA and the US	Could have some resistance from employees who are use to standard practices	
	SIPM can be put in place directly by the Permittees	Some may find the organic methods of gardening to be too time consuming	
	SIPM can be incorporated directly into current maintenance activities		
	Includes LID aspects		
Public Outreach and Education	EPA states that Public Outreach is key for any BMP program	Cannot control the direct actions of public but only educate	$
	Copermittees have already implemented a public outreach program	Hard to measure the direct impact of pollutant reduction	
	Employees of business have direct impact on the buying choices of the general public		
	Programs have been implemented by many municipalities		

Table 6.1 (continued)
BMP Comparison Table

BMP Technology	Advantages	Disadvantages	Relative Cost*
Treatment Control			
Porous Pavement	Reduces runoff volume while reducing pollutant load as well	Requires ongoing minimal maintenance	$ to $$ depending on size
	Can be easily replaced depending on the size and location of design	No known measured reduction of pyrethroids.	
Media Filter	Do not require vegetation	No known measured reduction of pyrethroids.	$$$
	Highly effective in removal of sediments	Clogging is an issue because of the erosion potential in the watershed.	
	Requires less space than other treatment controls for sediment removal		
Extended Detention Basin	Known for significant trash	Large footprint Moderately successful at removing sediment	$$$
	Standard BMP with many years of maintenance and operational information available	Create an area with vector breeding potential	
		No known measured reduction of pyrethroids.	
Infiltration Basin and Trench	Uses natural ability of soil to remove pollutants.	Unknown if pyrethroids would be transported to the groundwater table.	$ to $$$
	Local soils would allow infiltration	Would require a pilot study to determine transport.	
		No known measured reduction of pyrethroids.	
		Clogging of outlet structure	
		Accumulation of metals in soil	

*Relative Cost: $ = $0 to $50,000, $$ = $50,001 to $100,000, $$$>100,000

5.0 Pending Legislation

There is no relevant pending state legislation relating to pyrethroid pesticides from the California Department of Pesticide Regulation or, in general, the State of California as of December, 2008 (State of California, 2008) (CDPR, 2008). In August 2006, the DPR put rules in place to control insecticide sprays during the dormant season. During winter, pesticides are applied to dormant tree and vine crops to kill overwintering pests and diseases. The new rules restrict the use of most dormant insecticides when residuals can run off into water (DPR 2007-08 Progress Report). However, there are no additional updates relating to pending pyrethroid legislation at this time.

There is no relevant pending federal legislation relating to pyrethroid pesticides from the United States Congress as of December, 2008 (Library of Congress, 2008). Although the EPA is working on proposed mitigation labeling for non-agricultural pyrethroids, there is no indication as to when this legislation may be enacted (TDC, 2007).

6.0 Proposed Course of Action

The Permittees intend to use a phased approach to address the identified sources of pyrethroid pesticides causing toxicity in surface waters of the SMR watershed. As described in Section 4, various source control BMPs and treatment control BMPs are available to address these sources. However, the use of pyrethroid pesticides can not be directly regulated by local governments. The most effective control strategy involves effective labeling and use restrictions via state or federal regulatory action, to prevent water quality impacts from legal pesticide uses. The proposed course of action involves an adaptive management approach with the following broad elements:

- Pursue state and federal regulatory change through CASQA
- Implement a set of source controls targeted specifically at urban pesticide use,
- Through the annual reporting process, monitor the implementation of those controls, assess effectiveness, and identify sources or areas where additional effort is needed,
- Evaluate whether additional controls, including treatment controls, may be needed to further reduce pyrethroid pollution,
- Implement additional controls as needed,
- Continue to monitor implementation, as well as conditions within the target receiving waters, assess effectiveness, and re-evaluate control program

The Permittees will continue to support CASQA and/or other agencies pursuing regulatory change in labeling or use limitations for pyrethroid pesticides. This support will include participation in the CASQA Pesticides Subcommittee and the Urban Pesticide Committee, and supporting the implementation of the Urban Pesticide Pollution Prevention (UP3) Project. Permittee staff will continue to provide staff time and resources necessary for the CASQA Pesticides Subcommittee to complete its negotiations with the California Department of Pesticide Regulation and USEPA regarding labeling and use limitations for pyrethroids.

Source control is generally a more cost-effective approach to pollution abatement than treatment control, as source controls do not involve the costly capital investments of treatment controls. As discussed previously, CASQA, EPA, and other agencies and experts

recommend a source control program as an essential component of a successful pollution reduction strategy.

The basis of source control involves preventing the entrance of the subject pollutant into the discharge stream. For pyrethroid pesticides, this means preventing the pesticide from entering the municipal storm drain system through urban runoff. This can take place by intervention at the various steps in the pest control process:

- Point of sale: reducing the purchase of pyrethroid products through education of PCOs and the public in consequences of pesticide use and alternative means of pest control, including integrated pest management (IPM)
- Application: reducing use of pyrethroids on site through education of PCOs and the public into the importance of proper application methods and the potential consequences of pesticide use, as well as pest control alternatives (IPM techniques)
- Off-site Transport: reducing movement of pyrethroids into municipal storm drain system via use of Green Gardener approaches, IPM, and LID building techniques to reduce irrigation water use, retain storm water runoff on-site, and provide on-site mitigation for runoff pollutants (via grassy swales, infiltration, etc.)

A five-year pyrethroid pollutant reduction program is proposed by the Permittees.

<u>Year 1</u>

- Continue to support state and federal efforts to improve pyrethroid pesticide regulation
- Continue to publicize/promote the services of IPM-certified PCOs, to encourage businesses and homeowners to choose their services
- Continue to implement local agency contracting rules to require contracting of IPM-certified PCOs for municipal pest control (through EcoWise Certified IPM Contracting Tool Kit, e.g.)
- Continue point-of-sale education effort providing instruction in pesticide alternatives and proper use/application (using materials available through Our Water Our World, UP3 Project, CASQA members, e.g.)
- Continue efforts to develop and implement LID guidance for planning and development

Year 2

- Coordinate with the University of California (UC) Extension Master Gardener Program to extend its services to the Temecula/Murrieta area to further promote and support the use of IPM by local residents
- Re-evaluate, enhance as needed, and continue measures implemented in Year 1

Year 3

- Conduct programmatic assessment as part of third-year annual report, evaluate successes and areas where additional efforts are needed and adjust program accordingly
- Re-evaluate, enhance as needed, and continue measures implemented in Years 1 and 2

Year 4

- Evaluate effectiveness of BMPs using water quality monitoring data as part of fourth year annual report
- Re-evaluate, enhance as needed, and continue implementation of revised program as defined in Year 3

Year 5

- Conduct programmatic assessment, evaluate successes and areas where additional efforts are needed as part of ROWD process
- Identify additional program elements, including source and/or treatment controls, as needed to effect required pollutant reductions; revise program accordingly
- Re-evaluate, enhance as needed, and continue implementation of revised program as defined in Year 3

Many of the source control materials and programs needed are readily available through existing programs such as EcoWise Certified, Green Gardener, Our Water Our World, the UP3 Project, and the Western IPM Center. The following websites provide further information on these and other programs:

Urban Pesticide Pollution Prevention (UP3) Project: www.up3project.org
Green Gardener Program: www.green-gardener.org/about
Western Integrated Pest Management Center: www.wripmc.org
EcoWise Certified Integrated Pest Management: www.ecowisecertified.com
Our Water Our World: www.ourwaterourworld.org
Green California: www.green.ca.gov/EPP/building/structipm.htm

City of San Francisco: http://www.sfenvironment.org/our_programs/topics.html?ti=1
DPR: http://www.cdpr.ca.gov/docs/registration/reevaluation/chemicals/pyrethroids.htm

As a practical measure, it will be necessary to evaluate individual Permittee capabilities and resources, and develop a specific work plan for implementation of the pyrethroid pollutant reduction program.

It is also essential to develop and implement the pyrethroid pollutant reduction program in coordination with other regulatory requirements, especially other pollutant reduction programs mandated under the storm water NPDES Permit and/or load allocations required by TMDLs within the SMR watershed.

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2009 REPORT OF WASTE DISCHARGE

CERTIFICATION

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Signed _____

Warren D. Williams
General Manager - Chief Engineer
Riverside County Flood Control
and Water Conservation District

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Signed: Gary M. Christmas Date: 1/8/09

Gary M. Christmas
Chief Deputy County Executive Officer
Riverside County Executive Office

2009 REPORT OF WASTE DISCHARGE

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CITY
OF
MENIFEE

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Signed: _____
George A. Wentz, City Manager
City of Menifee

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RIVERSIDE COUNTY FLOOD CONTROL & WATER CONSERVATION DISTRICT

CERTIFICATION STATEMENT

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Patrick A. Thomas

Signature

Mr. Patrick A. Thomas / Director of Public Works

Name & Title

January 8, 2009

Date

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Signed: _____

Bill Hughes
Director of Public Works
City of Temecula

CITY COUNCIL MEMBERS

BOB CASHMAN
BRIDGETTE MOORE
MARSHA SWANSON
SCOTT FARNAM
SHERYL ADE

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Signed: _____
John Danielson, City Manager
City of Wildomar

23873 Clinton Keith Road | Suite 201 | Wildomar, CA 92595 | 951.677.7751 PHONE | 951.698.1463 FAX
www.cityofwildomar.org

SANTA MARGARITA WATERSHED

COUNTY OF RIVERSIDE, CALIFORNIA

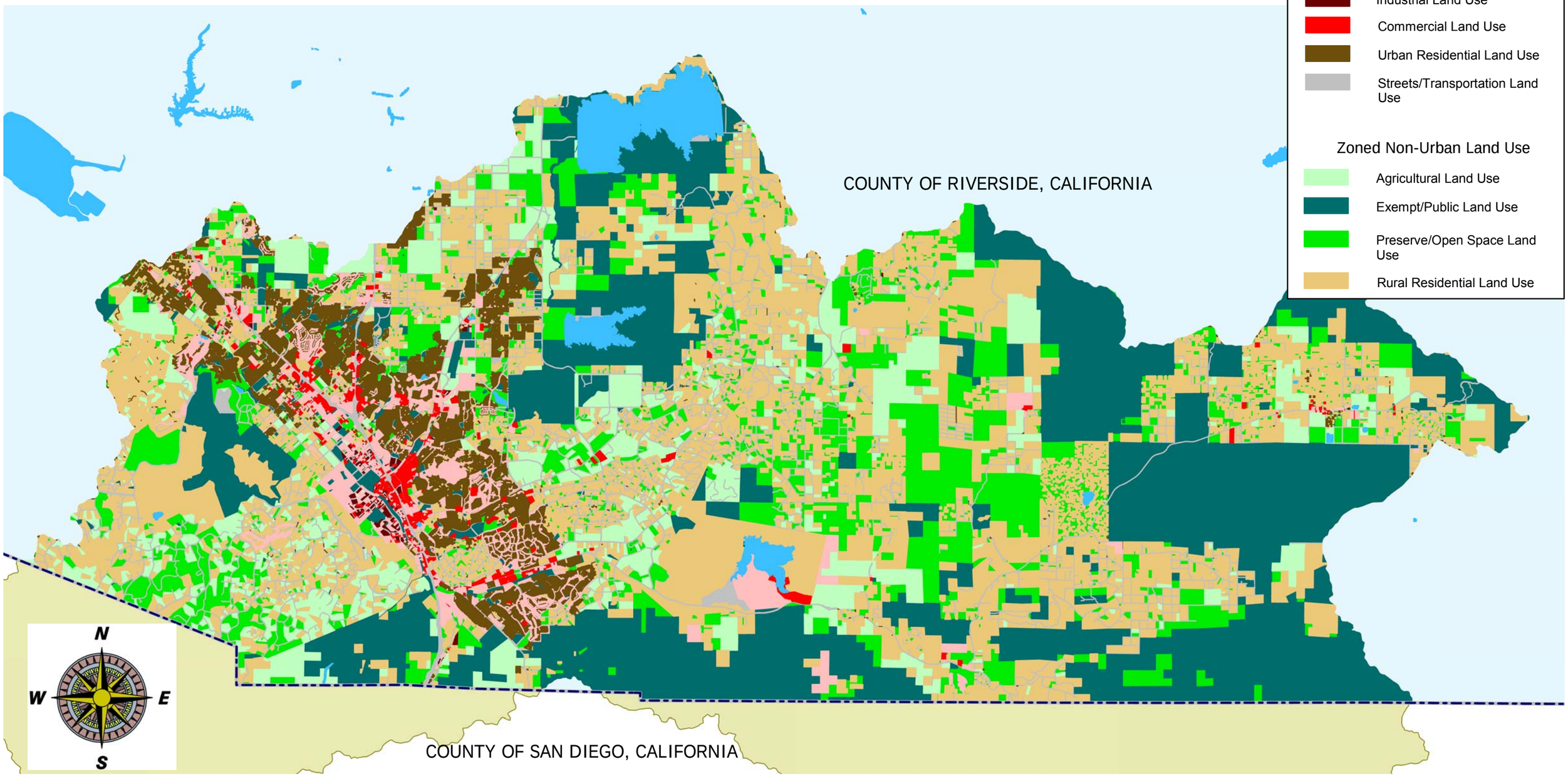

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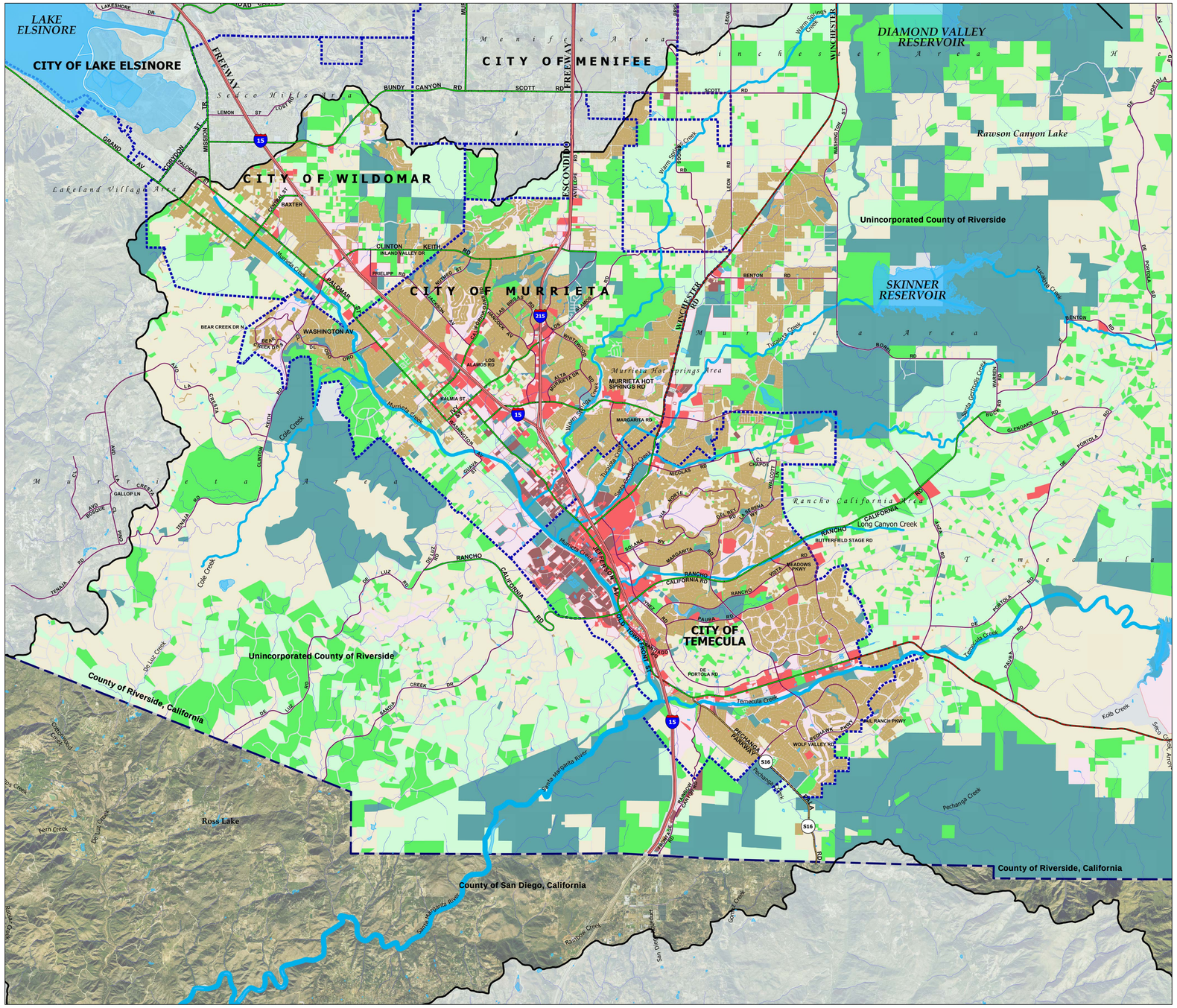
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SKINNER RESERVOIR
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County of San Diego, California
County of Riverside, California
Ross Lake
Murrieta Hot Springs Area
Rancho California Area
Long Canyon Creek
Temecula Creek
Santa Margarita River
Cole Creek
Murrieta Creek
Tucalota Creek
Warm Springs Creek
Pechanga Creek
Kolb Creek
Rainbow Creek
Gopher Creek
Deerwood Creek
De Luz Creek
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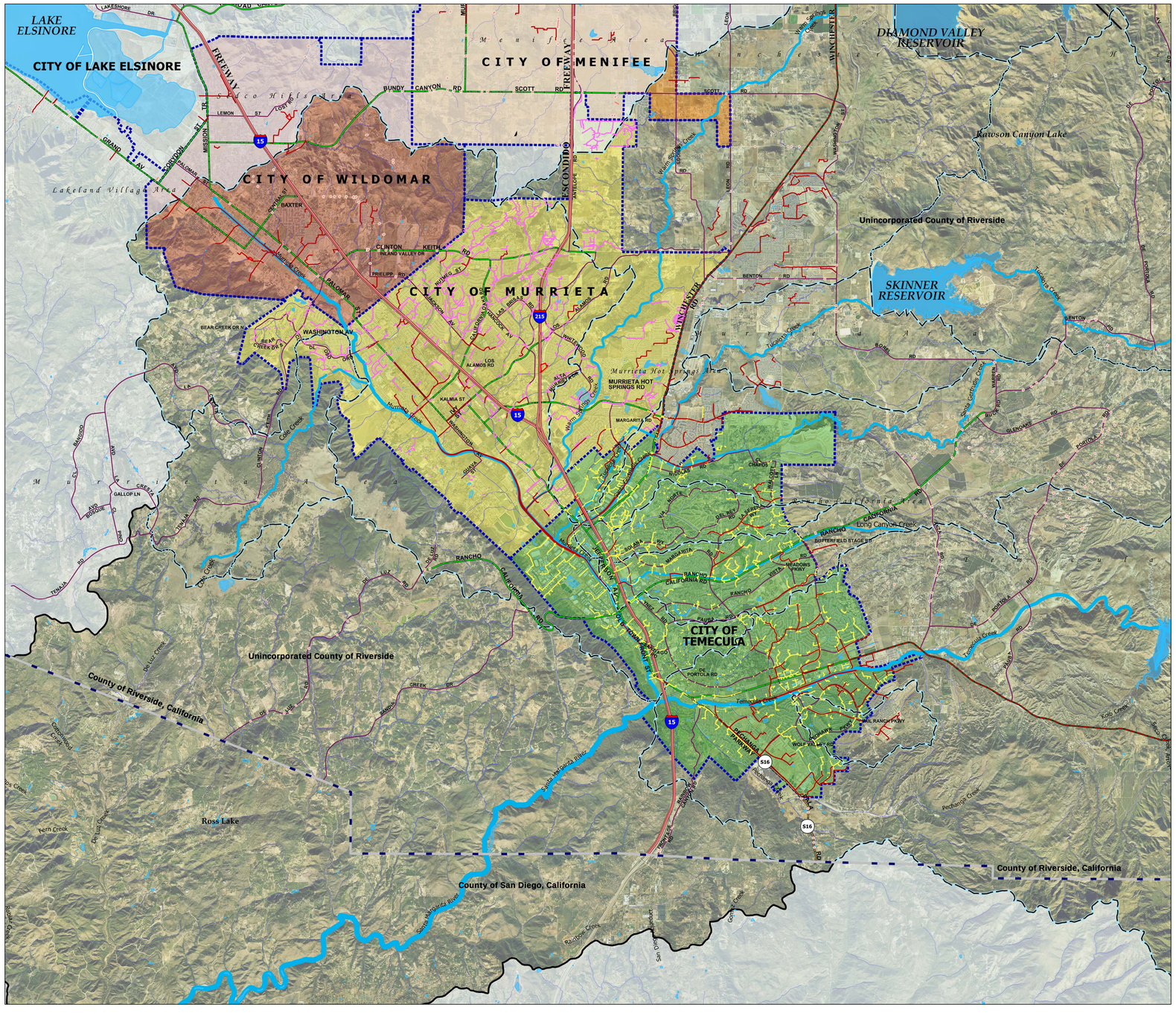
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Unincorporated County of Riverside
County of Riverside, California
County of Riverside, California
County of San Diego, California
Ross Lake
Lakeland Village Area
Murrieta Hot Springs Area
Murrieta Area
Temecula Area
Western California Area
Menifee Area
Winchester Area
Salt Creek
Murrieta Creek
Tenaja Creek
Temecula Creek
Santa Margarita River
Long Canyon Creek
Pechanga Creek
Rancho Creek
Gomez Creek
Kolb Creek
Rice Creek
Rice Canyon
Cole Creek
De Luz Creek
Cottonwood Creek
Fern Creek
Warm Springs Creek
Wilson Creek
Santa Gertrudis Creek
Murrieta Hot Springs Rd
Margarita Rd
Rancho California Rd
Rancho California Rd
Pauba Rd
Rancho Vista Blvd
Rancho California Rd
Meadows Pkwy
Butterfield Stage Rd
Jedediah Smith Rd
Pala Rd
Temecula Pkwy
Rancho Vista Blvd
Pechanga Pkwy
Rancho California Rd
Wolf Valley Rd
Pala Rd
Rancho California Rd
Rancho California Rd
Rancho California

Construction Component Effectiveness Assessments

Goals

I Ensure that all Construction Sites have applicable permits from the Permittee.

II Increase the percentage of Construction Sites that are in compliance with Permittee building and grading permits

III Place additional focus on Construction Sites during Wet Season

IV Ensure that construction inspection staff are properly trained and informed of the issues related to stormwater quality

Goal Addressed	Measureable Metrics Collected / Compiled Annually	Highest Potential CASQA Effectiveness Level	Effectiveness Assessment Timeframe	Outcome required to support Effectiveness Level	Can a Reasonable Municipal Action Level be developed?
I	% of active construction sites that are discovered without building/grading permits	2	Permit Term	Decreasing Trend or minimal %	Y
II	% of active High/Medium priority sites subjected to enforcement beyond verbal/written warnings	3	Permit Term	Decreasing Trend or minimal %	N
II, III	% of active High/Medium priority sites subjected to enforcement beyond verbal/written warnings **during wet season**	3	Permit Term	Decreasing Trend or minimal %	N
II	% of enforcement actions that reached each level of enforcement	3	Permit Term	Trend toward lower levels	N
III	% of active permitted construction sites provided wet weather reminders	2	Annually	N/A	Y
IV	% of construction inspectors receiving annual training	1	Annually	N/A	Y

Development Planning Component Effectiveness Assessments

Goals

I Develop Design Guidance for Low Impact Development (LID) BMPs

III Encourage the use of LID-Based Treatment Control BMPs

IV Ensure that appropriate planning staff are trained in WQMP requirements

Goal Addressed	Measureable Metrics Collected / Compiled Annually	Highest Potential CASQA Effectiveness Level	Effectiveness Assessment Timeframe	Outcome required to support Effectiveness Level	Can a Reasonable Municipal Action Level be developed?
I	Status of SMC LID BMP Design Manual	1	Within Permit Term	Completion	Y
II	% of WQMP projects that met the exemption requirements for inspection and maintenance reporting by implementing only LID-Based Treatment Control BMPs	3	Permit Term	Increasing Trend	N
III	% of applicable planning staff that attended WQMP training.	1	Annually	N/A	Y

Permittee Facilities and Activities Program Effectiveness Assessments

Goals

I Ensure that Permittee Facilities have adequate BMPs implemented and that they are properly maintained
II Ensure that Channels and Inlets are kept free from trash and debris
III Encourage the use of Integrated Pest Management (IPM) on Permittee Facilities
IV Maintain an updated GIS map of the MS4 system
V Ensure the Permittee facility operators and maintenance workers are properly trained in issues related to water quality.

Goal Addressed	Measureable Metrics Collected / Compiled Annually	Highest Potential CASQA Effectiveness Level	Effectiveness Assessment Timeframe	Outcome required to support Effectiveness Level	Can a Reasonable Municipal Action Level be developed?
I	% of facilities with appropriate BMPs identified	1	Annually	N/A	Y
I	% of Facilities provided reminders of appropriate BMPs	2	Annually	N/A	Y
I	% of annual facility inspections finding deficiencies in BMP implementation that require follow-up actions	3	Permit Term	Decreasing Trend or minimal %	Y
I	Average % of deficiencies identified in the previous year's inspections that were addressed.	3	Permit Term	Increasing Trend or high %	Y
II	Estimated Tons of Waste removed from Streets	4	Annually	N/A	N
II	Estimated Tons of Waste removed from Inlets	4	Annually	N/A	N
II	Estimated Tons of Waste removed from Open Channels	5	Annually	N/A	N
III	% of Pest Control Contracts that include language promoting or requiring IPM	1	Annually	N/A	N
IV	% of new Permittee-maintained MS4 facilities added to GIS Map	1	Annually	N/A	Y
V	% of Permittee Facility and MS4 operators and maintenance staff that attended training.	1	Annually	N/A	Y

Industrial-Commercial Facilities Program Effectiveness Assessments

Goals

I Maintain an updated and prioritized list of Industrial and Commercial Facilities

II Ensure the each Industrial and Commercial Facility has implemented BMPs that are appropriate for the activities and features at that facility

III Ensure that implemented BMPs are properly maintained to ensure their effective operation

IV Implement enforcement measures as necessary to reduce the occurance and recurrance of violations

V Ensure that inspectors are appropriately trained to identify problem areas and BMPs maintenance issues.

Goal Addressed	Measureable Metrics Collected / Compiled Annually	Highest Potential CASQA Effectiveness Level	Timeframe to Determine Effectiveness	Outcome required to support Effectiveness Level	Can a Reasonable Municipal Action Level be developed?
I	% of new facilities added to database and prioritized	1	Annually	N/A	Y
II	% of inspected facilities with adequate Minimum BMPs in place at time of inspection	3	Permit Term	Increasing Trend or High %	N
III	% of inspected WQMP facilities subject to Post Construction Treatment Control BMP Inspection, with adequately maintained Treatment Control BMP	3	Permit Term	Increasing Trend or High %	N
IV	% of inspected High/Medium priority facilities that were subjected to enforcement beyond verbal/written warnings	3	Permit Term	Decreasing Trend or Low %	N
IV	% of enforced sites that are repeat offenders	3	Permit Term	Decreasing Trend or Low %	N
IV	% / Number of enforcement actions that reached each level of enforcement	3	Permit Term	Trend toward lower enforcement	N
V	Percent of applicable inspectors that attended training	1	Annually	N/A	Y

Residential Program Effectiveness Assessments

Goals

I Raise awareness among residents of activities that may be contributing to stormwater pollution
II Increase public awareness of BMPs for residential activities
III Increase public participation in hazardous material collection events
IV Increase public involvement in keeping the watershed clean
V Encourage the use of Alternative Pest Control Methods

Goal Addressed	Measureable Metrics Collected / Compiled Annually	Highest Potential CASQA Effectiveness Level	Timeframe to Determine Effectiveness	Outcome required to support Effectiveness Level	Can a Reasonable Municipal Action Level be developed?
I	Number of outreach events to Schools	1	Annually	N/A	N
II	Number and type of educational materials distributed that target residential activities	1	Annually	N/A	Y
I, II	Results of Public Ed Surveys	2	Permit Term	Increasing or high level of Knowledge	Y
III	Gallons of Used Oil Collected through Used Oil Block Cycle Grant	4	Annually	N/A	Y
III	Total Pounds collected at HHW/ABOP events	4	Annually	N/A	Y
III	Total Number of participants at HHW/ABOP events	3	Annually	Increasing Trend	Y
IV	Pounds of trash removed through Watershed Cleanup Events	4	Annually (as events occur)	NA	N
V	Number of Home Improvement stores provided outreach and customer educational information for pesticide use	2	Annually	Increasing Trend	Y

Detection and Elimination of Illicit Discharges and Connections Effectiveness Assessments

I Revise and enhance IC/ID Monitoring Program
II Reduce the occurance of Illicit Connections and Discharges
III Increase public reporting of improper disposal into MS4
IV Ensure the IC/ID reports are reviewed and responded to in a timely manner
V Ensure the confirmed IC/ID events are eliminated as quickly as possible
VI Ensure the IC/ID response staff are trained to identify potential sources of Illicit Discharges and recommend BMPs to prevent such discharges

Goal Addressed	Measureable Metrics Collected / Compiled Annually	Highest Potential CASQA Effectiveness Level	Timeframe to Determine Effectiveness	Outcome required to support Effectiveness Level	Can a Reasonable Municipal Action Level be developed?
I	Revise IC/ID Monitoring Program to screen random MS4 outfalls	1	N/A	N/A	N
II	% of IC/ID Monitoring events with sampleable flow	1	Permit Term	N/A	N
II	% of IC/ID Monitoring events that exceeded criteria and required follow-up	5	Permit Term	Decreasing Trend or low %	N
III	Number of IC/ID reports received	2	Annually	Increasing Trend	N
IV	% of IC/ID reports responded to within 1 business day of receipt	1	Annually	N/A	Y
V	% of confirmed and source-identified IC/ID incidents that required enforcement beyond verbal or written wardnings to eliminate	3	Permit Term	Decreasing Trend or minimal %	N
V	% of each type / level of enforcement	3	Permit Term	Trend toward lower levels	N
VI	% of IC/ID response staff receiving training	1	Annually	N/A	Y

Riverside County Flood Control and Water Conservation District

Riverside County – Santa Margarita Region Pyrethroid Source Identification Toxicity Reduction Evaluation

Final Phase II Report
January 2009

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Executive Summary

This document is the Phase II report for the Santa Margarita Region (SMR) Pyrethroid Source Identification Toxicity Reduction Evaluation (TRE) conducted by the SMR Permittees to identify the source(s) of toxicity in the SMR and develop a plan to reduce the toxicity. This report documents the Permittees' ongoing and proposed efforts to identify and reduce sources of pyrethroid pesticide toxicity associated with urban runoff.

Data gathered under this TRE was compared to data from neighboring counties. Based on available data, problems with pyrethroid-induced toxicity in urban runoff are common among municipalities in Southern California, and methods for addressing the problems are comparable.

A literature review was conducted to determine appropriate source control and treatment control BMPs for reducing the concentration and load of pyrethroids in storm water runoff. The literature source, the estimated potential for reducing pyrethroid-induced toxicity, and possible concerns about implementing the BMP are summarized.

Based on the results of the literature review, BMPs are evaluated for applicability and potential effectiveness in the SMR watershed. Many of the most effective and appropriate BMPs are currently being implemented by the Permittees.

A search for pending legislation did not identify any pending legislation pertaining to pyrethroid pesticides.

The most effective strategy to prevent water quality impacts from legal pesticide uses was identified as state or federal regulatory change involving effective labeling and use restrictions. The Permittees propose a five year plan to continue, review, and enhance current activities to reduce pyrethroid-induced toxicity.

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1.0 Introduction

This document is the Phase II report for the Santa Margarita Region (SMR) Pyrethroid Source Identification Toxicity Reduction Evaluation (TRE) conducted by the County of Riverside, the City of Murrieta, the City of Temecula, and the Riverside County Flood Control and Water Conservation District (District, collectively Permittees). The Phase I Status Report (RCFCWCD, 2008) contains the work plan for Phase II and an outline of the topics in this report, as well as additional background information. This Phase II report is divided into six sections.

Section 1 describes the purpose of the TRE and provides an overview of the approach taken by the Permittees. Section 1 also contains a discussion of the regulatory framework of the TRE, a brief project background, a description of the Santa Margarita watershed, pyrethroid pesticide background and usage, and management questions and objectives.

Section 2 describes available pyrethroid and toxicity data from other counties in Southern California, and compares the data to data from Riverside County. The data and comparisons are included to demonstrate that the problems and solutions relating to pyrethroid pesticides facing the Permittees are similar to those of neighboring counties in the region.

Section 3 presents the results of the literature review conducted for this study of pesticide reduction Best Management Practices (BMPs).

Section 4 discusses potential pesticide reduction BMPs, the status of the Permittees implementation of the BMPs, and, when applicable, examples of the implementation of the BMPs in other municipalities. Section 4 also contains a table summarizing the potential BMPs, their advantages and disadvantages, and relative cost.

Section 5 discusses pending legislation relating to pyrethroid pesticides.

Section 6 presents the five-year course of action the Permittees propose to follow to reduce pyrethroid-induced toxicity in the SMR.

1.1 Purpose and Overview of Approach

The purpose of the TRE is to identify the source(s) of toxicity in the SMR and develop a plan to reduce the toxicity. The results of Phase I of the TRE are contained in the TRE Status Report (Riverside, 2008). This Phase II report for the TRE study documents the Permittees' ongoing and proposed efforts to identify and reduce sources of pyrethroid pesticide toxicity associated with urban runoff. The goal of Phase II is to establish a course of action and develop modifications to the Permittee's Storm Water Management Plans (SWMPs) to more effectively control the sources of toxicity that were identified in Phase I of the TRE. The Permittees will incorporate the course of action and SWMP modifications into the Report of Waste Discharge (ROWD) that will be submitted to the RWQCB in January 2009.

Phase II activities included:

- A comparison of toxicity and chemistry results to data from adjacent Phase I municipal separate storm sewer system (MS4) permit areas, including San Diego County and Orange County.
- A literature review of current studies and a survey of pesticide reduction BMPs.
- A search for pending legislation regarding pyrethroid pesticides.
- Development of a proposed course of action for the Permittees.

A literature review was conducted of BMP information available from the Urban Pesticide Pollution Prevention (UP3) Project and other pesticide management programs and documents. Information on relevant BMPs was compiled and evaluated to identify potential BMPs that are available to mitigate urban sources of pyrethroids. Existing Permittee programs, such as outreach, regulation, and BMP implementation, were then evaluated for improvement opportunities.

The proposed course of action was determined with consideration of the adequacy of data collection (sufficient precipitation and runoff to collect adequate data) and pending

regulatory actions by California Department of Pesticide Regulation (DPR), and the United States Environmental Protection Agency (EPA).

Land uses in Riverside County are comparable to those in neighboring Orange County and San Diego County, and pyrethroid pesticide-induced toxicity has been observed in those counties. The Permittees are committed to identifying and addressing water quality issues with methods consistent with those used by other stakeholders in Southern California. To this end, data gathered under this TRE was compared to data from neighboring counties, and current pesticide reduction programs used by municipalities throughout California were reviewed.

Source control and treatment control BMPs were researched and evaluated for potential effectiveness in reducing pyrethroid pesticide-induced toxicity in the Santa Margarita watershed. Many of the most effective BMPs are currently implemented by the Permittees, and several have been implemented within the previous Permit term (2004-2008). A proposed five-year course of action for the Permittees was developed by combining the results of the research with the existing programs.

1.2 Regulatory Framework

At the federal level, the authority to regulate pesticide manufacture and use is assigned to the United States Environmental Protection Agency (EPA) under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA). In California, pesticide use is regulated at the state level by the DPR. In the SMR, the Permittees are required under the Clean Water Act to control discharges of pollutants, including pesticides that produce water toxicity, to and from their MS4 under the National Pollutant Discharge Elimination System (NPDES).

This TRE was performed as required by Monitoring and Reporting Program (MRP) R9-2004-001.

The MRP, Section II. A. I. 4, states:

> *"When results from the chemistry, toxicity, and bioassessment monitoring…indicate urban runoff-induced degradation, Permittees shall evaluate the extent and causes of urban runoff pollution in receiving waters and prioritize management actions to eliminate or reduce sources. Toxicity Identification Evaluations (TIEs) shall be used to determine the cause of the toxicity, and Toxicity Reduction Evaluations (TREs) shall be used to identify sources and implement management actions to reduce pollutants in urban runoff causing toxicity."*

As local regulation of pesticide use is generally preempted by federal and state law, the Permitttees' authorities are limited to addressing illegal disposal of pesticides, promoting public education, setting the example for minimum pesticide use, and coordinating with the federal and state agencies to facilitate regulatory changes at the state and federal level.

1.3 Project Background

Phase I of the TRE consisted of the toxicity monitoring begun in 2004 and the Toxicity Identification Evaluations (TIE) was initiated in the spring of 2007. The Phase I Status Report (RCFCWCD, 2008) provides a full project background. Toxicity monitoring at Temecula Creek and Murrieta Creek was initiated in 2004 using EPA protocol with the following indicator species: *Ceriodaphnia dubia*, *Selenastrum capricornutum*, and *Hyalella azteca*. Toxicity testing during the 2004-2008 reporting period indicated persistent wet weather toxicity to *Hyalella* in both Temecula Creek and Murrieta Creek. Toxicity was not observed to either *Ceriodaphnia* or *Selenastrum* in any of the samples collected over the four annual reporting periods beginning in the fall of 2004.

Toxicity Identification Evaluations (TIEs) were conducted on the wet weather samples collected from Temecula Creek and Murrieta Creek beginning in April 2007, in accordance with Table 2 of the MRP. The TIEs indicated that pyrethroids were the primary source of toxicity and biological degradation in both Murrieta Creek and Temecula Creek.

As a result of the toxicity and TIEs, storm water monitoring for pyrethroids was initiated in 2007-2008. Results indicate that the pyrethroids permethrin and/or bifenthrin are present in wet weather water samples taken at Murrieta Creek and Temecula Creek.

To further assess the impacts of pyrethroid pesticides the Permittees instituted Dry Weather Toxicity Testing and direct measurement of pyrethroid pesticide concentrations in dry weather water samples during the 2007-2008 reporting period. Toxicity and pyrethroid pesticides were not detected in dry weather water samples at either Murrieta Creek or Temecula Creek.

Phase I of the TRE concluded with the Phase I Status Report. The Phase I Status Report included studies to better characterize patterns and sources of toxicity and to evaluate the hypothesis that the *Hyalella* toxicity is due to pyrethroids.

Bifenthrin and permethrin appear to be the primary toxic elements in Temecula Creek and Murrieta Creek. While bifenthrin and permethrin were applied to both agricultural and non-agricultural land uses, the major sources of pyrethroid toxicity in the SMR are non-agricultural activities. Permethrin was applied more than any other pyrethroid pesticide in the urban landscape. Bifenthrin and permethrin application rates were one and three orders of magnitude higher for structural control applications than agricultural applications in Riverside County. Structural control appears to represent 93% of the total pyrethroids use for Riverside County.

The Status Report outlined the plan for Phase II of the TRE, and this report presents the results of Phase II.

1.4 Watershed Description

The SMR encompasses approximately 750 square miles in southwestern Riverside and northern San Diego Counties (see Figure 1-1). The upper (northeast) portion of the SMR is in Riverside County with the remainder in San Diego County. The SMR is subdivided into the Temecula Creek and Murrieta Creek sub-watersheds and has an arid Mediterranean climate. Creeks in the SMR are ephemeral. Flow in Temecula Creek and in Murrieta Creek results almost exclusively from groundwater during the dry season. It is rare to find flow during dry weather at the tributary stations, and usually this flow infiltrates before reaching Temecula Creek or Murrieta Creek (2006-2007 Monitoring Annual Report). While the ephemeral streams in the SMR are technically receiving waters, the term "Receiving Waters" as used in this TRE Status Report refers exclusively to Murrieta Creek and Temecula Creek.

The Santa Margarita River is formed by the confluence of Murrieta Creek and Temecula Creek. The confluence is located in Riverside County, approximately five miles northeast of San Diego County. The Santa Margarita River flows from Riverside County into San Diego County through the community of Fallbrook and Marine Corps Base Camp Pendleton. The lower estuary and river are protected by Camp Pendleton and are much less developed than surrounding areas in Southern California. The Santa Margarita River is able to support a relative abundance of wildlife and habitats in part because of its undeveloped state.

Figure 1-1

Riverside County Santa Margarita Watershed

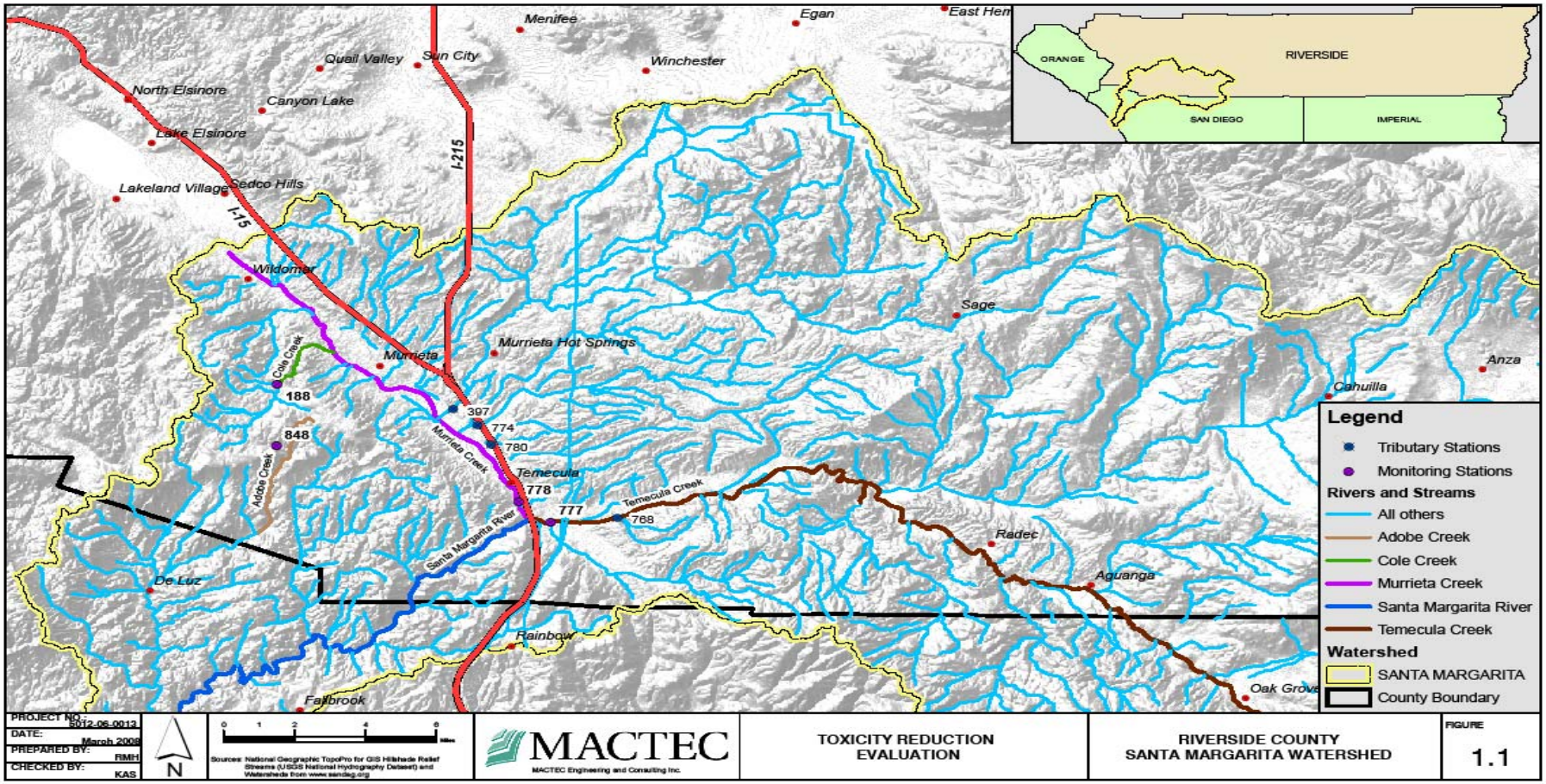

As presented in Table 1-1, the total population in the SMR of Riverside County is significantly less than adjacent watersheds covered under similar Phase I MS4 NPDES permits.

Table 1-1

San Diego Region Populations

Jurisdiction	Population
Orange County	3,002,048
San Diego County	2,941,454
SMR/Riverside County	250,483
Unincorporated	55,291
Murrieta	97,257
Temecula	97,935

1.5 Pyrethroid Pesticide Background and Usage

A statewide compilation of the presence and effects of pyrethroid pesticides in urban surface waters, prepared in July 2008 and presented at the 2008 California Association of Stormwater Quality Agencies (CASQA) Conference, outlined the rise in pyrethroid use and its increased presence in urban waterways (Ruby, 2008). A comprehensive survey of pesticide use in Sacramento, San Diego, and Orange Counties also concluded that, as the older pesticides chlorpyrifos and diazinon have been phased out, pyrethroid pesticides have seen increased usage (Wilen, 2005). The Urban Pesticide Pollution Prevention (UP3) Project confirms that pyrethroids are the cause of toxicity in numerous California waterways, particularly in urban waterways. The UP3 Project (www.up3project.org) publishes an annual review of new scientific findings on pesticides in urban surface water (TDC, 2007). Since 2005, the reviews have consistently indicated that pyrethroid use continues to increase and that pyrethroids are found to be the cause of toxicity in urban waterways. The pyrethroid use information is confirmed by data published by the DPR.

Pyrethrins are natural insecticides that are derived from an extract of chrysanthemum flowers. Pyrethroids are synthetic versions of pyrethrins. These chemicals act on the nervous system of insects. Commercial pyrethroid pesticides often contain a synergist that works by restricting the enzymes insects use to detoxify pyrethroids. While pyrethroids have been shown to be one of the least poisonous insecticides to mammals, the effects depend on the level of exposure, the health of the animal, and the environmental circumstances.

Pyrethroids applied in urban areas enter the storm drainage system of the MS4 by surface runoff and are transported directly to receiving waters. Other potential urban sources are runoff from irrigation with reclaimed water, application overspray, and atmospheric deposition. Pyrethroids transported via the MS4, from whatever source, are considered to be non-point discharges. Agriculture, nursery, and urban/suburban uses are the main categories of sources of pyrethroids in the receiving waters of the SMR.

Outdoor structural pest control is the predominant urban use of pyrethroids in most watersheds. However, in the SMR, the acreage dedicated to agricultural land use exceeds the urban land use area by approximately 2:1. Pyrethroid insecticides are applied to a variety of crops in the SMR and California throughout the year. According to the DPR, pyrethroids are commonly used on fruit and nut trees, row crops, and in nurseries. Six of the primary pyrethroids used in California agriculture, in order of decreasing amount applied in 2003, are permethrin, esfenvalerate, lambda-cyhalothrin, cyfluthrin, bifenthrin, and cypermethrin. Therefore, agricultural sources of pyrethroids were considered.

TIE methods for pyrethroids are still being developed. Effective methods require the ability to measure low concentrations of pyrethroids, and this remains a challenge. Fortunately, the development of TIE methods for pyrethroids is progressing and moving towards standardization (San Francisco Estuary Project, 2007). TIEs are planned for storm water samples collected during 2008-2009 when toxicity is evident.

1.6 Management Questions and Objectives

This TRE is designed to confirm the toxic element observed in the samples collected in the Santa Margarita Region, identify likely sources of the toxic element, and propose mitigation measures for those sources. TIEs identified pyrethroids pesticides as the likely toxic element. As the MRP specifies that a TRE must be conducted following toxicant identification through a TIE, Phase I of the TRE focused on the pyrethroids identified as the source of toxicity in the 2007 TIEs. To support this TRE, the Permittees commissioned additional wet and dry weather toxicity testing, water column pyrethroid testing, additional TIEs to verify the persistence of pyrethroids as the toxicant. Based on the resulting information, the TRE evaluates the specific sources of toxicity and likely mitigation.

This TRE study assumes that pyrethroid sources and resultant toxicity patterns in the SMR are similar to those in neighboring counties, in particular San Diego and Orange Counties. Under this assumption, the Permittees hypothesized that pyrethroids would be detected in samples at most if not all monitoring locations, that the samples would exhibit toxicity to *Hyalella*, and that TIEs would indicate pyrethroids as the cause of the toxicity. Unlike other regions, dry weather toxicity is not expected in the SMR, as dry weather flows are supported primarily by groundwater.

Based on this assumption, this TRE was designed to provide information to help answer the following five management questions related to the toxicity:

1) Is the pyrethroid toxicity persistent in Temecula Creek and Murrieta Creek?
2) Does the toxicity occur during dry weather?
3) Are there any obvious sources of illicit discharge of pyrethroids that can be abated?
4) What are the likely sources of pyrethroid toxicity in the SMR?
5) What potential management measures are available to the Permittees to mitigate the impacts of pyrethroid pesticide application?

Answers to the first four questions are detailed in the Phase I Status Report. Briefly, toxicity is persistent in the creeks during wet weather, but is not evident in dry weather samples. No

obvious sources of illicit discharge were found. The likely primary source of pyrethroids is structural control performed by pest control operators (PCOs). The final question is addressed during Phase II and is the focus of this report.

2.0 Data Comparison

An assumption of this TRE study is that pyrethroid sources and resultant toxicity patterns in the SMR are analogous to those in similar counties, in particular neighboring San Diego and Orange Counties. To verify this assumption, it was necessary to compare data collected in SMR to data collected in other locations. As part of the 2008 CASQA pyrethroids data compilation, monitoring results were summarized from studies that investigated the presence and effects of pyrethroid pesticides in urban areas of California (Ruby, 2008). The CASQA summary listed the frequency of detection of various pyrethroid pesticides and results of toxicity testing for different indicator species. Results from various northern and Southern California locations were detailed, including results of water column studies from Orange, San Diego and Sacramento Counties.

Pyrethroids, as a class of chemicals, have an affinity for particles and they are considered to be relatively hydrophobic; they are therefore commonly found in sediments of waterways downstream of their application sites. The initial toxicity studies leading to the identification of pyrethroids as pervasive environmental contaminants in California were performed on sediment samples by Don Weston and his colleagues at the University of California, Berkeley (Weston et al., 2005; Amweg et al., 2006). Recently, improvements in analytical methods for pyrethroids in water, and modification of toxicity studies to more effectively test for pyrethroid-based toxicity in water, have lead to increasing evidence of the presence of pyrethroids in water column samples, and toxic effects in the water matrix (see citations for Orange and San Diego County in Ruby, 2008).

Extensive work has been performed on the environmental presence and effects of pyrethroids in urban areas of the neighboring Orange and San Diego counties; however, much of this work has been performed on sediment samples. Although the sediment monitoring results do not correspond directly with the SMR water column test results, sediments are considered to be effective integrators of contaminants from the contributing storm water flows. The deposited sediments are produced as particles settle out from the passing water over some

period of time, and tend to accumulate until they are washed away by higher-velocity flows. Summaries of the relevant sediment study results are therefore included in the discussion that follows.

In Orange County, an ongoing study being performed by UC Davis, in conjunction with UC Riverside and the Orange County UC Cooperative Extension, has consistently found bifenthrin and permethrin in water column runoff samples from residential areas (Haver et al., 2007; Oki, personal communication). In samples from four residential sites they have detected bifenthrin in 100% of samples, with the number of samples varying from 48 to 57 per site (Oki, personal communication). In sediment samples collected in recent years from the Santa Ana Region of Orange County, bifenthrin is commonly detected (32 of 56 samples) and permethrin less frequently so (4 of 56 samples), with sediment toxicity to *Hyalella* common (39 of 54 samples tested were moderately or highly toxic; see summary in Ruby, 2008).

In a 2005 study of six Orange County residential storm drainages and seven tributary streams draining commercial/residential land uses, bifenthrin was detected in 95% of dry weather samples and 100% of wet weather samples (Budd et al., 2007). Because treatment of nursery products is mandatory to control Red Imported Fire Ants, an older DPR study, conducted in 1999-2002, found occasional detects of bifenthrin in urban runoff samples, along with frequent detects in nursery runoff from several Orange County sites.

In San Diego County, under NPDES Permit monitoring conducted since 2004, pyrethroids have been commonly detected in water samples from several receiving waters, and toxicity to *Hyalella* has been increasingly observed in water samples (see summary in Ruby, 2008). Bifenthrin was detected in 12 of 15 samples collected from 2005-2006 and 2006-2007; detection frequency was 100% in samples from Chollas Creek, Agua Hedionda, and Tecolote Creek. Toxicity to *Hyalella* was observed in 22 of 57 samples tested over the three year period, 2004-2007. In a TIE study performed on Chollas Creek samples during 2005-2006,

67% of samples were acutely toxic to *Hyalella*, and the toxicity was found to be likely due to pyrethroids.

In a 2004-2005 study performed by UC Davis and others, sediments from Switzer Creek at its outlet to San Diego Harbor were found to be highly toxic; bifenthrin and permethrin were detected at high concentrations, and a sediment TIE identified pyrethroids as the likely cause of the observed toxicity (Anderson et al., in press). As part of a statewide survey of urban waterways, sediments were tested from several receiving waters in San Diego County. All were found to be highly toxic to *Hyalella* (Holmes et al., in press).

To further compare the pyrethroid sources and toxicity patterns in the SMR to other counties, the CASQA data summary was analyzed to select the studies which reported results for the same constituents and effects identified in the SMR, specifically permethrin, bifenthrin, and toxicity to *Hyalella.* The total number of detections for the different monitoring locations was divided by the total number of samples taken at the sites to calculate the percentage of samples with detectable concentrations of pyrethroids. This normalized metric allowed for comparison of the various datasets.

While permethrin is among the more commonly-used pyrethroids, it is much less toxic to aquatic life than bifenthrin (TDC, 2007). For the purposes of this assessment, bifenthrin detection frequency and frequency of toxic effects were used as the metrics for comparison.

Comparative results for bifenthrin are summarized in Figure 2-1. Data were available for two creeks in Sacramento County and three locations in San Diego County, in addition to the data collected for SMR. Two samples were taken at the Sacramento County sampling locations. For San Diego County, each creek was sampled three times except for Chollas Creek, which was sampled six times. The SMR was sampled a total of eight times. In most cases, bifenthrin was detected in over 80% of samples. Only at Elk Grove Creek in Sacramento County was bifenthrin detected at a notably lower percentage.

Figure 2-1

Percentage of Samples with Bifenthrin Detections

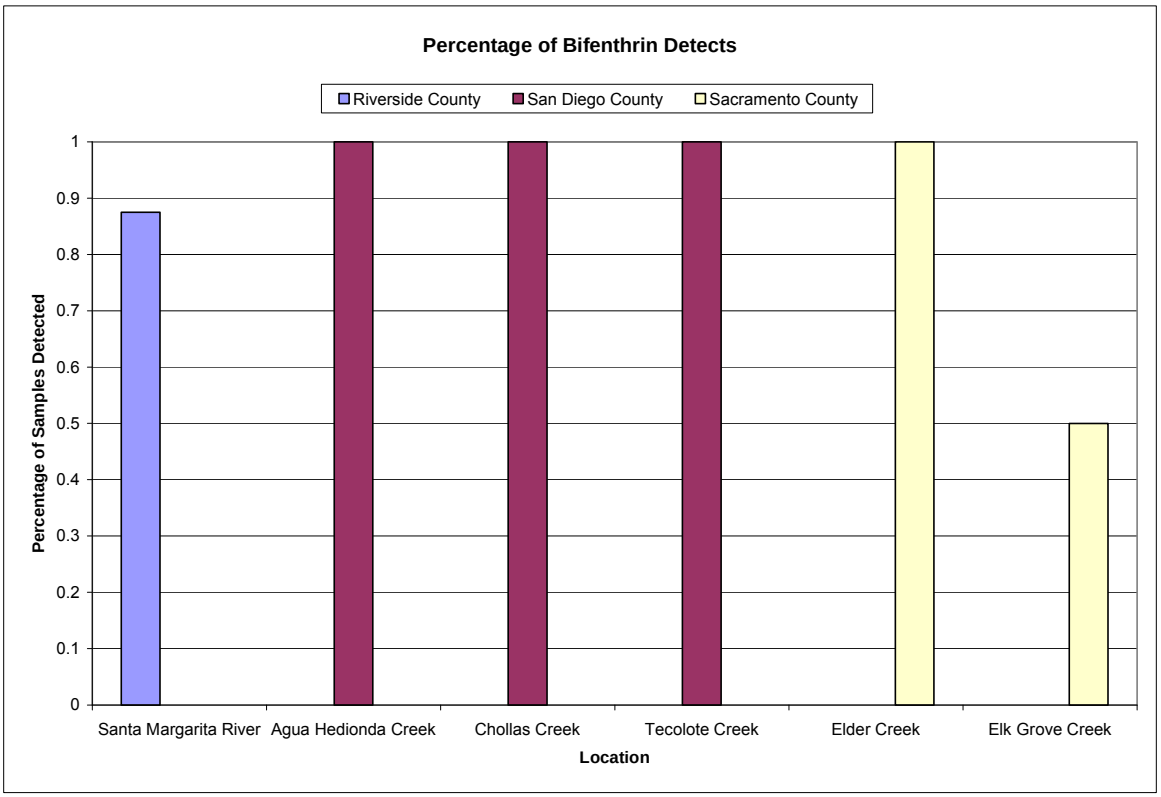

Toxicity to *Hyalella* was documented in water samples from San Diego County, along with the SMR. Toxicity testing was performed on samples from seven San Diego County water bodies. The sample sets ranged from three to nine toxicity tests (Aqua Hedionda, San Dieguito River, Tijuana River, and Chollas Creek). In the SMR, a total of eight toxicity tests were performed on samples from Murrieta Creek and Temecula Creek. The results for frequency of acute toxicity from the SMR were within the range of the results for similar sites in San Diego County (see Figure 2-2).

After comparing the results from different locations, the assumption that pyrethroid sources and resultant toxicity patterns in the SMR are similar to those in similar counties appears to be valid.

Figure 2-2

Percentage of Samples with Acute Toxicity to *Hyalella*

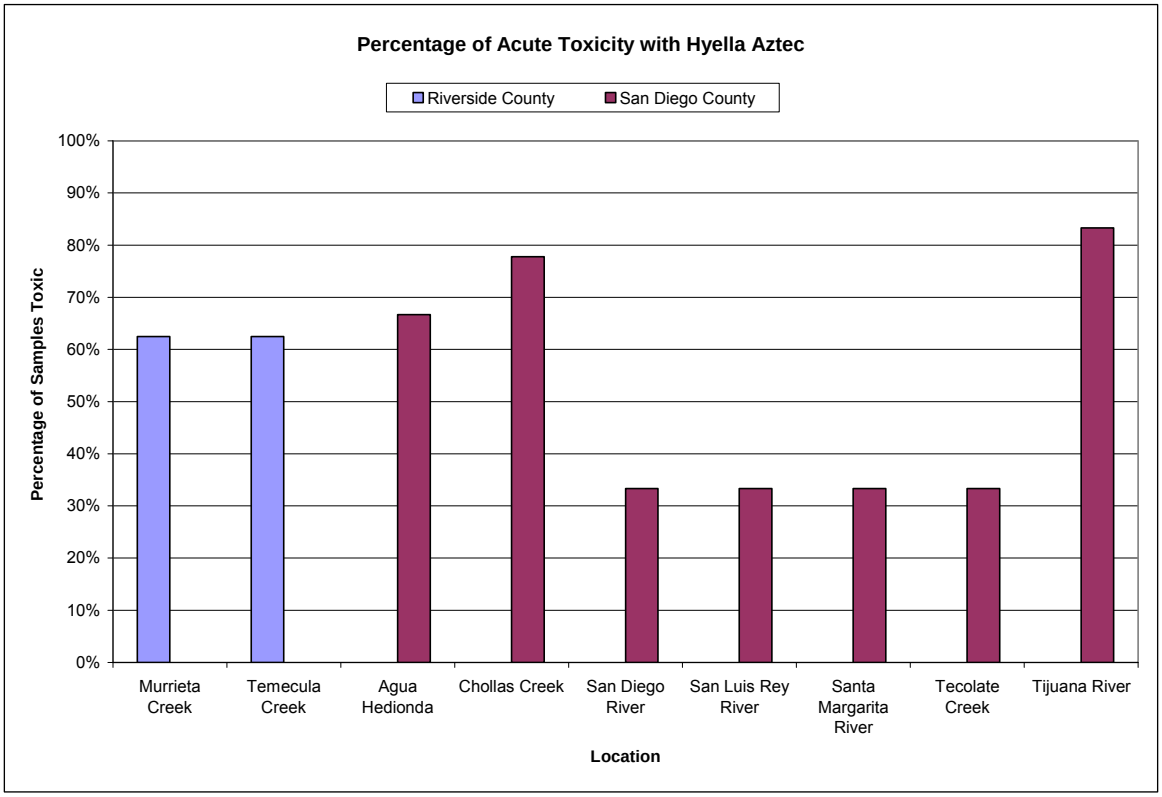

3.0 Literature Review

A literature review was conducted during December, 2008 to determine appropriate BMPs for reducing the concentration and load of pyrethroids in storm water runoff. An initial search was made of the Urban Pollution Prevention Program (UP3) website (www.up3program.org) for potential examples of BMP strategies implemented specifically for pyrethroids. The United States Environmental Protection Agency website and the CASQA website were also reviewed for pyrethroid specific BMPs. Widespread use of pyrethroids is relatively recent, and there has been little direct evaluation of BMPs for pyrethroids. Further research was conducted on general storm water BMPs, and their potential for pyrethroid reduction was evaluated based on the design of the BMP and the chemical behavior of pyrethroids.

To identify pending legislation that may be related to pyrethroid pesticides, web searches were conducted on the websites for DPR, the California legislature, the EPA, and the Library of Congress. However, no pending legislation was identified as relevant to pyrethroid pesticides.

Table 3-1 below presents the findings of the literature review. BMPs are categorized as either source control or treatment control, and within each category they are sorted by type. The literature source, a summary of the BMP, the estimated potential for reducing pyrethroid-induced toxicity, and possible concerns about implementing the BMP are provided. See Section 4 for further information about each type of BMP.

Table 3-1
Literature Review Matrix

Type of BMP	Literature Source	Summary	Ability to Reduce Toxicity Caused by Pyrethroids	Storm Water Concerns
Source Control				
Regulatory	Pesticides of Interest for Urban Surface Water Quality. Urban Pesticides Use Trends Annual Report. July 2008.	Suggests regulatory changes as a result of increased toxicity due to pyrethroid use	Potentially High	Supplementary to other BMPs, Will take years to show results
Regulatory	Improving Urban Pesticide Regulatory Activities to Protect Water Quality – Annual Update 2007. November 2007.	Discusses recent state and federal regulatory pesticide activities on an annual basis	Potentially High	Supplementary to other BMPs, Will take years to show results
Regulatory	California Department of Pesticide Regulation. http://www.cdpr.ca.gov/docs/registration/reevaluation/chemicals/pyrethroids.htm. 2007.	The reevaluation of the widespread presence of synthetic pyrethroid residues in the sediment of both agricultural and urban dominated California waterways at levels toxic to Hyalella azteca (H. azteca).	Potentially High	Supplementary to other BMPs, Will take years to show results
Integrated Pest Management (IPM)	Building Maintenance - Structural Integrated Pest Management. June 2008.	Promotes reduction in pesticide use through use of municipality IPM and hiring of PCO's trained in IPM	Potentially High	Does not eliminate all uses of pyrethroids
IPM	California Stormwater BMP Handbook. January 2003.	Promotes prevention of pesticide use through use hiring of PCOs that use IPM as an alternative	Potentially High	Does not eliminate all uses of pyrethroids
IPM	City of Santa Monica Toxics Use Reduction Program Integrated Pest Management. June 1997.	Overview of IPM program initiated by the City of Santa Monica	Potentially High	Does not eliminate all uses of pyrethroids
IPM	National Management Measures to Control Nonpoint Source Pollution from Urban Areas. November 2005.	EPA document discussing management practices to help reduce pesticide use	Potentially High	Does not eliminate all uses of pyrethroids
IPM	National Pollutant Discharge Elimination System (NPDES) Phase II BMP & Measureable Goal Examples. February 2008.	Provides examples and goals of good housekeeping BMPs	Potentially High	Does not eliminate all uses of pyrethroids
IPM	The Monterey Bay Green Gardener Program "sample curriculum". www.green-gardener.org/about. Accessed December 2008.	Informs the public and landscapers about the green gardener program and how to get involved	Potentially High	Does not eliminate all uses of pyrethroids

Table 3-1 (continued)
Literature Review Matrix

Type of BMP	Literature Source	Summary	Ability to Reduce Toxicity Caused by Pyrethroids	Storm Water Concerns
Source Control				
IPM	Western IPM Center. www.wripmc.org. Last updated 12/23/2008.	Pest management information specific to region, state, or territory.	Potentially High	Does not directly address pyrethroids
IPM	EcoWise Certified. www.ecowisecertified.com. Accessed December 2008.	Information on IPM program design, developing contracts for structural IPM, and pilot program aimed at developing IPM certification.	Potentially High	Does not directly address pyrethroids
IPM	Our Water Our World. www.ourwaterourworld.org. Copyright 2008.	Contains assorted fact sheets on specific pests and methods to manage them without using hazardous materials.	Potentially High	Addresses pyrethroids in water pollution fact sheet.
IPM	UP3 Project. www.up3project.org. November 2008.	Provides tools to municipalities to reduce municipal pesticide use and to conduct outreach to their communities on less-toxic methods of pest control	Potentially High	Addresses pyrethroids toxic impact on water bodies.
IPM	State of California Green California. www.green.ca.gov/EPP/building/structipm.htm. Accessed December 2008.	Provides information on structural IPM.	Potentially High	Addresses pyrethroids impact on storm water.
IPM	San Francisco Department of the Environment. http://www.sfenvironment.org/our_programs/topics.html?ti=1. Accessed December 2008.	Contains information regarding key components of integrated pest management.	Potentially High	Addresses pyrethroids impact on storm water.
Low Impact Development	Low-Impact Development Design Strategies: An Integrated Approach. June 1999.	Discusses LID design strategies and successes, including storm water controls	Potentially High	Does not directly address Pyrethroids
Low Impact Development	Low Impact Development Handbook: Stormwater Management Strategies. December 2007.	Reviews many LID techniques appropriate for Southern California's climate	Potentially High	Does not directly address Pyrethroids
Public Outreach	County of Los Angeles Department of Public WorksStorm Water/Urban Runoff Public Education Model Program. Fiscal Year 2002.	Provides Los Angeles specific examples of Public Outreach and Education	Potentially High	Change is up to individuals, needs cumulative effect

Table 3-1 (continued)
Literature Review Matrix

Type of BMP	Literature Source	Summary	Ability to Reduce Toxicity Caused by Pyrethroids	Storm Water Concerns
Source Control				
Public Outreach	Drainage Area Management Plan - Santa Ana and Santa Margarita Regions. July 2005.	Discusses local outreach actions conducted by the Permittees	Potentially High	Change is up to individuals, needs cumulative effect
Public Outreach	Environmental Justice Pilot Project Pest Management Assessment: Soil Fumigant and Organophosphate Insecticide Use and Alternatives - Parlier, Fresno County, California. October 2007.	Study of Agricultural pesticide use in Fresno area, including use of reduced risk pesticides	Potentially High	Unknown potential water quality and toxicity issues
Public Outreach	National Management Measures to Control Nonpoint Source Pollution from Urban Areas. November 2005.	EPA document discussing management practices to help reduce pesticide use	Potentially High	Change is up to individuals, needs cumulative effect
Public Outreach	National Pollutant Discharge Elimination System (NPDES) Phase II BMP & Measureable Goal Examples. February 2008.	Provides examples and goals of public outreach BMPs	Potentially High	Change is up to individuals, needs cumulative effect
Public Outreach	Pesticides of Interest for Urban Surface Water Quality. Urban Pesticides Use Trends Annual Report. July 2008.	Contains recommendations for public education based on analysis of pyrethroid use trends	Potentially High	Change is up to individuals, needs cumulative effect
Treatment Control				
Extended Detention Basin	Santa Clara Valley Urban Runoff Pollution Prevention Program Commercial Site Design Examples. February 2007.	Shows examples of different structural treatment methods and their effectiveness	Moderate	Improper maintenance could lead to other water quality issues
Extended Detention Basin	California Stormwater BMP Handbook. January 2003.	Reviews extended detention basin BMP methods, concerns, and goals	Moderate	Improper maintenance could lead to other water quality issues
Extended Detention Basin	Ventura Countywide Stormwater Quality Management Program Technical Guidance Manual for Stormwater Quality Control Measures. July 2002.	Reviews many BMP methods and contains information specific to Southern California	Moderate	Improper maintenance could lead to other water quality issues

Table 3-1 (continued)
Literature Review Matrix

Type of BMP	Literature Source	Summary	Ability to Reduce Toxicity Caused by Pyrethroids	Storm Water Concerns
Treatment Control				
Infiltration Basin	California Stormwater BMP Handbook. January 2003.	Reviews infiltration basin BMP methods, concerns, and goals	Potentially High	Improper maintenance could lead to other water quality issues
Infiltration Basin	Ventura Countywide Stormwater Quality Management Program Technical Guidance Manual for Stormwater Quality Control Measures. July 2002.	Reviews infiltration basin BMP methods, concerns, and goals	Potentially High	Improper maintenance could lead to other water quality issues
Infiltration Trench	California Stormwater BMP Handbook. January 2003.	Reviews infiltration trench methods of BMP methods, concerns, and goals	Potentially High	Improper maintenance could lead to other water quality issues
Infiltration Trench	Ventura Countywide Stormwater Quality Management Program Technical Guidance Manual for Stormwater Quality Control Measures. July 2002.	Reviews infiltration trench methods of BMP methods, concerns, and goals	Potentially High	Improper maintenance could lead to other water quality issues
Media Filter	California Stormwater BMP Handbook. January 2003.	Reviews media filter BMP methods, concerns, and goals	Potentially High	Improper maintenance could lead to other water quality issues
Media Filter	Ventura Countywide Stormwater Quality Management Program Technical Guidance Manual for Stormwater Quality Control Measures. July 2002.	Reviews many BMP methods and contains information specific to Southern California	Potentially High	Improper maintenance could lead to other water quality issues
Pervious Pavement	California Stormwater BMP Handbook. January 2003.	Reviews pervious pavement BMP methods, concerns, and goals	Potentially High	Improper maintenance could lead to other water quality issues
Pervious Pavement	Low Impact Development Handbook: Stormwater Management Strategies. December 2007.	Discusses LID strategies for assistance in storm water management	Potentially High	May contaminate groundwater

4.0 BMP Analysis

Based on the literature review and the findings of Phase I of the TRE, BMPs were evaluated for their applicability to the SMR. Because the toxicity appears to be principally a wet weather phenomenon, and because the Permittees' jurisdiction includes the urbanized area of the watershed, the analysis focused on BMPs designed to reduce the amount of storm water pollution caused by urban runoff.

The potentially applicable BMPs are divided into Source Control and Treatment Control BMPs and are discussed in detail below. Through the Permittee's proactive efforts to protect the quality of the receiving waters and their beneficial uses, many programs addressing these broad categories are either already in place or are actively being developed. The implementation status for each specific BMP is discussed. Examples of BMP implementation by other municipalities in the region are included as a tool for evaluating the consistency of the Permittees' program with other programs in the region.

4.1 Source Control BMPs

Source control BMPs are designed to curtail pollution at the source before it has the opportunity to enter the storm drain system and pollute waterways. They are generally the preferred type of BMP because reduction of pollution occurs at the source, before runoff has become contaminated (CASQA, 2003). The types of broad categories of source control BMPs that identified as most appropriate for the Santa Margarita watershed are: pursuing regulatory change, implementing IPM strategies including LID, and public outreach and education.

4.1.1 Regulatory Action

Status: Currently being implemented by the Permittees.

Pesticide manufacturers are required to receive approval by USEPA and California DPR for specific pesticide uses, and both agencies can impose use restrictions to prevent unwanted impacts on the environment and public health. At the federal level, a fundamental regulatory disconnect exists between pesticide approval (registration) under FIFRA and water pollution control programs under the Clean Water Act. This has resulted in a repeating pattern, in which a) pesticides are approved for use without sufficient consideration of potential environmental effects, b) water quality and other ecological impacts accrue, c) use restrictions are applied to the offending products (sometimes involving widespread bans on use), and d) new pesticides are approved for use, with subsequent environmental impacts.

In 1962 Rachel Carson published *Silent Spring*, documenting the widespread ecological consequences of pesticide applications. The federal government responded by banning the use of DDT and other organochlorine pesticides, based on extensive evidence of environmental impacts through the process of bioaccumulation. The ban has lead to dramatic recoveries in affected populations of bald eagles and other species; however, the legacy of these long-lasting pesticides near-shore dumping areas in Los Angeles County and elsewhere remains (IWS, 2007).

Eventually the organochlorine pesticides were replaced principally by organophosphate pesticides, especially in urban uses. In the mid-1990s municipal storm water monitoring programs began to document that commonly-used organophosphate pesticides, especially diazinon and chlorpyrifos, were present at toxic levels and causing toxicity to aquatic organisms, principally the common water flea, *Ceriodaphnia*. Although not bioaccumulative, diazinon and chlorpyrifos were discovered to cause widespread toxicity in urban runoff and local receiving waters (TDC, 2001). USEPA subsequently banned most urban uses of diazinon and chlorpyrifos, although EPA's main motivation involved human health effects

on the pesticide applicators, and water quality was not an important factor in those decisions. Again, the ban was also immediately effective, reflected in reduced concentrations of diazinon and chlorpyrifos in urban water samples, and fewer occurrences of organophosphate-based water column toxicity (c.f., references in Ruby, 2008 for San Diego County Municipal Copermittees Annual Urban Runoff Monitoring Reports). But pesticide manufacturers simply replaced the OP pesticides in their products with other active ingredients, principally pyrethroids. Shortly thereafter, researchers and municipal storm water programs began documenting toxic effects from the new pyrethroid products. The pyrethroid impacts were first documented in sediments, and the affected test organism shifted from *Ceriodaphnia* to the sediment-dwelling *Hyalella*.

In the cases of both organochlorine (DDT) and organophosphate (diazinon, chlorpyrifos) pesticides, federal limitations or bans on uses were effective in ameliorating the associated environmental impacts. In both cases, however, new pesticide products were approved for use that then caused related but different impacts to the environment. Therefore it is clear that the most effective strategy for preventing environmental impacts from pesticide use involves implementing an effective process of pesticide approval and registration that comprehensively accounts for and mitigates against such impacts.

For more than ten years CASQA and various other California state and local agencies have promoted better regulation of pesticides at the federal level, encouraging use restrictions as the most effective means of source control. California water quality agencies have sent comment letters to USEPA and DPR on guidance pertaining to the application of pesticides to surface waters and on recommended environmental hazard statements for residential outdoor pesticides (TDC, 2007). These efforts are beginning to show some modest signs of success. In a recent letter to stakeholders, EPA outlined an approach to provide better cooperation between the Office of Pesticide Programs (OPP) and the Office of Water (OW), to allow for “environmentally protective and scientifically defensible effects assessment judgments about contaminants that are or may be found in ambient water”. The Riverside County Permittees plan to continue their support of these efforts through ongoing

participation in the CASQA Pesticides Subcommittee, the Urban Pesticide Pollution Prevention (UP3) Project, and the Urban Pesticide Committee. The Permittees also plan to request that the RWQCB become involved in advocating for more effective pesticide regulation at the state and federal levels.

The Permittees are members of a CASQA subcommittee that addresses pesticide uses impacting stormwater discharges. Effort focuses on providing input to the USEPA and the California Department of Pesticide Regulation (DPR) to improve pesticides regulations so that they more fully protect water quality and are better aligned with the Clean Water Act and California Water Code. (RCFCWCD, 2008). CASQA has also been active in supporting DPR's ongoing reevaluation of allowable pyrethroid pesticide uses (TDC, 2007).

Increasingly, the regulatory response to the water quality impacts resulting from *legal uses of approved pesticides* has been for regional water boards to impose limitations on the allowable loadings of pesticides to impaired waters through the TMDL process. Local agencies have little or no jurisdiction over sales or use of these pesticide products, and therefore do not have the full authority needed to perform loading reductions in resulting TMDLs. An effective regulatory solution must occur at the state and federal levels, to regulate allowable pesticide uses to effectively prevent such water quality impacts.

Current legislation requires users of certain pesticides to be trained, often certified, in the use of those pesticides and to report the amounts applied (State of California, 2008). A similar regulatory approach could be used to promote pesticide alternatives, such as for PCOs to train and certify their technicians in the use of IPM methods (Quarles, 2002). The Permittees are considering supporting regulatory action by the state to include IPM training for PCOs in the requirements for certification and training on the use of pesticides.

Environmentally sensitive and flexible zoning ordinances may be adopted to facilitate the use of LID principles, thereby encouraging private developers to use LID principles (Prince Georges County, 1999). Additional land use restrictions or alternatives to present zoning

laws may help reduce urban storm water runoff, potentially reducing pyrethroid loadings in receiving waters. The Permittees plan to continue promoting LID implementation through interagency communications and cooperation.

4.1.2 Integrated Pest Management

Status: Currently being implemented by the Permittees.

IPM is "a decision-making process for managing pests that uses monitoring to determine pest injury levels, and combines biological, cultural, mechanical, physical, and chemical tools and other management practices to control pests in a safe, cost effective, and environmentally sound manner that contributes to the protection of public health" (Carlsen, 2008). IPM can further be described as an approach to solving pest problems by using information about the pest and landscape to eradicate the pest's habitat in a manner that poses the least risk to humans (Ecology Action, 2007). IPM has many different aspects that help to reduce pests and in turn cause a reduction in pesticide use, including green gardening and structurally integrated pest management (SIPM). BMPs that are typically used as part of an IPM strategy are described in the following sub-sections.

4.1.2.1 Green Gardening

Status: Not currently being implemented by the Permittees, program under consideration and will be enacted in the near future.

The Green Gardener program, implemented through landscapers, promotes environmentally responsible landscaping to reduce the use and need for pesticides. In general, education of gardening and landscape maintenance staff is beneficial for pest reduction as part of an IPM program. It provides alternative methods to landscapers, such as reducing outdoor sources of ants by elimination of their food and water sources through management of honeydew producing insects and plants associated with them (UC Davis, 2007). The Green Gardener

program encourages businesses to participate in environmentally sound landscape maintenance. Healthy landscapes are more resistant to pests (Ecology Action, 2007). Pests that do not have a suitable habitat will leave to find a more hospitable environment. When the pests leave, then there is a lessened need for pesticide applications and lower risk of pyrethroids entering storm water.

The County of Santa Barbara implemented a Green Gardener Program, in which landscapers are encouraged to take a class at the local city college, covering subjects such as IPM strategies and environmentally beneficial landscaping to obtain a "Green Gardener" card. They are then placed on the Green Gardener list, which is then promoted to the public by the County (County of Santa Barbara, 2008). The program benefits both parties; gardeners receive education and advertising at a nominal cost, and the County receives the benefit of more environmentally-friendly landscaping and a reduction in the use of pesticides. Municipalities may promote this type of program by contracting with landscaping companies that have their employees trained in green gardening practices.

Encouraged by the success of the Santa Barbara Green Gardener Program, the Monterey Bay area instituted a similar program. "The goal of the program was to educate and certify local gardeners in resource efficient and pollution prevention landscape management practices" (Ecology Action, 2007). With the support of the State of California Water Resources Control Board, more municipalities are likely to follow (Ecology Action, 2007).

4.1.2.2 Pest Control Contracting

Status: Currently partially implemented by the Permittees.

Many municipalities contract pesticide applications to professional PCOs. Contracting only with PCOs that have IPM training and certification can help realize IPM models and goals. The recently completed EcoWise Certified IPM Contracting Tool Kit (www.EcoWiseCertified.org), provides resources for municipal agencies to use in developing such a program. The EcoWise IPM Tool Kit includes:

- Elements to consider when developing an IPM policy
- Roles and responsibilities of the agency or business in an IPM program
- How to hire and work with a professional IPM service provider

The Took Kit also includes the EcoWise IPM Process along with a number of other helpful resources and sample documents.

Because PCOs are responsible for the majority of pesticides applied in urban areas, distribution of information regarding less-toxic alternatives, lower-use application techniques, and proper disposal, practices to professional applicators is an essential component of the Permitee's pesticide control effort. The Permittees currently distribute information to PCOs through the Public Outreach and Education Program (see Section 4.1.3).

The City of Palo Alto's Regional Water Quality Control Plant includes IPM requirements in their contracts with PCOs (City of Palo Alto, 2008). The City of Santa Monica, as a part of their SIPM program, specified IPM requirements in their PCO contracts (Raphael, 1997). Use of PCOs with IPM training and certification by municipalities encourages local PCOs to invest in IPM training and certification, which in turn, allows their expertise in IPM to expand beyond just the municipality itself (Quarles, 2002). Education of PCOs, hiring only PCOs that have IPM training, and contracting specifically for IPM by local agencies may

create more public awareness and reduce the use of pyrethroids in the Santa Margarita watershed.

4.1.2.3 Structurally Integrated Pest Management Program

Status: Currently being implemented by the Permittees, with additional programs under consideration.

SIPM is a program that controls the access of pests to buildings and the potential food sources within them by protecting the structure itself from pests, with minimal use of pesticides. The Permittees intend to lead by example, sharing success through public outreach programs and encouraging individuals and businesses to do the same. SIPM is a long term solution offering positive potential impacts on budget, reduction of pests and, reduction of pyrethroid pesticide use. Note that SIPM should not be confused with category of pesticide use referred to as structural pest control. SIPM is a BMP designed to reduce the use of pesticides in a structural pest control program.

The City of Santa Monica implemented an SIPM program and experienced a reduction in pests and in the use of pesticides. In addition, Santa Monica reduced pest management costs by 30% (State of California, 2008). California law requires a SIPM strategy for all state-owned buildings and schools (State of California, 2008). The three main aspects of a SIPM strategy are facility design and LID, monitoring, and facility maintenance.

<u>Facility Design</u>

Status: Currently being implemented by the Permittees.

Facility design can play a large role in the exclusion of potential pests. "A facility's planning, design, and construction provides an opportunity to incorporate features that help to exclude pests, minimize pest habitat, and promote proper sanitation" (NIH, 1999). It can also reduce

storm water runoff (NAHB, 2008). Exclusion of pests helps reduce pest infestations and in turn the need for pyrethroid pesticide use. For example, ensuring that the design holds plants and mulch several inches away from the foundation of a building may assist the reduction of ant populations immediately adjacent to the building (UC Davis, 2007). A reduction in storm water runoff may also reduce the amount of pyrethroids that enter receiving waters. Facility designs can incorporate aspects of LID, as discussed below. New development and redevelopment may incorporate designs that aid in the exclusion of pests and the reduction of urban runoff, which may contribute to a reduction of pollutant loads, including pyrethroids.

Pest Monitoring

Status: Currently in not use by the Permittees, program under consideration.

Monitoring structures and adjacent areas may help prevent pest infestations and quickly identify potential problems. Traps, visual inspections, and staff interviews assist in the identification of areas and conditions that may foster pest activity (NIH, 1999). Monitoring for ants, for example, may consist of simple inspections of facilities such as looking under sinks and along pipes and electrical wires (UC Davis, 2007). The City of Santa Monica, as a part of their SIPM, provided training to all general staff, purchasing, carpenters and custodial staff. Specific presentations were given to groups, such as the custodial staff, who learned about products used in control of ant and cockroach populations and general sanitation. The staff is trained in the identification of potential pest infestations and habitat conditions that may foster pest activity (Raphael, 1997). Early identification of pest infestations can increase the effectiveness of specific treatments and reduce the overall need for pesticide use.

Sanitation and Facility Maintenance

Status: Currently not being implemented by the Permittees, program under consideration.

Proper sanitation includes reducing clutter and pest habitat and incorporating proper facility and waste management practices. Records of maintenance and housekeeping conditions may help track pest problems and assist in the determination of whether corrective action is needed or has been taken in a timely manner (NIH, 1999). Sanitation and facility maintenance involves the housekeeping staff, the building maintenance staff, and the landscaping staff.

Improper storage of waste may affect urban runoff, and it may create a hospitable environment for pests, particularly ants. Initial, low-cost steps that municipalities may take to improve waste handling are: controlling litter, keeping waste collection areas clean, and insuring proper disposal of pyrethroid pesticide products, if used, and educating employees and the public. Simple solutions such as rinsing out soda bottles and emptying trash daily prove effective to reduce insect infestations, particularly ants (UC Davis, 2007). An important component of an SIPM monitoring program is regular inspections of solid waste containers for structural damage or leaks (CASQA, 2004).

Educating custodial staff, such as was done in the City of Santa Monica, can reduce the amount of improperly disposed pesticides (Raphael, 1997). Designating staff members to perform a daily checklist of areas around the structure to ensure cleanliness and proper storage of waste can assist the efforts to reduce potential pest infestations and leakage of hazardous waste (CASQA, 2004).

Building maintenance staff also benefit from education and acceptance of responsibility for pest management. Maintenance crews can contribute to an SIPM strategy by securing the structure, such as caulking holes and cracks, assisting in the removal of clutter, and installing

door sweeps (State of California, 2008). Caulking holes in structures can prove effective in keeping ants out of facilities (UC Davis, 2007). Upkeep on building maintenance helps reduce potential pest habitat, and thus may reduce the need for application of pyrethroid pesticides.

Reduction of pest habitat around structures may reduce pest populations in and around structures. Marin County, as part of its integrated pest management program, has reduced rat habitat around the local Civic Center and in turn has seen suppression of the rat population (Carlsen, 2008). Programs similarly tailored to ants may result in a positive effect of pest reduction within the SMR. For example, banding tree trunks with tanglefoot or similar sticky substances can keep ants away from trees (UC Davis, 2007). Education and training may be provided to Permittee landscaping crews to assist in proper vegetation removal and, when necessary, pesticide use. Landscaping crews may be informed that pyrethroid pesticides or any less toxic pesticides are to be used only when a pest problem arises to an intolerable level, that they are not administered when a wet weather event is expected and only when low wind speeds are present (CASQA, 2004). Education of landscaping crews to remove pest habitat may reduce the need for pyrethroid use thus reducing the potential risk of pyrethroids entering storm water runoff.

Also, utilizing low water using vegetation and alternative landscaping techniques such as xeriscaping or naturescaping are efforts that landscape crews can take to reduce pyrethroids in urban runoff. Landscaping crews may also help preserve the water efficiency of the landscape through properly timed fertilizing, weeding, pruning, and pest control. For example, proper collection and disposal of yard clippings can prevent loose vegetation that has possibly been treated with pyrethroid pesticides from entering waterways or storm water drainage systems such as MS4s (CASQA, 2004). Reduction in pest habitat and proper landscaping maintenance may help reduce pest problems, and thus the need for pyrethroid pesticides.

4.1.3 Public Outreach and Education

Status: Currently being implemented by the Permittees.

Public Outreach and Education programs inform the public about storm water issues, proper use and disposal of publically available chemicals, and alternatives to pyrethroid pesticides. Reaching out to the public and providing information about the dangers of pyrethroids pesticides encourages citizens to make educated decisions about pesticide use. It also may accelerate state and federal regulatory changes regarding pyrethroid use through public promotion of such changes. According to the EPA, public education and awareness can be a "key component" in any BMP program for storm water management (EPA, 2008).

The District has enacted a public outreach program to help reduce the potential for pyrethroid pesticides to contaminate receiving waters. This program has initiated: distribution of educational materials to hardware store employees, active participation and distribution of outreach for HHW/ABOP facilities to provide for free venues to dispose of excess pesticides, and distribution of EPA and CalEPA materials to the public. The District also promotes the use of less toxic pesticides, provides education on storm water issues in public schools, and has enacted a multimedia campaign to control urban sources of pyrethroid pesticides (RCFCWCD, 2005).

<u>Education and Outreach to Businesses</u>

Status: Currently being implemented by the Permittees.

Distribution of information regarding pesticides to businesses, particularly hardware stores, is crucial for reducing pyrethroid use and misuse at its source. Education on pyrethroid runoff to local hardware stores may assist local hardware store employees to educate their customers on alternative methods of pest control. An Orange County survey from 2001 found that 55% of pest control products were purchased at hardware stores (Wilen, 2001). In

2006, Riverside County had 177,562 pounds of reported non-agricultural usage of pyrethroid pesticides (RCFCWCD, 2008). Reduction in usage may lead to a reduction of pyrethroids in urban storm water runoff. Educating hardware store employees about urban water quality impacts of pyrethroid pesticides may help reduce the usage and thus the toxicity of runoff in the Santa Margarita Watershed resulting from pyrethroid use, as employees have the ability to recommend alternative methods of pest management to their customers.

Education of nursery employees about pyrethroid management and IPM techniques may also yield significant source control benefits. In general, nursery employees tend to be more knowledgeable about pesticides than employees at hardware stores (Wilen, 2001). Nurseries that use and sell pyrethroids offer the highest return on outreach resources, while those nurseries that have chosen alternate pest management methods serve as examples of IPM in practice. In a recent Riverside County survey, one nursery stated that they do not use pesticides and if their nursery does experience a pest infestation, it is treated naturally (RCFCWCD, 2008). Such nurseries are likely to encourage their clients and customers to use the same methods. Education and outreach can lead to cooperation and sharing of successful and unsuccessful methods of IPM and ultimately reduce pyrethroid pesticide use and toxicity of storm water runoff.

Businesses not in the industry of pesticide sales may also benefit from outreach. The District directs outreach efforts to all businesses; those in the business of selling or using pesticides, and those that are not. The District has coordinated with the County's Business License Department to include an educational insert of the "Only Rain Down the Storm Drain" program to new business license applicants and annual renewal reminders (CRWQCBSD, 2008). Informing companies on proper disposal of hazardous materials such as pesticides is crucial to prevent pyrethroid containers from being improperly disposed of, leaking, and then contributing to storm water pollution.

Several Southern California cities conduct general business outreach as well. Cities such as Carson, Gardena, Inglewood, and Lomita distribute informational pamphlets on storm water

pollution relating to landscaping and gardening practices to general businesses (DCWMAC, 2007). Such information informs businesses of alternate methods of pest control beyond pesticide use and imparts knowledge about storm water quality issues. Thus, dissemination of educational materials to local businesses is intended to help reduce pyrethroid runoff by ensuring proper disposal of pesticides and encouraging alternate methods of pest control.

Educational and Outreach to the General Public

Status: Currently being implemented by the Permittees.

The District distributes educational materials within the Santa Margarita Region such as EPA sponsored pamphlets in order to promote reduced use of pyrethroid pesticides and educate the public about alternate practices of pest management. The public purchases retail pesticides and uses them, presumably, according to the manufacturer's instructions and in compliance with regulations listed on the packaging, including proper disposal of empty containers in the municipal waste stream. However, even when used properly, retail pesticides have the potential to contaminate urban runoff, and homeowners may be unaware of the downstream consequences of pesticide use. Depending on the landscaping practices in a neighborhood, promoting alternative pest management strategies and educating the public on storm water quality and pesticide use may be the most beneficial way to reduce the source of pyrethroids in urban runoff (Wilen, 2005).

The District distributes educational materials within other public outreach programs and maintains pest management information on the internet. The District also distributes brochures to educate the public on lawn and garden maintenance, fertilization, and pesticide and household chemical use (RCFCWCD, 2005). These educational materials provide public education on alternative pest control methods, limiting individual use of pyrethroids, and proper disposal of pesticide containers.

Many municipalities perform storm water outreach at festivals and public events by participating in the events and by distributing brochures. The Cities of Lawndale and Torrance plan and attend public festivals and rent booth space to educate the public about storm water quality and the use of pyrethroids (DCWMAC, 2007). Cities including Carson, Gardena, Inglewood, and Lomita distribute informational pamphlets on storm water pollution relating to household activities and landscaping and gardening practices to the general public (DCWMAC, 2007). The District participates in events such as the Children's Groundwater Festival, the Southern California Fair, the Community Water Festival, and the Santa Margarita Watershed Clean Up (RCFCWCD, 2005). The Permittees, as well as other municipalities within California, participate in public events and distribute informative materials as a portion of their current public outreach programs.

Education on proper disposal of pesticides

Status: Currently being implemented by the Permittees.

Improper disposal of pesticides is a potential contributor to storm water contamination. Empty containers be disposed of in the municipal waste stream are not likely to contribute to storm water pollution, however, unused pesticides may enter the MS4 by leaking in transit. In Orange County in 2001, 54.5% of people surveyed claimed to have disposed of unwanted pesticides in the municipal waste stream, and 78.6% did not know the location of a household waste disposal site (Wilen, 2001). The District has created a partnership with Riverside County Waste Management to provide educational programs and materials on proper disposal of unwanted waste, including pesticide containers (RCFCWCD, 2005).

Multimedia Outreach

Status: Currently being implemented by the Permittees.

The EPA suggests using multiple media sources to promote and educate on storm water impacts, particularly through public service messages (EPA, 2007). Mass media has proven to be a key source of pollution prevention information for the general public (LADPW, 2002). The District currently participates in a multimedia advertising campaign including: maintaining a website that provides information, distributing mailing inserts regarding water quality issues through various county entities, and billboard advertising campaigns. Many other municipalities, such as the Cities of Palo Alto and Lawndale, also use the world wide web to provide information to the public (City of Palo Alto, 2008) (DCWMAC, 2007).

Public School Programs

Status: Currently being implemented by the Permittees.

A storm water education program for public schools is a concept supported by the EPA (EPA, 2007). The County of Los Angeles has incorporated public school educational programs into its outreach program (LADPW, 2002). The District focuses storm water education efforts on elementary school students (RCFCWCD, 2005). For example, sixth-grade students at Warm Springs Middle School were given an interactive presentation regarding storm water pollution with an enviroscape model that excited and engaged the students; a presentation that has been given over 150 times during the 2003-2004 school year (Jamescourie, 2004). Educational programs in public schools are intended to produce long-term benefits to storm water runoff quality.

Education on Lower Risk Alternative Pesticides

Status: Currently being implemented by the Permittees.

Part of Public outreach includes suggesting less toxic alternatives to pyrethroid pesticides, such as those listed on the Our Water Our World website (www.ourwaterourworld.org). Lower risk pesticides have reduced impacts on human health, lessened toxicity to non-target organisms, decreased potential for water contamination, and lower pest resistance potential (Matteson et al., 2007). The District distributes materials associated with the "Our Water Our World" organization (RCFCWCD, 2008).

However, some of the lower risk pesticides are toxic to beneficial arthropods and still have the potential to pollute surface and ground water (Matteson et al., 2007). Pyrethroids were developed as a less toxic alternative from organophosphate pesticides (Quarles, 2002). In the Santa Margarita Watershed, there was a decrease in water toxicity to *Ceriodaphnia* and an increase in toxicity to *Hyalella* as organophosphate pesticides such as chlorpyrifos and diazinon and were replaced by pyrethroids (RCFCWCD, 2008). The effects on storm water runoff of lower risk pesticides must be carefully evaluated before they are promoted as effective solutions to urban storm water runoff pollution.

4.1.4 Low Impact Development (LID)

Status: Currently being implemented by the Permittees.

LID involves environmentally-friendly building and development designs that mitigate impacts to land and water. LID functions by managing storm water at its source, incorporating a variety of runoff control techniques, using natural features as design features, and protecting natural resources (NAHB, 2008). Municipalities that promote LID have the potential to reduce municipal infrastructure and maintenance costs while balancing growth needs with environmental protection (NAHB, 2008). LID practices include "small scale,

decentralized treatment practices" that include conservation of open space, a reduction of impervious surfaces, and the incorporation of water controls (NAHB, 2008). Reduction of urban runoff volumes may reduce the loadings of pyrethroids to receiving waters in urban areas.

In 2007, EPA implemented a retrofit of the agency headquarters in Washington, D.C., incorporating LID designs to assist with storm water retention (EPA, 2007). Retention of storm water on the land helps prevent pollutants from entering streams and rivers (EPA, 2007). One of the main goals of the EPA LID retrofit was to demonstrate several LID techniques and encourage government agencies and developers to use them (EPA, 2007). LID may be used in conjunction with IPM programs, which would reduce the amount of pesticides used and minimize the urban storm water runoff of pyrethroids. The County of San Diego's most recent MS4 permit requires implementation of LID techniques (County of San Diego, 2007); this appears likely to continue as a trend with other permits in the region as they are renewed. The incorporation of LID principles into development regulations in the Santa Margarita watershed provides a potential solution to runoff of pyrethroids into receiving waters.

4.2 Treatment Control BMPs

Treatment Control BMPs are typically structural devices engineered with the intent to remove pollutants from storm water. Treatment BMPs require construction and long term maintenance, but can be extremely effective (CASQA, 2003). Although treatment BMP's have not been thoroughly investigated specifically for reduction of pyrethroids, some methods may be useful. Pyrethroids bind tightly to soil particles so there is a high probability that pyrethroids would be removed with suspended solids when they pass through treatment BMPs. In addition, pyrethroids degrade over time; permethrin, for example, has a half life in soil of about 30 days and about 10 days on certain plant life. Because pyrethroids have low mobility in soil, infiltration-based treatment BMPs have a low probability of contributing to groundwater contamination (NPTN, 1997).

From the list of available treatment BMP's identified in Table 3-1, the types of treatment BMPs feasible for pyrethroid treatment in the Santa Margarita Watershed, considering the climate, local vegetation, and soil types present are: pervious pavement, media filters, extended detention basins, infiltration basins, and infiltration trenches.

These BMPs and their potential to remove pyrethroids from storm water runoff are described below.

4.2.1 Pervious Pavement

Status: Currently being implemented by Permittees under LID program.

Pervious or porous pavement is "a system comprising a load-bearing, durable surface together with an underlying layered structure that temporarily stores water prior to infiltration or drainage to a controlled outlet" (CASQA, 2003). Pervious surfaces include grass, gravel, and porous concrete and asphalt (CASQA, 2003). The multi layer system assists in preventing pyrethroid pollution by providing a stable structure for pyrethroids to bind to and degrade, thus helping to prevent their transport in to receiving waters. Silts that are deposited within the pavement may need infrequent controlled waste disposal (CASQA, 2003).

The advantage of porous pavement is that urban runoff is reduced while treatment is provided and it is an effective drainage solution in confined urban areas. However, porous pavement is not a viable option on high traffic or high speed roads due to safety issues. There is a small chance that it may contaminate groundwater. It is fairly easy to replace, should there be a clog or damaged area, as small areas can individually be paved (CASQA, 2003). The use of pervious pavement appears to be a growing trend.

4.2.2 Media Filter

Status: Currently being implemented by Permittees via sand filters.

Storm water media filters are usually two-chambered including a pretreatment settling basin and a filter bed filled with sand or other absorptive filtering media. As storm water flows into the first chamber, large particles settle out, and then finer particles and other pollutants are removed as storm water flows through the filtering media in the second chamber. Media filters are highly effective at removing sediment from storm water flows (CASQA, 2003). They are appropriate in low flow areas, particularly with sandy soil. Washington D.C. and Austin, TX have both successfully implemented media filters to treat storm water (VCSQMP, 2002). They "are well suited to Southern California because they do not require vegetation and require less space than other treatment control measures with similar removal efficiencies when a partial treatment sedimentation basin is used" (VCSQMP, 2002).

However, media filters clog easily when exposed to high sediment loads and may decrease in effectiveness after being in use for a few years (CASQA, 2003). A media filter is not appropriate for areas with erosive soil upstream from the treatment filter (VCSQMP, 2002). The lack of abundant native vegetation in the Santa Margarita watershed contributes to a high potential for erosion, so media filters may not be effective in the long term due to clogging. When clogging does occur, media filters may become a nuisance due to mosquito or midge breeding in pooled waters (CASQA, 2003).

4.2.3 Extended Detention Basin

Status: Currently not being implemented by the Permittees for pyrethroid reduction.

An extended detention basin (EDB) is a permanent basin "formed by excavation and/or construction of embankments to temporarily detain the Stormwater Quality Design Volume

(SQDV) of storm water runoff to allow sedimentation of particulates to occur before the runoff is discharged"(VCSQMP, 2002). EDBs are constructed with an outlet at the bottom that allows for a slow, time-controlled release. The ultimate goal of EDBs is to level off peak storm water runoff rates (VCSQMP, 2002). Santa Clara Valley and the City of Palo Alto have noted that their detention basins have helped with the reduction of pollutants (EOA, 2004) (City of Palo Alto, 2008). Pyrethroids could be removed in the basin through settling of particulates.

Extended detention basins can serve multiple purposes as they provide for significant trash removal as well (CASQA, 2003). Maintenance is needed to ensure that the pond fully drains after large wet weather events, to avoid creation of standing pools causing mosquito or other vector habitats (CASQA, 2003). Extended detention basins are most effective when used in conjunction with other control measures, and are only moderately successful at removal of sediment. EDBs require relatively large amounts of land and therefore may not be feasible in urban areas of the Santa Margarita watershed (VCSQMP, 2002). There are no available examples of test results from municipalities using an extended detention basin for reduction of pyrethroid pesticides.

4.2.4 Infiltration Basin

Status: Currently not being implemented by the Permittees for pyrethroid reduction.

An infiltration basin is a shallow impoundment that is designed to infiltrate storm water and utilize the natural ability of soil to remove pollutants in storm water runoff (CASQA, 2003). Infiltration basins store runoff until it eventually enters the soil and infiltrates into the water table (CASQA, 2003). The soil present in the Santa Margarita Region is extremely pervious and may work well with an infiltration basin treatment structure.

Since pyrethroids adsorb onto soil, pyrethroids are likely to be removed from the storm water into the soil. However, there is a slight possibility that they may be resuspended into the

groundwater. Monitoring of pilot sites would be required to determine if there is transport of pyrethroids to the water table.

As with detention basins, maintenance is needed to ensure that the basin fully drains after large wet weather events to avoid creation of standing pools causing mosquito or other vector habitats. Infiltration basins may fail if the storm water volume is greater than the design volume (VCSQMP, 2002). Since infiltration basins require a large amount of open space, installation in urban areas is problematic. There are no available examples of test results from municipalities using infiltration basins for reduction of pyrethroid pesticides.

4.2.5 Infiltration Trench

Status: Currently not being implemented by the Permittees for pyrethroid reduction.

An infiltration trench is a long and narrow ditch that collects storm water runoff by storing it in the voids in a rock bed and allowing it to infiltrate to the soil matrix (CASQA, 2003). Infiltration trenches are extremely effective at removing fine sediment particles and associated pollutants (CASQA, 2003). Naturally pervious soils are required (VCSQMP, 2002). The Santa Margarita watershed has naturally pervious soils, which would allow for the removal of pyrethroids from the water and into the sandy soil.

Infiltration trenches are typically used in conjunction with grass lined channels or grass filter areas located upstream for maximum removal of sediment and larger particles (VCSQMP, 2002). Due to the arid environment in the Santa Margarita Region, grass lined channels, or even vegetated strips, would require irrigation to maintain the vegetation. If the infiltration trench clogs, it can become a source for mosquito breeding. There are no available examples of test results from municipalities using infiltration trenches for reduction of pyrethroid pesticides.

4.3 BMP Evaluation

A summary of the relative advantages, disadvantages and costs of the various BMPs identified in Sections 4.1 and 4.2 above is presented in Table 6.1 below. The table includes advantages, disadvantages, and the relative cost of implementing the BMPs.

Table 6.1
BMP Comparison Table

BMP Technology	Advantages	Disadvantages	Relative Cost*
Source Control			
Regulatory Change	Reduces the availability of pyrethroids on the market	May take years to achieve full effect	$
Integrated Pest Management	Engages businesses and the public in environmentally sound gardening practices	Need to ensure that employees are following protocols	$
	Has been implemented in various locations throughout CA and the US	Could have some resistance from employees who are use to standard practices	
	SIPM can be put in place directly by the Permittees	Some may find the organic methods of gardening to be too time consuming	
	SIPM can be incorporated directly into current maintenance activities		
	Includes LID aspects		
Public Outreach and Education	EPA states that Public Outreach is key for any BMP program	Cannot control the direct actions of public but only educate	$
	Copermittees have already implemented a public outreach program	Hard to measure the direct impact of pollutant reduction	
	Employees of business have direct impact on the buying choices of the general public		
	Programs have been implemented by many municipalities		

Table 6.1 (continued)
BMP Comparison Table

BMP Technology	Advantages	Disadvantages	Relative Cost*
Treatment Control			
Porous Pavement	Reduces runoff volume while reducing pollutant load as well	Requires ongoing minimal maintenance	$ to $$ depending on size
	Can be easily replaced depending on the size and location of design	No known measured reduction of pyrethroids.	
Media Filter	Do not require vegetation	No known measured reduction of pyrethroids.	$$$
	Highly effective in removal of sediments	Clogging is an issue because of the erosion potential in the watershed.	
	Requires less space than other treatment controls for sediment removal		
Extended Detention Basin	Known for significant trash	Large footprint Moderately successful at removing sediment	$$$
	Standard BMP with many years of maintenance and operational information available	Create an area with vector breeding potential	
		No known measured reduction of pyrethroids.	
Infiltration Basin and Trench	Uses natural ability of soil to remove pollutants.	Unknown if pyrethroids would be transported to the groundwater table.	$ to $$$
	Local soils would allow infiltration	Would require a pilot study to determine transport.	
		No known measured reduction of pyrethroids.	
		Clogging of outlet structure	
		Accumulation of metals in soil	

*Relative Cost: $ = $0 to $50,000, $$ = $50,001 to $100,000, $$$>100,000

5.0 Pending Legislation

There is no relevant pending state legislation relating to pyrethroid pesticides from the California Department of Pesticide Regulation or, in general, the State of California as of December, 2008 (State of California, 2008) (CDPR, 2008). In August 2006, the DPR put rules in place to control insecticide sprays during the dormant season. During winter, pesticides are applied to dormant tree and vine crops to kill overwintering pests and diseases. The new rules restrict the use of most dormant insecticides when residuals can run off into water (DPR 2007-08 Progress Report). However, there are no additional updates relating to pending pyrethroid legislation at this time.

There is no relevant pending federal legislation relating to pyrethroid pesticides from the United States Congress as of December, 2008 (Library of Congress, 2008). Although the EPA is working on proposed mitigation labeling for non-agricultural pyrethroids, there is no indication as to when this legislation may be enacted (TDC, 2007).

6.0 Proposed Course of Action

The Permittees intend to use a phased approach to address the identified sources of pyrethroid pesticides causing toxicity in surface waters of the SMR watershed. As described in Section 4, various source control BMPs and treatment control BMPs are available to address these sources. However, the use of pyrethroid pesticides can not be directly regulated by local governments. The most effective control strategy involves effective labeling and use restrictions via state or federal regulatory action, to prevent water quality impacts from legal pesticide uses. The proposed course of action involves an adaptive management approach with the following broad elements:

- Pursue state and federal regulatory change through CASQA
- Implement a set of source controls targeted specifically at urban pesticide use,
- Through the annual reporting process, monitor the implementation of those controls, assess effectiveness, and identify sources or areas where additional effort is needed,
- Evaluate whether additional controls, including treatment controls, may be needed to further reduce pyrethroid pollution,
- Implement additional controls as needed,
- Continue to monitor implementation, as well as conditions within the target receiving waters, assess effectiveness, and re-evaluate control program

The Permittees will continue to support CASQA and/or other agencies pursuing regulatory change in labeling or use limitations for pyrethroid pesticides. This support will include participation in the CASQA Pesticides Subcommittee and the Urban Pesticide Committee, and supporting the implementation of the Urban Pesticide Pollution Prevention (UP3) Project. Permittee staff will continue to provide staff time and resources necessary for the CASQA Pesticides Subcommittee to complete its negotiations with the California Department of Pesticide Regulation and USEPA regarding labeling and use limitations for pyrethroids.

Source control is generally a more cost-effective approach to pollution abatement than treatment control, as source controls do not involve the costly capital investments of treatment controls. As discussed previously, CASQA, EPA, and other agencies and experts

recommend a source control program as an essential component of a successful pollution reduction strategy.

The basis of source control involves preventing the entrance of the subject pollutant into the discharge stream. For pyrethroid pesticides, this means preventing the pesticide from entering the municipal storm drain system through urban runoff. This can take place by intervention at the various steps in the pest control process:

- Point of sale: reducing the purchase of pyrethroid products through education of PCOs and the public in consequences of pesticide use and alternative means of pest control, including integrated pest management (IPM)
- Application: reducing use of pyrethroids on site through education of PCOs and the public into the importance of proper application methods and the potential consequences of pesticide use, as well as pest control alternatives (IPM techniques)
- Off-site Transport: reducing movement of pyrethroids into municipal storm drain system via use of Green Gardener approaches, IPM, and LID building techniques to reduce irrigation water use, retain storm water runoff on-site, and provide on-site mitigation for runoff pollutants (via grassy swales, infiltration, etc.)

A five-year pyrethroid pollutant reduction program is proposed by the Permittees.

<u>Year 1</u>

- Continue to support state and federal efforts to improve pyrethroid pesticide regulation
- Continue to publicize/promote the services of IPM-certified PCOs, to encourage businesses and homeowners to choose their services
- Continue to implement local agency contracting rules to require contracting of IPM-certified PCOs for municipal pest control (through EcoWise Certified IPM Contracting Tool Kit, e.g.)
- Continue point-of-sale education effort providing instruction in pesticide alternatives and proper use/application (using materials available through Our Water Our World, UP3 Project, CASQA members, e.g.)
- Continue efforts to develop and implement LID guidance for planning and development

Year 2

- Coordinate with the University of California (UC) Extension Master Gardener Program to extend its services to the Temecula/Murrieta area to further promote and support the use of IPM by local residents
- Re-evaluate, enhance as needed, and continue measures implemented in Year 1

Year 3

- Conduct programmatic assessment as part of third-year annual report, evaluate successes and areas where additional efforts are needed and adjust program accordingly
- Re-evaluate, enhance as needed, and continue measures implemented in Years 1 and 2

Year 4

- Evaluate effectiveness of BMPs using water quality monitoring data as part of fourth year annual report
- Re-evaluate, enhance as needed, and continue implementation of revised program as defined in Year 3

Year 5

- Conduct programmatic assessment, evaluate successes and areas where additional efforts are needed as part of ROWD process
- Identify additional program elements, including source and/or treatment controls, as needed to effect required pollutant reductions; revise program accordingly
- Re-evaluate, enhance as needed, and continue implementation of revised program as defined in Year 3

Many of the source control materials and programs needed are readily available through existing programs such as EcoWise Certified, Green Gardener, Our Water Our World, the UP3 Project, and the Western IPM Center. The following websites provide further information on these and other programs:

Urban Pesticide Pollution Prevention (UP3) Project: www.up3project.org
Green Gardener Program: www.green-gardener.org/about
Western Integrated Pest Management Center: www.wripmc.org
EcoWise Certified Integrated Pest Management: www.ecowisecertified.com
Our Water Our World: www.ourwaterourworld.org
Green California: www.green.ca.gov/EPP/building/structipm.htm

City of San Francisco: http://www.sfenvironment.org/our_programs/topics.html?ti=1
DPR: http://www.cdpr.ca.gov/docs/registration/reevaluation/chemicals/pyrethroids.htm

As a practical measure, it will be necessary to evaluate individual Permittee capabilities and resources, and develop a specific work plan for implementation of the pyrethroid pollutant reduction program.

It is also essential to develop and implement the pyrethroid pollutant reduction program in coordination with other regulatory requirements, especially other pollutant reduction programs mandated under the storm water NPDES Permit and/or load allocations required by TMDLs within the SMR watershed.

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RIVERSIDE, CA 92501
951.955.1200
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0003264
SAN DIEGO REGIONAL
WATER QUALITY
CONTROL BOARD
2009 OCT 30 A 10: 36

RIVERSIDE COUNTY FLOOD CONTROL
AND WATER CONSERVATION DISTRICT

October 29, 2009

Hand Delivered

Mr. John Robertus, Executive Officer
San Diego Regional Water Quality Control Board
9771 Clairemont Mesa Blvd., Suite A
San Diego, CA 92124

Sent UPS Next Day Air

Mr. Terry Oda, Chief
CWA Standards and Permits
United States Environmental Protection Agency
Region IX (WTR-5)
75 Hawthorne Street
San Francisco, CA 94015-3901

Dear Messrs. Robertus and Oda:

Re: FY 2008-2009 Annual Reports
Order No. R9-2004-001
NPDES Permit No. CAS0108766

Please find attached copies of the FY 2008-2009 annual reports for the National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) program for the Santa Margarita Region of Riverside County. The following annual reports are submitted in accordance with Third-Term NPDES MS4 Permit (Board Order No. R9-2004-001, NPDES Permit No. CAS0108766) adopted by the San Diego Region Regional Water Quality Control Board (Regional Board) on July 14, 2004 for the Santa Margarita Watershed Region of Riverside County (Third-Term NPDES MS4 Permit):

- Riverside County Flood Control and Water Conservation District (District) Individual Storm Water Management Plan (Individual SWMP) Annual Report
- County of Riverside Individual SWMP Annual Report
- City of Murrieta Individual SWMP Annual Report
- City of Temecula Individual SWMP Annual Report
- Watershed SWMP Annual Report
- Monitoring Program Annual Report (as Appendix G of Watershed SWMP Annual Report)

The reports provide a comprehensive summary and analysis of the Third-Term NPDES MS4 Permit compliance activities during FY 2008-2009 by the District, County of Riverside, and Cities of Murrieta and Temecula (Permittees).

The Individual SWMP Annual Reports summarize the Permittees' individual compliance activities. The Watershed SWMP Annual Report summarizes the Permittees' combined watershed based compliance activities.

The District is committed to continuing its ongoing efforts to work cooperatively with the Co-Permittees, Regional Board staff and other stakeholders in implementing an effective municipal stormwater program and fulfilling the requirements of the current Third-Term NPDES MS4 Permit. If you have any questions concerning this matter, please feel free to call me at 951.955.8411 or Jason Uhley at 951.955.1273.

Very truly yours,

Mark H. Wills

MARK H. WILLS
Chief of Regulatory Division

Attachments:

- District Individual SWMP Annual Report
- County of Riverside Individual SWMP Annual Report
- Murrieta Individual SWMP Annual Report
- Temecula Individual SWMP Annual Report
- Watershed SWMP Annual Report
- Monitoring Program Annual Report (as Appendix G of Watershed Annual Report)
- CD/DVD with electronic copies of above reports

ec: Riverside County - Santa Margarita Watershed MS4 Co-Permittees

- U. S. Environmental Protection Agency - Region IX
  Attn: Eugene Bromley
- Santa Rosa Plateau Ecological Reserve
  Attn: Carole Bell

JU:cw
P8/127666

CITY OF MURRIETA
ANNUAL PROGRESS REPORT

Reporting Period
July 1, 2008 to June 30, 2009

Santa Margarita River Watershed

FOR
SAN DIEGO REGIONAL WATER QUALITY CONTROL BOARD
(ORDER NO. R9-2004-001)

CITY OF MURRIETA

CERTIFICATION STATEMENT

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Patrick A. Thomas

Signature

Mr. Patrick A. Thomas / Director of Public Works

Name & Title

10/26/09

Date

SANTA MARGARITA WATERSHED NPDES MUNICIPAL STORMWATER PERMIT

(NPDES No. CAS0108766)

ANNUAL REPORTING FORMS

FOR

CITY OF MURRIETA
FISCAL YEAR 2008 - 2009

I. Executive Summary
1. Development Planning
2. Construction
3. Municipal
4. Industrial/Commercial
5. Residential
6. Education
7. Illicit Discharge Detection and Elimination
8. Public Participation
9. Fiscal Analysis Component
10. Non-Storm Water Discharges
11. Receiving Water Limitations
12. Additional Urban Runoff Data
13. Proposed Revisions

BOARD ORDER NO. R9-2004-001
CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN DIEGO REGION

I. EXECUTIVE SUMMARY

This Annual Progress Report describes the current status of the storm water management program for the City of Murrieta (City) for the Santa Margarita River Watershed. The reporting period is for fiscal year 2008 / 2009 beginning July 1, 2008 and ending June 30, 2009. Each section addresses individual programs that were implemented to comply with the requirements of the municipal separate storm sewer system permit (MS4 Permit) issued to the Santa Margarita Watershed Permittees by the San Diego Regional Water Quality Control board on July 14, 2004. The Permittees, at the time the MS4 Permit was issued, consisted of the City of Murrieta, City of Temecula, County of Riverside, and Riverside County Flood Control and Water Conservation District. Since then, the areas of Menifee and Wildomar have incorporated.

1. DEVELOPMENT PLANNING
(SECTION F of ORDER NO. R9-2004-001)

1) **Description of any amendments to the General Plan or the development project approval process:** None

2) **Number of grading permits issued:** 20

3) **Number of developments conditioned to meet SUSMP requirements:** Thirteen

4) **Attach one example of a development project that was conditioned to meet SUSMP requirements and a description of the required BMPs:** See **Attachment 'A'**

5) **Description of any updates to the environmental review process:** None

6) **Description and number of training efforts conducted during the reporting period (for staff, developers, contractors, etc.), including the number of staff trained.**

   a) **Training:**

Training	Training Description	Training Dates	Number of Attendees
New Development	Riv. Co. NPDES for Damp Implementation	11/3/08	1
New Development	Riv. Co. NPDES for Damp Implementation	5/4/09	3
		Total	**4**

   b) **Summarize the educational and outreach activities the Development Planning Component has conducted over the past year:** Provide WQMP check list to Applicants and require it to be completed for every project. City website has NPDES section.

1. DEVELOPMENT PLANNING
(SECTION F of ORDER NO. R9-2004-001), CONT.

b) **Summarize the educational and outreach activities the Development Planning Component has conducted over the past year:** Provide WQMP check list to Applicants and require it to be completed for every project. City website has NPDES section.

7) **An assessment of program effectiveness based on the measurable goals established in the Permittee's Individual SWMP:** The effectiveness is good. All projects are conditioned with WQMP's if one is required according to the MS4 permit requirements.

8) **Additional Comments/Information:**

Describe the major accomplishments of the Development Planning Component over the past year. (General Plan or ordinance revisions, procedure/approval process changes, SUSMP guidance material): there are no major accomplishments to make note of this year. There were no changes to the General Plan and the Environmental Review Process is the same.

Summarize new activities or improvements to be implemented next year as a result of your self assessment of the Development Planning Component: We updated the WQMP checklist and will post the new General Construction Permit and new MS4 permit on the City website.

Other comments

1. DEVELOPMENT PLANNING
(SECTION F of ORDER NO. R9-2004-001), CONT.

ATTACHMENT A

PLANNING DIRECTOR'S HEARING
RESOLUTION NO. DH-2009-_15_

A RESOLUTION OF THE PLANNING DIRECTOR OF THE CITY OF MURRIETA APPROVING DEVELOPMENT PLAN (CASE # DPO-008-2726), AN APPLICATION BY JIM ALLEN FOR THE DEVELOPMENT OF A 7,437 SQUARE FOOT RETAIL BUILDING IN THE EXISTING MARGARITA VILLE COMMERCIAL CENTER LOCATED AT 39550 MURRIETA HOT SPRINGS RD.

The Planning Director of the City of Murrieta hereby resolves as follows:

WHEREAS, on October 17, 2008 an application was filed by Jim Allen of Allen Associates proposing a development of a 7,437 square foot building on a site area of 55,054 square feet. The building consists of a 5,745 square foot credit union and an attached 1,692 square foot retail lease area. A development plan permit is required by Section 16.56.020.

WHEREAS, a public hearing was duly noticed for the Director's Hearing meeting of June 4, 2009, by mailing a notice to property owners within a 500 foot radius of the site on May 22, 2009, publishing the notice in The Californian newspaper on May 24, 2009, and posting the site on May 22, 2009.

WHEREAS, the project, as proposed, has been determined to be in compliance with Mitigated Negative Declaration for Development Plan DP0-004-059, Tentative Parcel Map 32921, and Variance VAR-004-061, which was adopted on October 13th 2004 as it adequately addressed any potential environmental impacts of the proposed project and pursuant to Section 15162 (Subsequent EIRs and Negative Declarations) of the Guideline for Implementation of the California Environmental Quality Act (CEQA), California Code of Regulations (CCR) Title 14, no further environmental review is required for the project.

NOW, therefore, the Planning Director of the City of Murrieta resolves as follows:

SECTION 1. In accordance with Section 16.56.040 of the Murrieta Municipal Code, based upon the staff reports, public testimony and record herein, the Planning Director makes the following findings regarding Development Plan Permit 008-2726:

1. The proposed use is allowed within the subject zoning district and complies with all applicable provisions of this development code;

FACTS: The proposed commercial development is consistent with the Land Use zone designation of Community Commercial. Retail Commercial, Financial Institutions, Fast Food, and Restaurant uses are permitted in the underlying zoning district. The site complies with the Community Commercial zone and applicable Development Code requirements.

2. The proposed use would be consistent with the objectives, policies, general land uses, and programs of the general plan and any applicable specific plan;

   FACTS: The proposed development is consistent with General Plan policies and objectives of the Community Commercial land use designation. The use is consistent with the Community Commercial General Plan Land Use Designation, which allows various commercial uses, financial, office and restaurant activities.

3. The approval of the development plan for the proposed use is in compliance with the requirements of the California Environmental Quality Act (CEQA) and there will be no potentially significant negative impacts upon environmental quality and natural resources that could not be properly mitigated and monitored;

   FACTS: The property as proposed has been determined to be in compliance with Mitigated Negative Declaration for Development Plan DP0-004-059, Tentative Parcel Map 32921, and Variance VAR-004-061, which was adopted on October 13th 2004 as it adequately addressed any potential environmental impacts of the proposed project and pursuant to Section 15162 (Subsequent EIRs and Negative Declarations) of the Guideline for Implementation of the California Environmental Quality Act (CEQA), California Code of Regulations (CCR) Title 14, no further environmental review is required for the project.

4. The location, size, design, and operating characteristics of the proposed use would be compatible with existing land uses within the general area in which the proposed use is to be located.

   FACTS: The site is physically suitable for development and is compatible with the surrounding properties. The proposed building complies with the City's architectural standards for commercial development, Section 16.44.110 of the Murrieta Development Code. The southeast corner of Murrieta Hot Springs Road and Margarita Road is also zoned Community Commercial and is fully developed. Uses such as retail commercial, financial, offices, restaurants, fast food restaurants, and fueling facilities are within the vicinity of the subject site. The proposed development is compatible with the surrounding residential land uses based on the requirement for screening walls and landscaped buffers along the adjacent property lines of the site and the single family homes to the south and west.

5. There subject site is physically suitable for the type and density/intensity of the use being proposed.

   FACTS: The site is physically suitable for development and is compatible with the surrounding properties. The proposed facility is adjacent to other commercial uses, which are zoned Community Commercial and Single Family 2. The General Plan and Development Code require buffering for the adjacent residential uses. There are existing screening walls and landscaped buffers for the adjacent residential uses that are a part of the site design.

6. There are adequate provisions for public access, water, sanitation, and public utilities and services to ensure that the proposed use would not be detrimental to the public convenience, health safety, or general welfare.

   FACTS: The project proposes uses consistent with the surrounding area, General Plan and zoning. The Eastern Municipal Water District will provide sewer and water; electricity by Southern California Edison Company; and gas by the Gas Company. These facilities are available through connections from existing Murrieta Hot Springs Road and Margarita Road.

SECTION 2. Pursuant to the above findings, the Planning Director of the City of Murrieta hereby accepts the environmental determination and adopts a Resolution approving Development Plan Permit DP0-008-2726 based on the Findings and subject to the following conditions contained in the attached Exhibit A incorporated herein by this reference.

PASSED, APPROVED AND ADOPTED THIS 4th DAY OF JUNE, 2009

Mary E. Lanier, Community Development Director

ATTEST:

Cynthia S. Kinser, City Planner

I, Cynthia S. Kinser, City Planner, City of Murrieta, California do hereby certify under penalty of perjury that the foregoing Resolution was duly adopted at a Director's Hearing on the 4th day of June, 2009.

FINAL CONDITIONS OF APPROVAL
DEVELOPMENT PLAN 008-2726
NORTH ISLAND CREDIT UNION
JUNE 4, 2009

PLANNING DEPARTMENT:

1. The permittee/owner shall defend (with attorneys approved by the City), indemnify and hold harmless the City of Murrieta, its agents, officers, and employees from any claims, damages, action, or proceeding against the City or its agents, officers, or employees to attack, set aside, void, or annul an approval of the City, its advisory agencies, appeal boards, or legislative body concerning this approval Development Plan 008-2726. The City will promptly notify the permittee of any such claim, action, or proceeding against the City and will cooperate fully in the defense.

2. Any fees due the City of Murrieta for processing this project shall be paid to the City within thirty (30) calendar days of final action by the approval authority. Failure to pay such outstanding fees within the time specified shall invalidate any approval or conditional approval granted. No permits, site work, or other actions authorized by this action shall be processed by the City, nor permitted, authorized or commenced until all outstanding fees are paid to the City.

3. The project approval is for a Development Plan consisting of a single story 7,437 square foot single story building. This development consists of a 5,745 square foot credit union and an attached 1,692 retail lease area. All construction shall be in substantial conformance with approved plans, elevations, material and color board (s) with the approval date of June 4, 2009. Any proposed change substantially different than the approved plan shall require an amendment to this approval in accordance with the Development Code.

4. The project shall be developed in conformance with all approved exhibits stamped and dated June 4, 2009. Subsequent modifications of this approval, which do not intensify the use, including but not limited to reorientation of structures, alteration of parking and circulation design, minor changes to the Conditions of Approval, interpretations of the Conditions of Approval relative to intent, necessity of, and timing, may be approved by the Planning Director, unless the Director requires a Substantial Conformance or Revised Permit application in accordance with the Development Code. Materials and colors used in the construction of the building(s) shall be consistent with those approved with this application and which are consistent with the rest of the commercial center.

5. Pursuant to Section 711.4 of the State of California Fish and Game Code, the applicant is required to pay a $64.00 County of Riverside handling fee. Said fees shall be paid to the Clerk/Recorder of the County of Riverside at the time the Notice of Determination/Exemption is filed pursuant to Section 21152 of the Public Resources Code. If this fee is not paid, the approval of this project shall not be operative, vested, or final. In order to comply with State mandated time lines for filing of a Notice of Determination, the above fee must be delivered to the Planning Department within **two (2)** working days after the date of final approval.

6. Building colors and materials shall be in substantial conformance with those shown on APPROVED PLANS June 4, 2009.

7. The development of these premises shall comply with the standards of the City's Development Code and all other applicable State and Federal codes.

8. This permit shall conform to the development standards of the Community Commercial (CC) zone.

9. Prior to the execution of any purchase contract or tenant lease agreements, a detailed statement disclosing to perspective buyer/tenant(s) the amount of parking provided for each unit, and that the City's parking requirements could significantly restrict a proposed use. Additionally, the disclosure shall advise buyers/tenants to confirm with the City the parking requirements for the any proposed use. Any use requiring additional parking above that provided or otherwise made available shall not be permitted.

10. The applicant shall pay all applicable impact and/or mitigation fees or provide proof that all required fees have been paid in accordance with City policies and ordinances in effect at the time of permit issuance.

11. The project site shall be the point-of-sale for the purpose of collecting any sales tax on goods that are sold, delivered or rented by any business on the site.

12. Parking for this project was determined primarily on the basis of Development Code Section 16.34 and requires 37 parking stalls based on retail services. The average retail use calls for 1 space for each 200 square feet of gross floor area. Per the approved shopping center site plan, 50 spaces are being provided.

13. No signs are approved as part of this project approval. Prior to the installation of any on-site advertising or directional signs, the applicant shall review and adhere to the existing center's comprehensive sign plan. A sign permit application shall be submitted to and approved by the Planning Department pursuant to the requirements of Section 16.38 of the City's Development Code.

14. No outdoor advertising display, sign or billboard (not including on-site advertising or directional signs) shall be constructed or maintained within the property subject to this approval.

15. Roof gutters and downspouts are not permitted on the exterior of the building unless satisfactorily integrated into the architecture as determined by the Planning Department prior to building permit issuance.

16. All trash bins shall be stored in approved enclosures and screened in compliance with Sections 16.18.120 and 16.18.150 of the Murrieta Development Code. The location of the enclosures must be shown on the precise grade plan.

17. Trellis for trash enclosures must meet the following design guidelines: 6"X6" post, 6"X6" beam, 4"X4" or 4"X6" rafter at 12" on center, 18" cantilever end cuts or chamfer.

18. Construction of this project may be done in one (1) phase as shown on APPROVED PLANS. Any additional phases, or modifications to the approved phasing, may be permitted provided a plan for each phase of development is submitted to and approved by the Planning Department.

19. No tenant improvement permit, or any other building permit, shall be granted for any second story, second floor, mezzanine, or interior balcony unless a Development plan, conditional use permit, substantial conformance or a revised permit is approved by the Planning Department in order to assure adequate parking remains within the property. Only a one-story building was approved as part of this permit and reviewed for parking standards.

20. All plant materials within landscaped areas shall be maintained in a viable growth condition throughout the life of this permit.

21. In the event the use hereby permitted under this permit, a) is found to be in violation of the terms and conditions of this permit, b) is found to have been obtained by fraud or perjured testimony, or c) is found to be detrimental to the public health, safety or general welfare, or is a public nuisance, this permit shall be subject to the revocation procedures in Section 16.82 of the Development Code.

22. Outside storage is not approved/permitted as part of this project.

23. The applicant shall obtain approval of all necessary plans for the construction of structures on the subject property in accordance with the Murrieta Development Code. Such plans include, but are not limited to floor plans and elevations, grading plans, landscaping plans.

24. Mechanical or other utility equipment shall be screened whether it is located on the roof, side of the building or on the ground. The method of screening shall be architecturally integrated in terms of materials, color and form. Roof top equipment should be integrated into the design of the building. An interior room, with direct access, shall be provided for the placement of main utility switch gear distribution and roof access ladders.

    a. Any mechanical equipment and vents (ground or rooftop) shall be screened from view from any public right of ways, landscaping area, open space and parking area. Line of sight details shall be included in the plans for building permit issuance and stamped by a licensed architect. In addition, details including the height of the roof-top equipment and height of the parapet must be a detail within the plans for building permit issuance. Also, during the Planning Department review of the building plans, the design of a proposed screening method shall be included within the building plans in the event the roof top equipment is visible.

b. If any time during the building inspection process, any roof-top equipment is found to exceed the height provided in the details of the approved plans for building permit issuance, the applicant must submit proposed method for screening of the equipment. Approval of such screening method is at the discretion of the Planning Department.

c. Planning Department Approval and Building Permit Issuance must be obtained prior to any installation of the proposed screening method.

25. The life of Development Plan No. 008-2726 shall be used within two (2) years of approval date; otherwise, it shall become null and void and of no effect whatsoever, pursuant to Development Code Section, 16.56.060 B

Prior to grading permit issuance:

26. If during construction/grading cultural or paleontological resources are encountered, work shall be halted or diverted in the immediate area until a qualified archaeologist or paleontological is retained to evaluate the finds and make recommendations for mitigation to the Planning Department. Work shall not resume in the area until the mitigation required by the Planning Department has been implemented.

    If any human remains are encountered during ground-disturbing activities, all such activities in the vicinity of the discovery shall be terminated immediately and notification shall be provided to the County Coroner's office, the Pechanga Band of Luiseno Indians shall be contacted to arrange for the management of the remains. Work shall not resume in the vicinity of the discovery until authorized by the Planning Department.

    A report documenting the monitoring activities shall be submitted to the City of Murrieta within 60 days of the completion of the grading activities. This report shall document the type of cultural resources recovered and the disposition of these resources. The artifacts shall be deposited into an accredited institution that is authorized to accept these types of cultural resources.

27. Prior to issuance of grading permits, the Planning Department shall determine if the deposit based fees for the project are in a negative balance. If so, any outstanding fees shall be paid by the applicant/developer.

28. Prior to the issuance of grading permits, the project applicant shall comply with the provisions of any existing City ordinance that has been established as a mitigation measure for the Stephens' Kangaroo Rat. These ordinances may include fee schedules, mechanisms for protecting habitat, or a combination thereof.

Prior to building permit issuance:

29. Elevations and floor plans of all buildings and structures submitted for building plan check approval shall be in substantial conformance with the elevations and floor plans shown on approved plans dated June 4, 2009.

30. All of the conditions of approval shall be inserted into the building plans.

31. Any exterior lighting within parking lot areas shall not exceed 0.3 foot candles illumination at adjacent residential properties. All lighting fixtures where applicable shall include cut-off fixtures, and shall be designed to project in a downward manner to minimize glare to surrounding properties.

32. All parking lot lights and other outdoor lighting shall be shown on electrical plans submitted to the Department of Building and Safety for plan check approval and shall comply with the requirements of Development Code Section 16.18.100 (Lighting) and thru 16.18.110 Mt. Palomar Lighting Standards.

    a. Any outside lighting shall be hooded and directed so as not to shine directly upon adjoining property or public rights-of-way.

33. The applicant shall pay all applicable fees, mitigation fees or provide proof that all required fees have been paid in accordance with City policies and ordinances in effect at the time of permit issuance.

Prior to building final inspection:

34. All parking requirements shall be completed in conformance with the approved plans, unless otherwise approved by the Planning Department. All parking shall be designed and improved pursuant to Section 16.34 of the Murrieta Development Code.

35. Loading spaces(s) shall be provided in accordance with Section 16.34.100 of the Development Code, as shown on the approved plans dated June 4, 2009. The loading space shall be surfaced with six (6) inches of concrete over a suitable base and shall not be less than 15 feet wide by 25 feet long, with 14 feet vertical clearance.

36. The required number of bicycle rack spaces for this project is 2 (two) spaces which shall be provided in convenient locations to facilitate bicycle access to the project area in accordance with section 16.34.090 of the Development Code. The bicycle racks shall be shown on project landscaping and improvement plans submitted for Planning Department approval, and shall be installed in accordance with those plans, prior to occupancy.

37. All required landscape planting and irrigation shall have been installed in accordance with City's Landscape Architect.

38. All existing outdoor advertising displays, signs or billboards shall be removed.

LANDSCAPING:

Prior to the issuance of building permits:

39. Three copies of construction landscaping plans shall be submitted to the Planning Department and approved. A licensed Landscape Architect shall prepare the plans.

40. The above-described plans shall be in substantial conformance with the plans as approved by the City Landscape Architect, City Administrative Staff, Planning Commission and/or City Council. Notes, details, and specifications shall be included.

41. All landscape and irrigation plans shall be consistent with Title 16.27 (Water Efficient Landscape) and 16.28 (Landscape Standards) of the Murrieta Municipal Code.

42. All parking lot planting areas, curbing, irrigation, and bumper overhang shall be consistent with Title 16.34.070-H. of the Murrieta Municipal Code. Landscaping equal to the amount of parking stall overhang shall be provided in addition to the required five-foot (minimum) planting area or paving required for parking stall overhang in parking stalls that are less than 18 feet long.

43. Planting areas adjacent to streets shall contain at least 12 feet of landscaping between the right-of-way and curb within private property.

44. Landscape plans shall be drawn at a scale of 20 feet equal to 1 foot or larger. The City Landscape Architect will not accept plans drawn in 30 feet scale or smaller without prior approval.

45. No light fixture, flagpole, electric transformer, fire detector check or fire hydrant shall be designed for any location in a planting area, which would make it necessary to eliminate a tree. All overhead light fixtures and utilities shall be identified on the grading and site plan prior to approval of the grading and site plans

46. Plant materials shall be installed from container sizes consistent with Murrieta Municipal Code, 16.28.080, Table 3-5, Minimum Required Mix of Plant Materials.

47. All ground covers shall be installed from living plant materials. Spacing shall be such that 100% coverage is achieved within 2 years of the installation. No gravel or bark areas are allowed. No large expanses of ground cover on slopes shall be designed without approved masses of shrubs within the ground cover areas.

48. All planter areas shall be a minimum of 5 feet wide excluding curbs and required concrete strip adjacent to parking spaces (12" wide by 4" deep doweled into the 6" wide curb or 12" wide by 12" deep integrally poured curb) and excluding walkways, walls, wall footings and overhead obstructions.

49. All trash enclosures shall be covered with architectural treatment to blend with the buildings as approved by the Planning Department. All three sides of trash enclosure

walls shall have a minimum 5 foot wide planting area (excluding curbing, walkway strip, and wall footing encroachment). Flowering vines shall be trained on to the walls. Trees, shrubs and ground covers shall be included.

50. Planting areas adjacent to streets shall have trees provided at the rate of one for each 30 lineal feet of landscaped area.

51. Mature specimen trees in 36-inch or 48-inch boxes or palms with a minimum of 15 feet of brown trunk shall be supplied in sufficient quantity to provide variety and emphasis at main focal areas.

52. Above ground utility locations shall be approved with prior permission of the Planning Department. Building backflow prevention units, fire detector checks and electric transformers shall be located in shrub areas outside of the City right-of-way and screened with shrubs. All double detector check and backflow assemblies shall be located in shrub beds clearly identified on the grading or site plan prior to approval of the site plan. The detector check /backflow devices shall be painted a neutral/earth-tone color and any pipes extending above ground shall be finished and painted to match the device. The detector check and post indicator shall be set back at least 10 feet away from the driveway or sidewalk in a shrub area. Transformers shall be screened with 5 feet of landscaping outside the required setback (18 inches on sides and 8 feet at the front doors).

53. No required canopy shade tree planting area or shrub planting bed shall be narrower than 5 feet wide.

54. Canopy shade trees shall be located directly adjacent to public parking spaces in continuous planting areas at no farther than 25 to 30 feet on center (depending on the canopy spread of the species) to provide the required percentage of parking spaces shaded at 15 years growth. Trees located within the parking lot and in front of buildings with adjacent parking spaces, shall be located no farther than 36 feet on center within curbed planter areas containing a minimum of 25 square feet of planted area. Palms shall not be considered a shade tree.

55. Landscaping shall encompass the site area, as identified on the site plan.

56. No building roof drain shall daylight into a planter area or splash block. Roof drains located at planter areas shall be adapted to convey excess water through the planter via drain pipes, which daylight through the curb into the adjacent gutter or approved bio-swale.

57. Landscaping shall be incorporated and planned as an integral part of the overall project design around the buildings. Landscaping should not interfere with pedestrian or handicap accessibility. Pedestrian and handicap accessibility shall be designed not to interfere with landscaping required around the building.

58. All trees shall be double staked with rubber type ties nailed to the lodge pole stakes in at least two vertical locations.

59. All irrigation in shrub areas shall be designed and installed using drip irrigation. A weather-based irrigation controller shall be installed that measures evapo-transpiration. A rain shut off device shall be installed connected with the irrigation controller.

60. Plant materials within shrub areas shall be drought-tolerant, water-efficient and hydro-zoned. The plant species shall tie in with the existing theme of the overall shopping center.

61. All fertilizers and soil amendments used during planting preparation and installation shall be derived from organic based materials as a best management practice for storm water source control.

62. All private landscaping and landscaping maintained by the City of Murrieta shall be clearly designated on the precise grading and landscape plans.

63. A minimum 12-foot wide landscape area shall be provided along Margarita Road between the right of way and the paving.

64. The project driveway entry point shall be designed with enhanced landscaping in a minimum of 40 feet long (setback from the right of way) by 7 feet wide strip on both sides of the driveway aisle or a 7 foot wide center median. If sidewalks are proposed, the landscaping may be reduced to 4 feet wide adjacent to the sidewalk.

Prior to Construction:

65. The City Landscape Architect shall meet with the job site superintendent and the landscape contractor for a pre-job meeting. A copy of the soil fertility recommendations shall be presented prior to the meeting. No landscaping or site work in public right-of-ways shall occur prior to the meeting.

Prior to the issuance of occupancy permits:

66. Performance securities, in the amount determined by the City to guarantee the adequate maintenance of the landscaping materials and irrigation system in accordance with the approved plans for a period of one (1) year from the date of final clearance of the installed landscaping by the City, shall be posted with the Planning Department. Acceptable forms of security shall be limited to cash deposit, cash bonds, or irrevocable letters of credit. The performance securities shall be released one (1) year after final clearance of the installed landscaping by the City, upon written request by the owner, if the landscaping has been adequately maintained. A deposit to cover re-inspection of the landscape, at the current City rate shall be posted with the Planning Department prior to re-inspection for maintenance bond release.

67. All required landscaping and irrigation systems shall be installed in a condition acceptable to the City. The owner's Landscape Architect shall provide inspection of the landscaping. The owner's Landscape Architect shall provide the City with a Certificate of Compliance stating that the landscaping was installed per the approved plans. The City will review the Certificate of Compliance and conduct inspections to ensure that the landscape installation is in compliance with the approved landscape plans.

ENGINEERING DEPARTMENT:

General Requirements

68. It is understood that the development plan correctly shows all existing easements, traveled ways, and drainage courses, and that the omission may require the map or plans associated with this application to be resubmitted for further consideration.

69. A precise grading permit shall be obtained from the Department of Public Works prior to commencement of any construction outside of the City-maintained road right-of-way.

70. An Encroachment Permit shall be obtained from the Department of Public Works prior to commencement of any construction within an existing or proposed City right-of-way or easement.

71. Coordinate with adjacent property owners affected by grading, street, utility and drainage improvements necessary for the onsite, frontage and offsite improvements. Be solely responsible for acquisition of any necessary easements and agreements prior to grading permit or improvement approval whichever comes first. If necessary, the agreements shall address maintenance, erosion control, and be notarized in a format acceptable to the City Engineer.

72. All improvement plans, grading plans, landscape and irrigation plans shall be coordinated for consistency with adjacent projects and existing improvements contiguous to the site and shall be submitted on standard 24" x 36" City-formatted mylars.

73. All designs shall conform to the City of Murrieta Municipal Code, Development Code, Standard Drawings, and Circulation Element unless otherwise approved by the City Engineer.

74. Prior to approval of any grading plan, improvement plan, or final map; submit clearances from all applicable agencies, and pay all outstanding plan check and processing fees.

PRIOR TO ISSUANCE OF ANY GRADING PERMIT, UNLESS OTHER TIMING IS INDICATED, THE APPLICANT SHALL COMPLETE THE FOLLOWING OR HAVE PLANS SUBMITTED AND APPROVED, IMPROVEMENT AGREEMENTS EXECUTED AND Securities Posted:

75. Pay to the City all County of Riverside Development Impact Fees applicable at time of grading permit issuance or as otherwise approved by ordinance. In the event these fees have been previously paid, the Developer shall provide proof of payment. Said fees are not limited to the following:

- Riverside County Area Drainage Fee
- Kangaroo Rat Fee
- MSHCP Fee

76. Obtain written clearance, as deemed necessary by the Public Works Department, from the following agencies:
    a. San Diego Regional Water Quality Control Board
    b. Department of Fish & Game
    c. U. S. Army Corps of Engineers
    d. Planning Department
    e. Engineering Department
    f. Community Services Department
    g. Sewer and Water District(s)
    h. The Gas Company
    i. Southern California Edison Company
    j. Phone and CATV

77. A Precise Grading Plan shall be prepared by a registered Civil Engineer in accordance with City standards and approved by the Department of Public Works prior to commencement of any grading. The plan shall incorporate adequate erosion control measures to protect the site and adjoining properties from damage due to erosion. The plan shall also show drainage, striping and signage improvements.

78. A comprehensive Geologic and Geotechnical Report shall be prepared by a registered Civil or Soils Engineer and submitted to the Engineering Department with the initial grading plan check. The report shall address in situ soils conditions, identify any geotechnical hazards for the site, provide recommendations for the construction of engineered structures, preliminary pavement sections, slope stability, identify and located faults, and confirm the buildings have sufficient setback from the fault but not be limited to just these items. All recommended measures identified in the report shall be incorporated into the project design. The report may be subject to a third-party review at the discretion of the City Engineer.

79. A haul permit is required prior to hauling dirt or construction debris onto or off the site. Submit a proposed haul route plan and comply with all conditions and requirements the City Engineer may impose to the hauling operation.

80. Grades of Entrances, Parking Spaces and Driveways shall conform to Development Code 16.34.070 that allows a maximum grade of seven percent measured in any direction for parking lots and fifteen percent for entrance driveways.

NOI, SWPPP, WQMP

81. Prior to issuance of a grading permit or other construction activities, the Developer shall provide the following to City staff:

    a. A copy of the Notice of Intent (NOI) and waste Discharge Identification (WDID) number from the State Water Resources Control Board.

    b. An adequate Storm Water Pollution Plan (SWPPP) shall be available to State and City Inspectors at the job site prior to commencing construction. The developer shall be responsible for implementation, monitoring, operation and maintenance of the SWPPP until all improvements have been accepted by the City or construction is complete, whichever is later. A Notice of Termination (NOT) can then be filed with the State Water Resources Control Board.

    c. A final project-specific Water Quality Management Plan (WQMP) shall be submitted to the City for approval with the grading plan check application and approved by the Engineering Department prior to issuance of a grading permit. It shall incorporate, but not be limited to, the following: site design BMP's, applicable source control BMP's, treatment control BMP's, long term operation and maintenance requirements, inspection and maintenance checklist; maintenance agreement, covenant agreement, or funding mechanism for long-term maintenance and operation. The post-construction best management practices (BMPs) outlined in the approved final project-specific WQMP shall be incorporated in the grading plan.

82. A copy of the WQMP shall be kept onsite at all times. The Developer shall make the occupants, tenants, staff, employees, and contractors aware of this document and educate them on the items pertinent to them.

83. All grading activities shall minimize dust through compliance with AQMD Rule 403 which requires watering during earth moving operations.

84. Post security and enter into an agreement guaranteeing the grading and erosion control improvements in conformance with applicable City Standards and subject to approval by the Department of Public Works.

Drainage

85. Provide a hydrologic and hydraulic study prepared by a registered Civil Engineer which identifies storm water runoff quantities from the site and upstream of the site. The study shall show all existing or proposed offsite public or private drainage facilities intended to discharge this runoff. The study shall include a capacity analysis verifying the adequacy of the facilities. Runoff from the development or partial phase of development of the property shall not exceed the existing natural discharge quantities with respect to the following criteria:

A. Detention shall not be required for developments of less than one acre if the development uses volume based water quality measures.

B. For projects less than 10 acres, including those less than one acre NOT using volume based water quality measures shall analyze and mitigate the difference in developed and undeveloped runoff for a 10-year storm. A simplified hydrograph method shall be used that simulates the hydrograph with a triangle. The Rational method flow rate shall be the top value of the triangle and the base width shall be two times the time of concentration (Tc). The difference in area between the developed condition triangle and the existing condition triangle represents the required storage volume. Both triangles shall use time of concentration from the developed condition. Based upon the storage volume head, the outlet structure shall have an outlet flow no larger than the existing flow rate.

C. Projects that are 10 acres or greater shall analyze for the 1,3,6 and 24-hour duration for the 2,5 and 10-year frequency storms.

The design of detention basins shall provide for the detention of nuisance flow. Development shall detain the year and duration incremental storm runoff developed and or increased by means of on-site detention. Detention techniques shall include, but not be limited to: Parking lot detention or on-site detention basin or other methods approved by the City Engineer. Detention shall not be required in the event facilities downstream from the point of discharge are shown to be designed for and have been constructed to convey the 100 year storm event. Evidence of a maintenance mechanism shall be provided for the basins. If project discharges/connects to an off-site detention basin, provide permission to drain/connect correspondence from the owner of basin or system. Off-site detention basins require a Declaration of Dedication. All detention measures shall have positive drainage with 48hr max draw-down time. Standing water is not permitted. (The Applicant's civil engineer must substantiate their claim that the hydrology report prepared when Margarita Ville developed sufficiently mitigated increased runoff by ponding water 0.5' at each catch basin.)

86. Design and install a catch basin, with appropriate water quality insert, at the northwest corner of the drive through isle to intercept and treat runoff. A gutter shall be extended from the east side of the east drive isle to said catch basin to intercept and convey first flush runoff.

87. Street storm flows shall not exceed top of curb for the 10-year storm event and must be contained within the street right-of-way for the 100-year storm event.

88. Accept and properly dispose of all offsite drainage flowing onto or through the site.

Street Improvements

89. Vehicular sight distance and installation of pedestrian and traffic control facilities shall be provided at all street intersections and entrances in accordance with City Standard No. 214.

Sewer and Water

90. Verify capacity of proposed sewer and water systems and provide approval by the governing Sewer and Water District that the proposed sewer and water system is compliant with the District's master plan.

91. Design and guarantee the construction of all sewer and water improvements necessary to serve this project.

Mapping

92. All easements and/or right-of-way dedications shall be offered for dedication to the public or other appropriate agency and shall continue in force until the City accepts or abandons such offers. All dedications shall be free from all encumbrances as approved by the Department of Public Works.

93. If not already done, relinquish and waive abutter's right of access to Margarita Road excepting the entrance as shown on the approved development plan.

94. Any delinquent property taxes shall be paid.

95. All existing street and property monuments within or abutting this project site shall be preserved. If monuments are damaged or destroyed, the Developer shall retain a qualified licensed land surveyor or civil engineer to reset those monuments per City Standards and file the necessary information with the County Recorder's office as required by California Business and Professions Code Section 8771.

Utilities

96. All existing and proposed utility systems including gas, electric (33kv and under), telephone, water, sewer, and cable TV shall be installed underground, with easements provided as required, and designed and constructed in accordance with City Codes and the utility provider.

97. Telephone, cable TV, high speed internet and/or security systems shall be pre-wired in the building.

98. Notify the cable TV franchises of the intent to develop. Install conduit to cable TV requirements at time of street improvements.

Prior to the issuance of building permits

99. All easements, agreements of improvements, offsite construction, and dedication for required rights-of-way shall be approved by the Engineering Department.

100. The building pad shall be certified by a registered Civil Engineer for location and elevation, and the Soils Engineer shall issue a Final Soils Report addressing compaction and site conditions.

101. Final grading of the subject property shall be in accordance with the California Building Code, the approved Precise Grading Plan, the conditions of the grading permit, City Grading Manual and accepted grading construction practices.

102. Pay to the City the applicable Development Impact Fees as required by, and in accordance with City Ordinance 196-98.

103. Pay to the City the Western Riverside County Transportation Uniform Mitigation Fee (TUMF) based on the applicable rates at time of permit.

Prior to the issuance of a certificate of occupancy

104. All improvements, required by the Public Works Department, *including the raised median on Murrieta Hot Springs Road (added by the Engineering Manager on June 4, 2009)* shall be constructed and completed per the approved plans and City standards to the satisfaction of the City Engineer.

105. All sewer and water improvements shall be constructed and completed in accordance with the Sewer and Water District standards.

106. Demonstrate that all structural BMP's described in the final project-specific WQMP have been constructed and installed in conformance with the approved plans and specifications and the Developer is prepared to implement all non-structural BMP's described in the approved final project-specific WQMP.

107. A copy of the as-built project specific WQMP (approved final WQMP updated to include any changes made during construction) and recorded WQMP maintenance agreement shall be provided to the City and occupants. This information is required prior to releasing the grading and erosion control bonds.

108. Provide one set of Mylars and electronic copy of "As-Built" drawings of the Precise Grading Plan, improvement plans, hydrology and final maps (if applicable).

109. Obtain written clearance, as deemed necessary by the Public Works Department, from the following agencies:

    a. Planning Department
    b. Engineering Department
    c. Building Department
    d. Fire Department
    e. Community Services Department
    f. Sewer and Water District
    g. Utility Companies

BUILDING DEPARTMENT:

General:

110. All structures shall comply with the current California Building Codes (CBC), and related Codes and Ordinances of the City of Murrieta. Three (3) sets of plans shall be submitted for a building permit, and shall include building data, building use/occupancy, construction type, allowable area increases and actual building square foot area, building setbacks, related building means of egress and ensuing egress discharge to the public right-of-way.

111. Required CBC, site facility accessibility components and details, unload areas, striping and HC parking symbol, accessible exterior routes of travel, as defined in the current California Building Code (CBC); routes of travel, transition components etc., shall be provided between all commercial buildings, and each building to its own accessible trash enclosure and at least one exterior route shall be from the project site, to the public right-of-way, which shall be shown on an architectural site plan, and shall correlate with the civil designed precise grade plan. All design and details shall comply with California State guidelines as outlined in Title 24 California Building Code. The property owner shall be responsible for Federal ADA compliance.

112. Plans submitted during the permitting process, including but not limited to, site plan, precise grade plans and building architectural features, shall not vary substantially, from plans previously reviewed and Approved by the Planning, Engineering or other City Departments, without prior authorization form the Planning Manager, Public Works Director and/or Building and Safety Manager.

113. All exterior lighting shall be shown on building permit plans and shall comply with the City of Murrieta's MMC Sec.16.18.110, Mt. Palomar Lighting Pollution Control Standards.

Building Permit Application:

114. Plans submitted for building construction shall contain a full size copy of the Final Approved set of city department's Conditions of Approval.

115. Two sets of signed soil reports shall be submitted and correlate with building foundation design by reference. The report shall be from an individual licensed by the state to prepare such report, including compaction test results and verification of satisfactory placement, of any fill material used to support the foundation of any building or structure, in accordance with accepted engineering practice or, as recommended in any engineering geology preliminary report for any engineered grading design.

116. Separate permits shall be obtained from the City of Murrieta Building & Safety Department, for individual structures e.g., monument signs, building wall signs, masonry

walls, retaining walls, temporary power etc. Temporary power and temporary wiring shall comply with the current California Electrical Code.

Prior To Building Final:

120. Final permit approvals shall be obtained, and any outstanding fees shall be paid to all City Departments/Divisions which may include Fire, Planning, Engineering, Building & Safety, and the City Landscape Architect, prior to a tenant occupancy of a building permitted as a "shell only" building, a building shell "Notice of Inspection Completion", and the issuance of a Certificate of Occupancy from the City of Murrieta Building & Safety Division.

POLICE DEPARTMENT:

General:

121. The applicant shall be responsible for maintaining free of litter the area adjacent to the premises over which he has control.

122. Graffiti shall be removed from the exterior walls and windows of the premises within 24 hours of discovery at the expense of the owner or property manager.

123. There shall be no special promotional events held on the property which would adversely affect the approved parking requirements or public safety, unless a written request for such is received and approved by the City of Murrieta Planning Department and the Police Department at least thirty (30) days in advance.

124. The parking lot of the premises shall be equipped with lighting of sufficient power to illuminate and make easily discernible the appearance and conduct of all persons on or about the parking lot and conforms to Mt. Palomar lighting standards.

125. Roof Address Numbering: The number/letter of each independently addressed building on the property shall be marked with a reflectorized material (vinyl or paint), or in a color that contrasts the color of the roofing material. The lettering must be at least 24 inches in height so that the address can be viewed from the sky and is on the flat portion of the roof of the building and does not negatively impact the aesthetics of the project. The lettering must be positioned so that the address faces the direction of the corresponding street for which the address is assigned.

Prior to Building Plan Final:

126. Video Surveillance System plans must be submitted to the Police Chief or his designee for approval of the site security plan. The security plan shall include the technological capabilities of the surveillance system and a project map indicating the intended placement of surveillance cameras for the project and how video records are to be maintained and how they can be accessed by law enforcement.

Surveillance:

127. Prior to occupancy, the applicant must install a video surveillance system capable of day and night viewing which encompasses all interior customer areas and all building entrances. The exterior surveillance system must capture all vehicles, front and rear vehicle license plates and vehicle occupants within the Automated Teller Machines (ATM) areas, drive-thru teller area, the parking lot and both vehicle entrances/exits to the site to the satisfaction of the Chief of Police or his designee.

    The minimum standards for the system must be a digital system with the capability to view in color and in a low-lux environment. Video surveillance records must be maintained by the management for at least sixty (60) days and made available to any law enforcement agency for viewing and/or copying within one (1) business day.

128. A direct alarm dedicated hard phone line (automated voice dialer) device must be installed with connectivity to the police department in the event of silent robbery alarm (or similar emergency) for the purposes of allowing the police department to listen to live audio within the location.

FIRE DEPARTMENT:

Building Plan Submittal

129. City of Murrieta Ordinance No. 546 establishes the installation of a fire protection sprinkler system in all buildings with fire flows calculated with a base of 1500 GPM or greater. The sprinkler system post indicator valve and fire department connection shall be located to the front of the project and no further than 40 feet from a super fire hydrant and on the same geographical side of any drive aisles. These appliances shall be located at a minimum of 25 feet from any building. A statement that the building(s) will be automatically fire sprinklered must appear on the title page of the building plans.

130. Comply with all conditions for explosion venting and dust collecting addressed in the 2007 California Building Code Section # 307.1 If applicable.

131. Plans must illustrate designated location of fire lanes. Contact Fire Prevention for recommended designations.

132. Fire sprinkler system shell conform to NFPA 13, 13R, 13D If applicable.

133. Minimum fire sprinkler density of .33 GPM/ 2500 SF is required even if high piled stock is planned.

134. If project is planned for Business condominium or changes to business condominium project addition conditions will apply.

135. Applicant must comply with conditions addressed in the California Administrative Code Titles 19 & 24.

136. Occupancy separation may be required as per the California Building Code, Section 302.

137. All buildings within the City of Murrieta shall have fire retardant roofing with a Class "B" minimum rating. The developer must submit documented fire rated listings, supplied by the manufacturer, to the Fire Marshal if he/she chooses to use wood shingles.

Prior To Building Plan Release

138. A looped combination of an on-site/off-site fire protection water systems is required with (6" x 4" x 2-1/2" x 2-1/2") super fire hydrants. This system shall be designed and installed with no hydrant closer than 25 feet or no further than 165 feet from any portion of exterior walls as measured along vehicular travelways.

139. Fire Prevention has established a required minimum fire flow for protection of the above referenced project. Using UFC Table III-A for determining fire flows, 2850 GPM for a 4-hour duration at 20-PSI residual operating pressure must be available before any combustible material is placed on the job site. This fireflow is all inclusive of fire sprinkler system and inside / outside hose demand (Estimate only further clarification of square footages needed.)

140. Fire Flow Requirements have been based on CFC guidelines for the determination of fire flow requirements. Factors considered were Type V construction.

141. Permittee/Developer shall furnish one copy of the water system plans to the Fire Department for review. Plans shall conform to fire hydrant types, location and spacing, and, the system shall meet the fire flow requirements. Plans shall be signed/approved by the water company having jurisdiction and a registered engineer must provide the following certification statement.

> "I hereby state that the design of the water system within this project is in accordance with the requirements prescribed by the Murrieta Fire Department as to hydrant type and spacing, and will provide fire flow of 2850 GPM if sufficient water is available at the point of connection."

142. City of Murrieta Fire Department requires all commercial buildings to provide flush mount Knox Box Access Systems and must be no higher than 6' off the finished ground to the right of front and rear doors as being faced. Must also be shown on architectural plans. Applications are provided by our Planning/Prevention Bureau.

General Conditions

143. All standards, regulations and policies established for public safety and the protection of property established in City of Murrieta Development Code must be in compliance with the approval of all local authorities.

Access Requirements

144. The Permittee/Developer shall agree to make application and agreements with the Murrieta Fire Department, to install a strobe light monitor receiver with Knox key switch backup, on all electrically controlled gates for vehicular access, prior to occupancy of any structure within this project.

145. Access will be a minimum of 28 feet wide to accommodate fire apparatus.

146. Access will have a minimum of 13 foot 6 inches vertical clearance to accommodate fire apparatus.

147. Any dead end in excess of 150' requires an approved turnaround. Contact Fire Department for details.

148. All road surface improvements shall be in place with all weather surfacing, acceptable to fire staff, prior to construction of any buildings within this project.

Prior to Occupancy

149. Install a supervised sprinkler water flow detection alarm system as per National Fire Protection Association (NFPA) pamphlet No. 71. Notification of alarm to be provided for all tenant spaces. These plans must be designed by a certified fire alarm specialist and submitted for Fire Prevention approval prior to installation.

150. Fire sprinklers may need to be relocated to provide adequate coverage when improvements are installed. Engineered drawings must be submitted to the Fire Department for approval prior to any system modification.

151. Portable Multi-purpose fire extinguishers with a minimum rating of 2A-10BC must be installed so that the top of the fire extinguisher is not more than 5' ft above and not less than 3'ft from the bottom of the extinguisher to the floor. (2007 CFC 906.9) Contact a certified extinguisher company for proper placement of equipment.

152. Federal law under SARA Title III (Right To Know Act) requires that facilities with hazardous materials must provide Material Safety Data Sheets to the local Fire Department, the local Emergency Planning Committee and the State Emergency Response Commission.

153. All buildings will comply with NFPA 704 placard requirements when applicable. Contact Fire Department for information.

154. Address directory shall be provided next to all major entranceways to this project. Al l buildings shall be clearly identified with designators 12" high with 1" strokes mounted on contrasting backgrounds. These designators shall be placed on all 4 sides of each building and show address locations and elevations on architectural plan.

155. All interior decorative materials must be flame resistive. Prior to release of occupancy, the Permittee must submit manufactures State Fire Marshal's listings of all materials being used. Cloth and other flammables must display a label of the State Fire Marshal's seal of approval

156. Prior to release of above referenced project, the Permittee is responsible to provide all fire protection measures and information required by Fire Prevention. If any of these conditions are not met before, during or after completion of the proposed buildings, the Permittee understands that he is in violation of City of Murrieta Developer Code and/or the California Fire Code, and Fire Prevention has the authority to disrupt or permanently stop the construction of the project.

157. A check or money order in the amount of (contact Fire Department for exact amount) shall be made payable to CITY OF MURRIETA FIRE DEPARTMENT for building plan review. Project number submitted by City of Murrieta Planning Department must be referenced in order to credit the appropriate project. Refer to Plan Check Fee/Mitigation Sheet attached to Building Plan Review letter.

158. Murrieta City Resolution requires that fire impact mitigation fees totaling (see planning department) per square foot, as part of the Development Impact Fee, must be paid prior to release of building permit. Contact Planning Department for exact amount.

159. Prior to any building release, the permittee / developer shall submit approved water plans and pay all required fire fee's.

END OF CONDITIONS

2. CONSTRUCTION
(SECTION G of ORDER NO. R9-2004-001)

1) **Number of inspections conducted:** 20

2) **Number and type of enforcement actions related to construction sites:**

Enforcement and Compliance Responses	Private Projects	Public Projects
Non-monetary Penalties (1st & 2nd Written Warnings)	0	0
Stop Work Authority	0	0
Fines	0	0
Financial Security (Fines Assessed)	0	0
Permit/Certificate of Occupancy Denial	0	0
Referral to SDRWQCB Cory to provide	0	0
Total	**0**	**0**

3) **Description of modifications made to the construction and grading approval process:** There were no changes to the Grading Ordinance, Grading Manual and Standard Notes (grading, erosion, sediment control).

4) **Description and number of training efforts conducted during the reporting.**

a) **Training:**

Training	Training Description	Training Dates	Number of Attendees
Construction	Riv. Co. NPDES Construction Training	5/27/08	1
		Total	**1**

2. CONSTRUCTION
(SECTION G of ORDER NO. R9-2004-001), CONT.

b) **Summarize any additional education and outreach activities conducted for project applicants, contractors, developers, property owners, and/or responsible parties in support of the Construction Component:** The City of Murrieta began hand-delivering the annual "Fist Notice to all Project Developments" to site owners, project managers and field superintendents, on August 29, 2008 notifying them of the annual requirement for implementation of wet-weather BMP's by October 1st to April 30th. Year round implementation and maintenance of the erosion and sediment control at the construction sites was also emphasized in this letter. A "Second Notice to All Project Developments" emphasizing the requirement and implementation of wet-weather BMP's was distributed on September 22, 2008. See copies in **Attachment 'B'**

5) **An assessment of program effectiveness based on the measurable goals established in the Permittee's Individual SWMP:** The Construction program appears to be effective. Of the 20 sites inspected none of were issued a citation.

6) **Additional Comments/Information:**

Describe the major accomplishments of the Constrution Component over the past year: the construction activity has dropped dramatically during this severe economic down turn. Grading permits dropped 42% compared to last year. As a result, there are no major accomplishments to report outside of no citations being issued.

Summarize new activities or improvements to be implemented next year as a result of your self assessment of the Construction Component: Have inspectors review the new General Construction Permit that goes into effect July 1, 2010.

2. CONSTRUCTION
(SECTION G. of ORDER NO. R9-2004-001)

ATTACHMENT B

CITY OF MURRIETA

FIRST NOTICE TO ALL PROJECT DEVELOPMENTS

August 29, 2008

SUBJECT: National Pollution Discharge Elimination System (NPDES) Requirements for Construction Sites

TO: Site Owners, Project Managers and Field Superintendents

City of Murrieta has NPDES Permits with the San Diego and Santa Ana Regional Water Quality Control Boards for discharge of urban runoff into the municipal separate storm sewer system (MS4). For all projects one acre or greater, you must file a Notice of Intent (NOI) with the State Board and a copy shall be posted at a designated location onsite along with the Waste Discharge Identification (WDID) number. A site-specific Storm Water Pollution Prevention Plan (SWPPP) must be implemented and maintained throughout the duration of the project.

Under the NPDES program, you are responsible for implementing **year-round pollution prevention measures** or best management practices (BMPs) at your site and prevent illegal discharges from leaving the project boundaries and / or entering the City's storm drain system. Additional "wet-season" control measures must be implemented between October 1st and April 30th to ensure that pollutants in storm water runoff are mitigated.

Project sites will be inspected during the month of September 2008 by City NPDES inspectors to ensure adequate preparation of erosion and sediment control measures for the wet season are in place.

At a minimum, the following requirements must be implemented throughout the duration of your project:

- All onsite and offsite flow-lines, storm drain inlets, and streets affected by your site shall be free and clear of sediment, construction materials, construction waste and miscellaneous debris;
- Construction waste and miscellaneous debris shall be placed in enclosed bins and be covered with a lid or plastic tarp prior to a forecasted rain event. No wire mesh debris receptacles will be permitted;
- Erosion and sediment controls (BMPs) shall be implemented and maintained throughout the duration of the project;

1 Town Square, 24601 Jefferson Avenue • Murrieta, California 92562
phone: 951.304.CITY (2489) • fax: 951.698.4509 • web: murrieta.org

Minimum requirements (continued):

- Additional erosion and sediment control materials (BMPs) shall be stockpiled at various locations throughout the site prior to a 40% forecasted rain event for immediate implementation. Stockpile locations shall be identified in the site-specific SWPPP;
- Wash-out stations shall be provided for concrete, paints, stucco, etc. and shall be lined with plastic and located away from streets and storm drains. These locations shall be identified on the site-specific SWPPP;
- Rock and shaker plates shall be installed at all construction exits **per modified detail TC-1 (attached);**
- All portable mixers shall have plastic under-liners. Gravel bags shall also be placed on the downhill side of the liner to contain any discharges;
- A street sweeper shall be present during all hauling and trenching operations to minimize sediment track-out onto paved streets;
- Street sweeping shall be performed on all paved streets within the site and outside of all construction exits on a regular basis as identified in the site-specific SWPPP;
- Water shall be pumped out from retention basins / desilting basins with appropriate dewatering measures within 72-hours of collection; and
- To ensure adherence to erosion and sediment control plans and standard notes, all site personnel including contractors and trade-partners shall adhere to your site-specific SWPPP.

City inspectors will conduct NPDES inspections at your site to ensure that an effective combination of erosion and sediment control measures, including pollution prevention measures, have been implemented and are maintained. Additional control measures may be required by the City inspectors as the site conditions change.

Failure to implement minimum requirements by **October 1, 2008** will result in issuance of a stop-work notice. If non-compliance continues, enforcement actions will be pursued, including citations and case referrals to the respective Regional Water Quality Control Boards.

Please feel free to contact me at (951) 461-6075 should there be any questions regarding compliance with the NPDES requirements.

Sincerely,

Ken L. Burris
Public Works Inspection Superintendent

CITY OF MURRIETA

SECOND NOTICE TO ALL PROJECT DEVELOPMENTS

September 22, 2008

SUBJECT: National Pollution Discharge Elimination System (NPDES) Requirements for Construction Sites

TO: Site Owners, Project Managers and Field Superintendents

City of Murrieta has NPDES Permits with the San Diego and Santa Ana Regional Water Quality Control Boards for discharge of urban runoff into the municipal separate storm sewer system (MS4). For all projects one acre or greater, you must file a Notice of Intent (NOI) with the State Board and a copy shall be posted at a designated location onsite along with the Waste Discharge Identification (WDID) number. A site-specific Storm Water Pollution Prevention Plan (SWPPP) must be implemented and maintained throughout the duration of the project.

Under the NPDES program, you are responsible for implementing **year-round pollution prevention measures** or best management practices (BMPs) at your site and prevent illegal discharges from leaving the project boundaries and / or entering the City's storm drain system. Additional "wet-season" control measures must be implemented between October 1st and April 30th to ensure that pollutants in storm water runoff are mitigated.

Project sites will be inspected during the month of September 2008 by City NPDES inspectors to ensure adequate preparation of erosion and sediment control measures for the wet season are in place.

At a minimum, the following requirements must be implemented throughout the duration of your project:

- All onsite and offsite flow-lines, storm drain inlets, and streets affected by your site shall be free and clear of sediment, construction materials, construction waste and miscellaneous debris;
- Construction waste and miscellaneous debris shall be placed in enclosed bins and be covered with a lid or plastic tarp prior to a forecasted rain event. No wire mesh debris receptacles will be permitted;
- Erosion and sediment controls (BMPs) shall be implemented and maintained throughout the duration of the project;

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phone: 951.304.CITY (2489) • fax: 951.698.4509 • web: murrieta.org

Minimum requirements (continued):

- Additional erosion and sediment control materials (BMPs) shall be stockpiled at various locations throughout the site prior to a 40% forecasted rain event for immediate implementation. Stockpile locations shall be identified in the site-specific SWPPP;
- Wash-out stations shall be provided for concrete, paints, stucco, etc. and shall be lined with plastic and located away from streets and storm drains. These locations shall be identified on the site-specific SWPPP;
- Rock and shaker plates shall be installed at all construction exits **per modified detail TC-1 (attached);**
- All portable mixers shall have plastic under-liners. Gravel bags shall also be placed on the downhill side of the liner to contain any discharges;
- A street sweeper shall be present during all hauling and trenching operations to minimize sediment track-out onto paved streets;
- Street sweeping shall be performed on all paved streets within the site and outside of all construction exits on a regular basis as identified in the site-specific SWPPP;
- Water shall be pumped out from retention basins / desilting basins with appropriate dewatering measures within 72-hours of collection; and
- To ensure adherence to erosion and sediment control plans and standard notes, all site personnel including contractors and trade-partners shall adhere to your site-specific SWPPP.

City inspectors will conduct NPDES inspections at your site to ensure that an effective combination of erosion and sediment control measures, including pollution prevention measures, have been implemented and are maintained. Additional control measures may be required by the City inspectors as the site conditions change.

Failure to implement minimum requirements by **October 1, 2008** will result in issuance of a stop-work notice. If non-compliance continues, enforcement actions will be pursued, including citations and case referrals to the respective Regional Water Quality Control Boards.

Please feel free to contact me at (951) 461-6028 should there be any questions regarding compliance with the NPDES requirements.

Sincerely,

Ken L. Burris
Public Works Inspection Superintendent

3. MUNICIPAL
(SECTION H.1 of ORDER NO. R9-2004-001)

1) **Number of inspections conducted at existing municipal facilities:** The municipal facilities are maintained on a daily basis. General housekeeping guidelines are used like covering construction material. Each facility is subject to an annual inspection.

2) **Number and type of enforcement actions related to municipal sites:**

Enforcement and Compliance Responses	Number
Education and Information	0
Verbal warning	0
Written warning	0
Other:	0
Total	**0**

3) **Number of catch basins and inlets that were inspected and the number that were cleaned:**

	Number Inspected	Number Cleaned
Catch Basins and Inlets	1428	559

3. MUNICIPAL
(SECTION H.1 of ORDER NO. R9-2004-001), CONT.

4) **Assessment of the amount and type of debris removed from catch basins, streets, and open channels, including an identification of problem areas that generate the most pollutants:**

Facility	Type of Debris	Amount (tons)	Problem Areas that Generate Most Pollutants
Catch basins	Vegetative Litter	8.59	
	Anthropogenic Litter	3.43	
	Sediment	22.32	
	Other man-made debris		
Total		**34.34**	**tons (wet weight)**
Streets	Vegetative Litter	475	
	Anthropogenic Litter	190	
	Sediment	1,235	
	Other man-made debris		
Total		**1900**	**tons (wet weight)**
Open Channels	Vegetative Litter	38	
	Anthropogenic Litter	30	
	Sediment	10	
	Other man-made debris		
Total		**78**	**tons (wet weight)**
Facility Total		**2012.34**	**tons (wet weight)**

0003304

3. MUNICIPAL
(SECTION H.1 of ORDER NO. R9-2004-001), CONT.

5) **Assessment of effectiveness of BMPs that have been implemented for municipal facilities and activities:**

BMP Code	Description	Used	Notes
SC-10	Non-Stormwater Discharges	☒ Yes ☐ No	Vehicles are cleaned at local car wash
SC-11	Spill Prevention, Control and Clean-up	☒ Yes ☐ No	Swift response and clean up of spills
SC-20	Vehicle and Equipment Fueling	☒ Yes ☐ No	Fueling stations have a barrier to contain spills
SC-21	Vehicle and Equipment Cleaning	☒ Yes ☐ No	Vehicle cleaning done at local car wash
SC-22	Vehicle and Equipment Repair	☒ Yes ☐ No	Repairs are done offsite and under contract
SC-30	Outdoor Loading/Unloading of Materials	☐ Yes ☒ No	
SC-31	Outdoor Liquid Container Storage	☒ Yes ☐ No	Secondary containment
SC-32	Outdoor Equipment Maintenance	☐ Yes ☒ No	
SC-33	Outdoor Storage of Raw Materials	☒ Yes ☐ No	Are covered
SC-34	Waste Handling and Disposal	☒ Yes ☐ No	
SC-35	Safe Alternative Products	☐ Yes ☒ No	Use biodegradable clearing solutions
SC-40	Contaminated or Erodible Areas	☐ Yes ☒ No	
SC-41	Building and Grounds Maintenance	☒ Yes ☐ No	
SC-42	Building Repair and Construction	☒ Yes ☐ No	
SC-43	Parking/Storage Area Maintenance	☒ Yes ☐ No	
SC-44	Drainage System Maintenance	☒ Yes ☐ No	Filters, cleaning, & annual inspection
SC-60	Housekeeping Practices	☒ Yes ☐ No	
SC-61	Safe Alternative Products	☒ Yes ☐ No	Use bio-degradable cleaning solutions
SC-70	Road and Street Maintenance	☒ Yes ☐ No	Street sweeping and prompt pothole patching
SC-71	Plaza and Sidewalk Cleaning	☐ Yes ☒ No	
SC-72	Fountain and Pool Maintenance	☒ Yes ☐ No	
SC-73	Landscape Maintenance	☒ Yes ☐ No	Use organic fertilizers
SC-74	Drainage System Maintenance	☒ Yes ☐ No	Catch basins are labeled and numbered
SC-75	Waste Handling and Disposal	☒ Yes ☐ No	
SC-76	Water and Sewer Utility Maintenance	☐ Yes ☒ No	

Assessment of the effectiveness of BMPs that have been implemented for municipal facilities and activities.

They appear to be effective to the maximum extent practical.

0003305

3. MUNICIPAL
(SECTION H.1 of ORDER NO. R9-2004-001), CONT.

6) **Description and number of training efforts conducted over the last year (for municipal facility operators and/or inspectors).**

a) **Training:**

Training	Training Description	Training Dates	Number of Attendees
Municipal	Riv. Co. NPDES Municipal Training at City Hall	11/6/08	28
Municipal	Riv. Co. NPDES Municipal Training at Flood Control	5/5/09	4
		Total	**28**

b) **Summarize the internal and external education and outreach activities the Municipal Component has conducted over the past year:** discuss at Tailgate Safety Meetings that construction material must be covered.

7) **An assessment of program effectiveness based on the measurable goals established in the Permittee's Individual SWMP:** good housekeeping practices appear to be effective.

8) **Additional Comments/Information:**

9) **Describe the major accomplishments of the Municipal Component over the past year:** with the recent purchase of a vacuum trailer, cleaning of storm drains is now quicker and easier. The number of drains cleaned has risen significantly over last year.

Summarize new activities or improvements to be implemented next year as a result of your self assessment of the Municipal Component: create a written procedure to monitor the municipal facilities

Other comments

4. INDUSTRIAL/COMMERCIAL
(SECTION H.2 of ORDER NO. R9-2004-001), CONT.

1) **Number of inspections conducted:** City of Murrieta utilized the Compliance Assistance Program (CAP), which generates NPDES survey reports from inspections completed by the County of Riverside Hazardous Materials Department (HMMD) for businesses storing or handling hazardous materials and also from the County of Riverside Department of Environmental Health (DEH) for inspections of food establishments.

Category	Number of Inspections
Industrial Facilities	**73**
High Priority Facilities	
Medium Priority Facilities	
Low Priority Facilities	73
Commercial Facilities (Food)	**74**
High Priority Facilities	
Medium Priority Facilities	
Low Priority Facilities	74
(See Attachment 'C' for Inspection Sheets) Total	**147**

2) **Number and type of enforcement actions taken:**

Enforcement and Compliance Responses	Industrial	Commercial
Non-Monetary Penalties	0	0
Fines	0	0
Bonding Requirements	0	0
Permit Denial	0	0
Referral to SDRWQCB	0	0
Total	**0**	**0**

ATTACHMENT C

0003309

HAZARDOUS WASTE/ HAZARDOUS MATERIALS FACILITY STORM WATER COMPLIANCE SURVEY FORM

FACILITY DBA: Auto Haus Frankfurt	TELEPHONE: (951) 894-2985	DATE: 6/25/09
ADDRESS: 41137 Raintree Ct	CITY, ZIP: Murrieta, 92562	
MAILING ADDRESS (if different from site address)	MAILING CITY, ZIP	
CONTACT: Hilda Kiottmayer	FACILITY#: FA0031973	SIC CODE: 7538

Compliance Areas	YES	NO	N/A
***OUTSIDE AREAS (Free of staining & debris; provides good housekeeping; maintained in a manner to prevent runoff.)**		**Requires follow up**	
1. CHEMICAL STORAGE * The outside storage area is kept to minimize the possibility of a release. Chemicals / materials are protected from precipitation / storm water runoff and the containers show no signs of leaking.	✓		
2. DUMPSTER * No liquids are leaking from dumpster; surrounding area is free of trash.	✓		
3. ABOVEGROUND TANKS * No ground staining, no spill age observed and no discharge to storm drain. Tanks are maintained to minimize the possibility of a release (secondary containment).			✓
4. ONSITE STORM DRAIN* Protected from accidental discharge other than water.			✓
5. POWER WASH OR STEAM CLEAN* (discharge to se wer) Drains to oil/water separator connected to a sanitary sewer and not a septic system. Steam cleaning not discharged to parking lot, storm drain or soil.			✓
6. PARKING LOT / DRIVE WAY* Free of excess trash, chemical staining or liquids other than water.	✓		
7. OTHER* Non-storm water discharge (i.e. non-hazardous process discharge).			✓
8. MOP WATER TO SANITARY SEWER VIA CLARIFIER. Mop water is not dumped to the soil, parking lot, gutter, or other areas susceptible to storm water drainage.			✓
9. STORM WATER EDUCATIONAL BROCHURES GIVEN TO FACILITY OR POSTERS DISPLAYED FOR EMPLOYEES. If no, what informational material should be sent to the facility?			✓
10. IF A SWPPP IS REQUIRED, WAS IT AVAILA BLE FOR REVIEW? See storm water handout for industrial facilities.			✓

OVERALL EVALUATION/ COMMENTS : No violations noted at time of inspection

RECEIVED BY: Hilda Kiottmayer	HAZ MAT SPEC: M. Shallo	BADGE #
Agency referred to as indicated on the back of this page.		

For additional information, please refer to our web site at www.floodcontrol.co.riverside.ca.us or contact the "Only Rain Down the Storm Drain" Pollution Prevention Program of the Cities and County of Riverside at (800) 506-2555.

...ONLY RAIN... DOWN THE STORM DRAIN

0003310

HAZARDOUS WASTE/ HAZARDOUS MATERIALS FACILITY STORM WATER COMPLIANCE SURVEY FORM

FACILITY DBA: Verizon / Murrieta CO	TELEPHONE: (951) 677-0000	DATE: 8/3/09
ADDRESS: 24961 Washington Ave	CITY, ZIP: Murrieta, 92562	
MAILING ADDRESS (if different from site address)	MAILING CITY, ZIP	
CONTACT: Rudy Almazan	FACILITY#: PR0028243	SIC CODE: 4899

Compliance Areas	YES	NO	N/A
***OUTSIDE AREAS (Free of staining & debris; provides good housekeeping; maintained in a manner to prevent runoff.)**		**Requires follow up**	
1. CHEMICAL STORAGE * The outside storage area is kept to minimize the possibility of a release. Chemicals / materials are protected from precipitation / storm water runoff and the containers show no signs of leaking.			✓
2. DUMPSTER * No liquids are leaking from dumpster; surrounding area is free of trash.	✓		
3. ABOVEGROUND TANKS * No ground staining, no spillage observed and no discharge to storm drain. Tanks are maintained to minimize the possibility of a release (secondary containment).			✓
4. ONSITE STORM DRAIN* Protected from accidental discharge other than water.			✓
5. POWER WASH OR STEAM CLEAN* (discharge to sewer) Drains to oil/water separator connected to a sanitary sewer and not a septic system. Steam cleaning not discharged to parking lot, storm drain or soil.			✓
6. PARKING LOT / DRIVE WAY* Free of excess trash, chemical staining or liquids other than water.	✓		
7. OTHER* Non-storm water discharge (i.e. non-hazardous process discharge).			✓
8. MOP WATER TO SANITARY SEWER VIA CLARIFIER. Mop water is not dumped to the soil, parking lot, gutter, or other areas susceptible to storm water drainage.			✓
9. STORM WATER EDUCATIONAL BROCHURES GIVEN TO FACILITY OR POSTERS DISPLAYED FOR EMPLOYEES. If no, what informational material should be sent to the facility?			✓
10. IF A SWPPP IS REQUIRED, WAS IT AVAILABLE FOR REVEIW? See storm water handout for industrial facilities.			✓

OVERALL EVALUATION/ COMMENTS: No Violations

RECEIVED BY:	HAZ MAT SPEC: M. Kolb	BADGE #
Agency referred to as indicated on the back of this page.		

If additional information is required, contact the Storm Water /Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

0003311

HAZARDOUS WASTE/ HAZARDOUS MATERIALS FACILITY STORM WATER COMPLIANCE SURVEY FORM

FACILITY DBA Murrieta Valley USD Transportation Facility	TELEPHONE (951) 696-1600	DATE 6/1/09
ADDRESS 41870 McAlby Ct	CITY, ZIP Murrieta 92562	
MAILING ADDRESS (if different from site address)	MAILING CITY, ZIP	
CONTACT Jon Brugger	FACILITY# PR0033099	SIC CODE 4151

Compliance Areas	YES	NO	N/A
***OUTSIDE AREAS (Free of staining & debris; provides good housekeeping; maintained in a manner to prevent runoff.)**		**Requires follow up**	
1. CHEMICAL STORAGE * The outside storage area is kept to minimize the possibility of a release. Chemicals / materials are protected from precipitation / storm water runoff and the containers show no signs of leaking.	✓		
2. DUMPSTER * No liquids are leaking from dumpster; surrounding area is free of trash.	✓		
3. ABOVEGROUND TANKS * No ground staining, no spillage observed and no discharge to storm drain. Tanks are maintained to minimize the possibility of a release (secondary containment).			✓
4. ONSITE STORM DRAIN* Protected from accidental discharge other than water.	✓		
5. POWER WASH OR STEAM CLEAN* (discharge to sewer) Drains to oil/water separator connected to a sanitary sewer and not a septic system. Steam cleaning not discharged to parking lot, storm drain or soil.	✓		
6. PARKING LOT / DRIVE WAY* Free of excess trash, chemical staining or liquids other than water.	✓		
7. OTHER* Non-storm water discharge (i.e. non-hazardous process discharge).	✓		
8. MOP WATER TO SANITARY SEWER VIA CLARIFIER. Mop water is not dumped to the soil, parking lot, gutter, or other areas susceptible to storm water drainage.	✓		
9. STORM WATER EDUCATIONAL BROCHURES GIVEN TO FACILITY OR POSTERS DISPLAYED FOR EMPLOYEES. If no, what informational material should be sent to the facility?			✓
10. IF A SWPPP IS REQUIRED, WAS IT AVAILABLE FOR REVEIW? See storm water handout for industrial facilities.	✓		✓

OVERALL EVALUATION/ COMMENTS: No violations

RECEIVED BY: Jon Brugger	HAZ MAT SPEC: M. Hall	BADGE #
Agency referred to as indicated on the back of this page.		

If additional information is required, contact the Storm Water /Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

0003312

HAZARDOUS WASTE/ HAZARDOUS MATERIALS FACILITY STORM WATER COMPLIANCE SURVEY FORM

FACILITY DBA: Carrier Sales & Distribution LLC (Totaline)	TELEPHONE: (951) 304-0011	DATE: 6/1/09
ADDRESS: 41710 Reagan Wy	CITY, ZIP: Murrieta 92562	
MAILING ADDRESS (if different from site address):	MAILING CITY, ZIP:	
CONTACT: Robby Evans	FACILITY#: PR 00 40805	SIC CODE: 5075

Compliance Areas	YES	NO	N/A
***OUTSIDE AREAS (Free of staining & debris; provides good housekeeping; maintained in a manner to p event runo .)**		**Requires follow up**	
1. CHEMICAL STORAGE * The outside storage area is kept to minimize the possibility of a release. Chemicals / materials are protected from precipitation / storm water runoff and the containers show no signs of leaking.			✓
2. DUMPSTER * No liquids are leaking from dumpster; surrounding area is free of trash.	✓		
3. ABOVEGROUND TANKS * No ground staining, no spillage observed and no discharge to storm drain. Tanks are maintained to minimize the possibility of a release (secondary containment).			✓
4. ONSITE STORM DRAIN* Protected from accidental discharge other than water.			✓
5. POWER WASH OR STEAM CLEAN* (discharge to sewer) Drains to oil/water separator connected to a sanitary sewer and not a septic system. Steam cleaning not discharged to parking lot, storm drain or soil.			✓
6. PARKING LOT / DRIVE WAY* Free of excess trash, chemical staining or liquids other than water.	✓		
7. OTHER* Non-storm water discharge (i.e. non-hazardous process discharge).			✓
8. MOP WATER TO SANITARY SEWER VIA CLARIFIER. Mop water is not dumped to the soil, parking lot, gutter, or other areas susceptible to storm water drainage.			✓
9. STORM WATER EDUCATIONAL BROCHURES GIVEN TO FACILITY OR POSTERS DISPLAYED FOR EMPLOYEES. If no, what informational material should be sent to the facility?			✓
10. IF A SWPPP IS REQUIRED, WAS IT AVAILABLE FOR REVEIW? See storm water handout for industrial facilities.			✓

OVERALL EVALUATION/ COMMENTS: No Violations

RECEIVED BY: Ron E	HAZ MAT SPEC: M. Shelly	BADGE #

Agency referred to as indicated on the back of this page.

If additional information is required, contact the Storm Water /Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

0003313

HAZARDOUS WASTE/ HAZARDOUS MATERIALS FACILITY STORM WATER COMPLIANCE SURVEY FORM

FACILITY DBA: Cameron Welding Supply	TELEPHONE: (951) 677-5141	DATE: 5/28/09
ADDRESS: 41341 Date St	CITY, ZIP: Murrieta 92562	
MAILING ADDRESS (if different from site address)	MAILING CITY, ZIP	
CONTACT: Geno Sanchez	FACILITY#: PR0032421	SIC CODE: 3548

Compliance Areas	YES	NO	N/A
***OUTSIDE AREAS (Free of staining & debris; provides good housekeeping; maintained in a manner to prevent runoff.)**		**Requires follow up**	
1. CHEMICAL STORAGE * The outside storage area is kept to minimize the possibility of a release. Chemicals / materials are protected from precipitation / storm water runoff and the containers show no signs of leaking.	✓		
2. DUMPSTER * No liquids are leaking from dumpster; surrounding area is free of trash.	✓		
3. ABOVEGROUND TANKS * No ground staining, no spillage observed and no discharge to storm drain. Tanks are maintained to minimize the possibility of a release (secondary containment).			✓
4. ONSITE STORM DRAIN* Protected from accidental discharge other than water.			✓
5. POWER WASH OR STEAM CLEAN* (discharge to sewer) Drains to oil/water separator connected to a sanitary sewer and not a septic system. Steam cleaning not discharged to parking lot, storm drain or soil.			✓
6. PARKING LOT / DRIVE WAY* Free of excess trash, chemical staining or liquids other than water.	✓		
7. OTHER* Non-storm water discharge (i.e. non-hazardous process discharge).			✓
8. MOP WATER TO SANITARY SEWER VIA CLARIFIER. Mop water is not dumped to the soil, parking lot, gutter, or other areas susceptible to storm water drainage.			✓
9. STORM WATER EDUCATIONAL BROCHURES GIVEN TO FACILITY OR POSTERS DISPLAYED FOR EMPLOYEES. If no, what informational material should be sent to the facility?			✓
10. IF A SWPPP IS REQUIRED, WAS IT AVAILABLE FOR REVEIW? See storm water handout for industrial facilities.			✓

OVERALL EVALUATION/ COMMENTS: No Violations

RECEIVED BY:	HAZ MAT SPEC: M. Khalil	BADGE #
Agency referred to as indicated on the back of this page.		

If additional information is required, contact the Storm Water /Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

0003314

HAZARDOUS WASTE/ HAZARDOUS MATERIALS FACILITY STORM WATER COMPLIANCE SURVEY FORM

FACILITY DBA: Affordable Automotive Repair	TELEPHONE: (951) 677-2373	DATE: 5/28/09
ADDRESS: 41604 Date St Ste A	CITY, ZIP: Murrieta 92562	
MAILING ADDRESS (if different from site address)	MAILING CITY, ZIP	
CONTACT: Doug Blickhan	FACILITY# PR00 23726	SIC CODE: 7538

Compliance Areas	YES	NO	N/A
***OUTSIDE AREAS (Free of staining & debris; provides good housekeeping; maintained in a manner to prevent runoff.)**		**Requires follow up**	
1. CHEMICAL STORAGE * The outside storage area is kept to minimize the possibility of a release. Chemicals / materials are protected from precipitation / storm water runoff and the containers show no signs of leaking.			✓
2. DUMPSTER * No liquids are leaking from dumpster; surrounding area is free of trash.	✓		
3. ABOVEGROUND TANKS * No ground staining, no spillage observed and no discharge to storm drain. Tanks are maintained to minimize the possibility of a release (secondary containment).			✓
4. ONSITE STORM DRAIN* Protected from accidental discharge other than water.			✓
5. POWER WASH OR STEAM CLEAN* (discharge to sewer) Drains to oil/water separator connected to a sanitary sewer and not a septic system. Steam cleaning not discharged to parking lot, storm drain or soil.			✓
6. PARKING LOT / DRIVE WAY* Free of excess trash, chemical staining or liquids other than water.	✓		
7. OTHER* Non-storm water discharge (i.e. non-hazardous process discharge).			✓
8. MOP WATER TO SANITARY SEWER VIA CLARIFIER. Mop water is not dumped to the soil, parking lot, gutter, or other areas susceptible to storm water drainage.	✓		
9. STORM WATER EDUCATIONAL BROCHURES GIVEN TO FACILITY OR POSTERS DISPLAYED FOR EMPLOYEES. If no, what informational material should be sent to the facility?			✓
10. IF A SWPPP IS REQUIRED, WAS IT AVAILABLE FOR REVEIW? See storm water handout for industrial facilities.			✓

OVERALL EVALUATION/ COMMENTS: No Violations

RECEIVED BY: [signature]	HAZ MAT SPEC: M. [signature]	BADGE #

Agency referred to as indicated on the back of this page.

If additional information is required, contact the Storm Water /Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

0003315

HAZARDOUS WASTE/ HAZARDOUS MATERIALS FACILITY STORM WATER COMPLIANCE SURVEY FORM

FACILITY DBA: Superior Ready Mix Concrete	TELEPHONE: (951) 304-7659	DATE: 5/28/09
ADDRESS: 26165 Adam Ave	CITY, ZIP: Murrieta 92562	
MAILING ADDRESS (if different from site address)	MAILING CITY, ZIP	
CONTACT: Steve Haflich	FACILITY#: PR0035161	SIC CODE: 3273

Compliance Areas	YES	NO	N/A
***OUTSIDE AREAS (Free of staining & debris; provides good housekeeping; maintained in a manner to prevent runoff:)**		**Requires follow up**	
1. CHEMICAL STORAGE * The outside storage area is kept to minimize the possibility of a release. Chemicals / materials are protected from precipitation / storm water runoff and the containers show no signs of leaking.	✓		
2. DUMPSTER * No liquids are leaking from dumpster; surrounding area is free of trash.	✓		
3. ABOVEGROUND TANKS * No ground staining, no spillage observed and no discharge to storm drain. Tanks are maintained to minimize the possibility of a release (secondary containment).	✓		
4. ONSITE STORM DRAIN* Protected from accidental discharge other than water.	✓		
5. POWER WASH OR STEAM CLEAN* (discharge to sewer) Drains to oil/water separator connected to a sanitary sewer and not a septic system. Steam cleaning not discharged to parking lot, storm drain or soil.	✓		
6. PARKING LOT / DRIVE WAY* Free of excess trash, chemical staining or liquids other than water.	✓		
7. OTHER* Non-storm water discharge (i.e. non-hazardous process discharge).	✓		
8. MOP WATER TO SANITARY SEWER VIA CLARIFIER. Mop water is not dumped to the soil, parking lot, gutter, or other areas susceptible to storm water drainage.			✓
9. STORM WATER EDUCATIONAL BROCHURES GIVEN TO FACILITY OR POSTERS DISPLAYED FOR EMPLOYEES. If no, what informational material should be sent to the facility?			✓
10. IF A SWPPP IS REQUIRED, WAS IT AVAILABLE FOR REVEIW? See storm water handout for industrial facilities.	✓		

OVERALL EVALUATION/ COMMENTS: No Violations

RECEIVED BY: Steve Haflich	HAZ MAT SPEC: M. Shalhub	BADGE #

Agency referred to as indicated on the back of this page.

If additional information is required, contact the Storm Water /Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

0003316

HAZARDOUS WASTE/ HAZARDOUS MATERIALS FACILITY STORM WATER COMPLIANCE SURVEY FORM

FACILITY DBA: Home Depot #668	TELEPHONE: (951) ~~3070~~ 698-1555	DATE: 5/27/09
ADDRESS: 25100 Madison Ave	CITY, ZIP: Murrieta 92563	
MAILING ADDRESS (if different from site address)	MAILING CITY, ZIP	
CONTACT: Aaron Drake	FACILITY#: 30701	SIC CODE: 5251

Compliance Areas	YES	NO	N/A
***OUTSIDE AREAS (Free of staining & debris; provides good housekeeping; maintained in a manner to prevent runoff.)**		**Requires follow-up**	
1. CHEMICAL STORAGE * The outside storage area is kept to minimize the possibility of a release. Chemicals / materials are protected from precipitation / storm water runoff and the containers show no signs of leaking.	✓		
2. DUMPSTER * No liquids are leaking from dumpster; surrounding area is free of trash.	✓		
3. ABOVEGROUND TANKS * No ground staining, no spillage observed and no discharge to storm drain. Tanks are maintained to minimize the possibility of a release (secondary containment).	✓		
4. ONSITE STORM DRAIN* Protected from accidental discharge other than water.	✓		
5. POWER WASH OR STEAM CLEAN* (discharge to sewer) Drains to oil/water separator connected to a sanitary sewer and not a septic system. Steam cleaning not discharged to parking lot, storm drain or soil.	✓		
6. PARKING LOT / DRIVE WAY* Free of excess trash, chemical staining or liquids other than water.	✓		
7. OTHER* Non-storm water discharge (i.e. non-hazardous process discharge).	✓		
8. MOP WATER TO SANITARY SEWER VIA CLARIFIER. Mop water is not dumped to the soil, parking lot, gutter, or other areas susceptible to storm water drainage.	✓		
9. STORM WATER EDUCATIONAL BROCHURES GIVEN TO FACILITY OR POSTERS DISPLAYED FOR EMPLOYEES. If no, what informational material should be sent to the facility?	✓		
10. IF A SWPPP IS REQUIRED, WAS IT AVAILABLE FOR REVEIW? See storm water handout for industrial facilities.			✓

OVERALL EVALUATION/ COMMENTS: No violations noted at time of inspection. Facility washes equipment & waste water drains into clarifier

RECEIVED BY:	HAZ MAT SPEC: M. Shallb	BADGE #

Agency referred to as indicated on the back of this page.

If additional information is required, contact the Storm Water /Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

0003317

HAZARDOUS WASTE/ HAZARDOUS MATERIALS FACILITY STORM WATER COMPLIANCE SURVEY FORM

FACILITY DBA Murrieta Hot Springs Shell	TELEPHONE (951) 677-0218	DATE 5/19/09
ADDRESS 40452 MHS Rd	CITY, ZIP Murrieta 92562	
MAILING ADDRESS (if different from site address)	MAILING CITY, ZIP	
CONTACT Michael Paunovic	FACILITY# PR0033911	SIC CODE 5541

Compliance Areas	YES	NO	N/A
***OUTSIDE AREAS (Free of staining & debris; provides good housekeeping; maintained in a manner to prevent runoff.)**		**Requires follow up**	
1. CHEMICAL STORAGE * The outside storage area is kept to minimize the possibility of a release. Chemicals / materials are protected from precipitation / storm water runoff and the containers show no signs of leaking.	✓		
2. DUMPSTER * No liquids are leaking from dumpster; surrounding area is free of trash.	✓		
3. ABOVEGROUND TANKS * No ground staining, no spillage observed and no discharge to storm drain. Tanks are maintained to minimize the possibility of a release (secondary containment).			✓
4. ONSITE STORM DRAIN* Protected from accidental discharge other than water.	✓		
5. POWER WASH OR STEAM CLEAN* (discharge to sewer) Drains to oil/water separator connected to a sanitary sewer and not a septic system. Steam cleaning not discharged to parking lot, storm drain or soil.	✓		
6. PARKING LOT / DRIVE WAY* Free of excess trash, chemical staining or liquids other than water.	✓		
7. OTHER* Non-storm water discharge (i.e. non-hazardous process discharge).	✓		
8. MOP WATER TO SANITARY SEWER VIA CLARIFIER. Mop water is not dumped to the soil, parking lot, gutter, or other areas susceptible to storm water drainage.	✓		
9. STORM WATER EDUCATIONAL BROCHURES GIVEN TO FACILITY OR POSTERS DISPLAYED FOR EMPLOYEES. If no, what informational material should be sent to the facility?	✓		
10. IF A SWPPP IS REQUIRED, WAS IT AVAILABLE FOR REVEIW? See storm water handout for industrial facilities.			✓

OVERALL EVALUATION/ COMMENTS: Facility has a carwash and clarifier system No violations

RECEIVED BY: [illegible]	HAZ MAT SPEC: M. Shalkb.	BADGE #

Agency referred to as indicated on the back of this page.

If additional information is required, contact the Storm Water /Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

0003318

HAZARDOUS WASTE/ HAZARDOUS MATERIALS FACILITY STORM WATER COMPLIANCE SURVEY FORM

FACILITY DBA: Southern California Ga Co	TELEPHONE: (909) 335-7972	DATE: 5/6/09
ADDRESS: 25620 Jefferson St	CITY, ZIP: Murrieta 92562	
MAILING ADDRESS (if different from site address)	MAILING CITY, ZIP	
CONTACT: Christopher Sowell	FACILITY#: PR00 33282	SIC CODE: 4924

Compliance Areas	YES	NO	N/A
***OUTSIDE AREAS (Free of staining & debris; provides good housekeeping; maintained in a manner to prevent runoff.)**		Requires follow up	
1. CHEMICAL STORAGE * The outside storage area is kept to minimize the possibility of a release. Chemicals / materials are protected from precipitation / storm water runoff and the containers show no signs of leaking.	✓		
2. DUMPSTER * No liquids are leaking from dumpster; surrounding area is free of trash.	✓		
3. ABOVEGROUND TANKS * No ground staining, no spillage observed and no discharge to storm drain. Tanks are maintained to minimize the possibility of a release (secondary containment).	✓		
4. ONSITE STORM DRAIN* Protected from accidental discharge other than water.	✓		
5. POWER WASH OR STEAM CLEAN* (discharge to sewer) Drains to oil/water separator connected to a sanitary sewer and not a septic system. Steam cleaning not discharged to parking lot, storm drain or soil.	✓		
6. PARKING LOT / DRIVE WAY* Free of excess trash, chemical staining or liquids other than water.	✓		
7. OTHER* Non-storm water discharge (i.e. non-hazardous process discharge).			✓
8. MOP WATER TO SANITARY SEWER VIA CLARIFIER. Mop water is not dumped to the soil, parking lot, gutter, or other areas susceptible to storm water drainage.	✓		
9. STORM WATER EDUCATIONAL BROCHURES GIVEN TO FACILITY OR POSTERS DISPLAYED FOR EMPLOYEES. If no, what informational material should be sent to the facility?	✓		
10. IF A SWPPP IS REQUIRED, WAS IT AVAILA BLE FOR REVIEW? See storm water handout for industrial facilities.			✓

OVERALL EVALUATION/ COMMENTS : No Violations

RECEIVED BY: [signature], TA	HAZ MAT SPEC: M. [signature]	BADGE #

Agency referred to as indicated on the back of this page.

For additional information, please refer to our web site at www.floodcontrol.co.riverside.ca.us or contact the "Only Rain Down the Storm Drain" Pollution Prevention Program of the Cities and County of Riverside at (800) 506-2555.

...ONLY RAIN... DOWN THE STORM DRAIN

0003319

HAZARDOUS WASTE/ HAZARDOUS MATERIALS FACILITY STORM WATER COMPLIANCE SURVEY FORM

FACILITY DBA Chevron Station # 210409	TELEPHONE (951) 461-4178	DATE 5/5/09
ADDRESS 39440 Mtn Rd	CITY, ZIP Murrieta 92563	
MAILING ADDRESS (if different from site address)	MAILING CITY, ZIP	
CONTACT Somi Ratnayake	FACILITY# PR0034066	SIC CODE 5541

Compliance Areas	YES	NO	N/A
***OUTSIDE AREAS (Free of staining & debris; provides good housekeeping; maintained in a manner to prevent runoff.)**		Requires follow-up	
1. CHEMICAL STORAGE * The outside storage area is kept to minimize the possibility of a release. Chemicals / materials are protected from precipitation / storm water runoff and the containers show no signs of leaking.	✓		
2. DUMPSTER * No liquids are leaking from dumpster; surrounding area is free of trash.	✓		
3. ABOVEGROUND TANKS * No ground staining, no spill age observed and no discharge to storm drain. Tanks are maintained to minimize the possibility of a release (secondary containment).			✓
4. ONSITE STORM DRAIN* Protected from accidental discharge other than water.	✓		
5. POWER WASH OR STEAM CLEAN* (discharge to sewer) Drains to oil/water separator connected to a sanitary sewer and not a septic system. Steam cleaning not discharged to parking lot, storm drain or soil.	✓		
6. PARKING LOT / DRIVE WAY* Free of excess trash, chemical staining or liquids other than water.	✓		
7. OTHER* Non-storm water discharge (i.e. non-hazardous process discharge).	✓		
8. MOP WATER TO SANITARY SEWER VIA CLARIFIER. Mop water is not dumped to the soil, parking lot, gutter, or other areas susceptible to storm water drainage.	✓		
9. STORM WATER EDUCATIONAL BROCHURES GIVEN TO FACILITY OR POSTERS DISPLAYED FOR EMPLOYEES. If no, what informational material should be sent to the facility?			✓
10. IF A SWPPP IS REQUIRED, WAS IT AVAILA BLE FOR REVIEW? See storm water handout for industrial facilities.			✓

OVERALL EVALUATION/ COMMENTS : No violations.

RECEIVED BY: [signature]	HAZ MAT SPEC: [signature]	BADGE #

Agency referred to as indicated on the back of this page.

For additional information, please refer to our web site at www.floodcontrol.co.riverside.ca.us or contact the "Only Rain Down the Storm Drain" Pollution Prevention Program of the Cities and County of Riverside at (800) 506-2555.

...ONLY RAIN... DOWN THE STORM DRAIN

0003320

HAZARDOUS WASTE/ HAZARDOUS MATERIALS FACILITY STORM WATER COMPLIANCE SURVEY FORM

FACILITY DBA: Caliber Collision Centers	TELEPHONE: (951) 677-3533	DATE: 4/29/09
ADDRESS: 41416 Pear St	CITY, ZIP: Murrieta 92562	
MAILING ADDRESS (if different from site address)	MAILING CITY, ZIP	
CONTACT: Larry Turner	FACILITY#: PR0031558	SIC CODE: 7532

Compliance Areas	YES	NO	N/A
***OUTSIDE AREAS (Free of staining & debris; provides good housekeeping; maintained in a manner to prevent runoff.)**		**Requires follow up**	
1. CHEMICAL STORAGE * The outside storage area is kept to minimize the possibility of a release. Chemicals / materials are protected from precipitation / storm water runoff and the containers show no signs of leaking.	✓		
2. DUMPSTER * No liquids are leaking from dumpster; surrounding area is free of trash.	✓		
3. ABOVEGROUND TANKS * No ground staining, no spillage observed and no discharge to storm drain. Tanks are maintained to minimize the possibility of a release (secondary containment).	✓		
4. ONSITE STORM DRAIN* Protected from accidental discharge other than water.			✓
5. POWER WASH OR STEAM CLEAN* (discharge to sewer) Drains to oil/water separator connected to a sanitary sewer and not a septic system. Steam cleaning not discharged to parking lot, storm drain or soil.			✓
6. PARKING LOT / DRIVE WAY* Free of excess trash, chemical staining or liquids other than water.	✓		
7. OTHER* Non-storm water discharge (i.e. non-hazardous process discharge).	✓		
8. MOP WATER TO SANITARY SEWER VIA CLARIFIER. Mop water is not dumped to the soil, parking lot, gutter, or other areas susceptible to storm water drainage.			✓
9. STORM WATER EDUCATIONAL BROCHURES GIVEN TO FACILITY OR POSTERS DISPLAYED FOR EMPLOYEES. If no, what informational material should be sent to the facility?			✓
10. IF A SWPPP IS REQUIRED, WAS IT AVAILABLE FOR REVEIW? See storm water handout for industrial facilities.			✓

OVERALL EVALUATION/ COMMENTS: Facility hand washes & details cars and wash water drains off property. Operator stated method approved by city with proper water soluble soaps - no silicon based products.

RECEIVED BY:	HAZ MAT SPEC: M. Khalkho	BADGE #

Agency referred to as indicated on the back of this page.

If additional information is required, contact the Storm Water /Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

0003321

HAZARDOUS WASTE/ HAZARDOUS MATERIALS FACILITY STORM WATER COMPLIANCE SURVEY FORM

FACILITY DBA: California Auto Centers	TELEPHONE: (951) 698-4886	DATE: 4/29/09
ADDRESS: 26860 Jefferson Ave Ste I	CITY, ZIP: Murrieta 92562	
MAILING ADDRESS (if different from site address)	MAILING CITY, ZIP	
CONTACT: Joe Becht	FACILITY#: PR0029662	SIC CODE: 7538

Compliance Areas	YES	NO	N/A
***OUTSIDE AREAS (Free of staining & debris; provides good housekeeping; maintained in a manner to prevent runoff.)**		**Requires follow up**	
1. CHEMICAL STORAGE * The outside storage area is kept to minimize the possibility of a release. Chemicals / materials are protected from precipitation / storm water runoff and the containers show no signs of leaking.			✓
2. DUMPSTER * No liquids are leaking from dumpster; surrounding area is free of trash.	✓		
3. ABOVEGROUND TANKS * No ground staining, no spillage observed and no discharge to storm drain. Tanks are maintained to minimize the possibility of a release (secondary containment).			✓
4. ONSITE STORM DRAIN* Protected from accidental discharge other than water.			✓
5. POWER WASH OR STEAM CLEAN* (discharge to sewer) Drains to oil/water separator connected to a sanitary sewer and not a septic system. Steam cleaning not discharged to parking lot, storm drain or soil.			✓
6. PARKING LOT / DRIVE WAY* Free of excess trash, chemical staining or liquids other than water.	✓		
7. OTHER* Non-storm water discharge (i.e. non-hazardous process discharge).			✓
8. MOP WATER TO SANITARY SEWER VIA CLARIFIER. Mop water is not dumped to the soil, parking lot, gutter, or other areas susceptible to storm water drainage.			✓
9. STORM WATER EDUCATIONAL BROCHURES GIVEN TO FACILITY OR POSTERS DISPLAYED FOR EMPLOYEES. If no, what informational material should be sent to the facility?			✓
10. IF A SWPPP IS REQUIRED, WAS IT AVAILABLE FOR REVEIW? See storm water handout for industrial facilities.			✓

OVERALL EVALUATION/ COMMENTS: No Violations

RECEIVED BY:	HAZ MAT SPEC: M. Khalib	BADGE #

Agency referred to as indicated on the back of this page.

If additional information is required, contact the Storm Water /Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

0003322

HAZARDOUS WASTE/ HAZARDOUS MATERIALS FACILITY STORM WATER COMPLIANCE SURVEY FORM

FACILITY DBA: Temecula Autobody	TELEPHONE: (951) 677-9619	DATE: 4/28/09
ADDRESS: 41196 Nick Lane	CITY, ZIP: Murrieta 92562	
MAILING ADDRESS (if different from site address)	MAILING CITY, ZIP	
CONTACT: John Volpe	FACILITY#: PR0020213	SIC CODE: 7532

Compliance Areas	YES	NO	N/A
***OUTSIDE AREAS (Free of staining & debris; provides good housekeeping; maintained in a manner to prevent runoff.)**		**Requires follow up**	
1. CHEMICAL STORAGE * The outside storage area is kept to minimize the possibility of a release. Chemicals / materials are protected from precipitation / storm water runoff and the containers show no signs of leaking.			✓
2. DUMPSTER * No liquids are leaking from dumpster; surrounding area is free of trash.	✓		
3. ABOVEGROUND TANKS * No ground staining, no spillage observed and no discharge to storm drain. Tanks are maintained to minimize the possibility of a release (secondary containment).			✓
4. ONSITE STORM DRAIN* Protected from accidental discharge other than water.	✓		
5. POWER WASH OR STEAM CLEAN* (discharge to sewer) Drains to oil/water separator connected to a sanitary sewer and not a septic system. Steam cleaning not discharged to parking lot, storm drain or soil.			✓
6. PARKING LOT / DRIVE WAY* Free of excess trash, chemical staining or liquids other than water.	✓		
7. OTHER* Non-storm water discharge (i.e. non-hazardous process discharge).	✓		
8. MOP WATER TO SANITARY SEWER VIA CLARIFIER. Mop water is not dumped to the soil, parking lot, gutter, or other areas susceptible to storm water drainage.			✓
9. STORM WATER EDUCATIONAL BROCHURES GIVEN TO FACILITY OR POSTERS DISPLAYED FOR EMPLOYEES. If no, what informational material should be sent to the facility?			✓
10. IF A SWPPP IS REQUIRED, WAS IT AVAILA BLE FOR REVIEW? See storm water handout for industrial facilities.			✓

OVERALL EVALUATION/ COMMENTS: (7) Facility washes cars outside and wash water drains into storm drain.

RECEIVED BY: Kmeza	HAZ MAT SPEC: M. Shalub	BADGE #

Agency referred to as indicated on the back of this page.

For additional information, please refer to our web site at www.floodcontrol.co.riverside.ca.us or contact the "Only Rain Down the Storm Drain" Pollution Prevention Program of the Cities and County of Riverside at (800) 506-2555.

ONLY RAIN DOWN THE STORM DRAIN

0003323

HAZARDOUS WASTE/ HAZARDOUS MATERIALS FACILITY STORM WATER COMPLIANCE SURVEY FORM

FACILITY DBA: Faith Quality Auto Body	TELEPHONE: (951) 698-8215	DATE: 4/28/09
ADDRESS: 41130 Nick Ln	CITY, ZIP: Murrieta 92562	
MAILING ADDRESS (if different from site address)	MAILING CITY, ZIP	
CONTACT: Steve Saunders	FACILITY#: PR0028199	SIC CODE: 7532

Compliance Areas	YES	NO	N/A
***OUTSIDE AREAS (Free of staining & debris; provides good housekeeping; maintained in a manner to prevent runoff.)**		**Requires follow up**	
1. CHEMICAL STORAGE * The outside storage area is kept to minimize the possibility of a release. Chemicals / materials are protected from precipitation / storm water runoff and the containers show no signs of leaking.	✓		
2. DUMPSTER * No liquids are leaking from dumpster; surrounding area is free of trash.	✓		
3. ABOVEGROUND TANKS * No ground staining, no spillage observed and no discharge to storm drain. Tanks are maintained to minimize the possibility of a release (secondary containment).			✓
4. ONSITE STORM DRAIN* Protected from accidental discharge other than water.			✓
5. POWER WASH OR STEAM CLEAN* (discharge to sewer) Drains to oil/water separator connected to a sanitary sewer and not a septic system. Steam cleaning not discharged to parking lot, storm drain or soil.	✓		
6. PARKING LOT / DRIVE WAY* Free of excess trash, chemical staining or liquids other than water.	✓		
7. OTHER* Non-storm water discharge (i.e. non-hazardous process discharge).			✓
8. MOP WATER TO SANITARY SEWER VIA CLARIFIER. Mop water is not dumped to the soil, parking lot, gutter, or other areas susceptible to storm water drainage.	✓		
9. STORM WATER EDUCATIONAL BROCHURES GIVEN TO FACILITY OR POSTERS DISPLAYED FOR EMPLOYEES. If no, what informational material should be sent to the facility?			✓
10. IF A SWPPP IS REQUIRED, WAS IT AVAILABLE FOR REVEIW? See storm water handout for industrial facilities.			✓

OVERALL EVALUATION/ COMMENTS: No Violations. Facility has clarifier for wash/detail area discharge.

RECEIVED BY:	HAZ MAT SPEC: M. Shelb	BADGE #

Agency referred to as indicated on the back of this page.

If additional information is required, contact the Storm Water /Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

0003324

HAZARDOUS WASTE/ HAZARDOUS MATERIALS FACILITY STORM WATER COMPLIANCE SURVEY FORM

FACILITY DBA Blacks Auto Repair	TELEPHONE (951) 677-9645	DATE 4/20/09
ADDRESS 25760 Washington Ave	CITY, ZIP Murrieta 92562	
MAILING ADDRESS (if different from site address)	MAILING CITY, ZIP	
CONTACT Chuck Whittelsey	FACILITY# PR0031137	SIC CODE 7538

Compliance Areas	YES	NO	N/A
***OUTSIDE AREAS (Free of staining & debris; provides good housekeeping; maintained in a manner to prevent runoff.)**		**Requires follow up**	
1. CHEMICAL STORAGE * The outside storage area is kept to minimize the possibility of a release. Chemicals / materials are protected from precipitation / storm water runoff and the containers show no signs of leaking.	✓		
2. DUMPSTER * No liquids are leaking from dumpster; surrounding area is free of trash.	✓		
3. ABOVEGROUND TANKS * No ground staining, no spillage observed and no discharge to storm drain. Tanks are maintained to minimize the possibility of a release (secondary containment).	✓		
4. ONSITE STORM DRAIN* Protected from accidental discharge other than water.			✓
5. POWER WASH OR STEAM CLEAN* (discharge to sewer) Drains to oil/water separator connected to a sanitary sewer and not a septic system. Steam cleaning not discharged to parking lot, storm drain or soil.			✓
6. PARKING LOT / DRIVE WAY* Free of excess trash, chemical staining or liquids other than water.	✓		
7. OTHER* Non-storm water discharge (i.e. non-hazardous process discharge).			✓
8. MOP WATER TO SANITARY SEWER VIA CLARIFIER. Mop water is not dumped to the soil, parking lot, gutter, or other areas susceptible to storm water drainage.	✓		
9. STORM WATER EDUCATIONAL BROCHURES GIVEN TO FACILITY OR POSTERS DISPLAYED FOR EMPLOYEES. If no, what informational material should be sent to the facility?			✓
10. IF A SWPPP IS REQUIRED, WAS IT AVAILABLE FOR REVEIW? See storm water handout for industrial facilities.			✓

OVERALL EVALUATION/ COMMENTS: No Violations.

RECEIVED BY: P. Whittelsey	HAZ MAT SPEC: M. Khalkh	BADGE #

Agency referred to as indicated on the back of this page.

If additional information is required, contact the Storm Water /Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

0003325

HAZARDOUS WASTE/ HAZARDOUS MATERIALS FACILITY STORM WATER COMPLIANCE SURVEY FORM

FACILITY DBA: KIP Incorporated	TELEPHONE: (951) 698-7890	DATE: 4/20/09
ADDRESS: 25740 Washington Ave	CITY, ZIP: Murrieta 92562	
MAILING ADDRESS (if different from site address):	MAILING CITY, ZIP:	
CONTACT: Dale Grayczyk	FACILITY#: 29972	SIC CODE: 1629

Compliance Areas	YES	NO	N/A
***OUTSIDE AREAS (Free of staining & debris; provides good housekeeping; maintained in a manner to prevent runoff.)**		**Requires follow up**	
1. CHEMICAL STORAGE * The outside storage area is kept to minimize the possibility of a release. Chemicals / materials are protected from precipitation / storm water runoff and the containers show no signs of leaking.	✓		
2. DUMPSTER * No liquids are leaking from dumpster; surrounding area is free of trash.	✓		
3. ABOVEGROUND TANKS * No ground staining, no spillage observed and no discharge to storm drain. Tanks are maintained to minimize the possibility of a release (secondary containment).		✓	
4. ONSITE STORM DRAIN* Protected from accidental discharge other than water.	✓		✓
5. POWER WASH OR STEAM CLEAN* (discharge to sewer) Drains to oil/water separator connected to a sanitary sewer and not a septic system. Steam cleaning not discharged to parking lot, storm drain or soil.		✓	
6. PARKING LOT / DRIVE WAY* Free of excess trash, chemical staining or liquids other than water.	✓		
7. OTHER* Non-storm water discharge (i.e. non-hazardous process discharge).			✓
8. MOP WATER TO SANITARY SEWER VIA CLARIFIER. Mop water is not dumped to the soil, parking lot, gutter, or other areas susceptible to storm water drainage.	✓		
9. STORM WATER EDUCATIONAL BROCHURES GIVEN TO FACILITY OR POSTERS DISPLAYED FOR EMPLOYEES. If no, what informational material should be sent to the facility?			✓
10. IF A SWPPP IS REQUIRED, WAS IT AVAILABLE FOR REVEIW? See storm water handout for industrial facilities.			✓

OVERALL EVALUATION/ COMMENTS: #3 Observed ground staining around fueling nozzles #5: Wash pit drains into a containment sump that when overflows discharges onto the ground evidenced by staining under drain holes.

RECEIVED BY: [signature] | HAZ MAT SPEC: [signature] | BADGE #

Agency referred to as indicated on the back of this page.

If additional information is required, contact the Storm Water /Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

CITY OF MURRIETA

COMPLIANCE ASSISTANCE PROGRAM (CAP)
RE-INSPECTION SURVEY FORM

FACILITY DBA	TELEPHONE	DATE
KIP INC.	(951) 698-7890	6-30-09
ADDRESS: 25740 WASHINGTON AVE.	CITY, ZIP: MURRIETA, 92562	
MAILING ADDRESS	MAILING CITY, ZIP	
CONTACT: DALE GRAJCZYK	FACILITY #: 29972	SIC CODE: 1629

Follow-up Inspection	YES	NO	DATE
*OUTSIDE AREAS (Free of staining & debris; provides good housekeeping; maintained in a manner to prevent runoff.)			
1. CHEMICAL STORAGE * The outside storage area is kept to minimize the possibility of a release. Chemicals/materials are protected from precipitation/storm water runoff and the containers show no signs of leaking.			
2. DUMPSTER* No liquids are leaking from dumpster; surrounding area is free of trash.			
3. ABOVEGROUND TANKS* No ground staining, no spillage observed and no discharge to storm drain. Tanks are maintained to minimize the possibility of a release (secondary containment.)	✓		
4. ONSITE STORM DRAIN* Protected from accidental discharge other than water.			
5. POWER WASH OR STEAM CLEAN* (discharge to sewer) Drains to oil/water separator connected to a sanitary sewer and not a septic system. Steam cleaning not discharged to parking lot, storm drain or soil.	✓		
6. PARKING LOT/DRIVE WAY* Free of excess trash, chemical staining or liquids other than water.			
7. OTHER* Non-storm water discharge (i.e. non-hazardous process discharge.)			
8. MOP WATER TO SANITARY SEWER VIA CLARIFIER. Mop water is not dumped to the soil, parking lot, gutter, or other areas susceptible to storm water drainage.			
9. STORM WATER EDUCATIONAL BROCHURES GIVEN TO FACILITY OR POSTERS DISPLAYED FOR EMPLOYEES. If no, what information material should be sent to the facility?			
10. IF A SWPPP IS REQUIRED, WAS IT AVAILABLE FOR REVIEW? See storm water handout for industrial facilities.			

OVERALL EVALUATION/COMMENTS: Observed all issues & found all to be acceptable.

RECEIVED BY:	HAZ MAT SPEC:	BADGE #

0003327

HAZARDOUS WASTE/ HAZARDOUS MATERIALS FACILITY STORM WATER COMPLIANCE SURVEY FORM

FACILITY DBA: Chevron Stations Inc #1484/201241	TELEPHONE: (951) 696-9572	DATE: 4/2/09
ADDRESS: 40500 California Oaks Rd	CITY, ZIP: Murrieta 92562	
MAILING ADDRESS (if different from site address)	MAILING CITY, ZIP	
CONTACT: Charles Clinton	FACILITY#: PR0028096	SIC CODE: 5541

Compliance Areas	YES	NO	N/A
***OUTSIDE AREAS (Free of staining & debris; provides good housekeeping; maintained in a manner to prevent runoff.)**		**Requires follow up**	
1. CHEMICAL STORAGE * The outside storage area is kept to minimize the possibility of a release. Chemicals / materials are protected from precipitation / storm water runoff and the containers show no signs of leaking.	✓		
2. DUMPSTER * No liquids are leaking from dumpster; surrounding area is free of trash.	✓		
3. ABOVEGROUND TANKS * No ground staining, no spill age observed and no discharge to storm drain. Tanks are maintained to minimize the possibility of a release (secondary containment).			✓
4. ONSITE STORM DRAIN* Protected from accidental discharge other than water.	✓		
5. POWER WASH OR STEAM CLEAN* (discharge to sewer) Drains to oil/water separator connected to a sanitary sewer and not a septic system. Steam cleaning not discharged to parking lot, storm drain or soil.			✓
6. PARKING LOT / DRIVE WAY* Free of excess trash, chemical staining or liquids other than water.	✓		
7. OTHER* Non-storm water discharge (i.e. non-hazardous process discharge).			✓
8. MOP WATER TO SANITARY SEWER VIA CLARIFIER. Mop water is not dumped to the soil, parking lot, gutter, or other areas susceptible to storm water drainage.	✓		
9. STORM WATER EDUCATIONAL BROCHURES GIVEN TO FACILITY OR POSTERS DISPLAYED FOR EMPLOYEES. If no, what informational material should be sent to the facility?			✓
10. IF A SWPPP IS REQUIRED, WAS IT AVAILA BLE FOR REVIEW? See storm water handout for industrial facilities.			✓

OVERALL EVALUATION/ COMMENTS : No Violations noted

RECEIVED BY:	HAZ MAT SPEC: M. Shalla	BADGE #

Agency referred to as indicated on the back of this page.

For additional information, please refer to our web site at www.floodcontrol.co.riverside.ca.us or contact the "Only Rain Down the Storm Drain" Pollution Prevention Program of the Cities and County of Riverside at (800) 506-2555.

...ONLY RAIN... DOWN THE STORM DRAIN

0003328

HAZARDOUS WASTE/ HAZARDOUS MATERIALS FACILITY
STORM WATER COMPLIANCE SURVEY FORM

FACILITY DBA: USA Station # 68168	TELEPHONE: (951) 600-8172	DATE: 3/23/09
ADDRESS: 39055 Winchester Rd	CITY, ZIP: Murrieta 92563	
MAILING ADDRESS (if different from site address)	MAILING CITY, ZIP	
CONTACT: Cheryl Jones	FACILITY#: PR0030708	SIC CODE: 5541

Compliance Areas	YES	NO	N/A
***OUTSIDE AREAS (Free of staining & debris; provides good housekeeping; maintained in a manner to prevent runoff.)**		**Requires follow up**	
1. CHEMICAL STORAGE * The outside storage area is kept to minimize the possibility of a release. Chemicals / materials are protected from precipitation / storm water runoff and the containers show no signs of leaking.	✓		
2. DUMPSTER * No liquids are leaking from dumpster; surrounding area is free of trash.	✓		
3. ABOVEGROUND TANKS * No ground staining, no spillage observed and no discharge to storm drain. Tanks are maintained to minimize the possibility of a release (secondary containment).	✓		
4. ONSITE STORM DRAIN* Protected from accidental discharge other than water.			✓
5. POWER WASH OR STEAM CLEAN* (discharge to sewer) Drains to oil/water separator connected to a sanitary sewer and not a septic system. Steam cleaning not discharged to parking lot, storm drain or soil.			✓
6. PARKING LOT / DRIVE WAY* Free of excess trash, chemical staining or liquids other than water.	✓		
7. OTHER* Non-storm water discharge (i.e. non-hazardous process discharge).			✓
8. MOP WATER TO SANITARY SEWER VIA CLARIFIER. Mop water is not dumped to the soil, parking lot, gutter, or other areas susceptible to storm water drainage.	✓		
9. STORM WATER EDUCATIONAL BROCHURES GIVEN TO FACILITY OR POSTERS DISPLAYED FOR EMPLOYEES. If no, what informational material should be sent to the facility?	✓		
10. IF A SWPPP IS REQUIRED, WAS IT AVAILABLE FOR REVIEW? See storm water handout for industrial facilities.			✓

OVERALL EVALUATION/ COMMENTS : No Violations.

RECEIVED BY: Cheryl Jones	HAZ MAT SPEC: M. Hall	BADGE #

Agency referred to as indicated on the back of this page.

For additional information, please refer to our web site at www.floodcontrol.co.riverside.ca.us or contact the "Only Rain Down the Storm Drain" Pollution Prevention Program of the Cities and County of Riverside at (800) 506-2555.

ONLY RAIN... DOWN THE STORM DRAIN

0003329

HAZARDOUS WASTE/ HAZARDOUS MATERIALS FACILITY STORM WATER COMPLIANCE SURVEY FORM

FACILITY DBA: Calvary Chapel Conference Center	TELEPHONE: (951) 698-5031	DATE: 3/17/09
ADDRESS: 39405 Mtts Rd	CITY, ZIP: Murrieta 92563	
MAILING ADDRESS (if different from site address)	MAILING CITY, ZIP	
CONTACT: Daryl Bickley	FACILITY#: PR0028363	SIC CODE: 8221

Compliance Areas	YES	NO	N/A
***OUTSIDE AREAS (Free of staining & debris; provides good housekeeping; maintained in a manner to prevent runoff.)**		**Requires follow up**	
1. CHEMICAL STORAGE * The outside storage area is kept to minimize the possibility of a release. Chemicals / materials are protected from precipitation / storm water runoff and the containers show no signs of leaking.			✓
2. DUMPSTER * No liquids are leaking from dumpster; surrounding area is free of trash.	✓		
3. ABOVEGROUND TANKS * No ground staining, no spillage observed and no discharge to storm drain. Tanks are maintained to minimize the possibility of a release (secondary containment).			✓
4. ONSITE STORM DRAIN* Protected from accidental discharge other than water.			✓
5. POWER WASH OR STEAM CLEAN* (discharge to sewer) Drains to oil/water separator connected to a sanitary sewer and not a septic system. Steam cleaning not discharged to parking lot, storm drain or soil.			✓
6. PARKING LOT / DRIVE WAY* Free of excess trash, chemical staining or liquids other than water.	✓		
7. OTHER* Non-storm water discharge (i.e. non-hazardous process discharge).			✓
8. MOP WATER TO SANITARY SEWER VIA CLARIFIER. Mop water is not dumped to the soil, parking lot, gutter, or other areas susceptible to storm water drainage.	✓		
9. STORM WATER EDUCATIONAL BROCHURES GIVEN TO FACILITY OR POSTERS DISPLAYED FOR EMPLOYEES. If no, what informational material should be sent to the facility?			✓
10. IF A SWPPP IS REQUIRED, WAS IT AVAILABLE FOR REVEIW? See storm water handout for industrial facilities.			✓

OVERALL EVALUATION/ COMMENTS: _____

RECEIVED BY: Daryl S. Bickley	HAZ MAT SPEC: M Shattuck	BADGE #

Agency referred to as indicated on the back of this page.

If additional information is required, contact the Storm Water /Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

0003330

HAZARDOUS WASTE/ HAZARDOUS MATERIALS FACILITY STORM WATER COMPLIANCE SURVEY FORM

FACILITY DBA: James Allen Collision Center II	TELEPHONE: (951) 304-0563	DATE: 3/16/09
ADDRESS: 41109 Sandalwood Cir	CITY, ZIP: Murrieta 92562	
MAILING ADDRESS (if different from site address)	MAILING CITY, ZIP	
CONTACT: Chris Frederick	FACILITY#: PR0028280	SIC CODE: 7532

Compliance Areas	YES	NO	N/A
***OUTSIDE AREAS (Free of staining & debris; provides good housekeeping; maintained in a manner to prevent runoff.)**		**Requires follow up**	
1. CHEMICAL STORAGE * The outside storage area is kept to minimize the possibility of a release. Chemicals / materials are protected from precipitation / storm water runoff and the containers show no signs of leaking.		NA	✓
2. DUMPSTER * No liquids are leaking from dumpster; surrounding area is free of trash.	✓		
3. ABOVEGROUND TANKS * No ground staining, no spillage observed and no discharge to storm drain. Tanks are maintained to minimize the possibility of a release (secondary containment).			✓
4. ONSITE STORM DRAIN* Protected from accidental discharge other than water.			✓
5. POWER WASH OR STEAM CLEAN* (discharge to sewer) Drains to oil/water separator connected to a sanitary sewer and not a septic system. Steam cleaning not discharged to parking lot, storm drain or soil.			✓
6. PARKING LOT / DRIVE WAY* Free of excess trash, chemical staining or liquids other than water.	✓		
7. OTHER* Non-storm water discharge (i.e. non-hazardous process discharge).	✓		
8. MOP WATER TO SANITARY SEWER VIA CLARIFIER. Mop water is not dumped to the soil, parking lot, gutter, or other areas susceptible to storm water drainage.	✓		
9. STORM WATER EDUCATIONAL BROCHURES GIVEN TO FACILITY OR POSTERS DISPLAYED FOR EMPLOYEES. If no, what informational material should be sent to the facility?			✓
10. IF A SWPPP IS REQUIRED, WAS IT AVAILABLE FOR REVEIW? See storm water handout for industrial facilities.			✓

OVERALL EVALUATION/ COMMENTS: _____

RECEIVED BY:	HAZ MAT SPEC: M Khalib	BADGE #

Agency referred to as indicated on the back of this page.

If additional information is required, contact the Storm Water /Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

0003331

HAZARDOUS WASTE/ HAZARDOUS MATERIALS FACILITY STORM WATER COMPLIANCE SURVEY FORM

FACILITY DBA Chuck E. Cheese	TELEPHONE (951) 698-1307	DATE 3/5/09
ADDRESS 25110 Hancock Ave	CITY, ZIP Murrieta 92562	
MAILING ADDRESS (if different from site address)	MAILING CITY, ZIP	
CONTACT Veronica Briseno	FACILITY# PR0033788	SIC CODE 5812

Compliance Areas	YES	NO	N/A
***OUTSIDE AREAS (Free of staining & debris; provides good housekeeping; maintained in a manner to prevent runoff.)**		**Requires follow up**	
1. CHEMICAL STORAGE * The outside storage area is kept to minimize the possibility of a release. Chemicals / materials are protected from precipitation / storm water runoff and the containers show no signs of leaking.			✓
2. DUMPSTER * No liquids are leaking from dumpster; surrounding area is free of trash.	✓		
3. ABOVEGROUND TANKS * No ground staining, no spill age observed and no discharge to storm drain. Tanks are maintained to minimize the possibility of a release (secondary containment).			✓
4. ONSITE STORM DRAIN* Protected from accidental discharge other than water.			✓
5. POWER WASH OR STEAM CLEAN* (discharge to se wer) Drains to oil/water separator connected to a sanitary sewer and not a septic system. Steam cleaning not discharged to parking lot, storm drain or soil.			✓
6. PARKING LOT / DRIVE WAY* Free of excess trash, chemical staining or liquids other than water.	✓		
7. OTHER* Non-storm water discharge (i.e. non-hazardous process discharge).			✓
8. MOP WATER TO SANITARY SEWER VIA CLARIFIER. Mop water is not dumped to the soil, parking lot, gutter, or other areas susceptible to storm water drainage.	✓		
9. STORM WATER EDUCATIONAL BROCHURES GIVEN TO FACILITY OR POSTERS DISPLAYED FOR EMPLOYEES. If no, what informational material should be sent to the facility?			✓
10. IF A SWPPP IS REQUIRED, WAS IT AVAILA BLE FOR REVIEW? See storm water handout for industrial facilities.			✓

OVERALL EVALUATION/ COMMENTS : _____

RECEIVED BY: Veronica Briseno	HAZ MAT SPEC: M. Shalkb	BADGE #

Agency referred to as indicated on the back of this page.

For additional information, please refer to our web site at www.floodcontrol.co.riverside.ca.us or contact the "Only Rain Down the Storm Drain" Pollution Prevention Program of the Cities and County of Riverside at (800) 506-2555.

...ONLY RAIN... DOWN THE STORM DRAIN

0003332

HAZARDOUS WASTE/ HAZARDOUS MATERIALS FACILITY STORM WATER COMPLIANCE SURVEY FORM

FACILITY DBA: CVS Pharmacy #9628	TELEPHONE: (951) 698-7380	DATE: 3/5/09
ADDRESS: 25080 Hancock Ave	CITY, ZIP: Murrieta 92562	
MAILING ADDRESS (if different from site address)	MAILING CITY, ZIP	
CONTACT: Kak Ouellette	FACILITY#: PR0022157	SIC CODE: 5912

Compliance Areas	YES	NO	N/A
***OUTSIDE AREAS (Free of staining & debris; provides good housekeeping; maintained in a manner to prevent runoff.)**		**Requires follow up**	
1. CHEMICAL STORAGE * The outside storage area is kept to minimize the possibility of a release. Chemicals / materials are protected from precipitation / storm water runoff and the containers show no signs of leaking.			✓
2. DUMPSTER * No liquids are leaking from dumpster; surrounding area is free of trash.	✓		
3. ABOVEGROUND TANKS * No ground staining, no spill age observed and no discharge to storm drain. Tanks are maintained to minimize the possibility of a release (secondary containment).			✓
4. ONSITE STORM DRAIN* Protected from accidental discharge other than water.			✓
5. POWER WASH OR STEAM CLEAN* (discharge to sewer) Drains to oil/water separator connected to a sanitary sewer and not a septic system. Steam cleaning not discharged to parking lot, storm drain or soil.			✓
6. PARKING LOT / DRIVE WAY* Free of excess trash, chemical staining or liquids other than water.	✓		
7. OTHER* Non-storm water discharge (i.e. non-hazardous process discharge).			✓
8. MOP WATER TO SANITARY SEWER VIA CLARIFIER. Mop water is not dumped to the soil, parking lot, gutter, or other areas susceptible to storm water drainage.	✓		
9. STORM WATER EDUCATIONAL BROCHURES GIVEN TO FACILITY OR POSTERS DISPLAYED FOR EMPLOYEES. If no, what informational material should be sent to the facility?			✓
10. IF A SWPPP IS REQUIRED, WAS IT AVAILA BLE FOR REVIEW? See storm water handout for industrial facilities.			✓

OVERALL EVALUATION/ COMMENTS : _____

RECEIVED BY: [signature] | HAZ MAT SPEC: M. Hall | BADGE #

Agency referred to as indicated on the back of this page.

For additional information, please refer to our web site at www.floodcontrol.co.riverside.ca.us or contact the "Only Rain Down the Storm Drain" Pollution Prevention Program of the Cities and County of Riverside at (800) 506-2555.

...ONLY RAIN... DOWN THE STORM DRAIN

0003333

HAZARDOUS WASTE/ HAZARDOUS MATERIALS FACILITY
STORM WATER COMPLIANCE SURVEY FORM

FACILITY DBA: Stater Bros Market #139	TELEPHONE: (951) 677-4117	DATE: 3/5/09
ADDRESS: 25050 Hancock Ave	CITY, ZIP: Murrieta 92562	
MAILING ADDRESS (if different from site address)	MAILING CITY, ZIP	
CONTACT: Matt Smaby	FACILITY#: PR0030853	SIC CODE: 5411

Compliance Areas	YES	NO	N/A
***OUTSIDE AREAS (Free of staining & debris; provides good housekeeping; maintained in a manner to prevent runoff.)**		**Requires follow up**	
1. CHEMICAL STORAGE * The outside storage area is kept to minimize the possibility of a release. Chemicals / materials are protected from precipitation / storm water runoff and the containers show no signs of leaking.		MS	✓
2. DUMPSTER * No liquids are leaking from dumpster; surrounding area is free of trash.	✓		
3. ABOVEGROUND TANKS * No ground staining, no spill age observed and no discharge to storm drain. Tanks are maintained to minimize the possibility of a release (secondary containment).			✓
4. ONSITE STORM DRAIN* Protected from accidental discharge other than water.			✓
5. POWER WASH OR STEAM CLEAN* (discharge to sewer) Drains to oil/water separator connected to a sanitary sewer and not a septic system. Steam cleaning not discharged to parking lot, storm drain or soil.			✓
6. PARKING LOT / DRIVE WAY* Free of excess trash, chemical staining or liquids other than water.	✓		
7. OTHER* Non-storm water discharge (i.e. non-hazardous process discharge).			✓
8. MOP WATER TO SANITARY SEWER VIA CLARIFIER. Mop water is not dumped to the soil, parking lot, gutter, or other areas susceptible to storm water drainage.	✓		
9. STORM WATER EDUCATIONAL BROCHURES GIVEN TO FACILITY OR POSTERS DISPLAYED FOR EMPLOYEES. If no, what informational material should be sent to the facility?			✓
10. IF A SWPPP IS REQUIRED, WAS IT AVAILA BLE FOR REVIEW? See storm water handout for industrial facilities.			✓

OVERALL EVALUATION/ COMMENTS : _____

RECEIVED BY: MATT SMABY	HAZ MAT SPEC: M. Khalil	BADGE #

Agency referred to as indicated on the back of this page.

For additional information, please refer to our web site at www.floodcontrol.co.riverside.ca.us or contact the "Only Rain Down the Storm Drain" Pollution Prevention Program of the Cities and County of Riverside at (800) 506-2555.

ONLY RAIN DOWN THE STORM DRAIN

0003334

HAZARDOUS WASTE/ HAZARDOUS MATERIALS FACILITY STORM WATER COMPLIANCE SURVEY FORM

FACILITY DBA: Gentle Dry Cleaners	TELEPHONE: (951) 600-0211	DATE: 3/5/09
ADDRESS: 25060 Hancock Ave #101	CITY, ZIP: Murrieta 92562	
MAILING ADDRESS (if different from site address)	MAILING CITY, ZIP	
CONTACT: Sung Hyuk Im	FACILITY#: PR00 28213	SIC CODE: 7219

Compliance Areas	YES	NO	N/A
***OUTSIDE AREAS (Free of staining & debris; provides good housekeeping; maintained in a manner to prevent runoff.)**		**Requires follow up**	
1. CHEMICAL STORAGE * The outside storage area is kept to minimize the possibility of a release. Chemicals / materials are protected from precipitation / storm water runoff and the containers show no signs of leaking.			✓
2. DUMPSTER * No liquids are leaking from dumpster; surrounding area is free of trash.	✓		
3. ABOVEGROUND TANKS * No ground staining, no spill age observed and no discharge to storm drain. Tanks are maintained to minimize the possibility of a release (secondary containment).			✓
4. ONSITE STORM DRAIN* Protected from accidental discharge other than water.			✓
5. POWER WASH OR STEAM CLEAN* (discharge to se wer) Drains to oil/water separator connected to a sanitary sewer and not a septic system. Steam cleaning not discharged to parking lot, storm drain or soil.			✓
6. PARKING LOT / DRIVE WAY* Free of excess trash, chemical staining or liquids other than water.	✓		
7. OTHER* Non-storm water discharge (i.e. non-hazardous process discharge).	✓		
8. MOP WATER TO SANITARY SEWER VIA CLARIFIER. Mop water is not dumped to the soil, parking lot, gutter, or other areas susceptible to storm water drainage.	✓		
9. STORM WATER EDUCATIONAL BROCHURES GIVEN TO FACILITY OR POSTERS DISPLAYED FOR EMPLOYEES. If no, what informational material should be sent to the facility?			✓
10. IF A SWPPP IS REQUIRED, WAS IT AVAILA BLE FOR REVIEW? See storm water handout for industrial facilities.			✓

OVERALL EVALUATION/ COMMENTS : _____

RECEIVED BY: Sung Im	HAZ MAT SPEC: M. Khalib	BADGE #

Agency referred to as indicated on the back of this page.

For additional information, please refer to our web site at www.floodcontrol.co.riverside.ca.us or contact the "Only Rain Down the Storm Drain" Pollution Prevention Program of the Cities and County of Riverside at (800) 506-2555.

...ONLY RAIN... DOWN THE STORM DRAIN

0003335

HAZARDOUS WASTE/ HAZARDOUS MATERIALS FACILITY
STORM WATER COMPLIANCE SURVEY FORM

FACILITY DBA Pure Chiropractic	TELEPHONE (951) 461-4617	DATE 3/5/09
ADDRESS 25136 Hancock Ave, Ste C	CITY, ZIP Murrieta, 92562	
MAILING ADDRESS (if different from site address)	MAILING CITY, ZIP	
CONTACT Michelle Becerra	FACILITY#	SIC CODE 8011

Compliance Areas	YES	NO	N/A
***OUTSIDE AREAS (Free of staining & debris; provides good housekeeping; maintained in a manner to prevent runoff.)**		**Requires follow up**	
1. CHEMICAL STORAGE * The outside storage area is kept to minimize the possibility of a release. Chemicals / materials are protected from precipitation / storm water runoff and the containers show no signs of leaking.			✓
2. DUMPSTER * No liquids are leaking from dumpster; surrounding area is free of trash.	✓		
3. ABOVEGROUND TANKS * No ground staining, no spill age observed and no discharge to storm drain. Tanks are maintained to minimize the possibility of a release (secondary containment).			✓
4. ONSITE STORM DRAIN* Protected from accidental discharge other than water.			✓
5. POWER WASH OR STEAM CLEAN* (discharge to se wer) Drains to oil/water separator connected to a sanitary sewer and not a septic system. Steam cleaning not discharged to parking lot, storm drain or soil.			✓
6. PARKING LOT / DRIVE WAY* Free of excess trash, chemical staining or liquids other than water.	✓		
7. OTHER* Non-storm water discharge (i.e. non-hazardous process discharge).			✓
8. MOP WATER TO SANITARY SEWER VIA CLARIFIER. Mop water is not dumped to the soil, parking lot, gutter, or other areas susceptible to storm water drainage.	✓		
9. STORM WATER EDUCATIONAL BROCHURES GIVEN TO FACILITY OR POSTERS DISPLAYED FOR EMPLOYEES. If no, what informational material should be sent to the facility?			✓
10. IF A SWPPP IS REQUIRED, WAS IT AVAILA BLE FOR REVIEW? See storm water handout for industrial facilities.			✓

OVERALL EVALUATION/ COMMENTS : _____

RECEIVED BY: [signature]	HAZ MAT SPEC: M. Shalb	BADGE #

Agency referred to as indicated on the back of this page.

For additional information, please refer to our web site at www.floodcontrol.co.riverside.ca.us or contact the "Only Rain Down the Storm Drain" Pollution Prevention Program of the Cities and County of Riverside at (800) 506-2555.

ONLY RAIN... DOWN THE STORM DRAIN

0003336

HAZARDOUS WASTE/ HAZARDOUS MATERIALS FACILITY STORM WATER COMPLIANCE SURVEY FORM

FACILITY DBA: Seven-Eleven # 33552	TELEPHONE: (951) 698-3686	DATE: 2/26/09
ADDRESS: 40210 Murrieta Hot Springs Rd	CITY, ZIP: Murrieta 92563	
MAILING ADDRESS (if different from site address)	MAILING CITY, ZIP	
CONTACT: Jolly Singh	FACILITY# 34493 PR00 ~~[illegible]~~	SIC CODE: 5541

Compliance Areas	YES	NO	N/A
***OUT IDE AREAS (Free of staining & debris; provides good housekeeping; maintained in a manner to prevent runoff.)**		**Requires follow up**	
1. CHEMICAL STORAGE * The outside storage area is kept to minimize the possibility of a release. Chemicals / materials are protected from precipitation / storm water runoff and the containers show no signs of leaking.	✓		
2. DUMPSTER * No liquids are leaking from dumpster; surrounding area is free of trash.	✓		
3. ABOVEGROUND TANKS * No ground staining, no spillage observed and no discharge to storm drain. Tanks are maintained to minimize the possibility of a release (secondary containment).			✓
4. ONSITE STORM DRAIN* Protected from accidental discharge other than water.	✓		
5. POWER WASH OR STEAM CLEAN* (discharge to sewer) Drains to oil/water separator connected to a sanitary sewer and not a septic system. Steam cleaning not discharged to parking lot, storm drain or soil.	✓		
6. PARKING LOT / DRIVE WAY* Free of excess trash, chemical staining or liquids other than water.	✓		
7. OTHER* Non-storm water discharge (i.e. non-hazardous process discharge).	✓		
8. MOP WATER TO SANITARY SEWER VIA CLARIFIER. Mop water is not dumped to the soil, parking lot, gutter, or other areas susceptible to storm water drainage.	✓		
9. STORM WATER EDUCATIONAL BROCHURES GIVEN TO FACILITY OR POSTERS DISPLAYED FOR EMPLOYEES. If no, what informational material should be sent to the facility?	✓		
10. IF A SWPPP IS REQUIRED, WAS IT AVAILABLE FOR REVEIW? See storm water handout for industrial facilities.			✓

OVERALL EVALUATION/ COMMENTS: No violations noted

RECEIVED BY: [signature]	HAZ MAT SPEC: M. Thalk	BADGE #

Agency referred to as indicated on the back of this page.

If additional information is required, contact the Storm Water /Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

0003337

HAZARDOUS WASTE/ HAZARDOUS MATERIALS FACILITY STORM WATER COMPLIANCE SURVEY FORM

FACILITY DBA: Murrieta Volkswagon	TELEPHONE: (951) 894-6555	DATE: 2/25/09
ADDRESS: 41300 Date St	CITY, ZIP: Murrieta, CA 92562	
MAILING ADDRESS (if different from site address): P.O. Box 1081	MAILING CITY, ZIP: Murrieta, CA 92564	
CONTACT: Lewis Singleterry	FACILITY#: R00033504	SIC CODE: 7538

Compliance Areas	YES	NO	N/A
***OUTSIDE AREAS (Free of staining & debris; provides good housekeeping; maintained in a manner to prevent runoff.)**		**Requires follow up**	
1. CHEMICAL STORAGE * The outside storage area is kept to minimize the possibility of a release. Chemicals / materials are protected from precipitation / storm water runoff and the containers show no signs of leaking.	✓		
2. DUMPSTER * No liquids are leaking from dumpster; surrounding area is free of trash.	✓		
3. ABOVEGROUND TANKS * No ground staining, no spillage observed and no discharge to storm drain. Tanks are maintained to minimize the possibility of a release (secondary containment).	✓		
4. ONSITE STORM DRAIN* Protected from accidental discharge other than water.	✓		
5. POWER WASH OR STEAM CLEAN* (discharge to sewer) Drains to oil/water separator connected to a sanitary sewer and not a septic system. Steam cleaning not discharged to parking lot, storm drain or soil.	✓		
6. PARKING LOT / DRIVE WAY* Free of excess trash, chemical staining or liquids other than water.	✓		
7. OTHER* Non-storm water discharge (i.e. non-hazardous process discharge).	✓		
8. MOP WATER TO SANITARY SEWER VIA CLARIFIER. Mop water is not dumped to the soil, parking lot, gutter, or other areas susceptible to storm water drainage.	✓		
9. STORM WATER EDUCATIONAL BROCHURES GIVEN TO FACILITY OR POSTERS DISPLAYED FOR EMPLOYEES. If no, what informational material should be sent to the facility?	✓		
10. IF A SWPPP IS REQUIRED, WAS IT AVAILABLE FOR REVEIW? See storm water handout for industrial facilities.			✓

OVERALL EVALUATION/ COMMENTS: No violations noted at time of inspection.

RECEIVED BY: [signature] HAZ MAT SPEC: M. Khalib BADGE #

Agency referred to as indicated on the back of this page.

If additional information is required, contact the Storm Water /Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

0003338

HAZARDOUS WASTE/ HAZARDOUS MATERIALS FACILITY STORM WATER COMPLIANCE SURVEY FORM

FACILITY DBA: Carriage Motors, Inc	TELEPHONE: (951)	DATE: 2/25/09
ADDRESS: 26825 Auto Mall Pkwy	CITY, ZIP: Murrieta 92562	
MAILING ADDRESS (if different from site address): P.O. Box 892830	MAILING CITY, ZIP: Temecula 92589	
CONTACT: Eli Miller	FACILITY#: PR0033596	SIC CODE: 7538

Compliance Areas	YES	NO	N/A
***OUTSIDE AREAS (Free of staining & debris; provides good housekeeping; maintained in a manner to prevent runoff.)**		**Requires follow up**	
1. CHEMICAL STORAGE * The outside storage area is kept to minimize the possibility of a release. Chemicals / materials are protected from precipitation / storm water runoff and the containers show no signs of leaking.	✓		
2. DUMPSTER * No liquids are leaking from dumpster; surrounding area is free of trash.	✓		
3. ABOVEGROUND TANKS * No ground staining, no spillage observed and no discharge to storm drain. Tanks are maintained to minimize the possibility of a release (secondary containment).	✓		
4. ONSITE STORM DRAIN* Protected from accidental discharge other than water.	✓		
5. POWER WASH OR STEAM CLEAN* (discharge to sewer) Drains to oil/water separator connected to a sanitary sewer and not a septic system. Steam cleaning not discharged to parking lot, storm drain or soil.	✓		
6. PARKING LOT / DRIVE WAY* Free of excess trash, chemical staining or liquids other than water.	✓		
7. OTHER* Non-storm water discharge (i.e. non-hazardous process discharge).	✓		
8. MOP WATER TO SANITARY SEWER VIA CLARIFIER. Mop water is not dumped to the soil, parking lot, gutter, or other areas susceptible to storm water drainage.	✓		
9. STORM WATER EDUCATIONAL BROCHURES GIVEN TO FACILITY OR POSTERS DISPLAYED FOR EMPLOYEES. If no, what informational material should be sent to the facility?	✓		
10. IF A SWPPP IS REQUIRED, WAS IT AVAILABLE FOR REVEIW? See storm water handout for industrial facilities.			✓

OVERALL EVALUATION/ COMMENTS: No Violations

RECEIVED BY: [signature] | HAZ MAT SPEC: M. Shalhub | BADGE #

Agency referred to as indicated on the back of this page.

If additional information is required, contact the Storm Water /Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

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PW/LAND DEVELOPME

HAZARDOUS WASTE/ HAZARDOUS MATERIALS FACILITY STORM WATER COMPLIANCE SURVEY FORM

FACILITY DBA: Albertsons #6734	TELEPHONE: (951) 600-0329	DATE: 2/23/09
ADDRESS: 39224 Winchester Rd	CITY, ZIP: Murrieta 92563	
MAILING ADDRESS (if different from site address): S.A.A	MAILING CITY, ZIP: S.A.A	
CONTACT: Dianna O'Donnell	FACILITY#: PR0033141	SIC CODE: 5541

Compliance Areas	YES	NO	N/A
***OUTSIDE AREAS (Free of staining & debris; provides good housekeeping; maintained in a manner to prevent runoff.)**		**Requires follow up**	
1. CHEMICAL STORAGE * The outside storage area is kept to minimize the possibility of a release. Chemicals / materials are protected from precipitation / storm water runoff and the containers show no signs of leaking.	✓		
2. DUMPSTER * No liquids are leaking from dumpster; surrounding area is free of trash.	✓		
3. ABOVEGROUND TANKS * No ground staining, no spillage observed and no discharge to storm drain. Tanks are maintained to minimize the possibility of a release (secondary containment).			✓
4. ONSITE STORM DRAIN* Protected from accidental discharge other than water.	✓		
5. POWER WASH OR STEAM CLEAN* (discharge to sewer) Drains to oil/water separator connected to a sanitary sewer and not a septic system. Steam cleaning not discharged to parking lot, storm drain or soil.	✓		
6. PARKING LOT / DRIVE WAY* Free of excess trash, chemical staining or liquids other than water.	✓		
7. OTHER* Non-storm water discharge (i.e. non-hazardous process discharge).	✓		
8. MOP WATER TO SANITARY SEWER VIA CLARIFIER. Mop water is not dumped to the soil, parking lot, gutter, or other areas susceptible to storm water drainage.	✓		
9. STORM WATER EDUCATIONAL BROCHURES GIVEN TO FACILITY OR POSTERS DISPLAYED FOR EMPLOYEES. If no, what informational material should be sent to the facility?	✓		
10. IF A SWPPP IS REQUIRED, WAS IT AVAILABLE FOR REVEIW? See storm water handout for industrial facilities.			✓

OVERALL EVALUATION/ COMMENTS: No violations noted.

RECEIVED BY: Dianna O'Donnell HAZ MAT SPEC: M. Khalil BADGE #

Agency referred to as indicated on the back of this page.

If additional information is required, contact the Storm Water /Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

0003340

HAZARDOUS WASTE/ HAZARDOUS MATERIALS FACILITY STORM WATER COMPLIANCE SURVEY FORM

FACILITY DBA: ~~Kin~~ California Oaks Shell	TELEPHONE: (951) 696-8291	DATE: 2/3/09
ADDRESS: 40981 California Oaks Rd	CITY, ZIP: Murrieta, 92562	
MAILING ADDRESS (if different from site address): S.A.A.	MAILING CITY, ZIP: S.A.A.	
CONTACT: Raman Goyal.	FACILITY#: PR00 31104	SIC CODE: 5541

Compliance Areas	YES	NO	N/A
***OUTSIDE AREAS (Free of staining & debris; provides good housekeeping; maintained in a manner to prevent runoff.)**		Requires follow up	
1. CHEMICAL STORAGE * The outside storage area is kept to minimize the possibility of a release. Chemicals / materials are protected from precipitation / storm water runoff and the containers show no signs of leaking.			✓
2. DUMPSTER * No liquids are leaking from dumpster; surrounding area is free of trash.	✓		
3. ABOVEGROUND TANKS * No ground staining, no spillage observed and no discharge to storm drain. Tanks are maintained to minimize the possibility of a release (secondary containment).			✓
4. ONSITE STORM DRAIN* Protected from accidental discharge other than water.			✓
5. POWER WASH OR STEAM CLEAN* (discharge to sewer) Drains to oil/water separator connected to a sanitary sewer and not a septic system. Steam cleaning not discharged to parking lot, storm drain or soil.	✓		
6. PARKING LOT / DRIVE WAY* Free of excess trash, chemical staining or liquids other than water.	✓		
7. OTHER* Non-storm water discharge (i.e. non-hazardous process discharge).	✓		
8. MOP WATER TO SANITARY SEWER VIA CLARIFIER. Mop water is not dumped to the soil, parking lot, gutter, or other areas susceptible to storm water drainage.	✓		
9. STORM WATER EDUCATIONAL BROCHURES GIVEN TO FACILITY OR POSTERS DISPLAYED FOR EMPLOYEES. If no, what informational material should be sent to the facility?	✓		
10. IF A SWPPP IS REQUIRED, WAS IT AVAILABLE FOR REVEIW? See storm water handout for industrial facilities.			✓

OVERALL EVALUATION/ COMMENTS: _____

RECEIVED BY: Raman	HAZ MAT SPEC: M. Khalthub	BADGE #

Agency referred to as indicated on the back of this page.

If additional information is required, contact the Storm Water /Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

0003341

HAZARDOUS WASTE/ HAZARDOUS MATERIALS FACILITY STORM WATER COMPLIANCE SURVEY FORM

FACILITY DBA: Star Trac Strength Inc	TELEPHONE: (951) 600-3800	DATE: 2/2/09
ADDRESS: 41180 Raintree Ct	CITY, ZIP: Murrieta, 92562	
MAILING ADDRESS (if different from site address): SAA	MAILING CITY, ZIP: SAA	
CONTACT: Emily Flamenco	FACILITY#: PR0032328	SIC CODE: 3949

Compliance Areas	YES	NO	N/A
***OUTSIDE AREAS (Free of staining & debris; provides good housekeeping; maintained in a manner to prevent runoff.)**		**Requires follow up**	
1. CHEMICAL STORAGE * The outside storage area is kept to minimize the possibility of a release. Chemicals / materials are protected from precipitation / storm water runoff and the containers show no signs of leaking.	✓		
2. DUMPSTER * No liquids are leaking from dumpster; surrounding area is free of trash.	✓		
3. ABOVEGROUND TANKS * No ground staining, no spillage observed and no discharge to storm drain. Tanks are maintained to minimize the possibility of a release (secondary containment).	✓		
4. ONSITE STORM DRAIN* Protected from accidental discharge other than water.			✓
5. POWER WASH OR STEAM CLEAN* (discharge to sewer) Drains to oil/water separator connected to a sanitary sewer and not a septic system. Steam cleaning not discharged to parking lot, storm drain or soil.			✓
6. PARKING LOT / DRIVE WAY* Free of excess trash, chemical staining or liquids other than water.	✓		
7. OTHER* Non-storm water discharge (i.e. non-hazardous process discharge).			✓
8. MOP WATER TO SANITARY SEWER VIA CLARIFIER. Mop water is not dumped to the soil, parking lot, gutter, or other areas susceptible to storm water drainage.			✓
9. STORM WATER EDUCATIONAL BROCHURES GIVEN TO FACILITY OR POSTERS DISPLAYED FOR EMPLOYEES. If no, what informational material should be sent to the facility?	✓		
10. IF A SWPPP IS REQUIRED, WAS IT AVAILABLE FOR REVEIW? See storm water handout for industrial facilities.			✓

OVERALL EVALUATION/ COMMENTS: _____

RECEIVED BY: [signature] | HAZ MAT SPEC: M. Khalib | BADGE #

Agency referred to as indicated on the back of this page.

If additional information is required, contact the Storm Water /Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

0003342

HAZARDOUS WASTE/ HAZARDOUS MATERIALS FACILITY STORM WATER COMPLIANCE SURVEY FORM

FACILITY DBA: Johnson Machinery Rentals	TELEPHONE: (951) 696-1063	DATE: 2/2/09
ADDRESS: 41105 Raintree Ct	CITY, ZIP: Murrieta 92562	
MAILING ADDRESS (if different from site address): S.A.A	MAILING CITY, ZIP: S.A.A	
CONTACT: Scott McIntosh	FACILITY#: PR0032329	SIC CODE: ~~[illegible]~~ 7513

Compliance Areas	YES	NO	N/A
***OUTSIDE AREAS (Free of staining & debris; provides good housekeeping; maintained in a manner to prevent runoff.)**		**Requires follow up**	
1. CHEMICAL STORAGE * The outside storage area is kept to minimize the possibility of a release. Chemicals / materials are protected from precipitation / storm water runoff and the containers show no signs of leaking.	✓		
2. DUMPSTER * No liquids are leaking from dumpster; surrounding area is free of trash.	✓		
3. ABOVEGROUND TANKS * No ground staining, no spillage observed and no discharge to storm drain. Tanks are maintained to minimize the possibility of a release (secondary containment).	✓		
4. ONSITE STORM DRAIN* Protected from accidental discharge other than water.			✓
5. POWER WASH OR STEAM CLEAN* (discharge to sewer) Drains to oil/water separator connected to a sanitary sewer and not a septic system. Steam cleaning not discharged to parking lot, storm drain or soil.	✓		
6. PARKING LOT / DRIVE WAY* Free of excess trash, chemical staining or liquids other than water.	✓		
7. OTHER* Non-storm water discharge (i.e. non-hazardous process discharge).	✓		
8. MOP WATER TO SANITARY SEWER VIA CLARIFIER. Mop water is not dumped to the soil, parking lot, gutter, or other areas susceptible to storm water drainage.	✓		
9. STORM WATER EDUCATIONAL BROCHURES GIVEN TO FACILITY OR POSTERS DISPLAYED FOR EMPLOYEES. If no, what informational material should be sent to the facility?	✓		
10. IF A SWPPP IS REQUIRED, WAS IT AVAILABLE FOR REVEIW? See storm water handout for industrial facilities.			✓

OVERALL EVALUATION/ COMMENTS: _____

RECEIVED BY: [illegible]	HAZ MAT SPEC: M. Kallab	BADGE #

Agency referred to as indicated on the back of this page.

If additional information is required, contact the Storm Water /Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

0003343

HAZARDOUS WASTE/ HAZARDOUS MATERIALS FACILITY STORM WATER COMPLIANCE SURVEY FORM

FACILITY DBA: RK Sport Inc	TELEPHONE: (951) 894-7883	DATE: 2/2/09
ADDRESS: 26900 Jefferson Ave #A	CITY, ZIP: Murrieta, 92562	
MAILING ADDRESS (if different from site address): S.A.A	MAILING CITY, ZIP: S.A.A	
CONTACT: Mike Lazana	FACILITY#: PR0033725	SIC CODE: 3714

Compliance Areas	YES	NO	N/A
***OUTSIDE AREAS (Free of staining & debris; provides good housekeeping; maintained in a manner to prevent runoff.)**		**Requires follow up**	
1. CHEMICAL STORAGE * The outside storage area is kept to minimize the possibility of a release. Chemicals / materials are protected from precipitation / storm water runoff and the containers show no signs of leaking.			✓
2. DUMPSTER * No liquids are leaking from dumpster; surrounding area is free of trash.	✓		
3. ABOVEGROUND TANKS * No ground staining, no spillage observed and no discharge to storm drain. Tanks are maintained to minimize the possibility of a release (secondary containment).			✓
4. ONSITE STORM DRAIN* Protected from accidental discharge other than water.			✓
5. POWER WASH OR STEAM CLEAN* (discharge to sewer) Drains to oil/water separator connected to a sanitary sewer and not a septic system. Steam cleaning not discharged to parking lot, storm drain or soil.			✓
6. PARKING LOT / DRIVE WAY* Free of excess trash, chemical staining or liquids other than water.	✓		
7. OTHER* Non-storm water discharge (i.e. non-hazardous process discharge).			✓
8. MOP WATER TO SANITARY SEWER VIA CLARIFIER. Mop water is not dumped to the soil, parking lot, gutter, or other areas susceptible to storm water drainage.			✓
9. STORM WATER EDUCATIONAL BROCHURES GIVEN TO FACILITY OR POSTERS DISPLAYED FOR EMPLOYEES. If no, what informational material should be sent to the facility?	✓		
10. IF A SWPPP IS REQUIRED, WAS IT AVAILABLE FOR REVEIW? See storm water handout for industrial facilities.			✓

OVERALL EVALUATION/ COMMENTS: _____

RECEIVED BY: Miles Cordero	HAZ MAT SPEC: [illegible]	BADGE #

Agency referred to as indicated on the back of this page.

If additional information is required, contact the Storm Water /Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

0003344

HAZARDOUS WASTE/ HAZARDOUS MATERIALS FACILITY STORM WATER COMPLIANCE SURVEY FORM

FACILITY DBA RCP Block & Brick	TELEPHONE (951) 677-1489	DATE 1/28/09
ADDRESS 25725 Jefferson Ave.	CITY, ZIP Murrieta, 92562	
MAILING ADDRESS (if different from site address)	MAILING CITY, ZIP	
CONTACT Ryan Steiner	FACILITY# RR0032430	SIC CODE 5032

Compliance Areas	YES	NO	N/A
***OUTSIDE AREAS (Free of staining & debris; provides good housekeeping; maintained in a manner to prevent runoff.)**		**Requires follow up**	
1. CHEMICAL STORAGE * The outside storage area is kept to minimize the possibility of a release. Chemicals / materials are protected from precipitation / storm water runoff and the containers show no signs of leaking.	✓		
2. DUMPSTER * No liquids are leaking from dumpster; surrounding area is free of trash.	✓		
3. ABOVEGROUND TANKS * No ground staining, no spillage observed and no discharge to storm drain. Tanks are maintained to minimize the possibility of a release (secondary containment).	✓		
4. ONSITE STORM DRAIN* Protected from accidental discharge other than water.			✓
5. POWER WASH OR STEAM CLEAN* (discharge to sewer) Drains to oil/water separator connected to a sanitary sewer and not a septic system. Steam cleaning not discharged to parking lot, storm drain or soil.			✓
6. PARKING LOT / DRIVE WAY* Free of excess trash, chemical staining or liquids other than water.	✓		
7. OTHER* Non-storm water discharge (i.e. non-hazardous process discharge).			✓
8. MOP WATER TO SANITARY SEWER VIA CLARIFIER. Mop water is not dumped to the soil, parking lot, gutter, or other areas susceptible to storm water drainage.			✓
9. STORM WATER EDUCATIONAL BROCHURES GIVEN TO FACILITY OR POSTERS DISPLAYED FOR EMPLOYEES. If no, what informational material should be sent to the facility?	✓		
10. IF A SWPPP IS REQUIRED, WAS IT AVAILABLE FOR REVEIW? See storm water handout for industrial facilities.			✓

OVERALL EVALUATION/ COMMENTS: _____

RECEIVED BY:	HAZ MAT SPEC:	BADGE #

Agency referred to as indicated on the back of this page.

If additional information is required, contact the Storm Water /Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

0003345

HAZARDOUS WASTE/ HAZARDOUS MATERIALS FACILITY STORM WATER COMPLIANCE SURVEY FORM

FACILITY DBA Baliani Automotive	TELEPHONE (951) 496-0665	DATE 1/27/09
ADDRESS 26450 Jefferson Ave #104	CITY, ZIP Murrieta, 92562	
MAILING ADDRESS (if different from site address) S.A.A	MAILING CITY, ZIP S.A.A	
CONTACT Michael Baliani	FACILITY# PR0023402	SIC CODE 7538

Compliance Areas	YES	NO	N/A
***OUTSIDE AREAS (Free of staining & debris; provides good housekeeping; maintained in a manner to prevent runoff.)**		**Requires follow up**	
1. CHEMICAL STORAGE * The outside storage area is kept to minimize the possibility of a release. Chemicals / materials are protected from precipitation / storm water runoff and the containers show no signs of leaking.			✓
2. DUMPSTER * No liquids are leaking from dumpster; surrounding area is free of trash.	✓		
3. ABOVEGROUND TANKS * No ground staining, no spillage observed and no discharge to storm drain. Tanks are maintained to minimize the possibility of a release (secondary containment).			✓
4. ONSITE STORM DRAIN* Protected from accidental discharge other than water.			✓
5. POWER WASH OR STEAM CLEAN* (discharge to sewer) Drains to oil/water separator connected to a sanitary sewer and not a septic system. Steam cleaning not discharged to parking lot, storm drain or soil.			✓
6. PARKING LOT / DRIVE WAY* Free of excess trash, chemical staining or liquids other than water.	✓		
7. OTHER* Non-storm water discharge (i.e. non-hazardous process discharge).			✓
8. MOP WATER TO SANITARY SEWER VIA CLARIFIER. Mop water is not dumped to the soil, parking lot, gutter, or other areas susceptible to storm water drainage.	✓		
9. STORM WATER EDUCATIONAL BROCHURES GIVEN TO FACILITY OR POSTERS DISPLAYED FOR EMPLOYEES. If no, what informational material should be sent to the facility?	✓		
10. IF A SWPPP IS REQUIRED, WAS IT AVAILABLE FOR REVEIW? See storm water handout for industrial facilities.			✓

OVERALL EVALUATION/ COMMENTS: _____

RECEIVED BY: [signature]	HAZ MAT SPEC: M. Analhub	BADGE #

Agency referred to as indicated on the back of this page.

If additional information is required, contact the Storm Water /Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

0003346

HAZARDOUS WASTE/ HAZARDOUS MATERIALS FACILITY STORM WATER COMPLIANCE SURVEY FORM

FACILITY DBA Worldwide Autoworks	TELEPHONE (951) 677-3515	DATE 1/27/09
ADDRESS 26450 Jefferson #105	CITY, ZIP Murrieta 92562	
MAILING ADDRESS (if different from site address) S.A.A	MAILING CITY, ZIP S.A.A	
CONTACT Shawn Schultz	FACILITY# PR0023401	SIC CODE 7538

Compliance Areas	YES	NO	N/A
***OUTSIDE AREAS (Free of staining & debris; provides good housekeeping; maintained in a manner to prevent runoff.)**		**Requires follow up**	
1. CHEMICAL STORAGE * The outside storage area is kept to minimize the possibility of a release. Chemicals / materials are protected from precipitation / storm water runoff and the containers show no signs of leaking.			✓
2. DUMPSTER * No liquids are leaking from dumpster; surrounding area is free of trash.	✓		
3. ABOVEGROUND TANKS * No ground staining, no spillage observed and no discharge to storm drain. Tanks are maintained to minimize the possibility of a release (secondary containment).			✓
4. ONSITE STORM DRAIN* Protected from accidental discharge other than water.			✓
5. POWER WASH OR STEAM CLEAN* (discharge to sewer) Drains to oil/water separator connected to a sanitary sewer and not a septic system. Steam cleaning not discharged to parking lot, storm drain or soil.			✓
6. PARKING LOT / DRIVE WAY* Free of excess trash, chemical staining or liquids other than water.	✓		
7. OTHER* Non-storm water discharge (i.e. non-hazardous process discharge).			✓
8. MOP WATER TO SANITARY SEWER VIA CLARIFIER. Mop water is not dumped to the soil, parking lot, gutter, or other areas susceptible to storm water drainage.	✓		
9. STORM WATER EDUCATIONAL BROCHURES GIVEN TO FACILITY OR POSTERS DISPLAYED FOR EMPLOYEES. If no, what informational material should be sent to the facility?	✓		
10. IF A SWPPP IS REQUIRED, WAS IT AVAILABLE FOR REVEIW? See storm water handout for industrial facilities.			✓

OVERALL EVALUATION/ COMMENTS: _____

RECEIVED BY: Shawn Schultz	HAZ MAT SPEC: M. Shalhub	BADGE #

Agency referred to as indicated on the back of this page.

If additional information is required, contact the Storm Water /Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

0003347

HAZARDOUS WASTE/ HAZARDOUS MATERIALS FACILITY STORM WATER COMPLIANCE SURVEY FORM

FACILITY DBA High Tech Auto	TELEPHONE (951) 696-1982	DATE 1/27/09
ADDRESS 26450 Jefferson Ave #103	CITY, ZIP Murrieta, 92562	
MAILING ADDRESS (if different from site address) S.A.A.	MAILING CITY, ZIP S.A.A	
CONTACT Thomas Flohr	FACILITY# PR00 23425	SIC CODE 7538

Compliance Areas	YES	NO	N/A
***OUTSIDE AREAS (Free of staining & debris; provides good housekeeping; maintained in a manner to prevent runoff.)**		**Requires follow up**	
1. CHEMICAL STORAGE * The outside storage area is kept to minimize the possibility of a release. Chemicals / materials are protected from precipitation / storm water runoff and the containers show no signs of leaking.			✓
2. DUMPSTER * No liquids are leaking from dumpster; surrounding area is free of trash.	✓		
3. ABOVEGROUND TANKS * No ground staining, no spillage observed and no discharge to storm drain. Tanks are maintained to minimize the possibility of a release (secondary containment).			✓
4. ONSITE STORM DRAIN* Protected from accidental discharge other than water.			✓
5. POWER WASH OR STEAM CLEAN* (discharge to sewer) Drains to oil/water separator connected to a sanitary sewer and not a septic system. Steam cleaning not discharged to parking lot, storm drain or soil.			✓
6. PARKING LOT / DRIVE WAY* Free of excess trash, chemical staining or liquids other than water.	✓		
7. OTHER* Non-storm water discharge (i.e. non-hazardous process discharge).			✓
8. MOP WATER TO SANITARY SEWER VIA CLARIFIER. Mop water is not dumped to the soil, parking lot, gutter, or other areas susceptible to storm water drainage.	✓		
9. STORM WATER EDUCATIONAL BROCHURES GIVEN TO FACILITY OR POSTERS DISPLAYED FOR EMPLOYEES. If no, what informational material should be sent to the facility?			✓
10. IF A SWPPP IS REQUIRED, WAS IT AVAILABLE FOR REVEIW? See storm water handout for industrial facilities.			✓

OVERALL EVALUATION/ COMMENTS: _____

RECEIVED BY: [signature]	HAZ MAT SPEC: M. Khalkho	BADGE #

Agency referred to as indicated on the back of this page.

If additional information is required, contact the Storm Water /Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

0003348

HAZARDOUS WASTE/ HAZARDOUS MATERIALS FACILITY STORM WATER COMPLIANCE SURVEY FORM

FACILITY DBA Pro-tec	TELEPHONE (951) 698-8988	DATE 1/22/09
ADDRESS 41376 Pear St	CITY, ZIP Murrieta 92562	
MAILING ADDRESS (if different from site address)	MAILING CITY, ZIP	
CONTACT Carl Brown.	FACILITY# PR0030564	SIC CODE 3999

Compliance Areas	YES	NO	N/A
***OUTSIDE AREAS (Free of staining & debris; provides good housekeeping; maintained in a manner to prevent runoff.)**		**Requires follow up**	
1. CHEMICAL STORAGE * The outside storage area is kept to minimize the possibility of a release. Chemicals / materials are protected from precipitation / storm water runoff and the containers show no signs of leaking.	✓		
2. DUMPSTER * No liquids are leaking from dumpster; surrounding area is free of trash.	✓		
3. ABOVEGROUND TANKS * No ground staining, no spillage observed and no discharge to storm drain. Tanks are maintained to minimize the possibility of a release (secondary containment).			✓
4. ONSITE STORM DRAIN* Protected from accidental discharge other than water.			✓
5. POWER WASH OR STEAM CLEAN* (discharge to sewer) Drains to oil/water separator connected to a sanitary sewer and not a septic system. Steam cleaning not discharged to parking lot, storm drain or soil.			✓
6. PARKING LOT / DRIVE WAY* Free of excess trash, chemical staining or liquids other than water.	✓		
7. OTHER* Non-storm water discharge (i.e. non-hazardous process discharge).			✓
8. MOP WATER TO SANITARY SEWER VIA CLARIFIER. Mop water is not dumped to the soil, parking lot, gutter, or other areas susceptible to storm water drainage.	✓		
9. STORM WATER EDUCATIONAL BROCHURES GIVEN TO FACILITY OR POSTERS DISPLAYED FOR EMPLOYEES. If no, what informational material should be sent to the facility?	✓		
10. IF A SWPPP IS REQUIRED, WAS IT AVAILABLE FOR REVEIW? See storm water handout for industrial facilities.			✓

OVERALL EVALUATION/ COMMENTS: _____

RECEIVED BY: CB	HAZ MAT SPEC: M. Khalkh	BADGE #

Agency referred to as indicated on the back of this page.

If additional information is required, contact the Storm Water /Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

0003349

HAZARDOUS WASTE/ HAZARDOUS MATERIALS FACILITY STORM WATER COMPLIANCE SURVEY FORM

FACILITY DBA: Auto Techniques	TELEPHONE: (951) 698-7638	DATE: 1/22/09
ADDRESS: 41340 Pear St #15	CITY, ZIP: Murrieta 92562	
MAILING ADDRESS (if different from site address): S.A.A	MAILING CITY, ZIP: S.A.A.	
CONTACT: Anthony Gonzalez	FACILITY#: PR 0019732	SIC CODE: 7538

Compliance Areas	YES	NO	N/A
***OUTSIDE AREAS (Free of staining & debris; provides good housekeeping; maintained in a manner to prevent runoff.)**		**Requires follow up**	
1. CHEMICAL STORAGE * The outside storage area is kept to minimize the possibility of a release. Chemicals / materials are protected from precipitation / storm water runoff and the containers show no signs of leaking.			✓
2. DUMPSTER * No liquids are leaking from dumpster; surrounding area is free of trash.	✓		
3. ABOVEGROUND TANKS * No ground staining, no spillage observed and no discharge to storm drain. Tanks are maintained to minimize the possibility of a release (secondary containment).			✓
4. ONSITE STORM DRAIN* Protected from accidental discharge other than water.			✓
5. POWER WASH OR STEAM CLEAN* (discharge to sewer) Drains to oil/water separator connected to a sanitary sewer and not a septic system. Steam cleaning not discharged to parking lot, storm drain or soil.			✓
6. PARKING LOT / DRIVE WAY* Free of excess trash, chemical staining or liquids other than water.	✓		
7. OTHER* Non-storm water discharge (i.e. non-hazardous process discharge).			✓
8. MOP WATER TO SANITARY SEWER VIA CLARIFIER. Mop water is not dumped to the soil, parking lot, gutter, or other areas susceptible to storm water drainage.	✓		
9. STORM WATER EDUCATIONAL BROCHURES GIVEN TO FACILITY OR POSTERS DISPLAYED FOR EMPLOYEES. If no, what informational material should be sent to the facility?			✓
10. IF A SWPPP IS REQUIRED, WAS IT AVAILABLE FOR REVEIW? See storm water handout for industrial facilities.			✓

OVERALL EVALUATION/ COMMENTS: _____

RECEIVED BY: [signature]	HAZ MAT SPEC: M. Shalub	BADGE #

Agency referred to as indicated on the back of this page.

If additional information is required, contact the Storm Water /Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

0003350

HAZARDOUS WASTE/ HAZARDOUS MATERIALS FACILITY STORM WATER COMPLIANCE SURVEY FORM

FACILITY DBA: Autobahn Automotive	TELEPHONE: (951) 696-7623	DATE: 1/22/09
ADDRESS: 26871 Hobie Cir Unit B-1	CITY, ZIP: Murrieta 92562	
MAILING ADDRESS (if different from site address)	MAILING CITY, ZIP	
CONTACT: Steve Ewing	FACILITY#: PR0040172 (New)	SIC CODE: 7538

Compliance Areas	YES	NO	N/A
***OUTSIDE AREAS (Free of staining & debris; provides good housekeeping; maintained in a manner to prevent runoff.)**		**Requires follow up**	
1. CHEMICAL STORAGE * The outside storage area is kept to minimize the possibility of a release. Chemicals / materials are protected from precipitation / storm water runoff and the containers show no signs of leaking.			✓
2. DUMPSTER * No liquids are leaking from dumpster; surrounding area is free of trash.	✓		
3. ABOVEGROUND TANKS * No ground staining, no spillage observed and no discharge to storm drain. Tanks are maintained to minimize the possibility of a release (secondary containment).			✓
4. ONSITE STORM DRAIN* Protected from accidental discharge other than water.			✓
5. POWER WASH OR STEAM CLEAN* (discharge to sewer) Drains to oil/water separator connected to a sanitary sewer and not a septic system. Steam cleaning not discharged to parking lot, storm drain or soil.			✓
6. PARKING LOT / DRIVE WAY* Free of excess trash, chemical staining or liquids other than water.	✓		
7. OTHER* Non-storm water discharge (i.e. non-hazardous process discharge).			✓
8. MOP WATER TO SANITARY SEWER VIA CLARIFIER. Mop water is not dumped to the soil, parking lot, gutter, or other areas susceptible to storm water drainage.	✓		
9. STORM WATER EDUCATIONAL BROCHURES GIVEN TO FACILITY OR POSTERS DISPLAYED FOR EMPLOYEES. If no, what informational material should be sent to the facility?	✓		
10. IF A SWPPP IS REQUIRED, WAS IT AVAILABLE FOR REVEIW? See storm water handout for industrial facilities.			✓

OVERALL EVALUATION/ COMMENTS: _____

RECEIVED BY: Frank J. Ewing	HAZ MAT SPEC: M. Shalhub	BADGE #

Agency referred to as indicated on the back of this page.

If additional information is required, contact the Storm Water /Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

0003351

HAZARDOUS WASTE/ HAZARDOUS MATERIALS FACILITY STORM WATER COMPLIANCE SURVEY FORM

FACILITY DBA S & T Saab Volvo Specialists	TELEPHONE (951) 894-2333	DATE 1/15/09	
ADDRESS 26622 Jefferson St #105	CITY, ZIP Murrieta 92562		
MAILING ADDRESS (if different from site address) S.A.A	MAILING CITY, ZIP		
CONTACT Sonny Dank	FACILITY# R0023777	SIC CODE 7538	

Compliance Areas	YES	NO	N/A
***OUTSIDE AREAS (Free of staining & debris; provides good housekeeping; maintained in a manner to prevent runoff.)**		**Requires follow up**	
1. CHEMICAL STORAGE * The outside storage area is kept to minimize the possibility of a release. Chemicals / materials are protected from precipitation / storm water runoff and the containers show no signs of leaking.			✓
2. DUMPSTER * No liquids are leaking from dumpster; surrounding area is free of trash.	✓		
3. ABOVEGROUND TANKS * No ground staining, no spillage observed and no discharge to storm drain. Tanks are maintained to minimize the possibility of a release (secondary containment).			✓
4. ONSITE STORM DRAIN* Protected from accidental discharge other than water.			✓
5. POWER WASH OR STEAM CLEAN* (discharge to sewer) Drains to oil/water separator connected to a sanitary sewer and not a septic system. Steam cleaning not discharged to parking lot, storm drain or soil.			✓
6. PARKING LOT / DRIVE WAY* Free of excess trash, chemical staining or liquids other than water.	✓		
7. OTHER* Non-storm water discharge (i.e. non-hazardous process discharge).			✓
8. MOP WATER TO SANITARY SEWER VIA CLARIFIER. Mop water is not dumped to the soil, parking lot, gutter, or other areas susceptible to storm water drainage.	✓		
9. STORM WATER EDUCATIONAL BROCHURES GIVEN TO FACILITY OR POSTERS DISPLAYED FOR EMPLOYEES. If no, what informational material should be sent to the facility?	✓		
10. IF A SWPPP IS REQUIRED, WAS IT AVAILABLE FOR REVEIW? See storm water handout for industrial facilities.			✓

OVERALL EVALUATION/ COMMENTS: _____

RECEIVED BY: [signature]	HAZ MAT SPEC: M. Khalib	BADGE #

Agency referred to as indicated on the back of this page.

If additional information is required, contact the Storm Water /Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

0003352

HAZARDOUS WASTE/ HAZARDOUS MATERIALS FACILITY STORM WATER COMPLIANCE SURVEY FORM

FACILITY DBA: A-1 Murrieta Auto Repair	TELEPHONE: (951) 677-4004	DATE: 1/15/09
ADDRESS: 26622 Jefferson Ave #103	CITY, ZIP: Murrieta 92562	
MAILING ADDRESS (if different from site address): S.A.A.	MAILING CITY, ZIP: S.A.A.	
CONTACT: Alex Valdez	FACILITY#: PR 00 23695	SIC CODE: 7538

Compliance Areas	YES	NO	N/A
***OUTSIDE AREAS (Free of staining & debris; provides good housekeeping; maintained in a manner to prevent runoff.)**		**Requires follow up**	
1. CHEMICAL STORAGE * The outside storage area is kept to minimize the possibility of a release. Chemicals / materials are protected from precipitation / storm water runoff and the containers show no signs of leaking.			✓
2. DUMPSTER * No liquids are leaking from dumpster; surrounding area is free of trash.	✓		
3. ABOVEGROUND TANKS * No ground staining, no spillage observed and no discharge to storm drain. Tanks are maintained to minimize the possibility of a release (secondary containment).			✓
4. ONSITE STORM DRAIN* Protected from accidental discharge other than water.			✓
5. POWER WASH OR STEAM CLEAN* (discharge to sewer) Drains to oil/water separator connected to a sanitary sewer and not a septic system. Steam cleaning not discharged to parking lot, storm drain or soil.			✓
6. PARKING LOT / DRIVE WAY* Free of excess trash, chemical staining or liquids other than water.	✓		
7. OTHER* Non-storm water discharge (i.e. non-hazardous process discharge).			✓
8. MOP WATER TO SANITARY SEWER VIA CLARIFIER. Mop water is not dumped to the soil, parking lot, gutter, or other areas susceptible to storm water drainage.	✓		
9. STORM WATER EDUCATIONAL BROCHURES GIVEN TO FACILITY OR POSTERS DISPLAYED FOR EMPLOYEES. If no, what informational material should be sent to the facility?	✓		
10. IF A SWPPP IS REQUIRED, WAS IT AVAILABLE FOR REVEIW? See storm water handout for industrial facilities.			✓

OVERALL EVALUATION/ COMMENTS: _____

RECEIVED BY: Cl.	HAZ MAT SPEC: M. Khalil	BADGE #

Agency referred to as indicated on the back of this page.

If additional information is required, contact the Storm Water /Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

0003353

HAZARDOUS WASTE/ HAZARDOUS MATERIALS FACILITY STORM WATER COMPLIANCE SURVEY FORM

FACILITY DBA: 1st Class Collision Murrieta	TELEPHONE: (951) 834-9700	DATE: 1/15/09
ADDRESS: 41729 Eastman Dr	CITY, ZIP: Murrieta 92562	
MAILING ADDRESS (if different from site address): S.A.A.	MAILING CITY, ZIP: S.A.A	
CONTACT: Bruce Newell	FACILITY#: PR0033621	SIC CODE: 7532

Compliance Areas	YES	NO	N/A
***OUTSIDE AREAS (Free of staining & debris; provides good housekeeping; maintained in a manner to prevent runoff.)**		**Requires follow up**	
1. CHEMICAL STORAGE * The outside storage area is kept to minimize the possibility of a release. Chemicals / materials are protected from precipitation / storm water runoff and the containers show no signs of leaking.	✓		
2. DUMPSTER * No liquids are leaking from dumpster; surrounding area is free of trash.	✓		
3. ABOVEGROUND TANKS * No ground staining, no spillage observed and no discharge to storm drain. Tanks are maintained to minimize the possibility of a release (secondary containment).			✓
4. ONSITE STORM DRAIN* Protected from accidental discharge other than water.			✓
5. POWER WASH OR STEAM CLEAN* (discharge to sewer) Drains to oil/water separator connected to a sanitary sewer and not a septic system. Steam cleaning not discharged to parking lot, storm drain or soil.	✓		
6. PARKING LOT / DRIVE WAY* Free of excess trash, chemical staining or liquids other than water.	✓		
7. OTHER* Non-storm water discharge (i.e. non-hazardous process discharge).			✓
8. MOP WATER TO SANITARY SEWER VIA CLARIFIER. Mop water is not dumped to the soil, parking lot, gutter, or other areas susceptible to storm water drainage.	✓		
9. STORM WATER EDUCATIONAL BROCHURES GIVEN TO FACILITY OR POSTERS DISPLAYED FOR EMPLOYEES. If no, what informational material should be sent to the facility?	✓		
10. IF A SWPPP IS REQUIRED, WAS IT AVAILABLE FOR REVEIW? See storm water handout for industrial facilities.			✓

OVERALL EVALUATION/ COMMENTS: _____

RECEIVED BY: Bruce Newell	HAZ MAT SPEC: M. Strathmb	BADGE #

Agency referred to as indicated on the back of this page.

If additional information is required, contact the Storm Water /Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

0003354

HAZARDOUS WASTE/ HAZARDOUS MATERIALS FACILITY STORM WATER COMPLIANCE SURVEY FORM

FACILITY DBA: Hot Springs Cleaners Inc	TELEPHONE: (951)696-2900	DATE: 1/13/09
ADDRESS: 40469 Murrieta Hot Springs Rd #G-1	CITY, ZIP: Murrieta 92563	
MAILING ADDRESS (if different from site address)	MAILING CITY, ZIP: S.A.A	
CONTACT: Young Lee	FACILITY#: PR 0028205	SIC CODE: 7216

Compliance Areas	YES	NO	N/A
***OUTSIDE AREAS (Free of staining & debris; provides good housekeeping; maintained in a manner to prevent runoff.)**		**Requires follow up**	
1. CHEMICAL STORAGE * The outside storage area is kept to minimize the possibility of a release. Chemicals / materials are protected from precipitation / storm water runoff and the containers show no signs of leaking.			✓
2. DUMPSTER * No liquids are leaking from dumpster; surrounding area is free of trash.	✓		
3. ABOVEGROUND TANKS * No ground staining, no spillage observed and no discharge to storm drain. Tanks are maintained to minimize the possibility of a release (secondary containment).	✓		
4. ONSITE STORM DRAIN* Protected from accidental discharge other than water.			✓
5. POWER WASH OR STEAM CLEAN* (discharge to sewer) Drains to oil/water separator connected to a sanitary sewer and not a septic system. Steam cleaning not discharged to parking lot, storm drain or soil.			✓
6. PARKING LOT / DRIVE WAY* Free of excess trash, chemical staining or liquids other than water.	✓		
7. OTHER* Non-storm water discharge (i.e. non-hazardous process discharge).	✓		
8. MOP WATER TO SANITARY SEWER VIA CLARIFIER. Mop water is not dumped to the soil, parking lot, gutter, or other areas susceptible to storm water drainage.	✓		
9. STORM WATER EDUCATIONAL BROCHURES GIVEN TO FACILITY OR POSTERS DISPLAYED FOR EMPLOYEES. If no, what informational material should be sent to the facility?	✓		
10. IF A SWPPP IS REQUIRED, WAS IT AVAILABLE FOR REVEIW? See storm water handout for industrial facilities.			✓

OVERALL EVALUATION/ COMMENTS: _____

RECEIVED BY: [signature]	HAZ MAT SPEC: M. Shalk	BADGE #

Agency referred to as indicated on the back of this page.

If additional information is required, contact the Storm Water /Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

0003355

HAZARDOUS WASTE/ HAZARDOUS MATERIALS FACILITY STORM WATER COMPLIANCE SURVEY FORM

FACILITY DBA: Alta Dry Cleaners	TELEPHONE: (951) 698-3007	DATE: 1/13/09
ADDRESS: 40365 Murrieta Hot Springs Rd #C-1	CITY, ZIP: Murrieta, 92562	
MAILING ADDRESS (if different from site address): S.A.A	MAILING CITY, ZIP: S.A.A	
CONTACT: Ho Sung Park	FACILITY#: PR0032786	SIC CODE: 7216

Compliance Areas	YES	NO	N/A
***OUTSIDE AREAS (Free of staining & debris; provides good housekeeping; maintained in a manner to prevent runoff.)**		**Requires follow up**	
1. CHEMICAL STORAGE * The outside storage area is kept to minimize the possibility of a release. Chemicals / materials are protected from precipitation / storm water runoff and the containers show no signs of leaking.			✓
2. DUMPSTER * No liquids are leaking from dumpster; surrounding area is free of trash.	✓		
3. ABOVEGROUND TANKS * No ground staining, no spillage observed and no discharge to storm drain. Tanks are maintained to minimize the possibility of a release (secondary containment).	✓		
4. ONSITE STORM DRAIN* Protected from accidental discharge other than water.			✓
5. POWER WASH OR STEAM CLEAN* (discharge to sewer) Drains to oil/water separator connected to a sanitary sewer and not a septic system. Steam cleaning not discharged to parking lot, storm drain or soil.			✓
6. PARKING LOT / DRIVE WAY* Free of excess trash, chemical staining or liquids other than water.	✓		
7. OTHER* Non-storm water discharge (i.e. non-hazardous process discharge).	✓		
8. MOP WATER TO SANITARY SEWER VIA CLARIFIER. Mop water is not dumped to the soil, parking lot, gutter, or other areas susceptible to storm water drainage.	✓		
9. STORM WATER EDUCATIONAL BROCHURES GIVEN TO FACILITY OR POSTERS DISPLAYED FOR EMPLOYEES. If no, what informational material should be sent to the facility?	✓		
10. IF A SWPPP IS REQUIRED, WAS IT AVAILABLE FOR REVEIW? See storm water handout for industrial facilities.			✓

OVERALL EVALUATION/ COMMENTS: _____

RECEIVED BY: Ho Sung Park | HAZ MAT SPEC: M. Shalhub | BADGE #

Agency referred to as indicated on the back of this page.

If additional information is required, contact the Storm Water /Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

0003356

HAZARDOUS WASTE/ HAZARDOUS MATERIALS FACILITY STORM WATER COMPLIANCE SURVEY FORM

FACILITY DBA: Convenience Retailers LLC #2705793	TELEPHONE: (951) 461-0217	DATE: 1/13/09
ADDRESS: 41010 California Oaks Rd	CITY, ZIP: Murrieta, 92562	
MAILING ADDRESS (if different from site address): S.A.A	MAILING CITY, ZIP: S.A.A	
CONTACT: Judy Emanuelson	FACILITY#: PR0032532	SIC CODE: 5541

Compliance Areas	YES	NO	N/A
***OUTSIDE AREAS (Free of staining & debris; provides good housekeeping; maintained in a manner to prevent runoff.)**		**Requires follow up**	
1. CHEMICAL STORAGE * The outside storage area is kept to minimize the possibility of a release. Chemicals / materials are protected from precipitation / storm water runoff and the containers show no signs of leaking.	✓		
2. DUMPSTER * No liquids are leaking from dumpster; surrounding area is free of trash.	✓		
3. ABOVEGROUND TANKS * No ground staining, no spillage observed and no discharge to storm drain. Tanks are maintained to minimize the possibility of a release (secondary containment).			✓
4. ONSITE STORM DRAIN* Protected from accidental discharge other than water.	✓		
5. POWER WASH OR STEAM CLEAN* (discharge to sewer) Drains to oil/water separator connected to a sanitary sewer and not a septic system. Steam cleaning not discharged to parking lot, storm drain or soil.			✓
6. PARKING LOT / DRIVE WAY* Free of excess trash, chemical staining or liquids other than water.	✓		
7. OTHER* Non-storm water discharge (i.e. non-hazardous process discharge).			✓
8. MOP WATER TO SANITARY SEWER VIA CLARIFIER. Mop water is not dumped to the soil, parking lot, gutter, or other areas susceptible to storm water drainage.	✓		
9. STORM WATER EDUCATIONAL BROCHURES GIVEN TO FACILITY OR POSTERS DISPLAYED FOR EMPLOYEES. If no, what informational material should be sent to the facility?	✓		
10. IF A SWPPP IS REQUIRED, WAS IT AVAILABLE FOR REVEIW? See storm water handout for industrial facilities.			✓

OVERALL EVALUATION/ COMMENTS: _____

RECEIVED BY: Judy Emanuelson	HAZ MAT SPEC: U. Shalk	BADGE #

Agency referred to as indicated on the back of this page.

If additional information is required, contact the Storm Water /Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

0003357

HAZARDOUS WASTE/ HAZARDOUS MATERIALS FACILITY STORM WATER COMPLIANCE SURVEY FORM

FACILITY DBA Capri Cleaners	TELEPHONE (951) 600-1517	DATE 1/12/09
ADDRESS 40119 Murrieta Hot Springs Rd	CITY, ZIP Murrieta 92561	
MAILING ADDRESS (if different from site address) S.A.A	MAILING CITY, ZIP S.A.A	
CONTACT Jimmy Chianis	FACILITY# PR 0032979	SIC CODE 7216

Compliance Areas	YES	NO	N/A
***OUTSIDE AREAS (Free of staining & debris; provides good housekeeping; maintained in a manner to prevent runoff.)**		**Requires follow up**	
1. CHEMICAL STORAGE * The outside storage area is kept to minimize the possibility of a release. Chemicals / materials are protected from precipitation / storm water runoff and the containers show no signs of leaking.			✓
2. DUMPSTER * No liquids are leaking from dumpster; surrounding area is free of trash.	✓		
3. ABOVEGROUND TANKS * No ground staining, no spillage observed and no discharge to storm drain. Tanks are maintained to minimize the possibility of a release (secondary containment).	✓		
4. ONSITE STORM DRAIN* Protected from accidental discharge other than water.			✓
5. POWER WASH OR STEAM CLEAN* (discharge to sewer) Drains to oil/water separator connected to a sanitary sewer and not a septic system. Steam cleaning not discharged to parking lot, storm drain or soil.			✓
6. PARKING LOT / DRIVE WAY* Free of excess trash, chemical staining or liquids other than water.	✓		
7. OTHER* Non-storm water discharge (i.e. non-hazardous process discharge).	✓		
8. MOP WATER TO SANITARY SEWER VIA CLARIFIER. Mop water is not dumped to the soil, parking lot, gutter, or other areas susceptible to storm water drainage.	✓		
9. STORM WATER EDUCATIONAL BROCHURES GIVEN TO FACILITY OR POSTERS DISPLAYED FOR EMPLOYEES. If no, what informational material should be sent to the facility?			✓
10. IF A SWPPP IS REQUIRED, WAS IT AVAILABLE FOR REVEIW? See storm water handout for industrial facilities.			✓

OVERALL EVALUATION/ COMMENTS: _____

RECEIVED BY:	HAZ MAT SPEC: M. Thalk	BADGE #

Agency referred to as indicated on the back of this page.

If additional information is required, contact the Storm Water /Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

0003358

HAZARDOUS WASTE/ HAZARDOUS MATERIALS FACILITY STORM WATER COMPLIANCE SURVEY FORM

FACILITY DBA: American Industrial Mfg. Services	TELEPHONE: (951) 698-3379	DATE: 1/8/09
ADDRESS: 41673 Corning Pl	CITY, ZIP: Murrieta 92562	
MAILING ADDRESS (if different from site address)	MAILING CITY, ZIP	
CONTACT: Ben Robledo	FACILITY#: PR0029664	SIC CODE: 3599

Compliance Areas	YES	NO	N/A
***OUTSIDE AREAS (Free of staining & debris; provides good housekeeping; maintained in a manner to prevent runoff.)**		**Requires follow up**	
1. CHEMICAL STORAGE * The outside storage area is kept to minimize the possibility of a release. Chemicals / materials are protected from precipitation / storm water runoff and the containers show no signs of leaking.			✓
2. DUMPSTER * No liquids are leaking from dumpster; surrounding area is free of trash.	✓		
3. ABOVEGROUND TANKS * No ground staining, no spillage observed and no discharge to storm drain. Tanks are maintained to minimize the possibility of a release (secondary containment).			✓
4. ONSITE STORM DRAIN* Protected from accidental discharge other than water.			✓
5. POWER WASH OR STEAM CLEAN* (discharge to sewer) Drains to oil/water separator connected to a sanitary sewer and not a septic system. Steam cleaning not discharged to parking lot, storm drain or soil.	✓		
6. PARKING LOT / DRIVE WAY* Free of excess trash, chemical staining or liquids other than water.	✓		
7. OTHER* Non-storm water discharge (i.e. non-hazardous process discharge).			✓
8. MOP WATER TO SANITARY SEWER VIA CLARIFIER. Mop water is not dumped to the soil, parking lot, gutter, or other areas susceptible to storm water drainage.	✓		
9. STORM WATER EDUCATIONAL BROCHURES GIVEN TO FACILITY OR POSTERS DISPLAYED FOR EMPLOYEES. If no, what informational material should be sent to the facility?	✓		
10. IF A SWPPP IS REQUIRED, WAS IT AVAILABLE FOR REVEIW? See storm water handout for industrial facilities.			✓

OVERALL EVALUATION/ COMMENTS: _____

RECEIVED BY:	HAZ MAT SPEC:	BADGE #

Agency referred to as indicated on the back of this page.

If additional information is required, contact the Storm Water /Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

0003359

HAZARDOUS WASTE/ HAZARDOUS MATERIALS FACILITY STORM WATER COMPLIANCE SURVEY FORM

FACILITY DBA: International Immunology Corp.	TELEPHONE: (951) 677-5629	DATE: 1/8/09
ADDRESS: 25549 Adams Ave	CITY, ZIP: Murrieta 92562	
MAILING ADDRESS (if different from site address): S.A.A.	MAILING CITY, ZIP: SAA	
CONTACT: Randy Kirschman	FACILITY#: PR0028292	SIC CODE: 2836

Compliance Areas	YES	NO	N/A
***OUTSID AS (Fre of staining & debris; provides good housekeeping; maintained in a manner to p event run ff.)**		**Requires follow up**	
1. CHEMICAL STORAGE * The outside storage area is kept to minimize the possibility of a release. Chemicals / materials are protected from precipitation / storm water runoff and the containers show no signs of leaking.			✓
2. DUMPSTER * No liquids are leaking from dumpster; surrounding area is free of trash.	✓		
3. ABOVEGROUND TANKS * No ground staining, no spillage observed and no discharge to storm drain. Tanks are maintained to minimize the possibility of a release (secondary containment).	✓		
4. ONSITE STORM DRAIN* Protected from accidental discharge other than water.			✓
5. POWER WASH OR STEAM CLEAN* (discharge to sewer) Drains to oil/water separator connected to a sanitary sewer and not a septic system. Steam cleaning not discharged to parking lot, storm drain or soil.			✓
6. PARKING LOT / DRIVE WAY* Free of excess trash, chemical staining or liquids other than water.	✓		
7. OTHER* Non-storm water discharge (i.e. non-hazardous process discharge).			✓
8. MOP WATER TO SANITARY SEWER VIA CLARIFIER. Mop water is not dumped to the soil, parking lot, gutter, or other areas susceptible to storm water drainage.	✓		
9. STORM WATER EDUCATIONAL BROCHURES GIVEN TO FACILITY OR POSTERS DISPLAYED FOR EMPLOYEES. If no, what informational material should be sent to the facility?			✓
10. IF A SWPPP IS REQUIRED, WAS IT AVAILABLE FOR REVEIW? See storm water handout for industrial facilities.			✓

OVERALL EVALUATION/ COMMENTS: _____

RECEIVED BY: [signature] HAZ MAT SPEC: [signature] BADGE #

Agency referred to as indicated on the back of this page.

If additional information is required, contact the Storm Water /Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

0003360

HAZARDOUS WASTE/ HAZARDOUS MATERIALS FACILITY STORM WATER COMPLIANCE SURVEY FORM

FACILITY DBA: TESORO / SHELL	TELEPHONE: 951-600-1031	DATE: 12-08-08
ADDRESS: 25336 MADISON AVE	CITY, ZIP: MURRIETA 92562	
MAILING ADDRESS (if different from site address)	MAILING CITY, ZIP	
CONTACT: Joe Cook	FACILITY#: PR0026296	SIC CODE: 5541

Compliance Areas	YES	NO	N/A
***OUTSIDE AREAS (Free of staining & debris; provides good housekeeping; maintained in a manner to pre ent runoff.)**		**uires follow up**	
1. CHEMICAL STORAGE * The outside storage area is kept to minimize the possibility of a release. Chemicals / materials are protected from precipitation / storm water runoff and the containers show no signs of leaking.	✓		
2. DUMPSTER * No liquids are leaking from dumpster; surrounding area is free of trash.		X	
3. ABOVEGROUND TANKS * No ground staining, no spillage observed and no discharge to storm drain. Tanks are maintained to minimize the possibility of a release (secondary containment).			✓
4. ONSITE STORM DRAIN* Protected from accidental discharge other than water.	✓		
5. POWER WASH OR STEAM CLEAN* (discharge to sewer) Drains to oil/water separator connected to a sanitary sewer and not a septic system. Steam cleaning not discharged to parking lot, storm drain or soil.			✓
6. PARKING LOT / DRIVE WAY* Free of excess trash, chemical staining or liquids other than water.	✓		
7. OTHER* Non-storm water discharge (i.e. non-hazardous process discharge).	✓		
8. MOP WATER TO SANITARY SEWER VIA CLARIFIER. Mop water is not dumped to the soil, parking lot, gutter, or other areas susceptible to storm water drainage.	✓		
9. STORM WATER EDUCATIONAL BROCHURES GIVEN TO FACILITY OR POSTERS DISPLAYED FOR EMPLOYEES. If no, what informational material should be sent to the facility?	✓		
10. IF A SWPPP IS REQUIRED, WAS IT AVAILABLE FOR REVEIW? See storm water handout for industrial facilities.			✓

OVERALL EVALUATION/ COMMENTS: MAKE SURE DUMPSTER AREA IS FREE OF TRASH AND EXCESS PERTS

RECEIVED BY: Joe Cook	HAZ MAT SPEC: J. BUSTAMANTE	BADGE #

Agency referred to as indicated on the back of this page.

For additional information, please refer to our web site at www.floodcontrol.co.riverside.ca.us or contact the "Only Rain Down the Storm Drain" Pollution Prevention Program of the Cities and County of Riverside at (800) 506-2555.

ONLY RAIN DOWN THE STORM DRAIN
CALL 1-800-506-2555 TO REPORT
ILLEGAL POLLUTING OF STORM DRAINS

CITY OF MURRIETA

COMPLIANCE ASSISTANCE PROGRAM (CAP)
RE-INSPECTION SURVEY FORM

FACILITY DBA	TELEPHONE	DATE
TESORO/SHELL	951-600-1631	3-23-09
ADDRESS	**CITY, ZIP**	
25336 MADISON AVE.	MURRIETA CA. 92562	
MAILING ADDRESS	**MAILING CITY, ZIP**	
CONTACT	**FACILITY #**	**SIC CODE**
JASON BARNAT	PRO026296	5541

Follow-up Inspection	YES	NO	DATE
*OUTSIDE AREAS (Free of staining & debris; provides good housekeeping; maintained in a manner to prevent runoff.)	✓		
1. CHEMICAL STORAGE * The outside storage area is kept to minimize the possibility of a release. Chemicals/materials are protected from precipitation/storm water runoff and the containers show no signs of leaking.	✓		
2. DUMPSTER* No liquids are leaking from dumpster; surrounding area is free of trash.	✓		3/23/09 *
3. ABOVEGROUND TANKS* No ground staining, no spillage observed and no discharge to storm drain. Tanks are maintained to minimize the possibility of a release (secondary containment.)			✓
4. ONSITE STORM DRAIN* Protected from accidental discharge other than water.	✓		
5. POWER WASH OR STEAM CLEAN* (discharge to sewer) Drains to oil/water separator connected to a sanitary sewer and not a septic system. Steam cleaning not discharged to parking lot, storm drain or soil.	✓		
6. PARKING LOT/DRIVE WAY* Free of excess trash, chemical staining or liquids other than water.	✓		
7. OTHER* Non-storm water discharge (i.e. non-hazardous process discharge.)	✓		
8. MOP WATER TO SANITARY SEWER VIA CLARIFIER. Mop water is not dumped to the soil, parking lot, gutter, or other areas susceptible to storm water drainage.	✓		
9. STORM WATER EDUCATIONAL BROCHURES GIVEN TO FACILITY OR POSTERS DISPLAYED FOR EMPLOYEES. If no, what information material should be sent to the facility?	✓		
10. IF A SWPPP IS REQUIRED, WAS IT AVAILABLE FOR REVIEW? See storm water handout for industrial facilities.			✓

OVERALL EVALUATION/COMMENTS: * Reinspected Dumpster & Found Free of Trash & debris.

RECEIVED BY:	HAZ MAT SPEC:	BADGE #
[signature]	K. Burris	

0003362

HAZARDOUS WASTE/ HAZARDOUS MATERIALS FACILITY STORM WATER COMPLIANCE SURVEY FORM

FACILITY DBA: EXCALIBER FUELS #5/ MOBIL	TELEPHONE: 951- 698 - 9450	DATE: 1-24-08
ADDRESS: 40048 CALIFORNIA OAKS Rd.	CITY, ZIP: MURRIETA 92562	
MAILING ADDRESS (if different from site address)	MAILING CITY, ZIP	
CONTACT: ALFREDO HERNANDEZ	FACILITY#: PR00 259 74	SIC CODE: 5541

Compliance Areas	YES	NO	N/A
***OUTSIDE AREAS (Free of staining & debris; provides good housekeeping; maintained in a manner to prevent runoff.)**		**Requires follow up**	
1. CHEMICAL STORAGE * The outside storage area is kept to minimize the possibility of a release. Chemicals / materials are protected from precipitation / storm water runoff and the containers show no signs of leaking.	✓		
2. DUMPSTER * No liquids are leaking from dumpster; surrounding area is free of trash.	✓		
3. ABOVEGROUND TANKS * No ground staining, no spillage observed and no discharge to storm drain. Tanks are maintained to minimize the possibility of a release (secondary containment).			✓
4. ONSITE STORM DRAIN* Protected from accidental discharge other than water.	✓		
5. POWER WASH OR STEAM CLEAN* (discharge to sewer) Drains to oil/water separator connected to a sanitary sewer and not a septic system. Steam cleaning not discharged to parking lot, storm drain or soil.	✓		
6. PARKING LOT / DRIVE WAY* Free of excess trash, chemical staining or liquids other than water.	✓		
7. OTHER* Non-storm water discharge (i.e. non-hazardous process discharge).			✓
8. MOP WATER TO SANITARY SEWER VIA CLARIFIER. Mop water is not dumped to the soil, parking lot, gutter, or other areas susceptible to storm water drainage.	✓		
9. STORM WATER EDUCATIONAL BROCHURES GIVEN TO FACILITY OR POSTERS DISPLAYED FOR EMPLOYEES. If no, what informational material should be sent to the facility?			✓
10. IF A SWPPP IS REQUIRED, WAS IT AVAILABLE FOR REVEIW? See storm water handout for industrial facilities.			✓

OVERALL EVALUATION/ COMMENTS: NO VIOLATIONS OBSERVED

RECEIVED BY:	HAZ MAT SPEC: J. BUSTAMANTE	BADGE #

Agency referred to as indicated on the back of this page.

If additional information is required, contact the Storm Water /Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

0003363

HAZARDOUS WASTE/ HAZARDOUS MATERIALS FACILITY STORM WATER COMPLIANCE SURVEY FORM

FACILITY DBA: DECHENNE WATER WELL DRILLING	TELEPHONE: 951-676-7869	DATE: 11-19-08
ADDRESS: 35854 GREER Rd.	CITY, ZIP: MURRIETA 92562	
MAILING ADDRESS (if different from site address)	MAILING CITY, ZIP	
CONTACT: RUSS DECHENNE	FACILITY#: TBD	SIC CODE: 1781

Compliance Areas	YES	NO	N/A
***OUTSIDE AREAS (Free of staining & debris; provides good housekeeping; maintained in a manner to prevent runoff.)**		**Requires follow up**	
1. CHEMICAL STORAGE * The outside storage area is kept to minimize the possibility of a release. Chemicals / materials are protected from precipitation / storm water runoff and the containers show no signs of leaking.		X	
2. DUMPSTER * No liquids are leaking from dumpster; surrounding area is free of trash.			✓
3. ABOVEGROUND TANKS * No ground staining, no spillage observed and no discharge to storm drain. Tanks are maintained to minimize the possibility of a release (secondary containment).	✓		
4. ONSITE STORM DRAIN* Protected from accidental discharge other than water.			✓
5. POWER WASH OR STEAM CLEAN* (discharge to sewer) Drains to oil/water separator connected to a sanitary sewer and not a septic system. Steam cleaning not discharged to parking lot, storm drain or soil.		X	
6. PARKING LOT / DRIVE WAY* Free of excess trash, chemical staining or liquids other than water.		X	
7. OTHER* Non-storm water discharge (i.e. non-hazardous process discharge).		X	
8. MOP WATER TO SANITARY SEWER VIA CLARIFIER. Mop water is not dumped to the soil, parking lot, gutter, or other areas susceptible to storm water drainage.		~~X~~	✓
9. STORM WATER EDUCATIONAL BROCHURES GIVEN TO FACILITY OR POSTERS DISPLAYED FOR EMPLOYEES. If no, what informational material should be sent to the facility?		X	
10. IF A SWPPP IS REQUIRED, WAS IT AVAILABLE FOR REVEIW? See storm water handout for industrial facilities.			✓

OVERALL EVALUATION/ COMMENTS: FACILITY WAS WASHING TRUCKS ON BARE SOIL - RUN OFF WAS not being contained. CREEK IS BEHIND FACILITY. FACILITY WAS informed to stop practice unless a proper collection system of run off is built.

RECEIVED BY:	HAZ MAT SPEC: J. BUSTAMANTE	BADGE #

Agency referred to as indicated on the back of this page.

If additional information is required, contact the Storm Water /Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

CITY OF MURRIETA

COMPLIANCE ASSISTANCE PROGRAM (CAP)
RE-INSPECTION SURVEY FORM

FACILITY DBA	TELEPHONE	DATE
DECHENNE WATER WELL DRILLING	(951) 676-7864	4-2-09
ADDRESS	**CITY, ZIP**	
35854 GRAND Rd.	MURRIETA, CA.	
MAILING ADDRESS	**MAILING CITY, ZIP**	
CONTACT	**FACILITY #**	**SIC CODE**
RUSS DECHENNE	TBD	1781

Follow-up Inspection	YES	NO	DATE
*OUTSIDE AREAS (Free of staining & debris; provides good housekeeping; maintained in a manner to prevent runoff.)			
1. CHEMICAL STORAGE * The outside storage area is kept to minimize the possibility of a release. Chemicals/materials are protected from precipitation/storm water runoff and the containers show no signs of leaking.	✓		
2. DUMPSTER* No liquids are leaking from dumpster; surrounding area is free of trash.			
3. ABOVEGROUND TANKS* No ground staining, no spillage observed and no discharge to storm drain. Tanks are maintained to minimize the possibility of a release (secondary containment.)			
4. ONSITE STORM DRAIN* Protected from accidental discharge other than water.			
5. POWER WASH OR STEAM CLEAN* (discharge to sewer) Drains to oil/water separator connected to a sanitary sewer and not a septic system. Steam cleaning not discharged to parking lot, storm drain or soil.	✓		
6. PARKING LOT/DRIVE WAY* Free of excess trash, chemical staining or liquids other than water.	✓		
7. OTHER* Non-storm water discharge (i.e. non-hazardous process discharge.)	✓		
8. MOP WATER TO SANITARY SEWER VIA CLARIFIER. Mop water is not dumped to the soil, parking lot, gutter, or other areas susceptible to storm water drainage.			
9. STORM WATER EDUCATIONAL BROCHURES GIVEN TO FACILITY OR POSTERS DISPLAYED FOR EMPLOYEES. If no, what information material should be sent to the facility?	✓		
10. IF A SWPPP IS REQUIRED, WAS IT AVAILABLE FOR REVIEW? See storm water handout for industrial facilities.			

OVERALL EVALUATION/COMMENTS: 100% FACILITY IMPROVEMENT.

RECEIVED BY:	HAZ MAT SPEC.	BADGE #

0003365

HAZARDOUS WASTE/ HAZARDOUS MATERIALS FACILITY STORM WATER COMPLIANCE SURVEY FORM

FACILITY DBA: RALPHS #118	TELEPHONE: 951-600-1905	DATE: 11-13-08
ADDRESS: 23801 WASHINGTON AVE	CITY, ZIP: MURRIETA 92562	
MAILING ADDRESS (if different from site address)	MAILING CITY, ZIP	
CONTACT: DAN HUTCHISON	FACILITY#: PR0026685	SIC CODE: 5541

Compliance Areas	YES	NO	N/A
***OUTSIDE AREAS (Free of staining & debris; provides good housekeeping; maintained in a manner to prevent runoff.)**		**Requires follow up**	
1. CHEMICAL STORAGE * The outside storage area is kept to minimize the possibility of a release. Chemicals / materials are protected from precipitation / storm water runoff and the containers show no signs of leaking.	✓		
2. DUMPSTER * No liquids are leaking from dumpster; surrounding area is free of trash.	✓		
3. ABOVEGROUND TANKS * No ground staining, no spillage observed and no discharge to storm drain. Tanks are maintained to minimize the possibility of a release (secondary containment).			✓
4. ONSITE STORM DRAIN* Protected from accidental discharge other than water.	✓		
5. POWER WASH OR STEAM CLEAN* (discharge to sewer) Drains to oil/water separator connected to a sanitary sewer and not a septic system. Steam cleaning not discharged to parking lot, storm drain or soil.			✓
6. PARKING LOT / DRIVE WAY* Free of excess trash, chemical staining or liquids other than water.	✓		
7. OTHER* Non-storm water discharge (i.e. non-hazardous process discharge).			✓
8. MOP WATER TO SANITARY SEWER VIA CLARIFIER. Mop water is not dumped to the soil, parking lot, gutter, or other areas susceptible to storm water drainage.		X	
9. STORM WATER EDUCATIONAL BROCHURES GIVEN TO FACILITY OR POSTERS DISPLAYED FOR EMPLOYEES. If no, what informational material should be sent to the facility?	WM	X	
10. IF A SWPPP IS REQUIRED, WAS IT AVAILABLE FOR REVEIW? See storm water handout for industrial facilities.			✓

OVERALL EVALUATION/ COMMENTS: EMPLOYEE STATED THAT THEY SOMETIME DUMP MOP WATER INTO THE BUSHES. SEND FACILITY BROCHURES / INFO ON PROPER WAYS TO DISPOSE MOP WATER

RECEIVED BY: [signature] | HAZ MAT SPEC: J. BUSTAMANTE | BADGE #

Agency referred to as indicated on the back of this page.

If additional information is required, contact the Storm Water /Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

CITY OF MURRIETA

COMPLIANCE ASSISTANCE PROGRAM (CAP)
RE-INSPECTION SURVEY FORM

FACILITY DBA	TELEPHONE	DATE
Ralphs #118	951-600-1905	4-2-09
ADDRESS	**CITY, ZIP**	
23801 Washington Ave	Murrieta CA. 92562	
MAILING ADDRESS	**MAILING CITY, ZIP**	
CONTACT	**FACILITY #**	**SIC CODE**
Dan Hutchison	PR00 266685	5541

Follow-up Inspection	YES	NO	DATE
*OUTSIDE AREAS (Free of staining & debris; provides good housekeeping; maintained in a manner to prevent runoff.)			
1. CHEMICAL STORAGE * The outside storage area is kept to minimize the possibility of a release. Chemicals/materials are protected from precipitation/storm water runoff and the containers show no signs of leaking.			
2. DUMPSTER* No liquids are leaking from dumpster; surrounding area is free of trash.			
3. ABOVEGROUND TANKS* No ground staining, no spillage observed and no discharge to storm drain. Tanks are maintained to minimize the possibility of a release (secondary containment.)			
4. ONSITE STORM DRAIN* Protected from accidental discharge other than water.			
5. POWER WASH OR STEAM CLEAN* (discharge to sewer) Drains to oil/water separator connected to a sanitary sewer and not a septic system. Steam cleaning not discharged to parking lot, storm drain or soil.			
6. PARKING LOT/DRIVE WAY* Free of excess trash, chemical staining or liquids other than water.			
7. OTHER* Non-storm water discharge (i.e. non-hazardous process discharge.)			
8. MOP WATER TO SANITARY SEWER VIA CLARIFIER. Mop water is not dumped to the soil, parking lot, gutter, or other areas susceptible to storm water drainage.	✓		
9. STORM WATER EDUCATIONAL BROCHURES GIVEN TO FACILITY OR POSTERS DISPLAYED FOR EMPLOYEES. If no, what information material should be sent to the facility?	✓		
10. IF A SWPPP IS REQUIRED, WAS IT AVAILABLE FOR REVIEW? See storm water handout for industrial facilities.			

OVERALL EVALUATION/COMMENTS: Mop water dumping issue has been corrected to Sanitary Sewer Clarifier (2) Brochures given to Mang.

RECEIVED BY:	HAZ MAT SPEC:	BADGE #

0003367

HAZARDOUS WASTE/ HAZARDOUS MATERIALS FACILITY STORM WATER COMPLIANCE SURVEY FORM

FACILITY DBA	TELEPHONE	DATE
7-ELEVEN	951-461-4621	10-29-03
ADDRESS: 41260 MURRIETA HOT SPRINGS Rd.	CITY, ZIP: MURRIETA 92562	
MAILING ADDRESS (if different from site address)	MAILING CITY, ZIP	
CONTACT: DAVID HENDRICKS	FACILITY#: PR00266605	SIC CODE: 5541

Compliance Areas	YES	NO	N/A
***OUTSIDE AREAS (Free of staining & debris; provides good housekeeping; maintained in a manner to prevent runoff.)**		**Requires follow up**	
1. CHEMICAL STORAGE * The outside storage area is kept to minimize the possibility of a release. Chemicals / materials are protected from precipitation / storm water runoff and the containers show no signs of leaking.	✓		
2. DUMPSTER * No liquids are leaking from dumpster; surrounding area is free of trash.	✓		
3. ABOVEGROUND TANKS * No ground staining, no spillage observed and no discharge to storm drain. Tanks are maintained to minimize the possibility of a release (secondary containment).			✓
4. ONSITE STORM DRAIN* Protected from accidental discharge other than water.	✓		
5. POWER WASH OR STEAM CLEAN* (discharge to sewer) Drains to oil/water separator connected to a sanitary sewer and not a septic system. Steam cleaning not discharged to parking lot, storm drain or soil.			✓
6. PARKING LOT / DRIVE WAY* Free of excess trash, chemical staining or liquids other than water.	✓		
7. OTHER* Non-storm water discharge (i.e. non-hazardous process discharge).			✓
8. MOP WATER TO SANITARY SEWER VIA CLARIFIER. Mop water is not dumped to the soil, parking lot, gutter, or other areas susceptible to storm water drainage.	✓		
9. STORM WATER EDUCATIONAL BROCHURES GIVEN TO FACILITY OR POSTERS DISPLAYED FOR EMPLOYEES. If no, what informational material should be sent to the facility?			✓
10. IF A SWPPP IS REQUIRED, WAS IT AVAILABLE FOR REVEIW? See storm water handout for industrial facilities.			✓

OVERALL EVALUATION/ COMMENTS: No Violations Observed

RECEIVED BY: [signature] | HAZ MAT SPEC: J. BUSTAMANTE | BADGE #

Agency referred to as indicated on the back of this page.

If additional information is required, contact the Storm Water /Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

0003368

HAZARDOUS WASTE/ HAZARDOUS MATERIALS FACILITY STORM WATER COMPLIANCE SURVEY FORM

FACILITY DBA: French Valley Chevron	TELEPHONE: (951) 395-5861	DATE: 10/21/08
ADDRESS: 30616 Benton Rd	CITY, ZIP: Winchester 92596 / Murrieta CA ~~92562~~	
MAILING ADDRESS (if different from site address)	MAILING CITY, ZIP	
CONTACT: Lorraine Sinsonetti	FACILITY#: PR00 26738	SIC CODE: 5541

Compliance Areas	YES	NO	N/A
***OUTSIDE AREAS (Free of staining & debris; provides good housekeeping; maintained in a manner to prevent runoff.)**		**Requires follow up**	
1. CHEMICAL STORAGE * The outside storage area is kept to minimize the possibility of a release. Chemicals / materials are protected from precipitation / storm water runoff and the containers show no signs of leaking.	✓		
2. DUMPSTER * No liquids are leaking from dumpster; surrounding area is free of trash.	✓		
3. ABOVEGROUND TANKS * No ground staining, no spillage observed and no discharge to storm drain. Tanks are maintained to minimize the possibility of a release (secondary containment).			✓
4. ONSITE STORM DRAIN* Protected from accidental discharge other than water.	✓		
5. POWER WASH OR STEAM CLEAN* (discharge to sewer) Drains to oil/water separator connected to a sanitary sewer and not a septic system. Steam cleaning not discharged to parking lot, storm drain or soil.	✓		
6. PARKING LOT / DRIVE WAY* Free of excess trash, chemical staining or liquids other than water.	✓		
7. OTHER* Non-storm water discharge (i.e. non-hazardous process discharge).	✓		
8. MOP WATER TO SANITARY SEWER VIA CLARIFIER. Mop water is not dumped to the soil, parking lot, gutter, or other areas susceptible to storm water drainage.	✓		
9. STORM WATER EDUCATIONAL BROCHURES GIVEN TO FACILITY OR POSTERS DISPLAYED FOR EMPLOYEES. If no, what informational material should be sent to the facility?	✓		
10. IF A SWPPP IS REQUIRED, WAS IT AVAILABLE FOR REVEIW? See storm water handout for industrial facilities.	✓		

OVERALL EVALUATION/ COMMENTS: No Violations Noted.

RECEIVED BY:	HAZ MAT SPEC: M. Vargas	BADGE #
Agency referred to as indicated on the back of this page.		

If additional information is required, contact the Storm Water /Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

0003369

HAZARDOUS WASTE/ HAZARDOUS MATERIALS FACILITY STORM WATER COMPLIANCE SURVEY FORM

FACILITY DBA: Vons Gas Station	TELEPHONE: (951) 600-9583	DATE: 10/20/08
ADDRESS: 29910-B Murrieta Hot Springs Rd	CITY, ZIP: Murrieta [redacted] CA 92563	
MAILING ADDRESS (if different from site address)	MAILING CITY, ZIP	
CONTACT: Erica Powell	FACILITY#: PR0028705	SIC CODE: 5989

Compliance Areas	YES	NO	N/A
***OUTSIDE AREAS (Free of staining & debris; provides good housekeeping; maintained in a manner to prevent runoff.)**		**Requires follow up**	
1. CHEMICAL STORAGE * The outside storage area is kept to minimize the possibility of a release. Chemicals / materials are protected from precipitation / storm water runoff and the containers show no signs of leaking.	✓		
2. DUMPSTER * No liquids are leaking from dumpster; surrounding area is free of trash.	✓		
3. ABOVEGROUND TANKS * No ground staining, no spillage observed and no discharge to storm drain. Tanks are maintained to minimize the possibility of a release (secondary containment).			✓
4. ONSITE STORM DRAIN* Protected from accidental discharge other than water.	✓		
5. POWER WASH OR STEAM CLEAN* (discharge to sewer) Drains to oil/water separator connected to a sanitary sewer and not a septic system. Steam cleaning not discharged to parking lot, storm drain or soil.	✓		
6. PARKING LOT / DRIVE WAY* Free of excess trash, chemical staining or liquids other than water.	✓		
7. OTHER* Non-storm water discharge (i.e. non-hazardous process discharge).			✓
8. MOP WATER TO SANITARY SEWER VIA CLARIFIER. Mop water is not dumped to the soil, parking lot, gutter, or other areas susceptible to storm water drainage.	✓		
9. STORM WATER EDUCATIONAL BROCHURES GIVEN TO FACILITY OR POSTERS DISPLAYED FOR EMPLOYEES. If no, what informational material should be sent to the facility?	✓		
10. IF A SWPPP IS REQUIRED, WAS IT AVAILABLE FOR REVEIW? See storm water handout for industrial facilities.	✓		

OVERALL EVALUATION/ COMMENTS: NO Violations note.

RECEIVED BY: [signature] FUEL SUPERVISOR	HAZ MAT SPEC: M. Vargas	BADGE #

Agency referred to as indicated on the back of this page.

If additional information is required, contact the Storm Water /Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

0003370

HAZARDOUS WASTE/ HAZARDOUS MATERIALS FACILITY STORM WATER COMPLIANCE SURVEY FORM

FACILITY DBA: Murrieta 76	TELEPHONE: (951) 698-6418	DATE: 10/14/08
ADDRESS: 39460 Murrieta Hot Springs Rd	CITY, ZIP: Murrieta CA 92563	
MAILING ADDRESS (if different from site address)	MAILING CITY, ZIP	
CONTACT: Wally Simpkins	FACILITY#: PR0023721	SIC CODE: 5541

Compliance Areas	YES	NO	N/A
***OUTSIDE AREAS (Free of staining & debris; provides good housekeeping; maintained in a manner to prevent runoff.)**		**Requires follow up**	
1. CHEMICAL STORAGE * The outside storage area is kept to minimize the possibility of a release. Chemicals / materials are protected from precipitation / storm water runoff and the containers show no signs of leaking.	✓		
2. DUMPSTER * No liquids are leaking from dumpster; surrounding area is free of trash.	✓		
3. ABOVEGROUND TANKS * No ground staining, no spillage observed and no discharge to storm drain. Tanks are maintained to minimize the possibility of a release (secondary containment).			✓
4. ONSITE STORM DRAIN* Protected from accidental discharge other than water.	✓		
5. POWER WASH OR STEAM CLEAN* (discharge to sewer) Drains to oil/water separator connected to a sanitary sewer and not a septic system. Steam cleaning not discharged to parking lot, storm drain or soil.	✓		
6. PARKING LOT / DRIVE WAY* Free of excess trash, chemical staining or liquids other than water.	✓		
7. OTHER* Non-storm water discharge (i.e. non-hazardous process discharge).			✓
8. MOP WATER TO SANITARY SEWER VIA CLARIFIER. Mop water is not dumped to the soil, parking lot, gutter, or other areas susceptible to storm water drainage.	✓		
9. STORM WATER EDUCATIONAL BROCHURES GIVEN TO FACILITY OR POSTERS DISPLAYED FOR EMPLOYEES. If no, what informational material should be sent to the facility?	✓	✓	
10. IF A SWPPP IS REQUIRED, WAS IT AVAILABLE FOR REVEIW? See storm water handout for industrial facilities.			✓

OVERALL EVALUATION/ COMMENTS: No Violations noted.

RECEIVED BY: Wally Simpkins	HAZ MAT SPEC: M. Vargas	BADGE #

Agency referred to as indicated on the back of this page.

If additional information is required, contact the Storm Water /Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

CITY OF MURRIETA

0003371

OCT 0 HAZARDOUS WASTE/ HAZARDOUS MATERIALS FACILITY

RECEIVED STORM WATER COMPLIANCE SURVEY FORM

ENGINEERING DEPT.

FACILITY DBA: BURGER KING #10733	TELEPHONE: 951-696-9031	DATE: 8-22-08
ADDRESS: 40931 CALIFORNIA OAKS Rd.	CITY, ZIP: MURRIETA 92562	
MAILING ADDRESS (if different from site address)	MAILING CITY, ZIP	
CONTACT: NORMA RAMIREZ	FACILITY#: PR0033749	SIC CODE: 5541 5812

Compliance Areas	YES	NO	N/A
***OUTSIDE AREAS (Free of staining & debris; provides good housekeeping; maintained in a manner to prevent runoff.)**		**Requires follow up**	
1. CHEMICAL STORAGE * The outside storage area is kept to minimize the possibility of a release. Chemicals / materials are protected from precipitation / storm water runoff and the containers show no signs of leaking.	✓		
2. DUMPSTER * No liquids are leaking from dumpster; surrounding area is free of trash.	✓		
3. ABOVEGROUND TANKS * No ground staining, no spillage observed and no discharge to storm drain. Tanks are maintained to minimize the possibility of a release (secondary containment).			✓
4. ONSITE STORM DRAIN* Protected from accidental discharge other than water.			✓
5. POWER WASH OR STEAM CLEAN* (discharge to sewer) Drains to oil/water separator connected to a sanitary sewer and not a septic system. Steam cleaning not discharged to parking lot, storm drain or soil.			✓
6. PARKING LOT / DRIVE WAY* Free of excess trash, chemical staining or liquids other than water.	✓		
7. OTHER* Non-storm water discharge (i.e. non-hazardous process discharge).			✓
8. MOP WATER TO SANITARY SEWER VIA CLARIFIER. Mop water is not dumped to the soil, parking lot, gutter, or other areas susceptible to storm water drainage.	✓		
9. STORM WATER EDUCATIONAL BROCHURES GIVEN TO FACILITY OR POSTERS DISPLAYED FOR EMPLOYEES. If no, what informational material should be sent to the facility?			✓
10. IF A SWPPP IS REQUIRED, WAS IT AVAILABLE FOR REVEIW? See storm water handout for industrial facilities.			✓

OVERALL EVALUATION/ COMMENTS: NO VIOLATIONS OBSERVED

RECEIVED BY: [signature]	HAZ MAT SPEC: JEFF BUSTAMANTE	BADGE #

Agency referred to as indicated on the back of this page.

If additional information is required, contact the Storm Water /Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

0003372

HAZARDOUS WASTE/ HAZARDOUS MATERIALS FACILITY STORM WATER COMPLIANCE SURVEY FORM

FACILITY DBA	TELEPHONE	DATE
KFC #32	951-696-2250	8-22-08
ADDRESS: 40702 CALIFORNIA OAKS Rd.	CITY, ZIP: MURRIETA 92563	
MAILING ADDRESS (if different from site address)	MAILING CITY, ZIP	
CONTACT: BLANCA FERNANDES	FACILITY#: PR0033791	SIC CODE: 582

Compliance Areas	YES	NO	N/A
***OUTSIDE AREAS (Free of staining & debris; provides good housekeeping; maintained in a manner to prevent runoff.)**		**Requires follow up**	
1. CHEMICAL STORAGE * The outside storage area is kept to minimize the possibility of a release. Chemicals / materials are protected from precipitation / storm water runoff and the containers show no signs of leaking.	✓		
2. DUMPSTER * No liquids are leaking from dumpster; surrounding area is free of trash.	✓		
3. ABOVEGROUND TANKS * No ground staining, no spillage observed and no discharge to storm drain. Tanks are maintained to minimize the possibility of a release (secondary containment).			✓
4. ONSITE STORM DRAIN* Protected from accidental discharge other than water.	✓		
5. POWER WASH OR STEAM CLEAN* (discharge to sewer) Drains to oil/water separator connected to a sanitary sewer and not a septic system. Steam cleaning not discharged to parking lot, storm drain or soil.			✓
6. PARKING LOT / DRIVE WAY* Free of excess trash, chemical staining or liquids other than water.	✓		
7. OTHER* Non-storm water discharge (i.e. non-hazardous process discharge).			✓
8. MOP WATER TO SANITARY SEWER VIA CLARIFIER. Mop water is not dumped to the soil, parking lot, gutter, or other areas susceptible to storm water drainage.	✓		
9. STORM WATER EDUCATIONAL BROCHURES GIVEN TO FACILITY OR POSTERS DISPLAYED FOR EMPLOYEES. If no, what informational material should be sent to the facility?			✓
10. IF A SWPPP IS REQUIRED, WAS IT AVAILABLE FOR REVEIW? See storm water handout for industrial facilities.			✓

OVERALL EVALUATION/ COMMENTS: NO VIOLATIONS OBSERVED

RECEIVED BY: Blanca Hernandez	HAZ MAT SPEC: J. BUSTAMANTE	BADGE #

Agency referred to as indicated on the back of this page.

If additional information is required, contact the Storm Water /Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

CITY OF MURRIETA
0003373
SEP 04 2008
RECEIVED
ENGINEERING DEPT.

HAZARDOUS WASTE/ HAZARDOUS MATERIALS FACILITY STORM WATER COMPLIANCE SURVEY FORM

FACILITY DBA: TARGET STORE # 1283	TELEPHONE: 951 696-7524	DATE: 8-14-08
ADDRESS: 41040 CALIFORNIA OAKS Rd	CITY, ZIP: MURRIETA 92562	
MAILING ADDRESS (if different from site address)	MAILING CITY, ZIP	
CONTACT: MIKE BETZ	FACILITY#: PR002327	SIC CODE: 5399

Compliance Areas	YES	NO	N/A
***OUTSIDE AREAS (Free of staining & debris; provides good housekeeping; maintained in a manner to prevent runoff.)**		**Requires follow up**	
1. CHEMICAL STORAGE * The outside storage area is kept to minimize the possibility of a release. Chemicals / materials are protected from precipitation / storm water runoff and the containers show no signs of leaking.	✓		
2. DUMPSTER * No liquids are leaking from dumpster; surrounding area is free of trash.	✓		
3. ABOVEGROUND TANKS * No ground staining, no spillage observed and no discharge to storm drain. Tanks are maintained to minimize the possibility of a release (secondary containment).			✓
4. ONSITE STORM DRAIN* Protected from accidental discharge other than water.	✓		
5. POWER WASH OR STEAM CLEAN* (discharge to sewer) Drains to oil/water separator connected to a sanitary sewer and not a septic system. Steam cleaning not discharged to parking lot, storm drain or soil.			✓
6. PARKING LOT / DRIVE WAY* Free of excess trash, chemical staining or liquids other than water.	✓		
7. OTHER* Non-storm water discharge (i.e. non-hazardous process discharge).			✓
8. MOP WATER TO SANITARY SEWER VIA CLARIFIER. Mop water is not dumped to the soil, parking lot, gutter, or other areas susceptible to storm water drainage.	✓		
9. STORM WATER EDUCATIONAL BROCHURES GIVEN TO FACILITY OR POSTERS DISPLAYED FOR EMPLOYEES. If no, what informational material should be sent to the facility?	✓		
10. IF A SWPPP IS REQUIRED, WAS IT AVAILABLE FOR REVEIW? See storm water handout for industrial facilities.			✓

OVERALL EVALUATION/ COMMENTS: NO VIOLATIONS AT THIS TIME

RECEIVED BY: [signature]	HAZ MAT SPEC: J. BUSTAMANTE	BADGE #

Agency referred to as indicated on the back of this page.

If additional information is required, contact the Storm Water /Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

0003374

HAZARDOUS WASTE/ HAZARDOUS MATERIALS FACILITY STORM WATER COMPLIANCE SURVEY FORM

FACILITY DBA BIG O TIRES	TELEPHONE 951-600-0160	DATE 8-8-08
ADDRESS 40420 CALIFORNIA OAKS Rd.	CITY, ZIP MURRIETA 92562	
MAILING ADDRESS (if different from site address)	MAILING CITY, ZIP	
CONTACT NIGEL WRIGHT	FACILITY# PR0021213	SIC CODE 7699

Compliance Areas	YES	NO	N/A
***OUTSIDE AREAS (Free of staining & debris; provides good housekeeping; maintained in a manner to prevent runoff.)**		**Requires follow up**	
1. CHEMICAL STORAGE * The outside storage area is kept to minimize the possibility of a release. Chemicals / materials are protected from precipitation / storm water runoff and the containers show no signs of leaking.	✓		
2. DUMPSTER * No liquids are leaking from dumpster; surrounding area is free of trash.	✓		
3. ABOVEGROUND TANKS * No ground staining, no spillage observed and no discharge to storm drain. Tanks are maintained to minimize the possibility of a release (secondary containment).	✓		
4. ONSITE STORM DRAIN* Protected from accidental discharge other than water.	✓		
5. POWER WASH OR STEAM CLEAN* (discharge to sewer) Drains to oil/water separator connected to a sanitary sewer and not a septic system. Steam cleaning not discharged to parking lot, storm drain or soil.			✓
6. PARKING LOT / DRIVE WAY* Free of excess trash, chemical staining or liquids other than water.	✓		
7. OTHER* Non-storm water discharge (i.e. non-hazardous process discharge).			✓
8. MOP WATER TO SANITARY SEWER VIA CLARIFIER. Mop water is not dumped to the soil, parking lot, gutter, or other areas susceptible to storm water drainage.	✓		
9. STORM WATER EDUCATIONAL BROCHURES GIVEN TO FACILITY OR POSTERS DISPLAYED FOR EMPLOYEES. If no, what informational material should be sent to the facility?	✓		
10. IF A SWPPP IS REQUIRED, WAS IT AVAILABLE FOR REVEIW? See storm water handout for industrial facilities.			✓

OVERALL EVALUATION/ COMMENTS: NO VIOLATIONS AT THIS TIME

RECEIVED BY:	HAZ MAT SPEC: J. BUSTAMANTE	BADGE #

Agency referred to as indicated on the back of this page.

If additional information is required, contact the Storm Water /Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

0003375

HAZARDOUS WASTE/ HAZARDOUS MATERIALS FACILITY STORM WATER COMPLIANCE SURVEY FORM

FACILITY DBA: EXPRESS TIRE-MURRIETA	TELEPHONE: 951-696-5200	DATE: 8-8-08
ADDRESS: 40615	CITY, ZIP: MURRIETA 92562	
MAILING ADDRESS (if different from site address)	MAILING CITY, ZIP	
CONTACT: JIM WILKINSON	FACILITY#: PR0022448	SIC CODE: 7699

Compliance Areas	YES	NO	N/A
***OUTSIDE AREAS (Free of staining & debris; provides good housekeeping; maintained in a manner to prevent runoff.)**		**Requires follow up**	
1. CHEMICAL STORAGE * The outside storage area is kept to minimize the possibility of a release. Chemicals / materials are protected from precipitation / storm water runoff and the containers show no signs of leaking.	✓		
2. DUMPSTER * No liquids are leaking from dumpster; surrounding area is free of trash.	✓		
3. ABOVEGROUND TANKS * No ground staining, no spillage observed and no discharge to storm drain. Tanks are maintained to minimize the possibility of a release (secondary containment).	✓		
4. ONSITE STORM DRAIN* Protected from accidental discharge other than water.			✓
5. POWER WASH OR STEAM CLEAN* (discharge to sewer) Drains to oil/water separator connected to a sanitary sewer and not a septic system. Steam cleaning not discharged to parking lot, storm drain or soil.			✓
6. PARKING LOT / DRIVE WAY* Free of excess trash, chemical staining or liquids other than water.	✓		
7. OTHER* Non-storm water discharge (i.e. non-hazardous process discharge).			✓
8. MOP WATER TO SANITARY SEWER VIA CLARIFIER. Mop water is not dumped to the soil, parking lot, gutter, or other areas susceptible to storm water drainage.	✓		
9. STORM WATER EDUCATIONAL BROCHURES GIVEN TO FACILITY OR POSTERS DISPLAYED FOR EMPLOYEES. If no, what informational material should be sent to the facility?	✓		
10. IF A SWPPP IS REQUIRED, WAS IT AVAILABLE FOR REVEIW? See storm water handout for industrial facilities.			✓

OVERALL EVALUATION/ COMMENTS: NO VIOLATIONS AT THIS TIME

RECEIVED BY: J. Wilkinson	HAZ MAT SPEC: J. BUSTAMANTE	BADGE #

Agency referred to as indicated on the back of this page.

If additional information is required, contact the Storm Water /Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

0003376

HAZARDOUS WASTE/ HAZARDOUS MATERIALS FACILITY STORM WATER COMPLIANCE SURVEY FORM

FACILITY DBA: CARL'S JR # 1105	TELEPHONE: 951-677-8344	DATE: 8-7-08
ADDRESS: 40980 CALIFORNIA OAKS Rd.	CITY, ZIP: MURRIETA 92562	
MAILING ADDRESS (if different from site address)	MAILING CITY, ZIP	
CONTACT: JUANA ~~MAYE~~ MIIAGI	FACILITY#: PR0033874	SIC CODE: 5812

Compliance Areas	YES	NO	N/A
***OUTSIDE AREAS (Free of staining & debris; provides good housekeeping; maintained in a manner to prevent runoff.)**		**Requires follow up**	
1. CHEMICAL STORAGE * The outside storage area is kept to minimize the possibility of a release. Chemicals / materials are protected from precipitation / storm water runoff and the containers show no signs of leaking.	✓		
2. DUMPSTER * No liquids are leaking from dumpster; surrounding area is free of trash.	✓		
3. ABOVEGROUND TANKS * No ground staining, no spillage observed and no discharge to storm drain. Tanks are maintained to minimize the possibility of a release (secondary containment).			✓
4. ONSITE STORM DRAIN* Protected from accidental discharge other than water.	✓		
5. POWER WASH OR STEAM CLEAN* (discharge to sewer) Drains to oil/water separator connected to a sanitary sewer and not a septic system. Steam cleaning not discharged to parking lot, storm drain or soil.			✓
6. PARKING LOT / DRIVE WAY* Free of excess trash, chemical staining or liquids other than water.	✓		
7. OTHER* Non-storm water discharge (i.e. non-hazardous process discharge).			✓
8. MOP WATER TO SANITARY SEWER VIA CLARIFIER. Mop water is not dumped to the soil, parking lot, gutter, or other areas susceptible to storm water drainage.	✓		
9. STORM WATER EDUCATIONAL BROCHURES GIVEN TO FACILITY OR POSTERS DISPLAYED FOR EMPLOYEES. If no, what informational material should be sent to the facility?			✓
10. IF A SWPPP IS REQUIRED, WAS IT AVAILABLE FOR REVEIW? See storm water handout for industrial facilities.			✓

OVERALL EVALUATION/ COMMENTS: NO VIOLATIONS AT THIS TIME

RECEIVED BY: [signature]	HAZ MAT SPEC: J. BUSTAMANTE	BADGE #
Agency referred to as indicated on the back of this page.		

If additional information is required, contact the Storm Water /Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

0003377

HAZARDOUS WASTE/ HAZARDOUS MATERIALS FACILITY STORM WATER COMPLIANCE SURVEY FORM

FACILITY DBA: THE MOVIE EXPERIENCE	TELEPHONE: 951-696-8425	DATE: 8-7-08
ADDRESS: 41090 CALIFORNIA OAKS Rd.	CITY, ZIP: MURRIETA 92562	
MAILING ADDRESS (if different from site address)	MAILING CITY, ZIP	
CONTACT: TERRI MARSITAI	FACILITY#: PR0033837	SIC CODE: 5812

Compliance Areas	YES	NO	N/A
***OUTSIDE AREAS (Free of staining & debris; provides good housekeeping; maintained in a manner to prevent runoff.)**		**Requires follow up**	
1. CHEMICAL STORAGE * The outside storage area is kept to minimize the possibility of a release. Chemicals / materials are protected from precipitation / storm water runoff and the containers show no signs of leaking.	✓		
2. DUMPSTER * No liquids are leaking from dumpster; surrounding area is free of trash.	✓		
3. ABOVEGROUND TANKS * No ground staining, no spillage observed and no discharge to storm drain. Tanks are maintained to minimize the possibility of a release (secondary containment).			✓
4. ONSITE STORM DRAIN* Protected from accidental discharge other than water.	✓		
5. POWER WASH OR STEAM CLEAN* (discharge to sewer) Drains to oil/water separator connected to a sanitary sewer and not a septic system. Steam cleaning not discharged to parking lot, storm drain or soil.			✓
6. PARKING LOT / DRIVE WAY* Free of excess trash, chemical staining or liquids other than water.	✓		
7. OTHER* Non-storm water discharge (i.e. non-hazardous process discharge).			✓
8. MOP WATER TO SANITARY SEWER VIA CLARIFIER. Mop water is not dumped to the soil, parking lot, gutter, or other areas susceptible to storm water drainage.	✓		
9. STORM WATER EDUCATIONAL BROCHURES GIVEN TO FACILITY OR POSTERS DISPLAYED FOR EMPLOYEES. If no, what informational material should be sent to the facility?			✓
10. IF A SWPPP IS REQUIRED, WAS IT AVAILABLE FOR REVEIW? See storm water handout for industrial facilities.			✓

OVERALL EVALUATION/ COMMENTS: NO VIOLATIONS AT THIS TIME

RECEIVED BY: Terri Marshall | HAZ MAT SPEC: J. BUSTAMANTE | BADGE #

Agency referred to as indicated on the back of this page.

If additional information is required, contact the Storm Water /Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

0003378

HAZARDOUS WASTE/ HAZARDOUS MATERIALS FACILITY STORM WATER COMPLIANCE SURVEY FORM

FACILITY DBA: BRUNSWICK (BOWLING CENTER)	TELEPHONE: 951-698-2202	DATE: 7-31-08
ADDRESS: 40440 CALIFORNIA OAKS Rd.	CITY, ZIP: MURRIETA 92562	
MAILING ADDRESS (if different from site address)	MAILING CITY, ZIP	
CONTACT: KEVIN HATZELL	FACILITY#: PR0033838	SIC CODE: 7933

Compliance Areas	YES	NO	N/A
***OUTSIDE AREAS (Free of staining & debris; provides good housekeeping; maintained in a manner to prevent runoff.)**		**Requires follow up**	
1. CHEMICAL STORAGE * The outside storage area is kept to minimize the possibility of a release. Chemicals / materials are protected from precipitation / storm water runoff and the containers show no signs of leaking.	✓		
2. DUMPSTER * No liquids are leaking from dumpster; surrounding area is free of trash.	✓		
3. ABOVEGROUND TANKS * No ground staining, no spillage observed and no discharge to storm drain. Tanks are maintained to minimize the possibility of a release (secondary containment).			✓
4. ONSITE STORM DRAIN* Protected from accidental discharge other than water.	✓		
5. POWER WASH OR STEAM CLEAN* (discharge to sewer) Drains to oil/water separator connected to a sanitary sewer and not a septic system. Steam cleaning not discharged to parking lot, storm drain or soil.			✓
6. PARKING LOT / DRIVE WAY* Free of excess trash, chemical staining or liquids other than water.	✓		
7. OTHER* Non-storm water discharge (i.e. non-hazardous process discharge).			✓
8. MOP WATER TO SANITARY SEWER VIA CLARIFIER. Mop water is not dumped to the soil, parking lot, gutter, or other areas susceptible to storm water drainage.	✓		
9. STORM WATER EDUCATIONAL BROCHURES GIVEN TO FACILITY OR POSTERS DISPLAYED FOR EMPLOYEES. If no, what informational material should be sent to the facility?			✓
10. IF A SWPPP IS REQUIRED, WAS IT AVAILABLE FOR REVEIW? See storm water handout for industrial facilities.			✓

OVERALL EVALUATION/ COMMENTS: NO VIOLATIONS AT THIS TIME

RECEIVED BY: [signature]	HAZ MAT SPEC: V. BUSTAMANTE	BADGE #

Agency referred to as indicated on the back of this page.

If additional information is required, contact the Storm Water /Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

CITY OF MURRIETA

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Storm Water Clean Water PROTECTION PROGRAM

0003379

HAZARDOUS WASTE/ HAZARDOUS MATERIALS FACILITY STORM WATER COMPLIANCE SURVEY FORM

FACILITY DBA: EZ LUBE #115	TELEPHONE: 951-696 2883	DATE: 7-31-08
ADDRESS: 40430 CALIFORNIA OAKS Rd.	CITY, ZIP: MURRIETA 92562	
MAILING ADDRESS (if different from site address)	MAILING CITY, ZIP	
CONTACT: BRIAN TOO	FACILITY#: PR0022360	SIC CODE: 7699

Compliance Areas	YES	NO	N/A
***OUTSIDE AREAS (Free of staining & debris; provides good housekeeping; maintained in a manner to prevent runoff.)**		**Requires follow up**	
1. CHEMICAL STORAGE * The outside storage area is kept to minimize the possibility of a release. Chemicals / materials are protected from precipitation / storm water runoff and the containers show no signs of leaking.	✓		
2. DUMPSTER * No liquids are leaking from dumpster; surrounding area is free of trash.	✓		
3. ABOVEGROUND TANKS * No ground staining, no spill age observed and no discharge to storm drain. Tanks are maintained to minimize the possibility of a release (secondary containment).	✓		
4. ONSITE STORM DRAIN* Protected from accidental discharge other than water.	✓		
5. POWER WASH OR STEAM CLEAN* (discharge to se wer) Drains to oil/water separator connected to a sanitary sewer and not a septic system. Steam cleaning not discharged to parking lot, storm drain or soil.			✓
6. PARKING LOT / DRIVE WAY* Free of excess trash, chemical staining or liquids other than water.		X	
7. OTHER* Non-storm water discharge (i.e. non-hazardous process discharge).			✓
8. MOP WATER TO SANITARY SEWER VIA CLARIFIER. Mop water is not dumped to the soil, parking lot, gutter, or other areas susceptible to storm water drainage.	✓		
9. STORM WATER EDUCATIONAL BROCHURES GIVEN TO FACILITY OR POSTERS DISPLAYED FOR EMPLOYEES. If no, what informational material should be sent to the facility?			✓
10. IF A SWPPP IS REQUIRED, WAS IT AVAILA BLE FOR REVIEW? See storm water handout for industrial facilities.			✓

OVERALL EVALUATION/ COMMENTS : PARKING LOT IS A SERVICE FACILITY, SO THERE IS OIL DRIPINGS IN THE PARKING LOT FROM CUSTOMER VEHICLES - NOTHING ABNORMAL.

RECEIVED BY:	HAZ MAT SPEC: ✓ JEFF BUSTAMANTE	BADGE #

Agency referred to as indicated on the back of this page.

For additional information, please refer to our web site at www.floodcontrol.co.riverside.ca.us or contact the "Only Rain Down the Storm Drain" Pollution Prevention Program of the Cities and County of Riverside at (800) 506-2555.

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0003380

HAZARDOUS WASTE/ HAZARDOUS MATERIALS FACILITY STORM WATER COMPLIANCE SURVEY FORM

FACILITY DBA: Air Mech Inc	TELEPHONE: 951-696-0160	DATE: 7-30-08
ADDRESS: 37552 Winchester Rd.	CITY, ZIP: Murrieta 92563	
MAILING ADDRESS (if different from site address)	MAILING CITY, ZIP	
CONTACT: Brian Gallager	FACILITY#: PR0019702	SIC CODE: 7699

Compliance Areas	YES	NO	N/A
***OUTSIDE AREAS (Free of staining & debris; provides good housekeeping; maintained in a manner to prevent runoff.)**		**Requires follow up**	
1. CHEMICAL STORAGE * The outside storage area is kept to minimize the possibility of a release. Chemicals / materials are protected from precipitation / storm water runoff and the containers show no signs of leaking.	✓		
2. DUMPSTER * No liquids are leaking from dumpster; surrounding area is free of trash.	✓		
3. ABOVEGROUND TANKS * No ground staining, no spill age observed and no discharge to storm drain. Tanks are maintained to minimize the possibility of a release (secondary containment).	✓		
4. ONSITE STORM DRAIN* Protected from accidental discharge other than water.			✓
5. POWER WASH OR STEAM CLEAN* (discharge to se wer) Drains to oil/water separator connected to a sanitary sewer and not a septic system. Steam cleaning not discharged to parking lot, storm drain or soil.			✓
6. PARKING LOT / DRIVE WAY* Free of excess trash, chemical staining or liquids other than water.	✓		
7. OTHER* Non-storm water discharge (i.e. non-hazardous process discharge).			✓
8. MOP WATER TO SANITARY SEWER VIA CLARIFIER. Mop water is not dumped to the soil, parking lot, gutter, or other areas susceptible to storm water drainage.			✓
9. STORM WATER EDUCATIONAL BROCHURES GIVEN TO FACILITY OR POSTERS DISPLAYED FOR EMPLOYEES. If no, what informational material should be sent to the facility?			✓
10. IF A SWPPP IS REQUIRED, WAS IT AVAILA BLE FOR REVIEW? See storm water handout for industrial facilities.			✓

OVERALL EVALUATION/ COMMENTS : NO VIOLATIONS AT THIS TIME

RECEIVED BY: [signature]	HAZ MAT SPEC: J. Bustamante	BADGE #

Agency referred to as indicated on the back of this page.

For additional information, please refer to our web site at www.floodcontrol.co.riverside.ca.us or contact the "Only Rain Down the Storm Drain" Pollution Prevention Program of the Cities and County of Riverside at (800) 506-2555.

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0003381

HAZARDOUS WASTE/ HAZARDOUS MATERIALS FACILITY STORM WATER COMPLIANCE SURVEY FORM

FACILITY DBA: SPECTRUM CLEANERS III	TELEPHONE: 951-696-2886	DATE: 7-25-08
ADDRESS: 40964 CALIFORNIA OAKS Rd.	CITY, ZIP: MURRIETA 92562	
MAILING ADDRESS (if different from site address)	MAILING CITY, ZIP	
CONTACT: JOOK HARRY	FACILITY#: PR0031701	SIC CODE: 7216

Compliance Areas	YES	NO	N/A
***OUTSIDE AREAS (Free of staining & debris; provides good housekeeping; maintained in a manner to prevent runoff.)**		**Requires follow up**	
1. CHEMICAL STORAGE * The outside storage area is kept to minimize the possibility of a release. Chemicals / materials are protected from precipitation / storm water runoff and the containers show no signs of leaking.	✓		
2. DUMPSTER * No liquids are leaking from dumpster; surrounding area is free of trash.	✓		
3. ABOVEGROUND TANKS * No ground staining, no spill age observed and no discharge to storm drain. Tanks are maintained to minimize the possibility of a release (secondary containment).			✓
4. ONSITE STORM DRAIN* Protected from accidental discharge other than water.	✓		
5. POWER WASH OR STEAM CLEAN* (discharge to se wer) Drains to oil/water separator connected to a sanitary sewer and not a septic system. Steam cleaning not discharged to parking lot, storm drain or soil.			✓
6. PARKING LOT / DRIVE WAY* Free of excess trash, chemical staining or liquids other than water.	✓		
7. OTHER* Non-storm water discharge (i.e. non-hazardous process discharge).			✓
8. MOP WATER TO SANITARY SEWER VIA CLARIFIER. Mop water is not dumped to the soil, parking lot, gutter, or other areas susceptible to storm water drainage.	✓		
9. STORM WATER EDUCATIONAL BROCHURES GIVEN TO FACILITY OR POSTERS DISPLAYED FOR EMPLOYEES. If no, what informational material should be sent to the facility?			✓
10. IF A SWPPP IS REQUIRED, WAS IT AVAILA BLE FOR REVIEW? See storm water handout for industrial facilities.			✓

OVERALL EVALUATION/ COMMENTS : NO VIOLATIONS AT THIS TIME

RECEIVED BY: [illegible]	HAZ MAT SPEC: J. BUSTAMANTE	BADGE #

Agency referred to as indicated on the back of this page.

For additional information, please refer to our web site at www.floodcontrol.co.riverside.ca.us or contact the "Only Rain Down the Storm Drain" Pollution Prevention Program of the Cities and County of Riverside at (800) 506-2555.

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0003382

HAZARDOUS WASTE/ HAZARDOUS MATERIALS FACILITY STORM WATER COMPLIANCE SURVEY FORM

FACILITY DBA: AUTOZONE #5566	TELEPHONE: 951-677-7206	DATE: 7-25-08
ADDRESS: 40950 CALIFORNIA OAKS Rd	CITY, ZIP: MURRIETA 92562	
MAILING ADDRESS (if different from site address)	MAILING CITY, ZIP	
CONTACT: STEVE ALIGAN	FACILITY#: PR0023872	SIC CODE: 5999

Compliance Areas	YES	NO	N/A
***OUTSIDE AREAS (Free of staining & debris; provides good housekeeping; maintained in a manner to prevent runoff.)**		**Requires follow up**	
1. CHEMICAL STORAGE * The outside storage area is kept to minimize the possibility of a release. Chemicals / materials are protected from precipitation / storm water runoff and the containers show no signs of leaking.	✓		
2. DUMPSTER * No liquids are leaking from dumpster; surrounding area is free of trash.	✓		
3. ABOVEGROUND TANKS * No ground staining, no spill age observed and no discharge to storm drain. Tanks are maintained to minimize the possibility of a release (secondary containment).	✓		
4. ONSITE STORM DRAIN* Protected from accidental discharge other than water.			✓
5. POWER WASH OR STEAM CLEAN* (discharge to se wer) Drains to oil/water separator connected to a sanitary sewer and not a septic system. Steam cleaning not discharged to parking lot, storm drain or soil.			✓
6. PARKING LOT / DRIVE WAY* Free of excess trash, chemical staining or liquids other than water.	✓		
7. OTHER* Non-storm water discharge (i.e. non-hazardous process discharge).	✓		
8. MOP WATER TO SANITARY SEWER VIA CLARIFIER. Mop water is not dumped to the soil, parking lot, gutter, or other areas susceptible to storm water drainage.	✓		
9. STORM WATER EDUCATIONAL BROCHURES GIVEN TO FACILITY OR POSTERS DISPLAYED FOR EMPLOYEES. If no, what informational material should be sent to the facility?			✓
10. IF A SWPPP IS REQUIRED, WAS IT AVAILA BLE FOR REVIEW? See storm water handout for industrial facilities.			✓

OVERALL EVALUATION/ COMMENTS : NO VIOLATIONS AT THIS TIME

RECEIVED BY: [signature] | HAZ MAT SPEC: J. BUSTAMANTE | BADGE #

Agency referred to as indicated on the back of this page.

For additional information, please refer to our web site at www.floodcontrol.co.riverside.ca.us or contact the "Only Rain Down the Storm Drain" Pollution Prevention Program of the Cities and County of Riverside at (800) 506-2555.

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0003383

HAZARDOUS WASTE/ HAZARDOUS MATERIALS FACILITY STORM WATER COMPLIANCE SURVEY FORM

FACILITY DBA: KRAGEN AUTO PARTS #1430	TELEPHONE: 951-696-2491	DATE: 7-25-08
ADDRESS: 40951 CALIFORNIA OAKS Rd	CITY, ZIP: Murrieta 92562	
MAILING ADDRESS (if different from site address)	MAILING CITY, ZIP	
CONTACT: HENRY VERDUGO	FACILITY#: PR0023861	SIC CODE: 5999

Compliance Areas	YES	NO	N/A
***OUTSIDE AREAS (Free of staining & debris; provides good housekeeping; maintained in a manner to prevent runoff.)**		**Requires follow up**	
1. CHEMICAL STORAGE * The outside storage area is kept to minimize the possibility of a release. Chemicals / materials are protected from precipitation / storm water runoff and the containers show no signs of leaking.	✓		
2. DUMPSTER * No liquids are leaking from dumpster; surrounding area is free of trash.	✓		
3. ABOVEGROUND TANKS * No ground staining, no spill age observed and no discharge to storm drain. Tanks are maintained to minimize the possibility of a release (secondary containment).	✓		
4. ONSITE STORM DRAIN* Protected from accidental discharge other than water.	✓		
5. POWER WASH OR STEAM CLEAN* (discharge to se wer) Drains to oil/water separator connected to a sanitary sewer and not a septic system. Steam cleaning not discharged to parking lot, storm drain or soil.			✓
6. PARKING LOT / DRIVE WAY* Free of excess trash, chemical staining or liquids other than water.	✓		
7. OTHER* Non-storm water discharge (i.e. non-hazardous process discharge).			✓
8. MOP WATER TO SANITARY SEWER VIA CLARIFIER. Mop water is not dumped to the soil, parking lot, gutter, or other areas susceptible to storm water drainage.	✓		
9. STORM WATER EDUCATIONAL BROCHURES GIVEN TO FACILITY OR POSTERS DISPLAYED FOR EMPLOYEES. If no, what informational material should be sent to the facility?			✓
10. IF A SWPPP IS REQUIRED, WAS IT AVAILA BLE FOR REVIEW? See storm water handout for industrial facilities.			✓

OVERALL EVALUATION/ COMMENTS : NO VIOLATIONS AT THIS TIME

RECEIVED BY:	HAZ MAT SPEC: J. BUSTAMANTE	BADGE #

Agency referred to as indicated on the back of this page.

For additional information, please refer to our web site at www.floodcontrol.co.riverside.ca.us or contact the "Only Rain Down the Storm Drain" Pollution Prevention Program of the Cities and County of Riverside at (800) 506-2555.

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0003384

HAZARDOUS WASTE/ HAZARDOUS MATERIALS FACILITY STORM WATER COMPLIANCE SURVEY FORM

FACILITY DBA: CALIFORNIA OAKS GOLF COURSE	TELEPHONE	DATE: 7-9-08
ADDRESS: 40603 COLONY DR	CITY, ZIP: MURRIETA 92562	
MAILING ADDRESS (if different from site address)	MAILING CITY, ZIP	
CONTACT: TIM HUANG	FACILITY#: PR0021197	SIC CODE: 7999

Compliance Areas	YES	NO	N/A
***OUTSIDE AREAS (Free of staining & debris; provides good housekeeping; maintained in a manner to prevent runoff.)**		**Requires follow up**	
1. CHEMICAL STORAGE * The outside storage area is kept to minimize the possibility of a release. Chemicals / materials are protected from precipitation / storm water runoff and the containers show no signs of leaking.	✓		
2. DUMPSTER * No liquids are leaking from dumpster; surrounding area is free of trash.	✓		
3. ABOVEGROUND TANKS * No ground staining, no spillage observed and no discharge to storm drain. Tanks are maintained to minimize the possibility of a release (secondary containment).	✓		
4. ONSITE STORM DRAIN* Protected from accidental discharge other than water.			✓
5. POWER WASH OR STEAM CLEAN* (discharge to sewer) Drains to oil/water separator connected to a sanitary sewer and not a septic system. Steam cleaning not discharged to parking lot, storm drain or soil.			✓
6. PARKING LOT / DRIVE WAY* Free of excess trash, chemical staining or liquids other than water.	✓		✓
7. OTHER* Non-storm water discharge (i.e. non-hazardous process discharge).			✓
8. MOP WATER TO SANITARY SEWER VIA CLARIFIER. Mop water is not dumped to the soil, parking lot, gutter, or other areas susceptible to storm water drainage.	✓		
9. STORM WATER EDUCATIONAL BROCHURES GIVEN TO FACILITY OR POSTERS DISPLAYED FOR EMPLOYEES. If no, what informational material should be sent to the facility?	✓		
10. IF A SWPPP IS REQUIRED, WAS IT AVAILABLE FOR REVEIW? See storm water handout for industrial facilities.			✓

OVERALL EVALUATION/ COMMENTS: NO VIOLATIONS AT THIS TIME

RECEIVED BY:	HAZ MAT SPEC: J. BUSTAMANTE	BADGE #
Agency referred to as indicated on the back of this page.		

If additional information is required, contact the Storm Water /Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

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0003385

HAZARDOUS WASTE/ HAZARDOUS MATERIALS FACILITY STORM WATER COMPLIANCE SURVEY FORM

FACILITY DBA: CALIFORNIA OAKS CARWASH/QUICKLUBE	TELEPHONE: 951-696-5004	DATE: 7-2-08
ADDRESS: 40933 CAL OAKS Rd	CITY, ZIP: MURRIETA 92562	
MAILING ADDRESS (if different from site address)	MAILING CITY, ZIP	
CONTACT: DIANA JUAN	FACILITY#: PR0023067	SIC CODE: 7699

Compliance Areas	YES	NO	N/A
***OUTSIDE AREAS (Free of staining & debris; provides good housekeeping; maintained in a manner to prevent runoff.)**		**Requires follow up**	
1. CHEMICAL STORAGE * The outside storage area is kept to minimize the possibility of a release. Chemicals / materials are protected from precipitation / storm water runoff and the containers show no signs of leaking.		X	
2. DUMPSTER * No liquids are leaking from dumpster; surrounding area is free of trash.	✓		
3. ABOVEGROUND TANKS * No ground staining, no spillage observed and no discharge to storm drain. Tanks are maintained to minimize the possibility of a release (secondary containment).	✓		
4. ONSITE STORM DRAIN* Protected from accidental discharge other than water.			✓
5. POWER WASH OR STEAM CLEAN* (discharge to sewer) Drains to oil/water separator connected to a sanitary sewer and not a septic system. Steam cleaning not discharged to parking lot, storm drain or soil.	✓		
6. PARKING LOT / DRIVE WAY* Free of excess trash, chemical staining or liquids other than water.	✓		
7. OTHER* Non-storm water discharge (i.e. non-hazardous process discharge).	✓		
8. MOP WATER TO SANITARY SEWER VIA CLARIFIER. Mop water is not dumped to the soil, parking lot, gutter, or other areas susceptible to storm water drainage.	✓		
9. STORM WATER EDUCATIONAL BROCHURES GIVEN TO FACILITY OR POSTERS DISPLAYED FOR EMPLOYEES. If no, what informational material should be sent to the facility?	✓		
10. IF A SWPPP IS REQUIRED, WAS IT AVAILABLE FOR REVEIW? See storm water handout for industrial facilities.			✓

OVERALL EVALUATION/ COMMENTS: NO VIOLATIONS AT THIS TIME

RECEIVED BY:	HAZ MAT SPEC: J. BUSTAMANTE	BADGE #
Agency referred to as indicated on the back of this page.		

If additional information is required contact the Storm Water /Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

CITY OF MURRIETA
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Storm Water Clean Water PROTECTION PROGRAM

0003386

HAZARDOUS WASTE/ HAZARDOUS MATERIALS FACILITY STORM WATER COMPLIANCE SURVEY FORM

FACILITY DBA: INLAND TRUCKS	TELEPHONE: 951-461-4412	DATE: 7-1-08
ADDRESS: 26500 JEFFERSON AVE #A	CITY, ZIP: MURRIETA 92562	
MAILING ADDRESS (if different from site address)	MAILING CITY, ZIP	
CONTACT: DALON M. PORAN	FACILITY#: PR0022832	SIC CODE: 7699

Compliance Areas	YES	NO	N/A
***OUTSIDE AREAS (Free of staining & debris; provides good housekeeping; maintained in a manner to prevent runoff.)**		**Requires follow up**	
1. CHEMICAL STORAGE * The outside storage area is kept to minimize the possibility of a release. Chemicals / materials are protected from precipitation / storm water runoff and the containers show no signs of leaking.			✓
2. DUMPSTER * No liquids are leaking from dumpster; surrounding area is free of trash.	✓		
3. ABOVEGROUND TANKS * No ground staining, no spillage observed and no discharge to storm drain. Tanks are maintained to minimize the possibility of a release (secondary containment).	✓		
4. ONSITE STORM DRAIN* Protected from accidental discharge other than water.			✓
5. POWER WASH OR STEAM CLEAN* (discharge to sewer) Drains to oil/water separator connected to a sanitary sewer and not a septic system. Steam cleaning not discharged to parking lot, storm drain or soil.			✓
6. PARKING LOT / DRIVE WAY* Free of excess trash, chemical staining or liquids other than water.	✓		
7. OTHER* Non-storm water discharge (i.e. non-hazardous process discharge).			✓
8. MOP WATER TO SANITARY SEWER VIA CLARIFIER. Mop water is not dumped to the soil, parking lot, gutter, or other areas susceptible to storm water drainage.			✓
9. STORM WATER EDUCATIONAL BROCHURES GIVEN TO FACILITY OR POSTERS DISPLAYED FOR EMPLOYEES. If no, what informational material should be sent to the facility?			✓
10. IF A SWPPP IS REQUIRED, WAS IT AVAILABLE FOR REVEIW? See storm water handout for industrial facilities.			✓

OVERALL EVALUATION/ COMMENTS: NO VIOLATIONS AT THIS TIME

RECEIVED BY: [signature]	HAZ MAT SPEC: J. BUSTAMANTE	BADGE #

Agency referred to as indicated on the back of this page.

If additional information is required, contact the Storm Water /Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

CITY OF MURRIETA
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Storm Water Clean Water PROTECTION PROGRAM

0003387

FOOD FACILITY STORMWATER COMPLIANCE SURVEY

FACILITY DBA Sidelines	FACILITY # 4907	DATE 6/9/09	
ADDRESS 24910 Washington ave Murrieta Ca 92562	ACTIVITY 02	SERVICE CODE: 410	
COMPLIANCE AREAS	YES	NO	N/A
GREASE BARRELS/ INTERCEPTORS			
1. Grease pumped/removed on a regular basis.		✓	
2. Grease interceptor located outside facility, maintained properly.			
EQUIPMENT CLEANING			
3. The following items are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Grease filters			
b. Floor mats		✓	
c. Floors (mop water and rinse water)			
d. Grills			
OUTSIDE AREAS			
4. The following areas are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Sidewalk or outdoor seating			
b. Drive thru			
DUMPSTERS AND RECYCLING CONTAINERS			
5. Food waste bagged and sealed before disposal.			
6. Dumpsters and recycling containers are covered.			
7. Spilled materials around containers are picked up regularly.			
8. Wash water is discharged to the sanitary sewer or is collected for proper disposal.		✓	
EMPLOYEE EDUCATION/ AWARENESS			
9. Brochures or posters displayed.			
10. BMPs observed.			
OVERALL RATING	GOOD	AVERAGE	NEEDS IMPROVEMENT

COMMENTS: 1) Discontinue placing plastic 2-3 gallon containers outside with non approved weather resistant container 2) Clean floor mats inside facility, not outside 8) Discontinue cleaning floors, floor mats outside of facility.

Received by:	Env. Health Specialist: EHS II Enrique Rueda	Badge # 654

For additional information, please refer to our web site at www.floodcontrol.co.riverside.ca.us or contact the "Only Rain Down the Storm Drain" Pollution Prevention Program of the Cities and County of Riverside at (800) 506-2555.

CITY OF MURRIETA
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ONLY RAIN DOWN THE STORM DRAIN

0003388

FOOD FACILITY STORMWATER COMPLIANCE SURVEY

FACILITY DBA Sidelines	FACILITY # 4907	DATE 6/9/09	
ADDRESS 24910 Washington ave Murrieta Ca 92562	ACTIVITY 02	SERVICE CODE: 410	
COMPLIANCE AREAS	YES	NO	N/A
1. Grease pumped/removed on a regular basis.		✓	
2. Grease interceptor located outside facility, maintained properly.			
3. The following items are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Grease filters			
b. Floor mats		✓	
c. Floors (mop water and rinse water)			
d. Grills			
4. The following areas are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Sidewalk or outdoor seating			
b. Drive thru			
5. Food waste bagged and sealed before disposal.			
6. Dumpsters and recycling containers are covered.			
7. Spilled materials around containers are picked up regularly.			
8. Wash water is discharged to the sanitary sewer or is collected for proper disposal.		✓	
9. Brochures or posters displayed.			
10. BMPs observed.			
OVERALL RATING	GOOD	AVERAGE	NEEDS IMPROVEMENT

COMMENTS: 1) Discontinue placing plastic 2-3 gallon containers outside with non approved weather resistant containers 2) Clean floormats inside facility, not outside 8) Discontinue cleaning floors, floormats outside of facility.

Received by: [signature]	Env. Health Specialist: EHS II Enrique Rueda	Badge # 654

For additional information, please refer to our web site at www.floodcontrol.co.riverside.ca.us or contact the "Only Rain Down the Storm Drain" Pollution Prevention Program of the Cities and County of Riverside at (800) 506-2555.

ONLY RAIN DOWN THE STORM DRAIN

COUNTY OF RIVERSIDE
DEPARTMENT OF ENVIRONMENTAL HEALTH
DISTRICT ENVIRONMENTAL SERVICES DIVISION
38740 Sky Canyon Drive • Murrieta, CA 92563

Fax Transmittal

DATE:	6/10/09
TO:	Ingrid
FAX NUMBER:	~~Fax~~ office (951) 461-0284 ~~office~~ Fax (951) 461-0245
FROM:	☐ Bonnie Dierking ☐ Liliana Lizalde ☐ Dave Bishop ☐ Tyler Skrove ☐ Robert Hunt ☐ Stacy Anderson ☐ Kristen Burnham ☒ Enrique Rueda ☐ Jeff Bustamante ☐ Kelly Winters ☐ Lisa Davis ☐ Sheila Peralta Other:
SUBJECT OR MESSAGE:	Observed Stormwater Violations for Sidelines Bar.

If you received this transmittal in error, please contact our office at (951) 461-0284.

Total number of pages: 1

Department Web Site www.rivcoeh.org

0003390

FOOD FACILITY STORM WATER COMPLIANCE SURVEY

CITY OF MURRIETA

FACILITY DBA Sidelines	FACILITY # 4907	DATE 6/30/09
ADDRESS 24910 WASHINGTON AVE MURRIETA, CA. 92562	ACTIVITY 02	SIC CODE

COMPLIANCE AREAS	YES	NO	N/A
GREASE BARRELS/INTERCEPTORS			
1. Grease pumped/removed on a regular basis.	✓		
2. Grease interceptor located outside facility, maintained properly.			
EQUIPMENT CLEANING			
3. The following items are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Grease filters			
b. Floor mats	✓		
c. Floors (mop water and rinse water)			
d. Grills			
OUTSIDE AREAS			
4. The following areas are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Sidewalk or outdoor seating			
b. Drive thru			
DUMPSTERS AND RECYCLING CONTAINERS			
5. Food waste bagged and sealed before disposal.			
6. Dumpsters and recycling containers are covered.			
7. Spilled materials around containers are picked up regularly.			
8. Wash water is discharged to the sanitary sewer or is collected for proper disposal.	✓		
EMPLOYEE EDUCATION/AWARENESS			
9. Brochures or posters displayed.			
10. BMPs observed.			

OVERALL RATING	GOOD	AVERAGE	NEEDS IMPROVEMENT

COMMENTS: SITE HAS EXISTING SEPARATOR FOR CLEAN WATER INSTEAD DISCHARGE CLEANING WATER IN SEPARATOR. GREASE PUMPED ON REGULAR BASIS.

Received by: Donna L Harrison	Env. Health Specialist:	Badge #

0003391

FOOD FACILITY STORMWATER COMPLIANCE SURVEY

FACILITY DBA Dicks Sporting Goods 92563	FACILITY # PR#4 2451	DATE 5-26-09
ADDRESS 40404 Murrieta Hot Springs Murrieta	ACTIVITY 7601	SERVICE CODE: 410

COMPLIANCE AREAS	YES	NO	N/A
GREASE BARRELS/ INTERCEPTORS			
1. Grease pumped/removed on a regular basis.			✓
2. Grease interceptor located outside facility, maintained properly.			✓
EQUIPMENT CLEANING			
3. The following items are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Grease filters			✓
b. Floor mats			✓
c. Floors (mop water and rinse water)	✓		
d. Grills			✓
OUTSIDE AREAS			
4. The following areas are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Sidewalk or outdoor seating			✓
b. Drive thru			✓
DUMPSTERS AND RECYCLING CONTAINERS			
5. Food waste bagged and sealed before disposal.	✓		
6. Dumpsters and recycling containers are covered.	✓		
7. Spilled materials around containers are picked up regularly.	✓		
8. Wash water is discharged to the sanitary sewer or is collected for proper disposal.			✓
EMPLOYEE EDUCATION/ AWARENESS			
9. Brochures or posters displayed.	✓		
10. BMPs observed.			
OVERALL RATING	(GOOD)	AVERAGE	NEEDS IMPROVEMENT

COMMENTS: ensure trash bags are properly sealed before disposing any food items.

Received by:	Env. Health Specialist:	Badge # 4918

For additional information, please refer to our web site at www.floodcontrol.co.riverside.ca.us or contact the "Only Rain Down the Storm Drain" Pollution Prevention Program of the Cities and County of Riverside at (800) 506-2555.

ONLY RAIN DOWN THE STORM DRAIN

0003392

FOOD FACILITY STORMWATER COMPLIANCE SURVEY

FACILITY DBA Unique Pizza & Subs	FACILITY # 40796	DATE 4/8/09	
ADDRESS 25383 Madison Ave Murrieta Ca 92562	ACTIVITY 02	SERVICE CODE: 410	
COMPLIANCE AREAS	**YES**	**NO**	**N/A**
GREASE BARRELS/ INTERCEPTORS			
1. Grease pumped/removed on a regular basis.	✓		
2. Grease interceptor located outside facility, maintained properly.			✓
EQUIPMENT CLEANING			
3. The following items are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Grease filters	✓		
b. Floor mats	✓		
c. Floors (mop water and rinse water)	✓		
d. Grills			✓
OUTSIDE AREAS			
4. The following areas are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Sidewalk or outdoor seating			✓
b. Drive thru			✓
DUMPSTERS AND RECYCLING CONTAINERS			
5. Food waste bagged and sealed before disposal.	✓		
6. Dumpsters and recycling containers are covered.	✓		
7. Spilled materials around containers are picked up regularly.	✓		
8. Wash water is discharged to the sanitary sewer or is collected for proper disposal.	✓		
EMPLOYEE EDUCATION/ AWARENESS			
9. Brochures or posters displayed.	✓		
10. BMPs observed.	✓		
OVERALL RATING	(GOOD)	AVERAGE	NEEDS IMPROVEMENT

COMMENTS:

Received by:	Env. Health Specialist: E. Rueda	Badge # 654

For additional information, please refer to our web site at www.floodcontrol.co.riverside.ca.us or contact the "Only Rain Down the Storm Drain" Pollution Prevention Program of the Cities and County of Riverside at (800) 506-2555.

ONLY RAIN DOWN THE STORM DRAIN

0003393

FOOD FACILITY STORMWATER COMPLIANCE SURVEY

FACILITY DBA Pho Tho Vietnamese Restaurant	FACILITY # 40382	DATE 3-17-09	
ADDRESS 40250 Murrieta Hot Springs Rd, Murrieta	ACTIVITY 3620	SERVICE CODE: 410	
COMPLIANCE AREAS	**YES**	**NO**	**N/A**
GREASE BARRELS/ INTERCEPTORS			
1. Grease pumped/removed on a regular basis.	X		
2. Grease interceptor located outside facility, maintained properly.	X		
EQUIPMENT CLEANING			
3. The following items are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Grease filters	X		
b. Floor mats	X		
c. Floors (mop water and rinse water) mop H_2O outside. mop sink blocked		X	
d. Grills	X		
OUTSIDE AREAS			
4. The following areas are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Sidewalk or outdoor seating	X		
b. Drive thru			X
DUMPSTERS AND RECYCLING CONTAINERS			
5. Food waste bagged and sealed before disposal.	X		
6. Dumpsters and recycling containers are covered.	X		
7. Spilled materials around containers are picked up regularly.	X		
8. Wash water is discharged to the sanitary sewer or is collected for proper disposal.	X		
EMPEOYEE EDUCATION/ AWARENESS			
9. Brochures or posters displayed.	X		
10. BMPs observed.	X		
OVERALL RATING	GOOD	AVERAGE	NEEDS IMPROVEMENT

COMMENTS:

Received by:	Env. Health Specialist:	Badge # 218476

For additional information, please refer to our web site at www.floodcontrol.co.riverside.ca.us or contact the "Only Rain Down the Storm Drain" Pollution Prevention Program of the Cities and County of Riverside at (800) 506-2555.

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0003394

FOOD FACILITY STORM WATER COMPLIANCE SURVEY

CITY OF MURRIETA

FACILITY DBA	FACILITY #	DATE
Pho Tho Vietnamese Rest.	40362	6-30-09
ADDRESS	ACTIVITY	SIC CODE
	3620	

COMPLIANCE AREAS	YES	NO	N/A
GREASE BARRELS/INTERCEPTORS			
1. Grease pumped/removed on a regular basis.			
2. Grease interceptor located outside facility, maintained properly.			
EQUIPMENT CLEANING			
3. The following items are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Grease filters			
b. Floor mats			
c. Floors (mop water and rinse water)	✓		
d. Grills			
OUTSIDE AREAS			
4. The following areas are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Sidewalk or outdoor seating			
b. Drive thru			
DUMPSTERS AND RECYCLING CONTAINERS			
5. Food waste bagged and sealed before disposal.			
6. Dumpsters and recycling containers are covered.			
7. Spilled materials around containers are picked up regularly.			
8. Wash water is discharged to the sanitary sewer or is collected for proper disposal.			
EMPLOYEE EDUCATION/AWARENESS			
9. Brochures or posters displayed.			
10. BMPs observed.			

OVERALL RATING	GOOD	AVERAGE	NEEDS IMPROVEMENT

COMMENTS: Mat Conditions:

Received by:	Env. Health Specialist:	Badge #

0003395

FOOD FACILITY STORMWATER COMPLIANCE SURVEY

FACILITY DBA Baja Grill	PR# FACILITY # 37759	DATE 2-18-09	
ADDRESS 40663 Murrieta Hot Springs Murrieta 92562	ACTIVITY 3620	SERVICE CODE: 410	
COMPLIANCE AREAS	YES	NO	N/A
GREASE BARRELS/ INTERCEPTORS			
1. Grease pumped/removed on a regular basis.			✓
2. Grease interceptor located outside facility, maintained properly.			✓
EQUIPMENT CLEANING			
3. The following items are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Grease filters			✓
b. Floor mats	✓		
c. Floors (mop water and rinse water)	✓		
d. Grills			✓
OUTSIDE AREAS			
4. The following areas are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Sidewalk or outdoor seating	✓		
b. Drive thru			✓
DUMPSTERS AND RECYCLING CONTAINERS			
5. Food waste bagged and sealed before disposal.	✓		
6. Dumpsters and recycling containers are covered.	✓		
7. Spilled materials around containers are picked up regularly.	✓		
8. Wash water is discharged to the sanitary sewer or is collected for proper disposal.	✓		
EMPLOYEE EDUCATION/ AWARENESS			
9. Brochures or posters displayed.	✓		
10. BMPs observed.			
OVERALL RATING	(GOOD)	AVERAGE	NEEDS IMPROVEMENT

COMMENTS:

Received by: [signature]	Env. Health Specialist: L. Giraldi	Badge # 9318

If additional information is required, contact the Storm Water/Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

mw 9/01

0003396

FOOD FACILITY STORMWATER COMPLIANCE SURVEY

FACILITY DBA Little Caesar's Pizza	FACILITY # 39802	DATE 1-29-09	
ADDRESS 39209 Winchester Rd #103, Murrieta	ACTIVITY 3620	SERVICE CODE: 410	
COMPLIANCE AREAS	**YES**	**NO**	**N/A**
GREASE BARRELS/ INTERCEPTORS			
1. Grease pumped/removed on a regular basis.			✓
2. Grease interceptor located outside facility, maintained properly.			✓
EQUIPMENT CLEANING			
3. The following items are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Grease filters			✓
b. Floor mats	✓		
c. Floors (mop water and rinse water)	✓		
d. Grills			✓
OUTSIDE AREAS			
4. The following areas are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Sidewalk or outdoor seating			✓
b. Drive thru			✓
DUMPSTERS AND RECYCLING CONTAINERS			
5. Food waste bagged and sealed before disposal.	✓		
6. Dumpsters and recycling containers are covered.		✓	
7. Spilled materials around containers are picked up regularly.			✓
8. Wash water is discharged to the sanitary sewer or is collected for proper disposal.			✓
EMPLOYEE EDUCATION/ AWARENESS			
9. Brochures or posters displayed.	✓		
10. BMPs observed.	✓		
OVERALL RATING	GOOD	AVERAGE	NEEDS IMPROVEMENT

COMMENTS: Cover dumpster with lids

Received by: Erika Torres	Env. Health Specialist: J. Peralta	Badge # 396

For additional information, please refer to our web site at www.floodcontrol.co.riverside.ca.us or contact the "Only Rain Down the Storm Drain" Pollution Prevention Program of the Cities and County of Riverside at (800) 506-2555.

ONLY RAIN DOWN THE STORM DRAIN

FOOD FACILITY STORM WATER COMPLIANCE SURVEY

CITY OF MURRIETA

FACILITY DBA	FACILITY #	DATE
Little Caesars Pizza	39802	6-30-09
ADDRESS	ACTIVITY	SIC CODE
39209 Winchester Rd Suite #103 Murrieta Ca. 92562	3620	

COMPLIANCE AREAS	YES	NO	N/A
GREASE BARRELS/INTERCEPTORS			
1. Grease pumped/removed on a regular basis.			
2. Grease interceptor located outside facility, maintained properly.			
EQUIPMENT CLEANING			
3. The following items are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Grease filters			
b. Floor mats			
c. Floors (mop water and rinse water)			
d. Grills			
OUTSIDE AREAS			
4. The following areas are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Sidewalk or outdoor seating			
b. Drive thru			
DUMPSTERS AND RECYCLING CONTAINERS			
5. Food waste bagged and sealed before disposal.			
6. Dumpsters and recycling containers are covered.	✓		
7. Spilled materials around containers are picked up regularly.			
8. Wash water is discharged to the sanitary sewer or is collected for proper disposal.			
EMPLOYEE EDUCATION/AWARENESS			
9. Brochures or posters displayed.			
10. BMPs observed.			

OVERALL RATING	GOOD	AVERAGE	NEEDS IMPROVEMENT

COMMENTS: Dumpsters are covered w/ lids.

Received by:	Env. Health Specialist:	Badge #
Erika Torres		

0003398

FOOD FACILITY STORMWATER COMPLIANCE SURVEY

FACILITY DBA White Lime Yogurt	FACILITY # 39925	DATE 1-28-09	
ADDRESS 39540 Murrieta Hot Springs, Murrieta	ACTIVITY 2020	SERVICE CODE: 410	
COMPLIANCE AREAS	YES	NO	N/A
GREASE BARRELS/ INTERCEPTORS			
1. Grease pumped/removed on a regular basis.			✓
2. Grease interceptor located outside facility, maintained properly.			✓
EQUIPMENT CLEANING			
3. The following items are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Grease filters			✓
b. Floor mats			✓
c. Floors (mop water and rinse water)	✓		
d. Grills			✓
OUTSIDE AREAS			
4. The following areas are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Sidewalk or outdoor seating			✓
b. Drive thru			✓
DUMPSTERS AND RECYCLING CONTAINERS			
5. Food waste bagged and sealed before disposal.	✓		
6. Dumpsters and recycling containers are covered.	✓		
7. Spilled materials around containers are picked up regularly.			✓
8. Wash water is discharged to the sanitary sewer or is collected for proper disposal.			✓
EMPLOYEE EDUCATION/ AWARENESS			
9. Brochures or posters displayed.	✓		
10. BMPs observed.			
OVERALL RATING	GOOD	AVERAGE	NEEDS IMPROVEMENT

COMMENTS:

Received by:	Env. Health Specialist: S. Perales	Badge # 516

For additional information, please refer to our web site at www.floodcontrol.co.riverside.ca.us or contact the "Only Rain Down the Storm Drain" Pollution Prevention Program of the Cities and County of Riverside at (800) 506-2555.

ONLY RAIN... DOWN THE STORM DRAIN

0003399

FOOD FACILITY STORMWATER COMPLIANCE SURVEY

FACILITY DBA Office Depot	FACILITY # 39917	DATE 1-23-09
ADDRESS 24500 Village Walk Wdy Murrieta 92562	ACTIVITY 1601-02	SERVICE CODE: 410

COMPLIANCE AREAS	YES	NO	N/A
GREASE BARRELS/ INTERCEPTORS			
1. Grease pumped/removed on a regular basis.			✓
2. Grease interceptor located outside facility, maintained properly.			✓
EQUIPMENT CLEANING			
3. The following items are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Grease filters			✓
b. Floor mats		✓	
c. Floors (mop water and rinse water)	✓		
d. Grills			✓
OUTSIDE AREAS			
4. The following areas are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Sidewalk or outdoor seating			✓
b. Drive thru			✓
DUMPSTERS AND RECYCLING CONTAINERS			
5. Food waste bagged and sealed before disposal.	✓		
6. Dumpsters and recycling containers are covered.	✓		
7. Spilled materials around containers are picked up regularly.	✓		
8. Wash water is discharged to the sanitary sewer or is collected for proper disposal.	✓		
EMPLOYEE EDUCATION/ AWARENESS			
9. Brochures or posters displayed.	✓		
10. BMPs observed.			
OVERALL RATING	GOOD	AVERAGE	NEEDS IMPROVEMENT

COMMENTS:

Received by:	Env. Health Specialist:	Badge # 9218

If additional information is required, contact the Storm Water/Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

mw 9/01

0003400

FOOD FACILITY STORMWATER COMPLIANCE SURVEY

FACILITY DBA Office Depot	FACILITY # 39917	DATE 1-23-09
ADDRESS 24500 Village Walk Wy Murrieta 92562	ACTIVITY 1601-02	SERVICE CODE: 410

COMPLIANCE AREAS	YES	NO	N/A
GREASE BARRELS/ INTERCEPTORS			
1. Grease pumped/removed on a regular basis.			✓
2. Grease interceptor located outside facility, maintained properly.			✓
EQUIPMENT CLEANING			
3. The following items are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Grease filters			✓
b. Floor mats		✓	
c. Floors (mop water and rinse water)	✓		
d. Grills			✓
OUTSIDE AREAS			
4. The following areas are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Sidewalk or outdoor seating			✓
b. Drive thru			✓
DUMPSTERS AND RECYCLING CONTAINERS			
5. Food waste bagged and sealed before disposal.	✓		
6. Dumpsters and recycling containers are covered.	✓		
7. Spilled materials around containers are picked up regularly.	✓		
8. Wash water is discharged to the sanitary sewer or is collected for proper disposal.	✓		
EMPLOYEE EDUCATION/ AWARENESS			
9. Brochures or posters displayed.	✓		
10. BMPs observed.			
OVERALL RATING	GOOD	AVERAGE	NEEDS IMPROVEMENT

COMMENTS: This is not a Food Service Facility. Mats are cleaned by a service that removes from site & replaces clean.

Received by:	Env. Health Specialist:	Badge # 4218

If additional information is required, contact the Storm Water/Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

mw 9/01

FOOD FACILITY STORM WATER COMPLIANCE SURVEY

CITY OF MURRIETA

FACILITY DBA	FACILITY #	DATE
OFFICE DEPOT	39917	6-30-09
ADDRESS	ACTIVITY	SIC CODE
24500 Village Walk Murrieta, CA. 92562	1601-02	

COMPLIANCE AREAS	YES	NO	N/A
GREASE BARRELS/INTERCEPTORS			
1. Grease pumped/removed on a regular basis.			
2. Grease interceptor located outside facility, maintained properly.			
EQUIPMENT CLEANING			
3. The following items are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Grease filters			
b. Floor mats	✓		
c. Floors (mop water and rinse water)			
d. Grills			
OUTSIDE AREAS			
4. The following areas are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Sidewalk or outdoor seating			
b. Drive thru			
DUMPSTERS AND RECYCLING CONTAINERS			
5. Food waste bagged and sealed before disposal.			
6. Dumpsters and recycling containers are covered.			
7. Spilled materials around containers are picked up regularly.			
8. Wash water is discharged to the sanitary sewer or is collected for proper disposal.			
EMPLOYEE EDUCATION/AWARENESS			
9. Brochures or posters displayed.			
10. BMPs observed.			

OVERALL RATING	GOOD	AVERAGE	NEEDS IMPROVEMENT

COMMENTS: This is not a Food Service Facility. Floor Mats are Removed from Sink & Returned Clean.

Received by:	Env. Health Specialist:	Badge #

0003402

FOOD FACILITY STORMWATER COMPLIANCE SURVEY

FACILITY DBA Tacos Durango	FACILITY # 39494	DATE 1-21-09	
ADDRESS 41539 Kalmia St. #105 Murrieta	ACTIVITY 360-02	SERVICE CODE: 410	
COMPLIANCE AREAS	**YES**	**NO**	**N/A**
GREASE BARRELS/ INTERCEPTORS			
1. Grease pumped/removed on a regular basis.	✓		
2. Grease interceptor located outside facility, maintained properly.	✓		
EQUIPMENT CLEANING			
3. The following items are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Grease filters	✓		
b. Floor mats		✓	
c. Floors (mop water and rinse water)	✓		
d. Grills	✓		
OUTSIDE AREAS			
4. The following areas are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Sidewalk or outdoor seating	✓		
b. Drive thru			✓
DUMPSTERS AND RECYCLING CONTAINERS			
5. Food waste bagged and sealed before disposal.	✓		
6. Dumpsters and recycling containers are covered.	✓		
7. Spilled materials around containers are picked up regularly.	✓		
8. Wash water is discharged to the sanitary sewer or is collected for proper disposal.	✓		
EMPLOYEE EDUCATION/ AWARENESS			
9. Brochures or posters displayed.	✓		
10. BMPs observed.			
OVERALL RATING	GOOD	AVERAGE	NEEDS IMPROVEMENT

COMMENTS:

Received by: Maria Morales | Env. Health Specialist: [signature] | Badge # 4218

If additional information is required, contact the Storm Water/Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

mw 9/01

FOOD FACILITY STORM WATER COMPLIANCE SURVEY

CITY OF MURRIETA

FACILITY DBA	FACILITY #	DATE
TACOS DURANGO	39494	6-30-09
ADDRESS: 41539 KALMIA ST. #105 MURRIETA, CA. 92562	ACTIVITY: 3620-02	SIC CODE

COMPLIANCE AREAS	YES	NO	N/A
GREASE BARRELS/INTERCEPTORS			
1. Grease pumped/removed on a regular basis.			
2. Grease interceptor located outside facility, maintained properly.			
EQUIPMENT CLEANING			
3. The following items are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Grease filters			
b. Floor mats	✓		
c. Floors (mop water and rinse water)			
d. Grills			
OUTSIDE AREAS			
4. The following areas are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Sidewalk or outdoor seating			
b. Drive thru			
DUMPSTERS AND RECYCLING CONTAINERS			
5. Food waste bagged and sealed before disposal.			
6. Dumpsters and recycling containers are covered.			
7. Spilled materials around containers are picked up regularly.			
8. Wash water is discharged to the sanitary sewer or is collected for proper disposal.			
EMPLOYEE EDUCATION/AWARENESS			
9. Brochures or posters displayed.			
10. BMPs observed.			
OVERALL RATING	GOOD	AVERAGE	NEEDS IMPROVEMENT

COMMENTS: MATS AND CLEANING INSIDE OF FACILITY.

Received by:	Env. Health Specialist:	Badge #
Maria Morales		

0003404

FOOD FACILITY STORMWATER COMPLIANCE SURVEY

FACILITY DBA Chick-Fil-A	FACILITY # 9472	DATE 1/15/08	
ADDRESS 24794 Madison Ave Murrieta Ca 92562	ACTIVITY 02	SERVICE CODE: 410	
COMPLIANCE AREAS	**YES**	**NO**	**N/A**
GREASE BARRELS/ INTERCEPTORS			
1. Grease pumped/removed on a regular basis.	✓		
2. Grease interceptor located outside facility, maintained properly.	✓		
EQUIPMENT CLEANING			
3. The following items are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Grease filters	✓		
b. Floor mats	✓		
c. Floors (mop water and rinse water)	✓		
d. Grills	✓		
OUTSIDE AREAS			
4. The following areas are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Sidewalk or outdoor seating	✓		
b. Drive thru	✓		
DUMPSTERS AND RECYCLING CONTAINERS			
5. Food waste bagged and sealed before disposal.	✓		
6. Dumpsters and recycling containers are covered.	✓		
7. Spilled materials around containers are picked up regularly.	✓		
8. Wash water is discharged to the sanitary sewer or is collected for proper disposal.	✓		
EMPLOYEE EDUCATION/ AWARENESS			
9. Brochures or posters displayed.	✓		
10. BMPs observed.	✓		
OVERALL RATING	GOOD	AVERAGE	NEEDS IMPROVEMENT

COMMENTS:

Received by:	Env. Health Specialist: EHS II E. Rueda	Badge # 654

For additional information, please refer to our web site at www.floodcontrol.co.riverside.ca.us or contact the "Only Rain Down the Storm Drain" Pollution Prevention Program of the Cities and County of Riverside at (800) 506-2555.

...ONLY RAIN... DOWN THE STORM DRAIN

0003405

FOOD FACILITY STORMWATER COMPLIANCE SURVEY

FACILITY DBA Catch of the Day Seafood Grill	FACILITY # 39593	DATE 1-13-09	
ADDRESS 40365 Murrieta Hot Springs Rd Murrieta 92563	ACTIVITY 3621	SERVICE CODE: 410	
COMPLIANCE AREAS	**YES**	**NO**	**N/A**
GREASE BARRELS/ INTERCEPTORS			
1. Grease pumped/removed on a regular basis.	✓		
2. Grease interceptor located outside facility, maintained properly.	✓		
EQUIPMENT CLEANING			
3. The following items are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Grease filters	✓		
b. Floor mats	✓		
c. Floors (mop water and rinse water)	✓		
d. Grills			✓
OUTSIDE AREAS			
4. The following areas are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Sidewalk or outdoor seating	✓		
b. Drive thru			✓
DUMPSTERS AND RECYCLING CONTAINERS			
5. Food waste bagged and sealed before disposal.	✓		
6. Dumpsters and recycling containers are covered.	✓		
7. Spilled materials around containers are picked up regularly.			✓
8. Wash water is discharged to the sanitary sewer or is collected for proper disposal.			✓
EMPLOYEE EDUCATION/ AWARENESS			
9. Brochures or posters displayed.			
10. BMPs observed.			
OVERALL RATING	GOOD	AVERAGE	NEEDS IMPROVEMENT
COMMENTS:			
Received by:	Env. Health Specialist: S. Peralta		Badge # 376

For additional information, please refer to our web site at www.floodcontrol.co.riverside.ca.us or contact the "Only Rain Down the Storm Drain" Pollution Prevention Program of the Cities and County of Riverside at (800) 506-2555.

...ONLY RAIN... DOWN THE STORM DRAIN

0003406

FOOD FACILITY STORMWATER COMPLIANCE SURVEY

FACILITY DBA Cookies Cafe (Submakers)	FACILITY # 7973	DATE 7-12-09	
ADDRESS 25030 Hancock Ave #100 Murr 92562	ACTIVITY 26,20-02	SERVICE CODE: 410	
COMPLIANCE AREAS	**YES**	**NO**	**N/A**
GREASE BARRELS/ INTERCEPTORS			
1. Grease pumped/removed on a regular basis.			✓
2. Grease interceptor located outside facility, maintained properly.			✓
EQUIPMENT CLEANING			
3. The following items are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Grease filters			✓
b. Floor mats	✓		
c. Floors (mop water and rinse water)	✓		
d. Grills			✓
OUTSIDE AREAS			
4. The following areas are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Sidewalk or outdoor seating			✓
b. Drive thru			✓
DUMPSTERS AND RECYCLING CONTAINERS			
5. Food waste bagged and sealed before disposal.	✓		
6. Dumpsters and recycling containers are covered.	✓		
7. Spilled materials around containers are picked up regularly.	✓		
8. Wash water is discharged to the sanitary sewer or is collected for proper disposal.	✓		
EMPLOYEE EDUCATION/ AWARENESS			
9. Brochures or posters displayed.	✓		
10. BMPs observed.			
OVERALL RATING	GOOD	AVERAGE	NEEDS IMPROVEMENT

COMMENTS:

Received by: Melody Rodriguez	Env. Health Specialist: L. Wade	Badge # 4218

If additional information is required, contact the Storm Water/Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

mw 9/01

0003407

FOOD FACILITY STORMWATER COMPLIANCE SURVEY

FACILITY DBA Sushi Tomi (Golden Phoenix)	FACILITY # 3813	DATE 1-12-09	
ADDRESS 25100 Hancock Ave. Murrieta	ACTIVITY 3620-02	SERVICE CODE: 410	
COMPLIANCE AREAS	**YES**	**NO**	**N/A**
GREASE BARRELS/ INTERCEPTORS			
1. Grease pumped/removed on a regular basis.	✓		
2. Grease interceptor located outside facility, maintained properly.	✓		
EQUIPMENT CLEANING			
3. The following items are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Grease filters	✓		
b. Floor mats		✓	
c. Floors (mop water and rinse water)	✓		
d. Grills	✓		
OUTSIDE AREAS			
4. The following areas are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Sidewalk or outdoor seating			✓
b. Drive thru			✓
DUMPSTERS AND RECYCLING CONTAINERS			
5. Food waste bagged and sealed before disposal.	✓		
6. Dumpsters and recycling containers are covered.	✓		
7. Spilled materials around containers are picked up regularly.	✓		
8. Wash water is discharged to the sanitary sewer or is collected for proper disposal.			
EMPLOYEE EDUCATION/ AWARENESS			
9. Brochures or posters displayed.	✓		
10. BMPs observed.			
OVERALL RATING	GOOD	AVERAGE (circled)	NEEDS IMPROVEMENT

COMMENTS: Discontinue washing floor mats in 3 compartment sink. Cover dumpster when trash inside.

Received by: [signature]	Env. Health Specialist: L. Lizalde	Badge # 4218

If additional information is required, contact the Storm Water/Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

mw 9/01

FOOD FACILITY STORM WATER COMPLIANCE SURVEY

CITY OF MURRIETA

FACILITY DBA	FACILITY #	DATE
Sushi Tokki	3813	6-30-09
ADDRESS	ACTIVITY	SIC CODE
25900 Hancock	3620-02	

COMPLIANCE AREAS	YES	NO	N/A
GREASE BARRELS/INTERCEPTORS			
1. Grease pumped/removed on a regular basis.			
2. Grease interceptor located outside facility, maintained properly.			
EQUIPMENT CLEANING			
3. The following items are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Grease filters			
b. Floor mats	✓		
c. Floors (mop water and rinse water)			
d. Grills			
OUTSIDE AREAS			
4. The following areas are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Sidewalk or outdoor seating			
b. Drive thru			
DUMPSTERS AND RECYCLING CONTAINERS			
5. Food waste bagged and sealed before disposal.			
6. Dumpsters and recycling containers are covered.			
7. Spilled materials around containers are picked up regularly.			
8. Wash water is discharged to the sanitary sewer or is collected for proper disposal.			
EMPLOYEE EDUCATION/AWARENESS			
9. Brochures or posters displayed.			
10. BMPs observed.			
OVERALL RATING	GOOD	AVERAGE	NEEDS IMPROVEMENT

COMMENTS: No Floor Mats

Received by:	Env. Health Specialist:	Badge #

0003409

FOOD FACILITY STORMWATER COMPLIANCE SURVEY

FACILITY DBA Murrieta Home Brew Emporium	FACILITY # 395667	DATE 12.23.08	
ADDRESS 38750 Sky Canyon Dr. Murrieta 92563	ACTIVITY 1601	SERVICE CODE: 410	
COMPLIANCE AREAS	**YES**	**NO**	**N/A**
GREASE BARRELS/ INTERCEPTORS			
1. Grease pumped/removed on a regular basis.			✓
2. Grease interceptor located outside facility, maintained properly.			✓
EQUIPMENT CLEANING			
3. The following items are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Grease filters			✓
b. Floor mats			✓
c. Floors (mop water and rinse water)			✓
d. Grills			✓
OUTSIDE AREAS			
4. The following areas are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Sidewalk or outdoor seating			✓
b. Drive thru			✓
DUMPSTERS AND RECYCLING CONTAINERS			
5. Food waste bagged and sealed before disposal.	✓		
6. Dumpsters and recycling containers are covered.	✓		
7. Spilled materials around containers are picked up regularly.			✓
8. Wash water is discharged to the sanitary sewer or is collected for proper disposal.			✓
EMPLOYEE EDUCATION/ AWARENESS			
9. Brochures or posters displayed.	✓		
10. BMPs observed.	✓		
OVERALL RATING	GOOD	AVERAGE	NEEDS IMPROVEMENT

COMMENTS:

Received by: Jim Fenty	Env. Health Specialist: S. Peralta/S. Anderson	Badge # 396

If additional information is required, contact the Storm Water/Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

StormWater CleanWater PROTECTION PROGRAM

mw 9/01

0003410

FOOD FACILITY STORMWATER COMPLIANCE SURVEY

FACILITY DBA Dudley's Wine & Gifts	FACILITY # 38302	DATE 12-5-08	
ADDRESS 40675 Murrieta Hot Springs Rd 92562 Murr.	ACTIVITY 02	SERVICE CODE: 410	
COMPLIANCE AREAS	**YES**	**NO**	**N/A**
GREASE BARRELS/ INTERCEPTORS			
1. Grease pumped/removed on a regular basis.			✓
2. Grease interceptor located outside facility, maintained properly.			✓
EQUIPMENT CLEANING			
3. The following items are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Grease filters			✓
b. Floor mats			✓
c. Floors (mop water and rinse water)	✓		
d. Grills			✓
OUTSIDE AREAS			
4. The following areas are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Sidewalk or outdoor seating			✓
b. Drive thru			✓
DUMPSTERS AND RECYCLING CONTAINERS			
5. Food waste bagged and sealed before disposal.	✓		
6. Dumpsters and recycling containers are covered.	✓		
7. Spilled materials around containers are picked up regularly.	✓		
8. Wash water is discharged to the sanitary sewer or is collected for proper disposal.	✓		
EMPLOYEE EDUCATION/ AWARENESS			
9. Brochures or posters displayed.	✓		
10. BMPs observed.			✓
OVERALL RATING	GOOD	AVERAGE	NEEDS IMPROVEMENT

COMMENTS:

Received by:	Env. Health Specialist:	Badge #

If additional information is required, contact the Storm Water/Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

mw 9/01

0003411

FOOD FACILITY STORMWATER COMPLIANCE SURVEY

FACILITY DBA Hudrieta Elementary Sch	FACILITY# 4310	DATE 12/03/08 ±	
ADDRESS 24725 Adams Ave Muriel	ACTIVITY 2628	SERVICE CODE: 410	
COMPLIANCE AREAS	YES	NO	N/A
GREASE BARRELS/ INTERCEPTORS			
1. Grease pumped/removed on a regular basis.			✓
2. Grease interceptor located outside facility, maintained properly.			✓
EQUIPMENT CLEANING			
3. The following items are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Grease filters	✓		
b. Floor mats			✓
c. Floors (mop water and rinse water)	✓		
d. Grills			✓
OUTSIDE AREAS			
4. The following areas are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Sidewalk or outdoor seating	✓		
b. Drive thru			✓
DUMPSTERS AND RECYCLING CONTAINERS			
5. Food waste bagged and sealed before disposal.	✓		
6. Dumpsters and recycling containers are covered.	✓		
7. Spilled materials around containers are picked up regularly.	✓		
8. Wash water is discharged to the sanitary sewer or is collected for proper disposal.	✓		
EMPLOYEE EDUCATION/ AWARENESS			
9. Brochures or posters displayed.	✓		
10. BMPs observed.			
OVERALL RATING	GOOD	AVERAGE	NEEDS IMPROVEMENT

COMMENTS:

Print: Christine LeRoy

Received by: Christine LeRoy | Env. Health Specialist: D. Bishop | Badge #: 64

For additional information, please refer to our web site at www.floodcontrol.co.riverside.ca.us or contact the "Only Rain Down the Storm Drain" Pollution Prevention Program of the Cities and County of Riverside at (800) 506-2555.

ONLY RAIN DOWN THE STORM DRAIN

0003412

FOOD FACILITY STORMWATER COMPLIANCE SURVEY

FACILITY DBA Shivela Middle School	FACILITY # 1255	DATE 12/03/08	
ADDRESS 24515 Lincoln Ave Moreno	ACTIVITY 2628	SERVICE CODE 410	
COMPLIANCE AREAS	YES	NO	N/A
GREASE BARRELS/ INTERCEPTORS			
1. Grease pumped/removed on a regular basis.	✓		
2. Grease interceptor located outside facility, maintained properly.	✓		
EQUIPMENT CLEANING			
3. The following items are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Grease filters	✓		
b. Floor mats	✓		
c. Floors (mop water and rinse water)	✓		
d. Grills			✓
OUTSIDE AREAS			
4. The following areas are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Sidewalk or outdoor seating	✓		
b. Drive thru			✓
DUMPSTERS AND RECYCLING CONTAINERS			
5. Food waste bagged and sealed before disposal.	✓		
6. Dumpsters and recycling containers are covered.	✓		
7. Spilled materials around containers are picked up regularly.	✓		
8. Wash water is discharged to the sanitary sewer or is collected for proper disposal.	✓		
EMPLOYEE EDUCATION/ AWARENESS			
9. Brochures or posters displayed.	✓		
10. BMPs observed.			
OVERALL RATING	(GOOD)	AVERAGE	NEEDS IMPROVEMENT

COMMENTS:

Print: Vivian Martin

Received by: Vivian Martin	Env. Health Specialist: D. Bishop	Badge # 74

For additional information, please refer to our web site at www.floodcontrol.co.riverside.ca.us or contact the "Only Rain Down the Storm Drain" Pollution Prevention Program of the Cities and County of Riverside at (800) 506-2555.

ONLY RAIN DOWN THE STORM DRAIN

0003413

FOOD FACILITY STORMWATER COMPLIANCE SURVEY

FACILITY DBA Alamos Elementary	FACILITY # 8461	DATE 12/2/08	
ADDRESS 38200 Pacific Park Murr	ACTIVITY 2628	SERVICE CODE: 410	
COMPLIANCE AREAS	**YES**	**NO**	**N/A**
GREASE BARRELS/ INTERCEPTORS			
1. Grease pumped/removed on a regular basis.			✓
2. Grease interceptor located outside facility, maintained properly.			✓
EQUIPMENT CLEANING			
3. The following items are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Grease filters	✓		
b. Floor mats			✓
c. Floors (mop water and rinse water)	✓		
d. Grills			✓
OUTSIDE AREAS			
4. The following areas are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Sidewalk or outdoor seating	✓		
b. Drive thru			✓
DUMPSTERS AND RECYCLING CONTAINERS			
5. Food waste bagged and sealed before disposal.	✓		
6. Dumpsters and recycling containers are covered.	✓		
7. Spilled materials around containers are picked up regularly.	✓		
8. Wash water is discharged to the sanitary sewer or is collected for proper disposal.	✓		
EMPLOYEE EDUCATION/ AWARENESS			
9. Brochures or posters displayed.	✓		
10. BMPs observed.			
OVERALL RATING	(GOOD)	AVERAGE	NEEDS IMPROVEMENT

COMMENTS:

Print SUSAN TARIN

Received by: Susan Tarin | Env. Health Specialist: D. Bishop | Badge #: 72

For additional information, please refer to our web site at www.floodcontrol.co.riverside.ca.us or contact the "Only Rain Down the Storm Drain" Pollution Prevention Program of the Cities and County of Riverside at (800) 506-2555.

...ONLY RAIN... DOWN THE STORM DRAIN

0003414

FOOD FACILITY STORMWATER COMPLIANCE SURVEY

FACILITY DBA Bella Vista Middle School	FACILITY# 8470	DATE 12/2/08	
ADDRESS 31650 Browning St. Menifee	ACTIVITY 2678	SERVICE CODE: 410	
COMPLIANCE AREAS	**YES**	**NO**	**N/A**
GREASE BARRELS/ INTERCEPTORS			
1. Grease pumped/removed on a regular basis.			✓
2. Grease interceptor located outside facility, maintained properly.			✓
EQUIPMENT CLEANING			
3. The following items are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Grease filters	✓		
b. Floor mats			✓
c. Floors (mop water and rinse water)	✓		
d. Grills			✓
OUTSIDE AREAS			
4. The following areas are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Sidewalk or outdoor seating	✓		
b. Drive thru			✓
DUMPSTERS AND RECYCLING CONTAINERS			
5. Food waste bagged and sealed before disposal.	✓		
6. Dumpsters and recycling containers are covered.	✓		
7. Spilled materials around containers are picked up regularly.	✓		
8. Wash water is discharged to the sanitary sewer or is collected for proper disposal.	✓		
EMPLOYEE EDUCATION/ AWARENESS			
9. Brochures or posters displayed.	✓		
10. BMPs observed.			
OVERALL RATING	GOOD	AVERAGE	NEEDS IMPROVEMENT

COMMENTS:

Print: JO Austin

Received by: Jo Austin | Env. Health Specialist: D C Bishop | Badge #: 174

For additional information, please refer to our web site at www.floodcontrol.co.riverside.ca.us or contact the "Only Rain Down the Storm Drain" Pollution Prevention Program of the Cities and County of Riverside at (800) 506-2555.

...ONLY RAIN... DOWN THE STORM DRAIN

0003415

FOOD FACILITY STORMWATER COMPLIANCE SURVEY

FACILITY DBA: Pelas Vly Elementary	FACILITY #: 5274	DATE: 12/2/08	
ADDRESS: 39600 N. General Kearney, Murrieta	ACTIVITY: 2628	SERVICE CODE: 410	
COMPLIANCE AREAS	**YES**	**NO**	**N/A**
GREASE BARRELS/ INTERCEPTORS			
1. Grease pumped/removed on a regular basis.			✓
2. Grease interceptor located outside facility, maintained properly.			✓
EQUIPMENT CLEANING			
3. The following items are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Grease filters	✓		
b. Floor mats			✓
c. Floors (mop water and rinse water)	✓		
d. Grills			✓
OUTSIDE AREAS			
4. The following areas are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Sidewalk or outdoor seating	✓		
b. Drive thru			✓
DUMPSTERS AND RECYCLING CONTAINERS			
5. Food waste bagged and sealed before disposal.	✓		
6. Dumpsters and recycling containers are covered.	✓		
7. Spilled materials around containers are picked up regularly.	✓		
8. Wash water is discharged to the sanitary sewer or is collected for proper disposal.	✓		
EMPLOYEE EDUCATION/ AWARENESS			
9. Brochures or posters displayed.	✓		
10. BMPs observed.			
OVERALL RATING	GOOD	AVERAGE	NEEDS IMPROVEMENT

COMMENTS:

Prin. Linda C. Bacon

Received by: Linda C Bacon	Env. Health Specialist: D. Bishop	Badge #: 174

For additional information, please refer to our web site at www.floodcontrol.co.riverside.ca.us or contact the "Only Rain Down the Storm Drain" Pollution Prevention Program of the Cities and County of Riverside at (800) 506-2555.

ONLY RAIN DOWN THE STORM DRAIN

0003416

FOOD FACILITY STORMWATER COMPLIANCE SURVEY

FACILITY DBA Margarita Middle Sch.	FACILITY# 79540	DATE 12/2/08	
ADDRESS 30600 Margarita Rd., Murrieta	ACTIVITY 2628	SERVICE CODE: 410	
COMPLIANCE AREAS	**YES**	**NO**	**N/A**
GREASE BARREES/ INTERCEPTORS			
1. Grease pumped/removed on a regular basis.			✓
2. Grease interceptor located outside facility, maintained properly.			✓
EQUIPMENT CLEANING			
3. The following items are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Grease filters	✓		
b. Floor mats			✓
c. Floors (mop water and rinse water)	✓		
d. Grills			✓
OUTSIDE AREAS			
4. The following areas are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Sidewalk or outdoor seating	✓		
b. Drive thru			✓
DUMPSTERS AND RECYCLING CONTAINERS			
5. Food waste bagged and sealed before disposal.	✓		
6. Dumpsters and recycling containers are covered.	✓		
7. Spilled materials around containers are picked up regularly.	✓		
8. Wash water is discharged to the sanitary sewer or is collected for proper disposal.	✓		
EMPLOYEE EDUCATION/ AWARENESS			
9. Brochures or posters displayed.	✓		
10. BMPs observed.			
OVERALL RATING	(GOOD)	AVERAGE	NEEDS IMPROVEMENT

COMMENTS:

PRINT: Julie Leone

Received by: Julie [signature] | Env. Health Specialist: D. Osborn | Badge #

For additional information, please refer to our web site at www.floodcontrol.co.riverside.ca.us or contact the "Only Rain Down the Storm Drain" Pollution Prevention Program of the Cities and County of Riverside at (800) 506-2555.

...ONLY RAIN... DOWN THE STORM DRAIN

0003417

FOOD FACILITY STORMWATER COMPLIANCE SURVEY

FACILITY DBA Nutrishop	FACILITY #	DATE 11-25-08	
ADDRESS 24530 Village Walk #C Murrieta	ACTIVITY 02	SERVICE CODE: 410	
COMPLIANCE AREAS	**YES**	**NO**	**N/A**
GREASE BARRELS/ INTERCEPTORS			
1. Grease pumped/removed on a regular basis.			✓
2. Grease interceptor located outside facility, maintained properly.			✓
EQUIPMENT CLEANING			
3. The following items are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Grease filters			✓
b. Floor mats			✓
c. Floors (mop water and rinse water)	✓		
d. Grills			✓
OUTSIDE AREAS			
4. The following areas are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Sidewalk or outdoor seating			✓
b. Drive thru			✓
DUMPSTERS AND RECYCLING CONTAINERS			
5. Food waste bagged and sealed before disposal.	✓		
6. Dumpsters and recycling containers are covered.	✓		
7. Spilled materials around containers are picked up regularly.	✓		
8. Wash water is discharged to the sanitary sewer or is collected for proper disposal.	✓		
EMPLOYEE EDUCATION/ AWARENESS			
9. Brochures or posters displayed.	✓		
10. BMPs observed.			✓
OVERALL RATING	(GOOD)	AVERAGE	NEEDS IMPROVEMENT

COMMENTS:

Received by:	Env. Health Specialist:	Badge #

If additional information is required, contact the Storm Water/Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

mw 9/01

0003418

FOOD FACILITY STORMWATER COMPLIANCE SURVEY

FACILITY DBA Francos Water Store	FACILITY #	DATE 11-25-08	
ADDRESS 40685 Calif. Oaks Rd #E Murrieta 92563	ACTIVITY 02	SERVICE CODE: 410	
COMPLIANCE AREAS	YES	NO	N/A
GREASE BARRELS/ INTERCEPTORS			
1. Grease pumped/removed on a regular basis.			✓
2. Grease interceptor located outside facility, maintained properly.			✓
EQUIPMENT CLEANING			
3. The following items are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Grease filters			✓
b. Floor mats			✓
c. Floors (mop water and rinse water)	✓		
d. Grills			✓
OUTSIDE AREAS			
4. The following areas are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Sidewalk or outdoor seating			✓
b. Drive thru			✓
DUMPSTERS AND RECYCLING CONTAINERS			
5. Food waste bagged and sealed before disposal.	✓		
6. Dumpsters and recycling containers are covered.	✓		
7. Spilled materials around containers are picked up regularly.	✓		
8. Wash water is discharged to the sanitary sewer or is collected for proper disposal.	✓		
EMPLOYEE EDUCATION/ AWARENESS			
9. Brochures or posters displayed.	✓		
10. BMPs observed.			✓
OVERALL RATING	(GOOD)	AVERAGE	NEEDS IMPROVEMENT

COMMENTS:

Received by: Mariano Franco	Env. Health Specialist: L Rosaldi	Badge #

If additional information is required, contact the Storm Water/Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

mw 9/01

0003419

FOOD FACILITY STORMWATER COMPLIANCE SURVEY

FACILITY DBA Rubio's Murrieta Store	FACILITY # 31349	DATE 11/18/08	
ADDRESS 40436 Murrieta Hot Springs Rd Murrieta Ca 92563	ACTIVITY 02	SERVICE CODE: 410	
COMPLIANCE AREAS	**YES**	**NO**	**N/A**
GREASE BARRELS/ INTERCEPTORS			
1. Grease pumped/removed on a regular basis.	✓		
2. Grease interceptor located outside facility, maintained properly.	✓		
EQUIPMENT CLEANING			
3. The following items are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Grease filters	✓		
b. Floor mats	✓		
c. Floors (mop water and rinse water)	✓		
d. Grills	✓		
OUTSIDE AREAS			
4. The following areas are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Sidewalk or outdoor seating	✓		
b. Drive thru			✓
DUMPSTERS AND RECYCLING CONTAINERS			
5. Food waste bagged and sealed before disposal.	✓		
6. Dumpsters and recycling containers are covered.		✓	
7. Spilled materials around containers are picked up regularly.	✓		
8. Wash water is discharged to the sanitary sewer or is collected for proper disposal.	✓		
EMPLOYEE EDUCATION/ AWARENESS			
9. Brochures or posters displayed.	✓		
10. BMPs observed.	✓		
OVERALL RATING	(GOOD)	AVERAGE	NEEDS IMPROVEMENT

COMMENTS: 6.) Ensure dumpster and recycling containers are covered with lids.

Received by:	Env. Health Specialist: EHS II E. Pueda	Badge # 654

If additional information is required, contact the Storm Water/Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

FOOD FACILITY STORM WATER COMPLIANCE SURVEY

CITY OF MURRIETA

FACILITY DBA	FACILITY #	DATE
Rubio's Murrieta	31349	4/7/09
ADDRESS	ACTIVITY	SIC CODE
	02	

COMPLIANCE AREAS	YES	NO	N/A
GREASE BARRELS/INTERCEPTORS			
1. Grease pumped/removed on a regular basis.			
2. Grease interceptor located outside facility, maintained properly.			
EQUIPMENT CLEANING			
3. The following items are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Grease filters			
b. Floor mats			
c. Floors (mop water and rinse water)			
d. Grills			
OUTSIDE AREAS			
4. The following areas are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Sidewalk or outdoor seating			
b. Drive thru			
DUMPSTERS AND RECYCLING CONTAINERS			
5. Food waste bagged and sealed before disposal.			
6. Dumpsters and recycling containers are covered.	✓		
7. Spilled materials around containers are picked up regularly.			
8. Wash water is discharged to the sanitary sewer or is collected for proper disposal.			
EMPLOYEE EDUCATION/AWARENESS			
9. Brochures or posters displayed.			
10. BMPs observed.			
OVERALL RATING	GOOD	AVERAGE	NEEDS IMPROVEMENT

COMMENTS: HANG. MONITORS DUMPSTERS FOR COMPLIANCE
HAZMAT REMOVED 55-GAL drum.

Received by:	Env. Health Specialist:	Badge #

0003421

FOOD FACILITY STORMWATER COMPLIANCE SURVEY

FACILITY DBA Thai Orchid Restaurant	FACILITY # 7458	DATE 11/18/08	
ADDRESS 25359 Madison Ave ste 101 murrieta Ca 92562	ACTIVITY 02	SERVICE CODE: 410	
COMPLIANCE AREAS	**YES**	**NO**	**N/A**
GREASE BARRELS/ INTERCEPTORS			
1. Grease pumped/removed on a regular basis.	✓		
2. Grease interceptor located outside facility, maintained properly.	✓		
EQUIPMENT CLEANING			
3. The following items are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Grease filters	✓		
b. Floor mats	✓		
c. Floors (mop water and rinse water)	✓		
d. Grills	✓		
OUTSIDE AREAS			
4. The following areas are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Sidewalk or outdoor seating	✓		
b. Drive thru			✓
DUMPSTERS AND RECYCLING CONTAINERS			
5. Food waste bagged and sealed before disposal.	✓		
6. Dumpsters and recycling containers are covered.	✓		
7. Spilled materials around containers are picked up regularly.	✓		
8. Wash water is discharged to the sanitary sewer or is collected for proper disposal.	✓		
EMPLOYEE EDUCATION/ AWARENESS			
9. Brochures or posters displayed.	✓		
10. BMPs observed.	✓		
OVERALL RATING	(GOOD)	AVERAGE	NEEDS IMPROVEMENT

COMMENTS:

Received by: [illegible]	Env. Health Specialist: EHS II E. Aveda	Badge # 654

If additional information is required, contact the Storm Water/Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

0003422

FOOD FACILITY STORMWATER COMPLIANCE SURVEY

FACILITY DBA Beverages & More	FACILITY # 39317	DATE 11-17-08	
ADDRESS 24390 Village Walk Pl. Murrieta 92562	ACTIVITY 02	SERVICE CODE: 410	
COMPLIANCE AREAS	**YES**	**NO**	**N/A**
GREASE BARRELS/ INTERCEPTORS			
1. Grease pumped/removed on a regular basis.			✓
2. Grease interceptor located outside facility, maintained properly.			✓
EQUIPMENT CLEANING			
3. The following items are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Grease filters			✓
b. Floor mats			✓
c. Floors (mop water and rinse water)	✓		
d. Grills			✓
OUTSIDE AREAS			
4. The following areas are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Sidewalk or outdoor seating			✓
b. Drive thru			✓
DUMPSTERS AND RECYCLING CONTAINERS			
5. Food waste bagged and sealed before disposal.	✓		
6. Dumpsters and recycling containers are covered.	✓		
7. Spilled materials around containers are picked up regularly.			
8. Wash water is discharged to the sanitary sewer or is collected for proper disposal.	✓		
EMPLOYEE EDUCATION/ AWARENESS			
9. Brochures or posters displayed.			
10. BMPs observed.			✓
OVERALL RATING	(GOOD)	AVERAGE	NEEDS IMPROVEMENT

COMMENTS:

Received by: [signature] | Env. Health Specialist: L Rizalde | Badge #

If additional information is required, contact the Storm Water/Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

mw 9/01

0003423

FOOD FACILITY STORMWATER COMPLIANCE SURVEY

FACILITY DBA Lisa J. Miles Elementary	FACILITY # 18253	DATE 11/12/08	
ADDRESS Briggs Rd & Baxter Rd. Murr	ACTIVITY 2628	SERVICE CODE: 410	
COMPLIANCE AREAS	**YES**	**NO**	**N/A**
GREASE BARRELS/ INTERCEPTORS			
1. Grease pumped/removed on a regular basis.			✓
2. Grease interceptor located outside facility, maintained properly.			✓
EQUIPMENT CLEANING			
3. The following items are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Grease filters	✓		
b. Floor mats			✓
c. Floors (mop water and rinse water)	✓		
d. Grills			✓
OUTSIDE AREAS			
4. The following areas are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Sidewalk or outdoor seating	✓		
b. Drive thru			✓
DUMPSTERS AND RECYCLING CONTAINERS			
5. Food waste bagged and sealed before disposal.	✓		
6. Dumpsters and recycling containers are covered.	✓		
7. Spilled materials around containers are picked up regularly.	✓		
8. Wash water is discharged to the sanitary sewer or is collected for proper disposal.	✓		
EMPLOYEE EDUCATION/ AWARENESS			
9. Brochures or posters displayed.	✓		
10. BMPs observed.			
OVERALL RATING	(GOOD)	AVERAGE	NEEDS IMPROVEMENT

COMMENTS:

Kathy Foley

Received by: Kathy Foley | Env. Health Specialist: D. Bishop | Badge #

For additional information, please refer to our web site at www.floodcontrol.co.riverside.ca.us or contact the "Only Rain Down the Storm Drain" Pollution Prevention Program of the Cities and County of Riverside at (800) 506-2555.

ONLY RAIN DOWN THE STORM DRAIN

0003424

FOOD FACILITY STORMWATER COMPLIANCE SURVEY

FACILITY DBA The Mill	FACILITY # 35693	DATE 11/12/08	
ADDRESS 24690 Washington St Murrieta Ca 92563	ACTIVITY 02	SERVICE CODE: 410	
COMPLIANCE AREAS	**YES**	**NO**	**N/A**
GREASE BARRELS/ INTERCEPTORS			
1. Grease pumped/removed on a regular basis.			✓
2. Grease interceptor located outside facility, maintained properly.	✓		
EQUIPMENT CLEANING			
3. The following items are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Grease filters	✓		
b. Floor mats			✓
c. Floors (mop water and rinse water)	✓		
d. Grills	✓		
OUTSIDE AREAS			
4. The following areas are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Sidewalk or outdoor seating	✓		
b. Drive thru			✓
DUMPSTERS AND RECYCLING CONTAINERS			
5. Food waste bagged and sealed before disposal.	✓		
6. Dumpsters and recycling containers are covered.	✓		
7. Spilled materials around containers are picked up regularly.	✓		
8. Wash water is discharged to the sanitary sewer or is collected for proper disposal.	✓		
EMPLOYEE EDUCATION/ AWARENESS			
9. Brochures or posters displayed.	✓		
10. BMPs observed.	✓		
OVERALL RATING	(GOOD)	AVERAGE	NEEDS IMPROVEMENT

COMMENTS:

Received by:	Env. Health Specialist: EHS H. E. Rueda	Badge # 654

If additional information is required, contact the Storm Water/Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

0003425

FOOD FACILITY STORMWATER COMPLIANCE SURVEY

FACILITY DBA Delta Murrieta Elementary	FACILITY # 5978	DATE 11-6-08	
ADDRESS 39475 Whitewood Rd	ACTIVITY 1628	SERVICE CODE: 410	
COMPLIANCE AREAS MURR	YES	NO	N/A
GREASE BARRELS/ INTERCEPTORS			
1. Grease pumped/removed on a regular basis.			✓
2. Grease interceptor located outside facility, maintained properly.			✓
EQUIPMENT CLEANING			
3. The following items are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Grease filters	✓		
b. Floor mats	✓		
c. Floors (mop water and rinse water)	✓		
d. Grills			✓
OUTSIDE AREAS			
4. The following areas are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Sidewalk or outdoor seating	✓		
b. Drive thru			✓
DUMPSTERS AND RECYCLING CONTAINERS			
5. Food waste bagged and sealed before disposal.	✓		
6. Dumpsters and recycling containers are covered.	✓		
7. Spilled materials around containers are picked up regularly.	✓		
8. Wash water is discharged to the sanitary sewer or is collected for proper disposal.	✓		
EMPLOYEE EDUCATION/ AWARENESS			
9. Brochures or posters displayed.	✓		
10. BMPs observed.			
OVERALL RATING	GOOD	AVERAGE	NEEDS IMPROVEMENT

COMMENTS:

Print: Kristy Wells

Received by: Kristy Wells	Env. Health Specialist: D. Bishop	Badge #:

For additional information, please refer to our web site at www.floodcontrol.co.riverside.ca.us or contact the "Only Rain Down the Storm Drain" Pollution Prevention Program of the Cities and County of Riverside at (800) 506-2555.

...ONLY RAIN... DOWN THE STORM DRAIN

0003426

FOOD FACILITY STORMWATER COMPLIANCE SURVEY

FACILITY DBA Booster Juice	FACILITY # 39096	DATE 11/6/08	
ADDRESS 24635 Madison ave Murr	ACTIVITY 02	SERVICE CODE: 410	
COMPLIANCE AREAS	**YES**	**NO**	**N/A**
GREASE BARRELS/ INTERCEPTORS			
1. Grease pumped/removed on a regular basis.			✓
2. Grease interceptor located outside facility, maintained properly.			✓
EQUIPMENT CLEANING			
3. The following items are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Grease filters			✓
b. Floor mats	✓		
c. Floors (mop water and rinse water)	✓		
d. Grills			✓
OUTSIDE AREAS			
4. The following areas are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Sidewalk or outdoor seating			✓
b. Drive thru			✓
DUMPSTERS AND RECYCLING CONTAINERS			
5. Food waste bagged and sealed before disposal.	✓		
6. Dumpsters and recycling containers are covered.	✓		
7. Spilled materials around containers are picked up regularly.	✓		
8. Wash water is discharged to the sanitary sewer or is collected for proper disposal.	✓		
EMPLOYEE EDUCATION/ AWARENESS			
9. Brochures or posters displayed.	✓		
10. BMPs observed.	✓		
OVERALL RATING	(GOOD)	AVERAGE	NEEDS IMPROVEMENT

COMMENTS:

Received by: Beja Dendeh	Env. Health Specialist: EHS II E. Ruedas	Badge # 654

If additional information is required, contact the Storm Water/Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

0003427

FOOD FACILITY STORMWATER COMPLIANCE SURVEY

FACILITY DBA: Monte Vista Elementary	FACILITY #: 2004	DATE: 11-6-08	
ADDRESS: 37240 Via Mira Mesa Murr	ACTIVITY: 2628	SERVICE CODE: 410	
COMPLIANCE AREAS	**YES**	**NO**	**N/A**
GREASE BARRELS/ INTERCEPTORS			
1. Grease pumped/removed on a regular basis.			✓
2. Grease interceptor located outside facility, maintained properly.			✓
EQUIPMENT CLEANING			
3. The following items are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Grease filters	✓		
b. Floor mats	✓		
c. Floors (mop water and rinse water)	✓		
d. Grills			✓
OUTSIDE AREAS			
4. The following areas are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Sidewalk or outdoor seating	✓		
b. Drive thru			✓
DUMPSTERS AND RECYCLING CONTAINERS			
5. Food waste bagged and sealed before disposal.	✓		
6. Dumpsters and recycling containers are covered.	✓		
7. Spilled materials around containers are picked up regularly.	✓		
8. Wash water is discharged to the sanitary sewer or is collected for proper disposal.	✓		
EMPLOYEE EDUCATION/ AWARENESS			
9. Brochures or posters displayed.	✓		
10. BMPs observed.			
OVERALL RATING	GOOD	AVERAGE	NEEDS IMPROVEMENT

COMMENTS:

Print: Nicole Thompson

Received by: [signature] | Env. Health Specialist: D. Bishop | Badge #: 74

For additional information, please refer to our web site at www.floodcontrol.co.riverside.ca.us or contact the "Only Rain Down the Storm Drain" Pollution Prevention Program of the Cities and County of Riverside at (800) 506-2555.

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0003428

FOOD FACILITY STORMWATER COMPLIANCE SURVEY

FACILITY DBA: Warm Springs Middle Sch	FACILITY #: 8321	DATE: 11-6-08	
ADDRESS: 30245 Calle de Fortuna Mur	FACILITY: 2628	SERVICE CODE: 410	
COMPLIANCE AREAS	**YES**	**NO**	**N/A**
GREASE BARRELS/ INTERCEPTORS			
1. Grease pumped/removed on a regular basis.	✓		
2. Grease interceptor located outside facility, maintained properly.	✓		
EQUIPMENT CLEANING			
3. The following items are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Grease filters	✓		
b. Floor mats	✓		
c. Floors (mop water and rinse water)	✓		
d. Grills	✓		
OUTSIDE AREAS			
4. The following areas are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Sidewalk or outdoor seating	✓		
b. Drive thru			✓
DUMPSTERS AND RECYCLING CONTAINERS			
5. Food waste bagged and sealed before disposal.	✓		
6. Dumpsters and recycling containers are covered.	✓		
7. Spilled materials around containers are picked up regularly.	✓		
8. Wash water is discharged to the sanitary sewer or is collected for proper disposal.	✓		
EMPLOYEE EDUCATION/ AWARENESS			
9. Brochures or posters displayed.	✓		
10. BMPs observed.			
OVERALL RATING	GOOD	AVERAGE	NEEDS IMPROVEMENT

COMMENTS:

Print Name: PATRICIA GORDON

Received by: Patricia Gordon | Env. Health Specialist: D. Bishop | Badge #: 14

For additional information, please refer to our web site at www.floodcontrol.co.riverside.ca.us or contact the "Only Rain Down the Storm Drain" Pollution Prevention Program of the Cities and County of Riverside at (800) 506-2555.

ONLY RAIN DOWN THE STORM DRAIN

0003429

FOOD FACILITY STORMWATER COMPLIANCE SURVEY

FACILITY DBA Side lines	FACILITY # 4707	DATE 11/6/08	
ADDRESS 24910 Washington ave Murrieta Ca	ACTIVITY 02	SERVICE CODE: 410	
COMPLIANCE AREAS	YES	NO	N/A
GREASE BARRELS/ INTERCEPTORS			
1. Grease pumped/removed on a regular basis.	✓		
2. Grease interceptor located outside facility, maintained properly.	✓		
EQUIPMENT CLEANING			
3. The following items are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Grease filters	✓		
b. Floor mats		✓	
c. Floors (mop water and rinse water)	✓		
d. Grills	✓		
OUTSIDE AREAS			
4. The following areas are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Sidewalk or outdoor seating			✓
b. Drive thru			✓
DUMPSTERS AND RECYCLING CONTAINERS			
5. Food waste bagged and sealed before disposal.	✓		
6. Dumpsters and recycling containers are covered.	✓		
7. Spilled materials around containers are picked up regularly.	✓		
8. Wash water is discharged to the sanitary sewer or is collected for proper disposal.	✓		
EMPLOYEE EDUCATION/ AWARENESS			
9. Brochures or posters displayed.	✓		
10. BMPs observed.	✓		
OVERALL RATING	(GOOD)	AVERAGE	NEEDS IMPROVEMENT

COMMENTS: 8 B) Please discontinue cleaning floor mats out side with soaps and water. Better method is to clean in-house near floor drains.

Received by: Valerie Snell	Env. Health Specialist: EHS H E. Pineda	Badge # 6594

For additional information, please refer to our web site at www.floodcontrol.co.riverside.ca.us or contact the "Only Rain Down the Storm Drain" Pollution Prevention Program of the Cities and County of Riverside at (800) 506-2555.

ONLY RAIN DOWN THE STORM DRAIN
CALL 1-800-506-2555 TO REPORT
ILLEGAL POLLUTING OF STORM DRAINS

0003430

FOOD FACILITY STORM WATER COMPLIANCE SURVEY

CITY OF MURRIETA

FACILITY DBA	FACILITY #	DATE
Sidelines	4907	4/2/09
ADDRESS	**ACTIVITY**	**SIC CODE**
24910 Washington Ave Murrieta	02	410

COMPLIANCE AREAS	YES	NO	N/A
GREASE BARRELS/INTERCEPTORS			
1. Grease pumped/removed on a regular basis.			
2. Grease interceptor located outside facility, maintained properly.			
EQUIPMENT CLEANING			
3. The following items are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Grease filters			
b. Floor mats	✓		
c. Floors (mop water and rinse water)			
d. Grills			
OUTSIDE AREAS			
4. The following areas are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Sidewalk or outdoor seating			
b. Drive thru			
DUMPSTERS AND RECYCLING CONTAINERS			
5. Food waste bagged and sealed before disposal.			
6. Dumpsters and recycling containers are covered.			
7. Spilled materials around containers are picked up regularly.			
8. Wash water is discharged to the sanitary sewer or is collected for proper disposal.			
EMPLOYEE EDUCATION/AWARENESS			
9. Brochures or posters displayed.			
10. BMPs observed.			

OVERALL RATING	GOOD	AVERAGE	NEEDS IMPROVEMENT

COMMENTS: Owner has employee cleaning floor drain in building.

Received by:	Env. Health Specialist:	Badge #
Valerie Smith	[signature]	

0003431

FOOD FACILITY STORMWATER COMPLIANCE SURVEY

FACILITY DBA Buchanan Elementary	FACILITY # 1079	DATE 11-6-08	
ADDRESS 40121 Torrey Pines Murr.	ACTIVITY 2628	SERVICE CODE: 410	
COMPLIANCE AREAS	YES	NO	N/A
GREASE BARRELS/ INTERCEPTORS			
1. Grease pumped/removed on a regular basis.			✓
2. Grease interceptor located outside facility, maintained properly.			✓
EQUIPMENT CLEANING			
3. The following items are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Grease filters	✓		
b. Floor mats			✓
c. Floors (mop water and rinse water)	✓		
d. Grills			✓
OUTSIDE AREAS			
4. The following areas are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Sidewalk or outdoor seating	✓		
b. Drive thru			✓
DUMPSTERS AND RECYCLING CONTAINERS			
5. Food waste bagged and sealed before disposal.	✓		
6. Dumpsters and recycling containers are covered.	✓		
7. Spilled materials around containers are picked up regularly.	✓		
8. Wash water is discharged to the sanitary sewer or is collected for proper disposal.	✓		
EMPLOYEE EDUCATION/ AWARENESS			
9. Brochures or posters displayed.	✓		
10. BMPs observed.			
OVERALL RATING	GOOD	AVERAGE	NEEDS IMPROVEMENT

COMMENTS:

Print: JOAN GREENWOOD

Received by: Joan S Greenwood | Env. Health Specialist: D. Bishop | Badge #: 74

For additional information, please refer to our web site at www.floodcontrol.co.riverside.ca.us or contact the "Only Rain Down the Storm Drain" Pollution Prevention Program of the Cities and County of Riverside at (800) 506-2555.

...ONLY RAIN... DOWN THE STORM DRAIN

0003432

FOOD FACILITY STORMWATER COMPLIANCE SURVEY

FACILITY DBA: Rail Ranch Elementary	FACILITY #: 5099	DATE: 11-6-08
ADDRESS: 25030 Sun Santee Moreno	ACTIVITY: 2628	SERVICE CODE: 410

COMPLIANCE AREAS	YES	NO	N/A
GREASE BARRELS/ INTERCEPTORS			
1. Grease pumped/removed on a regular basis.			✓
2. Grease interceptor located outside facility, maintained properly.			✓
EQUIPMENT CLEANING			
3. The following items are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Grease filters	✓		
b. Floor mats			✓
c. Floors (mop water and rinse water)	✓		
d. Grills			✓
OUTSIDE AREAS			
4. The following areas are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Sidewalk or outdoor seating	✓		
b. Drive thru			✓
DUMPSTERS AND RECYCLING CONTAINERS			
5. Food waste bagged and sealed before disposal.	✓		
6. Dumpsters and recycling containers are covered.	✓		
7. Spilled materials around containers are picked up regularly.	✓		
8. Wash water is discharged to the sanitary sewer or is collected for proper disposal.	✓		
EMPLOYEE EDUCATION/ AWARENESS			
9. Brochures or posters displayed.	✓		
10. BMPs observed.			
OVERALL RATING	(GOOD)	AVERAGE	NEEDS IMPROVEMENT

COMMENTS:

Print: Denise Smith

Received by: Denise Smith | Env. Health Specialist: D. Bishop | Badge #: 41

For additional information, please refer to our web site at www.floodcontrol.co.riverside.ca.us or contact the "Only Rain Down the Storm Drain" Pollution Prevention Program of the Cities and County of Riverside at (800) 506-2555.

ONLY RAIN... DOWN THE STORM DRAIN

0003433

FOOD FACILITY STORMWATER COMPLIANCE SURVEY

FACILITY DBA Vista Murrieta H.S.	FACILITY # 2808	DATE 10/30/08	
ADDRESS 28251 Clinton Keith Rd	ACTIVITY 2628	SERVICE CODE: 410	
COMPLIANCE AREAS MURR.	**YES**	**NO**	**N/A**
GREASE BARRELS/ INTERCEPTORS			
1. Grease pumped/removed on a regular basis.	✓		
2. Grease interceptor located outside facility, maintained properly.	✓		
EQUIPMENT CLEANING			
3. The following items are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Grease filters	✓		
b. Floor mats	✓		
c. Floors (mop water and rinse water)	✓		
d. Grills	✓		
OUTSIDE AREAS			
4. The following areas are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Sidewalk or outdoor seating	✓		
b. Drive thru			✓
DUMPSTERS AND RECYCLING CONTAINERS			
5. Food waste bagged and sealed before disposal.	✓		
6. Dumpsters and recycling containers are covered.	✓		
7. Spilled materials around containers are picked up regularly.	✓		
8. Wash water is discharged to the sanitary sewer or is collected for proper disposal.	✓		
EMPLOYEE EDUCATION/ AWARENESS			
9. Brochures or posters displayed.	✓		
10. BMPs observed.			
OVERALL RATING	(GOOD)	AVERAGE	NEEDS IMPROVEMENT

COMMENTS:

Print: Shaney Whitbeck

Received by: S. Whitbeck | Env. Health Specialist: D. Bishop | Badge # 74

For additional information, please refer to our web site at www.floodcontrol.co.riverside.ca.us or contact the "Only Rain Down the Storm Drain" Pollution Prevention Program of the Cities and County of Riverside at (800) 506-2555.

ONLY RAIN... DOWN THE STORM DRAIN

0003434

FOOD FACILITY STORMWATER COMPLIANCE SURVEY

FACILITY DBA Le Petit Cafe	FACILITY # 10409	DATE 10/30/08	
ADDRESS 26499 Jefferson Ave Ste F murrieta Ca	ACTIVITY	SERVICE CODE: 410	
COMPLIANCE AREAS	**YES**	**NO**	**N/A**
GREASE BARRELS/ INTERCEPTORS			
1. Grease pumped/removed on a regular basis.			✓
2. Grease interceptor located outside facility, maintained properly.			✓
EQUIPMENT CLEANING			
3. The following items are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Grease filters			✓
b. Floor mats	✓		
c. Floors (mop water and rinse water)	✓		
d. Grills			✓
OUTSIDE AREAS			
4. The following areas are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Sidewalk or outdoor seating	✓		
b. Drive thru			✓
DUMPSTERS AND RECYCLING CONTAINERS			
5. Food waste bagged and sealed before disposal.	✓		
6. Dumpsters and recycling containers are covered.	✓		
7. Spilled materials around containers are picked up regularly.	✓		
8. Wash water is discharged to the sanitary sewer or is collected for proper disposal.	✓		
EMPLOYEE EDUCATION/ AWARENESS			
9. Brochures or posters displayed.	✓		
10. BMPs observed.	✓		
OVERALL RATING	GOOD	AVERAGE	NEEDS IMPROVEMENT

COMMENTS:

Received by: [signature]	Env. Health Specialist: EHS II E. Pineda	Badge # 654

If additional information is required, contact the Storm Water/Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

0003435

FOOD FACILITY STORMWATER COMPLIANCE SURVEY

FACILITY DBA KR's Chicken & Ribs	FACILITY # 38029	DATE 10/30/08	
ADDRESS 41539 Kalmia St #120 Murrieta	ACTIVITY	SERVICE CODE: 410	
COMPLIANCE AREAS	**YES**	**NO**	**N/A**
GREASE BARRELS/ INTERCEPTORS			
1. Grease pumped/removed on a regular basis.	✓		
2. Grease interceptor located outside facility, maintained properly.	✓		
EQUIPMENT CLEANING			
3. The following items are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Grease filters	✓		
b. Floor mats	✓		
c. Floors (mop water and rinse water)	✓		
d. Grills	✓		
OUTSIDE AREAS			
4. The following areas are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Sidewalk or outdoor seating	✓		
b. Drive thru			✓
DUMPSTERS AND RECYCLING CONTAINERS			
5. Food waste bagged and sealed before disposal.	✓		
6. Dumpsters and recycling containers are covered.	✓		
7. Spilled materials around containers are picked up regularly.	✓		
8. Wash water is discharged to the sanitary sewer or is collected for proper disposal.	✓		
EMPLOYEE EDUCATION/ AWARENESS			
9. Brochures or posters displayed.	✓		
10. BMPs observed.	✓		
OVERALL RATING	(GOOD)	AVERAGE	NEEDS IMPROVEMENT
COMMENTS:			
Received by: [signature]	Env. Health Specialist: EHS II E. Meda		Badge # 654

If additional information is required, contact the Storm Water/Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

0003436

FOOD FACILITY STORMWATER COMPLIANCE SURVEY

FACILITY DBA: Citeleo & Hills Elementary	FACILITY #: 0605	DATE: 10/30/08	
ADDRESS: 36105 Murrieta Oaks Murr	ACTIVITY: 2628	SERVICE CODE: 410	
COMPLIANCE AREAS	**YES**	**NO**	**N/A**
GREASE BARRELS/ INTERCEPTORS			
1. Grease pumped/removed on a regular basis.			✓
2. Grease interceptor located outside facility, maintained properly.			✓
EQUIPMENT CLEANING			
3. The following items are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Grease filters	✓		
b. Floor mats			✓
c. Floors (mop water and rinse water)	✓		
d. Grills			✓
OUTSIDE AREAS			
4. The following areas are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Sidewalk or outdoor seating	✓		
b. Drive thru			✓
DUMPSTERS AND RECYCLING CONTAINERS			
5. Food waste bagged and sealed before disposal.	✓		
6. Dumpsters and recycling containers are covered.	✓		
7. Spilled materials around containers are picked up regularly.	✓		
8. Wash water is discharged to the sanitary sewer or is collected for proper disposal.	✓		
EMPLOYEE EDUCATION/ AWARENESS			
9. Brochures or posters displayed.	✓		
10. BMPs observed.			
OVERALL RATING	(GOOD)	AVERAGE	NEEDS IMPROVEMENT
COMMENTS:			
Print: Sue Jordan			
Received by: Sue Jordan	Env. Health Specialist: D. Bishop		Badge #: 74

For additional information, please refer to our web site at www.floodcontrol.co.riverside.ca.us or contact the "Only Rain Down the Storm Drain" Pollution Prevention Program of the Cities and County of Riverside at (800) 506-2555.

ONLY RAIN DOWN THE STORM DRAIN

0003437

FOOD FACILITY STORMWATER COMPLIANCE SURVEY

FACILITY DBA Lovekral Elementary	FACILITY # 2622	DATE 10/30/08	
ADDRESS 23801 St. Raphael Moreno	ACTIVITY 2628	SERVICE CODE: 410	
COMPLIANCE AREAS	**YES**	**NO**	**N/A**
GREASE BARRELS/ INTERCEPTORS			
1. Grease pumped/removed on a regular basis.			✓
2. Grease interceptor located outside facility, maintained properly.			✓
EQUIPMENT CLEANING			
3. The following items are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Grease filters	✓		
b. Floor mats	✓		
c. Floors (mop water and rinse water)	✓		
d. Grills			✓
OUTSIDE AREAS			
4. The following areas are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Sidewalk or outdoor seating	✓		
b. Drive thru			✓
DUMPSTERS AND RECYCLING CONTAINERS			
5. Food waste bagged and sealed before disposal.	✓		
6. Dumpsters and recycling containers are covered.	✓		
7. Spilled materials around containers are picked up regularly.	✓		
8. Wash water is discharged to the sanitary sewer or is collected for proper disposal.	✓		
EMPLOYEE EDUCATION/ AWARENESS			
9. Brochures or posters displayed.	✓		
10. BMPs observed.			
OVERALL RATING	GOOD	AVERAGE	NEEDS IMPROVEMENT

COMMENTS:

PRINT:

Received by: [illegible] | Env. Health Specialist: D. Bishop | Badge # 79

For additional information, please refer to our web site at www.floodcontrol.co.riverside.ca.us or contact the "Only Rain Down the Storm Drain" Pollution Prevention Program of the Cities and County of Riverside at (800) 506-2555.

ONLY RAIN DOWN THE STORM DRAIN

0003438

FOOD FACILITY STORMWATER COMPLIANCE SURVEY

FACILITY DBA: Auxiat School	FACILITY # 4541	DATE 10/30/08	
ADDRESS 24300 Las Brisas Moreno	ACTIVITY 2628	SERVICE CODE: 410	
COMPLIANCE AREAS	**YES**	**NO**	**N/A**
GREASE BARRELS/ INTERCEPTORS			
1. Grease pumped/removed on a regular basis.			✓
2. Grease interceptor located outside facility, maintained properly.			✓
EQUIPMENT CLEANING			
3. The following items are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Grease filters	✓		
b. Floor mats			✓
c. Floors (mop water and rinse water)	✓		
d. Grills			✓
OUTSIDE AREAS			
4. The following areas are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Sidewalk or outdoor seating	✓		
b. Drive thru			✓
DUMPSTERS AND RECYCLING CONTAINERS			
5. Food waste bagged and sealed before disposal.	✓		
6. Dumpsters and recycling containers are covered.	✓		
7. Spilled materials around containers are picked up regularly.	✓		
8. Wash water is discharged to the sanitary sewer or is collected for proper disposal.	✓		
EMPLOYEE EDUCATION/ AWARENESS			
9. Brochures or posters displayed.			
10. BMPs observed.	✓		
OVERALL RATING	GOOD	AVERAGE	NEEDS IMPROVEMENT

COMMENTS:

Print: Josie Rigden

Received by: [signature]

Env. Health Specialist: D. Bisliop

Badge #: 74

For additional information, please refer to our web site at www.floodcontrol.co.riverside.ca.us or contact the "Only Rain Down the Storm Drain" Pollution Prevention Program of the Cities and County of Riverside at (800) 506-2555.

ONLY RAIN DOWN THE STORM DRAIN

0003439

FOOD FACILITY STORMWATER COMPLIANCE SURVEY

FACILITY DBA: Oak Meadows Elementary	FACILITY #: 8732	DATE: 10/30/08
ADDRESS: 28600 Poinsettia ST Murr	ACTIVITY: 2628	SERVICE CODE: 410

COMPLIANCE AREAS	YES	NO	N/A
GREASE BARRELS/ INTERCEPTORS			
1. Grease pumped/removed on a regular basis.			✓
2. Grease interceptor located outside facility, maintained properly.			✓
EQUIPMENT CLEANING			
3. The following items are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Grease filters			✓
b. Floor mats	✓		
c. Floors (mop water and rinse water)	✓		
d. Grills			✓
OUTSIDE AREAS			
4. The following areas are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Sidewalk or outdoor seating	✓		
b. Drive thru			✓
DUMPSTERS AND RECYCLING CONTAINERS			
5. Food waste bagged and sealed before disposal.	✓		
6. Dumpsters and recycling containers are covered.	✓		
7. Spilled materials around containers are picked up regularly.	✓		
8. Wash water is discharged to the sanitary sewer or is collected for proper disposal.	✓		
EMPLOYEE EDUCATION/ AWARENESS			
9. Brochures or posters displayed.	✓		
10. BMPs observed.			
OVERALL RATING	GOOD	AVERAGE	NEEDS IMPROVEMENT

COMMENTS:

Print: Rebecca Anderson

Received by: Rebecca Anderson | Env. Health Specialist: D. Bishop | Badge #: 74

For additional information, please refer to our web site at www.floodcontrol.co.riverside.ca.us or contact the "Only Rain Down the Storm Drain" Pollution Prevention Program of the Cities and County of Riverside at (800) 506-2555.

ONLY RAIN DOWN THE STORM DRAIN

0003440

FOOD FACILITY STORMWATER COMPLIANCE SURVEY

FACILITY DBA China Panda	FACILITY # 83016	DATE 10/29/08	
ADDRESS 39252 Winchester #121 Murrieta	ACTIVITY 3620	SERVICE CODE: 410	
COMPLIANCE AREAS	**YES**	**NO**	**N/A**
GREASE BARRELS/ INTERCEPTORS			
1. Grease pumped/removed on a regular basis.	✓		
2. Grease interceptor located outside facility, maintained properly.	✓		
EQUIPMENT CLEANING			
3. The following items are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Grease filters	✓		
b. Floor mats	✓		
c. Floors (mop water and rinse water)	✓		
d. Grills			✓
OUTSIDE AREAS			
4. The following areas are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Sidewalk or outdoor seating			✓
b. Drive thru			✓
DUMPSTERS AND RECYCLING CONTAINERS			
5. Food waste bagged and sealed before disposal.	✓		
6. Dumpsters and recycling containers are covered.	✓		
7. Spilled materials around containers are picked up regularly.	✓		
8. Wash water is discharged to the sanitary sewer or is collected for proper disposal.	✓		
EMPLOYEE EDUCATION/ AWARENESS			
9. Brochures or posters displayed.		✓	
10. BMPs observed.	✓		
OVERALL RATING	(GOOD)	AVERAGE	NEEDS IMPROVEMENT

COMMENTS: Poster and brochure provided.

Received by: [signature]	Env. Health Specialist: Kristen Burnham	Badge # 451

For additional information, please refer to our web site at www.floodcontrol.co.riverside.ca.us or contact the "Only Rain Down the Storm Drain" Pollution Prevention Program of the Cities and County of Riverside at (800) 506-2555.

ONLY RAIN... DOWN THE STORM DRAIN

0003441

FOOD FACILITY STORMWATER COMPLIANCE SURVEY

FACILITY DBA China Panda	FACILITY # 83016	DATE 10/29/08	
ADDRESS 39252 Winchester #121 Murrieta	ACTIVITY 3620	SERVICE CODE: 410	
COMPLIANCE AREAS	**YES**	**NO**	**N/A**
GREASE BARRELS/ INTERCEPTORS			
1. Grease pumped/removed on a regular basis.	✓		
2. Grease interceptor located outside facility, maintained properly.	✓		
EQUIPMENT CLEANING			
3. The following items are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Grease filters	✓		
b. Floor mats	✓		
c. Floors (mop water and rinse water)	✓		
d. Grills			✓
OUTSIDE AREAS			
4. The following areas are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Sidewalk or outdoor seating			✓
b. Drive thru			✓
DUMPSTERS AND RECYCLING CONTAINERS			
5. Food waste bagged and sealed before disposal.	✓		
6. Dumpsters and recycling containers are covered.	✓		
7. Spilled materials around containers are picked up regularly.	✓		
8. Wash water is discharged to the sanitary sewer or is collected for proper disposal.	✓		
EMPLOYEE EDUCATION/AWARENESS			
9. Brochures or posters displayed.		✓	
10. BMPs observed.	✓		
OVERALL RATING	(GOOD)	AVERAGE	NEEDS IMPROVEMENT

COMMENTS: Poster and brochure provided. F/U & see if Posture & Brochure are displayed. (BW)

Received by: [signature]	Env. Health Specialist: Kristen Burnham	Badge # 451

For additional information, please refer to our web site at www.floodcontrol.co.riverside.ca.us or contact the "Only Rain Down the Storm Drain" Pollution Prevention Program of the Cities and County of Riverside at (800) 506-2555.

ONLY RAIN DOWN THE STORM DRAIN

NOTE: Located in County; Not City Jurisdiction

0003442

FOOD FACILITY STORMWATER COMPLIANCE SURVEY

FACILITY DBA Truly Madly Sweetly	FACILITY # 39054	DATE 10/29/08	
ADDRESS 41539 Kalmia St. Murrieta	ACTIVITY 02	SERVICE CODE: 410	
COMPLIANCE AREAS	YES	NO	N/A
GREASE BARRELS/ INTERCEPTORS			
1. Grease pumped/removed on a regular basis.			✓
2. Grease interceptor located outside facility, maintained properly.			✓
EQUIPMENT CLEANING			
3. The following items are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Grease filters 3 C	✓		
b. Floor mats mop sink	✓		
c. Floors (mop water and rinse water)	✓		
d. Grills			✓
OUTSIDE AREAS			
4. The following areas are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Sidewalk or outdoor seating sweep	✓		
b. Drive thru			✓
DUMPSTERS AND RECYCLING CONTAINERS			
5. Food waste bagged and sealed before disposal.	✓		
6. Dumpsters and recycling containers are covered.	✓		
7. Spilled materials around containers are picked up regularly.	✓		
8. Wash water is discharged to the sanitary sewer or is collected for proper disposal.	✓		
EMPLOYEE EDUCATION/ AWARENESS			
9. Brochures or posters displayed.	✓		
10. BMPs observed.			
OVERALL RATING	GOOD	AVERAGE	NEEDS IMPROVEMENT

COMMENTS: Issued brochure + poster

Received by: Catherine Howell

Env. Health Specialist: [illegible]

Badge # 91

If additional information is required, contact the Storm Water/Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

0003443

FOOD FACILITY STORMWATER COMPLIANCE SURVEY

FACILITY DBA SCBA Members Club	FACILITY # 4880	DATE 10-21-08	
ADDRESS 39500 Robert Trent Pkwy, Murrieta	ACTIVITY 3620	SERVICE CODE: 410	
COMPLIANCE AREAS	YES	NO	N/A
GREASE BARRELS/ INTERCEPTORS			
1. Grease pumped/removed on a regular basis.	✓		
2. Grease interceptor located outside facility, maintained properly.			✓
EQUIPMENT CLEANING			
3. The following items are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Grease filters	✓		
b. Floor mats	✓		
c. Floors (mop water and rinse water)	✓		
d. Grills	✓		✓
OUTSIDE AREAS			
4. The following areas are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Sidewalk or outdoor seating	✓		
b. Drive thru	✓		✓
DUMPSTERS AND RECYCLING CONTAINERS			
5. Food waste bagged and sealed before disposal.	✓		
6. Dumpsters and recycling containers are covered.	✓		
7. Spilled materials around containers are picked up regularly.	✓		
8. Wash water is discharged to the sanitary sewer or is collected for proper disposal.	✓		
EMPLOYEE EDUCATION/ AWARENESS			
9. Brochures or posters displayed.	✓		
10. BMPs observed.	✓		
OVERALL RATING	GOOD	AVERAGE	NEEDS IMPROVEMENT
COMMENTS:			
Received by:	Env. Health Specialist: S. Peralta		Badge # 396

For additional information, please refer to our web site at www.floodcontrol.co.riverside.ca.us or contact the "Only Rain Down the Storm Drain" Pollution Prevention Program of the Cities and County of Riverside at (800) 506-2555.

ONLY RAIN... DOWN THE STORM DRAIN

0003444

FOOD FACILITY STORMWATER COMPLIANCE SURVEY

FACILITY DBA Subway # 41278	FACILITY # 58401	DATE 10·16·08	
ADDRESS 39460 Murrieta Hot Springs Rd Murrieta	ACTIVITY 2620	SERVICE CODE: 410	
COMPLIANCE AREAS	**YES**	**NO**	**N/A**
GREASE BARRELS/ INTERCEPTORS			
1. Grease pumped/removed on a regular basis.			✓
2. Grease interceptor located outside facility, maintained properly.			✓
EQUIPMENT CLEANING			
3. The following items are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Grease filters			✓
b. Floor mats	✓		✓
c. Floors (mop water and rinse water)	✓		
d. Grills			✓
OUTSIDE AREAS			
4. The following areas are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Sidewalk or outdoor seating	✓		
b. Drive thru	✓		
DUMPSTERS AND RECYCLING CONTAINERS			
5. Food waste bagged and sealed before disposal.	✓		
6. Dumpsters and recycling containers are covered.	✓		
7. Spilled materials around containers are picked up regularly.			✓
8. Wash water is discharged to the sanitary sewer or is collected for proper disposal.			✓
EMPLOYEE EDUCATION/ AWARENESS			
9. Brochures or posters displayed.	✓		
10. BMPs observed.	✓		
OVERALL RATING	GOOD	AVERAGE	NEEDS IMPROVEMENT
COMMENTS:			
Received by: [signature]	Env. Health Specialist: S. Peralta		Badge # 396

If additional information is required, contact the Storm Water/Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

0003445

FOOD FACILITY STORMWATER COMPLIANCE SURVEY

FACILITY DBA Smokin Joe's Pizza & Deli	FACILITY # 382244	DATE 9/23/08	
ADDRESS 38365 Innovation Ct. #102 Murrieta	ACTIVITY 3620	SERVICE CODE: 410	
COMPLIANCE AREAS	YES	NO	N/A
GREASE BARRELS/ INTERCEPTORS			
1. Grease pumped/removed on a regular basis.			✓
2. Grease interceptor located outside facility, maintained properly.			✓
EQUIPMENT CLEANING			
3. The following items are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Grease filters	✓		
b. Floor mats	✓		
c. Floors (mop water and rinse water)	✓		
d. Grills			✓
OUTSIDE AREAS			
4. The following areas are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Sidewalk or outdoor seating	✓		
b. Drive thru			✓
DUMPSTERS AND RECYCLING CONTAINERS			
5. Food waste bagged and sealed before disposal.	✓		
6. Dumpsters and recycling containers are covered.	✓		
7. Spilled materials around containers are picked up regularly.	✓		
8. Wash water is discharged to the sanitary sewer or is collected for proper disposal.	✓		
EMPLOYEE EDUCATION/ AWARENESS			
9. Brochures or posters displayed.	✓		
10. BMPs observed.	✓		
OVERALL RATING	GOOD	AVERAGE	NEEDS IMPROVEMENT
COMMENTS:			
Received by: JOE DACORTA	Env. Health Specialist: Stemen		Badge # 3[illegible]

For additional information, please refer to our web site at www.floodcontrol.co.riverside.ca.us or contact the "Only Rain Down the Storm Drain" Pollution Prevention Program of the Cities and County of Riverside at (800) 506-2555.

...ONLY RAIN... DOWN THE STORM DRAIN

0003446

FOOD FACILITY STORMWATER COMPLIANCE SURVEY

FACILITY DBA E. Hale Curran School	FACILITY# 5097	DATE 9/22/08	
ADDRESS 10855 Chaco Cyn. Rd., Murr	ACTIVITY 2628	SERVICE CODE: 410	
COMPLIANCE AREAS	**YES**	**NO**	**N/A**
GREASE BARRELS/ INTERCEPTORS			
1. Grease pumped/removed on a regular basis.			✓
2. Grease interceptor located outside facility, maintained properly.			✓
EQUIPMENT CLEANING			
3. The following items are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Grease filters	✓		
b. Floor mats	✓		
c. Floors (mop water and rinse water)	✓		
d. Grills			✓
OUTSIDE AREAS			
4. The following areas are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Sidewalk or outdoor seating	✓		
b. Drive thru			✓
DUMPSTERS AND RECYCLING CONTAINERS			
5. Food waste bagged and sealed before disposal.	✓		
6. Dumpsters and recycling containers are covered.	✓		
7. Spilled materials around containers are picked up regularly.	✓		
8. Wash water is discharged to the sanitary sewer or is collected for proper disposal.	✓		
EMPLOYEE EDUCATION/ AWARENESS			
9. Brochures or posters displayed.	✓		
10. BMPs observed.			
OVERALL RATING	(GOOD)	AVERAGE	NEEDS IMPROVEMENT

COMMENTS:

Print Name: Christina Donohew

Received by: C Donohew | Env. Health Specialist: DCBISHop | Badge # 74

For additional information, please refer to our web site at www.floodcontrol.co.riverside.ca.us or contact the "Only Rain Down the Storm Drain" Pollution Prevention Program of the Cities and County of Riverside at (800) 506-2555.

ONLY RAIN DOWN THE STORM DRAIN

0003447

FOOD FACILITY STORMWATER COMPLIANCE SURVEY

FACILITY DBA Murrieta Pizza Factory	FACILITY # 37713	DATE 9/22/08	
ADDRESS 40477 Murrieta Hot Springs Murrieta	ACTIVITY 3021	SERVICE CODE: 416	
COMPLIANCE AREAS	**YES**	**NO**	**N/A**
GREASE BARRELS/ INTERCEPTORS			
1. Grease pumped/removed on a regular basis.			✓
2. Grease interceptor located outside facility, maintained properly.			✓
EQUIPMENT CLEANING			
3. The following items are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Grease filters	✓		
b. Floor mats	✓		
c. Floors (mop water and rinse water)	✓		
d. Grills			✓
OUTSIDE AREAS			
4. The following areas are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Sidewalk or outdoor seating	✓		
b. Drive thru			✓
DUMPSTERS AND RECYCLING CONTAINERS			
5. Food waste bagged and sealed before disposal.	✓		
6. Dumpsters and recycling containers are covered.	✓		
7. Spilled materials around containers are picked up regularly.	✓		
8. Wash water is discharged to the sanitary sewer or is collected for proper disposal.	✓		
EMPLOYEE EDUCATION/ AWARENESS			
9. Brochures or posters displayed.	✓		
10. BMPs observed.			
OVERALL RATING	GOOD	AVERAGE	NEEDS IMPROVEMENT

COMMENTS:

Received by:	Env. Health Specialist:	Badge #

If additional information is required, contact the Storm Water/Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

mw 9/01

0003448

FOOD FACILITY STORMWATER COMPLIANCE SURVEY

FACILITY DBA Cole Canyon Elementary	FACILITY # 6706	DATE 9/16/08 ±	
ADDRESS 23750 Via Velisal, Murr	ACTIVITY 2628	SERVICE CODE: 410	
COMPLIANCE AREAS	YES	NO	N/A
GREASE BARRELS/ INTERCEPTORS			
1. Grease pumped/removed on a regular basis.			✓
2. Grease interceptor located outside facility, maintained properly.			✓
EQUIPMENT CLEANING			
3. The following items are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Grease filters	✓		
b. Floor mats	✓		
c. Floors (mop water and rinse water)	✓		
d. Grills			✓
OUTSIDE AREAS			
4. The following areas are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Sidewalk or outdoor seating	✓		
b. Drive thru			✓
DUMPSTERS AND RECYCLING CONTAINERS			
5. Food waste bagged and sealed before disposal.	✓		
6. Dumpsters and recycling containers are covered.	✓		
7. Spilled materials around containers are picked up regularly.	✓		
8. Wash water is discharged to the sanitary sewer or is collected for proper disposal.	✓		
EMPLOYEE EDUCATION/ AWARENESS			
9. Brochures or posters displayed.	✓		
10. BMPs observed.			
OVERALL RATING	(GOOD)	AVERAGE	NEEDS IMPROVEMENT

COMMENTS:

Print Name: Cindy Erbeck

Received by: Cynthia Erbeck | Env. Health Specialist: D. Bishop | Badge #: 44

For additional information, please refer to our web site at www.floodcontrol.co.riverside.ca.us or contact the "Only Rain Down the Storm Drain" Pollution Prevention Program of the Cities and County of Riverside at (800) 506-2555.

ONLY RAIN... DOWN THE STORM DRAIN

0003449

FOOD FACILITY STORMWATER COMPLIANCE SURVEY

FACILITY DBA Chile Hot Family Restaurant	FACILITY# 89661	DATE 9/16/08	
ADDRESS 40119 Murrieta Hot Springs. Murrieta	ACTIVITY 8620	SERVICE CODE: 410	
COMPLIANCE AREAS	YES	NO	N/A
GREASE BARRELS/ INTERCEPTORS			
1. Grease pumped/removed on a regular basis.	✓		
2. Grease interceptor located outside facility, maintained properly.	✓		
EQUIPMENT CLEANING			
3. The following items are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Grease filters	✓		
b. Floor mats	✓		
c. Floors (mop water and rinse water)	✓		
d. Grills			✓
OUTSIDE AREAS			
4. The following areas are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Sidewalk or outdoor seating	✓		
b. Drive thru			✓
DUMPSTERS AND RECYCLING CONTAINERS			
5. Food waste bagged and sealed before disposal.	✓		
6. Dumpsters and recycling containers are covered.	✓		
7. Spilled materials around containers are picked up regularly.			✓
8. Wash water is discharged to the sanitary sewer or is collected for proper disposal.	✓		
EMPLOYEE EDUCATION/ AWARENESS			
9. Brochures or posters displayed.	✓		
10. BMPs observed.	✓		
OVERALL RATING	GOOD	AVERAGE	NEEDS IMPROVEMENT
COMMENTS:			
Received by:	Env. Health Specialist: S. Peralta		Badge# 3646

If additional information is required, contact the Storm Water/Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

StormWater Clean Water PROTECTION PROGRAM

CITY OF MURRIETA

mw 9/01

0003450

FOOD FACILITY STORMWATER COMPLIANCE SURVEY

FACILITY DBA Sweet Layers	FACILITY # 08392	DATE 9/10/08	
ADDRESS 29992 Hunter Rd #103 Murrieta	ACTIVITY 2020	SERVICE CODE: 410	
COMPLIANCE AREAS	**YES**	**NO**	**N/A**
GREASE BARRELS/ INTERCEPTORS			
1. Grease pumped/removed on a regular basis.			✓
2. Grease interceptor located outside facility, maintained properly.			✓
EQUIPMENT CLEANING			
3. The following items are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Grease filters			✓
b. Floor mats	✓		
c. Floors (mop water and rinse water)	✓		
d. Grills			✓
OUTSIDE AREAS			
4. The following areas are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Sidewalk or outdoor seating	✓		
b. Drive thru			✓
DUMPSTERS AND RECYCLING CONTAINERS			
5. Food waste bagged and sealed before disposal.	✓		
6. Dumpsters and recycling containers are covered.	✓		
7. Spilled materials around containers are picked up regularly.			✓
8. Wash water is discharged to the sanitary sewer or is collected for proper disposal.			✓
EMPLOYEE EDUCATION/ AWARENESS			
9. Brochures or posters displayed.	✓		
10. BMPs observed.	✓		
OVERALL RATING	GOOD	AVERAGE	NEEDS IMPROVEMENT
COMMENTS:			
Received by: Cynthia Wilson	Env. Health Specialist S. Peralta		Badge # 326

If additional information is required, contact the Storm Water/Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

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0003451

FOOD FACILITY STORMWATER COMPLIANCE SURVEY

FACILITY DBA: Pony Chinese	FACILITY #: 03746	DATE: 9/10/08	
ADDRESS: 39525 #K Los Alamos Rd	ACTIVITY: 3621	SERVICE CODE: 410	
COMPLIANCE AREAS	**YES**	**NO**	**N/A**
GREASE BARRELS/ INTERCEPTORS			
1. Grease pumped/removed on a regular basis.	✓		
2. Grease interceptor located outside facility, maintained properly.	✓		✓ OK
EQUIPMENT CLEANING			
3. The following items are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Grease filters	✓		
b. Floor mats			✓
c. Floors (mop water and rinse water)	✓		
d. Grills			✓
OUTSIDE AREAS			
4. The following areas are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Sidewalk or outdoor seating	✓		
b. Drive thru			✓
DUMPSTERS AND RECYCLING CONTAINERS			
5. Food waste bagged and sealed before disposal.	✓		
6. Dumpsters and recycling containers are covered.	✓		
7. Spilled materials around containers are picked up regularly.	✓		
8. Wash water is discharged to the sanitary sewer or is collected for proper disposal.	✓		
EMPLOYEE EDUCATION/ AWARENESS			
9. Brochures or posters displayed.	✓		
10. BMPs observed.	✓		
OVERALL RATING	GOOD	AVERAGE	NEEDS IMPROVEMENT
COMMENTS:			
Received by:	Env. Health Specialist: S. Peralta		Badge # 3[illegible]

If additional information is required, contact the Storm Water/Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

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0003452

FOOD FACILITY STORMWATER COMPLIANCE SURVEY

FACILITY DBA Fresh & Easy	FACILITY # 38837	DATE 9-9-08	
ADDRESS 39530 Murrieta Hot Spgs, Murrieta	ACTIVITY 3622	SERVICE CODE: 410	
COMPLIANCE AREAS	**YES**	**NO**	**N/A**
GREASE BARRELS/ INTERCEPTORS			
1. Grease pumped/removed on a regular basis.			X
2. Grease interceptor located outside facility, maintained properly.			X
EQUIPMENT CLEANING			
3. The following items are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Grease filters			X
b. Floor mats	X		
c. Floors (mop water and rinse water)	X		
d. Grills			X
OUTSIDE AREAS			
4. The following areas are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Sidewalk or outdoor seating			X
b. Drive thru			X
DUMPSTERS AND RECYCLING CONTAINERS			
5. Food waste bagged and sealed before disposal.	X		
6. Dumpsters and recycling containers are covered.	X		
7. Spilled materials around containers are picked up regularly.	X		
8. Wash water is discharged to the sanitary sewer or is collected for proper disposal.	X		
EMPLOYEE EDUCATION/ AWARENESS			
9. Brochures or posters displayed.	X		
10. BMPs observed.	X		
OVERALL RATING	GOOD	AVERAGE	NEEDS IMPROVEMENT

COMMENTS:

Received by:	Env. Health Specialist: Stacy Anderson	Badge # 21847 6

If additional information is required, contact the Storm Water/Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

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0003453

FOOD FACILITY STORMWATER COMPLIANCE SURVEY

FACILITY DBA Sizzler	FACILITY # 035297	DATE 9/8/08	
ADDRESS 40489 Murrieta Hot Springs, Murrieta	ACTIVITY 3622	SERVICE CODE: 410	
COMPLIANCE AREAS	**YES**	**NO**	**N/A**
GREASE BARRELS/ INTERCEPTORS			
1. Grease pumped/removed on a regular basis.	✓		
2. Grease interceptor located outside facility, maintained properly.	✓		
EQUIPMENT CLEANING			
3. The following items are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Grease filters	✓		
b. Floor mats	✓		
c. Floors (mop water and rinse water)	✓		
d. Grills			✓
OUTSIDE AREAS			
4. The following areas are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Sidewalk or outdoor seating	✓		
b. Drive thru			✓
DUMPSTERS AND RECYCLING CONTAINERS			
5. Food waste bagged and sealed before disposal.	✓		
6. Dumpsters and recycling containers are covered.	✓		
7. Spilled materials around containers are picked up regularly.	✓		
8. Wash water is discharged to the sanitary sewer or is collected for proper disposal.	✓		
EMPLOYEE EDUCATION/ AWARENESS			
9. Brochures or posters displayed.	✓		
10. BMPs observed.	✓		
OVERALL RATING	GOOD	AVERAGE	NEEDS IMPROVEMENT

COMMENTS:

Received by: Tony	Env. Health Specialist: S. Peralta	Badge # 326

If additional information is required, contact the Storm Water/Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

mw 9/01

0003454

FOOD FACILITY STORMWATER COMPLIANCE SURVEY

FACILITY DBA Andy's Cafe	FACILITY # 05263	DATE 9/8/08
ADDRESS 40469 Murrieta Hot Springs Murrieta	ACTIVITY 3621	SERVICE CODE: 410

COMPLIANCE AREAS	YES	NO	N/A
GREASE BARRELS/ INTERCEPTORS			
1. Grease pumped/removed on a regular basis.	✓		
2. Grease interceptor located outside facility, maintained properly.			✓
EQUIPMENT CLEANING			
3. The following items are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Grease filters	✓		
b. Floor mats	✓		
c. Floors (mop water and rinse water)	✓		
d. Grills	✓		
OUTSIDE AREAS			
4. The following areas are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Sidewalk or outdoor seating	✓		
b. Drive thru			✓
DUMPSTERS AND RECYCLING CONTAINERS			
5. Food waste bagged and sealed before disposal.	✓		
6. Dumpsters and recycling containers are covered.	✓		
7. Spilled materials around containers are picked up regularly.	✓		
8. Wash water is discharged to the sanitary sewer or is collected for proper disposal.	✓		
EMPLOYEE EDUCATION/ AWARENESS			
9. Brochures or posters displayed.	✓		
10. BMPs observed.	✓		
OVERALL RATING	GOOD	AVERAGE	NEEDS IMPROVEMENT

COMMENTS:

Received by:	Env. Health Specialist:	Badge #
		326

If additional information is required, contact the Storm Water/Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

mw 9/01

0003455

FOOD FACILITY STORMWATER COMPLIANCE SURVEY

FACILITY DBA French Valley Cafe	FACILITY # 06836	DATE 9/8/08	
ADDRESS 37552 Winchester Rd Murrieta	ACTIVITY 3620	SERVICE CODE: 410	
COMPLIANCE AREAS	**YES**	**NO**	**N/A**
GREASE BARRELS/ INTERCEPTORS			
1. Grease pumped/removed on a regular basis.	✓		
2. Grease interceptor located outside facility, maintained properly.	✓		
EQUIPMENT CLEANING			
3. The following items are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Grease filters	✓		
b. Floor mats	✓		
c. Floors (mop water and rinse water)	✓		
d. Grills	✓		
OUTSIDE AREAS			
4. The following areas are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Sidewalk or outdoor seating	✓		
b. Drive thru			✓
DUMPSTERS AND RECYCLING CONTAINERS			
5. Food waste bagged and sealed before disposal.	✓		
6. Dumpsters and recycling containers are covered.	✓		
7. Spilled materials around containers are picked up regularly.	✓		
8. Wash water is discharged to the sanitary sewer or is collected for proper disposal.	✓		
EMPLOYEE EDUCATION/ AWARENESS			
9. Brochures or posters displayed.	✓		
10. BMPs observed.	✓		
OVERALL RATING	GOOD	AVERAGE	NEEDS IMPROVEMENT
COMMENTS:			
Received by:	Env. Health Specialist: S. Perulla		Badge #

If additional information is required, contact the Storm Water/Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

0003456

FOOD FACILITY STORMWATER COMPLIANCE SURVEY

FACILITY DBA Hole N One Bagels & Donuts	FACILITY # 36179	DATE 8-19-08	
ADDRESS 40119 Murrieta Hot Springs Rd, Murrieta	ACTIVITY 3620	SERVICE CODE: 410	
COMPLIANCE AREAS	**YES**	**NO**	**N/A**
GREASE BARRELS/ INTERCEPTORS			
1. Grease pumped/removed on a regular basis.	✓		
2. Grease interceptor located outside facility, maintained properly.			✓
EQUIPMENT CLEANING			
3. The following items are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Grease filters	✓		
b. Floor mats	✓		
c. Floors (mop water and rinse water)	✓		
d. Grills			✓
OUTSIDE AREAS			
4. The following areas are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Sidewalk or outdoor seating	✓		
b. Drive thru			✓
DUMPSTERS AND RECYCLING CONTAINERS			
5. Food waste bagged and sealed before disposal.	✓		
6. Dumpsters and recycling containers are covered.	✓		
7. Spilled materials around containers are picked up regularly.	✓		
8. Wash water is discharged to the sanitary sewer or is collected for proper disposal.	✓		
EMPLOYEE EDUCATION/ AWARENESS			
9. Brochures or posters displayed.	✓		
10. BMPs observed.	✓		
OVERALL RATING	**GOOD**	**AVERAGE**	**NEEDS IMPROVEMENT**
COMMENTS:			
Received by: [signature]	Env. Health Specialist S. Peralta		Badge #

If additional information is required, contact the Storm Water/Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

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0003457

FOOD FACILITY STORMWATER COMPLIANCE SURVEY

FACILITY DBA Honeycutt Farms	FACILITY # 65231	DATE 8 12 08	
ADDRESS 40477 Murrieta Hot Springs Rd	ACTIVITY 3621	SERVICE CODE: 410	
COMPLIANCE AREAS	**YES**	**NO**	**N/A**
GREASE BARRELS/ INTERCEPTORS			
1. Grease pumped/removed on a regular basis.	✓		
2. Grease interceptor located outside facility, maintained properly.	✓		
EQUIPMENT CLEANING			
3. The following items are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Grease filters	✓		
b. Floor mats	✓		
c. Floors (mop water and rinse water)	✓		
d. Grills			✓
OUTSIDE AREAS			
4. The following areas are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Sidewalk or outdoor seating	✓		
b. Drive thru			✓
DUMPSTERS AND RECYCLING CONTAINERS			
5. Food waste bagged and sealed before disposal.	✓		
6. Dumpsters and recycling containers are covered.	✓		
7. Spilled materials around containers are picked up regularly.	✓		
8. Wash water is discharged to the sanitary sewer or is collected for proper disposal.	✓		
EMPLOYEE EDUCATION/ AWARENESS			
9. Brochures or posters displayed.	✓		
10. BMPs observed.	✓		
OVERALL RATING	GOOD	AVERAGE	NEEDS IMPROVEMENT
COMMENTS:			
Received by: Nichole Monk	Env. Health Specialist: S. Perullo		Badge # 326

If additional information is required, contact the Storm Water/Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

mw 9/01

0003458

FOOD FACILITY STORMWATER COMPLIANCE SURVEY

FACILITY DBA Taco Bell #5081	FACILITY # 03022	DATE 8.12.08	
ADDRESS 39557 Los Alamos Murrieta	ACTIVITY 2621	SERVICE CODE: 410	
COMPLIANCE AREAS	YES	NO	N/A
GREASE BARRELS/ INTERCEPTORS			
1. Grease pumped/removed on a regular basis.	✓		
2. Grease interceptor located outside facility, maintained properly.			✓
EQUIPMENT CLEANING			
3. The following items are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Grease filters	✓		
b. Floor mats			✓
c. Floors (mop water and rinse water)	✓		
d. Grills			✓
OUTSIDE AREAS			
4. The following areas are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Sidewalk or outdoor seating	✓		
b. Drive thru	✓		
DUMPSTERS AND RECYCLING CONTAINERS			
5. Food waste bagged and sealed before disposal.	✓		
6. Dumpsters and recycling containers are covered.	✓		
7. Spilled materials around containers are picked up regularly.	✓		
8. Wash water is discharged to the sanitary sewer or is collected for proper disposal.	✓		
EMPLOYEE EDUCATION/ AWARENESS			
9. Brochures or posters displayed.	✓		
10. BMPs observed.	✓		
OVERALL RATING	GOOD	AVERAGE	NEEDS IMPROVEMENT
COMMENTS:			
Received by: Antonia Aguilar	Env. Health Specialist: S. Peralta		Badge # 5 6

If additional information is required, contact the Storm Water/Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

mw 9/01

0003459

FOOD FACILITY STORMWATER COMPLIANCE SURVEY

FACILITY DBA SGC Sushi Japanese	FACILITY # 87351	DATE 8.12.08
ADDRESS 40461 Murrieta Hot Spnngs, Murrieta	ACTIVITY 3621	SERVICE CODE: 410

COMPLIANCE AREAS	YES	NO	N/A
GREASE BARRELS/ INTERCEPTORS			
1. Grease pumped/removed on a regular basis.	✓		
2. Grease interceptor located outside facility, maintained properly.	✓		
EQUIPMENT CLEANING			
3. The following items are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Grease filters	✓		
b. Floor mats	✓		
c. Floors (mop water and rinse water)	✓		
d. Grills			✓
OUTSIDE AREAS			
4. The following areas are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Sidewalk or outdoor seating	✓		
b. Drive thru			✓
DUMPSTERS AND RECYCLING CONTAINERS			
5. Food waste bagged and sealed before disposal.	✓		
6. Dumpsters and recycling containers are covered.	✓		
7. Spilled materials around containers are picked up regularly.	✓		
8. Wash water is discharged to the sanitary sewer or is collected for proper disposal.	✓		
EMPLOYEE EDUCATION/ AWARENESS			
9. Brochures or posters displayed.	✓		
10. BMPs observed.	✓		
OVERALL RATING	GOOD	AVERAGE	NEEDS IMPROVEMENT

COMMENTS:

Received by:	Env. Health Specialist:	Badge # 396

If additional information is required, contact the Storm Water/Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

mw 9/01

0003460

FOOD FACILITY STORMWATER COMPLIANCE SURVEY

FACILITY DBA Hot Wok Chinese Food	FACILITY # 06960	DATE 8/12-05	
ADDRESS 40469 Murrieta Hot Spnngs	ACTIVITY 3620	SERVICE CODE: 410	
COMPLIANCE AREAS	YES	NO	N/A
GREASE BARRELS/INTERCEPTORS			
1. Grease pumped/removed on a regular basis.	✓		
2. Grease interceptor located outside facility, maintained properly.	✓		
EQUIPMENT CLEANING			
3. The following items are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Grease filters	✓		
b. Floor mats	✓		✓
c. Floors (mop water and rinse water)	✓		✓
d. Grills			✓
OUTSIDE AREAS			
4. The following areas are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Sidewalk or outdoor seating	✓		✓
b. Drive thru			✓
DUMPSTERS AND RECYCLING CONTAINERS			
5. Food waste bagged and sealed before disposal.	✓		
6. Dumpsters and recycling containers are covered.	✓		
7. Spilled materials around containers are picked up regularly.	✓		
8. Wash water is discharged to the sanitary sewer or is collected for proper disposal.	✓		
EMPLOYEE EDUCATION/AWARENESS			
9. Brochures or posters displayed.	✓		
10. BMPs observed.	✓		
OVERALL RATING	GOOD	AVERAGE	NEEDS IMPROVEMENT

COMMENTS:

Received by: [signature]	Env. Health Specialist: S. Peralta	Badge # 390

If additional information is required, contact the Storm Water/Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

mw 9/01

0003461

FOOD FACILITY STORMWATER COMPLIANCE SURVEY

FACILITY DBA Hot Wok Chinese Food	FACILITY # 06460	DATE 8/2·05	
ADDRESS 40469 Murrieta Hot Spnngs	ACTIVITY 3620	SERVICE CODE: 410	
COMPLIANCE AREAS	YES	NO	N/A
GREASE BARRELS/ INTERCEPTORS			
1. Grease pumped/removed on a regular basis.	✓		
2. Grease interceptor located outside facility, maintained properly.	✓		
EQUIPMENT CLEANING			
3. The following items are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Grease filters	✓		
b. Floor mats			✓
c. Floors (mop water and rinse water)	✓		
d. Grills			✓
OUTSIDE AREAS			
4. The following areas are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Sidewalk or outdoor seating	✓		
b. Drive thru			✓
DUMPSTERS AND RECYCLING CONTAINERS			
5. Food waste bagged and sealed before disposal.	✓		
6. Dumpsters and recycling containers are covered.	✓		
7. Spilled materials around containers are picked up regularly.	✓		
8. Wash water is discharged to the sanitary sewer or is collected for proper disposal.	✓		
EMPLOYEE EDUCATION/ AWARENESS			
9. Brochures or posters displayed.	✓		
10. BMPs observed.			
OVERALL RATING	GOOD	AVERAGE	NEEDS IMPROVEMENT
COMMENTS:			
Received by: [signature]	Env. Health Specialist: S. Peralta		Badge # 390

If additional information is required, contact the Storm Water/Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

mw 9/01

0003462

FOOD FACILITY STORMWATER COMPLIANCE SURVEY

FACILITY DBA Del Taco #249	FACILITY# 5368	DATE 8-11-05	
ADDRESS 40465 Alta Murrieta, Murrieta	ACTIVITY 2620	SERVICE CODE: 410	
COMPLIANCE AREAS	YES	NO	N/A
GREASE BARRELS/ INTERCEPTORS			
1. Grease pumped/removed on a regular basis.	✓		
2. Grease interceptor located outside facility, maintained properly.	✓		
EQUIPMENT CLEANING			
3. The following items are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Grease filters	✓		✓
b. Floor mats	✓		✓
c. Floors (mop water and rinse water)	✓		
d. Grills			✓
OUTSIDE AREAS			
4. The following areas are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Sidewalk or outdoor seating	✓		
b. Drive thru	✓		
DUMPSTERS AND RECYCLING CONTAINERS			
5. Food waste bagged and sealed before disposal.	✓		
6. Dumpsters and recycling containers are covered.	✓		
7. Spilled materials around containers are picked up regularly.	✓		
8. Wash water is discharged to the sanitary sewer or is collected for proper disposal.	✓		
EMPLOYEE EDUCATION/ AWARENESS			
9. Brochures or posters displayed.	✓		
10. BMPs observed.	✓		
OVERALL RATING	GOOD	AVERAGE	NEEDS IMPROVEMENT

COMMENTS:

Received by:	Env. Health Specialist: S. Peralta	Badge # 396

If additional information is required, contact the Storm Water/Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

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0003463

FOOD FACILITY STORMWATER COMPLIANCE SURVEY

FACILITY DBA KR's Chicken & Ribs	FACILITY # 88029	DATE 8-4-08	
ADDRESS 41539 Kalmia St #120, Murrieta	ACTIVITY 3620	SERVICE CODE: 410	
COMPLIANCE AREAS	YES	NO	N/A
GREASE BARRELS/ INTERCEPTORS			
1. Grease pumped/removed on a regular basis.	✓		
2. Grease interceptor located outside facility, maintained properly.	✓		
EQUIPMENT CLEANING			
3. The following items are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Grease filters	✓		
b. Floor mats	✓		
c. Floors (mop water and rinse water)	✓		
d. Grills	✓		
OUTSIDE AREAS			
4. The following areas are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Sidewalk or outdoor seating	✓		
b. Drive thru			✓
DUMPSTERS AND RECYCLING CONTAINERS			
5. Food waste bagged and sealed before disposal.	✓		
6. Dumpsters and recycling containers are covered.	✓		
7. Spilled materials around containers are picked up regularly.	✓		
8. Wash water is discharged to the sanitary sewer or is collected for proper disposal.	✓		
EMPLOYEE EDUCATION/ AWARENESS			
9. Brochures or posters displayed.	✓		
10. BMPs observed.	✓		
OVERALL RATING	GOOD	AVERAGE	NEEDS IMPROVEMENT

COMMENTS:

Received by: Malcom Jolak	Env. Health Specialist: S. Peralta	Badge # 896

If additional information is required, contact the Storm Water/Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

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0003464

FOOD FACILITY STORMWATER COMPLIANCE SURVEY

FACILITY DBA Taco Bell	FACILITY# 7123	DATE 8-6-08 ±	
ADDRESS 35056 Winchester Rd., Murrieta	ACTIVITY 2621	SERVICE CODE: 410	
COMPLIANCE AREAS	YES	NO	N/A
GREASE BARRELS/ INTERCEPTORS			
1. Grease pumped/removed on a regular basis. NOT SURE	✓		
2. Grease interceptor located outside facility, maintained properly.	✓		
EQUIPMENT CLEANING			
3. The following items are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Grease filters	✓		
b. Floor mats	✓		
c. Floors (mop water and rinse water)	✓		
d. Grills			✓
OUTSIDE AREAS			
4. The following areas are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Sidewalk or outdoor seating		✓	
b. Drive thru	✓		
DUMPSTERS AND RECYCLING CONTAINERS			
5. Food waste bagged and sealed before disposal.	✓		
6. Dumpsters and recycling containers are covered.	✓		
7. Spilled materials around containers are picked up regularly.	✓		
8. Wash water is discharged to the sanitary sewer or is collected for proper disposal.	✓		
EMPLOYEE EDUCATION/ AWARENESS			
9. Brochures or posters displayed. Provided	✓		
10. BMPs observed.	✓		
OVERALL RATING	GOOD	AVERAGE	NEEDS IMPROVEMENT

COMMENTS:

Received by: [signature]	Env. Health Specialist: D. Bishop	Badge #

For additional information, please refer to our web site at www.floodcontrol.co.riverside.ca.us or contact the "Only Rain Down the Storm Drain" Pollution Prevention Program of the Cities and County of Riverside at (800) 506-2555.

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0003465

FOOD FACILITY STORMWATER COMPLIANCE SURVEY

FACILITY DBA Aroma Coffee & Floral	FACILITY # 208445	DATE 8-6-08	
ADDRESS 29950 Hunter Rd Murrieta	ACTIVITY 2620	SERVICE CODE: 410	
COMPLIANCE AREAS	YES	NO	N/A
GREASE BARRELS/ INTERCEPTORS			
1. Grease pumped/removed on a regular basis.			✓
2. Grease interceptor located outside facility, maintained properly.			✓
EQUIPMENT CLEANING			
3. The following items are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Grease filters			✓
b. Floor mats	✓		✓
c. Floors (mop water and rinse water)	✓		
d. Grills			✓
OUTSIDE AREAS			
4. The following areas are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Sidewalk or outdoor seating	✓		
b. Drive thru			✓
DUMPSTERS AND RECYCLING CONTAINERS			
5. Food waste bagged and sealed before disposal.	✓		
6. Dumpsters and recycling containers are covered.	✓		
7. Spilled materials around containers are picked up regularly.	✓		
8. Wash water is discharged to the sanitary sewer or is collected for proper disposal.	✓		
EMPLOYEE EDUCATION/ AWARENESS			
9. Brochures or posters displayed.	✓		
10. BMPs observed.	✓		
OVERALL RATING	GOOD	AVERAGE	NEEDS IMPROVEMENT

COMMENTS:

Received by: Jane Kelly	Env. Health Specialist: S. Percella	Badge # 56

If additional information is required, contact the Storm Water/Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

mw 9/01

0003466

FOOD FACILITY STORMWATER COMPLIANCE SURVEY

FACILITY DBA Bowtz Grill	FACILITY # 36899	DATE 8-6-08	
ADDRESS 39809 Los Alamos, Murrieta	ACTIVITY 3621	SERVICE CODE: 410	
COMPLIANCE AREAS	**YES**	**NO**	**N/A**
GREASE BARRELS/ INTERCEPTORS			
1. Grease pumped/removed on a regular basis.	✓		✓
2. Grease interceptor located outside facility, maintained properly.			✓
EQUIPMENT CLEANING			
3. The following items are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Grease filters	✓		
b. Floor mats	✓		
c. Floors (mop water and rinse water)	✓		
d. Grills	✓		
OUTSIDE AREAS			
4. The following areas are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Sidewalk or outdoor seating	✓		
b. Drive thru	✓		
DUMPSTERS AND RECYCLING CONTAINERS			
5. Food waste bagged and sealed before disposal.	✓		
6. Dumpsters and recycling containers are covered.	✓		
7. Spilled materials around containers are picked up regularly.	✓		
8. Wash water is discharged to the sanitary sewer or is collected for proper disposal.	✓		
EMPLOYEE EDUCATION/ AWARENESS			
9. Brochures or posters displayed.	✓		
10. BMPs observed.			
OVERALL RATING	GOOD	AVERAGE	NEEDS IMPROVEMENT

COMMENTS:

Received by: [signature]

Env. Health Specialist: [signature]

Badge # 396

If additional information is required, contact the Storm Water/Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

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0003467

FOOD FACILITY STORMWATER COMPLIANCE SURVEY

FACILITY DBA Walmart,	FACILITY # 06973	DATE 7-31-08	
ADDRESS 41200 Murrieta Hot Springs Murrieta	ACTIVITY 11604	SERVICE CODE: 410	
COMPLIANCE AREAS	**YES**	**NO**	**N/A**
GREASE BARRELS/INTERCEPTORS			
1. Grease pumped/removed on a regular basis.			✓
2. Grease interceptor located outside facility, maintained properly.			✓
EQUIPMENT CLEANING			
3. The following items are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Grease filters			✓
b. Floor mats	✓		
c. Floors (mop water and rinse water)	✓		
d. Grills			✓
OUTSIDE AREAS			
4. The following areas are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Sidewalk or outdoor seating	✓		
b. Drive thru			✓
DUMPSTERS AND RECYCLING CONTAINERS			
5. Food waste bagged and sealed before disposal.	✓		
6. Dumpsters and recycling containers are covered.	✓		
7. Spilled materials around containers are picked up regularly.			✓
8. Wash water is discharged to the sanitary sewer or is collected for proper disposal.	✓		
EMPLOYEE EDUCATION/ AWARENESS			
9. Brochures or posters displayed.	✓		
10. BMPs observed.	✓		
OVERALL RATING	GOOD	AVERAGE	NEEDS IMPROVEMENT

COMMENTS:

Received by: Rebecca	Env. Health Specialist: S. Peralta	Badge # 386

If additional information is required, contact the Storm Water/Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

mw 9/01

0003468

FOOD FACILITY STORMWATER COMPLIANCE SURVEY

FACILITY DBA Murrieta High School	FACILITY #: 5940	DATE 2/17/08	
ADDRESS 24105 Washington, Murr.	ACTIVITY 2628	SERVICE CODE: 410	
COMPLIANCE AREAS	**YES**	**NO**	**N/A**
GREASE BARRELS/ INTERCEPTORS			
1. Grease pumped/removed on a regular basis.			✓
2. Grease interceptor located outside facility, maintained properly.			✓
EQUIPMENT CLEANING			
3. The following items are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Grease filters	✓		
b. Floor mats	✓		
c. Floors (mop water and rinse water)	✓		
d. Grills			✓
OUTSIDE AREAS			
4. The following areas are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Sidewalk or outdoor seating	✓		
b. Drive thru			✓
DUMPSTERS AND RECYCLING CONTAINERS			
5. Food waste bagged and sealed before disposal.	✓		
6. Dumpsters and recycling containers are covered.	✓		
7. Spilled materials around containers are picked up regularly.	✓		
8. Wash water is discharged to the sanitary sewer or is collected for proper disposal.	✓		
EMPLOYEE EDUCATION/ AWARENESS			
9. Brochures or posters displayed.	✓		
10. BMPs observed.			
OVERALL RATING	(GOOD)	AVERAGE	NEEDS IMPROVEMENT

COMMENTS:

Print Name: Teresa Thurman

Received by: [signature] | Env. Health Specialist: D. Osborp | Badge #: 77

For additional information, please refer to our web site at www.floodcontrol.co.riverside.ca.us or contact the "Only Rain Down the Storm Drain" Pollution Prevention Program of the Cities and County of Riverside at (800) 506-2555.

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0003469

FOOD FACILITY STORMWATER COMPLIANCE SURVEY

FACILITY DBA Juice It Up 37948	FACILITY # ~~2620~~	DATE 7-2-08	
ADDRESS 27890 Clinton Keith Rd, Murrieta	ACTIVITY 2620	SERVICE CODE: 410	
COMPLIANCE AREAS	YES	NO	N/A
GREASE BARRELS/ INTERCEPTORS			
1. Grease pumped/removed on a regular basis.			✓
2. Grease interceptor located outside facility, maintained properly.			✓
EQUIPMENT CLEANING			
3. The following items are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Grease filters			✓
b. Floor mats	✓		
c. Floors (mop water and rinse water)	✓		
d. Grills			✓
OUTSIDE AREAS			
4. The following areas are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Sidewalk or outdoor seating	✓		
b. Drive thru			✓
DUMPSTERS AND RECYCLING CONTAINERS			
5. Food waste bagged and sealed before disposal.	✓		
6. Dumpsters and recycling containers are covered.	✓		
7. Spilled materials around containers are picked up regularly.	✓		
8. Wash water is discharged to the sanitary sewer or is collected for proper disposal.	✓		
EMPLOYEE EDUCATION/ AWARENESS			
9. Brochures or posters displayed.	✓		
10. BMPs observed.	✓		
OVERALL RATING	GOOD	AVERAGE	NEEDS IMPROVEMENT

COMMENTS:

Received by: [signature]	Env. Health Specialist S. Peralta	Badge # 34

If additional information is required, contact the Storm Water/Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

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0003470

FOOD FACILITY STORMWATER COMPLIANCE SURVEY

FACILITY DBA TKS Donuts & Ice Cream	FACILITY # 37917	DATE 7-2-08	
ADDRESS 41539 Kalmia St #107, Murrieta	ACTIVITY 3620	SERVICE CODE: 410	
COMPLIANCE AREAS	**YES**	**NO**	**N/A**
GREASE BARRELS/INTERCEPTORS			
1. Grease pumped/removed on a regular basis.			✓
2. Grease interceptor located outside facility, maintained properly.			✓
EQUIPMENT CLEANING			
3. The following items are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Grease filters	✓		
b. Floor mats			✓
c. Floors (mop water and rinse water)	✓		
d. Grills	1		✓
OUTSIDE AREAS			
4. The following areas are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Sidewalk or outdoor seating	✓		
b. Drive thru			✓
DUMPSTERS AND RECYCLING CONTAINERS			
5. Food waste bagged and sealed before disposal.	✓		
6. Dumpsters and recycling containers are covered.	✓		
7. Spilled materials around containers are picked up regularly.	✓		
8. Wash water is discharged to the sanitary sewer or is collected for proper disposal.	✓		
EMPLOYEE EDUCATION/ AWARENESS			
9. Brochures or posters displayed.	✓		
10. BMPs observed.	✓		
OVERALL RATING	GOOD	AVERAGE	NEEDS IMPROVEMENT
COMMENTS:			
Received by: Sitty Lap	Env. Health Specialist: S. Peralta		Badge #

If additional information is required, contact the Storm Water/Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

mw 9/01

4. INDUSTRIAL/COMMERCIAL
(SECTION H.2 of ORDER NO. R9-2004-001), CONT.

Description and number of training efforts conducted over the last year (for industrial/commercial facility operators and/or inspectors). Attendance of Riverside County Flood Control NPDES training for activities related to DAMP implementation

3)

a. **Training:**

Training	Training Description	Training Dates	Number of Attendees
Industrial / Commercial	Riv. Co. NPDES Industrial / Commercial	5/26/09	1
		Total	**1**

4) **An assessment of program effectiveness based on the measurable goals established in the Permittee's Individual SWMP:** the City relies on the CAP, HMMD, and DEH inspection programs. The City performed follow up inspections at the facilities that were marked as "No" on the Compliance Survey sheet to ensure the items were corrected. No penalties or fines were necessary.

5) **Additional Comments/Information:**

Describe the major accomplishments of the Industrial Component over the past year: The Industrial Component appears to be in compliance.

Describe the major accomplishments of the Commercial Component over the past year: The Commercial Component appears to be in compliance.

Summarize the internal and external education and outreach activities the Industrial Component has conducted over the past year: the City relies on the CAP, HMMD, and DEH programs. The City also has brochures at the front counter and links on their website.

Summarize the internal and external education and outreach activities the Commercial Component has conducted over the past year: the City relies on the CAP, HMMD, and DEH programs. The City also has brochures at the front counter and links on their website.

4. INDUSTRIAL/COMMERCIAL
(SECTION H.2 of ORDER NO. R9-2004-001), CONT.

Summarize new activities or improvements to be implemented next year as a result of your self assessment of the Industrial Component: continue training and propose additional inspection program.

Summarize new activities or improvements to be implemented next year as a result of your self assessment of the Commerical Component: continue training and propose additional inspection program.

Other comments

5. RESIDENTIAL
(SECTION H.3 of ORDER NO. R9-2004-001)

1) **A description of residential areas that were focused on during the past year:** existing single family residences are the primary focus of Code Enforcement. The City currently performs inspections as they pass through the different areas as part of their daily trips to other sites and responds to phone calls as they are received. All new residential projects, before being accepted for maintenance by the City, are required to submit a video tape inspection of the storm drain and drainage system, ensuring no illicit connections or points of discharge. This process is a good precautionary step for the City involving new residential developments.

2) **Number and type of enforcement actions taken:**

Enforcement and Compliance Responses	Public Projects
Education and information	0
Verbal Warning	0
Written Warning	0
Notice of Non-Compliance	0
Administrative Compliance Order	0
Misdemeanor	0
Infraction (NPDES violations)	0
Citation	0
Referral to SDRWQCB	0
Total	**0**

3) **An assessment of program effectiveness based on the measurable goals established in the Permittee's Individual SWMP:** good

4) **Additional Comments/Information:**

Describe the major accomplishments of the Residential Component over the past year: While on patrol, pro-active response to person illegally discharging, dumping, littering into the residential storm drains, is routinely addressed while on duty.

Summarize the internal and external education and outreach activities the Residential Component has conducted over the past year: the City had two community clean up events that removed approximately 17.6 tons of waste as follows: 0.7 tons Green waste, 1.2 tons E-waste, 1.4 tons of Tires, 9.4 tons of Trash, and 4.9 tons of Metal. The City also participated in the United Way "Day of Caring" to remove landscape debris at one senior citizen's property.

RESIDENTIAL
(SECTION H.3), CONT.

Summarize new activities or improvements to be implemented next year as a result of your self assessment of the Residential Component: coordinate efforts with Construction department.

Other comments

6. EDUCATION
(SECTION I of ORDER NO. R9-2004-001)

1) **Description of education efforts conducted by the Permittee (not collectively with other Permittees) during the previous year:**

Audience	Measures
Permittee Departments and Personnel	Number of Permittee employees trained for: • Construction Inspection: 1 • Industrial/Commercial Inspection: 1 • Municipal Facilities and Activities: 32 • Development Planning / WQMP: 4
Construction Site Owners and Developers	Outreach events conducted: distribute first notice in August 2008 and second notice September 2008
Industrial/Commercial Owners and Operators	Industrial/Commercial outreach events conducted: None
Residential Community, General Public, Other Public Agencies and Students	Number of Media Impressions in: • Newspaper: None • Mailings: None • Radio/TV: None • Billboards: None • Other: Website • Materials: Pamphlets at main entrance area Number of classroom presentations: 63 (739 students) Public Education events conducted: Community Cleanup, United Way Day of Caring, Santa Margarita River Watershed Clean-up.

2) **Assessment of overall program effectiveness based on the measurable goals established in the Permittee's Individual SWMP:** The City continued to provide training to municipal staff in specific categories (i.e. new development, construction, municipal activities and industrial / commercial) through the implementation agreement with Riverside County Flood Control & Water Conservation District.

3) **Additional Comments/Information:**

Describe the major accomplishments of the Education Component over the past year:
None to report

6. EDUCATION
(SECTION I of ORDER NO. R9-2004-001)

Summarize new activities or improvements to be implemented next year as a result of your self assessment of the Education Component: propose adding educational information on the City's Public Access Television Channel.

Other comments

7. ILLICIT DISCHARGE DETECTION AND ELIMINATION
(SECTION J of ORDER NO. R9-2004-001)

1) **Number of illicit discharges, connections and spills reported and/or identified during the reporting period:** Code Enforcement reported 31 NPDES related calls-for-service during the reporting period. The distinguishing between the different types of violations (illicit discharges, illicit connections, and spills) was not tracked. However, the typical phone call is a resident complaining about their neighbor dumping something in the street like when they construct a pool. The Code Enforcement officer does address the concern either by follow-up telephone call or a site visit. Illicit activity was down from last year and Code Enforcement did not issue any fines.

   a) **Illicit Discharges (ID): 31**
   b) **Illicit Connections (IC): 0**
   c) **Spills (S): 0**

2) **Number of illicit discharges or connections investigated during the reporting period and the outcome of the investigations:** Code Enforcement reported 31 NPDES related calls-for-service during the reporting period. The outcome of investigations is mixed in with over 5,000 other calls Code Enforcement acted on. The Code Enforcement officer does address the concern either by follow-up telephone call or a site visit.

Type	Category	Substance	Outcome of Investigation
ID	Residential	Oil/Grease	
ID	Residential	Oil/Grease	
ID	Residential	Oil/Grease	
ID	Residential	Oil/Grease	
ID	Residential	Oil/Grease	
ID	Residential	Oil/Grease	

3) **Number and types of enforcement actions taken for illicit discharges or connections during the reporting period:**

Enforcement and Compliance Responses	Private Facilities	Public Facilities
Non-monetary penalties	0	0
Stop work authority	0	0
Fines	0	0
Financial Security (amount of Fines assessed)	0	0
Permit/Business License Denial	0	0
Total	**0**	**0**

7. ILLICIT DISCHARGE DETECTION AND ELIMINATION
(SECTION J of ORDER NO. R9-2004-001), CONT.

4) **Number of times your agency's hotline was called during the reporting period, as compared to previous reporting periods.**

	Number of Calls	
	2007-08	**2008-09**
Water Pollution Hotline	46	31

5) **Number and location of dry weather monitoring sites that were monitored during the reporting period:** there were five sites monitored twice during the reporting period. Once in the fall and once in the spring. The fall monitoring was done in November which was late however, we felt this was okay because there was little or no rain yet. Also, we felt it was monitor late then to not monitor at all. The spring monitoring was done in May. If any test sites had enough flow, field tests were performed. Qualifying samples were tested at a lab and the results were negative. As a result, further upstream investigation was not warranted.

Number of Site(s): Five

Location(s): Catt Road at Clinton Keith, Warms Springs Creek @ MHS Road, Los Alamos Road West of Kasota, Line 'F' west of Jefferson Avenue, Murrieta Creek upstream of Kalmia and confluence of Line 'F'.

7. ILLICIT DISCHARGE DETECTION AND ELIMINATION
(SECTION J of ORDER NO. R9-2004-001), CONT.

Summary of Illicit Discharge Monitoring Program results, including: 1) All inspection, field screening, and analytical monitoring results; 2) All follow-up and elimination activities; and 3) Any proposed changes to station locations and/or sampling frequencies: See **Attachment 'D'** for field data

Date	Location	Monitoring Results	Follow-up and Elimination Activities	Proposed Changes
				No Changes Comment(s):
				No Changes Comment(s):
				No Changes Comment(s):
				No Changes Comment(s):
				No Changes Comment(s):
				No Changes Comment(s):
				No Changes Comment(s):
				No Changes Comment(s):
				No Changes Comment(s):
				No Changes Comment(s):

0003479

ATTACHMENT D

Riverside County Flood Control & Water Conservation District

0003481

FIELD DATA SHEET

Station Information

Station ID No.: _____ Station Name: CATT ROAD @ CKR ROAD

Watershed: ☐SAR ☒SMR ☐WWR

Location (if not standard site): _____

Thos. Bros Page: _____

Conveyance type: _____

District Zone: _____

GPS Info: Lat _____ Long _____

Major land uses in area: Urban/Rural/Ind/Comm/Ag/Non-juris/Open

Sample Date (MM/DD/YYYY): 05/07/2009 Time (24-hr clock): 0840

Sequence (if duplicate): _____

Printed Names of Sampling Team: BILL WOOLSEY; DAVID ORTEGA

Signature of lead sampler: David Ortega

Agency conducting sampling: RCFC

Sample Information

No. of containers: 9

Chilled: ☒Yes ☐ No

Sealed: ☒Yes ☐ No

Preservatives Used:

☐ HNO_3 ☐ HCl

☐ H_2SO_4 ☐ NaOH

☐ $Na_2S_2O_3$

Sample Category

☐ Wet Weather

Storm: ☐1st ☐2nd ☐3rd

☒ Dry Weather

☐ Recon / IC/ID

☐ Complaint

☐ Other _____

Sample Type (check all that applies)

☒ Grab (specify type)

☐ Bacteria ☐ Toxicity

☐ Composite

☐ Visited, not sampled

☐ Other _____

☐ Other _____

Sample Matrix

☐Storm Water

☐Other Water

☐Soil

☒Other WASTE WATER

Flow Conditions

☐ Ponded

☒ Tranquil

☐ Rapid

☐ Storm/Flood

☐ Other _____

Weather Conditions

Now	Past 24 hrs
☐ Storm (heavy rain)	☐
☐ Rain (steady rain)	☐
☐ Showers (intermittent)	☐
☐ Partly cloudy	☐
☐ Haze	☐
☐ Fog	☐
☒ Clear	☒
☐ _____	☐

Wind:

☐ Speed _____

☒ Calm (0-5 mph)

☐ Breezy (5-10 mph)

☐ Windy (11-25 mph)

☐ Gusty (occ. 25+ mph)

☐ _____

Time since last rain: >72 hrs/days Amt. of last rain: ____ in

Flow Estimation

☐ Directly Measured _____

Units: ☐cfs ☐gpm ☐gph ☐_____

☐ USGS Gauge height _____ ft

Depth _____ Stage _____ Elev _____ Level _____

Q (cfs) = 0.3 = VISUAL ESTIMATE

[coef(1,2/3,____)]*[depth____ft]*[width____ft]*[vel____fps]

Parameters Measured

Field	Units	Grab[hrs]	BacT[hrs]	Tox[hrs]
☐ Air Temp				
☐ Sample Temp				
☐ pH				
☐ EC				
☐ Turbidity				
☐ DO				
☐ ORP (Redox)				
☐ Salinity				
☐				

IC/ID (Analytical Parameters):

☐ Total Hardness ☐ *E. coli* ☐ Dissolved Cu

☐ Oil & Grease ☐ Total Coliform ☐ Total Cu

☐ Nitrate-N ☐ Fecal Coliform ☐ Dissolved Pb

☐ Ammonia-N ☐ _____ ☐ _____

☐ Total P

☐ MBAS

☐ Diazinon

☐ Chlorpyrifos

Reasons for selecting IC/ID parameters:

Observations

Site conditions (describe):

☐ Odors

☒ Color CLEAR

☒ Clarity CLEAR

☒ Floatables VERY LITTLE

☒ Settleables VERY LITTLE

☐ Staining

☐ Condition of surr. vegetation

☐ Sediments

☐ Structural

☒ Photographs

Observations AND field notes/variations (see instructions)

SIGNIFICANT AMOUNT OF ALGAE, NATURAL VEGETATION, DEPTH OF STREAM IS TOO SHALLOW TO OBTAIN WATER QUALITY FIELD PARAMETERS WITH METER. SAMPLE LOCATION IS JUST DOWNSTREAM SOUTH OF CATT ROAD.

Composite Samples Only

No.	Time	H	Flow
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

Riverside County Flood Control & Water Conservation District

0003482

FIELD DATA SHEET

Station Information

Station ID No.: _____ Station Name: WARM SPRINGS CREEK @ MHS Rd Watershed: ☐SAR ☒SMR ☐WWR

Location (if not standard site): _____ Thos. Bros Page: _____

Conveyance type: _____ District Zone: _____

GPS Info: Lat _____ Long _____ Major land uses in area: Urban/Rural/Ind/Comm/Ag/Non-juris/Open

Sample Date (MM/DD/YYYY): 05/07/2009 Time (24-hr clock): 0940 Sequence (if duplicate): _____

Printed Names of Sampling Team: BILL WOOLSEY ; DAVID ORTEGA

Signature of lead sampler: David J Ortega Agency conducting sampling: RCFC

Sample Information

No. of containers: 2

Chilled: ☐Yes ☐ No

Sealed: ☐Yes ☐ No

Preservatives Used:

☐ HNO_3 ☐ HCl

☐ H_2SO_4 ☐ NaOH

☐ $Na_2S_2O_3$

Sample Category

☐ Wet Weather

Storm: ☐1st ☐2nd ☐3rd

☒ Dry Weather

☐ Recon / IC/ID

☐ Complaint

☐ Other _____

Sample Type (check all that applies)

☐ Grab (specify type)

☐ Bacteria ☐ Toxicity

☐ Composite

☒ Visited, not sampled

☐ Other _____

☐ Other _____

Sample Matrix

☐Storm Water

☐Other Water

☐Soil

☐Other _____

Flow Conditions

☒Ponded

☐ Tranquil

☐ Rapid

☐ Storm/Flood

☐ Other _____

Weather Conditions

Now	Past 24 hrs
☐ Storm (heavy rain)	☐
☐ Rain (steady rain)	☐
☐ Showers (intermittent)	☐
☐ Partly cloudy	☐
☐ Haze	☐
☐ Fog	☐
☒ Clear	☐
☐ _____	☐

Wind:

☐ Speed _____

☒ Calm (0-5 mph)

☐ Breezy (5-10 mph)

☐ Windy (11-25 mph)

☐ Gusty (occ. 25+ mph)

☐ _____

Time since last rain: 772 hrs/days Amt. of last rain: ____ in

Flow Estimation

☐ Directly Measured _____

Units: ☐cfs ☐gpm ☐gph ☐_____

☐ USGS Gauge height _____ ft

Depth _____ Stage _____ Elev _____ Level _____

Q (cfs) = Ø = PONDED

[coef(1,2/3,____)]*[depth____ft]*[width____ft]*[vel____fps]

Parameters Measured

Field	Units	Grab[hrs]	BacT[hrs]	Tox[hrs]
☐ Air Temp				
☒ Sample Temp	16.7°C			
☒ pH	7.33			
☒ EC	0.152 S/m			
☒ Turbidity	0.1 NTU			
☒ DO	5.95 mg/l			
☒ ORP (Redox)	133 mV			
☐ Salinity				
☐				

IC/ID (Analytical Parameters):

☐ Total Hardness ☐ *E. coli* ☐ Dissolved Cu

☐ Oil & Grease ☐ Total Coliform ☐ Total Cu

☐ Nitrate-N ☐ Fecal Coliform ☐ Dissolved Pb

☐ Ammonia-N ☐ _____ ☐ _____

☐ Total P

☐ MBAS

☐ Diazinon

☐ Chlorpyrifos

Reasons for selecting IC/ID parameters:

Observations

Site conditions (describe):

☐ Odors

☐ Color

☐ Clarity

☐ Floatables

☐ Settleables

☐ Staining

☒ Condition of surr. vegetation — see OBSERVATIONS

☐ Sediments

☐ Structural

☒ Photographs

Observations AND field notes/variations (see instructions)

SMALL BASS FISH, SCHOOL OF GUPPIES, TALL WEEDS, ALGAE, PONDED WATER, SHOPPING CART, TRASH, SCUM, in the ponded water at this location.

Composite Samples Only

No.	Time	H	Flow
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

Riverside County Flood Control & Water Conservation District

0003483

FIELD DATA SHEET

Station Information

Station ID No.: _____ Station Name: LOS ALAMOS Rd @ WEST OF KASOTA Watershed: ☐SAR ☒SMR ☐WWR

Location (if not standard site): _____ Thos. Bros Page: _____

Conveyance type: _____ District Zone: _____

GPS Info: Lat _____ Long _____ Major land uses in area: Urban/Rural/Ind/Comm/Ag/Non-juris/Open

Sample Date (MM/DD/YYYY): 05/07/09 Time (24-hr clock): _____ Sequence (if duplicate): _____

Printed Names of Sampling Team: BILL WOOLSEY; DAVID ORTEGA

Signature of lead sampler: David J Ortega Agency conducting sampling: RCFC

Sample Information

No. of containers: 0

Chilled: ☐Yes ☐ No

Sealed: ☐Yes ☐ No

Preservatives Used:

☐ HNO_3 ☐ HCl

☐ H_2SO_4 ☐ NaOH

☐ $Na_2S_2O_3$

Sample Category

☐ Wet Weather

Storm: ☐1st ☐2nd ☐3rd

☒ Dry Weather

☐ Recon / IC/ID

☐ Complaint

☐ Other _____

Sample Type (check all that applies)

☐ Grab (specify type)

☐ Bacteria ☐ Toxicity

☐ Composite

☒ Visited, not sampled

☐ Other _____

☐ Other _____

Sample Matrix

☐Storm Water

☐Other Water

☐Soil

☐Other _____

Flow Conditions

☐ Ponded

☐ Tranquil

☐ Rapid

☐ Storm/Flood

☒ Other DRY

Weather Conditions

Now	Past 24 hrs
☐ Storm (heavy rain)	☐
☐ Rain (steady rain)	☐
☐ Showers (intermittent)	☐
☐ Partly cloudy	☐
☐ Haze	☐
☐ Fog	☐
☒ Clear	☐
☐ _____	☐

Wind:

☐ Speed _____

☐ Calm (0-5 mph)

☐ Breezy (5-10 mph)

☐ Windy (11-25 mph)

☐ Gusty (occ. 25+ mph)

☐ _____

Time since last rain: 72 hrs/days Amt. of last rain: ____ in

Flow Estimation

☐ Directly Measured _____

Units: ☐cfs ☐gpm ☐gph ☐_____

☐ USGS Gauge height _____ ft

Depth _____ Stage _____ Elev _____ Level _____

Q (cfs) = 0 = DRY

[coef(1,$^2/_3$,____)]*[depth____ft]*[width____ft]*[vel____fps]

Parameters Measured

Field	Units	Grab[hrs]	BacT[hrs]	Tox[hrs]
☐ Air Temp				
☐ Sample Temp				
☐ pH				
☐ EC				
☐ Turbidity				
☐ DO				
☐ ORP (Redox)				
☐ Salinity				
☐				

IC/ID (Analytical Parameters):

☐ Total Hardness ☐ *E. coli* ☐ Dissolved Cu

☐ Oil & Grease ☐ Total Coliform ☐ Total Cu

☐ Nitrate-N ☐ Fecal Coliform ☐ Dissolved Pb

☐ Ammonia-N ☐ _____ ☐ _____

☐ Total P

☐ MBAS

☐ Diazinon

☐ Chlorpyrifos

Reasons for selecting IC/ID parameters:

Observations

Site conditions (describe):

☐ Odors

☐ Color

☐ Clarity

☐ Floatables

☐ Settleables

☐ Staining

☐ Condition of surr. vegetation

☐ Sediments

☐ Structural

☒ Photographs

Observations AND field notes/variations (see instructions)

DRY

Composite Samples Only

No.	Time	H	Flow
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

Riverside County Flood Control & Water Conservation District

0003484

FIELD DATA SHEET

Station Information

Station ID No.: _____ Station Name: LINE P' WEST OF JEFFERSON AVE

Watershed: ☐SAR ☒SMR ☐WWR

Location (if not standard site): _____

Thos. Bros Page: _____

Conveyance type: _____

District Zone: _____

GPS Info: Lat _____ Long _____

Major land uses in area: Urban/Rural/Ind/Comm/Ag/Non-juris/Open

Sample Date (MM/DD/YYYY): 05/07/09 Time (24-hr clock): _____ Sequence (if duplicate): _____

Printed Names of Sampling Team: BILL WOOLSEY; DAVID ORTEGA

Signature of lead sampler: David Ortega Agency conducting sampling: RCFC

Sample Information

No. of containers: 9

Chilled: ☒Yes ☐ No

Sealed: ☒Yes ☐ No

Preservatives Used:

☐ HNO_3 ☐ HCl

☐ H_2SO_4 ☐ NaOH

☐ $Na_2S_2O_3$

Sample Category

☐ Wet Weather

Storm: ☐1st ☐2nd ☐3rd

☒ Dry Weather

☐ Recon / IC/ID

☐ Complaint

☐ Other _____

Sample Type (check all that applies)

☒ Grab (specify type)

☐ Bacteria ☐ Toxicity

☐ Composite

☐ Visited, not sampled

☐ Other _____

☐ Other _____

Sample Matrix

☐Storm Water

☐Other Water

☐Soil

☒Other WASTE WATER

Flow Conditions

☐ Ponded

☒ Tranquil

☐ Rapid

☐ Storm/Flood

☐ Other _____

Weather Conditions

Now	Past 24 hrs
☐ Storm (heavy rain)	☐
☐ Rain (steady rain)	☐
☐ Showers (intermittent)	☐
☐ Partly cloudy	☐
☐ Haze	☐
☐ Fog	☐
☒ Clear	☐
☐ _____	☐

Wind:

☐ Speed _____

☒ Calm (0-5 mph)

☐ Breezy (5-10 mph)

☐ Windy (11-25 mph)

☐ Gusty (occ. 25+ mph)

☐ _____

Time since last rain: ____ hrs/days Amt. of last rain: ____ in

Flow Estimation

☐ Directly Measured _____

Units: ☐cfs ☐gpm ☐gph ☐_____

☐ USGS Gauge height _____ ft

Depth 0.17' Stage _____ Elev _____ Level _____

Q (cfs) = 1.5 = VISUAL ESTIMATE

[coef(1, 2/3, ____)]*[depth____ft]*[width____ft]*[vel____fps]

Parameters Measured

Field	Units	Grab[hrs]	BacT[hrs]	Tox[hrs]
☐ Air Temp				
☒ Sample Temp	°C	26.9°		
☒ pH		8.23		
☒ EC	S/m	0.169		
☒ Turbidity	NTU	1.0		
☒ DO	mg/l	5.96		
☒ ORP (Redox)	mV	68		
☐ Salinity				
☐				

IC/ID (Analytical Parameters):

☐ Total Hardness ☐ *E. coli* ☐ Dissolved Cu

☐ Oil & Grease ☐ Total Coliform ☐ Total Cu

☐ Nitrate-N ☐ Fecal Coliform ☐ Dissolved Pb

☐ Ammonia-N ☐ _____ ☐ _____

☐ Total P

☐ MBAS

☐ Diazinon

☐ Chlorpyrifos

Reasons for selecting IC/ID parameters:

Observations

Site conditions (describe):

☐ Odors

☒ Color CLEAR

☒ Clarity CLEAR

☐ Floatables

☐ Settleables

☐ Staining

☒ Condition of surr. vegetation SEE OBSERVATIONS

☐ Sediments

☐ Structural

☒ Photographs

Observations AND field notes/variations (see instructions)

ALGAE, HEAVY VEGETATION UPSTREAM

LIGHT VEGETATION IN SAMPLE AREA

Composite Samples Only

No.	Time	H	Flow
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

Riverside County Flood Control & Water Conservation District

0003485

FIELD DATA SHEET

Station Information

Station ID No.: _____ Station Name: MURRIETA CREEK UPSTREAM OF KALMIA & CONFLUENCE W/ LINE 'F'

Watershed: ☐SAR ☒SMR ☐WWR

Location (if not standard site): _____

Thos. Bros Page: _____

Conveyance type: _____

District Zone: _____

GPS Info: Lat _____ Long _____

Major land uses in area: Urban/Rural/Ind/Comm/Ag/Non-juris/Open

Sample Date (MM/DD/YYYY): 05/07/09 Time (24-hr clock): _____ Sequence (if duplicate): _____

Printed Names of Sampling Team: BILL WOOLSEY; DAVID ORREGA

Signature of lead sampler: David J. Ortega Agency conducting sampling: RCFC

Sample Information

No. of containers: Ø

Chilled: ☐Yes ☐ No

Sealed: ☐Yes ☐ No

Preservatives Used:

☐ HNO_3 ☐ HCl

☐ H_2SO_4 ☐ NaOH

☐ $Na_2S_2O_3$

Sample Category

☐ Wet Weather

Storm: ☐1st ☐2nd ☐3rd

☒ Dry Weather

☐ Recon / IC/ID

☐ Complaint

☐ Other _____

Sample Type (check all that applies)

☐ Grab (specify type)

☐ Bacteria ☐ Toxicity

☐ Composite

☒ Visited, not sampled

☐ Other _____

☐ Other _____

Sample Matrix

☐Storm Water

☐Other Water

☐Soil

☐Other _____

Flow Conditions

☐ Ponded

☐ Tranquil

☐ Rapid

☐ Storm/Flood

☒ Other DRY

Weather Conditions

Now	Past 24 hrs
☐ Storm (heavy rain)	☐
☐ Rain (steady rain)	☐
☐ Showers (intermittent)	☐
☐ Partly cloudy	☐
☐ Haze	☐
☐ Fog	☐
☒ Clear	☒
☐ _____	☐

Wind:

☐ Speed _____

☑ Calm (0-5 mph)

☐ Breezy (5-10 mph)

☐ Windy (11-25 mph)

☐ Gusty (occ. 25+ mph)

☐ _____

Time since last rain: >72 hrs/days Amt. of last rain: ____ in

Flow Estimation

☐ Directly Measured _____

Units: ☐cfs ☐gpm ☐gph ☐_____

☐ USGS Gauge height _____ ft

Depth _____ Stage _____ Elev _____ Level _____

Q (cfs) = Ø = DRY

[coef(1,2/3,____)]*[depth____ft]*[width____ft]*[vel____fps]

Parameters Measured

Field	Units	Grab[hrs]	BacT[hrs]	Tox[hrs]
☐ Air Temp				
☐ Sample Temp				
☐ pH				
☐ EC				
☐ Turbidity				
☐ DO				
☐ ORP (Redox)				
☐ Salinity				
☐				

IC/ID (Analytical Parameters):

☐ Total Hardness ☐ *E. coli* ☐ Dissolved Cu

☐ Oil & Grease ☐ Total Coliform ☐ Total Cu

☐ Nitrate-N ☐ Fecal Coliform ☐ Dissolved Pb

☐ Ammonia-N ☐ _____ ☐ _____

☐ Total P

☐ MBAS

☐ Diazinon

☐ Chlorpyrifos

Reasons for selecting IC/ID parameters:

Observations

Site conditions (describe):

☐ Odors

☐ Color

☐ Clarity

☐ Floatables

☐ Settleables

☐ Staining

☐ Condition of surr. vegetation

☐ Sediments

☐ Structural

☒ Photographs

Observations AND field notes/variations (see instructions)

DRY

Composite Samples Only

No.	Time	H	Flow
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

Santa Margarita Region IC/ID Monitoring

Stations	Hydron #	Notes	GRAB Dry
Murrieta Creek @ Clinton Keith Road	781	IC/ID	
Tucaloca Creek (u/s MHS Road)	800		
Benton Creek @ Van Gaele Lane	806		
Pechanga Creek @ Pala Road	849		
Catt Road @ Clinton Keith Rd.			✓
Line 'F' west of Jefferson Ave.			✓
Field parameters		**EPA Method**	
Conductance, Specific, field	1200	Field Meter	x
Turbidity, field	1690		x
pH, field	1705		x
Temperature, field	1660		x
Oxygen, Dissolved, field	1435		x
Lab/Chemical Analyses		**EPA Method**	
Conventional & Non-Conventional Pollutants			
Hardness as $CaCO_3$	1262	EPA 200.7	x
MBAS	2345	SM 5540 C	x
OP Pesticides			
Diazinon	1227	EPA 8141 B	x
Chlorpyrifos	1174	EPA 8141 B	x
Nutrients			
Ammonia as Nitrogen (NH_3-N)	1051	SM 4500 NH3H	x
Nitrate as Nitrogen (NO_3-N)	1340	EPA 300.0	x
Total Phosphorous	1485	SM 4500 P B	x
Bacteria			
E. coli	1077	SM 9223 B	x
Fecal Coliform	1075	SM 9221 E	x
Total Coliform	1085	SM 9221 B	x
Metals (total recoverable)			
Copper (Cu)	1210	EPA 200.8	x
Metals (dissolved)			
Copper (Cu)	1209	EPA 200.8	x
Lead (Pb)	1287	EPA 200.8	x
Petroleum products			
Oil & Grease	1380	EPA 1664	x
Bottle List	**Quantity**	**Notes**	**Dry**
$^1/_2$ - gallon poly	1	Use as a scoop	x
1-qt. poly, unpreserved	1		x
1-qt. poly w/ HNO_3	1		x
1-qt. poly w/ H_2SO_4	1		x
120-mL sterile Bacti w/ $Na_2S_2O_3$	2		x
500-mL Amber Glass wide mouth w/ H_2SO_4	1		x
1-L Amber Glass narrow mouth, unpreserved	3		x

DAVID ORTEGA; RCFC & WCD BILL WOOLSEY, CITY OF MURRIETA

DRY WEATHER TESTING ~ Santa Margarita Watershed IC/ID FIELD THRESHOLDS

11/24/2008

Sample Number	Location	Temp. F / C	Specific Conductance ms/cm	Total Dissolved Solids	Turbidity NTU	PH	Dissolved Oxygen mg/L	Comments: (include odors, color, clarity, floatables, stains, oil, sheen, surface scum, vegetation, etc.)
	CAL OAKS CHANNEL		LINE 'F'	WEST OF JEFFERSON		& EAST OF	LINE	F/
	2.9' WIDE		x .08' Deep x 1.43 F/S	(6.67, 7.61)	Say 7 F/S	x 0.7	SURFACE	= 0.23 CFS
	1.1' WIDE		x 0.9' Deep x 2.5 F/S	(4.07, 4.29)	Say 4 F/S	x 0.7	SURFACE	= 0.17 CFS
								0.40 CFS TOTAL FLOW
1	LINE 'F'	14.1°	1.62 ms/cm	1,085.4 mg/L	-10 NTU	7.45	9.24 mg/L	TOO SHALLOW TO COLLECT REPRESENTATIVE SAMPLE, GOOD CLARITY, NO ODOR LOTS OF GREEN ALGAE GROWING & BLACK ALGAE ON THE CHANNEL BOTTOM, SOME PLANTS GROWING in CHANNEL
2	MURRIETA CREEK		UPSTREAM	OF KALMIA	- DRY	& NOT	TESTED	
3	CATT Rd.		UPSTREAM	CLINTON KEITH Rd	- DRY	& NOT	TESTED	
4	WARM SPRINGS		CREEK UPSTREAM @	MHS Rd.	- TEST	POND	ED WATER	; LITTLE MURKY, COLOR IS OPAQUE
		15.3°	1.73 ms/cm	1,159.1 mg/L	-10 NTU	6.75	9.64 mg/L	
5	UPSTREAM	LOS ALAMOS Rd.		EAST OF SHOSONE	- DRY &	NOT	TESTED	

NOTES:

1. Specific Conductance Electronic Conductivity (EC) > 25% higher that WQO, Threshold: No WQO
2. Total Dissolved Solids (TDS) > 25% higher than WQO, Threshold: 1.25*750 = 937.5 mg/L
3. Turbidity > 25% higher than the log-term average, Threshold: 1.25*71.3 = 89.1 NTU
4. pH below 6 or above 9.5, Threshold: 6 < pH < 9.5
5. Dissolved Oxygen (DO) below 4 mg/L, Threshold: DO < 4.0 mg/L

0003487

File: S:/All City/WP/Common/Engineer/WQMP/Dry Weather Test Form.xls

7. ILLICIT DISCHARGE DETECTION AND ELIMINATION
(SECTION J of ORDER NO. R9-2004-001), CONT.

6) **An assessment of overall program effectiveness based on the measurable goals established in the Permittee's Individual SWMP:** The program appears to be effective. Dry weather testing did not locate and illicit discharges or concerns for illegal connections. The few water samples tested did not cause any concerns for further investigations.

7) **Additional Comments/Information:**

Describe the major accomplishments of the Illicit Discharge Detection and Elimination Component over the past year: None to report

Summarize the internal and external education and outreach activities the Illicit Discharge Detection and Elimination Component has conducted over the past year: None to report

Summarize new activities or improvements to be implemented next year as a result of your self assessment of the Illicit Discharge Detection and Elimination Component: No new activities or improvements will be implemented because the program appears to be effective. Water test samples collected and tested by Riverside County Flood Control indicates that there are no additional persistent exceedances that need to be addressed.

Other comments

8. PUBLIC PARTICIPATION

1) **A description of efforts to include the public urban runoff management programs during the reporting period (i.e., river clean-ups, volunteer monitoring, Permittee council meetings related to the SWMP, etc.):** The City is an active participant in the annual Santa Margarita River watershed clean up. With the help of over 600 volunteers approximately 25 tons of waste was removed. **Attachment 'E'** has a flyer of last year's event and newspaper article from the Press Enterprise. The City also intends to participate in the United Ways "Day of Caring" community event in next year's reporting period. This involves helping some less than fortunate individuals by removing trash and debris from their property.

2) **Additional Comments/Information:**

Assessment of overall program effectivenss based on the measurable goals established in the Permittee's Individual SWMP: it is difficult to gauge if the Public is aware of the goals because the public does not provide feedback. However, staff does inform those asking what is required to open a business or develop a site that they have to satisfy WQMP requirements.

Describe the major accomplishments of the Public Participation Component over the past year: None

Summarize the internal and external education and outreach activities the Public Participation Component has conducted over the past year: community clean up events, water quality brochures at the public counter, and City website with links to other information websites.

Summarize new activities or improvements to be implemented next year as a result of your self assessment of the Public Participation Component: None to report

Other comments

ATTACHMENT E

Please Join Us!

SANTA MARGARITA RIVER

WATERSHED CLEAN UP

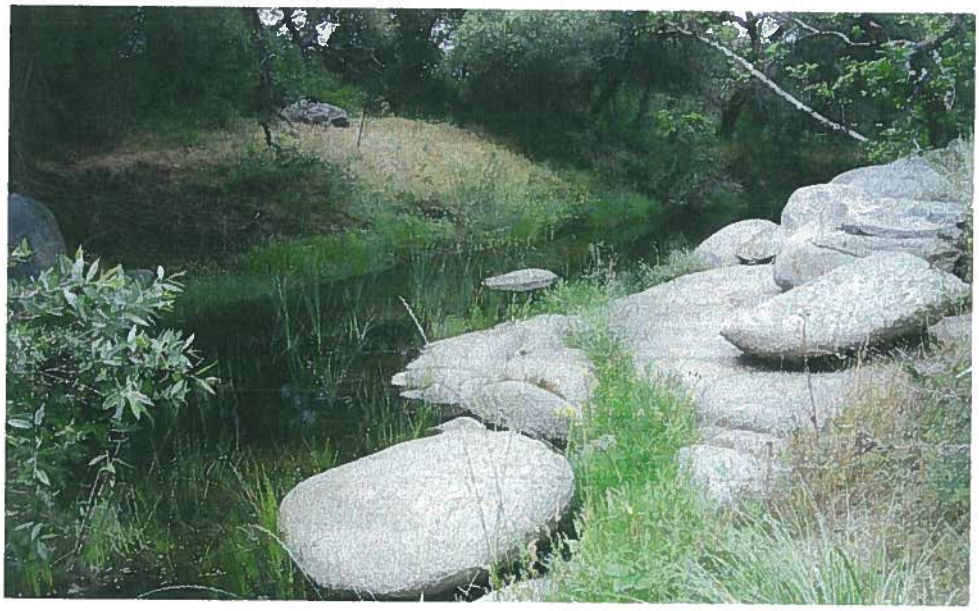

November 1, 2008, 8am-12pm

The 26.2 mile watershed of the Santa Margarita River provides habitat for plants and animals in San Diego and Riverside Counties. Since 1995, volunteers have prevented over 1400 tons of trash from polluting our creeks and entering the Pacific Ocean.

8:00 am Report to one of the staging areas below to pick up
your free Clean Up T-shirt, garbage bags,
and directions to your clean up area.

12:00 pm Free barbecue for volunteers
at Perrit Park in Lakeland Village

Murrieta Staging Areas:

Santa Rosa Plateau Ecological Reserve, 39400 Clinton Keith Road
Murrieta Police Station, 24701 Jefferson Avenue

For more information, contact Carole Bell at (951) 677-6951x223 or cbell@tnc.org
Community Service Hours are available

Sponsored by: Supervisor Bob Buster, CR&R, WM and EMARCD

THE PRESS-ENTERPRISE 11/2/08 LOCAL ■ INLAND EMPIRE

I SAW Pop up tent & trailer in Police Dept parking lot on SATURDAY.

Volunteers take out the trash

ANNUAL EVENT: The group of 125 cleans up areas around Murrieta and removes 25 tons of debris.

BY JERRY SOIFER
SPECIAL TO THE PRESS-ENTERPRISE

JERRY SOIFER/SPECIAL TO THE PRESS-ENTERPRISE

Joe Bobak, of Murrieta, pushes trash up a hillside Saturday in DeLuz Canyon in a cleanup effort that attracted 125 volunteers.

MURRIETA — Joe Bobak, a transplant from Chicago to Murrieta, searched the Web site of his new hometown for a place he could take his daughter trick-or-treating on Halloween.

Instead, he found an announcement of the cleanup of the watershed of the Santa Margarita River west of Murrieta. Bobak and his wife, Lauren, were two of 125 people who attempted to purge trash and all forms of pollution Saturday from the Santa Rosa Plateau Reserve, the Lakeland Village area, Lake Elsinore and the environs of Murrieta.

The group picked up about 25 tons of waste such as a hot tub, enough discarded parts to build an auto and the skeletal remains of animals, including what may have been a horse.

Carole Anne Bell, manager of the reserve who started the event in 1994, said, "The (De Luz) Canyon looks free of trash as of this moment. What makes this a success is all these people joining together."

People came from as far as Norco, Woodcrest and Bonsall in San Diego County. "This is the good half of humanity," Bryce Miller, of Bonsall, said of his colleagues working in DeLuz Canyon.

"That's the bad half," Miller said, pointing at the rubble they had pushed up the side of a hill.

Bobak said he joined the cleanup effort to get out of the house and to exercise.

Riverside County code workers hooked up a chain to the hot tub to haul it up from the side of the canyon before it was loaded on a truck. "Once we got it attached (to the chain), it wasn't too hard," said Mike Slaick, county flood control operator.

The Bobaks, Miller and Murrieta residents Zach and Beth Principe needed mountaineering skills to inch their way down the side of the canyon to retrieve trash. Zach Principe found a wallet filled with credit cards.

Beth found a pillow that she flung like a Frisbee. They found a child's bicycle with its training wheels, and legal documents that might have been divorce papers.

Kim Hull, 16, a Murrieta Valley High School junior, found desks, plastic piping and lockers while working off Jackson Avenue in Murrieta. "We filled a whole Dumpster," Kim said. "I was sweating. It wasn't that hot."

Vance Usui, a teacher at Norco High School, brought five students to give them "a first-hand look at what we do to the environment and to also get some community service hours."

Bell said the cleanup was scheduled in mid-fall to avoid the heat. Large satellite dishes were a common find at previous cleanups because smaller ones were coming into vogue, Bell said.

At noon, the volunteers joined county workers and Cal Fire firefighters for a picnic at Perret Park in Lakeland Village. Cal Fire Capt. John Crater said, "This is an example of leadership in the community and getting to know their neighbors. The more of these events they have, the closer the community becomes."

Samantha Dempster, of Woodcrest, collects shirts with the cleanup insignia the way runners amass shirts from races. She wore the shirt from the 2004 cleanup Saturday.

Erin Snyder, of Riverside, worked at her third cleanup in the space of a month.

"This is such a pretty county site," said Snyder who was wearing a shirt from the 2006 cleanup. "It's a great excuse to get out here."

9. FISCAL ANALYSIS COMPONENT

Fiscal Analysis Component - each Permittee shall include an annual fiscal analysis, for each fiscal year covered by Order No. R9-2004-001, in its Individual Annual Report. This analysis shall evaluate the expenditures (such as capital, operation and maintenance, education, and administrative expenditures) necessary to accomplish the activities of the Permittee's Individual SWMP. The analysis shall include the following:

1) **A report of the previous reporting period's budget and a budget for the upcoming reporting period. To the extent possible, the budgets should be broken down by the following programs:**

Program Element	Fiscal Year 2008-2009		Fiscal Year 2009-2010	
	Capital Expenditures	O&M/Admin Expenditure	Capital Expenditures	O&M/Admin Expenditure
Program Management				
Annual Fee for MS4 NPDES Permit				
Implementation Agreement Shared Cost				
Construction Inspections	(See	Attachment	'F')	
Development Planning				
Industrial and Commercial Inspections				
Illicit Connections & Illegal Discharges Program				
Municipal Facilities and Activities				
Public Education & Outreach				
Monitoring Program				
Other				
Total	**$ 0**	**$ 0**	**$ 0**	**$ 0**

ATTACHMENT F

Murrieta
a great place to grow

Revenue Sources by Type

Fiscal Years 2009-2011

Fund Type & Name	Actuals 2006-07	Actuals 2007-08	Budget 2008-09	Adopted 2009-10	Forecast 2010-11
OTHER SPECIAL FUNDS					
NPDES (CSA 152)					
Charges for Services Revenue	317,561	220,158	285,000	350,000	350,000
Transfer In Accounts	166,400	226,100	145,122	0	0
Use of Reserves	0	0	120,890	235,938	230,576
Total OTHER SPECIAL FUNDS	483,961	446,258	551,012	585,938	580,576
TOTAL	483,961	446,258	551,012	585,938	580,576

Murrieta
a great place to grow

History of Expenditures by Department

Fiscal Years 2009-2011

Expenditure Type	Actuals 2006-07	Actuals 2007-08	Budget 2008-09	Adopted 2009-10	Forecast 2010-11
OTHER SPECIAL FUNDS					
NPDES (CSA 152)					
NPDES Fund (052)	231,927	348,497	552,180	588,272	580,576
Salaries and Wages	0	0	89,790	124,621	124,663
Operating and Maintenance	186,377	258,247	451,390	459,651	451,913
Capital Outlay	0	0	7,000	0	0
Transfers	45,550	90,250	4,000	4,000	4,000
NPDES (CSA 152) Total	231,927	348,497	552,180	588,272	580,576
OTHER SPECIAL FUNDS Total	231,927	348,497	552,180	588,272	580,576
TOTAL	**231,927**	**348,497**	**552,180**	**588,272**	**580,576**

NPDES Fund (052)

0003497

NPDES (CSA 152) 052

Department No. 0000

BUDGETED EXPENSES	2009/10 BUDGET	2010/11 BUDGET
Operating and Maintenance	$459,651	$451,913
Salaries and Wages	$122,287	$124,663
Transfers	$4,000	$4,000
TOTAL	$585,938	$580,576

FINANCING SOURCES		
Charges for Services Revenue	$350,000	$350,000
Transfer In Accounts	$0	$0
Use of Reserves	$235,938	$230,576
General Revenues	$0	$0
TOTAL	$585,938	$580,576

PERSONNEL	2006/07	2007/08	2008/09	2009/10	2010/11
Civil Engineering Associate	0.00	0.00	0.50	0.50	0.50
Senior Public Works Inspector	0.00	0.00	0.05	0.25	0.25
PW Lead Maintenance Worker	0.00	0.00	0.50	0.50	0.50
TOTAL	**0.00**	**0.00**	**1.05**	**1.25**	**1.25**

NPDES Fund (052)

0003498

NPDES (CSA 152) 052

Department No. 0000

6183	TRAINING & DEVELOPMENT	Public Works Staff NPDES Trainings ($1,000 / $1,000)
6410	CONTRACT SERVICES	Mandated reports programming, NPDES Program Implementation ($30,000 / $30,000)
6410.007	CONTRACT SVCS - UNDERGROUND/OPEN CH	Open Channel Maintenance Permits ($40,000 / $40,000)
6410.011	CONTRACT SVCS-MUNI FACILITY	Municipal facitilites - BMP ($3,000 / $3,000)
6410.012	CONTRACT SVCS-SWRCB MS4 PERMIT FEE	SWRCB MS4 Permit Fee ($22,500 / $22,500)
6410.013	CONTRACT SVCS-LEGAL COUNCIL ASSISTANCE	Legal Council Assistance ($10,000 / $10,000)
6410.014	CONTRACT SVCS-IMPLEMENTATION AGENT	Santa Ana Implementation Agreement ($1,000 / $1,000)
		Santa Margarita Implementation Agreement (6) ($177,000 / $189,000)
6410.015	CONTRACT SVCS - LAGOON TMDL COST SHARING	Lagoon Total Maximum Daily Loads cost sharing ($20,000 / 0)
6410.016	CONTRACT SVCS - TMDL INV ORDER	LESJWA ($5,000 / $5,000)
		Self Audit Program (8) ($15,000 / $15,000)
6410.018	CONTRACT SVCS-INDUSTRIAL/COMMERCIAL INSPECTION	Commercial/Industrial Inspections ($30,000 / $30,000)
999	CONTINGENCY	Unanticipated expenses/overages ($5,000 / $5,000)
9001	TRSF OUT - GENERAL FUND	Catch basin stencil ($3,000 / $3,000)
		Emergency response ($1,000 / $1,000)

NPDES Fund (052)

0003499

NPDES (CSA 152) 052

Department No. 0000

		2006/07 ACTUAL	2007/08 ACTUAL	2008/09 BUDGET	2009/10 BUDGET	2010/11 BUDGET
	Revenue	483,961	446,258	551,012	585,938	580,576
	Salaries and Wages					
5011	SALARY	0	0	56,948	80,813	82,690
50xx	BENEFITS	0	0	32,842	41,474	41,973
	Salaries and Wages Total:	0	0	89,790	122,287	124,663
	Operating and Maintenance					
6114	MAINTENANCE SUPPLIES	997	0	5,000	5,000	5,000
6160	INCIDENTAL MILEAGE	0	189	500	0	0
6183	TRAINING & DEVELOPMENT	0	488	1,500	1,000	1,000
6320	PROMOTIONAL SUPPLIES	0	0	1,500	1,000	1,000
6410.xx	CONTRACT SERVICES	128,887	193,648	365,120	353,500	345,500
6418	STREET SWEEPING	56,493	63,922	76,770	80,000	80,000
6940	RISK MANAGEMENT SERVICES	0	0	0	4,046	4,046
6960	INFORMATION TECHNOLOGY SERVICES	0	0	0	10,105	10,367
6999	CONTINGENCY	0	0	1,000	5,000	5,000
	Operating and Maintenance Total:	186,377	258,247	451,390	459,651	451,913
	Capital Outlay	0	0	7,000	0	0
	Transfers	45,550	90,250	4,000	4,000	4,000
	GRAND TOTAL	252,033	97,762	(1,168)	0	0

9. FISCAL ANALYSIS COMPONENT

(CONT.)

2) **A description of the source(s) of funds that were utilized during the previous fiscal year and the source(s) of funds proposed to meet the necessary expenditures for the subsequent year, including legal restrictions on the use of such funds.**

Source of Funds	Capital Expenditures	Percent of Total Program Funding	Restrictions on Use (if applicable)
CSA 152		100%	
General Fund		0	

3) **Additional Comments/Information:**

Other comments

10. NON-STORM WATER DISCHARGES

Permittees shall report on any discharge category listed in Requirement B.2 of Order No. R9-2004-001 that was identified as a source of pollutants during the reporting period. For each identified category, the Permittee shall report whether it elected to prohibit the discharge or to require BMPs to reduce pollutants in the discharge to the MEP. If the discharge is not prohibited, the BMPs that will be implemented, or required to be implemented, shall be described in each Permittee's Individual SWMP Annual Report. Last year's responses are noted in red

Category	Prohibited	BMP to be Implemented
Diverted stream flows	☐ Yes ☒ No	Not Applicable
Rising ground waters	☐ Yes ☒ No	Not Applicable
Uncontaminated ground water infiltration [as defined at 40 CFR 35.2005(20)] to MS4s	☐ Yes ☒ No	Not Applicable
Uncontaminated pumped ground water	☐ Yes ☒ No	Analyze water sample for total suspended solids, specific conductance, semiviolatiles and volatiles by EPA method's 624 & 625
Foundation drains	☐ Yes ☒ No	Not Applicable
Springs	☐ Yes ☒ No	Not Applicable
Water from crawl space pumps	☐ Yes ☒ No	Filtered prior to pumped into a catch basin
Footing drains	☐ Yes ☒ No	Not Applicable
Air conditioning condensation	☐ Yes ☒ No	Not Applicable
Flows from riparian habitats and wetlands	☐ Yes ☒ No	Not Applicable
Water line flushing	☐ Yes ☒ No	Filtered prior to pumped into a catch basin
Landscape irrigation	☐ Yes ☒ No	Not Applicable
Discharges from potable water sources not subject to NPDES Permit No. CAG679001, other than water main breaks	☐ Yes ☒ No	Filter prior to pumped into a catch basin
Irrigation water	☐ Yes ☒ No	Not Applicable
Lawn watering	☐ Yes ☒ No	Not Applicable
Individual residential car washing	☐ Yes ☒ No	Not Applicable
Non-emergency fire fighting flows	☐ Yes ☒ No	Not Applicable
Dechlorinated swimming pool discharges	☐ Yes ☒ No	Use Flood Control handout

1) **Additional Comments/Information:** Other comments

11. RECEIVING WATER LIMITATIONS

This section includes the report required pursuant to Requirement C.2.a. of Order No. R9-2004-001, if applicable.

Requirement C.2.a. states:

"Upon a determination by either a Permittee or the SDRWQCB that MS4 discharges are causing or contributing to an exceedance of an applicable water quality standard, the Permittee shall promptly notify and thereafter submit a report to the SDRWQCB that describes BMPs that are currently being implemented and additional BMPs that will be implemented to prevent or reduce any pollutants that are causing or contributing to the exceedance of water quality standards. The report may be incorporated in the SWMP Annual Report unless the SDRWQCB directs an earlier submittal. The report shall include an implementation schedule. The SDRWQCB may require modifications to the report;"

This section does not apply to this reporting period as there have been no indications of exceedances to applicable water quality standards established in this area.

12. ADDITIONAL URBAN RUNOFF DATA

This section is a summary of all urban runoff related data not included in the annual monitoring report (e.g., special investigations).

Additional data was not generated during this reporting period by the City of Murrieta

13. PROPOSED REVISIONS

This section includes proposed revisions to the Individual SWMP, including areas in need of improvement based on the assessment of effectiveness of each program component.

The City of Murrieta's stormwater ordinance and SWMP could be revised to reflect the new MS4 permit (4th Term) depending on when the new permit is adopted and goes into effect.

WARREN D. WILLIAMS
General Manager-Chief Engineer

1995 MARKET STREET
RIVERSIDE, CA 92501
951.955.1200
FAX 951.788.9965
www.rcflood.org

0003505
SAN DIEGO REGIONAL
WATER QUALITY
CONTROL BOARD
2009 OCT 30 A 10: 36

RIVERSIDE COUNTY FLOOD CONTROL
AND WATER CONSERVATION DISTRICT

October 29, 2009

Hand Delivered

Mr. John Robertus, Executive Officer
San Diego Regional Water Quality Control Board
9771 Clairemont Mesa Blvd., Suite A
San Diego, CA 92124

Sent UPS Next Day Air

Mr. Terry Oda, Chief
CWA Standards and Permits
United States Environmental Protection Agency
Region IX (WTR-5)
75 Hawthorne Street
San Francisco, CA 94015-3901

Dear Messrs. Robertus and Oda:

Re: FY 2008-2009 Annual Reports
Order No. R9-2004-001
NPDES Permit No. CAS0108766

Please find attached copies of the FY 2008-2009 annual reports for the National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) program for the Santa Margarita Region of Riverside County. The following annual reports are submitted in accordance with Third-Term NPDES MS4 Permit (Board Order No. R9-2004-001, NPDES Permit No. CAS0108766) adopted by the San Diego Region Regional Water Quality Control Board (Regional Board) on July 14, 2004 for the Santa Margarita Watershed Region of Riverside County (Third-Term NPDES MS4 Permit):

- Riverside County Flood Control and Water Conservation District (District) Individual Storm Water Management Plan (Individual SWMP) Annual Report
- County of Riverside Individual SWMP Annual Report
- City of Murrieta Individual SWMP Annual Report
- City of Temecula Individual SWMP Annual Report
- Watershed SWMP Annual Report
- Monitoring Program Annual Report (as Appendix G of Watershed SWMP Annual Report)

The reports provide a comprehensive summary and analysis of the Third-Term NPDES MS4 Permit compliance activities during FY 2008-2009 by the District, County of Riverside, and Cities of Murrieta and Temecula (Permittees).

The Individual SWMP Annual Reports summarize the Permittees' individual compliance activities. The Watershed SWMP Annual Report summarizes the Permittees' combined watershed based compliance activities.

The District is committed to continuing its ongoing efforts to work cooperatively with the Co-Permittees, Regional Board staff and other stakeholders in implementing an effective municipal stormwater program and fulfilling the requirements of the current Third-Term NPDES MS4 Permit. If you have any questions concerning this matter, please feel free to call me at 951.955.8411 or Jason Uhley at 951.955.1273.

Very truly yours,

Mark H. Wills

MARK H. WILLS
Chief of Regulatory Division

Attachments:

- District Individual SWMP Annual Report
- County of Riverside Individual SWMP Annual Report
- Murrieta Individual SWMP Annual Report
- Temecula Individual SWMP Annual Report
- Watershed SWMP Annual Report
- Monitoring Program Annual Report (as Appendix G of Watershed Annual Report)
- CD/DVD with electronic copies of above reports

ec: Riverside County - Santa Margarita Watershed MS4 Co-Permittees

- U. S. Environmental Protection Agency - Region IX
  Attn: Eugene Bromley
- Santa Rosa Plateau Ecological Reserve
  Attn: Carole Bell

JU:cw
P8/127666

CITY OF TEMECULA
ANNUAL PROGRESS REPORT

Reporting Period
July 1, 2008 to June 30, 2009

Santa Margarita River Watershed

FOR
SAN DIEGO REGIONAL WATER QUALITY CONTROL BOARD
(ORDER NO. R9-2004-001)

PREPARED
October 20, 2009

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CERTIFICATION STATEMENT

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2.0	Introduction
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12.0	Fiscal Analysis
13.0	Non-Storm Water Discharges
14.0	Receiving Water Limitations
15.0	Additional Urban Runoff Data
16.0	Proposed Revisions

ATTACHMENTS

A Development Planning Program.
B Construction Program.
C Municipal Program.
D Industrial/Commercial Program.
E Residential Program.
F Illicit Discharge Detection Program.

CITY OF TEMECULA
CERTIFICATION STATEMENT

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to ensure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Signature

Daniel A. York, City Engineer
Name and Title, Printed or Typed

October 20, 2009
Date

1.0 EXECUTIVE SUMMARY

This annual report represents the City of Temecula's (City) current status of the stormwater management program. This report covers the reporting period between July 1, 2008 and June 30, 2009. Each section addresses individual program components that were implemented in order to comply with the requirements of the National Pollution Discharge Elimination System (NPDES) Municipal Separate Storm-Sewer System (MS4) Permit (Permit) issued to the Santa Margarita River (SMR) watershed permittees of Riverside County.

The Permit was issued on July 14, 2004 by the San Diego Regional Water Quality Control Board (Board). Throughout this Permit term, the City collected a considerable amount of data representing measurable metrics for the purpose of establishing baseline values that will be used as the basis for the long-term effectiveness assessment. Data presented in each section of this report demonstrates the City's significant investment, positive accomplishments, and commitment in allocating finite resources to the program.

In addition to these metrics, the City believes that other indicators provide strong evidence of positive results. For example, field observations show that the City's persistent emphasis on education and enforcement are the most contributing factors in promoting and increasing compliance. At active construction sites, superintendents are now enhancing their compliance efforts in order to avoid fines, and have a broader understanding of the NPDES requirements as a result of all of the City's outreach efforts. City inspectors have also become proficient at addressing BMP implementation issues due to all of the training provided throughout the year.

In addition, in-house support increased significantly. The program now has full support throughout other City departments, which in turn translates into better cooperation and increased coordination among departments. The Engineering, Planning, Community Services, and Fire departments now work closely together to ensure that WQMP requirements are addressed early-on during a project's pre-submittal stage to avoid design conflicts during the application and plancheck processes. The result has been improved submittals of LID-based site plans from the development community. In essence, the NPDES program is now a City-wide program.

The City is also partnering with local water districts to address excess irrigation runoff from residential areas, and with the principle permittee to enhance the regional monitoring efforts. As such, the City is focusing on a purpose-driven strategy in order to allocate our limited resources in areas requiring the most attention.

In addition to the above accomplishments, the following items represent the significant changes, highlights, and observations noted during the current reporting period.

- There was a significant decline in the number of grading permits that were issued.
- The number of Water Quality Management Plans conditioned remained low.
- There was a significant increase in the number of inactive projects. As a result, the number of construction inspections decreased.
- Citations issued by the City also decreased.
- The number of City staff attending formal classroom training remained high.

2.0 INTRODUCTION

The information contained herein represents the fifth annual progress report under Order No. R9-2004-001 and is presented in the same format as that outlined in Section III of the Monitoring and Reporting Program (MRP) of the City's Permit. Each section addresses individual components of the Permit and summarizes the progress accomplished during the reporting period. These sections include the City's Development Planning process, Construction program, Municipal program, Industrial and Commercial program, Residential program, Education program, and Illicit Discharge Detection and Elimination Program (IC/ID), respectively.

This Annual Report specifically responds to the Permit's reporting requirements and identifies the program's progress and effectiveness. This reporting period constitutes the fourth year that the new Permit programs are fully implemented and effectiveness data is collected to establish baseline conditions. The Permit also requires the Permittees to develop a long term strategy for addressing the effectiveness of each jurisdiction's Storm Water Management Plan (SWMP). The SWMP represents each jurisdiction's set of written policies and procedures for each component outlined in the Permit. To that end, the Permittees have developed a long term strategy to evaluate the effectiveness of the SWMPs.

The long term strategy for the program effectiveness assessment (PEA) will be conducted at two levels described below. It should be noted that a PEA requires the initial establishment of a set of baseline conditions using measurable metrics. These baseline conditions can then be used to establish measurable goals based on the measured metrics. Thereafter, effectiveness can be evaluated by comparisons of successive years of measurable metrics against the baseline data and measurable goals.

At the first level, or Annual Assessment Level, the PEA will focus on an annual assessment of program implementation and Permit compliance. These assessments will be addressed by completing the Annual Reporting Forms, which will confirm program implementation, Permit compliance, and collection of measurable metrics. These assessments are included at the end of each Annual Report section. Inferences about the success of each program component will predominantly be drawn from both direct and indirect measures for each component.

At the second level, or Long Term Level, the Permittees will collectively evaluate the measurable metrics to assess potential changes in knowledge and behavior, load reductions and improvements in Receiving Water Quality. A long-term assessment was conducted as part of the Report of Waste Discharge (ROWD). The results of this long-term assessment will be evaluations of the need to make significant programmatic revisions to the Permit compliance programs, as necessary, to protect Beneficial Uses of Receiving Waters. This level will place more emphasis on using direct measures of progress (monitoring data, long term trend analysis) and will support the review and any revisions to the Drainage Area Management Plan (DAMP) and Individual SWMPs using information from the measurable metrics that have been collected.

Where the period of evaluation is characterized by the implementation of new program requirements, determinations of program effectiveness will initially be limited to confirmation of program implementation and collection of measurable metrics until baseline conditions can be properly established. Further, it must be recognized that direct measures related to long term program effectiveness may not be available within the timeframe of the Third Term Permit. This arises because:

- Baseline water quality conditions are not readily established;
- Water quality changes in response to program implementation are likely to be very slow; and
- Establishing a link between receiving water condition and program activities is difficult at the watershed scale when programs are being implemented incrementally with the development/redevelopment cycle.

While program effectiveness assessment is a key step in the iterative process of program implementation, it should be realized that effectiveness assessment itself is a part of the management process that is also evolving. Assessing program effectiveness is recognized as a challenge for program managers across California, and the City of Temecula is supporting the effort of the California Stormwater Quality Association (CASQA) to develop guidance in this area at a statewide level.

3.0 DEVELOPMENT PLANNING PROGRAM

1) Description of any amendments to the General Plan or the development project approval process:

Although there were no modifications to the General Plan, the development approval process improved. Of significance, the Engineering, Planning, Community Services, and Fire departments now work closely together to ensure that WQMP requirements are addressed early-on during a project's pre-submittal stage to avoid design conflicts during the application and plancheck processes. The result has been improved submittals of LID-based site plans.

2) Number of grading permits issued:

TABLE 3-1

Fiscal Year	Permits Issued
2008 – 2009	15
2007 – 2008	28
2006 – 2007	38
2005 – 2006	62
2004 – 2005	76

Attachment A includes the list of grading permits issued during this reporting period.

3) Number of developments conditioned to meet WQMP requirements:

TABLE 3-2

Fiscal Year	Projects Requiring a WQMP (1)	Projects Conditioned for a WQMP (2)	Finalized WQMPs (4)
2008-2009	13	6	16
2007-2008	15	5	17
2006-2007	25	14	15
2005-2006	31	31	5
2004-2005	Not Applicable	30 (3)	Not Applicable

(1) These values show all proposed projects requiring WQMPs at the application stage.
(2) The difference between "Projects Requiring a WQMP' and 'Projects Conditioned for a WQMP' is that many projects became inactive prior to reaching the conditioning stage or were delayed into the next reporting period.
(3) The City required treatment BMPs on these projects prior to the start of the WQMP Program.
(4) Most of these projects were conditioned during previous reporting periods.

Attachment A includes a monthly tally of finalized WQMPs accepted, to-date, by the City. This tally provides a detailed breakdown by land-use category (residential, business, and municipal) of the number of WQMPs that have been accepted for private and public projects.

4) Attach one example of a development project that was conditioned to meet WQMP requirements and a description of the required BMPs:

Attachment A includes an approved COA for a new development that was conditioned with the WQMP requirement. The project consists of a new self-storage site with nine self-storage

buildings and 42 covered RV spaces. The WQMP requirement is referenced in line-item 95 of the COAs under 'General Requirements' of the 'Public Works Departments' section. The treatment control BMP consists of a centralized gravel-filled infiltration basin topped with porous concrete that encompasses all of the 42 RV spaces. The first flush volume of runoff from the entire site will collect and infiltrate at this location. Subsequent overflow is directed into a nearby inlet that contains a filter to prevent trash and debris from exiting the site.

5) Description of any updates to the environmental review process:

There have been no updates to the City's CEQA process during this reporting period.

6) Description and number of municipal employee training efforts conducted during the reporting period:

a) WQMP Training:

TABLE 3-3

Training Dates	Training Description (1)	Number of Staff Attended
6/9/09	Annual WQMP Refresher	11
5/4/09	Annual WQMP Refresher	6
4/22/08	LID Workshop	3
3/27/08	LID Workshop	1
12/5/07	Annual WQMP Refresher	19
11/28/07	Annual WQMP Refresher	1
9/10/07	CASQA Conference	2
6/27/07	LID Workshop	1
9/25/06	CASQA Conference	1
6/21/06	Annual WQMP Refresher	26
10/3/05	CASQA Conference	2
5/4/05	Annual WQMP Refresher	19
12/15/04	Annual WQMP Refresher	1
12/10/04	Annual WQMP Refresher	3

(1) – 'Annual Refresher' refers to the sessions conducted by the Principle Permittee.

A copy of the City's NPDES Training Log is included in Attachment A.

b) Summarize any additional education and outreach activities conducted for project applicants, contractors, developers, property owners, and/or other responsible parties in support of the Development Planning Component:

All of the City's WQMP requirements are posted and readily accessible on the City's web site. This website includes downloadable information including the County-wide WQMP design handbook, project-specific WQMP template, City-specific inserts, receiving waters map, three separate checklists, brochures, list of BMP maintenance contractors, and links to CASQA's BMP handbooks.

7) An assessment of program effectiveness based on the measurable goals established in the SWMP:

The information provided in tables 3-1, 3-2, and 3-3 represents measurable data that the City collected in order to begin establishing baseline values that are being applied as the basis for a long-term effectiveness assessment as required by the MS4 Permit.

The City witnessed another significant decline in the number of grading permits for the fourth consecutive year. Due to the current economic climate, the number of issued grading permits dropped by 46% from the past reporting period. Overall, since the beginning of this permit term, the issuance of grading permits has dropped from 76 to 15; in other words, an 80% drop between 2005 and 2009.

The City successfully continued capturing all projects meeting the WQMP requirements. In addition, the City established stricter requirements by applying a 5,000 square foot minimum threshold across-the-board and strictly enforcing the 2,500 square foot threshold if the project is in an Environmentally Sensitive Area. As a result, since the beginning of the current Permit term, the City has captured 84 development projects meeting the stricter criteria. To date, the City has accepted 53 finalized WQMPs.

The City's success with this permit requirement is due to several factors, including the participation of various departments and divisions with the WQMP process, a high staff attendance at numerous workshops, conferences, seminars, and annual refresher courses, and stricter thresholds than that outlined in the MS4 permit. These factors have ensured that the City properly identified all projects requiring WQMPs and ensured that these projects correctly addressed their treatment needs.

4.0 CONSTRUCTION PROGRAM

1) Number of inspections conducted:

TABLE 4-1

Fiscal Year	Private	Public	Total Inspections Conducted
2008 – 2009	2196	523	2,719
2007 – 2008	2949	145	3,097
2006 – 2007	*	*	2,976
2005 – 2006	*	*	2,154
2004 – 2005	*	*	1,647

* Previous tallys did not differentiate between private versus public projects.

Attachment B includes the tally of Total NPDES Construction Inspections conducted during this reporting period. This list is based on the City's monthly NPDES Inspection Frequency Sheets, of which the August 2008 set is provided as an example in Attachment B. These sheets provide a project-by-project break-down of the number of inspections conducted during the month, the project's priority category (high, medium, low), and enforcement actions. In addition, the NPDES Inspection Frequency Sheets for October 2009 are provided to show that the number of active projects throughout the City have decreased significantly. These sheets also show that a significant number of projects have been abandoned and are now inactive.

2) Number and type of enforcement actions related to construction sites:

TABLE 4-2

	Private Projects				Public Projects			
Enforcement Action	05-06	06-07	07-08	08-09	05-06	06-07	07-08	08-09
Verbal Warning	268	633	630	404	16	43	55	154
Written Warning	414	116	132	99	18	7	3	10
Fines	66	22	71	56	1	2	1	3
Stop Work Authority	0	(1)	(1)	(1)	0	(1)	(1)	(1)
Permit Revocation/Certificate of Occupancy Denial	0	(1)	(1)	(1)	0	(1)	(1)	(1)
Referral to SDRWQCB	0	(1)	(1)	(1)	0	(1)	(1)	(1)

(1) These measures were not required.

3) Description of modifications made to the construction and grading approval process:

During this reporting period, enhancements to this component included the following:

1) Finalized updates to the City's Grading Ordinance and Grading Manual. These updates include revisions to the NPDES Chapter and reflect successful and reasonable field practices observed since the previous round of revisions.

2) Finalized updates to the City's Standard Erosion and Sediment Control Notes. These updates reflect successful and reasonable field practices observed since the previous round of revisions.

3) Wet-weather inspections at City-owned vacant properties. Although the MS4 Permit does not specify inspection obligations at sites that do not require grading, building, or State permits, or are vacant or do not have any ongoing or immediately proposed construction activities, the City implemented this enhancement to further ensure adequate protection of our local waterways. The task primarily consisted of identifying all city-owned vacant properties within and immediately surrounding the City limits, determining which properties required erosion and sediment controls, installing BMPs where deemed necessary, and establishing an inspection frequency schedule as that outlined in the MS4 permit. Currently, BMPs have been implemented at properties that could potentially release sediment during heavy storms.

4) Wet-weather inspections at City-owned construction projects. The City placed an added emphasis on ensuring adequate protection at City-owned active construction projects. This emphasis included increased inspections, increased enforcement actions against non-compliant contractors, and increasing the amount of BMPs throughout these projects.

5) Updates to the NPDES Inspection Frequency sheets. These updates included consolidating all active municipal construction projects into a single section of the frequency sheets to ensure adequate inspection coverage of these projects.

6) Adopting the CASQA BMP Handbook. The City adopted the CASQA BMP Handbook for Construction Activities as the uniform set of standards for construction BMPs. This handbook is now available and readily accessible on the City's website.

4) Description and number of municipal employee training efforts conducted during the reporting period.

a) Construction Training

TABLE 4-3

Training Dates	Training Description (1)	Number of Staff Attended
9/30/08	Annual ESC Refresher	9
9/29/08	Annual ESC Refresher	8

8/26/08	Inland Erosion Annual SWPPP Seminar	9
3/18/08	International Erosion Control Association Seminar	2
2/29/08	BIA SWPPP Workshop	1
1/17/08	Annual ESC Refresher	13
8/22/07	Inland Erosion's Annual SWPPP Seminar	20
10/18/06	Annual ESC Refresher	29
9/28/05	Annual ESC Refresher	3
8/29/05	Inland Erosion's Annual SWPPP Seminar	15
5/3/05	Annual ESC Refresher	7
3/2/05	Annual ESC Refresher	2
8/18/04	Inland Erosion's Annual SWPPP Seminar	30

(1) – 'Annual Refresher' refers to the sessions conducted by the Principle Permittee.

A copy of the City's NPDES Training Log is included in Attachment A.

b) Summarize any additional education and outreach activities conducted for project applicants, contractors, developers, property owners, and/or other responsible parties in support of the Construction Component:

1) As of August 25, 2008, the City began hand-delivering the annual NPDES notification letter to all active construction sites listed on the City's NPDES Inspection Frequency Sheets for August 2008. These included both private and public projects. The City also began forwarding a copy of the letter to owners of inactive and abandoned sites. This letter is a formal notification to all responsible parties to: 1) implement pollution prevention measures year-round, 2) install additional wet-weather BMPs by October 1st, 3) adhere to the State General Construction Permit, if applicable, and 4) protect inactive and abandoned projects. At a minimum, approximately 60 letters were hand-delivered. This number is down by 33% from the last reporting period due to the significant decrease in active projects and an increasing amount of inactive and abandoned sites. A copy

of the August 2008 NPDES Inspection Frequency Sheets as well as a copy of the letter are included in Attachment B.

2) The City also distributed Inland Erosion's flyer for their Annual Erosion Compliance Seminar on August 26, 2008.

5) An assessment of program effectiveness based on the measurable goals established in the SWMP:

The information provided in tables 4-1, 4-2, and 4-3 represents measurable data that the City collected in order to begin establishing baseline values that are being applied as the basis for a long-term effectiveness assessment as required by the MS4 Permit.

Overall, due to the significant decrease in active projects, the total number of inspections decreased by approximately 12% from the previous reporting period. As the number of private-development inspections dropped by 25%, they increased by 261% for public projects as part of the City's commitment to ensure adequate protection at City-owned active construction sites. As a result, the issuance of citations to private developments decreased by 21% while increasing from 1 citation to 3 citations for public projects. In general, tables 4-1 and 4-2 show that, over the last five years, fluctuations in the number of inspections correlate with fluctuations in the number of citations issued.

The City also continued to make every attempt to contact owners of inactive projects to repair, replace, and/or enhance the BMPs at their sites. Many owners walked away from their projects, which in turn began delaying crucial compliance efforts. It should be noted that the City also identified vacant parcels that were not construction projects. Although these vacant parcels fall outside of the Permit's construction component, the City actively pursued the responsible parties in efforts to minimize potential discharges.

All in all, field observations indicated that the development community, in general, has become more knowledgeable with the NPDES requirements throughout this Permit term.

5.0 MUNICIPAL PROGRAM

1) Number of inspections conducted at existing Municipal facilities:

The City conducts inspections at all of its facilities. Inspection frequencies vary between the different types of facilities. A detailed listing of these facilities is presented in Appendix B of the SWMP. For example, the corporate yard, fire stations, City Hall, and other buildings are maintained daily; parks and landscaped areas are maintained weekly; catchbasins and open channels are inspected twice annually; and streets, curbs, and gutters are addressed weekly through the city-wide street sweeping program.

2) Number and type of enforcement actions related to municipal construction sites:

TABLE 5-1

	Active Construction Projects			
Enforcement Action	05-06	06-07	07-08	08-09
Verbal Warning	16	43	55	154
Written Warning	18	7	3	10
Fines	1	2	1	3
Stop Work Authority	0	(1)	(1)	(1)
Permit Revocation/Certificate of Occupancy Denial	0	(1)	(1)	(1)
Referral to SDRWQCB	0	(1)	(1)	(1)

(1) These measures were not required.

3) Number of catch basins that were inspected and the number that were cleaned:

TABLE 5-2

	Total on GIS Map (1)	**Total in the City (2)**	**City-Maintained Catchbasins**	**Minimum Number Inspected (3)**	**Number Cleaned**
2008-2009	1,975	1,901	1,650	3,300	4,103 (5)
2007-2008	1,975	1,901	1,600	3,200	1,828
2006-2007	1,964	(4)	1,600	3,200	1,974
2005-2006	(4)	(4)	(4)	3,928	2,946

(1) Consists of all catch basins located within the City limits and in future surrounding annexation areas.
(2) Consists of all catch basins (city, County, Caltrans, HOA, private) located within the City limits only.
(3) All catch basins are visually inspected at least twice per fiscal year.
(4) Not Available.
(5) This number represents multiple visits to areas requiring frequent cleanings.

All of the 1,650 city-maintained catchbasins currently documented on the City's GIS map were visited, at a minimum, twice during the reporting period. Many catchbasins required cleaning during both, or more, visits, while others were cleaned and only required visual inspections. The City maintains a monthly catch basin maintenance log that lists dates, locations, and number of catch basins maintained. Maintenance activities include visual inspections, cleaning, and stencil replacement. Stencils are placed at the top of each catchbasin opening and state "Only Rain In The Drain". An example of the monthly log is included in Attachment C.

4) Assessment of the amount and type of debris removed from catch basins, streets, and open channels, including identification of areas that generate the most pollutants:

TABLE 5-3

Facility	Type of Debris	Approx. %	Problem Areas that Generate Most Pollutants
Catch basins (1)	Anthropogenic Litter Green Waste Sediment	35 60 5	Residential and Commercial Total Removed: 180 CY
Street Sweeping (2)(3)	Litter and Sediment	100	Total Removed: 1,196.7 Tons
Open Channels (1)	Anthropogenic Litter Green Waste Sediment	7 3 90	Natural channels Total Removed: 4,000 CY

(1) – These figures are provided by the Maintenance Division of the PW Department.
(2) – This figure is provided by Temecula Community Services Department's "City of Temecula Tonnage Report".
(3) – Street sweeping areas consist of all paved city-maintained streets. Currently, street sweeping is conducted on 299 miles of paved streets.

5) Assessment of effectiveness of BMPs implemented for municipal facilities and activities:

TABLE 5-4

BMP Code	Description	Used	Notes
SC-10	Non-Stormwater Discharges	☒ Yes ☐ No	
SC-11	Spill Prevention, Control and Clean-up	☒ Yes ☐ No	
SC-20	Vehicle and Equipment Fueling	☐ Yes ☒ N/A	Fueling is conducted offsite
SC-21	Vehicle and Equipment Cleaning	☒ Yes ☐ No	
SC-22	Vehicle and Equipment Repair	☐ Yes ☒ N/A	Repairs are conducted offsite
SC-30	Outdoor Loading/Unloading of Materials	☒ Yes ☐ No	
SC-31	Outdoor Liquid Container Storage	☒ Yes ☐ No	
SC-32	Outdoor Equipment Maintenance	☐ Yes ☒ N/A	Repairs are conducted offsite
SC-33	Outdoor Storage of Raw Materials	☒ Yes ☐ No	
SC-34	Waste Handling and Disposal	☒ Yes ☐ No	
SC-35	Safe Alternative Products	☒ Yes ☐ No	
SC-40	Contaminated or Erodible Areas	☒ Yes ☐ No	
SC-41	Building and Grounds Maintenance	☒ Yes ☐ No	
SC-42	Building Repair and Construction	☒ Yes ☐ No	
SC-43	Parking/Storage Area Maintenance	☒ Yes ☐ No	
SC-44	Drainage System Maintenance	☒ Yes ☐ No	
SC-60	Housekeeping Practices	☒ Yes ☐ No	
SC-61	Safe Alternative Products	☒ Yes ☐ No	
SC-70	Road and Street Maintenance	☒ Yes ☐ No	
SC-71	Plaza and Sidewalk Cleaning	☒ Yes ☐ No	
SC-72	Fountain and Pool Maintenance	☒ Yes ☐ No	
SC-73	Landscape Maintenance	☒ Yes ☐ No	
SC-74	Drainage System Maintenance	☒ Yes ☐ No	
SC-75	Waste Handling and Disposal	☒ Yes ☐ No	
SC-76	Water and Sewer Utility Maintenance	☐ Yes ☒ N/A	These utilities are provided by RCWD and EMWD

6) Description and number of municipal employee training efforts conducted during the reporting period.

a) Municipal Training:

TABLE 5-5

Training Dates	Training Description	Number of Staff Attended
11/06/08	Annual Refresher	28
01/17/08	Annual Refresher	29
10/18/06	Annual Refresher	7

04/27/06	Annual Refresher	20
09/26/05	Annual Refresher	4
05/03/05	Annual Refresher	16
10/21/04	Annual Refresher	8

A copy of the City's tracking log for staff training is included in Attachment A.

b) Summarize any additional education and outreach activities conducted for municipal staff in support of the Municipal Component:

The City's field crews receive informal field training throughout the year, on an as-needed basis, as they encounter conditions requiring BMPs.

7) An assessment of program effectiveness based on the measurable goals established in the SWMP:

The information provided in tables 5-1 thru 5-5 represents measurable data that the City collected in order to begin establishing baseline values that are being applied as the basis for a long-term effectiveness assessment as required by the MS4 Permit.

Education was once again the key element to this component. The City continues to maintain a successful track record with this component by providing as much education as possible to every field crew member, and then empowering each crew with the responsibility of designing and carrying out their own BMP implementation-and-inspection program. This approach has allowed them to claim ownership over their BMP practices, and increased their level of awareness and expertise.

6.0 INDUSTRIAL/COMMERCIAL PROGRAM

1) Number of inspections conducted:

TABLE 6-1

	Category			
	High Priority	Medium Priority	Low Priority	Total Inspections
2008-2009	14 (1)	--	--	14
2007-2008	73	141	147	361
2006-2007	252	61	96	409
2005-2006	266	52	1	319

1) This value represents the remaining number of field-verified high-priority facilities following reassessments, reclassifications, and removing businesses that had closed.

Throughout this reporting period, the City focused on completing all of its annual high-priority facility inspections. Many of these facilities were found to be in compliance or significantly had downsized their staff and operations. As such, these facilities were reassessed and reclassified as medium priority during each inspection. Inspections also revealed that a significant number of previous high-priority facilities had moved without notifying the City or were no longer in business. The combination of reclassifications and closures has caused the number of high-priority facilities to drop by 81% from the past reporting period.

Each facility was provided educational materials (brochures), a completed written inspection report, a brief explanation of the State and City requirements, and suggestions for BMP implementation. The inspection reports serve to document the current conditions at each facility, including any deficiencies observed and areas for improvement. An example of a completed inspection form is included in Attachment D. Follow-up visits were also conducted at specific sites to ensure that these were actively pursuing total compliance. The City's current prioritized inventory of industrial and commercial facilities and the current inspection forms are located in Appendix D of the SWMP.

2) Number and type of enforcement actions taken:

TABLE 6-2

Enforcement Action	05-06	06-07	07-08	08-09
Education and Information (1)	305	380	325	14
Verbal Warning (1)	305	380	325	14
Written Warning (1)	305	380	325	14
Fines	8	1	(2)	2 (3)
Business License Denial	(2)	(2)	(2)	(2)
Referral to SDRWQCB	(2)	(2)	(2)	(2)

1) Education and warnings are all addressed through the NPDES Inspection reports. As such, the values for education and warnings will be the same as the number of inspection reports.
2) These measures were not required.
3) Tallied from the NPDES citation log.

4) An assessment of program effectiveness based on the measurable goals established in the SWMP:

The information provided in tables 6-1 and 6-2 represents measurable data that the City collected in order to begin establishing baseline values that are being applied as the basis for a long-term effectiveness assessment as required by the MS4 Permit.

Overall, the number of high-priority facilities dropped by approximately 95% since the City first implemented this inspection program. Throughout each reporting period, the City educated and guided businesses through the compliance process, and, as a result, has been able to reassess and reprioritize the majority of businesses that were originally listed as a high priority. In addition, the current number of high-priority businesses were in compliance during this last round of inspections. As such, enforcement actions were not required.

The collective inspection efforts between the City's business inspection program and the County's Department of Environmental Health (Haz Mat and Food Services groups) have encouraged business owners to prevent illegal discharges from occurring at their sites. As a result, these repeated inspections have caused the business community, in general, to become aware of the City's NPDES requirements.

7.0 RESIDENTIAL PROGRAM

1) A description of residential areas that were focused on during the past year:

Throughout this reporting period, the City focused on minimizing illegal discharges from high-priority residential activities throughout existing residential communities. According to the MS4 permit, these activities include automobile repair, maintenance, washing and parking on City streets; home and garden care; disposal of household waste, pet waste, and green waste; and any other activities (ie. sediment discharges) that could contribute significant pollutant loads to the MS4.

NPDES staff addressed all concerns and complaints associated with discharges from these types of activities. Each concern or complaint was submitted to the City and logged as a Service Order Request (SOR). Each SOR was then addressed within 24 hours. The initial SOR visits are documented on the City's NPDES SOR tracking log. Not all incidences required follow-up visits. Follow-up visits were conducted on an as-needed basis within 72 hours. These follow-ups were also documented on the City's tracking log.

SORs were received from throughout the City and did not provide any indication of any specific 'hot spots' requiring additional or special attention. The City's existing residential efforts are presented in Section 9.0 of the SWMP under Residential Sources.

2) Number and type of enforcement actions taken:

TABLE 7-1

Enforcement Action	06-07	07-08	08-09
Education and Information	(1)	(1)	(1)
Verbal Warning	(1)	(1)	(1)
Written Warning (2)	0	12	0
Fines (3)	5	4	7

(1) Brochures and verbal warnings are provided on an as-needed basis and not tracked or tallied.
(2) Written Warnings are issued when responsible parties can not be contacted.
(3) Tallied from the NPDES Citation Log.

3) An assessment of program effectiveness based on the measurable goals established in the SWMP:

The information provided in tables 7-1 and 7-2 represents measurable data that the City collected in order to begin establishing baseline values that are being applied as the basis for a long-term effectiveness assessment as required by the MS4 Permit.

TABLE 7-2

	Residential SORs Received	Trash/Recyclables/Green Waste (Tons)
2008-2009	39	48,263
2007-2008	72	52,277
2006-2007	41	53,692
2005-2006	24	54,429
2004-2005	Not documented	Not documented

As table 7-2 shows, reports of illegal discharges from residential sources dropped significantly this reporting period. Due to the current state of the economy, the construction sector suffered a tremendous slow-down. As a result, City inspectors, code enforcement officers, and maintenance crews were able to apply their resources to residential areas. Due to their current level of training, each team was also able to successfully identify and stop illegal discharges on-the-spot.

4) Additional Comments/Information:

Another key factor in reducing illegal discharges throughout the residential sector was educating the public through outreach materials and events. The following are a few examples of the City's efforts:

1) Newsletter, Magazines, Flyers. The City's "Inside Temecula" newsletter, "Guide to Leisure Living Activities" guide, "CityWide Clean-up" flyers, and Household Hazardous Waste Collection" flyers were distributed to all City residents during the reporting period. Information pertaining to stormwater, recycling, hazardous waste disposal, community clean-up events, greenwaste management, landscape maintenance, and street sweeping were provided. Excerpts from the newsletter, guides, and flyers are included in Attachment E.

2) City-Sponsored Clean-Up Events. The City sponsored two community clean-up events on November 15, 2008 and on April 11, 2009.

3) County-Sponsored Household Hazardous Waste Collection Events. City-Hall served as the location for two clean-up events on September 13, 2008 and on January 31, 2009.

8.0 EDUCATION PROGRAM

1) Description of education efforts conducted by the Permittee (not collectively with other Permittees) during the previous year:

TABLE 8-1

Audience	Measures
Permittee Departments and Personnel	Number of Permittee employees trained for: • Construction Inspection: * • Industrial/Commercial Inspection: * • Municipal Facilities and Activities: * • Development Planning: * NOTE (*) - City staff are provided with informal in-house training on an individual and as-needed basis. These one-on-one opportunities are not formally documented. Formal classroom workshops are conducted and documented thru the regional education program administered by the Principle Permitee and paid for by all permittees.
Construction Site Owners and Developers	Outreach: 1) Distributed the City's annual NPDES notification letter to all active projects. 2) Distributed BIA's annual workshop flyer to all active projects. 3) Distributed Inland Erosion's annual workshop flyer to all active projects.
Industrial/ Commercial Owners and Operators	Outreach: 1) Provided educational brochures and written inspection notices to businesses on the high-priority list.
Residential Community, General Public, Other Public Agencies and Students	Number of Media Impressions: • Newspaper: Refer to Watershed Report • Mailings: All outreach material was hand-delivered. • Radio/TV: Refer to Watershed Report • Web Site: In place. • Billboards: Refer to Watershed Report • Brochures: Distributed on an as-needed basis and not tracked or tallied. ♦ Calendars: 600 calendars were distributed this reporting period (300 at City Hall, 200 at Temecula's Public Library, and 100 to the Temecula Sister City Association). Classroom Presentations: As part of the Permittee's regional educational program, 88 presentations were conducted at 10

	schools throughout the Temecula Valley Unified School District by the Mission Resource Conservation District on behalf of the City of Temecula. Public Education Events: 1) Earth Day, April 22, 2009, at River Springs Charter School 2) City-sponsored "City-Wide Cleanup'. 3) County-sponsored 'Household Hazardous Waste Collection'. 4) Earth Day at the Promenade Mall. 5) Temecula Wine and Balloon Festival.

2) Assessment of overall program effectiveness based on the measurable goals established in the SWMP:

The information provided in tables 8-1 and 8-2 (below) represents measurable data that the City collected in order to begin establishing baseline values that that are being applied as the basis for a long-term effectiveness assessment as required by the MS4 Permit.

TABLE 8-2

Total Staff Trained (Workshops specifically conducted by the Principle Permittee)				
	New Development	Construction	Municipal	Commercial/ Industrial
2008-2009	17	17	28	1
2007-2008	20	33	29	1
2006-2007	(1)	29	7	(2)
2005-2006	26	18	24	(2)
2004-2005	23	39	24	1

(1) – Although staff attended training within the calendar year, it did not correspond with the reporting period.
(2) - The City contracted with AEI-CASC to conduct all business inspections. As such, municipal staff did not receive annual training for this component.

Table 8-2 shows that City staff have been receiving formal training on an annual basis. Overall, the City continued maintaining a high level of attendance among each training category. Various divisions are represented in each of these training categories; Land Development, Capital Improvement, Public Works Maintenance, NPDES, Community Services, Code Enforcement, and Planning. Throughout this permit term, the City has become increasingly aware of the NPDES requirements. This awareness has translated into increased efforts to achieve compliance as compared to previous permit terms. As such, the City will continue its current efforts into the subsequent reporting period.

9.0 ILLICIT DISCHARGE DETECTION AND ELIMINATION PROGRAM

1) Number of times City Hall was notified (calls, e-mail, walk-ins) during the reporting period, as compared to previous reporting periods.

TABLE 9-1

	NPDES Service Orders Requests
2008-2009	56
2007-2008	106
2006-2007	41
2005-2006	24
2004-2005	74

2) Number of illicit discharges, connections and spills reported and/or identified during the reporting period:

TABLE 9-2 (1)

	Illicit Discharges	Illicit Connections	Sewage Spills
2008-2009	31	0	0
2007-2008	60	1	0
2006-2007	22	0	2
2005-2006	24	0	0
2004-2005	74	0	2

(1) Based on Service Order Requests (SORs)

3) Number of illicit discharges or connections investigated during the reporting period and the outcome of the investigations:

All SORs were addressed. Many of the alleged discharges were not evident at the time of the initial visit, or had already been mitigated by the time City staff arrived on site. Many of the SORs were disputes between neighbors, while a significant number were called-in as small leaks from parked vehicles. Citations were issued against blatant discharges of paints, oils, cements, and pet waste.

4) Number and types of enforcement actions taken for active illicit discharges or connections during the reporting period:

TABLE 9-3

Enforcement and Compliance Responses	**Private Facilities**				**Public Facilities**			
	05-06	06-07	07-08	08-09	05-06	06-07	07-08	08-09
Non-monetary penalties	19	16	54	47	0 (1)	0 (1)	0 (1)	0 (1)
Fines (residential & business)	5	6	6	9 (2)	0 (1)	0 (1)	0 (1)	0 (1)

(1) There were no SORs associated with public facilities this reporting period.
(2) Tallied from the NPDES Citation Log.

5) Number and location of dry weather monitoring sites that were monitored during the reporting period:

It is important to note that since the beginning of the current permit term, and in concurrence with Regional Board staff in 2004, the City of Temecula has been consistently monitoring 4 fixed locations. Although current Board staff have indicated a desire to shift direction with this component near the end of this permit term, the SMR permittees have agreed to continue with the existing direction established in 2004 in order to maintain the original goal of establishing baseline values that can be applied as the basis for a long-term effectiveness assessment as required by the MS4 Permit. The City is currently in the process of identifying additional monitoring locations, or alternate stations, that will represent the upper portions of the City's drainage systems in order to enhance this component.

These sites consist of the following core locations:

1. Empire Creek at the Del Rio bridge.
2. Pechanga Parkway stormdrain channel upgradient to the confluence into Temecula Creek.
3. Pechanga Creek at the Rainbow Canyon bridge.
4. Temecula Creek slightly upgradient to the confluence Murrieta Creek.

In addition, the Riverside County Flood Control District selected four separate sites throughout the City that are also monitored in like manner. Their sites consist of the following locations:

1. Long Canyon Wash at the Commerce Center Drive bridge.
2. Murrieta Creek at the USGS station at the end of Pujol street.
3. Redhawk Parkway stormdrain channel near the confluence with Temecula Creek.
4. Santa Gertrudis Creek at the Jefferson Avenue bridge.

All of the City's monitoring locations were selected based on the following criteria:

- *Accessibility*. Per the Monitoring and Reporting Program, Part II.B.1.a, all of the stations are open channels, are readily accessible points to City staff, and are located downstream of potential illicit discharges.

- *Assessment of Illegal Discharges*. Since each station is located within a watercourse, these points represent confluences for storm drain lines, catch basins, improved channels, natural tributary drainage courses, and outfalls. As such, each location is a critical point in the drainage course of each sub-watershed within the City in which illegal discharges can readily be detected at a single location.

- *Integration with Principle Permittee's stations*. The City coordinated with the Principle Permitee to provide coverage necessary to adequately represent the entire MS4 as per the MRP, section II.B.1.a, throughout the City. As such, the City and Principle Permittee collectively monitor a total of eight stations throughout the City.

- *Establishing Numeric Criteria.* These stations were selected based on conditions at each site that would ensure consistency at each station each year. This approach was intended to establish baseline values that could be used in determining meaningful numeric criteria rather than collecting random data from random samples at random locations that have little to no connectivity.

The results of the City's monitoring activities that were conducted during this reporting period are presented in Attachment F.

6) Summary of Illicit Discharge Monitoring Program results, including: 1) All inspection, field screening, and analytical monitoring results; 2) All follow-up and elimination activities; and 3) Any proposed changes to station locations and/or sampling frequencies:

TABLE 9-4

Date (1)	Location	Monitoring Results	Follow-up and Elimination Activities	Proposed Changes
September 18, 2008	Core Locations	No indications of illicit discharges	None	No Changes Comment(s):
August 27, 2008	Core Locations	No indications of illicit discharges	None	No Changes Comment(s):

(1) - Section II.B.1.a of the MRP requires two (at a minimum) sampling events between May 1 and September 30.

7) Assessment of the overall program effectiveness based on the measurable goals established in the SWMP:

All of the City's dry-weather monitoring locations were inspected and all SORs were investigated. The City did not encounter any evidence of illicit connections or discharges into or at any of the monitoring locations. All of the SORs resulted in either verbal, written, or monetary enforcement actions. While the overall number of SORs decreased by 47% from the previous reporting period, and the number of reported illegal discharges dropped by 48%, the number of citations increased by 50%. Although these numbers may reflect the City's successful efforts in addressing this component, the data does not provide a clear correlation between enforcement and water quality.

10.0 PUBLIC PARTICIPATION

1) A description of efforts to include the public in urban runoff management programs during the reporting period.

The City conducted various outreach efforts to the public this reporting period. The most visible programs consisted of the community clean-up activities on September 13, 2008, November 15, 2008, January 31, 2009, April 11, 2009, and May 9, 2009, and Earth Day on April 22, 2009. The less visible programs included personal contact with the public regarding pollution prevention during routine inspections and responses to Service Order Requests.

11.0 ASSESSMENT OF OVERALL SWMP EFFECTIVENESS

The SWMP continued to be implemented in its entirety throughout this reporting period. Each section provides sufficient detail to successfully implement each of the components of the permit.

12.0 FISCAL ANALYSIS

1) A summary of the city's reporting period expenditures and estimated budgets for the upcoming reporting period.

TABLE 12-1

Program Element	Fiscal Year 2007-2008		Fiscal Year 2008-2009		Fiscal Year 2009-2010 (Estimated)	
	Capital Expenditures	O&M/Admin Expenditure	Capital Expenditures	O&M/Admin Expenditure	Capital Expenditures	O&M/Admin Expenditure
Program Management (1)	--	121,747	--	126,836	--	131,974
Annual Fee for NPDES Permit from SWRCB	--	11,109	--	13,499	--	13,499
Implementation Agreement (I.A.) Shared Cost	--	140,248	--	163,768	--	200,794
Construction Inspections (2)	--	58,163	--	60,389	--	62,528
Development Planning (WQMP reviews)	--	10,000 (3)	--	Included under program management	--	Included under program management
Industrial and Commercial Inspections	--	70,000 (4)	--	Included under program management	--	$30,000
IC/ID Program	--	Included under program management	--	Included under program management	--	Included under program management
Municipal Programs (PW Maint) (5)	--	327,000	--	160,000	--	160,000
Municipal Programs (TCSD) (6)	--	7,134,931	--	7,848,424	--	7,566,959
Public Outreach (schools, public events)	--	Included in the I.A.	--	Included in the I.A.	--	Included in the I.A.
Regional Monitoring Program	--	Included in the I.A.	--	Included in the I.A.	--	Included in the I.A.
Other (7)	--	10,000	--	10,000	--	10,000
Grand Total	**$0**	**$7,883,198**	**$0**	**$8,382,916**	**$0**	**$8,175,754**

Notes:
(1) This cost reflects program administrator time.
(2) This costs reflects NPDES inspector time plus 5K vehicle expenses
(3) This cost reflects out-sourced WQMP reviews
(4) This cost reflects out-sourced inspection services
(5) This cost reflects drainage facility maintenance (channels, crossings, catchbasins.desilting ponds, creek clean-up events).
(6) This cost reflects the operating budgets for refuse/recycling, street sweeping, landscape/slope programs through Temecula Community Services Department.
(7) This cost reflects staff's time for formal classroom training inspection forms, citation books, mailings, and supplies.

2) A description of the source(s) of funds that were utilized during the previous fiscal year and the source(s) of funds proposed to meet the necessary expenditures for the subsequent year, including legal restrictions on the use of such funds.

TABLE 12-2

Source of Funds	Percent of Program Funding (approximate)	Restrictions on Use (if applicable)
General Fund	74.5	General Fund is used to fund other departments and divisions.
WQMP Review Fees	9	Fixed fee based on project size.
WQMP Construction Inspection Fees	0.5	Fixed percentage based on project's 'Engineering Cost Estimate'.
ESC Review Fees	5	Fixed percentage based on project's 'Engineering Cost Estimate'.
ESC Inspection Fees	7	Fixed percentage based on project's 'Engineering Cost Estimate'.
Citations	4	

13.0 NON-STORM WATER DISCHARGES

Permittees shall report on any discharge category listed in Requirement B.2 of Order No. R9-2004-001 that was identified as a source of pollutants during the reporting period. For each identified category, the Permittee shall report whether it elected to prohibit the discharge or to require BMPs to reduce pollutants in the discharge to the MEP. If the discharge is not prohibited, the BMPs that will be implemented, or required to be implemented, shall be described in each SWMP Annual Report.

Category	Prohibited	BMP to be Implemented
Diverted stream flows	☐ Yes ☒ No	Not Applicable
Rising ground waters	☐ Yes ☒ No	Not Applicable
Uncontaminated ground water infiltration [as defined at 40 CFR 35.2005(20)] to MS4s	☐ Yes ☒ No	Not Applicable
Uncontaminated pumped ground water	☐ Yes ☒ No	Not Applicable
Foundation drains	☐ Yes ☒ No	Not Applicable
Springs	☐ Yes ☒ No	Not Applicable
Water from crawl space pumps (Identified as a source of pollutants when commingled with construction-related sediment).	☐ Yes ☒ No	Filtered through gravel-bag chevrons prior to entering a CB
Footing drains	☐ Yes ☒ No	Not Applicable
Air conditioning condensation	☐ Yes ☒ No	Not Applicable
Flows from riparian habitats and wetlands	☐ Yes ☒ No	Not Applicable
Water line flushing. (Identified as a source of pollution when commingled with construction-related sediment).	☐ Yes ☒ No	Filtered through gravel-bag chevrons prior to entering a CB
Landscape irrigation	☐ Yes ☒ No	Not Applicable
Discharges from potable water sources not subject to NPDES Permit No. CAG679001, other than water main breaks. (Identified as a source of pollutants when commingled with construction-related sediment).	☐ Yes ☒ No	Filtered through gravel-bag chevrons prior to entering a CB
Irrigation water	☐ Yes ☒ No	Not Applicable
Lawn watering	☐ Yes ☒ No	Not Applicable
Individual residential car washing	☐ Yes ☒ No	Not Applicable
Non-emergency fire fighting flows	☐ Yes ☒ No	Not Applicable
Dechlorinated swimming pool discharges	☐ Yes ☒ No	Not Applicable

14.0 RECEIVING WATER LIMITATIONS

This section includes the report required pursuant to Requirement C.2.a. of Order No. R9-2004-001, if applicable. Requirement C.2.a. states:

"Upon a determination by either a Permittee or the SDRWQCB that MS4 discharges are causing or contributing to an exceedance of an applicable water quality standard, the Permittee shall promptly notify and thereafter submit a report to the SDRWQCB that describes BMPs that are currently being implemented and additional BMPs that will be implemented to prevent or reduce any pollutants that are causing or contributing to the exceedance of water quality standards. The report may be incorporated in the SWMP Annual Report unless the SDRWQCB directs an earlier submittal. The report shall include an implementation schedule. The SDRWQCB may require modifications to the report."

The City is not aware of any exceedances to any water quality standards in this area during the reporting period. Please refer to the watershed annual report for a detailed review of the monitoring data collected throughout the Santa Margarita River in Riverside County.

15.0 SUMMARY OF ADDITIONAL URBAN RUNOFF DATA

This section is a summary of all urban runoff related data not included in the annual monitoring report (e.g., special investigations).

The City of Temecula did not conduct any special investigations during this reporting period.

16.0 PROPOSED REVISIONS TO THE SWMP

This section includes proposed revisions to the Individual SWMP, including areas in need of improvement based on the assessment of effectiveness of each program component.

There were no significant programmatic changes to the City's SWMP during this reporting period. Attachment G includes a list of revisions that have been incorporated into the SWMP since July 1, 2005.

ATTACHMENT A

DEVELOPMENT PLANNING PROGRAM

- List of Issued Grading Permits
- Monthly tally of Finalized WQMPs
- Example of Final Conditions of Approval
- NPDES Training Log

ATTACHMENT B

CONSTRUCTION PROGRAM

- Monthly Tally of NPDES Inspections
- Example of a Completed NPDES Inspection Frequency Sheet
- Annual Letter to Development Community

ATTACHMENT C

MUNICIPAL PROGRAM

- Debris Tonnage Report
- Monthly Catch Basin Maintenance Logs

ATTACHMENT D

INDUSTRIAL/COMMERCIAL PROGRAM

- Example of Completed NPDES Inspection form for Commercial/Industrial Facilities

ATTACHMENT E

RESIDENTIAL PROGRAM

- "Inside Temecula" Newsletters
- "Guide to Leisure Activities"
- City-Sponsored "City-Wide Clean-up" Flyers
- County-Sponsored "Household Hazardous Waste Collection" Flyers

ATTACHMENT F

ILLICIT DISCHARGE DETECTION PROGRAM

- Completed Dry-Weather Monitoring Log

ATTACHMENT G

REVISIONS TO THE SWMP

- SWMP Revisions List

ATTACHMENT A

DEVELOPMENT PLANNING PROGRAM

- List of Issued Grading Permits
- Monthly tally of Finalized WQMPs
- Example of Final Conditions of Approval
- NPDES Training Log

Number	Address or Location	Entered	Status	Type	Sub Type	Level	Type_Cat	Balance	Title
LD07-006GR	27985 DIAZ RD TEME	01/09/2007	ISSUED	LD_GRADE	PA_PGP	A	PW	0	DOWNS ENERGY COMMERCIAL FUEL
LD07-006GR	29055 MAP TEME	01/09/2007	ISSUED	LD_GRADE	PA_PGP	A	PW	0	DOWNS ENERGY COMMERCIAL FUEL
LD07-124GR	32225 TEMECULA PARKWAY TEME	12/05/2007	ISSUED	LD_GRADE	PA_PGP	A	PW	0	WAL-MART #2708-01 EXPANSION
LD07-124GR	23172 MAP TEME	12/05/2007	ISSUED	LD_GRADE	PA_PGP	A	PW	0	WAL-MART #2708-01 EXPANSION
LD07-130GR	31107 MARIPOSA PL TEME	12/19/2007	ISSUED	LD_GRADE	SFR	A	PW	0	KONICKI RESIDENCE
LD08-021GR	10291 MAP TEME	04/10/2008	ISSUED	LD_GRADE	PA_PGP	A	PW	0	PUJOL STREET APARTMENTS
LD08-021GR	28771 PUJOL ST TEME	04/10/2008	ISSUED	LD_GRADE	PA_PGP	A	PW	0	PUJOL STREET APARTMENTS
LD08-021GR	8643 MAP TEME	04/10/2008	ISSUED	LD_GRADE	PA_PGP	A	PW	0	PUJOL STREET APARTMENTS
LD08-029GR	39540 WINCHESTER RD TEME	05/08/2008	ISSUED	LD_GRADE	PA_PGP	A	PW	0	FIRST BANK
LD08-029GR	30719 MAP TEME	05/08/2008	ISSUED	LD_GRADE	PA_PGP	A	PW	0	FIRST BANK
LD08-032GR	41785 NICOLE LN TEME	05/21/2008	ISSUED	LD_GRADE	PA_PGP	A	PW	0	CREEKSIDE CENTRE/RUBY TUESDAY
LD08-032GR	30107 MAP TEME	05/21/2008	ISSUED	LD_GRADE	PA_PGP	A	PW	0	CREEKSIDE CENTRE/RUBY TUESDAY
LD08-063GR	42081 3RD ST TEME	09/03/2008	ISSUED	LD_GRADE	PA_PGP	A	PW	0	WAREHOUSE @ CREEKSIDE
LD08-066GR	31521 ENFIELD LN TEME	09/12/2008	ISSUED	LD_GRADE	PA_PGP	A	PW	0	NUNEZ RESIDENCE
LD08-068GR	41000 MAIN ST TEME	09/23/2008	ISSUED	LD_GRADE	MGR_RGR	A	PW	0	CIVIC CENTER
LD08-072GR	41719 FOSSE WY TEME	10/06/2008	ISSUED	LD_GRADE	SFR	A	PW	0	RAINEY RESIDENCE
LD08-072GR	12318 MAP TEME	10/06/2008	ISSUED	LD_GRADE	SFR	A	PW	0	RAINEY RESIDENCE
LD08-075GR	41705 OVERLAND DR TEME	10/24/2008	FINAL	LD_GRADE	PA_PGP	A	PW	0	OVERLAND SELF STORAGE
LD08-075GR	16178 3 MAP TEME	10/24/2008	FINAL	LD_GRADE	PA_PGP	A	PW	0	OVERLAND SELF STORAGE
LD08-080GR	42429 WINCHESTER RD TEME	11/14/2008	ISSUED	LD_GRADE	PA_PGP	A	PW	0	AMERICAN AG CREDIT
LD08-087GR	28071 DIAZ RD TEME	12/23/2008	ISSUED	LD_GRADE	PA_PGP	A	PW	0	DIAZ INDUSTRIAL 2/RTA PARKING
LD08-087GR	27509 MAP TEME	12/23/2008	ISSUED	LD_GRADE	PA_PGP	A	PW	0	DIAZ INDUSTRIAL 2/RTA PARKING
LD09-004GR	41793 NICOLE LN TEME	02/03/2009	ISSUED	LD_GRADE	PA_PGP	A	PW	0	PANERA BREAD & BAKERY

LD09-004GR	34387 MAP TEME	02/03/2009	ISSUED	LD_GRADE	PA_PGP	A	PW	0	PANERA BREAD & BAKERY
LD09-007GR	43845 CALLE DE VELARDO TEME	03/11/2009	ISSUED	LD_GRADE	SFR	A	PW	0	BLACKMUN RESIDENCE
LD09-007GR	9833 3 MAP TEME	03/11/2009	ISSUED	LD_GRADE	SFR	A	PW	0	BLACKMUN RESIDENCE

Total Rows: 26

MONTHLY TALLY OF FINALIZED WQMPS

	Residental	Com/Ind	Mun	Total Accepted
	2006			
Jan-06				0
Feb-06		1		1
Mar-06				0
Apr-06				0
May-06		2		2
Jun-06		1	1	2
Jul-06		1		1
Aug-06	1	1		2
Sep-06		1		1
Oct-06	1	2		3
Nov-06		2		2
Dec-06				0
TOTALS	**2**	**11**	**1**	**14**
	2007			
Jan-07				0
Feb-07		1		1
Mar-07				0
Apr-07		1		1
May-07		2		2
Jun-07		2		2
Jul-07	1	1		2
Aug-07		1		1
Sep-07		2		2
Oct-07	2	5		7
Nov-07		1		1
Dec-07				0
TOTALS	**3**	**16**	**0**	**19**
	2008			
Jan-08		1		1
Feb-08				0
Mar-08				0
Apr-08		1		1
May-08				0
Jun-08		2		2
Jul-08		1		1
Aug-08		2	1	3
Sep-08	1	2		3
Oct-08		1		1
Nov-08				0
Dec-08		3	2	5
TOTALS	**1**	**13**	**3**	**17**
	2009			
Jan-09				0
Feb-09		1		1
Mar-09				0
Apr-09		1	1	2
May-09				0
Jun-09				0
Jul-09		1		1
Aug-09				0
Sep-09		1		1

MONTHLY TALLY OF FINALIZED WQMPS

	Residental	Com/Ind	Mun	Total Accepted
Oct-09				0
Nov-09				0
Dec-09				0
TOTALS	**0**	**4**	**1**	**5**
Cumulative Total	**6**	**44**	**5**	**55**

ACCEPTANCE OF CONDITIONS OF APPROVAL

I, Kenneth High, understand that Planning Application No. PA06-0389 has been approved with Conditions of Approval which are set forth in Exhibit A. I have read the Conditions of Approval contained in PC Resolution No. and understand them. Through signing this ACCEPTANCE OF CONDITIONS OF APPROVAL, I agree and commit to the City of Temecula that I will implement and abide by the Conditions of Approval, including any indemnification requirements imposed by those conditions.

SIGNATURE

6/1/08
DATE

EXHIBIT A

CITY OF TEMECULA

FINAL CONDITIONS OF APPROVAL

Planning Application No.: PA06-0389

Project Description: A Conditional Use Permit and a Development Plan to construct a 26,418 square foot self-storage facility with nine storage buildings and 42 covered RV parking spaces located at 41705 Overland Drive

Assessor's Parcel No.: 921-480-044 and 921-480-045

MSHCP Category: Commercial

DIF Category: Service Commercial

TUMF Category: Service

Approval Date: June 4, 2008

Expiration Date: June 4, 2010

PLANNING DEPARTMENT

Within 48 Hours of the Approval of This Project

1. The applicant/developer shall deliver to the Planning Department a cashier's check or money order made payable to the County Clerk in the amount of Sixty-Four Dollars ($64.00) for the County administrative fee, to enable the City to file the Notice of Exemption as provided under Public Resources Code Section 21152 and California Code of Regulations Section 15062. If within said 48-hour period the applicant/developer has not delivered to the Planning Department the check as required above, the approval for the project granted shall be void by reason of failure of condition (Fish and Game Code Section 711.4(c)).

2. The applicant shall review and sign the Acceptance of Conditions of Approval document that will be provided by the Planning Department staff and return the document with an original signature to the Planning Department.

General Requirements

3. The applicant and owner of the real property subject to this condition shall hereby agree to indemnify, protect, hold harmless, and defend the City with Legal Counsel of the City's own selection from any and all claims, actions, awards, judgments, or proceedings against the City to attack, set aside, annul, or seek monetary damages resulting, directly or indirectly, from any action in furtherance of and the approval of the City, or any agency or instrumentality thereof, advisory agency, appeal board or legislative body including actions approved by the voters of the City, concerning the Planning Application. The City shall be deemed for purposes of this condition, to include any agency or instrumentality thereof, or

any of its elected or appointed officials, officers, employees, consultants, contractors, legal counsel, and agents. City shall promptly notify both the applicant and landowner of any claim, action, or proceeding to which this condition is applicable and shall further cooperate fully in the defense of the action. The City reserves the right to take any and all action the City deems to be in the best interest of the City and its citizens in regards to such defense.

4. The permittee shall obtain City approval for any modifications or revisions to the approval of this project.

5. This approval shall be used within two years of the approval date; otherwise, it shall become null and void. By use is meant the beginning of substantial construction contemplated by this approval within the two year period, which is thereafter diligently pursued to completion, or the beginning of substantial utilization contemplated by this approval.

6. The Director of Planning may, upon an application being filed within 30 days prior to expiration, and for good cause, grant a time extension of up to 3 one-year extensions of time, one year at a time.

7. A separate building permit shall be required for all signage.

8. The development of the premises shall substantially conform to the approved site plan and elevations contained on file with the Planning Department.

9. Landscaping installed for the project shall be continuously maintained to the reasonable satisfaction of the Planning Director. If it is determined that the landscaping is not being maintained, the Planning Director shall have the authority to require the property owner to bring the landscaping into conformance with the approved landscape plan. The continued maintenance of all landscaped areas shall be the responsibility of the developer or any successors in interest.

10. The applicant shall paint a three-foot by three-foot section of the building for Planning Department inspection, prior to commencing painting of the building.

11. The applicant shall submit to the Planning Department for permanent filing two 8" X 10" glossy photographic color prints of the approved Color and Materials Board and the colored architectural elevations. All labels on the Color and Materials Board and Elevations shall be readable on the photographic prints.

12. The Conditions of Approval specified in this resolution, to the extent specific items, materials, equipment, techniques, finishes or similar matters are specified, shall be deemed satisfied by staff's prior approval of the use or utilization of an item, material, equipment, finish or technique that City staff determines to be the substantial equivalent of that required by the Conditions of Approval. Staff may elect to reject the request to substitute, in which case the real party in interest may appeal, after payment of the regular cost of an appeal, the decision to the Planning Commission for its decision.

MATERIAL	COLOR
Stucco Exterior	Frazee 7761W, Nutmeg Dust
Concrete Tile Roof	US Tile, S-tile, Tuscany
Accent Stucco	Frazee 8244D, Copper Springs
Tower Element Stucco	Frazee 7753M, Harvest Tan
Wrought Iron Trellis	Frazee 8244D, Copper Springs
Metal Seam Roof	McElroy Metals, Rustic Red
Gutters and Downspouts	Frazee 7761W, Nutmeg Dust
Metal Canopy	Baja Storage, Exposed Metal Beams and Posts
Gates and Fencing	Enviro Finish ESS LT Green
Roll-up Doors	Roll Rite, Denali Green

13. Trash enclosures shall be provided to house all trash receptacles utilized on the site. These shall be clearly labeled on site plan.

14. Parking for the project shall be shared across the site, including parking spaces in all lots that are a part of the project. If the project involves multiple lots, the applicant shall submit to the Planning Department a copy of a recorded Reciprocal Use Agreement, which provides for cross-lot access and parking across all lots.

15. If construction is phased, a construction staging area plan or phasing plan for construction equipment and trash shall be approved the Director of Planning.

16. Regular hours of operation shall be between 7 a.m. and 9 p.m., seven days each week.

17. The applicant shall comply with their Statement of Operations dated December 19, 2006, on file with the Planning Department, unless superseded by these Conditions of Approval.

18. This Conditional Use Permit may be revoked pursuant to Section 17.03.080 of the City's Development Code.

19. The City, its Planning Director, Planning Commission, and City Council retain and reserve the right and jurisdiction to review and modify this Conditional Use Permit (including the Conditions of Approval) based on changed circumstances. Changed circumstances include, but are not limited to, the modification of business, a change in scope, emphasis, size of nature of the business, and the expansion, alteration, reconfiguration or change of use. The reservation of right to review any Conditional Use Permit granted or approved or conditionally approved hereunder by the City, its Planning Director, Planning Commission and City Council is in addition to, and not in-lieu of, the right of the City, its Planning Director, Planning Commission, and City Council to review, revoke or modify any Conditional Use Permit approved or conditionally approved hereunder for any violations of the conditions imposed on such Conditional Use Permit or for the maintenance of any nuisance condition or other code violation thereon.

Prior to Issuance of Grading Permit(s)

20. Provide the Planning Department with a copy of the underground water plans and electrical plans for verification of proper placement of transformer(s) and double detector check prior to final agreement with the utility companies.

21. Double detector check valves shall be either installed underground or internal to the project

site at locations not visible from the public right-of-way, subject to review and approval by the Director of Planning.

22. A Parcel Merger must be filed and approved to the satisfaction of the Director of the Department of Public Works.

23. The following shall be included in the Notes Section of the Grading Plan: "If at any time during excavation/construction of the site, archaeological/cultural resources, or any artifacts or other objects which reasonably appears to be evidence of cultural or archaeological resource are discovered, the property owner shall immediately advise the City of such and the City shall cause all further excavation or other disturbance of the affected area to immediately cease. The Director of Planning at his/her sole discretion may require the property owner to deposit a sum of money it deems reasonably necessary to allow the City to consult and/or authorize an independent, fully qualified specialist to inspect the site at no cost to the City, in order to assess the significance of the find. Upon determining that the discovery is not an archaeological/cultural resource, the Director of Planning shall notify the property owner of such determination and shall authorize the resumption of work. Upon determining that the discovery is an archaeological/cultural resource, the Director of Planning shall notify the property owner that no further excavation or development may take place until a mitigation plan or other corrective measures have been approved by the Director of Planning."

24. A copy of the Rough Grading Plans shall be submitted and approved by the Planning Department.

Prior to Issuance of Building Permit(s)

25. The applicant shall submit a photometric plan, including the parking lot to the Planning Department, which meets the requirements of the Development Code and the Palomar Lighting Ordinance. The parking lot light standards shall be placed in such a way as to not adversely impact the growth potential of the parking lot trees.

26. All downspouts shall be internalized with the exception of interior facing wall surfaces where buildings are not visible from public view. All exterior downspouts shall be painted the same color as the exterior of the building.

27. Three copies of Construction Landscaping and Irrigation Plans shall be reviewed and approved by the Planning Department. These plans shall conform to the approved conceptual landscape plan, or as amended by these conditions. The location, number, genus, species, and container size of the plants shall be shown. The plans shall be consistent with the Water Efficient Ordinance. The plans shall be accompanied by the following items:

    a. Appropriate filing fee (per the City of Temecula Fee Schedule at time of submittal).

    b. Provide a minimum five foot wide planter to be installed at the perimeter of all parking areas. Curbs, walkways, etc. are not to infringe on this area.

    c. A note on the plans stating that "Two landscape inspections are required: One inspection is required for irrigation lines and a separate inspection is required for final planting inspection."

d. A note on the plans stating that "The contractor shall provide two copies of an agronomic soils report at the first irrigation inspection."

e. One copy of the approved Grading Plan.

f. Water usage calculations per Chapter 17.32 of the Development Code (Water Efficient Ordinance).

g. Total cost estimate of plantings and irrigation (in accordance with approved plan).

h. The locations of all existing trees that will be saved consistent with the tentative map.

i. A landscape maintenance program shall be submitted for approval, which details the proper maintenance of all proposed plant materials to assure proper growth and landscape development for the long-term esthetics of the property. The approved maintenance program shall be provided to the landscape maintenance contractor who shall be responsible to carry out the detailed program.

j. Specifications shall indicate that a minimum of two landscape site inspections will be required. One inspection to verify that the irrigation mainline is capable of being pressurized to 150 psi for a minimum period of two hours without loss of pressure. The second inspection will verify that all irrigation systems have head-to-head coverage, and to verify that all plantings have been installed consistent with the approved construction landscape plans. The applicant/owner shall contact the Planning Department to schedule inspections.

28. The east wall shall be moved five feet to the west to accommodate five feet of perimeter landscaping.

29. All plantings located on the interior side of the east wall shall be moved to the exterior of the east wall to provide for perimeter screening.

30. All off-site plantings shall be removed from the landscaping plan.

31. Roof-mounted mechanical equipment shall not be permitted within the subdivision; however, solar equipment or any other energy saving devices shall be permitted with Director of Planning approval.

32. All utilities shall be screened from public view. Landscape construction drawings shall show and label all utilities and provide appropriate screening. Provide a three foot clear zone around fire check detectors as required by the Fire Department before starting the screen. Group utilities together in order to reduce intrusion. Screening of utilities is not to look like an after-thought. Plan planting beds and design around utilities. Locate all light poles on plans and insure that there are no conflicts with trees.

33. Building Construction Plans shall include exterior details including but not limited to wall finishes, building materials and colors, and trash enclosures to match the style of the building subject to the approval of the Planning Director.

34. All block walls along the perimeter of the site shall have an exterior stucco finish to match the buildings.

35. The two perimeter walls along the north entrance of the site shall have a cornice detail similar to the trim on buildings A and B.

36. The building construction plans shall include trash enclosure details. Trash enclosures shall consist of masonry walls with an exterior stucco finish to match buildings, metal or wood doors, a trellis structure over the top of the enclosure, and a concrete floor and a concrete stress pad to reduce pavement damage from disposal trucks.

37. Building plans shall indicate that all roof hatches shall be painted "International Orange."

38. The construction plans shall indicate the application of painted rooftop addressing plotted on a nine-inch grid pattern with 45-inch tall numerals spaced nine inches apart. The numerals shall be painted with a standard nine-inch paint roller using fluorescent yellow paint applied over a contrasting background. The address shall be oriented to the street and placed as closely as possible to the edge of the building closest to the street.

Prior to Release of Power, Building Occupancy or Any Use Allowed by This Permit

39. An applicant shall submit a letter of substantial conformance, subject to field verification by the Planning Director or his/her designee. Said letter of substantial conformance shall be prepared by the project designer and shall indicate that all plant materials and irrigation system components have been installed in accordance with the approved final landscape and irrigation plans. If a certificate of use and occupancy is not required for the project, such letter of substantial conformance shall be submitted prior to scheduling for the final inspection.

40. The applicant shall be required to screen all loading areas and roof mounted mechanical equipment from view of the adjacent residences and public right-of-ways. If upon final inspection it is determined that any mechanical equipment, roof equipment or backs of building parapet walls are visible from any portion of the public right-of-way adjacent to the project site, the developer shall provide screening by constructing a sloping tile covered mansard roof element or other screening reviewed and approved by the Director of Planning.

41. All required landscape planting and irrigation shall have been installed consistent with the approved construction plans and shall be in a condition acceptable to the Director of Planning. The plants shall be healthy and free of weeds, disease, or pests. The irrigation system shall be properly constructed and in good working order.

42. Each parking space reserved for the handicapped shall be identified by a permanently affixed reflectorized sign constructed of porcelain on steel, beaded text or equal, displaying the International Symbol of Accessibility. The sign shall not be smaller than 70 square inches in area and shall be centered at the interior end of the parking space at a minimum height of 80 inches from the bottom of the sign to the parking space finished grade, or centered at a minimum height of 36 inches from the parking space finished grade, ground, or sidewalk. A sign shall also be posted in a conspicuous place, at each entrance to the off-street parking facility, not less than 17 inches by 22 inches, clearly and conspicuously stating the following:

> "Unauthorized vehicles parked in designated accessible spaces not displaying distinguishing placards or license plates issued for persons with disabilities may be towed away at owner's expense. Towed vehicles may be reclaimed by telephoning (951) 696-3000."

43. In addition to the above requirements, the surface of each parking place shall have a

surface identification sign duplicating the Symbol of Accessibility in blue paint of at least three square feet in size.

44. All site improvements including but not limited to parking areas and striping shall be installed.

45. All of the foregoing conditions shall be complied with prior to occupancy or any use allowed by this permit.

OUTSIDE AGENCIES

46. The applicant shall comply with the recommendations set forth in the County of Riverside Department of Environmental Health's transmittal dated January 8, 2007, a copy of which is attached.

47. The applicant shall comply with the recommendations set forth in the Rancho California Water District's transmittal dated January 29, 2007, a copy of which is attached.

BUILDING AND SAFETY DEPARTMENT

General Requirements

48. All design components shall comply with applicable provisions of the 2007 edition of the California Building, Plumbing and Mechanical Codes; 2007 California Electrical Code; California Administrative Code, Title 24 Energy Code, California Title 24 Disabled Access Regulations, and the Temecula Municipal Code.

49. The City of Temecula adopted an ordinance on March 31, 2003 to collect fees for a Riverside County area wide Transportation Uniform Mitigation Fee (TUMF). This project is subject to payment of these fees at the time of building permit issuance. The fees shall be subject to the provisions of Ordinance 03-01 and the fee schedule in effect at the time of building permit issuance.

50. Submit at time of plan review, a complete exterior site lighting plans showing compliance with Ordinance No. 655 for the regulation of light pollution. All streetlights and other outdoor lighting shall be shown on electrical plans submitted to the Department of Building and Safety. Any outside lighting shall be hooded and directed so as not to shine directly upon adjoining property or public rights-of-way.

51. A receipt or clearance letter from the Temecula Valley School District shall be submitted to the Building and Safety Department to ensure the payment or exemption from School Mitigation Fees.

52. Obtain all building plans and permit approvals prior to commencement of any construction work.

53. Show all building setbacks.

54. Developments with multi-tenant buildings or shell buildings shall provide a house electrical meter to provide power for the operation of exterior lighting, irrigation pedestals and fire alarm systems for each building on the site. Developments with single user buildings shall clearly show on the plans how the operation of exterior lighting and fire alarm systems when

a house meter is not specifically proposed.

55. Provide an approved automatic fire sprinkler system.

56. All building and facilities must comply with applicable disabled access regulations. Provide all details on plans.

57. Provide disabled access from the public way to the main entrance of the building.

58. Provide van accessible parking located as close as possible to the main entry.

59. Commercial and Industrial project trash enclosures, patio covers, light standards, and any block walls will require separate approvals and permits.

60. Signage shall be posted conspicuously at the entrance to the project that indicates the hours of construction, shown below, as allowed by the City of Temecula Ordinance No. 94-21, specifically Section G (1) of Riverside County Ordinance No. 457.73, for any site within one-quarter mile of an occupied residence. The permitted hours of construction are Monday through Friday from 6:30 a.m. to 6:30 p.m., and Saturday from 7:00 a.m. to 6:30 p.m. No work is permitted on Sundays or Government Holidays.

61. Obtain street addressing for all proposed buildings prior to submittal for plan review.

Prior to Issuance of Building Permit

62. Restroom fixtures, number and type, to be in accordance with the provisions of the 2007 edition of the California Plumbing Code.

63. Provide electrical plan including load calculations and panel schedule, plumbing schematic and mechanical plan applicable to scope of work for plan review.

64. Truss calculations that are stamped by the engineer of record and the truss manufacturer engineer are required for plan review submittal.

65. Provide precise grading plan at plan check submittal to check accessibility for persons with disabilities.

66. Provide appropriate stamp of a registered professional with original signature on plans prior to permit issuance.

Prior to Release of Power, Building Occupancy or Any Use Allowed by This Permit

67. A pre-construction meeting is required with the building inspector prior to the start of the building construction.

COMMUNITY SERVICES DEPARTMENT

General Requirements

68. The trash enclosures shall be large enough to accommodate a recycling bin, as well as, regular solid waste containers.

69. The Applicant shall comply with the Public Art Ordinance.

Prior to Issuance of Building Permit(s)

70. The developer shall contact the City's franchised solid waste hauler for disposal of construction debris. Only the City's franchisee may haul construction debris.

FIRE PREVENTION

General Requirements

71. Final fire and life safety conditions will be addressed when building plans are reviewed by the Fire Prevention Bureau. These conditions will be based on occupancy, use, the California Building Code (CBC), California Fire Code (CFC), and related codes which are in force at the time of building plan submittal.

72. The Fire Prevention Bureau is required to set a minimum fire flow for the remodel or construction of all commercial buildings per CFC Appendix III.A, Table A-III-A-1. The developer shall provide for this project, a water system capable of delivering 4,000 GPM at 20 PSI residual operating pressure for a 4 hour duration (CFC 903.2, Appendix III-A).

73. The Fire Prevention Bureau is required to set minimum fire hydrant distances per CFC Appendix III-B, Table A-III-B-1. A combination of on-site and off-site (6" x 4" x 2-2 1/2" outlets) shall be located on Fire Department access roads and adjacent public streets. Hydrants shall be spaced at 350 feet apart, at each intersection and shall be located no more than 210 feet from any point on the street or Fire Department access road(s) frontage to a hydrant. The required fire flow shall be available from any adjacent hydrant(s) in the system (CFC 903.2, 903.4.2, and Appendix III-B).

74. If construction is phased, each phase shall provide approved access and fire protection prior to any building construction (CFC 8704.2 and 902.2.2).

Prior to Issuance of Grading Permits

75. As required by the California Fire Code, when any portion of the facility is in excess of 150 feet from a water supply on a public street, as measured by an approved route around the exterior of the facility, on-site fire hydrants and mains capable of supplying the required fire flow shall be provided. For this project on site fire hydrants are required (CFC 903.2).

76. Prior to building construction, all locations where structures are to be built shall have approved temporary Fire Department vehicle access roads for use until permanent roads are installed. Temporary Fire Department access roads shall be an all weather surface for 80,000 lbs. GVW. (CFC 8704.2 and 902.2.2.2)

77. Fire Department vehicle access roads shall have an unobstructed width of not less than 24 feet and an unobstructed vertical clearance of not less than 13 feet 6 inches (CFC 902.2.2.1).

78. The gradient for a fire apparatus access roads shall not exceed 15 percent (CFC 902.2.2.6 Ord. 99-14).

79. Prior to building construction, dead end road ways and streets in excess of 150 feet which have not been completed shall have a turnaround capable of accommodating fire apparatus (CFC 902.2.2.4).

Prior to Issuance of Building Permit(s)

80. Prior to issuance of building permits, the developer shall furnish three copies of the water system plans directly to the Fire Prevention Bureau for approval prior to installation. Plans shall be signed by a registered civil engineer; contain a Fire Prevention Bureau approval signature block; and conform to hydrant type, location, spacing and minimum fire flow standards. After the plans are signed by the local water company, the originals shall be presented to the Fire Prevention Bureau for signatures. The required water system including fire hydrants shall be installed and accepted by the appropriate water agency prior to any combustible building materials being placed on an individual lot (CFC 8704.3, 901.2.2.2 and National Fire Protection Association 24 1-4.1).

81. Prior to building permit, all locations where structures are to be built shall have approved Fire Department vehicle access roads to within 150 feet to any portion of the facility or any portion of an exterior wall of the building(s). Fire Department access roads shall be an all weather surface designed for 80,000 lbs. GVW with a minimum AC thickness of .25 feet (CFC sec 902)

82. Fire sprinkler plans shall be submitted to the Fire Prevention Bureau for approval. Three sets of sprinkler plans must be submitted by the installing contractor to the Fire Prevention Bureau.

83. Fire alarm plans shall be submitted to the Fire Prevention Bureau for approval. Three sets of alarm plans must be submitted by the installing contractor to the Fire Prevention Bureau.

Prior to Release of Power, Building Occupancy or Any Use Allowed by This Permit

84. "Blue Reflective Markers" shall be installed to identify fire hydrant locations (CFC 901.4.3).

85. Approved numbers or addresses shall be provided on all new and existing buildings in such a position as to be plainly visible and legible from the street or road fronting the property. Numbers shall be of a contrasting color to their background. Commercial, multi-family residential and industrial buildings shall have a minimum 12-inch numbers with suite numbers a minimum of six inches in size. All suites shall gave a minimum of six-inch high letters and/or numbers on both the front and rear doors. Single family residences and multi-family residential units shall have four-inch letters and /or numbers, as approved by the Fire Prevention Bureau (CFC 901.4.4).

86. Prior to issuance of Certificate of Occupancy or building final, based on square footage and type of construction, occupancy or use, the developer shall install a fire sprinkler system (CFC Article 10, CBC Chapter 9).

87. Prior to issuance of Certificate of Occupancy or building final, based on a requirement for monitoring the sprinkler system, occupancy or use, the developer shall install an fire alarm system monitored by an approved Underwriters Laboratory listed central station. Plans shall be submitted to the Fire Prevention Bureau for approval prior to installation (CFC Article 10).

88. A "Knox-Box" shall be provided. The Knox-Box shall be installed a minimum of six feet in

height and be located to the right side of the main entrance door (CFC 902.4).

89. All manual and electronic gates on required Fire Department access roads or gates obstructing Fire Department building access shall be provided with the Knox Rapid entry system for emergency access by fire fighting personnel (CFC 902.4).

90. Prior to final inspection of any building, the applicant shall prepare and submit to the Fire Department for approval, a site plan designating Fire Lanes with appropriate lane painting and or signs.

PUBLIC WORKS DEPARTMENT

General Requirements

91. A Grading Permit for precise grading, including all on-site flat work and improvements, shall be obtained from the Department of Public Works prior to commencement of any construction outside of the City-maintained street right-of way.

92. An Encroachment Permit shall be obtained from the Department of Public Works prior to commencement of any construction within an existing or proposed City right-of-way.

93. All grading plans shall be coordinated for consistency with adjacent projects and existing improvements contiguous to the site and shall be submitted on standard 24" x 36" City of Temecula mylars.

94. The project shall include construction-phase pollution prevention controls and permanent post-construction water quality protection measures into the design of the project to prevent non-permitted runoff from discharging offsite or entering any storm drain system or receiving water.

95. A Water Quality Management Plan (WQMP) must be accepted by the City prior to the initial grading plan check. The WQMP will be prepared by a registered civil engineer and include site design BMPs (Best Management Practices), source controls, and treatment mechanisms.

Prior to Issuance of Grading Permit(s)

96. A copy of the grading, improvement plans, along with supporting hydrologic and hydraulic calculations shall be submitted to the Riverside County Flood Control and Water Conservation District for approval prior to the issuance of any permit.

97. A permit from Riverside County Flood Control and Water Conservation District is required for work within their right-of-way.

98. A grading plan shall be prepared by a registered civil engineer and shall be reviewed and approved by the Department of Public Works. The grading plan shall include all necessary erosion control measures needed to adequately protect adjacent public and private property.

99. The developer shall post security and enter into an agreement guaranteeing the grading and erosion control improvements in conformance with applicable City Standards and subject to approval by the Department of Public Works.

100. A Soils Report shall be prepared by a registered soil or civil engineer and submitted to the Department of Public Works with the initial grading plan check. The report shall address all soils conditions of the site, and provide recommendations for the construction of engineered structures and pavement sections.

101. A Geological Report shall be prepared by a qualified engineer or geologist and submitted to the Department of Public Works with the initial grading plan check. The report shall address special study zones and the geological conditions of the site, and shall provide recommendations to mitigate the impact of ground shaking and liquefaction.

102. The developer shall have a Drainage Study prepared by a registered civil engineer in accordance with City Standards identifying storm water runoff expected from this site and upstream of this site. The study shall identify all existing or proposed public or private drainage facilities intended to discharge this runoff. The study shall also analyze and identify impacts to downstream properties and provide specific recommendations to protect the properties and mitigate any impacts. Any upgrading or upsizing of downstream facilities, including acquisition of drainage or access easements necessary to make required improvements, shall be provided by the Developer.

103. Construction-phase pollution prevention controls shall be consistent with the City's Grading, Erosion and Sediment Control Ordinance and associated technical manual, and the City's standard notes for Erosion and Sediment Control.

104. The project shall demonstrate coverage under the State NPDES General Permit for Construction Activities by providing a copy of the Waste Discharge Identification number (WDID) issued by the State Water Resources Control Board (SWRCB). A Stormwater Pollution Prevention Plan (SWPPP) shall be available at the site throughout the duration of construction activities.

105. As deemed necessary by the Director of the Department of Public Works, the Developer shall receive written clearance from the San Diego Regional Water Quality Control Board, Riverside County Flood Control and Water Conservation District, Planning Department, or other affected agencies.

106. The developer shall comply with all constraints which may be shown upon an Environmental Constraint Sheet (ECS) recorded with any underlying maps related to the subject property.

107. The applicant shall comply with the provisions of Chapter 8.24 of the Temecula Municipal Code (Habitat Conservation) by paying the appropriate fee set forth in that Ordinance or by providing documented evidence that the fees have already been paid.

108. A flood mitigation charge shall be paid. The Area Drainage Plan fee is payable to the Riverside County Flood Control and Water Conservation District by either cashier's check or money order, prior to issuance of permits, based on the prevailing area drainage plan fee. If the full Area Drainage Plan fee or mitigation charge has already been credited to this property, no new charge needs to be paid.

Prior to Issuance of Building Permit(s)

109. Precise grading plans shall conform to applicable City of Temecula Standards subject to approval by the Director of the Department of Public Works. The following design criteria shall be observed:

a. Flowline grades shall be 0.5% minimum over P.C.C. and 1.00% minimum over A.C. paving.

b. Driveways shall conform to the applicable City of Temecula Standard No. 207A.

c. All street and driveway centerline intersections shall be at 90 degrees.

d. Landscaping shall be limited in the corner cut-off area of all intersections and adjacent to driveways to provide for minimum sight distance and visibility.

110. The Developer shall construct the following public improvements in conformance with applicable City Standards and subject to approval by the Director of the Department of Public Works.

a. Street improvements, which may include, but not limited to: pavement, curb and gutter and drive approaches other traffic control devices as appropriate

b. Storm drain facilities

c. Sewer and domestic water systems

d. Under grounding of proposed and existing utility distribution lines less than 34 KV.

111. The building pad shall be certified to have been substantially constructed in accordance with the approved Precise Grading Plan by a registered civil engineer, and the soils engineer shall issue a Final Soil Report addressing compaction and site conditions.

112. The developer shall pay to the City the Public Facilities Development Impact Fee as required by, and in accordance with, Chapter 15.06 of the Temecula Municipal Code and all Resolutions implementing Chapter 15.06.

113. The developer shall pay to the City the Western Riverside County Transportation Uniform Mitigation Fee (TUMF) Program as required by, and in accordance with, Chapter 15.08 of the Temecula Municipal Code and all Resolutions implementing Chapter 15.08.

Prior to Release of Power, Building Occupancy or Any Use Allowed by This Permit

114. The project shall demonstrate that the pollution prevention BMPs outlined in the WQMP have been constructed and installed in conformance with approved plans and are ready for immediate implementation.

115. As deemed necessary by the Department of Public Works, the Developer shall receive written clearance from Rancho California Water District, Eastern Municipal Water District, or other affected agencies

116. All public improvements, including traffic signals, shall be constructed and completed per the approved plans and City standards to the satisfaction of the Department of Public Works.

117. The existing improvements shall be reviewed. Any appurtenance damaged or broken shall be repaired or removed and replaced to the satisfaction of the Department of Public Works.

NPDES TRAINING LOG		FY 2008 - 2009			
DEPARTMENT	STAFF	CONSTRUCTION	MUNICIPAL	NEW DEVELOPMENT	COMMERCIAL / INDUSTRIAL
ENGINEERING	ATTAR, AMER	09/30/08		06/09/09	
	BECERA, WILL	09/30/08		06/09/09	
	BESWICK, STEVE	09/29/08		----------	
	BOSTRE-LE, ANNIE	09/29/08			
	CHARETTE, STEVE	09/29/08		06/09/09	
	DE LA TORRE, MAYRA	09/29/08		06/09/09	
	HAGHIGHI, KAVON	08/26/08		----------	
	HANNAH, KENDRA	09/29/08		05/04/09	
	LICITRA, ALDO	08/26/08	11/06/08	05/04/09	05/26/09
	MCATEER, BILL			05/04/09	
	MCBRIDE, DAVID	09/29/08		05/04/09	
	ODVIAR, AVLIN	09/30/08		05/04/09	
	POURKAZEMI, JOHN	09/30/08		06/09/09	
	SALAZAR, JON	09/29/08		05/04/09	
	VLAHOS, CHRIS			06/09/09	
	WHITE, CHRIS			06/09/09	
PW INSPECTORS	ARMSTRONG, DOUG				
	BEILE, MATT	08/26/08			
	HODSON, JACK	08/26/08			
	HUDSON, MIKE	09/29/08			
	OLDHAM, JAY	09/30/08			
	RYAN. PAT	08/26/08			
	SHABEC, RUDY	08/26/08			
PW MAINTENANCE	BURON, BRAD		11/06/08		
	CASTILLO, RYAN		11/06/08		
	DAVIS, DAVID		11/06/08		
	GONZALES, GUS		11/06/08		
	JAIME, JUAN		11/06/08		
	LEVIS, MARK		11/06/08		
	LUDWIG, PERRY		11/06/08		
	NORMAN, FLINT		11/06/08		
	PAYNE, CHRIS		11/06/08		
	ROMINE, LARRY		11/06/08		
	SMITH, JIM		11/06/08		
	TIDWELL, RODNEY		11/06/08		
	WARD, JOHN		11/06/08		
	WEST, RANDY		11/04/08		
TCSD	CAMBEROS, DINO		11/06/08		
	DE LA ROSA, GEORGE		11/06/08		
	DIAZ, JOSE		11/06/08		
	HARRINGTON, KEVIN		11/06/08		
	KANIGOWSKI, JERZY				
	MAISEY, JOHN		11/06/08		
	MARTINEZ, ANTHONY				
	MCDONALD, DAVID				
	MUNOZ, MARIO		11/06/08		
	NORDGREN, KARL		11/06/08		
	SERVEN, RICK		11/06/08		
	SHEA, RICHARD		11/06/08		
	STERLING, STEVE		11/06/08		
	THURMAN, DAVID		11/06/08		
	WEDEKING, BRUCE		11/06/08		
	WIECHEC, MATT		11/06/08		
CODE ENFORCEMENT	CHING, MARIA	08/26/08			
	COLE, TOM	09/30/08			05/26/09
	COX, KEN	08/26/08			
	PARKER, MARRIANE	09/30/08			
	SMITH, ZARA	08/26/08			----------
	TAYLOR, WILLIAM	09/30/08			
	VOSHALL, JEAN	09/30/08			05/26/09
PLANNING	FISK, STUART			06/09/09	

NPDES TRAINING LOG		FY 2008 - 2009			
DEPARTMENT	STAFF	CONSTRUCTION	MUNICIPAL	NEW DEVELOPMENT	COMMERCIAL / INDUSTRIAL
	JONES, ERIC			06/09/09	
	KITZEROW, CHERYL				
	PETERS, MATT				
	SCHUMA, DANA			06/09/09	
	WEST, DALE			06/09/09	
BUILDING AND SAFETY	CLEMENTS, BRIAN				05/26/09
	OSVOLD, HEIDA				05/26/09

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ATTACHMENT B

CONSTRUCTION PROGRAM

- Monthly Tally of NPDES Inspections
- Example of a Completed NPDES Inspection Frequency Sheet
- Annual Letter to Development Community

TOTAL NPDES ONSTRUCTION INSPECTIONS
2008 - 2009

MONTH		PRIORITY SITES			TOTAL INSPECTIONS	WRITTEN WARNINGS	VERBAL WARNINGS	CITATIONS
		HIGH	MEDIUM	LOW				
July, 2008		72	59	0	131	4	32	4
	YEAR-TO-DATE	**72**	**59**	**0**	**131**	**4**	**32**	**4**
August, 2008		116	81	4	201	5	46	1
	YEAR-TO-DATE	**188**	**140**	**4**	**332**	**9**	**78**	**5**
September, 2008		164	71	6	241	10	60	2
	YEAR-TO-DATE	**352**	**211**	**10**	**573**	**19**	**138**	**7**
October, 2008		170	93	2	265	7	44	3
	YEAR-TO-DATE	**522**	**304**	**12**	**838**	**26**	**182**	**10**
November, 2008		189	99	3	291	9	67	6
	YEAR-TO-DATE	**711**	**403**	**15**	**1129**	**35**	**249**	**16**
December, 2008		176	134	23	333	19	83	9
	YEAR-TO-DATE	**887**	**537**	**38**	**1462**	**54**	**332**	**25**
January. 2009		135	78	4	217	9	35	3
	YEAR-TO-DATE	**1022**	**615**	**42**	**1679**	**63**	**367**	**28**
February, 2009		151	129	12	292	18	57	8

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TOTAL NPDES ONSTRUCTION INSPECTIONS
2008 - 2009

MONTH		PRIORITY SITES			TOTAL INSPECTIONS	WRITTEN WARNINGS	VERBAL WARNINGS	CITATIONS
		HIGH	MEDIUM	LOW				
	YEAR-TO-DATE	**1173**	**744**	**54**	**1971**	**81**	**424**	**36**
March, 2009		122	103	5	230	7	55	6
	YEAR-TO-DATE	**1295**	**847**	**59**	**2201**	**88**	**479**	**42**
April, 2009		141	62	3	206	9	41	7
	YEAR-TO-DATE	**1436**	**909**	**62**	**2407**	**97**	**520**	**49**
May, 2009		115	62	5	182	7	25	6
	YEAR-TO-DATE	**1551**	**971**	**67**	**2589**	**104**	**545**	**55**
June, 2009		81	43	6	130	5	13	4
	YEAR-TO-DATE	**1632**	**1014**	**73**	**2719**	**109**	**558**	**59**

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NPDES Inspection Frequency Sheet

Construction

High Priority Sites (*Inspect once every two weeks during the wet season*)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Inspector	
Wolf Creek-1																																Pat	
Woodside Homes-Mahogany						X																										04-122	1✓
Wolf Creek-2																																	
Standard Pacific-Cottonwood						I												X														06-042&043	2✓
Standard Pacific-Redwood						X												X														30264	2✓
Standard Pacific-LLC	Complete																																
Stanard Pacific-Laurel						X												I														05-224	2✓
Woodside - Ironwood						X												X														05-211	2✓
Woodside - Sycamore						X					X	X	X					X										V				06-073	6✓
Woodside Homes- Hawthorne						X												X							V		X					05-227	4✓
Woodside - Tamerack						X												X										V				06-018	3✓
Lennar - Stonebriar						X												X									X					06-103	3✓
Roripaugh Ranch																																Jack	
Panhandle																																	
Ashby - 1A																		X														05-139	1✓
Davidson - 2																		X														04-222	1✓
Key Bank -3																		X															1✓
Vineyard Bank - 4A																		X															1✓
Downey Bank - 4B																		X															1✓
Pan																																	
Ashby LLC -																		X	V		V											02-138	3✓
6 Ac Park																		X														03-327	1✓
Harveston																																Doug	
William Lyons - Charleston Ln															X						V								X			04-209	3✓
Meritage - Aberdeen															X														X			05-117	2✓
Meritage - Charveston															X														X			05-121	2✓
Lennar - Prescott	Inactive														X																	06-022	1✓
Lennar - Barrington	Inactive														X																	06-082	1✓
Lennar - Emery	Inactive														X																	06-101	1✓
Temecula Ln - D R Horton																																05-096	
Loma Linda / Temecula Ln						X	X											X											X			Pat	4✓
Butterfield Self Storage	Complete																															Jack	
79S & Butterfield Ranch																																06-047	
Centex Homes - Hemmingway																																Pat	
Via Puebla				X			X					X								X							X		X			05-156	6✓
Centex Homes - Statford																																Pat	
Primrose Ave				X			X				X	X								X							X					05-157	6✓
	I-12										I-7							I-16							I-8								
											V-5																						
	V-2																	V-4							V-4								
	N-1																	N-1															

60

I = Inspected
V = Verbal
N = Inspection Notice Issued

C = Citation Issued
RB = SDRWQCB Rep Present
** = New Site

Aug 2[illegible]

NPDES Inspectio[illegible] Frequency Sheet

Cons[illegible]tion

High Priority Sites (*Inspect once every two weeks during the wet season*)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Inspector	
Maravilla - Pulte Homes		Inactive																														Doug	
Rancho Highlands & Ynez															I												I					06-032	2✓
MJW Property		Inactive																														Jack	
Ave. Alvardo				I																I								N				05-006	3✓
PH II - Lennar																																Doug	
Ynez / Date														I	I				I													07-105	2✓
PHS Warehouse - Garrett																																Pat	
Winchester / Dendy											I			I						I								I				07-008	4✓
Temecula Villa Apartments		**				I																										Jack	
28771 Pujol St												I						I														08-030	3✓
City of Temecula Projects																																	
Murrieta Creek Multi-Purpose Trail CT																																Mike	
Diaz / Winchester to Rancho Ca					I	I	I	I			I	I	I		I			I	I	I	I						I		I			PW01-27	14✓
Temecula Education Ctr-Yeager		Inactive																														Jay	
Dendy Parkway											I										I											05-126	2✓
Madison Ave Property		Inactive																														Avlin	
Madison Ave Property											I										I												2✓
Old Town Infrastructure Project																																Mike	
Main and Mercedes					I		I	I			I			I						I							I		I		07-Jun	8✓
Temecula Community Center- Ph 1																																Mike	
28816 Pujol St		Inactive			I						I							I														PW06-05	3✓
Pechanga Street Imp.		**																														Matt	
Pechanga						I	I				I	I	I	I	I			I		I	I						I	I	I			PW99-11	13✓
																																	56

I-9 V-3 | I-12 V-7 | I-13 V-2 | I-8 V-1 N-1

I = Inspected
V = Verbal
N = Inspection Notice Issued

C = Citation Issued
RB = SDRWQCB Rep Present
** = New Site

0003573

Aug 20[illegible]

NPDES Inspection Frequency Sheet

Construction

Medium Priority Sites (*Inspect three times during the wet season*)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Inspector	
Abbott Ed. Center																																Jack	
Motor Car Parkway							F						I	N				F									N	I			06-175	6✓
Margarita Office Center			Inactive																													Doug	
43040 Margarita @ Pauba																																04-090	
Commercial Center - Davcon Development				(WQMP installation?)																												Jack	
41785 Nicole Ln @ Overland																												I	N			05-083	2✓
Temecula Village Apartments - MJW																																Jack	
Rancho Calif. Rd. e/o Moraga Rd.											I								N									N					3✓
SFR Byrne Res																																	
43596 Manzano						I							I							NB							I		I		Rudy	6✓
Harveston																																	
Harveston Retirement Res. - Colson & Colson																																05-012	
40024 Harveston Dr.	Complete														I						I											Doug	2✓
Comm. - Fullmer																																06-035	
27298 Via Industria							F																										1✓
Anthony Res. -SFR																																	
Santiago Rd													I																			06-048	1✓
Redhawk Pavilon																																Doug	
44060 Margarita						I																										06-090	1✓
Artsan Comm.			Inactive																														
Deerhollow & Peachtree					I						I																	I				06-199	3✓
Vineyard Custom Homes - Vernaccia																																Matt	
Ynez & Quiet Meadows								I											I										I			06-098	3✓
Comm - Marble Express			Complete																														
42068 Winchester																																05-196	
Rancho Water / EMWD																																Matt	
Various locations						N	F																					N				various	3✓
First Bank - New Ground																																Jack	
30679 79 S					I								I							I												07-062	3✓
Summer House - Pac. Cent. Group																																Doug	
Margarita & Dartolo						I													I													06-131	2✓
Promenade Expansion																																Jack	
Promenade Expansion SD system							I												N								I					07-022	3✓
Promenade E. Parking Structure	Complete										I-7							I-5														Jack	
Promenade Mall							I																									07-090	1✓
											V-1							V-2															40
				I-11																						I-6							
				V-1														N-1								V-5							
																		C-1															

I = Inspected
V = Verbal
N = Inspection Notice Issued
F = Follow-Up Required

M/C = Met/Called Responsible Party
CIT = Citation Issued
WB = SDRWQCB Rep Present
** = New Site

Aug 2

NPDES Inspection Frequency Sheet

Construction

Medium Priority Sites (*Inspect three times during the wet season*)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Inspector	
Delgado Property																																Jack	
Santiago / Ormsby													I																			07-005	1✓
Media Filter System																																Pat	
27427 Bostik Court					I																I											05-057	2✓
Habitat for Humanity	Complete																																
Pujol / 1st St.																																07-003	
Comm Bldg - Fred Perkins																																	
28544 Old Town Front St				I											I													I				07-081	3✓
Redhawk Tire Store																																Pat	
Margarita / 79 S						I		I				I							I													07-048	4✓
Plaza Rio Vista - Office Bldg																																Doug	
43055 & 43015 Blackdeer Loop							I											I														07-031	2✓
EZ Lube - Marshall Group	Complete																															Pat	
30625 Hwy 79S																																07-022	
Med Off Bldg - M.A.C.S.	INACTIVE																															Jack	
28975 Old Town Front St								I																				I				07-047	2✓
Comm. Center - Schaffer Const.																																	
29710 Via Las Colinas											I							I	I	I								I				07-094	5✓
Rancho Tem.Town Ctr Bldg K - Mercer																																Doug	
39848 Winchester	Complete					I																										05-106	1✓
YMCA																																Doug	
29119 Margarita											I																I	I				07-049	3✓
Comm. Complex																																	
43950 Margarita		**				I													I													07-113	2✓
Deportola Professional Ctr		**																														Pat	
Deportola / Margarita						I													I													07-109	2✓
Crowne Hill																																Doug	
Pacific Century Homes - The Reserve																										I						01-139	1✓
Hotel - Premier																																Doug	
28220 Jefferson							I					I																	I			07-096	3✓
SFR Timothy Hawk		**																														Matt	
30705 Pauba													I																			07-069	1✓
Episcopal Church																																	
44651 Avenida De Missiones		**			I																											05-022	1✓
Temecula Estates - K&B Homes	COMPLETE																															Doug	
Serafina and Murrieta Hot Springs																		I															1✓
Chaparral Village											I-7																					Jack	
Nicolas and Winchester		**					I				V-1				I											I						07-125	3✓
	I-9																		I-7						I-7								37
	V-3																		V-2						V-1								

I = Inspected
V = Verbal
N = Inspection Notice Issued
F = Follow-Up Required

M/C = Met/Called Responsible Party
CIT = Citation Issued
WB = SDRWQCB Rep Present
** = New Site

Aug 20[illegible]

NPDES Inspection Frequency Sheet

Construction

Medium Priority Sites (*Inspect three times during the wet season*)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Inspector
Kaiser - Swinerton	COMPLETE																															Jack
27309 Madison Ave.											~~I~~		~~I~~	~~I~~																		08-024
RUBY TUESDAY																																
21785 NICOLE																												~~N~~				08-032
											I-1																					
												V-2																				
												N-1																				

3 ✓

1 ✓

4

I = Inspected
V = Verbal
N = Inspection Notice Issued
F = Follow-Up Required

M/C = Met/Called Responsible Party
CIT = Citation Issued
WB = SDRWQCB Rep Present
** = New Site

0003576

Aug 2[illegible]

NPDES Inspectio[illegible] Frequency Sheet

Cons[illegible]ction

Low Priority Sites (*Inspect as needed during the wet season*)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Inspector
Single Family - Vito Violante																																Pat
29880 Los Nogales Rd																																05-003
Single Family Res. - Campora																																
30306 Del Rey RD																																
SFR - Boers Res																																
40231 Paseo Del Cielo @ Via Val Verde		Complete																														05-238
Cavary Baptist Church- Gary Center																																Jack
31087 Nicolas Rd																																04-247
SFR- Torrales																																
30865 Via Norte																																05-231
SFR - Britt																																
40550 Calle Madero																																06-124
SFR-Fen Yong																																05-064
30881 Del Rey Rd																																
SFR Ritenour																																Jack
39835 Calle Mudusa																																06-194
SFR Gronlund																																
29699 Avenida Del Sol																																06-170
SFR - Augustine																																
30535 Estero St		Complete																														07-014
SFR - Dohrman																																Matt
30277 Via Brisa																											~~I~~					05-081 IV
SFR- Dibble																																
41875 Yorba Ave																																07-024
SFR - Chacon																																Pat
40390 Calle Fiesta																																07-057
SFR - Brian Nguyen																																Doug
43599 Calle De Velardo																																07-054
SFR -Mendez																																
30935 Avenida Del Reposo		**																														07-091
SFR - Medley																																
30894 Bel Monte east		**																														07-119
Harveston																																
William Lyons - Savannah	~~Inactive~~														~~I~~																	04-208 IV
Parker Res.																																
43910 Flores Dr																																08-012

I-2

2

I = Inspected
V = Verbal
N = Inspection Notice Issued
F = Follow-up Required

M/C = Met/Called Responsible Party
CIT = Citation Issued
WB = SDRWQCB Rep Present
** = New Site

Aug 2[illegible]

NPDES Inspection Frequency Sheet

Construction

Low Priority Sites (*Inspect as needed during the wet season*)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Inspector
First Bank		**																														
39540 Winchester						I									I																	08-029
											I-2																					

2V

2

I = Inspected
V = Verbal
N = Inspection Notice Issued
F = Follow-up Required

M/C = Met/Called Responsible Party
CIT = Citation Issued
WB = SDRWQCB Rep Present
** = New Site

0003578

Oct 2009

NPDES Inspection Frequency Sheet

Construction

High Priority Sites (*Inspect once every two weeks during the wet season*)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Inspector
Wolf Creek-2																																**Pat**
Standard Pacific-Cottonwood																																06-042&043
Standard Pacific-Redwood																																05-195
Standard Pacific-LLC																																
Stanard Pacific-Laurel																																05-250
Woodside - Ironwood																																05-211
Woodside - Sycamore																																06-073
Woodside Homes- Hawthorne																																05-227
Woodside - Tamerack																																06-018
Lennar - Stonebriar																																06-103
Roripaugh Ranch																																**Rudy**
Panhandle																																
Unicom - 1A	Inactive																															05-139
Davidson - 2	Inactive																															04-222
HRA - 3	Inactive																															
HRA -4A	Inactive																															
Downey Bank - 4B	Inactive																															
Pan																																
Unicom	Inactive																															02-138
Ashby LLC -	Inactive																															02-138
6 Ac Park	Inactive																															03-327
Harveston																																**Doug**
Lennar - Prescott	Inactive																															06-022
Lennar - Barrington	Inactive																															06-082
Lennar - Emery	Inactive																															06-101
Temecula Ln - D R Horton																																06-173
Loma Linda / Temecula Ln																																**Pat**
Centex Homes - Hemmingway	Inactive																															**Pat**
Via Puebla																																05-156
Rycel Holdings - Hemmingway	Inactive																															**Pat**
Via Puebla																																05-156
Centex Homes - Statford																																**Pat**
Primrose Ave																																05-157
Rycel Holdings - Stratford	Inactive																															**Pat**
Primrose Ave																																05-157
Maravilla - Pulte Homes	Inactive																															**Doug**
Rancho Highlands & Ynez																																06-032

I = Inspected
V = Verbal
N = Inspection Notice Issued

C = Citation Issued
RB = SDRWQCB Rep Present
** = New Site

0003579

Oct 2009

NPDES Inspection Frequency Sheet

Construction

High Priority Sites (*Inspect once every two weeks during the wet season*)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Inspector
MJW Property	Inactive																															**Rudy**
Ave. Alvardo																																05-006
Bieri Property	Inactive																															**Doug**
Ynez / Date																																07-105
PHS Warehouse - Garrett																																**Pat**
Winchester / Dendy																																07-008
Temecula Villa Apartments																																**Doug**
28771 Pujol St																																08-021
Newland	Inactive																															**Doug**
Pauba / Margarita																																02-007
City of Temecula Projects																																
NW RDA Property / Old Ed Ctr	Inactive																															**Jay**
Dendy Parkway																																05-126
Madison Ave Property	Inactive																															**Avlin**
Madison Ave Property																																
Old Town Infrastructure Project																																**Jay**
Main and Mercedes																																06-07 1E
OTCC Parking Structure																																**Mike**
Mercedes																																06-07 1D
Temecula Community Center- Ph 1																																**Mike**
28816 Pujol St																																PW06-05
Pechanga Street Imp.	Complete																															**Matt**
Pechanga																																PW99-11
DePortola Rehab																																**Matt**
DePortola																																PW06-10
OTCC - Edge -Ph2																																**Mike**
Mercedes																																PW06-07
Rancho Cal Street Imp.																																**Jay**
Butterfield to Ynez																																PW06-14
Butterfield / Meadows Pkwy Traffic Signals																																**Rudy**
Welton / McCabe	Complete																															PW07-09/10

I = Inspected
V = Verbal
N = Inspection Notice Issued

C = Citation Issued
RB = SDRWQCB Rep Present
** = New Site

0003580

NPDES Inspection Frequency Sheet

Medium Priority Sites (*Inspect three times during the wet season*)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Inspector
Temecula Village Apts - MJW	Inactive																															**Rudy**
Rancho Calif. Rd. e/o Moraga Rd.																																
Dr Byrne	Inactive																															**Rudy**
43596 Manzano																																07-027
Anthony Res. -SFR	Inactive																															**Rudy**
Santiago Rd																																06-048
Artisan Communities	Inactive																															
Deerhollow & Peachtree																																06-199
Summer House - Pac. Cent. Group																																**Doug**
Margarita & Dartolo	Inactive																															06-131
Delgado Property	Inactive																															**Rudy**
Santiago / Ormsby																																07-005
Media Filter System																																**Pat**
27427 Bostik Court																																05-057
Med Off Bldg - M.A.C.S.																																**Rudy**
28975 Old Town Front St																																07-047
Comm. Center - Schaffer Const.	Inactive																															**Doug**
29710 Via Las Colinas																																07-094
Deportola Professional Ctr	Inactive																															**Pat**
Deportola / Margarita																																07-109
Crowne Hill	Inactive																															**Doug**
Pacific Century Homes - The Reserve																																01-139
Sprillhill Suites - Premier																																**Doug**
28220 Jefferson																																07-096
Episcopal Church																																**Pat**
44651 Avenida De Missiones																																05-022
Konicki Res.																																**Rudy**
31107 Maripose Ln																																07-130
Wal Mart	Complete																															**Pat**
Temecula Parkway																																07-124
Warehouse at Creekside																																**Doug**
42081 3rd St																																08-063
American AG Credit	Complete																															**Pat**
42429 Winchester Rd																																08-080
Panera Bread	Inactive																															**Pat**
41793 Nicole Ln																																09-004

I = Inspected
V = Verbal
N = Inspection Notice Issued
F = Follow-Up Required

M/C = Met/Called Responsible Party
CIT = Citation Issued
WB = SDRWQCB Rep Present
** = New Site

0003581

NPDES Inspection Frequency Sheet

Construction

Medium Priority Sites (*Inspect three times during the wet season*)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Inspector
Diaz II RTA	Complete																															**Rudy**
28071 Diaz Rd																																08-087

I = Inspected
V = Verbal
N = Inspection Notice Issued
F = Follow-Up Required

M/C = Met/Called Responsible Party
CIT = Citation Issued
WB = SDRWQCB Rep Present
** = New Site

0003582

Oct 2009

NPDES Inspection Frequency Sheet

Construction

Low Priority Sites (*Inspect as needed during the wet season*)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Inspector
SFR- Torrales																																
30865 Via Norte	Inactive																															05-231
SFR Gronlund																																
29699 Avenida Del Sol	Inactive																															06-170
SFR - Dohrman																																**Matt**
30277 Via Brisa	Inactive																															05-081
SFR - Chacon																																**Pat**
40390 Calle Fiesta	Inactive																															07-057
SFR - Brian Nguyen	Complete																															**Doug**
43599 Calle De Velardo																																07-054
SFR - Nunez																																**Doug**
31521 Enfield																																08-066
Blackmun Res																																**Rudy**
43845 Calle De Velardo																																09-007
King Property		**																														**Pat**
39120 Liefer Rd																																09-016

I = Inspected
V = Verbal
N = Inspection Notice Issued
F = Follow-up Required

M/C = Met/Called Responsible Party
CIT = Citation Issued
WB = SDRWQCB Rep Present
** = New Site

0003583

City of Temecula

Public Works Department
43200 Business Park Drive▪Temecula, CA 92590▪Mailing Address: P.O. Box 9033▪Temecula, CA 92589-9033
(951) 694-6411 ▪ Fax (951) 694-6475

August 25, 2008

To: Property Owners, Developers, Project Managers, Field Superintendents, and Contractors.

RE: Requirements for Construction Projects.

The City of Temecula is requiring **Year-Round pollution prevention measures,** also known as Best Management Practices (BMPs), at every active and inactive construction project throughout the City. In addition, **Wet-Weather BMPs (erosion controls) must also be implemented between October 1st and April 30th.** Illegal discharges shall be prevented from occurring throughout your project and from entering or leaving any storm drain system.

Compliance with the State General Construction Permit is also required if your project disturbs, exposes, clears, grades, or stockpiles one acre or more of soil. If applicable, a Notice of Intent (NOI) must be filed with the State, proof of a Waste Discharge Identification (WDID) Number must be provided to the City, and a Storm Water Pollution Prevention Plan (SWPPP) must be onsite. The SWPPP must be implemented throughout the duration of the project, readily available to City and State inspectors, and updated as conditions change.

At a minimum, the following requirements must be implemented:

- **NEW** The City shall be notified if your project becomes wholly or partially inactive. A project, or portions within, becomes inactive when construction activities cease for seven (7) consecutive calendar days. Inactivity requires: 1) the submittal of a BMP implementation plan to the City demonstrating current conditions and compliance throughout the expected period of inactivity, and 2) establishment of 100% vegetative coverage as the primary erosion control on all inactive areas of the project.**
- All stormwater conveyance systems (streets, inlets, outlets, flow-lines [v-ditches, brow ditches, terrace drains, ribbon gutters, curb gutters]), checkdams, chevrons, silt fences, temporary desilting basins, etc. shall be free of sediment, construction materials, waste, miscellaneous debris, and deteriorated BMPs;

- Waste and debris shall be placed in enclosed trash bins. These bins shall be covered with a lid or plastic tarp prior to any forecasted rain;
- Prior to any forecasted rain, additional BMPs shall be stockpiled at various locations throughout the site for immediate implementation;
- Wash-out stations shall be provided for concrete, paints, stucco, etc. and shall be lined with plastic and located away from streets, sidewalk right-of-ways, and drainage inlets;
- Portable toilets shall be placed away from streets, sidewalks, flowlines, and drainage inlets;
- A combination of rock and shaker plates shall be installed at all construction access locations. Interior access points (driveways, staging areas, etc.) shall also have rock accesses;
- All completed slopes and inactive pads shall have BMPs;
- All portable mixers shall have plastic liners underneath with gravel bags placed on the down-hill side of the liners to contain discharges;
- Street sweeping shall be performed on all paved streets and at all construction exits on a regular basis. A street sweeper shall also operate during hauling operations and on all haul route streets. Vacuum sweepers shall be used when street sweeping become ineffective;
- Water shall be filtered and drained from basins within 72-hours of collection;
- ESC plans and Standard Notes must be adhered to at all times;
- Project developer is responsible for all discharges from all site personnel, including subcontractors and landscapers.

City inspectors will conduct Wet-Weather inspections beginning **October 1st** at each site. Failure to implement wet-weather BMPs in addition to year-round BMPs will result in citations, Stop Work notices, suspension of business licenses, withholding of occupancies, and case referrals to the San Diego Regional Water Quality Control Board. If existing BMPs are inadequate, additional ones will be required by City inspectors.

Please call us at (951) 694-6411 if you have any questions regarding this information.

Sincerely,

Aldo Licitra

Aldo Licitra
NPDES Program

ATTACHMENT C

MUNICIPAL PROGRAM

- Debris Tonnage Report
- Monthly Catch Basin Maintenance Logs

CR&R

CITY OF TEMECULA

SOLID WASTE & RECYCLING TONS SUMMARY REPORT

RESIDENTIAL / MULTI-FAMILY

MONTH	CURBSIDE RECYCLABLES	CURBSIDE GREENWASTE	CURBSIDE WASTE	CURBSIDE DIVERSION	MULTI-FAMILY RECYCLABLES	MULTI-FAMILY WASTE	MULTI-FAMILY DIVERSION	TOTAL RES DIVERSION	BIO-MASS DIVERSION
Jan-09	839.97	1,071.82	2114.56	47.48%	0.00	0.00	#DIV/0!	47.48%	364.68
Feb-09	692.62	778.53	1749.01	45.69%	0.00	0.00	#DIV/0!	45.69%	331.93
Mar-09	746.19	1,259.21	2003.99	50.02%	0.00	0.00	#DIV/0!	50.02%	223.14
Apr-09	722.72	1,290.25	2070.29	49.30%	0.00	0.00	#DIV/0!	49.30%	152.30
May-09	750.19	1,329.71	2074.62	50.06%	0.00	0.00	#DIV/0!	50.06%	0.00
Jun-09	740.26	1,330.14	2071.42	49.99%	0.00	0.00	#DIV/0!	49.99%	0.00
Jul-09	739.38	1,300.20	2136.07	48.84%	0.00	0.00	#DIV/0!	48.84%	0.00
Aug-09				#DIV/0!			#DIV/0!	#DIV/0!	
Sep-09				#DIV/0!			#DIV/0!	#DIV/0!	
Oct-09				#DIV/0!			#DIV/0!	#DIV/0!	
Nov-09				#DIV/0!			#DIV/0!	#DIV/0!	
Dec-09				#DIV/0!			#DIV/0!	#DIV/0!	
TOTAL	5,231.33	8,359.86	14,219.96	48.87%	0.00	0.00	#DIV/0!	48.87%	1,072.05
YTD TOTAL	5,231.33	8,359.86	14,219.96	48.87%	0.00	0.00	#DIV/0!	48.87%	1,072.05

4,492.0 7,059.7 12,083.9 = 23,635.6 TONS

COMMERCIAL / ROLL-OFF

MONTH	SEPARATED RECYCLABLES	DIVERTED SWEEPER WASTE	MRF RECOVERED RECYCLABLES	COMMERCIAL WASTE	COMMERCIAL DIVERSION	SOURCE SPEARATED	ROLL OFF RECYCLABLES	ROLL-OFF GREENWASTE	ROLL-OFF WASTE	ROLL-OFF DIVERSION
Jan-09	163.74	185.62	149.61	2,454.70	16.89%	78.90	0.00	25.93	1,215.62	7.94%
Feb-09	171.25	126.50	215.95	2,268.88	18.46%	88.88	0.00	1.91	1,052.54	7.94%
Mar-09	167.52	131.24	214.43	2,424.17	17.47%	63.42	0.00	19.22	1,048.02	7.23%
Apr-09	157.82	115.21	218.13	2,307.92	17.55%	82.54	0.00	33.61	1,148.44	9.18%
May-09	156.05	96.57	122.92	2,430.29	9.94%	80.27	0.00	3.08	1,126.42	6.89%
Jun-09	172.74	106.12	133.37	2,617.54	10.10%	95.24	0.00	12.34	1,143.35	8.60%
Jul-09	159.57	123.72	113.42	2,473.24	9.51%	87.87	0.00	14.55	1,422.32	6.72%
Aug-09					#DIV/0!					#DIV/0!
Sep-09					#DIV/0!					#DIV/0!
Oct-09					#DIV/0!					#DIV/0!
Nov-09					#DIV/0!					#DIV/0!
Dec-09					#DIV/0!					#DIV/0!
TOTAL	1,148.69	884.98	1,167.83	16,976.74	15.87%	577.12	0.00	109.64	8,156.71	7.77%
YTD TOTAL	1,148.69	884.98	1,167.83	16,976.74	15.87%	577.12	0.00	109.64	8,156.71	7.77%

761.3 (INCLUDES RESIDENTIAL)

C&D PROCESSING / CITY SERVICES

MONTH	SOURCE SEPARATED	C&D MATERIAL DIVERTED	C&D RESIDUAL WASTE	C&D DIVERSION	SEPARATED RECYCLABLES	C&D MATERIAL	GREENWASTE	SWEEPER WASTE	RESIDUAL WASTE	CITY DIVERSION
Jan-09	15.15	1,097.76	0.00	100.00%	80.38	0.00	84.03	0.00	20.59	88.87%
Feb-09	69.45	529.97	0.00	100.00%	104.00	0.00	39.89	0.00	11.52	92.59%
Mar-09	90.28	8.40	0.00	100.00%	93.99	0.00	36.37	0.00	5.82	95.73%
Apr-09	214.08	248.52	0.00	100.00%	61.57	0.00	30.61	0.00	3.78	96.06%
May-09	53.72	58.25	0.00	100.00%	73.86	0.00	31.16	0.00	5.60	94.94%
Jun-09	118.21	121.80	0.00	100.00%	19.76	0.00	48.24	0.00	9.23	88.05%
Jul-09	499.54	72.88	0.00	100.00%	41.14	0.00	47.77	0.00	3.96	95.74%
Aug-09				#DIV/0!						#DIV/0!
Sep-09				#DIV/0!						#DIV/0!
Oct-09				#DIV/0!						#DIV/0!
Nov-09				#DIV/0!						#DIV/0!
Dec-09				#DIV/0!						#DIV/0!
TOTAL	1,060.43	2,137.58	0.00	100.00%	474.70	0.00	318.07	0.00	60.50	92.91%
YTD TOTAL	1,060.43	2,137.58	0.00	100.00%	474.70	0.00	318.07	0.00	60.50	92.91%

OVERALL TOTAL

MONTH	TOTAL DIVERTED	TOTAL LANDFILLED	OVERALL DIVERSION
Jan-09	4,157.59	5,805.47	41.73%
Feb-09	3,150.88	5,081.95	38.27%
Mar-09	3,052.41	5,482.00	35.77%
Apr-09	3,327.36	5,530.43	37.58%
May-09	2,755.78	5,636.93	32.84%
Jun-09	2,898.22	5,841.54	33.16%
Jul-09	3,200.04	6,035.59	34.65%
Aug-09	-	-	#DIV/0!
Sep-09	-	-	#DIV/0!
Oct-09	-	-	#DIV/0!
Nov-09	-	-	#DIV/0!
Dec-09	-	-	#DIV/0!
TOTAL	22,542.28	39,413.91	36.38%
YTD TOTAL	22,542.28	39,413.91	36.38%

THIS REPORT REFLECTS THE MOST UP-TO-DATE INFORMATION FOR ALL MONTHS LISTED.

CR&R

CITY OF TEMECULA

SOLID WASTE & RECYCLING TONS SUMMARY REPORT

RESIDENTIAL / MULTI-FAMILY

MONTH	CURBSIDE RECYCLABLES	CURBSIDE GREENWASTE	CURBSIDE WASTE	CURBSIDE DIVERSION	MULTI-FAMILY RECYCLABLES	MULTI-FAMILY WASTE	MULTI-FAMILY DIVERSION	TOTAL RES DIVERSION	BIO-MASS DIVERSION
Jan-08	1,000.60	1,066.84	2187.37	48.59%	0.00	0.00	#DIV/0!	48.59%	71.74
Feb-08	832.54	963.19	1934.56	48.14%	0.00	0.00	#DIV/0!	48.14%	85.60
Mar-08	869.26	1,355.36	2031.67	52.27%	0.00	0.00	#DIV/0!	52.27%	107.84
Apr-08	875.39	1,450.30	2172.70	51.70%	0.00	0.00	#DIV/0!	51.70%	164.92
May-08	879.24	1,446.46	2186.07	51.55%	0.00	0.00	#DIV/0!	51.55%	130.95
Jun-08	793.74	1,295.97	1937.07	51.90%	0.00	0.00	#DIV/0!	51.90%	81.33
Jul-08	869.52	1,446.28	2191.47	51.38%	0.00	0.00	#DIV/0!	51.38%	116.23
Aug-08	777.74	1,301.20	2009.77	50.85%	0.00	0.00	#DIV/0!	50.85%	113.69
Sep-08	788.20	1,402.12	2074.27	51.36%	0.00	0.00	#DIV/0!	51.36%	498.78
Oct-08	783.13	1,309.12	1954.77	51.70%	0.00	0.00	#DIV/0!	51.70%	778.04
Nov-08	745.05	927.20	1876.42	47.12%	0.00	0.00	#DIV/0!	47.12%	661.75
Dec-08	972.58	964.97	2233.55	46.45%	0.00	0.00	#DIV/0!	46.45%	178.81
TOTAL	10,186.99	14,929.01	24,789.69	50.33%	0.00	0.00	#DIV/0!	50.33%	2,989.68
2008 YTD TOTAL	10,186.99	14,929.01	24,789.69	50.33%	0.00	0.00	#DIV/0!	50.33%	2,989.68

4,936.2 7,350.9 12,340.3 = 24,627.4 TONS

COMMERCIAL / ROLL-OFF

MONTH	SEPARATED RECYCLABLES	DIVERTED SWEEPER WASTE	MRF RECOVERED RECYCLABLES	COMMERCIAL WASTE	COMMERCIAL DIVERSION	SOURCE SPEARATED	ROLL OFF RECYCLABLES	ROLL-OFF GREENWASTE	ROLL-OFF WASTE	ROLL-OFF DIVERSION
Jan-08	217.77	145.55	187.53	3,215.05	14.63%	87.45	0.00	86.26	1,472.39	10.55%
Feb-08	173.28	139.81	157.67	2,932.23	13.83%	73.68	0.00	45.85	1,381.38	7.96%
Mar-08	164.52	138.06	134.82	2,917.75	13.04%	92.39	0.00	147.40	1,494.09	13.83%
Apr-08	168.23	135.99	160.51	2,828.51	14.11%	98.54	0.00	75.42	1,555.31	10.06%
May-08	177.55	116.49	193.62	2,954.31	14.17%	85.32	0.00	74.63	1,511.17	9.67%
Jun-08	174.54	103.51	190.37	2,798.32	14.34%	80.24	0.00	22.95	1,456.45	6.62%
Jul-08	173.14	95.77	178.46	2,764.65	13.93%	77.01	0.00	82.92	1,434.00	10.03%
Aug-08	165.42	76.35	128.17	2,762.51	11.81%	83.79	0.00	13.27	1,446.44	6.29%
Sep-08	161.65	90.08	127.95	2,686.73	12.38%	107.00	0.00	16.98	1,351.96	8.40%
Oct-08	167.36	99.39	165.56	2,706.63	13.17%	85.54	0.00	51.25	1,370.90	9.07%
Nov-08	153.01	102.58	164.89	2,402.67	14.89%	104.34	0.00	34.50	1,315.43	9.55%
Dec-08	200.00	173.92	211.21	2,656.21	18.05%	100.34	0.00	34.47	1,349.58	9.08%
TOTAL	2,096.47	1,417.50	2,000.76	33,625.57	14.09%	1075.64	0.00	685.90	17,139.10	9.32%
2008 YTD TOTAL	2,096.47	1,417.50	2,000.76	33,625.57	14.09%	1075.64	0.00	685.90	17,139.10	9.32%

638.1 TONS (INCLUDES RESIDENTIAL)

C&D PROCESSING / CITY SERVICES

MONTH	SOURCE SEPARATED	C&D MATERIAL DIVERTED	C&D RESIDUAL WASTE	C&D DIVERSION	SEPARATED RECYCLABLES	C&D MATERIAL	GREENWASTE	SWEEPER WASTE	RESIDUAL WASTE	CITY DIVERSION
Jan-08	22.03	214.58	140.80	62.69%	24.48	0.00	60.90	0.00	4.55	94.94%
Feb-08	49.70	100.04	236.44	38.77%	2.68	0.00	36.43	0.00	27.51	58.71%
Mar-08	8.39	100.84	53.36	67.18%	55.16	0.00	15.19	0.00	9.87	87.70%
Apr-08	130.28	332.72	45.94	90.97%	90.61	26.17	28.64	0.00	22.53	86.59%
May-08	18.10	826.12	8.39	99.02%	49.85	0.00	15.26	0.00	13.71	82.61%
Jun-08	101.79	408.35	10.51	97.98%	85.34	8.02	33.27	0.00	1.23	99.04%
Jul-08	74.47	138.91	51.51	80.55%	35.66	0.00	46.40	0.00	33.18	71.21%
Aug-08	63.91	134.47	0.82	99.59%	84.48	0.00	55.13	0.00	0.91	99.35%
Sep-08	41.26	58.70	2.53	97.53%	31.08	0.00	43.58	0.00	2.74	96.46%
Oct-08	67.66	699.29	0.00	100.00%	51.19	0.00	37.93	6.22	11.99	88.83%
Nov-08	24.11	761.72	0.00	100.00%	79.09	0.00	31.56	0.00	12.82	89.62%
Dec-08	61.27	933.94	0.00	100.00%	21.31	0.00	112.88	0.00	26.59	83.46%
TOTAL	662.97	4,709.68	550.30	90.71%	610.93	34.19	517.17	6.22	167.63	87.45%
2008 YTD TOTAL	662.97	4,709.68	550.30	90.71%	610.93	34.19	517.17	6.22	167.63	87.45%

OVERALL TOTAL

MONTH	TOTAL DIVERTED	TOTAL LANDFILLED	OVERALL DIVERSION
Jan-08	3,185.73	7,020.16	31.21%
Feb-08	2,660.47	6,512.12	29.00%
Mar-08	3,189.23	6,506.74	32.89%
Apr-08	3,737.72	6,624.99	36.07%
May-08	4,013.59	6,673.65	37.55%
Jun-08	3,379.42	6,203.58	35.26%
Jul-08	3,334.77	6,474.81	34.00%
Aug-08	2,997.62	6,220.45	32.52%
Sep-08	3,367.38	6,118.23	35.50%
Oct-08	4,301.68	6,044.29	41.58%
Nov-08	3,789.80	5,607.34	40.33%
Dec-08	3,965.70	6,265.93	38.76%
TOTAL	41,923.11	76,272.29	35.47%
2008 YTD TOTAL	41,923.11	76,272.29	35.47%

THIS REPORT REFLECTS THE MOST UP-TO-DATE INFORMATION FOR ALL MONTHS LISTED.

CITY OF TEMECULA
DEPARTMENT OF PUBLIC WORKS
ROADS DIVISION

CATCH BASIN MAINTENANCE

MONTH OF JULY, 2008

DATE	LOCATION	WORK COMPLETED	
07/07/08	CITYWIDE	CLEANED & CHECKED	20 CATCH BASINS
07/08/08	OLD TOWN	CLEANED & CHECKED	2 CATCH BASINS
07/09/08	AREA #5	CLEANED & CHECKED	21 CATCH BASINS
07/10/08	AREA #5	CLEANED & CHECKED	20 CATCH BASINS
07/14/08	AREA #5	CLEANED & CHECKED	22 CATCH BASINS
07/15/08	AREA #5	CLEANED & CHECKED	12 CATCH BASINS
07/16/08	AREA #5	CLEANED & CHECKED	10 CATCH BASINS
07/18/08	33033 TULLEY RANCH ROAD	CLEANED & CHECKED	1 CATCH BASINS
07/21/08	CITYWIDE	CLEANED & CHECKED	15 CATCH BASINS
07/22/08	AREA #5	CLEANED & CHECKED	31 CATCH BASINS
07/23/08	AREA #5	CLEANED & CHECKED	17 CATCH BASINS
07/24/08	JEFFERSON AT WINCHESTER	CLEANED & CHECKED	2 CATCH BASINS
07/24/08	RANCHO CALIFORNIA BRIDGE (CLEANED GRATES)	CLEANED & CHECKED	4 CATCH BASINS
07/24/08	OVERLAND BRIDGE (CLEANED GRATES)	CLEANED & CHECKED	4 CATCH BASINS
07/25/08	MARGARITA AT AVENIDA SONOMA	CLEANED & CHECKED	1 CATCH BASINS
07/25/08	29792, 29806, 29886 VIA PUESTA DEL SOL	CLEANED & CHECKED	3 CATCH BASINS
07/25/08	AREA #5	CLEANED & CHECKED	1 CATCH BASINS
07/28/08	CITYWIDE	CLEANED & CHECKED	15 CATCH BASINS
07/31/08	29792, 29886 VIA PUESTA DEL SOL	CLEANED & CHECKED	2 CATCH BASINS
	TOTAL CATCH BASINS CLEANED & CHECKED	**203**	

CITY OF TEMECULA
DEPARTMENT OF PUBLIC WORKS
ROADS DIVISION

CATCH BASIN MAINTENANCE

MONTH OF AUGUST, 2008

DATE	LOCATION	WORK COMPLETED	
08/04/08	CITYWIDE	CLEANED & CHECKED	29 CATCH BASINS
08/06/08	AREA #5	CLEANED & CHECKED	23 CATCH BASINS
08/07/08	AREA #5	CLEANED & CHECKED	14 CATCH BASINS
08/11/08	CITYWIDE	CLEANED & CHECKED	15 CATCH BASINS
08/12/08	AREA #5	CLEANED & CHECKED	15 CATCH BASINS
08/13/08	AREA #5	CLEANED & CHECKED	25 CATCH BASINS
08/14/08	AREA #5	CLEANED & CHECKED	9 CATCH BASINS
08/18/08	CITYWIDE	CLEANED & CHECKED	18 CATCH BASINS
08/19/08	AREA #5	CLEANED & CHECKED	4 CATCH BASINS
08/20/08	AREA #5	CLEANED & CHECKED	19 CATCH BASINS
08/21/08	AREA #5	CLEANED & CHECKED	21 CATCH BASINS
08/25/08	CITYWIDE	CLEANED & CHECKED	10 CATCH BASINS
08/26/08	CITYWIDE	CLEANED & CHECKED	11 CATCH BASINS
08/26/08	AREA #5	CLEANED & CHECKED	10 CATCH BASINS
08/27/08	AREA #5	CLEANED & CHECKED	15 CATCH BASINS
08/28/08	AREA #1	CLEANED & CHECKED	16 CATCH BASINS
	TOTAL CATCH BASINS CLEANED & CHECKED 254		

CITY OF TEMECULA
DEPARTMENT OF PUBLIC WORKS
ROADS DIVISION

CATCH BASIN MAINTENANCE

MONTH OF SEPTEMBER, 2008

DATE	LOCATION	WORK COMPLETED	
09/02/08	CITYWIDE	CLEANED & CHECKED	15 CATCH BASINS
09/03/08	AREA #1	CLEANED & CHECKED	21 CATCH BASINS
09/04/08	AREA #1	CLEANED & CHECKED	17 CATCH BASINS
09/08/08	CITYWIDE	CLEANED & CHECKED	18 CATCH BASINS
09/09/08	AREA #1	CLEANED & CHECKED	23 CATCH BASINS
09/10/08	AREA #1	CLEANED & CHECKED	24 CATCH BASINS
09/11/08	AREA #1	CLEANED & CHECKED	17 CATCH BASINS
09/12/08	AREA #1	CLEANED & CHECKED	7 CATCH BASINS
09/15/08	CITYWIDE	CLEANED & CHECKED	15 CATCH BASINS
09/16/08	AREA #1	CLEANED & CHECKED	20 CATCH BASINS
09/17/08	AREA #1	CLEANED & CHECKED	12 CATCH BASINS
09/18/08	AREA #1	CLEANED & CHECKED	14 CATCH BASINS
09/22/08	CITYWIDE	CLEANED & CHECKED	23 CATCH BASINS
09/23/08	AREA #1	CLEANED & CHECKED	23 CATCH BASINS
09/24/08	AREA #1	CLEANED & CHECKED	24 CATCH BASINS
09/25/08	CITYWIDE	CLEANED & CHECKED	7 CATCH BASINS
09/29/08	AREA #1	CLEANED & CHECKED	60 CATCH BASINS
09/29/08	CITYWIDE	CLEANED & CHECKED	19 CATCH BASINS
09/30/08	AREA #2	CLEANED & CHECKED	11 CATCH BASINS
09/30/08	AREA #2	CLEANED & CHECKED	29 CATCH BASINS
	TOTAL CATCH BASINS CLEANED & CHECKED 399		

CITY OF TEMECULA
DEPARTMENT OF PUBLIC WORKS
ROADS DIVISION

CATCH BASIN MAINTENANCE

MONTH OF OCTOBER, 2008

DATE	LOCATION	WORK COMPLETED		
10/01/08	AREA #3	CLEANED & CHECKED	13	CATCH BASINS
10/01/08	AREA #1	CLEANED & CHECKED	56	CATCH BASINS
10/01/08	AREA #2	CLEANED & CHECKED	13	CATCH BASINS
10/02/08	AREAS #1 & #2	CLEANED & CHECKED	106	CATCH BASINS
10/02/08	AREA #2	CLEANED & CHECKED	12	CATCH BASINS
10/06/08	CITYWIDE	CLEANED & CHECKED	24	CATCH BASINS
10/07/08	AREA #2	CLEANED & CHECKED	20	CATCH BASINS
10/08/08	AREA #2	CLEANED & CHECKED	19	CATCH BASINS
10/09/08	AREA #2	CLEANED & CHECKED	7	CATCH BASINS
10/13/08	CITYWIDE	CLEANED & CHECKED	14	CATCH BASINS
10/15/08	AREA #3	CLEANED & CHECKED	21	CATCH BASINS
10/16/08	AREA #2	CLEANED & CHECKED	9	CATCH BASINS
10/20/08	AREA #3	CLEANED & CHECKED	23	CATCH BASINS
10/20/08	CITYWIDE	CLEANED & CHECKED	17	CATCH BASINS
10/21/08	AREA #4	CLEANED & CHECKED	26	CATCH BASINS
10/21/08	CITYWIDE	CLEANED & CHECKED	18	CATCH BASINS
10/21/08	AREA #3	CLEANED & CHECKED	20	CATCH BASINS
10/22/08	AREA #4	CLEANED & CHECKED	13	CATCH BASINS
10/22/08	AREA #2	CLEANED & CHECKED	22	CATCH BASINS
10/22/08	AREA #3	CLEANED & CHECKED	23	CATCH BASINS
10/23/08	AREA #4	CLEANED & CHECKED	33	CATCH BASINS
10/27/08	CITYWIDE	CLEANED & CHECKED	28	CATCH BASINS
10/28/08	AREA #3	CLEANED & CHECKED	29	CATCH BASINS
10/28/08	AREA #5	CLEANED & CHECKED	19	CATCH BASINS
10/28/08	AREA #5	CLEANED & CHECKED	19	CATCH BASINS
10/30/08	AREAS #1 & #2	CLEANED & CHECKED	9	CATCH BASINS
	TOTAL CATCH BASINS CLEANED & CHECKED		**613**	

CITY OF TEMECULA
DEPARTMENT OF PUBLIC WORKS
ROADS DIVISION

CATCH BASIN MAINTENANCE

MONTH OF NOVEMBER, 2008

DATE	LOCATION	WORK COMPLETED	
11/03/08	CITYWIDE	CLEANED & CHECKED	20 CATCH BASINS
11/04/08	CITYWIDE "RAIN"	CLEANED & CHECKED	15 CATCH BASINS
11/05/08	AREA #2	CLEANED & CHECKED	19 CATCH BASINS
11/06/08	AREA #2	CLEANED & CHECKED	5 CATCH BASINS
11/10/08	CITYWIDE	CLEANED & CHECKED	25 CATCH BASINS
11/13/08	AREA #2	CLEANED & CHECKED	15 CATCH BASINS
11/17/08	CITYWIDE	CLEANED & CHECKED	23 CATCH BASINS
11/18/08	AREA #2	CLEANED & CHECKED	14 CATCH BASINS
11/19/08	AREA #2	CLEANED & CHECKED	26 CATCH BASINS
11/20/08	AREA #2	CLEANED & CHECKED	16 CATCH BASINS
11/24/08	CITYWIDE	CLEANED & CHECKED	33 CATCH BASINS
11/25/08	AREA #2	CLEANED & CHECKED	19 CATCH BASINS
11/26/08	CITYWIDE "RAIN"	CLEANED & CHECKED	25 CATCH BASINS
	TOTAL CATCH BASINS CLEANED & CHECKED	255	

CITY OF TEMECULA
DEPARTMENT OF PUBLIC WORKS
ROADS DIVISION

CATCH BASIN MAINTENANCE

MONTH OF DECEMBER, 2008

DATE	LOCATION	WORK COMPLETED	
12/01/08	CITYWIDE	CLEANED & CHECKED	15 CATCH BASINS
12/02/08	AREA #2	CLEANED & CHECKED	29 CATCH BASINS
12/08/08	CITYWIDE	CLEANED & CHECKED	20 CATCH BASINS
12/09/08	AREA #2	CLEANED & CHECKED	35 CATCH BASINS
12/10/08	AREA #2	CLEANED & CHECKED	29 CATCH BASINS
12/11/08	AREA #2	CLEANED & CHECKED	7 CATCH BASINS
12/15/08	CITYWIDE "RAIN"	CLEANED & CHECKED	55 CATCH BASINS
12/16/O8	CITYWIDE "RAIN"	CLEANED & CHECKED	59 CATCH BASINS
12/17/08	CITYWIDE "RAIN"	CLEANED & CHECKED	54 CATCH BASINS
12/18/08	CITYWIDE "RAIN"	CLEANED & CHECKED	8 CATCH BASINS
12/22/08	CITYWIDE "RAIN"	CLEANED & CHECKED	9 CATCH BASINS
12/22/08	CITYWIDE "RAIN"	CLEANED & CHECKED	45 CATCH BASINS
12/23/08	CITYWIDE "RAIN"	CLEANED & CHECKED	17 CATCH BASINS
12/23/08	CITYWIDE "RAIN"	CLEANED & CHECKED	2 CATCH BASINS
12/24/08	AREA #4	CLEANED & CHECKED	3 CATCH BASINS
12/26/08	CITYWIDE	CLEANED & CHECKED	2 CATCH BASINS
12/29/08	CITYWIDE	CLEANED & CHECKED	32 CATCH BASINS
12/29/08	AREAS #3 & #4	CLEANED & CHECKED	11 CATCH BASINS
12/30/08	AREA #2	CLEANED & CHECKED	40 CATCH BASINS
	TOTAL CATCH BASINS CLEANED & CHECKED		472

CITY OF TEMECULA
DEPARTMENT OF PUBLIC WORKS
ROADS DIVISION

CATCH BASIN MAINTENANCE

MONTH OF JANUARY, 2009

DATE	LOCATION	WORK COMPLETED	
01/05/09	CITYWIDE	CLEANED & CHECKED	32 CATCH BASINS
01/07/09	AREA #2	CLEANED & CHECKED	8 CATCH BASINS
01/08/09	AREA #2	CLEANED & CHECKED	22 CATCH BASINS
01/12/09	CITYWIDE	CLEANED & CHECKED	23 CATCH BASINS
01/13/09	AREA #2	CLEANED & CHECKED	20 CATCH BASINS
01/14/09	AREA #3	CLEANED & CHECKED	33 CATCH BASINS
01/15/09	AREA #3	CLEANED & CHECKED	11 CATCH BASINS
01/16/09	AREA #3	CLEANED & CHECKED	7 CATCH BASINS
01/20/09	CITYWIDE	CLEANED & CHECKED	23 CATCH BASINS
01/21/09	AREA #3	CLEANED & CHECKED	27 CATCH BASINS
01/22/09	AREAS #1 & #2	CLEANED & CHECKED	30 CATCH BASINS
01/22/09	AREA #3	CLEANED & CHECKED	42 CATCH BASINS
01/26/09	AREA #2	CLEANED & CHECKED	44 CATCH BASINS
01/26/09	CITYWIDE	CLEANED & CHECKED	24 CATCH BASINS
01/27/09	AREA #3	CLEANED & CHECKED	47 CATCH BASINS
01/27/09	AREA #3	CLEANED & CHECKED	46 CATCH BASINS
01/28/09	AREAS #1 #2	CLEANED & CHECKED	52 CATCH BASINS
01/28/09	AREA #3	CLEANED & CHECKED	52 CATCH BASINS
01/29/09	AREA #3	CLEANED & CHECKED	26 CATCH BASINS
	TOTAL CATCH BASINS CLEANED & CHECKED 569		

CITY OF TEMECULA
DEPARTMENT OF PUBLIC WORKS
ROADS DIVISION

CATCH BASIN MAINTENANCE

MONTH OF FEBRUARY, 2009

DATE	LOCATION	WORK COMPLETED	
02/02/09	AREA #1	CLEANED & CHECKED	70 CATCH BASINS
02/02/09	CITYWIDE	CLEANED & CHECKED	24 CATCH BASINS
02/03/09	AREA #4	CLEANED & CHECKED	10 CATCH BASINS
02/03/09	AREA #3	CLEANED & CHECKED	28 CATCH BASINS
02/04/09	AREA #4	CLEANED & CHECKED	43 CATCH BASINS
02/04/09	AREA #4	CLEANED & CHECKED	44 CATCH BASINS
02/05/09	AREA #4	CLEANED & CHECKED	29 CATCH BASINS
02/05/09	AREA #5	CLEANED & CHECKED	24 CATCH BASINS
02/06/09	CITYWIDE "RAIN"	CLEANED & CHECKED	32 CATCH BASINS
02/09/09	CITYWIDE	CLEANED & CHECKED	21 CATCH BASINS
02/17/09	CITYWIDE	CLEANED & CHECKED	17 CATCH BASINS
02/17/09	CITYWIDE	CLEANED & CHECKED	11 CATCH BASINS
02/18/09	REDHAWK	CLEANED & CHECKED	18 CATCH BASINS
02/23/09	CITYWIDE	CLEANED & CHECKED	26 CATCH BASINS
02/24/09	AREA #4	CLEANED & CHECKED	14 CATCH BASINS
	TOTAL CATCH BASINS CLEANED & CHECKED 411		

CITY OF TEMECULA
DEPARTMENT OF PUBLIC WORKS
ROADS DIVISION

CATCH BASIN MAINTENANCE

MONTH OF MARCH, 2009

DATE	LOCATION	WORK COMPLETED	
03/02/09	HOT SPOTS CITYWIDE	CLEANED & CHECKED	19 CATCH BASINS
03/04/09	JEFFERSON AT WINCHESTER	CLEANED & CHECKED	2 CATCH BASINS
03/09/09	HOT SPOTS CITYWIDE	CLEANED & CHECKED	21 CATCH BASINS
03/16/09	HOT SPOTS CITYWIDE	CLEANED & CHECKED	22 CATCH BASINS
03/17/09	AREA #4	CLEANED & CHECKED	13 CATCH BASINS
03/20/09	AREA #5	CLEANED & CHECKED	2 CATCH BASINS
03/24/09	HOT SPOTS	CLEANED & CHECKED	13 CATCH BASINS
03/24/09	31108 RUIDOSA	CLEANED & CHECKED	1 CATCH BASINS
03/25/09	AREA #4	CLEANED & CHECKED	21 CATCH BASINS
03/26/09	AREA #4	CLEANED & CHECKED	12 CATCH BASINS
03/31/09	HOT SPOTS	CLEANED & CHECKED	11 CATCH BASINS
	TOTAL CATCH BASINS CLEANED & CHECKED 137		

CITY OF TEMECULA
DEPARTMENT OF PUBLIC WORKS
ROADS DIVISION

CATCH BASIN MAINTENANCE

MONTH OF APRIL, 2009

DATE	LOCATION	WORK COMPLETED	
04/01/09	CALLE GIRASOL AT RIVERTON DRIVE	CLEANED & CHECKED	1 CATCH BASINS
04/01/09	AREA #4	CLEANED & CHECKED	44 CATCH BASINS
04/01/09	AREA #1	CLEANED & CHECKED	4 CATCH BASINS
04/02/09	AREA #4	CLEANED & CHECKED	38 CATCH BASINS
04/07/09	CITYWIDE HOT SPOTS	CLEANED & CHECKED	5 CATCH BASINS
04/08/09	CITYWIDE HOT SPOTS	CLEANED & CHECKED	29 CATCH BASINS
04/09/09	AREA #4	CLEANED & CHECKED	47 CATCH BASINS
04/13/09	CITYWIDE HOT SPOTS	CLEANED & CHECKED	9 CATCH BASINS
04/14/09	CITYWIDE HOT SPOTS	CLEANED & CHECKED	22 CATCH BASINS
04/15/09	AREA #4	CLEANED & CHECKED	25 CATCH BASINS
04/16/09	AREA #4	CLEANED & CHECKED	41 CATCH BASINS
04/20/09	CITYWIDE HOT SPOTS	CLEANED & CHECKED	11 CATCH BASINS
04/20/09	CITYWIDE HOT SPOTS	CLEANED & CHECKED	4 CATCH BASINS
04/22/09	CITYWIDE AREAS #2, #3, #4	CLEANED & CHECKED	8 CATCH BASINS
04/23/09	AREA #5	CLEANED & CHECKED	43 CATCH BASINS
04/27/09	CITYWIDE HOT SPOTS	CLEANED & CHECKED	11 CATCH BASINS
	TOTAL CATCH BASINS CLEANED & CHECKED 342		

CITY OF TEMECULA
DEPARTMENT OF PUBLIC WORKS
ROADS DIVISION

CATCH BASIN MAINTENANCE

MONTH OF MAY, 2009

DATE	LOCATION	WORK COMPLETED	
05/05/09	CITYWIDE HOT SPOTS	CLEANED & CHECKED	11 CATCH BASINS
05/06/09	31321 HURON	CLEANED & CHECKED	1 CATCH BASINS
05/11/09	CITYWIDE HOT SPOTS	CLEANED & CHECKED	11 CATCH BASINS
05/13/09	AREA #1	CLEANED & CHECKED	26 CATCH BASINS
05/14/09	AREA #5	CLEANED & CHECKED	29 CATCH BASINS
05/14/09	APIS AT TEMECULA PARKWAY	CLEANED & CHECKED	1 CATCH BASINS
05/15/09	CATCH BASINS AREAS #1 & #2	CLEANED & CHECKED	10 CATCH BASINS
05/18/09	CITYWIDE HOT SPOTS	CLEANED & CHECKED	30 CATCH BASINS
05/26/09	CATCH BASINS HOT SPOTS	CLEANED & CHECKED	15 CATCH BASINS
05/29/09	VIA PUESTA DEL SOL	CLEANED & CHECKED	5 CATCH BASINS
05/29/09	43241 MODENA	CLEANED & CHECKED	1 CATCH BASINS
	TOTAL CATCH BASINS CLEANED & CHECKED	**140**	

CITY OF TEMECULA
DEPARTMENT OF PUBLIC WORKS
ROADS DIVISION

CATCH BASIN MAINTENANCE

MONTH OF JUNE, 2009

DATE	LOCATION	WORK COMPLETED	
06/01/09	CITYWIDE "HOT SPOTS"	CLEANED & CHECKED	12 CATCH BASINS
06/02/09	PAUBA ROAD AT MARGARITA ROAD	CLEANED & CHECKED	1 CATCH BASINS
06/02/09	AREA #2	CLEANED & CHECKED	3 CATCH BASINS
06/04/09	AREAS #1 & #2	CLEANED & CHECKED	16 CATCH BASINS
06/08/09	CITYWIDE "HOT SPOTS"	CLEANED & CHECKED	15 CATCH BASINS
06/09/09	AREA #1 (S.O.R.)	CLEANED & CHECKED	5 CATCH BASINS
06/09/09	AREA #5	CLEANED & CHECKED	30 CATCH BASINS
06/10/09	AREA #5	CLEANED & CHECKED	38 CATCH BASINS
06/10/09	AREA #5	CLEANED & CHECKED	12 CATCH BASINS
06/15/09	CITYWIDE	CLEANED & CHECKED	10 CATCH BASINS
06/17/09	AREA #5	CLEANED & CHECKED	31 CATCH BASINS
06/18/09	AREAS #1 & #5	CLEANED & CHECKED	41 CATCH BASINS
06/22/09	CITYWIDE "HOT SPOTS"	CLEANED & CHECKED	14 CATCH BASINS
06/23/09	HOT SPOTS	CLEANED & CHECKED	28 CATCH BASINS
06/24/09	AREAS #1 & #4	CLEANED & CHECKED	24 CATCH BASINS
06/29/09	HOT SPOTS	CLEANED & CHECKED	17 CATCH BASINS
06/30/09	OLD TOWN	CLEANED & CHECKED	11 CATCH BASINS
	TOTAL CATCH BASINS CLEANED & CHECKED 308		

ATTACHMENT D

INDUSTRIAL/COMMERCIAL PROGRAM

- Example of Completed NPDES Inspection form for Commercial/Industrial Facilities

Water Quality Program
Business Inspection Checklist
43200 Business Park Drive, Temecula, CA.
(951) 308-6395
www.cityoftemecula.org

Name of Inspector:	ALDO LICITRA		
Type of Inspection:	[X] Routine	[ ] Follow-up	[ ] Complaint Investigation
Date:	6/30/09		
Time:	3:23		
Received By:	Elvin M.		

A. CONTACT INFORMATION

Facility Name: TEMECULA RECYCLING — Category: [ ] Industrial [X] Commercial

Street Address: 27635 DIAZ RD — Contact Number:

Contact Person: Elvin M. - ELVEN MOSH — Mailing Address (if different):

B. FACILITY / SITE INFORMATION:

Description of Site Activities: COLLECTION ~~RECYCLING~~ FACILITY - CANS / BOTTLES / PAPER / SMALL MISCELLANEOUS

SIC / NAIC Code (circle one): 5093 — Revised SIC/NAIC Code:

Priority Classification: [X] High [ ] Medium [ ] Low

Revised Priority Classification: [X] High [ ] Medium [ ] Low

Does facility have a current business license? [X] Yes [ ] No # 030996 Exp. 1/31/10

Is facility subject to a State General Industrial Permit? [ ] Yes [X] No WDID #:

Does facility have a 'No Exposure Certification' (NEC)? [ ] Yes [ ] No [ ] N/A

Does facility maintain a SWPPP or equivalent plan? [ ] Yes [ ] No [ ] N/A

Are all BMPs implemented? [ ] Yes [ ] No [ ] N/A

Does facility maintain a Stormwater Monitoring Plan? [ ] Yes [ ] No [ ] N/A

Were storm water samples collected last rain season? [ ] Yes [ ] No [ ] N/A

Were sample results within effluent guidelines? [ ] Yes [ ] No [ ] N/A

List the surface flow paths from facility to Murrieta Creek: FLOWS ARE DIRECTED TO A NATURAL DRAINAGE CHANNEL ADJACENT TO FACILITY.

C. BEST MANAGEMENT PRACTICES (BMP) ASSESSMENT:

		N/A	Yes	No	Comments
C.1	**General Areas**				
a.	Is the site free of evidence of unauthorized releases?			✓	PREVIOUS STAINING
b.	Is the site free of evidence of illicit connections?		✓		
c.	Are onsite inlets and flowlines free of dirt, litter, stains, other material?			✓	SEDIMENT, GRAVEL, SMALL DEBRIS
d.	Are onsite inlets and flowlines protected from unauthorized releases?			✓	STRAIGHT PATH INTO DRAINAGE CHANNEL
e.	Is washwater from all cleaning activities disposed properly? Where to?	✓			NO HOSING
f.	Are biodegradable soaps used? Specify activity.	✓			
g.	Is roof water drained to parking lot / landscaping?		✓		
C.2	**Landscaped Areas**				
a.	Are adequate erosion prevention measures employed? (vegetation or physical stabilization)		✓		GRASS LANDSCAPE
b.	Are irrigation systems programmed to minimize over-watering and runoff?		✓		

Water Quality Program
Business Inspection Checklist
43200 Business Park Drive, Temecula, CA.
(951) 308-6395
www.cityoftemecula.org

C. BEST MANAGEMENT PRACTICES (BMP) ASSESSMENT (Contd.):

		N/A	Yes	No	Comments
c.	Are inlets or flowlines free of landscape waste (tree or shrub trimmings, grass clippings, etc)?		✓		
d.	Is landscape material (fertilizers, pesticides, etc) stored onsite/protected against runoff?	✓			
C.3	**Materials and Wastes Areas**				
a.	Are all materials and activities protected from exposure to stormwater?			✓	PLASTIC DRUMS ARE ONLY MATERIALS
b.	Are adequate trash containers provided? (covered, no leaks)		✓		
	Are these areas free of litter and stains?		✓		
c.	Are adequate recycling containers provided? (covered, no leaks)		✓		
	Are these areas free of litter and stains?		✓		
d.	Is service provided to prevent trash and recycling containers from overflowing?		✓		
e.	Are adequate material storage areas provided (covered, secondary containment, limited access, properly labeled, free of stains)?		✓		ALL BARRELS ARE MOVED INSIDE INSIDE DAILY.
f.	Is there an accessible spill response kit?			✓	
g.	Are reporting procedures readily available in the event of a release?		✓		
h.	Are aboveground storage tanks (greater than 250 gallons) equipped with secondary containment?	✓			
	If yes, is the secondary containment monitored for spills & leaks? How often?	✓			
i.	Are loading and unloading areas free of litter and stains?			✓	LITTER
j.	Are inlets, if any, protected/connected to santitary sewer?	✓			
k.	Is run-on diverted from entering into these areas?	✓			
C.4	**Equipment and Vehicle Areas**				
a.	Are common parking areas and driveways free of litter, stains, non-stormwater liquids?			✓	LITTER
b.	Are vehicles and equipment stored indoors or under canopies?		✓		
c.	Are vehicles and equipment maintained or repaired indoors?	✓			
	If not, where?	✓			
d.	Is runoff contained or treated at maintenance areas?	✓			
e.	Is runoff contained or treated at fueling areas?	✓			
f.	Is runoff contained or treated at wash areas?	✓			
g.	Is run-on diverted from entering into these areas?	✓			
C.5	**Other**				
a.	Is employee training provided / Information posted?			✓	
b.	Specify the number of accidental releases within the past 12 months.	----	----	----	
c.	Does the facility have pollution prevention policies/procedures/plan?			✓	
d.	Have all concerns been addressed?		✓		If no, describe on Page 3.

Water Quality Program
Business Inspection Checklist
43200 Business Park Drive, Temecula, CA.
(951) 308-6395
www.cityoftemecula.org

D. CORRECTIVE ACTIONS REQUIRED:

1. ENSURE FLOWLINES ARE CLEAN
2. ENSURE BROKEN GLASS IS REMOVED THROUGHOUT THE BACK LOT, INCLUDING COPPER RINGS
3. REMOVE SPILL RESIDUE FROM SCALE AREA
4. ENSURE RECYCLING ROLL-OFF CONTAINERS ARE COVERED PRIOR TO ANY RAIN
5. ENSURE A SPILL KIT IS READILY ACCESSIBLE AND VISIBLE. LABEL AS "SPILL KIT".

E. CITY ACTION(S):

[X] No violations [ ] Verbal / Written Warning [ ] Citation Issued [ ] SDRWQCB Notified

F. ADDITIONAL COMMENTS:

1. FOLLOW-UP: CONTACT CITY W/IN 30 DAYS FOR STATUS ON CORRECTION ACTIONS.
2. NO MANUFACTURING. ALL DRY PRODUCT.

ATTACHMENT E

RESIDENTIAL PROGRAM

- "Inside Temecula" Newsletters
- "Guide to Leisure Activities"
- City-Sponsored "City-Wide Clean-up" Flyers
- County-Sponsored "Household Hazardous Waste Collection" Flyers

Featuring the Gilby Clarke Band, Austin Law, and Gene Loves Jezebel
Saturday, August 29th - 5:30pm to 11:00pm at Quaid Harley-Davidson Service Center on Old Town Front Street, Temecula.

For more information or to purchase tickets please go to
http://www.goldencrownproductions.com/ or info@goldencrownproductions.com,
Or call 951-658-2411

Bulky Item Pick- Ups / Street Sweeping in Temecula

Bulky Item Pick Ups

Temecula Residents are allowed two FREE bulky item pick ups per year. Contact CR&R at (800) 755-8112 to check for limitations and schedule a pick up.

Street Sweeping

Did you know that all residential streets are swept weekly? Your street is swept the day after your trash and recycling is picked up. If your trash is serviced on Friday, your street is swept on the following Monday.

Please refrain from parking in the street on street sweeping day. Keeping the streets clear of vehicles allows for better sweeping services. Observing this simple request helps keep all of Temecula's neighborhoods looking their best.

Get Composting!!

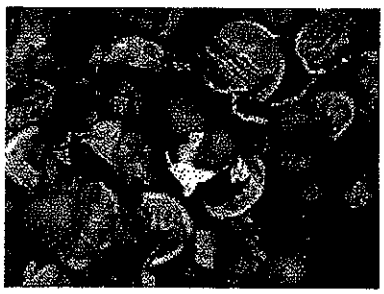

Got food Scaps?
Got Yard Clippings?
Then Get Composting!

Why Should You Compost?

Organic materials take up a lot of space in landfills. As organics decompose, methane gas is produced which can pollute our ground water and air.

What Happens During the Composting Process?

In composting, organic materials are mixed together in a pile or bin, where literally billions of tiny microbes digest the material and turn it into rich, dark, nutrient-rich compost. Think of your compost pile as a tiny zoo.

What is the Benefit of the Compost?

Using compost in your yard can reduce the need to water, fertilize and use pesticides. Compost has also been shown to prevent erosion on embankments.

How can You Learn More About Composting?

Attend a Riverside County Waste Management Department FREE workshop.

When: July 25th or October 31st
Where: Grace Mellman Community Library; 41000 County Center Drive, Temecula

Hunts. Events are for children ages 1-11 with prize drawings for teens and adults. Egg hunts begin at 10:00 am sharp at the following locations:

Ronald Reagan Sports Park ~ Temeku Hills Park
Harveston Community Park ~ Paloma Del Sol Park

Looking For Some Family Fun???

Join the City of Temecula Community Services Department for a "Family Fun Night!" These events are for the whole family. That means that Moms and Dads get to play too!

March 20th ~ Cartooning with Big Foot
April 16th ~ Rad Hatter Night

These events require pre-registration. Cost is $3.00 per person.
For more information, call (951) 694-6480.

"Rhythms" Teen Dance Party!

"Rhythms" Teen Dance Party! Featuring D.J. 5 Cent with all the latest, hottest jams! Saturday, April 18th, from 8 pm-11:30 pm. $3 cover, OR print out this page of the "Inside Temecula" newsletter to get $1 off admission! Ages 15 to 18 - must bring photo ID.

Rhythms Dance Party is located at 41625 Enterprise Circle South, in Temecula. Please go to our MySpace page at: www.myspace.com/temeculayouth for more information, to see a map, and to get directions to the party. Come ready to dance!

Earth Day 2009 Celebrations

To inspire awareness of and appreciation for the Earth's environment, this April cities across California will host a variety of festivals and celebrations to highlight Earth Day. San Diego, Santa Barbara, Ventura and Lake Arrowhead are just a few of the communities which will recognize Earth Day 2009 with large scale celebrations. The City of Temecula will host an Arbor Day Celebration on April 25th, from 10:00 am to 1:00 pm at the Community Recreation Center. The event is free!

Spring Outdoors

Spring in Temecula is the perfect time of year to spend your day outdoors. Blue skies, green hills, and the spring flowers blooming is the perfect recipe for outdoor fun.
- Take Fido to the dog park
- Pack a picnic and take the family to one of Temecula's 38 parks for a great day of outdoor fun, flying kites, playing frisbee, and more.

Each year about 260 children under the age of 5 years old drown in swimming pools. In addition, the suction from drains in swimming pools and spas, under certain conditions, can entrap swimmers underwater. To help protect your family, be sure to take the following steps:

Use Layers of Protection

To prevent swimming pool drowning, layers of protection are essential. Place barriers completely around the pool, closely supervise young children and be prepared in case of an emergency.

In addition:

- If a child is missing, always look first in the pool. Seconds Count!
- Knowing how to swim doesn't make a child drown-proof. Never use flotation devices as a substitute for supervision.
- Keep rescue equipment and a phone next to the pool.
- Learn cardiopulmonary resuscitation (CPR).
- If your house forms one side of the barrier for the pool, doors leading from the house to the pool should be protected with alarms that sound when the doors are unexpectedly opened. Also, use a power safety cover, a motor-powered barrier placed over the water area, to prevent access by young children.
- For above-ground pools, steps and ladders to the pool should be secured or removed when the pool is not in use.
- Install physical barriers around the pool to limit access.
- Fences and walls should be at least 4-feet high and installed completely around the pool.
- Gates should be self-closing and self-latching. The latch should be out of reach of small children.

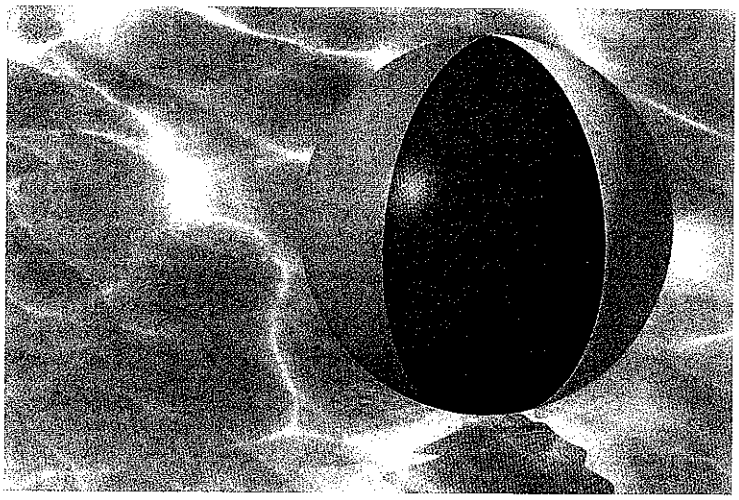

Pool and Spa Entrapment Dangers

Never use a pool or spa with a missing drain cover. Be sure a newer safer drain cover is in place. New covers are usually dome-shaped, not flat.

Consider installing a Safety Vacuum Release System, a device that automatically shuts off the pump when blockage is detected.

Have a professional regularly inspect your pool or spa for entrapment or entanglement hazards.

Plainly mark the location of the electrical cut-off switch for the pool or spa pump.

If someone is entrapped against a drain, cut off the pump immediately. Instead of pulling the person away from the pump, pry a hand between the drain and the person's body to break the seal.

For more information, please visit www.rvcfire.org/opencms/yoursafety/drowning_is_preventable.html

Crush – Don't Flush!

Most of us have old vitamins, unwanted over-the-counter medications or expired prescription drugs in our homes.

Everyday in California, unwanted or expired medicine is disposed of down the toilet. While this was once recommended practice to protect children and pets from accidental poisonings, studies show that pharmaceuticals can pass through wastewater treatment facilities into creeks, rivers, bays and oceans. When disposing of pharmaceuticals, make sure you remove the label with your personal information from the package, mix them with cat litter or coffee grounds and place in the trash. Below are a few guidelines for disposing of unwanted medication.

- Liquids - Empty onto absorbent paper towels or rags and dispose of with regular trash.
- Pills - Crush pills and dispose of powdered medication with regular trash.
- Propellant Inhaler – Empty container by expelling all propellant. Dispose empty cylinder into the trash.
- Sharps/Needles – Place and secure sharps in an approved container. Approved containers are available at Riverside County Household Hazardous Waste Collection Events. For temporary storage and eventual disposal place sharps in a hard sided PLASTIC container like a bleach or laundry detergent bottle with a secure lid, making sure to:
- Secure the lid.
- Tape the container closed.
- Label the container 'SHARPS/NEEDLES".
- Take Back Programs - Ask your Pharmacy and Health Care Provider if they offer "Take Back" programs for sharps or medications to their patients.

For more information call Riverside County Waste Management at (800) 304-2226 or (951) 486-3200 or check their website at www.rivcowm.org.

0003609

Winter/Spring 2009

City of TEMECULA

Community Services Department

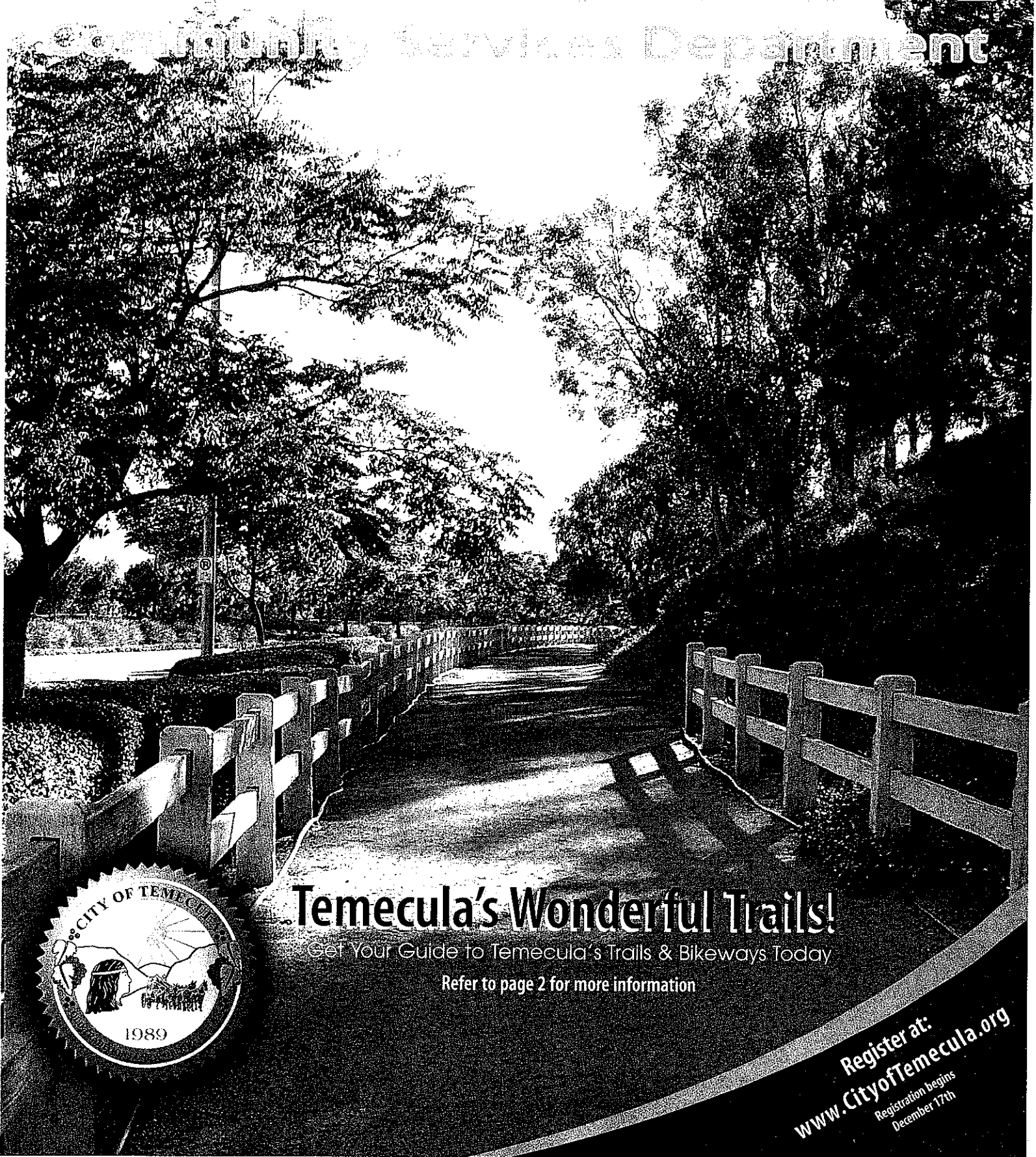

Temecula's Wonderful Trails!

Get Your Guide to Temecula's Trails & Bikeways Today

Refer to page 2 for more information

Register at:
www.CityofTemecula.org
Registration begins December 17th

Recycling and Trash Services

Recycling

The City of Temecula strongly encourages all residents and businesses to recycle. Residents can call CR&R to request an extra recycling container at no charge. Discounted rates are provided for businesses that request a "recycled materials only" bin. For more information, contact CR&R at (800) 755-8112.

Household Batteries

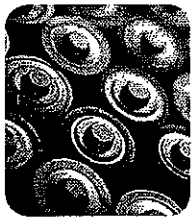

Did you know that you can no longer throw your batteries into your trash bin? Household batteries are now banned from the landfill and have been labeled as "Universal Waste" which is subject to disposal restrictions.

What can you do with your batteries?

The City of Temecula has provided 6 permanent opportunities to properly dispose of your batteries at the following locations:

1. City Hall (CH), 43200 Business Park Drive
2. Temecula Community Center (TCC), 28816 Pujol Street
3. Mary Phillips Senior Center (MPSC), 41845 6th Street
4. Community Recreation Center (CRC), 30875 Rancho Vista Road
5. Temecula Public Library (TPL), 30600 Pauba Road
6. Grace Mellman Library (GML), 41000 County Center Drive

Household Hazardous Waste (HHW)

Riverside County also offers weekly antifreeze, vehicle and household batteries, oil (and filters), and paint (latex only) collections:

WHEN: Every NON-holiday Saturday (Subject to closure during inclement weather)

TIME: 9:00am until 2:00pm

WHERE: 25315 Jefferson Avenue, Murrieta

Maximum chemical load: 5 gallons or 50 lbs. (per trip). Some restrictions apply; contact Riverside County Waste Management at (951) 486-3200 for additional information.

Bulky Item Pick-Up

Reminder! City of Temecula residents are allowed two FREE bulky item pick-ups, including e-waste, annually. Call CR&R at (800) 755-8112 to arrange for a bulky item pick-up.

Street Sweeping

Please be a good neighbor and remember not to park on residential streets on trash pick-up day and street sweeping day. Residential streets are swept the day after trash pick-up day. Keeping vehicles off the streets on these days allows efficient trash collection and street sweeping. Observing this simple request helps keep all of Temecula's neighborhoods looking their best!

City Wide Clean-Up & Oil Collection

CR&R Inc. and the City of Temecula will be co-sponsoring the bi-annual Community Clean-Up Day and Citywide Clean-up and Oil Collection tentatively scheduled for one Saturday in the spring & fall. All City residents may dispose of e-waste, used motor oil, antifreeze, auto batteries, and green waste, as well as bulky items. This service is free to Temecula residents. (ID is required). The event will be held at Chaparral High School between 8am and 2pm. For more information, please contact Community Services at 694-6480.

Holiday Schedule Trash Pick-Up

Holidays are: New Year's Day, Memorial Day, 4th of July, Labor Day, Thanksgiving and Christmas. Following a holiday, your trash collection will be delayed one day. If your normal trash day is Friday, your trash will be collected on Saturday. Holidays will also affect the street sweeping schedule. If the holiday occurs on Saturday or Sunday, your collection & street sweeping services may not change.

Park Rangers and Park Rules

General Information: The City of Temecula currently has two Park Rangers monitoring its many park sites and facilities throughout the City. Since incorporation, the City's park system has experienced extraordinary growth and the number of citizens and their guests using the park system continues to increase. Therefore, as a community outreach and customer service program, the Park Rangers continue to support the Community Services Department by directly assisting citizens in understanding and maintaining the safety rules and regulations established within the park system.

All Neighborhood parks not listed below close at dusk.
All Special Use Parks listed below close and lights out by 10:00pm.

Harveston Community Park
Harveston Lake Park
Margarita Community Park
Paloma Del Sol Park
Patricia H. Birdsall Sports Park
Ronald Reagan Sports Park
Temecula Skate Park

Park Rules:

- Use caution and drive slowly while driving in all parking areas.
- Loitering in City Parks is not permitted.
- Help keep our parks clean. Please do not litter.
- Appropriate use of handicapped parking stalls will be monitored.
- Fire Lanes must remain open at all times.
- Dogs must be on a leash at all times.
- Please clean up after your dogs.
- Consumption of alcohol in the park system is prohibited.
- Flying balloons, planes, rockets and fireworks are not permitted.
- Party jumps must be pre-approved. Call 694-6410 for information.
- Selling merchandise or providing services in City park sites or recreational facilities without approval is prohibited.
- Overnight parking is prohibited at all park sites and facilities.
- For safety purposes, the use of private boats, powered model boats or watercraft of any kind is prohibited at the Temecula Duck Pond and Harveston Lake Park.

Multi-Use Trails and Bikeways

To report hazards on the trails or bike lanes please contact Public Works at 694-6411. **For comments or suggestions** that will help the City provide a better trail and/or bikeway system, or to receive "Your Guide to Temecula Trails & Bikeways," contact Community Services at 694-6480, or visit the city's website at: www.cityoftemecula.org.

CSD Maintenance Division

The Maintenance Services Division is committed to ensuring an aesthetically pleasing and healthy City by providing safe, clean public areas. The Maintenance Services Program provides effective landscape and facility maintenance services to parks, slopes, medians, recreation facilities, and City Administration Offices. TCSD Maintenance Division also oversees the repair and maintenance of arterial and neighborhood streetlights. If you have a streetlight out in your neighborhood, you may call the Community Services Department at 694-6480, or use our web page at www.cityoftemecula.org

We're Here for You!

0003611

TEMECULA

Community Services Department

Guide To Leisure Activities

Summer/Fall 2008

Recycling and Trash Services

Household Batteries

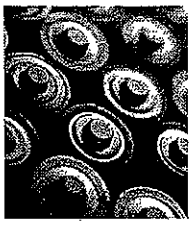

Did you know that you can no longer throw your batteries into your trash bin? As of February 6, 2006, household batteries, such as ones in your children's toys, CD players and flash lights are now banned from the landfill. Household batteries have been labeled as "Universal Waste" which is subject to disposal restrictions.

What can you do with your batteries?

The City of Temecula has provided 6 permanent opportunities to properly dispose of your batteries at the following locations:

1. Lobby at City Hall located at 43200 Business Park Drive
2. Temecula Community Center (TCC) at 28816 Pujol Street
3. Mary Phillips Senior Center (MPSC) at 41845 6th Street
4. Community Recreation Center (CRC) 30875 Rancho Vista Road
5. Temecula Public Library located at 30600 Pauba Road
6. Grace Mellman Library located at 4100 County Center Drive

Household Hazardous Waste (HHW)

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WHEN: Every NON-holiday Saturday (Subject to closure during inclement weather)
TIME: 9:00am until 2:00pm
WHERE: 25315 Jefferson Avenue in Murrieta (North of Murrieta Hot Springs)
Maximum chemical load: 5 gallons or 50 lbs. (per trip). Some restrictions apply; contact Riverside County Waste Management at (951) 486-3200 for additional information.

Recycling

The City of Temecula strongly encourages all residents and businesses to recycle. Residents can call CR&R to request an extra recycling container at no charge. Discounted rates are provided for businesses that request a "recycled materials only" bin. For more information, contact CR&R at (800) 755-8112.

Bulky Item Pick-Up

Reminder! City of Temecula residents are allowed two FREE bulky item pick-ups, including e-waste annually. Please call CR&R at (800) 755-8112 and make arrangements in advance for the pick-up of these items.

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City Wide Clean Up

(Citywide Clean-up and Oil Collection)

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Park Rules:

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- Loitering in City parks is not permitted.
- Help keep our parks clean, please do not litter.
- Appropriate use of handicapped parking stalls will be monitored.
- Fire Lanes must remain open at all times.
- Dogs must be on a leash at all times.
- Please clean-up after your dogs.
- Consumption of alcohol in the park system is prohibited.
- Flying balloon, planes, rockets and fireworks are not permitted.
- Party jumps must be pre-approved. Call 694-6410 for information.
- Selling merchandise or providing services in City park sites or recreational facilities without approval is prohibited.
- Overnight parking is prohibited at all park sites and facilities.
- For safety purposes body contact and the use of private boats, powered model boats or watercraft of any kind is prohibited at the Temecula Duck Pond and Harveston Lake Park.

Multi-Use Trails and Bikeways

To report hazards on the trails or bike lanes please contact Public Works at 694-6411. **For comments or suggestions** that will help the City provide a better trail and/or bikeway system please contact Barbara Smith in Community Services at 694-6480. Both Public Works and Community Services can be contacted via the city's website at: www.cityoftemecula.org.

CSD Maintenance Division

The Maintenance Services Division is committed to ensuring an aesthetically pleasing and healthy City by providing safe, clean public areas. The Maintenance Services Program provides effective landscape and facility maintenance services to parks, slopes, medians, recreation facilities, and City Administration Offices. TCSD Maintenance Division also oversees the repair and maintenance of arterial and neighborhood streetlights. If you have a streetlight out in your neighborhood, you may call the Community Services Department at 694-6480, or use our web page at www.cityoftemecula.org

CITY OF TEMECULA
Community Services Department

City of Temecula Community Services Department and CR&R, Incorporated Presents

City Wide Clean-Up
for
TEMECULA RESIDENTS ONLY

Saturday
APRIL 11, 2009
8:00 AM to 2:00 PM

CR&R
RECYCLING AND REFUSE SERVICE

Location
Chaparral High School
27215 Nicolas Road
Temecula

Directions: From I15, travel East on Winchester Rd., approximately 1.6 miles, to Nicolas Road

The City of Temecula and CR&R are sponsoring a program to help you dispose of household waste and large miscellaneous debris that can't be placed in your trash bins.

Proof of residency such as a California Driver's License, California ID Card, recent utility bill, or property tax statement is required.

HOW THE PROGRAM WORKS:

WE WILL ACCEPT

- Anti-Freeze
- Auto Batteries (2 per resident, per visit)
- All Household Electronic Devices
- Green Waste
- Large Bulky Items
- Motor Oil
- Small (Empty) Gas Operated Equipment

PLEASE DO NOT BRING

- Household Batteries
- Chemicals/Solvents/Gasoline
- Empty Drums
- Fluorescent Light Tubes
- Any Type of Paint
- Pesticides
- Thermostats
- Tires
- Other Hazardous Waste
- Sharps

For information contact the City of Temecula Community Services Department at (951) 308-6393 or CR&R at (800) 755-8112

City of Temecula Community Services Department and CR&R, Incorporated Presents

City Wide Clean-Up
for
TEMECULA RESIDENTS ONLY

Saturday
November 15, 2008
8:00 AM to 2:00 PM

Location
Chaparral High School
27215 Nicolas Road
Temecula

Directions: From I15, travel East on Winchester Rd., approximately 1.6 miles, to Nicolas Road

The City of Temecula and CR&R are sponsoring a program to help you dispose of household waste and large miscellaneous debris that can't be placed in your trash bins.

Proof of residency such as a California Driver's License, California ID Card, recent utility bill, or property tax statement is required.

HOW THE PROGRAM WORKS:

WE WILL ACCEPT

- Anti-Freeze
- Auto Batteries (2 per resident, per visit)
- All Household Electronic Devices
- Green Waste
- Large Bulky Items
- Motor Oil
- Small (Empty) Gas Operated Equipment

PLEASE DO NOT BRING

- Household Batteries
- Chemicals/Solvents/Gasoline
- Empty Drums
- Fluorescent Light Tubes
- Any Type of Paint
- Pesticides
- Thermostats
- Tires
- Other Hazardous Waste
- Sharps

For information, contact Janet Kitchel at (951) 308-6393 or CR&R at (800) 755-8112

Aldo Licitra

From: Gail Zigler

Sent: Wednesday, May 06, 2009 3:52 PM

To: All City Employees; All Council Members; Commissioner Edwards; Commissioner Fox; Commissioner Hogan; Commissioner McCracken; Commissioner Meyler

Subject: Household Hazardous Waste Collection at City Hall

What: Household Hazardous Waste Collection (HHW)
When: Saturday, May 9, 2009
Time: 9 am to 2 pm.
Cost: FREE to Riverside County Residents

Limitations:
Residential HHW only; business waste will not be accepted.
Quantity limits to 5 gallons or 50 lbs per trip – you can make multiple trips.

Items Accepted:
Household cleaners and chemicals
Yard fertilizers and insecticides
Vehicle antifreeze, brake fluids, fuel, batteries, motor oil
All types of paints, sharps (needles), e-waste, propane tanks, fluorescent tubes.

IMPORTANT: This is not a bulky item or green waste collection event.

Household Hazardous Waste Collection Event

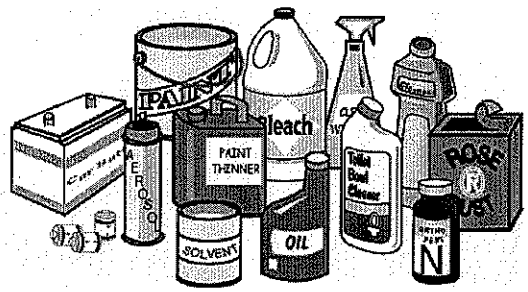

Saturday
January 31, 2009
9:00 am – 2:00 pm

This event is for Riverside County residents only and event will close during inclement weather or other hazardous conditions.

Free of charge to all Riverside County RESIDENTS

Location of Event: Temecula City Hall - Parking Lot
43200 Business Park Drive, Temecula, CA 92589

Acceptable Chemical Materials
limit of up to 5 gallons or 50 pounds per trip:

- Batteries (vehicle and household)
- Household chemicals (bleach, ammonia, pesticides, motor oil, etc.)
- Miscellaneous waste (propane tanks, pool chemicals, etc.)
- Paints, solvents, thinners, photo chemicals and non-empty aerosol cans
- Fluorescent lamps, thermostats, mercury-containing objects

And

- E-waste (computers, monitors, televisions, etc.)
- Sharps (sharps containers will be provided at no charge while supplies last)

Did you know?

- Absolutely No Bulky Items Or Yard Waste
- This event is for Residential Use Only; business waste not accepted
- Container volume must not exceed 5 gallons
- Containers will not be returned

For more information, please contact Riverside County at
(951) 486-3200, (800) 304-2226 or go to www.rivcowm.org.

Household Hazardous Waste Collection Event

WHEN: **Saturday, September 13, 2008**

TIME: **9:00 am – 2:00 pm**

WHERE: **Temecula City Hall - Parking Lot**
43200 Business Park Drive

Free of charge to all Riverside County Residents

*****Chemical or Material Quantity Limits*****
Up to 5 gallons or 50 pounds per trip

For more information:
Riverside County Waste Management at
(951) 486-3200, (800) 304-2226 or go to
www.rivcowm.org

ATTACHMENT F

ILLICIT DISCHARGE DETECTION PROGRAM

- Completed Dry-Weather Monitoring Log

Dry Weather Illicit Discharge Monitoring Log - 2008

	Watercourse	Thomas Maps (2003)	Station I.D.	Location	Date and Time	Date and Time of Last Rain	Quantity of Last Rain	Flow Data	
	Inspected twice between May 1 and September 30 :							Width / Depth	Velocity / Rate
1	Empire Creek	958 H6	EC1	Del Rio Road Bridge	9/18/08 3:30 PM	5/23/08 12:00 AM	0.01"	7'/9"	PONDED
2	Pechanga Creek	979 B3	PC1	Rainbow Canyon Road Bridge	9/18/08 1:20 PM	5/23/08 12:00 AM	0.01"	DRY	—
3	Pechanga Rd. stormdrain channel	979 C3	PP1	Behind Canterfield & Trotsdale	9/18/08 2:38 PM	5/23/08 12:00 AM	0.01"	3'/6"	6"/SEC
4	Temecula Creek	979 A3	TC1	Confluence with Murrieta Creek	9/18/08 11:45 AM	5/23/08 12:00 AM	0.01"	5'/4"	6"/SEC

	Specific Conductance	Turbidity	pH	Temperature	Dissolved Oxygen	COMMENTS: (include odors, color, clarity, floatables, stains, oil, sheen, surface scum, vegetation, etc)
1	2.21	≤10	7.79	26.0	10.32	PONDED. SURFACE ALGAE. ABUNDANT CATTAILS.
Sampled By:	Aldo Ficitra					NO ODORS. NO SHEEN. DARK GREEN COLOR, BUT CLEAR.
2	—				—	NO FLOWS. DRY CREEK BED.
Sampled By:	Aldo Ficitra					
3	1.45	≤10	8.62	26.3	11.90	CLEAR. COPPER COLOR. ODORLESS. NO SHEEN.
Sampled By:	Aldo Ficitra					ALGAE ON BOTTOM OF FLOWLINE.
4	1.81	≤10	7.94	22.3	8.78	CLEAR. NO ODORS. NO SHEEN. ABUNDANT
Sampled By:	Aldo Ficitra					VEGETATION AND FISH.

000367

Dry Weather Illicit Discharge Monitoring Log - 2008

	Watercourse	Thomas Maps (2003)	Station I.D.	Location	Date and Time	Date and Time of Last Rain	Quantity of Last Rain	Flow Data	
	Inspected twice between May 1 and September 30 :							Width / Depth	Velocity / Rate
1	Empire Creek	958 H6	EC1	Del Rio Road Bridge	8/27/08 3:15 PM	5/23/08 12:00 AM	0.01"	10'/1'	PONDED
2	Pechanga Creek	979 B3	PC1	Rainbow Canyon Road Bridge	8/27/08 12:31 PM	5/23/08 12:00 AM	0.01"	DRY	—
3	Pechanga Rd. stormdrain channel	979 C3	PP1	Behind Canterfield & Trotsdale	8/27/08 1:00 PM	5/23/08 12:00 AM	0.01"	3'/6"	6"/SEC
NEW SAMPLING LOCATION: BEGINNING OF RIP RAP SECTION									
4	Temecula Creek	979 A3	TC1	Confluence with Murrieta Creek	8/27/08 12:00 PM	5/23/08 12:00 AM	0.01"	5'/4"	6"/SEC
NEW SAMPLING LOCATION: TEMECULA CREEK, EAST OF CONFLUENCE, NEARER TO EMWD PUMP STATION									

	Specific Conductance	Turbidity	pH	Temperature	Dissolved Oxygen	COMMENTS: (include odors, color, clarity, floatables, stains, oil, sheen, surface scum, vegetation, etc)
1	1.75	≤10	8.39	27.9	18.0	PONDED. CLEAR. DARK GREEN. ABUNDANT CATTAILS
Sampled By: Aldo Ficitra						SURFACE ALGAE. NO ODORS. NO SHEEN. ABUNDANT FISH.
2	—				—	NO FLOWS. DRY CREEK BED.
Sampled By: Aldo Ficitra						
3	1.20	≤10	8.99	27.3	14.00	CLEAR. DARK GREEN. ALGAE ACCUMULATING ON
Sampled By: Aldo Ficitra						BOTTOM OF FLOWLINE. NO ODORS. NO SHEEN.
4	1.73	≤10	8.05	23.3	8.51	CLEAR. NO ODORS. NO SHEAN. SLIGHTLY
Sampled By: Aldo Ficitra						BROWN. ABUNDANT VEGETATION. ABUNDANT FISH.

ATTACHMENT G

REVISIONS TO THE SWMP

- SWMP Revisions List

Revisions to the SWMP since July 1, 2005

Table of Contents.

January 2006

- Modified format of Appendices.
- Attachments were grouped into single appendices corresponding to their respective sections.

Section 1.0 Executive Summary

Section 2.0 Introduction to the City of Temecula Stormwater Management Plan

July 2009

- Updated stormdrain information.

Section 3.0 Program Management

Section 4.0 Elimination of Illicit Connections and Illegal Discharges

Section 5.0 Municipal Facilities and Activities

January 2006

- Per RB meeting (Aug 31, 2005), included min. BMP source controls rather than generating P3s for each facility.
- Revised the inventory of City facilities to exclude non-jurisdictional facilities (i.e. police stations).

Section 6.0 Development Planning

July 2008

- Revised Initial applicability Checklist to emphasize 'Land Area for Development' in various categories as per the Permit text.

August 2008

- Designated CASQA's New Development Handbook as the City's set of standards for new development BMPs.

Section 7.0 Private Development Construction Activity

January 2006

- Per RB comment letter (Sep 28, 2005), included annual tally of inspections for every project.

August 2008

- Designated CASQA's Construction Handbook as the City's set of standards for construction BMPs.

Section 8.0 Industrial and Commercial Sources

Section 9.0 Residential Sources

Section 10.0 Public Education and Outreach

Section 11.0 Monitoring Program

January 2006

- Included the City's dry-weather monitoring log.

April 2006

- Revised the locations for the Pechanga Creek and Temecula Creek monitoring stations. The new locations are at the Rainbow Creek bridge and on Temecula creek, near the confluence with the Santa Margarita River.

Section 12.0 Program Reporting, Evaluation, and Revision

Appendix A Program Management

Appendix B Municipal Facilities and Activities

January 2006

- Included city-facility source control table.

January 2008

- Updated the municipal facilities list.

July 2009

- Updated the municipal facilities list.

Appendix C Private Development Construction Activity

January 2006

- Included annual tally of construction inspections, latest E&S notes, latest monthly construction inspection frequency sheet.
- Included latest version of City's ESC standard notes.

January 2008

- Updated the inspection frequency list.

August 2008

- Updated Annual Letter to Developer.

October 2008

- Included latest version of City's ESC standard notes.

July 2009

- Updated the annual tally of construction inspections.
- Included latest inspection frequency sheets

Appendix D Industrial and Commercial Sources

February 2006

- Updated the business inspection form to include complaint calls.

January 2008

- Updated the business list.

January 2009

- Updated the business list.

April 2009

- Updated business inspection checklist.

Appendix E Monitoring Program

January 2006

- Included dry-weather inspection log.

January 2008

- Removed secondary sampling locations from the dry weather monitoring log.

August 2008

- Updated dry-weather inspection log.

WARREN D. WILLIAMS
General Manager-Chief Engineer

1995 MARKET STREET
RIVERSIDE, CA 92501
951.955.1200
FAX 951.788.9965
www.rcflood.org

0003624
SAN DIEGO REGIONAL
WATER QUALITY
CONTROL BOARD
2009 OCT 30 A 10: 36

RIVERSIDE COUNTY FLOOD CONTROL
AND WATER CONSERVATION DISTRICT

October 29, 2009

Hand Delivered

Mr. John Robertus, Executive Officer
San Diego Regional Water Quality Control Board
9771 Clairemont Mesa Blvd., Suite A
San Diego, CA 92124

Sent UPS Next Day Air

Mr. Terry Oda, Chief
CWA Standards and Permits
United States Environmental Protection Agency
Region IX (WTR-5)
75 Hawthorne Street
San Francisco, CA 94015-3901

Dear Messrs. Robertus and Oda:

Re: FY 2008-2009 Annual Reports
Order No. R9-2004-001
NPDES Permit No. CAS0108766

Please find attached copies of the FY 2008-2009 annual reports for the National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) program for the Santa Margarita Region of Riverside County. The following annual reports are submitted in accordance with Third-Term NPDES MS4 Permit (Board Order No. R9-2004-001, NPDES Permit No. CAS0108766) adopted by the San Diego Region Regional Water Quality Control Board (Regional Board) on July 14, 2004 for the Santa Margarita Watershed Region of Riverside County (Third-Term NPDES MS4 Permit):

- Riverside County Flood Control and Water Conservation District (District) Individual Storm Water Management Plan (Individual SWMP) Annual Report
- County of Riverside Individual SWMP Annual Report
- City of Murrieta Individual SWMP Annual Report
- City of Temecula Individual SWMP Annual Report
- Watershed SWMP Annual Report
- Monitoring Program Annual Report (as Appendix G of Watershed SWMP Annual Report)

The reports provide a comprehensive summary and analysis of the Third-Term NPDES MS4 Permit compliance activities during FY 2008-2009 by the District, County of Riverside, and Cities of Murrieta and Temecula (Permittees).

The Individual SWMP Annual Reports summarize the Permittees' individual compliance activities. The Watershed SWMP Annual Report summarizes the Permittees' combined watershed based compliance activities.

The District is committed to continuing its ongoing efforts to work cooperatively with the Co-Permittees, Regional Board staff and other stakeholders in implementing an effective municipal stormwater program and fulfilling the requirements of the current Third-Term NPDES MS4 Permit. If you have any questions concerning this matter, please feel free to call me at 951.955.8411 or Jason Uhley at 951.955.1273.

Very truly yours,

Mark H. Wills

MARK H. WILLS
Chief of Regulatory Division

Attachments:

- District Individual SWMP Annual Report
- County of Riverside Individual SWMP Annual Report
- Murrieta Individual SWMP Annual Report
- Temecula Individual SWMP Annual Report
- Watershed SWMP Annual Report
- Monitoring Program Annual Report (as Appendix G of Watershed Annual Report)
- CD/DVD with electronic copies of above reports

ec: Riverside County - Santa Margarita Watershed MS4 Co-Permittees

- U. S. Environmental Protection Agency - Region IX
  Attn: Eugene Bromley
- Santa Rosa Plateau Ecological Reserve
  Attn: Carole Bell

JU:cw
P8/127666

County of Riverside

Santa Margarita Watershed

Municipal Separate Storm Sewer System

FY 2008-2009

Progress Report

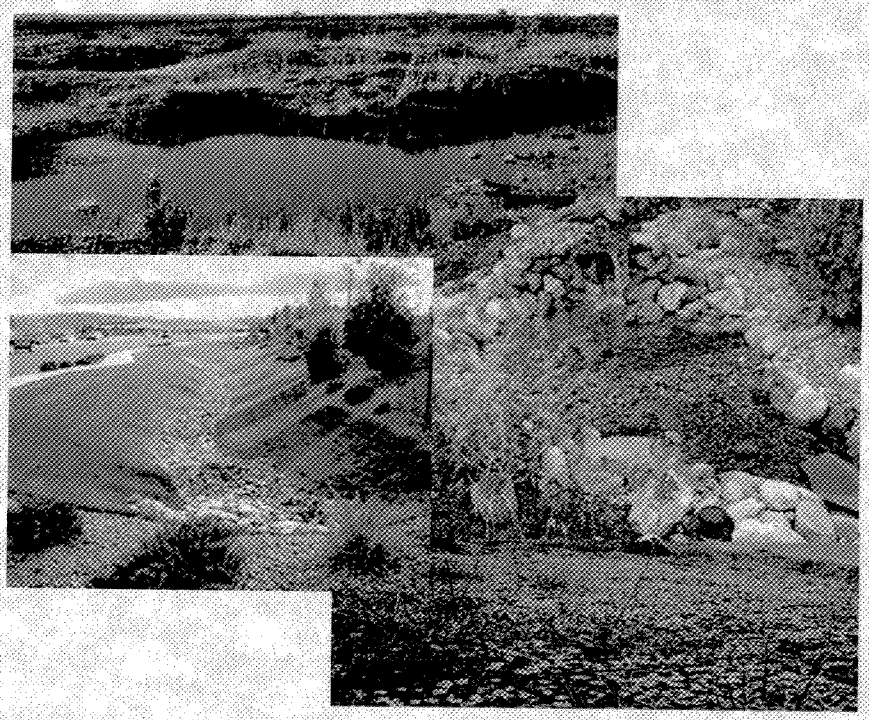

NPDES Permit #: CAS108766

San Diego Regional Water Quality Control Board Order #: R-9-2004-001

Bill Luna
County Executive Officer

Jay E. Orr
Assistant County Executive Officer

Executive Office, County of Riverside

County of Riverside Certification Statement

I Certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based upon my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Gary M. Christmas
Signature

Gary Christmas, Chief Deputy County Executive Officer

September 30, 2009
Date

Robert T. Andersen Administrative Center
4080 Lemon Street • 4th Floor • Riverside, California 92501 • (951) 955-1100 • Fax (951) 955-1105

SANTA MARGARITA WATERSHED NPDES MUNICIPAL STORMWATER PERMIT

(NPDES No. CAS0108766)

ANNUAL REPORTING FORMS

FOR

CITY/COUNTY/DISTRICT FISCAL YEAR 2008 - 2009

I. Executive Summary
1. Development Planning
2. Construction
3. Municipal
4. Industrial/Commercial
5. Residential
6. Education
7. Illicit Discharge Detection and Elimination
8. Public Participation
9. Fiscal Analysis Component
10. Non-Storm Water Discharges
11. Receiving Water Limitations
12. Additional Urban Runoff Data
13. Proposed Revisions

BOARD ORDER NO. R9-2004-001
CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN DIEGO REGION

Executive Summary

The County of Riverside (County), the Riverside County Flood Control and Water Conservation District (District), Coachella Valley Water District (CVWD) and the twenty-six cities of Riverside County including Banning, Beaumont, Blythe, Calimesa, Canyon Lake, Cathedral City, Coachella, Corona, Desert Hot Springs, Hemet, Indian Wells, Indio, La Quinta, Lake Elsinore, Menifee, Moreno Valley, Murrieta, Norco, Palm Desert, Palm Springs, Perris ,Rancho Mirage, Riverside, San Jacinto, Temecula and Wildomar (Cities) are regulated pursuant to the Federal Clean Water Act and the California Water Code through the following National Pollution Discharge Elimination System (NPDES) and Municipal Separate Storm Sewer System (MS4) permits:

- Whitewater River Basin, NPDES Permit No. CAS6177002 and California Regional Water Quality Control Board, Colorado River Region, Board Order R7-2008-001
- Santa Ana River Watershed, NPDES Permit No. CAS601833 and California Regional Water Quality Control Board, Santa Ana River Region, Board Order R8-2002-0011 (pending renewal)
- Santa Margarita River Watershed, NPDES Permit No. CAS0108766 and California Regional Water Quality Control Board, San Diego Region, Board Order R9-2004-001 (pending renewal)

The District serves as the principle permittee within the three watersheds described above, with the unincorporated County areas, Cities (depending on geography) and CVWD (Whitewater River Basin only) designated as the co-permittees. Collectively the permittees are required as part of the NPDES and MS4 permit process to adopt, develop and implement adaptable stormwater management programs to protect surface water quality and to report annually on their progress with respect to specific compliance activities.

Demographics

Population

The County was incorporated in 1893 out of parts of San Diego and San Bernardino Counties in Southern California. It is bordered by San Bernardino County (North), La Paz County, Arizona (East), Orange County (West) and Imperial and San Diego Counties (South). As of Jan 2009 the California Department of Finance estimates the population of Riverside County at 2,107,653 making it the fourth largest County of the fifty-eight counties in the State. This accounts for an increase of 29,052 residents since 2008. The County provides governmental services to 5.5% of the State's population.

City/County Population Estimates with Annual Percent Change
January 1, 2008 and 2009
(California Department of Finance, 2008/2009 Population Estimates)

State/County/City	Total Population 1/1/2008	Total Population 1/1/2009	Percent Change
California	37,883,992	38,292,687	1.1
Riverside County	2,078,601	2,107,653	1.4
Banning	28,148	28,457	1.1
Beaumont	31,317	32,403	3.5
Blythe	21,627	21,329	-1.4
Calimesa	7,423	7,498	1.0
Canyon Lake	10,994	11,128	1.2
Cathedral City	51,972	52,447	0.9
Coachella	40,317	41,000	1.7
Corona	146,698	148,597	1.3
Desert Hot Springs	25,939	26,552	2.4
Hemet	73,205	74,361	1.6
Indian Wells	5,000	5,093	1.9
Indio	80,962	82,230	1.6
Lake Elsinore	49,556	50,267	1.4
La Quinta	42,743	43,778	2.4
Menifee	0	67,705	0.0
Moreno Valley	182,945	186,301	1.8
Murrieta	99,576	100,714	1.1
Norco	27,143	27,160	0.1
Palm Desert	50,686	51,509	1.6
Palm Springs	47,019	47,601	1.2
Perris	53,340	54,323	1.8
Rancho Mirage	16,975	17,180	1.2
Riverside	296,191	300,430	1.4
San Jacinto	35,491	36,477	2.8
Temecula	99,873	102,604	2.7
Wildomar	0	31,321	0.0
Unincorporated County	553,461	459,188	-17.0

Land Area

As well as having the fourth largest population the County of Riverside has the forth largest land mass in the State encompassing 7295.6 square miles. The region is made up of 90 percent arid and semi arid desert rural lands with 10 percent comprising urban and suburban inland valleys and mountains. Less than 25 percent of the population lives in the rural portions of the County in comparison to 75 percent living in the western urban/suburban interface.

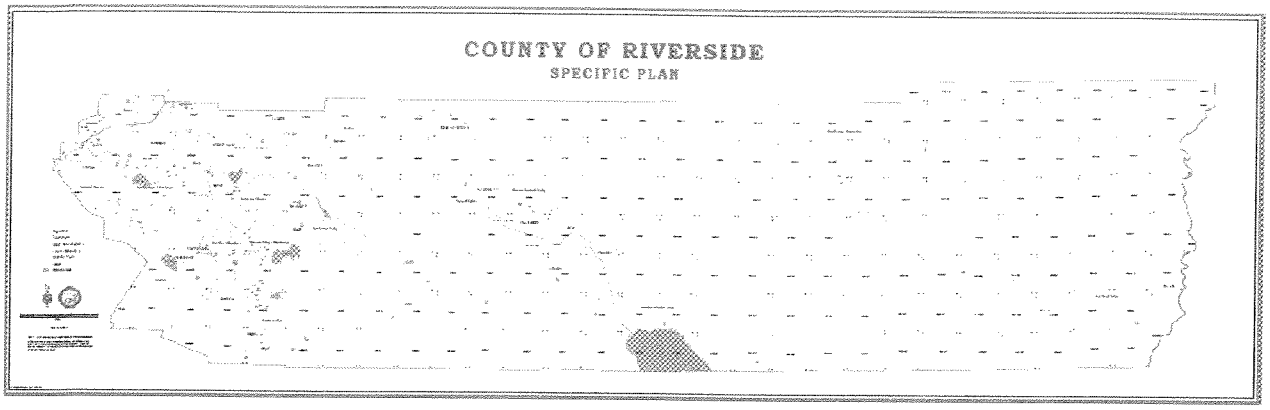

Land Use

Historically the primary land use for the region has been farming. The Coachella Valley is known for having one of the longest growing seasons in the world. Agricultural products cultivated in the Coachella Valley include fruits and vegetables. Because of the mild winter climate the Coachella Valley is in a state of transition with the demand for affordable housing and mild winters. The Coachella Valley is the annual winter destination for "snow-birds" (retired individuals who temporarily migrate to the desert to escape the harsh winters in the Midwest and Northeast.

The Central portion of Riverside County has been historically known as the "Agri-Empire" where potatoes and other vegetable crops were grown. It is also home to numerous dairy farms. The Temecula Valley has had a long tradition in citrus and avocados. However, most recently it has become known for its vineyards that produce world renowned wines.

In Western Riverside County expansive citrus groves once flourished and in 1895, due to the amazingly sweet naval orange crop, Riverside was the richest city per capita in the nation and referred to as the "Orange Empire". Almost one hundred years later only a few groves remain.

The urban/suburban interface of Western Riverside County has been transformed into a warehousing and transportation hub intersected by rail and interstate transportation corridors and linking the ports of San Diego, Long Beach and Los Angeles to heartland USA and destinations east.

Salton Sea

The Salton Sea is the largest lake in California. It is jointly contained in Riverside and Imperial Counties. The 320 square mile inland sea was formed in 1905 when an irrigation canal that brought water from the Colorado River to the valley was breached and overwhelmed by high water levels caused from heavy rains in the upper Colorado River watershed. For almost two years the entire flow of the Colorado River dumped into the "Salton Sink" filling it with water. Today's Salton Sea is slowly evaporating which is causing environmental and ecological concerns. The Salton Sea provides an

ecosystem for hundreds of species birds and other wildlife and is a crucial link to the Pacific Flyway and an integral part of the Colorado River delta.

Western Riverside County Multiple Species Habitat Conservation Plan

The Western Riverside County Multiple Species Habitat Conservation Plan (MSHCP) was adopted June 2003, and is a comprehensive multi-jurisdictional Habitat Conservation Plan (HCP) that focuses on conservation of species and their associated habitats in Western Riverside County. This plan was the first of several efforts in Southern California with the overall goal of maintaining biological and ecological diversity within a rapidly growing and urbanizing region. The MSHCP allows Riverside County and its cities to control local land use decisions and maintain a strong economic climate in the region while addressing the requirements of the state and federal endangered species acts. The HCP is one of the largest plans ever attempted in the nation and covers multiple species and habitats within a diverse landscaped that includes urban cents to undeveloped foothills and forests, all under multiple jurisdictions. It extends across many bioregion including the Santa Ana mountains, Riverside lowlands, San Jacinto foothills, San Jacinto mountains, Agua Tibia mountains, San Bernardino mountains and desert transition areas. The HCP provides for coordinated conservation areas that preserve biological diversity and maintain the regions quality of life.

The Western Riverside County MSHCP serves as a HCP pursuant to Section 10(a)(1)(b) of the federal Endangered Species Act of 1973 (FESA) and the Natural Communities Conservation Plan Act of 2001 (NCCP). The MSHCP authorizes participating jurisdictions "Take" of plant and wildlife species identified within the planning area. The United States Fish and Wildlife Service (USFWS) and the California Department of Fish and Game (CDFG) have the authority to regulate the Take of threatened, endangered, and rare species. In coordination with local land use authority these wildlife agencies review public and private development to ensure that Take is managed and coordinated in accordance with the MSHCP area.

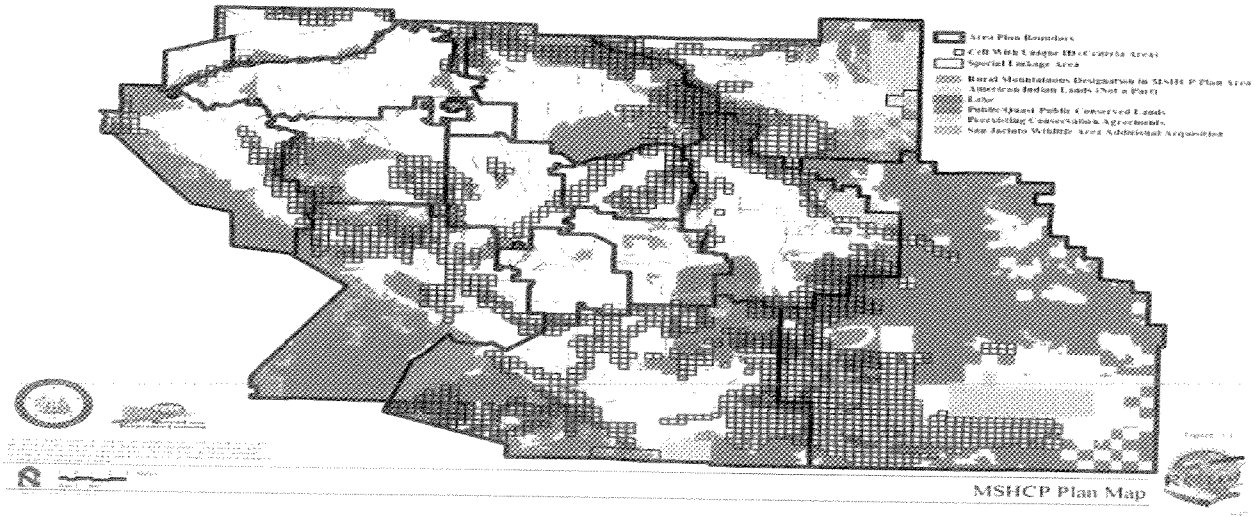

Coachella Valley Multiple Species Habitat Conservation Plan

The diverse desert landscape of the Coachella Valley provides habitat for dozens of plan and animal species, some found nowhere else in the world. Until the recent economic decline the Coachella Valley was one of the fastest growing regions in the State. The Coachella Valley Multiple Species Habitat Conservation Plan (CVMSHCP) provides a regional vision for balanced growth to meet the requirements of federal and state endangered species laws, while promoting enhanced opportunities for recreation, tourism and job growth. The CVMSHCP aims to conserve over 240,00 acres of open space and protect twenty-seven plant and animal species. The CVMSHCP not only safeguards the desert's natural heritage for future generations, it allows for timely construction of roads and other infrastructure that is vital to improving quality of life in the Coachella Valley.

The Coachella Valley Association of Governments (CVAG) serves as the lead agency for regional plan review and final consideration for new development as it relates to CVMSHCP. Participants include Riverside County, Cathedral City, Coachella, Desert Ht Springs, Indian Wells, Indio, La Quinta, Palm Desert, Palm Springs, Rancho Mirage, as well as the Coachella Valley Water District and the Imperial Irrigation District. The benefits of the CVMSHCP include:

- Preservation of Coachella Valley's native desert wildlife;
- Creates a system of open space, trails and reserves;
- Safeguards significant habitat linkages and wildlife corridors that enable animals to move safely and unobstructed from one habitat to another;
- Assures critical transportation corridors including freeways, currently planned road projects and interchanges can be constructed without delays resulting from endangered species conflicts;
- Offers certainty for new development and the business community making the Coachella Valley a more attractive place for businesses to relocate or expand;
- Ensures the continuation of the Fringe-Toed Lizard permit and provides long term conservation for this endangered species;
- Approximately 60,000 acres (twenty-five percent of the land) has already been acquired for the CVMSHCP.

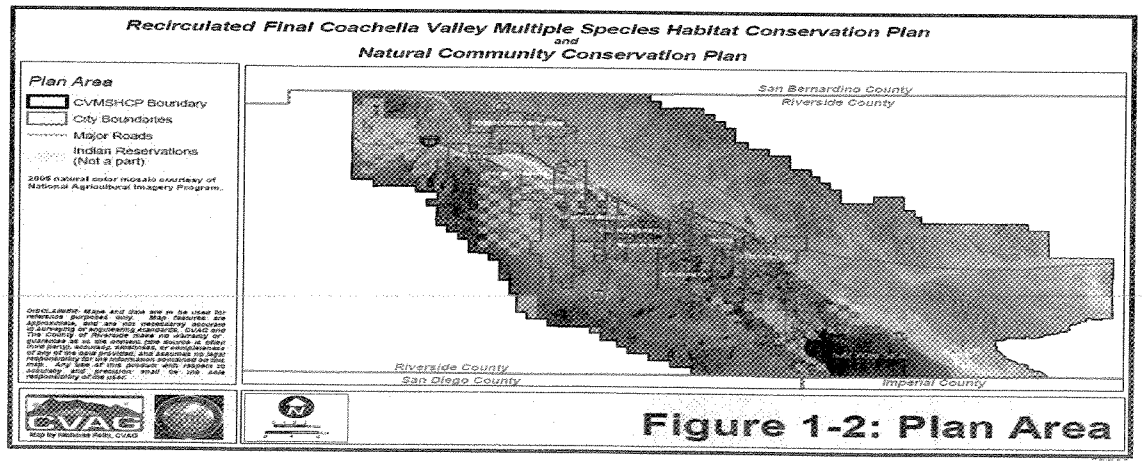

Figure 1-2: Plan Area

The combined efforts of the Western Riverside County MSHCP and the CVMSHCP will effectively preserve one third of the total land area within Riverside County which equates to 2,360 square miles of pristine meadows, forests and desert lands.

Weather, Precipitation and Drought

Riverside County continues to suffer moderate to severe drought conditions in all three watersheds. In fact those who ascribed to the global warming theory contend that the Southwestern United States is in the midst of a 10 year drought with no indication of it subsiding. The 2008-2009 storm seasons for most parts of western Riverside County was 65% of normal at 6.67 inches of rainfall. Palm Springs and the Coachella Valley experienced 97% of normal and recorded 5.07 inches of rainfall.

March-October 2008 was the driest such 8-month period on record for California and Nevada. As October came to a close, the California Department of Water Resources (www.water.ca.gov/drought) called the drought of the past two years, "the most significant water crisis in California's history." The drought was also arguably the biggest factor in the wildfires that made this year's "the worst fire season in California's history," according to Governor Schwarzenegger and CalFire. Water supply problems in the months ahead were expected. As noted by the North County Times, the amount of water being stored in California reservoirs was at its lowest point in 14 years, underscoring the severity of a worsening drought that could prompt providers to order rationing in San Diego and Riverside counties as early as January 2009. According to news reports (San Francisco Chronicle), California announced that it planned to cut water deliveries to their second-lowest level ever in 2009, raising the prospect of rationing for cities and less planting by farmers. The Department of Water Resources projected that it would deliver just 15 percent of the amount that local water agencies throughout California request every year. The reservoirs that are most crucial to the state's water delivery system were at their lowest levels since 1977, after two years of dry weather and court-ordered restrictions on water pumping out of the Sacramento-San Joaquin Delta.

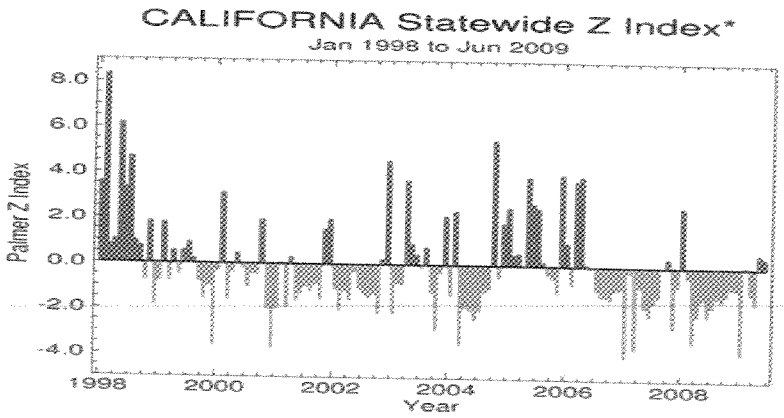

National Climatic Data Center / NESDIS / NOAA

*Palmer Z Index
Short-Term Drought

Dry Spell
Wet Spell

Economic Condition and Outlook

The economic condition and outlook for Riverside County is sobering at best. Unemployment for July 2009 is approaching 15%. Foreclosures, realignment of property taxes, non-existent new development, a faltering State budget and a sluggish economy have caused declines in all areas of local government.

ANNUAL LABOR FORCE AND EMPLOYMENT AVERAGES
County of Riverside

Civilian Year	Labor Force	Employment	Unemployment Number	Unemployment Percent
1992	576,400	507,600	68,800	11.9
1993	582,600	511,600	71,000	12.2
1994	597,400	534,000	63,400	10.6
1995	607,400	549,900	57,500	9.5
1996	614,500	563,100	51,400	8.4
1997	638,200	589,600	48,600	7.6
1998	659,900	615,900	44,000	6.7
1999	691,500	653,600	37,900	5.5
2000	680,700	644,200	36,500	5.4
2001	711,100	672,000	39,100	5.5
2002	750,400	701,800	48,600	6.5
2003	781,700	730,700	51,100	6.5
2004	820,900	771,600	49,300	6.0
2005	857,300	811,000	46,300	5.4
2006	890,100	845,300	44,800	5.0
2007	911,500	856,500	55,000	6.0
2008	918,800	839,900	79,000	8.6

2009 Monthly Labor Force and Employment Data **
County of Riverside

Month	Labor Force	Employment	Number	Percent
January	927,100	813,800	113,400	12.2
February	927,100	809,100	118,000	12.7
March	931,500	807,700	123,800	13.3
April	923,600	804,600	119,100	12.9
May	916,100	794,300	121,900	13.3
June	922,000	792,700	129,400	14.0
July*	925,400	789,100	136,400	14.7
August				
September				
October				
November				
December				

* Preliminary data
** Labor force data for all geographic areas now reflect the March 2008 benchmark and Census 2000 population controls at the state level.

Website: http://www.labormarketinfo.edd.ca.gov
Data Source: State of California Employment Development Department

The recession is over a year old and appears to have bottomed out. The Riverside County Assessor released the following table of assessed property value. The County-wide reduction is 10.5 %

RIVERSIDE COUNTY ASSESSOR
ASSESSED VALUE FOR CITIES
2009/2010

CITY	TOTAL 2009/2010 LOCAL ROLL	LESS NON-REIMBURSED EXEMPTIONS	NET TANGIBLE VALUE	LESS HOMEOWNER'S EXEMPTIONS	2009/2010 NET TAXABLE VALUE	2008/2009 NET TAXABLE VALUE	ASSESSED VALUE CHANGE	PERCENTAGE CHANGE
BANNING	1,892,855,441	29,069,121	1,863,786,320	42,552,776	1,821,233,544	2,085,234,266	(264,000,722)	-12.66%
BEAUMONT	3,032,750,635	37,704,383	2,995,046,252	37,690,561	2,957,355,691	3,433,163,322	(475,807,631)	-13.86%
BLYTHE	712,140,706	59,760,131	652,380,575	11,347,105	641,033,470	649,031,089	(7,997,619)	-1.23%
CALIMESA	626,851,566	20,851,019	606,000,547	12,414,596	593,585,951	674,799,992	(81,214,041)	-12.04%
CANYON LAKE	1,388,362,533	5,375,714	1,382,986,819	18,215,400	1,364,771,419	1,653,519,724	(288,748,305)	-17.46%
CATHEDRAL CITY	3,969,635,768	112,964,044	3,856,671,724	50,164,380	3,806,507,344	4,336,410,655	(529,903,311)	-12.22%
COACHELLA	1,812,837,329	124,593,687	1,688,243,642	19,943,566	1,668,300,076	1,969,816,859	(301,516,783)	-15.31%
CORONA	16,531,078,963	251,764,260	16,279,314,703	151,399,913	16,127,914,790	17,538,887,024	(1,410,972,234)	-8.04%
DESERT HOT SPRINGS	1,394,489,500	40,301,206	1,354,188,294	20,501,815	1,333,686,479	2,031,451,328	(697,764,849)	-34.35%
HEMET	4,663,340,424	87,827,026	4,575,513,398	86,714,458	4,488,798,940	5,387,762,136	(898,963,196)	-16.69%
INDIAN WELLS	4,928,767,802	41,681,052	4,887,086,750	10,182,200	4,876,904,550	5,056,071,924	(179,167,374)	-3.54%
INDIO	6,701,613,437	102,207,066	6,599,406,371	64,956,134	6,534,450,237	7,367,866,013	(833,415,776)	-11.31%
LA QUINTA	11,863,938,782	56,588,290	11,807,350,492	54,164,600	11,753,185,892	12,416,034,763	(662,848,871)	-5.34%
LAKE ELSINORE	4,101,193,647	40,181,207	4,061,012,440	42,153,790	4,018,858,650	4,885,098,504	(866,239,854)	-17.73%
MENIFEE	6,177,757,060	77,990,175	6,099,766,885	106,946,302	5,992,820,583	0	5,992,820,583	-
MORENO VALLEY	11,235,023,117	225,491,493	11,009,531,624	154,005,955	10,855,525,669	13,374,228,662	(2,518,702,993)	-18.83%
MURRIETA	10,112,353,803	108,567,661	10,003,786,142	117,769,454	9,886,016,688	11,689,213,209	(1,803,196,521)	-15.43%
NORCO	2,629,466,998	46,534,604	2,582,932,394	30,150,400	2,552,781,994	2,883,035,076	(330,253,082)	-11.46%
PALM DESERT	13,475,475,941	141,241,966	13,334,233,975	76,082,588	13,258,151,387	13,753,561,325	(495,409,938)	-3.60%
PALM SPRINGS	9,793,147,879	138,925,681	9,654,222,198	66,544,249	9,587,677,949	10,108,391,005	(520,713,056)	-5.15%
PERRIS	4,082,350,354	31,636,986	4,050,713,368	43,445,652	4,007,267,716	4,967,960,323	(960,692,607)	-19.34%
RANCHO MIRAGE	8,300,121,942	232,254,754	8,067,867,188	32,711,561	8,035,155,627	8,071,182,949	(36,027,322)	-0.45%
RIVERSIDE	23,942,491,969	939,822,636	23,002,669,333	266,165,526	22,736,503,807	24,598,583,377	(1,862,079,570)	-7.57%
SAN JACINTO	2,397,602,820	44,017,401	2,353,585,419	39,052,238	2,314,533,181	3,158,772,345	(844,239,164)	-26.73%
TEMECULA	12,003,546,129	112,285,694	11,891,260,435	115,782,800	11,775,477,635	13,320,998,304	(1,545,520,669)	-11.60%
WILDOMAR	2,498,809,180	60,180,421	2,438,628,759	35,529,624	2,403,099,135	0	2,403,099,135	-
CITY TOTALS	170,268,003,725	3,169,817,678	167,098,186,047	1,706,587,643	165,391,598,404	175,411,074,174	(10,019,475,770)	-5.71%

Data suggest that property tax revenue through FY 2011/2012 will not meet the current growth projections (represented by the dashed line in the graph below) used to estimate revenue as part of the county's long-range budget plan. The bold line represents a negative assessed value growth for FY2009/2010.

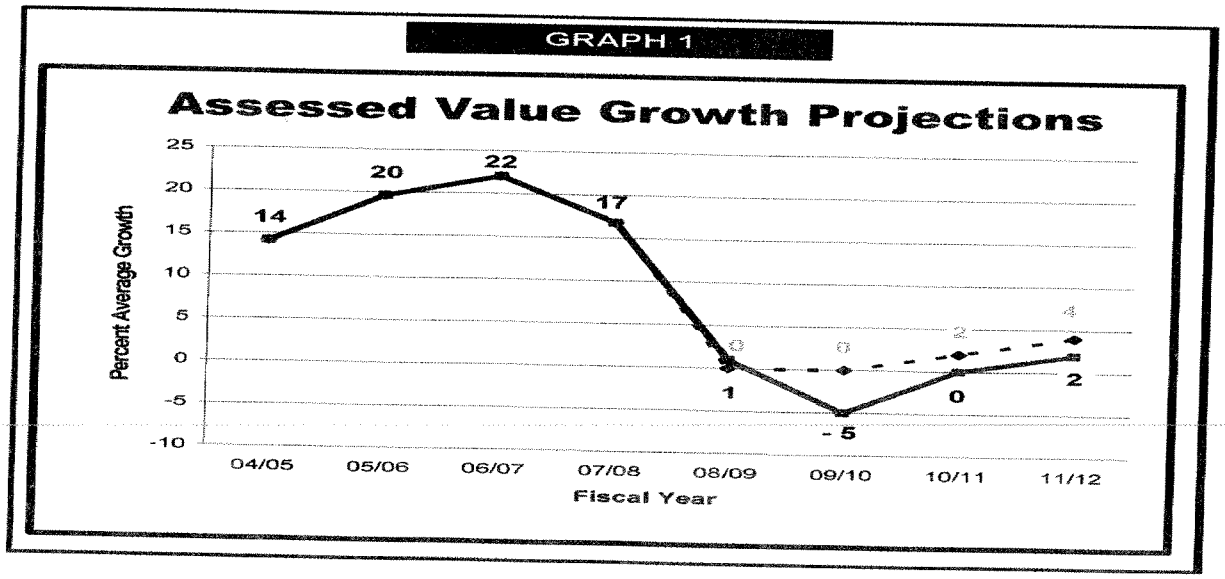

Local economist have stated that Riverside-San Bernardino region is poised to remain for the next year among the nation's weakest local economies, with unemployment soaring to as high as 16 percent and home values dipping to 65 percent below their 2006 peaks. Economists also concede that the real estate implosion in Southwest Riverside County was almost certainly a factor in the 11 percent decline in local retail sales in 2008 compared with 2007.

They predicted a recovery may begin to form in 2010. All agreed that real estate development should and probably will remain important for the region, and that its eventual recovery will probably play a role in a broader economic recovery. Ditto for the distribution and warehousing industries, which funnel imported goods from the Los Angeles, San Diego, and Long Beach port complex, the nation's largest. The downside is that wages are middling in those industries, and lower among the strip malls that dot the region, according to state figures.

Foreclosures

A report released by RealtyTrac in April of 2009 announced that the Riverside County region had the fourth highest foreclosure rate in the nation. Lenders sent default notices to 16,906 homeowners in Riverside County in the first quarter of 2009 a 12% increase from the same period in 2008. Other reports have warned that adjustable-rate loans taken out in the last three years will begin to reset next year through 2012, likely resulting in a second wave of foreclosures. As of August 2009 Riverside County has the second highest foreclosure rate in the State. Currently, 1 in 74 households in Riverside County are going into default.

Riverside County Budget Crisis for 2009-2010

Calling the budget process for 2009-2010 a challenge is an understatement. An overnight reduction of $130 million for general fund purposes (from a base of $750 million in FY 2008/2009) makes for difficult choices and requires a restructuring of government over the next several years. The State of California in an attempt to balance their own budget has taken steps to cut allocations in several program areas and raid local Prop 42 revenue. These additional losses in funds (approximately $45 million) will reduce the services that the County currently provides. Any unfunded mandates passed down to the local level will be vigorously challenged as resources are not available for frivolous program enhancements that are not proven to protect water quality or the environment.

County Governmental Structure

Board of Supervisors

The Riverside County Board of Supervisors is the governing body of the County, certain special districts, and the housing authority. The Board enacts ordinances, and resolutions, adopts the annual budget , approves contracts, appropriates funds, determines land use zoning for the unincorporated area of the county. In addition, the Board appoints certain County officers and members of various boards and

commissions. There are five supervisorial districts based upon an equal distribution of population.

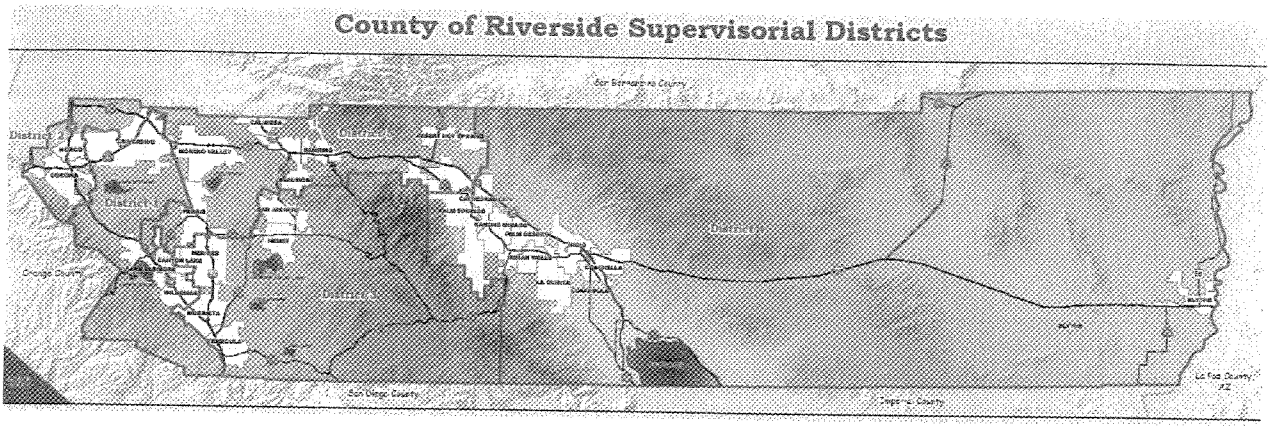

- The First District includes portions of Riverside and Lake Elsinore and the City of Wildomar;
- The Second District includes portions of Riverside, and the cities of Corona and Norco;
- The Third District includes the Cities of Canyon Lake, Hemet, Murrieta, San Jacinto, Temecula and portions of Menifee and Lake Elsinore;
- The Fourth District includes the cities Blythe, Cathedral City, Coachella, Indian Wells , Indio, La Quinta, Rancho Mirages and a portion of Palm Springs
- The Fifth District includes the cities of Banning Beaumont Calimesa, Desert Hot Springs, Moreno Valle and portions of Palm Springs and Menifee.

Executive Office

The County Executive Officer and his staff provide for management and administrative oversight for County activities including long range planning, budget, internal and inter-governmental affairs. The Executive Office coordinates all National Pollution Discharge Elimination System (NPDES) and Municipal Separate Storm Sewer System (MS4) activities with County departments to ensure consistency and regulatory compliance with all applicable laws and regulations.

Capital Improvement Projects

To ensure that all municipal construction projects have adequate funding and that all environmental requirements including CEQA, NPDES/stormwater and air quality criteria is considered the County Executive Office formed the Capital Improvement Project Oversite and Review Committee. The makeup of the committee includes representatives from the Executive Office with finance, NPDES and construction expertise, Director of Economic Development Agency and management staff, County Information Technology staff. All proposed projects must have adequate funding, be reviewed for various project requirements and approved prior to commencement of work.

Economic Development Agency

The Riverside County Economic Development Agency (EDA) includes various divisions made up of Community Development (Aviation, County Service Areas, and Housing) Economic Development and Redevelopment, Work Force Development, Life Style & Leisure (County Fair and National Date Festival) and Facilities Management including Capital Improvement Projects (CIP). The inclusion of Facilities Management Department within the Economic Development Agency was due to the fact that CIPs are managed from the conceptual idea, environmental study, project design, construction, and then maintained by Facilities Management. Economic and Redevelopment projects go through the same process as CIP. To save costs the building and construction functionality of EDA and Facilities Management was merged.

Leadership in Energy and Environmental Design (LEED™) Certification

The LEED™ "green building rating is a nationally accepted benchmark for the design, construction and operation of green buildings. LEED™ gives building owners and operators the tools they need to have and immediate and measurable impact on their buildings' performance in five key areas:

- Sustainable site development
- Water conservation
- Energy efficiency
- Materials selection, and
- Indoor air quality
-

The County of Riverside EDA is on the cutting edge as it has incorporated LEED™ criteria into CIP.

County Service Area 152 (CSA 152)

The Economic Development Agency assumed control of County Service Area's (CSAs) in July of 2002.CSAs are an alternative method of providing governmental services by the County within unincorporated areas to provide extended services such as sheriff protection, fire protection, local park maintenance services, water and sewer services, ambulance services, streetlight energy services, landscape services and street sweeping.

CSA 152 was designated as the mechanism to provide limited maintenance for MS4 and NPDES issues within the service area.

Transportation Land Management Agency

The Riverside County Transportation Land Management Agency (TLMA) is made up of the following departments: Transportation, Building & Safety, Code Enforcement, Planning, Environmental Programs, Administrative Services which includes Geographic Information System (GIS) and database management.

New Development construction has come to a complete standstill as builders and developers reacted to an unexpected severe drop-off in buying. The spiraling decline in permit activity has caused the county to take steps to reduce the number of inspectors and engineers that perform plan review and field work. This exodus of qualified staff through early retirement and layoffs has cause a loss of institutional knowledge and experience.

- ***Building and Safety Department-*** To augment the Compliance Assistance Program (CAP) program the County took steps in December of 2007 to establish a business registration and licensing ordinance. Ordinance 857, Section 13 provides for water quality inspections and enforcement of the MS4 permit requirements. Over 10,000 establishments have been registered within the unincorporated portion of the County. For those businesses that meet the criteria for a water quality inspection an additional inspection fee is charged. The CAP will continue to be utilized by the cities until such time the water quality inspections program is integrated through an MOU or each city independently establishes their own water quality inspection program. This is a revenue neutral program and the fee only and covers the cost of registration and the time required to perform the water quality inspections. Building and Safety is also responsible for inspections of new residential and commercial development for sediment and erosion control measures. Referrals are made to the Regional Board for observed non-compliance issues associated with the Statewide General Construction Permit.
- ***Code Enforcement Department-*** The Code Enforcement Department is the investigatory unit that does follow-up investigations on land use complaints. This includes illegal connections and illicit discharges (IC/ID) investigations. The Code Enforcement Department has taken a more proactive approach to community policing and outreach by implementing a community improvement planning process in the economically underserved communities throughout the County. The community improvement plan is used to address conditions that otherwise lead to blighted conditions. "The Posting" a monthly newsletter provides success stories throughout the area.
- ***Planning Department-*** The Planning Department is the entry portal for private residential and commercial development review for the unincorporated county areas. A checklist is utilized to ensure that projects conform to the MS4 permit requirements. Projects that meet specified criteria are subject to the submission of a Water Quality Management Plan (WQMP) which is synonymous with the Standard Urban Stormwater Mitigation Plan (SUSMP). The WQMP is reviewed by the Riverside County Flood Control and Water Conservation District for substantial conformity. The WQMP is required to address post construction best management practices (BMPs), long term maintenance and monitoring.
- ***Environmental Programs Department-*** The Environmental Programs Department (EPD) is responsible for overseeing program implementation of the regional habitat conservation plans including the Expedited Review Process (ERP) for the Western Riverside County MSHCP.

- ***ERP-*** Property owners who intend to construct a single family residence on an existing legal parcel will be required to go through the ERP if their property is located within a criteria cell as identified in the MSHCP. The ERP will determine the appropriate location of a building footprint and access roads. Habitat assessments for plants and /or animal species may also be required. The ERP does not prevent construction, but the result of the ERP may require that structures and access road be located on the least sensitive portion of the property.

- ***Administrative Services (GIS and data management)-*** The Administrative Services Department provides support to the other departments within the TLMA structure including GIS and data management functions.
- ***Transportation Department-*** The County Transportation Department provides design specifications, construction and monitoring and maintenance of publicly owned roads, right of way and some MS4 facilities. One of the tools utilized by the Transportation Department to ensure compliance of the MS4 facilities is through the formation of Landscape and Lighting Maintenance Districts (LLMDs). Each LLMD is responsible for ensuring that MS4 facilities and structural BMPs in their right of way are routinely cleaned and maintained. The LLMD also provides for street sweeping in some areas. Another function of the Transportation Department is the mapping of MS4 facilities that are owned and operated by the department. GIS mapping is a fluid process and continues to grow as new areas in the county are developed.

Community Health Agency

The Community Health Agency is the umbrella agency for the Department of Environmental Health. The Department of Environmental Health (DEH) provides support to the MS4 program through the CAP for those cities that do not have an industrial solid/liquid waste inspection program. A survey form is used by DEH staff to supplement the inspection efforts of businesses that handle hazardous materials, generate hazardous waste, store fuel in underground storage tanks and retail food establishments. The surveys are then provided to the cities to follow-up on any MS4 compliance issues. The DEH also responds to hazardous materials emergency spills and large sewage discharges (greater than 1000 gallons) that have the potential of entering the MS4. The DEH also performs complaint investigations for some IC/ID. The DEH also is part of the District Attorney's Environmental Crimes Task Force where some misdemeanor and felony environmental crimes investigations are handled.

DEH acts as the Local Enforcement Agency (LEA) for solid waste issues. As part of the franchise trash haulers agreement some jurisdictions in the unincorporated portions of the county require mandatory trash pickup and street sweeping.

On-Site Wastewater Disposal System (OSWDS) or septic system construction is managed through plan check activities. OSWDS moratoriums and prohibitions in coordination with the Santa Ana RWQCB have been instituted in various locations within the watershed.

Special Districts

Regional Parks and Open Space District

The Riverside County Regional Park and Open-Space District was created by the electorate in November 1990 by a 64% vote and formed on January 29, 1991. The District is an independent agency governed by the Board of Supervisors, which sits as the District Board of Directors. The Park District presently employs approximately 100 staff who bring to their jobs a high degree of dedication to the public and a wide variety of skills and abilities.

At the present time, the district manages and operates more than 44,000 acres which includes forty parks, reserves, historic or archaeological sites and ninety miles of regional trails. The staff includes professionals in the fields of accounting and finance, biology, building and grounds maintenance, carpentry and construction, ecology, as well as environmental restoration.

Additional fields include historic preservation, interpretation, landscape architecture, museum and curatorial management, park planning, personnel administration, recreation, security, trails planning and construction, weddings and special events, wildlife habitat management, and a host of other disciplines.

Waste Resources Management Department

The mission of the Riverside County Waste Management Department is to provide for the protection of the general public health and welfare by efficient management of Riverside County's solid waste system through:

- provision of facilities and programs which meet or exceed all applicable local, State, Federal and land use regulations;
- utilization of up-to-date technological improvements;
- development and maintenance of a system that is balanced economically, socially and politically; and,
- economically feasible recovery of waste materials.

The Waste Management Department currently operates 6 landfills; an additional privately owned and operated landfill is located in Western Riverside County. In addition to the landfills there are 8 privately owned and operated transfer stations.

Recycling and Specialty Programs

Household Hazardous Waste (HHW)-Residential Program

The County of Riverside established the Household Hazardous Waste Program in October 1988 with the formation of a mobile community HHW collection program. This HHW program has evolved and is comprised of a combination of three permanent HHW collection centers, two Antifreeze, Battery, Oil and Paint (latex only) ABOP collection centers and temporary collection events at 16 locations throughout the County.

Conditionally Exempt Small Quantity Generator (CESQG) -Business Program

As an enhancement to the HHW program and to encourage small businesses to properly handle their hazardous waste the County provides the CESQG program as an affordable and legal solution for the proper disposal of hazardous waste. The program is on an appointment only basis and a hazardous waste disposal contractor comes to the business to ensure proper labeling and documentation is provided.

Universal and e-Waste

Universal Wastes are hazardous wastes that are generated by several sectors of society, rather than a single industry or type of business. Universal Wastes contain harmful chemicals, which, if put in the trash may harm people or the environment. E-waste include:

- ***Common Batteries*** - AA, AAA, C & D Cell and button batteries (e.g. hearing aid and watch batteries). Automotive type batteries are not Universal Waste. When they become waste, they are regulated under a different law.
- ***Fluorescent Tubes, Bulbs and Other Mercury Containing Lamps*** - Fluorescent light tubes and bulbs, Hi Intensity discharge (HID), metal halide, sodium and neon bulbs.
- ***Electronic Devices*** - Televisions, computer monitors computers, printers, VCR's, cell phones, telephones, radios, and microwave ovens.
- ***Mercury-Containing Devices*** - Thermostats, switches, thermometers, dental amalgam, pressure and vacuum gauges, novelty items, counterweights and dampers, and medical devices known as dilators.
- ***Non-Empty Aerosol Cans that Contain Hazardous Materials***. (Labeled Toxic, Flammable, or Corrosive)

Riverside County's Backyard Composting Program:

This program has been developed to aid the residents of Riverside County in composting their organic material, so that we can all recycle more and discard less.

Composting harnesses the natural process of decomposition by turning organic matter (such as fruit and vegetable wastes, grass clippings, leaves, and some animal manure's) into a useful product for your landscape or garden. Composting can also improve hard, depleted soils, so that flowers, vegetables, and fruit trees can thrive in a nutrient-rich environment. Composting also improves the soil by boosting its fertility, its moisture-holding capabilities, and its texture.

Composted material is actually rather expensive to buy. But anyone with a little extra room in a garden, a little extra time, and a good source of compostable materials can produce good, high quality compost in as little as 4 weeks - absolutely free! By composting, you return the earth's nutrients back to the soil, where your plants absorb them, thereby becoming healthier. Healthy plants are far more resistant to diseases and pests. Instead of throwing away your organic waste, compost them! You will cut down your trash collection service, and you will be prolonging the life of Riverside County's rapidly depleting landfill space!

Sharps

Hypodermic needles, lances, and other sharp material associated with medical treatment can be collected in sharps containers and brought to the HHW collection centers for proper disposal. Sharps containers can be obtained from your HHW collection center or local pharmacy.

Construction Activities

The Waste Management Department's construction and industrial activities include maintenance of county operated landfills and stabilization of closed landfills. This includes the requirement to prevent and mitigate stormwater or other discharges including sediment, solid waste and liquids from entering an MS4 system.

Flood Control and Water Conservation District (District)

The Control and Water Conservation District (District) operates and maintains major flood control facilities such as dams, flood basins, levees, open channels and major underground storm drains. In most cases, the District does not maintain storm drain inlets or pipes less than 36 inches in diameter. These smaller facilities are typically maintained by City or County Transportation Department crews. The engineering design of all projects constructed by the District is performed under the direct supervision of, one of the District's two design teams. They are responsible for coordinating all activities involved in moving projects forward from the conceptual planning phase to the actual start of construction

The construction section administers all District construction contracts and inspects the construction of all flood control projects to be accepted for operation and maintenance by the District.

In addition, as part of the plan review process for private development and CIPs within the county, the District's planning section review and make recommendations on WQMP submittals.

Local Ordinances

The County of Riverside has enacted the following ordinances to address stormwater issues and related activities. The text for each of the ordinances can be found at http://www.clerkoftheboard.co.riverside.ca.us/ords.htm

ORDINANCE 348
Land Use Ordinance of Riverside County
Amended through Ordinance No. 348.4574

ORDINANCE 427
Regulating Land Application of Manure
Amended through Ordinance No. 427.3

ORDINANCE 492
Regulating Food Establishments and Food Facilities
Amended through 492.9 and Incorporating by Reference Ordinance 725

ORDINANCE 541
Related to the Removal of Rubbish
Amended through Ordinance 541.5

ORDINANCE 615
Relating to Establishments where Hazardous Waste is Generated, Stored, Handled, Disposed, Treated or Recycled
Amended through Ordinance 615.3

ORDINANCE 617
Regulating Underground Storage Tank Systems containing Hazardous Substances
Amended through Ordinance 617.4

ORDINANCE 650
Regulating the Discharge of Sewage in the Unincorporated Areas of Riverside County
Amended through Ordinance 650.5 and Incorporating Ordinance No. 725

ORDINANCE 657
Regulating the Collection, Transfer, and Removal of Solid Waste
Amended through 657.6

ORDINANCE 689
Prohibiting the Unlawful Dumping of Trash
Amended through 689.1

ORDINANCE 725
Establishing Procedures and Penalties for Violations of Riverside County Ordinances and Providing for Reasonable Costs Related to Enforcement
Amended through 725.12 and Incorporating by Reference Ordinance 640.

ORDINANCE 745
Providing for the Comprehensive Collection and Disposal of Solid Waste in Specified Unincorporated Areas of Riverside County
Amended through Ordinance 745.2

ORDINANCE 754
Establishing Stormwater/Urban Runoff Management and Controls
Amended through Ordinance 754.2

ORDINANCE 772
Declaring as a Fire Hazard Abandoned or Neglected Orchards, Groves or Vineyards, and Ancillary weeds and Debris and Providing for their Abatement

ORDINANCE 812
Prohibiting the Land Application of Class B Sewage and Sludge
Amended through Ordinance 812.1 and Incorporating by Reference Ordinance 725

ORDINANCE 830
Regulating the Land Application of Class A Sewage Sludge For Agricultural Activities
Amended through Ordinance 830.1 and Incorporating by Reference Ordinance 725.

ORDINANCE 843
Regulating the Discharge of Waste into the Public Sewer System for the Highgrove Community

ORDINANCE 856
Establishing a Septic Tank Prohibition for Specified Areas of Quail Valley
Requiring the Connection of Existing Septic systems to Sewer

ORDINANCE 857
Regarding the Establishment of a Business Registration and Licensing Program

ORDINANCE 859
Establishing Water-efficient Landscape Requirements
Amended through Ordinance 859.1

ORDINANCE 871
Prohibiting the Installation of Specified Septic Systems in Cherry Valley

ORGANIZATIONAL CHART

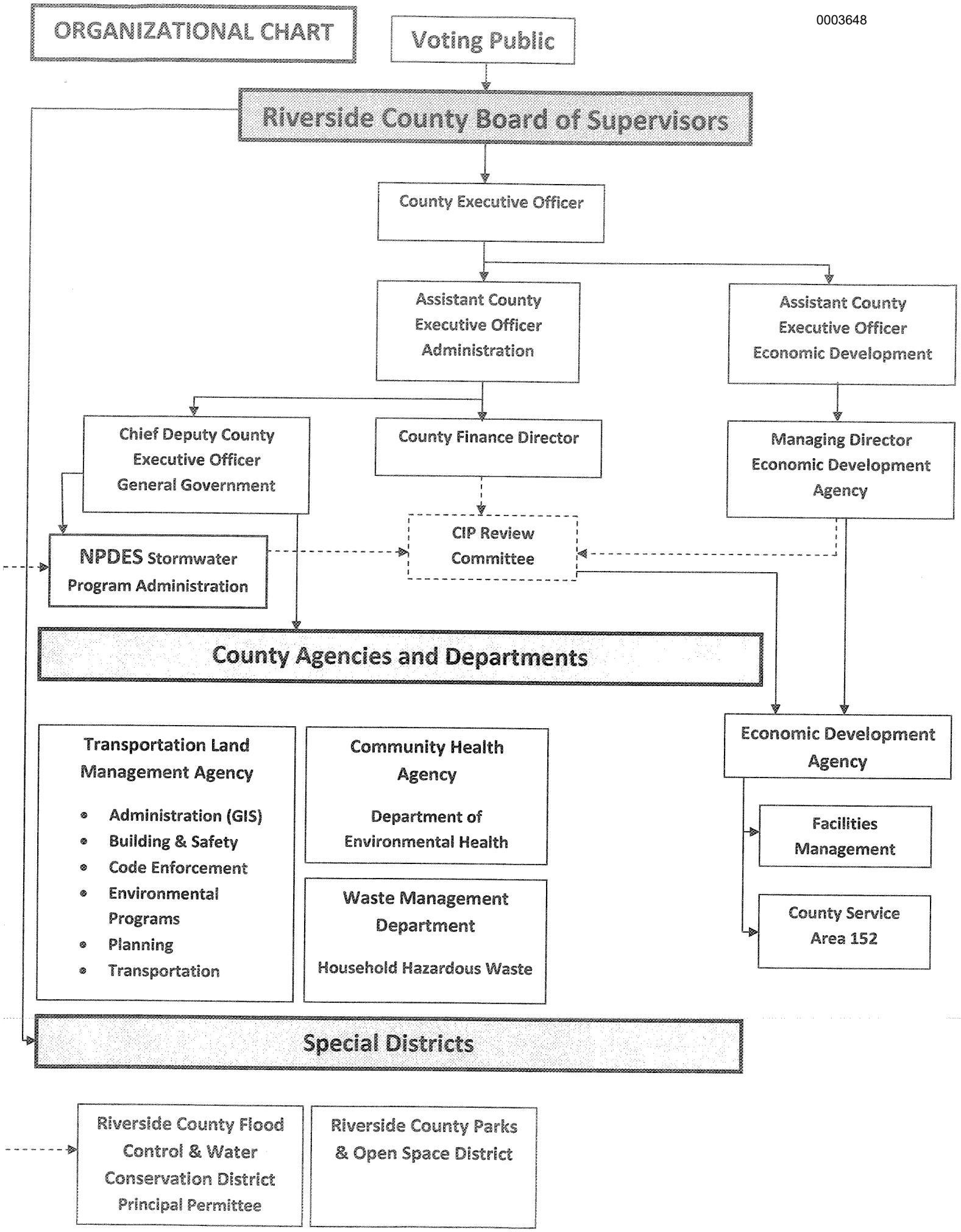

1. DEVELOPMENT PLANNING
(SECTION F of ORDER NO. R9-2004-001)

1) **Description of any amendments to the General Plan or the development project approval process:** None

1) **Number of grading permits issued:** 388 within the Santa Margarita Watershed

2) **Number of developments conditioned to meet SUSMP(WQMP) requirements:** See Flood Control Report for projects conditioned and reviewed for SUSMP (WQMP) by the District. Three municipal CIPs were conditions with SUSUMP/WQMP requirements

3) **Attach one example of a development project that was conditioned to meet SUSMP (WQMP) requirements and a description of the required BMPs:** See Flood Control District Report

4) **Description of any updates to the environmental review process:** None, the 2003 General Plan is still in effect.

5) **Description and number of training efforts conducted during the reporting period (for staff, developers, contractors, etc.), including the number of staff trained.**

a) **Training:**

Training	Training Description	Training Dates	Number of Attendees
WQMP	WQMP Training	11/3/08	19
	WQMP Training	5/4/09	11
	WQMP Training	6/8/09	2
		Total	**0**

b) **Summarize the educational and outreach activities the Development Planning Component has conducted over the past year:** [i.e., focused brochures, posters - see Education form (Section I)] Educational Outreach is provided through Riverside County FC&WCD. Kiosks are setup at all TLMA in-take counters where NPDES stormwater information is available. Each Development Project conditioned for approval is required to obtain copies of public education materials, sign an affidavit stating that they will provide stormwater related materials to all property owners. In addition the County and RCFC&WCD keep the general public and the development community informed of all training and educational opportunities through the District website and informational bulletins.

1. DEVELOPMENT PLANNING
(SECTION F of ORDER NO. R9-2004-001)

6) **An assessment of program effectiveness based on the measurable goals established in the Permittee's Individual SWMP:**

   a. Training continues to be a priority with changing technology and increased emphasis on hydromodification and low impact development (LID) as they relate to SUSMP (WQMP) requirements.

   b. Projects that meet the regulatory threshold are conditioned for SUSMP/WQMP

7) **Additional Comments/Information:**

Describe the major accomplishments of the Development Planning Component over the past year. (General Plan or ordinance revisions, procedure/approval process changes, SUSMP guidance material): The Economy has continued to stall, which has effectively curtailed most development over the last 18 months as can be seen by the significant drop off in the number of grading permits issued. Availability of diminishing water resources caused by drought conditions will continue to have an impact on future development for the region. For those projects that have moved through the development process and into the construction phase, emphasis has been on incorporated drought tolerant landscape and water efficient micro-irrigation techniques including the use of smart irrigation controllers. Where recycled water is available infrastructure is being added to accommodate common area landscape.

Summarize new activities or improvements to be implemented next year as a result of your self assessment of the Development Planning Component:

Post construction BMPs installed by developer continue to be inspected by Building and Safety –Environmental Compliance Inspection staff to ensure that they are working as designed and are providing adequate protection of the MS4.

Planned Projects for FY 2009/2010

Facilities Management

1. Southwest Law and Justice Center (Parking Lot Expansion)

WDID #: 9-33C352808

Processing Date: 7/31/2008

WQMP completed: Yes

Project Manager: Nahid Selbe

Comments: Project funded, design phase completed and moving forward to bid award.

Date Project Completed: unknown, to be determined

1. DEVELOPMENT PLANNING
(SECTION F of ORDER NO. R9-2004-001)

2. Glen Oaks Fire Station (On Hold) (Facilities Management)

WDID #:

Processing Date:

WQMP completed: Yes

Project Manager: Dane Winkelman

Comments: Land acquisition completed-, project put on hold pending funding

Date Project Completed: unknown, funding not obtained

3. Lake Riverside Fire Station (On Hold)

WDID #: Pending

Processing Date: Pending

WQMP Completed: No

Project Manager: Real Estate – Burt Presnell

Comments: Land acquisition not yet completed. Further geotechnical study underway.

Date Project Completed: unknown, pending further study

2. CONSTRUCTION
(SECTION G of ORDER NO. R9-2004-001)

1) **Number of inspections conducted:** 508

2) **Number and type of enforcement actions related to construction sites:**

Enforcement and Compliance Responses	Private Projects	Public Projects
Non-monetary Penalties	0	0
Stop Work Authority	28	0
Fines	0	0
Financial Security	0	0
Permit/Certificate of Occupancy Denial	0	0
Referral to SDRWQCB	49	0
Total	**77**	**0**

3) **Description of modifications made to the construction and grading approval process:** The Building and Safety Department construction and grading approval process has not been significantly modified since our last annual report was filed. Standard NPDES Construction Notes are still required to be included on the County approved grading plans for projects with more than one acre of disturbance. Projects with less than one acre of disturbance are still required to install erosion and sediment controls, but not to the same extent as those projects involving more than one acre. The Department still ensures that proof of the filing of a NOI is provided when necessary and that the site WDID is noted.

4) **Description and number of training efforts conducted during the reporting.**

a) **Training:**

Training	Training Description	Training Dates	Number of Attendees
Grading 101 and BMPS	Grading- BMP- 101 class	3/18/09	10
Construction NPDES	Classroom Training	9/4/08	8
Construction NPDES	Classroom Training	10/9/08	8
In Field NPDES training	(one on one) NPDES Field training	10/9/08	8
BIA Construction NPDES	Board Chambers Class Training	1/15/09	30
Flood Control Provided Construction Training	Classroom Training	9/29/08 9/30/08 5/27/09	33 59 24
		Total	**180**

2. CONSTRUCTION
(SECTION G of ORDER NO. R9-2004-001)

b) **Summarize any additional education and outreach activities conducted for project applicants, contractors, developers, property owners, and/or responsible parties in support of the Construction Component:**

Building and Safety: During NPDES construction inspections, staff spent a substantial amount of time meeting with developers, owners. Etc., discussing the educational material that is available for the development of the site specific SWPPPs ad the installation and continued maintenance of site erosion and sediment control measures. In addition our inspection staff spent and additional six, nine hour days training one on one on construction aspects and NPDES related materials with our consultant. Educational materials such as brochures and posters are freely distributed for use and reference by to interested parties to assist with compliance of NPDES rules and regulations. Pre-storm season site inspections are conducted on all single family residential, commercial and tract construction sites in September of each year. In addition the Building and Safety Department spends time with small builders and owner-builders to insure that they understand what BMPs are and give them ample opportunity to meet compliance requirements. This storm season was third year in a row where pre-season storm inspections were conducted. 1176 conducted in 2008. In August 2008 County staff assisted in leading over 200 developers in the area with NPDES training at the Pechanga Indian Resort.

Transportation: The Transportation Department encourages and supports all appropriate staff to attend NPDES Training. In addition to NPDES Construction training, five (5) employees attended training in NPDES Municipal, NPDES Water Quality Management Plan and NPDES Vegetation Management.

EDA/Facilities Management: All construction management staff has received NPDES training in construction management to ensure that municipal construction projects are in compliance with NPDES rules and regulations.

Regional Parks and Open Space District: Planning staff responsible for oversight of municipal construction activities have received the required NPDES training.

5) **An assessment of program effectiveness based on the measurable goals established in the Permittee's Individual SWMP:**

Building and Safety Department: 508construction related NPDES inspections were completed on 157 project sites within the upper portion of the Santa Margarita Watershed. The table below provides the distribution of sites greater than 1 acre that were inspected during the 2008-2009 Storm Season.

Project Type	# of Projects
Single Family Residential > 1 acre	123
Commercial	8
Tracts	27

2. CONSTRUCTION
(SECTION G of ORDER NO. R9-2004-001)

Transportation Department: two (2) construction projects were completed in the Santa Margarita region.

Project Description	Status	Priority	# of Inspections	NOI Submitted	NOT Submitted
Scott Rd Widening	Completed	Medium	11	Oct 2008	Sep 2009
*Winchester Rd (SR79-Thompson Rd to Whisper Rd)	Completed	Low	2	Feb 2008	Aug 2008

* Note: The Winchester Road Project (State Route 79) was under the jurisdiction of the Caltrans NPDES Permit.

The NPDES Construction Inspection Program requires that High priority projects be inspected once every two weeks. Medium priority projects are required to be inspected once each month, and Low priority projects are required to be inspected once during the wet season (October 1st thought May 31st).

6) **Additional Comments/Information:**

- A Decision was made by the Building and Safety Department to utilize County staff to conduct NPDES construction inspection instead of consultant services. Currently there are four fulltime Environmental Compliance Inspectors, two Senior Environmental Compliance Inspectors and one Principle Environmental Compliance Inspector.
- For the 2009-2010 storm season all construction sites will be required to have a storm season meeting prior to grading activities commencing.
- The Transportation Department utilized consultant services, URS Corporation, to conduct NPDES Construction and Municipal Inspections for FY 08/09.

Other Comments

For FY 09/10, URS will continue to assist the Transportation Department with Construction and Municipal Inspections for public road construction activities.

3. MUNICIPAL
(SECTION H.1 of ORDER NO. R9-2004-001)

1) **Number of inspections conducted at existing municipal facilities:** There are currently no EDA-Facilities Management /county owned facilities within the Santa Margarita Watershed that have post construction BMPs as required by a WQMP. Current county owned municipal construction was completed prior to the WQMP requirement. Future projects will require WQMPs and inspection schedules for post construction BMPs. The Department of Environmental Health conducted CAP hazardous materials and UST inspections of county facilities including fleet services and transportation maintenance countywide. Also, Transportation conducts facility inspection though a consultant at all road maintenance yards throughout the County.

2) **Number and type of enforcement actions related to municipal sites:**

Enforcement and Compliance Responses	Number
Education and Information	
Verbal warning	
Written warning	
Other:	
Total	**0**

3) **Number of catch basins and inlets that were inspected and the number that were cleaned:**

Transportation Department	Number Inspected	Number Cleaned
Catch Basins and Inlets	149	149

3. MUNICIPAL
(SECTION H.1 of ORDER NO. R9-2004-001), CONT.

4) **Assessment of the amount and type of debris removed from catch basins, streets, and open channels, including an identification of problem areas that generate the most pollutants:**

Facility	Type of Debris	Amount (tons)	Problem Areas that Generate Most Pollutants
Catch Basin Cleaning Program	Vegetative Litter	5.42	
	Anthropogenic Litter	7.95	
	Sediment	10.62	
	Other man-made debris		
Total		**23.99**	**tons (wet weight)**
Street Sweeping Program	Vegetative Litter	179.02	
	Anthropogenic Litter	59.67	
	Sediment	954.82	
	Other man-made debris		
Total		**1,193.51**	**tons (wet weight)**
Roadside Litter Removal Program	Vegetative Litter		
	Anthropogenic Litter	11.15	
	Sediment		
	Other man-made debris		
Total		**11.15**	**tons (wet weight)**
Code Enforcement Clean Up Program	Vegetative Litter	469.19	
Total		**469.19**	**tons (wet weight)**
	TOTAL	**1696.84**	**tons (wet weight)**

00003656

3. MUNICIPAL
(SECTION H.1 of ORDER NO. R9-2004-001), CONT.

5) **Assessment of effectiveness of BMPs that have been implemented for municipal facilities and activities:**

BMP Code	Description	Used	Notes
SC-10	Non-Stormwater Discharges	☐ Yes ☐ No	N/A
SC-11	Spill Prevention, Control and Clean-up	☒ Yes ☐ No	Transportation, Fleet Services, Waste Mgmt
SC-20	Vehicle and Equipment Fueling	☒ Yes ☐ No	Transportation, Fleet Services, Waste Mgmt
SC-21	Vehicle and Equipment Cleaning	☒ Yes ☐ No	Transportation, Fleet Services, Waste Mgmt
SC-22	Vehicle and Equipment Repair	☒ Yes ☐ No	Transportation, Fleet Services, Waste Mgmt
SC-30	Outdoor Loading/Unloading of Materials	☒ Yes ☐ No	Purchasing
SC-31	Outdoor Liquid Container Storage	☒ Yes ☐ No	Transportation, Fleet Services, Waste Mgmt
SC-32	Outdoor Equipment Maintenance	☒ Yes ☐ No	Transportation, Fleet Services, Waste Mgmt
SC-33	Outdoor Storage of Raw Materials	☒ Yes ☐ No	Transportation
SC-34	Waste Handling and Disposal	☒ Yes ☐ No	Transportation, Fleet Services, Waste Mgmt
SC-35	Safe Alternative Products	☒ Yes ☐ No	Purchasing
SC-40	Contaminated or Erodible Areas	☐ Yes ☐ No	N/A
SC-41	Building and Grounds Maintenance	☒ Yes ☐ No	EDA-Facilities
SC-42	Building Repair and Construction	☒ Yes ☐ No	EDA-Facilities
SC-43	Parking/Storage Area Maintenance	☒ Yes ☐ No	EDA-Facilities
SC-44	Drainage System Maintenance	☒ Yes ☐ No	EDA-Facilities
SC-60	Housekeeping Practices	☒ Yes ☐ No	EDA-Facilities
SC-61	Safe Alternative Products	☒ Yes ☐ No	EDA-Facilities
SC-70	Road and Street Maintenance	☒ Yes ☐ No	Transportation
SC-71	Plaza and Sidewalk Cleaning	☒ Yes ☐ No	EDA-Facilities
SC-72	Fountain and Pool Maintenance	☐ Yes ☐ No	N/A
SC-73	Landscape Maintenance	☒ Yes ☐ No	County Policy H28
SC-74	Drainage System Maintenance	☒ Yes ☐ No	EDA-Facilities
SC-75	Waste Handling and Disposal	☒ Yes ☐ No	Transportation, Fleet Services, Waste Mgmt
SC-76	Water and Sewer Utility Maintenance	☐ Yes ☐ No	N/A

Assessment of the effectiveness of BMPs that have been implemented for municipal facilities and activities.

Applicable departments have facility pollution prevention plans that include BMPs that are managed by each site.

00003657

3. MUNICIPAL
(SECTION H.1 of ORDER NO. R9-2004-001), CONT.

6) **Description and number of training efforts conducted over the last year (for municipal facility operators and/or inspectors).**

a) **Training:**

Training	Training Description	Training Dates	Number of Attendees
Municipal	Municipal Training	11/6/08	10
	Municipal Training	11/18/08	4
	Municipal Training	5/5/09	9
	Municipal Training	5/26/09	14
		Total	**37**

b) **Summarize the internal and external education and outreach activities the Municipal Component has conducted over the past year:** Staff attended the municipal training provided by Flood Control.

7) **An assessment of program effectiveness based on the measurable goals established in the Permittee's Individual SWMP:**

Storm drain inspections and cleaning were conducted during the dry season for FY 08/09 in Santa Margarita Region as required by the MS4 Permit.

The Catch Basin Cleaning & Inspection Crew documented all inspections and cleanings. The Catch Basin Cleaning & Inspection Crew removed approximately 23.99 tons of litter of which 7.95 tons were anthropogenic littler, 5.42 tons were vegetative litter and 10.62 were sediment littler. Dump tickets were collected to verify projected weight of debris removed from storm drains.

In addition, each district Road Maintenance Supervisor and Assistant Supervisor visually inspects pipes and various storm drains such as catch basins, inlets, outlets, culverts, swales and channels frequently. Special attention is paid to the storm drains located within traditional or known problem areas.

8) **Additional Comments/Information:**

Describe the major accomplishments of the Municipal Component over the past year:
The Transportation Department hired a consultant to update the Stormwater Prevention Pollution Plans for all municipal facilities in the Department. Best Management Practices (BMPs) were implemented.

3. MUNICIPAL
(SECTION H.1 of ORDER NO. R9-2004-001), CONT.

Summarize new activities or improvements to be implemented next year as a result of your self assessment of the Municipal Component:

Yearly assessments will continue to be conducted by the Transportation staff and the consultant (URS) for our Municipal Sites. Additionally, staff will continue to update the database that was developed to capture data for catch basin inspections and cleaning.

Transportation Department: Continue education and training for all appropriate staff to insure that appropriate BMPs are used at all municipal facilities.

EDA/Facilities: Continue education and training for all appropriate staff to insure that appropriate BMPs are used at all municipal facilities.

Parks and Open Space District: Continue education and training for all appropriate staff to insure that appropriate BMPs are used at all municipal facilities.

Other comments

4. INDUSTRIAL/COMMERCIAL
(SECTION H.2 of ORDER NO. R9-2004-001), CONT.

1) **Number of inspections conducted:**

Category	Number of Inspections By Building & Safety	Number of CAP Inspections By Environmental Health*
Industrial Facilities	**28**	**77**
High Priority Facilities	14	18
Medium Priority Facilities	9	55
Low Priority Facilities	5	4
Commercial Facilities	**577**	**328**
High Priority Facilities	91	55
Medium Priority Facilities	181	58
Low Priority Facilities	305	216
Total	**605**	**406**

*This is a transition year. In future years CAP inspections by Environmental Health will only be done in the cities that lack an inspection programs.

2) **Number and type of enforcement actions taken:**

Enforcement and Compliance Responses	Industrial	Commercial
Non-Monetary Penalties	8	11
Fines		
Bonding Requirements		
Permit Denial		
Referral to SDRWQCB	0	3
Total	**0**	**3**

4. INDUSTRIAL/COMMERCIAL
(SECTION H.2 of ORDER NO. R9-2004-001), CONT.

3) **Description and number of training efforts conducted over the last year (for industrial/commercial facility operators and/or inspectors).**

a. **Training:**

Training	Training Description	Training Dates	Number of Attendees
Special/Detailed Training-Building + Safety Staff	Inspection training specifically for Industrial/ Commercial NPDES Inspections	8/7/08	8
Special/Detailed Training-Building + Safety Staff	Inspection training specifically for Industrial/ Commercial NPDES Inspections	8/13/08	8
Special/Detailed Training-Building + Safety Staff	Inspection training specifically for Industrial/ Commercial NPDES Inspections	8/20/09	8
EPA Teleconference	NPDES Industrial Permit	11/5/09	2
CASQA Conference	Stormwater Related Issues Presnetation on Commercial NPDES Inspections	9/22/09	1
Environmental Health CAP Training (DES & HAZMAT)	Annual Refresher Training	6/2/09	72
		Total	**97**

4) **An assessment of program effectiveness based on the measurable goals established in the Permittee's Individual SWMP:** The County of Riverside Industrial/Commercial NPDES Inspection Program is approximately one year old. We have completed 605 NPDES Industrial and Commercial inspections.. At every inspection education and outreach is performed with educational information left for businesses. The CAP program is in transition, the county area is inspected by Building and & Safety Environmental Compliance Inspectors. The cities still rely on the CAP program provided by Environmental Health to meet their compliance inspection requirement if they don't already have a stand-alone program in place.

5) **Additional Comments/Information:**

Describe the major accomplishments of the Industrial Component over the past year: The major accomplishment for the combined Industrial/Commercial Component this past year

4. INDUSTRIAL/COMMERCIAL
(SECTION H.2 of ORDER NO. R9-2004-001), CONT.

was the continued registration of approximately 12,000 businesses located in the unincorporated area of Riverside County. Environmental Health Department conducted Industrial/Commercial NPDES inspections in incorporated areas, and Building and Safety conducted 605 inspections in un-incorporated areas.

Summarize the internal and external education and outreach activities the Industrial Component has conducted over the past year: The combined Industrial/Commercial internal, external educational and outreach activities centered around the training and readying of Environmental Compliance staff for beginning the Industrial/Commercial NPDES Inspections. Environmental Complianc inspectors have undergone over 40 hours of hands on and in class room training on NPDES Industrial and Commercial requirments, and how to's for performing these inspections.

Summarize the internal and external education and outreach activities the Commercial Component has conducted over the past year: We plan on continuing with initial site inspections until all businesses have been evaluated.

Summarize new activities or improvements to be implemented next year as a result of your self assessment of the Industrial Component: Due to the fiscal crisis and reduction in workforce it will be a struggle to maintain the level of service provided in the previous years.

Summarize new activities or improvements to be implemented next year as a result of your self assessment of the Commerical Component: The transition from a survey program that was based upon the Department of Environmental Health inspection to a more comprehensive and focused NPDES/stormwater specific inspection program by the Department of Building and Safety should increase awareness of the program to the regulated businesses throughout the unincorporated portions of the county.

Other comments

5. RESIDENTIAL
(SECTION H.3 of ORDER NO. R9-2004-001)

1) **A description of residential areas that were focused on during the past year:**

Flood Control District: The flood Control District provides various opportunities for public education throughout the year as well as follow-ups on complaints that are located within their right of way. See Flood Control and Water Conservation District Report

Code Enforcement: Community Improvement Programs, Community Cleanup activities, Code complaint investigations and enforcement actions,

Waste Management Department: Household hazardous waste community collection program for disposal of household generated hazardous waste such as paint, pesticides, batteries, solvents, universal waste, used oil, coolant, and other hazardous materials.

2) **Number and type of enforcement actions taken:**

Enforcement and Compliance Responses	Public Projects
Education and information	See Flood Control Report
Verbal Warning	
Written Warning	
Notice of Non-Compliance (illegal grading activities)	327
Administrative Compliance Order	
Misdemeanor	
Infraction	
Citation	
Referral to SDRWQCB	
Total	**0**

3) **An assessment of program effectiveness based on the measurable goals established in the Permittee's Individual SWMP:** The Countywide Household Hazardous Waste Collection Program has achieve significant success in diverting hazardous materials from being illegally dumped and ending up in the local landfills and providing easy access to the public with three regional HHW collection centers and opportunities at selected locations for mobile collection events in rural communities. This program has significantly reduced the amount of illegal dumping of household hazardous waste.

RESIDENTIAL
(SECTION H.3), CONT.

The Code Enforcement Department continues to be successful with their community policing program and use of the community improvement planning efforts. These programs help reduce illegal disposal and blight, and provide the public a sense of community and an opportunity to get involved. Significant volumes of trash and debris have been collected through the efforts of community cleanup days. See totals in Section 3.

4) **Additional Comments/Information:**

Describe the major accomplishments of the Residential Component over the past year:
Although outside of the Santa Margarita Watershed, a new full service HHW facility was constructed in the City of Palm Springs. Residents from throughout the county have access to all County Waste Management HHW sites.

Summarize the internal and external education and outreach activities the Residential Component has conducted over the past year: See Flood Control District Report for community educational activities.

Summarize new activities or improvements to be implemented next year as a result of your self assessment of the Residential Component: Continue community oriented code enforcement activities that focus on reducing blight and illegal dumping on vacant land. See newsletter in attachments section

Educational information and written notice of violation and other enforcement tools will be utilized to insure residents are in compliance with stormwater and landscape ordinances.

Other comments None.

6. EDUCATION
(SECTION I of ORDER NO. R9-2004-001)

1) **Description of education efforts conducted by the Permittee (not collectively with other Permittees) during the previous year:**

Audience	Measures
Permittee Departments and Personnel	Number of Permittee employees trained for: ***See Flood Control Report for additional detail.*** • Construction Inspection: 64 • Industrial/Commercial Inspection: 605 • Municipal Facilities and Activities: 0 • Development Planning: 0
Construction Site Owners and Developers	Outreach events conducted: ***See Flood Control Report***
Industrial/Commercial Owners and Operators	Industrial/Commercial outreach events conducted: ***See Flood Control Report***
Residential Community, General Public, Other Public Agencies and Students	Number of Media Impressions in: ***See Flood Control Report*** • Newspaper: • Mailings: • Radio/TV: • Billboards: • Other: • Materials: Number of classroom presentations: Public Education events conducted:

2) **Assessment of overall program effectiveness based on the measurable goals established in the Permittee's Individual SWMP:** ***See Flood Control Report for details***

3) **Additional Comments/Information:**

Describe the major accomplishments of the Education Component over the past year:
See Flood Control Report

6. EDUCATION
(SECTION I of ORDER NO. R9-2004-001)

Summarize new activities or improvements to be implemented next year as a result of your self assessment of the Education Component: County departments' partner with the Riverside County Flood Control and Water Conservation District on all educational opportunities and share cost and time at community events with their "Only Rain in the Drain" campaign.

Other comments

7. ILLICIT DISCHARGE DETECTION AND ELIMINATION
(SECTION J of ORDER NO. R9-2004-001)

1) **Number of illicit discharges, connections and spills reported and/or identified during the reporting period:**

   a) **Illicit Discharges (ID):** 33 illegal dumping which involved hazardous materials, tires, green waste, construction debris and household waste.
   b) **Illicit Connections (IC):** 18 pool discharges and filter cleaning directed toward storm drain.
   c) **Spills (S):**

As IC\IDs are identified follow-up investigations are initiated and as appropriate progressive enforcement action is taken to ensure abatement of conditions. In difficult cases and need for additional regulatory authority RWQCB staff and other regulatory agencies are notified for assistance.

2) **Number of illicit discharges or connections investigated during the reporting period and the outcome of the investigations:** See 1above .

Type	Category	Substance	Outcome of Investigation
ID	Residential	Oil/Grease	
ID	Residential	Oil/Grease	
ID	Residential	Oil/Grease	
ID	Residential	Oil/Grease	
ID	Residential	Oil/Grease	
ID	Residential	Oil/Grease	

3) **Number and types of enforcement actions taken for illicit discharges or connections during the reporting period:**

Enforcement and Compliance Responses	Private Facilities	Public Facilities
Non-monetary penalties (cleanup and abatement)	51	
Stop work authority (illegal grading)	327	
Fines		
Financial Security		
Permit/Business License Denial		
Total	**378**	**0**

7. ILLICIT DISCHARGE DETECTION AND ELIMINATION
(SECTION J of ORDER NO. R9-2004-001), CONT.

4) **Number of times your agency's hotline was called during the reporting period, as compared to previous reporting periods.**

	Number of Calls	
	2007-08	**2008-09**
Water Pollution Hotline	See Flood Control Report	See Flood Control Report

5) **Number and location of dry weather monitoring sites that were monitored during the reporting period:**

Number of Site(s): See Flood Control Report

Location(s): See Flood Control Report

7. ILLICIT DISCHARGE DETECTION AND ELIMINATION
(SECTION J of ORDER NO. R9-2004-001), CONT.

6) **Summary of Illicit Discharge Monitoring Program results, including: 1) All inspection, field screening, and analytical monitoring results; 2) All follow-up and elimination activities; and 3) Any proposed changes to station locations and/or sampling frequencies:** The Riverside County Flood Control & Water Conservation District provides this function, See their report

Date	Location	Monitoring Results	Follow-up and Elimination Activities	Proposed Changes
				No Changes Comment(s):
				No Changes Comment(s):
				No Changes Comment(s):
				No Changes Comment(s):
				No Changes Comment(s):
				No Changes Comment(s):
				No Changes Comment(s):
				No Changes Comment(s):
				No Changes Comment(s):
				No Changes Comment(s):

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7. ILLICIT DISCHARGE DETECTION AND ELIMINATION
(SECTION J of ORDER NO. R9-2004-001), CONT.

7) **An assessment of overall program effectiveness based on the measurable goals established in the Permittee's Individual SWMP:** See Flood Control Report

8) **Additional Comments/Information:**

Describe the major accomplishments of the Illicit Discharge Detection and Elimination Component over the past year: See Flood Control Report

Summarize the internal and external education and outreach activities the Illicit Discharge Detection and Elimination Component has conducted over the past year:
See Flood Control Report

Summarize new activities or improvements to be implemented next year as a result of your self assessment of the Illicit Discharge Detection and Elimination Component:

Other comments

8. PUBLIC PARTICIPATION

1) **A description of efforts to include the public urban runoff management programs during the reporting period (i.e., river clean-ups, volunteer monitoring, Permittee council meetings related to the SWMP, etc.):** The County participates in various organizations, committees and workshops to ensure coordination and countywide consistency. (CASQA, SA/SMR TAC, Management Steering Committee (City Managers) Capitol Improvement Project Review Committee, Departmental Water Quality Management Committee, IRWMP process (three regions). Various departments participate on community cleanup days throughout the county.

2) **Additional Comments/Information:**

Assessment of overall program effectivenss based on the measurable goals established in the Permittee's Individual SWMP: Participation by departments is expected by management.

Code Enforcement Cleanup crews accounted for 469.19 tons of litter removal as part of the community cleanup efforts in Supervisorial District 1 and 3.

Describe the major accomplishments of the Public Participation Component over the past year: See Flood Control Report

Summarize the internal and external education and outreach activities the Public Participation Component has conducted over the past year: See the Flood Control Report

Summarize new activities or improvements to be implemented next year as a result of your self assessment of the Public Participation Component: No planned additional activities.

Other comments

9. FISCAL ANALYSIS COMPONENT

Fiscal Analysis Component - each Permittee shall include an annual fiscal analysis, for each fiscal year covered by Order No. R9-2004-001, in its Individual Annual Report. This analysis shall evaluate the expenditures (such as capital, operation and maintenance, education, and administrative expenditures) necessary to accomplish the activities of the Permittee's Individual SWMP. The analysis shall include the following:

1) **A report of the previous reporting period's budget and a budget for the upcoming reporting period. To the extent possible, the budgets should be broken down by the following programs:**

Program Element	Fiscal Year 2007-2008		Fiscal Year 2008-2009	
	Capital Expenditures	O&M/Admin Expenditure	Capital Expenditures	O&M/Admin Expenditure
Program Management		853,000		785,000
Annual Fee for MS4 NPDES Permit		40,00		40,000
Implementation Agreement Shared Cost		190,000		150,000
Construction Inspections		485,000		485,000
Development Planning		30,000		30,000
Industrial and Commercial Inspections		175,000		175,000
Illicit Connections & Illegal Discharges Program		1,610,000		1,625,000
Municipal Facilities and Activities		180,000		180,000
Catch Basin Cleaning		796,272		430,513
Public Education & Outreach		N/A		N/A
Monitoring Program		685,000		685,000
Other: GIS Roadside Litter Removal CSA 152/Street Sweeping		347,729 1,625,000 681,753		620,530 1,351,238 789,614
Total	**$**	**7,698,754 ***	**$ 0**	**7,346,894***

The annual budget for 07/08 reflected an 8% reduction in general fund dollars. The annual County Budget for 09/10 will reflect a 10% cut across all general fund departments with an

9. FISCAL ANALYSIS COMPONENT

(CONT.)

additional 7-10% reduction proposed for FY10/11. This will put the general funding available to NPDES/Stormwater activities back to FY 04/05 levels. With the inclusion of 26 mandatory furlough days, layoffs, and early retirement; less general fund dollars, time and staff will be available to accomplish the same workload. * Direct cost only, this does not include ancillary costs in combination with related program activities, which is estimated at between $17-$18 million. The estimated immediate loss in revenue due to property tax reassessments and State of California take backs for FY09/10 is $150 million.

2) **A description of the source(s) of funds that were utilized during the previous fiscal year and the source(s) of funds proposed to meet the necessary expenditures for the subsequent year, including legal restrictions on the use of such funds.**

Source of Funds	Capital Expenditures	Percent of Program Funding	Restrictions on Use (if applicable)
General fund (TLMA, EDA, Facilities Management, Environmental Health, Executive Office (EO), Parks District)		33% (supplemented by EO General Fund budget) 67% from Departmental General Fund budgets)	NPDES fund designations within budget units. Catch basin cleanouts, MS4 mapping, roadside litter removal, IC/ID inspections
GAS Tax, FEMA		<1%	Storm related damage to MS4 within Transportation Dept jurisdictional control
Assessments		100%	Street sweeping
Contract obligations (Waste Hauler Street Sweeping)		100%	Street sweeping
Business Licensing/Industrial Commercial NPDES inspection (fee neutrality)		50% 50% general fund support	Industrial/Commercial NPDES inspections (inspection fee-hourly rate) regulated business community only
Developer Fees (developer cost) * 50% reduction for FY 09/10		100%	Project Specific inspections for erosion and sediment control
WQMP Review (developer cost)		100%	Project Specific

9. FISCAL ANALYSIS COMPONENT

(CONT.)

3) Additional Comments/Information:

Overall, the direct and indirect cost for program implementation of NPDES related activities are in the range of $17,000,000-18,000,000 countywide. Program costs continue to increase while revenues and taxes are decreasing. Each watershed requires additional quantification of activities, tracking and need for funding with no additional projected income foreseen. In this period of economic recession, general fund dollars are diminishing with a projected 20% decrease anticipated in the County's general fund for the next 3 years. It is imperative that the County continues to closely monitor and contain program costs and work with the three Regional Boards to ensure economic considerations are taken into account when planning any new program requirements.

10. NON-STORM WATER DISCHARGES

Permittees shall report on any discharge category listed in Requirement B.2 of Order No. R9-2004-001 that was identified as a source of pollutants during the reporting period. For each identified category, the Permittee shall report whether it elected to prohibit the discharge or to require BMPs to reduce pollutants in the discharge to the MEP. If the discharge is not prohibited, the BMPs that will be implemented, or required to be implemented, shall be described in each Permittee's Individual SWMP Annual Report.

Category	Prohibited	BMP to be Implemented
Diverted stream flows	☐ Yes ☐ No	Not Applicable
Rising ground waters	☐ Yes ☐ No	Not Applicable
Uncontaminated ground water infiltration [as defined at 40 CFR 35.2005(20)] to MS4s	☐ Yes ☐ No	Not Applicable
Uncontaminated pumped ground water	☐ Yes ☐ No	Not Applicable
Foundation drains	☐ Yes ☐ No	Not Applicable
Springs	☐ Yes ☐ No	Not Applicable
Water from crawl space pumps	☐ Yes ☐ No	Not Applicable
Footing drains	☐ Yes ☐ No	Not Applicable
Air conditioning condensation	☐ Yes ☐ No	Not Applicable
Flows from riparian habitats and wetlands	☐ Yes ☐ No	Not Applicable
Water line flushing	☐ Yes ☐ No	Not Applicable
Landscape irrigation	☒ Yes ☐ No	Ordinance 859.1
Discharges from potable water sources not subject to NPDES Permit No. CAG679001, other than water main breaks	☐ Yes ☐ No	Not Applicable
Irrigation water	☐ Yes ☐ No	Not Applicable
Lawn watering	☒ Yes ☐ No	Ordinance 859.1
Individual residential car washing	☐ Yes ☐ No	Not Applicable
Non-emergency fire fighting flows	☐ Yes ☐ No	Not Applicable
Dechlorinated swimming pool discharges	☐ Yes ☐ No	Educational materials, progressive enforcement for illegal discharges of pool water (chlorinated or algae laden)

1) **Additional Comments/Information:** Landscape Ordinance 859.1 in effect as of 4/25/20

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11. RECEIVING WATER LIMITATIONS

This section includes the report required pursuant to Requirement C.2.a. of Order No. R9-2004-001, if applicable.

Requirement C.2.a. states:

"Upon a determination by either a Permittee or the SDRWQCB that MS4 discharges are causing or contributing to an exceedance of an applicable water quality standard, the Permittee shall promptly notify and thereafter submit a report to the SDRWQCB that describes BMPs that are currently being implemented and additional BMPs that will be implemented to prevent or reduce any pollutants that are causing or contributing to the exceedance of water quality standards. The report may be incorporated in the SWMP Annual Report unless the SDRWQCB directs an earlier submittal. The report shall include an implementation schedule. The SDRWQCB may require modifications to the report;"

See Flood control and Water Conservation Report.

The County relies on the Flood Control and Water Conservation District to conduct water quality monitoring. The District advises the permittees of any pollutants of concern that have been identified and corrective actions are taken through a cost share agreement. This process is evolving and requires additional work. Flood Control staff have transitioned out of the program and new staff are being trained. In addition, a sub contractor is being brought on to perform a revised monitoring program that will enhance monitoring and enforcement for IC/ID which ultimately will be more protective of water quality.

12. ADDITIONAL URBAN RUNOFF DATA

This section is a summary of all urban runoff related data not included in the annual monitoring report (e.g., special investigations).

See Flood Control Report for monitoring and data analysis.

13. PROPOSED REVISIONS

This section includes proposed revisions to the Individual SWMP, including areas in need of improvement based on the assessment of effectiveness of each program component.

1) The cities of Wildomar and Menifee will be reporting their respective jurisdictional areas in future reports. The City of Menifee has approximately 60,000 residents that live in a 50 square miles area of which less than 5% is in the Santa Margarita watershed. The City of Wildomar has approximately 23,000 residents in a 24 square mile area with approximately 60 % in the Santa Margarita watershed. All MS4 infrastructure managed by the TLMA in these two jurisdictions has been transferred. All plan check and new development review is the responsibility of the cities.

2) GIS mapping continues to evolve as data sets become more refined. Improved mapping and data management capabilities will increase effectiveness for BMP cataloging and long term operation & maintenance.

3) Consistency of MS4 permits between Regional Boards (Santa Ana, San Diego and Colorado) that take into consideration inland valley arid and semi-arid conditions of the region (not coastal issues) would be less confusing and provide for programmatic uniformity and help with the County's attempt to comply with the ever increasing regulatory burden.

4) Due to budget issues cost containment must be taken into consideration for continued program implementation. The voting public will not tolerate increases in fees and/or taxes to support increased non-science based program initiatives.

Supporting Documentation

SUPPORTING DOCUMENTATION

TRANSPORTATION DEPARTMENT

BUILDING & SAFETY DEPARTMENT

PLANNING DEPARTMENT

CODE ENFORCEMENT DEPARTMENT

DEPARTMENT OF ENVIRONMENTAL HEALTH

WASTE MANAGEMENT DEPARTMENT-HOUSEHOLD HAZARDOUS WASTE

AGRICULTURE

LANDSCAPE ORDIANCE 859.2

MEETINGS (Examples)

TRANING LOGS

TRANSPORTATION DEPARTMENT

SANTA MARGARITA ATTACHMENT A

(TRANSPORTATION DEPARTMENT)

BACKGROUND

The Transportation Department's NPDES activities for Fiscal Year (FY) 08/09 included the Roadside Litter Removal Program, Catch Basin Inspection & Cleaning Program, Code Enforcement Clean up Program, and the enhancement to the integrated approach in the continued development of the MS4 map.

The Roadside Litter Removal Program has a crew of seven (7) employees that provides roadside clean up efforts. The funding for this Program is provided by each of the five Supervisorial Districts within the County. The crew collects roadside litter from ten (10) linear miles of designated roadways in each of the five Supervisorial Districts. Ten (10) linear miles are cleaned on a rotating basis, allowing for problems areas to be re-addressed every ten (10) weeks. Cumulatively, this program cleans approximately 60 linear miles quarterly. This effort has proven successful in reducing the amount of debris and anthropogenic litter entering the storm drains, nearby streams and waterbodies within the different watersheds. Roughly, 33.75 road miles were cleaned in the Santa Margarita watershed, and approximately 11.15 tons of anthropogenic litter was removed under this program for FY 08/09.

The Catch Basin Inspection & Cleaning Program has a crew of five (5) employees. The funding for this Program is provided by the County Executive Office. This Program performs inspection and maintenance on all storm drainage facilities maintained by the County of Riverside. The crew inspects and maintains catch basins, inlets, outlets, culverts, channels, swales and detention/retention basins to ensure maximum storm water diversion from rights-of-way, while simultaneously maintaining the National Pollutant Discharge Elimination System standards. For FY 08/09, approximately 7.95 tons of anthropogenic litter, 5.42 tons of vegetative litter, and 10.62 tons of sediment litter were removed from the Santa Margarita watershed under this Program.

The Code Enforcement Clean up Program has three crews totaling seventeen (17) employee positions. The funding for this Program is provided by Code Enforcement Department. The crew carries out wide-ranging clean ups. The Santa Margarita watershed falls within Supervisorial District 1 and 3. For FY 08/09, the approximate tonnage of litter removed from each Supervisorial District is summarized in the following table:

Supervisorial District	Tons of Litter Removed
District 1	230.17
District 3	239.02
Total	**469.19**

ROAD REPAIR AND STREET SWEEPING

For FY 08/09, the Transportation Department received a total of 1292 complaint calls countywide for general road repair and maintenance, of which a total of 106 complaints were within the Santa Margarita Region involving the following issues:

Type of Complaint	Number of Complaints
a. Flooding-road shoulder, ditch damage	0
b. Ditches gutter, culvert drains, clean out	3
c. Drainage low spots, ponding floods	1
d. Mud gravel, dirt, rock, snow, swept/cleared	6
e. Trash, debris, object removed or cleared	10
f. Trees, palm fronds and branches	11
g. Weed, grass, brushes and tumbleweeds	8
h. Graffiti	0
i. Potholes or large holes	14
j. Improvements, grading paving & resurfacing	52
k. Road sidewalk, curb gutter damage & repair	1
Total	**106**

Currently, all streets in County Service Area (CSA) 152 are swept. New development projects within the County (with curb and gutter) are required to annex into CSA 152 in order to receive street sweeping services. These services are contracted out and roadways are swept at least once a month, and in some cases more frequently. Whenever possible, the Department has increased the frequency of street sweeping to twice a month. During FY 08/09, a total of 14,376 curb miles were swept. In comparison to last fiscal year, FY 07/08, a total of 13,398 curb miles were swept, which represents a 7.30% increase.

The amount of debris removed from street sweeping activities decreased this year. For last FY 07/08, approximately 1,548 tons of debris were removed from streets, in comparison to this FY 08/09, approximately 1,193 tons of debris were removed. It represents 22.93% decrease in amount of debris removed. In general, for FY08/09 less anthropogenic, vegetative and sediment littler were removed from street sweeping activities.

FISCAL EXPENDITURES FOR FY 08/09

Expenditures for NPDES activities include Municipal Inspections, MS4 Mapping, Catch Basin Inspection, Monitoring & Cleaning Program and Code Enforcement Clean Up Program & Roadside Litter Removal Program. Future costs are expected to increase as the program expands. The following table summarizes the NPDES program expenditures funded by the County General Funds and other related activities and fund sources:

Program/Activity	Funding Source	FY 08/09 Expenditures
Overlay, Sealing	Gas Tax	$3,482,891
Storm Damage	Gas Tax, FEMA	$11,044
Municipal Inspections	General Funds	$13,652
MS4 Mapping	General Funds	$347,729
Catch Basin Inspection, Monitoring & Cleaning Program	General Funds	$430,513
Street Sweeping CSA 152	County Assessment Area 152	$556,448
Street Sweeping (Non-CSA 152)	Waste Haulers (ISS Sweeping)	$161,790
	Environmental Health (Burrtec Waste Industries, Inc.)	$71,376
Code Enforcement Clean Up Program & Roadside Litter Removal Program	Code Enforcement, General Funds	$1,625,000

TRAINING

The Transportation Department is very supportive of NPDES training. A total of sixty-eight (68) Transportation staff attended NPDES training offered by Flood Control during FY 08/09. In addition, one (1) employee attended the California Stormwater Quality Association (CASQA) Annual Conference.

ILLICIT CONNECTION/ILLEGAL DISCHARGE (IC/ID)

The Riverside County Transportation Department, as part of its normal duties, conducts routine maintenance of the storm drain facilities. The Highway Operations Division provides the County with coverage concerning illegal connections or illegal discharges within the storm drain systems such as inlets, outlets, culverts, swales and channels which ultimately make their way to facilities owned by Riverside County Flood Control District. The Transportation Department District Road Maintenance Supervisors and Assistant Supervisors visually inspect the storm drain infrastructure on a regular basis as part of their daily routine. They look for evidence of illegal discharge or illicit

connections. They pay close attention to facilities located within areas of concern, or areas that historically have had issues. This could involve areas where illegal dumping has occurred or other maintenance issues need to be addressed, which would require additional follow-up. These issues could necessitate additional assistance from the County illegal dumping cleanup programs and/or Code Enforcement investigation.

The Transportation Department Permit Engineer also sends a letter to property owners that encroach upon County right-of-way with illegal connections or other obstructions, and if needed is reported to Code Enforcement. The Permit Engineer is responsible for reviewing encroachment applications along County road right-of-way. If the illegal connection is not remedied in a timely manner, it is removed by the County and billed to the owner of the property.

In summary, for FY 08/09, Code Enforcement supervised the following three (3) types of illicit discharges, connections and spills:

a. There were 327 cases of illegal grading or grading without permit in which 88 are currently opened and 239 are closed. They were discharge of soil and sediments.

b. There were 33 cases of illegal dumping in which 5 are currently opened and 28 are closed. They were a variety of materials from hazmat, tires, green waste, construction debris, and household waste.

c. There were 18 NPDES investigations in which 4 are currently opened and 14 are closed. The NPDES violations were for illegal pool water discharges and the cleaning of pool filters into gutters.

MAINTENANCE STORMWATER POLLUTION PREVENTION BULLETIN

Issue 2 - August 2009

Handling and Storage of Liquid Wastes

Improper storage and handling of liquid wastes can allow oils and greases, heavy metals, nutrients, toxic substances and other pollutants to enter stormwater runoff. Help prevent the discharge of pollutants by:

» Reducing and tracking waste generation, storage and disposal;

» Properly handling and storing wastes; and

» Preventing run-on to and runoff from storage areas.

By implementing the following Best Management Practices (BMPs), you can help prevent pollution.

Managing Waste Generation

» Reduce waste generated by minimizing the amount of material stored onsite; using the most efficient method and equipment for the job; and considering the use of the most non-toxic material.

» Establish a material tracking system to increase awareness about materials usage and waste generation.

» Recycle materials whenever possible.

General Liquid Storage Practices

» Prevent waste materials from directly contacting stormwater. Cover storage areas with a permanent roof and always cover containers with secured, spill-proof lids.

» Place storage containers on secondary containment pallets.

» Prevent stormwater run-on from entering the waste storage area by enclosing the area or building a berm around it.

» Use drip pans or absorbent materials whenever oil or grease containers are emptied.

» Check storage containers weekly for leaks and spills and to ensure that lids are properly secured.

» Inspect, repair, and replace faulty pumps, valves, lines, seals, or hoses regularly to minimize the potential of releases and spills.

» Replace any containers that are leaking, corroded, or otherwise deteriorating.

» Sweep and clean the storage area regularly. Do not hose down the area.

» Dispose of rinse and wash water from cleaning waste containers into a sanitary sewer if allowed by the local sewer authority.

» Take special care when loading and unloading liquid wastes to minimize drips and spills.

» Do not mix wastes! Mixing wastes may cause chemical reactions, make recycling impossible, and complicate disposal.

Good Housekeeping

» Use all of a product before disposing of the container.

» Keep the waste storage area clean at all times by sweeping and cleaning up spills immediately.

» Stencil storm drains on the facility's property with a prohibitive message regarding waste disposal (e.g. "Only Rain Down the Storm Drain").

Liquid Hazardous Wastes

» Examples of liquid hazardous wastes include wastes generated from the use of petroleum products, wood preservatives, concrete curing compounds, asphalt products, pesticides, paints, and solvents.

» Hazardous wastes must be stored in sealed containers constructed of a suitable material in compliance with fire and hazardous waste codes and labeled with the waste being stored and the date of accumulation.

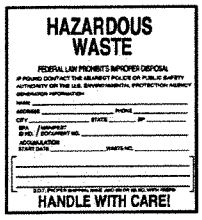

» Store hazardous waste only in the designated on-site hazardous waste storage area.

» Place all hazardous waste containers in secondary containment.

» Provide sufficient separation between stored containers to allow for spill cleanup and emergency response access.

» The hazardous waste storage area should be roofed and curbed or diked to provide a spill containment volume equal to 10% of the combined volume of all containers or 110% of the capacity of the largest container, whichever is greater.

» The hazardous waste storage area should be impervious to the stored substances (if spilled) for a minimum contact time of 72 hours.

» The hazardous waste storage area should be maintained free of accumulated rainwater and spills. In the event of spills or leaks, accumulated rainwater and spilled substances should be placed into drums and handled as a hazardous waste unless laboratory analytical testing determines it to be non-hazardous.

» Ensure that hazardous waste is collected, removed, and disposed by licensed and permitted hazardous waste transporters and disposal facilities utilizing properly completed Uniform Hazardous Waste Manifests.

If you have any doubt about proper handling and storage of a waste ask your District Supervisor.

Remember, pollution prevention begins with you.

MAINTENANCE STORMWATER POLLUTION PREVENTION BULLETIN

Issue 3 - September 2009

Handling and Storage of Solid Wastes

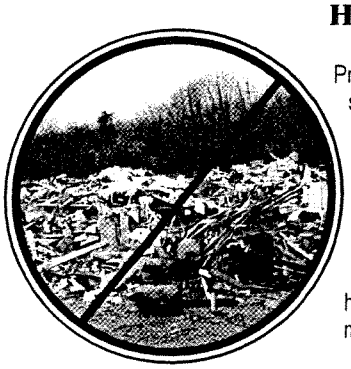

Properly implemented solid waste management practices help prevent and reduce stormwater pollutants such as sediment, paper, plastics, green waste, oils and greases, and metals such as lead, copper, zinc, etc. Solid waste management practices include:

» Providing designated waste storage areas and containers

» Properly maintaining designated waste storage areas and containers; and

» Arranging for regular disposal

Posting of waste disposal guidance charts in multiple locations may be helpful. Such a chart lists a waste's hazardous nature (toxic, corrosive, ignitable, reactive), prohibitions on its disposal, and the recommended disposal method (recycle, sanitary sewer, landfill, etc.).

Implement the following Best Management Practices (BMPs) to help prevent the release of pollutants to stormwater.

General BMPs for Solid Waste Storage

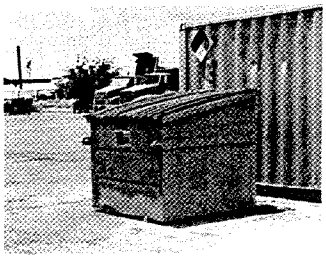

» Provide adequate solid waste containers for waste generated.

» Arrange for regular waste collection; increase waste collection frequency or number of dumpsters, if necessary.

» Locate solid waste storage areas at least 50 feet from storm drains and watercourses and away from areas prone to flooding or ponding.

» Cover solid waste containers, dumpsters and trash receptacles at all times to prevent wind-blown debris.

» Regularly inspect solid waste containers for damage to prevent waste from escaping through holes or cracks in the container.

» All waste piles should be covered (e.g., tarp)

» Prevent stormwater run-on from contacting stored solid waste by installing and maintaining berms, dikes or other diversion structures or by elevating the waste off the ground.

» Ensure that only appropriate solid wastes are added to a solid waste container—hazardous wastes must not be placed in regular trash dumpster.

» Inspect and sweep/clean the solid waste storage area regularly, but do not hose down the area to a storm drain.

» Do not hose out dumpsters or other waste containers; leave dumpster cleaning to the trash hauling contractor.

Green Waste BMPs

» Do not dispose collected green waste into waterways or storm-water drainage systems.

» Securely cover green waste not stored in watertight dumpsters with tarps to protect against wind and rain.

» Salvage or recycle useful vegetation debris. For example, cut trees and shrubs can be converted into wood chips and used as mulch.

Controlling Litter

» Post "No Littering" signs and enforce compliance.

» Provide sufficient covered litter receptacles in appropriate locations.

» Empty litter receptacles frequently to prevent overflow and windblown litter.

Solid Hazardous Wastes

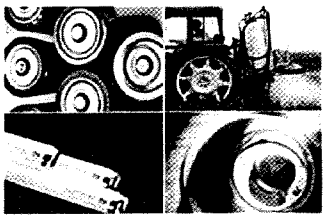

» Examples of solid hazardous wastes include soil, absorbents, and rags containing petroleum-based substances (oil, diesel, gasoline etc.); fluorescent light bulbs; lithium or lead-containing batteries; cathode ray tubes found in televisions and computer monitors; and mercury-containing devices such as thermostats, thermometers, electric switches, and relays.

» Do not mix wastes! Segregate solid hazardous waste from solid non-hazardous waste.

» Ensure that adequate solid hazardous waste storage is available,conveniently located, and away from storm drains, watercourses, and moving vehicles.

» Store solid hazardous waste only in a designated solid hazardous waste storage area. Do not allow potentially hazardous wastes to accumulate directly on the ground.

» Solid hazardous wastes must be stored in sealed containers constructed of a suitable material in compliance with fire and hazardous waste codes and labeled with the waste being stored and the date of accumulation.

» Ensure that solid hazardous waste is collected, removed, and disposed by licensed and permitted hazardous waste transporters and disposal facilities utilizing properly completed Uniform Hazardous Waste Manifests.

If you have any doubt about proper handling and storage of a waste ask your District Supervisor.

Remember, pollution prevention begins with you!

MAINTENANCE
STORM WATER POLLUTION PREVENTION BULLETIN

Issue 1 - July 2009

Spill Prevention, Control and Cleanup

Spills and leaks are one of the largest contributors of stormwater pollutants. Help prevent the discharge of pollutants to drainage systems and surface waters by reducing the chance for spills, stopping the source of spills, containing and cleaning up spills, and properly disposing of spilled materials. By implementing the following Best Management Practices (BMPs), you can help prevent the discharge of pollutants into the environment.

Spill Prevention and Control

» Keep storage areas clean, well organized, and equipped with ample cleanup supplies.

» Sweep storage areas monthly if it is paved - do not hose down the area to a storm drain.

» Check tanks daily for leaks and spills.

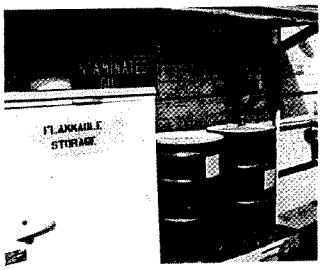

» Store and contain liquid materials in such a way that the contents of a ruptured tank or container will not discharge, flow, or be washed into the storm drainage system, surface waters, or groundwater.

» Place drip pans or absorbent materials beneath all mounted taps, and at all potential drip and spill locations during filling of and dispensing from tanks. Properly dispose of all collected liquids and soiled absorbent materials immediately. Do not leave full drip pans or other open containers lying around.

» Oil filters disposed in trashcans or dumpsters can leak oil and pollute stormwater. Place oil filters in a funnel over a waste oil-recycling drum to drain excess oil before disposal or recycling.

» Store cracked batteries in a covered, non-leaking secondary container. If a battery is dropped, treat it as if it is cracked and place in a containment area until certain it is not leaking.

» Regularly inspect onsite vehicles and equipment for leaks and repair them immediately.

» Repair or replace perimeter controls, containment structures, covers, and liners as needed to maintain their proper function.

Cleanup

Minor Spills

Minor spills typically involve small quantities of oil, gas, paint, etc. which can be controlled by the first responder at the discovery of the spill. If you are the first to detect the spill:

» Contain the spread of the spill.

» Clean the contaminated area by using absorbent materials rather than hosing it down or burying the spill.

» Promptly and properly dispose of contaminated materials.

Semi-Significant Spills

Semi-significant spills can be controlled by the first responder with the assistance of other personnel and may require all other activities to be temporarily discontinued. To control and clean up this type of spill:

» Contain the spread of the spill.

» Notify your supervisor.

» If the spill occurs on a paved surface, immediately contain it by encircling it with absorbent materials. Use "dry" methods such as absorbent materials, cat litter and/or rags for clean up.

» If the spill occurs in an unpaved area, immediately contain it by constructing an earthen dike. Dig up and properly dispose of the contaminated soil.

» If the spill occurs during a rain event, contain and block storm drains (if any) and then cover the spill with a tarp or other material to prevent runoff contamination.

Significant/Hazardous Spills

For significant or hazardous spills that cannot be controlled by properly trained personnel in

the immediate vicinity, take the following steps:

» Notify the local emergency response (911) and your District Road Maintenance Supervisor.

» If necessary, the District Road Maintenance Supervisor will notify the County Fire Department and/or the County Department of Environmental Health (HazMat).

» Notification must be made by telephone immediately (within 24 hours of discovery) and followed up with a written report.

» The services of a spills contractor or a Haz-Mat team should be obtained immediately. Road maintenance staff should not attempt to clean up the spill until appropriate and qualified personnel have arrived on site.

» Other agencies may also need to be notified. Speak to your District Road Maintenance Supervisor for guidance.

Remember, pollution prevention begins with you.

BUILDING & SAFETY DEPARTMENT

BUSINESS REGISTRATION AND LICENSING PROGRAM

In November 2006, the Riverside County Board of Supervisors approved Ordinance No. 857 creating a Business Registration and Licensing Program. The ordinance requires that businesses within the unincorporated area of Riverside County obtain a business license. The ordinance includes information regarding the contents of the application form, license issuance protocol, description of license fee, license inspections, water quality inspections and enforcement, and business license enforcement procedures.

The ordinance requires all businesses to register; however, some businesses are exempt from paying fees. Fee exemptions will be granted for various agricultural activities, certain residential businesses, places of worship, specific non-profit, and any business exempt by virtue of constitutional law.

Business license fees will not exceed the reasonable cost of providing an inventory of county businesses and the required registration information. No business license fee charged under the provisions of this ordinance shall be construed as a business license tax.

A business registration form designed to ascertain pertinent information regarding the businesses will be mailed to every known business within unincorporated area of Riverside County. In addition, businesses have the ability to access the County of Riverside's website for an on-line registration and payment system. For more information regarding business registration requirements, please contact the Business Registration and License Program Office at 951-955-1400. or on the website: www.rctlma.org.buslic

FEE EXEMPTIONS

Pursuant to Ordinance No. 857, some businesses are exempt from paying fees; however, they must register within 60 days of being notified by the County in order to maintain their exempt status. Exemptions apply to the following:

Residential Facility: Apartments, rooming houses, residential care homes, and family day care homes.

Church, Temple or Places of Worship: Churches, temples or other places of worship, for worship, religious education, or the social affairs of the religious group. **NOTE:** This exemption shall not apply to other activities, including, but not limited to, day schools, social service programs or Church-owned or operated business enterprises.

Home Occupations: Home occupations that are not subject to compliance with water quality restrictions. If your business affects water quality, it will not be exempt from the registration fee.

Agriculture: Agricultural pursuits consisting of the growing of crops, raising of livestock, and dairying, the purchase and storage of substances, materials, supplies, animal feeds and produce, and the marketing of farm products. **NOTE:** A business license shall be required in connection with any of the following: 1) retail nurseries, 2) retail greenhouses; and 3) wholesaling, processing, storage or manufacturing use which involves the collection of products of multiple farms or ranches .

Federal or State Law: Any businesses that are legally recognized as exempt by the U. S. Constitution or applicable statutes, or by the State of California.

Non-Profit Organizations: Any non-profit organizations that are legally recognized as tax exempt pursuant to the provisions of 26 U.S.C. Section 501 (c)(3).

RIVERSIDE COUNTY BUSINESS REGISTRATION AND LICENSING PROGRAM

4080 Lemon St.
P.O. Box 1208
Riverside, Ca 92503
www.rctlma.org/buslic
(951) 955-1400

00003691

Frequently Asked Questions?

WHAT IS THE PURPOSE OF THE BUSINESS REGISTRATION AND LICENSING PROGRAM?

This program provides a comprehensive inventory of businesses in unincorporated area of Riverside County, enhances public safety and helps achieve compliance with federal, state and local water quality regulations.

HOW DOES THE BUSINESS REGISTRATION PROGRAM BENEFIT BUSINESS OWNERS AND THE GENERAL PUBLIC?

There are a two major benefits to the business community and general public from the business registration program:

Public Safety

The program gives county law enforcement and fire personnel a better understanding of the business community and its processes and alerts them to potential hazards, making them more effective responding to protect residents and property. .

Water Quality

The business registration program requires that specific business types be identified, prioritized and inspected for storm water management requirements. It will ensure that those businesses have implemented best management practices to prevent illicit discharges into the storm water system that could ultimately harm water quality.

HOW MUCH WILL THE BUSINESS LICENSE COST?

License fees charged pursuant to this ordinance are as follows:

License fee (first year):	**$45**
Annual renewal fee:	**$30**
Change of name/ location:	**$30**
Duplicate license:	**$30**

WHO IS REQUIRED TO HAVE A LICENSE?

Every person conducting business as defined in Riverside County Ordinance 857 in unincorporated areas of Riverside County must obtain a business license. A separate license must be obtained for each physical location. Any person who does not obtain the required license is subject to the procedures and penalties set forth in the ordinance.

WHAT IF I OPERATE A MOBILE BUSINESS?

A business license is required for the following mobile businesses: mobile automobile or other motor vehicle washing; pest control services; mobile carpet; drape or furniture cleaning; concrete mixing or cutting; masonry; painting and coating; landscaping; pool and fountain cleaning; and portable toilet servicing.

WHAT IF MY BUSINESS ALSO CONDUCTS BUSINESS IN ANOTHER CITY OR COUNTY?

You might need a separate business license to conduct business in any city or county. Most California cities and counties have a business license ordinance. Each jurisdiction, however, has it's own filing fee and requirements. Check with the appropriate jurisdiction for its' fees.

HOW LONG IS THIS LICENSE GOOD FOR?

Your license is current for one calendar year from the effective date of license issuance. Renewal fees are due 30 days prior to the expiration date on the license.

DO STATE LICENSED CONTRACTORS NEED A BUSINESS LICENSE?

Any person licensed as a contractor by the State Contractors Board must obtain a business license if they are physically located within the unincorporated areas of the County.

DO I NEED A LICENSE IF I WORK OUT OF MY HOME?

Yes, home-based businesses also require registration. Most home occupations are exempt from paying registration fees. The fee exemption shall not apply to those home occupations that are subject to comply with water quality requirements. Please refer to the brochure's fee exemption section or go to our website at: www.rctlma.org/buslic.

IF I AM A NONPROFIT BUSINESS, DO I HAVE TO REGISTER?

You are required to register, but are exempt from paying fees if your organization is legally recognized as tax exempt pursuant to the provisions of Internal Revenue Code Section 501 (C) (3) and your exemption is filed within 60 days of notification of the County's registration requirement.

DO I NEED A LICENSE FOR GROWING OR PRODUCING AGRICULTURAL PRODUCTS?

Yes, all agricultural businesses must register; however, some agricultural activities may be exempt from fees. Refer to the fee exemption section on this brochure or go to www.rctlma.org/buslic.

WHAT IS THE APPLICATION PROCEDURE?

The process to obtain a business license takes only a few minutes and may be completed by mail or on the web based registration system. Using the internet, go to the county business registration website at: www.rctlma.org/buslic where you will find online instructions, a registration application and convenient payment system.

IF I AM EXEMPT FROM FEES, DO I STILL HAVE TO REGISTER?

Yes. Business that are exempt from paying fees still must register within 60 days of notification.

0003696

County of Riverside
Environmental Compliance Division
NPDES Construction Inspection Form

Tract/Plot/APN No: 963-070-026
Date: 11/6/08 ECI: C. Santiago P. Broesdime.
Grading Permit No: 200 63890-07-02-2008 by Facilities only
Thomas Bros: 929 B-2 & B-3
WDID Number: 933C351153
Weather Condition: Sunny
Size/Site (Acres Disturbed): East of Briggs Rd. 9.5 Acres
Contact Person: John Murillo
Owner/Applicant: French Valley Business Center
Phone Number: 951 970 7566
Address:
Email: John@KeetonConstruction.com
Process Date: 11-6-08

Site Priority Level	Revised Priority Level	Inactive	Active
☐ Low ☑ Medium ☐ High	☐ Low ☐ Medium ☑ High	☐	☑

Yes	No	
		1 Storm Water Pollution Prevention Plan:
☐	☑	A) Current SWPPP document on job site?
		2. Best Management Practices:
☐	☑	A) Erosion Control BMPs installed, maintained and effective?
☐	☑	B) Sediment Control BMPs installed, maintained and effective?
☐	☑	C) Wind Erosion Control BMPs installed, maintained and effective?
☑	☐	D) Tracking Control BMPs installed, maintained and effective?
☐	☑	E) Non-Stormwater Management BMPs installed, maintained and effective?
☐	☑	F) Waste management and materials pollution control BMPs installed, maintained and effective?
		3. Non-Stormwater Discharges:
☐	☑	A) Is the site free from evidence of non-storm water discharges?
☐	☑	B) Is the site free from the potential to create a non-storm water discharge?
☐	☑	C) Is there an effective combination of BMPs installed?

Enforcement: Facilities Contact George 955 4875

In Compliance	Non-Compliance	Gross Non-Compliance
☐	☐	☑

☐ Verbal ☐ Written ☑ NOV ☐ Stop Work Order ☐ RWQCB Notified

**This inspection is based solely upon the observations made by the inspector at the time of the inspection.*

Comments: No swppp on site. No Grading Permit. Conditional grading permit from Facilities. Only one rumble strip at entrance. No BMPs installed throughout. Blue stream. Ben Weil complaint. Must obtain grading Permit. Implement swppp, & effective combo of BMPs.

Follow Up Date: 11/13/08

**See back for additional comments.*

R.M.

Date: 11/13/08 Action: NOV.

0003694

Department of Building and Safety

COUNTY OF RIVERSIDE

TO: Dist.

ADDRESS: Date 11-13-08

CORRECTION NOTICE

Permit No. PP 17666

NOV - MUST OBTAIN A GRADING PERMIT FROM COUNTY OF RIVERSIDE + NOT FOR WDID # + COMPLIANCE FOR NPDES. INSTALL BMPS TO KEEP ALL SEDIMENT ON SITE

PHIL C BROESAMLE
Inspector

DO NOT REMOVE FROM JOBSITE

284-205 (rev. 1/83) DISTRIBUTION: WHITE-Job, CANARY-Inspector, PINK-Office

Attachment A: 2008-2009 Storm Season Final Statistics SM

Legal Description	Regional Water Quality Control Board Responsible	End of Storm Season Percent Compliance	Number of Verifications Conducted	Date Last Verification Processed
APN 156-340-024 SFR				
APN 384-080-013 SFR		STOP WORK ORDER	2	12/10/2008
APN 384-080-015 SFR		STOP WORK ORDER	1	9/4/2008
APN 384-080-016 SFR		STOP WORK ORDER	1	9/4/2008
APN 470-330-025 SFR	SM	IC	4	3/26/2009
APN 470-340-023 SFR	SM	NC	5	3/26/2009
APN 571-130-039 SFR	SM	NC	1	9/11/2009
APN 571-630-010 SFR	SM	NC	3	4/9/2009
APN 640-040-005 SFR	SM	IC	3	4/14/2009
APN 904-560-010 SFR	SM	NC	3	4/8/2009
APN 915-080-028 SFR	SM	NC	4	1/26/2009
APN 915-110-027 SFR	SM	IC	3	4/15/2009
APN 915-110-041 SFR	SM	NC	1	3/10/2009
APN 915-110-045 SFR	SM	NC	3	5/14/2009
APN 915-210-050 SFR	SM	IC	2	1/20/2009
APN 915-220-051 SFR	SM	IC	2	11/3/2008
APN 915-230-053 SFR	SM	STOP WORK ORDER	2	10/20/2008
APN 915-240-036 SFR	SM	NC	2	10/7/2008
APN 915-240-054 SFR		NC	3	11/25/2008
APN 915-370-075 SFR	SM	IC	2	12/10/008
APN 915-400-020 SFR	SM	NC	3	12/19/2008
APN 915-550-017 SFR	SM	STOP WORK ORDER	2	10/24/2009
APN 915-550-034 SFR	SM	NC	3	1/20/2009
APN 915-550-042 SFR	SM	IC	2	10/20/2008
APN 915-560-017 SFR	SM	STOP WORK ORDER	2	10/20/2009
APN 915-560-026 SFR	SM	NC	1	9/9/2008
APN 915-560-033 SFR	SM	STOP WORK ORDER	3	10/20/2008
APN 915-560-034 SFR	SM	STOP WORK ORDER	3	10/20/2008
APN 915-750-007 SFR	SM	STOP WORK ORDER	3	4/14/2009
APN 915-750-030 SFR	SM	IC	3	1/28/2009
APN 915-750-038 SFR	SM	STOP WORK ORDER	3	10/20/2009
APN 915-750-039 SFR	SM	NC	3	1/21/2009
APN 918-020-022 SFR	SM	NC	4	4/7/2009
APN 927-150-024 SFR	SM	NC	4	5/28/2009
APN 927-220-004 SFR	SM	STOP WORK ORDER	2	10/20/2009
APN 927-220-005 SFR	SM	STOP WORK ORDER	2	10/20/2009
APN 927-250-008 SFR	SM	NC	1	11/5/2008
APN 927-510-025 SFR	SM	IC	2	12/5/2008

APN 928-170-040 SFR	SM	Closed	1	9/24/2008
APN 928-210-003 SFR	SM	NC	3	3/30/2009
APN 928-210-005 SFR	SM	STOP WORK ORDER	3	4/13/2009
APN 928-220-011 SFR	SM	STOP WORK ORDER	4	4/13/2009
APN 928-220-012 SFR	SM	STOP WORK ORDER	4	4/13/2009
APN 928-220-024 SFR	SM	STOP WORK ORDER	4	4/13/2009
APN 928-220-025 SFR	SM	STOP WORK ORDER	4	4/13/2000
APN 928-220-026 SFR	SM	STOP WORK ORDER	4	4/13/2009
APN 928-220-029 SFR	SM	STOP WORK ORDER	2	4/13/2009
APN 928-220-030 SFR	SM	STOP WORK ORDER	4	4/13/2009
APN 928-230-015 SFR	SM	STOP WORK ORDER	4	4/13/2009
APN 928-230-016 SFR	SM	STOP WORK ORDER	4	4/13/2009
APN 928-230-021 SFR	SM	NC	3	3/30/2009
APN 928-240-025 SFR	SM	NC	3	3/30/2009
APN 928-260-030 SFR	SM	IC	3	4/14/2009
APN 928-280-018 SFR	SM	NC	1	9/28/2009
APN 928-310-007 SFR	SM	STOP WORK ORDER	4	3/11/2009
APN 928-350-030 SFR	SM	IC	1	9/24/2008
APN 929-020-012 SFR	SM	STOP WORK ORDER	5	2/23/2009
APN 929-020-014 SFR	SM	IC	3	4/14/2009
APN 929-110-020 SFR	SM	Closed	2	3/17/2009
APN 929-190-022 SFR	SM	IC	3	2/23/2009
APN 929-290-002 SFR	SM	NC	3	12/18/2008
APN 929-350-005 SFR	SM	IC	4	5/13/2009
APN 929-360-004 SFR	SM	IC	2	12/10/2008
APN 930-060-002 SFR	SM	IC	3	1/6/2009
APN 930-150-002 SFR	SM	NC	3	12/31/2008
APN 931-020-004 SFR	SM	NC	2	1/16/2009
APN 931-040-014 SFR	SM	Closed	1	9/29/2008
APN 931-050-011 SFR	SM	NC	3	4/8/2009
APN 931-070-012 SFR	SM	NC	3	4/8/2009
APN 931-070-013 SFR	SM	Closed	1	12/08/0/
APN 931-170-007 SFR	SM	IC	3	2/23/2009
APN 931-220-009 SFR	SM	IC	3	5/13/2009
APN 931-380-019 SFR	SM	Closed	1	9/19/2008
APN 932-020-019 SFR	SM	Closed	1	11/25/2008
APN 932-020-024 SFR	SM	IC	3	1/28/2009
APN 932-030-018 SFR	SM	NC	6	4/14/2009
APN 932-260-065 SFR	SM	NC	3	4/8/2009
APN 932-280-037 SFR	SM	Closed	1	9/25/2008
APN 932-310-002 SFR	SM	NC	2	1/22/2009
APN 932-310-007 SFR	SM	IC	2	12/1/2008
APN 932-320-045 SFR	SM	NC	3	12/22/2008
APN 932-340-004 SFR	SM	NC	3	4/8/2009
APN 932-340-013 SFR		STOP WORK ORDER		
APN 932-350-003 SFR	SM	STOP WORK ORDER	1	10/31/2008
APN 932-350-005 SFR	SM	IC	2	1/16/2009
APN 932-350-025 SFR	SM	IC	2	10/31/2008
APN 932-370-034 SFR	SM	NC	2	10/28/2008
APN 932-370-036 SFR	SM	IC	2	2/4/2009
APN 932-370-037 SFR	SM	IC	2	3/10/2009
APN 932-370-046 SFR	SM	NC	3	4/8/2009

APN 932-370-048 SFR	SM	NC	3	2/9/2009
APN 934-030-007 SFR	SM	NC	4	4/14/2009
APN 934-180-008 SFR	SM	IC	3	12/30/2008
APN 935-130-005 SFR	SM	IC	3	5/13/2009
APN 935-180-015 SFR	SM	IC	4	5/28/2009
APN 935-190-007 SFR	SM	IC	3	4/7/2009
APN 935-200-012 SFR	SM	Closed	1	11/12/2008
APN 935-220-019 SFR	SM	STOP WORK ORDER	1	3/5/2009
APN 935-400-008 SFR	SM	Closed	1	9/24/2008
APN 936-150-015 SFR	SM	Closed	1	9/15/2009
APN 937-070-021 SFR	SM	IC	2	5/14/2009
APN 937-160-004 SFR	SM	Closed	1	9/15/2009
APN 938-150-004 SFR	SM	IC	3	1/27/2009
APN 939-110-013 SFR	SM	IC	2	4/7/2009
APN 940-040-005 SFR	SM	NC	3	1/27/2009
APN 940-070-004 SFR	SM	IC	3	4/7/2009
APN 940-070-020 SFR	SM	NC	3	5/28/2009
APN 940-160-003 SFR	SM	IC	7	5/13/2009
APN 941-030-008 SFR	SM	IC	3	4/15/2009
APN 941-060-010 SFR	SM	IC	3	5/28/2009
APN 941-070-007 SFR	SM	IC	2	12/3/2008
APN 942-060-010 SFR	SM	IC	2	1/28/2009
APN 942-110-005 SFR	SM	IC	2	12/9/2008
APN 942-250-026 SFR	SM	Closed	1	9/16/2008
APN 943-090-023 SFR	SM	NC	3	4/20/2009
APN 951-040-008 SFR	SM	IC	1	12/17/2008
APN 951-090-025 SFR	SM	NC	3	2/10/2009
APN 951-750-013 SFR	SM	NC	2	10/20/2008
PM 30017 / PP 17680	SM	IC	2	12/4/2008
PM 32159-PP 17680	SM	Expired	1	10/4/2008
PM 33691	SM	Closed	2	1/15/2009
PP 17680	SM	STOP WORK ORDER	3	1/21/2009
PP 18891	SM	IC	1	11/5/2008
PP 22254	SM	IC	2	2/3/2009
PP 22461	SM	Closed	2	1/27/2009
PP 31219	SM	NC	2	3/17/2009
TR 22948	SM	IC	1	10/14/2008
TR 25994	SM	NC	1	11/5/2008
TR 27603	SM	Expired	1	11/12/2008
TR 28298	SM	IC	5	4/2/2009
TR 28695-1	SM	IC	2	12/10/2008
TR 28695-2	SM	IC	3	3/20/2009
TR 29114	SM	IC	5	2/9/2009
TR 29214	SM	IC	5	2/6/2009
TR 29962	SM	Closed	1	10/14/2008
TR 30069-1	SM	NC	8	5/12/2009
TR 30155	SM	STOP WORK ORDER	7	5/12/2009
TR 30297	SM	IC	3	2/4/2009
TR 30347	SM	IC	3	1/7/2009
TR 30791	SM	IC	3	4/2/2009
TR 30885	SM	NC	8	5/13/2009
TR 30939	SM	Closed	4	4/17/2009

TR 31118	SM	IC	4	4/2/2009
TR 31330	SM	IC	3	3/17/2009
TR 31353	SM	NC	6	5/12/2009
TR 31662	SM	Closed	4	4/6/2009
TR 31674	SM	NC	3	12/30/2008
TR 32049	SM	IC	8	5/8/2009
TR 32171	SM	IC	3	4/2/2009
TR 32185	SM	IC	5	5/8/2009
TR 32982	SM	Expired	1	11/5/2008
TR 34324	SM	NC	4	3/26/2009
TR 35200	SM	IC	3	3/17/2009

Attachment B: 2008-09 Storm Season – Sites Where Enforcement Acti

LEGAL	RWQCB	% COMPLIANCE IMPROVEMENT	VERIFICATION NO.
		STOP WORK ORDERS	
APN 384-080-013 SF	SM	STOP WORK ORDER	2
APN 384-080-015 SF	SM	STOP WORK ORDER	1
APN 384-080-016 SF	SM	STOP WORK ORDER	1
APN 915-230-053 SF	SM	STOP WORK ORDER	2
APN 915-550-017 SF	SM	STOP WORK ORDER	2
APN 915-560-017 SF	SM	STOP WORK ORDER	2
APN 915-560-033 SF	SM	STOP WORK ORDER	3
APN 915-560-034 SF	SM	STOP WORK ORDER	3
APN 915-750-007 SF	SM	STOP WORK ORDER	3
APN 915-750-038 SF	SM	STOP WORK ORDER	3
APN 927-220-004 SF	SM	STOP WORK ORDER	2
APN 927-220-005 SF	SM	STOP WORK ORDER	2
APN 928-210-005 SF	SM	STOP WORK ORDER	3
APN 928-220-011 SF	SM	STOP WORK ORDER	4
APN 928-220-012 SF	SM	STOP WORK ORDER	4
APN 928-220-024 SF	SM	STOP WORK ORDER	4
APN 928-220-025 SF	SM	STOP WORK ORDER	4
APN 928-220-026 SF	SM	STOP WORK ORDER	4
APN 928-220-029 SF	SM	STOP WORK ORDER	2
APN 928-220-030 SF	SM	STOP WORK ORDER	4
APN 928-230-015 SF	SM	STOP WORK ORDER	4
APN 928-230-016 SF	SM	STOP WORK ORDER	4
APN 928-310-007 SF	SM	STOP WORK ORDER	4
APN 929-020-012 SF	SM	STOP WORK ORDER	5
APN 932-340-013 SFR		STOP WORK ORDER	
APN 932-350-003 SF	SM	STOP WORK ORDER	1
APN 935-220-019 SF	SM	STOP WORK ORDER	1
PP 17680	SM	STOP WORK ORDER	3
TR 30155	SM	STOP WORK ORDER	7

on Was Taken SM

DATE STOP WORK ORDER WAS ISSUED	COMMENT REGARDING ACTION TAKEN
12/10/2008	Still in Effect
9/4/2008	Still in Effect
9/4/2008	Still in Effect
10/20/2008	Still in Effect
10/24/2009	Still in Effect
10/20/2009	Still in Effect
10/20/2008	Still in Effect
10/20/2008	Still in Effect
4/14/2009	Still in Effect
10/20/2009	Still in Effect
10/20/2009	Still in Effect
10/20/2009	Still in Effect
4/13/2009	Still in Effect
4/13/2009	Still in Effect
4/13/2009	Still in Effect
4/13/2009	Still in Effect
4/13/2000	Still in Effect
4/13/2009	Still in Effect
4/13/2009	Still in Effect
4/13/2009	Still in Effect
4/13/2009	Still in Effect
4/13/2009	Still in Effect
3/11/2009	Still in Effect
2/23/2009	Still in Effect
	Still in Effect
10/31/2008	Still in Effect
3/5/2009	Still in Effect
1/21/2009	Still in Effect
5/12/2009	Still in Effect

Case No.	Hearing Date	Item #	Planner	Super. Dist.	Area Plan	Watershed	Decision	D.U.s
PP23285	06/11/08	5.5	A. Krizek	3	Southwest	Santa Marga	A	
TR29010	06/11/08	5.6	J. Horn	3	Riverside E	Santa Marga	A	32
PM35108	07/23/08	5.5	A. Krizek	3	Southwest	Santa Marga	A	2
PM35070	07/23/08	5.1	M. Straite	1	Southwest	Santa Marga	A	4
PM33093	08/06/08	5.3	A. Krizek	3	Southwest	Santa Marga	A	2
PM34498	08/11/08	4.1	J. Equina	3	Riverside E	Santa Marga	A	2
PM34562	08/20/08	5.3	A. Krizek	3	Southwest	Santa Marga	A	4
PM35241	09/22/08	4.7	A. Krizek	3	Southwest	Santa Marga	A	4
PM35983	10/06/08	3.5	R. Brady	3	Harvest Vall	Santa Marga	A	2
PM34828	10/20/08	4.3	A. Krizek	3	Southwest	Santa Marga	A	2
PM35139	10/20/08	4.1	J. Horn	3	Riverside E	Santa Marga	A	3
PP20375	01/12/09	4.2	A. Krizek	3	thwest Area	Santa Marga	A	
PP23017	01/26/09	5.1	A. Krizek	3	thwest Area	Santa Marga	N	
PM35118	02/04/09	5.5	A. Krizek	3	Southwest	Santa Marga	A	4
CUP03551	02/04/09	5.6	A. Krizek	3	Southwest	Santa Marga	A	
PM35829	02/04/09	5.7	A. Krizek	2	Southwest	Santa Marga	A	2
PM33459A2	02/18/09	5.3	J. Horn	3	Riverside E	Santa Marga	A	0
TR33423M1	03/04/09	4.1	A. Krizek	3	Southwest	Santa Marga	A	0
PM35656	03/04/09	7.1	A. Krizek	3	Southwest	Santa Marga	A	4
PM32981M1	04/15/09	4.2	L.Sheldon	3	Southwest	Santa Marga	A	
PM34343	04/15/09	5.5	L.Sheldon	3	Southwest	Santa Marga	A	2
TR32896	05/13/09	5.6	J.Horn	3	REMAP	Santa Marga	A	7
PUP00892	06/24/09	8.6	A.RUSH	1	Mead Valley	Santa Margarita		
PM30038	06/24/09	8.4	J.Horn	3	REMAP	Santa Margarita		4
PM35279	06/29/09	4.2	J.Horn	3	REMAP	Santa Margarita		4
PP22217	06/29/09	4.1	L. Sheldon	3	RANCHO C	Santa Margarita		

Total Cases	26
Total DU	84
Total Bldg Area	4,168

Illegal Grading Closed FY0809

Case #	Case Name	Location	CITY	Case Closed
CV034351	GRADING WITHOUT PERMIT	APN #917-290-001 □1 Parcel W. of 44735 Sage Rd, Temecula □Contact: LAURENCE RENEE *(NEW)		1/26/2009
CV044781	GRADING WITHOUT PERMIT	382390031 □34824 Stoneman Ave.		9/22/2008
CV044909	GRADING WITHOUT PERMIT	362240008		9/2/2008
CV050254	GRADING WITHOUT PERMIT	382140011		9/22/2008
CV050494	GRADING WITHOUT PERMIT	380290026	WILDOMAR	9/19/2008
CV050495	GRADING WITHOUT PERMIT	380290015	WILDOMAR	9/22/2008
CV051204	GRADING WITHOUT PERMIT	368200035 □:ADDR 20980 PALOMAR ST LAKE ELSINORE CA		7/16/2008
CV051205	GRADING WITHOUT PERMIT	368030053 □:ADDR 34980 MISSION TR LAKE ELSINORE CA		7/31/2008
CV051286	GRADING WITHOUT PERMIT	367310010	WILDOMAR	2/23/2009
CV051288	GRADING WITHOUT PERMIT	376350014	WILDOMAR	7/22/2008
CV051289	GRADING WITHOUT PERMIT	376350003	WILDOMAR	7/22/2008
CV051511	GRADING WITHOUT PERMIT	382120055 □34647 Borchard Rd., Lake Elsinore		9/22/2008
CV053131		367160006		8/6/2008
CV053131		367160006		10/16/2008
CV053154	GRADING WITHOUT PERMIT	583100010	AGUANGA	3/4/2009
CV053862	GRADING WITHOUT PERMIT	362120053 □ □RP: ROBERT STURGIS @ 951-244-9885 (HM) @ 951-203-7824 (CELL) □ □	MENIFEE	9/19/2008
CV054056	GRADING WITHOUT PERMIT	384120007 □ □RP: BILL @ 909-519-1234 □		2/27/2009
CV054247	grading without a permit	366240082 □rp-anonymous	WILDOMAR	7/21/2008
CV054247	grading without a permit	366240082 □rp-anonymous	WILDOMAR	10/6/2008
CV054512	GWP	376160023, 376160024, 376160025, 376160026 □RPTY Bill Greenly 21645 Indiana, Wildomar Home(951)678-5538 Cell (951)757-2316		7/7/2008

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Illegal Grading Closed FY0809

Case #	Case Name	Location	CITY	Case Closed
CV054778	GRADING WITHOUT PERMIT	918260009 RP: TOM WILHELM @ 760-742-0642 		12/23/2008
CV054779	GRADING WITHOUT PERMIT	918260011 RP: TOM WILHELM @ 760-742-0642 		1/13/2009
CV054781	GRADING WITHOUT PERMIT	918260013 RP: TOM WILHELM @ 760-742-0642	Temecula	12/23/2008
CV055350	Grading w/o Permit	376150010 RPTY - Martha Gonzales (951)674-8118	LAKE ELSINORE	2/23/2009
CV055653	Grading without a Permit	367480007 Ruth Turner (951)674-2885	WILDOMAR	12/1/2008
CV055709	GRADING WITHOUT PERMIT	571110024 ADDRESS: 1 Parcel east of 47855 Rawhide Rd., Aguanga, CA 92536 RP: Marie Goetz @ 951-767-9427		1/7/2009
CV056593	GRADING WITHOUT PERMIT	APN: 917-130-005 RP: JOHN HUELSON @ 951-302-1381	TEMECULA	8/27/2008
CV056640	GRADING WITHOUT PERMIT	569330008		3/24/2009
CV060365	GRADING WITHOUT PERMIT	915-240-060 RP: Suzanne 951-302-6191		1/13/2009
CV060516	Grading without permit	382170024 between 20679 Grand Ave. & Alameda Del Monte, Wildomar		9/22/2008
CV060641	GRADING WITHOUT PERMIT	915-640-011 RP: Carol Schmuhl @ 951-767-1061 760-891-7965 (work)	TEMECULA	1/21/2009
CV060916	Grading w/o Permit	380070011		9/19/2008
CV061071	GRADING WITHOUT PERMIT	932200026 ADDR: A PARCEL ON VIA VOLCANO (TENAJA ROAD), NORTH OF AVOCADO MESA RP: CHARLES WIDEEN		2/23/2009
CV061098	GRADING WITHOUT PERMIT	569-330-011 Address: One Parcel East of 43220 Falcon RP: Michael Ray Horn (951) 265-9637 hm. (909) 322-8643 wk.		1/15/2009
CV062451	CONST W/O PERMIT	579-260-024 RP: Gordon Lea @ 591 763-0161	ANZA	10/30/2008
CV062555	GRADING WITHOUT PERMIT	943-250-019 RP: LINDA @ 951-699-3629	TEMECULA	4/30/2009
CV062752	Grading w/o permit	368170050		7/25/2008
CV062883	Grading Without a Permit	927-120-013 RP: Barry Wilson - Building & Safety	TEMECULA	1/12/2009

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Illegal Grading Closed FY0809

Case #	Case Name	Location	CITY	Case Closed
CV062922	Grading w/o permit	368060005		7/25/2008
CV063239	GRADING WITHOUT PERMIT	915-550-028 □ADDR: 1 Parcel East of 40055 Green Oaks Dr., Temecula □RP: Tressa @ 949-631-5444 ext 205 until 3:30pm		7/15/2008
CV063751	Grading Without Permit	952170005		2/27/2009
CV063879	Grading Without Permit	APN: 951-110-010 □RP: Anonymous	TEMECULA	4/16/2009
CV064027	Occupied Recreation Vehicles	915480001 □RP: John @ 767-2423 (home)/526-3741 (cell)	HEMET	12/2/2008
CV064097	Grading w/o Permit	928280001	MURRIETA	2/20/2009
CV064213	GRADING WITHOUT PERMIT	917170001		2/6/2009
CV064587	Grading Without Permit	583280012		3/4/2009
CV064676	Grading w/o permit	932050020		4/3/2009
CV064726	Grading Without Permit	APN: 915-270-021, Temecula. SW corner, intersection of Exaely Rd & Rope Rd □RP: Susan @ 760 891-7922		1/21/2009
CV064743	Grading Without Permit	941200017 □RP: Officer discovery - Mark Slocum	TEMECULA	4/27/2009
CV064937	GRADING WITHOUT PERMIT	APN: 362-440-023 □ADDR: 32200 Geary, Menifee	MENIFEE	2/23/2009
CV065399	GRADING WITHOUT PERMIT	APN: 952-320-018 □ADDR: 42145 CALLE BARBONA, TEMECULA	TEMECULA	4/8/2009
CV065496	Grading w/o permit	939080016	TEMECULA	8/13/2008
CV066644	Grading without a permit	271210002		2/27/2009
CV066788	GRADING WITHOUT PERMIT	951-090-025	TEMECULA	7/30/2008
CV066954	GRADING WITHOUT PERMIT	APN: 952-060-022	TEMECULA	1/14/2009
CV067072	GWP	178230018		6/22/2009
CV067487	GRADING WITHOUT PERMIT	581060001		3/2/2009
CV067583	GRADING WITHOUT PERMIT	915330021		1/12/2009
CV067776	GRADING WITHOUT PERMIT	580360020	AGUANGA	4/6/2009
CV070185	GRADING WITHOUT PERMIT	943110018	TEMECULA	2/3/2009
CV070585	Grading w/out permit	963100008	WINCHESTER	12/4/2008
CV070786	GRADING WITHOUT PERMIT	915080028	TEMECULA	1/29/2009
CV070824	GRADING WITHOUT PERMIT	583260051		3/30/2009
CV070861	Grading without Permit	927540036		1/9/2009
CV070864	Grading without a Permit	583120018	AGUANGA	1/7/2009
CV070938	Grading without Permit	915220023	TEMECULA	1/16/2009
CV0710098	Grading Without Permit	915220018	TEMECULA	10/9/2008
CV0710130	GRADING WITHOUT PERMIT	915560028	temecula	2/9/2009

Illegal Grading Closed FY0809

Case #	Case Name	Location	CITY	Case Closed
CV0710144	GRADING WITHOUT PERMIT	936040020		8/6/2008
CV0710177	GRADING WITHOUT PERMIT	583190031	AGUANGA	1/12/2009
CV0710205	GRADING WITHOUT PERMIT	951270014	Temecula	7/23/2008
CV0710213	GRADING WITHOUT PERMIT	939110029		1/16/2009
CV0710217	GRADING WITHOUT PERMIT	386172011	LAKE ELSINORE	7/11/2008
CV0710326	GRADING WITHOUT PERMIT	942080029	TEMECULA	5/27/2009
CV0710370	Grading without permits.	917310030		6/24/2009
CV0710377	GRADING WITHOUT PERMIT	366230011	WILDOMAR	11/4/2008
CV071230	Grading without permit	965250015	TEMECULA	1/29/2009
CV071941	Grading without a permit	581160011	AGUANGA	3/2/2009
CV072261	Grading without a permit	941120013	Temecula,	3/19/2009
CV072347	Grading without permits.	361051011		1/23/2009
CV072494	Grading without permits	952090003		1/29/2009
CV072694	Grading without permits.	918270057	TEMECULA	4/23/2009
CV073322	GRADING WITHOUT PERMIT	932200012	MURRIETA	3/12/2009
CV073564	GRADING WITHOUT A PERMIT	940-240-005 GRADING WITHOUT A PERMIT	TEMECULA	11/18/2008
CV073587	GRADING WITHOUT PERMIT	917110017	TEMECULA	1/16/2009
CV073588	Grading without a Permit	915440006	TEMECULA	12/30/2008
CV074056	Grading without permits	467030022	WINCHESTER	8/14/2008
CV074553	GRADING WITHOUT PERMIT	927550017	TEMECULA	6/24/2009
CV074619	Grading Without Permit	466160013	WINCHESTER	1/21/2009
CV074920	Grading without a permit	927620017 □1 Parcel S. of 38685 De Portola Rd.		10/28/2008
CV075984	Grading Without Permit	915560007		2/24/2009
CV076012	Grading without permits	964110013	WINCHESTER	3/12/2009
CV076146	GRADING WITHOUT PERMIT	928180007		11/18/2008
CV076232	Grading Without Permit	964110010		4/1/2009
CV076333	Grading / Stockpiling	526220011		11/20/2008
CV076355	Grading without Permit.	942250035	TEMECULA	3/5/2009
CV077322	Grading Without Permit	917260081		2/4/2009
CV077407	Grading w/out Permits	345100021		11/20/2008
CV078308	Grading without permits	941120014	Temcula	12/15/2008
CV078354	Grading without premits	951130014	TEMECULA	7/15/2008
CV078532	Grading Without Permit	584250021	ANZA	10/6/2008
CV078828	Grading Without Permit	927280007		3/26/2009
CV078828	Grading Without Permit	927280007		8/11/2008
CV079004	Grading without permits	583260069		4/16/2009
CV079105	Grading Without Permit	924120027	TEMECULA	6/4/2009
CV079656	GRADING WITHOUT PERMIT	366260001	WILDOMAR	7/23/2008

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Illegal Grading Closed FY0809

Case #	Case Name	Location	CITY	Case Closed
CV079657	GRADING WITHOUT PERMIT	366230008	WILDOMAR	7/29/2008
CV0800034	Grading without permit	927280011		7/7/2008
CV0800108	GRADING WITHOUT PERMIT	951270003	TEMECULA	2/9/2009
CV0800280	GRADING WITHOUT PERMIT	581210017	AGUANGA	3/31/2009
CV0800596	Grading Without Permit	927500031	TEMECULA	4/13/2009
CV0800645	Grading Without Permit	571270063	AGUANGA	3/16/2009
CV0800699	Grading Without Permit	571150061	HEMET	3/16/2009
CV0800709	Grading without permits	384160005	MENIFEE	10/28/2008
CV0800752	Grading Without Permit	915050008	TEMECULA	4/28/2009
CV0800921	GRADING WITHOUT PERMIT	931170007		12/15/2008
CV0801087	Grading Without Permit	927440007		1/28/2009
CV0801152	Grading Without Permit	915630002	TEMECULA	3/27/2009
CV0801160	Grading Without Permit	581100012		3/31/2009
CV0801161	Grading Without Permit	581120006	AGUANGA	3/30/2009
CV0801186	Grading Without Permit	927280040		8/5/2008
CV0801249	Grading Without Permit	941300009	TEMECULA	2/9/2009
CV0801724	GRADING WITHOUT PERMIT	576030019	ANZA	9/11/2008
CV0801915	GRADING WITHOUT PERMIT	932060034		10/15/2008
CV0801948	GRADING WITHOUT PERMIT	927370020	TEMECULA	7/25/2008
CV0802045	GRADING WITHOUT PERMIT	367270008		6/29/2009
CV0802270	Grading without a Permit	583250008		11/26/2008
CV0802496	GRADING WITHOUT PERMIT	571280018 Address: Parcel SE of 38155 Reed Valley Rd., Aguanga, CA		4/29/2009
CV0802529	GRADING WITHOUT PERMIT	942180001 Address: Parcel East of 39815 Jeremiah Road, Temecula, CA		7/7/2008
CV0802651	Grading without permits	943240006		7/18/2008
CV0802697	Grading Without Permit	917260050	TEMECULA	7/18/2008
CV0803204	GRADING WITHOUT PERMIT	929270011		6/18/2009
CV0803381	Grading Without Permit	579270039	Anza	4/14/2009
CV0803611	GRADING WITHOUT PERMIT	915720020		5/27/2009
CV0803705	Grading Without Permit	927320081		4/2/2009
CV0804117	GRADING WITHOUT PERMIT	943230001	TEMECULA	7/7/2008
CV0804383	GRADING WITHOUT PERMIT	915720030		5/27/2009
CV0804402	GRADING WITHOUT PERMIT	927660003	TEMECULA	5/5/2009
CV0805031	GRADING WITHOUT PERMIT	940020007		10/15/2008
CV0805224	Grading Without Permit	915710013	TEMECULA	3/27/2009
CV0805335	GRADING WITHOUT PERMIT	943170017	TEMECULA	7/22/2008

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Illegal Grading Closed FY0809

Case #	Case Name	Location	CITY	Case Closed
CV0805386	GRADING WITHOUT PERMIT	575250007	ANZA	4/7/2009
CV0805752	GRADING WITHOUT PERMIT	932120010		11/10/2008
CV0805752	GRADING WITHOUT PERMIT	932120010		7/1/2008
CV0805787	GRADING WITHOUT PERMIT	927530018	TEMECULA	9/29/2008
CV0805787	GRADING WITHOUT PERMIT	927530018	TEMECULA	7/2/2008
CV0805942	GRADING WITHOUT PERMIT	931240004	MURRIETA	7/9/2008
CV0805942	GRADING WITHOUT PERMIT	931240004	MURRIETA	2/23/2009
CV0806189	GRADING WITHOUT PERMIT	380120012	WILDOMAR	7/17/2008
CV0806189	GRADING WITHOUT PERMIT	380120012	WILDOMAR	6/17/2009
CV0806190	GRADING WITHOUT PERMIT	380120013		7/17/2008
CV0806190	GRADING WITHOUT PERMIT	380120013		6/17/2009
CV0806315	Grading Without Permit	917260046	TEMECULA	5/5/2009
CV0806315	Grading Without Permit	917260046	TEMECULA	7/22/2008
CV0806408	Grading Without Permit	924150015	TEMECULA	4/30/2009
CV0806408	Grading Without Permit	924150015	TEMECULA	7/24/2008
CV0806594	GRADING WITHOUT PERMIT	932330060		7/30/2008
CV0806594	GRADING WITHOUT PERMIT	932330060		8/6/2008
CV0807066	NPDES/ PM-10	1 lot S. of 48335 Painted Canyon Rd., Cahuilla Hills		4/21/2009
CV0807066	NPDES/ PM-10	1 lot S. of 48335 Painted Canyon Rd., Cahuilla Hills		8/18/2008
CV0807088	NPDS/ PM-10	1 lot W of 71670 Jaguar Way, Cahuilla Hills		3/17/2009
CV0807088	NPDS/ PM-10	1 lot W of 71670 Jaguar Way, Cahuilla Hills		8/18/2008
CV0807180	GRADING WITHOUT PERMIT	575280011 □Address: Parcel South of 59792 Hop Patch Spring Rd., Mountain Center, CA		8/20/2008
CV0807180	GRADING WITHOUT PERMIT	575280011 □Address: Parcel South of 59792 Hop Patch Spring Rd., Mountain Center, CA		9/3/2008
CV0807738	CONSTRUCTION WITHOUT PERI	376361005	WILDOMAR	9/8/2008
CV0807738	CONSTRUCTION WITHOUT PERI	376361005	WILDOMAR	5/13/2009
CV0807745	STOCKPILING SOIL	382200012	WILDOMAR	9/8/2008
CV0807745	STOCKPILING SOIL	382200012	WILDOMAR	11/17/2008
CV0807810	GWP	583280007	AGUANGA	9/10/2008
CV0807810	GWP	583280007	AGUANGA	12/9/2008
CV0807862	GWP	575280001 □1 Par. S/o of 59783 Hop Patch Springs Rd., Mountain Center		9/11/2008
CV0807862	GWP	575280001 □1 Par. S/o of 59783 Hop Patch Springs Rd., Mountain Center		10/28/2008
CV0807960	Grading Without Permit	915120042	TEMECULA	1/27/2009
CV0807960	Grading Without Permit	915120042	TEMECULA	9/16/2008

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Illegal Grading Closed FY0809

Case #	Case Name	Location	CITY	Case Closed
CV0808368	GWP	951-080-018	TEMECULA	10/1/2008
CV0808369	GWP	951-080-024	TEMECULA	10/1/2008
CV0808480	GWP	966040008	TEMECULA	10/2/2008
CV0808480	GWP	966040008	TEMECULA	5/7/2009
CV0808508	GRADING WITHOUT PERMIT	367300001	WILDOMAR	10/3/2008
CV0808508	GRADING WITHOUT PERMIT	367300001	WILDOMAR	6/25/2009
CV0808529	GRADING WITHOUT PERMIT (ST	383105023	LAKE ELSINORE	10/3/2008
CV0808768	GRADING WITHOUT PERMIT	928260030		11/10/2008
CV0808768	GRADING WITHOUT PERMIT	928260030		10/16/2008
CV0808860	Grading without Permit	349-240-048		12/11/2008
CV0808985	Grading without Permit	927330014	TEMECULA	2/26/2009
CV0809500	Gradin without permit	579140033	ANZA	11/6/2008
CV0809500	Gradin without permit	579140033	ANZA	12/29/2008
CV0809732	Grading without Permit	927340016	TEMECULA	11/17/2008
CV0809732	Grading without Permit	927340016	TEMECULA	6/24/2009
CV0810048	Grading W/O Permit	963040003	MURRIETA	11/25/2008
CV0810048	Grading W/O Permit	963040003	MURRIETA	12/12/2008
CV0810074	Grading without permit	APN: 928-280-018 □	murrieta	12/1/2008
CV0810254	GRADING WITHOUT A PERMIT	3 P/S OF 21491 SALTER ROAD PERRIS, CA		12/4/2008
CV0810627	GRADING W/O PERMIT	927360027	TEMECULA	12/16/2008
CV0810627	GRADING W/O PERMIT	927360027	TEMECULA	6/17/2009
CV0810732	GRADING WITHOUT PERMIT	469100006	HEMET	12/18/2008
CV0810732	GRADING WITHOUT PERMIT	469100006	HEMET	6/26/2009
CV0810753	GRADING WITHOUT PERMIT	927360027	Temecula	12/19/2008
CV0810753	GRADING WITHOUT PERMIT	927360027	Temecula	2/26/2009
CV0810921	GRADING WITHOUT PERMIT	915220023	TEMECULA	12/30/2008
CV0810921	GRADING WITHOUT PERMIT	915220023	TEMECULA	3/12/2009
CV0810930	GRADING WITHOUT PERMIT	915550016	TEMECULA	12/30/2008
CV0810930	GRADING WITHOUT PERMIT	915550016	TEMECULA	3/11/2009
CV0810936	GRADING WITHOUT PERMIT	915560017	TEMECULA	12/30/2008
CV0810936	GRADING WITHOUT PERMIT	915560017	TEMECULA	2/5/2009
CV0900124	GRADING WITHOUT PERMIT	951140057 □Address: SW corner of Rancho California and Anza, Temecula		1/9/2009
CV0900124	GRADING WITHOUT PERMIT	951140057 □Address: SW corner of Rancho California and Anza, Temecula		3/23/2009
CV0900250	GRADING WITHOUT PERMIT	571500001	Hemet	1/13/2009

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Illegal Grading Closed FY0809

Case #	Case Name	Location	CITY	Case Closed
CV0900250	GRADING WITHOUT PERMIT	571500001	Hemet	3/16/2009
CV0900293	GRADING WITHOUT PERMIT	941310004	TEMECULA	1/14/2009
CV0900293	GRADING WITHOUT PERMIT	941310004	TEMECULA	6/24/2009
CV0900300	GRADING W/O PERMIT	576610010	AGUANGA	1/14/2009
CV0900300	GRADING W/O PERMIT	576610010	AGUANGA	2/5/2009
CV0900463	GRADING WITHOUT PERMIT	362240025	WILDOMAR	1/21/2009
CV0900463	GRADING WITHOUT PERMIT	362240025	WILDOMAR	6/25/2009
CV0900467	GRADING WITHOUT PERMIT	362240026	WILDOMAR	1/21/2009
CV0900467	GRADING WITHOUT PERMIT	362240026	WILDOMAR	6/26/2009
CV0901105	GRADING WITHOUT PERMIT	380050019	WILDOMAR	2/17/2009
CV0901105	GRADING WITHOUT PERMIT	380050019	WILDOMAR	3/12/2009
CV0901255	GRADING WITHOUT PERMIT	951120024	TEMECULA	2/23/2009
CV0901255	GRADING WITHOUT PERMIT	951120024	TEMECULA	4/23/2009
CV0901298	GRADING WITHOUT PERMIT	927660002	TEMECULA	2/24/2009
CV0901298	GRADING WITHOUT PERMIT	927660002	TEMECULA	5/5/2009
CV0901308	GRADING WITHOUT PERMIT	927680002	TEMECULA	2/25/2009
CV0901308	GRADING WITHOUT PERMIT	927680002	TEMECULA	3/9/2009
CV0901504	GRADING WITHOUT PERMIT	584250030	Aguanga	3/3/2009
CV0901504	GRADING WITHOUT PERMIT	584250030	Aguanga	3/19/2009
CV0901589	GRADING WITHOUT PERMIT	571580005	AGUANGA	3/6/2009
CV0901589	GRADING WITHOUT PERMIT	571580005	AGUANGA	3/16/2009
CV0901704	GRADING WITHOUT PERMIT	571600004	AGUANGA	3/11/2009
CV0901704	GRADING WITHOUT PERMIT	571600004	AGUANGA	3/24/2009
CV0901914	GRADING WITHOUT PERMIT	584190015	AGUANGA	3/18/2009
CV0901914	GRADING WITHOUT PERMIT	584190015	AGUANGA	3/24/2009
CV0903044	Grading without permits		TEMECULA	4/29/2009
CV0903222	GRADING WITHOUT PERMIT	928220030 LEGAL ADDRESS PER LMS IS 37020 VIA VISTA GRANDE, MURRIETA		5/7/2009
CV0903222	GRADING WITHOUT PERMIT	928220030 LEGAL ADDRESS PER LMS IS 37020 VIA VISTA GRANDE, MURRIETA		6/22/2009
CV0903542	UNAPPROVED GRADING/CLEAR	470450011 ADDRESS: PARCEL EAST OF 37370 HORSEMAN DR. TEMECULA		5/15/2009
CV0903542	UNAPPROVED GRADING/CLEAR	470450011 ADDRESS: PARCEL EAST OF 37370 HORSEMAN DR. TEMECULA		5/20/2009
CV0903823	Grading Without Permit	924180020		5/28/2009
			Total	239

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Illegal Grading Open FY0809

Case #	Case Opened	CASE NAME	Location	Case Status	CITY
CV0807002	8/14/2008	Grading without permits		Open	TEMECULA
CV0810935	12/30/2008	GRADING WITHOUT PERMIT	915550057	Open	Temecula
CV0900940	2/4/2009	GRADING WITHOUT PERMIT	901060007	Closed	LAKE ELSINORE
CV0901308	2/25/2009	GRADING WITHOUT PERMIT	927680002	Closed	TEMECULA
CV0806408	7/24/2008	Grading Without Permit	924150015	Closed	TEMECULA
CV0806315	7/22/2008	Grading Without Permit	917260046	Closed	TEMECULA
CV0807962	9/16/2008	GRADING WITHOUT PERMIT	936280018	Open	TEMECULA
CV0806189	7/17/2008	GRADING WITHOUT PERMIT	380120012	Closed	WILDOMAR
CV0807745	9/8/2008	STOCKPILING SOIL	382200012	Closed	WILDOMAR
CV0807172	8/20/2008	GRADING WITHOUT PERMIT	917260050	Open	TEMECULA
CV0807517	9/2/2008	Grading Without Permit	901-020-022	Open	
CV0810921	12/30/2008	GRADING WITHOUT PERMIT	915220023	Closed	TEMECULA
CV0805770	7/1/2008	GRADING WITHOUT PERMIT		Closed	WILDOMAR
CV0807960	9/16/2008	Grading Without Permit	915120042	Closed	TEMECULA
CV0805942	7/9/2008	GRADING WITHOUT PERMIT	931240004	Closed	MURRIETA
CV0900250	1/13/2009	GRADING WITHOUT PERMIT	571500001	Closed	Hemet
CV0805752	7/1/2008	GRADING WITHOUT PERMIT	932120010	Closed	
CV0810732	12/18/2008	GRADING WITHOUT PERMIT	469100006	Closed	HEMET
CV0809732	11/17/2008	Grading without Permit	927340016	Closed	TEMECULA
CV0805787	7/2/2008	GRADING WITHOUT PERMIT	927530018	Closed	TEMECULA
CV0808985	10/23/2008	Grading without Permit	927330014	Closed	TEMECULA
CV0807801	9/10/2008	GWP	9172600051 □ADDR: 4600 ANZA RD., TEMECULA	Open	
CV0809250	10/31/2008	Surface Mining	Par. N/o 29990 TECHNOLOGY DR, MURRIETA, CA. 92563 □	Closed	
CV0806430	7/25/2008	GRADING WITHOUT PERMIT	571040013 □Address: Parcel South East of 44630 Skaggs Road, Hemet, CA	Open	
CV0806594	7/30/2008	GRADING WITHOUT PERMIT	932330060	Closed	
CV0900124	1/9/2009	GRADING WITHOUT PERMIT	951140057 □Address: SW corner of Rancho California and Anza, Temecula	Closed	
CV0806657	8/1/2008	GRADING WITHOUT PERMIT		Closed	MURRIETA
CV0810927	12/30/2008	GRADING WITHOUT PERMIT	917260042	Open	TEMECULA
CV0900168	1/12/2009	Grading without Permit	915750014	Open	
CV0807738	9/8/2008	CONSTRUCTION WITHOUT PERMIT	376361005	Closed	WILDOMAR
CV0808768	10/16/2008	GRADING WITHOUT PERMIT	928260030	Closed	
CV0807365	8/27/2008	Grading without permits/NPDES	917260051	Open	TEMECULA

Illegal Grading Open FY0809

Case #	Case Opened	CASE NAME	Location	Case Status	CITY
CV0808502	10/3/2008	CWP	579440008	Open	ANZA
CV0807810	9/10/2008	GWP	583280007	Closed	AGUANGA
CV0807862	9/11/2008	GWP	575280001 □1 Par. S/o of 59783 Hop Patch Springs Rd., Mountain Center	Closed	
CV0900463	1/21/2009	GRADING WITHOUT PERMIT	362240025	Closed	WILDOMAR
CV0901105	2/17/2009	GRADING WITHOUT PERMIT	380050019	Closed	WILDOMAR
CV0808508	10/3/2008	GRADING WITHOUT PERMIT	367300001	Closed	WILDOMAR
CV0810753	12/19/2008	GRADING WITHOUT PERMIT	927360027	Closed	Temecula
CV0810919	12/30/2008	GRADING WITHOUT PERMIT	915550042	Open	TEMECULA, CA
CV0808368	10/1/2008	GWP	951-080-018	Closed	TEMECULA
CV0808369	10/1/2008	GWP	951-080-024	Closed	TEMECULA
CV0808480	10/2/2008	GWP	966040008	Closed	TEMECULA
CV0810931	12/30/2008	GRADING WITHOUT PERMIT	915550068	Open	TEMECULA, CA
CV0810074	12/1/2008	Grading without permit	APN: 928-280-018 □	Closed	murrieta
CV0810910	12/30/2008	GWP-EXPIRED PERMIT	915550045	Open	TEMECULA
CV0901451	3/2/2009	GRADING W/O PERMIT	941190036	Open	TEMECULA
CV0810817	12/24/2008	Grading Without Permit	928220027	Open	
CV0809500	11/6/2008	Gradin without permit	579140033	Closed	ANZA
CV0901589	3/6/2009	GRADING WITHOUT PERMIT	571580005	Closed	AGUANGA
CV0901704	3/11/2009	GRADING WITHOUT PERMIT	571600004	Closed	AGUANGA
CV0810048	11/25/2008	Grading W/O Permit	963040003	Closed	MURRIETA
CV0810251	12/4/2008	Grading without Permit	941100002	Open	TEMECULA
CV0810940	12/30/2008	GRADING WITHOUT PERMIT	915220016	Open	TEMECULA, CA
CV0810765	12/19/2008	GWP	NEW APN# 927490025	Open	
CV0900293	1/14/2009	GRADING WITHOUT PERMIT	941310004	Closed	TEMECULA
CV0903220	5/7/2009	GRADING WITHOUT PERMIT	928230016 LEGAL ADDRESS PER LMS IS 38155 VIA VISTA GRANDE, MURRIETA	Open	
CV0903222	5/7/2009	GRADING WITHOUT PERMIT	928220030 LEGAL ADDRESS PER LMS IS 37020 VIA VISTA GRANDE, MURRIETA	Closed	
CV0903224	5/7/2009	GRADING WITHOUT PERMIT	928220029 LEGAL ADDRESS PER LMS IS 37120 VIA VISTA GRANDE, MURRIETA	Open	
CV0810926	12/30/2008	GRADING WITHOUT PERMIT	964120013	Open	TEMECULA
CV0810627	12/16/2008	GRADING W/O PERMIT	927360027	Closed	TEMECULA
CV0810941	12/30/2008	GRADING WITHOUT PERMIT	941020001	Open	TEMECULA
CV0901874	3/17/2009	GRADING WITHOUT PERMIT	929230004	Open	MURRIETA
CV0810936	12/30/2008	GRADING WITHOUT PERMIT	915560017	Closed	TEMECULA
CV0810767	12/19/2008	Grading Without Permit	927490024	Open	

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Illegal Grading Open FY0809

Case #	Case Opened	CASE NAME	Location	Case Status	CITY
CV0810930	12/30/2008	GRADING WITHOUT PERMIT	915550016	Closed	TEMECULA
CV0810938	12/30/2008	GRADING WITHOUT PERMIT	941310012	Open	TEMECULA, CA
CV0900467	1/21/2009	GRADING WITHOUT PERMIT	362240026	Closed	WILDOMAR
CV0900300	1/14/2009	GRADING W/O PERMIT	576610010	Closed	AGUANGA
CV0901373	2/27/2009	Grading Without Permit	584250029	Open	Aguanga
CV0901255	2/23/2009	GRADING WITHOUT PERMIT	951120024	Closed	TEMECULA
CV0901298	2/24/2009	GRADING WITHOUT PERMIT	927660002	Closed	TEMECULA
CV0903285	5/7/2009	GRADING WITHOUT PERMIT	928220012	Open	
CV0901504	3/3/2009	GRADING WITHOUT PERMIT	584250030	Closed	Aguanga
CV0901424	2/27/2009	GRADING WITHOUT PERMIT	380290008	Open	WILDOMAR
CV0903044	4/29/2009	Grading without permits		Closed	TEMECULA
CV0903552	5/15/2009	GRADING WITHOUT PERMIT	38240005	Closed	LAKE ELSINORE
CV0901914	3/18/2009	GRADING WITHOUT PERMIT	584190015	Closed	AGUANGA
CV0904190	6/10/2009	GRADING WITHOUT PERMIT	932060031	Open	MURRIETA
CV0902270	3/31/2009	UNAPPROVED GRADING	581110010	Open	AGUANGA
CV0903811	5/28/2009	Grading Without Permit	927210018	Open	TEMECULA
CV0902917	4/27/2009	GRADING WITHOUT PERMIT	928190018	Open	MURRIETA
CV0903221	5/7/2009	GRADING WITHOUT PERMIT	928230015 LEGAL ADDRESS PER LMS IS 38175 VIA VISTA GRANDE, MURRIETA	Open	
CV0903223	5/7/2009	GRADING WITHOUT PERMIT	928220024 LEGAL ADDRESS PER LMS IS 37195 VIA VISTA GRANDE, MURRIETA	Open	
CV0903225	5/7/2009	GRADING WITHOUT PERMIT	928220025 LEGAL ADDRESS PER LMS IS 37720 VIA VISTA GRANDE, MURRIETA	Open	
CV0903226	5/7/2009	GRADING WITHOUT PERMIT	928220026 LEGAL ADDRESS PER LMS IS 37980 VIA VISTA GRANDE, MURRIETA	Open	
CV0903284	5/7/2009	GRADING WITHOUT PERMIT	928220011	Open	
CV0903823	5/28/2009	Grading Without Permit	924180020	Closed	

Illegal Dumping Closed FY0708

Case #	CASE NAME	Location	CITY	Date Closed
SE055748	Illegal Dumping		TEMECULA	2/10/2009
SE060783	Illegal Dumping	951160009	TEMECULA	2/11/2009
SE060827	Illegal Dumping	APN # 469-230-009 West of 30920 Charlene Way, Diamond Valley		2/11/2009
SE060898	Illegal Dumping	Owl Valley Rd. & Quarter Valley Rd. Sage		2/11/2009
SE063191	Illegal Dumping	6th St & C St Valle Vista		2/10/2009
SE066628	Illegal Dumping	North of SH 79 & East of Anza		2/10/2009
SE067132	Illegal Dumping	Mira & Scott Menifee		2/11/2009
SE0800425	Illegal Dumping	Cahuilla and Ave 66		9/11/2008
SE0800457	Illegal Dumping	Sage X/of Cactus		7/22/2008
SE0800478	Illegal Dumping	963321031	MURRIETA	9/12/2008
SE0800591	Illegal Dumping	Sage Rd x/of Cactus Valley road		9/22/2008
SE0800661	Illegal Dumping	2nd and Cahuilla		8/8/2008
SE0800731	Illegal Dumping	2nd and Coahuilla		9/15/2008
SE0800731	Illegal Dumping	2nd and Coahuilla		8/27/2008
SE0800807	Illegal Dumping	3rd/Coahuilla		9/23/2008
SE0800807	Illegal Dumping	3rd/Coahuilla		9/24/2008
SE0900022	Illegal Dumping	2nd & Coahuilla		1/9/2009
SE0900022	Illegal Dumping	2nd & Coahuilla		1/20/2009
SE0900112	Illegal Dumping	24831 Clinton Keith	WILDOMAR	5/14/2009
SE0900112	Illegal Dumping	24831 Clinton Keith	WILDOMAR	2/3/2009
SE0900113	ILLEGAL DUMPING	30040 COMMERCE CT. AND MURRIETA HOT SPRINGS/POUROY		2/4/2009
SE0900113	ILLEGAL DUMPING	30040 COMMERCE CT. AND MURRIETA HOT SPRINGS/POUROY		4/24/2009
SE0900118	Illegal Dumping	Coahuilla St & 2nd	mecca	2/11/2009
SE0900118	Illegal Dumping	Coahuilla St & 2nd	mecca	2/5/2009
SE0900227	ILLEGAL DUMPING	WINCHESTER/BOREL		3/17/2009
SE0900227	ILLEGAL DUMPING	WINCHESTER/BOREL		4/24/2009
SE0900276	ILLEGAL DUMPING	2ND/COAHUILLA		3/31/2009
SE0900276	ILLEGAL DUMPING	2ND/COAHUILLA		4/8/2009
				Total 28

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Illegal Dumping Open FY0809

Case #	Case Opened	Case Type	Location	Current Status	CITY
SE0800850	10/10/2008	Illegal Dumping	Cactus Valley & Sage	Open	
SE0900201	3/6/2009	ILLEGAL DUMPING	CHRISTMAS TREE LANE/SANTA ROSA MINES RD	Open	
SE0900430	5/29/2009	Illegal Dumping	Ave 62 & Van Buren	Open	
SE0900368	5/5/2009	Illegal Dumping	Mountain & Menifee	Open	
SE0900471	6/18/2009	Illegal Dumping	Walden Rd x/of Murrieta	Open	

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NPDES Closed FY0809

Case #	Location	CITY	Closed Dated
CV034155	940030002 □ADDR 27695 RANCHO CALIFORNIA RD TEMECULA CA :Contact: MANNING BRUCE/"LOURDES"		2/23/2009
CV034155	940030002 □ADDR 27695 RANCHO CALIFORNIA RD TEMECULA CA :Contact: MANNING BRUCE/"LOURDES"		2/23/2009
SE055927	Vuelta Grande Rd. & Carancho Rd. De Luz Creek		2/10/2009
SE055927	Vuelta Grande Rd. & Carancho Rd. De Luz Creek		2/10/2009
SE060090	Avenida De La Bandlaro APN # 924-180-009		2/11/2009
SE060090	Avenida De La Bandlaro APN # 924-180-009		2/11/2009
SE061735	Murrieta Rd. & Corson Ave. Menifee		2/11/2009
SE061735	Murrieta Rd. & Corson Ave. Menifee		2/11/2009
SE064741		WILDOMAR	2/10/2009
SE064741		WILDOMAR	2/10/2009
SE0800728	1 Parcel W. of 35100 Calle Nopal		8/27/2008
SE0800728	1 Parcel W. of 35100 Calle Nopal		10/27/2008
SE0800728	1 Parcel W. of 35100 Calle Nopal		8/27/2008
SE0800728	1 Parcel W. of 35100 Calle Nopal		10/27/2008

NPDES Open FY0809

Case #	Date Opened	CASE NAME	Location	Case Status	CITY
SE0800728	8/27/2008	NPDES/grading without permits	1 Parcel W. of 35100 Calle Nopal	Closed	
SE0800728	8/27/2008	NPDES/grading without permits	1 Parcel W. of 35100 Calle Nopal	Closed	
SE0900286	4/3/2009	NPDES VIOLATION	38300 Via Majorca, Murrieta	Open	
SE0900286	4/3/2009	NPDES VIOLATION	38300 Via Majorca, Murrieta	Open	

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PLANNING DEPARTMENT

Project Address	Street Address	Cross Street	Tracking No.	City	Zip	Tract/Block or Assessor Parcel No.	Acreage	Project Type	Project Description	Wetlands? (Use Note 1)	Project Priority	No. of Units	Owner/ Applicant Name	Owner/ Applicant Address	Owner/ Applicant Phone	Owner/ Applicant Email	Contact Name	Contact Address	Contact Phone	Contact Email	Contact Preferred Method
PROJECT GENERAL INFORMATION																					
Project Location																					
6300 Ayala Drive, Suite 150			Tentative	Rancho Cucamonga	91701	1100-070-01-0000	1.0	Other Tenant Improvement	Tenant improvements for a new Dollar Tree store.	No	Medium	1	Dollar Tree Stores, Inc.	500 Volvo Parkway	(757) 321-5500		Jeff Hoffman	500 Volvo Parkway	(757) 321-5500		Email
6300 Ayala Drive, Suite 200			Tentative	Rancho Cucamonga	91701	1100-070-01-0000	1.0	Other Tenant Improvement	Tenant improvements for a new Dollar Tree store.	No	Medium	1	Dollar Tree Stores, Inc.	500 Volvo Parkway	(757) 321-5500		Jeff Hoffman	500 Volvo Parkway	(757) 321-5500		Email
6300 Ayala Drive, Suite 300			Tentative	Rancho Cucamonga	91701	1100-070-01-0000	1.0	Other Tenant Improvement	Tenant improvements for a new Dollar Tree store.	No	Medium	1	Dollar Tree Stores, Inc.	500 Volvo Parkway	(757) 321-5500		Jeff Hoffman	500 Volvo Parkway	(757) 321-5500		Email
6300 Ayala Drive, Suite 400			Tentative	Rancho Cucamonga	91701	1100-070-01-0000	1.0	Other Tenant Improvement	Tenant improvements for a new Dollar Tree store.	No	Medium	1	Dollar Tree Stores, Inc.	500 Volvo Parkway	(757) 321-5500		Jeff Hoffman	500 Volvo Parkway	(757) 321-5500		Email
6300 Ayala Drive, Suite 500			Tentative	Rancho Cucamonga	91701	1100-070-01-0000	1.0	Other Tenant Improvement	Tenant improvements for a new Dollar Tree store.	No	Medium	1	Dollar Tree Stores, Inc.	500 Volvo Parkway	(757) 321-5500		Jeff Hoffman	500 Volvo Parkway	(757) 321-5500		Email
14 Mauk Street			Tentative	Irvine	92618	1100-070-01-0000	1.0	Other Tenant Improvement	Tenant improvements for a new Dollar Tree store.	No	Medium	1	Dollar Tree Stores, Inc.	500 Volvo Parkway	(757) 321-5500		Jeff Hoffman	500 Volvo Parkway	(757) 321-5500		Email
4150 Winchester Road, Suite 212A			Tentative	Murrieta	92562	961-080-019	NO

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CODE ENFORCEMENT DEPARTMENT

CODE ENFORCEMENT
Illegal Dumping Closed FY0809

Case #	CASE NAME	Location	CITY	Date Closed	WATERSHED
SE063191	Illegal Dumping	6th St & C St Valle Vista		2/10/2009	SA
SE055748	Illegal Dumping		TEMECULA	2/10/2009	SMR
SE060783	Illegal Dumping	951160009	TEMECULA	2/11/2009	SMR
SE060827	Illegal Dumping	APN # 469-230-009 West of 30920 Charlene Way, Diamond Valley		2/11/2009	SMR
SE060898	Illegal Dumping	Owl Valley Rd. & Quarter Valley Rd. Sage		2/11/2009	SMR
SE066628	Illegal Dumping	North of SH 79 & East of Anza		2/10/2009	SMR
SE067132	Illegal Dumping	Mira & Scott Menifee		2/11/2009	SMR
SE0800457	Illegal Dumping	Sage X/of Cactus		7/22/2008	SMR
SE0800478	Illegal Dumping	963321031	MURRIETA	9/12/2008	SMR
SE0800591	Illegal Dumping	Sage Rd x/of Cactus Valley road		9/22/2008	SMR
SE0900112	Illegal Dumping	24831 Clinton Keith	WILDOMAR	5/14/2009	SMR
SE0900112	Illegal Dumping	24831 Clinton Keith	WILDOMAR	2/3/2009	SMR
SE0900113	ILLEGAL DUMPING	30040 COMMERCE CT. AND MURRIETA HOT SPRINGS/POUROY		2/4/2009	SMR
SE0900113	ILLEGAL DUMPING	30040 COMMERCE CT. AND MURRIETA HOT SPRINGS/POUROY		4/24/2009	SMR
SE0900227	ILLEGAL DUMPING	WINCHESTER/BOREL		3/17/2009	SMR
SE0900227	ILLEGAL DUMPING	WINCHESTER/BOREL		4/24/2009	SMR
SE0800425	Illegal Dumping	Cahuilla and Ave 66		9/11/2008	W
SE0800661	Illegal Dumping	2nd and Cahuilla		8/8/2008	W
SE0800731	Illegal Dumping	2nd and Coahuilla		9/15/2008	W
SE0800731	Illegal Dumping	2nd and Coahuilla		8/27/2008	W
SE0800807	Illegal Dumping	3rd/Coahuilla		9/23/2008	W
SE0800807	Illegal Dumping	3rd/Coahuilla		9/24/2008	W
SE0900022	Illegal Dumping	2nd & Coahuilla		1/9/2009	W
SE0900022	Illegal Dumping	2nd & Coahuilla		1/20/2009	W
SE0900118	Illegal Dumping	Coahuilla St & 2nd	mecca	2/11/2009	W
SE0900118	Illegal Dumping	Coahuilla St & 2nd	mecca	2/5/2009	W
SE0900276	ILLEGAL DUMPING	2ND/COAHUILLA		3/31/2009	W
SE0900276	ILLEGAL DUMPING	2ND/COAHUILLA		4/8/2009	W
				Total 28	

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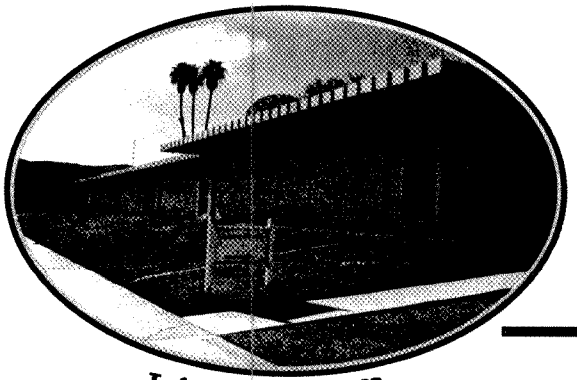

Lake Elsinore Office

Home Gardens Office

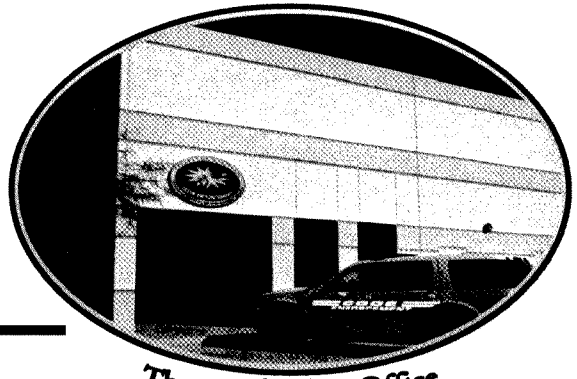

Thousand Palms Office

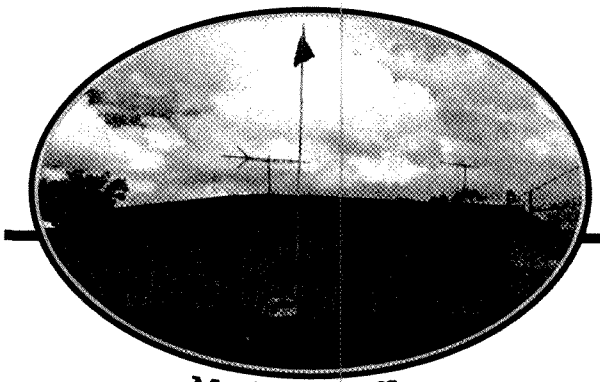

Mead Valley Office

COUNTY OF RIVERSIDE
CODE ENFORCEMENT
TRANSPORTATION & LAND MANAGEMENT AGENCY

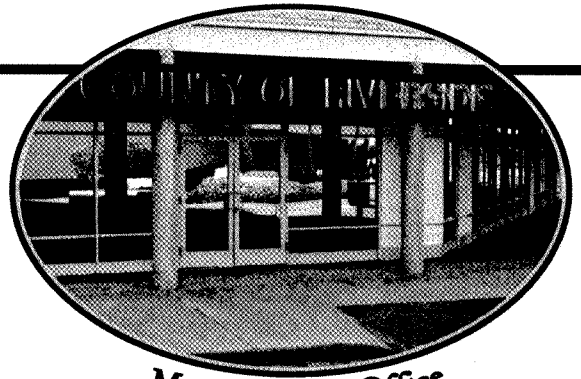

Moreno Valley Office

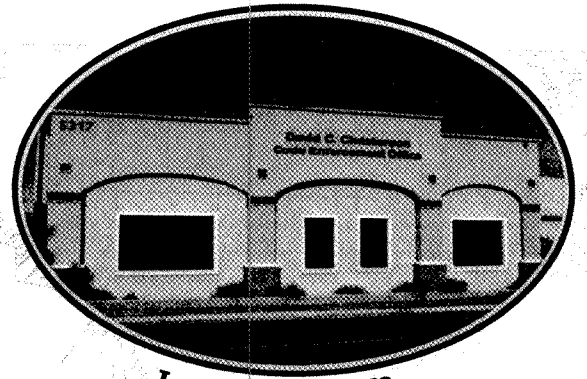

Jurupa Valley Office

2008 Annual Report

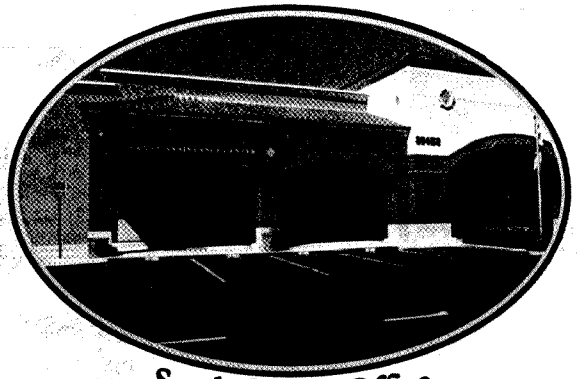

South County Office

County of Riverside
Code Enforcement Department

0003730

County of Riverside
Board of Supervisors

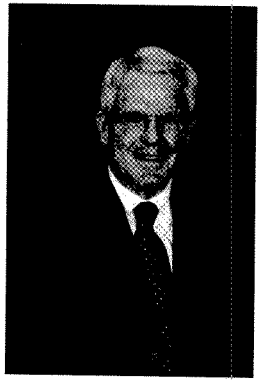

Bob Buster
District 1

John F. Tavaglione
District 2

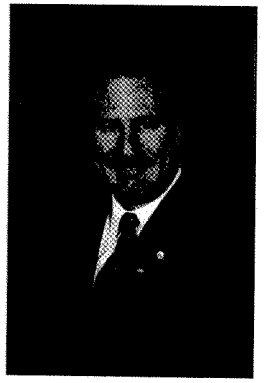

Jeff Stone
District 3

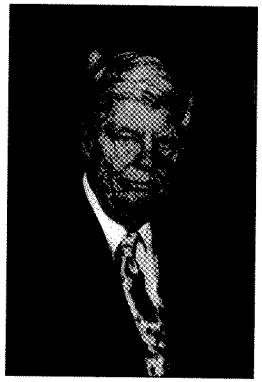

Roy Wilson
District 4

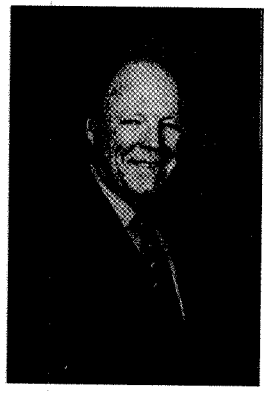

Marion Ashley
District 5

The Code Enforcement Department would like to thank the Board of Supervisors whose forward thinking has given us the support we need to make such a positive impact for the residents and businesses of Riverside County.

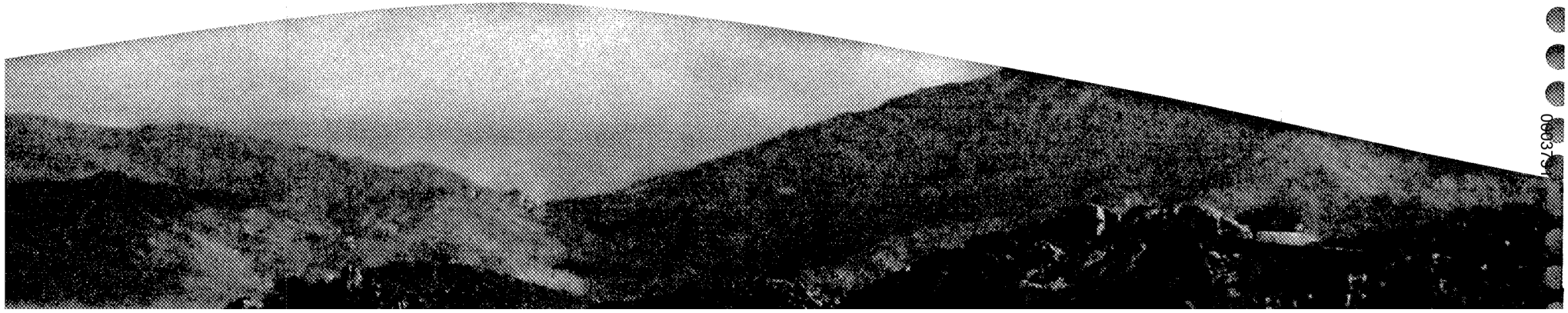

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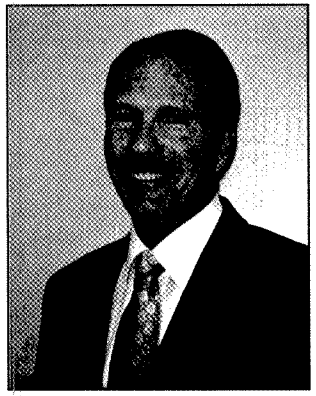

January 2009

To the Residents of Riverside County:

This past year has been filled with challenging opportunities. After accepting the position of Code Enforcement Director in September, I quickly developed an understanding of why this department has long been recognized for its problem-solving skills. In the last two years, Code Enforcement has been re-engineered to become the flagship code enforcement agency statewide. Our vision is to develop, establish, and maintain "sustainable healthy neighborhoods." By partnering with our neighborhood communities, and engaging them in developing and using their own assets and skills, we not only get to the bottom of their fundamental code issues, but the potential for long-term sustainability is greatly enhanced. As the Director, I am committed to providing training and resources necessary to give our officers and staff all the tools and skills they will need to be effective in their chosen professions. I look forward to the challenges that lie ahead of us in the coming years as we continue moving forward to make a positive difference in the communities we serve.

John Boyd

John Boyd, Director
Code Enforcement Department
County of Riverside

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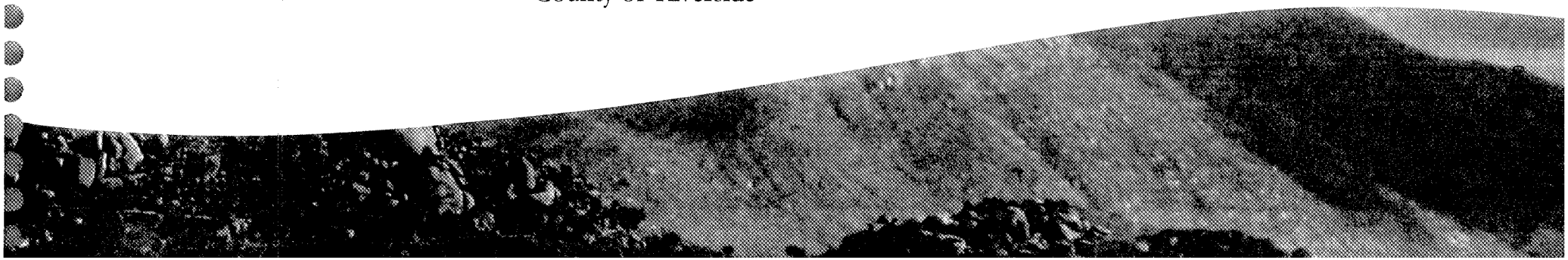

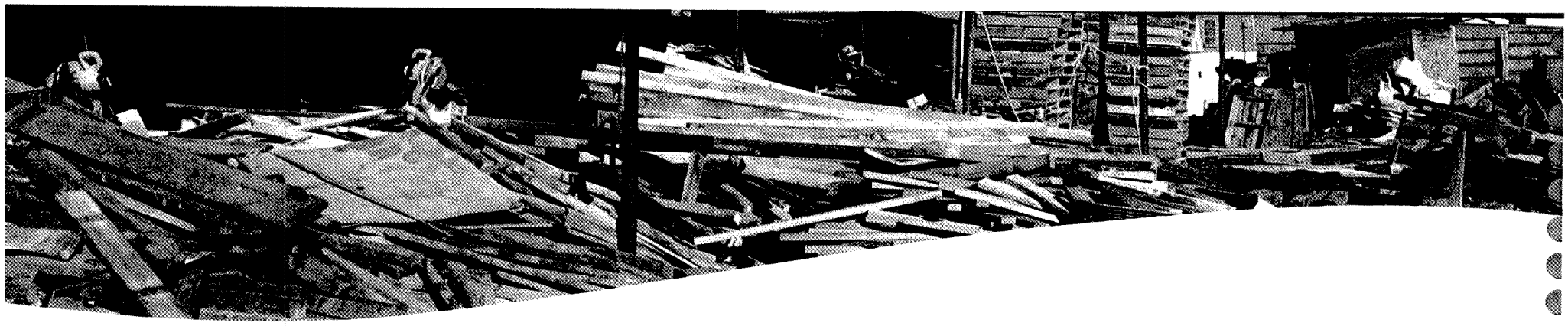

Code Enforcement Department Management Team

Greg Flannery
Division Manager

Tracey Towner
Division Manager

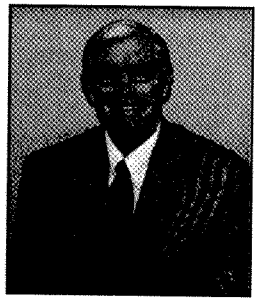

Steve Bloomquist
Division Manager

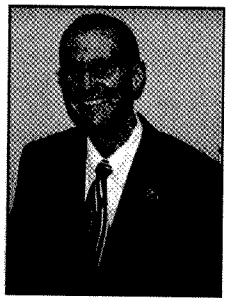

Jim Monroe
Division Manager

Ward Komers
Administrative Manager

Vision Statement

Our vision is to develop, establish, and maintain sustainable healthy neighborhoods.

Mission Statement

Our mission is to enhance public safety and the quality of life in partnership with communities through fair enforcement of laws and codes.

000378

Our Organization

150 Budgeted Positions
136 Filled Positions
101 Field Staff

Our Budget

FY08/09 $21,251,168
Serving over 554,571 residents

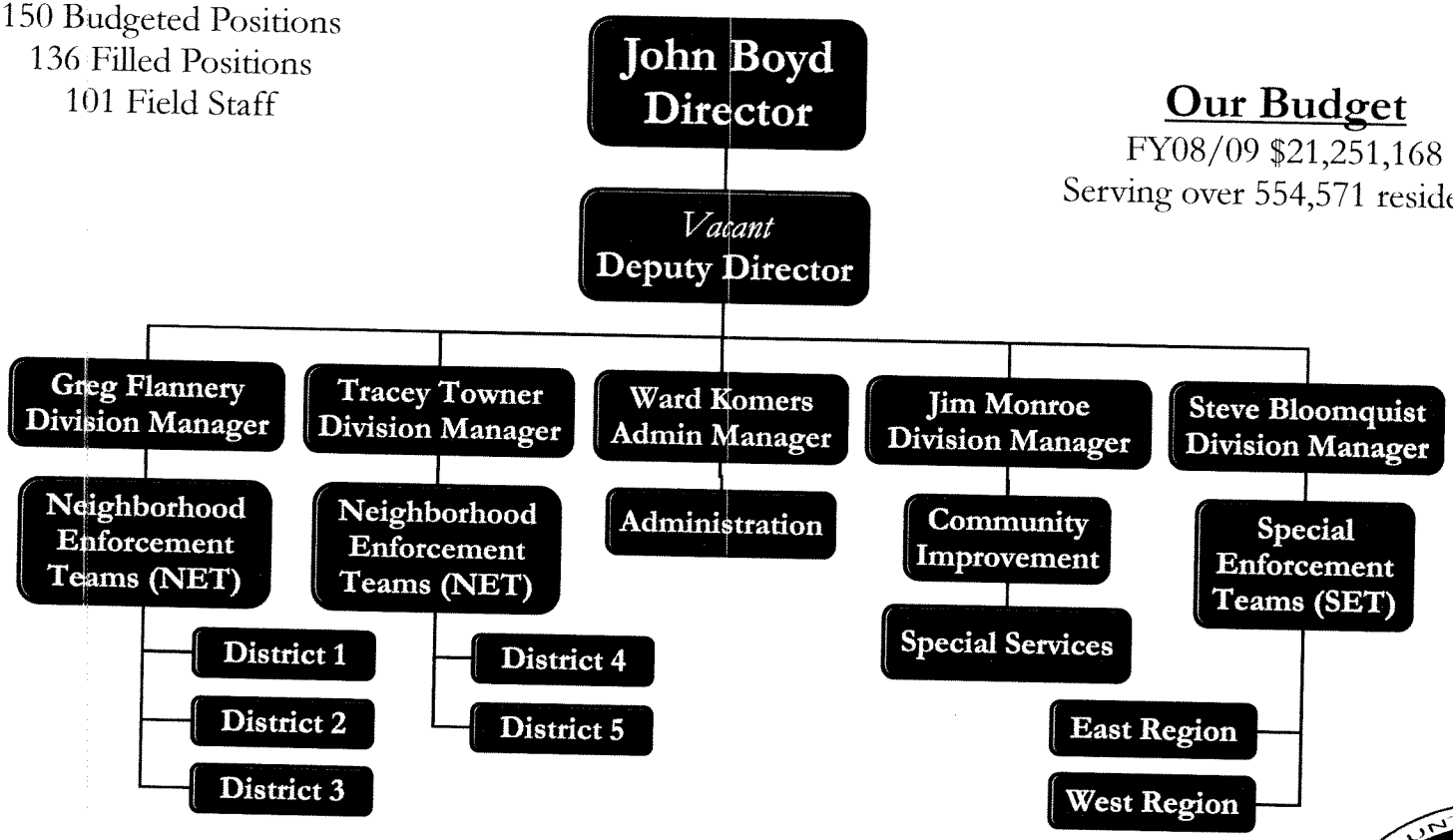

COUNTY OF RIVERSIDE
CODE ENFORCEMENT
TRANSPORTATION & LAND MANAGEMENT AGENCY

0003734

Highlights of 2008

- The Foreclosure Task Force, consisting of over 12 members from our department, was created to tackle code issues associated with the growing trend of abandoned and distressed homes. **This represents over 10% of our field staff dedicated to this issue in the last quarter of 2008.**

- **8,840 property inspections** have been conducted of the 12,663 homes in some stage of foreclosure targeted by the task force, which also identified **795 additional code violations** being addressed by our department.

- **34,750** copies of The Posting, our monthly Code Enforcement newsletter, were distributed in 2008.

- Generated **$2.8 million** in revenue and additional funding from land use/parking enforcement, vehicle abatement, grants, and other sources.

- Over **26,847** hits were registered on the Code Enforcement website at **http://www.rctlma.org/ce**.

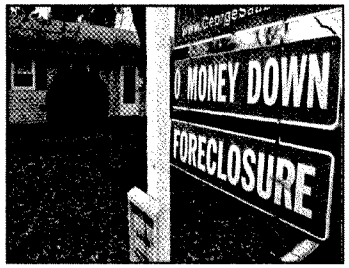

The Board of Supervisors passed Ordinances 880 & 881, effective May 13, 2008, which affects residential properties in the unincorporated areas of Riverside County. These properties, left unmaintained, have led to a decline in property value, pose a danger to children as attractive nuisances, provide opportunities for secretive criminal conduct including gang and drug related crimes, squatters, and real estate fraud. On June 27, 2008, previous Code Enforcement Director Jay E. Orr made the decision to host a forum for members of the financial and real estate communities so that they could come together and engage in open dialogue about these ordinances and the concerns of the county. The purpose of the meeting was to provide information about the registration and enforcement requirements of the ordinances. The forum also provided an opportunity for the public to ask questions and provide input on implementation concerns. Nearly 100 representatives from leading financial, real estate, and title companies participated in this meeting. Code Enforcement Director John Boyd opened the forum with introductions of the management team, followed by a presentation by Code Enforcement outlining a realistic perspective of the problem. Lisa Traczyk, Deputy County Counsel, walked the audience through the key components of the ordinances. Questions and comments from the participants lasted almost an hour, and several commented on their appreciation for the event.

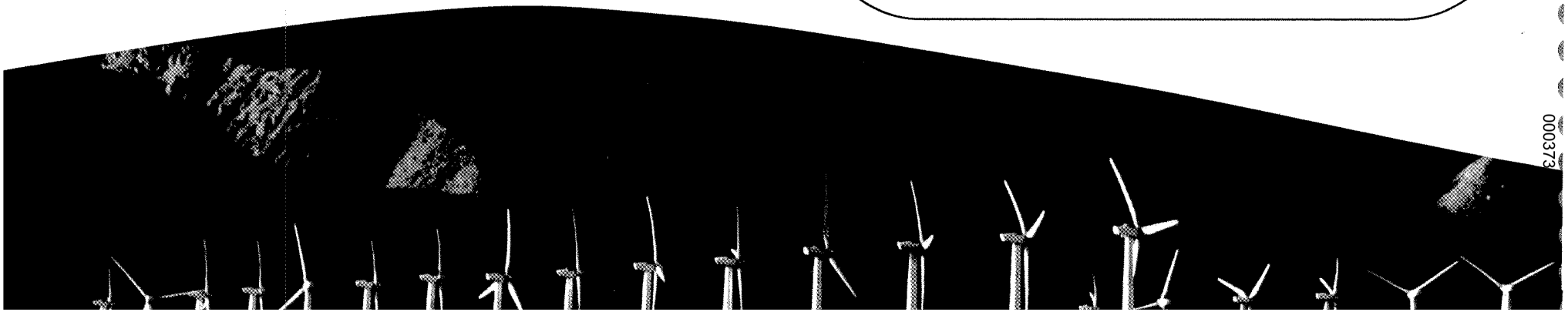

000373

Highlights of 2008 Continued...

- The **Thousand Palms** Code Enforcement office was opened in April of 2008, and the **Home Gardens** Code Enforcement office was opened in June of 2008.

- **10,941 new Code Enforcement cases** were investigated in **2008**. This is in addition to the 8,840 property inspections that have been conducted by the Foreclosure Task Force.

- **26,686 inspections** were conducted by Code Enforcement staff in 2008.

- **1,699 administrative citations** and **8,289 parking citations** were issued in 2008.

- **150 public hearings** regarding administrative abatements were held by the Board of Supervisors in 2008.

- The Code Enforcement Department sponsored over **1,135 media spots,** educating the public concerning a variety of code enforcement issues.

The Department continues to grow as offices were opened in Thousand Palms and Home Gardens. This demonstrates that Riverside County Code Enforcement grows side-by-side with the community. It also shows that officers and staff are working hard to form alliances with the communities, working together to improve the quality of life in Riverside County.

The beginning of the second quarter of 2008 marked a new phase for Riverside County Code Enforcement. This phase began with a radio campaign to introduce the Department and the various ways we can be of assistance to the community. These commercial spots gave examples of numerous violations and invited the community to call in and get informed on how to come into compliance. During the month of May, Code Enforcement officers made history, as they became guests of the 30-minute local show "Despierta Nuestro Valle" ("Wake Up Our Valley") on the Univision channel in the desert communities of District 4. They touched upon the history of Code Enforcement, types of violations, how to comply, and where the Department is going.

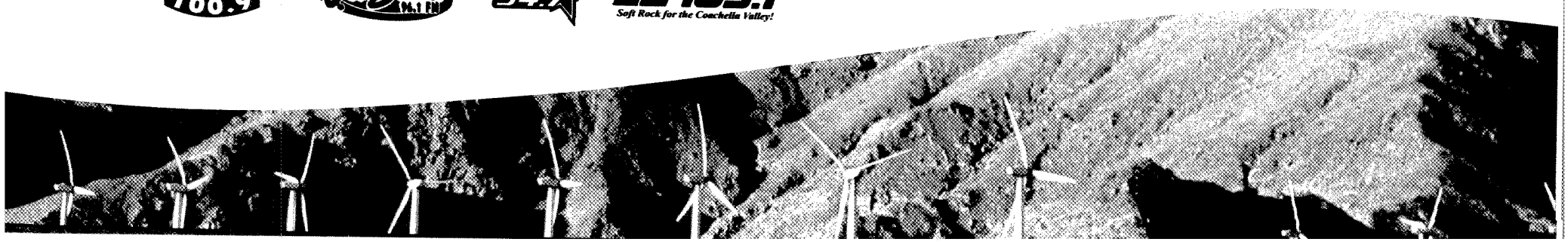

Highlights of 2008

- We held **34 community cleanup events** in 2008.
- These cleanup events collected over **1,106 tons of trash** and serviced well over **2,000 participants**.
- The Trash Task Force collected over **2,383 tons of trash** from our roadsides in 2008.
- Our **compliance rate for accumulated rubbish cases** has increased from 68% in 2007 to **77% in 2008**. Because the process for these cases has been streamlined, we are operating more efficiently; we experienced a **50% increase in opened cases** and a **70% increase in closed cases** for accumulated rubbish in 2008.
- In conjunction with our Community Impact Plans, we held over **10 community resource fairs** and **15 code enforcement workshops** to better inform the community members on ways they can "violation proof" their properties.

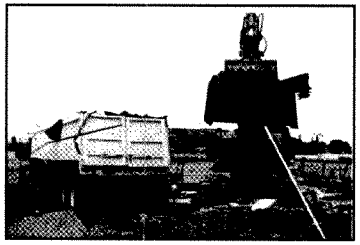

The Riverside County Board of Supervisors recently amended the ordinance (Ord. 541.5) that regulates the removal of rubbish, including green waste. This ordinance was amended to protect the health and welfare of residents from possible fire hazards and other safety concerns by expediting the process in which trash can be removed from vacant parcels.

Although Notices of Violation are still required, the time frames have been significantly reduced to gain compliance. This ordinance will allow county officials the ability to move quickly in abating these violations.

This improved process has increased the number of accumulated rubbish cases the Code Enforcement Department opened in 2008 to 2,198, which is 737 more than in 2007.

The fact that we can move expeditiously on this issue has led to increased compliance. We have been able to resolve 1,696 of accumulated rubbish cases in 2008, which is an increase of 703 cases over 2007.

0003737

Highlights of 2008 Continued...

- **622 criminal citations** were issued for **illegal vending (51% increase over 2007)** and **228 criminal citations** were issued for **illegal dumping** in 2008.

- We implemented the "Safe Parks Now" program, which has identified and **inspected 349 units in 25 illegal or non-permitted mobile home parks,** addressing dangerous health and safety conditions affecting the residents of these parks.

- We continue to provide Code Enforcement services to the newly incorporated cities of Wildomar and Menifee.

- **$242,783** in grant funds were utilized by our Community Improvement Program to help owners clean and improve their properties, thereby enhancing their community.

- We cleaned up the largest trash pile in the history of the County. See page 9 for more information.

- We hosted our First Annual Neighborhood Conference. See page 11 for more information.

- We received the Challenge Award from the California Association of Counties (CSAC) for our Community Impact Plans. See page 13 for more information.

In the recent months, Code Enforcement officers have been working with mobile home park owners and residents in addressing immediate health and safety concerns. During this time, the Department launched the "Safe Parks Now" program to address quality of life issues within mobile home parks in the Coachella Valley. In order to address the health and safety issues found within these parks, a task force was formed between state and county agencies, including Code Enforcement, Housing & Community Development, Catholic Charities, Economic Development Agency, Housing Authority, and the California Rural Legal Assistance.

To date, this group of park inspectors has conducted inspections of 25 illegal and unpermitted mobile home parks. The outcome of the inspections has been very positive since the team identified and addressed numerous life-threatening conditions, such as exposed, energized wires and uncovered cesspools. The diligent efforts of the task force has resulted in the elimination of various types of health and safety hazards. These actions mean that the residents, including many children, are no longer being subjected to ongoing health risks. During the inspections, property owners are also being educated concerning their options and presented with programs available from county agencies that may assist them in bringing their properties into compliance.

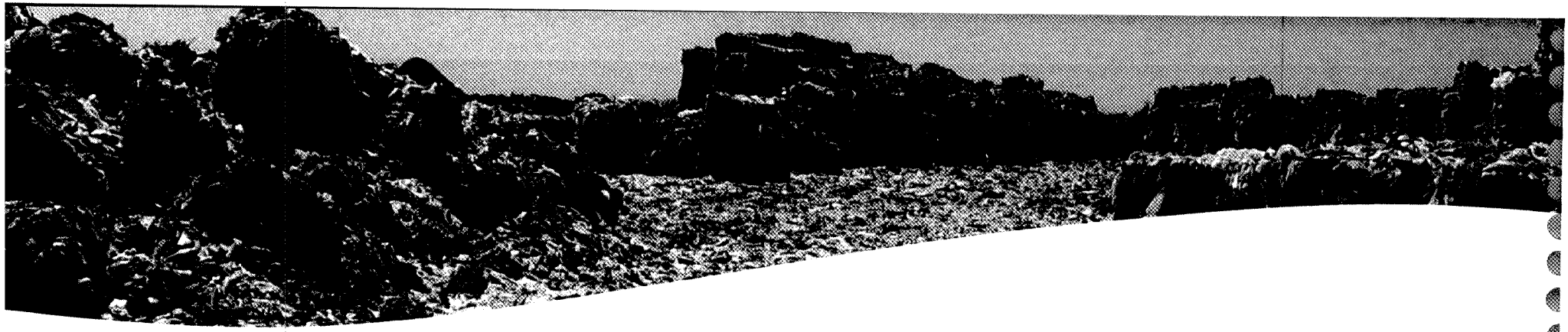

Code Enforcement and the California Integrated Waste Management Board Team Up to Clean One of the Largest Trash Heaps in County History

Code Enforcement routinely investigates illegal and unpermitted businesses and complaints regarding accumulated rubbish. However, this investigation, spearheaded by Senior Officer George Gianos, very rapidly escalated into an abatement action that far exceeded the scope of any trash cleanup undertaken by the Department. Senior Officer Gianos described his first encounter with this enormous trash heap this way: "We investigated the matter and discovered stockpiles of bundled trash covering an area of about seven acres. **Some of the bundles were stockpiled over 20 feet high!** The bundles consisted of household trash, soft goods, and plastics. The site contained no active fire prevention apparatus or measures for rodent control." The property owner, doing business as Mission Fiber, was immediately notified of the violations by Senior Officer Gianos, who also brought County Counsel into the mix to begin processing a court case for injunctive relief. Pam Walls, Assistant County Counsel, delivered a powerfully persuasive argument in favor of shutting the business down and cleaning the site immediately. Due to the overwhelming evidence of potential harm to the public, a judge agreed with Ms. Walls and ordered Mission Fiber to cease operation and remove the offending rubbish from the property. Senior Officer Gianos then began the arduous task of enforcing the court order and ensuring the cleanup of the property. "Unfortunately, the business owner was reluctant to comply," said Senior Officer Gianos. "The business owner's idea of compliance was to remove the rubbish at a slow pace, spanning several months to two other counties." Several attempts by the owners to remove the rubbish failed and were met with stiff legal opposition from other counties. It was beginning to look like Code Enforcement was going to have to move forward in contracting for the abatement of this monumental nuisance. A preliminary job walk was conducted, which established the amount of trash to be removed at about 12,000 tons, making this the largest trash removal project ever undertaken by county Code Enforcement.

000379

Senior Officer George Gianos receives a special proclamation from the Board of Supervisors, recognizing his resourcefulness in making this cleanup a success.

Bids came in ranging from several hundred thousand to over a million dollars to abate this mountain of trash. Knowing that the exorbitant amount of this abatement project could seriously jeopardize the future of Code Enforcement's abatement program, Senior Officer Gianos began looking for alternative funding sources. He knew that the Department had worked with the California Integrated Waste Management Board (CIWMB) on other enforcement programs in the past and were currently partnering with the CIWMB on the Waste Tire Enforcement Grant Program. Senior Officer Gianos felt this would be the perfect agency to pitch this cleanup project to. "I forwarded my case report, photos, and a cover letter requesting help to the CIWMB," said Senior Officer Gianos. "They promptly responded by sending their investigators and a state approved contractor to the site. We all walked the site, and I pointed out the hazardous conditions to the state officials. I was very pleased when I received word that the CIWMB had decided that the site fit the criteria for a state assisted cleanup. My case report was forwarded to the CIWMB review committee in Sacramento. **After testifying in front of the committee, our request was approved, and an award of $950,000 was budgeted toward the abatement.**" The state wasted no time in mobilizing equipment at the dump site. For about 12 days during the month of November, over 20 truckers hauled over 500 loads of rubbish to a landfill in Arizona. A CIWMB representative remained on site until the project was completed. Thanks to the innovative thinking by Senior Officer George Gianos, and the much appreciated assistance from the CIWMB, **this property is now in compliance, and the potential health and safety threat to the nearby city of Blythe has been avoided.**

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Riverside County Code Enforcement Department's First Annual Neighborhood Conference is a Huge Success

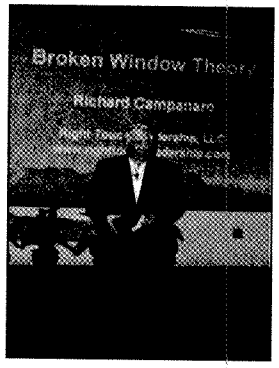

Keynote speaker Richard Campanaro's presentation on the "Broken Windows Theory" received rave reviews.

Our neighborhoods start with our families. As such, all were welcome at the Neighborhood Conference.

What the Community is Saying...

"...helped to educate me on the simplicity of empowering residents to effect change.

Excellent presentation with lots of ideas to share with my community.

Very well organized; please come back next year. I will tell my neighbors to come.

Code Enforcement did a great job... lots of good information."

Service FIRST

- **F**ocused on Compliance
- **I**nvestigate and Document
- **R**esponsive to the Community
- **S**ense of Appropriate Urgency
- **T**eamwork and Collaboration

COUNTY OF RIVERSIDE CODE ENFORCEMENT

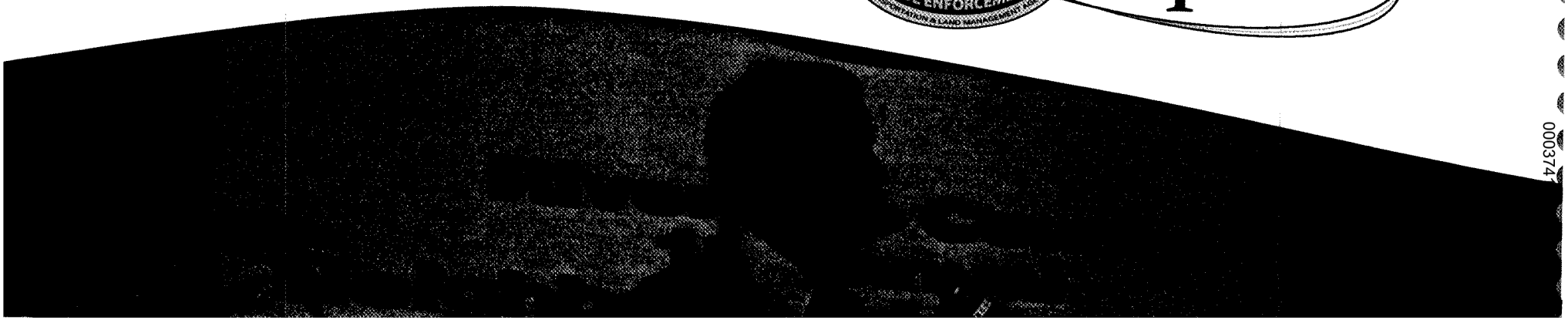

Partnering with Communities for Sustainable Neighborhoods

On Saturday, October 25, 2008, Riverside County Code Enforcement hosted its First Annual Neighborhood Conference at the beautiful UC Riverside Palm Desert campus. "Community Partnerships for Sustainable Neighborhoods" was the theme of the conference. The Following workshops were held for community members: Asset Based Community Development, Foreclosures, Making Meetings Work, Lush and Efficient Landscaping, Living with Diversity in Your Community, and 12 Steps of Emergency Preparedness.

Numerous public and private organizations provided information to the participants throughout the day. Richard Campanaro, the keynote speaker for the conference, presented the "Broken Windows Theory" as well as strategies for transforming your life and your community. When surveyed, the majority of the participants stated that this presentation was powerful and the highlight of the conference.

In addition to our innovative community impact plans, this conference is another method for our department to establish and maintain a beneficial relationship with the communities in which we serve. We will continue to work with these community stakeholders to educate and empower residents to improve the quality of life in their neighborhoods and to establish sustainable and healthy communities, while making the best use of all our resources.

Due to the success of this first Neighborhood Conference, plans are already underway for next year's event, which will include more information and strategies to assist residents and further our efforts in providing our valuable services throughout the unincorporated communities of Riverside County.

Our Second Annual Neighborhood Conference is being planned for Fall of 2009

COMMUNITY IMPACT PLANS

Winner of the Prestigious California State Association of Counties 2008 Challenge Award

changing COMMUNITIES

making an IMPACT

producing RESULTS

A comprehensive five point strategy...

Ongoing Assessment

Utilizing assessments, surveys, and input from stakeholders we will develop a plan to address the true needs of the community.

Community Involvement

Build relationships of trust and understanding with community stakeholders to maximize resources and benefit the community.

Education/Outreach

Education of our mission, purpose, methods, and outreach of community services offered to ensure that we are all working together and using all available resources.

Cleanup

Utilize existing cleanup programs and special projects to make an impact in the community.

Enforcement

Conduct a phased enforcement program customized to the unique needs and resources included within the Community Impact Plan.

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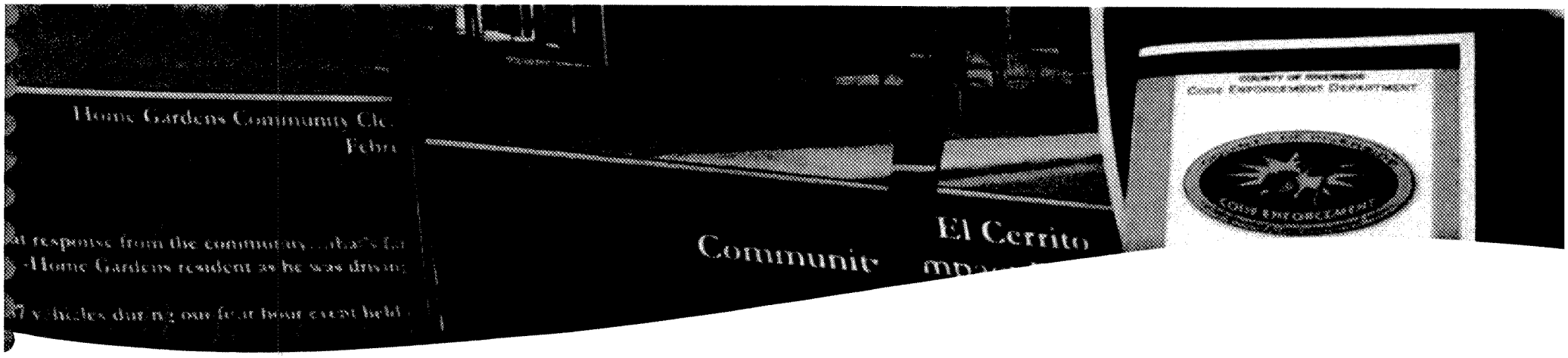

Revolutionizing Code Enforcement

The concept of our community impact plans is revolutionizing how Code Enforcement interacts with the communities we serve. Using the best concepts from community policing and other community improvement programs, we are developing comprehensive five-point community impact plans.

We are no longer waiting for issues to become problems and complaints to be filed. We are taking a more proactive approach by maximizing our resources to prevent problems and to address them before they become major issues.

This process all started when the Department tackled the unique challenges of the community of Mecca. Code Enforcement took a fresh look at how we could partner with the community and identified numerous ways we could assist the community in improving their quality of life. Partnering with local churches, we started a progressive outreach campaign. A total of 920 people attended one of our five community meetings. Following a targeted enforcement period, dramatic changes were seen in Mecca. We experienced an unprecedented rate of voluntary compliance from property owners desiring to make improvements without the need for enforcement action.

Utilizing the successful model we developed in Mecca, our department has expanded this program to communities throughout the county. Our goal is to have a community impact plan directing our activities in each community we serve.

Eager to share this effective program with other jurisdictions, we submitted our community impact plan process to the California State Association of Counties, and we were awarded one of ten Challenge Awards for this fresh and innovative approach to addressing issues affecting the health and well-being of the communities we serve.

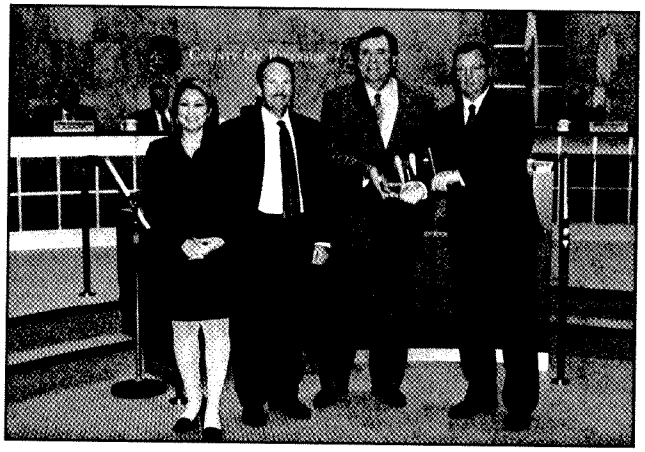

Susana Orozco, John Boyd, Paul McIntosh and Jay Orr at the presentation of one of ten 2008 CSAC Challenge Awards recognized statewide by the California State Association of Counties.

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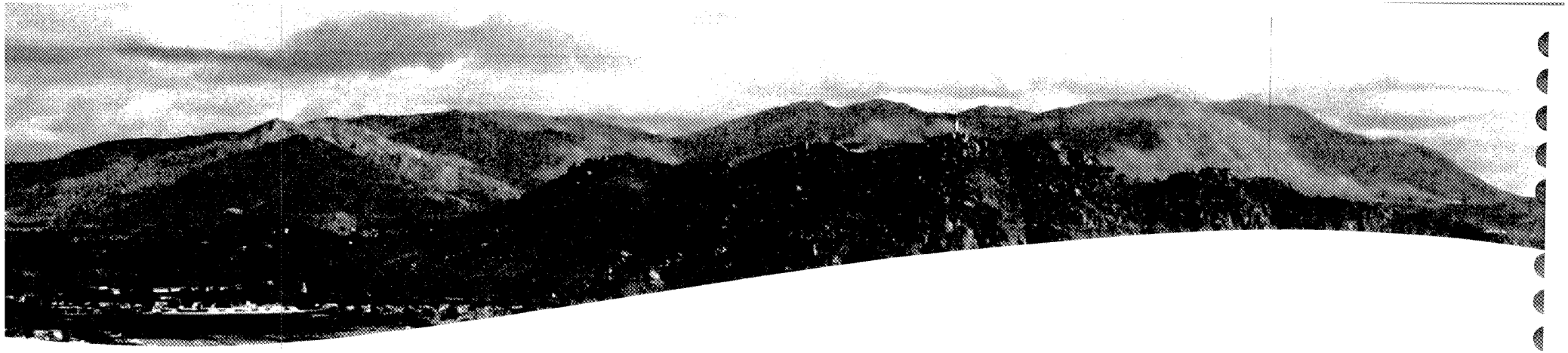

Administrative Services

Meeting long-term needs...

The Administrative Services Unit is tasked with providing the Department with a variety of support related services. Some of which include the following:

- Initial and recurrent training
- Create, review, and update policies and procedures
- Administer the State Waste Tire Enforcement Grant
- Special projects
- Review cases for cost recovery
- Administer the Abandoned Residential Property Registration Program
- Purchasing support
- Publications
- Providing administrative support to the Director
- Administer the Abandoned Vehicle Abatement (AVA) Service Authority
- Prepare for and represent the Department at weekly public nuisance abatement and statement of expense hearings before the Board of Supervisors

Training Update

During the past year, Code Enforcement staff attended a wide variety of training classes geared to improving their overall job knowledge and officer safety. This, in turn, has improved our capacity to provide exceptional service to the public. **For the year 2008, the training program coordinated over 290 training classes and 7,100 hours of training to department staff, a 50% increase over 2007.**

0003745

Abandoned Vehicle Abatement Service Authority

The Riverside County Abandoned Vehicle Abatement (AVA) Service Authority was established to receive monies from the state, which are derived from a one dollar service fee per vehicle registered in this county pursuant to the California Vehicle Code. The AVA Service Authority's administrator, under the guidance of the Board approved Abandoned Vehicle Abatement Plan, disburses these funds to its member jurisdictions based on area and population data as well as vehicle abatement activity. Funds are used to reimburse member cities and the county for the abatement of abandoned, wrecked, dismantled, or inoperable vehicles from private and public property.

Since its inception in 1993, the Riverside County Abandoned Vehicle Abatement Service Authority has disbursed $14,335,725 to reimburse cities and the unincorporated Riverside County for the removal of 117,363 junk vehicles. In this same period, the unincorporated county has received $4,713,529, or 33% of the total allocation of AVA funding and has effected the removal of 30,971 junk vehicles, or 26% of all vehicles abated countywide.

Recent changes in legislation under Senate Bill 106 provides for the extension of the service fee in increments of up to ten years. The current sunset date of the Authority is 2014.

Waste Tire Enforcement Grant

The Waste Tire Enforcement Grant is a state program designed to track the movement of used and waste tires throughout the State of California. The key component of the program is on-site inspections. More than two hundred inspections of waste tire generators, haulers, and end-use facilities were conducted in 2008. These inspections are critical in ensuring that used and waste tires are properly accounted for as required by the California Integrated Waste Management Board (CIWMB). To date, over 50 Notices of Violation have been issued and more than 20 locations have come into compliance with state requirements. Five violators that failed to comply were referred to the State for further enforcement action.

In addition to enforcement, education plays a vital part in the program. Several training sessions benefited the tire haulers in Riverside County, who were trained on the proper way of documenting and manifesting waste tires.

0003746

Community Improvement

Caring for the community...

The Community Improvement Program is a community based outreach effort intended to help residents enhance their neighborhoods and come into compliance with the laws we enforce.

It is the goal of the Community Improvement Program to provide visual improvement throughout Riverside County while instilling community pride.

Community Improvement Programs:

- Beautification Program (CDBG Grant)
- Clean Money (Giving Youth Groups Fundraising opportunities by cleaning the community)
- Voluntary Compliance Programs (CDBG Grant)
- Monthly publishing of "The Posting"
- Media Campaign
- Code Enforcement Web Site
- Neighborhood Conference
- Code Enforcement Resource Fairs
- Community Cleanup Events
- Code Enforcement Workshops
- Trash Task Force
- Thermal United Kids Program (CDBG Grant)

Your donations have helped make a difference!

We would like to thank all of the businesses, organizations, and individuals who have donated so much of their time and resources in making our events so successful and allowing us to empower residents in improving their communities.

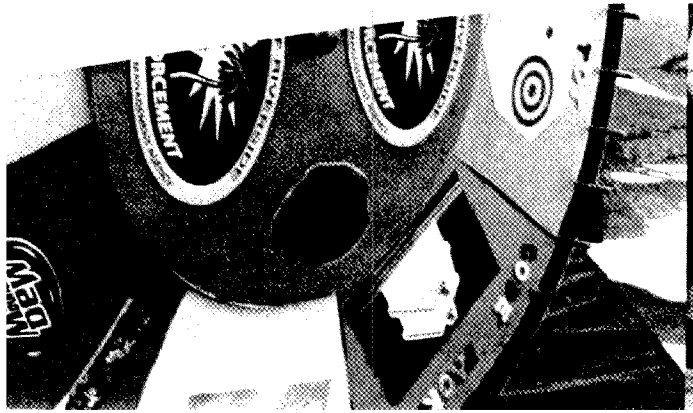

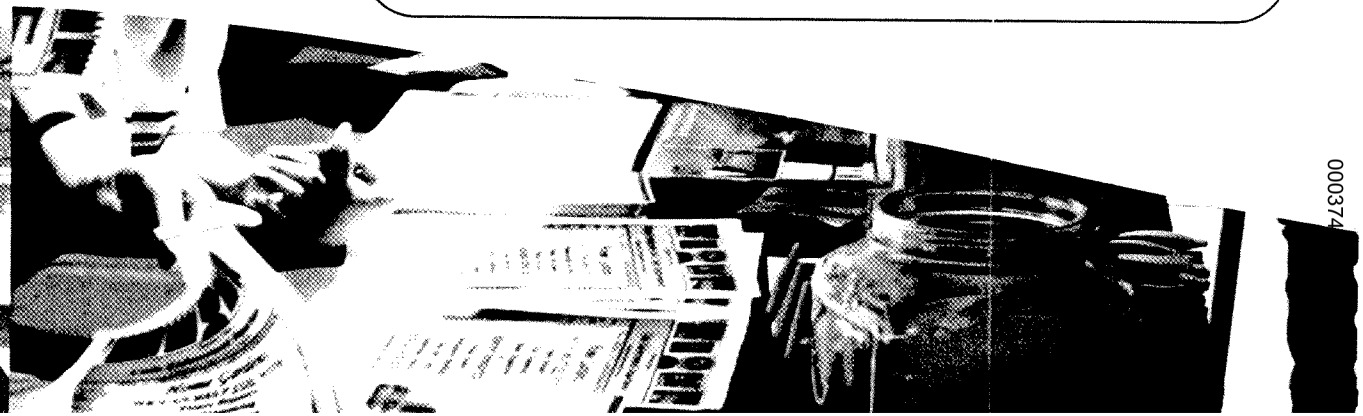

000374

Code Enforcement Assisting the Community in Cleaning Up

This year, Riverside County Code Enforcement applied for and received funds to help homeowners living in the communities of Ripley, Mesa Verde, Thermal, Oasis, Mecca, Good Hope, Home Gardens, Bell Town, Rubidoux, and Mead Valley. These funds were awarded to the Code Enforcement Department through the Federal Community Development Block Grant (CDBG) program. The department administers these funds through the Voluntary Public Nuisance Abatement Program (VPNAP).

This vital program allows Code Enforcement to provide assistance to struggling property owners for the removal of substandard structures, weeds/vegetation, trash, excessive outside storage, inoperable vehicles, as well as unoccupied mobile homes. In certain communities such as Mecca, Home Gardens, and Rubidoux, residents may be eligible for property beautification assistance. This program allows the department to select qualified applicants, who will receive services from an authorized contractor for fencing installation and repairs, residential landscaping, and residential exterior painting – all free of charge to the resident.

To be eligible, the applicant must reside within one of the above-mentioned communities and be in need of financial assistance to clean up their property. Funds may be used to correct code violations if applicable, and assistance through the VPNAP is a one-time grant, which is funded on a first come, first served basis.

County Celebrates 10,000 Tons of Roadside Trash Removed

In March, the Riverside County Board of Supervisors recognized County departments and private industries for their hard work and efforts in the removal of over 10,000 tons of trash in Riverside County in 2007. This is equivalent to over five miles of dumpsters. That amount would line the highway from downtown Riverside to San Bernardino County.

T.O.M. and Fifth District Legislative Assistant Jaime Hurtado

Riverside County Code Enforcement started the cleanup campaign in 2006. It is a collaborative effort between County departments and private agencies. At the March 25, 2008 Board meeting, Supervisors Marion Ashley and John Tavaglione and previous Code Enforcement Director Jay Orr presented the Recognition Awards to department heads and independent business owners. Certificates of appreciation were also given to 227 staff members from those agencies.

Thank you to the trashcan mascot, who made a surprise appearance, as pictured above with Fifth District Legislative Assistant Jaime Hurtado. In 2008, the Trash Task Force collected over 2,383 tons of material from our roadsides.

Neighborhood Enforcement Teams (NET)

The Neighborhood Enforcement Teams (NET) utilize a planned comprehensive approach to resolving issues within the communities we serve. NET focuses on "traditional" code enforcement issues including:

- Accumulated Rubbish
- Inoperable or Abandoned Vehicles
- Excessive Animals
- Prohibited Fencing Materials
- Substandard/Hazardous Structures
- Uncovered Excavations and Unsecured Pools
- Substandard Mobile Home and/or Recreational Vehicles
- Occupied Recreational Vehicles/Travel Trailers
- Unpermitted Second Dwellings
- Illegal Mobile Home Parks
- Zoning Violations
- Junkyards (Excessive Outside Storage)
- Land Use Violations
- Unpermitted Occupancy
- Grading without Permits
- Construction without Permits
- Mobile Home Install without Permits
- Parking Violations
- NPDES-Storm Water Management
- Abandoned and Distressed Properties
- Noise Complaints
- Unpermitted Businesses

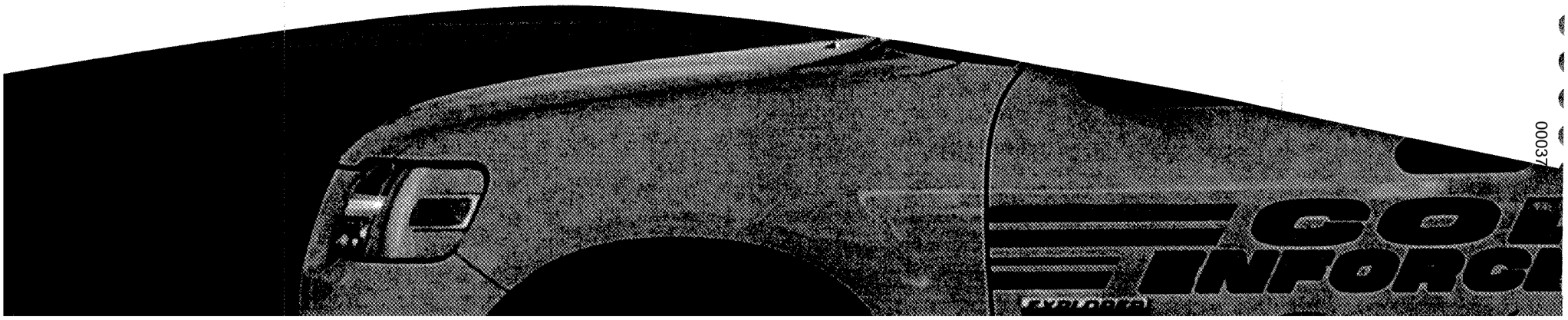

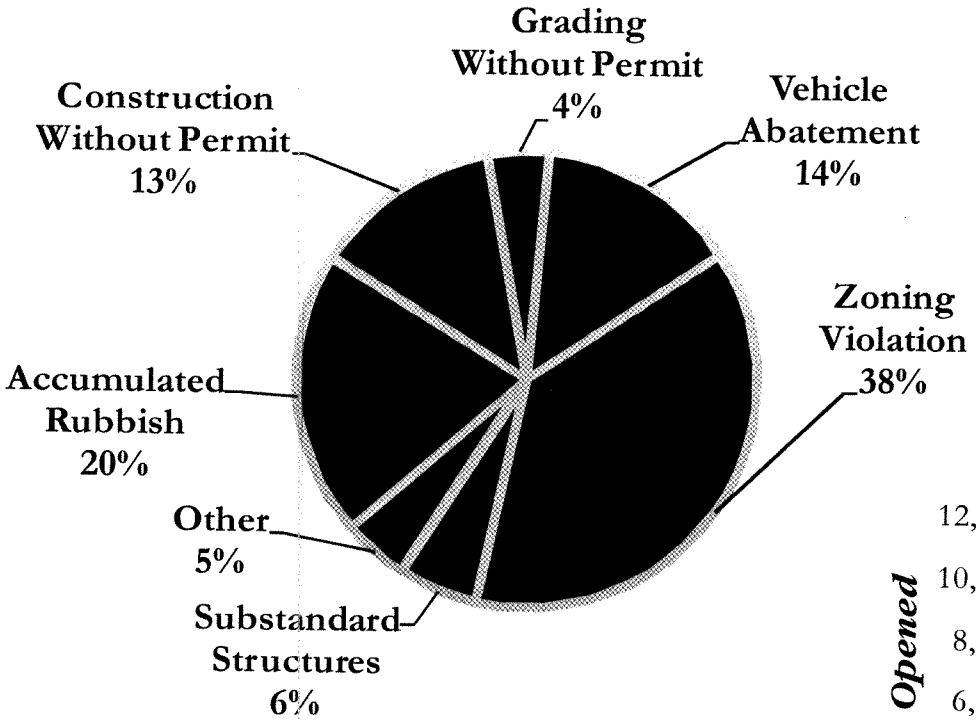

Our Goal Is Compliance...

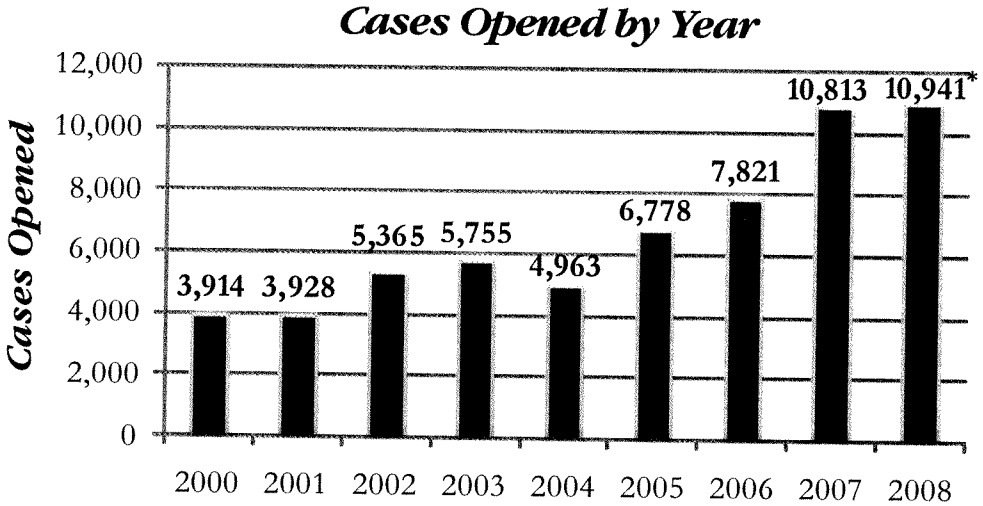

*This number does not include the 8,840 property inspections conducted by the Foreclosure Task Force.

In 2008, 10,941 new Code Enforcement cases were opened based on complaints or officer observed violations.

At any given time, we have over 8,000 cases under investigation.

This year we resolved 9,934 cases through investigation, compliance, or abatement.

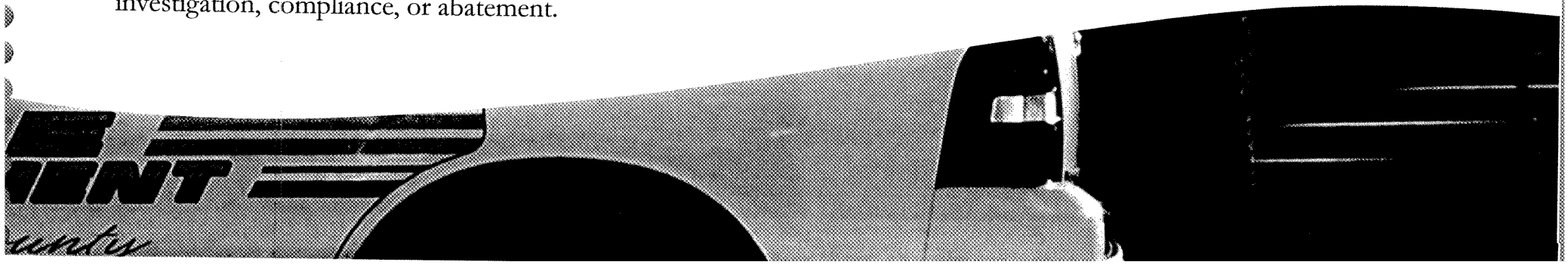

First District

Proudly serving the communities of:

- Lake Elsinore
- Alberhill
- Gavilan Hills
- Horsethief Canyon
- La Sierra
- Lakeland Village
- Mead Valley
- Lake Mathews
- Temescal Valley
- Woodcrest
- Glen Ivy
- Glen Valley
- Sedco Hills
- Wildomar

Giving our best to make a difference...

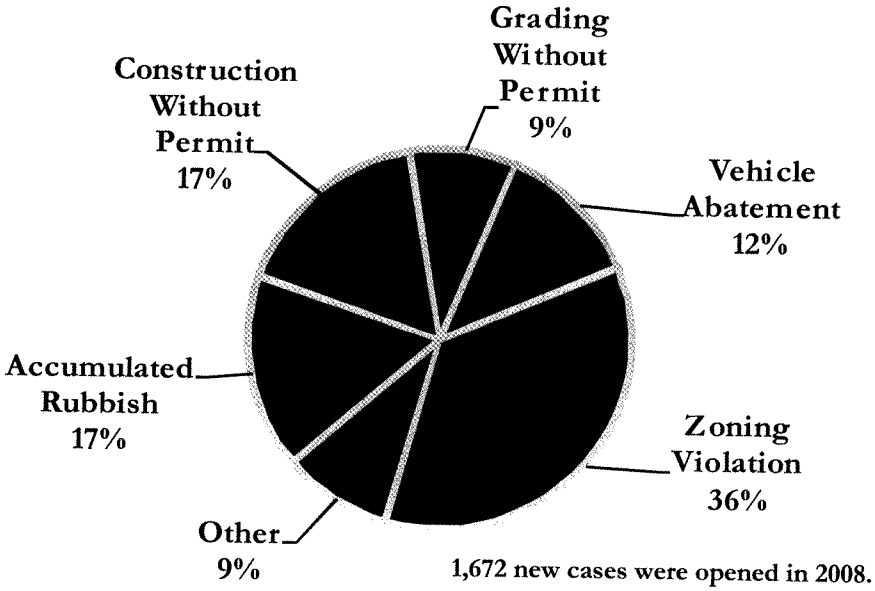

1,672 new cases were opened in 2008.

This is what the community is saying...

"I really appreciate the Block Grant funding to help clean up my property, and you have been awesome to work with. Thank you so much for everything!

-Keri Mittan – Mead Valley Resident

I just wanted to THANK YOU again for all your help. It would have taken me months to do what you guys did in a couple days. I owe each of you big time."

-Brian Shomo, RCHCA

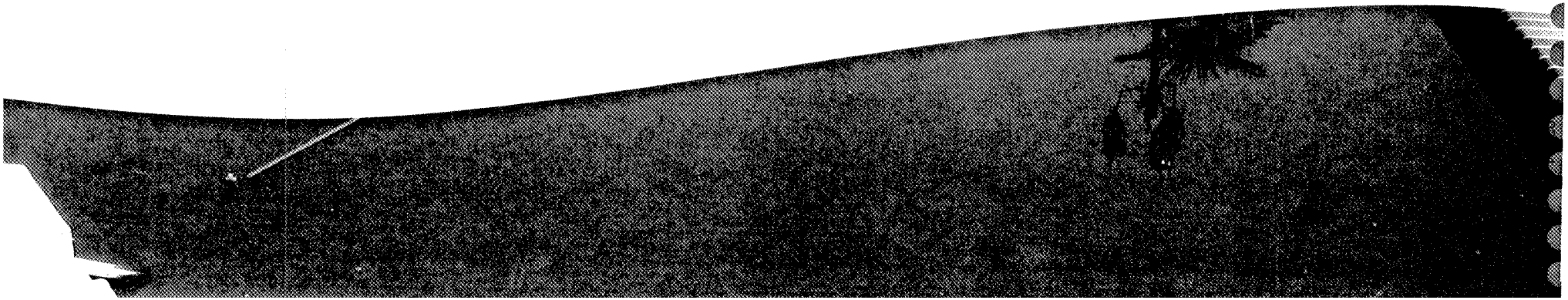

Lake Elsinore/Mead Valley Office

Distinguished Accomplishments...

Safer Neighborhoods

Lake Elsinore staff inspected an alleged illegal business that had multiple code enforcement violations and posed a potential fire hazard. Staff found an area of the property next to a grassy hillside used to store 5,000 wood pallets, as well as a large shed with multiple electrical cords. Upon completion of the inspection, the business owner received a notice of the violation and a stop work order, which remained in effect until the proper permits could be obtained. Within 35 days, all 5,000 pallets had been removed and the large shed taken down. The property had been cleaned of all material related to the business and no further actions were needed. Code Enforcement's quick and decisive action eliminated violations that could have led to a devastating fire.

Preserving Residential Tranquility

Staff investigated a cabinet manufacturing shop located on Santa Rosa Mine Road in Perris. Officers discovered an illegally operating cabinet shop with multiple workers and a large permitted covered horse arena that stored all the materials. A citation was issued at the time of the inspection. At the 30-day follow-up inspection, the violation remained. Code Enforcement sent the case to County Counsel for a civil injunction to shut down the illegal land use. A hearing at Riverside Superior Court resulted in an agreement with the property owners to stop the illegal activity and bring the property into compliance. Subsequently, Code Enforcement staff conducted a follow-up site inspection and observed the business was no longer in operation and the property was clean and clear of all materials, bringing peace to the residential community.

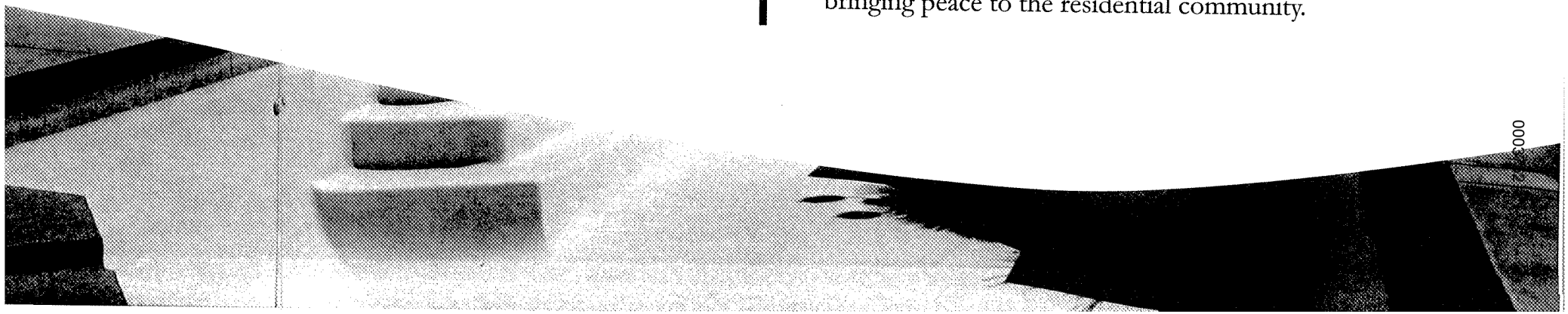

Second District

Proudly serving the communities of:

- Belltown
- Coronita
- Crestmore
- Eastvale
- El Cerrito
- Glen Avon
- Home Gardens
- Indian Hills
- Jurupa Valley
- Mira Loma
- Pedley
- Rubidoux
- Sunnyslope

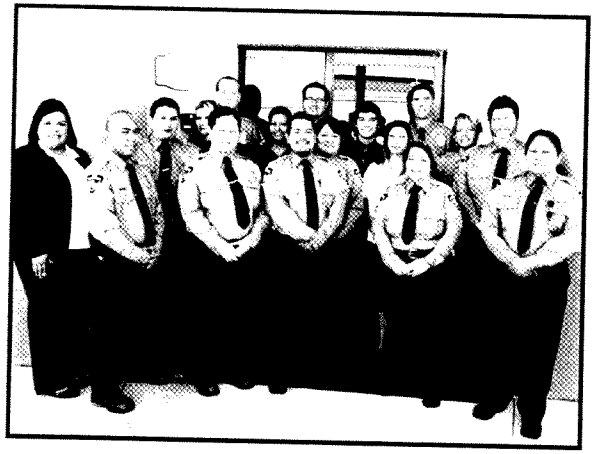

Working the issues that matter...

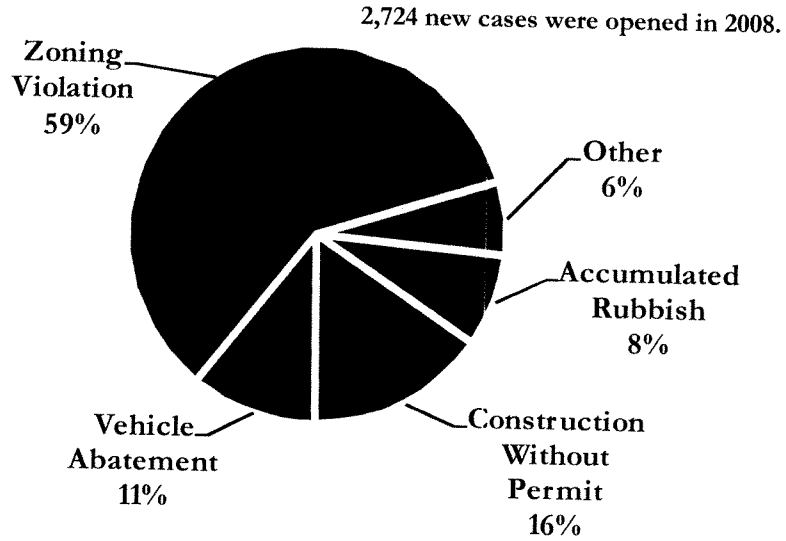

This is what the community is saying...

"**This is exactly what the community needed. What a good thing.**

-Leticia Carmona, El Cerrito Resident

Just want you to know I think you are doing a heck of a good job.

-Linda Prokus, Indian Hills Resident

Thank you, thank you, thank you! You are doing a great job.

-Ed Cleveland, Glen Avon Resident"

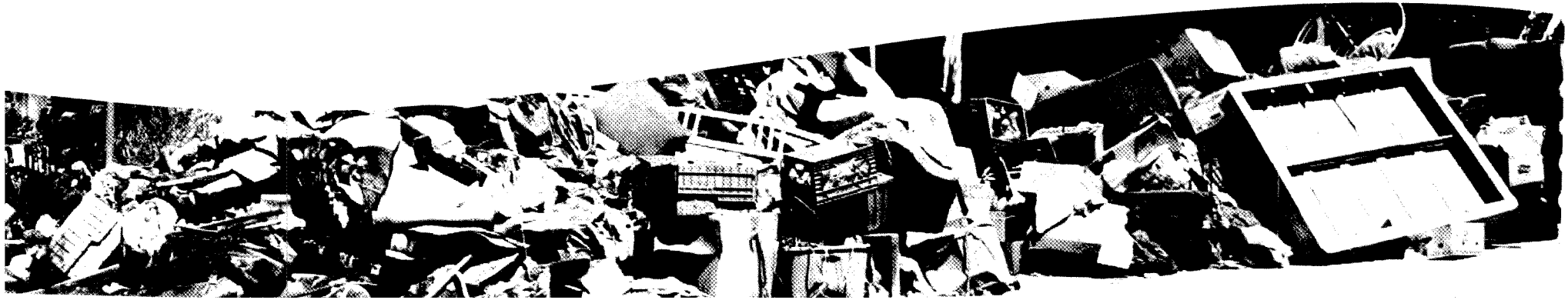

Jurupa Valley/Home Gardens Office

Solving Problems...

Permanent Compliance

For some time, staff has investigated a property on Felspar Avenue for junk, illegally occupied recreational vehicles, and substandard structures that fostered other illegal activity in the area. The property changed ownership this year through a trustee sales and the new owner quickly discovered the deteriorating conditions. He contacted his local Code Enforcement office and asked for help. Seeing a great opportunity, the Jurupa office partnered with the Riverside County Sheriff's Department to utilize this property as a temporary training facility to increase law enforcement presence in the neighborhood, thus reducing crime. Then Code Enforcement worked with the Riverside County Economic Development Agency to obtain a demolition grant to clean the entire property, bringing closure to a stubborn problem.

Productive Commercial Enforcement

Officers investigated a 28th Street property for an unpermitted concrete business, which included the storage of concrete mixing trucks. The illegal business was creating a public nuisance, as many neighbors complained about excessive noise and dust. To exacerbate an already volatile situation, the property had been illegally graded in such a manner causing drainage and runoff to adversely impact neighboring properties. Soon into the investigation, when it became apparent that the business owner was not going to comply with the officer's directive to cease the business activity, the Department filed a civil injunction in Riverside Superior Court. During the court proceedings, the judge found in favor of the County and ordered the business to vacate the property. As a result, concrete trucks no longer travel through this residential area, that has since returned to a normal, quiet neighborhood.

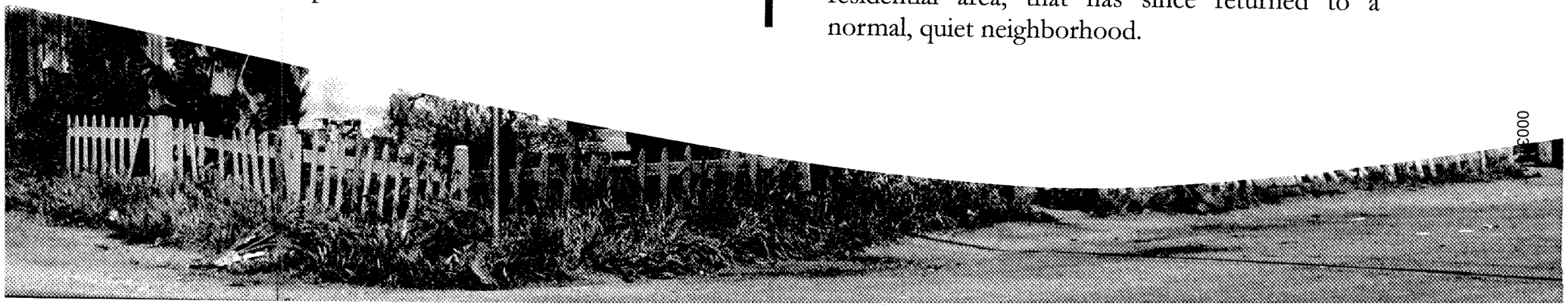

Third District

Proudly serving the communities of:

- Aguanga
- Anza
- Cottonwood Canyon
- French Valley
- Garner Valley
- Green Acres
- Homeland
- Idyllwild
- Lake Riverside
- Lake Skinner
- Menifee
- Mountain Center
- Murrieta Hot Springs
- Pine Cove
- Pine Meadow
- Pinyon Pines
- Poppet Flats
- Quail Valley
- Rancho California
- Soboba Hot Springs
- Sun City
- Vail Lake
- Valle Vista
- Winchester

Putting the community first...

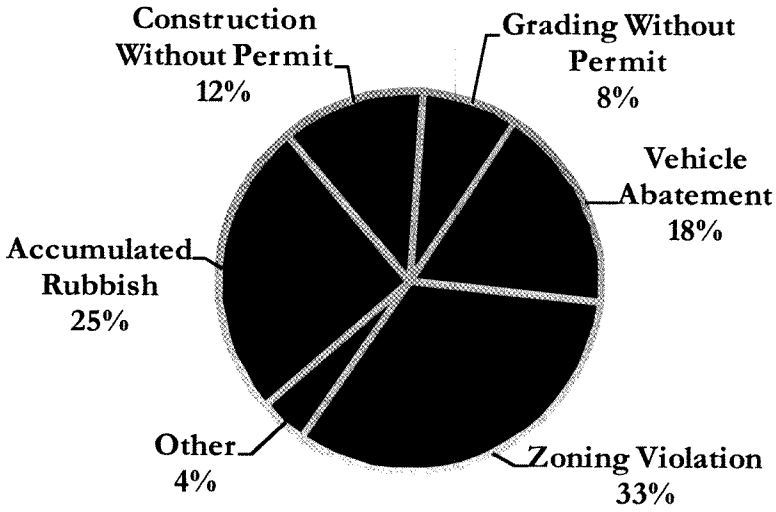

2,534 new cases were opened in 2008.

This is what the community is saying...

"We appreciate your hard work and dedication to us. Your hard work has brought many visible changes to our community, as well as our way of life.

-Earl McGee, Executive Director Quail Valley Crime Watch

This is the best I have seen Idyllwild look in a long time. Code Enforcement over the past year has made a difference. I truly mean it!"

-Jerry Holldber, General Manager of the Pine Cove Water District

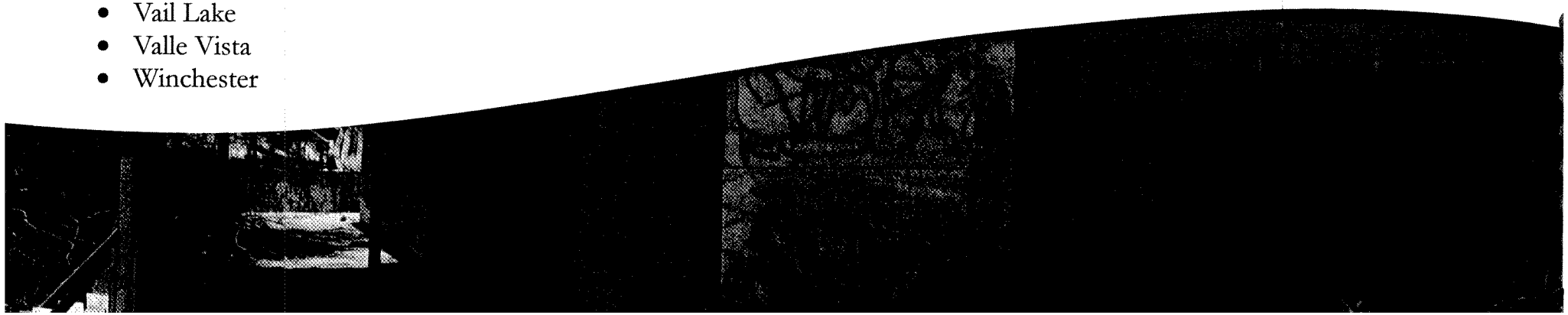

Murrieta/South County Office

Getting the Job Done...

Improving Living Conditions

During the summer of 2008, Murrieta staff focused enforcement efforts on a mobile home park in Quail Valley that had become a source of problems for the community and a safe haven for criminal activity. The mobile home park had several code violations, including substandard and unpermitted mobile homes, non-operational vehicles, accumulated rubbish, and other conditions that violated its permit to operate. Since normal enforcement activity was not inducing compliance, staff pursued a revocation of the Conditional Use Permit. As time drew closer for the revocation hearing, the property owner began to rapidly comply with our corrective actions. The park is no longer a safe haven for criminal activity, demonstrating that addressing these code issues can have a beneficial impact on the quality of life.

Partnerships Are Making a Difference

The apartments on Marine Drive in Hemet have had a long-standing problem with trash and illegal dumping from its residents. Under new management, occupants had been directed to clean their properties and remove excessive storage in order to remain a resident of this neighborhood. Instead of complying with management's directives, many residents moved out and left behind garbage, furniture, and rubbish. Code Enforcement Department staff, in partnership with the Sheriff's Hemet Station, conducted a cleanup on June 11, 2008. The Sheriff's Department and Code Enforcement worked throughout the day, loading and unloading truckloads of furniture and garbage into trash bins provided by the local trash hauler. This cleanup demonstrated that county staff cares about the communities in which they serve.

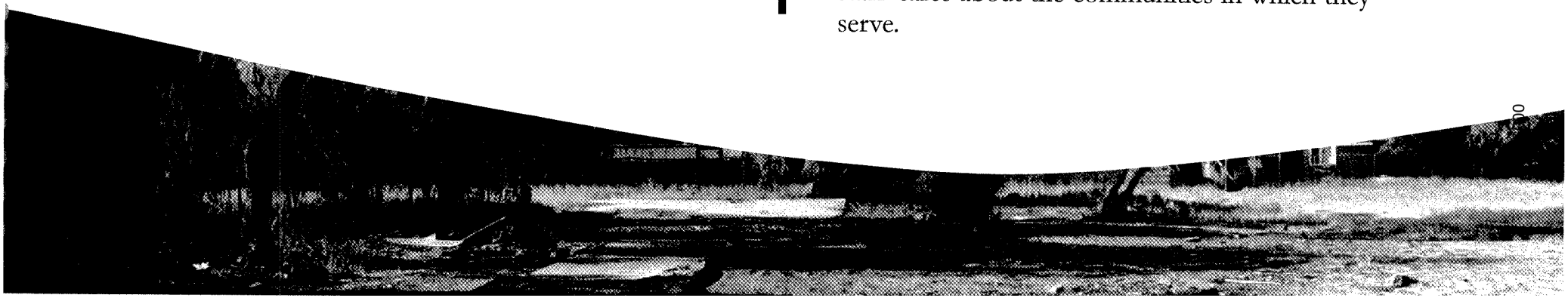

Fourth District

Proudly serving the communities of:

- Bermuda Dunes
- Ciriaco Summit
- Desert Center
- Eagle Mountain
- Indio Hills
- Mecca
- Mesa Verde
- North Shore
- Oasis
- Ripley
- Sky Valley
- Thermal
- Thousand Palms
- Valerie Jean
- Vista Santa Rosa

Building partnerships for success...

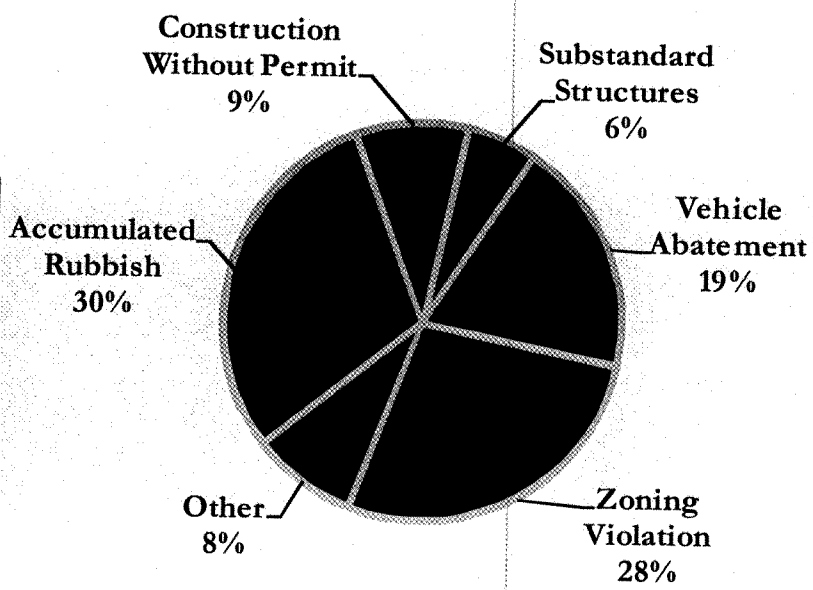

1,810 new cases were opened in 2008.

This is what the community is saying...

"**My family really appreciates what Code has done for Mecca.** – *Mecca Resident*

We greatly appreciate what you do for us in helping us clean up our community. Thanks! – *Julie Casserly, Sky Valley Community Council*

We are so excited that we are finally having a cleanup. We have needed a cleanup for over five years. Thank you very much.

– *Rigoberto Perez, Ripley Community Council*"

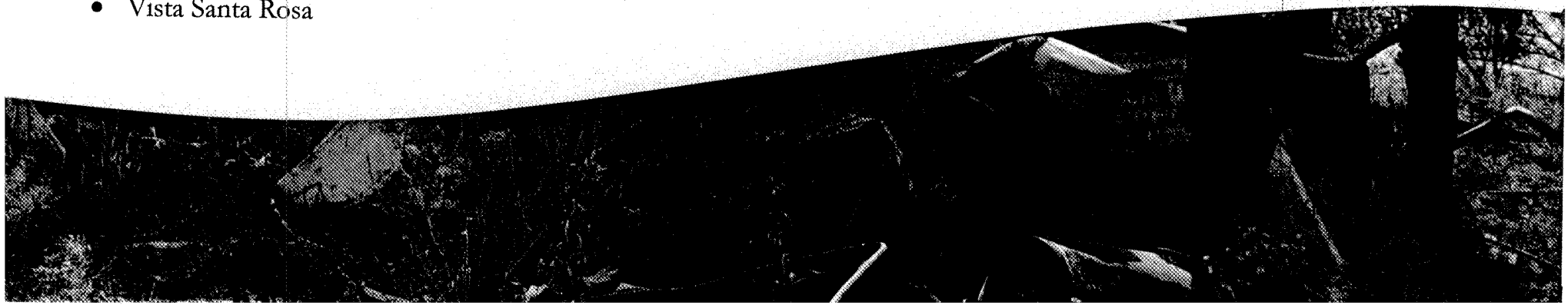

Thousand Palms/East County Office

Making a Difference...

Tackling Chronic Problems

The Thousand Palms office received numerous complaints about the condition of several properties located on East Vernon Avenue in Blythe. These properties have had intermittent code violations over the years. Upon inspection, officers found dilapidated residences containing rubbish, abandoned vehicles, and three substandard cottages. They also discovered a fire damaged duplex that was being used by transients who were conducting criminal activity. Working with the property owners, rehabilitation permits were issued for the substandard dwellings, and all the rubbish was removed. A number of vehicles were also removed through the Department's "Junk Your Clunker" program. One property owner was reluctant to comply, and a seizure warrant was obtained. In the end, all of the properties were cleaned up, making a significant visual difference in the community.

Restoring Our Natural Habitats

Staff discovered several vacant properties on Wallace Road in Thermal that contained a massive accumulation of illegally dumped rubbish and debris, including over 100 waste tires. The dumping was so expansive that a satellite GPS system was utilized to determine the approximate location and quantity of trash. Over 120,000 square feet of trash was observed, and in some areas, the rubbish piles exceeded five feet in height! Through the diligent efforts of Code Enforcement staff, one owner came forward and voluntarily cleaned his property. The remaining trash and debris was removed by a contractor hired by the County. Scorching summer heat and an active beehive did not deter the Department from completing the task of removing the remaining rubbish piles. Eventually, all of the parcels were completely cleaned, eliminating an extremely blighted condition and restoring a portion of our beautiful desert habitat to its original pristine condition.

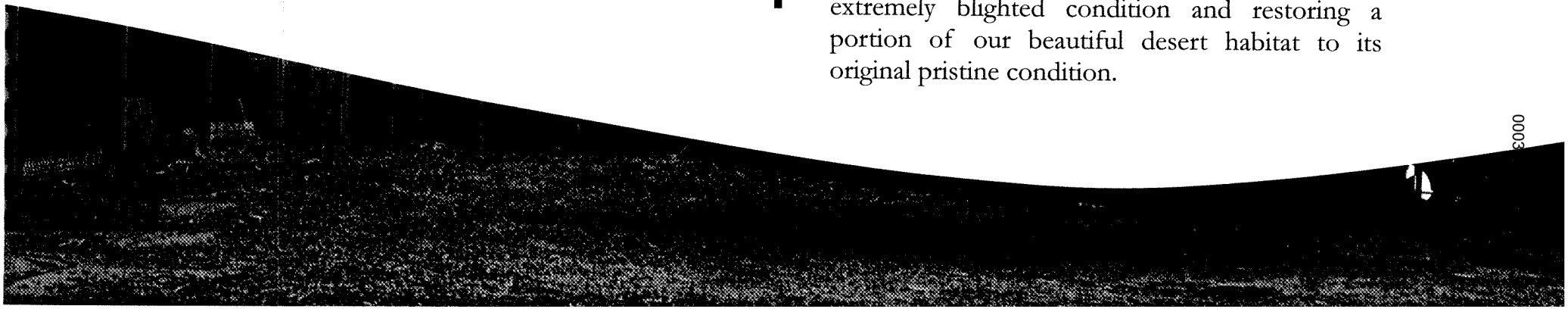

Fifth District

Proudly serving the communities of:

- Cabazon
- Cherry Valley
- Desert Hot Springs
- Eden Hot Springs
- Garnet
- Gilman Hot Springs
- Good Hope
- Highgrove
- Juniper Flats
- Lakeview
- Meadowbrook
- North Palm Springs
- Nuevo
- Painted Hills
- Reche Canyon
- Romoland
- Twin Pines
- Whitewater
- Windy Point

Providing excellence in customer service...

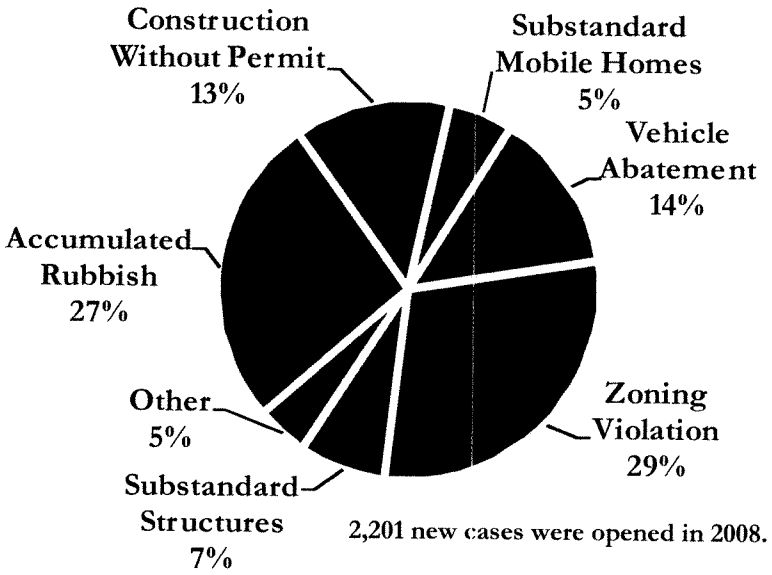

2,201 new cases were opened in 2008.

This is what the community is saying...

"Your department and Supervisor Marion Ashley's office have done great things for our small communities of Nuevo, Lakeview, and Juniper Flats". Thank you Code Enforcement! *- Mr. John Linch*

I appreciate the cleanup and increasing higher standards. *-Henry Mussenden*

It's time people clean up the trash; we cannot even ride our horses without risk. Thank you Department of Code Enforcement. *-Jim & Kim Kresin*"

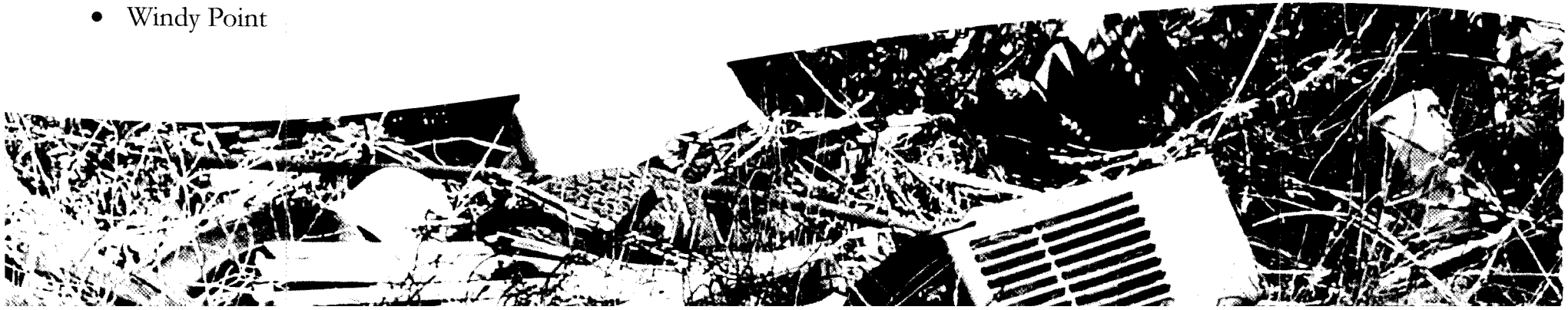

Moreno Valley/Banning Office

Significant Achievements...

Persistence is Rewarded with Compliance

Officers inspected a property on Prospect Avenue in Highgrove for multiple code violations. The property, located on a heavily traveled street, contained six substandard structures with defects ranging from general dilapidation and hazardous electrical wiring to open and attractive nuisance. Several discussions with the property owner about abating the substandard structures did not produce the desired result. Officers persisted in their efforts to rid the neighborhood of this eyesore and prepared the case for an administrative abatement hearing before the Board of Supervisors. Once the owner was convinced that Code Enforcement was not backing down, they proceeded to completely demolish all six structures and remove all of the construction debris and trash. This case of voluntary compliance not only abated dangerous housing conditions, it also serves as a reminder to other property owners of the importance of keeping their residences up to code.

Contracting with Desert Hot Springs

With the support of Supervisor Ashley, staff from Code Enforcement were contracted in 2008 to work closely with the City of Desert Hot Springs to help address issues identified within the city. Officer James Pike worked primarily on violations involving businesses and health and safety issues. Working to gain compliance, staff educated the residents and businesses and worked with them to improve the safety and quality of life in the city. A total of 24 citations were issued to non-compliant property owners. In addition to these routine issues, the Department also addressed other problems, including the illegal dumping of medical waste, unsafe living conditions of homeless camps, and dilapidated structures. All of the objectives set forth for this contact were met, and the County is proud we were able to assist the City of Desert Hot Springs in improving the quality of life for their residents.

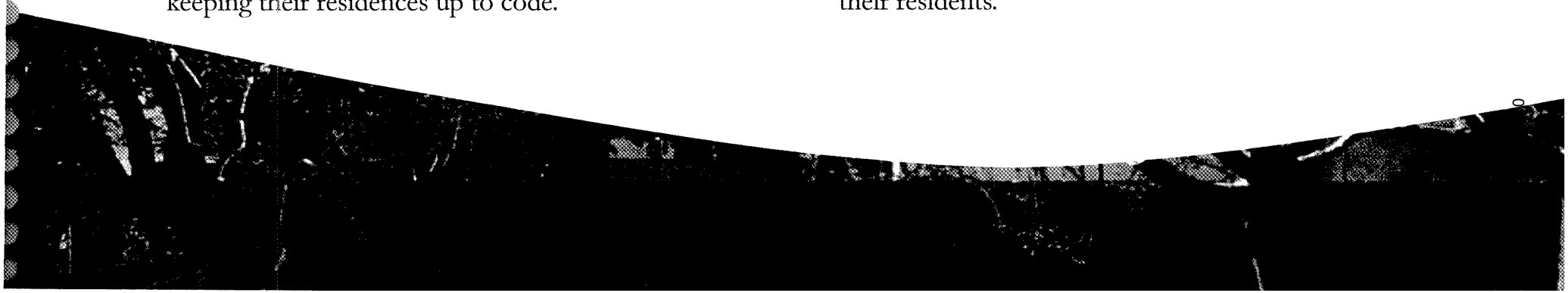

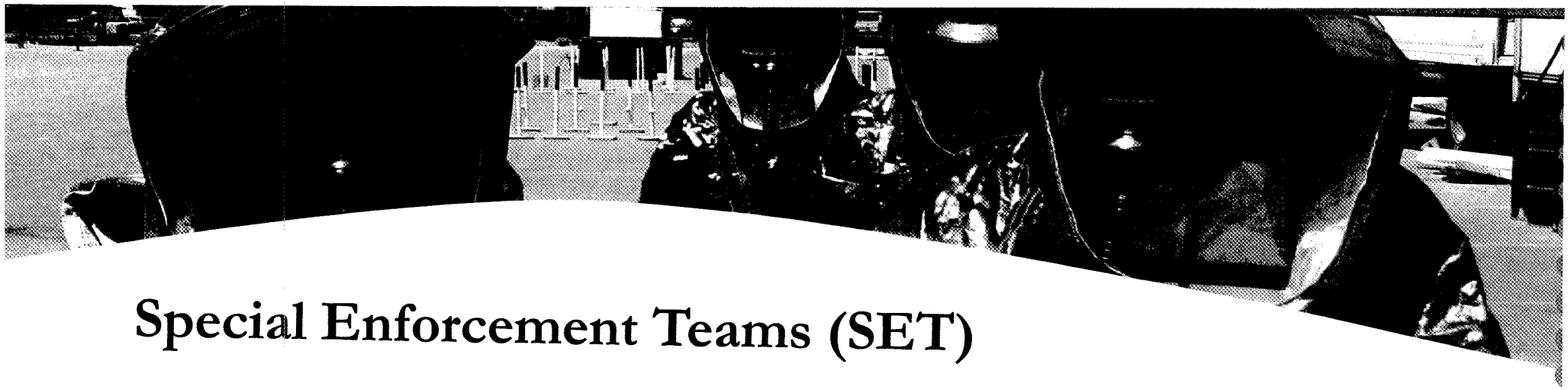

Special Enforcement Teams (SET)

Making things happen...

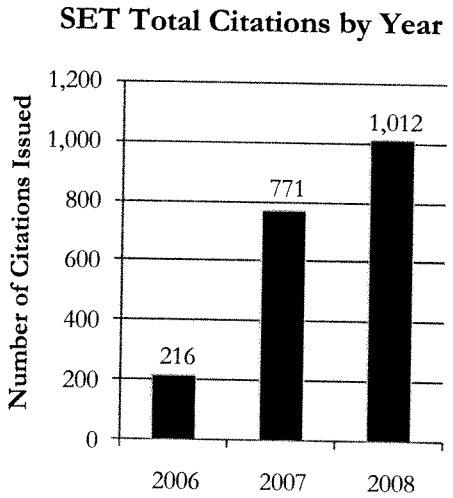

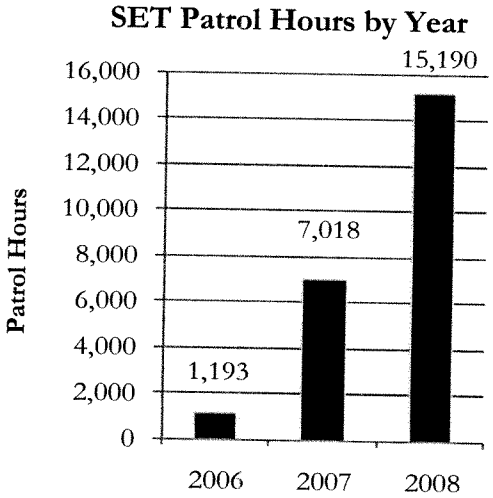

It is the goal of the Special Enforcement Team (SET) to provide support to the district offices in resolving specific issues identified and affecting the communities.

SET activities have increased dramatically during its expansion beginning in 2007 resulting in 2008 being the first year this program was fully staffed and operational.

SET working closely with the Sheriff's Department and the District Attorney's Office, investigate and submit for prosecution of criminal activity in the following areas:

- Illegal Dumping
- Illegal Vending
- Unpermitted Swap Meets/Fiestas
- Excessive Noise/Off-Highway Vehicle Enforcement

0003761

Roadside and Illegal Vending

In response to very loud and consistent public outcry, the Special Enforcement Team coordinated enforcement efforts through a coalition of federal, state, and local enforcement agencies including Riverside County District Attorney's office, Riverside County Environmental Health (Illegal Food Program), Riverside County Sheriff's Department, and Riverside County Animal Control, as well as agents from the California Franchise Tax Board, California Department of Food & Agriculture (Milk and Dairy), Brand Inspector and representatives from the Recording Industry & Artist Association (RIAA) and luxury item industry (counterfeit clothing, jewelry, and other accessory clothing items).

The goal was to pursue vertical prosecution through comprehensive enforcement programs, addressing violations ranging from illegal home kitchens/restaurants, illegal fiestas, roadside taco stands, and roadside food vendors. These illegal activities pose a threat to public health by operating unpermitted facilities and include the "underground economy" aspect of each of these crimes. *(Continued in next column.)*

Through various direct and undercover enforcement actions, the coalition experienced unprecedented success as measured by a decrease in the number of calls for service and a noticeable reduction in the number of unpermitted vendors.

Carver Tract Project

In February of 2008, in an effort to curtail individuals drinking liquor and using illegal drugs behind the Coachella Valley Rescue Mission located in Indio, Code Enforcement SET officers and deputies formulated a plan to clean up the area by removing trash and old furniture from behind the mission. Code Enforcement established an account with Waste Management and rented a flatbed truck to remove the trash. Deputies provided security and contacted persons loitering at the location. A number of individuals contacted were found to be in violation of Health and Safety codes, Penal codes, county ordinances, and were either arrested or issued citations.

During the enforcement action, SET officers issued citations for various violations. Both agencies continue to host cleanup operations, removing trash and old furniture left in the area.

0003762

2008 Statistics

NET Statistics by District						
District	1st	2nd	3rd	4th	5th	Totals
Opened Cases	1,672	2,724	2,534	1,810	2,201	10,941
Inspections[1]	5,120	6,310	5,991	4,823	4,442	26,686
Parking Citations	853	5,996	1,098	80	262	8,289
Administrative Citations	353	700	193	146	307	1,699
Abatement Hearings	38	8	26	13	20	105
Expense Hearings	20	2	8	4	11	45

[1] These are inspections conducted by field staff for standard code enforcement cases. 2008 is the first year we began tracking this information. This does not include the 8,840 property inspections conducted by the Foreclosure Task Force.

Community Improvement Statistics by District						
District	1st	2nd	3rd	4th	5th	Totals
Cleanup Events	3	4	6	12	9	34
Tonnage from Events	124	167	168	400	247	1,106
Tonnage Trash Task Force	643	470	278	188[1]	804	2,383

[1] Not all tonnage information was available for Fourth District.

District Information

SET Statistics by District						
District	1st	2nd	3rd	4th	5th	Totals
Dumping						
Infractions	9	6	3	69	4	91
Misdemeanors	21	21	52	26	30	150
Felonies	0	0	0	1	0	1
Vending						
Infractions	113	253	55	88	76	585
Misdemeanors	2	18	3	2	2	27
Felonies	1	0	7	2	0	10
Other						
Infractions	5	5	5	79	9	103
Misdemeanors	2	23	6	5	8	44
Felonies	0	1	0	0	0	1
Totals	153	327	131	272	129	1,012

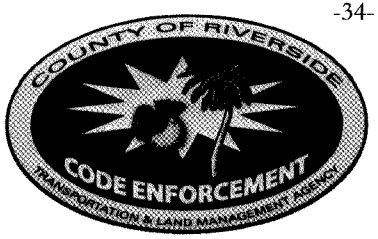

Countywide Information

Countywide Activity Levels	2006	2007	2008
Cases Opened	7,817	10,813	**10,941**
Inspections[1]	N/A	N/A	26,686
Public Hearings	30	82	**150**
Administrative Citations	1,252	2,041	1,699
Parking Citations	2,898	12,276	8,289
Vehicles Abated[2]	1,035	938	**3,000**
Accumulated Rubbish Cases Opened	N/A	1,461	**2,198**
Accumulated Rubbish Cases Resolved	N/A	993	**1,696**
Cleanup Events Material Collected (Tons)	740	1,256	1,106
Number of Cleanup Events	24	39	34
Code Enforcement Resource Fairs[3]	N/A	N/A	10
Code Enforcement Workshops[3]	N/A	N/A	15
Trash Task Force Material Collected (Tons)	N/A	9,425	2,383
Criminal Citations Issued			
Illegal Dumping	113	220	**242**
Illegal Vending	27	412	**622**
All Other Criminal Violations	76	139	**148**
SET Patrol Hours[4]	1,193	7,018	**15,190**

[1] These are inspections conducted by field staff for standard code enforcement cases. 2008 is the first year we began tracking this information. This does not include the 8,840 property inspections conducted by the Foreclosure Task Force.

[2] 2008 was the first year we instituted a comprehensive case auditing process to accurately match the state's AVA reporting requirements.

[3] This information was not recorded for previous years.

[4] Patrol hours increased dramatically during SET's expansion beginning in 2007 resulting in 2008 being the first year this program was fully staffed.

Acknowledgements:

It is difficult to articulate the value of the services we perform. Although we point to our traditional workload indicators, we invite you to review our monthly newsletter, *The Posting*, and see just how our job makes an impact every day in the communities throughout Riverside County.

We wish to thank the county departments who worked closely with us in serving the residents of Riverside County.

We cannot be as successful as we are without the help and partnerships of so many dedicated community members who truly help us make a difference.

Thank You

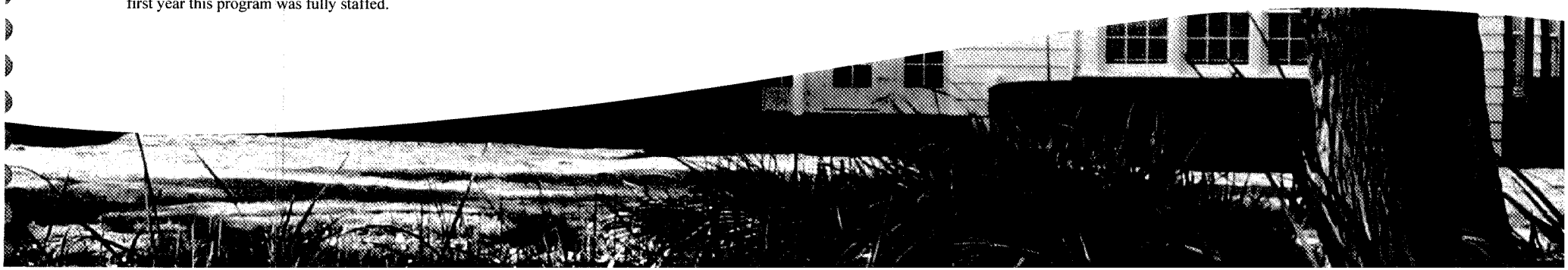

COUNTY OF RIVERSIDE

CODE ENFORCEMENT DEPARTMENT

ADMINISTRATIVE OFFICES
4080 LEMON STREET, 12TH FLOOR
RIVERSIDE, CALIFORNIA 92501
(951) 955-2004 ▪ FAX (951) 955-8680

FIRST DISTRICT
LAKE ELSINORE/MEAD VALLEY OFFICE
117 SOUTH LANGSTAFF STREET
LAKE ELSINORE, CALIFORNIA 92530
(951) 245-3186

SECOND DISTRICT
JURUPA VALLEY/HOME GARDENS OFFICE
5317 MISSION BOULEVARD
RIVERSIDE, CALIFORNIA 92509
(951) 275-8739

THIRD DISTRICT
MURRIETA SOUTH COUNTY OFFICE
39493 LOS ALAMOS ROAD, SUITE A
MURRIETA, CALIFORNIA 92563
(951) 600-6140

FOURTH DISTRICT
THOUSAND PALMS EAST COUNTY OFFICE
31-290 PLANTATION DRIVE
THOUSAND PALMS, CALIFORNIA 92276
(760) 343-4150

FIFTH DISTRICT
MORENO VALLEY/BANNING OFFICE
24318 HEMLOCK AVENUE, SUITE C-1
MORENO VALLEY, CALIFORNIA 92557
(951) 485-5840

0003765

Riverside County Code Enforcement

August 2008
Volume 2, Issue 8

The Posting

A TLMA Code Enforcement Monthly Newsletter

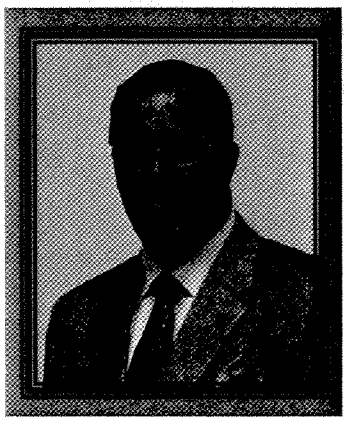

Director Jay E. Orr

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Nuevo Community Clean-up & Tire Collection Event

Community residents lined up as early as 6:30 a.m. to unload household trash that had been illegally dumped along Ramona Expressway and in the open fields of the Juniper Flats, Nuevo and Lakeview communities. Code Enforcement staff were eager to assist residents in the removal of unwanted tires and waste. Not only were these residents provided with an opportunity to dispose of their waste but thanks to Community Improvement Specialist, Sue Rush, local residents were educated on new County ordinances, Household Hazardous Waste & Tire collection events and property maintenance. Code Enforcement Officer Jennifer Morris assisted with traffic control and bin monitoring to ensure that hazardous waste was not disposed of at this event. Waste Management Inc. donated and delivered 19 bins for this event. Clean ups such as these, provide an opportunity for residents to come into compliance.

Chaka Osborne-5

There were 311 tires removed from all three communities combined!

"Your Department and Supervisor Marion Ashley's office has done great things for our small communities of Nuevo, Lakeview, and Juniper Flats". Thank you Code Enforcement!- Mr. John Linch

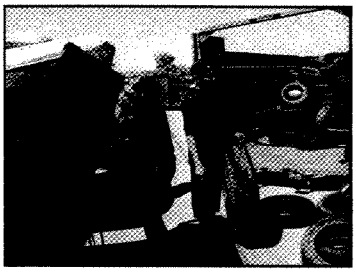

CIS Grace Escobar counts tires & inspects vehicles for hazardous waste.

19 bins; 55.20 tons of waste removed from Nuevo, Lakeview and Juniper Flats.

From Trash to Gardens

In Code Enforcement, we strive to achieve voluntary compliance. In working with Community Improvement Programs and Impact Plans, we offer all available resources to help bring property owners into compliance. In most cases we are able to bring everything to a happy ending. For example, on the morning of May 6, using Dakeno Demolitions, we were able to bring the property seen in these photos into compliance.

BEFORE

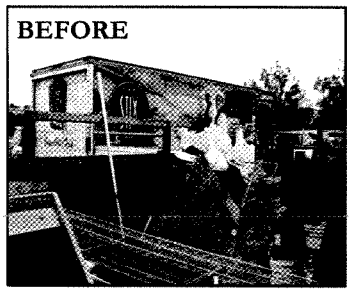

Even though the property owner was hesitant at first about the abatement, in the end, the property owner admitted that this was the best thing they could have done. In fact, upon a follow-up visit, we found the property owner planting a garden and enjoying the clean space.

Ken King-2

AFTER

Riverside County Code Enforcement

September 2008
Volume 2, Issue 9

The Posting

A TLMA Code Enforcement Monthly Newsletter

Mission Statement: "To enhance public safety and the quality of life in partnership with communities through fair enforcement of laws and codes."

Director Jay E. Orr

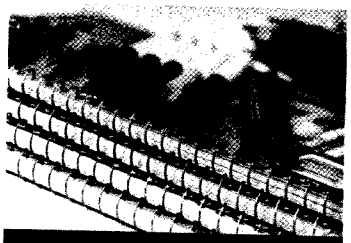

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Watch Where You Park

Riverside County Ordinance 413, which regulates parking, was enacted in order to "further community preservation and protection of the health, safety, and welfare of its citizens, property values, and aesthetic qualities." With this ordinance, Riverside County Code Enforcement is regulating and enforcing street parking restrictions and prohibitions for certain vehicles within the unincorporated areas of the county. Code Enforcement officers enforce a variety of parking regulations including the parking of commercial vehicles in residential districts.

Ordinance 413 generally prohibits the parking of any commercial vehicle in excess of 10,000 pounds of gross vehicle weight on a residential street. Certain exceptions to this regulation apply, such as commercial vehicles engaged in the pick up or delivery of goods, wares, or merchandise.

The parking of commercial trailers or semi-trailers on residential streets is prohibited regardless of weight. Code Enforcement Supervisor Mickey Parmele commented, "This is a problem because of the very large number of commercial truckers we have. Lots of them get in late and just take their trucks home." Consequently, most commercial drivers find out about this regulation the hard way. The penalties for this violation are high and you can receive additional citations every 24-hour period (see chart below). Commercial vehicles should be parked in commercially zoned areas or in a lawfully permitted vehicle storage yard. Signs are strategically posted at the entry points into the county and along major streets and thoroughfares alerting drivers to the commercial vehicle parking restrictions in residential areas. So why not save yourself time and money and just "Park it right and forget the cite!"

Grace Escobar

1st Violation	$ 250.00
2nd Violation	$ 500.00
3rd Violation	$ 750.00

CODE ENFORCEMENT ADMINISTRATION
4080 Lemon Street,
12th Floor
Riverside, CA 92501
Phone: 951-955-2004
Fax: 951-955-8680

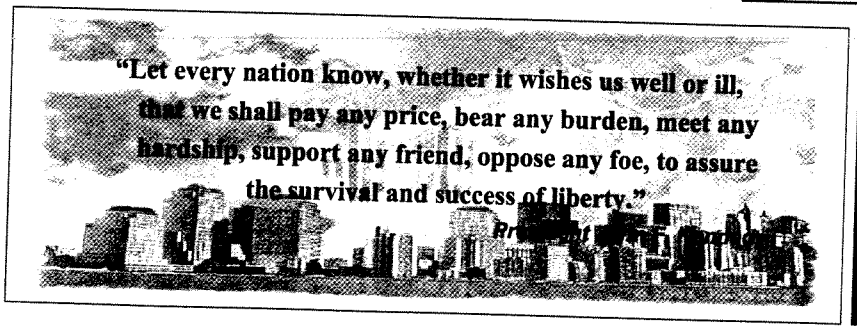

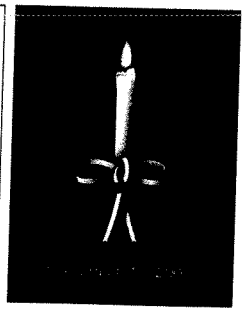

Riverside County
Code Enforcement

October
Volume 2, Issue 10

The Posting

A TLMA Code Enforcement Monthly Newsletter

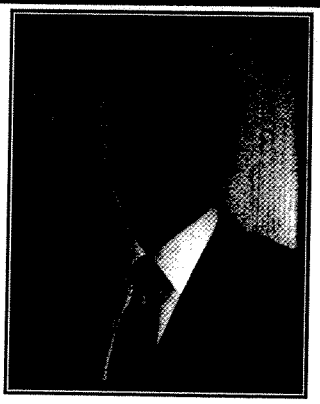

Director John Boyd

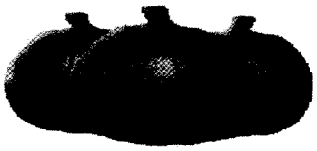

Mission Statement: "To enhance public safety and the quality of life in partnership with communities through fair enforcement of laws and codes."

Message From Our New Director

Last month we celebrated the promotion of our former Director, Jay Orr, to his new post as Assistant County Executive Officer under County Executive Officer Bill Luna. In the last two years Code Enforcement has been reengineered to become the flagship Code Enforcement agency statewide. As the new Director, I am now responsible to carry on the programs established under Jay and will strive to continue to make this department one recognized for its problem-solving skills.

I worked in developing the Community Oriented Policing model used by the Riverside Sheriff's Department, so I understand the importance of identifying and analyzing community problems and engaging the community in developing solutions. Our vision is to develop, establish, and maintain "sustainable healthy neighborhoods." By engaging the community in enhancing and using their own assets and skills, the potential for long-term sustainability is great.

As the Director, I am committed to providing training and resources necessary to give the officers and staff all the tools and skills they will need to be effective in their chosen professions. I look forward to the challenges that lie ahead of us as we continue moving forward to make a positive difference in the communities we serve.

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CODE ENFORCEMENT ADMINISTRATION
4080 Lemon Street,
12th Floor
Riverside, CA 92501
Phone: 951-955-2004

Code Enforcement to Host FREE Conference

On the 25th of October, a groundbreaking event will take place that you absolutely do not want to miss. On that day, at the beautiful Palm Desert campus of the University of California, the Code Enforcement Department will be hosting the first ever Riverside County Neighborhood Conference.

This half day gathering will be filled with exciting workshops and speakers who will prove to be not only informative, but challenging and engaging as well. Please view the last page for Workshop titles and other vital information.

This is a great opportunity for you, as a community leader or supporter, to receive creative ideas that you can take back and invest in your neighborhood. Networking and the sharing of ideas with other community members will be encouraged throughout the day. All participants will come together in the afternoon to hear nationally recognized keynote speaker Richard Campanero, who will be delivering a motivationally thought-provoking presentation on the "Broken Window Theory."

For the little ones who attend, there will be separate activities geared specifically for children ages 6-12. A free continental breakfast and delicious box lunch will be provided to all participants. To round out the conference, several vendors will be on hand all day to talk to you about the services and products they offer, designed to help in the growth of sustainable neighborhoods.

Van pools are being coordinated to assist those coming to the conference from distant communities. For those driving to the event, you will be pleased to know that parking is abundant and FREE, thanks to the hospitality of our friends at the Palm Desert UCR campus.

We look forward to seeing you at the conference, as we continue to make positive strides toward forming "Community Partnerships for Sustainable Neighborhoods."

James Monroe,
Administration

Riverside County Code Enforcement

THE POSTING

December 2008

Volume 2, Issue 12

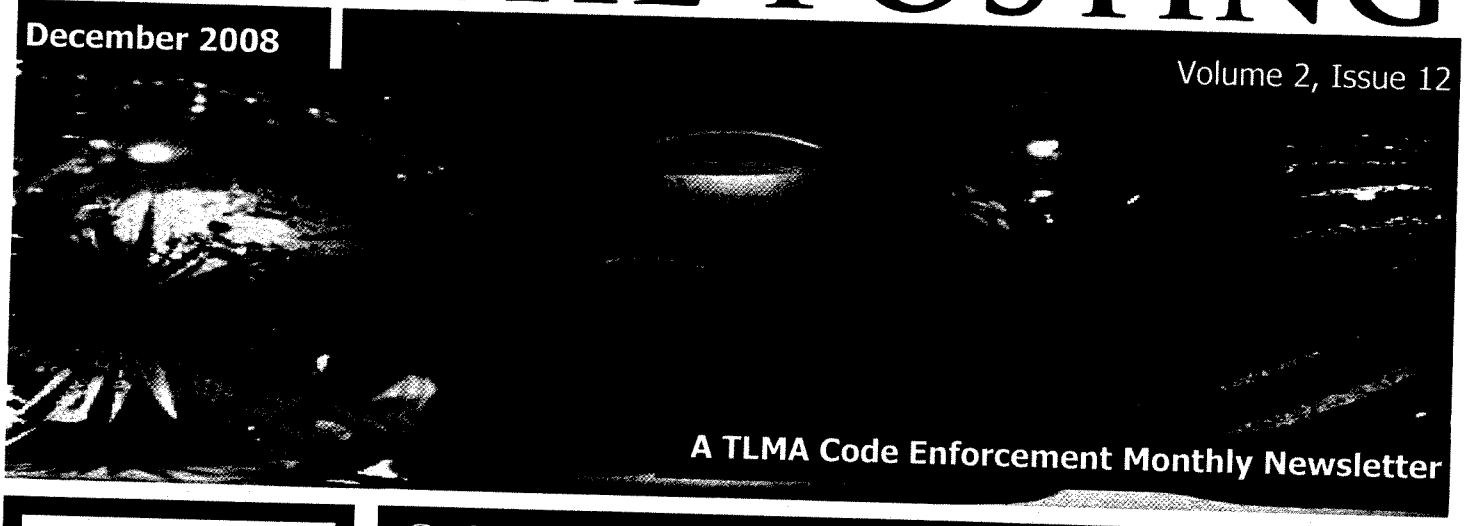

A TLMA Code Enforcement Monthly Newsletter

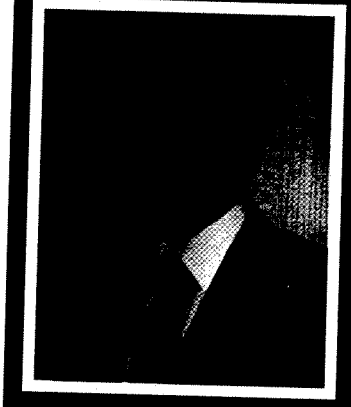

Director John Boyd

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Phone: 951-955-2004
www.rctlma.org

Code Enforcement and the State Team Up to Clean One of the Largest Trash Heaps in County History *District 4*

Code Enforcement routinely investigates illegal and unpermitted businesses and complaints regarding accumulated rubbish; however, this investigation, spearheaded by Senior Officer George Gianos, very rapidly escalated into an abatement action that far exceeded the scope of any trash cleanup undertaken by the Department.

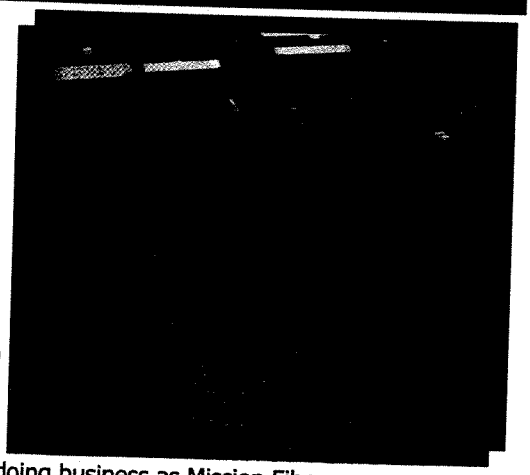

Officer Gianos described his first encounter with this enormous trash heap this way: "We investigated the matter and discovered stockpiles of bundled trash covering an area of about seven acres. Some of the bundles were stockpiled over 20 feet high! The trash bundles consisted of household trash, soft goods, and plastics. The site contained no active fire prevention apparatus or measures for rodent control." The property owner, doing business as Mission Fiber, was immediately notified of the violations by Officer Gianos, who also brought County Counsel into the mix to begin processing a court case for injunctive relief. Assistant County Counsel Pam Walls delivered a powerfully persuasive argument in favor of shutting the business down and cleaning the site immediately.

Due to the overwhelming evidence of potential harm to the public, the judge agreed with Ms. Walls and ordered Mission Fiber to cease operation and remove the offending rubbish from the property. Officer Gianos then began the arduous task of enforcing the court order and ensuring the cleanup of the property. "Unfortunately, the business owner was reluctant to comply," said Officer Gianos. The business owner's idea of compliance was to remove the rubbish at a slow pace to two other counties, spanning several months.

(continued on page 2)

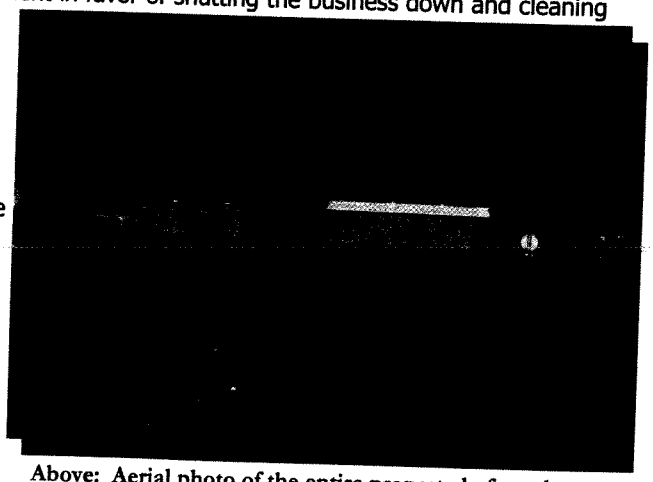

Above: Aerial photo of the entire property before cleanup
Below: The same property after the cleanup

Riverside County Code Enforcement

THE POSTING

January 2009

Volume 3, Issue 1

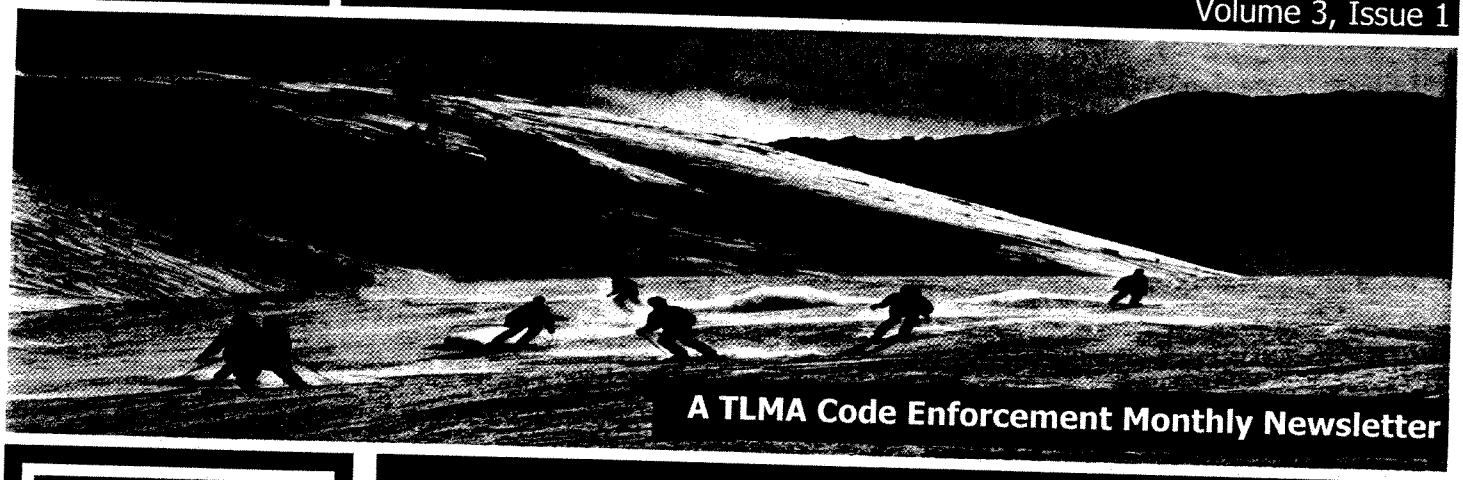

A TLMA Code Enforcement Monthly Newsletter

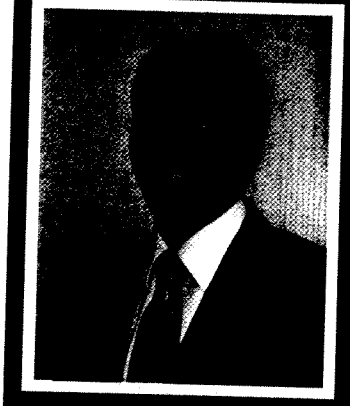

Director John Boyd

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4080 Lemon Street
12th Floor,
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Phone: 951-955-2004
www.rctlma.org

Bee Careful *District 1*

Code Enforcement officers are trained to constantly keep their eyes open and their ears tuned in to what is going on around them, because they never know what they may encounter while conducting a routine property investigation. Officer Brett Farlow was conducting an inspection in the unincorporated area of Murrieta when he encountered a swarm of Africanized bees that had taken up residency in a boat stored on the property. "Even though I responded immediately to the impending threat, the bees keyed in on our movement from over 50 yards away and attacked the property owner and myself, stinging us repeatedly," stated Officer Farlow. With prior Animal Services training, Officer Farlow knew the best strategy was to run away from the hive. "We ran over a quarter of a mile before the bees gave up chase," Officer Farlow recounted. Furthermore, Cal Fire was called and responded to the scene due to the extreme behavior exhibited by the bees. Cal Fire donned protective gear with bee screens and displaced the hive with foam. While on site, paramedics provided first aid to Officer Farlow and the property owner. Other than a real painful experience, neither sting victim sustained any serious injuries that required further medical assistance.

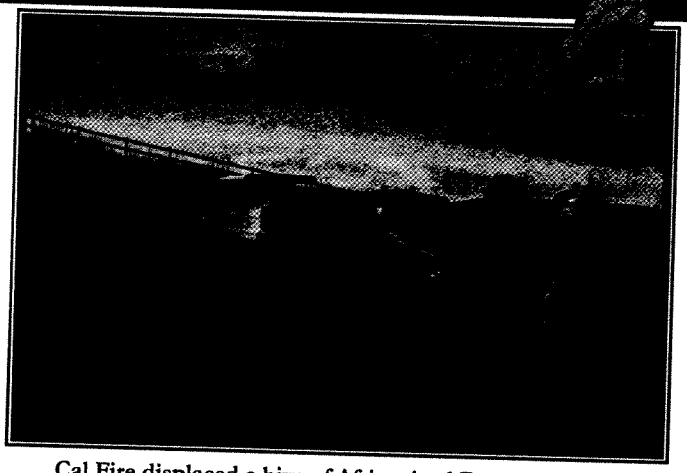

Cal Fire displaced a hive of Africanized Bees with foam

WHAT TO DO IF YOU ARE STUNG:

- Pull or scrape stings from skin as soon as possible. Most venom is released within one minute.
- Wash stung areas with soap and water like any other wound to prevent infection.
- Apply ice to relieve pain and swelling.
- Seek medical attention if breathing is difficult, if stung many times, or if allergic to bee stings.

Riverside County Code Enforcement

THE POSTING

February 2009

Volume 3, Issue 2

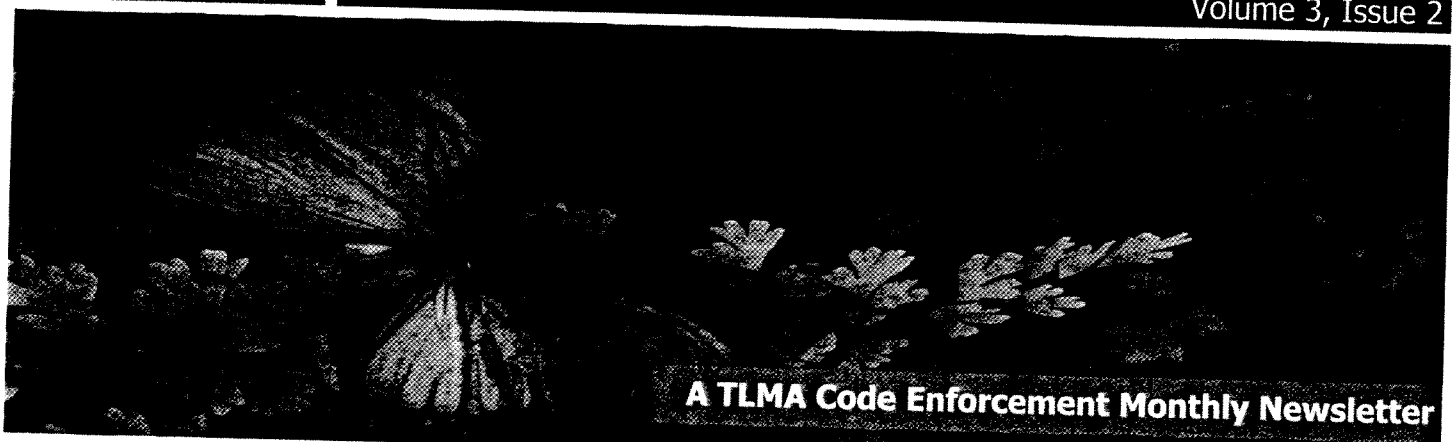

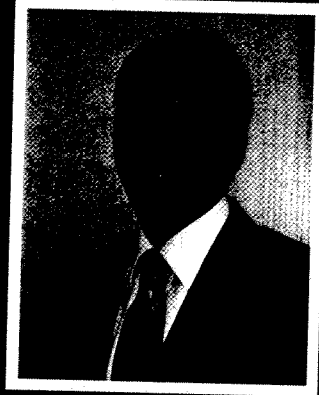

Director John Boyd

"To enhance public safety and the quality of life in partnership with communities through fair enforcement of laws and codes."

4080 Lemon Street
12th Floor,
Riverside, CA 92501
Phone: 951-955-2004
www.rctlma.org/ce

Revolutionizing Code Enforcement

In the face of increased foreclosed and abandoned homes, blight and the subsequent health and safety issues have become more prevalent and an adversary for Code Enforcement. Violations such as abandoned vehicles, trash and debris, dilapidated buildings, dry vegetation on vacant properties, and illegal signs bring blight to unincorporated communities. To manage the influx of issues facing the County of Riverside our department developed the model for Community Impact Plans, a five-point strategy that uses the best concepts from Community Policing and Improvement Programs. The concept of our Community Impact Plans is revolutionizing how Code Enforcement interacts with the communities we serve.

The Community Impact Plans encompass the characteristics of each community and take into account the history, demographics, zoning, and media outlets to ensure community involvement and a sense of pride for the residents as their wants and needs are considered. The plans consist of assessment and research, community involvement, education and outreach, clean-ups and pro-active enforcement.

Utilizing the successful model we developed in one of our communities, our department has expanded this program to communities throughout the county. We are taking a more proactive approach by maximizing our resources to prevent problems and to address them before they become major issues. Our goal is to have a community impact plan directing our activities in each community.

Eager to share this effective program with other jurisdictions, we submitted our community impact plan process to the California State Association of Counties, and we were awarded one of ten Challenge Awards for this fresh and innovative approach to addressing issues affecting the health and well-being of the communities we serve. Feedback from residents is positive, common code violations have been significantly reduced, and internal management of the department has improved. In addition, the Code Enforcement Department is perceived as playing an active role in solving neighborhood problems.

CSAC CALIFORNIA COUNTIES CHALLENGE AWARD
2008 WINNER

Susana Orozco, John Boyd, Paul McIntosh, and Jay Orr at the presentation of the 2008 CSAC Challenge Awards.

Riverside County Code Enforcement

THE POSTING

March 2009

Volume 3, Issue 3

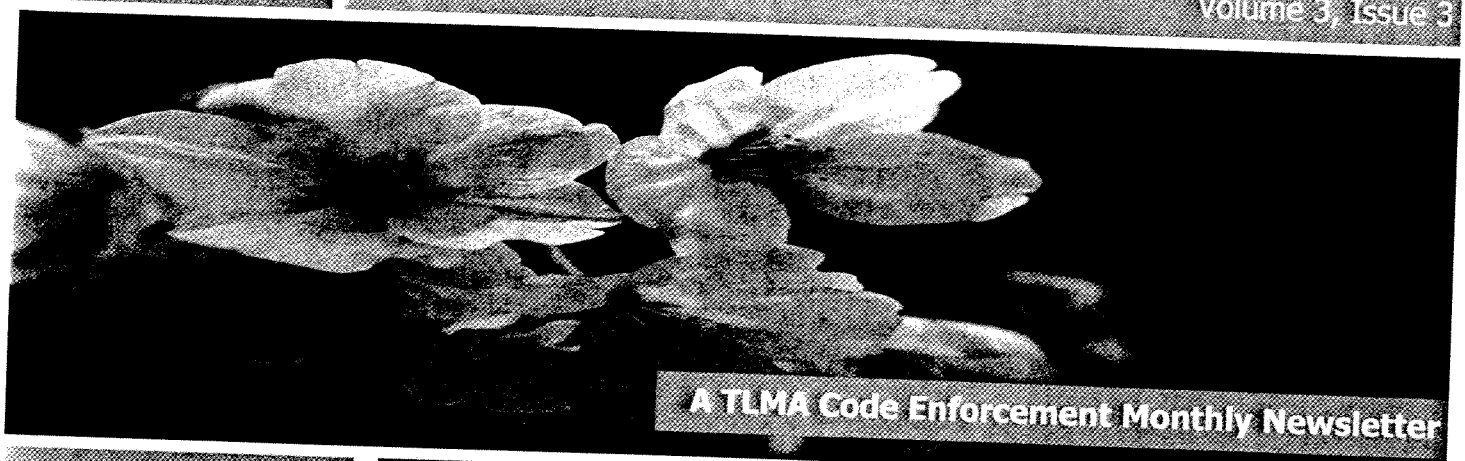

A TLMA Code Enforcement Monthly Newsletter

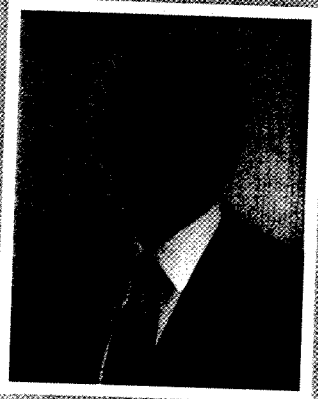

Director John Boyd

Mission Statement:

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Code Enforcement Administration

[illegible] Lemon Street
[illegible] Floor
[illegible]side, CA 92501
[illegible] 951.955-[illegible]
[illegible]tlma.org/[illegible]

Earlier this year, the Special Enforcement Team (SET) received a telephone call from a District Five constituent regarding a single wide mobile home that had been dumped on the side of Cherry Valley Boulevard, east of the I-10 freeway. SET officers responded and contacted the property owner where the unit was located. During their investigation, officers determined that the property owner was not responsible nor had they agreed to the dumping of the mobile home on their property. SET officers then contacted several neighbors around the dump location in an effort to generate any investigative leads. Unfortunately, no leads developed and the property owner was in no financial position to remove the unit. This ugly pink mobile home was not going anywhere, anytime soon. Or so the officers thought.

SET contacted Community Improvement, inquiring about resources that could be offered to the victim. Community Improvement identified that the location was not in a CDBG area and therefore not eligible for grant funds. Susan Rush, from the Community Improvement team, made one phone call and Riverside County's own Transportation Department (once again) came to the rescue. With their big tractors, they hauled away the junked out mobile home. Special thanks to everyone involved for your team effort and persistence in getting this mobile removed!

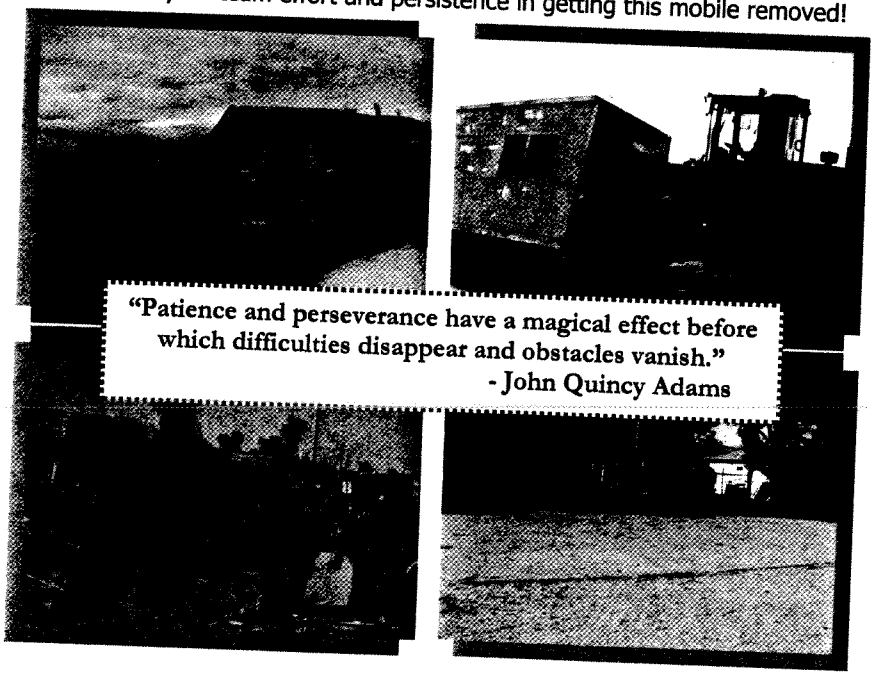

"Patience and perseverance have a magical effect before which difficulties disappear and obstacles vanish."
- John Quincy Adams

Riverside County Code Enforcement

THE POSTING

April 2009

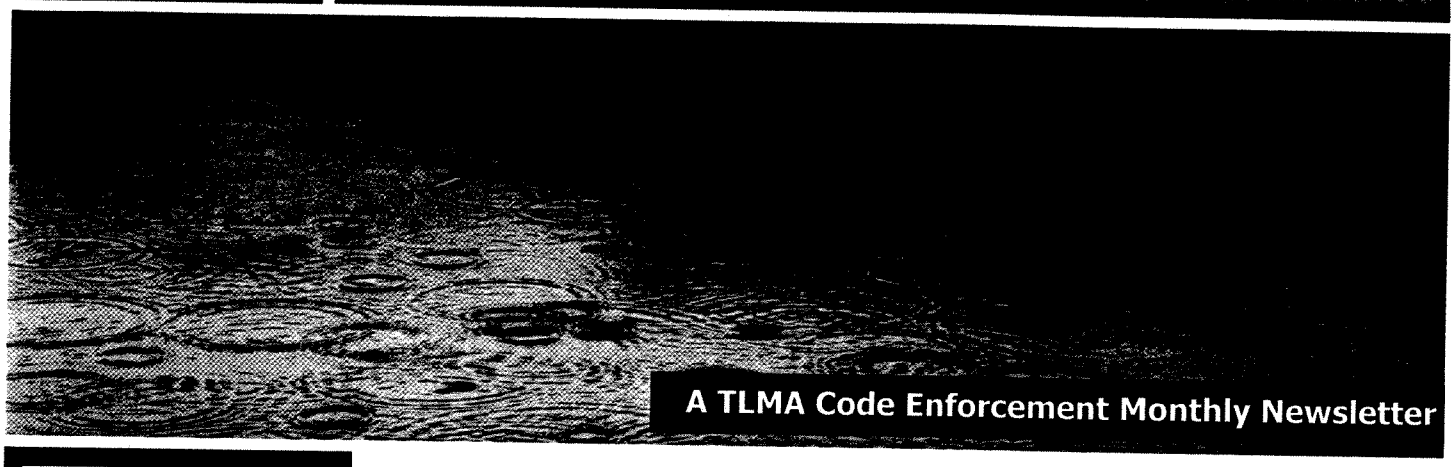

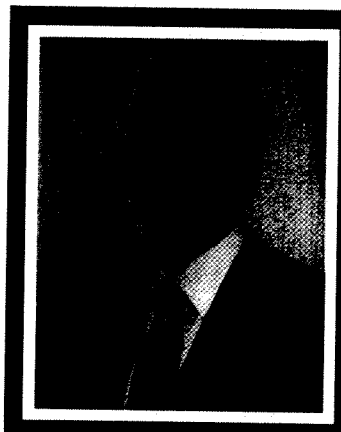

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Indio Hills Receives a Much Needed Facelift *District 4*

You could see it all from Dillon Road. The entire property was visible from the major roadway through the area, and the citizens of Indio Hills had a constant reminder that their area had problems. Since there was no perimeter fencing, the neighborhood was able to see over twenty (20) inoperable, dismantled vehicles, including trucks, a sweeper, motor homes, and boats. The owner, who had been renting the house to relatives, had recently moved back to the property.

Code Enforcement Officer Jacqueline Fogh began a vehicle abatement case to cause the owner to take the necessary action to remove, repair, or properly store the inoperable vehicles on the property. Soon after notifying the owner of a county code ordinance violation, the property owner either removed or garaged the offending vehicles; but the property owner did not stop there. The excess outside storage was also removed, and all the operable vehicles were arranged neatly on the property.

The area now looks so much better thanks to the owner who took responsibility for the property – with a friendly reminder from the Code Enforcement Department.

Over 20 inoperable vehicles were scattered around the property

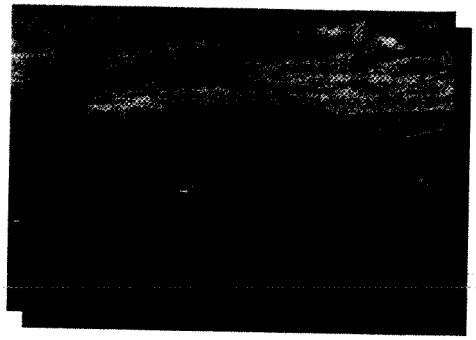

The vehicles were either removed or stored properly

Good Neighbor Tip:
Park your car(s) in designated areas on the street or in your driveway or garage.

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Riverside County Code Enforcement

THE POSTING

May 2009

Volume 3, Issue 5

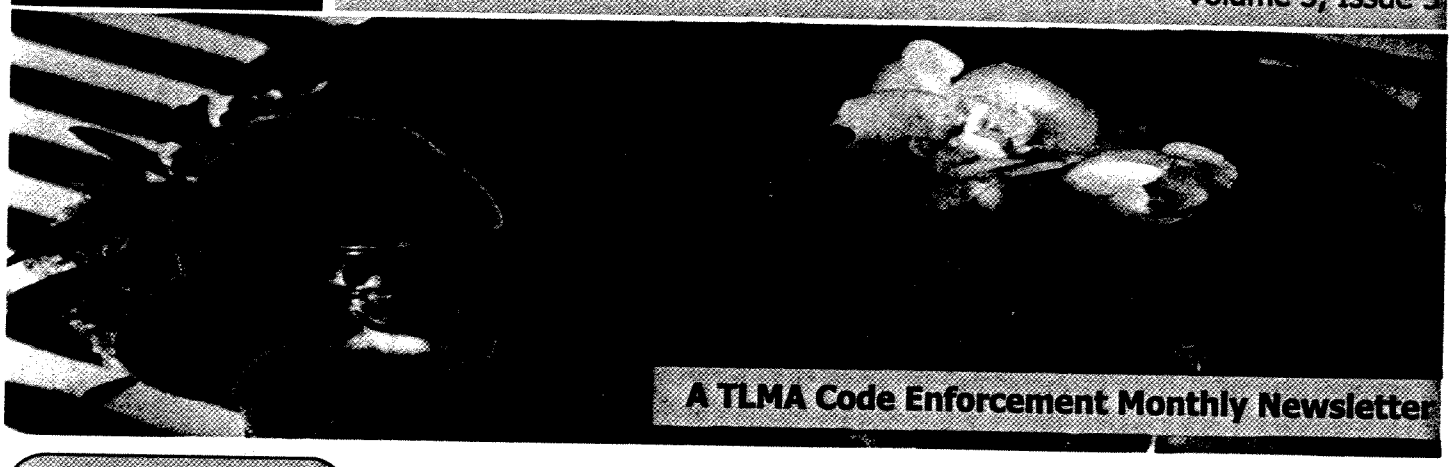

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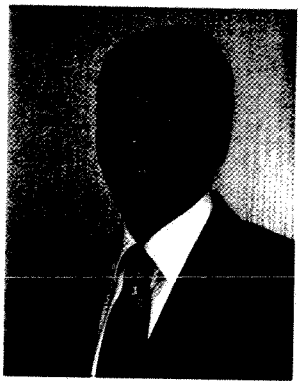

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Elderly Resident Removed from Unsanitary Conditions by Caring Family *District 5*

Code Enforcement officers are subjected to all sorts of code violations on a daily basis. Oftentimes, property owners and family members become emotional as the officers attempt to communicate the hazards and safety concerns they witness on a property. Code Enforcement Officers Anthony Green, James Pike, and Lanee Padilla were contacted by Animal Services to assist with a multi-agency cleanup of a property in Cabazon.

During the initial inspection of the property, it was discovered that the elderly resident was living in very unsanitary conditions. In addition to the intrinsic conditions associated with the keeping of over 20 cats and dogs, several electrical hazards were also documented on the property.

A high level of courtesy, compassion, and customer service was exercised by the Code Enforcement Department, Animal Services, and the Sheriff's Department in order to avoid any additional stress being placed on the property owner or her family members. During the inspection, the owner was voluntarily removed from the residence by relatives and taken to an assisted care facility.

Although these types of cases can be emotionally draining, the gratitude expressed by the family members and neighbors make it all worthwhile.

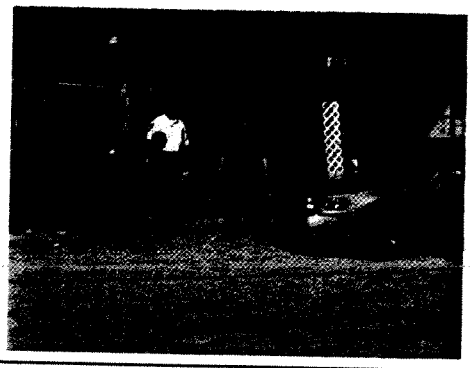

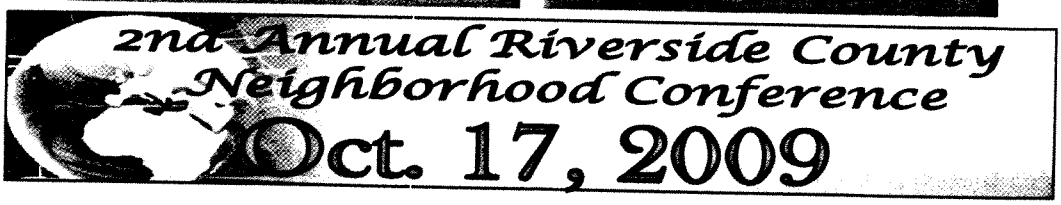

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Riverside County Code Enforcement

THE POSTING

June 2009
Volume 3, Issue 6

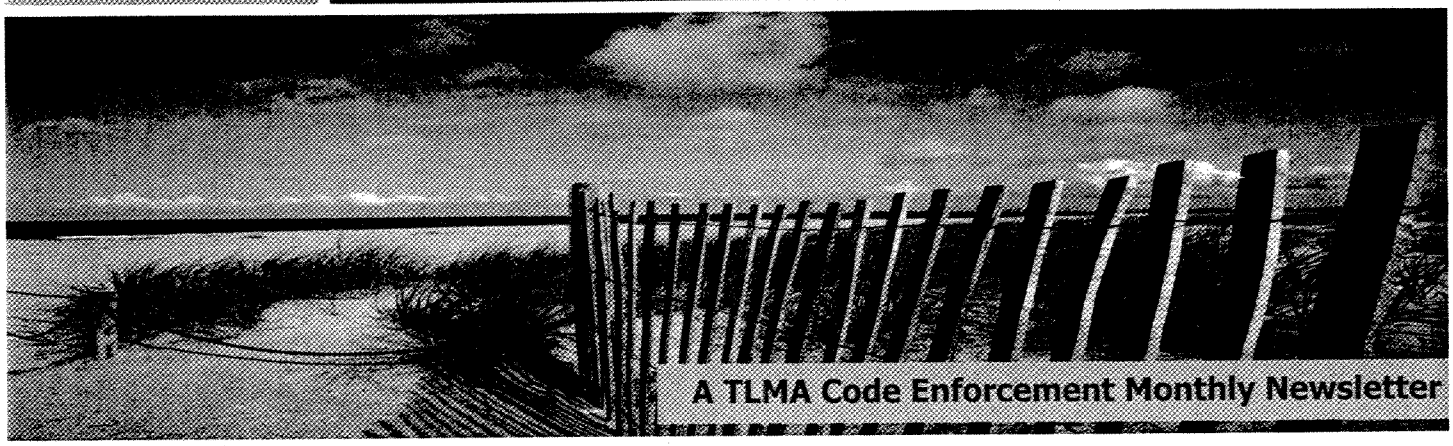

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Fire Damage Leads to Voluntary Compliance *District 2*

The Riverside County Code Enforcement Department received a report from the California Department of Forestry regarding a structure fire on Grant Street in the community of Home Gardens. Senior Officer Marcella Villanueva and Officer Diana Parra inspected the location.

Officers Villanueva and Parra found the structure had sustained major fire damage. While inspecting the property, the officers also discovered that the structure's garage had been illegally converted into living space and contained a large L-shaped unpermitted addition. The garage and addition had been divided into three separate units, and it was unknown if the utilities to the unpermitted units were correctly installed, which could have proved hazardous to the previous occupants. The main structure was deemed substandard and a notice was posted. A Notice of Violation was issued for the unpermitted additions and garage conversion.

Officer Parra contacted the individual representing the property owner and gave the representative direction on how to come into compliance. The property owner decided to remove the structure from the property and obtained a demolition permit. Code Enforcement maintained contact with the representative and demolition contractor, and within weeks, the structure was removed from the property. Currently there are plans for a new single family residence to be built at this location.

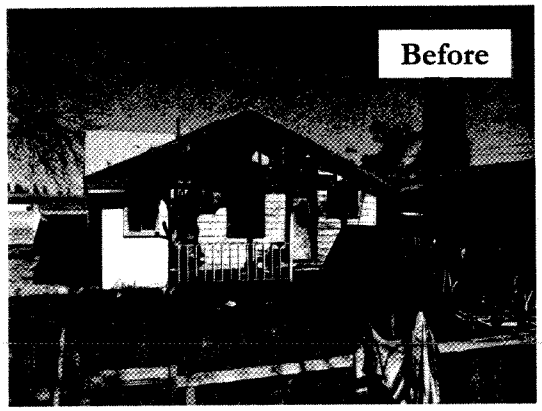

2nd Annual Riverside County Neighborhood Conference

Save the Date **Oct. 17, 2009** Save the Date

DEPARTMENT OF ENVIRONMENTAL HEALTH

Murrieta

PR0033621	1st Class Collision Murrieta	41729 Eastman Dr	Murrieta	1/15/09
PR0023695	A-1 Murrieta Auto Repair	26622 Jefferson Ave #	Murrieta	1/15/09
PR0023726	Affordable Automotive Repair	41604 Date St Ste.D	Murrieta	5/28/09
PR0019702	Airmech Inc	37552 Winchester Rd	Murrieta	7/30/08
PR0038081	Albertson's #6609	28047 Scott Rd	Murrieta	3/12/09
PR0033141	Albertson's #6734	39224 Winchester Rd	Murrieta	2/23/09
PR0032786	Alta Dry Cleaners	40365 Murrieta Hot Sp	Murrieta	1/13/09
PR0023293	Alta Dry Cleaners	40365 Murrieta Hot Sp	Murrieta	8/19/08
PR0019732	Auto Techniques	41340 Pear St #15	Murrieta	1/22/09
PR0040172	Autobahn Automotive	26871 Hobie Cir #B-1	Murrieta	1/22/09
PR0034046	AutoZone #5566	40950 California Oaks	Murrieta	7/25/08
PR0023402	Baliani Automotive	26450 Jefferson Ave #	Murrieta	1/27/09
PR0021213	Big O Tires	40420 California Oaks	Murrieta	8/8/08
PR0031137	Black's Auto Repair	25760 Washington Av	Murrieta	4/20/09
PR0033838	Brunswick California Oaks Bowl	40440 California Oaks	Murrieta	7/31/08
PR0031558	Caliber Collision Centers	41416 Pear St	Murrieta	4/29/09
PR0029662	California Auto Centers	26860 Jefferson Ave #	Murrieta	4/29/09
PR0023067	California Oaks Carwash/Quick Lu	40933 California Oaks	Murrieta	7/2/08
PR0031104	California Oaks Shell	40981 California Oaks	Murrieta	2/3/09
PR0028363	Calvary Chapel Conference Cente	39405 Murrieta Hot Sp	Murrieta	3/17/09
PR0032421	Cameron Welding Supply	41341 Date St	Murrieta	5/28/09
PR0032979	Capri Cleaners	40119 Murrieta Hot Sp	Murrieta	1/12/09
PR0033784	Carl's Jr #1105	40980 California Oaks	Murrieta	8/7/08
PR0033596	Carriage Motors, Inc	26825 Auto Mall Pkwy	Murrieta	2/25/09
PR0040805	Carrier Sales & Distribution, LLC	41710 Reagan Wy	Murrieta	6/1/09
PR0034066	Chevron Station #21-0409	39440 Murrieta Hot Sp	Murrieta	5/5/09
PR0028096	Chevron Stations Inc. #1484/2012	40500 California Oaks	Murrieta	4/2/09
PR0033788	Chuck E Cheese #414	25110 Hancock Ave	Murrieta	3/5/09
PR0020242	Classic Cleaners-OOB OOB	40605 California Oaks	Murrieta	8/19/08
PR0032532	Convenience Retailers LLC-OOB	41010 California Oaks	Murrieta	1/13/09
PR0022157	CVS Pharmacy #9628	25080 Hancock Ave	Murrieta	3/5/09
PR0025974	Excaliber Fuels #5	40648 California Oaks	Murrieta	11/26/08
PR0029929	Excaliber Fuels #5	40648 California Oaks	Murrieta	1/8/09
PR0022448	Express Tire - Murrieta	40615 California Oaks	Murrieta	8/8/08
PR0022360	EZ Lube #115	40430 California Oaks	Murrieta	7/31/08
PR0028199	Faith Quality Auto Body, Inc.	41130 Nick Ln	Murrieta	4/28/09

PR0028213	Gentle Dry Cleaners	25060 Hancock Ave #	Murrieta	3/5/09
PR0023425	High Tech Auto	26450 Jefferson Ave #	Murrieta	1/27/09
PR0030701	Home Depot #668	25100 Madison Ave	Murrieta	5/27/09
PR0028205	Hot Springs Cleaners	40469 Murrieta Hot Sp	Murrieta	1/13/09
PR0028292	International Immunology Corp	25549 Adams Ave	Murrieta	1/8/09
PR0028280	James Allen Collision Center II	41109 Sandalwood Ci	Murrieta	3/16/09
PR0032329	Johnson Machinery Rentals	41105 Raintree Ct	Murrieta	2/2/09
PR0029972	Kip Incorporated	25740 Washington Av	Murrieta	4/20/09
PR0034035	Kragen Auto Parts #1430	40951 California Oaks	Murrieta	7/25/08
PR0026296	Madison Shell #68569	25336 Madison Ave	Murrieta	12/8/08
PR0023721	Murrieta 76	39460 Murrieta Hot Sp	Murrieta	10/14/08
PR0033911	Murrieta Hot Springs Shell	40452 Murrieta Hot Sp	Murrieta	5/19/09
PR0033504	Murrieta Volkswagon	41300 Date St	Murrieta	2/25/09
PR0033099	MVUSD Transportation Facility	41870 Mc Alby Ct	Murrieta	6/1/09
PR0030564	Pro-Tec	41376 Pear St	Murrieta	1/22/09
PR0040564	Pure Chiropractic	25136 Hancock Ave S	Murrieta	3/5/09
PR0026685	Ralphs Grocery Company #118	23801 Washington Av	Murrieta	11/13/08
PR0032430	RCP Block & Brick	25725 Jefferson Ave	Murrieta	1/28/09
PR0033725	RK Sport Inc	26900 Jefferson Ave #	Murrieta	2/2/09
PR0023777	S & T Saab Volvo Specialist	26622 Jefferson #105	Murrieta	1/15/09
PR0039847	Scott-Murrieta Service Station LP	33070 Antelope Rd	Murrieta	5/27/09
PR0033974	Seven Eleven #33484	28015 Scott Rd	Murrieta	3/12/09
PR0034493	Seven-Eleven #33552	40210 Murrieta Hot Sp	Murrieta	2/26/09
PR0033282	Southern California Gas Co	25620 Jefferson St	Murrieta	5/6/09
PR0031701	Spectrum Cleaners III	40964 California Oaks	Murrieta	7/25/08
PR0032328	Star Trac Strength Inc	41180 Raintree Ct	Murrieta	2/2/09
PR0030853	Stater Bros. Market #139	25050 Hancock Ave	Murrieta	3/5/09
PR0035161	Superior Ready Mix Concrete	26165 Adams Ave	Murrieta	5/28/09
PR0023270	Target Store #1283	41040 California Oaks	Murrieta	8/14/08
PR0042282	Temecula Auto Body & Paint	41196 Nick Ln	Murrieta	4/28/09
PR0033837	The Movie Experience	41090 California Oaks	Murrieta	8/7/08
PR0030708	USA Station #68168	39055 Winchester Rd	Murrieta	3/23/09
PR0028243	Verizon/Murrieta CO	24961 Washington Av	Murrieta	6/3/09
PR0026705	Vons Fuel Center #2660	29910 Murrieta Hot Sp	Murrieta	10/20/08
PR0023401	Worldwide Autoworks	26450 Jefferson #105	Murrieta	1/27/09

Total Site Visits for Murrieta - 71

Temecula

PR0022876	A 1 Auto	28696 Via Montezuma	Temecula	2/19/09
PR0038911	Above All Auto Body, Inc	27516 Commerce Cer	Temecula	10/14/08
PR0023459	Adobe Plaza Cleaners	27625 Jefferson Ave #	Temecula	10/2/08
PR0031317	Airgas West Inc	41735 Rider Wy	Temecula	5/19/09
PR0030854	Albertson's #6706	30530 Rancho Californ	Temecula	9/10/08
PR0022434	APD Technologies, Inc-OOB OOE	42066 Avenida Alvara	Temecula	3/12/09
PR0026102	Arco #5928/Prestige Stations-OOI	27691 Ynez Rd	Temecula	7/22/08
PR0022407	Arco #6305/Prestige Stations #63	40212 Winchester Rd	Temecula	8/13/08
PR0023786	Arrow Engines	43162 Blackdeer Loop	Temecula	7/21/08
PR0024170	Ask Terry Automotive	28733 Via Montezuma	Temecula	11/3/08
PR0021879	Auto Care Experts, Inc	42295 Avenida Alvara	Temecula	7/7/08
PR0019731	Auto Doctor- Thompson Magnetic	42255 Baldaray Cir St	Temecula	7/16/08
PR0022741	Auto World Service Center	27495 Commerce Cer	Temecula	7/29/08
PR0019831	Autocenter Autobody Of Temecula	28710 Las Haciendas	Temecula	7/31/08
PR0038764	Automedics	42103 Rio Nedo # 103	Temecula	8/26/08
PR0023869	AutoZone #5936	40345 Winchester Rd	Temecula	2/24/09
PR0035040	BJ's Restaurant & Brewhouse	26500 Ynez Rd	Temecula	4/21/09
PR0024384	Bostik Findley Inc	27460 Bostik Ct	Temecula	7/28/08
PR0034540	Burger King	30534 Rancho Californ	Temecula	3/5/09
PR0025149	California Highway Patrol	27685 Commerce Cer	Temecula	9/26/08
PR0034501	Carl's Jr #1023	30660 Rancho Californ	Temecula	1/20/09
PR0028062	Cemex Construction Materials Pa	29065 Front St	Temecula	11/26/08
PR0040669	Central Service Station LP	44239 Margarita Rd	Temecula	6/3/09
PR0019862	Chase Auto Repair	27516 Commerce Cer	Temecula	8/19/08
PR0019862	Chase Auto Repair	27516 Commerce Cer	Temecula	3/3/09
PR0019813	Chevron Jefferson Street	27560 Jefferson Ave	Temecula	11/26/08
PR0025921	Chevron SS #1492/201596	40635 Winchester Rd	Temecula	12/23/08
PR0026094	Chevron SS #1838/204029	31669 Hwy 79	Temecula	12/29/08
PR0034030	Chick-fil-A-OOB OOB	40531 Margarita Rd	Temecula	2/25/09
PR0034322	Chipotle Mexican Grill	40573 Margarita Rd #	Temecula	2/25/09
PR0023435	Continental Cleaners	33175 S Hwy 79 Ste.D	Temecula	7/23/08
PR0024107	Creative Touch Interiors	43085 Business Park I	Temecula	9/23/08
PR0019840	Creekside Gas And Food Mart	29115 Front St	Temecula	2/17/09
PR0038709	Cycle Shack	32839 Temecula Pkwy	Temecula	3/24/09

PR0023669	DCH Acura of Temecula	26705 Ynez Rd	Temecula	1/21/09
PR0020212	DCH Chrysler Jeep Temecula-OC	26799 Ynez Rd	Temecula	1/21/09
PR0020216	DCH Honda of Temecula	26755 Ynez Rd	Temecula	1/21/09
PR0019852	Del Rio Enterprise	42181 Avenida Alvara	Temecula	8/19/08
PR0034619	Denny's	28915 Rancho Califor	Temecula	2/19/09
PR0019856	Dial Automotive	43175 Blackdeer Lp	Temecula	7/7/08
PR0023732	Discount Auto Service	41680 Enterprise Cir S	Temecula	11/3/08
PR0022079	Dutch Dry Cleaners	27461 Jefferson Ave	Temecula	3/18/09
PR0019873	EMWD Temecula Valley Regional	42565 Avenida Alvara	Temecula	8/12/08
PR0020138	Enterprise Automotive	28696 Via Montezuma	Temecula	4/13/09
PR0040329	Express Tire	44092 Margarita Rd	Temecula	2/5/09
PR0022537	Express Tire - Temecula	29095 Front St	Temecula	9/17/08
PR0020040	ExxonMobil Oil Corporation #1019	44520 Bedford Ct	Temecula	4/20/09
PR0020037	ExxonMobil Oil Corporation #1084	29500 Rancho Califor	Temecula	2/19/09
PR0023276	ExxonMobil Oil Corporation #1913	33165 Hwy 79	Temecula	9/25/08
PR0037891	EZ Lube #85	30625 Temecula Pkwy	Temecula	7/31/08
PR0039626	Food 4 Less #319	26419 Ynez Rd	Temecula	3/17/09
PR0021464	Fourth Street Automotive	41935 4th St	Temecula	9/24/08
PR0030867	Frazee Paint & Wallcovering	27355 Jefferson Ave S	Temecula	3/18/09
PR0023264	Front St. Service Station LP	44987 Front St	Temecula	10/22/08
PR0034671	Gilmore Liquid Air Co	42217 Rio Nedo #B10	Temecula	4/21/09
PR0022275	Gold Prospectors Assoc of Americ	43445 Business Park I	Temecula	11/3/08
PR0019913	Graphics Unlimited Lithography-O	43171 Business Park I	Temecula	7/23/08
PR0022288	Grizzle & Hunter Plastics LLC	27957 Diaz Rd	Temecula	9/24/08
PR0024108	HD Supply White Cap Constructio	28065 Diaz Rd	Temecula	8/25/08
PR0023239	Home Depot #1028	32020 Hwy 79	Temecula	7/30/08
PR0034257	Jack in the Box #0048-OOB OOB	27410 Jefferson Ave	Temecula	3/9/09
PR0020193	Jiffy Lube #1878	30690 Rancho Califor	Temecula	5/27/09
PR0023608	Johnson Matthey	27449 Colt Ct	Temecula	8/25/08
PR0023642	Label Productions of California	43135 Blackdeer Loop	Temecula	7/24/08
PR0020010	Lewis Cleaners	29760 Rancho Califor	Temecula	3/12/09
PR0032287	Line-X of Temecula Valley	28069 Diaz Rd #F	Temecula	9/24/08
PR0023109	Long Machine, Inc.	27450 Colt Ct	Temecula	11/3/08
PR0022042	M A C Products Inc	43214 Blackdeer Loop	Temecula	7/30/08
PR0021219	Magic Cleaners	41925 Motor Car Pkwy	Temecula	5/20/09
PR0019855	Magnecomp Corp.	26201 Ynez Rd #103	Temecula	4/21/09
PR0025299	McMillan Farm Management	35350 Rancho Califor	Temecula	12/18/08

PR0022429	Minuteman Press	27452 Jefferson Ave	Temecula	5/20/09
PR0021438	Molding International Engineering	42136 Avenida Alvara	Temecula	7/24/08
PR0021182	Murrieta Valley RV Service	27882 Del Rio Rd	Temecula	9/17/08
PR0020020	My Tech Automotive-OOB OOB	42346 Rio Nedo St #G	Temecula	1/21/09
PR0020020	My Tech Automotive-OOB OOB	42346 Rio Nedo St #G	Temecula	10/6/08
PR0020058	National Process Industries Inc	42250 Baldaray Cir	Temecula	10/1/08
PR0020073	Old Town Tire & Service	28700 Front St	Temecula	9/17/08
PR0026445	Palomar Village Shell	42197 Margarita Rd	Temecula	10/15/08
PR0034397	Panda Express #834	32195 S Hwy 79 Ste.C	Temecula	4/14/09
PR0019727	Pauley Equipment Company	28374 Felix Valdez Av	Temecula	7/29/08
PR0028402	Pedley Propane	42046 Rio Nedo St	Temecula	5/20/09
PR0028417	Polycraft Inc	42075 Avenida Alvara	Temecula	7/8/08
PR0022907	Pro Auto Collision	42011 E Avenida Alva	Temecula	7/9/08
PR0023589	Quality 1 Auto Service	27512 W Enterprise C	Temecula	11/13/08
PR0038269	Rainbow Service Station	30535 Temecula Pkw	Temecula	8/20/08
PR0023320	Ramona Tire And Service Center	31955 Via Rio Temec	Temecula	3/19/09
PR0020136	Rancho Car Wash	27378 Jefferson Ave	Temecula	10/7/08
PR0037535	Rancho Cleaners	27477 Ynez Rd	Temecula	7/9/08
PR0022110	Rancho Ford Lincoln Mercury	26895 Ynez Rd	Temecula	3/18/09
PR0026135	Rancho Shell #68623	29750 Rancho Califor	Temecula	1/5/09
PR0029748	RCWD Ace Bowen Pump Station	29025 Via Santa Rosa	Temecula	6/10/09
PR0039301	RCWD Calle Breve PS		Temecula	6/10/09
PR0029752	RCWD Carancho Pump Station	43695 El Calamar Rd	Temecula	6/10/09
PR0028481	RCWD De Portola Pump Station	40110 Cordova Dr	Temecula	6/10/09
PR0034159	RCWD Doherty Pump Station	43250 Elm St	Temecula	6/9/09
PR0029743	RCWD East Bluff Pump Station	42500 Block of Busine	Temecula	6/9/09
PR0028461	RCWD RC Pump Station #2 Well	31690 Rancho Califor	Temecula	6/9/09
PR0034158	RCWD VDC	37100 Block De Portol	Temecula	6/10/09
PR0028445	RCWD Well #108	40000 Block Margarita	Temecula	6/9/09
PR0028444	RCWD Well #309	26585 Madison Ave	Temecula	6/9/09
PR0022312	Redhawk Shell #68622	44260 Redhawk Pkwy	Temecula	2/4/09
PR0020154	Roadside Automotive & Tire Road	42346 Rio Nedo St # A	Temecula	4/13/09
PR0038913	S & P Automotive	42103 Rio Nedo # 105	Temecula	9/12/08
PR0023387	Saturn Of Temecula-OOB OOB	27430 Ynez Rd	Temecula	2/25/09
PR0024198	Sears Auto Center #2658	40680 Winchester Rd	Temecula	11/12/08
PR0023070	Sears Roebuck & Company #110	40710 Winchester Rd	Temecula	11/12/08
PR0040629	Shahin Shaath	27691 Ynez Rd	Temecula	5/4/09

PR0020219	SKS, Inc	41981 Avenida Alvara	Temecula	6/9/09
PR0020187	Solid State Stamping Inc	43350 Business Park I	Temecula	10/1/08
PR0019832	South Bay Cable Corp	42033 Rio Nedo St	Temecula	10/6/08
PR0036840	Stater Bros. Market #138 (Red Ha	31813 Temecula Pkwy	Temecula	7/10/08
PR0021686	Superior Auto Repair	28733 Via Montezuma	Temecula	7/22/08
PR0021761	T.V.S. Complete Auto Care	28822 Front St #107	Temecula	11/18/08
PR0035842	Taco Bell #19515	41005 Winchester Rd	Temecula	1/20/09
PR0022068	Target Stores #359	29676 Rancho Californ	Temecula	4/1/09
PR0038902	Techstar Automotive-OOB OOB	43094 Via Dos Picos #	Temecula	9/11/08
PR0037602	Temecula 76	28903 Rancho Californ	Temecula	8/15/08
PR0033197	Temecula Auto Repair & Radiator	43191 Rancho Wy	Temecula	2/3/09
PR0020215	Temecula Car Wash	29766 Rancho Californ	Temecula	3/11/09
PR0023619	Temecula Motorcycle Service	41860 Enterprise Cir S	Temecula	11/12/08
PR0020045	Temecula Print	40610 County Center I	Temecula	11/13/08
PR0023208	Temecula Quick Lube	29764 Rancho Californ	Temecula	8/27/08
PR0039110	Temecula Valley Paint	27641 Commerce Cer	Temecula	10/7/08
PR0026058	Temecula Valley School District	40516 Roripaugh Rd	Temecula	11/26/08
PR0034323	Temeku Cinema	26463 Ynez Rd	Temecula	3/4/09
PR0022798	Temeku Hills Golf Club	41687 Temeku Dr	Temecula	3/11/09
PR0034278	The Movie Experience	27531 Ynez Rd	Temecula	3/4/09
PR0019959	The Tranny Shop, Inc.	42346 Rio Nedo St #I	Temecula	10/6/08
PR0022922	Thompson's Discount Tire Center	28007 Jefferson Ave S	Temecula	10/9/08
PR0024041	Toyota of Temecula Valley	41892 Motor Car Pkwy	Temecula	2/4/09
PR0020244	Toyota Of Temecula Valley	26631 Ynez Rd	Temecula	2/4/09
PR0038675	Transmission Plus	28733 Via Montezuma	Temecula	4/14/09
PR0038910	Ultra Motorcycles-OOB OOB	42180 Sarah Wy	Temecula	9/9/08
PR0031426	Vail Lake Resort	40940 Hwy 79	Temecula	7/7/08
PR0022684	Vail Ranch Cleaners	31821 Hwy 79 #B5	Temecula	4/14/09
PR0028247	Verizon/Rancho California CO	41963 Moreno Rd	Temecula	9/29/08
PR0032079	Verizon/Redhawk CO	32505 Hwy 79	Temecula	9/29/08
PR0037090	Ynez Shell Food Mart/Car Wash	26680 Ynez Rd	Temecula	10/16/08

Total Site Visits for Temecula - 139

Wildomar

PR0038549	Arco AM/PM	36228 Hidden Springs	Wildomar	7/30/08
PR0037751	Arco AM/PM	33986 Orange St	Wildomar	3/11/09
PR0039863	Bundy Canyon Turf Supply	21400 Bundy Canyon	Wildomar	12/1/08

PR0022471	FCP, Inc	23100 Baxter Rd	Wildomar	8/20/08
PR0036117	HBPARKCO Contruction, Inc	33861 Mission Trail	Wildomar	2/25/09
PR0038869	Marc Cohen Trucking, Inc	31705 Central Ave #B	Wildomar	8/12/08
PR0019568	Round Up Liquor & Deli	20651 Palomar St	Wildomar	10/30/08
PR0035662	Seven Eleven #33595	32060 Clinton Keith R(	Wildomar	10/20/08
PR0023473	USA Station #68238	23905 Catt Rd	Wildomar	12/19/08

Total Site Visits for Wildomar - 9

TOTAL SITE VISITS: 219

Murrieta

PR0038920	Aliberto's Mexican Food	25312 Madison Ave Ste #102	Murrieta	9/23/08
PR0005098	ALTA MURRIETA ELEMENTARY SCHOOL	39475 WHITEWOOD RD	MURRIETA	11/6/08
PR0005263	ANDY'S CAFE	40469 MURRIETA HOT SPRINGS RD	MURRIETA	9/8/08
PR0008985	ANTELOPE HILLS ELEMENTARY	36105 E MURRIETA OAKS Ave	MURRIETA	10/30/08
PR0038294	Anthony's Lounge & Restorante	24630 Washington Ave #100	Murrieta	9/24/08
PR0038210	Applebee's Neighborhood Grill & Bar	24872 Madison Ave	Murrieta	1/15/09
PR0035931	AROMAS COFFEE AND FLORAL CO	29950 HUNTER RD 103	Murrieta	8/6/08
PR0004941	AVAXAT ELEMENTARY SCHOOL	24300 LAS BRISAS Rd	MURRIETA	10/30/08
PR0039759	Baja Grill	40663 Murrieta Hot Springs Rd	Murrieta	2/18/09
PR0008470	BELLA VISTA MIDDLE SCHOOL	31650 BROWNING ST	MURRIETA	12/2/08
PR0036899	Board'z Grill	39509 Los Alamos Rd D	Murrieta	8/6/08
PR0039096	Booster Juice	24635 Madison Ave	Murrieta	11/6/08
PR0007099	BUCHANAN ELEMENTARY	40121 TORREY PINES RD	MURRIETA	11/6/08
PR0009407	CARL'S JR.	28023 SCOTT RD	MURRIETA	9/10/08
PR0039593	Catch of the Day Seafood Grill	40365 Murrieta Hot Springs Rd Ste #C-14	Murrieta	1/13/09
PR0008306	CHINA PANDA	39252 WINCHESTER RD 121	MURRIETA	10/29/08
PR0007186	CHUY'S MESQUITE BROILER	25401 MADISON AVE	MURRIETA	1/15/09
PR0006906	COLE CANYON ELEMENTARY SCHOOL	23750 VIA ALISOL	MURRIETA	9/17/08
PR0039395	Cookie's Cafe	25030 Hamcock Ave Ste #104	Murrieta	1/12/09
PR0005368	DEL TACO #249	40465 ALTA MURRIETA DR	MURRIETA	8/11/08
PR0042451	Dick's Sporting Goods	40404 Murrieta Hot Springs Rd	Murrieta	5/26/09
PR0005097	E. HALE CURRAN ELEMENTARY SCHOOL	40855 CHACO CANYON RD	MURRIETA	9/17/08
PR0039450	E1-X / Mini Melts Dist	26692 Pierce Cir Ste #B	Murrieta	1/13/09
PR0006836	FRENCH VALLEY CAFE	37552 WINCHESTER RD	MURRIETA	9/8/08
PR0038837	Fresh and Easy	39530 Murrieta Hot Springs Rd	Murrieta	9/9/08
PR0003813	GOLDEN PHOENIX--OOB	25100 HANCOCK AVE 105	MURRIETA	1/12/09
PR0036179	Hole In One Donuts & Bagels	40119 Murrieta Hot Springs Rd	Murrieta	8/19/08
PR0005231	HONEYCUTT FARMS	40477 MURRIETA HOT SPRINGS RD	MURRIETA	8/12/08
PR0006460	HOT WOK CHINESE FOOD	40469 MURRIETA HOT SPRINGS RD	MURRIETA	8/12/08
PR0040078	Jack in the Box	33080 Antelope Rd	Murrieta	2/10/09
PR0037948	Juice It Up	27890 Clinton Keith Rd #G	Murrieta	7/2/08
PR0038029	KR's Chicken & Ribs	41539 Kalmia St #120	Murrieta	10/30/08
PR0038029	KR's Chicken & Ribs	41539 Kalmia St #120	Murrieta	8/4/08
PR0010409	LE PETIT CAFE	26499 JEFFERSON AVE #F	MURRIETA	10/30/08
PR0018253	Lisa J Mails Elementary School	35185 Briggs	Murrieta	11/12/08
PR0039802	Little Caesars Pizza #5955	39209 Winchester Rd Ste #103	Murrieta	1/29/09
PR0008007	MONTE VISTA ELEMENTARY SCHOOL	37420 VIA MIRA MOSA	MURRIETA	11/6/08
PR0039567	Murrieta Home Brew Emporium	38750 Sky Canyon Dr	Murrieta	12/23/08
PR0037713	Murrieta Pizza Factory--OOB	40477 Murrieta Hot Springs Rd # D3	Murrieta	9/22/08
PR0005940	MURRIETA VALLEY HIGH SCHOOL	24105 WASHINGTON AVE	MURRIETA	9/17/08
PR0005940	MURRIETA VALLEY HIGH SCHOOL	24105 WASHINGTON AVE	MURRIETA	12/3/08

PR0008932	OAK MEADOWS ELEMENTARY SCHOOL	28600 POINSETTIA ST	MURRIETA	10/30/08
PR0039917	Office Depot #2371	24500 Village Walk	Murrieta	1/23/09
PR0003746	PEONY CHINESE CUISINE	39525 LOS ALAMOS RD	MURRIETA	9/10/08
PR0040382	Pho Tho Vietnamese Restaurant	40250 Murrieta Hot Springs Rd Ste #101	Murrieta	3/17/09
PR0005099	RAIL RANCH ELEMENTARY SCHOOL	25030 VIA SANTEE Rd	MURRIETA	11/6/08
PR0039349	Rubio's Murrieta Store	40436 Murrieta Hot Springs Rd	Murrieta	11/18/08
PR0004880	SCGA MEMBERS' CLUB AT RANCHO CALIFORNIA	39500 ROBERT TRENT JONES PKWAY	MURRIETA	10/21/08
PR0039801	Scott-Murrieta Service Station LP	33070 Antelope Rd	Murrieta	1/20/09
PR0037351	SGC Sushi Japanese Restaurant	40461 Murrieta Hot Springs Rd Ste J-2	Murrieta	8/12/08
PR0006155	SHIVELA MIDDLE SCHOOL	24515 LINCOLN AVE	MURRIETA	12/3/08
PR0004907	SIDELINES SPORTS BAR & GRILL	24910 WASHINGTON AVE	MURRIETA	11/6/08
PR0004907	SIDELINES SPORTS BAR & GRILL	24910 WASHINGTON AVE	MURRIETA	6/9/09
PR0005297	SIZZLER	40489 MURRIETA HOT SPRINGS RD	MURRIETA	9/8/08
PR0038244	Smokin Joe's Pizza Deli	38365 Innovation Ct	Murrieta	9/23/08
PR0038401	Subway	31460 Murrieta Hot Springs	Murrieta	10/16/08
PR0008392	SWEET LAYERS CAKES & PASTRIES	29992 HUNTER RD 103	MURRIETA	9/10/08
PR0037917	T K's Donuts & Ice Cream	41539 Kalmia St #107	Murrieta	7/2/08
PR0009123	TACO BELL #22691	39056 WINCHESTER RD	MURRIETA	8/5/08
PR0003022	TACO BELL #5081	39557 LOS ALAMOS RD	MURRIETA	8/12/08
PR0039494	Taco's Durango	41539 Kalmia St #105	Murrieta	1/21/09
PR0007458	THAI ORCHID RESTAURANT	25359 MADISON AVE F101	MURRIETA	11/18/08
PR0035693	The Mill	24690 Washington ST	Murrieta	11/12/08
PR0006827	THOMPSON MIDDLE SCHOOL	42400 NIGHTHAWK WAY	MURRIETA	9/24/08
PR0006622	TOVASHAL ELEMENTARY SCHOOL	23801 SAINT RAPHAEL DR	MURRIETA	10/30/08
PR0039054	Truly Madly Sweetly	41539 Kalmia Ste #102	Murrieta	10/29/08
PR0040796	Unique Pizza & Subs	25383 Madison Ave	Murrieta	4/8/09
PR0008008	VISTA MURRIETA HIGH SCHOOL	28251 CLINTON KEITH RD	MURRIETA	10/30/08
PR0006973	WAL-MART #2952	41200 MURRIETA HOT SPRINGS RD	MURRIETA	7/31/08
PR0008521	WARM SPRINGS MIDDLE SCHOOL	39245 CALLE DE FORTUNA	MURRIETA	11/6/08
PR0039925	White Lime Yogurt	39540 Murrieta Hot Springs Rd	Murrieta	1/28/09
PR0039496	Xtreme Frozen Yogurt	27890 Clinton Keith Rd Ste #C	Murrieta	12/2/08

Total Site Visits for Murrieta - 72

Temecula

PR0038170	5th Ave Dog House	41958 Fifth St	Temecula	9/23/08
PR0040047	Abbott Vascular Coffee Bar	41888 Motorcar Pkwy	Temecula	3/18/09
PR0006641	ABBY REINKE ELEMENTARY SCHOOL	43799 SUNNY MEADOWS DR	TEMECULA	9/9/08
PR0009803	AIYARA THAI CUISINE	41533 MARGARITA RD	TEMECULA	1/15/09
PR0008461	ALAMOS ELEMENTARY SCHOOL	38200 PACIFIC PARK DR	TEMECULA	12/2/08
PR0037420	America's Wholesale Ice Cream--OOB	26111 Ynez Rd #B-2	Temecula	8/13/08
PR0005113	ARBY'S	27702 JEFFERSON AVE	TEMECULA	1/14/09
PR0041041	Arco Am/Pm	27691 Ynez Rd	Temecula	5/7/09
PR0009924	BASKIN ROBBINS--OOB	31891 RANCHO CALIFORNIA RD 300	TEMECULA	7/9/08

PR0009739	BJ'S RESTAURANT	26500 YNEZ RD	TEMECULA	10/30/08
PR0038295	Bob's Big Boy	27313 Jefferson Ave	Temecula	7/28/08
PR0006844	BURGER KING	40520 WINCHESTER RD	TEMECULA	10/28/08
PR0037985	California Tea & Coffee Brewery	40315 Winchester Rd #A	Temecula	7/25/08
PR0039873	Chevron Extra Mile Station	28900 Rancho California	Temecula	1/7/09
PR0003876	CHEVRON FOOD MART	40635 WINCHESTER RD	TEMECULA	10/29/08
PR0003819	CHILIS GRILL & BAR	27645 YNEZ RD	TEMECULA	2/3/09
PR0008546	CHIPOTLE MEXICAN GRILL	40573 MARGARITA RD E	TEMECULA	10/29/08
PR0039845	Chronic Tacos	27523 Ynez Rd	Temecula	4/21/09
PR0008988	CROWNE HILL ELEMENTARY SCHOOL	33535 OLD KENT RD	TEMECULA	10/2/08
PR0037683	Daly's Frozen--OOB	28480 Old Town Front St D	Temecula	7/2/08
PR0004452	DEL TACO #395	27445 JEFFERSON AVE	TEMECULA	1/14/09
PR0009095	DEL TACO #763	30607 HWY 79 S	TEMECULA	7/11/08
PR0006832	DEL TACO #835	40375 WINCHESTER RD	TEMECULA	10/22/08
PR0003353	DENNY'S #1947--OOB	28915 RANCHO CALIFORNIA RD	TEMECULA	1/13/09
PR0004958	EL POLLO LOCO #3337	27375 JEFFERSON AVE	TEMECULA	1/13/09
PR0009263	EL TORITO RESTAURANT	40517 MARGARITA RD	TEMECULA	10/29/08
PR0007981	ERLE STANLEY GARDNER MIDDLE SCHOOL	45125 VIA DEL CORONADO	TEMECULA	12/4/08
PR0040336	ET's Lounge	27423 Jefferson Ave	Temecula	5/15/09
PR0040335	Filipinoy Asian Market	31141 Temecula Pkwy Ste #4	Temecula	3/17/09
PR0005982	FISH HOUSE VERA CRUZ	26700 YNEZ RD	TEMECULA	10/30/08
PR0039364	Fresh & Easy	44060 Margarita Rd	Temecula	1/29/09
PR0037918	Giant New York Pizza Co--OOB	27371 Jefferson Ave #S	Temecula	8/12/08
PR0040076	Goldilocks Bakery and Restaurant	27480 YNEZ Rd STE #O-1	Temecula	3/18/09
PR0040302	Great Harvest Bread Co	31795 Rancho California Rd	Temecula	3/16/09
PR0008455	GREAT OAKS HIGH SCHOOL-SNACK BAR-200	32555 DEER HOLLOW WAY	TEMECULA	11/20/08
PR0006599	HELEN HUNT JACKSON ELEMENTARY SCHOOL	32400 CAMINO SAN DIMAS	TEMECULA	11/20/08
PR0004613	JACK IN THE BOX #48--OOB	27410 JEFFERSON AVE	TEMECULA	11/18/08
PR0006600	JAMES L. DAY MIDDLE SCHOOL	40775 CAMINO CAMPOS VERDE	TEMECULA	9/30/08
PR0038147	Juice It Up! Village Walk	39848 Winchester Rd #8	Temecula	8/6/08
PR0004774	LA CASITA NUEVA	27645 JEFFERSON AVE	TEMECULA	10/30/08
PR0039803	Little Caesars Pizza #5956	44066 Margarita Rd Ste # 4	Temecula	2/2/09
PR0040692	Lucille's Smokehouse BBQ	40748 Winchester Rd	Temecula	5/12/09
PR0003340	MAD MADELINES	28495 FRONT ST	TEMECULA	10/22/08
PR0040512	Mangoz Ultimate Frozen Yogurt	40573 Margarita Rd #B	Temecula	4/8/09
PR0004940	MARGARITA MIDDLE SCHOOL	30600 MARGARITA RD	TEMECULA	12/2/08
PR0038283	Mariscos El Cuete	32459 Temecula Pkwy # D-107	Temecula	9/15/08
PR0004646	MCDONALD'S	28100 Jefferson Ave	TEMECULA	11/13/08
PR0036852	Meritage At Callaway	32720 Rancho California Rd	Temecula	7/1/08
PR0039100	Mr Shish Restaurant	28120 Jefferson Ave Ste #A101	Temecula	1/14/09
PR0010311	MR YOU EXPRESS	31795 RANCHO CALIFORNIA RD 100	TEMECULA	7/9/08
PR0005274	NICHOLAS VALLEY ELEMENTARY SCHOOL	39600 N GENERAL KEARNY Rd	TEMECULA	12/2/08

PR0038558	Noodles Of The World	32965 Temecula Parkway	Temecula	11/4/08
PR0040841	Noodles Of The World	30590 Rancho California Rd Ste C303	Temecula	4/29/09
PR0038206	Oak Mountain Winery	36522 Via Verde	Temecula	12/4/08
PR0040389	P F Chang's China Bistro	40762 Winchester Rd #400	Temecula	4/6/09
PR0006303	PALOMA ELEMENTARY SCHOOL	42940 VIA RAMI	TEMECULA	10/2/08
PR0039592	Pami Kabob House	41257 Margarita Rd Ste #B101	Temecula	1/30/09
PR0041437	Papa Paul's Restaurant	27470 Commerce Center Dr	Temecula	5/7/09
PR0036982	Papa Paul's Restaurant--OOB	27535 Jefferson Ave	Temecula	9/30/08
PR0006451	PAUBA VALLEY ELEMENTARY	33215 REGINA DR	TEMECULA	9/9/08
PR0038827	Pizza Fusion	40695 Winchester Rd Ste #C1	Temecula	11/18/08
PR0004752	RANCHO ELEMENTARY SCHOOL	31530 LA SERENA WAY	TEMECULA	10/2/08
PR0042480	Rancho Fruit Market	28670 Old Town Front St	Temecula	5/29/09
PR0005482	RED HAWK ELEMENTARY SCHOOL	32045 CAMINO SAN JOSE	TEMECULA	11/20/08
PR0042402	Ruby Tuesday 6201	41785 Nicole Ln	Temecula	5/29/09
PR0006947	SAIGON NOODLE HOUSE	27523 JEFFERSON AVE	TEMECULA	11/7/08
PR0005051	SERRANO'S FRESCO GRILL	27315 JEFFERSON AVE	TEMECULA	11/4/08
PR0039862	Shakey's Pizza Parlor	26479 Ynez Rd Ste #C	Temecula	1/9/09
PR0039442	South Coast Winery- Snack Bar	34843 Rancho California Rd	Temecula	12/4/08
PR0004938	SPARKMAN ELEMENTARY SCHOOL	32225 PIO PICO Rd	TEMECULA	9/9/08
PR0038150	Starbucks Coffee #14486	39848 Winchester Rd	Temecula	8/6/08
PR0004571	SUSHI HOUSE ONE +	27725 JEFFERSON AVE -104	TEMECULA	11/7/08
PR0042625	Sweet Lumpy's BBQ	41915 3rd St	Temecula	6/26/09
PR0006712	T.G.I. FRIDAY'S	40830 WINCHESTER RD	TEMECULA	11/4/08
PR0005657	TACO BELL #19515	41005 WINCHESTER RD	TEMECULA	10/29/08
PR0039913	Tacos El Gordo	27590 Jefferson Ave	Temecula	2/11/09
PR0040196	Taqueria Los Campeones	41925 Motorcar Pkwy	Temecula	2/25/09
PR0039552	Tastee Tacos	43049 Margarita Rd Ste #A103	Temecula	12/4/08
PR0005100	TEMECULA ELEMENTARY SCHOOL	41951 MORAGA RD	TEMECULA	9/30/08
PR0038721	Temecula Luiseno Elementary	45754 N Wolf Creek Dr	Temecula	12/4/08
PR0004324	TEMECULA MIDDLE SCHOOL	42075 MEADOWS PKWY	TEMECULA	10/2/08
PR0038973	Temecula Valley Elks #2801	28061 Diaz	Temecula	10/2/08
PR0004647	TEMECULA VALLEY HIGH SCHOOL	31555 RANCHO VISTA RD	TEMECULA	10/7/08
PR0005109	TEMECULA VALLEY HS CAMPUS SNACK BAR	31350 RANCHO VISTA RD	TEMECULA	10/7/08
PR0038928	The Blue Peacock	27536 Ynez Rd	Temecula	11/10/08
PR0008089	THE FORGE	42170 SARAH WAY B	TEMECULA	11/12/08
PR0042166	The Gambling Cowboy Chophouse &	42072 Fifth St #303	Temecula	5/22/09
PR0038044	The Melting Pot	39738 Winchester Rd	Temecula	8/7/08
PR0038492	The Public House	41971 Main St	Temecula	9/23/08
PR0005283	THE SWEET BEAN	30590 RANCHO CALIFORNIA RD	TEMECULA	7/9/08
PR0009441	TOBIN ELEMENTARY SCHOOL	45200 MORGAN HILL DR	TEMECULA	9/9/08
PR0004325	VAIL ELEMENTARY SCHOOL	29915 MIRA LOMA DR	TEMECULA	10/7/08
PR0006410	VAIL RANCH MIDDLE SCHOOL	33340 CAMINO PIEDRA ROJO	TEMECULA	9/9/08

PR0042400	Vesuvio Brick Fired Pizza	27371 Jefferson Ave Ste #S	Temecula	5/21/09
PR0004803	VINCE'S SPAGHETTI EXPRESS	28145 JEFFERSON	TEMECULA	11/13/08
PR0005658	VINTAGE HILLS ELEMENTARY SCHOOL	42240 CAMINO ROMO	TEMECULA	10/7/08
PR0039145	Virginia Barbeque	30571 Temecula Pkwy Ste #C	Temecula	11/4/08
PR0010329	WENDI DONUTS	31867 RANCHO CALIFORNIA RD	TEMECULA	7/9/08
PR0042407	Whimsical Yogurt & Gelato	40756 Winchester Rd	Temecula	5/29/09
PR0042403	White Lime	30630 Rancho California Rd Ste #503	Temecula	6/29/09
PR0040724	Williams Sonoma #795	40764 Winchester Rd Ste #560	Temecula	4/9/09
PR0007606	WILSON CREEK WINERY	35960 RANCHO CALIFORNIA RD	TEMECULA	11/4/08
PR0039329	Wilson Creek Winery Restaurant	35960 Rancho California Rd	Temecula	11/4/08
PR0040666	Yard House	40770 Winchester Rd Ste #750	Temecula	4/9/09
PR0039903	Yogurt Island	32240 Temecula Pkwy Ste #B106	Temecula	2/4/09
PR0042465	Yogurt Point	29073 Overland Dr Ste #J	Temecula	5/29/09
PR0037977	Zarka Cigar Lounge	28120 Jefferson Ave Ste# B202	Temecula	7/2/08

Total Site Visits for Temecula - 107

WILDOMAR

PR0006301	BROWN MIDDLE SCHOOL	21861 GRAND AVE	WILDOMAR	10/27/08
PR0040457	Checkerboard Deli	36068 Hidden Springs Ste #B	Wildomar	4/7/09
PR0039673	Denny's #7830	23857 Clinton Keith Rd	Wildomar	1/21/09
PR0038509	La Cresta Mexican Grill	23865 Clinton Keith Rd #2	Wildomar	9/30/08
PR0038514	Panda Express	23861 Clinton Keith Rd Ste 1	Wildomar	9/30/08
PR0009047	RONALD REAGAN ELEMENTARY SCHOOL	35445 PORRAS RD	WILDOMAR	10/27/08
PR0004333	WILDOMAR ELEMENTARY SCHOOL	21575 PALOMAR ST	WILDOMAR	10/27/08
PR0009379	WILLIAM COLLIER ELEMENTARY SCHOOL	20150 MAYHALL DR	WILDOMAR	10/29/08

Total Site Visits for WILDOMAR - 8

TOTAL SITE VISITS: 187

WASTE MANAGEMENT DEPARTMENT-
HOUSEHOLD HAZARDOUS WASTE

PRESS RELEASE

RIVERSIDE COUNTY
WASTE MANAGEMENT DEPARTMENT

Diane Christensen
Program Administrator
(951) 486-3282

September 28, 2009

Riverside County Regional Permanent Household Hazardous Waste Collection Facility Opens in Palm Springs

A new hazardous waste facility will open July 11 in Palm Springs. The facility will replace the previous facility on Alejo Road, which closed permanently June 27.

The new facility on 1100 Vella Road, across from Demuth Park, will accept drop-offs starting 7 a.m. This new site will be open to the public on Saturdays from 7 a.m. to noon through September. Operational hours from October through May are from 9 a.m. to 2 p.m. The hazardous waste facility will close on holidays or due to inclement weather.

Most residential hazardous waste will be accepted at the new location, including electronic waste. Hazardous waste collection is a free service provided to Riverside County residents. State law requires the safe disposal of used motor oil, flammable liquids, paint, antifreeze, household and automotive batteries, pesticides, cleaning products, fluorescent lamps and properly packaged and labeled sharps such as needles syringes or lancets. Televisions, computers, VCRs and telephones are also accepted. Flammable liquids are accepted, but containers, such as gasoline cans, will not be returned.

The new facility is a partnership between the county Waste Management Department and the City of Palm Springs. While the facility is available for the safe disposal of hazardous waste, residents are encouraged to use up their hazardous products whenever possible to help keep down the costs of the free service.

Residents are limited to transporting no more than five gallons or 50 pounds of hazardous waste per trip, but multiple trips are allowed. The facility will not accept appliances, explosives, radioactive waste, ammunition, asbestos, compressed gas cylinders over 40 pounds, and infectious or medical waste other than sharps. Waste is not accepted from business or non-profits.

For more information or questions, call (951) 486-3200 or (800) 304-2226

Riverside County Waste Management Department
Household Hazardous Waste Collection Program
FY 2008/2009 Activities in
Santa Margarita Watershed

0003792

Location	Service Dates	Number of Service Days in FY 2008/2009	Contractor Cost	Total Vehicles	Batteries (Auto) (lbs) 45#/unit	Nicad/ Lithium Batteries (lbs)	Waste Oil (lbs) 8.5 lb/gal	Anti-Freeze (lbs) 8.5 lb/gal	Latex Paint (lbs) 10 lb/gal	Oil Filters (lbs)	Alkaline Batteries (lbs)	Mercury (lbs)	Propane (lbs)	Paint Related (lbs)	Fluor. Tubes (lbs) 0.2 lbs/linear foot	Flam. Solid/Liq (lbs)	Reuse (lbs)	Poison (lbs)	Acid (lbs)	Base (lbs)	Oxidizer (lbs)	Other (lbs)	Aerosols (lbs)	Asbestos (lbs)	Sharps (lbs)	CRTs (lbs)	Misc E-waste (lbs)	Total Pounds Shipped
Murrieta ABOP HHW Collection Facility																												
	All non-holiday Saturdays	44	$ 37,029	1,927	9,810	221	25,160	3,528	51,655	1,264	797	0	0	657	0	511	0	0	0	0	0	1,200	0	0	0	0	0	94,803
Temporary HHW Collection Facility (THHWCF) Events																												
Aguanga	10/18/2008	1	$ 750	11	69	0	850	34	0	0	15	0	180	694	4	167	0	0	0	0	0	0	18	0	0	60	20	2,111
Aguanga	5/30/2009	1	$ 900	12	255	0	425	0	250	4	10	0	6	0	11	0	0	72	18	0	8	0	26	0	7	26	520	1,638
Subtotal		2	$ 1,650	23	324	0	1,275	34	250	4	25	0	186	694	15	167	0	72	18	0	8	0	44	0	7	86	540	3,749
Anza	9/27/2008	1	$ 5,336	67	407	0	2,635	128	1,200	85	31	0	190	862	0	1,854	20	471	361	130	12	659	133	0	53	40	20	9,291
Anza	12/20/2008	1	$ 1,650	24	90	0	850	0	500	14	7	0	0	340	0	551	0	213	9	0	0	0	11	0	0	780	160	3,525
Anza	3/28/2009	1	$ 4,575	62	642	16	2,848	0	700	41	70	0	226	773	23	904	2	215	9	46	9	33	88	0	0	0	280	6,925
Subtotal		3	$ 11,561	153	1,139	16	6,333	128	2,400	140	108	0	416	1,975	23	3,309	22	899	379	176	21	692	232	0	53	820	460	19,741
Pinyon Pines	11/15/2008	1	$ 1,725	28	759	27	638	26	650	38	38	0	5	201	11	0	0	136	0	0	0	309	16	0	0	1,420	600	4,874
Pinyon Pines	5/16/2009	1	$ 2,025	30	203	10	680	255	400	31	16	0	27	473	16	220	0	285	0	0	0	16	28	0	15	360	200	3,235
Subtotal		2	$ 3,750	58	962	37	1,318	281	1,050	69	54	0	32	674	27	220	0	421	0	0	0	325	44	0	15	1,780	800	8,109
Temecula	9/13/2008	1	$ 26,519	382	2,233	90	1,488	340	5,250	15	430	5	1,751	3,173	162	3,462	0	547	136	326	18	36	486	0	114	6,680	4,100	30,842
Temecula	1/31/2009	1	$ 34,875	495	1,448	194	1,488	425	9,000	55	645	6	775	3,338	203	4,447	2	583	245	224	51	185	800	0	166	6,460	4,560	35,300
Temecula	5/9/2009	1	$ 18,750	261	923	56	1,275	340	3,700	13	256	6	159	2,170	49	2,577	0	191	113	268	18	106	351	0	132	1,760	1,900	16,363
Subtotal		3	$ 80,144	1,138	4,604	340	4,250	1,105	17,950	83	1,331	17	2,685	8,681	414	10,486	2	1,321	494	818	87	327	1,637	0	412	14,900	10,560	82,504
TOTAL THHWCF		10	97,105	1,372	7,029	393	13,176	1,548	21,650	296	1,518	17	3,319	12,024	479	14,182	24	2,713	891	994	116	1,344	1,957	0	487	17,586	12,360	114,103
TOTAL AMOUNTS FROM ALL HHW FACILITY TYPES IN SANTA MARGARITA WATERSHED																												
		54	$ 134,134	3,299	16,839	614	38,336	5,076	73,305	1,560	2,315	17	3,319	12,681	479	14,693	24	2,713	891	994	116	2,544	1,957	0	487	17,586	12,360	208,906

Household Hazardous Waste Schedule

ALL SITES ARE OPEN FROM 9:00 am to 2:00 pm
CLOSED: During Inclement Weather or other Hazardous Conditions
Facilities are closed on Holiday Weekends unless otherwise scheduled
Maximum Chemical Load: 5 gallons or 50 lbs. (per trip)
July - December 2008

Date	Location
07/05/08	HOLIDAY CLOSURE
07/12/08	Lake Elsinore
07/12/08	Pedley
07/19/08	Pedley
07/26/08	Pedley
08/02/08	Lake Elsinore
08/02/08	Pedley
08/09/08	Pedley
08/16/08	Pedley
08/23/08	Pedley
08/30/08	HOLIDAY CLOSURE
09/06/08	Lake Elsinore
09/06/08	Pedley
09/06/08	Riverside
09/13/08	Pedley
09/13/08	Temecula
09/19/08	Corona
09/20/08	Corona
09/20/08	Pedley
09/27/08	Anza
09/27/08	La Quinta
09/27/08	Pedley

Date	Location
10/04/08	Agua Mansa
10/04/08	Lake Elsinore
10/04/08	Norco
10/04/08	Oasis
10/10/08	Moreno Valley
10/11/08	Moreno Valley
10/11/08	Agua Mansa
10/18/08	Agua Mansa
10/18/08	Aguanga
10/18/08	Blythe
10/24/08	Palm Springs
10/25/08	Palm Springs
10/25/08	Agua Mansa
10/31/08	Cathedral City
11/01/08	Cathedral city
11/01/08	Agua Mansa
11/01/08	Lake Elsinore
11/08/08	Agua Mansa
11/15/08	Agua Mansa
11/15/08	Banning
11/15/08	Pinyon Pines
11/21/08	Hemet
11/22/08	Hemet

Date	Location
11/22/08	Agua Mansa
11/29/08	HOLIDAY CLOSURE
12/5/08	Corona
12/6/08	Corona
12/6/08	Agua Mansa
12/13/08	Agua Mansa
12/13/08	Indio
12/20/08	Agua Mansa
12/20/08	Anza
12/27/08	HOLIDAY CLOSURE

Holiday Closure Dates

July 5, 2008
August 30, 2008
November 29, 2008
December 27, 2008

Changing Oil Too Often?

Review your owner's manual for manufacturer's suggested oil change frequency!

RECYCLE USED OIL

RECYCLE USED OIL FILTERS

Zero Waste - You Make It Happen!

Funded by a Grant from the
California Integrated Waste Management Board.

Additional Hazardous Waste Services Available in the following Cities:

Indian Wells
760-346-2489 x227

Palm Springs
Rancho Mirage
1-800-449-7587

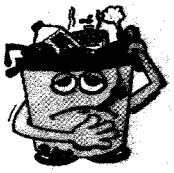

Household Hazardous Waste Collection Program
July thru December 2008
What is Household Hazardous Waste?
All The Items Listed Below And More!

Household Hazardous Waste Collection Sites will take ALL Household Hazardous Waste

Before transporting waste to the collection event or facility, please use this checklist to make sure you have done the following:

- ☐ Have I used up every product to the fullest extent possible?
- ☐ Have I offered good, usable products I can't use to my neighbor, family or friends?
- ☐ Have I kept the amount of chemical waste to less than 5 gallons or 50 pounds for transportation? (State Law maximum transportation limitation.)
- ☐ Are any of the containers leaking? (If they are, place them in a container or material that will not allow the leak to spread and place securely in the vehicle for safe transport.)
- ☐ Is the waste in its original container or is it properly labeled as to the contents? (The contents of the container must be the same as stated on the label. If not, cover up the label and write the name of its content.)
- ☐ Are the items placed in a sturdy container, such as cardboard or wooden box, for transporting? (Wrap glass bottles in newspaper to prevent breakage.) Containers with flammable liquid will not be returned.
- ☐ Is the box placed in the trunk of your car or in the bed of your pickup truck and secured to prevent movement? (Keep items away from passengers.)

Follow directions once you reach the event site. You will be asked to turn off your motor and stay in your vehicle. The site staff will unload the material from your vehicle.

THIS EVENT IS FOR RESIDENTIAL USE ONLY. PHOTO DOCUMENTATION WILL BE MADE OF EXCESSIVE OR SUSPECTED NON-RESIDENTIAL LOADS COMING TO EVENT.

The following waste CANNOT be accepted at ANY Riverside County HHW collection facility:
Ammunition, Appliances, Asbestos or other Remediation Waste, Compressed Gas Cylinders greater than 40 pounds Explosives, Infectious or Medical Waste other than Home-Generated Sharps, Radioactive Waste, Non-Residentially Generated Waste, Waste Generated Outside of Riverside County.

If you have any of the above wastes please call (951) 486-3200 for assistance.

ACCEPTABLE MATERIALS

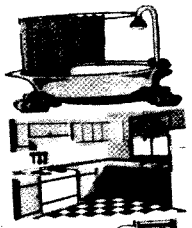

BATHROOM
*Chlorine Bleach
*Nail Polish Remover
*Deodorizer/Air Freshener
*Shoe Dye
*Disinfectant
*Toilet, Tub & Tile Cleaner
*Mercury Devices
*Hair Dye

KITCHEN
*Aerosol Cans
*Floor Care Products
*Aluminum Cleaner
*Furniture Polish
*Ammonia
*Oven Cleaner
*Drain Opener
*Microwave Oven

WORKSHOP & HOBBY
*Caulking
*Paint Stripper
*Wood Preservative
*Gun Cleaner
*Paint Thinner/Turpentine
*Glue
*Fiberglass & Epoxy Resins
*Photo Chemicals
*Roof Coating
*Paint Latex/Oil Based
*Varnish
*Hobby Chemicals

GARDENING
*Fertilizer
*Slug and Snail Poison
*Fungicide
*Weed Killer/Herbicides
*Insecticides/Pesticides
*Rodent Bait/Poison
*Aerosol Insecticides
*BBQ Propane Tanks

GARAGE
*Antifreeze
*Engine Degreaser
*Transmission & Brake Fluid
*Auto Batteries
*Gas, Diesel Fuel
*Fluorescent Tubes/Bulbs
*Carburetor Cleaner
*Motor Oil
*Old TV's & Computers
*Chrome Polish
*Oil Filters
*Rodent Poison

MISCELLANEOUS
*Artist's Paints
*Kerosene/Lamp Oil
*Rug Cleaner
*Camp Propane Tanks
*Lighter Fluid
*Sharps/Needles
*All Batteries
*Moth Balls/Flakes
*Spot Remover w/Solvent
*Flea Powder
*Pool/Spa Chemicals
*Electronic Devices

Household Hazardous Waste Information (800) 304-2226 or www.rivcowm.org

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Household Hazardous Waste Collection Locations

Permanent Sites
(All Hazardous Waste Types)

Agua Mansa Area (HHW)
FACILITY OPENS - October 4, 2008
Agua Mansa HHW Facility
1780 Agua Mansa Rd. (92509)
TB 866 E4 (cross Market St.)
Open Non Holiday Saturdays.
9:00 AM to 2:00 PM

Lake Elsinore Area (HHW)
City Maintenance Facility
521 N. Langstaff St. (92530)
TB 866 E4 (cross Sumner)
Open 1st Saturday each month except
January, September, and December
9:00 AM to 2:00 PM

Pedley Area (HHW)
FACILITY CLOSURE - end of September 2008
County Road Yard
6851 Van Buren Blvd.(92503)
TB 684 E6 (at Clay St.)
NON-Holiday Saturdays.
9:00 AM to 2:00 PM

Palm Desert Area (HHW)
(Open to Palm Desert Residents ONLY)
41-800 Corporate Way (92260)
Behind Post Office on Hovley Lane
TB 818 H5 (between Portola & Cook)
NON-Holiday Saturdays.
9:00 AM to 1:00 PM
(760) 340-2113

Temporary Event Locations
(See Schedule for Dates &Times)

Aguanga Area
Cottonwood Fire Station
44222 Sage Rd. (92536)
TB 981 J4 (cross North of Hwy 79)

Anza Area
Anza Transfer Station
40329 Terwilliger Rd. (92539)
TB 965 E3 (cross South Of Hwy 371)

Banning Area
Repplier Park
789 N. San Gorgonio Ave. (92220)
TB 722 B2 (cross Wilson St.)

Blythe Area
County Administration Center
260 N. Broadway St. (92225)
TB 5491 E6 (cross Murphy St.)

Cathedral City Area
Vacant lot near City Hall
East of City Hall on Buddy Rogers Ave.
TB 787 E7 (cross Van Fleet & Buddy Rogers)

Corona Area
City Corporate Yard
760 Corporation Yard Way (92880)
TB 743 C4 (cross Cota St.)

Hemet Area
County Road Yard
595 N. Juanita St. (92543)
TB 811 A6 (cross Oakland Ave.)

Indio Area
Date Festival Fairgrounds
46-350 Arabia St. (Gate #6) (92201)
TB 5470 F2 (cross Dr. Carreon Blvd.)

La Quinta Area
Parking Lot next to Fritz Burns Park
South Side of Ave. 52 (92253)
TB 849 F7 (cross Desert Club Dr.)

Moreno Valley Area
City Maintenance Facility
15670 Perris Blvd. (92251)
TB 747 G2 (cross N. of Iris Ave.)

Norco Area
Norco Community Center
3900 Acacia Ave. (92860)
TB 713 E3 (cross Taft at Hamner Ave.)

Oasis Area
Oasis Landfill
84-505 84th Avenue (92274)
TB 5772 H3 (cross Hwy 86)

Palm Springs Area
Fire Department Training Center
3000 E. Alejo Rd. (92262)
TB 786 H1 (cross Civic Dr.)

Pinyon Pines Area
Pinon Flats Transfer Station
TB 907 H7 See Page 906 (cross South End of Pinon Flats Road)

Riverside Area
City Corporate Yard
8095 Lincoln Ave. (92504)
TB 715 D5 (cross St. Lawrence St.)

Temecula Area
City Public Works Parking Lot
43200 Business Park Dr. (92590)
TB 958 G6 (across from City Hall)

All sites will accommodate multiple trips if storage capacity allows
COLLECTION SITES MAY BE CLOSED DURING INCLEMENT WEATHER

TB = Thomas Bros. Guide

ABOP Centers

Antifreeze, Batteries, Oil (and Filters), and Paint (Latex) ONLY
Collection Center
SATURDAY 9:00 am to 2:00 pm (see details for each)
LIMIT: 5 gallons or 50 lbs. (per trip)
CLOSED: During inclement weather and hazardous conditions.

RECYCLE USED OIL

HOLIDAY CLOSURE DATES:
07/05/08, 08/30/08, 11/29/08, 12/27/08

RECYCLE USED OIL FILTERS

Accepting: Cooking Oil

Murrieta Area
County Road Yard
25315 Jefferson Ave. (92562)
TB 928 C6 (cross Murrieta Hot Springs Rd.)
NON-Holiday Saturdays
9:00 AM to 2:00 PM.

Palm Springs Area
Fire Department Training Center
3000 E. Alejo Rd. (92262)
TB 786 H1 (cross Civic Dr.)
NON-Holiday Saturdays. Oct - May 9:00 AM to 2:00 PM
NON-Holiday Saturdays. Jun - Sept 7:00 AM to 12:00 PM

Proper Disposal of Medication and Sharps

Most medications are not considered hazardous waste and can be disposed of in regular trash.
Remove personal information from containers before disposal.

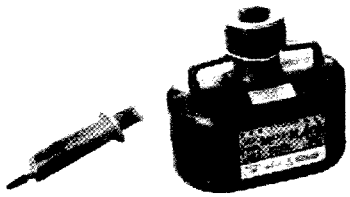

Liquid.....Empty liquid medication onto absorbent paper towels or rags and throw IN TRASH.

Pill.....Crush pills, mix with coffee grounds or kitty litter, and dispose of mixture IN TRASH.

Inhaler.....Empty container, expel propellant, and toss empty cylinder IN TRASH.

Sharps/Needles.....Must be placed in a secure approved sharps container and brought to a Household Hazardous Waste collection for disposal. FREE Approved containers are available while supply lasts. If a container is not available, put sharps in rigid plastic jug (bleach bottle), tighten lid, secure with tape, and place label "SHARPS/NEEDLES".
ALWAYS BRING SHARPS TO HHW PERMANENT FACILITY OR TEMPORARY EVENT.

Small Business Hazardous & Universal Waste

Conditional Exempt Small Quantity Generator (CESQG) **1-800-952-5566**

What is a CESQG? Businesses that generate up to 27 gallons or 220 lbs. of hazardous waste, or 2.2 lbs of extremely hazardous waste per month are called CESQG's. These businesses are required to use a licensed hazardous waste hauler to manifest and transport their waste. The most common CESQG's are painters, print shops, auto shops, builders, churches, schools, non-profit groups and property managers.

What is the CESQG Program? This Program is a hazardous waste pick-up disposal service for eligible businesses/non-profit organizations in the County of Riverside. This Program provides small quantity generators with a legal and affordable way to dispose of their waste with all legal documentation provided as part of the service.

How do I get service? To arrange an appointment for the **CESQG** Program, call **1-800-952-5566.**
A disposal fee will be charged based on the type and amount of waste picked-up.

Storm Water Pollution Prevention - ONLY RAIN DOWN THE STORM DRAIN

What is the #1 reason water bodies such as creeks, rivers, and lakes get dirty? It's from pollutants that flow into storm drains then make their way to your favorite water recreational facility. The storm drain system is designed to prevent flooding and is not connected to a treatment facility.

Call **1-800-506-2555** to report storm drain disposal or obtain more information.
You can also email us at **flood.fcndes@co.riverside.ca.us** or visit **www.floodcontrol.co.riverside.ca.us**

Household Hazardous Waste Information (800) 304-2226 or www.rivcowm.org

Recycle. It's in your hands.

bottlesandcans.com

Permanent Household Hazardous Waste Collection Facilities

Limit: 5 gallons or 50 lbs of chemical waste (per trip)

CLOSED on Holiday weekends and during inclement weather

Agua Mansa
1780 Agua Mansa Rd.
Riverside, CA 92509
Open: Saturdays
9:00 AM to 2:00 PM

Lake Elsinore
521 N. Langstaff St.
Lake Elsinore, CA 92530
Open: First Saturday of the month (except January & December)
9:00 AM to 2:00 PM

Palm Desert
(Palm Desert Residents only)
41800 Corporate Way
Palm Desert, CA 92260
Open: Saturdays -
9:00 AM to 1:00 PM
(760) 340-2113

Palm Springs Opening Late April
1100 Vella Road
Palm Springs, CA 92264
Open: Saturdays
Oct - May 9:00 AM to 2:00 PM
Jun - Sept 7:00 AM to 12:00 PM

Antifreeze, Batteries, Oil *(and filters)*, and Paint *(Latex)* ONLY Collection Centers

Limit: 5 gallons or 50 lbs of chemical waste (per trip)

CLOSED on Holiday weekends and during inclement weather

Cathedral City Area
Edom Hill Transfer Station
70-100 Edom Hill Rd.
Cathedral City, CA 92235
Open: Non-Holiday Saturdays
8:00 AM to 4:30 PM
(760) 340-2113

Coachella Valley Area
Coachella Valley Transfer Station
87-011A Landfill Road
Coachella Valley, CA 92236
Open: Mon-Friday, 8:00 AM to 5:00 PM, and Saturday 8:00 AM to Noon
(760) 863-4094

Murrieta Area
County Road Yard
25315 Jefferson Ave.
Murrieta, CA 92562
Open: NON-Holiday Saturdays
9:00 AM to 2:00 PM

Palm Springs Area
Fire Department Training Center
3000 E. Alejo Rd.
Palm Springs, CA 92262
Open: NON-Holiday Saturdays
Oct - May: 9:00 AM to 2:00 PM
Jun - Sept: 7:00 AM to 12:00 PM

Proper Disposal of Medication and Sharps

- Most medications are not considered hazardous waste and can be disposed of in regular trash.
- No Drugs Down the Drain. Do not flush unused medications down the toilet.
- Remove personal information from containers before disposal.
- Sharps and needles should be taken to a household hazardous waste facility or event.

LIQUID & PILLS Empty medication into coffee grounds or kitty litter and dispose with regular TRASH.

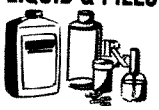

INHALER Empty container by expelling propellant and dispose of cylinder in regular TRASH.

SHARPS/ NEEDLES **Always bring Sharps to a HHW Facility or Temporary Collection** Sharps must be placed and secured in an approved sharps disposal container and brought to a Household Hazardous Waste collection for disposal. FREE Approved containers are available at HHW events - while supply lasts.

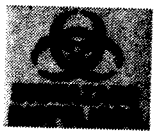

Make your own container from a non-food rigid plastic sealable jug. For instructions and FREE Biohazard Labels: 951-486-3200 or http://www.rivcowm.org/hhw/medications.html
Contact your Local City Hall for additional Sharps collection programs.

For more information:
(951) 486-3200 or http://www.rivcowm.org/hhw/medications.html

Riverside County Backyard Composting Program

Free Workshop Schedule

Saturdays 10:00 am

Date	*Area*	*Location*
April 25	Palm Desert	San Nicholas Garden
May 9	Riverside	Landscapes So Cal Style Garden
May 30	Idyllwild	Town Hall
June 20	Jurupa	Jurupa Cultural Center
June 27	Hemet	Hemet Public Library
July 11	Wildomar	Mission Trail Library
July 18	Banning	Banning Community Center
July 25	Temecula	Grace Mellman Community Ctr.
August 8	Perris	Perris Public Library
August 15	Norco	Norco Public Library
September 19	Hemet	Hemet Public Library
October 17	Jurupa	Jurupa Cultural Center
October 24	Palm Springs	Mizell Senior Center
October 31	Temecula	Grace Mellman Community Ctr.
November 7	Riverside	Landscapes So Cal Style Garden
November 21	Cathedral City	Cathedral City Public Library

Low Cost Compost Bins

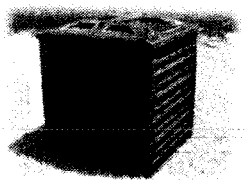

Volunteers needed to become Master Composters
Training Class to begin in August 2009

For more information:
(951) 486-3200 *or*
http://www.rivcowm.org/composting/compost_in_rc.html

What Is Household Hazardous Waste?

Many products used in our home contain hazardous materials. Your home and garage may seem safe, but look again. To know whether or not a product is hazardous, check the label. **Unwanted products labeled Corrosive, Flammable, or Toxic warn of potential hazards** if the chemical product is misused, spilled or disposed of improperly. Typical products found throughout the house that may be hazardous are as follows:

Last year, more than 21,000 residents have properly disposed of over 1,965,000 pounds of Household Hazardous Waste. Thank you for participating in this valuable Riverside County Program.

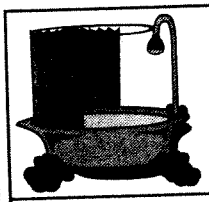

BATHROOM

- Chlorine Bleach
- Deodorizer/ Air Freshener
- Disinfectant
- Nail Polish Remover
- Shoe Dye
- Mercury Thermometer
- Toilet, Tub & Tile Cleaner

GARDENING

- Fertilizer
- Fungicide
- Insecticides
- Pesticides
- Moss Killer
- Slug And Snail Poison
- Weed Killer/Herbicides

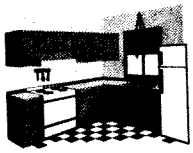

KITCHEN

- Microwave Oven
- Aerosol Cans
- Aluminum Cleaner
- Ammonia
- Drain Opener
- Floor Care Products
- Furniture Polish
- Oven Cleaner
- Rodent Poison

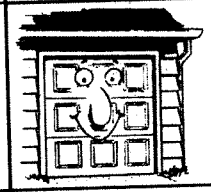

GARAGE

- Antifreeze
- Auto Batteries
- Transmission & Brake Fluid
- Carburetor Cleaner
- Chrome Polish
- Gas, Diesel Fuel
- Engine Degreaser
- Motor Oil
- Oil Filters

WORKSHOP

- Fiberglass & Epoxy Resins
- Glue
- Gun Cleaner
- Paint Latex/Oil Based
- Paint Stripper
- Paint Thinner/ Turpentine
- Photo Chemicals
- Varnish
- Wood Preservative
- Caulking
- Fluorescent Lamps

MISCELLANEOUS

- Artists' Paints
- Flea Powder
- All Batteries
- Kerosene/Lamp Oil
- Lighter Fluid
- Moth Balls/ Flakes
- Pool/Spa Chemicals
- Rug Cleaner
- Spot Remover w/Solvent
- Cell Phones
- TV's
- Computers
- Mercury Devices
- Consumer Electronics
- Sharps-Needles
- BBQ Propane Tanks

UNIVERSAL WASTES (a category of Household Hazardous Waste)

- Aerosol Cans (non-empty label toxic or flammable)
- Batteries (AA, AAA, C & D cell) all single use.
- Cell phone
- Computer
- Computer Monitor (up to 3)
- Dental amalgam
- Fluorescent Bulbs
- Fluorescent Tubes
- Microwave oven
- Printer
- Radio
- Telephone
- Thermometer
- Thermostat
- TV's and VCR's (up to 3)

RESTRICTIONS:

- County of Riverside residents only
- No explosives/ammunition
- No radioactive materials
- No tires
- No business or non-profit organization waste
- No appliances
- No medical waste
- No 30 or 55-gallon drums

CAUTION:

- You may bring up to **5 gallons** or **50 lbs.** of a chemical hazardous waste maximum per car/per trip.
- Container shall be marked and secured to prevent leaks. Do not mix waste products.
- Containers holding gasoline will not be returned.

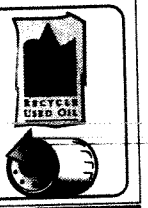

HOUSEHOLD HAZARDOUS WASTE 24 Hour HOTLINE 1-800-304-2226
Current Schedule or Subscribe for automatic updates:
http://www.rivcowm.org/hhw/hhw_schedule.html
Riverside County Waste Management Department (951) 486-3200

This insert has been funded through a cooperative effort from Riverside County Waste Management Department, the cities and County of Riverside Storm Water/Clean Water Protection Program, the California Department of Conservation, and the California Integrated Waste Management Board. Zero Waste - You Make It Happen!

05231008M915.2

Household Hazardous Waste

or HHW, are unwanted materials that are flammable, reactive, poisonous, or corrosive. These items are banned from the landfill and must be disposed of at an HHW Collection Facility or event.

Common Acceptable Items include:

- Batteries
- Fluorescent Bulbs
- Electronic Devices
- Mercury-Containing Devices
- Sharps
- Paints and Thinners
- Cleaners
- Solvents
- Pesticides
- Yard Chemicals
- Automotive Fluids
- Small & BBQ Propane Tanks
- Swimming Pool Chemicals
- Hobby Chemicals

Items which CANNOT be accepted include:

- Ammunition
- Asbestos or Remediation Waste
- Compressed Gas Cylinders Greater Than 40 Pounds
- Explosives
- Infectious or Medical Waste, except Sharps
- Radioactive Waste
- Business Waste
- Waste Generated Outside of Riverside County.

Material must be secured from tipping, abeled and sealed during transport. State aw limits the amount of waste to 5 gallons or 50 pounds per visit.

The Riverside County Waste Management Department Mission Statement

To provide for the protection of the general public health and welfare by efficient management of Riverside County's solid waste system through:

- Provision of facilities and programs which meet or exceed all applicable local, State, Federal and land use regulations;
- Utilization of up-to-date technological improvements;
- Development and maintenance of a system that is balanced economically, socially and politically; and
- Economically feasible recovery of waste materials.

For more program information, visit www.rivcowm.org or call 1-800-304-2226

RECYCLE
USED OIL FILTERS

Zero Waste - You Make It Happen!

This publication was funded by a grant from the California Integrated Waste Management Board.

What to do with Household Hazardous Waste *in Riverside County*

0003799

Riverside County
Waste Management Department

Permanent HHW Facilities

Lake Elsinore City Maintenance Facility
521 N. Langstaff Street, near Sumner
pen 1st Sat. of the month, except in Dec. & Jan.
From 9:00 AM to 2:00 PM

Pedley Area - County Road Yard
6851 Van Buren Boulevard, near Clay Street
Open NON-holiday Sat's, from 9 AM to 2 PM

Beaumont Area *(Open in 2008)*
Lamb Canyon Landfill
16411 Lamb Canyon Road
Open NON-holiday Sat's, from 9 AM to 2 PM

Palm Springs Area *(Open in 2008)*
Wastewater Treatment Plant
4575 E. Mesquite Ave.
Open NON-holiday Sat's,
October - May from 9 AM to 2 PM
June - September from 7 AM to 12Noon

Riverside Area *(Open in 2008)*
East of Robert A. Nelson Transfer Station
1830 Agua Mansa Rd.
Open NON-holiday Sat's, from 9 AM to 2 PM

Temporary HHW Sites are set up

throughout the County and throughout the year.
For locations, dates, and times, please call
1-800-304-2226 or visit www.rivcowm.org.

ABOP Locations, (or those that take ONLY Antifreeze, Batteries, Oil, and Paint)

Murrieta Area - County Road Yard
25315 Jefferson Avenue
Open NON-Holiday Sat's, from 9 AM - 2 PM

Palm Springs Area - Fire Dept. Training Area
3000 E. Alejo Road
Open NON-holiday Sat's,
October - May from 9 AM to 2 PM
June - September from 7 AM to 12 Noon

Recycle Park at Lamb Canyon Landfill

Recycle Park is designed to divert usable and recyclable materials from the waste stream, while also providing a location for disposing of Household Hazardous Waste and other items banned from the landfill. Though it is currently in the construction phase, once completed, it will feature:

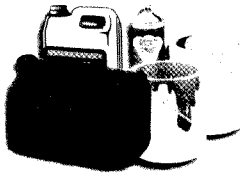

Household Hazardous Waste Collection:
providing a new permanent facility for the area.

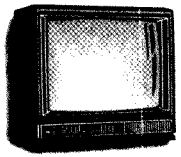

Consumer Electronics Drop-Off:
of unwanted televisions, computer, and other electronic devices.

Tire Drop Off:
from cars, passenger trucks, and RVs

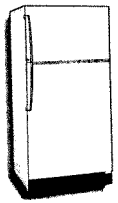

Appliance Recycling:
for major appliances, including items with Freon.

Reuse Exchange Store:
where visitors can purchase used items.

Trash Disposal Pad:
which is an area where visitors can safely unload unusable refuse away from heavy equipment.

0003800

printed on recycled paper

REGISTERED HAZARDOUS WASTE TRANSPORTERS SERVING RIVERSIDE COUNTY

***ADVANCED CLEANUP TECHNOLOGIES, INC.**
18414 S. Santa Fe Ave.
Rancho Dominguez, CA 90221
(800) 334-2284 (310) 763-1423 actihmu340@aol.com

EPA ID# CAD983620402
Full service hazardous waste bulk and tanker trucks. Available 24 hours emergency response.

***ADVANCED CLEANUP TECHNOLOGIES, INC.**
12345 South La Cadena Drive
Colton, CA 92324
(800) 334-2284 (909) 423-0438 jenniferf@acticolton

EPA ID# CAD983620402
Full service hazardous waste bulk and tanker trucks. Available 24 hours emergency response.

ADVANCE ENVIRONMENTAL SERVICES, INC.
7 Amato
Mission Viejo, CA 92692
(800) 850-8680 (949) 454-2546

EPA ID# CAR000149070
Full service hazardous waste bulk and tanker trucks. Available 24 hours emergency response
Clarifier waste

ADVANCED ENVIRONMENTAL TECHNICAL SERVICE (ATES)
570 E La Cadena, Suite 2J 107 S. Motor Ave.
Riverside CA 92501 Azusa CA 91702
(951) 782-8375 (818)334-5117 (800) 572-2964

EPA ID# NJD080631369
Unknown spill clean-up. Transports bulk or containerized waste. Available 24hrs. Clarifier waste.

AMBERWICK CORP.
2304 W. 16th Street
Long Beach CA 90813
(562) 901-2350 (800) 300-9990

EPA ID# CAL000827879
Transports bulk or containerized waste. No radioactive or explosive wastes.

[redacted]

***ASBURY ENVIRONMENTAL SERVICES**
2100 N. Alameda Street
Compton, CA 90222
(800) 974-4495 (310) 886-3400

EPA ID# CAD 028277036
Full service hazardous waste bulk and tanker trucks. Available 24 hours emergency response.

AUTOMOTIVE ENVIRONMENTAL SERVICES
2081 Bay Road,
East Palo Alto CA 94303
(650) 325-2666 (888) 242-8592

EPA ID# CAD981694664
Waste Antifreeze, use oil filters, and miscellaneous haz. waste. Clarifier waste.

BENCO SALES, INC.
123 Stout Dr
Crossvield, TN 38555
(931) 484-9578

EPA ID# CAD084455757
Transports known containerized hazardous waste.

*** CONSOLIDATED WASTE INDUSTRIES**
10680 Silicon Avenue
Montclair, CA 91763
(800) 788-2167 (909) 625-6645

EPA ID# CAD983668583
Unknown spill cleanup; transports bulk or containerized waste; Available 24hrs. Clarifier waste

Note: The above facilities were included on this list by request only. Therefore, this section is to be used for a reference and is not intended as a complete list of hazardous waste transporters.

*** 24 hour Haz Mat Response**

REGISTERED HAZARDOUS WASTE TRANSPORTERS SERVING RIVERSIDE COUNTY (cont)

CROSBY & OVERTON, INC.
1610 West 17th Street
Long Beach, CA 90813
(562) 432-5445 (800) 827-6729)

EPA ID# CAD028409019
Unknown spill cleanup; transports bulk or containerized waste.

DALTON TRUCKING INC.
13560 Whittram Ave.
Fontana, CA 92335
(909) 823-0663 (800) 333-2400

EPA ID# CAD076078666
Transports bulk and containerized wastes; available 24 hrs.

***ECOLOGY CONTROL INDUSTRIES**
20846 Normandi
Torrance, CA 90502
(800) 321-5479 (310) 320-2555

EPA ID# CAD982030173
Unknown spill cleanup; transports bulk or containerized waste; available 24 hrs.

ECOLOGY CONTROL INDUSTRIES
10680 Silicon Ave
Montclair, CA 91763
(909) 355-5601 (909) 625-6645

EPA ID# CAD982030173
Unknown spill cleanup; transports bulk or containerized waste; available 24 hrs

EVERGREEN ENVIRONMENTAL MANAGEMENT
2355 Main Street, Suite 230
Irvine CA 92614
(949) 757-7770 (800) 972-5284

EPA ID# CAL000219066
Vacuum truck service; spill clean-up; transports containerized wastes; available 24 hours. Clarifier waste.

FILTER RECYCLING SERVICES, INC.
180 W. Monte Ave.
PO Box 449
Rialto, CA 92376
(800) 698-4377 (909)873-4141

EPA ID# CAD982444481
TSDF; Transporter of various waste; Emergency Response; Drop off and pickup service; Recycles various waste.

FRS ENVIRONMENTAL
1414 East 6th St.
Corona, CA 92879
(951) 898-1888

EPA ID# CAL000224539
General transportation of various waste. Drop off and pickup service, recycles water based parts washing solutions

HAZARDOUS TECHNOLOGIES
2744 Pomona Blvd.
Pomona, CA 91768
(909) 595-5991

EPA ID# CAD009661844
Wastes transported: various types of hazardous waste.

INDUSTRIAL WASTE UTILIZATION, INC.
5601 State Street
Montclair, CA 91763
(909) 984-9984

EPA ID# CAD980585293
Vacuum truck service; transports liquids & solids in bulk or containers; treatment units available. Clarifier waste.

INTELLIGENT RECYCLING SOLUTIONS
81-194 Red Bluff Road
Indio, CA 92201
(760) 342-0680 www.waste-hauler.com

EPA ID #CAL000161242
Specialize in household hazardous waste and small business hazardous waste. Registered waste tire hauler.

Note: The above facilities were included on this list by request only. Therefore, this section is to be used for a reference and is not intended as a complete list of hazardous waste transporters.

*** 24 hour Haz Mat Response**

REGISTERED HAZARDOUS WASTE TRANSPORTERS SERVING RIVERSIDE COUNTY (cont)

INTERSTATE PUMPING COMPANY
4023 Bayberry
Chino Hills, CA 91709
(909) 393-4696

EPA ID# CAD982462871
Vacuum truck service; transports bulk solids; spill cleanup; available 24 hrs. Clarifier waste.

ISLAND ENVIRONMENTAL SERVICES, INC.
3359 W. Pomona Blvd.
Pomona, CA 91768
(800) 400-4347, (626) 855-1200

EPA ID# CAR000053405
Vacuum truck service; transports liquids &solids in bulk or containers.

***CLEAN HARBORS**
5295 S. Garvey Road
Westmorland, CA 92281
760) 344-9400

EPA ID# SCD987574647
Disposal of known containerized wastes; vacuum truck service; **TSDF;** unknown spill cleanup; avail. 24 hours.

***CLEAN HARBORS**
5756 Alba Street
Los Angeles, CA 90058
(909) 933-3604, (800) 366-0506

EPA ID# CAD050806850
Disposal of known containerized wastes; vacuum truck service; unknown spill cleanup; avail. 24 hours. Clarifier waste.

STARLITE RECLAMATION
229 N. Laurel Ave.
Ontario, CA 91762
(909) 933-3604, (909) 694-7227 24 hr pager

EPA ID# CAL000063809
Wastes transported: Waste oil and all hazardous waste types
Clarifier waste.

*** UNITED PUMPING SERVICE**
14000 East Valley Blvd.
City of Industry, CA 91746
(626) 961-9326

EPA ID# CAD072953771
Unknown spill cleanup; transports bulk or containerized waste; Available 24hr. Clarifier waste.

Small Business Waste

Conditional Exempt Small Quantity Generator (CESQG) **1-800-952-5566**

What is a CESQG? Businesses that generate up to 27 gallons or 220 lbs. of hazardous waste, or 2.2 lbs of extremely hazardous waste per month are called CESQG's. These businesses are required to use a licensed hazardous waste hauler to manifest and transport their waste. The most common CESQG's are painters, print shops, auto shops, builders, churches, schools, non-profit groups and property managers.

What is the CESQG Program? This program is an "At the Business" hazardous waste pick-up disposal service for eligible businesses/ non-profit organizations in the County of Riverside. This program provides small quantity generators with a legal and affordable way to dispose of their waste with all legal documentation provided as part of the service.

How do I get service? To arrange an appointment for the **CESQG** Program, call 1 (800) 952-5566. A disposal fee will be charged based on the type and amount of waste picked-up. **Business waste will NOT be accepted at HHW events or facilities.**

Note: The above facilities were included on this list by request only. Therefore, this section is to be used for a reference and is not intended as a complete list of hazardous waste transporters.

*** 24 hour Haz Mat Response**

UNIVERSAL WASTE
MAIL-BACK RECYCLING SERVICES

Onyx Environmental Services
https://www.onyxes.com/OnyxPak/index.jsp

Proper recycling is easy with OnyxPak. When you have lamps, ballasts, batteries, mercury devices or computer monitors to dispose of simply order an OnyxPak. OnyxPak makes it easy to recycle small quantities and to comply with today's changing regulations. Our prepaid packaging allows you to conveniently manage lighting and electronic waste. One price includes everything you need - packaging, freight, insurance, liability protection and certificates of recycling.
We stock a variety of fiber drums, boxes and pails that will meet your needs. Simply fill, seal and return via the prepaid shipping label. Your boxes, drums or pails will be delivered to one of four fully permitted Onyx facilities, where your waste will be recycled to the highest standards in the industry. That's compliance with confidence!

Benefits of OnyxPak

Low cost compliance. Price includes packaging, return shipping and recycling.

Minimize the need to sort, count and store lighting and electronic waste.

Easy process for recycling your lamps and ballasts. Simply go to our ordering page or call toll-free (800) 556-5267.

Access to recycling expertise. Customer service representatives are standing by, ready to assist you.

Receive confirmation that your lighting and electronic waste was recycled. Onyx will send you a certificate of recycling.

For larger or bulk quantities, we offer competitive pricing, containers and documentation for sorting, storing and shipping your lighting and electronic wastes. When it comes time to recycle, we'll even arrange for transportation.
Contact us today to request a bulk quote.

Lighting Resources, Inc.
http://www.lightingresourcesinc.com/hs_services.html

Corporate Offices
805 E. Francis Street
Ontario, CA 91761

DID YOU KNOW ?

COMPOUNDS & SOLUTIONS
COMPUTER RECYCLING
ACCEPTABLE MATERIALS LIST
PRODUCT SALES & MORE
PRE-PAID RETURN PROGRAM
MERCURY SPILL KITS
NEWS ARCHIVES
CONTACT AERC
MERCURY LINKS & ARTICLES
ONLINE FORMS

EPA

WHY RECYCLE

- Mercury is a toxic metal that is hazardous to both the environment and human health.
- An ounce of mercury contaminates a lake for centuries.
- 100 fluorescent lamps contain approximately 4 grams of mercury.
- Ballasts contain polychlorinated biphenyls (PCB's) which is a hazardous waste.
- Batteries contain heavy metals and corrosive components.
- Computer monitors contain toxic lead in the glass and circuits.

UNIVERSAL WASTE RULE (UWR)

The EPA issued the UWR in 1995 to reduce the amount of hazardous waste items entering municipal solid waste. It encourages recycling and proper disposal of certain wastes. Regulatory and administrative burdens for managing wastes were also streamlined. Numerous states have moved forward with the inclusion of electronic scrap (e-scrap) into the UWR. In addition, numerous states have banned monitors from landfills.

AERC PRE-PAID RETURN PROGRAM

AERC offers a comprehensive recycling service for commercial, institutional, municipal, and governmental waste generators.

1. Order Your Recycle Kit Order your kit by going to the RecycleKits website or by calling your AERC representative. You will need to know what quantities of the specific material you will be recycling. Prepayment includes recycling fees, container and FedEx freight. Certificates of Recycling and Process available upon request. AERC offers a comprehensive recycling service for commercial, institutional, municipal, and government waste generators.

2. Shipping Guidelines Put the material you're recycling into the designed container and follow the packaging instructions. Complete the enclosed labels and affix the prepaid shipping labels to the container.

FedEx Ground will not accept any package with the a PPRP label that has been changed, altered or tampered with in any way.

Give this package to the FedEx Ground driver during a routine delivery. Do not call FedEx Ground for a pickup if you are already set up for daily pick-ups. If you are not set-up for daily pick-ups you will need to call FedEx Ground as (888)777-6040 to schedule a pick-up.

3. AERC Recycles Your Waste AERC recycles your waste at one of its four fully permitted facilities. After your waste has been processed, a Certificate of Recycling or Process can be provided upon request.

ADVANTAGES OF AERC'S PPRP PROGRAM

- One price includes everything you need.
- Convenience for small quantity generators with storage limitations.
- Reduces the chances of facility contamination by minimizing volumes of waste on-site.
- Allows each facility to purchase recycling services based on its individual

Regional Sales Manager: Robert Hewitt
(760) 929-8718, (949) 400-3350, Fax (760) 929-8728

Earth Protection Services
http://www.earthpro.com/

Corporate Headquarters:
10 S. 48th Ave., Suite #4
Phoenix, AZ 85043
Phone: 800-414-0443 - Fax: 602-353-9285
Mailing Address: P.O. Box 23820
Phoenix, AZ 85063-3820
Send E-mail to EPSI earthpro@fiberpipe.net

See website for complete information on EPSI Pak mail back services.

Bethlehem Apparatus
http://www.bethlehemlamprecycling.com/

Mercury Waste Solutions, Inc.
http://www.lamptracker.com/new/LampTracker.pdf

Air Cycle Corporation
http://www.lamprecycling.com/pdf/EasyPak.pdf
Air Cycle Corporation
2000 S. 25th Avenue, Suite C
Broadview, IL 60155
Tel: (800) 909-9709
Fax: (708) 344-7875

Toxco
http://www.biggreenbox.com/StoreFront.bok
http://www.toxco.com/

The Riverside County Waste Management Department has added electronics recycling collections to their current residential Household Hazardous Waste Events. For more information go to www.rivcowm.org or call (800) 304-2226.

The California Integrated Waste Management Board maintains a list of certified recyclers http://www.ciwmb.ca.gov/Electronics/Collection/

Goodwill - Magnolia Center	(951) 688-0035	Riverside
Goodwill - La Sierra	(951) 684-1160	Riverside
Goodwill - Cathedral City	(760) 202-1544	Cathedral City

Riverside County landfills will accept residential TV, monitors, CRT's, and other consumer electronic devices for recycling. Residents may bring in up to 2 CRT type devices per trip. A minimum fee of $8.00 will be charged for loads up to 800 lbs. or $31.91 per ton prorated for heavier loads (new fees effective 7/1/06). Electronic waste from businesses is not accepted at the landfills at this time. Please contact the handlers on the following list.

Large Quantity CRT Handlers

Computer Recyclers of America	(760) 599-9131
Chase Electronics, Inc.	(610) 449-8160
Edom Hill Transfer Station	(760) 251-3649
Electronics Partners Corp.	(415) 541-5346
Envirocycle	(909) 519-3276
E-Recycling of So. Cal.	(562) 634-8372
Gold N' West	(951) 340-1501
Goodwill Industries	(323) 223-1211
Industrial Recycling Services	(951) 301-5252
Nxtcycle	(602) 442-7900
SoCal Computer Recycling, Inc.	(310) 978-2790
U. S. Dept of Justice, UNICOR	(330) 424-7448 x1313
UPS	(678) 746-7021
Waste Management, Inc.	(951) 280-5430

If you would like to be added to our listing, please contact jmorelan@co.riverside.ca.us. These lists are provided as a public service and are not an endorsement of these companies or their services. The Department is not responsible for any errors or omissions on these listings.

0003808

County Fire Stations within the Santa Margarita Watershed

9-Feb-09

	Fire Station	Address	City	State	Zipcode	Comments
Lower Watershed						
	Temecula Sta 12	28330 Mercedes St	Temecula	CA	92590	Contract City of Temecula
	Wildomar Sta 61	32637 Grunwell St	Wildomar	CA	92595	
	Rancho California Sta 73	27415 Enterprise Circle West	Temecula	CA	92590	Contract City of Temecula
	Bear Creek Sta 75	38900 Clinton Keith Rd	Murrieta	CA	92562	
	French Valley Sta 83	37500 Sky Canyon Dr	Murrieta	CA	92563	Contract City of Temecula
	Parkview Sta 84	30650 Pauba Rd	Temecula	CA	92592	Contract City of Temecula
	Wolf Creek Sta 92	32211 Wolf Creek Dr	Temecula	CA	92592	Contract City of Temecula
Upper Watershed						
	Anza Sta 29	6560 Highway 371	Anza	CA	92539	
	Pinyon Sta 30	70080 Highway 74-103	Anza	CA	92539	
	Cottonwood Sta 52	44222 Sage Rd	Aguanga	CA	92536	
	Garner Valley Sta 53	59200 Morris Ranch Rd	Mountain Center	CA	92561	
	Lake Riverside Sta 77	41610 Lakeshore Blvd	Aguanga	CA	92536	
	Glen Oaks Sta 96*	37700 Glen Oaks Rd	Temecula	CA	92593	

* Temporary site

AGRICULTURE

University of California
COOPERATIVE EXTENSION

Riverside County

Current Research and Education using Multi-disciplinary Approaches to Solving Complex Issues, 2007-08 update

Environmental Horticulture Effort Saves Billions of Gallons of Water in Desert

Using temporary weather stations, Advisor Mike Henry and CE Specialist, Rick Snyder teamed with the Coachella Valley Water District in an eight year study to determine local reference evapotranspiration (ETo) in urban sites in the Coachella Valley, California. Findings showed potential water savings of 2.5 billion gallons annually.

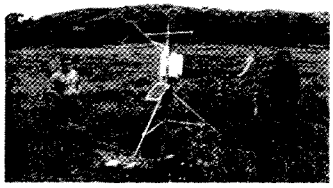

Temporary weather station with temperature, humidity, radiation and wind speed sensors provided data that could be used to calculate ETo which was then compared with the ETo for the Valley from the State CIMIS station in Indio, CA (# 200)).

Agricultural Economics: New Crop Studies Show Opportunity for Sustainability and Viability of Agriculture in Southern California

Current cost studies analysed by Eta Takele show the benefits and challenges of producing and investing in crops such as Dates, Mandarins and Blueberries.

The Coachella Valley, the Date Production Area in the US

Rapid population growth and the high cost of production resulting from resource diversion of water and land from agriculture to urban development has led many growers to consider high value, small scale production in southern California. For detail information of the studies, please go to the following websites and access the publications.

http://coststudies.ucdavis.edu
http://groups.ucanr.org/farmgt/

Subtropical Horticulture Program

Citrus leafminer (CLM) continues to be an insect pest on all varieties of citrus trees in Riverside County. A variety of natural predators appear to be gradually controlling the CLM populations. Allowing biological control to take effect is highly recommended at this time. Working in conjunction with UCR Entomology, Dr. Peggy Mauk and SRA Tom Shea are supplying CLM infested leaves from field work and more predators are being successfully reared for release. For mature trees and any citrus tree over four years old, no pesticide application is suggested. See UC ANR publication – Pest Notes #74137, August 2007, for more CLM information – available online.

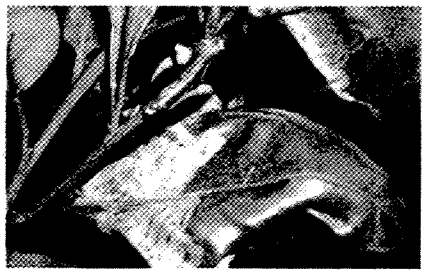

The serpentine (snake –like) mines of citrus leafminer on a citrus leaf.

Vegetable Crops

Vegetable crops advisor, Jose Aguiar in 2006 took a sabbatical leave in Sinaloa, Mexico to study bell pepper production. He found various technologies that can be applicable in the Coachella Valley including green house, Maya Sombra and open field production. Along with UC specialists and advisors, Jose is now evaluating the benefits of these techniques.

Bell peppers being grown in shade house in the Oasis area of the Coachella Valley.

State Water Quality Grant Uses BMP's To Improve San Jacinto Watershed

Best Management practices for Citrus, Grain, Vegetable crops and urban turfgrass are being developed and extended to farmers and residential clientele in the watershed to improve the water quality of Canyon Lake and Lake Elsinore in western Riverside County. Mike Henry, Darren Haver, Eta Takele, Nyles Peterson and CE Specialist, Milt McGiffen work with Dr. Laoshang Wu, CE Water Specialist (P.I.) and the State Water Quality Control Board on this project.

Project researchers install field instrumentation to measure runoff from potato field in Riverside County.

Nutrition, Family and Consumer Sciences

Advisor Chutima Ganthavorn and EFNEP/FSNEP program staff, Fatima Afana, Gustavo Rimada, Liz Armijo, Myriam Acevedo and Sharon Southworth, teamed with local agency partners and schools to make a change in food behaviors of parents and children from low-income families. During FY 2006-2007 Riverside County EFNEP helped 576 low income families and 1,142 youth to improve their nutrition, physical activity and health, while Riverside County FSNEP helped 313 food stamp families and 1,702 youth to improve their knowledge in money management and nutrition.

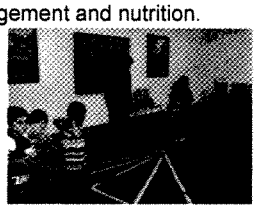

Promoting MyPyramid and physical activity in youth from grandparents raising grandchildren families

Head Start parents learning to use a cooking thermometer.

University of California
COOPERATIVE EXTENSION

Riverside County

Current Research and Education using Multi-disciplinary Approaches to Solving Complex Issues cont'd, 2007-08 update

Master Gardener Program Teams With FSNEP & 4-H on TWIGS Project

In Riverside County, Master Gardeners, FSNEP and 4-H are teaming up to support school gardens. Elementary school youth learn about gardening and nutrition from the TWIGS (Team with Intergenerational Support) curriculum. Master Gardeners and 4-H program rep, Jeanne Lothridge, are helping with direct teaching, gardening and making supplemental posters for TWIGS.

Master Gardener, Pauline Pedigo introducing her pet desert turtle during a break from TWIGS lesson at school garden in Riverside, CA.

Viticulture Program

The viticulture program addresses critical needs and issues that affect wine grape and table grape production in Riverside, San Bernardino and San Diego counties. Advisor Carmen Gispert is currently working on new table grape selections and the efficacy of novel insecticide materials for the control of vine mealybug.

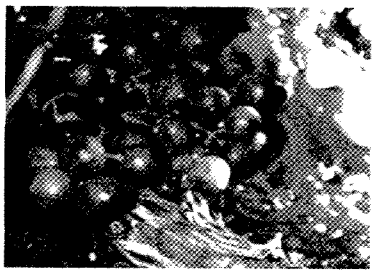

Vine mealybug on grapes in the Temecula Valley of Riverside County.

A collaborative effort among the University of California, the California Department of Food and Agriculture has successfully maintained low populations of the glassy-winged sharpshooter in the Coachella and Temecula Valleys, reducing the potential of the spread of Pierce's disease, a lethal malady on grapes.

Poultry Science

Advisor Doug Kuney currently serves on County Poultry Committees. The committee's mission is to help resolve and prevent nuisance related complaints from neighboring communities near poultry farms. Doug assists the committee by providing information about management practices that have been proven to mitigate nuisance related complaints. In addition, he works with the poultry industry to adopt those management practices.

Main Office:
21150 Box Springs Road, Suite 202, Moreno Valley, CA 92557.
Tel . (951) 683-6491

Indio Office:
82-675 Highway 111, Room 118, Indio, CA 92201.
Tel. (760)863-8293

Palo Verde Office:
290 N. Broadway, Blythe, CA 92225.
Tel. (760) 921-5060

University of California, County of Riverside and U.S. Department of Agriculture Cooperating

Serving Riverside County residents in delivering research and educational programs in: Agriculture, Nutrition, Youth Development, and Natural Resources since 1917

Etaferahu Takele
County Director
Tel. 951-683-6491 Ext. 243
Fax 951-788-2615
E-mail: ettakele@ucdavis.edu

There is a wealth of consumer resources for homeowners to learn more about smart pesticide use as well as alternatives to pesticides. While a larger list is available at here are some of the more authoritative resources:

California Department of Pesticide Regulation:

California Stormwater Quality Association:

California Structural Pest Control Board:

Centers for Disease Control:

National Pest Management Association – Quality Pro:

National Pest Management Association – QualityPro Green:

University of California Integrated Pest Management Program:

US Environmental Protection Agency:

What is IPM:

apply .org

Printed on recycled paper

apply .org

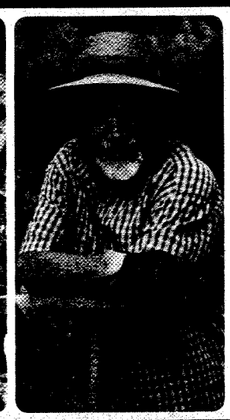
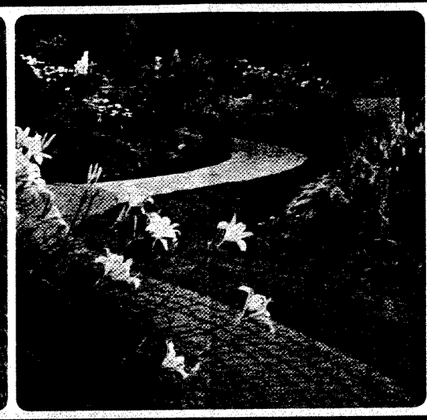

Smart tips for homeowners about the proper use, storage and disposal of outdoor consumer pesticide products, including insecticides. If you use these products, please apply them responsibly to protect our water and environment.

URBAN PYRETHROID

Pyrethroids (pronounced *"pī-rē-throids"*) are ingredients found in many commonly used consumer home and garden insecticides for treating a wide variety of pests, including problems with mosquitoes, caterpillars, ants, spiders, garden worms, wasps, cockroaches, aphids and other insect infestations.

The Urban Pyrethroid Stewardship is a pesticide industry alliance that is promoting *"Apply Responsibly"*— a campaign to inform Californians in urban areas about environmentally responsible ways to handle, store and dispose of a wide range of home and garden pesticide products, including insecticides containing pyrethroids in order to help protect California's waters.

If you use insecticides in your garden or outside your house, please remember to apply them responsibly to protect our water and environment. *"Apply Responsibly"* also provides resources for consumers who may want to consider limiting pesticide use through integrated pest management and prevention efforts.

Protecting Our Water

Water is an essential natural resource that every Californian should help safeguard.

Many urban creeks in California receive water from residential areas. Chemicals used around the home, including home and garden pesticides, can move from where they are applied and run off through the storm drain system into these creeks.

By following a few simple rules for handling and disposal of chemicals, you can play an important role in helping prevent this type of runoff and in preserving California's water quality and environment.

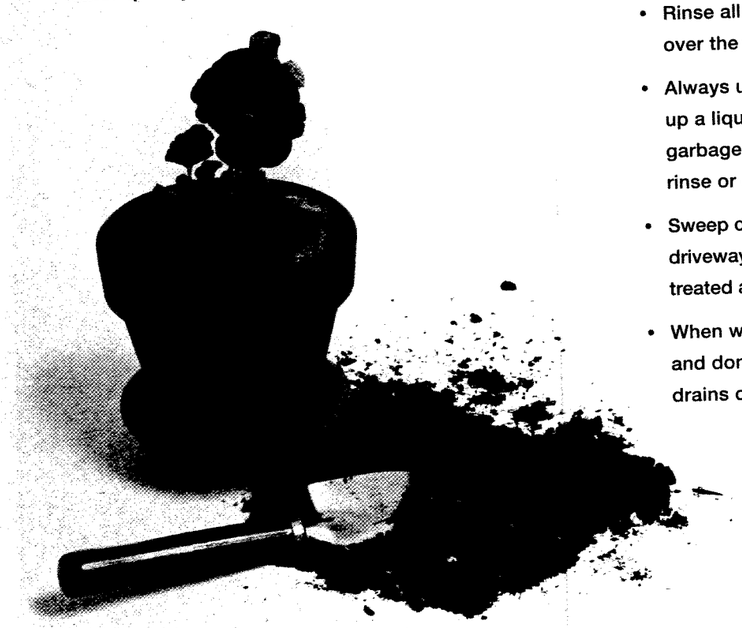

Tips for the Lawn & Garden

Gardeners who choose to use pesticides to control insects in their yards should adhere to the following guidelines:

- Always read the entire label first and follow the directions
- Reduce pest infestations by eliminating what often attracts them or creates ideal breeding conditions – standing water, pet droppings, tree prunings or fallen fruit
- Remove thatch buildup in lawns to ensure water soaks deeply into the lawn and prevents runoff
- Mix and use only the amount you need
- Avoid applying a spray or dust on a windy day
- Rinse all pesticide application equipment only over the treated area
- Always use dry sawdust or kitty litter to soak up a liquid spill and then sweep it into a plastic garbage bag for disposal; don't use water to rinse or clean up a liquid spill
- Sweep or blow granules that fall on porches, driveways and sidewalks back onto the treated area
- When watering treated areas, don't overwater and don't allow water runoff into gutters, in-lawn drains or storm drains

Tips for Around the House

Homeowners who apply pesticides around the outside of their homes should follow a number of important guidelines:

- Always read the entire label first and follow the directions
- Limit the likelihood of pest infestations near the house by keeping wood piles, groundcover and shrubs away from the outside surfaces of your house
- Avoid applying a spray or dust on a windy day
- Only apply pesticides to the target problem areas
- If a product is labeled for "spot" and "cracks and crevices" you should only treat those areas
- Don't treat entire driveways, patios, sidewalks or similar outdoor surfaces
- Always use dry sawdust or kitty litter to soak up a liquid spill and then sweep it into a plastic garbage bag for disposal; don't use water to rinse or clean up a liquid spill
- If you hire a professional pest control company, be sure the operator is licensed and certified according to state law and local ordinances. Have a conversation with them to understand what, if any, pesticides they will apply around your home. Tell them about any do-it-yourself products that you may be using as sometimes they can interfere with products the professional may use. Finally, be sure to ask about steps that you can take to help keep pests from entering your home such as sealing cracks and crevices or fixing leaks

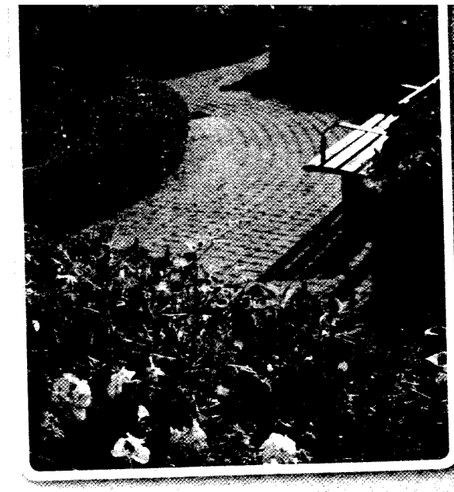

Storage & Disposal

- Dispose of unused pesticides according to the instructions on the product label
- Never pour any leftover pesticides down the sink, toilet, sewer or storm drain
- Don't stockpile pesticides. Buy only enough for one season
- If you only need to treat a small area, consider ready-to-use pesticides rather than products you have to mix yourself
- Always store pesticides in their original containers
- Ensure containers are securely closed
- Store in a safe place away from children
- Do not reuse an empty pesticide container
- Remember that an empty pesticide container contains residue and should also be handled carefully and according to the label

LANDSCAPE ORDIANCE 859.2

0003815

202

ORIG APPROVED COUNTY COUNSEL
Y. KARIN L. WATTS-BAZAN 8/18/09
DATE

SUBMITTAL TO THE BOARD OF SUPERVISORS
COUNTY OF RIVERSIDE, STATE OF CALIFORNIA

FROM: TLMA - Planning

SUBMITTAL DATE:
September 3, 2009

SUBJECT: Amendment to Ordinance No. 859 The Water Efficient Landscape Requirements

RECOMMENDED MOTION: That the Board of Supervisors introduce Ordinance No. 859.2 on September 15, 2009 and adopt Ordinance No. 859.2 on September 29, 2009.

BACKGROUND: Court rulings on endangered species, a growing crisis involving a long-term pumping solution for the Bay Delta, and drought conditions continue to impact the way the State of California uses water. On December 19, 2006 the County adopted Ordinance No. 859 which established water-efficient landscape requirements for all discretionary permits and/or approvals.

On September 28, 2006, the State adopted AB1881 which revised the Water Conservation in Landscaping Act. AB1881 gave local land use jurisdictions until January 1, 2010 to adopt an ordinance "as effective" as the State's Model Ordinance or the State's Model Ordinance would prevail. On February 8, 2008, the California Department of Water Resources (DWR) promulgated the first of several model water efficient landscape ordinances that began to define the State requirements for water efficient landscaping.

CONTINUED ON ATTACHED PAGE

Damian Meins, Assistant Planning Director for
Ron Goldman
Planning Director

FINANCIAL DATA				
	Current F.Y. Total Cost:	$ 0	In Current Year Budget:	N/A
	Current F.Y. Net County Cost:	$ 0	Budget Adjustment:	N/A
	Annual Net County Cost:	$ 0	For Fiscal Year:	N/A

SOURCE OF FUNDS: N/A

Positions To Be Deleted Per A-30 ☐
Requires 4/5 Vote ☐

C.E.O. RECOMMENDATION:

APPROVE
BY Tina Grande

County Executive Office Signature

Dep't Recomm.: ☒ Policy ☐ Consent
Per Exec. Ofc.: ☒ Policy ☐ Consent

Prev. Agn. Ref.: | District: 1-5 | Agenda Number: 3.45

During the Spring of 2009, the Riverside County Water Task Force developed and subsequently released a Local Model Landscape Water Use Efficiency Ordinance (Local Model Ordinance). This ordinance was modeled after the County's Ordinance No. 859 and incorporated the required elements of the State's Model Ordinance. The Local Model Ordinance was tailored to meet the unique relationships and needs of the Riverside County region.

On June 8, 2009, the WRCOG Executive Committee endorsed the Local Model Ordinance and encouraged its member jurisdictions to adopt it or utilize it in creating their respective local ordinances. Staff has incorporated the Local Model Ordinance into Ordinance No. 859.2 (Attachment A) and its accompanying provisions of resolution (Attachment B).

Key, new features of Ordinance No. 859.2 include:

1. Its applicability to landscapes equal to or greater than 2,500 square feet which require a discretionary permit or approval
2. A reduction in maximum water demand from 80% to 70% of the referenced evapotranspiration rate
3. Greater specificity concerning the design requirements of landscape plans
4. An expanded landscape documentation package including a:
    a. soils management plan, and a
    b. grading plan
5. A requirement that surface area of water features be incorporated into the water budget calculations
6. Added emphasis on recycled water
7. Special provisions for cemeteries, areas irrigated with recycled water, parks, sports fields, and other high traffic turf areas

Key features of Resolution 2009-289 include:

1. Reliance on local water purveyors, as the direct and immediate supplier of water, to enforce landscape water use efficiency standards with respect to existing customers
2. A request to local water purveyors to identify programs that enhance and encourage landscape water use efficiency (e.g. tiered water rate structure, allocation-based conservation water pricing structure, etc.)

On September 29, 2009, staff will bring the aforementioned ordinance and resolution to the Board for approval along with a revised Board Policy H-25 that addresses the County's Water Efficient Landscape Policy for County Facilities.

ATTACHMENT A

ORDINANCE NO. 859.2

AN ORDINANCE OF THE COUNTY OF RIVERSIDE

AMENDING ORDINANCE NO. 859 THE WATER EFFICIENT

LANDSCAPE REQUIREMENTS

The Board of Supervisors of the County of Riverside ordains as follows:

Section 1. Ordinance No. 859 is hereby amended in its entirety to read as follows:

Section 1. **SHORT TITLE**. This Ordinance shall be known as the Water Efficient Landscape Requirements Ordinance.

Section 2. **INTENT**. It is the intent of the Board of Supervisors in adopting this Ordinance to:

A. Establish provisions for water management practices and water waste prevention;

B. Establish a structure for planning, designing, installing, maintaining, and managing water efficient landscapes in new and rehabilitated projects;

C. To reduce the water demands from landscapes without a decline in landscape quality or quantity;

D. To retain flexibility and encourage creativity through appropriate design;

E. To assure the attainment of water efficient landscape goals by requiring that landscapes not exceed a maximum water demand of seventy percent (70%) of its reference evapotranspiration (ETo) or any lower percentage as may be required by state legislation, whichever is stricter;

F. To eliminate water waste from overspray and/or runoff;

G. To achieve water conservation by raising the public awareness of the need to conserve water through education and motivation to embrace an effective water demand management program; and

H. To implement the requirements of the California Water Conservation in Landscaping Act 2006 and the California Code of Regulations Title 23, Division 2, Chapter 2.7.

Section 3. **DEFINITIONS.** The terms used in this Ordinance shall have the meaning set forth below:

a. "backfilling means to refill an excavation, usually with excavated material.

b. "backflow prevention device" means a safety device used to prevent pollution or contamination of the water supply due to the reverse flow of water from the irrigation system.

c. "check valve" or "anti-drain valve" means a valve located under a sprinkler head or other location in the irrigation system to hold water in the system to prevent drainage from the sprinkler heads when the system is off.

d. "established landscape" means the point at which plants in the landscape have developed a significant root growth into the site. Typically, most plants are established after one or two years of growth.

e. "estimated annual water use" or "EAWU" means estimated total water use per year as calculated by the formula contained in Section 5.B.12.n.

f. "hydrozone" means a portion of the landscaped area having plants with similar water needs. A hydrozone may be irrigated or non-irrigated.

g. "invasive species" are non-indigenous species (e.g. plants or animals) that adversely affect the habitats they invade economically, environmentally, or ecologically. Lists of invasive species are included within the Western

Riverside County Multiple Species Habitat Conservation Plan and the Coachella Valley Multiple Species Habitat Conservation Plan. Said lists are hereby incorporated by reference.

h. "landscape architect" means a person who holds a license to practice landscape architecture in the State of California.

i. "landscaped area" or "LA" means all of the planting areas, turf areas, and water features in a landscape design plan subject to the Maximum Applied Water Allowance (MAWA) calculation. The landscape area does not include footprints of buildings, or structures, sidewalks, driveways, parking lots, decks, patios, gravel or stone walks, other pervious or impervious hardscapes, and other non-irrigated areas designated for non-development (e.g., open space and existing native vegetation).

j. "local water purveyor" means any entity, including a public agency or private water company that provides retail water service to customers in the unincorporated area of Riverside County.

k. "low volume irrigation" means the application of irrigation water at low pressure through a system of tubing or lateral lines and low volume emitters such as drip, to apply small volumes of water slowly at or near the root zone of plants.

l. "Maximum Applied Water Allowance" or "MAWA" means the upper limit of annual applied water allowed for the established landscaped area.

m. "overhead sprinkler irrigation systems" means systems that deliver water through the air (e.g. pop ups, impulse sprinklers, spray heads and rotors, etc.).

n. "reference evapotranspiration" or "ETo" means a standard measurement of environmental parameters which affect the water use of plants. ETo is given in inches per day, month, or year. Reference evapotranspiration is used as the basis of determining the Maximum Applied Water Allowances

so that regional differences in climate can be accommodated. Reference evapotranspiration numbers shall be taken from the most current EvapoTranspiration Zones Map developed by the California Department of Water Resources. For geographic areas not covered by the EvapoTranspiration Zones Map, data from nearby areas shall be used.

o. "rehabilitated landscapes" means any re-landscaping of a project that requires a discretionary permit.

p. "special landscape area" means an area of the landscape dedicated to edible plants, areas irrigated with recycled water, and publicly accessible areas dedicated to active play such as parks, sports fields, golf courses, where turf provides a playing field or where turf is needed for high traffic activities.

q. "temporarily irrigated" means irrigation for the purposes of establishing plants, or irrigation which will not continue after plant establishment. Temporary irrigation is for a period of six months or less.

r. "water-intensive landscaping" means a landscape with a WUCOLS plant factor of 0.7 or greater.

s. "WUCOLS" means the publication entitled "Water Use Classification of Landscape Species" by the University of California Cooperative Extension (1999 or most current version).

<u>Section 4.</u> APPLICABILITY.

A. The water-efficient landscape requirements contained in this Ordinance shall be applicable to all new and rehabilitated landscapes associated with residential uses (including single family and multi-family units/projects) with a total landscape area equal to or greater than 2,500 square feet which require a discretionary permit and/or approval and all new and rehabilitated landscapes

associated with commercial or industrial uses which require a discretionary permit and/or approval.

B. In the event Covenants, Conditions and Restrictions are required for any permit subject to this Ordinance, a condition shall be incorporated into any project approval prohibiting the use of water-intensive landscaping and requiring the use of low water use landscaping pursuant to the provisions of this Ordinance in connection with common area/open space landscaping. Additionally, such a condition shall also require the Covenants, Conditions and Restrictions to incorporate provisions concerning landscape irrigation system management and maintenance. This Ordinance shall not be construed as requiring landscaping of common areas or open space that is intended to remain natural. Covenants, Conditions and Restrictions shall not prohibit use of low-water use plants or the replacement of turf with less water intensive plant species.

C. Recognizing the special landscape needs of cemeteries, new and rehabilitated landscapes within a cemetery are subject only to the provisions set forth in Sections 6.A.and 6.B. of this Ordinance.

D. The following uses and/or projects are exempt from the provisions of this Ordinance:

1. Registered local, state or federal historical sites;
2. Ecological restoration projects that do not require a permanent irrigation system and have an establishment period of less than 5 years;
3. Mined land reclamation projects that do not require a permanent irrigation system; and
4. Botanical gardens and arboretums open to the public.

Section 5. **LANDSCAPE DOCUMENTATION REQUIREMENTS.** An applicant proposing any new or rehabilitated landscape for a project subject to the requirements of Section 4 of this Ordinance shall prepare and submit to the Planning Director documentation including the following: 1. project information; 2. a planting plan; 3. an irrigation design plan; 4. a soil management plan; and 5. a grading design plan. The "Riverside County Guide to California Friendly Landscaping" (Landscaping Guide) as may be periodically amended by the Planning Director is hereby incorporated by reference to assist in designing, constructing and maintaining a water efficient landscape and efficient irrigation system.

It is recommended that an applicant proposing any new or rehabilitated landscape that is designated for recycled water use consult with the appropriate local water purveyor early in the development review process to ensure that future recycled water facilities meet the projected demand and that the aforementioned plans when submitted comply with the applicable standards, approvals and implementation requirements of this Ordinance, the local water purveyor and any applicable maintenance entity.

Water systems for common open space areas shall use non-potable water if approved facilities are made available by the local water purveyor. Provisions for a non-potable water system shall be provided within the irrigation design plan. Water systems designed to utilize non-potable water shall be designed to meet all applicable standards of the applicable Regional Water Quality Control Board and the Riverside County Health Department.

A. **PROJECT INFORMATION.**

1. date;
2. name of applicant and contact information;
3. name of project owner and contact information;
4. project address including parcel and lot numbers;
5. total landscape area in square feet;
6. project type (e.g. new or rehabilitated, and residential, commercial, or industrial);

7. water supply (e.g. potable, well, recycled; use of recycled water is encouraged);

8. applicant's signature and date with statement, "I agree to comply with the requirements of Ordinance No. 859 and submit a complete Landscape Documentation Package."

B. **PLANTING PLAN REQUIREMENTS.**

1. Plant types shall be grouped together in regards to their water, soil, sun and shade requirements and in relationship to the buildings. Plants with different water needs shall be irrigated separately. Plants with the following classifications shall be grouped accordingly: high and moderate, moderate and low, low and very low. Deviation from these groupings shall be not be permitted.

2. Trees for shade shall be provided for residential, commercial and industrial buildings, parking lots and open space areas. These trees can be deciduous or evergreen and are to be incorporated to provide natural cooling opportunities for the purpose of energy and water conservation.

3. Plants shall be placed in a manner considerate of solar orientation to maximize summer shade and winter solar gain.

4. Plant selection for projects in high fire hazard areas shall address fire safety and prevention. A defensible space or zone around a building or structure is required pursuant to Public Resources Code Section 4291 and Ordinance No. 695. Fire-prone plant materials and highly flammable mulches shall be avoided.

5. Invasive species of plants shall be avoided especially near parks, buffers, greenbelts, water bodies, conservation areas/reserves and other open space areas because of their potential to cause harm to environmentally sensitive areas.

6. All exposed surfaces of non-turf areas within the developed landscape area shall be mulched with a minimum three inch (3") layer of material, except in areas with groundcover planted from flats where mulch depth shall be one and one half inches (1 ½").
7. Stabilizing mulching products shall be used on slopes.
8. Turf areas shall be used in response to functional needs and in compliance with the water budget.
9. Decorative water features shall use re-circulating water systems.
10. Where available, recycled water shall be used as the source for irrigation and decorative water features.
11. Planting plans shall identify and site the following:
    a. new and existing trees, shrubs, ground covers, and turf areas within the proposed landscaped area;
    b. a planting legend indicating all plant species by botanical name and common name, spacing, and quantities of each type of plant by container size;
    c. designation of hydrozones;
    d. area, in square feet, devoted to landscaping and a breakdown of the total area by landscape hydrozones;
    e. property lines, streets, and street names;
    f. building locations, driveways, sidewalks, retaining walls, and other hardscape features;
    g. appropriate scale and north arrow;
    h. any special landscape areas;
    i. type of mulch and application depth;
    j. type and surface area of water features;
    k. type and installation details of any applicable stormwater best management practices;

l. planting specifications and details, including the recommendations from the soils analysis, if applicable;

m. maximum Applied Water Allowance (MAWA):

i. Planting plans shall be prepared using the following Water Budget Formula:

MAWA (in gallons) = (ETo)(0.62)[0.7 x LA+0.3 x SLA]

where

ETo is reference evapotranspiration

SLA is the amount of special landscape area in square feet

LA is total landscape area (including the SLA) in square feet; and

ii. For the purposes of determining the MAWA, average irrigation efficiency is assumed to be 0.71. Irrigation systems shall be designed, maintained, and managed to meet or exceed an average irrigation efficiency of 0.71.

n. Estimated Annual Water Use (EAWU):

i. EAWU for a given hydrozone is calculated as follows:

EAWU (in gallons) = (ETo)(0.62)[((PF x HA)/IE) + SLA]

where

ETo is reference evapotranspiration

PF is Plant Factor

HA is hydrozone area in square feet

IE is irrigation efficiency (minimum 0.71)

SLA is the amount of special landscape area in square feet;

ii. Landscaping plans shall provide EAWU (in the same units as the MAWA) for each valve circuit in the irrigation hydrozone. The sum of all EAWU calculations shall not exceed the MAWA for the project;

iii. The plant factor used shall be from WUCOLS. The plant factor for low water use plants range from 0 to 0.3, for moderate water use plants range from 0.4 to 0.6, and for high water use plants range from 0.7 to 1.0.

iv. The plant factor calculation is based on the proportions of the respective plant water uses and their plant factor, or the factor of the higher water using plant used.

v. The surface area of a water feature shall be included in the high water use hydrozone area of the water budget calculation and temporarily irrigated areas in the low water use hydrozone.

12. Planting plans and Irrigation plans (Section 5.C.) shall be drawn at the same size and scale.

13. The Planting plan shall be prepared by a Landscape Architect licensed by the State of California.

C. **IRRIGATION DESIGN PLAN REQUIREMENTS.**

1. Irrigation systems shall be designed, maintained, and managed to meet or exceed an average irrigation efficiency of 0.71.
2. All irrigation systems shall be designed to prevent runoff, over-spray, lowhead drainage and other similar conditions where water flows off-site on to adjacent property, non-irrigated areas, walk, roadways, or structures. Irrigation systems shall be designed, constructed, managed, and maintained to achieve as high an overall efficiency as possible. The irrigation system shall be designed to ensure that the dynamic pressure at each emission device is within the manufacturer's recommended pressure range for optimal performance.
3. Landscaped areas shall be provided with a smart irrigation controller which automatically adjusts the frequency and/or duration of irrigation events in response to changing weather conditions unless the use of the property would otherwise prohibit use of a timer. The planting areas shall be grouped in relation to moisture control zones based on similarity of water requirements (i.e., turf separate from shrub and groundcover, full sun exposure areas separate from shade areas, top of slope separate from toe of slope). Additional water conservation technology may be require, where necessary, at the discretion of the Planning Director.
4. Water systems for common open space areas shall use non-potable water, if approved facilities are made available by the water purveyor. Provisions for the conversion to a non-potable water system shall be provided within the landscape plan. Water systems designed to utilize non-potable water shall be designed to meet all

applicable standards of the California Regional Water Quality Control Board and the Riverside County Health Department.

5. Separate valves shall be provided for separate water use planting areas, so that plants with similar water needs are irrigated by the same irrigation valve. All installations shall rely on highly efficient state of the art irrigation systems to eliminate runoff and maximize irrigation efficiency as required by the Landscaping Guide.

6. Static water pressure, dynamic or operating pressure and flow reading of the water supply shall be measured. These pressure and flow measurements shall be conducted at the design stage. If the measurements are not available at the design stage, the measurements shall be conducted at the installation.

7. The capacity of the irrigation system shall not exceed:

   a. the capacity required for peak water demand based on water budget calculations;

   b. meter capacity; or

   c. backflow preventer type and device capacity.

8. Sprinkler heads and other emission devices shall have matched precipitation rates, unless otherwise directed by the manufacturer.

9. In mulched planting areas, the use of low volume irrigation is required to maximize water infiltration into the root zone.

10. Non-turf areas on slopes greater than 25% shall be irrigated with drip irrigation or other low volume irrigation technology.

11. Long-narrow, or irregularly shaped areas including turf less than eight (8) feet in width in any direction shall be irrigated with subsurface irrigation or low-volume irrigation technology.

12. Overhead irrigation shall not be permitted within 24 inches of any non-permeable surface. There are no restrictions on the irrigation system type if the landscape area is adjacent to permeable surfacing and no overspray and runoff occurs.

13. Overhead irrigation shall be limited to the hours of 8 p.m. to 9 a.m.

14. All irrigation systems shall be equipped with the following:

    a. A smart irrigation controller as defined in Section 5.C.4. of this Ordinance;

    b. A rain sensing device to prevent irrigation during rainy weather;

    c. Anti-drain check valves installed at strategic points to minimize or prevent low-head drainage;

    d. A manual shut-off valve shall be required as close as possible to the point of connection of the water supply, to minimize water loss in case of an emergency or routine repair;

    e. A pressure regulator when the static water pressure is above or below the recommended operating pressure of the irrigation system;

    f. Backflow prevention devices; and

    g. Riser protection components for all risers in high traffic areas.

15. Dedicated landscape meters shall be required for all projects greater than 2,500 square feet except single-family residences.

16. Irrigation design plans shall identity and site the following:

    a. Hydrozones:

        i. Each hydrozone shall be designated by number, letter or other designation.

in gallons per month and gallons per year, for the established landscape; and

l. Irrigation design plans shall contain the following statement, "I agree to comply with the criteria of Ordinance No. 859 and to apply the criteria for the efficient use of water in the irrigation design plan."

17. For each valve, two irrigation schedules shall be prepared, one for the initial establishment period of six months and one for the established landscape, which incorporate the specific water needs of the plants and turf throughout the calendar year.

18. Irrigation design plans and planting plans (Section 5.B.) shall be drawn at the same size and scale.

D. **SOIL MANAGEMENT PLAN REQUIREMENTS.**

1. After mass grading, the project applicant shall:

a. perform a preliminary site inspection;

b. determine the appropriate level of soil sampling and sampling method needed to obtain representative soil sample(s);

c. conduct a soil probe test to determine if the soil in the landscape area has sufficient depth to support the intended plants; and

d. obtain appropriate soil sample(s).

2. The project applicant shall submit soil sample(s) to a laboratory for analysis and recommendation. The soil analysis may include:

a. soil texture;

b. infiltration rate determined by laboratory test or soil texture infiltration rate tables;

c. pH;

d. total soluble salts;

e. sodium; and

f. recommendations.

3. The project applicant shall prepare documentation describing the following:

a. soil type;

b. identification of limiting soil characteristics;

c. identification of planned soil management actions to remediate limiting soil characteristics; and

d. submit the soil analysis report and documentation verifying implementation of soil analysis report recommendations to the County pursuant to the requirements of Section 7.C.

E. **GRADING DESIGN PLAN REQUIREMENTS.**

1. The landscape documentation submitted shall also include rough/precise grade elevations prepared for the project by a licensed civil engineer.

Section 6. **LANDSCAPE IRRIGATION AND MAINTENANCE.** This section shall apply to all projects subject to the provisions of this Ordinance as set forth in Section 4.

A. Two irrigation schedules shall be prepared, one for the initial establishment period of six months and one for the established landscape, which incorporate the specific water needs of the plants and turf throughout the calendar year. The irrigation schedule shall take into account the particular characteristics of the soil; shall be continuously available on site to those responsible for the landscape maintenance; and shall contain specifics as to optimum run time and frequency of watering, and irrigation hours per day. The schedule currently in effect shall be posted at the controller.

B. A regular maintenance schedule and Certificate of Completion shall be submitted to the Planning Director, property owner, and water purveyor. A regular maintenance schedule shall include, but not be limited to, routine inspection, adjustments, and repair of the irrigation system and its components; aerating and dethatching turf areas; replenishing mulch; fertilizing; pruning; weeding in all landscape areas and removing any obstruction to irrigation devices. Repair of all irrigation equipment shall be done with the originally installed components or equivalent.

C. All model homes that are landscaped shall use signs and written information to demonstrate the principles of water efficient landscapes described in this Ordinance.

D. Information shall be provided to owners of new, single family residential homes regarding the design, installation, management, and maintenance of water efficient landscapes.

Section 7. COMPLIANCE/PLAN SUBMITTAL PROCESS. Prior to issuance of a building permit for the project, the project applicant shall:

A. Submit all landscape documents for review and approval by the Planning Director. The planting plan, irrigation design plan, and soils management plan shall be reviewed by an independent licensed landscape architect to ensure that all components of the plans adhere to the requirements of this Ordinance. The licensed landscape architect shall sign the plans verifying that the plans comply with this Ordinance. Any plans submitted without the signature of a licensed landscape architect shall not be accepted for review.

B. Prior to issuance of a certificate of occupancy or final inspection for the project, a regular maintenance schedule and a Certificate of Completion shall be submitted to the Planning Director certifying that

the landscaping has been completed in accordance with the approved planting, irrigation design, soil management, and grading design plans for the project. The Certificate of Completion shall be signed by a licensed landscape architect and shall indicate:

1. Date;
2. Project information:
   a. Project name;
   b. Project applicant name, telephone and mailing address;
   c. Project address and location; and
   d. Property owner name and mailing address;
3. Prior to backfilling, evidence that the party responsible for irrigation installation conducted a preliminary field inspection of the irrigation system (evidence of field inspection shall be attached);
4. The landscaping has been installed in conformance with the approved planting and irrigation design plans;
5. Irrigation audit report performed by a certified irrigation auditor after project installation (audit report shall be attached);
6. The smart irrigation controller has been set according to the irrigation schedule;
7. The irrigation system has been adjusted to maximize irrigation efficiency and eliminate overspray and runoff; and
8. A copy of the approved landscape documentation (Section 5), the irrigation schedule (Section 6.A.) and the maintenance schedule (Section 6.B.) has been given to the property owner and local water purveyor.
9. Verification that the maintenance schedule has been provided to the Planning Director.

C. At a minimum, all landscape irrigation audits shall comply with the "Irrigation Association Certified Landscape Irrigation Auditor Training Manual" (2004 or most current) and shall be conducted by a certified landscape irrigation auditor.

D. The Planning Director or his/her designee shall have the right to enter upon the project site at any time before, during and after installation of the landscaping, to conduct inspections for the purpose of enforcing this Ordinance.

Section 2. The provisions of this Ordinance shall not take effect until thirty (30) days after its adoption.

BOARD OF SUPERVISORS OF THE COUNTY
OF RIVERSIDE, STATE OF CALIFORNIA

By: _____
Chairman, Board of Supervisors

ATTEST:
CLERK OF THE BOARD

By: _____
Deputy

(SEAL)

APPROVED AS TO FORM
September 3, 2009

By: Karin Watts-Bazan
KARIN WATTS-BAZAN
Deputy County Counsel

KWB:mdk
08/20/09
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Board of Supervisors **Attachment B** **County of Riverside**

RESOLUTION NO. 2009-289
COORDINATION WITH WATER PURVEYORS CONCERNING LANDSCAPE WATER EFFICIENCY PROGRAMS

WHEREAS, the State of California has enacted the Water Conservation in Landscaping Act (Landscaping Act);

WHEREAS, Assembly Bill 1881 amends said Landscaping Act to require the Department of Water Resources to update the State's model water efficient landscape ordinance in accordance with certain specified requirements;

WHEREAS, the Department of Water Resources has updated the State's model efficient landscape ordinance;

WHEREAS, said Landscaping Act mandates local agencies to, no later than January 1, 2010, adopt the State's model ordinance or a water efficient landscape ordinance that is at least as effective in conserving water as the updated model ordinance;

WHEREAS, the Board of Supervisors on September 29, 2009 adopted a comprehensive amendment to Ordinance No. 859 (Riverside County's ordinance establishing water efficient landscape requirements) in order to comply with Assembly Bill 1881;

WHEREAS, the State's model water efficient landscape ordinance includes provisions regarding the efficiency and analysis of landscape irrigation water use and it is the purpose of this Resolution to provide an equivalent mechanism;

WHEREAS, Ordinance No. 859, in combination with the requirements of Board Policy H-25 and the provisions of this Resolution, is at least as effective in conserving water as the State's updated model ordinance.

FORM APPROVED COUNTY COUNSEL
KARIN WATTS-BAZAZ 8/27/09
DATE

BE IT RESOLVED, DETERMINED, AND ORDERED by the Board of Supervisors of the County of Riverside, State of California, in regular session assembled on September 29, 2009, as follows:

1. The County of Riverside shall rely on local water purveyors, as the direct and immediate supplier of water, to enforce landscape water use efficiency standards with respect to existing customers.
2. The Board of Supervisors hereby requests local water purveyors to identify programs that enhance and encourage landscape water use efficiency such as:
   a. a tiered water rate structure, or
   b. an allocation-based conservation water pricing structure, or
   c. a rate structure at least as effective as the aforementioned options, or
   d. establishment of a program to administer/perform irrigation audits and/or irrigation surveys to insure the landscape areas of its customers meet the maximum applied water allowance, or
   e. the imposition of penalties, including fines for water waste.

The Board of Supervisors hereby directs the Planning Director, or his designee, to transmit a copy of this Resolution to all water purveyors providing service to customers with the unincorporated area of Riverside County

MEETINGS

(Examples)

RIVERSIDE COUNTY STORMWATER MANAGEMENT PROGRAM
MANAGEMENT STEERING COMMITTEE
SANTA ANA/SANTA MARGARITA REGIONS

MEETING MINUTES
for
May 21, 2009

Attendees:

Jason Uhley	RCFC&WCD
Linda Garcia	RCFC&WCD
Alex Gann	Riverside County Executive Office
Joe Aklufi	City of Beaumont
Kishen Prathivadi	City of Beaumont
Randy Anstine	City of Calimesa
Habib Motlagh	City of Canyon Lake
Rudy Fandel	City of Corona
Tom Koper	City of Corona
Bill Woolsey	City of Murrieta
Andy Okoro	City of Norco
Habib Motlagh	City of Perris/Canyon Lake
Barry McClellan	City of San Jacinto
Ron Grider	City of Wildomar

1. ***Welcome and Self Introductions – Jason Uhley, RCFC&WCD***

Jason Uhley welcomed everyone to the meeting and initiated self introductions of attendees. Jason noted that this meeting was the 4th and final meeting of the fiscal year.

2. ***Review May 21, 2009 Agenda and Approval of April 16, 2009 Meeting Minutes – Jason Uhley, RCFC&WCD***

Handouts Provided

- Agenda for May 21, 2009
- Minutes for April 16, 2009
- General Construction Permit Update (From Best, Best and Krieger and CASQA)

Jason added Riverside County Issued a draft ACL to agenda item 3.

Minutes were approved.

3. ***Santa Ana/Santa Margarita Program Status - Jason Uhley, RCFC&WCD***

- **General Construction Permit** – (Last page of agenda handout). Existing Permit has been in effect since 1999. There is a revised draft out for review. The State Board would like to have the Permit adopted by October 2009. Jason explained that the new Permit has erroneous provisions in that there is a lot more monitoring required. It will require staffs who conduct inspections for public works projects or preparing stormwater pollution prevention plans for public works projects to go through a formal training program and obtain certification. The Stormwater Pollution Prevention Plan will be a much more dynamic document that will need to

be continuously updated, in which there are associated costs. There are also additional BMP requirements; because this is a draft Permit, things can change. More importantly, Jason added that there is no grandfathering clause for projects that will be in construction at the time the Permit is adopted, which means that Permittees may want to include in any specifications for any projects they expect to be active across the period of the Permit renewal, language that will require contractors to comply with the new draft Permit. It was asked if this applied to all agencies. Jason explained that the General Construction Permit applies to any construction project that disturbs more than 1 acre and applies to all agencies. Updates and additional information will be provided to the NPDES TAC representatives. Please see handout provided at meeting for more detailed General Construction Permit information.

As of the May 21st MSC Meeting, the draft Santa Ana NPDES MS4 Permit had not yet been released.

- **Permit Renewal Status**
  1. **North Orange County MS4 Permit** – There is an adoption hearing scheduled for May 22, 2009. The one item left for discussion on the North Orange County Permit deals with what types of BMPs will be required for new developments whether they are public or private. The issue is whether or not the Permit will mandate that all new projects infiltrate or reuse stormwater on site. Currently there is no requirement to infiltrate. The Counties of Orange, San Bernardino and Riverside, along with the BIA are expected to attend the adoption hearing and will be recommending that filtration BMPs be identified as part of the allowable BMPs to be used as part of a development project. It is likely that what is adopted for Orange County will be modeled for the Riverside County MS4 Permit in the Santa Ana Region.

  2. **South Orange County MS4 Permit** – This Permit is issued by the San Diego Regional Board. It is expected that this Permit will be the template for the Santa Margarita Region MS4 Permit for Riverside County. A meeting is set for May 26, 2009 with Board staff to discuss the LID provisions. As this Permit forms, updates will be provided. The most important issue with this Permit is that it would require a prohibition of excess irrigation runoff. San Diego County is working diligently to get the language of the Permit revised.

  3. **Riverside County Issued a draft ACL** – Last week the County of Riverside received a draft Administrative Civil Liability (ACL) fine from the San Diego Regional Board for 1.2 million dollars. The fine alleged that the County did not have a public works WQMP process. Jason discussed details of the two projects (1 in Santa Ana watershed and 1 which went across the watershed boundary) in which the draft ACL evolved. This raises the point for those Cities that are across that boundary, in that they need to be very careful in making sure that they know where their projects are relative to their Permit areas.

4. ***TMDL Development – Jason Uhley, RCFC&WCD***

- **Lake Elsinore and Canyon Lake Nutrient TMDL** – Jason advised City Managers and representatives to make sure that their staff is attending the meetings for the TMDLs. The next meeting is set for August 3rd at 2 p.m. There was discussion on issues with Lake Elsinore. Jason stated that Permittees have been out of compliance in regards to the measures of the target parameters. The Task Force will need to reevaluate how success at the lake is being determined. This will be a very expensive long term effort and will take a couple of years to get around to.

- **Middle Santa Ana River Watershed Bacteria Indicator TMDL** - No updates.

- **Santa Ana Region Draft 303 (d) List** – No updates.

5. ***New Agenda Items/Schedule Next MSC Meetings - Jason Uhley, RCFC&WCD***

- **Schedule Next MSC Meeting** – The next meeting was set for October 15th. Subsequently, the draft Riverside County MS4 Permit was released and the meeting was rescheduled to August 20th.

NEXT MEETING IS SET FOR
August 20, 2009
AT
RIVESIDE COUNTY EXECUTIVE OFFICE, FIFTH FLOOR, ROOM C
4080 Lemon Street, Riverside, CA 92501

Visit the StormWater/Clean Water Protection Program website at:
http://rcflood.org/NPDES/
The site contains a variety of useful stormwater program information including links to other stormwater management programs and related web sites.

P8/126352

Water Quality Management Committee

Meeting Agenda
July 21, 2008
10:00-11:00
Riverside County Executive Office-Conference Room A

1. **Self Introductions**

2. **Notice of Violation-Santa Ana Audit of 2006**
   a. **Next steps**
      - **FPPPs for Parks District**

3. **Notice of Violation-San Diego Audit of 2007 & follow-up 2008**
   a. **Next steps**
      - **EDA and FM**

4. **Department updates and discussion points**
   a. ***Environmental Health***
   b. ***Building and Safety***
   c. ***Transportation Department***
   d. ***Planning Department***
   e. ***Code Enforcement***
   f. ***Facilities Management***
   g. ***EDA/RDA***
   h. ***Parks and Open Space District***

5. **Flood Control and Water Conservation District Updates**

6. **Training**

7. **IRWM Progress (Prop 50, Prop 84, Prop 1E)**
   a. Anza-$50,000 Capacity Building Grant

8. **IC/ ID complaints**

9. **Non-agenda items and round table discussion.**

10. **Next meeting date <u>September 15, 2008</u>**

Water Quality Management Committee

Meeting Agenda
April 20, 2009
10:00-11:00
Riverside County Executive Office-Conference Room A

1. **Self Introductions**

2. **Department updates and discussion points**
   - ***a. Environmental Health Jeff Lojeski***
   - ***b. Building and Safety-Chandra Santiago***
   - ***c. Transportation Department-Glen Higa***
   - ***d. Planning Department-Kristi Lovelady***
   - ***e. Code Enforcement-Hector Viray***
   - ***f. Facilities Management-Claudia Steiding***
   - ***g. EDA/RDA-Lance Nolan***
   - ***h. Parks and Open Space District-Marc Brewer***

3. **Flood Control and Water Conservation District Updates-Jason Uhley**
   - a. Monthly Report
     - ROWD-Santa Margarita River MS4 Permit
     - Permit negotiations Santa Ana River MS4 Permit
     - c. SWMP / WQMP-Whitewater River MS4 Permit
     - Ventura County and Orange County Santa Ana MS4Permit and ramifications to Riverside County
       - CASQA Newsletter
   - b. TMDLs

4. **Training**
   Spring Training through Flood Control now available

5. **IC/ ID complaints**
   - a. Grey Squirrel (Rancho Glen Oaks)-Status Report from Code Enforcement

6. **Non-agenda items and round table discussion.**

7. **Next meeting dates <u>May 18, 2009.</u>**

Riverside County Flood Control & Water Cons
NPDES Stormwater Quality Tra

Home Courses Locations Presentations Need Help? Register

Storm Water Quality Training

Annual training is required by our National Pollutant Discharge Elimination System (NPDES) Permits to ensure that water quality is protected. Not attending training may result in non-compliance for your municipality and possible fines for your programs. Click on the "Need He link if you have questions on which class if any is right for you."

Riverside County's Flood Control & Water Conservation District provides the following **NO FEE TRAINING**:

- Construction Training
- Industrial/Commercial Training
- WQMP Training
- Municipal Training

This website is designed to provide multiple ways of determining which class is right for you. Each path will take you to the same webpage that will allow you to register for yourself and/or for multiple people.

Login:
For those who've already registered.

Email:

Password:

Submit

Note: All of the login accounts are res every training period. Please register fc training season to login.

Please note that we are going **GREEN**! Unlike the previous trainings, NPDES training classe now be virtually ***paperless***. All presentation materials and handouts will be posted on this we Copies of the presentation materials will ***not*** be available at the training. Attendees are encou to print in advance any presentation materials they want to have in class. All presentation ma will be posted on-line at this site after the training for attendees to reference or download.

Please let us know in advance if you need public education materials. Click here to view our form.

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CASQA California Stormwater Quality Association™
Dedicated to the Advancement of Stormwater Quality Management, Science and Regulation

Week of April 13, 2009

In this Update:

1. May 15 CASQA General Membership meeting and webcast focus is stormwater harvesting and reuse
2. 5th Annual CASQA Conference – Exhibitor space and General registration now available
3. Upcoming CASQA Committee / Subcommittee meetings / conference calls
4. Position openings / Opportunities
5. City of Stockton survey of Phase I Stormwater Rates

1. **May 15 CASQA General Membership meeting / webcast to focus on stormwater harvesting and reuse** – The 2nd quarterly meeting / webcast of the year will focus on a very timely issue and one that affects water supply and stormwater quality agencies. We have put together an agenda covering stormwater permit issues, California's water balance and water supply, examples of regional agencies' efforts to harvest precipitation, a discussion of regulatory barriers and solutions to using stormwater, and case studies showcasing the use of different source water, treatment systems, and re-uses. Click **here** for the agenda. Click **here** to register to attend the meeting or watch the webcast.
   - Friday, May 15 (3rd Friday) – General Membership meeting and webcast (2nd quarterly) at the Waterfront Hotel in Jack London Square, Oakland.

2. **5th Annual CASQA Conference–Exhibitor space and General registration now available**– The 2009 CASQA Stormwater Conference will be held November 2-4, 2009 at sunny Mission Bay in San Diego! The theme for this year's Conference is: "Stormwater Management: Challenges and Solutions." The CASQA 2009 Conference will again offer a full program of training workshops, presentations, and exhibits for holders of municipal, industrial, and construction NPDES stormwater permits. Click **here** for registration and other information.

   The 2009 CASQA Conference is the premier event for addressing municipal, industrial, and construction stormwater issues. CASQA prides itself on offering its members timely information on critical stormwater issues from the most influential and experienced leaders in the field. CASQA's work products, including past Conferences, the Program Effectiveness Assessment manual, and our various Stormwater BMP Handbooks have received national recognition. CASQA's committee members have been influential in promulgation of state and federal regulations, statewide NPDES Permits, and formulating strategies to assist local governments, businesses, and contractors in addressing many critical policy issues vexing the state. The 2009 Conference will present our latest updates and the latest information regarding critical stormwater issues including:

   - Regulations, Permits, and Policies
   - Sustainable Development
   - True Source Control
   - Stormwater Treatment
   - Pollutants of Concern
   - Modifying Public Behavior
   - Program Assessment
   - Scientific Advances

If you only attend one stormwater conference this year, this is the one!

The 2009 Conference will be held at the Hilton San Diego Resort & Spa located at 1775 East Mission Bay Drive, San Diego, CA 92109. Click here for map and transportation information. The conference hotel is located just six miles from the San Diego International Airport and right on San Diego's famous Mission Bay. The Hilton San Diego Resort & Spa is centrally located near the world famous San Diego Zoo, Balboa Park, Historic Old Town, and the Gaslamp Quarter, host to world class shopping and fine dining.

3. **Upcoming CASQA Committee / Subcommittee meetings / conference calls**
   - Tuesday, April 14: 3:30 – Policy & Permitting Subcommittee call (Richard Boon)
   - Wednesday, April 15; 2:30 – Phase II Subcommittee call (Kelye McKinney)
   - Thursday, April 16; 8:30 – Watershed Management & Impaired Waterbodies Subcommittee call (Rich Watson)

   - Tuesday, April 21; 8:00 – Membership Committee call (Scott Taylor)

4. **Position openings / Opportunities**
   - City of Santa Rosa; 2 Associate Civil Engineer positions (see attached)

5. **City of Stockton survey of Phase I Stormwater Rates**
   The City of Stockton implemented its current Stormwater Rate (service fee) in 1991 and has not had an increase since the Rate was established. In order to prepare for a Rate study, the City is conducting a survey of Phase I communities around California and is asking for information from communities that have Stormwater Rates in place. The following information is being requested:

   Name of community
   Population
   Current Stormwater Rate
   Year Rate was last increased
   CPI or annual increase
   Was there a Prop 218 vote? If so, was it successful?

   Please send the information to: Courtney D. Vasquez, Stormwater Program Manager, City of Stockton Municipal Utilities Department
   Courtney.vasquez@ci.stockton.ca.us

Review of Draft South Orange County MS4 Permit

Key Management Issues

April 16, 2009

StormWater

Background

South Orange County MS4 Permit:

- February 2008 adoption hearing–
  - USEPA Region IX staff did not endorse adoption
  - RWQCB staff directed to revise
  - No consultation with OC Permittees
- Model for Santa Margarita Region MS4 Permit

StormWater

Non-Stormwater Runoff

- Dry weather discharges:
  - Are not "storm water"
  - Maximum Extent Practicable (MEP) standard not applicable
- Mandates prohibition of non-stormwater discharges:
  - Landscape irrigation
  - Irrigation water
  - Lawn watering
- Establishes numeric effluent limits for non-stormwater based on:
  - Basin Plan Objectives
  - California Toxics Rule
  - USEPA criteria

StormWater

MS4 Stormwater Discharges

- Establishes Municipal Action Levels (MALs)
  - Numerical discharge limits
  - Based on nationwide MS4 monitoring
- Exceedance of MALs presumes failure to comply with MEP (i.e., violation)
- No exceedance of MALs does not presume MEP is met

StormWater

MS4 Stormwater Discharges
(continued)

- MS4 facilities will be subject to hydromodification requirements
- MS4 discharges must comply at all times irrespective of source and manner of discharge
- Asserts that trash is a serious threat to beneficial uses

StormWater

Permittee Compliance Programs

- Mandates Treatment Control BMP databases
- Annually
  - Inspect 100% of Permittee and "high priority" privately-owned Treatment Control BMPs
  - Verify that @ least 90% of WQMPs are implemented
  - Inspect and remove accumulated waste from all MS4 facilities
  - Develop and update Watershed Water Quality Work Plan

StormWater

Permittee Programs
(continued)

- Develop and implement Hydromodification Management Plan
- Expand HOA oversight and enforcement programs
- Must develop long-term funding/business plan for compliance program

StormWater

New Development Requirements

- Redefines Priority Development Project to include commercial and industrial projects >1 acre (versus 100,000 sq ft impervious)

StormWater

New Development
(continued)

WQMPs for Priority Development Projects

- Specific Low Impact Development BMPs must be incorporated
- Irrigation runoff must be eliminated
- Landscaping with native or low water species required
- Effective Impervious Area (EIA) limited to 5% of project area pending development of Permittee programs

StormWater cleanWater

New Development
(continued)

WQMPs for Priority Development Projects

- Comply with Permittee-developed hydromodification requirements
- Reviews of WQMPs must include assessment of:
  - Techniques to infiltrate, filter, store, evaporate, or detain runoff
  - Potential collection of storm water for reuse onsite or offsite
  - Alternatives to conventional stormwater conveyance and management

StormWater cleanWater

Existing Development

Mandates retrofit of existing development with Source Control and Treatment Control BMPs including LID in accordance with Standard Stormwater Mitigation Plan* (SSMP) requirements

**Not Standard Urban Stormwater Mitigation Plan (SUSMP). The word "urban" has been struck throughout the Tentative Draft.*

StormWater cleanWater

Construction

Ordinances must include the following sanctions for non-compliance:

- Non-monetary penalties
- Fines
- Bonding requirements
- Permit/occupancy denials

StormWater cleanWater

Monitoring & Special Studies

- Each CoPermittee required to conduct non-storm numeric effluent monitoring
- Urban stream toxicity study
- Trash and litter impairment investigation
- Inventory and evaluate MS4 facilities as pollutant source
  - Identify source controls
  - Evaluate feasibility of retrofit

StormWater

MS4 Permit Adoption Process

- Draft Orange County MS4 Permit released March 13 and workshop held April 3
- Deadline for written comments April 24
- MS4 adoption hearing scheduled for June 10

StormWater

Summary

- Asserts Permit not an "Unfunded State Mandate"
- Standards of compliance based on numeric standards
- Expansion of New Development requirements
- Requirements for retrofit
- Expansion of monitoring/special studies

  If applied in SMR, would result in significant increase in compliance costs

StormWater

Please plan to join us for a one day conference

Storm Water Issues: Changes, Challenges, and Solutions

Plus Other Construction Water Handling Solutions

Hall & Foreman, Inc.
Engineering • Planning • Surveying

Friday, May 15, 2009

9:00 am to 3:00 pm

Rain for Rent
6400 Fischer Road
Riverside, CA

- Panel discussions

Public Sector Panelists

Chandra Santiago, Riverside County Environmental Compliance Division
Michael Roth, Santa Ana Regional Water Quality Board
Dan Ilkay, San Bernardino County Stormwater Program

Private Sector Panelist

Allison Mackenzie, E.S. Babcock & Sons Inc
Joe Zucker, Hall & Foreman Inc
Joel Woolf, Rain for Rent
Clayton Miller, BIA of Southern California

- Vendor displays

Construction water-related products and solutions

Individual Attendee Fee- $10.00 (includes lunch)

Send checks payable to Rain for Rent, to:
Chris Armstrong
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3404 State Road
Bakersfield, CA 93308

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0003853

Sign In Log
Water Quality Management Meeting
July 21, 2008

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Steve Horn	Facilities	5-2549	sthorn@rc-facilities.org
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0003854

WQMC
Sign In. Sheet Oct 2008

Name	Dept	phone	email
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HECTOR VIRAY	CODE	5-1897	HVIRAY@RCTLMA.ORG

Dec 15, 2008

Sign In WQMC

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County of Riverside Water Quality Management Committee
County Executive Office
4080 Lemon Street, 4th Floor, Conference Room A, Riverside, California 92501

Monday, January 26, 2009
10:00 a.m.

Name	Department	Phone	E-Mail Address
Barbara Klos	URS Corp/RCTD	714.648.2769	barbara_klos@urscorp.com
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David Mares	Planning	5-9541	DMares@RCTLMA.org

00003856

0003857

Sign In Log
Water Quality Management Meeting
Feb 23, 2009

Name	Department	Phone	email
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0003858

Sign In Sheet

Mar 2009

Water Quality Management Meeting.

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0003859

Water Quality Management Meeting
April 20, 2009
Sign In Log

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Kristi Lovelady	Co. Planning	955-0781	Klovelad@ rctlma.org

0003860

WATER QUALITY MANAGEMENT MEETING
May 18, 2009

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Keith Jones	CHA / EH	8-5172	kjones@co.riverside.ca.us
Jeff Lojeski	CHA/EN. Health	8-5172	jlojeski@co.riverside.ca.us
Steve Horn	FM	5.2549	sthorn@rc-facilities.org
Hank Brewer	TLMA	5-4316	hbrewer@co.riverside.ca.us
Glenn Higa	TRANS	50043	ghiga@rctlma.org
Patty Romo	TRANS	56740	PRomo@rctlma.org
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Chandra Santiago	B&S	5.5996	csantiag@rctlma.org.
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Alex Gann	EO	5-1110	

0003861

Sign In Log
Water Quality Management Meeting
June 15, 2009

Name	Department	Phone	email
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Jason Kirkley	EC	51273	

`CIP TEAM AGENDA
Executive Office, Conference Room D
October 27, 2008 3:30 pm
(BOS Date 11/04/08)

1. Call to Order

2. Forms 11

103 FM (Sheriff) – Progress Report Regarding the Hub Jail Facility Construction Project

104 FM – Hemet Family Care Center (architectural and engineering services agreement)- ***Project will generate over 5000 sq ft of impervious surface and therefore a WQMP to address hydromodification and LID requirements shall be implemented. SWPPP during construction will necessitate BMPs to MEP standard. Post construction BMPs will be sized in accordance with the WQMP. Post construction BMPs shall have an O & M plan in place at time of building acceptance.***

123 FM – Desert Hot Springs Family Care Center (Schematic Design) ***Project will generate over 5000 sq ft of impervious surface and therefore a WQMP to address hydromodification and LID requirements shall be implemented. SWPPP during construction will necessitate BMPs to MEP standard. Post construction BMPs will be sized in accordance with the WQMP. Post construction BMPs shall have an O & M plan in place at time of building acceptance.***

134c EDA – Consent to the Purchase of Real Property by the RDA known as APNs: 727-161-018, 019, 020, 021, 024 and 727-165-040, Desert Communities Project Area, 4th District

139FM – Blythe Fleet Services Fueling Station and Car Wash (Schematic Design) ***Project will generate over 5000 sq ft of impervious surface and therefore a WQMP to address hydromodification and LID requirements shall be implemented. SWPPP during construction will necessitate BMPs to MEP standard. Post construction BMPs will be sized in accordance with the WQMP. Post construction BMPs shall have an O & M plan in place at time of building acceptance.***

Because this project will have above ground fuel storage tanks (ASTs) a Spill Prevention and Countermeasures Control Plan (SPCC) will be required. This plan must be approved by the Riverside County Department of Environmental Health prior to the operation of the AST.

CIP TEAM AGENDA
Executive Office, Conference Room D
November 10, 2008 3:30 pm
(BOS Date 11/18/08)

1. Call to Order

2. Forms 11

   205 FM (Probation) – Lease Agreement – Probation Department, Moreno Valley

   215 FIRE – Approve the Agreement for Consultant Services for the Riverside County Fire Department Strategic Plan

   224 FM (CHA) – Blythe Animal Shelter (Schematic Design)

   230 FM (RCRMC) – Riverside County Regional Medical Center Spine Clinic Remodel (Advertise for Bids)

   265 FM – County Administrative Center 7th Floor Renovation (Architectural Agreement)

   266 FM – Job Order Contract #002 – Approve Contract and Total Funding

   267 FM – North Shore Yacht Club Rehabilitation (Architectural Agreement)

3. Items for Discussion

4. Open Agenda

5. Next Meeting Date

CIP TEAM AGENDA
Executive Office, Conference Room D
December 1, 2008 3:30 pm
(BOS Date 12/9/08)

1. Call to Order

2. Forms 11

   402 FM (Courts) – Riverside Federal Court Grand Jury Remodel (advertise for bids)

   404 FM (DA) – Indio District Attorney and Public Defender Renovation Project Phase I

   405 FM (Sheriff) – Progress Report Regarding the Hub Jail Facility Construction Project

   406 FM (Public Defender) – Indio Public Defender – County Administrative Center Annex – Phase 2 (architectural services agreement)

   412 FM – Resolution No. 2008-406, Notice of Intention to Convey Real Property to the Riverside County Habitat Conservation Agency

   413 FM – Desert Hot Springs Family Care Center – Approval of Plans and Specifications for Street Improvements

   431 FM – Resolution No. 2008-499, Notice of Intention to Purchase Real Property in the City of Riverside, CA

   464 FM – License Agreement – Atrium Café, Riverside

3. Items for Discussion

4. Open Agenda

5. Next Meeting Date

CIP TEAM AGENDA
Executive Office, Conference Room B
February 2, 2009 - 3:30 pm
(BOS Date 2/10/09)

1. Call to Order

2. Forms 11

   307 FM – Perris Fueling Station and Car Wash – Notice of Completion (for information only)

   314 RDA – (Sheriff) Thermal Sheriff's Station and Aviation Facility Architectural and Engineering Services Agreement

   322 RCIT – In-Principle approval to authorize the Department of Facilities Management, Real Estate Division, to locate office space and negotiate a lease agreement for Riverside County Information Technology

3. Items for Discussion

4. Open Agenda

5. Next Meeting Date

   - Tuesday, February 17 at 9:00 am

CIP TEAM AGENDA
Executive Office, Conference Room B
March 16, 2009 – 3:30 p.m.
(BOS Date 3/24/09)

1. Call to Order

2. Forms 11

   806 PSEC Project Executive Steering Committee – PSEC Detail Design and Contract Amendments

   822 RDA – Jurupa Valley Aquatic Center - Findings and Approval of the Plans and Specifications

   823 RDA – Proposed Romoland/Homeland Community and Childcare Center and Park Project – Findings and Approval of the Plans and Specifications

   826 FM (Courts) – Riverside Federal Court Grand Jury Remodel (construction agreement)

3. Items for Discussion

4. Open Agenda

5. Next Meeting Date

   - Monday, March 23

CIP TEAM AGENDA
Executive Office, Conference Room B
April 6, 2009 – 3:30 p.m.
(BOS Date 4/14/09)

1. Call to Order

2. Forms 11

   203 FM (Fire) – Adopt Mitigated Negative Declaration, Mitigation Monitoring and Reporting Plan, and Addendum No. 1 for the Cajalco Fire Station and Improvements to Western Municipal Water District's Operation Center Project ("the Project").

   206 FM (Fire) – Glen Oaks Fire Station (Mitigated Negative Declaration)

   255 FM – Riverside Centre Roof Replacement (contractor agreement)

   256 FM (Sheriff) – Ben Clark Training Center Fire Drill Grounds Infrastructure Project Phase 1 and Phase II

   269 FM (Fire) – Glen Oaks Fire Station (advertise for bids)

3. Items for Discussion

4. Open Agenda

5. Next Meeting Date

   - Monday, April 13

CIP TEAM AGENDA
Executive Office, Conference Room B
April 27, 2009 – 3:30 p.m.
(BOS Date 5/5/09)

1. Call to Order

2. Forms 11

   503 Ben Clark Training Center Larry Parrish Parkway Extension – Phase 1A and 1B (advertise for bids)

   519 FIRE – Sole Source Purchase of Software Applications from Northrop Grumman Corporation

3. Items for Discussion

4. Open Agenda

5. Next Meeting Date

   - Monday, May 4

CIP TEAM AGENDA
Executive Office, Conference Room B
May 5, 2009 – 8:30 a.m.
(BOS Date 5/12/09)

1. Call to Order

2. Forms 11

✓ 601 EDA – ADA Paving Improvements at Riverside County Fairgrounds < >5000 SqFt) WQMP –

612 FM – Professional Service Agreement for Legal Services (French Valley Business Center) litigation – funding

✓ 613 FM – Southwest Justice Center Parking Lot Expansion (advertise for bids) WQMP

615 Sheriff-Coroner – Approval of Budget Adjustments to Purchase Security Cameras for the Sheriff's Criminal Justice Building

617 Housing Authority – Award of Consulting Services Agreement with Escalante Architects for Dr. Clair S. Johnson Apartments

✓ 631C EDA – Rancho Ramona Park Rehabilitation Project < need stormwater >

✓ 638 FM – Indio Volunteer Clinic (architectural and engineering services) WQMP

641 EDA – Bermuda Dunes Community Service Center

3. Items for Discussion

4. Open Agenda

5. Next Meeting Date

- Monday, May 11

CIP TEAM AGENDA
Executive Office, Conference Room B
June 1, 2009 – 3:30 pm
(BOS Date 6/9/09)

1. Call to Order

2. Forms 11

   903 PARKS – Gilman Historic Ranch and Wagon Museum Site Improvement Project - Notice of Completion – District V

   906 FM – Re-Route Downtown Voice and Data – Phase I (engineering service agreement)

   918 RCIT – Approval of the Agreement with Verizon Business Network Services Inc., on Behalf of Verizon Select Services Inc., to Provide Cabling Equipment and Installation Services for the Downtown Law Building

   919 AEFD – Resolution No. 2009-159, Authorization to Purchase Real Property Interests in the City of Banning, CA (Larry Smith Correctional Facility Project Expansion No. 3)

   922 AEFD – Resolution No. 2009-142, Authorization to Purchase Real Property Interests in the City of Banning, CA (Larry Smith Correctional Facility Expansion No. 3)

   931 FM/RCRMC – Riverside County Regional Medical Center Emergency Department / Trauma Expansion (architectural and engineering services agreement)

3. Items for Discussion

4. Open Agenda

5. Next Meeting Date

   - Monday, June 8 - 3:30 pm

CIP TEAM AGENDA
Executive Office, Conference Room B
June 22, 2009 – 3:30 pm
(BOS Date 6/30/09)

1. Call to Order

2. Forms 11

320	EDA	First Amendment – Personal Service Agreement for Legal Services
322	EDA *(FYI)*	Resolution No. 2009-222, Notice of Intention to Purchase, Public Safety Enterprise Communications Project Site, Clinton Keith
323	EO	Amendment to Capital Improvement Program (CIP) Policy B-22
343	EDA	Resolution No. 2009-053, Authorization to Purchase Real Property for the Public Safety Enterprise Communications Project, Morongo Site
347	FM	Probation Department Security/Safety Enhancements - Ratification of Actions and Notice of Completion of Riverside Juvenile Hall Security Lighting Project
366	EDA/ RCRMC	Riverside County Regional Medical Center Energy Update Project
374	EDA (FYI)	Mesa Verde Community and Childcare Center Project
376	IT	Approval of the Agreement with Verizon Business Network Services Inc., on behalf of Verizon Selection Services, Inc., to Provide Cabling Equipment and Installation Services for the Downtown Law Building

3. Items for Discussion

   - CIP Policy

4. Open Agenda

5. Next Meeting Date

   - Monday, July 6 3:30 pm

TRANING LOGS

PLEASE SIGN IN

NPDES STORMWATER QUALITY TRAINING FOR
Construction Training
Riverside County Flood Control & Water Conservation District

Meeting of: Monday, September 29 - 08:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
1	Kris	Harper	City of Banning	Public Utilities		
2	Joe	Arias	City of Banning	Public Utilities		
3	Roger	Ohms	City of Banning	Public Utilities		
4	Mike	Steen	City of Banning	Public Utilities		
5	Jason	Smith	City of Banning	Public Utilities		
6	Erick	Shackelford	City of Riverside	Public Utilities - Water Field	(951) 351-6350	
7	lewis	barry	Riverside County	Building & Safety	(951) 955-1800	BARRY LEWIS
8	Douglass	Gardenias	Riverside County	Transportation Department	(951) 955-1095	
9	James	Wilson	Riverside County	Transportation Department	(951) 955-1095	
10	Jeffrey	Kukulka	Riverside County	Waste Management	909 288 6410	
11	Brian	Hawkinson	Riverside County	Waste Management		
12	Mark	Hunt	Riverside County	Waste Management		
13	Rob	Istik	Riverside County	Waste Management		
14	Scott	Kraak	Riverside County	Waste Management		
15	Nguyen	Jessica	Riverside County	Waste Management		Jessica nguyen
16	Joe	Schupp	Riverside County	Waste Management		
17	Evangelina	Zapien	Riverside County	Waste Management		
18	RYAN	RIGHETTI	Riverside County	TRANSPORTATION	(951) 659-2603	
19	Rick	Fite	Riverside County	TRANSPORTATION	(951) 659-2603	
20	Morgan	Newlin	City of Hemet	Public Works Engineering	(951) 765-3855	

0003873

NPDES STORMWATER QUALITY TRAINING FOR
Construction Training
Riverside County Flood Control & Water Conservation District

Meeting of: Monday, September 29 - 08:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
21	Daniel	Valenzuela	City of La Quinta	Public Works	(760) 777-7096	
22	Randy	Olgren	City of Riverside	PU Electric Field	(951) 351-6351	
23	Rick	Skelton	City of Riverside	PU Electric Field	(951) 351-6351	
24	Rusty	Clarke	City of Riverside	PU Electric Field	(951) 351-6351	
25	Roger	Wagner	City of Riverside	PU Electric Field	(951) 351-6351	
26	Greg	Yates	City of Riverside	PU Electric Field	(951) 351-6351	
27	Bill	Crumley	City of Riverside	PU Electric Field	(951) 351-6351	
28	Dave	McLellan	City of Riverside	PU Electric Field	(951) 351-6351	
29	Bruce	Taylor	City of Riverside	PU Electric Field	(951) 351-6351	
30	Casey	Whitney	City of Riverside	PU Electric Field	(951) 351-6351	
31	Dale	Underwood	City of Riverside	PU Electric Field	(951) 351-6351	
32	Matt	Field	City of Banning	Public Utilities		
33	Michael	Colantuono	City of Banning	Public Utilities		
34	Mario	Elizondo	City of Banning	Public Utilities		
35	michael	ramek	Riverside County	Building & Safety	(951) 955-1800	
36	ted	gascoigne	Riverside County	Building & Safety	(951) 955-1800	
37	rendell	klaarenbeek	Riverside County	Building & Safety	(951) 955-1800	
38	Shea	Anti	Riverside County	Waste Management		
39	Tim	Evans	Riverside County	Waste Management		
40	Donald	Gerber	Riverside County	Waste Management		

0003874

NPDES STORMWATER QUALITY TRAINING FOR
Construction Training
Riverside County Flood Control & Water Conservation District

Meeting of: Monday, September 29 - 08:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
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42	Jason	Woods	City of Banning	Public Utilities		
43	Gregory	Oliver	City of Riverside	Public Utilities - Water Field	(951) 351-6350	
44	william	peppas	Riverside County	Building & Safety	(951) 955-1800	
45	richard	sharp	Riverside County	Building & Safety	(951) 955-1800	
46	Kenneth	McGregor	City of Riverside	Public Utilities - Water Field	(951) 351-6350	
47	Michael	Baggett	City of Riverside	Public Utilities - Water Field	(951) 351-6350	
48	Al	orozco	City of Riverside	Public Utilities - Water Field	(951) 351-6350	
49	gary	Kirby	City of Riverside	Public Utilities - Water Field	(951) 351-6350	
50	Randall	Marrs	Riverside County	Waste Management	951 640 5840	
51	Todd	Shibata	Riverside County	Waste Management	782 1 6	
52	[illegible]	[illegible]				
53	CHRIS	GREEN				
54	[illegible]	[illegible]	City of Banning	Utilities		
55	ERICK	SHACKELFORD	City of Riv.	utilities		
56	Rodney	Koenig	Riverside C.	waste Management	951-544-7210	
57	[illegible]	Sharp	County of Riverside			
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PLEASE SIGN IN

NPDES STORMWATER QUALITY TRAINING FOR
WQMP Training
Riverside County Flood Control & Water Conservation District

Meeting of: Monday, November 3 - 08:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
1	David	Cooper	Other	Consultant; Bureau Veritas	(858) 735-1352	
2	Guy	Pegan	City of Moreno Valley	Public Works	(951) 413-3115	
3	Josh	Frohman	City of Moreno Valley	Public Works	(951) 413-3251	
4	Timothy	Kearns	Riverside County	Facilities Management	(951) 955-9467	
5	Andres	Alfaro	Riverside County	Facilities Management	(951) 823-2724	
6	Arthur	Miller	Riverside County	Facilities Management		
7	Jim	Rossman	Riverside County	Facilities Management	(951) 901-5091	
8	Donald	Delgadillo	RCFC & WCD	Flood Control	(951) 955-4683	
9	Daisy	Barreto	RCFC & WCD	Plan Check	(951) 955-1269	
10	Jianhong	Xiong	Other	Consultant for RCFC & WCD	(858) 451-6100	
11	Lori	Wolfe	RCFC & WCD	Plan Check	(714) 402-9645	
12	Komy	Ghods	RCFC & WCD	Design	(951) 955-1326	
13	Mark	Westover	City of Moreno Valley	Public Works	(951) 413-3114	
14	DEEPAK	SOLANKI	City of Moreno Valley	CAPITAL PROJECTS DIVISION	(909) 268-7639	
15	Anabella	Hedman	Other	Consultant for RCFC & WCD	(858) 869-4851	
16	Monte	Bowers	Other	Consultant for RCFC & WCD	(858) 451-6100	
17	Marc	Crispin	Riverside County	Facilities Management	(951) 955-0167	

NPDES STORMWATER QUALITY TRAINING FOR
WQMP Training
Riverside County Flood Control & Water Conservation District

Meeting of: Monday, November 3 - 08:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
18	Larry	Gonzales	City of Moreno Valley	Public Works	(951) 413-3130	
19	Marge	Lazarus	City of Moreno Valley	Public Works	(951) 413-3130	
20	Sergio	Pena	Riverside County	Facilities Management	(951) 955-2800	
21	kyle	gallup	RCFC & WCD	design	(951) 955-8627	
22	Mike	Wong	RCFC & WCD	Design	(951) 955-1205	
23	Amy	McNeill	RCFC & WCD	Design	(951) 955-1268	Amy McNeill
24	JERRAD	JACKSON	MORENO VALLEY		951 413-3171	
25	VIKKI	KUNTZ	COUNTY/FRIV.	DESIGN & CONST	951 955 0161	
26	~~KOR~~ STEVE	KORN	" "	" "	951.955.2549	
27	Lance	Noland	County of Riverside	EDA	955-9698	
28	JOHN	ALFRED	COUNTY OF RIVERSIDE	FACILITIES MGMT.	951-955-4844	
29	~~LORI~~	~~WOLFE~~				
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NPDES STORMWATER QUALITY TRAINING FOR
Municipal Training
Riverside County Flood Control & Water Conservation District

Meeting of: Tuesday, November 4 - 08:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
35	Terry	Anderson	Riverside County	Facilities Management	(951) 782-2449	
36	Ross	Rither	Riverside County	Facilities Management	(951) 358-5483	
37	Gilbert	Montanez	Riverside County	Facilities Management	(951) 955-4806	
38	Kevin	Short	Riverside County	Facilities Management	(951) 955-4115	
39	Arthur	Fong	Riverside County	Facilities Management	(951) 955-2500	
40	Stuart	Sheldon	City of Moreno Valley	Public Works	(951) 413-3483	
41	Tony	Silvas	City of Moreno Valley	Public Works Special Districts	(951) 616-7299	
42	Dave	Carrico	City of San Jacinto	Public Works	(951) 654-4041	
43	Joe	Vilchis	City of San Jacinto	Public Works	(951) 654-4041	
44	Frank	Zaldivar	City of San Jacinto	Public Works	(951) 654-4041	
45	Gilbert	Gonzales	City of San Jacinto	Public Works	(951) 654-4041	
46	Alfonso	Zubia	City of San Jacinto	Public Works	(951) 654-4041	
47	John	Holmes	City of San Jacinto	Public Works	(951) 654-4041	
48	Ann	Iaali	Riverside County	RCFC&WCD NPDES	955-1248	
49						
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NPDES STORMWATER QUALITY TRAINING FOR
Municipal Training
Coachella Valley Water District

Meeting of: Tuesday, November 18 - 08:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
1	Brandon	Garcia	Riverside County	Transportation Department	(951) 955-1095	
2	Donald	Raymond	Riverside County	Transportation Department	(951) 955-1095	Don Raymond
3	Alana	Townsend	City of Palm Desert	Public Works	(760) 346-0611	Alana Townsend
4	James	Breihan	City of Palm Springs	Aviation	(760) 318-3823	
5	Edward	Graff	City of Palm Springs	Aviation	(760) 318-3824	
6	Cora	Salas	City of Palm Desert	Public Works	(760) 346-0611	
7	Scott	Hamilton	City of La Quinta	Public Works		
8	Demetrio	Pecina	City of La Quinta	Public Works		
9	Ed	Houston	CVWD	Safety/Human Resources	(760) 398-2651	
10	Javier	Miranda	CVWD	Trades & Support	(760) 398-2651	Rene Luna for Javier Miranda
11	Javier	Loredo	CVWD	Trades & Support	(760) 398-2651	
12	Rick	Adamson	CVWD	Trades & Support	(760) 398-2651	
13	Juan	Hernandez	City of Palm Desert	Parks	(760) 346-0611	
14	Valerie	Wagner	City of Palm Springs	Street Maintenance	(760) 322-8364	Valerie Wagner
15	Larry	Naranjo	Riverside County	Facilities Management	(760) 921-5042	
16	George	Herrera	City of Palm Springs	Street Maintenance	(760) 322-8364	
17	Adam	Servin	Riverside County	Facilities Management	(760) 863-8704	

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18	Andy	Luna	Riverside County	Facilities Management	(760) 393-3253	
19	Jay	Mirpour	Whitewater Regional Board	Stormwater	(760) 776-8981	
20	Erich	Konrad	City of Palm Springs	Fleet Operations	7603238	
21	David	Flint	City of Palm Desert	Building Maintenance	(760) 346-0611	
22	Cyril	Snake	City of Palm Desert	Building Maintenance	(760) 346-0611	
23	Marco	Zamudio	City of Palm Desert	Public Works	(760) 346-0611	
24	Joe	Rojas	City of Palm Desert	Public Works	(760) 346-0611	
25	James	Lindsey	City of La Quinta	Public Works	(760) 777-7052	
26	Adolfo	Cabrera	City of La Quinta	Public Works		
27	Tim	Batten	City of La Quinta	Public Works		
28	Raphael	Alvarado	City of La Quinta	Public Works		
29	Agustin	Arellano	City of La Quinta	Public Works		
30	Steven	Rakestraw	City of Palm Springs	Fleet Operations	(760) 323-8168	
31	Jesus	Padilla	City of Palm Desert	Public Works	(760) 346-0611	
32	Frank	Duran	City of Palm Desert	Public Works	(760) 346-0611	
33	Ernesto	Teran	City of Palm Desert	Parks	(760) 346-0611	
34	Daniel	Lopez	City of Palm Desert	Public Works	(760) 346-0611	
35	Ruben	Castaneda	City of La Quinta	Public Works		
36	James	Staight	City of La Quinta	Public Works		
37	Beto	Gonzales	City of La Quinta	Public Works		
38	Alex	Martinez	City of La Quinta	Public Works		

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39	Pablo	Rivera	City of Indian Wells	Public Works	(760) 776-0237	
40	Ryan	Bowen	City of Indian Wells	Public Works	(760) 776-0237	
41	Francisco	Torres	City of Palm Desert	Public Works	(760) 346-0611	
42	Jaime	Macias	City of Palm Springs	Fleet Operations	760 323-8168	
43	Freddy	Rios	City of Palm Desert	Public Works	(760) 346-0611	
44	Brian	Petree	City of Norco	Parks, Recreation and Community Services		
45	John	Carmona	Whitewater Regional Board	NPDES Unit	(760) 340-4521	
46	THOMAS	TVEIT	CITY OF COACHELLA	BLDG DEPT	760 398 3002	
47	ROBERT	RUEDA	CITY OF COACHELLA	PUBLIC WORKS	760 398 5744	
48	Gabriel	Pérez	City of Coachella	Community Development	760 398-3102	
49	Gabriel	Papp	" " "	" "	" " "	
50	PAVEL	HORN	CATHEDRAL CITY	ENG. DEPT.	760 770-0320	
51	Ramon	Villalobos	City of INDIO	Equipment Operator	760-347-1058	
52	Margarito	Bautista	City of Coachella	PUBLIC WORKS - streets	760/398-4202	
53	JESSE	Nunez	City of Coachella	Public work - streets	(760) 398-4202	
54	ALEX	ALARCON	City of COACHELLA	CODE ENFORCEMENT	760 398-4978	
55	GEORGE	INSUEZ	City OF COACHELLA	PUBLIC WORKS	760) 398-5744	
56	OSCAR	RODAS	CITY OF CATHEDRAL CITY	ENGINEERING	(760) 770-0327	
57	Sergio	Samaniego	City of Palm Desert	Public works	(760) 346-0611	
58	[illegible]	[illegible]	C.V.W.D.	INSPECTOR	760) 832-2906	
59	Jim	Kreizinger	C.V.W.D.	INSPECTOR	760 4859437	

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NPDES STORMWATER QUALITY TRAINING FOR
Construction Training
Riverside County Flood Control & Water Conservation District

Meeting of: Tuesday, September 30 - 13:00 - 17:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
18	Jeremy	Seward	Riverside County	Transportation Department	(951) 955-1095	
19	Hoang	Nguyen	City of Moreno Valley	Public Works	(951) 413-3216	
20	Chris	Sunde	City of Perris	Engineering	(951) 943-6504	
21	STEVEN	HOWARD	City of Riverside	PUBLIC WORKS	(951) 712-3904	Steve Howard
22	James	Caddel	City of Riverside	PUBLIC WORKS	(951) 329-7703	
23	Jean	Voshall	City of Temecula	Public Works	(951) 302-4144	
24	Tom	Cole	City of Temecula	Public Works	(951) 302-4144	
25	JUVENTINO	GARCIA	City of Riverside	PUBLIC WORKS	(951) 826-5599	
26	Tom	Mckay	Riverside County	transportation	(951) 313-2154	
27	Mac	McCall	City of Hemet	Public Works Engineering	(951) 765-2360	
28	Douglas	Norfolk	City of Norco	Eng.	(951) 545-7894	
29	Mervyn	Manalo	Riverside County	EDA	(951) 955-3408	
30	Melvyn "Matt"	Sayre	Riverside County	Transportation Department	(951) 955-1095	
31	Salvador	Lopez	Riverside County	Transportation Department	(951) 955-1095	Salvador Lopez #17
32	Lisa	Elder	Riverside County	Transportation Department	(951) 955-1095	
33	Julie	Meyer	Riverside County	Transportation Department	(951) 955-1095	Julie Meyer
34	Sean	Motlagh	Other	City of Perris, City of San Jacinto	(951) 943-6504	

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PLEASE SIGN IN

NPDES STORMWATER QUALITY TRAINING FOR
Construction Training
Riverside County Flood Control & Water Conservation District

Meeting of: Tuesday, September 30 - 13:00 - 17:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
1	Marianne	Parker	City of Temecula	Public Works	909-703-8354	Marianne L Parker
2	William	Taylor	City of Temecula	Public Works	(951) 302-4144	
3	Rodney	Koenig	Riverside County	Waste Management		
4	RYAN	RIGHETTI	Riverside County	TRANSPORTATION	(951) 659-2603	
5	Monica	Telles	Riverside County	EDA	(760) 863-2541	
6	Der	Xiong	Riverside County	EDA	(951) 955-3421	
7	Jim	Ayres	Riverside County	Economic Development Agency	(760) 863-2552	
8	Anna	Rodriguez	Riverside County	Economic Development Agency	(760) 863-2537	
9	Leah	Rodriguez	Riverside County	Economic Development Agency	(760) 863-2534	
10	Joaquin	Tijerina	Riverside County	Economic Development Agency	(760) 863-2529	
11	Larry	Bennett	Riverside County	Transportation Department	(951) 955-1095	
12	Henry	Gutierrez	Riverside County	Transportation Department	(951) 955-1095	
13	Zuri	Lowe	Riverside County	Transportation Department	(951) 955-1095	
14	Byron	Moreno	Riverside County	Transportation Department	(951) 955-1095	
15	Jeff	Gullett	Riverside County	Transportation Department	(951) 955-1095	
16	William E.	Anderson	Riverside County	Transportation Department	(951) 955-1095	
17	Monty	Smith	Riverside County	Transportation Department	(951) 955-1095	

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NPDES STORMWATER QUALITY TRAINING FOR
WQMP Training
Riverside County Flood Control & Water Conservation District

Meeting of: Monday, November 3 - 13:00 - 17:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
36	ANN	JAALI	RCFC&WCD	NPDES	955 1245	[illegible]
37	JAY	MARBOUR	RWQCB-7	NPDES	760	776-8981
38	John	Carman	" "	"	"	"
39	Daisy	Barrera	RCFC&WCD	Plan Check	955-1269	Daisy Barrera
40	Robert	Vasquez	RCFC&WCD	Design II		[illegible]
41	HOANG	NGUYEN	CITY OF MORENO VALL	NPDES	951-413-3216	Hoang Nguyen
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NPDES STORMWATER QUALITY TRAINING FOR
WQMP Training
Riverside County Flood Control & Water Conservation District

Meeting of: Monday, November 3 - 13:00 - 17:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
18	Quang	Nguyen	City of Moreno Valley	Public Works	(951) 413-3130	
19	Michael	Cairns	RCFC & WCD	Plan Check	(858) 866-0128	
20	Dennis	Downs	Riverside County	Facilities Management	(951) 955-0391	
21	Sean	Motlagh	Other	City of Perris, City of San Jacinto	(951) 943-6504	
22	Bob	Moehling	City of Murrieta	Engineering	(951) 304-2489	
23	Tim	Taylor	City of Hemet	Engineering	(951) 765-3889	
24	John	Kerenyi	City of Moreno Valley	Public Works Transportation Engineering	(951) 413-3199	
25	Henry	Ngo	City of Moreno Valley	Public Works	(951) 413-3130	
26	Ewina	Lau	City of Riverside	Parks, Recreation, & Community Services Department	(951) 826-2012	
27	Bill	Woolsey	City of Murrieta	Engineering	(951) 461-6073	Bill Woolsey
28	John	Hogard	City of Moreno Valley	Public Works	(951) 413-3130	
29	Alfredo	Del Toro	Riverside County	Facilities Management	(951) 955-8324	
30	Frank	Gonzales	Riverside County	Facilities Management	(951) 955-8467	
31	Jason	Plotkin	Riverside County	Facilities Management		
32	Nahid	Selbe	Riverside County	Facilities Management	(951) 955-4728	Nahid N. Selbe
33	Dane	Winkelman	Riverside County	Facilities Management	(951) 955-0394	
34	Rizaldy	Baluyot	Riverside County	Facilities Management	(951) 955-4889	
35	Randy	McDaniel	City of Riverside	Park Planning	(951) 826-2006	

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PLEASE SIGN IN

NPDES STORMWATER QUALITY TRAINING FOR
WQMP Training
Riverside County Flood Control & Water Conservation District

Meeting of: Monday, November 3 - 13:00 - 17:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
1	Christopher	Wiberg	City of Moreno Valley	Public Works	(951) 413-3130	
2	Edward	Perez	RCFC & WCD	Plan Check	(714) 750-7275	
3	Bruce	Norris	Riverside County	Facilities Management	(951) 955-0353	
4	Dawn	Torres	Riverside County	Facilities Management	(951) 955-4880	
5	Rita	Medellin	Riverside County	Facilities Management	(951) 955-0395	
6	Jeremy	Mueller	Riverside County	Facilities Management	(951) 955-4845	
7	Kent	Wegelin	City of Moreno Valley	Public Works	(951) 413-3497	
8	Arman	Bualong BULAONG	City of Perris	Engineering	(951) 943-6504	
9	Chris	Sunde	City of Perris	Engineering	(951) 943-6504	
10	John	Carmona	Whitewater Regional Board	NPDES Unit		
11	Ken	Horsley	RCFC & WCD	Planning	(858) 866-0128	
12	Lombardo	Detrinidad	RCFC & WCD	Planning	(619) 866-0128	
13	Rachel	McLure	City of Riverside	Parks, Recreation, & Community Services Department	(951) 826-2028	
14	Derek	Petersen	RCFC & WCD	Planning	(619) 920-6430	
15	Jeff	Fulton	RCFC & WCD	Plan Check	(760) 603-6091	
16	Nancy	Cano	Riverside County	Facilities Management	(951) 955-0392	
17	Rebecca	Tsagris	Riverside County	Facilities Management	(951) 955-8764	

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NPDES STORMWATER QUALITY TRAINING FOR
Construction Training
Riverside County Flood Control & Water Conservation District

Meeting of: Monday, September 29 - 13:00 - 17:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
45	Joanna	Dorham	City of Moreno Valley	Public Works	(951) 413-3192	
46	Chuck	Thurman	City of Banning	Public Utilities	951-922-3268	Chuck Thurman
47	Rick	Diaz	City of Banning	Public Utilities	9512324934	
48	Tim	McLaughlin	City of Banning	Public Utilities	951 922 3260	
49	Cameron	Hawley	City of Banning	Public Utilities	951849-1506	
50	Ryan	Frisby	City of Banning	Public Utilities	(951)314-1650	
51	Marques	Crews	Riverside County	Waste Management	(951)486-3269	
52	Noah	Rau	Riverside County	Waste Management	951-486-3260	Noah Rau
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NPDES STORMWATER QUALITY TRAINING FOR
Construction Training
Riverside County Flood Control & Water Conservation District

Meeting of: Monday, September 29 - 13:00 - 17:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
23	Art	Fuentes	Riverside County	Waste Management	951-486-3274	
24	Kaniz	Quazi	Riverside County	Waste Management		
25	Manuel	Ruiz	Riverside County	Waste Management		
26	Samuel	Theodora	City of Canyon Lake	Special Enforcement	(951) 244-2955	
27	Daniel	Cuthbertson	City of Norco	Public Works	(951) 545-7872	
28	Ann	Iaali	RCFC & WCD	NPDES, Regulatory Division	(951) 955-1248	
29	nohemi	johnston	Riverside County	TLMA/Code Enforcement	(951) 955-8802	
30	Oscar	Rodas	City of Catherdal City	Engineering	(760) 770-0327	
31	Terry	Huemer	City of Perris	Engineering	(951) 943-6504	
32	marco	diaz	Riverside County	TLMA/Code Enforcement	(951) 955-8802	
33	Jon	Salazar	City of Temecula	Public Works	(951) 694-6411	
34	Mayra	De La Torre	City of Temecula	Public Works	(951) 694-6411	
35	Kendra	Hannah-Meistrell	City of Temecula	Public Works	(951) 694-6411	
36	Steve	Beswick	City of Temecula	Public Works	(951) 694-6411	
37	Mike	Hudson	City of Temecula	Public Works	(951) 694-6411	
38	Steve	Charette	City of Temecula	Public Works	(951) 694-6411	
39	John	Shelton	Riverside County	Transportation Department	(951) 955-1095	
40	Chad	Davies	Riverside County	Economic Development Agency-Aviation Division	(951) 955-9417	
41	Kelley	Donovan	Riverside County	Transportation Department	(951) 955-1095	
42	Randy	White	Riverside County	Transportation Department	(951) 955-1095	
43	Eddie	Godinez	City of Moreno Valley	Public Works	(951) 413-3127	
44	Alex	Ramirez	City of Moreno Valley	Public Works	(951) 413-3123	

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PLEASE SIGN IN

NPDES STORMWATER QUALITY TRAINING FOR
Construction Training
Riverside County Flood Control & Water Conservation District

Meeting of: Monday, September 29 - 13:00 - 17:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
1	Chuck	Peebles	City of San Jacinto	Engineering	(951) 654-3592	
2	Tamrat	Seyoum	City of Riverside	Water Department	(951) 826-5672	
3	Annie	Bostre-Le	City of Temecula	Public Works	(951) 694-6411	
4	Robert	Bohan	City of Canyon Lake	Special Enforcement	(951) 244-2955	
5	John	Bivens	City of Canyon Lake	Special Enforcement	(951) 244-2955	
6	Richard	Rupert	City of Canyon Lake	Special Enforcement	(951) 244-2955	
7	Lance	Noland	Riverside County	Econo0mic Development Agency	(951) 955-9698	
8	Linda	Nixon	City of Hemet	Public Works Engineering	(951) 765-3880	
9	Kent	Wegelin	City of Moreno Valley	Public Works	(951) 413-3497	
10	Jay	PEEBLES Hutchinson	City of San Jacinto	Engineering	(951) 654-3592	
11	Leo	Ferrando	City of Riverside	Water Department	(951) 826-5694	
12	Eric	Escobar	City of Riverside	Water Department	(951) 826-2253	
13	Arman	Bualong BULAONG	City of Perris	Engineering	(951) 943-6504	
14	Pavel	Horn	City of Catherdal City	Engineering	(760) 770-0329	
15	Ismael	Pando	City of Hemet	Public Works Engineering	(951) 765-2361	
16	David	McBride	City of Temecula	Public Works	(951) 694-6411	
17	Dan	York	City of Temecula	Public Works	(951) 694-6411	
18	Jeramy	Jackson	City of Moreno Valley	Public Works	(951) 413-3474	
19	Steve	Grewe	Riverside County	Transportation Department	(951) 955-1095	
20	Robert	Morris	Riverside County	Transportation Department	(951) 955-1095	
21	John C.	Wilson	Riverside County	Transportation Department	(951) 955-1095	
22	mark	mandel	Riverside County	TLMA/Code Enforcement	(951) 955-8802	

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NPDES STORMWATER QUALITY TRAINING FOR
Construction Training
Riverside County Flood Control & Water Conservation District

Meeting of: Tuesday, September 30 - 13:00 - 17:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
52	Travis	Taylor	Riverside County	Waste Management	951-486-3273	
53	Justin	Brown	Riverside County	Waste Management	951-246-3278	
54	Michael	Ray	Riverside County	Waste Management	9512471761	M.I. Ray
55	Donald	Chase	Riverside County	Waste Management		Donald Chase
56	George	Solorio	Riverside County	Waste Management	951-318-1994	George Solorio
57	Jim	Mikkelson	Riverside County	Waste Management	951-500-0324	Donald Chase 951 323-1155
58	Mario	Ramirez	Riverside County	Waste Management	9510486-3270	
59	Panda	Workman	Riverside County	Waste Management	951-486-3270	Panda
60	Juan	Yepez	Riverside County	Waste Management	951-486-3270	Juan Yepez
61	Tom	M Ray	" "	TRANS.	951-658-5234	Tom McRay
62	Nancy	Beltran	City of Hemet	Engineering Dept.	951-765-3877	
63	MAC	McCall	City of Hemet	ENGINEERING DEPT	951-847-5737	Mac McCall
64	Daniel	Nicholson	Riverside Co	TRANS	951-955-1793	
65	Rick	Fite	Riverside Co	Dist. Tel. Maint. Sup.	9511659-2603	Rick Fite
66	~~[illegible]~~	~~[illegible]~~				
67	Henry	Gutierrez	Riverside Co	Equipt operator II	909.872-4019	Henry M Gutierrez
68						

0003890

NPDES STORMWATER QUALITY TRAINING FOR
Construction Training
Riverside County Flood Control & Water Conservation District

Meeting of: Tuesday, September 30 - 08:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
35	Jeffrey	Karalun	City of Riverside	Public Utilities - Water Field	(951) 351-6350	
36	William	Cates	City of Riverside	Public Utilities - Water Field	(951) 351-6350	
37	Victor	Velasquez	City of Riverside	Public Utilities - Water Field	(951) 351-6339	
38	Steven	Horn	Riverside County	Facilities Management	(951) 955-2549	
39	Dario	Samonte	RCFC & WCD	Construction Inspection	(909) 560-0199	Dario Sam
40	Jeff	Lewellen	Riverside County	Transportation Department	(951) 955-1095	
41	Richard "Rick"	Ott	Riverside County	Transportation Department	(951) 955-1095	Richard Ott
42	Stewart	Noble	City of Riverside	Water Department	(951) 538-6970	
43	Roger	Florez	Riverside County	Transportation Department	(951) 955-1095	Roger Flo
44	Tracy	Bravo	Riverside County	Transportation Department	(951) 955-1095	
45	Rene	Guzman	Riverside County	Transportation Department	(951) 955-1095	
46	Joseph	Bohne	Riverside County	Transportation Department	(951) 955-1095	
47	Mike	Lynch	City of Banning	Engineering/Public Works	(951) 922-3130	
48	David	Matier	City of Banning	Engineering/Public Works	(951) 922-3130	
49	carol	lucero	Riverside County	TLMA/Code Enforcement	(951) 955-8802	Carol Lucero
50	donna	payne	Riverside County	TLMA/Code Enforcement	(951) 955-8802	D Payne
51	patricia	silva	Riverside County	TLMA/Code Enforcement	(951) 955-8802	

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NPDES STORMWATER QUALITY TRAINING FOR
Construction Training
Riverside County Flood Control & Water Conservation District

Meeting of: Tuesday, September 30 - 08:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
18	Todd	Jorgenson	City of Riverside	Water Department	(951) 233-6381	
19	Claudia	Steiding	Riverside County	Facilities Management	(951) 955-8174	
20	Vikki	Kuntz	Riverside County	Facilities Management	(951) 955-0166	
21	David	Hatch	City of Riverside	PUBLIC WORKS	(951) 288-3632	
22	JACK	PALOMAREZ	City of Riverside	PUBLIC WORKS	(951) 712-4972	
23	FRED	CERDA	City of Riverside	PUBLIC WORKS	(951) 712-4966	
24	Mike	Luna	RCFC & WCD	Construction Inspection	(909) 908-0978	
25	Will	Becerra	City of Temecula	Public Works	(951) 694-6411	
26	John	Pourkazemi	City of Temecula	Public Works	(951) 694-6411	
27	Andy	Lindsay	City of Riverside	Public Utilities - Water Field	(951) 351-6368	
28	Chris	Joranco	City of Riverside	Public Utilities - Water Field	(951) 351-6350	
29	William	Ryan	City of Riverside	Public Utilities - Water Field	(951) 351-6350	
30	Richard	Ryno	City of Riverside	Public Utilities - Water Field	(951) 351-6350	
31	Robert	Lucas	City of Riverside	Public Utilities - Water Field	(951) 351-6350	
32	Jim	Grady	City of Riverside	Public Utilities - Water Field	(951) 351-6350	
33	Gene	Lewis	RCFC & WCD	Construction administration	(951) 850-6917	
34	Miguel	Perez	City of Riverside	Public Utilities - Water Field	(951) 351-6350	

0003892

PLEASE SIGN IN

NPDES STORMWATER QUALITY TRAINING FOR
Construction Training
Riverside County Flood Control & Water Conservation District

Meeting of: Tuesday, September 30 - 08:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
1	BRENT	MYTINGER	RCFC & WCD	Inspection	(909) 560-1142	
2	Jeremy	Stroschein	Riverside County	Transportation Department		
3	Ray	Dunn	RCFC & WCD	Construction Inspection	(951) 955-1315	
4	Jesus	Pizano	Riverside County	Transportation Department	(951) 955-1095	
5	Barry	Temple	RCFC & WCD	Construction Inspection	(951) 955-1315	
6	Gabriel	Novello	City of Banning	Engineering/Public Works	(951) 922-3130	
7	Bill	Russell	City of Banning	Engineering/Public Works	(951) 922-3130	
8	Waren	Woodstock	City of Banning	Engineering/Public Works	(951) 922-3130	
9	Guero	Cervantes	City of Perris	Engineering Department	(951) 943-6504	
10	Greg	Butler	City of Temecula	Public Works	(951) 694-6411	
11	Avlin	Odviar	City of Temecula	Public Works	(951) 694-6411	
12	Tony	Colarossi	City of La Quinta	Public Works	(760) 777-7089	
13	Michael	Davis	Riverside County	Transportation Department	(951) 955-1095	
14	Tim	Fagg	RCFC & WCD	Construction Inspection	(951) 955-1236	
15	Charles	McBride	City of Riverside	Water Department	(951) 538-6972	
16	Michael	Morrison	Riverside County	Transportation Department	(951) 955-1095	
17	Habib	Hariri	City of Riverside	Water Department	(951) 826-5304	

00003893

NPDES STORMWATER QUALITY TRAINING FOR
Industrial/Commercial Training
Coachella Valley Water District

Meeting of: Tuesday, November 18 - 13:00 - 17:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
1	Hart	Ponder	City of Palm Desert	Code Enforcement	(760) 346-0611	
2	Pedro	Rodriguez	City of Palm Desert	Code Enforcement	(760) 346-0611	Pedro Rodriguez
3	Shawn	Kilpatrick	City of Palm Desert	Code Enforcement	(760) 346-0611	Shawn M Kilpatrick
4	Johnny	Terfehr	City of Palm Desert	Code Enforcement	(760) 346-0611	
5	Michael	Adkins	City of Palm Desert	Code Enforcement	(760) 346-0611	Michael P Adkins
6	Sara	Toyoda	City of Indio	Public Works	(760) 391-4149	Sara Toyoda
7	Leland	Bishop	City of Indio	Public Works	760-391-4067	Leland Bishop
8	John	Carmona	Whitewater Regional Board	NPDES Unit	7603404521	John Carmona
9	Brett	Daniels	City of Coachella	Environmental Programs Director	(760) 398-3002	
10	Bob	French	City of Calimesa	Public Workds	(909) 795-9801	Bob French
11	Mike	McCabe	City of Calimesa	Public Works	(909) 795-9801	Mike McCabe
12	Butch	Scheffer	City of Calimesa	Public Works	(909) 795-9801	B Scheffer
13	BOB	OKREN	City of Palm Springs	COMPLIANCE	(760) 343-6505	R Okren
14	TRAVIS	JOHNSON	CITY OF COACHELLA	FLEET	760 272-6909	TRAVIS JOHNSON
15	JOHN	BROWN	CITY of Coachell	Building + Safety	760-398-3002	John Brown
16	[illegible]	INFUEZ	City of Coachella	Public Works	(760) 398-5744	[illegible]
17						

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NPDES STORMWATER QUALITY TRAINING FOR
Construction Training
Riverside County Flood Control & Water Conservation District

Meeting of: Tuesday, September 30 - 13:00 - 17:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
35	Xavier	Jacobo	City of Riverside	Water Department	(951) 538-3461	
36	Jim	Henke	City of Riverside	Water Department	(951) 538-3451	
37	Cesar	Gutierrez	Riverside County	Transportation Department	(951) 955-1095	
38	angela	frazier	Riverside County	TLMA/Code Enforcement	(951) 955-8802	
39	Bill	McAteer	City of Temecula	Public Works	(951) 694-6411	
40	Amer	Attar	City of Temecula	Public Works	(951) 694-6411	
41	Laura	Bragg	City of Temecula	Public Works	(951) 694-6411	
42	David	Maus	Riverside County	Transportation Department	(951) 955-1095	
43	Kevin	Gillette	Riverside County	Transportation Department	(951) 955-1095	
44	Thomas	Shipley	Riverside County	Transportation Department	(951) 955-1095	
45	Yolanda	Macalalad	City of Corona	Public Works	(951) 279-3748	
46	Danny	Astorga	City of Moreno Valley	Public Works	(951) 413-3119	
47	Gabriel	Gonzalez	City of Moreno Valley	Public Works	(951) 413-3252	
48	Mosallam	Almasri	City of Moreno Valley	Public Works	(951) 413-3113	
49	Preston "Jerry"	Lytle	Riverside County	Transportation Department	(951) 955-1095	
50	Koran	Manka	Riverside County	Transportation Department	(951) 955-1095	
51	Harvey	McCoy	Riverside County	Transportation/Operations	(951) 658-5234	

00038895

NPDES STORMWATER QUALITY TRAINING FOR
Construction Training
Riverside County Flood Control & Water Conservation District

Meeting of: Tuesday, September 30 - 08:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
52	jamison	cole	Riverside County	TLMA/Code Enforcement	(951) 955-8802	
53	Bob	French	City of Calimesa	Public Workds	(909) 795-9801	
54	jeannie	chambelain	Riverside County	TLMA/Code Enforcement	(951) 955-8802	
55	roy	ryder	Riverside County	TLMA/Code Enforcement	(951) 955-8802	
56	Mike	McCabe	City of Calimesa	Public Works	(909) 795-9801	
57	Luis	Tapia	City of Riverside	Water Department	(951) 538-3456	
58	Gary	Moss	Riverside County	Transportation Department	(951) 955-1095	
59	Jay	Oldham	City of Temecula	Public Works	(951) 694-6411	
60	Henry	Olivo	RCFC & WCD	Construction Administration	(951) 955-1288	
61	Gary	Lundberg	RCFC	Inspection	9095601147	
62	Byron	Moreno	Trans Dept			
63	Mayra	DeLaTorre	City of Temecula	Public Works	951)6946411	
64						
65						
66						
67						
68						

NPDES STORMWATER QUALITY TRAINING FOR
Municipal Training
Murrieta City Hall

Meeting of: Thursday, November 6 - 08:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
18	Matt	Wicks	City of San Jacinto	Public Works	(951) 654-4041	
19	Kenny	Rodger	City of San Jacinto	Public Works	(951) 654-4041	
20	Kevin	Carranza	City of San Jacinto	Public Works	(951) 654-4041	
21	Victor	Vasquez	City of San Jacinto	Public Works	(951) 654-4041	
22	Paul	Swancott	City of Murrieta	Planning	(951) 304-2489	
23	Cory	Hammond	City of Murrieta	Public Works	(951) 304-2489	
24	Lanker	Figueroa	City of Murrieta	Public Works	(951) 304-2489	
25	Mike	Brooks	City of Murrieta	Public Works	(951) 304-2489	
26	Sarah	Russell	City of Murrieta	Public Works	(951) 304-2489	Sarah Russell
27	David	Hendry	City of Murrieta	Public Works	(951) 304-2489	
28	Ken	Jones	City of Murrieta	Engineering	(951) 304-2489	
29	Mike	Almodovar	City of Murrieta	Public Works	(951) 304-2489	
30	Daniel	Scroggins	City of Murrieta	Public Works	(951) 304-2489	
31	Aaron	Rintamaki	City of Murrieta	Planning	(951) 304-2489	
32	Israel	Reyes	City of Murrieta	Community Services	(951) 461-6124	
33	Jose	Munoz	City of Murrieta	Community Services	(951) 461-6124	
34	Juan	Del Val	City of Murrieta	Community Services	(951) 461-6124	

0003897

PLEASE SIGN IN

NPDES STORMWATER QUALITY TRAINING FOR
Municipal Training
Murrieta City Hall

Meeting of: Thursday, November 6 - 08:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
1	Brad	Buron	City of Temecula	Public Works	(951) 694-6411	
2	Mark	Levis	City of Temecula	Public Works	(951) 694-6411	
3	Jim	Smith	City of Temecula	Public Works	(951) 694-6411	
4	David	Davis	City of Temecula	Public Works	(951) 694-6411	
5	Mario	Munoz	City of Temecula	Community Services	(951) 694-6480	
6	John	Maisey	City of Temecula	Public Works	(951) 694-6480	
7	George	DeLaRosa	City of Temecula	Community Services	(951) 694-6480	
8	Jose	Diaz	City of Temecula	Community Services	(951) 694-6480	
9	Matt	Wiechec	City of Temecula	Community Services	(951) 694-6480	
10	Richard	Serven	City of Temecula	Community Services	(951) 694-6480	
11	David	Thurman	City of Temecula	Community Services	(951) 694-6480	
12	Dino	Camberos	City of Temecula	Community Services	(951) 694-6480	
13	Steve	Sterling	City of Temecula	Community Services	(951) 694-6480	
14	Richard	Shea	City of Temecula	Community Services	(951) 694-6480	
15	Karl	Nordgren	City of Temecula	Community Services	(951) 694-6480	
16	Kevin	Harrington	City of Temecula	Community Services	(951) 694-6480	
17	Tim	Stockton	City of San Jacinto	Public Works	(951) 654-4041	

0003898

NPDES STORMWATER QUALITY TRAINING FOR
Municipal Training
Murrieta City Hall

Meeting of: Thursday, November 6 - 08:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
52	Juan	Jaime	City of Temecula	Public Works	(951) 694-6411	
53	Ryan	Castillo	City of Temecula	Public Works	(951) 694-6411	
54	Perry	Ludwig	City of Temecula	Public Works	(951) 694-6411	
55	Gus	Gonzalez	City of Temecula	Public Works	(951) 694-6411	
56	John	Ward	City of Temecula	Public Works	(951) 694-6411	
57	Bradley	Moore	Riverside County	Facilities Management	(951) 696-3441	
58	Danny	Astorga	City of San Jacinto	Public Works	(951) 654-4041	
59	Alex	Garcia	City of San Jacinto	Public Works	(951) 654-4041	
60	Mark	Halman	City of San Jacinto	Public Works	(951) 654-4041	
61	JEREMY	JACKSON	CITY OF MOVAL	CAND DEV	913-3474	
62	Matt	Nicks	City of San Jac.	Public Works		
63	DINO	CAMBEROS	Temecula	TCSD		
64	RON	STUART	MURRIETA	CSD	9514616124	
65	BOB	KAST	"	"	"	
66	RICK	THOMPSON	"	"	"	
67	JOSE	ALFARO	EXCEL LANDSCAPE	SUPERVISOR	9517359650	
68	PHIL	ESNAYRA	CITY OF MURRIETA	C.S.D	951 532-7513	

0003899

NPDES STORMWATER QUALITY TRAINING FOR
Municipal Training
Murrieta City Hall

Meeting of: Thursday, November 6 - 08:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
35	Larry	Gross	City of Murrieta	Community Services	(951) 461-6124	
36	Mike	Bigay	City of Murrieta	Community Services	(951) 461-6124	
37	Hoang	Nguyen	City of Moreno Valley	Public Works	(951) 413-3216	Hoang Nguyen
38	Manuel	Moran	Riverside County	Facilities Management	(950) 600-6240	
39	Rodney	Tidwell	City of Temecula	Public Works	(951) 694-6411	
40	Bruce	Wedeking	City of Temecula	Community Services	(951) 694-6480	
41	Aldo	Licitra	City of Temecula	Public Works	(951) 694-6411	Aldo Licitra
42	Danny	Marks	City of Murrieta	Community Services	(951) 461-6124	
43	Mark	Bolschweiler	City of Murrieta	Public Works	(951) 304-2489	
44	Mike	Burris	City of Murrieta	Public Works	(951) 304-2489	
45	Lucas	Haynes	City of Murrieta	Public Works	(951) 304-2489	
46	Robert	Edmonds	City of Murrieta	Public Works	(951) 304-2489	
47	Nick	Vaughn	City of Murrieta	Public Works	(951) 304-2489	
48	Alberto	Aspe	City of Murrieta	Community Services	(951) 461-6124	
49	Chris	Payne	City of Temecula	Public Works	(951) 694-6411	
50	Flint	Norman	City of Temecula	Public Works	(951) 694-6411	
51	Larry	Romine	City of Temecula	Public Works	(951) 694-6411	

PLEASE SIGN IN

NPDES STORMWATER QUALITY TRAINING FOR
Industrial/Commercial Training
Riverside County Flood Control & Water Conservation District

Meeting of: Tuesday, November 4 - 13:00 - 17:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
1	Joe	Mullen	City of San Jacinto	Public Works	(951) 654-4041	
2	Jeff	Potts	City of Corona	Public Works	951-736-2446	
3	Dennis	Hurford	City of Norco	Building and Safety	(951) 270-5689	
4	Jeramy	Jackson	City of Moreno Valley	Public Works	(951) 413-3474	
5	Lori	Askew	City of Norco	Engineering	(951) 270-5678	
6	Sheldon	Zell	City of Norco	Fire Department	(951) 737-8097	
7	Mark	Solano	City of Corona	Department of Water & Power	(951) 279-3558	
8	Rudy	Fandel	City of Corona	Department of Water & Power	(951) 736-2476	
9	Craig	Leyland	City of San Jacinto	Public Works	(951) 654-4041	
10	Ralph	Durrett	City of San Jacinto	Public Works	(951) 654-4041	Ralph Durrett
11	HOANG	NGUYEN	CITY OF MORENO VAL	"	951 413-3216	
12	ANN	JAFLI	County of Riverside	RCFC &WCD - NPDES	9557248	
13						
14						
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16						
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NPDES STORMWATER QUALITY TRAINING FOR
Municipal Training
Murrieta City Hall

Meeting of: Thursday, November 6 - 08:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
69	Venita	Anderson	Code Enforcement	PD	4616332	Venita Anderson
70	Gene	Dickson	Code Enfo MPD.	PD	4616334	[illegible]
71	George	Nelson	Code Enforcement	PD	461-6338	[illegible]
72	Linda	Mejia	Code Enf.	PD	461-6337	[illegible]
73	Paul	Swanott	City Murrieta	Planning	461-6063	Paul Swanott
74	MIKE	BROOKS	MURRIETA	PW MAINT.	461-6401	[illegible]
75	JASON	JONES	"	CODE ENF.	461-6331	[illegible]
76	James	Smith	Temecula	Public works	303-3164	[illegible]
77	Bill	Woolsey	Murrieta	ENG	461-6073	Bill Woolsey
78	Rich	Shea	Temecula	C.S.		[illegible]
79						
80						

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PLEASE SIGN IN

NPDES STORMWATER QUALITY TRAINING FOR
Municipal Training
Riverside County Flood Control & Water Conservation District

Meeting of: Tuesday, November 4 - 08:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
1	Daniel	Monto	City of Moreno Valley	Public Works	(951) 413-3485	
2	Renee	Power	City of Norco	Animal Control Dept ~~Parks, Recreation and Community Services~~	737 8972	
3	Lance	Noland	Riverside County	Econo0mic Development Agency	(951) 955-9698	
4	mike	blanco	City of Norco	Public Works	951-270-5207	
5	Keith	Price	City of Norco	Parks, Recreation and Community Services	(951) 545-7891	
6	Bob	March	City of Norco	Parks, Recreation and Community Services	(951) 545-7892	Robert March
7	Michelle	Anglin	City of Norco	Parks, Recreation and Community Services	951.545.7883	
8	Brandie	Potter	City of Norco	Parks, Recreation and Community Services	[illegible]	
9	Roger	Jackson	City of San Jacinto	Public Works	(951) 654-4041	Roger Jackson
10	Jim	Cash	City of San Jacinto	Public Works	(951) 654-4041	Tim Cash
11	Ray	Sanchez	City of San Jacinto	Public Works	(951) 654-4041	
12	Ben	Haskell	City of San Jacinto	Public Works	(951) 654-4041	
13	Chris	Wyrick	City of Norco	Parks, Recreation and Community Services	951 545 7850	
14	Henk	Koke	City of Norco	Parks, Recreation and Community Services	951-545-7814	
15	Jeff	Woodley	City of Banning	Engineering/Public Works	(951) 922-3286	Jeff Woodley
16	Ramiro	Garcia	City of Banning	Engineering/Public Works	(951) 922-3286	Ramiro Garcia
17	Carlos	Navarro	City of Banning	Engineering/Public Works	951-922 3241	Carlos Navarro

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NPDES STORMWATER QUALITY TRAINING FOR
Municipal Training
Riverside County Flood Control & Water Conservation District

Meeting of: Tuesday, November 4 - 08:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
18	Quang	Nguyen	City of Moreno Valley	Public Works	(951) 413-3159	
19	Terrence	Piorkowski	City of Norco	Public Works	(951) 270-5607	
20	derek	lacombe	City of Norco	Public Works	951 - 270 - 5601	
21	nate	salazar	City of Norco	Public Works		
22	ryan	McIntyre	City of Norco	Public Works		
23	Lyndon	Lorance	City of Norco	Public Works		
24	Zachary	Foster	City of Moreno Valley	Public Works	(951) 203-4997	
25	Ann	iaali	RCFC & WCD	NPDES, Regulatory Division		
26	Miguel	Mariscal	City of Banning	Parks/Street Maintenance Division	(951) 922-3320	
27	Steven	Horn	Riverside County	Facilities Management	(951) 955-2549	
28	Randy	West	City of Temecula	Public Works	(951) 694-6411	
29	Robert	Florez	City of Moreno Valley	Special Districts	(951) 413-3471	
30	Bill	Shesgreen	City of Banning	Parks/Street Maintenace Division	(951) 922-3286	
31	Pete	Schlensker	City of Banning	Engineering/Public Works	(951) 922-3286	
32	Steve	Parker	City of Banning	Engineering/Public Works	951-922-3572	
33	Daniel	Cover	City of Moreno Valley	Public Works/ Special districts	(951) 413-3503	
34	Robert	Johnson	Riverside County	Facilities Management	(951) 782-2458	

00003904

18	Andy	Luna	Riverside County	Facilities Management	(760) 393-3253	
19	Jay	Mirpour	Whitewater Regional Board	Stormwater	(760) 776-8981	
20	Erich	Konrad	City of Palm Springs	Fleet Operations	760 323 8168	
21	David	Flint	City of Palm Desert	Building Maintenance	(760) 346-0611	
22	Cyril	Snake	City of Palm Desert	Building Maintenance	(760) 346-0611	
23	Marco	Zamudio	City of Palm Desert	Public Works	(760) 346-0611	
24	Joe	Rojas	City of Palm Desert	Public Works	(760) 346-0611	
25	James	Lindsey	City of La Quinta	Public Works	(760) 777-7052	
26	Adolfo	Cabrera	City of La Quinta	Public Works		
27	Tim	Batten	City of La Quinta	Public Works		
28	Raphael	Alvarado	City of La Quinta	Public Works		
29	Agustin	Arellano	City of La Quinta	Public Works		
30	Steven	Rakestraw	City of Palm Springs	Fleet Operations	(760) 323-8168	
31	Jesus	Padilla	City of Palm Desert	Public Works	(760) 346-0611	
32	Frank	Duran	City of Palm Desert	Public Works	(760) 346-0611	
33	Ernesto	Tovar	City of Palm Desert	Parks	(760) 346-0611	
34	David	Lopez	City of Palm Desert	Public Works	(760) 346-0611	
35	Dennis	Gonzalez	City of La Quinta	Public Works		
36	Ramon	Sandoval	City of La Quinta	Public Works		
37	Pedro	Gonzalez	City of La Quinta	Public Works		
38	Luis	Gutierrez	City of La Quinta	Public Works		

00003905

NPDES STORMWATER QUALITY TRAINING FOR
WQMP Training
Riverside County Flood Control & Water Conservation District

Meeting of: Monday, November 3 - 08:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
18	Larry	Gonzales	City of Moreno Valley	Public Works	(951) 413-3130	
19	Marge	Lazarus	City of Moreno Valley	Public Works	(951) 413-3130	
20	Sergio	Pena	Riverside County	Facilities Management	(951) 955-2809	
21	kyle	gallup	RCFC & WCD	design	(951) 955-8627	
22	Mike	Wong	RCFC & WCD	Design	(951) 955-1205	
23	Amy	McNeill	RCFC & WCD	Design	(951) 955-1268	Amy McNeill
24	JERAMY	JACKSON	MORENO VALLEY		951 413-3171	
25	VIKKI	KUNTZ	COUNTY/RIV.	DESIGN & CONST	951 955 0161	
26	~~[illegible]~~ STEVE	HORN	" "	" "	951.955.2599	
27	Lance	Noland	County of Riverside	EDA	955-9698	
28	JOHN	ALFRED	COUNTY OF RIVERSIDE	FACILITIES MGMT.	951-955-4844	
29	~~[illegible]~~	~~[illegible]~~				
30						
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MAPS

NPDES Progress Map

As of 12/31/2008

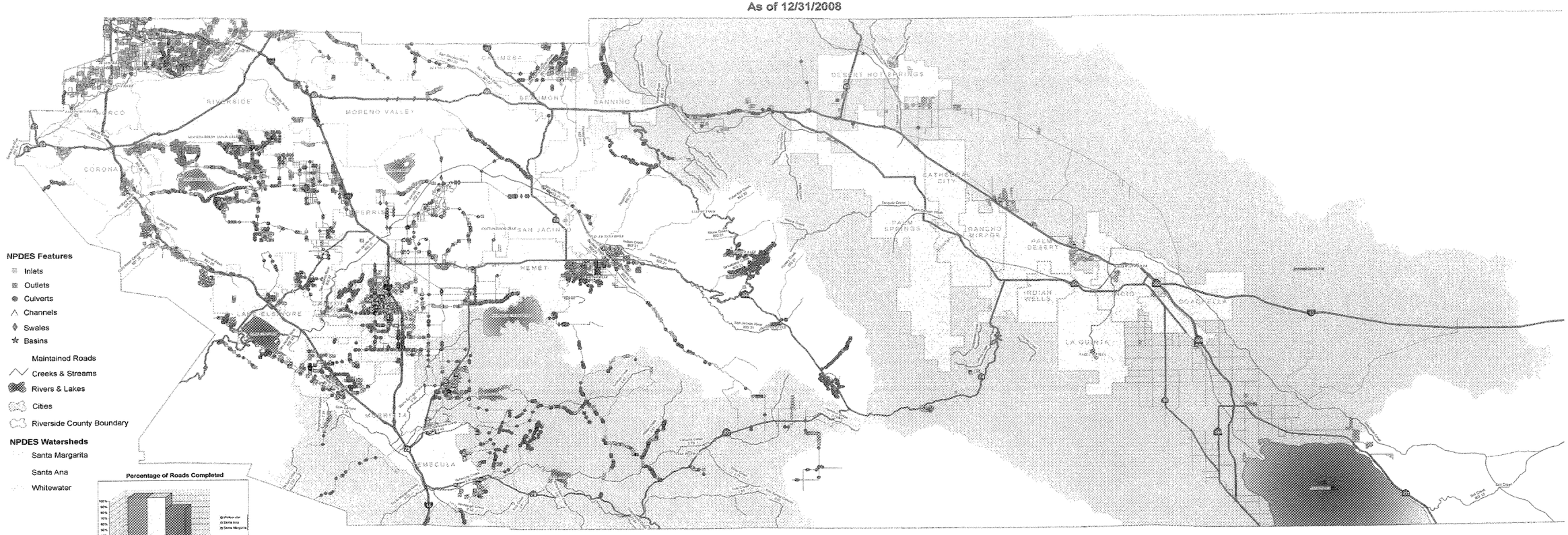

** Data Collected by John Morris and Larry Cecil*
As of 12/31/2008

Watershed	Basin Points	Basins	Channel Points	Channels	Swale Points	Swales	Culvert Points	Culverts	Inlet Points	Outlet Points	Control Points	Total Maintained Roads	Road Completed	% Completed
Santa Margarita	22	2	16	7	22	11	792	376	988	-	64	253.99	253.99	* *Less than 100.0%
Santa Ana	18	2	183	79	390	136	2686	1227	4206	580	111	1,358.46	1,358.46	100.0%
Whitewater	0	0	0	0	3	1	139	42	242	9	2	557.12	557.12	100.0%
Total	**40**	**4**	**199**	**86**	**415**	**148**	**3617**	**1645**	**5436**	**589**	**177**			

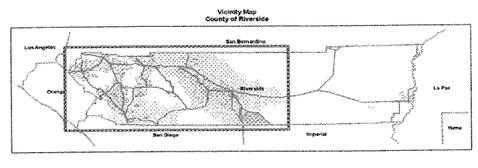

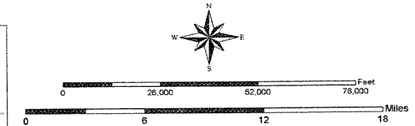

Disclaimer. Maps and data are to be used for reference purposes only. Map features are approximate, and are not necessarily accurate to surveying or engineering standards. The County of Riverside makes no warranty or guarantee as to the content (the source is often third party), accuracy, timeliness, or completeness of any of the data provided, and assumes no legal responsibility for the information contained on this map. Any use of this product with respect to accuracy and precision shall be the sole responsibility of the user.

Map Created by Adriana Soares, Riverside County, Transportation Department/GIS - December 10, 2008
U:\Projects\NPDES\Progress_Maps\Whitewater_12\1009.mxd

Example of an Inlet

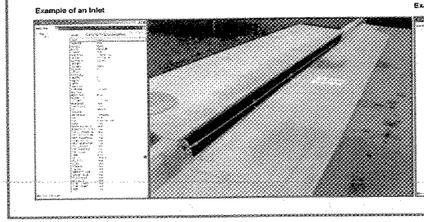

Example of an Outlet

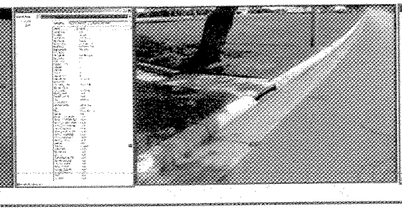

Example of a Culvert

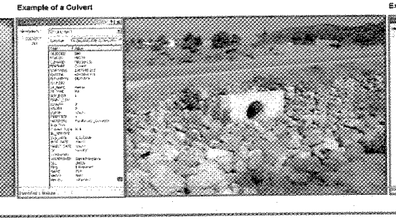

Example of a Channel

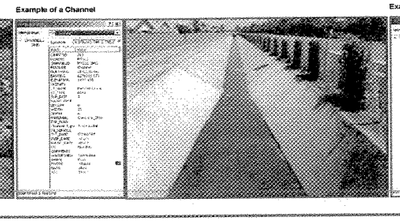

Example of a Swale

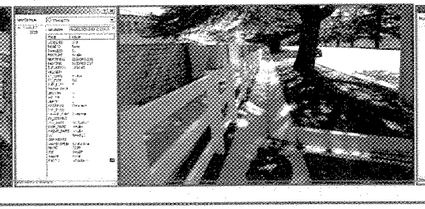

Example of a Basin

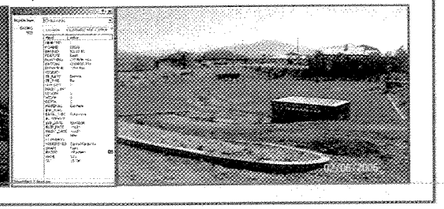

Western Riverside County Habitat Conservation Summary

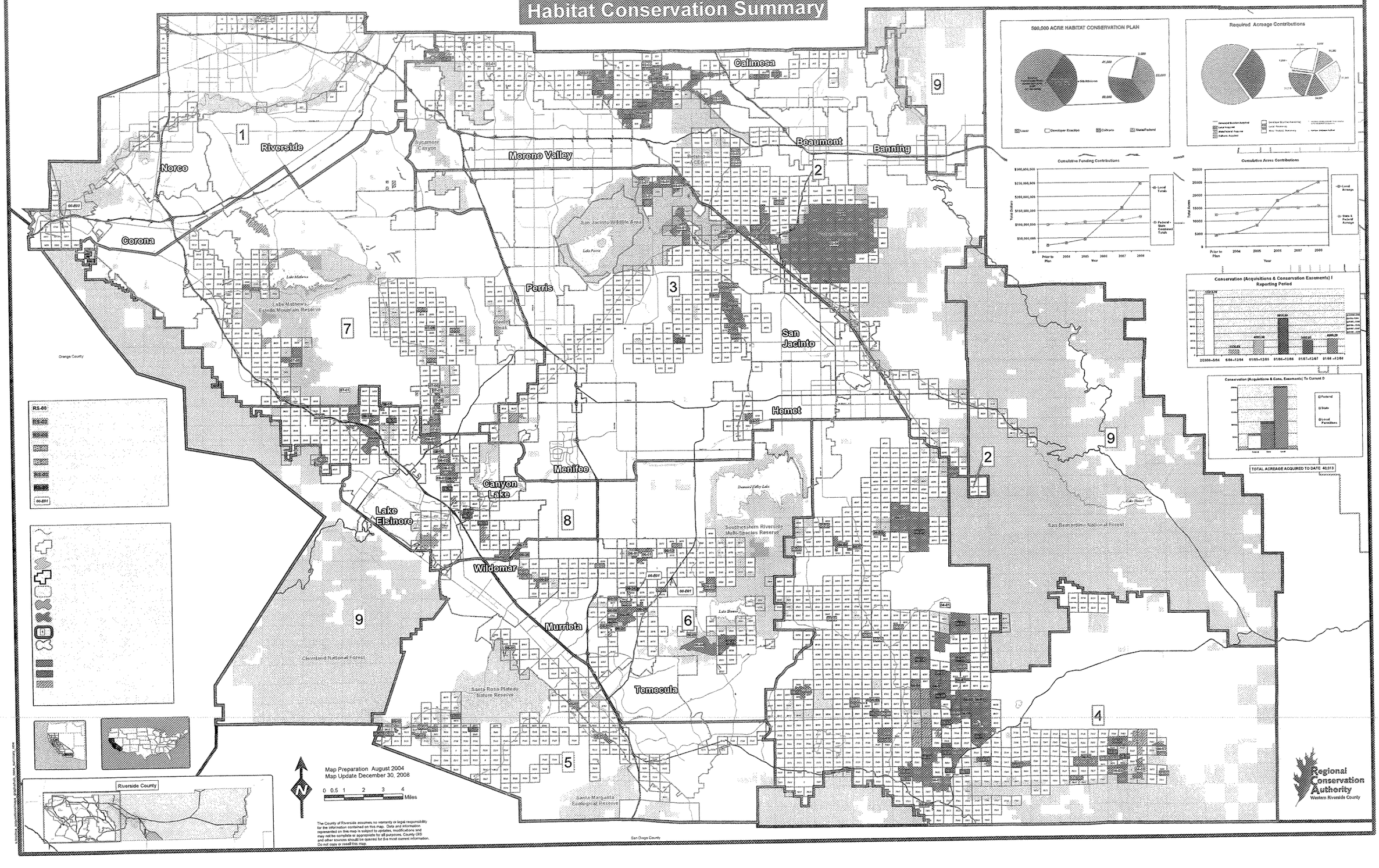

500,000 ACRE HABITAT CONSERVATION PLAN

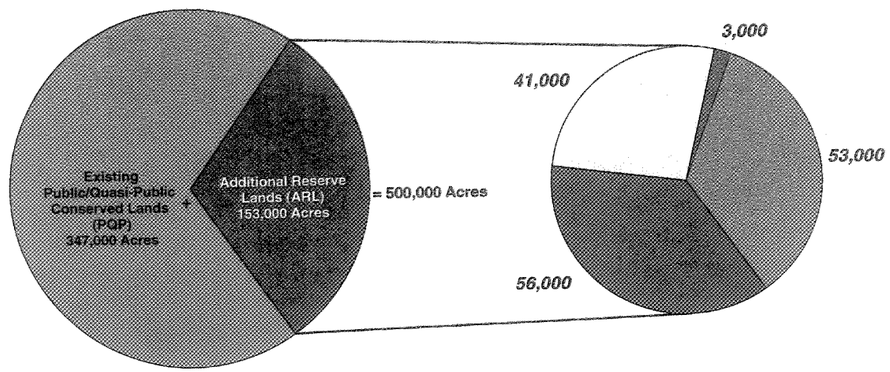

Required Acreage Contributions

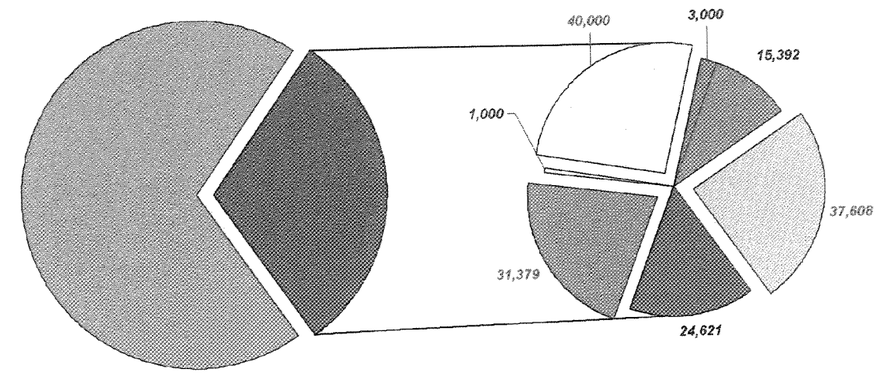

Developer Exaction Acquired
Local Acquired
State/Federal Acquired
Caltrans Acquired
Developer Exaction Remaining
Local Remaining
State / Federal Remaining
*** Numbers in Red Indicate Acres Needed to Fulfill MSHCP Obligations.
* Caltrans Obligation Fulfilled

Cumulative Funding Contributions

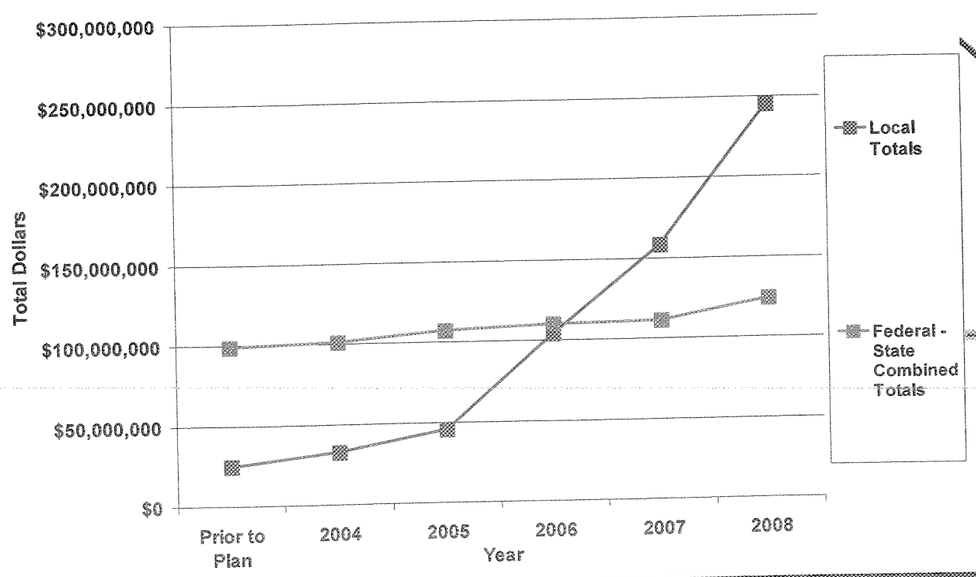

Cumulative Acres Contributions

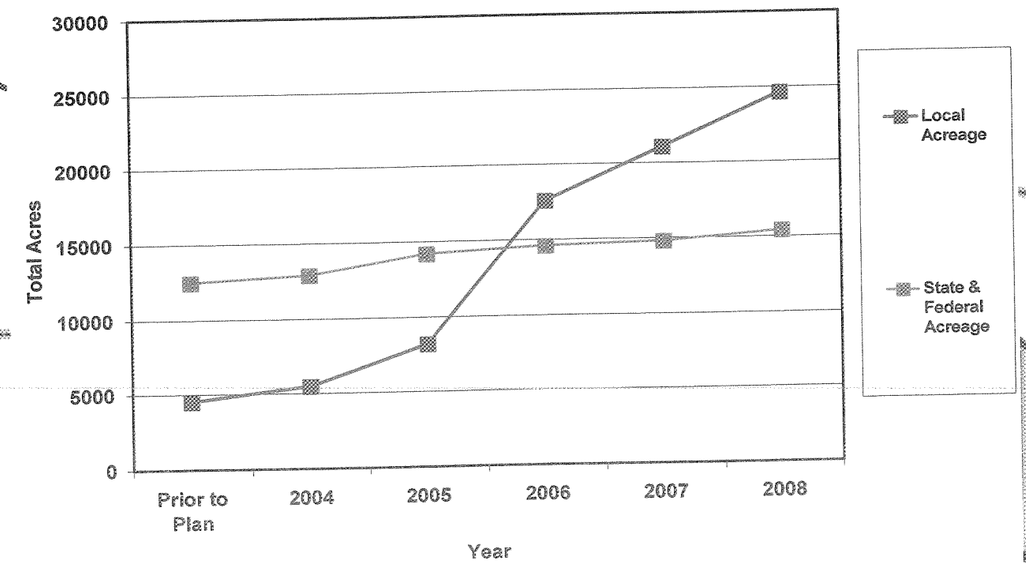

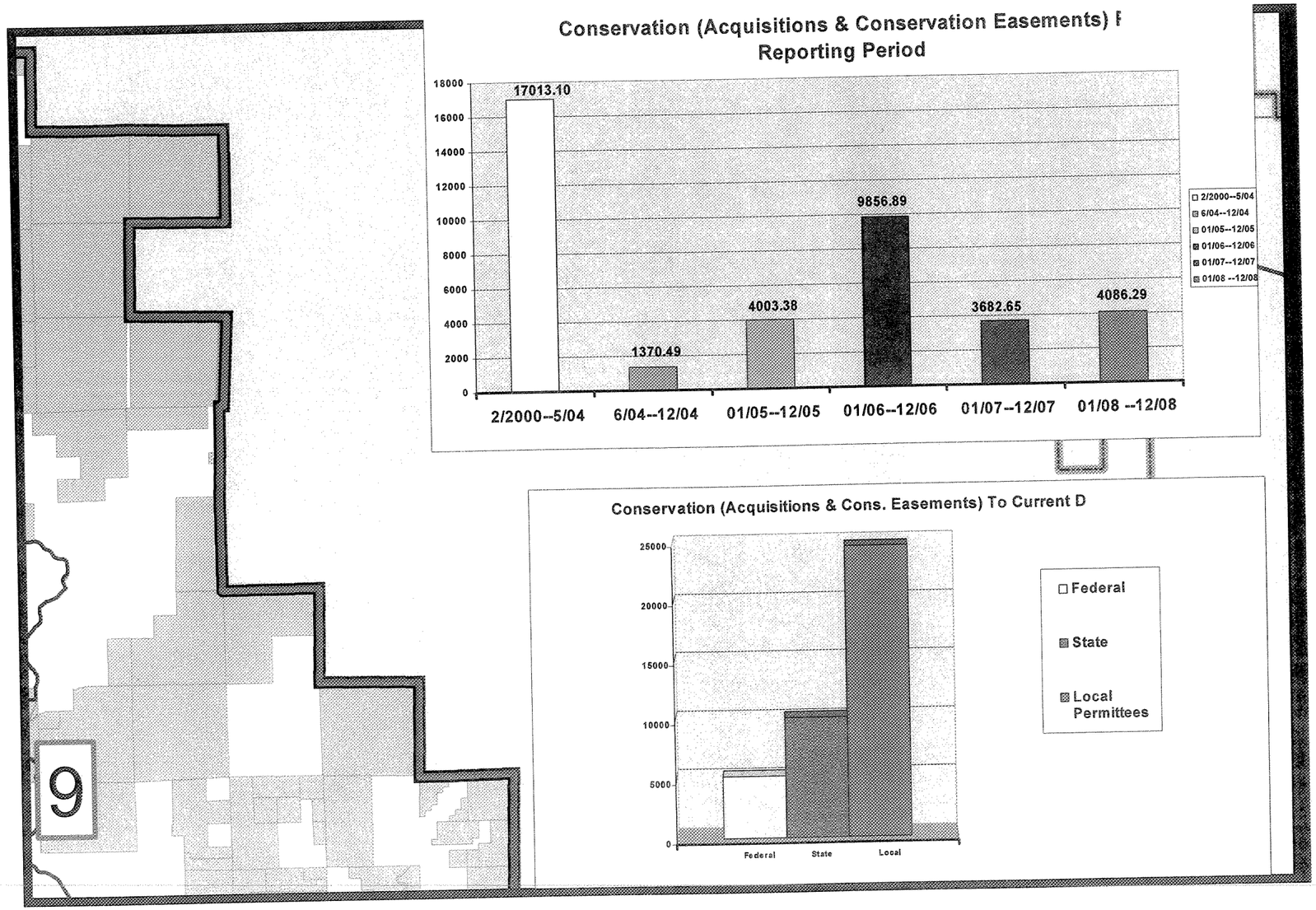
Conservation (Acquisitions & Conservation Easements) F
Reporting Period
18000
16000
14000
12000
10000
8000
6000
4000
2000
0
17013.10
1370.49
4003.38
9856.89
3682.65
4086.29
2/2000--5/04
6/04--12/04
01/05--12/05
01/06--12/06
01/07--12/07
01/08 --12/08
Conservation (Acquisitions & Cons. Easements) To Current D
25000
20000
15000
10000
5000
0
Federal
State
Local
Federal
State
Local Permittees
9

WARREN D. WILLIAMS
General Manager-Chief Engineer

1995 MARKET STREET
RIVERSIDE, CA 92501
951.955.1200
FAX 951.788.9965
www.rcflood.org

0003912
SAN DIEGO REGIONAL
WATER QUALITY
CONTROL BOARD
2009 OCT 30 A 10: 36

RIVERSIDE COUNTY FLOOD CONTROL
AND WATER CONSERVATION DISTRICT

October 29, 2009

Hand Delivered

Mr. John Robertus, Executive Officer
San Diego Regional Water Quality Control Board
9771 Clairemont Mesa Blvd., Suite A
San Diego, CA 92124

Sent UPS Next Day Air

Mr. Terry Oda, Chief
CWA Standards and Permits
United States Environmental Protection Agency
Region IX (WTR-5)
75 Hawthorne Street
San Francisco, CA 94015-3901

Dear Messrs. Robertus and Oda:

Re: FY 2008-2009 Annual Reports
Order No. R9-2004-001
NPDES Permit No. CAS0108766

Please find attached copies of the FY 2008-2009 annual reports for the National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) program for the Santa Margarita Region of Riverside County. The following annual reports are submitted in accordance with Third-Term NPDES MS4 Permit (Board Order No. R9-2004-001, NPDES Permit No. CAS0108766) adopted by the San Diego Region Regional Water Quality Control Board (Regional Board) on July 14, 2004 for the Santa Margarita Watershed Region of Riverside County (Third-Term NPDES MS4 Permit):

- Riverside County Flood Control and Water Conservation District (District) Individual Storm Water Management Plan (Individual SWMP) Annual Report
- County of Riverside Individual SWMP Annual Report
- City of Murrieta Individual SWMP Annual Report
- City of Temecula Individual SWMP Annual Report
- Watershed SWMP Annual Report
- Monitoring Program Annual Report (as Appendix G of Watershed SWMP Annual Report)

The reports provide a comprehensive summary and analysis of the Third-Term NPDES MS4 Permit compliance activities during FY 2008-2009 by the District, County of Riverside, and Cities of Murrieta and Temecula (Permittees).

The Individual SWMP Annual Reports summarize the Permittees' individual compliance activities. The Watershed SWMP Annual Report summarizes the Permittees' combined watershed based compliance activities.

The District is committed to continuing its ongoing efforts to work cooperatively with the Co-Permittees, Regional Board staff and other stakeholders in implementing an effective municipal stormwater program and fulfilling the requirements of the current Third-Term NPDES MS4 Permit. If you have any questions concerning this matter, please feel free to call me at 951.955.8411 or Jason Uhley at 951.955.1273.

Very truly yours,

Mark H. Wills

MARK H. WILLS
Chief of Regulatory Division

Attachments:

- District Individual SWMP Annual Report
- County of Riverside Individual SWMP Annual Report
- Murrieta Individual SWMP Annual Report
- Temecula Individual SWMP Annual Report
- Watershed SWMP Annual Report
- Monitoring Program Annual Report (as Appendix G of Watershed Annual Report)
- CD/DVD with electronic copies of above reports

ec: Riverside County - Santa Margarita Watershed MS4 Co-Permittees

- U. S. Environmental Protection Agency - Region IX
  Attn: Eugene Bromley
- Santa Rosa Plateau Ecological Reserve
  Attn: Carole Bell

JU:cw
P8/127666

RCFC&WCD

SANTA MARGARITA WATERSHED
NPDES MUNICIPAL STORMWATER PERMIT
(NPDES No. CAS0108766)

INDIVIDUAL ANNUAL REPORT

FOR

DISTRICT
FISCAL YEAR 2008-2009

I. Executive Summary
1. Development Planning
2. Construction
3. Municipal
4. Industrial/Commercial
5. Residential
6. Education
7. Illicit Discharge Detection and Elimination
8. Public Participation
9. Fiscal Analysis Component
10. Non-Storm Water Discharges
11. Receiving Water Limitations
12. Additional Urban Runoff Data
13. Proposed Revisions

Attachment A – WQMP Tracking Report
Attachment B – WQMP Example conditions
Attachment C – Training Logs
Attachment D – Encroachment Permit Log
Attachment E – Reports of Collected Debris in MS4
Attachment F – IC/ID Reports
Attachment G – Newly accepted Flood Control Facilities

BOARD ORDER NO. R9-2004-001
CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN DIEGO REGION

CERTIFICATION

FY 2008-2009 District Annual Report

For the

Santa Margarita Watershed

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Signed: Mark H. Wills Date: 10/29/09

Mark H. Wills
Chief of Regulatory Division
Riverside County Flood Control
and Water Conservation District

EXECUTIVE SUMMARY

This Individual SWMP Annual Report (Annual Report) documents the specific urban runoff management programs and activities implemented by the Riverside County Flood Control and Water Conservation District (District) to comply with the requirements of the third-term Municipal Separate Storm Sewer System (MS4) Permit issued to the District by the San Diego Regional Water Quality Control Board (Regional Board) on July 14, 2004 (Board Order R9-2004-001).

This Permit regulates storm water discharges from permittee-owned MS4's within the Santa Margarita Watershed Region of Riverside County (SMR).The following Municipal governments are Co-Permittees on this permit:

- The District (serving as principal permittee)
- The County of Riverside
- The City of Murrieta
- The City of Temecula

Additionally, as part of the 2009 Report of Waste Discharge (ROWD) the newly incorporated cities of Menifee and Wildomar submitted their notice of intent to participate in the upcoming 4th Term MS4 Permit.

The goals of this permit are to protect and enhance the quality of surface waters within the watershed to protect their beneficial uses as described in the Basin Plan. As stated above, this report documents the specific activities of the District to reach or maintain water quality objectives within the SMR.

The Third-Term MS4 Permit required each Permittee to develop an Individual Storm Water Management Plan (SWMP) and for all the Permittees to jointly develop a Watershed Storm Water Management Plan. As Principal Permittee, the District was to coordinate the development of the compliance programs. Annual Reports for each of these compliance programs are required and are to be submitted to the Regional Board on October 31st of each calendar year. The reporting period is specified as the preceeding fiscal year. The District specifically prepares this Individual Annual Report and the Watershed Annual Report. In addition, as Principal Permittee, the District is tasked with coordinating the submittal of the Individual SWMP Annual Reports for the other Co-Permittees.

This Annual Report covers the period extending from July 1, 2008 through June 30, 2009 and specifically responds to reporting requirements specified in Provision III.A.1 of the Monitoring and Reporting Program of the Permit. This includes identifying program progress and effectiveness evaluations.

The District was created by an act of the state legislature and is charged with providing flood protection within the limits of its service area. The District constructs, owns and maintains an expansive network of MS4 throughout the western portion of Riverside County including in the Santa Margarita Watershed; however its legislative charter does not provide any authority (police power) to regulate land-use for areas tributary to these MS4 systems. As such, the District's activities continue to be limited to MS4 Maintenance Activities, Public Outreach, Training, Water Quality Monitoring and IC/ID activities. The District relies on the combined Legal Authority with the Co-Permittees for all enforcement activities outside of District Right-of-Way.

EXECUTIVE SUMMARY

Program Implementation Highlights

The District continues to evaluate and optimize its programs based on the observations of District staff, RWQCB audits and other sources of input. Highlights for the current reporting period are as follows:

- The District coordinated and implemented the regional programs described in the DAMP and reported upon in the Watershed Annual Report.
- Coordinated and prepared the 2009 Report of Waste Discharge (ROWD). In this report the Permittees performed a comprehensive review and analysis of the effectiveness of their programs, and determined that their overall programs have been successful in protecting water quality, especially in light of the substantial (almost 300%) growth that has occurred within the region since 1990.
  Nevertheless, as part of their proactive and iterative management of their programs, the Permittees made various recommendations in the ROWD for specific new or modified regional and individual programs and activities that will further enhance their ability to effectively address the identified water quality problems. The recommended activities described in the ROWD that are applicable to the Districts individual compliance activities are referenced in the appropriate sections of this report.

- Continued Improvement of the Development Planning Program
  - Planning the formation of a Community Facilities District (CFD) through which the District will be tracking and maintaining post-construction BMPs of residential developments in the unincorporated county.
  - The District is working on an overhaul of the existing BMP Design Manual to include expanded treatment control BMP design guidance with additional focus placed on low impact development concepts.
  - Coordinating with the SMC and CASQA on the Regional LID BMP manual.
  - The District is finishing the design phase of a proposed reconstruction of its headquarters complex as a Low Impact Development Testing and Demonstration Facility. This facility will have both regional and statewide benefits as it will help to increase municipal, developer and public awareness of LID technology and also collect data necessary to assess the effectiveness of various LID techniques.
  - The District is now reviewing Water Quality Management Plans (WQMPs) prepared by the County of Riverside Economic Development Agency and the County Facilities Management Department in an effort to ensure consistency between public works projects and private development projects within unincorporated County areas.
  - Continued cooperation with the Southern California Coastal Waters Research Project (SCCWRP) and the SMC to develop appropriate hydromodification guidance for southern California.
  - Developing a streamlined WQMP template to ensure that District projects that trigger Priority Development Project requirements are identified and include appropriate BMPs.
- Continued improvement of municipal maintenance programs
  - Refined and formalized existing procedures for reporting and addressing hazardous materials spills.

EXECUTIVE SUMMARY

- Continued improvement of the IC/ID programs
    - Proposed in the ROWD to revise the Permittees IC/ID programs to enhance their ability to detect and eliminate illicit discharges.
    - Developed a database to track third-party discharges.

These and other compliance activities are addressed in the main body of this report.

Program Effectiveness

The Third-Term MS4 Permit required the Permittees to develop a long-term strategy to evaluate the effectiveness of the SWMPs and in the 4th year annual report and in the subsequent ROWD, the Permittees performed a comprehensive assessment of the effectiveness of their overall programs based on the strategy established. It was found that in light of the almost 300% growth that has occurred in the region since 1990, the Permittees programs have been effective at protecting water quality.

While program effectiveness assessment is a key step in the iterative process of program implementation, it should be realized that effectiveness assessment itself is a part of the management process that is also evolving. Assessing program effectiveness is recognized as a challenge for program managers across California, and the District, together with the Permittees, supported the efforts of CASQA to develop guidance in this area at a statewide level. As such, the ROWD also includes recommendations for revised reporting formats and proposes a new method for effectiveness assessments based upon the CASQA methodology, which will provide a better and more transparent view into the Permittees compliance activities in the fourth term MS4 Permit.

For purposes of this Annual Report, the terms "Watershed Stormwater Management Plan (Watershed SWMP)" and "Standard Urban Stormwater Management Plan (SUSMP)" referenced in the Permit are referred to as the "DAMP" and "Water Quality Management Plan (WQMP)" respectively, to be consistent with terminology previously established and in use by the Permittees. Additional terms and acronyms used in this Annual Report are defined in the glossary included in the DAMP.

1. DEVELOPMENT PLANNING
(SECTION F of ORDER R9-2004-001)

1. Description of any Amendments to the General Plan or the Development Project Approval Process:

The District's enabling act does not provide any authority (police power) to regulate land-use; therefore, the District does not maintain a General Plan or otherwise control the overall development project approval process within its service area. Discretionary land use decisions for projects within the area served by the District are made by the appropriate municipality or agency with jurisdiction over that project. However, at the County of Riverside's request, the District has agreed to review proposed developments in the unincorporated County area for water quality and flood control related impacts and recommend appropriate conditions of approval to the County.

In support of this role, the District spent the last fiscal year working on the following tasks:

- Subsequent to the Regional Board's Audit of the County's implementation of Permit Provision F – Development Planning, the District agreed to, and now reviews WQMPs for Capital Improvement Projects (CIP's) proposed by County Economic Development Agency (EDA) and the Facilities Management Department (FMD). This helps to ensure the County's compliance with their individual SWMP and the DAMP and to ensure that BMPs for Development Projects sponsored by these departments are appropriate and address and meet MEP for the project's pollutants of concern. It should be noted that the District has no discretionary or permit authority over the County of Riverside in the review of these cases, and as such only provides WQMP recommendations to these departments.

- The District has hired a consultant to develop a plan for the formation of a Community Facilities District (CFD) to ensure that maintenance of the post-construction BMPs would be fully funded. Through the funding generated by this CFD, the District will be tracking and maintaining post-construction BMPs of residential developments in the unincorporated county.

- District staff is continuing to work on an overhaul of the existing BMP Design Manual included as Appendix C of the WQMP. The updated manual will include expanded treatment control BMP design guidance with additional focus placed on LID concepts such as landscape-based BMPs, and BMPs that maximize the opportunity for infiltration. Additionally, the enhanced guidance is being peer reviewed by various departments within the district to ensure: constructability, maintainability, pollutant removal efficacy and consistency in implementation; and to include appropriate limitations/considerations such as infiltration and groundwater protection, and to identify ongoing maintenance requirements.

- The District is completing the design of a $2.65 Million project that will significantly retrofit the District's headquarters in Riverside to establish a regional example of green development concepts and a LID BMP Testing and Evaluation facility. The upgraded facility will be used as a regional "green" training center for municipal employees, developers, engineers, and contractors throughout the Inland Empire and Orange County and will implement a variety of LID Integrated Management Practices (IMPs) that will be used to test and demonstrate the effectiveness of these practices in contributing to storm water capture and management, treating pollutants of concern associated with urban runoff, mitigating the impacts of hydromodification from urban development, and identifying optimum IMP design criteria

1. DEVELOPMENT PLANNING
(SECTION F of ORDER R9-2004-001)
CONTINUED

and standards for LID IMPs in Riverside County. Data collected by this project will be provided to the regional SMC LID Project and will be available to benefit all SMC members. As this project will have statewide and regional benefits, additional information can be found in the Watershed Annual Report. The project will be implemented in three distinct phases:

1. Remodeling of the District's front parking area to facilitate enhanced traffic control and incorporation of porous pavements, disconnection of impervious area, and drought tolerant landscaping;
2. The new landscaping plan will be designed in accordance with the newly adopted County Ordinance No. 859 and will include specific California native plants that grow well in arid climates and require minimal watering once established. All landscaped areas will be irrigated using 'smart controllers' which automatically adjust watering schedule in response to changing weather conditions; and
3. Remodeling of the District's rear parking areas and drainage system to incorporate various examples of low impact development concepts including porous pavements, planter boxes, and water quality swales. These low impact development features will also be designed to incorporate testing facilities that will allow the District to evaluate the long term water quality benefits and maintenance costs as well as the effectiveness of design parameters for these features. The data will be published as part of a broader southern California study of low impact development technologies.

As Principal Permittee, the District is also participating in and/or coordinating several additional projects and studies as part of the Permittees' regionally implemented programs. These additional efforts are fully reported upon in the Watershed Annual Report and are summarized below.

- The District is participating in a study coordinated by the Southern California Monitoring Coalition (SMC) to develop a regional LID BMP design manual.
- The District continues to participate in the SMC's efforts to develop numeric guidance for addressing Hydrologic Conditions of Concern, including their Hydromodification study and LID Projects. These efforts are further described in the Watershed Annual Report in Appendix G, Section G.7

2. Number of Grading Permits Issued:

Not applicable. The District does not issue grading permits.

1. DEVELOPMENT PLANNING
(SECTION F of ORDER R9-2004-001)
CONTINUED

3. Number of Developments Conditioned to meet WQMP Requirements:

The District utilizes a case tracking program (District Land Management Tracking) that tracks project status and produces reports identifying the number of developments conditioned with WQMPs. The following numbers reflect projects reviewed that are recorded as being in the Santa Margarita Watershed.

160 Land Use/Development proposals were reviewed by the District for water quality and flood control related impacts.

59 Land Use/Development proposals met the minimum requirements for Priority Development Projects and were required to prepare a preliminary project specific WQMP,

37 of the Priority Development Project proposals submitted an acceptable preliminary WQMP and were issued 'recommended' Conditions of Approval. The District does not have land use authority, thus these 'recommended' conditions are forwarded to the County who subsequently establishes the conditions of approval for the project.

A summary log of projects that the District reviewed is contained in Attachment A. Entries marked "approved" are those for which Conditions of Approval were recommended to the County.

4. Attach One Example of a Development Project that was Conditioned to Meet WQMP Requirements and a Description of the required BMPs:

See Attachment B.

5. Description of any Updates to the Environmental Review Process:

The District's environmental review process is described in Section 6.3 of the District's Individual SWMP. During this reporting period, no revisions were needed nor made to this process.

1. DEVELOPMENT PLANNING
(SECTION F of ORDER R9-2004-001)
CONTINUED

6. Description and Number of Training Efforts Conducted during the Reporting Period (for staff, developers, contractors, etc.), including the Number of Staff Trained.

Training	Training Description	Training Dates	Number of District Attendees
WQMP	New Development	11/3/08	18
WQMP	New Development	5/4/09	16
WQMP	New Development	6/9/09	4
		Total	**38**

a. Training:

See Attachment C

b. Summarize the Educational and Outreach Activities the Development Planning Component has conducted over the Past Year.

Priority development projects conditioned by the County are required to obtain copies of appropriate public education and outreach materials from the District's NPDES Public Information Officer or from our website. They are also required to submit an affidavit stating that they will distribute the public education materials to new property owners. This affidavit is recorded in the development's individual file. Additionally, the District has implemented a tracking mechanism to facilitate the accurate reporting of the number of affidavits received each fiscal year.

A total of **four** (4) Public Education Affidavits were received during the reporting period.

Additional public education and outreach activities undertaken by the District are considered part of the Regional Public Education Program described in the Watershed Annual Report.

7. An Assessment of Program Effectiveness Based on the Measurable Goals Established in the Permittee's Individual SWMP:

As mentioned above, the District has no authority to regulate land-use and provides development review services on the County's behalf. Thus, the District has no direct measurable goals for its individual Development Planning Component. As indicated in the District's Individual SWMP, we collect the metrics described in this report and forward them to the County for analysis as part of the County's Individual SWMP Annual Report.

1. DEVELOPMENT PLANNING
(SECTION F of ORDER R9-2004-001)
CONTINUED

Nevertheless, as Principal Permittee the District is participating in and/or coordinating various regional studies and projects that will enhance the Permittees abilities to address pollution from development projects. These efforts are summarized in the response to question 1 above.

8. Additional Comments/Information:

Describe the Major Accomplishments of the Development Planning Component over the Past Year. (General Plan or ordinance revisions, procedure/approval process changes, SUSMP guidance material):

Major accomplishments of the program are described in responses to questions 1, 3 and 6 of this reporting form.

9. Summarize New Activities or Improvements to be implemented Next Year as a result of your Self Assessment of the Development Planning Component:

Within the next fiscal year, the District plans to continue the ongoing development and implementation of the activities described in the response to question 1 in this section.

Additionally, as outlined in section 7.2.2 of the 2009 ROWD the District and the Permittees have identified and described several proposed enhancements / revisions to their Development Planning Programs that they propose to implement pending the fourth-term permit renewal. These included:

- Revising the BMP Handbook to better incorporate LID concepts and to describe how LID can offset Treatment Control requirements and Hydromodification impacts.
- Review (and update as appropriate) of numeric guidance for hydromodification based on outcome of SCCWRP hydromodification study.
- Clarifying BMP effectiveness at removing sediment-bound pesticides such as pyrethroid pesticides
- A program to inspect and verify the maintenance of Post Construction BMPs.

2. CONSTRUCTION
(SECTION G)

NOTE: THIS SECTION IS APPLICABLE TO DISTRICT ADMINISTERED AND ENCROACHMENT PROJECTS ONLY.

1) Number of Inspections Conducted:

District Administered Construction Projects

There were **zero (0)** District administered construction projects within the Permit area within the reporting period.

Encroachment Permits Issued:

There were **six (6)** encroachment permits issued by the District within the Permit area. Of the 6 encroachment permits issued, **four (4)** had construction related activities within the District right-of-way.

During the active construction period of these encroachment projects, the District inspects the site as required based on the scope of the work being done. In general, most District encroachment projects last for a month or less and do not involve significant construction activity. Occasionally, more extensive projects may encroach on the District property for a longer period. A copy of the encroachment permit log, with projects located in the Permit area highlighted in green, is included in Attachment D.

For both construction and encroachment projects, site inspections include verifying that adequate minimum BMPs are in place to comply with Order R9-2004-001 and the General Construction Permit. Inspection reports are not produced during a site visit unless there is a problem which needs to be addressed, at which time a notification is given. There were no significant construction related problems during the reporting period.

2) Number and Type of Enforcement Actions Related to Construction Sites:

Enforcement and Compliance Responses	Private Projects	Public Projects
Non-monetary Penalties	0	0
Stop Work Authority	0	0
Fines	0	0
Financial Security	0	0
Permit/Certificate of Occupancy Denial	0	0
Referral to SDRWQCB	0	0
Total	**0**	**0**

3) Description of Modifications made to the Construction and Grading Approval Process:

No revisions were needed nor made.

2. CONSTRUCTION
(SECTION G)
CONTINUED

NOTE: THIS SECTION IS APPLICABLE TO DISTRICT ADMINISTERED AND ENCROACHMENT PROJECTS ONLY.

4) Description and Number of Training Efforts Conducted during the Reporting Period.

a. Training: (See Attachment C.)

Training	Training Description	Training Dates	Number of District Attendees
Construction	NPDES Training for Construction Inspectors	9/29/08	1
Construction	NPDES Training for Construction Inspectors	9/30/08	8
Construction	NPDES Training for Construction Inspectors	5/27/09	0
Construction	SWPPP Training	9/17/08	1
		Total	**10**

b. Summarize any Additional Education and Outreach Activities Conducted for Project Applicants, Contractors, Developers, Property Owners, and/or other Responsible Parties in Support of the Construction Component:

The District is only directly responsible for administering District Public Works projects; it does not have authority over private development activities. For all District construction projects, the District reviews and approves its contractors' SWPPP's prior to construction. As stated in the currently effective General Construction Permit (Order No. 99-08 DWQ), individuals responsible for SWPPP preparation, implementation, and permit compliance shall be appropriately trained both formally and informally. During the SWPPP review process, the District requires that its contractors meet the requirements of the General Construction Permit and requires that training certifications are provided. Additionally, as part of the preconstruction meeting for all District projects, the contractor must attend a NPDES Contractor's Training Presentation given by District staff. In addition, the District's specifications require compliance with the Permit and the General Construction Permit, including appropriate minimum erosion and sediment control BMPs on District Capital Improvement Projects.

Additional contractor education and outreach is implemented through the Regional Public Education Program described in the Watershed SWMP.

5) An Assessment of Program Effectiveness based on the Measurable Goals Established in the Permittee's Individual SWMP:

As indicated in the District's Individual SWMP, the District does not have authority to regulate land-use or construction activities outside of their right-of-way; therefore it does not issue grading permits or otherwise regulate private construction activities. This, the District's construction program is limited to District projects or those portions of Third-Party

2. CONSTRUCTION
(SECTION G)
CONTINUED

NOTE: THIS SECTION IS APPLICABLE TO DISTRICT ADMINISTERED AND ENCROACHMENT PROJECTS ONLY.

Construction Projects that encroach upon District rights-of-way. The District's Individual SWMP, therefore, did not establish specific measurable goals because of the District's limited role in construction activities and limited number of District projects in the Permit area.

Additionally, through a review of our NPDES Training Materials, District NPDES Staff are recommending that District Construction Inspectors attend additional training specific to the Construction General Permit in the future. This is because District construction inspectors only work on District public works projects that must be in compliance with the Construction General Permit. The District will evaluate potential providers of this training and propose implementation following the roll-out of the new Construction General Permit.

The District's construction program has been found to be effective because its inspectors received appropriate training and encroachment permit projects were inspected consistent with permit requirements.

6) Additional Comments/Information:

Attachment D includes the following items:

- Copy of the District's encroachment permit log.
- Standard encroachment permit application and requirements,
- Standard specifications related to water quality for District-administered construction projects.

3. MUNICIPAL
(SECTION H.1 of ORDER R9-2004-001)

1) Number of Inspections Conducted at Existing Municipal Facilities:

Not Applicable – there are no District municipal facilities within the Permit area. However, the District does annually inspect its MS4 consistent with the requirements of the current Permit.

2) Number and Type of Enforcement Actions Related to Municipal Sites:

Enforcement and Compliance Responses	Number
Education and Information	N/A
Verbal Warning	N/A
Written Warning	N/A
Other	
Total	**N/A**

3) Number of Catch Basins and Inlets that were Inspected and the Number that were Cleaned:

	Number Inspected	Number Cleaned
Catch Basins and Inlets	N/A	N/A

NOTE: The District does not operate nor maintain catch basins and inlets within the permit area aside from those that are within District Rights-of-Way. Usually any inlets that are within District R/W are immediately adjacent to a channel, and are maintained as part of routine maintenance of the channels; as such they are not tracked separately. A significant majority of catch basins and inlets are maintained by the municipalities or in rare instances, may be maintained by property owners associations (POAs) or homeowners associations (HOAs).

3. MUNICIPAL
(SECTION H.1 of ORDER R9-2004-001)
CONTINUED

4) Assessment of the Amount and Type of Debris Removed from Catch Basins, Streets and Open Channels, including an Identification of Problem Areas that Generate the most Pollutants: (See Attachment E.)

Facility	Type of Debris	Approx. Weight	Problem Areas that Generate Most Pollutants
Catch basins	Vegetative Litter Anthropogenic Litter Sediment Other man-made debris		N/A
Total		**N/A**	**tons (wet weight)**
Streets	Vegetative Litter Anthropogenic Litter Sediment Other man-made debris		N/A
Total		**N/A**	**tons (wet weight)**
Open Channels	Vegetative Litter Anthropogenic Litter Sediment Other man-made debris	106 4.7 8,913*	N/A
Total		**9,024**	**tons (wet weight)**
Facility Total		**9,024**	**tons (wet weight)**

* 5,079 cy of sediment were removed, tonnage calculated based on an assumed density of 130 lbs/cf.

3. MUNICIPAL
(SECTION H.1 of ORDER R9-2004-001)
CONTINUED

5) Assessment of effectiveness of BMPs that have been implemented for municipal facilities and activities:

BMP Code	Description	Used	Notes
SC-10	Non-Stormwater Discharges	☒ Yes ☐ No	
SC-11	Spill Prevention, Control and Clean-up	☒ Yes ☐ No	
SC-20	Vehicle and Equipment Fueling	☐ Yes ☐ No	N/A
SC-21	Vehicle and Equipment Cleaning	☐ Yes ☐ No	N/A
SC-22	Vehicle and Equipment Repair	☐ Yes ☐ No	N/A
SC-30	Outdoor Loading/Unloading of Materials	☐ Yes ☐ No	N/A
SC-31	Outdoor Liquid Container Storage	☐ Yes ☐ No	N/A
SC-32	Outdoor Equipment Maintenance	☐ Yes ☐ No	N/A
SC-33	Outdoor Storage of Raw Materials	☐ Yes ☐ No	N/A
SC-34	Waste Handling and Disposal	☒ Yes ☐ No	
SC-35	Safe Alternative Products	☒ Yes ☐ No	
SC-40	Contaminated or Erodible Areas	☐ Yes ☐ No	N/A
SC-41	Building and Grounds Maintenance	☒ Yes ☐ No	
SC-42	Building Repair and Construction	☐ Yes ☐ No	N/A
SC-43	Parking/Storage Area Maintenance	☒ Yes ☐ No	
SC-44	Drainage System Maintenance	☒ Yes ☐ No	
SC-60	Housekeeping Practices	☒ Yes ☐ No	
SC-61	Safe Alternative Products	☒ Yes ☐ No	
SC-70	Road and Street Maintenance	☐ Yes ☐ No	N/A
SC-71	Plaza and Sidewalk Cleaning	☐ Yes ☐ No	N/A
SC-72	Fountain and Pool Maintenance	☐ Yes ☐ No	N/A
SC-73	Landscape Maintenance	☒ Yes ☐ No	
SC-74	Drainage System Maintenance	☒ Yes ☐ No	
SC-75	Waste Handling and Disposal	☒ Yes ☐ No	
SC-76	Water and Sewer Utility Maintenance	☐ Yes ☐ No	N/A

Assessment of the effectiveness of BMPs that have been implemented for municipal facilities and activities:

THE DISTRICT DOES NOT OPERATE MUNICIPAL FACILITIES OTHER THAN MS4 IN THE SANTA MARGARITA REGION, THEREFORE THESE RESPONSES ARE LIMITED TO ADDRESSING THE DISTRICT IMPLEMENTATION OF BMP's RELATING AND APPLICABLE TO MS4 MAINTENANCE.

3. MUNICIPAL
(SECTION H.1 of ORDER R9-2004-001)

6) Description and Number of Training Efforts Conducted over the last year (for Municipal Facility Operators and/or Inspectors).

a. Training:

Note – Because District staff do maintain MS4 in the Santa Margarita Region, District maintenance staff receive municipal NPDES training per the requirement of the NPDES permit. Attendance logs are contained in Attachment C to this report.

Training	Training Description	Training Dates	District Attend-ees
Municipal Training	Municipal Site Inspection	11/4/08	2
Municipal Training	Municipal Site Inspection	11/6/08	0
Municipal Training	Municipal Site Inspection	11/18/09	0
Municipal Training	Municipal Site Inspection	5/5/09 (2 sessions)	57
Municipal Training	Municipal Site Inspection	5/26/09	5
Municipal Training	In-house training for PPE	4/30/09	63
Herbicide Safety Training (Helena Chemical Company)	BMP implementation during herbicide applications	6/24/09	26
Municipal Training	Hazardous Material Spill Notification and Cleanup	1/22/09	55
Municipal Training	Hazardous Material Spill Notification and Cleanup	6/25/09	59
Aquatic Weed School 2008 UC Davis, CA	Learn about identification, biology, ecology, control and regulations for management of aquatic weeds	9/16, 9/17 2008	4
Annual Fall Product Seminar 2008 (Helena Chemical Company)	BMP implementation during herbicide applications	11/6/08	31
		Total	**302**

b. Summarize the Internal and External Education and Outreach Activities the Municipal Component has Conducted over the past year:

In compliance with Order No. R9-2004-001, the District maintains the District's corporate yard Pollution Prevention Plan (PPP), which also address field MS4 maintenance in the Santa Margarita Watershed. The PPP provides the pollution prevention strategy to address

facilities and associated activities that may cause stormwater pollution without proper controls.

Staff also reviews the standard operating procedures for herbicide/pesticide management (product label instructions and Material Safety Data Sheets) that are part of the existing education requirements for applicators. Examples of standard procedures that constitute BMPs include schedules for applications considering weather and nesting seasons, and proper storage and disposal of unused product.

Site and activity assessments are performed annually prior to the storm season including the District's headquarters (not subject to the SMR Permit) and the MS4 within the Permit area. The District does not own nor maintain any facilities in the SMR other than the MS4.

Additionally, District Maintenance staff have attended annual training events conducted by our contracted herbicide provider (Helena Chemical Company). These venues focus on BMP implementation for specific herbicides used by the District. The BMPs and related topics included:

- Anticipated Glyphosate concentration ranges in water samples given average AquaMaster application rates and following label instruction.
- Calculation for determining estimated surfactant concentrations.
- Application techniques for effective results when applying AquaMaster.
- California laboratories that can analyze for Glyphosate, should the need arise.

7) An Assessment of Program Effectiveness Based on the Measurable Goals Established in the Permittee's Individual SWMP:

The following metrics are required to be tracked and reported on by Section 5.6 of the District's Individual SWMP:

- Amount and Types of Debris Removed from Open Channels

  Other than MS4, there are no District municipal facilities within the Santa Margarita Watershed. Therefore, the District's municipal program is limited to MS4 maintenance. The type and total amount of debris removed for each fiscal year is as follows:

Fiscal Year	Vegetative Litter	Anthropogenic Litter	Sediment	Total Amount of Debris Removed (tons)

3. MUNICIPAL
(SECTION H.1 of ORDER R9-2004-001)
CONTINUED

FY 2004-2005	55.9	0	5,763.4	5,819.3
FY 2005-2006	16.0	8.1	7,532.5	7,556.6
FY 2006-2007	10.4	4.7	2,113.0	2,128.1
FY 2007-2008	45.5	5.2	10,798.5	10,849
FY 2008-2009	106	4.7	8,913	9,023.7

As the District does not own any municipal facilities within the watershed, their Municipal program is limited to MS4 Maintenance. As shown in the table above, their maintenance activities have removed over 9,000 tons of waste, sediment and debris from their system of open channels during the reporting period, demonstrating the effectiveness of their program.

- Description of Training Efforts

  See Section 3.6) above

Other Measures of Effectiveness

- The District developed a procedure (SOM-28) to better address hazardous material clean-up and reporting related to illegal dumping and/or District operational activities. District Maintenance Supervisors are now required to complete BMP plans for major maintenance activities in open channels. These BMP plans identify the BMPs that are to be deployed as part of the maintenance activity.

8) Additional Comments/Information:

The District's municipal program in the Permit area is limited to MS4 maintenance. The District reviewed its program to ensure it is continuing to meet or exceed the minimum requirements of Board Order R9-2004-001.

Within FY 2008-2009, the District did not construct any additional MS4 within the SMR. However, the District accepted maintenance responsibilities for several flood control facilities constructed by Developers. Maps showing the location of these new facilities are included in Attachment G of this report. An updated map of all District and City maintained facilities is included in Appendix F of the Watershed Annual Report.

Summarize New Activities or Improvements to be implemented next year as a result of your Self Assessment of the Municipal Component:

As mentioned above, the District reviews its corporate yard Pollution Prevention Plan (PPP) at least annually to determine if any revision is necessary to reflect changes in the facility or changes in the activities conducted.

Additionally, in section 7.4.2 of the 2009 ROWD, the District committed to incorporate standard IPM language into their municipal pesticide contracts as part of their compliance

3. MUNICIPAL
(SECTION H.1 of ORDER R9-2004-001)
CONTINUED

efforts within the 4th Term MS4 Permit. The District is proactively addressing this issue and within the next reporting period will initiate a review of any pest management contracts at the District's Corporate Yard in Riverside to look for opportunities to incorporate IPM.

4. INDUSTRIAL/COMMERCIAL
(SECTION H.2 of ORDER R9-2004-001)

The District's enabling act does not provide land-use powers and therefore, individually it has no jurisdiction over industrial or commercial facilities. Through Combined Legal Authority established through an implementation agreement, the District relies on the Co-Permittees for regulation and enforcement related to Industrial and Commercial businesses and activities.

1) Description and Number of Training Efforts conducted over the last year (for Industrial/Commercial Facility Operators and/or Inspectors).

a. Training:

Although the District does not have authority to inspect or regulate industrial/commercial land-uses, District staff that respond to IC/ID complaints or notifications receive training to ensure that they are familiar with appropriate BMPs applicable to the various potential sources of discharges including Industrial/Commercial Operations and Facilities and Construction Sites. This training helps staff effectively respond to IC/ID events and, through discussions with offending parties, recommend BMPs to curtail illicit discharges to the MS4.

Training	Training Description	Training Dates	Number of Attendees
Industrial/Commercial Training	Industrial/Commercial Facility Inspection	11/4/08	1
Industrial/Commercial Training	Industrial/Commercial Facility Inspection	11/8/08	0
Industrial/Commercial Training	Industrial/Commercial Facility Inspection	5/26/09	0
		Total	1*

***** District Staff that respond to IC/ID complaints or notifications attend inspection training annually, either for Commercial-Industrial sources or for Construction sources.

5. RESIDENTIAL
(SECTION H.3 of ORDER R9-2004-001)

The District's enabling act does not provide land-use powers or authority and therefore individually it has no jurisdiction over residential activities. Through Combined Legal Authority established through an implementation agreement, the District relies on the Co-Permittees for regulation and enforcement related to residential activities.

6. EDUCATION
(SECTION I of ORDER R9-2004-001)

1) Description of Education Efforts conducted by the Permittee (not collectively with other Permittees) during the previous year:

The District and the Co-Permittees jointly fund a watershed-wide Public Education program administered by the District and fully reported upon in Section F of the Watershed Annual Report. Since the District does not have any land use authority, it generally does not conduct Educational activities outside of the collective educational efforts for the SMR permittees.

Sections 1 through 4 of this report include an accounting of training that District employees have received training within this reporting period. The training sessions listed in those sections includes Municipal staff training that was conducted by the District on behalf of the Co-Permittees as part of the watershed-wide education program, and training attended that was conducted by others, as available.

The education and outreach programs described below were implemented as part of the Watershed SWMP requirements. Additional details regarding these programs are available in the Watershed Annual Report.

Education and Outreach efforts were conducted toward the following audiences:

Audience	Measures Impressions are County-wide unless otherwise noted
Permittee Departments and Personnel	Number of District employees trained for: • Construction Inspection: 9 • Industrial/Commercial Inspection: 1 • Municipal Facilities and Activities: 302 • Development Planning: 40
Development Community	Applicable Outreach material was provided to Permittee staff at the following NPDES Trainings for distribution to the development community: Construction Site Inspection Training: August. 29 - 30, 2008 (4 sessions), May 27, 2009 (2 sessions) Water Quality Management Plan Training: Nov. 3, 2008 (2 sessions); May 4, 2009 (2 sessions); June 9, 2009
Industrial/Commercial Owners and Operators	Industrial/Commercial outreach conducted: SGA provided workshops at **4** Home Improvement

6. EDUCATION
(SECTION I of ORDER R9-2004-001)
CONTINUED

	Stores Riverside County Business License Program inserts were issued to all new license applicants and renewals. Inserts distributed: 7,500 (approx)
Residential Community, General Public, Other Public Agencies and Students	Number of Media Impressions in: • Newspaper/City/County publications 1,320,000 • 800 Line Calls: 1,169 • Website: 3,096 • Radio/TV: Not determined • Billboards: 3,373,530 • Other: 200 • Materials Distributed: 211,564 Number of students: 3,463 Public Education events conducted within the Watershed: 2 • Community Water Festival • Temecula Kids Day

6. EDUCATION
(SECTION I of ORDER R9-2004-001)
CONTINUED

2) Assessment of Overall Program Effectiveness Based on the Measurable Goals Established in the Permittee's Individual SWMP:

Measurable goals for the public education program are defined in Section 10 of the District's Individual SWMP.

As described in the DAMP, the Permittees have decided to pool their efforts into a single county-wide public education program implemented by the District. Since the District's individual jurisdiction covers the entire Santa Margarita Region, the District does not differentiate between education outreach efforts undertaken individually or as part of the county-wide efforts. Therefore, as stated in Section 10 of the District's Individual SWMP, a description and evaluation of the public education program implemented in the Permit area is contained in Sections F and H of the Watershed Annual Report.

Additional Measures of Effectiveness

Additionally, long-term effectiveness assessments of the Permittee Training and Public Education programs are described in Sections 6.2.3 and 6.3.3 of the ROWD, respectively.

Beyond the standard NPDES staff training that the District provides, District NPDES employees are constantly updating their knowledge on various topics relevant to their compliance programs. In this manner, this year District NPDES staff attended CASQA's Annual Conference in Oakland. This conference included technical discussions on many aspects of MS4 Permit Compliance including:

- Low Impact Development
- Water Quality BMP's
- Hydromodification
- Green Building
- Monitoring
- Program Effectiveness Assessment
- Pesticides, and
- Many others

3) Additional Comments/Information:

As described above, the District reports all of its implemented education related activities, and an assessment of the public education program in the Watershed Annual Report.

Describe the major accomplishments of the Education Component over the past year.

See Section F of the FY08-09 Watershed Annual Report.

Summarize new activities or improvements to be implemented next year as a result of your self assessment of the Education Component:

All recommended new activities or improvements to the Permittee Training and Public Education programs are described in the Watershed Annual Report.

7. ILLICIT DISCHARGE DETECTION AND ELIMINATION
(SECTION J of ORDER R9-2004-001)

1) Number of Illicit Discharges, Connections and Spills Reported and/or Identified during the Reporting Period:

The District recorded **a total of 45** IC/ID/S reports during FY08-09.

- **Illicit Discharges (ID):** 4
- **Illicit Connections (IC):** 0
- **Spills (S):** 41

a. **Illicit Discharges (ID):** The ID numbers above reflect the number of reports received that constitute the willful and/or negligent but intentional release of prohibited discharges. ID reports received by the District are included in Attachment F. In addition, Appendix C of the Watershed Annual Report contains a Fire Department HazMat Response Team Report of other IC/ID/S responses acted upon directly by them.

b. **Illicit Connections (IC):** In 1990, the District performed a detailed reconnaissance of its MS4 to identify potential illicit connections. A very small number of connections were identified. Since then, the District maintenance and construction inspectors have been trained to look for and report any illicit connections. In addition, the District requires entities wishing to drain non-stormwater discharges to its facilities to complete a Third-Party Non-Stormwater Discharge Application to ensure the discharge complies with the requirements of R9-2004-001.

c. **Spills (S):** The Spill numbers above reflect the number of reports received that consisted of accidental release of hazardous and/or prohibited discharges. Typically the District is notified of spills through receipt of a copy of the California Emergency Management Agency (Cal EMA) report, and in most cases the spill has already been appropriately responded to when the District receives the report. The District does however, review all spill reports and follow-up on those deemed a threat to water quality. Spill reports received by the District are included in Attachment F. In addition, Appendix C of the Watershed Annual Report contains a report of spill responses by the Riverside County Fire Department HazMat Response Team. The District contributes significant funding to the Hazmat team to ensure that they are cognizant of stormwater issues and incorporate appropriate BMPs as part of their hazardous materials response activities.

7. ILLICIT DISCHARGE DETECTION AND ELIMINATION
(SECTION J of ORDER R9-2004-001)
CONTINUED

2) Number of Illicit Discharges or Connections Investigated during the Reporting Period and the Outcome of the Investigations:

All reports received are reviewed/ investigated to ensure that they are responded to appropriately and to check for proximity and impact to District Facilities. In many cases such as spills, the District receives reports after the incident has already been appropriately responded to and no further action by the District is necessary.

Number of IC/ID/S reports reviewed/investigated by District: 45
Number of IC/ID/S incidents having potential to impact District facilities: 15**
Number of IC/ID/S incidents directly impacting District facilities: 11*

** "Potential to impact District Facilities" was classified as spills/discharges that were not contained nor cleaned up and were near a District Facility, or were cleaned up but were immediately adjacent to a District Facility.

* "Directly impacting District Facilities" is classified as spills/discharges that are known to have entered a District Facility.

Results of investigations can be found in the IC/ID/S Reports included in Attachment F

3) Number and Types of Enforcement Actions Taken for Illicit Discharges or Connections during the Reporting Period:

See Summary Report in Attachment F.

Because the District's enabling act does not provide authority to regulate land-use and activities, the District relies on combined legal authority with the Co-Permittees to control industrial, commercial or development activities within their jurisdiction. Any enforcement actions resulting from an IC/ID reported to the District would be taken by the respective Co-Permittee with jurisdiction. The District does maintain the ability to regulate third-party activities within its rights-of-way through encroachment permits, construction contracts and other legal agreements.

4) Number of Times your Agency's Hotline was called during the Reporting Period, as Compared to Previous Reporting Periods.

The table below identifies the number of calls that were tracked by our 1-800 hotline. Do to a technical error, the calls identified below for FY 2004-2005 only reflect the calls that were diverted to the District's front counter. The District has restored this service with the County Information Technology Department who hosts the hotline. These calls may have been for IC/ID, education outreach or other purposes.

7. ILLICIT DISCHARGE DETECTION AND ELIMINATION
(SECTION J of ORDER R9-2004-001)
CONTINUED

	Number of Calls				
	2004-05	**2005-06**	**2006-07**	**2007-08**	**2008-09**
Water Pollution Hotline	100	2015	1648	1317	1,169

5) Number and Location of Dry Weather Monitoring Sites that were Monitored during the Reporting Period:

The District maintains four IC/ID dry weather monitoring stations. These stations are identified below:

Number of Site(s): 4

Location(s): Santa Gertrudis Channel, Warm Springs Creek, Long Canyon Channel, Redhawk Channel

The exact location of these stations can be found in Attachment D to the Santa Margarita Region Monitoring Annual Report (Appendix G of this Report).

6) Summary of Illicit Discharge Monitoring Program results, including: 1) All inspection, field screening and analytical monitoring results 2) All follow-up and elimination activities and 3) Any proposed changes to station locations and/or sampling frequencies:

The District conducts IC/ID dry weather monitoring at the four tributary stations described above. As a result, monitoring occurs more frequently than the minimum of two times required under the MRP.

Inspection, Field Screening and Analytical Monitoring Results

All field screening and analytical monitoring results can be found in the Watershed Annual Report, Appendix G (Monitoring Annual Report) Tables G-14 and G-42 for all four tributary stations: Long Canyon Channel, Santa Gertrudis Channel, Redhawk Channel and Warm Springs Creek.

The District has developed numeric field screening criteria to determine whether a follow-up laboratory sample should be collected as summarized below:

- Specific conductance more than 25% higher than BPO
- Total dissolved solids more than 25% higher than BPO
- Turbidity more than 25% higher than long-term average (Avg. = 71.3 NTU)
- pH below 6 or above 9.5

7. ILLICIT DISCHARGE DETECTION AND ELIMINATION
(SECTION J of ORDER R9-2004-001)
CONTINUED

- Dissolved oxygen below 4 mg/L
- Unusually low or high water temperature
- Sensory observations in the area of the discharge that indicates the presence of pollutants (e.g., staining, water sheen, water color and/or odor, algae, foaming)

Below is a summary of the results of the IC/ID investigations conducted by the District.

IC/ID Investigations Conducted by the District

IC/ID Station Name	Date	TDS (mg/L)	Sp. Cond. (µmhos/cm)	Turbidity (NTU)	pH	T (°C)	DO (mg/L)
Redhawk Channel	11/18/08*	**900**	1215	68.7	9.11	17.8	12.74
	06/17/09*	-	1870	7.1	**10.41**	29.74	9.05
Long Canyon Channel	11/18/08	600	1155	29.7	7.48	15.3	17.8
	06/17/09	Insufficient volume for field measurements					
Santa Gertrudis Chnl. near Murrieta	11/18/08	Insufficient volume for field measurements					
	06/17/09	Insufficient volume for field measurements					
Warm Springs Creek near Murrieta	11/18/08	Dry					
	06/17/09	Dry					

* Samples taken for Analytical Testing
** **Bold** values exceeded field screening criteria

Follow-up and Elimination Activities

Generally, during IC/ID field visits, visual observations and field screening did not indicate the presence of illicit connections or illegal discharges. The two exceptions within the reporting period are summarized as follows:

11/18/08: Field TDS exceeded at 900 mg/l. There was adequate flow to collect samples for laboratory analysis and samples were collected. Lab turbidity (1.8 NTU) was below BPO; however, lab TDS slightly exceeded 125% BPO. Redhawk is in a predominately-residential area and rules out discharges from industries that would most likely produce elevated TDS flows. Nutrient levels are normal for the watershed and MBAS results are below BPO. No obvious sources of the exceedance were determined based on the field visit or follow up chemical analysis.

06/17/09: Field Parameters indicated an elevated field pH, exceeding IC/ID criteria. There was adequate flow to collect samples for laboratory analysis and samples were collected. No obvious illegal discharges were detected during the field visits or from lab results.

7. ILLICIT DISCHARGE DETECTION AND ELIMINATION
(SECTION J of ORDER R9-2004-001)
CONTINUED

Proposed changes to station locations and/or sampling frequencies

No changes are proposed to the station locations and/or sampling frequencies at this time; however, the District has committed to revising the entire IC/ID program as described in the 2009 ROWD.

7) An Assessment of Overall Program Effectiveness Based on the Measurable Goals Established in the Permittee's Individual SWMP:

The measurable goals are defined in Section 4.4 of the District's Individual SWMP and have been reported upon in response to questions 1 through 5 of this section. Within the framework of the existing IC/ID program, the Overall IC/ID program has been found to be effective based on the responses to these questions.

In response to the Los Angeles RWQCB and the Ventura County MS4 Permit, CASQA prepared a letter identify proposed measures and goals to evaluate the effectiveness of the IC/ID Program. The measures are as follows:

- Percent (%) of IC/IDs responded to within 24 hours of receiving notice; and
- Percent (%) of Illegal Connections eliminated or permitted once detected.

The goal identified for each measure was 80%. Based on our FY 2008-2009 IC/ID information, 100% of IC/ID reports were responded to within 24 hours of receiving notice and zero (0) Illicit Connections were detected.

8) Additional Comments/Information:

Describe the major accomplishments of the Illicit Discharge Detection and Elimination Component over the past year:

Based on experiences implementing the current IC/ID monitoring program, the 2009 ROWD included recommendations for a revised IC/ID program as part of the 4th term permit that will allow the Permittees to better detect and eliminate IC/IDs. The recommended revisions are designed to:

- Distribute the monitoring sites throughout the Santa Margarita Region to detect Illicit Discharges closer to their source before they become excessively diluted.
- Increase efficiency and consistency in sampling resulting in enhanced data quality.
- Enhance response time to identify IC/IDs

The District has also established an electronic third-party discharge electronic reporting form and database that will allow us to quickly research known third-party discharges to our system as part of complaint call responses. Additional enhancements to this system will include creation of a GIS layer.

7. ILLICIT DISCHARGE DETECTION AND ELIMINATION
(SECTION J of ORDER R9-2004-001)
CONTINUED

Summarize the internal and external education and outreach activities the Illicit Discharge Detection and Elimination Component has conducted over the past year:

- During field investigations of complaint calls, field staff disseminates public education and outreach information to violators and adjacent residents/businesses. Other IC/ID education addressed through the public education program is described in the Watershed Annual Report.

Summarize new activities or improvements to be implemented next year as a result of your self assessment of the Illicit Discharge Detection and Elimination Component:

- The District will continue to implement the existing program pending any changes in the upcoming fourth-term MS4 Permit.

Other Comments:

N/A

8. PUBLIC PARTICIPATION

1) A Description of Efforts to Include the Public in Urban Runoff Management Programs during the Reporting Period (i.e., river clean-ups, volunteer monitoring, Permittee council meetings related to the SWMP, etc.):

Public involvement programs for this reporting period are described in the Watershed Annual Report and have included:

a) Technical Advisory Committee meetings held on a monthly basis.

b) Participation in SMR Executive Management Team.

c) The Santa Margarita Watershed Cleanup described in section G.7.3 of the Watershed Annual Report included over 120 public volunteers and removed 12 tons of waste from the Santa Margarita Watershed.

d) Through the regionally implemented programs supported in part by the District, fifty-four (54) Household Hazardous Waste collection events have been held, involving the public in ensuring that wastes are disposed of properly. During this reporting period there were 3,300 participants in the collection events.

2) Additional Comments/Information:

N/A

9. FISCAL ANALYSIS COMPONENT

Fiscal Analysis Component - each Permittee shall include an annual fiscal analysis, for each fiscal year covered by Order No. R9-2004-001, in its Individual Annual Report. This analysis shall evaluate the expenditures (such as capital, operation and maintenance, education, and administrative expenditures) necessary to accomplish the activities of the Permittee's Individual SWMP. The analysis shall include the following:

1) **A Report of the Previous Reporting Period's Budget and a Budget for the Upcoming Reporting Period. To the Extent Possible, the Budgets should be Broken Down by the following Programs:**

   Expenditures identified below reflect costs incurred by the District for implementing its own NPDES Program **and** for implementing the Regional Watershed Program. The District does not track its direct implementation costs separately nor does it track costs separately for many permit provisions.

Program Element	Fiscal Year 2008-2009		Fiscal Year 2009-2010	
	Capital Expenditures	**O&M/ Admin Expenditure**	**Capital Budget**	**O&M/ Admin Budget**
Program Management [(a)]	N/A	$393,606	N/A	$582,590
Development Planning [(b)]	N/A	N/A	N/A	N/A
Construction Inspections [(c)]	N/A	$0	N/A	$149,040
Industrial and Commercial Inspections (CAP Program) [(d)]	N/A	$25,000	N/A	$19,830
Illicit Connections & Illegal Discharges Program (HAZMAT, HHW/ABOP Collections) [(d)]	N/A	$66,500	N/A	$66,500
Municipal Facilities and Activities	N/A	$1,069,539	N/A	$1,356,100
Training, Public Education & Outreach [(e)]	N/A	$69,000	N/A	$74,910
Monitoring Program [(e)]	N/A	$307,158	N/A	$200,200
Other	N/A	$0	N/A	$0
Total	**N/A**	**$1,930,803**	**N/A**	**$2,449,170**

(a) Program Management includes all costs not directly tracked below, and includes staffing, administration & overhead, and consultant services.

(b) The District does not have any individual costs associated with this program element, however a brief description follows that identifies manpower requirements for the District's assistance to the County of Riverside in reviewing development proposals.

(c) Costs are not directly tracked for this Program Element, however a brief description follows that identifies manpower requirements for this element.

(d) The District does not have any individual costs associated with this program element. Costs shown are for the indicated regionally implemented program.

(e) Costs for this element are not tracked separately from the District-Implemented Regional Programs and as such, shown costs are inclusive of costs incurred for implementing the regional element.

9. FISCAL ANALYSIS COMPONENT
CONTINUED

Construction Inspection – The District's Construction Inspectors are trained to address construction related NPDES issues associated with District administered construction projects (storm drains, channels, levees, basins, etc.) and ensure the proper construction of District maintained MS4 that are being constructed as part of private development projects. They perform these inspections as part of their normal duties. The District's NPDES Section staff also has an individual assigned to review SWPPPs associated with District administered construction projects. The NPDES staff person also provides a training presentation on NPDES related construction issues at construction project pre-construction meetings for the benefit of the contractor. Costs for Construction Inspection obligations for the Santa Margarita Watershed are recovered from the District's ad-valorum tax revenues collected within the Santa Margarita Region of the County.

Development Planning – At the request of the County, the District's Development Review staff are reviewing proposed development projects in the unincorporated Riverside County area for compliance with the DAMP and the County's individual SWMP, recommending conditions of approval relative to water quality/NPDES and reviewing preliminary Project-Specific WQMPs and associated plans within the unincorporated County. Costs incurred by the District's Development Review and Plan Check staff for Development Planning permit obligations are directly recovered via development review and plan check fees charged to the development proponent.

9. FISCAL ANALYSIS COMPONENT
CONTINUED

2) A Description of the Source(s) of Funds that were Utilized during the Previous Fiscal Year and the Source(s) of Funds Proposed to Meet the Necessary Expenditures for the Subsequent Year, including Legal Restrictions on the use of such Funds.

Source of Funds[a]	FY 2008-2009 Revenues	Percent of Total Program Funding	Restrictions on Use (if applicable)
Santa Margarita Watershed Benefit Assessment Fund	$444,830	22.9%	District NPDES compliance costs, excess funds used to fund regional NPDES activities.
Santa Margarita Watershed Permittee Implementation Agreement	$422,323	21.7%	Regional NPDES Compliance Programs.
Zone 7 Ad-Valorem Tax Allocation	$1,069,539	54.9%	Costs associated with District's compliance with Municipal Construction component of Board Order R9-2004-001.
Developer Development Review/Plan Check Fees	Unknown [b]	Unknown	Costs associated with review of proposed developments in the unincorporated County
Spending Against Reserves	$0	0%	District NPDES Compliance Costs
Miscellaneous Revenue	~$10,000	0.5%	Interest, Other Misc.
TOTAL	**1,946,692**	**100%**	

(a) evenue sources do not change from year to year.

(b) The District does not have any individual costs associated with the review of development projects. Costs incurred through plan review assistance to County are directly recovered from the project proponent and are not separately tracked.

3) Additional Comments/Information:

The District is working to leverage funds for regional planning objectives including:

Santa Ana Watershed Project Authority – Jointly fund a LID BMP testing and demonstration facility. This effort is described in the Watershed Annual Report, in Appendix G, Section G-7.

Joint Permittee Efforts - Additional efforts to leverage funds are jointly being made with the SMR permittees. These efforts are described in Section G.11 of the Watershed Annual Report.

10. NON-STORM WATER DISCHARGES

Permittees shall report on any discharge category listed in Requirement B.2 of Order No. R9-2004-001 that was identified as a source of pollutants during the reporting period. For each identified category, the Permittee shall report whether it elected to prohibit the discharge or to require BMPs to reduce pollutants in the discharge to the MEP. If the discharge is not prohibited, the BMPs that will be implemented, or required to be implemented, shall be described in each Permittee's Individual SWMP Annual Report.

Category	Prohibited	BMP to be Implemented
Diverted stream flows	☐ Yes ☒ No	Not Applicable, no applications
Rising ground waters	☐ Yes ☒ No	Not Applicable, no applications
Uncontaminated ground water infiltration [as defined at 40CFR35.2005(20)] to MS4s	☐ Yes ☒ No	Not Applicable, no applications
Uncontaminated pumped ground water	☐ Yes ☒ No	Not Applicable, no applications
Foundation drains	☐ Yes ☒ No	Not Applicable, no applications
Springs	☐ Yes ☒ No	Not Applicable, no applications
Water from crawl space pumps	☐ Yes ☒ No	Not Applicable, no applications
Footing drains	☐ Yes ☒ No	Not Applicable, no applications
Air conditioning condensation	☐ Yes ☒ No	Not Applicable, no applications
Flows from riparian habitats and wetlands	☐ Yes ☒ No	Not Applicable, no applications
Water line flushing	☐ Yes ☒ No	Not Applicable, no applications
Landscape irrigation	☐ Yes ☒ No	Not Applicable, no applications
Discharges from potable water sources not subject to NPDES Permit No. CAG679001, other than water main breaks	☐ Yes ☒ No	Not Applicable, no applications
Irrigation water	☐ Yes ☒ No	Not Applicable, no applications
Lawn watering	☐ Yes ☒ No	Not Applicable, no applications
Individual residential car washing	☐ Yes ☒ No	Not Applicable, no applications
Non-emergency fire fighting flows	☐ Yes ☒ No	Not Applicable, no applications
Dechlorinated swimming pool discharges	☐ Yes ☒ No	Not Applicable, no applications

10. NON-STORM WATER DISCHARGES
CONTINUED

Additional Comments/Information:

The District requires a Third-Party Non-Stormwater Discharge Application to be completed for any encroachment involving a non-stormwater discharge into District facilities. The application requires the applicant to characterize the discharge, including a chemical analysis of the flow when possible. Where the discharges would contain contaminants exceeding receiving water standards, BMPs are required or the specific discharge would be prohibited. No evidence has been identified to date that would indicate that a specific class, or classes, of allowable non-stormwater discharges are persistent sources of pollution per Requirement B.2.

11. RECEIVING WATER LIMITATIONS

This section includes the report required pursuant to Requirement C.2.a. of Order No. R9-2004-001, if applicable.

Requirement C.2.a. states:

"Upon a determination by either a Permittee or the SDRWQCB that MS4 discharges are causing or contributing to an exceedance of an applicable water quality standard, the Permittee shall promptly notify and thereafter submit a report to the SDRWQCB that describes BMPs that are currently being implemented and additional BMPs that will be implemented to prevent or reduce any pollutants that are causing or contributing to the exceedance of water quality standards. The report may be incorporated in the SWMP Annual Report unless the SDRWQCB directs an earlier submittal. The report shall include an implementation schedule. The SDRWQCB may require modifications to the report."

Each reporting period, the District collects and reviews monitoring data as part of Appendix G of the Watershed Annual Report. Based on the results of this monitoring data, pollutants of concern are identified and prioritized. Programs necessary to control these pollutants of concern are also identified in Appendix G and incorporated into the Permittees compliance programs.

12. ADDITIONAL URBAN RUNOFF DATA

This Section is a Summary of all Urban Runoff Related Data not included in the Annual Monitoring Report (e.g., special investigations).

The District did not collect any supplemental data that is not otherwise reported in the Monitoring Report (Appendix G of the Watershed Report).

13. PROPOSED REVISIONS TO THE INDIVIDUAL SWMP

This Section Includes Proposed Revisions to the Individual SWMP, Including Areas in Need of Improvement Based on the Assessment of Effectiveness of Each Program Component.

The District, together with the Permittees has developed a comprehensive set of recommended revisions their compliance programs that was included in their 2009 ROWD. Using these recommendations as a framework, the District plans to work with the Regionional Board in the development of their fourth-term MS4 permit to ensure they continue to reduce pollutant discharges to the receiving waters to the MEP. Upon adoption of the fourth-term MS4 Permit, the District commits to update their Individual SWMPs in accordance with the requirements and schedules therein.

The preceeding sections of this annual report identify other recommended activities to address water quality within the SMR that will be continued or initiated within the next reporting period. These recommended activities, while demonstrating the District's iterative management of its programs, are within the existing framework of, and do not necessitate any revisions to the Individual SWMP. As such, no further revisions to the Individual SWMP are proposed at this time.

ATTACHMENT A

WQMP TRACKING REPORT

Riverside County Flood Control and Water Conservation District

Subdivision Cases Responded Date from 7/1/2008 to 6/30/2009

Type	Case Number	Received Date	Watershed	Response Date	Engineer Name	WQMP	Status
COC	COC-06855	07/23/2008	Santa Margarita	08/12/2008	Shaheen Mooman	NO	Approved
CUP	CUP-03403	02/17/2009	Santa Margarita	02/04/2009	Charles de Chambeau	YES	Approved
CUP	CUP-03471	06/05/2009	Santa Margarita	06/09/2009	Shaheen Mooman	NO	Approved
CUP	CUP-03545	08/13/2008	Santa Margarita	08/25/2008	Charles de Chambeau	YES	Approved
CUP	CUP-03556	05/08/2008	Santa Margarita	07/07/2008	Eric Russell	YES	Approved
CUP	CUP-03572	11/25/2008	Santa Margarita	12/22/2008	Eric Russell	YES	Approved
CUP	CUP-03593	07/07/2008	Santa Margarita	09/17/2008	Tina Hanson	YES	Denied
CUP	CUP-03606	12/03/2008	Santa Margarita	12/17/2008	Tina Hanson	YES	Approved
CZ-	CZ-07180	05/22/2008	Santa Margarita	05/11/2009	Tina Hanson	NO	Locked
CZ-	CZ-07484	03/07/2007	Santa Margarita	08/05/2008	Kamyar Ghods	NO	Approved
CZ-	CZ-07659	09/04/2008	Santa Margarita	09/25/2008	Tina Hanson	NO	Approved
CZ-	CZ-07662	10/29/2008	Santa Margarita	11/18/2008	Shaheen Mooman	NO	Approved
CZ-	CZ-07663	09/23/2008	Santa Margarita	10/16/2008	Tina Hanson	NO	Approved
CZ-	CZ-07665	06/17/2008	Santa Margarita	07/08/2008	Charles de Chambeau	NO	Approved
CZ-	CZ-07674	07/29/2008	Santa Margarita	08/07/2008	Michele Martin	NO	Approved
CZ-	CZ-07678	09/15/2008	Santa Margarita	10/09/2008	Shaheen Mooman	NO	Approved
CZ-	CZ-07682	10/27/2008	Santa Margarita	11/18/2008	Eric Russell	NO	Approved
CZ-	CZ-07692	12/23/2008	Santa Margarita	01/15/2009	Tina Hanson	NO	Approved
CZ-	CZ-07701	03/10/2009	Santa Margarita	04/09/2009	Tina Hanson	NO	Approved
CZ-	CZ-07709	04/27/2009	Santa Margarita	05/13/2009	Eric Russell	NO	Approved
EIR	EIR-00475	04/22/2009	Santa Margarita	05/07/2009	Charles de Chambeau	YES	Denied
EIR	EIR-00517	05/04/2009	Santa Margarita	06/01/2009	Shaheen Mooman	NO	Denied
FT-	FT-2008-21	12/23/2008	Santa Margarita	01/12/2009	Charles de Chambeau	YES	Denied
FT-	FT-2009-01	02/25/2009	Santa Margarita	03/10/2009	Eric Russell	NO	Approved
LLA	LLA-05073	05/21/2009	Santa Margarita	06/08/2009	Tina Hanson	NO	Approved
LLA	LLA-05274	03/24/2008	Santa Margarita	08/14/2008	Michele Martin	NO	Approved
LLA	LLA-05311	10/06/2008	Santa Margarita	10/28/2008	Charles de Chambeau	NO	Approved
LLA	LLA-05312	10/14/2008	Santa Margarita	11/05/2008	Charles de Chambeau	NO	Approved
LLA	LLA-05317	12/03/2008	Santa Margarita	01/12/2009	Shaheen Mooman	NO	Approved
LLA	LLA-05326	03/17/2009	Santa Margarita	04/06/2009	Shaheen Mooman	NO	Approved
LLA	LLA-05327	02/13/2009	Santa Margarita	02/23/2009	Eric Russell	NO	Approved
LLA	LLA-05328	02/13/2009	Santa Margarita	02/27/2009	Tina Hanson	NO	Approved
LLA	LLA-05330	02/17/2009	Santa Margarita	02/23/2009	Eric Russell	NO	Locked
LLA	LLA-05339	04/16/2009	Santa Margarita	05/06/2009	Shaheen Mooman	NO	Approved
MS-	MS-00116		Santa Margarita	07/08/2008	Charles de Chambeau	YES	Approved
PM-	PM-29512	10/29/2008	Santa Margarita	11/04/2008	Shaheen Mooman	NO	Approved
PM-	PM-30038	07/02/2008	Santa Margarita	07/10/2008	Shaheen Mooman	NO	Approved
PM-	PM-30363	12/19/2008	Santa Margarita	03/19/2009	Shaheen Mooman	NO	Pass
PM-	PM-30790	12/04/2008	Santa Margarita	12/17/2008	Charles de Chambeau	YES	Approved
PM-	PM-32257	02/17/2009	Santa Margarita	02/26/2009	Charles de Chambeau	YES	Approved
PM-	PM-32749	09/02/2008	Santa Margarita	09/09/2008	Michele Martin	NO	Approved
PM-	PM-32875	02/03/2009	Santa Margarita	03/02/2009	Tina Hanson	NO	Approved
PM-	PM-32981	12/04/2008	Santa Margarita	01/08/2009	Shaheen Mooman	NO	Approved
PM-	PM-33262	07/24/2008	Santa Margarita	07/29/2008	Shaheen Mooman	NO	No Route
PM-	PM-33345	06/04/2008	Santa Margarita	07/09/2008	Shaheen Mooman	NO	Approved
PM-	PM-33391	09/02/2008	Santa Margarita	09/23/2008	Shaheen Mooman	NO	Approved
PM-	PM-33434	11/19/2008	Santa Margarita	12/09/2008	Charles de Chambeau	YES	Denied
PM-	PM-33463	12/01/2008	Santa Margarita	12/24/2008	Shaheen Mooman	NO	Pass
PM-	PM-33581	04/27/2009	Santa Margarita	05/19/2009	Shaheen Mooman	YES	Approved
PM-	PM-33750	07/07/2008	Santa Margarita	09/17/2008	Tina Hanson	NO	Denied
PM-	PM-33789	01/23/2009	Santa Margarita	01/27/2009	Shaheen Mooman	NO	No Route
PM-	PM-33817	03/31/2008	Santa Margarita	07/21/2008	Everett Duckworth	YES	Approved
PM-	PM-33831	01/13/2009	Santa Margarita	02/02/2009	Tina Hanson	YES	Approved
PM-	PM-33928	06/24/2008	Santa Margarita	07/07/2008	Shaheen Mooman	NO	Approved
PM-	PM-34218	05/26/2009	Santa Margarita	06/08/2009	Shaheen Mooman	YES	Approved
PM-	PM-34340	07/24/2008	Santa Margarita	07/29/2008	Shaheen Mooman	NO	Approved
PM-	PM-34343	02/03/2009	Santa Margarita	02/11/2009	Shaheen Mooman	NO	No Route
PM-	PM-34624	10/29/2008	Santa Margarita	11/20/2008	Shaheen Mooman	YES	Approved
PM-	PM-34634	09/30/2008	Santa Margarita	10/22/2008	Shaheen Mooman	NO	No Route
PM-	PM-34669	11/10/2008	Santa Margarita	11/19/2008	Charles de Chambeau	YES	Denied

Riverside County Flood Control and Water Conservation District

Subdivision Cases Responded Date from 7/1/2008 to 6/30/2009

Type	Case Number	Received Date	Watershed	Response Date	Engineer Name	WQMP	Status
PM-	PM-35212	01/26/2009	Santa Margarita	02/11/2009	Charles de Chambeau	YES	Approved
PM-	PM-35220	04/01/2009	Santa Margarita	04/07/2009	Shaheen Mooman	NO	No Route
PM-	PM-35399	10/30/2008	Santa Margarita	11/04/2008	Shaheen Mooman	NO	Approved
PM-	PM-35410	03/10/2009	Santa Margarita	04/09/2009	Tina Hanson	NO	Denied
PM-	PM-35548	05/19/2009	Santa Margarita	06/05/2009	Shaheen Mooman	NO	Approved
PM-	PM-35596	03/03/2009	Santa Margarita	03/11/2009	Eric Russell	NO	Approved
PM-	PM-35656	07/24/2008	Santa Margarita	08/12/2008	Shaheen Mooman	NO	Approved
PM-	PM-35683	03/23/2009	Santa Margarita	06/09/2009	Tina Hanson	NO	Approved
PM-	PM-35849	12/23/2008	Santa Margarita	01/15/2009	Tina Hanson	YES	Approved
PM-	PM-35887	11/19/2008	Santa Margarita	12/15/2008	Shaheen Mooman	NO	Approved
PM-	PM-35923	05/05/2008	Santa Margarita	07/10/2008	Charles de Chambeau	YES	Approved
PM-	PM-36039	10/27/2008	Santa Margarita	11/18/2008	Eric Russell	NO	Approved
PM-	PM-36049	11/25/2008	Santa Margarita	01/23/2009	Charles de Chambeau	YES	Denied
PM-	PM-36050	05/19/2009	Santa Margarita	06/04/2009	Shaheen Mooman	NO	Approved
PM-	PM-36161	04/27/2009	Santa Margarita	05/14/2009	Eric Russell	NO	Approved
PP-	PP-03243	10/16/2008	Santa Margarita	11/07/2008	Tina Hanson	NO	Approved
PP-	PP-12246	03/24/2008	Santa Margarita	10/06/2008	Tina Hanson	YES	Denied
PP-	PP-16891	05/04/2009	Santa Margarita	05/21/2009	Shaheen Mooman	YES	Approved
PP-	PP-16949	09/16/2008	Santa Margarita	10/01/2008	Eric Russell	NO	Approved
PP-	PP-17345	04/01/2009	Santa Margarita	04/09/2009	Shaheen Mooman	NO	Approved
PP-	PP-19414	06/05/2009	Santa Margarita	06/09/2009	Shaheen Mooman	NO	Approved
PP-	PP-19998	11/25/2008	Santa Margarita	12/03/2008	Eric Russell	NO	Approved
PP-	PP-20375	09/08/2008	Santa Margarita	09/24/2008	Michele Martin	YES	Approved
PP-	PP-20384	07/15/2008	Santa Margarita	07/22/2008	Shaheen Mooman	NO	Approved
PP-	PP-20392	06/05/2009	Santa Margarita	06/09/2009	Shaheen Mooman	NO	Approved
PP-	PP-21375	01/06/2009	Santa Margarita	01/27/2009	Charles de Chambeau	YES	Denied
PP-	PP-21570	03/10/2009	Santa Margarita	04/07/2009	Eric Russell	YES	Approved
PP-	PP-21750	11/10/2008	Santa Margarita	11/19/2008	Charles de Chambeau	YES	Denied
PP-	PP-22217	12/23/2008	Santa Margarita	01/07/2009	Eric Russell	YES	Approved
PP-	PP-22282	02/05/2009	Santa Margarita	03/18/2009	Tina Hanson	NO	Pass
PP-	PP-22569	04/27/2009	Santa Margarita	06/09/2009	Eric Russell	YES	Denied
PP-	PP-23017	10/30/2008	Santa Margarita	12/31/2008	Tina Hanson	NO	Approved
PP-	PP-23175	12/10/2008	Santa Margarita	12/30/2008	Shaheen Mooman	NO	No Route
PP-	PP-23215	03/03/2009	Santa Margarita	03/25/2009	Shaheen Mooman	NO	Approved
PP-	PP-23233	01/31/2008	Santa Margarita	07/15/2008	Everett Duckworth	YES	Denied
PP-	PP-23289	05/23/2008	Santa Margarita	07/10/2008	Charles de Chambeau	YES	Approved
PP-	PP-23318	10/15/2008	Santa Margarita	11/03/2008	Shaheen Mooman	YES	Approved
PP-	PP-23319	10/15/2008	Santa Margarita	11/03/2008	Shaheen Mooman	YES	Approved
PP-	PP-23320	10/15/2008	Santa Margarita	11/03/2008	Shaheen Mooman	YES	Approved
PP-	PP-23333	06/12/2008	Santa Margarita	07/03/2008	Eric Russell	NO	Locked
PP-	PP-23343	11/18/2008	Santa Margarita	12/17/2008	Tina Hanson	YES	Denied
PP-	PP-23376	05/26/2009	Santa Margarita	06/02/2009	Shaheen Mooman	YES	Denied
PP-	PP-23404	12/04/2008	Santa Margarita	12/17/2008	Charles de Chambeau	YES	Denied
PP-	PP-23450	06/17/2008	Santa Margarita	07/14/2008	Eric Russell	NO	Approved
PP-	PP-23492	07/16/2008	Santa Margarita	08/06/2008	Tina Hanson	NO	Approved
PP-	PP-23786	10/14/2008	Santa Margarita	10/27/2008	Shaheen Mooman	NO	Approved
PP-	PP-23819	05/19/2009	Santa Margarita	05/20/2009	Charles de Chambeau	YES	Denied
PP-	PP-23860	11/25/2008	Santa Margarita	12/17/2008	Tina Hanson	NO	Approved
PP-	PP-23896	12/08/2008	Santa Margarita	12/30/2008	Shaheen Mooman	NO	Denied
PP-	PP-23916	12/23/2008	Santa Margarita	01/15/2009	Tina Hanson	NO	Approved
PP-	PP-23975	06/02/2009	Santa Margarita	06/25/2009	Eric Russell	YES	Approved
PP-	PP-24046	04/20/2009	Santa Margarita	05/14/2009	Shaheen Mooman	NO	Approved
PP-	PP-24047	04/15/2009	Santa Margarita	05/07/2009	Tina Hanson	YES	Denied
PP-	PP-24054	04/27/2009	Santa Margarita	05/14/2009	Eric Russell	YES	Approved
PUP	PUP-00593	01/06/2009	Santa Margarita	02/04/2009	Eric Russell	YES	Denied
PUP	PUP-00895	04/01/2009	Santa Margarita	05/28/2009	Shaheen Mooman	YES	Approved
PUP	PUP-00901	02/17/2009	Santa Margarita	03/02/2009	Shaheen Mooman	YES	Approved
PUP	PUP-00904	03/17/2009	Santa Margarita	04/14/2009	Tina Hanson	YES	Denied
SMP	SMP-00213	04/17/2009	Santa Margarita	04/28/2009	Charles de Chambeau	YES	Approved
SP-	SP-00106	12/04/2008	Santa Margarita	12/17/2008	Charles de Chambeau	NO	Approved

Riverside County Flood Control and Water Conservation District

Subdivision Cases Responded Date from 7/1/2008 to 6/30/2009

Type	Case Number	Received Date	Watershed	Response Date	Engineer Name	WQMP	Status
SUP	SUP-01331	12/27/2007	Santa Margarita	09/03/2008	Shaheen Mooman	NO	Approved
SUP	SUP-01372	08/27/2008	Santa Margarita	09/18/2008	Michele Martin	NO	Approved
SUP	SUP-01375	09/16/2008	Santa Margarita	09/30/2008	Shaheen Mooman	NO	Approved
SUP	SUP-01381	12/18/2008	Santa Margarita	01/12/2009	Tina Hanson	NO	Denied
SUP	SUP-01382	10/15/2008	Santa Margarita	12/15/2008	Tina Hanson	NO	Approved
SUP	SUP-01385	11/12/2008	Santa Margarita	11/26/2008	Shaheen Mooman	NO	Approved
SUP	SUP-01393	03/19/2009	Santa Margarita	04/07/2009	Eric Russell	NO	Approved
TR-	TR-31871	03/31/2008	Santa Margarita	07/11/2008	Everett Duckworth	YES	Approved
TR-	TR-32035	09/18/2008	Santa Margarita	11/05/2008	Tina Hanson	NO	Denied
TR-	TR-32286	02/02/2009	Santa Margarita	02/27/2009	Tina Hanson	YES	Approved
TR-	TR-32778	07/22/2008	Santa Margarita	07/29/2008	Shaheen Mooman	NO	Approved
TR-	TR-32896	12/12/2008	Santa Margarita	12/29/2008	Charles de Chambeau	NO	Approved
TR-	TR-32988	01/28/2009	Santa Margarita	02/20/2009	Eric Russell	YES	Approved
TR-	TR-33254	07/01/2008	Santa Margarita	07/29/2008	Eric Russell	NO	Approved
TR-	TR-33356	10/02/2008	Santa Margarita	10/29/2008	Tina Hanson	YES	Approved
TR-	TR-33423	12/16/2008	Santa Margarita	12/31/2008	Charles de Chambeau	YES	Approved
TR-	TR-33751	07/07/2008	Santa Margarita	09/17/2008	Tina Hanson	NO	Denied
TR-	TR-34150	06/02/2009	Santa Margarita	06/23/2009	Eric Russell	YES	Denied
TR-	TR-34676	04/14/2008	Santa Margarita	07/17/2008	Shaheen Mooman	YES	Denied
TR-	TR-35161	01/28/2009	Santa Margarita	02/19/2009	Charles de Chambeau	YES	Denied
TR-	TR-35815	09/04/2008	Santa Margarita	10/08/2008	Tina Hanson	YES	Approved
TR-	TR-35924	11/18/2008	Santa Margarita	12/17/2008	Tina Hanson	YES	Denied
TR-	TR-36063	10/30/2008	Santa Margarita	11/25/2008	Tina Hanson	NO	Approved
TUP	TUP-00197	11/05/2008	Santa Margarita	12/16/2008	Tina Hanson	NO	Denied
UPH	UPH-00578	06/05/2008	Santa Margarita	07/09/2008	Shaheen Mooman	NO	Approved
UPH	UPH-00579	06/05/2008	Santa Margarita	07/09/2008	Shaheen Mooman	NO	Approved
UPH	UPH-00580	06/05/2008	Santa Margarita	07/09/2008	Shaheen Mooman	NO	Approved
UPH	UPH-00607	02/11/2008	Santa Margarita	07/30/2008	Charles de Chambeau	NO	Approved
UPH	UPH-00608	02/11/2008	Santa Margarita	07/30/2008	Charles de Chambeau	NO	Approved
UPH	UPH-00609	02/11/2008	Santa Margarita	07/30/2008	Charles de Chambeau	NO	Approved
UPH	UPH-00610	02/11/2008	Santa Margarita	07/30/2008	Charles de Chambeau	NO	Approved
UPH	UPH-00611	02/11/2008	Santa Margarita	07/30/2008	Charles de Chambeau	NO	Approved
UPH	UPH-00618	08/25/2008	Santa Margarita	09/22/2008	Tina Hanson	NO	Approved
UPH	UPH-00619	08/25/2008	Santa Margarita	09/22/2008	Tina Hanson	NO	Approved
UPH	UPH-00620	08/25/2008	Santa Margarita	09/22/2008	Tina Hanson	NO	Approved
UPH	UPH-00621	08/25/2008	Santa Margarita	09/22/2008	Tina Hanson	NO	Approved
UPH	UPH-00622	08/25/2008	Santa Margarita	09/22/2008	Tina Hanson	NO	Approved
UPH	UPH-00623	08/25/2008	Santa Margarita	09/22/2008	Tina Hanson	NO	Approved
WQ-	WQ-00005	05/21/2009	Santa Margarita	05/21/2009	Charles de Chambeau	YES	Approved
WQ-	WQ-00006	05/12/2009	Santa Margarita	05/20/2009	Charles de Chambeau	YES	Approved

ATTACHMENT B

WQMP EXAMPLE CONDITIONS

Project Specific
Preliminary Water Quality Management Plan

For:

TENTATIVE TRACT MAP NO. 35161

36050 POURROY ROAD

SOUTHEAST OF THOMPSON ROAD AND POURROY ROAD INTESECTION

DESIGN REVIEW NO. TR35161

Prepared for:

JOSEPH TURLEY
309 West Columbine Street
Santa Ana, CA 92707
(714) 241-1771

RECEIVED
JUL 28 2009
RIVERSIDE COUNTY FLOOD CONTROL
AND WATER CONSERVATION DISTRICT
DEVELOPMENT REVIEW/PLAN CHECK

Prepared by:

HUNSAKER & ASSOCIATES IRVINE, INC.
3 HUGHES
IRVINE, CA 92618
(949) 583-1010
Daniel P. Gerken, CPESC, CPSWQ

Prepared: July 6, 2009

W.O. 3178-1

OWNER'S CERTIFICATION

This project-specific Water Quality Management Plan (WQMP) has been prepared for:

Joseph Turley

by **Hunsaker & Associates Irvine, Inc.** for the project known as **Tentative Tract 35161** at **36050 Pourroy Road (Southeast of Thompson Road and Pourroy Road).**

This WQMP is intended to comply with the requirements of the **County of Riverside** for **Tentative Tract Map No. 35161**, which includes the requirement for the preparation and implementation of a project-specific WQMP.

The undersigned, while owning the property/project described in the preceding paragraph, shall be responsible for the implementation of this WQMP and will ensure that this WQMP is amended as appropriate to reflect up-to-date conditions on the site. This WQMP will be reviewed with the facility operator, facility supervisors, employees, tenants, maintenance and service contractors, or any other party (or parties) having responsibility for implementing portions of this WQMP. At least one copy of this WQMP will be maintained at the project site or project office in perpetuity.

The undersigned is authorized to certify and to approve implementation of this WQMP. The undersigned is aware that implementation of this WQMP is enforceable under The County of Riverside Water Quality Ordinance (Municipal Code Section 13.12; Ord. 754.1).

If the undersigned transfers its interest in the subject property/project, its successor in interest the undersigned shall notify the successor in interest of its responsibility to implement this WQMP.

"I, the undersigned, certify under penalty of law that the provisions of this WQMP have been reviewed and accepted and that the WQMP will be transferred to future successors in interest."

Owner's Signature	Date
Owner's Printed Name	Owner's Title/Position

Joseph Turley
309 West Columbine Street
Santa Ana, CA 92707
(714) 241-1771

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H. PHASE 1 ENVIRONMENTAL SITE ASSESSMENT – SUMMARY OF SITE REMEDIATION CONDUCTED AND USE RESTRICTIONS

I. Project Description

Project Owner: Joseph Turley
309 West Columbine Street
Santa Ana, CA 92707
(714) 241-1771
Contact: Martin Turley

WQMP Preparer: Hunsaker and Associates Irvine, Inc.
3 Hughes
Irvine, CA 92618
Telephone: (949) 583-1010
Preparer: Tommy I. Hsu, CPESC, CPSWQ

Project Site Address: 36050 Pourroy Road, located Southeast of Thompson Road and Pourroy Road.

Planning Area/ Community Name/ Development Name: Planning Area No. 34, Winchester 1800, Specific Plan No. 286
Tentative Tract No. 35161

APN Number(s): 964-010-001

Thomas Bros. Map: Page 899; Grid E-7 – Riverside County (2005 Edition)

Project Watershed: Santa Margarita River Watershed

Sub-watershed: Murrieta Creek Watershed

Project Site Size: 19.4 Acres

Standard Industrial Classification (SIC) Code: Not applicable. Proposed project is a residential development.

Formation of Home Owners' Association (HOA)/Property Owners' Association (POA):

Y ☒ N ☐

An HOA will be established for the proposed development. The HOA shall be responsible for parkway landscaping located adjacent to Galleano Avenue, the proposed storm water treatment BMP's, as well as the storm water detention basin. All improvements outside of the private lots and not within the jurisdiction of the HOA shall be considered public improvements, to be owned and maintained by the County of Riverside. The developer shall act as the responsible party for French Valley until the County of Riverside accepts responsibility for the project's public common areas. **The contact person for Joseph Turley is Mr. Martin Turley.**

Additional Permits/Approvals required for the Project:

AGENCY	Permit required (yes or no)
State Department of Fish and Game, 1601 Streambed Alteration Agreement	Y ☐ N ☒
State Water Resources Control Board, Clean Water Act (CWA) Section 401 Water Quality Certification	Y ☐ N ☒
US Army Corps of Engineers, CWA section 404 permit	Y ☐ N ☒
US Fish and Wildlife, Endangered Species Act section 7 biological opinion	Y ☐ N ☒
Other *(please list in the space below as required):* County of Riverside Grading/Building Permit	Y ☒ N ☐

Joseph Turley proposes the development of Tentative Tract 35161 as "French Valley" (the "Project"). The project is located at the southeast corner of the Thompson Road and Pourroy Road intersection, in an unincorporated area of Riverside County, California. The project site is to the north by Thompson Road, with single-family homes and rural developments beyond; to the east by open space and rural development; to the south by Galleano Avenue and rural developments beyond; and to the west by Pourroy Road and single-single family homes beyond. Entrance to the site shall be obtained from Thompson Road to the north and Galleano Avenue to the south (See exhibits in Appendix B).

The project site consists of approximately 19.4 acres of undeveloped land that historically has been used for some agricultural crops, but for the most part, the land has been tilled and undeveloped. The proposed project will consist of 51 single-family detached residences with a minimum lot size of 7,200 square feet and average lot size of 9,998 square feet, streets curb, gutter and, infrastructure improvements, including wet and dry utilities and storm drains, pedestrian walkways, treatment BMP's and a storm water detention basin. The approximate land use summary is subject to change and is as follows:

Land Use Summary

Lots	Land Use	Acreage
1-51	Residential Lots	11.7
A	Sand Filter Water Quality Basin	1.6
B	Landscape Development Zone Per Winchester 1800 Specific Plan No. 286	0.5
--	Roads	5.6
Total	--	19.4

Paved areas for the site include project streets, curbs, sidewalks and gutters, and homeowner driveways and patios located within individual lots. Pervious areas for the site include Lot A (storm water detention basin) and Lot B (Landscape Development Zone) and other miscellaneous landscape areas, which include private parkway landscaping and private homeowner lawns and gardens. These areas shall include native/drought tolerant plant species. All private landscaping shall be maintained by the homeowner and the HOA, as appropriate. Landscaping located in the public areas will be owned and maintained by the County of Riverside through Community Service Area (CSA) or Valley Wide Recreation and Park District.

Parking for the site includes covered garage spaces and driveways for residents and guests, as well as on-street public parking. Total parking spaces shall be consistent with the County of Riverside's parking regulations, standards and requirements.

Outdoor activities for the project include commuting, walking, jogging, playing, gardening and other common residential activities.

No community pools, recreation areas, parks, tot lots or car wash areas have been proposed for the project. Additionally, since the project is residential, no material delivery and storage areas or loading docks have been proposed. However, each homeowner's drive way is available for applicable individual deliveries and each homeowner's garage will serve as an applicable storage area for miscellaneous household items.

Normal single family home homeowner use related trash can be anticipated, from curb side, to be produced daily by each home's intended daily use. Such trash will be disposed of by each homeowner and removed by the local private waste management company on a weekly basis for proper disposal to a central trash disposal facility offsite. All trash containers shall be stored within the individual owner's private areas, to be protected from rain, storm water run-on and wind.

Appendix B of this project-specific WQMP includes a Vicinity Map and a Site Plan for the project. The site plan included as part of Appendix B depicts the following project features:

- Location of all structural BMPs, including Treatment Control BMPs;
- Landscaped areas;
- Paved areas and intended uses (i.e., parking, outdoor work area, outdoor material storage area, sidewalks, patios, tennis courts, etc.);
- Number and type of structures and intended uses (i.e., buildings, tenant spaces, dwelling units, community facilities such as pools, recreation facilities, tot lots, etc.);
- Infrastructure (i.e., streets, storm drains, etc.) that will revert to public agency ownership and operation;
- Location of existing and proposed public and private storm drain facilities (i.e., storm drains, channels, basins, etc.), including catch basins and other inlets/outlet structures;
- Location(s) of Receiving Waters and points where onsite flows exit the property/project site;
- Proposed drainage areas boundaries, including tributary offsite areas, for each location where flows exits the property/project site;
- Pre- and post-project topography.

II. Site Characterization

Land Use Designation or Zoning: The project is located within "French Valley" and the Winchester 1800 Area Plan. Existing land use designation and zoning by the County of Riverside is Medium Density Residential (MDR) and Specific Plan Zone (Winchester 1800 Plan No. 286 – Planning Area 34).

Current Property Use: The site is currently vacant, tilled and unimproved. Onsite structures were removed in June 2007. Based on historical aerial photographs reviewed during preparation of the project's Phase I report, some row crops were present on the site prior to 1979, but for the most part the land has been tilled and unimproved, with some residential structures.

Proposed Project Use: Proposed use as detached single family residential is consistent with existing zoning for MDR.

Availability of Soils Report: Y ☒ N ☐

Geotechnical Review of Tentative Tract 35161, French Valley Area, County of Riverside, California. Prepared by Pacific Soils Engineering, Inc. October 26, 2007.

The site ranges in elevation from approximately 1,400 feet above mean sea level (msl) in the northeastern area to 1,371 feet msl in the west. The general grade is to the south-southwest.

Topographically, the site is situated in the Perris Block of the Peninsular Ranges Province. The site is underlain by middle to early Pleistocene fluvial sediments that were deposited on a broad canyon floor. The sediments consist of moderate to well indurated reddish-brown sand with varying amounts of gravel, silt and clay. Based on the USGS Soil Survey, the site consists primarily of Monserate sandy loam, then Vallecitos loam and Escondido fine sandy loam. Site soils are shown as "C" on the Hydrologic Soils Group Map, Plate C-1.53, in the Riverside County Flood Control Hydrology Manual. Group C soils are characterized as having slow infiltration rates when thoroughly wetted and consisting chiefly of silty-loam soils with a layer that impedes downward movement of water, or soils with moderately fine to fine texture. These soils have slow rate of water transmission.

The site resides within the Temecula Valley groundwater basin and contains five (5) abandoned groundwater wells in the central portion of the site prior to the start of the project's development and construction. Depth to groundwater in these wells was reported to be approximately 45 feet below ground surface during the wells' time of use (approximately 1968).

Phase 1 Site Assessment: Y ☒ N ☐

Appendix H contains a copy of the project's Phase I study: "Phase I Environmental Assessment of the Property Currently Referred to as Tentative Tract No. 36161, 36050 Pourroy Road, Riverside County, California". Carlin Environmental Consulting. October 11, 2007.

Receiving Waters for Urban Runoff from Site:

Receiving Waters	303(d) List Impairments	Designated Beneficial Uses	Proximity to RARE Beneficial Use
Benton Creek Channel - French Valley Hydrologic Unit 2.33	None	MUN, AGR, IND, PROC, REC1, REC2, WARM, WILD	No RARE designation
Warm Springs Creek San Diego Basin Plan Hydrologic Unit 2.33	None	MUN, AGR, IND, PROC, REC1, REC2, WARM, WILD	No RARE designation
Murrieta Creek Hydrologic Unit Basin Number 2.52	Iron (Source unknown); Manganese (Source Unknown); Nitrogen (Source Unknown), Phosphorus (Source Unknown); TMDL for Phosphorous	MUN, AGR, IND, PROC, REC1 (potential), REC2, WARM, WILD	No RARE designation
Upper Santa Margarita River San Diego Basin Plan Hydrologic Unit 2.22	Phosphorus (Urban Runoff, Storm Sewers, Unknown nonpoint source, Unknown point source); TMDL for Phosphorous	MUN, AGR,IND, PROC, REC1, REC2, WARM, WILD, RARE	Approximately 13.2 miles from site to RARE designation (Santa Margarita River)
Santa Margarita Lagoon San Diego Basin Plan Hydrologic Unit 2.11	Eutrophic (Nutrients) (Nonpoint/point source); TMDL for Eutrophic (Nutrients)	REC1, REC2, EST, WILD, RARE, MAR, MIGR, SPWN	Approximately 41.7 miles to RARE designation (Santa Margarita Lagoon)

The project site resides within the jurisdiction of the San Diego Regional Water Quality Control Board (Region 8) and the Murrieta Creek portion of the Santa Margarita River Watershed.

There are no known existing water quality problems associated with the site. The site does not contain any areas of biological significance (ASBS) or environmentally sensitive areas (ESA's) as defined by the San Diego RWQCB. Runoff from the site is conveyed in a southwesterly direction to an existing storm towards Pourroy Road. Runoff is then conveyed approximately 0.1 miles south along Pourroy Road via existing storm drain improvements to the Benton Creek Channel, then westerly approximately 3.0 miles to the confluence with Warm Springs Creek, prior to discharging to Murrieta Creek, located downstream approximately 5.5 miles to the southwest. Any runoff that does not infiltrate or evaporate is then conveyed to the confluence with the Upper Santa Margarita River, located approximately 4.6 miles to the south.

Murrieta Creek is currently on the State's 303(d) List of Water Quality Limited Segments as impaired for Iron, Manganese, Nitrogen, and Phosphorous; and has a Total Maximum Daily Load (TMDL) established for Phosphorous (USEPA). The Upper Santa Margarita River is 303(d) listed for Phosphorus and has a TMDL for Phosphorous. The Santa Margarita Lagoon is 303(d) listed for Eutrophic condition and has a TMDL for any discharges contributing to Eutrophic conditions.

III. Pollutants of Concern

First flush and low flows from the project site will be treated via Filterra® bioretention filtration units prior to discharging to the proposed storm drain system.

Potential Pollutants Generated by Land Use Type:

(from Exhibit B of the Riverside County Water Quality Management Plan)

Type of Development (Land Use)	Sediment/ Turbidity	Nutrients	Organic Compounds	Trash & Debris	Oxygen Demanding Substances	Bacteria & Viruses	Oil & Grease	Pesticides	Metals
Detached Residential Development	**P**	**P**	**N**	**P**	**P**	**P**	**P**	**P**	**N**
Attached Residential Development	P	P	N	P	P(1)	P	P(2)	P	N
Commercial Industrial Development	P(1)	P(1)	P(5)	P	P(1)	P(3)	P	P(1)	P
Automotive Repair Shops	N	N	P(4,5)	P	N	N	P	N	P
Restaurants	N	N	N	P	P	P	P	N	N
Hillside Development	P	P	N	P	P	P	P	P	N
Parking Lots	P	P	P(4)	P	P(1)	P(6)	P	P(1)	P
Streets, Highways & Freeways	P	P(1)	P(4)	P(1)	P(1)	P(6)	P	P(1)	P

Abbreviations:
P=Potential N=Not Expected

Notes:
(1) A potential pollutant if landscaping or open area exists on the Project site.
(2) A potential pollutant if the project includes uncovered parking areas.
(3) A potential pollutant if land use involves animal waste.
(4) Specifically, petroleum hydrocarbons.
(5) Specifically, solvents.
(6) Bacterial indicators are routinely detected in pavement runoff.

The potential stormwater and urban runoff pollutants anticipated to be associated with this project are sediment/turbidity, nutrients, organic compounds (hydrocarbons), trash and debris, oil and grease, pesticides and metals. **Legacy pollutants** may have existed on site due to previous agricultural use but have been diluted by the site's inactivity to concentrations that are only remotely detectable. According to the Phase I report, there is minimal potential for residual pollutants from the site's past agricultural usage. Based on current receiving water impairments (303d List) and allowable discharge requirements (USEPA TMDL List), the project's **pollutants of concern** are Phosphorous and Nutrients (includes phosphorous and nitrogen).

IV. Hydrologic Conditions of Concern

Impacts to the hydrologic regime resulting from the Project may include increased runoff volume and velocity; reduced infiltration; increased flow frequency, duration, and peaks; faster time to reach peak flow; and water quality degradation. Under certain circumstances, changes could also result in the reduction in the amount of available sediment for transport; storm flows could fill this sediment-carrying capacity by eroding the downstream channel. These changes have the potential to permanently impact downstream channels and habitat integrity. A change to the hydrologic regime of a Project's site would be considered a hydrologic condition of concern if the change would have a significant impact on downstream natural channels and habitat integrity, alone or as part of a cumulative impact from development in the watershed.

This project-specific WQMP must address the issue of hydrologic conditions of concern unless one of the following conditions is met:

- **Condition A:** Runoff from the Project is discharged directly to a publicly-owned, operated and maintained MS4; the discharge is in full compliance with Co-Permittee requirements for connections and discharges to the MS4 (including both quality and quantity requirements); the discharge would not significantly impact stream habitat in proximate Receiving Waters; and the discharge is authorized by the Co-Permittee.
- **Condition B:** The project disturbs less than 1 acre. The disturbed area calculation should include all disturbances associated with larger plans of development.
- **Condition C:** The project's runoff flow rate, volume, velocity and duration for the post-development condition do not exceed the pre-development condition for the 2-year, 24-hour and 10-year 24-hour rainfall events. This condition can be achieved by minimizing impervious area on a site and incorporating other site-design concepts that mimic pre-development conditions. This condition must be substantiated by hydrologic modeling methods acceptable to the Co-Permittee.

This Project meets the following condition: Condition "A"

- **Condition C:** The project's runoff flow rate, volume, velocity and duration for the post-development condition do not exceed the pre-development condition for the 2-year, 24-hour and 10-year 24-hour rainfall events. This condition can be achieved by minimizing impervious area on a site and incorporating other site-design concepts that mimic pre-development conditions. This condition must be substantiated by hydrologic modeling methods acceptable to the Co-Permittee.

Pre-Development Hydrology

In the existing condition, there are two main drainage areas that convey flow to existing Benton Creek Channel located to the south of proposed project. Drainage Area "A" is conveyed to the northwestern portion of the project boundaries where runoff enters an existing catch basin located on the northern side of Thompson Road and an inlet on the eastern side of Pourroy Road just south of the street intersection. Runoff is conveyed to Benton Creek Channel via existing storm drain per Tract 29875, -1, -2 & -3 (by others). Drainage Area "A" consists of approximately 8.0 acres and produces a total 100-year storm flow rate of 18.5 cfs (15.2 cfs + 3.3 cfs). Drainage Area "B" has runoff that discharges to three distinct locations bounded by ridges in project site topography and ultimately arrives at the Benton Creek Channel.

Drainage Area "B" consists of approximately 11.3 acres and produces a total 100-year storm flow rate of 24.6 cfs (0.8c fs + 11.5 cfs + 12.3 cfs). Flow rates are added together for unit hydrograph analyses because they confluence to the south at the existing Benton Creek Channel.

Post-Development Hydrology

There is one drainage area that will be routed through a detention basin located in the southern part of the project along Galleano Road. A riser will be installed to tie into existing 60" RCP Line "F" storm drain during final design. Current design and hydraulic analysis of this storm drain yields a hydraulic grade line that is half full and preliminary calculations show that this pipe can handle proposed flows from the onsite detention basin. Though existing conditions have multiple drainage areas, flows were combined and outlet though basin riser to avoid surface flows from current outlet locations. Existing velocities will be maintained as outlet will be routed through riser and not through surface runoff over Galleano Road. Proposed Drainage Area "A" consists of approximately 19.3 acres and produces a total 100-year storm flow rate of 50.0 cfs (42.5 cfs + 7.5 cfs).

Storm runoff produced on site will be mitigated through the project site via surface flow and treated for water quality through proposed sand filter water quality detention basin prior to discharging to an existing storm drain system.

The project site generates a larger flow rate than existing conditions and will therefore be mitigated via a proposed onsite sand filter water quality detention basin that will be designed in more detail during final engineering. The detention system is designed to mitigate the difference in volume between the proposed and existing 10-year, 24 hour storm event. This volume was determined by creating unit hydrographs with the 10-yr storm condition (See Section 4 of the project's hydrology study) and determined to be 0.6 acre-feet. A basin volume of 2.1 acre-feet has been provided for detention purposes.

	2 year - 24 hour		10 year - 24 hour	
	Precondition	**Post-condition**	**Precondition**	**Post-condition**
Discharge (cfs)	0.5	2.5	2.6	4.4
Velocity (fps)	0.3	3.0	0.5	3.5
Volume (cubic feet)	0.3	1.5	1.4	2.0
Duration (minutes)	9.8	7.9	9.8	8.3

The hydrology for the proposed condition, including drainage areas and storm drain facilities, is provided in Appendix C of this WQMP.

V. Best Management Practices

V.1. Site Design BMPs

The following Site Design concepts have been incorporated into the proposed project:

1) Minimize Urban Runoff
2) Minimize Impervious Footprint
3) Conserve Natural Areas
4) Minimize Directly Connected Impervious Areas (DCIAs)

A brief discussion of each BMPs not employed is provided in the section following Table 1, which shows site design BMPs that have been included in this project. A brief description of the employed Site Design BMPs follows Table 1.

Table 1. Site Design BMPs

Design Concept	Technique	Specific BMP	Included		
			Yes	No	N/A
Site Design Concept 1	*Minimize Urban Runoff*	Maximize the permeable area (See Section 4.5.1 of the WQMP).	☒	☐	☐
		Incorporate landscaped buffer areas between sidewalks and streets	☒	☐	☐
		Maximize canopy interception and water conservation by preserving existing native trees and shrubs, and planting additional native or drought tolerant trees and large shrubs	☐	☒[1]	☐
		Use natural drainage systems	☐	☒[2]	☐
		Where soils conditions are suitable, use perforated pipe or gravel filtration pits for low flow infiltration.	☐	☒[3,4]	☐
		Construct onsite ponding areas or retention facilities to increase opportunities for infiltration consistent with vector control objectives	☒	☐	☐

Table 1. Site Design BMPs (continued)

Design Concept	Technique	Specific BMP	Included		
			Yes	No	N/A
		Other comparable and equally effective site design concepts as approved by the Co-Permittee (Note: Additional narrative required to describe BMP and how it addresses Site Design concept).	☐	☒[5]	☐
Site Design Concept 2	*Minimize Impervious Footprint*	Maximize the permeable area (See Section 4.5.1 of the WQMP)	☒	☐	☐
		Construct walkways, trails, patios, overflow parking lots, alleys, driveways, low-traffic streets and other low-traffic areas with open-jointed paving materials or permeable surfaces, such as pervious concrete, porous asphalt, unit pavers, and granular materials	☐	☒[3,4]	☐
		Construct streets, sidewalks and parking lot aisles to the minimum widths necessary, provided that public safety and a walk able environment for pedestrians are not compromised.	☒	☐	☐
		Reduce widths of street where off-street parking is available.	☐	☐	☒[6]
		Minimize the use of impervious surfaces, such as decorative concrete, in the landscape design.	☒	☐	☐
		Other comparable and equally effective site design concepts as approved by the Co-Permittee (Note: Additional narrative required describing BMP and how it addresses Site Design concept).	☐	☒[5]	☐
Site Design Concept 3	*Conserve Natural Areas*	Conserve natural areas (See WQMP Section 4.5.1).	☐	☒[1]	☐
		Maximize canopy interception and water conservation by preserving existing native trees and shrubs, and planting additional native or drought tolerant trees and large shrubs.	☐	☒[1]	☐
		Use natural drainage systems.	☐	☒[2]	☐
		Other comparable and equally effective site design concepts as approved by the Co-Permittee (Note: Additional narrative required describing BMP and how it addresses Site Design concept).	☒[7]	☐	☐

Table 1. Site Design BMPs (continued)

Design Concept	Technique	Specific BMP	Included		
			Yes	No	N/A
Site Design Concept 4	*Minimize Directly Connected Impervious Areas (DCIAs)*	Residential and commercial sites must be designed to contain and infiltrate roof runoff, or direct roof runoff to vegetative swales or buffer areas, where feasible.	☒	☐	☐
		Where landscaping is proposed, drain impervious sidewalks, walkways, trails, and patios into adjacent landscaping.	☒	☐	☐
		Increase the use of vegetated drainage swales in lieu of underground piping or imperviously lined swales.	☐	☒[3,4]	☐
		Rural swale system: street sheet flows to vegetated swale or gravel shoulder, curbs at street corners, culverts under driveways and street crossings.	☐	☒[3,4]	☐
		Urban curb/swale system: streets slopes to curb; periodic swale inlets drain to vegetated swale/biofilter.	☐	☒[3,4]	☐
		Dual drainage system: First flush captured in street catch basins and discharged to adjacent vegetated swale or gravel shoulder, high flows connect directly to MS4s.	☐	☒[3,4]	☐
		Design driveways with shared access, flared (single lane at street) or wheel strips (paving only under tires); or, drain into landscaping prior to discharging to the MS4	☐	☒[8]	☐
		Uncovered temporary or guest parking on private residential lots may be paved with a permeable surface, or designed to drain into landscaping prior to discharging to the MS4.	☐	☐	☒[9]
		Where landscaping is proposed in parking areas, incorporate landscape areas into the drainage design.	☐	☐	☒[10]
		Overflow parking (parking stalls provided in excess of the Co-Permittee's minimum parking requirements) may be constructed with permeable paving.	☐	☐	☒[11]
		Other comparable and equally effective design concepts as approved by the Co-Permittee (Note: Additional narrative required describing BMP and how it addresses Site Design concept).	☐	☒[5]	☐

Justification for BMP Not Employed and Non-applicable Site Design BMPs:

1. There are no existing trees or vegetation to preserve. Site is in a disturbed tilled condition. Site will be re-vegetated with native and/or non-invasive plants and trees to help reduce runoff velocity and volume and to provide plant cover.

2. No natural drainage systems currently exist onsite. Proposed condition would use storm drain system for conveyance.

3. Pervious pavement, perforated pipes, gravel filtration pits and drainage swales were considered for use to reduce the quantity and velocity of runoff from the residential portions of the site but not proposed due to the potential for saturation of adjacent soil and foundations from prolong exposure to nuisance flows and the site's soil condition (Group C soils). The employment of sand filter water quality detention basin will be used to treat runoff and reduce runoff volume and velocity.

4. The proposed project will incorporate the use of an Austin Sand filter water quality media filter detention basin to minimize the amount and velocity of water discharged from the site during storm events. The basin will be effective in retaining the increased runoff volume as a result of project development. First flush and low flow runoff will be treated by this sand filter water quality detention basin prior to discharging into an existing, downstream and offsite drain system.

5. The project does not proposed any site design alternatives other than what has been selected in Table 1.

6. This design BMP is not applicable. There is no off-street parking proposed.

7. The project proposes to plant drought native and/or drought tolerant trees, shrubs and other vegetation to provide canopy cover and increase pervious area. See Item 3 in the following section.

8. Runoff from driveways will be conveyed as gutter flow to proposed Filterra units for filtration.

9. This design BMP is not applicable. There are no designated temporary or guest parking areas proposed within private lots.

10. This design BMP is not applicable. There are no landscape areas proposed in parking areas.

11. This design BMP is not applicable. The proposed project does not provide overflow parking.

Project Site Design BMPs:

1. **Minimize Urban Runoff** – The project has been designed to maximize the available permeable area to minimize urban runoff by limiting housing density and providing landscaped buffer areas between sidewalks and project streets. The project also proposes the use of a storm water detention basin to mitigate runoff flow and velocity during storm events. All landscape areas will preferably consist of native or drought tolerant species such as Schinus Molle (California pepper tree), Quercus Virginiana (Southern Live Oak), Platanus Racemosa (California Sycamore), etc.

   The development's storm drain system will mimic the site's existing drainage patterns, which flows from west to east. Where feasible, storm water will discharge over landscaped areas prior to entering project gutters. Runoff will then be conveyed as gutter flow to proposed Filterra units for treatment prior to discharging to the storm drain system. The units will be effective in treating potential pollutants in first flush and low flow runoff.

2. **Minimize Impervious Footprint** – The project has been designed to maximize the available permeable area based on the proposed tract design by proposing multi-level dwellings with large private landscape areas within individual lots. Streets are proposed to be constructed to the minimum width allowed. Use of decorative impervious surfaces will be limited in the project's landscaping.

3. **Conserve Natural Area** – Since very little canopy exists on the site, the few native and non-native disturbed vegetation will not be preserved. All new landscape areas will preferably consist of native or drought tolerant species such as Schinus Molle (California pepper tree), Quercus Virginiana (Southern Live Oak), Platanus Racemosa (California Sycamore), etc.

4. **Minimize Directly Connected Impervious Areas (DCIAs)** – The project proposed large residential lots and landscaping adjacent to paved areas (such as sidewalks) to minimize the amount directly connected impervious areas. Roof runoff form portions of the site will be conveyed through landscaping wherever feasible, prior to discharging to projects.

V.2. Source Control BMPs

All source control BMPs listed for specific land use/type of project in the following Countywide Water Quality Management Plan tables have been discussed and considered for utilization to the extent that they are appropriate for the site and project. For a BMP listed in the table following not used for the project, this section of the WQMP has explained why this source control BMP is not appropriate for the project.

The following tables show source control BMPs (routine non-structural and routine structural) included in this project and those that were not included.

Table 2. Source Control BMPs

BMP Name	Check One		If not applicable, state brief reason
	Included	Not Applicable	
Non-Structural Source Control BMPs			
Education for Property Owners, Operators, Tenants, Occupants, or Employees	☒	☐	
Activity Restrictions	☒	☐	
Irrigation System and Landscape Maintenance	☒	☐	
Common Area Litter Control	☒	☐	
Street Sweeping Public Streets and Parking Lots	☒	☐	
Drainage Facility Inspection and Maintenance	☒	☐	
Structural Source Control BMPs			
Storm Drain System Stenciling and Signage	☒	☐	
Landscape and Irrigation System Design	☒	☐	
Protect Slopes and Channels	☐	☒	No large manufactured slopes or earthen channels proposed.
Properly Design:			
Fueling Areas	☐	☒	Project is residential.
Air/Water Supply Area Drainage	☐	☒	None proposed onsite.

BMP Name	Check One		If not applicable, state brief reason
	Included	Not Applicable	
Trash Storage Areas	☐	☒	Individual homeowners will be responsible for household trash. No common trash enclosures proposed.
Loading Docks	☐	☒	Project is residential.
Maintenance Bays	☐	☒	Project is residential.
Vehicle and Equipment Wash Areas	☐	☒	Project is residential.
Outdoor Material Storage Areas	☐	☒	Project is residential
Outdoor Work Areas or Processing Areas	☐	☒	Project is residential.
Provide Wash Water Controls for Food Preparation Areas	☐	☒	Project is residential.

V.2.1 Non-Structural Source Control BMPs

Education for Property Owners, Operators, Tenants, Occupants, or Employees

Joseph Turley will insure that all lot owners/homeowners be given a copy of the latest environmental awareness education materials provided by the County of Riverside. The developer shall provide materials that inform home buyers of the impacts of dumping oil, paints, solvents or other potentially harmful chemicals into the storm drain; the proper use and management of fertilizers, pesticides and herbicides in home landscaping and gardening practices; the impacts of littering and improper watering. Environmental awareness education materials, including, but not limited to those included in Appendix D of this WQMP, shall be provided by the developer prior to the close of escrow. Responsibility of this BMP shall be that of the owner's after the close of escrow.

Activity Restrictions

Within the CC&R's to be prepared, language shall be included to identify surface water quality protection required of the HOA. Surface water quality activities shall also be conducted in conformance with the Water Quality Management Plan as it relates to the handling and disposal of contaminants.

Irrigation System and Landscape Maintenance

Management programs will be designed and established by the County of Riverside, which will own and maintain the public common areas located around the perimeter of the site, through the CSA or VWRPD. These programs will include how to mitigate the potential dangers of fertilizer and pesticide usage. Ongoing maintenance will be consistent with Riverside County Water Conservation Resolution, the State of California Model Water-Efficient Landscape Ordinance and the County of Riverside Water Conservation Ordinance. Fertilizer and Pesticide usage shall be consistent with County Management Guidelines for use of Fertilizers and Pesticides.

The HOA shall be responsible for the detention basin as well as the landscaping located on the northern and southern sides of Galleano Avenue.

Landscape maintenance shall include all maintenance and replacement of dead vegetation, erosion rills, proper disposal of green wastes, etc. Irrigation systems shall be tested regularly to ensure that all systems are functioning optimally.

Common Area Litter Control

Each homeowner will be required to provide trash pick-up within private lot areas and landscape areas. Daily inspection will be made of common area trash receptacles to make sure lids are closed and pick-up of any excess trash on the ground has occurred. The HOA shall be responsible for the areas within its jurisdiction. Pursuant to Table 4 located at the end of Section VI, responsibility shall include the emptying of trash receptacles, noting of disposal violations by homeowners, and reporting such violations to the HOA and County for investigation.

Street Sweeping Public Streets and Parking Lots

Post construction, the County of Riverside shall have all public streets and vacuum swept on a monthly basis, at minimum. This procedure shall be intensified around October 1st of each year prior to the beginning of the rainy season.

Drainage Facility Inspection and Maintenance

Post construction, any onsite catch basins and storm drains less than 36" will be owned, maintained and cleaned by the County of Riverside (Riverside County Transportation Department). Any facilities 36" and larger shall be owned and maintained by the Riverside County Flood Control and Water Conservation District (RCFC&WCD). These activities will be done on a regular basis, and prior to the storm season, no later than October 1st of each year. Maintenance schedule for drain inspection and maintenance can be found in Table 4 at the end of Section VI. Appendix D includes copies of the educational materials that will be used in implementing this project-specific WQMP.

The HOA shall be responsible for maintenance of all proposed Filterra units as well as the storm water detention basin.

V.2.2 Structural Source Control BMPs

Storm Drain System Stenciling and Signage (CASQA SD-13)

As a part of the final civil engineering drawings, it will be required by Joseph Turley to stencil on all of the project's catch basins, where applicable in paved areas, the words, "Only Rain...Down the Storm Drain." This will be done in a location that can be clearly seen by all and will be routinely inspected and re-stenciled, as required, until RCTD accepts maintenance responsibility for the catch basins. Thereafter, RCTD shall routinely inspect and re-stencil the catch basins, as necessary (See Table 2).

Landscape and Irrigation System Design (CASQA SD-10 & SD-12)

As a part of the design of all common area landscape irrigation, implementation of the County of Riverside Water Conservation Ordinance including, but not limited to, such provisions as water sensors, programmable irrigation times (for short cycles), rain shutoff devices, flow reducers or shut off valves, etc., will be used.

As a part of the design of all common area landscape areas, similar planting material with similar water requirements will be used in order to reduce excess irrigation runoff and promote surface filtration. Such landscape areas will be maintained by the County through the CSA or VWRPD, the home owner and the HOA, as appropriate (See Table 4 located at the end of Section VI).

Prior to the responsible party's takeover of maintenance responsibilities, the developer shall be responsible for installation and maintenance of these common areas.

V.3. Treatment Control BMPs

This project is designated as a Priority Project. Therefore, treatment control BMPs are required to remove pollutants typically associated with urban runoff. The following table shows treatment BMPs that are included in this project. A brief description of each BMP also follows:

Table 3: Treatment Control BMP Selection Matrix

Pollutant of Concern	Treatment Control BMP Categories[9]							
	Biofilters[2] Vegetated Swales Bioretention	Detention Basins[3]	Infiltration Basins & Trenches/Porous Pavement[4][10]	Wet Ponds or Wetlands[5]	Sand Filter or Filtration[6]	Water Quality Inlets	Hydrodynamic Separator Systems [7]	Manufactured / Proprietary Devices Catch Basin Filter Insert
Sediment/Turbidity Y ☐ N ☒	H[12] ☐	M ☐	H/M ☐	H/M ☐	H/M ☒	L ☐	H/M (L for turbidity) ☐	H ☒
Nutrients Y ☒ N ☐	M[12] ☐	M ☐	H/M ☐	H/M ☐	L/M ☒	L ☐	L ☐	L ☒
Organic Compounds Y ☐ N ☒	H[12] ☐	M[11] ☐	U ☐	U ☐	H/M ☒	L ☐	L ☐	U ☒
Trash & Debris Y ☐ N ☒	H[12] ☐	M ☐	U ☐	U ☐	H/M ☒	M ☐	H/M ☐	H ☒
Oxygen Demanding Substances Y ☐ N ☒	L ☐	U ☐	H/M ☐	H/M ☐	H/M ☒	L ☐	L ☐	L ☒
Bacteria & Viruses Y ☐ N ☒	H[12] ☐	M[11] ☐	H/M ☐	U ☐	H/M ☒	L ☐	L ☐	U ☒
Oils & Grease Y ☐ N ☒	H[12] ☐	M ☐	U ☐	U ☐	H/M ☒	M ☐	L/M ☐	H ☒
Pesticides (non-soil bound) Y ☐ N ☒	U ☐	U ☐	U ☐	U ☐	U ☒	L ☐	L ☐	L ☒
Metals Y ☒ N ☐	H[12] ☐	M ☐	H ☐	H ☐	H ☒	L ☐	L ☐	L/M ☒

0003979

Abbreviations:

L: Low removal efficiency H/M: High or medium removal efficiency U: Unknown removal efficiency

Notes:

(1) Periodic performance assessment and updating of the guidance provided by this table may be necessary.

(2) Includes grass swales, grass strips, wetland vegetation swales, and bioretention.

(3) Includes extended/dry detention basins with grass lining and extended/dry detention basins with impervious lining. Effectiveness based upon minimum 36-48-hour drawdown time.

(4) Includes infiltration basins, infiltration trenches, and porous pavements.

(5) Includes permanent pool wet ponds and constructed wetlands.

(6) Includes sand filters and media filters.

(7) Also known as hydrodynamic devices, baffle boxes, swirl concentrators, or cyclone separators.

(8) Includes proprietary stormwater treatment devices as listed in the CASQA Stormwater Best Management Practices Handbooks, other stormwater treatment BMPs not specifically listed in this WQMP, or newly developed/emerging stormwater treatment technologies.

(9) Project proponents should base BMP designs on the Riverside County Stormwater Quality Best Management Practice Design Handbook. However, project proponents may also wish to reference the California Stormwater BMP Handbook – New Development and Redevelopment (www.cabmphandbooks.com). The Handbook contains additional information on BMP operation and maintenance.

(10) Note: Projects that will utilize infiltration-based Treatment Control BMPs (e.g., Infiltration Basins, Infiltration Trenches, Porous Pavement) must include a copy of the property/project soils report as Appendix E to the project-specific WQMP. The selection of a Treatment Control BMP (or BMPs) for the project must specifically consider the effectiveness of the Treatment Control BMP for pollutants identified as causing an impairment of Receiving Waters to which the project will discharge Urban Runoff.

(11) Per CASQA Manual (January 2003; Errata May 2006), extended detention basins have medium removal efficiency for bacteria and organics.

(12) Per CASQA Manual (January 2003) TC-32 Bioretention Fact Sheet and Filterra®.

Media Filter (CASQA TC-40) Austin Sand Filter Water Quality Detention Basin

The majority of first flush and low flow runoff from the site will be conveyed to an Austin Sand Filter Detention Basin for treatment prior to entering the project's discharge storm drain system. The Austin Sand Filter media unit will be effective in removing expected pollutants from project runoff through the filtering characteristics of the unit's sand media that captures, removes, degrades and cleans pollutants through a filtering process. The locations of the unit is as shown in the WQMP Site Plan.

Maintenance of the proposed Austin Sand Filter unit includes yearly removal of accumulated trash, litter, sediment and other debris as well as the removal/replacement of the 3" top layer. Maintenance of the proposed Austin Sand Filter shall be the responsibility of the HOA, post construction.

Supporting engineering calculations for Q_{BMP} of the Austin Sand Filter media unit, as well as the Treatment Control BMP design details are included in Appendix F. Maintenance procedures and inspection frequencies are provided in Table 4 located in Section VI.

Drain Inserts (CASQA MP-52)

A minimal amount of project first flush and low flow runoff is conveyed as sheet flow from both a minimal portion of the east side of Pourroy Road and a small portion of the south side of Thompson Road to a catch basin with a Kristar Fossil Filter Flogard Plus Drain Insert Filter for treatment. This catch basin is located on the south side of Thompson Road near the Thompson Road/Pourroy Road intersection. See the WQMP site plan in Appendix B for reference.

Maintenance of the one proposed Flogard Plus Drain Insert Filter by Kristar shall be the responsibility of the County of Riverside, post construction. Supporting engineering calculations for Q_{BMP} of the Flogard Plus Drain Insert by Kristar as well as the Treatment Control BMP design details are included in Appendix F. Maintenance procedures and inspection frequencies are provided in Table 4 of Section VI.

V.4. Equivalent Treatment Control Alternatives

Not applicable. All project runoff shall be treated onsite prior to discharging to the storm drain system.

V.5. Regionally-Based Treatment Control BMPs

Not applicable. All project runoff shall be treated onsite prior to discharge. The project does not discharge to any regionally based treatment control BMPs.

VI. Operation and Maintenance Responsibility for Treatment Control BMPs

Prior to transfer of site ownership and maintenance responsibilities to the HOA, the homeowner and the County of Riverside, as appropriate, Joseph Turley shall be responsible for installing, inspecting, and maintaining all improvements onsite. **The contact person for Joseph Turley is Mr. Martin Turley.** Mr. Turley shall be responsible for the management of the project site plus implementation and maintenance of the BMPs required by this WQMP until such time these responsibilities have been transferred over to the HOA, the homeowner and the County of Riverside, as appropriate.

Maintenance and inspection activities for the identified BMPs will be performed as indicated on the enclosed BMP Maintenance Responsibility/Frequency Matrix (See Table 4). **The homeowner shall be responsible for all maintenance and inspection responsibilities for private landscaped areas, driveways, and maintaining all applicable project related improvements within the private lots, as well as the parkway landscaping located in front of each homeowner's lot.**

The HOA shall be responsible for all maintenance and inspection responsibilities for both the Austin Sand Filter storm water media filter detention basin and parkway landscaping located along Galleano Avenue.

The County of Riverside shall be responsible for maintaining the proposed landscaping areas located along Thompson Road and Pourroy Road, as well as the proposed catch basins, curb, sidewalk, gutter and street improvements.

TABLE NO. 4

NON-STRUCTURAL BMP MAINTENANCE RESPONSIBILITY/FREQUENCY MATRIX

BMP	RESPONSIBILITY	BMP START DATE	FREQUENCY
Education for Property Owners, Operators, Tenants, Occupants, or Employees	Joseph Turley	At close of escrow/ transfer of site responsibilities to the homeowner.	Information to be provided to homeowner at close of escrow. Thereafter the homeowner shall be responsible for providing information to future buyer.
Activity Restrictions	HOA through CC&R's and County of Riverside through municipal code	At transfer of site responsibilities to the HOA and the County.	Continuous.
Irrigation System and Landscape Maintenance	HOA, Homeowner and County of Riverside, as appropriate	At transfer of site responsibilities to the HOA, homeowner and County.	Monthly during regular maintenance, manage landscaping in accordance with the County of Riverside Water Conservation Ordinance and with the State of California Department of Pesticides management guidelines for use of fertilizers and pesticides.
Common Area Litter Control	HOA, Homeowner and County of Riverside, as appropriate	At transfer of site responsibilities to HOA, homeowner and the County of Riverside.	Weekly inspection of trash receptacles to ensure that lids are closed and pick up any excess trash on the ground, noting trash disposal violations by homeowners and reporting the violations to the county for investigation.
Street Sweeping Public Streets and Parking Lots	County of Riverside through CSA or VWRPD, as appropriate	At transfer of site responsibilities to the County of Riverside.	Streets shall be swept on a monthly basis, at minimum. Sweeping may intensify during non-rainy days after October 1st (Rainy season).

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TABLE NO. 4

NON-STRUCTURAL BMP MAINTENANCE RESPONSIBILITY/FREQUENCY MATRIX

BMP	RESPONSIBILITY	BMP START DATE	FREQUENCY
Drainage Facility Inspection and Maintenance and the one Drain Insert Filter, Flogard Plus by Kristar (MP-52) Located on the South Side of Thompson Road Near the Thompson Road/Pourroy Road Intersection	County of Riverside (RCFC&WCD and RCTD, as appropriate)	At transfer of site responsibilities to the County of Riverside.	Once per quarter to clean debris and silt in bottom of catch basins as needed. Intensified around October 1st of each year, prior to "first flush" storm. Remove and replace drain insert, when needed.

0003984

TABLE NO. 4

STRUCTURAL BMP MAINTENANCE RESPONSIBILITY/FREQUENCY MATRIX

BMP	RESPONSIBILITY	BMP START DATE	FREQUENCY
Storm Drain System Stenciling and Signage (SD-13)	RCTD	At transfer of site responsibilities to RCTD.	Once every 6 months, inspect for re-stenciling needs and re-stencil as necessary.
Landscape and Irrigation System Design (SD-10 & SD-12)	HOA, Homeowner and the County of Riverside through CSA or VWRPD, as appropriate	At transfer of site responsibilities to HOA, homeowner and County of Riverside.	Once a week, in conjunction with maintenance activities. Verify that runoff minimizing landscape design continues to function by checking that water sensors are functioning properly, that irrigation heads are adjusted properly to eliminate overspray to hardscape areas, and to verify that irrigation timing and cycle lengths are adjusted in accordance with water demands, given time of year, weather and day or night time temperatures.

00003985

TABLE NO. 4

TREATMENT BMP MAINTENANCE RESPONSIBILITY/FREQUENCY MATRIX

BMP	RESPONSIBILITY	BMP START DATE	FREQUENCY
Storm Water Austin Sand Filter Media Detention Basin (TC-40)	HOA	At transfer of site responsibilities to the HOA.	Monthly inspections for vegetation establishment and remove as necessary. Semi-annual grooming and vegetation removal. Semi-annual inspections for overall basin function and efficiency. Regrade media basin every 10 years or as needed based on 10% accumulation requirement. Semi-annual inspections for beginning/end of wet season for standing water, slope stability, sediment, trash/debris, presence of burrows. Trim vegetation at beginning and end of wet season and inspect monthly to prevent unwanted vegetation establishment. Remove accumulated sediment and re-grade every 10 years or when accumulated volume exceeds 10% of basin volume. Inspect yearly for accumulated sediment volume. Once per year, remove and replace the top 3" media layer. Clean unit of trash/debris as necessary during routine landscaping maintenance.

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VII. Funding

The homeowner shall be responsible for funding the maintenance of all areas within individual lots as well as the parkway landscaping located in front of the private lots.

The HOA shall be the long term funding mechanism for all BMP inspection and maintenance activities as it pertains to both the proposed Austin Sand Filter media, storm water detention basin and parkway landscaping located along Galleano Avenue; and ensuring that all BMPs are functioning efficiently and optimally.

The County of Riverside shall be responsible for funding the maintenance of all improvements located outside the individual homeowner and HOA jurisdiction, including project streets (including Thompson Road and Pourroy Road), designated landscape areas, curb, sidewalk, gutter and storm drain improvements. The funding sources for the County of Riverside shall be provided once delegation of site responsibilities is complete.

Appendix A

CONDITIONS OF APPROVAL

Planning Commission Resolution TBD

Dated TBD

Appendix B

VICINITY MAP, WQMP SITE PLAN, WATER QUALITY EXHIBIT AND RECEIVING WATERS MAP

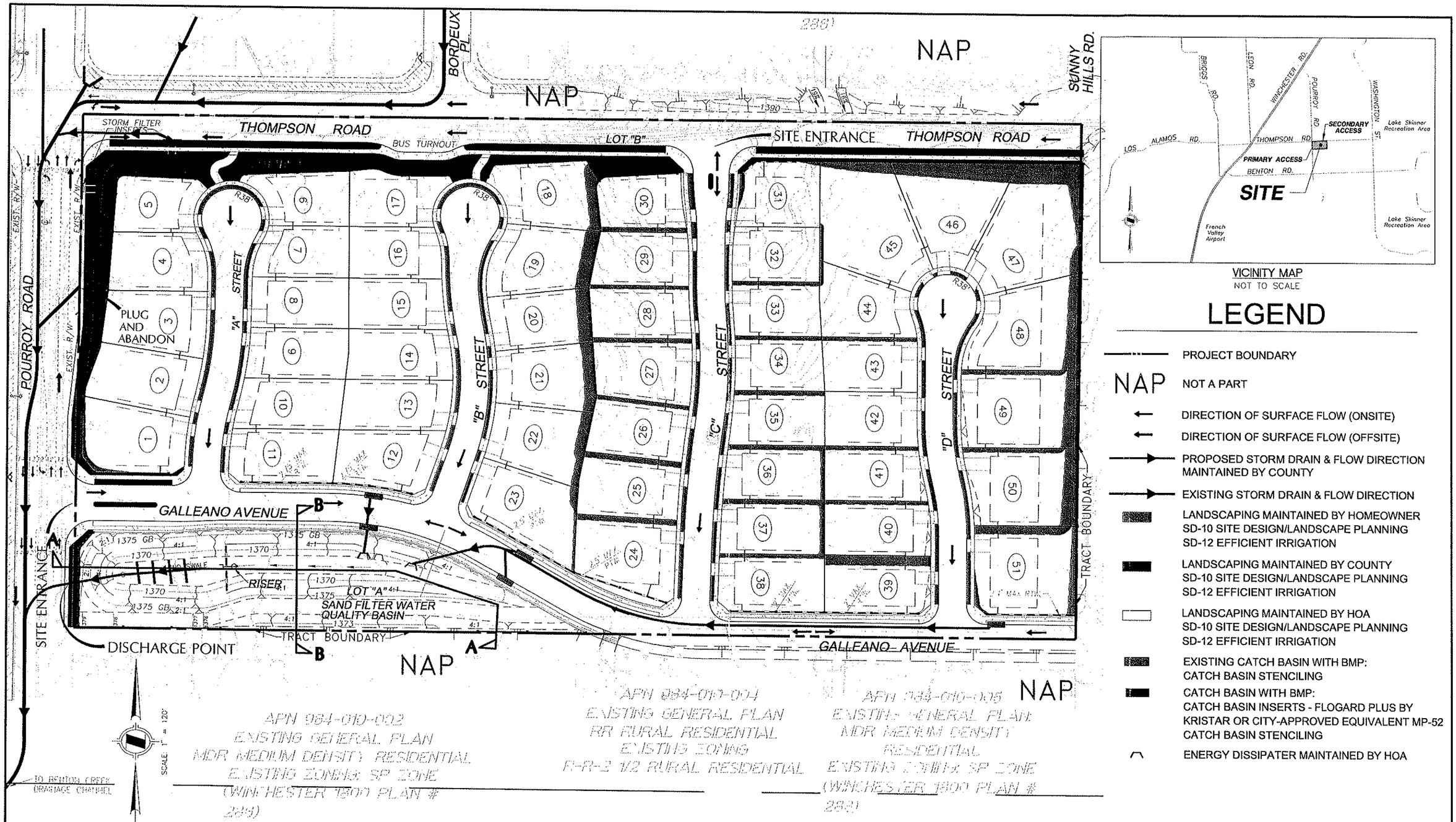

VICINITY MAP
NOT TO SCALE

LEGEND

- PROJECT BOUNDARY
- NAP — NOT A PART
- DIRECTION OF SURFACE FLOW (ONSITE)
- DIRECTION OF SURFACE FLOW (OFFSITE)
- PROPOSED STORM DRAIN & FLOW DIRECTION MAINTAINED BY COUNTY
- EXISTING STORM DRAIN & FLOW DIRECTION
- LANDSCAPING MAINTAINED BY HOMEOWNER SD-10 SITE DESIGN/LANDSCAPE PLANNING SD-12 EFFICIENT IRRIGATION
- LANDSCAPING MAINTAINED BY COUNTY SD-10 SITE DESIGN/LANDSCAPE PLANNING SD-12 EFFICIENT IRRIGATION
- LANDSCAPING MAINTAINED BY HOA SD-10 SITE DESIGN/LANDSCAPE PLANNING SD-12 EFFICIENT IRRIGATION
- EXISTING CATCH BASIN WITH BMP: CATCH BASIN STENCILING
- CATCH BASIN WITH BMP: CATCH BASIN INSERTS - FLOGARD PLUS BY KRISTAR OR CITY-APPROVED EQUIVALENT MP-52 CATCH BASIN STENCILING
- ENERGY DISSIPATER MAINTAINED BY HOA

PREPARED BY:	PREPARED FOR:	DATE PREPARED: 07/06/09	TENTATIVE TRACT MAP 35161 36050 POURROY ROAD FRENCH VALLEY COUNTY OF RIVERSIDE, CA	PRELIMINARY WQMP SITE PLAN SHEET 1 OF 2
HUNSAKER & ASSOCIATES IRVINE, INC. PLANNING • ENGINEERING • SURVEYING Three Hughes • Irvine, CA 92618 • PH: (949) 583-1010 • FX: (949) 583-0759	*JOSEPH TURLEY* *309 WEST COLUMBINE STREET* *SANTA ANA, CA 92707* *(714) 241-1771*	W.O. # 3178-1		

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SECTION A–A

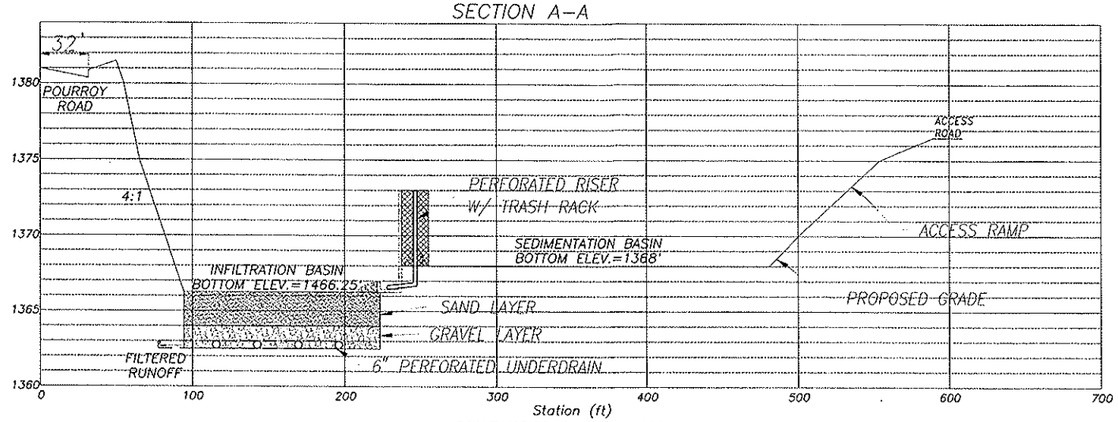

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VERTICAL: 1" = 10'

SECTION B–B

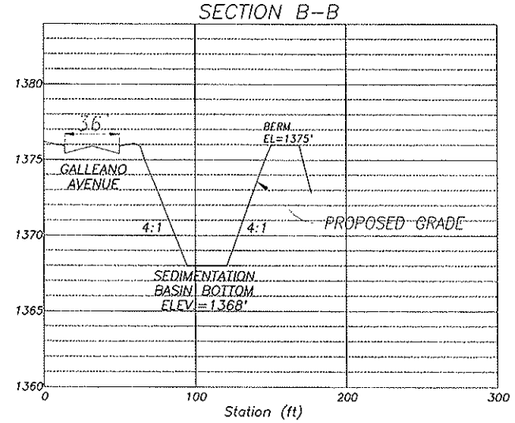

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VERTICAL: 1" = 10'

PREPARED BY:	PREPARED FOR:	DATE PREPARED: 06/01/09	TENTATIVE TRACT MAP 35161 36050 POURROY ROAD FRENCH VALLEY COUNTY OF RIVERSIDE, CA	PRELIMINARY WQMP SITE PLAN SHEET 2 OF 2
HUNSAKER & ASSOCIATES IRVINE, INC. PLANNING ▪ ENGINEERING ▪ SURVEYING Three Hughes ▪ Irvine, CA 92618 ▪ PH: (949) 583-1010 ▪ FX: (949) 583-0759	*JOSEPH TURLEY* *309 WEST COLUMBINE STREET* *SANTA ANA, CA 92707* *(714) 241–1771*	W.O. # 3178-1		

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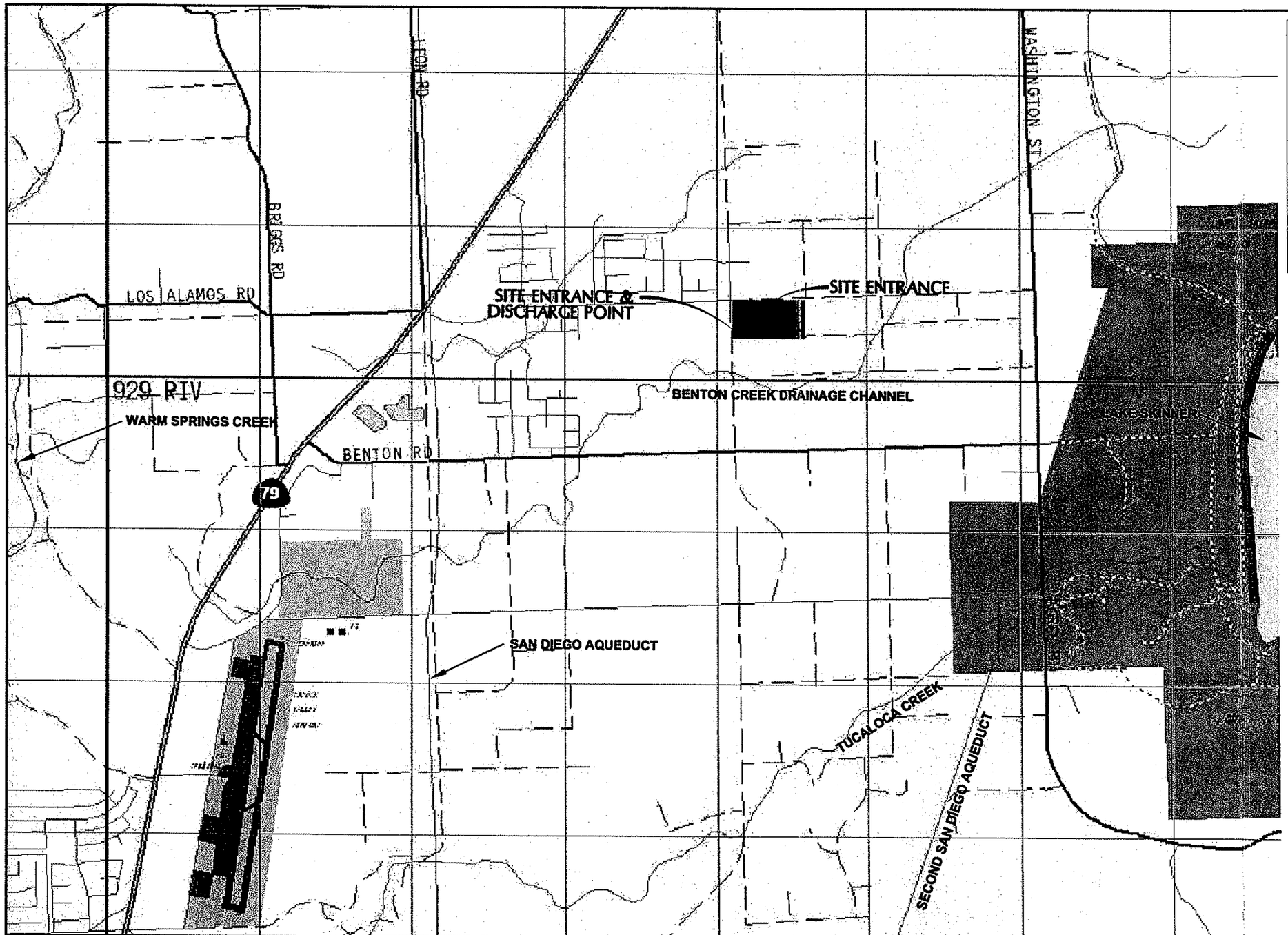

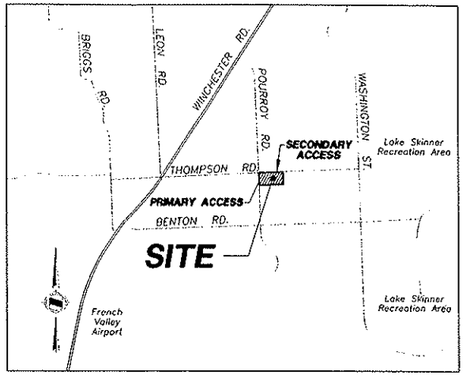

LOCATION MAP
NOT TO SCALE

LEGEND

TENTATIVE TRACT NO. 35161

SCALE: 1" = 1800'

PREPARED BY:

HUNSAKER & ASSOCIATES
IRVINE, INC.
PLANNING ▪ ENGINEERING ▪ SURVEYING
Three Hughes • Irvine, CA 92618 • PH: (949) 583-1010 • FX: (949) 583-0759

PREPARED FOR:

JOSEPH TURLEY
309 WEST COLUMBINE STREET
SANTA ANA, CA 92707
(714) 241-1771

DATE PREPARED: 01/09/09

W.O. # 3178-1

TENTATIVE TRACT MAP 35161
36050 POURROY ROAD
FRENCH VALLEY
COUNTY OF RIVERSIDE, CA

PRELIMINARY
WQMP
VICINITY MAP

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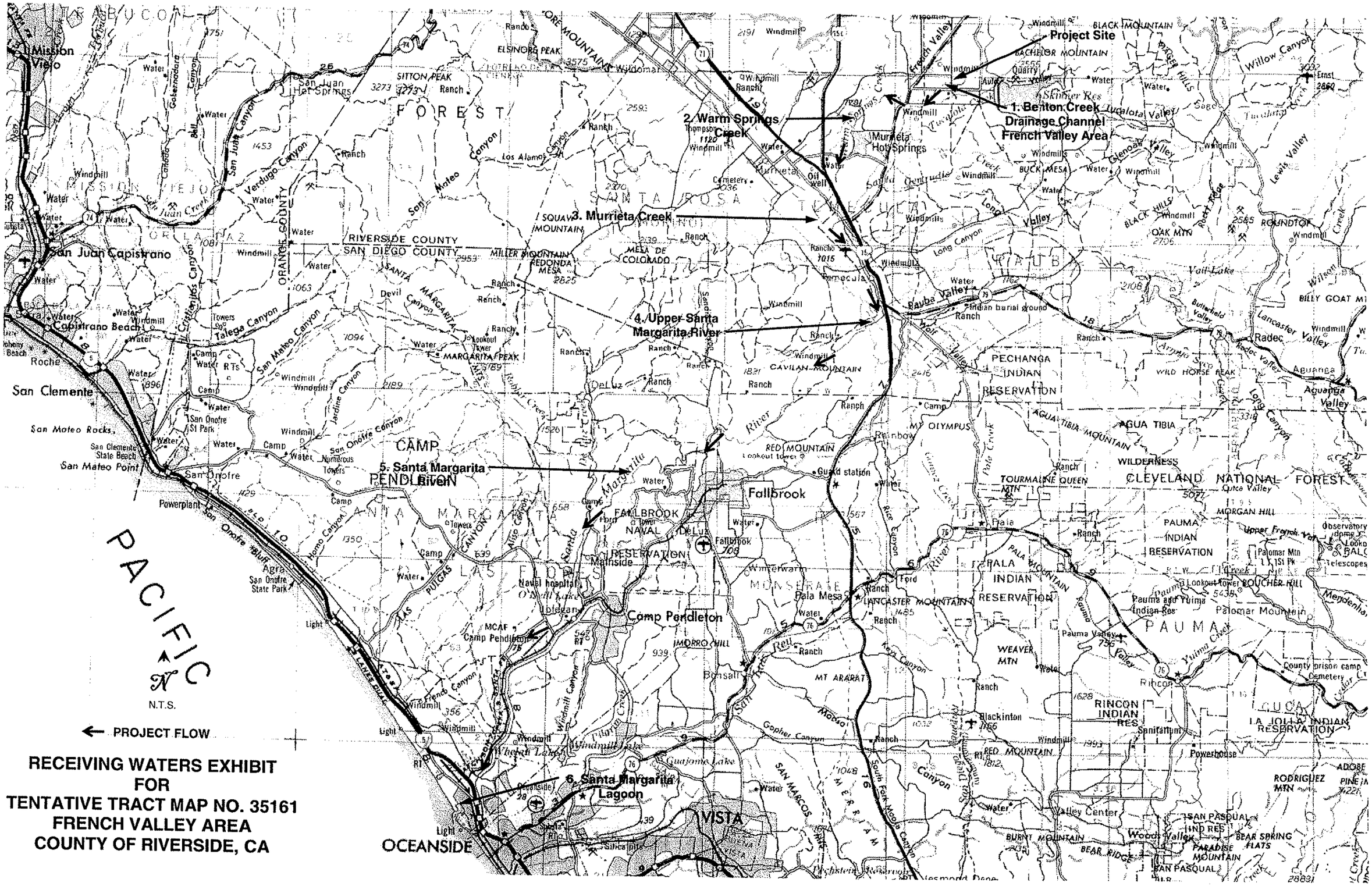

RECEIVING WATERS EXHIBIT
FOR
TENTATIVE TRACT MAP NO. 35161
FRENCH VALLEY AREA
COUNTY OF RIVERSIDE, CA

Appendix C

SUPPORTING DETAIL RELATED TO HYDRAULIC CONDITIONS OF CONCERN

HYDROLOGY ANALYSIS

FOR

TENTATIVE TRACT MAP NO. 35161
JUNE 2009

County of Riverside

REGISTERED PROFESSIONAL ENGINEER
PHILIP D. DOWTY
NO. 42038
Exp. 3/31/10
CIVIL
STATE OF CALIFORNIA

PREPARED BY: TANG LEE
PREPARED UNDER THE SUPERVISION OF:

Philip D. Dowty 6/4/09
Philip D. Dowty, R.C.E. 42038, Exp. 3/31/10 Date

Appendix D

EDUCATIONAL MATERIALS

10 Ways to Save Water Outdoors

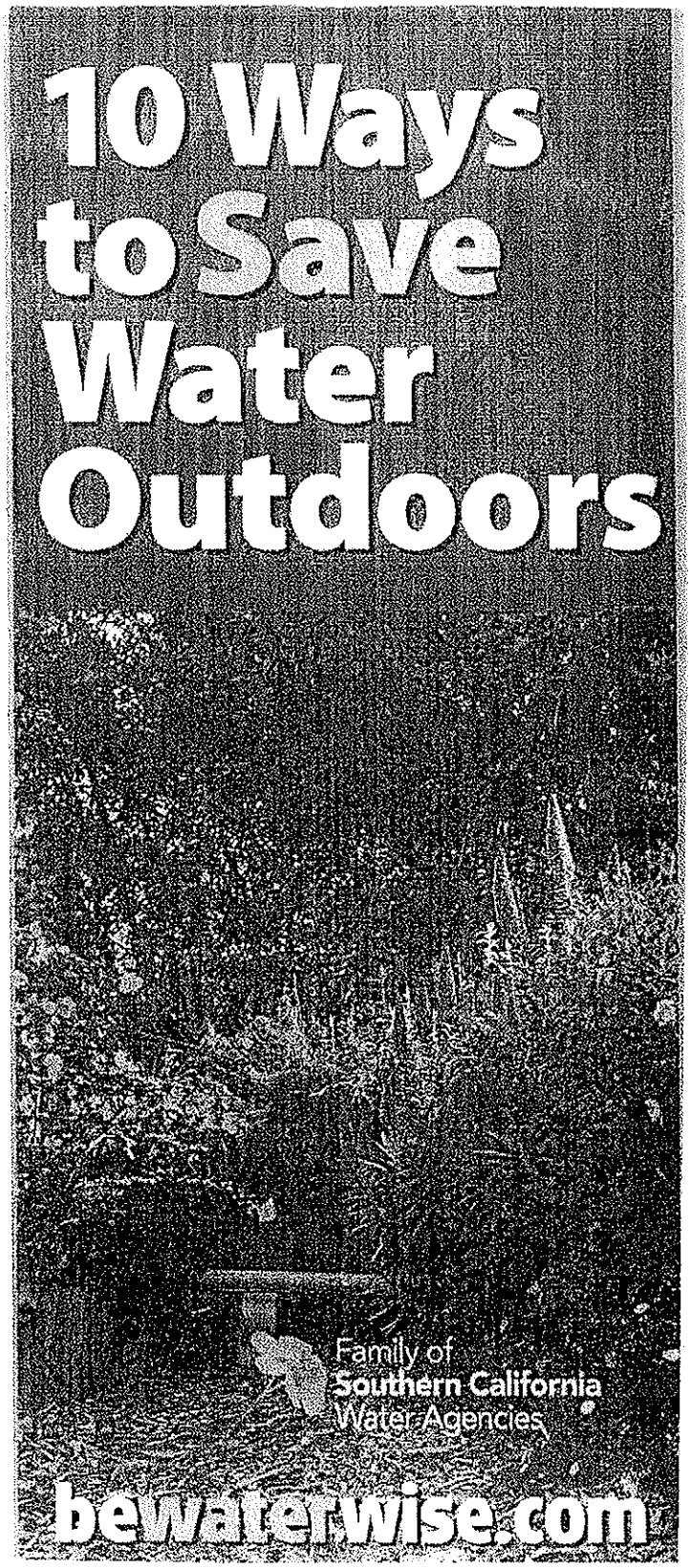

bewaterwise.com

TIP #1 The average homeowner uses twice the amount of water needed to keep plants healthy. Use the watering calculator and index at **bewaterwise.com** to know exactly how much water your plants need.

TIP #2 Check your sprinkler system for leaks, overspray and broken sprinkler heads. Update with drip or other more water-efficient sprinklers where appropriate.

TIP #3 This fall, plant a portion of your garden with beautiful native and California Friendly plants. Browse the plant database at **bewaterwise.com** to find just the right look for your outdoor spaces.

TIP #4 Reduce the amount of water-thirsty grass. Keep only what you need and replace the rest with less-thirsty plants or permeable paving.

TIP #5 For the grass you keep, set your lawnmower blade higher.

TIP #6 Adjust your sprinkler timer downward in September. Plants need less water when days are shorter.

TIP #7 Use a broom instead of the hose for cleaning sidewalks and patios.

TIP #8 Mulch! A layer of bark, gravel, compost, sawdust or low-growing groundcover evens out soil temperature and allows better water retention.

TIP #9 Check the list of invasive plants that hurt our environment at **caleppc.org** and remove any from your garden.

TIP #10 Share these tips with your gardener, neighbors and friends. Water conservation should be a part of every Southern Californian's lifestyle, but that doesn't mean we can't have lush and beautiful outdoor spaces.

bewaterwise.com

After the Storm

What is stormwater runoff?

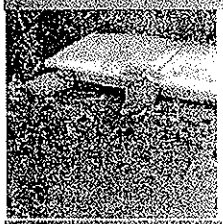

Stormwater runoff occurs when precipitation from rain or snowmelt flows over the ground. Impervious surfaces like driveways, sidewalks, and streets prevent stormwater from naturally soaking into the ground.

Why is stormwater runoff a problem?

Stormwater can pick up debris, chemicals, dirt, and other pollutants and flow into a storm sewer system or directly to a lake, stream, river, wetland, or coastal water. Anything that enters a storm sewer system is discharged untreated into the waterbodies we use for swimming, fishing, and providing drinking water.

The effects of pollution

Polluted stormwater runoff can have many adverse effects on plants, fish, animals, and people.

- Sediment can cloud the water and make it difficult or impossible for aquatic plants to grow. Sediment also can destroy aquatic habitats.
- Excess nutrients can cause algae blooms. When algae die, they sink to the bottom and decompose in a process that removes oxygen from the water. Fish and other aquatic organisms can't exist in water with low dissolved oxygen levels.
- Bacteria and other pathogens can wash into swimming areas and create health hazards, often making beach closures necessary.
- Debris—plastic bags, six-pack rings, bottles, and cigarette butts—washed into waterbodies can choke, suffocate, or disable aquatic life like ducks, fish, turtles, and birds.
- Household hazardous wastes like insecticides, pesticides, paint, solvents, used motor oil, and other auto fluids can poison aquatic life. Land animals and people can become sick or die from eating diseased fish and shellfish or ingesting polluted water.

- Polluted stormwater often affects drinking water sources. This, in turn, can affect human health and increase drinking water treatment costs.

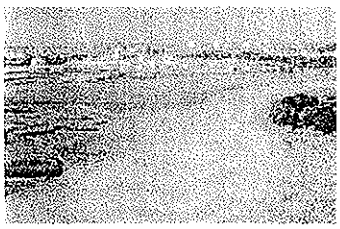

For more information contact:

or visit
www.epa.gov/npdes/stormwater
www.epa.gov/nps

Stormwater Pollution Solutions

Residential

Recycle or properly dispose of household products that contain chemicals, such as insecticides, pesticides, paint, solvents, and used motor oil and other auto fluids. Don't pour them onto the ground or into storm drains.

Lawn care

Excess fertilizers and pesticides applied to lawns and gardens wash off and pollute streams. In addition, yard clippings and leaves can wash into storm drains and contribute nutrients and organic matter to streams.

- Don't overwater your lawn. Consider using a soaker hose instead of a sprinkler.
- Use pesticides and fertilizers sparingly. When use is necessary, use these chemicals in the recommended amounts. Use organic mulch or safer pest control methods whenever possible.
- Compost or mulch yard waste. Don't leave it in the street or sweep it into storm drains or streams.
- Cover piles of dirt or mulch being used in landscaping projects.

Auto care

Washing your car and degreasing auto parts at home can send detergents and other contaminants through the storm sewer system. Dumping automotive fluids into storm drains has the same result as dumping the materials directly into a waterbody.

- Use a commercial car wash that treats or recycles its wastewater, or wash your car on your yard so the water infiltrates into the ground.
- Repair leaks and dispose of used auto fluids and batteries at designated drop-off or recycling locations.

Septic systems

Leaking and poorly maintained septic systems release nutrients and pathogens (bacteria and viruses) that can be picked up by stormwater and discharged into nearby waterbodies. Pathogens can cause public health problems and environmental concerns.

- Inspect your system every 3 years and pump your tank as necessary (every 3 to 5 years).
- Don't dispose of household hazardous waste in sinks or toilets.

Pet waste

Pet waste can be a major source of bacteria and excess nutrients in local waters.

- When walking your pet, remember to pick up the waste and dispose of it properly. Flushing pet waste is the best disposal method. Leaving pet waste on the ground increases public health risks by allowing harmful bacteria and nutrients to wash into the storm drain and eventually into local waterbodies.

Education is essential to changing people's behavior. Signs and markers near storm drains warn residents that pollutants entering the drains will be carried untreated into a local waterbody.

Residential landscaping

Permeable Pavement—Traditional concrete and asphalt don't allow water to soak into the ground. Instead these surfaces rely on storm drains to divert unwanted water. Permeable pavement systems allow rain and snowmelt to soak through decreasing stormwater runoff.

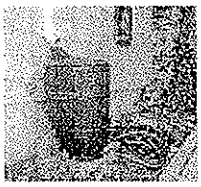

Rain Barrels—You can collect rainwater from rooftops in mosquito-proof containers. The water can be used later on lawn or garden areas.

Rain Gardens and Grassy Swales—Specially designed areas planted with native plants can provide natural places for rainwater to collect and soak into the ground. Rain from rooftop areas or paved areas can be diverted into these areas rather than into storm drains.

Vegetated Filter Strips—Filter strips are areas of native grass or plants created along roadways or streams. They trap the pollutants stormwater picks up as it flows across driveways and streets.

Commercial

Dirt, oil, and debris that collect in parking lots and paved areas can be washed into the storm sewer system and eventually enter local waterbodies.

- Sweep up litter and debris from sidewalks, driveways and parking lots, especially around storm drains.
- Cover grease storage and dumpsters and keep them clean to avoid leaks.
- Report any chemical spill to the local hazardous waste cleanup team. They'll know the best way to keep spills from harming the environment.

Construction

Erosion controls that aren't maintained can cause excessive amounts of sediment and debris to be carried into the stormwater system. Construction vehicles can leak fuel, oil, and other harmful fluids that can be picked up by stormwater and deposited into local waterbodies.

- Divert stormwater away from disturbed or exposed areas of the construction site.
- Install silt fences, vehicle mud removal areas, vegetative cover, and other sediment and erosion controls and properly maintain them, especially after rainstorms.
- Prevent soil erosion by minimizing disturbed areas during construction projects, and seed and mulch bare areas as soon as possible.

Agriculture

Lack of vegetation on streambanks can lead to erosion. Overgrazed pastures can also contribute excessive amounts of sediment to local waterbodies. Excess fertilizers and pesticides can poison aquatic animals and lead to destructive algae blooms. Livestock in streams can contaminate waterways with bacteria, making them unsafe for human contact.

- Keep livestock away from streambanks and provide them a water source away from waterbodies.
- Store and apply manure away from waterbodies and in accordance with a nutrient management plan.
- Vegetate riparian areas along waterways.
- Rotate animal grazing to prevent soil erosion in fields.
- Apply fertilizers and pesticides according to label instructions to save money and minimize pollution.

Forestry

Improperly managed logging operations can result in erosion and sedimentation.

- Conduct preharvest planning to prevent erosion and lower costs.
- Use logging methods and equipment that minimize soil disturbance.
- Plan and design skid trails, yard areas, and truck access roads to minimize stream crossings and avoid disturbing the forest floor.
- Construct stream crossings so that they minimize erosion and physical changes to streams.
- Expedite revegetation of cleared areas.

Automotive Facilities

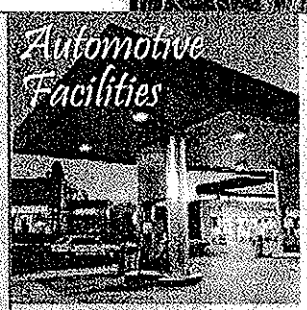

Uncovered fueling stations allow spills to be washed into storm drains. Cars waiting to be repaired can leak fuel, oil, and other harmful fluids that can be picked up by stormwater.

- Clean up spills immediately and properly dispose of cleanup materials.
- Provide cover over fueling stations and design or retrofit facilities for spill containment.
- Properly maintain fleet vehicles to prevent oil, gas, and other discharges from being washed into local waterbodies.
- Install and maintain oil/water separators.

Adopt a pet from your local animal shelter or adoption centers at pet stores. A variety of animals, from purebred tomixe d breed are waiting for loving arms and good homes. Consider volunteering at your local animal shelters. Volunteers, donations, food, newspapers, old towels and linens are needed to help the animals.

RIVERSIDE COUNTY
ANIMAL SHELTER LOCATIONS:

BLYTHE
16450 West Hobson Way
Blythe, CA 92225
760-921-7857

HEMET
800 South Sanderson
Hemet, CA 92545
909 925-8025

INDIO
45-355 Van Buren
Indio, CA 92201
760-347-2319

RIVERSIDE
5950 Wilderness Avenue
Riverside, CA 92504
909-358-7387

FOR ALL OTHER AREAS
CALL 1-888-636-7387

Riverside County gratefully acknowledges the City of Los Angeles Stormwater Program for the design concept of this brochure.

What's the Scoop?

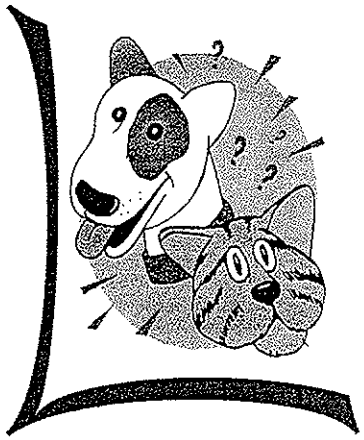

TIPS FOR A HEALTHY PET AND A HEALTHIER ENVIRONMENT

CREATE A HEALTHY ENVIRONMENT in and around your home by following these simple pet practices. Your pet, family and neighbors will appreciate their clean comfortable surroundings.

HOUSEHOLD PETS

We all love our pets, but pet waste is a subject everyone likes to avoid. Pet waste left on trails, sidewalks, streets, and grassy areas is immediately flushed into the nearest waterway when it rains. Even if you can't see water near you, the rain or waste water WASHES all that PET WASTE and BACTERIA INTO THE STORMDRAIN, where it travels to your neighborhood creek or lake untreated. These animal droppings also contain nutrients that can promote the growth of algae, if they enter our streams and lakes. The risk of STORMWATER CONTAMINATION INCREASES, if pet wastes is allowed to accumulate in animal pen areas or left on sidewalks, streets, or driveways where runoff can carry them to storm sewers.

Some of the DISEASES THAT CAN SPREAD from pet waste are:
Campylobacteriosis — a bacterial infection that causes diarrhea in humans.
Salmonellosis — the most common bacterial infection transmitted to humans from animals.
Toxocarisis — roundworms transmitted from animals to humans.

Flies and other pest insects can also increase when pet waste is disposed of improperly, becoming a nuisance and adding yet another vector for disease transmission.

WHAT CAN YOU DO?

- SCOOP up pet waste and flush it down the toilet.
- NEVER DUMP pet waste into a storm drain or catch basin.
- USE the complimentary BAGS or mutt mitts offered in dispensers at local parks.
- CARRY EXTRA BAGS when walking your dog and make them available to other pet owners who are without.
- TEACH CHILDREN how to properly clean up after a pet.
- TELL FRIENDS AND NEIGHBORS about the ill effects of animal waste on the environment. Encourage them to clean up after pets.

Did You Know ...
that Californians illegally dump about 80 million gallons of motor oil each year?

0004001

Many communities have "Scoop the Poop" laws that govern pet waste cleanup. Some of these laws specifically require anyone who walks an animal off of their property to carry a bag, shovel, or scooper. Any waste left by the animal must be cleaned up immediately. CALL YOUR LOCAL CODE ENFORCEMENT OFFICER to find out more about pet waste regulations.

Pets are only one of the many fixtures of suburban America that add to water pollution. Lawn fertilizers, rinse water from driveways and motor oil commonly end up in streams and lakes. **CALL 1-800-506-2555 FOR HOUSEHOLD HAZARDOUS WASTE COLLECTION LOCATION AND DATES.** Maintain your automobile to avoid leaks. Dispose of used vehicle fluids properly. Your pets can be poisoned if they ingest gas, oil or antifreeze that drips onto the pavement or is stored in open containers.

NEVER HOSE VEHICLE FLUIDS into the street or gutter. USE ABSORBENT MATERIALS such as cat litter to clean-up spills. SWEEP UP used absorbent materials and place in the trash.

HORSES AND LIVESTOCK

Fortunate enough to own a horse or livestock? You, too, can play a part in protecting and cleaning up our water resources. The following are a few simple Best Management Practices (BMPs) specifically designed for horse owners and landowners with horses.

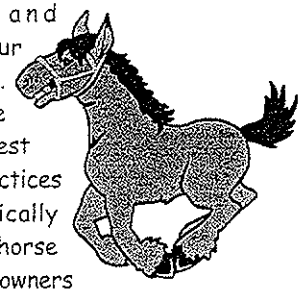

- STORE your manure properly. Do not store unprotected piles of manure in places where runoff may enter streams, or flood waters may wash the manure away. Place a cover or tarp over the pile to keep rainwater out.
- CHECK with your local conservation district to design manure storage facilities to protect water quality. These structures usually consist of a concrete pad to protect ground water and a short wall on one or two sides to make manure handling easier.
- TRY composting - A vegetative cover placed around buildings or on steeper slopes can help minimize erosion and absorb nutrients while improving the appearance of your property. In addition, avoid costlier erosion controls, vegetative covers will provide animals with better traction during wet or icy conditions.

- KEEP animals out of steams - Designed stream crossings provide a safe, easy way for horses and livestock to ford streams. Fencing encourages the use of the crossing instead of the streambed to navigate streams. This will allow vegetation to stabilize stream banks and reduce sediment pollution.
- MOW pastures to proper height, six inches is typically recommended.
- Material STORAGE SAFETY TIPS - Many of the chemicals found in barns require careful handling and proper disposal. When using these chemicals, be certain to follow these common sense guidelines:
  - Buy only what you need.
  - Treat spills of hoof oils like fuel spill. Use kitty litter to soak up the oil and dispose in a tightly sealed plastic bag.
  - Store pesticides in a locked, dry, well-ventilated area.
  - Protect stored fertilizer and pesticides from rain and surface water.

Call 1-800-506-2555 to locate your local conservation district to find out what to do with your current backyard manure pile, how to re-establish a healthy pasture, what to do about weeds, and what grasses grow best in your soils.

Thank you for doing your part to protect your watershed, the environment, and the equestrian way of life in your community!

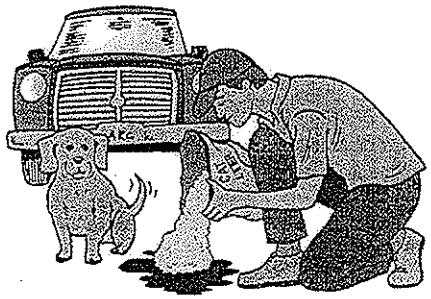

Greenwaste Recyclers

Name	Address	City	Zip Code	Phone	Branches	Grass Clippings	Leaves	Palm Fronds	Scalping	Wood Waste
Cherry Valley Nursery & Landscape	37955 Cherry Valley Blvd.	Cherry Valley	92223	951-845-7045	X	X	X		X	
Imperial Western	86600 Avenue 54	Coachella	92236	760-398-0815	X					X
B. P. John Hauling	1501 Sherborn St.	Corona	91720	951-696-1144	X		X			X
Viramontes Express	17130 Hellman Ave	Corona	92880	909-597-7232	X					X
Coachella Valley Compost Facility	87-011 Landfill Rd.	indio	92236	760-863-4364	X	X	X	X	X	X
A. Lua Wood Recycling	18938 Mermack Avenue	Lake Elsinore	92532	951-245-4497	X		X			X
COLMAC Energy Inc.	62-300 Gene Welmas Dr.	Mecca	92254	760-396-2554	X					X
Agriscape	37760 Borel Rd.	Murrieta	92563-2527	951-696-0651	X	X	X	X	X	X
Artesia Sawdust, Inc.	13434 Ontario Ave.	Ontario	91761-7956	909-923-0563	X					X
Recycle America of the Desert	41800 Corporate Way	Palm Desert	92260-1912	760-324-1741	X	X	X	X	X	
Perris Transfer Station	1706 Goetz Rd.	Perris	92570	951-943-1991	X	X	X			X
One-Stop Landscaping	13024 San Timeteo Cyn Rd.	Redlands	92373-7805	909-798-1278	X	X	X		X	X
Robert A. Nelson Transfer Station/Burrtec	1830 Agua Mansa Rd.	Riverside	92509	951-786-0655	X	X	X			X
B. P. John Hauling	28700 Matthews Rd.	Romoland	92585	951-696-1144	X	X	X	X		X
CST Organic Recycling	595 E. Orangeshow Rd.	San Bernardino	92408	909-884-8198	X	X	X		X	X
California Biomass	83-109 Avenue 62	Thermal	92370	760-399-4128	X	X	X		X	X
Southern California Recyclers	29-250 Rio del Sol	Thousand Palms	92276	760-343-0499	X	X	X	X	X	X

This list is provided as a public service and is not an endorsement of these companies or their services.
The department is not responsible for any errors or omissions in this listing.

Used Oil Recycling Centers

Name	Address	City	Zip Code	Phone	Certified
Auto Zone #2816	3453-A W. Ramsey St	Banning	92220	951-849-4626	yes
Ted's Lube Oil Plus *	4097 W Ramsey St	Banning	92220	951-849-0765	yes
Kragen Auto Parts #751 *	635 Highland Springs Rd	Beaumont	92223	951-845-3186	yes
Auto Zone #5549	812 E Hobson Way	Blythe	92225	760-922-0544	yes
Checker Auto Parts #1123 *	1315 W Hobson Way	Blythe	92225	760-922-2330	yes
Texaco Xpress Lube	128 N Palm	Blythe	92225	760-922-5000	yes
Canyon Lake Xpress Lube + Car Wash *	31638 Railroad Cyn Rd	Canyon Lake	92587	951-244-3286	yes
Auto Zone #5550	34051 Date Palm Dr	Cathedral City	92234	760-324-9579	yes
Crystal Chrysler Ctr	36444 Auto Park Dr	Cathedral City	92234	760-324-4557	yes
Firestone Store #2234 *	68240 Ramon Rd	Cathedral City	92234	760-324-1774	yes
Pep Boys #844 -	31-505 Date Palm Dr	Cathedral City	92234	760-324-7677	yes
The Lube Shop *	68-815 Ramon Rd	Cathedral City	92234	760-328-0480	yes
Kragen Auto Parts #1480	69140 Ramon Rd	Cathedral City	92235	760-202-1868	yes
Auto Zone #5552	49617 Harrison	Coachella	92236	760-398-8902	yes
Kragen Auto Parts #1286	51339 Harrison (Hwy 86)	Coachella	92236	760-398-2114	yes
K C B Oil Refinery Co	12645 Security	Colton	92324	909-687-1012	yes
Grease Monkey	1270 E Grand Ave	Corona	91719	951-278-0591	yes
Kragen Auto Parts #1078	1220 Magnolia Ave #102	Corona	91719	951-273-9892	yes
Scher Tire Inc #25 dba Goodyear Tire	2189 Sampson Ave Ste 111	Corona	91719	951-736-8473	yes
A Plus Auto Repair	1359 W 6th St, Ste C	Corona	91720	951-272-1141	yes
Auto Zone #5554	701 W 6th St	Corona	91720	951-371-4730	yes
Big O Tires #620	1002 W 6th St	Corona	91720	951-735-2430	yes
Firestone Store #2258	522 N Main St	Corona	91720	951-735-4101	yes
Jiffy Lube #1907	906 W 6th St	Corona	91720	951-549-9060	yes
Pep Boys #778	581 N Main St	Corona	91720	951-279-9230	yes
Ramona Tire Inc	304 W 6th St	Corona	91720	951-734-1222	yes
Kragen Auto Parts #4185	1142 W 6th St	Corona	92882	951-735-0936	yes
Auto Zone #2877	12660 Palm Dr	Desert Hot Springs	92240	760-329-1072	yes
Kragen Auto Parts #1601	13310 Palm Dr	Desert Hot Springs	92240	760-251-3119	yes
Star Auto Parts	9410 Mission Blvd	Glen Avon	92509	951-685-2929	yes
Auto Zone #2820	1550 W Florida Ave	Hemet	92543	951-929-0807	yes
Firestone Store #2233	350 W Florida Ave	Hemet	92543	951-929-2424	yes
Grease Monkey	532 W Florida Ave	Hemet	92543	951-766-1996	yes
Kragen Auto Parts #1332	849 W Florida Ave	Hemet	92543	951-929-2210	yes
Auto Zone #5556	3100 E Florida Ave	Hemet	92544	951-652-1308	yes
Kragen Auto Parts #1045	3330 E Florida Ave	Hemet	92544	951-766-2825	yes
Plaza Chevron Automotive	2099 E Florida Ave	Hemet	92544	951-658-2607	yes
City of Hemet Public Works *	3777 Industrial Ave	Hemet	92545	951-765-3777	
Hemet Auto Mall Lube N Wash	450 Carriage Cir	Hemet	92545	951-658-3185	yes
Inland Chevrolet Geo Oldsmobile *A69	2505 W Florida Ave	Hemet	92545	951-658-4401	yes
Masterlube #101	3615 W Florida Ave	Hemet	92545	951-766-7055	yes
Pep Boys #866	2050 W Florida Ave	Hemet	92545	951-766-1477	yes
Ramona Tire Inc	2350 Menlo Ave	Hemet	92545	951-925-6650	yes
Idyllwild Garage	25015 Hwy #243	Idyllwild	92549	951-659-2613	yes
Firestone Store #2231	82323 Hwy #111	Indio	92201	760-347-0787	yes
Kragen Auto Parts #799	81930 Hwy #111	Indio	92201	760-347-4787	yes
Kwik Kar of Indio	81-088 Hwy #111	Indio	92201	760-775-5945	yes
Pep Boys #675 - Region 3	81-246 Hwy #111	Indio	92201	760-347-4597	yes
Auto Zone #5560	78792 Hwy #111	La Quinta	92253	760-771-1858	yes
The Lube Shop	78-988 Hwy #111	La Quinta	92253	760-564-3630	yes
Auto Zone #5558	30870 Riverside	Lake Elsinore	92530	951-674-7806	yes
Auto Zone #5559	32231 Mission Trail Rd	Lake Elsinore	92530	951-245-1012	yes
Autoaid	31760 Mission Trail Rd	Lake Elsinore	92530	951-245-1948	
Econo Lube N' Tune	31700 Casino Dr	Lake Elsinore	92530	951-674-8693	yes
Firestone Store #2238	31748 Mission Trl Rd	Lake Elsinore	92530	951-674-0633	yes
Lake Elsinore Unocal	515 Main St	Lake Elsinore	92530	951-674-3963	yes
Marlar's Auto Service	300 W Graham Ave	Lake Elsinore	92530	951-674-2330	yes
Jiffy Lube #2237	12300 Heacock Ave	Moreno Valley	92557	951-485-1588	
Walmart Tire & Lube Express *	31700 Grape St	Lake Elsinore	92530	951-245-5149	
Kragen Auto Parts #1429	31660 Grape St	Lake Elsinore	92532	951-245-5049	yes
Auto Zone #5561	30121 Antelope Rd Bldg L	Menifee	92584	951-301-7240	yes
One Stop Lube & Oil	26825 Newport Rd	Menifee	92584	951-672-8511	yes
Auto Zone #5562	11020 Limonite Ave	Mira Loma	91752	951-738-8260	yes
Auto Zone #5563	24570 Alessandro Blvd	Moreno Valley	92553	951-242-8439	yes
Auto Zone #5564	12601 Perris Blvd	Moreno Valley	92553	951-242-4353	yes
Auto Zone #5565	23031 Sunnymead Blvd	Moreno Valley	92553	951-924-5460	yes
Ayres Auto Service *	24759 Sunnymead Blvd Unit A	Moreno Valley	92553	951-485-3525	yes
The Pit Stop	24035 Sunnymead Blvd	Moreno Valley	92553	951-924-6363	yes

Used Oil Recycling Centers

Name	Address	City	Zip Code	Phone	Certified
Firestone Store #2259	24673 Alessandro Blvd	Moreno Valley	92553	951-242-6631	yes
Kragen Auto Parts #1304	24021-C Alessandro Blvd	Moreno Valley	92553	951-242-0641	yes
Pep Boys #724	23470 Sunnymead Blvd	Moreno Valley	92553	951-247-4564	yes
Grease Monkey	23165 Hemlock	Moreno Valley	92557	951-247-1873	yes
Kragen Auto Parts #1704	12240 Perris Blvd	Moreno Valley	92557	951-247-5509	yes
Ramona Tire & Automotive	12275 Heacock St	Moreno Valley	92557	951-924-9797	yes
Scher Tire #14	23135 Hemlock Ave	Moreno Valley	92557	951-243-6424	yes
Auto Zone #5566	40950 California Oaks Rd	Murrieta	92562	951-677-6206	yes
Big O Tires Murrieta	40420 California Oaks Rd	Murrieta	92562	951-600-0160	yes
Grease Monkey	40430 California Oaks Rd	Murrieta	92562	951-351-0604	yes
Kragen Auto Parts #1430	40951 California Oaks Rd	Murrieta	92562	951-696-2991	yes
Kragen Auto Parts #1616 *A69	1050 Hamner Ave	Norco	91760	951-898-1283	yes
Phillips Pontiac Mazda	2000 Hamner Ave	Norco	91760	951-734-1555	yes
Auto Zone #5567	73800 Hwy #111	Palm Desert	92260	760-340-6331	yes
W.M.O.D./Recycle America	41575 Eclectic St	Palm Desert	92260	760-340-6445	yes
Auto Zone #5568	1717 Vista Chino	Palm Springs	92262	760-320-0617	yes
Kragen Auto Parts #769	8702 Limonite	Pedley	92509	951-685-0823	yes
Auto Zone #5570	394 E 4th St	Perris	92570	951-657-0696	yes
City of Perris Public Works	1015 S "G" St	Perris	92570	951-657-3280	
Walmart Tire & Lube Express	2560 N Perris Blvd	Perris	92570	951-943-2030	
Auto Zone #5571	1675 N Perris Blvd	Perris	92571	951-943-5998	yes
Econo Lube N Tune #97	2309 N Perris Blvd	Perris	92571	951-657-8664	yes
Kragen Auto Parts #1046	119 W Nuevo Rd	Perris	92571	951-657-1488	yes
Ramona Tire Inc	71491 Hwy #111	Rancho Mirage	92270	760-773-3935	yes
Burke's Auto Repair	3615 Oakley Ave	Riverside	92501	951-682-2214	
Firestone Store #2256	4199 Market St	Riverside	92501	951-686-4465	yes
Kragen Auto Parts #1573	1691 University Ave	Riverside	92501	951-222-2900	yes
Auto Zone #5573	4195 Van Buren Blvd	Riverside	92503	951-359-7760	yes
Auto Zone #5575	10249 Arlington Ave	Riverside	92503	951-688-0297	yes
Auto Zone #5578	3400 E La Sierra Ave	Riverside	92503	951-354-0781	yes
Firestone Store #2257 *	10091 Magnolia Ave	Riverside	92503	951-687-3950	yes
Grease Monkey	7437 Arlington Ave	Riverside	92503	951-351-0604	yes
Ramona Tire Inc	3255 Van Buren Blvd	Riverside	92503	951-785-8590	yes
Scher Tire Inc #22 dba Goodyear Tire	3863 Tyler St	Riverside	92503	951-359-3500	yes
The Carriage Motor House	12321 Sampson Ave	Riverside	92503	951-520-0483	yes
AutoZone #5547	1947 University Ave	Riverside	92504	951-780-0723	yes
Kragen Auto Parts #1015	6160 Arlington Ave	Riverside	92504	951-689-0944	yes
Moss Motors	8151 Auto Dr	Riverside	92504	951-688-6200	yes
Scher Tire #13	5110 Arlington Ave	Riverside	92504	951-785-1000	yes
Jiffy Lube #2237	3693 La Sierra Ave	Riverside	92505	951-359-8999	yes
Kragen Auto Parts #732	10403 Magnolia Ave	Riverside	92505	951-359-3041	yes
Pep Boys #690 *	10831 Magnolia Ave	Riverside	92505	951-354-0100	yes
Auto Zone #5576	6047 Magnolia Ave Ste A	Riverside	92506	951-784-9201	yes
Grease Monkey	3417 Arlington Ave	Riverside	92506	951-788-7725	yes
Pick A Part	3760 Pyrite Street	Riverside	92509	951-685-6744	yes
Kragen Auto Parts #1322	3790 Jurupa Ave	Riverside	92506	951-682-6082	yes
Auto Zone #5547	1947 University Ave	Riverside	92507	951-788-4013	yes
Walmart Tire & Lube Express *	2663 Canyon Springs	Riverside	92507	951-653-3289	
Grease Monkey	18681 Van Buren Blvd	Riverside	92508	951-351-0604	yes
Jiffy Lube	2634 E. Alessandro Blvd	Riverside	92508	951-653-6655	
Auto Zone #5580	5623 Mission Blvd	Riverside	92509	951-275-0301	yes
INABA Auto Parts	5680 Mission Blvd	Riverside	92509	951-686-7070	yes
Scher Tire Inc #24dba Goodyear Tire	6072 Camino Real	Riverside	92509	951-685-1000	yes
Ramona Tire Inc	27526 Hwy #74	Romoland	92585	951-928-1925	yes
Auto Zone #5581	1470 San Jacinto Ave	San Jacinto	92583	951-654-2216	yes
Quality Auto Parts	570 S State St	San Jacinto	92583	951-654-8046	
Ramona Tire Inc	2447 S San Jacinto Ave.	San Jacinto	92583	951-925-5117	yes
Auto Zone #5936	40345 Winchester Rd	Temecula	92589	951-308-2324	yes
Econo Lube N Tune #181	27685 Jefferson Ave	Temecula	92590	951-694-4073	yes
Ramona Tire Inc	28860 Front St B-6	Temecula	92590	951-676-8473	yes
Rancho Car Wash and Quick Lube	27378 Jefferson Ave	Temecula	92590	951-699-3722	yes
Big O Tires #5628 *	40525 Winchester Rd	Temecula	92591	951-676-1430	yes
Jiffy Lube #1878	30690 Rancho California Rd	Temecula	92591	951-694-5460	yes
Kragen Auto Parts #483	41125 Winchester Rd	Temecula	92591	951-699-1679	yes
Pep Boys #800 - Region 3 *	40605 Winchester Rd	Temecula	92591	951-695-2322	yes
Precision Tune Auto Care	26673 Ynez Rd Suite A	Temecula	92591	951-699-6969	yes
Auto Zone #5582	31837 HWY #79, S #A-1	Temecula	92592	951-695-2663	yes
My Garage	21952 Walnut St	Wildomar	92595	951-674-8412	yes

* = This location also accepts used oil filters for recycling.

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Riverside County Regional Recyclers

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					Metals					Appliances			Glass		Plastics				Paper				
Riverside Metro Area	ADDRESS	CITY	ZIP CODE	PHONE	Aluminum	Tin	Ferrous Metals	Non-Ferrous Metals	Car Batteries	CFC Removal	Repairable Appliances	Scrap Appliances	CRV Glass	Non-CRV Glass	PET Plastic - #1	CRV Plastic	HDPE Plastic - #2	Polystyrene	Newspaper	Office Paper	Computer Paper	Cardboard	Mixed Paper
Riverside Metro Area																							
20/20 Recycling Center	480 McKinley St.	Corona	91719-1291	800-969-2020	X								X	X	X	X							
Yawl Recycle Center	31 E. Grand Blvd.	Corona	92879	951-371-9716	X			X					X			X							
Six-Pack Recycling Center	1430 E. 6th St.	Corona	92879	951-734-2910	X	X	X	X				X	X	X	X	X	X		X	X	X	X	X
National Polystyrene Recycling Corp.	720 S. Temescal	Corona	91719-2050	951-736-7040														X					
Liston Brick Co. of Corona	20401 Temescal Canyon	Corona	91719-4937	951-277-4221	X			X															
20/20 Recycling Center	301 S. Lincoln	Corona	91720-1857	800-969-2020	X								X		X	X							
Tomra Pacific Inc.	1288 Border Ave.	Corona	91720-3801	951-980-1203	X	X							X	X	X	X							
20/20 Recycling Center	1731 Pomona Rd.	Corona	91720-6963	800-969-2020	X								X	X	X	X							
Tomra Pacific Inc.	1193 Magnolia Ave.	Corona	92879-3202	951-980-1203	X	X							X	X	X	X	X						
A & C Recycling	9401 Etiwanda Ave.	Mira Loma	91752-1404	909-988-8000	X	X	X	X				X											
Tomra Pacific Inc.	11070 Limonite	Mira Loma	91752-2120	909-980-1203	X	X							X	X	X	X							
Tomra Pacific Inc.	2790 Hamner Ave.	Norco	91760-1932	909-980-1203	X	X							X	X	X	X	X						
Cash 4 Cans	7633 Cypress	Riverside	92503	951-352-5995	X		X	X					X	X	X				X				
Jared's Refrigerant Recovery Svs.	1673 Tava Ln.	Riverside	92504	951-780-7610						X													
Battery Systems	1860 Chicago Ave., H-23	Riverside	92507	951-778-0295					X														
Tomra Pacific Inc.	5225 Canyon Crest, Ste 1	Riverside	92507	951-980-1203	X								X	X	X	X							
Tomra Pacific Inc.	2995 Iowa Ave.	Riverside	92507	951-980-1203	X	X							X	X	X	X	X						
Tomra Pacific Inc.	9155 Jurupa Rd.	Riverside	92509	951-980-1203	X	X							X	X	X	X	X						
Battery Systems	4811 Van Buren Blvd.	Riverside	92503-2612	951-359-0204					X														
Tomra Pacific Inc.	9225 Magnolia Ave.	Riverside	92503-3858	951-980-1203	X	X							X	X	X	X							
Tomra Pacific Inc.	3420 S. La Sierra Ave.	Riverside	92503-5203	951-980-1203	X	X							X	X	X	X	X						
Tomra Pacific Inc.	6180 Arlington Ave.	Riverside	92504-1944	951-980-1203	X	X							X	X	X	X							
Tomra Pacific Inc.	4250 Van Buren Blvd.	Riverside	92504-5939	951-980-1203	X	X							X	X	X	X							
Tomra Pacific Inc.	17050 Van Buren Blvd.	Riverside	92504-5939	951-980-1203	X	X							X	X	X	X	X						
Tomra Pacific Inc.	10370 Arlington Ave.	Riverside	92505-1102	951-980-1203	X	X							X	X	X	X	X						
Tomra Pacific Inc.	10471 Magnolia Ave.	Riverside	92505-1811	951-980-1203	X	X							X	X	X	X							
Tomra Pacific Inc.	4880 La Sierra Ave.	Riverside	92505-2763	951-980-1203	X	X							X	X	X	X							
20/20 Recycling Center	3840 La Sierra Ave.	Riverside	92505-3528	800-969-2020	X								X		X	X							
20/20 Recycling Center	3520 Riverside Plaza	Riverside	92506-2723	800-969-2020	X								X		X	X							
Tomra Pacific Inc.	2861 Mary St.	Riverside	92506-4247	951-980-1203	X	X							X	X	X	X	X						
Summit Pulp and Paper	1575 Marlborough Ave.	Riverside	92507-2029	951-786-6000															X	X	X	X	X
Riverside Scrap Iron and Metals	2993 6th St.	Riverside	92507-4131	951-686-2120	X	X	X	X				X	X	X	X	X	X		X		X	X	
Tomra Pacific Inc.	315 E. Alessandro Blvd.	Riverside	92508-2463	951-980-1203	X	X							X	X	X	X							
Appliance Recycling Factory	3851 Pyrite	Riverside	92509-1108	951-681-5300						X	X												
Newcoliris Buy Back Center	7000 Jurupa Ave.	Riverside	92509	951-688-4350	X								X	X	X	X			X			X	
Recycling Service Center	6565 Mission Blvd.	Riverside	92509-4193	951-681-2525	X			X					X	X	X	X			X			X	
Recycling Service Center	8566 Limonite	Riverside	92509-5113	951-685-4430	X			X					X	X	X	X							
San Bernardino Area																							
Augustine Metals	2021 W. Placentia	Colton	92324-3317	951-682-8102	X		X	X	X		X	X	X			X							
Colton Iron and Metal	790 East M St.	Colton	92324-3910	909-825-1662			X			X		X											
Cannco	1224 N. Mt. Vernon	Colton	92324-2502	909-824-2559	X			X					X	X	X	X							
Inland Recycling	340 W. Valley Blvd	Colton	92324	909-825-1200	X								X			X			X	X	X	X	X
Fontana Paper Mills	13733 Valley Blvd.	Fontana	92335-5268	909-823-4100															X	X	X	X	X
West Valley MRF	13373 Napa St.	Fontana	92335	909-899-5501	X	X	X	X					X	X	X	X	X		X	X	X	X	X
Battery Systems	16010 Valley Blvd.	Fontana	92335	909-823-9865					X														
Sims Metals of America	15615 Arrow Route	Fontana	92335-3272	909-823-3431	X	X	X	X				X	X			X							
Inland Paper Stock	777 W. Rialto	San Bernardino	92410-3329	909-884-8672	X								X	X	X	X	X		X	X	X	X	X
San Bernardino Recycling Center	144 S. G St.	San Bernardino	92410-3360	909-889-0626	X			X	X				X	X		X	X		X			X	
All-Metals Recycling	31710 Dunlop Blvd.	Yucaipa	92316-1903	909-794-5865	X	X	X	X	X			X	X		X	X			X			X	
Western San Bernardino County																							
Main Street Fibers	608 Main St.	Ontario	91761-1711	909-986-6310	X	X	X	X					X	X	X	X	X		X	X	X	X	X
D & M Metals	840 State St.	Ontario	91761-1836	909-986-1996	X			X					X		X	X							
Ontario Metal Recycling	717 S. Taylor	Ontario	91761-1847	909-983-0655	X	X	X	X				X	X	X	X	X	X						
American Metal Recycling	2202 S. Milliken Ave.	Ontario	91761-2307	909-988-8000	X	X	X	X				X											
Inland Container Corp.	5100 E. Jurupa	Ontario	91761-3618	909-292-1055																		X	
Recycling Resources	1406 W. 2nd St.	Pomona	91766-1201	909-629-9911	X								X	X	X	X			X	X	X	X	X
Appliance Services	225 South I Street	San Bernardino	92410	909-884-9758						X	X	X											

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Riverside County Regional Recyclers

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					Metals					Appliances			Glass		Plastics				Paper				
NAME	ADDRESS	CITY	ZIP CODE	PHONE	Aluminum	Tin	Ferrous Metals-iron	Non-Ferrous Metals	Car Batteries	CFC Removal	Repairable Appliances	Scrap Appliances	CRV Glass	Non-CRV Glass	PET Plastic - #1	CRV Plastic	HDPE Plastic - #2	Polystyrene	Newspaper	Office Paper	Computer Paper	Cardboard	Mixed Paper
Moreno Valley/Perris Area																							
Tri-Cycle Recycling	23720 Sunnymead Blvd.	Moreno Valley	92553-3022	951-924-5391	X			X					X	X	X	X							
Tomra Pacific Inc.	24595 Alessandro Blvd.	Moreno Valley	92553-3927	951-980-1203	X	X							X	X	X	X	X						
20/20 Recycling Center	25065 Sunnymead Blvd.	Moreno Valley	92553-4195	800-969-2020	X								X			X							
Tomra Pacific Inc.	12625 Fredrick Ave.	Moreno Valley	92553-5216	951-980-1203	X	X							X	X	X	X							
Tomra Pacific Inc	14930 Perris Blvd.	Moreno Valley	92553-7183	951-980-1203	X								X	X	X	X	X						
Tomra Pacific Inc.	23575 Sunnymead Ranch	Moreno Valley	92557-2866	951-980-1203	X								X	X	X	X	X						
20/20 Recycling Center	11875 Pigeon Pass Rd. Ste.	Moreno Valley	92557-6039	800-969-2020	X								X			X							
Perris Valley Recycling	707 E. 4th St.	Perris	92570-2255	951-657-9811	X	X	X	X				X	X	X	X	X	X		X	X	X	X	
Tomra Pacific Inc.	47 W. Nuevo Rd.	Perris	92571-0831	951-980-1203	X								X			X	X						
20/20 Recycling Center	2560 N. Perris Blvd.	Perris	92571-3254	951-279-2200	X								X			X							
Hemet/San Jacinto Area																							
Royal Metals	1401 Suite A, Mesa View,	Hemet	92543-1538	951-654-2257	X								X										
Valley Metals	405 N. Buena Vista	Hemet	92543-2921	951-925-8577	X			X					X	X	X	X			X				
Mobile Recycling Inc.	41849 Florida Ave.	Hemet	92544-5066	714-891-7766	X	X							X	X	X	X			X				
Tomra Pacific Inc.	43396 Florida Ave.	Hemet	92544-5220	951-980-1203	X	X							X	X	X	X							
Lion's Club	119 S. Inez St.	Hemet	92543-4135	951-929-2344	X	X	X	X					X	X	X	X	X		X	X	X	X	X
20/20 Recycling Center	3125 W. Florida	Hemet	92545-3618	800-969-2020	X								X		X	X							
San Gorgonio Pass																							
Ramsey Recycling	1243 E. Ramsey Ave.	Banning	92220-5927	951-849-5997	X	X	X	X	X		X	X	X	X					X			X	
Banning Recycling	284 S. 8th St.	Banning	92220	951-922-9236	X	X	X	X				X	X			X			X				
Top $ Recycling	149 E. Third St.	Beaumont	92223	951-769-9037	X	X	X	X				X	X		X	X	X		X			X	
Tomra Pacific Inc.	1661 E. 6th St.	Beaumont	92223-2509	909-980-1203	X	X							X	X	X	X	X						
Tomra Pacific Inc.	1155 Calimesa Blvd.	Calimesa	92320-1549	909-980-1203	X	X							X	X	X	X							
Southwest County																							
20/20 Recycling Center	32281 Mission Trail	Lake Elsinore	92530-4524	800-969-2020	X								X			X			X				
Cans + Recycling	29170 Riverside Dr.	Lake Elsinore	92530-2610	951-245-1178	X			X					X	X									
Tomra Pacific Inc.	16750 Lakeshore Dr.	Lake Elsinore	92530-4902	909-980-1203	X	X							X	X	X	X							
Tomra Pacific Inc.	30125 Antelope Rd.	Menifee	92584-8072	909-980-1203	X	X							X	X	X	X							
Tomra Pacific Inc.	40473 Murrieta Hot Sprgs Rd	Murrieta	92563-6401	909-980-1203	X								X	X	X	X	X						
Rancho Metal and Recycling	41400 Dale St.	Murrieta	92562-7026	951-677-8586	X		X	X					X		X	X							
Tomra Pacific Inc.	25904 Newport Rd.	Sun City	92584-9130	909-980-1203	X	X							X	X	X	X	X						
Tomra Pacific Inc.	30530 Rancho California Rd.	Temecula	92591-3277	909-980-1203	X	X							X	X	X	X	X						
Tomra Pacific Inc.	27475 Jefferson St.	Temecula	92590-2602	909-980-1203	X	X							X	X	X	X							
Coachella and Palo Verde Valleys																							
B & O Metals	4140 Sutton Rd.	Blythe	92225	760-664-4196	X			X					X		X	X							
VFW Post 2987	378 N. Eucalyptus St.	Blythe	92225-1581	760-921-2763	X								X		X	X							
20/20 Recycling Center	69-255 Ramon Rd.	Cathedral City	92234-3346	800-969-2020	X								X	X	X	X			X				
20/20 Recycling Center	35-935 Date Palm St.	Cathedral City	92234-6658	800-969-2020	X								X		X	X			X				
Tomra Pacific Inc.	34-251 Date Palm Dr.	Cathedral City	92234-6815	909-980-8795	X	X							X	X	X	X	X						
Appliance Recycling Factory	34-900 Date Palm Dr.	Cathedral City	92234-6833	760-321-0330							X												
Hubert's Appliance	68-713 Perez Rd. B-14	Cathedral City	92234-7222	760-328-0260						X	X												
Palm Springs Recycling	36-630 Sunair Plaza	Cathedral City	92234-7620	760-321-4087	X		X	X	X		X	X	X	X	X	X	X		X	X	X	X	
Valley Scrap	48-100 Harrison	Coachella	92236-1214	760-398-5651	X	X	X	X				X	X	X	X	X	X					X	
Riverside Scrap Iron and Metals	86-015 Avenue 52	Coachella	92236-2701	760-398-7772	X		X	X				X	X	X	X	X	X		X				
Tomra Pacific Inc.	13-200 Palm Dr.	Desert Hot Springs	92240-5902	909-980-1203	X	X							X	X	X	X	X						
Mobile Recycling Inc.	74-895 Hwy. 111	Indian Wells	92210-7115	714-891-7766	X	X							X	X	X	X							
Apple Recycling	80-631 Indio Blvd.	Indio	92201	760-397-4279	X								X	X	X	X							
Tomra Pacific Inc.	81-056 Hwy. 111	Indio	92201-6664	909-980-1203	X	X							X	X	X	X							
20/20 Recycling Center	78-630 Hwy. 111	La Quinta	92253-2067	800-969-2020	X								X	X	X	X			X				
Tomra Pacific Inc.	50-929 Washington St	La Quinta	92253-2889	909-980-1203	X	X							X	X	X	X	X						
Tomra Pacific Inc.	74-884 Country Club Dr.	Palm Desert	92260	909-980-1203	X	X							X	X	X	X	X						
Recycle America of the Desert	41800 Corporate Way	Palm Desert	92260-1912	760-324-1741	X	X							X	X	X	X	X	X	X	X	X	X	
20/20 Recycling Center	73-101 Country Club Dr.	Palm Desert	92260-2350	800-969-2020	X								X		X	X							X
20/20 Recycling Center	2315 E. Tahquitz-McCallum	Palm Springs	92262	800-969-2020	X								X		X	X							
Tomra Pacific Inc.	1733 E. Palm Canyon Dr.	Palm Springs	92264	909-980-1230	X	X							X	X	X	X	X						
Palm Springs Recycling	280 Oasis	Palm Springs	92262-1644	760-325-3377	X	X	X	X	X				X	X	X	X	X		X	X	X	X	
Palm Springs Disposal Services	4690 E. Mesquite Ave.	Palm Springs	92264-3510	760-327-1351	X	X							X	X	X	X	X		X			X	
20/20 Recycling Center	4733 E. Palm Canyon Dr.	Palm Springs	92264-5219	800-969-2020	X								X		X	X							X
Apple Recycling	65-959 Hwy. 86	Thermal	92274-9545	760-397-4279	X								X	X	X	X							
Southern California Recycling	29-250 Rio Del Sol Rd.	Thousand Palms	92276	760-343-0499								X											

This list is provided as a public service and is not an endorsement of these companies or their services.
The department is not responsible for any errors or omissions in this listing.

Information:

LOCAL SEWERING AGENCIES IN RIVERSIDE COUNTY:

City of Beaumont	(909) 769-8520
Belair Homeowners Association	(909) 277-1414
City of Banning	(909) 922-3130
City of Blythe	(760) 922-6161
City of Coachella	(760) 391-5008
Coachella Valley Water District	(760) 398-2651
City of Corona	(909) 736-2259
Desert Center, CSA #51	(760) 227-3203
Eastern Municipal Water District	(909) 928-3777
Elsinore Valley MWD	(909) 674-3146
Farm Mutual Water Company	(909) 244-4198
Idyllwild Water District	(909) 659-2143
Indio Community Services Dist.	(909) 685-7434
Lake Hemet MWD	(909) 658-3241
Lake Mathews Water District	(909) 277-1414
March Air Force Base	(909) 656-7000
Mission Springs Water District	(760) 329-6448
City of Palm Springs	(760) 323-8242
Ramona Caballero	(909) 780-9272
Ramona California Water Dist	(909) 678-4101
Thermal CSA #92	(760) 922-4909
Rubidoux Community Services Dist	(909) 684-7580
City of Riverside	(909) 782-5341
Sherry Valley Club, Inc	(909) 849-4501
Valley Sanitary District	(760) 347-2356
Western Municipal Water District	(909) 780-4170

SPILL RESPONSE AGENCY:

HAZMAT	(909) 358-5055
HAZARDOUS WASTE DISPOSAL:	(909) 358-5055
TO REPORT ILLEGAL DUMPING OR A CLOGGED STORM DRAIN:	1-800-506-2555

StormWater CleanWater PROTECTION PROGRAM

Riverside County gratefully acknowledges the Bay Area Stormwater Management Agencies Association and the Cleaning Equipment Trade Association for information provided in this brochure

StormWater Pollution

What you should know for...

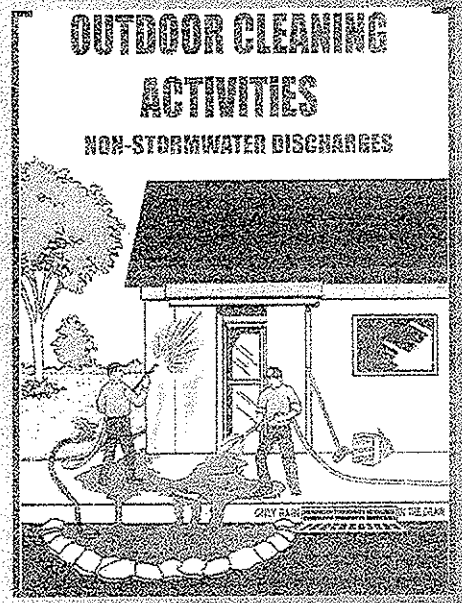

GUIDELINES for disposal of washwater from:

- Sidewalk, plaza or parking lot cleaning
- Vehicle washing or detailing
- Building exterior cleaning
- Waterproofing
- Equipment cleaning or degreasing

Do you know ... where the water should go?

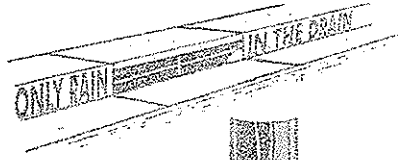

Riverside County has two drainage systems - sanitary sewers and storm drains. The storm drain system is designed to prevent flooding by carrying excess rainwater away from streets ... it's not designed to be a waste disposal system. Since the storm drain system does not provide for water treatment, it often serves the unintended function of transporting pollutants directly to our waterways.

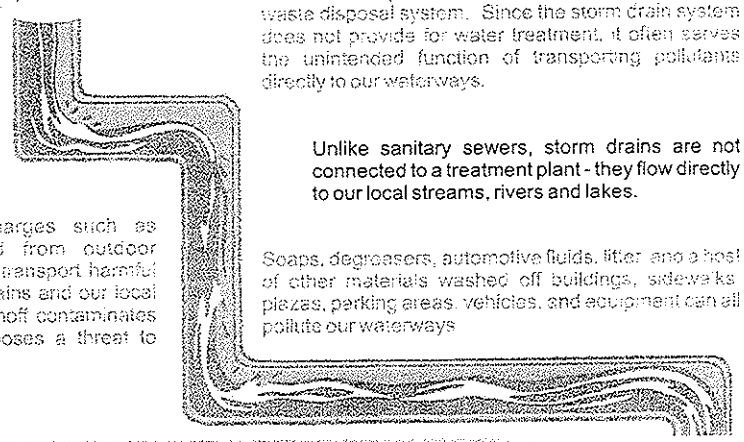

Unlike sanitary sewers, storm drains are not connected to a treatment plant - they flow directly to our local streams, rivers and lakes.

Non-stormwater discharges such as washwater generated from outdoor cleaning projects often transport harmful pollutants into storm drains and our local waterways. Polluted runoff contaminates local waterways and poses a threat to groundwater resources

Soaps, degreasers, automotive fluids, litter and a host of other materials washed off buildings, sidewalks, plazas, parking areas, vehicles, and equipment can all pollute our waterways

The Cities and County of Riverside StormWater/CleanWater Protection Program

Since preventing pollution is much easier, and less costly than cleaning up "after the fact," the Cities and County of Riverside StormWater/CleanWater Protection Program informs residents and businesses of pollution prevention activities such as those described in this pamphlet.

The Cities and County of Riverside have adopted ordinances for stormwater management and discharge control. In accordance with state and federal law, these local stormwater ordinances **prohibit** the discharge of wastes into the storm drain system or local surface waters. This includes non-stormwater discharges containing oil, grease, detergents, degreasers, trash, or other waste materials.

PLEASE NOTE: The discharge of pollutants into the street, gutters, storm drain system, or waterways - without a Regional Water Quality Control Board permit or waiver - is *strictly prohibited* by local ordinance and state and federal law.

0004008

Help Protect Our Waterways!

Use These Guidelines for Outdoor Cleaning Activities and Washwater Disposal

DO . . . Dispose of **small amounts** of **washwater from cleaning building exteriors, sidewalks, or plazas** onto landscaped or unpaved surfaces provided you have the owner's permission and the discharge will not cause flooding or nuisance problems, or flow into a storm drain.

DO NOT . . . Discharge **large amounts** of these types of washwater onto landscaped areas or soil where water may run to a street or storm drain. Wastewater from exterior cleaning may be pumped to a sewer line with specific permission from the local sewering agency.

DO . . . Check with your local sewering agency's policies and requirements concerning waste water disposal. **Water from many outdoor cleaning activities** may be acceptable for disposal to the sewer system. See the list on the back of this flyer for phone numbers of the sewering agencies in your area.

DO NOT . . . Pour **hazardous wastes** or toxic materials into the storm drain or sewer system . . . properly dispose of it instead. When in doubt, contact the local sewering agency! The agency will tell you what types of liquid wastes can be accepted.

DO . . . Understand that **water (without soap) used to remove dust from clean vehicles** may be discharged to a street or storm drain. **Washwater from sidewalk, plaza, and building surface cleaning** may go into a street or storm drain if ALL of the following conditions are met:

1. The surface being washed is free of residual oil stains, debris and similar pollutants by using dry cleanup methods (sweeping, and cleaning any oil or chemical spills with rags or other absorbent materials before using water).
2. Washing is done with water only - no soap or other cleaning materials.
3. You have not used the water to remove paint from surfaces during cleaning.

DO NOT . . . Dispose of water containing **soap or any other type of cleaning agent** into a storm drain or water body. This is a direct violation of state and/or local regulations. Because **wastewater from cleaning parking areas or roadways** normally contains metallic brake pad dust, oil and other automotive fluids, it should never be discharged to a street, gutter, or storm drain.

DO . . . Understand that mobile auto detailers should divert washwater to landscaped or dirt areas. Note: Be aware that soapy washwater may adversely affect landscaping; consult with the property owner. Residual washwater may remain on paved surfaces to evaporate; sweep up any remaining residue. If there is sufficient water volume to reach the storm drain, collect the runoff and obtain permission to pump it into the sanitary sewer. Follow local sewering agency's requirements for disposal.

DO NOT . . . Dispose of left over cleaning agents into the gutter, storm drain or sanitary sewer.

Regarding Cleaning Agents:

If you must use soap, use biodegradable/phosphate free cleaners. Avoid use of petroleum based cleaning products. Although the use of nontoxic cleaning products is strongly encouraged, do understand that these products can still degrade water quality and, therefore, the discharge of these products into

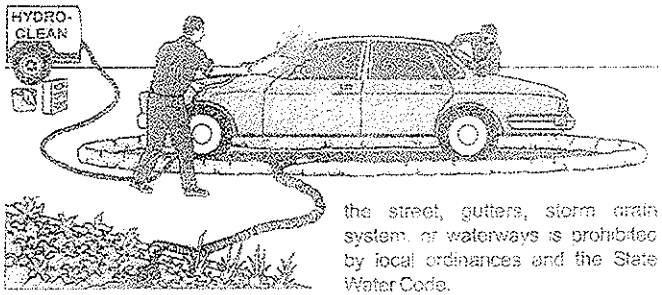

the street, gutters, storm drain system, or waterways is prohibited by local ordinances and the State Water Code.

Note: When cleaning surfaces with a high pressure washer or steam cleaning methods, additional precautions should be taken to prevent the discharge of pollutants into the storm drain system. These two methods of surface cleaning, as compared to the use of a low pressure hose, can remove additional materials that can contaminate local waterways.

Other Tips to Help Protect Our Water . . .

Screening Wash Water

A thorough dry cleanup before washing (without soap) surfaces such as building exteriors and decks without loose paint, sidewalks, or plaza areas, *should be sufficient to protect storm drains.* **However** if any debris (solids) could enter storm drains or remain in the gutter or street after cleaning, washwater should first pass through a "20 mesh" or finer screen to catch the solid material, which should then be disposed of in the trash.

Drain Inlet Protection/ Containing & Collecting Wash Water

- Sand bags can be used to create a barrier around storm drain inlets.
- Plugs or rubber mats can be used to temporarily seal storm drain openings.
- You can also use vacuum booms, containment pads, or temporary berms to keep wash water away from the street, gutter, or storm drain.

Equipment and Supplies

Special materials such as absorbents, storm drain plugs and seals, small sump pumps, and vacuum booms are available from many vendors. For more information check catalogs such as New Pig (800-468-4647), Lab Safety Supply (800-356-0783), C&H (800-558-9966), and W.W. Grainger (800-994-9174); or call the Cleaning Equipment Trade Association (800-441-0111) or the Power Washers of North America (800-393-PWNA).

00004009

Helpful telephone numbers and links:

RIVERSIDE COUNTY WATER AGENCIES:

City of Banning	(951) 922-3130
City of Beaumont	(951) 769-8520
City of Blythe	(760) 922-6161
City of Coachella	(760) 398-3502
Coachella Valley Water District	(760) 398-2651
City of Corona	(951) 736-2259
Desert Center, CSA #51	(760) 227-3203
Eastern Municipal Water District	(951) 928-3777
Elsinore Valley MWD	(951) 674-3146
Farm Mutual Water Company	(951) 244-4198
City of Hemet	(951) 765-3712
Idyllwild Water District	(951) 659-2143
Jurupa Community Services District	(951) 360-8795
Lake Hemet MWD	(951) 658-3241
Lee Lake Water District	(951) 277-1414
March Air Force Base	(951) 656-7000
Mission Springs Water District	(760) 329-6448
City of Palm Springs	(760) 323-8253
Rancho Caballero	(951) 780-9272
Rancho California Water District	(951) 296-6900
Ripley, CSA #62	(760) 922-4951
City of Riverside	(951) 351-6170
Rubidoux Community Services District	(951) 684-7580
Silent Valley Club, Inc	(951) 849-4501
Valley Sanitary District	(760) 347-2356
Western Municipal Water District	(951) 789-5000
Yucaipa Valley Water District	(909) 797-5117

CALL 1-800-506-2555 to:

- Report clogged storm drains or illegal storm drain disposal from residential, industrial, construction and commercial sites into public streets, storm drains and/or water bodies.
- Find out about our various storm drain pollution prevention materials.
- Locate the dates and times of Household Hazardous Waste (HHW) Collection Event.
- Request adult, neighborhood, or classroom presentations.
- Locate other County environmental services.
- Receive grasscycling information and composting workshop information.

Or visit our (Riverside County Flood Control District website at:
www.floodcontrol.co.riverside.ca.us

Other links to additional storm drain pollution information:

- County of Riverside Environmental Health:
  www.rivcoeh.org
- California State Water Resource Conservation Board:
  www.swrcb.ca.gov/stormwater/links.html
- California Water Quality Task Force:
  www.cslt-rchandbooks.com/
- United State Environmental Protection Agency (EPA):
  www.epa.gov/epahome/dp2hom.htm/programs/busprc.htm
  (compliance assistance information)

Riverside County Only Rain in the Storm Drain Pollution Protection Program gratefully acknowledges the Bay Area Stormwater Management Agencies Association and the Cleaning Equipment Trade Association for information provided in this brochure.

StormWater Pollution

What you should know for...

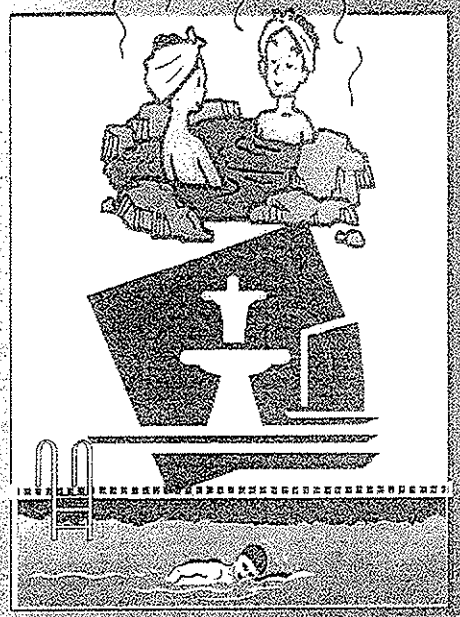

Swimming Pool, Jacuzzi and Fountain Maintenance

Do you know . . . where the water actually goes?

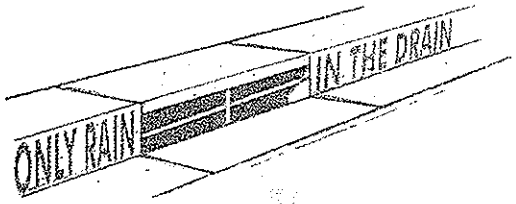

Storm Drains are not connected to sanitary sewer systems and treatment plants!

The primary purpose of storm drains is to carry rain water away from developed areas to prevent flooding. Untreated storm water and the pollutants it carries flow directly into rivers, lakes, and streams. Wastewater from residential swimming pools, jacuzzis, fishponds, and fountains often contain chemicals used for sanitizing or cleansing purposes. Toxic chemicals (such as chlorine or copper-based algaecides) can damage the environment when wastewater is allowed to flow into our local rivers, lakes, and streams by way of the storm drain system. Each of us can do our part to help clean our water, and that adds up to a pollution solution.

The Cities and County of Riverside have adopted ordinances for storm drain pollution management to maintain discharge control and prevent illegal storm drain discharge. In accordance with state and federal law, these local storm water ordinances prohibit the discharge of pollutants into the storm drain system or local surface waters. The Only Rain in the Storm Drain Pollution Program informs residents and businesses of storm drain pollution prevention activities such as those described in this brochure.

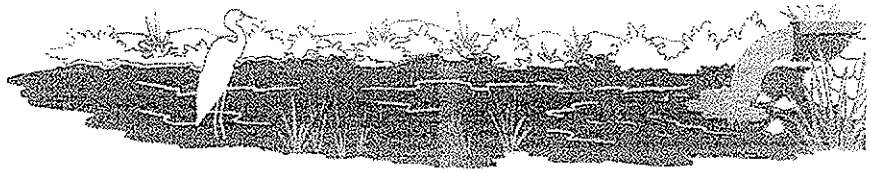

PLEASE NOTE: The discharge of pollutants into the street, gutters, storm drain system, or waterways – without a Regional Water Quality Control board permit or waiver – is strictly prohibited by local ordinances and state and federal law.

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Do Your Part to Protect Our Waterways!

Use These Guidelines For Proper Draining of Your Swimming Pool, Jacuzzi and Fountain Water

Discharge Regulations

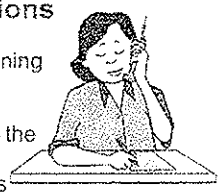

Requirements for pool draining may differ from city to city. Check with your water agency to see if disposal to the sanitary sewer line is allowed for pool discharges (see reverse side for Riverside County water purveyors).

If sewer discharge is allowed, a hose can be run from your swimming pool pump to the washing machine drain or a sink or bathtub. If sewer discharge is not allowed, or if your house is served by a septic tank, review the options presented below.

Refinishing Pool Surfaces

If you are resurfacing your pool, or resurfacing the pool patio area, be sure to hose down mixers, tools and trailers in a dirt area where rinse water won't flow into the street, gutter or storm drain. Local storm water ordinances strictly prohibit the discharge of pollutants into the storm drain system.

Residues from acid washing and similar activities require special handling. Never discharge low or high pH wastewater into the street, gutter or storm drain.

Discharge Options

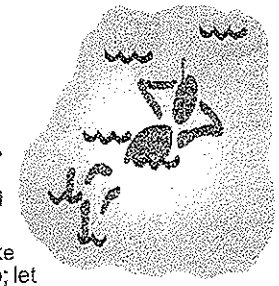

If your local sewer agency will not accept pool water into their system, or if you are on a septic tank system, follow these guidelines:

1. Reduce or eliminate solids (e.g., debris, leaves or dirt) in the pool water.
2. Allow the chemicals in the pool water to dissipate. This could take up to seven (7) days depending on the time of year. Create a co-op; let your neighbor share your pool while theirs is being prepared for draining, then use their pool while yours is being drained. Chlorinated water should not be discharged into the storm drain or surface waters. This includes large pools such as community swimming pools or spas.
3. When the pool water is free of all chemicals (verify by a home pool water test kit) drain pool water to landscaped areas, lawns, yards, or any areas that will absorb the water.
4. You may have to drain the pool water over a period of a few days to allow the landscape areas to absorb most of the water.
5. Control the flow of the draining pool water to prevent soil erosion. Do not allow sediment to enter the street, gutter or storm drain.
6. Avoid discharging pool water into the street and storm drain system. Water runoff that enters the street can pick up motor oil, pet waste, trash and other pollutants, eventually carrying them into the storm drain system and local surface waters.

Cleaning Filters

Discharge of pool filter rinse water and backflush to a stream, ditch, or storm drain is prohibited. Backflush from pool filters must be discharged to the sanitary sewer, on-site septic tank and drainfield system (if properly designed and adequately sized), or a seepage pit. Alternatively, pool filter rinse water and backwash may be diverted to dirt or landscaped areas. Filter media and other solids should be picked up and disposed of in the trash.

Algaecides

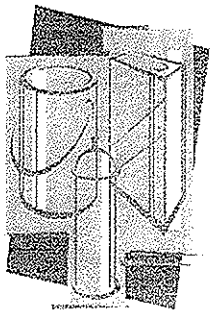

Avoid using copper-based algaecides unless absolutely necessary. Control algae with chlorine, organic polymers or other alternatives to copper-based pool chemicals. Copper is a heavy metal that can be toxic to aquatic life.

Chemical Storage and Handling

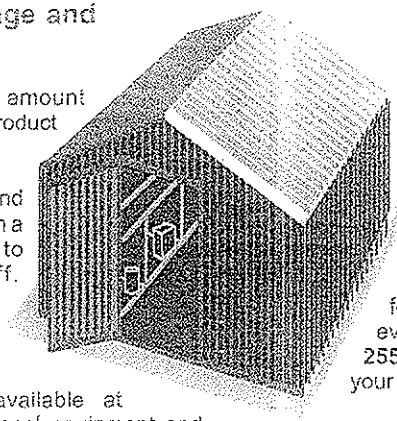

- Use only the amount indicated on product labels.
- Store chlorine and other chemicals in a covered area to prevent runoff. Keep out of reach of children and pets.
- Chlorine kits, available at retail swimming pool equipment and supply stores, should be used to monitor the chlorine and pH levels.
- Chlorine and other pool chemicals should never be allowed to flow into the gutter or the storm drain system.

Proper Disposal of Pool Chemicals

If you need to dispose of unwanted pool chemicals, first try giving them to a neighbor with a pool. If that doesn't work, bring unwanted pool chemicals to a Household Hazardous Waste (HHW) Collection Event. There's no cost for bringing HHW items to collection events - it's FREE! Call 1-800-506-2555 for a schedule of HHW events in your community.

NEVER put unused chemicals into the trash, onto the ground or down a storm drain.

0004011

Stormwater Pollution Found in Your Area!

This is not a citation.

This is to inform you that our staff found the following pollutants in the storm sewer system in your area. This storm sewer system leads directly to

_____.

- ❑ Motor oil
- ❑ Oil filters
- ❑ Antifreeze/ transmission fluid
- ❑ Paint
- ❑ Solvent/degreaser
- ❑ Cooking grease
- ❑ Detergent
- ❑ Home improvement waste (concrete, mortar)
- ❑ Pet waste
- ❑ Yard waste (leaves, grass, mulch)
- ❑ Excessive dirt and gravel
- ❑ Trash
- ❑ Construction debris
- ❑ Pesticides and fertilizers
- ❑ Other

_____

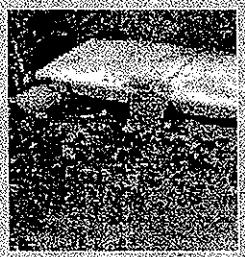

For more information or to report an illegal discharge of pollutants, please call:

Riverside County Residents, Call . . .
1-800-506-2555

WHEN IT RAINS
IT DRAINS

EPA
United States
Environmental Protection
Agency

www.epa.gov/npdes/stormwater

EPA 833-F-03-002
April 2003

Stormwater runoff is precipitation from rain or snowmelt that flows over the ground. As it flows, it can pick up debris, chemicals, dirt, and other pollutants and deposit them into a storm sewer system or waterbody

Anything that enters a storm sewer system is dischargeduntreatedinto the waterbodies we use for swimming, fishing, and providing drinking water

Remember:
Only Rain Down the Drain

To keep the stormwater leaving your home or workplace clean, follow these simple guidelines:

- Use pesticides and fertilizers sparingly
- Repair auto leaks.
- Dispose of household hazardous waste, used auto fluids (antifreeze, oil, etc.), and batteries at designated collection or recycling locations.
- Clean up after your pet.
- Use a commercial car wash or wash your car on a lawn or other unpaved surface.
- Sweep up yard debris rather than hosing down areas. Compost or recycle yard waste when possible.
- Clean paint brushes in a sink, not outdoors. Properly dispose of excess paints through a household hazardous waste collection program.
- Sweep up and properly dispose of construction debris like concrete and mortar

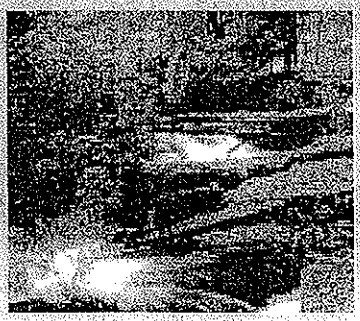

Appendix E

SOILS REPORT

Project does not propose any infiltration BMPs. Therefore, the soils report has not been included in this section of the WQMP.

Soil Map–Western side Area, California
(TENTATIVE TRACT MAP NO. 35161)

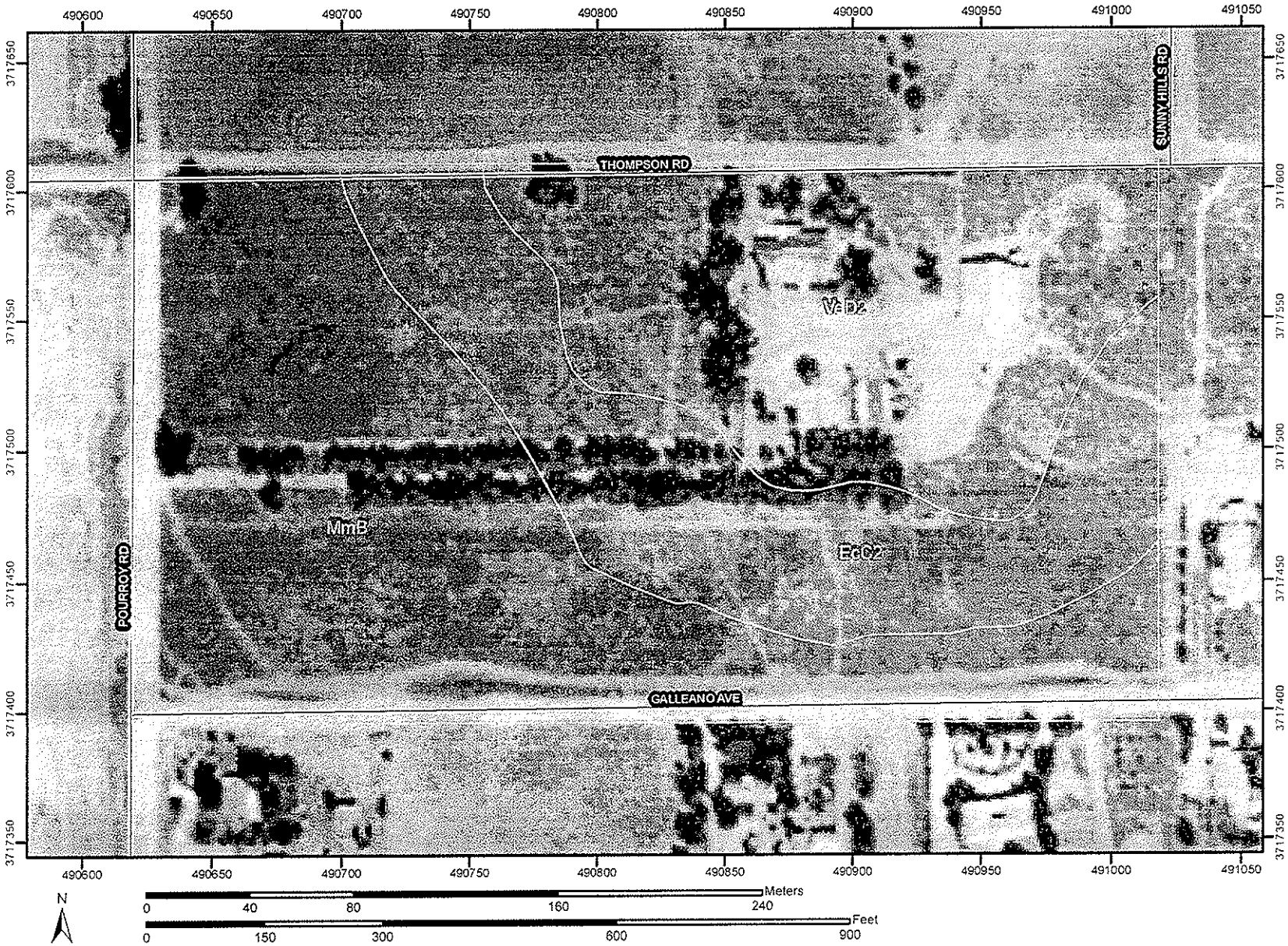

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

- Soil Map Units

Special Point Features

- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other

Special Line Features

- Gully
- Short Steep Slope
- Other

Political Features

Municipalities

- Cities
- Urban Areas

Water Features

- Oceans
- Streams and Canals

Transportation

- Rails

Roads

- Interstate Highways
- US Routes
- State Highways
- Local Roads
- Other Roads

MAP INFORMATION

Original soil survey map sheets were prepared at publication scale. Viewing scale and printing scale, however, may vary from the original. Please rely on the bar scale on each map sheet for proper map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: UTM Zone 11N

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Western Riverside Area, California
Survey Area Data: Version 4, Jan 5, 2007

Date(s) aerial images were photographed: 1996

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

0004016

Map Unit Legend

Western Riverside Area, California (CA679)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
EcC2	Escondido fine sandy loam, 2 to 8 percent slopes, erode d	5.0	23.6%
MmB	Monserate sandy loam, 0 to 5 percent slopes	9.8	46.2%
VeD2	Vallecitos loam, thick solum variant, 8 to 15 percent s lopes, eroded	6.4	30.2%
Totals for Area of Interest (AOI)		21.2	100.0%

0004017

Appendix F

TREATMENT CONTROL BMP SIZING CALCULATIONS AND DESIGN DETAILS

Volume Based BMPs

General

The largest concentrations of pollutants are found in runoff from small volume storms and from the first flush of larger storms. Therefore, volume based BMPs should be sized to capture and treat the initial and more frequent runoff surges that convey the greatest concentration of pollutants. To maximize treatment and avoid health hazards, volume-based BMPs must retain and release the runoff between a 24 and 72 hour period. This handbook typically recommends a draw down time of 48 hours, as recommended by the California BMP Handbook. The drawdown time refers to the minimum amount of time the design volume must be retained.

In order to meet RWQCB requirements, the method for determining the design volume is based on capturing 85 percent of the total annual runoff. These 85 percent capture values were determined throughout Riverside County using rain gages with the greatest periods of record. Key model assumptions are based on studies used in the *Urban Runoff Quality Management, WEF Manual of Practice No. 23/ASCE Manual of Practice No. 87, (1998)* and *the California Best Management Practice Handbook*. This handbook gives a simple procedure for determining the design volume of a BMP based on the location of the project.

BMP Design Volume Calculations

Following is a step-by-step procedure for determining design volume for BMPs using Worksheet 1. Examples of the following procedure can be found in Appendix B.

1. Create Unit Storage Volume Graph:
   a) Locate the project site on the Slope of the Design Volume Curve contained in Appendix A.
   b) Read the slope value at this location. This value is the Unit Storage Volume for a runoff coefficient of 1.0.
   c) Plot this value as a point (corresponding to a coefficient of 1.0) on the Unit Storage Volume Graph shown on Figure 2.
   d) Draw a straight line from this point to the origin, to create the graph.

2. Determine the runoff coefficient (C) from Figure 1 or the following relationship:

$$C = .858i^3 - .78i^2 + .774i + .04$$

where i = impervious percentage

3. Using the runoff coefficient found in step 2, determine 85th percentile unit storage volume (V_u) using Figure 2 (created in step 1).

4. Determine the design storage volume (V_{BMP}). This is the volume to be used in the design of selected BMPs presented in this handbook.

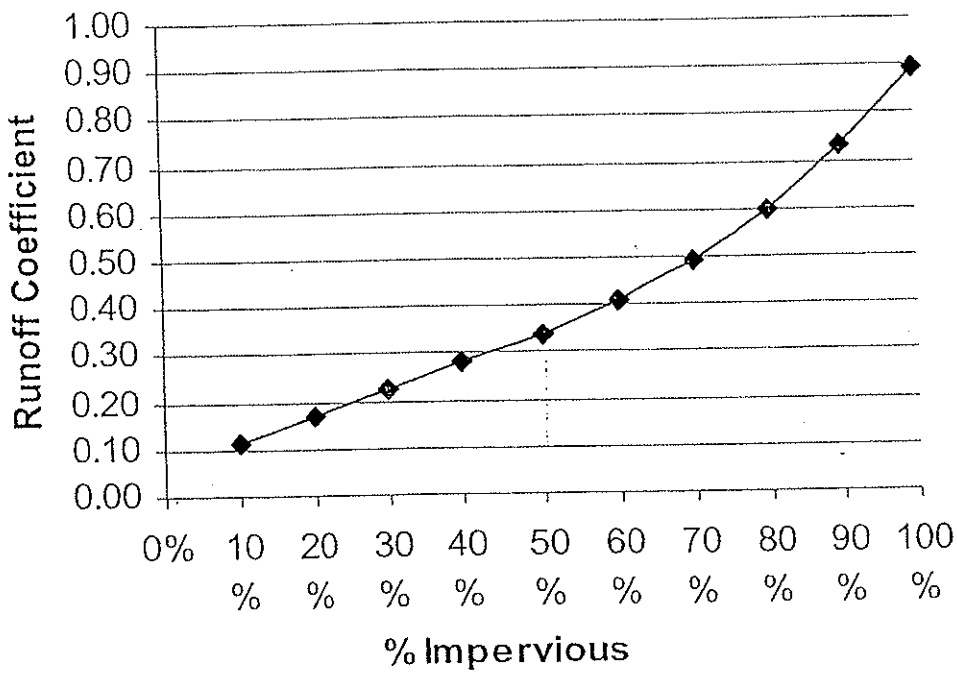

Figure 1. Impervious – Coefficient Curve (WEF/ASCE Method[1])

[1] Imperviousness is the decimal fraction of the total catchment covered by the sum of roads, parking lots, sidewalks, rooftops, and other impermeable surfaces of an urban landscape.

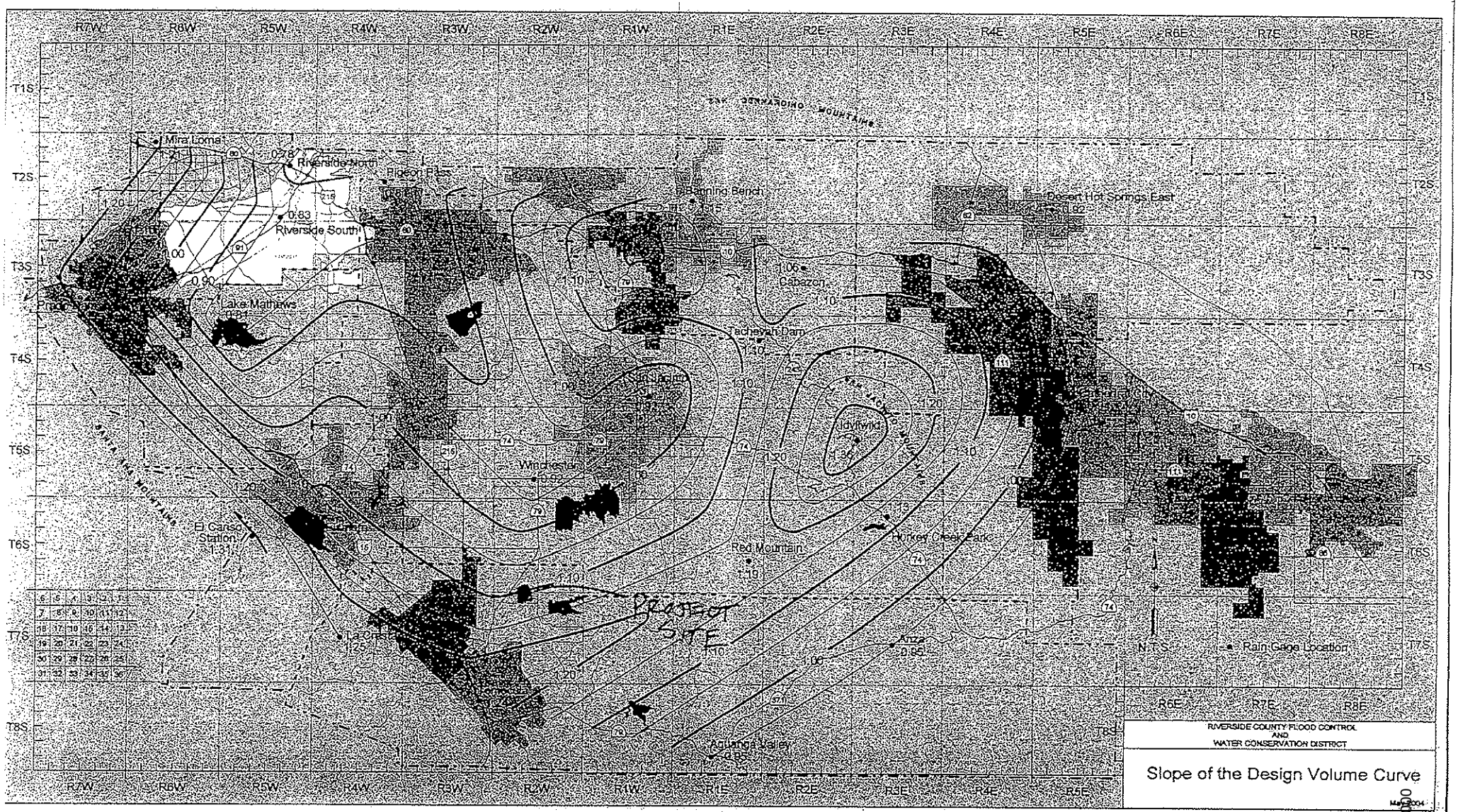
R7W
R6W
R5W
R4W
R3W
R2W
R1W
R1E
R2E
R3E
R4E
R5E
R6E
R7E
R8E
T1S
T2S
T3S
T4S
T5S
T6S
T7S
T8S
Mira Loma
Riverside North
Riverside South
Lake Mathews
Pigeon Pass
Banning Bench
Desert Hot Springs East
Cabazon
Tachevah Dam
San Jacinto
Idyllwild
Winchester
El Cariso Station
Red Mountain
Hurkey Creek Park
Anza
Aguanga Valley
PROJECT SITE
Rain Gage Location
N.T.S.
RIVERSIDE COUNTY FLOOD CONTROL
AND
WATER CONSERVATION DISTRICT
Slope of the Design Volume Curve

0004021

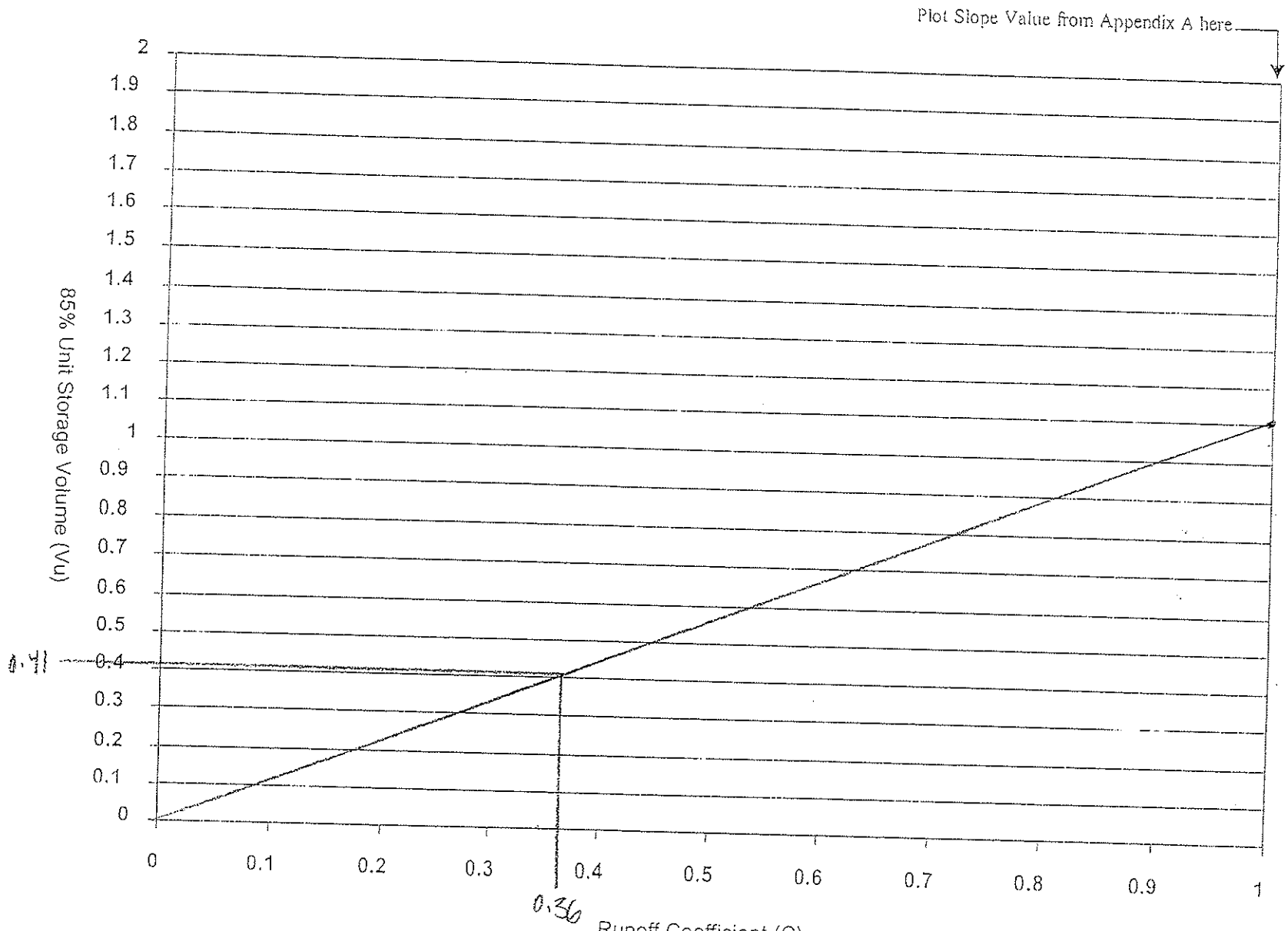

Figure 2 Unit Storage Volume Graph

Design Procedure for BMP Design Volume
Spreadsheet Based on Riverside County Water Quality Management Plan

Designer: **Tang Lee**
Project: **Tentative Tract Map No.35161 French Valley - Pourroy Project**
Location: **County of Riverside, California**
Date: **5/12/2009**

1. Create Unit Storage Volume Graph a. Site location (Township, Range, and Section). b. Slope value from the Design Volume Curve in **Appendix A**. c. Plot this value on the Unit Storage Volume Graph shown on **Figure 2**. d. Draw a straight line form this point to the origin, to create the graph	T &R Section Slope = 1.1 Is this graph attached? Yes_x_ No___	(1) (2)
2. Determine Runoff Coefficient a. Determine total impervious area b. Determine total tributary area c. Determine Impervious fraction i = **(5)** / **(6)** d. Use **(7)** in **Figure 1** to find Runoff OR $C = 0.858i^3 - .78i^2 + .774i + .04$	$A_{impervious}$ = 8.9 acres A_{total} = 16.9 acres i = 0.526 C = 0.36	(5) (6) (7) (8)
3. Determine 85% Unit Storage Volume a. Use **(8)** in **Figure 2** Draw a Vertical line from **(8)** to the graph, then a Horizontal line to the desired V_u value	V_u = 0.41	(9)
4. Determine Design Storage Volume a. V_{BMP} = **(9)** x **(6)** b. V_{BMP} = **(10)** / **(12)** c. V_{BMP} = **(11)** x 43560	V_u = 6.93 V_u = 0.58 V_u = 25152	(10) (11) (12)

Sand Filters

General

Sand Filters capture and treat the design runoff in a two-part system, first a settling basin, then a filter bed. The settling basin collects large sediment and prevents these particles from clogging the filter bed. The sand bed then strains the water, removing soluble and particulate pollutants. The treated water is conveyed through pipes back into a stream or channel. Sand Filters are especially useful where water quality concerns might preclude the use of infiltration BMPs.

There are many variations of sand filter designs, and it is up to the designer to determine the most effective sand filter to use in each case. Two of the most common sand filters, the Austin sand filter and the Delaware sand filter, have been conditioned in this manual. Although the Austin filter was not included in the Attachment, it was added to this manual because it can treat a very large tributary area and because it is well suited to southern California. Other sand filter designs may be used if it is shown that they are more appropriate.

Austin Sand Filter

The Austin Sand Filter, as developed by the city of Austin, Texas, is an aboveground sand filter that does not include a permanent wet pool. The filter inlet captures the design volume, while directing larger flows past. The first chamber of the filter is the sedimentation basin, which holds the entire design volume (this handbook conditions a full sedimentation design). The design volume drains into the second chamber, which is the filtration basin, over a period of 48 hours. This allows large particles to settle in the sedimentation basin and protects the filter bed from clogging. The sand and gravel filter bed removes soluble and particulate pollutants, and the treated water is returned to a storm drain. In order to drain by gravity, an Austin sand filter must be located in an area where the topography has sufficient vertical drops. These filters can be used to treat runoff from areas up to 100 acres large.

Austin Sand Filter Basin Design Criteria:

Design Parameter	Unit	Design Criteria
Design Volume	ft^3	V_{BMP}
Maximum tributary area	acre	100[1]
Minimum sedimentation basin depth	ft	3 [1]
Minimum sedimentation basin area (A_s)	ft^2	V_{BMP} / 10 ft [1]
Length to Width ratio (L:W)	-	2 to 1 or greater[1]
Draw-down time	hrs	48 [3]
Freeboard	ft	1.0 ft above maximum water surface elevation [1]
Minimum sedimentation basin volume	ft^3	V_{BMP} + freeboard volume [1]
Maximum inlet velocity	fps	3.0 [1]
Minimum particle size removed	micron	20 (specific gravity =2.65) [1]
Minimum gravel depth over sand filter	inches	2 [1]
Maximum water depth over filter, 2h	ft	Between 2 and 10 feet [3]
Minimum sand depth, d_s	inches	18 [1]
Minimum filtration rate of filter, k	ft/d	3.5 [1]
Slope of sand filter surface	%	0 [1]
Minimum gravel cover over underdrain	inches	2 [1]
Sand size, diameter	inches	0.02 – 0.04 [1]
Underdrain gravel diameter size	inches	0.5 – 2.0 [1]
Minimum inside diameter underdrain	inches	6 [1]
Underdrain pipe type	-	PVC schedule 40 (or thicker) [1]
Minimum slope of underdrain	%	1.0 [1]
Minimum underdrain perforation diameter	inches	0.375 [1]
Minimum perforations per row	-	6 [1]
Minimum space between perforation rows	inches	6 [1]
Minimum gravel bed depth, d_g	inches	16 [1]

1 Ventura County's Technical Guidance Manual for Stormwater Quality Control Measures
2 City of Modesto's Guidance Manual for New Development Stormwater Quality Control Measures
3 CA Stormwater BMP Handbook for New Development and Significant Redevelopment
4 Riverside County DAMP Supplement A Attachment

Austin Sand Filter Design Procedure

Part I – Sedimentation Basin Design

1. Design Storage Volume
   Use Worksheet 1- Design Procedure Form for Design Storage Volume, V_{BMP}.

2. Maximum Water Depth
   Determine maximum allowable depth of water (2h) in the sedimentation basin considering elevation differences between inlet and outlet inverts of the sedimentation basin and filter surface. (This sets the height or elevation of the inlet invert for bypass pipes and orifices).

3. Sedimentation Basin Design
   The sedimentation basin design should maximize the distance from the inlet to the outlet while avoiding short circuiting (flow reaching the outlet structure before it passes through the sedimentation basin volume) and dead storage areas (areas in the basin that are bypassed by the main flow). The basin shape should include a gradual expansion from the inlet and a gradual contraction toward the outlet. The length to width ratio should be a minimum of 2:1. Internal baffling with berms may be necessary to achieve this ratio.
   a. Find the sedimentation basin area, A_s
      $A_s = V_{BMP} / (2h)$
   b. Determine the basin length and width
      Width = $A_s / (3)$
      Length = (2) x (width)

4. Energy Dissipation Structure
   Basin inlet and outlet points should include an energy dissipation structure and/or erosion protection. An energy dissipation structure is required when inlet velocities exceed 3 feet per second.

5. Sedimentation Inlet
   The inlet structure design must isolate the water quality volume and convey flows greater than the V_{BMP} past the basin. The water quality volume should be discharged uniformly and at low velocities into the sedimentation basin.

6. Sedimentation Outlet
   The outlet structure conveys the water quality volume from the sedimentation basin to the filtration basin. The outlet structure shall be designed to outlet the design volume (ponded to a height of 2h) into the filter basin over a drawdown period of 48 hours.

7. Trash Rack/Gravel Pack
   A trash rack or gravel pack around perforated risers shall be provided to protect outlet orifices from clogging.

8. Sediment Trap (optional)
   Placing a sediment trap in the basin can improve long-term removal efficiency and reduce maintenance requirements.

Part II – Filter Basin Design

9. Filter Basin Surface Area
   The required filter basin surface area (A_f) can be calculated using the following simplified equation from the CA BMP Handbook:

   $$A_f = V_{BMP} / 18$$

10. Filter Basin Volume
    The storage capacity of the filtration basin, above the surface of the filter media, should be greater than or equal to 20 percent of the V_{BMP}. This capacity is necessary in order to account for backwater effects resulting from partially clogged filter media. If the filter basin volume is less than the required volume, redesign with an increased filter depth or increase the filter area.

11. Filter Basin Inlet Structure
    The inlet structure should spread the flow uniformly across the surface of the media filter. Flow spreaders, weirs or multiple orifice openings are recommended.

12. Filter Bed
    The sand bed may be a choice of one of the two configurations given below. Note: Sand bed depths are final, consolidated depths. Consolidated effects must be taken into account.

    1) Sand Bed with Gravel Layer (Figure 9A)
       The sand layer is a minimum depth of 18 inches consisting of 0.02-0.04 inch diameter sand. Under the sand is a layer of 0.5 to 2.0 inch diameter gravel which provides a minimum of two inches of cover over the top of the underdrain lateral pipes. No gravel is required under the lateral pipes. A layer of geotextile fabric meeting the following specifications must separate the sand and gravel and must be wrapped around the lateral pipes:

Table 4. Geotextile Fabric Specifications

Property	Test Method	Unit	Specification
Material			Nonwoven geotextile fabric
Unit Weight		Oz/yd^2	8 (minimum)

Filtration Rate		In/sec	0.08 (minimum)
Puncture Strength	ASTM D-751 (modified)	Lb.	125 (minimum)
Mullen Burst Strength	ASTM D-751	PSI	400 (minimum)
Tensile Strength	ASTM-D-1682	Lb.	300 (minimum)
Equiv. Opening Size	US Standard Sieve	No.	80 (minimum)

Drainage matting meeting the following specifications should be placed under the laterals to provide for adequate vertical and horizontal hydraulic conductivity to the laterals:

Table 5. Drainage Matting Specifications

Property	Test Method	Unit	Specification
Material			Nonwoven geotextile fabric
Unit Weight		Oz/yd^2	20
Flow Rate (fabric)		GPM/ft^2	180 (minimum)
Permeability	ASTM D-2434	Cm/sec	12.4×10^{-2}
Grab strength (fabric)	ASTM D-1682	Lb.	Dry Lg. 90 Dry Wd. 70 Wet Lg. 95 Wet Wd. 70
Puncture Strength (fabric)	COE CW-02215	Lb.	42 (minimum)
Mullen burst strength	ASTM D-1117	Psi	140 (minimum)
Equiv. opening size	US Standard Sieve	No.	100 (70 – 120)
Flow rate (drainage core)	Drexel Univ. Test Method	GPM/ft. width	14

In areas with high sediment load (total suspended solids concentration ? 200 mg/L), the two-inch layer of stone on top of the sand filter should be underlain with Enkadrain 9120 filter fabric or equivalent with the following specifications:

Table 6. Filter Fabric Specifications

Property	Test Method	Unit	Specification
Material			Nonwoven geotextile fabric
Unit Weight	ASTM D-1777	Oz/yd^2	4.3 (minimum)
Flow Rate	Failing Head Test	GPM/ft^2	120 (minimum)
Puncture Strength	ASTM-D751 (modified)	Lb.	60 (minimum)
Thickness		inches	0.8 (minimum)

2) Sand Bed with Trench Design (Figure 9B)
The top layer shall be 12-18 inches of 0.02-0.04 inch diameter sand. Laterals shall be placed in trenches with a covering of 0.5 to 2.0-inch gravel and geotextile fabric. The laterals shall be underlain by a layer of drainage matting. The geotextile fabric is needed to prevent the filter media from infiltrating into the lateral piping. The drainage matting is needed to provide for adequate vertical and horizontal hydraulic conductivity to the laterals. The geotextile fabric and drainage matting specifications are listed above in Tables 1 and 2 respectively. A minimum 2" layer of stone will be place on top of the sand bed underlain with filter fabric (Table 4) in drainage areas with high sediment loads (TSS ? 200 mg/L).

13. Underdrain Piping
The underdrain piping consists of the main collector pipe(s) and perforated lateral branch pipes. The piping should be reinforced to withstand the weight of the overburden. Internal diameters of lateral branch pipes should be six inches or greater and perforations should be 3/8 inch. Each row of perforations should contain at least six holes and the maximum spacing between rows of perforations should not exceed six inches. All piping is to be schedule 40 polyvinyl chloride or greater strength. The minimum grade of piping shall be 1 percent slope (slopes down to 0.5% are acceptable with prior approval). Access for cleaning all underdrain piping is needed.

Note: No draw-down time is to be associated with sand filtration basins, only with sedimentation basins. Thus, it is not necessary to have a specifically designed orifice for the filtration outlet structure.

14. Filter Basin Liner
If an impermeable liner is required to protect ground water quality it shall meet the specifications for clay liner given in the following table (table 4). The clay liner should have a minimum thickness of 12 inches. If an impermeable liner is not required then a geotextile fabric liner shall be installed that meets the specifications listed in table 1 unless the pond has been excavated to bedrock. If a geomembrane is used it should have a minimum thickness of 30 mils and be ultraviolet resistant.

Table 7. Clay Liner Specifications

Property	Test Method	Unit	Specification
Permeability	ASTM D-2434	cm/sec	$1x10^{-6}$
Plasticity Index of Clay	ASTM D-423 & D-424	%	Not less than 15
Liquid Limit of Clay	ASTM D-2216	%	Not less than 30
Clay Particles Passing	ASTM-D422	%	Not less than 30
Clay Compaction	ASTM-D2216	%	95% of Std. Proctor Density

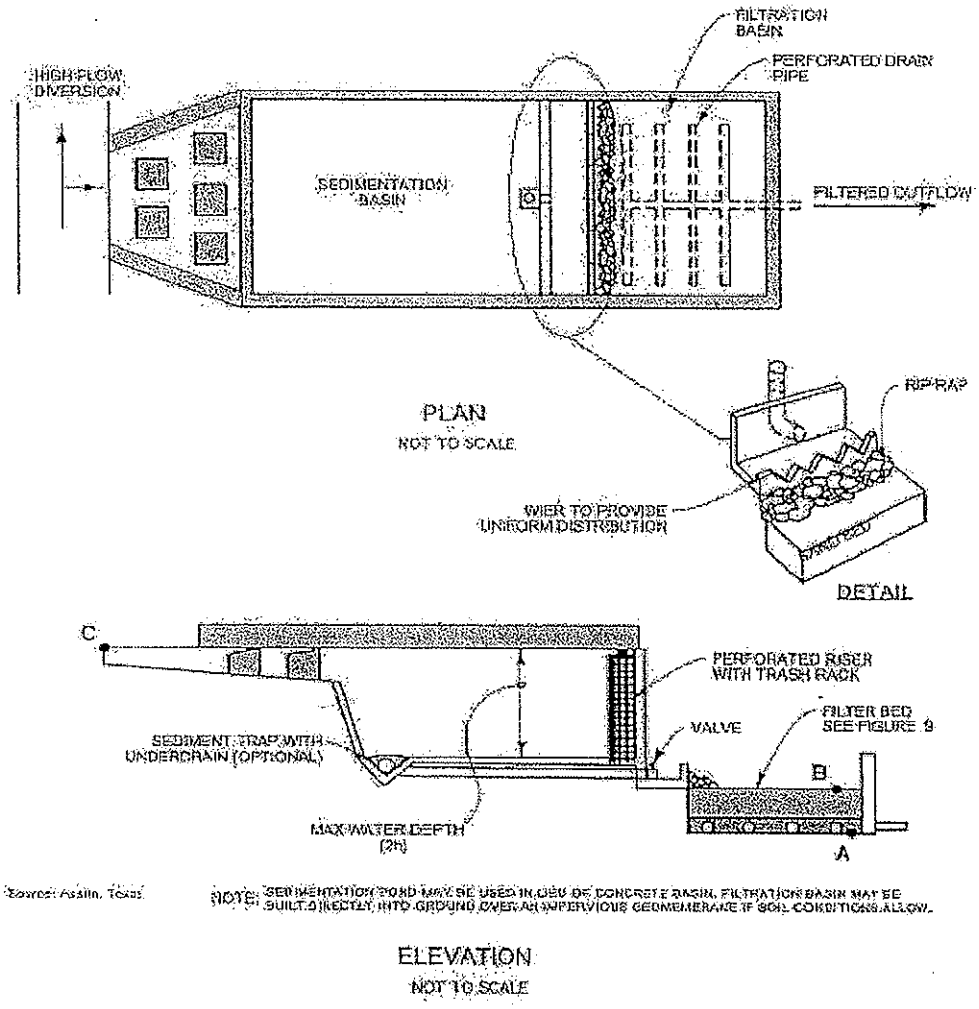

Figure 9: Austin Sand Filter

Source: Ventura County Guidance Manual

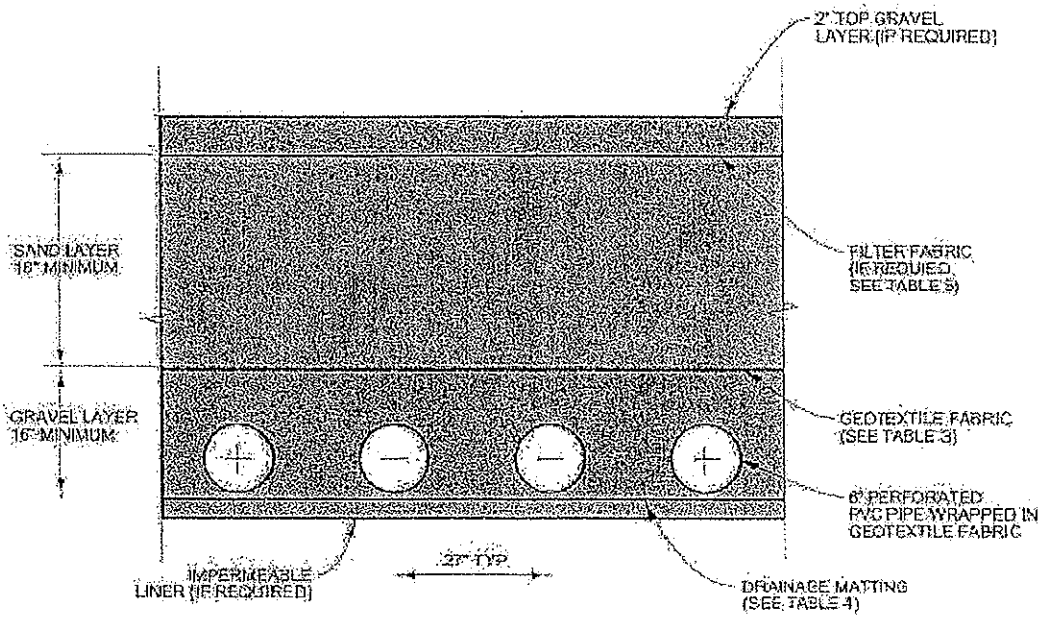

Figure 9A: Filter Bed with Gravel Underdrain

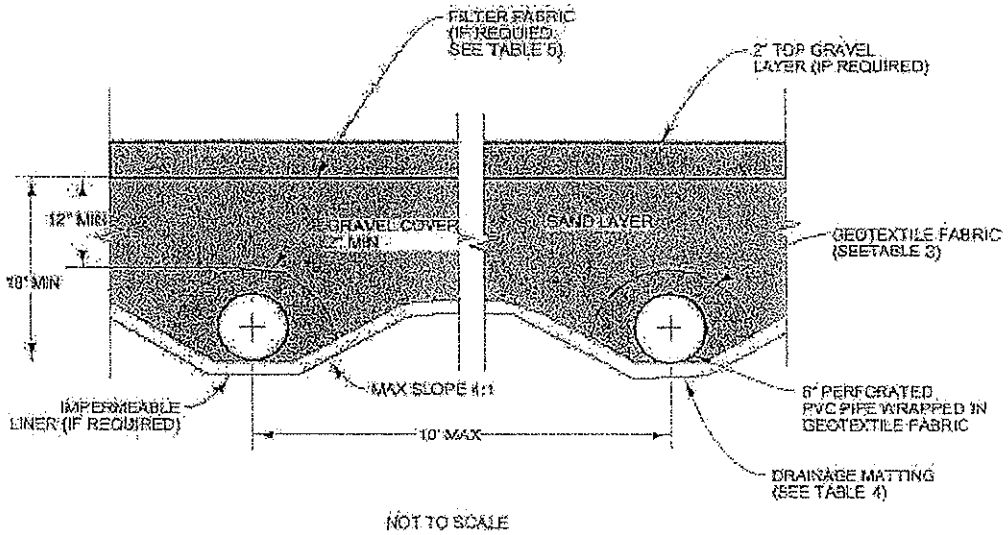

Figure 9B: Filter Bed with Trench Underdrain

Source: Ventura County Guidance Manual

Worksheet 7

Design Procedure Form for Austin Sand Filter

Designer: TANG LEE
Company: HUNSAKER & ASSOCIATES
Date: 6/1/09
Project: FRENCH VALLEY - POURROY TRACT 35761
Location:

1. Determine Design Storage Volume (Use Worksheet 1) a. Total Tributary Area (maximum 100) b. Design Storage Volume, V_{BMP}	A_{total} = 16.9 acres V_{BMP} = 25,152 ft^3
2. Maximum Water Height in Sedimentation Basin* a. Invert elevation at connection to storm drain system. b. Sand Filter invert elevation (consider min. grade (1%) from storm drain). Point A, Figure 9. c. Estimate filter depth or use min. (3'). d. Top elevation of filter bed. Point B, Figure 9. e. Surface elevation at BMP inlet. Point C, Figure 9. f. Determine max. allowable height (2h) of water in the sedimentation basin using the elevation difference between points C and B. (min. 2', max. 10') ALREADY PROVIDE 2h = [(C-B) – 1' Freeboard] 2' FREE BOARD	Elev. Storm Drain = 1361 ft Elev. Pt A = 1362.5 ft Filter Depth = 3.75 ft Elev. Pt B = 1366.25 ft Elev. Pt C = 1373 ft 2h = 6.75 ft
3. Size Sedimentation Basin a. Find Sedimentation Basin Area, A_s $A_s = V_{BMP} / (2h)$ b. Determine basin length and width, using a length to width ratio ? 2:1 width = A_s / 3 length = 2 x width	A_s = 3,730 ft^2 width = 25 ft length = 150 ft >MIN.
4. Size Filter Basin a. Determine Filter Basin Area, A_f $A_f = V_{BMP} / 18$	A_f = 1,400 ft^2

b. Determine Filter Basin Volume $V_f = A_f$ x filter depth (part 2c) c. Determine Required Volume, V_r $V_r = 0.2 \times V_{BMP}$ d. Check if V_r ? V_f? If no, redesign with an increased filter depth or increase filter area.	V_f = 5,250 ft^3 V_r = 5,030 ft^3 Check V_r ? V_f $V_f \geq V_r$ ok

Notes:
SEDIMENTATION BASIN SIZED AT APPROXIMATE
150x25 → 3,750 sq. ft ≥ 3,730 sq. ft [ok]

INFILTRATION BASIN SIZED AT
130'x25' → 3,250 sq. ft ≥ 1,400 sq. ft [ok]

- SOFT-LINED BASIN WITH VERTICAL WALL
SEPARATING INFILTRATION & SEDIMENTATION BASIN

* Based on these elevations, is there a sufficient elevation drop to allow gravity flow from the outlet of the control measure to the storm drain system? If no, investigate alternative on-site locations for treatment control, consider another treatment control measure more suitable for site conditions, or contact the District to discuss on-site pumping requirements.

Media Filter

TC-40

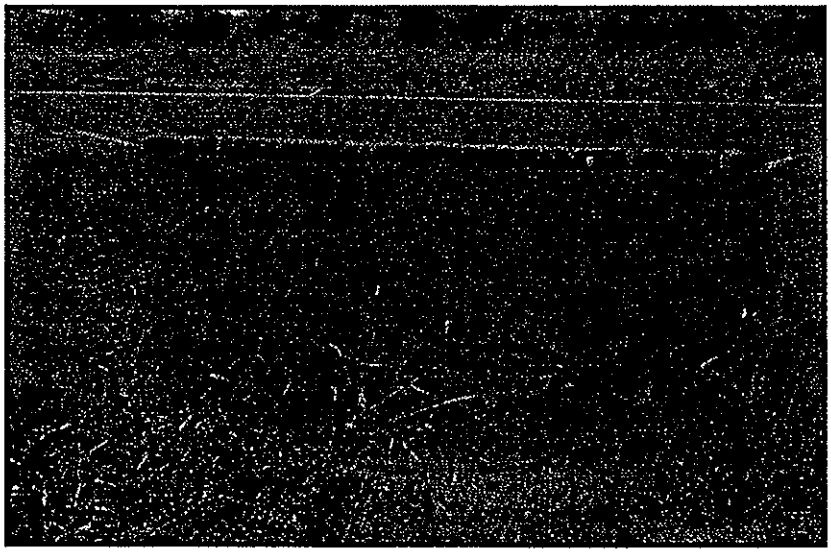

Design Considerations

- Aesthetics
- Hydraulic Head

Description

Stormwater media filters are usually two-chambered including a pretreatment settling basin and a filter bed filled with sand or other absorptive filtering media. As stormwater flows into the first chamber, large particles settle out, and then finer particles and other pollutants are removed as stormwater flows through the filtering media in the second chamber. There are a number of design variations including the Austin sand filter, Delaware sand filter, and multi-chambered treatment train (MCTT).

Targeted Constituents

✓	Sediment	■
✓	Nutrients	●
✓	Trash	■
✓	Metals	■
✓	Bacteria	▲
✓	Oil and Grease	■
✓	Organics	■

Legend *(Removal Effectiveness)*

● Low ■ High

▲ Medium

California Experience

Caltrans constructed and monitored five Austin sand filters, two MCTTs, and one Delaware design in southern California. Pollutant removal was very similar for each of the designs; however operational and maintenance aspects were quite different. The Delaware filter and MCTT maintain permanent pools and consequently mosquito management was a critical issue, while the Austin style which is designed to empty completely between storms was less affected. Removal of the top few inches of sand was required at 3 of the Austin filters and the Delaware filter during the third year of operation; consequently, sizing of the filter bed is a critical design factor for establishing maintenance frequency.

Advantages

- Relatively high pollutant removal, especially for sediment and associated pollutants.
- Widespread application with sufficient capture volume can provide significant control of channel erosion and enlargement caused by changes to flow frequency relationships resulting from the increase of impervious cover in a watershed.

Limitations

CASQA
California Stormwater Quality Association

- More expensive to construct than many other BMPs.
- May require more maintenance that some other BMPs depending upon the sizing of the filter bed.
- Generally require more hydraulic head to operate properly (minimum 4 feet).
- High solids loads will cause the filter to clog.
- Work best for relatively small, impervious watersheds.
- Filters in residential areas can present aesthetic and safety problems if constructed with vertical concrete walls.
- Certain designs (e.g., MCTT and Delaware filter) maintain permanent sources of standing water where mosquito and midge breeding is likely to occur.

Design and Sizing Guidelines

- Capture volume determined by local requirements or sized to treat 85% of the annual runoff volume.
- Filter bed sized to discharge the capture volume over a period of 48 hours.
- Filter bed 18 inches thick above underdrain system.
- Include energy dissipation in the inlet design to reduce resuspension of accumulated sediment.
- A maintenance ramp should be included in the design to facilitate access to the sedimentation and filter basins for maintenance activities (particularly for the Austin design).
- Designs that utilize covered sedimentation and filtration basins should be accessible to vector control personnel via access doors to facilitate vector surveillance and controlling the basins if needed.

Construction/Inspection Considerations

- Tributary area should be completely stabilized before media is installed to prevent premature clogging.

Performance

The pollutant removal performance of media filters and other stormwater BMPs is generally characterized by the percent reduction in the influent load. This method implies a relationship between influent and effluent concentrations. For instance, it would be expected that a device that is reported to achieve a 75% reduction would have an effluent concentration equal to 25% of the influent concentrations. Recent work in California (Caltrans, 2002) on various sand filter designs indicates that this model for characterizing performance is inadequate. Figure 4 presents a graph relating influent and effluent TSS concentrations for the Austin full sedimentation design.

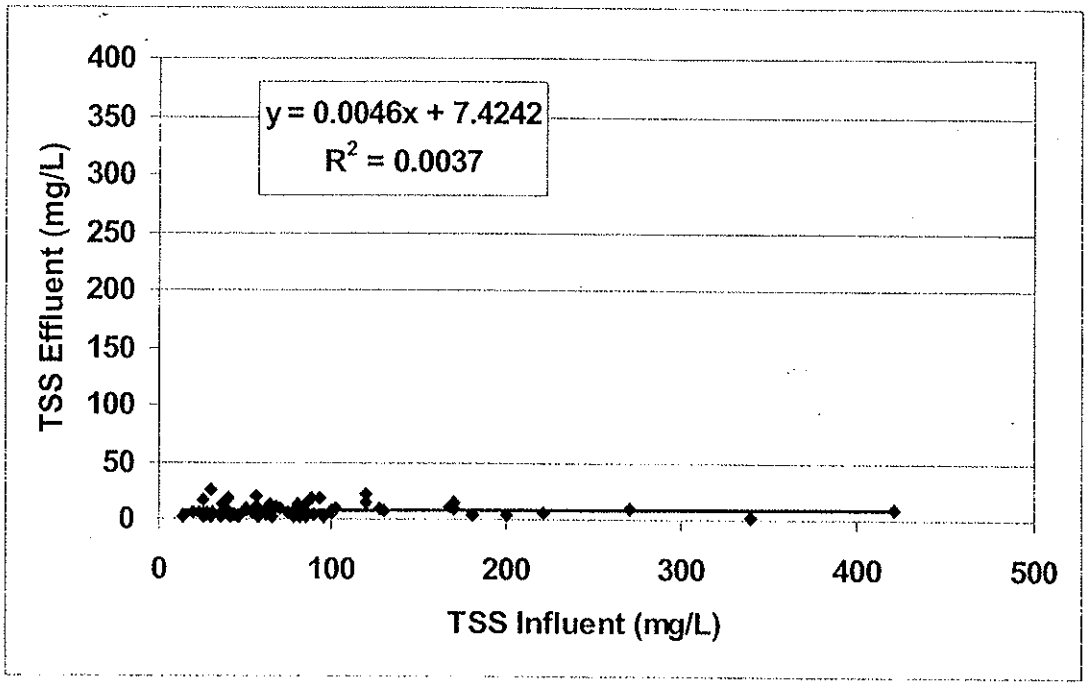

Figure 4
Comparison of Influent and Effluent Concentrations for TSS

It is clearly evident that the effluent concentration is relative constant and independent of influent concentration. Consequently, the performance is more accurately characterized by the effluent concentration, which is about 7.5 mg/L. Constant effluent concentrations also are observed for all other particle related constituents such as particulate metals (total - dissolved) and particulate phosphorus.

The small uncertainty in the estimate of the mean effluent concentration highlights the very consistent effluent quality for TSS produced by sand filters. In addition, it demonstrates that a calculated percent reduction for TSS and other constituents with similar behavior for Austin sand filters is a secondary characteristic of the device and depends primarily on the specific influent concentrations observed. The distinction between a constant effluent quality and a percent reduction is extremely important to recognize if the results are to be used to estimate effluent quality from sand filters installed at other sites with different influent concentrations or for estimating compliance with water quality standards for storms with high concentrations of particulate constituents.

If the conventionally derived removal efficiency (90%) were used to estimate the TSS concentrations in the treated runoff from storms with high influent concentrations, the estimated effluent concentration would be too high. For instance, the storm with the highest observed influent concentration (420 mg/L) would be expected to have a concentration in the treated runoff of 42 mg/L, rather than the 10 mg/L that was measured. In fact, the TSS effluent concentrations for all events with influent concentrations greater than 200 mg/L were 10 mg/L or less.

The stable effluent concentration of a sand filter under very different influent TSS concentrations implies something about the properties of the influent particle size distribution. If one assumes that

only the smallest size fraction can pass through the filter, then the similarity in effluent concentrations suggests that there is little difference in the total mass of the smallest sized particles even when the total TSS concentration varies greatly. Further, the difference in TSS concentration must then be caused by changes in the relative amount of the larger size fractions. Further research is necessary to determine the range of particle size that is effectively removed in the filter and the portion of the size fraction of suspended solids that it represents in urban stormwater.

Sand filters are effective stormwater management practices for pollutant removal. Conventional removal rates for all sand filters and organic filters are presented in Table 1. With the exception of nitrates, which are always exported from filtering systems because of the conversion of ammonia and organic nitrogen to nitrate, they perform relatively well at removing pollutants.

Table 1 Sand filter removal efficiencies (percent)

	Sand Filter (Glick et al, 1998)	Compost Filter System		Multi-Chamber Treatment Train		
		Stewart, 1992	Leif, 1999	Pitt et al., 1997	Pitt, 1996	Greb et al., 1998
TSS	89	95	85	85	83	98
TP	59	41	4	80	-	84
TN	17	-	-	-	-	-
Nitrate	-76	-34	-95	-	14	-
Metals	72-86	61-88	44-75	65-90	91-100	83-89
Bacteria	65	-	-	-	-	-

From the few studies available, it is difficult to determine if organic filters necessarily have higher removal efficiencies than sand filters. The MCTT may have high pollutant removal for some constituents, although an evaluation of these devices by the California Department of Transportation indicated no significant difference for most conventional pollutants.

In addition to the relatively high pollutant removal in media filters, these devices, when sized to capture the channel forming storm volume, are highly effective at attenuating peak flow rates and reducing channel erosion.

Siting Criteria

In general, sand filters are preferred over infiltration practices, such as infiltration trenches, when contamination of groundwater with conventional pollutants is of concern. This usually occurs in areas where underlying soils alone cannot treat runoff adequately - or ground water tables are high. In most cases, sand filters can be constructed with impermeable basin or chamber bottoms, which help to collect, treat, and release runoff to a storm drainage system or directly to surface water with no contact between contaminated runoff and groundwater. In regions where evaporation exceeds rainfall and a wet pond would be unlikely to maintain the required permanent pool, a sand filtration system can be used.

The selection of a sand filter design depends largely on the drainage area's characteristics. For example, the Washington, D.C. and Delaware sand filter systems are well suited for highly impervious areas where land available for structural controls is limited, since both are installed underground. They have been used to treat runoff from parking lots, driveways, loading docks, service stations, garages, airport runways/taxiways, and storage yards. The Austin sand filtration system is more suited for large drainage areas that have both impervious and pervious surfaces. This system is located at grade and is used to treat runoff from any urban land use.

It is challenging to use most sand filters in very flat terrain because they require a significant amount of hydraulic head (about 4 feet), to allow flow through the system. One exception is the perimeter sand filter, which can be applied with as little as 2 feet of head.

Sand filters are best applied on relatively small sites (up to 25 acres for surface sand filters and closer to 2 acres for perimeter or underground filters). Filters have been used on larger drainage areas, of up to 100 acres, but these systems can clog when they treat larger drainage areas unless adequate measures are provided to prevent clogging, such as a larger sedimentation chamber or more intensive regular maintenance.

When sand filters are designed as a stand-alone practice, they can be used on almost any soil because they can be designed so that stormwater never infiltrates into the soil or interacts with the ground water. Alternatively, sand filters can be designed as pretreatment for an infiltration practice, where soils do play a role.

Additional Design Guidelines

Pretreatment is a critical component of any stormwater management practice. In sand filters, pretreatment is achieved in the sedimentation chamber that precedes the filter bed. In this chamber, the coarsest particles settle out and thus do not reach the filter bed. Pretreatment reduces the maintenance burden of sand filters by reducing the potential for these sediments to clog the filter. When pretreatment is not provided designers should increase the size of the filter area to reduce the clogging potential. In sand filters, designers should select a medium sand as the filtering medium. A fine aggregate (ASTM C-33) that is intended for use in concrete is commonly specified.

Many guidelines recommend sizing the filter bed using Darcy's Law, which relates the velocity of fluids to the hydraulic head and the coefficient of permeability of a medium. The resulting equation, as derived by the city of Austin, Texas, (1996), is

$$Af = WQV\ d/[k\ t\ (h+d)]$$

Where:

Af = area of the filter bed (ft^2);

d = depth of the filter bed (ft; usually about 1.5 feet, depending on the design);

k = coefficient of permeability of the filtering medium (ft/day);

t = time for the water quality volume to filter through the system (days; usually assumed to be 1.67 days); and

h = average water height above the sand bed (ft; assumed to be one-half of the maximum head).

Typical values for k, as assembled by CWP (1996), are shown in Table 2.

Table 2 Coefficient of permeability values for stormwater filtering practices (CWP, 1996)

Filter Medium	Coefficient of Permeability (ft/day)
Sand	3.5
Peat/Sand	2.75
Compost	8.7

The permeability of sand shown in Table 2 is extremely conservative, but is widely used since it is incorporated in the design guidelines of the City of Austin. When the sand is initially installed, the permeability is so high (over 100 ft/d) that generally only a portion of the filter area is required to infiltrate the entire volume, especially in a "full sedimentation" Austin design where the capture volume is released to the filter basin over 24 hours.

The preceding methodology results in a filter bed area that is oversized when new and the entire water quality volume is filtered in less than a day with no significant height of water on top of the sand bed. Consequently, the following simple rule of thumb is adequate for sizing the filter area. If the filter is preceded by a sedimentation basin that releases the water quality volume (WQV) to the filter over 24 hours, then

$$Af = WQV/18$$

If no pretreatment is provided then the filter area is calculated more conservatively as:

$$Af = WQV/10$$

Typically, filtering practices are designed as "off-line" systems, meaning that during larger storms all runoff greater than the water quality volume is bypassed untreated using a flow splitter, which is a structure that directs larger flows to the storm drain system or to a stabilized channel. One exception is the perimeter filter; in this design, all flows enter the system, but larger flows overflow to an outlet chamber and are not treated by the practice.

The Austin design variations are preferred where there is sufficient space, because they lack a permanent pool, which eliminates vector concerns. Design details of this variation are summarized below.

Summary of Design Recommendations

(1) Capture Volume - The facility should be sized to capture the required water quality volume, preferably in a separate pretreatment sedimentation basin.

(2) Basin Geometry – The water depth in the sedimentation basin when full should be at least 2 feet and no greater than 10 feet. A fixed vertical sediment depth marker should be installed in the sedimentation basin to indicate when 20% of the basin volume has been lost because of sediment accumulation. When a pretreatment sedimentation basin is provided the minimum average surface area for the sand filter (Af) is calculated from the following equation:

$$Af = WQV/18$$

If no pretreatment is provided then the filter area is calculated as:

$$Af = WQV/10$$

(3) Sand and Gravel Configuration - The sand filter is constructed with 18 inches of sand overlying 6 inches of gravel. The sand and gravel media are separated by permeable geotextile fabric and the gravel layer is situated on geotextile fabric. Four-inch perforated PVC pipe is used to drain captured flows from the gravel layer. A minimum of 2 inches of gravel must cover the top surface of the PVC pipe. Figure 5 presents a schematic representation of a standard sand bed profile.

(4) Sand Properties – The sand grain size distribution should be comparable to that of "washed concrete sand," as specified for fine aggregate in ASTM C-33.

(5) Underdrain Pipe Configuration – In an Austin filter, the underdrain piping should consist of a main collector pipe and two or more lateral branch pipes, each with a minimum diameter of 4 inches. The pipes should have a minimum slope of 1% (1/8 inch per foot) and the laterals should be spaced at intervals of no more than 10 feet. There should be no fewer than two lateral branch pipes. Each individual underdrain pipe should have a cleanout access location. All piping is to be Schedule 40 PVC. The maximum spacing between rows of perforations should not exceed 6 inches.

(6) Flow Splitter - The inflow structure to the sedimentation chamber should incorporate a flow-splitting device capable of isolating the capture volume and bypassing the 25-year peak flow around the facility with the sedimentation/filtration pond full.

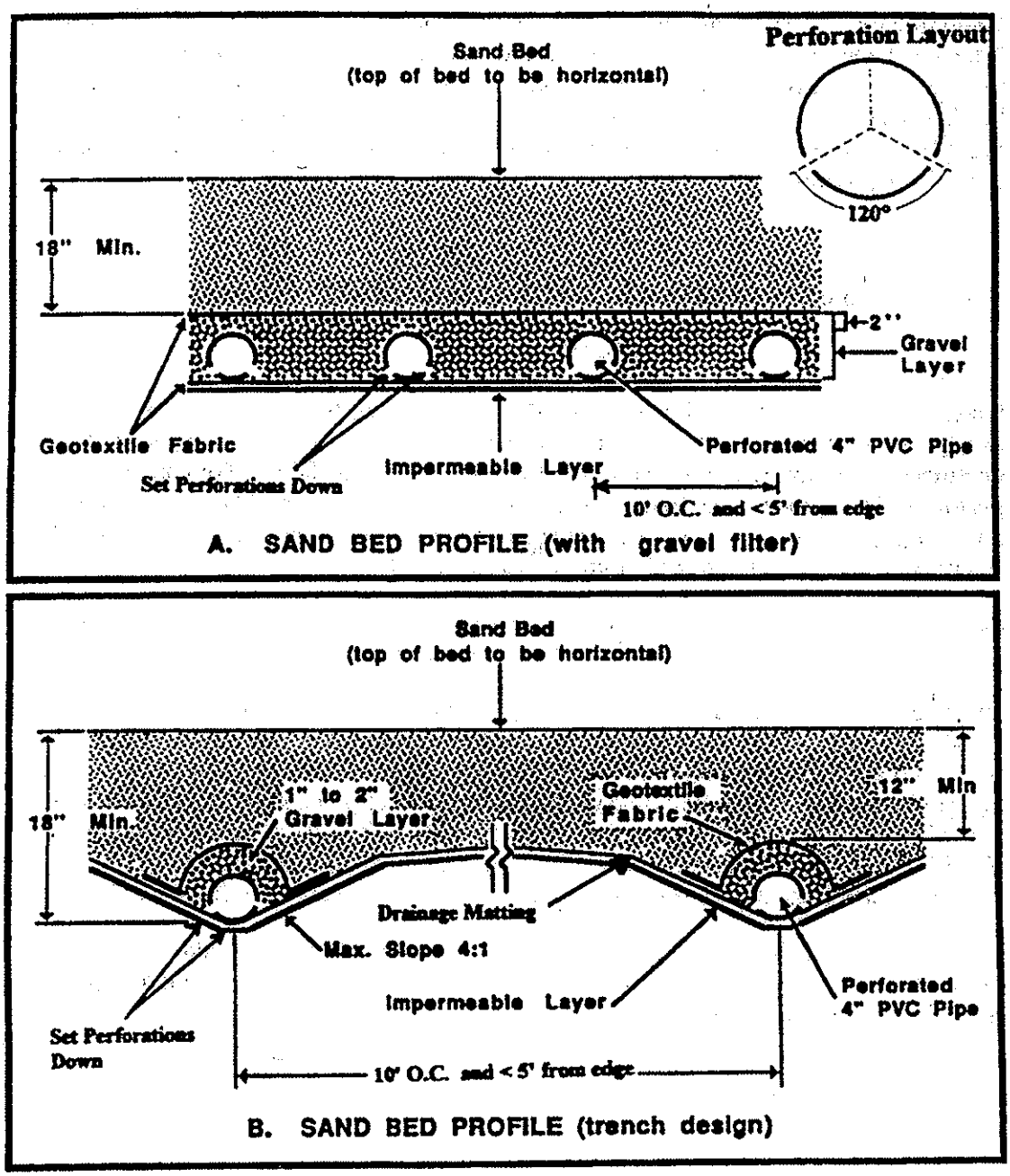

Figure 5
Schematic of Sand Bed Profile

(7) Basin Inlet – Energy dissipation is required at the sedimentation basin inlet so that flows entering the basin should be distributed uniformly and at low velocity in order to prevent resuspension and encourage quiescent conditions necessary for deposition of solids.

(8) Sedimentation Pond Outlet Structure - The outflow structure from the sedimentation chamber should be (1) an earthen berm; (2) a concrete wall; or (3) a rock gabion. Gabion outflow structures should extend across the full width of the facility such that no short-circuiting of flows can occur. The gabion rock should be 4 inches in diameter. The

receiving end of the sand filter should be protected (splash pad, riprap, etc.) such that erosion of the sand media does not occur. When a riser pipe is used to connect the sedimentation and filtration basins (example in Figure 6), a valve should be included to isolate the sedimentation basin in case of a hazardous material spill in the watershed. The control for the valve must be accessible at all times, including when the basin is full. The riser pipe should have a minimum diameter of 6 inches with four 1-inch perforations per row. The vertical spacing between rows should be 4 inches (on centers).

(9) Sand Filter Discharge – If a gabion structure is used to separate the sedimentation and filtration basins, a valve must installed so that discharge from the BMP can be stopped in case runoff from a spill of hazardous material enters the sand filter. The control for the valve must be accessible at all times, including when the basin is full.

Maintenance

Even though sand filters are generally thought of as one of the higher maintenance BMPs, in a recent California study an average of only about 49 hours a year were required for field activities. This was less maintenance than was required by extended detention basins serving comparable sized catchments. Most maintenance consists of routine removal of trash and debris, especially in Austin sand filters where the outlet riser from the sedimentation basin can become clogged.

Most data (i.e. Clark, 2001) indicate that hydraulic failure from clogging of the sand media occurs before pollutant breakthrough. Typically, only the very top of the sand becomes clogged while the rest remains in relative pristine condition as shown in Figure 7. The rate of clogging has been related to the TSS loading on the filter bed (Urbonas, 1999); however, the data are quite variable. Empirical observation of sites treating urban and highway runoff indicates that clogging of the filter occurs after 2 – 10 years of service. Presumably, this is related to differences in the type and amount of sediment in the catchment areas of the various installations. Once clogging occurs the top 2 – 3 inches of filter media is removed, which restores much, but not all, of the lost permeability. This removal of the surface layer can occur several times before the entire filter bed must be replaced. The cost of the removal of the surface layer is not prohibitive, generally ranging between $2,000 (EPA Fact Sheet) and $4,000 (Caltrans, 2002) depending on the size of the filter.

Media filters can become a nuisance due to mosquito and midge breeding in certain designs or if not regularly maintained. "Wet" designs (e.g., MCTT and Delaware filter) are more conducive to vectors than others (e.g., Austin filters) because they maintain permanent sources of standing water where breeding is likely to occur. Caltrans successfully excluded mosquitoes and midges from accessing the permanent water in the sedimentation basin of MCTT installations through use of a tight-fitting aluminum cover to seal vectors out. However, typical wet designs may require routine inspections and treatments by local mosquito and vector control agencies to suppress mosquito production. Vector habitats may also be created in "dry" designs when media filters clog, and/or when features such as level spreaders that hold water over 72 hours are included in the installation. Dry designs such as Austin filters should dewater completely (recommended 72 hour residence time or less) to prevent creating mosquito and other vector habitats. Maintenance efforts to prevent vector breeding in dry designs will need to focus on basic housekeeping practices such as removal of debris accumulations and vegetation management (in filter media) to prevent clogs and/or pools of standing water.

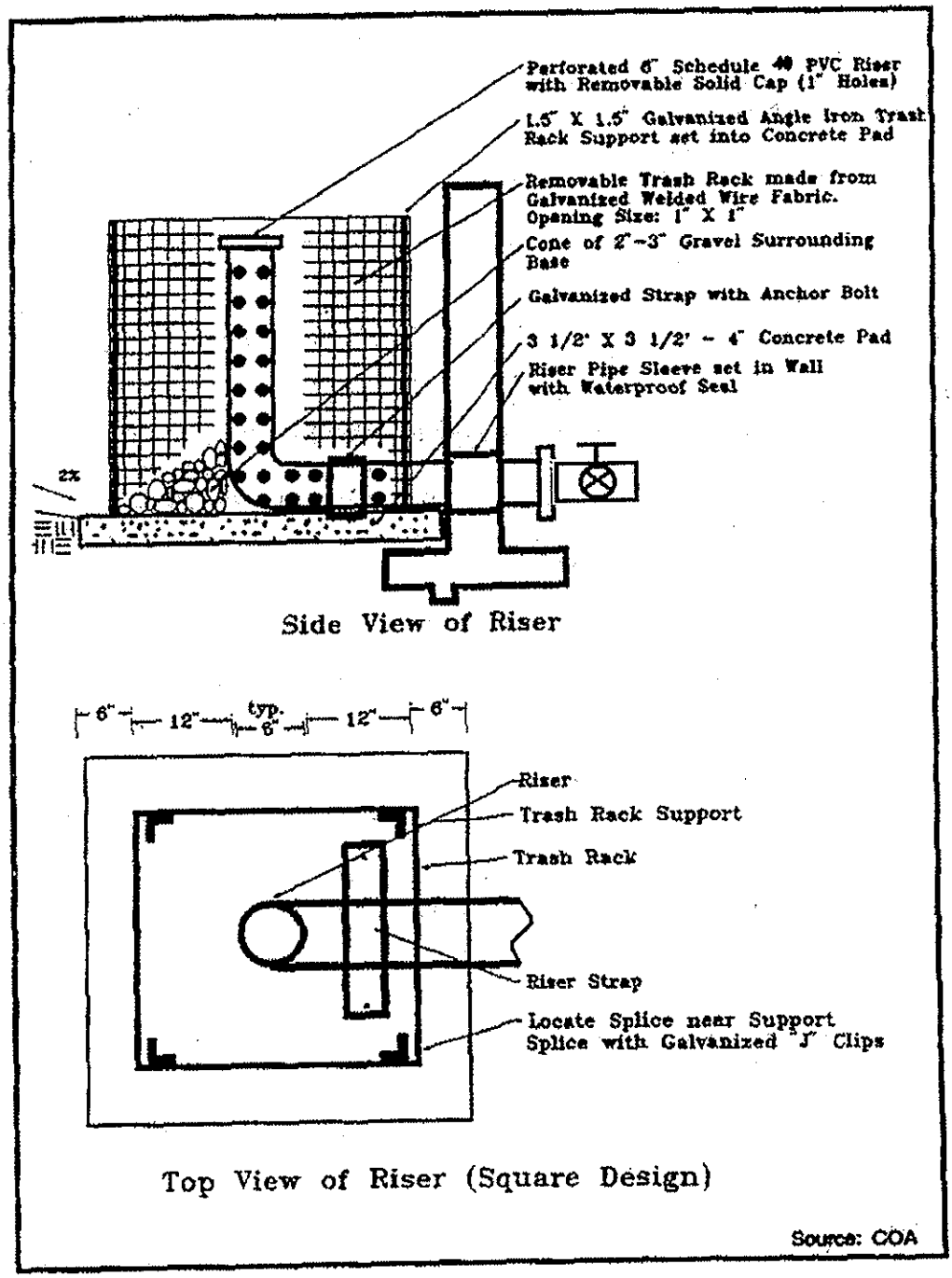

Figure 6
Detail of Sedimentation Riser Pipe

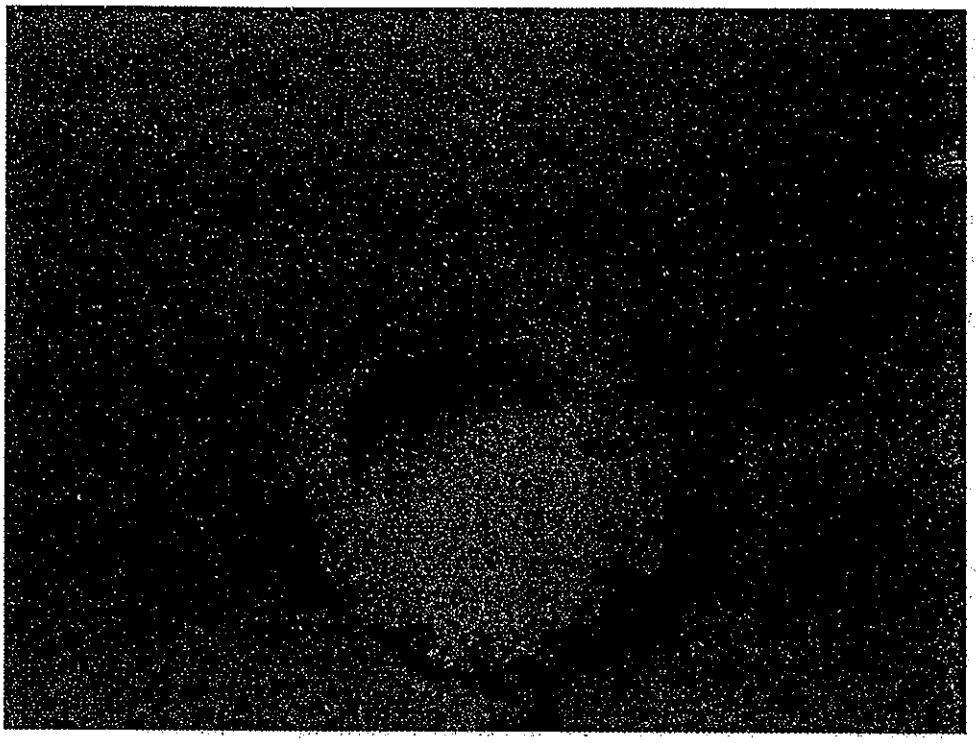

Figure 7
Formation of Clogging Crust on Filter Bed

Recommended maintenance activities and frequencies include:

- Inspections semi-annually for standing water, sediment, trash and debris, and to identify potential problems.
- Remove accumulated trash and debris in the sedimentation basin, from the riser pipe, and the filter bed during routine inspections.
- Inspect the facility once during the wet season after a large rain event to determine whether the facility is draining completely within 72 hr.
- Remove top 50 mm (2 in.) of sand and dispose of sediment if facility drain time exceeds 72 hr. Restore media depth to 450 mm (18 in.) when overall media depth drops to 300 mm (12 in.).
- Remove accumulated sediment in the sedimentation basin every 10 yr or when the sediment occupies 10 percent of the basin volume, whichever is less.

Cost

Construction Cost

There are few consistent published data on the cost of sand filters, largely because, with the exception of Austin, Texas, Alexandria, Virginia, and Washington, D.C., they have not been widely used. Furthermore, filters have such varied designs that it is difficult to assign a cost to filters in general. A study by Brown and Schueler (1997) was unable to find a statistically valid relationship between the volume of water treated in a filter and the cost of the practice. The EPA filter fact sheet indicates a cost for an Austin sand filter at $18,500 (1997 dollars) for a 0.4 hectare- (1 acre-)

drainage area. However, the same design implemented at a 1.1 ha site by the California Department of Transportation, cost $240,000. Consequently, there is a tremendous uncertainty about what the average construction cost might be.

It is important to note that, although underground and perimeter sand filters can be more expensive than surface sand filters, they consume no surface space, making them a relatively cost-effective practice in ultra-urban areas where land is at a premium.

Given the number of facilities installed in the areas that promote their use it should be possible to develop fairly accurate construction cost numbers through a more comprehensive survey of municipalities and developers that have implemented these filters.

Maintenance Cost

Annual costs for maintaining sand filter systems average about 5 percent of the initial construction cost (Schueler, 1992). Media is replaced as needed, with the frequency correlated with the solids loading on the filter bed. Currently the sand is being replaced in the D.C. filter systems about every 2 years, while an Austin design might last 3-10 years depending on the watershed characteristics. The cost to replace the gravel layer, filter fabric and top portion of the sand for D.C. sand filters is approximately $1,700 (1997 dollars).

Caltrans estimated future maintenance costs for the Austin design, assuming a device sized to treat runoff from approximately 4 acres. These estimates are presented in Table 3 and assume a fully burdened hourly rate of $44 for labor. This estimate is somewhat uncertain, since complete replacement of the filter bed was not required during the period that maintenance costs were recorded.

Table 3 Expected Annual Maintenance Costs for an Austin Sand Filter

Activity	Labor Hours	Equipment and Materials ($)	Cost
Inspections	4	0	176
Maintenance	36	125	1,706
Vector Control	0	0	0
Administration	3	0	132
Direct Costs	-	888	888
Total	43	$1,013	**$2,902**

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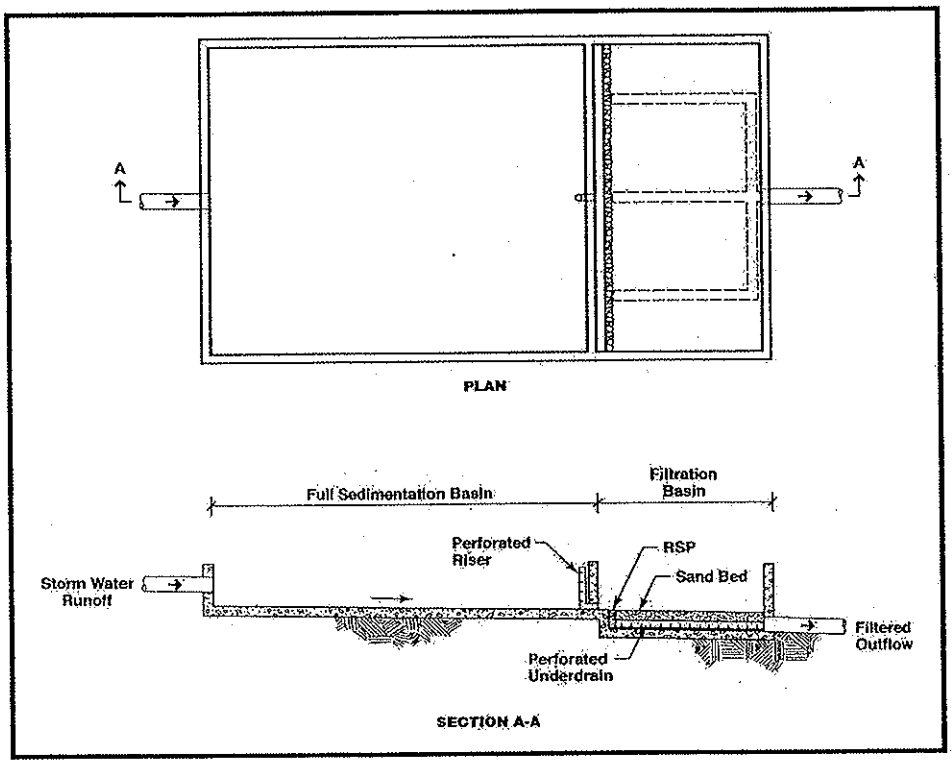

Schematic of the "Full Sedimentation" Austin Sand Filter

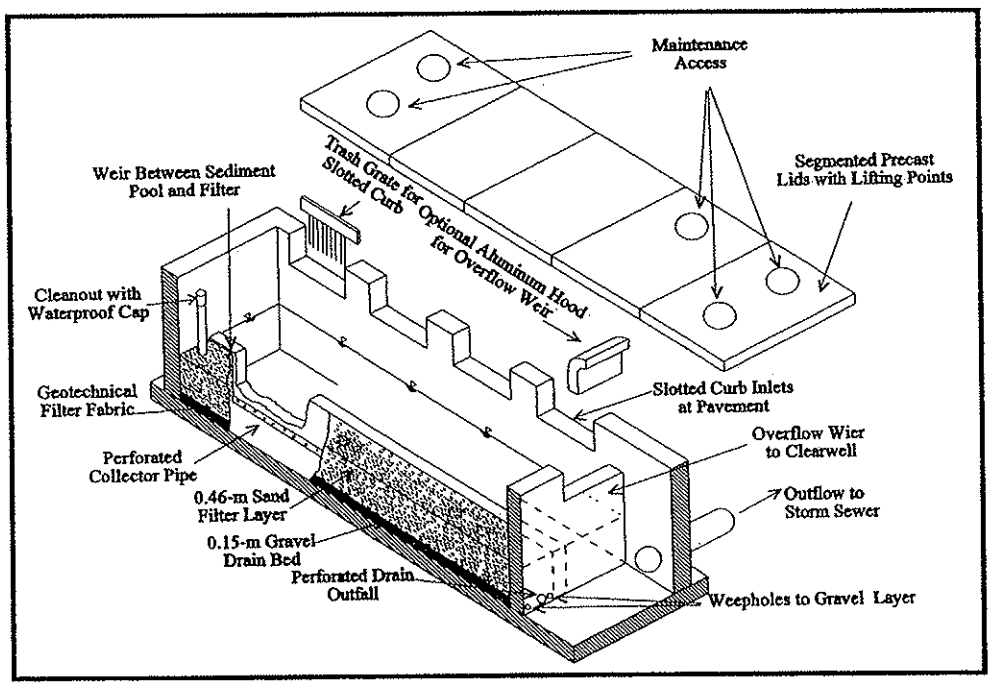

Schematic of a Delaware Sand Filter (Young et al., 1996)

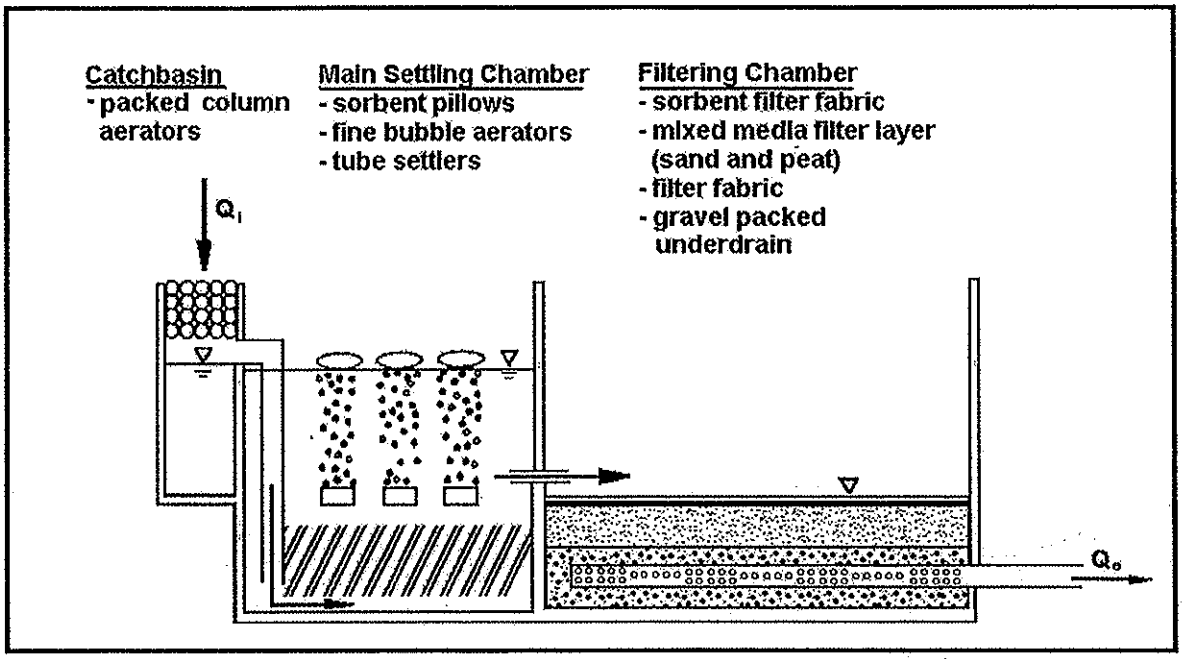

Schematic of a MCTT (Robertson et al., 1995)

Drain Inserts

MP-52

Description

Drain inserts are manufactured filters or fabric placed in a drop inlet to remove sediment and debris. There are a multitude of inserts of various shapes and configurations, typically falling into one of three different groups: socks, boxes, and trays. The sock consists of a fabric, usually constructed of polypropylene. The fabric may be attached to a frame or the grate of the inlet holds the sock. Socks are meant for vertical (drop) inlets. Boxes are constructed of plastic or wire mesh. Typically a polypropylene "bag" is placed in the wire mesh box. The bag takes the form of the box. Most box products are one box; that is, the setting area and filtration through media occur in the same box. Some products consist of one or more trays or mesh grates. The trays may hold different types of media. Filtration media vary by manufacturer. Types include polypropylene, porous polymer, treated cellulose, and activated carbon.

California Experience

The number of installations is unknown but likely exceeds a thousand. Some users have reported that these systems require considerable maintenance to prevent plugging and bypass.

Advantages

- Does not require additional space as inserts as the drain inlets are already a component of the standard drainage systems.
- Easy access for inspection and maintenance.
- As there is no standing water, there is little concern for mosquito breeding.
- A relatively inexpensive retrofit option.

Limitations

Performance is likely significantly less than treatment systems that are located at the end of the drainage system such as ponds and vaults. Usually not suitable for large areas or areas with trash or leaves than can plug the insert.

Design and Sizing Guidelines

Refer to manufacturer's guidelines. Drain inserts come any many configurations but can be placed into three general groups: socks, boxes, and trays. The sock consists of a fabric, usually constructed of polypropylene. The fabric may be attached to a frame or the grate of the inlet holds the sock. Socks are meant for vertical (drop) inlets. Boxes are constructed of plastic or wire mesh. Typically a polypropylene "bag" is placed in the wire mesh box. The bag takes the form of the box. Most box products are

Design Considerations

- Use with other BMPs
- Fit and Seal Capacity within Inlet

Targeted Constituents

- ✓ Sediment
- ✓ Nutrients
- ✓ Trash
- ✓ Metals
- Bacteria
- ✓ Oil and Grease
- ✓ Organics

Removal Effectiveness

See New Development and Redevelopment Handbook-Section 5.

CASQA California Stormwater Quality Association

Woodward Clyde, June 11, 1996, Parking Lot Monitoring Report, Santa Clara Valley Nonpoint Source Pollution Control Program.

one box; that is, the setting area and filtration through media occurs in the same box. One manufacturer has a double-box. Stormwater enters the first box where setting occurs. The stormwater flows into the second box where the filter media is located. Some products consist of one or more trays or mesh grates. The trays can hold different types of media. Filtration media vary with the manufacturer: types include polypropylene, porous polymer, treated cellulose, and activated carbon.

Construction/Inspection Considerations

Be certain that installation is done in a manner that makes certain that the stormwater enters the unit and does not leak around the perimeter. Leakage between the frame of the insert and the frame of the drain inlet can easily occur with vertical (drop) inlets.

Performance

Few products have performance data collected under field conditions.

Siting Criteria

It is recommended that inserts be used only for retrofit situations or as pretreatment where other treatment BMPs presented in this section area used.

Additional Design Guidelines

Follow guidelines provided by individual manufacturers.

Maintenance

Likely require frequent maintenance, on the order of several times per year.

Cost

- The initial cost of individual inserts ranges from less than $100 to about $2,000. The cost of using multiple units in curb inlet drains varies with the size of the inlet.
- The low cost of inserts may tend to favor the use of these systems over other, more effective treatment BMPs. However, the low cost of each unit may be offset by the number of units that are required, more frequent maintenance, and the shorter structural life (and therefore replacement).

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innovative stormwater management products

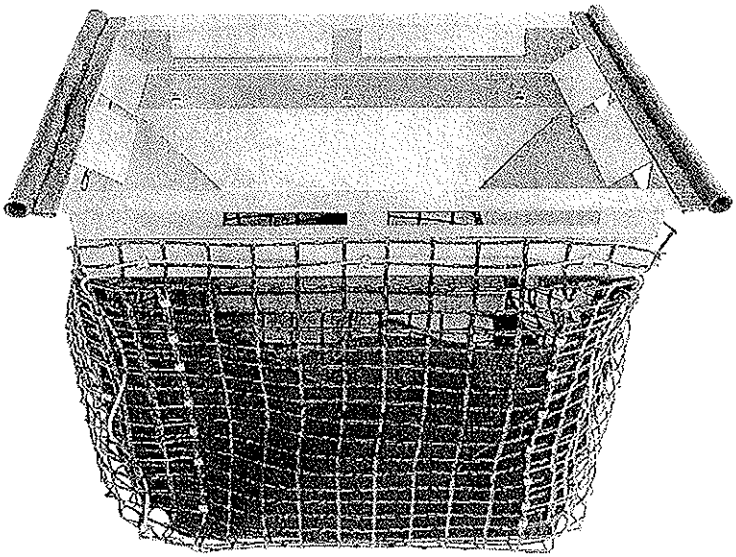

KRISTAR

FloGard®+PLUS

Catch Basin Insert Filter

FloGard®+PLUS Catch Basin Insert Filter

GENERAL FILTER CONFIGURATION

FloGard®+PLUS catch basin insert filter shall provide solids filtration through a filter screen or filter liner, and hydrocarbon capture shall be effected using a non-leaching absorbent material contained in a pouch or similar removable restraint. Hydrocarbon absorbent shall not be placed at an exposed location at the entry to the filter that would allow blinding by debris and sediment without provision for self-cleaning in operation.

Filter shall conform to the dimensions of the inlet in which it is applied, allow removal and replacement of all internal components, and allow complete inspection and cleaning in the field.

FLOW CAPACITY

Filter shall provide two internal high-flow bypass locations that in total exceed the inlet peak flow capacity. Filter shall provide filtered flow capacity in excess of the required "first flush" treatment flow. Unit shall not impede flow into or through the catch basin when properly sized and installed.

MATERIALS

Filter support frame shall be constructed of type 304 stainless steel. Filter screen, when used in place of filter liner, shall be type 304 or 316 stainless steel, with an apparent opening size of not less than 4 U.S. mesh. Filter liner, when used in place of filter screen, shall be woven polypropylene geotextile fabric liner with an apparent opening size (AOS) of not less than 40 U.S. mesh as determined by ASTM D 4751. Filter liner shall include a support basket of polypropylene geogrid with stainless steel cable reinforcement.

Filter frame shall be rated at a minimum 25-year service life. All other materials, with the exception of the hydrocarbon absorbent, shall have a rated service life in excess of 2 years.

FloGard®+PLUS TEST RESULTS SUMMARY

Testing Agency	% TSS Removal	% Oil and Grease Removal	% PAH Removal
UCLA	80	70 to 80	
U of Auckland Tonking & Taylor Ltd. (for city of Auckland)	78 to 95		
U of Hawaii (for city of Honolulu)	80		20 to 40

FEATURES

- Easy to install, inspect and maintain
- Can be retrofitted to existing drain catch basins – or used in new projects
- Economical and efficient
- Catches pollutants where they are easiest to catch (at the inlet)
- No standing water – minimizes vector, bacteria and odor problems
- Can be incorporated as part of a "Treatment Train"

BENEFITS

- Lower installation, inspection and maintenance costs
- Versatile installation applications
- Higher return on investment
- Allows for installation on small and confined sites
- Minimizes vector, bacteria and odor problems
- Allows user to target specific pollutants

Innovative stormwater management products

FloGard® +PLUS

Catch Basin Insert Filter

INSTALLATION AND MAINTENANCE

Filter shall be installed and maintained in accordance with manufacturer's general instructions and recommendations.

PERFORMANCE

Filter shall provide 80% removal of total suspended solids (TSS) from treated flow with a particle size distribution consistent with typical urban street deposited sediments. Filter shall capture at least 70% of oil and grease and 40% of total phosphorus (TP) associated with organic debris from treated flow. Unit shall provide for isolation of trapped pollutants, including debris, sediments, and floatable trash and hydrocarbons, from bypass flow such that re-suspension and loss of pollutants is minimized during peak flow events.

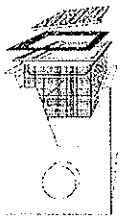

FloGard+PLUS Combination Inlet

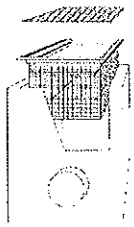

FloGard+PLUS Flat Grate

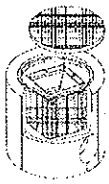

FloGard+PLUS Round Gated Inlet

FloGard®+PLUS COMPETITIVE FEATURE COMPARISON

Evaluation of FloGard+PLUS Units (Based on flow-comparable units) (Scale 1-10, 10 being best)	FloGard+PLUS	Other Insert Filter Types**
Flow Rate	10	7
Removal Efficiency*	80%	45%
Capacity – Sludge and Oil	7	7
Service Life	10	3
Installation – Ease of Handling / Installation	8	6
Ease of Inspections & Maintenance	7	7
Value	10	2

*approximate, based on field sediment removal testing in urban street application **average

Long-Term Cost Comparison (Scale 1-10, 10 being lowest cost, higher number being best)	FloGard+PLUS	Other Insert Filter Types
Unit cost — initial ($/cfs treated)	10	4
Installation cost ($/cfs treated)	9	6
Adsorbent replacement (annual avg $/cfs treated)	10	2
Unit materials replacement (annual avg $/cfs treated)	10	10
Maintenance cost (annual avg $/cfs treated)	9	6
Total first yr ($/cfs treated)	10	5
Total Annual Avg ($/cfs treated, avg over 20 yrs)*	10	5

*assumes 3% annual inflation

Captured debris from FloGard+PLUS, Dana Point, CA

KriStar Enterprises, Inc
P.O. Box 6419
Santa Rosa, CA 95406-1419

PH 800-579-8819
FAX 707-524-8186
www.kristar.com

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FGP-T 11.19.18.04.2M

FloGard® is a registered trademark of KriStar Enterprises Inc

G-0001

SPECIFIER CHART			
MODEL	INLET ID	GRATE OD	COMMENTS
FF-16D	16" X 16"	18" X 18"	GRATED INLET
FF-18D	18" X 18"	20" X 20"	GRATED INLET
FF-1836SD	18" X 36"	18" X 40"	GRATED INLET
FF-1836DGO	18" X 36"	18" X 40"	COMBINATION INLET
FF-24D	24" X 24"	26" X 26"	GRATED INLET
FF-2436D	24" X 36"	24" X 40"	GRATED INLET
FF-RF24D	24" DIA.	25" DIA.	CIRCULAR INLET
FF-24DGO	24" X 24"	18" X 26"	COMBINATION INLET
FF-2436DGO	24" X 36"	24" X 40"	COMBINATION INLET
FF-36D (2 PIECE)	36" X 36"	36" X 40"	GRATED INLET
FF-3648D (2 PIECE)	36" X 48"	40" X 48"	GRATED INLET

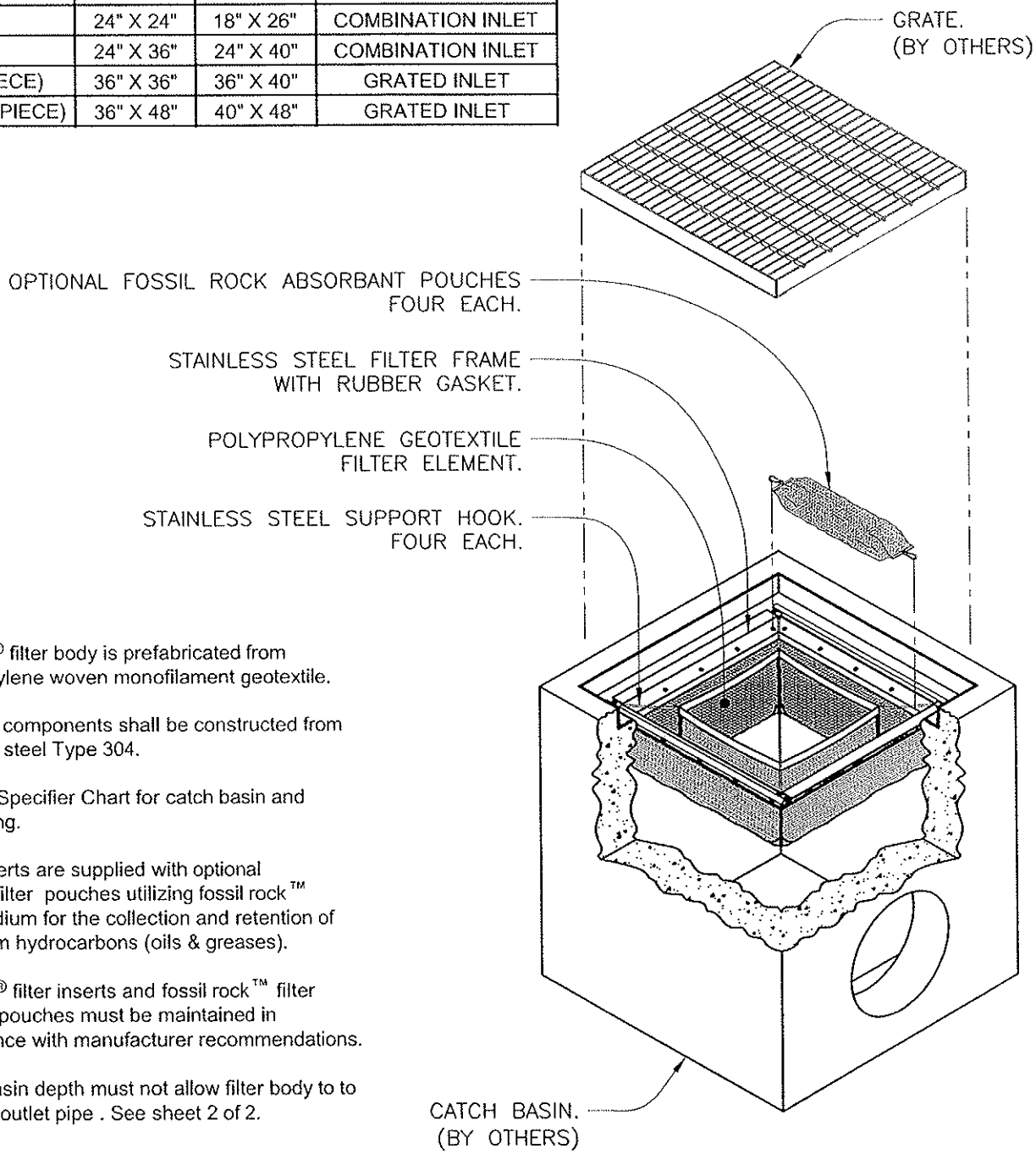

NOTES:

1. FloGard® filter body is prefabricated from polypropylene woven monofilament geotextile.
2. All metal components shall be constructed from stainless steel Type 304.
3. Refer to Specifier Chart for catch basin and filter sizing.
4. Filter inserts are supplied with optional "clip-in" filter pouches utilizing fossil rock™ filter medium for the collection and retention of petroleum hydrocarbons (oils & greases).
5. FloGard® filter inserts and fossil rock™ filter medium pouches must be maintained in accordance with manufacturer recommendations.
6. Catch basin depth must not allow filter body to to obstruct outlet pipe . See sheet 2 of 2.

FloGard®

CATCH BASIN FILTER INSERT

KriStar Enterprises, Inc.
360 Sutton Place, Santa Rosa, CA 95407
Ph: 800.579.8819, Fax: 707.524.8186, www.kristar.com

DRAWING NO.	REV	ECO	DATE	
FG-0001	B	0059 JPR 12/30/08	JPR 12/18/06	SHEET 1 OF 2

G-0001

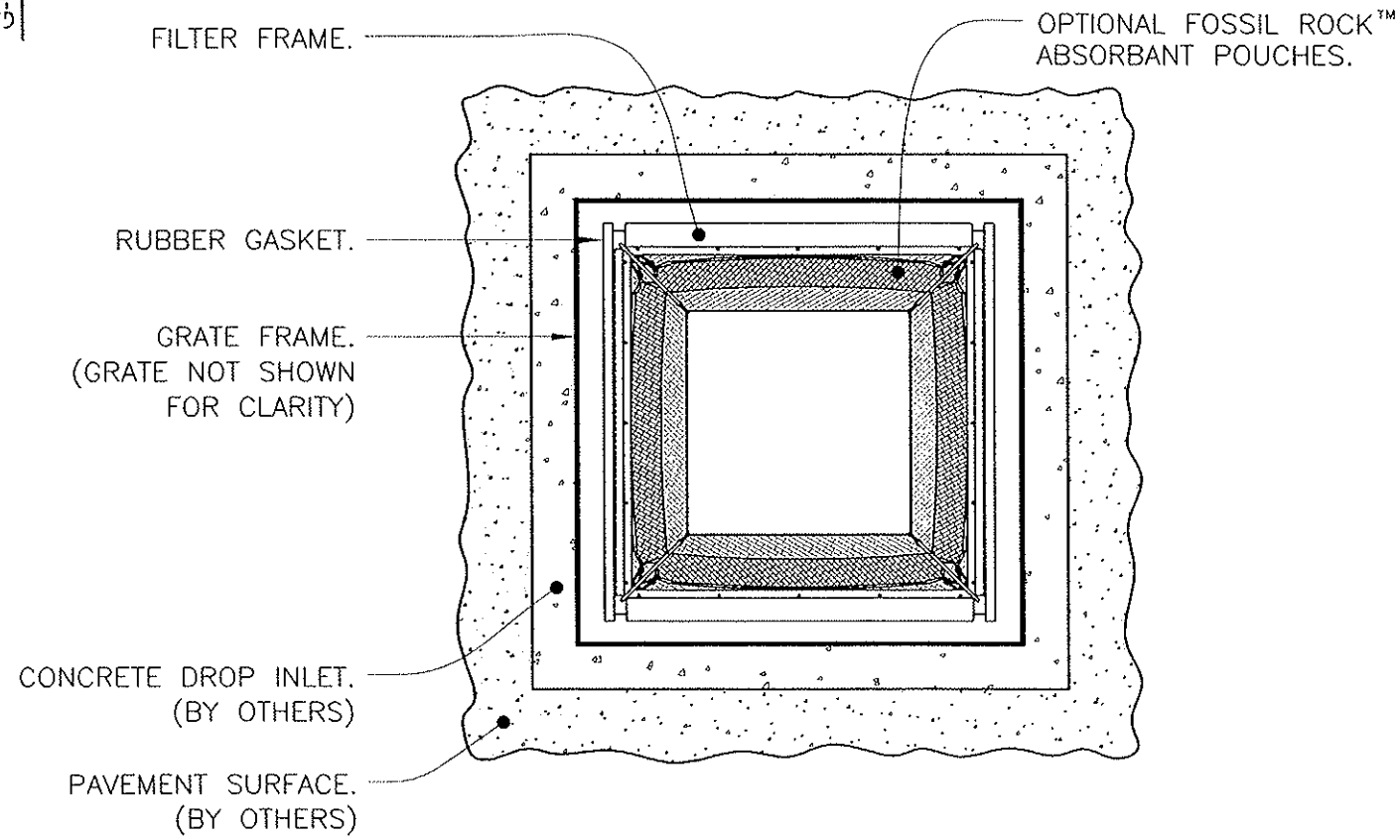

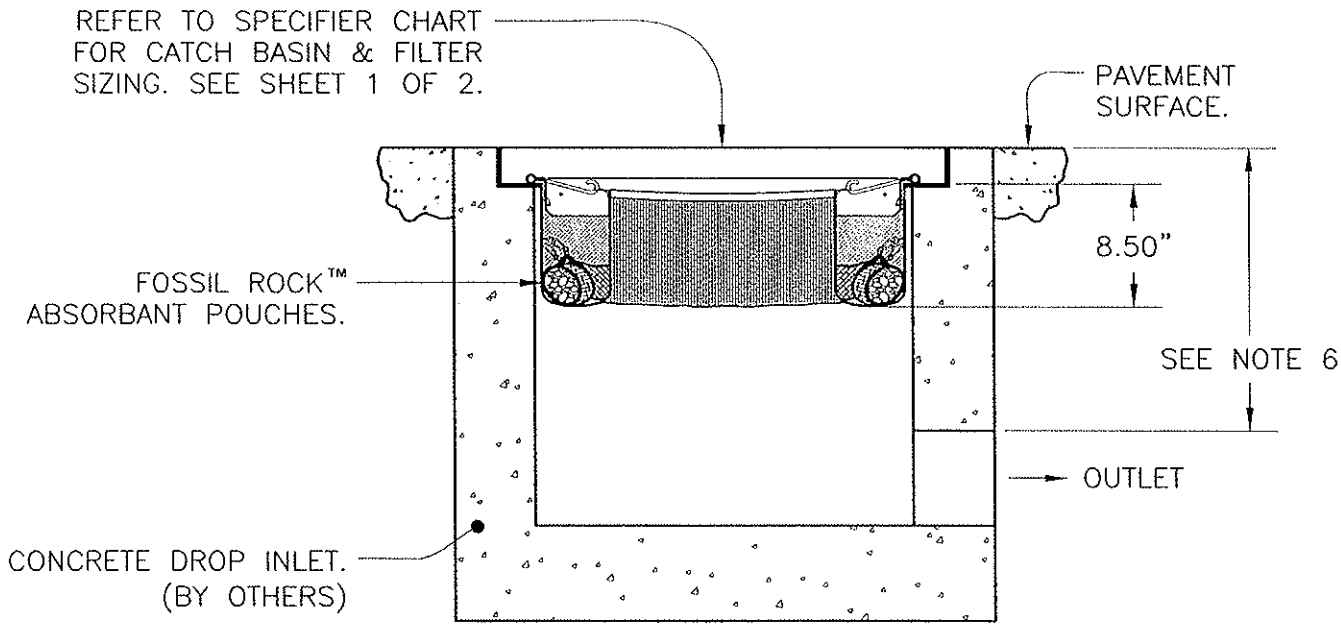

SECTION VIEW

.E

FloGard®

CATCH BASIN FILTER INSERT

KriStar Enterprises, Inc.

360 Sutton Place, Santa Rosa, CA 95407
Ph: 800.579.8819, Fax: 707.524.8186, www.kristar.com

DRAWING NO.	REV	ECO	DATE	
FG-0001	B	0059 JPR 12/30/08	JPR 12/18/06	SHEET 2 OF 2

Appendix G

AGREEMENTS – CC&RS, COVENANT AND AGREEMENTS AND/OR OTHER MECHANISMS FOR ENSURING ONGOING OPERATION, MAINTENANCE, FUNDING AND TRANSFER OF REQUIREMENTS FOR THIS PROJECT-SPECIFIC WQMP

Appendix H

PHASE 1 ENVIRONMENTAL SITE ASSESSMENT – SUMMARY OF SITE REMEDIATION CONDUCTED AND USE RESTRICTIONS

PHASE I
ENVIRONMENTAL SITE ASSESSMENT OF THE PROPERTY CURRENTLY REFERED TO AS TENTATIVE TRACT # 35161 36050 POURROY ROAD RIVERSIDE COUNTY, CALIFORNIA

Prepared for:
Josepth Turley
C/O
Hunsaker & Associates Irvine, Inc.
3 Hughes
Irvine, California, 92618

Prepared by:
Carlin Environmental Consulting, Inc.
14661 Myford Road, Suite A
Tustin, California 92780

October 11, 2007

APPENDICIES

1- FIGURES
2- SITE PHOTOGRAPHS
3- AERIAL PHOTOGRAPHS
4- TOPOGRAPHIC MAPS
5- SANBORN MAPS
6- ENVIRONMENTAL LIEN SEARCH
7- INTERVIEW RECORDS
8- ASBESTOS DISPOSAL RECORDS
9- GROUNDWATER WELL INFORMATION
10- LOCAL AGENCY RECORDS
11- STATEMENT OF QUALIFICATIONS
12- EDR REPORT

usage, past or present, of potentially hazardous materials for a Phase I - Environmental Site Assessment. Within this resulting assessment report, CEC identifies observed and/or documented recognized environmental conditions, if any exist, that may have significantly impacted the site.

2.2 Methodology

This environmental investigation and the resulting report were prepared generally utilizing the procedures presented in ASTM E 1527-05, Standard Practice for Environmental Site Assessments, Phase I Environmental Site Assessment Process. Site and vicinity inspections, owner and tenant interviews, and document research were performed generally according to ASTM guidelines.

2.3 Limitations and Exceptions

This environmental investigation was conducted using a degree of care and skill normally exercised, under similar circumstances, by reputable soil engineers, geologists, and environmental scientists practicing in this and similar localities. Opinions presented herein apply to site conditions existing at the time of our study and cannot necessarily be taken to apply to site conditions or changes that we are not aware of or have not had the opportunity to evaluate. The conclusions presented in this report are based on interviews conducted of the current owner and contractors that have recently worked on the site, documentation reviewed in the archives of the County of Riverside, aerial photograph reviews and topographic maps reviews. CEC will comment that the only definitive land use documentation reviewed is for the past twenty-nine years. The only information available for land use prior to 1978 is from aerial photography. Data gaps within the aerial photograph records exist, with the largest being fifteen years. Additionally, the initial development of the site occurred prior to 1938, the oldest aerial photograph reviewed. Topographic maps dating back to 1901 appear to show that at least one structure and a road was present at that time. Due to the rural setting of the site and the apparent use of the site as a ranch, it is CEC's opinion that it is unlikely that possible activities conducted at the subject site severely impacted the environmental integrity of the subject site.

chain-link fence borders the site along the northern, southern and western boundaries. According to Ms. Karina Faherty of Hunsaker & Associates, Irvine, Inc. (H&A) buildings that were associated with a former residence at the site were demolished and the debris removed in June 2007.

On September 12, 2007 CEC personnel inspected the subject site and vicinity. CEC personnel walked the entire site and inspected the soils and features of interest. Very little nuisance trash, consisting mainly of beverage containers and empty oil containers, was noted in the western portion of the property. The soils at the site appeared to have been recently disked. The only compacted soils note at the site were those in the area immediately north of the southern boundary and those of the unimproved road that traverses the western and central portions of the site in an east-west trend. The only vegetation noted at the site consisted of several watermelon plants and other weeds in the east-central portion of the site and shrubs along the southern and western boundaries of the site. No soil staining was noted at the site, though personnel did note that non-native soils (light gray in color) were present in the northwestern portion of the site. It was reported by H&A that stockpiles of illegally dumped soil and concrete were present in this area prior to demolition activities that occurred in June 2007. H&A reported that the concrete debris in the piles was removed from the site during demolition activities and that the soil from the stockpiles was disked into the soils at the site. The inspection of the site suggests that the stockpiled soils were disked in place and were not dispersed throughout the site. CEC will discuss these deposits in later sections of this report.

A round stormwater structure was present along the western boundary of the subject site. The condition of the structure suggests that it was recently installed. Five utility panels/vaults were present in the northwestern corner at the time of the site inspection. Additional aboveground and underground utilities were present along the unimproved east-west road that traverses through the site. A pole-mounted electrical transformer was present on one of the poles near the center of the property. No evidence of leaks or stains was noted on the transformer, pole or soil around the pole.

The site is situated in the Perris Block of the Peninsular Ranges Province. The majority of the site is underlain by middle to early Pleistocene fluvial sediments that were deposited on a broad canyon floor. The sediments consist of moderate to well indurated reddish-brown sand with varying amounts of gravel, silt and clay. Non-native soils, gravelly sand, were present in the northwestern portion of the site at the time of the site inspection.

The site lies within the Temecula Valley groundwater basin. Five groundwater wells have been mapped in the central portion of the site. A list of these wells is presented as an appendix to this report. These wells appear to have been constructed between the late 1950s and early 1960s. Depth to groundwater in these wells was reported as shallow as forty-five feet below ground surface (bgs) in 1968. No visual evidence of these wells was noted during the site inspection conducted by CEC. Groundwater flow is expected to be southerly.

Tectonically, the site is not on or adjacent to an earthquake fault considered active by the United States Geological Survey (USGS). A review of the California Division of Mines and Geology 1997 edition of the publication "Fault-Rupture Hazard Zones in California" showed that the site is not within an Alquist-Priolo Special Study Zone. Special Study Zones associated with the Elsinore Fault Zone are located approximately six miles southwest of the site. An extension of the Glen Ivy fault is located approximately three miles southwest of the site. The San Jacinto Fault Zone is located approximately fourteen miles northeast of the subject site. Faults that make up the Elsinore Fault Zone and the San Jacinto Fault Zones have the potential of producing high ground accelerations during an earthquake.

4.0 RECORDS REVIEW

4.1 Federal and State Environmental Records

A search of Federal and State of California environmental database records regarding the site and vicinity was supplied by Environmental Data Resources, Inc. (EDR) on

Material Licensing Tracking System, Facility Index System, RCRA Administrative Action Tracking System, Integrated Compliance Information System Incident and Accident Database, or Emissions Inventory Data.

The subject site is not listed on any of the databases normally researched during a Phase I investigation.

Two sites within one-quarter mile of the subject site are listed on the California Water Resources Control Board's Waste Discharge System. The sites on this list are presented below.

- AD 9 Water Distribution Pipeline – Thompson Road/Maddaleana Road – Located approximately 1,300 feet east of the subject site. The facility does not fall into the category of municipal, domestic, industrial, agricultural or solid waste. The site is listed as active. It is listed as a minor threat to water quality.
- Sheffield French Valley Det Facil – Pourroy Road by Thompson/Benton Road – Located southwest of the subject site. The facility does not fall into the category of municipal, industrial, agricultural or solid waste. The site is listed as active. The facility has no waste treatment systems, such as cooling water dischargers or those who must comply through best management practices, facilities with passive waste treatment and disposal systems, such as septic systems with subsurface disposal, or dischargers having waste storage systems with land disposal such as dairy waste ponds.

One site within one-quarter mile of the subject site is listed on the Haznet database. This database contains information gathered by the Department of Toxic Control Substances from waste manifests. The site follows.

- Promotive Inc. – 32150 Thompson Road. Located directly north of the subject site. This site is listed for the offsite disposal of 0.2 ton of waste oil/mixed oil and 0.22 ton of oil/water separation sludge at a recycling facility.

- Planning Case CFG00855 – 10/11/94 – Applicant listed as Coscan Stewart Partnership – Historical Fish and Game fees.
- Planning Case PAR00983 – 12/14/06 – Applicant listed as Hunsaker & Associates – Approved division of 24 acres into 75 single family residential lots.

On September 18, 2007 CEC requested any available records from the County of Riverside Community Health Agency – Department of Environmental Health. This agency is responsible for permitting and inspecting sites that utilize, store, produce, or treat hazardous materials and sites with underground or aboveground storage tanks. On October 2, 2007, this agency responded via letter (appended to this report) that no records exist for the subject site address.

4.3 Environmental Lien Search

An Environmental Lien Search report for the property was provided by EDR on October 8, 2007. No environmental liens or activity use limitations were reported for Assessor's Parcel Number 964-010-001.

The following legal description of the site was provided in the Quitclaim Deed appended to the Environmental Lien Search report.

North half of the Northwest Quarter of Section 4, Township 7 South, Range 2 West, San Bernardino Base and Meridian.

Excepting Therefrom that portion described as follows;

Parcels 2 and 3 as shown on Parcel Map No. 6643 recorded May 19, 1976, in Book 24, Page 59 of Parcel Maps, Records of Riverside County, California. APN 958-020-001.

The following legal description of the site was provided by H&A.

Parcel 1 and Lot C in the Unincorporated territory of the County of Riverside, State of California, as shown on Parcel Map No. 6643, filed in Book 24, Page 59 of Parcel Maps, Record of said County. APN: 964-010-001 (Old APN 958-020-001)

1967

Approximately ten buildings of various sizes are present in the central portion of the site. A hummocky area, triangular in shape, is present southeast of the buildings. Smaller structures are present to the east. A darker portion of land is present near the northwestern corner. The southern portion of the site appears to be tilled. The properties in all direction are undeveloped and tilled.

1953

The property appears as it did in the 1967 photograph with the exception that the dark area in the northwest is not present and the triangular area to the southeast of the buildings blends in with the rest of the site. The southern portion of the site is tilled. The property to the north of the subject site is tilled.

1938

The site is somewhat washed out. Rows of circular white structures (possibly crops) are present in the western portion of the site. The rest of the site appears as it did in the 1953 photograph. The properties in the vicinity are the same as they appeared in the 1953 photograph.

No evidence of oil fields in the area is apparent from the aerial photographs. H&A provided CEC with an aerial photograph that is also available on the GoogleEarth website. This photograph showed several rows of what were reported to be stockpiles of illegally dumped soil and concrete. H&A reported that the concrete debris was disposed of offsite and that the remaining soil piles were disked into the native soils. CEC's reconnaissance of the site revealed that the disked soils are still present in the northwestern portion of the site.

4.5 Historical Maps

CEC requested historical maps, including Sanborn fire insurance maps, covering the site, from EDR, Inc. to determine if any additional areas of potential environmental concern were noted on these maps. EDR determined that no Sanborn maps for the site were available. Several historical topographic maps provided by EDR were also reviewed. The following observations were made in the topographic maps reviewed.

- No air emission permits exist for the subject site.

Ms. Karina Faherty of H&A was also interviewed several times throughout the project regarding the former structures at the site. Ms. Faherty reported that the former buildings at the site were demolished in June 2007 by Vizion's West, Inc. The demolition company removed non-friable asbestos-containing materials from the structures and had the wastes disposed offsite on March 27, 2007. The waste manifest for the asbestos waste and a Completion Letter are appended to this report. Ms. Faherty also reported that Vizion's West, Inc. was also tasked with the removal of the concrete stockpiles in the northwestern portion of the site. Teresa Zitzun of Vizion's West, Inc. was interviewed via telephone on October 10, 2007 regarding the removal of these wastes. Ms. Zitzun reported that the materials that were removed from the site only contained concrete debris and that no soil or material samples were collected for analysis prior to disposal. Ms. Zitzun also reported that to the best of her knowledge no hazardous materials were noted in the stockpiled materials.

5.0 POTENTIAL SOURCES OF HAZARDOUS SUBSTANCES

5.1 Underground Storage Tanks

No superficial indications of underground storage tanks were observed on the site during our site inspection or during the documentary investigation. A review of historical aerial photographs revealed that the site was developed as a ranch since at least the late 1930s. Due to this relatively long period of development and the lack of development in the area through most of the history of the subject site's development, it is possible that underground storage tanks may have been present at the site prior to the time when such structures were regulated. CEC recommends that if such a structure, or remnant thereof, is encountered during future redevelopment activities, it will be necessary to contact the County of Riverside Department of Environmental Health to properly permit the removal of the structure. Soil samples may need to be collected during the removal of any such structures.

5.5 Stained Soil or Pavement

No pavement is present at the subject site. CEC personnel walked the entire site and found no areas of stained soil. CEC did note that different soil types are present in the northwestern portion of the site. These soils are believed to be the stockpiled soils that were disked into the native soils in June 2007.

5.6 Solid Waste

No industrial activities were reported for the subject site by persons interviewed and the review of historical aerial photographs does not lead CEC to believe that industrial activities were conducted at the site prior to 1978. The disposal method for solid waste generated at the subject site during the use of the site as a ranch is unknown. CEC cannot discount the possibility that such waste was disposed in pits at the site or burned at the site during the early part of the twentieth century. If buried waste or buried burn pits are encountered during redevelopment activities, CEC recommends that the removal of the waste and the evaluation of the surrounding soils be documented by an environmental professional.

CEC will also comment that piles of dry horse manure were present in the central and eastern portions of the property at the time of the site inspection. CEC recommends that these wastes be properly removed from the subject site prior to redevelopment of the site, as burial of such waste has the potential of generating methane gas. If buried manure is encountered during redevelopment activities, CEC recommends that the manure and manure impacted soils be properly removed from the subject site.

5.7 Waste Water

No evidence exists that indicates that significant volumes of waste water have been generated on the site.

The study found detectable concentrations of one or all of the DDT family of compounds in each of the 99 soil samples tested from the state's agricultural areas. The report concludes that these compounds are residues from the legal applications of the chemicals between approximately mid-1940's and 1974. Recent discussions with the California Environmental Protection Agency (Cal-EPA) have revealed that concentration of DDT and its residual compounds that are in the range of these found in the Food and Agriculture study are not actionable by the agency. Thus, if shallow soil samples were collected at the site and analyzed, DDT and its residual compounds could possibly be found in concentrations comparable to those reported in the 1985 study. However, it is unlikely that significant volumes of DDT compounds have been applied to the site since the late-1950's. In any event, it is unlikely that a government regulatory agency would require remediation activities.

5.11 Radon

Based on our previous experience with projects at localities with similar conditions, it is CEC's opinion that the site and immediate vicinity are situated within a Radon Zone with a level rated at 2, which indicates that the predicted average indoor screening level of radon is most likely to be between 2pCi/L and 4 pCi/L. The EPA action level for radon retesting and subsequent possible remediation is 4 pCi/L, thus, no remedial action is likely to be necessary.

5.12 PCB's

A detailed PCB survey was not a part of the scope of this assessment. CEC will comment that a pole-mounted electrical transformer was present in the central portion of the subject site. No staining was noted on the transformer, pole or the soils surrounding the pole.

5.13 Asbestos

A detailed asbestos survey was not a part of the scope of this assessment but CEC will comment that non-friable asbestos-containing materials were removed from the former structures at the subject site prior to the demolition of said structures. The asbestos waste

recommends that the removal of the waste and the evaluation of the surrounding soils be documented by an environmental professional.

5.18 Oil Wells

Based on a review of a current California Division of Oil, Gas, and Geothermal Resources (DOG) oil well location map W 1-7, no oil wells have existed on the subject site. The closest oil well to the subject site is located approximately five miles southwest of the subject site. This well does not appear to pose a threat to the environmental integrity of the subject site.

6.0 CONCLUSIONS AND RECOMMENDATION

Carlin Environmental Consulting, Inc. conducted a site inspection, a historical document research, governmental regulatory agency database reviews and owner and contractor interviews. During the investigation CEC identified three recognized environmental conditions (REC) that could complicate redevelopment of the subject site for residential purposes. The RECs and additional recommendations are presented below.

The first REC is the number of piles of mulched plant materials, mainly palm trees and other tree materials that were present in the central, western and south-central portions of the site. CEC recommends that these materials be removed from the subject site prior to grading activities, as the burial of such materials may generate methane gas that could affect future development efforts at the site.

The second REC is the number of piles of dry horse manure that were present in the central and eastern portions of the property at the time of the site inspection. CEC recommends that these wastes be properly removed from the subject site prior to grading activities at the site, as burial of such waste has the potential of generating methane gas. If buried manure is encountered during grading activities, CEC recommends that the manure and manure impacted soils be properly removed from the subject site.

Due to the relatively long period of development and the lack of development in the area through most of the history of the subject site's development, it is possible that underground storage tanks may have been present at the site prior to the time when such structures were regulated. CEC recommends that if such a structure, or remnant thereof, is encountered during future grading activities, it will be necessary to contact the County of Riverside Department of Environmental Health to properly permit the removal of the structure. Soil samples may need to be collected during the removal of any such structures.

CEC will comment that due to the development of the site prior to 1938 and the rural location of the site at that time it is likely that either a septic system or outhouses were once used at the site. If evidence of such structures is encountered during grading of the site, CEC recommends that the soils in the area be evaluated for proper offsite disposal and to ensure that no contamination that may affect future residents of the site is present.

No evidence of aboveground storage tanks or drum was observed on the site during the site inspection. CEC will comment that due to the former use of the site as homestead/ranch in a rural area it is possible that such structures were once utilized at the site. If such structures are encountered during grading activities, the removal and disposal of these structures should be documented by an environmental professional and the surrounding soil should be evaluated for the potential of contamination.

References

California Department of Water Resources. 2003. California's Groundwater. Bulletin 118. 2006 update.

California Division of Mines and Geology. 1990. Murrieta Quadrangle Special Studies Zones Map.

Hart, E.W. and W.A. Bryant. 1999. Fault-Rupture Hazard Zones in California – Alquist-Priolo Earthquake Fault Zoning Act with Index to Earthquake Fault Zones Maps. Special Publication 42. California Division of Mines and Geology.

Morton, D.M. and M.P. Kennedy. 2003. Geologic Map of the Bachelor Mountain 7.5' Quadrangle, Riverside County, California. Version 1.0. Open File Report 03-103.

State of California Department of Conservation Division of Oil and Gas. 2004. Riverside and San Diego Counties. Regional Wildcat Map W1-7.

United States Geological Survey. Earthquake Hazards Program website. www.http://quake.wr.usgs.gov/info/faultmaps/index.html

ATTACHMENT C

TRAINING LOGS

PLEASE SIGN IN

NPDES STORMWATER QUALITY TRAINING FOR
WQMP Training
Riverside County Flood Control & Water Conservation District

Meeting of: Monday, November 3 - 08:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
1	David	Cooper	Other	Consultant; Bureau Veritas	(858) 735-1352	
2	Guy	Pegan	City of Moreno Valley	Public Works	(951) 413-3115	
3	Josh	Frohman	City of Moreno Valley	Public Works	(951) 413-3251	
4	Timothy	Kearns	Riverside County	Facilities Management	(951) 955-9467	T.C. Kearns
5	Andres	Alfaro	Riverside County	Facilities Management	(951) 823-2724	
6	Arthur	Miller	Riverside County	Facilities Management		
7	Jim	Rossman	Riverside County	Facilities Management	(951) 901-5091	
8	Donald	Delgadillo	RCFC & WCD	Flood Control	(951) 955-4683	
9	Daisy	Barreto	RCFC & WCD	Plan Check	(951) 955-1269	
10	Jianhong	Xiong	Other	Consultant for RCFC & WCD	(858) 451-6100	
11	Lori	Wolfe	RCFC & WCD	Plan Check	(714) 402-9645	
12	Komy	Ghods	RCFC & WCD	Design	(951) 955-1326	
13	Mark	Westover	City of Moreno Valley	Public Works	(951) 413-3114	
14	DEEPAK	SOLANKI	City of Moreno Valley	CAPITAL PROJECTS DIVISION	(909) 268-7639	
15	Anabella	Hedman	Other	Consultant for RCFC & WCD	(858) 869-4851	
16	Monte	Bowers	Other	Consultant for RCFC & WCD	(858) 451-6100	
17	Marc	Crispin	Riverside County	Facilities Management	(951) 955-0167	

NPDES STORMWATER QUALITY TRAINING FOR
WQMP Training
Riverside County Flood Control & Water Conservation District

Meeting of: Monday, November 3 - 08:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
18	Larry	Gonzales	City of Moreno Valley	Public Works	(951) 413-3130	
19	Marge	Lazarus	City of Moreno Valley	Public Works	(951) 413-3130	
20	Sergio	Pena	Riverside County	Facilities Management	(951) 955-2809	
21	kyle	gallup	RCFC & WCD	design	(951) 955-8627	
22	Mike	Wong	RCFC & WCD	Design	(951) 955-1205	
23	Amy	McNeill	RCFC & WCD	Design	(951) 955-1268	Amy McNeill
24	JERAMY	JACKSON	MORENO VALLEY		951 413-3174	
25	VIKKI	KUNTZ	COUNTY/RIV.	DESIGN & CONST	951 955 0164	
26	~~KEVIN~~ STEVE	HORN	" "	" "	951.955.2549	
27	Lance	Noland	County of Riverside	EDA	955-9698	
28	JOHN	ALFRED	COUNTY OF RIVERSIDE	FACILITIES MGMT.	951-955 4844	
29	~~LORI~~	~~WOLFE~~				
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PLEASE SIGN IN

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NPDES STORMWATER QUALITY TRAINING FOR
WQMP Training
Riverside County Flood Control & Water Conservation District

Meeting of: Monday, November 3 - 13:00 - 17:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
1	Christopher	Wiberg	City of Moreno Valley	Public Works	(951) 413-3130	
2	Edward	Perez	RCFC & WCD	Plan Check	(714) 750-7275	
3	Bruce	Norris	Riverside County	Facilities Management	(951) 955-0353	
4	Dawn	Torres	Riverside County	Facilities Management	(951) 955-4880	
5	Rita	Medellin	Riverside County	Facilities Management	(951) 955-0395	
6	Jeremy	Mueller	Riverside County	Facilities Management	(951) 955-4845	
7	Kent	Wegelin	City of Moreno Valley	Public Works	(951) 413-3497	
8	Arman	BULAONG Bualong	City of Perris	Engineering	(951) 943-6504	
9	Chris	Sunde	City of Perris	Engineering	(951) 943-6504	
10	John	Carmona	Whitewater Regional Board	NPDES Unit		
11	Ken	Horsley	RCFC & WCD	Planning	(858) 866-0128	
12	Lombardo	Detrinidad	RCFC & WCD	Planning	(619) 866-0128	
13	Rachel	McLure	City of Riverside	Parks, Recreation, & Community Services Department	(951) 826-2028	
14	Derek	Petersen	RCFC & WCD	Planning	(619) 920-6430	
15	Jeff	Fulton	RCFC & WCD	Plan Check	(760) 603-6091	
16	Nancy	Cano	Riverside County	Facilities Management	(951) 955-0392	
17	Rebecca	Tsagris	Riverside County	Facilities Management	(951) 955-8764	

NPDES STORMWATER QUALITY TRAINING FOR
WQMP Training
Riverside County Flood Control & Water Conservation District

Meeting of: Monday, November 3 - 13:00 - 17:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
18	Quang	Nguyen	City of Moreno Valley	Public Works	(951) 413-3130	
19	Michael	Cairns	RCFC & WCD	Plan Check	(858) 866-0128	
20	Dennis	Downs	Riverside County	Facilities Management	(951) 955-0391	
21	Sean	Motlagh	Other	City of Perris, City of San Jacinto	(951) 943-6504	
22	Bob	Moehling	City of Murrieta	Engineering	(951) 304-2489	
23	Tim	Taylor	City of Hemet	Engineering	(951) 765-3889	
24	John	Kerenyi	City of Moreno Valley	Public Works Transportation Engineering	(951) 413-3199	
25	Henry	Ngo	City of Moreno Valley	Public Works	(951) 413-3130	
26	Ewina	Lau	City of Riverside	Parks, Recreation, & Community Services Department	(951) 826-2012	
27	Bill	Woolsey	City of Murrieta	Engineering	(951) 461-6073	Bill Woolsey
28	John	Hogard	City of Moreno Valley	Public Works	(951) 413-3130	
29	Alfredo	Del Toro	Riverside County	Facilities Management	(951) 955-8324	
30	Frank	Gonzales	Riverside County	Facilities Management	(951) 955-8467	
31	Jason	Plotkin	Riverside County	Facilities Management		
32	Nahid	Selbe	Riverside County	Facilities Management	(951) 955-4728	Nahid N. Selbe
33	Dane	Winkelman	Riverside County	Facilities Management	(951) 955-0394	
34	Rizaldy	Baluyot	Riverside County	Facilities Management	(951) 955-4889	
35	Randy	McDaniel	City of Riverside	Park Planning	(951) 826-2006	

NPDES STORMWATER QUALITY TRAINING FOR
WQMP Training
Riverside County Flood Control & Water Conservation District

Meeting of: Monday, November 3 - 13:00 - 17:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
36	ANN	IAALI	RCFC&WCD	NPDES	955 1245	[illegible]
37	JAY	MARBOUR	RWQCB-7	NPDES	760	776-8981
38	John	Carman	" "	"	"	
39	Daisy	Barreto	RCFC&WCD	Plan Check	955-1269	Daisy Barreto
40	Robert	Vasquez	RCFC&WCD	Design II		[illegible]
41	HANG	NGUYEN	CITY OF MORENO VALL	NPDES	951-413-3216	[illegible]
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PLEASE SIGN IN

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NPDES STORMWATER QUALITY TRAINING FOR
WQMP Training
Riverside County Flood Control & Water Conservation District

Meeting of: Monday, May 4 - 08:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
1	Kevin	Marstall	City of Riverside	Public Works	(951) 826-5345	
2	Ingrid	Outlaw	Riverside County	Economic Development Agency	(951) 955-8069	
3	Trish	Field	Riverside County	Economic Development Agency	(951) 955-8069	
4	Rudy	Martinez	Riverside County	Transportation Department	(951) 955-1095	
5	Cenk	Yavas	RCFC & WCD	Plan Check	(714) 750-7275	
6	Brian	Robertson	RCFC & WCD	Plan Check	(714) 750-7275	
7	Steve	Charette	City of Temecula	Public Works	(951) 694-6411	
8	Chris	Vlahos	City of Temecula	Public Works	(951) 694-6411	
9	Bill	McAteer	City of Temecula	Public Works	(951) 694-6411	
10	Amer	Attar	City of Temecula	Public Works	(951) 694-6411	
11	Todd	Bilo	Riverside County	Environmental Compliance Division	(951) 955-1870	
12	Sam	Gonzalez	Riverside County	Environmental Compliance Division	(951)955-2559	
13	Everett	Duckworth	RCFC & WCD	planning	(951) 955-9412	
14	Vikki	Kuntz	Other	DOFM	(951) 955-0166	
15	Kahlil	Amin	RCFC & WCD	Design	(951) 955-1200	
16	Chandra	Santiago	Riverside County	Environmental Compliance Division	(951) 955-5996	
17	Rusel	Baker	Riverside County	Environmental Compliance Division	(951) 955-2268	
18	Phil	Broesalme	Riverside County	Environmental Compliance Division	(951) 955-3185	
19	Julianna	Gonzalez	RCFC & WCD	Planning	(951) 955-8064	

NPDES STORMWATER QUALITY TRAINING FOR
WQMP Training
Riverside County Flood Control & Water Conservation District

Meeting of: Monday, May 4 - 08:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
20	ALAN	BOSIA	City of Riverside	Public Works-Contracts Adminstration	(951) 377-5514	
21	Richard	Carrera	Riverside County	Environmental Compliance Division	(951) 955-8116	
22	Emi	Tanitomi	RCFC & WCD	CValdo Plan Checking	(858) 866-0218	
23	David	Zarate	RCFC & WCD	CValdo Plan Checking	(858) 866-0128	
24	Dominick	Lombardi	Riverside County	Economic Development Agency	(951) 955-6622	
25	Edwin	Quinonez	Santa Margarita Regional Board	Flood Control - Project Planning	(951) 955-1917	
26	Tina	Hanson	RCFC & WCD	Subdivisions	(951) 955-2511	
27	Shaheen	Mooman	RCFC & WCD	Development Review	(951) 955-1318	
28	Donna	Puentes	City of Riverside	Public Works-Contracts Adminstration	(951) 712-4962	
29	Matt	Ciarlo	City of Riverside	Public Works-Contracts Adminstration	(951) ~~346~~ 236-4130	
30	Robert	Savant	City of Riverside	Public Works-Contracts Adminstration	(951) 346-6170	
31	JACK	LYNN	City of Riverside	Public Works-Contracts Adminstration	(951) 712-2321	
32	Mayra	De La Torre	City of Temecula	Public Works	(951) 694-6411	
33	Will	Becerra	City of Temecula	Public Works	(951) 694-6411	
34	Chris	White	City of Temecula	Public Works	(951) 694-6411	
35	John	Pourkazemi	City of Temecula	Public Works	(951) 694-6411	
	Mike	Hasapes	" " San Jacinto	Planning	951 487-7330	
	Daniel	Borges	Hemet	Public works	951 634 1206	Daniel Borges
	Tommy	Rodriguez	Hemet	Public Works	951 760 0550	Tommy Rodriguez
	Robert	Morgan	Hemet	Public works	951 973-3495	
	MATT	TAYLOR	HEMET	PUBLIC WORKS	(951) 526-3394	
	Arturo	Navarro	Hemet	Public works	(951) 654-9787	
	JAMES	Wood	HEMET	"	951 765-3712	

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NPDES STORMWATER QUALITY TRAINING FOR

WQMP Training - Santa Ana and Santa Margarita Regions

Riverside County Flood Control & Water Conservation District

Meeting of: Monday, May 4 - 13:00 - 17:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
1	ERIC	LOMELI	RCFC & WCD	DESIGN 1	(951) 955-8601	
2	Helio	Takano	RCFC & WCD	Planning	(951) 955-1348	
3	Mekbib	Degaga	Riverside County	RCFC and WCD	(951) 955-1214	
4	Edward	Luna	City of Palm Springs	Wastewater Treatment	(760) 899-2314	
5	Avlin	Odviar	City of Temecula	Public Works	(951) 694-6411	
6	John	Salazar	City of Temecula	Public Works	(951) 694-6411	
7	Annie	Bostre-Le	City of Temecula	Public Works	(951) 694-6411	
8	Claudia	Steiding	Other	DOFM	(951) 955-8174	
9	Chris	Sunde	Other	Cities of Perris, Canyon Lake & San Jacinto	(951) 943-6504	
10	Kendra	Hannah-Meistrell	City of Temecula	Public Works	(951) 694-6411	
11	David	McBride	City of Temecula	Public Works	(951) 694-6411	
12	Travis	Randel	City of Riverside	Planning	(951) 826-5932	
13	Gustavo	Gonzalez	City of Riverside	Planning	(951) 826-5931	
14	~~Arman~~ SEAN	~~Sotarag~~ MOTLAGH	Other	Cities of Perris, Canyon Lake & San Jacinto	(951) 943-6504	
15	Cassandra	Weiss	RCFC & WCD	Planning	(951) 955-1612	
16	Eric	Russell	RCFC & WCD	Development Review	(951) 955-1211	Eric W. Russell
17	Jeff	Crawford	Riverside County	Transportation Department	(951) 955-1095	J Crawford
18	Bob	Moehling	City of Murrieta	Engineering	(951) 461-6036	
19	Aldo	Licitra	City of Temecula	Public Works	(951) 694-6411	Aldo Licitra
20	Charles	de Chambeau	RCFC & WCD	Development Review	(951) 955-1298	
21	Vicente	Giron	City of Moreno Valley	Public Works	(951) 413-3107	
22	Lisa	McCullough	City of San Jacinto	Community Development	(951) 537-6360	
23	Bill	Woolsey	City of Murrieta	Engineering	(951) 461-6073	Bill Woolsey
24	Jennifer	Gale	RCFC & WCD	Flood	(951) 955-4050	
25	Dale	Anderson	RCFC & WCD	Planning	(951) 955-1345	

... continued Next Page

NPDES STORMWATER QUALITY TRAINING FOR

WQMP Training - Santa Ana and Santa Margarita Regions

Riverside County Flood Control & Water Conservation District

Meeting of: Monday, May 4 - 13:00 - 17:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
26	Clement	Jimenez	City of Moreno Valley	Public Works Land Development	(951) 413-3121	
27	Kack	Sung	Riverside County	~~Environmental Compliance Division~~ PLAN REVIEW/ENGR	(951) 955-2036	
28	Carole	Kendrick	City of Hemet	Planning Department	(951) 765-2373	Carole Kendrick
29	Soledad	Carrisoza	City of Hemet	Planning Department	(951) 765-2376	Soledad Carrisoza
30	Jorge	Biagioni	City of Hemet	Public Works Engineering	(951) 765-2362	
31	Todd	Shibata	City of Moreno Valley	Riverside County Waste Management	951 486-3261	
32	Jeff	Hitch	City of Murrieta	Public Works/Engineering	(951) 461-6076	
33	Katie	Chamberlain	City of Riverside	Planning	(951) 826-2369	
34	Moises	Lopez	City of Riverside	Planning	(951) 826-5264	
35	Lance	Noland	RCRDA	Redevelopment Agency	5-9698	
36	Bill	MCATEER	City of Temecula	Public Works	951-694-6411	
37	~~Vicente~~	~~Girón~~	~~City of Moreno Valley~~	~~Public Works/Land Dev.~~	~~951-486-3707~~	
38	ASHER	HARTEL	CITY OF SAN JACINTO	PLANNING	951-487-7307	
39	SOARES	ADRIANA	Riverside County	Transportation	(951)955-1862	Adriana Soares
40						

NPDES STORMWATER QUALITY TRAINING FOR

WQMP Training - Santa Ana and Santa Margarita Regions

Riverside County Flood Control & Water Conservation District

Meeting of: Tuesday, June 9, 2009 - 08:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signature
1	Kent	Allen	RCFC & WCD	Design	(951) 955-1270	
2	Mike	Beutler	Other	City of Menifee	(951) 672-6777	
3	Annie	Bostre-Le	City of Temecula	Public Works	(951) 694-6411	
4	Barbara	Bouska	City of Riverside	Planning	(951) 826-5507	
5	Patricia	Brenes	City of Riverside	Planning	(951) 826-5933	
6	Marc	Brewer	Riverside County	Parks	(951) 955-4316	
7	Arman	Bulaong	Other	Cities of Perris, Canyon Lake & San Jacinto	(951) 943-6504	
8	FRED	CERDA	City of Riverside	Public Works-Contracts Adminstration	(951) 712-4966	
9	Katie	Chamberlain	City of Riverside	Planning	(951) 826-2369	
10	Trish	Field	Riverside County	Economic Development Agency	(951) 955-8069	
11	Stuart	Fisk	City of Temecula	~~Public Works~~ Planning	(951) 694-6411	
12	Julianna	Gonzalez	RCFC & WCD	Planning	(951) 955-8064	
13	Erlan	Gonzalez	Riverside County	Economic Development Agency	(951) 955-8069	
14	Steve	Hayes	City of Riverside	Planning	(951) 826-5775	
15	Diana	Hernandez	RCFC & WCD	Design	(951) 955-1329	
16	Paloma	Hernandez-Barker	Riverside County	Economic Development Agency	(951) 955-8069	
17	Paul	Johnson	City of Canyon Lake	Operations	(951) 244-6841	
18	Eric	Jones	City of Temecula	Public Works	(951) 694-6400	
19	Brad	Kutzner	Other	City of Menifee	(951) 672-6777	
20	Demeke	Muarega	RCFC & WCD	Design 2		
21	Linda	Nixon	City of Hemet	Public Works	(951) 765-3880	Linda Nixon

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NPDES STORMWATER QUALITY TRAINING FOR

WQMP Training - Santa Ana and Santa Margarita Regions

Riverside County Flood Control & Water Conservation District

Meeting of: Tuesday, June 9, 2009 - 08:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signature
22	Ingrid	Outlaw	Riverside County	Economic Development Agency	(951) 955-8069	
23	Dana	Schuma	City of Temecula	Public Works	(951) 694-6400	
24	Yvette	Sennewald	City of Riverside	Planning	(951) 826-5168	
25	Kyle	Smith	City of Riverside	Planning	(951) 826-5220	
26	Robert	Van Zanten	City of Riverside	Public Works	(951) 826-5875	
27	Dale	West	City of Temecula	Public Works	(951) 694-6400	
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NPDES STORMWATER QUALITY TRAINING FOR
Municipal Training
Riverside County Flood Control & Water Conservation District

Meeting of: Tuesday, November 4 - 08:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
1	Daniel	Monto	City of Moreno Valley	Public Works	(951) 413-3485	
2	Renee	Power	City of Norco	~~Parks, Recreation and Community Services~~ Animal control Dept	737 8972	
3	Lance	Noland	Riverside County	Econo0mic Development Agency	(951) 955-9698	
4	mike	blanco	City of Norco	Public Works	951-270-5607	
5	Keith	Price	City of Norco	Parks, Recreation and Community Services	(951) 545-7891	
6	Bob	March	City of Norco	Parks, Recreation and Community Services	(951) 545-7892	Robert March
7	Michelle	Anglin	City of Norco	Parks, Recreation and Community Services	951-545-7903	
8	Brandie	Potter	City of Norco	Parks, Recreation and Community Services	951-545-7890	
9	Roger	Jackson	City of San Jacinto	Public Works	(951) 654-4041	Roger Jackson
10	Jim	Cash	City of San Jacinto	Public Works	(951) 654-4041	Jim Cash
11	Ray	Sanchez	City of San Jacinto	Public Works	(951) 654-4041	
12	Ben	Haskell	City of San Jacinto	Public Works	(951) 654-4041	
13	Chris	Wyrick	City of Norco	Parks, Recreation and Community Services	951 545 7890	
14	Henk	Koke	City of Norco	Parks, Recreation and Community Services	951-545-7099	
15	Jeff	Woodley	City of Banning	Engineering/Public Works	(951) 922-3286	Jeff Woodley
16	Ramiro	Garcia	City of Banning	Engineering/Public Works	(951) 922-3286	Ramiro Garcia
17	Carlos	Navarro	City of Banning	Engineering/Public Works	951-922-3291	Carlos Navarro

NPDES STORMWATER QUALITY TRAINING FOR
Municipal Training
Riverside County Flood Control & Water Conservation District

Meeting of: Tuesday, November 4 - 08:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
18	Quang	Nguyen	City of Moreno Valley	Public Works	(951) 413-3159	
19	Terrence	Piorkowski	City of Norco	Public Works	(951) 270-5607	
20	derek	lacombe	City of Norco	Public Works	951-270-5607	
21	nate	salazar	City of Norco	Public Works		
22	ryan	McIntyre	City of Norco	Public Works		
23	Lyndon	Lorance	City of Norco	Public Works		
24	Zachary	Foster	City of Moreno Valley	Public Works	(951) 203-4997	
25	Ann	iaali	RCFC & WCD	NPDES, Regulatory Division		
26	Miguel	Mariscal	City of Banning	Parks/Street Maintenance Division	(951) 922-3320	
27	Steven	Horn	Riverside County	Facilities Management	(951) 955-2549	
28	Randy	West	City of Temecula	Public Works	(951) 694-6411	
29	Robert	Florez	City of Moreno Valley	Special Districts	(951) 413-3471	
30	Bill	Shesgreen	City of Banning	Parks/Street Maintenace Division	(951) 922-3286	
31	Pete	Schlensker	City of Banning	Engineering/Public Works	(951) 922-3286	
32	Steve	Parker	City of Banning	Engineering/Public Works	951-922-3512	
33	Daniel	Cover	City of Moreno Valley	Public Works/ Special districts	(951) 413-3503	
34	Robert	Johnson	Riverside County	Facilities Management	(951) 782-2458	

NPDES STORMWATER QUALITY TRAINING FOR
Municipal Training
Riverside County Flood Control & Water Conservation District

Meeting of: Tuesday, November 4 - 08:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
35	Terry	Anderson	Riverside County	Facilities Management	(951) 782-2449	
36	Ross	Rither	Riverside County	Facilities Management	(951) 358-5483	
37	Gilbert	Montanez	Riverside County	Facilities Management	(951) 955-4806	
38	Kevin	Short	Riverside County	Facilities Management	(951) 955-4115	
39	Arthur	Fong	Riverside County	Facilities Management	(951) 955-2500	
40	Stuart	Sheldon	City of Moreno Valley	Public Works	(951) 413-3483	
41	Tony	Silvas	City of Moreno Valley	Public Works Special Districts	(951) 616-7299	
42	Dave	Carrico	City of San Jacinto	Public Works	(951) 654-4041	
43	Joe	Vilchis	City of San Jacinto	Public Works	(951) 654-4041	
44	Frank	Zaldivar	City of San Jacinto	Public Works	(951) 654-4041	
45	Gilbert	Gonzales	City of San Jacinto	Public Works	(951) 654-4041	
46	Alfonso	Zubia	City of San Jacinto	Public Works	(951) 654-4041	
47	John	Holmes	City of San Jacinto	Public Works	(951) 654-4041	
48	ANN	Iaali	Riverside County	RCFC&WCD NPDES	955-1248	
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NPDES STORMWATER QUALITY TRAINING FOR
Municipal Training
Riverside County Flood Control & Water Conservation District

Meeting of: Tuesday, November 4 - 08:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
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PLEASE SIGN IN

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NPDES STORMWATER QUALITY TRAINING FOR
Municipal Training
Murrieta City Hall

Meeting of: Thursday, November 6 - 08:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
1	Brad	Buron	City of Temecula	Public Works	(951) 694-6411	
2	Mark	Levis	City of Temecula	Public Works	(951) 694-6411	
3	Jim	Smith	City of Temecula	Public Works	(951) 694-6411	
4	David	Davis	City of Temecula	Public Works	(951) 694-6411	
5	Mario	Munoz	City of Temecula	Community Services	(951) 694-6480	
6	John	Maisey	City of Temecula	Public Works	(951) 694-6480	
7	George	DeLaRosa	City of Temecula	Community Services	(951) 694-6480	
8	Jose	Diaz	City of Temecula	Community Services	(951) 694-6480	
9	Matt	Wiechec	City of Temecula	Community Services	(951) 694-6480	
10	Richard	Serven	City of Temecula	Community Services	(951) 694-6480	
11	David	Thurman	City of Temecula	Community Services	(951) 694-6480	
12	Dino	Camberos	City of Temecula	Community Services	(951) 694-6480	
13	Steve	Sterling	City of Temecula	Community Services	(951) 694-6480	
14	Richard	Shea	City of Temecula	Community Services	(951) 694-6480	
15	Karl	Nordgren	City of Temecula	Community Services	(951) 694-6480	
16	Kevin	Harrington	City of Temecula	Community Services	(951) 694-6480	
17	Tim	Stockton	City of San Jacinto	Public Works	(951) 654-4041	

NPDES STORMWATER QUALITY TRAINING FOR
Municipal Training
Murrieta City Hall

Meeting of: Thursday, November 6 - 08:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
18	Matt	Wicks	City of San Jacinto	Public Works	(951) 654-4041	
19	Kenny	Rodger	City of San Jacinto	Public Works	(951) 654-4041	
20	Kevin	Carranza	City of San Jacinto	Public Works	(951) 654-4041	
21	Victor	Vasquez	City of San Jacinto	Public Works	(951) 654-4041	
22	Paul	Swancott	City of Murrieta	Planning	(951) 304-2489	
23	Cory	Hammond	City of Murrieta	Public Works	(951) 304-2489	
24	Lanker	Figueroa	City of Murrieta	Public Works	(951) 304-2489	
25	Mike	Brooks	City of Murrieta	Public Works	(951) 304-2489	
26	Sarah	Russell	City of Murrieta	Public Works	(951) 304-2489	Sarah Russell
27	David	Hendry	City of Murrieta	Public Works	(951) 304-2489	
28	Ken	Jones	City of Murrieta	Engineering	(951) 304-2489	
29	Mike	Almodovar	City of Murrieta	Public Works	(951) 304-2489	
30	Daniel	Scroggins	City of Murrieta	Public Works	(951) 304-2489	
31	Aaron	Rintamaki	City of Murrieta	Planning	(951) 304-2489	
32	Israel	Reyes	City of Murrieta	Community Services	(951) 461-6124	
33	Jose	Munoz	City of Murrieta	Community Services	(951) 461-6124	
34	Juan	Del Val	City of Murrieta	Community Services	(951) 461-6124	

NPDES STORMWATER QUALITY TRAINING FOR
Municipal Training
Murrieta City Hall

Meeting of: Thursday, November 6 - 08:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
35	Larry	Gross	City of Murrieta	Community Services	(951) 461-6124	
36	Mike	Bigay	City of Murrieta	Community Services	(951) 461-6124	
37	Hoang	Nguyen	City of Moreno Valley	Public Works	(951) 413-3216	Hoang Nguyen
38	Manuel	Moran	Riverside County	Facilities Management	(950) 600-6240	
39	Rodney	Tidwell	City of Temecula	Public Works	(951) 694-6411	
40	Bruce	Wedeking	City of Temecula	Community Services	(951) 694-6480	
41	Aldo	Licitra	City of Temecula	Public Works	(951) 694-6411	Aldo Licitra
42	Danny	Marks	City of Murrieta	Community Services	(951) 461-6124	
43	Mark	Bolschweiler	City of Murrieta	Public Works	(951) 304-2489	
44	Mike	Burris	City of Murrieta	Public Works	(951) 304-2489	
45	Lucas	Haynes	City of Murrieta	Public Works	(951) 304-2489	
46	Robert	Edmonds	City of Murrieta	Public Works	(951) 304-2489	
47	Nick	Vaughn	City of Murrieta	Public Works	(951) 304-2489	
48	Alberto	Aspe	City of Murrieta	Community Services	(951) 461-6124	
49	Chris	Payne	City of Temecula	Public Works	(951) 694-6411	
50	Flint	Norman	City of Temecula	Public Works	(951) 694-6411	
51	Larry	Romine	City of Temecula	Public Works	(951) 694-6411	

NPDES STORMWATER QUALITY TRAINING FOR
Municipal Training
Murrieta City Hall

Meeting of: Thursday, November 6 - 08:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
52	Juan	Jaime	City of Temecula	Public Works	(951) 694-6411	
53	Ryan	Castillo	City of Temecula	Public Works	(951) 694-6411	
54	Perry	Ludwig	City of Temecula	Public Works	(951) 694-6411	
55	Gus	Gonzalez	City of Temecula	Public Works	(951) 694-6411	
56	John	Ward	City of Temecula	Public Works	(951) 694-6411	
57	Bradley	Moore	Riverside County	Facilities Management	(951) 696-3441	
58	Danny	Astorga	City of San Jacinto	Public Works	(951) 654-4041	
59	Alex	Garcia	City of San Jacinto	Public Works	(951) 654-4041	
60	Mark	Halman	City of San Jacinto	Public Works	(951) 654-4041	
61	FRANK	JACKSON	CITY OF MOVAL	CAND DEV	913-3474	
62	Matt	Nicks	City of San Jac.	Public Works		
63	DINO	CAMBEROS	Temecula	TCSD		
64	RON	STUART	MURRIETA	CSD	9514616124	
65	BOB	KAST	"	"	"	
66	RICK	THOMPSON	"	"	"	
67	JOSE	ALFARO	EXCEL LANDSCAPE	SUPERVISOR	9617359650	
68	PHIL	ESNAYRA	CITY OF MURRIETA	C.S.D	951-532-7513	

NPDES STORMWATER QUALITY TRAINING FOR
Municipal Training
Murrieta City Hall

Meeting of: Thursday, November 6 - 08:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
69	Venita	Anderson	Code Enforcement	PD	4616332	Venita Anderson
70	Gena	Dickson	Code Enfo Mgr.	PD	4616334	G Dickson
71	George	Nelson	Code Enforcement	PD	461-6338	
72	Linda	Mejia	Code Enf.	PD	461-6337	
73	Paul	Swancott	City Murrieta	Planning	461-6063	Paul Swancott
74	MIKE	BROOKS	MURRIETA	PW MAINT.	461-6401	
75	JASON	JONES	"	CODE ENF.	461-6331	
76	James	Smith	Temecula	Public works	303-3164	
77	Bill	Woolsey	Murrieta	ENG	461-6073	Bill Woolsey
78	Rick	Shea	Temecula	C.S.		
79						
80						

NPDES STORMWATER QUALITY TRAINING FOR
Municipal Training
Coachella Valley Water District

Meeting of: Tuesday, November 18 - 08:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
1	Brandon	Garcia	Riverside County	Transportation Department	(951) 955-1095	
2	Donald	Raymond	Riverside County	Transportation Department	(951) 955-1095	Don Raymond
3	Alana	Townsend	City of Palm Desert	Public Works	(760) 346-0611	Alana Townsend
4	James	Breihan	City of Palm Springs	Aviation	(760) 318-3823	
5	Edward	Graff	City of Palm Springs	Aviation	(760) 318-3824	
6	Cora	Salas	City of Palm Desert	Public Works	(760) 346-0611	
7	Scott	Hamilton	City of La Quinta	Public Works		
8	Demetrio	Pecina	City of La Quinta	Public Works		
9	Ed	Houston	CVWD	Safety/Human Resources	(760) 398-2651	
10	Javier	Miranda	CVWD	Trades & Support	(760) 398-2651	Reyes Luna for Javier Miranda
11	Javier	Loredo	CVWD	Trades & Support	(760) 398-2651	
12	Rick	Adamson	CVWD	Trades & Support	(760) 398-2651	
13	Juan	Hernandez	City of Palm Desert	Parks	(760) 346-0611	
14	Valerie	Wagner	City of Palm Springs	Street Maintenance	(760) 322-8364	Valerie Wagner
15	Larry	Naranjo	Riverside County	Facilities Management	(760) 921-5042	
16	George	Herrera	City of Palm Springs	Street Maintenance	(760) 322-8364	
17	Adam	Servin	Riverside County	Facilities Management	(760) 863-8704	

18	Andy	Luna	Riverside County	Facilities Management	(760) 393-3253	
19	Jay	Mirpour	Whitewater Regional Board	Stormwater	(760) 776-8981	
20	Erich	Konrad	City of Palm Springs	Fleet Operations	760 323 8168	
21	David	Flint	City of Palm Desert	Building Maintenance	(760) 346-0611	
22	Cyril	Snake	City of Palm Desert	Building Maintenance	(760) 346-0611	
23	Marco	Zamudio	City of Palm Desert	Public Works	(760) 346-0611	
24	Joe	Rojas	City of Palm Desert	Public Works	(760) 346-0611	
25	James	Lindsey	City of La Quinta	Public Works	(760) 777-7052	
26	Adolfo	Cabrera	City of La Quinta	Public Works		
27	Tim	Batten	City of La Quinta	Public Works		
28	Raphael	Alvarado	City of La Quinta	Public Works		
29	Agustin	Arellano	City of La Quinta	Public Works		
30	Steven	Rakestraw	City of Palm Springs	Fleet Operations	(760) 323-8168	
31	Jesus	Padilla	City of Palm Desert	Public Works	(760) 346-0611	
32	Frank	Duran	City of Palm Desert	Public Works	(760) 346-0611	
33	Ernesto	Teran	City of Palm Desert	Parks	(760) 346-0611	
34	Daniel	Lopez	City of Palm Desert	Public Works	(760) 346-0611	
35	Ruben	Castaneda	City of La Quinta	Public Works		
36	James	Staight	City of La Quinta	Public Works		
37	Beto	Gonzales	City of La Quinta	Public Works		
38	Alex	Martinez	City of La Quinta	Public Works		

39	Pablo	Rivera	City of Indian Wells	Public Works	(760) 776-0237	
40	Ryan	Bowen	City of Indian Wells	Public Works	(760) 776-0237	
41	Francisco	Torres	City of Palm Desert	Public Works	(760) 346-0611	
42	Jaime	Macias	City of Palm Springs	Fleet Operations	760 323-8168	
43	Freddy	Rios	City of Palm Desert	Public Works	(760) 346-0611	
44	Brian	Petree	City of Norco	Parks, Recreation and Community Services		
45	John	Carmona	Whitewater Regional Board	NPDES Unit	(760) 340-4521	
46	THOMAS	TVEIT	CITY OF COACHELLA	BLDG DEPT	760 398 3002	
47	ROBERT	RUEDA	CITY OF COACHELLA	PUBLIC WORKS	760 398 5744	
48	Gabriel	Pérez	City of Coachella	Community Development	760 398-3102	
49	Gabriel	Papp	" " "	" "	" " "	
50	PAVEL	HORN	CATHEDRAL CITY	ENG. DEPT.	760 770-0320	
51	Ramon	Villalobos	City of INDIO	Equipment Operator	760-347-1058	
52	Margarito	Bautista	City of Coachella	PUBLIC WORKS - streets	(760) 398-4202	
53	JESSE	Nunez	City of Coachella	Public work - streets	(760) 398-4202	
54	ALEX	ALARCON	City of COACHELLA	CODE ENFORCEMENT	(760) 398-4978	
55	GEORGE	INSUEZ	CITY OF COACHELLA	PUBLIC WORKS	(760) 398-5744	
56	OSCAR	RODAS	CITY OF CATHEDRAL CITY	ENGINEERING	(760) 770-0327	
57	Sergio	Samaniego	City of Palm Desert	Public works	(760) 346-0611	
58	[illegible]	Jimenez	C.V.W.D.	INSPECTOR	(760) 822-2906	
59	Jim	Kreizinger	C.V.W.D.	INSPECTOR	760 4859437	

0004098

MAINTENANCE SAFETY MEETING SIGN IN

TRAINER: CLAUDIO PADRES

TOPIC: NPDES TRAINING

Video☐

Date: 5/5/09

EMPLOYEE	SIGNATURE
Aleman-Lopez, Ramiro	
Alls, Jr., Eugene	Eugene Alls Jr
Alvino, John	
Amis, Timmy	Timmy Amis
Arias, Jessie	
Biloki, Mark	Mark Biloki
Chavez, Roger	
Clark, Ken	Ken Clark
Clark II, Kenneth (Steve)	
Crawford, Michael	
D'Aprile, Frank	Frank D'Aprile
Drake, Carl	Carl L Drake
Espinoza, Jose	José Espinoza
Garza, Richard	
Glassey, Mike	
Guillen, David	
Gutknecht, Josh	
Haro, Ivan	Ivan Haro
Haskins, George	
Haywood, Michael	
Healy, Stuart	
Hernandez, Brian	
Hernandez, Tom	
House, Steve	
Houston, Walter	
Houwaart, Alex	

EMPLOYEE	SIGNATURE
Huggins, John	
Hurtado, Phil	
Jones, David	
Kriner, Travis	
Luce, James	
Luna, Mark	
Lysiak, Robert	
Macias, Christopher	
McGee, Raynard	
McPherson, George	
Melendrez, Tim	
Mitchell, Tyrone	
Moore, Edward	
Muela, Jr, Mario	
Necochea, Walter	
Negrete, Miguel	
Newson, John	
O'Malley, Mike	
Pena, Peter	
Picazo, Michael	
Pinon, Jaime	
Prichard, Matthew	
Regan, Tim	
Riemer, Rodney	
Rogers, George	
Rossi, Michael	
Rubio, Gabriel	
Ruiz, George	

EMPLOYEE	SIGNATURE
Salazar, Angel	
Seager, Richard	
Silva, Mario	
Slaick, Mike	
Slaick, Nicholas	
Smith, Ryan	
Taylor, John	
Tovar, Jess	
Underhill, Edward	
Valdez, Hector	Hector Valdez
Valencia, Avelino	
Valerdi, Mauricio	
Vaughan, Ronnie	
Vega, Augustin	
Viall, Phillip	Phillip Viall
Villegas, Carlos	
Villegas, Raul	Raul C Villegas
Whitmore, Bryan	

NPDES STORMWATER QUALITY TRAINING FOR
Municipal Training
Riverside County Flood Control & Water Conservation District

Meeting of: Tuesday, May 5 - 12:30 - 16:30

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
1	Steve	Wolny	City of Hemet	Public Works-Facilities Maintenance	(951) 765-3712	
2	Joel	Dyer	City of Hemet	Public Works-Facilities Maintenance	(951) 765-3712	
3	Paul	McCalley	City of Hemet	Public Works-Facilities Maintenance	(951) 765-3712	
4	John	Huston	City of Hemet	Public Works-Equipment Maintenance	(951) 765-3712	
5	Chris	Walters	City of Hemet	Public Works-Equipment Maintenance	(951) 765-3712	
6	Bill	Bryant	City of San Jacinto	Public Works	(951) 654-4041	
7	Barry	Mulcock	City of San Jacinto	Public Works	(951) 654-4041	
8	Edgar	Marquez	City of Moreno Valley	Special Districts	(951) 413-3490	
9	Joe	Carpenter	City of Murrieta	CSD	(951) 461-6124	
10	Melecia	Price	City of Murrieta	CSD	(951) 461-6124	
11	Rudy	Martinez	Riverside County	Transportation Department	(951) 955-1095	
12	Edward	Sandoval	Riverside County	Transportation Department	(951) 955-1095	
13	Jeremy	Stroschein	Riverside County	Transportation Department	(951) 955-1095	
14	Mihai	Dan	City of Indian Wells	Public Works	(760) 776-0237	
15	Chris	Wiggins	City of Indian Wells	Public Works	(760) 776-0237	
16	Mark	Durbin	City of Murrieta	CSD	(951) 461-6124	
17	Mike	Emberton	City of San Jacinto	Public Works	(951) 654-4041	
18	Lhoran	Burr	City of Indian Wells	Public Works	(760) 776-0237	
19	Brian	Draper	City of Moreno Valley	Riverside County Waste Management		
20	Nibardo	Orozco	City of Moreno Valley	Public Works	(951) 413-3514	
21	Barry	Verdusco	City of Moreno Valley	Public works/Special Districts	(951) 616-7296	
22	Ralph	Scharffenberg	City of Moreno Valley	Public Works/Special Districts Division	(951) 413-3472	
23	valin	gray	City of Moreno Valley	public works	(951) 413-3486	
24	Gayle	Cuneo	RCFC & WCD	Maintenance	(951) 955-1311	
25	Ben	Aborita	City of Moreno Valley	Riverside County Waste Management		
26	Peter	Aker	City of Moreno Valley	Riverside County Waste Management		

NPDES STORMWATER QUALITY TRAINING FOR
Municipal Training
Riverside County Flood Control & Water Conservation District

Meeting of: Tuesday, May 5 - 12:30 - 16:30

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
27	Scott	Kraak	City of Moreno Valley	Riverside County Waste Management	951-845 3273	
28	Jeff	Mitchell	City of Moreno Valley	Riverside County Waste Management	951 486-3324	
29	Kerry	Moore	City of Moreno Valley	Riverside County Waste Management	951 486 3322	
30	Bob	Cartwright	Other	City of Menifee	(951) 672-6777	
31	BILL	WOOLSEY	MURRIETA	ENGINEERING	461-6073	Bill Woolsey
32	Ryan	Smith	Riverside County	Flood Control	955-1661	
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NPDES STORMWATER QUALITY TRAINING FOR
Municipal Training
Riverside County Flood Control & Water Conservation District

Meeting of: Tuesday, May 26 - 08:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
1	Taylor	Matthew	City of Hemet	Public Works-Parks Department	(951) 765-3712	
2	James	Wood	City of Hemet	Public Works-Parks Department	(951) 765-3712	
3	Robert	Morgan	City of Hemet	Public Works-Parks Department	(951) 765-3712	
4	Jose	Fernandez	City of Hemet	Public Works-Equipment Maintenance	(951) 765-3712	
5	John	Damm	City of Hemet	Public Works-Equipment Maintenance	(951) 765-3712	
6	Matt	Devere	City of Hemet	Public Works-Facilities Maintenance	(951) 765-3712	
7	Karl	Bornemann	City of Hemet	Public Works-Facilities Maintenance	(951) 765-3712	
8	Jim	Powell	City of Hemet	Public Works-Facilities Maintenance	(951) 765-3712	
9	Dan	Mudrovich	City of San Jacinto	Public Works	(951) 654-4041	D.M.
10	Brian	Hernandez	RCFC & WCD	Maintenance	(951) 955-2109	
11	Walter	Necochea	RCFC & WCD	Maintenance	(951) 955-1246	
12	Steve	Fries	City of Moreno Valley	Services	(951) 413-3799	
13	Martin	Bowman	City of Riverside	Fleet Management	(951) 351-6157	
14	Ken	Lathrop	City of Riverside	Fleet Management	(951) 351-6157	
15	William	Mastas	City of Palm Springs	Streets/Traffic		
16	Raul	Hernandez	City of Palm Springs	Streets/Traffic		

17	Fredrick	Collins	City of Palm Springs	Streets/Traffic		
18	Freddy	Rios	City of Palm Springs	Streets/Traffic		
19	Charles	Whyel	City of Palm Springs	Streets/Traffic		
20	Shane	Wilkerson	City of Palm Springs	Streets/Traffic		
21	Jason	Smith	City of San Jacinto	Public Works	(951) 654-4041	
22	Tom	Ash	Riverside County	Parks	(951) 906-9777	
23	Adriana	Soaresw	Riverside County	Transportation	(951) 955-1862	
24	Jeff	Crawford	Riverside County	Transportation Department		
25	Daniel	Ramirez	Riverside County	Transportation Department	(951) 955-1095	
26	Mario	Macias	Riverside County	Transportation Department	(951) 955-1095	
27	Albert	Rodriguez	City of La Quinta	Public Works	(760) 777-7052	
28	Steve	Kochell	City of La Quinta	Public Works	(760) 777-7053	
29	Carl	Szoyka	City of Banning	Street	(951) 922-3286	
30	Tom	Lara	City of Banning	Street	(951) 922-3286	
31	Ruben	Macias	City of Banning	Street	(951) 922-3286	
32	Lisa	McCullough	City of San Jacinto	Community Development	(951) 537-6360	
33	Tommy	Rodriguez	City of Hemet	Public Works-Parks Department	(951) 765-3712	
34	David	Hensley	City of Moreno Valley	Riverside County Waste Management	951 483 3324	
35	Jim	Mikkelson	City of Moreno Valley	Riverside County Waste Management	951 901-520	
36	Kaniz	Quazi	City of Moreno Valley	Riverside County Waste Management	951 486 3246	
37	Steve	Armitage	City of Banning	Street	(951) 922-3286	

38	Gourley	Collins	City of Banning	Street	(951) 922-3286	
39	Daniel	Borges	City of Hemet	Public Works-Parks Department	(951) 765-3712	
40	Arturo	Navarro	City of Hemet	Public Works-Parks Department	(951) 765-3712	
41	Sean	Vance	City of San Jacinto	Public Works	(951) 654-4041	
42	Scott	Bryant	City of Moreno Valley	Riverside County Waste Management	312-2383	
43	John	Kennedy	Riverside County	Transportation Department	(951) 955-1095	
44	Gabriel	Rubio	RCFC & WCD	Maintenance	(951) 955-2109	
45	Ron	Baxter	Riverside County	Parks	(951) 637-6984	RJB
46	Dan	Nove	Riverside County	Parks	(951) 955-6998	
47	Jim	Davis	Riverside County	Parks	(951) 906-9327	
48	John	Burns	Riverside County	Parks John Burns	(951) 906-9321	
49	Pat	Milos	City of Catherdal City	Public Works	(760) 770-0390	
50	Joe	Montalvo	City of Moreno Valley	Riverside County Waste Management		
51	John	Newson	RCFC & WCD	Maintenance		
52	Stuart	Healy	RCFC & WCD	Maintenance	(951) 955-2109	
53	michael	dietrick	CVWD	inspections	(760) 861-3598	
54	Mario	Castillo	WM.	Mechanic		
55	Paul	Hoffman	WM	Mechanic	951 986 9300	
56	Robert	Fontes	city Palm Springs	Mechanic Tec III	760-323-8168	
57	LARRY	STICKLES	CITY Palm Springs	PARTS SPECIALIST	760-323-8172	
58	LARRY	STICKLES				

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PLEASE SIGN IN

NPDES STORMWATER QUALITY TRAINING FOR
Industrial/Commercial Training
Riverside County Flood Control & Water Conservation District

Meeting of: Tuesday, November 4 - 13:00 - 17:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
1	Joe	Mullen	City of San Jacinto	Public Works	(951) 654-4041	
2	Jeff	Potts	City of Corona	Public Works	951-736-2442	
3	Dennis	Hurford	City of Norco	Building and Safety	(951) 270-5689	
4	Jeramy	Jackson	City of Moreno Valley	Public Works	(951) 413-3474	
5	Lori	Askew	City of Norco	Engineering	(951) 270-5678	
6	Sheldon	Zell	City of Norco	Fire Department	(951) 737-8097	
7	Mark	Solano	City of Corona	Department of Water & Power	(951) 279-3558	
8	Rudy	Fandel	City of Corona	Department of Water & Power	(951) 736-2476	
9	Craig	Leyland	City of San Jacinto	Public Works	(951) 654-4041	
10	Ralph	Durrett	City of San Jacinto	Public Works	(951) 654-4041	
11	HOANG	NGUYEN	CITY OF MORENO VAL	"	951 413-3216	
12	ANN	JAPLI	County of Riverside	RCFC &WCD -NPDES	9557248	
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NPDES STORMWATER QUALITY TRAINING FOR
Industrial/Commercial Training
Coachella Valley Water District

Meeting of: Tuesday, November 18 - 13:00 - 17:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
1	Hart	Ponder	City of Palm Desert	Code Enforcement	(760) 346-0611	
2	Pedro	Rodriguez	City of Palm Desert	Code Enforcement	(760) 346-0611	Pedro Rodriguez
3	Shawn	Kilpatrick	City of Palm Desert	Code Enforcement	(760) 346-0611	Shawn M Kilp
4	Johnny	Terfehr	City of Palm Desert	Code Enforcement	(760) 346-0611	
5	Michael	Adkins	City of Palm Desert	Code Enforcement	(760) 346-0611	Michael P Adk
6	Sara	Toyoda	City of Indio	Public Works	(760) 391-4149	Sara Toyoda
7	Leland	Bishop	City of Indio	Public Works	760-391-4067	Leland Bish
8	John	Carmona	Whitewater Regional Board	NPDES Unit	7603404521	JCarm
9	Brett	Daniels	City of Coachella	Environmental Programs Director	(760) 398-3002	
10	Bob	French	City of Calimesa	Public Workds	(909) 795-9801	Bob
11	Mike	McCabe	City of Calimesa	Public Works	(909) 795-9801	Mike
12	Butch	Scheffer	City of Calimesa	Public Works	(909) 795-9801	B Sch
13	BOB	OKREN	City of Palm Springs	COMPLIANCE	(760) 343-6505	R Okren
14	TRAVIS	JOHNSON	CITY OF COACHELLA	FLEET	(760) 272-6909	TMK John
15	JOHN	BROWN	CITY of Coachell	Building + Safety	760-398-3002	John B
16	[illegible]	INGUEZ	City of Coachella	Public Works	(760) 398-5744	[illegible]
17						

NPDES STORMWATER QUALITY TRAINING FOR
Industrial/Commercial Training
Riverside County Flood Control & Water Conservation District

Meeting of: Tuesday, May 26 - 13:00 - 17:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
1	Ken	Huntzinger	City of Palm Springs	Wastewater Treatment	(760) 323-8166	
2	Mike	Yasmer	City of Riverside	Environmental Compliance	(951) 351-6145	
3	Gary	Merk	City of Riverside	Code Enforcement	(951) 826-5224	
4	Hector	Molina	City of Coachella	Code Enforcement	(760) 398-4978	
5	Heida	Osvold	City of Temecula	Building and Safety	(951) 694-6439	
6	Brian	Clements	City of Temecula	Building and Safety	(951) 694-6439	
7	Sam	Gonzalez	Riverside County	Environmental Compliance Division		
8	Cynthia	Black	Riverside County	Code Enforcement	(951) 485-5849	
9	Ryan	Dolan	Riverside County	Code Enforcement	(951) 791-3601	
10	Bob	French	City of Calimesa	Public Works	(909) 795-9801	
11	Michael	Ray	City of Moreno Valley	Riverside County Waste Management	951 247 1261	
12	Xente	Baker	City of Corona	Fire	(951) 736-2257	
13	Rusel	Baker	Riverside County	Environmental Compliance Division		
14	Todd	Bilo	Riverside County	Environmental Compliance Division	951-955-1876	
15	Mark	Solano	City of Corona	Dept. of Water & Power	(951) 279-3558	
16	Lionel	Ornelas	City of Corona	Dept. of Water & Power	(951) 279-3668	

17	Paul	Shaffer	City of Corona	Dept. of Water & Power	(951) 279-3592	
18	Joseph	Ainsworth	City of Moreno Valley	Riverside County Waste Management	486-3265	
19	Don	Chase	City of Moreno Valley	Riverside County Waste Management		
20	Emily	Chau	City of Moreno Valley	Riverside County Waste Management		
21	Oren	Cook	City of Moreno Valley	Riverside County Waste Management	951-486-3274	
22	Marques	Crews	City of Moreno Valley	Riverside County Waste Management	(951) 314-7752	
23	Joseph	Williams	City of Moreno Valley	Riverside County Waste Management	951 286 7741	
24	Art	Fuentes	City of Moreno Valley	Riverside County Waste Management	951 486-3274	
25	Chris	Green	City of Moreno Valley	Riverside County Waste Management	522-0860	
26	Sam	Guerrero	City of Moreno Valley	Riverside County Waste Management	951-567-6942	
27	Jessica	Nguyen	City of Moreno Valley	Riverside County Waste Management	951 486 3255	
28	Justin	Brown	City of Moreno Valley	Riverside County Waste Management	237-3111	
29	Rodney	Koenig	City of Moreno Valley	Riverside County Waste Management	544-7210	
30	Richard	Lopez	City of Moreno Valley	Riverside County Waste Management	909 254 3418	
31	Randall	Marrs	City of Moreno Valley	Riverside County Waste Management	640 5840	
32	Raymond	Martinez	City of Moreno Valley	Riverside County Waste Management		
33	Juan Mario	Ortega	City of Moreno Valley	Riverside County Waste Management	312-6857	
34	Vidal "Tim"	Evans	City of Moreno Valley	Riverside County Waste Management	(951)486-3275	
35	Mario	Ramirez	City of Moreno Valley	Riverside County Waste Management	(951)275-3672	
36	Darryl	Root	City of Moreno Valley	Riverside County Waste Management		
37	George	Solorio	City of Moreno Valley	Riverside County Waste Management		

38	George	Solorio, Jr.	City of Moreno Valley	Riverside County Waste Management		
39	Travis	Taylor	City of Moreno Valley	Riverside County Waste Management	486-3276	
40	Kurt	Van Dusen	City of Moreno Valley	Riverside County Waste Management	486-3307	
41	Sarah	Watrous	City of Moreno Valley	Riverside County Waste Management	486-325	
42	Juan	Yepez	City of Moreno Valley	Riverside County Waste Management	909 341-3655	
43	Palmer	James	Riverside County	Code Enforcement	(951) 245-3212	
44	Rick	Davis	City of Moreno Valley	Riverside County Waste Management	951 845-1477	
45	Jean	Voshall	City of Temecula	Code Enforcement	(951) 302-4144	Jean Voshall
46	Maria	~~Ching~~ COLET	City of Temecula	Public Works	(951) 302-4144	
47	Richard	Carrera	Riverside County	Environmental Compliance Division	951-955-8116	
48	Michael	Sanders	Riverside County	Code Enforcement	(951) 600-6130	
49	Amber	Miller	Riverside County	Environmental Compliance Division	(951) 955-1871	A Miller
50	~~Allen~~ TIM	~~Pielin~~ KING	City of Riverside	Public Works	(951) 351-6072	
51	Larry	Stickles	City of Palm Springs	Fleet Operations	(760) 323-8168	
52	Michele	Hindersinn	City of Corona	Public Works	(951) 736-2248	
53	Danny	Gregorio	Riverside County	Environmental Compliance Division	(951) 955-1951	
54	Anthony	Moreno	City of La Quinta	Building & Safety	(760) 777-7034	
55	Roger	Miller	Riverside County	Environmental Compliance Division	(951) 955-0886	R. Miller
56	Rene	Rosales	City of Coachella	Code Enforcement	(760) 398-4978	
57	Bruce	Pelletier	City of Indian Wells	Building and Safety	(760) 776-0230	
58	Noah	Rau	City of Moreno Valley	Riverside County Waste Management	951-486-3267	

59	Donald	Gerber	City of Moreno Valley	Riverside County Waste Management	4863206	
60	Michelle	Douglas	City of Riverside	Public Work ECS		

61 Larry Salazar City of Riverside Public Work ECS

62 George Ahing City of Riverside " " "

Bill Woolsey City of Murrieta Public Works/Eng. 461-6073 Bill Woolsey

Mike Yasmer City of Riverside

JAMES PALMER COUNTY OF RIVERSIDE CODE ENFORCEMEN 245-3166

ED LUNA Veolia Water NA FOG Compliance (760) 702-7876

CINDY SWAVELY ENVIRONMENTAL COMPLIANCE CITY OF RIVERSIDE 951 712-2555

PLEASE SIGN IN

0004113

NPDES STORMWATER QUALITY TRAINING FOR
Construction Training
Riverside County Flood Control & Water Conservation District

Meeting of: Monday, September 29 - 08:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
1	Kris	Harper	City of Banning	Public Utilities		
2	Joe	Arias	City of Banning	Public Utilities		
3	Roger	Ohms	City of Banning	Public Utilities		
4	Mike	Steen	City of Banning	Public Utilities		
5	Jason	Smith	City of Banning	Public Utilities		
6	Erick	Shackelford	City of Riverside	Public Utilities - Water Field	(951) 351-6350	
7	lewis	barry	Riverside County	Building & Safety	(951) 955-1800	BARRY LEWIS
8	Douglass	Gardenias	Riverside County	Transportation Department	(951) 955-1095	
9	James	Wilson	Riverside County	Transportation Department	(951) 955-1095	
10	Jeffrey	Kukulka	Riverside County	Waste Management	909 288 6610	
11	Brian	Hawkinson	Riverside County	Waste Management		
12	Mark	Hunt	Riverside County	Waste Management		
13	Rob	Istik	Riverside County	Waste Management		
14	Scott	Kraak	Riverside County	Waste Management		
15	Nguyen	Jessica	Riverside County	Waste Management		Jessica nguyen
16	Joe	Schupp	Riverside County	Waste Management		
17	Evangelina	Zapien	Riverside County	Waste Management		
18	RYAN	RIGHETTI	Riverside County	TRANSPORTATION	(951) 659-2603	
19	Rick	Fite	Riverside County	TRANSPORTATION	(951) 659-2603	
20	Morgan	Newlin	City of Hemet	Public Works Engineering	(951) 765-3855	

NPDES STORMWATER QUALITY TRAINING FOR
Construction Training
Riverside County Flood Control & Water Conservation District

Meeting of: Monday, September 29 - 08:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
21	Daniel	Valenzuela	City of La Quinta	Public Works	(760) 777-7096	
22	Randy	Olgren	City of Riverside	PU Electric Field	(951) 351-6351	
23	Rick	Skelton	City of Riverside	PU Electric Field	(951) 351-6351	
24	Rusty	Clarke	City of Riverside	PU Electric Field	(951) 351-6351	
25	Roger	Wagner	City of Riverside	PU Electric Field	(951) 351-6351	
26	Greg	Yates	City of Riverside	PU Electric Field	(951) 351-6351	
27	Bill	Crumley	City of Riverside	PU Electric Field	(951) 351-6351	
28	Dave	McLellan	City of Riverside	PU Electric Field	(951) 351-6351	
29	Bruce	Taylor	City of Riverside	PU Electric Field	(951) 351-6351	
30	Casey	Whitney	City of Riverside	PU Electric Field	(951) 351-6351	
31	Dale	Underwood	City of Riverside	PU Electric Field	(951) 351-6351	
32	Matt	Field	City of Banning	Public Utilities		
33	Michael	Colantuono	City of Banning	Public Utilities		
34	Mario	Elizondo	City of Banning	Public Utilities		
35	michael	ramek	Riverside County	Building & Safety	(951) 955-1800	
36	ted	gascoigne	Riverside County	Building & Safety	(951) 955-1800	
37	rendell	klaarenbeek	Riverside County	Building & Safety	(951) 955-1800	
38	Shea	Anti	Riverside County	Waste Management		
39	Tim	Evans	Riverside County	Waste Management		
40	Donald	Gerber	Riverside County	Waste Management		

NPDES STORMWATER QUALITY TRAINING FOR
Construction Training
Riverside County Flood Control & Water Conservation District

Meeting of: Monday, September 29 - 08:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
41	Christopher	Green	Riverside County	Waste Management		
42	Jason	Woods	City of Banning	Public Utilities		
43	Gregory	Oliver	City of Riverside	Public Utilities - Water Field	(951) 351-6350	
44	william	peppas	Riverside County	Building & Safety	(951) 955-1800	
45	richard	sharp	Riverside County	Building & Safety	(951) 955-1800	
46	Kenneth	McGregor	City of Riverside	Public Utilities - Water Field	(951) 351-6350	
47	Michael	Baggett	City of Riverside	Public Utilities - Water Field	(951) 351-6350	
48	Al	orozco	City of Riverside	Public Utilities - Water Field	(951) 351-6350	
49	gary	Kirby	City of Riverside	Public Utilities - Water Field	(951) 351-6350	
50	Randall	Marrs	Riverside County	Waste Management	951 640 5840	
51	Todd	Shibata	Riverside County	Waste Management	462 16	
52	SCOTT	KAAR				
53	CHRIS	GREEN				
54	[illegible]	[illegible]	City of Banning	Utilities		
55	ERICK	Shackelford	City of Riv.	utilities		
56	Rodney	Koenig	Riverside C.	waste Management	951-544-7210	
57	[illegible]	Sharp	County [illegible]			
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PLEASE SIGN IN

NPDES STORMWATER QUALITY TRAINING FOR
Construction Training
Riverside County Flood Control & Water Conservation District

Meeting of: Monday, September 29 - 13:00 - 17:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
1	Chuck	Peebles	City of San Jacinto	Engineering	(951) 654-3592	
2	Tamrat	Seyoum	City of Riverside	Water Department	(951) 826-5672	Tamrat Seyoum
3	Annie	Bostre-Le	City of Temecula	Public Works	(951) 694-6411	
4	Robert	Bohan	City of Canyon Lake	Special Enforcement	(951) 244-2955	
5	John	Bivens	City of Canyon Lake	Special Enforcement	(951) 244-2955	
6	Richard	Rupert	City of Canyon Lake	Special Enforcement	(951) 244-2955	
7	Lance	Noland	Riverside County	Econo0mic Development Agency	(951) 955-9698	
8	Linda	Nixon	City of Hemet	Public Works Engineering	(951) 765-3880	Linda Nixon
9	Kent	Wegelin	City of Moreno Valley	Public Works	(951) 413-3497	
10	Jay	PEEBLES Hutchinson	City of San Jacinto	Engineering	(951) 654-3592	Chuck Peebles James C Hutchinson
11	Leo	Ferrando	City of Riverside	Water Department	(951) 826-5694	Leo Ferrando
12	Eric	Escobar	City of Riverside	Water Department	(951) 826-2253	Eric Escobar
13	Arman	Bualong BULAONG	City of Perris	Engineering	(951) 943-6504	
14	Pavel	Horn	City of Catherdal City	Engineering	(760) 770-0329	Pavel Horn
15	Ismael	Pando	City of Hemet	Public Works Engineering	(951) 765-2361	Ismael Pando
16	David	McBride	City of Temecula	Public Works	(951) 694-6411	
17	Dan	York	City of Temecula	Public Works	(951) 694-6411	
18	Jeramy	Jackson	City of Moreno Valley	Public Works	(951) 413-3474	JERAMY JACKSON
19	Steve	Grewe	Riverside County	Transportation Department	(951) 955-1095	Steve Grewe
20	Robert	Morris	Riverside County	Transportation Department	(951) 955-1095	
21	John C.	Wilson	Riverside County	Transportation Department	(951) 955-1095	
22	mark	mandel	Riverside County	TLMA/Code Enforcement	(951) 955-8802	Mark Mandel

NPDES STORMWATER QUALITY TRAINING FOR
Construction Training
Riverside County Flood Control & Water Conservation District

Meeting of: Monday, September 29 - 13:00 - 17:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
23	Art	Fuentes	Riverside County	Waste Management	951-486-3274	
24	Kaniz	Quazi	Riverside County	Waste Management		
25	Manuel	Ruiz	Riverside County	Waste Management		
26	Samuel	Theodora	City of Canyon Lake	Special Enforcement	(951) 244-2955	
27	Daniel	Cuthbertson	City of Norco	Public Works	(951) 545-7872	
28	Ann	Iaali	RCFC & WCD	NPDES, Regulatory Division	(951) 955-1248	
29	nohemi	johnston	Riverside County	TLMA/Code Enforcement	(951) 955-8802	
30	Oscar	Rodas	City of Catherdal City	Engineering	(760) 770-0327	
31	Terry	Huemer	City of Perris	Engineering	(951) 943-6504	
32	marco	diaz	Riverside County	TLMA/Code Enforcement	(951) 955-8802	
33	Jon	Salazar	City of Temecula	Public Works	(951) 694-6411	
34	Mayra	De La Torre	City of Temecula	Public Works	(951) 694-6411	
35	Kendra	Hannah-Meistrell	City of Temecula	Public Works	(951) 694-6411	
36	Steve	Beswick	City of Temecula	Public Works	(951) 694-6411	
37	Mike	Hudson	City of Temecula	Public Works	(951) 694-6411	
38	Steve	Charette	City of Temecula	Public Works	(951) 694-6411	
39	John	Shelton	Riverside County	Transportation Department	(951) 955-1095	
40	Chad	Davies	Riverside County	Economic Development Agency-Aviation Division	(951) 955-9417	
41	Kelley	Donovan	Riverside County	Transportation Department	(951) 955-1095	
42	Randy	White	Riverside County	Transportation Department	(951) 955-1095	
43	Eddie	Godinez	City of Moreno Valley	Public Works	(951) 413-3127	
44	Alex	Ramirez	City of Moreno Valley	Public Works	(951) 413-3123	

NPDES STORMWATER QUALITY TRAINING FOR
Construction Training
Riverside County Flood Control & Water Conservation District

Meeting of: Monday, September 29 - 13:00 - 17:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
45	Joanna	Dorham	City of Moreno Valley	Public Works	(951) 413-3192	
46	Chuck	Thurman	City of Banning	Public Utilities	951-922-3260	Chuck Thurman
47	Rick	Diaz	City of Banning	Public Utilities	9512324934	
48	Tim	McLaughlin	City of Banning	Public Utilities	951 922 3260	
49	Cameron	Hawley	City of Banning	Public Utilities	951849-1506	aka Legend
50	Ryan	Frisby	City of Banning	Public Utilities	(951)314-1690	
51	Marques	Crews	Riverside County	Waste Management	(951)486-3269	
52	Noah	Rau	Riverside County	Waste Management	951-486-3200	Noah Rau
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PLEASE SIGN IN

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NPDES STORMWATER QUALITY TRAINING FOR
Construction Training
Riverside County Flood Control & Water Conservation District

Meeting of: Tuesday, September 30 - 08:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
1	BRENT	MYTINGER	RCFC & WCD	Inspection	(909) 560-1142	
2	Jeremy	Stroschein	Riverside County	Transportation Department		
3	Ray	Dunn	RCFC & WCD	Construction Inspection	(951) 955-1315	
4	Jesus	Pizano	Riverside County	Transportation Department	(951) 955-1095	
5	Barry	Temple	RCFC & WCD	Construction Inspection	(951) 955-1315	
6	Gabriel	Novello	City of Banning	Engineering/Public Works	(951) 922-3130	
7	Bill	Russell	City of Banning	Engineering/Public Works	(951) 922-3130	
8	Waren	Woodstock	City of Banning	Engineering/Public Works	(951) 922-3130	
9	Guero	Cervantes	City of Perris	Engineering Department	(951) 943-6504	
10	Greg	Butler	City of Temecula	Public Works	(951) 694-6411	
11	Avlin	Odviar	City of Temecula	Public Works	(951) 694-6411	
12	Tony	Colarossi	City of La Quinta	Public Works	(760) 777-7089	
13	Michael	Davis	Riverside County	Transportation Department	(951) 955-1095	
14	Tim	Fagg	RCFC & WCD	Construction Inspection	(951) 955-1236	
15	Charles	McBride	City of Riverside	Water Department	(951) 538-6972	
16	Michael	Morrison	Riverside County	Transportation Department	(951) 955-1095	
17	Habib	Hariri	City of Riverside	Water Department	(951) 826-5304	

NPDES STORMWATER QUALITY TRAINING FOR
Construction Training
Riverside County Flood Control & Water Conservation District

Meeting of: Tuesday, September 30 - 08:00 - 12:00 SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
18	Todd	Jorgenson	City of Riverside	Water Department	(951) 233-6381	
19	Claudia	Steiding	Riverside County	Facilities Management	(951) 955-8174	
20	Vikki	Kuntz	Riverside County	Facilities Management	(951) 955-0166	
21	David	Hatch	City of Riverside	PUBLIC WORKS	(951) 288-3632	
22	JACK	PALOMAREZ	City of Riverside	PUBLIC WORKS	(951) 712-4972	
23	FRED	CERDA	City of Riverside	PUBLIC WORKS	(951) 712-4966	
24	Mike	Luna	RCFC & WCD	Construction Inspection	(909) 908-0978	
25	Will	Becerra	City of Temecula	Public Works	(951) 694-6411	
26	John	Pourkazemi	City of Temecula	Public Works	(951) 694-6411	
27	Andy	Lindsay	City of Riverside	Public Utilities - Water Field	(951) 351-6368	
28	Chris	Joranco	City of Riverside	Public Utilities - Water Field	(951) 351-6350	
29	William	Ryan	City of Riverside	Public Utilities - Water Field	(951) 351-6350	
30	Richard	Ryno	City of Riverside	Public Utilities - Water Field	(951) 351-6350	
31	Robert	Lucas	City of Riverside	Public Utilities - Water Field	(951) 351-6350	
32	Jim	Grady	City of Riverside	Public Utilities - Water Field	(951) 351-6350	
33	Gene	Lewis	RCFC & WCD	Construction administration	(951) 850-6917	
34	Miguel	Perez	City of Riverside	Public Utilities - Water Field	(951) 351-6350	

NPDES STORMWATER QUALITY TRAINING FOR
Construction Training
Riverside County Flood Control & Water Conservation District

Meeting of: Tuesday, September 30 - 08:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
35	Jeffrey	Karalun	City of Riverside	Public Utilities - Water Field	(951) 351-6350	
36	William	Cates	City of Riverside	Public Utilities - Water Field	(951) 351-6350	
37	Victor	Velasquez	City of Riverside	Public Utilities - Water Field	(951) 351-6339	
38	Steven	Horn	Riverside County	Facilities Management	(951) 955-2549	
39	Dario	Samonte	RCFC & WCD	Construction Inspection	(909) 560-0199	Dario Sam
40	Jeff	Lewellen	Riverside County	Transportation Department	(951) 955-1095	
41	Richard "Rick"	Ott	Riverside County	Transportation Department	(951) 955-1095	
42	Stewart	Noble	City of Riverside	Water Department	(951) 538-6970	
43	Roger	Florez	Riverside County	Transportation Department	(951) 955-1095	
44	Tracy	Bravo	Riverside County	Transportation Department	(951) 955-1095	
45	Rene	Guzman	Riverside County	Transportation Department	(951) 955-1095	
46	Joseph	Bohne	Riverside County	Transportation Department	(951) 955-1095	
47	Mike	Lynch	City of Banning	Engineering/Public Works	(951) 922-3130	
48	David	Matier	City of Banning	Engineering/Public Works	(951) 922-3130	
49	carol	lucero	Riverside County	TLMA/Code Enforcement	(951) 955-8802	
50	donna	payne	Riverside County	TLMA/Code Enforcement	(951) 955-8802	
51	patricia	silva	Riverside County	TLMA/Code Enforcement	(951) 955-8802	

NPDES STORMWATER QUALITY TRAINING FOR
Construction Training
Riverside County Flood Control & Water Conservation District

Meeting of: Tuesday, September 30 - 13:00 - 17:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
52	Travis	Taylor	Riverside County	Waste Management	951-486-3273	
53	Justin	Brown	Riverside County	Waste Management	951-486-3278	
54	Michael	Ray	Riverside County	Waste Management	9512471761	M. I. Ray
55	Donald	Chase	Riverside County	Waste Management		Donald Chase
56	George	Solorio	Riverside County	Waste Management	951-318-1994	George Solorio
57	Jim	Mikkelson	Riverside County	Waste Management	951-550-0324	Donald Chase 951 323-1155
58	Mario	Ramirez	Riverside County	Waste Management	9514861-3270	
59	Panda	Workman	Riverside County	Waste Management	951-486-3276	Panda
60	Juan	Yepez	Riverside County	Waste Management	951-486-3265	Juan Yepez
61	Tom	M Ray	" "	TRANS.	951-658-5234	Tom McRay
62	Nancy	Beltran	City of Hemet	Engineering Dept.	951-765-3877	
63	MAC	McCall	City of Hemet	ENGINEERING DEPT	951-847-5737	MAC McCall
64	Daniel	Nicholson	Riverside Co	TRANS	951-955-6793	
65	Rick	Fite	Riverside Co	Dist. Rd. Maint. Sup.	9511659-2603	Rick Fite
66	~~Monty~~	~~Smith~~	~~R~~			
67	Henry	Gutierrez	Riverside Co	Equipt operator II	909.872-4019	Henry M. Gutierrez
68						

PLEASE SIGN IN

0004123

NPDES STORMWATER QUALITY TRAINING FOR
Construction Training
Riverside County Flood Control & Water Conservation District

Meeting of: Tuesday, September 30 - 13:00 - 17:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
1	Marianne	Parker	City of Temecula	Public Works	909-707-8254	Marianne L Parker
2	William	Taylor	City of Temecula	Public Works	(951) 302-4144	
3	Rodney	Koenig	Riverside County	Waste Management		
4	RYAN	RIGHETTI	Riverside County	TRANSPORTATION	(951) 659-2603	
5	Monica	Telles	Riverside County	EDA	(760) 863-2541	
6	Der	Xiong	Riverside County	EDA	(951) 955-3421	
7	Jim	Ayres	Riverside County	Economic Development Agency	(760) 863-2552	
8	Anna	Rodriguez	Riverside County	Economic Development Agency	(760) 863-2537	Anna Rodriguez
9	Leah	Rodriguez	Riverside County	Economic Development Agency	(760) 863-2534	Leah Rodriguez
10	Joaquin	Tijerina	Riverside County	Economic Development Agency	(760) 863-2529	
11	Larry	Bennett	Riverside County	Transportation Department	(951) 955-1095	
12	Henry	Gutierrez	Riverside County	Transportation Department	(951) 955-1095	
13	Zuri	Lowe	Riverside County	Transportation Department	(951) 955-1095	
14	Byron	Moreno	Riverside County	Transportation Department	(951) 955-1095	
15	Jeff	Gullett	Riverside County	Transportation Department	(951) 955-1095	Jeff Gullett
16	William E.	Anderson	Riverside County	Transportation Department	(951) 955-1095	
17	Monty	Smith	Riverside County	Transportation Department	(951) 955-1095	

NPDES STORMWATER QUALITY TRAINING FOR
Construction Training
Riverside County Flood Control & Water Conservation District

Meeting of: Tuesday, September 30 - 13:00 - 17:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
18	Jeremy	Seward	Riverside County	Transportation Department	(951) 955-1095	
19	Hoang	Nguyen	City of Moreno Valley	Public Works	(951) 413-3216	Hoang Nguyen
20	Chris	Sunde	City of Perris	Engineering	(951) 943-6504	
21	STEVEN	HOWARD	City of Riverside	PUBLIC WORKS	(951) 712-3904	Steve Howard
22	James	Caddel	City of Riverside	PUBLIC WORKS	(951) 329-7703	
23	Jean	Voshall	City of Temecula	Public Works	(951) 302-4144	Jean Voshall
24	Tom	Cole	City of Temecula	Public Works	(951) 302-4144	
25	JUVENTINO	GARCIA	City of Riverside	PUBLIC WORKS	(951) 826-5599	
26	Tom	Mckay	Riverside County	transportation	(951) 313-2154	
27	Mac	McCall	City of Hemet	Public Works Engineering	(951) 765-2360	
28	Douglas	Norfolk	City of Norco	Eng.	(951) 545-7894	Douglas W. Norfolk
29	Mervyn	Manalo	Riverside County	EDA	(951) 955-3408	
30	Melvyn "Matt"	Sayre	Riverside County	Transportation Department	(951) 955-1095	
31	Salvador	Lopez	Riverside County	Transportation Department	(951) 955-1095	Salvador Lopez, T #17
32	Lisa	Elder	Riverside County	Transportation Department	(951) 955-1095	
33	Julie	Meyer	Riverside County	Transportation Department	(951) 955-1095	Julie Meyer
34	Sean	Motlagh	Other	City of Perris, City of San Jacinto	(951) 943-6504	

NPDES STORMWATER QUALITY TRAINING FOR
Construction Training
Riverside County Flood Control & Water Conservation District

Meeting of: Tuesday, September 30 - 13:00 - 17:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
35	Xavier	Jacobo	City of Riverside	Water Department	(951) 538-3461	
36	Jim	Henke	City of Riverside	Water Department	(951) 538-3451	
37	Cesar	Gutierrez	Riverside County	Transportation Department	(951) 955-1095	
38	angela	frazier	Riverside County	TLMA/Code Enforcement	(951) 955-8802	
39	Bill	McAteer	City of Temecula	Public Works	(951) 694-6411	
40	Amer	Attar	City of Temecula	Public Works	(951) 694-6411	
41	Laura	Bragg	City of Temecula	Public Works	(951) 694-6411	
42	David	Maus	Riverside County	Transportation Department	(951) 955-1095	
43	Kevin	Gillette	Riverside County	Transportation Department	(951) 955-1095	
44	Thomas	Shipley	Riverside County	Transportation Department	(951) 955-1095	
45	Yolanda	Macalalad	City of Corona	Public Works	(951) 279-3748	
46	Danny	Astorga	City of Moreno Valley	Public Works	(951) 413-3119	
47	Gabriel	Gonzalez	City of Moreno Valley	Public Works	(951) 413-3252	
48	Mosallam	Almasri	City of Moreno Valley	Public Works	(951) 413-3113	
49	Preston "Jerry"	Lytle	Riverside County	Transportation Department	(951) 955-1095	
50	Koran	Manka	Riverside County	Transportation Department	(951) 955-1095	
51	Harvey	McCoy	Riverside County	Transportation/Operations	(951) 658-5234	

NPDES STORMWATER QUALITY TRAINING FOR
Construction Training
Riverside County Flood Control & Water Conservation District

Meeting of: Tuesday, September 30 - 08:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
52	jamison	cole	Riverside County	TLMA/Code Enforcement	(951) 955-8802	Jamison Cole
53	Bob	French	City of Calimesa	Public Workds	(909) 795-9801	
54	jeannie	chambelain	Riverside County	TLMA/Code Enforcement	(951) 955-8802	Jeannie Chamberlain
55	roy	ryder	Riverside County	TLMA/Code Enforcement	(951) 955-8802	
56	Mike	McCabe	City of Calimesa	Public Works	(909) 795-9801	
57	Luis	Tapia	City of Riverside	Water Department	(951) 538-3456	
58	Gary	Moss	Riverside County	Transportation Department	(951) 955-1095	Gary Moss
59	Jay	Oldham	City of Temecula	Public Works	(951) 694-6411	
60	Henry	Olivo	RCFC & WCD	Construction Administration	(951) 955-1288	
61	Gary	Lundberg	RCFC	Inspection	9095601147	
62	Byron	Moreno	Trans Dept			
63	Mayra	DeLaTorre	city of Temecula	Public Works	(951) 6946411	
64						
65						
66						
67						
68						

NPDES STORMWATER QUALITY TRAINING FOR

Construction Training

Riverside County Flood Control & Water Conservation District

Meeting of: Wednesday, May 27 - 08:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
1	Robert	Parker	City of Desert Hot Springs	Public Works	(760) 272-6016	
2	Paul	Goble	City of La Quinta	Public Works	(760) 777-7087	
3	Amy	Yu	City of La Quinta	Public Works	(760) 777-7047	
4	Richard "Mike"	Call	Riverside County	Transportation Department	(951) 955-1095	
5	Brigitte	Dunmire	Riverside County	Transportation Department	(951) 955-1095	
6	Patrick	Watson	Riverside County	Transportation Department	(951) 955-1095	
7	Paul	Gearhart	City of Riverside	Public Utilities - Water Field	(951) 351-6350	
8	Richard	Gastelum	City of Riverside	Public Utilities - Water Field	(951) 351-6350	
9	Jeff	Kukulka	City of Moreno Valley	Riverside County Waste Management		
10	Thomas	Collins	City of Riverside	Public Utilities - Water Field	(951) 351-6350	
11	Ed	Wimmer	City of La Quinta	Public Works	(760) 777-7088	
12	James	O'Neal	City of Moreno Valley	Riverside County Waste Management		
13	Renata	Purkart	City of Moreno Valley	Riverside County Waste Management		
14	James	Thompson	City of Banning	Public Works	(951) 922-3130	James Thompson
15	Kevin	Meredith	City of La Quinta	Building & Safety	(760) 777-7017	
16	George	Munoz	City of La Quinta	Building & Safety	(760) 777-7099	
17	Michael	Morris	City of La Quinta	Building & Safety	(760) 777-7014	
18	Anthony	Moreno	City of La Quinta	Building & Safety	(760) 777-7034	
19	Chris	Trinidad	City of Beaumont	Public Works	(951) 769-6999	
20	Ron	Allen	City of Beaumont	Public Works	(951) 769-6999	
21	Joe	Janda	City of Beaumont	Public Works	(951) 769-6999	Joe Janda
22	Susan	James	City of Riverside	Parks and Recreation	(951) 684-4120	Susan James
23	George	Boyden	Riverside County	Transportation Department	(951) 955-1095	
24	Jesus	Mendoza	Riverside County	Transportation Department		
25	Trai	Nguyen	Riverside County	Transportation Department		
26	Kimberly	Cohen	City of Corona	Fire	(951) 279-3775	
27	Cris	Dragomir	City of Moreno Valley	Riverside County Waste Management		
28	Eduardo	Castellanos	City of Moreno Valley	Riverside County Waste Management		
29	Nimrod	Garay	City of Moreno Valley	Riverside County Waste Management		N. Garay
30	Joseph	Hickman	City of Moreno Valley	Riverside County Waste Management		
31	Rob	Istik	~~City of Moreno Valley~~	Riverside County Waste Management		

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NPDES STORMWATER QUALITY TRAINING FOR

Construction Training

Riverside County Flood Control & Water Conservation District

Meeting of: Wednesday, May 27 - 08:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signature
32	Jim	Henke	City of Riverside	Water Engineering	(951) 538-3451	
33	Diedre	Locati	City of Corona	Fire Department	(951) 279-3762	Diedre Locati
34	Cindi	Schmitz	City of Corona	Fire Department	(951) 736-2220	C. Schmitz
35	Brenda	Salas	Riverside County	Economic Development Agency	(951) 955-8069	
36	VICTOR	MOORE	City of Riverside	Public Works-Contracts Adminstration	(951) 232-7139	
37	JUVENTINO	GARCIA	City of Riverside	Public Works-Contracts Adminstration	(951) 640-2885	
38	BARNEY	HUNTER	City of Riverside	Public Works-Contracts Adminstration	(951) 712-3947	
39	Donna	Puentes	City of Riverside	Public Works-Contracts Adminstration	(951) 712-4962	
40	Robert	Savant	City of Riverside	Public Works-Contracts Adminstration	(951) 346-6170	RDS
41	James	Caddel	City of Riverside	Public Works-Contracts Adminstration	(951) 329-7703	
42	TIM	DEXTER	City of Riverside	Public Works-Contracts Adminstration	(951) 712-4974	
43	JUAN	ROJAS	City of Riverside	Public Works-Contracts Adminstration	(951) 538-3037	Juan Rojas
44	DANNY	CWIAK	City of Riverside	Public Works-Contracts Adminstration	(951) 377-5514	Danny Cwiak
45	Freeman	Axtell	Riverside County	Transportation Department	(951) 955-1095	
46	Lisa	Elder	Riverside County	Transportation Department	(951) 955-1095	
47	Paul	Castillo	Riverside County	Transportation Department	(951) 955-1095	
48	David	Hylkema	Riverside County	Transportation Department	(951) 955-1095	
49	MICHAEL	MOTT	City of Palm Springs	Engineering / Public Works	(760) 323-8253	
50	John	Contrado	City of Corona	Public Works Department	(951) 279-3512	
51	Ken	Dagenais	City of Corona	Public Works Department	(951) 736-2456	
52	Darren	Young	City of Corona	Public Works Department	(951) 736-2304	
53	Brian	Ladnier	City of Corona	Public Works Department	(951) 279-3647	Brian Ladnier
54	Michele	Hindersinn	City of Corona	Public Works	(951) 736-2248	
55	Ibrahim	Massoud	City of Riverside	Public Works	(951) 826-5805	Massoud
56	Reza	Asghapour	City of Indian Wells	Building and Safety	(760) 776-0237	
57	Bacilio	Gutierrez	City of Riverside	Public Utilities - Water Field	(951) 351-6350	
58	William	Harris	City of Riverside	Public Utilities - Water Field	(951) 351-6350	
59	Pete	Diaz	City of Riverside	Public Utilities - Water Field	(951) 351-6384	
60	Mark	Ensign	City of Riverside	Public Utilities - Water Field	(951) 351-6350	
61	Mike	Ernante	City of Indian wells	Public Works	(760) 836-9595	
62	Anthony	Diaz	City of Indian wells	Public Works	(760) 776-8090	
63	Pat	Milos	Cathedral City	Public Work	760-770-0390	

NPDES STORMWATER QUALITY TRAINING FOR

Construction Training

Riverside County Flood Control & Water Conservation District

Meeting of: Wednesday, May 27 - 08:00 - 12:00 SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
	RENE	MARTINEZ	CITY OF PALM SPRINGS	ENG / PUBLIC WORKS	760 323-8253	[illegible]
	PHIL	BROESTRUP	COUNTY OF RIVERSIDE	ENV-INSP. B&S	955-3185	Phil C Bro[illegible]
	BILL	WOOLSEY	CITY OF MURRIETA	ENG. / P.W.	461-6073	Bill Woolsey
	ROBERT	PARKER				

ROBERT PARKER CITY OF DESERT HOT SPRINGS PUBLIC WORKS 760) 272-6016 [illegible]

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NPDES STORMWATER QUALITY TRAINING FOR
Construction Training
Riverside County Flood Control & Water Conservation District

Meeting of: Wednesday, May 27 - 13:00 - 17:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signature
1	Moises	Rodarte	City of La Quinta	Building & Safety for	(760) 777-7128	Elizabeth Escatto
2	Wayne	Campbell	City of La Quinta	Building & Safety	(760) 777-7098	
3	Sean	Motlagh	Other	Cities of Perris, Canyon Lake & San Jacinto	(951) 943-6504	
4	Bryan	McKinney	City of La Quinta	Public Works	(760) 777-7045	
5	Rachel Sarah	McLure	City of Riverside	Parks and Recreation	(951) 826-2028	
6	DANIEL	SIMMONS	City of Riverside	Public Works-Contracts Adminstration	(951) 712-4952	
7	Keith	Barnett	Riverside County	Transportation Department	(951) 955-1095	
8	Mark	Hughes	Riverside County	Transportation Department	(951) 955-1095	
9	Guero	Cervantes	City of Perris	Engineering	(951) 943-6504	
10	Stewart	Noble	City of Riverside	Water Engineering	(951) 538-6970	
11	Deby	Conrad	City of La Quinta	Building & Safety	(760) 777-7022	
12	Nicasio "Nick"	Sison	Riverside County	Transportation Department	(951) 955-1095	
13	Amber	Miller	Riverside County	Environmental Compliance Division	955-1871	
14	Roger	Miller	Riverside County	Environmental Compliance Division	955 0886	
15	Michael	Sanders	Riverside County	Code Enforcement	(951) 600-6130	
16	Luis H	Tapia	City of Riverside	Water Engineering	(951) 538-3456	
17	Jeff	Gow	~~City of Moreno Valley~~ Riverside County	Riverside County Waste Management		
18	Ben	Mah	City of Moreno Valley	Riverside County Waste Management	6-3248	
19	Michael	McKinley	City of Moreno Valley	Riverside County Waste Management	2471863	
20	Dan	Olea	~~City of~~ Moreno Valley	Riverside County Waste Management	951-486-3202	
21	Rob	Owen	City of Beaumont	Public Works	(951) 769-6999	
22	Alfredo	Ignacio	City of Beaumont	Public Works	(951) 769-6999	
23	Kevin	Joyce	~~City of Moreno Valley~~	Riverside County Waste Management	2471849	
24	Bob	Cartwright	Other	City of Menifee	(951) 672-6777	
25	Matt	Ciarlo	City of Riverside	Public Works-Contracts Adminstration	(951) 346-4130	Matt Ciarlo
26	Mike	Neal	City of Beaumont	Public Works	(951) 769-6999	
27	William	Jackson	Riverside County	Transportation Department	(951) 955-1095	
28	Eric	Lohr	Riverside County	Transportation Department	(951) 955-1095	
29	Gabriel	Munoz	Riverside County	Transportation Department	(951) 955-1095	
30	Bondie	Baker	City of Indian Wells	Public Works	(760) 776-0237	
31	Danny	Gregorio	Riverside County	Environmental Compliance Division		Dan Gregorio
32	Phil	Broesalme	Riverside County	Environmental Compliance Division		
33	Chandra	Santiago	Riverside County	Environmental Compliance Division		
34	Larry	Joseph	City of Moreno Valley	Riverside County Waste Management		
35	Edward	Wee Eng	City of Moreno Valley	Riverside County Waste Management	951 486 3221	

NPDES STORMWATER QUALITY TRAINING FOR
Construction Training
Riverside County Flood Control & Water Conservation District

Meeting of: Wednesday, May 27 - 13:00 - 17:00

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	First Name	Last Name	Municipality	Department	Phone No	Signature
36	Jackie	Misuraca	City of La Quinta	Building & Safety	(760) 777-7021	
37	Lance	Noland	Riverside County	EDA	(951) 955-9698	
38	STEVEN	HOWARD	City of Riverside	Public Works-Contracts Adminstration	(951) 712-3904	
39	DON	BUCHANAN	City of Riverside	Public Works-Contracts Adminstration	(951) 712-4970	
40	JIM	STONE	City of Riverside	Public Works-Contracts Adminstration	(951) 712-4972	Jim Stone
41	JACK	LYNN	City of Riverside	Public Works-Contracts Adminstration	(951) 712-2321	
42	FRED	CERDA	City of Riverside	Public Works-Contracts Adminstration	(951) 712-4966	
43	David	Hatch	City of Riverside	Public Works-Contracts Adminstration	(951) 288-3632	
44	Ewina	Lau	City of Riverside	Parks and Recreation	(951) 826-2012	
45	Elmer	Datuin	Riverside County	Transportation Department	(951) 955-1095	
46	Steven	Wann	Riverside County	Transportation Department	(951) 955-1095	
47	Reda "George"	Yassa	Riverside County	Transportation Department	(951) 955-1095	
48	Randy	McDaniel	City of Riverside	Park Planning	(951) 826-2006	
49	Tom	Hall	City of Corona	Public Works Department	(951) 739-4816	
50	Dave	Shreve	City of Corona	Public Works Department	(951) 817-5706	David L. Shreve
51	Rosario	Ruvalcaba	City of Corona	Public Works Department	(951) 739-4813	
52	David	Mitchell	City of Corona	Public Works Department	(951) 279-3510	
53	Anthony	Diaz	City of Indian Wells	Public Works	(760) 776-0237	
54	Michael	Errante	City of Indian Wells	Public Works	(760) 776-0237	
55	Jeff	Potts	City of Corona	Public Works	(951) 736-2442	
56	Chuck	Peebles	City of San Jacinto	Engineering	(951) 654-3592	
57	Mike	Beutler	Other	City of Menifee	(951) 672-6777	
58	Brad	Kutzner	Other	City of Menifee	(951) 672-6777	
59	Kevin	Rhodes	~~City of Moreno Valley~~ RIV. COUNTY	Riverside County Waste Management	951-236-2888	
60	Brian	Stephenson	~~City of Moreno Valley~~	Riverside County Waste Management	(951) 315-7298	
61	KEN	DAGRAIS	C of CORONA	P W	951 736-2456	
62	Kevin	Meredith	City La Quinta	Building + Safety	760 777-7017	
63	MIKE	MORRIS	CITY LA QUINTA	BUILDING & SAFETY	760 777-7014	
64	Elizabeth	Escott	CITY OF LA QUINTA	Building & Safety	760 777-7110	Elizabeth Escott
65						

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NPDES STORMWATER QUALITY TRAINING FOR

Compliance Assistance Program - Stormwater Training

Riverside County Flood Control

Meeting of: 2009, Tuesday, June 2 - 09:00 - 11:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Office	Signature
1	Stacy	Anderson	County of Riverside	Environmental Health - DES	Area 5 (Murrieta)	
2	Sandy	Arnett	County of Riverside	Environmental Health - DES	Area 2 (Hemet)	Sandy Arnett
3	Bonessa	Arpa	County of Riverside	Environmental Health - DES	Area 2 (Hemet)	
4	Shantel	Bacon	County of Riverside	Environmental Health - DES	Area 3 (Palm Springs)	Shantel Bacon
5	Martha	Bahia	County of Riverside	Environmental Health - HazMat	Riverside	
6	Bruce	Bailey	County of Riverside	Environmental Health - HazMat	Corona	
7	Darrel	Balancier	County of Riverside	Environmental Health - DES	Area 3 (Palm Springs)	
8	Brad	Ballen	County of Riverside	Environmental Health - HazMat	Indio	
9	Heidi	Barrios	County of Riverside	Environmental Health - DES	Area 2 (Hemet)	Heidi Barrios
10	Dan	Blum	County of Riverside	Environmental Health - DES	Area 4 (Indio)	
11	Andrea	Briones	County of Riverside	Environmental Health - DES	Area 1 (Riverside)	Andrea Briones
12	Carolyn	Brown	County of Riverside	Environmental Health - HazMat	Hemet	
13	Sandy	Bunchek	County of Riverside	Environmental Health - HazMat	Corona	Sandy Bunchek
14	Kristen	Burnham	County of Riverside	Environmental Health - DES	Area 5 (Murrieta)	Kristen Burnham
15	Jeff	Bustamante	County of Riverside	Environmental Health - HazMat	Hemet	
16	Edina	Camama	County of Riverside	Environmental Health - DES	Area 3 (Palm Springs)	Edi Camama

NPDES STORMWATER QUALITY TRAINING FOR

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	First Name	Last Name	Municipality	Department	Office	Signature
17	Betsy	Capps	County of Riverside	Environmental Health - DES	Area 6 (Corona)	
18	Brent	Casey	County of Riverside	Environmental Health - DES	Area 1 (Riverside)	
19	Ken	Chandler	County of Riverside	Environmental Health - DES	Area 6 (Corona)	
20	Jose	Chavez	County of Riverside	Environmental Health - DES	Area 3 (Palm Springs)	
21	Kris	Cowen	County of Riverside	Environmental Health - DES	Area 3 (Palm Springs)	
22	Nicholas	Crain	County of Riverside	Environmental Health - HazMat	Hemet	
23	Sarah	Crossman	County of Riverside	Environmental Health - DES	Area 1 (Riverside)	
24	Sandi	Delao	County of Riverside	Environmental Health - DES	Area 1 (Riverside)	
25	Fritzy	Devera	County of Riverside	Environmental Health - DES	Special Projects	
26	Bonnie	~~Diefking~~ Dier King	County of Riverside	Environmental Health - DES	Area 5 (Murrieta)	
27	Dottie	Ellis-Merki	County of Riverside	Environmental Health - DES	Area 1 (Riverside)	
28	Ralph	Fregoso	County of Riverside	Environmental Health - DES	Area 1 (Riverside)	
29	Win	Ganly	County of Riverside	Environmental Health - DES	Area 4 (Indio)	
30	Jenny	Gonseca	County of Riverside	Environmental Health - DES	Area 4 (Indio)	
31	Marcie	Graefe	County of Riverside	Environmental Health - DES	Area 3 (Palm Springs)	
32	Richard	Guerrero	County of Riverside	Environmental Health - HazMat	Corona	

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	First Name	Last Name	Municipality	Department	Office	Signature
33	My	Ha	County of Riverside	Environmental Health - DES	Area 2 (Hemet)	
34	Michael	Hernandez	County of Riverside	Environmental Health - DES	Area 4 (Indio)	
35	Antonio	Islas	County of Riverside	Environmental Health - DES	Area 1 (Riverside)	A. Islas
36	Kelly	Kersten	County of Riverside	Environmental Health - HazMat	Corona	Kelly Kersten
37	Kristine	Kim	County of Riverside	Environmental Health - DES	Area 6 (Corona)	
38	Bob	Lehmann	County of Riverside	Environmental Health - HazMat	ER Day Team	
39	Lillana	Lizalde	County of Riverside	Environmental Health - DES	Area 5 (Murrieta)	Lilliana Lizalde
40	Jeff	Lojeski	County of Riverside	Environmental Health - DES	Special Projects	Jeff Lojeski
41	Alberto	Lopez	County of Riverside	Environmental Health - DES	Area 2 (Hemet)	
42	Krisin	Lorge	County of Riverside	Environmental Health - DES	Area 6 (Corona)	Kristin Lorge
43	Jenay	Marcotte	County of Riverside	Environmental Health - DES	Special Projects	Jenay Marcotte
44	Brian	McGowan	County of Riverside	Environmental Health - DES	Area 4 (Indio)	
45	Mike	Mendoza	County of Riverside	Environmental Health - DES	Area 1 (Riverside)	Michael A. Mendoza
46	Paul	Mitchell	County of Riverside	Environmental Health - HazMat	Riverside	
47	Lisa	Mitchell	County of Riverside	Environmental Health - HazMat	ER Day Team	
48	Gino	Monterroso	County of Riverside	Environmental Health - HazMat	Corona	

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Meeting of: 2009, Tuesday, June 2 - 09:00 - 11:00

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	First Name	Last Name	Municipality	Department	Office	Signature
49	David	Moran	County of Riverside	Environmental Health - DES	Area 4 (Indio)	
50	Doug	Osborn	County of Riverside	Environmental Health - DES	Special Projects	
51	Neil	Ozonur	County of Riverside	Environmental Health - HazMat	Corona	
52	Christine	Parsons	County of Riverside	Environmental Health - HazMat	Corona	
53	Sheila	Peralta	County of Riverside	Environmental Health - DES	Area 5 (Murrieta)	
54	Stephanie	Percival	County of Riverside	Environmental Health - DES	Area 2 (Hemet)	
55	Lester	Powell	County of Riverside	Environmental Health - DES	Area 1 (Riverside)	
56	Jim	Ray	County of Riverside	Environmental Health - HazMat	Indio	
57	Gregg	Reyes	County of Riverside	Environmental Health - DES	Special Projects	
58	John	Riddell	County of Riverside	Environmental Health - HazMat	Indio	
59	Bobby	Riggs	County of Riverside	Environmental Health - HazMat	Indio	
60	Jason	Roy	County of Riverside	Environmental Health - DES	Area 2 (Hemet)	
61	Enrique	Rueda	County of Riverside	Environmental Health - DES	Area 5 (Murrieta)	
62	Dena	Sampel	County of Riverside	Environmental Health - DES	Area 6 (Corona)	
63	Jim	Sappington	County of Riverside	Environmental Health - HazMat	ER Day Team	
64	Bernie	Schleicher	County of Riverside	Environmental Health - HazMat	Corona	

NPDES STORMWATER QUALITY TRAINING FOR

Compliance Assistance Program - Stormwater Training

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Meeting of: 2009, Tuesday, June 2 - 09:00 - 11:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Office	Signature
65	Mike	Shalhub	County of Riverside	Environmental Health - HazMat	Hemet	
66	Carolinn	Shay	County of Riverside	Environmental Health - HazMat	Indio	Carolinn Shay
67	Tyler	Skrove	County of Riverside	Environmental Health - DES	Area 5 (Murrieta)	
68	Ryan	Smith	County of Riverside	Environmental Health - HazMat	Hemet	
69	Jean	Strey	County of Riverside	Environmental Health - DES	Special Projects	
70	Daisy	Tepetitla	County of Riverside	Environmental Health - DES	Area 6 (Corona)	Daisy E. Tepetitla
71	Karen	Tracy	County of Riverside	Environmental Health - DES	Area 3 (Palm Springs)	
72	Jess	Trinidad	County of Riverside	Environmental Health - DES	Area 6 (Corona)	
73	Manny	Vargas	County of Riverside	Environmental Health - HazMat	Hemet	
74	Kristen	Vejar	County of Riverside	Environmental Health - DES	Area 4 (Indio)	
75	Nichael	Walling	County of Riverside	Environmental Health - HazMat	Indio	
76	Lynne	Wilder	County of Riverside	Environmental Health - DES	Area 2 (Hemet)	Lynne Wilder
77	Kelly	Winters	County of Riverside	Environmental Health - HazMat	ER Day Team	
78	C. Kevin	Yang	County of Riverside	Environmental Health - HazMat	Indio	
79						
80						

ATTACHMENT D

ENCROACHMENT PERMIT LOG

0004138

DATE	PERMIT NUMBER PERMITTEE	CHANNEL NAME DWG. NO./STS	TRACT OR PARCEL MAP NO. AGENCY PROJECT NAME	FILING FEE PAID	ENTERED DATABASE	PERMIT WRITTEN	INSPECTION FEE PAID	INSURANCE CERT. IN	COMPLETED OR CLOSED	DATABASE UPDATED	AS BUILTS PLOTTED
5/14	4-0-0010-3165 MARC, LLC	PERRIS VALLEY	18" & 24" CONNECTIONS TRACT 35062	✓	○	○	✓	○	○	○	○
5/22	2-0-0200-3166 SUNESYS, LLC	MAIN ST. 2-143/8	FIBER OPTIC CABLE INSTALL	✓	○	✓	✓	●	○	○	○
5/28	4-0-0211-3167 HEMET UNIFIED SCHOOL	HEMET LINE D 4-852/2&3	3-RCP CONNECTIONS	✓	○	✓	✓	○	✓	○	●
6/9	1-0-0150-3168 HALEY & ALDRICH	ANZA 1-302/17	3 SOIL BORINGS	✓	○	✓	✓	✓	✓	○	✓
6/9	2-0-0050-3169 JLC ENGINEERING	TEMESCAL 2-195/2&3	RCB EXTENSION	✓	○	○	✓	○	○	○	○
6/10	4-0-0684-3170 BARONET & CO.	SUNNYHEAD LINE M4 4-450/2	36" RCP CONNECTION	✓	○	✓	✓	✓	✓	○	✓
6/17	6-0-0150-3171 VANCE CORPORATION	VERBENA ROW 6-262/2	ROW GRADING	✓	○	✓	✓	✓	✓	○	N/A
6/30	1-0-0050-3172 SUNESYS, INC.	SAN SEVAINE 1-449/12	FIBER OPTIC INSTALLATION	✓	○	✓	✓	●	○	○	○
6/30	1-0-0230-3173 SUNESYS, INC	JURUPA 1-392/2	FIBER OPTIC INSTALLATION	✓	○	✓	✓	●	○	○	○
2008 1/3	1-0-0122-3174 CITY OF RIVERSIDE	THORNTON AVE. S.D. 1-364/14-17	STORM DRAIN REALIGNMENT	✓	○	✓	✓	✓	○	○	○

Permits within SMR shown in GREEN

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1/9	6-0-0150-3175 COUNTY TRANSPORTATION	VERBENA 6-262/3	SIDEWALK CONSTRUCTION	WAIVED	○	✓	N/A	○	✓	○	✓
1/11	1-0-0060-3176 CITY OF RIVERSIDE	LA SIERRA 1-151/4	TEMPORARY FENCE REMOVAL	✓	○	✓	✓	✓	○	○	N/A
1/16	1-0-0050-3177 COUNTY TRANSPORTATION	SAN SEVAINE 1-449/3-5	PEDESTRIAN TRAIL	WAIVED	○	✓	N/A	✓	○	○	○
1/21	4-0-0010-3178 KB HOME	PERRIS VALLEY	RECONSTRUCTION OF STORM DRAIN CONNECTION	✓	○	○	✓	○	○	○	○
1/25	2-0-0200-3179 BOURESTON COMPANIES	MAIN ST. 2-143/9	2-24" RCP CONNECTIONS	✓	○	✓	✓	✓	✓	○	●
7/29	4-0-0010-3180 Kleinfelder	Perris Valley	Soil Borings	✓	○	✓	✓	○	✓ CLOSED	○	N/A
8/11	1-0-0090-3181 SUNESYS, LLC	BLY STORM 1-356/2	FIBER OPTIC INSTALLATION	✓	○	✓	✓	✓	○	○	○
8/13	1-0-0092-3182 MISSION VILLAGE APTS.	BLY STORM 1-318/2	42" RCP CONNECTION	○	○	○	○	○	✓ CLOSED	○	N/A
8/19	4-0-0150-3183 SUNESYS, LLC	SUN CITY LINE X-X 4-197/2	FIBER OPTIC INSTALLATION	✓	○	✓	✓	●	○	○	○
8/20	4-0-0010-3184 SCE	PERRIS VALLEY	ELECTRICAL CABLE INSTALLATION	✓	○	✓	✓	○	✓	○	●

0004140

DATE	PERMIT NUMBER PERMITTEE	CHANNEL NAME DWG. NO./STS	TRACT OR PARCEL MAP NO. AGENCY PROJECT NAME	FILING FEE PAID	ENTERED DATABASE	PERMIT WRITTEN	INSPECTION FEE PAID	INSURANCE CERT. IN	COMPLETED OR CLOSED	DATABASE UPDATED	AS BUILTS PLOTTED
8/26	1-0-0090-3185 JCSD	BLY STORM 1-192/2	18" WATERLINE & 21" SEWERLINE INSTALLATIONS	✓	○	✓	✓	✓	✓	○	●
9/1	1-0-0020-3186 DMC BUILDING CO., INC.	MURRIETA CREEK	54" RCP CONNECTION.	✓	○	✓	✓	✓	✓	○	●
9/10	2-0-0497-3187 WILDROSE RIDGE	LEROY RD STORM DRAIN 2-336/9	PARKING & LANDSCAPING	✓	○	○	✓	○	○	○	○
9/17	4-0-0020-3188 EMWD	MERIDIAN ST. 4-371/4	24" RCP CONNECTION	✓	○	✓	✓	✓	✓	○	✓
9/18	1-0-0122-3189 MASTER DEVELOPMENT	THORNTON AVE. S.D. 1-364/27	36" RCP CONNECTION	✓	○	✓	✓	✓	✓	○	✓
9/19	4-0-0250-3190 CITY OF HEMET	PARK HILL 4-265/4	18" RCP CONNECTION	✓	○	✓	✓	○	✓	○	✓
9/23	2-0-0070-3191 CITY OF CORONA	OAK ST. CORPS OF ENGINEERS 13 & 14	POLICE VEHICLE ACCESS	N/A VOID	○	✓	N/A	○	○	○	N/A
9/29	1-0-0130-3192 BINNQUIST DEVELOPMENT	MURRIETA CREEK MDP LINE E 1-323/10	18" RCP CONNECTION	✓	○	✓	✓	✓	✓	○	✓
10/23	1-0-0247-3193 COSTCO	1-575/4 1-577/16 DRY CREEK CHNL F	36" & 24" RCP CONNECTION	✓	○	○	✓	○	○	○	○
11/10	4-0-0270-3194 R.C.T.C.	PERRIS 3RD ST. BASIN OUTLET 4-271/3-5	STREET IMPROVEMENTS AND 18" RCP CONNECTION	✓	○	✓	✓	✓	✓	○	✓

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11/13	4-0-0261-3195 SCE	MERIDIAN ST 4-371/1,6,15	ELECTRICAL CONDUIT INSTALLATION	✓	○	✓	✓	✓	✓	○	✓
11/25	4-0-0530-3196 LNR CPI MERIDIAN	MARCH BUSINESS CENTER LINE FF 4-821/16	TRACT 30857 36" RCP CONNECTION.	✓	○	○	✓	○	○	○	○
12/2	1-0-0335-3197 BURNTEC WASTE	AUGA MANSA 1-514/18-19	24" RCP CONNECTION	✓	○	✓	✓	✓	✓	○	✓
12/3	7-0-0020-3198 CITY OF TEMECULA	MURRIETA CREEK 7-363/3	SOIL BORINGS	✓	○	✓	✓	✓	✓	○	N/A
12/8	1-0-0122-3199 CITY OF RIVERSIDE	THORNTON S.D. 1-364/20-22, 27 & 34	18", 24", 30", & 36" CONNECTIONS	✓	○	✓	✓	●	○	○	○
12/9	4-0-0456-3200 HOGLE-IRELAND	PERRIS LAT. J-9 4-935/3,4,&5	18" & 30" RCP CONNECTIONS	✓	○	○	✓	○	○	○	○
1/6/09	4-0-0008-3201 CITY OF MORENO VALLEY	P.V.C. LAT. A 4-617/13, 4-474/2 4-514/2	HEACOCK ST. WIDENING	✓	○	○	✓	○	○	○	○
1/13	1-0-0010-3202 THIENES ENGINEERING	PERRIS VALLEY 4-103/5	CHANNEL CONNECTION	✓	○	○	✓	○	○	○	○
1/13	2-0-0041-3203 RBF CONSULTING	MAUBE CYN. BASIN KROONEN CYN. CHNL. 2-168 2-167	SOIL BORINGS	WAIVED	○	✓	WAIVED	✓	○	○	○
1/14	1-0-0050-3204 SO. CAL. GAS	SAN SEVAINE 1-400/2	4" GAS LINE INSTALLATION	WAIVED	○	✓	WAIVED	○	✓	○	✓

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1/20	2-0-0498-3205 SUNESYS 3205 & 3210	TEMESCAL CH. 2-325/2	ELECTRICAL CONDUIT INSTALL	✓		✓	✓	✓	✓ CLOSED		N/A
1/20	2-0-0070-3206 SUNESYS 3206 & 3211	OAK ST. CH. 2-250/A1	ELECTRICAL CONDUIT INSTALL	✓		✓	✓	✓	✓ CLOSED		N/A
1/20	1-0-0230-3207 SUNESYS	SUNNY BASIN 1-347/3	ELECTRICAL CONDUIT INSTALL	✓		✓	✓	✓	✓ CLOSED		N/A
1/20	4-0-0010-3208 SUNESYS 3208 & 3209	MARCH AFB CAT A 4-101/2	ELECTRICAL CONDUIT INSTALL	✓		✓	✓	●			
1/20	4-0-0009-3209 SUNESYS 3208 & 3209	PERRIS CAT B 4-791/4	ELECTRICAL CONDUIT INSTALL	✓		✓	✓	✓			
1/20	2-0-0110-3210 SUNESYS 3205 & 3210	EL CERRITO CH. 2-73/3	ELECTRICAL CONDUIT INSTALL	✓		✓	✓		✓ CLOSED		N/A
1/20	2-0-0200-3211 SUNESYS 3206 & 3211	MAIN ST CANYON WATERSHED S.O. 2 2-143/10	ELECTRICAL CONDUIT INSTALL	✓		✓	✓	✓			
1/20	1-0-0078-3212 COUNTY REDEVELOPMENT	CENTER ST. STORM DRAIN 1-582/41,43,&44	8", 10", & 12" SEWER LINES	WAIVED			WAIVED				
1/21	1-0-0010-3213 LENNAR HOMES	PERRIS VALLEY	TEMPORARY BRIDGE	✓			✓				
1/27	4-0-0505-3214 SUNESYS	PERRIS VALLEY LIN. 5 4-585/11	FIBER OPTIC CABLE	✓		✓	✓	✓			

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1/27	1-0-0250-3215 JCSD	DAY CREEK 1-499/8	12" WELL DRAIN	✓	○	✓	✓	●	○	○	N/A
1/28	1-0-0060-3216 SHUR-STEP CORPORATION	SANTA GERTRUDIS 1-150/485	BLOCK WALL REPAIR	✓	○	✓	✓	✓	✓	○	N/A
1/29	1-0-0142-3217 WEST RIV. VETERINARY HOSPITAL	RUBIDOUX SD 1-290/19,24-29	PARCEL MAP 35546 18" RCP CONNECTION	✓	○	✓	✓	●	○	○	○
2/18	1-0-0193-3218 RCTC	MAGNOLIA CENTER STORM DRAIN 1-266/6	POTHOLING OF STORM DRAIN	✓	○	✓	✓	✓	○	○	N/A
2/19	6-0-00010-3219 CATHEDRAL CITY	CATHEDRAL CYN. LEVEE 6-347/8-9	GRADING FOR ADJACENT PARKING LOT.	✓	○	✓	✓	●	○	○	○
3/2	4-0-0260-3220 LHMWD	LITTLE LAKE BASIN 4-273/5	TEMPORARY WATER DISCHARGE	WAIVED	○	✓	WAIVED	✓	✓	○	N/A
3/18	2-0-0110-3221 RIVERSIDE EDA	EL CERRITO 2-73/3	3-24" RCP CONNECTIONS	WAIVED	○	✓	WAIVED	✓	✓	○	●
3/20	0-0-0000-3222 CITY OF RIVERSIDE	N/A N/A	UNDERGROUND ELECTRICAL INSTALLATION	WAIVED	○	✓	WAIVED	✓	○	○	N/A
3/20	4-0-0360/0762-3223 SCE	SUNNYMEAD LINES MORENO LINE I 4-458/8 4-904/3	ELECTRICAL CONDUIT INSTALLATION	✓	○	✓	✓	●	○	○	○
3/20	6-0-0010-3224 CATHERAL CITY	E. CATHEDRAL CYN.	MAINTENANCE RD. ACCESS RAMP	✓	○	✓	✓	●	○	○	○

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3/26	1-0-0245-3225 W.C. BUTLER	DAY CREEK 1-575/	24"&36" CONNECTION	✓	○	✓	✓	●	○	○	○
4/6	2-0-0150-3226 CORONA-NORCO SCHOOL	SOUTH NORCO 2-102/11	PEDESTRIAN BRIDGE	✓	○	✓	✓	✓	○	○	○
4/20	4-0-0506-3227 SUNESYS	PERRIS VALLEY LINE K1 & K1-6 4-575/3-5	FIBER OPTIC CABLE INSTALL.	✓	○	✓	✓	○	✓	○	●
5/1	7-0-0054-3228 LDS	TEMECULA CREEK RD. STORM DRAIN 7-378/4	24" RCP CONNECTION	✓	○	○	✓	○	○	○	○
5/6	3-0-0040-3229 CITY OF LAKE ELSINORE	ELSINORE OUTLET	RIVERWALK	✓	○	○	✓	○	○	○	○
5/11	4-0-0105/0203-3230 CITY OF MORENO VALLEY	SUNNYMEAD LINES B-13 & H-9 4-459/6 4-666/8	24" RCP CONNECTIONS	✓	○	○	✓	○	○	○	○
5/29	4-0-0030-3231 COUNTY TRANSPORTATION	BAUTISTA 4-234/16	PEDESTRIAN BRIDGE	WAIVED	○	✓	WAIVED	●	○	○	○
6/3	4-0-0215-3232 CITY OF HEMET	HEMET MDP LINE A-3 4-551/3	2-12" HDPE CONNECTIONS	✓	○	✓	✓	○	✓	○	●
2009 6/30	7-0-0060-3233 GEOCON INLAND EMPIRE	SANTA GERTRUDIS 7-102/2-7	14 SOIL BORINGS	✓	○	✓	✓	●	○	○	N/A
7/13	4-0-0260-3234 LAKE HEMET WATER DISTRICT	LITTLE LAKE BASIN 4-273/2	GROUND WATER PERCOLATION	WAIVED	○	✓	WAIVED	✓	✓	○	N/A

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

ENCROACHMENT PERMIT INFORMATION SHEET

Applicants: Please note that the following information and documents **MUST** be submitted with your application in order for the Riverside County Flood Control and Water Conservation District (District) to begin processing your request for an encroachment permit. Failure to submit all documentation as described below will delay the processing of your application:

1. Completed Check List (attached) with all applicable items addressed.

2. Completed and signed Application Form (attached).

3. Two sets of approved and signed plans for the proposed work.

4. One copy of the District as-built drawing(s) clearly showing the proposed work to be done under the requested encroachment permit. As-built drawings can be purchased from the District's Reproduction Section (951.955.1221).

5. A check or money order written for the appropriate fee amount to be deposited. (Please refer to the attached Encroachment Permit Fee Deposit Requirement Sheet.) Fees will be placed in an individual account and all District costs will be tracked as work is performed. If the balance in the account drops under 25% of the original deposit and the General Manager-Chief Engineer determines that the remaining amount is insufficient to complete the processing of the application (including environmental review, inspection and finalization of the project), the applicant will be required to submit an additional deposit prior to continuing to work on the application or proceeding with any further work on the project. Further inspections will not be scheduled until the additional deposit is submitted. Once a project is completed and accepted by the District, all unused funds will be refunded to the applicant within 60 days. All applicants, including public entities, must submit the required fee.

6. A copy of the approved and filed California Environmental Quality Act (CEQA) document (e.g., Notice of Exemption, Negative Declaration, Mitigated Negative Declaration/Initial Study, Environmental Impact Report and Statement of Overriding Consideration) as prepared by the Lead Agency for the proposed project shall be submitted to the District. The CEQA document is usually available from the City or County Planning Department that originally approved the proposed project. The District, as a CEQA Responsible Agency, must prepare the appropriate CEQA document for the proposed project prior to issuance of the requested encroachment permit.

7. Proof of prior compliance with the approved Western Riverside County Multiple Species Habitat Conservation Plan (MSHCP) must be submitted to the District for proposed projects with the boundaries of the MSHCP. For projects previously approved by the County or Cities, this proof may consist of written documentation from the applicable jurisdiction confirming compliance with the MSHCP. Documentation concerning payment of the MSHCP Mitigation Fee alone is not sufficient. The District must receive written documentation specifically confirming compliance with Sections 6.1.2, 6.1.3, 6.1.4 and 6.3 of the MSHCP as well as the Criteria if the project is located within the Criteria Area/Cell. Encroachment Permits associated with a project not previously reviewed by the County or a City for MSHCP compliance or Encroachment Permits not associated with any project that are located within the boundaries of the MSHCP will need to be reviewed for compliance with the requirements of the MSHCP by the District prior to issuance of the requested Encroachment Permit. The issuance of an Encroachment Permit by the District is a discretionary action subject to compliance with the MSHCP.

8. NPDES REQUIREMENTS: Encroachment permit applications associated with new or redevelopment projects proposing to discharge stormwater or non-stormwater into District facilities must identify the structural and non-structural best management practices (BMPs) to mitigate water quality impacts from the proposed project.

    a. ENCROACHMENT PERMITS WITHIN THE SANTA ANA OR SANTA MARGARITA WATERSHEDS: Projects within the Santa Margarita and Santa Ana watershed regions of Riverside County must meet the requirements of Section 6 of the Riverside County Drainage Area Management Plan (DAMP) for the Santa Margarita and Santa Ana watershed regions of Riverside County (SA/SM DAMP). Encroachment permit applications for projects that meet the definition of new development or significant redevelopment per Section 6 of the SA/SM DAMP may demonstrate compliance by providing proof of completion of a project-specific Water Quality Management Plan (WQMP). Projects that do not meet the definition of new development or significant redevelopment per Section 6 of the SA/SM DAMP must demonstrate compliance with the structural and non-structural BMPs requirements specified for other development projects per the requirements of Section 6.4.4 of the SA/SM DAMP. Submittal of plans identifying the locations of post-construction BMPs can be used to demonstrate compliance with this requirement.

    b. Projects within the Whitewater Region of Riverside County must demonstrate compliance with Supplement A to the Riverside County DAMP for the Whitewater Region (WW DAMP). This may be accomplished by submitting plans demonstrating the location of approved post-construction BMPs, or by submitting conditions of approval requiring compliance with Supplement A.

    c. Encroachment permit applicants not associated with new or redevelopment projects who discharge stormwater or non-stormwater to District facilities must identify the necessary structural and non-structural BMPs to mitigate water quality impacts from the proposed project. The applicant must complete the Application for Third-Party Discharge to the District Facilities. The application form is available on-line at www.floodcontrol.co.riverside.ca.us/waterqualitynpdes.asp. It may be advisable to contact the NPDES representative listed on the form to determine what, if any, water quality sampling data may be needed to process the application.

9. STORM DRAIN CONNECTIONS, BRIDGES AND CULVERT CROSSINGS: Hydrology and hydraulic calculations prepared and signed by a Registered Civil Engineer must be submitted with all applications for storm drain connections, bridges and culvert crossings. The maximum confluence angle at the junction of a lateral storm drain and mainline channel shall be 45 degrees. A hydraulic junction analysis must be done if the lateral flowrate is greater than 25% of the mainline flowrate. The hydraulic grade line, flow rate, and velocity shall be shown on the storm drain profile drawing. Only reinforced concrete pipe (RCP minimum 1500D) will be approved within District right of way.

10. EXCESS MATERIAL REMOVAL: Excess material removal shall be approved by the District's Chief of Operations and Maintenance, prior to submitting the encroachment permit application. An inspection fee for a minimum of $0.35 per cubic yard will take effect when the permit is issued and is payable to the District monthly or as specified in the encroachment permit.

    a. Applicants requesting encroachment permits for the removal of excess material from District facilities must also submit a Storm Water Pollution Prevention Plan (SWPPP) per the requirements of the appropriate Regional Water Control Board. A copy of the SWPPP shall be provided and approved by the District prior to receiving the requested encroachment permit. A SWPPP template and guidance on the preparation of a SWPPP can be downloaded from the California Association of Stormwater Quality Agencies (CASQA) website at http://www.cabmphandbooks.com/Construction.asp.

b. Applicants requesting encroachment permits for the removal of excess material from District facilities must also submit a fugitive dust control plan (DCP) per the requirements of the Air Quality Management District or local ordinances, as required. A copy of the DCP shall be provided and approved by the District prior to receiving the requested encroachment permit. DCP Handbooks for the Coachella Valley region can be downloaded from the Coachella Valley Association of Governments at http://www.cvag.org/depts/hcr.htm.

11. The applicant shall accept full responsibility for obtaining and complying with all applicable provisions of the appropriate regulatory permits. If the requested encroachment permit is for facilities that will be ultimately maintained by the District, the regulatory permits shall address both the construction and maintenance activities of these facilities in compliance with all applicable Federal, State and local regulations. These regulatory permits include, but are not limited to: a Section 404 Permit issued by the U.S. Army Corps of Engineers in compliance with Section 404 of the Clean Water Act, a California State Department of Fish and Game Streambed Alteration Agreement in compliance with the Fish and Game Code Sections 1600 et seq., and a 401 Water Quality Certification or a Report of Waste Discharge Requirements in compliance with Section 401 of the Clean Water Act or State Porter-Cologne Water Quality Act, respectively, from the appropriate Regional Water Quality Control Board. A general permit for discharges shall be obtained from the State Water Resources Control Board or Regional Water Quality Control Board as applicable for discharges of storm water associated with construction activity. The applicant shall also be responsible for complying with all mitigation measures as required under CEQA and all Federal, State, and local environmental rules and regulations. A copy of the above mentioned permits shall be submitted to the District for review and approval for all facilities that will ultimately be maintained by the District prior to District issuance of the requested encroachment permit. For projects that will not be maintained by the District a copy of the above mentioned permits shall be submitted to the District for the encroachment permit file. Mitigation measures may not be placed within District rights of way without prior approval from the General Manager–Chief Engineer.

12. ADDITIONAL DEPOSIT - If the District determines that survey monuments are located in the area of work, an additional deposit will be required to cover the cost of replacing any survey monuments that may be disturbed. District survey crews will replace monuments. A map will be provided to the applicant showing locations of survey monuments involved.

Requirements Due Prior to the Issuance of the Encroachment Permit

Prior to the issuance of the encroachment permit, the applicant or the contractor performing the work shall furnish a certificate of insurance specifying comprehensive liability limits of $2,000,000 per occurrence and $2,000,000 general aggregate. The applicant, the District, the County of Riverside, and any municipal corporation within which the work is to be performed, shall each be named as an additional insured. Alternatively, comprehensive liability limits shall be $1,000,000 per occurrence, with $2,000,000 general aggregate and a minimum of $2,000,000 excess liability. This insurance shall remain in effect for the duration of the work. Please reference the encroachment permit number (shown on your receipt for the initial deposit) on the certificate of insurance.

Additional Information

1. Please contact the District's Permit Engineer at 951.955.1266 if you have any questions or need any additional information.

2. Processing time for a typical encroachment permit (if all required information is submitted with the initial application) is approximately 30 working days.

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

ENCROACHMENT PERMIT CHECK LIST

Applicant Name: _____

Address: _____

_____

Contact Number: _____

1. _____ Completed and signed Application Form

2. _____ Check or Money Order written for the appropriate deposit

3. _____ Signed and approved plans for the proposed work (2 Sets)

4. _____ District as-built drawing(s) clearly marked to show the proposed work

5. _____ Copy of the Lead Agency's approved and filed CEQA documents

6. _____ Proof of compliance with the Western Riverside MSHCP (if proposed work is within the MSHCP boundary)

7. _____ Proof of NPDES Compliance

8. _____Hydrology and Hydraulic Calculations (if for a storm drain connection, bridge or culvert crossing)

Regulatory Permits (if appropriate)

8. _____Streambed Alteration Agreement from the California Department of Fish and Game

9. _____Section 404 Authorization from the U.S. Army Corps of Engineers

10. _____Section 401 Water Quality Certification from the appropriate Regional Water Quality Control Board

Encroachment Permits for the Removal of Excess Material

11. _____ Dust Control Plan

12. _____ Stormwater Pollution Prevention Plan

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

ENCROACHMENT PERMIT FEE DEPOSIT REQUIREMENTS
Effective December 23, 2004

Note: Per Ordinance No. 19 the Filing Fee for each encroachment permit shall be $500, with the exception of a permit for access to adjacent properties which shall be $250. This fee is non-refundable and will be deducted from the initial deposit.

STORM DRAIN CONNECTIONS

(a) 0" to 60" diameter

Initial Deposit (including non-refundable Filing Fee)..... $2,000.00

(b) Over 60" will be considered as major construction.
(See below)

ACCESS TO ADJACENT PROPERTY VIA DISTRICT FACILITY WITH TEMPORARY FENCE REMOVAL

(a) Initial Deposit (including non-refundable Filing Fee)..... $750.00

UTILITY CROSSINGS

(a) Underground Initial Deposit (including non-refundable Filing Fee) $2,000.00

(b) Aerial Initial Deposit (including non-refundable Filing Fee)..... $2,000.00

PARALLEL UTILITIES

(a) Underground Initial Deposit (including non-refundable Filing Fee) $2,000.00

(b) Aerial Filing Fee (including non-refundable Filing Fee) $2,000.00

MAJOR CONSTRUCTION

(a) Initial Deposit (including non-refundable Filing Fee)..... $3,000.00

EXCESS MATERIAL REMOVAL

(a) Initial Deposit (including non-refundable Filing Fee)..... $2,000.00
Inspection Fee - Per Cubic Yard Removed $0.35 (Minimum)

MISCELLANEOUS ENCROACHMENT (Any situation not covered above)

(a) Miscellaneous Filing Fee (including non-refundable Filing Fee) $2,000.00

NOTE: NO WORK SHALL COMMENCE WITHIN DISTIRCT RIGHT OF WAY PRIOR TO OBTAINING AN ENCROACHMENT PERMIT. IN SUCH EVENT, THE APPLICANT/OWNER MAY BE REQUIRED TO REMOVE ALL WORK WITHIN DISTRICT RIGHT OF WAY AND RESTORE THE SITE TO PRE-PROJECT CONDITION AT THE APPLICANT/OWNER'S EXPENSE. IF AT THE DESCRETION OF THE GENERAL MANAGER – CHIEF ENGINEER, AN ENCROACHMENT PERMIT IS SUBSEQUENTLY ISSUED THE APPLICANT/OWNER WILL BE REQUIRED TO PAY A $1000 PENALTY FEE (NON-REFUNDABLE) IN ADDITION TO ALL OTHER DEPOSITS WHICH WILL BE REQUIRED AS STIPULATED HEREIN.

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

APPLICATION FOR ENCROACHMENT PERMIT

TO: Riverside County Flood Control
and Water Conservation District
Encroachment Permit Section
1995 Market Street
Riverside, California 92501

Date: _____

The undersigned hereby applies for an encroachment permit to perform the following work within Riverside County Flood Control and Water Conservation District (District) right of way:
Please describe the work proposed to be done within District right of way. (Use extra sheets if necessary.)

_____
_____
_____
_____

Location of proposed work (Specify City, Township, Range, Section):_____
_____

Name and Project Number of District Facility impacted by the proposed work:_____
_____

Estimated duration of construction for proposed project:_____working days.

Applicant agrees to do the work in accordance with all pertinent District rules and regulations and that the proposed work as shown on the attached drawings will be subject to inspection and approval. (Refer to the Encroachment Permit Information Sheet for details on the complete submittal required.)

Applicant acknowledges and understands that construction within District rights of way will, in all likelihood, not be permitted from October 31st through March 31st due to seasonal constraints. Further, Applicant acknowledges that weather and/or flow conditions may necessitate the District, at its sole discretion, to delay or suspend Applicant's work at any time of the year in the interest of public health and safety. Moreover, Applicant appreciates the significance of these seasonal constraints, and understands and agrees to adjust all scheduling accordingly.

Agency Requiring Work (if different than Applicant)	Applicant:
_____	_____
Signature	Signature
_____	_____
Print Name and Title	Print Name and Title
_____	_____
Agency Name	Company Name
_____	_____
Address	Address
_____	_____
_____	_____
Telephone number	Telephone number

SECTION 6 - SPECIAL REQUIREMENTS

6.1 National Pollutant Discharge Elimination System (NPDES) –

Determine which watershed then: choose 1, 2 or 3 for construction site ≥1 acres; choose 4, 5 or 6 for construction site <1 acres.

1. Whitewater River Watershed

The Contractor shall comply with the requirements of Board Order No. R7-2008-0001 (NPDES No. CAS617002), NPDES Area-Wide Municipal Storm Water Permit, hereafter referred to in this Section as the "Permit", issued by the California Regional Water Quality Control Board (CRWQCB) – Colorado River Basin Region. This Permit regulates both stormwater and non-stormwater discharges associated with Contractor's construction activities. The Contractor shall prepare and implement a Stormwater Pollution Prevention Plan (SWPPP) in accordance with Section 29 "Stormwater and Non-Stormwater Pollution Control" of the Detailed Specifications.

The Contractor's attention is directed to: 1) Section 29.2 "General Requirements" which allows the Engineer to withhold progress payments if the Contractor fails to fully implement Section 29 "Stormwater and Non-Stormwater Pollution Control" or is deemed to be in non-compliance with the provisions of the Permit; 2) Section 29.3 "Stormwater Pollution Prevention Plan Preparation and Approval" which requires that a SWPPP be prepared and approved prior to the Pre-Construction meeting; and 3) Section 29.7 "SWPPP Implementation" which allows the Engineer to suspend construction operations if the Contractor fails to implement the approved SWPPP and any amendments thereto.

2. Santa Ana Watershed

The Contractor shall comply with the requirements of Board Order No. R8-2002-0011 (NPDES No. CAS618033), NPDES Area-Wide Municipal Stormwater Permit, hereafter referred to in this Section as the "Permit", issued by the California Regional Water Quality Control Board (CRWQCB) – Santa Ana Region. This Permit regulates both stormwater and non-stormwater discharges associated with Contractor's construction activities. The Contractor shall prepare and implement a Stormwater Pollution Prevention Plan (SWPPP) in accordance with Section 29 "Stormwater and Non-Stormwater Pollution Control" of the Detailed Specifications.

The Contractor's attention is directed to: 1) Section 29.2 "General Requirements" which allows the Engineer to withhold progress payments if the Contractor fails to fully implement Section 29 "Stormwater and Non-Stormwater Pollution Control" or is deemed to be in non-compliance with provisions of the Permit; 2) Section 29.3 "Stormwater Pollution Prevention Plan Preparation and Approval" which requires that a SWPPP be prepared and approved prior to the Pre-Construction meeting; and 3) Section 29.7 "SWPPP Implementation" which allows the Engineer to suspend construction operations if the Contractor fails to implement the approved SWPPP and any amendments thereto.

3. Santa Margarita Watershed

The Contractor shall comply with the requirements of Board Order No. R9-2004-001 (NPDES No. CAS0108766), NPDES Municipal Separate Storm Sewer Systems (MS4s), hereafter referred to in this Section as the "Permit", issued by the California Regional Water Quality Control Board (CRWQCB) – San Diego Region and the requirements of Section 5.2 of the District's Santa Margarita Region Storm Water Management Plan, referred to as "District SWMP". The Permit and District SWMP regulates both stormwater and non-stormwater discharges associated with Contractor's construction activities. The Contractor shall prepare and implement a Stormwater Pollution Prevention Plan (SWPPP) in accordance with Section 29 "Stormwater and Non-Stormwater Pollution Control" of the Detailed Specifications.

The Contractor's attention is directed to: 1) Section 29.2 "General Requirements" which allows the Engineer to withhold progress payments if the Contractor fails to fully implement Section 29 "Stormwater and Non-Stormwater Pollution Control" or is deemed to be in non-compliance with provisions of the General Permit; 2) Section 29.3 "Stormwater Pollution Prevention Plan Preparation and Approval" which requires that a SWPPP be prepared and approved prior to the Pre-Construction meeting; and 3) Section 29.7 "SWPPP Implementation" which allows the Engineer to suspend construction operations if the Contractor fails to implement the approved SWPPP and any amendments thereto.

****** Choose 4, 5 or 6 for construction site < 1 acre ******

4. Whitewater River Watershed

The Contractor shall comply with the requirements of Board Order No. R7-2008-0001 (NPDES No. CAS617002), NPDES Area-Wide Municipal Storm Water Permit, hereafter referred to in this Section as the "Permit", issued by the California Regional Water Quality Control Board (CRWQCB) – Colorado River Basin Region. This Permit regulates stormwater discharges associated with construction activities performed under the direction of a municipal stormwater permittee. The Contractor shall prepare and implement a Pollution Prevention Plan (PPP) in accordance with Section 29 "Stormwater and Non-Stormwater Pollution Control" of the Detailed Specifications.

The Contractor's attention is directed to: 1) Section 29.2 "General Requirements" which allows the Engineer to withhold progress payments if the Contractor fails to fully implement Section 29 "Stormwater and Non-Stormwater Pollution Control" or is deemed to be in non-compliance with provisions of the Permit; 2) Section 29.3 "Pollution Prevention Plan Preparation and Approval" which requires that a PPP be prepared and approved prior to the Pre-Construction meeting; and 3) Section 29.5 "Pollution Prevention Plan Implementation" which allows the Engineer to suspend construction operations if the Contractor fails to implement the approved PPP and any amendments thereto.

Throughout the term of this contract, the total soil-disturbed area of the project site shall be no more than 1 acre.

5. Santa Ana Watershed

The Contractor shall comply with the requirements of Board Order No. R8-2002-0011 (NPDES No. CAS618033), NPDES Area-Wide Municipal Stormwater Permit, hereafter referred to in this Section as the "Permit", issued by the California Regional Water Quality Control Board (CRWQCB) – Santa Ana Region. This Permit regulates stormwater discharges associated with construction activities performed under the direction of a municipal stormwater permittee. The Contractor shall prepare and implement a Pollution Prevention Plan (PPP) in accordance with Section 29 "Stormwater and Non-Stormwater Pollution Control" of the Detailed Specifications.

The Contractor's attention is directed to: 1) Section 29.2 "General Requirements" which allows the Engineer to withhold progress payments if the Contractor fails to fully implement Section 29 "Stormwater and Non-Stormwater Pollution Control" or is deemed to be in non-compliance with provisions of the Permit; 2) Section 29.3 "Pollution Prevention Plan Preparation and Approval" which requires that a PPP be prepared and approved prior to the Pre-Construction meeting; and 3) Section 29.5 "Pollution Prevention Plan Implementation" which allows the Engineer to suspend construction operations if the Contractor fails to implement the approved PPP and any amendments thereto.

Throughout the term of this contract, the total soil-disturbed area of the project site shall be no more than 1 acre.

6. Santa Margarita Watershed

The Contractor shall comply with the requirements of Board Order No. R9-2004-001 (NPDES Permit No. CAS0108766) NPDES Municipal Separate Storm Sewer System Permit (MS4s), hereafter referred to in this Section as the "Permit", issued by the California Regional Water Quality Control Board (CRWQCB) – San Diego Region. This Permit regulates stormwater discharges associated with construction activities performed under the direction of a municipal stormwater permittee. The Contractor shall prepare and implement a Pollution Prevention Plan (PPP) in accordance with Section 29 "Stormwater and Non-Stormwater Pollution Control" of the Detailed Specifications.

The Contractor's attention is directed to: 1) Section 29.2 "General Requirements" which allows the Engineer to withhold progress payments if the Contractor fails to fully implement Section 29 "Stormwater and Non-Stormwater Pollution Control" or is deemed to be in non-compliance with provisions of the Permit; 2) Section 29.3 "Pollution Prevention Plan Preparation and Approval" which requires that a PPP be prepared and approved prior to the Pre-Construction meeting; and 3) Section 29.5 "Pollution Prevention Plan Implementation" which allows the Engineer to suspend construction operations if the Contractor fails to implement the approved PPP and any amendments thereto.

Throughout the term of this contract, the total soil-disturbed area of the project site shall be no more than 1 acre.

SECTION 29 – STORMWATER AND NON-STORMWATER POLLUTION CONTROL

For construction site **≥ 1** acre, choose 1, 2 or 3 (SWPPP) **with** Appendix; - **OR** -

For construction site **< 1** acre, choose 4 (PPP) – **no** Appendix.

1. Santa Ana Watershed

29.1 Description – The contract item Stormwater and Non-Stormwater Pollution Control shall include preparing, obtaining approval of, amending and implementing the Stormwater Pollution Prevention Plan (SWPPP) as required by the State Water Resources Control Board (SWRCB) and the California Regional Water Quality Control Board (CRWQCB) - Santa Ana Region.

The SWPPP shall identify site specific Best Management Practices (BMPs) to be implemented during and after construction to minimize the potential pollution of stormwater runoff and receiving waters. The identified BMPs shall be practices designed to minimize or eliminate the discharge of pollutants from the construction site and Contractor's construction activities, including, but not limited to:

1. Good housekeeping practices for solid and sanitary/septic waste management, vehicle and equipment cleaning/maintenance, and material handling and storage.

2. Construction procedures such as stabilized construction access points, scheduling/phasing to minimize areas of soil disturbance, soil stabilization and erosion/sediment control.

The SWPPP shall also stipulate an ongoing program for monitoring and maintenance of all BMPs.

29.2 General Requirements – All activities performed by the Contractor for this project shall conform to the requirements of the State-wide National Pollutant Discharge Elimination System (NPDES) General Permit (Permit No. CAS000002) for Stormwater Discharges Associated with Construction and Land Disturbance Activities, hereafter referred to as the "General Permit", issued by the SWRCB. This General Permit regulates both stormwater and non-stormwater discharges associated with Contractor's construction activities. A copy of this General Permit is included as Appendix "D" of these Specifications.

In the event the District incurs any Administrative Civil Liability or Mandatory Minimum (fine) imposed by the CRWQCB - Santa Ana Region, as a result of Contractor's failure to fully implement the provisions of this section and permit requirements, "Stormwater and Non-Stormwater Pollution Control", the Engineer may, in the exercise of his sole judgment and discretion, withhold from payments otherwise due Contractor a sufficient amount to cover the Civil Liability. Liability may be in an amount up to $32,500 per day per deemed occurrence.

Also insert *** portion found after 3. verbiage.

2. Santa Margarita Watershed

29.1 Description – The contract item Stormwater and Non-Stormwater Pollution Control shall include preparing, obtaining approval of, amending and implementing the Stormwater Pollution Prevention Plan (SWPPP) as required by the State Water Resources Control Board (SWRCB),

the California Regional Water Quality Control Board (CRWQCB) - San Diego Region and by the District's Santa Margarita Region Stormwater Management Plan (District SWMP).

The SWPPP shall identify site specific Best Management Practices (BMPs) to be implemented during and after construction to minimize the potential pollution of stormwater runoff and receiving waters. The identified BMPs shall be practices designed to minimize or eliminate the discharge of pollutants from the construction site and Contractor's construction activities, including, but not limited to:

1. Good housekeeping practices for solid and sanitary/septic waste management, vehicle and equipment cleaning/maintenance, and material handling and storage.

2. Construction procedures such as stabilized construction access points, scheduling/phasing to minimize areas of soil disturbance, soil stabilization and erosion/sediment control.

3. Incorporating the minimum BMPs identified in Section 5.2 of the District's SWMP.

The SWPPP shall also stipulate an ongoing program for monitoring and maintenance of all BMPs.

29.2 General Requirements – All activities performed by the Contractor for this project shall conform to the requirements of the State-wide National Pollutant Discharge Elimination System (NPDES) General Permit (Permit No. CAS000002) for Stormwater Discharges of Associated with Construction and Land Disturbance Activities, hereafter referred to as the "General Permit", issued by the SWRCB. This General Permit regulates both stormwater and non-stormwater discharges associated with Contractor's construction activities. A copy of this General Permit is included as Appendix "D" of these Specifications.

In the event the District incurs any Administrative Civil Liability or Mandatory Minimum (fine) imposed by the CRWQCB – San Diego Region, as a result of Contractor's failure to fully implement the provisions of this section and permit requirements, "Stormwater and Non-Stormwater Pollution Control", the Engineer may, in the exercise of his sole judgment and discretion, withhold from payments otherwise due Contractor a sufficient amount to cover the Civil Liability. Liability may be in an amount up to $32,500 per day per deemed occurrence.

Also insert *** text portion found after 3. verbiage.

3. Whitewater River Watershed

29.1 Description – The contract item Storm Water and Non-Storm Water Pollution Control shall include preparing, obtaining approval of, amending and implementing the Storm Water Pollution Prevention Plan (SWPPP) as required by the State Water Resources Control Board

(SWRCB) and the California Regional Water Quality Control Board (CRWQCB) - Colorado River Basin Region.

The SWPPP shall identify site specific Best Management Practices (BMPs) to be implemented during and after construction to minimize the potential pollution of stormwater runoff and receiving waters. The identified BMPs shall be practices designed to minimize or eliminate the discharge of pollutants from the construction site and Contractor's construction activities, including, but not limited to:

1. Good housekeeping practices for solid and sanitary/septic waste management, vehicle and equipment cleaning/maintenance, and material handling and storage.

2. Construction procedures such as stabilized construction access points, scheduling/phasing to minimize areas of soil disturbance, soil stabilization and erosion/sediment control.

3. Measures to control debris disposal, releases of sediment laden liquids, spills, leakage, and dumping, and to prevent illicit connections during construction must be addressed through structural as well as non-structural BMPs.

4. Staff must be trained in stormwater management.

The SWPPP shall also stipulate an ongoing program for monitoring and maintenance of all BMPs.

29.2 General Requirements – All activities performed by the Contractor for this project shall conform to the requirements of the State-wide National Pollutant Discharge Elimination System (NPDES) General Permit (Permit No. CAS000002) for Discharges of Stormwater Runoff Associated with Construction Activity, hereafter referred to as the "General Permit", issued by the SWRCB. This General Permit regulates both stormwater and non-stormwater discharges associated with Contractor's construction activities. A copy of this General Permit is included as Appendix "D" of these Specifications.

The project must comply with State Water Resources Control Board (SWRCB) Order No. 99-08-DWQ (Permit No. CAS000002) Waste Discharge Requirements for Discharges of Storm Water Runoff Associated with Construction Activity through June 30, 2010. Beginning July 1, 2010, the project must comply with Order No. 2009-0009-DWQ which was adopted on September 2, 2009.

Please note that Permit Registration Documents (PRDs) required by the new Order will need to be submitted well in advance of the July 1, 2010 Permit implementation date. The District will coordinate the submittal of the PRDs with the Contractor as the date approaches if necessary.

Another requirement of this new General Permit is the Training Qualifications and Certification Requirements found in Section VII of the Order. SWPPPs will need to be written, amended and

certified by a Qualified SWPPP Developer (QSD) and all BMPs required by the Permit are to be implemented by a Qualified SWPPP Practitioner (QSP). The Contractor should familiarize itself, and comply with the new Permit Training Qualifications and Certification Requirements prior to the July 1, 2010 implementation date.

In the event the District incurs any Administrative Civil Liability or Mandatory Minimum Penalty (fine) imposed by the CRWQCB – Colorado River Basin Region, as a result of Contractor's failure to fully implement the provisions of this section and permit requirements, "Stormwater and Non-Stormwater Pollution Control", the Engineer may, in the exercise of his sole judgment and discretion, withhold from payments otherwise due Contractor a sufficient amount to cover the Civil Liability. Liability may be in an amount up to $32,500 per day per deemed occurrence.

Also insert *** text portion found after 3. verbiage.

***** After 29.2 insert the following (same for all watersheds)**

Stormwater and Non-Stormwater Pollution Control work shall conform to the requirements in the latest version of the California Stormwater Quality Association (CASQA) Handbook, entitled **"California Stormwater BMP Handbook – Construction"**. A copy of the "California Stormwater BMP Handbook – Construction", hereafter referred to as the "CASQA Handbook", may be obtained from CASQA, Post Office Box 2105, Menlo Park, California 94026-2105. Telephone: 650.366.1042. Copies of the handbook can also be downloaded from the CASQA Internet site at http://www.cabmphandbooks.com/construction.asp. In addition, a copy of the CASQA Handbook is available for review at the District's office.

The Contractor shall be responsible for all costs and for any liability imposed by law as a result of the Contractor's failure to comply with the requirements set forth in this section, "Stormwater and Non-Stormwater Pollution Control", including but not limited to, compliance with the applicable provisions of the CASQA Handbook, General Permit, Federal, State and local regulations. For the purpose of this paragraph, costs and liabilities include, but are not limited to, fines, penalties and damages whether assessed against the District or the Contractor, including those levied under the Federal Clean Water Act and the State Porter-Cologne Water Quality Act.

The Contractor shall become fully informed of and comply with the applicable provisions of the CASQA Handbook, General Permit, Federal, State and local regulations that govern the Contractor's activities and operation pertaining to both stormwater and non-stormwater discharges from both the project site and areas of disturbance outside the project limits during construction. The Contractor shall, at all times, keep copies of the General Permit, approved SWPPP and all amendments at the project site. The SWPPP shall be made available upon request of a representative of the SWRCB, CRWQCB, United States Environmental Protection Agency (USEPA) or local stormwater management agency. Requests by the public shall be directed to the Engineer.

The Contractor is solely and exclusively responsible for any arrangements made between the Contractor and other property owners or entities that results in disturbance of areas or construction activities being conducted outside limits of the designated rights-of-way and temporary construction easements as shown on the project drawings.

The Contractor shall, at reasonable times, allow authorized agents of the CRWQCB, SWRCB, USEPA or local stormwater management agency, upon the presentation of credentials and other documents as may be required by law, to:

1. Enter upon the construction site and the Contractor's facilities pertinent to the work;
2. Have access to and copy any records required to be kept as specified in the General Permit;
3. Inspect the construction site, including any offsite staging areas or material storage areas, and related soil stabilization practices and sediment control BMPs; and
4. Sample or monitor for the purpose of ensuring compliance with the General Permit.

The Contractor shall notify the Engineer immediately upon request from regulatory agencies to enter, inspect, sample, monitor or otherwise access the project site or the Contractor's records.

29.3 Stormwater Pollution Prevention Plan Preparation and Approval - The Contractor shall prepare and obtain approval of the SWPPP as part of the Stormwater and Non-Stormwater Pollution Control work for this contract. The SWPPP shall include an appropriate sampling and analysis plan (SAP) as required by Section B, "Monitoring Program and Reporting Requirements", of the General Permit. A guidance document titled "Construction Storm Water Sampling and Analysis Guidance Document" is available from the California Stormwater Quality Association internet site at http://www.cabmphandbooks.com/Construction.asp. The Contractor shall prepare and implement the SWPPP in accordance with the CASQA Handbook and SAP, the General Permit and these Detailed Specifications.

In case of conflict between the CASQA Handbook and these Detailed Specifications, the Detailed Specifications shall govern; in case of conflict between these Detailed Specifications and the General Permit, the latter shall govern.

Within five (5) working days after the award of the contract, the Contractor shall submit two (2) copies of the SWPPP to the Engineer for review and approval. The Contractor shall allow ten (10) working days for the Engineer to review the SWPPP. If revisions are required as determined by the Engineer, the Contractor shall revise and resubmit the SWPPP within three (3) working days of receipt of the Engineer's comments and shall allow ten (10) working days for the Engineer to review the revisions. The Contractor shall submit four (4) copies of the approved SWPPP to the Engineer prior to the pre-construction meeting. **The Contractor must have an approved SWPPP prior to the pre-construction meeting**.

The objectives of the SWPPP shall be to identify all pollution sources associated with Contractor's construction activities that may adversely affect the quality of stormwater discharges; to identify all non-stormwater discharges; to identify, construct, implement and maintain water pollution control best management practices, hereafter referred to as "BMPs", to reduce to the maximum extent practicable pollutants in both stormwater discharges and authorized non-stormwater discharges from the construction site during construction and to develop a maintenance schedule for BMPs after construction is completed under this contract.

The SWPPP shall incorporate BMPs in each of the following categories:

1. Soil stabilization practices;
2. Sediment control practices;
3. Sediment tracking control practices;
4. Wind erosion control practices; and
5. Non-stormwater management, and waste management and disposal control practices.

Specific objectives and minimum requirements for each category of BMPs are described in the CASQA Handbook. The Contractor shall consider the objectives and minimum requirements presented in the CASQA Handbook for each of the above categories. When minimum requirements are listed for any category, the Contractor shall incorporate one or more of the listed minimum BMPs required into the SWPPP and implement on the project to meet the pollution control objectives for the category. In addition, the Contractor shall consider other BMPs presented in the CASQA Handbook to supplement the minimum BMPs required when necessary to meet the objectives of the SWPPP and maintain compliance with the General Permit. The Contractor shall document the selection process in accordance with the procedure specified in the CASQA Handbook.

The Contractor should not assume that the minimum BMPs required for each category presented in the CASQA Handbook are adequate to meet the pollution control objectives. The Contractor may use other effective BMPs, as approved by the Engineer, in addition to the minimum as required in the CASQA Handbook to achieve the pollution control objectives.

The SWPPP shall include the following items as described in the CASQA Handbook, SAP and General Permit:

1. Title Page;
2. Certification and Approval;
3. Table of Contents;
4. Description of Site;
5. Source Identification;
6. Stormwater and Non-Stormwater Pollution Control Drawings;
7. Erosion Control;
8. Stabilization;
9. Sediment Control;

10. Non-Stormwater Management;
11. Waste Management and Disposal;
12. Implementation of any approved local plans;
13 Development and Implementation of Monitoring Program
14. Maintenance, Inspection and Repair Program;
15. Training;
16. List of Contractors and Subcontractors;
17. Sampling and Analysis Plan;
18. Post-Construction Stormwater Management and Control Requirements;
19. Current Inventory of BMP related materials;
20. Mobilization Plan for BMP deployment;
21. A copy of the Notice Of Intent (NOI) form submitted by the District for this project;
22. A copy of the Waste Discharge Identification (WDID) number or proof of mailing of the NOI (provided by the District);
23. A copy of the General Permit;
24. A copy of other applicable Plans/Permits, if any;
25. Construction Site Inspection Checklist;
26. Pre/Post Storm Inspection Checklist;
27. Inspection Log;
28. A copy of the Amendments, if any;
29. Amendment Certification and Approval, if any;
30. Amendment Log;
31. Annual Compliance Certification;
32. BMPs Consideration Checklist; and
33. SWPPP Checklist.

To ensure that the preparation, implementation, and oversight of the SWPPP is sufficient for effective pollution prevention, individuals responsible for creating, revising, overseeing, and implementing the SWPPP should participate in applicable training programs and document such training in the SWPPP. A copy of the SWPPP should be located at the construction site.

The following notes (or notes of substantially similar intent) that address pollution prevention to the Maximum Extent Practicable during the construction phase of a project on a year-round basis needs to be placed on the Stormwater and Non-Stormwater Pollution Control Drawings:

- Erosion control BMPs shall be implemented and maintained to minimize and/or prevent the entrainment of soil in runoff from disturbed soil areas on construction sites.
- Sediment control BMPs shall be implemented and maintained to prevent and/or minimize the transport of soil from the construction site.
- Stockpiles of soil shall be properly contained to eliminate or reduce sediment transport from the site to streets, drainage facilities or adjacent properties via runoff, vehicle tracking or wind.

- Appropriate BMPs for construction-related materials, wastes, spills or residues shall be implemented to eliminate or reduce transport from the site to streets, drainage facilities or adjoining properties by wind or runoff.
- Runoff from equipment and vehicle washing shall be contained at construction sites and must not be discharged to receiving waters or the local storm drain system. Washwaters or rinsate from ready mix, concrete, or cement vehicles must be handled appropriately and may not be discharged to receiving waters or the any storm drain system.
- All construction contractor and subcontractor personnel are to be made aware of the required best management practices and good housekeeping measures for the project site and any associated construction staging areas.
- At the end of each day of construction activity all construction debris and waste materials shall be collected and properly disposed in trash or recycle bins.
- Construction sites shall be maintained in such a condition that a storm does not carry wastes or pollutants off the site. Discharges other than stormwater (non-stormwater discharges) are prohibited, except as authorized by an individual NPDES permit or the State-wide General Permit for Storm Water Discharges Associated with Construction Activity. Potential pollutants include but are not limited to: solid or liquid chemical spills; wastes from paints, stains, sealants, solvents, detergents, glues, lime, pesticides, herbicides, fertilizers, wood preservatives and asbestos fibers; paint flakes or stucco fragments; fuels, oils, lubricants and hydraulic, radiator or battery fluids; concrete and related cutting or curing residues; floatable wastes; wastes from engine/equipment steam cleaning or chemical degreasing; wastes from street cleaning; and super-chlorinated potable water from line flushing and testing. During construction, disposal of such materials should occur in a specified and controlled temporary area onsite physically separated from potential stormwater runoff, with ultimate disposal in accordance with local, State and Federal requirements.
- Discharging contaminated groundwater produced by dewatering groundwater that has infiltrated into the construction site is prohibited. Discharging of contaminated soils via surface erosion is also prohibited.
- The Contractor is required to notify and obtain approval from the District 10 days prior to any non-stormwater discharge or dewatering associated with Contractor's construction activities.
- Construction sites shall be managed to minimize the exposure time of disturbed soil areas through phasing and scheduling of grading to the extent feasible and the use of temporary and permanent soil stabilization.
- BMPs shall be maintained at all times. In addition, BMPs shall be inspected prior to predicted storm events and following storm events.

29.4 Stormwater Pollution Prevention Plan Amendments - The Contractor shall prepare amendments to the SWPPP, both graphically and in narrative form, whenever there is a change in Contractor's construction activities or operations which may result in the discharge of pollutants to surface waters, groundwaters, municipal storm drain systems, or as deemed necessary by the Engineer. The Contractor shall also amend the SWPPP if it is in violation of any condition of the General Permit, or has not effectively achieved the objective of reducing

pollutants in stormwater discharges. Amendments shall show additional BMPs, revised Contractor's construction activities or operations, including those in areas not shown in the initially approved SWPPP, which are required on the project to effectively control water pollution.

Amendments to the SWPPP shall be submitted for review and approval by the Engineer in the same manner specified for the initial approval of the SWPPP. The Contractor shall date and attach all approved amendments to the SWPPP. Upon approval of the amendment, the Contractor shall implement the additional BMPs, revised construction activities or operations.

29.5 Annual Compliance Certification – The Contractor shall certify annually that construction activities are in compliance with the requirements of the General Permit and the approved SWPPP. The certification must be completed by July 1st of each year.

29.6 Non-Compliance Reporting - If the project is in non-compliance at any time, the Contractor shall make a written report to the Engineer within two (2) calendar days of identification of non-compliance activities.

29.7 SWPPP Implementation - Upon approval of the SWPPP, the Contractor shall be responsible throughout the duration of the project for placing, installing, constructing, inspecting and maintaining the BMPs as well as conducting the sampling and analysis plan as included in the SWPPP and any amendments thereto, and for removing and disposing of temporary BMPs. Unless otherwise directed by the Engineer or specified in these Detailed Specifications, the Contractor's responsibility for SWPPP implementation shall continue throughout any temporary suspension of work ordered in accordance with Section 6.05, "TEMPORARY SUSPENSION OF THE WORK", of the General Provisions. Requirements for installation, construction, inspection, maintenance, removal and disposal of BMPs are specified in the Caltrans Handbooks and these Detailed Specifications.

The Engineer may order the suspension of construction operations if the Contractor fails to comply with the requirements of this section, "Stormwater and Non-Stormwater Pollution Control", as determined by the Engineer.

The Contractor will not be compensated for sampling and analysis work because of the Contractor's failure to properly implement, inspect, maintain and repair BMPs in the approved SWPPP and any amendments thereto, or for failing to store construction materials or wastes in watertight containers.

(a) **Santa Margarita Watershed** Stormwater Pollution Control - **The Contractor shall implement soil stabilization practices and sediment control BMPs, including minimum requirements as presented in the Caltrans Handbooks, on all disturbed areas of the project site during the rainy season, defined as between October 1st and April 30th.**

(a) **Whitewater Watershed** Stormwater Pollution Control - **The Contractor shall implement soil stabilization practices and sediment control BMPs, including**

minimum requirements as presented in the Caltrans Handbooks, on all disturbed areas of the project site during the rainy season, although undefined shall be August 1- October 1 and November 1-May 1, which is consistent with Caltrans definition of rainy season for the eastern desert region.

(a) **Santa Ana Watershed** Stormwater Pollution Control - **The Contractor shall implement soil stabilization practices and sediment control BMPs, including minimum requirements as presented in the Caltrans Handbooks, on all disturbed areas of the project site during the rainy season, defined as between October 1st and May 31st.**

Implementation of soil stabilization practices and sediment control BMPs for soil-disturbed areas, including but not limited to, rough graded access roads, slopes, channel inverts, operational inlets and outlets of the project shall be completed no later than ten (10) calendar days prior to the start of the rainy season or upon start of applicable Contractor's construction activities for projects which begin either during or within ten (10) calendar days of the rainy season.

The Engineer may require the Contractor, on a case-by-case basis, to reduce the active, soil-disturbed area limit of the project. The Contractor shall demonstrate the ability and preparedness to fully deploy soil stabilization practices and sediment control BMPs to protect soil-disturbed areas of the project site by maintaining an adequate quantity of soil stabilization and sediment control materials onsite to protect exposed, soil-disturbed areas and a detailed plan for the mobilization of sufficient labor and equipment to fully deploy the required BMPs prior to the onset of precipitation and for the duration of the project.

Throughout the rainy season, soil-disturbed areas of the project site shall be considered to be nonactive whenever soil disturbing activities are expected to be discontinued for a period of fifteen (15) calendar days or more. Areas that will become nonactive either during the rainy season or within ten (10) calendar days thereof shall be fully protected with soil stabilization practices such as covering with mulch, temporary seeding, fiber rolls, blankets, etc., within ten (10) calendar days of the discontinuance of soil disturbing activities or prior to the onset of precipitation, whichever is first to occur. Areas that will become nonactive either during the rainy season or within ten (10) calendar days thereof shall be fully protected with sediment control BMPs within ten (10) calendar days of the discontinuance of soil disturbing activities or prior to the onset of precipitation, whichever is first to occur.

Throughout the rainy season, active soil-disturbed areas of the project site shall be fully protected at the end of each day with soil stabilization practices and sediment control BMPs. The Contractor shall monitor the weather forecast on a daily basis. The National Weather Service forecast shall be used, or an alternative weather forecast proposed by the Contractor may be used if approved by the

Engineer. If precipitation is predicted prior to the end of the following workday, construction scheduling shall be modified, as required, and the Contractor shall deploy functioning BMPs prior to the onset of the precipitation.

(b) Non-Stormwater Pollution Control - **The Contractor shall implement, year-round and throughout the duration of the project, BMPs included in the SWPPP for sediment tracking, wind erosion, non-stormwater management, and waste management and disposal.**

(c) Inspections and Reporting - The Contractor shall regularly inspect the construction site for BMPs identified in the SWPPP to ensure the proper implementation and functioning of BMPs. The Contractor shall identify corrective actions and time frames to address any damaged BMPs or reinitiate any BMPs that have been discontinued.

At a minimum, the Contractor shall inspect the construction site as follows:

1. Prior to a forecast storm;
2. After any precipitation which causes runoff capable of carrying sediment from the construction site;
3. At 24 hour intervals during extended precipitation events; and
4. At a regular interval of once every 2 weeks.

The construction site inspection checklist provided in the Caltrans Handbooks shall be used to ensure that the necessary BMPs are being properly implemented and are functioning adequately. The Contractor shall submit one copy of each site inspection record to the Engineer.

(d) Maintenance - The Contractor shall maintain construction site BMPs identified in the SWPPP to ensure the proper implementation and functioning of BMPs. If the Contractor or the Engineer identifies a deficiency in the deployment or functioning of an identified BMP, the deficiency shall be corrected by the Contractor immediately, or by a later date and time if requested by the Contractor and approved by the Engineer in writing, but not later than the onset of subsequent precipitation events. The correction of deficiencies shall be at no additional cost to the District.

(e) Training – The Contractor shall describe the types of training that the Contractor's BMP inspection, maintenance and repair personnel have received or will receive that is directly related to stormwater pollution prevention.

29.8 Payment - The contract lump sum price paid for the Stormwater and Non-Stormwater Pollution Control work shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals for doing all the work involved in developing, preparing, obtaining approval of, revising and amending the SWPPP, and installing, constructing, maintaining, removing and disposing of BMPs as shown in the SWPPP, as specified in the Caltrans

Handbooks and Sample Contractor's Water Quality SAPs, General Permit and these Detailed Specifications, and as directed by the Engineer.

Payment will be made on a basis of the percentage of work completed on the entire project.

ΞΞΞEnd of insert

4. For construction site < 1 acre (PPP) NO Appendix

29.1 Description - The contract item Stormwater and Non-Stormwater Pollution Control shall include preparing, obtaining approval of, amending and implementing Contractor's Pollution Prevention Plan (PPP). The PPP shall identify site specific Best Management Practices (BMPs) to be implemented during and after construction to minimize the potential pollution of stormwater runoff and receiving waters. The identified BMPs shall be practices designed to minimize or eliminate the discharge of pollutants from the construction site and Contractor's construction activities, including, but not limited to:

1. Good housekeeping practices for solid and sanitary/septic waste management, vehicle and equipment cleaning/maintenance, and material handling and storage.

2. Construction procedures such as stabilized construction access points, scheduling/phasing to minimize areas of soil disturbance, soil stabilization and erosion/sediment control.

The PPP shall also stipulate an ongoing program for monitoring and maintenance of all BMPs.

29.2 General Requirements – Stormwater and Non-Stormwater Pollution Control work shall conform to the requirements in the latest version of Caltrans Storm Water Quality Handbooks, entitled **"Construction Site Best Management Practices (BMPs) Manual" and "Storm Water Pollution Prevention Plan (SWPPP) and Water Pollution Control Program (WPCP) Preparation Manual"**. Copies of the "Construction Site BMPs Manual" and "SWPPP and WPCP Preparation Manual", hereafter referred to collectively as the "Caltrans Handbooks", may be obtained from the California Department of Transportation Publication Distribution Unit, 1900 Royal Oaks Drive, Sacramento, California, 95815-3800. Telephone: (916) 445-3520. Copies of the Caltrans Handbooks can also be downloaded from the Caltrans internet site at http://www.dot.ca.gov/hq/construc/stormwater/manuals.htm. In addition, copies of the Caltrans Handbooks are available for review at the District's office.

In the event the District incurs any Administrative Civil Liability or Mandatory Minimum Penalty (fine) imposed by the California Regional Water Quality Control Board, as a result of Contractor's failure to fully implement the provisions of this section and permit requirements, "Stormwater and Non-Stormwater Pollution Control", the Engineer may, in the exercise of his sole judgment and discretion, withhold from payments otherwise

due Contractor a sufficient amount to cover the Civil Liability. Liability may be in an amount up to $32,500 per day per deemed occurrence.

The Contractor shall be responsible for all costs and for any liability imposed by law as a result of the Contractor's failure to comply with the requirements set forth in this section, "Stormwater and Non-Stormwater Pollution Control", including but not limited to, compliance with the applicable provisions of the Caltrans Handbooks, Federal, State, and local regulations. For the purpose of this paragraph, costs and liabilities include, but are not limited to, fines, penalties and damages whether assessed against the District or the Contractor, including those levied under the Federal Clean Water Act and the State Porter-Cologne Water Quality Act.

The Contractor shall become fully informed of and comply with the applicable provisions of the Caltrans Handbooks, Federal, State and local regulations that govern the Contractor's activities and operation pertaining to both stormwater and non-stormwater discharges from both the project site and areas of disturbance outside the project limits during construction. The Contractor shall, at all times, keep copies of the approved PPP and all amendments at the project site. The PPP shall be made available upon request of a representative of the SWRCB, CRWQCB, United States Environmental Protection Agency (USEPA) or local stormwater management agency. Requests by the public shall be directed to the Engineer.

The Contractor is solely and exclusively responsible for any arrangements made between the Contractor and other property owners or entities that results in disturbance of areas or construction activities being conducted outside limits of the designated rights-of-way and temporary construction easements as shown on the project drawings.

29.3 Pollution Prevention Plan Preparation and Approval - The Contractor shall prepare and obtain approval of the PPP as part of the Stormwater and Non-Stormwater Pollution Control work for this contract. The Contractor shall prepare the PPP in accordance with Section 3, "Preparing a Water Pollution Control Program (WPCP)", of the Caltrans Storm Water Quality Handbooks, entitled "**Storm Water Pollution Prevention Plan (SWPPP) and Water Pollution Control Program (WPCP) Preparation Manual**" and these Detailed Specifications.

In case of conflict between the Caltrans Handbooks and these Detailed Specifications, the Detailed Specifications shall govern.

Within five (5) working days after the award of the contract, the Contractor shall submit two (2) copies of the PPP to the Engineer for review and approval. The Contractor shall allow ten (10) working days for the Engineer to review the PPP. If revisions are required as determined by the Engineer, the Contractor shall revise and resubmit the PPP within three (3) working days of receipt of the Engineer's comments and shall allow ten (10) working days for the Engineer to review the revisions. The Contractor shall submit four (4) copies of the approved PPP to the Engineer prior to the pre-construction meeting. **The Contractor must have an approved PPP prior to the pre-construction meeting**.

The objectives of the PPP shall be to identify all pollution sources associated with Contractor's construction activities that may adversely affect the quality of stormwater discharges and receiving waters; to identify all non-stormwater discharges; to identify, construct, implement and maintain water pollution control best management practices, hereafter referred to as "BMPs", to reduce to the maximum extent practicable pollutants in both stormwater and authorized non-stormwater discharges from the construction site during construction and to develop a maintenance schedule for BMPs after construction is completed under this contract.

The PPP shall incorporate BMPs in each of the following categories:

1. Soil stabilization practices;
2. Sediment control practices;
3. Sediment tracking control practices;
4. Wind erosion control practices; and
5. Non-stormwater management, and waste management and disposal control practices.

Specific objectives and minimum requirements for each category of BMPs are contained in the Caltrans Handbooks. The Contractor shall consider the objectives and minimum requirements presented in the Caltrans Handbooks for each of the above categories. When minimum requirements are listed for any category, the Contractor shall incorporate one or more of the listed minimum BMPs required into the PPP and implement on the project to meet the pollution control objectives for the category. In addition, the Contractor shall consider other BMPs presented in the Caltrans Handbooks to supplement the minimum BMPs required when necessary to meet the objectives of the PPP. The Contractor shall document the selection process in accordance with the procedure specified in the Caltrans Handbooks.

The Contractor shall not assume that the minimum BMPs required for each category presented in the Caltrans Handbooks are adequate to meet the pollution control objectives. The Contractor may use other effective BMPs, as approved by the Engineer, in addition to the minimum BMPs required in the Caltrans Handbooks to achieve the pollution control objectives.

The PPP shall include all of the following items in the order given below:

1. Title Page;
2. Table of Contents;
3. Project Description and Contractor's Certification;
4. Project Information;
5. Pollution Sources and BMPs;
6. Water Pollution Control Drawings;
7. A copy of the Amendments, if any;
8. Amendment Log;
9. Maintenance, Inspection, and Repair Program;
10. Inspection Log;
11. Construction Site Inspection Checklist;
12. Current Inventory of BMP related materials; and

13. Mobilization Plan for BMP deployment.

The following notes (or notes of substantially similar intent) that address pollution prevention to the Maximum Extent Practicable during the construction phase of a project on a year-round basis needs to be placed on the Stormwater and Non-Stormwater Pollution Control Drawings:

- Erosion control BMPs shall be implemented and maintained to minimize and/or prevent the entrainment of soil in runoff from disturbed soil areas on construction sites.
- Sediment control BMPs shall be implemented and maintained to prevent and/or minimize the transport of soil from the construction site.
- Stockpiles of soil shall be properly contained to eliminate or reduce sediment transport from the site to streets, drainage facilities or adjacent properties via runoff, vehicle tracking or wind.
- Appropriate BMPs for construction-related materials, wastes, spills or residues shall be implemented to eliminate or reduce transport from the site to streets, drainage facilities or adjoining properties by wind or runoff.
- Runoff from equipment and vehicle washing shall be contained at construction sites and must not be discharged to receiving waters or the local storm drain system. Washwaters or rinsate from ready mix, concrete, or cement vehicles must be handled appropriately and may not be discharged to receiving waters or the any storm drain system.
- All construction contractor and subcontractor personnel are to be made aware of the required best management practices and good housekeeping measures for the project site and any associated construction staging areas.
- At the end of each day of construction activity all construction debris and waste materials shall be collected and properly disposed in trash or recycle bins.
- Construction sites shall be maintained in such a condition that a storm does not carry wastes or pollutants off the site. Discharges other than stormwater (non-stormwater discharges) are prohibited, except as authorized by an individual NPDES permit, the State-wide General Permit for Storm Water Discharges Associated with Construction Activity. Potential pollutants include but are not limited to: solid or liquid chemical spills; wastes from paints, stains, sealants, solvents, detergents, glues, lime, pesticides, herbicides, fertilizers, wood preservatives and asbestos fibers; paint flakes or stucco fragments; fuels, oils, lubricants and hydraulic, radiator or battery fluids; concrete and related cutting or curing residues; floatable wastes; wastes from engine/equipment steam cleaning or chemical degreasing; wastes from street cleaning; and super-chlorinated potable water from line flushing and testing. During construction, disposal of such materials should occur in a specified and controlled temporary area onsite physically separated from potential stormwater runoff, with ultimate disposal in accordance with local, State and Federal requirements.
- Discharging contaminated groundwater produced by dewatering groundwater that has infiltrated into the construction site is prohibited. Discharging of contaminated soils via surface erosion is also prohibited.

- The Contractor is required to notify and obtain approval from the District 10 days prior to any non-stormwater discharge or dewatering associated with Contractor's construction activities.
- Construction sites shall be managed to minimize the exposure time of disturbed soil areas through phasing and scheduling of grading to the extent feasible and the use of temporary and permanent soil stabilization.
- BMPs shall be maintained at all times. In addition, BMPs shall be inspected prior to predicted storm events and following storm events.

29.4 Pollution Prevention Plan Amendments - The Contractor shall prepare amendments to the PPP, both graphically and in narrative form, whenever there is a change in Contractor's construction activities or operations which may result in the discharge of pollutants to surface waters, groundwaters, municipal storm drain systems or when deemed necessary by the Engineer. The Contractor shall also amend the PPP if it is not effectively achieving the objectives of reducing pollutants in stormwater discharges. Amendments shall show additional BMPs or revisions to Contractor's construction activities or operations (including any construction activities in areas not included in the initially approved PPP) which are required on the project to effectively control water pollution.

Amendments to the PPP shall be submitted for review and approval by the Engineer in the same manner specified for the initial approval of the PPP. The Contractor shall date and attach all approved amendments to the PPP. Upon approval of the amendment, the Contractor shall implement the additional BMPs, revised construction activities or operations as described therein.

29.5 Pollution Prevention Plan Implementation - Upon approval of the PPP, the Contractor shall be responsible throughout the duration of the project for installing, constructing, inspecting and maintaining the BMPs included in the PPP and any amendments thereto and for removing and disposing of temporary BMPs. Unless otherwise directed by the Engineer or specified in these Detailed Specifications, the Contractor's responsibility for PPP implementation and maintenance shall continue throughout any temporary suspension of work ordered in accordance with Section 6.05, TEMPORARY SUSPENSION OF THE WORK, of the General Provisions. Requirements for installation, construction, inspection, maintenance, removal and disposal of BMPs are specified in the Caltrans Handbooks and these Detailed Specifications. The Contractor shall implement the PPP in accordance with the Caltrans Handbooks and these Detailed Specifications.

The Engineer may order the suspension of construction operations if the Contractor fails to comply with the requirements of this section, "Stormwater and Non-Stormwater Pollution Control", as determined by the Engineer.

(a) Stormwater Pollution Control - **The Contractor shall implement soil stabilization practices and sediment control BMPs, including minimum requirements as presented in the Caltrans Handbooks, on all disturbed areas of the project site throughout the rainy season, defined as between August 1 -**

October 1 and November 1 - May 1, which is consistent with Caltrans definition of rainy season for the eastern desert region.

Implementation of soil stabilization practices and sediment control BMPs for soil-disturbed areas, including but not limited to, rough graded access roads, slopes, channel inverts, operational inlets and outlets of the project site shall be completed no later than ten (10) calendar days prior to the start of the winter season or upon start of applicable Contractor's construction activities for projects which begin either during or within ten (10) calendar days of the winter season.

Throughout the term of this contract, the total soil-disturbed area of the project site shall be less than one (1) acre. The Contractor shall demonstrate the ability and preparedness to fully deploy soil stabilization practices and sediment control BMPs to protect soil-disturbed areas of the project site by maintaining an adequate quantity of soil stabilization and sediment control materials onsite to protect exposed, soil-disturbed areas and a detailed plan for the mobilization of sufficient labor and equipment to fully deploy the required BMPs prior to the onset of precipitation and for the duration of the project.

Throughout the winter season, active soil-disturbed areas of the project site shall be fully protected at the end of each day with soil stabilization practices and sediment control BMPs. The Contractor shall monitor the weather forecast on a daily basis. The National Weather Service forecast shall be used or an alternative weather forecast proposed by the Contractor may be used if approved by the Engineer. If precipitation is predicted prior to the end of the following workday, construction scheduling shall be modified, as required, and the Contractor shall deploy functioning control measures prior to the onset of the precipitation.

Throughout the winter season, soil-disturbed areas of the project site shall be considered to be non-active whenever soil disturbing activities are expected to be discontinued for a period of fifteen (15) calendar days or more. Areas that will become non-active either during the winter season or within ten (10) calendar days thereof shall be fully protected with soil stabilization practices such as covering with mulch, temporary seeding, fiber rolls, blankets, etc. within ten (10) calendar days of the discontinuance of soil disturbing activities or prior to the onset of precipitation, whichever is first to occur. Areas that will become non-active either during the winter season or within ten (10) calendar days thereof shall be fully protected with sediment control BMPs within ten (10) calendar days of the discontinuance of soil disturbing activities or prior to the onset of precipitation, whichever is first to occur.

(b) Non-Stormwater Pollution Control - **The Contractor shall implement, year-round and throughout the duration of the project, BMPs included in the PPP for sediment tracking, wind erosion, non-stormwater management, and waste management and disposal.**

(c) Inspections and Reporting - The Contractor shall regularly inspect the construction site for BMPs identified in the PPP to ensure the proper implementation and functioning of BMPs. The Contractor shall identify corrective actions and time frames to address any deficient BMPs or reinitiate any BMPs that have been discontinued.

At a minimum, the Contractor shall inspect the construction site as follows:

1. Prior to a forecast storm;
2. After any precipitation which causes runoff capable of carrying sediment from the construction site;
3. At 24 hour intervals during extended precipitation events; and
4. At a regular interval of once every 2 weeks.

The construction site inspection checklist provided in the Caltrans Handbooks shall be used to ensure that the necessary BMPs are being properly implemented and are functioning adequately. The Contractor shall submit one copy of each site inspection record to the Engineer.

(d) Maintenance – The Contractor shall maintain construction site BMPs identified in the PPP to ensure the proper implementation and functioning of BMPs. If the Contractor or the Engineer identifies a deficiency in the deployment or functioning of an identified BMP, the deficiency shall be corrected by the Contractor immediately, or by a later date and time if requested by the Contractor and approved by the Engineer in writing, but not later than the onset of subsequent precipitation events. The correction of deficiencies shall be at no additional cost to the District.

(e) Training – The Contractor shall describe the types of training that the Contractor's BMP inspection, maintenance and repair personnel have received or will receive that is directly related to stormwater pollution prevention.

29.6 Payment - The contract lump sum price paid for contract item Stormwater and Non Stormwater Pollution Control shall include full compensation for all direct and indirect costs incurred under this section.

Payment will be made on a basis of the percentage of work completed on the entire project.

ATTACHMENT E

REPORTS OF COLLECTED DEBRIS IN MS4

Riverside County Flood Control and Water Conservation District

Sediment Removal Santa Margarita Watershed

Filter ((((..\Start Date Actual is after #7/1/08#) And (Start Date is through #6/30/09#)) And (rcfc_activity contains "616")) And (..\rcfc zone contains "7"))

Report Title **Sediment Removal Santa Margarita Watershed**

Activity Number: 616 **Activity Name:** Sediment Removal

Zone 7 **Quantity:** 3,624.00

Total Quantity: 3,624.00 **Unit:** Cy

Riverside County Flood Control and Water Conservation District

Sediment Removal Santa Margarita Watershed

Filter ((((..\Start Date Actual is after #7/1/08#) And (Start Date is through #6/30/09#)) And (rcfc_activity contains "5129")) And (..\rcfc zone contains "7"))

Report Title **Sediment Removal Santa Margarita Watershed**

Activity Number: 5129 **Activity Name:** Sediment Removal

Zone 7 **Quantity:** 1,425.00

Total Quantity: 1,425.00 **Unit:** CY

Riverside County Flood Control and Water Conservation District

Sediment Removal Santa Margarita Watershed

Filter ((((..\Start Date Actual is after #7/1/08#) And (Start Date is through #6/30/09#)) And (rcfc_activity contains "613")) And (..\rcfc zone contains "7"))

Report Title **Sediment Removal Santa Margarita Watershed**

Activity Number: 613 **Activity Name:** Dams - Stack Sediment

Zone 7 **Quantity:** 30.00

Total Quantity: 30.00 **Unit:** CY

Riverside County Flood Control and Water Conservation District

Debris Removal Santa Margarita Watershed

Filter ((((..\Start Date Actual is after #7/1/08#) And (Start Date is through #6/30/09#)) And (rcfc_activity contains "404")) And (..\rcfc zone contains "7"))

Report Title **Trash Removal Santa Margarita Watershed**

Activity Number: 404 **Activity Name:** Trash Pickup

Zone 7 **Quantity:** 4.65

Total Quantity: 4.65 **Unit:** Ton

Riverside County Flood Control and Water Conservation District

Debris Removal Santa Margarita Watershed

Filter ((((..\Start Date Actual is after #7/1/08#) And (Start Date is through #6/30/09#)) And (rcfc_activity contains "7000")) And (..\rcfc zone contains "7"))

Report Title **Debris Removal Santa Margarita Watershed**

Activity Number: 7000 **Activity Name:** Debris taken out of Channels

Zone 7 **Quantity:** 106.06

Total Quantity: 106.06 **Unit:** Ton

ATTACHMENT F

IC/ID REPORTS

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1976

Type	Illicit Discharge
Received Date	4/30/2009
APN	906-070-074
First Name	Mark
Last Name	Mandel
Complainant Address	
Complainant City	Murrieta
Complainant Zip Code	92562
Phone	951 722-8906
Received By	David Ortega
Complaint Adderess	41891 Kalmia Street, Suite A
Complaint City	Murrieta
Complaint Zip Code	92562
Location	Creative Hydroseed

Complaint Grass seed has been dumped in a 'washout' area on the complaint address; the residual hydroseed has migrated on to the access road of the Riverside County Flood Control (RCFC) District facility: "Murrieta Creek Master Drainage Plan - Line F".

Findings 4/30/09: David Ortega, of the NPDES Section at the RCFC, (951) 955-4390, received a call today from Mark Mandel, Riverside County Code Enforcement, about this complaint.

Action 5/1/09: Mr. Ortega went to the site today and took a few photos of the hydroseed that has been dumped on the ground of the business located at the complaint address. Mr. Ortega also noticed that some of the hydroseed from this 'washout' area had migrated onto the access road of the RCFC District facility. Mr. Ortega went to the office of the complaint address and spoke with Jana Rush. She escorted Mr. Ortega to the fenced in 'washout' area to take a better look at the hydroseed that was dumped. Mr. Ortega took a few more photos and then told Ms. Rush that he would find out how severe this matter is. Later that day, Mr. Ortega briefed J. Uhley, of the NPDES Section at the RCFC about this incident. Mr. Uhley stated to Mr. Ortega that hydroseed is a big factor of nutrient loads in that watershed. 5/4/09: Mr. Ortega spoke briefly with Cheryl Roberts of Creative Hydroseed today about the 'washout' area at her business. Mr. Ortega stated that he will have to get with the City of Murrieta's Code Enforcement to find out how they would like to proceed with this matter. Ms. Roberts did say that "she is willing to cooperate with getting things cleaned up and getting a better 'washout' area engineered and in place as soon as possible". 5/20/09: Mark Mandel of County of Code Enforcement called Mr. Ortega today to inform him that Jason Jones, Murrieta Code Enforcement, (951) 461-6331, will be handling this matter. Mr. Mandel sent an email to Mr. Ortega about this and also stating that the business owner will be taking steps to reduce the risk of hydroseed run-off into the RCFC District's facility as well as off of the business property. These steps include: 1. Installing a curb in the rear of the property where they conduct the washouts of their hydroseeding business at the end of each day. 2. Installing an NPDES compliant concrete washout box for the hydroseeding residue. 3. Hiring an engineer to design a permanent concrete vault or pit with pumps to capture the hyroseeding residue and recycle it on the property. 6/17/09: Mr. Ortega and P. Nanney of the NPDES Section met briefly today with the owners of Creative Hydroseed to view the improved BMP's to the hydroseed washout area. Mr. Ortega gave the owners a few pamphlets about the County's Stormwater/Cleanwater program. Mr. Ortega also took a few photos of the installed BMP on site.

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1879

Type Illicit Discharge

Received Date 3/16/2009

APN 920-110-009

First Name Avelino

Last Name Valencia

Complainant Address

Complainant City Temecula

Complainant Zip Code 92591

Phone 951 955-1307

Received By David Ortega

Complaint Adderess

Complaint City Temecula

Complaint Zip Code 92591

Location Santa Gertrudis Creek Channel, just east of Winchester Road

Complaint A 100 gallon, metal tank, has been dumped in the Santa Gertrudis Creek Channel (a Riverside County Flood Control District facility), just east of Winchester Road. Not certain if there is any type of product in the tank that could be hazardous.

Findings 3/16/09: Avelino Valencia, of the Operations & Maintenance Section at the Riverside County Flood Control (RCFC) District, called David Ortega, in the NPDES Section at the RCFC, about this complaint. Mr. Valencia stated to Mr. Ortega that a guy from one of the field crews called this in today. Mr. Valencia told Mr. Ortega, at first, that the tank is located "downstream" of Winchester Road. And that the tank is in the creek bottom. 3/18/09: David Ortega spoke to Richard Garza today about this matter. Mr. Garza stated that he and others from one of the O & M field crews located this tank "about two months ago". Mr. Garza continued to say that "he notified Mark Luna about this who said that he would report it to others in the office". When the field crew members discovered this in the channel, they were hoping to mow the vegetation around it. They moved this tank slightly and noticed that some product was leaking from the bottom of the tank onto the soil. They quickly uprighted the tank and mowed around it. Mr. Valencia also stated that they (O & M) were hoping to remove it from the channel and bring the tank back here to the District because they "assumed" that there was "motor oil" in the tank because of the product that they saw leaking from it.

Action 3/16/09: Mr. Ortega called Kelly Winters, of Riverside County Haz.-Mat., (951) 453-5804, about this complaint. Mr. Winters stated that before he left for the day that he would go to this area to locate the tank and find out the status of it then he would call back to Mr. Ortega. Later in this day, Mr. Winters called back to Mr. Ortega and stated that he looked in Santa Gertrudis Creek Channel from Winchester Road to Margarita Road and could not locate the tank. Mr. Ortega told Mr. Winters that he will call him back tomorrow morning about this matter. 3/17/09, 1510 hours: Mr. Ortega arrived at the site and eventually located the tank in the Santa Gertrudis Creek Channel; upstream of Winchester Road near N. General Kearny Road. Mr. Ortega took a few photos while on site today. He noticed an information plate on the tank that stated it was a tank made "for butane gases only". Mr. Ortega called Mr. Winters back today to set up a time for tomorrow (3/18/09) to meet on site: 0830 hours. 3/18/09, 0830 hours: Mr. Ortega met with Mr. Winters and Jim Sappington of County Haz.-Mat. and with a crew from the Riverside County Fire Department, Emergency Response Unit. Mr. Winters used a "drum thief" to get some product out of the tank to perform a hazard categorization (haz.-cat.). The haz.-cat. of the product was a pH 7, combustible hydrocarbon. After the haz.-cat., Mr. Ortega was given permission by Mr. Winters to call a contractor to remove the tank and product from the site. Eventually, Filter Recycling came to the site today and removed 65 gallons of product from the tank. They also poured a bag of dry sorbent into the tank to inert any residue. They removed the tank off of the site today as well. Mr. Ortega took photos of the work performed by Filter Recycling today. The product went off site on Uniform Hazardous Waste Manifest# 003807833 JJK as 'Waste, Flammable Liquids, N.O.S. 3, UN1993' The tank went off site on Uniform Hazardous Waste Manifest# 004852776 JJK as 'on-RCRA Hazardous Waste Solid'.

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1867

Type	Illicit Discharge
Received Date	12/23/2008
APN	
First Name	Eileen
Last Name	Boken
Complainant Address	
Complainant City	Various
Complainant Zip Code	
Phone	415 972-3757
Received By	David Ortega
Complaint Adderess	Various
Complaint City	Various
Complaint Zip Code	
Location	Various

Complaint Mobile detail businesses are operating in Temecula, Murrieta, Wildomar, and Lake Elsinore area. The following tip is from the US EPA National Tips Database: "recently, I noticed quite a bit of activity involving 'mobile detail' businesses that are engaged in the business of car washing, steam cleaning, waxing, polishing, etc. I believe the Clean Water Act clearly states that home owners are exempt washing their personal vehicle. However, when one engages as a business (for profit) it is considered industrial waste water. Therefore, what is occurring is industrial waste water being dumped intentionally in the drain systems. Who should supervise this? You tell me, you are the 'expert' folks. Who is responsible? Cities like Temecula, Murrieta, and Lake Elsinore who have granted these businesses licenses to operate.

Findings 12/23/08: David Ortega, of the NPDES Section of the Riverside County Flood Control (RCFC), called and spoke to Eileen Boken at the US EPA today about this matter. She stated that if I need more information about this complaint, that I should call Mr. Harry Paez, of Wildomar, at (951) 678-1682. He is the one who provided the complaint onto the US EPA National Tips Database.

Action 12/23/09: Mr. Ortega called and spoke to Mr. Paez today about this complaint. Mr. Paez was very concerned that this type of business practice, from 'mobile detailers' continue on a daily basis in the cities mentioned in his complaint. Mr. Ortega asked Mr. Paez if there is a specific name and/or phone number to any of these type of mobile detailers that are possibly in violation. Mr. Paez stated that he did not have any specific names of businesses, nor any specific dates of possible violations, nor any specific addresses that this has occurred. Mr. Paez stated that "Riverside County should have their employees drive around these cities to monitor this type of activity". Mr. Ortega stated to Mr. Paez that if and when he witnesses an active discharge happening, then he can call Mr. Ortega at his cell phone# (951) 961-9574, and either he will mobilize to the site and/or someone from County Code Enforcement will drive to the site. Mr. Ortega also stated to Mr. Paez that there is not much that can be done now for some incident that occurred sometime ago with no names of businesses, no phone numbers to the businesses, and no photos showing the possible infractions.

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1695

Type	Illicit Discharge
Received Date	10/31/2008
APN	948-310-010
First Name	Jason
Last Name	Jones
Complainant Address	
Complainant City	Murrieta
Complainant Zip Code	92563
Phone	951 461-6331
Received By	David Ortega
Complaint Adderess	
Complaint City	Murrieta
Complaint Zip Code	92563
Location	Murrieta Valley I-215 Retention Basin

Complaint Illegal dumping of mattresses, palm fronds and trash in the Riverside County Flood Control (RCFC) District facility: "Murrieta Valley I-215 Retention Basin".

Findings 10/30/08, 1642 hours: Officer Jason Jones, City of Murrieta Code Enforcement, (951) 461-6331, called and left a voice mail message for David Ortega in the NPDES Section of the RCFC concerning the nature of the complaint. 10/31/08, 0715 hours: David Ortega of the RCFC forwarded the voice mail message to Mark Biloki of the RCFC; at his direct line. Mr. Ortega also forwarded the voice mail message to Jason Uhley of the RCFC. Mr. Ortega also called Mr. Jones and left him a voice mail message to give him the cell phone for Mark Biloki, (951) 288-5254, and to suggest that Mr. Jones call Mr. Biloki concerning this matter. Mr. Jones stated in his voice mail message that "he is hoping someone from the RCFC District will be coming out either today or tomorrow (11/1/08) to clean up the items from the I-215 basin so that he can close out his report".

Action 11/3/08: Mark Biloki of the RCFC, Operations & Maintenance Section, sent an email today to David Ortega at the RCFC stating that the illegally dumped materials were cleaned up on Saturday, 11/1/08.

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1683

Type	Illicit Discharge
Received Date	10/17/2008
APN	909-090-001
First Name	Tiffany
Last Name	Zimmer
Complainant Address	
Complainant City	Murrieta
Complainant Zip Code	92562
Phone	951 461-6330
Received By	Claudio Padres
Complaint Adderess	25070 Hayes Ave.
Complaint City	Murrieta
Complaint Zip Code	92562
Location	Murrieta Creek ~200yd south of Ivy on West Side

Complaint 10/17/2008 - Tiffany Zimmer from City of Murrieta Code Enforcement called to ask if we owned a portion of Murrieta Creek between Hayes Ave and Newday. Stated that a person was caught dumping green waste in Murrieta Creek there. I told her that I would look into it and call back.

Findings 10/17/2008 - Found that the property is not owned by the District. It is under the jurisdiction of CDFG and District must obtain permits for maintenance in this area. Spoke with Murrieta Police Officer Bennett who stated that they caught the person in the act dumping Palm Fronds within the creek bed. The property owner (who employed the person caught dumping) came to the scene and told the officer that he owns the land. Officer Bennett told the person to stop the dumping and made them remove the debris. Murrieta Police issued incident number 082910103 regarding this matter.

Action Officer Bennett asked me when he should report such dumping. I informed Officer Bennett that any dumping within a waterway regardless of ownership is illegal and should be reported.

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1994

Type	Spill
Received Date	6/25/2009
APN	57-304-007
First Name	NRC
Last Name	
Complainant Address	
Complainant City	Anza
Complainant Zip Code	92539
Phone	
Received By	David Ortega
Complaint Adderess	38100-38200 Fisher Road
Complaint City	Anza
Complaint Zip Code	92539
Location	

Complaint Per NRC Report# 909723, the caller is reporting that the SRP is dumping oil onto the ground on his property.

Findings 6/25/09: NRC called the California Emergency Management Agency (CEMA) to report this release. The CEMA issued a Hazardous Materials Spill Report, Control# 09-4584, concerning this incident. The CEMA report states that no water was involved from this release. The Riverside County Environmental Health Department was notified about this incident. There are no Riverside County Flood Control District facilities in the area of the complaint address that could have been impacted from this release. NOTE: The complaint APN listed in this report is a reference APN only.

Action

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1993

Type	Spill
Received Date	6/25/2009
APN	922-210-048
First Name	Eastern Municipal Water District (EMWD)
Last Name	
Complainant Address	
Complainant City	Temecula
Complainant Zip Code	92592
Phone	
Received By	David Ortega
Complaint Adderess	29170 Front Street
Complaint City	Temecula
Complaint Zip Code	92592
Location	

Complaint 9,000 gallons of raw sewage was released due to a lift station failure that caused the manhole to back up and spill out. River flows south from Riverside County into San Diego County.

Findings 6/25/09: EMWD called the California Emergency Management Agency (CEMA) to report this release. The CEMA issued a Hazardous Materials Spill Report, Control# 09-4582, concerning this incident. The CEMA report states that it is unknown if any drinking water was impacted from this release. The CEMA report also states that water was involved in the Santa Margarita River. The CEMA report states that the sewage was contained but was considered unrecoverable. The Riverside County Environmental Health Department and the San Diego RWQCB were notified about this incident. There are no Riverside County Flood Control District facilities in the area of the complaint address that could have been impacted from this release. NOTE: The complaint APN listed in this report is a reference APN only.

Action 6/25/09, 0805 hours: The CEMA received a situation update concerning this incident. RP provided an update to the quantity released, which is 4,000 gallons.

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1990

Type	Spill
Received Date	6/23/2009
APN	943-120-022
First Name	CHP Temecula
Last Name	
Complainant Address	
Complainant City	Rancho California
Complainant Zip Code	92591
Phone	0
Received By	David Ortega
Complaint Adderess	
Complaint City	Rancho California
Complaint Zip Code	92591
Location	Calle Contento North of Rancho California Road

Complaint A combination of muriatic acid, chlorine and pH balancer (adding up to a total of about 20 gallons) was released due to a traffic accident involving a pool service vehicle; less than 20 gallons of pool cleaning chemicals were spilled on the roadway, mostly within the vehicle. The injuries due to chemical spill, only the collision.

Findings 6/23/09: CHP Temecula called the California Emergency Management Agency (CEMA) to report this release. The CEMA issued a Hazardous Materials Spill Report, Control# 09-4554, concerning this incident. The CEMA report states that no water was involved from this release. The CEMA report also states that the substances were contained and cleaned up by the Fire Department. CHP, County Health, and the Fire Department were on scene concerning this incident. The Riverside County Environmental Health Department were notified about this release. The nearest Riverside County Flood Control District facility is located about 1.1 miles to the southwest of the complaint location: "AD159 - Butterfield Stage Road Storm Drain".

Action

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1988

Type	Spill
Received Date	6/19/2009
APN	380-160-013
First Name	Rancho Water District (RWD)
Last Name	
Complainant Address	
Complainant City	Murrieta
Complainant Zip Code	92562
Phone	
Received By	David Ortega
Complaint Adderess	23072 Rancho Mirlo Road
Complaint City	Murrieta
Complaint Zip Code	92562
Location	

Complaint 250 gallons of raw sewage was released due to a break in a 2" copper service line leading to air vac; it caused an overflow in the vault.

Findings 6/19/09: RWD called the California Emergency Management Agency (CEMA) to report this release. The CEMA issued a Hazardous Materials Spill Report, Control# 09-4481, concerning this incident. The CEMA report states that no water was involved from this release. The CEMA report also states that the sewage was contained and cleaned up the reporting party (RWD). The Riverside County Environmental Health Department was notified about this incident. The nearest Riverside County Flood Control District facility is located about 1.2 miles to the southeast of the complaint address: "Murrieta Creek Master Drainage Plan - Line G".

Action

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1966

Type	Spill
Received Date	6/7/2009
APN	906-050-002
First Name	Western Municipal Water District (WMWD)
Last Name	
Complainant Address	
Complainant City	Murrieta
Complainant Zip Code	92562
Phone	
Received By	David Ortega
Complaint Adderess	
Complaint City	Murrieta
Complaint Zip Code	92562
Location	Lemon Street and Jefferson Avenue

Complaint 375 gallons of waste water was released from a manhole due to a main line blockage. A small amount went into a storm drain and was cleaned up.

Findings 6/7/09: WMWD called the California Emergency Management Agency (CEMA) to report this release. The CEMA issued a Hazardous Materials Spill Report, Control# 09-4194, concerning this incident. The CEMA report states that no water was involved from this release. The CEMA report also states that the substance was contained and cleaned up by the responsible party. The Riverside County Environmental Health Department and the RWQCB San Diego were notified about this incident. The nearest Riverside County Flood Control District facility is located about .2 mile to the southwest of the complaint location: "Murrieta Creek Master Drainage Plan - Line F-1". NOTE: The complaint APN listed in this report is a reference APN only.

Action

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1964

Type	Spill
Received Date	6/4/2009
APN	
First Name	Veeder Root
Last Name	
Complainant Address	
Complainant City	Murrieta
Complainant Zip Code	92562
Phone	
Received By	David Ortega
Complaint Adderess	39850 Los Alamos
Complaint City	Murrieta
Complaint Zip Code	92562
Location	Exxon Mobil

Complaint 1 ounce of gasoline was released was caused by an autoshut off failure at a pump.

Findings 6/4/09: Veeder Root called the California Emergency Management Agency (Cal-EMA) to report this release. The Cal-EMA issued a Hazardous Materials Spill Report, Control# 09-4139, concerning this incident. The Cal-EMA report states that no water was involved from this release. The Cal-EMA report also states that the gasoline was contained and was "unrecoverable". The Riverside County Environmental Health Department was notified about this incident. The nearest Riverside County Flood Control District facility is located about .1 mile to the west of the complaint address, "Murrieta Valley - Coliseum Way Storm Drain.

Action

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1957

Type	Spill
Received Date	5/26/2009
APN	904-601-015
First Name	Southern Ca. Edison (SCE)
Last Name	
Complainant Address	
Complainant City	Murrieta
Complainant Zip Code	92562
Phone	0
Received By	David Ortega
Complaint Adderess	23794 Scarlet Oak Drive
Complaint City	Murrieta
Complaint Zip Code	92562
Location	

Complaint 2 gallons of mineral oil, non PCB, was released from a pad mounted transformer that was discovered as leaking. No waterways were affected.

Findings 5/26/09: SCE called the California Emergency Management Agency (CEMA) to report this release. The CEMA issued a Hazardous Materials Spill Report, Control# 09-3939, concerning this incident. The CEMA report states that no water was involved from this release. The CEMA report also states that the substance was contained and cleaned up by a contractor. The Riverside County Environmental Health Department was notified about this incident. The nearest Riverside County Flood Control District facility is located about .5 mile to the east, southeast of the complaint address: "Murrieta Creek Master Drainage Plan - Line G".

Action

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1935

Type	Spill
Received Date	5/7/2009
APN	948-500-003
First Name	Veeder Root
Last Name	
Complainant Address	
Complainant City	Murrieta
Complainant Zip Code	92562
Phone	
Received By	David Ortega
Complaint Adderess	39850 Los Alamos Road
Complaint City	Murrieta
Complaint Zip Code	92562
Location	

Complaint .25 gallons of gasoline was released due to customer error. The nozzle fell from the tank.

Findings 5/7/09: Veeder Root called the California Emergency Management Agency (Cal-EMA) to report this release. The Cal-EMA issued a Hazardous Materials Spill Report, Control# 09-3499, concerning this incident. The Cal-EMA report states that no water was involved from this release. The Cal-EMA report also states that the gasoline was contained and was cleaned up by the reporting party (Veeder Root). The Riverside County Environmental Health Department was notified about this incident. The nearest Riverside County Flood Control District facility is located about .1 mile to the west of the complaint address, "Murrieta Valley - Coliseum Way Storm Drain.

Action

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1934

Type	Spill
Received Date	5/6/2009
APN	904-754-005
First Name	Southern California Edison (SCE)
Last Name	
Complainant Address	
Complainant City	Murrieta
Complainant Zip Code	92562
Phone	0
Received By	David Ortega
Complaint Adderess	23852 Cloverleaf Way
Complaint City	Murrieta
Complaint Zip Code	92562
Location	

Complaint 68 gallons of Non-PCB Mineral oil was released from a pad mounted transformer that failed. The release went out on the front lawn of a residence.

Findings 5/6/09: SCE called the California Emergency Management Agency (CAL-EMA) to report this release. The CAL-EMA issued a Hazardous Materials Spill Report, Control# 09-3496, concerning this incident. The CAL-EMA report states that no water was involved from this release. The CAL-EMA report also states that the substance was contained and cleaned up by Double Barrel Contractor. The Riverside County Environmental Health Department was notified about this incident. The nearest Riverside County Flood Control District facility is located about .5 mile to the east of the complaint address: "Murrieta Creek Master Drainage Plan - Line G".

Action

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1915

Type	Spill
Received Date	4/18/2009
APN	
First Name	Southern California Edison (SCE)
Last Name	
Complainant Address	
Complainant City	Murrieta
Complainant Zip Code	92562
Phone	0
Received By	David Ortega
Complaint Adderess	26895 Sayence
Complaint City	Murrieta
Complaint Zip Code	92562
Location	

Complaint 10 gallons of non-PCB mineral oil was released due to rust deterioration on a pad-mounted transformer that resulted in equipment failure. An outside contractor (AIS) is currently performing clean up.

Findings 4/18/09: SCE called the California Emergency Management Agency (CEMA) to report this release. The CEMA issued a Hazardous Materials Spill Report, Control# 09-3062, concerning this incident. The CEMA report states that no water was involved from this release. The Riverside County Environmental Health and Riverside County CUPA were notified about this incident. NOTE: There is no complaint APN attached to this report because it is unknown where this address is in the City of Murrieta and/or in the County. Therefore, it is also unknown if this complaint address is near a Riverside County Flood Control District facility or not.

Action

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1907

Type	Spill
Received Date	4/10/2009
APN	900-040-007
First Name	CHP - San Diego
Last Name	
Complainant Address	
Complainant City	Murrieta
Complainant Zip Code	92562
Phone	
Received By	David Ortega
Complaint Adderess	
Complaint City	Murrieta
Complaint Zip Code	92562
Location	Southbound 215 Freeway, just south of Clinton Keith Road

Complaint An unknown amount of Nebutyl Acetate was released from a tank vehicle that had leaked the product onto the road shoulder. The product is evaporating and clean up is in progress. No waterways were affected.

Findings 4/10/09: CHP - San Diego called the California Emergency Management Agency (CEMA) to report this release. The CEMA issued a Hazardous Materials Spill Report, Control# 09-2880, concerning this incident. The CEMA report states that no water was involved from this release. The CEMA report also states that the substance was contained and cleaned up by CalTrans. CalTrans, CHP, and the Fire Department were on scene concerning this incident. The Riverside County Environmental Health Department, Murrieta Police Department, and the Fire Department were notified about this release. The nearest Riverside County Flood Control District facility is located about .9 mile to the west of the complaint location: "California Oaks - Via Segovia Storm Drain." NOTE: The complaint APN listed in this report is a reference APN only.

Action

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1887

Type	Spill
Received Date	3/26/2009
APN	909-290-009
First Name	Eastern Municipal Water District (EMWD)
Last Name	
Complainant Address	
Complainant City	Temecula
Complainant Zip Code	92590
Phone	0
Received By	David Ortega
Complaint Adderess	42565 Avenida Alvarado
Complaint City	Temecula
Complaint Zip Code	92590
Location	

Complaint 1.8 to 2 gallons Ferric Chloride - 48% was released.

Findings 3/26/09: EMWD called the California Emergency Management Agency (CEMA) to report this release. The CEMA issued a Hazardous Materials Spill Report, Control# 09-2531, concerning this incident. The CEMA report states that no water and no drinking water was involved and/or impacted from this release. The CEMA report also states that a delivery driver doing a delivery thought he was empty, and was clearing the house. There was product still inside which was released during the clearing process onto him and the spill containment area. The driver was wearing protective clothing and is in process of chemical removal now from his person. No injury is being reported at this time. NRC Report# 900985 for this incident. The Riverside County Environmental Health Department and the NRC were notified about this release. The nearest Riverside County Flood Control District facility is located about .8 mile to the northeast of the complaint address: "Murrieta Creek at Winchester Road." NOTE: The complaint APN listed in this report is a reference APN only.

Action

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1884

Type	Spill
Received Date	3/23/2009
APN	964-060-001
First Name	Metropolitan Water Dist. (MWD)
Last Name	
Complainant Address	
Complainant City	Winchester
Complainant Zip Code	92596
Phone	
Received By	David Ortega
Complaint Adderess	33740 Borel Road
Complaint City	Winchester
Complaint Zip Code	92596
Location	

Complaint 1 pint of sulfuric acid was released while actuating a valve. A leak started and was then stopped.

Findings 3/23/09: MWD called the California Emergency Management Agency (CEMA) to report this release. The CEMA issued a Hazardous Materials Spill Report, Control# 09-2466, concerning this incident. The CEMA report states that no water was involved from this release. The CEMA report also states that the substance was contained and cleaned up by the reporting party (MWD). The Riverside County Environmental Health Department was notified about this incident. There are no Riverside County Flood Control District facilities in the area of the complaint address that could have been impacted from this release.

Action

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1864

Type	Spill
Received Date	3/11/2009
APN	947-182-039
First Name	So. Cal. Edison (SCE)
Last Name	
Complainant Address	
Complainant City	Murrieta
Complainant Zip Code	92562
Phone	
Received By	David Ortega
Complaint Adderess	39660 Almansa Court
Complaint City	Murrieta
Complaint Zip Code	92562
Location	

Complaint 20 to 30 gallons of mineral oil, non PCB, was released due to a malfunction of a pad-mounted transformer.

Findings 3/11/09: SCE called the California Emergency Management Agency (CEMA) to report this release. The CEMA issued a Hazardous Materials Spill Report, Control# 09-2178, concerning this incident. The CEMA report states that no water was involved from this release. The CEMA report also states that the substance was contained and cleaned up by a contractor. The Riverside County Environmental Health Department was notified about this incident. The nearest Riverside County Flood Control District facility is located about .6 mile to the north, northwest of the complaint address: "California Oaks - Nutmeg Street Storm Drain".

Action

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1845

Type	Spill
Received Date	2/21/2009
APN	376-060-021
First Name	Eastern Municipal Water District (EMWD)
Last Name	
Complainant Address	
Complainant City	Wildomar
Complainant Zip Code	92595
Phone	
Received By	David Ortega
Complaint Adderess	21422 South Palomar Road
Complaint City	Wildomar
Complaint Zip Code	92595
Location	

Complaint 50 gallons of sodium bisulfite was released from an above ground storage tank and into secondary containment.

Findings 2/21/09: EMWD called the California Emergency Management Agency (CEMA) to report this release. The CEMA issued a Hazardous Materials Spill Report, Control# 09-1510, concerning this incident. The CEMA report states that no water was involved from this release. The CEMA report also states that the substance was contained and cleaned up by the reporting party (EMWD). The Riverside County Environmental Health Department was notified about this incident. The nearest Riverside County Flood Control District facility is located about .3 mile to the southwest of the complaint address: "Wildomar Master Drainage Plan Channel". NOTE: The complaint APN listed in this report is a reference APN only.

Action

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1841

Type	Spill
Received Date	2/19/2009
APN	909-290-009
First Name	Eastern Municipal Water Dist. (EMWD)
Last Name	
Complainant Address	
Complainant City	Temecula
Complainant Zip Code	92590
Phone	
Received By	David Ortega
Complaint Adderess	42565 Avenida Alvarado
Complaint City	Temecula
Complaint Zip Code	92590
Location	

Complaint An unknown amount of reclaimed chlorinated water was released due to a wash-water line that failed.

Findings 2/19/09: EMWD called the California Emergency Management Agency (CEMA) to report this release. The CEMA issued a Hazardous Materials Spill Report, Control# 09-1430, concerning this incident. The CEMA report states that water was involved in Murrieta Creek from this release; no drinking water was impacted. The release has entered an adjacent creek that runs along the property. The CEMA report also states that the substance was contained and cleaned up by the responsible party. Remediation will include pumping the affected portion of the creek back into the system. The Riverside County Environmental Health Department and CUPA were notified about this incident. The nearest Riverside County Flood Control District facility is located about .8 mile to the northeast of the complaint address: "Murrieta Creek at Winchester Road." NOTE: The complaint APN listed in this report is a reference APN only.

Action

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1832

Type	Spill
Received Date	2/12/2009
APN	964-060-001
First Name	Metro. Water Dist. So. Cal. (MWD)
Last Name	
Complainant Address	
Complainant City	Winchester
Complainant Zip Code	92596
Phone	
Received By	David Ortega
Complaint Adderess	
Complaint City	Winchester
Complaint Zip Code	92596
Location	Station 48 Plus 10, Borel Rd. and Auld St.

Complaint 5 gallons of hydraulic oil was released to soil due to a hydraulic line that was loose on a piece of equipment.

Findings 2/12/09: MWD called the California Emergency Management Agency (CEMA) to report this release. The CEMA issued a Hazardous Materials Spill Report, Control# 09-1208, concerning this incident. The CEMA report states that no water and no drinking water was involved and/or impacted from this release. The CEMA report also states that the substance was contained and cleaned up by the reporting party (MWD). The Riverside County Environmental Health Department was notified about this incident. There are no Riverside County Flood Control District facilities in the area of the complaint address that could have been impacted from this release.

Action

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1823

Type	Spill
Received Date	2/5/2009
APN	964-060-001
First Name	Metropolitan Water District (MWD)
Last Name	
Complainant Address	
Complainant City	Winchester
Complainant Zip Code	92596
Phone	
Received By	David Ortega
Complaint Adderess	33740 Borel Road
Complaint City	Winchester
Complaint Zip Code	92596
Location	

Complaint 8 ounces of chlorine was released. Caller advised that an employee was performing a hook up for the trailer to the chlorine system. A leaking valve caused the release of chlorine gas and the employee inhaled it. The employee was taken to the hospital to be treated.

Findings 2/5/09: MWD called the California Emergency Management Agency (CEMA) to report this release. The CEMA issued a Hazardous Materials Spill Report, Control# 09-1059, concerning this incident. The CEMA report states that no water was involved. The CEMA report also states that the substance was contained and cleaned up by the reporting party (MWD). The Riverside County Environmental Health Department was notified about this incident. There are no Riverside County Flood Control District facilities in the area of the complaint address that could have been impacted from this release.

Action

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1808

Type	Spill
Received Date	1/24/2009
APN	900-310-021
First Name	Eastern Municipal Water Dist. (EMWD)
Last Name	
Complainant Address	
Complainant City	Murrieta
Complainant Zip Code	92563
Phone	
Received By	David Ortega
Complaint Adderess	27843 Wintergrove Way
Complaint City	Murrieta
Complaint Zip Code	92563
Location	

Complaint 2,000 gallons of sewage was released as an overflow from a manhole due to an unknown blockage.

Findings 1/24/09: EMWD called the California Emergency Management Agency (CEMA) to report this release. The CEMA issued a Hazardous Materials Spill Report, Control# 09-0729, concerning this incident. The CEMA report states that no drinking water was impacted from this release, however water was involved in a storm drain. The CEMA report also states that the sewage was contained and cleaned up by the reporting party (EMWD). The Riverside County Environmental Health Department was notified about this incident. The nearest Riverside County Flood Control District facility is located about .9 mile to the south of the complaint address: "Murrieta Valley I-215 Basin."

Action

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1802

Type	Spill
Received Date	1/17/2009
APN	922-120-017
First Name	Eastern Municipal Water Dist. (EMWD)
Last Name	
Complainant Address	
Complainant City	Temecula
Complainant Zip Code	92590
Phone	
Received By	David Ortega
Complaint Adderess	29170 Front Street
Complaint City	Temecula
Complaint Zip Code	92590
Location	

Complaint 15,750 gallons of sewage was released from a manhole due to a lift station failure. The release was unrecoverable.

Findings 1/17/09: EMWD called the California Emergency Management Agency (CEMA) to report this release. The CEMA issued a Hazardous Materials Spill Report, Control# 09-0403, concerning this incident. The CEMA report states that no drinking water was impacted from this release, however water was involved in the Santa Margarita River. The CEMA report also states that the sewage was contained and cleaned up by the reporting party (EMWD). The Riverside County Environmental Health Department was notified about this incident. The nearest Riverside County Flood Control District facility is located about .5 mile north of the complaint APN: "Murrieta Creek Channel". NOTE: The complaint APN listed in this report is a reference APN only.

Action 1/17/09, 1517 hours: A situation update came in to the CEMA concerning this incident. Riverside County advised the SDO that a block was placed in between where the spill occurred and the intake for the drinking water source, so no sewage will go into the drinking water.

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1799

Type	Spill
Received Date	1/16/2009
APN	920-301-002
First Name	Eastern Municipal Water Dist. (EMWD)
Last Name	
Complainant Address	
Complainant City	Temecula
Complainant Zip Code	92563
Phone	
Received By	David Ortega
Complaint Adderess	27293 Cresta Del Norte
Complaint City	Temecula
Complaint Zip Code	92563
Location	

Complaint 350 gallons of sewage was released from an unknown cause; possibly some kind of blockage.

Findings 1/16/09: EMWD called the California Emergency Management Agency (CEMA) to report this release. The CEMA issued a Hazardous Materials Spill Report, Control# 09-0384, concerning this incident. The CEMA report states that this is an ongoing release. Water was involved in a storm drain/ Tucaloca Creek/ Murrieta Creek/ Santa Margarita River/ Pacific Ocean. Drinking water was not impacted from this incident. The CEMA report also states that the sewage was contained and cleaned up by the responsible party. The Riverside County Environmental Health Department and the RWQCB were notified about this release. The nearest Riverside County Flood Control District facility is located adjacent to the complaint address: "Santa Gertrudis Valley Sierra Madre Drive Storm Drain."

Action

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1784

Type	Spill
Received Date	12/23/2008
APN	964-060-001
First Name	Metro. Water Dist. (MWD)
Last Name	
Complainant Address	
Complainant City	Winchester
Complainant Zip Code	92596
Phone	
Received By	David Ortega
Complaint Adderess	3770 Borel Road
Complaint City	Winchester
Complaint Zip Code	92596
Location	Skinner Filtration Plant

Complaint 200 gallons of diesel was released from a portable container that was knocked over.

Findings 12/23/08: MWD called the Governor's Office of Emergency Services (OES) to report this release. The OES issued a Hazardous Materials Spill Report, Control# 08-9102, concerning this incident. The OES report states that no water was involved. The OES report also states that the substance was contained and cleaned up by a contractor. The Riverside County Environmental Health Department was notified about this incident. There are no Riverside County Flood Control District facilities in the area of the complaint address that could have been impacted from this release.

Action

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1777

Type	Spill
Received Date	12/20/2008
APN	909-290-009
First Name	Eastern Municipal Water District (EMWD)
Last Name	
Complainant Address	
Complainant City	Temecula
Complainant Zip Code	92590
Phone	
Received By	David Ortega
Complaint Adderess	42565 Avenida Alvarado Street
Complaint City	Temecula
Complaint Zip Code	92590
Location	

Complaint 62 gallons of sodium bisulfite was released when a gauge on the discharge side of the pump had a seal failure which resulted in the release of the substance.

Findings 12/20/08: EMWD called the Governor's Office of Emergency Services (OES) to report this release. The OES issued a Hazardous Materials Spill Report, Control# 08-9037, concerning this incident. The OES report states that no water was involved from this release. The OES report also states that the substance was contained in a wet well within the facility and will not impact any outside waterways. Cleanup will be performed by the reporting party (EMWD). The Riverside County Environmental Health Department was notified about this incident. The nearest Riverside County Flood Control District facility is located about .8 mile to the northeast of the complaint address: "Murrieta Creek at Winchester Road." NOTE: The complaint APN listed in this report is a reference APN only.

Action

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1774

Type	Spill
Received Date	12/18/2008
APN	964-060-001
First Name	Metropolitan Water Dist. So. Ca. (MWD)
Last Name	
Complainant Address	
Complainant City	Winchester
Complainant Zip Code	92596
Phone	
Received By	David Ortega
Complaint Adderess	33740 Borel Road
Complaint City	Winchester
Complaint Zip Code	92596
Location	

Complaint .5 gallon of caustic soda was released due to a sample valve being partially open during a delivery. Caller states substance released to a tank farm containment area where it mixed with rain water in the containment area.

Findings 12/18/09: MWD called the Governor's Office of Emergency Services (OES) to report this release. The OES issued a Hazardous Materials Spill Report, Control# 08-9001, concerning this incident. The OES report states that no water was involved. The OES report also states that the substance was contained and cleaned up by the reporting party (MWD). The Riverside County Environmental Health Department was notified about this incident. There are no Riverside County Flood Control District facilities in the area of the complaint address that could have been impacted from this release.

Action

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1744

Type	Spill
Received Date	12/4/2008
APN	943-230-003
First Name	Riverside County Health Department
Last Name	
Complainant Address	
Complainant City	Rancho California
Complainant Zip Code	92591
Phone	0
Received By	David Ortega
Complaint Adderess	
Complaint City	Rancho California
Complaint Zip Code	92591
Location	Anza Road and Rancho California Road

Complaint 1,000 gallons of sewage leaked out of seepage pits and flowed into a storm drain on Anza Road. On site maintenance advises there are 4 seepage pits with a valve that directs the flow. The valve was turned in such a way as to direct entire flow to one pit. Once valve was adjust all was fine. It is believed to be under 1,000 gallons, but RP will check with staff that was on scene and advise.

Findings 12/4/08: The Riverside County Health Department called the Governor's Office of Emergency Services (OES) to report this release. The OES issued a Hazardous Materials Spill Report, Control# 08-8658, concerning this incident. The OES report states that this is a "historical report"; meaning that this release occurred on 11/29/08. Water was involved in a storm drain to an unknown location. It is unknown if drinking water was impacted. The OES report also states that the sewage was contained and cleaned up by the responsible party. The Riverside County Environmental Health Department were notified about this incident. The nearest Riverside County Flood Control District facility is located about 1.9 miles to the west, southwest of the complaint location: "Temecula VLY Butterfield Stage Road". NOTE: The complaint APN listed in this report is a reference APN only.

Action 12/4/08, 0811 hours: A situation update came into the OES concerning this incident. The Riverside County Environmental Health Department states that personnel on scene advise amount released is unknown, however release did occur over a period of a few days to a week. The Riverside County Environmental Health Department also state that the on-site maintenance person was Alejandro Pizana.

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1728

Type	Spill
Received Date	11/29/2008
APN	909-290-009
First Name	Eastern Municipal Water District (EMWD)
Last Name	
Complainant Address	
Complainant City	Temecula
Complainant Zip Code	92590
Phone	0
Received By	David Ortega
Complaint Adderess	42565 Avenida Alvarado
Complaint City	Temecula
Complaint Zip Code	92590
Location	Temecula Regional Water Reclamation Facility

Complaint 2,804 gallons of secondary sludge was released while draining and cleaning the residual out of a secondary aeration tank. The released occurred due to the pump discharge hose being dislodged from the discharge point. In addition, 934 gallons of the substance went into a dry storm drain and no waterways were impacted. Clean up crews are enroute to the scene.

Findings 11/29/08: EMWD called the Governor's Office of Emergency Services (OES) to report this release. The OES issued a Hazardous Materials Spill Report, Control# 08-8534, concerning this incident. The OES report states that no water was involved from this release. The OES report also states that the substance was contained and cleaned up by the reporting party (EMWD). The Riverside County Environmental Health Department and the San Diego RWQCB were notified about this incident. The nearest Riverside County Flood Control District facility is located about .8 mile to the northeast of the complaint address: "Murrieta Creek at Winchester Road."

Action 11/29/08, 1313 hours: A situation update came into the OES concerning this incident. Received NRC Report# 891266 regarding this release. 1650 hours: Another situation update came into the OES concerning this incident. The total amount released was 16,824 gallons. The amount that went into the storm drain was 6,732 gallons but still no water ways were impacted.

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1705

Type	Spill
Received Date	11/10/2008
APN	948-045-007
First Name	So. Cal. Edison (SCE)
Last Name	
Complainant Address	
Complainant City	Murrieta
Complainant Zip Code	92562
Phone	0
Received By	David Ortega
Complaint Adderess	40005 Via Verano
Complaint City	Murrieta
Complaint Zip Code	92562
Location	

Complaint 20 gallons of mineral oil (unknown PCBs) was released from an underground transformer that was found to be leaking.

Findings 11/10/08: SCE called the Governor's Office of Emergency Services (OES) to report this release. The OES issued a Hazardous Materials Spill Report, Control# 08-8091, concerning this incident. The OES report states that the leak was contained to the transformer area. No waterways were affected. The Riverside County Environmental Health Department was notified about this release. The nearest Riverside County Flood Control District facility is located about .8 mile to the south of the complaint APN: "Murrieta VY Coliseum Way Storm Drain". NOTE: The complaint APN listed in this report is a reference APN only.

Action

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1702

Type	Spill
Received Date	11/6/2008
APN	918-130-021
First Name	CHP
Last Name	
Complainant Address	
Complainant City	Temecula
Complainant Zip Code	92592
Phone	
Received By	David Ortega
Complaint Adderess	
Complaint City	Temecula
Complaint Zip Code	92592
Location	Northbound I-15 Freeway at the Rainbow Scale facility

Complaint 1 ounce of acetone was on the side of a 55 gallon drum.

Findings 11/6/08: CHP called the Governor's Office of Emergency Services (OES) to report this substance. The OES issued a Hazardous Materials Spill Report, Control# 08-8003, concerning this incident. The OES report states that this is a "historical" report; the incident occurred on 10/24/08. No water and no drinking water was involved and/or impacted from the substance. The OES report also states that the substance was contained. The Riverside County Environmental Health Department was notified about this incident. There are no Riverside County Flood Control District facilities in the area of the complaint location that could have been impacted from the substance. NOTE: The complaint APN listed in this report is a reference APN only.

Action

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1652

Type	Spill
Received Date	9/24/2008
APN	904-762-007
First Name	So. Cal. Edison (SCE)
Last Name	
Complainant Address	
Complainant City	Murrieta
Complainant Zip Code	92562
Phone	
Received By	David Ortega
Complaint Adderess	38145 Placer Creek Street
Complaint City	Murrieta
Complaint Zip Code	92562
Location	

Complaint 2 gallons of mineral oil was released due to equipment malfunction and pad mounted transformer released mineral oil on to soil and a driveway.

Findings 9/24/08: SCE Called the Governor's Office of Emergency Services (OES) to report this release. The OES issued a Hazardous Materials Spill Report, Control# 08-6919, concerning this incident. The OES report states that no water and no drinking water was involved and/or impacted from this release. The OES also states that the substance was contained and cleaned up by a contractor. The Riverside County Environmental Health Department was notified about this incident. The nearest Riverside County Flood Control District facility is located about .9 mile to the east of the complaint address: "Murrieta Creek MDP Line G at Washington".

Action

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1632

Type	Spill
Received Date	9/12/2008
APN	964-060-001
First Name	Metro. Water Dist. So. Cal. (MWD)
Last Name	
Complainant Address	
Complainant City	Winchester
Complainant Zip Code	92596
Phone	
Received By	David Ortega
Complaint Adderess	33740 Borel Road
Complaint City	Winchester
Complaint Zip Code	92596
Location	

Complaint 1 ounce of flourasalicic acid was released when a bolt hole on the holding tank leaked.

Findings 9/12/08: MWD called the Governor's Office of Emergency Services (OES) to report this release. The OES issued a Hazardous Materials Spill Report, Control# 08-6689, concerning this incident. The OES report states that no water was involved from this release. The OES report also states that the substance was contained and cleaned up by the responsible party. The Riverside County Environmental Health Department was notified about this incident. There are no Riverside County Flood Control District facilities in the area of the complaint address that could have been impacted from this release.

Action

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1630

Type	Spill
Received Date	9/11/2008
APN	964-060-001
First Name	Metro. Water Dist. So. Cal. (MWD)
Last Name	
Complainant Address	
Complainant City	Winchester
Complainant Zip Code	92596
Phone	
Received By	David Ortega
Complaint Adderess	33740 Borel Road
Complaint City	Winchester
Complaint Zip Code	92596
Location	

Complaint .5 gallon of Ferric Chloride was released during a transfer operation that caused a tank to overfill.

Findings 9/11/08: MWD called the Governor's Office of Emergency Services (OES) to report this release. The OES issued a Hazardous Materials Spill Report, Control# 08-6649, concerning this incident. The OES report states that no water was involved from this release. The OES report also states that the substance was contained and cleaned up by the responsible party. The Riverside County Environmental Health Department was notified about this incident. There are no Riverside County Flood Control District facilities in the area of the complaint address that could have been impacted by this release.

Action

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1625

Type	Spill
Received Date	9/9/2008
APN	964-060-001
First Name	Metro. Water Dist. L.A. (MWD)
Last Name	
Complainant Address	
Complainant City	Winchester
Complainant Zip Code	92596
Phone	
Received By	David Ortega
Complaint Adderess	33740 Borel Road
Complaint City	Winchester
Complaint Zip Code	92596
Location	

Complaint 8 ounces of aqua-ammonia was released as a leak on a transfer pump.

Findings 9/9/08: MWD called the Governor's Office of Emergency Services (OES) to report this release. The OES issued a Hazardous Materials Spill Report, Control# 08-6601, concerning this incident. The OES report states that no water was involved from this release. The OES report also states that the substance was contained and cleaned up by the responsible party. County Health was notified about this incident. There are no Riverside County Flood Control District facilities in the area of the complaint address that could have been impacted from this release.

Action

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1623

Type	Spill
Received Date	9/8/2008
APN	964-060-001
First Name	Metropolitan Water District of
Last Name	Southern California (MWD)
Complainant Address	
Complainant City	Winchester
Complainant Zip Code	92396
Phone	
Received By	David Ortega
Complaint Adderess	33740 Borel Road
Complaint City	Winchester
Complaint Zip Code	92396
Location	Robert A. Skinner Filtration Plant

Complaint .5 gallon of oil based paint was released when one of the workers dropped a container and spilled the substance out onto the asphalt.

Findings 9/8/08: MWD called the Governor's Office of Emergency Services (OES) to report this release. The OES issued a Hazardous Materials Spill Report, Control# 08-6556, concerning this incident. The OES report states that no water was involved from this release. The OES report also states that the substance was contained and cleaned up by the reporting party (MWD). The Riverside County Environmental Health Department was notified about this incident. There are no Riverside County Flood Control District facilities in the area of the complaint address that could have been impacted from this release

Action

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1621

Type	Spill
Received Date	9/6/2008
APN	909-290-009
First Name	Eastern Municipal Water Dist. (EMWD)
Last Name	
Complainant Address	
Complainant City	Temecula
Complainant Zip Code	92590
Phone	
Received By	David Ortega
Complaint Adderess	42565 Avenida Alvarado
Complaint City	Temecula
Complaint Zip Code	92590
Location	

Complaint 180 gallons of ferric chloride was released from the pump due to a fitting breaking sometime between 1630 hours on 9/5/08 and 0600 hours on 9/6/08.

Findings 9/6/08: EMWD called the Governor's Office of Emergency Services (OES) to report this release. The OES issued a Hazardous Materials Spill Report, Control# 08-6506, concerning this incident. The OES report states that no water was involved from this release. The OES report also states that the substance was contained. The Riverside County Environmental Health Department and Riverside County Haz.-Mat. were notified about this incident. The nearest Riverside County Flood Control District facility is located about .8 mile to the northeast of the complaint address: "Murrieta Creek at Winchester Road."

Action

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1612

Type Spill

Received Date 9/2/2008

APN 921-740-003

First Name Riverside County Environmental

Last Name Health Haz.-Mat. (County Haz.-Mat.)

Complainant Address

Complainant City Temecula

Complainant Zip Code 92590

Phone 0

Received By David Ortega

Complaint Adderess

Complaint City Temecula

Complaint Zip Code 92590

Location On Via Montezuma, cross street of Del Rio Road

Complaint 5 gallons of a mixture of motor oil, transmission oil, and Gasoline was released due to a solo accident that resulted in the vehicle going over the side of the road and into a creek (Murrieta Creek).

Findings 9/1/08, 1150 hours: County Haz.-Mat. called the Governor's Office of Emergency Services (OES) to report this release. The OES issued a Hazardous Materials Spill Report, Control# 08-6384, concerning this incident. The OES report states that no drinking water was impacted from this release however, water was involved in Murrieta Creek. The OES report also states that the vehicle has been extracted but substance has been released to the creek bed. Absorbent pads have been placed to contain substance and Flood Control will be contacted regarding determining who will clean up. Police Dept., Cal Fire, and Temecula Public Works were on scene concerning this incident. The Riverside County Environmental Health Department was notified about this release.

Action 9/2/08: David Ortega spoke briefly to Christine Parsons today about this incident that occurred yesterday on Labor Day. Ms. Parsons said that she was on call this past weekend and left voice messages to Mark Biloki and Steve Thomas of the Riverside County Flood Control (RCFC) with no response from either since yesterday about this release into Murrieta Creek. Ms. Parsons referred Mr. Ortega to call Jim Sappington of County Haz.-Mat., (951) 377-8407, today about this incident. Mr. Ortega left a voice message for Aldo Licitra to call him back today. Mr. Ortega spoke briefly with Mr. Sappington today about this release near Murrieta Creek. Mr. Sappington stated that Cal Fire had set out some absorbent pads on the spilled material. Mr. Sappington also said that he traded voice messages today with Mr. Licitra of the City of Temecula about the impacted area. Mr. Sappington said that Mr. Licitra will have a City of Temecula crew pick up the pads tomorrow (9/3/08). 9/5/08: David Ortega, (951) 955-4390), of the RCFC District spoke briefly to Aldo Licitra, City of Temecula, about this incident. Mr. Licitra emailed an update about this release to Ben Neill of the RWQCB, to Mike Shetler at the Riverside County Executive Office, to J. Uhley, C. Padres and to David Ortega at the RCFC and to others. The email stated that, "Once the City (Temecula) was notified, immediate actions were implemented. Although Murrieta Creek does not fall under the City's maintenance jurisdiction, assistance was provided to the Haz Mat team to ensure their safety during their operations. The accident occurred on a low-flow crossing at Via Montezuma. The area affected by the accident was limited to a small section of shallow ponded water immediately adjacent to the crossing and did not move beyond the crossing. The vehicle was immediately removed from the crossing and an array of absorbent pads were placed by both the Hazmat team and the City maintenance crew on areas where sheen was observed. The City (Temecula) subsequently removed these pads once the sheen was absorbed. No further impacts were observed at the location of the incident. The City re-opened the low-flow access immediately afterward. The City appreciates the collective efforts between Haz Mat, Flood Control, and the County in resolving this issue".

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1584

Type	Spill
Received Date	8/15/2008
APN	964-060-001
First Name	Metro. Water Dist. (MWD)
Last Name	
Complainant Address	
Complainant City	Winchester
Complainant Zip Code	92396
Phone	0
Received By	David Ortega
Complaint Adderess	33740 Borel Road
Complaint City	Winchester
Complaint Zip Code	92396
Location	

Complaint 1 ounce of Ferric Chloride was released as drops from the last couple of deliveries.

Findings 8/15/08: MWD called the Governor's Office of Emergency Services (OES) to report this release. The OES issued a Hazardous Materials Spill Report, Control# 08-5954, concerning this incident. The OES report states that no water was involved from this release. The OES report also states that the substance was contained and cleaned up by the responsible party. The Riverside County Environmental Health Department was notified about this incident. There are no Riverside County Flood Control District facilities in the area of the complaint address that could have been impacted from this release.

Action

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1579

Type	Spill
Received Date	8/13/2008
APN	935-200-005
First Name	So. Cal. Edison (SCE)
Last Name	
Complainant Address	
Complainant City	Riverside County
Complainant Zip Code	92590
Phone	
Received By	David Ortega
Complaint Adderess	
Complaint City	Riverside County
Complaint Zip Code	92590
Location	Teramo Street and Charm Street

Complaint 10 gallons of mineral oil/Non-PCB was released from a pad mounted transformer due to an equipment failure.

Findings 8/13/08: SCE called the Governor's Office of Emergency Services (OES) to report this release. The OES issued a Hazardous Materials Spill Report, Control# 08-5891, concerning this incident. The OES report states that this release affected concrete, soil and grass. No water was involved from this incident. The OES report also states that the substance was contained and cleaned up by a contractor. The Riverside County Environmental Health Department was notified about this release. There are no Riverside County Flood Control District facilities in the area of the complaint location that could have been impacted from this incident. NOTE: The complaint APN listed in this report is a reference APN only.

Action

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1571

Type	Spill
Received Date	8/5/2008
APN	935-220-012
First Name	So. Cal. Edison (SCE)
Last Name	
Complainant Address	
Complainant City	Riverside County
Complainant Zip Code	92590
Phone	
Received By	David Ortega
Complaint Adderess	25367 Terreno
Complaint City	Riverside County
Complaint Zip Code	92590
Location	

Complaint 25 gallons of mineral oil/ Non-PCB was released onto the soil within an avocado grove from a pad-mounted transformer that failed.

Findings 8/5/08: SCE called the Governor's Office of Emergency Services (OES) to report this release. The OES issued a Hazardous Materials Spill Report, Control# 08-5682, concerning this incident. The OES report states that no water was involved from this release. The OES report also states that the substance was contained and will be cleaned up by AES (Contractor). The Riverside County Environmental Health Department was notified about this incident. There are no Riverside County Flood Control District facility in the area of the complaint address that could have been impacted from this release. NOTE: The complaint APN listed in this report is a reference APN only.

Action

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1561

Type	Spill
Received Date	7/28/2008
APN	909-290-009
First Name	Eastern Municipal Water District (EMWD)
Last Name	
Complainant Address	
Complainant City	Temecula
Complainant Zip Code	92590
Phone	
Received By	David Ortega
Complaint Adderess	42565 Avenida Alvarado
Complaint City	Temecula
Complaint Zip Code	92590
Location	

Complaint 1,000 gallons of secondary recycled water was released due to a valve that was left open.

Findings 7/28/08: EMWD called the Governor's Office of Emergency Services (OES) to report this release. The OES issued a Hazardous Materials Spill Report, Control# 08-5496, concerning this incident. The OES report states that no water and no drinking water was involved and/or impacted from this release. The OES report also states that the substance was contained and cleaned up by the reporting party (EMWD). The Riverside County Environmental Health Department was notified about this incident. The nearest Riverside County Flood Control District facility is located about .8 mile to the northeast of the complaint address: "Murrieta Creek at Winchester Road."

Action

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1557

Type	Spill
Received Date	7/22/2008
APN	929-040-013
First Name	Southern California Edison (SCE)
Last Name	
Complainant Address	
Complainant City	Riverside County
Complainant Zip Code	92562
Phone	
Received By	David Ortega
Complaint Adderess	34970 Via Sereno
Complaint City	Riverside County
Complaint Zip Code	92562
Location	

Complaint 20 gallons of unknown PCB mineral oil was released when a car hit a pad-mounted transformer.

Findings 7/22/08: SCE called the Governor's Office of Emergency Services (OES) to report this release. The OES issued a Hazardous Materials Spill Report, Control# 08-5354, concerning this incident. The OES report states that no water was involved from this release. The OES report also states that the substance was contained and cleaned up by a contractor. The Riverside County SO and the Riverside County Environmental Health Department were notified about this incident. There are no Riverside County Flood Control District facilities in the area of the complaint address that could have been impacted from this release.

Action

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1526

Type	Spill
Received Date	7/7/2008
APN	572-050-002
First Name	NRC
Last Name	
Complainant Address	
Complainant City	Anza
Complainant Zip Code	92539
Phone	
Received By	David Ortega
Complaint Adderess	
Complaint City	Anza
Complaint Zip Code	92539
Location	Off Highway 371 next to the Anza Recycling Yard

Complaint As stated per the NRC Report# 876516, a caller reported that oil spilled from several 55 gallon drums onto the ground and was covered up with gravel by the company.

Findings 7/7/08: NRC called the Governor's Office of Emergency Services (OES) to report this spill. The OES issued a Hazardous Materials Spill Report, Control# 08-4967, concerning this incident. The OES report states that no water and no drinking water was involved and/or impacted from this spill. The OES report also states that it is unknown if the spill oil was contained and/or cleaned up. The Riverside County Environmental Health Department was notified about this incident. There are no Riverside County Flood Control District facilities in the area of the complaint location that could have been impacted from this spill. NOTE: The complaint APN listed in this report is a reference APN only.

Action

ATTACHMENT G

NEWLY ACCEPTED FLOOD CONTROL FACILITIES

M E M O R A N D U M

RIVERSIDE COUNTY FLOOD CONTROL
AND WATER CONSERVATION DISTRICT

DATE: August 22, 2008

TO: Mark Biloki, Operations and Maintenance Superintendent

FROM: Stephen E. Stump, Chief of Operations and Maintenance Division SES

RE: Tract No. 24182
Temecula Creek Channel – Meadows Greenbelt Lateral
Temecula Creek Channel – Campanula Way Storm Drain
Project Nos. 7-0-00044 and 7-0-00047
Drawing No. 7-205

Please add the referenced projects to the District's maintained system and acquaint your staff with the new projects. Also, make an addition in the next FY budget to account for maintenance costs. The attached maps and plans are for your use.

Attachments

c: Kent Allen
Bob Cullen
Sam Tercero
Jay Keller
Ivan Chand
Sharon Johnson
Jim Morrell
Bill Hofferber
Imad Guirguis - w/plan sheet
Gayle Cuneo - w/reduced plans
Teresa Tung - w/plan sheet
Jason Uhley - w/plan sheet
Ami Urista - w/plan sheet
GIS Technical Committee
Attn: Bill Rhoades - w/plan sheet
File Room
R/W File
Robin Pierce

AU:rlp

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

0004227

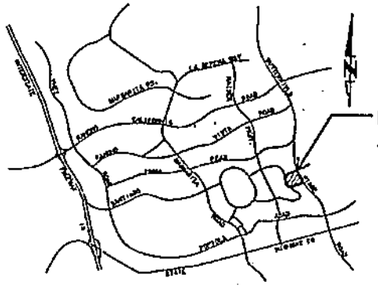

VICINITY MAP
NOT TO SCALE

R.C.F.C.D. STANDARD DRAWINGS

CB 100	CATCH BASIN Nº 1
CB 107	TYPE IX INLET
CB 110	CONCRETE DROP INLET
JS 227	JUNCTION STRUCTURE Nº 2
JS 229	JUNCTION STRUCTURE Nº 4
MH 251	MANHOLE Nº 1
MH 252	MANHOLE Nº 2
MH 254	MANHOLE Nº 4
TS 303	TRANSITION STRUCTURE Nº 3
M 803	CONCRETE COLLAR
M 816	CONCRETE BULKHEAD

MAINTENANCE NOTE

THE FOLLOWING ITEMS ARE TO BE INSPECTED AND MAINTAINED BY RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT:

60" RCP FROM STATION 71+62.48 TO STATION 71+75.57 AS SHOWN ON SHEET 5.

48" RCP FROM STATION 20+10.00 TO STATION 20+29.82; STATION 71+03.28 TO STATION 75+54.91 AS SHOWN ON SHEETS 3 & 5.

42" RCP FROM STATION 75+93.07 TO STATION 82+00.76 AS SHOWN ON SHEET 5.

AND ALL MANHOLES & OTHER STRUCTURES REQUIRED TO COMPLETE THE CONSTRUCTION OF THE ABOVEMENTIONED MAINLINE PIPE; *EXCLUDING CATCH BASINS AND CONNECTOR PIPES.*

SHEET INDEX

	SHEET NO.
TITLE SHEET	1
GENERAL NOTES, CONSTRUCTION NOTES AND ESTIMATED QUANTITIES	2
~~LINE "A" — PLAN AND PROFILE STA. 00+39.33 TO STA. 00+20.01~~	
~~LINE "A" — PLAN AND PROFILE STA. 88+20.01 TO STA. 95+12.05~~	
~~LINE "A" — PLAN AND PROFILE STA. 95+12.05 TO STA. 105+13.78~~	
~~LINE "B" — PLAN AND PROFILE STA. 10+00.00 TO STA. 10+65.14~~	
~~LINE "C" — PLAN AND PROFILE STA. 10+44.94 TO STA. 16+50.00~~	
LINE "D" STA. 20+10.00 TO STA. 29+29.82	3
LINE "E". PLAN AND PROFILE STA. 10+00.00 TO STA. 10+95.00	4
LINE "F" PLAN AND PROFILE STA. 71+62.48 TO STA. 82+00.76	5
LATERAL PROFILES AND DETAILS	6
LATERAL PROFILES AND DETAILS	7
~~LATERAL PROFILES AND DETAILS~~	
~~LATERAL PROFILES AND DETAILS~~	

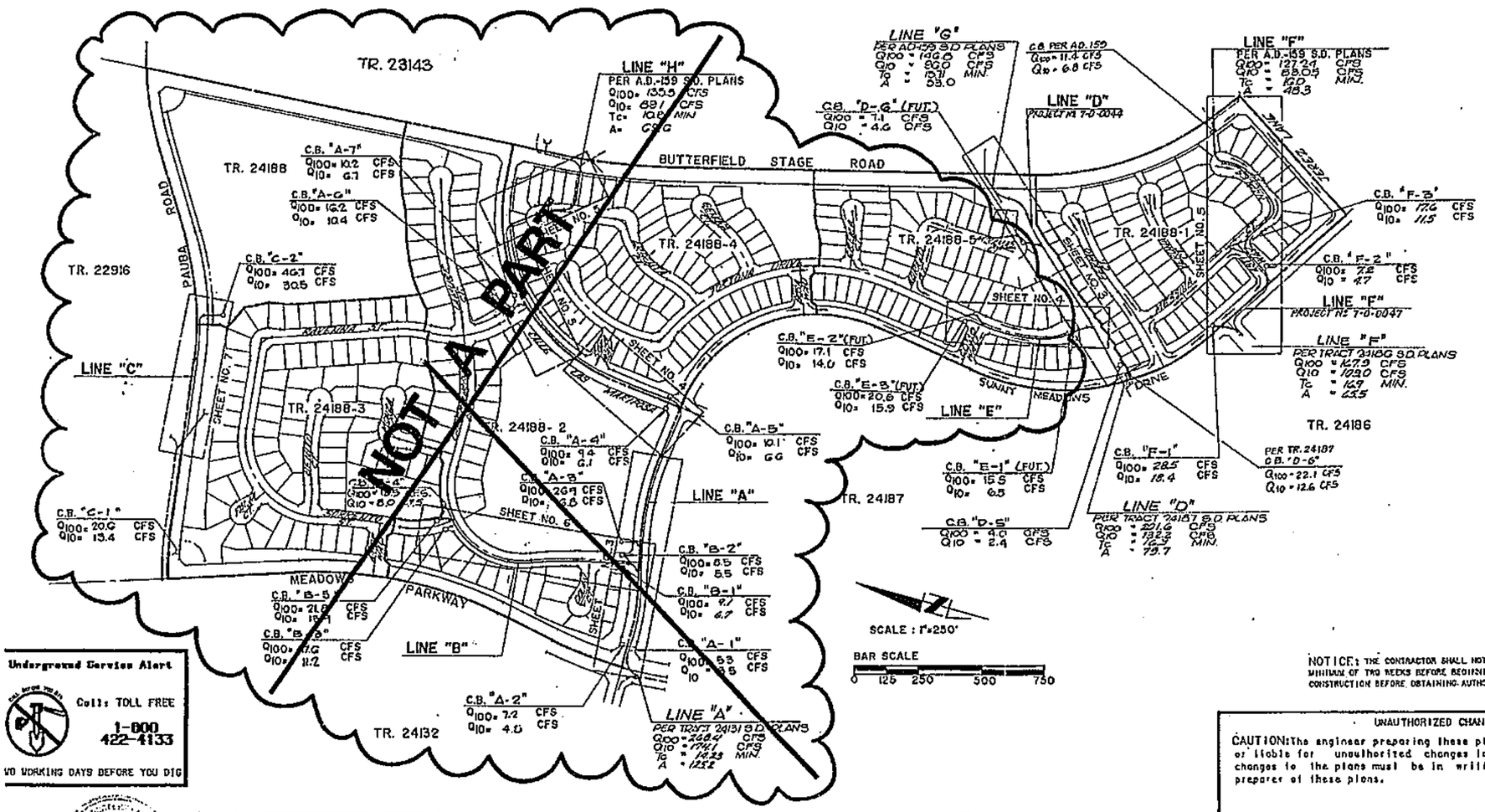

AS BUILT
APPROVED BY:
DATE 4/2/05

UNDERGROUND STRUCTURES

ALL UNDERGROUND UTILITIES OR STRUCTURES REPORTED BY THE OWNER OR OTHERS AND THOSE SHOWN ON THE RECORDS EXAMINED ARE INDICATED WITH THEIR APPROXIMATE LOCATION AND EXTENT. THE OWNER BY ACCEPTING THESE PLANS OR PROCEEDING WITH IMPROVEMENTS PURSUANT THERETO AGREES TO ASSUME LIABILITY AND TO HOLD UNDERSIGNED HARMLESS FOR ANY DAMAGES RESULTING FROM THE EXISTENCE OF UNDERGROUND UTILITIES OR STRUCTURES NOT REPORTED TO THE UNDERSIGNED; NOT INDICATED ON THE PUBLIC RECORDS EXAMINED; LOCATED AT VARIANCE WITH THAT REPORTED OR SHOWN ON RECORDS EXAMINED. THE CONTRACTOR IS REQUIRED TO TAKE DUE PRECAUTIONARY MEASURES TO PROTECT THE UTILITIES OR STUCTURES SHOWN AND ANY OTHER UTILITIES OR STRUCTURES FOUND AT THE SITE. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO NOTIFY THE OWNERS OF THE UTILITIES OR STRUCTURES CONCERNED BEFORE STARTING WORK.

NOTICE: THE CONTRACTOR SHALL NOTIFY THE DISTRICT IN WRITING A MINIMUM OF TWO WEEKS BEFORE BEGINNING CONSTRUCTION AND SHALL NOT BEGIN CONSTRUCTION BEFORE OBTAINING AUTHORIZATION TO PROCEED.

LD 96-133 CO

Underground Service Alert
Call: TOLL FREE
1-800 422-4133
TWO WORKING DAYS BEFORE YOU DIG

DAVID LI-WEN SHEN
NO. 44374
Exp. 6-30-97
CIVIL
STATE OF CALIFORNIA

UNAUTHORIZED CHANGES & USES

CAUTION: The engineer preparing these plans will not be responsible for, or liable for unauthorized changes to or uses of these plans. All changes to the plans must be in writing and must be approved by the preparer of these plans.

BENCH MARK
COUNTY OF RIVERSIDE B.M. NO. 7-29-81
2 1/2" BRASS DISC. IN CONC. CYLINDER LOCATED FROM THE INTERSECTION OF FRONT ST. AND RANCHO CALIFORNIA ROAD, 1.8 MILES N.E. ON RANCHO CALIFORNIA ROAD TO THE INTERSECTION OF RANCHO CALIFORNIA ROAD AND MARGARITA ROAD, IN THE N.W. CORNER OF THE INTERSECTION 1'E OF A 7 FENCE, 24" X 18" ARCHED SQ. CALIF. GAS VALVE, 40' N. OF P.P. END, 88 04' N. OF THE CENTERLINE OF RANCHO CALIFORNIA ROAD, FIBERGLASS WITNESS POST SET 1' W OF MONUMENT.
ADJ. DATE 9-13-82 ELEV. 1828.410

KEITH INTERNATIONAL, INC.
Planning • Civil Engineering • Environmental Services
Land Surveying • Public Works • Water Resources
Inland Empire Division
PREPARED UNDER THE SUPERVISION OF:
DAVID LI-WEN SHEN RCE NO. 44374 EXP. 6/30/97 DATE 7-24-96

BASIS OF BEARINGS
THE BEARINGS SHOWN HEREON ARE BASED ON THE CENTERLINE OF PAUBA ROAD AS SHOWN ON PARCEL MAP NO. 22514 RECORDED IN BOOK 145, PAGES 80 THROUGH 86 OF PARCEL MAPS IN THE OFFICE OF THE COUNTY RECORDER OF RIVERSIDE COUNTY, CALIFORNIA. BEING N 01° 44' 30" W.

REVISIONS					
REF.	DESCRIPTION	REC'D	DATE	APPR.	DATE

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
RECOMMENDED FOR APPROVAL BY: PLANNING ENGINEER DATE: 3/18/97
APPROVED BY: CHIEF ENGINEER DATE: 3/18/97

CITY OF TEMECULA
RECOMMENDED BY: DATE 3/3/97
ACCEPTED BY: DATE 3/3/97
RONALD J. PARKS
PRINCIPAL ENGINEER, FOR CITY ENGINEER
RCE NO. 19744 EXP. DATE: 9/30/97

PALOMA DEL SOL
TEMECULA CREEK CHANNEL - CAMPANULA WAY STORM DRAIN & MEADOWS GREENBELT LATERAL
TRACT NO. 24188-1
STORM DRAIN PLANS

PROJECT NO. 7-0-0047 7-0-0044
DRAWING NO. 7-205
SHEET NO. 1 OF 7

0004228 120744

M E M O R A N D U M

RIVERSIDE COUNTY FLOOD CONTROL
AND WATER CONSERVATION DISTRICT

DATE: August 22, 2008

TO: Mark Biloki, Operations and Maintenance Superintendent

FROM: Stephen E. Stump, Chief of Operations and Maintenance Division SES

RE: Tract No. 24186
Temecula Creek Channel – Campanula Way Storm Drain
Project No. 7-0-00047
Drawing No. 7-262

Please add the referenced project to the District's maintained system and acquaint your staff with the new project. Also, make an addition in the next FY budget to account for maintenance costs. The attached maps and plans are for your use.

Attachments

c: Kent Allen
Bob Cullen
Sam Tercero
Jay Keller
Ivan Chand
Sharon Johnson
Jim Morrell
Bill Hofferber
Imad Guirguis - w/plan sheet
Gayle Cuneo - w/reduced plans
Teresa Tung - w/plan sheet
Jason Uhley - w/plan sheet
Ami Urista - w/plan sheet
GIS Technical Committee
Attn: Bill Rhoades - w/plan sheet
File Room
R/W File
Robin Pierce

AU:rlp

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

CAST-IN-PLACE PIPE RECOMMENDATION

1. CONCRETE MIXES SHALL NOT HAVE LESS THAN SIX (6) SACKS OF PORTLAND CEMENT/CU. YD.
2. CONCRETE MIX DESIGNS SHALL BE SUBMITTED BY CONTRACTOR FOR APPROVAL PRIOR TO START OF CONSTRUCTION.
3. IF CAST-IN-PLACE PIPE IS USED FOR DESIGN VELOCITIES GREATER THAN 20 FPS AND LESS THAN 30 FPS, THE INVERT THICKNESS SHALL BE INCREASED 2" OVER THE LOWER 120 DEGREES OF THE PIPE. FOR VELOCITIES GREATER THAN 30 FPS, A 4" THICKENED INVERT SHALL BE CONSTRUCTED. THE CONCRETE DESIGN STRENGTH IN THESE REACHES SHALL BE FC GREATER THAN OR EQUAL TO 4,000 PSI.
4. MAXIMUM PERMISSIBLE CONCRETE SLUMP SHALL BE 2-1/2", 1-1/2" MIN. TO 2-1/2" MAX.
5. CONTRACTOR SHALL ALLOW INSPECTOR INTO PIPE WHILE UNDER CONSTRUCTION & "ROD" FOR WALL THICKNESS AT A MIN. OF 25 C.Y. OF THE POUR.
6. AT THE END OF ALL POURS AND AT THE END OF EACH WORKING DAY, THE CONTRACTOR SHALL INSTALL #4 DOWELS 24" LONG, 12" INTO THE LAST POUR AT 12" CENTERS AROUND THE CIRCUMFERENCE OF CAST-IN-PLACE PIPE.
7. REFER TO ADDENDUM TO GEOTECHNICAL INVESTIGATION BY CONVERSE CONSULTANTS INLAND EMPIRE DATED MAY 16, 1996 REF. GEOTECHNICAL RECOMMENDATIONS FOR CAST-IN-PLACE CONCRETE PIPE.
8. JUNCTION STRUCTURES SHOWN ON THE PLANS ARE FOR REINFORCED CONCRETE PIPE. THE FOLLOWING SUBSTITUTIONS SHALL BE MADE FOR JUNCTIONS STRUCTURES FOR USE WITH CAST-IN-PLACE PIPE:
   A. A JUNCTION STRUCTURE NO. 4 (JS 229) SHALL BE REPLACED WITH EITHER A JUNCTION STRUCTURE NO. 2 (JS 227) OR A TRANSITION STRUCTURE NO 3 (TS 303).
   B. A JUNCTION STRUCTURE NO. 2 (JS 227) SHALL BE REPLACED WITH A TRANSITION STRUCTURE NO. 3 (TS 303).
9. STANDARD DRAWING NO. JS 227, JUNCTION STRUCTURE NO. 2 WHEN USED WITH CAST-IN-PLACE PIPE SHALL BE MODIFIED TO INCLUDE CONCRETE BACKFILL 1 FOOT OVER THE CAST-IN-PLACE PIPE.

R.C.F.C.D. STANDARD DRAWINGS

JS 229 JUNCTION STRUCTURE NO. 4
JS 227 JUNCTION STRUCTURE NO. 2
MH 252 MANHOLE NO. 2
MH 254 MANHOLE NO. 4
TS 303 TRANSITION STRUCTURE NO. 3
M 803 CONCRETE COLLAR
CB 100 CATCH BASIN NO. 1

MAINTENANCE NOTE

THE FOLLOWING ITEMS ARE TO BE INSPECTED AND MAINTAINED BY RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT:

2682.48 L.F. 60" R.C.P. FROM STA. 44+80.00 TO STA. 71+62.48 AS SHOWN ON SHEETS 3, 4 & 5.

AND ALL MANHOLES AND OTHER STRUCTURES REQUIRED TO COMPLETE THE CONSTRUCTION OF THE ABOVE MENTIONED MAINLINE PIPE;
EXCLUDING CATCH BASINS AND CONNECTOR PIPES.

"APPROVAL OF THESE PLANS BY THE CITY OR ITS AGENTS DOES NOT RELIEVE THE APPLICANT AND HIS ENGINEER FROM THE RESPONSIBILITY FOR THE CORRECTION OF ERRORS OR OMISSIONS DISCOVERED DURING CONSTRUCTION. UPON REQUEST, THE APPROPRIATE PLAN REVISIONS SHALL BE PROMPTLY SUBMITTED TO THE CITY ENGINEER FOR REVIEW AND APPROVAL."

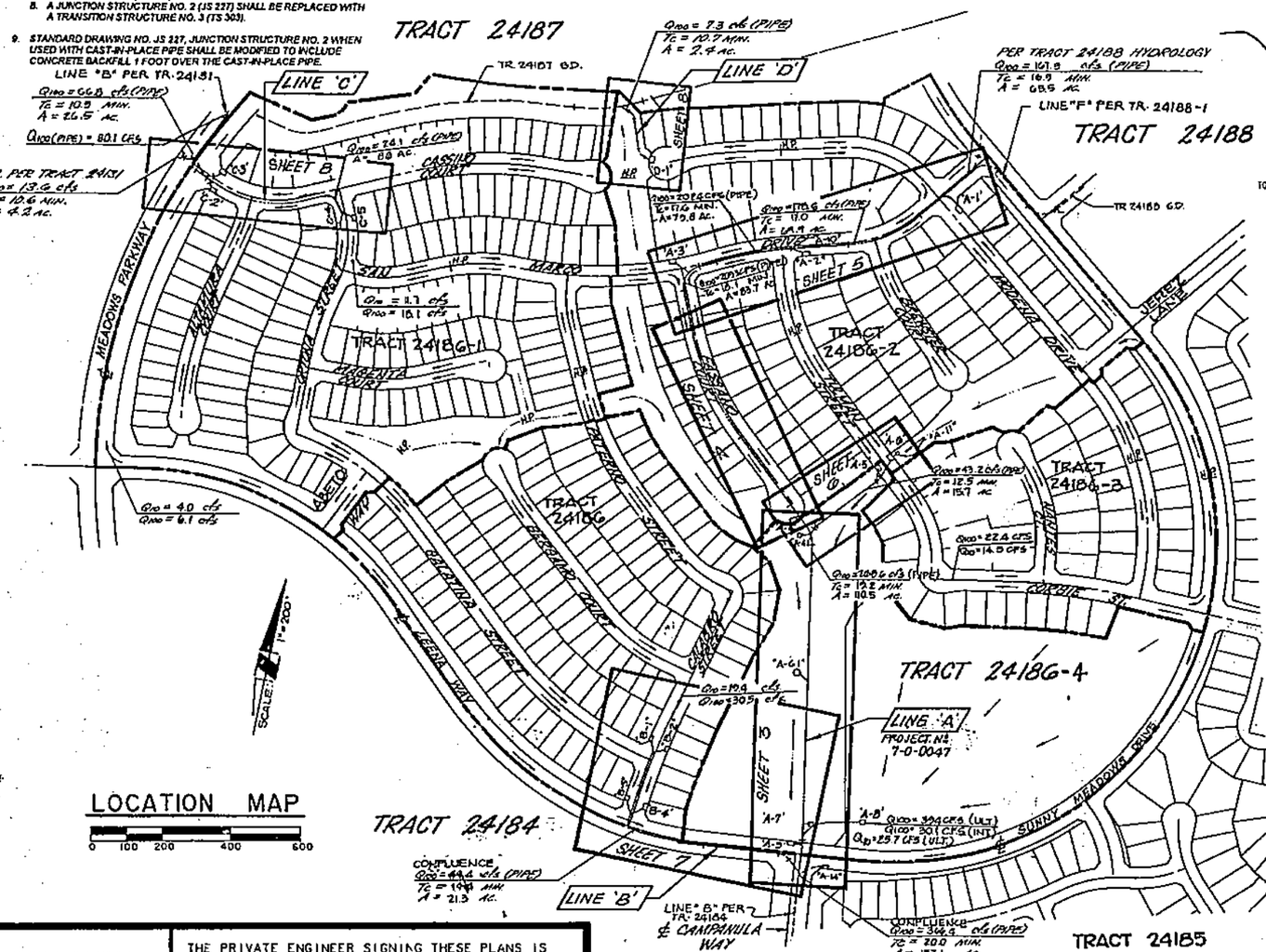

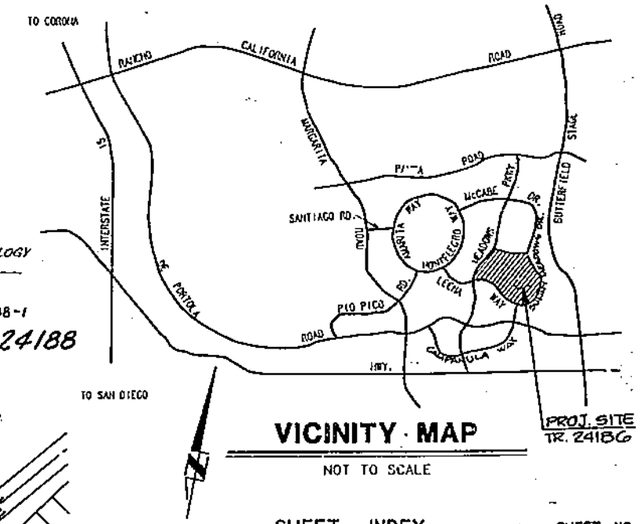

VICINITY MAP

NOT TO SCALE

LOCATION MAP

0 100 200 400 600

SHEET INDEX

	SHEET NO.
TITLE SHEET	1
GENERAL NOTES, CONSTRUCTION NOTES AND ESTIMATED QUANTITIES	2
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LINE 'A' - PLAN AND PROFILE STA. 54+78.07 TO STA. 61+46.03	4
LINE 'A' - PLAN AND PROFILE STA. 61+46.03 TO STA. 71+62.48	5
LAT. "A-5" & LAT. "A-6" PLAN AND PROFILE LATERALS AND DETAILS	6
LINE 'B' - PLAN AND PROFILE STA. 10+00.00 TO STA. 17+63.56	7
LINE 'C' & LINE "D" PLAN AND PROFILE LINE "C" STA. 3+12.58 TO STA. 7+48.77 LINE "D" STA. 10+09.21 TO STA. 12+06.39	8
LATERALS AND DETAIL	9, 10, 11

AS BUILT
APPROVED BY:
DATE 9/4/97

CATCH BASIN INLET TABLE

IDENTIFICATION NUMBER		DESIGN Q100(cfs)	FLOW-THRU Q100 (cfs)
LINE 'A' :	A-1	12.4	0.0
	A-2	15.8	0.0
	A-3	9.9	7.2
	A-4	24.8	19.7
	A-4.1	3.9	2.3
	A-5	20.1	13.0
	A-6	20.1	13.0
	A-6.5	5.2	3.1
	A-7	9.2	5.4
	A-8	33.4	23.7
	A-9	11.1	7.2
	A-10	13.8	5.9
	A-11	8.9	2.3
	A-14	9.9	6.1
LINE 'B' :	B-1	19.0	14.0
	B-2	8.6	5.4
	B-4	3.8	1.5
	B-5	21.4	12.5
LINE 'C' :	C-2	34.9	21.2
	C-3	15.0	5.6
	C-4	9.1	5.9
	C-5	16.0	11.9
LINE 'D'	D-1	7.8	4.1

Underground Service Alert
Call: TOLL FREE 1-800 422-4133
TWO WORKING DAYS BEFORE YOU DIG

UNDERGROUND STRUCTURES

ALL UNDERGROUND UTILITIES OR STRUCTURES REPORTED BY THE OWNER OR OTHERS AND THOSE SHOWN ON THE RECORDS EXAMINED ARE INDICATED WITH THEIR APPROXIMATE LOCATION AND EXTENT. THE OWNER BY ACCEPTING THESE PLANS OR PROCEEDING WITH IMPROVEMENTS PURSUANT THERETO AGREES TO ASSUME LIABILITY AND TO HOLD UNDERSIGNED HARMLESS FOR ANY DAMAGE RESULTING FROM THE EXISTENCE OF UNDERGROUND UTILITIES OR STRUCTURES NOT REPORTED TO THE UNDERSIGNED NOT INDICATED ON THE PUBLIC RECORDS EXAMINED, LOCATED AT VARIANCE WITH THAT REPORTED OR SHOWN ON RECORDS EXAMINED. THE CONTRACTOR IS REQUIRED TO TAKE DUE PRECAUTIONARY MEASURES TO PROTECT THE UTILITIES OR STRUCTURES SHOWN AND ANY OTHER UTILITIES OR STRUCTURES FOUND AT THE SITE. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO NOTIFY THE OWNERS OF THE UTILITIES OR STRUCTURES CONCERNED BEFORE STARTING WORK

THE PRIVATE ENGINEER SIGNING THESE PLANS IS RESPONSIBLE FOR ASSURING THE ACCURACY OF DESIGN AND ACCEPTABILITY OF THE WORK HEREON. IN THE EVENT OF DISCREPANCIES ARISING AFTER CITY APPROVAL OR DURING CONSTRUCTION, THE PRIVATE ENGINEER SHALL BE RESPONSIBLE FOR DETERMINING AN ACCEPTABLE SOLUTION AND REVISING THE PLANS FOR APPROVAL BY THE CITY, AND BY THE RIVERSIDE COUNTY FLOOD CONTROL & WATER CONSERVATION DISTRICT.

BASIS OF BEARINGS

THE BEARINGS SHOWN HEREON ARE BASED ON A PORTION OF THE CENTERLINE OF BUTTERFIELD STAGE ROAD AS SHOWN ON PARCEL MAP NO. 23432 FILED IN BOOK 159, PAGES 38 THROUGH 61 OF PARCEL MAPS IN THE OFFICE OF THE COUNTY RECORDER OF RIVERSIDE COUNTY, CALIFORNIA BEING N 22°50'29" W

BENCH MARK

COUNTY OF RIVERSIDE B.M. NO. T-29-81
1 1/2" BRASS DISC IN CONC. CYLINDER LOCATED FROM THE INTERSECTION OF FRONT ST. AND RANCHO CALIFORNIA ROAD, 1.8 MILES N.E. ON RANCHO CALIFORNIA ROAD TO THE INTERSECTION OF RANCHO CALIFORNIA ROAD AND MARGARITA ROAD, IN THE N.W. CORNER OF THE INTERSECTION 1' E. OF A 7' CHAIN LINK FENCE, 21' x 16' AROUND SO. CALIF. GAS VALVES, 40' N. OF P.P. (NO. 8) 94' N. OF THE CENTERLINE OF RANCHO CALIFORNIA ROAD, FIBERGLASS WITNESS POST SET 1' W. OF MONUMENT.
ADJ. DATE: 9-13-82 ELEV. 1128.410

LD 96-116 CO

DAVID LI-WEN SHEN NO. 44374 EXP. 6-30-97 CIVIL STATE OF CALIFORNIA

KEITH INTERNATIONAL, INC.
Planning • Civil Engineering • Environmental Services
Land Surveying • Public Works • Water Resources
Inland Empire Division
PREPARED UNDER THE SUPERVISION OF
DAVID LI-WEN SHEN RCE NO. 44374 EXP. 6/30/97 DATE 6-1-96

REVISIONS	ENG.		RCFC		
REF.	DESCRIPTION	APPR.	DATE	APPR.	DATE

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
RECOMMENDED FOR APPROVAL BY: Stuart T. McKibben, PLANNING ENGINEER, DATE 5-13-97
APPROVED BY: CHIEF ENGINEER, DATE 5/13/97

CITY OF TEMECULA
RECOMMENDED BY: DATE 4/15/97
ACCEPTED BY: RONALD J. PARKS, PRINCIPAL ENGINEER, FOR CITY ENGINEER, RCE NO. 15744 EXP. DATE 9/30/97, DATE 4/15/97

PALOMA DEL SOL
TEMECULA CREEK CHANNEL - CAMPANULA WAY STORM DRAIN
TRACT NO. 24186
STORM DRAIN PLANS

PROJECT NO. 7-0-0047
DRAWING NO. 7-262
SHEET NO. 1 OF 11

0004230
120738

M E M O R A N D U M

RIVERSIDE COUNTY FLOOD CONTROL
AND WATER CONSERVATION DISTRICT

DATE: August 22, 2008

TO: Mark Biloki, Operations and Maintenance Superintendent

FROM: Stephen E. Stump, Chief of Operations and Maintenance Division SES

RE: Tract No. 24184
Temecula Creek Channel – Campanula Way Storm Drain
Project No. 7-0-00047
Drawing No. 7-261

Please add the referenced project to the District's maintained system and acquaint your staff with the new project. Also, make an addition in the next FY budget to account for maintenance costs. The attached maps and plans are for your use.

Attachments

c: Kent Allen
Bob Cullen
Sam Tercero
Jay Keller
Ivan Chand
Sharon Johnson
Jim Morrell
Bill Hofferber
Imad Guirguis - w/plan sheet
Gayle Cuneo - w/reduced plans
Teresa Tung - w/plan sheet
Jason Uhley - w/plan sheet
Ami Urista - w/plan sheet
GIS Technical Committee
Attn: Bill Rhoades - w/plan sheet
File Room
R/W File
Robin Pierce

AU:rlp

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

CAST-IN-PLACE PIPE RECOMMENDATION

1. CONCRETE MIXES SHALL NOT HAVE LESS THAN SIX (6) SACKS OF PORTLAND CEMENT/CU. YD.
2. CONCRETE MIX DESIGNS SHALL BE SUBMITTED BY CONTRACTOR FOR APPROVAL PRIOR TO START OF CONSTRUCTION.
3. IF CAST-IN-PLACE PIPE IS USED FOR DESIGN VELOCITIES GREATER THAN 20 FPS AND LESS THAN 30 FPS, THE INVERT THICKNESS SHALL BE INCREASED 2" OVER THE LOWER 120 DEGREES OF THE PIPE. FOR VELOCITIES GREATER THAN 30 FPS, A 4" THICKENED INVERT SHALL BE CONSTRUCTED. THE CONCRETE DESIGN STRENGTH IN THESE REACHES SHALL BE F'C GREATER THAN OR EQUAL TO 4,000 PSI.
4. MAXIMUM PERMISSIBLE CONCRETE SLUMP SHALL BE 2-1/2", 1-1/2" MIN. TO 2-1/2" MAX.
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6. AT THE END OF ALL POURS AND AT THE END OF EACH WORKING DAY THE CONTRACTOR SHALL INSTALL #4 DOWELS 24" LONG 12" INTO THE LAST POUR AT 12" CENTERS AROUND THE CIRCUMFERENCE OF REINFORCED CONCRETE PIPE.
7. REFER TO ADDENDUM TO GEOTECHNICAL INVESTIGATION BY CONVERSE CONSULTANTS INLAND EMPIRE DATED MAY 16, 1996 REF. GEOTECHNICAL RECOMMENDATIONS FOR CAST-IN-PLACE CONCRETE PIPE.
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   - A. A JUNCTION STRUCTURE NO. 4 (JS 229) SHALL BE REPLACED WITH EITHER A JUNCTION STRUCTURE NO. 2 (JS 227) OR A TRANSITION STRUCTURE NO 3 (TS 303).
   - B. A JUNCTION STRUCTURE NO. 2 (JS 227) SHALL BE REPLACED WITH A TRANSITION STRUCTURE NO. 3 (TS 303).
9. STANDARD DRAWING NO. JS 227, JUNCTION STRUCTURE NO. 2 WHEN USED WITH CAST-IN-PLACE PIPE SHALL BE MODIFIED TO INCLUDE CONCRETE BACKFILL 1 FOOT OVER THE CAST-IN-PLACE PIPE.

MAINTENANCE NOTE

THE FOLLOWING ITEMS ARE TO BE INSPECTED AND MAINTAINED BY INVESTOR COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT:

- 72" RCP FROM STATION 33+70.00 TO STATION 33+92.70 AS SHOWN ON SHEET 4
- 66" RCP FROM STATION 33+36.36 TO STATION 33+90.00 AS SHOWN ON SHEET 4.
- 42" RCP FROM STATION 10+28.80 TO STATION 22+96.08 AS SHOWN ON SHEETS 3 & 4.

AND ALL MANHOLES AND OTHER STRUCTURES REQUIRED TO COMPLETE THE CONSTRUCTION OF THE ABOVE MENTIONED MAINLINE PIPES, EXCLUDING CATCH BASINS AND CONNECTOR PIPES

R.C.F.C.D. STANDARD DRAWINGS

CB 100 CATCH BASIN NO. 1

JS 229 JUNCTION STRUCTURE NO. 4

MH 252 MANHOLE NO. 2

MH 254 MANHOLE NO. 4

TS 303 TRANSITION STRUCTURE NO. 3

M 608 CONCRETE COLLAR

CITY OF TEMECULA GENERAL NOTES

1. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE CLEARING OF THE PROPOSED WORK AREA, AND RELOCATION COSTS OF ALL EXISTING UTILITIES. PERMITTEE MUST INFORM THE CITY OF CONSTRUCTION SCHEDULE AT LEAST 48 HOURS PRIOR TO BEGINNING OF CONSTRUCTION.
   PHONE: (909) 694-6411
2. ALL CITY INSPECTED WORK SHALL CONFORM TO THE REQUIREMENTS OF THE CITY OF TEMECULA PUBLIC WORKS DEPARTMENT IMPROVEMENT STANDARDS AND THE LATEST EDITION OF STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION (GREEN BOOK).
3. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO NOTIFY THE ENGINEER TO INSTALL STREET CENTERLINE MONUMENTS AS REQUIRED BY THE CITY OF TEMECULA STANDARDS.
4. IT SHALL BE THE RESPONSIBILITY OF THE DEVELOPER OR CONTRACTOR TO APPLY TO THE CITY OF TEMECULA DEPARTMENT OF PUBLIC WORKS FOR AN ENCROACHMENT PERMIT FOR ALL WORK ON EXISTING CITY MAINTAINED ROADS, AND FOR UTILITY WORK WITHIN OFFERS OF DEDICATION FOR PUBLIC USE.
5. ALL UNDERGROUND FACILITIES, WITH LATERALS, SHALL BE IN PLACE PRIOR TO PAVING THE STREET SECTION INCLUDING, BUT NOT LIMITED TO, THE FOLLOWING: SEWER, WATER, ELECTRIC, GAS, DRAINAGE.
6. ASPHALTIC EMULSION (FOG SEAL) SHALL BE APPLIED NOT LESS THAN FOURTEEN (14) DAYS FOLLOWING PLACEMENT OF THE ASPHALT SURFACING AND SHALL BE APPLIED AT A RATE OF 0.05 GALLON PER SQUARE YARD. ASPHALTIC EMULSION SHALL CONFORM TO SECTION 37, 39 AND 94 OF THE STATE STANDARD SPECIFICATIONS.

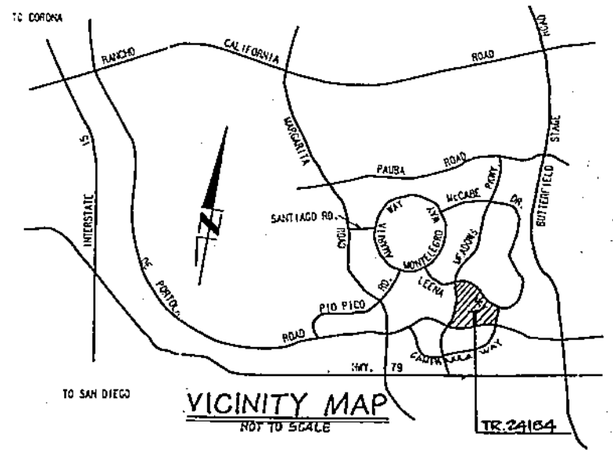

VICINITY MAP
NOT TO SCALE

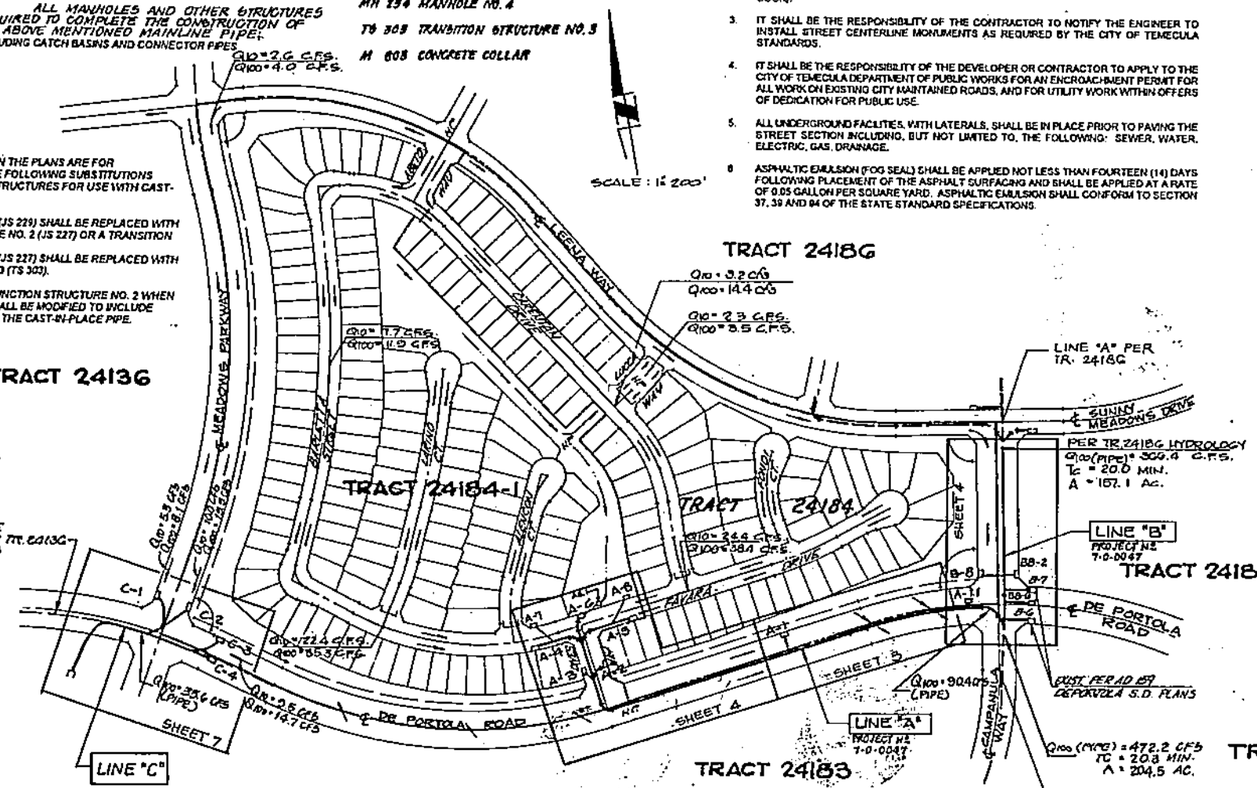

LOCATION MAP
GRAPHIC SCALE : 1" = 200'
0 100 200 400 600

SHEET INDEX

	SHEET. NO.
TITLE SHEET	1
GENERAL NOTES, CONSTRUCTION NOTES, L.D. DETAILS AND ESTIMATED QUANTITIES	2
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LINE 'A' & LINE 'B' PLAN AND PROFILE STA. 20+00.00 TO STA. 23+70.36 LINE 'A' STA. 39+70.00 TO STA. 44+80.00 LINE 'B'	4
LATERALS AND DETAILS	5
LATERALS	6
LINE 'C' - PLAN AND PROFILE STA. 48+08.79 TO STA. 50+93.15	7
LATERALS AND DETAILS	8
DETAILS	

CATCH BASIN INLET TABLE

IDENTIFICATION NUMBER		DESIGN FLOW Q100(cfs)	Q10 (cfs)
LINE 'A' :	A-1	4.0	2.6
	A-2	1.5	0.9
	A-3	5.2	0.7
	A-4	21.3	15.0
	A-5	19.8	12.6
	A-6	8.6	1.7
	A-7	21.8	15.0
	A-8	15.8	12.6
LINE 'B' :	B-8	10.6	7.0
	B-6	6.0	4.0
	B-7/BB-2	3.8	2.5
	BB-6	4.5	2.9
LINE 'C'	C-1	8.1	5.3
	C-2	15.5	10.0
	C-3	9.4	6.1
	C-4	5.8	3.4
	A-6.1	2.8	1.7
	A-1.1	5.0	3.4

AS BUILT
APPROVED BY:
DATE 9/7/00

Underground Service Alert
Call: TOLL FREE
1-800 422-4133
TWO WORKING DAYS BEFORE YOU DIG

UNDERGROUND STRUCTURES

ALL UNDERGROUND UTILITIES OR STRUCTURES REPORTED BY THE OWNER OR OTHERS AND THOSE SHOWN ON THE RECORDS EXAMINED ARE INDICATED WITH THEIR APPROXIMATE LOCATION AND EXTENT. THE OWNER BY ACCEPTING THESE PLANS OR PROCEEDING WITH IMPROVEMENTS PURSUANT THERETO AGREES TO ASSUME LIABILITY AND TO HOLD UNDERSIGNED HARMLESS FOR ANY DAMAGE RESULTING FROM THE EXISTENCE OF UNDERGROUND UTILITIES OR STRUCTURES NOT REPORTED TO THE UNDERSIGNED, NOT INDICATED ON THE PUBLIC RECORDS EXAMINED, LOCATED AT VARIANCE WITH THAT REPORTED OR SHOWN ON RECORDS EXAMINED. THE CONTRACTOR IS REQUIRED TO TAKE DUE PRECAUTIONARY MEASURES TO PROTECT THE UTILITIES OR STRUCTURES SHOWN AND ANY OTHER UTILITIES OR STRUCTURES FOUND AT THE SITE. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO NOTIFY THE OWNERS OF THE UTILITIES OR STRUCTURES CONCERNED BEFORE STARTING WORK.

THE PRIVATE ENGINEER SIGNING THESE PLANS IS RESPONSIBLE FOR ASSURING THE ACCURACY OF DESIGN AND ACCEPTABILITY OF THE WORK HEREON. IN THE EVENT OF DISCREPANCIES ARISING AFTER CITY APPROVAL OR DURING CONSTRUCTION, THE PRIVATE ENGINEER SHALL BE RESPONSIBLE FOR DETERMINING AN ACCEPTABLE SOLUTION AND REVISING THE PLANS FOR APPROVAL BY THE CITY AND BY THE RIVERSIDE COUNTY FLOOD CONTROL & WATER CONSERVATION DISTRICT.

BASIS OF BEARINGS

THE BEARINGS SHOWN HEREON ARE BASED ON A PORTION OF THE CENTERLINE OF BUTTERFIELD STAGE ROAD AS SHOWN ON PARCEL MAP NO. 23432 FILED IN BOOK 159, PAGES 38 THROUGH 61 OF PARCEL MAPS IN THE OFFICE OF THE COUNTY RECORDER OF RIVERSIDE COUNTY, CALIFORNIA BEING N 22° 56' 23" W

BENCH MARK

COUNTY OF RIVERSIDE B.M. NO. T-29-81
1 1/2" BRASS DISC IN CONC. CYLINDER LOCATED FROM THE INTERSECTION OF FRONT ST. AND RANCHO CALIFORNIA ROAD, 1.8 MILES N.E. ON RANCHO CALIFORNIA ROAD TO THE INTERSECTION OF RANCHO CALIFORNIA ROAD AND MARGARITA ROAD, IN THE N.W. CORNER OF THE INTERSECTION 1' E. OF A 7' CHAINLINK FENCE, 21' x 15' AROUND SO. CALIF. GAS VALVES, 40' N. OF P.P. (NO.41) 84' N. OF THE CENTERLINE OF RANCHO CALIFORNIA ROAD, FIBERGLASS WITNESS POST SET 1' W. OF MONUMENT.
ADJ. DATE: 9-13-82 ELEV. 1128.410

LD 96-080CO

DAVID LI-WEN SHEN NO. 44374 Exp. 6-30-97 CIVIL STATE OF CALIFORNIA

KEITH INTERNATIONAL, INC.
Planning • Civil Engineering • Environmental Services • Land Surveying • Public Works • Water Resources
Inland Empire Division
PREPARED UNDER THE SUPERVISION OF
DAVID LI-WEN SHEN RCE NO. 44374 EXP. 6/30/97 DATE 5-6-96

REVISIONS	ENG.	RCFC
REF.	DESCRIPTION	APPROVE / APPR. / DATE

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
RECOMMENDED FOR APPROVAL BY: Stuart T. Kitlas, PLANNING ENGINEER, DATE 5-13-97
APPROVED BY: David Zoro, CHIEF ENGINEER, DATE 5/13/97

CITY OF TEMECULA
RECOMMENDED BY: Geoff Aggen DATE 4/28/97
ACCEPTED BY: Ronald L. Parks DATE 4/29/97
RONALD L. PARKS
PRINCIPAL ENGINEER, FOR CITY ENGINEER
RCE NO. 19744 EXP. DATE 9/30/97

PALOMA DEL SOL
TEMECULA CREEK CHANNEL - CAMPANULA WAY STORM DRAIN
TRACT NO. 24184
STORM DRAIN PLANS

PROJECT NO. 7-0-0047
DRAWING NO. 7-261
SHEET NO. 1 OF 8

0004232 120741

M E M O R A N D U M

RIVERSIDE COUNTY FLOOD CONTROL
AND WATER CONSERVATION DISTRICT

DATE: August 22, 2008

TO: Mark Biloki, Operations and Maintenance Superintendent

FROM: Stephen E. Stump, Chief of Operations and Maintenance Division SES

RE: Tract No. 24185
Temecula Creek Channel – Alcoba Drive Storm Drain
Project No. 7-0-00046
Drawing No. 7-263

Please add the referenced project to the District's maintained system and acquaint your staff with the new project. Also, make an addition in the next FY budget to account for maintenance costs. The attached maps and plans are for your use.

Attachments

c: Kent Allen
Bob Cullen
Sam Tercero
Jay Keller
Ivan Chand
Sharon Johnson
Jim Morrell
Bill Hofferber
Imad Guirguis - w/plan sheet
Gayle Cuneo - w/reduced plans
Teresa Tung - w/plan sheet
Jason Uhley - w/plan sheet
Ami Urista - w/plan sheet
GIS Technical Committee
Attn: Bill Rhoades - w/plan sheet
File Room
R/W File
Robin Pierce

AU:rlp

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

CAST-IN-PLACE PIPE RECOMMENDATION

1. CONCRETE MIXES SHALL NOT HAVE LESS THAN SIX (6) SACKS OF PORTLAND CEMENT/CU YD.
2. CONCRETE MIX DESIGNS SHALL BE SUBMITTED BY CONTRACTOR FOR APPROVAL PRIOR TO START OF CONSTRUCTION.
3. IF CAST-IN-PLACE PIPE IS USED FOR DESIGN VELOCITIES GREATER THAN 20 FPS AND LESS THAN 30 FPS, THE INVERT THICKNESS SHALL BE INCREASED 2" OVER THE LOWER 120 DEGREES OF THE PIPE. FOR VELOCITIES GREATER THAN 30 FPS, A 4" THICKENED INVERT SHALL BE CONSTRUCTED. THE CONCRETE DESIGN STRENGTH IN THESE REACHES SHALL BE F'C GREATER THAN OR EQUAL TO 4,000 PSI.
4. MAXIMUM PERMISSIBLE CONCRETE SLUMP SHALL BE 2-1/2", 1-1/2" MIN. TO 2-1/2" MAX.
5. CONTRACTOR SHALL ALLOW INSPECTOR INTO PIPE WHILE UNDER CONSTRUCTION & "FOOT" FOR WALL THICKNESS AT A MIN. OF 25 C.Y. OF THE POUR.
6. AT THE END OF ALL POURS AND AT THE END OF EACH WORKING DAY THE CONTRACTOR SHALL INSTALL #4 DOWELS 24" LONG 12" INTO THE LAST POUR AT 12" CENTERS AROUND THE CIRCUMFERENCE OF REINFORCED CONCRETE PIPE.
7. REFER TO ADDENDUM TO GEOTECHNICAL INVESTIGATION BY CONVERSE CONSULTANTS INLAND EMPIRE DATED MAY 16, 1996 REF. GEOTECHNICAL RECOMMENDATIONS FOR CAST-IN-PLACE CONCRETE PIPE.
8. JUNCTION STRUCTURES SHOWN ON THE PLANS ARE FOR REINFORCED CONCRETE PIPE. THE FOLLOWING SUBSTITUTIONS SHALL BE MADE FOR JUNCTIONS STRUCTURES FOR USE WITH CAST-IN-PLACE PIPE:
   - A. A JUNCTION STRUCTURE NO. 4 (JS 229) SHALL BE REPLACED WITH EITHER A JUNCTION STRUCTURE NO. 2 (JS 227) OR A TRANSITION STRUCTURE NO 3 (TS 303).
   - B. A JUNCTION STRUCTURE NO. 2 (JS 227) SHALL BE REPLACED WITH A TRANSITION STRUCTURE NO. 3 (TS 303).
9. STANDARD DRAWING NO. JS 227, JUNCTION STRUCTURE NO. 2 WHEN USED WITH CAST-IN-PLACE PIPE SHALL BE MODIFIED TO INCLUDE CONCRETE BACKFILL 1 FOOT OVER THE CAST-IN-PLACE PIPE.

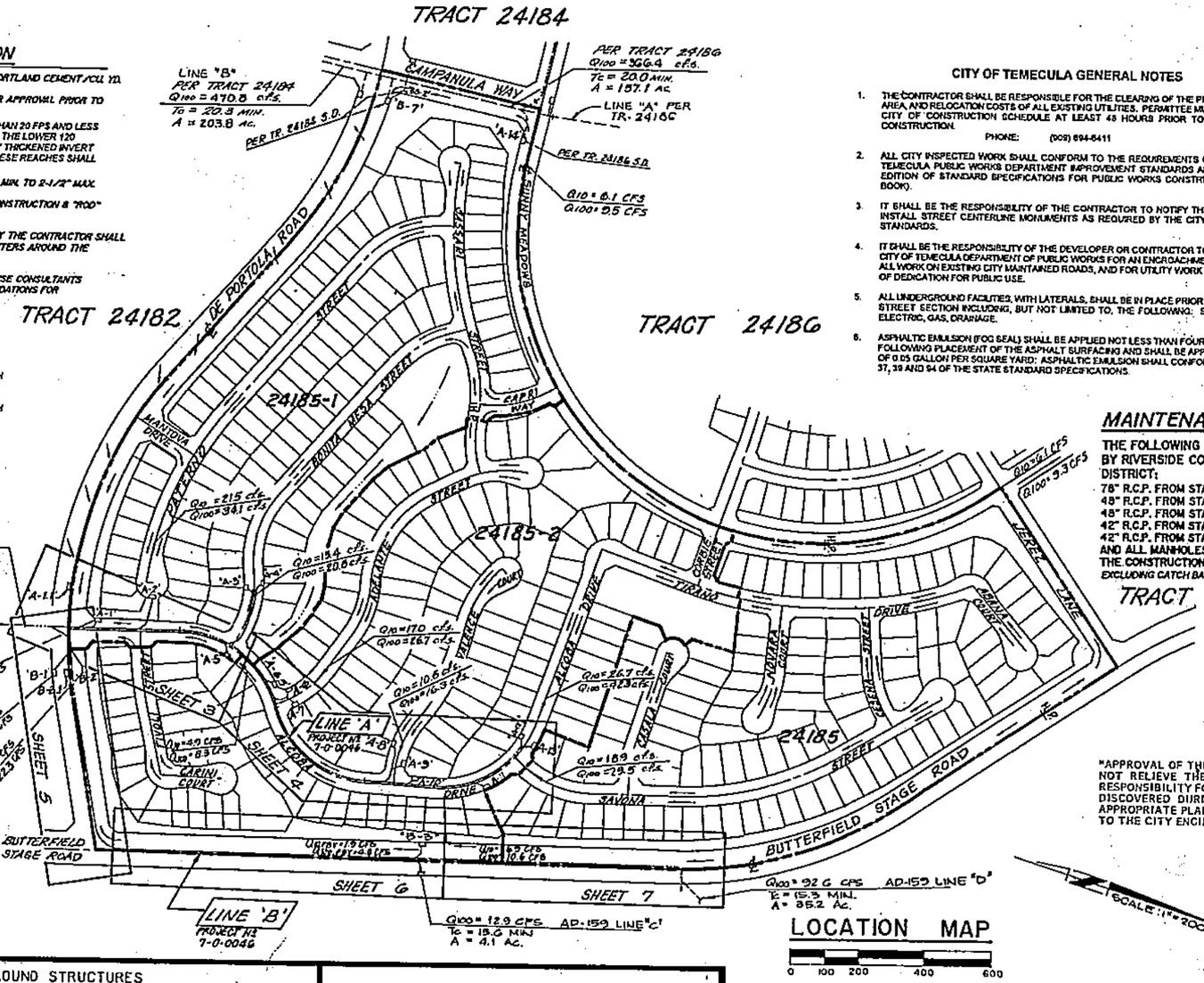

CITY OF TEMECULA GENERAL NOTES

1. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE CLEARING OF THE PROPOSED WORK AREA, AND RELOCATION COSTS OF ALL EXISTING UTILITIES. PERMITTEE MUST INFORM THE CITY OF CONSTRUCTION SCHEDULE AT LEAST 48 HOURS PRIOR TO BEGINNING OF CONSTRUCTION.
   PHONE: (909) 694-6411
2. ALL CITY INSPECTED WORK SHALL CONFORM TO THE REQUIREMENTS OF THE CITY OF TEMECULA PUBLIC WORKS DEPARTMENT IMPROVEMENT STANDARDS AND THE LATEST EDITION OF STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION (GREEN BOOK).
3. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO NOTIFY THE ENGINEER TO INSTALL STREET CENTERLINE MONUMENTS AS REQUIRED BY THE CITY OF TEMECULA STANDARDS.
4. IT SHALL BE THE RESPONSIBILITY OF THE DEVELOPER OR CONTRACTOR TO APPLY TO THE CITY OF TEMECULA DEPARTMENT OF PUBLIC WORKS FOR AN ENCROACHMENT PERMIT FOR ALL WORK ON EXISTING CITY MAINTAINED ROADS, AND FOR UTILITY WORK WITHIN OFFERS OF DEDICATION FOR PUBLIC USE.
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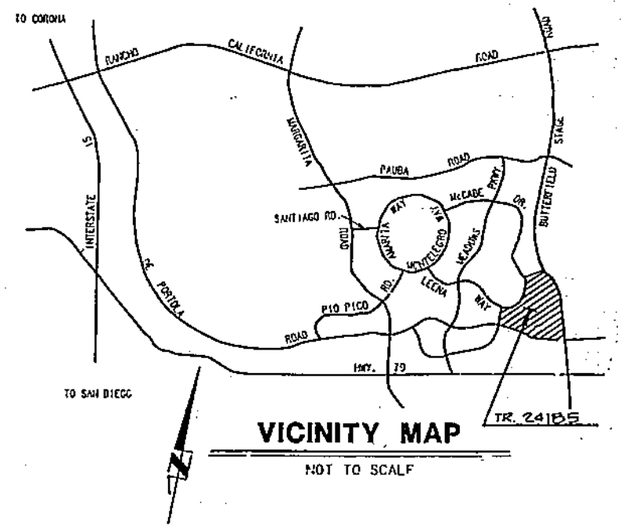

VICINITY MAP

NOT TO SCALE

MAINTENANCE NOTE

THE FOLLOWING ITEMS ARE TO BE INSPECTED AND MAINTAINED BY RIVERSIDE COUNTY FLOOD CONTROL & WATER CONSERVATION DISTRICT:

78" R.C.P. FROM STA. 24+90.00 TO STA. 25+00.00 SHOWN ON SHEET 3
48" R.C.P. FROM STA. 25+14.16 TO STA. 27+85.00 SHOWN ON SHEET 3
48" R.C.P. FROM STA. 10+14.58 TO STA. 17+97.67 SHOWN ON SHEETS 5 & 6
42" R.C.P. FROM STA. 27+94.16 TO STA. 30+15.74 SHOWN ON SHEET 3
42" R.C.P. FROM STA. 18+02.33 TO STA. 25+99.42 SHOWN ON SHEET 6
AND ALL MANHOLES AND OTHER STRUCTURES REQUIRED TO COMPLETE THE CONSTRUCTION OF THE ABOVE MENTIONED MAINLINE PIPE;
EXCLUDING CATCH BASINS AND CONNECTOR PIPES.

SHEET INDEX

	SHEET NO.
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GENERAL NOTES, CONSTRUCTION NOTES, LEGEND AND ESTIMATED QUANTITIES	2
LINE 'A' - PLAN AND PROFILE STA. 24+90.00 TO STA. 31+50.00	3
LINE 'A' - PLAN AND PROFILE STA. 31+50.00 TO STA. 41+76.64	4
LINE 'B' - PLAN AND PROFILE STA. 10+00.00 TO STA. 17+50.00	5
LINE 'B' - PLAN AND PROFILE STA. 17+50.00 TO STA. 27+00.00	6
LINE 'B' - PLAN AND PROFILE STA. 27+00.00 TO STA. 34+37.42	7
LATERALS AND DETAILS	8, 9, 10

"APPROVAL OF THESE PLANS BY THE CITY OR ITS AGENTS DOES NOT RELIEVE THE APPLICANT AND HIS ENGINEER FROM THE RESPONSIBILITY FOR THE CORRECTION OF ERRORS OR OMISSIONS DISCOVERED DURING CONSTRUCTION. UPON REQUEST, THE APPROPRIATE PLAN REVISIONS SHALL BE PROMPTLY SUBMITTED TO THE CITY ENGINEER FOR REVIEW AND APPROVAL."

R.C.F.C.D. STANDARD DRAWINGS

- CB 100 CATCH BASIN NO. 1
- JS 227 JUNCTION STRUCTURE NO. 2
- JS 229 JUNCTION STRUCTURE NO. 4
- MH 251 MANHOLE NO. 1
- MH 252 MANHOLE NO. 2
- MH 254 MANHOLE NO. 4
- TS 303 TRANSITION STRUCTURE NO. 3
- M 803 CONCRETE COLLAR

CATCH BASIN INLET TABLE

IDENTIFICATION NUMBER		DESIGN Q100(cfs)	FLOW Q100(cfs)
LINE 'A':	A-1	15.0	7.7
	A-2	54.1	21.5
	A-3	10.4	6.7
	A-4	10.4	6.7
	A-5	8.5	4.9
	A-6	13.4	8.5
	A-6.5	8.4	2.7
	A-7	8.2	9.6
	A-8	8.2	5.3
	A-9	8.2	5.3
	A-10	13.4	10.5
	A-11	13.4	10.5
	A-12	21.2	13.4
	A-13	21.2	13.4
	A-14	1.2	0.8
LINE 'B':	B-1	1.9	1.3
	B-2	22.3	13.6
	B-3	9.0	5.0
	B-3.1	1.8	0.9

SCALE 1" = 200'

LOCATION MAP

0 100 200 400 600

AS BUILT
APPROVED BY:
DATE 9/24/96

REGISTERED PROFESSIONAL ENGINEER DAVID W. BECKLUND NO. 20737 EXP. 12/31/97 CIVIL STATE OF CALIFORNIA

Underground Service Alert
Call: TOLL FREE
1-800 422-4133
TWO WORKING DAYS BEFORE YOU DIG

UNDERGROUND STRUCTURES

ALL UNDERGROUND UTILITIES OR STRUCTURES REPORTED BY THE OWNER OR OTHERS AND THOSE SHOWN ON THE RECORDS EXAMINED ARE INDICATED WITH THEIR APPROXIMATE LOCATION AND EXTENT. THE OWNER BY ACCEPTING THESE PLANS OR PROCEEDING WITH IMPROVEMENTS PURSUANT THERETO AGREES TO ASSUME LIABILITY AND TO HOLD UNDERSIGNED HARMLESS FOR ANY DAMAGE RESULTING FROM THE EXISTENCE OF UNDERGROUND UTILITIES OR STRUCTURES NOT REPORTED TO THE UNDERSIGNED, NOT INDICATED ON THE PUBLIC RECORDS EXAMINED, LOCATED AT VARIANCE WITH THAT REPORTED OR SHOWN ON RECORDS EXAMINED. THE CONTRACTOR IS REQUIRED TO TAKE DUE PRECAUTIONARY MEASURES TO PROTECT THE UTILITIES OR STRUCTURES SHOWN AND ANY OTHER UTILITIES OR STRUCTURES FOUND AT THE SITE. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO NOTIFY THE OWNERS OF THE UTILITIES OR STRUCTURES CONCERNED BEFORE STARTING WORK.

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BASIS OF BEARINGS

THE BEARINGS SHOWN HEREON ARE BASED ON A PORTION OF THE CENTERLINE OF BUTTERFIELD STAGE ROAD AS SHOWN ON PARCEL MAP NO. 25432 FILED IN BOOK 159, PAGES 38 THROUGH 61 OF PARCEL MAPS IN THE OFFICE OF THE COUNTY RECORDER OF RIVERSIDE COUNTY, CALIFORNIA BEING N22°50'23"W

BENCH MARK

COUNTY OF RIVERSIDE B.M. NO. T-29-81
1 1/2" BRASS DISC IN CONC. CYLINDER LOCATED FROM THE INTERSECTION OF FRONT ST. AND RANCHO CALIFORNIA ROAD, 1.8 MILES N.E. ON RANCHO CALIFORNIA ROAD TO THE INTERSECTION OF RANCHO CALIFORNIA ROAD AND MARGARITA ROAD, IN THE N.W. CORNER OF THE INTERSECTION 1' E. OF A 7' CHAINLINK FENCE, 21' x 16' AROUND SO. CALIF. GAS VALVES, 40' N. OF P.P. (NO.31 94' N. OF THE CENTERLINE OF RANCHO CALIFORNIA ROAD. FIBERGLASS WITNESS POST SET 1' W. OF MONUMENT.
ADJ. DATE: 9-13-82 ELEV. 1128.410

REGISTERED PROFESSIONAL ENGINEER DAVID LI-WEN SHEN NO. 44374 EXP. 6/30/97 CIVIL STATE OF CALIFORNIA

KEITH INTERNATIONAL, INC.
Planning • Civil Engineering • Environmental Services • Land Surveying • Public Works • Water Resources
Inland Empire Division
PREPARED UNDER THE SUPERVISION OF:
DAVID LI-WEN SHEN RCE NO. 44374 EXP. 6/30/97 DATE 4-22-96

REVISIONS					
REF.	DESCRIPTION	ENGR.	DATE	REVIEW	DATE

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
RECOMMENDED FOR APPROVAL BY: PLANNING ENGINEER DATE: 8/29/97
APPROVED BY: CHIEF ENGINEER DATE: 9/5/97

CITY OF TEMECULA
RECOMENDED BY: DATE: 8/29/97
ACCEPTED BY: PRINCIPAL ENGINEER, FOR CITY ENGINEER RONALD J. PARKS DATE: 8/29/97
R.C.E. NO. 13744 EXP. DATE: 9/30/01

PALOMA DEL SOL
TEMECULA CREEK CHANNEL - ALCOBA DRIVE STORM DRAIN
TRACT NO. 24185
STORM DRAIN PLANS

PROJECT NO. 7-0-0046
DRAWING NO. 7-263
SHEET NO. 1 OF 10

LD 96-055 CO

M E M O R A N D U M

RIVERSIDE COUNTY FLOOD CONTROL
AND WATER CONSERVATION DISTRICT

DATE: August 22, 2008

TO: Mark Biloki, Operations and Maintenance Superintendent

FROM: Stephen E. Stump, Chief of Operations and Maintenance Division SES

RE: Tract No. 24188-1
Temecula Creek Channel – Meadows Greenbelt Lateral
Temecula Creek Channel – Campanula Way Storm Drain
Project Nos. 7-0-00044 and 7-0-00047
Drawing No. 7-205

Please add the referenced projects to the District's maintained system and acquaint your staff with the new project. Also, make an addition in the next FY budget to account for maintenance costs. The attached maps and plans are for your use.

Attachments

c: Kent Allen
Bob Cullen
Sam Tercero
Jay Keller
Ivan Chand
Sharon Johnson
Jim Morrell
Bill Hofferber
Imad Guirguis - w/plan sheet
Gayle Cuneo - w/reduced plans
Teresa Tung - w/plan sheet
Jason Uhley - w/plan sheet
Ami Urista - w/plan sheet
GIS Technical Committee
Attn: Bill Rhoades - w/plan sheet
File Room
R/W File
Robin Pierce

AU:rlp

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

PROJECT SITE

ITEMS TO BE INSPECTED AND MAINTAINED BY R.C.F.C. & W.C.D.

LINE "A" FROM STA. 7+90.00 TO 8+78.23 & 24+01.73 TO 24+50.00, SHT. 3
LINE "B" FROM STA. 5+46.62 TO STA. 39+70.00, SHEETS 5, 6, 7 & 8
LINE "C" FROM STA. 24+68.33 TO STA. 25+50.00, SHEET 9
LATERAL "B-7" FROM STA. 10+00.00 TO STA. 11+56.05, SHEET 5
~~LATERAL "B-8" FROM STA. 10+00.00 TO STA. 11+15.00, SHEET 5~~
~~LATERAL "B-9" FROM STA. 10+00.00 TO STA. 11+15.00, SHEET 5~~
~~* ALL REMAINING PIPES TO BE MAINTAINED BY THE CITY *~~
AND ALL MANHOLES AND OTHER STRUCTURES REQUIRED TO COMPLETE THE CONSTRUCTION OF THE ABOVE MENTIONED MAINLINE PIPE; EXCLUDING CATCH BASINS AND CONNECTOR PIPES. ALL LATERALS CONNECTED TO INTERIM DEBRIS BASIN RISERS WILL BE MAINTAINED BY THE DEVELOPER UNTIL THE RISERS ARE REMOVED AND THE PIPES ARE EXTENDED INTO THE ADJACENT TRACT.

R.C.F.C.D. STANDARD DRAWINGS

- CB 100 CATCH BASIN Nº 1
- CB 108 TYPE X INLET
- CB 109 SPECIAL CONNECTION TO C.B.
- JS 227 JUNCTION STRUCTURE Nº 2
- JS 228 JUNCTION STRUCTURE Nº 3
- JS 229 JUNCTION STRUCTURE Nº 4
- MH 252 MANHOLE Nº 2
- MH 253 MANHOLE Nº 3
- MH 254 MANHOLE Nº 4
- TS 301 TRANSITION STRUCTURE Nº 1
- TS 303 TRANSITION STRUCTURE Nº 3
- M 803 CONCRETE COLLAR
- M 816 CONCRETE BULKHEAD

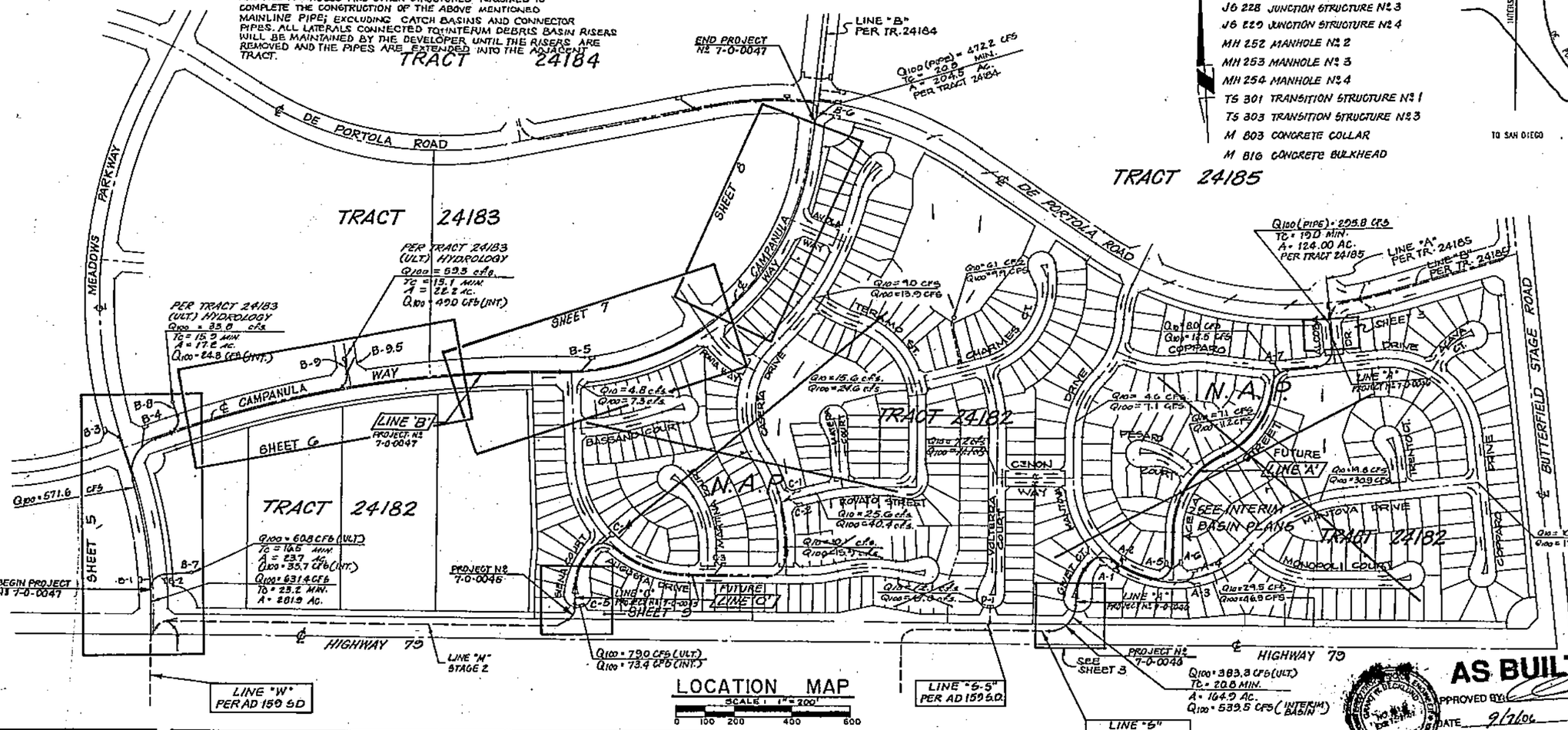

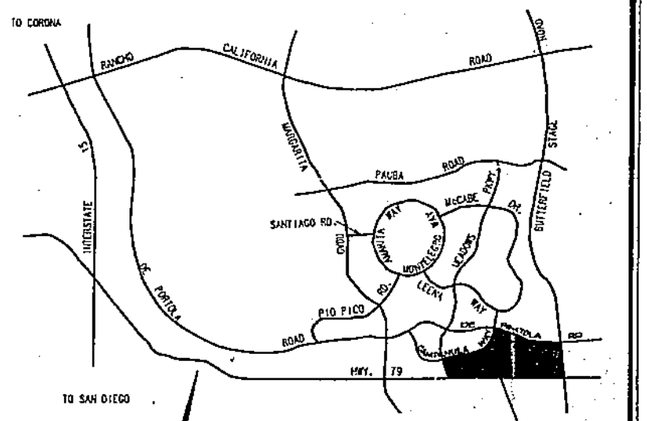

VICINITY MAP

NOT TO SCALE

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LINE 'A' - PLAN AND PROFILE STA. 24+01.73 TO STA. 24+50.00	3
*	*
LINE 'B' - PLAN AND PROFILE STA. 5+95.55 TO STA. 12+41.50	5
LINE 'B' - PLAN AND PROFILE STA. 12+41.50 TO STA. 22+00.00	6
LINE 'B' - PLAN AND PROFILE STA. 22+00.00 TO STA. 32+00.00	7
LINE 'B' - PLAN AND PROFILE STA. 32+00.00 TO STA. 39+70.00	8
LINE 'C' - PLAN AND PROFILE STA. 24+68.33 TO STA. 25+50.00	9
LATERALS & DETAILS	9, 10 & 11

* SHEET 4 DELETED

CATCH BASIN INLET TABLE

IDENTIFICATION NUMBER		DESIGN FLOW Q100 (cfs)	Q100 (INT.)	Q10 (cfs)	
LINE 'A':	A-1	17.3	36.7	10.7	FUTURE
	A-2	7.9	36.7	4.9	
	A-3	23.5	–	14.1	
	A-4	23.5	–	14.1	
	A-5	10.3	–	6.4	
	A-6	10.3	–	6.4	
	A-7	13.9	–	7.9	
LINE 'B':	B-1	5.9	–	2.7	
	B-2	8.0	–	5.1	
	B-3	8.9	–	5.6	
	B-4	11.6	–	7.6	
	B-5	10.8	–	7.0	
	B-6	1.3	–	1.0	
	B-7	–	357	0.0	
	B-8	–	243	2.8	
	B-9	–	492	2.8	
	B-9.5	43	–	2.8	
LINE 'C'		79.0	73.4	2.8	

LOCATION MAP

SCALE: 1" = 200'

0 100 200 400 600

AS BUILT

APPROVED BY: [illegible]

DATE 9/7/06

LD 06-134 CO

Underground Service Alert

Call: TOLL FREE 1-800 422-4133

WORKING DAYS BEFORE YOU DIG

UNDERGROUND STRUCTURES

ALL UNDERGROUND UTILITIES OR STRUCTURES REPORTED BY THE OWNER OR OTHERS AND THOSE SHOWN ON THE RECORDS EXAMINED ARE INDICATED WITH THEIR APPROXIMATE LOCATION AND EXTENT. THE OWNER BY ACCEPTING THESE PLANS OR PROCEEDING WITH IMPROVEMENTS PURSUANT THERETO AGREES TO ASSUME LIABILITY AND TO HOLD UNDERSIGNED HARMLESS FOR ANY DAMAGE RESULTING FROM THE EXISTENCE OF UNDERGROUND UTILITIES OR STRUCTURES NOT REPORTED TO THE UNDERSIGNED, NOT INDICATED ON THE PUBLIC RECORDS EXAMINED, LOCATED AT VARIANCE WITH THAT REPORTED OR SHOWN ON RECORDS EXAMINED. THE CONTRACTOR IS REQUIRED TO TAKE DUE PRECAUTIONARY MEASURES TO PROTECT THE UTILITIES OR STRUCTURES SHOWN AND ANY OTHER UTILITIES OR STRUCTURES FOUND AT THE SITE. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO NOTIFY THE OWNERS OF THE UTILITIES OR STRUCTURES CONCERNED BEFORE STARTING WORK.

THE PRIVATE ENGINEER SIGNING THESE PLANS IS RESPONSIBLE FOR ASSURING THE ACCURACY OF DESIGN AND ACCEPTABILITY OF THE WORK HEREON. IN THE EVENT OF DISCREPANCIES ARISING AFTER CITY APPROVAL OR DURING CONSTRUCTION, THE PRIVATE ENGINEER SHALL BE RESPONSIBLE FOR DETERMINING AN ACCEPTABLE SOLUTION AND REVISING THE PLANS FOR APPROVAL BY THE CITY.

BASIS OF BEARINGS

THE BEARINGS SHOWN HEREON ARE BASED ON A PORTION OF THE CENTERLINE OF BUTTERFIELD STAGE ROAD AS SHOWN ON PARCEL MAP NO. 23432 FILED IN BOOK 159, PAGES 38 THROUGH 61 OF PARCEL MAPS IN THE OFFICE OF THE COUNTY RECORDER OF RIVERSIDE COUNTY, CALIFORNIA BEING N 04°25'05" W

BENCH MARK

COUNTY OF RIVERSIDE B.M. NO. T-29-81
1 1/2" BRASS DISC IN CONC. CYLINDER LOCATED FROM THE INTERSECTION OF FRONT ST. AND RANCHO CALIFORNIA ROAD, 1.8 MILES N.E. ON RANCHO CALIFORNIA ROAD TO THE INTERSECTION OF RANCHO CALIFORNIA ROAD AND MARGARITA ROAD, IN THE N.W. CORNER OF THE INTERSECTION 1' E. OF A 7' CHAINLINK FENCE, 21' x 16' AROUND SO. CALIF. GAS VALVES, 40' N. OF P.P. (NO. 81 94' N. OF THE CENTERLINE OF RANCHO CALIFORNIA ROAD. FIBERGLASS WITNESS POST SET 1' W. OF MONUMENT.
ADJ. DATE: 9-13-82 ELEV. 1128.410

REGISTERED PROFESSIONAL ENGINEER DAVID LI-WEN SHEN No. 44374 Exp. 6-30-97 CIVIL STATE OF CALIFORNIA

KEITH INTERNATIONAL, INC.
• Planning • Civil Engineering • Environmental Services • Land Surveying • Public Works • Water Resources
Inland Empire Division
PREPARED UNDER THE SUPERVISION OF
DAVID LI-WEN SHEN RCE NO. 44374 EXP. 6/30/97 DATE 8-29-96

REVISIONS	BY		RCFC/CITY	
REF.	DESCRIPTION	APPR.	DATE	APPR.	DATE

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
RECOMMENDED FOR APPROVAL BY: Stuart T. Kilgore, PLANNING ENGINEER, DATE: 5-13-97
APPROVED BY: [illegible], CHIEF ENGINEER, DATE: 5/13/97

CITY OF TEMECULA
RECOMMENDED BY: [illegible] DATE 5/1/97
ACCEPTED BY: Ronald E. Parker, PRINCIPAL ENGINEER, FOR CITY ENGINEER, RCE NO. 13744, EXP. DATE: 3/30/97, DATE 5/2/97

PALOMA DEL SOL
TEMECULA CREEK CHANNEL - CAMPANULA WAY S.D., GABBIANO DR. S.D. & ALCOBA DR. S.D.
TRACT NO. 24182
STORM DRAIN PLANS

PROJ. NO. 7-0-0047, 7-0-0046, 7-0-0048
DRAWING NO. 7-260
SHEET NO. 1 OF 11

J.N.

0004236 120753

M E M O R A N D U M

RIVERSIDE COUNTY FLOOD CONTROL
AND WATER CONSERVATION DISTRICT

DATE: August 25, 2008

TO: Mark Biloki, Operations and Maintenance Superintendent

FROM: Stephen E. Stump, Chief of Operations and Maintenance Division SES

RE: Tract No. 29202
Warm Springs Valley – Euclid Loop Storm Drain, Stage 2
Project No. 7-0-00199-02
Drawing No. 7-384

Please add the referenced project to the District's maintained system and acquaint your staff with the new project. Also, make an addition in the next FY budget to account for maintenance costs. The attached maps and plans are for your use.

Attachments

c: Kent Allen
Bob Cullen
Sam Tercero
Jay Keller
Ivan Chand
Sharon Johnson
Jim Morrell
Bill Hofferber
Imad Guirguis - w/plan sheet
Gayle Cuneo - w/reduced plans
Teresa Tung - w/plan sheet
Jason Uhley - w/plan sheet
Ami Urista - w/plan sheet
GIS Technical Committee
Attn: Bill Rhoades - w/plan sheet
File Room
R/W File
Robin Pierce

AU:rlp

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

0004237

WARM SPRING VALLEY-EUCLID LOOP STORM DRAIN IMPROVEMENT PLAN

GENERAL NOTES

1. THE CONTRACTOR SHALL CONSTRUCT THE FLOOD CONTROL IMPROVEMENTS SHOWN ON THE DRAWINGS IN CONFORMANCE WITH THE REQUIREMENTS OF THE RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT'S MEMORANDUM OF UNDERSTANDING STANDARD SPECIFICATIONS, DATED SEPTEMBER 1984, AND DESIGN MANUAL STANDARD DRAWINGS, RECENT EDITION.
2. AN ENCROACHMENT PERMIT IS REQUIRED FROM RIVERSIDE COUNT FLOOD CONTROL. CONTACT ED LOTZ AT (909) 955-1266. AFTER THE PERMIT IS ISSUED THE DISTRICT MUST BE NOTIFIED ONE WEEK PRIOR TO CONSTRUCTION.
3. CONSTRUCTION INSPECTION WILL BE PERFORMED BY RIVERSIDE COUNTY FLOOD CONTROL. CONTACT DALE ANDERSON AT (909) 955-1200. THE DISTRICT MUST BE NOTIFIED 20 DAYS PRIOR TO CONSTRUCTION.
4. ALL STATIONING REFERS TO THE CENTERLINE OF CONSTRUCTION UNLESS OTHERWISE NOTED.
5. STATIONING FOR LATERALS AND CONNECTOR PIPE REFER TO THE CENTERLINE-CENTERLINE INTERSECTION STATION.
6. FORTY-EIGHT HOURS BEFORE EXCAVATION, CALL UNDERGROUND SERVICE ALERT 1-800-227-2600.
7. ALL ELEVATIONS SHOWN ARE IN FEET AND DECIMALS THEREOF BASED ON U.S.C. & G.S. DATUM.
8. ALL CROSS SECTIONS ARE TAKEN LOOKING DOWNSTREAM.
9. ELEVATIONS AND LOCATIONS OF UTILITIES SHOWN ARE APPROXIMATE UNLESS OTHERWISE NOTED.
10. OPENINGS RESULTING FROM THE CUTTING OR PARTIAL REMOVAL OF EXISTING CULVERTS, PIPES OR SIMILAR STRUCTURES TO BE ABANDONED SHALL BE SEALED WITH 6 INCHES OF CLASS "B" CONCRETE.
11. PIPE CONNECTED TO THE MAINLINE PIPE SHALL CONFORM TO JUNCTION STRUCTURE NO. 4 (JS 225) UNLESS OTHERWISE NOTED.
12. BEDDING PIPE SHALL CONFORM TO RCFC&WCD STD. M815, EXCEPT FOR COVER < 2 FEET. FOR COVER < 2 FEET, CONCRETE SLURRY (2000 PSI - 2 SACK) SHALL BE USED. THE ENTIRE TRENCH SHALL BE SLURRY EXTENDING 4 INCHES MINIMUM AND 12 INCHES MAXIMUM ABOVE THE TOP OF THE PIPE.
13. ⊖ INDICATES SOIL BORING LOCATIONS BASED ON THE SOIL REPORT DATED 9/16/2002. LOCATIONS SHOWN ARE APPROXIMATE.
14. "V" IS THE DEPTH OF INLET AND CATCH BASINS MEASURED FROM THE TOP OF CURB TO INVERT OF CONNECTOR PIPE.
15. ALL CURBS, GUTTERS, SIDEWALKS, DRIVEWAYS AND OTHER EXISTING IMPROVEMENTS TO BE RECONSTRUCTED IN KIND AND AT THE SAME ELEVATION AND LOCATION AS THE EXISTING IMPROVEMENTS UNLESS OTHERWISE NOTED.
16. STANDARD DRAWINGS CALLED FOR ON THE PLAN AND PROFILE SHALL CONFORM TO DISTRICT STANDARD DRAWINGS UNLESS NOTED OTHERWISE.
17. DURING ROUGH GRADING OPERATIONS AND PRIOR TO CONSTRUCTION OF PERMANENT DRAINAGE STRUCTURES, TEMPORARY DRAINAGE CONTROL SHALL BE PROVIDED TO PREVENT PONDING WATER AND DAMAGE TO ADJACENT PROPERTIES.
18. HYDRAULIC GRADE LINES SHOWN IN PROFILES ARE FOR 100 YEAR FREQUENCY FLOWS, UNLESS OTHERWISE NOTED.
19. THE CONTRACTOR SHALL COMPLY WITH THE STATE AND LOCAL SAFETY CODES DURING THE PROGRESS OF WORK.
20. THE DEVELOPER SHALL MAINTAIN ADJACENT STREETS IN A NEAT, SAFE, CLEAN AND SANITARY CONDITION AT ALL TIMES AND TO THE SATISFACTION OF THE COUNTY'S OR DISTRICT'S INSPECTOR. THE ADJACENT STREETS SHALL BE KEPT CLEAN OF DEBRIS, WITH DUST AND OTHER NUISANCE BEING CONTROLLED AT ALL TIMES.
21. METHOD OF STREET CLEANING SHALL BE BY DRY SWEEPING OF ALL PAVED AREAS.
22. THE CONTRACTOR AGREES THAT HE SHALL ASSUME SOLE AND COMPLETE RESPONSIBILITY FOR THE JOB SITE CONDITIONS DURING THE COURSE OF CONSTRUCTION OF THIS PROJECT, INCLUDING SAFETY OF ALL PERSONS AND PROPERTY, THAT THIS REQUIREMENT SHALL APPLY CONTINUOUSLY AND NOT BE LIMITED TO NORMAL WORKING HOURS; AND THAT THE CONTRACTOR SHALL DEFEND, INDEMNIFY AND HOLD THE OWNER, R.C.F.C.&.D., COUNTY ROAD DEPARTMENT, AND THE DEVELOPER'S ENGINEER HARMLESS FROM ANY AND ALL LIABILITY, REAL OR ALLEGED, IN CONNECTION WITH THE PERFORMANCE OF WORK ON THIS PROJECT, EXCEPTING FOR LIABILITY ARISING FROM THE SOLE NEGLIGENCE OF THE OWNERS OR THE DEVELOPERS ENGINEER.
23. ADJUST ALL STORM DRAIN AND SEWER MANHOLES, AND WATER VALVES TO GRADE.
24. ALL PIPE LENGTHS ARE HORIZONTAL PROJECTIONS (NOT TRUE LENGTHS OF PIPE) AND ARE THE BASIS OF THE ESTIMATES OF QUANTITIES. THE CONTRACTOR SHALL DETERMINE THE TRUE QUANTITY OF PIPE REQUIRED FOR THIS PROJECT PRIOR TO PLACING THE ORDER.
25. ALL ELEVATIONS SHOWN ARE TO THE INVERT OF PIPE, EXCEPT WHERE OTHERWISE NOTED.
26. AT THE DISCRETION OF THE ENGINEER, THE CONTRACTOR MAY BE REQUIRED TO VERIFY BY POTHOLING THE LOCATION OF POTENTIALLY AFFECTED UTILITIES.

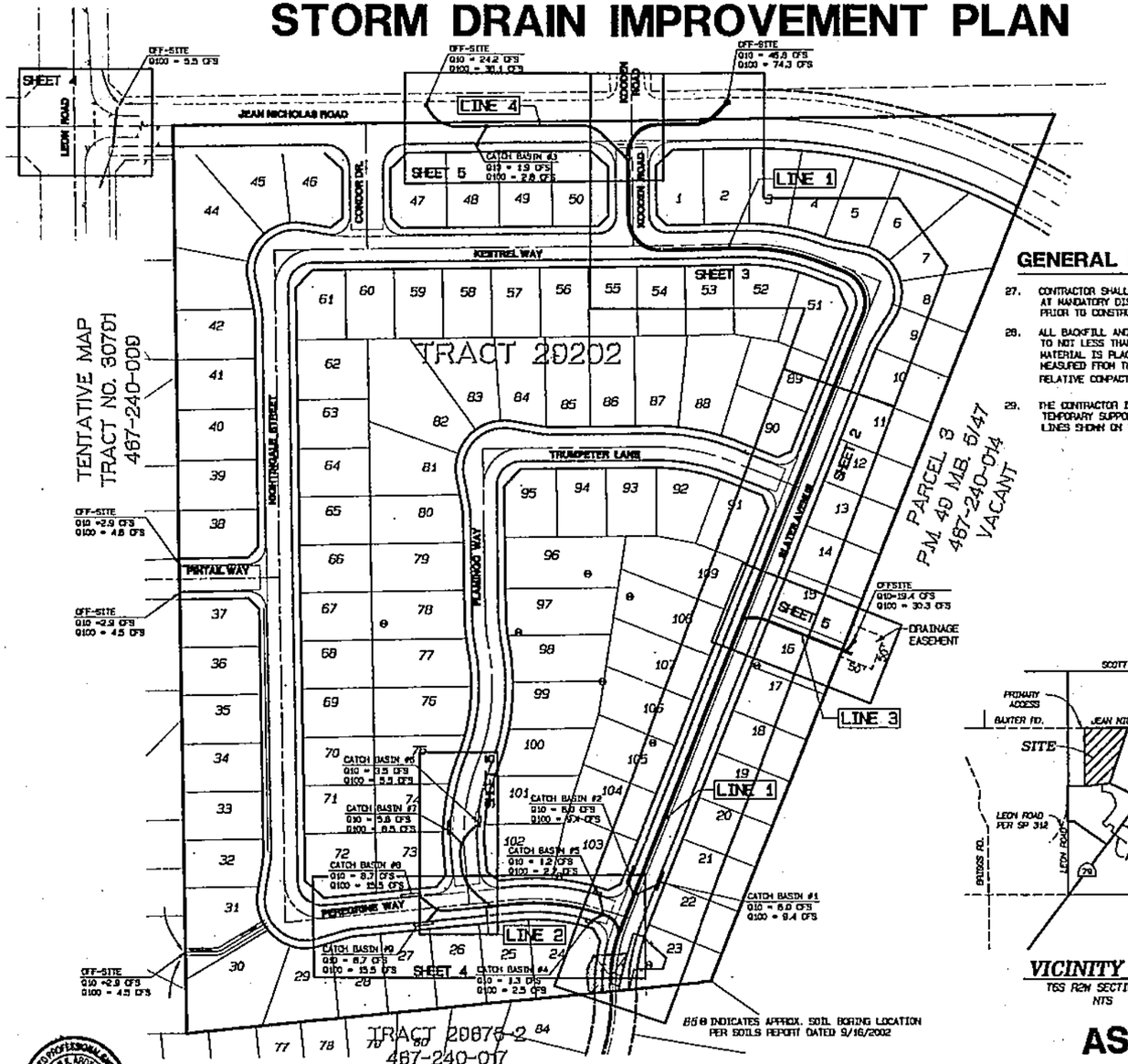

INDEX MAP

SCALE: 1"=100'

SHEET INDEX

	SHEET NO.
TITLE SHEET	1
STORM DRAIN PLAN AND PROFILES	2 - 5
STORM DRAIN LATERAL PROFILES AND ACCESS ROAD	6

GENERAL NOTES (CONTINUED)

27. CONTRACTOR SHALL DISPOSE OF ALL EXCESS EXCAVATED MATERIAL AT MANDATORY DISPOSAL SITE. MUST BE NOTIFIED ONE WEEK PRIOR TO CONSTRUCTION.
28. ALL BACKFILL AND BEDDING AROUND STRUCTURES AND PIPES SHALL BE COMPACTED TO NOT LESS THAN 90 PERCENT RELATIVE COMPACTION EXCEPT WHERE SUCH MATERIAL IS PLACED UNDER EXISTING PAVED ROADWAYS, THE TOP 3 FEET, MEASURED FROM THE FINISHED PAVING, SHALL BE COMPACTED TO 95 PERCENT RELATIVE COMPACTION.
29. THE CONTRACTOR IS REQUIRED TO CONTACT ALL UTILITY AGENCIES REGARDING TEMPORARY SUPPORT AND SHORING REQUIREMENTS FOR THE VARIOUS UTILITY LINES SHOWN ON THESE PLANS.

RCFC STD. DRAWINGS

CB 108	INLET TYPE X
MH 252	MANHOLE NO. 2
MH 254	MANHOLE NO. 4
MH 255	MANHOLE FRAME AND COVER, NON-ROCKING
MH 257	MANHOLE SHAFT FOR CAST PIPE
MH 259	STANDARD DROP STEP
JS 227	JUNCTION STRUCTURE NO. 2
TS 303	TRANSITION STRUCTURE NO. 3
M 803	CONCRETE COLLAR
M 815	BEDDING AND PAY LINES
M 816	CONCRETE BULKHEAD
M 820	PIPE SWING GATE

RCTD STD. DRAWINGS

STD. 300 CURB INLET CATCH BASIN

STD. 311 GUTTER DEPRESSION CASE B & CASE C

CALTRANS STD. DRAWINGS

STD. D93C CMP RISER, TYPE A

MAINTENANCE NOTE

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT WILL INSPECT AND MAINTAIN THE FOLLOWING :
48" STORM DRAIN
FROM STA. 10+00 TO 27+38.36 AS SHOWN ON SHEETS 2 & 3. ALL MANHOLES AND OTHER STRUCTURES REQUIRED TO COMPLETE THE CONSTRUCTION OF THE ABOVE MENTIONED MAINLINE PIPE, EXCEPTING CATCH BASINS AND CONNECTOR PIPES.

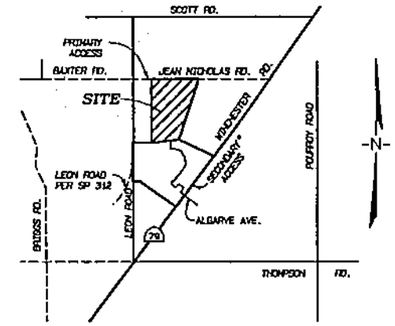

VICINITY MAP

T6S R2W SECTION 32

NTS

CONSTRUCTION NOTES

1	CONSTRUCT 18" RCP CLASS IV
2	CONSTRUCT 24" RCP CLASS IV
3	CONSTRUCT 30" RCP (D AS NOTED)
4	CONSTRUCT 36" RCP (D AS NOTED)
5	CONSTRUCT 48" RCP (D AS NOTED)
6	CONSTRUCT MODIFIED INLET TYPE X PER RCFC STD. CB108 (INLET SIZE AS SPECIFIED ON PLAN(SEE DETAIL ON SHEET 3)
7	CONSTRUCT CURB INLET CATCH BASIN COUNTY STD. 300 AND GUTTER DEPRESSION PER COUNTY STD. 311 CASE B
8	CONSTRUCT CURB INLET CATCH BASIN COUNTY STD. 300 AND GUTTER DEPRESSION PER COUNTY STD. 311 CASE C
9	CONSTRUCT JUNCTION STRUCTURE NO. 2 PER RCFC STD. JS227
10	CONSTRUCT MANHOLE NO. 4 PER RCFC STD. MH254
11	CONSTRUCT MANHOLE NO. 2 PER RCFC STD. MH252
12	CONSTRUCT TRANSITION STRUCTURE NO. 3 PER RCFC STD. TS303
13	CONST. CONC. COLLAR PER 6 RCFC STD. M803
14	REMOVE HEADWALL AND ENTRANCE STRUCTURE AND JOIN EXISTING PIPE
15	CONSTRUCT CONCRETE BULKHEAD PER RCFC STD. M816
16	CONSTRUCT PIPE SWING GATE PER RCFC STD. M820

AS BUILT

APPROVED BY: [signature]

DATE 7/18/08

IP NO. 030016

UNDERGROUND SERVICE ALERT
CALL: TOLL FREE
1-800
227-2600
TWO WORKING DAYS BEFORE YOU DIG

BENCHMARK
NGS Z 311 EL. 1335.34'
THIS IS BASED ON NAVD DATUM IN 1929 AND RE-ESTABLISHED IN 1994.

SEAL-ENGINEER

ALBERT A. WEBB ASSOCIATES
3788 McCRAY STREET, RIVERSIDE, CA 92506
PH. (909) 686-1070 FAX (909) 788-1256

PREPARED BY: [signature] DATE: 2/25/04
R.C.E. NO. 039530 EXP. DATE: 12-31-05
DESIGNED BY:
DRAWN BY:
CHECKED BY:

SEAL-COUNTY

REVISIONS			
REF.	DESCRIPTION	APPR.	DATE

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
RECOMMENDED FOR APPROVAL: [signature] PLANNING ENGINEER DATE: 3-10-2004
APPROVED BY: [signature] CHIEF ENGINEER DATE: 3/10/04

COUNTY OF RIVERSIDE TRANSPORTATION DEPARTMENT
APPROVED BY: [signature] DATE 3/12/04
KHALED ODMAN, P.E.
RECOMMENDED DATE 2/26/04

TRACT NO.29202
WARM SPRING VALLEY - EUCLID LOOP STORM DRAIN STAGE 2
TITLE SHEET

PROJECT NO. 7-0-0199-02
DRAWING NO. 7-384
SHEET NO. 1 OF 6

0004238
121791

M E M O R A N D U M

RIVERSIDE COUNTY FLOOD CONTROL
AND WATER CONSERVATION DISTRICT

DATE: October 20, 2008

TO: Mark Biloki, Operations and Maintenance Superintendent

FROM: Stephen E. Stump, Chief of Operations and Maintenance Division SES

RE: Tract No. 29593
Santa Gertrudis Valley – Murrieta Hot Springs, Willows Avenue Lateral
Project No. 7-0-00124
Drawing No. 7-346

Please add the referenced project to the District's maintained system and acquaint your staff with the new project. Also, make an addition in the next FY budget to account for maintenance costs. The attached maps and plans are for your use.

Attachments

c: Henry Olivo
Bob Cullen
Contract Admin File
Jay Keller
Ivan Chand
Sharon Johnson
Jim Morrell
Bill Hofferber
Imad Guirguis - w/plan sheet
Gayle Cuneo - w/reduced plans
Teresa Tung - w/plan sheet
Jason Uhley - w/plan sheet
Ami Urista - w/plan sheet
GIS Technical Committee
Attn: Bill Rhoades - w/plan sheet
File Room
R/W Acquisition File
Robin Pierce

AU:rlp

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

PM 29594 MS 3741

0004239

GENERAL NOTES (RCFC & WCD)

1. THE CONTRACTOR SHALL CONSTRUCT THE FLOOD CONTROL IMPROVEMENTS SHOWN ON THE DRAWINGS IN CONFORMANCE WITH THE REQUIREMENTS OF THE RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT'S M.O.U. STANDARD SPECIFICATIONS DATED SEPTEMBER 1984, AND DESIGN MANUAL STANDARD DRAWINGS DATED MAY 1971.
2. IF AN ENCROACHMENT PERMIT IS REQUIRED FROM RIVERSIDE COUNTY FLOOD CONTROL, CONTACT ED LOTZ AT 909/955-1266. AFTER THE PERMIT IS ISSUED THE DISTRICT MUST BE NOTIFIED ONE WEEK PRIOR TO CONSTRUCTION.
3. CONSTRUCTION INSPECTION WILL BE PERFORMED BY RIVERSIDE COUNTY FLOOD CONTROL. CONTACT DALE ANDERSON AT 909/955-1288. THE DISTRICT MUST BE NOTIFIED TWO WEEKS PRIOR TO CONSTRUCTION.
4. ALL STATIONING REFERS TO CENTERLINE OF CONSTRUCTION UNLESS OTHERWISE NOTED.
5. STATIONING FOR LATERALS AND CONNECTOR PIPE REFER TO THE CENTERLINE INTERSECTION STATIONS.
6. AT LEAST FORTY-EIGHT (48) HOURS BEFORE EXCAVATION, CONTRACTOR SHALL CALL UNDERGROUND SERVICE ALERT AT 1-800-227-2600.
7. ALL ELEVATIONS SHOWN ARE IN FEET AND DECIMALS THEREOF BASED ON U.S.C. & G.S. DATUM.
8. ALL CROSS SECTIONS ARE TAKEN LOOKING DOWNSTREAM.
9. ELEVATIONS OF UTILITIES ARE APPROXIMATE UNLESS OTHERWISE NOTED.
10. OPENINGS RESULTING FROM THE CUTTING OR PARTIAL REMOVAL OF EXISTING CULVERTS, PIPES OR SIMILAR STRUCTURES TO BE ABANDONED SHALL BE SEALED WITH 6" OF CLASS "B" CONCRETE.
11. PIPE CONNECTED TO THE MAINLINE PIPE SHALL CONFORM TO JUNCTION STRUCTURE NO. 4 (JS 229) UNLESS OTHERWISE NOTED.
12. BEDDING PIPE WITH LESS THAN TWO FEET OF COVER SHALL CONFORM TO LOS ANGELES COUNTY FLOOD CONTROL DISTRICT STANDARD DRAWINGS 2-0213.3 AND 2-0177 FOR CONCRETE BACKFILL IN TRENCHES. ALL OTHER PIPE SHALL CONFORM TO RCFC&WCD STD. DWG. W815.
13. "V" IS THE DEPTH OF INLET OF CATCH BASINS MEASURED FROM THE TOP OF CURB TO INVERT OF CONNECTOR PIPE.
14. CATCH BASINS SHALL BE LOCATED SO THAT LOCAL DEPRESSION SHALL BEGIN AT EXISTING CURB RETURN JOINT, UNLESS OTHERWISE SPECIFIED.
15. ALL CURBS, GUTTERS, SIDEWALKS, DRIVEWAYS AND OTHER EXISTING IMPROVEMENTS TO BE RECONSTRUCTED IN KIND AND AT THE SAME ELEVATION AND LOCATION AS THE EXISTING IMPROVEMENTS UNLESS OTHERWISE NOTED.
16. LOCATIONS OF PUBLIC UTILITIES SHOWN HAVE BEEN DETERMINED FROM AVAILABLE INFORMATION. HOWEVER, IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO DETERMINE THE TRUE LOCATION OF ANY EXISTING UTILITIES AND TO EXERCISE PROPER PRECAUTIONS TO AVOID INJURY AND DAMAGE THERETO.
17. A SOILS INVESTIGATION BY LEIGHTON AND ASSOCIATES, INC., PROJECT NO. 11980108-001, SHALL BE INCLUDED AS A PART OF THESE PLANS. ALL WORK SHALL CONFORM TO RECOMMENDATIONS AS OUTLINED IN SAID REPORT.
18. THE CONCRETE COVER ON THE INSIDE OF ALL REINFORCED CONCRETE PIPES MUST BE INCREASED TO PROVIDE A MINIMUM OF 1 1/2" OVER THE REINFORCING WHEN THE DESIGN VELOCITIES EXCEED 20 FEET PER SECOND. THE CONCRETE DESIGN STRENGTH IN THESE REACHES SHALL BE f'=4000 PSI FOR VELOCITIES EXCEEDING 20 FEET PER SECOND.

GENERAL NOTES (COUNTY TRANSPORTATION)

1. IT SHALL BE THE RESPONSIBILITY OF THE DEVELOPER / OWNER OR CONTRACTOR TO APPLY TO THE RIVERSIDE COUNTY TRANSPORTATION DEPARTMENT, PERMIT SECTION, FOR AN ENCROACHMENT PERMIT FOR ALL WORK PERFORMED WITHIN PUBLIC RIGHT-OF-WAY, DEDICATED AND ACCEPTED FOR PUBLIC USE; AND TO BE RESPONSIBLE FOR SATISFACTORY COMPLIANCE FOR ALL CURRENT ENVIRONMENTAL REGULATIONS DURING THE LIFE OF CONSTRUCTION ACTIVITIES FOR THIS PROJECT. ADDITIONAL STUDIES AND / OR PERMITS MAY BE REQUIRED. PHONE: 909/955-6885 FOR PARCEL MAPS & TRACT MAPS
2. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE CLEARING OF THE PROPOSED WORK AREA, AND RELOCATION COSTS OF ALL EXISTING UTILITIES. PERMITTEE MUST INFORM COUNTY OF CONSTRUCTION SCHEDULE AT LEAST 48 HOURS PRIOR TO TO BEGINNING OF CONSTRUCTION.
3. ALL WORK SHALL CONFORM TO THE REQUIREMENTS OF THE RIVERSIDE COUNTY TRANSPORTATION DEPARTMENT IMPROVEMENT STANDARDS AND SPECIFICATIONS, LATEST EDITION, COUNTY ORDINANCE NO. 461 AND SUBSEQUENT AMENDMENTS.
4. ALL UNDERGROUND FACILITIES, WITH LATERALS, SHALL BE IN PLACE PRIOR TO PAVING THE STREET, INCLUDING, BUT NOT LIMITED TO, THE FOLLOWING: SEWER, WATER, ELECTRIC, GAS, AND STORM DRAIN.

UNDERGROUND STRUCTURES

ALL UNDERGROUND UTILITIES OR STRUCTURES REPORTED BY THE OWNER OR OTHERS AND THOSE SHOWN ON THE RECORD EXAMINED ARE INDICATED WITH THEIR APPROXIMATE LOCATION AND EXTENT. THE OWNER BY ACCEPTING THESE PLANS OR PROCEEDING WITH IMPROVEMENTS PURSUANT THERETO AGREES TO ASSUME LIABILITY AND TO HOLD UNDERSIGNED HARMLESS FOR ANY DAMAGES RESULTING FROM THE EXISTENCE OF UNDERGROUND UTILITIES OR STRUCTURES NOT REPORTED TO THE UNDERSIGNED; NOT INDICATED ON THE PUBLIC RECORDS EXAMINED; LOCATED AT VARIANCE WITH THAT REPORTED OR SHOWN ON RECORDS EXAMINED. THE CONTRACTOR IS REQUIRED TO TAKE DUE PRECAUTIONARY MEASURES TO PROTECT THE UTILITIES OR STRUCTURES SHOWN AND ANY OTHER UTILITIES OR STRUCTURES FOUND AT THE SITE. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO NOTIFY THE OWNERS OF THE UTILITIES OR STRUCTURES CONCERNED BEFORE STARTING WORK.

UNAUTHORIZED CHANGES & USES

CAUTION: THE ENGINEER PREPARING THESE PLANS WILL NOT BE RESPONSIBLE FOR, OR LIABLE FOR, UNAUTHORIZED CHANGES TO OR USES OF THESE PLANS. ALL CHANGES TO THE PLANS MUST BE IN WRITING AND MUST BE APPROVED BY THE PREPARER OF THESE PLANS.

MAINTENANCE RESPONSIBILITY

THE FOLLOWING ITEMS ARE TO BE INSPECTED AND MAINTAINED BY RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT:

WILLOWS AVE. LATERAL FROM STA. 10+79.20 TO STA. 25+18.61 AS SHOWN ON SHEETS 2 & 3.

ALL MANHOLES AND OTHER STRUCTURES REQUIRED TO COMPLETE THE CONSTRUCTION OF THE ABOVE MENTIONED MAINLINE PIPE EXCEPTING CATCH BASINS AND CONNECTOR PIPE.

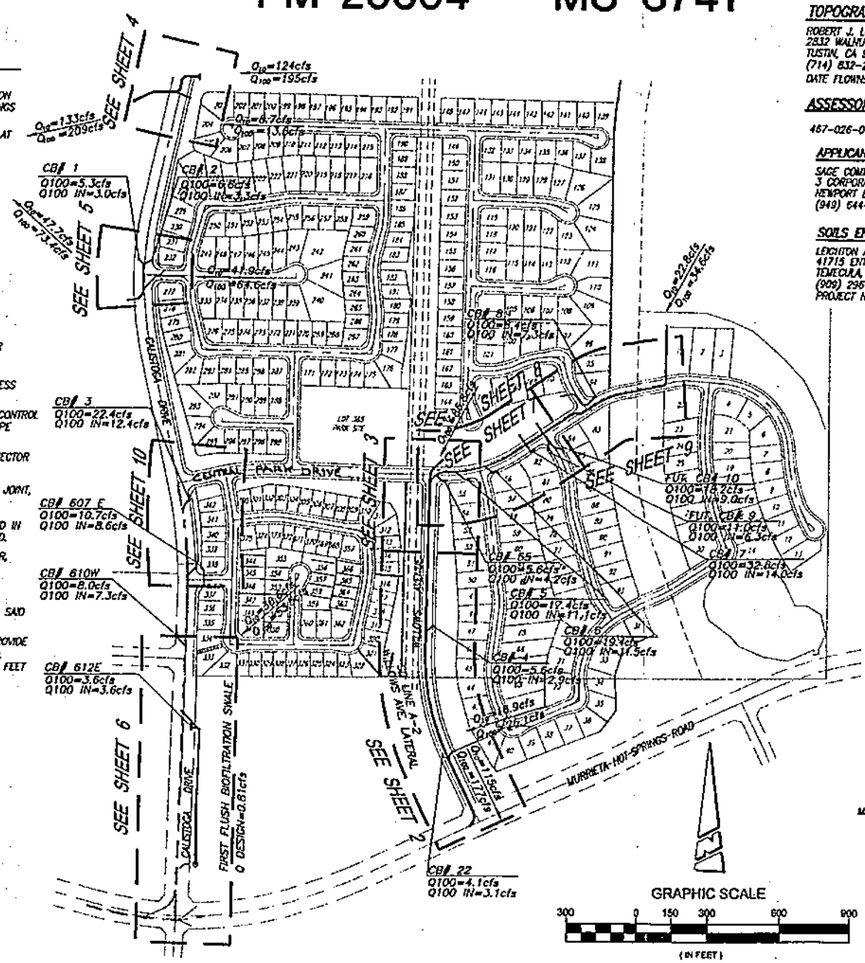

GRAPHIC SCALE

300 0 150 300 600 900

(IN FEET)
1 inch = 300 ft.

TOPOGRAPHY SOURCE:

ROBERT J. LUND & ASSOCIATES
2832 WALNUT AVE.
TUSTIN, CA 92680
(714) 832-2077
DATE FLOWN: 5-23-89

ASSESSORS PARCEL NO.

467-026-041 ; 467-260-042

APPLICANT:

SAGE COMMUNITY GROUP, INC.
3 CORPORATE PLAZA, SUITE 102
NEWPORT BEACH, CA. 92660
(949) 644-3514

SOILS ENGINEER

LEIGHTON AND ASSOCIATES, INC.
41715 ENTERPRISE CIRCLE N., SUITE 103
TEMECULA, CA 92590
(909) 296-0330
PROJECT NO. 11980108-001

LEGAL DESCRIPTION:

BEING A SUBDIVISION OF THE "REMAINDER PARCEL" AS DELINEATED & DESIGNATED ON PARCEL MAP NO. 23248-2, AS SHOWN BY PARCEL MAP ON FILE IN BOOK 174 AT PAGES 9 THROUGH 14 INCLUSIVE OF PARCEL MAPS; PARCELS 1 & 2 OF PARCEL MAP NO. 10054 AS SHOWN BY PARCEL MAP OF FILE IN BOOK 59 AT PAGE 67 OF PARCEL MAPS AND A PORTION OF PARCEL MAP ON FILE IN BOOK 61 AT PAGES 81 THROUGH 82 INCLUSIVE OF PARCEL MAPS, RECORDS OF RIVERSIDE COUNTY, STATE OF CALIFORNIA, LYING IN A PORTION OF THE SOUTH HALF OF SECTION 18 AND A PORTION OF THE NORTHEAST QUARTER OF SECTION 19, T7S, R2W, S.B.B.M.

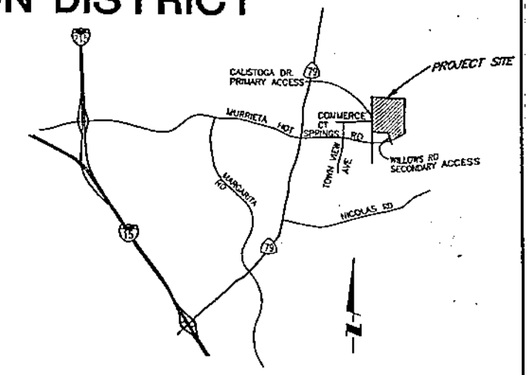

VICINITY MAP
N.T.S.
THOMAS BROS MAP BOOK: PAGE 929-B6
(SECTION 28,29,32+33, T6S, R2W)

INDEX OF SHEETS:

SHEET 1	TITLE SHEET
SHEET 2	LINE A-2, A-2-1, & A-2-3
SHEET 3	LINES A-2, A-2-1, & A-2-3
SHEET 4	LINES 700 & 700-A
SHEET 5	LINES 800, 800-A, 800-A-1, 800-A-2 & 800-B
SHEET 6	PRIVATE FIRST FLUSH STORM DRAIN
SHEET 7	LINES A, A1, B, C & D
SHEET 8	LINE A-2-5
SHEET 9	LINE A-2-5

AS BUILT
APPROVED BY: [signature]
DATE 6/6/08

CALTRANS STANDARD DRAWINGS

D89	PIPE HEADWALL
D94	METAL FLARED END SECTION
D90	PIPE HEADWALL, ENDWALL, & WINGWALLS

R.C.F.C. & W.C.D. STANDARD DRAWINGS

CB100	CATCH BASIN NO. 1
CB103	CATCH BASIN FRAME & COVER (WANHOLE)
CB105	CATCH BASIN DETAIL OF OPENING
CB106	CATCH BASIN REINFORCEMENT
CB109	CATCH BASIN SPECIAL CONNECTIONS
LD201	LOCAL DEPRESSION NO. 2
JS227	JUNCTION STRUCTURE NO. 2
JS229	JUNCTION STRUCTURE NO. 4
MH251	MANHOLE NO. 1
MH252	MANHOLE NO. 2
MH254	MANHOLE NO. 4
MH255	MANHOLE FRAME & COVER (NON-ROCKING)
MH257	MANHOLE SHAFT FOR CAST PIPE
MH259	STANDARD DROP STEP
TS703	TRANSITION STRUCTURE NO. 3
MB14	ABBREVIATIONS AND SYMBOLS
MB16	CONC. BULKHEAD

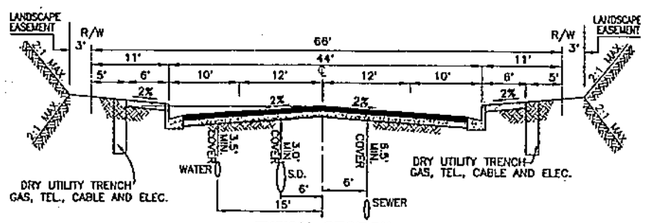

TYPICAL SECTION
SCALE: HORIZ.:1"=10'
VERT.: N.T.S.
WILLOWS AVENUE

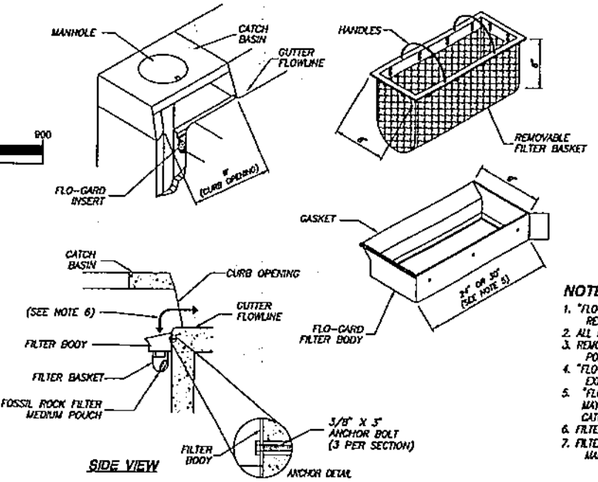

NOTES:

1. "FLO-GARD" FILTER BODY SHALL BE MANUFACTURED FROM PETROLEUM RESISTANT FIBERGLASS WHICH MEETS OR EXCEEDS PS 15-69.
2. ALL METAL COMPONENTS SHALL BE STAINLESS STEEL (TYPE 304).
3. REMOVABLE FILTER BASKET SHALL BE CONSTRUCTED FROM DURABLE POLYPROPYLENE WOVEN MONOFILAMENT GEOTEXTILE.
4. "FLO-GARD" FILTER BODY SHALL BE SECURED TO CATCH BASIN WALL WITH EXPANSION ANCHOR BOLTS AND WASHER. (SEE DETAIL)
5. "FLO-GARD" INSERTS ARE AVAILABLE IN 24" OR 30" LENGTH SECTIONS AND MAY BE INSTALLED IN VARIOUS COMBINATIONS (END-TO-END) TO FIT MOST CATCH BASIN WIDTHS.
6. FILTER BASKET MAY BE REMOVED THROUGH CURB OPENING FOR EASE OF MAINTENANCE.
7. FILTER MEDIUM SHALL BE "FLO-GARD" IN DISPOSABLE POUCHES, INSTALLED AND MAINTAINED IN ACCORDANCE WITH MANUFACTURER RECOMMENDATIONS.

(7) FOSSIL FILTER FLO-GARD
(CURB OPENING INLET)
N.T.S.

W.O. 74-1004 M.S. 3741 IP 0100 67

Underground Service Alert of Southern California
Call: TOLL FREE 1-800 227-2600
TWO WORKING DAYS BEFORE YOU DIG

COUNTY OF RIVERSIDE
TRANSPORTATION DEPARTMENT
SHEET 1 THROUGH 10
APPROVED BY: [signature] 1/17/02
RECOMMENDED: [signature] 1/22/02
DATE

PRIVATE ENGINEERING NOTE

CONSTRUCTION CONTRACTOR AGREES THAT IN ACCORDANCE WITH GENERALLY ACCEPTED CONSTRUCTION PRACTICES, CONSTRUCTION CONTRACTOR WILL BE REQUIRED TO ASSUME SOLE AND COMPLETE RESPONSIBILITY FOR JOB SITE CONDITIONS DURING THE COURSE OF CONSTRUCTION OF THE PROJECT, INCLUDING SAFETY OF ALL PERSONS AND PROPERTY; THAT THIS REQUIREMENT SHALL BE MADE TO APPLY CONTINUOUSLY AND NOT BE LIMITED TO NORMAL WORKING HOURS, AND CONSTRUCTION CONTRACTOR FURTHER AGREES TO DEFEND, INDEMNIFY AND HOLD DESIGN PROFESSIONAL HARMLESS FROM ANY AND ALL LIABILITY, REAL OR ALLEGED, IN CONNECTION WITH THE PERFORMANCE OF WORK ON THIS PROJECT, EXCEPTING LIABILITY ARISING FROM THE SOLE NEGLIGENCE OF DESIGN PROFESSIONAL.

REGISTERED PROFESSIONAL ENGINEER Ned J. Araujo No. 57835 Exp. 6-30-02 STATE OF CALIFORNIA

The Keith Companies TKC
APPROVED BY: [signature] R.E. NO. 57835
DATE: 11/7/07 REGISTRATION EXPIRES 6-30-02

DESIGNED BY:
DRAWN BY:
DATE DRAWN:
CHECKED BY:

BENCH MARK:
2.8 MILES NORTH ALONG U.S. HIGHWAY 395 FROM TEMECULA, RIVERSIDE COUNTY, THENCE 5.5 MILES NORTHEAST ALONG THE WINCHESTER ROAD/DAVIAN ROAD, 1.3 MILES WEST OF ALMAC SCHOOL, 80 YARDS WEST OF THE INTERSECTION OF BRIGGS ROAD, AT A RIGHT-ANGLE TURN IN HIGGS ROAD, 18 FEET WEST OF THE CENTERLINE OF BRIGGS ROAD, AND 7 FEET NORTH OF A FIELD GATE. A STANDARD DISK, STAMPED F 311 1955 AND SET WITH TOP OF A CONCRETE POST.

REVISIONS

REF.	DESCRIPTION	APPR	DATE

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
RECOMMENDED FOR APPROVAL BY: [signature] PLANNING ENGINEER DATE: 2/22/02
APPROVED BY: [signature] CHIEF ENGINEER DATE: 2/26/02

C.F.D. 88-4 (M.S. #3741)
COUNTY OF RIVERSIDE
STORM DRAIN
IMPROVEMENT PLANS
TITLE SHEET
PM 29594

PROJECT NO. 7-0-01 24
DRAWING NO. 7-346
SHEET NO. 1 OF 10

0004240
122494

M E M O R A N D U M

RIVERSIDE COUNTY FLOOD CONTROL
AND WATER CONSERVATION DISTRICT

DATE: November 25, 2008

TO: Mark Biloki, Operations and Maintenance Superintendent

FROM: Stephen E. Stump, Chief of Operations and Maintenance Division SES

RE: Tract No. 23143-1 and 23143-9
Temecula Valley-Calle Las Mariposas Storm Drain
aka A.D. 159 Butterfield Stage Road Calle Las Mariposas Storm Drain
aka Temecula Creek – Royal Crest Place Storm Drain
Project No. 7-0-00409
Drawing No. 7-148

Please add the referenced project to the District's maintained system as of November 14, 2008 and acquaint your staff with the new project. Also, make an addition in the next FY budget to account for maintenance costs. The attached maps and plans are for your use.

Attachments

c: Henry Olivo
Bob Cullen
Contract Admin File
Jay Keller
Ivan Chand
Sharon Johnson
Jim Morrell
Bill Hofferber
Imad Guirguis - w/plan sheet
Gayle Cuneo - w/reduced plans
Teresa Tung - w/plan sheet
Jason Uhley - w/plan sheet
Ami Urista - w/plan sheet
GIS Technical Committee
Attn: Bill Rhoades - w/plan sheet
File Room
R/W Acquisition File
Robin Pierce

AU:rlp

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

ASSESSMENT DISTRICT NO.159

CONSTRUCTION NOTES AND QUANTITY ESTIMATES

	ITEMS	UNIT	QUANTITY I#	QUANTITY II##
61	CONSTRUCT CATCH BASIN NO.1 LOCAL DEPRESSION NO.2 CASE "B" PER RCFC & WCD STD. DWG. NO. CB. 100 & LD 201 ("N" & "V" AS SHOWN ON PLANS)	EA.	4	—
62	CONSTRUCT CATCH BASIN NO.1 LOCAL DEPRESSION NO.2 CASE "C" PER RCFC & WCD STD. DWG. NO. CB. 100 & LD 201 ("N" & "V" AS SHOWN ON PLANS)	EA.	1	2
63	CONSTRUCT MANHOLE NO.1 PER RCFC & WCD STD. DWG. M.H.251	EA.	3	1
64	CONSTRUCT MANHOLE NO.2 PER RCFC & WCD STD. DWG. M.H.252	EA.	3	1
67	INSTALL RIPRAP (SIZES AS SHOWN ON PLAN -1/2 TON RIPRAP	C.Y.	△8 8	75
73	CONSTRUCT CONCRETE BULKHEAD PER RCFC & WCD STD. DWG. NO. M-816	EA.	2	—
81	CONSTRUCT JUNCTION STRUCTURE NO. 4 PER RCFC & WCD STD. DWG. J.S. 229	EA.	—	1
82	INSTALL REINFORCED CONCRETE PIPE PER RCFC & WCD SPECIFICATIONS:			
	18" R.C.P. (CLASS IV)	L.F.	△1 △1 290	145
	24" R.C.P. (CLASS IV)	L.F.	6△1 △1 △1	62
	36" R.C.P. (1350-D)	L.F.	△1 310	---
	42" R.C.P. (1350-D)	L.F.	65	~~100~~ 157 △1
	48" R.C.P. (1350-D)	L.F.	△1 371	244
	30" R.C.P. (1350-D)	L.F.	68 △1	126
95	CONSTRUCT PRECAST CONCRETE FLARED END SECTION TYPE "B" PER CALTRANS STD. D94/	EA.	3 △1	1
96	CONSTRUCT CONCRETE PIPE SLOPE ANCHOR PER DETAIL SHEET NO.6	EA.	—	3
97	CONSTRUCT TRANSITION STRUCTURE NO. 3 PER RCFC & WCD STD. DWG. NO. TS303	EA.	2	1
△1 85	CONSTRUCT JUNCTION STRUCTURE NO.2 PER RCFC & WCD STD.DWG. NO. J.S. 227	EA.	1	
	# I - QUANTITIES FOR ROYAL CREST PLACE			
	##II - QUANTITIES FOR BUTTERFIELD STAGE ROAD			
△1 98	CONSTRUCT MODIFIED MANHOLE NO. 4 (SPLITTER BOX PER DETAIL ON SHT. 5 & R.C.F.C. STD. M.H. 664).	EA.	1	
△1 99	CONSTRUCT HEADWALL PER CAL-TRANS STD. DWG. D-89	EA.	1	
△1 100	CONSTRUCT CONC. COLLAR PER R.C.F.C. STD. M 809.	EA.	1	
△1 101	INSTALL 4" D.I.P. AND OUTLET STRUCTURE PER DETAIL ON SHT. 5	EA.	1	

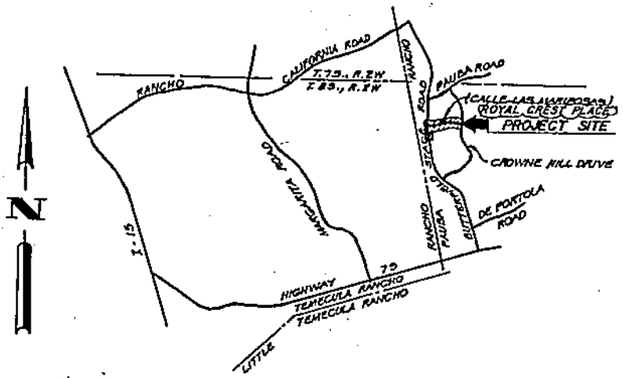

VICINITY MAP
NOT TO SCALE

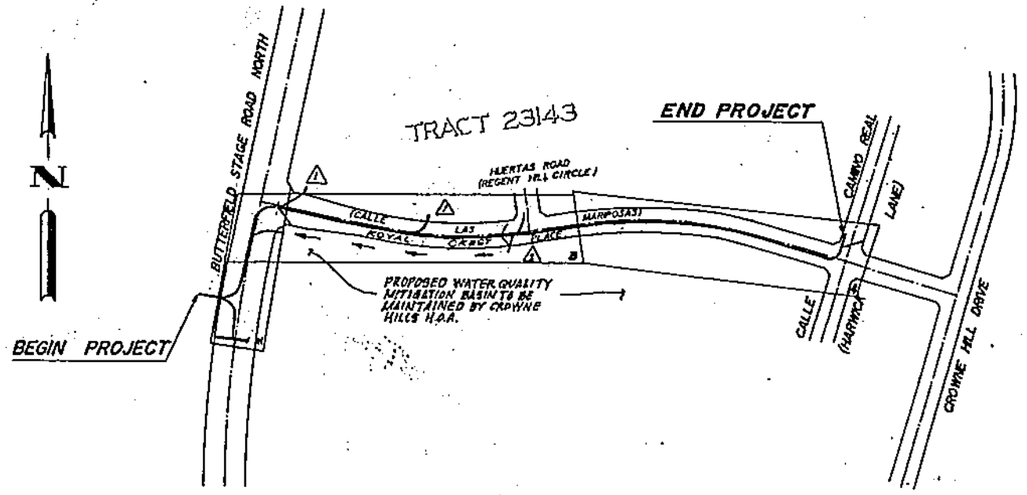

INDEX MAP
SCALE: 1" = 200'

GENERAL NOTES:

1. THE CONTRACTOR SHALL CONSTRUCT THE FLOOD CONTROL IMPROVEMENTS SHOWN ON THE DRAWINGS IN CONFORMANCE WITH THE REQUIREMENTS OF THE RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT'S SPECIAL PROVISIONS AND DETAILED SPECIFICATIONS DATED SEPTEMBER 1984, AND DESIGN MANUAL STANDARD DRAWINGS DATED MAY 1971.
2. AN ENCROACHMENT PERMIT IS REQUIRED FROM RIVERSIDE COUNTY FLOOD CONTROL. CONTACT ED LOTZ AT 909/955-1266. AFTER THE PERMIT IS ISSUED THE DISTRICT MUST BE NOTIFIED ONE WEEK PRIOR TO CONSTRUCTION.
3. CONSTRUCTION INSPECTION WILL BE PERFORMED BY RIVERSIDE COUNTY FLOOD CONTROL. CONTACT DALE ANDERSON AT 909/955-1299. THE DISTRICT MUST BE NOTIFIED ONE WEEK PRIOR TO CONSTRUCTION.
4. ALL STATIONING REFERS TO CENTERLINE OF CONSTRUCTION UNLESS OTHERWISE NOTED.
5. STATIONING FOR LATERALS AND CONNECTOR PIPE REFER TO THE CENTERLINE- CENTERLINE INTERSECTION STATION.
6. FORTY-EIGHT HOURS BEFORE EXCAVATION, CALL UNDERGROUND SERVICE ALERT 1-800-422-4133.
7. ALL ELEVATIONS SHOWN ARE IN FEET AND DECIMALS THEREOF BASED ON U.S.C. & G.S. DATUM.
8. ALL CROSS SECTIONS ARE TAKEN LOOKING DOWNSTREAM.
9. ELEVATIONS OF UTILITIES ARE APPROXIMATE UNLESS OTHERWISE NOTED.
10. OPENINGS RESULTING FROM THE CUTTING OR PARTIAL REMOVAL OF EXISTING CULVERTS, PIPES OR SIMILAR STRUCTURES TO BE ABANDONED SHALL BE SEALED WITH 6" OF CLASS "B" CONCRETE.
11. PIPE CONNECTED TO THE MAINLINE PIPE SHALL CONFORM TO JUNCTION STRUCTURE NO. 4 (JS 229) UNLESS OTHERWISE NOTED.
12. BEDDING PIPE WITH LESS THAN TWO FEET OF COVER SHALL CONFORM TO LOS ANGELES COUNTY FLOOD CONTROL DISTRICT STANDARD DRAWINGS 2-D213.3 AND 2-D177 FOR CONCRETE BACKFILL IN TRENCHES. ALL OTHER PIPE SHALL CONFORM TO RCFC&WCD STD. DWG. M815.
13. B## INDICATES SOIL BORING LOCATIONS BASED ON THE SOILS REPORT DATED MAY 24, 1989 LOCATIONS SHOWN ARE APPROXIMATE.
14. "V" IS THE DEPTH OF INLET OF CATCH BASINS MEASURED FROM THE TOP OF CURB TO INVERT OF CONNECTOR PIPE.
15. CATCH BASINS SHALL BE LOCATED SO THAT LOCAL DEPRESSION SHALL BEGIN AT EXISTING CURB RETURN JOINT, UNLESS OTHERWISE SPECIFIED.
16. ALL CURBS, GUTTERS, SIDEWALKS, DRIVEWAYS AND OTHER EXISTING ELEVATION AND LOCATION AS THE EXISTING IMPROVEMENTS UNLESS OTHERWISE NOTED.

NOTE:

THE FOLLOWING ITEMS ARE TO BE INSPECTED AND MAINTAINED BY RIVERSIDE COUNTY FLOOD CONTROL & WATER CONSERVATION DISTRICT:

I. (CALLE LAS MARIPOSAS) ROYAL CREST PLACE

48" RCP FROM STA. 12 + 47.93 TO STA. 18 + 94.09 (LINE "H") AS SHOWN ON SHEET 3.

II. BUTTERFIELD STAGE ROAD

48" RCP FROM STA. 8 + 71.95 TO STA. 12 + 47.93 9 (LINE "H") AS SHOWN ON SHEET 2.

42 " RCP TEMPORARY LINE "H-1" AS SHOWN ON SHEET 2.

ALL MANHOLES AND OTHER STRUCTURES REQUIRED TO COMPLETE THE CONSTRUCTION OF THE ABOVE MAINLINE.

THE FOLLOWING ITEMS ARE TO BE INSPECTED AND MAINTAINED BY RIVERSIDE COUNTY ROAD DEPARTMENT:

I. (CALLE LAS MARIPOSAS) ROYAL CREST PLACE

36" RCP FROM STA. 18 + 94.09 TO STA. 19 + 56.57 (LINE "H") AS SHOWN ON SHEET 3.

36" RCP FROM STA. 19 + 05.24 TO STA. 21 + 73.15 (LINE "H-4") AS SHOWN ON SHEET 3 & 4;

24" RCP FROM STA. 21 + 73.15 TO STA. 28 + 09.53 (LINE "H-4") AS SHOWN ON SHEET 4;

CONNECTOR PIPES LINE "H-2", "H-3", "H-5", "H-6" & "H-7" AS SHOWN ON SHEETS 3, 4, 5 & 6

II. BUTTERFIELD STAGE ROAD

24" RCP LINE "J" AS SHOWN ON SHEET 2;

18" RCP LINE "I" AS SHOWN ON SHEET 2.

INDEX

	SHEET NO.
TITLE SHEET	1
MAINLINE & PROFILE SHEETS	2-4
CONNECTOR PIPE PROFILES	5-6
ACCESS ROAD	6A

AS BUILT
APPROVED BY: [signature]
DATE 8/10/94

BENCHMARK DESCRIPTION

ELEVATION: 1120.588 DATE: 4-7-81
RIVERSIDE COUNTY DESIGNATION: T-4-81 STAMPED ON 2-1/2" BRASS DISK IN CONCRETE CYLINDER. 8 MILES SOUTHEAST ON HIGHWAY 79 FROM THE INTERSECTION OF MAIN AND FRONT STREETS IN TEMECULA, 41' NORTH OF HIGHWAY 79, 4' WEST OF POWER POLE #1623426E ON EDGE OF CULTIVATED FIELD. SET FIBERGLASS WITNESS POST 1 FOOT NORTH OF MONUMENT.

NOTICE

THE CONTRACTOR SHALL NOTIFY THE COUNTY (OR DISTRICT, AS APPROPRIATE) IN WRITING A MINIMUM OF TWO WEEKS BEFORE BEGINNING CONSTRUCTION, AND SHALL NOT BEGIN CONSTRUCTION BEFORE OBTAINING AUTHORIZATION TO PROCEED.

UNDERGROUND STRUCTURES

ALL UNDERGROUND UTILITIES OR STRUCTURES REPORTED BY THE OWNER OR OTHERS AND THOSE SHOWN ON THE RECORDS EXAMINED ARE INDICATED WITH THEIR APPROXIMATE LOCATION AND EXTENT. THE OWNER BY ACCEPTING THESE PLANS OR PROCEEDING WITH IMPROVEMENTS PURSUANT THERETO AGREES TO ASSUME LIABILITY AND TO HOLD UNDERSIGNED HARMLESS FOR ANY DAMAGES RESULTING FROM THE EXISTENCE OF UNDERGROUND UTILITIES OR STRUCTURES NOT REPORTED TO THE UNDERSIGNED; NOT INDICATED ON THE PUBLIC RECORDS EXAMINED; LOCATED AT VARIANCE WITH THAT REPORTED OR SHOWN ON RECORDS EXAMINED. THE CONTRACTOR IS REQUIRED TO TAKE DUE PRECAUTIONARY MEASURES TO PROTECT THE UTILITIES OR STRUCTURES SHOWN AND ANY OTHER UTILITIES OR STRUCTURES FOUND AT THE SITE. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO NOTIFY THE OWNERS OF THE UTILITIES OR STRUCTURES CONCERNED BEFORE STARTING WORK.

UNAUTHORIZED CHANGES & USES

CAUTION: THE ENGINEER PREPARING THESE PLANS WILL NOT BE RESPONSIBLE FOR, OR LIABLE FOR, UNAUTHORIZED CHANGES TO OR USES OF THESE PLANS. ALL CHANGES TO THE PLANS MUST BE IN WRITING AND MUST BE APPROVED BY THE PREPARER OF THESE PLANS.

CALIFORNIA COUNCIL OF CIVIL ENGINEERS & LAND SURVEYORS

REGISTERED PROFESSIONAL ENGINEER DAVID T. SHELDON No. 19339 Exp. 6-30-93 CIVIL STATE OF CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER FRANK J. PEARS Exp. 9-30-93 No. 21908 CIVIL STATE OF CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER JOHN D. TANNER III C001320 EXP. 09/30/94 CIVIL STATE OF CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER NORMAN L. THOMAS No. 30927 Exp. 3/31/92 CIVIL STATE OF CALIFORNIA

RANPAC ENGINEERING CORP.
27447 Enterprise Circle West
Temecula, California 92390
Tel. (714) 676-7000
SUBMITTED BY: [signature] REGISTERED CIVIL ENGINEER NO. 30927 EXP. 3/31/92
DATE: 6-19-89

BENCH MARK: SEE ABOVE RIGHT

REVISIONS						
	REVISED CTY. ESTIMATES			NLT	NLT	12/09/9
△1	INDEX MAP & NOTE	NLT		NLT	DT	7/18/91
△1	ADD SPLITTER BOX & INLET	NLT	NLT	NLT	DT	7/18/91
△1	ADD OUTLET STRUCTURE - SHEET #46	NLT	NLT	NLT	DT	7/18/91
△1	ADDED SHEET 6A	NLT	NLT	NLT	DT	7/18/91
REF.	DESCRIPTION	APPR	DATE	APPR	DATE	

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
RECOMMENDED FOR APPROVAL BY: [signature] PLANNING ENGINEER R.E. NO. 21800 DATE: 3/30/90
APPROVED BY: David T. Sheldon ASST. CHIEF ENGR. R.E. NO. 19339 DATE: 4/2/90

County of Riverside
APPROVED BY: [signature] FOR ROAD COMMISSIONER RIVERSIDE COUNTY, CALIF. DATE: 3/13/90

ASSESSMENT DISTRICT NO. 159
STORM DRAIN PLANS
ROYAL CREST PLACE
(CALLE LAS MARIPOSAS)
BUTTERFIELD STAGE ROAD
TITLE SHEET

PROJECT NO. 7-0-409
DRAWING NO. 7-148
SHEET NO. 1 OF 6

0004242
123391

M E M O R A N D U M

RIVERSIDE COUNTY FLOOD CONTROL
AND WATER CONSERVATION DISTRICT

DATE: January 22, 2009

TO: Mark Biloki, Operations and Maintenance Superintendent

FROM: Stephen E. Stump, Chief of Operations and Maintenance Division SES

RE: Tract No. 30264-5
Wolf Valley – Fireside Drive Lateral
Project No. 7-0-00272
Drawing No. 7-479

Please add the referenced project to the District's maintained system and acquaint your staff with the new project. Also, make an addition in the next FY budget to account for maintenance costs. The attached maps and plans are for your use.

Attachments

c: Henry Olivo
Bob Cullen
Contract Admin File
Jay Keller
Ivan Chand
Sharon Johnson
Jim Morrell
Bill Hofferber
Imad Guirguis - w/plan sheet
Gayle Cuneo - w/reduced plans
Teresa Tung - w/plan sheet
Jason Uhley - w/plan sheet
Ami Urista - w/plan sheet
GIS Technical Committee
Attn: Bill Rhoades - w/plan sheet
File Room
R/W Acquisition File
Robin Pierce

AU:rlp

0004243

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

GENERAL NOTES

1. CONSTRUCTION INSPECTION WILL BE PERFORMED BY RIVERSIDE COUNTY FLOOD CONTROL. CONTACT DALE ANDERSON AT 909-955-1288. THE DISTRICT MUST BE NOTIFIED 20 DAYS PRIOR TO CONSTRUCTION.
2. THE CONTRACTOR SHALL CONSTRUCT THE FLOOD CONTROL IMPROVEMENTS SHOWN ON THE DRAWINGS IN CONFORMANCE WITH THE REQUIREMENTS OF THE RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT'S M.O.U. STANDARD SPECIFICATIONS DATED SEPTEMBER 1984, AND DESIGN MANUAL STANDARD DRAWINGS DATED APRIL 2004.
3. AN ENCROACHMENT PERMIT IS REQUIRED FROM RIVERSIDE COUNTY FLOOD CONTROL. CONTACT ED LOTZ AT 909/955-1266. AFTER THE PERMIT IS ISSUED THE DISTRICT MUST BE NOTIFIED ONE WEEK PRIOR TO CONSTRUCTION.
4. CONSTRUCTION INSPECTION WILL BE PERFORMED BY RIVERSIDE COUNTY FLOOD CONTROL. CONTACT DALE ANDERSON AT 909/955-1288. THE DISTRICT MUST BE NOTIFIED TWENTY DAYS (20) PRIOR TO CONSTRUCTION.
5. ALL STATIONING REFERS TO CENTERLINE OF CONSTRUCTION UNLESS OTHERWISE NOTED.
6. STATIONING FOR LATERALS AND CONNECTOR PIPE REFER TO THE CENTERLINE INTERSECTION STATIONS.
7. FORTY-EIGHT HOURS BEFORE EXCAVATION, CALL UNDERGROUND SERVICE ALERT 1-800-227-2600.
8. ALL ELEVATIONS SHOWN ARE IN FEET AND DECIMALS THEREOF BASED ON U.S.C. & G.S DATUM.
9. ALL CROSS SECTIONS ARE TAKEN LOOKING DOWNSTREAM.
10. ELEVATIONS OF UTILITIES ARE APPROXIMATE UNLESS OTHERWISE NOTED.
11. OPENINGS RESULTING FROM THE CUTTING OR PARTIAL REMOVAL OF EXISTING CULVERTS, PIPES OR SIMILAR STRUCTURES TO BE ABANDONED SHALL BE SEALED WITH 6" OF CLASS "B" CONCRETE.
12. PIPE CONNECTED TO THE MAINLINE PIPE SHALL CONFORM TO JUNCTION STRUCTURE NO. 4 (JS 229) UNLESS OTHERWISE NOTED.
13. PIPE BEDDING SHALL CONFORM TO RCFC&WCD STD. DWG. NO. MB15 EXCEPT FOR COVER <2 FEET. FOR COVER <2 FEET, CONCRETE SLURRY (2000 PSI - 2 SACK) SHALL BE USED. THE ENTIRE TRENCH SHALL BE SLURRY EXTENDING 4 INCHES MINIMUM AND 12 INCHES MAXIMUM ABOVE THE TOP OF PIPE.
14. "V" IS THE DEPTH OF CATCH BASINS MEASURED FROM THE TOP OF CURB TO INVERT OF CONNECTOR PIPE.
15. ALL CURBS, GUTTERS, SIDEWALKS, DRIVEWAYS AND OTHER EXISTING IMPROVEMENTS TO BE RECONSTRUCTED IN KIND AND AT THE SAME ELEVATION AND LOCATION AS THE EXISTING IMPROVEMENTS UNLESS OTHERWISE NOTED.
16. STANDARD DRAWINGS CALLED FOR ON THE PLAN AND PROFILE SHALL CONFORM TO DISTRICT STANDARD DRAWINGS UNLESS NOTED OTHERWISE.
17. THE CONTRACTOR IS REQUIRED TO CALL ALL UTILITY AGENCIES REGARDING TEMPORARY SHORING AND SUPPORT REQUIREMENTS FOR THE VARIOUS UTILITY LINES SHOWN ON THESE PLANS.
18. DURING ROUGH GRADING OPERATIONS AND PRIOR TO CONSTRUCTION OF PERMANENT DRAINAGE STRUCTURES, TEMPORARY DRAINAGE CONTROL SHOULD BE PROVIDED TO PREVENT PONDING WATER AND DAMAGE TO ADJACENT PROPERTIES.
19. APPROVAL OF THESE PLANS BY THE RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT DOES NOT RELIEVE THE DEVELOPER'S ENGINEER OF RESPONSIBILITY FOR THE ENGINEERING DESIGN. IF FIELD CHANGES ARE REQUIRED, IT WILL BE THE RESPONSIBILITY OF THE DESIGN ENGINEER TO MAKE THE NECESSARY CORRECTIONS.
20. THE CONTRACTOR OR DEVELOPER SHALL SECURE ALL REQUIRED ENCROACHMENT AND/OR STATE AND FEDERAL REGULATORY PERMITS PRIOR TO THE COMMENCEMENT OF ANY WORK.
21. PIPE BEDDING SHALL CONFORM TO R.C.F.C.W.C.D. STANDARD DRAWING No. M-815 EXCEPT FOR COVER LESS THAN TWO FEET. FOR COVER LESS THAN TWO FEET, CONCRETE SLURRY (2000 psi-2 SACK MIX) BACKFILL SHALL BE USED. THE ENTIRE TRENCH SHALL BE SLURRY BACKFILLED EXTENDING 4" MINIMUM AND 12" MAXIMUM ABOVE THE TOP OF PIPE.

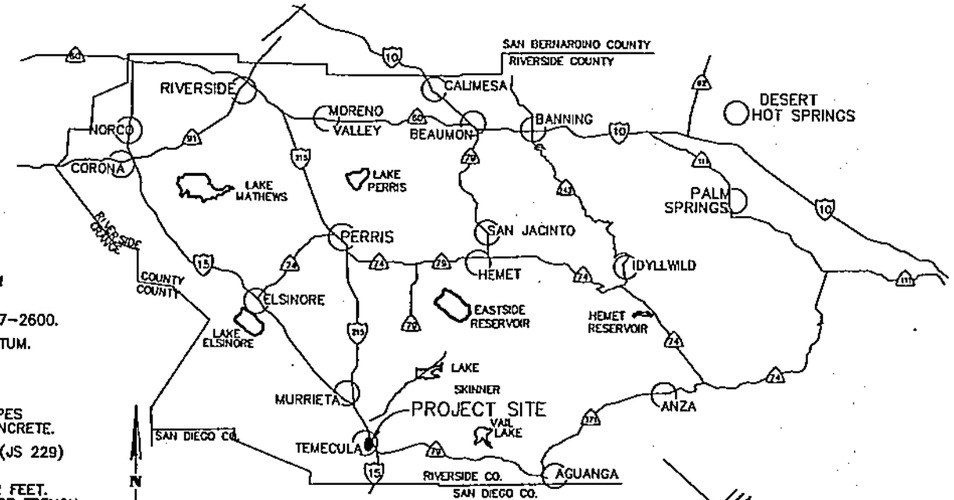

VICINITY MAP

NTS

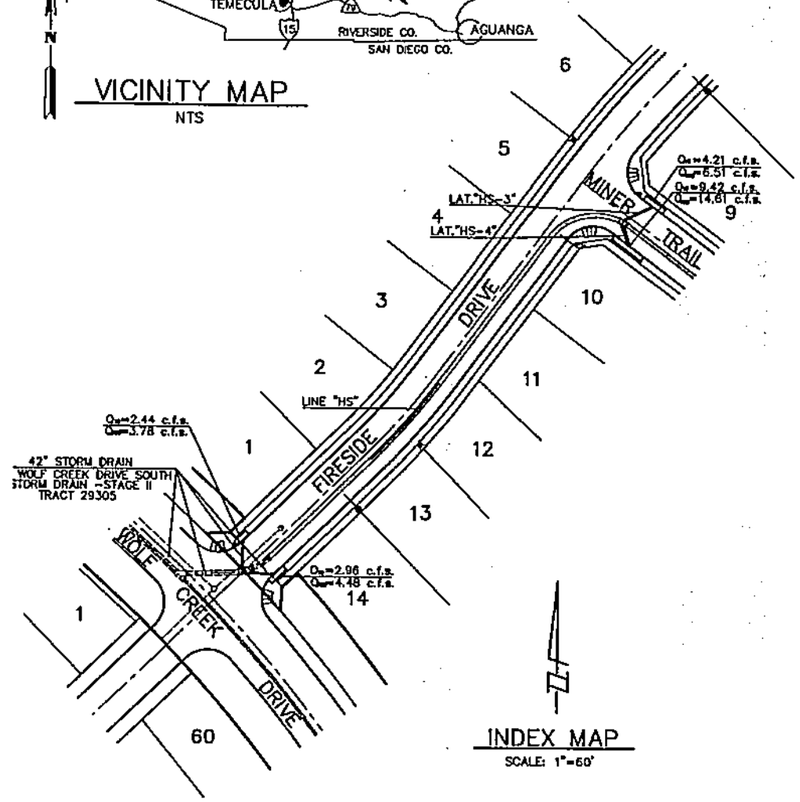

INDEX MAP

SCALE: 1"=60'

INDEX

	SHEET NO.:
TITLE SHEET	1
MAIN LINE "HS", PLAN AND PROFILE	2

R.C.F.C. & W.C.D. STANDARD DRAWINGS

MH 254 MANHOLE NO. 4
MH 255 MANHOLE FRAME & COVER

ENGINEERS ESTIMATE OF QUANTITIES

(27)-INSTALL 42" R.C.P. (1300 D)	400 L.F.
(28) CONST. M.H. No. 4	1 EA.

AS BUILT

APPROVED BY: Fredric Rieger
DATE 7-19-06

REGISTERED PROFESSIONAL ENGINEER FREDRIC W. RIEGER No. 18526 Exp. 6/30/07 CIVIL STATE OF CALIFORNIA

MAINTENANCE RESPONSIBILITIES

R.C.F.C.W.C.D. MAINTAINS:

1. LINE "HS", 42" R.C.P., FROM STA. 10+75.98 TO STA. 14+81.10
2. ALL MANHOLES AND OTHER STRUCTURES REQUIRED TO COMPLETE THE CONSTRUCTION OF THE ABOVE MENTIONED MAINLINE PIPE, EXCLUDING CATCH BASINS AND CONNECTOR PIPES

CITY OF TEMECULA MAINTAINS:

1. LATERALS "HS-1" THROUGH "HS-4".
2. ALL CATCH BASINS AND CONNECTOR PIPES.

RIVERSIDE COUNTY 600-62-69 1970
BRASS DISC SET 1' EAST OF CONCRETE POST MARKER STAMPED 68 RESET. 2.9 MILES S.E. ALONG PALA ROAD FROM POST OFFICE AT TEMECULA 29' N.E. OF THE PAVED ROAD 5' N.W. OF TEL. POLE NO. 6295, C.W.T. 3' S.W. OF 36" CONCRETE STANDPIPE. ELEV. 1039.378

UNDERGROUND STRUCTURES

ALL UNDERGROUND UTILITIES OR STRUCTURES REPORTED BY THE OWNER OR OTHERS AND THOSE SHOWN ON THE RECORDS EXAMINED ARE INDICATED WITH THEIR APPROXIMATE LOCATION AND EXTENT. THE OWNER BY ACCEPTING THESE PLANS OR PROCEEDING WITH IMPROVEMENTS PURSUANT THERETO AGREES TO ASSUME LIABILITY AND TO HOLD UNDERSIGNED HARMLESS FOR ANY DAMAGES RESULTING FROM THE EXISTENCE OF UNDERGROUND UTILITIES OR STRUCTURES NOT REPORTED TO THE UNDERSIGNED; NOT INDICATED ON THE PUBLIC RECORDS EXAMINED; LOCATED AT VARIANCE WITH THAT REPORTED OR SHOWN ON RECORDS EXAMINED. THE CONTRACTOR IS REQUIRED TO TAKE DUE PRECAUTIONARY MEASURES TO PROTECT THE UTILITIES OR STRUCTURES SHOWN AND ANY OTHER UTILITIES OR STRUCTURES FOUND AT THE SITE. IT SHALL BE THE CONTRACTORS RESPONSIBILITY TO NOTIFY THE OWNER OF THE UTILITIES OR STRUCTURES CONCERNED BEFORE STARTING WORK.

UNDERGROUND SERVICE ALERT
CALL: TOLL FREE 1-800-227-2600
TWO WORKING DAYS BEFORE YOU DIG

BASIS OF BEARINGS:

THE BASIS OF BEARINGS IS THE CENTERLINE OF PALA ROAD PER RECORD OF SURVEY BOOK 100, PAGE 28, IE N47°45'28"W

BENCH MARK:
SEE SHEET No.1

	ENGINEER		RCFC/WCD	
	APPR.	DATE	APPR.	DATE

Hall & Foreman, Inc.
Engineering·Surveying·Planning·Landscape Architecture
43511 Ridge Park Drive Temecula, Ca. 92590
Ph. 909 676-4726 Fax 909 699-0896

PREPARED BY: 9/28/05
ANTHONY J. TERICH
R.C.E. No. 21914 Expires 9-30-07

REGISTERED PROFESSIONAL ENGINEER ANTHONY J. TERICH No. 21914 EXP. 9-30-07 CIVIL STATE OF CALIFORNIA

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
RECOMMENDED FOR APPROVAL BY: PLANNING ENGINEER DATE: 10-11-2005
APPROVED BY: CHIEF ENGINEER DATE: 10/12/05

REGISTERED PROFESSIONAL ENGINEER ROGER J. PARKS No. 19744 EXP. 9-30-07 CIVIL STATE OF CALIFORNIA

RECOMMENDED BY: DATE: 9/29/05
ACCEPTED BY: ROGER J. PARKS DEPUTY DIRECTOR OF PUBLIC WORKS DATE: 9/29/05
R.C.E. No. 19744 EXPIRES 9/30/07

TRACT 30264-5
WOLF VALLEY- FIRESIDE DRIVE LATERAL STORM DRAIN IMPROVEMENTS
TITLE SHEET

LD05-061Co

PROJECT NO.	7-0-0272
DRAWING NO.	7-479
SHEET NO.	1 OF 2

Drawing Name: S:\AS-BUILTS\Tract 30264-05\Lat\Fred Park\Storm Drain Plans - Temecula\Th_30264.dwg
Last Saved: Sep 22, 2005 - 2:00pm by TOdaurra

0004244
123695

MEMORANDUM

RIVERSIDE COUNTY FLOOD CONTROL
AND WATER CONSERVATION DISTRICT

DATE: February 11, 2009

TO: Mark Biloki, Operations and Maintenance Superintendent

FROM: Stephen E. Stump, Chief of Operations and Maintenance Division

RE: Tract No. 29570-1
Santa Gertrudis Valley – Seraphina Road Lateral, Stage 1
Project No. 7-0-00026
Drawing No. 7-365

Please add the referenced project to the District's maintained system and acquaint your staff with the new project. Also, make an addition in the next FY budget to account for maintenance costs. The attached maps and plans are for your use.

Attachments

c: Henry Olivo
Bob Cullen
Contract Admin File
Jay Keller
Ivan Chand
Sharon Johnson
Jim Morrell
Bill Hofferber
Imad Guirguis - w/plan sheet
Gayle Cuneo - w/reduced plans
Teresa Tung - w/plan sheet
Jason Uhley - w/plan sheet
Ami Urista - w/plan sheet
GIS Technical Committee
Attn: Bill Rhoades - w/plan sheet
File Room
R/W Acquisition File
Robin Pierce

AU:rlp

RIVERSIDE COUNTY FLOOD CONTROL & WATER CONSERVATION DISTRICT

STORM DRAIN IMPROVEMENT PLANS FOR SILVERHAWK III

TRACT NO. 29570-1

GENERAL NOTES

1. THE CONTRACTOR SHALL CONSTRUCT THE FLOOD CONTROL IMPROVEMENTS SHOWN ON THE DRAWINGS IN CONFORMANCE WITH THE REQUIREMENTS OF THE RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT'S MEMORANDUM OF UNDERSTANDING STANDARD SPECIFICATIONS DATED SEPTEMBER 1984, AND DESIGN MANUAL STANDARD DRAWINGS DATED MAY 1971.

2. IF AN ENCROACHMENT PERMIT IS REQUIRED FROM RIVERSIDE COUNTY FLOOD CONTROL, THEN CONTACT ED LOTZ AT 909-955-1277. AFTER THE PERMIT IS ISSUED THE DISTRICT MUST BE NOTIFIED ONE WEEK PRIOR TO CONSTRUCTION.

3. CONSTRUCTION INSPECTION WILL BE PERFORMED BY RIVERSIDE COUNTY FLOOD CONTROL. CONTACT DALE ANDERSON AT 909-955-1288. THE DISTRICT MUST BE NOTIFIED TWO WEEKS PRIOR TO CONSTRUCTION.

4. ALL STATIONING REFERS TO CENTERLINE OF CONSTRUCTION UNLESS OTHERWISE NOTED.

5. STATIONING FOR LATERALS AND CONNECTOR PIPE REFER TO THE CENTERLINE-CENTERLINE INTERSECTION STATION.

6. FORTY-EIGHT HOURS BEFORE EXCAVATION, CALL UNDERGROUND SERVICE ALERT 1-800-227-2600.

7. ALL ELEVATIONS SHOWN ARE IN FEET AND DECIMALS THEREOF BASED ON U.S.C. & G.S. DATUM.

8. ALL CROSS SECTIONS ARE TAKEN LOOKING DOWNSTREAM.

9. ELEVATIONS OF UTILITIES ARE APPROXIMATE UNLESS OTHERWISE NOTED.

10. OPENINGS RESULTING FROM THE CUTTING OR PARTIAL REMOVAL OF EXISTING CULVERTS, PIPES OR SIMILAR STRUCTURES TO BE ABANDONED SHALL BE SEALED WITH 6" OF CLASS "B" CONCRETE.

11. PIPE CONNECTED TO THE MAINLINE PIPE SHALL CONFORM TO JUNCTION STRUCTURE NO. 4 (JS 229) UNLESS OTHERWISE NOTED.

12. BEDDING PIPE SHALL CONFORM TO RCFC&WCD STD. M815, EXCEPT FOR COVER < 2 FEET. FOR COVER < 2 FEET, CONCRETE SLURRY (2000 PSI - 2 SACK) SHALL BE USED. THE ENTIRE TRENCH SHALL BE SLURRY EXTENDING 4 INCHES MINIMUM AND 12 INCHES MAXIMUM ABOVE THE TOP OF THE PIPE.

13. "H" IS THE DEPTH OF INLET OF CATCH BASINS MEASURED FROM THE NORMAL FLOWLINE TO INVERT OF CONNECTOR PIPE.

14. CATCH BASINS SHALL BE LOCATED SO THAT LOCAL DEPRESSION SHALL BEGIN AT EXISTING CURB RETURN JOINT, UNLESS OTHERWISE SPECIFIED.

15. ALL CURBS, GUTTERS, SIDEWALKS, DRIVEWAYS AND OTHER EXISTING IMPROVEMENTS TO BE REMOVED IN KIND AND AT THE SAME ELEVATION AND LOCATION AS THE EXISTING IMPROVEMENTS UNLESS OTHERWISE NOTED.

16. THE CONCRETE COVER ON THE INSIDE OF ALL REINFORCED CONCRETE PIPES MUST BE INCREASED TO PROVIDE A MINIMUM OF 1-1/2" OVER THE REINFORCING WHEN THE DESIGN VELOCITIES EXCEED 20 FEET PER SECOND. THE CONCRETE DESIGN STRENGTH IN THESE REACHES SHALL BE f'c=5,000 PSI FOR VELOCITIES EXCEEDING 20 FEET PER SECOND, AND f'c=6,000 PSI FOR VELOCITIES EXCEEDING 30 FEET PER SECOND.

17. BH-1 INDICATES SOIL BORING LOCATIONS BASED ON THE SOILS REPORT DATED NOVEMBER 14, 2000, BY LEIGHTON & ASSOCIATES; LOCATIONS SHOWN ARE APPROXIMATE.

Underground Service Alert

Call: TOLL FREE

1-800 227-2600

TWO WORKING DAYS BEFORE YOU DIG

"CAUTION": Remember that the USA Center notifies only those utilities belonging to the center. There could be other utilities present at the work site. The center will inform you of whom they will notify.

NOTE:

WORK CONTAINED WITHIN THESE PLANS SHALL NOT COMMENCE UNTIL AN ENCROACHMENT PERMIT AND/OR A GRADING PERMIT HAS BEEN ISSUED.

The private engineer signing these plans is responsible for ensuring the accuracy and acceptability of the design herein. In the event of discrepancies arising after county approval or during construction, the private engineer shall be responsible for determining an acceptable solution or revising the plans for approval by

REGISTERED PROFESSIONAL ENGINEER PAUL R. NUCCITELLI NO. 58020 EXP. 6/30/06 CIVIL STATE OF CALIFORNIA

NOTICE TO CONTRACTOR:

CONTRACTOR AGREES THAT HE SHALL ASSUME SOLE AND COMPLETE RESPONSIBILITY FOR JOB SITE CONDITIONS DURING THE COURSE OF CONSTRUCTION OF THIS PROJECT, INCLUDING SAFETY OF ALL PERSONS AND PROPERTY; THAT THIS REQUIREMENT SHALL APPLY CONTINUOUSLY AND NOT BE LIMITED TO NORMAL WORKING HOURS; AND THAT THE CONTRACTOR SHALL DEFEND, INDEMNIFY AND HOLD THE OWNER AND THE ENGINEER HARMLESS FROM ANY AND ALL LIABILITY, REAL OR ALLEGED, IN CONNECTION WITH THE PERFORMANCE OF WORK ON THIS PROJECT, EXCEPTING FOR LIABILITY ARISING FROM THE SOLE NEGLIGENCE OF THE OWNER OR THE ENGINEER.

THE EXISTENCE AND LOCATION OF ANY UNDERGROUND UTILITIES OR STRUCTURES SHOWN ON THESE PLANS ARE OBTAINED BY A SEARCH OF AVAILABLE RECORDS. TO THE BEST OF OUR KNOWLEDGE, THERE ARE NO EXISTING UTILITIES EXCEPT THOSE SHOWN ON THESE PLANS. THE CONTRACTOR IS REQUIRED TO TAKE ALL PRECAUTIONARY MEASURES TO PROTECT THE UTILITIES SHOWN, AND, ANY OTHER LINES OR STRUCTURES NOT SHOWN ON THESE PLANS AND IS RESPONSIBLE FOR THE PROTECTION OF OR ANY DAMAGE TO THESE LINES OR STRUCTURES.

ALL RETAINING WALLS SHOWN ON THESE PLANS ARE SHOWN FOR REFERENCE ONLY AND ARE TO BE CONSTRUCTED PER SEPARATE PERMIT.

CONTRACTOR SHALL VERIFY ALL CONDITIONS AND DIMENSIONS AND SHALL REPORT ALL DISCREPANCIES TO THE ENGINEER PRIOR TO COMMENCEMENT OF WORK.

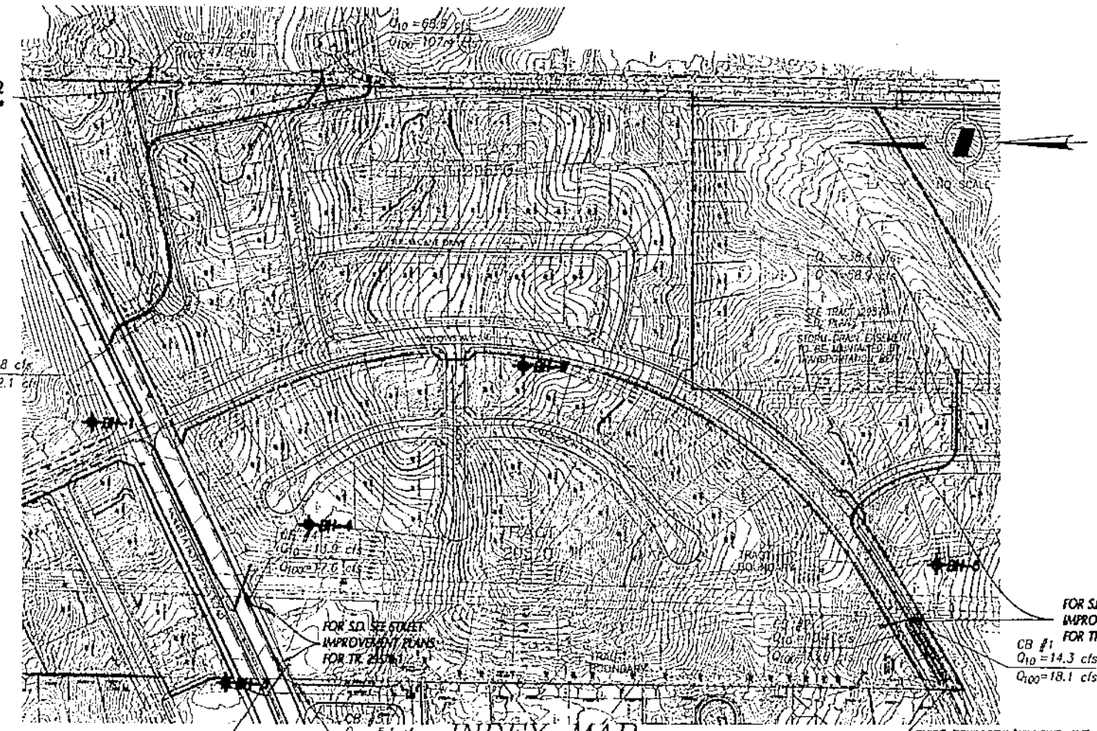

INDEX MAP

NOT TO SCALE

THE FOLLOWING ITEMS ARE TO BE INSPECTED AND MAINTAINED BY: RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT:

54" R.C.P. FROM STATION 10+00.00 TO STATION 14+79.14 (LINE "A-3c") - PROJECT NO. 7-0-0026 - STORM DRAIN IMPROVEMENTS - SILVERHAWK III (AS SHOWN ON SHEET 2)

48" R.C.P. FROM STATION 14+89.34 TO STATION 20+01.54 (LINE "A-3c") - PROJECT NO. 7-0-0026 - STORM DRAIN IMPROVEMENTS - SILVERHAWK III (AS SHOWN ON SHEET 2 & 3)

48" R.C.P. FROM STATION 1+07.00 TO STATION 1+83.57 (LINE "A-3C-3") - PROJECT NO. 7-0-0026 - STORM DRAIN IMPROVEMENTS - SILVERHAWK III (AS SHOWN ON SHEET 3)

LEGEND OF ABBREVIATIONS & SYMBOLS

T.C.	TOP OF CURB
F.L.	FLOWLINE ELEV.
T.G.	TOP OF GRATE
R.C.P.	REINFORCED CONCRETE PIPE
H.G.L.(100)	100-YR HYDRAULIC GRADE LINE
S	SLOPE
INV.	INVERT OF DRAIN
B.C.	BEGINNING OF CURVE
E.C.	END OF CURVE
P.R.C.	POINT OF REVERSE CURVE
P.C.C.	POINT OF COMPOUND CURVE
C.B.	CATCH BASIN
J.S.	JUNCTION STRUCTURE
M.H.	MANHOLE
T.W.	TOP OF WALL ELEV.
N.T.S.	NOT TO SCALE
V(MAX)	MAXIMUM VELOCITY
Q(100)	100-YR FLOWRATE
Q(10)	10-YR FLOWRATE
℄	CENTERLINE

HYDRAULIC GRADE LINE
PIPE
SD CENTERLINE
CATCH BASIN
TAILWATER
CONCRETE COLLAR, SLOPE ANCHOR & PLUG
TRENCH LIMITS

ESTIMATE OF STORM DRAIN QUANTITIES

NO	DESCRIPTION	R.C.F.C.	TRANS.	TOTAL	UNIT
81	INST. 24" R.C.P. (CLASS IV)	000 245	6	6	L.F.
83	INST. 36" R.C.P. (SEE PROFILE FOR D-LOAD)	0	207	207	L.F.
85	INST. 48" R.C.P. (SEE PROFILE FOR D-LOAD)	579	0	579	L.F.
86	INST. 54" R.C.P. (SEE PROFILE FOR D-LOAD)	465	0	465	L.F.
89	CONST. T.S. NO. 3 PER R.C.F.C. & W.C.D. STD. DWG. NO. TS 303	1	0	1	EA.
92	CONST. M.H. NO. 2 PER R.C.F.C. & W.C.D. STD. DWG. NO. MH 252	1	0	1	EA.
93	CONST. CURB INLET C.B. PER R.C.T.D. STD. DWG. NO. 300 WITH FOSSIL FILTER FLO-GARD PER DETAIL ON SHEET NO. 3	0	1	1	EA.
94	CONST. GUTTER DEPRESSION PER R.C.T.D. STD. DWG. NO. 311, CASE C	0	1	1	EA.
98	CONST. M.H. NO. 4 PER R.C.F.C. & W.C.D. STD. DWG. NO. MH 254	3	0	3	EA.
107	CONST. MANHOLE SHAFT SAFETY LEDGE PER A.P.W.A. STD. PLAN 330-1	0	4	4	EA.
110	REMOVE AND REPLACE EXIST. IMPROVEMENTS	0	1	1	L.S.
111	CONST. INLET NO. 1 PER L.A.C.D.P.W. STD. PLAN NO. 3050-D, CASE 2	0	2	2	EA.
112	CONST. CONC. BULKHEAD PER R.C.F.C. & W.C.D. STD. DWG. NO. M 818	0	1	1	EA.
113	REMOVE EXIST. 48" R.C.P.	49	0	49	L.F.
114	CONST. 3" A.B. CL. II	0	5,841	5,841	S.F.

INDEX

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CALTRANS STANDARD DRAWINGS:	
PIPE HEADWALLS	D89
A.P.W.A. STANDARD PLANS:	
MANHOLE SHAFT SAFETY LEDGE	330-1

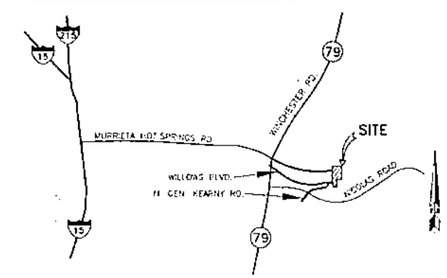

VICINITY MAP

N.T.S.

AS BUILT

APPROVED BY: [signature]

DATE 9/21/8

HUNSAKER & ASSOCIATES IRVINE, INC. INLAND EMPIRE REGION
PLANNING ▪ ENGINEERING ▪ SURVEYING
2300 Adams Street Suite A-15 Riverside, CA 92504 PH (909) 352-7200 FX (909) 352-8369

PREPARED BY: [signature] R.C.E. NO. 58020 DATE 8/5/03

BENCHMARK: T-46-81 RESET 1997 ELEV. 1097.163
FROM THE INTERSECTION OF RANCHO CALIFORNIA ROAD AND FRONT STREET 1.7 MILES NW ON FRONT STREET--JEFFERSON AVENUE TO THE INTERSECTION OF JEFFERSON AND WINCHESTER (HWY 79), 2.0 MILES NE ON WINCHESTER ROAD (HWY 79) TO A BRIDGE OVER THE SANTA GERTRUDES CREEK, 55.5' ELV OF CENTERLINE OF WINCHESTER ROAD (HWY 79) AT SELY COR BRIDGE OVER SANTA GERTRUDES CREEK 45' WLY OF SLY SIDE OF CREEK.

SCALE: H: 1" = 40' V: 1" = 4'

MARK	BY	DATE	REVISIONS	APPR	DATE
ENGINEER				COUNTY	

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
RECOMMENDED FOR APPROVAL BY: [signature] PLANNING ENGINEER DATE: 9-4-2003
APPROVED BY: [signature] CHIEF ENGINEER DATE: 9-4-03

COUNTY OF RIVERSIDE
TRANSPORTATION DEPARTMENT
APPROVED BY: [signature] DATE: 8/26/03
RECOMMENDED BY: BOYLE ENGINEERING [signature] DATE: 8-19-03

SANTA GERTRUDIS VALLEY-SERAPHINA ROAD LATERAL, STAGE I - STORM DRAIN
SILVERHAWK III - TRACT 29570-1
TITLE SHEET

FOR: PULTE HOME CORPORATION | W.O. | COUNTY FILE NO.

PROJECT NO 7-0-0026
DRAWING NO. 7-365
SHEET 1 OF 4

0004246

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

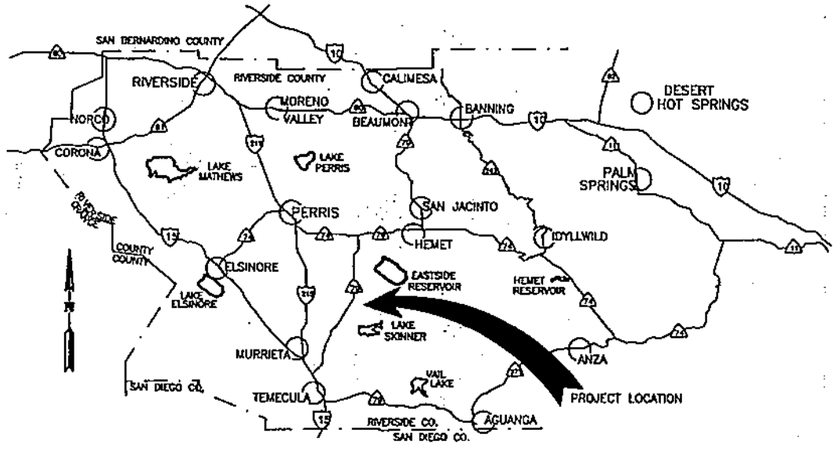

VICINITY MAP
NTS

INDEX

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GENERAL NOTES

1. THE CONTRACTOR SHALL CONSTRUCT THE FLOOD CONTROL IMPROVEMENTS SHOWN ON THE DRAWINGS IN CONFORMANCE WITH THE REQUIREMENTS OF THE RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT'S M.O.U. STANDARD SPECIFICATIONS DATED SEPTEMBER 1984, AND DESIGN MANUAL STANDARD DRAWINGS DATED APRIL 2004.
2. AN ENCROACHMENT PERMIT IS REQUIRED FROM RIVERSIDE COUNTY FLOOD CONTROL. CONTACT ED LOTZ AT 951/955-1266. AFTER THE PERMIT IS ISSUED THE DISTRICT MUST BE NOTIFIED ONE WEEK PRIOR TO CONSTRUCTION.
3. CONSTRUCTION INSPECTION WILL BE PERFORMED BY RIVERSIDE COUNTY FLOOD CONTROL. CONTACT DALE ANDERSON AT 951/955-1288. THE DISTRICT MUST BE NOTIFIED TWENTY DAYS (20) PRIOR TO CONSTRUCTION.
4. ALL STATIONING REFERS TO CENTERLINE OF CONSTRUCTION UNLESS OTHERWISE NOTED.
5. STATIONING FOR LATERALS AND CONNECTOR PIPE REFER TO THE CENTERLINE INTERSECTION STATIONS.
6. FORTY-EIGHT HOURS BEFORE EXCAVATION, CALL UNDERGROUND SERVICE ALERT 1-800-227-2600.
7. ALL ELEVATIONS SHOWN ARE IN FEET AND DECIMALS THEREOF BASED ON U.S.C. & G.S DATUM.
8. ALL CROSS SECTIONS ARE TAKEN LOOKING DOWNSTREAM.
9. ELEVATIONS OF UTILITIES ARE APPROXIMATE UNLESS OTHERWISE NOTED.
10. OPENINGS RESULTING FROM THE CUTTING OR PARTIAL REMOVAL OF EXISTING CULVERTS, PIPES OR SIMILAR STRUCTURES TO BE ABANDONED SHALL BE SEALED WITH 6" OF CLASS "B" CONCRETE.
11. PIPE CONNECTED TO THE MAINLINE PIPE SHALL CONFORM TO JUNCTION STRUCTURE NO. 4 (JS 229) UNLESS OTHERWISE NOTED.
12. PIPE BEDDING SHALL CONFORM TO RCFC&WCD STD. DWG. NO. M815 EXCEPT FOR COVER <2 FEET. FOR COVER <2 FEET, CONCRETE SLURRY (2000 PSI – 2 SACK) SHALL BE USED. THE ENTIRE TRENCH SHALL BE SLURRY EXTENDING 4 INCHES MINIMUM AND 12 INCHES MAXIMUM ABOVE THE TOP OF PIPE.
13. BH-1 INDICATES SOIL BORING LOCATIONS BASED ON THE SOILS REPORT DATED (N/A) LOCATIONS SHOWN ARE APPROXIMATE.
14. "V" IS THE DEPTH OF CATCH BASINS MEASURED FROM THE TOP OF CURB TO INVERT OF CONNECTOR PIPE.
15. CATCH BASINS SHALL BE LOCATED SO THAT LOCAL DEPRESSION SHALL BEGIN AT EXISTING CURB RETURN JOINT, UNLESS SPECIFIED.
16. ALL CURBS, GUTTERS, SIDEWALKS, DRIVEWAYS AND OTHER EXISTING IMPROVEMENTS TO BE RECONSTRUCTED IN KIND AND AT THE SAME ELEVATION AND LOCATION AS THE EXISTING IMPROVEMENTS UNLESS OTHERWISE NOTED.
17. STANDARD DRAWINGS CALLED FOR ON THE PLAN AND PROFILE SHALL CONFORM TO DISTRICT STANDARD DRAWINGS UNLESS NOTED OTHERWISE.
18. THE CONTRACTOR IS REQUIRED TO CALL ALL UTILITY AGENCIES REGARDING TEMPORARY SHORING AND SUPPORT REQUIREMENTS FOR THE VARIOUS UTILITY LINES SHOWN ON THESE PLANS.
19. DURING ROUGH GRADING OPERATIONS AND PRIOR TO CONSTRUCTION OF PERMANENT DRAINAGE STRUCTURES, TEMPORARY DRAINAGE CONTROL SHOULD BE PROVIDED TO PREVENT PONDING WATER AND DAMAGE TO ADJACENT PROPERTIES.
20. APPROVAL OF THESE PLANS BY THE RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT DOES NOT RELIEVE THE DEVELOPER'S ENGINEER OF RESPONSIBILITY FOR THE ENGINEERING DESIGN. IF FIELD CHANGES ARE REQUIRED, IT WILL BE THE RESPONSIBILITY OF THE DESIGN ENGINEER TO MAKE THE NECESSARY CORRECTIONS.
21. THE CONTRACTOR OR DEVELOPER SHALL SECURE ALL REQUIRED ENCROACHMENT AND/OR STATE AND FEDERAL REGULATORY PERMITS PRIOR TO THE COMMENCEMENT OF ANY WORK.

R.C.F.C. & W.C.D. STANDARD DRAWINGS

CB 106	CATCH BASIN REINFORCEMENT
CB 109	SPECIAL CONNECTIONS TO CATCH BASIN
CB 110	CONCRETE DROP INLET
LD 201	LOCAL DEPRESSION No. 2
JS 226	JUNCTION STRUCTURE No. 1
JS 228	JUNCTION STRUCTURE No. 3
JS 229	JUNCTION STRUCTURE No. 4
MH 253	MANHOLE NO. 3
MH 255	MANHOLE FRAME & COVER NON-ROCKING
MH 257	MANHOLE SHAFT FOR CAST PIPE
MH 259	STANDARD DROP STEP
TS 301	TRANSITION STRUCTURE No. 1
CH 326	TRAPEZOIDAL CHANNEL DETAILS
CH 329	TRANSITION STRUCTURAL DETAILS
BX 401	SINGLE CELL R.C.B. STRUCTURAL DETAILS
M 801	CHAIN LINK FENCE DETAILS
M 803	CONCRETE COLLAR FOR PIPE
M 806	PIPE SUPPORTS ACROSS TRENCHES
M 808	REMODELING DETAILS – HOUSE CONNECTION SEWERS
M 814	ABBREVIATIONS AND SYMBOLS
M 815	BEDDING AND PAY LINES
M 816	CONCRETE BULKHEAD
M 819	MAXIMUM CHORD LENGTHS FOR CURVED SECTIONS

R.C.T.D. STANDARD DRAWINGS

STD NO 300	MANHOLE FRAME AND COVER PER RIVERSIDE COUNTY TRANS. STD. 608
STD NO 302	DETAIL OF CATCH BASIN OPENING & INSTALLATION DETAILS/REMOVABLE PROTECTION BAR FOR C.B. PER RIVERSIDE COUNTY TRANS. STD. 304

NOTICE: THE CONTRACTOR SHALL NOTIFY THE DISTRICT IN WRITING A MINIMUM OF 20 DAYS BEFORE BEGINNING CONSTRUCTION, AND SHALL NOT BEGIN CONSTRUCTION BEFORE OBTAINING AUTHORIZATION TO PROCEED.

LEGEND

TC	TOP OF CURB	SD	STORM DRAIN
FS	FINISHED SURFACE	LF	LINEAR FEET
FL	FLOW LINE	EA	EACH
HP	HIGH POINT	SF	SQUARE FEET
PL	PROPERTY LINE	CY	CUBIC YARDS
BVC	BEGIN VERTICAL CURVE	R/W	RIGHT OF WAY
EVC	END VERTICAL CURVE	(R)	RADIAL
PI	POINT OF INTERSECTION	MIN	MINIMUM
CL	CENTERLINE	MAX	MAXIMUM
BCR	BEGIN CURB RETURN	AC	ASPHALT CONCRETE
ECR	END CURB RETURN	AB	AGGREGATE BASE
FG	FINISHED GRADE	CONC	CONCRETE
LP	LOW POINT	RCP	REINFORCED CONCRETE PIPE
TG	TOP OF GRATE	CMP	CORRUGATED METAL PIPE
INV	INVERT	NG	NATURAL GROUND
GB	GRADE BREAK	CF	CURB FACE
	DIRECTION OF FLOW	TYP	TYPICAL
8	LOT OR PARCEL NO.	PVC	POLYVINYL CHLORIDE PIPE
1396	PROPOSED CONTOUR ELEVATION	●	INLET
1396	EXISTING CONTOUR ELEVATION		EXISTING SD
	DOUBLE COURSE OF SANDBAGS		PROPOSED SD
+	STREET TREE	✡	STREET LIGHT

Don't Dig...Until You Call U.S.A. Toll Free
1-800-227-2600
for the location of buried utility lines.
Don't disrupt vital services.
TWO WORKING DAYS BEFORE YOU DIG

THE BASIS OF BEARINGS FOR THIS MAP IS N 89°35'44" E BEING THE CENTERLINE OF BRUNFIELD STREET PER PARCEL MAP NO. 15090, PARCEL MAP BOOK 93, PAGES 80–82.

BENCH MARK ELEVATION 1339.04'
RIVERSIDE COUNTY B.M. T-49-81, 2.5" BRASS DISC IN CONC. CYLINDER LOCATED AS FOLLOWS: FROM THE INT. OF RANCHO CA. RD. & FRONT ST. 1.7 MI. NW ON FRONT ST./JEFFERSON AVE. TO THE INT. OF JEFFERSON & WINCHESTER RD.(HWY 79)5.5 MILES NE ON WINCHESTER RD.(HWY 79) TO THE INT. OF WINCHESTER AND BENTON RD., 0.05 MI. W. ON BENTON RD TO THE BENTON/BRIGGS RD. INT., 0.5 MI. N. ON BRIGGS RD. TO THE BRIGGS/THOMPSON RD. INT.,200' E. OF THE INT., 22' S. OF THE C/L THOMPSON RD. NEAR THE NW COR OF 16' X 22' CHAIN LINK FENCE AROUND SOUTHERN CAL. GAS CO. VALVES. WIRED PADDLE MARKED TO FENCE.

SEAL-COUNTY
REGISTERED PROFESSIONAL ENGINEER KHALED A. OTHMAN No. 33950 Exp. 06-30-06 CIVIL STATE OF CALIFORNIA

COUNTY OF RIVERSIDE
TRANSPORTATION DEPARTMENT
APPROVED BY
KHALED A. OTHMAN, P.E. R.C.E. 33950 EXP. 6-30-06 — DATE 11/23/05
RECOMMENDED BY — DATE 11/22/05

NOTICE TO CONTRACTOR

THE EXISTENCE AND LOCATION OF ANY UNDERGROUND UTILITY PIPES OR STRUCTURES SHOWN ON THESE PLANS ARE OBTAINED BY A SEARCH OF AVAILABLE RECORDS. TO THE BEST OF OUR KNOWLEDGE, THERE ARE NO EXISTING UTILITIES EXCEPT UTILITIES EXCEPT AS SHOWN ON THESE PLANS. THE CONTRACTOR IS REQUIRED TO TAKE DUE PRECAUTIONARY MEASURES TO PROTECT THE UTILITY LINES SHOWN AND OTHER LINES NOT OF RECORD OR NOT SHOWN ON THESE PLANS AND SHALL BE RESPONSIBLE FOR ANY DAMAGE THERETO.

REGISTERED PROFESSIONAL ENGINEER JENS THIELMANN C 56742 EXP. 12-31-05 CIVIL STATE OF CALIFORNIA

AS BUILT
APPROVED BY Jens Thielmann
DATE 11-19-08

(SW)
TRACT NO 29962 IP 040179

BENCH MARK	REVISIONS	ENGINEER	RCFC/	DESIGNED BY: JT
				DRAWN BY: GT
				DATE DRAWN: 8/04
SEE ABOVE	REF. DESCRIPTION	APPR. DATE	APPR. DATE	

APPROVED BY: THIELMANN ENGINEERS
221 S CLASSELL ST ORANGE, CA 92866
(714) 744-9700 FAX (714) 744-9312
Jens Thielmann 10-31-05
JENS THIELMANN DATE

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
RECOMMENDED FOR APPROVAL BY: PLANNING ENGINEER DATE: 1-18-2006
APPROVED BY: CHIEF ENGINEER DATE: 1-24-06

WARM SPRINGS VALLEY–
COVENTRY LANE STORM DRAIN
FIELDS DRIVE STORM DRAIN

PROJECT NO. 7-0-00216 7-0-00217
DRAWING NO. 7-470
SHEET NO. 1 OF 10

J:\sara\Van-Sobo\SP\w001.dwg 10/29/05

WARREN D. WILLIAMS
General Manager-Chief Engineer

0004247 124543
1995 MARKET STREET
RIVERSIDE, CA 92501
951.955.1200
FAX 951.788.9965
www.floodcontrol.co.riverside.ca.us

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

DATE: April 8, 2009

TO: Mark Biloki, Operations and Maintenance Superintendent

FROM: Stephen E. Stump, Chief of Operations and Maintenance Division SE Stump

RE: Tract No. 29962
Warm Springs Valley – Coventry Lane Storm Drain
Warm Springs Valley – Fields Drive Storm Drain
Project Nos. 7-0-00216 and 7-0-00217
Drawing No. 7-470

Please add the referenced projects to the District's maintained system and acquaint your staff with the new projects. Also, make an addition in the next FY budget to account for maintenance costs. The attached maps and plans are for your use.

Attachments

c: Henry Olivo
Bob Cullen
Contract Admin File
Jay Keller
Ivan Chand
Sharon Johnson
Jim Morrell
Bill Hofferber
Imad Guirguis - w/plan sheet
Gayle Cuneo - w/reduced plans
Teresa Tung - w/plan sheet
Jason Uhley - w/plan sheet
Ami Urista - w/plan sheet
GIS Technical Committee
Attn: Bill Rhoades - w/plan sheet
File Room
R/W Acquisition File

AU:rlp

0004248

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

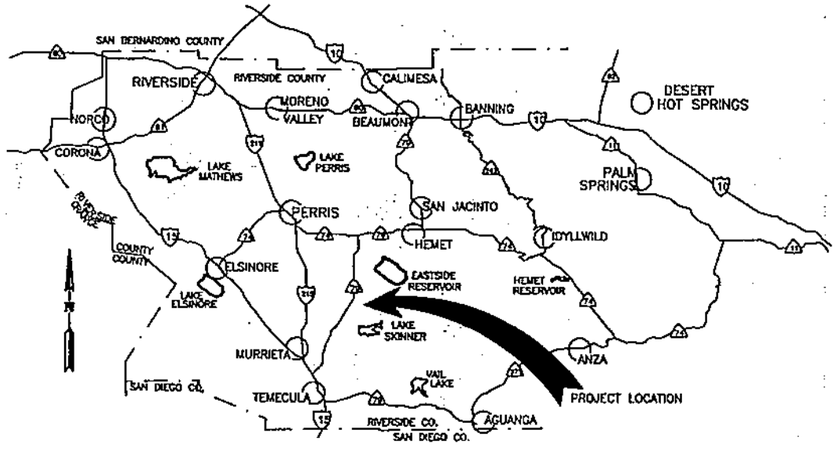

VICINITY MAP
NTS

INDEX

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INDEX MAP & CONSTRUCTION NOTES	2
PLAN & PROFILE	3–9

GENERAL NOTES

1. THE CONTRACTOR SHALL CONSTRUCT THE FLOOD CONTROL IMPROVEMENTS SHOWN ON THE DRAWINGS IN CONFORMANCE WITH THE REQUIREMENTS OF THE RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT'S M.O.U. STANDARD SPECIFICATIONS DATED SEPTEMBER 1984, AND DESIGN MANUAL STANDARD DRAWINGS DATED APRIL 2004.
2. AN ENCROACHMENT PERMIT IS REQUIRED FROM RIVERSIDE COUNTY FLOOD CONTROL. CONTACT ED LOTZ AT 951/955-1266. AFTER THE PERMIT IS ISSUED THE DISTRICT MUST BE NOTIFIED ONE WEEK PRIOR TO CONSTRUCTION.
3. CONSTRUCTION INSPECTION WILL BE PERFORMED BY RIVERSIDE COUNTY FLOOD CONTROL. CONTACT DALE ANDERSON AT 951/955-1288. THE DISTRICT MUST BE NOTIFIED TWENTY DAYS (20) PRIOR TO CONSTRUCTION.
4. ALL STATIONING REFERS TO CENTERLINE OF CONSTRUCTION UNLESS OTHERWISE NOTED.
5. STATIONING FOR LATERALS AND CONNECTOR PIPE REFER TO THE CENTERLINE INTERSECTION STATIONS.
6. FORTY-EIGHT HOURS BEFORE EXCAVATION, CALL UNDERGROUND SERVICE ALERT 1-800-227-2600.
7. ALL ELEVATIONS SHOWN ARE IN FEET AND DECIMALS THEREOF BASED ON U.S.C. & G.S DATUM.
8. ALL CROSS SECTIONS ARE TAKEN LOOKING DOWNSTREAM.
9. ELEVATIONS OF UTILITIES ARE APPROXIMATE UNLESS OTHERWISE NOTED.
10. OPENINGS RESULTING FROM THE CUTTING OR PARTIAL REMOVAL OF EXISTING CULVERTS, PIPES OR SIMILAR STRUCTURES TO BE ABANDONED SHALL BE SEALED WITH 6" OF CLASS "B" CONCRETE.
11. PIPE CONNECTED TO THE MAINLINE PIPE SHALL CONFORM TO JUNCTION STRUCTURE NO. 4 (JS 229) UNLESS OTHERWISE NOTED.
12. PIPE BEDDING SHALL CONFORM TO RCFC&WCD STD. DWG. NO. M815 EXCEPT FOR COVER <2 FEET. FOR COVER <2 FEET, CONCRETE SLURRY (2000 PSI – 2 SACK) SHALL BE USED. THE ENTIRE TRENCH SHALL BE SLURRY EXTENDING 4 INCHES MINIMUM AND 12 INCHES MAXIMUM ABOVE THE TOP OF PIPE.
13. BH-1 INDICATES SOIL BORING LOCATIONS BASED ON THE SOILS REPORT DATED (N/A) LOCATIONS SHOWN ARE APPROXIMATE.
14. "V" IS THE DEPTH OF CATCH BASINS MEASURED FROM THE TOP OF CURB TO INVERT OF CONNECTOR PIPE.
15. CATCH BASINS SHALL BE LOCATED SO THAT LOCAL DEPRESSION SHALL BEGIN AT EXISTING CURB RETURN JOINT, UNLESS SPECIFIED.
16. ALL CURBS, GUTTERS, SIDEWALKS, DRIVEWAYS AND OTHER EXISTING IMPROVEMENTS TO BE RECONSTRUCTED IN KIND AND AT THE SAME ELEVATION AND LOCATION AS THE EXISTING IMPROVEMENTS UNLESS OTHERWISE NOTED.
17. STANDARD DRAWINGS CALLED FOR ON THE PLAN AND PROFILE SHALL CONFORM TO DISTRICT STANDARD DRAWINGS UNLESS NOTED OTHERWISE.
18. THE CONTRACTOR IS REQUIRED TO CALL ALL UTILITY AGENCIES REGARDING TEMPORARY SHORING AND SUPPORT REQUIREMENTS FOR THE VARIOUS UTILITY LINES SHOWN ON THESE PLANS.
19. DURING ROUGH GRADING OPERATIONS AND PRIOR TO CONSTRUCTION OF PERMANENT DRAINAGE STRUCTURES, TEMPORARY DRAINAGE CONTROL SHOULD BE PROVIDED TO PREVENT PONDING WATER AND DAMAGE TO ADJACENT PROPERTIES.
20. APPROVAL OF THESE PLANS BY THE RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT DOES NOT RELIEVE THE DEVELOPER'S ENGINEER OF RESPONSIBILITY FOR THE ENGINEERING DESIGN. IF FIELD CHANGES ARE REQUIRED, IT WILL BE THE RESPONSIBILITY OF THE DESIGN ENGINEER TO MAKE THE NECESSARY CORRECTIONS.
21. THE CONTRACTOR OR DEVELOPER SHALL SECURE ALL REQUIRED ENCROACHMENT AND/OR STATE AND FEDERAL REGULATORY PERMITS PRIOR TO THE COMMENCEMENT OF ANY WORK.

R.C.F.C. & W.C.D. STANDARD DRAWINGS

CB 106	CATCH BASIN REINFORCEMENT
CB 109	SPECIAL CONNECTIONS TO CATCH BASIN
CB 110	CONCRETE DROP INLET
LD 201	LOCAL DEPRESSION No. 2
JS 226	JUNCTION STRUCTURE No. 1
JS 228	JUNCTION STRUCTURE No. 3
JS 229	JUNCTION STRUCTURE No. 4
MH 253	MANHOLE NO. 3
MH 255	MANHOLE FRAME & COVER NON-ROCKING
MH 257	MANHOLE SHAFT FOR CAST PIPE
MH 259	STANDARD DROP STEP
TS 301	TRANSITION STRUCTURE No. 1
CH 326	TRAPEZOIDAL CHANNEL DETAILS
CH 329	TRANSITION STRUCTURAL DETAILS
BX 401	SINGLE CELL R.C.B. STRUCTURAL DETAILS
M 801	CHAIN LINK FENCE DETAILS
M 803	CONCRETE COLLAR FOR PIPE
M 806	PIPE SUPPORTS ACROSS TRENCHES
M 808	REMODELING DETAILS – HOUSE CONNECTION SEWERS
M 814	ABBREVIATIONS AND SYMBOLS
M 815	BEDDING AND PAY LINES
M 816	CONCRETE BULKHEAD
M 819	MAXIMUM CHORD LENGTHS FOR CURVED SECTIONS

R.C.T.D. STANDARD DRAWINGS

STD NO 300	MANHOLE FRAME AND COVER PER RIVERSIDE COUNTY TRANS. STD. 608
STD NO 302	DETAIL OF CATCH BASIN OPENING & INSTALLATION DETAILS/REMOVABLE PROTECTION BAR FOR C.B. PER RIVERSIDE COUNTY TRANS. STD. 304

NOTICE: THE CONTRACTOR SHALL NOTIFY THE DISTRICT IN WRITING A MINIMUM OF 20 DAYS BEFORE BEGINNING CONSTRUCTION, AND SHALL NOT BEGIN CONSTRUCTION BEFORE OBTAINING AUTHORIZATION TO PROCEED.

LEGEND

TC	TOP OF CURB	SD	STORM DRAIN
FS	FINISHED SURFACE	LF	LINEAR FEET
FL	FLOW LINE	EA	EACH
HP	HIGH POINT	SF	SQUARE FEET
PL	PROPERTY LINE	CY	CUBIC YARDS
BVC	BEGIN VERTICAL CURVE	R/W	RIGHT OF WAY
EVC	END VERTICAL CURVE	(R)	RADIAL
PI	POINT OF INTERSECTION	MIN	MINIMUM
CL	CENTERLINE	MAX	MAXIMUM
BCR	BEGIN CURB RETURN	AC	ASPHALT CONCRETE
ECR	END CURB RETURN	AB	AGGREGATE BASE
FG	FINISHED GRADE	CONC	CONCRETE
LP	LOW POINT	RCP	REINFORCED CONCRETE PIPE
TG	TOP OF GRATE	CMP	CORRUGATED METAL PIPE
INV	INVERT	NG	NATURAL GROUND
GB	GRADE BREAK	CF	CURB FACE
	DIRECTION OF FLOW	TYP	TYPICAL
8	LOT OR PARCEL NO.	PVC	POLYVINYL CHLORIDE PIPE
1396	PROPOSED CONTOUR ELEVATION	●	INLET
1396	EXISTING CONTOUR ELEVATION		EXISTING SD
	DOUBLE COURSE OF SANDBAGS		PROPOSED SD
+	STREET TREE	✡	STREET LIGHT

Don't Dig...Until You Call U.S.A. Toll Free
1-800-227-2600
for the location of buried utility lines.
Don't disrupt vital services.
TWO WORKING DAYS BEFORE YOU DIG

THE BASIS OF BEARINGS FOR THIS MAP IS N 89°35'44" E BEING THE CENTERLINE OF BRUNFIELD STREET PER PARCEL MAP NO. 15090, PARCEL MAP BOOK 93, PAGES 80–82.

BENCH MARK ELEVATION 1339.04'
RIVERSIDE COUNTY B.M. T-49-81, 2.5" BRASS DISC IN CONC. CYLINDER LOCATED AS FOLLOWS: FROM THE INT. OF RANCHO CA. RD. & FRONT ST. 1.7 MI. NW ON FRONT ST./JEFFERSON AVE. TO THE INT. OF JEFFERSON & WINCHESTER RD.(HWY 79)5.5 MILES NE ON WINCHESTER RD.(HWY 79) TO THE INT. OF WINCHESTER AND BENTON RD., 0.05 MI. W. ON BENTON RD TO THE BENTON/BRIGGS RD. INT., 0.5 MI. N. ON BRIGGS RD. TO THE BRIGGS/THOMPSON RD. INT.,200' E. OF THE INT., 22' S. OF THE C/L THOMPSON RD. NEAR THE NW COR OF 16' X 22' CHAIN LINK FENCE AROUND SOUTHERN CAL. GAS CO. VALVES. WIRED PADDLE MARKED TO FENCE.

SEAL-COUNTY: REGISTERED PROFESSIONAL ENGINEER KHALED A. OTHMAN No. 33950 Exp. 06-30-06 CIVIL STATE OF CALIFORNIA

COUNTY OF RIVERSIDE TRANSPORTATION DEPARTMENT APPROVED BY
KHALED A. OTHMAN, P.E. R.C.E. 33950 EXP. 6-30-06 — DATE 11/23/05
RECOMMENDED BY — DATE 11/22/05

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REGISTERED PROFESSIONAL ENGINEER JENS THIELMANN C 25742 EXP. 12/31/05 CIVIL STATE OF CALIFORNIA

AS BUILT
APPROVED BY: Jens Thielmann
DATE 11-19-08

(SW)

TRACT NO 29962 IP 040179

BENCH MARK	REVISIONS	ENGINEER	RCFC/	DESIGNED BY: JT
SEE ABOVE	REF. / DESCRIPTION	APPR. / DATE	APPR. / DATE	DRAWN BY: GT; DATE DRAWN: 8/04

APPROVED BY: THIELMANN ENGINEERS
221 S CLASSELL ST ORANGE, CA 92868
(714) 744-9700 FAX (714) 744-9312
Jens Thielmann 10-31-05
JENS THIELMANN — DATE

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
RECOMMENDED FOR APPROVAL BY: PLANNING ENGINEER — DATE: 1-18-2006
APPROVED BY: CHIEF ENGINEER — DATE: 1-24-06

WARM SPRINGS VALLEY–
COVENTRY LANE STORM DRAIN
FIELDS DRIVE STORM DRAIN

PROJECT NO. 7-0-00216 7-0-00217
DRAWING NO. 7-470
SHEET NO. 1 OF 10

J:\sara\Van-Sobo\SP\w001.dwg 10/29/05

California Regional Water Quality Control Board

San Diego Region

Over 50 Years Serving San Diego, Orange, and Riverside Counties
Recipient of the 2004 Environmental Award for Outstanding Achievement from USEPA

Linda S. Adams
Secretary for Environmental Protection

Arnold Schwarzenegger
Governor

9174 Sky Park Court, Suite 100, San Diego, California 92123-4353
(858) 467-2952 • Fax (858) 571-6972
http:// www.waterboards.ca.gov/sandiego

February 18, 2010

In reply refer to:
749045:bneill

Warren D. Williams
General Manager, Chief Engineer
Riverside County Flood Control and Water Conservation District
1995 Market Street
Riverside, CA 92501

Dear Mr. Williams:

SUBJECT: Review of Report of Waste Discharge for the Riverside County Municipal Storm Water Permit Reissuance, Tentative Order No. R9-2010-0016, NPDES No. CAS0108740

The California Regional Water Quality Control Board, San Diego Region (Regional Board), has reviewed the Report of Waste Discharge (ROWD) submitted by the Riverside County Flood Control and Water Conservation District on behalf of the County of Riverside, and the Cities of Menifee, Murrieta, Temecula, and Wildomar. The ROWD and recent annual reports provide an overview of current programs found to be effective and proposed improvements to the storm water management programs. With the annual reports, the ROWD satisfies reapplication requirements found in federal regulations and the United States Environmental Protection Agency's *Interpretative Policy Memorandum on Reapplication Requirements for Municipal Separate Storm Sewer Systems.*

The Regional Board will rely on the information contained in the ROWD and annual reports in order to draft a tentative Order for the reissuance of the NPDES permit, Order No. R9-2004-0001 (Permit). The Copermittees may be asked to provide supplemental and clarifying information to assist the reissuance process. A public comment period will follow the release of the tentative Order and is expected to last no less than 45 days. A public workshop is tentatively scheduled for the Regional Board's regular meeting held on April 14, 2010. The tentative Order will then be revised, if necessary, and scheduled for adoption consideration at a future meeting.

In the interim, the Regional Board wishes to start meeting with the Copermittees to discuss programmatic elements of the reissued permit and suggests meeting regularly following the Copermittees' monthly Technical Advisory Committee meetings. To expedite discussions, we are providing the following comments on the ROWD:

1. The Regional Board is sensitive to the current economic difficulties encountered by local and State government agencies and will take into consideration the economic information provided in the ROWD for permit development.

2. The ROWD reports "no statistically significant trends" in water quality monitoring data and the ROWD attributes this to the effectiveness of the Copermittees' programs. The Regional Board does not conclude that an absence of a statistically significant trend is solely attributed to the effectiveness of the Copermittees' programs. Rather, the lack of a statistically significant trend could also be attributed to a lack of data; historic difficulties with monitoring at triad stations and difficulties with monitoring for the illicit discharge detection and elimination program. Recent monitoring data submitted to the Regional Board suggests continuing exceedances of Basin Plan water quality objectives and an increased number of water bodies in the Santa Margarita watershed that are listed as impaired in the December 2009, Clean Water Act 305(b) and 303(d) Integrated Report for the San Diego Region.

3. The Regional Board is encouraged by the Copermittees' recognition of the need for measureable performance criteria including action levels. The ultimate objective of effectiveness assessment is measuring outcome level 5 – "Improving Runoff Quality" and measuring outcome level 6 – "Protecting Receiving Water Quality". We will continue to review the Copermittees' proposed revisions to enhance program effectiveness assessment during the permit reissuance process.

4. The Regional Board agrees with the Copermittees' recommendation to revise the annual reporting requirements. The format and layout for annual reporting can be improved to increase clarity and readability.

5. The ROWD proposes elimination of the watershed storm water management program (SWMP) in deference to the countywide drainage area management plan (DAMP). The model DAMP does not fulfill USEPA's goal of "coordination with adjacent MS4s on monitoring or other efforts; and using a watershed approach to storm water management" as found in the *Interpretative Policy Memorandum on Reapplication Requirements for Municipal Separate Storm Sewer Systems.* The DAMP's effectiveness in providing guidance is ultimately left up to the Copermittees as Permit compliance is the responsibility of the individual jurisdictions. In addition, the watershed SWMP implements USEPA's "Watershed-Based National Pollutant Discharge Elimination System (NPDES) Permitting Policy Statement" from January of 2003. Nevertheless, the Regional Board understands that improvements can be made in the implementation and

exercise of the watershed SWMP and is open to discussing improvements to the watershed SWMP.

6. The ROWD proposes several changes to the monitoring program. The Regional Board agrees that improvements to the Copermittees' monitoring program should be made to comply with federal regulations and the goals of the monitoring program. As such, we will carefully consider the Copermittees' proposed changes to the monitoring program.

7. The ROWD proposes clarification in criteria for mobilization of monitoring events. The Permit does not specify the mobilization criteria. Such changes are more appropriate in the Consolidated Monitoring Program that can be updated by the Copermittees. In addition, auto samplers can help alleviate some of the difficulties that the Copermittees have encountered with monitoring.

8. The ROWD proposes a reduction in the number of dry and wet weather monitoring events due in part to the Copermittees' difficulties with collecting samples. The ROWD does not discuss the efficacy and benefits of the monitoring frequencies for water quality data analysis. The Regional Board recognizes the benefits of increased monitoring and believes any difficulties could be resolved through improved management of the monitoring program.

9. The Regional Board is encouraged by the Copermittees' recognition in the ROWD of Low Impact Development (LID) as a best management practice (BMP). Recently adopted MS4 permits in Southern California incorporate measureable performance criteria for LID implementation. Similar requirements are appropriate in Riverside County and will be discussed in future meetings with the Regional Board.

10. The ROWD states that the Copermittees would like to review the exclusion of roads as priority development projects due to "potential avenues for unavoidable non-compliance". The ROWD does not describe in detail unavoidable instances of non-compliance. To date, evidence indicates that roads are pollutant generating projects that need storm water treatment. The Regional Board are open to discussing other measures to improve Copermittees' storm water programs with oversight of public works projects.

11. The ROWD proposes a tiered program of inspection and verification of post construction treatment control BMPs to ensure ongoing effectiveness. The Regional Board will continue to review the Copermittee's proposed program during the permit reissuance process and discussions with the Copermittees.

12. The ROWD does not propose any changes to the construction oversight program. Current technology and practices in managing storm water runoff from construction sites may not be reflected in the current Permit. BMPs such as phased grading and active treatment systems have proven to be effective in addressing storm water pollutants from construction sites. As such, the Regional Board anticipates discussing these issues further with the Copermittees through the permit reissuance process.

13. The ROWD proposes improvements to the illicit discharge detection and elimination (IDDE) program. The Copermittees' recognition of the need for improvements to the IDDE program is admirable and the Regional Board looks forward to discussing this in more detail with the Copermittees during the permit reissuance process. The Regional Board encourages the Copermittees to examine guidance from USEPA and the Center for Watershed Protection for program development and technical assessments.

14. The ROWD does not address the potential for non-storm water over irrigation discharges as contributing to exceedances of surface water quality objectives. Over watering of lawns has been increasingly identified throughout southern California as a source and conveyance of pollutants to surface waters. In addition to conservation measures to address wasteful water use, the Copermittees' efforts to comply with AB 1881 can have water quality benefits that should be examined.

15. The ROWD does not address the potential for retrofitting existing developments. The National Research Council's report, "Urban Stormwater Management in the United States" identifies that to meet watershed objectives, retrofitting will be necessary in a substantial amount of existing development. Retrofitting existing development through small, distributed practices (i.e. LID) was found to be more cost-effective than large, centralized approaches to retrofitting.

If you have any questions or need further clarification, please contact Ben Neill at (858) 467-2983 or bneill@waterboards.ca.gov.

Respectfully,

CHIARA CLEMENTE
Senior Environmental Scientist

CC:bin

Cc by email:

Riverside County Flood Control District and Water Conservation District, Jason Uhley, Engineering Project Manager, and Claudio Padres, Associate Civil Engineer / Santa Margarita Watershed MS4 Permit Manager;
City of Meniffee, Don Allison, Public Works Director/City Engineer;
City of Murrieta, Bill Woolsey, Civil Engineering Associate;
City of Temecula, Aldo Licitra, Associate Engineer / NPDES, Daniel York, Deputy Director of Public Works / City Engineer;
City of Wildomar, Michael Kashiwagi, Director of Municipal Services;
County of Riverside, Mike Shetler, Senior Management Analyst, and Alex Gann, Principal Management Analyst;

DRAFT AGENDA

Santa Margarita Region Permit Renewal Meeting

1:30 PM – 3:30 p.m. March 22, 2010

Purpose: To present perspectives on the Upper Santa Margarita Watershed and discuss a win-win process for MS4 Permit Renewal

1. Opening Comments – Jason Uhley / David Gibson
2. Permittee Watershed Perspective – Jason Uhley
3. Regional Board Watershed Perspective – RWQCB Staff
4. MS4 Permit Renewal Process
    a. Develop Ground Rules - Group
    b. Develop Process Framework - Group
5. Set next meeting dates.

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN DIEGO REGION

SIGN-IN SHEET

DATE: **March 22, 2010**
PROJECT: **Riverside County Municipal Storm Water Permit (Tentative Order No. R9-2010-0016)**

Name	Organization	email (or phone)
Mike Shetler	Co of Riverside	mshetler@rceo.org
Jim DZMURA	CITY OF WILDOMAR	TDZMURA@CITYOFWILDOMAR.ORG
Mack Walker	Larry Walker Assc.	mackw@lwa.com
Jason Uhley	RCFC&WCD	juhley@rcflood.org
Daniel Apt	RBF	dapt@rbf.com
Claudio Padres	RCFC&WCD	cmpadres@rcflood.org
ALDO LICITRA	CITY OF TEMECULA	ALDO.LICITRA@CITYOFTEMECULA.ORG
MAYRA DE LA TORRE	"	Mayra.DeLaTorre@cityoftemecula.org
GREG BUTLER	"	Greg.Butler@cityoftemecula.org
Bill Woolsey	" " MURRIETA	wwoolsey@murrieta.org
Patrick Thomas	" " "	pthomas@murrieta.org
Chiara Clemente	RWQCB	cclemente@waterboards.ca.gov
Jimmy Smith	RWQCB	jsmith@waterboards.ca.gov 858 467-2732
WAYNE CHIU	RWQCB	wchiu@waterboards.ca.gov
Ben Neill	RWQCB	bneill@waterboards.ca.gov

0004255

San Diego Region Riverside County MS4 Permit Renewal

Joint Meeting – San Diego Water Board and MS4s

March 22, 2010, 1:30 – 3:30

Attendees: See attached sign-up sheet.

Draft Meeting Notes

1. Opening comments.
    a. Jason Uhley on behalf of the MS4s.
        i. Purpose of the meeting is to set up a framework for a process to develop new permit for the SMR watershed.
        ii. The intent of establishing a process for the renewal is to have a similar result (efficient adoption process) as the other permits recently renewed in Riverside County by Region 8 (Santa Ana Water Board) and Region 7 (Colorado River Water Board).
        iii. To facilitate a productive permit renewal process that is protective of water quality and addresses local considerations, we need to define the issues in the watershed.
    b. Jimmy Smith on behalf of the San Diego Water Board
        i. The State of California established semi-autonomous Water Boards to address local considerations in the best interest of protecting water quality for the public.
        ii. The Water Board is sensitive to the Copermittees' concerns regarding consistent NPDES permits and believes the first step is having a consistent MS4 permit throughout the San Diego Water Board's jurisdiction.
2. Permittee Watershed Perspective
    a. Jason Uhley on behalf of the MS4s.
        i. Provided some background information on the watershed within Riverside County (see PowerPoint presentation slides 1-37). Some highlights included:
            1. Permittee Structure is the Riverside Flood Control and Water Conservation District as Principal Permittee, with the County of Riverside and the Cities of Menifee, Murrieta, Temecula, Wildomar as Co-Permittees. Wildomar and Menifee are newly incorporated for the next permit cycle.
            2. DAMP is the Copermittees' guiding document for complying with the San Diego and Santa Ana Water Boards' MS4 permits within Riverside County.

3. SMR watershed within Riverside County is primarily rural (defined as a 1 acre lots or greater) and will stay that way (growth potential waning) barring a change in existing policies, ordinances and laws.
4. County has moved forward with incorporating LID concepts into the land development process by developing their own Design Manual that includes design specifications and standard drawings for several landscape-based BMPs. Manual is due to be completed in July, however, development projects have been incorporating preliminary landscaped-based BMP design concepts since the WQMP's implementation.
5. The District has also contributed to the development of the Stormwater Montioring Coalition LID Manual.
6. The County is implementing the BMPs identified in the Riverside Design Manual at the District offices in Riverside to identify the water quality and volume reduction benefits, as well as maintenance needs, of the BMPs. The Permittees are interested in making adjustments to the LID provisions in the San Diego Water Board's Riverside MS4 Permit to ensure that the program builds on existing Permittee efforts.
7. Hydromodification is controlled to large part by the existing dams that control runoff from 2/3 of the watershed and the confined limits of the urban area. Build out in the watershed will have little hydromodification affect due to these factors. The Permittees would like to discuss how to develop hydromodification requirements that are appropriate to the needs of the region and respectful of Permittee resources.
8. The District has initiated a pyrethoid management program including proactive efforts to change state and federal pesticide management regulations and outreach to local residents.
9. Economic situation is deteriorating through at least the next two fiscal years with necessary adjustments being made to public agency funds.

ii. The guiding principles for the MS4 efforts with permit negotiations include:

1. Consistency with Riverside County MS4 permit issued by the Santa Ana Water Board (Santa Ana Permit) to allow for administrative efficiencies and reduce confusion for dually-regulated Permittees staff, residents and businesses.
2. Cost neutral with current permit and consistent with the Permittee resources.
3. Ability to prioritize issues to direct resources to programs that provide the greatest water quality benefit.
4. Reduce administrative burden in reporting.

iii. Conclusions

1. The Permittees are committed to an effective program

2. The Permittees are committed to work with the Water Board Staff on this permit.
3. The Permittees and Water Board have mutual goals.

3. San Diego Water Board Perspective
   a. David Gibson provided initial comments. Highlighting the following
      i. Asked about the Riverside County Board of Supervisors' resolution requesting that Riverside County be included on an Assembly Bill to be removed from the San Diego Water Board's jurisdiction. Inquired whether the Riverside County staff were the source of the resolution. Mike Shetler of Riverside County responded by saying the Assembly Bill was brought to the County Supervisor's attention.
      ii. WB will take a close look at the issues brought up in today's presentation.
      iii. WB will look for opportunities to crossover with the Santa Ana permit.
      iv. WB is committed to open dialogue to produce a permit that is:
         1. Socially and environmentally responsible
         2. Affordable
         3. Improves water quality
      v. WB interested in allowing Menifee to be wholly regulated by the Santa Ana Water Board and Murrieta to be wholly regulated by the San Diego Water Board.
      vi. Need to focus on the efforts that make the most sense and provide flexibility in the permit.
      vii. Issues that cannot be resolved may need to be brought to the Water Board for policy directions.
   b. Ben Neill provided follow up comments
      i. Must keep in mind the goals of the Clean Water Act to protect beneficial uses and meet water quality standards.
      ii. Will need to identify measurable criteria (action levels, capture 85th percentile of storm event, hydromod, and any TMDL's) in the MS4 permit.
      iii. Increase focus on pollutants of concern that are causing impairment.
      iv. Protection of water supply
      v. An additional shift in focus of recent permits has been on LID and hydromodification and the measureable criteria.
      vi. Permit needs to have provisions to protect environmentally sensitive areas.
      vii. Sees common elements between Orange County Permit and Riverside County Permit.
      viii. Will look for more focused monitoring with special interest in IC/ID, bioassessmsnt and ubiquitous trash.
   c. David Gibson provided additional comments:
      i. LID BMPs, if appropriate, are excellent for protecting water quality
      ii. WB would like to have mutual gains for the permit

iii. WB not committed to having Permit put on the Consent Calendar as a goal for the renewal process, but supportive of discussions
iv. Need a process to show that the WB and the Permittees are working together
v. Is mindful of the economic restraints presented and there is a lot of room to provide flexibility in the permit.

d. Jason responded to the comments provided by David and Ben
    i. There are many benefits to having regionally coordinated programs so looking at SAR programs for the SMR permit
    ii. Permittees and the RB can work together to define a process.
    iii. Direct communication with staff will allow a permit to grow from these conversations.
    iv. Looking to have a "true" cost-neutral permit and prioritize spending where a difference can be made due to limited resources
e. Michael Shetler with Riverside County inquired if the permit could be back loaded with requirements to allow for the economic situation to improve. David Gibson noted he was willing to consider that approach and noted that he and Jason had discussed growth based targets as one way to address the issue.

4. MS4 Permit Renewal Process
    a. Jason recommended moving on to identifying a process for the permit renewal.
    b. David Gibson identified that it was important for a commitment that agreements in the discussions are memorialized in writing.
    c. Ben noted that the Water Board and MS4s are public agencies and that private conversations subverted the process in adopting the Ventura Permit. Mack Walker provided clarification, from his perspective, on what occurred in Ventura, and did not believe that it would be an issue in this process..
    d. Jason posed the question as to where we should start from with regards to Permit language. Suggested using the current Riverside permit and modify it based on the ROWD. The Permittees are committed to providing the time and resources to convene with the WB to resolve permit issues during the permit development process.
    e. Jimmy noted that by starting with the already adopted Riverside Permit there would be no issues. The WB will start with the recently adopted south Orange County permit that is the current state of the art in stormwater regulations and believes that there is sufficient flexibility in the OC permit to meet Riverside's needs or concerns. Jimmy also noted that MEP was defined for the entire SD Region by the OC Permit, including the Upper SMR, and the latest permit (South OC) is the current state of MEP for the entire region. Jimmy noted that the OC permit language was intentionally vague to allow the Copermittees flexibility in achieving compliance with the permit requirements.
    f. David Gibson noted that the Regional Board members are expecting a permit similar to South OC. Any major differences from the South OC Permit would need to be justified to the RWQCB.

g. The Permittees would like to see the Permit be specific with regards to requirements and not leave the flexibility to an interpretation by the RB or others. Goal of process would be to determine priorities for the region and fashion an appropriate permit.
h. Back and forth discussion regarding the SMR watershed versus other watersheds. And ultimately it was decided to start with a list of issues and positions and start from there.
i. David Gibson suggested the following;
    i. Start with the least controversial issues
    ii. Look at the OC permit and compare with the ROWD and Santa Ana Permit.
    iii. Need to articulate how SMR is different from OC. Is MEP different in the SMR from south OC?
    iv. Need to properly define the issues
j. Discussion regarding the schedule and personnel involved with permit discussion.
    i. There is a commitment to a series of meetings from the RB and the Permittees
    ii. The next meeting will define the Permittee's issues for discussion.There was agreement that the San Diego Water Board's comments on the ROWD would be a good set of issues to start off with.
    iii. There is some flexibility in the schedule, but the RB would like to have an adopted permit not later than December
    iv. Claudio will set up the next meeting.
    v. David Barker will be the RB management representative. .
    vi. Ben indicated that he is available to meet twice per week, or as often as possible.
    vii. Temecula was identified as the primary meeting location although some meetings could be done by conference call or in San Diego based on need.

5. Wrap up
    a. David Gibson closing thoughts:
        i. Committed to reducing the permit writing burden for staff and having staff in the field helping the Permittees implement the permit
        ii. Committed to getting away from paperwork and getting to implementation that improves water quality
        iii. Committed to meeting prior to public release of the permit
    b. Jason provided a summary of the process:
        i. All parties are committed to the process as long as efforts are productive
        ii. The RB staff that will be in the meetings will primarily include Ben Neill, and Wayne Chiu. Chiara Clemente , David Barker, , and Chad Loflen will also attend most meetings.
        iii. Purpose of next meeting will be to identify the Copermittees issues and discuss the ROWD comment letter.
        iv. County will take lead in setting up schedule, including next meeting date, and will provide to the regional Board by Monday of next week.

LAKE VILLAGE COMMUNTIY ASSOCIATION
30398 CALLE SONORA STREET
TEMECULA, CA 92592

March 23, 2010

San Diego Regional Water Quality Control Board
Attention: Mr. Ben Neill, Water Resources Control Engineer
9174 Sky Park Ct., Suite 100
San Diego, CA 92123

SUBJECTS: (1) CLEAN WATER ACT/NPDES PERMIT VIOLATIONS
(2) COMMENTS ON CITY OF TEMECULA'S NPDES MS4 PERMIT RENEWAL

Dear Mr. Neill:

Thank you for your support and information regarding water quality compliance requirements applicable to the lakes of Lake Village Community Association.

2010 MAR 24 P 2: 17
SAN DIEGO REGIONAL WATER QUALITY CONTROL BOARD

We are writing to provide you comments on City of Temecula's NPDES MS4 permit renewal and to file complaints on the illicit discharges to the lakes of our community.

Lake Village Community was developed in 1967, with 251 homes built around 4-acre upper and 9- acre lower lakes. The upper and lower lakes were originally built with maximum depths of 7ft and 18 ft, respectively. The lakes in the community provide recreational activities such as fishing, boating, picnicking, sunbathing, hiking, sight-seeing, and/or or aesthetic enjoyment. In addition, many, many wildlife frolic in and around the lakes such as ducks, geese, herons, egrets, and many varieties of bird species.

The overflow from the upper lake leads to the lower lake via a dam and spillway. The overflow from the lower lake leads to a culvert that eventually leads to Temecula Creek, which is a tributary to Santa Margarita River. Our lakes receive storm-water run-offs from the City of Temecula via seven (7) storm-drains (4 drains in upper lake, 3 drains in lower lake) and Ronald Reagan Sports Park desilting basin. Attached are some photos for your reference. Photo no. 1 is the desilting basin water way, which is located up above the upper lake (photo no. 2). Photo no. 3 is the dam, which overflows lead to the lower lake. Photo no. 4 is the culvert, which overflows eventually lead to Temecula Creek.

Many housing, recreational, structural, and other developments around Lake Village community from 1967 to date have resulted to degradation of the quality of storm-water run-offs being discharged to our lakes. Many years of poor quality storm-water discharges from the City storm drains and desilting basin have adversely impacted our lakes.

Lake Village initiated collecting and analyzing discharges to our lakes. The first sample collected was on 13April2003, which was analyzed on 14April 2003 by Babcock and Sons, Inc. per Enclosure (1). Heavy rains during the weekend of January 14, 2010 and the week of January 18, 2010, exacerbated by the improper timing of the desilting basin's dredging activities had resulted to heavy discharges of pollutants with high concentrations of sediments/silt. Heavy volumes and strong current of storm water run-offs swept away the filtration mechanisms and sandbags at the discharge points from the desilting basin to the upper lake, which resulted to discharge of muddy storm water runoff to the upper lake. Please refer to photo nos. 5 through 9.

Our lake maintenance contractor, Water Resources, collected samples of the discharge from the storm drains of the upper and lower lakes and from the discharge of the desilting basin to the upper lake. On 14January2010 and 22January2010, samples from the desilting basin were collected at the discharge point to the upper lake. On January 18, 2010, samples were collected from the storm drains-three (3) samples from the lower lake and two (2) samples from the upper lake. These samples were taken to Associated Labs for analysis. Two (2) composite samples were made: one (1) from the (three) 3 samples collected from the lower lake and one (1) from the (two) 2 samples collected in the upper lake. Enclosure (2) is the analytical results of the sample collected from the desilting basin discharge on 14Jan2010. Enclosure (3) is the analytical results of the composite samples from the storm drains collected on 18Jan2010. Enclosure (4) is the analytical result of the sample collected from the desilting basin discharge on 22January2010. The San Diego Region Basin Plan-Chapter 3 Water Quality Objectives are referenced and summarized in the Table below, which includes the analytical results of the samples collected on 14April2003, 14Jan2010, 18Jan2010, and 22Jan2010.

SUMMARY OF ANALYTICAL RESULTS

Pollutants Analyzed	Desilting Basin Sample collected on 14Apr2003	Composite Sample Result (upper lake) 18Jan2010	Composite Sample Result (lower lake) 18Jan2010	Desilting Basin Discharge (14Jan2010)	Desilting Basin Discharge (22Jan2010)	Chapter 3-Basin Plan water quality objectives (inland surface waters)
Sp. Conductance (umhos/cm)	280	223	210	570	220	<=500
Turbidity(NTU)	160	7.74	18.43	42.4	114	<=20
Ph	7.2	6.99	7.27	6.88	7.05	6.5-8.5
Dissolved Oxygen(mg/l)		6.18	8.93	7.92		>=7
Total hardness(mg/L)		67	62	108		?
Oil and Grease(mg/L)	ND	16	ND	ND	ND	Waters shall not contain oils, grease, waxes which result in a visible film or coating on the surface of the water or objects in the water, or which cause nuisance or which otherwise adversely affect beneficial uses
Ammonia Nitrogen(mg/L)	0.23	0.14	ND	0.30	ND	0.025
Ortho Phosphate Phosphorous (mg/L)	0.32					
Total Phosphorous	0.72	0.52	0.48	1.05	0.064	<0.05

(mg/L)						
Copper (Total dissolved)(mg/L)		0.012	0.016	ND		?
Nitrate nitrogen(mg/L)	ND	0.29	0.88	ND	0.40	N:P (10:1 ratio)-?
Total coli form(MPN/100n)		>160,000	>160,000	9,000		Concentrations for any 30-day period shall not exceed 2,000/100mL nor shall be more than 10% of samples collected during any 30-day period exceed 4000/100mL
Fecal colophon(MPN/100ml)		2,400	50,000	1,700		(should be combined with Total coli form)
Inorganic nitrogen (mg/l)	ND	0.43	0.88	0.30		N:P (10:1 ratio)-?
Total suspended solids (mg/L)	42	24	30	79	123	Waters shall not contain suspended and settleable solids in concentrations of solids that cause nuisance or adversely affect beneficial uses
Color (units)	60	200	200	200	200	20
Odor (TON)	ND	ND	ND	ND	ND	(3 odor units for drinking water- ? for inland surface water)
Nitrite as nitrogen (mg/L)	ND	ND	ND	ND	ND	N:P (10:1 ratio)-?

The analytical results in the above-mentioned table do not conform with the Water Quality objectives of the San Diego Region Basin Plan-Chapter 3 for inland surface waters non-contact rec 2, which is the beneficial use classification of our lakes-specifically, specific conductance, turbidity, dissolved oxygen, oil and grease, ammonia nitrogen, total phosphorous, total fecal coli form, total suspended solids, and color units. As it is difficult to decipher water quality objectives for nitrogen, copper and total hardness, we would rely on the Regional Board to make these determinations.

San Diego Region Water Quality Control Board (SDRWQCB) prepared Technical Report dated July 14, 2004 for the issuance of the Municipal Storm water Permit No.R9-2004-001, which covers the permit for Riverside County, City of Temecula and City of Murrietta. Pages 16-20 of this report discussed the water

quality concerns in the Upper Santa Margarita Watershed. The report also summarized existing and potential problems, list of potential sources of the reported exceedances, exceedances of urban run-off related pollutants reported in the Permittees' water quality monitoring reports.

Our lakes, classified by the SDRWQCB as waters of the US, are tributaries to Temecula Creek. Temecula Creek is a tributary to the Santa Margarita River. Temecula Creek is classified as Monitoring Station #777, which is one of the triad stations required to be monitored and reported by the Permittees under Municipal Storm water Permit No.R9-2004-001. Table 3, page 18 of the Technical report indicates multiple or persistent exceedances of water quality objectives from 1993-2003 for Monitoring Station #777- Temecula Creek-specifically color, total nitrogen, total phosphorous, fecal coli form, iron, manganese, nitrogen-nitrate, dissolved oxygen, total dissolved solids, sulfate, turbidity and antimony. The Technical report concluded that the chemical, biological and physical data and information presented in the report indicate that urban runoff is causing degradation of the quality and the biological and physical integrity of the receiving waters in the Santa Margarita Water shed.

The City of Temecula's storm water run-offs are discharged to Lake Village Community's upper and lower lakes via storm-drains and the waterway of Ronald Reagan Sports Park desilting basin. From our lakes, the storm-water run-offs are discharged to Temecula Creek, to the Santa Margarita River and eventually to the ocean through Camp Pendleton's corridor. The samples collected and analyzed by Lake Village proved one of the many sources of the water quality problems and pollutant exceedances in the upper Margarita Watershed as discussed in the Technical Report prepared by the SDRWQCB dated July 14, 2004 for the issuance of the Municipal Storm water Permit No.R9-2004-001.

The City of Temecula developed Best Management Practices for its storm water run-offs and prepared Storm Water Management Plan (SWMP), which is the City's water quality objective-Maximum Extent Practicable (MEP)- required in the permit. Lake Village would like to point out to the SDRWQCB that the City's poorly maintained desilting basin, BMP's, and SWMP-MEP do not work effectively as depicted in our photos and analytical results. The last clean-up of the desilting basin occurred in year 2000. The most recent maintenance occurred this January, 2010. This ten year maintenance gap and the untimely maintenance during the wet season caused high concentrations of pollutant discharges to our lakes. The depths of the upper and lower lakes have been drastically reduced to approximately 3 ft and 5 ft (originally 7f and 18 ft), respectively, due to heavy sediments/silts deposits. The illicit discharges to the lakes have made it difficult for Lake Village Community to maintain and sustain healthy aquatic and marine life on the lakes. Summer of 2009 resulted to many fish kills on the upper and lower lakes.

A. VIOLATIONS:

The City of Temecula's illicit discharges to Lake Village Community lakes, depicted in the photos, discussed and as presented in the Table above, are in violation of the following requirements:

1.Clean Water Act (CWA) Section 401 Water Quality Certification No. 07C-113 issued for Ronald Reagan Sports Park Desiltation Basin Project:

Condition Violation 1-The project information submitted with the application for 401 Certification, page 12, Attachment 1, Project Description specified that "maintenance will be conducted in the fall when the basin is expected to be dry."
Maintenance was conducted in winter when heavy rains occurred and the basin was full of storm water run-off resulting to discharge of pollution from the basin to the upper and lower lakes.

Condition Violation 2- Water containing mud, silt or other pollutants from equipment washing or other activities, must not be discharged to waters of the United States and/or the State or placed in locations that may be subjected to storm flows. Pollutants discharged to areas within a stream diversion or dredge work area must be removed at the end of each work day or sooner if rain is predicted.

The community lakes are waters of the US and as depicted in the photos and analytical results-mud, silt, and other pollutants were discharged to our lakes. These pollutants as discharged to our lake must be removed.

Condition Violation 3- If the basin needs to be drained, basin draining must be done in a manner that prevents pollution, siltation and erosion in downstream water bodies. Silty/turbid water from the basin draining or other activities must not be discharged into downstream water bodies. Such water must be settled, filtered, or otherwise treated prior to discharge. Draining activities must not result in degradation of beneficial uses or exceedances of water quality objectives of the receiving waters.

The community lakes are waters of the State and US, and as depicted in the photos and analytical results-mud, silt, and other pollutants were discharged to our lakes. Lake Village upper lake is downstream from the desilting basin. The upper lake received silty/turbid water from the desilting basin, which then leads to the lower lake. As presented in the Table above-the discharges to the lakes resulted in the degradation of beneficial use or exceedances of the water quality objectives of the upper and lower lakes.

2. California Water Code (CWC) Discharge Prohibitions.

Prohibition Violation 1-CWC Section 13050: The discharge of waste to waters of the state in a manner causing or threatening to cause a condition of pollution, contamination, or nuisance is prohibited.
Prohibition Violation 2-CWC Section 13376: The discharge of pollutants or dredged or fill material to waters of the US is prohibited.
Prohibition Violation 3-The discharge of waste to inland surface waters, except in cases where the quality of the discharge complies with applicable receiving water quality objectives, is prohibited.
Prohibition Violation 4-The dumping, deposition, or discharge of waste directly into the waters of the state, or adjacent to such waters in any manner which may permit its being transported into the waters, is prohibited unless authorized by the SDRWQCB.
Prohibition Violation 5-Any discharge to a MS4 that is not composed entirely of storm water is prohibited unless authorized by the SDRWQCB.
Prohibition Violation 6- The discharge of sand, silt, clay or other earthen materials from any activity, including land grading and construction, in quantities which cause deleterious bottom deposits, turbidity or discoloration in waters of the state or which unreasonably affect, or threaten to affect, beneficial uses of such waters is prohibited.

3. Federal NPDES/CWA Regulations:

Prohibition Violation 1, 40CFR122.26(d)(2)(i)(A-D): require municipalities to implement controls to reduce pollutants in urban runoff from commercial, residential, industrial, and construction land uses or activities.
Prohibition Violation2, CWA (402)(p)(3)(B)(ii): requires municipalities effectively prohibit non-storm water discharges into the storm sewers.
Prohibition Violation3, Fed NPDES 40CFR122.26(d)(2)(iv)(B): requires MS4 operators to detect and remove illicit discharges and improper disposal into the storm sewer
Prohibition Violation4, Fed NPDES 40CFR122.26(d)(2)(iv)(B)(1): requires permittees to prevent all types of illicit discharges in the MS4, except for the non storm water discharges listed, provided that these discharges are not found to be a significant source of pollutants to waters of the US.
Prohibition Violation5, CWA(402)(p)(3)(B)(ii): requires each permittee to prohibit non-storm water discharges into its MS4.
Prohibition Violation6, Fed NPDES 40CFR122.26(d)(2)(iv)(B)(3): permittees shall investigate portions of the separate storm sewer system that, based on the results of a field screen, or other appropriate information, indicate a reasonable potential of containing illicit discharges or other sources on non-storm water.

B. REMEDY/RELIEF:

As discussed in SDRWQCB Technical Report dated July 14, 2004 for the issuance of the Municipal Storm water Permit No.R9-2004-001, chemical, biological and physical data and information presented in the report indicate that urban runoff is causing degradation of the quality and the biological and physical integrity of the receiving waters (Temecula Creek/Murrietta Creek) in the Santa Margarita Water shed. And, as presented in this letter, illicit discharges occurred and continue to occur in Lake Village Community lakes, leading to Temecula Creek and to Santa Margarita River. These illicit discharges must discontinue and the pollutants discharged to our lakes must be cleaned or remediated. In light of the facts presented above, we urge the SDRWQCB to regulate and remediate the illicit discharges to our lakes as follows:

1-Require the City of Temecula to remove/cleanup the sediments/silts discharged and deposited in the lakes in order to sustain and maintain water quality, hence, sustain aquatic/marine life in the upper and lower lakes.
2-Regulate and remediate the storm-water pollutants discharged and contained in the lakes.
3-Require yearly clean-up and maintenance of the culverts, drains, and desilting basin during dry season.
4- Provide Lake Village a copy of the Maintenance Plan for culverts, drains, and desilting basin for review, comment and concurrence.
5-Implement immediate relief upon illicit discharge occurrence to the upper and lower lakes through treatment, clean-up and/or removal of pollutants, sediments or silts. Immediate must be defined within a time frame.
6- Identify the upper lake drains, lower lake drains and desilting basin discharge point as one of the monitoring stations to be monitored during dry and wet seasons for the MS4 Permit. Monitoring reports must be provided to Lake Village Community Association for review.
7-Revisit and improve BMP/SWMP around Lake Village Community with provisions to insure control and remediate illicit discharges to Lake Village Community Association lakes.

The Regional Boards is tasked with a mission to develop and enforce water quality objectives and implementation plans that will best protect the State's waters. In light of this, we seek your protection and relief from illicit discharges to our lakes by the City of Temecula.

Our point of contact in this matter is Ms. Myrna Alzaga. Please do not hesitate to contact her at (858) 342-2060.

Thank you for your support and cooperation in this endeavor.

Respectfully,

Jon St. Jacque
President

Cc: CalEPA

Enclosures

Photo #1

Photo #2

Photo #3

Photo #4

0004271

Photo A5

0004272

E.S BABCOCK & SONS, INC.
Established 1906

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Client Name: Elite Management Co.
Contact: Earlene Bodman
Address: 38760 Sky Canyon Dr. Ste. C
Murrieta, CA 92563

Analytical Report: Page 1 of 3
Project Name: No Project
Project Number: No Project
Work Order Number: A3D0724
Report Date: 25-Apr-2003

Sample Identification

Lab Sample #	Client Sample ID	Matrix	Date Sampled	By	Date Submitted	By
A3D0724-01	Lake Village Stormwater	Liquid	04/14/03 18:20		04/15/03 12:10	Earlene Bodman

Approval

Enclosed are the analytical results for the submitted sample(s). Babcock Laboratories certify the data presented as part of this report meet the minimum quality standards in the referenced analytical methods. Any exceptions have been noted. Babcock Laboratories and its officers and employees assume no responsibility and make no warranty, express or implied, for uses or interpretations made by any recipients, intended or unintended, of this report.

☑ James K. Babcock, President
☐ Allison Mackenzie, Lab Manager
☐ Lawrence J. Chrystal, Lab Director

cc:

ACCREDITED IN ACCORDANCE WITH nelac

ENCLOSURE (1)

0004273

Photo #6

Photo #8

Photo #19

E.S BABCOCK & SONS, INC.
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Analytical Report: Page 2 of 3
Project Name: No Project
Project Number: No Project
Work Order Number: A3D0724
Report Date: 25-Apr-2003

Laboratory Reference Number
A3D0724-01

Sample Description	Matrix	Sampled Date/Time	Received Date/Time
Lake Village Stormwater	Liquid	04/14/03 18:20	04/15/03 12:10

Analyte(s)	Result	*RDL	Units	Method	Analysis Date	Analyst	Flag
Anions							
Inorganic Nitrogen	ND	0.40	mg/L	EPA 300.0	04/22/03 12:44	aeh	
Nitrate as N	ND	0.20	mg/L	EPA 300.0	04/16/03 04:19	KOS	
Aggregate Properties							
pH	7.2	1.0	pH Units	SM 4500H+ B	04/15/03 20:45	imm	
Specific Conductance	280	1.0	umhos/cm	SM 2510	04/15/03 20:45	imm	
Solids							
Total Suspended Solids	42	5	mg/L	SM 2540D	04/21/03 15:37	aeh	
Aggregate Organic Compounds							
Oil & Grease (HEM)	ND	4	mg/L	EPA 1664	04/23/03 16:57	tih	
General Physical							
Color	60	3.0	Color Units	SM 2120B	04/15/03 22:16	era	N-COT
Odor	ND	1.0	T.O.N.	SM 2150	04/15/03 22:16	era	
Turbidity	160	0.20	NTU	SM 2130 B	04/15/03 22:16	era	
Nutrients							
Ammonia-Nitrogen	0.23	0.10	mg/L	SM4500NH3H	04/22/03 12:44	sil	
Nitrite as N	ND	0.10	mg/L	SM 4500NO2 E	04/16/03 10:45	aeh	
Ortho Phosphate Phosphorus	0.32	0.050	mg/L	SM 4500P E	04/15/03 20:25	jme	
Total Phosphorus	0.72	0.10	mg/L	SM 4500P B E	04/21/03 13:20	jme	

*Reportable Detection Limit

ACCREDITED IN ACCORDANCE WITH nelac

E.S BABCOCK & SONS, INC.
Established 1906

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Analytical Report: Page 3 of 3
Project Name: No Project
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Work Order Number: A3D0724
Report Date: 25-Apr-2003

Notes and Definitions

DET	Analyte DETECTED
ND	Analyte NOT DETECTED at or above the reporting limit (RDL)
NR	Not Reported
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference

*Reportable Detection Limit

ACCREDITED IN ACCORDANCE WITH nelac

ASSOCIATED LABORATORIES
806 North Batavia - Orange, California 92868 - 714/771-6900 *FAX 714/538-1209*

CLIENT Water Resources (8762)
ATTN: Mark
1198 Pacific Coast Highway
Seal Beach, CA 90740

LAB REQUEST 247882
REPORTED 01/28/2010
RECEIVED 01/14/2010

SUBMITTER Client

COMMENTS

This laboratory request covers the following listed samples which were analyzed for the parameters indicated on the attached Analytical Result Report. All analyses were conducted using the appropriate methods as indicated on the report. This cover letter is an integral part of the final report.

Order No.	Client Sample Identification
1050300	CB
1050301	Laboratory Method Blank

Thank you for the opportunity to be of service to your company. Please feel free to call if there are any questions regarding this report or if we can be of further service.

ASSOCIATED LABORATORIES by,

Edward S. Behare, Ph.D.
Vice President

NOTE: Unless notified in writing, all samples will be discarded by appropriate disposal protocol 30 days from date reported.

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TESTING & CONSULTING
Chemical
Microbiological
Environmental

ENCLOSURE (2)

Order #: 1050300
Matrix: WATER
Date Sampled: 01/14/2010
Time Sampled:
Sampled By:

Client: Water Resources
Client Sample ID: CB

Analyte	Result	DF	DLR	Units	Date/Analyst	
1664 Oil and Grease						
Total Oil and Grease	ND	1	5	mg/L	01/20/10	LN
200.7 ICP Total Metals - Water Only						
Copper	0.010	1	0.01	mg/L	01/18/10	KN
Copper, Dissolved	ND	1	0.010	mg/L	01/18/10	KN
2120B Color						
Color	200	1	5.0	Units	01/20/10	AE
2130B Turbidity						
Turbidity	42.4	2	0.2	NTU	01/14/10	DV
2150B Odor Threshold						
Odor Threshold	ND	1		TON	01/20/10	AE
2340B Total Hardness						
Total Hardness	108	1	0.5	mg/L	01/18/10	KN
2510B Specific Conductance						
Specific Conductance	570	1	1.0	umhos/cm	01/18/10	DV
2540 D Total Suspended Solids						
Total Suspended Solids	79	1	5.0	mg/L	01/19/10	AE
300.0 Nitrate as N by Ion Chromatography						
Nitrate (as N)	ND	1	0.1	mg/L	01/15/10	WW

DLR = Detection limit for reporting purposes, ND = Not Detected below indicated detection limit, DF = Dilution Factor

ASSOCIATED LABORATORIES Analytical Results Report

Order #: 1050300
Matrix: WATER
Date Sampled: 01/14/2010
Time Sampled:
Sampled By:

Client: Water Resources
Client Sample ID: CB

Analyte	Result	DF	DLR	Units	Date/Analyst	
300.0-350.2 Total Inorganic Nitrogen (as N)						
Ammonia (as N)	0.30	1	0.1	mg/L	01/16/10	TP
Nitrate (as N)	ND	1	0.1	mg/L	01/15/10	WW
Nitrite (as N)	ND	1	0.1	mg/L	01/15/10	WW
Total Inorganic Nitrogen	0.30	1	0.1	mg/L	01/16/10	TP
350.1 Ammonia, Automated Phenate						
Ammonia -N	0.30	1	0.1	mg/L	01/16/10	TP
4500-H+B pH						
pH	6.88	1		NA	01/14/10	MS
4500-O G Dissolved Oxygen, Membrane Electrode						
Dissolved Oxygen	7.92	1		mg/L	01/14/10	HT
4500-P-B.5-E Total Phosphorus						
Total Phosphorus as P	1.05	3	0.05	mg/L	01/18/10	DK
9221 Coliform by Multiple Tube Fermentation						
Coliform by MTF, Total	9000	1		MPN/100m	01/14/10	RB
Fecal Coliform by MTF	1700	1		MPN/100m	01/14/10	RB

DLR = Detection limit for reporting purposes, ND = Not Detected below indicated detection limit, DF = Dilution Factor

Order #: 1050301
Matrix: WATER
Date Sampled:
Time Sampled:
Sampled By:

Client: Water Resources
Client Sample ID: Laboratory Method Blank

Analyte	Result	DF	DLR	Units	Date/Analyst	
1664 Oil and Grease						
Total Oil and Grease	ND	1	5	mg/L	01/20/10	LN
200.7 ICP Total Metals - Water Only						
Copper	ND	1	0.010	mg/L	01/18/10	KN
Copper, Dissolved	ND	1	0.010	mg/L	01/18/10	KN
2120B Color						
Color	ND	1	5	Units	01/20/10	AE
2130B Turbidity						
Turbidity	ND	1	0.1	NTU	01/14/10	DV
2150B Odor Threshold						
Odor Threshold	ND	1		TON	01/20/10	AE
2340B Total Hardness						
Total Hardness	ND	1	0.5	mg/L	01/18/10	KN
2510B Specific Conductance						
Specific Conductance	0.59	1	1.0	umhos/cm	01/18/10	DV
2540 D Total Suspended Solids						
Total Suspended Solids	ND	1	5.0	mg/L	01/19/10	AE
300.0 Nitrate as N by Ion Chromatography						
Nitrate (as N)	ND	1	0.1	mg/L	01/15/10	WW

DLR = Detection limit for reporting purposes, ND = Not Detected below indicated detection limit, DF = Dilution Factor

ASSOCIATED LABORATORIES Analytical Results Report

Order #: 1050301
Matrix: WATER
Date Sampled:
Time Sampled:
Sampled By:

Client: Water Resources
Client Sample ID: Laboratory Method Blank

Analyte	Result	DF	DLR	Units	Date/Analyst	
300.0-350.2 Total Inorganic Nitrogen (as N)						
Ammonia (as N)	ND	1	0.1	mg/L	01/16/10	TP
Nitrate (as N)	ND	1	0.1	mg/L	01/15/10	WW
Nitrite (as N)	ND	1	0.1	mg/L	01/15/10	WW
Total Inorganic Nitrogen	ND	1	0.1	mg/L	01/16/10	TP
350.1 Ammonia, Automated Phenate						
Ammonia -N	ND	1	0.1	mg/L	01/16/10	TP
4500-H+B pH						
pH	5.44	1		NA	01/14/10	MS
4500-O G Dissolved Oxygen, Membrane Electrode						
Dissolved Oxygen	9.40	1		mg/L	01/14/10	HT
4500-P-B.5-E Total Phosphorus						
Total Phosphorus as P	ND	1	0.02	mg/L	01/18/10	DK

DLR = Detection limit for reporting purposes, ND = Not Detected below indicated detection limit, DF = Dilution Factor

ASSOCIATED LABORATORIES
QA REPORT FORM

QC Sample : LR 248191

Matrix: WATER

Prep.Date: January 20, 2010

Analysis Date: January 20, 2010

Lab ID#'s in Batch: LR 248191, 248179, 248040, 248109, 248047, 248041, 248129, 248111, 247874 248306, 247882, 248100, 247883, 248073, 248075, 248080

REPORTING UNITS = mg/L

PREPARATION BLANK / LAB CONTROL SAMPLE RESULTS

		PREP BLK	LCS				
Test	**Method**	**Value**	**Result**	**True**	**%Rec**	**L.Limit**	**H.Limit**
O&G	1664	ND	38.90	40	97	78%	114%

VALUE = Preparation Blank Value; ND = Not-Detected
LCS = Lab Control Sample Result
TRUE = True Value of LCS
L.LIMIT / H.LIMIT = LCS Control Limits

ASSOCIATED LABORATORIES
QA REPORT FORM - METHOD 200.7 / 6010

QC Sample: 247871-1050279 H# 011510 W4

Matrix: WATER

Prep. Date: January 15, 2010

Analysis Date: January 18, 2010

Lab ID#'s in Batch: 247871, 247882, 247915, 247913, 247923, 247911, 247874, 247962

Reporting Units = mg/L

MATRIX SPIKE / MATRIX SPIKE DUPLICATE RESULT

Test	Sample Result	Spike Added	Matrix Spike	%Rec MS
B	0.200	1.0	1.26	106
Cr	ND	1.0	1.12	112
Cu	ND	1.0	1.07	107
Ni	ND	1.0	1.05	105
Ag	ND	0.5	0.39	78
Zn	0.024	1.0	1.09	107
Fe*	0.066	1.0	1.40	133
Mn	ND	1.0	1.15	115
Cd	ND	1.0	1.11	111
Pb	0.005	1.0	0.99	99

* = Outside QC limits, due to matrix Interference
If Sample Result > 4 times Spike Added, then "NC"

% REC LIMITS = 75 -125
RPD LIMITS = 20

ASSOCIATED LABORATORIES
LCS REPORT FORM - METHOD 200.7 / 6010

LCS RECOVERY / METHOD BLANK

Test	LCS Result	True Value	LCS %Rec	QC Limit %REC	Method Blank
Ag	0.87	1.0	87	80-120	< 0.005
Al	2.05	2.0	103	80-120	< 0.03
As	1.97	2.0	99	80-120	< 0.005
B	1.99	2.0	100	80-120	< 0.05
Ba	2.17	2.0	109	80-120	< 0.01
Be	2.01	2.0	101	80-120	< 0.005
Cd	2.04	2.0	102	80-120	< 0.005
Co	2.02	2.0	101	80-120	< 0.005
Cr	2.05	2.0	103	80-120	< 0.01
Cu	2.12	2.0	106	80-120	< 0.01
Fe	2.19	2.0	110	80-120	< 0.02
Mn	2.28	2.0	114	80-120	< 0.01
Mo	1.96	2.0	98	80-120	< 0.01
Ni	2.02	2.0	101	80-120	< 0.015
Pb	2.04	2.0	102	80-120	< 0.005
Sb	1.97	2.0	99	80-120	< 0.006
Se	1.96	2.0	98	80-120	< 0.006
Tl	2.09	2.0	105	80-120	< 0.005
V	2.13	2.0	107	80-120	< 0.005
Zn	2.02	2.0	101	80-120	< 0.01
Ca	2.13	2.0	107	80-120	< 0.1
Mg	2.28	2.0	114	80-120	< 0.1
K	20.60	20.0	103	80-120	< 0.5
Na	2.08	2.0	104	80-120	< 0.1

ASSOCIATED LABORATORIES
QA REPORT FORM

QC Sample: 248004 / 1050854

Matrix: WATER

Prep. Date: January 19, 2010

Analysis Date: January 19, 2010

Lab ID#'s in Batch: 247882, 247991, 247996, 247997, 247998, 247999, 248003, 248004, 248006

REPORTING UNITS = mg/L

SAMPLE DUPLICATE RESULT

Test	Method	Sample Result	Sample Duplicate	%RPD
TSS	EPA160.2/SM2540D	763	764	0

ND = "U" - Not Detected
RPD = Relative Percent Difference of Sample Result and Sample Duplicate

RPD LIMITS = 5%

ASSOCIATED LABORATORIES
QA REPORT FORM

QC Sample : 247925-1050522

Matrix: WATER

Prep. Date: 01/15 - 01/16/2010

Analysis Date: 01/17/10

Lab ID#'s in Batch: 247882, 247925, 247954, 247952

MATRIX SPIKE / MATRIX SPIKE DUPLICATE RESULT

Reporting Unints = mg/L

Test	Method	Sample Result	Spike Added	Matrix Spike	Matrix Spike Dup	%Rec MS	%Rec MSD	RPD
CL	300.0	66	200	246.66	249.88	90	92	1
SO4	300.0	91	200	281.45	285.59	95	97	1
NO3	300.0	3.7	100	84.03	85.76	80	82	2
NO2	300.0	ND	100	109.37	110.98	109	111	1

RPD = Relative Percent Difference of Matrix Spike and Matrix Spike Dup
%REC-MS & MSD = Percent Recovery of Matrix Spike & Matrix Spike Duplicate

%Rec Limits = 80 - 120
RPD Limits = 20

PREPARATION BLANK / LAB CONTROL SAMPLE RESULTS

Test	Method	PREP BLK Value	LCS Result	True	%Rec	L.Limit	H.Limit
CL	300.0	ND	25.58	25	102	90%	110%
SO4	300.0	ND	26.78	25	107	90%	110%
NO3	300.0	ND	11.99	11	108	90%	110%
NO2	300.0	ND	7.94	8	97	90%	110%

VALUE = Preparation Blank Value; ND = Not-Detected
LCS = Lab Control Sample Result
TRUE = True Value of LCS
L.LIMIT / H.LIMIT = LCS Control Limits

ASSOCIATED LABORATORIES
QA REPORT FORM

QC Sample: 247874-1050293

Matrix: WATER

Prep. Date: 01/16/10

Analysis Date: 01/17/10

Lab ID#'s in Batch: 247913, 245117, 247874, 247952, 247860, 247986, 247990, 247882, 248017, Phibro Lacsd, Hydra Semanhole

MATRIX SPIKE / MATRIX SPIKE DUPLICATE RESULT

Reporting Units = mg/L

Test	Method	Sample Result	Spike Added	Matrix Spike	Matrix Spike Dup	%Rec MS	%Rec MSD	RPD
NH3-N	350.1	ND	10.00	10.28	10.16	103	102	1

ND = Not Detected
RPD = Relative Percent Difference of Matrix Spike and Matrix Spike Duplicate
%REC-MS & MSD = Percent Recovery of Matrix Spike & Matrix Spike Duplicate

%REC LIMITS = 80 - 120
RPD LIMITS = 20

PREPARATION BLANK / LAB CONTROL SAMPLE RESULTS

PREP BLK	LCS				
Value	Result	True	%Rec	L.Limit	H.Limit
ND	5.07	5.00	101	80%	120%

Value = Preparation Blank Value
LCS Result = Lab Control Sample Result
True = True Value of LCS
L.Limit / H.Limit = LCS Control Limits

ASSOCIATED LABORATORIES
QA REPORT FORM - INORGANICS

QC Sample: LR 247988

Matrix: WATER

Prep. Date: January 18, 2010

Analysis Date: January 18, 2010

Lab ID#'s in Batch: LR 247988, 247717, 247882, 247990, 247694, 246117

MATRIX SPIKE / MATRIX SPIKE DUPLICATE RESULT

Reporting Units = mg/L

Test	Method	Sample Result	Spike Added	Matrix Spike	Matrix Spike Dup	%Rec MS	%Rec MSD	RPD
Total Phosphate (as P)	4500-P-E	0.08	0.40	0.48	0.48	100	99	0
Total Phosphate (as PO4)	4500-P-E	0.24	1.23	1.47	1.46	100	99	0

RPD = Relative Percent Difference of Matrix Spike and Matrix Spike Duplicate
%REC-MS & MSD = Percent Recovery of Matrix Spike & Matrix Spike Duplicate

%REC LIMITS = 75-125
RPD LIMITS = 20

PREPARATION BLANK / LAB CONTROL SAMPLE RESULTS

Test	Method	PREP BLK	LCS				
		Value	Result	True	%Rec	L.Limit	H.Limit
Total Phosphate (as P)	4500-P-E	ND	0.33	0.33	100	80%	120%
Total Phosphate (as PO4)	4500-P-E	ND	1.01	1.00	100	80%	120%

Value = Preparation Blank Value; ND = Not-Detected
LCS Result = Lab Control Sample Result
True = True Value of LCS
L.Limit / H.Limit = LCS Control Limits

ASSOCIATED LABORATORIES
806 North Batavia - Orange, California 92868 - 714/771-6900 *FAX 714/538-1209*

CLIENT Water Resources (8762)
ATTN: Mark
1198 Pacific Coast Highway
Seal Beach, CA 90740

LAB REQUEST 247873
REPORTED 01/18/2010
RECEIVED 01/14/2010

SUBMITTER Client

COMMENTS

This laboratory request covers the following listed samples which were analyzed for the parameters indicated on the attached Analytical Result Report. All analyses were conducted using the appropriate methods as indicated on the report. This cover letter is an integral part of the final report.

Order No.	Client Sample Identification
1050290	LL128
1050291	UL162
1050292	Laboratory Method Blank

Thank you for the opportunity to be of service to your company. Please feel free to call if there are any questions regarding this report or if we can be of further service.

ASSOCIATED LABORATORIES by,

Edward S. Behare, Ph.D.
Vice President

NOTE: Unless notified in writing, all samples will be discarded by appropriate disposal protocol 30 days from date reported.

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TESTING & CONSULTING
Chemical
Microbiological
Environmental

ENCLOSURE (3)

Order #: 1050290 **Client Sample ID:** LL128 0004292
Matrix: WATER
Date Sampled: 01/14/2010

Analyte	Result	DLR	Units	Date/Analyst
4500-O G Dissolved Oxygen, Membrane Electrode				
Dissolved Oxygen	7.66		mg/L	01/14/10 HT

Order #: 1050291 **Client Sample ID:** UL162
Matrix: WATER
Date Sampled: 01/14/2010

Analyte	Result	DLR	Units	Date/Analyst
4500-O G Dissolved Oxygen, Membrane Electrode				
Dissolved Oxygen	2.48		mg/L	01/14/10 HT

Order #: 1050292 **Client Sample ID:** Laboratory Method Blank
Matrix: WATER

Analyte	Result	DLR	Units	Date/Analyst
4500-O G Dissolved Oxygen, Membrane Electrode				
Dissolved Oxygen	9.40		mg/L	01/14/10 HT

DLR = Detection limit for reporting purposes, ND = Not Detected below indicated detection limit

ASSOCIATED LABORATORIES 0004293
806 North Batavia ▪ Orange, CA 92868
Phone: (714) 771-6900 ▪ Fax: (714) 538-1209

Chain of Custody Record

A.L. Job No. 247873

Page ____ of ____

Company: Water Resources
Phone: 714 865 5388
Project Manager: 1198 P.C.H., Seal Beach
Fax:
Project Name:
Project #:
Site Name and Address:

	Sample ID	Lab ID	Date	Time	Matrix	Container Number/Size	Pres.	Analysis Requested	Test Instructions & Comments
1	LL128		1-14-10			1g			
2									
3	UL162		1-14-10			1gl			
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									

Sample Receipt - To Be Filled By Laboratory

Total Number of Containers		Properly Cooled Y / N / NA	
Custody Seals Y / N / NA		Samples Intact Y / N / NA	
Received in Good Condition Y / N		Samples Accepted Y / N	

Turn Around Time

☐ Normal ☐ Rush ☐ Same Day ☐ 24 hrs. ☐ 48 hrs. ☐ 72 hrs.

Relinquished by Sampler: 1.	Relinquished by 2.	Relinquished by 3.
Signature: [signature]	Signature:	Signature:
Printed Name:	Printed Name:	Printed Name:
Date: 1-14-10 Time: 1215	Date: Time:	Date: Time:
Received By: 1.	**Received By: 2.**	**Received By: 3.**
Signature: [signature]	Signature:	Signature:
Printed Name:	Printed Name:	Printed Name:
Date: 1-14-10 Time: 1215	Date: Time:	Date: Time:

Distribution: White - Laboratory Canary - Laboratory Pink - Project/Account Manager Goldenrod - Sampler/Originator

ASSOCIATED LABORATORIES
806 North Batavia - Orange, California 92868 - 714/771-6900 *FAX 714/538-1209*

CLIENT Water Resources (8762)
ATTN: Mark
1198 Pacific Coast Highway
Seal Beach, CA 90740

LAB REQUEST 248046
REPORTED 02/01/2010
RECEIVED 01/18/2010

SUBMITTER Client

COMMENTS

This laboratory request covers the following listed samples which were analyzed for the parameters indicated on the attached Analytical Result Report. All analyses were conducted using the appropriate methods as indicated on the report. This cover letter is an integral part of the final report.

Order No.	Client Sample Identification
1050963	LL 112
1050964	LL 133
1050965	LL 140
1050966	Composite 3 Samples LL
1050967	UL 170A
1050968	UL165
1050991	Composite 2 Samples UL
1050992	Laboratory Method Blank

Thank you for the opportunity to be of service to your company. Please feel free to call if there are any questions regarding this report or if we can be of further service.

ASSOCIATED LABORATORIES by,

Edward S. Behare, Ph.D.
Vice President

NOTE: Unless notified in writing, all samples will be discarded by appropriate disposal protocol 30 days from date reported.

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TESTING & CONSULTING
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Microbiological
Environmental

Order #: 1050966
Matrix: WATER
Date Sampled: 01/18/2010
Time Sampled:
Sampled By:

Client: Water Resources
Client Sample ID: Composite 3 Samples LL

Analyte	Result	DF	DLR	Units	Date/Analyst	
1664 Oil and Grease						
Total Oil and Grease	ND	1	5	mg/L	01/28/10	LN
200.7 ICP Total Metals - Water Only						
Copper	0.018	1	0.01	mg/L	01/19/10	KN
Copper, Dissolved	0.016	1	0.010	mg/L	01/19/10	KN
2120B Color						
Color	200	10	50.0	Units	01/25/10	AE
2130B Turbidity						
Turbidity	18.43	1	0.1	NTU	01/18/10	AE
2150B Odor Threshold						
Odor Threshold	ND	1		TON	01/25/10	AE
2340B Total Hardness						
Total Hardness	62	1	0.5	mg/L	01/19/10	MES
2510B Specific Conductance						
Specific Conductance	210	1	1.0	umhos/cm	02/01/10	DV
2540 D Total Suspended Solids						
Total Suspended Solids	30	1	5.0	mg/L	01/25/10	AE
300.0 Nitrate as N by Ion Chromatography						
Nitrate (as N)	0.88	1	0.1	mg/L	01/18/10	WW

DLR = Detection limit for reporting purposes, ND = Not Detected below indicated detection limit, DF = Dilution Factor

ASSOCIATED LABORATORIES Analytical Results Report

Order #: 1050966
Matrix: WATER
Date Sampled: 01/18/2010
Time Sampled:
Sampled By:

Client: Water Resources
Client Sample ID: Composite 3 Samples LL

Analyte	Result	DF	DLR	Units	Date/Analyst	
300.0-350.2 Total Inorganic Nitrogen (as N)						
Ammonia (as N)	ND	1	0.1	mg/L	01/20/10	TP
Nitrate (as N)	0.88	1	0.1	mg/L	01/18/10	WW
Nitrite (as N)	ND	1	0.1	mg/L	01/18/10	WW
Total Inorganic Nitrogen	0.88	1	0.1	mg/L	01/25/10	TP
350.1 Ammonia, Automated Phenate						
Ammonia -N	ND	1	0.1	mg/L	01/20/10	TP
4500-H+B pH						
pH	7.27	1		NA	01/18/10	MS
4500-O G Dissolved Oxygen, Membrane Electrode						
Dissolved Oxygen	8.93	1		mg/L	01/18/10	HT
4500-P-B.5-E Total Phosphorus						
Total Phosphorus as P	0.48	1	0.02	mg/L	01/25/10	DK
9221 Coliform by Multiple Tube Fermentation						
Coliform by MTF, Total	> 160000	1		MPN/100n	01/18/10	RG
Fecal Coliform by MTF	50000	1		MPN/100n	01/18/10	RG

DLR = Detection limit for reporting purposes, ND = Not Detected below indicated detection limit, DF = Dilution Factor

Order #: 1050991
Matrix: WATER
Date Sampled: 01/18/2010
Time Sampled:
Sampled By:

Client: Water Resources
Client Sample ID: Composite 2 Samples UL

Analyte	Result	DF	DLR	Units	Date/Analyst	
1664 Oil and Grease						
Total Oil and Grease	16	1	5.0	mg/L	01/28/10	LN
200.7 ICP Total Metals - Water Only						
Copper	0.016	1	0.01	mg/L	01/20/10	KN
Copper, Dissolved	0.012	1	0.010	mg/L	01/20/10	KN
2120B Color						
Color	200	10	50.0	Units	01/25/10	AE
2130B Turbidity						
Turbidity	7.74	1	0.1	NTU	01/18/10	AE
2150B Odor Threshold						
Odor Threshold	ND	1		TON	01/25/10	AE
2340B Total Hardness						
Total Hardness	67	1	0.5	mg/L	01/20/10	MES
2510B Specific Conductance						
Specific Conductance	223	1	1.0	umhos/cm	02/01/10	DV
2540 D Total Suspended Solids						
Total Suspended Solids	24	1	5.0	mg/L	01/25/10	AE
300.0 Nitrate as N by Ion Chromatography						
Nitrate (as N)	0.29	1	0.1	mg/L	01/18/10	WW

DLR = Detection limit for reporting purposes, ND = Not Detected below indicated detection limit, DF = Dilution Factor

ASSOCIATED LABORATORIES Analytical Results Report

Order #: 1050991
Matrix: WATER
Date Sampled: 01/18/2010
Time Sampled:
Sampled By:

Client: Water Resources
Client Sample ID: Composite 2 Samples UL

Analyte	Result	DF	DLR	Units	Date/Analyst	
300.0-350.2 Total Inorganic Nitrogen (as N)						
Ammonia (as N)	0.14	1	0.1	mg/L	01/20/10	TP
Nitrate (as N)	0.29	1	0.1	mg/L	01/18/10	WW
Nitrite (as N)	ND	1	0.1	mg/L	01/18/10	WW
Total Inorganic Nitrogen	0.43	1	0.1	mg/L	01/25/10	TP
350.1 Ammonia, Automated Phenate						
Ammonia -N	0.14	1	0.1	mg/L	01/20/10	TP
4500-H+B pH						
pH	6.99	1		NA	01/18/10	MS
4500-O G Dissolved Oxygen, Membrane Electrode						
Dissolved Oxygen	6.18	1		mg/L	01/18/10	HT
4500-P-B.5-E Total Phosphorus						
Total Phosphorus as P	0.52	1	0.02	mg/L	01/25/10	DK
9221 Coliform by Multiple Tube Fermentation						
Coliform by MTF, Total	> 160000	1		MPN/100m	01/18/10	RG
Fecal Coliform by MTF	2400	1		MPN/100m	01/18/10	RG

DLR = Detection limit for reporting purposes, ND = Not Detected below indicated detection limit, DF = Dilution Factor

Order #: 1050992
Matrix: WATER
Date Sampled:
Time Sampled:
Sampled By:

Client: Water Resources
Client Sample ID: Laboratory Method Blank

Analyte	Result	DF	DLR	Units	Date/Analyst	
1664 Oil and Grease						
Total Oil and Grease	ND	1	5	mg/L	01/28/10	LN
200.7 ICP Total Metals - Water Only						
Copper	ND	1	0.010	mg/L	01/19/10	KN
Copper, Dissolved	ND	1	0.010	mg/L	01/19/10	KN
2120B Color						
Color	ND	1	5	Units	01/25/10	AE
2130B Turbidity						
Turbidity	ND	1	0.1	NTU	01/18/10	AE
2150B Odor Threshold						
Odor Threshold	ND	1		TON	01/25/10	AE
2340B Total Hardness						
Total Hardness	ND	1	0.5	mg/L	01/19/10	MES
2510B Specific Conductance						
Specific Conductance	0.53	1	1.0	umhos/cm	02/01/10	DV
2540 D Total Suspended Solids						
Total Suspended Solids	ND	1	5.0	mg/L	01/25/10	AE
300.0 Nitrate as N by Ion Chromatography						
Nitrate (as N)	ND	1	0.1	mg/L	01/18/10	WW

DLR = Detection limit for reporting purposes, ND = Not Detected below indicated detection limit, DF = Dilution Factor

Order #: 1050992 **Client:** Water Resources

Matrix: WATER **Client Sample ID:** Laboratory Method Blank

Date Sampled:

Time Sampled:

Sampled By:

Analyte	Result	DF	DLR	Units	Date/Analyst	
300.0-350.2 Total Inorganic Nitrogen (as N)						
Ammonia (as N)	ND	1	0.1	mg/L	01/20/10	TP
Nitrate (as N)	ND	1	0.1	mg/L	01/18/10	WW
Nitrite (as N)	ND	1	0.1	mg/L	01/18/10	WW
Total Inorganic Nitrogen	ND	1	0.1	mg/L	01/25/10	TP
350.1 Ammonia, Automated Phenate						
Ammonia -N	ND	1	0.1	mg/L	01/20/10	TP
4500-H+B pH						
pH	5.39	1		NA	01/18/10	MS
4500-O G Dissolved Oxygen, Membrane Electrode						
Dissolved Oxygen	9.27	1		mg/L	01/18/10	HT
4500-P-B.5-E Total Phosphorus						
Total Phosphorus as P	ND	1	0.02	mg/L	01/25/10	DK

DLR = Detection limit for reporting purposes, ND = Not Detected below indicated detection limit, DF = Dilution Factor

ASSOCIATED LABORATORIES
806 North Batavia - Orange, California 92868 - 714/771-6900 *FAX 714/538-1209*

CLIENT Water Resources (8762)
ATTN: Mark
1198 Pacific Coast Highway
Seal Beach, CA 90740

LAB REQUEST 248454
REPORTED 01/28/2010
RECEIVED 01/22/2010

SUBMITTER Client

COMMENTS

This laboratory request covers the following listed samples which were analyzed for the parameters indicated on the attached Analytical Result Report. All analyses were conducted using the appropriate methods as indicated on the report. This cover letter is an integral part of the final report.

Order No.	Client Sample Identification
1052373	Lake Water
1052374	Laboratory Method Blank

Thank you for the opportunity to be of service to your company. Please feel free to call if there are any questions regarding this report or if we can be of further service.

ASSOCIATED LABORATORIES by,

Edward S. Behase, Ph.D.
Vice President

NOTE: Unless notified in writing, all samples will be discarded by appropriate disposal protocol 30 days from date reported.

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TESTING & CONSULTING
Chemical
Microbiological
Environmental

ENCLOSURE (4)

Order #: 1052373 **Client:** Water Resources

Matrix: WATER **Client Sample ID:** Lake Water

Date Sampled:

Time Sampled:

Sampled By:

Analyte	Result	DF	DLR	Units	Date/Analyst	
2120B Color						
Color	200	1	5	Units	01/22/10	AE
2150B Odor Threshold						
Odor Threshold	ND	1		TON	01/22/10	AE
2510B Specific Conductance						
Specific Conductance	220	1	1.0	umhos/cm	01/25/10	DV
2540 D Total Suspended Solids						
Total Suspended Solids	123	1	5.0	mg/L	01/25/10	AE
300.0-350.2 Total Inorganic Nitrogen (as N)						
Ammonia (as N)	ND	1	0.1	mg/L	01/24/10	TP
Nitrate (as N)	0.40	1	0.1	mg/L	01/22/10	WW
Nitrite (as N)	ND	1	0.1	mg/L	01/22/10	WW
Total Inorganic Nitrogen	0.40	1	0.1	mg/L	01/25/10	TP

DLR = Detection limit for reporting purposes, ND = Not Detected below indicated detection limit, DF = Dilution Factor

Order #: 1052374 **Client:** Water Resources
Matrix: WATER **Client Sample ID:** Laboratory Method Blank
Date Sampled:
Time Sampled:
Sampled By:

Analyte	Result	DF	DLR	Units	Date/Analyst	
2120B Color						
Color	ND	1	5	Units	01/22/10	AE
2150B Odor Threshold						
Odor Threshold	ND	1		TON	01/22/10	AE
2510B Specific Conductance						
Specific Conductance	0.54	1	1.0	umhos/cm	01/25/10	MES
2540 D Total Suspended Solids						
Total Suspended Solids	ND	1	5.0	mg/L	01/25/10	AE
300.0-350.2 Total Inorganic Nitrogen (as N)						
Ammonia (as N)	ND	1	0.1	mg/L	01/24/10	TP
Nitrate (as N)	ND	1	0.1	mg/L	01/22/10	WW
Nitrite (as N)	ND	1	0.1	mg/L	01/22/10	WW
Total Inorganic Nitrogen	ND	1	0.1	mg/L	01/25/10	TP

DLR = Detection limit for reporting purposes, ND = Not Detected below indicated detection limit, DF = Dilution Factor

ASSOCIATED LABORATORIES
QA REPORT FORM

QC Sample: 248457 / 1052389

Matrix: WATER

Prep. Date: January 25, 2010

Analysis Date: January 25, 2010

Lab ID#'s in Batch: 248463, 248454, 248046, 248456, 248460, 248453, 248457, 248470, 248465

REPORTING UNITS = mg/L

SAMPLE DUPLICATE RESULT

Test	Method	Sample Result	Sample Duplicate	%RPD
TSS	EPA160.2/SM2540D	201	202	0

ND = "U" - Not Detected
RPD = Relative Percent Difference of Sample Result and Sample Duplicate

RPD LIMITS = 5%

ASSOCIATED LABORATORIES

QA REPORT FORM

QC Sample : 248330-1051991

Matrix: WATER

Prep. Date: January 21, 2010

Analysis Date: January 22, 2010

Lab ID#'s in Batch: 248312, 248300, 248311, 248330, 248410, 248432, 248454, 248463, 248416

MATRIX SPIKE / MATRIX SPIKE DUPLICATE RESULT

Reporting Unints = mg/L

Test	Method	Sample Result	Spike Added	Matrix Spike	Matrix Spike Dup	%Rec MS	%Rec MSD	RPD
CL	300.0	12.05	200	189.58	190.61	89	89	1
SO4	300.0	8.76	200	195.31	192.44	93	92	1
NO3	300.0	5.51	100	89.20	86.74	84	81	3
NO2	300.0	ND	100	107.20	109.55	107	110	2

RPD = Relative Percent Difference of Matrix Spike and Matrix Spike Dup
%REC-MS & MSD = Percent Recovery of Matrix Spike & Matrix Spike Duplicate

%Rec Limits = 80 - 120
RPD Limits = 20

PREPARATION BLANK / LAB CONTROL SAMPLE RESULTS

Test	Method	PREP BLK Value	LCS Result	True	%Rec	L.Limit	H.Limit
CL	300.0	ND	10.21	10	102	90%	110%
SO4	300.0	ND	10.30	10	103	90%	110%
NO3	300.0	ND	4.30	4	97	90%	110%
NO2	300.0	ND	3.16	3	96	90%	110%

VALUE = Preparation Blank Value; ND = Not-Detected
LCS = Lab Control Sample Result
TRUE = True Value of LCS
L.LIMIT / H.LIMIT = LCS Control Limits

ASSOCIATED LABORATORIES
QA REPORT FORM

QC Sample: 248454-1052373

Matrix: WATER

Prep. Date: 01/24/10

Analysis Date: 01/25/10

Lab ID#'s in Batch: 248083, 248454, 248408, 248037

MATRIX SPIKE / MATRIX SPIKE DUPLICATE RESULT

Reporting Units = mg/L

Test	Method	Sample Result	Spike Added	Matrix Spike	Matrix Spike Dup	%Rec MS	%Rec MSD	RPD
NH3-N	350.1	ND	5.00	5.13	5.13	103	103	0

ND = Not Detected
RPD = Relative Percent Difference of Matrix Spike and Matrix Spike Duplicate
%REC-MS & MSD = Percent Recovery of Matrix Spike & Matrix Spike Duplicate

%REC LIMITS = 80 - 120
RPD LIMITS = 20

PREPARATION BLANK / LAB CONTROL SAMPLE RESULTS

PREP BLK	LCS				
Value	Result	True	%Rec	L.Limit	H.Limit
ND	4.89	5.00	98	80%	120%

Value = Preparation Blank Value
LCS Result = Lab Control Sample Result
True = True Value of LCS
L.Limit / H.Limit = LCS Control Limits

0004307

Ben Neill - Draft Riverside MS4 Permit

From: Ben Neill
To: Aldo Licitra; Bill Woolsey; Claudio Padres; Jason Uhley; Mike Shetler; Tim Dzmura
Date: 4/22/10 4:18 PM
Subject: Draft Riverside MS4 Permit
CC: Chad Loflen; Chiara Clemente; David Barker; James Smith; Wayne Chiu
Attachments: Tent R9-2010-0016.doc

Dear Copermittees,

Per Mr. Barker's commitment at today's meeting, attached is a rough draft of the Riverside MS4 permit.

Ben Neill
Water Resource Control Engineer
Northern Watershed Protection Unit
San Diego Regional Water Quality Control Board
9174 Sky Park Ct., Suite 100
San Diego, CA 92123
Tel: (858) 467-2983
Fax: (858) 571-6972

California Regional Water Quality Control Board
San Diego Region

Waste Discharge Requirements for Discharges from the Municipal Separate Storm Sewer Systems (MS4s) Draining the County of Riverside, the Incorporated Cities of Riverside County, and the Riverside County Flood Control and Water Conservation District within the San Diego Region

Tentative Order No. R9-2010-0016
NPDES NO. CAS0108740

TBD, 2010

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN DIEGO REGION
9174 Sky Park Court, Suite 100, San Diego, California 92123-4340
Phone • (858) 467-2952 • Fax (858) 571-6972
http://www.waterboards.ca.gov/sandiego

To request copies of the Riverside County Municipal Storm Water Permit, please contact Ben Neill, Water Resources Control Engineer at (858) 467 – 2983, bneill@waterboards.ca.gov

Documents also are available at: http://www.waterboards.ca.gov/sandiego

Waste Discharge Requirements for Discharges from the Municipal Separate Storm Sewer Systems (MS4s) Draining the County of Riverside, the Incorporated Cities of Riverside County, and the Riverside County Flood Control and Water Conservation District within the San Diego Region

Adopted by the
California Regional Water Quality Control Board
San Diego Region
on TBD, 2010

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN DIEGO REGION
9174 Sky Park Court, Suite 100
San Diego, California 92123-4340

Telephone (858) 467-2952

STATE OF CALIFORNIA

ARNOLD SCHWARZENEGGER, Governor
LINDA S. ADAMS, Agency Secretary, California Environmental Protection Agency

California Regional Water Quality Control Board
San Diego Region

David King *Vice Chair*	Recreation / Wildlife
Eric Anderson	Irrigated Agriculture
Wayne Rayfield	Water Quality
Grant Destache	Industrial Water Use
George Loveland	Water Supply
Marc Luker	Undesignated (Public)

David W. Gibson, *Executive Officer*
James Smith, *Assistant Executive Officer*

This permit was prepared under the direction of

David T. Barker P.E., *Chief, Water Resource Protection Branch*

by

Ben Neill, *Water Resource Control Engineer*
Chad Loflen, *Environmental Scientist*
Wayne Chiu P.E., *Water Resource Control Engineer*

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Attachment E – Receiving Waters And MS4 Discharge Monitoring And Reporting Program No. R9-2010-0016
Attachment F – Data

The California Regional Water Quality Control Board, San Diego Region (hereinafter San Diego Water Board), finds that:

A. BASIS FOR THE ORDER

1. This Order is based on the federal Clean Water Act (CWA), the Porter-Cologne Water Quality Control Act (Division 7 of the Water Code, commencing with Section 13000), applicable State and federal regulations, all applicable provisions of statewide Water Quality Control Plans and Policies adopted by the State Water Resources Control Board (State Water Board), the Water Quality Control Plan for the San Diego Basin adopted by the San Diego Water Board, the California Toxics Rule, and the California Toxics Rule Implementation Plan.

2. This Order reissues National Pollutant Discharge Elimination System (NPDES) Permit No. CAS0108766, which was first adopted by the San Diego Water Board on July 16, 1990 (Order No. 90-38), and then reissued on May 13, 1998 (Order No. R9-98-02). On May 26, 1998, the United States Environmental Protection Agency (EPA), Region IX, objected to Order No. 98-02 due to concerns regarding Receiving Water Limitations (RWL) language. The EPA concluded that the RWL language in the permit did not comply with the federal Clean Water Act (CWA) and its implementing regulations. On April 27, 1999, the EPA reissued the MS4 permit, which the San Diego Water Board adopted as Addendum No. 1 to Order No. R9-98-02 on November 8, 2000. On July 14, 2004, the San Diego Water Board adopted the third term MS4 permit, Order No. R9-2004-001. On January 15, 2009, the Riverside County Flood Control and Water Conservation District (District), as the Principal Copermittee, submitted a Report of Waste Discharge (ROWD) for reissuance of the municipal separate storm sewer system (MS4) Permit.

3. This Order is consistent with the following precedential Orders adopted by the State Water Resources Control Board (State Water Board) addressing MS4 NPDES Permits: Order 99-05, Order WQ-2000-11, Order WQ 2001-15, Order WQO 2002-0014, and Order WQ-2009-0008 (*SWRCB/OCC FILE A-1780).*

4. The Fact Sheet / Technical Report for the Order No. R9-2010-0016, NPDES No. CAS0108766, Waste Discharge Requirements for Discharges from the Municipal Separate Storm Sewer Systems (MS4s) Draining the County of Riverside, the Incorporated Cities of Riverside County, and the Riverside County Flood Control and Water Conservation District within the San Diego Region, includes cited regulatory and legal references and additional explanatory information and data in support of the requirements of this Permit. This information, including any supplements thereto, and any response to comments on the Tentative Orders, is hereby incorporated by reference into these findings.

B. REGULATED PARTIES

1. Each of the persons in Table 1 below, hereinafter called Copermittees or dischargers, owns or operates an MS4, through which it discharges into waters of the United States within the San Diego Region. These MS4s fall into one or more of the following categories: (1) a medium or large MS4 that services a population of greater than 100,000 or 250,000 respectively; or (2) a small MS4 that is "interrelated" to a medium or large MS4; or (3) an MS4 which contributes to a violation of a water quality standard; or (4) an MS4 which is a significant contributor of pollutants to waters of the United States (waters of the U.S).

Table 1. Municipal Copermittees

1. City of Menifee	5. County of Riverside
2. City of Murrieta	6. Riverside County Flood Control and Water Conservation District
3. City of Temecula	
4. City of Wildomar	

C. DISCHARGE CHARACTERISTICS

1. Discharges from the MS4 contain waste, as defined in the California Water Code (CWC), and pollutants that adversely affect the quality of the waters of the State. The discharge from an MS4 is a "discharge of pollutants from a point source" into waters of the U.S. as defined in the CWA.

2. MS4 storm water and non-storm water discharges are likely to contain pollutants that cause or threaten to cause a violation of water quality standards, as outlined in the San Diego Water Board's Water Quality Control Plan for the San Diego Basin (Basin Plan). Storm water and non-storm water discharges from the MS4 are subject to the conditions and requirements established in the San Diego Basin Plan for point source discharges.

3. The most common categories of pollutants in runoff include total suspended solids, sediment, pathogens (e.g., bacteria, viruses, protozoa); heavy metals (e.g., copper, lead, zinc and cadmium); petroleum products and polynuclear aromatic hydrocarbons; synthetic organics (e.g., pesticides, herbicides, and PCBs); nutrients (e.g., nitrogen and phosphorus fertilizers); oxygen-demanding substances (decaying vegetation, animal waste); detergents; and trash.

4. The discharge of pollutants and/or increased flows from MS4s may cause or threaten to cause the concentration of pollutants to exceed applicable receiving water quality objectives and/or impair or threaten to impair designated beneficial uses resulting in a condition of pollution (i.e., unreasonable impairment of water

quality for designated beneficial uses), contamination, or nuisance.

5. Pollutants in runoff can threaten and adversely affect human health. Human illnesses have been clearly linked to recreating near storm drains flowing to receiving waters. Also, runoff pollutants in receiving waters can bioaccumulate in the tissues of invertebrates and fish, which may be eventually consumed by humans.

6. Runoff discharges from MS4s often contain pollutants that cause toxicity to aquatic organisms (i.e., adverse responses of organisms to chemicals or physical agents ranging from mortality to physiological responses such as impaired reproduction or growth anomalies). Toxic pollutants impact the overall quality of aquatic systems and beneficial uses of receiving waters.

7. The Copermittees discharge runoff into lakes, drinking water reservoirs, rivers, streams, creeks, bays, estuaries, coastal lagoons, the Pacific Ocean, and tributaries thereto within one of the eleven hydrologic units (Santa Margarita Hydrologic Unit) comprising the San Diego Region as shown in Table 2. Some of the receiving water bodies have been designated as impaired by the San Diego Water Board in 2009 pursuant to CWA section 303(d).

Table 2. Common Watersheds and CWA Section 303(d) Impaired Waters

Hydrologic Area (HA) or Hydrologic Subarea (HSA) of the Santa Margarita Hydrologic Unit	**Major Receiving Water Bodies**	**303(d) Pollutant(s)/stressor or Water Quality Effect[1]**
DeLuz Creek HSA (902.21)	De Luz Creek	Iron, Manganese, Nitrogen, Sulfates
Murrieta HSA (902.32)	Long Canyon Creek (tributary to Murrieta Creek	Chlorpyrifos, E. Coli, Fecal Coliform, Iron, Manganese
Wolf HSA (902.52)	Murrieta Creek	Chlorpyrifos, Copper, Iron, Manganese, Nitrogen, Toxicity
Pauba HSA (902.51)	Redhawk Channel	Chlorpyrifos, Copper, Diazinon, E. Coli, Fecal Coliform, Iron, Manganese, Nitrogen, Phosphorus, Total Dissolved Solids
Gavilan HSA (902.22)	Sandia Creek	Iron, Sulfates
Gertrudis HSA	Santa Gertrudis Creek	Chlorpyrifos, Copper, E. Coli, Fecal

[1] The listed 303(d) pollutant(s) do not necessarily reflect impairment of the entire corresponding WMA or all corresponding major surface water bodies. The specific impaired portions of each WMA are listed in the State Water Resources Control Board's 2008 Section 303(d) List of Water Quality Limited Segments.

Table 2. Common Watersheds and CWA Section 303(d) Impaired Waters

Hydrologic Area (HA) or Hydrologic Subarea (HSA) of the Santa Margarita Hydrologic Unit	**Major Receiving Water Bodies**	**303(d) Pollutant(s)/stressor or Water Quality Effect[1]**
(902.42)		Coliform, Iron, Phosphorous
Lower Ysidora HSA (902.11)	Santa Margarita Lagoon	Eutrophic
Lower Ysidora HSA (902.11)	Santa Margarita River (Lower)	Enterococcus, Fecal Coliform, Phosphorus, Total Nitrogen as N
Gavilan HSA (902.22)	Santa Margarita River (Upper)	Toxicity
Pauba HSA (902.51)	Temecula Creek	Chlorpyrifos, Copper, Phosphorus, Total Dissolved Solids, Toxicity
French HSA (902.33)	Warm Springs Creek (Riverside County)	Chlorpyrifos, E. Coli, Fecal Coliform, Iron, Manganese, Phosphorus, Total Nitrogen as N

8. Trash is a persistent pollutant which can enter receiving waters from the MS4 resulting in accumulation and transport in receiving waters over time. Trash poses a serious threat to the Beneficial Uses of the receiving waters, including, but not limited to, human health, rare and endangered species, navigation and human recreation.

9. The Copermittees' water quality monitoring data submitted to date documents persistent violations of Basin Plan water quality objectives for various runoff-related pollutants (indicator bacteria, dissolved solids, turbidity, metals, pesticides, etc.) at various watershed monitoring stations. Persistent toxicity has also been observed at some watershed monitoring stations. In addition, bioassessment data indicates that the majority of the monitored receiving waters have Poor to Very Poor Index of Biotic Integrity ratings. In sum, the above findings indicate that runoff discharges are causing or contributing to water quality impairments, and are a leading cause of such impairments in Riverside County.

10. When natural vegetated pervious ground cover is converted to impervious surfaces such as paved highways, streets, rooftops, and parking lots, the natural absorption and infiltration abilities of the land are lost. Therefore, runoff leaving a developed area is significantly greater in runoff volume, velocity, and peak flow rate than pre-development runoff from the same area. Runoff durations can also increase as a result of flood control and other efforts to control peak flow rates. Increased volume, velocity, rate, and duration of runoff, and decreased natural clean sediment loads,

greatly accelerate the erosion of downstream natural channels. Significant declines in the biological integrity and physical habitat of streams and other receiving waters have been found to occur with as little as a 3-5 percent conversion from natural to impervious surfaces. The increased runoff characteristics from new development must be controlled to protect against increased erosion of channel beds and banks, sediment pollutant generation, or other impacts to beneficial uses and stream habitat due to increased erosive force.

11. Development creates new pollution sources as human population density increases and brings with it proportionately higher levels of car emissions, car maintenance wastes, municipal sewage, pesticides, household hazardous wastes, pet wastes, trash, etc. which can either be washed or directly dumped into the MS4. As a result, the runoff leaving the developed urban area is significantly greater in pollutant load than the pre-development runoff from the same area. These increased pollutant loads must be controlled to protect downstream receiving water quality.

12. Development and urbanization especially threaten environmentally sensitive areas (ESAs), such as water bodies designated as supporting a RARE beneficial use (supporting rare, threatened or endangered species) and CWA 303(d)-impaired water bodies. Such areas have a much lower capacity to withstand pollutant shocks than might be acceptable in other areas. In essence, development that is ordinarily insignificant in its impact on the environment may become significant in a particularly sensitive environment. Therefore, additional controls to reduce storm water pollutants from new and existing development may be necessary for areas adjacent to or discharging directly to an ESA.

13. Although dependent on several factors, the risks typically associated with properly managed infiltration of runoff (especially from residential land use areas) are not significant. The risks associated with infiltration can be managed by many techniques, including (1) designing landscape drainage features that promote infiltration of runoff, but do not “inject” runoff (injection bypasses the natural processes of filtering and transformation that occur in the soil); (2) taking reasonable steps to prevent the illegal disposal of wastes; (3) protecting footings and foundations; (4) ensuring that each drainage feature is adequately maintained in perpetuity; and (5) pretreatment.

14. Non-storm water (dry weather) discharge from the MS4 is not considered a storm water (wet weather) discharge and therefore is not subject to regulation under the Maximum Extent Practicable (MEP) standard from CWA 402(p)(3)(B)(iii), which is explicitly for “Municipal … *Stormwater Discharges* (emphasis added)” from the MS4. Rather, non-storm water discharges, per CWA 402(p)(3)(B)(ii), are to be effectively prohibited. Such dry weather non-storm water discharges have been shown to contribute significant levels of pollutants and flow in arid, developed Southern California watersheds and are to be effectively prohibited under the Clean Water Act.

15. Non-storm water discharges to the MS4 granted an influent exception [i.e., which are exempt from the effective prohibition requirement set forth in CWA section 402(p)(3)(B)(ii)] under 40 CFR 122.26 are included within this Order. Any exempted discharges identified by Copermittees as a source of pollutants are subsequently required to be *addressed* (emphasis added) as illicit discharges through prohibition and incorporation into existing IC/ID programs. Furthermore, the Federal Register (55, page 48037) clarifies that the San Diego Water Board may also identify exempted discharges as a source of pollutants required to be addressed as illicit discharges. The San Diego Water Board and the Copermittees have identified landscape irrigation, irrigation water and lawn water, previously exempted discharges, as a source of pollutants and conveyance of pollutants to waters of the United States.

D. RUNOFF MANAGEMENT PROGRAMS

1. General

a. This Order specifies requirements necessary for the Copermittees to reduce the discharge of pollutants in storm water to the maximum extent practicable (MEP). However, since MEP is a dynamic performance standard, which evolves over time as runoff management knowledge increases, the Copermittees' runoff management programs must continually be assessed and modified to incorporate improved programs, control measures, best management practices (BMPs), etc. in order to achieve the evolving MEP standard. Absent evidence to the contrary, this continual assessment, revision, and improvement of runoff management program implementation is expected to ultimately achieve compliance with water quality standards in the Region.

b. The Copermittees have generally been implementing the jurisdictional runoff management programs required pursuant to Order No. 2004-001 since July 14, 2004. Prior to that, the Copermittees were regulated by Order No. 98-02, since May 13, 1998. MS4 discharges, however, continue to cause or contribute to violations of water quality standards as evidenced by the Copermittees monitoring results.

c. This Order contains new or modified requirements that are necessary to improve Copermittees' efforts to reduce the discharge of pollutants in storm water runoff to the MEP and achieve water quality standards. Some of the new or modified requirements, such as the revised Watershed Runoff Management Program section, are designed to specifically address high priority water quality problems. Other new or modified requirements address program deficiencies that have been noted during audits, report reviews, and other San Diego Water Board compliance assessment activities.

d. Updated individual Drainage Area Management Plans (DAMP), and Watershed Stormwater Management Plans (watershed SWMPs), which describe the

Copermittees' runoff management programs in their entirety, are needed to guide the Copermittees' runoff management efforts and aid the Copermittees in tracking runoff management program implementation. It is practicable for the Copermittees to update the JRMPs and WRMPs within one year, since significant efforts to develop these programs have already occurred. Hereinafter, the individual DAMP is referred to as the Jurisdictional Runoff Management Plans (JRMPs) and the Watershed SWMP is referred to as the Watershed Runoff Management Plan (WRMP).

e. Pollutants can be effectively reduced in storm water runoff by the application of a combination of pollution prevention, source control, and treatment control BMPs. Pollution prevention is the reduction or elimination of pollutant generation at its source and is the best "first line of defense." Source control BMPs (both structural and non-structural) minimize the contact between pollutants and flows (e.g., rerouting run-on around pollutant sources or keeping pollutants on-site and out of receiving waters). Treatment control BMPs remove pollutants that have been mobilized by wet-weather or dry-weather flows.

f. Runoff needs to be addressed during the three major phases of urban development (planning, construction, and use) in order to reduce the discharge of pollutants from storm water to the MEP, effectively prohibit non-storm water discharges and protect receiving waters. Development which is not guided by water quality planning policies and principles can unnecessarily result in increased pollutant load discharges, flow rates, and flow durations which can negatively impact receiving water beneficial uses. Construction sites without adequate BMP implementation result in sediment runoff rates which greatly exceed natural erosion rates of undisturbed lands, causing siltation and impairment of receiving waters. Existing development generates substantial pollutant loads which are discharged in runoff to receiving waters.

g. Annual reporting requirements included in this Order are necessary to meet federal requirements and to evaluate the effectiveness and compliance of the Copermittees' programs.

h. This Order establishes Storm Water Action Levels (SALs) for selected pollutants based on USEPA Rain Zone 6 (arid southwest) Phase I MS4 monitoring data for pollutants in storm water. The SALs were computed as the 90th percentile of the data set, utilizing the statistical based population approach, one of three approaches recommended by the California Water Board's Storm Water Panel in its report, 'The Feasibility of Numerical Effluent Limits Applicable to Discharges of Storm Water Associated with Municipal, Industrial and Construction Activities (June 2006). SALs are identified in Section D of this Order. Copermittees shall implement a timely, comprehensive, cost-effective storm water pollution control program to reduce the discharge of pollutants in storm water from the permitted areas so as not to exceed the SALs. Exceedance of SALs may indicate inadequacy of programmatic measures and BMPs required in this Order.

2. **Development Planning**

a. The Standard Storm Water Mitigation Plan (SSMP) requirements contained in this Order are consistent with Order WQ-2000-11 adopted by the State Water Resources Control Board (State Board) on October 5, 2000. In the precedential order, the State Board found that the design standards, which essentially require that runoff generated by 85 percent of storm events from specific development categories be infiltrated or treated, reflect the MEP standard. The order also found that the SSMP requirements are appropriately applied to the majority of the Priority Development Project categories contained in Section F.1 of this Order. The State Board also gave Regional Water Quality Control Boards the needed discretion to include additional categories and locations, such as retail gasoline outlets (RGOs), in SSMPs.

b. Controlling runoff pollution by using a combination of onsite source control and site design BMPs augmented with treatment control BMPs before the runoff enters the MS4 is important for the following reasons: (1) Many end-of-pipe BMPs (such as diversion to the sanitary sewer) are typically ineffective during significant storm events. Whereas, onsite source control BMPs can be applied during all runoff conditions; (2) End-of-pipe BMPs are often incapable of capturing and treating the wide range of pollutants which can be generated on a sub-watershed scale; (3) End-of-pipe BMPs are more effective when used as polishing BMPs, rather than the sole BMP to be implemented; (4) End-of-pipe BMPs do not protect the quality or beneficial uses of receiving waters between the pollutant source and the BMP; and (5) Offsite end-of-pipe BMPs do not aid in the effort to educate the public regarding sources of pollution and their prevention.

c. Use of Low-Impact Development (LID) site design BMPs at new development, redevelopment and retrofit projects can be an effective means for minimizing the impact of storm water runoff discharges from the development projects on receiving waters. LID is a site design strategy with a goal of maintaining or replicating the pre-development hydrologic regime through the use of design techniques. LID site design BMPs help preserve and restore the natural hydrologic cycle of the site, allowing for filtration and infiltration which can greatly reduce the volume, peak flow rate, velocity, and pollutant loads of storm water runoff. Current runoff management, knowledge, practices and technology have resulted in the use of LID BMPs as an acceptable means of meeting the storm water MEP standard.

d. Retail Gasoline Outlets (RGOs) are significant sources of pollutants in storm water runoff. RGOs are points of convergence for motor vehicles for automotive related services such as repair, refueling, tire inflation, and radiator fill-up and consequently produce significantly higher loadings of hydrocarbons and trace metals (including copper and zinc) than other developed areas.

e. Industrial sites are significant sources of pollutants in runoff. Pollutant concentrations and loads in runoff from industrial sites are similar or exceed pollutant concentrations and loads in runoff from other land uses, such as commercial or residential land uses. As with other land uses, LID site design, source control, and treatment control BMPs are needed at industrial sites in order to meet the MEP standard. These BMPs are necessary where the industrial site is larger than 10,000 square feet. The 10,000 square feet threshold is appropriate, since it is consistent with requirements in other Phase I NPDES storm water regulations throughout California.

f. If not properly designed or maintained, certain BMPs implemented or required by municipalities for runoff management may create a habitat for vectors (e.g. mosquitoes and rodents). Proper BMP design and maintenance to avoid standing water, however, can prevent the creation of vector habitat. Nuisances and public health impacts resulting from vector breeding can be prevented with close collaboration and cooperative effort between municipalities, local vector control agencies, and the California Department of Public Health during the development and implementation of runoff management programs.

g. The increased volume, velocity, frequency and discharge duration of storm water runoff from developed areas has the potential to greatly accelerate downstream erosion, impair stream habitat in natural drainages, and negatively impact beneficial uses. Development and urbanization increase pollutant loads in storm water runoff and the volume of storm water runoff. Impervious surfaces can neither absorb water nor remove pollutants and thus lose the purification and infiltration provided by natural vegetated soil. Hydromodification measures for discharges to hardened channels are needed for the future restoration of the hardened channels to their natural state, thereby restoring the chemical, physical, and biological integrity and Beneficial Uses of local receiving waters.

3. **Construction and Existing Development**

a. In accordance with federal NPDES regulations and to ensure the most effective oversight of industrial and construction site discharges, discharges of runoff from industrial and construction sites are subject to dual (State and local) storm water regulation. Under this dual system, each Copermittee is responsible for enforcing its local permits, plans, and ordinances, and the San Diego Water Board is responsible for enforcing the General Construction Activities Storm Water Permit, State Board Order 2009-0009-DWQ, NPDES No. CAS000002 (General Construction Permit) and the General Industrial Activities Storm Water Permit, State Board Order 97-03 DWQ, NPDES No. CAS000001 (General Industrial Permit) and any reissuance of these permits. NPDES municipal regulations require that municipalities develop and implement measures to address runoff from industrial and construction activities. Those measures may require the implementation of additional BMPs than are required under the

statewide general permits for activities subject to both State and local regulation.

b. Identification of sources of pollutants in runoff (such as municipal areas and activities, industrial and commercial sites/sources, construction sites, and residential areas), development and implementation of BMPs to address those sources, and updating ordinances and approval processes are necessary for the Copermittees to ensure that discharges of pollutants from its MS4 in storm water are reduced to the MEP and that non-storm water discharges are not occurring. Inspections and other compliance verification methods are needed to ensure minimum BMPs are implemented. Inspections are especially important at high risk areas for pollutant discharges.

c. Historic and current development makes use of natural drainage patterns and features as conveyances for runoff. Urban streams used in this manner are part of the municipalities MS4 regardless of whether they are natural, anthropogenic, or partially modified features. In these cases, the urban stream is both an MS4 and receiving water.

d. As operators of the MS4s, the Copermittees cannot passively receive and discharge pollutants from third parties. By providing free and open access to an MS4 that conveys discharges to waters of the U.S., the operator essentially accepts responsibility for discharges into the MS4 that it does not prohibit or control. These discharges may cause or contribute to a condition of contamination or a violation of water quality standards.

e. Waste and pollutants which are deposited and accumulate in MS4 drainage structures will be discharged from these structures to waters of the U.S. unless they are removed. These discharges may cause or contribute to, or threaten to cause or contribute to, a condition of pollution in receiving waters. For this reason, pollutant discharges from storm water into MS4s must be reduced using a combination of management measures, including source control, and an effective MS4 maintenance program must be implemented by each Copermittee.

f. Enforcement of local runoff related ordinances, permits, and plans is an essential component of every runoff management program and is specifically required in the federal storm water regulations and this Order. Each Copermittee is individually responsible for adoption and enforcement of ordinances and/or policies, implementation of identified control measures/BMPs needed to prevent or reduce pollutants in storm water runoff, and for the allocation of funds for the capital, operation and maintenance, administrative, and enforcement expenditures necessary to implement and enforce such control measures/BMPs under its jurisdiction. Education is an important aspect of every effective runoff management program and the basis for changes in behavior at a societal level. Education of municipal planning, inspection, and maintenance department staffs is especially critical to ensure that in-house staffs understand how their activities impact water quality, how to accomplish their jobs while protecting water quality,

and their specific roles and responsibilities for compliance with this Order. Public education, designed to target various urban land users and other audiences, is also essential to inform the public of how individual actions affect receiving water quality and how adverse effects can be minimized.

g. Public participation during the development of runoff management programs is necessary to ensure that all stakeholder interests and a variety of creative solutions are considered.

h. Retrofitting existing development with storm water treatment controls, including LID, is necessary to address storm water discharges from existing development that may cause or contribute to a condition of pollution or a violation of water quality standards. Although SSMP BMPs are required for redevelopment, the current rate of redevelopment will not address water quality problems in a timely manner. Cooperation with private landowners is necessary to effectively identify, implement and maintain retrofit projects for the preservation, restoration, and enhancement of water quality.

4. **Watershed Runoff Management**

a. Since runoff within a watershed can flow from and through multiple land uses and political jurisdictions, watershed-based runoff management can greatly enhance the protection of receiving waters. Such management provides a means to focus on the most important water quality problems in each watershed. By focusing on the most important water quality problems, watershed efforts can maximize protection of beneficial use in an efficient manner. Effective watershed-based runoff management actively reduces pollutant discharges and abates pollutant sources causing or contributing to watershed water quality problems. Watershed-based runoff management that does not actively reduce pollutant discharges and abate pollutant sources causing or contributing to watershed water quality problems can necessitate implementation of the iterative process outlined in section A.3 of the Tentative Order. Watershed management of runoff does not require Copermittees to expend resources outside of their jurisdictions. Watershed management requires the Copermittees within a watershed to develop a watershed-based management strategy, which can then be implemented on a jurisdictional basis.

b. Some runoff issues, such as general education and training, can be effectively addressed on a regional basis. Regional approaches to runoff management can improve program consistency and promote sharing of resources, which can result in implementation of more efficient programs.

c. It is important for the Copermittees to coordinate their water quality protection and land use planning activities to achieve the greatest protection of receiving water bodies. Copermittee coordination with other watershed stakeholders, especially the State of California Department of Transportation, the United States

Department of Defense, and water and sewer districts, is also important.

E. STATUTE AND REGULATORY CONSIDERATIONS

1. The Receiving Water Limitations (RWL) language specified in this Order is consistent with language recommended by the USEPA and established in State Board Water Quality Order 99-05, *Own Motion Review of the Petition of Environmental Health Coalition to Review Waste Discharge Requirements Order No. 96-03, NPDES Permit No. CAS0108740*, adopted by the State Board on June 17, 1999. The RWL in this Order require compliance with water quality standards, which for storm water discharges is to be achieved through an iterative approach requiring the implementation of improved and better-tailored BMPs over time. Compliance with receiving water limits based on applicable water quality standards is necessary to ensure that MS4 discharges will not cause or contribute to violations of water quality standards and the creation of conditions of pollution.

2. The Water Quality Control Plan for the San Diego Basin (Basin Plan), identifies the following existing and potential beneficial uses for surface waters in Riverside County: Municipal and Domestic Supply (MUN), Agricultural Supply (AGR), Industrial Process Supply (PROC), Hydropower Generation (POW), Industrial Service Supply (IND), Ground Water Recharge (GWR), Contact Water Recreation (REC1), Non-contact Water Recreation (REC2), Warm Freshwater Habitat (WARM), Cold Freshwater Habitat (COLD), Wildlife Habitat (WILD), Rare, Threatened, or Endangered Species (RARE), Spawning, Reproduction and/or Early Development (SPWN) and Preservation of Biological Habitats of Special Significance (BIOL).

3. This Order is in conformance with State Board Resolution No. 68-16, *Statement of Policy with Respect to Maintaining High Quality Waters in California*, and the federal Antidegradation Policy described in 40 CFR 131.12.

4. Section 6217(g) of the Coastal Zone Act Reauthorization Amendments of 1990 (CZARA) requires coastal states with approved coastal zone management programs to address non-point pollution impacting or threatening coastal water quality. CZARA addresses five sources of non-point pollution: agriculture, silviculture, urban, marinas, and hydromodification. This NPDES permit addresses the management measures required for the urban category, with the exception of septic systems. The adoption and implementation of this NPDES permit relieves the Copermittee from developing a non-point source plan, for the urban category, under CZARA. The San Diego Water Board addresses septic systems through the administration of other programs.

5. Section 303(d)(1)(A) of the CWA requires that “Each state shall identify those waters within its boundaries for which the effluent limitations…are not stringent enough to implement any water quality standard (WQS) applicable to such waters.” The CWA

also requires states to establish a priority ranking of impaired water bodies known as Water Quality Limited Segments and to establish Total Maximum Daily Loads (TMDLs) for such waters. This priority list of impaired water bodies is called the Section 303(d) List. The 2006 Section 303(d) List was approved by the State Board on October 25, 2006. On June 28, 2007, the 2006 303(d) list for California was given final approval by the United States Environmental Protection Agency (USEPA). The 303(d) List was recently updated, and on December 16, 2009, the 2008 303(d) List was approved by the San Diego Water Board. The 2008 List is awaiting State Board and USEPA approval.

6. This Order does not constitute an unfunded local government mandate subject to subvention under Article XIIIB, Section (6) of the California Constitution for several reasons, including, but not limited to, the following. First, this Order implements federally mandated requirements under federal Clean Water Act section 402. (33 U.S.C. § 1342(p)(3)(B).) Second, the local agency Copermittees' obligations under this Order are similar to, and in many respects less stringent than, the obligations of non-governmental and new dischargers who are issued NPDES permits for storm water and non-storm water discharges. Third, the local agency Copermittees have the authority to levy service charges, fees, or assessments sufficient to pay for compliance with this Order. Fourth, the Copermittees have requested permit coverage in lieu of compliance with the complete prohibition against the discharge of pollutants contained in federal Clean Water Act section 301, subdivision (a) (33 U.S.C. § 1311(a)) and in lieu of numeric restrictions on their storm water discharges. Fifth, the local agencies' responsibility for preventing discharges of waste that can create conditions of pollution or nuisance from conveyances that are within their ownership or control under State law predates the enactment of Article XIIIB, Section (6) of the California Constitution. Likewise, the provisions of this Order to implement total maximum daily loads (TMDLs) are federal mandates. The federal Clean Water Act requires TMDLs to be developed for water bodies that do not meet federal water quality standards. (33 U.S.C. sec. 1313(d).) Once the U.S. Environmental Protection Agency or a state develops a TMDL, federal law requires that permits must contain effluent limitations consistent with the assumptions of any applicable wasteload allocation. (40 C.F.R. sec. 122.44(d)(1)(vii)(B).)

7. Runoff treatment and/or mitigation must occur prior to the discharge of runoff into receiving waters. Treatment BMPs must not be constructed in waters of the U.S. or State unless the runoff flows are sufficiently pretreated to protect the values and functions of the water body. Federal regulations at 40 CFR 131.10(a) state that in no case shall a state adopt waste transport or waste assimilation as a designated use for any waters of the U.S. Authorizing the construction of an runoff treatment facility within a water of the U.S., or using the water body itself as a treatment system or for conveyance to a treatment system, would be tantamount to accepting waste assimilation as an appropriate use for that water body. Furthermore, the construction, operation, and maintenance of a pollution control facility in a water body can negatively impact the physical, chemical, and biological integrity, as well as the beneficial uses, of the water body. Without federal authorization (e.g.,

pursuant to Clean Water Act Section 404), waters of the U.S. may not be converted into, or used as, waste treatment or conveyance facilities. Similarly, waste discharge requirements pursuant to California Water Code Section 13260 are required for the conversion or use of waters of the State as waste treatment or conveyance facilities. Diversion from waters of the U.S./State to treatment facilities and subsequent return to waters of the U.S. is allowable, provided that the effluent complies with applicable NPDES requirements.

8. The issuance of waste discharge requirements and an NPDES permit for the discharge of runoff from MS4s to waters of the U.S. is exempt from the requirement for preparation of environmental documents under the California Environmental Quality Act (CEQA) (Public Resources Code, Division 13, Chapter 3, section 21000 et seq.) in accordance with the CWC section 13389.

9. Storm water discharges from developed and developing areas in Riverside County are significant sources of certain pollutants that cause, may be causing, threatening to cause or contributing to water quality impairment in the waters of Riverside County. Furthermore, as delineated in the CWA section 303(d) list in Table 2, the San Diego Water Board has found that there is a reasonable potential that municipal storm water and non-storm water discharges from MS4s cause or may cause or contribute to an excursion above water quality standards for the following pollutants: Indicator Bacteria, Copper, Manganese, Iron, Chlorpyrifos, Sulfates, Phosphorous, Nitrogen, Toxicity and Turbidity. In accordance with CWA section 303(d), the San Diego Water Board is required to establish Total Maximum Daily Loads (TMDLs) for these pollutants to these waters to eliminate impairment and attain water quality standards. Therefore, certain early pollutant control actions and further pollutant impact assessments by the Copermittees are warranted and required pursuant to this Order.

10. This Order requires each Copermittee to effectively prohibit all types of unauthorized discharges of non-storm water into its MS4. However, historically pollutants have been identified as present in dry weather non-storm water discharges from the MS4s through 303(d) listings, monitoring conducted by the Copermittees under Order No. R9-2004-0001, and there are others expected to be present in dry weather non-storm water discharges because of the nature of these discharges. This Order includes action levels for pollutants in non-storm water, dry weather, discharges from the MS4 designed to ensure that the requirement to effectively prohibit all types of unauthorized discharges of non-storm water in the MS4 is being complied with. Action levels in the Order are based upon numeric or narrative water quality objectives and criteria as defined in the Basin Plan, the Water Quality Control Plan for Ocean Waters of California (Ocean Plan), and the State Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California (State Implementation Policy or SIP). An exceedance of an action level requires specified responsive action by the Copermittees. This Order describes what actions the Copermittees must take when an exceedance of an action level is observed. Exceedances of non-storm water action levels do not alone

constitute a violation of this Order but could indicate non-compliance with the requirement to effectively prohibit all types of unauthorized non-storm water discharges into the MS4 or other prohibitions established in this Order. Failure to undertake required source investigation and elimination action following an exceedance of a non-storm water action level (NAL or action level) is a violation of this Order. The San Diego Water Board recognizes that use of action levels will not necessarily result in detection of all unauthorized sources of non-storm water discharges because there may be some discharges in which pollutants do not exceed established action levels. However, establishing NALs at levels appropriate to protect water quality standards is expected to lead to the identification of significant sources of pollutants in dry weather non-storm water discharges.

11. In addition to federal regulations cited in the Fact Sheet / Technical Report for the Order No. R9-2010-0016, monitoring and reporting required under Order No. R9-2010-0016 is required pursuant to authority under CWC section 13383.

F. PUBLIC PROCESS

1. The San Diego Water Board has notified the Copermittees, all known interested parties, and the public of its intent to consider adoption of an Order prescribing waste discharge requirements that would serve to renew an NPDES permit for the existing discharge of runoff.

2. The San Diego Water Board has held public hearings on TBD and heard and considered all comments pertaining to the terms and conditions of this Order.

IT IS HEREBY ORDERED that the Copermittees, in order to meet the provisions contained in Division 7 of the California Water Code (CWC) and regulations adopted thereunder, and the provisions of the Clean Water Act (CWA) and regulations adopted thereunder, must each comply with the following:

A. PROHIBITIONS AND RECEIVING WATER LIMITATIONS

1. Discharges into and from municipal separate storm sewer systems (MS4s) in a manner causing, or threatening to cause, a condition of pollution, contamination, or nuisance (as defined in CWC section 13050), in waters of the state are prohibited.

2. Storm water discharges from MS4s containing pollutants which have not been reduced to the maximum extent practicable (MEP) are prohibited.[2]

3. Discharges from MS4s that cause or contribute to the violation of water quality standards (designated beneficial uses, water quality objectives developed to protect beneficial uses, and the State policy with respect to maintaining high quality waters) are prohibited.

a. Each Copermittee must comply with section A.3 and section A.4 as it applies to Prohibition 5 in Attachment A of this Order through timely implementation of control measures and other actions to reduce pollutants in storm water discharges in accordance with this Order, including any modifications. If exceedance(s) of water quality standards persist notwithstanding implementation of this Order, the Copermittee must assure compliance with section A.3 and section A.4 as it applies to Prohibition 5 in Attachment A of this Order by complying with the following procedure:

(1) Upon a determination by either the Copermittee or the San Diego Water Board that storm water MS4 discharges are causing or contributing to an exceedance of an applicable water quality standard, the Copermittee must notify the San Diego Water Board within 30 days and thereafter submit a report to the San Diego Water Board that describes best management practices (BMPs) that are currently being implemented and additional BMPs that will be implemented to prevent or reduce any pollutants that are causing or contributing to the exceedance of water quality standards. The report may be incorporated in the Annual Report unless the San Diego Water Board directs an earlier submittal. The report must include an implementation schedule. The San Diego Water Board may require modifications to the report;

[2] This prohibition does not apply to MS4 discharges which receive subsequent treatment to reduce pollutants to the MEP prior to entering receiving waters (e.g., low flow diversions to the sanitary sewer).

(2) Submit any modifications to the report required by the San Diego Water Board within 30 days of notification;

(3) Within 30 days following approval of the report described above by the San Diego Water Board, the Copermittee must revise its Jurisdictional Runoff Management Program and monitoring program to incorporate the approved modified BMPs that have been and will be implemented, the implementation schedule, and any additional monitoring required; and

(4) Implement the revised Jurisdictional Runoff Management Program and monitoring program in accordance with the approved schedule.

b. The Copermittee must repeat the procedure set forth above to comply with the receiving water limitations for continuing or recurring exceedances of the same water quality standard(s) unless directed to do otherwise by the San Diego Water Board Executive Officer.

c. Nothing in section A.3 must prevent the San Diego Water Board from enforcing any provision of this Order while the Copermittee prepares and implements the above report.

4. In addition to the above prohibitions, discharges from MS4s are subject to all Basin Plan prohibitions cited in Attachment A to this Order.

B. NON-STORM WATER DISCHARGES

1. Each Copermittee must effectively prohibit all types of non-storm water discharges into its MS4 unless such discharges are either authorized by a separate National Pollutant Discharge Elimination System (NPDES) permit; or not prohibited in accordance with sections B.2 and B.3 below.

2. The following categories of non-storm water discharges are not prohibited unless a Copermittee or the San Diego Water Board identifies the discharge category as a source of pollutants to waters of the U.S. Where the Copermittee(s) have identified a category as a source of pollutants, the category shall be addressed as an illicit discharge and prohibited through ordinance, order or similar means. The San Diego Water Board may identify categories of discharge that either requires prohibition or other controls. For such a discharge category, the Copermittee, under direction of the San Diego Water Board, must either prohibit the discharge category or develop and implement appropriate control measures to prevent the discharge of pollutants to the MS4 and report to the San Diego Water Board pursuant to Section K.1 and K.3 of this Order.

a. Diverted stream flows;
b. Rising ground waters;

c. Uncontaminated ground water infiltration [as defined at 40 CFR 35.2005(20)] to MS4s;
d. Uncontaminated pumped ground water[3];
e. Foundation drains[3];
f. Springs;
g. Water from crawl space pumps[3];
h. Footing drains[3];
i. Air conditioning condensation;
j. Flows from riparian habitats and wetlands;
k. Water line flushing[4,5];
l. Discharges from potable water sources not subject to NPDES Permit No. CAG679001, other than water main breaks;
m. Individual residential car washing; and
n. Dechlorinated swimming pool discharges[6].

3. Emergency fire fighting flows (i.e., flows necessary for the protection of life or property) do not require BMPs and need not be prohibited. As part of the Jurisdictional Runoff Management Plan (JRMP), each Copermittee must develop and implement a program to address pollutants from non-emergency fire fighting flows (i.e., flows from controlled or practice blazes and maintenance activities) identified by the Copermittee to be significant sources of pollutants to waters of the United States.

a. Building fire suppression system maintenance discharges (e.g. sprinkler line flushing) contain waste. Therefore, such discharges are to be prohibited by the Copermittees as illicit discharges through ordinance, order, or similar means.

4. Each Copermittee must examine all dry weather effluent analytical monitoring results collected in accordance with section F.4 of this Order and Receiving Waters and MS4 Discharge Monitoring and Reporting Program No. R9-2010-0016 to identify water quality problems which may be the result of any non-prohibited discharge category(ies) identified above in section B.2. Follow-up investigations must be conducted to identify and control, pursuant to section B.2, any non-prohibited discharge category(ies) listed above.

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[3] Requires enrollment under Order R9-2008-002. Discharges into the MS4 require authorization from the owner and operator of the MS4 system.
[4] This exemption does not include fire suppression sprinkler system maintenance and testing discharges. Those discharges may be regulated under Section B.3.
[5] Requires enrollment under Order R9-2002-0020.
[6] Including saline swimming pool discharges directly to a saline water body.

C. NON-STORM WATER DRY WEATHER ACTION LEVELS

1. Each Copermittee, beginning no later than May 1, 2011, shall implement the non-storm water dry weather action level (NAL) monitoring as described in Attachment E of this Order.

2. In response to an exceedance of an NAL, each Copermittee must investigate and identify the source of the exceedance in a timely manner. However, if any Copermittee identifies exceedances of NALs that prevent them from adequately conducting source investigations in a timely manner, then the Copermittees may submit a prioritization plan and timeline that identifies the timeframe and planned actions to investigate and report their findings on all of the exceedances. Following the source investigation and identification, the Copermittees must submit an action report dependant on the source of the pollutant exceedance as follows:

a. If the Copermittee identifies the source of the exceedance as natural (non-anthropogenically influenced) in origin and in conveyance into the MS4; then the Copermittee shall report their findings and documentation of their source investigation to the San Diego Water Board within fourteen days of the source identification.

b. If the Copermittee identifies the source of the exceedance as an illicit discharge or connection, then the Copermittees must eliminate the discharge to their MS4 and report the findings, including any enforcement action(s) taken, and documentation of the source investigation to the San Diego Water Board within fourteen days of the source identification. If the Copermittee is unable to eliminate the source of discharge within fourteen days, then the Copermittee must submit, as part of their action report, their plan and timeframe to eliminate the source of the exceedance. Those dischargers seeking to continue such a discharge must become subject to a separate NPDES permit prior to continuing any such discharge.

c. If the Copermittee identifies the source of the exceedance as an exempted category of non-storm water discharge, then the Copermittees must determine if this is an isolated circumstance or if the category of discharges must be addressed through the prevention or prohibition of that category of discharge as an illicit discharge. The Copermittee must submit their findings in including a description of the steps taken to address the discharge and the category of discharge, to the San Diego Water Board for review with the next subsequent annual report. Such description shall include relevant updates to or new ordinances, orders, or other legal means of addressing the category of discharge. The Copermittees must also submit a summary of their findings with the Report of Waste Discharge.

d. If the Copermittee identifies the source of the exceedance as a non-storm water discharge in violation or potential violation of an existing separate NPDES permit

(e.g. the groundwater dewatering permit), then the Copermittee must report, within three business days, the findings to the San Diego Water Board including all pertinent information regarding the discharger and discharge characteristics.

e. If the Copermittee is unable to identify the source of the exceedance after taking and documenting reasonable steps to do so, then the Copermittee must identify the pollutant as a high priority pollutant of concern in the tributary subwatershed, perform additional focused sampling and update their programs within a year to reflect this priority. The Copermittee's annual report shall include these updates to their programs including, where applicable, updates to their watershed workplans (Section G.2), retrofitting consideration (Section F.3.d) and program effectiveness work plans (Section J.4).

f. The Copermittees or any interested party, may evaluate existing NALs and propose revised NALs for future Board consideration.

3. An exceedance of an NAL does not alone constitute a violation of the provisions of this Order, but an exceedance of an NAL may indicate a lack of compliance with the requirement that Copermittees effectively prohibit all types of unauthorized non-storm water discharges into the MS4 or other prohibitions set forth in Sections A and B of this Order. Failure to timely implement required actions specified in this Order following an exceedance of an NAL constitutes a violation of this Order. However, neither compliance with NALs nor compliance with required actions following observed exceedances, excuses any non-compliance with the requirement to effectively prohibit all types of unauthorized non-storm water discharges into the MS4s or any non-compliance with the prohibitions in Sections A and B of this Order. NALs provide an assessment of the effectiveness of the prohibition of non-storm water discharges and of the appropriateness of exempted non-storm water discharges. During any annual reporting period in which one or more exceedances of NALs have been documented the Copermittee must submit with their next scheduled annual report, a report describing whether and how the observed exceedances did or did not result in a discharge form the MS4 that caused, or threatened to cause or contribute to a condition of pollution, contamination, or nuisance in the receiving waters.

4. Monitoring of effluent will occur at the end-of-pipe prior to discharge into the receiving waters, with a focus on Major Outfalls, as defined in 40 CFR 122.26(B 5-6) and Attachment E of this Order. The Copermittees must develop their monitoring plans to sample a representative percentage of major outfalls and identified stations within each hydrologic subarea. At a minimum, outfalls that exceed any NALs once during any year must be monitored in the subsequent year. Any station that does not exceed an NAL for 3 years may be replaced with a different station.

5. Each Copermittee shall monitor for the non-storm water dry weather action levels, which are incorporated into this Order as follows:

a. Action levels for discharges to inland surface waters:

Table 3.a.1: General Constituents

Parameter	Units	AMAL	MDAL	Instantaneous Maximum	Basis
Fecal Coliform	MPN/ 100 ml	200[A] 400[B]	-		BPO
Enterococci	MPN/ 100 ml	33	-	61[C]	BPO
Turbidity	NTU	-	20		BPO
pH	Units	Within limit of 6.5 to 8.5 at all times			BPO
Dissolved Oxygen	mg/L	Not less than 5.0 in WARM waters and not less than 6.0 in COLD waters			BPO
Total Nitrogen	mg/L	-	1.0	See MDAL	BPO
Total Phosphorus	mg/L	-	0.1	See MDAL	BPO
Methylene Blue Active Substances	mg/L	-	0.5	See MDAL	BPO
Iron	mg/L	-	0.3	See MDAL	BPO
Manganese	mg/L	-	0.05	See MDAL	BPO

A – Based on a minimum of not less than five samples for any 30-day period
B – No more than 10 percent of total samples may exceed 400 per 100 ml during any 30 day period
C – This Value has been set to Basin Plan Criteria for Designated Beach Areas
BPO – Basin Plan Objective
MDAL – Maximum Daily Action Level AMAL – Average Monthly Action Level

Table 3.a.2: Priority Pollutants

		Freshwater (CTR)	
Parameter	Units	MDAL	AMAL
Cadmium	ug/L	**	**
Copper	ug/L	*	*
Chromium III	ug/L	**	**
Chromium VI (hexavalent)	ug/L	16	8.1
Lead	ug/L	*	*
Nickel	ug/L	**	**
Silver	ug/L	*	*
Zinc	ug/L	*	*

CTR – California Toxic Rule
*- Action Levels developed on a case-by-case basis (see below)
**- Action Levels developed on a case-by-case basis (see below), but calculated criteria are not to exceed Maximum Contaminant Levels under the California Code of Regulations[7]

The NALs for Cadmium, Copper, Chromium (III), Lead, Nickel, Silver and Zinc will be developed on a case-by-case basis because the freshwater criteria are based on

[7] California Code of Regulations, Title 22, Division 4, Chapter 15, Article 4, Section 64431.

site-specific water quality data (receiving water hardness). For these priority pollutants, the following equations (40 CFR 131.38.b.2) will be required:

Cadmium (Total Recoverable) = exp(0.7852[ln(hardness)] -2.715)
Chromium III (Total Recoverable) = exp(0.8190[ln(hardness)] + .6848)
Copper (Total Recoverable) = exp(0.8545[ln(hardness)] - 1.702)
Lead (Total Recoverable) = exp(1.273[ln(hardness)] - 4.705)
Nickel (Total Recoverable) = exp(.8460[ln(hardness)] + 0.0584)
Silver (Total Recoverable) = exp(1.72[ln(hardness)] - 6.52)
Zinc (Total Recoverable) = exp(0.8473[ln(hardness)] + 0.884)

D. STORM WATER ACTION LEVELS

1. Beginning Year 3 after Order adoption date, a running average of twenty percent or greater of exceedances of any discharge of storm water from the MS4 to waters of the United States that exceed the Storm Water Action Levels (SALs) for the pollutants listed in Table 5 (below) will require each Copermittee to affirmatively augment and implement all necessary storm water controls and measures to reduce the discharge of the associated class of pollutants(s) to the MEP standard. The Copermittees must utilize the exceedance information when adjusting and executing annual work plans, as required by this Order. Copermittees shall take the magnitude, frequency, and number of constituents exceeding the SAL(s), in addition to receiving water quality data and other information, into consideration when reacting to SAL exceedances in an iterative manner. Failure to appropriately consider and react to SAL exceedances in an iterative manner creates a presumption that the Copermittee(s) have not complied with the MEP standard.

Table 4. Storm Water Action Levels

Pollutant	Action Level
Turbidity (NTU)	126
Nitrate & Nitrite total (mg/L)	2.6
P total (mg/L)	1.46
Cd total (µg/L)	3.0
Cu total (µg/L)	127
Pb total (µg/L)	250
Zn total (µg/L)	976

2. The end-of-pipe assessment points for the determination of SAL compliance are all major outfalls, as defined in 40 CFR 122.26(b)(5) and (b)(6). The Copermittees must develop their monitoring plans to sample a representative percent of the major outfalls within each hydrologic subarea. At a minimum, outfalls that exceed SALs must be monitored in the subsequent year. Any station that does not exceed an SAL for 3 years may be replaced with a different station. SAL samples must be 24 hour time weighted composites.

3. The absence of SAL exceedances does not relieve the Copermittees from

implementing all other required elements of this Permit.

4. This Permit does not regulate natural sources and conveyances of constituents listed in Table 5. To be relieved of the requirements to prioritize pollutant/watershed combinations for BMP updates and to continue monitoring a station, the Copermittee must demonstrate that the likely and expected cause of the SAL exceedance is not anthropogenic in nature.

5. The SALs will be reviewed and updated at the end of every permit cycle. The data collected pursuant to D.2 above can be used to create SALs based upon local data. It is the goal of the SALs, through the iterative and MEP process, to have outfall storm water discharges meet all applicable water quality standards.

E. LEGAL AUTHORITY

1. Each Copermittee must establish, maintain, and enforce adequate legal authority to control pollutant discharges into and from its MS4 through ordinance, statute, permit, contract or similar means. Nothing herein shall authorize a Co-Permittee or other discharger regulated under the terms of this order to divert, store or otherwise impound water if such action is reasonably anticipated to harm downstream water right holders in the exercise of their water rights. This legal authority must, at a minimum, authorize the Copermittee to:

- **a.** Control the contribution of pollutants in discharges of runoff associated with industrial and construction activity to its MS4 and control the quality of runoff from industrial and construction sites. This requirement applies both to industrial and construction sites which have coverage under the statewide general industrial or construction storm water permits, as well as to those sites which do not. Grading ordinances must be updated and enforced as necessary to comply with this Order;
- **b.** Prohibit all identified illicit discharges not otherwise allowed pursuant to section B.2;
- **c.** Prohibit and eliminate illicit connections to the MS4;
- **d.** Control the discharge of spills, dumping, or disposal of materials other than storm water to its MS4;
- **e.** Require compliance with conditions in Copermittee ordinances, permits, contracts or orders (i.e., hold dischargers to its MS4 accountable for their contributions of pollutants and flows);
- **f.** Utilize enforcement mechanisms to require compliance with Copermittee storm water ordinances, permits, contracts, or orders;
- **g.** Control the contribution of pollutants from one portion of the shared MS4 to another portion of the MS4 through interagency agreements among Copermittees. Control of the contribution of pollutants from one portion of the shared MS4 to another portion of the MS4 through interagency agreements with other owners of the MS4 such as the State of California Department of

Transportation, the United States Department of Defense, or Native American Tribes is encouraged;

h. Carry out all inspections, surveillance, and monitoring necessary to determine compliance and noncompliance with local ordinances and permits and with this Order, including the prohibition on illicit discharges to the MS4. This means the Copermittee must have authority to enter, monitor, inspect, take measurements, review and copy records, and require regular reports from industrial facilities discharging into its MS4, including construction sites;

i. Require the use of BMPs to prevent or reduce the discharge of pollutants into MS4s from storm water to the MEP; and

j. Require documentation on the effectiveness of BMPs implemented to reduce the discharge of storm water pollutants to the MS4 to the MEP.

2. Each Copermittee must submit within 365 days of adoption of this Order, a statement certified by its chief legal counsel that the Copermittee has taken the necessary steps to obtain and maintain full legal authority to implement and enforce each of the requirements contained in 40 CFR 122.26(d)(2)(i)(A-F) and this Order. These statements must include:

a. Identification of all departments within the jurisdiction that conduct runoff related activities, and their roles and responsibilities under this Order. Include an up to date organizational chart specifying these departments and key personnel.

b. Citation of runoff related ordinances and the reasons they are enforceable;

c. Identification of the local administrative and legal procedures available to mandate compliance with runoff related ordinances and therefore with the conditions of this Order;

d. A description of how runoff related ordinances are implemented and appealed; and

e. Description of whether the municipality can issue administrative orders and injunctions or if it must go through the court system for enforcement actions.

F. JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM (JRMP)

Each Copermittee must implement all requirements of section F of this Order no later than 365 days after adoption of the Order, unless otherwise specified. Prior to 365 days after adoption of the Order, each Copermittee must at a minimum implement its Jurisdictional RMP document, as the document was developed and amended to comply with the requirements of Order No. R9-2004-001.

Each Copermittee must develop and implement an updated JRMP for its jurisdiction. Each updated JRMP must meet the requirements of section F of this Order, reduce the discharge of storm water pollutants from the MS4 to the MEP, effectively prohibit non-storm water discharges and prevent runoff discharges from the MS4 from causing or contributing to a violation of water quality standards.

1. DEVELOPMENT PLANNING COMPONENT

Each Copermittee must implement a program which meets the requirements of this section and (1) reduces Development Project discharges of storm water pollutants from the MS4 to the MEP; (2) prevents Development Project discharges from the MS4 from causing or contributing to a violation of water quality standards; (3) prevents illicit discharges into the MS4; and (4) manages increases in runoff discharge rates and durations from Development Projects that are likely to cause increased erosion of stream beds and banks, silt pollutant generation, or other impacts to beneficial uses and stream habitat due to increased erosive force.

a. GENERAL PLAN

Each Copermittee must revise as needed its General Plan or equivalent plan (e.g., Comprehensive, Master, or Community Plan) to include water quality and watershed protection principles and policies that direct land-use decisions and require implementation of consistent water quality protection measures for all development, redevelopment and retrofit projects. Examples of water quality and watershed protection principles and policies to be considered include the following:

(1) Minimize the amount of impervious surfaces and directly connected impervious surfaces in areas of new development and redevelopment and where feasible slow runoff and maximize on-site infiltration of runoff.

(2) Implement pollution prevention methods supplemented by pollutant source controls and treatment. Use small collection strategies located at, or as close as possible to, the source (i.e., the point where water initially meets the ground) to minimize the transport of urban runoff and pollutants offsite and into an MS4.

(3) Preserve, and where possible, create or restore areas that provide important water quality benefits, such as riparian corridors, wetlands, and buffer zones. Encourage land acquisition of such areas.

(4) Limit disturbances of natural water bodies and natural drainage systems caused by development including roads, highways, and bridges.

(5) Prior to making land use decisions, utilize methods available to estimate increases in pollutant loads and flows resulting from projected future development. Require incorporation of structural and non-structural BMPs to mitigate the projected increases in pollutant loads and flows.

(6) Avoid development of areas that are particularly susceptible to erosion and sediment loss; or establish development guidance that identifies these areas and protects them from erosion and sediment loss.

(7) Reduce pollutants associated with vehicles and increasing traffic resulting from development.

(8) Post-development runoff from a site shall not contain pollutant loads that cause or contribute to an exceedance of receiving water quality objectives and which have not been reduced to the MEP.

b. ENVIRONMENTAL REVIEW PROCESS

Each Copermittee must revise as needed its current environmental review processes to accurately evaluate water quality impacts and cumulative impacts and identify appropriate measures to avoid, minimize and mitigate those impacts for all Development Projects.

c. APPROVAL PROCESS CRITERIA AND REQUIREMENTS FOR ALL DEVELOPMENT PROJECTS

For all proposed Development Projects, each Copermittee during the planning process, and prior to project approval and issuance of local permits, must prescribe the necessary requirements so that Development Project discharges of storm water pollutants from the MS4 will be reduced to the MEP, will not cause or contribute to a violation of water quality standards, and will comply with Copermittee's ordinances, permits, plans, and requirements, and with this Order.

Performance Criteria: Discharges from each approved development project must be subject to the following management measures:

(1) Source control BMPs that reduce storm water pollutants of concern in runoff; prevention of illicit discharges into the MS4; prevention of irrigation runoff; storm drain system stenciling or signage; properly designed outdoor material storage areas; properly designed outdoor work areas; and properly designed trash storage areas.

(2) The following LID BMPs listed below shall be implemented at all Development Projects where applicable and feasible.

(a) Conserve natural areas, including existing trees, other vegetation, and soils,
(b) Construct streets, sidewalks, or parking lot aisles to the minimum widths necessary, provided that public safety is not compromised,
(c) Minimize the impervious footprint of the project,
(d) Minimize soil compaction to landscaped areas,
(e) Minimize disturbances to natural drainages (e.g., natural swales, topographic depressions, etc.), and
(f) Disconnect impervious surfaces through distributed pervious areas.

(3) Buffer zones for natural water bodies, where technically feasible. Where buffer zones are technically infeasible, require project proponent to implement other buffers such as trees, access restrictions, etc;

(4) Measures necessary so that grading or other construction activities meet the provisions specified in section F.2 of this Order.

(5) Where known, require industrial facility operators subject to the General Industrial permit to provide evidence of permit coverage prior to occupancy.

(6) Submittal of proof of a mechanism under which ongoing long-term maintenance of all structural post-construction BMPs will be conducted.

(7) Infiltration and Groundwater Protection

To protect groundwater quality, each Copermittee must apply restrictions to the use of treatment control BMPs that are designed to primarily function as large, centralized infiltration devices (such as large infiltration trenches and infiltration basins). Such restrictions must be designed so that the use of such infiltration treatment control BMPs must not cause or contribute to an exceedance of groundwater quality objectives. At a minimum, each treatment control BMP designed to primarily function as a centralized infiltration device must meet the restrictions below, unless it is demonstrated that a restriction is not necessary to protect groundwater quality. The Copermittees may collectively or individually develop alternative restrictions on the use of treatment control BMPs which are designed to primarily function as centralized infiltration devices. Alternative restrictions developed by the Copermittees can partially or wholly replace the restrictions listed below. The restrictions do not apply to small infiltration systems dispersed throughout a development project.

(a) Runoff must undergo pretreatment such as sedimentation or filtration prior to infiltration;

(b) All dry weather flows containing significant pollutant loads must be diverted from infiltration devices and treated through other BMPs;

(c) Pollution prevention and source control BMPs must be implemented at a level appropriate to protect groundwater quality at sites where infiltration treatment control BMPs are to be used;

(d) Infiltration treatment control BMPs must be adequately maintained so that they remove storm water pollutants to the MEP;

(e) The vertical distance from the base of any infiltration treatment control

BMP to the seasonal high groundwater mark must be at least 10 feet. Where groundwater basins do not support beneficial uses, this vertical distance criteria may be reduced, provided groundwater quality is maintained;

(f) The soil through which infiltration is to occur must have physical and chemical characteristics (such as appropriate cation exchange capacity, organic content, clay content, and infiltration rate) which are adequate for proper infiltration durations and treatment of runoff for the protection of groundwater beneficial uses;

(g) Infiltration treatment control BMPs must not be used for areas of industrial or light industrial activity; areas subject to high vehicular traffic (25,000 or greater average daily traffic on main roadway or 15,000 or more average daily traffic on any intersecting roadway); automotive repair shops; car washes; fleet storage areas (bus, truck, etc.); nurseries; and other high threat to water quality land uses and activities as designated by each Copermittee unless first treated or filtered to remove pollutants prior to infiltration and a comprehensive site-specific evaluation has been conducted; and

(h) Infiltration treatment control BMPs must be located a minimum of 100 feet horizontally from any water supply wells.

(7) Where feasible, landscaping with native or low water species shall be preferred in areas that drain to the MS4 or to waters of the United States.

d. STANDARD STORM WATER MITIGATION PLANS (SSMPS) – APPROVAL PROCESS CRITERIA AND REQUIREMENTS FOR PRIORITY DEVELOPMENT PROJECTS

Within 365 days of adoption of this Order, the Copermittees must submit an updated model SSMP, to the San Diego Water Board's Executive Officer for a 30 day public review and comment period. The San Diego Water Board's Executive Officer has the discretion to determine the necessity of a public hearing. Within 180 days of determination that the Model SSMP is in compliance with this Permit's provisions, each Copermittee must update their own local SSMP, and amended ordinances consistent with the model SSMP, and shall submit both (local SSMP and amended ordinances) to the San Diego Water Board. The model SSMP must meet the requirements of section F.1.d of this Order to (1) reduce Priority Development Project discharges of storm water pollutants from the MS4 to the MEP, and (2) prevent Priority Development Project runoff discharges from the MS4 from causing or contributing to a violation of water quality standards.[8]

[8] Updated SSMP and hydromodification requirements must apply to all priority projects or phases of priority projects which have not yet begun grading or construction activities at the time any updated SSMP or hydromodification requirement commences. If lawful prior approval of a project exists, whereby

(1) Definition of Priority Development Project (PDP):

Priority Development Projects are:

(a) All new Development Projects that fall under the project categories or locations listed in section F.1.d.(2), and

(b) Those redevelopment projects that create, add, or replace at least 5,000 square feet of impervious surfaces on an already developed site and the existing development and/or the redevelopment project falls under the project categories or locations listed in section F.1.d.(2). Where redevelopment results in an increase of less than fifty percent of the impervious surfaces of a previously existing development, and the existing development was not subject to SSMP requirements, the numeric sizing criteria discussed in section F.1.d.(6) applies only to the addition or replacement, and not to the entire development. Where redevelopment results in an increase of more than fifty percent of the impervious surfaces of a previously existing development, the numeric sizing criteria applies to the entire development.

(c) One acre threshold: In addition to the Priority Development Project Categories identified in section F.1.d.(2), Priority Development Projects must also include all other pollutant-generating Development Projects that result in the disturbance of one acre or more of land within two years of adoption of this Order.[9]

(2) Priority Development Project Categories

Where a new Development Project feature, such as a parking lot, falls into a Priority Development Project Category, the entire project footprint is subject to SSMP requirements.

(a) New development projects that create 10,000 square feet or more of impervious surfaces (collectively over the entire project site) including

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application of an updated SSMP or hydromodification requirement to the project is illegal, the updated SSMP or hydromodification requirement need not apply to the project. Updated Development Planning requirements set forth in Sections F.1. (a) through (h) of this Order must apply to all projects or phases of projects, unless, at the time any updated Development Planning requirement commences, the projects or project phases meet any one of the following conditions: (i) the project or phase has begun grading or construction activities; or (ii) a Copermittee determines that lawful prior approval rights for a project or project phase exist, whereby application of the Updated Development Planning requirement to the project is legally infeasible. Where feasible, the Permittees must utilize the SSMP and hydromodification update periods to ensure that projects undergoing approval processes include application of the updated SSMP and hydromodification requirements in their plans.

[9] Pollutant generating Development Projects are those projects that generate pollutants at levels greater than natural background levels.

commercial, industrial, residential, mixed-use, and public projects. This category includes development projects on public or private land which fall under the planning and building authority of the Copermittees.

(b) Automotive repair shops. This category is defined as a facility that is categorized in any one of the following Standard Industrial Classification (SIC) codes: 5013, 5014, 5541, 7532-7534, or 7536-7539.

(c) Restaurants. This category is defined as a facility that sells prepared foods and drinks for consumption, including stationary lunch counters and refreshment stands selling prepared foods and drinks for immediate consumption (SIC code 5812), where the land area for development is greater than 5,000 square feet. Restaurants where land development is less than 5,000 square feet must meet all SSMP requirements except for structural treatment BMP and numeric sizing criteria requirement F.1.d.(6) and hydromodification requirement F.1.h.

(d) All hillside development greater than 5,000 square feet. This category is defined as any development which creates 5,000 square feet of impervious surface which is located in an area with known erosive soil conditions, where the development will grade on any natural slope that is twenty-five percent or greater.

(e) Environmentally Sensitive Areas (ESAs). All development located within or directly adjacent to or discharging directly to an ESA (where discharges from the development or redevelopment will enter receiving waters within the ESA), which either creates 2,500 square feet of impervious surface on a proposed project site or increases the area of imperviousness of a proposed project site to 10 percent or more of its naturally occurring condition. “Directly adjacent” means situated within 200 feet of the ESA. “Discharging directly to” means outflow from a drainage conveyance system that is composed entirely of flows from the subject development or redevelopment site, and not commingled with flows from adjacent lands.

(f) Parking lots 5,000 square feet or more or with 15 or more parking spaces and potentially exposed to runoff. Parking lot is defined as a land area or facility for the temporary parking or storage of motor vehicles used personally, for business, or for commerce.

(g) Street, roads, highways, and freeways. This category includes any paved surface that is 5,000 square feet or greater used for the transportation of automobiles, trucks, motorcycles, and other vehicles.

(h) Retail Gasoline Outlets (RGOs). This category includes RGOs that meet the following criteria: (a) 5,000 square feet or more or (b) a projected Average Daily Traffic (ADT) of 100 or more vehicles per day.

(3) Pollutants of Concern

As part of its local SSMP, each Copermittee must implement an updated procedure for identifying pollutants of concern for each Priority Development Project. The procedure must address, at a minimum: (1) Receiving water quality (including pollutants for which receiving waters are listed as impaired under CWA section 303(d)); (2) Land-use type of the Development Project and pollutants associated with that land use type; and (3) Pollutants expected to be present on site.

(4) Low Impact Development BMP Requirements

Each Copermittee must require each Priority Development Project to implement LID BMPs which will collectively minimize directly connected impervious areas, limit loss of existing infiltration capacity, and protect areas that provide important water quality benefits necessary to maintain riparian and aquatic biota, and/or are particularly susceptible to erosion and sediment loss.

(a) The Copermittees must take the following measures to ensure that LID BMPs are implemented at PDPs:

(i) Each Copermittee must require LID BMPs or make a finding of technical infeasibility for each Priority Development Project in accordance with the LID waiver program in Section F.1.d.(8);
(ii) Each Copermittee must incorporate formalized consideration, such as thorough checklists, ordinances, and/or other means, of LID BMPs into the plan review process for Priority Development Projects;
(iii) The review of each Priority Development Project must include an assessment of potential collection of storm water for on-site or off-site reuse opportunities;
(iv) The review of each Priority Development Project must include an assessment of techniques to infiltrate, filter, store, evaporate, or retain runoff close to the source of runoff; and
(v) Within 2 years after adoption of this Order, each Copermittee must review its local codes, policies, and ordinances and identify barriers therein to implementation of LID BMPs. Following the identification of these barriers to LID implementation, where feasible, the Copermittee must take, by the end of the permit cycle, appropriate actions to remove such barriers.

(b) The following LID BMPs must be implemented at each PDP:

(i) Maintain or restore natural storage reservoirs and drainage

corridors (including depressions, areas of permeable soils, swales, and ephemeral and intermittent streams.

(ii) Projects with landscaped or other pervious areas must, where feasible, drain runoff from impervious areas (rooftops, parking lots, sidewalks, walkways, patios, etc) into pervious areas prior to discharge to the MS4. The amount of runoff from impervious areas that is to drain to pervious areas shall not exceed the total capacity of the project's pervious areas to infiltrate or treat runoff, taking into consideration the pervious areas' geologic and soil conditions, slope, and other pertinent factors.

(iii) Projects with landscaped or other pervious areas must, where feasible, properly design and construct the pervious areas to effectively receive and infiltrate or treat runoff from impervious areas, prior to discharge to the MS4. Soil compaction for these areas shall be minimized. The amount of the impervious areas that are to drain to pervious areas must be based upon the total size, soil conditions, slope, and other pertinent factors.

(iv) Projects with low traffic areas and appropriate soil conditions must construct walkways, trails, overflow parking lots, alleys, or other low-traffic areas with permeable surfaces, such as pervious concrete, porous asphalt, unit pavers, and granular materials.

(b) To protect ground water resources any large, centralized infiltration BMPs must comply with Section F.1.(c)(6). The restrictions do not apply to small infiltration systems dispersed throughout a development project.

(c) LID BMPs sizing criteria:

(i) LID BMPs shall be sized and designed to ensure onsite retention without runoff, of the volume of runoff produced from a 24-hour 85th percentile storm event[10] ("design capture volume");

(ii) If onsite retention LID BMPs are technically infeasible per section F.1.d.(7)(b), LID biofiltration BMPs may treat any volume that is not retained onsite by the LID BMPs. The LID biofiltration BMPs must be designed for an appropriate surface loading rate to prevent erosion, scour and channeling within the BMP. Due to the flow through design of biofiltration BMPs, the total volume of the BMP, including pore spaces and prefilter detention volume, must be sized

[10] This volume is not a single volume to be applied to all of Riverside County. The size of the 85th percentile storm event is different for various parts of the County. The Copermittees are encouraged to calculate the 85th percentile storm event for each of their jurisdictions using local rain data pertinent to their particular jurisdiction (0.6 inch standard is a rough average for the County and should only be used where appropriate rain data is not available). In addition, isopluvial maps may be used to extrapolate rainfall data to areas where insufficient data exists in order to determine the volume of the local 85th percentile storm event in such areas. Where the Copermittees will use isopluvial maps to determine the 85th percentile storm event in areas lacking rain data, the Copermittees shall describe their method for using isopluvial maps in their SSMPs.

to hold at least 0.75 times the design storm volume that is not retained onsite by LID retention BMPs;

(iii) If it is shown to be technically infeasible to treat the remaining volume up to and including the design capture volume using LID BMPs (retention or biofiltration), the project must implement conventional treatment control BMPs in accordance with Section F.1.d.(6) below and must participate in the LID waiver program in Section F.1.d.(7).

(e) All LID BMPs shall be designed and implemented with measures to avoid the creation of nuisance or pollution associated with vectors, such as mosquitoes, rodents, and flies.

(5) Source Control BMP Requirements

Each Copermittee must require each Priority Development Project to implement source control BMPs. The source control BMPs to be required must:

(a) Prevent illicit discharges into the MS4;
(b) Minimize storm water pollutants of concern in runoff;
(c) Eliminate irrigation runoff;
(d) Include storm drain system stenciling or signage;
(e) Include properly designed outdoor material storage areas;
(f) Include properly designed outdoor work areas;
(g) Include properly designed trash storage areas;
(h) Include water quality requirements applicable to individual priority project categories.

(6) Treatment Control BMP Requirements[11]

Each Copermittee must require each Priority Development Project to implement treatment control BMPs that meet the following requirements:

(a) All treatment control BMPs for a single Priority Development Project must collectively be sized to comply with the following numeric sizing criteria:

(i) Volume-based treatment control BMPs must be designed to mitigate (infiltrate, filter, or treat) the volume of runoff produced from a 24-hour 85th percentile storm event,[12]; or

[11] This section only applies to those PDPs not implementing LID capable of meeting the design storm criteria for the entire site and meeting technical infeasibility eligibility. Low-Impact Development (LID) and other site design BMPs that are correctly designed to effectively remove pollutants from runoff are considered treatment control BMPs.

[12] This volume is not a single volume to be applied to all of Riverside County. The size of the 85th percentile storm event is different for various parts of the County. The Copermittees are encouraged to calculate the 85th percentile storm event for each of their jurisdictions using local rain data pertinent to

(ii) Flow-based treatment control BMPs must be designed to mitigate (infiltrate, filter, or treat) either: a) the maximum flow rate of runoff produced from a rainfall intensity of 0.2 inch of rainfall per hour, for each hour of a storm event; or b) the maximum flow rate of runoff produced by the 85th percentile hourly rainfall intensity (for each hour of a storm event), as determined from the local historical rainfall record, multiplied by a factor of two.

(b) Treatment control BMPs for all Priority Development Projects must mitigate (treat through infiltration, settling, filtration or other unit processes) the required volume or flow of runoff from all developed portions of the project, including landscaped areas.

(c) All treatment control BMPs must be located so as to remove pollutants from runoff prior to its discharge to any receiving waters. Multiple Priority Development Projects may use shared treatment control BMPs as long as construction of any shared treatment control BMP is completed prior to the use or occupation of any Priority Development Project from which the treatment control BMP will receive runoff.

(d) All treatment control BMPs for Priority Development Projects must, at a minimum:

(i) Be ranked with high or medium pollutant removal efficiency for the project's most significant pollutants of concern, as the pollutant removal efficiencies are identified in the Copermittees' Model SSMP. Treatment control BMPs with a low removal efficiency ranking must only be approved by a Copermittee when a feasibility analysis has been conducted which exhibits that implementation of treatment control BMPs with high or medium removal efficiency rankings are infeasible for a Priority Development Project or portion of a Priority Development Project.

(ii) Be correctly sized and designed so as to remove storm water pollutants to the MEP.

(e) Target removal of pollutants of concern from runoff.

(f) Be implemented close to pollutant sources, and prior to discharging into waters of the U.S.

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their particular jurisdiction. In addition, isopluvial maps may be used to extrapolate rainfall data to areas where insufficient data exists in order to determine the volume of the local 85th percentile storm event in such areas. Where the Copermittees will use isopluvial maps to determine the 85th percentile storm event in areas lacking rain data, the Copermittees shall describe their method for using isopluvial maps in their SSMPs.

(g) Not be constructed within a waters of the U.S. or waters of the State.

(h) Include proof of a mechanism under which ongoing long-term maintenance will be conducted to ensure proper maintenance for the life of the project. The mechanisms may be provided by the project proponent or Copermittee.

(i) Be designed and implemented with measures to avoid the creation of nuisance or pollution associated with vectors, such as mosquitoes, rodents, and flies.

(7) Low Impact Development (LID) BMP Waiver Program

The Copermittees must develop, collectively or individually, a LID waiver program for incorporation into local SSMPs, which would allow a Priority Development Project to substitute implementation of all or a portion of required LID BMPs in section F.1.d(4) with implementation of treatment control BMPs and either 1) a mitigation project, 2) payment into an in-lieu funding program, and/or 3) watershed equivalent BMP(s) consistent with Section F.1.d.(11). The Copermittees shall submit the LID waiver program as part of their updated model SSMP. At a minimum, the program must meet the requirements below:

(a) Prior to implementation, the LID waiver program must clearly exhibit that it will not allow PDPs to result in a net impact (after consideration of any mitigation and in-lieu payments) from pollutant loadings over and above the impact caused by projects meeting LID requirements;

(b) For each PDP participating, a technical feasibility analysis must be included demonstrating that it is technically infeasible to implement LID BMPs that comply with the requirements of Section F.1.(d)(4). The Copermittee(s) must develop criteria for the technical feasibility analysis including a cost benefit analysis, examination of LID BMPs considered and alternatives chosen. Each PDP participating must demonstrate that LID BMPs were implemented as much as feasible given the site's unique conditions. Analysis must be made of the pollutant loading for each project participating in the LID substitution program. The estimated impacts from not implementing the required LID BMPs in section F.1.d.(4) must be fully mitigated. Technical infeasibility may result from conditions including, but not limited to:

(i) Locations that cannot meet the infiltration and groundwater protection requirements in section F.1.c.(6) for large, centralized infiltration BMPs. Where infiltration is technically infeasible, the project must still examine the feasibility of other onsite retention LID

BMPs;

(ii) Smart growth and infill or redevelopment locations where the density and/or nature of the project would create significant difficulty for compliance with the onsite volume retention requirements; and

(iii) Other site, geologic, soil or implementation constraints identified in the Copermittees updated local SSMP document.

(c) The LID waiver program must include mechanisms to verify that each Priority Development Project participating in the program is in compliance with all applicable SSMP requirements;

(d) The LID waiver program must develop and implement a review process verifying that the BMPs to be implemented meet the designated design criteria. The review process must also verify that each Priority Development Project participating in the program is in compliance with all applicable SSMP requirements.

(e) The LID waiver program must include performance standards for treatment control BMPs specified in compliance with section F.1.(d)(6).

(f) Each PDP that participates in the LID waiver program must mitigate for the pollutant loads expected to be discharged due to not implementing the LID BMPs in section F.1.d.(4). Mitigation projects must be implemented within the same hydrologic subarea as the PDP. Mitigation projects outside of the hydrologic subarea but within the same hydrologic unit may be approved provided that the project proponent demonstrates that mitigation projects within the same hydrologic subarea are infeasible and that the mitigation project will address similar beneficial use impacts as expected from the PDPs pollutant load types and amount. Offsite mitigation projects may include green streets projects, existing development retrofit projects, retrofit incentive programs, regional BMPs and stream restoration. Project applicants seeking to utilize these alternative compliance provisions may propose other offsite mitigation projects, which the Copermittees may approve if they meet the requirements of this subpart.

(g) A Copermittee may choose to implement a pollutant credit system as part of the LID waiver program provided that such a credit system clearly exhibits that it will not allow PDPs to result in a net impact from pollutant loadings over and above the impact caused by projects meeting LID requirements. Any credit system that a Copermittee chooses to implement must be submitted to the Executive Officer for review and approval as part of the waiver program.

(h) The LID waiver program shall include a storm water mitigation fund

developed by the Copermittee(s) to be used for water quality improvement projects which may serve in lieu of the PDP's required mitigation in section F.1.d.(8)(e). The LID waiver program's storm water mitigation fund shall, at a minimum, identify;

(i) The entity or entities that will manage the storm water mitigation fund (i.e., assume full responsibility);
(ii) The range and types of acceptable projects for which storm water mitigation funds may be expended;
(iii) The entity or entities that will assume full responsibility for each water quality improvement project, including its successful completion; and
(iv) How the dollar amount of storm water mitigation fund contributions will be determined. In-lieu payments must be proportional to the additional pollutant load discharged by not fully implementing LID.

(i) Each Copermittee must notify the San Diego Water Board in their annual report of each PDP choosing to participate in the LID waiver program. The annual report must include the following information:

(i) Name of the developer of the participating PDP;
(ii) Site location;
(iii) Reason for LID waiver including technical feasibility analysis;
(iv) Description of BMPs implemented;
(v) Total amount deposited, if any, into the storm water mitigation fund described in section F.1.d.(8)(f);
(vi) Water quality improvement project(s) proposed to be funded; and
(vii) Timeframe for implementation of water quality improvement projects.

(8) Site Design and Treatment Control BMP Design Standards

As part of its local SSMP, each Copermittee must develop and require Priority Development Projects to implement sitting, design, and maintenance criteria for each site design and treatment control BMP listed in its local SSMP to determine feasibility and applicability and so that implemented site design and treatment control BMPs are constructed correctly and are effective at pollutant removal, runoff control, and vector minimization. LID techniques must be incorporated into the criteria for appropriate treatment control BMPs. Development of BMP design worksheets which can be used by project proponents is encouraged.

(9) Implementation Process

As part of its local SSMP, each Copermittee must implement a process to verify compliance with SSMP requirements. The process must identify at

what point in the planning process Priority Development Projects will be required to meet SSMP requirements and at a minimum, the Priority Development Project must implement the required post-construction BMPs prior to occupancy and/or the intended use of any portion of that project. The process must also include identification of the roles and responsibilities of various municipal departments in implementing the SSMP requirements, as well as any other measures necessary for the implementation of SSMP requirements.

(10) Treatment BMP Review

(a) The Copermittees must review and update the BMPs that are listed in their local SSMPs as options for treatment control. At a minimum, the update must include removal of obsolete or ineffective BMPs and addition of LID BMPs that can be used for treatment, such as bioretention cells, bioretention swales, etc. The update must also add appropriate LID BMPs to any tables or discussions in the local SSMPs addressing pollutant removal efficiencies of treatment control BMPs. In addition, the update must include review and revision where necessary of treatment control BMP pollutant removal efficiencies.

(b) The update must incorporate findings from BMP effectiveness studies conducted by the Copermittees for projects funded wholly or in part by the State Board or Regional Boards.

(c) Each Copermittee must implement a mechanism for annually incorporating findings from local treatment BMP effectiveness studies (e.g., ones conducted by, or on-behalf of, public agencies in Riverside County) into SSMP project reviews and permitting

(11) Where a development project, greater than 100 acres in total project size or smaller than 100 acres in size yet part of a larger common plan of development that is over 100 acres, has been prepared using watershed and/or sub-watershed based water quality, hydrologic, and fluvial geomorphologic planning principles that implement regional LID BMPs in accordance with the sizing and location criteria of this Order and acceptable to the San Diego Water Board, such standards shall govern review of projects with respect to Section F.1 of this Order and shall be deemed to satisfy this Order's requirements for LID site design, buffer zone, infiltration and groundwater protection standards, source control, treatment control, and hydromodification control standards. Regional BMPs must clearly exhibit that they will not result in a net impact from pollutant loadings over and above the impact caused by capture and retention of the design storm. Regional BMPs may be used provided that the BMPs capture and retain the volume of runoff produced from the 24-hour 85th percentile storm event as defined in section F.1.d.(6)(a)(i) and that such controls are located upstream

of receiving waters. Any volume that is not retained by the LID BMPs, up to the design capture volume, must be treated using LID biofiltration. Where regional LID implementation has been shown to be technically infeasible (per section F.1.d.7.b) any volume up to and including the design capture volume, not retained by LID BMPs, nor treated by LID biofiltration, must be treated using conventional treatment control BMPs in accordance with Section F.1.d.(6) and participation in the LID waiver program in Section F.1.d.(7).

e. BMP CONSTRUCTION VERIFICATION

Prior to occupancy and/or intended use of any portion of the Priority Development Project subject to SSMP requirements, each Copermittee must inspect the constructed site design, source control, and treatment control BMPs to verify that they have been constructed and are operating in compliance with all specifications, plans, permits, ordinances, and this Order.

f. BMP MAINTENANCE TRACKING

(1) Each Copermittee must develop and maintain a watershed-based database to track and inventory all approved post-construction BMPs and BMP maintenance within its jurisdiction since July, 2005. LID BMPs implemented on a lot by lot basis at a single family residential home, such as rainbarrels, are not required to be tracked or inventoried. At a minimum, the database must include information on BMP type, location, watershed, date of construction, party responsible for maintenance, maintenance certifications or verifications, inspections, inspection findings, and corrective actions, including whether the site was referred to the local vector control agency or department.

(2) Each Copermittee must establish a mechanism not only to track post-construction BMPs, but also to ensure that appropriate easements and ownerships are properly recorded in public records and the information is conveyed to all appropriate parties when there is a change in project or site ownership.

(3) Each Copermittee must verify that approved post-construction BMPs are operating effectively and have been adequately maintained by implementing the following measures:

(a) An annual inventory of all approved BMPs within the Copermittee's jurisdiction. LID BMPs implemented on a lot by lot basis at a single family residential home, such as rainbarrels, are not required to be tracked or inventoried. The inventory must also include all BMPs approved for Priority Development Projects since July, 2005;

(b) The designation of high priority BMPs. High-priority designation must include consideration of BMP size, recommended maintenance frequency, likelihood of operational and maintenance issues, location, receiving water quality, and other pertinent factors;

(c) Verify implementation, operation, and maintenance of BMPs by inspection, self-certification, surveys, or other equally effective approaches with the following conditions:

(i) The implementation, operation, and maintenance of at least 90 percent of approved and inventoried final project public and private SSMPs (a.k.a. WQMPs) must be verified annually. All post-construction BMPs shall be verified within every four year period;
(ii) Operation and maintenance verifications must be required prior to each rainy season;
(iii) All (100 percent) projects with BMPs that are high priority must be inspected by the Copermittee annually prior to each rainy season;
(iv) All (100 percent) public agency projects with BMPs must be inspected by the Copermittee annually;
(v) At least 50 percent of projects with drainage insert treatment control BMPs must be inspected by the Copermittee annually;
(vi) Appropriate follow-up measures (including re-inspections, enforcement, maintenance, etc.) must be conducted to ensure the treatment BMPs continue to reduce storm water pollutants as originally designed;
(vii) All inspections must verify effective operation and maintenance of the treatment control BMPs, as well as compliance with all ordinances, permits, and this Order; and
(viii) Inspections must note observations of vector conditions, such as mosquitoes. Where conditions are identified as contributing to mosquito production, the Copermittee must notify their local vector control agency.

g. ENFORCEMENT OF DEVELOPMENT SITES

Each Copermittee must enforce its storm water ordinance for all Development Projects and at all development sites as necessary to maintain compliance with this Order. Copermittee ordinances or other regulatory mechanisms must include appropriate sanctions to achieve compliance. Sanctions must include the following or their equivalent: Non-monetary penalties, fines, bonding requirements, and/or permit or occupancy denials for non-compliance.

h. HYDROMODIFICATION – LIMITATIONS ON INCREASES OF RUNOFF DISCHARGE RATES AND DURATIONS[13]

[13] Updated SSMP and hydromodification requirements shall apply to all priority projects or phases of priority projects which have not yet begun grading or construction activities at the time any updated

Each Copermittee shall collaborate with the other Copermittees to develop and implement a Hydromodification Management Plan (HMP) to manage increases in runoff discharge rates and durations from all Priority Development Projects. The HMP shall be incorporated into the local SSMP and implemented by each Copermittee so that estimated post-project runoff discharge rates and durations shall not exceed pre-development discharge rates and durations. Where the proposed project is located on an already developed site, the pre-project discharge rate and duration shall be that of the pre-developed, naturally occurring condition. The HMP shall be submitted to the Executive Officer within 2 years of permit adoption. The HMP will be made available for public review and comment and the Executive Officer will determine the need for a public hearing.

(1) The HMP must:

(a) Identify a method for assessing susceptibility of channel segments which receive runoff discharges from Priority Development Projects. The geomorphic stability within the channel shall be assessed. A performance standard shall be created that ensures that the geomorphic stability within the channel not be compromised as a result of receiving runoff discharges from Priority Development Projects.

(b) Utilize continuous simulation of the entire rainfall record (or other analytical method proposed by the Copermittees and deemed acceptable by the San Diego Water Board) to identify a range of runoff flows[14] for which priority Development Project post-project runoff flow rates and durations shall not exceed pre-development (naturally occurring) runoff flow rates and durations by more than 10 percent, where the increased flow rates and durations will result in increased potential for erosion or other significant adverse impacts to beneficial uses. In addition, the identified range of runoff flow rates and durations must compensate for the loss of sediment supply due to the development. The lower boundary of the range of runoff flows identified shall correspond with the critical channel flow that produces the critical shear stress that initiates channel bed movement or that erodes the toe of channel banks. The identified range of runoff flows may be different for specific watersheds, channels, or channel reaches. In the case of an artificially hardened (concrete lined, rip

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SSMP or hydromodification requirement commences. If a Copermittee determines that lawful prior approval of a project exists, whereby application of an updated SSMP or hydromodification requirement to the project is legally infeasible, the updated SSMP or hydromodification requirement need not apply to the project. The Copermittees shall utilize the SSMP and hydromodification update periods to ensure that projects undergoing approval processes include application of the updated SSMP and hydromodification requirements in their plans.

[14] The identified range of runoff flows to be controlled should be expressed in terms of peak flow rates of rainfall events, such as “10% of the pre-development 2-year runoff event up to the pre-project 10-year runoff event.”

rap, etc.) channel, the lower boundary of the range of runoff flows identified shall correspond with the critical channel flow that produces the critical shear stress that initiates channel bed movement or that erodes the toe of channel banks of a comparable soft-bottomed channel.

(c) Require Priority Development Projects to implement hydrologic control measures so that Priority Development Projects' post-project runoff flow rates and durations (1) do not exceed pre-project (naturally occurring) runoff flow rates and durations by more than 10 percent for the range of runoff flows identified under section F.1.h.(1)(b), where the increased flow rates and durations will result in increased potential for erosion or other significant adverse impacts to beneficial uses; (2) do not result in channel conditions which do not meet the channel standard developed under section F.1.h.(1)(a) for channel segments downstream of Priority Development Project discharge points; and (3) compensate for the loss of sediment supply due to development.

(d) Include other performance criteria (numeric or otherwise) for Priority Development Projects as necessary to prevent runoff from the projects from increasing and/or continuing unnatural rates of erosion of channel beds and banks, silt pollutants generation, or other impacts to beneficial uses and stream habitat due to increased erosive force.

(e) Include a review of pertinent literature.

(f) Identify areas within the Santa Margarita Hydrologic Unit where historic hydromodification of receiving waters has a negative impact to benthic macroinvertebrate and benthic periphyton by identifying areas with low or very low Index of Biotic Integrity (IBI) scores.

(g) Include a protocol to evaluate potential hydrograph change impacts to downstream watercourses from Priority Development Projects. This protocol must include the use of the IBI score as a metric for assessing impacts and improvements to downstream watercourses.

(h) Include a description of how the Copermittees will incorporate the HMP requirements into their local approval processes.

(i) Include criteria on selection and design of management practices and measures (such as detention, retention, and infiltration) to control flow rates and durations and address potential hydromodification impacts.

(j) Include technical information supporting any standards and criteria proposed.

(k) Include a description of inspections and maintenance to be conducted for

management practices and measures to control flow rates and durations and address potential hydromodification impacts.

(l) Include a description of pre- and post-project monitoring and other program evaluation, including IBI score, to be conducted to assess the effectiveness of implementation of the HMP.

(m) Include mechanisms for assessing and addressing cumulative impacts within a watershed on channel morphology.

(n) Include information on evaluation of channel form and condition, including slope, discharge, vegetation, underlying geology, and other information, as appropriate.

(2) In addition to the hydrologic control measures that must be implemented per section F.1.h.(1)(c), the HMP must include a suite of management measures to be used on Priority Development Projects to protect and restore downstream beneficial uses and prevent or further prevent adverse physical changes to downstream channels. The measures must be based on a prioritized consideration of the following elements in this order:

(a) Hydrologic control measures;
(b) On-site management controls;
(c) Regional controls located upstream of receiving waters; and
(d) In-stream controls.

Where stream channels are adjacent to, or are to be modified as part of a Priority Development Project, management measures must include buffer zones and setbacks. Under no circumstances will in-stream controls include the use of non-naturally occurring hardscape materials such as concrete, riprap, gabions, etc. The suite of management measures shall also include stream restoration as a viable option to achieve the channel standard in section F.1.h.(1)(a).

(3) Each individual Copermittee has the discretion to not require Section F.1.h. at Priority Development Projects where the project:

(a) Discharges storm water runoff into underground storm drains discharging directly to bays or the ocean; or
(b) Discharges storm water runoff into conveyance channels whose bed and bank are concrete lined all the way from the point of discharge to ocean waters, enclosed bays, estuaries, or water storage reservoirs and lakes.

(4) HMP Reporting and Implementation

(a) Within 2 years of adoption of the Order, the Copermittees shall submit to

the San Diego Water Board a draft HMP that has been reviewed by the public, including the analysis that identifies the appropriate limiting range of flow rates per section F.1.h.(1)(b).

(b) Within 180 days of receiving San Diego Water Board comments on the draft HMP, the Copermittees shall submit a final HMP that addressed the San Diego Water Board's comments.

(c) Within 90 days of receiving a finding of adequacy from the Executive Officer, each Copermittee shall incorporate and implement the HMP for all Priority Development Projects.

(d) Prior to approval of the HMP by the San Diego Water Board, the early implementation measures likely to be included in the HMP shall be encouraged by the Copermittees.

(5) Interim Hydromodification Criteria

Within one year of adoption of this Order, each Copermittee must ensure that all Priority Development Projects are implementing the following criteria by comparing the pre-development (naturally occurring) and post-project flow rates and durations using a continuous simulation hydrologic model such as US EPA's Hydrograph Simulation Program-Fortran (HSPF):

(a) For flow rates from 10 percent of the 2-year storm event to the 5 year storm event, the post-project peak flows shall not exceed pre-development (naturally occurring) peak flows.

(b) For flow rates from the 5 year storm event to the 10 year storm event the post-project peak flows may exceed pre-development (naturally occurring) flows by up to 10 percent for a 1-year frequency interval.

The interim hydromodification criteria do not apply to Priority Development Projects where the project discharges (1) storm water runoff into underground storm drains discharging directly to bays or the ocean, or (2) storm water runoff into conveyance channels whose bed and bank are concrete lined all the way from the point of discharge to ocean waters, enclosed bays, estuaries, or water storage reservoirs and lakes.

Within one year of adoption of this Order, each Copermittee must submit a signed, certification statement to the San Diego Water Board verifying implementation of the interim hydromodification criteria.

(6) No part of section F.1.h shall alleviate the Copermittees responsibilities for implementing Low Impact Development BMPs as required under section F.1.d.(4).

i. TRAINING AND EDUCATION

(1) Municipal Departments and Personnel Education

Municipal Development Planning: Each Copermittee must implement an education program so that its planning and development review staffs and contractors (and Planning Boards and Elected Officials, if applicable) have an understanding of:

(a) Federal, State, and local water quality laws and regulations applicable to Development Projects;

(b) The connection between land use decisions and short and long-term water quality impacts (i.e., impacts from land development and urbanization); and

(c) Methods of minimizing impacts to receiving water quality resulting from development, including:

(i) Storm water management plan development and review;
(ii) Local sensitive water bodies, including 303(d)-impairments and ESAs;
(iii) Methods to control downstream erosion impacts;
(iv) Identification of pollutants of concern;
(v) Site design BMP techniques;
(vi) Source control BMPs;
(vii) Selection of the most effective treatment control BMPs for the pollutants of concern; and
(viii) Public heath concerns related to storm water management infrastructure.

(2) Project Applicants, Developers, Contractors, Property Owners, and other Responsible Parties

(a) Each Copermittee must implement a New Development / Redevelopment education program using all media as appropriate to:

(i) Measurably increase the knowledge of the target communities regarding MS4s, impacts of runoff on receiving waters, and potential BMP solutions for the target audience; and
(ii) To measurably change the behavior of target communities and thereby reduce pollutant releases to MS4s and the environment.

(b) Each Copermittee must educate each target community on the following topics where appropriate:

(i) The importance of educating all construction workers in the field about storm water issues and BMPs though formal or informal training;
(ii) Federal, State, and local water quality laws and regulations applicable to new development and redevelopment activities;
(iii) Site design, source control, pollution prevention, and treatment BMPs;
(iv) General runoff concepts; and
(v) Other topics of local importance, including local water quality conditions, impaired waterbodies and environmentally sensitive areas.

2. CONSTRUCTION COMPONENT

Each Copermittee must implement a construction program which meets the requirements of this section, prevents illicit discharges into the MS4, implements and maintains structural and non-structural BMPs to reduce pollutants in storm water runoff from construction sites to the MS4, reduces construction site discharges of storm water pollutants from the MS4 to the MEP, and prevents construction site discharges from the MS4 from causing or contributing to a violation of water quality standards.

a. ORDINANCE UPDATE

Within 365 days of adoption of this Order, each Copermittee must review and update its grading ordinances and other ordinances as necessary to achieve full compliance with this Order, including requirements for the implementation of all designated BMPs and other measures.

b. SOURCE IDENTIFICATION

Each Copermittee must maintain an updated watershed based inventory of all construction sites within its jurisdiction. The use of an automated database system, such as Geographical Information Systems (GIS) is required.

c. SITE PLANNING AND PROJECT APPROVAL PROCESS

Each Copermittee must incorporate consideration of potential water quality impacts prior to approval and issuance of construction and grading permits.

(1) Each construction and grading permit must require proposed construction sites to implement designated BMPs and other measures so that illicit discharges into the MS4 are prevented and storm water pollutants discharged from the site will be reduced to the maximum extent practicable and will not cause or contribute to a violation of water quality standards.

(2) Prior to permit issuance, the project proponent's runoff management plan (or equivalent construction BMP plan) must be required to comply, and

reviewed to verify compliance, with the local grading ordinance, other applicable local ordinances, and this Order.

(3) Prior to permit issuance, each Copermittee must verify that project proponents subject to California's statewide General NPDES Permit for Storm Water Discharges Associated With Construction Activities, (hereinafter General Construction Permit), have existing coverage under the General Construction Permit.

d. BMP IMPLEMENTATION

(1) Designate BMPs: Each Copermittee must designate a minimum set of BMPs and other measures to be implemented at all construction sites. The designated minimum set of BMPs must include:

(a) Management Measures:

(i) Pollution prevention, where appropriate;
(ii) Development and implementation of a site-specific runoff management plan;
(iii) Minimization of areas that are cleared and graded to only the portion of the site that is necessary for construction;
(iv) Minimization of exposure time of disturbed soil areas;
(v) Minimization of grading during the wet season and correlation of grading with seasonal dry weather periods to the extent feasible;
(vi) Limitation of grading to a maximum disturbed area as determined by each Copermittee before either temporary or permanent erosion controls are implemented to prevent storm water pollution. The Copermittee has the option of temporarily increasing the size of disturbed soil areas by a set amount beyond the maximum, if the individual site is in compliance with applicable storm water regulations and the site has adequate control practices implemented to prevent storm water pollution;
(vii) Temporary stabilization and reseeding of disturbed soil areas as rapidly as feasible;
(viii) Wind erosion controls;
(ix) Tracking controls;
(x) Non-stormwater management measures to prevent illicit discharges and control storm water pollution sources;
(xi) Waste management measures;
(xii) Preservation of natural hydrologic features where feasible;
(xiii) Preservation of riparian buffers and corridors where feasible;
(xiv) Evaluation and maintenance of all BMPs, until removed; and
(xv) Retention, reduction, and proper management of all storm water pollutant discharges on site to the MEP standard.

(b) Erosion and Sediment Controls:

(i) Erosion prevention. Erosion prevention is to be used as the most important measure for keeping sediment on site during construction;
(ii) Sediment controls. Sediment controls are to be used as a supplement to erosion prevention for keeping sediment on-site during construction;
(iii) Slope stabilization must be used on all active slopes during rain events regardless of the season and on all inactive slopes during the rainy season and during rain events in the dry season; and
(iv) Permanent revegetation or landscaping as early as feasible.

(c) Designate enhanced BMPs[15] for 303(d) impairments and ESAs: Each Copermittee must implement, or require implementation of, enhanced measures to address the exceptional threat to water quality posed by all construction sites tributary to CWA section 303(d) water body segments impaired for sediment or turbidity. Each Copermittee must also implement, or require implementation of, enhanced, site-specific measures for construction sites within or adjacent to or discharging directly to receiving waters within environmentally sensitive areas (as defined in Attachment C of this Order).

(i) Active Sediment Treatment (AST): Each Copermittee must require implementation of advanced treatment for sediment at construction sites (or portions thereof) that are determined by the Copermittee to be an exceptional threat to water quality. In evaluating the threat to water quality, the following factors must be considered by the Copermittee:

[a] Soil erosion potential or soil type;
[b] The site's slopes;
[c] Project size and type;
[d] Sensitivity of receiving water bodies;
[e] Proximity to receiving water bodies;
[f] Non-storm water discharges;
[g] Ineffectiveness of other BMPs;
[h] Proximity and sensitivity of aquatic threatened and endangered species of concern;
[i] Known effects of AST chemicals; and
[j] Any other relevant factors.

(d) Implement BMPs: Each Copermittee must implement, or require the

[15] Enhanced BMPs are control actions specifically targeted to the pollutant or condition of concern and of higher quality and effectiveness than the minimum control measures otherwise required. Enhanced in this Order means better, not simply more, BMPs.

implementation of, the designated minimum BMPs and any additional measures necessary to comply with this Order at each construction site within its jurisdiction year round. BMP implementation requirements, however, can vary based on wet and dry seasons. Dry season BMP implementation must plan for and address unseasonal rain events that may occur during the dry season (May 1 through September 30).

e. INSPECTION OF CONSTRUCTION SITES

Each Copermittee must conduct construction site inspections for compliance with its ordinances (grading, storm water, etc.), permits (construction, grading, etc.), and this Order. Priorities for inspecting sites must consider the nature and size of the construction activity, topography, and the characteristics of soils and receiving water quality.

(1) During the wet season, each Copermittee must inspect at least every two weeks, all construction sites within its jurisdiction meeting any of the following criteria:

(a) All sites 30 acres or more in size with rough grading or active slopes occurring during the wet season;

(b) All sites one acre or more, and tributary to a CWA section 303(d) water body segment impaired for sediment or within or directly adjacent to, or discharging directly to a receiving water within an ESA; and

(c) Other sites determined by the Copermittees or the San Diego Water Board as a significant threat to water quality. In evaluating threat to water quality, the following factors must be considered: (1) soil erosion potential; (2) site slope; (3) project size and type; (4) sensitivity of receiving water bodies; (5) proximity to receiving water bodies; (6) non-storm water discharges; (7) past record of non-compliance by the operators of the construction site; and (8) any other relevant factors.

(2) During the wet season, each Copermittee must inspect at least monthly, all construction sites with one acre or more of soil disturbance not meeting the criteria specified above in section F.2.e.(1).

(3) During the wet season, each Copermittee must inspect construction sites less than one acre in size as needed to ensure compliance with its ordinances and this Order.

(4) Each Copermittee must inspect all construction sites as needed during the dry season. Sites meeting the criteria in section F.2.e.(1) must be inspected at least once in August or September each year.

(5) Re-inspections: Based upon site inspection findings, each Copermittee must implement all follow-up actions (i.e., re-inspection, enforcement) necessary to comply with this Order. Reinspection frequencies must be determined by each Copermittee based upon the severity of deficiencies, the nature of the construction activity, and the characteristics of soils and receiving water quality.

(6) Inspections of construction sites must include, but not be limited to:

(a) Check for coverage under the General Construction Permit (Notice of Intent (NOI) and/or Waste Discharge Identification No.) during initial inspections;
(b) Assessment of compliance with Copermittee ordinances and permits related to runoff, including the implementation and maintenance of designated minimum BMPs;
(c) Assessment of BMP effectiveness;
(d) Visual observations for non-storm water discharges, potential illicit connections, and potential discharge of pollutants in storm water runoff;
(e) Review of site monitoring data, if the site monitors its runoff
(f) Education and outreach on storm water pollution prevention, as needed; and
(g) Creation of a written or electronic inspection report.

(7) The Copermittees must track the number of inspections for each inventoried construction site throughout the reporting period to verify that each site is inspected at the minimum frequencies required.

f. ENFORCEMENT OF CONSTRUCTION SITES

(1) Each Copermittee must develop and implement an escalating enforcement process that achieves prompt corrective actions at construction sites for violations of the Copermittee's water quality protection permits, requirements, and ordinances. This enforcement process must include authorizing the Copermittee's construction site inspectors to take immediate enforcement actions when appropriate and necessary. The enforcement process must include appropriate sanctions such as stop work orders, non-monetary penalties, fines, bonding requirements, and/or permit denials for non-compliance.

(2) Each Copermittee must be able to respond to complaints received from third-parties and to ensure the San Diego Water Board that corrective actions have been implemented.

g. REPORTING OF NON-COMPLIANT SITES

(1) In addition to the notification requirements in Attachment B, each

Copermittee must notify the San Diego Water Board when the Copermittee issues a stop work order or other high level enforcement to a construction site in its jurisdiction as a result of storm water violations.

(2) Each Copermittee shall annually notify the San Diego Water Board, prior to the commencement of the wet season, of all construction sites with alleged violations. Information may be provided as part of the JRMP annual report if submitted prior to the rainy season. Information provided shall include, but not be limited to, the following:

(a) WDID number if enrolled under the General Construction Permit
(b) Site Location, including address
(c) Current violations or suspected violations

h. TRAINING AND EDUCATION

(1) Municipal Staff and Contractors: Requirements for municipal staff and contractors are described in the Municipal Component section of this Order.

(2) Construction Site Owner / Operator Responsibilities:

As early in the planning and development process as possible and all through the permitting and construction process, each Copermittee must implement a program to educate project applicants, developers, contractors, property owners, and other responsible parties. The education program must provide an understanding of the topics listed below, as appropriate for the audience being educated.

(a) The importance of educating all construction workers in the field about storm water issues and BMPs though formal or informal training;
(b) Federal, State, and local water quality laws and regulations applicable to construction and grading activities;
(c) Site design, source control, pollution prevention, and treatment BMPs;
(d) General runoff concepts; and
(e) Other topics of local importance, including local water quality conditions, impaired waterbodies and environmentally sensitive areas.

3. EXISTING DEVELOPMENT COMPONENT

a. MUNICIPAL

Each Copermittee must implement a municipal program which meets the requirements of this section, prevents illicit discharges into the MS4, reduces municipal discharges of storm water pollutants from the MS4 to the MEP, and prevents municipal discharges from the MS4 from causing or contributing to a violation of water quality standards.

(1) Source Identification / Inventory

Each Copermittee must maintain an updated watershed-based inventory of all municipal areas and activities. The inventory must include the name, address (if applicable), and a description of the area/activity; which pollutants are potentially generated by the area/activity; whether the area/activity is adjacent to an ESA; and identification of whether the area/activity is tributary to a CWA section 303(d) water body segment and generates pollutants for which the water body segment is impaired. The use of an automated database system, such as Geographical Information Systems (GIS) is required when applicable.

(2) General BMP Implementation

(a) Pollution Prevention: Each Copermittee must implement pollution prevention methods in its municipal program and must require their use by appropriate municipal departments, personnel, and contractors, where appropriate.

(b) Designate Minimum BMPs: Each Copermittee must designate a minimum set of BMPs for all municipal areas and activities. The designated minimum BMPs for municipal areas and activities must be area or activity specific as appropriate. BMPs must be designated for special events that are expected to generate significant trash and litter.

(c) Designate BMPs for ESAs and 303(d) Impairments: Each Copermittee

must designate enhanced measures for municipal areas and activities tributary to CWA section 303(d) impaired water body segments when an area or activity generates pollutants for which the water body segment is impaired. Each Copermittee must also designate additional controls for municipal areas and activities within or directly adjacent to or discharging directly to coastal lagoons, the ocean, or other receiving waters within environmentally sensitive areas (as defined in Attachment C of this Order).

(d) Implement BMPs: Each Copermittee must implement, or require the implementation of, the designated minimum and enhanced BMPs and any additional measures necessary based on its inventory to comply with this Order for each municipal area or activity within its jurisdiction.

(3) BMP Implementation for Management of Pesticides, Herbicides, and Fertilizers

Each Copermittee must implement BMPs to reduce the contribution of storm water pollutants associated with the application, storage, and disposal of pesticides, herbicides and fertilizers from municipal areas and activities to MS4s and receiving waters. Such BMPs must include, at a minimum:

(a) Educational activities, permits, certifications and other measures for municipal applicators and distributors;
(b) Integrated Pest Management (IPM) measures that rely on non-chemical solutions;
(c) The use of native vegetation;
(d) Schedules for irrigation and chemical application; and
(e) The collection and proper disposal of unused pesticides, herbicides, and fertilizers.

(4) BMP implementation for Flood Control Structures

(a) Each Copermittee must implement procedures to assure that flood management projects assess the impacts on the water quality of receiving water bodies.
(b) Each Copermittee must include water quality protection measures, where feasible, when retrofitting existing flood control structural devices.
(c) Each Copermittee must evaluate its existing flood control devices, identify devices causing or contributing to a condition of pollution, identify measures to reduce or eliminate the structure's effect on pollution, and evaluate the feasibility of retrofitting the structural flood control device. The inventory and evaluation must be completed by and submitted to the San Diego Water Board in the 2nd year JRMP Annual Report.

(5) BMP Implementation for Sweeping of Municipal Areas

Where municipal area sweeping is implemented as an MS4 BMP for municipal roads, streets, highways, and parking facilities, each Copermittee must design and implement the program based on the following criteria:

(a) Optimize pickup of trash and debris based on land uses, trash collection schedules, seasonal factors (e.g., special events, tourism, etc.) and inspections of municipal areas/activities.

(6) Operation and Maintenance of Municipal Separate Storm Sewer System (MS4) and Structural Controls

(a) Treatment Controls: Each Copermittee must implement a schedule of inspection and maintenance activities to verify proper operation of all municipal structural treatment controls designed to reduce storm water pollutant discharges to or from its MS4s and related drainage structures.

(b) MS4 and Facilities: Each Copermittee must implement a schedule of maintenance activities for the MS4 and MS4 facilities (catch basins, storm drain inlets, open channels, etc). The maintenance activities must, at a minimum, include:

(i) Inspection and removal of accumulated waste at least once a year between May 1 and September 30 of each year for all MS4 facilities;
(ii) Additional cleaning as necessary between October 1 and April 30 of each year for facilities that receive or collect high volumes of trash and debris;
(iii) Following two years of inspections, any MS4 facility that requires inspection and cleaning less than annually may be inspected as needed, but not less that every other year;
(iv) Open channels must be cleaned of observed anthropogenic litter in a timely manner;
(v) Maintenance activities within open channels must not adversely impact beneficial uses;
(vi) Record keeping of the maintenance and cleaning activities including the overall quantity of waste removed;
(vii) Proper disposal of waste removed pursuant to applicable laws; and
(viii) Measures to eliminate waste discharges during MS4 maintenance and cleaning activities.

(7) Infiltration From Sanitary Sewer to MS4/Provide Preventive Maintenance of Both

(a) Each Copermittee must implement controls and measures to prevent and eliminate infiltration of seepage from municipal sanitary sewers to MS4s through thorough, routine preventive maintenance of the MS4. Each Copermittee that operates both a municipal sanitary sewer system and a

MS4 must implement controls and measures to prevent and eliminate infiltration of seepage from the municipal sanitary sewers to the MS4s that must include overall sanitary sewer and MS4 surveys and thorough, routine preventive maintenance of both.

(b) Each Copermittee must implement controls to limit infiltration of seepage from municipal sanitary sewers to municipal separate storm sewer systems where necessary. Such controls must include:

(i) Adequate plan checking for construction and new development,
(ii) Incident response training for municipal employees that identify sanitary sewer spills;
(iii) Code enforcement inspections;
(iv) MS4 maintenance and inspections;
(v) Interagency coordination with sewer agencies; and
(vi) Proper education of municipal staff and contractors conducting field operations on the MS4 or municipal sanitary sewer (if applicable).

(8) Inspection of Municipal Areas and Activities

(a) At a minimum, each Copermittee must inspect the following high priority municipal areas and activities annually:

(i) Roads, Streets, Highways, and Parking Facilities;
(ii) Flood Management Projects and Flood Control Devices;
(iii) Areas and activities tributary to a CWA section 303(d) impaired water body segment, where an area or activity generates pollutants for which the water body segment is impaired.
(iv) Areas and activities within or adjacent to or discharging directly to receiving waters within environmentally sensitive areas (as defined in Attachment C of this Order);
(v) Municipal Facilities:
[a] Active or closed municipal landfills;
[b] Publicly owned treatment works (including water and wastewater treatment plants) and sanitary sewage collection systems;
[c] Solid waste transfer facilities;
[d] Land application sites;
[e] Corporate yards including maintenance and storage yards for materials, waste, equipment and vehicles; and
[f] Household hazardous waste collection facilities.
(vi) Municipal airfields;
(vii) Parks and recreation facilities;
(viii) Special event venues following special events (festivals, sporting events, etc.);
(ix) Power washing; and

(x) Other municipal areas and activities that the Copermittee determines may contribute a significant pollutant load to the MS4.

(b) Other municipal areas and activities must be inspected as needed and in response to water quality data, valid public complaints, and findings from municipal or contract staff.

(c) Based upon site inspection findings, each Copermittee must implement all follow-up actions necessary to comply with this Order.

(9) Enforcement of Municipal Areas and Activities

Each Copermittee must enforce its storm water ordinance for all municipal areas and activities as necessary to maintain compliance with this Order.

(10) Training and Education

Each Copermittee must ensure that all municipal personnel and contractors that have responsibilities for selecting, implementing, and evaluating BMPs for municipal areas and activities are adequately trained and educated to perform such tasks.

(a) Municipal Departments and Personnel Education

(i) Municipal Construction Activities: Each Copermittee must implement an education program that includes annual training prior to the rainy season so that its construction, building, code enforcement, and grading review staffs, inspectors, and other responsible construction staff have, at a minimum, an understanding of the following topics, as appropriate for the target audience:

[a] Federal, State, and local water quality laws and regulations applicable to construction and grading activities;
[b] The connection between construction activities and water quality impacts (i.e., impacts from land development and urbanization and impacts from construction material such as sediment);
[c] Proper implementation of erosion and sediment control and other BMPs to minimize the impacts to receiving water quality resulting from construction activities;
[d] The Copermittee's inspection, plan review, and enforcement policies and procedures to verify consistent application;
[e] Current advancements in BMP technologies;
[f] SSMP Requirements including treatment options, site design, source control, and applicable tracking mechanisms; and
[g] Other topics of local importance, including local water quality conditions, impaired water bodies, environmentally sensitive areas,

and public health and disease vector issues associated with runoff.

(ii) Municipal Industrial/Commercial Activities: Each Copermittee must train staff responsible for conducting storm water compliance inspections and enforcement of industrial and commercial facilities at least once a year. Training must cover inspection and enforcement procedures, BMP implementation, and review of monitoring data

(iii) Municipal Other Activities: Each Copermittee must implement an education program so that municipal personnel and contractors performing activities which generate pollutants have an understanding of the activity specific BMPs for each activity to be performed.

b. COMMERCIAL / INDUSTRIAL

Each Copermittee must implement a commercial / industrial program that meets the requirements of this section, prevents illicit discharges into the MS4, reduces commercial / industrial discharges of storm water pollutants from the MS4 to the MEP, and prevents commercial / industrial discharges from the MS4 from causing or contributing to a violation of water quality standards.

(1) Source Identification

(a) Each Copermittee must maintain an updated watershed-based inventory of all industrial and commercial sites/sources within its jurisdiction (regardless of ownership) that could contribute a significant pollutant load to the MS4. The inventory must include the following minimum information for each industrial and commercial site/source: name; address; pollutants potentially generated by the site/source; and identification of whether the site/source is tributary to a Clean Water Act section 303(d) water body segment and generates pollutants for which the water body segment is impaired; and a narrative description including SIC codes which best reflects the principal products or services provided by each facility.

At a minimum, the following sites/sources must be included in the inventory:

(i) Commercial Sites/Sources:

[a] Automobile repair, maintenance, fueling, or cleaning;
[b] Airplane repair, maintenance, fueling, or cleaning;
[c] Boat repair, maintenance, fueling, or cleaning;
[d] Equipment repair, maintenance, fueling, or cleaning;
[e] Automobile and other vehicle body repair or painting;
[f] Mobile automobile or other vehicle washing;

[g] Automobile (or other vehicle) parking lots and storage facilities;
[h] Retail or wholesale fueling;
[i] Pest control services;
[j] Eating or drinking establishments, including food markets;
[k] Mobile carpet, drape or furniture cleaning;
[l] Cement mixing or cutting;
[m] Masonry;
[n] Painting and coating;
[o] Botanical or zoological gardens and exhibits;
[p] Landscaping;
[q] Nurseries and greenhouses;
[r] Golf courses, parks and other recreational areas/facilities;
[s] Cemeteries;
[t] Pool and fountain cleaning;
[u] Marinas;
[v] Portable sanitary services;
[w] Building material retailers and storage;
[x] Animal facilities;
[y] Mobile pet services;
[z] Power washing services; and
[aa] Other sites and sources with a history of un-authorized discharges to the MS4.

(ii) Industrial Sites/Sources:

[a] Industrial Facilities, as defined at 40 CFR § 122.26(b)(14), including those subject to the General Industrial Permit or other individual NPDES permit;
[b] Operating and closed landfills;
[c] Facilities subject to SARA Title III; and
[d] Hazardous waste treatment, disposal, storage and recovery facilities.

(iii) ESAs and 303(d) Listed Waterbodies: All other commercial or industrial sites/sources tributary to a CWA Section 303(d) impaired water body segment, where the site/source generates pollutants for which the water body segment is impaired. All other commercial or industrial sites/sources within or directly adjacent to or discharging directly to coastal lagoons, the ocean, or other receiving waters within environmentally sensitive areas (as defined in Attachment C of this Order).

(iv) All other commercial or industrial sites/sources that the Copermittee determines may contribute a significant pollutant load to the MS4.

(2) <u>General BMP Implementation</u>

(a) Pollution Prevention: Each Copermittee must require the use of pollution prevention methods by industrial and commercial sites/sources.

(b) Designate / Update Minimum BMPs: Each Copermittee must designate a minimum set of BMPs for all industrial and commercial sites/sources. Where BMPs have already been designated, each Copermittee must review its existing BMPs for adequacy. The designated minimum BMPs must be specific to facility types and pollutant-generating activities, as appropriate.

(c) Designate Enhanced BMPs for ESAs and 303(d) Impairments: Each Copermittee must designate enhanced measures for industrial and commercial sites/sources tributary to CWA section 303(d) impaired water body segments (where a site/source generates pollutants for which the water body segment is impaired). Each Copermittee must also designate additional controls for industrial and commercial sites/sources within or directly adjacent to or discharging directly to coastal lagoons, the ocean, or other receiving waters within environmentally sensitive areas (as defined in Attachment C of this Order).

(d) Implement BMPs: Each Copermittee must implement, or require the implementation of, the designated minimum and enhanced BMPs and any additional measures necessary based on inspections, incident responses, and water quality data to comply with this Order at each industrial and commercial site/source within its jurisdiction.

(3) <u>BMP Implementation for Mobile Businesses</u>

(a) Each Copermittee must develop and implement a program to reduce the discharge of storm water pollutants from mobile businesses to the MEP and to prohibit non-storm water discharges pursuant to Section B of this Order. Each Copermittee must keep as part of their commercial source inventory a listing of mobile businesses known to operate within its jurisdiction. The program must include:

(i) Development and implementation of minimum standards and BMPs to be required for each of the various types of mobile businesses;
(ii) Development and implementation of an enforcement strategy which specifically addresses the unique characteristics of mobile businesses;
(iii) Notification of those mobile businesses known to operate within the Copermittee's jurisdiction of the minimum standards and BMP requirements and local ordinances;
(iv) Development and implementation of an outreach and education strategy; and
(v) Inspection of mobile businesses as needed to implement the program.

(b) If they choose to, the Copermittees may cooperate in developing and implementing their programs for mobile businesses, including sharing of mobile business inventories, BMP requirements, enforcement action information, and education.

(4) Inspection of Industrial and Commercial Sites/Sources

Each Copermittee must conduct industrial and commercial site inspections for compliance with its ordinances, permits, and this Order.

(a) Inspection Procedures: Inspections must include but not be limited to:

(i) Review of BMP implementation plans, if the site uses or is required to use such a plan;

(ii) Review of facility monitoring data, if the site monitors its runoff;

(iii) Check for coverage under the General Industrial Permit (Notice of Intent (NOI) and/or Waste Discharge Identification Number), if applicable;

(iv) Assessment of compliance with Copermittee ordinances and permits related to runoff;

(v) Assessment of BMP implementation, maintenance and effectiveness;

(vi) Visual observations for non-storm water discharges, potential illicit connections, and potential discharge of pollutants in storm water runoff; and

(vii) Education and training on storm water pollution prevention, as conditions warrant.

(b) Each Copermittee shall annually notify the San Diego Water Board, prior to the commencement of the wet season, of all Industrial Sites and Industrial Facilities subject to the General Industrial Permit or other individual NPDES permit with alleged violations. Information may be provided as part of the JRMP annual report if submitted prior to the rainy season. Information provided shall include, but not be limited to, the following:

(i) WDID number if enrolled under the General Industrial Permit;
(ii) Site Location, including address;
(iii) Current violations or suspected violations; and

(iv) Past Violation history.

(c) Frequencies: At a minimum, 25 percent of the sites inventoried as required in section F.3.b.(1) above (excluding mobile sources) including all sites determined to pose a high threat to water quality must be inspected each year. All sites must be Mobile businesses must be inspected pursuant to the enforcement strategy developed pursuant to section F.3.b.(3). In evaluating threat to water quality, each Copermittee shall consider, at a minimum, the following:

(i) Type of activity (SIC code);
(ii) Materials used at the facility;
(iii) Wastes generated;
(iv) Pollutant discharge potential;
(v) Non-storm water discharges;
(vi) Size of facility;
(vii) Proximity to receiving water bodies;
(viii) Sensitivity of receiving water bodies;
(ix) Whether the facility is subject to the General Industrial Permit or an individual NPDES permit;
(x) Whether the facility has filed a No Exposure Certification/Notice of Non-Applicability;
(xi) Facility design;
(xii) Total area of the site, area of the site where industrial or commercial activities occur, and area of the site exposed to rainfall and runoff;
(xiii) The facility's compliance history; and
(xiv) Any other relevant factors.

(d) Third-Party Inspections: Each Copermittee may develop and implement a third party inspection program for verifying industrial and commercial site/source compliance with its ordinances, permits, and this Order. The third party inspections can satisfy up to 30% of the inspection requirements in section F.3.b(4)(c), with the Copermittee having to fulfill the remaining required inspections. To the extent that third party inspections are conducted to fulfill the requirements of this Order, the Copermittee will be responsible for conducting and documenting quality assurance and quality control of the third-party inspections.

(i) Each inspection conducted by a third-party must, at a minimum, result in the following:

[a] Photo documentation of potential storm water violations identified during the third party inspection;
[b] Reporting to the Copermittee of identified significant potential violations, including imminent or observed illegal discharges, within 24 hours of the third party inspection;

[c] Reporting to the Copermittee of all inspection findings within one week of the inspection being conducted; and
[d] Copermittee follow-up and/or enforcement actions for identified potential storm water violations within two business days of the inspection or potential violation report receipt.

(e) Based upon site inspection findings, each Copermittee must implement all follow-up actions and enforcement necessary to comply with this Order.

(f) To the extent that the San Diego Water Board has conducted an inspection of an industrial site during a particular year, the requirement for the responsible Copermittee to inspect this facility during the same year will be satisfied.

(g) The Copermittees must track the number of inspections for the inventoried industrial and commercial sites/sources throughout the reporting period to verify that the sites/sources are inspected at the minimum frequencies listed in this Order.

(5) Enforcement of Industrial and Commercial Sites/Sources

Each Copermittee must enforce its storm water ordinance for all industrial and commercial sites/sources as necessary to maintain compliance with this Order. Copermittee ordinances or other regulatory mechanisms must include appropriate sanctions to achieve compliance. Sanctions must include the following or their equivalent: Non-monetary penalties, fines, bonding requirements, and/or permit denials for non-compliance.

(6) Training and Education for Owners and Operators of Commercial and Industrial Activities

(a) Each Copermittee must implement an education program using all media as appropriate to (1) measurably increase the knowledge of owners and operators of commercial and industrial activities regarding MS4s, impacts of runoff on receiving waters, and potential BMP solutions for the target audience; and (2) to measurably change the behavior of target communities and thereby reduce storm water pollutant releases and eliminate prohibited non-storm water discharges to MS4s and the environment. At a minimum, the education program must meet the requirements of this section and address the following issues:

(i) Laws, regulations, permits, & requirements;
(ii) Best management practices;
(iii) General runoff concepts; and

(iv) Other topics, including public reporting mechanisms, water

conservation, low-impact development techniques.

(b) BMP Notification: At least twice during the five-year period of this Order, each Copermittee must notify the owner/operator of each inventoried industrial and commercial site/source of the BMP requirements applicable to the site/source.

c. Residential

Each Copermittee must implement a residential program which meets the requirements of this section, prevents illicit discharges into the MS4, reduces residential discharges of storm water pollutants from the MS4 to the MEP, and prevents residential discharges from the MS4 from causing or contributing to a violation of water quality standards.

(1) Threat to Water Quality Prioritization

Each Copermittee must identify residential areas and activities that pose a high threat to water quality. At a minimum, these must include:

(a) Automobile repair, maintenance, washing, and parking;
(b) Home and garden care activities and product use (pesticides, herbicides, and fertilizers);
(c) Disposal of trash, pet waste, green waste, and household hazardous waste (e.g., paints, cleaning products);
(d) Any other residential source that the Copermittee determines may contribute a significant pollutant load to the MS4;
(e) Any residential areas tributary to a CWA section 303(d) impaired water body, where the residence generates pollutants for which the water body is impaired; and
(f) Any residential areas within or directly adjacent to or discharging directly to a coastal lagoon, the ocean, or other receiving waters within an environmentally sensitive area (as defined in Attachment C of this Order).

(2) BMP Implementation

(a) Pollution Prevention: Each Copermittee must actively encourage the use of pollution prevention methods by residents.

(b) Designate BMPs: Each Copermittee must designate minimum BMPs for high-threat-to-water quality residential areas and activities. The designated minimum BMPs for high-threat-to-water quality residential areas and activities must be area or activity specific.

(c) Hazardous Waste BMPs: Each Copermittee must facilitate the proper management and disposal of used oil, toxic materials, and other

household hazardous wastes. Such facilitation must include educational activities, public information activities, and establishment of collection sites operated by the Copermittee or a private entity. Curbside collection of household hazardous wastes is encouraged.

(d) Implement BMPs: Each Copermittee must implement, or require implementation of, the designated minimum BMPs and any additional measures necessary to comply with Sections A and B of this Order.

(e) Each Copermittee must implement, or require implementation of, BMPs for residential areas and activities that have not been designated a high threat to water quality, as necessary.

(3) Enforcement of Residential Areas and Activities

Each Copermittee must enforce its storm water ordinance for all residential areas and activities as necessary to maintain compliance with this Order.

(4) Evaluation of Oversight of Residential Areas and Activities

Each Copermittee must annually review the effectiveness of efforts to reduce residential discharges of storm water pollutants from the MS4 and eliminate illicit residential discharges into the MS4. The evaluation must consider findings from monitoring data, municipal employee comments, inspections, complaints, and other appropriate sources.

(5) Common Interest Areas (CIA) / Home Owner Association (HOA) Areas

Each Copermittee must implement measures specifically to ensure that runoff within common interest developments, including areas managed by associations, meets the objectives of this section and Order.

(a) BMP Implementation: Each Copermittee must implement management measures based on a review of pertinent factors, including:

(i) Current maintenance duties and procedures used by CIA/HOA maintenance associations within its jurisdiction;
(ii) Whether streets and storm drains are publicly or privately owned within the CIA/HOA;
(iii) Whether the CIA/HOA area has been identified as a high priority residential area;
(iv) Proximity to 303(d)-listed waterbodies, and/or environmentally sensitive areas;
(v) Evaluation of water quality monitoring data;
(vi) Evaluation of existing illegal discharge/illicit connection activities;
(vii) Other activities conducted or authorized by the HOA that may pose a

significant risk to inland or coastal receiving waters.

(b) Legal Authority and Enforcement: Within one year of adoption of this Order, each Copermittee must review its Municipal Code to determine the most appropriate method to implement and enforce runoff management measures within CIA/HOA areas.

(6) Residential Education Program

(a) Each Copermittee must implement a Residential Education Program using all media as appropriate to (1) measurably increase the knowledge regarding MS4s, impacts of runoff on receiving waters, and potential BMP solutions for the target audience; and (2) to measurably change the behavior of target communities and thereby reduce storm water and eliminate prohibited non-storm water pollutant releases to MS4s and the environment.

(b) Copermittee educational programs must emphasize underserved target audiences, residents and managers of CIA/HOA areas, high-risk behaviors, and "allowable" behaviors and discharges. At a minimum, the education program must meet the requirements of this section and address the following issues:

(i) Laws, regulations, permits, and requirements;
(ii) Best management practices;
(iii) General runoff concepts;
(iv) Existing water quality, including local water quality conditions, impaired waterbodies and environmentally sensitive areas; and
(v) Other topics, including public reporting mechanisms, water conservation, low-impact development techniques, and public health and disease vector issues associated with runoff.

d. Retrofitting Existing Development

Each Copermittee must develop and implement a retrofitting program which meets the requirements of this section. The goals of the existing development retrofitting program are to reduce impacts from hydromodification, promote LID, support riparian and aquatic habitat restoration, reduce the discharges of storm water pollutants from the MS4 to the MEP, and prevent discharges from the MS4 from causing or contributing to a violation of water quality standards. Where feasible, at the discretion of the Copermittee, the existing development retrofitting program may be coordinated with flood control projects and infrastructure improvement programs.

(1) Source Identification

The Copermittee must identify and inventory existing developments (i.e. municipal, industrial, commercial, residential) as candidates for retrofitting. Potential retrofitting candidates must include but are not limited to:

(a) Developments that contribute pollutants of concern to a TMDL or an ESA;
(b) Receiving waters that are channelized or otherwise hardened;
(c) Developments tributary to receiving waters that are channelized or otherwise hardened;
(d) Developments tributary to receiving waters that are significantly eroded;
(e) Developments tributary to an ASBS or SWQPA; and
(f) Developments that cause hydraulic constriction.

(2) Each Copermittee shall evaluate and rank the inventoried existing developments to prioritize retrofitting. Criteria for evaluation must include but is not limited to:

(a) Feasibility;
(b) Cost effectiveness;
(c) Pollutant removal effectiveness;
(d) Impervious area potentially treated;
(e) Maintenance requirements;
(f) Landowner cooperation;
(g) Neighborhood acceptance;
(h) Aesthetic qualities; and
(i) Efficacy at addressing concern.

(3) Each Copermittee must consider the results of the evaluation in prioritizing work plans for the following year. Highly feasible projects expected to benefit water quality should be given a high priority to implement source control and treatment control BMPs. Where feasible, the retrofit projects should be designed in accordance with the SSMP requirements within sections F.1.d.(3) through F.1.d.(8). In addition, the Copermittee shall encourage retrofit projects to implement where feasible the Hydromodification requirements in Section F.1.h.

(4) The Copermittees will cooperate with private landowners to encourage retrofitting projects. The Copermittee must consider the following practices in cooperating and encouraging private landowners to retrofit their existing development:

(a) Demonstration retrofit projects;
(b) Retrofits on public land and easements that treat runoff from private developments;
(c) Education and outreach;
(d) Subsidies for retrofit projects;
(e) Requiring retrofit projects as enforcement, mitigation or ordinance

compliance;
(f) Public and private partnerships; and
(g) Fees for existing discharges to the MS4 and reduction of fees for retrofit implementation.

(5) The completed retrofit BMPs shall be tracked and inspected in accordance with section F.1.f.

(6) Where constraints on retrofitting preclude effective BMP deployment on existing developments at locations critical to protect receiving waters, a Copermittee may propose a regional mitigation project to improve water quality. Such regional projects may include but are not limited to:

(a) Regional water quality treatment BMPs;
(b) Urban creek or wetlands restoration and preservation;
(c) Daylighting and restoring underground creeks;
(d) Localized rainfall storage and reuse to the extent such projects are fully protective of downstream water rights;
(e) Hydromodification project; and
(f) Removal of invasive plant species.

(7) A retrofit project or regional mitigation project may qualify as a Watershed Water Quality Activity provided it meets the requirements in section G. Watershed Runoff Management Program.

4. ILLICIT DISCHARGE DETECTION AND ELIMINATION

Each Copermittee must implement a program which meets the requirements of this section to actively detect and eliminate illicit discharges and disposal into the MS4. The program must address all types of illicit discharges and connections excluding those non-storm water discharges not prohibited by the Copermittee in accordance with section B of this Order.

a. PREVENT AND DETECT ILLICIT DISCHARGES AND CONNECTIONS

Each Copermittee must implement measures to prevent and detect illicit discharges to the MS4.

(1) Legal Authority: Each Copermittee must retain legal authority to prevent and eliminate illicit discharges and connections to the MS4.

(2) Inspections: Each Copermittee must include use of appropriate municipal personnel and contractors to assist in identifying illicit discharges and connections during their daily activities.

(a) Inspections for illegal discharges and connections must be conducted during routine maintenance of all MS4 facilities.

(b) Municipal staff and contractors conducting non-MS4 field operations must be trained to report suspected illegal discharges and connections to proper municipal staff.

b. MAINTAIN MS4 MAP

Each Copermittee must maintain an updated map of its entire MS4 and the corresponding drainage areas within its jurisdiction. The use of GIS is required. The accuracy of the MS4 map must be confirmed during dry weather field screening and analytical monitoring and must be updated at least annually. The GIS layers of the MS4 map must be submitted with the updated Jurisdictional Runoff Management Plan within 365 days after adoption of this Order.

c. FACILITATE PUBLIC REPORTING OF ILLICIT DISCHARGES AND CONNECTIONS - PUBLIC HOTLINE

Each Copermittee must promote, publicize and facilitate public reporting of illicit discharges or water quality impacts associated with discharges into or from MS4s. Each Copermittee must facilitate public reporting through development and operation of a public hotline. Public hotlines can be Copermittee-specific or shared by Copermittees. All storm water hotlines must be capable of receiving reports in both English and Spanish 24 hours per day and seven days per week. All reported incidents, and how each was resolved, shall be summarized in each Copermittee's Individual Annual Report.

d. DRY WEATHER FIELD SCREENING AND ANALYTICAL MONITORING

Each Copermittee must conduct dry weather field screening and analytical monitoring of MS4 outfalls and other portions of its MS4 within its jurisdiction to detect illicit discharges and connections in accordance with Receiving Waters and MS4 Discharge Monitoring and Reporting Program No. R9-2010-0016 in Attachment E of this Order.

e. INVESTIGATION / INSPECTION AND FOLLOW-UP

Each Copermittee must implement procedures to investigate and inspect portions of the MS4 that, based on the results of field screening, analytical monitoring, or other appropriate information, indicate a reasonable potential of containing illicit discharges, illicit connections, or other sources of pollutants in non-storm water.

(1) Develop response criteria for data: Each Copermittee must develop, update, and use numeric criteria action levels (or other actions level criteria where appropriate) to determine when follow-up investigations will be performed in

response to water quality monitoring. The criteria must include required non-storm water action levels (see Section C) and a consideration of 303(d)-listed waterbodies and environmentally sensitive areas (ESAs) as defined in Attachment C.

(2) Respond to data: Each Copermittee must investigate portions of the MS4 for which water quality data or conditions indicates a potential illegal discharge or connection.

(a) Obvious illicit discharges (i.e. color, odor, or significant exceedances of action levels) must be investigated immediately.

(b) Field screen data: Within two business days of receiving dry weather field screening results that exceed action levels, the Copermittees must either initiate an investigation to identify the source of the discharge or document the rationale for why the discharge does not pose a threat to water quality and does not need further investigation. This documentation shall be included in the Annual Report.

(c) Analytical data: Within five business days of receiving analytical laboratory results that exceed action levels, the Copermittees must either initiate an investigation to identify the source of the discharge or document the rationale for why the discharge does not pose a threat to water quality and does not need further investigation. This documentation shall be included in the Annual Report.

(3) Respond to notifications: Each Copermittee must respond to and resolve each reported incident (e.g., public hotline, staff notification, etc.) in a timely manner. Criteria may be developed to assess the validity of, and prioritize the response to, each report.

f. ELIMINATION OF ILLICIT DISCHARGES AND CONNECTIONS

Each Copermittee must take immediate action to initiate steps necessary to eliminate all detected illicit discharges, illicit discharge sources, and illicit connections after detection. Elimination measures may include an escalating series of enforcement actions for those illicit discharges that are not a serious threat to public health or the environment. Illicit discharges that pose a serious threat to the public's health or the environment must be eliminated immediately.

g. ENFORCE ORDINANCES

Each Copermittee must implement and enforce its ordinances, orders, or other legal authority to prevent illicit discharges and connections to its MS4 and to eliminate detected illicit discharges and connections to it's MS4.

h. PREVENT AND RESPOND TO SEWAGE SPILLS (INCLUDING FROM PRIVATE LATERALS AND FAILING SEPTIC SYSTEMS) AND OTHER SPILLS

(1) Each Copermittee must implement management measures and procedures to prevent, respond to, contain and clean up all sewage (see below) and other spills that may discharge into its MS4 from any source (including private laterals and failing septic systems). Copermittees must coordinate with spill response teams to prevent entry of spills into the MS4 and contamination of surface water, ground water and soil. Each Copermittee must coordinate spill prevention, containment and response activities throughout all appropriate departments, programs and agencies so that maximum water quality protection is available at all times.

(2) Each Copermittee must develop and implement a mechanism whereby it is notified of all sewage spills from private laterals and failing septic systems into its MS4. Each Copermittee must implement management measures and procedures to prevent, respond to, and coordinate a response to contain and clean up sewage from any such notification.

i. EDUCATION AND TRAINING

Each Copermittee must implement educational activities, public information activities, and other appropriate activities to facilitate the proper management and disposal of used oil and toxic materials.

5. PUBLIC PARTICIPATION COMPONENT

Each Copermittee must incorporate a mechanism for public participation in the updating, development, and implementation of the Jurisdictional Runoff Management Program.

G. WATERSHED RUNOFF MANAGEMENT PROGRAM

Each Copermittee must collaborate with other Copermittees to identify, address, and mitigate the highest priority water quality issues/pollutants in the Upper Santa Margarita Watershed.

1. Watershed Water Quality Workplan (Watershed Workplan)

The Watershed Workplan shall describe the Copermittees' development and implementation of a collective watershed strategy to assess and prioritize the water quality problems within the watershed's receiving waters, identify and model sources of the highest priority water quality problem(s), develop a watershed-wide BMP implementation strategy to abate highest priority water quality problems, and a

monitoring strategy to evaluate BMP effectiveness and changing water quality prioritization in the WMA.

The work plan shall, at a minimum:

a. Characterize the receiving water quality in the WMA. Characterization shall include use of regularly collected water quality data, reports, monitoring and analysis generated in accordance with the requirements of the Receiving Waters Monitoring and Reporting Program, as well as applicable information available from other public and private organizations.

b. Identify the highest priority water quality problem(s), in terms of constituents by location, in the WMA's receiving waters. Identified water quality problem(s) shall, at a minimum, give consideration to; TMDLs, receiving waters listed on the CWA section 303(d) list, waters with persistent violations of water quality standards, toxicity, or impacts to beneficial uses, and other pertinent conditions.

c. Identify the sources of the highest water quality problem(s) within the WMA. Efforts to determine such sources shall include, but not be limited to: use of information from the construction, industrial/commercial, municipal, and residential source identification programs required within the Jurisdictional Runoff Program (JRMP) of this Order; specific actions to model pollutant transport to receiving waters for the sake of identifying the source(s) point(s) of origin; water quality monitoring data collected as part of the Receiving Water Monitoring and Reporting Program required by this Order, and additional focused water quality monitoring to identify specific sources within the watershed.

d. Develop a watershed BMP implementation strategy to attain receiving water quality objectives in the identified highest priority water quality problem(s). The BMP implementation strategy shall include a schedule for implementation of the BMP projects to abate specific receiving water quality problems. BMPs not contributing to measured pollutant reductions or improvements to water quality must be removed and replaced with alternative BMPs. Identified watershed water quality problems may be the result of jurisdictional discharges that will need to be addressed with BMPs applied in a specific jurisdiction in order to generate a benefit to the watershed.

e. Develop a strategy to model and monitor improvements in receiving water quality directly resulting from implementation of the BMPs described in the Watershed Workplan. The modeling and monitoring strategy shall generate the necessary data to report on the measured pollutant reduction that results from proper BMP implementation. Monitoring shall, at a minimum, be conducted in the receiving water to demonstrate reduction in pollutant concentrations and progression towards attainment of receiving water quality objectives.

f. Establish a schedule for development and implementation of the Watershed

strategy outlined in the Workplan. The schedule shall, at a minimum, include forecasted dates of planned actions to address Provisions E.2(a) through E.2(e) and dates for watershed review meetings through the remaining portion of this Permit cycle. Annual watershed workplan review meetings must be open to the public and appropriately publically noticed such that interested parties may come and provide comments on the watershed program.

2. **Watershed Workplan Implementation –** Watershed Copermittee's shall begin implementing the Watershed Workplan within 60-days of acceptance by the San Diego Water Board Executive Officer. If within 30 days of submittal, the San Diego Water Board has not taken an action, the Workplan shall be deemed acceptable.

3. **Copermittee Collaboration** – Watershed Copermittees shall collaborate to develop and implement the Watershed Workplan. Watershed Copermittee collaboration shall include frequent regularly scheduled meetings. The Copermittees shall seek to obtain any interagency agreements, or other efforts, with non-Copermittee owners of the MS4 (such as Caltrans, Native American tribes, and school districts) to control the contribution of pollutants from one portion of the shared MS4 to another portion of the shared MS4. The Copermittees shall, as appropriate, participate in watershed management efforts to address water quality issues within the entire Santa Margarita Watershed (such as the County of San Diego and United States Marine Corps Camp Pendleton).

4. **Public Participation –** Watershed Copermittees shall implement a watershed-specific public participation mechanism within each watershed. A required component of the watershed-specific public participation shall be a minimum 30-day public review of the Watershed Workplan prior to submittal for acceptance by the San Diego Water Board Execuive Officer. Opportunity for the public to review and comment on the Watershed Workplan must occur before the workplan is implemented.

5. **Watershed Workplan Review and Updates –** Watershed Copermittees shall review and update the Watershed Workplan annually to identify needed changes to the prioritized water quality problem(s) listed in the workplan. All updates to the Watershed Workplan shall be presented during an Annual Watershed Review Meeting. Annual Watershed Review Meetings shall occur once every calendar year and be conducted by the Watershed Copermittees. Annual Watershed Review Meetings shall be open to the public and adequately noticed. Individual Watershed Copermittees shall also review and modify their jurisdictional programs and JRMP Annual Reports, as necessary, so that they are consistent with the updated Watershed Workplan.

6. **Pyrethroid Toxicity Reduction Evaluation –** The Watershed Copermittees shall

incorporate the pyrethroid pollutant reduction program[16] into the Watershed Workplan. The pyrethroid pollutant reduction program shall include the following elements:

a. Pursue state and federal regulatory change.
b. Implement a set of source controls targeted specifically at urban pesticide use,
c. Through the annual reporting process, monitor the implementation of those controls, assess effectiveness, and identify sources or areas where additional effort is needed,
d. Implement additional controls as needed,
e. Continue to monitor implementation, as well as conditions within the target receiving waters, assess effectiveness, and re-evaluate control programs.

H. FISCAL ANALYSIS

1. Secure Resources: Each Copermittee must secure the resources necessary to meet all requirements of this Order.

2. Annual Analysis: Each Copermittee must conduct an annual fiscal analysis of the necessary capital and operation and maintenance expenditures necessary to accomplish the activities of the programs required by this Order. The analysis must include estimated expenditures for the reporting period, the preceding period, and the next reporting period.

a. Each analysis must include a description of the source of funds that are proposed to meet the necessary expenditures, including legal restrictions on the use of such funds.
b. Each analysis must include a narrative description of circumstances resulting in a 25 percent or greater annual change for any budget line items.

3. Annual Reporting: Each Copermittee must submit its annual fiscal analysis with the annual JRMP report.

I. TOTAL MAXIMUM DAILY LOADS

The waste load allocations (WLAs) of fully approved and adopted TMDLs are incorporated as Water Quality Based Effluent Limitations on a pollutant by pollutant, watershed by watershed basis. Early TMDL requirements, including monitoring, may be required and inserted into this Order pursuant to Finding E.10

[16] The pyrethroid pollutant reduction program is described in the "Riverside County – Santa Margarita Region Pyrethroid Source Identification Toxicity Reduction Evaluaion, Final Phase II Report", January 2009 by MACTEC.

J. PROGRAM EFFECTIVENESS ASSESSMENT AND REPORTING

1. Jurisdictional Program Effectiveness Assessments

a. OBJECTIVES OF EFFECTIVENESS ASSESSMENTS

Beginning with the Annual Report due in 2012, each Copermittee must annually assess the effectiveness of its Jurisdictional Runoff Management Program (JRMP) implementation at meeting the following objectives:

(1) Objective for 303(d) Waterbodies: Reduce storm water pollutant loadings.

(a) Each Copermittee must establish annual assessment measures or methods specifically for reducing discharges of storm water pollutants from its MS4 into each downstream 303(d)-listed water body for which that waterbody is impaired. Assessment measures must be developed for each of the six outcome levels described by CASQA.[17]
(b) Each Copermittee must annually conduct each established assessment measure or method and evaluate the outcome. Each outcome must then be used to assess the effectiveness of implemented management measures toward reducing MS4 discharges of the specific pollutants causing or contributing to conditions of impairment.
(c) The assessment measures must target both water quality outcomes and the results of municipal enforcement activities.

(2) Objective for Environmentally-Sensitive Areas: Prevent storm water MS4 discharges from causing or contributing to conditions of pollution, nuisance, or contamination.

(a) Each Copermittee must establish annual measures or methods specifically for assessing the effectiveness of its management measures for protecting downstream ESAs from adverse effects caused by discharges from its MS4. Assessment measures must be developed for each of the six outcome levels described by CASQA.
(b) Each Copermittee must annually implement each established assessment measure or method and evaluate the outcome. Each outcome must be used to assess the effectiveness of implemented management measures toward reducing MS4 discharges of the specific pollutants causing or contributing to conditions of impairment.
(c) The assessment measures must target both water quality outcomes and the results of municipal enforcement activities.

(3) Objectives for major program component outcomes: Determined by Each

[17] Effectiveness assessment outcome levels as defined by CASQA are defined in Attachment C of this Order. See "*Municipal Stormwater Program Effectiveness Assessment Guidance"* (CASQA, May 2007) for guidance for assessing program activities at the various outcome levels.

Copermittee.

(a) Each Copermittee must annually develop objectives for each program component in Section F and the overall JRMP. The objectives must be established as appropriate in response to program implementation and evaluation of water quality and management practices.
(b) Assessment approaches for program implementation must include a mix of specific activities, general program components, and water quality data.
(c) The assessment measures must target both water quality outcomes and the results of municipal enforcement activities.

(4) Objectives for actions taken to protect receiving water limitations in accordance with this Order.

(a) Each Copermittee must develop and implement an effectiveness assessment strategy for each measure conducted in response to a determination to implement the "iterative" approach to prevent or reduce any storm water pollutants that are causing or contributing to the exceedance of water quality standards as outlined in this Order

b. ASSESSMENT REVIEW

(1) Based on the results of the effectiveness assessments, each Copermittee must annually review its jurisdictional activities and BMPs to identify modifications and improvements needed to maximize JRMP effectiveness, as necessary to achieve compliance with this Order.

(2) Each Copermittee must develop and annually conduct an Integrated Assessment[18] of each effectiveness assessment objective above (Section J.1.a) and the overall JRMP using a combination of outcomes as appropriate to the objectives.[19]

2. Program Modifications

a. Each Copermittee must develop and implement a plan and schedule to address program modifications and improvements identified during annual effectiveness assessments.

b. Jurisdictional activities/BMPs that are ineffective or less effective than other comparable jurisdictional activities/BMPs must be replaced or improved upon by implementation of more effective jurisdictional activities/BMPs. Where monitoring data exhibits persistent water quality problems that are caused or

[18] Integrated assessment is defined in Attachment C. It is the process of evaluating whether program implementation is resulting in the protection or improvement of water quality. Integrated assessment combines assessments of program implementation and water quality.
[19] Not all program components need be addressed at each of the six outcome levels.

contributed to by MS4 discharges, jurisdictional activities or BMPs applicable to the water quality problems must be modified and improved to correct the water quality problems.

3. Effectiveness Assessment and Program Response Reporting

a. Each Copermittee must include a description and summary of its annual and long-term effectiveness assessments within each Annual Report. Beginning with the Annual Report due in 2011, the Program Effectiveness reporting must include:

(1) 303(d) waterbodies: A description and results of the annual assessment measures or methods specifically for reducing discharges of storm water pollutants from its MS4 into each 303(d)-listed waterbody;
(2) ESAs: A description and results of the annual assessment measures or methods specifically for managing discharges of pollutants from its MS4 into each downstream ESA;
(3) Other Program Components: A description of the objectives and corresponding assessment measures and results used to evaluate the effectiveness of each general program component. The results must include findings from both program implementation and water quality assessment where applicable;
(4) Receiving water protection: A description and results of the annual assessment measures or methods employed specifically for actions taken to protect receiving water limitations in accordance with Section A.3 of this Order;
(5) A description of the steps taken to use dry-weather and wet-weather monitoring data to assess the effectiveness of the programs for 303(d) impairments, ESAs, and general program components;
(6) A description of activities conducted in response to investigations of illicit discharge and illicit connection activities, including how each investigation was resolved and the pollutant(s) involved;
(7) Responses to effectiveness assessments: A description of each program modification, made in response to the results of effectiveness assessments conducted pursuant to Section J.1.a, and the basis for determining (pursuant to Section J.2.b.) that each modified activity and/or BMP represents an improvement with respect to reducing the discharge of storm water pollutants from the MS4.
(8) A description of the steps that will be taken to improve the Copermittee's ability to assess program effectiveness using measurable targeted outcomes, assessment measures, assessment methods, and outcome levels 1-6. Include a time schedule for when improvement will occur; and
(9) A description of the steps that will be taken to identify aspects of the Copermittee's Jurisdictional Runoff Management Program that will be changed based on the results of the effectiveness assessment.

4. Work Plan

Each Copermittee must develop a work plan to address their high priority water quality problems in an iterative manner over the life of the permit. The goal of the work plan is to demonstrate a responsive and adaptive approach for the judicious and effective use of available resources to attack the highest priority problems. The work plan shall include, at a minimum, the following:

- **a.** The problems and priorities identified during the assessment;
- **b.** A list of priority pollutants and known or suspected sources;
- **c.** A brief description of the strategy employed to reduce, eliminate or mitigate the negative impacts;
- **d.** A description and schedule for new and/or modified BMPs. The schedule is to include dates for significant milestones;
- **e.** A description of how the selected activities will address an identified high priority problem. This will include a description of the expected effectiveness and benefits of the new and/or modified BMPs;
- **f.** A description of implementation effectiveness metrics;
- **g.** A description of how efficacy results will be used to modify priorities and implementation; and
- **h.** A review of past activities implemented, progress in meeting water quality standards, and planned program adjustments.

The Copermittee shall submit the work plan to the San Diego Water Board within 365 days of adoption of the Order. Annual updates are also required and shall be included with the annual JRMP report. The San Diego Water Board will assess the work plan for compliance with the specific and overall requirements of the Order. To increase effectiveness and efficiencies, Copermittees may combine their implementation efforts and work plans within a hydrologic area or sub area. Each Copermittee, however, maintains individual responsibility for developing and implementing an acceptable work plan.

K. REPORTING

The Copermittees may propose alternate reporting criteria and schedules, as part of their updated JRMP, for the Executive Officer's acceptance. The Copermittees shall submit the updated JRMP within 365 days after adoption of this Order.

1. Runoff Management Plans

a. JURISDICTIONAL RUNOFF MANAGEMENT PLANS

(1) Copermittees: The written account of the overall program to be conducted by each Copermittee to meet the jurisdictional requirements of section F of this Order is referred to as the Jurisdictional Runoff Management Plan (JRMP). Each Copermittee must revise and update its existing JRMP so that it

describes all activities the Copermittee will undertake to implement the requirements of this Order. Each Copermittee must submit its updated and revised JRMP to the San Diego Water Board 365 days after adoption of this Order.

(2) At a minimum, each Copermittee's JRMP must be updated and revised to demonstrate compliance with each applicable section of this Order.

b. WATERSHED WORKPLANS

(1) Copermittees: The written account of the program conducted by group of Copermittees is referred to as the Watershed Workplan. Copermittees shall be responsible for updating and revising the Watershed Workplan. Each Watershed Workplan shall be updated and revised to describe any changes in water quality problems or priorities, and any necessary change to actions Copermittees will take to implement jurisdictional or watershed BMPs to address those identified. The Copermittees shall assemble and submit the Watershed Workplan to the San Diego Water Board no later than 365 days after adoption of this Order, and shall be prepared to implement the workplan within 60 days of the San Diego Water Board Executive Officer deeming the workplan acceptable.

(2) Each Watershed Workplan shall, at a minimum, include:

(a) An updated watershed map.
(b) Identification and description of all applicable water quality data, reports, analyses, and other information to be used to assess receiving water quality.
(c) Assessment and analysis of the watershed's water quality data, reports, analyses, and other information, used during identification and prioritization of the watershed's water quality problems.
(d) A prioritized list of water quality problems within the WMA including rationale explaining the method/logic used to determine prioritization.
(e) Identification of the likely sources, pollutant discharges, and/or other factors causing the high priority water quality problems within the WMA.
(f) A description of the strategy to be used to guide Copermittee implementation of BMPs either jurisdictionally or on a watershed-wide basis to abate the highest water quality problems
(g) A list of criteria used to evaluate BMP effectiveness and how it was applied.
(h) A GIS map of BMPs implemented and BMPs scheduled for implementation.
(i) A description of the public participation mechanisms to be used and the parties anticipated to be involved during the development and implementation of the Watershed Workplan.
(j) A description of Copermittee collaboration to accomplish development of

the Watershed Workplan, including a schedule for Watershed meetings.

(k) A description of how TMDLs and 303(d)-listed water bodies were considered during prioritization of watershed water quality problems

(l) A description of the strategy to model and monitor improvement in receiving water quality directly resulting from implementation of the BMPs described in the Watershed Workplan.

(m) A scheduled annual Watershed Workplan Review Meeting once every calendar year. This meeting shall be open to the public.

2. Other Required Reports and Plans

a. SSMP UPDATES

(1) Copermittees must submit their updated model SSMP in accordance with the applicable requirements of section F.1 with the JRMP two years after adoption of this Order.

(2) Within 180 days of determination that the Model SSMP is in compliance with this Permit's provisions, each Copermittee must update their own local SSMP, and amended ordinances consistent with the model SSMP, and shall submit both (local SSMP and amended ordinances) to the San Diego Water Board.

(3) For SSMP-related requirements of Section F.1 with subsequent implementation due dates, updated SSMPs must be submitted with the JRMP annual report covering the applicable reporting period.

b. REPORT OF WASTE DISCHARGE

The Copermittees must submit to the San Diego Water Board, no later than 210 days in advance of the expiration date of this Order, a Report of Waste Discharge (ROWD) as an application for issuance of new waste discharge requirements. The fourth annual report for this Order may supplement the ROWD, provided it contains the minimum information below.

At a minimum, the ROWD must include the following: (1) Proposed changes to the Copermittees' runoff management programs; (2) Proposed changes to monitoring programs; (3) Justification for proposed changes; (4) Name and mailing addresses of the Copermittees; (5) Names and titles of primary contacts of the Copermittees; and (6) Any other information necessary for the reissuance of this Order.

3. Annual Reports

a. JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM (JRMP) ANNUAL REPORTS

(1) Copermittees: Each Copermittee must generate individual JRMP Annual Reports which cover implementation of its jurisdictional activities during the

past annual reporting period. Each Annual Report must verify and document compliance with this Order as directed in this section. Each Copermittee must retain records through 2016, available for review, that document compliance with each requirement of this Order. The reporting period for these annual reports must be the previous fiscal year.

(2) Each Copermittee must submit their JRMP Annual Reports to the San Diego Water Board by September 30 of each year, beginning on September 30, 2011.

(3) Each JRMP Annual Report must contain, at a minimum, the following information:

(a) Information required to be reported annually in Section H (Fiscal Analysis) of this Order;
(b) Information required to be reported annually in Section J (Program Effectiveness) of this Order;
(c) The completed Reporting Checklist found in Attachment D, and
(d) Information for each program component by watershed as described in the following Table 9:

Table 9. Annual Reporting Requirements

Program Component	Reporting Requirement
New Development	1. Updated relevant sections of the General Plan and environmental review process and a description of planned updates within the next annual reporting period, if applicable
	2. Revisions to the local SSMP, including where applicable: (a) Identification and summary of where the SSMP fails to meet the requirements of this Order; (b) Updated procedures for identifying pollutants of concern for each Priority Development Project; (c) Updated treatment BMP ranking matrix; and (d) Updated site design and treatment control BMP design standards;
	3. Verification that site design, source control, and treatment BMPs were required on all applicable Priority Development Projects;
	4. Description of the application of LID and site design BMPs in the planning and approval process;
	5. Description of projects subject to the local waiver provision for numeric sizing of treatment control BMP requirements;
	6. Description and summary of the LID site design BMP substitution program, if applicable;

Program Component	Reporting Requirement
	7. Description and summary of the process to verify compliance with SSMP requirements;
	8. Updates to the BMPs that are listed in the local SSMP as options for treatment control;
	9. Description of the treatment control maintenance tracking process and verification that the requirements of this Order were met during the reporting period; (a) Updated watershed-based database of approved treatment control BMPs and treatment control BMP maintenance within its jurisdiction, including updates to the list of high-priority treatment BMPs;
	10. Description of the process for identifying and evaluating hydrologic conditions of concern and requiring a suite of management measures within all Priority Development Projects to protect downstream beneficial uses and prevent adverse physical changes to downstream stream channels;
	11. Description of enforcement activities applicable to the new development and redevelopment component and a summary of the effectiveness of those activities;
Construction	1. Updated relevant ordinances and description of planned ordinance updates within the next annual reporting period, if applicable;
	2. A description of procedures used for identifying priorities for inspecting sites and enforcing control measures which consider the nature of the construction activity, topography, and the characteristics of soils and receiving water quality;
	3. Designated minimum and enhanced BMPs;
	4. Summary of the inspection program, including the following information: (a) Number and date of inspections conducted at each facility, including the facility address; (b) Number of facilities lacking adequate BMPs; (c) The BMP violations identified during the inspection by facility; (d) Number, date, and types of enforcement actions by facility; (e) Narrative description of inspection findings and follow-up activities for each facility;
Municipal	1. Updated source inventory;
	2. Changes to the designated municipal BMPs;
	3. Descriptions of procedures to assure that flood management projects assess the impacts on the water quality of receiving water bodies;
	4. Summary and assessment of BMPs implemented at retrofitted flood control structures, including: (a) List of projects with BMP retrofits; and (b) List and description of structures retrofitted without BMPs;

Program Component	Reporting Requirement
	5. Description and assessment of the municipal structural treatment control operations and maintenance activities, including: (a) Number of inspections and types of facilities; and (b) Summary of findings;
	6. Description of the municipal areas/facilities operations and maintenance activities, including: (a) Number and types of facilities maintained; (b) Amount of material removed and how that material was disposed; and (c) List of facilities planned for bi-annual inspections and the justification;
	7. Description of the municipal areas/programs inspection activities, including: (a) Number and date of inspections conducted at each facility; (b) Number of facilities lacking adequate BMPs; (c) The BMP violations identified during the inspection by facility; (d) Number, date and types of enforcement actions by facility; (e) Narrative description of inspection findings and follow-up activities for each facility;
	8. Description of activities implemented to address sewage infiltration into the MS4;
Commercial / Industrial	1. Annual inventory of commercial / industrial sources;
	2. Summary of the inspection program, including the following information: (a) Number and date of inspections conducted at each facility including the facility address; (b) Number of facilities lacking adequate BMPs; (c) The BMP violations identified during the inspection by facility; (d) Number, date, and types of enforcement actions by facility; (e) Narrative description of inspection findings and follow-up activities for each facility;
	3. Changes to designated minimum and enhanced BMPs;
	4. A list of industrial sites, including each name, address, and SIC code, that the Copermittee suspects may require coverage under the General Industrial Permit, but has not submitted an NOI;
Residential	1. Updated minimum BMPs required for residential areas and activities;
	2. Quantification and summary of applicable runoff and storm water enforcement actions within residential areas and activities;
	3. Description of efforts to manage runoff and storm water pollution in common interest areas;
Retrofitting Existing Development	1. Updated inventory and prioritization of existing developments identified as candidates for retrofitting.
	2. Description of efforts to retrofit existing developments during the reporting year.

Program Component	Reporting Requirement
	3. Description of efforts taken to cooperate with private landowners to retrofit existing development.
	4. A list of retrofit projects that have been implemented, including site location, a description of the retrofit project, pollutants expected to be treated, and the tributary acreage of runoff that will be treated.
	5. A list of regional mitigation projects that have been implemented, including site location, a description of the regional mitigation project, pollutants expected to be treated, and the tributary acreage of runoff that will be treated.
	6. Any proposed retrofit or regional mitigation projects and timelines for future implementation.
	7. Any proposed changes to the Copermittee's overall retrofitting program.
Illicit Discharge Detection and Elimination	1. Changes to the legal authority to implement Illicit Discharge Detection and Elimination activities;
	2. Changes to the established investigation procedures;
	3. Public reporting mechanisms, including phone numbers and web pages;
	4. All data and assessments from the Dry Weather Effluent Analytical Monitoring activities;
	5. Response criteria developed for water quality data and notifications;
	6. Summaries of illicit discharges (including spills and water quality data events) and how each significant case was resolved;
	7. A description of instances when field screening and analytical data exceeded action levels, including those instances for which no investigation was conducted;
	8. A description of follow-up and enforcement actions taken in response to investigations of illicit discharges and a description of the effectiveness of those measures;
	9. A description of controls to prevent infiltration of seepage from municipal sanitary sewers to municipal separate storm sewer systems;
Work Plan	Priorities, strategy, implementation schedule and effectiveness evaluation;

(4) Each JRMP Annual Report must also include the following information regarding non-storm water discharges (see Section B.2. of this Order):

(a) Identification of non-storm water discharge categories identified as a source of pollutants to waters of the U.S;
(b) A description of ordinances, orders, or similar means to prohibit non-storm water discharge categories identified under section B.2 above ;
(c) Identification of any control measures to be required and implemented for non-storm water discharge categories identified as needing controls by the San Diego Water Board; and

(d) A description of a program to address pollutants from non-emergency fire fighting flows identified by the Copermittee to be significant sources of pollutants.

4. Interim Reporting Requirements

For the July 2010-June 2011 reporting period, the Jurisdictional RMP must be submitted on January 31, 2012. Each Jurisdictional RMP Annual Report submitted for this reporting period must, at a minimum, include comprehensive descriptions of all activities conducted to fully implement the Copermittees' Jurisdictional RMP documents, as those documents were developed to comply with the requirements of Order No. 2004-001.

5. Universal Reporting Requirements

All submittals must include an executive summary, introduction, conclusion, recommendations, and signed certified statement. Each Copermittee must submit a signed certified statement covering its responsibilities for each applicable submittal. The Principal Copermittee must submit a signed certified statement covering its responsibilities for each applicable submittal and the sections of the submittals for which it is responsible.

L. MODIFICATION OF PROGRAMS

Modifications of Jurisdictional Runoff Management Programs and/or Watershed Runoff Management Programs may be initiated by the Executive Officer of the San Diego Water Board or by the Copermittees. Requests by Copermittees must be made to the Executive Officer, and must be submitted during the annual review process. Requests for modifications should be incorporated, as appropriate, into the Annual Reports or other deliverables required or allowed under this Order.

1. Minor Modifications: Minor modifications to Jurisdictional Runoff Management Programs, and/or Watershed Runoff Management Programs, may be accepted by the Executive Officer where the Executive Officer finds the proposed modification complies with all discharge prohibitions, receiving water limitations, and other requirements of this Order.

2. Modifications Requiring an Amendment to this Order: Proposed modifications that are not minor require amendment of this Order in accordance with this Order's rules, policies, and procedures.

M. PRINCIPAL COPERMITTEE RESPONSIBILITIES

Within 180 days of adoption of this Order, the Copermittees must designate the Principal Copermittee and notify the San Diego Water Board of the name of the

Principal Copermittee. The Principal Copermittee must, at a minimum:

1. Serve as liaison between the Copermittees and the San Diego Water Board on general permit issues, and when necessary and appropriate, represent the Copermittees before the San Diego Water Board.
2. Coordinate permit activities among the Copermittees and facilitate collaboration on the development and implementation of programs required under this Order.
3. Produce and submit documents and reports as required by section K of this Order and Receiving Waters and MS4 Discharge Monitoring and Reporting Program No. R9-2010-0016 in Attachment E of this Order.

N. RECEIVING WATERS AND MS4 DISCHARGE MONITORING AND REPORTING PROGRAM

Pursuant to CWC section 13267, the Copermittees must comply with all the requirements contained in Receiving Waters and MS4 Discharge Monitoring and Reporting Program No. R9-2010-0016 in Attachment E of this Order.

O. STANDARD PROVISIONS, REPORTING REQUIREMENTS, AND NOTIFICATIONS

1. Each Copermittee must comply with Standard Provisions, Reporting Requirements, and Notifications contained in Attachment B of this Order. This includes 24 hour/5 day reporting requirements for any instance of non-compliance with this Order as described in section 5.e of Attachment B.

2. All plans, reports and subsequent amendments submitted in compliance with this Order must be implemented immediately (or as otherwise specified). All submittals by Copermittees must be adequate to implement the requirements of this Order.

I, David W. Gibson, Executive Officer, do hereby certify the foregoing is a full, true, and correct copy of an Order adopted by the California Regional Water Quality Control Board, San Diego Region, on TBD, 2010.

_____

David W. Gibson
Executive Officer

RIVERSIDE MS4 PERMIT MEETING
Sign in Sheet April 22, 2010

Name	Agency/Company Affiliation	Telephone	E-mail Address
Bill Woolsey	City of Murrieta	951-461-6073	wwoolsey@murrieta.org
Mack Walker	Larry Walker Assc.	530.753.6400	mackw@lwa.com
Claudio Padres	RCFC & WCD	951 955 8602	cmpadres@rcflood.org
Daniel Apt	RBF	949-330-4117	dapt@rbf.com
ALDO LICITRA	CITY OF TEMECULA	951 308 6387	ALDO.LICITRA@CITYOFTEMECULA.ORG
Jason Uhley	RCFC & WCD	951 955 1273	JUHLEY@RCFLOOD.ORG
Mike Shetler	Riv Co. Executive office	951 955 1110	mshetler@rceo.org
Chiara Clemente	SDRWQCB	858 467-2359	cclemente@waterboards.ca.gov
Wayne Chiu	SDRWQCB	858-637-5558	wchiu@waterboards.ca.gov
Ben Neill	"	858-467-2952	bneill@waterboards.ca.gov
David Barker	"		

Permit Area		*Starting* Point	Estimated Meeting Time to work through issues (based on starting point)
Prohibitions and Receiving Waters Language		Orange County Permit	1/3 Meeting
Non-Stormwater Discharges		Orange County Permit	1/3 Meeting
Action Levels		Orange County Permit	1-1.5 Meetings
Legal Authority		Orange County Permit	1/3 Meeting
Development Planning	Overall	Orange County Permit	4.5 Meetings Overall
	LID / In-Lieu	Orange County Permit	1.5 Meetings
	Post Construction BMP Verification	ROWD	1/2 Meeting
	Roads	Santa Ana Permit	1 Meeting
	Hydromodification	Local Solution Needed	1.5 Meetings
Construction		Orange County Permit	1/2 Meeting
Permittee Facilities		Orange County Permit	1/3 Meeting
Industrial - Commercial		SMR Permit	Minimal
Residential		Orange County Permit	1/3 Meeting
Retrofit		Hybrid - Orange County / Santa Ana Region	1 Meeting
IC/ID		Orange County Permit	Minimal
Watershed Programs		Orange County Permit	1/2 Meeting
Fiscal Analysis		Orange County Permit	Minimal
Effectiveness Assessment & Reporting		ROWD	1 Meeting
Findings		Local Solution Needed	1 Meeting
Monitoring		Local Solution Needed	1 Meeting
Fact Sheet		Local Solution Needed	1/2 Meeting
Definitions		SMR Permit	1/2 Meeting

Meeting Schedule

	April			May				June				July					August			
	4/15	4/22	4/28	5/6	5/13	5/20	5/26	6/3	6/10	6/17	6/23	7/1	7/8	7/15	7/21	7/29	8/5	8/12	8/19	8/25
Summary Schedule																				
Meeting Dates (pre-public draft)		X	X	X	X	X	X	X	X	X	X	X	X							
Complete Draft to Permittees															X					
Earliest Possible Public Release																	X			
Detail Schedule																				
Findings														X						
A. Prohibitions and RWLs								X												
B. Non-Storm Water								X												
C. NALs				X																
D. SALs				X																
E. Legal Authority												X								
Development Planning: F.1.a - F.1.c										X										
Development Planning: F.1.d(1) - F.1.d.(4)					X															
Development Planning: F.1.d.(5) - F.1.d.(10)							X													
Development Planning: F.1.e - F.1.g, F.1.i					X															
Development Planning: F.1.h						X	x													
F.2 - Construction												X								
F.3.a - Permittee Facilities			X																	
F.3.b - Comm. / Ind.									X											
F.3.c - Residential			X																	
F.3.d - Retrofit								X												
F.4 - IDDE									X											
F.5 - Public Participation			X																	
G - Watershed Plan												X								
H - Fiscal Analysis												X								
I - TMDLs												X								
J - Effectiveness													X							
K - Reporting													X							
L, M, N, O							X													
Attachment C - Definitions																X				
Attachment F - MRP															X					
Fact Sheet																X				
REGIONAL BOARD																				
David Barker	X	/	X	/	/	/	X	/	/	/	X	X	X	X	/	X	X	X	X	X
Chiara Clemente	/	/	X	X	X	/	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Ben Neill	X	X		X	X	X	X	X	X	X		X	X	X	X		X	X	X	X
Wayne Chiu	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Chad Loflen			/	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
PERMITTEES																				
Jason Uhley	X	X	X	X	X	X	X	X	X	X	X			X	X	X	X	X	X	X
Claudio Padres	X		X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X
County		X	X	X		X	X		X	X		X		X	X	X	X		X	X
Menifee			X	X		X	X	X		X	X	X		X	X	X	X		X	
Murrieta	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	
Temecula	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Wildomar	X	X	X	X	X	X	X	X	X	X			X	X	X	X	X	X	X	X

Santa Margarita Watershed MS4 Permit Renewal
Meeting with San Diego Regional Board Staff

San Diego Regional Board Office

April 22, 2010

10:00 AM – 11:30 PM

Attendees:

Dave Barker, SDRWQCB
Chiara Clemente, SDRWQCB
Ben Neill, SDRWQCB
Wayne Chiu, SDRWQCB
Jason Uhley, RFCWCD
Claudio Padres, RFCWCD
Mike Shelter, Riverside County
Bill Woolsey, Murrieta
Aldo Licitra, Temecula
Mack Walker, LWA
Daniel Apt, RBF

Agenda Item	**Discussion**
Introductions	• Dave Barker has been the Watershed Branch Manager for a year, and previously worked on other NPDES permits and TMDLs. • Chiara Clemente is the Supervisor of the Central Watershed Unit • Wayne Chiu is part of the Southern Watershed Unit
Recap of Goals for the Renewal i. Copermittee Overarching Goals	• The Copermittees feel that they have been successful with their other permit renewal processes in Region 8 and their overarching goals including: • Protection of water quality • Resource allocation as appropriate to the watershed • Consistency with county-wide programs • Cost-neutral permit
Recap of Goals for the Renewal ii. Regional Board Overarching Goals	• David Gibson would like the permit adopted no later than December 2010 • Each permit term there is room for improvement in the permit • There is an opportunity in the permit to reduce the permit details, specifically in areas where the Regional Board is overly prescriptive in dictating compliance • The OC permit is not the template for Riverside, as there is room for improvement
Discussion of the Gap	• The Permittees have looked through the Orange County permit and at a high level there are many sections where it is not far off the permittees' position • Review of the permit starting point table • The last column of the table is a qualitative assessment of the level of discussion needed regarding the permit area • In some cases starting with the OC permit language makes sense and in other cases the table identifies the Permittees' preference for the starting language

	• The Regional Board staff indicated that the schedule would be acceptable for driving future meeting discussions.
Process for Addressing Issues	• The preference of the Copermittees, to have an effective way to communicate, is to provide comments and suggested language on a draft permit provided by the Regional Board. • Dave Barker identified that he had no objection to the process working in this way and that the Regional Board staff do have a draft of the permit which can be provided to the Permittees. • The other Regional Board staff present identified some concerns of working directly with language comments including that there might be too much back and forth with specific language for permit sections, for some areas of the permit it may make sense that starting with language may not work if there is not agreement on the overarching issues, and that it might make sense to review the big issues first before going into detailed language. • The details of the process that was agreed upon include: 1. The Regional Board staff will provide a copy of the draft permit to the Copermittees in the next day or so 2. The Copermittees will comment and provide suggested language and a rationale for comments on the section of the permit that will be the subject of the next meeting 1 week prior to the meeting 3. The Regional Board will review the Copermittees' comments and suggested language; 4. The areas of disagreement will be discussed during the meeting 5. Meeting notes will be taken by the Copermittees to document the discussion and will be provided to the Regional Board staff within a day of the meeting for review and comment 6. For some permit areas where the issues merit discussion upfront (i.e. hydromodification) detailed language comments will not be provided prior to the meeting regarding that section of the permit 7. The rationale for permit language agreed to will be documented throughout the process, which can be used for the permit findings and fact sheet. 8. If time permits, the Regional Board staff will provide a draft of the entire permit to the Permittees for review and comment two weeks prior to public release of the permit 9. The official draft of the permit throughout the process will stay with the Regional Board.

Schedule for Moving Forward	• There will be weekly meetings based on the schedule provided • Each meeting has a mix of easier and more difficult topics • The schedule is also based on a logical progression as some permit sections will affect other permit sections • There is some flexibility built into the schedule based on outcomes of the meetings • The week of 6/23 is flexible in case some topics need to be revisited • The Copermittees will examine the schedule and make sure it is appropriate based on the discussion of today's meeting • Next week's meeting will cover 1) Municipal; 2) Residential; and 3) Public Participation • The Regional Board staff will provide a draft of the permit the day following this meeting • The Copermittees will provide comments and suggested language on the draft permit sections identified for the first meeting by close of business Monday 4/26
Summary of Action Items	• The Regional Board staff will provide a draft of the permit the day following this meeting • The Copermittees will examine the schedule and make sure it is appropriate based on the discussion of today's meeting • The Copermittees will provide comments and suggested language on the draft permit sections identified for the first meeting by close of business Monday 4/26

Meeting Schedule

Summary Schedule

	April			May				June				July					August			
	4/15	4/22	4/28	5/6	5/13	5/20	5/26	6/3	6/10	6/17	6/23	7/1	7/8	7/15	7/21	7/29	8/5	8/12	8/19	8/25
Meeting Dates (pre-public draft)		X	X	X	X	X	X	X	X	X	X	X	X							
Complete Draft to Permittees															X					
Earliest Possible Public Release																	X			

Detail Schedule

	April			May				June				July					August			
	4/15	4/22	4/28	5/6	5/13	5/20	5/26	6/3	6/10	6/17	6/23	7/1	7/8	7/15	7/21	7/29	8/5	8/12	8/19	8/25
Findings														X						
A. Prohibitions and RWLs								X												
B. Non-Storm Water								X												
C. NALs				X																
D. SALs				X																
E. Legal Authority												X								
Development Planning: F.1.a - F.1.c										X										
Development Planning: F.1.d(1) - F.1.d.(4)					X															
Development Planning: F.1.d.(5) - F.1.d.(10)							X													
Development Planning: F.1.e - F.1.g, F.1.i					X															
Development Planning: F.1.h						X	x													
F.2 - Construction												X								
F.3.a - Permittee Facilities			X																	
F.3.b - Comm. / Ind.									X											
F.3.c - Residential			X																	
F.3.d - Retrofit								X												
F.4 - IDDE									X											
F.5 - Public Participation			X																	
G - Watershed Plan												X								
H - Fiscal Analysis												X								
I - TMDLs												X								
J - Effectiveness													X							
K - Reporting													X							
L, M, N, O							X													
Attachment C - Definitions																X				
Attachment F - MRP															X					
Fact Sheet																X				
REGIONAL BOARD																				
David Barker	X	/	X	/	/	/	X	/	/	/	X	X	X	X	/	X	X	X	X	X
Chiara Clemente	/	/	X	X	X	/	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Ben Neill	X	X		X	X	X	X	X	X	X		X	X	X	X		X	X	X	X
Wayne Chiu	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Chad Loflen			/	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
PERMITTEES																				
Jason Uhley	X	X	X	X	X	X	X	X	X	X	X			X	X	X	X	X	X	X
Claudio Padres	X		X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X
County		X	X	X		X	X		X	X		X		X	X	X	X		X	X
Menifee			X	X		X	X	X		X	X	X		X	X	X	X		X	
Murrieta	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	
Temecula	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Wildomar	X	X	X	X	X	X	X	X	X	X			X	X	X	X	X	X	X	X

Permit Area		*Starting* Point	Estimated Meeting Time to work through issues (based on starting point)
Prohibitions and Receiving Waters Language		Orange County Permit	1/3 Meeting
Non-Stormwater Discharges		Orange County Permit	1/3 Meeting
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Monitoring		Local Solution Needed	1 Meeting
Fact Sheet		Local Solution Needed	1/2 Meeting
Definitions		SMR Permit	1/2 Meeting

0004407

From: "Padres, Claudio" <CMPadres@rcflood.org>
To: Chiara Clemente <CClemente@waterboards.ca.gov>, Ben Neill <BNeill@waterb...
CC: "Uhley, Jason" <JUHLEY@rcflood.org>, "County (Alex Gann)" <agann@rceo.or...
Date: 4/26/2010 7:23 PM
Subject: RE: Draft Riverside MS4 Permit
Attachments: R9-2010-0016_Week 1.doc; 2010-04-28_AGENDA.docx

Chiara, et.al.,

Attached are our comments on the topics scheduled for this Wednesday, April 28th, and an agenda for the meeting. Due to the IRWM meeting that is in the morning (9a-11a), our meeting will start later than usual. To ensure we have enough time to get through the agenda, I propose we start at noon and end at 4pm.

One thing we would like to discuss at this meeting and decide on as soon as possible, is addressing the dual-regulation of Menifee, Murrieta and Wildomar. David Gibson had expressed preliminary support for allowing at least Menifee and Murrieta to be wholly regulated by the Santa Ana Board and the San Diego Board respectively, as the overlapping areas are very small. The Santa Ana Board has already included language in the 2010 Riverside Permit to allow such a swap to happen. We think it is important to address this early so that the Cities can dedicate their time to the appropriate programs.

Our comments and edits were, as expected, not very extensive. Below are some highlights:

Public Participation:

* No Comments / Edits (no surprise there)

Residential:

* HOAs - Comments were primarily focused on F.3.c.(5) which is a new requirement specifically address HOAs. In the development of our 2004 permit, we discussed inclusion of this text and put it to rest through the mutual conclusion that requirements for HOAs were not necessary in this region; and we don't believe anything has changed since.

Municipal:

* Terminology - We ran into some terminology issues that we commented on in the attached documents, but that we can also discuss further in our meeting.

* Facility database - focusing what we are tracking to what will be useful in managing our programs.

* BMPs for Flood Control Structures - Simplifying requirements to get the same goal, and making the evaluation an on-going effort that is done as part of routine maintenance.

* MS4 inspections - Recommended changes to ensure consistency with existing programs.

0004408

I will follow up tomorrow with specific directions regarding where exactly we are meeting on Wednesday.

Claudio M. Padres
Santa Margarita MS4 Permit Manager
951.955.8602

From: Ben Neill [mailto:BNeill@waterboards.ca.gov]
Sent: Thursday, April 22, 2010 4:18 PM
To: Aldo Licitra; Tim Dzmura; Bill Woolsey; Mike Shetler; Padres, Claudio; Uhley, Jason
Cc: Chiara Clemente; Chad Loflen; David Barker; James Smith; Wayne Chiu
Subject: Draft Riverside MS4 Permit

Dear Copermittees,

Per Mr. Barker's commitment at today's meeting, attached is a rough draft of the Riverside MS4 permit.

Ben Neill
Water Resource Control Engineer
Northern Watershed Protection Unit
San Diego Regional Water Quality Control Board

9174 Sky Park Ct., Suite 100

San Diego, CA 92123
Tel: (858) 467-2983

Fax: (858) 571-6972

California Regional Water Quality Control Board
San Diego Region

Waste Discharge Requirements for Discharges from the Municipal Separate Storm Sewer Systems (MS4s) Draining the County of Riverside, the Incorporated Cities of Riverside County, and the Riverside County Flood Control and Water Conservation District within the San Diego Region

Tentative Order No. R9-2010-0016
NPDES NO. CAS0108740

TBD, 2010

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN DIEGO REGION
9174 Sky Park Court, Suite 100, San Diego, California 92123-4340
Phone • (858) 467-2952 • Fax (858) 571-6972
http://www.waterboards.ca.gov/sandiego

To request copies of the Riverside County Municipal Storm Water Permit, please contact Ben Neill, Water Resources Control Engineer at (858) 467 – 2983, bneill@waterboards.ca.gov

Documents also are available at: http://www.waterboards.ca.gov/sandiego

Waste Discharge Requirements for Discharges from the Municipal Separate Storm Sewer Systems (MS4s) Draining the County of Riverside, the Incorporated Cities of Riverside County, and the Riverside County Flood Control and Water Conservation District within the San Diego Region

Adopted by the
California Regional Water Quality Control Board
San Diego Region
on TBD, 2010

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN DIEGO REGION
9174 Sky Park Court, Suite 100
San Diego, California 92123-4340

Telephone (858) 467-2952

STATE OF CALIFORNIA

ARNOLD SCHWARZENEGGER, Governor
LINDA S. ADAMS, Agency Secretary, California Environmental Protection Agency

California Regional Water Quality Control Board
San Diego Region

David King *Vice Chair*	Recreation / Wildlife
Eric Anderson	Irrigated Agriculture
Wayne Rayfield	Water Quality
Grant Destache	Industrial Water Use
George Loveland	Water Supply
Marc Luker	Undesignated (Public)

David W. Gibson, *Executive Officer*
James Smith, *Assistant Executive Officer*

This permit was prepared under the direction of

David T. Barker P.E., *Chief, Water Resource Protection Branch*

by

Ben Neill, *Water Resource Control Engineer*
Chad Loflen, *Environmental Scientist*
Wayne Chiu P.E., *Water Resource Control Engineer*

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Attachment A – Basin Plan Prohibitions
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Attachment E – Receiving Waters And MS4 Discharge Monitoring And Reporting Program No. R9-2010-0016
Attachment F – Data

The California Regional Water Quality Control Board, San Diego Region (hereinafter San Diego Water Board), finds that:

A. BASIS FOR THE ORDER

1. This Order is based on the federal Clean Water Act (CWA), the Porter-Cologne Water Quality Control Act (Division 7 of the Water Code, commencing with Section 13000), applicable State and federal regulations, all applicable provisions of statewide Water Quality Control Plans and Policies adopted by the State Water Resources Control Board (State Water Board), the Water Quality Control Plan for the San Diego Basin adopted by the San Diego Water Board, the California Toxics Rule, and the California Toxics Rule Implementation Plan.

2. This Order reissues National Pollutant Discharge Elimination System (NPDES) Permit No. CAS0108766, which was first adopted by the San Diego Water Board on July 16, 1990 (Order No. 90-38), and then reissued on May 13, 1998 (Order No. R9-98-02). On May 26, 1998, the United States Environmental Protection Agency (EPA), Region IX, objected to Order No. 98-02 due to concerns regarding Receiving Water Limitations (RWL) language. The EPA concluded that the RWL language in the permit did not comply with the federal Clean Water Act (CWA) and its implementing regulations. On April 27, 1999, the EPA reissued the MS4 permit, which the San Diego Water Board adopted as Addendum No. 1 to Order No. R9-98-02 on November 8, 2000. On July 14, 2004, the San Diego Water Board adopted the third term MS4 permit, Order No. R9-2004-001. On January 15, 2009, the Riverside County Flood Control and Water Conservation District (District), as the Principal Copermittee, submitted a Report of Waste Discharge (ROWD) for reissuance of the municipal separate storm sewer system (MS4) Permit.

3. This Order is consistent with the following precedential Orders adopted by the State Water Resources Control Board (State Water Board) addressing MS4 NPDES Permits: Order 99-05, Order WQ-2000-11, Order WQ 2001-15, Order WQO 2002-0014, and Order WQ-2009-0008 (*SWRCB/OCC FILE A-1780).*

4. The Fact Sheet / Technical Report for the Order No. R9-2010-0016, NPDES No. CAS0108766, Waste Discharge Requirements for Discharges from the Municipal Separate Storm Sewer Systems (MS4s) Draining the County of Riverside, the Incorporated Cities of Riverside County, and the Riverside County Flood Control and Water Conservation District within the San Diego Region, includes cited regulatory and legal references and additional explanatory information and data in support of the requirements of this Permit. This information, including any supplements thereto, and any response to comments on the Tentative Orders, is hereby incorporated by reference into these findings.

B. REGULATED PARTIES

1. Each of the persons in Table 1 below, hereinafter called Copermittees or dischargers, owns or operates an MS4, through which it discharges into waters of the United States within the San Diego Region. These MS4s fall into one or more of the following categories: (1) a medium or large MS4 that services a population of greater than 100,000 or 250,000 respectively; or (2) a small MS4 that is "interrelated" to a medium or large MS4; or (3) an MS4 which contributes to a violation of a water quality standard; or (4) an MS4 which is a significant contributor of pollutants to waters of the United States (waters of the U.S).

Table 1. Municipal Copermittees

1. City of Menifee	5. County of Riverside
2. City of Murrieta	6. Riverside County Flood Control and Water Conservation District
3. City of Temecula	
4. City of Wildomar	

C. DISCHARGE CHARACTERISTICS

1. Discharges from the MS4 contain waste, as defined in the California Water Code (CWC), and pollutants that adversely affect the quality of the waters of the State. The discharge from an MS4 is a "discharge of pollutants from a point source" into waters of the U.S. as defined in the CWA.

2. MS4 storm water and non-storm water discharges are likely to contain pollutants that cause or threaten to cause a violation of water quality standards, as outlined in the San Diego Water Board's Water Quality Control Plan for the San Diego Basin (Basin Plan). Storm water and non-storm water discharges from the MS4 are subject to the conditions and requirements established in the San Diego Basin Plan for point source discharges.

3. The most common categories of pollutants in runoff include total suspended solids, sediment, pathogens (e.g., bacteria, viruses, protozoa); heavy metals (e.g., copper, lead, zinc and cadmium); petroleum products and polynuclear aromatic hydrocarbons; synthetic organics (e.g., pesticides, herbicides, and PCBs); nutrients (e.g., nitrogen and phosphorus fertilizers); oxygen-demanding substances (decaying vegetation, animal waste); detergents; and trash.

4. The discharge of pollutants and/or increased flows from MS4s may cause or threaten to cause the concentration of pollutants to exceed applicable receiving water quality objectives and/or impair or threaten to impair designated beneficial uses resulting in a condition of pollution (i.e., unreasonable impairment of water

quality for designated beneficial uses), contamination, or nuisance.

5. Pollutants in runoff can threaten and adversely affect human health. Human illnesses have been clearly linked to recreating near storm drains flowing to receiving waters. Also, runoff pollutants in receiving waters can bioaccumulate in the tissues of invertebrates and fish, which may be eventually consumed by humans.

6. Runoff discharges from MS4s often contain pollutants that cause toxicity to aquatic organisms (i.e., adverse responses of organisms to chemicals or physical agents ranging from mortality to physiological responses such as impaired reproduction or growth anomalies). Toxic pollutants impact the overall quality of aquatic systems and beneficial uses of receiving waters.

7. The Copermittees discharge runoff into lakes, drinking water reservoirs, rivers, streams, creeks, bays, estuaries, coastal lagoons, the Pacific Ocean, and tributaries thereto within one of the eleven hydrologic units (Santa Margarita Hydrologic Unit) comprising the San Diego Region as shown in Table 2. Some of the receiving water bodies have been designated as impaired by the San Diego Water Board in 2009 pursuant to CWA section 303(d).

Table 2. Common Watersheds and CWA Section 303(d) Impaired Waters

Hydrologic Area (HA) or Hydrologic Subarea (HSA) of the Santa Margarita Hydrologic Unit	**Major Receiving Water Bodies**	**303(d) Pollutant(s)/stressor or Water Quality Effect[1]**
DeLuz Creek HSA (902.21)	De Luz Creek	Iron, Manganese, Nitrogen, Sulfates
Murrieta HSA (902.32)	Long Canyon Creek (tributary to Murrieta Creek	Chlorpyrifos, E. Coli, Fecal Coliform, Iron, Manganese
Wolf HSA (902.52)	Murrieta Creek	Chlorpyrifos, Copper, Iron, Manganese, Nitrogen, Toxicity
Pauba HSA (902.51)	Redhawk Channel	Chlorpyrifos, Copper, Diazinon, E. Coli, Fecal Coliform, Iron, Manganese, Nitrogen, Phosphorus, Total Dissolved Solids
Gavilan HSA (902.22)	Sandia Creek	Iron, Sulfates
Gertrudis HSA (902.42)	Santa Gertrudis Creek	Chlorpyrifos, Copper, E. Coli, Fecal Coliform, Iron, Phosphorous

[1] The listed 303(d) pollutant(s) do not necessarily reflect impairment of the entire corresponding WMA or all corresponding major surface water bodies. The specific impaired portions of each WMA are listed in the State Water Resources Control Board's 2008 Section 303(d) List of Water Quality Limited Segments.

Lower Ysidora HSA (902.11)	Santa Margarita Lagoon	Eutrophic
Lower Ysidora HSA (902.11)	Santa Margarita River (Lower)	Enterococcus, Fecal Coliform, Phosphorus, Total Nitrogen as N
Gavilan HSA (902.22)	Santa Margarita River (Upper)	Toxicity
Pauba HSA (902.51)	Temecula Creek	Chlorpyrifos, Copper, Phosphorus, Total Dissolved Solids, Toxicity
French HSA (902.33)	Warm Springs Creek (Riverside County)	Chlorpyrifos, E. Coli, Fecal Coliform, Iron, Manganese, Phosphorus, Total Nitrogen as N

8. Trash is a persistent pollutant which can enter receiving waters from the MS4 resulting in accumulation and transport in receiving waters over time. Trash poses a serious threat to the Beneficial Uses of the receiving waters, including, but not limited to, human health, rare and endangered species, navigation and human recreation.

9. The Copermittees' water quality monitoring data submitted to date documents persistent violations of Basin Plan water quality objectives for various runoff-related pollutants (indicator bacteria, dissolved solids, turbidity, metals, pesticides, etc.) at various watershed monitoring stations. Persistent toxicity has also been observed at some watershed monitoring stations. In addition, bioassessment data indicates that the majority of the monitored receiving waters have Poor to Very Poor Index of Biotic Integrity ratings. In sum, the above findings indicate that runoff discharges are causing or contributing to water quality impairments, and are a leading cause of such impairments in Riverside County.

10. When natural vegetated pervious ground cover is converted to impervious surfaces such as paved highways, streets, rooftops, and parking lots, the natural absorption and infiltration abilities of the land are lost. Therefore, runoff leaving a developed area is significantly greater in runoff volume, velocity, and peak flow rate than pre-development runoff from the same area. Runoff durations can also increase as a result of flood control and other efforts to control peak flow rates. Increased volume, velocity, rate, and duration of runoff, and decreased natural clean sediment loads, greatly accelerate the erosion of downstream natural channels. Significant declines in the biological integrity and physical habitat of streams and other receiving waters have been found to occur with as little as a 3-5 percent conversion from natural to impervious surfaces. The increased runoff characteristics from new development must be controlled to protect against increased erosion of channel beds and banks, sediment pollutant generation, or other impacts to beneficial uses and stream habitat due to increased erosive force.

11. Development creates new pollution sources as human population density increases

and brings with it proportionately higher levels of car emissions, car maintenance wastes, municipal sewage, pesticides, household hazardous wastes, pet wastes, trash, etc. which can either be washed or directly dumped into the MS4. As a result, the runoff leaving the developed urban area is significantly greater in pollutant load than the pre-development runoff from the same area. These increased pollutant loads must be controlled to protect downstream receiving water quality.

12. Development and urbanization especially threaten environmentally sensitive areas (ESAs), such as water bodies designated as supporting a RARE beneficial use (supporting rare, threatened or endangered species) and CWA 303(d)-impaired water bodies. Such areas have a much lower capacity to withstand pollutant shocks than might be acceptable in other areas. In essence, development that is ordinarily insignificant in its impact on the environment may become significant in a particularly sensitive environment. Therefore, additional controls to reduce storm water pollutants from new and existing development may be necessary for areas adjacent to or discharging directly to an ESA.

13. Although dependent on several factors, the risks typically associated with properly managed infiltration of runoff (especially from residential land use areas) are not significant. The risks associated with infiltration can be managed by many techniques, including (1) designing landscape drainage features that promote infiltration of runoff, but do not “inject” runoff (injection bypasses the natural processes of filtering and transformation that occur in the soil); (2) taking reasonable steps to prevent the illegal disposal of wastes; (3) protecting footings and foundations; (4) ensuring that each drainage feature is adequately maintained in perpetuity; and (5) pretreatment.

14. Non-storm water (dry weather) discharge from the MS4 is not considered a storm water (wet weather) discharge and therefore is not subject to regulation under the Maximum Extent Practicable (MEP) standard from CWA 402(p)(3)(B)(iii), which is explicitly for “Municipal … *Stormwater Discharges* (emphasis added)” from the MS4. Rather, non-storm water discharges, per CWA 402(p)(3)(B)(ii), are to be effectively prohibited. Such dry weather non-storm water discharges have been shown to contribute significant levels of pollutants and flow in arid, developed Southern California watersheds and are to be effectively prohibited under the Clean Water Act.

15. Non-storm water discharges to the MS4 granted an influent exception [i.e., which are exempt from the effective prohibition requirement set forth in CWA section 402(p)(3)(B)(ii)] under 40 CFR 122.26 are included within this Order. Any exempted discharges identified by Copermittees as a source of pollutants are subsequently required to be *addressed* (emphasis added) as illicit discharges through prohibition and incorporation into existing IC/ID programs. Furthermore, the Federal Register (55, page 48037) clarifies that the San Diego Water Board may also identify exempted discharges as a source of pollutants required to be addressed as illicit discharges. The San Diego Water Board and the Copermittees have identified landscape irrigation, irrigation water and lawn water, previously exempted discharges, as a source of pollutants and conveyance of pollutants to waters of the United States.

D. RUNOFF MANAGEMENT PROGRAMS

1. General

a. This Order specifies requirements necessary for the Copermittees to reduce the discharge of pollutants in storm water to the maximum extent practicable (MEP). However, since MEP is a dynamic performance standard, which evolves over time as runoff management knowledge increases, the Copermittees' runoff management programs must continually be assessed and modified to incorporate improved programs, control measures, best management practices (BMPs), etc. in order to achieve the evolving MEP standard. Absent evidence to the contrary, this continual assessment, revision, and improvement of runoff management program implementation is expected to ultimately achieve compliance with water quality standards in the Region.

b. The Copermittees have generally been implementing the jurisdictional runoff management programs required pursuant to Order No. 2004-001 since July 14, 2004. Prior to that, the Copermittees were regulated by Order No. 98-02, since May 13, 1998. MS4 discharges, however, continue to cause or contribute to violations of water quality standards as evidenced by the Copermittees monitoring results.

c. This Order contains new or modified requirements that are necessary to improve Copermittees' efforts to reduce the discharge of pollutants in storm water runoff to the MEP and achieve water quality standards. Some of the new or modified requirements, such as the revised Watershed Runoff Management Program section, are designed to specifically address high priority water quality problems. Other new or modified requirements address program deficiencies that have been noted during audits, report reviews, and other San Diego Water Board compliance assessment activities.

d. Updated individual Drainage Area Management Plans (DAMP), and Watershed Stormwater Management Plans (watershed SWMPs), which describe the Copermittees' runoff management programs in their entirety, are needed to guide the Copermittees' runoff management efforts and aid the Copermittees in tracking runoff management program implementation. It is practicable for the Copermittees to update the JRMPs and WRMPs within one year, since significant efforts to develop these programs have already occurred. Hereinafter, the individual DAMP is referred to as the Jurisdictional Runoff Management Plans (JRMPs) and the Watershed SWMP is referred to as the Watershed Runoff Management Plan (WRMP).

e. Pollutants can be effectively reduced in storm water runoff by the application of a combination of pollution prevention, source control, and treatment control BMPs. Pollution prevention is the reduction or elimination of pollutant generation at its

source and is the best "first line of defense." Source control BMPs (both structural and non-structural) minimize the contact between pollutants and flows (e.g., rerouting run-on around pollutant sources or keeping pollutants on-site and out of receiving waters). Treatment control BMPs remove pollutants that have been mobilized by wet-weather or dry-weather flows.

f. Runoff needs to be addressed during the three major phases of urban development (planning, construction, and use) in order to reduce the discharge of pollutants from storm water to the MEP, effectively prohibit non-storm water discharges and protect receiving waters. Development which is not guided by water quality planning policies and principles can unnecessarily result in increased pollutant load discharges, flow rates, and flow durations which can negatively impact receiving water beneficial uses. Construction sites without adequate BMP implementation result in sediment runoff rates which greatly exceed natural erosion rates of undisturbed lands, causing siltation and impairment of receiving waters. Existing development generates substantial pollutant loads which are discharged in runoff to receiving waters.

g. Annual reporting requirements included in this Order are necessary to meet federal requirements and to evaluate the effectiveness and compliance of the Copermittees' programs.

h. This Order establishes Storm Water Action Levels (SALs) for selected pollutants based on USEPA Rain Zone 6 (arid southwest) Phase I MS4 monitoring data for pollutants in storm water. The SALs were computed as the 90th percentile of the data set, utilizing the statistical based population approach, one of three approaches recommended by the California Water Board's Storm Water Panel in its report, 'The Feasibility of Numerical Effluent Limits Applicable to Discharges of Storm Water Associated with Municipal, Industrial and Construction Activities (June 2006). SALs are identified in Section D of this Order. Copermittees shall implement a timely, comprehensive, cost-effective storm water pollution control program to reduce the discharge of pollutants in storm water from the permitted areas so as not to exceed the SALs. Exceedance of SALs may indicate inadequacy of programmatic measures and BMPs required in this Order.

2. **Development Planning**

a. The Standard Storm Water Mitigation Plan (SSMP) requirements contained in this Order are consistent with Order WQ-2000-11 adopted by the State Water Resources Control Board (State Board) on October 5, 2000. In the precedential order, the State Board found that the design standards, which essentially require that runoff generated by 85 percent of storm events from specific development categories be infiltrated or treated, reflect the MEP standard. The order also found that the SSMP requirements are appropriately applied to the majority of the Priority Development Project categories contained in Section F.1 of this Order. The State Board also gave Regional Water Quality Control Boards the needed discretion to include additional categories and locations, such as retail gasoline

outlets (RGOs), in SSMPs.

b. Controlling runoff pollution by using a combination of onsite source control and site design BMPs augmented with treatment control BMPs before the runoff enters the MS4 is important for the following reasons: (1) Many end-of-pipe BMPs (such as diversion to the sanitary sewer) are typically ineffective during significant storm events. Whereas, onsite source control BMPs can be applied during all runoff conditions; (2) End-of-pipe BMPs are often incapable of capturing and treating the wide range of pollutants which can be generated on a sub-watershed scale; (3) End-of-pipe BMPs are more effective when used as polishing BMPs, rather than the sole BMP to be implemented; (4) End-of-pipe BMPs do not protect the quality or beneficial uses of receiving waters between the pollutant source and the BMP; and (5) Offsite end-of-pipe BMPs do not aid in the effort to educate the public regarding sources of pollution and their prevention.

c. Use of Low-Impact Development (LID) site design BMPs at new development, redevelopment and retrofit projects can be an effective means for minimizing the impact of storm water runoff discharges from the development projects on receiving waters. LID is a site design strategy with a goal of maintaining or replicating the pre-development hydrologic regime through the use of design techniques. LID site design BMPs help preserve and restore the natural hydrologic cycle of the site, allowing for filtration and infiltration which can greatly reduce the volume, peak flow rate, velocity, and pollutant loads of storm water runoff. Current runoff management, knowledge, practices and technology have resulted in the use of LID BMPs as an acceptable means of meeting the storm water MEP standard.

d. Retail Gasoline Outlets (RGOs) are significant sources of pollutants in storm water runoff. RGOs are points of convergence for motor vehicles for automotive related services such as repair, refueling, tire inflation, and radiator fill-up and consequently produce significantly higher loadings of hydrocarbons and trace metals (including copper and zinc) than other developed areas.

e. Industrial sites are significant sources of pollutants in runoff. Pollutant concentrations and loads in runoff from industrial sites are similar or exceed pollutant concentrations and loads in runoff from other land uses, such as commercial or residential land uses. As with other land uses, LID site design, source control, and treatment control BMPs are needed at industrial sites in order to meet the MEP standard. These BMPs are necessary where the industrial site is larger than 10,000 square feet. The 10,000 square feet threshold is appropriate, since it is consistent with requirements in other Phase I NPDES storm water regulations throughout California.

f. If not properly designed or maintained, certain BMPs implemented or required by municipalities for runoff management may create a habitat for vectors (e.g. mosquitoes and rodents). Proper BMP design and maintenance to avoid

standing water, however, can prevent the creation of vector habitat. Nuisances and public health impacts resulting from vector breeding can be prevented with close collaboration and cooperative effort between municipalities, local vector control agencies, and the California Department of Public Health during the development and implementation of runoff management programs.

g. The increased volume, velocity, frequency and discharge duration of storm water runoff from developed areas has the potential to greatly accelerate downstream erosion, impair stream habitat in natural drainages, and negatively impact beneficial uses. Development and urbanization increase pollutant loads in storm water runoff and the volume of storm water runoff. Impervious surfaces can neither absorb water nor remove pollutants and thus lose the purification and infiltration provided by natural vegetated soil. Hydromodification measures for discharges to hardened channels are needed for the future restoration of the hardened channels to their natural state, thereby restoring the chemical, physical, and biological integrity and Beneficial Uses of local receiving waters.

3. **Construction and Existing Development**

a. In accordance with federal NPDES regulations and to ensure the most effective oversight of industrial and construction site discharges, discharges of runoff from industrial and construction sites are subject to dual (State and local) storm water regulation. Under this dual system, each Copermittee is responsible for enforcing its local permits, plans, and ordinances, and the San Diego Water Board is responsible for enforcing the General Construction Activities Storm Water Permit, State Board Order 2009-0009-DWQ, NPDES No. CAS000002 (General Construction Permit) and the General Industrial Activities Storm Water Permit, State Board Order 97-03 DWQ, NPDES No. CAS000001 (General Industrial Permit) and any reissuance of these permits. NPDES municipal regulations require that municipalities develop and implement measures to address runoff from industrial and construction activities. Those measures may require the implementation of additional BMPs than are required under the statewide general permits for activities subject to both State and local regulation.

b. Identification of sources of pollutants in runoff (such as municipal areas and activities, industrial and commercial sites/sources, construction sites, and residential areas), development and implementation of BMPs to address those sources, and updating ordinances and approval processes are necessary for the Copermittees to ensure that discharges of pollutants from its MS4 in storm water are reduced to the MEP and that non-storm water discharges are not occurring. Inspections and other compliance verification methods are needed to ensure minimum BMPs are implemented. Inspections are especially important at high risk areas for pollutant discharges.

c. Historic and current development makes use of natural drainage patterns and features as conveyances for runoff. Urban streams used in this manner are part of the municipalities MS4 regardless of whether they are natural, anthropogenic,

or partially modified features. In these cases, the urban stream is both an MS4 and receiving water.

d. As operators of the MS4s, the Copermittees cannot passively receive and discharge pollutants from third parties. By providing free and open access to an MS4 that conveys discharges to waters of the U.S., the operator essentially accepts responsibility for discharges into the MS4 that it does not prohibit or control. These discharges may cause or contribute to a condition of contamination or a violation of water quality standards.

e. Waste and pollutants which are deposited and accumulate in MS4 drainage structures will be discharged from these structures to waters of the U.S. unless they are removed. These discharges may cause or contribute to, or threaten to cause or contribute to, a condition of pollution in receiving waters. For this reason, pollutant discharges from storm water into MS4s must be reduced using a combination of management measures, including source control, and an effective MS4 maintenance program must be implemented by each Copermittee.

f. Enforcement of local runoff related ordinances, permits, and plans is an essential component of every runoff management program and is specifically required in the federal storm water regulations and this Order. Each Copermittee is individually responsible for adoption and enforcement of ordinances and/or policies, implementation of identified control measures/BMPs needed to prevent or reduce pollutants in storm water runoff, and for the allocation of funds for the capital, operation and maintenance, administrative, and enforcement expenditures necessary to implement and enforce such control measures/BMPs under its jurisdiction. Education is an important aspect of every effective runoff management program and the basis for changes in behavior at a societal level. Education of municipal planning, inspection, and maintenance department staffs is especially critical to ensure that in-house staffs understand how their activities impact water quality, how to accomplish their jobs while protecting water quality, and their specific roles and responsibilities for compliance with this Order. Public education, designed to target various urban land users and other audiences, is also essential to inform the public of how individual actions affect receiving water quality and how adverse effects can be minimized.

g. Public participation during the development of runoff management programs is necessary to ensure that all stakeholder interests and a variety of creative solutions are considered.

h. Retrofitting existing development with storm water treatment controls, including LID, is necessary to address storm water discharges from existing development that may cause or contribute to a condition of pollution or a violation of water quality standards. Although SSMP BMPs are required for redevelopment, the current rate of redevelopment will not address water quality problems in a timely manner. Cooperation with private landowners is necessary to effectively identify, implement and maintain retrofit projects for the preservation, restoration, and

enhancement of water quality.

4. **Watershed Runoff Management**

   a. Since runoff within a watershed can flow from and through multiple land uses and political jurisdictions, watershed-based runoff management can greatly enhance the protection of receiving waters. Such management provides a means to focus on the most important water quality problems in each watershed. By focusing on the most important water quality problems, watershed efforts can maximize protection of beneficial use in an efficient manner. Effective watershed-based runoff management actively reduces pollutant discharges and abates pollutant sources causing or contributing to watershed water quality problems. Watershed-based runoff management that does not actively reduce pollutant discharges and abate pollutant sources causing or contributing to watershed water quality problems can necessitate implementation of the iterative process outlined in section A.3 of the Tentative Order. Watershed management of runoff does not require Copermittees to expend resources outside of their jurisdictions. Watershed management requires the Copermittees within a watershed to develop a watershed-based management strategy, which can then be implemented on a jurisdictional basis.

   b. Some runoff issues, such as general education and training, can be effectively addressed on a regional basis. Regional approaches to runoff management can improve program consistency and promote sharing of resources, which can result in implementation of more efficient programs.

   c. It is important for the Copermittees to coordinate their water quality protection and land use planning activities to achieve the greatest protection of receiving water bodies. Copermittee coordination with other watershed stakeholders, especially the State of California Department of Transportation, the United States Department of Defense, and water and sewer districts, is also important.

E. STATUTE AND REGULATORY CONSIDERATIONS

1. The Receiving Water Limitations (RWL) language specified in this Order is consistent with language recommended by the USEPA and established in State Board Water Quality Order 99-05, *Own Motion Review of the Petition of Environmental Health Coalition to Review Waste Discharge Requirements Order No. 96-03, NPDES Permit No. CAS0108740*, adopted by the State Board on June 17, 1999. The RWL in this Order require compliance with water quality standards, which for storm water discharges is to be achieved through an iterative approach requiring the implementation of improved and better-tailored BMPs over time. Compliance with receiving water limits based on applicable water quality standards is necessary to ensure that MS4 discharges will not cause or contribute to violations of water quality standards and the creation of conditions of pollution.

2. The Water Quality Control Plan for the San Diego Basin (Basin Plan), identifies the following existing and potential beneficial uses for surface waters in Riverside County: Municipal and Domestic Supply (MUN), Agricultural Supply (AGR), Industrial Process Supply (PROC), Hydropower Generation (POW), Industrial Service Supply (IND), Ground Water Recharge (GWR), Contact Water Recreation (REC1), Non-contact Water Recreation (REC2), Warm Freshwater Habitat (WARM), Cold Freshwater Habitat (COLD), Wildlife Habitat (WILD), Rare, Threatened, or Endangered Species (RARE), Spawning, Reproduction and/or Early Development (SPWN) and Preservation of Biological Habitats of Special Significance (BIOL).

3. This Order is in conformance with State Board Resolution No. 68-16, *Statement of Policy with Respect to Maintaining High Quality Waters in California*, and the federal Antidegradation Policy described in 40 CFR 131.12.

4. Section 6217(g) of the Coastal Zone Act Reauthorization Amendments of 1990 (CZARA) requires coastal states with approved coastal zone management programs to address non-point pollution impacting or threatening coastal water quality. CZARA addresses five sources of non-point pollution: agriculture, silviculture, urban, marinas, and hydromodification. This NPDES permit addresses the management measures required for the urban category, with the exception of septic systems. The adoption and implementation of this NPDES permit relieves the Copermittee from developing a non-point source plan, for the urban category, under CZARA. The San Diego Water Board addresses septic systems through the administration of other programs.

5. Section 303(d)(1)(A) of the CWA requires that "Each state shall identify those waters within its boundaries for which the effluent limitations…are not stringent enough to implement any water quality standard (WQS) applicable to such waters." The CWA also requires states to establish a priority ranking of impaired water bodies known as Water Quality Limited Segments and to establish Total Maximum Daily Loads (TMDLs) for such waters. This priority list of impaired water bodies is called the Section 303(d) List. The 2006 Section 303(d) List was approved by the State Board on October 25, 2006. On June 28, 2007, the 2006 303(d) list for California was given final approval by the United States Environmental Protection Agency (USEPA). The 303(d) List was recently updated, and on December 16, 2009, the 2008 303(d) List was approved by the San Diego Water Board. The 2008 List is awaiting State Board and USEPA approval.

6. This Order does not constitute an unfunded local government mandate subject to subvention under Article XIIIB, Section (6) of the California Constitution for several reasons, including, but not limited to, the following. First, this Order implements federally mandated requirements under federal Clean Water Act section 402. (33 U.S.C. § 1342(p)(3)(B).) Second, the local agency Copermittees' obligations under this Order are similar to, and in many respects less stringent than, the obligations of non-governmental and new dischargers who are issued NPDES permits for storm

water and non-storm water discharges. Third, the local agency Copermittees have the authority to levy service charges, fees, or assessments sufficient to pay for compliance with this Order. Fourth, the Copermittees have requested permit coverage in lieu of compliance with the complete prohibition against the discharge of pollutants contained in federal Clean Water Act section 301, subdivision (a) (33 U.S.C. § 1311(a)) and in lieu of numeric restrictions on their storm water discharges. Fifth, the local agencies' responsibility for preventing discharges of waste that can create conditions of pollution or nuisance from conveyances that are within their ownership or control under State law predates the enactment of Article XIIIB, Section (6) of the California Constitution. Likewise, the provisions of this Order to implement total maximum daily loads (TMDLs) are federal mandates. The federal Clean Water Act requires TMDLs to be developed for water bodies that do not meet federal water quality standards. (33 U.S.C. sec. 1313(d).) Once the U.S. Environmental Protection Agency or a state develops a TMDL, federal law requires that permits must contain effluent limitations consistent with the assumptions of any applicable wasteload allocation. (40 C.F.R. sec. 122.44(d)(1)(vii)(B).)

7. Runoff treatment and/or mitigation must occur prior to the discharge of runoff into receiving waters. Treatment BMPs must not be constructed in waters of the U.S. or State unless the runoff flows are sufficiently pretreated to protect the values and functions of the water body. Federal regulations at 40 CFR 131.10(a) state that in no case shall a state adopt waste transport or waste assimilation as a designated use for any waters of the U.S. Authorizing the construction of an runoff treatment facility within a water of the U.S., or using the water body itself as a treatment system or for conveyance to a treatment system, would be tantamount to accepting waste assimilation as an appropriate use for that water body. Furthermore, the construction, operation, and maintenance of a pollution control facility in a water body can negatively impact the physical, chemical, and biological integrity, as well as the beneficial uses, of the water body. Without federal authorization (e.g., pursuant to Clean Water Act Section 404), waters of the U.S. may not be converted into, or used as, waste treatment or conveyance facilities. Similarly, waste discharge requirements pursuant to California Water Code Section 13260 are required for the conversion or use of waters of the State as waste treatment or conveyance facilities. Diversion from waters of the U.S./State to treatment facilities and subsequent return to waters of the U.S. is allowable, provided that the effluent complies with applicable NPDES requirements.

8. The issuance of waste discharge requirements and an NPDES permit for the discharge of runoff from MS4s to waters of the U.S. is exempt from the requirement for preparation of environmental documents under the California Environmental Quality Act (CEQA) (Public Resources Code, Division 13, Chapter 3, section 21000 et seq.) in accordance with the CWC section 13389.

9. Storm water discharges from developed and developing areas in Riverside County are significant sources of certain pollutants that cause, may be causing, threatening to cause or contributing to water quality impairment in the waters of Riverside County. Furthermore, as delineated in the CWA section 303(d) list in Table 2, the

San Diego Water Board has found that there is a reasonable potential that municipal storm water and non-storm water discharges from MS4s cause or may cause or contribute to an excursion above water quality standards for the following pollutants: Indicator Bacteria, Copper, Manganese, Iron, Chlorpyrifos, Sulfates, Phosphorous, Nitrogen, Toxicity and Turbidity. In accordance with CWA section 303(d), the San Diego Water Board is required to establish Total Maximum Daily Loads (TMDLs) for these pollutants to these waters to eliminate impairment and attain water quality standards. Therefore, certain early pollutant control actions and further pollutant impact assessments by the Copermittees are warranted and required pursuant to this Order.

10. This Order requires each Copermittee to effectively prohibit all types of unauthorized discharges of non-storm water into its MS4. However, historically pollutants have been identified as present in dry weather non-storm water discharges from the MS4s through 303(d) listings, monitoring conducted by the Copermittees under Order No. R9-2004-0001, and there are others expected to be present in dry weather non-storm water discharges because of the nature of these discharges. This Order includes action levels for pollutants in non-storm water, dry weather, discharges from the MS4 designed to ensure that the requirement to effectively prohibit all types of unauthorized discharges of non-storm water in the MS4 is being complied with. Action levels in the Order are based upon numeric or narrative water quality objectives and criteria as defined in the Basin Plan, the Water Quality Control Plan for Ocean Waters of California (Ocean Plan), and the State Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California (State Implementation Policy or SIP). An exceedance of an action level requires specified responsive action by the Copermittees. This Order describes what actions the Copermittees must take when an exceedance of an action level is observed. Exceedances of non-storm water action levels do not alone constitute a violation of this Order but could indicate non-compliance with the requirement to effectively prohibit all types of unauthorized non-storm water discharges into the MS4 or other prohibitions established in this Order. Failure to undertake required source investigation and elimination action following an exceedance of a non-storm water action level (NAL or action level) is a violation of this Order. The San Diego Water Board recognizes that use of action levels will not necessarily result in detection of all unauthorized sources of non-storm water discharges because there may be some discharges in which pollutants do not exceed established action levels. However, establishing NALs at levels appropriate to protect water quality standards is expected to lead to the identification of significant sources of pollutants in dry weather non-storm water discharges.

11. In addition to federal regulations cited in the Fact Sheet / Technical Report for the Order No. R9-2010-0016, monitoring and reporting required under Order No. R9-2010-0016 is required pursuant to authority under CWC section 13383.

F. PUBLIC PROCESS

1. The San Diego Water Board has notified the Copermittees, all known interested parties, and the public of its intent to consider adoption of an Order prescribing waste discharge requirements that would serve to renew an NPDES permit for the existing discharge of runoff.

2. The San Diego Water Board has held public hearings on TBD and heard and considered all comments pertaining to the terms and conditions of this Order.

IT IS HEREBY ORDERED that the Copermittees, in order to meet the provisions contained in Division 7 of the California Water Code (CWC) and regulations adopted thereunder, and the provisions of the Clean Water Act (CWA) and regulations adopted thereunder, must each comply with the following:

A. PROHIBITIONS AND RECEIVING WATER LIMITATIONS

1. Discharges into and from municipal separate storm sewer systems (MS4s) in a manner causing, or threatening to cause, a condition of pollution, contamination, or nuisance (as defined in CWC section 13050), in waters of the state are prohibited.

2. Storm water discharges from MS4s containing pollutants which have not been reduced to the maximum extent practicable (MEP) are prohibited.[2]

3. Discharges from MS4s that cause or contribute to the violation of water quality standards (designated beneficial uses, water quality objectives developed to protect beneficial uses, and the State policy with respect to maintaining high quality waters) are prohibited.

a. Each Copermittee must comply with section A.3 and section A.4 as it applies to Prohibition 5 in Attachment A of this Order through timely implementation of control measures and other actions to reduce pollutants in storm water discharges in accordance with this Order, including any modifications. If exceedance(s) of water quality standards persist notwithstanding implementation of this Order, the Copermittee must assure compliance with section A.3 and section A.4 as it applies to Prohibition 5 in Attachment A of this Order by complying with the following procedure:

(1) Upon a determination by either the Copermittee or the San Diego Water Board that storm water MS4 discharges are causing or contributing to an exceedance of an applicable water quality standard, the Copermittee must notify the San Diego Water Board within 30 days and thereafter submit a report to the San Diego Water Board that describes best management practices (BMPs) that are currently being implemented and additional BMPs that will be implemented to prevent or reduce any pollutants that are causing or contributing to the exceedance of water quality standards. The report may be incorporated in the Annual Report unless the San Diego Water Board directs an earlier submittal. The report must include an implementation schedule. The San Diego Water Board may require modifications to the report;

(2) Submit any modifications to the report required by the San Diego Water Board within 30 days of notification;

[2] This prohibition does not apply to MS4 discharges which receive subsequent treatment to reduce pollutants to the MEP prior to entering receiving waters (e.g., low flow diversions to the sanitary sewer).

(3) Within 30 days following approval of the report described above by the San Diego Water Board, the Copermittee must revise its Jurisdictional Runoff Management Program and monitoring program to incorporate the approved modified BMPs that have been and will be implemented, the implementation schedule, and any additional monitoring required; and

(4) Implement the revised Jurisdictional Runoff Management Program and monitoring program in accordance with the approved schedule.

b. The Copermittee must repeat the procedure set forth above to comply with the receiving water limitations for continuing or recurring exceedances of the same water quality standard(s) unless directed to do otherwise by the San Diego Water Board Executive Officer.

c. Nothing in section A.3 must prevent the San Diego Water Board from enforcing any provision of this Order while the Copermittee prepares and implements the above report.

4. In addition to the above prohibitions, discharges from MS4s are subject to all Basin Plan prohibitions cited in Attachment A to this Order.

B. NON-STORM WATER DISCHARGES

1. Each Copermittee must effectively prohibit all types of non-storm water discharges into its MS4 unless such discharges are either authorized by a separate National Pollutant Discharge Elimination System (NPDES) permit; or not prohibited in accordance with sections B.2 and B.3 below.

2. The following categories of non-storm water discharges are not prohibited unless a Copermittee or the San Diego Water Board identifies the discharge category as a source of pollutants to waters of the U.S. Where the Copermittee(s) have identified a category as a source of pollutants, the category shall be addressed as an illicit discharge and prohibited through ordinance, order or similar means. The San Diego Water Board may identify categories of discharge that either requires prohibition or other controls. For such a discharge category, the Copermittee, under direction of the San Diego Water Board, must either prohibit the discharge category or develop and implement appropriate control measures to prevent the discharge of pollutants to the MS4 and report to the San Diego Water Board pursuant to Section K.1 and K.3 of this Order.

a. Diverted stream flows;
b. Rising ground waters;
c. Uncontaminated ground water infiltration [as defined at 40 CFR 35.2005(20)] to MS4s;
d. Uncontaminated pumped ground water[3];

e. Foundation drains[8];
f. Springs;
g. Water from crawl space pumps[8];
h. Footing drains[8];
i. Air conditioning condensation;
j. Flows from riparian habitats and wetlands;
k. Water line flushing[4,5];
l. Discharges from potable water sources not subject to NPDES Permit No. CAG679001, other than water main breaks;
m. Individual residential car washing; and
n. Dechlorinated swimming pool discharges[6].

3. Emergency fire fighting flows (i.e., flows necessary for the protection of life or property) do not require BMPs and need not be prohibited. As part of the Jurisdictional Runoff Management Plan (JRMP), each Copermittee must develop and implement a program to address pollutants from non-emergency fire fighting flows (i.e., flows from controlled or practice blazes and maintenance activities) identified by the Copermittee to be significant sources of pollutants to waters of the United States.

a. Building fire suppression system maintenance discharges (e.g. sprinkler line flushing) contain waste. Therefore, such discharges are to be prohibited by the Copermittees as illicit discharges through ordinance, order, or similar means.

4. Each Copermittee must examine all dry weather effluent analytical monitoring results collected in accordance with section F.4 of this Order and Receiving Waters and MS4 Discharge Monitoring and Reporting Program No. R9-2010-0016 to identify water quality problems which may be the result of any non-prohibited discharge category(ies) identified above in section B.2. Follow-up investigations must be conducted to identify and control, pursuant to section B.2, any non-prohibited discharge category(ies) listed above.

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[3] Requires enrollment under Order R9-2008-002. Discharges into the MS4 require authorization from the owner and operator of the MS4 system.
[4] This exemption does not include fire suppression sprinkler system maintenance and testing discharges. Those discharges may be regulated under Section B.3.
[5] Requires enrollment under Order R9-2002-0020.
[6] Including saline swimming pool discharges directly to a saline water body.

C. NON-STORM WATER DRY WEATHER ACTION LEVELS

1. Each Copermittee, beginning no later than May 1, 2011, shall implement the non-storm water dry weather action level (NAL) monitoring as described in Attachment E of this Order.

2. In response to an exceedance of an NAL, each Copermittee must investigate and identify the source of the exceedance in a timely manner. However, if any Copermittee identifies exceedances of NALs that prevent them from adequately conducting source investigations in a timely manner, then the Copermittees may submit a prioritization plan and timeline that identifies the timeframe and planned actions to investigate and report their findings on all of the exceedances. Following the source investigation and identification, the Copermittees must submit an action report dependant on the source of the pollutant exceedance as follows:

a. If the Copermittee identifies the source of the exceedance as natural (non-anthropogenically influenced) in origin and in conveyance into the MS4; then the Copermittee shall report their findings and documentation of their source investigation to the San Diego Water Board within fourteen days of the source identification.

b. If the Copermittee identifies the source of the exceedance as an illicit discharge or connection, then the Copermittees must eliminate the discharge to their MS4 and report the findings, including any enforcement action(s) taken, and documentation of the source investigation to the San Diego Water Board within fourteen days of the source identification. If the Copermittee is unable to eliminate the source of discharge within fourteen days, then the Copermittee must submit, as part of their action report, their plan and timeframe to eliminate the source of the exceedance. Those dischargers seeking to continue such a discharge must become subject to a separate NPDES permit prior to continuing any such discharge.

c. If the Copermittee identifies the source of the exceedance as an exempted category of non-storm water discharge, then the Copermittees must determine if this is an isolated circumstance or if the category of discharges must be addressed through the prevention or prohibition of that category of discharge as an illicit discharge. The Copermittee must submit their findings in including a description of the steps taken to address the discharge and the category of discharge, to the San Diego Water Board for review with the next subsequent annual report. Such description shall include relevant updates to or new ordinances, orders, or other legal means of addressing the category of discharge. The Copermittees must also submit a summary of their findings with the Report of Waste Discharge.

d. If the Copermittee identifies the source of the exceedance as a non-storm water discharge in violation or potential violation of an existing separate NPDES permit (e.g. the groundwater dewatering permit), then the Copermittee must report,

within three business days, the findings to the San Diego Water Board including all pertinent information regarding the discharger and discharge characteristics.

e. If the Copermittee is unable to identify the source of the exceedance after taking and documenting reasonable steps to do so, then the Copermittee must identify the pollutant as a high priority pollutant of concern in the tributary subwatershed, perform additional focused sampling and update their programs within a year to reflect this priority. The Copermittee's annual report shall include these updates to their programs including, where applicable, updates to their watershed workplans (Section G.2), retrofitting consideration (Section F.3.d) and program effectiveness work plans (Section J.4).

f. The Copermittees or any interested party, may evaluate existing NALs and propose revised NALs for future Board consideration.

3. An exceedance of an NAL does not alone constitute a violation of the provisions of this Order, but an exceedance of an NAL may indicate a lack of compliance with the requirement that Copermittees effectively prohibit all types of unauthorized non-storm water discharges into the MS4 or other prohibitions set forth in Sections A and B of this Order. Failure to timely implement required actions specified in this Order following an exceedance of an NAL constitutes a violation of this Order. However, neither compliance with NALs nor compliance with required actions following observed exceedances, excuses any non-compliance with the requirement to effectively prohibit all types of unauthorized non-storm water discharges into the MS4s or any non-compliance with the prohibitions in Sections A and B of this Order. NALs provide an assessment of the effectiveness of the prohibition of non-storm water discharges and of the appropriateness of exempted non-storm water discharges. During any annual reporting period in which one or more exceedances of NALs have been documented the Copermittee must submit with their next scheduled annual report, a report describing whether and how the observed exceedances did or did not result in a discharge form the MS4 that caused, or threatened to cause or contribute to a condition of pollution, contamination, or nuisance in the receiving waters.

4. Monitoring of effluent will occur at the end-of-pipe prior to discharge into the receiving waters, with a focus on Major Outfalls, as defined in 40 CFR 122.26(B 5-6) and Attachment E of this Order. The Copermittees must develop their monitoring plans to sample a representative percentage of major outfalls and identified stations within each hydrologic subarea. At a minimum, outfalls that exceed any NALs once during any year must be monitored in the subsequent year. Any station that does not exceed an NAL for 3 years may be replaced with a different station.

5. Each Copermittee shall monitor for the non-storm water dry weather action levels, which are incorporated into this Order as follows:

a. Action levels for discharges to inland surface waters:

Table 3.a.1: General Constituents

Parameter	Units	AMAL	MDAL	Instantaneous Maximum	Basis
Fecal Coliform	MPN/ 100 ml	200[A] 400[B]	-		BPO
Enterococci	MPN/ 100 ml	33	-	61[C]	BPO
Turbidity	NTU	-	20		BPO
pH	Units	Within limit of 6.5 to 8.5 at all times			BPO
Dissolved Oxygen	mg/L	Not less than 5.0 in WARM waters and not less than 6.0 in COLD waters			BPO
Total Nitrogen	mg/L	-	1.0	See MDAL	BPO
Total Phosphorus	mg/L	-	0.1	See MDAL	BPO
Methylene Blue Active Substances	mg/L	-	0.5	See MDAL	BPO
Iron	mg/L	-	0.3	See MDAL	BPO
Manganese	mg/L	-	0.05	See MDAL	BPO

A – Based on a minimum of not less than five samples for any 30-day period
B – No more than 10 percent of total samples may exceed 400 per 100 ml during any 30 day period
C – This Value has been set to Basin Plan Criteria for Designated Beach Areas
BPO – Basin Plan Objective
MDAL – Maximum Daily Action Level AMAL – Average Monthly Action Level

Table 3.a.2: Priority Pollutants

		Freshwater (CTR)	
Parameter	Units	MDAL	AMAL
Cadmium	ug/L	**	**
Copper	ug/L	*	*
Chromium III	ug/L	**	**
Chromium VI (hexavalent)	ug/L	16	8.1
Lead	ug/L	*	*
Nickel	ug/L	**	**
Silver	ug/L	*	*
Zinc	ug/L	*	*

CTR – California Toxic Rule
*- Action Levels developed on a case-by-case basis (see below)
**- Action Levels developed on a case-by-case basis (see below), but calculated criteria are not to exceed Maximum Contaminant Levels under the California Code of Regulations[7]

The NALs for Cadmium, Copper, Chromium (III), Lead, Nickel, Silver and Zinc will be developed on a case-by-case basis because the freshwater criteria are based on site-specific water quality data (receiving water hardness). For these priority pollutants, the following equations (40 CFR 131.38.b.2) will be required:

Cadmium (Total Recoverable) = exp(0.7852[ln(hardness)] -2.715)

[7] California Code of Regulations, Title 22, Division 4, Chapter 15, Article 4, Section 64431.

Chromium III (Total Recoverable) = exp(0.8190[ln(hardness)] + .6848)
Copper (Total Recoverable) = exp(0.8545[ln(hardness)] - 1.702)
Lead (Total Recoverable) = exp(1.273[ln(hardness)] - 4.705)
Nickel (Total Recoverable) = exp(.8460[ln(hardness)] + 0.0584)
Silver (Total Recoverable) = exp(1.72[ln(hardness)] - 6.52)
Zinc (Total Recoverable) = exp(0.8473[ln(hardness)] + 0.884)

D. STORM WATER ACTION LEVELS

1. Beginning Year 3 after Order adoption date, a running average of twenty percent or greater of exceedances of any discharge of storm water from the MS4 to waters of the United States that exceed the Storm Water Action Levels (SALs) for the pollutants listed in Table 5 (below) will require each Copermittee to affirmatively augment and implement all necessary storm water controls and measures to reduce the discharge of the associated class of pollutants(s) to the MEP standard. The Copermittees must utilize the exceedance information when adjusting and executing annual work plans, as required by this Order. Copermittees shall take the magnitude, frequency, and number of constituents exceeding the SAL(s), in addition to receiving water quality data and other information, into consideration when reacting to SAL exceedances in an iterative manner. Failure to appropriately consider and react to SAL exceedances in an iterative manner creates a presumption that the Copermittee(s) have not complied with the MEP standard.

Table 4. Storm Water Action Levels

Pollutant	Action Level
Turbidity (NTU)	126
Nitrate & Nitrite total (mg/L)	2.6
P total (mg/L)	1.46
Cd total (µg/L)	3.0
Cu total (µg/L)	127
Pb total (µg/L)	250
Zn total (µg/L)	976

2. The end-of-pipe assessment points for the determination of SAL compliance are all major outfalls, as defined in 40 CFR 122.26(b)(5) and (b)(6). The Copermittees must develop their monitoring plans to sample a representative percent of the major outfalls within each hydrologic subarea. At a minimum, outfalls that exceed SALs must be monitored in the subsequent year. Any station that does not exceed an SAL for 3 years may be replaced with a different station. SAL samples must be 24 hour time weighted composites.

3. The absence of SAL exceedances does not relieve the Copermittees from implementing all other required elements of this Permit.

4. This Permit does not regulate natural sources and conveyances of constituents listed in Table 5. To be relieved of the requirements to prioritize pollutant/watershed

combinations for BMP updates and to continue monitoring a station, the Copermittee must demonstrate that the likely and expected cause of the SAL exceedance is not anthropogenic in nature.

5. The SALs will be reviewed and updated at the end of every permit cycle. The data collected pursuant to D.2 above can be used to create SALs based upon local data. It is the goal of the SALs, through the iterative and MEP process, to have outfall storm water discharges meet all applicable water quality standards.

E. LEGAL AUTHORITY

1. Each Copermittee must establish, maintain, and enforce adequate legal authority to control pollutant discharges into and from its MS4 through ordinance, statute, permit, contract or similar means. Nothing herein shall authorize a Co-Permittee or other discharger regulated under the terms of this order to divert, store or otherwise impound water if such action is reasonably anticipated to harm downstream water right holders in the exercise of their water rights. This legal authority must, at a minimum, authorize the Copermittee to:

a. Control the contribution of pollutants in discharges of runoff associated with industrial and construction activity to its MS4 and control the quality of runoff from industrial and construction sites. This requirement applies both to industrial and construction sites which have coverage under the statewide general industrial or construction storm water permits, as well as to those sites which do not. Grading ordinances must be updated and enforced as necessary to comply with this Order;

b. Prohibit all identified illicit discharges not otherwise allowed pursuant to section B.2;

c. Prohibit and eliminate illicit connections to the MS4;

d. Control the discharge of spills, dumping, or disposal of materials other than storm water to its MS4;

e. Require compliance with conditions in Copermittee ordinances, permits, contracts or orders (i.e., hold dischargers to its MS4 accountable for their contributions of pollutants and flows);

f. Utilize enforcement mechanisms to require compliance with Copermittee storm water ordinances, permits, contracts, or orders;

g. Control the contribution of pollutants from one portion of the shared MS4 to another portion of the MS4 through interagency agreements among Copermittees. Control of the contribution of pollutants from one portion of the shared MS4 to another portion of the MS4 through interagency agreements with other owners of the MS4 such as the State of California Department of Transportation, the United States Department of Defense, or Native American Tribes is encouraged;

h. Carry out all inspections, surveillance, and monitoring necessary to determine compliance and noncompliance with local ordinances and permits and with this

Order, including the prohibition on illicit discharges to the MS4. This means the Copermittee must have authority to enter, monitor, inspect, take measurements, review and copy records, and require regular reports from industrial facilities discharging into its MS4, including construction sites;

i. Require the use of BMPs to prevent or reduce the discharge of pollutants into MS4s from storm water to the MEP; and

j. Require documentation on the effectiveness of BMPs implemented to reduce the discharge of storm water pollutants to the MS4 to the MEP.

2. Each Copermittee must submit within 365 days of adoption of this Order, a statement certified by its chief legal counsel that the Copermittee has taken the necessary steps to obtain and maintain full legal authority to implement and enforce each of the requirements contained in 40 CFR 122.26(d)(2)(i)(A-F) and this Order. These statements must include:

a. Identification of all departments within the jurisdiction that conduct runoff related activities, and their roles and responsibilities under this Order. Include an up to date organizational chart specifying these departments and key personnel.

b. Citation of runoff related ordinances and the reasons they are enforceable;

c. Identification of the local administrative and legal procedures available to mandate compliance with runoff related ordinances and therefore with the conditions of this Order;

d. A description of how runoff related ordinances are implemented and appealed; and

e. Description of whether the municipality can issue administrative orders and injunctions or if it must go through the court system for enforcement actions.

F. JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM (JRMP)

Each Copermittee must implement all requirements of section F of this Order no later than 365 days after adoption of the Order, unless otherwise specified. Prior to 365 days after adoption of the Order, each Copermittee must at a minimum implement its Jurisdictional RMP document, as the document was developed and amended to comply with the requirements of Order No. R9-2004-001.

Each Copermittee must develop and implement an updated JRMP for its jurisdiction. Each updated JRMP must meet the requirements of section F of this Order, reduce the discharge of storm water pollutants from the MS4 to the MEP, effectively prohibit non-storm water discharges and prevent runoff discharges from the MS4 from causing or contributing to a violation of water quality standards.

1. Development Planning Component

Each Copermittee must implement a program which meets the requirements of this section and (1) reduces Development Project discharges of storm water pollutants

from the MS4 to the MEP; (2) prevents Development Project discharges from the MS4 from causing or contributing to a violation of water quality standards; (3) prevents illicit discharges into the MS4; and (4) manages increases in runoff discharge rates and durations from Development Projects that are likely to cause increased erosion of stream beds and banks, silt pollutant generation, or other impacts to beneficial uses and stream habitat due to increased erosive force.

a. General Plan

Each Copermittee must revise as needed its General Plan or equivalent plan (e.g., Comprehensive, Master, or Community Plan) to include water quality and watershed protection principles and policies that direct land-use decisions and require implementation of consistent water quality protection measures for all development, redevelopment and retrofit projects. Examples of water quality and watershed protection principles and policies to be considered include the following:

(1) Minimize the amount of impervious surfaces and directly connected impervious surfaces in areas of new development and redevelopment and where feasible slow runoff and maximize on-site infiltration of runoff.

(2) Implement pollution prevention methods supplemented by pollutant source controls and treatment. Use small collection strategies located at, or as close as possible to, the source (i.e., the point where water initially meets the ground) to minimize the transport of urban runoff and pollutants offsite and into an MS4.

(3) Preserve, and where possible, create or restore areas that provide important water quality benefits, such as riparian corridors, wetlands, and buffer zones. Encourage land acquisition of such areas.

(4) Limit disturbances of natural water bodies and natural drainage systems caused by development including roads, highways, and bridges.

(5) Prior to making land use decisions, utilize methods available to estimate increases in pollutant loads and flows resulting from projected future development. Require incorporation of structural and non-structural BMPs to mitigate the projected increases in pollutant loads and flows.

(6) Avoid development of areas that are particularly susceptible to erosion and sediment loss; or establish development guidance that identifies these areas and protects them from erosion and sediment loss.

(7) Reduce pollutants associated with vehicles and increasing traffic resulting from development.

(8) Post-development runoff from a site shall not contain pollutant loads that

cause or contribute to an exceedance of receiving water quality objectives and which have not been reduced to the MEP.

b. Environmental Review Process

Each Copermittee must revise as needed its current environmental review processes to accurately evaluate water quality impacts and cumulative impacts and identify appropriate measures to avoid, minimize and mitigate those impacts for all Development Projects.

c. Approval Process Criteria and Requirements for All Development Projects

For all proposed Development Projects, each Copermittee during the planning process, and prior to project approval and issuance of local permits, must prescribe the necessary requirements so that Development Project discharges of storm water pollutants from the MS4 will be reduced to the MEP, will not cause or contribute to a violation of water quality standards, and will comply with Copermittee's ordinances, permits, plans, and requirements, and with this Order.

Performance Criteria: Discharges from each approved development project must be subject to the following management measures:

(1) Source control BMPs that reduce storm water pollutants of concern in runoff; prevention of illicit discharges into the MS4; prevention of irrigation runoff; storm drain system stenciling or signage; properly designed outdoor material storage areas; properly designed outdoor work areas; and properly designed trash storage areas.

(2) The following LID BMPs listed below shall be implemented at all Development Projects where applicable and feasible.

(a) Conserve natural areas, including existing trees, other vegetation, and soils,
(b) Construct streets, sidewalks, or parking lot aisles to the minimum widths necessary, provided that public safety is not compromised,
(c) Minimize the impervious footprint of the project,
(d) Minimize soil compaction to landscaped areas,
(e) Minimize disturbances to natural drainages (e.g., natural swales, topographic depressions, etc.), and
(f) Disconnect impervious surfaces through distributed pervious areas.

(3) Buffer zones for natural water bodies, where technically feasible. Where buffer zones are technically infeasible, require project proponent to implement other buffers such as trees, access restrictions, etc;

(4) Measures necessary so that grading or other construction activities meet the provisions specified in section F.2 of this Order.

(5) Where known, require industrial facility operators subject to the General Industrial permit to provide evidence of permit coverage prior to occupancy.

(6) Submittal of proof of a mechanism under which ongoing long-term maintenance of all structural post-construction BMPs will be conducted.

(7) Infiltration and Groundwater Protection

To protect groundwater quality, each Copermittee must apply restrictions to the use of treatment control BMPs that are designed to primarily function as large, centralized infiltration devices (such as large infiltration trenches and infiltration basins). Such restrictions must be designed so that the use of such infiltration treatment control BMPs must not cause or contribute to an exceedance of groundwater quality objectives. At a minimum, each treatment control BMP designed to primarily function as a centralized infiltration device must meet the restrictions below, unless it is demonstrated that a restriction is not necessary to protect groundwater quality. The Copermittees may collectively or individually develop alternative restrictions on the use of treatment control BMPs which are designed to primarily function as centralized infiltration devices. Alternative restrictions developed by the Copermittees can partially or wholly replace the restrictions listed below. The restrictions do not apply to small infiltration systems dispersed throughout a development project.

(a) Runoff must undergo pretreatment such as sedimentation or filtration prior to infiltration;

(b) All dry weather flows containing significant pollutant loads must be diverted from infiltration devices and treated through other BMPs;

(c) Pollution prevention and source control BMPs must be implemented at a level appropriate to protect groundwater quality at sites where infiltration treatment control BMPs are to be used;

(d) Infiltration treatment control BMPs must be adequately maintained so that they remove storm water pollutants to the MEP;

(e) The vertical distance from the base of any infiltration treatment control BMP to the seasonal high groundwater mark must be at least 10 feet. Where groundwater basins do not support beneficial uses, this vertical distance criteria may be reduced, provided groundwater quality is maintained;

(f) The soil through which infiltration is to occur must have physical and chemical characteristics (such as appropriate cation exchange capacity, organic content, clay content, and infiltration rate) which are adequate for

proper infiltration durations and treatment of runoff for the protection of groundwater beneficial uses;

(g) Infiltration treatment control BMPs must not be used for areas of industrial or light industrial activity; areas subject to high vehicular traffic (25,000 or greater average daily traffic on main roadway or 15,000 or more average daily traffic on any intersecting roadway); automotive repair shops; car washes; fleet storage areas (bus, truck, etc.); nurseries; and other high threat to water quality land uses and activities as designated by each Copermittee unless first treated or filtered to remove pollutants prior to infiltration and a comprehensive site-specific evaluation has been conducted; and

(h) Infiltration treatment control BMPs must be located a minimum of 100 feet horizontally from any water supply wells.

(7) Where feasible, landscaping with native or low water species shall be preferred in areas that drain to the MS4 or to waters of the United States.

d. Standard Storm Water Mitigation Plans (SSMPs) – Approval Process Criteria and Requirements for Priority Development Projects

Within 365 days of adoption of this Order, the Copermittees must submit an updated model SSMP, to the San Diego Water Board's Executive Officer for a 30 day public review and comment period. The San Diego Water Board's Executive Officer has the discretion to determine the necessity of a public hearing. Within 180 days of determination that the Model SSMP is in compliance with this Permit's provisions, each Copermittee must update their own local SSMP, and amended ordinances consistent with the model SSMP, and shall submit both (local SSMP and amended ordinances) to the San Diego Water Board. The model SSMP must meet the requirements of section F.1.d of this Order to (1) reduce Priority Development Project discharges of storm water pollutants from the MS4 to the MEP, and (2) prevent Priority Development Project runoff discharges from the MS4 from causing or contributing to a violation of water quality standards.[8]

[8] Updated SSMP and hydromodification requirements must apply to all priority projects or phases of priority projects which have not yet begun grading or construction activities at the time any updated SSMP or hydromodification requirement commences. If lawful prior approval of a project exists, whereby application of an updated SSMP or hydromodification requirement to the project is illegal, the updated SSMP or hydromodification requirement need not apply to the project. Updated Development Planning requirements set forth in Sections F.1. (a) through (h) of this Order must apply to all projects or phases of projects, unless, at the time any updated Development Planning requirement commences, the projects or project phases meet any one of the following conditions: (i) the project or phase has begun grading or construction activities; or (ii) a Copermittee determines that lawful prior approval rights for a project or project phase exist, whereby application of the Updated Development Planning requirement to the project is legally infeasible. Where feasible, the Permittees must utilize the SSMP and hydromodification update periods to ensure that projects undergoing approval processes include application of the updated SSMP and hydromodification requirements in their plans.

(1) Definition of Priority Development Project (PDP):

Priority Development Projects are:

(a) All new Development Projects that fall under the project categories or locations listed in section F.1.d.(2), and

(b) Those redevelopment projects that create, add, or replace at least 5,000 square feet of impervious surfaces on an already developed site and the existing development and/or the redevelopment project falls under the project categories or locations listed in section F.1.d.(2). Where redevelopment results in an increase of less than fifty percent of the impervious surfaces of a previously existing development, and the existing development was not subject to SSMP requirements, the numeric sizing criteria discussed in section F.1.d.(6) applies only to the addition or replacement, and not to the entire development. Where redevelopment results in an increase of more than fifty percent of the impervious surfaces of a previously existing development, the numeric sizing criteria applies to the entire development.

(c) One acre threshold: In addition to the Priority Development Project Categories identified in section F.1.d.(2), Priority Development Projects must also include all other pollutant-generating Development Projects that result in the disturbance of one acre or more of land within two years of adoption of this Order.[9]

(2) Priority Development Project Categories

Where a new Development Project feature, such as a parking lot, falls into a Priority Development Project Category, the entire project footprint is subject to SSMP requirements.

(a) New development projects that create 10,000 square feet or more of impervious surfaces (collectively over the entire project site) including commercial, industrial, residential, mixed-use, and public projects. This category includes development projects on public or private land which fall under the planning and building authority of the Copermittees.

(b) Automotive repair shops. This category is defined as a facility that is categorized in any one of the following Standard Industrial Classification (SIC) codes: 5013, 5014, 5541, 7532-7534, or 7536-7539.

(c) Restaurants. This category is defined as a facility that sells prepared foods

[9] Pollutant generating Development Projects are those projects that generate pollutants at levels greater than natural background levels.

and drinks for consumption, including stationary lunch counters and refreshment stands selling prepared foods and drinks for immediate consumption (SIC code 5812), where the land area for development is greater than 5,000 square feet. Restaurants where land development is less than 5,000 square feet must meet all SSMP requirements except for structural treatment BMP and numeric sizing criteria requirement F.1.d.(6) and hydromodification requirement F.1.h.

(d) All hillside development greater than 5,000 square feet. This category is defined as any development which creates 5,000 square feet of impervious surface which is located in an area with known erosive soil conditions, where the development will grade on any natural slope that is twenty-five percent or greater.

(e) Environmentally Sensitive Areas (ESAs). All development located within or directly adjacent to or discharging directly to an ESA (where discharges from the development or redevelopment will enter receiving waters within the ESA), which either creates 2,500 square feet of impervious surface on a proposed project site or increases the area of imperviousness of a proposed project site to 10 percent or more of its naturally occurring condition. "Directly adjacent" means situated within 200 feet of the ESA. "Discharging directly to" means outflow from a drainage conveyance system that is composed entirely of flows from the subject development or redevelopment site, and not commingled with flows from adjacent lands.

(f) Parking lots 5,000 square feet or more or with 15 or more parking spaces and potentially exposed to runoff. Parking lot is defined as a land area or facility for the temporary parking or storage of motor vehicles used personally, for business, or for commerce.

(g) Street, roads, highways, and freeways. This category includes any paved surface that is 5,000 square feet or greater used for the transportation of automobiles, trucks, motorcycles, and other vehicles.

(h) Retail Gasoline Outlets (RGOs). This category includes RGOs that meet the following criteria: (a) 5,000 square feet or more or (b) a projected Average Daily Traffic (ADT) of 100 or more vehicles per day.

(3) Pollutants of Concern

As part of its local SSMP, each Copermittee must implement an updated procedure for identifying pollutants of concern for each Priority Development Project. The procedure must address, at a minimum: (1) Receiving water quality (including pollutants for which receiving waters are listed as impaired under CWA section 303(d)); (2) Land-use type of the Development Project and pollutants associated with that land use type; and (3) Pollutants expected to be present on site.

(4) Low Impact Development BMP Requirements

Each Copermittee must require each Priority Development Project to implement LID BMPs which will collectively minimize directly connected impervious areas, limit loss of existing infiltration capacity, and protect areas that provide important water quality benefits necessary to maintain riparian and aquatic biota, and/or are particularly susceptible to erosion and sediment loss.

(a) The Copermittees must take the following measures to ensure that LID BMPs are implemented at PDPs:

(i) Each Copermittee must require LID BMPs or make a finding of technical infeasibility for each Priority Development Project in accordance with the LID waiver program in Section F.1.d.(8);

(ii) Each Copermittee must incorporate formalized consideration, such as thorough checklists, ordinances, and/or other means, of LID BMPs into the plan review process for Priority Development Projects;

(iii) The review of each Priority Development Project must include an assessment of potential collection of storm water for on-site or off-site reuse opportunities;

(iv) The review of each Priority Development Project must include an assessment of techniques to infiltrate, filter, store, evaporate, or retain runoff close to the source of runoff; and

(v) Within 2 years after adoption of this Order, each Copermittee must review its local codes, policies, and ordinances and identify barriers therein to implementation of LID BMPs. Following the identification of these barriers to LID implementation, where feasible, the Copermittee must take, by the end of the permit cycle, appropriate actions to remove such barriers.

(b) The following LID BMPs must be implemented at each PDP:

(i) Maintain or restore natural storage reservoirs and drainage corridors (including depressions, areas of permeable soils, swales, and ephemeral and intermittent streams.

(ii) Projects with landscaped or other pervious areas must, where feasible, drain runoff from impervious areas (rooftops, parking lots, sidewalks, walkways, patios, etc) into pervious areas prior to discharge to the MS4. The amount of runoff from impervious areas that is to drain to pervious areas shall not exceed the total capacity of the project's pervious areas to infiltrate or treat runoff, taking into consideration the pervious areas' geologic and soil conditions, slope, and other pertinent factors.

(iii) Projects with landscaped or other pervious areas must, where

feasible, properly design and construct the pervious areas to effectively receive and infiltrate or treat runoff from impervious areas, prior to discharge to the MS4. Soil compaction for these areas shall be minimized. The amount of the impervious areas that are to drain to pervious areas must be based upon the total size, soil conditions, slope, and other pertinent factors.

(iv) Projects with low traffic areas and appropriate soil conditions must construct walkways, trails, overflow parking lots, alleys, or other low-traffic areas with permeable surfaces, such as pervious concrete, porous asphalt, unit pavers, and granular materials.

(b) To protect ground water resources any large, centralized infiltration BMPs must comply with Section F.1.(c)(6). The restrictions do not apply to small infiltration systems dispersed throughout a development project.

(c) LID BMPs sizing criteria:

(i) LID BMPs shall be sized and designed to ensure onsite retention without runoff, of the volume of runoff produced from a 24-hour 85th percentile storm event[10] ("design capture volume");

(ii) If onsite retention LID BMPs are technically infeasible per section F.1.d.(7)(b), LID biofiltration BMPs may treat any volume that is not retained onsite by the LID BMPs. The LID biofiltration BMPs must be designed for an appropriate surface loading rate to prevent erosion, scour and channeling within the BMP. Due to the flow through design of biofiltration BMPs, the total volume of the BMP, including pore spaces and prefilter detention volume, must be sized to hold at least 0.75 times the design storm volume that is not retained onsite by LID retention BMPs;

(iii) If it is shown to be technically infeasible to treat the remaining volume up to and including the design capture volume using LID BMPs (retention or biofiltration), the project must implement conventional treatment control BMPs in accordance with Section F.1.d.(6) below and must participate in the LID waiver program in Section F.1.d.(7).

(e) All LID BMPs shall be designed and implemented with measures to avoid the creation of nuisance or pollution associated with vectors, such as mosquitoes, rodents, and flies.

[10] This volume is not a single volume to be applied to all of Riverside County. The size of the 85th percentile storm event is different for various parts of the County. The Copermittees are encouraged to calculate the 85th percentile storm event for each of their jurisdictions using local rain data pertinent to their particular jurisdiction (0.6 inch standard is a rough average for the County and should only be used where appropriate rain data is not available). In addition, isopluvial maps may be used to extrapolate rainfall data to areas where insufficient data exists in order to determine the volume of the local 85th percentile storm event in such areas. Where the Copermittees will use isopluvial maps to determine the 85th percentile storm event in areas lacking rain data, the Copermittees shall describe their method for using isopluvial maps in their SSMPs.

(5) Source Control BMP Requirements

Each Copermittee must require each Priority Development Project to implement source control BMPs. The source control BMPs to be required must:

(a) Prevent illicit discharges into the MS4;
(b) Minimize storm water pollutants of concern in runoff;
(c) Eliminate irrigation runoff;
(d) Include storm drain system stenciling or signage;
(e) Include properly designed outdoor material storage areas;
(f) Include properly designed outdoor work areas;
(g) Include properly designed trash storage areas;
(h) Include water quality requirements applicable to individual priority project categories.

(6) Treatment Control BMP Requirements[11]

Each Copermittee must require each Priority Development Project to implement treatment control BMPs that meet the following requirements:

(a) All treatment control BMPs for a single Priority Development Project must collectively be sized to comply with the following numeric sizing criteria:

(i) Volume-based treatment control BMPs must be designed to mitigate (infiltrate, filter, or treat) the volume of runoff produced from a 24-hour 85th percentile storm event,[12]; or

(ii) Flow-based treatment control BMPs must be designed to mitigate (infiltrate, filter, or treat) either: a) the maximum flow rate of runoff produced from a rainfall intensity of 0.2 inch of rainfall per hour, for each hour of a storm event; or b) the maximum flow rate of runoff produced by the 85th percentile hourly rainfall intensity (for each hour of a storm event), as determined from the local historical rainfall record, multiplied by a factor of two.

[11] This section only applies to those PDPs not implementing LID capable of meeting the design storm criteria for the entire site and meeting technical infeasibility eligibility. Low-Impact Development (LID) and other site design BMPs that are correctly designed to effectively remove pollutants from runoff are considered treatment control BMPs.

[12] This volume is not a single volume to be applied to all of Riverside County. The size of the 85th percentile storm event is different for various parts of the County. The Copermittees are encouraged to calculate the 85th percentile storm event for each of their jurisdictions using local rain data pertinent to their particular jurisdiction. In addition, isopluvial maps may be used to extrapolate rainfall data to areas where insufficient data exists in order to determine the volume of the local 85th percentile storm event in such areas. Where the Copermittees will use isopluvial maps to determine the 85th percentile storm event in areas lacking rain data, the Copermittees shall describe their method for using isopluvial maps in their SSMPs.

(b) Treatment control BMPs for all Priority Development Projects must mitigate (treat through infiltration, settling, filtration or other unit processes) the required volume or flow of runoff from all developed portions of the project, including landscaped areas.

(c) All treatment control BMPs must be located so as to remove pollutants from runoff prior to its discharge to any receiving waters. Multiple Priority Development Projects may use shared treatment control BMPs as long as construction of any shared treatment control BMP is completed prior to the use or occupation of any Priority Development Project from which the treatment control BMP will receive runoff.

(d) All treatment control BMPs for Priority Development Projects must, at a minimum:

(i) Be ranked with high or medium pollutant removal efficiency for the project's most significant pollutants of concern, as the pollutant removal efficiencies are identified in the Copermittees' Model SSMP. Treatment control BMPs with a low removal efficiency ranking must only be approved by a Copermittee when a feasibility analysis has been conducted which exhibits that implementation of treatment control BMPs with high or medium removal efficiency rankings are infeasible for a Priority Development Project or portion of a Priority Development Project.

(ii) Be correctly sized and designed so as to remove storm water pollutants to the MEP.

(e) Target removal of pollutants of concern from runoff.

(f) Be implemented close to pollutant sources, and prior to discharging into waters of the U.S.

(g) Not be constructed within a waters of the U.S. or waters of the State.

(h) Include proof of a mechanism under which ongoing long-term maintenance will be conducted to ensure proper maintenance for the life of the project. The mechanisms may be provided by the project proponent or Copermittee.

(i) Be designed and implemented with measures to avoid the creation of nuisance or pollution associated with vectors, such as mosquitoes, rodents, and flies.

(7) Low Impact Development (LID) BMP Waiver Program

The Copermittees must develop, collectively or individually, a LID waiver program for incorporation into local SSMPs, which would allow a Priority Development Project to substitute implementation of all or a portion of required LID BMPs in section F.1.d(4) with implementation of treatment control BMPs and either 1) a mitigation project, 2) payment into an in-lieu funding program, and/or 3) watershed equivalent BMP(s) consistent with Section F.1.d.(11). The Copermittees shall submit the LID waiver program as part of their updated model SSMP. At a minimum, the program must meet the requirements below:

(a) Prior to implementation, the LID waiver program must clearly exhibit that it will not allow PDPs to result in a net impact (after consideration of any mitigation and in-lieu payments) from pollutant loadings over and above the impact caused by projects meeting LID requirements;

(b) For each PDP participating, a technical feasibility analysis must be included demonstrating that it is technically infeasible to implement LID BMPs that comply with the requirements of Section F.1.(d)(4). The Copermittee(s) must develop criteria for the technical feasibility analysis including a cost benefit analysis, examination of LID BMPs considered and alternatives chosen. Each PDP participating must demonstrate that LID BMPs were implemented as much as feasible given the site's unique conditions. Analysis must be made of the pollutant loading for each project participating in the LID substitution program. The estimated impacts from not implementing the required LID BMPs in section F.1.d.(4) must be fully mitigated. Technical infeasibility may result from conditions including, but not limited to:

    (i) Locations that cannot meet the infiltration and groundwater protection requirements in section F.1.c.(6) for large, centralized infiltration BMPs. Where infiltration is technically infeasible, the project must still examine the feasibility of other onsite retention LID BMPs;
    (ii) Smart growth and infill or redevelopment locations where the density and/or nature of the project would create significant difficulty for compliance with the onsite volume retention requirements; and
    (iii) Other site, geologic, soil or implementation constraints identified in the Copermittees updated local SSMP document.

(c) The LID waiver program must include mechanisms to verify that each Priority Development Project participating in the program is in compliance with all applicable SSMP requirements;

(d) The LID waiver program must develop and implement a review process verifying that the BMPs to be implemented meet the designated design criteria. The review process must also verify that each Priority Development Project participating in the program is in compliance with all

applicable SSMP requirements.

(e) The LID waiver program must include performance standards for treatment control BMPs specified in compliance with section F.1.(d)(6).

(f) Each PDP that participates in the LID waiver program must mitigate for the pollutant loads expected to be discharged due to not implementing the LID BMPs in section F.1.d.(4). Mitigation projects must be implemented within the same hydrologic subarea as the PDP. Mitigation projects outside of the hydrologic subarea but within the same hydrologic unit may be approved provided that the project proponent demonstrates that mitigation projects within the same hydrologic subarea are infeasible and that the mitigation project will address similar beneficial use impacts as expected from the PDPs pollutant load types and amount. Offsite mitigation projects may include green streets projects, existing development retrofit projects, retrofit incentive programs, regional BMPs and stream restoration. Project applicants seeking to utilize these alternative compliance provisions may propose other offsite mitigation projects, which the Copermittees may approve if they meet the requirements of this subpart.

(g) A Copermittee may choose to implement a pollutant credit system as part of the LID waiver program provided that such a credit system clearly exhibits that it will not allow PDPs to result in a net impact from pollutant loadings over and above the impact caused by projects meeting LID requirements. Any credit system that a Copermittee chooses to implement must be submitted to the Executive Officer for review and approval as part of the waiver program.

(h) The LID waiver program shall include a storm water mitigation fund developed by the Copermittee(s) to be used for water quality improvement projects which may serve in lieu of the PDP's required mitigation in section F.1.d.(8)(e). The LID waiver program's storm water mitigation fund shall, at a minimum, identify;

(i) The entity or entities that will manage the storm water mitigation fund (i.e., assume full responsibility);
(ii) The range and types of acceptable projects for which storm water mitigation funds may be expended;
(iii) The entity or entities that will assume full responsibility for each water quality improvement project, including its successful completion; and
(iv) How the dollar amount of storm water mitigation fund contributions will be determined. In-lieu payments must be proportional to the additional pollutant load discharged by not fully implementing LID.

(i) Each Copermittee must notify the San Diego Water Board in their annual report of each PDP choosing to participate in the LID waiver program.

The annual report must include the following information:

(i) Name of the developer of the participating PDP;
(ii) Site location;
(iii) Reason for LID waiver including technical feasibility analysis;
(iv) Description of BMPs implemented;
(v) Total amount deposited, if any, into the storm water mitigation fund described in section F.1.d.(8)(f);
(vi) Water quality improvement project(s) proposed to be funded; and
(vii) Timeframe for implementation of water quality improvement projects.

(8) Site Design and Treatment Control BMP Design Standards

As part of its local SSMP, each Copermittee must develop and require Priority Development Projects to implement sitting, design, and maintenance criteria for each site design and treatment control BMP listed in its local SSMP to determine feasibility and applicability and so that implemented site design and treatment control BMPs are constructed correctly and are effective at pollutant removal, runoff control, and vector minimization. LID techniques must be incorporated into the criteria for appropriate treatment control BMPs. Development of BMP design worksheets which can be used by project proponents is encouraged.

(9) Implementation Process

As part of its local SSMP, each Copermittee must implement a process to verify compliance with SSMP requirements. The process must identify at what point in the planning process Priority Development Projects will be required to meet SSMP requirements and at a minimum, the Priority Development Project must implement the required post-construction BMPs prior to occupancy and/or the intended use of any portion of that project. The process must also include identification of the roles and responsibilities of various municipal departments in implementing the SSMP requirements, as well as any other measures necessary for the implementation of SSMP requirements.

(10) Treatment BMP Review

(a) The Copermittees must review and update the BMPs that are listed in their local SSMPs as options for treatment control. At a minimum, the update must include removal of obsolete or ineffective BMPs and addition of LID BMPs that can be used for treatment, such as bioretention cells, bioretention swales, etc. The update must also add appropriate LID BMPs to any tables or discussions in the local SSMPs addressing pollutant removal efficiencies of treatment control BMPs. In addition, the update must include review and revision where necessary of treatment control

BMP pollutant removal efficiencies.

(b) The update must incorporate findings from BMP effectiveness studies conducted by the Copermittees for projects funded wholly or in part by the State Board or Regional Boards.

(c) Each Copermittee must implement a mechanism for annually incorporating findings from local treatment BMP effectiveness studies (e.g., ones conducted by, or on-behalf of, public agencies in Riverside County) into SSMP project reviews and permitting

(11) Where a development project, greater than 100 acres in total project size or smaller than 100 acres in size yet part of a larger common plan of development that is over 100 acres, has been prepared using watershed and/or sub-watershed based water quality, hydrologic, and fluvial geomorphologic planning principles that implement regional LID BMPs in accordance with the sizing and location criteria of this Order and acceptable to the San Diego Water Board, such standards shall govern review of projects with respect to Section F.1 of this Order and shall be deemed to satisfy this Order's requirements for LID site design, buffer zone, infiltration and groundwater protection standards, source control, treatment control, and hydromodification control standards. Regional BMPs must clearly exhibit that they will not result in a net impact from pollutant loadings over and above the impact caused by capture and retention of the design storm. Regional BMPs may be used provided that the BMPs capture and retain the volume of runoff produced from the 24-hour 85th percentile storm event as defined in section F.1.d.(6)(a)(i) and that such controls are located upstream of receiving waters. Any volume that is not retained by the LID BMPs, up to the design capture volume, must be treated using LID biofiltration. Where regional LID implementation has been shown to be technically infeasible (per section F.1.d.7.b) any volume up to and including the design capture volume, not retained by LID BMPs, nor treated by LID biofiltration, must be treated using conventional treatment control BMPs in accordance with Section F.1.d.(6) and participation in the LID waiver program in Section F.1.d.(7).

e. BMP Construction Verification

Prior to occupancy and/or intended use of any portion of the Priority Development Project subject to SSMP requirements, each Copermittee must inspect the constructed site design, source control, and treatment control BMPs to verify that they have been constructed and are operating in compliance with all specifications, plans, permits, ordinances, and this Order.

f. BMP Maintenance Tracking

(1) Each Copermittee must develop and maintain a watershed-based database

to track and inventory all approved post-construction BMPs and BMP maintenance within its jurisdiction since July, 2005. LID BMPs implemented on a lot by lot basis at a single family residential home, such as rainbarrels, are not required to be tracked or inventoried. At a minimum, the database must include information on BMP type, location, watershed, date of construction, party responsible for maintenance, maintenance certifications or verifications, inspections, inspection findings, and corrective actions, including whether the site was referred to the local vector control agency or department.

(2) Each Copermittee must establish a mechanism not only to track post-construction BMPs, but also to ensure that appropriate easements and ownerships are properly recorded in public records and the information is conveyed to all appropriate parties when there is a change in project or site ownership.

(3) Each Copermittee must verify that approved post-construction BMPs are operating effectively and have been adequately maintained by implementing the following measures:

(a) An annual inventory of all approved BMPs within the Copermittee's jurisdiction. LID BMPs implemented on a lot by lot basis at a single family residential home, such as rainbarrels, are not required to be tracked or inventoried. The inventory must also include all BMPs approved for Priority Development Projects since July, 2005;

(b) The designation of high priority BMPs. High-priority designation must include consideration of BMP size, recommended maintenance frequency, likelihood of operational and maintenance issues, location, receiving water quality, and other pertinent factors;

(c) Verify implementation, operation, and maintenance of BMPs by inspection, self-certification, surveys, or other equally effective approaches with the following conditions:

(i) The implementation, operation, and maintenance of at least 90 percent of approved and inventoried final project public and private SSMPs (a.k.a. WQMPs) must be verified annually. All post-construction BMPs shall be verified within every four year period;
(ii) Operation and maintenance verifications must be required prior to each rainy season;
(iii) All (100 percent) projects with BMPs that are high priority must be inspected by the Copermittee annually prior to each rainy season;
(iv) All (100 percent) public agency projects with BMPs must be inspected by the Copermittee annually;
(v) At least 50 percent of projects with drainage insert treatment control BMPs must be inspected by the Copermittee annually;

(vi) Appropriate follow-up measures (including re-inspections, enforcement, maintenance, etc.) must be conducted to ensure the treatment BMPs continue to reduce storm water pollutants as originally designed;

(vii) All inspections must verify effective operation and maintenance of the treatment control BMPs, as well as compliance with all ordinances, permits, and this Order; and

(viii) Inspections must note observations of vector conditions, such as mosquitoes. Where conditions are identified as contributing to mosquito production, the Copermittee must notify their local vector control agency.

g. Enforcement of Development Sites

Each Copermittee must enforce its storm water ordinance for all Development Projects and at all development sites as necessary to maintain compliance with this Order. Copermittee ordinances or other regulatory mechanisms must include appropriate sanctions to achieve compliance. Sanctions must include the following or their equivalent: Non-monetary penalties, fines, bonding requirements, and/or permit or occupancy denials for non-compliance.

h. Hydromodification – Limitations on Increases of Runoff Discharge Rates and Durations[13]

Each Copermittee shall collaborate with the other Copermittees to develop and implement a Hydromodification Management Plan (HMP) to manage increases in runoff discharge rates and durations from all Priority Development Projects. The HMP shall be incorporated into the local SSMP and implemented by each Copermittee so that estimated post-project runoff discharge rates and durations shall not exceed pre-development discharge rates and durations. Where the proposed project is located on an already developed site, the pre-project discharge rate and duration shall be that of the pre-developed, naturally occurring condition. The HMP shall be submitted to the Executive Officer within 2 years of permit adoption. The HMP will be made available for public review and comment and the Executive Officer will determine the need for a public hearing.

(1) The HMP must:

(a) Identify a method for assessing susceptibility of channel segments which

[13] Updated SSMP and hydromodification requirements shall apply to all priority projects or phases of priority projects which have not yet begun grading or construction activities at the time any updated SSMP or hydromodification requirement commences. If a Copermittee determines that lawful prior approval of a project exists, whereby application of an updated SSMP or hydromodification requirement to the project is legally infeasible, the updated SSMP or hydromodification requirement need not apply to the project. The Copermittees shall utilize the SSMP and hydromodification update periods to ensure that projects undergoing approval processes include application of the updated SSMP and hydromodification requirements in their plans.

receive runoff discharges from Priority Development Projects. The geomorphic stability within the channel shall be assessed. A performance standard shall be created that ensures that the geomorphic stability within the channel not be compromised as a result of receiving runoff discharges from Priority Development Projects.

(b) Utilize continuous simulation of the entire rainfall record (or other analytical method proposed by the Copermittees and deemed acceptable by the San Diego Water Board) to identify a range of runoff flows[14] for which priority Development Project post-project runoff flow rates and durations shall not exceed pre-development (naturally occurring) runoff flow rates and durations by more than 10 percent, where the increased flow rates and durations will result in increased potential for erosion or other significant adverse impacts to beneficial uses. In addition, the identified range of runoff flow rates and durations must compensate for the loss of sediment supply due to the development. The lower boundary of the range of runoff flows identified shall correspond with the critical channel flow that produces the critical shear stress that initiates channel bed movement or that erodes the toe of channel banks. The identified range of runoff flows may be different for specific watersheds, channels, or channel reaches. In the case of an artificially hardened (concrete lined, rip rap, etc.) channel, the lower boundary of the range of runoff flows identified shall correspond with the critical channel flow that produces the critical shear stress that initiates channel bed movement or that erodes the toe of channel banks of a comparable soft-bottomed channel.

(c) Require Priority Development Projects to implement hydrologic control measures so that Priority Development Projects' post-project runoff flow rates and durations (1) do not exceed pre-project (naturally occurring) runoff flow rates and durations by more than 10 percent for the range of runoff flows identified under section F.1.h.(1)(b), where the increased flow rates and durations will result in increased potential for erosion or other significant adverse impacts to beneficial uses; (2) do not result in channel conditions which do not meet the channel standard developed under section F.1.h.(1)(a) for channel segments downstream of Priority Development Project discharge points; and (3) compensate for the loss of sediment supply due to development.

(d) Include other performance criteria (numeric or otherwise) for Priority Development Projects as necessary to prevent runoff from the projects from increasing and/or continuing unnatural rates of erosion of channel beds and banks, silt pollutants generation, or other impacts to beneficial uses and stream habitat due to increased erosive force.

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[14] The identified range of runoff flows to be controlled should be expressed in terms of peak flow rates of rainfall events, such as "10% of the pre-development 2-year runoff event up to the pre-project 10-year runoff event."

(e) Include a review of pertinent literature.

(f) Identify areas within the Santa Margarita Hydrologic Unit where historic hydromodification of receiving waters has a negative impact to benthic macroinvertebrate and benthic periphyton by identifying areas with low or very low Index of Biotic Integrity (IBI) scores.

(g) Include a protocol to evaluate potential hydrograph change impacts to downstream watercourses from Priority Development Projects. This protocol must include the use of the IBI score as a metric for assessing impacts and improvements to downstream watercourses.

(h) Include a description of how the Copermittees will incorporate the HMP requirements into their local approval processes.

(i) Include criteria on selection and design of management practices and measures (such as detention, retention, and infiltration) to control flow rates and durations and address potential hydromodification impacts.

(j) Include technical information supporting any standards and criteria proposed.

(k) Include a description of inspections and maintenance to be conducted for management practices and measures to control flow rates and durations and address potential hydromodification impacts.

(l) Include a description of pre- and post-project monitoring and other program evaluation, including IBI score, to be conducted to assess the effectiveness of implementation of the HMP.

(m) Include mechanisms for assessing and addressing cumulative impacts within a watershed on channel morphology.

(n) Include information on evaluation of channel form and condition, including slope, discharge, vegetation, underlying geology, and other information, as appropriate.

(2) In addition to the hydrologic control measures that must be implemented per section F.1.h.(1)(c), the HMP must include a suite of management measures to be used on Priority Development Projects to protect and restore downstream beneficial uses and prevent or further prevent adverse physical changes to downstream channels. The measures must be based on a prioritized consideration of the following elements in this order:

(a) Hydrologic control measures;
(b) On-site management controls;
(c) Regional controls located upstream of receiving waters; and

(d) In-stream controls.

Where stream channels are adjacent to, or are to be modified as part of a Priority Development Project, management measures must include buffer zones and setbacks. Under no circumstances will in-stream controls include the use of non-naturally occurring hardscape materials such as concrete, riprap, gabions, etc. The suite of management measures shall also include stream restoration as a viable option to achieve the channel standard in section F.1.h.(1)(a).

(3) Each individual Copermittee has the discretion to not require Section F.1.h. at Priority Development Projects where the project:

(a) Discharges storm water runoff into underground storm drains discharging directly to bays or the ocean; or
(b) Discharges storm water runoff into conveyance channels whose bed and bank are concrete lined all the way from the point of discharge to ocean waters, enclosed bays, estuaries, or water storage reservoirs and lakes.

(4) HMP Reporting and Implementation

(a) Within 2 years of adoption of the Order, the Copermittees shall submit to the San Diego Water Board a draft HMP that has been reviewed by the public, including the analysis that identifies the appropriate limiting range of flow rates per section F.1.h.(1)(b).

(b) Within 180 days of receiving San Diego Water Board comments on the draft HMP, the Copermittees shall submit a final HMP that addressed the San Diego Water Board's comments.

(c) Within 90 days of receiving a finding of adequacy from the Executive Officer, each Copermittee shall incorporate and implement the HMP for all Priority Development Projects.

(d) Prior to approval of the HMP by the San Diego Water Board, the early implementation measures likely to be included in the HMP shall be encouraged by the Copermittees.

(5) Interim Hydromodification Criteria

Within one year of adoption of this Order, each Copermittee must ensure that all Priority Development Projects are implementing the following criteria by comparing the pre-development (naturally occurring) and post-project flow rates and durations using a continuous simulation hydrologic model such as US EPA's Hydrograph Simulation Program-Fortran (HSPF):

(a) For flow rates from 10 percent of the 2-year storm event to the 5 year

storm event, the post-project peak flows shall not exceed pre-development (naturally occurring) peak flows.

(b) For flow rates from the 5 year storm event to the 10 year storm event the post-project peak flows may exceed pre-development (naturally occurring) flows by up to 10 percent for a 1-year frequency interval.

The interim hydromodification criteria do not apply to Priority Development Projects where the project discharges (1) storm water runoff into underground storm drains discharging directly to bays or the ocean, or (2) storm water runoff into conveyance channels whose bed and bank are concrete lined all the way from the point of discharge to ocean waters, enclosed bays, estuaries, or water storage reservoirs and lakes.

Within one year of adoption of this Order, each Copermittee must submit a signed, certification statement to the San Diego Water Board verifying implementation of the interim hydromodification criteria.

(6) No part of section F.1.h shall alleviate the Copermittees responsibilities for implementing Low Impact Development BMPs as required under section F.1.d.(4).

i. Training And Education

(1) Municipal Departments and Personnel Education

Municipal Development Planning: Each Copermittee must implement an education program so that its planning and development review staffs and contractors (and Planning Boards and Elected Officials, if applicable) have an understanding of:

(a) Federal, State, and local water quality laws and regulations applicable to Development Projects;

(b) The connection between land use decisions and short and long-term water quality impacts (i.e., impacts from land development and urbanization); and

(c) Methods of minimizing impacts to receiving water quality resulting from development, including:

(i) Storm water management plan development and review;
(ii) Local sensitive water bodies, including 303(d)-impairments and ESAs;
(iii) Methods to control downstream erosion impacts;
(iv) Identification of pollutants of concern;
(v) Site design BMP techniques;

(vi) Source control BMPs;
(vii) Selection of the most effective treatment control BMPs for the pollutants of concern; and
(viii) Public heath concerns related to storm water management infrastructure.

(2) Project Applicants, Developers, Contractors, Property Owners, and other Responsible Parties

(a) Each Copermittee must implement a New Development / Redevelopment education program using all media as appropriate to:

(i) Measurably increase the knowledge of the target communities regarding MS4s, impacts of runoff on receiving waters, and potential BMP solutions for the target audience; and
(ii) To measurably change the behavior of target communities and thereby reduce pollutant releases to MS4s and the environment.

(b) Each Copermittee must educate each target community on the following topics where appropriate:

(i) The importance of educating all construction workers in the field about storm water issues and BMPs though formal or informal training;
(ii) Federal, State, and local water quality laws and regulations applicable to new development and redevelopment activities;
(iii) Site design, source control, pollution prevention, and treatment BMPs;
(iv) General runoff concepts; and
(v) Other topics of local importance, including local water quality conditions, impaired waterbodies and environmentally sensitive areas.

2. Construction Component

Each Copermittee must implement a construction program which meets the requirements of this section, prevents illicit discharges into the MS4, implements and maintains structural and non-structural BMPs to reduce pollutants in storm water runoff from construction sites to the MS4, reduces construction site discharges of storm water pollutants from the MS4 to the MEP, and prevents construction site discharges from the MS4 from causing or contributing to a violation of water quality standards.

a. Ordinance Update

Within 365 days of adoption of this Order, each Copermittee must review and update its grading ordinances and other ordinances as necessary to achieve full compliance with this Order, including requirements for the implementation of all designated BMPs and other measures.

b. Source Identification

Each Copermittee must maintain an updated watershed based inventory of all construction sites within its jurisdiction. The use of an automated database system, such as Geographical Information Systems (GIS) is required.

c. Site Planning and Project Approval Process

Each Copermittee must incorporate consideration of potential water quality impacts prior to approval and issuance of construction and grading permits.

(1) Each construction and grading permit must require proposed construction sites to implement designated BMPs and other measures so that illicit discharges into the MS4 are prevented and storm water pollutants discharged from the site will be reduced to the maximum extent practicable and will not cause or contribute to a violation of water quality standards.

(2) Prior to permit issuance, the project proponent's runoff management plan (or equivalent construction BMP plan) must be required to comply, and reviewed to verify compliance, with the local grading ordinance, other applicable local ordinances, and this Order.

(3) Prior to permit issuance, each Copermittee must verify that project proponents subject to California's statewide General NPDES Permit for Storm Water Discharges Associated With Construction Activities, (hereinafter General Construction Permit), have existing coverage under the General Construction Permit.

d. BMP Implementation

(1) Designate BMPs: Each Copermittee must designate a minimum set of BMPs and other measures to be implemented at all construction sites. The designated minimum set of BMPs must include:

(a) Management Measures:

(i) Pollution prevention, where appropriate;
(ii) Development and implementation of a site-specific runoff management plan;
(iii) Minimization of areas that are cleared and graded to only the portion of the site that is necessary for construction;
(iv) Minimization of exposure time of disturbed soil areas;
(v) Minimization of grading during the wet season and correlation of grading with seasonal dry weather periods to the extent feasible;
(vi) Limitation of grading to a maximum disturbed area as determined by each Copermittee before either temporary or permanent erosion

controls are implemented to prevent storm water pollution. The Copermittee has the option of temporarily increasing the size of disturbed soil areas by a set amount beyond the maximum, if the individual site is in compliance with applicable storm water regulations and the site has adequate control practices implemented to prevent storm water pollution;

(vii) Temporary stabilization and reseeding of disturbed soil areas as rapidly as feasible;
(viii) Wind erosion controls;
(ix) Tracking controls;
(x) Non-stormwater management measures to prevent illicit discharges and control storm water pollution sources;
(xi) Waste management measures;
(xii) Preservation of natural hydrologic features where feasible;
(xiii) Preservation of riparian buffers and corridors where feasible;
(xiv) Evaluation and maintenance of all BMPs, until removed; and
(xv) Retention, reduction, and proper management of all storm water pollutant discharges on site to the MEP standard.

(b) Erosion and Sediment Controls:

(i) Erosion prevention. Erosion prevention is to be used as the most important measure for keeping sediment on site during construction;
(ii) Sediment controls. Sediment controls are to be used as a supplement to erosion prevention for keeping sediment on-site during construction;
(iii) Slope stabilization must be used on all active slopes during rain events regardless of the season and on all inactive slopes during the rainy season and during rain events in the dry season; and
(iv) Permanent revegetation or landscaping as early as feasible.

(c) Designate enhanced BMPs[15] for 303(d) impairments and ESAs: Each Copermittee must implement, or require implementation of, enhanced measures to address the exceptional threat to water quality posed by all construction sites tributary to CWA section 303(d) water body segments impaired for sediment or turbidity. Each Copermittee must also implement, or require implementation of, enhanced, site-specific measures for construction sites within or adjacent to or discharging directly to receiving waters within environmentally sensitive areas (as defined in Attachment C of this Order).

(i) Active Sediment Treatment (AST): Each Copermittee must require implementation of advanced treatment for sediment at construction

[15] Enhanced BMPs are control actions specifically targeted to the pollutant or condition of concern and of higher quality and effectiveness than the minimum control measures otherwise required. Enhanced in this Order means better, not simply more, BMPs.

sites (or portions thereof) that are determined by the Copermittee to be an exceptional threat to water quality. In evaluating the threat to water quality, the following factors must be considered by the Copermittee:

[a] Soil erosion potential or soil type;
[b] The site's slopes;
[c] Project size and type;
[d] Sensitivity of receiving water bodies;
[e] Proximity to receiving water bodies;
[f] Non-storm water discharges;
[g] Ineffectiveness of other BMPs;
[h] Proximity and sensitivity of aquatic threatened and endangered species of concern;
[i] Known effects of AST chemicals; and
[j] Any other relevant factors.

(d) Implement BMPs: Each Copermittee must implement, or require the implementation of, the designated minimum BMPs and any additional measures necessary to comply with this Order at each construction site within its jurisdiction year round. BMP implementation requirements, however, can vary based on wet and dry seasons. Dry season BMP implementation must plan for and address unseasonal rain events that may occur during the dry season (May 1 through September 30).

e. Inspection of Construction Sites

Each Copermittee must conduct construction site inspections for compliance with its ordinances (grading, storm water, etc.), permits (construction, grading, etc.), and this Order. Priorities for inspecting sites must consider the nature and size of the construction activity, topography, and the characteristics of soils and receiving water quality.

(1) During the wet season, each Copermittee must inspect at least every two weeks, all construction sites within its jurisdiction meeting any of the following criteria:

(a) All sites 30 acres or more in size with rough grading or active slopes occurring during the wet season;

(b) All sites one acre or more, and tributary to a CWA section 303(d) water body segment impaired for sediment or within or directly adjacent to, or discharging directly to a receiving water within an ESA; and

(c) Other sites determined by the Copermittees or the San Diego Water Board as a significant threat to water quality. In evaluating threat to water quality, the following factors must be considered: (1) soil erosion potential;

(2) site slope; (3) project size and type; (4) sensitivity of receiving water bodies; (5) proximity to receiving water bodies; (6) non-storm water discharges; (7) past record of non-compliance by the operators of the construction site; and (8) any other relevant factors.

(2) During the wet season, each Copermittee must inspect at least monthly, all construction sites with one acre or more of soil disturbance not meeting the criteria specified above in section F.2.e.(1).

(3) During the wet season, each Copermittee must inspect construction sites less than one acre in size as needed to ensure compliance with its ordinances and this Order.

(4) Each Copermittee must inspect all construction sites as needed during the dry season. Sites meeting the criteria in section F.2.e.(1) must be inspected at least once in August or September each year.

(5) Re-inspections: Based upon site inspection findings, each Copermittee must implement all follow-up actions (i.e., re-inspection, enforcement) necessary to comply with this Order. Reinspection frequencies must be determined by each Copermittee based upon the severity of deficiencies, the nature of the construction activity, and the characteristics of soils and receiving water quality.

(6) Inspections of construction sites must include, but not be limited to:

(a) Check for coverage under the General Construction Permit (Notice of Intent (NOI) and/or Waste Discharge Identification No.) during initial inspections;
(b) Assessment of compliance with Copermittee ordinances and permits related to runoff, including the implementation and maintenance of designated minimum BMPs;
(c) Assessment of BMP effectiveness;
(d) Visual observations for non-storm water discharges, potential illicit connections, and potential discharge of pollutants in storm water runoff;
(e) Review of site monitoring data, if the site monitors its runoff
(f) Education and outreach on storm water pollution prevention, as needed; and
(g) Creation of a written or electronic inspection report.

(7) The Copermittees must track the number of inspections for each inventoried construction site throughout the reporting period to verify that each site is inspected at the minimum frequencies required.

f. Enforcement of Construction Sites

(1) Each Copermittee must develop and implement an escalating enforcement

process that achieves prompt corrective actions at construction sites for violations of the Copermittee's water quality protection permits, requirements, and ordinances. This enforcement process must include authorizing the Copermittee's construction site inspectors to take immediate enforcement actions when appropriate and necessary. The enforcement process must include appropriate sanctions such as stop work orders, non-monetary penalties, fines, bonding requirements, and/or permit denials for non-compliance.

(2) Each Copermittee must be able to respond to complaints received from third-parties and to ensure the San Diego Water Board that corrective actions have been implemented.

g. Reporting of Non-compliant Sites

(1) In addition to the notification requirements in Attachment B, each Copermittee must notify the San Diego Water Board when the Copermittee issues a stop work order or other high level enforcement to a construction site in its jurisdiction as a result of storm water violations.

(2) Each Copermittee shall annually notify the San Diego Water Board, prior to the commencement of the wet season, of all construction sites with alleged violations. Information may be provided as part of the JRMP annual report if submitted prior to the rainy season. Information provided shall include, but not be limited to, the following:

(a) WDID number if enrolled under the General Construction Permit
(b) Site Location, including address
(c) Current violations or suspected violations

h. Training and Education

(1) Municipal Staff and Contractors: Requirements for municipal staff and contractors are described in the Municipal Component section of this Order.

(2) Construction Site Owner / Operator Responsibilities:

As early in the planning and development process as possible and all through the permitting and construction process, each Copermittee must implement a program to educate project applicants, developers, contractors, property owners, and other responsible parties. The education program must provide an understanding of the topics listed below, as appropriate for the audience being educated.

(a) The importance of educating all construction workers in the field about storm water issues and BMPs though formal or informal training;
(b) Federal, State, and local water quality laws and regulations applicable to construction and grading activities;
(c) Site design, source control, pollution prevention, and treatment BMPs;
(d) General runoff concepts; and
(e) Other topics of local importance, including local water quality conditions, impaired waterbodies and environmentally sensitive areas.

3. Existing Development Component

a. Municipal

Each Copermittee must implement a municipal program for the Copermittee's facilities and activities which meets the requirements of this section to CMPprevent illicit discharges into the MS4, reduce municipal discharges of storm water pollutants from the MS4 to the MEP, and prevent municipal discharges from the MS4 from causing or contributing to a violation of water quality standards.

(1) Source Identification / Inventory

Each Copermittee must maintain an updated watershed-based inventory of all their municipal facilities CMPand activities that have the potential to discharge pollutants. The inventory must include the name, address (if applicable), and a description of the area/activity; he use of an automated database system, such as Geographical Information Systems (GIS) is suggestedCMP.

(2) General BMP Implementation

(a) Pollution Prevention: Each Copermittee must implement pollution prevention methods in its municipal program and must require their use by appropriate departments, personnel, and contractors, where appropriate.

(b) Designate Minimum BMPs: Each Copermittee must designate a minimum set of BMPs for their pollutant generating areas and activities. The designated minimum BMPs for municipal areas and activities must be area or activity specific as appropriate. BMPs must be designated for special events that are expected to generate significant trash and litter.

(c) Designate BMPs for ESAs and 303(d) Impairments: Each Copermittee must designate enhanced measures for their municipal areas and activities tributary to CWA section 303(d) impaired water body segments when an area or activity generates pollutants for which the water body segment is impaired. Each Copermittee must also designate additional controls for their municipal areas and activities within or directly adjacent

to or discharging directly to receiving waters within environmentally sensitive areas as necessary to comply with this OrderCMP (as defined in Attachment C of this Order).

(d) Implement BMPs: Each Copermittee must implement, or require the implementation of, the applicable designated minimum and/or enhanced BMPs, and any additional measures necessary based on its inventory to comply with this Order for each municipal area or activity within its jurisdiction that has the potential to discharge pollutants.

(3) BMP Implementation for Management of Pesticides, Herbicides, and Fertilizers

Each Copermittee must implement BMPs to reduce the contribution of storm water pollutants associated with the application, storage, and disposal of pesticides, herbicides and fertilizers from their municipal areas and activities to MS4s and receiving waters. Such BMPs must include, at a minimum:

(a) Educational activities, permits, certifications and other measures for municipal applicators and distributors;
(b) Integrated Pest Management (IPM) measures that rely on non-chemical solutions, to the extent practicableCMP;
(c) The use of native vegetation;
(d) Schedules for irrigation and chemical application to the extent feasibleCMP; and
(e) The collection and proper disposal of unused pesticides, herbicides, and fertilizers.

(4) BMP implementation for Flood Control Structures

(a) Each Copermittee must implement procedures to assure that new flood management projects assess the impacts on the water quality of receiving water bodies.
(b) Each Copermittee must include water quality protection measures, where feasible, when retrofitting existing flood control structural devices.
(c) Each Copermittee must evaluate its existing flood control structural devicesCMP as part of ongoing routine maintenance to identify devices causing or contributing to a condition of pollution, and identify, and where feasible implement, measures to reduce or eliminate the device's effect on pollution.

(5) BMP Implementation for Sweeping of Municipal Areas

Where municipal area sweeping is implemented as an MS4 BMP for Copermittee roads, streets, highways, and parking facilities, the Copermittee must design and implement the program based on the following criteria:

(a) Optimize pickup of trash and debris based on land uses, trash collection

schedules, seasonal factors (e.g., special events, tourism, etc.) and inspections of municipal areas/activities.

(6) Operation and Maintenance of Municipal Separate Storm Sewer System (MS4) and Treatment CMPControls

(a) Treatment Controls: Each Copermittee must implement a schedule of inspection and maintenance activities to verify proper operation of all their municipal structural treatment controls designed to reduce storm water pollutant discharges to or from its MS4s and related drainage structures.

(b) MS4: Each Copermittee must implement a schedule of maintenance activities for their MS4 and MS4 facilities (including catch basins, storm drain inlets, open channels, etc). The maintenance activities must, at a minimum, include:

(i) Inspection and removal of accumulated waste at least once a year between May 1 and September 30 of each year for Permittee catch basins and storm drain inletsCMP;
(ii) Additional catch basin and storm drain inlet cleaning as necessary between October 1 and April 30 of each year as necessaryCMP;
(iii) Following two years of inspections, any MS4 catch basin or storm drain inlet that requires inspection and cleaning less than annually may be inspected as needed, but not less than every other year;
(iv) Open channels must be cleaned of observed anthropogenic litter in a timely manner;
(v) Maintenance activities within open channels must not adversely impact beneficial uses;
(vi) Record keeping of the maintenance and cleaning activities including the overall quantity of waste removed;
(vii) Proper disposal of waste removed pursuant to applicable laws; and
(viii) Measures to eliminate waste discharges during MS4 maintenance and cleaning activities.

(7) Infiltration From Sanitary Sewer to MS4/Provide Preventive Maintenance of BothCMP

(a) Each Copermittee must implement controls and measures to prevent and eliminate infiltration of seepage from their municipal sanitary sewers to MS4s through thorough, routine preventive maintenance of the MS4. Each Copermittee that operates both a municipal sanitary sewer system and a MS4 must implement controls and measures to prevent and eliminate infiltration of seepage from the their municipal sanitary sewers to the MS4s that must include overall sanitary sewer and MS4 surveys and thorough, routine preventive maintenance of both.

(b) Each Copermittee must implement controls to limit infiltration of seepage

from their municipal sanitary sewers to municipal separate storm sewer systems where necessary. Such controls must include:

(i) Adequate plan checking for construction and new development,
(ii) Incident response training for their municipal employees that identify sanitary sewer spills;
(iii) Code enforcement inspections;
(iv) MS4 maintenance and inspections;
(v) Interagency coordination with sewer agencies; and
(vi) Proper education of their municipal staff and contractors conducting field operations on the MS4 or their municipal sanitary sewer (if applicable).

(8) Inspection of Municipal Areas and Activities

(a) At a minimum, each Copermittee must inspect the following high priority municipal areas and activities annually:

(i) Roads, Streets, Highways, and Parking Facilities;
(ii) CMPAreas and activities tributary to a CWA section 303(d) impaired water body segment, where an area or activity generates pollutants for which the water body segment is impaired.
(iii) Areas and activities within or CMPdischarging directly to receiving waters within environmentally sensitive areas (as defined in Attachment C of this Order);
(iv) Municipal Facilities:
[a] Active or closed municipal landfills;
[b] Publicly owned treatment works (including water and wastewater treatment plants) and sanitary sewage collection systems;
[c] Solid waste transfer facilities;
[d] Land application sites;
[e] Corporate yards including maintenance and storage yards for materials, waste, equipment and vehicles; and
[f] Household hazardous waste collection facilities.
(v) Municipal airfields;
(vi) Parks and recreation facilities;
(vii) Special event venues following special events (festivals, sporting events, etc.);
(viii) Power washing facilities; and
(ix) Other municipal areas and activities that the Copermittee determines may contribute a significant pollutant load to the MS4.

(b) Other municipal areas and activities must be inspected as needed and in response to water quality data, valid public complaints, and findings from municipal or contract staff.

(c) Based upon site inspection findings, each Copermittee must implement all

follow-up actions necessary to comply with this Order.

(9) Enforcement of Municipal Areas and Activities

Each Copermittee must enforce its storm water ordinance for all their municipal areas and activities as necessary to maintain compliance with this Order.

(10) Training and Education

Each Copermittee must ensure that all their municipal personnel and contractors that have responsibilities for selecting, implementing, and evaluating BMPs for their municipal areas and activities are adequately trained and educated to perform such tasks.

(a) Municipal Departments and Personnel EducationCMP

(i) Municipal Construction Activities: Each Copermittee must implement an education program that includes annual training prior to the rainy season so that its staff responsible for construction activities (e.g. construction, building, code enforcement, grading review staffs, inspectors, and other responsible construction staff) have, at a minimum, an understanding of the following topics, as appropriate for the target audience:

[a] Applicable CMPwater quality laws and regulations applicable to construction and grading activities conducted by the target audience;
[b] The connection between construction activities and water quality impacts (i.e., impacts from land development and urbanization and impacts from construction material such as sediment);
[c] Proper implementation of erosion and sediment control and other BMPs to minimize the impacts to receiving water quality resulting from construction activities;
[d] The Copermittee's inspection, plan review, and enforcement policies and procedures to verify consistent applicationCMP; where regional training is offered, the training shall focus on the DAMP's generalized inspection, plan review and enforcement policies and procedures;
[e] Current advancements in BMP technologies;
[f] SSMP Requirements including treatment options, site design, source control, and applicable tracking mechanisms; and
[g] Other topics of local importance, including local water quality conditions, impaired water bodies, environmentally sensitive areas, and public health and disease vector issues associated with runoff.

(ii) Municipal Industrial/Commercial ActivitiesCMP Inspectors: Each

Copermittee must train staff responsible for conducting storm water compliance inspections and enforcement of industrial and commercial facilities at least once a year. Training must cover inspection and enforcement procedures, BMP implementation, and review of monitoring data

(iii) Municipal Other Activities: Each Copermittee must implement an education program so that their municipal personnel and contractors performing activities which generate pollutants have an understanding of the activity specific BMPs for each activity to be performed.

b. Commercial / Industrial

Each Copermittee must implement a commercial / industrial program that meets the requirements of this section, prevents illicit discharges into the MS4, reduces commercial / industrial discharges of storm water pollutants from the MS4 to the MEP, and prevents commercial / industrial discharges from the MS4 from causing or contributing to a violation of water quality standards.

(1) Source Identification

(a) Each Copermittee must maintain an updated watershed-based inventory of all industrial and commercial sites/sources within its jurisdiction (regardless of ownership) that could contribute a significant pollutant load to the MS4. The inventory must include the following minimum information for each industrial and commercial site/source: name; address; pollutants potentially generated by the site/source; and identification of whether the site/source is tributary to a Clean Water Act section 303(d) water body segment and generates pollutants for which the water body segment is impaired; and a narrative description including SIC codes which best reflects the principal products or services provided by each facility.

At a minimum, the following sites/sources must be included in the inventory:

(i) Commercial Sites/Sources:

[a] Automobile repair, maintenance, fueling, or cleaning;
[b] Airplane repair, maintenance, fueling, or cleaning;
[c] Boat repair, maintenance, fueling, or cleaning;
[d] Equipment repair, maintenance, fueling, or cleaning;
[e] Automobile and other vehicle body repair or painting;
[f] Mobile automobile or other vehicle washing;
[g] Automobile (or other vehicle) parking lots and storage facilities;
[h] Retail or wholesale fueling;
[i] Pest control services;
[j] Eating or drinking establishments, including food markets;

[k] Mobile carpet, drape or furniture cleaning;
[l] Cement mixing or cutting;
[m] Masonry;
[n] Painting and coating;
[o] Botanical or zoological gardens and exhibits;
[p] Landscaping;
[q] Nurseries and greenhouses;
[r] Golf courses, parks and other recreational areas/facilities;
[s] Cemeteries;
[t] Pool and fountain cleaning;
[u] Marinas;
[v] Portable sanitary services;
[w] Building material retailers and storage;
[x] Animal facilities;
[y] Mobile pet services;
[z] Power washing services; and
[aa] Other sites and sources with a history of un-authorized discharges to the MS4.

(ii) Industrial Sites/Sources:

[a] Industrial Facilities, as defined at 40 CFR § 122.26(b)(14), including those subject to the General Industrial Permit or other individual NPDES permit;
[b] Operating and closed landfills;
[c] Facilities subject to SARA Title III; and
[d] Hazardous waste treatment, disposal, storage and recovery facilities.

(iii) ESAs and 303(d) Listed Waterbodies: All other commercial or industrial sites/sources tributary to a CWA Section 303(d) impaired water body segment, where the site/source generates pollutants for which the water body segment is impaired. All other commercial or industrial sites/sources within or directly adjacent to or discharging directly to coastal lagoons, the ocean, or other receiving waters within environmentally sensitive areas (as defined in Attachment C of this Order).

(iv) All other commercial or industrial sites/sources that the Copermittee determines may contribute a significant pollutant load to the MS4.

(2) General BMP Implementation

(a) Pollution Prevention: Each Copermittee must require the use of pollution prevention methods by industrial and commercial sites/sources.

(b) Designate / Update Minimum BMPs: Each Copermittee must designate a

minimum set of BMPs for all industrial and commercial sites/sources. Where BMPs have already been designated, each Copermittee must review its existing BMPs for adequacy. The designated minimum BMPs must be specific to facility types and pollutant-generating activities, as appropriate.

(c) Designate Enhanced BMPs for ESAs and 303(d) Impairments: Each Copermittee must designate enhanced measures for industrial and commercial sites/sources tributary to CWA section 303(d) impaired water body segments (where a site/source generates pollutants for which the water body segment is impaired). Each Copermittee must also designate additional controls for industrial and commercial sites/sources within or directly adjacent to or discharging directly to coastal lagoons, the ocean, or other receiving waters within environmentally sensitive areas (as defined in Attachment C of this Order).

(d) Implement BMPs: Each Copermittee must implement, or require the implementation of, the designated minimum and enhanced BMPs and any additional measures necessary based on inspections, incident responses, and water quality data to comply with this Order at each industrial and commercial site/source within its jurisdiction.

(3) BMP Implementation for Mobile Businesses

(a) Each Copermittee must develop and implement a program to reduce the discharge of storm water pollutants from mobile businesses to the MEP and to prohibit non-storm water discharges pursuant to Section B of this Order. Each Copermittee must keep as part of their commercial source inventory a listing of mobile businesses known to operate within its jurisdiction. The program must include:

(i) Development and implementation of minimum standards and BMPs to be required for each of the various types of mobile businesses;
(ii) Development and implementation of an enforcement strategy which specifically addresses the unique characteristics of mobile businesses;
(iii) Notification of those mobile businesses known to operate within the Copermittee's jurisdiction of the minimum standards and BMP requirements and local ordinances;
(iv) Development and implementation of an outreach and education strategy; and
(v) Inspection of mobile businesses as needed to implement the program.

(b) If they choose to, the Copermittees may cooperate in developing and implementing their programs for mobile businesses, including sharing of mobile business inventories, BMP requirements, enforcement action information, and education.

(4) Inspection of Industrial and Commercial Sites/Sources

Each Copermittee must conduct industrial and commercial site inspections for compliance with its ordinances, permits, and this Order.

(a) Inspection Procedures: Inspections must include but not be limited to:

(i) Review of BMP implementation plans, if the site uses or is required to use such a plan;

(ii) Review of facility monitoring data, if the site monitors its runoff;

(iii) Check for coverage under the General Industrial Permit (Notice of Intent (NOI) and/or Waste Discharge Identification Number), if applicable;

(iv) Assessment of compliance with Copermittee ordinances and permits related to runoff;

(v) Assessment of BMP implementation, maintenance and effectiveness;

(vi) Visual observations for non-storm water discharges, potential illicit connections, and potential discharge of pollutants in storm water runoff; and

(vii) Education and training on storm water pollution prevention, as conditions warrant.

(b) Each Copermittee shall annually notify the San Diego Water Board, prior to the commencement of the wet season, of all Industrial Sites and Industrial Facilities subject to the General Industrial Permit or other individual NPDES permit with alleged violations. Information may be provided as part of the JRMP annual report if submitted prior to the rainy season. Information provided shall include, but not be limited to, the following:

(i) WDID number if enrolled under the General Industrial Permit;
(ii) Site Location, including address;
(iii) Current violations or suspected violations; and
(iv) Past Violation history.

(c) Frequencies: At a minimum, 25 percent of the sites inventoried as required in section F.3.b.(1) above (excluding mobile sources) including all sites determined to pose a high threat to water quality must be inspected each year. All sites must be Mobile businesses must be inspected pursuant to the enforcement strategy developed pursuant to section

F.3.b.(3). In evaluating threat to water quality, each Copermittee shall consider, at a minimum, the following:

(i) Type of activity (SIC code);
(ii) Materials used at the facility;
(iii) Wastes generated;
(iv) Pollutant discharge potential;
(v) Non-storm water discharges;
(vi) Size of facility;
(vii) Proximity to receiving water bodies;
(viii) Sensitivity of receiving water bodies;
(ix) Whether the facility is subject to the General Industrial Permit or an individual NPDES permit;
(x) Whether the facility has filed a No Exposure Certification/Notice of Non-Applicability;
(xi) Facility design;
(xii) Total area of the site, area of the site where industrial or commercial activities occur, and area of the site exposed to rainfall and runoff;
(xiii) The facility's compliance history; and
(xiv) Any other relevant factors.

(d) Third-Party Inspections: Each Copermittee may develop and implement a third party inspection program for verifying industrial and commercial site/source compliance with its ordinances, permits, and this Order. The third party inspections can satisfy up to 30% of the inspection requirements in section F.3.b(4)(c), with the Copermittee having to fulfill the remaining required inspections. To the extent that third party inspections are conducted to fulfill the requirements of this Order, the Copermittee will be responsible for conducting and documenting quality assurance and quality control of the third-party inspections.

(i) Each inspection conducted by a third-party must, at a minimum, result in the following:

[a] Photo documentation of potential storm water violations identified during the third party inspection;
[b] Reporting to the Copermittee of identified significant potential violations, including imminent or observed illegal discharges, within 24 hours of the third party inspection;
[c] Reporting to the Copermittee of all inspection findings within one week of the inspection being conducted; and
[d] Copermittee follow-up and/or enforcement actions for identified potential storm water violations within two business days of the inspection or potential violation report receipt.

(e) Based upon site inspection findings, each Copermittee must implement all follow-up actions and enforcement necessary to comply with this Order.

(f) To the extent that the San Diego Water Board has conducted an inspection of an industrial site during a particular year, the requirement for the responsible Copermittee to inspect this facility during the same year will be satisfied.

(g) The Copermittees must track the number of inspections for the inventoried industrial and commercial sites/sources throughout the reporting period to verify that the sites/sources are inspected at the minimum frequencies listed in this Order.

(5) Enforcement of Industrial and Commercial Sites/Sources

Each Copermittee must enforce its storm water ordinance for all industrial and commercial sites/sources as necessary to maintain compliance with this Order. Copermittee ordinances or other regulatory mechanisms must include appropriate sanctions to achieve compliance. Sanctions must include the following or their equivalent: Non-monetary penalties, fines, bonding requirements, and/or permit denials for non-compliance.

(6) Training and Education for Owners and Operators of Commercial and Industrial Activities

(a) Each Copermittee must implement an education program using all media as appropriate to (1) measurably increase the knowledge of owners and operators of commercial and industrial activities regarding MS4s, impacts of runoff on receiving waters, and potential BMP solutions for the target audience; and (2) to measurably change the behavior of target communities and thereby reduce storm water pollutant releases and eliminate prohibited non-storm water discharges to MS4s and the environment. At a minimum, the education program must meet the requirements of this section and address the following issues:

(i) Laws, regulations, permits, & requirements;
(ii) Best management practices;
(iii) General runoff concepts; and

(iv) Other topics, including public reporting mechanisms, water conservation, low-impact development techniques.

(b) BMP Notification: At least twice during the five-year period of this Order, each Copermittee must notify the owner/operator of each inventoried industrial and commercial site/source of the BMP requirements applicable to the site/source.

c. Residential

Each Copermittee must implement a residential program which meets the requirements of this section to prevent illicit discharges into the MS4, reduce residential discharges of storm water pollutants from the MS4 to the MEP, and prevent residential discharges from the MS4 from causing or contributing to a violation of water quality standards.

(1) Threat to Water Quality Prioritization

Each Copermittee must identify residential areas and activities that pose a high threat to water quality. At a minimum, these must include:

(a) Automobile repair, maintenance, washing, and parking;
(b) Home and garden care activities and product use (pesticides, herbicides, and fertilizers);
(c) Disposal of trash, pet waste, green waste, and household hazardous waste (e.g., paints, cleaning products);
(d) Any other residential source that the Copermittee determines may contribute a significant pollutant load to the MS4;
(e) Any residential areas tributary to a CWA section 303(d) impaired water body, where the residence generates pollutants for which the water body is impaired; and
(f) Any residential areas within or directly adjacent to or discharging directly to a receiving water within an environmentally sensitive area (as defined in Attachment C of this Order).

(2) BMP Implementation

(a) Pollution Prevention: Each Copermittee must actively encourage the use of pollution prevention methods by residents.

(b) Designate BMPs: Each Copermittee must designate minimum BMPs for high-threat-to-water quality residential areas and activities. The designated minimum BMPs for high-threat-to-water quality residential areas and activities must be area or activity specific.

(c) Hazardous Waste BMPs: Each Copermittee must facilitate the proper management and disposal of used oil, toxic materials, and other household hazardous wastes. Such facilitation must include educational activities, public information activities, and establishment of collection sites operated individually or jointly CMPby the Copermittees or a private entity. Curbside collection of household hazardous wastes is encouraged.

(d) Implement BMPs: Each Copermittee must implement, or require implementation of, the designated minimum BMPs and any additional measures necessary to comply with Sections A and B of this Order to the MEP.

(e) Each Copermittee must implement, or require implementation of, BMPs for residential areas and activities that have not been designated a high threat to water quality, as necessary.

(3) Enforcement of Residential Areas and Activities

Each Copermittee must enforce its storm water ordinance for all residential areas and activities as necessary to maintain compliance with this Order.

(4) Evaluation of Oversight of Residential Areas and ActivitiesCMP

Each Copermittee must annually review the effectiveness of efforts to reduce residential discharges of storm water pollutants from the MS4 and eliminate illicit residential discharges into the MS4. The evaluation must consider findings from monitoring data, municipal employee comments, inspections, complaints, and other appropriate sources.

CMP

(5) Residential Education ProgramCMP

(a) Each Copermittee must individually or jointly implement a Residential Education Program using all media as appropriate to (1) measurably increase the knowledge regarding MS4s, impacts of runoff on receiving waters, and potential BMP solutions for the target audience; and (2) to measurably change the behavior of target communities and thereby reduce storm water and eliminate prohibited non-storm water pollutant releases to MS4s and the environment.

(b) Copermittee educational programs must address pollutant generating residential activities (e.g. car washing, mobile operations, yard maintenance) and pollutant generating products (i.e. pesticides, fertilizers, household chemicals) as appropriate. At a minimum, the education program must meet the requirements of this section and address thefollowing issues as appropriate to the specific outreach effort:

(i) Laws, regulations, permits, and requirements;
(ii) Best management practices;
(iii) General runoff concepts;
(iv) Existing water quality, including local water quality conditions, impaired waterbodies and environmentally sensitive areas; and
(v) Other topics, including public reporting mechanisms, water conservation, low-impact development techniques, and public health and disease vector issues associated with polluted runoff.

d. Retrofitting Existing Development

Each Copermittee must develop and implement a retrofitting program which

meets the requirements of this section. The goals of the existing development retrofitting program are to reduce impacts from hydromodification, promote LID, support riparian and aquatic habitat restoration, reduce the discharges of storm water pollutants from the MS4 to the MEP, and prevent discharges from the MS4 from causing or contributing to a violation of water quality standards. Where feasible, at the discretion of the Copermittee, the existing development retrofitting program may be coordinated with flood control projects and infrastructure improvement programs.

(1) Source Identification

The Copermittee must identify and inventory existing developments (i.e. municipal, industrial, commercial, residential) as candidates for retrofitting. Potential retrofitting candidates must include but are not limited to:

(a) Developments that contribute pollutants of concern to a TMDL or an ESA;
(b) Receiving waters that are channelized or otherwise hardened;
(c) Developments tributary to receiving waters that are channelized or otherwise hardened;
(d) Developments tributary to receiving waters that are significantly eroded;
(e) Developments tributary to an ASBS or SWQPA; and
(f) Developments that cause hydraulic constriction.

(2) Each Copermittee shall evaluate and rank the inventoried existing developments to prioritize retrofitting. Criteria for evaluation must include but is not limited to:

(a) Feasibility;
(b) Cost effectiveness;
(c) Pollutant removal effectiveness;
(d) Impervious area potentially treated;
(e) Maintenance requirements;
(f) Landowner cooperation;
(g) Neighborhood acceptance;
(h) Aesthetic qualities; and
(i) Efficacy at addressing concern.

(3) Each Copermittee must consider the results of the evaluation in prioritizing work plans for the following year. Highly feasible projects expected to benefit water quality should be given a high priority to implement source control and treatment control BMPs. Where feasible, the retrofit projects should be designed in accordance with the SSMP requirements within sections F.1.d.(3) through F.1.d.(8). In addition, the Copermittee shall encourage retrofit projects to implement where feasible the Hydromodification requirements in Section F.1.h.

(4) The Copermittees will cooperate with private landowners to encourage

retrofitting projects. The Copermittee must consider the following practices in cooperating and encouraging private landowners to retrofit their existing development:

(a) Demonstration retrofit projects;
(b) Retrofits on public land and easements that treat runoff from private developments;
(c) Education and outreach;
(d) Subsidies for retrofit projects;
(e) Requiring retrofit projects as enforcement, mitigation or ordinance compliance;
(f) Public and private partnerships; and
(g) Fees for existing discharges to the MS4 and reduction of fees for retrofit implementation.

(5) The completed retrofit BMPs shall be tracked and inspected in accordance with section F.1.f.

(6) Where constraints on retrofitting preclude effective BMP deployment on existing developments at locations critical to protect receiving waters, a Copermittee may propose a regional mitigation project to improve water quality. Such regional projects may include but are not limited to:

(a) Regional water quality treatment BMPs;
(b) Urban creek or wetlands restoration and preservation;
(c) Daylighting and restoring underground creeks;
(d) Localized rainfall storage and reuse to the extent such projects are fully protective of downstream water rights;
(e) Hydromodification project; and
(f) Removal of invasive plant species.

(7) A retrofit project or regional mitigation project may qualify as a Watershed Water Quality Activity provided it meets the requirements in section G. Watershed Runoff Management Program.

4. Illicit Discharge Detection and Elimination

Each Copermittee must implement a program which meets the requirements of this section to actively detect and eliminate illicit discharges and disposal into the MS4. The program must address all types of illicit discharges and connections excluding those non-storm water discharges not prohibited by the Copermittee in accordance with section B of this Order.

a. Prevent And Detect Illicit Discharges And Connections

Each Copermittee must implement measures to prevent and detect illicit discharges

to the MS4.

(1) Legal Authority: Each Copermittee must retain legal authority to prevent and eliminate illicit discharges and connections to the MS4.

(2) Inspections: Each Copermittee must include use of appropriate municipal personnel and contractors to assist in identifying illicit discharges and connections during their daily activities.

(a) Inspections for illegal discharges and connections must be conducted during routine maintenance of all MS4 facilities.

(b) Municipal staff and contractors conducting non-MS4 field operations must be trained to report suspected illegal discharges and connections to proper municipal staff.

b. Maintain MS4 Map

Each Copermittee must maintain an updated map of its entire MS4 and the corresponding drainage areas within its jurisdiction. The use of GIS is required. The accuracy of the MS4 map must be confirmed during dry weather field screening and analytical monitoring and must be updated at least annually. The GIS layers of the MS4 map must be submitted with the updated Jurisdictional Runoff Management Plan within 365 days after adoption of this Order.

c. Facilitate Public Reporting Of Illicit Discharges And Connections - Public Hotline

Each Copermittee must promote, publicize and facilitate public reporting of illicit discharges or water quality impacts associated with discharges into or from MS4s. Each Copermittee must facilitate public reporting through development and operation of a public hotline. Public hotlines can be Copermittee-specific or shared by Copermittees. All storm water hotlines must be capable of receiving reports in both English and Spanish 24 hours per day and seven days per week. All reported incidents, and how each was resolved, shall be summarized in each Copermittee's Individual Annual Report.

d. Dry Weather Field Screening And Analytical Monitoring

Each Copermittee must conduct dry weather field screening and analytical monitoring of MS4 outfalls and other portions of its MS4 within its jurisdiction to detect illicit discharges and connections in accordance with Receiving Waters and MS4 Discharge Monitoring and Reporting Program No. R9-2010-0016 in Attachment E of this Order.

e. Investigation / Inspection And Follow-Up

Each Copermittee must implement procedures to investigate and inspect portions of the MS4 that, based on the results of field screening, analytical monitoring, or other appropriate information, indicate a reasonable potential of containing illicit discharges, illicit connections, or other sources of pollutants in non-storm water.

(1) Develop response criteria for data: Each Copermittee must develop, update, and use numeric criteria action levels (or other actions level criteria where appropriate) to determine when follow-up investigations will be performed in response to water quality monitoring. The criteria must include required non-storm water action levels (see Section C) and a consideration of 303(d)-listed waterbodies and environmentally sensitive areas (ESAs) as defined in Attachment C.

(2) Respond to data: Each Copermittee must investigate portions of the MS4 for which water quality data or conditions indicates a potential illegal discharge or connection.

(a) Obvious illicit discharges (i.e. color, odor, or significant exceedances of action levels) must be investigated immediately.

(b) Field screen data: Within two business days of receiving dry weather field screening results that exceed action levels, the Copermittees must either initiate an investigation to identify the source of the discharge or document the rationale for why the discharge does not pose a threat to water quality and does not need further investigation. This documentation shall be included in the Annual Report.

(c) Analytical data: Within five business days of receiving analytical laboratory results that exceed action levels, the Copermittees must either initiate an investigation to identify the source of the discharge or document the rationale for why the discharge does not pose a threat to water quality and does not need further investigation. This documentation shall be included in the Annual Report.

(3) Respond to notifications: Each Copermittee must respond to and resolve each reported incident (e.g., public hotline, staff notification, etc.) in a timely manner. Criteria may be developed to assess the validity of, and prioritize the response to, each report.

f. Elimination Of Illicit Discharges And Connections

Each Copermittee must take immediate action to initiate steps necessary to eliminate all detected illicit discharges, illicit discharge sources, and illicit connections after detection. Elimination measures may include an escalating series of enforcement actions for those illicit discharges that are not a serious threat to public health or the environment. Illicit discharges that pose a serious threat to the public's health or the environment must be eliminated immediately.

g. Enforce Ordinances

Each Copermittee must implement and enforce its ordinances, orders, or other legal authority to prevent illicit discharges and connections to its MS4 and to eliminate detected illicit discharges and connections to it's MS4.

h. Prevent And Respond To Sewage Spills (Including From Private Laterals And Failing Septic Systems) And Other Spills

(1) Each Copermittee must implement management measures and procedures to prevent, respond to, contain and clean up all sewage (see below) and other spills that may discharge into its MS4 from any source (including private laterals and failing septic systems). Copermittees must coordinate with spill response teams to prevent entry of spills into the MS4 and contamination of surface water, ground water and soil. Each Copermittee must coordinate spill prevention, containment and response activities throughout all appropriate departments, programs and agencies so that maximum water quality protection is available at all times.

(2) Each Copermittee must develop and implement a mechanism whereby it is notified of all sewage spills from private laterals and failing septic systems into its MS4. Each Copermittee must implement management measures and procedures to prevent, respond to, and coordinate a response to contain and clean up sewage from any such notification.

i. Education And Training

Each Copermittee must implement educational activities, public information activities, and other appropriate activities to facilitate the proper management and disposal of used oil and toxic materials.

5. Public Participation Component

Each Copermittee must incorporate a mechanism for public participation in the updating, development, and implementation of the Jurisdictional Runoff Management Program.

G. WATERSHED RUNOFF MANAGEMENT PROGRAM

Each Copermittee must collaborate with other Copermittees to identify, address, and mitigate the highest priority water quality issues/pollutants in the Upper Santa Margarita Watershed.

1. Watershed Water Quality Workplan (Watershed Workplan)

The Watershed Workplan shall describe the Copermittees' development and implementation of a collective watershed strategy to assess and prioritize the water quality problems within the watershed's receiving waters, identify and model sources of the highest priority water quality problem(s), develop a watershed-wide BMP implementation strategy to abate highest priority water quality problems, and a monitoring strategy to evaluate BMP effectiveness and changing water quality prioritization in the WMA.

The work plan shall, at a minimum:

a. Characterize the receiving water quality in the WMA. Characterization shall include use of regularly collected water quality data, reports, monitoring and analysis generated in accordance with the requirements of the Receiving Waters Monitoring and Reporting Program, as well as applicable information available from other public and private organizations.

b. Identify the highest priority water quality problem(s), in terms of constituents by location, in the WMA's receiving waters. Identified water quality problem(s) shall, at a minimum, give consideration to; TMDLs, receiving waters listed on the CWA section 303(d) list, waters with persistent violations of water quality standards, toxicity, or impacts to beneficial uses, and other pertinent conditions.

c. Identify the sources of the highest water quality problem(s) within the WMA. Efforts to determine such sources shall include, but not be limited to: use of information from the construction, industrial/commercial, municipal, and residential source identification programs required within the Jurisdictional Runoff Program (JRMP) of this Order; specific actions to model pollutant transport to receiving waters for the sake of identifying the source(s) point(s) of origin; water quality monitoring data collected as part of the Receiving Water Monitoring and Reporting Program required by this Order, and additional focused water quality monitoring to identify specific sources within the watershed.

d. Develop a watershed BMP implementation strategy to attain receiving water quality objectives in the identified highest priority water quality problem(s). The BMP implementation strategy shall include a schedule for implementation of the BMP projects to abate specific receiving water quality problems. BMPs not contributing to measured pollutant reductions or improvements to water quality must be removed and replaced with alternative BMPs. Identified watershed water quality problems may be the result of jurisdictional discharges that will need to be addressed with BMPs applied in a specific jurisdiction in order to generate a benefit to the watershed.

e. Develop a strategy to model and monitor improvements in receiving water quality directly resulting from implementation of the BMPs described in the Watershed

Workplan. The modeling and monitoring strategy shall generate the necessary data to report on the measured pollutant reduction that results from proper BMP implementation. Monitoring shall, at a minimum, be conducted in the receiving water to demonstrate reduction in pollutant concentrations and progression towards attainment of receiving water quality objectives.

f. Establish a schedule for development and implementation of the Watershed strategy outlined in the Workplan. The schedule shall, at a minimum, include forecasted dates of planned actions to address Provisions E.2(a) through E.2(e) and dates for watershed review meetings through the remaining portion of this Permit cycle. Annual watershed workplan review meetings must be open to the public and appropriately publically noticed such that interested parties may come and provide comments on the watershed program.

2. **Watershed Workplan Implementation –** Watershed Copermittee's shall begin implementing the Watershed Workplan within 60-days of acceptance by the San Diego Water Board Executive Officer. If within 30 days of submittal, the San Diego Water Board has not taken an action, the Workplan shall be deemed acceptable.

3. **Copermittee Collaboration** – Watershed Copermittees shall collaborate to develop and implement the Watershed Workplan. Watershed Copermittee collaboration shall include frequent regularly scheduled meetings. The Copermittees shall seek to obtain any interagency agreements, or other efforts, with non-Copermittee owners of the MS4 (such as Caltrans, Native American tribes, and school districts) to control the contribution of pollutants from one portion of the shared MS4 to another portion of the shared MS4. The Copermittees shall, as appropriate, participate in watershed management efforts to address water quality issues within the entire Santa Margarita Watershed (such as the County of San Diego and United States Marine Corps Camp Pendleton).

4. **Public Participation –** Watershed Copermittees shall implement a watershed-specific public participation mechanism within each watershed. A required component of the watershed-specific public participation shall be a minimum 30-day public review of the Watershed Workplan prior to submittal for acceptance by the San Diego Water Board Execuive Officer. Opportunity for the public to review and comment on the Watershed Workplan must occur before the workplan is implemented.

5. **Watershed Workplan Review and Updates –** Watershed Copermittees shall review and update the Watershed Workplan annually to identify needed changes to the prioritized water quality problem(s) listed in the workplan. All updates to the Watershed Workplan shall be presented during an Annual Watershed Review Meeting. Annual Watershed Review Meetings shall occur once every calendar year and be conducted by the Watershed Copermittees. Annual Watershed Review Meetings shall be open to the public and adequately noticed. Individual Watershed Copermittees shall also review and modify their jurisdictional programs and JRMP

Annual Reports, as necessary, so that they are consistent with the updated Watershed Workplan.

6. **Pyrethroid Toxicity Reduction Evaluation –** The Watershed Copermittees shall incorporate the pyrethroid pollutant reduction program[16] into the Watershed Workplan. The pyrethroid pollutant reduction program shall include the following elements:

   a. Pursue state and federal regulatory change.
   b. Implement a set of source controls targeted specifically at urban pesticide use,
   c. Through the annual reporting process, monitor the implementation of those controls, assess effectiveness, and identify sources or areas where additional effort is needed,
   d. Implement additional controls as needed,
   e. Continue to monitor implementation, as well as conditions within the target receiving waters, assess effectiveness, and re-evaluate control programs.

H. FISCAL ANALYSIS

1. Secure Resources: Each Copermittee must secure the resources necessary to meet all requirements of this Order.

2. Annual Analysis: Each Copermittee must conduct an annual fiscal analysis of the necessary capital and operation and maintenance expenditures necessary to accomplish the activities of the programs required by this Order. The analysis must include estimated expenditures for the reporting period, the preceding period, and the next reporting period.

   a. Each analysis must include a description of the source of funds that are proposed to meet the necessary expenditures, including legal restrictions on the use of such funds.
   b. Each analysis must include a narrative description of circumstances resulting in a 25 percent or greater annual change for any budget line items.

3. Annual Reporting: Each Copermittee must submit its annual fiscal analysis with the annual JRMP report.

I. TOTAL MAXIMUM DAILY LOADS

The waste load allocations (WLAs) of fully approved and adopted TMDLs are incorporated as Water Quality Based Effluent Limitations on a pollutant by pollutant,

[16] The pyrethroid pollutant reduction program is described in the "Riverside County – Santa Margarita Region Pyrethroid Source Identification Toxicity Reduction Evaluaion, Final Phase II Report", January 2009 by MACTEC.

watershed by watershed basis. Early TMDL requirements, including monitoring, may be required and inserted into this Order pursuant to Finding E.10

J. PROGRAM EFFECTIVENESS ASSESSMENT AND REPORTING

1. Jurisdictional Program Effectiveness Assessments

a. Objectives of Effectiveness Assessments

Beginning with the Annual Report due in 2012, each Copermittee must annually assess the effectiveness of its Jurisdictional Runoff Management Program (JRMP) implementation at meeting the following objectives:

(1) Objective for 303(d) Waterbodies: Reduce storm water pollutant loadings.

(a) Each Copermittee must establish annual assessment measures or methods specifically for reducing discharges of storm water pollutants from its MS4 into each downstream 303(d)-listed water body for which that waterbody is impaired. Assessment measures must be developed for each of the six outcome levels described by CASQA.[17]
(b) Each Copermittee must annually conduct each established assessment measure or method and evaluate the outcome. Each outcome must then be used to assess the effectiveness of implemented management measures toward reducing MS4 discharges of the specific pollutants causing or contributing to conditions of impairment.
(c) The assessment measures must target both water quality outcomes and the results of municipal enforcement activities.

(2) Objective for Environmentally-Sensitive Areas: Prevent storm water MS4 discharges from causing or contributing to conditions of pollution, nuisance, or contamination.

(a) Each Copermittee must establish annual measures or methods specifically for assessing the effectiveness of its management measures for protecting downstream ESAs from adverse effects caused by discharges from its MS4. Assessment measures must be developed for each of the six outcome levels described by CASQA.
(b) Each Copermittee must annually implement each established assessment measure or method and evaluate the outcome. Each outcome must be used to assess the effectiveness of implemented management measures toward reducing MS4 discharges of the specific pollutants causing or contributing to conditions of impairment.
(c) The assessment measures must target both water quality outcomes and

[17] Effectiveness assessment outcome levels as defined by CASQA are defined in Attachment C of this Order. See "*Municipal Stormwater Program Effectiveness Assessment Guidance*" (CASQA, May 2007) for guidance for assessing program activities at the various outcome levels.

the results of municipal enforcement activities.

(3) Objectives for major program component outcomes: Determined by Each Copermittee.

(a) Each Copermittee must annually develop objectives for each program component in Section F and the overall JRMP. The objectives must be established as appropriate in response to program implementation and evaluation of water quality and management practices.
(b) Assessment approaches for program implementation must include a mix of specific activities, general program components, and water quality data.
(c) The assessment measures must target both water quality outcomes and the results of municipal enforcement activities.

(4) Objectives for actions taken to protect receiving water limitations in accordance with this Order.

(a) Each Copermittee must develop and implement an effectiveness assessment strategy for each measure conducted in response to a determination to implement the "iterative" approach to prevent or reduce any storm water pollutants that are causing or contributing to the exceedance of water quality standards as outlined in this Order

b. Assessment Review

(1) Based on the results of the effectiveness assessments, each Copermittee must annually review its jurisdictional activities and BMPs to identify modifications and improvements needed to maximize JRMP effectiveness, as necessary to achieve compliance with this Order.

(2) Each Copermittee must develop and annually conduct an Integrated Assessment[18] of each effectiveness assessment objective above (Section J.1.a) and the overall JRMP using a combination of outcomes as appropriate to the objectives.[19]

2. Program Modifications

a. Each Copermittee must develop and implement a plan and schedule to address program modifications and improvements identified during annual effectiveness assessments.

b. Jurisdictional activities/BMPs that are ineffective or less effective than other comparable jurisdictional activities/BMPs must be replaced or improved upon by

[18] Integrated assessment is defined in Attachment C. It is the process of evaluating whether program implementation is resulting in the protection or improvement of water quality. Integrated assessment combines assessments of program implementation and water quality.
[19] Not all program components need be addressed at each of the six outcome levels.

implementation of more effective jurisdictional activities/BMPs. Where monitoring data exhibits persistent water quality problems that are caused or contributed to by MS4 discharges, jurisdictional activities or BMPs applicable to the water quality problems must be modified and improved to correct the water quality problems.

3. Effectiveness Assessment and Program Response Reporting

a. Each Copermittee must include a description and summary of its annual and long-term effectiveness assessments within each Annual Report. Beginning with the Annual Report due in 2011, the Program Effectiveness reporting must include:

(1) 303(d) waterbodies: A description and results of the annual assessment measures or methods specifically for reducing discharges of storm water pollutants from its MS4 into each 303(d)-listed waterbody;
(2) ESAs: A description and results of the annual assessment measures or methods specifically for managing discharges of pollutants from its MS4 into each downstream ESA;
(3) Other Program Components: A description of the objectives and corresponding assessment measures and results used to evaluate the effectiveness of each general program component. The results must include findings from both program implementation and water quality assessment where applicable;
(4) Receiving water protection: A description and results of the annual assessment measures or methods employed specifically for actions taken to protect receiving water limitations in accordance with Section A.3 of this Order;
(5) A description of the steps taken to use dry-weather and wet-weather monitoring data to assess the effectiveness of the programs for 303(d) impairments, ESAs, and general program components;
(6) A description of activities conducted in response to investigations of illicit discharge and illicit connection activities, including how each investigation was resolved and the pollutant(s) involved;
(7) Responses to effectiveness assessments: A description of each program modification, made in response to the results of effectiveness assessments conducted pursuant to Section J.1.a, and the basis for determining (pursuant to Section J.2.b.) that each modified activity and/or BMP represents an improvement with respect to reducing the discharge of storm water pollutants from the MS4.
(8) A description of the steps that will be taken to improve the Copermittee's ability to assess program effectiveness using measurable targeted outcomes, assessment measures, assessment methods, and outcome levels 1-6. Include a time schedule for when improvement will occur; and
(9) A description of the steps that will be taken to identify aspects of the Copermittee's Jurisdictional Runoff Management Program that will be changed based on the results of the effectiveness assessment.

4. Work Plan

Each Copermittee must develop a work plan to address their high priority water quality problems in an iterative manner over the life of the permit. The goal of the work plan is to demonstrate a responsive and adaptive approach for the judicious and effective use of available resources to attack the highest priority problems. The work plan shall include, at a minimum, the following:

a. The problems and priorities identified during the assessment;
b. A list of priority pollutants and known or suspected sources;
c. A brief description of the strategy employed to reduce, eliminate or mitigate the negative impacts;
d. A description and schedule for new and/or modified BMPs. The schedule is to include dates for significant milestones;
e. A description of how the selected activities will address an identified high priority problem. This will include a description of the expected effectiveness and benefits of the new and/or modified BMPs;
f. A description of implementation effectiveness metrics;
g. A description of how efficacy results will be used to modify priorities and implementation; and
h. A review of past activities implemented, progress in meeting water quality standards, and planned program adjustments.

The Copermittee shall submit the work plan to the San Diego Water Board within 365 days of adoption of the Order. Annual updates are also required and shall be included with the annual JRMP report. The San Diego Water Board will assess the work plan for compliance with the specific and overall requirements of the Order. To increase effectiveness and efficiencies, Copermittees may combine their implementation efforts and work plans within a hydrologic area or sub area. Each Copermittee, however, maintains individual responsibility for developing and implementing an acceptable work plan.

K. REPORTING

The Copermittees may propose alternate reporting criteria and schedules, as part of their updated JRMP, for the Executive Officer's acceptance. The Copermittees shall submit the updated JRMP within 365 days after adoption of this Order.

1. Runoff Management Plans

a. Jurisdictional Runoff Management Plans

(1) Copermittees: The written account of the overall program to be conducted by each Copermittee to meet the jurisdictional requirements of section F of this Order is referred to as the Jurisdictional Runoff Management Plan (JRMP). Each Copermittee must revise and update its existing JRMP so that it

describes all activities the Copermittee will undertake to implement the requirements of this Order. Each Copermittee must submit its updated and revised JRMP to the San Diego Water Board 365 days after adoption of this Order.

(2) At a minimum, each Copermittee's JRMP must be updated and revised to demonstrate compliance with each applicable section of this Order.

b. Watershed Workplans

(1) Copermittees: The written account of the program conducted by group of Copermittees is referred to as the Watershed Workplan. Copermittees shall be responsible for updating and revising the Watershed Workplan. Each Watershed Workplan shall be updated and revised to describe any changes in water quality problems or priorities, and any necessary change to actions Copermittees will take to implement jurisdictional or watershed BMPs to address those identified. The Copermittees shall assemble and submit the Watershed Workplan to the San Diego Water Board no later than 365 days after adoption of this Order, and shall be prepared to implement the workplan within 60 days of the San Diego Water Board Executive Officer deeming the workplan acceptable.

(2) Each Watershed Workplan shall, at a minimum, include:

(a) An updated watershed map.
(b) Identification and description of all applicable water quality data, reports, analyses, and other information to be used to assess receiving water quality.
(c) Assessment and analysis of the watershed's water quality data, reports, analyses, and other information, used during identification and prioritization of the watershed's water quality problems.
(d) A prioritized list of water quality problems within the WMA including rationale explaining the method/logic used to determine prioritization.
(e) Identification of the likely sources, pollutant discharges, and/or other factors causing the high priority water quality problems within the WMA.
(f) A description of the strategy to be used to guide Copermittee implementation of BMPs either jurisdictionally or on a watershed-wide basis to abate the highest water quality problems
(g) A list of criteria used to evaluate BMP effectiveness and how it was applied.
(h) A GIS map of BMPs implemented and BMPs scheduled for implementation.
(i) A description of the public participation mechanisms to be used and the parties anticipated to be involved during the development and implementation of the Watershed Workplan.
(j) A description of Copermittee collaboration to accomplish development of the Watershed Workplan, including a schedule for Watershed meetings.

(k) A description of how TMDLs and 303(d)-listed water bodies were considered during prioritization of watershed water quality problems
(l) A description of the strategy to model and monitor improvement in receiving water quality directly resulting from implementation of the BMPs described in the Watershed Workplan.
(m) A scheduled annual Watershed Workplan Review Meeting once every calendar year. This meeting shall be open to the public.

2. Other Required Reports and Plans

a. SSMP Updates

(1) Copermittees must submit their updated model SSMP in accordance with the applicable requirements of section F.1 with the JRMP two years after adoption of this Order.
(2) Within 180 days of determination that the Model SSMP is in compliance with this Permit's provisions, each Copermittee must update their own local SSMP, and amended ordinances consistent with the model SSMP, and shall submit both (local SSMP and amended ordinances) to the San Diego Water Board.
(3) For SSMP-related requirements of Section F.1 with subsequent implementation due dates, updated SSMPs must be submitted with the JRMP annual report covering the applicable reporting period.

b. Report of Waste Discharge

The Copermittees must submit to the San Diego Water Board, no later than 210 days in advance of the expiration date of this Order, a Report of Waste Discharge (ROWD) as an application for issuance of new waste discharge requirements. The fourth annual report for this Order may supplement the ROWD, provided it contains the minimum information below.

At a minimum, the ROWD must include the following: (1) Proposed changes to the Copermittees' runoff management programs; (2) Proposed changes to monitoring programs; (3) Justification for proposed changes; (4) Name and mailing addresses of the Copermittees; (5) Names and titles of primary contacts of the Copermittees; and (6) Any other information necessary for the reissuance of this Order.

3. Annual Reports

a. Jurisdictional Runoff Management Program (JRMP) Annual Reports

(1) Copermittees: Each Copermittee must generate individual JRMP Annual Reports which cover implementation of its jurisdictional activities during the past annual reporting period. Each Annual Report must verify and document compliance with this Order as directed in this section. Each Copermittee

must retain records through 2016, available for review, that document compliance with each requirement of this Order. The reporting period for these annual reports must be the previous fiscal year.

(2) Each Copermittee must submit their JRMP Annual Reports to the San Diego Water Board by September 30 of each year, beginning on September 30, 2011.

(3) Each JRMP Annual Report must contain, at a minimum, the following information:

(a) Information required to be reported annually in Section H (Fiscal Analysis) of this Order;
(b) Information required to be reported annually in Section J (Program Effectiveness) of this Order;
(c) The completed Reporting Checklist found in Attachment D, and
(d) Information for each program component by watershed as described in the following Table 9:

Table 9. Annual Reporting Requirements

Program Component	Reporting Requirement
New Development	1. Updated relevant sections of the General Plan and environmental review process and a description of planned updates within the next annual reporting period, if applicable
	2. Revisions to the local SSMP, including where applicable: (a) Identification and summary of where the SSMP fails to meet the requirements of this Order; (b) Updated procedures for identifying pollutants of concern for each Priority Development Project; (c) Updated treatment BMP ranking matrix; and (d) Updated site design and treatment control BMP design standards;
	3. Verification that site design, source control, and treatment BMPs were required on all applicable Priority Development Projects;
	4. Description of the application of LID and site design BMPs in the planning and approval process;
	5. Description of projects subject to the local waiver provision for numeric sizing of treatment control BMP requirements;
	6. Description and summary of the LID site design BMP substitution program, if applicable;
	7. Description and summary of the process to verify compliance with SSMP requirements;

	8. Updates to the BMPs that are listed in the local SSMP as options for treatment control;
	9. Description of the treatment control maintenance tracking process and verification that the requirements of this Order were met during the reporting period; (a) Updated watershed-based database of approved treatment control BMPs and treatment control BMP maintenance within its jurisdiction, including updates to the list of high-priority treatment BMPs;
	10. Description of the process for identifying and evaluating hydrologic conditions of concern and requiring a suite of management measures within all Priority Development Projects to protect downstream beneficial uses and prevent adverse physical changes to downstream stream channels;
	11. Description of enforcement activities applicable to the new development and redevelopment component and a summary of the effectiveness of those activities;
Construction	1. Updated relevant ordinances and description of planned ordinance updates within the next annual reporting period, if applicable;
	2. A description of procedures used for identifying priorities for inspecting sites and enforcing control measures which consider the nature of the construction activity, topography, and the characteristics of soils and receiving water quality;
	3. Designated minimum and enhanced BMPs;
	4. Summary of the inspection program, including the following information: (a) Number and date of inspections conducted at each facility, including the facility address; (b) Number of facilities lacking adequate BMPs; (c) The BMP violations identified during the inspection by facility; (d) Number, date, and types of enforcement actions by facility; (e) Narrative description of inspection findings and follow-up activities for each facility;
Municipal	1. Updated source inventory;
	2. Changes to the designated municipal BMPs;
	3. Descriptions of procedures to assure that flood management projects assess the impacts on the water quality of receiving water bodies;
	4. Summary and assessment of BMPs implemented at retrofitted flood control structures, including: (a) List of projects with BMP retrofits; and (b) List and description of structures retrofitted without BMPs;
	5. Description and assessment of the municipal structural treatment control operations and maintenance activities, including: (a) Number of inspections and types of facilities; and (b) Summary of findings;

	6. Description of the municipal areas/facilities operations and maintenance activities, including: (a) Number and types of facilities maintained; (b) Amount of material removed and how that material was disposed; and (c) List of facilities planned for bi-annual inspections and the justification;
	7. Description of the municipal areas/programs inspection activities, including: (a) Number and date of inspections conducted at each facility; (b) Number of facilities lacking adequate BMPs; (c) The BMP violations identified during the inspection by facility; (d) Number, date and types of enforcement actions by facility; (e) Narrative description of inspection findings and follow-up activities for each facility;
	8. Description of activities implemented to address sewage infiltration into the MS4;
Commercial / Industrial	1. Annual inventory of commercial / industrial sources;
	2. Summary of the inspection program, including the following information: (a) Number and date of inspections conducted at each facility including the facility address; (b) Number of facilities lacking adequate BMPs; (c) The BMP violations identified during the inspection by facility; (d) Number, date, and types of enforcement actions by facility; (e) Narrative description of inspection findings and follow-up activities for each facility;
	3. Changes to designated minimum and enhanced BMPs;
	4. A list of industrial sites, including each name, address, and SIC code, that the Copermittee suspects may require coverage under the General Industrial Permit, but has not submitted an NOI;
Residential	1. Updated minimum BMPs required for residential areas and activities;
	2. Quantification and summary of applicable runoff and storm water enforcement actions within residential areas and activities;
	3. Description of efforts to manage runoff and storm water pollution in common interest areas;
Retrofitting Existing Development	1. Updated inventory and prioritization of existing developments identified as candidates for retrofitting.
	2. Description of efforts to retrofit existing developments during the reporting year.
	3. Description of efforts taken to cooperate with private landowners to retrofit existing development.
	4. A list of retrofit projects that have been implemented, including site location, a description of the retrofit project, pollutants expected to be treated, and the tributary acreage of runoff that will be treated.

	5. A list of regional mitigation projects that have been implemented, including site location, a description of the regional mitigation project, pollutants expected to be treated, and the tributary acreage of runoff that will be treated.
	6. Any proposed retrofit or regional mitigation projects and timelines for future implementation.
	7. Any proposed changes to the Copermittee's overall retrofitting program.
Illicit Discharge Detection and Elimination	1. Changes to the legal authority to implement Illicit Discharge Detection and Elimination activities;
	2. Changes to the established investigation procedures;
	3. Public reporting mechanisms, including phone numbers and web pages;
	4. All data and assessments from the Dry Weather Effluent Analytical Monitoring activities;
	5. Response criteria developed for water quality data and notifications;
	6. Summaries of illicit discharges (including spills and water quality data events) and how each significant case was resolved;
	7. A description of instances when field screening and analytical data exceeded action levels, including those instances for which no investigation was conducted;
	8. A description of follow-up and enforcement actions taken in response to investigations of illicit discharges and a description of the effectiveness of those measures;
	9. A description of controls to prevent infiltration of seepage from municipal sanitary sewers to municipal separate storm sewer systems;
Work Plan	Priorities, strategy, implementation schedule and effectiveness evaluation;

(4) Each JRMP Annual Report must also include the following information regarding non-storm water discharges (see Section B.2. of this Order):

(a) Identification of non-storm water discharge categories identified as a source of pollutants to waters of the U.S;
(b) A description of ordinances, orders, or similar means to prohibit non-storm water discharge categories identified under section B.2 above ;
(c) Identification of any control measures to be required and implemented for non-storm water discharge categories identified as needing controls by the San Diego Water Board; and
(d) A description of a program to address pollutants from non-emergency fire fighting flows identified by the Copermittee to be significant sources of pollutants.

4. Interim Reporting Requirements

For the July 2010-June 2011 reporting period, the Jurisdictional RMP must be submitted on January 31, 2012. Each Jurisdictional RMP Annual Report submitted

for this reporting period must, at a minimum, include comprehensive descriptions of all activities conducted to fully implement the Copermittees' Jurisdictional RMP documents, as those documents were developed to comply with the requirements of Order No. 2004-001.

5. Universal Reporting Requirements

All submittals must include an executive summary, introduction, conclusion, recommendations, and signed certified statement. Each Copermittee must submit a signed certified statement covering its responsibilities for each applicable submittal. The Principal Copermittee must submit a signed certified statement covering its responsibilities for each applicable submittal and the sections of the submittals for which it is responsible.

L. modification of programs

Modifications of Jurisdictional Runoff Management Programs and/or Watershed Runoff Management Programs may be initiated by the Executive Officer of the San Diego Water Board or by the Copermittees. Requests by Copermittees must be made to the Executive Officer, and must be submitted during the annual review process. Requests for modifications should be incorporated, as appropriate, into the Annual Reports or other deliverables required or allowed under this Order.

1. Minor Modifications: Minor modifications to Jurisdictional Runoff Management Programs, and/or Watershed Runoff Management Programs, may be accepted by the Executive Officer where the Executive Officer finds the proposed modification complies with all discharge prohibitions, receiving water limitations, and other requirements of this Order.

2. Modifications Requiring an Amendment to this Order: Proposed modifications that are not minor require amendment of this Order in accordance with this Order's rules, policies, and procedures.

M. Principal copermittee Responsibilities

Within 180 days of adoption of this Order, the Copermittees must designate the Principal Copermittee and notify the San Diego Water Board of the name of the Principal Copermittee. The Principal Copermittee must, at a minimum:

1. Serve as liaison between the Copermittees and the San Diego Water Board on general permit issues, and when necessary and appropriate, represent the Copermittees before the San Diego Water Board.
2. Coordinate permit activities among the Copermittees and facilitate collaboration on the development and implementation of programs required under this Order.
3. Produce and submit documents and reports as required by section K of this Order

and Receiving Waters and MS4 Discharge Monitoring and Reporting Program No. R9-2010-0016 in Attachment E of this Order.

N. RECEIVING WATERS AND MS4 DISCHARGE MONITORING AND REPORTING PROGRAM

Pursuant to CWC section 13267, the Copermittees must comply with all the requirements contained in Receiving Waters and MS4 Discharge Monitoring and Reporting Program No. R9-2010-0016 in Attachment E of this Order.

O. STANDARD PROVISIONS, REPORTING REQUIREMENTS, AND NOTIFICATIONS

1. Each Copermittee must comply with Standard Provisions, Reporting Requirements, and Notifications contained in Attachment B of this Order. This includes 24 hour/5 day reporting requirements for any instance of non-compliance with this Order as described in section 5.e of Attachment B.

2. All plans, reports and subsequent amendments submitted in compliance with this Order must be implemented immediately (or as otherwise specified). All submittals by Copermittees must be adequate to implement the requirements of this Order.

I, David W. Gibson, Executive Officer, do hereby certify the foregoing is a full, true, and correct copy of an Order adopted by the California Regional Water Quality Control Board, San Diego Region, on TBD, 2010.

David W. Gibson
Executive Officer

AGENDA

Santa Margarita Region
Permit Renewal Meeting

12:00 p.m. – 4:00 p.m. April 28, 2010
Location: City of Temecula

1. Process / Housekeeping

   i. Format for submitting documents

   ii. Addressing Menifee, Murrieta, and Wildomar

   iii. Clarifying permittee responsibilities

   iv. Terminology

   v. Issues that may affect the schedule

   vi. Monitoring NOV

2. Today's Topics

   i. Public Participation

   ii. Residential

   iii.

Municipal

3. Overview of next week
   i. NALs
   ii. SALs
   iii. IDDE

0004500

From: Wayne Chiu
To: Aldo Licitra; Ben Neill; Bill Woolsey; Claudio Padres; Jason Uhley; ...
CC: Chad Loflen; Chiara Clemente; David Barker; James Smith
Date: 4/27/2010 3:34 PM
Subject: Re: Draft Riverside MS4 Permit
Attachments: 2010-0428 DRAFT R9-2010-0016_Fact Sheet.doc

Hello all,

In addition to the rough draft of the Riverside MS4 permit Ben sent last week, attached is a rough draft of the Fact Sheet.

Please note that both of these documents have not undergone internal review and were already going to be subject to additional revisions.

Attachment E to the MS4 permit, the Monitoring and Reporting Program, has not been updated yet though the rough draft of the Fact Sheet provides some discussion about what is likely to be included.

See you all tomorrow.
Thanks,

Wayne Chiu, PE
Water Resource Control Engineer
Southern Watershed Unit
California Regional Water Quality Control Board
San Diego Region
9174 Sky Park Court
San Diego, California 92123
858-637-5558
858-571-6972 Fax

>>> Ben Neill 4/22/2010 4:18 PM >>>
Dear Copermittees,

Per Mr. Barker's commitment at today's meeting, attached is a rough draft of the Riverside MS4 permit.

Ben Neill
Water Resource Control Engineer
Northern Watershed Protection Unit
San Diego Regional Water Quality Control Board
9174 Sky Park Ct., Suite 100
San Diego, CA 92123
Tel: (858) 467-2983
Fax: (858) 571-6972

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN DIEGO REGION

FACT SHEET / TECHNICAL REPORT

FOR

ORDER NO. R9-2010-0016
NPDES NO. CAS0108766

WASTE DISCHARGE REQUIREMENTS

FOR

DISCHARGES FROM THE
MUNICIPAL SEPARATE STORM SEWER SYSTEMS (MS4s)
DRAINING THE COUNTY OF RIVERSIDE,
THE INCORPORATED CITIES OF RIVERSIDE COUNTY,
AND THE RIVERSIDE COUNTY FLOOD CONTROL
AND WATER CONSERVATION DISTRICT
WITHIN THE SAN DIEGO REGION

MONTH DAY, 2010

DRAFT-DO NOT CITE

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LIST OF ACRONYMS AND ABBREVIATIONS

ADT - Average Daily Traffic
ASBS - Area of Special Biological Significance
AST – Active Sediment Treatment
BAT - Best Available Technology
BIA - Building Industry Association of San Diego County
BMP - Best Management Practice
Basin Plan - Water Quality Control Plan for the San Diego Basin
BU – Beneficial Uses
CASQA - California Stormwater Quality Association
CCC - California Coastal Commission
CDFG - California Department of Fish and Game
CEQA - California Environmental Quality Act
CFR - Code of Federal Regulations
Copermittees - County of Riverside, the 4 incorporated cities within the County of Riverside in the San Diego Region, and the Riverside County Flood Control and Water Conservation District
CWA - Clean Water Act
CWC - California Water Code
CZARA - Coastal Zone Act Reauthorization Amendments of 1990
DAMP – Drainage Area Management Plan
ESAs - Environmentally Sensitive Areas
FR - Federal Register
GIS - Geographic Information System
HMP – Hydromodification Management Plan
IBI – Index of Biotic Integrity
IC/ID - Illicit Connections and Illicit Discharges
JRMP - Jurisdictional Runoff Management Plan
Los Angeles Water Board – California Regional Water Quality Control Board, Los Angeles Region
LID – Low Impact Development
MEP - Maximum Extent Practicable
MRP - Receiving Waters Monitoring and Reporting Program
MS4 - Municipal Separate Storm Sewer System
NAL – Non-storm Water Action Levels
NOI - Notice of Intent
NPDES - National Pollutant Discharge Elimination System
NRDC - Natural Resources Defense Council
NURP - Nationwide Urban Runoff Program
RGOs - Retail Gasoline Outlets
ROWD - Riverside County Copermittees' Report of Waste Discharge (application for NPDES reissuance)
RWLs - Receiving Water Limitations
SAL - Storm Water Action Level
San Diego Water Board – California Regional Water Quality Control Board, San Diego Region
SIC - Standard Industrial Classification Code
SSMP - Standard Storm Water Mitigation Plan
State Water Board - State Water Resources Control Board
SWMP - Storm Water Management Plan
SWPPP - Storm Water Pollution Prevention Plan
SWQPA - State Water Quality Protected Area
TAC - State Water Resources Control Board Urban Runoff Technical Advisory Committee
TIE - Toxicity Identification Evaluation
TMDL - Total Maximum Daily Load
USEPA - United States Environmental Protection Agency

USACE – United States Army Corps of Engineers
WDRs - Waste Discharge Requirements
WLA - Waste Load Allocation
WQC - Water Quality Criteria
WQBEL - Water Quality Based Effluent Limitations
WQMP – Water Quality Management Plan
WSPA - Western States Petroleum Association
WRMP - Watershed Runoff Management Plan

I. FACT SHEET FORMAT

This Fact Sheet briefly sets forth the principle facts and the significant factual, legal, methodological, and policy questions that the California Regional Water Quality Control Board, San Diego Region (San Diego Water Board) considered in preparing Order No. R9-2010-0016. In accordance with the Code of Federal Regulations (CFR) title 40 parts 124.8 and 124.56 (40 CFR 124.8 and 124.56), this Fact Sheet includes, but is not limited to, the following information:

A. Contact information
B. Public process and notification procedures
C. Background information
D. Permitting approach
E. Economic issues
F. Legal authority
G. Findings
H. Directives

Tentative Order No. R9-2010-0016 was distributed for review on Month Day, 2010. A public workshop was held on Month, Day, 2010. A public hearing was subsequently held on Month, Day, 2010in the Place TBD to receive oral comments from interested persons, and the Regional Board accepted written comments on the Tentative Order until Month, Day, 2010

The San Diego Water Board's files applicable to the issuance of Order No. R9-2010-0016 are incorporated into the administrative record in support of the findings and requirements of Order No. R9-2010-0016.

II. CONTACT INFORMATION

San Diego Water Board

Benjamin Neill,
Water Resource Control Engineer
9174 Sky Park Court, Suite 100
San Diego, CA 92123
858-467-2983
858-571-6972 (fax)
email: bneill@waterboards.ca.gov

Wayne Chiu, P.E.
Water Resource Control Engineer
9174 Sky Park Court, Suite 100
San Diego, CA 92123
858-637-5558
858-571-6972 (fax)
email: wchiu@waterboards.ca.gov

The Order and other related documents can be downloaded from the San Diego Water Board website at
http://www.waterboards.ca.gov/sandiego/water_issues/programs/stormwater/rsd_stormwater.shtml
All documents referenced in this Fact Sheet and in Order No. R9-2010-0016 are available for public review at the San Diego Water Board office, located at the address listed above. Public records are available for inspection during regular business hours, from 8:00 am to 5:00 pm Monday through Friday. To schedule an appointment to inspect public records, contact the Regional Board Records Management Officer at 858-467-2952.

Copermittees

1. City of Menifee	5. County of Riverside
2. City of Murrieta	6. Riverside County Flood Control and Water Conservation District
3. City of Temecula	
4. City of Wildomar	

III. PUBLIC PROCESS AND NOTIFICATION PROCEDURES

The San Diego Water Board followed the schedule listed below for the preparation of Order No. R9-2010-0016:

A. In December 2008, the San Diego Water Board met with the Copermittees to discuss the Report of Waste Discharge (ROWD) required by Order No. R9-2004-001.
B. On January 15, 2009, the San Diego Water Board received the ROWD for the permit renewal.
C. On October 29, 2009, the San Diego Water Board received the 2008-09 annual reports from the Copermittees for the existing permit.
D. On February 8, 2010, the San Diego Water Board notified all known interested parties that an electronic email listserv had been established to provide information and notices on the reissuance of the municipal storm water NPDES permit for southern Riverside County.
E. On February 18, 2010 the San Diego Water Board provided written comments on the ROWD to the Copermittees.
F. On March 22, 2010, the San Diego Water Board met with the Copermittees to discuss the potential changes to the permit based on the ROWD and annual reports.
G. On Month Day, 2010, the San Diego Water Board released the tentative Order and notified interested parties of a planned workshop
H. A public workshop was held on April XX, 2010.
I. In April and May 2010, the San Diego Water Board met with the Copermittees on several occasions to discuss their concerns about the tentative Order.
J. Written comments were accepted until Month Day, 2010.
K. A public hearing of the tentative Order was conducted on Month Day, 2010.

IV. BACKGROUND

Tentative Order No. R9-R9-2010-0016 is the fourth iteration of the storm water permit for the municipal separate storm sewer systems (MS4s) in the Riverside County portion of the San Diego region. The first permit was adopted in 1990. The San Diego Water Board adopted the second round of the permit in 1998. The U.S. Environmental Protection Agency (USEPA) objected to the 1998 permit and reissued the permit in 1999. In 2000, the San Diego Water Board issued an addendum to the 1998 permit and incorporated the USEPA's permit by reference. The San Diego Water Board reissued the third round of the permit in 2004.

Municipal Storm Water Permits are required by the Federal Clean Water Act 1987 Amendments. The federal Clean Water Act (CWA) was amended in 1987 to address storm water runoff from municipal and industrial dischargers. One requirement of the amendment was that many municipalities throughout the United States were obligated for the first time to obtain National Pollutant Discharge Elimination System (NPDES) permits for discharges of storm water runoff from their MS4s. In response to the CWA amendment (and the pending federal NPDES regulations which would implement the amendment), the San Diego Water Board issued a municipal storm water permit, Order No. 90-46, in July 1990 to the Copermittees for their MS4 discharges.[1]

The First and Second Term Permits, Order Nos. 90-46 and R9-98-02, provided maximum flexibility. Order No. 90-46 contained the "essentials" of the 1990 regulations, but the requirements were written in very broad, generic terms. This was done in order to provide the maximum amount of flexibility to the Copermittees in implementing the new requirements (flexibility was, in fact, the stated reason for issuing the permit in advance of the final regulations). From staff's perspective however, this same lack of specificity, combined with the lack of funding and political will, also provided the Copermittees with ample reasons to take few substantive steps towards permit compliance. The situation was exacerbated by the San Diego Water Board's own lack of storm water resources.

The Third-Term Permit introduced specific requirements. The regulatory approach incorporated into Order No. R9-2004-001 was a significant departure from the regulatory approach of the First and Second-Term Permits. Where Order Nos. 90-46 and R9-98-02 included broad, nonspecific requirements in order to provide the Copermittees with the maximum amount of flexibility in developing their programs, Order No. R9-2004-001 used detailed, specific requirements which outlined the minimum level of implementation required for the Copermittees' programs. In order to provide the Copermittees with the minimum requirements to meet the MEP standard for storm water of the San Diego Water Board, Order No. R9-2004-001 included more

[1] The 1990 permit was issued to the County of Riverside, the Orange County Flood Control and Water Conservaton District, and the City of Temecula. Additional municipalities have been added to the MS4 NPDES permit as they have incorporated.

detail to emphasize the strong jurisdictional level programs developed by the Copermittees during the First and Second Term Permits, as well as including the watershed-level program. The shift in permitting approaches resulted from the San Diego Water Board's conclusion that the lack of specificity in earlier Orders resulted in frequently unenforceable permit requirements, which in turn allowed some Copermittees to only make limited progress in implementing their programs.

The Third-Term Permit followed the San Diego County and Orange County permit templates. The shift in regulatory approaches for MS4 permits was first manifested in the 2001 MS4 permit to the owners and operators of San Diego County MS4s (Order No. R9-2001-01) and subsequently incorporated into the 2002 MS4 permit to the owners and operators of the Orange County MS4s (Order No. R9-2002-0001). The Third-Term Riverside County Permit included similar requirements as the 2001 San Diego County Permit and the 2002 Orange County Permit. Both the San Diego and Orange County Permits were appealed to the State Water Resources Control Board (State Water Board).[2] Minor modifications of each were made by the State Water Board, but the vast majority of the requirements were upheld. The San Diego County permit was also challenged in the Superior Court of the State of California and the Court of Appeal, Fourth Appellate District. Further litigation on the Orange County permit was held pending the precedential decisions on the San Diego Permit. The San Diego Permit was largely upheld in the Superior and Appellate Courts. The State of California Supreme Court declined to hear a final appeal from the Building Industry Association in March 2005. Thus, the Third-Term Riverside County permit requirements remained as slightly modified by the State Water Board.

The Third-Term Permit was adopted following substantial public participation. Public participation was extensive during the adoption process of the Third-Term Permit. The draft permit was released for public review and comment on December 15, 2003. Because the proposed requirements for Riverside County were similar to those that had recently been adopted and contested in San Diego County, much of the public participation dialogue echoed the discussions held during the San Diego renewal. A public workshop was held at the Temecula City Hall on January 23, 2004 to answer questions about the Tentative Order for the Third-Term Riverside County permit. A public hearing was held on February 11, 2004 to receive testimony. The public comment period was closed on March 10, 2004. Approximately 165 written and verbal comments were received and responded to during the public workshop, the public hearing, and the written comment period on the Tentative Order for the Third-Term Riverside County permit. Following the extensive public participation process, the San Diego Water Board adopted Order No. R9-2004-001 on July 14, 2004.

[2] Seven petitions were filed with the State Water Board over the Third-Term Orange County Permit. Six were placed in abeyance. Three of the petitioners sought stays. One stay request was dismissed and one was withdrawn. The active petition and stays were addressed by the State Water Board in Order No. WQO 2002-0014. That Order stayed provision F.5.f regarding sewage spills and modified Finding No. 26 regarding chronic toxicity.

Storm water programs have improved under the Third-Term Permit. Since adoption of Order No. R9-2004-001, the Copermittees' storm water programs have expanded. Audits of the Copermittees' programs and reviews of annual reports exhibit that the Copermittees' jurisdictional programs are largely in compliance with the Order. Some of the efforts currently being conducted on a regular basis by the Copermittees that were not conducted on a widespread basis prior to adoption of Order No. R9-2004-001, include: construction site storm water inspections, industrial and commercial facility storm water inspections, municipal facility storm water inspections, management of storm water quality from new development, development of BMP requirements for existing development, interdepartmental coordination, comprehensive water quality monitoring, and assessment of storm water program effectiveness.

Significant challenges remain. When viewed relative to the magnitude of the storm water runoff problem, enormous challenges remain, particularly regarding the management of storm water runoff on a watershed scale. Today, storm and non-storm water discharges from the MS4 continue to be the leading cause of water quality impairment in the San Diego Region.[3] The Copermittees' monitoring data exhibits persistent exceedances of water quality objectives in the Santa Margarita watershed.[4] The Santa Margarita watershed also has conditions that are frequently toxic to aquatic life. Bioassessment data from the watersheds further reflects these conditions, finding that macroinvertebrate communities in creeks have widespread Poor to Very Poor Index of Biotic Integrity ratings.

[3] The potential sources of impairments are identified on the CWA section 303(d) list of impaired water bodies for the San Diego Region.
[4] Data is provided in annual reports to the San Diego Water Board. A summary of data collected during the third-term permit is provided in the Copermittees' application for permit reissuance. That summary is available on-line at: http://www.waterboards.ca.gov/sandiego/water_issues/programs/stormwater/rsd_stormwater.shtml

V. PERMITTING APPROACH (PROGRAM INTEGRATION, FLEXIBILITY, AND DETAIL)

The Order contains an increased emphasis on storm water discharge management on a watershed basis. This shift towards increased watershed management is consistent with planning efforts conducted by the San Diego Water Board regarding reissuance of the San Diego Permit (Order No. R9-2007-0001) and Orange County Permit (Order No. R9-2009-0002). This shift reflects recognition of the maturity of the storm water programs since they began implementing the Third-Term Permit. Addressing storm water discharge management on a watershed basis is only possible if effective jurisdictional programs have been established, and maintaining effective jurisdictional programs is crucial to the success of watershed-focused management.

There are several reasons for this shift in emphasis. An emphasis on watersheds is necessary to shift the focus of the Copermittees from program development and implementation to water quality results. After over 20 years of Copermittee program implementation, it is critical that the Copermittees link their efforts with positive impacts on water quality. Addressing storm water on a watershed scale focuses on water quality results by emphasizing the receiving waters within the watershed. The conditions of the receiving waters drive management actions, which in turn focus on the water quality problems in each watershed.

Focusing on watershed implementation does not mean that the Copermittees must expend funds outside of their jurisdictions. Rather, the Copermittees within each watershed are expected to collaborate to develop a watershed strategy to address the high priority water quality problems within each watershed. They have the option of implementing the strategy in the manner they find to be most effective. Each Copermittee can implement the strategy individually within its jurisdiction, or the Copermittees can group together to implement the strategy throughout the watershed.

While the Order includes a new emphasis on addressing storm water discharges on a watershed basis, the Order includes recognition of the importance of continued program implementation on jurisdictional and countywide levels. The Order also acknowledges that jurisdictional, watershed, and countywide efforts are not always mutually exclusive. For this reason, an attempt has been made to allow for the Copermittees' jurisdictional, watershed, and countywide programs to integrate.

In the Order, the watershed requirements serve as the mechanism for this program integration. Since jurisdictional and countywide activities can also serve watershed purposes, such activities can be integrated into the Copermittees' watershed programs, provided the activities meet certain criteria. In this manner, the Copermittees' activities do not always need to distinguish between jurisdictional, watershed, and countywide levels of implementation. Instead, they can be integrated on multiple levels.

Such opportunities for program integration inherently provide flexibility to the Copermittees in implementing their programs. Program integration can be expanded or minimized as the Copermittees see fit. For example, there is flexibility provided in determining the activities to be integrated and implemented in the watershed programs – watershed-based efforts, countywide efforts, enhanced jurisdictional efforts, or a mixture of the three. Significant flexibility is also provided throughout other portions of the Order.

Copermittees can choose the best management practices (BMPs) to be implemented, or required to be implemented, for development, construction, and existing development areas. Flexibility to determine which industrial or commercial sites are to be inspected is also provided to the Copermittees. Educational approaches are also to be determined by the Copermittees under the Order. Implementation of certain efforts on a countywide basis is largely optional for the Copermittees as well. Significant leeway is also provided to the Copermittees in using methods to assess the effectiveness of their various runoff management programs. This flexibility is further extended to the monitoring program requirements, which allow the Copermittees to develop monitoring approaches to several aspects of the monitoring program.

The challenge in drafting the Order is to provide the flexibility described above while ensuring that the Order is still enforceable. To achieve this, the Order frequently prescribes minimum measurable outcomes, while providing the Copermittees with flexibility in the approaches they use to meet those outcomes. Enforceability has been found to be a critical aspect of the Order. For example, the watershed requirements of Order No. R9-2004-001 were some of the Order's most flexible requirements. This lack of specificity in the watershed requirements resulted in inefficient watershed compliance efforts. This situation reflects a common outcome of flexible permit language. Such language can be unclear and unenforceable, and it can lead to implementation of inadequate programs.

To avoid these types of situations, a balance between flexibility and enforceability has been crafted into the Order. Minimum measurable outcomes are utilized to ensure the Order is enforceable, while the Copermittees are provided flexibility in deciding how they will implement their programs to meet the minimum measurable outcomes.

VI. ECONOMIC ISSUES

Economic discussions of storm and non-storm water management programs tend to focus on the significant costs incurred by municipalities in developing and implementing the programs. However, when considering the cost of implementing the programs, it is also important to consider the alternative costs incurred by not fully

implementing the programs, as well as the benefits which result from program implementation.

The financial crisis and current economic environment has amplified the concerns about the costs incurred by the municipalities in implementing their programs. It is frequently cited by many of the Copermittees as a justification for reducing or modifying the requirements that must be met by their programs. While the current economic environment is a cause for concern in the short term, it also provides an opportunity for these programs to find and implement improvements and efficiencies before the next period of growth and development.

It is very difficult to ascertain the true cost of implementation of the Copermittees' management programs because of inconsistencies in reporting by the Copermittees. Reported costs of compliance for the same program element can vary widely from city to city, often by a very wide margin that is not easily explained.[5] Despite these problems, efforts have been made to identify management program costs, which can be helpful in understanding the costs of program implementation.

Estimates of Phase I Storm Water Program Costs.

The United States Environmental Protection Agency (USEPA), the California Regional Water Quality Control Boards, and the State Water Board have attempted to evaluate the costs of implementing municipal storm water programs. The assessments demonstrate that true costs are difficult to ascertain and reported costs vary widely. Nonetheless, they provide a useful context for considering the costs of requirements within Tentative Order No. R9-2010-0016. In addition, reported fiscal analyses tend to neglect the costs incurred to municipalities when storm water runoff is not effectively managed. Such costs result from pollution, contamination, nuisance, and damage to ecosystems, property, and human health.

In 1999 USEPA reported on multiple studies it conducted to determine the cost of management programs. A study of Phase II municipalities determined that the annual cost of the Phase II program was expected to be $9.16 per household. USEPA also studied 35 Phase I municipalities, finding costs to be $9.08 per household annually, similar to those anticipated for Phase II municipalities.[6]

A study on program cost was also conducted by the California Regional Water Quality Control Board, Los Angeles Region (Los Angeles Water Board), where program costs reported in the municipalities' annual reports were assessed. The Los Angeles Water Board estimated that average per household cost to implement the MS4 program in Los Angeles County was $12.50.[7] Since the Los Angeles County permit is very

[5] LARWQCB, 2003. Review and Analysis of Budget Data Submitted by the Permittees for Fiscal Years 2000-2003. P. 2.
[6] Federal Register / Vol. 64, No. 235 / Wednesday, December 8, 1999 / Rules and Regulations. P. 68791-68792.
[7] LARWQCB, 2003. Review and Analysis of Budget Data Submitted by the Permittees for Fiscal Years 2000-2003. P. 2.

similar to Order No. R9-2004-001, this estimate is also useful in assessing general program costs in Riverside County.

The State Water Board also commissioned a study by the California State University, Sacramento to assess costs of the Phase I MS4 program. This study includes an assessment of costs incurred by Phase I MS4s throughout the State to implement their programs. Annual cost per household in the study ranged from $18-46, with the Fresno-Clovis Metropolitan Area (FCMA) representing the lower end of the range, and the City of Encinitas (in San Diego County) representing the upper end of the range.[8] Included in the study is the City of Corona, which is in Riverside County under the jurisdiction of the Santa Ana Water Board.

The annual cost per household for the City of Corona's program was estimated to be $32, which should be similar to the costs to implement the MS4 programs in the Riverside County portion of the San Diego Region. In contrast, the cost of the City of Encinitas' program, with an annual cost per household estimated to be $46, may represent the upper range of Riverside County MS4 programs. However, the City of Encinitas's program cost can be considered as the high end of the spectrum for management program costs because the City has a consent decree with environmental groups regarding its program, and City of Encinitas has received recognition for implementing a superior program.

The annual costs for the City of Corona and City of Encinitas were estimated from data collected in 2003-2004. Between 2003 and 2008, the number of households in both cities has increased by approximately 3 percent and 7 percent, respectively.[9] In contrast, between 2003 and 2008 the number of households in the City of Temecula has increased from 23,199 to 31,135 (34 percent)[10] and the City of Murrieta has increased from 22,020 to 32,664 (48 percent).[11] This significant increase in number of households indicates a significant increase in the tax base (sales and property tax) available to fund the implementation of the MS4 programs for the City of Temecula and City of Murrieta, as well as for the County of Riverside and recently incorporated cities.

The average amount spent per household in the Cities of Temecula and Murrieta, however, does not correspond with the increase in the number of households or the amount spent in municipalities in other regions. The table below compares the reported expenditures for the MS4 programs from 2006-07 to 2008-09 compared to number of households in the Cities of Encinitas, Corona, Temecula, and Murrieta.[12]

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[8] State Water Board, 2005. NPDES Stormwater Cost Survey. P. ii.
[9] Southern California Association of Governments,, Profile of the City of Corona, dated May 2009; and City of Encinitas, Comprehensive Financial Annual Report, dated June 30, 2009.
[10] Southern California Association of Governments,, Profile of the City of Temecula, dated May 2009.
[11] Southern California Association of Governments,, Profile of the City of Murrieta, dated May 2009.
[12] Amount ($) Spent figures are the actual expenditures reported in the 2006-07, 2007-08, and/or 2008/09 Annual Reports for the jurisdictional programs for each municipality (figures with * are estimated/budgeted expenditures). Number of households derived from SCAG 2009 profiles of Corona, Temecula, and Murrieta, and from City of Encinitas 2009 Financial Annual Report.

	2006-07			2007-08			2008-09		
City	$ Spent	House-holds	$/House-hold	$ Spent	House-holds	$/House-hold	$ Spent	House-holds	$/House-hold
Encinitas	$1,192,174	23,798	$50.10	$2,052,671	23,871	$85.99	$1,729,962	24,100	$71.78
Corona	$988,547	43,000	$22.99	$1,151,779	43,482	$26.49	$1,162,928*	43,827	$26.53
Temecula	$566,952	28,890	$19.62	$748,267	30,222	$24.76	$534,492	31,135	$17.17
Murrieta	$186,377	30,237	$6.16	$258,247	31,758	$8.13	$541,180*	32,664	$16.56

It is important to note that the program costs reported above may not include costs incurred by other departments or programs that may support the MS4 permit programs. The costs only represent the funds spent by each municipality as reported in their jurisdictional program annual reports. In any case, the figures in the table above illustrate the disparity in the amounts reportedly budgeted and spent for the programs in the Riverside County portion of the San Diego Region in comparison to the amounts budgeted and spent in the Santa Ana Region and in the San Diego County portion of the San Diego Region.

It is also important to note that reported program costs are not all attributable to compliance with MS4 permits. Many program components, and their associated costs, existed before any MS4 permits were ever issued. For example, street sweeping and trash collection costs cannot be solely or even principally attributable to MS4 permit compliance, since these practices have long been expected from and implemented by municipalities. Therefore, true program cost resulting from MS4 permit requirements is some fraction of reported costs. The California State University, Sacramento study found that only 38 percent of program costs are new costs fully attributable to MS4 permits. The remainder of the program costs were either pre-existing or resulted from enhancement of pre-existing programs.[13] In 2000, the County of Orange found that even lesser amounts of program costs are solely attributable to MS4 permit compliance, reporting that the amount attributable to implement the County or Orange Drainage Area Management Plan (DAMP), was less than 20 percent of the total budget. The remaining 80 percent was attributable to pre-existing programs.[14]

Estimating Costs of Reissued Storm Water Permits

The vast majority of costs that will be incurred as a result of implementing Order No. R9-2010-0016 are not new. Storm water management programs have been in place in Riverside County for over 15 years. As shown in the discussion above, the amount spent for MS4 Permit compliance per household in the municipalities in the

[13] State Water Board, 2005. NPDES Stormwater Cost Survey. P. 58.
[14] County of Orange, 2000. A NPDES Annual Progress Report. P. 60. More current data from the County of Orange is not used in this discussion because the County of Orange no longer reports such information.

Riverside County portion of the San Diego Region is already low compared to other regions. Any increase in cost to the Copermittees, however, is still expected to be incremental in nature. Since Order No. R9-2010-0016 "fine tunes" the requirements of Order No. R9-2004-001, these cost increases are expected to be modest.

Where there may be additional elements that will incur new costs, the Riverside County Copermittees are given the time to develop the budgets and funding mechanisms to phase those elements into their programs. Additionally, development of these additional elements by the Riverside County Copermittees will have the benefit of the experiences and work already done by the San Diego County and Orange County Copermittees.

The anticipated costs of program changes are difficult to estimate because of the flexibility inherent within the Permit and the recognition that program modifications will vary among the municipalities in response to the specific needs of the local and watershed programs. In other words, the Permit is intended to allow each Copermittee to de-emphasize some program components and strengthen others based on the experience of the jurisdictional programs.

The changes in Order No. R9-2010-0016 reflect the iterative process of BMP implementation and the necessarily adaptive nature of storm water management that is expected by the USEPA. In 1996, USEPA recognized that changes to MS4 programs would occur during the reapplication period based on new information on the relative magnitude of a problem, new data on water quality impacts of the storm water discharges, and experience gained under the prior permit. [15] Some changes have been proposed by the Copermittees in the permit reapplication package, and others have been included because the San Diego Water Board considers those measures necessary and feasible to protect water quality from the effects of MS4 discharges.

Other Economic Considerations.

Economic considerations of management programs cannot be limited only to program costs. Evaluation of programs requires information on the implementation costs and information on the benefits derived from environmental protection and improvement.[16] Attention is often focused on program costs, but the programs must also be viewed in terms of their value to the public.

For example, household willingness to pay for improvements in fresh water quality for fishing and boating has been estimated by USEPA to be $158-210.[17] This estimate can be considered conservative, since it does not include important considerations

[15] Federal Register / Vol. 61, No. 155 / Friday, August 9, 1996 / Rules and Regulations. Interpretive policy memorandum on reapplication requirements for MS4s.
[16] Ribaudo M.O. and D. Heelerstein. 1992, *Estimating Water Quality Benefits: Theoretical and Methodological Issues.* U.S. Department of Agriculture. Technical Bulletin No. 1808.
[17] Federal Register / Vol. 64, No. 235 / Wednesday, December 8, 1999 / Rules and Regulations. P. 68793.

such as marine waters benefits, wildlife benefits, or flood control benefits. The California State University, Sacramento study reports that the annual household willingness to pay for statewide clean water is approximately $180.[18] When viewed in comparison to household costs for existing management programs, household willingness to pay estimates exhibit that per household costs incurred by the Riverside County Copermittees to implement their management programs are very low.

Placing a value on good water quality in receiving waters is very difficult. The Santa Margarita River is one of the few remaining natural gorge rivers in southern California, with approximately 70 species of special concern (rare, threatened, or endangered) regularly inhabiting the watershed, including 30 that are currently protected under the Federal Endangered Species Act.[19] The Upper Santa Margarita Watershed provides significant habitat and recreation opportunities. In addition, residents and businesses in the Upper Santa Margarita Watershed rely heavily of local water for drinking, agriculture, and industrial supply.

Often the value of receiving waters with good water quality manifests in other forms, such as tourism, recreational opportunities, and increased property values. When surface waters are degraded, thereby degrading the habitat, the public loses the aesthetic value and benefit of being able to use the area in and around the water. Surface waters that are able to support the beneficial uses designated in the Basin Plan can sustain plants and wildlife that can attract visitors and residents, providing aesthetic, recreational, as well as monetary value to the public. At this time, however, there have been no studies for the Riverside County portion of the San Diego Region to quantify the added value that surface waters with healthy water quality can provide.

It is also important to consider the benefits of management programs in conjunction with their costs. A study conducted by the University of Southern California and University of California, Los Angeles assessed the costs and benefits of implementing various approaches for achieving compliance with the MS4 permits in the Los Angeles Region. The study found that non-structural systems would cost $2.8 billion but provide $5.6 billion in benefit. If structural systems were determined to be needed, the study found that total costs would be $5.7 to $7.4 billion, while benefits could reach $18 billion.[20] Costs are anticipated to be borne over many years – probably ten years at least. As can be seen, the benefits of the programs are expected to considerably exceed their costs. Such findings are corroborated by USEPA, which found that the benefits of implementation of its Phase II storm water rule would also outweigh the costs.[21]

[18] State Water Board, 2005. NPDES Stormwater Cost Survey. P. iv.
[19] Stein, E. and Ambrose, R. 1998. Cumulative Impacts of Section 404 Clean Water Act Permitting on the Riparian Habitat of the Santa Margarita, California Watershed. Wetlands, Vol. 18, No. 3.
[20] LARWQCB, 2004. Alternative Approaches to Stormwater Control.
[21] Federal Register / Vol. 64, No. 235 / Wednesday, December 8, 1999 / Rules and Regulations. P. 68791.

VII. LEGAL AUTHORITY

The following statutes, regulations, and Water Quality Control Plans provide the basis for the requirements of Order No. R9-2010-0016: Clean Water Act (CWA), California Water Code (CWC), 40 CFR Parts 122, 123, 124 (National Pollutant Discharge Elimination System Permit Application Regulations for Storm Water Discharges, Final Rule), Part II of 40 CFR Parts 9, 122, 123, and 124 (National Pollutant Discharge Elimination System – Regulations for Revision of the Water Pollution Control Program Addressing Storm Water Discharges; Final Rule), Water Quality Control Plan – Ocean Waters of California (California Ocean Plan), Water Quality Control Plan for the San Diego Basin (Basin Plan), 40 CFR 131 Water Quality Standards; Establishment of Numeric Criteria for Priority Toxic Pollutants for the State of California; Rule (California Toxics Rule), and the California Toxics Rule Implementation Plan.

The legal authority citations below generally apply to directives in Order No. R9-2010-0016, and provide the San Diego Water Board with ample underlying authority to require each of the directives of Order No. R9-2010-0016. Legal authority citations are also provided with each permit section discussion in section IX of this Fact Sheet/Technical Report.

CWA 402(p)(3)(B)(ii) – The CWA requires in section 402(p)(3)(B)(ii) that permits for discharges from municipal storm sewers "shall include a requirement to effectively prohibit non-storm water discharges into the storm sewers."

CWA 402(p)(3)(B)(iii) – The CWA requires in section 402(p)(3)(B)(iii) that permits for discharges from municipal storm sewers "shall require controls to reduce the discharge of pollutants to the maximum extent practicable, including management practices, control techniques and system, design and engineering methods, and such other provisions as the Administrator or the State determines appropriate for the control of such pollutants."

40 CFR 122.26(d)(2)(i)(B,C,E, and F) – Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B,C,E, and F) provide that each Copermittee's permit application "shall consist of: (i) Adequate legal authority. A demonstration that the applicant can operate pursuant to legal authority established by statute, ordinance or series of contracts which authorizes or enables the applicant at a minimum to: […] (B) Prohibit through ordinance, order or similar means, illicit discharges to the municipal separate storm sewer; (C) Control through ordinance, order or similar means the discharge to a municipal separate storm sewer of spills, dumping or disposal of materials other than storm water; […] (E) Require compliance with condition in ordinances, permits, contracts or orders; and (F) Carry out all inspection, surveillance and monitoring procedures necessary to determine compliance and noncompliance with permit conditions including the prohibition on illicit discharges to the municipal separate storm sewer."

40 CFR 122.26(d)(2)(iv) – Federal NPDES regulation 40 CFR 122.26(d)(2)(iv) provides that the Copermittee shall develop and implement a proposed management program which "shall include a comprehensive planning process which involves public participation and where necessary intergovernmental coordination, to reduce the discharge of pollutants to the maximum extent practicable using management practices, control techniques and system, design and engineering methods, and such other provisions which are appropriate. The program shall also include a description of staff and equipment available to implement the program. […] Proposed programs may impose controls on a system wide basis, a watershed basis, a jurisdiction basis, or on individual outfalls. […] Proposed management programs shall describe priorities for implementing controls."

40 CFR 122.26(d)(2)(iv)(A - D) – Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(A - D) require municipalities to implement controls to reduce pollutants in storm water runoff from new development and significant redevelopment, construction, and commercial, residential, industrial, and municipal land uses or activities. Prevention of illicit discharges is also required.

CWC 13377 – CWC section 13377 provides that "Notwithstanding any other provision of this division, the State Board or the regional boards shall, as required or authorized by the CWA, as amended, issue waste discharge requirements and dredged or fill material permits which apply and ensure compliance with all applicable provisions of the act and acts amendatory thereof or supplementary, thereto, together with anymore stringent effluent standards or limitation necessary to implement water quality control plans, or for the protection of beneficial uses, or to prevent nuisance."

Order No. R9-2010-0016 is an essential mechanism for achieving the water quality objectives that have been established for protecting the beneficial uses of the water resources in the San Diego Water Board's portion of Riverside County. Federal NPDES regulation 40 CFR 122.44(d)(1) requires MS4 permits to include any requirements necessary to "achieve water quality standards established under CWA section 303, including State narrative criteria for water quality." The term "water quality standards" in this context refers to a water body's beneficial uses and the water quality objectives necessary to protect those beneficial uses as established in the Basin Plan and antidegradation policies.

VIII. FINDINGS

The findings of the Order have been modified to reduce repetition in their discussions and address new requirements. Each finding of the Order is provided and discussed below. Additional discussion relative to the findings can be found in section IX of the Fact Sheet, which provides discussions of the Order's directives.

A. Basis For the Order

Finding A.1. This Order is based on the federal Clean Water Act (CWA), the Porter-Cologne Water Quality Control Act (Division 7 of the Water Code, commencing with Section 13000), applicable state and federal regulations, all applicable provisions of statewide Water Quality Control Plans and Policies adopted by the State Water Resources Control Board (State Water Board), the Water Quality Control Plan for the San Diego Basin adopted by the San Diego Water Board, the California Toxics Rule, and the California Toxics Rule Implementation Plan.

Discussion of Finding A.1. In 1987, Congress established CWA Amendments to create requirements for storm water discharges under the NPDES program, which provides for permit systems to regulate the discharge of pollutants. Under the Porter-Cologne Water Quality Control Act, the State Water Board and the nine Regional Water Quality Control Boards have primary responsibility for the coordination and control of water quality, including the authority to implement the CWA. Porter-Cologne (section 13240) directs the Regional Water Quality Control Boards to set water quality objectives via adoption of Basin Plans that conform to all State policies for water quality control.

As a means for achieving those water quality objectives, Porter-Cologne (section 13243) further authorizes the Regional Water Quality Control Boards to establish waste discharge requirements (WDRs) to prohibit waste discharges in certain conditions or areas. Since 1990, the San Diego Water Board has issued area-wide MS4 NPDES permits. The Order will renew Order No. R9-2004-001 to comply with the CWA and attain water quality objectives in the Basin Plan by limiting the contributions of pollutants conveyed by storm water and by including numeric action levels for dry weather non-storm water discharges designed to ensure that the Copermittees comply with the requirement to effectively prohibit all types of unauthorized non-storm water discharges into their MS4. Further discussions of the legal authority associated with the prohibitions and directives of the Order are provided in section VII this document.

Finding A.2. This Order reissues National Pollutant Discharge Elimination System (NPDES) Permit No. CAS0108766, which was first adopted by the San Diego Water Board on July 16, 1990 (Order No. 90-38), and then reissued on May 13, 1998 (Order

No. R9-98-02). On May 26, 1998, the United States Environmental Protection Agency (USEPA), Region IX, objected to Order No. R9-98-02 due to concerns regarding Receiving Water Limitations (RWL) language. The USEPA concluded that the RWL language in the permit did not comply with the federal Clean Water Act (CWA) and its implementing regulations. On April 27, 1999, the USEPA reissued the MS4 permit, which the San Diego Water Board adopted as Addendum No. 1 to Order No. R9-98-02 on November 8, 2000. On July 14, 2004, the San Diego Water Board adopted the third term MS4 permit, Order No. R9-2004-001. On January 15, 2009, the Riverside County Flood Control and Water Conservation District (District), as the Principal Copermittee, submitted a Report of Waste Discharge (ROWD) for reissuance of the municipal separate storm sewer system (MS4) Permit.

Discussion of Finding A.2. This Order renews National Pollutant Discharge Elimination System (NPDES) Permit No. CAS0108766, which was first issued on July 16, 1990 (Order No. 90-38), and then renewed on May 13, 1998 (Order No. R9-98-02). The U.S Environmental Protection Agency (USEPA) determined that Order No. R9-98-02 the Receiving Water Limitations (RWL) language in the permit did not comply with the federal Clean Water Act (CWA) and its implementing regulations. The USEPA assumed responsibility and reissued the Riverside County MS4 permit on April 27, 1999. Subsequently, the San Diego Water Board adopted Addendum No. 1 to Order No. R9-98-02 on November 8, 2000, which incorporated the USEPA's permit by reference. On July 14, 2004, the San Diego Water Board adopted the third term MS4 permit, Order No. R9-2004-001. On January 15, 2009, in accordance with Order No. R9-2004-001, the Riverside County Flood Control and Water Conservation District (District), as the Principal Copermittee, submitted a Report of Waste Discharge (ROWD) for reissuance of the municipal separate storm sewer system (MS4) Permit. Supporting information discussing the topic of this finding can be found in section V of this document.

Finding A.3. This Order is consistent with the following precedential Orders adopted by the State Water Resources Control Board (State Water Board) addressing municipal storm water NPDES Permits: Order 99-05, Order WQ-2000-11, Order WQ 2001-15, Order WQO 2002-0014, and Order WQ-2009-0008 (*SWRCB/OCC FILE A-1780)*.

Discussion of Finding A.3. In recent years the State Water Board has considered several appeals of MS4 permits issued by the Regional Water Boards. In Order 99-05, the State Water Board established language for Receiving Water Limitation Language for MS4 permits. In Order No. WQ-2000-11, the State Water Board addressed design standards for Standard Urban Storm Water Mitigation Plan (SUSMP) requirements. Order WQ 2001-15 addressed Petitions of the San Diego County MS4 Permit issued by the San Diego Water Board in 2001 (Order No. R9-2001-01). Order WQO 2002-0014 addresses Petitions of the Orange County MS4 Permit issued by the San Diego Water Board in 2002 (Order No. R9-2002-0001).

Finding A.4 The Fact Sheet / Technical Report for the Order No. R9-2010-0016, NPDES No. CAS0108766, Waste Discharge Requirements for Discharges from the Municipal Separate Storm Sewer Systems (MS4s) Draining the County of Riverside, the Incorporated Cities of Riverside County, and the Riverside County Flood Control and Water Conservation District within the San Diego Region, includes cited regulatory and legal references and additional explanatory information and data in support of the requirements of this Permit. This information, including any supplements thereto, and any response to comments on the Tentative Orders, is hereby incorporated by reference into these findings.

Discussion of Finding A.4 This Fact Sheet briefly sets forth the principle facts and the significant factual, legal, methodological, and policy questions that the California Regional Water Quality Control Board, San Diego Region (San Diego Water Board) considered in preparing Order No. R9-2010-0016, in accordance with the Code of Federal Regulations (CFR) title 40 parts 124.8 and 124.56 (40 CFR 124.8 and 124.56). This Fact Sheet includes general information regarding the watershed and Copermittees discharges from their MS4 system. Where appropriate, the Fact Sheet references the applicable statutes and regulations. For some requirements, the Fact Sheet may explain the reasoning why a requested change was not incorporated or does not appear to be justified. The Fact Sheet also can clarify the permit writer's intent for requirements that appear vague or open to multiple interpretations.

B. Regulated Parties

Finding B.1. Each of the persons in Table 1 of the Order, hereinafter called Copermittees or dischargers, owns or operates a municipal separate storm sewer system (MS4), through which it discharges storm water and non-storm water into waters of the United States within the San Diego Region. These MS4s fall into one or more of the following categories: (1) a medium or large MS4 that services a population of greater than 100,000 or 250,000 respectively; or (2) a small MS4 that is "interrelated" to a medium or large MS4; or (3) an MS4 which contributes to a violation of a water quality standard; or (4) an MS4 which is a significant contributor of pollutants to waters of the United States.

Discussion of Finding B.1. Section 402 of the CWA prohibits the discharge of any pollutant to waters of the United States from a point source, unless that discharge is authorized by a NPDES permit. Though storm water and non-storm water may come from a diffuse source, it is discharged through MS4s, which are point sources under the CWA. Federal NPDES regulation 40 CFR 122.26(a) (iii) and (iv) provide that discharges from MS4s, which service medium or large populations greater than 100,000 or 250,000 respectively, shall be required to obtain a NPDES permit. Federal NPDES regulation 40 CFR 122.26(a)(v) also provides that a NPDES permit is required for "A [storm water] discharge which the Director, or in states with approved NPDES programs, either the Director or the USEPA Regional Administrator, determines to contribute to a violation of a water quality standard or is a significant contributor of pollutants to waters of the United States." Such sources are then designated into the program.

The Cities of Wildomar and Menifee are newly incorporated and designated as a Copermittee upon their incorporation. Both Cities were previously a part of the County of Riverside's jurisdiction and have an MS4 interrelated to other Copermittee MS4s.

Other small MS4s also exist within the watersheds of Riverside County in the San Diego Region. While these MS4s are not subject to this Order, they are subject to the Phase II NPDES storm water regulations. Over time, these MS4s will be designated for coverage under the State Water Board's statewide general storm water permit for small MS4s.

C. Discharge Characteristics

Finding C.1. Discharges from the MS4 contain waste, as defined in the California Water Code (CWC), and pollutants that adversely affect the quality of the waters of the State. The discharge from an MS4 is a "discharge of pollutants from a point source" into waters of the U.S. as defined in the CWA.

Discussion of Finding C.1. Section 13050(d) of the CWC defines "waste" as "sewage and any and all other waste substances, liquid, solid, gaseous, or radioactive, associated with human habitation, or of human or animal origin, or from any producing, manufacturing, or processing operation, including waste placed within containers of whatever nature prior to, and for purposes of, disposal." 40 CFR 122.2 defines "point source" as "any discernable, confined, and discrete conveyance, including but not limited to, any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, landfill leachate collection system, vessel or other floating craft from which pollutants are or may be discharged. This term does not include return flows from irrigated agriculture or agricultural storm water runoff." 40 CFR 122.2 defines "discharge of a pollutant" as "Any addition of any pollutant or combination of pollutants to waters of the U.S. from any point source." Also, the justification for control of pollution into waters of the state can be found at CWC section 13260(a)(1). State Water Board Order WQ 2001-15 verifies that discharges from the MS4 contain waste.[22]

The term urban runoff has been removed throughout Tentative Order R9-2010-0016 and replaced with storm water (wet weather) or non-storm water (dry weather) runoff. This clarification is necessary to prevent the misunderstanding that regulation under this permit is subject only to urbanized areas. The term "urban runoff" is not defined in the Code of Federal Regulations or Federal Register in the regulation of phase 1 MS4 discharges.

In the Copermittees' ROWD, a distinction is made between urban land use areas and non urban land use areas. Urban land use areas include commercial, industrial, *urban residential (less than 1 acre)*, parks and recreation facilities, and streets and roads land use categories. Non urban land use areas include preserves and open space, agriculture, federal/state/tribal lands/non-County jurisdiction, and *rural residential (greater than 1 acre)*. The ROWD implies that only discharges from the urban land use areas are subject to the requirements of the MS4 Permit, thus rural residential (greater than 1 acre) land use areas would not be subject to the requirements of the MS4 Permit. Rural residential land use areas, however, are subject to the requirements of the MS4 Permit. The removal of the term urban runoff will further clarify the application of the requirements of the MS4 Permit.

[22] State Water Board, 2001. Order WQ 2001-15. In the Matter of Petitions of Building Industry Association of San Diego County and Western States Petroleum Association: For Review of Waster Discharge Requirements Order No. 2001-01 for Urban Runoff from San Diego County [NPDES No. CAS0108758] Issued by the Regional Board.

The discharge of runoff from an MS4 is a "discharge of pollutants from a point source" into waters of the U.S. as defined in the Clean Water Act (CWA). The Permit defines runoff as all flows in a storm water conveyance system (MS4 defined below) and consists of the following components:

(1) storm water (wet weather flows) and
(2) non-storm water discharges (dry weather flows).

The Permit defines an MS4 as a conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, or storm drains):

(i) Owned or operated by a State, city, town, borough, county, parish, district, association, or other public body (created by or pursuant to State law) having jurisdiction over disposal of sewage, industrial wastes, storm water, or other wastes, including special districts under State law such as a sewer district, flood control district or drainage district, or similar entity, or an Indian tribe or an authorized Indian tribal organization, or designated and approved management agency under section 208 of the CWA that discharges to waters of the United States;

(ii) Designated or used for collecting or conveying storm water;

(iii) Which is not a combined sewer;

(iv) Which is not part of the Publicly Owned Treatment Works (POTW) as defined at 40 CFR 122.26.

Permit finding D.3.c. includes natural streams that convey runoff as part of the MS4. The presence of an MS4 system is not limited to areas considered to be "urban" in nature. Though the term urban is often referred to specifically as pertaining to cities, runoff means all flows in a storm water conveyance system, regardless of the location of the conveyance system. A conveyance system owned or operated by a State, city, town, borough, county, parish, district, association, or other public body (created by or pursuant to State law), may be located in a setting (e.g. unincorporated area, low density residential) that is not considered by the public to be "urban" in nature. These areas are contributing pollutants to the MS4 system that must be addressed. The term runoff applies to all flows in an MS4 system, no matter where the MS4 may be located in regards to incorporated or unincorporated property. Storm water and non-storm water discharges from the rural residential (greater than 1 acre) land use category, characterized as non urban, that enter into any part of the MS4 system (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, or storm drains), are also subject to the requirements of the MS4 Permit.

The Code of Federal Regulations (CFR) at 40 CFR 122.26 requires that large and medium MS4s obtain a permit for all discharges from their systems. Appendix I to 40 CFR 122 designates Riverside County as having a large and medium MS4 requiring a permit. The regulations do not differentiate discharges from urban or rural MS4 systems. Rather, the regulations require the permit for all discharges from their systems. In the Final Rule establishing the Phase 1 storm water regulations, the USEPA clarified that all discharges are subject to a permit. On page 48041 of the Final Rule, the USEPA states:

> "EPA recognizes that some of the counties addressed by today's rule have, in addition to areas with high unincorporated urbanized populations, areas that are essentially rural or uninhabited and may not be the subject of planned development. While permits issued for these municipal systems ***will cover*** *(emphasis added) municipal systems discharges in unincorporated portions of the county* (emphasis added), it is the intent of EPA that management plans and other components of the programs focus on the urbanized and developing areas of the county."

So, while the Permit covers all MS4 discharges regardless if that discharge is in an urban or unincorporated area; the Copermittees management program should focus on urbanized areas. Due to the Permit's requirements, the Copermittees management programs will naturally focus on urbanized areas. Urbanized areas have more industry, construction, pollution and MS4s that require more inspection, maintenance, monitoring, enforcement and complaint follow-up.

USEPA further clarified on page 48041 that all MS4 discharges require permit coverage when addressing highway MS4 systems:

> "[The regulations] will result in discharges from separate storm sewer systems serving State highways and other highways through storm sewers … in unincorporated portions of specified counties being included as part of the large or medium municipal separate storm sewer systems, since all municipal separate storm sewers within the boundaries of these political entities are included."

In their summary on page 48043, the USEPA states:

> "The definition [of MS4] provides that all systems within a geographical area including highways and flood controls will be covered, thereby avoiding fragmented and ill-coordinated programs;"

Neither the State Water Board's storm water permit for Caltrans (Order No. 99-06-DWQ) nor the Los Angeles Water Board's MS4 permit for Ventura County include the term "urban runoff" in a significant regulatory capacity. The Caltrans permit has one reference to "urban runoff" where the term is used interchangeably with "storm water." The draft Ventura permit uses the term "urban runoff" when referring to titles of

reference documents, previously adopted management plans and municipal ordinances that may contain the phrase.

Understandably, the Copermittees have expressed concern regarding the regulation of pollutants from natural, undeveloped areas that enter the MS4 in an unincorporated area. The MS4 collection could change a natural sheet flow discharge to a concentrated point discharge. The MS4 does not provide natural infiltration or other pollutant remediation that these flows would receive in an otherwise natural drainage system. The MS4 may concentrate these natural pollutants and flows. In some cases, the MS4 may ultimately discharge the elevated concentrations of natural pollutants and flow rates to waters of the US far from the natural pollutant and flow source, causing a condition of pollution or a violation of water quality standards.

Finding C.2. MS4 storm water and non-storm water discharges are likely to contain pollutants that cause or threaten to cause a violation of surface water quality standards, as outlined in the San Diego Water Board's Water Quality Control Plan for the San Diego Basin (Basin Plan). Storm water and non-storm water discharges from the MS4 are subject to the conditions and requirements established in the San Diego Basin Plan for point source discharges.

Discussion of Finding C.2. This finding is a clarification regarding the potential for discharges of storm water and non-storm water to impact the Beneficial Uses as described in the Basin Plan. As such these point source discharges require Waste Discharge Requirements (WDRs) to ensure that water quality standards are met. Furthermore, since point source discharges require WDRs, the discharges are subject to the prohibitions, conditions and requirements of the Basin Plan.

In addition, municipal discharges have been split into storm water and non-storm water discharges to represent the differing regulations applicable to storm water and non-storm water, though both types of discharges are likely to contain pollutants.

Finding C.3. The most common categories of pollutants in runoff include total suspended solids, sediment (due to anthropogenic activities); pathogens (e.g., bacteria, viruses, protozoa); heavy metals (e.g., copper, lead, zinc and cadmium); petroleum products and polynuclear aromatic hydrocarbons; synthetic organics (e.g., pesticides, herbicides, and PCBs); nutrients (e.g., nitrogen and phosphorus fertilizers); oxygen-demanding substances (decaying vegetation, animal waste); detergents; and trash.

Discussion of Finding C.3. The National Urban Runoff Program (NURP) study showed that heavy metals, organics, coliform bacteria, nutrients, oxygen demanding substances (e.g., decaying vegetation), and total suspended solids are found at relatively high levels in storm water and non-storm water discharges.[23] It also found that MS4 discharges draining residential, commercial, and light industrial areas contain

[23] Ibid.

significant loadings of total suspended solids and other pollutants. The Basin Plan goes on to identify runoff pollutants to include lawn and garden chemicals, household and automotive care products dumped or drained on streets, and sediment that erodes from construction sites.[24] In addition, the State Water Board Urban Runoff Technical Advisory Committee (TAC) finds that urban runoff pollutants include sediments, nutrients, oxygen-demanding substances, heavy metals, petroleum hydrocarbons, pathogenic bacteria, viruses, and pesticides.[25] Runoff that flows over streets, parking lots, construction sites, and industrial, commercial, residential, and municipal areas carries these untreated pollutants through storm drain networks directly to the receiving waters of the San Diego Region.

Finding C.4. The discharge of pollutants and/or increased flows from MS4s may cause or threaten to cause the concentration of pollutants to exceed applicable receiving water quality objectives and impair or threaten to impair designated beneficial uses resulting in a condition of pollution (i.e., unreasonable impairment of water quality for designated beneficial uses), contamination, or nuisance.

Discussion of Finding C.4. The 1992, 1994, and 1996 National Water Quality Inventory Reports to Congress prepared by USEPA showed a trend of impairment in the nation's waters from contaminated storm and non-storm water runoff.[26] The 1998 National Water Quality Inventory Report showed that runoff discharges affect 11 percent of rivers, 12 percent of lakes, and 28 percent of estuaries. Primary sources of impairment to rivers and streams included sediment, bacteria, nutrients, oxygen-depleting substances, metals, and pesticides. . The report notes that runoff discharges are the leading source of pollution and the main factor in the degradation of surface water quality in California's coastal waters, rivers, and streams. Furthermore, the NURP study found that pollutant levels from illicit non-storm water discharges were high enough to significantly degrade receiving water quality, and threaten aquatic life, wildlife, and human health.[27]

In addition, the Region's CWA section 303(d) list, which identifies water bodies with impaired beneficial uses within the region, also indicates that the impacts of storm water and non-storm water runoff on receiving waters are significant. Many of the impaired water bodies on the 303(d) list are impaired by constituents that have been found at high levels within storm water and non-storm water runoff by the Riverside County storm water monitoring program.[28] Examples of constituents frequently responsible for beneficial use impairment include indicator fecal bacteria, heavy metals, toxicity, pesticides, dissolved solids, turbidity, and nutrients; these constituents

[24] San Diego Water Board, 1994. Water Quality Control Plan, San Diego Basin, Region 9. San Diego.
[25] State Water Board, 1994. Urban Runoff Technical Advisory Committee Report and Recommendations. Nonpoint Source Management Program.
[26] USEPA, 2000. Quality of Our Nation's Waters: Summary of the National Water Quality Inventory 1998 Report to Congress – USEPA 841-S-00-001; Water Quality Conditions in the United States: Profile from the 1998 National Water Quality Inventory Report to Congress – USEPA 841-F-00-006.
[27] USEPA, 1993. Results of the Nationwide Urban Runoff Program, Volume 1 – Final Report.
[28] County of Riverside, 2009. Riverside County Municipal Copermittees 2008-09 Annual Storm Water Program Report, Section 11.

have been found at high levels in runoff both regionally and nationwide.[29,30] In addition, impairments may be caused by synergistic effects of multiple contaminants or by pollutants not currently monitored by storm water programs.

Finding C.5. Pollutants in runoff can threaten and adversely affect human health. Human illnesses have been clearly linked to recreating near storm drains flowing to receiving waters. Also, runoff pollutants in receiving waters can bioaccumulate in the tissues of invertebrates and fish, which may be eventually consumed by humans.

Discussion of Finding C.5. Human illnesses have been clearly linked to recreating near storm drains flowing to coastal waters. A landmark study, conducted by the Santa Monica Bay Restoration Project, found that there was an increased occurrence of illness in people that swam in proximity to a flowing storm drain.[31] A study of south Huntington Beach and north Newport Beach (both located in northern Orange County) found that an illness rate of about 0.8 percent among bathers at those beaches resulted in about $3 million annually in health-related expenses.[32] Although the Upper Santa Margarita Watershed is inland, the watershed drains to the Pacific Ocean, and pollutants generated in the area may impact coastal waters. For example, the Santa Margarita River system provides the main source of beach sand for the beaches in northern San Diego County.[33] In addition, residents from the Upper Santa Margarita Watershed, who recreate at southern California beaches, benefit from clean water.

Residents and businesses in the Upper Santa Margarita Watershed also rely heavily on local water for drinking, agriculture and industrial supply. Over 40 percent of the water used in the watershed is locally produced.[34] In addition, surface and ground water from the Upper Santa Margarita Watershed flow to Fallbrook in San Diego County and the U.S. Marine Corps Base Camp Pendleton where it is used as part of the municipal and domestic water supply.

According to the USEPA, spilled fuel, solvents, waste oil, paints, and other maintenance fluids pose a risk to the environment, but may be especially harmful if they enter someone's drinking water supply.[35] Discharges of runoff from urban areas were identified by the California Department of Health Services as one of the most prevalent possible contaminating activities for drinking water sources.[36] This issue of potential source water contamination is of fundamental importance, because of the dependence on local water for domestic use in the Santa Margarita Watershed.

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[29] Ibid.
[30] USEPA, 1983. Results of the Nationwide Urban Runoff Program, Volume 1 – Final Report.
[31]
[32]
[33] Shapiro. 1991. Refuge in an urbanized land, the Santa Margarita River: cultural and natural resource value. Santa Margarita Research Foundation, Fallbrook, CA.
[34] Jenks, .J. 2002. Santa Margarita River Watershed Annual Watermaster Report: Water Year 2000-2001.
[35] USEPA. 2004. Municipal Sotrm Water and Ground Water Discharge Regulations in California. F-909-04-004.
[36] Ibid.

Furthermore, runoff pollutants in receiving waters can bioaccumulate in the tissues of invertebrates and fish, which may eventually be consumed by humans. Pollutants such as heavy metals and pesticides, which are commonly found in MS4 runoff, have been found to bioaccumulate and biomagnify in long-lived organisms at the higher trophic levels.[37] Since many aquatic species are utilized for human consumption, toxic substances accumulated in species' tissues can pose a significant threat to public health. USEPA supports this finding when it states, "As runoff flows over areas altered by development, it picks up harmful sediment and chemicals such as oil and grease, pesticides, heavy metals, and nutrients (e.g., nitrogen and phosphorus). These pollutants often become suspended in runoff and are carried to receiving waters, such and lakes, ponds, and streams. Once deposited, these pollutants can enter the food chain through small aquatic life, eventually entering the tissues of fish and humans."[38]

Finding C.6. Runoff discharges from MS4s often contain pollutants that cause toxicity to aquatic organisms (i.e., adverse responses of organisms to chemicals or physical agents ranging from mortality to physiological responses such as impaired reproduction or growth anomalies). Toxic pollutants impact the overall quality of aquatic systems and beneficial uses of receiving waters.

Discussion of Finding C.6. The Copermittees' monitoring data exhibits frequent toxic conditions in runoff during storm events and dry weather. Toxicity varies significantly within and among sites and over time. The cause of toxicity may vary between locations, dates, and indicator organisms. The actual cause may be influenced by various factors such as development, land uses, runoff management, habitat modification, hydromodification, and native aquatic environment. Some toxicity identification evaluations (TIEs) have identified pyrethroids as a cause of toxicity in the receiving waters.[39]

Finding C.7. The Copermittees discharge runoff into lakes, drinking water reservoirs, rivers, streams, creeks, bays, estuaries, coastal lagoons, the Pacific Ocean, and tributaries thereto within one of the eleven hydrologic units (Santa Margarita Hydrologic Unit) comprising the San Diego Region as shown in Table 2. Some of the receiving water bodies have been designated as impaired by the San Diego Water Board in 2009 pursuant to CWA section 303(d).

Discussion of Finding C.7. This finding identifies the major receiving water bodies in the Riverside County portion of the Santa Margarita Hydrologic Unit that are listed as impaired on the CWA Section 303(d) List of Impaired Waters (303(d) List). The 2006 303(d) List has been approved by the San Diego Water Board, State Water Board, and USEPA.[40] The 2008 303(d) List was approved by the San Diego Water Board on

[37] Abel, P.D, 1996. Water Pollution Biology.
[38] USEPA, 2000. Storm Water Phase II Compliance Assistance Guide. Washington D.C. EPA 833-R-00-002.
[39] County of Riverside, 2009. Riverside County Municipal Copermittees 2008-09 Annual Storm Water Program Report, Section 11.
[40] The approved 2006 Clean Water Act Section 303(d) List of Water Quality Limited Segments is on-line at: http://www.waterboards.ca.gov/tmdl/303d_lists2006.html

December 18, 2009 and is awaiting State Water Board and USEPA approval.[41] The 303(d) list identifies waters that do not meet water quality standards after applying certain required technology-based effluent limits ("impaired" water bodies). As part of this listing process, states are required to prioritize waters/watersheds for future development of Total Maximum Daily Loads (TMDLs). The listed 303(d) pollutant(s) of concern do not necessarily reflect impairment of the entire corresponding major surface water bodies. The specific impaired portions of each water body are listed in the 2006 and 2008 303(d) Lists.

Since 2002, the number of water bodies and water body – pollutant combinations included on the 303(d) List, located in the Riverside County portion of the San Diego Region, has increased. A comparison of the 2002, 2006, and 2008 303(d) listings are summarized below in Table 2.

[41] The 2008 Clean Water Act Section 303(d) List of Water Quality Limited Segments, approved by the San Diego Water Board, is available on-line at http://www.swrcb.ca.gov/rwqcb9/water_issues/programs/303d_list/index.shtml

Table 2. Comparison of Riverside County 303(d) Listings

Watershed[1]	2002 303(d) List		2006 303(d) List		2008 303(d) List[2]	
	Listed Water Body	**Impairing Pollutants**	**Listed Water Body**	**Impairing Pollutants**	**Listed Water Body**	**Impairing Pollutants**
De Luz Creek HSA (902.21)	NO LISTINGS	NOT APPLICABLE	De Luz Creek	Iron Manganese	De Luz Creek	Iron Manganese Nitrogen Sulfates
Gavilan HSA (902.22)	Sandia Creek	TDS	Sandia Creek	Iron Manganese Nitrogen Sulfates TDS	Sandia Creek	Iron Sulfates TDS
	Santa Margarita River (Upper)	Phosphorus	Santa Margarita River (Upper)	Phosphorus	Santa Margarita River (Upper)	Phosphorus Toxicity
Murrieta HSA (902.32)	NO LISTINGS	NOT APPLICABLE	Long Canyon Creek	TDS	Long Canyon Creek	Chlorpyrifos E. Coli Fecal Coliform Iron Manganese
French HSA (902.33)	NO LISTINGS	NOT APPLICABLE	NO LISTINGS	NOT APPLICABLE	Warm Springs Creek	Chlorpyrifos E. Coli Fecal Coliform Iron Manganese Phosphorus Total Nitrogen as N

Table 2. Comparison of Riverside County 303(d) Listings (Cont'd)

Watershed[1]	2002 303(d) List		2006 303(d) List		2008 303(d) List[2]	
	Listed Water Body	**Impairing Pollutants**	**Listed Water Body**	**Impairing Pollutants**	**Listed Water Body**	**Impairing Pollutants**
Gertrudis HSA (902.42)	NO LISTINGS	NOT APPLICABLE	NO LISTINGS	NOT APPLICABLE	Santa Gertrudis Creek	Chlorpyrifos Copper E. Coli Fecal Coliform Iron Phosphorus
Pauba HSA (902.51)	NO LISTINGS	NOT APPLICABLE	Temecula Creek	TDS Phosphorus Nitrogen	Temecula Creek	Chlorpyrifos Copper Phosphorus TDS Toxicity
	NO LISTINGS	NOT APPLICABLE	NO LISTINGS	NOT APPLICABLE	Redhawk Channel	Chlorpyrifos Copper Diazinon E. Coli Fecal Coliform Iron Manganese Nitrogen Phosphorus TDS
Wolf HSA (902.52)	Murrieta Creek	Phosphorus	Murrieta Creek	Phosphorus	Murrieta Creek	Chlorpyrifos Copper Iron Manganese Nitrogen Phosphorus Toxicity

Notes:
1. Hydrologic subarea (HSA) within the Santa Margarita Hydrologic Unit (HU), located in the Riverside County portion of the San Diego Basin.
2. Water bodies and pollutants on the 2008 303(d) List was approved by the San Diego Water Board on December 18, 2009, and is awaiting final approval by the State Water Board and USEPA..

Finding C.8. Trash is a persistent pollutant which can enter receiving waters from the MS4 resulting in accumulation and transport in receiving waters over time. Trash poses a serious threat to the Beneficial Uses of the receiving waters, including, but not limited to, human health, rare and endangered species, navigation and human recreation.

Discussion of Finding C.8. The Copermittees to date have documented high volumes of trash coming from the MS4 system and in receiving waters.[42]

The Basin Plan specifies the following narrative Water Quality Objective (WQO) for Floating Material:

> *"Waters shall not contain floating material, including solids, liquids, foams, and scum in concentrations which cause nuisance or adversely affect beneficial uses."*

The Basin Plan specifies the following narrative WQO for Suspended and Settleable Solids: Material:

> *"Waters shall not contain suspended and settleable solids in concentrations of solids that cause nuisance or adversely affect beneficial uses."*

Additionally, high density urban areas in Southern California have been shown to be responsible for up to 60 percent of the trash that enters receiving waters from the MS4.[43] The retrofitting of existing MS4 systems, such as catch basins, in targeted high trash areas can result in significant reductions in the amount of trash entering receiving waters from the MS4.

Trash, as litter in both solid and liquid form, is consistently found on and adjacent to roadways. A California Department of Transportation Litter Management Pilot Study found that of roadway trash, plastics and Styrofoam accounted for 33 percent of trash by weight, and 43 percent by volume. Further, the study found that approximately 80 percent of the litter associated with roadways was floatable, indicating that, without capture, this litter would enter Waters of the State after a storm event, resulting in the impairment of Beneficial Uses.[44] The study, however, relied upon a mesh capture size of 0.25 inches (6.35 millimeters). This size is too large to effectively capture plastic pre-production pellets (aka "nurdles"), which are roughly 3 mm in size, and likely underestimated the total contribution of plastics. Furthermore, pre-production plastic pellets, which are small enough to be easily digested, have been found to carry persistent organic pollutants, including PCBs and DDT.[45]

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[42] Fiscal Year 2008-2009 Santa Margarita Watershed Annual Report
[43] The City of Los Angeles Meets Trash TMDLs Compliance with CB Inserts and Opening Covers. August 06, 2008.
[44] California Department of Transportation District 7 Litter Management Pilot Study. June 26, 2000.
[45] Rios, L.M., Moore, C. and Patrick R. Jones. 2007. Persistent organic pollutants carried by synthetic polymers in the ocean environment. *Marine Pollution Bulletin.* Vol. 54.

Finding C.9. The Copermittees' water quality monitoring data submitted to date documents persistent violations of Basin Plan water quality objectives for various runoff-related pollutants (indicator bacteria, dissolved solids, turbidity, metals, pesticides, etc.) at various watershed monitoring stations. Persistent toxicity has also been observed at some watershed monitoring stations. In addition, bioassessment data indicates that the majority of the monitored receiving waters have Poor to Very Poor Index of Biotic Integrity ratings. In sum, the above findings indicate that runoff discharges are causing or contributing to water quality impairments, and are a leading cause of such impairments in Riverside County.

Discussion of Finding C.9. The Copermittees have produced data that demonstrates water quality objectives are frequently not met during dry and wet weather. The 2009 Report of Waste Discharge and the 2008-2009 Annual Reports document that receiving water monitoring stations often fail to meet water quality objectives established in the Basin Plan.

Water quality in receiving waters downstream of MS4 discharges fail to meet California Toxics Rule standards[46] and Basin Plan objectives. Data submitted in the MS4 Annual Reports indicate that at various times chemical, bacteria, pesticide, and metal concentrations may exceed water quality objectives in receiving waters in both wet and dry weather conditions.

There are no other significant NPDES permits discharging to the creeks. For instance, there are no live-stream discharges of treated waste water in the Riverside County area of the Santa Margarita watershed. The few NPDES permits in the watersheds are mainly for recycled water which only discharges occasionally during the rainy season. Because the water quality monitoring indicates exceedances of water quality standards and MS4 discharges are the main source of pollutants in the watersheds, it can be inferred that the MS4 discharges are causing or contributing to water quality impairments, and are a leading cause of such impairments in Riverside County.

Finding C.10. When natural vegetated pervious ground cover is converted to impervious surfaces such as paved highways, streets, rooftops, and parking lots, the natural absorption and infiltration abilities of the land are lost. Therefore, runoff leaving a developed area is significantly greater in runoff volume, velocity, and peak flow rate than pre-development runoff from the same area. Runoff durations can also increase as a result of flood control and other efforts to control peak flow rates. Increased volume, velocity, rate, and duration of runoff greatly accelerate the erosion of downstream natural channels. Significant declines in the biological integrity and physical habitat of streams and other receiving waters have been found to occur with as little as a 3-5 percent conversion from natural to impervious surfaces. The increased runoff characteristics from new development must be controlled to protect

[46] The California Toxics Rule criteria promulgated by the USEPA are directly applicable water quality standards for certain priority toxic pollutants in inland surface waters and enclosed bays and estuaries in California.

against increased erosion of channel beds and banks, sediment pollutant generation, or other impacts to beneficial uses and stream habitat due to increased erosive force.

Finding C.11. Development creates new pollution sources as human population density increases and brings with it proportionately higher levels of car emissions, car maintenance wastes, municipal sewage, pesticides, household hazardous wastes, pet wastes, trash, etc. which can either be washed or directly dumped into the MS4. As a result, the runoff leaving the developed area is significantly greater in pollutant load than the pre-development runoff from the same area. These increased pollutant loads must be controlled to protect downstream receiving water quality.

Discussion of Findings C.10 and C.11.
The Natural Resources Defense Council (NRDC) 1999 Report, "*Stormwater Strategies, Community Responses to Runoff Pollution*" identifies two main causes of the storm water pollution problem in developed areas. Both causes are directly related to development:

1. Increased volume and velocity of surface runoff. There are three types of human-made impervious covers that increase the volume and velocity of runoff: (i) rooftop, (ii) transportation imperviousness, and (iii) non-porous (impervious) surfaces. As these impervious surfaces increase, infiltration will decrease, forcing more water to run off the surface, picking up speed and pollutants.

2. The concentration of pollutants in the runoff. Certain industrial, commercial, residential and construction activities are large contributors of pollutant concentrations in storm water runoff. As human population density increases, it brings with it proportionately higher levels of car emissions, car maintenance wastes, municipal sewage, pesticides, household hazardous wastes, pet wastes, trash, etc.

As a result of these two causes, runoff leaving developed areas is significantly greater in volume, velocity, and pollutant load than pre-development runoff from the same area.

By accommodating the traditional approach to storm water management, development has also altered the flow regime (rate, magnitude, frequency, timing, and flashiness of runoff) that supports aquatic and riparian habitats. These hydrologic changes are driven by the loss of water storage capacity in the watersheds,[47] and exacerbated by physical alterations of the stream channel network.[48] This relationship between development and stream channel integrity has been documented nationally and in

[47] Konrad, Christopher P. and Derek K. Booth, 2005. *Hydrologic Changes in Urban Streams and Their Ecological Significance.* American Fisheries Society Symposium Vol.47 pp.157-177.
[48] Poff. N.L. et al. 1997. The Natural Flow Regime: A paradigm for river conservation and restoration. Bioscience Vol. 47, No. 11, pp.769-784.

southern California. The Copermittees support these findings in their 1993 DAMP,[49] which states:

> "Many storm water runoff problems are primarily a consequence of urbanization. Water that previously soaked into the ground, removing pollutants by filtering through soil, and eventually replenishing groundwater supplies, now must flow overland and therefore enters local streams more rapidly. The rapid transport of water increases the erosion of stream banks and hillsides and does not permit filtering pollutants. Sediment carried by storm water runoff can build up in streambeds, harming fish and aquatic habitat. The sediment acts as a transport mechanism for pollutants which adhere to soil particles. Typical urban runoff pollutants found in surface waters include heavy metals, nutrients, petroleum products, sediment, bacteria, chemicals, and litter."

Hydrologic changes from development also directly and indirectly adversely affect wetlands. Natural wetlands support many beneficial uses and provide important water-quality related ecological services, including pollutant removal, flood attenuation, and groundwater recharge.[50] The Center for Watershed Protection recently provided USEPA with a synthesis of more than 100 scientific studies on the direct and indirect impacts of development, particularly urbanization, on wetlands and the role wetlands play in watershed quality. The report found that the three changes from land development with the most potential to impact wetlands include: Increased storm water runoff; decreased groundwater recharge; and flow constriction.[51] Each of these changes can often be avoided or minimized by implementing LID and hydromodification BMPs.

When Order No. R9-2004-001 was adopted, studies had shown that the level of imperviousness in an area strongly correlates with the quality of nearby receiving waters.[52] One comprehensive study, which looked at numerous areas, variables, and methods, revealed that stream degradation occurs at levels of imperviousness as low as 10 – 20 percent.[53] Stream degradation is a decline in the biological integrity and physical habitat conditions that are necessary to support natural biological diversity. For instance, few urban streams can support diverse benthic communities with imperviousness greater than or equal to 25 percent.[54] To provide some perspective, a medium density, single-family home area can be from 25 percent to 60 percent impervious (variation due to street and parking design).[55]

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[49] Riverside County Copermittees. 1993. Santa Margarita Regional Drainage Area Management Plan.
[50] Wright, Tiffany, et al. 2006. "Direct and Indirect Impacts of Urbanization on Wetland Quality." Prepared by the Center for Watershed Protection. Available at: http://www.cwp.org. 81p.
[51] Ibid p.26
[52] USEPA, 1999. Part II. 40 CFR Parts 9, 122, 123, and 124. National Pollutant Discharge Elimination System – Regulations for Revision of the Water Pollution Control Program Addressing Storm Water Discharges; Final Rule. Federal Register.
[53] Ibid.
[54] Ibid.
[55] Schueler, T.R., 1994. The Importance of Imperviousness. Watershed Protection Techniques. As cited in 64 Fed. Reg. 68725.

More recently, a report on the effects of impervious in southern California streams found that local ephemeral and intermittent streams are more sensitive to such effects than streams in other parts of the country. This study, by the Southern California Coastal Water Research Program, estimated a threshold of response at a two to three percent change in percent of impervious cover in a watershed. [56] This threshold is lower than the previously reported estimates by the USEPA that were cited in the Fact Sheet for Order No. R9-2004-001.

To demonstrate the principle of increased volume and velocity of runoff from urbanization, Figure 1 shows the flow rate of an urban vs. a natural stream. What the figure demonstrates is that urban stream flows have greater peaks and volumes, as well as shorter retention times than natural stream flows. The greater peak flows and volumes result in stream degradation through increased erosion of stream banks and damage to aquatic habitat. The shorter retention times result in less time for sediments and other pollutants to settle before being carried out to the ocean. This sediment, and the associated pollutants it carries, can be a significant cause of water quality degradation.

Figure 1. Flow Rate of Urban and Natural Streams[57]

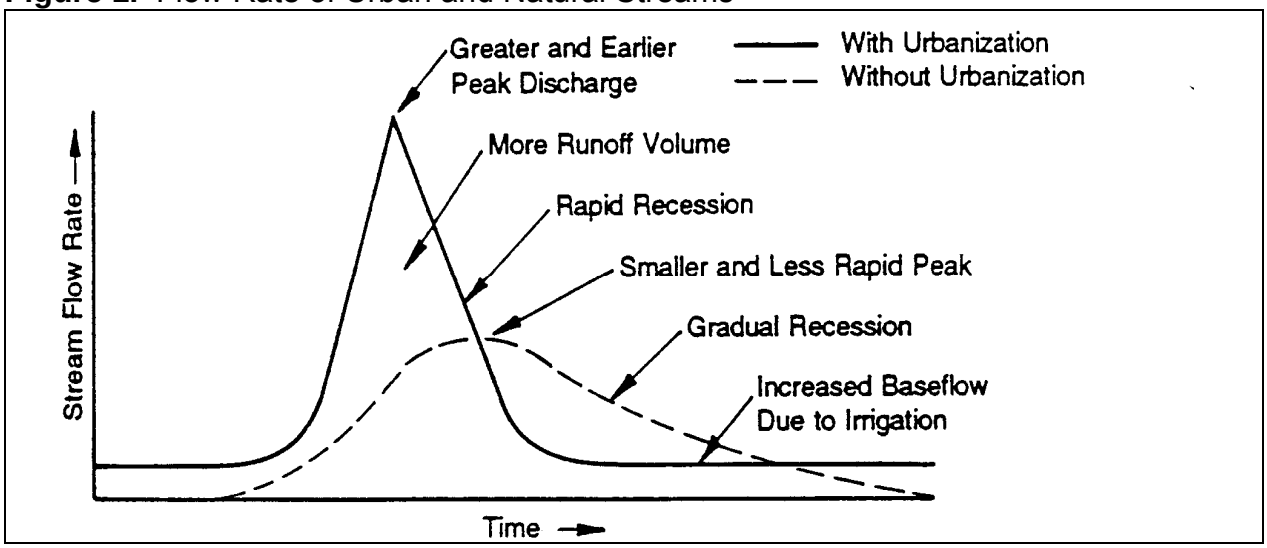

Increased volume and velocity of runoff adversely impacts receiving waters and their beneficial uses in many ways. According to the Urban Runoff TAC report,[58] increases in population density and imperviousness result in changes to stream hydrology including:

[56] Coleman, Derrick, et al. 2005. *Effect of Increases in Peak Flows and Imperviousness on the Morphology of Southern California Streams.* Technical Report No. 450 of the Southern California Coastal Water Research Project.
[57] Adapted from Schueler, T.R., 1987. Controlling Urban Runoff: A Practical Manual for Planning and Designing Urban BMPs. Metropolitan Washington Council of Governments.
[58] State Water Board, 1994. Urban Runoff Technical Advisory Committee Report and Recommendations. Nonpoint Source Management Program.

1. Increased peak discharges compared to pre-development levels;
2. Increased volume of storm water runoff with each storm compared to pre-development levels;
3. Decreased travel time to reach receiving water; increased frequency and severity of floods;
4. Reduced stream flow during prolonged periods of dry weather due to reduced levels of infiltration;
5. Increased runoff velocity during storms due to a combination of effects of higher discharge peaks, rapid time of concentration, and smoother hydraulic surfaces from channelization; and
6. Decreased infiltration and diminished ground water recharge.

Even though the rainfall depths in arid watersheds are lower, watershed development can greatly increase peak discharge rates during rare flood events.[59] A study conducted in arid watersheds around Riverside, CA showed that, over two decades, impervious cover increased from 9 percent to 22 percent, which resulted in an increase of more than 100 percent in the peak flow rate for the two-year storm event. The study also showed that the average annual storm water runoff volume had increased by 115 percent to 130 percent over the same time span.[60]

Flooding caused by the increased volume and velocity of runoff from urbanization in the upper Santa Margarita watershed are clear examples of the effects described above. Disastrous flooding has occurred more frequently in recent years. In the last century, flood events occurred in 1938, 1969, 1980, 1993, 1995, and 1998.[61] In the 1993 flood event, the Cities of Murrieta and Temecula sustained $12 million dollars in damage, and Camp Pendleton sustained $88 million in damage. Future flooding is expected to occur more frequently because of continued urban development within the watershed, and flood damages are expected to continue accruing at an estimated annual rate of $1,780,300.

Prior hydromodification studies in California have shown that the increase in impervious cover, and thus change in runoff volume, velocity, rate, and duration, results in a shift in the range of storms that produce geomorphically significant flows within receiving waters (see above discussion). Additionally, studies in California have determined that ninety percent of the geomorphic "work" done within channels receiving flows from developed areas now occurs from flows below the 10 year peak flow event.[62]

This increased volume, velocity, rate, and duration of runoff greatly accelerates the erosion of the beds and banks within downstream receiving waters. Additionally,

[59] Schueler and Holland, 2000. Storm Water Strategies for Arid and Semi-Arid Watersheds (Article 66). The Practice of Watershed Protection. P. 695-706.
[60] Ibid.
[61] U.S. Army Corps of Engineers, 2000. Final EIS/EIR, Murrieta Creek Flood Control Project.
[62] Santa Clara Valley Hydromodification Management Plan. April 21, 2005.

storm water flows which runoff directly from impervious surfaces into the MS4 and thus receiving waters prevent the associated runoff of natural sediments which would occur in pre-project conditions. This combined alteration of the physical condition of storm water runoff results in accelerated downstream erosion of receiving water bed and banks. The excessive erosion of stream beds and banks releases pollutants found in soils into receiving waters, degrades macroinvertebrate habitat (see D.2.c), eliminates spawning habitat, reduces associated wetland and riparian habitat, and threatens existing infrastructure adjacent to receiving waters. Bank sloughing within creeks and streams increases the pollutant loading to those receiving waters, particularly for turbidity and phosphorous.[63] In arid environments, accelerated channel erosion has been shown to have synergistic impacts within watersheds. Increased channel erosion within Las Vegas wash has resulted in the loss of over 1,000 acres of wetland and riparian habitat, released additional pollutants into downstream receiving waters, and eliminated in-stream habitat and water quality conditions required for existing threatened and endangered species.[64]

Regarding the impact of development on storm water runoff pollutant loads, the San Diego Water Board's Basin Plan states:

> *Nonpoint source pollution is primarily the result of man's uses of land such as urbanization, roads and highways, vehicles, agriculture, construction, industry, mineral extraction, physical habitat alteration (dredging/filling), hydromodification (diversion, impoundment, channelization), silviculture (logging), and other activities which disturb land.[65] As a result, when rain falls on and drains through urban freeways, industries, construction sites, and neighborhoods it picks up a multitude of pollutants. The pollutants can be dissolved in the runoff and quickly transported by gravity flow through a vast network of concrete channels and underground pipes referred to as storm water conveyance systems. Such systems ultimately discharge the polluted runoff, without treatment, into the nation's creeks, rivers, estuaries, bays, and oceans.[66]*

According to the Center for Watershed Protection, urbanization strongly shapes the quality of both surface and ground water in arid and semi-arid regions of the southwest. Since rain events are so rare, pollutants have more time to build up on impervious surfaces compared to humid regions. Therefore, the pollutant concentrations of storm water runoff from arid watersheds tends to be higher than that of humid watersheds.[67] The effect of antecedent rainfall events is demonstrated in a

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[63] Sekely, A.C., Mulla, D.J. and D.W. Bauer. 2002. Streambank slumping and its contribution to the phosphorus and suspended sediment loads of the Blue Earth River, Minnesota. *Journal of Soil and Water Conservation.* September 2002 vol. 57 no. 5 243-250.
[64] Tuttle, P.L.. and E..L.. Orsak. 2002. Las Vegas Wash Water Quality and Implications to Fish and Wildlife. U.S. Fish and Wildlife Service.
[65] San Diego Water Board, 1994. Water Quality Control Plan for the San Diego Basin. P. 4-66.
[66] Ibid. P. 4-69 - 4-70.
[67] Schueler and Holland, 2000. Storm Water Strategies for Arid and Semi-Arid Watersheds (Article 66). The Practice of Watershed Protection. P. 695-706.

report from the California Department of Transportation (Caltrans) that found the concept of a seasonal first flush is applicable to the southern California climate.[68]

Finding C.12. Development and urbanization especially threaten environmentally sensitive areas (ESAs), such as water bodies designated as supporting a RARE beneficial use (supporting rare, threatened or endangered species) and CWA 303(d)-impaired water bodies. Such areas have a much lower capacity to withstand pollutant shocks than might be acceptable in other areas. In essence, development that is ordinarily insignificant in its impact on the environment may become significant in a particularly sensitive environment. Therefore, additional controls to reduce storm water pollutants from new and existing development may be necessary for areas adjacent to or discharging directly to an ESA.

Discussion of Finding C.12. ESAs are defined in the Order as "Areas that include but are not limited to all CWA Section 303(d) impaired water bodies; areas designated as Areas of Special Biological Significance by the Basin Plan ; water bodies designated with the RARE beneficial use by the Basin Plan; areas designated as preserves or their equivalent under the Natural Communities Conservation Program within the Cities and County of Riverside; and any other equivalent environmentally sensitive areas which have been identified by the Copermittees."

Areas that meet this definition are inherently sensitive habitats containing unique, rare, threatened, or endangered species, or are not achieving their designated beneficial uses. As discussed above, runoff is known to contain a wide range of pollutants and has demonstrated toxicity to plants and animals. Therefore, it is necessary to apply additional storm water controls for developments within, adjacent to, or directly discharging to ESAs. This need for additional storm water controls is addressed within each component of the Order. USEPA supports the requirement for additional storm water controls, stating "For construction sites that discharge to receiving waters that do not support their designated use or other waters of special concern, additional construction site controls are probably warranted and should be strongly considered."[69] Further support for requiring additional controls to reduce pollutants in storm water discharges to ESAs can be found in *Mitigation of Storm Water Impacts From New Developments in Environmentally Sensitive Areas*, a technical report written by the Los Angeles Water Board .[70]

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[68] Stenstrom, Michael and Masoud Kayhanian, 2005. *First Flush Phenomenon Characterization.* Prepared for Caltrans. Report No. CTSW-RT-05-73-02.6 Study jointly performed by UCLA and UCD. Most of the data presented was collected from three highly urbanized highway sites in west Los Angeles. Much effort went into developing a quantitative way of defining the mass first flush. Other aspects include: variability of water quality during storm events, litter characteristics, correlation among constituents, first flush of organics and particle size distribution, new methods for measuring oil and grease, and grab and composite sampling strategies. The report is available on-line at: http://www.dot.ca.gov/hq/env/stormwater/special/newsetup/

[69] USEPA, 1992. Guidance Manual for the Preparation of Part II of the NPDES Permit Applications for Discharges from Municipal Separate Storm Sewer Systems. Washington D.C. EPA/833-B-92-002.

[70] LARWQCB, 2001. Mitigation of Storm Water Impacts From New Developments In Environmentally Sensitive Areas.

Finding C.13. Although dependent on several factors, the risks typically associated with properly managed infiltration of runoff (especially from residential land use areas) are not significant. The risks associated with infiltration can be managed by many techniques, including (1) designing landscape drainage features that promote infiltration of runoff, but do not "inject" runoff (injection bypasses the natural processes of filtering and transformation that occur in the soil); (2) taking reasonable steps to prevent the illegal disposal of wastes; (3) protecting footings and foundations; (4) ensuring that each drainage feature is adequately maintained in perpetuity; and (5) pretreatment.

Discussion of Finding C.13. Infiltration is an effective means for managing runoff. However, measures must be taken to protect groundwater quality when infiltration of runoff is implemented. USEPA supports runoff infiltration and provides guidance for protection of groundwater: "With a reasonable degree of site-specific design considerations to compensate for soil characteristics, infiltration may be very effective in controlling both urban runoff quality and quantity problems. This strategy encourages infiltration of urban runoff to replace the natural infiltration capacity lost through urbanization and to use the natural filtering and sorption capacity of soils to remove pollutants; however, the potential for some types of urban runoff to contaminate groundwater through infiltration requires some restrictions."[71] The restrictions placed on runoff infiltration in this Order are based on recommendations provided by the USEPA Risk Reduction Engineering Laboratory. The State Water Board found in Order WQ 2000-11 on the appeal of the Los Angeles Water Board's Standard Urban Storm Water Mitigation Plan (SUSMP) requirements that the guidance provided in the above referenced document by the USEPA Risk Reduction Engineering Laboratory is sufficient for the protection of groundwater quality from runoff infiltration. To further protect groundwater quality, the Order also includes guidance from the Los Angeles Water Board,[72] the State of Washington,[73] and the State of Maryland.[74] Subsequently, the California Storm Water Quality Association (CASQA) has produced technical guidance for post-construction treatment BMPs to protect ground water quality[75].

Finding C.14. Non-storm water (dry weather) discharge from the MS4 is not considered a storm water (wet weather) discharge and therefore is not subject to regulation under the Maximum Extent Practicable (MEP) standard from CWA 402(p)(3)(B)(iii), which is explicitly for "Municipal … *Stormwater Discharges* (emphasis added)" from the MS4. Rather, non-storm water discharges, per CWA 402(p)(3)(B)(ii), are to be effectively prohibited. Such dry weather non-storm water discharges have

[71] USEPA, 1994. Potential Groundwater Contamination from Intentional and Nonintentional Stormwater Infiltration. EPA 600 SR-94 051.
[72] LARWQCB, 2000. Standard Urban Storm Water Mitigation Plan for Los Angeles County and Cities in Los Angeles County.
[73] Washington State Department of Ecology, 1999. Draft Stormwater Management in Washington State. Volume V – Runoff Treatment BMPs. Pub. No. 99-15.
[74] Maryland Department of the Environment, 1999. 2000 Maryland Stormwater Design Manual. Volume I.
[75] CASQA. The New Development and Redevelopment Handbook, 2003. Available on-line at http://www.cabmphandbooks.org/Development.asp

been shown to contribute significant levels of pollutants and flow in arid, developed Southern California watersheds and are to be effectively prohibited under the Clean Water Act.

Discussion of Finding C.14.

Permitting Framework

The Clean Water Act (CWA) prohibits the discharge of any pollutant from a point source into waters of the United States unless the discharger of the pollutant(s) obtains a NPDES permit pursuant to Section 402 of the Clean Water Act. The discharge of storm water and/or non-storm water from an MS4 system is considered a discharge from a point source. As discussed below, however, the Clean Water Act regulates storm water and non-storm water discharges under different standards.

In 1987 the CWA was amended to include provisions that specifically concerned NPDES permitting requirements for storm water discharges from MS4 systems. Section 402(p) of the CWA regulates the discharge of storm water from a point source, the municipal separate storm sewers. Such discharges of storm water are subject to the maximum extent practicable (MEP) storm water standard and the related iterative process. The MEP standard for storm water discharges reflects Congress' recognition that the variability of flow and intensity of storm events render difficult strict compliance with water quality standards by MS4s. However, this standard was not considered applicable to non-storm water discharges, which under 402(p) are required to be effectively prohibited from entering the MS4. Clearly, if non-storm water discharges must be effectively prohibited from entering the MS4, the very next requirement (402(p)(3)(B)(iii)) requiring discharges from the MS4 be reduced to the MEP intends that the discharge of pollutants be limited to storm water. Unless exempt or authorized under a separate NPDES permit, non-storm water discharges are not authorized to enter the MS4 in the first instance and are considered to be illicit discharges.

The Federal Register further clarifies that such discharges through an MS4 are not authorized under the CWA (55 Fed. Reg. 47995):

> "Today's rule defines the term "illicit discharge" to describe any discharge through a municipal separate storm sewer system that is not composed entirely of storm water and that is not covered by an NPDES permit. Such illicit discharges are not authorized under the Clean Water Act. Section 402(p(3)(B) requires that permits for discharges from municipal separate storm sewers require the municipality to "effectively prohibit" non-storm water discharges from the municipal separate storm sewer…Ultimately, such non-storm water discharges through a municipal separate storm sewer must either be removed from the system or become subject to an NPDES permit."

The federal regulations (40 CFR 122.26(d)(vi)(2)(B)) require that the municipal separate storm sewer discharger prohibit "through ordinance, order or similar means, illicit discharges to the municipal separate storm sewer." As owners and operators of

the MS4, Copermittees cannot passively receive discharges from third parties (Federal Register 68766) and thus are responsible for the discharge of any non-storm water from their MS4.

The State Water Board's recent precedential order (Order WQ-2009-0008) affirming a Los Angeles County MS4 permit modification, consistent with USEPA's prior interpretations, recognizes that "[n]either the Clean Water Act nor the federal storm water regulations define 'non-storm water.' 'Illicit discharge' is defined as any discharge to an MS4 'not composed entirely of storm water.' Thus, 'illicit discharge' is the most nearly applicable definition of 'non-storm water' found in federal law and is often used interchangeably with that term."[76]

Storm Water and Non-storm Water Definitions

By definition non-storm water is not precipitation related. 40 CFR 122.26(b)(13) states that: "Storm water means storm water runoff, snowmelt runoff, and surface runoff and drainage." While "surface runoff and drainage" is not defined in federal law, it is related to precipitation events such as rain and/or snowmelt (see 55 Fed Reg 47995-96). The term "surface runoff and drainage" does not include all incidental flows in the MS4 system, but consists of flows relating to precipitation events as clarified by the Federal Register, USEPA's documents and permitting, and other Regional Water Board Orders.

The Federal Register (55 Fed Reg 47995-47996) provides clarification on the distinction between storm water and non-storm water discharges, including their regulation:

> "In response to the comments which requested EPA to define the term storm water broadly to include a number of classes of discharges **which are not in any way related to precipitation events, EPA believes that this rulemaking is not an appropriate forum for addressing the appropriate regulation of such non-storm water discharges**, even though some classes of non-storm water discharges may typically contain only minimal amounts of pollutants. Congress did not intend that the term storm water be used to describe any discharge that has a de minimis amount of pollutants, not did it intend for section 402(p) to be used to provide a moratorium from permitting other non-storm water discharges."

As recently recognized by the State Water Board in a precedential decision upholding an MS4 permit modification adopted by the Los Angeles Water Board, "U.S. EPA has previously rejected the notion that 'storm water,' as defined at 40 Code of Federal Regulations section 122.26(b)(13), includes dry weather flows. In U.S. EPA's preamble to the storm water regulations, U.S. EPA rejected an attempt to define storm water to include categories of discharges 'not in any way related to precipitation

[76] State Water Board Order WQ-2009-0008 (*In the Matter of the Petition of County of Los Angeles and Los Angeles County Flood Control District*, adopted August 4, 2009), p. 4.

events.'[77] Thus, USEPA has made it clear that it deems discharges unrelated to precipitation events to be non-storm water discharges. 40 CFR 122.26(d)(iv)(B) itself provides specific examples of non-storm water discharges:

> "…the following category of non-storm water discharges or flows shall only be addressed where such discharges are identified by the municipality as sources of pollutants to the United States: water line flushing, landscape irrigation, diverted stream flows, rising ground waters, uncontaminated groundwater infiltration (as defined at 40 CFR 35.2005(20) to separate storm sewers, uncontaminated pumped groundwater,…"

USEPA also removed street wash waters from the definition of storm water, as USEPA specifically identified this discharge as being non-storm water (55 Fed. Reg. page 47996). Additionally, section 1.2.2.2. of USEPA's Multi-Sector General Permit for Industrial Activities (MSGP-2000) considers fire hydrant flushings, irrigation drainage, landscape watering, and foundation or footing drains to be non-storm water discharges. USEPA's September 1999 Storm Water Management Fact Sheet for Non-Storm Water Discharges to Storm Sewers states that non-storm water discharges can include discharges of process water, air conditioning condensate, non-contact cooling water, vehicle wash water, or sanitary wastes.

While these types of non-storm water discharges (or illicit discharges) may be regulated under storm water permits because as a practical matter they can enter and be discharged from the MS4 systems, they are not regulated as storm water discharges under the Clean Water Act because they are unrelated to precipitation events. As indicated above, the State Water Resources Control Board recent discussion of this issue supports the conclusion that non-storm water discharges are unrelated to precipitation events. In its Order affirming amendments to the Los Angeles County MS4 permit to implement a TMDL to control bacteria in dry weather flows, the State Water Board rejected petitioners County of Los Angeles and the Los Angeles County Flood Control District implied assertion that the definition of "storm water" contained in the federal regulations (defined as "surface run-off and drainage") includes the run-off and drainage from non-storm events. The State Water Board notes that the challenged permit provisions do not apply to storm water flows in that they apply only during dry weather conditions as defined in the permit. In upholding the challenged order, the State Water Board notes that the Los Angeles Water Board's permit language followed USEPA's approach, referring to USEPA's rejection of attempts to define storm water to include categories of discharges "not in any way related to precipitation events."[78]

Lastly, the San Diego Water Board and State Water Board have issued multiple, separate NPDES permits for non-storm water discharges, including, but not limited to,

[77] State Water Board Order WQ-2009-0008 (*In the Matter of the Petition of County of Los Angeles and Los Angeles County Flood Control District*, adopted August 4, 2009), p. 7.
[78] State Water Board Order WQ-2009-0008 (*In the Matter of the Petition of County of Los Angeles and Los Angeles County Flood Control District*, adopted August 4, 2009), p. 7 (quoting 55 Fed. Reg. 47990. 47995).

R9-2008-0002 (extracted groundwater), R9-2002-0020 (hydrostatic discharge) and 2006-008 DWQ (utility vaults), pursuant to section 402 of the CWA.

Permitting Non-storm Water Discharges

Non-storm water discharges may contain pollutants which result from various activities that occur within areas draining into the MS4. This includes, but is not limited to, illicit discharges and connections, exempted categories of discharge not a source of pollutants (40 CFR 122.26(d)), and discharges into the MS4 covered under a separate NPDES permit. As such, existing and proposed discharges of non-storm water from MS4s:

a) Result from similar activities through the MS4 system;
b) Are the same type of water;
c) Require similar action levels for the protection of the Beneficial Uses of the receiving waters;
d) Require similar monitoring;
e) Are under the passive control of the owner and operator of the MS4 system; and
f) Are more appropriately regulated under a general permit than individual permits.

The U.S. EPA's approach (and the San Diego Water Board's under its approved program) for non-storm water discharges from MS4s is to regulate these discharges under the existing 402 NPDES framework (Fed Reg 47995 and 48037 see below) for discharges to surface waters. The NPDES program (40 CFR 122.44(d)) utilizes discharge prohibitions and effluent limitations as regulatory mechanisms to regulate non-storm water discharges, including the use of technology and water quality-based effluent limitations. Non-numerical effluent limitations, such as BMPs for non-storm water discharges may only be authorized where numerical effluent limits are infeasible or where the practices are reasonably necessary to achieve effluent limitations and standards or to carry out the purposes and intent of the CWA (40 CFR 122.44(k) see below).

The Federal Register (55, page 48037) provides clarification that non-storm water discharges from the MS4 are to be regulated under section 402, not 402(p):

> "Conveyances which continue to accept other "non-storm water" discharges (e.g. discharges without an NPDES permit) with the exceptions noted above (*exempted discharges that are not a source of pollutants*) do not meet the definition of municipal separate storm sewer and are not subject to 402(p)(3)(B) of the CWA unless such discharges are issued separate NPDES permits. Instead, conveyances which continue to accept non-storm water discharges which have not been issued separate NPDES permits are subject to sections 301 and 402 of the CWA."

This regulatory approach is consistent with the approach recently upheld by the State Water Board in a precedential order adopted on August 4, 2009. In this Order, the State Water Board rejected a challenge to amendments to the Los Angeles County MS4 permit that require compliance with receiving water limitations and discharge prohibitions for dry weather, non-storm water discharges. Petitioners there argued that the receiving water limits and discharge prohibitions for dry weather dischargers were inappropriate and that the Los Angeles Water Board should instead have regulated the discharges with the maximum extent practicable standard, through an iterative process. The State Water Board concludes that dry weather discharges, as defined in the permit and in the underlying TMDL, "are more appropriately regarded as non-storm water discharges, which the Clean Water Act requires to be effectively prohibited."[79]

As stated above, for NPDES permits under 402 of the CWA, the Code of Federal Regulations (122.44(k)) clarify that a discharger may utilize BMPs to control or abate the discharge of pollutants when:

> "(1) Authorized under section 304(e) of the CWA for the control of toxic pollutants and hazardous substances from ancillary industrial activities;
> (2) Authorized under section 402(p) of the CWA for the control of storm water discharges;
> (3) Numeric limits are infeasible; or
> (4) The practices are reasonably necessary to achieve effluent limitations and standards or to carry out the purposes and intent of the CWA."

For the last 20 years, Riverside County NPDES permits for discharges of storm water have regulated non-storm water discharges from the MS4. These permits required Copermittees (dischargers) to prohibit non-storm water discharges into (thus through and from) their MS4 systems, implement a program to prevent illicit discharges, and monitor to identify illicit discharges and exempted discharges that are a source of pollution. These measures are considered Best Management Practices (BMPs), are required to be included in NPDES permits issued under Section 402(p) of the CWA, and are considered by USEPA to be an interim approach to permitting non-storm water discharges from the MS4 in accordance with section 402 of the CWA and CFR 122.44(k).

As explained in the discussion of Finding C.15., below, the Copermittees' reliance on BMPs for the past 20 years has not resulted in compliance with applicable water quality standards. The San Diego Water Board has evaluated (in accordance with 40 CFR 122.44(d)(1)) past and existing controls (BMPs), non-storm water monitoring results, the sensitivity of the species in receiving waters (e.g. endangered species), and the potential for effluent dilution, and has determined that existing BMPs to control pollutants in storm water discharges are not sufficient to protect water quality standards in receiving waters and the existing requirement that Copermittees

[79] State Water Board Order WQ-2009-0008 (*In the Matter of the Petition of County of Los Angeles and Los Angeles County Flood Control District*, adopted August 4, 2009), p. 8

effectively prohibit all types of unauthorized non-storm water discharges into the MS4 historically results in the discharge of pollutants to the receiving waters. Thus, numeric action levels for non-storm water, dry weather, discharges from the MS4 and required actions following observed exceedances of numeric action levels have been established. For further discussion regarding the development of action levels please see Finding E.12 and discussion.

Dry weather action levels are applicable to non-storm water discharges of effluent from the MS4 system. Non-storm water effluent discharges from the MS4 are those which occur during dry weather conditions. These action levels are not applied to storm water discharges, as defined within the Order. Storm water discharges regulated by the Order are required to meet the MEP standard and related iterative process and have separate action levels.

Dry weather action levels are applicable to non-storm water discharges from the MS4 system into receiving waters. Non-storm water discharges are already required to be prohibited unless specifically exempted or covered under a separate NPDES permit. Dry weather action levels apply to non-storm water discharges of effluent from a point source into receiving waters. The MS4 is not a receiving water. Should a discharger wish to discharge a non-exempt category to the MS4 system, such discharges require a separate NPDES permit pursuant to sections 402 and 301 of the CWA. It is also infeasible to monitor and sample every discharge into the MS4, as such discharges are diffuse by nature and may vary spatially and temporally.

Finding C.15. Non-storm water discharges to the MS4 granted an influent exception (i.e., which are exempt from the effective prohibition requirement set forth in CWA section 402(p)(3)(B)(ii)) under 40 CFR 122. 26 are included within this Order. Any exempted discharges identified by Copermittees as a source of pollutants are subsequently required to be *addressed* (emphasis added) as illicit discharges through prohibition and incorporation into existing IC/ID programs. Furthermore, the Federal Register (55, page 48037) clarifies that the San Diego Water Board may also identify exempted discharges as a source of pollutants required to be addressed as illicit discharges. The San Diego Water Board and the Copermittees have identified landscape irrigation, irrigation water and lawn water, previously exempted discharges, as a source of pollutants and conveyance of pollutants to waters of the United States.

Discussion of Finding C.15. The Federal Register (55, page 48037) and 40 CFR 122.26(d)(iv)(B) clarify that certain components and categories of non-storm water discharges into the MS4 are not required to be prohibited. The Code of Federal Regulations requires the discharger have:

> "…a program, including inspections, to implement through ordinance, orders or similar means to prevent illicit discharges to the municipal separate storm sewer system; this program shall address all types of illicit discharges, however, the following category of non-storm water discharges or flows shall only be addressed where such discharges are identified by the municipality as sources

> of pollutants to waters of the United States: water line flushing, landscape irrigation, diverted stream flows, rising ground waters, uncontaminated groundwater infiltration (as defined at 40 CFR 35.2005(20) to separate storm sewers, uncontaminated pumped groundwater,…"

The categories of non-storm water discharges into the MS4, as listed under 40 CFR 122.26(d)(iv)(B), are not required to be prohibited unless identified by the Copermittees as sources of pollutants to waters of the United States. The Federal Register (55, page 48037), however, goes on to clarify that:

> "However, the Director may include permit conditions that either require municipalities to prohibit or otherwise control any of these types of discharge where appropriate."

Thus, the Copermittees or the San Diego Water Board may identify any of these categories of non-storm water discharges as a source of pollutants. As such, the identification of any of these categories as a source of pollutants requires them to be addressed as illicit discharges, which are not authorized under the CWA, and are required to be "effectively prohibited" as illicit discharges via ordinance, order or similar means. The prohibition of previously exempted discharges of non-storm water to waters of the United States from entering, and necessarily being discharged from an MS4, conforms with CWA requirements for standards and enforcement for effluent limitations to necessary to meet water quality standards (33 U.S.C. 1311(b)(1)(C)).

To date the San Diego Water Board and the Copermittees have identified overspray and drainage from potable and reclaimed water landscape irrigation as a substantial source and conveyance mechanism for pollutants into waters of the United States. Irrigation runoff into the MS4, as identified by the San Diego Water Board and the Copermittees, is a source of pollutants to waters of the United States, and is required to be *addressed* (emphasis added) as an illicit discharge per 40 CFR 122.26(d)(2)(iv)(B)(1) by prohibition through implementing and enforcing an ordinance, order or similar means. The San Diego Water Board and the Copermittees have identified irrigation water as a source of pollutants and conveyance of pollutants to waters of the United States, when applied improperly in excess and thereafter entering the MS4, in the following documents:

- In educational materials developed by The Cities and County of Riverside "Only Rain in the Storm Drain" Pollution Prevention Program, the Landscape and Garden brochure states:

  > *"Soil, yard wastes,* over-watering [emphasis added] *and garden chemicals become part of the urban runoff mix that winds it way through streets, gutters and storm drains before entering lakes, rivers, streams, etc."*

- In a survey developed by The Cities and County of Riverside "Only Rain in the Storm Drain" Pollution Prevention Program distributed at Public Outreach

events, the answer to the question about where lawn irrigation water goes states:

> *"Water that leaves your lawn from irrigation…can pick up motor oil and grease from vehicles, excess fertilizer from your lawn, bacteria from pet waste, and excess pesticides from your yard. These pollutants can be carried down streets and storm drains directly to our streams, lakes and rivers without treatment!"*

- On December 18, 2009, the San Diego Water Board adopted Order. No. R9-2009-0002, the fourth-term Orange County permit, which found that over-irrigation (landscape irrigation, irrigation water and lawn watering) into the MS4 is a source and conveyance of pollutants. Landscape irrigation, irrigation water, and lawn watering were categories removed from the list of non-storm water discharges not prohibited to be discharged into the MS4.

- In 2006, the State Water Quality Control Board (State Water Board) allocated Grant funding to the **SmartTimer/Edgescape Evaluation Program (SEEP)**. The project targets irrigation runoff by retrofitting existing development and documenting the conservation and runoff improvements. The Grant Application states that:

  > "*Irrigation runoff contributes flow & pollutant loads to creeks and beaches that are 303(d) listed for bacteria indicators.*"

  Furthermore, the grant application states:

  > "*Regional program managers agree that the reduction and/or elimination of irrigation-related urban flows and associated pollutant loads may be key to successful attainment of water quality and beneficial use goals as outlined in the San Diego Basin Plan and Bacteria TMDL over the long term.*"

  This is reinforced in the project descriptions and objectives:

  > "*Elevated dry-weather storm drain flows, composed primarily … of landscape irrigation water wasted as runoff, carry pollutants that impair recreational use and aquatic habitats all along Southern California's urbanized coastline. Storm drain systems carry the wasted water, along with landscape derived pollutants such as bacteria, nutrients and pesticides, to local creeks and the ocean. Given the local Mediterranean climate, excessive perennial dry season stream flows are an unnatural hydrologic pattern, causing species shifts in local riparian communities and warm, unseasonal contaminated freshwater plumes in the near-shore marine environment*".

  The basis of this grant project is that over-irrigation (landscape irrigation, irrigation water and lawn watering) into the MS4 is a source and conveyance of pollutants. In addition, they indicate that this alteration of natural flows is impacting the Beneficial Uses of Waters of the State and U.S. The results of this study can be applied broadly to any area where over-irrigation takes place.

Preliminary results from the study indicate that that over-irrigation (landscape irrigation, irrigation water and lawn watering) into the MS4 *is* a source and conveyance of pollutants.

D. Runoff Management Programs

Finding D.1.a. This Order specifies requirements necessary for the Copermittees to reduce the discharge of pollutants in storm water to the maximum extent practicable (MEP). However, since MEP is a dynamic performance standard, which evolves over time as runoff management knowledge increases, the Copermittees' runoff management programs must continually be assessed and modified to incorporate improved programs, control measures, best management practices (BMPs), etc. in order to achieve the evolving MEP standard. Absent evidence to the contrary, this continual assessment, revision, and improvement of runoff management program implementation is expected to ultimately achieve compliance with water quality standards in the Region.

Discussion of Finding D.1.a. Under CWA section 402(p), municipalities are required to reduce the discharge of storm water pollutants from their MS4s to the maximum extent practicable (MEP). MEP is the critical technology-based performance standard that municipalities must attain. The MEP standard is an ever-evolving, flexible, and advancing concept, which considers technical and economic feasibility. As knowledge about controlling storm water runoff continues to evolve, so does that which constitutes MEP. Reducing the discharge of storm water pollutants to the MEP requires Copermittees to assess each program component and revise activities, control measures, best management practices (BMPs), and measurable goals, as necessary to meet MEP.

To achieve the MEP standard, municipalities must employ whatever BMPs are technically feasible (i.e., are likely to be effective) and are not cost prohibitive. The major emphasis is on technical feasibility. Reducing storm water pollutants to the MEP means choosing effective BMPs, and rejecting applicable BMPs only where other effective BMPs will serve the same purpose, or the BMPs would not be technically feasible, or the cost would be prohibitive. In selecting BMPs to achieve the MEP standard, the following factors may be useful to consider:

1. Effectiveness: Will the BMPs address a pollutant (or pollutant source) of concern?
2. Regulatory Compliance: Is the BMP in compliance with storm water regulations as well as other environmental regulations?
3. Public Acceptance: Does the BMP have public support?
4. Cost: Will the cost of implementing the BMP have a reasonable relationship to he pollution control benefits to be achieved?
5. Technical Feasibility: Is the BMP technically feasible considering soils, geography, water resources, etc?

If a municipality reviews a lengthy menu of BMPs and chooses to select only a few of the least expensive BMPs, it is likely that MEP has not been met. On the other hand,

if a municipal discharger employs all applicable BMPs except those where it can show that they are not technically feasible in the locality, or whose cost is prohibitive, it would have met the standard. Where a choice may be made between two BMPs that should provide generally comparable effectiveness, the discharger may choose the least expensive alternative and exclude the more expensive BMP. However, it would not be acceptable either to reject all BMPs that would address a pollutant source, or to pick a BMP based solely on cost, which would be clearly less effective. In selecting BMPs the municipality must make a serious attempt to comply and practical solutions may not be easily dismissed. In any case, the burden is on the municipal discharger to show compliance with its permit. After selecting BMPs, it is the responsibility of the discharger to ensure that all BMPs are implemented.[80]

A definition of MEP is not provided in either the federal statute or in the federal regulations. The final determination regarding whether a municipality has reduced storm water pollutants to the MEP can only be made by the San Diego Water Board or the State Water Board, and not by the municipal discharger. While the San Diego Water Board or the State Water Board ultimately define MEP, it is the responsibility of the Copermittees to initially propose actions that implement BMPs to reduce storm water pollution to the MEP. In other words, the Copermittees' runoff management programs to be developed under the Order are the Copermittees' proposals of MEP. Their total collective and individual activities conducted pursuant to their runoff management programs become their proposal for MEP as it applies both to their overall effort, as well as to specific activities. The Order provides a minimum framework to guide the Copermittees in meeting the MEP standard for storm water.

It is the San Diego Water Board's responsibility to evaluate the proposed programs and specific BMPs to determine what constitutes MEP, using the above guidance and the court's 1994 decision in NRDC v. California Department of Transportation, Federal District Court, Central District of California. The federal court stated that a Copermittee must evaluate and implement BMPs except where (1) other effective BMPs will achieve greater or substantially similar pollution control benefits; (2) the BMP is not technically feasible; or (3) the cost of BMP implementation greatly outweighs the pollution control benefits. In the absence of a proposal acceptable to the San Diego Water Board, the San Diego Water Board will define MEP by requiring implementation of additional measures by the Copermittees.

The Copermittees' continual evolution in meeting the MEP standard is expected to achieve compliance with water quality standards. USEPA has consistently supported this expectation. In its Interim Permitting Approach for Water Quality-Based Effluent Limitations (WQBELs) in Storm Water Permits, USEPA states "the interim permitting approach uses best management practices (BMPs) in first-round storm water permits, and expanded or better-tailored BMPs in subsequent permits, where necessary, to provide for attainment of water quality standards."[81] USEPA reiterated its position in

[80] State Water Resources Control Board, 1993. Memo Entitled Definition of Maximum Extent Practicable.
[81] Federal Register / Vol. 61, No. 166 / August 26, 1996 / P. 43761.

1999, when it stated regarding the Phase II municipal storm water regulations that "successive iterations of the mix of BMPs and measurable goals will be driven by the objective of assuring maintenance of water quality standards" and "EPA anticipates that a permit for a regulated small MS4 operator implementing BMPs to satisfy the six minimum control measures will be sufficiently stringent to protect water quality, including water quality standards […]."[82]

The requirements of the Order are expected to achieve compliance with receiving water quality standards. The approach to be used is the continual assessment, revision, and improvement of Copermittee best management practice implementation. This approach is consistent with the Clean Water Act and State Water Board guidance. In Defenders of Wildlife v. Browner (1999, 197 F. 3d 1035), the United States Court of Appeals for the Ninth Circuit states: "Under 33 U.S.C. section 1342 (p)(3)(B)(iii), the EPA's choice to include either management practices or numeric limitations in the permits was within its discretion." In addition, the approach is consistent with State Water Board Order WQ 99-05, which outlines an iterative approach for achieving compliance with water quality standards.

Finding D.1.b. The Copermittees have generally been implementing the jurisdictional runoff management programs required pursuant to Order No. R9-2004-001 since July 14, 2004. Prior to that, the Copermittees were regulated by Order No. 98-02 since May 13, 1998. MS4 discharges, however, continue to cause or contribute to violations of water quality standards as evidenced by the Copermittees monitoring results.[83]

Discussion of Finding D.1.b. In response to Order No. R9-2004-001, the Copermittees have developed their runoff management programs. In order to implement the plans, the Copermittees have, among other things, developed BMP requirements, improved inter- and intra-governmental coordination, improved training programs, improved illicit discharge detection procedures, and improved their monitoring efforts. Although the programmatic improvements have led to better implementation of BMPs, the Copermittees' monitoring data demonstrate that additional or revised BMPs are necessary to prevent discharges from MS4s from causing and contributing to violations of water quality standards. A discussion of data collected by the Copermittees is included in the discussion for Finding C.9.

Finding D.1.c. This Order contains new or modified requirements that are necessary to improve Copermittees' efforts to reduce the discharge of storm water pollutants in runoff to the MEP and achieve water quality standards. Some of the new or modified requirements, such as the revised Watershed Runoff Management Program section, are designed to specifically address these high priority water quality problems. Other new or modified requirements address program deficiencies that have been noted

[82] Federal Register / Vol. 64, No. 235 / Wednesday, December 8, 1999 / Rules and Regulations. P. 68753-68754.
[83] County of Riverside, 2009. Riverside County Municipal Copermittees 2008-09 Annual Storm Water Program Report, Section 11..

during audits, report reviews, and other San Diego Water Board compliance assessment activities.

Discussion of Finding D.1.c. The Copermittees are required to update and expand their runoff management programs on jurisdictional and watershed levels in order to improve their efforts to reduce the contribution of storm water pollutants in runoff to the MEP and meet water quality standards. Changes to Order No. R9-2004-001's requirements have been made to help ensure these two standards are achieved by the Copermittees.

The Orders' jurisdictional requirements have changed based on findings by the San Diego Water Board during typical compliance assurance activities, audits, or receipt of complaints.[84] Where the audits found common implementation problems, requirements have been altered to better ensure compliance. In addition, the San Diego Water Board conducted detailed reviews of every jurisdictional annual report submitted by the Copermittees. Updates to the Copermittees' programs are also based on information found in the Copermittees' ROWD.[85]

To better focus on attainment of water quality standards, the Order's watershed requirements have been improved. The conditions of the receiving waters now drive management actions, which in turn focus diminishing resources on the highest priority water quality problems within the receiving waters in each watershed. Improvements to watershed requirements were also made to facilitate a mutually clear understanding of the requirements between the San Diego Water Board and Copermittees.

Finding D.1.d. Updated individual Drainage Area Management Plans (individual DAMPs) and Watershed Stormwater Management Plans (watershed SWMPs), which describe the Copermittees' runoff management programs in their entirety, are needed to guide the Copermittees' runoff management efforts and aid the Copermittees in tracking runoff management program implementation. It is practicable for the Copermittees to update the JRMPs and WRMPs within one year, since significant efforts to develop these programs have already occurred. Hereinafter, the individual DAMP is referred to as the Jurisdictional Runoff Management Plans (JRMPs) and the Watershed SWMP is referred to as the Watershed Runoff Management Plan (WRMP).

Discussion of Finding D.1.d. Development of runoff management plans is a crucial runoff management measure and should be considered a BMP. The plans help organize and focus the Copermittees' programs and guide their implementation. In its statewide assessment report to USEPA Region IX and the State Water Board, Tetra Tech, Inc. concluded that the lack of a master storm water planning document must be considered a serious program deficiency[86]. When submitted to the San Diego Water

[84] Audit reports, report reviews, and inspection reports are available for review at the San Diego Water Board office.
[85] All significant changes made to the Order's requirements are described and explained in detail in Fact Sheet section IX.
[86] Tetra Tech, Inc. 2006. *Assessment Report on Tetra Tech's Support of California's MS4 Stormwater Program.* Produced for USEPA Region IX and the California State and Regional Water Quality Control Boards.

Board, the plans provide useful correspondence between the Copermittees and the San Diego Water Board. The Plans also become available for review by the public, and thus facilitate public participation in runoff management decisions. Finally, while development and submittal of runoff management plans are not necessary to ensure compliance of the Copermittees' runoff management programs with the Order, the San Diego Water Board is provided with a means to track Copermittee implementation.

The focus of the Order is on development and implementation of storm water programs which meet MEP, rather than creation of Copermittee plans which exhibit MEP. While the Order does not rely upon the plans to ensure MEP and other standards are achieved, the plans still serve a useful purpose. As stated above, the plans serve to organize the Copermittees' efforts to address runoff. As a practical matter, any program of the size required by the Order should be documented in writing. This serves to guide implementation of the program by the numerous individuals responsible for program implementation.

Runoff management plans are not necessary for ensuring compliance with the Order because the Order itself contains sufficient detailed requirements to ensure that compliance with discharge prohibitions, receiving water limitations, and the narrative standard of MEP for storm water are achieved. Implementation by the Copermittees of programs in compliance with the Order's requirements, prohibitions, and receiving water limitations is the pertinent compliance standard to be used under the Order, as opposed to assessing compliance by reviewing the Copermittees' implementation of their plans alone. The San Diego Water Board ensures compliance with the Order by reviewing annual reports, conducting inspections, performing audits, and through other general program oversight.

Runoff management plans are particularly important and useful for municipalities when program implementation is spread across several departments and/or when municipalities experience staff turnover.[87] Each Copermittee relies on multiple employees or contractors for program implementation, but the spread of responsibility varies among Copermittees.[88] Written jurisdictional plans ensure appropriate coordination within each municipality.

Copermittees' runoff management plans are simply descriptions of their runoff management programs required under the Order. These plans serve as procedural correspondence which guides program implementation and aids the Copermittees and San Diego Water Board in tracking implementation of the programs. In this manner, the plans are not functional equivalents of the Order. For these reasons, the Copermittees' runoff management plans need not be an enforceable part of the Order.

[87] Tetra Tech, Inc. 2005. Program Evaluation Report. Orange County Storm Water Program: Cities of Laguna Beach, Laguna Hills, Lake Forest, and Rancho Santa Margarita.
[88] Responsible departments and employees are described in the 2005-06 Annual Reports for the MS4 programs.

The Copermittees' plans and programs can be updated within one year because much of their plans and programs are already in existence. For the development of some new components of their programs, the Copermittees are allowed longer than one year. In fact, many parts of their plans and programs have been in place for 15 years. Moreover, the adoption of Order No. R9-2004-0001 required a larger scale reorganization of the Copermittees' programs than Tentative Order No. R9-2010-0016, but also allowed one year for program updates. The Copermittees were generally able to meet the time schedule required under Order No. R9-2004-001.

Finding D.1.e. Pollutants can be effectively reduced in storm water runoff by the application of a combination of pollution prevention, source control, and treatment control BMPs. Pollution prevention is the reduction or elimination of pollutant generation at its source and is the best "first line of defense". Source control BMPs (both structural and non-structural) minimize the contact between pollutants and flows (e.g., rerouting run-on around pollutant sources or keeping pollutants on-site and out of receiving waters). Treatment control BMPs remove pollutants that have been mobilized by wet-weather or dry-weather flows.

Discussion of Finding D.1.e. The State Water Board finds in its Order No. WQ 98-01 that BMPs are effective in reducing pollutants in storm water runoff, stating that "implementation of BMPs [is] generally the most appropriate form of effluent limitations when designed to satisfy technology requirements, including reduction of pollutants to the maximum extent practicable." A State Water Board TAC further supports this finding by recommending "that nonpoint source pollution control can be accomplished most effectively by giving priority to [BMPs] in the following order:

1. Pollution Prevention – implementation of practices that use or promote pollution free alternatives;
2. Source Control – implementation of control measures that focus on preventing or minimizing urban runoff from contacting pollution sources;
3. Treatment Control – implementation of practices that require treatment of polluted runoff either onsite or offsite."[89]

Pollution prevention, the reduction or elimination of pollutant generation at its source, is an essential aspect of BMP implementation. Fewer pollutants are available to be washed from developed areas when the generation of pollutants by activities is limited. Thus, pollutant loads in storm water discharges are reduced from these areas. In addition, there is no need to control or treat pollutants that are never generated. Furthermore, pollution prevention BMPs are generally more cost effective than removal of pollutants by treatment facilities or cleanup of contaminated media.[90,91]

[89] State Water Board, 1994. Urban Runoff Technical Advisory Committee Report and Recommendations. Nonpoint Source Management Program.
[90] Devinny, J.S. et al. 2004. *Alternative Approaches to Stormwater Quality Control.* Prepared for the Los Angeles Regional Water Quality Control Board. Found as Appendix H to *NPDES Stormwater Cost Survey.* Prepared for the California State Water Resources Control Board by the Office of Water Programs California State University, Sacramento. Available on-line at: http://www.owp.csus.edu/research/npdes/

In the Pollution Prevention Act of 1990, Congress established a national policy that emphasizes pollution prevention over control and treatment. CWC section 13263.3(a) also supports pollution prevention, stating "The Legislature finds and declares that pollution prevention should be the first step in a hierarchy for reducing pollution and managing wastes, and to achieve environmental stewardship for society. The Legislature also finds and declares that pollution prevention is necessary to support the federal goal of zero discharge of pollutants into navigable waters." Finally, the Basin Plan also supports this finding by stating "To eliminate pollutants in storm water, one can either clean it up by removing pollutants or prevent it from becoming polluted in the first place. Because of the overwhelming volume of storm water and the enormous costs associated with pollutant removal, pollution prevention is the only approach that makes sense."[92]

USEPA also supports the utilization of a combination of BMPs to address pollutants in runoff. For example, USEPA has found there has been success in addressing illicit discharge related problems through BMP initiatives like storm drain stenciling and recycling programs, including household hazardous waste special collection days.[93] Structural BMP performance data has also been compiled and summarized by USEPA.[94]

The summary provides the performance ranges of various types of structural BMPs for removing suspended solids, nutrients, pathogens, and metals from storm water flows. These pollutants are generally a concern in storm water in the San Diego Region and Riverside County. For suspended solids, the least effective structural BMP type was found to remove 30-65 percent of the pollutant load, while the most effective was found to remove 65-100 percent of the pollutant load. For nutrients, the least effective structural BMP type was found to remove 15-45 percent of the pollutant load, while the most effective was found to remove 65-100 percent of the pollutant load. For pathogens, the least effective structural BMP type was found to remove <30 percent of the pollutant load, while the most effective was found to remove 65-100 percent of the pollutant load. For metals, the least effective structural BMP type was found to remove 15-45 percent of the pollutant load, while the most effective was found to remove 65-100 percent of the pollutant load.

It is important to note that the Clean Water Act and NPDES federal regulations clearly require control of discharges into the MS4. Section 402(p)(3)(B)(ii) of the Clean Water Act states that MS4 permits must "prohibit non-storm water discharges into the storm sewers." 40 CFR 122.26(d)(2)(iv)(B) requires Copermittees to "detect and remove […]

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[91] Schueler, T.R.., 2000. Center for Watershed Protection. Assessing the Potential for Urban Watershed Restoration, Article 142.
[92] San Diego Water Board, 1994. Water Quality Control Plan, San Diego Basin, Region 9.
[93] USEPA, 1999. 40 CFR Parts 9, 122, 123, and 124 National Pollutant Discharge Elimination System-Regulations for Revision of the Water Pollution Control Program Addressing Storm Water Discharges. 64 FR 68728.
[94] USEPA, 1999. Preliminary Data Summary of Urban Storm Water Best Management Practices. EPA 821-R-99-012.

illicit discharges and improper disposal into the storm sewer." See Finding C.14 and Discussion.

The Order's approach to regulating discharges into and from the MS4 is in accordance with State Water Board Order WQ 2001-15. In that order, the State Water Board reviewed the San Diego County permit (Order No. 2001-01) requirements and made one change to one prohibition.[95] The Order upheld all other requirements of the current permit. Order No. R9-2010-0016 incorporates the one change made by the State Water Board, and continues the approach of Order No. 2001-01 (the basis for the current permit), as it was upheld by the State Water Board in Order WQ 2001-15. State Water Board Order WQ 2001-15 supports such requirements, stating: "It is important to emphasize that dischargers into MS4s continue to be required to implement a full range of BMPs, including source control."

The Court of Appeals, Fourth Appellate District, found that the current permit's approach to regulation of discharges into the MS4 was appropriate. Since the Tentative Order utilizes the same approach, the court decision supports the Tentative Order's requirements.

Finding D.1.f. Runoff needs to be addressed during the three major phases of urban development (planning, construction, and use) in order to reduce the discharge of storm water pollutants to the MEP, effectively prohibit non-storm water discharges and protect receiving waters. Development which is not guided by water quality planning policies and principles can unnecessarily result in increased pollutant load discharges, flow rates, and flow durations which can impact receiving water beneficial uses. Construction sites without adequate BMP implementation result in sediment runoff rates which greatly exceed natural erosion rates of undisturbed lands, causing siltation and impairment of receiving waters. Existing development generates substantial pollutant loads which are discharged in runoff to receiving waters.

Discussion of Finding D.1.f. MS4 permits are issued to municipalities because of their land use authority. The ultimate responsibility for the pollutant discharges, increased runoff, and inevitable long-term water quality degradation that results from development lies with local governments. This responsibility is based on the fact that it is the local governments that have authorized the development (i.e., conversion of natural pervious ground cover to impervious surfaces) and the land uses that generate the pollutants and runoff. Furthermore, the MS4 through which the pollutants and increased flows are conveyed, and ultimately discharged into natural receiving waters, are owned and operated by the same local governments. In summary, the Copermittees under the Order are responsible for discharges into and out of their MS4s because (1) they own and operate the MS4; and (2) they have the legal

[95] The State Water Board removed the prohibition of discharges *into* the MS4 that cause or contribute to exceedances of water quality objectives. The revision allows for treatment of storm water flows once the pollutants have entered the MS4. It does not affect the effective prohibition on certain dry-weather flows into the MS4 that is required by the Clean Water Act.

authority that authorizes the very development and land uses with generate the pollutants and increased flows in the first place.

For example, since grading cannot commence prior to the issuance of a local grading permit, the Copermittees have a built-in mechanism to ensure that all grading activities are protective of receiving water quality. The Copermittee has the authority to withhold issuance of the grading permit until the project proponent has demonstrated to the satisfaction of the Copermittee that the project will not violate their ordinances or cause the Copermittee to be in violation of its MS4 permit. Since the Copermittee will ultimately be held responsible for any discharges from the grading project by the San Diego Water Board, the Copermittee will want to use its own permitting authority to ensure that whatever measures the Copermittee deems necessary to protect discharges into its MS4 are in fact taken by the project proponent.

The Order holds the local government accountable for this direct link between its land use decisions and water quality degradation. The Order recognizes that each of the three major stages in the development process (development planning, construction, and the use or operational stage) are controlled by and must be authorized by the local government. Accordingly, this permit requires the local government to implement, or require others to implement, appropriate best management practices to reduce storm water pollutant discharges and increased flow during each of the three stages of development.

Including plans for BMP implementation during the design phase of new development and redevelopment offers the most cost effective strategy to reduce storm water runoff pollutant loads to surface waters.[96] The Phase II regulations for small municipalities reflect the necessity of addressing runoff during the early planning phase. Due to the greater water quality concerns generally experienced by larger municipalities, Phase II requirements for small municipalities are also applicable to larger municipalities such as the Copermittees. The Phase II regulations direct municipalities to develop, implement, and enforce a program to address storm water runoff from new development and redevelopment projects that disturb greater than or equal to one acre, including projects less than one acre that are part of a larger common plan of development or sale. The program must ensure that controls are in place that would prevent or minimize water quality impacts. This includes developing and implementing strategies which include a combination of structural and/or non-structural BMPs appropriate to the locality. The program must also ensure the adequate long-term operation and maintenance of BMPs.[97] USEPA expands on the Phase II regulations for urban development when it recommends that Copermittees:

> "Adopt a planning process that identifies the municipality's program goals (e.g., minimize water quality impacts resulting from post-construction runoff from new

[96] USEPA, 2000. Storm Water Phase II Compliance Assistance Guide. EPA 833-R-00-002.
[97] USEPA, 1999. 40 CFR Parts 9, 122, 123, and 124 National Pollutant Discharge Elimination System-Regulations for Revision of the Water Pollution Control Program Addressing Storm Water Discharges; Final Rule. 64 FR 68845.

> development and redevelopment), implementation strategies (e.g., adopt a combination of structural and/or non-structural BMPs), operation and maintenance policies and procedures, and enforcement procedures. In developing your program, you should consider assessing existing ordinances, policies, programs and studies that address storm water runoff quality."

Management of storm water runoff during the construction phase is also essential. USEPA explains in the preamble to the Phase II regulations that storm water discharges generated during construction activities can cause an array of physical, chemical, and biological water quality impacts. Specifically, the biological, chemical and physical integrity of the waters may become severely compromised due to runoff from construction sites. Fine sediment from construction sites can adversely affect aquatic ecosystems by reducing light penetration, impeding sight-feeding, smothering benthic organisms, abrading gills and other sensitive structures, reducing habitat by clogging interstitial spaces within the streambed, and reducing intergravel dissolved oxygen by reducing the permeability of the bed material. Water quality impairment also results, in part, because a number of pollutants are preferentially absorbed onto mineral or organic particles found in fine sediment. The interconnected process of erosion (detachment of the soil particles), sediment transport, and delivery is the primary pathway for introducing key pollutants, such as nutrients, metals, and organic compounds into aquatic systems.[98]

Finally, storm water and non-storm water runoff from existing development must be addressed. The Copermittees' monitoring data exhibits that significant water quality problems exist in receiving waters which receive runoff from areas with extensive existing development, such as Aliso Creek. Source identification, BMP requirements, inspections, and enforcement are all important measures which can be implemented to address runoff from existing development. USEPA supports inspections and enforcement by municipalities when it states "Effective inspection and enforcement requires […] penalties to deter infractions and intervention by the municipal authority to correct violations. Enforcement mechanisms […] also must be described."[99]

Finding D.1.g. Annual reporting requirements included in this Order are necessary to meet federal requirements and to evaluate the effectiveness and compliance of the Copermittees' programs.

Discussion of Finding D.1.g. The annual reporting requirements are consistent with federal NPDES regulation 40 CFR 122.41, which states:

> "The operator of a large or medium municipal separate storm sewer system of a municipal separate storm sewer system that has been designated by the Director under section 122.26(a)(1)(v) of this part must submit an annual report

[98] Ibid., 64 FR 68728.
[99] USEPA, 1992. Guidance Manual for the Preparation of Part II of the NPDES Permit Applications for Discharges from Municipal Separate Storm Sewer Systems. EPA 833-B-92-002.

> by the anniversary of the date of the issuance of the permit for such a system. The report shall include: (1) The status of implementing the components of the storm water management program that are established as permit conditions; (2) Proposed changes to the storm water management program that are established as permit condition, Such proposed changes shall be consistent with § 122.26(d)(2)iii) of this part; (3) Revisions, if necessary, to the assessment of controls and the fiscal analysis reported in the permit application under § 122.26(d)(2)iv) and (d)(2)(v) of this part; (4) A summary of data, including monitoring data, that is accumulated throughout the reporting year; (5) Annual expenditures and budget for year following each annual report; (6) A summary describing the number and nature of enforcement actions, inspections, and public education programs; and (7) Identification of water quality improvements or degradation."

CWC section 13267 provides that "the regional board may require that any person who has discharged […] shall furnish, under penalty of perjury, technical or monitoring reports which the regional board requires."

The San Diego Water Board must assess the reports to ensure that the Copermittees' programs are adequate to assess and address water quality. The reporting requirements can also be useful tools for the Copermittees to review, update, or revise their programs. Areas or issues which have received insufficient efforts can also be identified and improved.

Finding D.1.h. This Order establishes Storm Water Action Levels (SALs) for selected pollutants based on USEPA Rain Zone 6 (arid southwest) Phase I MS4 monitoring data for pollutants in storm water. The SALs were computed as the 90th percentile of the data set, utilizing the statistical based population approach, one of three approaches recommended by the California Water Board's Storm Water Panel in its report, 'The Feasibility of Numerical Effluent Limits Applicable to Discharges of Storm Water Associated with Municipal, Industrial and Construction Activities (June 2006). SALs are identified in Section D of this Order. Copermittees shall implement a timely, comprehensive, cost-effective storm water pollution control program to reduce the discharge of pollutants in storm water from the permitted areas so as not to exceed the SALs. SALs express an integration of the adequacy/inadequacy of programmatic measures and BMPs required in this Order.

Discussion of Finding D.1.h. Section 402(p) of the CWA states MS4 permits for storm water shall require controls to reduce the discharge of pollutants to the maximum extent practicable, including management practices, control techniques and system, design and engineering methods, and such other provisions as the Administrator or the State determines appropriate for the control of such pollutants. This includes requiring numeric effluent limitations for storm water.

SALs are not numeric effluent limitations, which is reflected in language which clarifies an excursion above a SAL does not create a presumption that MEP is not being met. Instead, a SAL exceedance is to be used by the Copermittee as an indication that the MS4 storm water discharge point is a definitive "bad actor," and the result from the monitoring needs to be considered as part of the iterative process for reducing pollutants in storm water to the MEP.

The CWA defines effluent limitations as:

> “Any restriction imposed by the Director on quantities, discharge rates, and concentrations of pollutants which are “discharged” from “point sources” into “waters of the United States”…” A SAL is not a restriction on a quantity, rate or concentration, but is a level at which actions that further reduce pollutants from that discharge point need to be evaluated in order to reduce storm water pollutants to the MEP. Thus, SALs are not effluent limitations as defined by the CWC or CWA.

The approach of using "action levels" is consistent with recommendations made by USEPA in their Interim Permitting Approach for Water Quality-Based Effluent Limitations in Storm Water Permits, dated August 26, 1996:

> "Under the Clean Water Act(CWA) and NPDES regulations, permitting authorities may employ a variety of conditions and limitations in storm water permits, including best management practices, performance objectives, narrative conditions, monitoring triggers, action levels (e.g., monitoring benchmarks, toxicity reduction evaluation action levels), etc., as the necessary water-quality based limitations, where numeric water quality based effluent limitations are determined to be unnecessary or infeasible". As such, these action levels are not considered numeric water quality-based effluent limitations.

It should be noted that a purpose of monitoring, required under this and previous Orders, is to aid in the evaluation of implemented programs and BMPs in reducing pollutants in storm water discharges to the MEP. The tentative Monitoring and Reporting Program states:

> This Receiving Waters and Runoff Monitoring and Reporting Program is intended to meet the following goals:
>
> 2. Measure and improve the effectiveness of the Permittees’ runoff management programs;
> 3. Assess the chemical, physical, and biological impacts to receiving waters resulting from MS4 discharges;
> 4. Characterize stormwater discharges;
> 5. Identify sources of specific pollutants;
> 6. Prioritize drainage and sub-drainage areas that need management actions; and
> 9. Provide information to implement required BMP improvements.

For the past 4 permit cycles (20 years), Copermittees have utilized non-numerical limitations (BMPs) to control and abate the discharge of any pollutants in storm water discharges to the MEP. Copermittees have been accorded 20 years to research, develop, and deploy BMPs that are capable of reducing storm water discharges from the MS4 to levels represented in SALs. Storm Water Action Levels are set at such a level that any exceedance of a SAL will clearly indicate BMPs being implemented are insufficient to protect the Beneficial Uses of waters of the State. Copermittee shall utilize the exceedance information as a high priority consideration when adjusting and executing annual work plans, as required by this Permit. Failure to appropriately consider and react to SAL exceedances in an iterative manner creates a presumption that the Copermittee(s) have not complied to the MEP.

SALs have been developed utilizing Phase I storm water effluent data (updated February 2008, http://rpitt.eng.ua.edu/Research/ms4/mainms4.shtml) from the arid west region (USEPA Rain Zone 6). USEPA Rainfall Zone 6, which includes MS4 effluent data from Orange, San Diego, Los Angeles, Ventura and San Bernadino County. The approach taken to derive SALs is a straightforward percentile approach, with the SAL being set as the 90th percentile of the dataset for each constituent. This approach is consistent with the 2006 State Water Board Panel Report:

> "The statistically based population approach would once again rely on the average distribution of measured water quality values developed from many water quality samples taken for many events at many locations. In this case, however, the Action Level would be defined by the central tendency and variance estimates from the population data. For example, the Action Level could be set as two standard deviations above the mean, i.e. if measured concentrations are consistently higher than two standard deviations above the mean, an Action Level would be triggered. Other population based measures of central tendency could be used (i.e. geomean, median, etc.) or estimates of variance (i.e. prediction intervals, etc.). Regardless of which population based estimators are used (or percentile from above), the idea would be to identify the [statistically derived] point at which managers feel concentrations are significantly beyond the norm."

SALs are a measurable criteria which quantifies the performance of BMPs for a particular watershed or subwatershed that discharges storm water MS4 effluent from that particular discharge point. Thus, Copermittees can utilize SAL results to determine the effectiveness BMPs on the effluent from a particular area of the MS4.

SALs represent the lowest 10 percent of pollutant reduction for USEPA Rain Zone 6 MS4 Phase I programs discharging to waters of the United States. For the past 4 permit cycles (20 years), Copermittees have utilized non-numerical limitations (BMPs) to control and abate the discharge of any pollutants in storm water discharges to the MEP. Copermittees have been accorded 20 years to research, develop, and deploy BMPs that are capable of reducing storm water discharges from the MS4 to levels represented in SALs. Storm Water Action Levels are set at such a level that any

exceedance of a SAL will indicate to the Copermittee(s) that the discharge is within the lowest 10% of monitored outfalls. Therefore, an exceedance of a SAL warrants priority consideration within the Copermittee iterative process.

Finding D.2.a. The Standard Storm Water Mitigation Plan (SSMP) requirements contained in this Order are consistent with Order WQ-2000-11 adopted by the State Water Resources Control Board (State Water Board) on October 5, 2000. In the precedential order, the State Water Board found that the design standards, which essentially require that runoff generated by 85 percent of storm events from specific development categories be infiltrated or treated, reflect the MEP standard. The order also found that the SSMP requirements are appropriately applied to the majority of the Priority Development Project categories contained in Section D.1 of this Order. The State Water Board also gave Regional Water Quality Control Boards the needed discretion to include additional categories and locations, such as retail gasoline outlets (RGOs), in SSMPs.

Discussion of Finding D.2.a. The post-construction requirements and design standards contained in the SSMP section of Order No. R9-2010-0016 constitute MEP consistent with State Water Board guidance, court decisions, and San Diego Water Board requirements. The State Water Board and San Diego Water Boards have made several recent decisions in regards to inclusion of SSMP requirements in MS4 permits. In a precedential decision, State Water Board WQ Order No. 2000-11, the State Water Board found that the SSMP provisions constitute MEP for addressing storm water pollutant discharges resulting from Priority Development Projects. The provisions of the SSMP section of the Order are also consistent with those previously issued by the San Diego Water Board for Riverside County (Order No. R9-2004-001), Southern Orange County (Order Nos. R9-2002-0001 and R9-2009-0002) and San Diego County (Order Nos. R9-2001-01 and R9-2007-0001), as well as requirements in the Los Angeles County MS4 permit (Order No. R4-2001-182). In State Water Board Order WQ 2001-15, the State Water Board reaffirmed that SSMP requirements constitute MEP. Moreover, the SSMP requirements of the San Diego County MS4 permit (Order No. R9-2001-01) were upheld when the California State Supreme Court declined to hear the matter on appeal.

Finding D.2.b. Controlling runoff pollution by using a combination of onsite source control and site design BMPs augmented with treatment control BMPs before the runoff enters the MS4 is important for the following reasons: (1) Many end-of-pipe BMPs (such as diversion to the sanitary sewer) are typically ineffective during significant storm events. Whereas, onsite source control BMPs can be applied during all runoff conditions; (2) End-of-pipe BMPs are often incapable of capturing and treating the wide range of pollutants which can be generated on a sub-watershed scale; (3) End-of-pipe BMPs are more effective when used as polishing BMPs, rather than the sole BMP to be implemented; (4) End-of-pipe BMPs do not protect the quality or beneficial uses of receiving waters between the pollutant source and the BMP; and

(5) Offsite end-of-pipe BMPs do not aid in the effort to educate the public regarding sources of pollution and their prevention.

Discussion of Finding D.2.b. Many end-of-pipe BMPs are designed for low flow conditions because their end-of-pipe location prevents them from being designed for large storm events. This results in the end-of-pipe BMPs being overwhelmed, bypassed, or ineffective during larger storm events more frequently than onsite BMPs designed for larger storms. BMPs are also frequently most effective for a particular type of pollutant (such as sediment). Such BMPs may be appropriate for small sites with a limited suite of pollutants generated; however, end-of-pipe BMPs must typically be able to address a wide range of pollutants generated by a sub-watershed, limiting their effectiveness and/or increasing costs. Moreover, the location of some end-of-pipe BMPs allow for untreated pollutants to be discharged to and degrade receiving waters prior to their reaching the BMPs. This fails to protect receiving waters, which is the purpose of BMP implementation. In addition, opportunities to educate the public regarding runoff pollution can be lost when end-of-pipe BMPs are located away from pollutant sources and out of sight. Onsite BMPs can lead to a better public understanding of runoff issues since their presence can provide a visible and/or tangible lesson in pollution prevention.

Finding D.2.c. Use of Low-Impact Development (LID) site design BMPs at new development, redevelopment and retrofit projects can be an effective means for minimizing the impact of storm water runoff discharges from the development projects on receiving waters. LID is a site design strategy with a goal of maintaining or replicating the pre-development hydrologic regime through the use of design techniques. LID site design BMPs help preserve and restore the natural hydrologic cycle of the site, allowing for filtration and infiltration which can greatly reduce the volume, peak flow rate, velocity, and pollutant loads of storm water runoff. Current runoff management, knowledge, practices and technology have resulted in the use of LID BMPs as an acceptable means of meeting the storm water MEP standard.

Discussion of Finding D.2.c. The Clean Water Act (CWA) is the cornerstone of surface water quality protection in the United States. (The Act does not deal directly with ground water nor with water quantity issues.) The statute employs a variety of regulatory and nonregulatory tools to sharply reduce direct pollutant discharges into waterways, and manage polluted runoff. These tools are employed to achieve the broader goal of restoring and maintaining the chemical, physical, and biological integrity of the nation's waters so that they can support the protection and propagation of fish, shellfish, wildlife and recreation in and on the water.

Increasing the volume, velocity, frequency and discharge duration of storm water runoff from developed areas will eventually greatly accelerate downstream erosion, impair stream habitat in natural drainages, and negatively impact beneficial uses. Development and urbanization increase pollutant loads and volume while simultaneously increasing impervious area. Impervious surfaces can neither absorb

water nor remove pollutants and thus lose the purification and infiltration provided by naturally vegetated soil. Furthermore, impervious surfaces tend to concentrate pollutants on the top of the surface that are then washed off into the MS4 and waters of the State in a concentrated manner. The use of Low-Impact Development (LID) site design BMPs can be an effective means of minimizing the impact of runoff discharges on receiving waters. By reducing water pollution, reducing runoff and increasing groundwater recharge, LID helps to improve the quality of receiving surface waters, stabilize the flow rates of receiving waters (preventing downstream hydromodification), reduce downstream flooding and protect and enhance water supply sources. Current runoff management, knowledge, practice and technology has resulted in the use of LID BMPs as an acceptable means of meeting the MEP standard for storm water treatment.

Current municipal codes may oppose or hinder the design, use and implementation of specific elements of LID. These codes include, but are not limited to, emergency services access requirements, building landscape ordinances, building height limits and parking space requirements. It is essential for Copermittees to work with other responsible agencies and/or update codes that have the potential to impact the use of LID.

The Local Government Commission, a non-profit organization working to build livable communities, developed a set of principles known as the *Ahwahnee Water Principles for Resource-Efficient Land Use*[100] that provide the opportunity to reduce costs and improve the reliability and quality of our water resources. Implementation of LID incorporates several of the Ahwahnee principles such as:

1. "Community Design should be compact, mixed use, walkable and transit-oriented so that urban runoff pollutants are minimized and the open lands that absorb water are preserved to the maximum extent possible."
3. "Water holding areas such as creek beds, recessed athletic fields, ponds, cisterns, and other features that serve to recharge groundwater, reduce runoff, improve water quality and decrease flooding should be incorporated into the urban landscape."
4. "All aspects of landscaping from the selection of plants to soil preparation and the installation of irrigation systems should be designed to reduce water demand, retain runoff, decrease flooding, and recharge groundwater."
5. "Permeable surfaces should be used for hardscape. Impervious surfaces such as driveways, streets, and parking lots should be minimized so that land is available to absorb storm water, reduce polluted urban runoff, recharge groundwater and reduce flooding."

The use of LID site design BMPs helps reduce the amount of impervious area associated with development and allows storm water to infiltrate into the soil. Natural

[100] Local Government Commission, "The Ahwahnee Water Principles – A Blueprint for Regional Sustainability", http://water.lgc.org/Members/tony/docs/lgc_water_guide.pdf

vegetation and soil filters storm water runoff and reduces the volume and pollutant loads of storm water. Studies have revealed that the level of imperviousness resulting from development and urbanization is strongly correlated with the water quality impairment of nearby receiving waters.[101] In many cases, the impacts on receiving waters due to changes in hydrology can be more significant than those attributable to the contaminants found in storm water discharges.[102] These impacts include stream bank erosion (increased sediment load and subsequent deposition), benthic habitat degradation, and decreased diversity of macroinvertebrates. Although conventional BMPs do reduce storm water pollutant loads, they may not effectively control adverse effects from changes in the discharge hydrologic conditions.[103]

The Order includes requirements for developments to include site design BMPs that mimic or replicate the natural hydrologic cycle. Open space designs which maximize pervious surfaces and retention of "natural" drainages have been found to reduce both the costs of development and pollutant export.[104] Moreover, USEPA finds including plans for a "natural" site design and BMP implementation during the design phase of new development and redevelopment offers the most cost effective strategy to reduce storm water pollutant loads to surface waters.[105] In addition, a recent U.S. Department of Housing and Urban Development guidance document on low-impact development notes that the use of LID-based storm water management design allows land to be developed, but in a cost-effective manner that helps mitigate potential environmental impacts.[106]

Finding D.2.d. Retail Gasoline Outlets (RGOs) are significant sources of pollutants in storm water runoff. RGOs are points of convergence for motor vehicles for automotive related services such as repair, refueling, tire inflation, and radiator fill-up and consequently produce significantly higher loadings of hydrocarbons and trace metals (including copper and zinc) than other developed areas.

Discussion of Finding D.2.d. RGOs are included in the Order as a Priority Development Project category because RGOs produce significantly greater loadings of hydrocarbons and trace metals (including copper and zinc) than other developed areas. To meet the storm water MEP standard, source control and structural treatment BMPs are needed at RGOs that meet the following criteria: (a) 5,000 square feet or more or (b) an ADT of 100 or more vehicles per day. These are appropriate

[101] USEPA, 1999. 40 CFR Parts 9, 122, 123, and 124 National Pollutant Discharge Elimination System – Regulations for Revision of the Water Pollution Control Program Addressing Storm Water Discharges; Final Rule.
[102] Ibid.
[103] USEPA, 2000. Low-Impact Development: A literature review. EPA-841-B-00-005. 35p.
[104] Center for Watershed Protection, 2000. "The Benefits of Better Site Design in Residential Subdivisions." Watershed Protection Techniques. Vol. 3. No. 2.
[105] USEPA, 1999. 40 CFR Parts 9, 122, 123, and 124 National Pollutant Discharge Elimination System – Regulations for Revision of the Water Pollution Control Program Addressing Storm Water Discharges; Final Rule.
[106] U.S. Department of Housing and Urban Development, Office of Policy Development and Research, 2003. "The Practice of Low Impact Development." Prepared by: NAHB Research Center, Inc. Upper Marlboro, Maryland. Contract No. H-21314CA. 131p.

thresholds since vehicular development size and volume of traffic are good indicators of potential impacts of storm water runoff from RGOs on receiving waters.

This finding has been added to satisfy State Water Board WQ Order No. 2000-11's requirements for including RGOs as a Priority Development Category. Order No. 2000-11 acknowledged that a threshold (size, average daily traffic, etc.) appropriate to trigger SSMP requirements should be developed for RGOs and that specific findings regarding RGOs should be included in MS4 permits to justify the requirement.[107] Additional detail to support the inclusion of RGOs can be found in the Fact Sheet discussion of Section D.1.d.2.j.

Finding D.2.e. Industrial sites are significant sources of pollutants in runoff. Pollutant concentrations and loads in runoff from industrial sites are similar or exceed pollutant concentrations and loads in runoff from other land uses, such as commercial or residential land uses. As with other land uses, LID site design, source control, and treatment control BMPs are needed at industrial sites in order to meet the MEP standard. These BMPs are necessary where the industrial site is larger than 10,000 square feet. The 10,000 square feet threshold is appropriate, since it is consistent with requirements in other Phase I NPDES storm water regulations throughout California.

Discussion of Finding D.2.e. Industrial sites can be a significant source of pollutants in storm water runoff. In an extensive review of storm water literature, the Los Angeles Water Board found widespread support for the finding that "industrial and commercial activities can also be considered hot spots as sources of pollutants." It also found that "industrial and commercial areas were likely to be the most significant pollutant source areas" of heavy metals.[108] Likewise, storm water runoff from heavy industry in the Santa Clara Valley has been found to be extremely toxic.[109] These findings are corroborated by USEPA, which states in the preamble to the 1990 Phase I NPDES storm water regulations that "Because storm water from industrial facilities may be a major contributor of pollutants to municipal separate storm sewer systems, municipalities are obligated to develop controls for storm water discharges associated with industrial activity through their system in their storm water management program." Since heavy industrial sites can be a significant source of pollutants in runoff in a manner similar to other SSMP project categories such as commercial development or automotive repair shops, it is appropriate to include heavy industrial sites as a SSMP category in the Order.

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[107] State Water Board, 2000. Order WQ 2000-11. In the Matter of the Petitions of The Cities Of Bellflower, Et Al., The City Of Arcadia, And Western States Petroleum Association Review of January 26, 2000 Action of the Regional Board And Actions and Failures to Act by both the California Regional Water Quality Control Board, Los Angeles Region and Its Executive Officer Pursuant to Order No. 96-054, Permit for Municipal Storm Water and Urban Run-Off Discharges Within Los Angeles County [NPDES NO. CAS614001] SWRCB/OCC FILES A-1280, A-1280(a) and A-1280(b)
[108] Los Angeles Regional Water Quality Control Board. 2001.
[109] Schueler and Holland, 2000. Storm Water Strategies for Arid and Semi-Arid Watersheds (Article 66). The Practice of Watershed Protection.

The Phase I NPDES storm water regulations require the Copermittees to "control through ordinance, permit, contract, order, or similar means, the contribution of pollutants to the municipal storm sewer by storm water discharges associated with industrial activity and the quality of storm water discharged from sites of industrial activity" (40 CFR 122.26(d)(2)(i)). In addition, it has been established that the MEP standard for the control of storm water runoff from new development projects includes incorporation of the SSMP requirements. Since the Copermittees must both control storm water pollutants from industrial sites and meet the storm water MEP standard for new development, it is appropriate to apply the SSMP requirements to heavy industrial sites.

The State Water Board's Order WQ 2000-11 indicates that it is appropriate to apply SSMP requirements to categories of development where evidence shows the category of development can be a significant source of pollutants. As evidenced above, heavy industrial sites can be a significant source of pollutants. Therefore, the Order includes heavy industrial sites as a SSMP Priority Development Project category.

Finding D.2.f. If not properly designed or maintained, certain BMPs implemented or required by municipalities for runoff management may create a habitat for vectors (e.g. mosquitoes and rodents). However, proper BMP design and maintenance to avoid standing water can prevent the creation of vector habitat. Nuisances and public health impacts resulting from vector breeding can be prevented with close collaboration and cooperative effort between municipalities, the Riverside County Department of Environmental Health, and the California Department of Public Health during the development and implementation of runoff management programs.

Discussion of Finding D.2.f. The implementation of certain structural BMPs or other runoff treatment systems can result in significant vector problems in the form of increased breeding or harborage habitat for mosquitoes, rodents or other potentially disease transmitting organisms. The implementation of BMPs that retain water may provide breeding habitat for a variety of mosquito species, some of which have the potential to transmit diseases such as Western Equine Encephalitis, St. Louis Encephalomyelitis, and malaria. Recent BMP implementation studies by Caltrans[110] in District 7 and District 11 have demonstrated mosquito breeding associated with some types of BMPs. The Caltrans BMP Retrofit Pilot study cited lack of maintenance and improper design as factors contributing to mosquito production. However, a Watershed Protection Techniques article describes management techniques for selecting, designing, and maintaining structural treatment BMPs to minimize mosquito production.[111] State and local runoff management programs that include structural BMPs with the potential to retain water have been implemented in Florida and the

[110] Caltrans, 2000. BMP Retrofit Pilot Studies: A Preliminary Assessment of Vector Production.
[111] Watershed Protection Techniques, 1995. Mosquitoes in Constructed Wetlands: A Management Bugaboo? 1(4):203-207.

Chesapeake Bay region without resulting in significant public health threats from mosquitoes or other vectors.[112]

Finding D.2.g. The increased volume, velocity, frequency and discharge duration of storm water runoff from developed areas has the potential to greatly accelerate downstream erosion, impair stream habitat in natural drainages, and negatively impact beneficial uses. Development and urbanization increase pollutant loads in storm water runoff and the volume of storm water runoff. Impervious surfaces can neither absorb water nor remove pollutants and thus lose the purification and infiltration provided by natural vegetated soil. Hydromodification measures for discharges to hardened channels allow for the future restoration of the hardened channels to their natural state, thereby restoring the chemical, physical, and biological integrity and Beneficial Uses of local receiving waters.

Discussion of Finding D.2.g. Increasing the volume, velocity, frequency and discharge duration of storm water runoff from developed areas will eventually greatly accelerate downstream erosion, impair stream habitat in natural drainages, and negatively impact beneficial uses. Development and urbanization increase pollutant loads and volume while simultaneously increasing impervious area. Impervious surfaces can neither absorb water nor remove pollutants and thus lose the purification and infiltration provided by naturally vegetated soil.

Historic hydromodification impacts, such as concrete lining and channelization, have impacted the natural physical habitat of urban streams resulting in low Index of Biotic Integrity (IBI) scores. The Copermittee's monitoring to date indicates decreased IBI scores in the developed watersheds when compared to reference sites, with developed sites consistently having poor or very poor IBI scores. While habitat scores remained stable over the last reporting period, with scores of marginal to sub-optimal, the Copermittees have consistently monitored high levels of fine sediment in habitat assessments and often changing vegetative cover. However, the impact of persistent toxicity at the bioassessment stations in conjunction with physical habitat scores is unkown.[113]
Hydromodification impacts result in poor physical habitat conditions through streambed scour, erosion, vegetation displacement, sediment deposition, channelization and channel modifications. Increased sediment loads from hydromodification causes other impacts to physical habitats including increased turbidity which then may cause increased temperatures. In addition, an increased sediment load may have an increased biological content thereby increasing the sediment oxygen demand and lowering the dissolved oxygen available for aquatic life.[114]

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[112] Shaver, E. and R. Baldwin , 1995. Sand Filter Design for Water Quality Treatment in Herricks, E., Ed. Stormwater Runoff and Receiving Systems: Impact, Monitoring, and Assessment, CRC Lewis Publishers, New York, NY.
[113] Riverside County Copermittees, 2008-2009 Santa Margarita Watershed Annual Report.
[114] USEPA, National Management Measures to Control Nonpoint Source Pollution from Hydromodification, EPA 841-B-07-002, July 2007.

The objective of the CWA is "to restore and maintain the chemical, *physical,* and biological integrity of the Nation's waters (emphasis added)." Stream restoration by removing concrete and other unnatural materials is a major step toward achieving that objective. The success of future stream restoration and stabilization is, however, dependent on preventing and reducing physical impacts from activities upstream. Therefore, hydromodification management measures are necessary upstream of modified (e.g. concrete, rip rap, etc.) channels in addition to non-modified channels.

Please see discussion of Findings C.10 and C.11.

Finding D.3.a. In accordance with federal NPDES regulations and to ensure the most effective oversight of industrial and construction site discharges, discharges of runoff from industrial and construction sites are subject to dual (State and local) storm water regulation. Under this dual system, each Copermittee is responsible for enforcing its local permits, plans, and ordinances, and the San Diego Water Board is responsible for enforcing the General Construction Activities Storm Water Permit, State Water Board Order 99-08 DWQ, NPDES No. CAS000002 (General Construction Permit) and the General Industrial Activities Storm Water Permit, State Water Board Order 97-03 DWQ, NPDES No. CAS000001 (General Industrial Permit). NPDES municipal regulations require that municipalities develop and implement measures to address runoff from industrial and construction activities. Those measures may require the implementation of additional BMPs than are required under the statewide general permits for activities subject to both state and local regulation.

Discussion of Finding D.3.a. USEPA finds the control of pollutant discharges from industry and construction so important to receiving water quality that it has established a double system of regulation over industrial and construction sites. This double system of regulation consists of two parallel regulatory systems with the same common objective: to keep pollutants from industrial and construction sites out of the MS4. In this double system of regulation for runoff from industrial and construction sites, local governments must enforce their legal authorities (i.e., local ordinances and permits) while the San Diego Water Board must enforce its legal authority (i.e., statewide general industrial and construction storm water permits). These two regulatory systems are designed to complement and support each other. Municipalities are not required to enforce San Diego Water Board and State Water Board permits; however, they are required to enforce their ordinances and permits. The Federal regulations are clear that municipalities have responsibility to prevent non-storm water and address storm water runoff from industrial and construction sites which enters their MS4s.

Municipalities have this responsibility because they have the authority to issue land use and development permits. Since municipalities are the lead permitting authority for industrial land use and construction activities, they are also the lead for enforcement regarding runoff discharges from these sites. For sites where the

municipality is the lead permitting authority, the San Diego Water Board will work with the municipality and provide support where needed. The San Diego Water Board will assist municipalities in enforcement against non-compliant sites after the municipality has exhibited a good faith effort to bring the site into compliance.

According to USEPA, the storm water regulations envision that NPDES permitting authorities and municipal operators will cooperate to develop programs to monitor and control pollutants in storm water discharges from industrial facilities.[115] USEPA discusses the "dual regulation" of construction sites in its Storm Water Phase II Compliance Assistance Guide, which states "Even though all construction sites that disturb more than one acre are covered nationally by an NPDES storm water permit, the construction site runoff control minimum measure […] is needed to induce more localized site regulation and enforcement efforts, and to enable operators […] to more effectively control construction site discharges into their MS4s."[116] While the Storm Water Phase II Compliance Assistance Guide applies to small municipalities, it is applicable to the Copermittees, because they are similar in size and have the potential to discharge similar pollutant types as Phase II municipalities.

Finding D.3.b. Identification of sources of pollutants in runoff (such as municipal areas and activities, industrial and commercial sites/sources, construction sites, and residential areas), development and implementation of BMPs to address those sources, and updating ordinances and approval processes are necessary for the Copermittees to ensure that discharges of pollutants from its MS4 in storm water are reduced to the MEP and that non-storm water discharges are not occurring. Inspections and other compliance verification methods are needed to ensure minimum BMPs are implemented. Inspections are especially important at high risk areas for pollutant discharges.

Discussion of Finding D.3.b. Source identification is necessary to characterize the nature and extent of pollutants in discharges and to develop appropriate BMPs. It is the first step in a targeted approach to runoff management. Source identification helps identify the location of potential sources of pollutants in runoff. Pollutants found to be present in receiving waters can then be traced to the sites which frequently generate such pollutants. In this manner source inventories can help to target inspections, monitoring, and potential enforcement. This allows for limited inspection, monitoring, and enforcement time to be most effective. USEPA supports source identification as a concept when it recommends construction, municipal, and industrial source identification in guidance and the federal regulations.[117,118]

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[115] USEPA, 1992. Guidance Manual for the Preparation of Part II of the NPDES Permit Applications for Discharges from Municipal Separate Storm Sewer Systems. EPA 833-B-92-002.
[116] USEPA, 2000. Storm Water Phase II Compliance Assistance Guide. EPA 833-R-00-002.
[117] USEPA, 1992. Guidance Manual for the Preparation of Part II of the NPDES Permit Applications for Discharges from Municipal Separate Storm Sewer Systems. EPA 833-B-92-002.
[118] 40 CFR 122.26(d)(2)(ii)

The development of BMPs for identified sources will help ensure that appropriate, consistent controls are implemented at all types of development and areas. Copermittees must reduce the discharge of pollutants in storm water runoff to the maximum extent practicable. To achieve this level of pollutant reduction, BMPs must be implemented. Designation of minimum BMPs helps ensure that appropriate BMPs are implemented for various sources. These minimum BMPs also serve as guidance as to the level of water quality protection required. USEPA requires development and implementation of BMPs for construction, municipal, commercial, industrial, and residential sources at 40 CFR 122.26(d)(2)(iv)(A-D).

Updating ordinances and approval processes is necessary in order for the Copermittees to control discharges to their MS4s. USEPA supports updating ordinances and approval processes when it states "A crucial requirement of the NPDES storm water regulation is that a municipality must demonstrate that it has adequate legal authority to control the contribution of pollutants in storm water discharged to its MS4. […] In order to have an effective municipal storm water management program, a municipality must have adequate legal authority to control the contribution of pollutants to the MS4. […] 'Control,' in this context, means not only to require disclosure of information, but also to limit, discourage, or terminate a storm water discharge to the MS4."[119]

Inspections provide a necessary means for the Copermittees to evaluate compliance of pollutant sources with their municipal ordinances and minimum BMP requirements. USEPA supports inspections when it recommends inspections of construction, municipal, and industrial sources.[120] Inspection of high risk sources are especially important because of the ability of frequent inspections to help ensure compliance, thereby reducing the risk associated with such sources. USEPA suggests that inspections can improve compliance when it states "Effective inspection and enforcement requires […] penalties to deter infractions and intervention by the municipal authority to correct violations."[121]

Finding D.3.c. Historic and current development makes use of natural drainage patterns and features as conveyances for runoff. Urban streams used in this manner are part of the municipalities MS4 regardless of whether they are natural, anthropogenic, or partially modified features. In these cases, the urban stream is both an MS4 and receiving water.

Discussion of Finding D.3.c. An MS4 is defined in the federal regulations as a conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, or storm drains), owned or operated by a Copermittee, and designed or used for collecting or

[119] USEPA, 1992. Guidance Manual for the Preparation of Part II of the NPDES Permit Applications for Discharges from Municipal Separate Storm Sewer Systems. EPA 833-B-92-002.
[120] Ibid.
[121] USEPA, 1992. Guidance Manual for the Preparation of Part II of the NPDES Permit Applications for Discharges from Municipal Separate Storm Sewer Systems. EPA 833-B-92-002.

conveying runoff.[122] Natural drainage patterns and urban streams are frequently used by municipalities to collect and convey runoff away from development within their jurisdiction. Therefore, the San Diego Water Board considers natural drainages that are used for conveyances of runoff, regardless of whether or not they've been altered by the municipality, as both part of the MS4s and as receiving waters. To clarify, an unaltered natural drainage, which receives runoff from a point source (channeled by a Copermittee to drain an area within their jurisdiction), which then conveys the runoff to an altered natural drainage or a man-made MS4, is both an MS4 and a receiving water.[123]

Finding D.3.d. As operators of the MS4s, the Copermittees cannot passively receive and discharge pollutants from third parties. By providing free and open access to an MS4 that conveys discharges to waters of the U.S., the operator essentially accepts responsibility for discharges into the MS4 that it does not prohibit or control. These discharges may cause or contribute to a condition of contamination or a violation of water quality standards.

Discussion of Finding D.3.d. CWA section 402(p) requires operators of MS4s to prohibit non-storm water discharges into their MS4s. This is necessary because pollutants which enter the MS4 generally are conveyed through the MS4 to be eventually discharged into receiving waters. If a municipality does not prohibit non-storm water discharges, it is providing the pathway (its MS4) which enables pollutants to reach receiving waters. Since the municipality's storm water management service can result in pollutant discharges to receiving waters, the municipality must accept responsibility for the water quality consequences resulting from this service. Furthermore, third party discharges can cause a municipality to be out of compliance with its permit. Since pollutants from third parties which enter the MS4 will eventually be discharged from the MS4 to receiving waters, the third party discharges can result in a situation of municipality non-compliance if the discharges lead to an exceedance of water quality standards. For these reasons, each Copermittee must prohibit and/or control discharges from third parties to its MS4. USEPA supports this concept when it states "the operators of regulated small MS4s cannot passively receive and discharge pollutants from third parties" and "the operator of a small MS4 that does not prohibit and/or control discharges into its system essentially accepts 'title' for those discharges. At a minimum, by providing free and open access to the MS4s that convey discharges to the waters of the United States, the municipal storm sewer system enables water quality impairment by third parties."[124]

Finding D.3.e. Waste and pollutants which are deposited and accumulate in MS4 drainage structures will be discharged from these structures to waters of the U.S.

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[122] USEPA, 2000. EPA Administered Permit Programs: The National Pollutant Discharge Elimination System. Code of Federal Regulations, Vol. 40, Part 122.
[123] San Diego Water Board, 2001. Response in Opposition to Petitions for Review of California Regional Water Quality Control Board San Diego Region Order No. 2001-01 – NPDES Permit No. CAS0108758 (San Diego Municipal Storm Water Permit).
[124] Federal Register / Vol. 64, No. 235 / Wednesday, December 8, 1999 / Rules and Regulations. P. 68765-68766.

unless they are removed. These discharges may cause or contribute to, or threaten to cause or contribute to, a condition of pollution in receiving waters. For this reason, pollutant discharges from storm water into MS4s must be reduced using a combination of management measures, including source control, and an effective MS4 maintenance program must be implemented by each Copermittee.

Discussion of Finding D.3.e. When rain falls and drains freeways, industries, construction sites, and neighborhoods, it picks up a multitude of pollutants. Gravity flow transports the pollutants to the MS4. Illicit discharges and connections also can contribute a significant amount of pollutants to MS4s. MS4s are commonly designed to convey their contents as quickly as possible. Due to the resulting typically high flow rates within the concrete conveyance systems of MS4s, pollutants which enter or are deposited in the MS4 and not removed are generally flushed unimpeded through the MS4 to waters of the United States. Since treatment generally does not occur within the MS4, in such cases reduction of storm water pollutants to the MEP must occur prior to discharges entering the MS4.

The importance of this concept is supported by the tons of wastes/pollutants that have been removed from the Copermittees' MS4s as reported in their ROWD.[125] Moreover, these pollutants will be discharged into receiving waters unless an effective MS4 and structural treatment BMP maintenance program is implemented by the Copermittees. The requirement for Copermittees to conduct a MS4 maintenance program is specifically directed in both the Phase I and Phase II storm water regulations. Regarding MS4 cleaning, USEPA states "The removal of sediment, decaying debris, and highly polluted water from catch basins has aesthetic and water quality benefits, including reducing foul odors, reducing suspended solids, and reducing the load of oxygen-demanding substances that reach receiving waters."[126] It goes on to say, "Catch basin cleaning is an efficient and cost-effective method for preventing the transport of sediment and pollutants to receiving water bodies." USEPA also finds that "Lack of maintenance often limits the effectiveness of storm water structural controls such as detention/retention basins and infiltration devices. […] The proposed program should provide for maintenance logs and identify specific maintenance activities for each class of control, such as removing sediment from retention ponds every five years, cleaning catch basins annually, and removing litter from channels twice a year."[127]

Finding D.3.f. Enforcement of local runoff related ordinances, permits, and plans is an essential component of every runoff management program and is specifically required in the federal storm water regulations and this Order. Each Copermittee is individually responsible for adoption and enforcement of ordinances and/or policies, implementation of identified control measures/BMPs needed to prevent or reduce

[125] Riverside Storm Water Copermittees. 2009. Report of Waste Discharge (San Diego Region).
[126] USEPA, 1999. Storm Water O&M Fact Sheet, Catch Basin Cleaning. EPA 832-F-99-011.
[127] USEPA, 1992. Guidance Manual for the Preparation of Part II of the NPDES Permit Applications for Discharges from Municipal Separate Storm Sewer Systems. EPA 833-B-92-002.

pollutants in storm water runoff, and for the allocation of funds for the capital, operation and maintenance, administrative, and enforcement expenditures necessary to implement and enforce such control measures/BMPs under its jurisdiction. Education is an important aspect of every effective runoff management program and the basis for changes in behavior at a societal level. Education of municipal planning, inspection, and maintenance department staffs is especially critical to ensure that in-house staffs understand how their activities impact water quality, how to accomplish their jobs while protecting water quality, and their specific roles and responsibilities for compliance with this Order. Public education, designed to target various urban land users and other audiences, is also essential to inform the public of how individual actions affect receiving water quality and how adverse effects can be minimized.

Discussion of Finding D.3.f. The Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(A – D) are clear in placing responsibility on municipalities for control of runoff from third party activities and land uses to their MS4.[128] In order for municipalities to assume this responsibility, they must implement ordinances, permits, and plans addressing runoff from third parties. Assessments for compliance with their ordinances, permits, and plans are essential for a municipality to ensure that third parties are not causing the municipality to be in violation of its municipal storm water permit. When conditions of non-compliance are determined, enforcement is necessary to ensure that violations of municipality ordinances and permits are corrected. When the Copermittees determine a violation of its storm water ordinance, it must pursue correction of the violation. Without enforcement, third parties do not have incentive to correct violations. USEPA supports enforcement by municipalities when it states "Effective inspection and enforcement requires […] penalties to deter infractions and intervention by the municipal authority to correct violations. Enforcement mechanisms […] also must be described."[129]

Education is a critical BMP and an important aspect of runoff management programs. USEPA finds that "An informed and knowledgeable community is critical to the success of a storm water management program since it helps ensure the following: Greater support for the program as the public gains a greater understanding of the reasons why it is necessary and important, [and] greater compliance with the program as the public becomes aware of the personal responsibilities expected of them and others in the community, including the individual actions they can take to protect or improve the quality of area waters."[130]

Regarding target audiences, USEPA also states "The public education program should use a mix of appropriate local strategies to address the viewpoints and concerns of a variety of audiences and communities, including minority and disadvantaged communities, as well as children."

[128] USEPA, 2000. EPA Administered Permit Programs: The National Pollutant Discharge Elimination System. Code of Federal Regulations, Vol. 40, Part 122.
[129] USEPA, 1992. Guidance Manual for the Preparation of Part II of the NPDES Permit Applications for Discharges from Municipal Separate Storm Sewer Systems. EPA/833-B-92-002.
[130] USEPA, 2000. Storm Water Phase II Compliance Assistance Guide. EPA 833-R-00-002.

Finding D.3.g. Public participation during the development of runoff management programs is necessary to ensure that all stakeholder interests and a variety of creative solutions are considered.

Discussion of Finding D.3.g.
This finding is supported by the Phase II Storm Water Regulations, which state "early and frequent public involvement can shorten implementation schedules and broaden public support for a program." USEPA goes on to explain, "Public participation is likely to ensure a more successful storm water program by providing valuable expertise and a conduit to other programs and governments."[131]

Finding D.3.h. Retrofitting existing development with storm water treatment controls including LID, is necessary to address storm water discharges from existing development that may cause or contribute to a condition of pollution or a violation of water quality standards. Although SSMP BMPs are required for redevelopment, the current rate of redevelopment will not address water quality problems in a timely manner. Cooperation with private landowners is necessary to effectively identify, implement and maintain retrofit projects for the preservation, restoration, and enhancement of water quality.

Discussion of Finding D.3.h. Existing BMPs are not sufficient to protect the Beneficial Uses of receiving waters from storm water MS4 discharges, as evidenced by 303(d) listings and exceedances of Water Quality Objectives from the Copermittees monitoring reports. Implementing more advanced BMPs, including the retrofitting of existing development with LID, is part of the iterative process. Based on the current rate of redevelopment compared to existing BMPs, the use of LID only on new and redevelopment will not adequately address current water quality problems, including downstream hydromodification. Retrofitting existing development is practicable for a municipality through a systematic evaluation, prioritization and implementation plan focused on impaired water bodies, pollutants of concern, areas of downstream hydromodification, feasibility and effective communication and cooperation with private property owners.

Finding D.4.a. Since runoff within a watershed can flow from and through multiple land uses and political jurisdictions, watershed-based runoff management can greatly enhance the protection of receiving waters. Such management provides a means to focus on the most important water quality problems in each watershed. By focusing on the most important water quality problems, watershed efforts can maximize protection of beneficial use in an efficient manner. Effective watershed-based runoff management actively reduces pollutant discharges and abates pollutant sources causing or contributing to watershed water quality problems. Watershed-based runoff management that does not actively reduce pollutant discharges and abate pollutant sources causing or contributing to watershed water quality problems can necessitate

[131] Federal Register / Vol. 64, No. 235 / Wednesday, December 8, 1999 / Rules and Regulations. P. 68755.

implementation of the iterative process outlined in section A.3 of the Tentative Order. Watershed management of runoff does not require Copermittees to expend resources outside of their jurisdictions. Watershed management requires the Copermittees within a watershed to develop a watershed-based management strategy, which can then be implemented on a jurisdictional basis.

Discussion of Finding D.4.a. In recent years, addressing water quality issues from a watershed perspective has increasingly gained attention. Regarding watershed-based permitting, the USEPA *Watershed-Based NPDES Permitting Policy Statement* issued on Jan. 7, 2004 states the following:

> USEPA continues to support a holistic watershed approach to water quality management. The process for developing and issuing NPDES permits on a watershed basis is an important tool in water quality management. USEPA believes that developing and issuing NPDES permits on a watershed basis can benefit all watershed stakeholders, from the NPDES permitting authority to local community members. A watershed-based approach to point source permitting under the NPDES program may serve as one innovative tool for achieving new efficiencies and environmental results. USEPA believes that watershed-based permitting can:
>
> - Lead to more environmentally effective results;
> - Emphasize measuring the effectiveness of targeted actions on improvements in water quality;
> - Provide greater opportunities for trading and other market based approaches;
> - Reduce the cost of improving the quality of the nation's waters;
> - Foster more effective implementation of watershed plans, including total maximum daily loads (TMDLs); and
> - Realize other ancillary benefits beyond those that have been achieved under the CWA (e.g., facilitate program integration including integration of clean water act and safe drinking water act programs).
>
> Watershed-based permitting is a process that ultimately produces NPDES permits that are issued to point sources on a geographic or watershed basis. In establishing point source controls in a watershed-based permit, the permitting authority may focus on watershed goals, and consider multiple pollutant sources and stressors, including the level of nonpoint source control that is practicable. In general, there are numerous permitting mechanisms that may be used to develop and issue permits within a watershed approach.

This USEPA guidance is in line with State Water Board and San Diego Water Board watershed management goals. For example, the State Water Board's TAC recommends watershed-based water quality protection, stating "Municipal permits should have watershed specific components." The TAC further recommends that "All

NPDES permits and Waste Discharge Requirements should be considered for reissuance on a watershed basis."

In addition, the Basin Plan states that "public agencies and private organizations concerned with water resources have come to recognize that a comprehensive evaluation of pollutant contributions on a watershed scale is the only way to realistically assess cumulative impacts and formulate workable strategies to truly protect our water resources. Both water pollution and habitat degradation problems can best be solved by following a basin-wide approach."

In light of USEPA's policy statement and the State Water Board's and San Diego Water Board's watershed management goals, the San Diego Water Board seeks to expand watershed management in the regulation of runoff from the MS4. Watershed-based MS4 permits can provide for more effective receiving water quality protection by focusing on specific water quality problems. The entire watershed for the receiving water can be assessed, allowing for critical areas and practices to be targeted for corrective actions. Known sources of pollutants of concern can be investigated for potential water quality impacts. Problem areas can then be addressed, leading to eventual improvements in receiving water quality. Management of runoff on a watershed basis allows for specific water quality problems to be targeted so that efforts result in maximized water quality improvements.[132]

Finding D.4.b. Some runoff issues, such as general education and training, can be effectively addressed on a regional basis. Regional approaches to runoff management can improve program consistency and promote sharing of resources, which can result in implementation of more efficient programs.

Discussion of Finding D.4.b. Copermittees in Riverside County participate in several runoff-related activities whose scope extends beyond the area subject to this Order. These include countywide activities (e.g., portions of Riverside County fall under the jurisdictions of the Santa Ana Water Board and Colorado River Water Board), southern California, and statewide activities. Copermittees' participation in these regional activities is generally directed at improving management capability, preventing redundancy and taking advantage of economies of scale. For instance, Copermittees seek to develop consistency between watershed and/or jurisdictional programs (e.g., through standards development), and to collaborate on certain program activities such as education, training, and monitoring.

Finding D.4.c. It is important for the Copermittees to coordinate their water quality protection and land use planning activities to achieve the greatest protection of receiving water bodies. Copermittee coordination with other watershed stakeholders,

[132] San Diego Water Board, 2004. San Diego County Municipal Storm Water Permit Reissuance Analysis Summary. P. 1.

especially the State of California Department of Transportation, the United States Department of Defense, and water and sewer districts, is also important.

Discussion of Finding D.4.c. Conventional planning and zoning can be limited in their ability to protect the environmental quality of creeks, rivers, and other waterbodies. Watershed-based planning is often ignored, despite the fact that receiving waters unite land by collecting runoff from throughout the watershed. Since watersheds unite land, they can be used as an effective basis for planning. Watershed-based planning enables local and regional areas to realize economic, social, and other benefits associated with growth, while conserving the resources needed to sustain such growth, including water quality.

This type of planning can involve four steps: (1) Identify the watersheds shared by the participating jurisdictions; (2) Identify, assess, and prioritize the natural, social, and other resources in the watersheds; (3) Prioritize areas for growth, protection, and conservation, based on prioritized resources; and (4) Develop plans and regulations to guide growth and protect resources. Local governments have started with simple, yet effective, steps toward watershed planning, such as adopting a watershed-based planning approach, articulating the basic strategy in their General Plans, and beginning to pursue the basic strategy in collaboration with neighboring local governments who share the watersheds. Examples of new mechanisms created to facilitate watershed-based planning and zoning include the San Francisquito Creek Watershed Coordinated Resource Management Process and the Santa Clara Basin Watershed Management Initiative.[133]

[133] Bay Area Stormwater Management Agencies Association., 1999. Start at the Source. Forbes Custom Publishing. Available on-line at: http://www.scvurppp-w2k.com/basmaa_satsm.htm

E. Statute and Regulatory Considerations

Finding E.1. The Receiving Water Limitations (RWL) language specified in this Order is consistent with language recommended by the USEPA and established in State Water Board Water Quality Order 99-05, *Own Motion Review of the Petition of Environmental Health Coalition to Review Waste Discharge Requirements Order No. 96-03, NPDES Permit No. CAS0108740*, adopted by the State Water Board on June 17, 1999. The RWL in this Order require compliance with water quality standards, which for storm water discharges is to be achieved through an iterative approach requiring the implementation of improved and better-tailored BMPs over time. Compliance with receiving water limitations based on applicable water quality standards is necessary to ensure that MS4 discharges will not cause or contribute to violations of water quality standards and the creation of conditions of pollution.

Discussion of Finding E.1. The RWLs in the Order require storm water compliance with water quality standards through an iterative approach for implementing improved and better-tailored BMPs over time. The iterative BMP process requires the implementation of increasingly stringent BMPs until receiving water quality standards are achieved. This is necessary because implementation of BMPs alone cannot ensure attainment of receiving water quality standards. For example, a BMP that is effective in one situation may not be applicable in another. An iterative process of BMP development, implementation, and assessment is needed to promote consistent compliance with receiving water quality objectives. If assessment of a given BMP confirms that the BMP is ineffective, the iterative process should be restarted, with redevelopment of a new BMP that is anticipated to result in compliance with receiving water quality objectives.

The issue of whether storm water discharges from MS4s must meet water quality standards has been intensely debated in past years. The argument arises because CWA section 402(p) fails to clearly state that municipal dischargers of storm water must meet water quality standards. On the issue of industrial discharges of storm water, the statute clearly indicates that industrial dischargers must meet both (1) the technology-based standard of “best available technology economically achievable (BAT)” and (2) applicable water quality standards. On the issue of municipal discharges however, the statute states that municipal dischargers must meet (1) the technology-based standard of MEP” and (2) “such other provisions that the Administrator or the State determines appropriate for the control of such pollutants.” The statute fails, however, to specifically state that municipal dischargers must meet water quality standards.

As a result, the municipal storm water dischargers have argued that they do not have to meet water quality standards; and that they only are required to meet MEP for storm water. Environmental interest groups maintain that not only do MS4 discharges have to meet water quality standards, but that MS4 permits must also comply with numeric effluent limitations for the purpose of meeting water quality standards. On the issue of

water quality standards, USEPA, the State Water Board, and the San Diego Water Board have consistently maintained that MS4s must indeed comply with water quality standards. On the issue of whether water quality standards must be met by numeric effluent limitations, USEPA, the State Water Board (in Orders WQ 91-03 and WQ 91-04), and the San Diego Water Board have maintained that MS4 permits can contain narrative requirements for the implementation of BMPs in place of numeric effluent limitations for storm water discharges.[134]

In addition to relying on USEPA's legal opinion concluding that MS4s must meet MEP for storm water and water quality standards, the State Water Board also relied on the CWA's explicit authority for States to require "such other provisions that the Administrator or the State determines appropriate for the control of such pollutants" in addition to the technology-based standard of MEP for storm water discharges. To further support its conclusions that MS4 permit dischargers must meet water quality standards, the State Water Board relied on provisions of the CWC that specify that all waste discharge requirements must implement applicable Basin Plans and take into consideration the appropriate water quality objectives for the protection of beneficial uses.

The State Water Board first formally concluded that permits for MS4s must contain effluent limitations based on water quality standards in its Order WQ 91-03. In that Order, the State Water Board also concluded that it was appropriate for Regional Water Boards to achieve this result by requiring best management practices, rather than by inserting numeric effluent limitations into MS4 permits. Later, in Order WQ 98-01, the State Water Board prescribed specific precedent setting Receiving Water Limitations language to be included in all future MS4 permits. This language specifically requires that MS4 dischargers meet water quality standards and allows for the use of narrative BMPs (increasing in stringency and implemented in an iterative process) as the mechanism by which water quality standards can be met for storm water discharges.

In Order WQ 99-05, the State Water Board modified its receiving water limitations language in Order WQ 98-01 to meet specific objections by USEPA (the modifications resulted in stricter compliance with water quality standards). State Water Board Order WQ 99-05 states:

> "In Order WQ 98-01, the State Board ordered that certain receiving water limitation language be included in future municipal storm water permits. Following inclusion of that language in permits issued by the San Francisco Bay and San Diego Water Boards for Vallejo and Riverside respectively, the USEPA objected to the permits. The USEPA objection was based on the receiving

[134] For the most recent assessment, see Storm Water Panel Recommendations to the California State Water Resources Control Board, 2006. *The Feasibility of Numeric Effluent Limits Applicable to Discharges of Storm Water Associated with Municipal, Industrial, and Construction Activities.*

> water limitation language. The USEPA has now issued those permits itself and has included receiving water limitation language it deems appropriate.
>
> In light of USEPA's objection to the receiving water limitation language in Order WQ 98-01 and its adoption of alternative language, the State Board is revising its instructions regarding receiving water limitation language for municipal storm water permits. It is hereby ordered that Order WQ 98-01 will be amended to remove the receiving water limitation language contained therein and to substitute the USEPA language. Based on the reasons stated here, and as a precedent decision, the following receiving water limitation language shall be included in future municipal storm water permits."

In the 1999 case involving MS4 permits issued by USEPA to several Arizona cities (*Defenders of Wildlife v. Browner*, 1999, 197 F. 3d 1035), the United States Court of Appeals for the Ninth Circuit upheld USEPA's requirement for MS4 dischargers to meet water quality standards, but it did so on the basis of USEPA's discretion rather than on the basis of strict compliance with the Clean Water Act. In other words, while holding that the Clean Water Act does not require all MS4 discharges to comply strictly with state water quality standards, the Court also held that USEPA has the authority to determine that ensuring strict compliance with state water quality standards is necessary to control pollutants. On the question of whether MS4 permits must contain numeric effluent limitations, the court upheld USEPA's use of iterative BMPs in place of numeric effluent limitations for storm water discharges.

On October 14, 1999, the State Water Board issued a legal opinion on the federal appellate decision and provided advice to the Regional Water Boards on how to proceed in the future. In the memorandum, the State Water Board concludes that the recent Ninth Circuit opinion upholds the discretion of USEPA and the State to (continue to) issue storm water permits to MS4s that require compliance with water quality standards through iterative BMPs. Moreover, the memorandum states that "[…] because most MS4 discharges enter impaired water bodies, there is a real need for permits to include stringent requirements to protect those water bodies. As TMDLs are developed, it is likely that MS4s will have to participate in pollutant load reductions, and the MS4 permits are the most effective vehicles for those reductions." In summary, the State Water Board found that the Regional Water Boards should continue to include the RWL established in State Water Board Order WQ 99-05 in all future permits.

The issue of the RWLs language was also central to BIA's (and others') appeal of Order No. 2001-01 (San Diego MS4 permit), which was used as a template for Order No. R9-2002-0001. BIA contended that the storm water MEP standard was a ceiling on what could be required of the Copermittees in implementing their runoff management programs, and that Order No. 2001-01's receiving water limitations requirements exceeded that ceiling. In other words, BIA argued that the Copermittees could not be required to comply with receiving water limitations if they necessitated

efforts which went beyond the MEP standard. Again, the courts upheld the San Diego Water Board's discretion to require compliance with water quality standards in municipal storm water permits, without limitation. The Court of Appeal, Fourth Appellate District found that the San Diego Water Board has "the authority to include a permit provision requiring compliance with water quality standards."[135] On further appeal by BIA, the California State Supreme Court declined to hear the matter.

While implementation of the iterative BMP process is a means to achieve compliance with water quality objectives for storm water MS4 discharges, it does not shield the discharger from enforcement actions for continued non-compliance with water quality standards. Consistent with USEPA guidance,[136] regardless of whether or not an iterative process is being implemented, discharges that cause or contribute to a violation of water quality standards are in violation of Order No. R9-2010-0016.

Finding E.2. The Water Quality Control Plan for the San Diego Basin (Basin Plan), identifies the following existing and potential beneficial uses for surface waters in the Riverside County portion of the San Diego Region: Municipal and Domestic Supply (MUN), Agricultural Supply (AGR), Industrial Process Supply (PROC), Hydropower Generation (POW), Industrial Service Supply (IND), Ground Water Recharge (GWR), Contact Water Recreation (REC1), Non-contact Water Recreation (REC2), Warm Freshwater Habitat (WARM), Cold Freshwater Habitat (COLD), Wildlife Habitat (WILD), Rare, Threatened, or Endangered Species (RARE), Spawning, Reproduction and/or Early Development (SPWN) and Preservation of Biological Habitats of Special Significance (BIOL).

Discussion of Finding E.2. The southernwestern portion of Riverside County is within the San Diego Region. The Riverside County portion of the San Diego Region falls within Santa Margarita Hydrologic Unit. The major streams within the Riverside County portion of the Santa Margarita Hydrologic Unit are the Santa Margarita River, Temecula Creek, and Murrieta Creek. Other surface water bodies include De Luz Creek, Sandia Canyon Creek, Warm Springs Creek, San Gertrudis Creek, and Wilson Creek. . Major inland waterbodies include Lake Skinner and Vail Lake.

The Riverside County portion of the Santa Margarita Hydrologic Unit includes unincorporated portions of Riverside County, the Cities of Menifee, Murrieta, Temecula, and Wildomar..

Based on the 2000 census, approximately 150,000 people resided within the permitted area. . Since the 2000 census, however, several new developments, especially in the Cities of Temecula and Murrieta have increased the housing stock of the area, and the population is now significantly higher. As of January 1, 2009, approximately 250,000 people reside in the permitted area, with approximately 30,000 people living in the

[135] Building Industry Association et al., v. State Water Resources Control Board, et al. 2004.
[136] USEPA, 1998. Jan. 21, 1998 correspondence, "State Board/OCC File A-1041 for Orange County," from Alexis Strauss to Walt Petit, and March 17, 1998 correspondence from Alexis Strauss to Walt Petit.

unincorporated area and approximately 220,000 living in the Cities of Menifee, Murrieta, Temecula and Wildomar.[137]

Finding E.3. This Order is in conformance with State Water Board Resolution No. 68-16, *Statement of Policy with Respect to Maintaining High Quality Waters in California*, and the federal Antidegradation Policy described in 40 CFR 131.12.

Discussion of Finding E.3. Runoff management programs are required to be designed to reduce pollutants in storm water MS4 discharges to the maximum extent practicable and achieve compliance with water quality standards. Therefore, implementation of runoff management programs, which satisfy the requirements of Order No. R9-2010-0016, will prevent violations of receiving water quality standards. The Basin Plan states that "Water quality objectives must […] conform to US EPA regulations covering antidegradation (40 CFR 131.12) and State Water Board Resolution 68-16, Statement of Policy with Respect to Maintaining High Quality of Waters in California." As a result, when water quality standards are met, USEPA and State Water Board antidegradation policy requirements are also met.

Finding E.4. Section 6217(g) of the Coastal Zone Act Reauthorization Amendments of 1990 (CZARA) requires coastal states with approved coastal zone management programs to address non-point pollution impacting or threatening coastal water quality. CZARA addresses five sources of non-point pollution: agriculture, silviculture, urban, marinas, and hydromodification. This NPDES permit addresses the management measures required for the urban category, with the exception of septic systems. The adoption and implementation of this NPDES permit relieves the Permittee from developing a non-point source plan, for the urban category, under CZARA. The San Diego Water Board addresses septic systems through the administration of other programs.

Discussion of Finding E.4. Coastal states are required to develop programs to protect coastal waters from nonpoint source pollution, as mandated by the federal CZARA. CZARA Section 6217 identifies polluted runoff as a significant factor in coastal water degradation, and requires implementation of management measures and enforceable policies to restore and protect coastal waters. In lieu of developing a separate NPS program for the coastal zone, California's NPS Pollution Control Program was updated in 2000 to address the requirements of both the CWA section 319 and the CZARA section 6217 on a statewide basis. The California Coastal Commission (CCC), the State Water Board, and the nine Regional Water Quality Control Boards are the lead State agencies for upgrading the program, although 20 other State agencies also participate. Pursuant to the CZARA (6217(g) Guidance Document the development of runoff management programs pursuant to this NPDES permit fulfills the need for coastal cities to develop an runoff non-point source plan

[137] Fiscal Year 2008-2009 Santa Margarita Watershed Annual Report

identified in the State's Non-point Source Program Strategy and Implementation Plan.[138]

Finding E.5. Section 303(d)(1)(A) of the CWA requires that "Each state shall identify those waters within its boundaries for which the effluent limitations…are not stringent enough to implement any water quality standard (WQS) applicable to such waters." The CWA also requires states to establish a priority ranking of impaired waterbodies known as Water Quality Limited Segments and to establish Total Maximum Daily Loads (TMDLs) for such waters. This priority list of impaired waterbodies is called the Section 303(d) List. The 2006 303(d) List was approved by the State Water Board on October 25, 2006. On June 28, 2007 the 2006 303(d) List for California was given final approval by the United States Environmental Protection Agency (USEPA). The 303(d) List was recently updated, and on December 16, 2009 the 2008 303(d) List was approved by the San Diego Water Board. The 2008 303(d) List is awaiting State Water Board and USEPA approval.

Discussion of Finding E.5. Section 303(d) of the federal CWA (CWA, 33 USC 1250, et seq., at 1313(d)), requires States to identify waters that do not meet water quality standards after applying certain required technology-based effluent limits ("impaired" water bodies). States are required to compile this information in a list and submit the list to USEPA for review and approval. This list is known as the Section 303(d) list of impaired waters. As part of this listing process, States are required to prioritize waters/watersheds for future development of TMDLs. The State Water Board and Regional Water Boards have ongoing efforts to monitor and assess water quality, to prepare the Section 303(d) list, to prioritize waters/watersheds for TMDL development and to subsequently develop TMDLs. TMDLs developed and adopted by the San Diego Water Board are incorporated into the Basin Plan via a Basin Plan Amendment as authorized under section 13240 of the California Water Code. The 2006 California 303(d) List identifies impaired receiving water bodies and their watersheds within the State of California.[139] The San Diego Water Board recently updated the 303(d) List and adopted the 2008 303(d) List on December 16, 2009.[140] The number of water bodies listed as impaired in the Riverside County portion of the Santa Margarita Hydrologic Unit increased between the 2006 and 2008 303(d) Lists, indicating the receiving water quality has been degraded further. Storm water and non-storm water runoff that is discharged from the Copermittees' MS4s is a leading cause of receiving water quality impairment in the San Diego Region.

Finding E.6. This Order does not constitute an unfunded local government mandate subject to subvention under Article XIIIB, Section (6) of the California Constitution for several reasons, including, but not limited to, the following. First, this Order

[138] State Water Board/CCC, 2000. Nonpoint Source Program Strategy and Implementation Plan, 1998-2013 (PROSIP).
[139] The approved 2006 Clean Water Act Section 303(d) List of Water Quality Limited Segments is on-line at: http://www.waterboards.ca.gov/tmdl/303d_lists2006.html.
[140] The 2008 Clean Water Act Section 303(d) List of Water Quality Limited Segments, approved by the San Diego Water Board, is available on-line at http://www.swrcb.ca.gov/rwqcb9/water_issues/programs/303d_list/index.shtml

implements federally mandated requirements under federal Clean Water Act section 402. (33 U.S.C. § 1342(p)(3)(B).) Second, the local agency Copermittees' obligations under this Order are similar to, and in many respects less stringent than, the obligations of non-governmental and new dischargers who are issued NPDES permits for storm water and non-storm water discharges. Third, the local agency Copermittees have the authority to levy service charges, fees, or assessments sufficient to pay for compliance with this Order. Fourth, the Copermittees have requested permit coverage in lieu of compliance with the complete prohibition against the discharge of pollutants contained in federal Clean Water Act section 301, subdivision (a) (33 U.S.C. § 1311(a)) and in lieu of numeric restrictions on their storm water discharges. Fifth, the local agencies' responsibility for preventing discharges of waste that can create conditions of pollution or nuisance from conveyances that are within their ownership or control under State law predates the enactment of Article XIIIB, Section (6) of the California Constitution. Likewise, the provisions of this Order to implement total maximum daily loads (TMDLs) are federal mandates. The federal Clean Water Act requires TMDLs to be developed for water bodies that do not meet federal water quality standards. (33 U.S.C. sec. 1313(d).) Once the U.S. Environmental Protection Agency or a state develops a TMDL, federal law requires that permits must contain effluent limitations consistent with the assumptions of any applicable wasteload allocation. (40 C.F.R. sec. 122.44(d)(1)(vii)(B).)

Discussion of Finding E.6. This Order does not constitute an unfunded local government mandate subject to subvention under Article XIIIB, Section (6) of the California Constitution for several reasons, including, but not limited to, the following. First, this Order implements federally mandated requirements under federal Clean Water Act section 402, subdivision (p)(3)(B). (33 U.S.C. § 1342(p)(3)(B).) This includes federal requirements to effectively prohibit non-storm water discharges, to reduce the discharge of pollutants in storm water to the maximum extent practicable, and to include such other provisions as the Administrator or the State determines appropriate for the control of such pollutants. Federal cases have held these provisions require the development of permits and permit provisions on a case-by-case basis to satisfy federal requirements. (Natural Resources Defense Council, Inc. v. U.S. E.P.A. (9th Cir. 1992) 966 F.2d 1292, 1308, fn. 17.)

The authority exercised under this Order is not reserved state authority under the Clean Water Act's savings clause (cf. Burbank v. State Water Resources Control Bd. (2005) 35 Cal.4th 613, 627-628 [relying on 33 U.S.C. § 1370, which allows a state to develop requirements which are not "less stringent" than federal requirements]), but instead, is part of a federal mandate to develop pollutant reduction requirements for municipal separate storm sewer systems. To this extent, it is entirely federal authority that forms the legal basis to establish the permit provisions. (See, City of Rancho Cucamonga v. Regional Water Quality Control Bd.-Santa Ana Region (2006) 135 Cal.App.4th 1377, 1389; Building Industry Ass'n of San Diego County v. State Water Resources Control Bd. (2004) 124 Cal.App.4th 866, 882-883.)

Second, the local agency Copermittees' obligations under this Order are similar to, and in many respects less stringent than, the obligations of non-governmental dischargers who are issued NPDES permits for storm water discharges. With a few inapplicable exceptions, the Clean Water Act regulates the discharge of pollutants from point sources (33 U.S.C. § 1342) and the Porter-Cologne regulates the discharge of waste (Wat. Code, § 13263), both without regard to the source of the pollutant or waste. As a result, the "costs incurred by local agencies" to protect water quality reflect an overarching regulatory scheme that places similar requirements on governmental and nongovernmental dischargers. (See County of Los Angeles v. State of California (1987) 43 Cal.3d 46, 57-58 [finding comprehensive workers compensation scheme did not create a cost for local agencies that was subject to state subvention].)

The Clean Water Act and the Porter-Cologne Water Quality Control Act largely regulate storm water with an even hand, but to the extent there is any relaxation of this even-handed regulation, it is in favor of the local agencies. Except for municipal separate storm sewer systems, the Clean Water Act requires point source dischargers, including discharges of storm water associated with industrial or construction activity, to comply strictly with water quality standards. (33 U.S.C. § 1311(b)(1)(C), Defenders of Wildlife v. Browner (1999) 191 F.3d 1159, 1164-1165 [noting that industrial storm water discharges must strictly comply with water quality standards].) As discussed in prior State Water Resources Control Board decisions, this Order does not require strict compliance with water quality standards. (SWRCB Order No. WQ 2001-15, p. 7.) The Order, therefore, regulates the discharge of waste in municipal storm water more leniently than the discharge of waste from non-governmental sources.

Third, the local agency Copermittees have the authority to levy service charges, fees, or assessments sufficient to pay for compliance with this Order. The fact sheet demonstrates that numerous activities contribute to the pollutant loading in the municipal separate storm sewer system. Local agencies can levy service charges, fees, or assessments on these activities, independent of real property ownership. (See, e.g., Apartment Ass'n of Los Angeles County, Inc. v. City of Los Angeles (2001) 24 Cal.4th 830, 842 [upholding inspection fees associated with renting property].) The ability of a local agency to defray the cost of a program without raising taxes indicates that a program does not entail a cost subject to subvention. (County of Fresno v. State of California (1991) 53 Cal.3d 482, 487-488.)

Fourth, the Copermittees have requested permit coverage in lieu of compliance with the complete prohibition against the discharge of pollutants contained in federal Clean Water Act section 301, subdivision (a) (33 U.S.C. § 1311(a)) and in lieu of numeric restrictions on their storm water discharges. To the extent, the local agencies have voluntarily availed themselves of the permit, the program is not a state mandate. (Accord County of San Diego v. State of California (1997) 15 Cal.4th 68, 107-108.) Likewise, the Copermittees have voluntarily sought a program-based municipal storm

water permit in lieu of a numeric limitations approach on their storm water discharge. (See City of Abilene v. U.S. E.P.A. (5th Cir. 2003) 325 F.3d 657, 662-663 [noting that municipalities can choose between a management permit or a permit with numeric limitations].) The local agencies' voluntary decision to file a report of waste discharge proposing a program-based permit is a voluntary decision not subject to subvention. (See Environmental Defense Center v. USEPA (9th Cir. 2003) 344 F.3d 832, 845-848.)

Fifth, the local agencies' responsibility for preventing discharges of waste that can create conditions of pollution or nuisance from conveyances that are within their ownership or control under state law predates the enactment of Article XIIIB, Section (6) of the California Constitution.

Finding E.7. Runoff treatment and/or mitigation must occur prior to the discharge of runoff into receiving waters. Treatment BMPs must not be constructed in waters of the U.S. or State unless the runoff flows are sufficiently pretreated to protect the values and functions of the water body. Federal regulations at 40 CFR 131.10(a) state that in no case shall a state adopt waste transport or waste assimilation as a designated use for any waters of the U.S. Authorizing the construction of an runoff treatment facility within a water of the U.S., or using the water body itself as a treatment system or for conveyance to a treatment system, would be tantamount to accepting waste assimilation as an appropriate use for that water body. Furthermore, the construction, operation, and maintenance of a pollution control facility in a water body can negatively impact the physical, chemical, and biological integrity, as well as the beneficial uses, of the water body. Without federal authorization (e.g., pursuant to Clean Water Act Section 404), waters of the U.S. may not be converted into, or used as, waste treatment or conveyance facilities. Similarly, waste discharge requirements pursuant to California Water Code Section 13260 are required for the conversion or use of waters of the State as waste treatment or conveyance facilities. Diversion from waters of the U.S./State to treatment facilities and subsequent return to waters of the U.S. is allowable, provided that the effluent complies with applicable NPDES requirements.

Discussion of Finding E.7. Runoff treatment and/or mitigation in accordance with any of the requirements in the Order must occur prior to the discharge of storm water into receiving waters. Allowing storm water polluted runoff to enter receiving waters prior to treatment to the MEP will result in degradation of the water body and potential exceedances of water quality standards, from the discharge point to the point of dissipation, infiltration, or treatment. Furthermore, the construction, operation, and maintenance of a pollution control facility in a water body can negatively impact the physical, chemical, and biological integrity, as well as the beneficial uses, of the water body. This requirement is supported by federal regulation 40 CFR 131.10(a) and USEPA guidance. According to USEPA,[141] "To the extent possible, municipalities

[141] USEPA, 1992. Guidance Manual for the Preparation of Part II of the NPDES Permit Applications for Discharges from Municipal Separate Storm Sewer Systems. EPA 833-B-92-002.

should avoid locating structural controls in natural wetlands. Before considering siting of controls in a natural wetland, the municipality should demonstrate that it is not possible or practicable to construct them in sites that do not contain natural wetlands… Practices should be used that settle solids, regulate flow, and remove contaminants prior to discharging storm water into a wetland."

Additional Federal guidance discusses the implementation of wetlands to treat municipal storm water discharges (USEPA, 2000. *Guiding Principles for Constructed Treatment Wetlands: Providing for Water Quality and Wildlife Habitat*). It states:

> *"..treatment wetlands should not be constructed in a waters of the U.S. unless you can sufficiently pretreat the stormwater flows to protect the values and functions of the waters of the U.S. Because storm water is an unpredictable effluent source and can contain high levels of toxic substances, nutrients, and pathogens, we strongly encourage that you construct the treatment wetland in uplands and use best management practices in these projects."*[142]

Consistent with USEPA guidance, the conversion or use of waters of the U.S./State into runoff treatment facilities or conveyance facilities for untreated storm water discharges must be appropriately reviewed by both Federal and State resource agencies. Such projects may be subject to federal permitting pursuant to Clean Water Act Section 404 if discharges of dredged or fill material is involved.

The placement of hydromodification controls within waters of the U.S./State may also be subject to federal and/or state permitting, but would not necessarily be considered a pollutant treatment BMP. Provided the grade control structures are designed to re-establish a natural channel gradient and correct excessive changes to the sediment transport regime caused by urbanization, rather than to create a series of artificial hydrological impoundments for the purpose of treating pollution, this type of project is not considered an in-stream treatment BMP.

Finding E.8. The issuance of waste discharge requirements and an NPDES permit for the discharge of runoff from MS4s to waters of the U.S. is exempt from the requirement for preparation of environmental documents under the California Environmental Quality Act (CEQA) (Public Resources Code, Division 13, Chapter 3, section 21000 et seq.) in accordance with the CWC section 13389.

Discussion of Finding E.8. CWC Section 13389 exempts the adoption of waste discharge requirements (such as NPDES permits) from CEQA requirements: "Neither the State Board nor the regional boards shall be required to comply with the provisions of Chapter 3 (commencing with section 21100) of Division 13 of the Public Resources Code prior to the adoption of any waste discharge requirement, except requirements for new sources as defined in the Federal Water Pollution Control Act or acts amendatory thereof or supplementary thereto."

[142] USEPA, 2000. Guiding Principles for Constructed Treatment Wetlands: Providing for Water Quality and Wildlife Habitat, (EPA 843-B-00-003).

This CEQA exemption was challenged during BIA's (and others') appeal of Order No. 2001-01. BIA contended that the CEQA exemption did not apply to permit requirements where the San Diego Water Board utilized its discretion to craft permit requirements which were more prescriptive than required by federal law. The Court of Appeal, Fourth Appellate District disagreed with this argument, stating "we also reject Building Industry's argument to the extent it contends the statutory CEQA exemption in Water Code section 13389 is inapplicable to a particular NPDES permit provision that is discretionary, rather than mandatory, under the CWA."[143] On further appeal by BIA, the California State Supreme Court declined to hear the matter.

In a recent decision, the Court of Appeal of the State of California, Second Appellate District, upheld the CEQA exemption for municipal storm water NPDES permits (County of Los Angeles, et al. v. California State Water Resources Control Board, et al.).[144]

Finding E.9. Storm water discharges from developed and developing areas in Riverside County are significant sources of certain pollutants that cause, may be causing, threatening to cause or contributing to water quality impairment in the waters of Riverside County. Furthermore, as delineated in the CWA section 303(d) list in Table 2, the San Diego Water Board has found that there is a reasonable potential that municipal storm water and non-storm water discharges from MS4s cause or may cause or contribute to an excursion above water quality standards for the following pollutants: Indicator Bacteria, Copper, Manganese, Iron, Chlorpyrifos, Sulfates, Phosphorous, Nitrogen, Total Dissolved Solids, Toxicity and Turbidity.. In accordance with CWA section 303(d), the San Diego Water Board is required to establish Total Maximum Daily Loads (TMDLs) for these pollutants to these waters to eliminate impairment and attain water quality standards. Therefore, certain early pollutant control actions and further pollutant impact assessments by the Copermittees are warranted and required pursuant to this Order.

Discussion of Finding E.9. Section 303(d)(1)(A) of the Clean Water Act (CWA) requires that:

> "*Each state must identify those waters within its boundaries for which the effluent limitations…are not stringent enough to implement any water quality standard (WQS) applicable to such waters.*"

The CWA also requires states to establish a priority ranking of impaired waterbodies known as Water Quality Limited Segments and to establish Total Maximum Daily Loads (TMDLs) for such waters. This priority list of impaired waterbodies is called the Section 303(d) List. The current Section 303(d) List was approved by the State Water Resources Control Board (State Water Board) on October 25, 2006. On June 28, 2007 the 2006 303(d) list for California was given final approval by the United States

[143] Building Industry Association et al., v. State Water Resources Control Board, et al. 2004.
[144] Los Angeles County Super. Ct. No. BS080792. Partial publication dated November 6, 2006.

Environmental Protection Agency (USEPA). Every two years the State of California is required by CWA section 303(d) and 40 CFR(130.7) to develop and submit to the USEPA for approval an updated 303(d) list of impaired waterbodies. The San Diego Water Board recently updated the 303(d) List and adopted the 2008 303(d) List on December 16, 2009.[145] The 2008 303(d) List is awaiting approval by the State Water Board and USEPA. The number of water bodies listed as impaired in the Riverside County portion of the Santa Margarita Hydrologic Unit increased between the 2006 and 2008 303(d) Lists, indicating the receiving water quality has been degraded further.

Multiple water bodies in Riverside County have been identified as impaired and placed on the Section 303(d) list. The 303(d) listing of a waterbody and subsequent TMDL development is required when regulations under current permits, such as Technology Based Effluent Limitations (TBELs), are not stringent enough to meet Water Quality Standards and protect the Beneficial Uses of Waters of the State

Storm water discharges from developed and developing areas in Riverside County are a significant source of certain pollutants that cause, may be causing, threatening to cause or contributing to water quality impairment in the waters of Riverside County. Furthermore, the CWA section 303(d) list indicates that there is a reasonable potential that municipal storm water and dry weather discharges from MS4s cause or may cause or contribute to an excursion above water quality standards for the following pollutants: Indicator Bacteria, Copper, Manganese, Iron, Chlorpyrifos, Sulfates, Phosphorous, Nitrogen, Total Dissolved Solids, Toxicity and Turbidity (see Table 2).. In accordance with CWA section 303(d), the San Diego Water Board is required to establish TMDLs for these pollutants in these waters to eliminate impairment and attain water quality standards. Per 40 CFR(130.7), WLAs are required for all point sources, including storm water and non-storm water discharges from MS4s. Therefore, focused pollutant control actions and further pollutant impact assessments by the Copermittees are warranted and required pursuant to this Order.

MS4 Permits address only those TMDL WLAs that have been adopted by the San Diego Water Board and have been approved by the State Water Board, OAL and USEPA. WLAs are portions of a receiving water's loading capacity that is allocated to one of its existing or future point sources of pollution. To date, no TMDLs and WLAs have been adopted to address impaired water bodies in the Riverside County portion of the Santa Margarita Hydrologic Unit. When TMDLs and WLAs are adopted and approved, they will be incorporated into the MS4 permit. The TMDL WLAs in MS4 Permits can be addressed using water quality-based numeric effluent limitations (WQBELs) calculated at end-of-pipe. WQBELs must be consistent with the assumptions and requirements of the WLAs.[146]

[145] The 2008 Clean Water Act Section 303(d) List of Water Quality Limited Segments, approved by the San Diego Water Board, is available on-line at http://www.swrcb.ca.gov/rwqcb9/water_issues/programs/303d_list/index.shtml
[146] Per 40 CFR 122.44(d)(1)(vii)(B)

Finding E.10. This Order requires each Copermittee to effectively prohibit all types of unauthorized discharges of non-storm water into its MS4. However, historically pollutants have been identified as present in dry weather non-storm water discharges from the MS4s through 303(d) listings, monitoring conducted by the Copermittees under Order No. R9-2004-001, and there are others expected to be present in dry weather non-storm water discharges because of the nature of these discharges. This Order includes action levels for pollutants in non-storm water, dry weather, discharges from the MS4 designed to ensure that the requirement to effectively prohibit all types of unauthorized discharges of non-storm water in the MS4 is being complied with. Action levels in the Order are based upon numeric or narrative water quality objectives and criteria as outlined in the Basin Plan, Water Quality Control Plan for Ocean Waters of California (Ocean Plan), and State Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California (State Implementation Policy or SIP). An exceedance of an action level requires specified responsive action by the Copermittees. This Order describes what actions the Copermittees must take when an exceedance of an action level is observed. Exceedances of non-storm water action levels do not alone constitute a violation of this Order but could indicate non-compliance with the requirement to effectively prohibit all types of unauthorized non-storm water discharges into the MS4 or other prohibitions established in this Order. Failure to undertake required source investigation and elimination action following an exceedance of a non-storm water action level (NAL or action level) is a violation of this Order. The San Diego Water Board recognizes that use of action levels will not necessarily result in detection of all unauthorized sources of non-storm water discharges because there may be some discharges in which pollutants do not exceed established action levels. However, establishing NALs at levels appropriate to protect water quality standards is expected to lead to the identification of significant sources of pollutants in dry weather non-storm water discharges.

Discussion of Finding E.10. This Order includes the existing requirement that Copermittees effectively prohibit all types of unauthorized non-storm water discharges in the MS4s. It also includes the following prohibition set forth in the Basin Plan: “The discharge of waste to waters of the state in a manner causing, or threatening to cause a condition of pollution, contamination or nuisance as defined in California Water Code section 13050 is prohibited.” (Prohibition A.1.) As discussed in the Order’s Findings on discharge characteristics, e.g., C.2., C.4., C.6., C.7., C.9., C.14., and C.15., the Copermittees’ reliance on BMPs for the past 20 years has not resulted in compliance with applicable water quality standards or compliance with the requirement to effectively prohibit all types of unauthorized discharges of non-storm water in the MS4. The San Diego Water Board has evaluated (in accordance with 40 CFR 122.44(d)(1)) past and existing control (BMPs), non-storm water effluent monitoring results, the sensitivity of the species in receiving waters (e.g. endangered species), and the potential for effluent dilution and has determined that existing BMPs to control pollutants in storm water discharges are not sufficient to protect water quality standards in receiving waters and the existing requirement that Copermittees

effectively prohibit all types of unauthorized non-storm water discharges into the MS4 historically results in the discharge of pollutants to the receiving waters.

Therefore it is appropriate to establish dry weather non-storm water action levels based upon established water quality standards to measure pollutants levels in the discharge of dry weather non-storm water that could indicate non-compliance with the requirement to effectively prohibit al types of unauthorized non-storm water discharges into the MS4 and/or that these discharges are causing, or threatening to cause, a condition of pollution, contamination or nuisance in the receiving waters. NALs are not numeric effluent limitations. While not alone a violation of this Order, an exceedance of an NAL requires the Copermittees to initiate a series of source investigation and elimination actions to address the exceedance. Results from the NAL monitoring are to be used in developing the Copermittees annual work plans. Failure to undertake required source investigation and elimination action following an exceedance of an NAL is a violation of this Order. Please see further discussion in the directives section C of the fact sheet.

A purpose of monitoring, required under this and previous Orders, as stated in the Monitoring and Reporting Program is to “detect and eliminate illicit discharges and illicit connections to the MS4” and to answer the following core management questions:

1. Are conditions in receiving waters protective, or likely to be protective, of beneficial uses?
2. What is the extent and magnitude of the current or potential receiving water problems?
3. What is the relative MS4 discharge contribution to the receiving water problem(s)?
4. What are the sources of MS4 discharge that contribute to receiving water problem(s)?
5. Are conditions in receiving waters getting better or worse?

For the past 4 permit cycles (20 years), Copermittees have utilized their IC/ID program to identify and eliminate non-storm water discharges that are sources of pollutants to the MS4. The Copermittees are also subject to the requirement to effectively prohibit all types of unauthorized discharges of non-storm water into the MS4s. Historically, discharges of unauthorized non-storm water do occur, resulting in the discharge of pollutants to the receiving water. NALs have been included in this Order to ensure that the Copermittees comply with the requirement to effectively prohibit all types of unauthorized non-storm water discharges that are a source of pollutants in the receiving waters.

F. Public Process

Finding F.1. The San Diego Water Board has notified the Copermittees, all known interested parties, and the public of its intent to consider adoption of an Order prescribing waste discharge requirements that would serve to renew an NPDES permit for the existing discharge of runoff.

Discussion of Finding F.1. Public notification of development of a draft permit is required under Federal regulation 40 CFR 124.10(a)(1)(ii). This regulation states "(a) Scope. (1) The Director shall give public notice that the following actions have occurred: (ii) A draft permit has been prepared under Sec. 124.6(d)." Public notifications "shall allow at least 30 days for public comment," as required under Federal regulation 40 CFR 124.10(b)(1).

Finding F.2. The San Diego Water Board has held public hearings on Month Day, 2010 and heard and considered all comments pertaining to the terms and conditions of this Order.

Discussion of Finding F.2. Public hearings are required under CWC Section 13378, which states "Waste discharge requirements and dredged or fill material permits shall be adopted only after notice and any necessary hearing." Federal regulation 40 CFR 124.12(a)(1) also requires public hearings for draft permits, stating "The Director shall hold a public hearing whenever he or she finds, on the basis or requests, a significant degree of public interest in a draft permit(s)." Regarding public notice of a public hearing, Federal regulation 40 CFR 124.10(b)(2) states that "Public notice of a public hearing shall be given at least 30 days before the hearing."

IX. DIRECTIVES

This section discusses significant changes which have been made to the requirements of the Order from the requirements which were previously included in Order No. R9-2004-001. For each section of the Order than has been changed there is a discussion which describes the change that was made and provides the rationale for the change. In addition, comments on the Copermittees' ROWD recommendations, as they pertain to each changed requirement of the Order, are provided.

Requirements of the Order that are not discussed in this section have not been significantly changed from those requirements previously included in Order No. R9-2004-001. For such requirements, discussions and rationale for the requirements can be found in section VIII of the Fact Sheet/Technical Report for San Diego Water Board Order No. R9-2004-001, dated July 14, 2004. Section VIII also provides additional background information for those requirements that have undergone significant change which are described in detail in this report. The Fact Sheet/Technical Report is available for download at:

http://www.waterboards.ca.gov/sandiego/water_issues/programs/stormwater/rsd_stormwater.shtml

Legal authority citations are provided for each major section of the Tentative Order. These citations apply to all applicable requirements within the section for which they are provided.

A. Prohibitions and Receiving Water Limitations

The following legal authority applies to section A:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: The Water Quality Control Plan for the San Diego Basin (Basin Plan) contains the following waste discharge prohibition: "The discharge of waste to waters of the state in a manner causing, or threatening to cause a condition of pollution, contamination, or nuisance as defined in California Water Code Section 13050, is prohibited."

California Water Code section 13050(l) states "(1) 'Pollution' means an alteration of the quality of waters of the state by waste to a degree which unreasonably affects either of the following: (A) The water for beneficial uses. (B) Facilities which serve beneficial uses. (2) 'Pollution' may include "contamination."

California Water Code section 13050(k) states "'Contamination' means an impairment of the quality of waters of the state by waste to a degree which creates a hazard to public health through poisoning or through the spread of disease. 'Contamination' includes any equivalent effect resulting from the disposal of waste, whether or not waters of the state are affected."

California Water Code section 13050(m) states "'Nuisance' means anything which meets all of the following requirements: (1) Is injurious to health, or is indecent or offensive to the senses, or an obstruction to the free use of property, so as to interfere with the comfortable enjoyment of life or property. (2) Affects at the same time an entire community or neighborhood, or any considerable number of persons, although the extent of the annoyance or damage inflicted upon individuals may be unequal. (3) Occurs during, or as a result of, the treatment or disposal of wastes."

California Water Code section 13241 requires each regional board to "establish such water quality objectives in water quality control plans as in its judgment will ensure the reasonable protection of beneficial uses and the prevention of nuisance […]."

California Water Code Section 13243 provides that "A regional board, in a water quality control plan or in waste discharge requirements, may specify certain conditions or areas where the discharge of waste, or certain types of waste, will not be permitted."

California Water Code Section 13263(a) provides that waste discharge requirements prescribed by the San Diego Water Board implement the Basin Plan.

Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(A - D) require municipalities to implement controls to reduce pollutants in storm water runoff from commercial, residential, industrial, and construction land uses or activities.

Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(A - D) require municipalities to have legal authority to control various discharges to their MS4.

Federal NPDES regulation 40 CFR 122.44(d)(1) requires municipal storm water permits to include any requirements necessary to "[a]cheive water quality standards established under section 303 of the CWA, including State narrative criteria for water quality."

Federal NPDES regulation 40 CFR 122.44(d)(1)(i) requires NPDES permits to include limitations to "control all pollutants or pollutant parameters (either conventional, nonconventional, or toxic pollutants) which the Director determines are or may be discharged at a level which will cause, have reasonable potential to cause, or contribute to an excursion above any State water quality standard, including State narrative criteria for water quality."

Section A of the Order combines two previously distinct requirement sections – Prohibitions and Receiving Water Limitations. These sections have been combined into one section for organization purposes and to reduce redundancy, since both sections address the same issue. These changes have no net effect on the implementation and enforcement of the Order.

Section A.3 describes the “iterative process.” The Copermittees must reduce the discharge of storm water pollutants to the MEP and ensure that their MS4 discharges do not cause or contribute to violations of water quality standards. If the Copermittees have reduced storm water pollutant discharges to the MEP, but their discharges are still causing or contributing to violations of water quality standards, the Order provides a clear and detailed process for the Copermittees to follow. This process is often referred to as the "iterative process" and can be found at section A.3. The language of section A.3 is prescribed by the State Water Board and is included in MS4 permits statewide. Section A.3 essentially requires additional BMPs to be implemented until MS4 storm water discharges no longer cause or contribute to a violation of water quality standards.

The State Policy with respect to maintaining high quality waters has been added to clarify that discharges from the MS4 that cause or contribute to a violation of the Policy for high quality waters is prohibited.

B. Non-Storm Water Discharges

The following legal authority applies to section B:

Broad Legal Authority: CWA sections 402, 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F), 40 CFR 122.26(d)(2)(iv) and 40 CFR 122.44.

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B) requires MS4 operators "to detect and remove (or require the discharger to the municipal separate storm sewer to obtain a separate NPDES permit for) illicit discharges and improper disposal into the storm sewer."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B)(1) provides that the Copermittees shall prevent all types of illicit discharges into the MS4 except for certain non-storm water discharges.

Section B of the Order has been reworded to simplify and clarify the requirements for addressing non-storm water discharges that are not prohibited. This rewording has no net effect on the implementation and enforcement of the Order.

Section B.2 has been modified by the removal of landscape irrigation, irrigation water and lawn watering from the list of non-storm water discharges that are not prohibited, i.e. landscape irrigation, irrigation water and lawn watering discharges into and from the MS4 are now prohibited. Saline swimming pool discharges have been added as a footnote to the list provided the discharge is directly to a saline water body (see Finding C.14 and Discussion). Language has been added to the section to clarify differences in the federal regulations under 40 CFR 122.26(d)(iv)(B) and for the authority of the Director (San Diego Water Board) in regards to exempted discharges.

The following exemptions have been removed from Section B, per identification as a source and conveyance of pollutants to waters of the United States when discharged from the MS4: landscape irrigation, irrigation water and lawn watering. Therefore, these illicit discharges must be addressed per 40 CFR 122.26(B). The San Diego Water Board has also found that such discharges contain waste, and as such the San Diego Water Board is requiring these discharges be addressed as illicit discharges by the Copermittees. This is consistent with the Federal Regulations (55 Fed Reg 48037). Thus, the discharges are to be prohibited via ordinance, order or similar means and incorporated as part of the Copermittees IC/ID program. These previously exempted discharges have been identified by the San Diego Water Board and the Permittees as a source of pollutants and conveyance of pollutants to waters of the United States in the following:

In educational materials developed by The Cities and County of Riverside "Only Rain in the Storm Drain" Pollution Prevention Program, the Landscape and Garden brochure states: "Soil, yard wastes, *over-watering* [emphasis added] and garden chemicals become part of the urban runoff mix that winds it way through streets, gutters and storm drains before entering lakes, rivers, streams, etc."

In 2006, the State Water Quality Control Board allocated Grant funding to the Smarttimer/Edgescape Evaluation Program (SEEP). The project targets irrigation runoff by retrofitting existing development and documenting the conservation and runoff improvements. The Grant Application states that "Irrigation runoff contributes flow & pollutant loads to creeks and beaches that are 303(d) listed for bacteria indicators". Furthermore, the grant application states that "Regional program managers agree that the reduction and/or elimination of irrigation-related urban flows and associated pollutant loads may be key to successful attainment of water quality and beneficial use goals as outlined in the San Diego Basin Plan and Bacteria TMDL over the long term". This is reinforced in the project descriptions and objectives: "Elevated dry-weather storm drain flows, composed primarily … of landscape irrigation water wasted as runoff, carry pollutants that impair recreational use and aquatic habitats all along Southern California's urbanized coastline. Storm drain systems carry the wasted water, along with landscape derived pollutants such as bacteria, nutrients and pesticides, to local creeks and the ocean. Given the local Mediterranean climate, excessive perennial dry season stream flows are an unnatural hydrologic pattern, causing species shifts in local riparian communities and warm, unseasonal contaminated freshwater plumes in the near-shore marine environment". The basis of this grant project is that over-irrigation (landscape irrigation, irrigation water and lawn watering) into the MS4 is a source and conveyance of pollutants. In addition, they indicate that the alteration of natural flows is impacting the Beneficial Uses of waters of the State. The results of this study can be applied broadly to any area where over-irrigation takes place. Preliminary results from the study indicate that that over-irrigation (landscape irrigation, irrigation water and lawn watering) into the MS4 *is* a source and conveyance of pollutants.

On December 18, 2009, the San Diego Water Board adopted Order. No. R9-2009-0002, the fourth-term Orange County permit, which found that over-irrigation (landscape irrigation, irrigation water and lawn watering) into the MS4 is a source and conveyance of pollutants. Landscape irrigation, irrigation water, and lawn watering were categories removed from the list of non-storm water discharges not prohibited to be discharged into the MS4.

Section B.3 has been clarified by the recognition of building fire suppression system maintenance (e.g. fire sprinklers) as an illicit discharge. The San Diego Water Board has found that such discharges contain waste, and as such the San Diego Water Board is requiring these discharges be addressed as illicit discharges by the Copermittees. This is consistent with the Federal Regulations (55 Fed Reg 48037).

Thus, the discharges are to be prohibited via ordinance, order or similar means and incorporated as part of the Copermittees IC/ID program.

C. Non Storm Water Dry Weather Action Levels

The following legal authority applies to Section C:

Broad Legal Authority: CWA section 402, 402(p)(3)(B)(ii), CWC §13377. 40 CFR 122.26(d)(2)(i)(B, C, E, and F), and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority:
The Clean Water Act section 402(p)(3)(B)(ii) provides that MS4 permits "shall include a requirement to effectively prohibit non-storm water discharges into the storm sewers."

Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(B) provides that the proposed management program "shall be based on a description of a program including a schedule, to detect and remove (or require the discharger to the municipal storm sewer to obtain a separate NPDES permit for) illicit discharges and improper disposal into the storm sewer."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B)(1) provides that the Copermittee include in its proposed management program "a program, including inspections, to implement and enforce an ordinance, orders or similar means to prevent illicit discharges to the municipal storm sewer system; this program description shall address all types of illicit discharges, however the [listed exempt] category of non-storm water discharges or flows shall be addressed where such discharges are identified by the municipality as sources of pollutants to waters of the United States."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B)(2) provides that the Copermittee include in its proposed management program "a description of procedures to conduct on-going field screening activities during the life of the permit, including areas or locations that will be evaluated by such field screens."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B)(3) provides that the Copermittee include in its proposed management program "procedures to be followed to investigate portions of the separate storm sewer system that, based on the results of the field scree, or other appropriate information, indicate a reasonable potential of containing illicit discharges or other sources of non-storm water."

Section C establishes non-storm water dry weather action levels (see also Finding C.14, Finding E.10, and the Discussion for those sections).

Non-exempted, non-storm water discharges are to be effectively prohibited from entering the MS4 or become subject to another NPDES permit (see Federal Register, Vol. 55, No. 222, pg. 47995). Conveyances which continue to accept non-exempt, non-storm water discharges do not meet the definition of MS4 and are not subject to

section 402(p)(3)(B) of the CWA unless the discharges are issued separate NPDES permits. Instead, conveyances that continue to accept non-exempt, non-storm water discharges that do not have a separate NPDES permit are subject to sections 301 and 402 of the CWA (see Federal Register, Vol. 55, No. 222, pg. 48037).

The Order requires the sampling of a representative percentage of major outfalls and other identified stations within each hydrologic subarea. While it is important to assess all major outfall discharges from the MS4 into receiving waters, to date the Copermittees have implemented a dry-weather monitoring program that has utilized 4 water quality measurements taken in receiving waters, not major outfalls. In the ROWD the Copermittees have proposed relocating IC/ID (non-storm water) monitoring sites to major outfalls and increasing the level of monitoring. Thus, it is expected that the Copermittees will need to utilize current 303(d) listings, land use, the history of IC/ID complaints and the sensitivity of receiving waters in the selection and annual sampling of a representative percentage of major outfalls in accordance with the requirements under Section C.4. It is expected the selection of major outfalls will be done in conjunction with the Copermittees required updates to the MS4 map in Section F.4.a-b of the Order.

The Order requires an increase in the number and type of pollutants sampled in non-storm water from major outfalls. To date, Copermittees have not sampled major outfalls, only receiving waters, and sampling was limited to total dissolved solids, dissolved oxygen, pH, turbidity and specific conductance. Additional sampling was generally, though not always, conducted by Copermittees if initial sampling exceeded a Copermittee threshold. With the exception of dissolved oxygen, the current thresholds do not represent water quality objectives, as sampling may not trigger a threshold, but still be exceeding a water quality objective. This Order requires non-storm water discharges be sampled for additional pollutants including indicator bacteria, nutrients (nitrate and phosphorous), Methylene Blue Active Substances (MBAS), pesticides and metals. These pollutants are expected to be present in non-storm water discharges, are pollutants for which receiving waters are 303(d) listed as impaired or have been identified as present through receiving water monitoring.

Background and Rationale for Requirements

The San Diego Water Board developed the requirements for dry weather, non-storm water action levels based upon an evaluation of existing controls, monitoring and reporting programs (effluent and receiving water), special studies, and based upon Findings C.1 C.3, C.4, C.6, C.7 and C.14. In addition, the Copermittees' ROWD supports the establishment of action levels which can be used in the effectiveness assessment program to ensure a minimum level of program implementation and identify shortcomings in their MS4 programs.[147]

Water Quality Control Plan

[147] Riverside Storm Water Copermittees. 2009. Report of Waste Discharge (San Diego Region).

Section 303(C) of the Clean Water Act requires the state to establish Water Quality Standards (WQS). WQS define the water quality goals of a waterbody, or part thereof, by designating their use or uses to be made of the water and by setting criteria necessary to protect those uses.

The San Diego Water Board's Water Quality Control Plan for the San Diego Basin (Basin Plan) designates beneficial uses, establishes water quality objectives, and contains implementation programs and policies to achieve those objectives for all waters addressed through the Basin Plan. The Basin Plan was adopted by the San Diego Water Board on September 8, 1994, and was subsequently approved by the State Water Board on December 13, 1994. Subsequent revisions to the Basin Plan have also been adopted by the San Diego Water Board and State Water Board.

State Water Board Resolution No. 88-63 establishes state policy that all waters, with certain exceptions, should be considered suitable or potentially suitable for municipal and domestic supplies. Requirements of this Order include action levels, where appropriate, reflecting municipal and domestic supply use as all waters within the County of Riverside under this Order are specifically assigned municipal and domestic supply as a Beneficial Use.

National Toxics Rule (NTR) and California Toxics Rule (CTR)

The USEPA adopted the NTR on December 22, 1992, which was amended on May 4, 1995, and November 9, 1999. The CTR was adopted by USEPA on May 18, 2000, and amended on February 13, 2001. These rules include water quality criteria for priority pollutants and are applicable to non-storm water discharges from the MS4. Criteria for 126 priority pollutants are established by the CTR. USEPA promulgated this rule to fill a gap in California water quality standards that was created in 1994 when a California court overturned the State's water quality control plans containing criteria for priority toxic pollutants. The federal criteria are legally applicable in the State of California for inland surface waters, enclosed bays and estuaries for all purposes and programs under the CWA.

Antidegradation Policy

Section 131.12 of 40 CFR requires that the State water quality standards include an antidegradation policy consistent with the federal policy. The State Water Board established California's antidegradation policy in State Water Board Resolution No. 68-16. Resolution No. 68-16 incorporates the federal antidegradation policy where the federal policy applies under federal law. Resolution No. 68-16 requires that existing quality of waters be maintained unless degradation is justified based on specific findings. The Regional Water Boards' Basin Plans implement, and incorporate by reference, both the State and federal antidegradation policies. Permitted non-storm water discharges from the MS4 are consistent with the antidegradation provision of 40 CFR section 131.12 and State Water Board Resolution No. 68-16.

Monitoring and Reporting

40 CFR Section 122.48 requires that all NPDES permits specify requirements for recording and reporting monitoring results. Sections 13267 and 13383 of CWC authorize the Regional Water Boards to require technical and monitoring reports. The Monitoring and Reporting Program establishes monitoring and reporting requirements to implement state and federal regulations. The Monitoring and Reporting Program can be found as Attachment E of the Order.

Dilution or Mixing Zones

In order to protect the Beneficial Uses of receiving waters from pollutants as a result of non-storm water MS4 discharges, this Order does not provide for a mixing zone or a zone of initial dilution except when the discharge is to the surf zone.

The San Diego Region has predominately intermittent and ephemeral rivers and streams (Inland Surface Waters) which vary in flow volume and duration at spatial and temporal scales. Therefore, it is assumed that any non-storm water discharge from the MS4 into the receiving water is likely to be of a quantity and duration that does not allow for dilution or mixing. For ephemeral systems, non-storm water discharges from the MS4 are likely to be the only surface flows present within the receiving water during the dry season. Additionally, all surface waters within the jurisdiction of this Order having been assigned with municipal supply (MUN) as a beneficial use.

It is appropriate to base numeric action levels for dry weather non-storm water discharges on these considerations.

Establishment of Action Levels

Action levels in the Order are based upon numeric or narrative water quality objectives and criteria as defined in the Basin Plan and the State Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California (State Implementation Policy or SIP). The Regional Board recognizes that use of action levels will not necessarily result in detection of all unauthorized sources of non-storm water discharges because there may be some discharges in which pollutants do not exceed established action levels.

In June of 2006, the California Water Board's Blue Ribbon Storm Water Panel released its report titled 'The Feasibility of Numerical Effluent Limits Applicable to Discharges of Storm Water Associated with Municipal, Industrial and Construction Activities.' The report only examined numerical limits as applied to storm water and not non-storm water. In the recommendations, the Blue Ribbon panel proposed storm water action levels which are computed using statistical based population approaches. For example, Section D of the Permit uses a recommended statistical approach to develop storm water action levels. The Blue Ribbon panel did not examine the efficacy of action levels or recommendations for development of action levels for non-storm water discharges.

For discharges to inland surface waters, action levels are based on the USEPA water quality criteria for the protection of aquatic species, the USEPA water quality criteria for the protection of human health, water quality criteria and objectives in the applicable State plans, effluent concentration available using best available technology, and 40 CFR 131.38. Since the assumed initial dilution factor for the discharge is zero and a mixing zone is not allowed, a non-storm water discharge from the MS4 could not cause an excursion from numeric receiving water quality objectives if the discharge is in compliance with the action levels contained in the Order. Likewise, discharges in compliance with action levels to the surf zone cannot cause excursions from water quality objectives.

Dry weather monitoring of non-storm water conducted in receiving waters under the previous Order (R9-2004-001), which relies on BMPs as controls to protect water quality standards, has identified the presence of pollutants commonly found found in non-storm water discharges. Monitoring of Indicator Bacteria, pH, Dissolved Oxygen, Phosphorus, Nitrate, Turbidity, Methylene Blue Active Substances (MBAS), and metals in receiving waters has shown concentrations that exceed state water quality criteria. It is appropriate to establish numeric action levels for these pollutants to ensure that the Copermittees are complying with the requirement to effectively prohibit all types of unauthorized non-storm water discharges into the MS4s.

Water Quality Limited Segments on the current 303(d) list (2008) within the jurisdiction of this Order have been identified due to exceedances of Sulfate and Total Dissolved Solids criteria from a source which is currently unknown (see Table 2). These pollutants are not monitored for in non-storm water effluent under the current non-storm water MS4 monitoring program. While this Order does not establish a numeric action level for these constituents at this time, this Order now requires non-storm water MS4 discharge monitoring to include monitoring for SulfatesTotal Dissolved Solids, and Chlorides.

Priority pollutants analyzed included Cadmium, Copper, Chromium, Lead, Nickel, Silver and Zinc. These priority pollutants are likely to be present in non-storm water MS4 discharges (see Finding C.3) though dissolved metal effluent monitoring was not conducted under the previous Order. The most stringent applicable water quality criteria have been identified for these seven metals and, excluding Chromium (VI), and all are dependent on receiving water hardness. The conversion factors for Cadmium and Lead are also water hardness dependent (40 CFR 131.38(b)(2)). These levels are established as the action levels for these constituents.

While effluent monitoring is not available from the previous Order, the monitoring that was done for metal concentrations in receiving waters often lacked a measurement of receiving water hardness. Due to the multiple point source discharges of non-storm water from the MS4, a discharge may enter a receiving water whose hardness will

vary temporally. In addition, hardness may vary spatially within and among receiving waters.

However, other information is available to determine the appropriateness of an action level. Existing monitoring concentrations absent of receiving water data, no dilution credit or mixing zone allowance, current 303(d) listings of receiving waters for other pollutants, receiving water monitoring data, and the classification of waters as critical habitat for endangered and species of concern, provide evidence that NALs are appropriate for these priority pollutants at this time in order to ensure that the Copermittees comply with the requirement to effectively prohibit all types of unauthorized non-storm water discharges into the MS4s.

Existing receiving water pollutant concentration data (see attachment F)provides evidence that it is appropriate to include NALs based comparisons to water quality criteria givenobserved hardness levels, assumption of a conservative hardness level when data is absent, or designation of receiving waters as having MUN as a beneficial use. Although dry weather receiving water data is limited (see attachment F), data has been collected that documents exceedances of CTR criteria for Lead, Nickel, and Copper given the measured hardness for the receiving water. Absent receiving water hardness, Zinc has been detected in receiving waters at concentrations which may be in exceedance of CTR criteria depending on receiving water hardness. Additionally, Cadmium and Chromium were detected at elevated levels, though the concentrations were within CTR criteria given the observed receiving water hardness. However, these detections typically coincided with detections of other exceedances of water quality standards for other pollutants, including metals. Chromium and Nickel were also detected at levels that did not exceed CTR, but did exceed Maximum Contaminant Levels (MCLs) for receiving waters.
As discussed, inland surface waters have conservatively been allotted a mixing zone and dilution credit of zero. As such, any discharge of these priority pollutants is likely to impact the receiving water, regardless of the quantity or rate of discharge.

As discussed in Finding C.7 and discussion, multiple receiving waters within the County of Riverside are 303(d) listed for a number of pollutants, including toxicity. The 303(d) listing of a waterbody as impaired provides evidence that the receiving water(s) are already experiencing negative impacts. These water quality limited segments are more susceptible to degradation from the synergistic addition of more pollutants, even from upstream discharges. It is therefore appropriate to include NALs designed to ensure that the Copermittees are complying with the requirement to effectively prohibit all types of unauthorized discharges of non-storm water into the MS4s.

Copermittees have monitored the receiving waters for MS4 discharges pursuant to requirements under Order R9-2004-001. Dry weather receiving water data indicates poor conditions within waters receiving non-storm water MS4 discharges Bioassessment conducted under the Order (2004-present) has documented all non-

reference sites as consistently having poor or very poor Index of Biotic Integrity (IBI) scores, likely due to receiving water chemistry and toxicity[148].

Receiving waters and downstream receiving waters within the jurisdiction of this Order contain species and/or are classified as critical habitat (or are exempted pursuant to Integrated National Resource Management Plans), for endangered, threatened and species of concern including, but not limited to, *E. newberryil, A. marmorata pallida* and *G. orcutti.*
Furthermore, the Santa Margarita River has been designated with the RARE beneficial use.

Dry Weather Non-Storm Water Action Levels Calculations for Discharges to Inland Surface Waters

On the basis of the foregoing discussion, the NALs were calculated with the following considerations and assumptions:

> No dilution credit is considered for the discharge. Therefore, the discharge must comply with the Water Quality Objective at the point of discharge.
>
> For NALs based on CTR, implementation was done using the procedure list as outlined in the SIP (see below example).

NAL CTR/SIP Calculation – Chromium VI Example:

Criteria for Priority Toxic Pollutants in the State of California is described in the CTR table listed in 40 CFR 131.38.

[148] 2007-08 and 2008-09 Copermittee Annual Progress Reports.

A		B Freshwater		C Saltwater		D Human Health (10^{-6} risk for carcinogens) For consumption of:	
# Compound	CAS Number	Criterion Maximum Conc. [d] B1	Criterion Continuous Conc. [d] B2	Criterion Maximum Conc. [d] C1	Criterion Continuous Conc. [d] C2	Water & Organisms (µg/L) D1	Organisms Only (µg/L) D2
1. Antimony	7440360					14 a,s	4300 a,t
2. Arsenic [b]	7440382	340 i,m,w	150 i,m,w	69 i,m	36 i,m		
3. Beryllium	7440417					n	n
4. Cadmium [b]	7440439	4.3 e,i,m,w,x	2.2 e,i,m,w	42 i,m	9.3 i,m	n	n
5a. Chromium (III)	16065831	550 e,i,m,o	180 e,i,m,o			n	n
5b. Chromium (VI) [b]	18540299	16 i,m,w	11 i,m,w	1100 i,m	50 i,m	n	n
6. Copper [b]	7440508	13 e,i,m,w,x	9.0 e,i,m,w	4.8 i,m	3.1 i,m	1300	
7. Lead [b]	7439921	65 e,i,m	2.5 e,i,m	210 i,m	8.1 i,m	n	n
8. Mercury [b]	7439976	[Reserved]	[Reserved]	[Reserved]	[Reserved]	0.050 a	0.051 a
9. Nickel [b]	7440020	470 e,i,m,w	52 e,i,m,w	74 i,m	8.2 i,m	610 a	4600 a
10. Selenium [b]	7782492	[Reserved] p	5.0 q	290 i,m	71 i,m	n	n
11. Silver [b]	7440224	3.4 e,i,m		1.9 i,m			
12. Thallium	7440280					1.7 a,s	6.3 a,t
13. Zinc [b]	7440666	120 e,i,m,w,x	120 e,i,m,w	90 i,m	81 i,m		

Freshwater criterion maximum concentration (CMC) = 16 ug/L
Freshwater criterion continuous concentration (CCC) = 11 ug/L

These criteria are expressed in terms of the dissolved fraction of the metal in the water column. [See footnote “m” to Table in paragraph (b)(1) of 40 CFR 131.38].

40 CFR 122.45(c) requires that this Order include effluent limitations as total recoverable concentration; therefore it is appropriate to include action levels also as total recoverable concentration.

The SIP requires that if it is necessary to express a dissolved metal value as a total recoverable and a site-specific translator has not yet been developed, the Regional Board shall use the applicable conversion factor from 40 CFR 131.38.

The term “Conversion Factor” (CF) represents the recommended conversion factor for converting a metal criterion expressed as the total recoverable fraction in the water column to a criterion expressed as the dissolved fraction in the water column.

Total recoverable concentration * CF = Dissolved concentration criterion

or

Total recoverable concentration = Dissolved concentration criterion/ CF

§ 131.38 40 CFR Ch. I (7–1–08 Edition)

Metal	Conversion factor (CF) for freshwater acute criteria	CF for freshwater chronic criteria	CF for saltwater acute criteria	CF[a] for saltwater chronic criteria
Antimony	([d])	([d])	([d])	([d])
Arsenic	1.000	1.000	1.000	1.000
Beryllium	([d])	([d])	([d])	([d])
Cadmium	[b]0.944	[b]0.909	0.994	0.994
Chromium (III)	0.316	0.860	([d])	([d])
Chromium (VI)	0.982	0.962	0.993	0.993
Copper	0.960	0.960	0.83	0.83
Lead	[b]0.791	[b]0.791	0.951	0.951
Mercury				
Nickel	0.998	0.997	0.990	0.990
Selenium		([c])	0.998	0.998

CF for Chromium VI = .982 and .962, so the total recoverable concentrations for chromium VI:
16 ug/L dissolved (CMC)/ 0.982 (CF) = 16.3 ug/L total recoverable CMC
11 ug/L dissolved (CCC) / 0.962 (CF) = 11.4 ug/L total recoverable CCC

<u>Effluent Variability multiplier and Coefficient of Variation (CV)</u>
For each concentration based on an aquatic life criterion, the long-term average (LTA) is calculated by multiplying the concentration with a factor that adjusts for effluent variability. The multiplier can be found in Table 1 of the SIP. Since this Order does not have existing data to properly conduct a variability analysis in accordance with the SIP, the CV has been set equal to 0.6 per SIP requirements. The current effluent data is limited due to the small number of representative outfalls sampled, the lack of outfalls discharging to representative waterbodies within the Region, and the targeted nature of the sampling design.

Based upon a CV of 0.6, Table 1 of the SIP requires an effluent variability as follows:
Acute Multiplier = 0.321
Chronic Multiplier = 0.527

The long-term average (LTA) is calculated by multiplying the total recoverable concentrations for zinc with the acute and chronic multipliers:
LTA Acute = 16.3 ug/L * 0.321 = 5.23
LTA Chronic = 86 11.4 ug/L * 0.527 = 6.01

The MDAL and AMAL will be based on the most limiting of the acute and chronic LTA, in the case for copper the most limiting LTA is the acute of 5.23 ug/L

NALs are calculated by multiplying the most limiting LTA with a multiplier that adjusts for the averaging periods and exceedance frequencies of the criteria and the effluent limitations. The multiplier can be found in Table 2 of the SIP. Since this Order has insufficient data, the CV has been set to 0.6 and since sampling frequency is four times a month or less, n has been set equal to 4 per the SIP.

Table 2. Long-Term Average (LTA) Multipliers for Calculating Effluent Limitations

Coefficient of Variation	MDEL Multiplier	AMEL Multiplier			MDEL/AMEL Multiplier		
	99th Percentile Occurrence Probability	95th Percentile Occurrence Probability			MDEL = 99th Percentile AMEL = 95th Percentile Occurrence Probability		
(CV)		n = 4	n = 8	n = 30	n = 4	n = 8	n = 30
0.1	1.25	1.08	1.06	1.03	1.16	1.18	1.22
0.2	1.55	1.17	1.12	1.06	1.33	1.39	1.46
0.3	1.90	1.26	1.18	1.09	1.50	1.60	1.74
0.4	2.27	1.36	1.25	1.12	1.67	1.82	2.02
0.5	2.68	1.45	1.31	1.16	1.84	2.04	2.32
0.6	3.11	1.55	1.38	1.19	2.01	2.25	2.62

Therefore, from Table 2 of the SIP, the LTA multipliers will be as follows:
MDAL Multiplier = 3.11
AMAL Multiplier = 1.55

The MDAL and AMAL limits are calculated by multiplying the LTA with an LTA multiplier for each limit:
MDAL = 5.23 ug/L * 3.11 = 16 ug/L
AMAL = 5.23 ug/L * 1.55 = 8.1 ug/L

Dry Weather Non-Storm Water Action Levels Calculations for Discharges to the Surf Zone

Based on the foregoing discussion, the Average Monthly and Maximum Daily NALs were calculated with the following considerations and assumptions:

No dilution credit is considered for the discharge. Therefore, the discharge must comply with the Water Quality Objective at the point of discharge.

Whole Effluent Toxicity (WET) Testing Requirements

A WET limit is required if a discharge causes, has a reasonable potential to cause, or contributes to an exceedance of applicable water quality standards, including numeric and narrative. Since these types of discharges are prohibited under this Order, WET limits are not applicable.

Discussion of AMALs, MDALs and Instantaneous Maximums

Where practical, action levels in this Order have been expressed as both AMALs and MDALs. Certain action levels may not practicably be expressed as AMALs and MDALs due to specific BPO language, sampling requirements and/or a lack of Criteria. Based upon the likely sampling frequency of the Copermittees, the frequency of sampling will occur such that grab samples are taken once per sampling day. This single sample would then be subject to MDALs and Instantaneous Maximum levels. In this case, the more conservative action level would apply. In addition, it is expected that some effluent monitoring will occur less than or equal to once per month. In this scenario, the MDAL, AMAL and Instantaneous Maximum levels would need to be met based upon one sample, unless sampling did not occur. For some BPOs, AMALs have been excluded and only MDALs/Instantaneous Maximums set to prevent redundancy in action levels.

Compliance with Action levels (Priority Pollutants)
Compliance with action levels shall be determined as follows:

Dischargers shall be deemed out of compliance with this Order if the Copermittee failed to take the prescribed action in response to a concentration of the priority pollutant in the monitoring sample that is greater than the action level and greater than or equal to the reported Minimum Level (exceedance of an action level). Regardless of the Copermittee's actions in response to an exceedance, they are still subject to the prohibitions found in Section A and B of the Order.

When determining to take an action in response to the AMALs and more than one sample result is available in a month, the discharger shall compute the arithmetic mean unless the data set contains one or more reported determinations of DNQ or ND. In those cases, the discharger shall compute the median in place of the arithmetic mean in accordance with the following procedure:

(1) The data set shall be ranked from low to high, reported ND determinations lowest, DNQ determinations next, followed by quantified values (if any). The order of the individual ND or DNQ determinations is unimportant.

(2) The median value of the data set shall be determined. If the data set has an odd number of data points then the median is the middle value. If the data set has an even number of data points, then the median is the average of the two values around the middle unless one or both of those points are ND or DNQ, in which case the median value shall be the lower of the two data points where DNQ is lower than a value and ND is lower than DNQ.

D. Storm Water Action Levels

The following legal authority applies to Section D:

Broad Legal Authority: CWA §402, §402(p)(3)(B)(iii), CWC §13377., 40 CFR §122.44, 40 CFR §122.26(d)(2)(i)(E and F) and 40 CFR §122.26(d)(2)(iii and iv).

Specific Legal Authority:
The Clean Water Act section 402(p)(3)(B)(iii) provides that MS4 permits "shall require controls to reduce the discharge of pollutants to the maximum extent practicable, including management practices, control techniques and system, design and engineering methods and such other provisions as the Administrator or the State determines appropriate for the control of such pollutants."

Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(E and F) provides that the Copermittee "Require compliance with conditions in ordinances, permits, contracts or orders;" and "Carry out all inspection, surveillance and monitoring procedures necessary to determine compliance and noncompliance with permit conditions …"

Copermittees must conduct a comprehensive monitoring program as required under Federal NPDES regulations 40 CFR 122.26(d)(2)(iii).

Federal NPDES regulations 40 CFR 122.44 (d) provides that NPDES permits include any requirements necessary to "Achieve water quality standards,… including State narrative criteria for water quality."

Section D has been added to establish storm water action levels (see also Finding D.1.h and Discussion).

Introduction
The Copermittees' ROWD supports the establishment of action levels which can be used in the effectiveness assessment program to ensure a minimum level of program implementation and identify shortcomings in their MS4 programs.[149] Storm Water Action Level (SAL) concentrations, standards and constituents have been developed and incorporated into the monitoring requirements for wet weather.

SAL Concentration/Standards
SAL pollutant levels were developed from a regional subset of nationwide Phase I MS4 data. San Diego Water Board staff developed SALs by using USEPA Climate Zone 6 (arid west) data when computing SALs. Utilizing data from USEPA Climate Zone 6 is expected to produce SALs which closely reflect the environmental conditions

[149] Riverside Storm Water Copermittees. 2009. Report of Waste Discharge (San Diego Region).

experienced in Riverside County. The localized subset of data includes sampling events from multiple Southern California locations including Orange, San Diego, Riverside, Los Angeles and San Bernardino Counties. The dataset includes samples taken from highly built-out impervious areas and from storm events representative of Southern California conditions.

Additionally, utilization of regional data is appropriate due to the addition of data into the nationwide Phase I MS4 monitoring dataset in February 2008. This additional data increased the number of USEPA Climate Zone 6 samples to more than 400, and included additional monitoring events within Southern California (see Figure 2).

Figure 2. Sample Sizes Used to Calculate Storm Water Action Levels

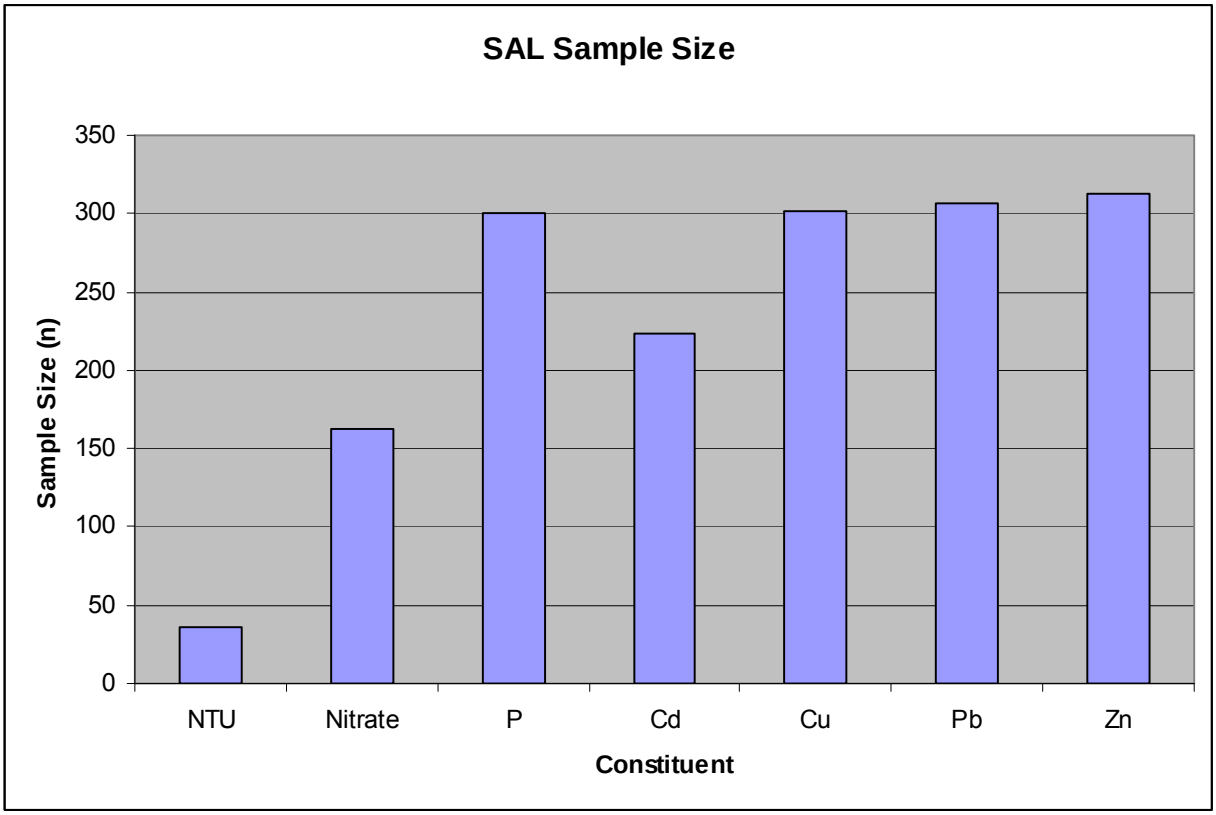

In addition, the SALs reflect the water quality standards in the Basin Plan for the San Diego Region, the California Toxic Rule and USEPA Water Quality Criteria. Since it is the goal of the SALs, through the iterative and MEP process, to have outfall storm water discharges meet all applicable water quality objectives, the list of constituents to be tested and protocol for testing has been developed to provide a reference point to evaluate the iterative MEP process.

SALs were developed based upon receiving water monitoring results and CWA Section 303(d) impaired waters listings. Nitrogen, Copper and Phosphorous are all pollutants for which receiving waters are 303(d) listed as impaired and for which

sufficient data was available to develop SALs. Additionally, receiving water monitoring, including from storm events monitored by the Copermittees, has demonstrated excursions and/or potential excursions, often absent receiving water hardness, above water quality criteria for turbidity (NTU), Cadmium, Lead and Zinc. SALs were not developed for some pollutants for which receiving waters are 303(d) listed as impaired due to a lack of representative data available. These pollutants are required to be monitored but are not subject to a SAL under the Order.

Monitoring

The SALs require the measurement of hardness and to provide more specificity in the assessment of samples with SALs for total metal concentrations. While USEPA Climate Region 6 data includes a large sample size for concentrations of total metals, the impact the concentration will have on receiving waters will vary with receiving water hardness. Since it is the goal of the SALs, through the iterative and MEP process, to have MS4 storm water discharges meet all applicable water quality objectives, the hardness of the receiving water should be used when assessing the total metal concentration of a sample. Thus, when an exceedance of a SAL concentration is detected for a metal the Copermittee must determine if that exceedance is above the existing applicable water quality limitation based upon the hardness of the receiving water. The water quality limitations Permittees must use to assess total metal SAL exceedances are the California Toxic Rule (CTR) and USEPA National Recommended Water Quality Criteria for Freshwater Aquatic Life 1 hour maximum concentrations. The 1 hour maximum concentration is to be used for comparison since it is expected to most replicate the impacts to waters of the State from the first flush following a precipitation event.

E. Legal Authority

The following legal authority applies to section E:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.26(d)(2)(i)(A) provides that the Copermittees shall develop and implement legal authority to "Control through ordinance, order or similar means, the contribution of pollutants to the municipal storm sewer by storm water discharges associated with industrial activity and the quality of storm water discharged from sites of industrial activity."

Federal NPDES regulation 40 CFR 122.26(d)(2)(i)(D) provides that the Copermittees shall develop and implement legal authority to "Control through interagency agreements among coapplicants the contribution of pollutants from one portion of the municipal system to another portion of the municipal system."

Illicit discharge is defined under Federal NPDES regulation 40 CFR 122.26(b)(2) as "any discharge to a municipal separate storm sewer system that is not composed entirely of storm water except discharges pursuant to a NPDES permit (other than the NPDES permit for discharges from the municipal separate storm sewer) and discharges resulting from fire fighting activities."

Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(A - D) require municipalities to implement controls to reduce pollutants in storm water runoff from commercial, residential, industrial, and construction land uses or activities.

Federal NPDES regulation 40 CFR 122.26(d)(1)(ii) requires from the Copermittee "A description of existing legal authority to control discharges to the municipal separate storm sewer system."

Section E.1.b Prohibit all identified illicit discharges not otherwise allowed pursuant to section B.2 including but not limited to:

(1) Sewage;
(2) Discharges of wash water resulting from the hosing or cleaning of gas stations, auto repair garages, or other types of automotive services facilities;
(3) Discharges resulting from the cleaning, repair, or maintenance of any type of equipment, machinery, or facility including motor vehicles, cement-related equipment, and port-a-potty servicing, etc.;
(4) Discharges of wash water from mobile operations such as mobile automobile washing, steam cleaning, power washing, and carpet cleaning, etc.;

(5) Discharges of wash water from the cleaning or hosing of impervious surfaces in municipal, industrial, commercial, and residential areas including parking lots, streets, sidewalks, driveways, patios, plazas, work yards and outdoor eating or drinking areas, etc.;
(6) Discharges of runoff from material storage areas containing chemicals, fuels, grease, oil, or other hazardous materials;
(7) Discharges of pool or fountain water containing chlorine, biocides, toxic amounts of salt, or other chemicals; discharges of pool or fountain filter backwash water;
(8) Discharges of sediment, pet waste, vegetation clippings, or other landscape or construction-related wastes; and
(9) Discharges of food-related wastes (e.g., grease, fish processing, and restaurant kitchen mat and trash bin wash water, etc.).

Duplicative language has been removed from this section.

Section E.1.j has been added to the Order to ensure that BMPs implemented by third parties are effective. Since the Copermittees cannot passively receive and discharge pollutants from third parties, the Copermittees must ensure discharges of storm water pollutants to the MS4 are reduced to the MEP. In order to achieve this, the Copermittees must be able to ensure that effective BMPs are being implemented by requiring the third parties to document BMP effectiveness. Regarding the Copermittees' ability to require documentation and reporting from third parties, USEPA states "municipalities should provide documentation of their authority to enter, sample, inspect, review, and copy records, etc., as well as demonstrate their authority to require regular reports."[150]

[150] USEPA, 1992. Guidance Manual for the Preparation of Part 2 of the NPDES Permit Applications for Discharges from Municipal Separate Storm Sewer Systems. EPA 833-B-92-002.

F. Jurisdictional Runoff Management Program

F.1. Development Planning Component

The following legal authority applies to section F.1:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWA section 402(a), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F), 40 CFR 131.12, and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A)(2) provides that Copermittees develop and implement a management program which is to include "A description of planning procedures including a comprehensive master plan to develop, implement and enforce controls to reduce the discharge of pollutants from municipal separate storm sewers which receive discharges from areas of new development and significant redevelopment. Such plans shall address controls to reduce pollutants in discharges from municipal separate storm sewers after construction is completed."

Federal NPDES regulation 40 CFR 122.44(d)(1) requires municipal storm water permits to include any requirements necessary to "[a]cheive water quality standards established under section 303 of the CWA, including State narrative criteria for water quality."

Sections F.1.a and F.1.b (General Plan and Environmental Review Process) require the Copermittees to update and revise their General Plan (or equivalent plan) and environmental review processes to ensure water quality and watershed protection principles are included. The Copermittees are required to detail any changes to the General Plan or environmental review process in their Jurisdictional Runoff Management Program Annual Reports.

The change made to these sections requires updating the General Plan and Environmental Review Process on an as-needed basis. Each Copermittee has either updated, is in the process of updating, or has assessed its General Plan to ensure the General Plans include the required principles and are in compliance with Order No. R9-2004-001.

Section F.1.a has been modified to include redevelopment projects in the General Plan. This change requires Copermittees to update their General Plan to include water quality and watershed protection for all new development and redevelopment projects.

Section F.1.c (Approval Process Criteria and Requirements) requires that all development projects (regardless of size) implement BMPs to reduce storm water

pollutant discharges to the MEP. Source control and site design BMP requirements were not clearly described in this section of Order No. R9-2004-001. Additional detail has been added to this section to better describe the source control and site design BMPs needed for implementation. This additional detail is consistent with the requirements of the SSMP, also known in Riverside County as the Water Quality Management Plan (WQMP). However, only source control and site design BMPs that apply to all types of development projects are required (i.e., properly designed trash storage areas).

The requirements are consistent with Order No. R9-2004-001, section F.2.a. However, some elements are not contained in the current DAMP[151] (e.g., buffer zones). One exception is that Order No. R9-2004-001's requirement that applicants must provide evidence of coverage under the General Industrial Permit has been removed, since industrial tenants for a development project are usually not known during the planning stage.

The section has been modified to reflect the prohibition of over-irrigation runoff to the MS4, as well as LID requirements. Additionally, this section requires the use of native and/or low water use plants for landscaping, where feasible.

Sections F.1.d and F.1.d.(1) (Standard Storm Water Mitigation Plans and Definition of Priority Development Project) require the Copermittees to review and update their local SSMPs (also known in Riverside County as Water Quality Management Plans – WQMPs) for compliance with the Order. The sections also require all Priority Development Projects falling under certain categories to meet SSMP requirements. The update is necessary to ensure that the Copermittees' local SSMPs are consistent with the changes that have been made to the Order's SSMP requirements. The requirement for the development/adoption of a Model SSMP has been removed since a model was completed and adopted in 2005.

The SSMP section of the Order has been reformatted for clarity. There are also some significant changes. Changes have been made in response to USEPA program evaluations, recent BMP development and effectiveness studies, recent reports on the magnitude of problems caused by hydromodification, and reviews of annual reports and the ROWD submitted by the Copermittees.

In addition, the Order requires that a one-acre threshold be phased in over three years for the priority development category. This threshold was selected to be consistent with the Phase II NPDES regulations for small municipalities. The one-acre determination applies to the amount of ground area disturbed, not the total size of the parcel or project. Each Copermittee may also lower this threshold if desired.

Section F.1.d.(2) (Priority Development Project Categories) includes several changes to improve, simplify, and clarify the Priority Development Project categories.

[151] Riverside County Storm Water Copermittees. *Drainage Area Management Plan (DAMP)2006.* July 21, 2006.

One of the most significant changes is that where a new Development Project feature, such as a parking lot, falls into a Priority Development Project Category, the entire project footprint is subject to SSMP requirements. This criterion was not included in Order No. R9-2004-001. It is included, however, in the Model San Diego SSMP that was approved by the San Diego Water Board in 2002. It is included in this Order because existing development inspections by Riverside County municipalities show that facilities included in the Priority Development Project Categories routinely pose threats to water quality. This permit requirement will improve water quality and program efficiency by preventing future problems associated with partly treated storm water runoff from redevelopment sites. This approach to improving storm water runoff from existing developments is practicable because municipalities have a better ability to regulate new developments than existing developments.

Another significant change is a new category for any new development projects that create 10,000 square feet or more of impervious surfaces (collectively over the entire project site). This category applies to commercial, industrial, residential, mixed use, and public projects on private or public land.

Development of new industrial sites was not included as a category in the Priority Development Projects in Order No. R9-2004-001 because industrial NPDES requirements already establish storm water criteria. Industrial sites are now included in the new development category in the Order to be consistent with Phase II rules and to close loopholes.

The criterion for commercial developments has been lowered to one acre from 100,000 square feet (2.3 acres). It is modified in order to be consistent with USEPA Phase II guidance, and to reflect the findings from Permittees that smaller commercial developments pose high threats to storm water discharges.

Section F.1.d.(3) (Pollutants of Concern) requires Copermittees to update their procedures for identifying pollutants of concern for each Priority Development Project. This is important to do periodically because of changing water quality conditions and designations of impairments or areas of concern. Furthermore Copermittees continually learn more about pollutant-generating activities as they conduct inspections and investigations, and that information must be incorporated into the SSMP process.

Section F.1.d.(4) (Low Impact Development BMP Requirements) has been modified to clarify some elements of low impact development. The Copermittees' ROWD proposes to revise the Riverside County Storm Water Quality BMP Design Handbook to incorporate LID design concepts.[152] This section requires Copermittees to require or implement site design BMPs at Priority Development Projects in order to reduce the amount of polluted storm water runoff from those sites. The primary approach in site design BMPs is to limit the permanent loss of existing infiltration capacity because loss

[152] Riverside Storm Water Copermittees. 2009. Report of Waste Discharge (San Diego Region).

of infiltration is a major contributor to wet weather pollution discharges. General means to accomplish that goal include retaining natural infiltration areas of a site and limiting the amount of impervious surfaces. The Order does not require a specific or relative amount of pervious surfaces be added to a project. The Order seeks to retain on-site capture of the 85th percentile storm.

First, section F.1.d.(4)(b) of the Order directs the Copermittees to require, rather than consider, new development projects to employ certain classes of site design BMPs. The required site design BMPs take advantage of features that are incorporated into the Priority Development Project, such as landscaping or walkways. It also requires that projects seek to maintain natural water drainage features rather than instinctively convey water in buried pipes and engineered ditches that eliminate natural water quality treatment functions. These types of site design BMPs are both effective and achievable.

Next, section F.1.d.(4)(d) of the Order requires that LID BMPs be sized and designed to ensure onsite retention without runoff, of the volume of runoff produced from a 24-hour 85th percentile storm event. This is consistent with other municipal stormwater NPDES permits recently adopted by the Los Angeles and Santa Ana Water Boards, as well as the permit recently adopted by the San Diego Water Board for Orange County. The requirement for a numerical BMP design standard is well established for treatment control BMPs and is required in permits throughout the nation such as in Pennsylvania, West Virginia, Georgia, and Washington D.C. Since the 85th percentile storm event has previously been used as the numeric design standard for treatment control BMPs; the same size storm event can be applied as the numeric design standard for LID BMPs. The average 24-hour, 85th percentile rainfall for the Riverside County portion of the San Diego Region was calculated to be approximately 0.6 inches of rain.[153]

The retention of natural drainage features, such as ephemeral streams, wetlands, and depressions, can be particularly important because small tributaries are essential to the maintenance of the chemical, biological, and physical integrity of larger waterbodies.[154] The loss and modification of such natural water resources to accommodate post-development storm water management leads to direct and indirect adverse effects on water quality that are felt both on the project site and off the site within the watershed.[155,156,157] Effects to aquatic beneficial uses from altered

[153] San Diego Water Board, 2004. Fact Sheet/Technical report for Order No. R9-2004-001, dated July 14, 2004.
[154] Aquatic scientists comment letter (April 10, 2003) on the Advanced Notice of Proposed Rulemaking (ANPRM) on the Clean Water Act Regulatory Definition of "Waters of the United States." (Docket ID No. OW-2002-0050). This letter is a synthesis of scientific information regarding ephemeral, intermittent, and headwater streams. It was written to USEPA by 85 leading aquatic scientists.
[155] Wright, Tiffany, et al. 2006. *Direct and Indirect Impacts of Urbanization on Wetland Quality.* Prepared by the Center for Watershed Protection for the USEPA Office of Wetlands, Oceans, an Watersheds. 81p. Available on-line at http://www.cwp.org
[156] Konrad, Christopher P. and Derek K. Booth, 2005. *Hydrologic Changes in Urban Streams and Their Ecological Significance.* American Fisheries Society Symposium. Vol. 45 pp.157-177.

drainage features can occur downstream and upstream. The length of upstream or downstream effect of channel modifications is dependant on the specific structure type and channel slope.[158] For instance, road culverts can act as partial barriers to upstream distribution of native aquatic macroinvertebrates in urban streams, while bridges can provide adequate passage.[159] As a result of the adverse effects to water quality and beneficial uses, the State of California nonpoint source pollution program management measures for urban areas includes limiting the destruction of natural drainage features and natural conveyance areas. [160]

Through its process of conditioning development projects under the CWA section 401 Water Quality Certification program, the San Diego Water Board finds that the level of site design BMP implementation in the Order is feasible for all projects. This site design BMP requirement will help ensure that site design BMPs are implemented for new development projects. Site design BMPs are a critical component of storm water runoff management at new development projects, since the BMPs provide multiple benefits including preservation of hydrologic conditions, reduction of pollutant discharges, cost effectiveness, and green space.

The site design BMP options listed do not need to be costly.[161] Some design options, such as concave vegetated surfaces or routing rooftop or walkway runoff to landscaped areas, are cost neutral.[162] Other site design BMPs, such as minimizing parking stall widths or use of efficient irrigation devices, are oftentimes already required. In addition, use of site design BMPs reduces storm water runoff quantity, allowing for treatment control BMPs and other storm water infrastructure on site to be smaller, therefore savings costs for both developers and municipalities.[163,164]

Because of the potential economic and environmental benefits of using low-impact development site design, the U.S. Department of Housing and Urban Development, Office of Policy Development and Research, developed "*The Practice of Low Impact Development (LID)*" to assist the housing industry during the land development

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[157] Coleman, Derrick, et al. 2005. *Effect of Increases in Peak Flows and Imperviousness on the Morphology of Southern California Streams*. Technical Report No. 450 of the Southern California Coastal Water Research Project.
[158] Fischenich, J.C. 2001. "*Impacts of stabilization measures*," EMRRP Technical Notes Collection (ERDC TNEMRRP- SR-32), U.S. Army Engineer Research and Development Center, Vicksburg, MS. http://www.wes.army.mil/el/emrrp
[159] Blakely, Tanya J., et al. 2006. *Barriers To The Recovery Of Aquatic Insect Communities In Urban Streams* Freshwater Biology Vol. 51(9), 1634–1645.
[160] California Nonpoint Source Encyclopedia, Management Measure 3.1.b. Runoff from Developing Areas, Site Development and Management Measure 3.3.a. Runoff from Existing Development, Existing Development.
[161] USEPA, 2000. Low-Impact Development: A literature review. EPA-841-B-00-005. 35p.
[162] Bay Area Stormwater Management Agencies Association., 1999. Start at the Source. Forbes Custom Publishing. Available on-line at: http://www.scvurppp-w2k.com/basmaa_satsm.htm. pp. 149.
[163] National Association of Home Builders Research Center. *Builders Guide to Low Impact Development.* Available on-line at http://www.toolbase.org
[164] National Association of Home Builders Research Center. *Municipal Guide to Low Impact Development.* Available on-line at http://www.toolbase.org

process. [165] This document focuses specifically on technologies that affect both the cost impacts and environmental issues associated with land development. Much of the report focuses on storm water management because low-impact development storm water management systems can save capital costs for developers and maintenance costs for municipalities.[166] The executive summary of the HUD report notes:

> *This approach to land development, called Low Impact Development (LID), uses various land planning and design practices and technologies to simultaneously conserve and protect natural resource systems and reduce infrastructure costs. LID still allows land to be developed, but in a cost-effective manner that helps mitigate potential environmental impacts. LID is best suited for new, suburban development.*

Developers can use site and structure designs that reduce building footprints, decrease the amount of paved infrastructure, and provide for dispersed drainage and infiltration of runoff from impervious surfaces to reduce the effective impervious surface.[167] The concept of effective impervious surface is important, because when runoff from these surfaces is directed to pervious areas rather to an impervious drainage system (i.e., curbs, gutters, street surfaces, storm drain pipes), it can infiltrate, evaporate, or be taken up by vegetation, thereby reducing the total volume of storm water runoff leaving a site.

The Order continues to provide the Copermittees with flexibility in implementing site design BMP requirements by providing a LID BMP waiver program.

Section F.1.d.(5) (Source Control BMP Requirements) requires that Priority Development Projects implement minimum source control BMPs. This section has been added to provide more detail and clarify the Order's requirements for source control BMPs. The minimum source control BMPs listed in the section are generally consistent with the Model WQMP.

Section F.1.d.(6) (Treatment Control BMP Requirements) is consistent with Order No. R9-2004-001, with two exceptions. First, the Order limits the selections of methods used to determine the appropriate volume of storm water runoff to be treated. The modification ensures that priority development project proponents utilize the most accurate information to determine the volume or flow of runoff which must be treated.

Second, the Order requires that treatment control BMPs selected for implementation at Priority Development Projects have a removal efficiency rating that is ranked with high

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[165] U.S. Department of Housing and Urban Development, Office of Policy Development and Research, 2003. *The Practice of Low Impact Development."* Prepared by: NAHB Research Center, Inc. Upper Marlboro, Maryland. Contract No. H-21314CA.
[166] Ibid. Executive Summary, p.x.
[167] Bay Area Stormwater Management Agencies Association. 2003. *Using Site Design Techniques to Meet Development Standards for Stormwater Quality*. Available on-line at: http://www.basmaa.org/

or medium pollutant removal frequency for the project's most significant pollutants of concern. . The requirement allows exceptions for those projects that, with a feasibility analysis, can justify the use of a treatment control BMP with a low removal efficiency for a Priority Development Project. This requirement is needed because to date, the Copermittees have generally approved low removal efficiency treatment control BMPs without justification or evidence that use of higher efficiency treatment BMPs was considered and found to be infeasible. Specifically, it has been found during audits of the Copermittees' SSMP programs that many SSMP reports do not adequately describe the selection of treatment control BMPs.[168] Moreover, USEPA's contractor Tetra Tech, Inc. recommends that "project proponents should begin with the treatment control that is most effective at removing the pollutants of concern […] and provide justification if that treatment control BMP is not selected."[169]

In addition, treatment control BMPs must be designed and implemented with measures to avoid the creation of nuisance or pollution associated with vectors, such as mosquitoes, rodents, and flies. Related guidelines are identified in guidance from CASQA.[170] Additional considerations are outlined in publications from the California Department of Health Services and University of California Division of Agriculture and Natural Resources.[171]

Section F.1.d.(7). (Low-Impact Development BMP Waiver Program) allows Copermittees to develop a LID BMP waiver program, under which projects where it is technically infeasible to implement the required LID BMPs could substitute with treatment control BMPs and a mitigation project, payment into an in-lieu funding program, and/or watershed equivalent BMPs. Some sites may be technically infeasible to implement the required LID BMPs due to the site constraints. For this reason, the San Diego Water Board has added to the Order a requirement for the Copermittees to develop such a program. The program would provide the opportunity for development projects to avoid partial or full LID BMP implementation in exchange for implementation of treatment control BMPs and mitigation. The program would maintain equal water quality benefits as properly implemented LID BMPs when partial LID BMPs are coupled with a mitigation project or in-lieu funding.

The Order includes specific minimum requirements so that the program will achieve similar water quality benefits. Any program which allows development projects to forgo LID BMP implementation must include provisions which will achieve similar water quality benefits. To ensure that this is the case for the LID BMP waiver program, minimum provisions for the program have been added to the Order

[168] PG Environmental, 2008. Riverside County Flood Control and Water Conservation District and County of Riverside MS4 Inspection Report.
[169] Tetra Tech, Inc., 2005. Program Evaluation Report –San Diego Standard Urban Storm Water Mitigation Plan (SUSMP) Evaluation. P. 5.
[170] For example, see the California Stormwater BMP Handbook guidelines for Extended Detention Basins (TC-22) at http://www.cabmphandbooks.org.
[171] Marco Metzger. "Managing Mosquitoes in Stormwater Treatment Devices." University of California Division of Agriculture and Natural Resources Publication No. 8125. Available at http://anrcatalog.ucdavis.edu.

Section F.1.d.(8). (Site Design and Treatment Control BMP Design Standards) addresses a need for the Copermittees to develop and apply consistent criteria for the design and maintenance of structural treatment BMPs. Correct BMP design is critical to ensure that BMPs are effective and perform as intended. Without design criteria, there is no assurance that this will occur, since there is no standard for design or review. As an example, Ventura County has developed a BMP manual that includes standard design procedure forms for BMPs. Ventura County's *Technical Guidance Manual for Storm Water Quality Control Measures* is available at http://www.vcstormwater.org/ publications.htm."[172] California Stormwater Quality Association (CASQA) also confirms the necessity of design criteria when it includes such criteria in its New Development and Redevelopment BMP Handbook.[173] This issue is noted in the ROWD, and the Copermittees propose to develop standard design checklist/plans/details for selected source control and treatment BMPs.

Section F.1.d.(9). (Implementation Process) requires the Copermittee to implement a process to verify compliance with SSMP requirements. As part of the SSMP, requires identification at what point in the planning process that projects must meet SUSMP requirements and what are roles/responsibilities of municipal departments. The intent of this requirement is to provide consistency in the application of the SSMPs between the Copermittees. This requirement was included in previous Order No. R9-2004-001.

Section F.1.d.(10) (Treatment BMP Review) requires Copermittees to keep their SSMPs up to date with BMP effectiveness studies for low-impact design and treatment control BMPs. This requirement will ensure that two important types of information be included in those efforts: Site design BMPs and treatment BMPs that are assessed as part of contracts with the State Water Board and San Diego Water Board. Projects funded with such state grants must include effectiveness assessments using a quality assurance plan. As a result, such studies generally provide reliable sources of local data and should be included in local SSMPs.

Sections F.1.e and F.1.f. (BMP Construction Verification and BMP Maintenance Tracking) are included in the Order to improve the effectiveness of the BMP requirements. They are included in response to recommendations from USEPA.[174] The Order requires high priority sites to be inspected annually, and allows other measures to be used for lower priority treatment control BMPs.

Section F.1.h. (Hydromodification) expands and clarifies current requirements for control of MS4 discharges to limit hydromodification effects caused by changes in runoff resulting from development and urbanization. The requirements are based on

[172] Ibid.
[173] California Stormwater Quality Association, 2003. Stormwater Best Management Practice Handbook – New Development and Redevelopment.
[174] Federal Register / Vol. 64, No. 235 / Wednesday, December 8, 1999 / Rules and Regulations. P. 68845. USEPA recommends such practices in the Phase II storm water regulations, promoting "inspections during construction to verify BMPs are built as designed."

findings and recommendations of the Riverside County Storm Water Program, the Stormwater Monitoring Coalition (SMC),[175,176] and the Storm Water Panel on Numeric Effluent Limits (Numeric Effluent Panel).[177] Added specificity is needed due to the current lack of a clear standard for controlling hydromodification resulting from development. More specific requirements are also warranted because hydromodification is increasingly recognized as a major factor affecting water quality and beneficial uses, and the Copermittees have proposed only vague and voluntary modifications to the Model WQMP. The Order is intended to ensure the intent of the proposed modifications is incorporated into each Copermittees' SSMP.

Hydromodification is the change in a watershed's runoff characteristics resulting from development, together with associated morphological changes to channels receiving the runoff. As the total area of impervious surfaces increases, infiltration of rainfall decreases, causing more water to run off the surface and at a higher velocity. Runoff from developed areas can produce erosive flows in channels under rainfall conditions which were not previously problematic. Moreover, runoff from developed areas increases the duration of time that channels are exposed to erosive flows. The increase in the volume of runoff and the length of time that erosive flows occur ultimately intensify sediment transport, causing changes in sediment transport characteristics and the hydraulic geometry (width, depth, and slope) of channels.[178]

These types of changes have been documented in southern California. It has been reported that researchers studying flood frequencies in Riverside County have found that increases in watershed imperviousness of only 9-22 percent can result in increases in peak flow rates for the two-year storm event of up to 100 percent.[179] Such changes in runoff have significant impacts on channel morphology. It has recently been found that ephemeral/intermittent channels in southern California appear to be more sensitive to changes in imperviousness than channels in other areas. Morphology of small channels in southern California was found to change with only 2-3 percent watershed imperviousness, as opposed to 7-10 percent watershed imperviousness in other parts of the nation.[180]

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[175] Coleman, Derrick, et al. 2005. *Effect of Increases in Peak Flows and Imperviousness on the Morphology of Southern California Streams.* Technical Report No. 450 of the Southern California Coastal Water Research Project.
[176] Stein, Eric and Susan Zaleski. 2005. Managing Runoff to Protect Natural Streams: The Latest Developments on Investigation and Management of Hydromodification in California. Proceedings of a special technical workshop co-sponsored by California Stormwater Quality Association (CASQA), Stormwater Monitoring Coalition (SMC), and University of Southern California Sea Grant (USC Sea Grant). Technical Report No. 475 of the Southern California Coastal Water Research Project.
[177] Storm Water Panel Recommendations to the California State Water Resources Control Board. 2006. The Feasibility of Numeric Effluent Limits Applicable to Discharges of Storm Water Associated with Municipal, Industrial, and Construction Activities.
[178] Santa Clara Valley Urban Runoff Pollution Prevention Program, 2005. Hydromodification Management Plan. P. 1-1.
[179] Schueler and Holland, 2000. Storm Water Strategies for Arid and Semi-Arid Watersheds (Article 66). The Practice of Watershed Protection.
[180] Coleman, et. al., 2005. Effect of Increases in Peak Flows and Imperviousness on the Morphology of Southern California Streams. P. iv.

Effects of hydromodification are evident in Riverside County and recognized by the Copermittees. Analyses of bioassessment data, for example, indicate that physical changes to stream channels caused by hydromodification are likely responsible, in part, for the low bioassessment scores in urbanized settings.[181] It is important to recognize that the physical changes are a direct result of MS4 discharges, but that two separate mechanisms are involved. First, is a change in the flow regime caused by the increase in impervious surfaces and loss of natural conveyance systems. Discharges to receiving waters from the MS4 outfalls do not mimic the natural discharges from former tributaries to that receiving water, and the change results in erosion. Second, the physical stream habitat in many places has been severely modified in order to efficiently convey those increased storm water discharges to the ocean. Where streams are hardened and/or buried to convey storm water, they cannot provide adequate water quality and other necessary conditions to support beneficial uses. Both of these issues are addressed in the Order.

The Copermittees' recognize the need to improve management of hydromodification. The ROWD proposes to revise the Model WQMP to incorporate additional information from ongoing hydromodification studies conducted by the SMC. The Order allows the Copermittees to adopt criteria consistent with future SMC findings in the development of their Hydromodification Management Plan (see below).

Section F.1.h. requires the Copermittees to submit a Hydromodification Management Plan (HMP) within two years of permit adoption. This is consistent with other Southern California MS4 permits.

Section F.1.h (1) describes several elements that must be included in the HMP. For example, the HMP must identify a method for assessing susceptibility of channel segments which receive runoff discharges from Priority Development Projects, and include a channel standard to ensure that the stability of the channel is not compromised as a result of discharges from the Priority Development Projects. The HMP must also identify a range of flows where Priority Development Projects could cause hydromodification effects and subsequent stream instability.

Additionally, the HMP must require Priority Development Projects to implement hydrologic control measures (such as LID or detention basins) to prevent hydromodification and resultant degradation of stream conditions downstream of project sites. To compare post-project flow rates and durations to pre-project flow rates and durations, the HMP must specify that the pre-developed (naturally occurring) flow rates and durations shall be used when assessing pre-project conditions, so that the naturally occurring hydrology is eventually restored.

In cases where a stream has been armored with concrete, rip rap, or other man-made materials, the HMP shall require the assessment of a comparable soft-bottom channel as the channel standard, as opposed to using the characteristics of the hardened

[181] See Chapter 11 of the ROWD and the 2005-06 Unified Annual Report for the analyses.

channel as the channel standard. This is to ensure that hydromodification management measures are already in place should any portion of the hardened channel be returned to its natural state, thereby restoring the physical integrity of the creek and its Beneficial Uses. For this reason, the waiver provision for hydromodification management measures for projects discharging into hardened channels was not included in the Tentative Order. The remaining exception is for projects that discharge storm water runoff into underground storm drains discharging directly into bays or the ocean and for projects discharging to waters where the entire channel bed and banks have been concrete lined all the way to ocean receiving waters.

The HMP must also include metrics for assessing impacts to downstream watercourses from Priority Development Projects, as well as assessing improvements to these watercourses. One metric that must be included is the Index of Biotic Integrity (IBI) score for benthic macroinvertebrates. This is because historic hydromodification impacts, such as concrete lining and channelization, have impacted the natural physical habitat of urban streams resulting in low IBI scores. The Copermittee's 2006-2007 monitoring indicated decreased IBI scores in the urbanized watersheds. In the absence of water chemistry and toxicity impacts, these low scores were attributed to be a result of poor physical habitat conditions.[182] Therefore, the IBI score will be a useful metric in terms of assessing both impacts to streams from Priority Development Projects and improvements due to implementation of management measures.

In addition to the hydrologic control measures that must be included in the HMP to prevent or minimize hydromodification effects from Priority Development Projects, the HMP must also include additional measures to be used on Priority Development Projects based on a prioritized consideration of the following elements in this order: 1) site-design hydrologic control measures, 2) on-site management measures, 3) the use of regional controls upstream of receiving waters, and lastly, 4) in-stream controls (not to include reinforcement with non-naturally occurring materials). The suite of management measures must also include stream restoration as a viable option to achieve the channel standard and subsequently restore Beneficial Uses.

Section F.1.h (5) describes interim hydromodification criteria that must be implemented by the Copermittees within one year of adoption of the Tentative Order and concurrent to development of the local HMP. The values chosen for the interim criteria are those currently being implemented by Copermittees in the San Diego area.

Finally, the requirements included in section F.1.h do not supersede the requirements for LID presented in section F.1.d. (4). In certain situations, the requirements to incorporate LID will satisfy the requirements for hydromodification management. For example, detention basins are a common BMP used to manage high flow rates but behave hydrologically different than distributed systems used in LID. Using LID is a

[182] Orange County Copermittees, November 15, 2007. 2006-2007 Unified Annual Progress Report Program Effectiveness Assessment (San Diego Region).

viable option for both accomplishing hydromodification management and pollutant load reductions.

F.2. Construction Component

The following legal authority applies to section F.2:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(D) provides that the proposed management program include "A description of a program to implement and maintain structural and non-structural best management practices to reduce pollutants in storm water runoff from construction sites to the municipal storm sewer system."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(D)(1) provides that the proposed management program include "A description of procedures for site planning which incorporate consideration of potential water quality impacts."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(D)(2) provides that the proposed management program include "A description of requirements for nonstructural and structural best management practices."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(D)(3) provides that the proposed management program include "A description of procedures for identifying priorities for inspecting sites and enforcing control measures which consider the nature of the construction activity, topography, and the characteristics of soils and receiving water quality."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(D)(4) provides that the proposed management program include "A description of appropriate educational and training measures for construction site operators."

Federal NPDES regulation 40 CFR 122.26(d)(2)(i)(A) provides that each Copermittee must demonstrate that it can control "through ordinance, permit, contract, order or similar means, the contribution of pollutants to the municipal storm sewer by storm water discharges associated with industrial activity and the quality of storm water discharged from site of industrial activity."

Federal NPDES regulation 40 CFR 122.26(b)(14) provides that "The following categories of facilities are considered to be engaging in 'industrial activity' for the purposes of this subsection: […] (x) Construction activity including cleaning, grading and excavation activities […]."

Federal NPDES regulation 40 CFR 122.44(d)(1)(i) requires NPDES permits to include limitations to "control all pollutants or pollutant parameters (either conventional, nonconventional, or toxic pollutants) which the Director determines are or may be discharged at a level which will cause, have reasonable potential to cause, or contribute to an excursion above any State water quality standard, including State narrative criteria for water quality."

Section F.2 has additions to ensure the protection of threatened and endangered species and requires the consideration of potential impacts from the use of Active Treatment Systems. These requirements were added to ensure additional protection of the Beneficial Uses of waters of the State.

Section F.2.a. (Ordinance Update) requires each Copermittee to review and update its grading and storm water ordinances as necessary to comply with the MS4 permit. By updating the grading and storm water ordinances, the Copermittees will have the necessary legal authority to require construction sites to implement effective BMPs that will reduce pollutant discharges to the maximum extent practicable. The Order allows the Copermittees 365 days to review and update their ordinances. The 365 days should be adequate to allow for the relatively minor changes that might be needed since their ordinances were last updated under Order No. R9-2004-001.

Section F.2.b. (Source Identification) requires the Copermittees to develop and update a watershed based inventory of all construction sites regardless of size or ownership. This section has been modified to require the inventory be updated regularly, rather than annually. More frequent updates will ensure the Copermittees have a more accurate inventory of construction sites within their jurisdiction. A regularly updated inventory of active construction sites will assist the Copermittees in ensuring that all sites are inspected per Order requirements. The Order does not specify the frequency of updates, and instead relies on each Copermittee to develop updates appropriate to local construction activity. Failure to maintain a useful inventory would be a violation of the Order.

Section F.2.c (Site Planning and Project Approval Process) requires Copermittees to incorporate consideration of potential water quality impacts prior to approval and issuance of construction and grading permits.

This section now requires the Copermittees to review project proponents' runoff management plans for compliance with local regulations, policies, and procedures. USEPA recommends that it is often easier and more effective to incorporate storm water quality controls during the site plan review process or earlier.[183] In the Phase I storm water regulations, USEPA states that a primary control technique is good site planning.[184] USEPA goes on to say that the most efficient controls result when a

[183] USEPA, 1992. Guidance 833-8-92-002. Section 6.3.2.1.
[184] Federal Register / Vol. 55, No. 222 / Friday, November 16, 1990 / Rules and Regulations. P. 48034.

comprehensive storm water management system is in place.[185] To determine if a construction site is in compliance with construction and grading ordinances and permits, USEPA states that the "MS4 operator should review the site plans submitted by the construction site operator before ground is broken."[186] Site plan review aids in compliance and enforcement efforts since it alerts the "MS4 operator early in the process to the planned use or non-use of proper BMPs and provides a way to track new construction activities."[187]

Section F.2.d (BMP Implementation) includes modifications to the requirements for each Copermittee to designate and ensure implementation of a set of minimum BMPs at construction sites. These modifications are based on San Diego Water Board findings and experience during implementation of Order No. R9-2004-001.

As a result, the Order requires a minimum set of BMPs to be designated for all sites and that enhanced BMPs, including advanced treatment systems, be designated for sites upstream of 303(d) impairments and ESAs. Advanced treatment has been effectively implemented extensively in the other states and in the Central Valley Region of California.[188] In addition, the San Diego Water Board's inspectors have observed advanced treatment being effectively implemented at large sites greater than 100 acres and at small, less than 5 acre, in-fill sites. Advanced treatment is often necessary for Copermittees to ensure that discharges from construction sites are not causing or contributing to a violation of water quality standards. For example, the Basin Plan lists the water quality objective for turbidity as 20 NTU for all hydrologic areas and subareas except for the Coronado HA (10.10) and the Tijuana Valley (11.10). For certain construction sites with large slopes and exposed areas, the only technology that is likely to meet 20 NTU is advanced treatment combined with erosion and sediment controls. To ensure the MEP standard and water quality standards are met, the requirement for implementation of advanced treatment at high threat construction sites has been added to the Order, while still providing sufficient flexibility for each Copermittee's unique program.

The Order does not include seasonal restrictions on grading. Seasonal restrictions on grading for storm water are difficult to implement due to the conflict between seasonal grading restrictions, endangered birds' breeding seasons and the seasonal passage of endangered salmonids; therefore the seasonal grading restrictions have not been included with the other BMPs in the Order. Found in southern California, the Least Bell's Vireo and the Coastal California Gnatcatcher are listed as federally endangered and threatened, respectively.[189] Permits issued by the California Department of Fish and Game (CDFG) restrict grading during these birds' breeding seasons, which is from

[185] Ibid.
[186] USEPA, 2000. Guidance 833-R-00-002. Section 4.6.2.4, P. 4-30.
[187] Ibid., P. 4-31.
[188] SWRCB, 2004. Conference on Advanced Treatment at Construction Sites.
[189] State of California, Department of Fish and Game, 2005. State and Federally Listed Endangered and Threatened Animals of California.

April 10 to August 31 for the Least Bell's Vireo[190] and from February 15 to August 31 for the Coastal California Gnatcatcher.[191] Ideally storm water restrictions on grading would be during the wet season from October 1 through April 30.[192] Combined, these restrictions would limit construction grading to be during the month of September, which is infeasible. Section D.2.d of the Order still requires project proponents to minimize grading during the wet season and coincide grading with seasonal dry weather periods to the extent feasible.

Section F.2.e (Inspections) establishes criteria for inspections based on risk factors including size, season, and location of the construction site. Modifications have been made to requirements of Order No. R9-2004-001 based on the experience of the Copermittees and San Diego Water Board construction programs.

The Order requires sites in active grading during the wet season that are over 30 acres be inspected every two weeks, rather than sites over 50 acres being inspected weekly. In Riverside County approximately 15 percent (66 sites) of construction sites over one acre are larger than 30 acres, whereas about 9 percent (39 sites) of sites are over 50 acres.[193] This may result in a net decrease of inspections of large sites, although more sites will be covered. The reduction in inspection frequency for sites greater than 50 acres is justified because the sites have generally improved their erosion and sediment control measures since adoption of Order No. R9-2004-001. Biweekly inspections of these sites in the future should be sufficient to ensure compliance with local regulations.

The Order lowers the size of construction sites adjacent to or discharging directly to ESAs that receive scrutiny. Order No. R9-2004-001 requires such sites five acres and more to be inspected every two weeks during the wet season. This Order requires such sites one acre and above to be inspected every two weeks during the wet season and once during August or September. The lower size threshold is consistent with Phase II storm water permits.

This section also requires the Copermittees to track the number of inspections for each inventoried construction site. This requirement has been added to ensure that the Copermittees can demonstrate that construction sites are inspected at the minimum frequencies.

Section F.2.g requires the Copermittees to notify the San Diego Water Board when stop work orders or other high level enforcement has been issued to a construction site as a result of storm water violations. Copermittees are also required to annually

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[190] United States Department of the Interior, Fish and Wildlife Service, 2001. Least Bell's Vireo Survey Guidelines.
[191] United States Department of the Interior, Fish and Wildlife Service, 1997. Coastal California Gnatcatcher (*Polioptila californica californica)* Presence/Absence Survey Guidelines.
[192] San Diego Water Board, 2001. Order No. 2001-01, San Diego County MS4 Permit. Directive F.2.g.(2).
[193] Based on the State Water Board's database of sites covered by the Construction Storm Water General NPDES Permit, Order No. 99-08-DWQ. That general permit requires sites disturbing over one acre to file for coverage, so it provides a good basis for assessment.

notify the San Diego Water Board of construction sites that have suspected violations. This section was added to enhance Regional Board and Copermittee communication and coordination in regulating construction sites.

F.3 Existing Development Component

F.3.a. Municipal
The following legal authority applies to section D.3.a:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A)(1) provides that the proposed management program include "A description of maintenance activities and a maintenance schedule for structural controls to reduce pollutants (including floatables) in discharges from municipal separate storm sewers."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A)(3) provides that the proposed management program include "A description for operating and maintaining public streets, roads and highways and procedures for reducing the impact on receiving waters of discharges from municipal storm sewer systems, including pollutants discharged as a result of de-icing activities."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A)(4) provides that the proposed management program include "A description of procedures to assure that flood management projects assess the impacts on the water quality of receiving water bodies and that existing structural flood control devices have been evaluated to determine if retrofitting the device to provide additional pollutant removal from storm water is feasible."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A)(5) provides that the proposed management program include "A description of a program to monitor pollutants in runoff from operating or closed municipal landfills or other treatment, storage or disposal facilities for municipal waste, which shall identify priorities and procedures for inspections and establishing and implementing control measures for such discharges."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A)(6) provides that the proposed management program include "A description of a program to reduce to the maximum extent practicable, pollutants in discharges from municipal separate storm sewers associated with the application of pesticides, herbicides, and fertilizer which will include, as appropriate, controls such as educational activities, permits, certifications, and other measures for commercial applicators and distributors, and controls for application in public right-of-ways and at municipal facilities."

Federal NPDES regulation 40 CFR 122.44(d)(1)(i) requires NPDES permits to include limitations to "control all pollutants or pollutant parameters (either conventional, nonconventional, or toxic pollutants) which the Director determines are or may be discharged at a level which will cause, have reasonable potential to cause, or contribute to an excursion above any State water quality standard, including State narrative criteria for water quality."

Section F.3.a.(2) (General BMP Implementation) requires the Copermittees to designate minimum BMPs for general municipal areas and activities, regardless of their threat to water quality. BMPs must also be designated for special events. The designated minimum BMPs required to be implemented at a site can be based on the sources or activities present at the site. Threat to water quality is used to determine inspection frequencies in section F.3.a.(8).

Section F.3.a.(3), F.3.a.(4), and F.3.a.(5) (BMP Implementation for Specific Categories) establishes requirements for specific categories of activities and areas. These are selected based on the CWA and findings of the Copermittees in annual reports and ROWD that identify these activities as warranting special attention.

Pesticides, Herbicides, and Fertilizers. 40 CFR 122.26(d)(2)(iv)(A)(6) requires a description of a storm water program for pesticides, herbicides, and fertilizers. In addition, water quality data demonstrates widespread presence of such pollutants in receiving waters and MS4 discharges. In response to similar requirements of Order No. R9-2004-001, the Copermittees have developed a specific model Integrated Pest Management, Pesticides, and Fertilizer guidelines.

Flood Control Structures. In order to more closely meet the intent of the federal regulations and guidance, the requirement has been modified. 40 CFR 122.26(d)(2)(iv)(A)(4) requires "A description of procedures to assure that flood management projects assess the impacts on the water quality of receiving water bodies and that existing structural flood control devices have been evaluated to determine if retrofitting the device to provide additional pollutant removal from storm water is feasible." Retrofitting flood control devices can reduce storm water pollutants and improve water quality.

USEPA expands on the federal provision with the following information: "Storm water management devices and structures that focus solely on water quantity are usually not designed to remove pollutants, and may sometimes harm aquatic habitat and aesthetic values".[194] As flood control structures and other elements of the MS4 age and retrofitting becomes necessary, opportunities for water quality improvements arise.

[194] USEPA, 1992. Guidance Manual for the Preparation of Part II of the NPDES Permit Applications for Discharges from Municipal Separate Storm Sewer Systems. Washington D.C. EPA/833-B-92-002.

Conveyance systems which take water quality consideration into account (such as grassed swales, vegetated detention ponds, etc.) can often cost less to construct than traditional concrete systems. Evaluation of the applicability of such systems during retrofitting must occur to ensure that pollutants in storm water runoff are reduced to the maximum extent practicable. USEPA supports utilizing BMPs for pollution reduction in flood management projects, stating that "The proposed management program must demonstrate that flood management projects take into account the effects on the water quality of receiving water bodies. […] Opportunities for pollutant reduction should be considered".[195]

There are generally two types of retrofits for flood control structures. The first type involves adding an engineered device to an existing structure in order to treat or divert runoff. Examples include catch basin inlet filters/screens, ultraviolet disinfection facilities, hydrodynamic separators, and diversions to the sanitary sewer. The second type involves re-installing pervious or natural treatment features to facilities. Examples include removing concrete portions of conveyances to create pervious conveyances; and creating treatment wetlands within flood detention facilities. The later type of retrofit is preferred by the San Diego Water Board. They are likely more sustainable over the long-term because they may require less rigorous operation and maintenance than the former. They may also provide the additional benefit of providing significant or incidental opportunities for beneficial uses (e.g., recreation, wildlife, water supply).[196,197]

Sweeping of Municipal Areas. Sweeping municipal areas would likely be done in the absence of the Order. However, in certain cases it is an important component of a jurisdictional runoff management program. The Order contains requirements to ensure that the use of street sweeping is optimized for runoff applications if it is to be used and reported as a BMP.

Section F.3.a.(6). (Operation and Maintenance of MS4 and Structural Controls) requires the Copermittees to inspect and remove waste from their MS4s prior to the rainy season.

Maintenance is critical to the successful implementation of every storm water runoff management program. USEPA finds that "Lack of maintenance often limits the effectiveness of storm water structural controls such as detention/retention basins and infiltration devices. […] The proposed program should provide for maintenance logs and identify specific maintenance activities for each class of control, such as removing sediment from retention ponds every five years, cleaning catch basins annually, and removing litter from channels twice a year.

[195] Ibid.
[196] Burton, Carmen et al. 2005. Assessing Water Source and Channel Type as Factors Affecting Benthic Macroinvertebrate and Periphyton Assemblages in the Highly Urbanized Santa Ana River Basin, California. American Fisheries Society Symposium. Vol.47 pp.239-262.
[197] Stromberg, Juliet C. 2001. Restoration of Riparian Vegetation in the South-Western United States: the importance of flow regimes and fluvial dynamism. Journal of Arid Environments. Vol49, pp.17-34.

If maintenance activities are scheduled infrequently, inspections must be scheduled to ensure that the control is operating adequately. In cases where scheduled maintenance is not appropriate, maintenance should be based on inspections of the control structure or frequency of storm events. If maintenance depends on the results of inspections or if it occurs infrequently, the applicant must provide an inspection schedule. The applicant should also identify the municipal department(s) responsible for the maintenance program". [198] The MS4 maintenance requirements are based on the above USEPA recommendations. This maintenance will help ensure that structural controls are in adequate condition to be effective year round, but especially at the beginning of and throughout the rainy season.

Two requirements have been added to the Order that were not within Order No. R9-2004-001. Subsection (iii) allows a decreased inspection frequency for facilities that are routinely clean, and Subsection (iv) requires trash to be removed from open channels in a timely manner. Typically, Copermittees have reported annual or semi-annual creek cleanups as significant BMPs. The large volumes of trash reported to be removed during these events demonstrates the significant amount of trash that accumulates in the channels. In order to reduce the effect of the trash, the Order requires that trash be removed more frequently.

Section F.3.a.(7) (Infiltration from Sanitary Sewer to MS4) requires the Copermittees to implement controls and measures to prevent and eliminate sewage infiltration or seepage from municipal sanitary sewers to MS4s through thorough, routine preventive maintenance of the MS4.

Sections F.3.a.(8) and F.3.a.(9) (Inspections and Enforcement) establishes a minimum set of municipal areas and activities for oversight and inspection by the Copermittees and requires that Copermittees properly enforce runoff requirements at municipal areas and activities.

F.3.b. Commercial / Industrial
The following legal authority applies to section F.3.b:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(C) provides that the proposed management program include "A description of a program to monitor and control pollutants in storm water discharges to municipal systems from municipal landfills, hazardous waste treatment, disposal and recovery facilities, industrial facilities that are subject to section 313 of title III of the Superfund

[198] USEPA, 1992. Guidance Manual for the Preparation of Part II of the NPDES Permit Applications for Discharges from Municipal Separate Storm Sewer Systems. Washington D.C. EPA/833-B-92-002.

Amendments and Reauthorization Act of 1986 (SARA), and industrial facilities that the municipal permit applicant determines are contributing a substantial pollutant loading to the municipal storm sewer system."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(C)(1) provides that the Copermittee must "identify priorities and procedures for inspections and establishing and implementing control measures for such discharges."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(C)(2) provides that the proposed management program shall "Describe a monitoring program for storm water discharges associated with the industrial facilities identified in paragraph (d)(2)(iv)(C) of this section, to be implemented during the term of the permit, including the submission of quantitative data on the following constituents: any pollutants limited in effluent guidelines subcategories, where applicable; any pollutant listed in an existing NPDES permit for a facility; oil and grease, COD, pH, BOD5 , TSS, total phosphorus, total Kjeldhal nitrogen, nitrate plus nitrite nitrogen, and any information on discharges required under 40 CFR 122.21(g)(7)(iii) and (iv)."

Federal NPDES regulation 40 CFR 122.26(d)(2)(ii) provides that the Copermittee "Provide an inventory, organized by watershed of the name and address, and a description (such as Standard Industrial Classification [SIC] codes) which best reflects the principal products or services provided by each facility which may discharge, to the municipal separate storm sewer, storm water associated with industrial activity."

Federal NPDES regulation 40 CFR 122.44(d)(1)(i) requires NPDES permits to include limitations to "control all pollutants or pollutant parameters (either conventional, nonconventional, or toxic pollutants) which the Director determines are or may be discharged at a level which will cause, have reasonable potential to cause, or contribute to an excursion above any State water quality standard, including State narrative criteria for water quality."

Federal NPDES regulation 40 CFR 122.26(d)(2)(i)(A) provides that each Copermittee must demonstrate that it can control "through ordinance, permit, contract, order or similar means, the contribution of pollutants to the municipal storm sewer by storm water discharges associated with industrial activity and the quality of storm water discharged from site of industrial activity."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A) provides that the Copermittee develop a proposed management program which includes "A description of structural and source control measures to reduce pollutants from runoff from commercial and residential areas that are discharged from the municipal storm sewer system that are to be implemented during the life of the permit, accompanied with an estimate of the expected reduction of pollutant loads and a proposed schedule for implementing such controls."

Section F.3.b.(1) (Source Identification) requires that botanical and zoological gardens and exhibits, building material retailers and storage, animal facilities, mobile pet services, and power washing services be included in the Copermittees' inventory of commercial sites/sources. This is not a significant change because Order No. R9-2004-001 requires that any commercial or industrial site or source determined by a Copermittee to contribute a significant pollutant load to the MS4 be added to its inventory of commercial or industrial sites.

Section F.3.b.(3) (BMP Implementation for Mobile Businesses) requires each Copermittee to develop and implement a program to reduce the discharge of storm water pollutants from mobile businesses to the MEP and to prevent the discharge of non-storm water. Mobile businesses are service industries that travel to the customer to perform the service rather than the customer traveling to the business to receive the service. Examples of mobile businesses are power washing, mobile vehicle washers, carpet cleaners, port-a-potty servicing, pool and fountain cleaning, mobile pet groomers, and landscapers. These mobile services produce waste streams that could potentially impact water quality if appropriate BMPs are not implemented.

Order No. R9-2004-001 also requires BMP implementation for certain mobile businesses (e.g., mobile vehicle washing and mobile carpet cleaning). These storm water requirements of Order No. R9-2004-001 are not significantly different from the existing requirements. The Order specifies mobile businesses must prevent non storm water dry weather flows from entering the MS4 (see C.2.b) for special attention because of the difficultly of controlling discharges from mobile businesses with existing programs.

Mobile businesses present a unique difficulty in storm water regulation. Due to the transient nature of the business, the regular, effective practice of unannounced inspections is difficult to implement. Also, tracking these mobile businesses is difficult because they are often not permitted or licensed and their services cross Copermittee jurisdictions. Mobile businesses that operate within a municipality may be based in another municipality or even outside the Region. The Order takes into account the difficulties in regulating mobile businesses.

Because BMPs have been developed already, but communication with mobile businesses may be difficult, the Order provides broad flexibility to the Copermittees for developing a targeted program within the Commercial portion of each JRMP.

Section F.3.b.(4) (Inspection of Industrial and Commercial Sites/Sources) includes requirements for inspections of industrial and commercial sites/sources. The Order is similar to the Order No. R9-2004-001 in requiring that inspections check for coverage under the General Industrial Permit; assessment of compliance with Copermittee ordinances and permits related to storm water and non-storm water runoff; assessment of BMP implementation, maintenance, and effectiveness; visual observations for non-storm water discharges, potential illicit connections, and potential

discharge of pollutants in storm water runoff; and education and outreach on storm water pollution prevention. The Order also requires that inspections include review of BMP implementation plans if the site uses or is required to use such a plan, and the review of facility monitoring data if the site monitors its runoff.

Changes in the Order's requirements for inspection procedures mimic USEPA's guidance: "Site inspections should include (1) an evaluation of the pollution prevention plan and any other pertinent documents, and (2) an onsite visual inspection of the facility to evaluate the potential for discharges of contaminated storm water from the site and to assess the effectiveness of the pollution prevention plan." [199] In 1999, USEPA "recognized visual inspection as a baseline BMP for over 10 years," and "visual inspections are an effective way to identify a variety of problems. Correcting these problems can improve the water quality of the receiving water." [200]

Inspection frequencies in the Order have been modified from Order No. R9-2004-001. Order No. R9-2004-001 specifies frequencies for inspecting commercial/industrial sites based on threat to water quality and requires high priority sites to be inspected annually, medium priority sites to be inspected biannually, and low priority sites to be inspected once during the 5-year term of the permit. Order No. R9-2010-0016 allows Copermittees to establish inspection frequencies for all sites, with at least 25 percent of the inventoried sites to be inspected each year. The sites that are inspected each year must include all the sites identified as high priority. For sites not identified as high priority, each site must be inspected at least once within a 5 year period.

An additional notification to the San Diego Water Board regarding industrial sites has been added. Copermittees are required to annually notify the San Diego Water Board of industrial sites that have suspected violations. This was added to enhance San Diego Water Board and Copermittee communication and coordination in regulating industrial sites.

Also, the option for implementing a third party inspection program is included. The third party inspections can satisfy up to 30 percent of the inspection requirements, with the Copermittee having to fulfill the remaining required inspections.

Section F.3.b.(6) (Training and Education for Owners and Operators of Commercial and Industrial Activities) requires training and education measures generally consistent with the existing storm water programs. One distinction is that the Order requires each Copermittee to notify the owner/operator of each inventoried industrial and commercial site/source of the BMP requirements applicable to the site/source. This requirement is necessary to ensure that the owners and operators of commercial sites stay informed of appropriate BMPs. This is especially important because sites may be inspected as little as once every five years.

[199] USEPA, 1992. Guidance 833-8-92-002, section 6.3.3.4 "Inspection and Monitoring".
[200] USEPA, 1999. 832-F-99-046, "Storm Water Management Fact Sheet – Visual Inspection".

F.3.c. Residential
The following legal authority applies to section F.3.c:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A) provides that the Copermittee develop a proposed management program which includes "A description of structural and source control measures to reduce pollutants from runoff from commercial and residential areas that are discharged from the municipal storm sewer system that are to be implemented during the life of the permit, accompanied with an estimate of the expected reduction of pollutant loads and a proposed schedule for implementing such controls."

Federal NPDES regulation 40 CFR 122.44(d)(1)(i) requires NPDES permits to include limitations to "control all pollutants or pollutant parameters (either conventional, nonconventional, or toxic pollutants) which the Director determines are or may be discharged at a level which will cause, have reasonable potential to cause, or contribute to an excursion above any State water quality standard, including State narrative criteria for water quality."

Section F.3.c.(5) (Common Interest Areas / Home Owner Association Areas) includes requirements for common interest areas / homeowners' associations. Many residential neighborhoods and some commercial areas within the jurisdiction of the Copermittees are within common interest developments and are, therefore, subject to management of common areas by associations. The Declaration of the Covenants, Conditions and Restrictions (CC&Rs) contains the ground rules for the operation of such an association. CC&Rs are an appropriate method for protecting the common plan of developments and to provide for a mechanism for financial support for the upkeep of common areas including roads, storm drains, and other components of storm water conveyance systems.

This Order interprets common interest areas as property subject to the codes and ordinance and enforcement mechanisms of the city or county in which it resides and, therefore, holds the local government responsible for the discharge of wastes from common interest area / homeowners' association storm water conveyance systems.

Section F.3.d. Retrofitting Existing Development
The following legal authority applies to section F.3.d:

Legal Authority: The legal authority for retrofitting existing development is the same legal authority as that identified for municipal, industrial, commercial and residential development sections (See fact sheet discussion on those sections, F.3.a – c). In

particular, CWA sections 402(p)(3)(B)(ii-iii), and CWC section 13377 give the Regional Water Board the legal authority to require retrofitting of existing development.

A section has been added to require the retrofit of existing development (see Finding D.3.i and Discussion). This section contains specific requirements for the retrofit process. Retrofitting existing development is a widespread practice across the United States. Successful retrofitting programs have been implemented in such diverse locations as Seattle, Washington[201]; Portland Oregon[202], Santa Monica, California[203]; Kansas City, Kansas[204]; and Montgomery County, MD[205]. When appropriately applied as the draft Tentative Order, retrofitting existing development meets the maximum extent practicable standard.

Existing BMPs are not sufficient, as evidenced by 303(d) listings and exceedances of Water Quality Objectives from the Copermittees monitoring reports. More advanced BMPs, including the retrofitting of existing development with LID, are part of the iterative process. Previous permits limited the requirement of treatment control BMPs to new development and redevelopment. Based on the current rate of redevelopment compared to existing BMPs, the use of LID only on new and redevelopment will not adequately address current water quality problems, including downstream hydromodification. Retrofitting existing development is practicable for a municipality through a systematic evaluation, prioritization and implementation plan focused on impaired water bodies, pollutants of concern, areas of downstream hydromodification, feasibility and effective communication and cooperation with private property owners.

F.4. Illicit Discharge Detection and Elimination

The following legal authority applies to section F.4:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(B) provides that the proposed management program "shall be based on a description of a program, including a schedule, to detect and remove (or require the discharger to the municipal storm sewer to obtain a separate NPDES permit for) illicit discharges and improper disposal into the storm sewer."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B)(1) provides that the Copermittee include in its proposed management program "a program, including

[201] SEA Street, http://www.seattle.gov/dpd/Planning/CityDesign/What_We_Do/Outreach/Folio/DPDS_008014.asp
[202] Clean River Rewards, http://www.portlandonline.com/BES/index.cfm?c=edeef
[203] City of Santa Monica, Urban Runoff program, http://www.smgov.net/Departments/OSE/categories/content.aspx?id=4007
[204] 10,000 Rain Gardens, http://www.rainkc.com/
[205] Rainscapes, http://www.montgomerycountymd.gov/Content/DEP/Rainscapes/home.html

inspections, to implement and enforce an ordinance, orders or similar means to prevent illicit discharges to the municipal storm sewer system."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B)(2) provides that the Copermittee include in its proposed management program "a description of procedures to conduct on-going field screening activities during the life of the permit, including areas or locations that will be evaluated by such field screens."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B)(3) provides that the Copermittee include in its proposed management program "procedures to be followed to investigate portions of the separate storm sewer system that, based on the results of the field screen, or other appropriate information, indicate a reasonable potential of containing illicit discharges or other sources of non-storm water."

Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(B)(4) provides that the Copermittee include in its proposed management program "a description of procedures to prevent, contain, and respond to spills that may discharge into the municipal separate storm sewer."

Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(B)(5) provides that the Copermittee include in its proposed management program "a description of a program to promote, publicize, and facilitate public reporting of the presence of illicit discharges or water quality impacts associated with discharges from municipal separate storm sewers."

Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(B)(6) provides that the Copermittee include in its proposed management program "a description of educational activities, public information activities, and other appropriate activities to facilitate the proper management and disposal of used oil and toxic materials."

Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(B)(7) provides that the Copermittee include in its proposed management program "a description of controls to limit infiltration of seepage from municipal sanitary sewers to municipal separate storm sewer systems where necessary."

Section F.4.a and F.4.b (Prevent and Detect Illicit Discharges and Connections and Maintain MS4 Map) requires the Copermittees to implement a program to actively seek and eliminate illicit connections and discharges (IC/ID). Additional wording has been added to this section to clarify and ensure that all appropriate municipal personnel (i.e., field personnel) are utilized in the program to observe and report these illicit discharges and connections. A requirement has been added requiring submittal of the GIS layers of the MS4 map within 365 days of Order adoption.

Section F.4.e (Investigation / Inspection and Follow-Up) requires the Copermittees to conduct follow up investigations and inspect portions of the MS4 for illicit discharges

and connections, based on dry weather effluent analytical monitoring results. The section also requires the Copermittees to establish criteria for triggering follow up investigations. Additional language has been added to this section to clarify the minimum level of effort and timeframes for follow up investigations when dry weather limitations are exceeded. Timely investigation and follow up of exceedances is necessary to identify sources of illicit discharges, especially since many of the discharges are transitory. The requirements for a 48-hour minimum response time when action levels are exceeded and for immediate response to obvious illicit discharges is necessary to ensure timely response by the Copermittees.

The Copermittees currently use action levels to facilitate the determination of when source investigation studies are warranted based on data from the dry-weather monitoring program. One set of criteria is based on regional averages of constituent concentrations that were developed based on randomly selected storm drains. Another set of criteria is based on trends at a particular station. These are reasonable criteria if decision-makers are properly trained and action levels set by the County are in compliance with dry weather non-storm water action levels as required in Section C. The ability of the local managers to interpret dry-weather monitoring data collected by the County has greatly improved in the last two years, and continued training is required in section F.4.i.

Section F.4.h (Prevent and Response to Sewage Spills and Other Spills) requires each Copermittee to implement measures to prevent and respond to spills into its MS4. These requirements are consistent with Order No. R9-2004-001 and based on federal regulations at 40 CFR 122.26(d)(2)(iv)(B)(4). Those federal NPDES regulations clearly require that owners and operators of MS4s have procedures to prevent, contain, and respond to spills that may discharge into the municipal separate storm sewer.

The Tentative Order includes sewage and non-sewage spills in the requirement for spill prevention and response. Federal regulations clearly define sewage as an illicit discharge that must be addressed by municipalities (see Phase II Final Rule, p.68758). Sewage is an illicit discharge to the MS4 that threatens public health. As such, the Copermittees must implement measures to prevent sewage from entering the MS4 system and must respond to illicit discharges that have entered the system. This section has been revised to clarify that management measures and procedures must be implemented to prevent, respond to, and cleanup spills.

Section F.3.a.(7) of the Tentative Order includes requirements for measures that must be taken to prevent sewage spills. Examples of measures being implemented by Copermittees include inspections of fats, oils, and grease management at restaurants. Other preventative measures can be implemented during routine planning efforts for new development and redevelopment projects. Similarly, building permit inspections should be used to verify the integrity of the sanitary and storm sewer infrastructure and ensure that cross-connections between the two are avoided.

G. Watershed Runoff Management Program

The following legal authority applies to section G:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.26(a)(3)(ii) states: "The Director may […] issue distinct permits for appropriate categories of discharges […] including, but not limited to […] all discharges within a system that discharge to the same watershed […]"

Federal NPDES regulations 40 CFR 122.26(a)(3)(v) states: "Permits for all or a portion of all discharges from large or medium municipal separate storm sewer systems that are issued on a system-wide, jurisdiction-wide, watershed, or other basis may specify different conditions relating to different discharges covered by the permit, including different management programs for different drainage areas [watersheds] which contribute storm water to the system."

Federal NPDES regulation 40 CFR 122.26(a)(5) states: "The Director may issue permits for municipal separate storm sewers that are designated under paragraph (a)91)(v) of this section on a system-wide basis, a jurisdiction-wide basis, watershed basis, or other appropriate basis."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv) states: "Proposed programs may impose controls on a system-wide basis, a watershed basis, a jurisdiction basis, or on individual outfalls."

Section G requires Copermittees to continue implementation of their watershed runoff management program (WRMP), however the implementation approach has changed. Order No. R9-2004-001 required a watershed RMP (referred to as a Watershed SWMPs in Order No. R9-2004-001) to include a collaborative strategy to abate the sources and reduce the discharges causing high priority water quality problems. This strategy was to guide Watershed Copermittee's selection and implementation of Watershed Activities, so that the activities selected and implemented would remove that pollutant contribution responsible for the identified high priority water quality problem. Outcomes of these requirements were not able to demonstrate improvements to water quality.

Revised language in Order No. R9-2010-0016 attempts to focus watershed copermittee's efforts and resources on addressing the highest water quality problems in the watershed by focusing attention on the health of the receiving water body and the most efficient use of the Watershed Copermittee's time and resources. Order No.

R9-2010-0016 requires the Watershed Copermittee's to follow a workplan approach towards assessing receiving water body conditions, prioritizing the Watershed Management Area's (WMAs) highest priority water quality problems, implementing effective BMPs, and measuring water quality improvement in the receiving water.

Section G.1. (Watershed Water Quality Workplan) requires the Watershed Copermittees to develop and implement a collective watershed strategy to assess and prioritize the water quality problems within the Upper Santa Margarita watershed's receiving waters, identify and model sources of the highest priority water quality problem(s), develop a watershed-wide BMP implementation strategy to abate highest priority water quality problems, and a monitoring strategy to evaluate BMP effectiveness and changing water quality prioritization in the Upper Santa Margarita watershed. Development of a workplan rather than watershed activities will allow the Copermittees flexibility to iteratively modify their watershed strategy over the course of future planning years as priorities change.

Section G.2 (Watershed Workplan Implementation) requires the Copermittee's to begin implementing the Watershed Workplan within 30-days of approval by the San Diego Water Board Executive Officer. Since the Copermittees are already familiar with the watershed program requirements implementing the watershed workplan within 30-days of approval by the San Diego Water Board Executive Officer is reasonable.

Section G.3 (Copermittee Collaboration) requires the Copermittees to collaborate to develop and implement the Watershed Workplan. Watershed Copermittee collaboration shall include frequent regularly scheduled meetings. Because there are several other agencies with MS4s in the Upper Santa Margarita watershed that may discharge into the MS4 systems of the Copermittees, the Copermittees are also required to obtain any interagency agreements, or other efforts, with non-Copermittee owners of the MS4 (such as Caltrans, Native American tribes, and school districts) to control the contribution of pollutants from one portion of the shared MS4 to another portion of the shared MS4. In addition, the Copermittees are required, as appropriate, to participate in watershed management efforts to address water quality issues within the entire Santa Margarita Watershed (such as the County of San Diego and United States Marine Corps Camp Pendleton).

Section G.4 (Public Participation) requires the Copermittees to implement a watershed-specific public participation mechanism within each watershed. A required component of the watershed-specific public participation shall be a minimum 30-day public review of the Watershed Workplan. Opportunity for the public to review and comment on the Watershed Workplan must occur before the workplan is implemented.

Section G.5 (Watershed Workplan Review and Updates) requires the Copermittees to review and update the Watershed Workplan annually to identify need changes to the prioritized water quality problem(s) listed in the workplan. All updates to the Watershed Workplan shall be presented during an Annual Watershed Review

Meeting. Annual Watershed Review Meetings shall be conducted by the Watershed Copermittees, open to the public and adequately noticed, and occur once every calendar year. Individual Watershed Copermittees shall also review and modify their jurisdictional programs and JRMP Annual Reports, as necessary, so that they are consistent with the updated Watershed Workplan.

This section requires the copermittee's to review and update their workplan each year to incorporate changing priorities and evolving watershed strategies.

Section G.6 (Pyrethroid Toxicity Reduction Evaluation) requires the Copermittees to incorporate the pyrethroid pollutant reduction program into the Watershed Workplan, as described in the ROWD.

H. Fiscal Analysis

The following legal authority applies to section H:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.26(d)(2)(vi) provides that "[The Copermittee must submit] for each fiscal year to be covered by the permit, a fiscal analysis of the necessary capital and operation and maintenance expenditures necessary to accomplish the activities of the programs under paragraphs (d)(2)(iii) and (iv) of this section. Such analysis shall include a description of the source of funds that are proposed to meet the necessary expenditures, including legal restrictions on the use of such funds."

Section H has been expanded in order to develop more useful and meaningful fiscal reporting. A revamped fiscal reporting strategy will provide the San Diego Water Board and the Copermittees with better capability to manage performance of the programs.

The Copermittees' effort is expected to provide standardization of reporting so that figures between Copermittees are comparable, which is one of many types of information which can be used by the San Diego Water Board to better understand Copermittee program implementation. Standardization and comparison of fiscal analysis reporting is supported by the State Water Board funded NPDES Stormwater Cost Survey, which finds that "standards for reporting costs and stormwater activities are needed to allow accurate cost comparisons to be made between stormwater activities."[206] This document also provides guidance regarding categorization of expenditures for tracking and reporting.

The Order establishes a criterion for when Copermittees must add narrative evaluations to the tables. This will address some of the variability in reporting and will provide the public and San Diego Water Board with improved understanding of how resources are shifted in response to annual assessments. This will also help ensure that projected annual costs adequately reflect planned program modifications described in the annual reports.

The San Diego Water Board has chosen not to require a description of fiscal benefits realized from implementation of the storm water protection program. This is a recommendation from the National Association of Flood and Stormwater Management

[206] Currier, et al., 2005. *NPDES Storm Water Cost Survey Final Report*. Prepared for California State Water Resources Control Board by Office of Water Programs, California State University, Sacramento. P. 63.

Agencies.[207] For instance, the current fiscal assessment does not address city-wide fiscal benefits of protection (e.g., public health, tourism, property values, economic activity, beneficial uses, etc.), even though many costs currently reported to the San Diego Water Board are for related activities. This type of assessment may help Copermittees improve the allocation of resources and it may help the Copermittees secure adequate funding for the program. Finally, it will provide a clearer picture of the storm water and non-storm water runoff program to the public and San Diego Water Board. However, qualitative assessments could be overly subjective and most Copermittees likely lack the ability to provide accurate quantitative assessments. The San Diego Water Board encourages Copermittees to consider means for conducting assessments of fiscal benefits derived from the programs. Such assessments could be conducted on a regional scale similar to studies of program costs conducted by the State Water Board.[208]

Currently, each Riverside County municipality's annual report includes a table based on a template developed by the principal Copermittee. The template was meant to facilitate reporting consistency among the Copermittees. The annual report table contains estimates of spending during the reported period and estimates of the next year's spending.

Review of the fiscal analysis tables included in the annual reports has not been as straightforward as expected, and the value of the information is moderate. The San Diego Water Board staff has found that cities do not use consistent methods to fill in the tables because they use different accounting and budgeting processes, and certain stormwater program expenditures are not easily categorized into the table formats. Furthermore, stormwater permit-related activities involve several departments, which makes it difficult for the storm water manager to gather and decipher actual costs.

These issues also make it difficult for the Copermittees to accurately compartmentalize expenditures within the format. As a result, the current financial reporting provides estimates at best and cannot be reliably used to compare program implementation among most municipalities.

[207] National Association of Flood and Stormwater Management Agencies. 2006. *Guidance for Municipal Stormwater Funding.* Prepared under a grant provided by the USEPA.
[208] State Water Board, 2005. NPDES Stormwater Cost Survey.

I. Total Maximum Daily Loads

The following legal authority applies to section I:

Broad Legal Authority: CWA section 303(d)(1)(A) and (C), and Federal regulations 40 CFR 130.2(i), 40 CFR 130.7(b)(1) and 40 CFR 122.44(d)(1)(vii)(B).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.44(d)(1)(vii)(B) requires that NPDES permit requirements incorporate water quality based effluent limitations that must be consistent with the requirements and assumptions of wasteload allocations (WLAs) assigned to the MS4 as part of the calculated TMDLs.

This section has been added as a placeholder for any future TMDLs that are adopted by the San Diego Water Board.

J. Program Effectiveness Component

The following legal authority applies to section J:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.26(d)(2)(v) provides that the Copermittees must include "Estimated reductions in loadings of pollutants from discharges of municipal storm sewer constituents from municipal storm sewer systems expected as the result of the municipal storm water quality management program. The assessment shall also identify known impacts of storm water controls on ground water." Under Federal NPDES regulation 40 CFR 122.42(c) applicants must provide annual reports on the progress of their storm water management programs.

Section J.1 (Jurisdictional Program Effectiveness Assessments) of the Order requires the Copermittees to assess the effectiveness of the implementation of their jurisdictional programs and activities. The section requires that the effectiveness strategy of the programs be designed around four classes of objectives and that the results are used to direct program modifications. The section does not specify the assessments to be conducted, but does require that assessment measures conform to the guidance developed by the California Storm Water Quality Association (CASQA). The Riverside County Storm Water Program is supportive of the CASQA effort, and

use of CASQA assessment techniques is consistent with the methodology proposed in the ROWD.[209] [210]

The Order provides focus to the assessment methodology by requiring that impaired waterbodies and environmentally-sensitive areas are specifically addressed. In this way, the high priority water quality issues will receive a high level of attention, consistent with USEPA and CASQA guidance for prioritization. The Order provides flexibility to establish the actual metrics for each assessment outcome level. The Order also provides the Copermittees flexibility to develop objectives for the general program components based on the CASQA guidance, as is proposed in the ROWD.

In addition, Section J.1 requires that an effectiveness assessment strategy is developed and implemented in response to actions taken by a Copermittee to comply with Section A.3 (Prohibitions and Receiving Water Limitations) of the Order. Section A.3 outlines the procedure for addressing instances when jurisdictional programs implement control actions in response to determinations that discharges from the MS4 are causing or contributing to violations of water quality standards.

This section includes a requirement for the Copermittees to develop and implement a workplan identifying and addressing the highest priority issues in the watershed. The workplan requirement in the JRMP section has been added to ensure Copermittees are allocating resources and effort to address priority problems and pollutants identified in the watershed analysis. This section has been added to ensure Copermittees use the annual watershed water quality assessment to asses, adjust and tailor their JRMP programs.

Section J.2 (Program Modifications) of the Order requires the Copermittees to improve jurisdictional activities or BMPs when they are found to be ineffective or when water quality impairments are continuing. This requirement fulfills the purpose of conducting effectiveness assessments – to improve and refine the Copermittees' programs. The requirement is consistent with USEPA's Phase II regulations, which state: "If the permittee determines that its original combination of BMPs are not adequate to achieve the objectives of the municipal program, the MS4 should revise its program to implement BMPs that are adequate […]."[211]

Section J.3 (Effectiveness Assessment and Program Response Reporting) of the Order describes the information required to be submitted in jurisdictional annual reports pertaining to program effectiveness assessments, review, and response. The reporting will demonstrate whether Copermittees have appropriately responded to the effectiveness assessments.

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[209] The Copermittees proposed an assessment strategy based on the CASQA Municipal Stormwater Program Effectiveness Assessment Guidance in section 6.1.2.1 of the ROWD.
[210] CASQA 2007. Municipal Stormwater Program Effectiveness Assessment Guidance.
[211] Federal Register / Vol. 64, No. 235 / Wednesday, December 8, 1999 / Rules and Regulations. P. 68762.

K. Reporting

The following legal authority applies to section K:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.42(c) requires that "The operator of a large or medium municipal separate storm sewer system or a municipal separate storm sewer system that has been designated by the director under § 122.26(a)(1)(v) of this part must submit an annual report by the anniversary of the date of the issuance of the permit for such system. The report shall include: (1) The status of implementing the components of the storm water management program that are established as permit conditions; (2) Proposed changes to the storm water management program that are established as permit condition. Such proposed changes shall be consistent with § 122.26(d)(2)(iii) of this part; (3) Revisions, if necessary, to the assessment of controls and the fiscal analysis reported in the permit application under § 122.26(d)(2)(iv) and (d)(2)(v) of this part; (4) A summary of data, including monitoring data, that is accumulated throughout the reporting year; (5) Annual expenditures and budget for year following each annual report; (6) A summary describing the number and nature of enforcement actions, inspections, and public education programs; (7) Identification of water quality improvements or degradation."

California Water Code section 13267 provides that "the Regional Board may require than any person who has discharged […] shall furnish, under penalty of perjury, technical or monitoring reports which the regional board requires."

Section K.1 (Runoff Management Plans) outlines the process and due dates for submitting Jurisdictional Runoff Management Plans and Watershed Workplans. The information to be included in the Jurisdictional and Watershed plans must be sufficient to demonstrate the capacity to implement the requirements of Section G and Section J, respectively, of the Order.

Two general modifications from Order No. R9-2004-001 result in reduced reporting effort by the Copermittees. In many cases, the requirements of the Order should not necessitate a complete rewrite of the plans, as was basically done in 2005. Only sections of the Order which are new or have been significantly changed should warrant rewriting of plans' sections. The San Diego Water Board plans to work with the Copermittees and provide guidance regarding where JRMPs and WRMPs must be updated in accordance with the Order. This will help ensure that rewriting, reporting, and review efforts are minimized.

A summary reporting checklist which has been added to the reporting requirements. The checklist has been added to ensure that Copermittees evaluate and demonstrate compliance with all requirements in the Order.

Section K.2 (Other Required Reports and Plans) include requirements for information to be included in the SSMP update and the Report of Waste Discharge for the next permit reissuance. The Order requires submittal of a ROWD prior to the expiration of the Order. The section identifies the minimum information to be included in the ROWD, based on USEPA's May 17, 1996 guidance "Interpretive Policy Memorandum on Reapplication Requirements for Municipal Separate Storm Sewer Systems."

Section K.3 (Annual Reports) outlines the process and roles of the Copermittees for developing and submitting the JRMP annual report. Information to be included in the annual reports is described in Section K.3.a.(3). The due dates have been changed. The JRMP is due one month earlier than under Order No. R9-2004-001. This change is necessary because the existing timelines prevented efficient response by the Copermittees to comments from the San Diego Water Board and the Copermittees' own review. However, the Copermittees may propose alternate reporting criteria and schedules, as part of their updated JRMP, for the Executive Officer's acceptance.

Each Copermittee is required to maintain records demonstrating that Permit activity requirements have been met, which allows the San Diego Water Board to confirm compliance as needed, such as via inspections, program audits, or requests for information per California Water Code Sections 13225 and 13267.

Reporting requirements in the Order focus on results and responses to the effectiveness assessments conducted by the Copermittees. This will allow the San Diego Water Board to determine how appropriately municipalities adapt and tailor their programs to findings from activities and monitoring results. Assessment of progress toward meeting the objectives is possible because the data collected by the Copermittees under Order No. R9-2004-001 can be used to establish baseline conditions. Compared to activity-based reporting, this will greatly enhance the ability of the San Diego Water Board, Copermittees, and the public to determine whether the programs are successful.

The Order reduces the amount of program activity-based reporting from Order No. R9-2004-001. Under the CASQA assessment model, activity-based reporting includes primarily outcomes that document compliance with permit requirements (Level 1 outcomes), rather than being indicators of the impact of activity implementation.[212] This approach is consistent with guidance from the USEPA, which notes that annual reports should highlight program effectiveness as well as describing activities.[213] This

[212] Level 1 outcomes under the CASQA guidance include documentation that required activities have been implemented.
[213] USEPA 2007. *MS4 Program Evaluation Guidance.* USEPA Office of Wastewater Management EPA-833-R-07-003. January 2007 field test version.

emphasis is also consistent with recommendations from the National Academy of Public Administration in its report to USEPA on Evaluating Environmental Progress, which suggest that reviewing activities data provides limited value when evaluating the effectiveness of programs and resulting environmental conditions.[214]

The Order maintains some reporting requirements for certain activity-based outcomes. These are mostly focused on activities that establish or revise municipal processes related to storm water runoff and management. The processes required by the Order are especially important in situations where sustaining water quality improvements may require activities that extend beyond the five-year period of the NPDES permit.

In addition, the Order maintains many activity-based reporting requirements related to enforcement of local requirements, with an emphasis on the results from such activities. This is intended to facilitate review of the contributions that inspection and enforcement activities have made toward meeting the goals of the Order. Reporting of these types of activities is supported by recommendations from the National Academy of Public Administration in its report to the USEPA: *Evaluating Environmental Progress: How EPA and the States Can Improve the Quality of Enforcement and Compliance Information* (June 2001).[215] Other activity-based reporting has been reduced to selected items based on consideration of program priorities.

Another source of prioritization for activity-based reporting is the *Storm Water Panel Recommendations to the California State Water Resources Control Board The Feasibility of Numeric Effluent Limits Applicable to Discharges of Storm Water Associated with Municipal, Industrial and Construction Activities* (June 19, 2006). In particular, the panel highlighted needs to improve the design, maintenance, and inspections of best management practices.

[214] National Academy of Public Adminstration 2001. Evaluating Environmental Progress: How EPA and the States Can Improve the Quality of Enforcement and Compliance Information (June 2001). http://www.napawash.org
[215] The National Academy of Public Administration report is available on-line at http://www.napawash.org

L. Modification of Programs

The following legal authority applies to section L:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv).

Section L of the Order provides a process for the Copermittees to modify their runoff management programs. This process will be useful so that the Copermittees can continue to refine and improve their programs based on the findings of their annual program effectiveness assessments. The process allows for minor modifications to the Copermittees' programs where the Copermittees can exhibit that the modifications meet or exceed existing legal requirements under the Order. Such a process avoids lengthy and time consuming formal approvals of proposed modifications before the San Diego Water Board, while still ensuring compliance with applicable legal standards and the Order. The process included in the Order is based on a process utilized by the San Francisco Bay Area Regional Water Quality Control Board in their MS4 permit for Alameda County.[216]

[216] San Francisco Bay Area Regional Water Quality Control Board, 2003. Order No. R2-2003-0021. P. 45.

M. Principal Permittee Responsibilities

The following legal authority applies to section M:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.26(a)(3)(iii)(C) provides that "A regional authority may be responsible for submitting a permit application."

Federal NPDES regulation 40 CFR 122.26(d)(2)(i)(D) provides that "[The Copermittee must demonstrate that it can control] through interagency agreements among coapplicants the contribution of pollutants from one portion of the municipal system to another portion of the municipal system."

No significant changes were made to this section.

N. Receiving Waters Monitoring and Reporting

The following legal authority applies to section N:

Broad Legal Authority: CWA sections 402, 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Copermittees must conduct a comprehensive monitoring program as required under Federal NPDES regulations 40 CFR 122.26(d)(2)(iii) and 122.44.

See section T of this Fact Sheet/Technical Report for a discussion of changes to the Receiving Waters Monitoring and Reporting Program.

O. Standard Provisions, Reporting Requirements, And Notifications

The following legal authority applies to section O:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Standard provisions, reporting requirements, and notifications are consistent to all NPDES permits and are generally found in Federal NPDES regulation 40 CFR 122.41.

Section O.2 of the Order has been changed to remove the statement that all plans and reports submitted in compliance with the Order are an enforceable part of the Order. This statement has been removed because it is unnecessary. The Order itself contains sufficient detailed requirements to ensure that compliance with discharge prohibitions, receiving water limitations, non-storm water action levels and the narrative standard of MEP for storm water are achieved. Implementation by the Copermittees of programs in compliance with the Order's requirements, prohibitions, and receiving water limitations is the pertinent compliance standard to be used under the Order, as opposed to assessing compliance by reviewing the Copermittees' implementation of their plans alone.

Rather than being substantive components of the Order itself, the Copermittees' management plans are simply descriptions of their runoff management programs required under the Order. These plans serve as procedural correspondence which guides program implementation and aids the Copermittees and San Diego Water Board in tracking implementation of the programs. In this manner, the plans are not functional equivalents of the Order. For these reasons, the Copermittees' runoff management plans need not be an enforceable part of the Order.

P. Attachment A – Basin Plan Prohibitions

The following legal authority applies to Attachment A:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: California Water Code Section 13243 provides that "A regional board, in a water quality control plan or in waste discharge requirements, may specify certain conditions or areas where the discharge of waste, or certain types of waste, will not be permitted."

California Water Code Section 13263(a) provides that waste discharge requirements prescribed by the SDRWQCB implement the Basin Plan.

No significant changes were made to this attachment.

Q. Attachment B – Standard Provisions

The following legal authority applies to Attachment B:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Standard provisions, reporting requirements, and notifications are consistent to all NPDES permits and are generally found in Federal NPDES regulation 40 CFR 122.41.

Attachment B includes Standard Provisions which have been developed by the State Water Board. These Standard Provisions ensure that NPDES permits are consistent and compatible with USEPA's federal regulations. Some Standard Provisions sections specific to publicly owned sewage treatment works are not included in Attachment B.

R. Attachment C – Definitions

The following legal authority applies to Attachment C:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv).

Attachment C contains definitions for terms found in the Order. In addition, definitions for terms previously defined in Order No. R9-2004-001 Attachment C, but which are not found in the current Order, have been deleted.

An additional section which includes acronyms and abbreviations has been added. This is to ensure clarity and prevent confusion of terms. Definitions have been added for new terms used in the permit to provide a clear understanding of their meaning and use.

S. Attachment D – Summary of Submittals

The following legal authority applies to Attachment D:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, 13383, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv) and 122.44(i).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.42(c) requires that "The operator of a large or medium municipal separate storm sewer system or a municipal separate storm sewer system that has been designated by the director under § 122.26(a)(1)(v) of this part must submit an annual report by the anniversary of the date of the issuance of the permit for such system. The report shall include: (1) The status of implementing the components of the storm water management program that are established as permit conditions; (2) Proposed changes to the storm water management program that are established as permit condition. Such proposed changes shall be consistent with § 122.26(d)(2)(iii) of this part; (3) Revisions, if necessary, to the assessment of controls and the fiscal analysis reported in the permit application under § 122.26(d)(2)(iv) and (d)(2)(v) of this part; (4) A summary of data, including monitoring data, that is accumulated throughout the reporting year; (5) Annual expenditures and budget for year following each annual report; (6) A summary describing the number and nature of enforcement actions, inspections, and public education programs; (7) Identification of water quality improvements or degradation."

California Water Code section 13267 provides that "the regional board may require than any person who has discharged […] shall furnish, under penalty of perjury, technical or monitoring reports which the regional board requires."

Attachment D to the Order provides a table summary of scheduled submittals required by the Order. Unscheduled submittals are no longer added to the table, since there is no proper due date for such submittals. A task summary has not been created for the Order, since the previous task summary was found to be redundant, repeating information found in the submittal summary and elsewhere in the Order.

A Jurisdictional Runoff Management Program (JRMP) Annual Report Checklist has been added to the reporting requirements. This addition is to determine and ensure that all requirements of the permit are being met. A Jurisdictional Runoff Management Program (JRMP) Annual Report Checklist has been added to the reporting requirements. This addition is to determine and ensure that all requirements of the permit are being met.

T. Attachment E - Receiving Waters and MS4 Discharge Monitoring and Reporting Program

The following legal authority applies to the Receiving Waters and MS4 Discharge Monitoring and Reporting Program:

Broad Legal Authority: CWA sections 402, 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv), 122.44 and 122.45.

Specific Legal Authority: Copermittees must conduct a comprehensive monitoring program as required under Federal NPDES regulations 40 CFR 122.26(d)(2)(iii).

Federal NPDES regulation 40 CFR 122.42(c) requires that "The operator of a large or medium municipal separate storm sewer system or a municipal separate storm sewer system that has been designated by the director under § 122.26(a)(1)(v) of this part must submit an annual report by the anniversary of the date of the issuance of the permit for such system. The report shall include: (1) The status of implementing the components of the storm water management program that are established as permit conditions; (2) Proposed changes to the storm water management program that are established as permit condition. Such proposed changes shall be consistent with § 122.26(d)(2)(iii) of this part; (3) Revisions, if necessary, to the assessment of controls and the fiscal analysis reported in the permit application under § 122.26(d)(2)(iv) and (d)(2)(v) of this part; (4) A summary of data, including monitoring data, that is accumulated throughout the reporting year; (5) Annual expenditures and budget for year following each annual report; (6) A summary describing the number and nature of enforcement actions, inspections, and public education programs; (7) Identification of water quality improvements or degradation."

California Water Code section 13267 provides that "the regional board may require than any person who has discharged […] shall furnish, under penalty of perjury, technical or monitoring reports which the regional board requires."

I. Purpose

According to USEPA, the benefits of sampling data include, but are not limited to:

1. Providing a means for evaluating the environmental risk of storm water discharges by identifying types and amounts of pollutants present;
2. Determining the relative potential for storm water discharges to contribute to water quality impacts or water quality standard violations;
3. Identifying potential sources of pollutants; and

4. Eliminating or controlling identified sources more specifically through permit conditions.[217]

Equally important, monitoring programs are an essential link in the improvement of storm water management efforts. Data collected from monitoring programs can be assessed to determine the effectiveness of management programs and practices, which is vital for the success of the iterative approach used to meet the MEP standard for storm water. Specifically, when data indicates that a particular BMP or program component is not effective, improved efforts can be selected and implemented. Also, when water quality data indicate that water quality standards or objectives are being exceeded, particular pollutants, sources, and drainage areas can be identified and targeted for specific management efforts.

Considering the benefits described above, the Receiving Waters Monitoring and Reporting Program (MRP) has been designed to determine impacts to receiving water quality and beneficial uses from storm water runoff and to use the results to refine the Copermittees' storm water runoff management programs for the reduction of storm water pollutant loadings to the MEP. For non-storm water discharges, monitoring has been designed for the identification of prohibited illicit discharges and to determine appropriate actions to take in response to dry weather non-storm water action levels. Additionally, the results from dry weather non-storm water monitoring can be used to evaluate exempted non-storm water discharges as a source or conveyance of pollutants. The primary goals of the MRP include:

1. Assess compliance with Order No. R9-2010-0016;
2. Measure and improve the effectiveness of the Copermittees' runoff management programs;
3. Assess the chemical, physical, and biological impacts of receiving waters from MS4 discharges;
4. Characterize storm water runoff discharges;
5. Identify sources of specific pollutants;
6. Prioritize drainage and sub-drainage areas that need management actions;
7. Detect and eliminate illicit discharges and illicit connections to the MS4;
8. Assess the overall health of receiving waters; and
9. Provide information to implement required BMP improvements

Each of the components of the MRP is necessary to meet the objectives listed above. In addition, the MRP has been designed in accordance with the guidance provided by the Southern California Stormwater Monitoring Coalition's Model Monitoring Technical Committee in its August 2004 "Model Monitoring Program for Municipal Separate Storm Sewer Systems in Southern California." This guidance document was developed in response to Senate Bill 72 (Kuehl), which addressed the standardization of sampling and analysis protocols in municipal stormwater monitoring programs. The technical committee which developed the guidance included representatives from

[217] USEPA, 1992. NPDES Storm Water Sampling Guidance Document. EPA/833-B-92-001.

Southern California Regional Water Quality Control Boards (including the San Diego San Diego Water Board), municipal storm water Copermittees (including Riverside County Flood Control District), Heal the Bay, and the Southern California Coastal Water Research Project.

As its title suggests, the guidance essentially developed a model municipal storm water monitoring program for use in Southern California. The model program is structured around five fundamental management questions, outlined below. The MRP is designed as an iterative step towards ensuring that the Copermittees' monitoring program can fully answer each of the five management questions.

1. Are conditions in receiving waters protective, or likely to be protective, of beneficial uses?
2. What is the extent and magnitude of the current or potential receiving water problems?
3. What is the relative storm water runoff contribution to the receiving water problem(s)?
4. What are the sources of storm water runoff that contribute to receiving water problem(s)?
5. Are conditions in receiving waters getting better or worse?

The justifications for each component of the monitoring program are discussed below.

II. Monitoring Program

Section II.A.1 (Mass Loading Station Monitoring) of the MRP requires mass loading and toxicity monitoring at monitoring stations located at the bottom of the Riverside County portion of the Santa Margarita watershed. The intent of current mass loading monitoring as conducted by the Copermittees under Order No. R9-2004-001 is to use water chemistry data from storm events and dry weather flows to calculate pollutant loads and to assess water quality with respect to applicable acute and chronic toxicity criteria from the California Toxics Rule (CTR) and bioassessment as part of the triad monitoring approach.[218] The mass loading monitoring that is required by the Tentative Order will provide data representing event mean concentrations of pollutants, total pollutant loadings, and toxicity conditions from specific drainage areas. Mass loading monitoring stations are recommended by the Model Monitoring Technical Committee in order to answer management questions 1, 2, and 5.[219] The stations are also expected to contribute towards meeting MRP goals 1, 2, 3, 4, 6, and 8. The locations of the mass loading monitoring stations are not changed from Order No. R9-2004-001. However, some revisions to the required list of constituents have been made. The changes are made to be compatible with the federal NPDES regulations and in response to data collected during the current permit term. The changes include:

[218] Riverside County Storm Water Permittees. 2009. Report of Waste Discharge, section 6.4 .
[219] Model Monitoring Technical Committee, 2004. Model Monitoring Program for Municipal Separate Storm Sewer Systems in Southern California. Chapter 5.

1. All events must now include Biological Oxygen Demand, 5-day Chemical Oxygen Demand, Total Organic Carbon, Dissolved Organic Carbon. These are specifically identified in 40 CFR 122.26(d)(2)(iii)(B), but were omitted from Order No. R9-2004-001.

2. Carbamate and Pyrethroid pesticides must be monitored. Pyrethroid pesticides were identified from TIEs conducted in response to toxicity observed during sampling as part of the triad approach at Temecula and Murrieta Creek. Long term monitoring of pesticide presence is critical to evaluate Copermittees BMP efforts and program effectiveness.

3. Impaired water body pollutants. Specific pollutants have been added in response to the U.S. Environmental Protection Agency approval of California's 2004-2006 and the San Diego Water Board approval of the 2008 Section 303(d) Water Quality Limited Waters List.

4. A requirement to collect a grab sample for total petroleum hydrocarbons whenever a sheen is observed has been added based upon results from IC/ID programs in existing southern California NPDES MS4 permits.

5. The required organisms for toxicity testing have changed from the previous order to be consistent with USEPA guidance.[220] *Ceriodaphnia dubia* (water flea) has been replaced with *Pimephales promelas* (fathead minnow) to provide at least three test species from different phyla. *Hyalella azteca* has been retained as a test organism due to sensitivity to pyrethroid pesticides.

Section II.A.2 (Stream Bioassessment Monitoring) of the MRP requires the Copermittees to conduct bioassessment monitoring. Bioassessment monitoring is a cost-effective tool that measures the effects of water quality over time.[221] It is an important indicator of stream health and impacts from storm water and non-storm water runoff. It can detect impacts that chemical and toxicity monitoring cannot. USEPA encourages permitting authorities to consider requiring biological monitoring methods in conjunction with chemical and toxicity testing to fully characterize the nature and extent of impacts from runoff.[222] Therefore, the San Diego Water Board commonly requires bioassessment monitoring in MS4 and other types of discharge permits.

[220] USEPA, 1991. Technical Support Document for Water Quality Based Toxics Control. EPA 505-2-90-001.
[221] California Department of Fish and Game, 2002. California Regional Water Quality Control Board, San Diego Region 2002 Biological Assessment Report: Results of May 2001 Reference Site Study and Preliminary Index of Biotic Integrity.
[222] USEPA, 1999. Rapid Bioassessment Protocols for Use in Wadeable Streams and Rivers. EPA 841-B-99-002. P. 2-5.

Bioassessment is the direct measurement of the biological condition, physical condition, and attainment of beneficial uses of receiving waters (typically using benthic macroinvertebrates, periphyton, and fish). Bioassessment monitoring integrates the effects of both water chemistry and physical habitat impacts (e.g., sedimentation or erosion) of various discharges on the biological community native to the receiving waters. Moreover, bioassessment is a direct measurement of the impact of cumulative, sub-lethal doses of pollutants that may be below reasonable water chemistry detection limits, but that still have biological affects.

Because bioassessment focuses on communities of living organisms as integrators of cumulative impacts resulting from water quality or habitat degradation, it defines the ecological risks resulting from storm water and non-storm water MS4 runoff. Bioassessment not only identifies that an impact has occurred, but also measures the effect of the impact and tracks recovery when control or restoration measures have been taken. These features make bioassessment a powerful tool to assess compliance, evaluate the effectiveness of BMPs, and to track both short and long-term trends (MRP goals 1, 2, 3, and 8). Bioassessment can also help answer management questions 1, 2, and 5.

The Order also identifies the most current established protocol to be used in identifying bioassessment reference stations. The protocol referenced in the Order is specified because it provides a qualitative and repeatable method for identifying reference sites. Moreover, the protocol is well established, since it has been peer reviewed and published.

The Order includes four modifications to the bioassessment monitoring required under Order No. R9-2004-001. These changes include:

1. Bioassessment monitoring must be consistent with the State Board's Surface Water Ambient Monitoring Program (SWAMP) Standard Operating Procedures (SOP) as amended[223].
2. Bioassessment monitoring is to include an assessment of periphyton (algae)[224]. Advantages of bioassessment using periphyton include: (1) they have rapid reproduction rates and very short life cycles, making them valuable indicators of short-term impacts; (2) as primary producers, they are most directly affected by physical and chemical factors; (3) sampling is easy and inexpensive; and (4) algal assemblages are sensitive to some pollutants which may not visibly affect other aquatic assemblages.[225] Future bioassessment must use algal IBI scores, when developed.

[223] SWAMP February 2007 (amended September 2008). Standard Operating Procedures for Collecting Benthic Macroinvertebrate Samples and Associated Physical and Chemical Data for Ambient Bioassessments in California
[224] SWAMP June 2009. Standard Operating Procedures for Collecting Stream Algae Samples and Associated Physical Habitat and Chemical Data for Ambient Bioassessments in Califorinia.
[225] USEPA, 1999. Rapid Bioassessment Protocols for Use in Wadeable Streams and Rivers. EPA 841-B-99-002. P. 3-3.

3. The number of bioassessment stations has been increased from three to to six. The Copermittees currently conduct bioassessment monitoring at one reference station and at the two mass loading stations at Temecula and Murrieta Creek. The increase in required sampling is needed to evaluate more localized impacts higher in the Santa Margarita HU in conjunction with SAL and NAL monitoring, as well as to evaluate any impacts that occur from hydromodification. The additional required reference station will aid in detecting any differences in bioassessment scores over time that may be independent of MS4 discharges.

Section II.A.3 (Follow-up Analysis and Actions) of the MRP requires the Copermittees to use the results of the chemistry, toxicity, and bioassessment monitoring to determine if impacts from MS4 discharges are occurring and when follow-up actions are necessary. The triad approach allows a wide range of measurements to be combined to more efficiently identify pollutants, their sources, and appropriate follow-up actions. Results from the three types of monitoring shall be assessed to evaluate the extent and causes of pollution in receiving waters and to prioritize management actions to eliminate or reduce the sources. The framework provided is to be used to determine conclusions from the data and appropriate follow-up actions. The framework is proposed by the Copermittees and derived from the Model Monitoring Program for Municipal Separate Storm Sewer Systems in Southern California.[226] These follow-up actions are expected to primarily help answer management questions 2 and 4, as well as address MRP goals 2, 4, 5, 6 and 7.

When, based on the framework in Table 2 of the M&R Program, data indicates the presence of toxic pollutants in runoff, the Copermittees are required to conduct a Toxicity Identification Evaluation (TIE). A TIE is a set of procedures used to identify the specific chemical(s) responsible for toxicity to aquatic organisms. When discharges are toxic to a test organism, a TIE must be conducted to confirm potential constituents of concern and rule out others, therefore allowing Copermittees to determine and prioritize appropriate management actions. If a sample is toxic to more than one species, it is necessary to determine the toxicant(s) affecting each species. If the type and source of pollutants can be identified based on the data alone and an analysis of potential sources in the drainage area, a TIE is not necessary.

When a TIE identifies a pollutant associated with MS4 discharge as a cause of toxicity, it is then necessary to conduct follow-up actions to identify the causative agents of toxicity, isolate the sources of toxicity, evaluate the effectiveness of toxicity control options, and then confirm the reduction in toxicity. Follow-up actions should analyze all potential source(s) causing toxicity, potential BMPs to eliminate or reduce the pollutants causing toxicity, and suggested monitoring to demonstrate that toxicity has been removed.

[226] Model Monitoring Technical Committee, 2004. Model Monitoring Program for Municipal Separate Storm Sewer Systems in Southern California. P. 5-61.

Section II.B (Wet Weather MS4 Discharge Monitoring) of the MRP requires the Copermittees to develop and implement a program to monitor and characterize pollutant discharges from MS4 outfalls. Currently the Copermittees do not monitor the discharge of storm water from the MS4 outfalls. As a result, a substantial amount of information regarding the quality of MS4 effluent is unknown. The collection of wet-weather data will enable the Copermittees to assess the effectiveness of existing storm water BMP measures. This data can be used to more effectively target storm water management program efforts. The MRP also requires compliance with Section D of the Order for Storm Water Action Levels.

The monitoring of outfalls is expected to be used to identify storm drains that are discharging pollutants in concentrations that may pose a threat to receiving waters. Source investigations are expected to be conducted as a response to the data.

The MRP provides the Copermittees great flexibility in assigning stations for wet-weather monitoring. Copermittees are to choose the number and frequency of monitoring stations, thus determining the overall cost of their program.

The monitoring requirements also include a requirement to measure receiving water hardness when comparing storm water MS4 discharge data to Storm Water Action Levels for priority pollutants (e.g. metals). The effect of these constituents upon receiving waters will vary depending upon the hardness of receiving waters.

Section II.B.2 (Source Identification Monitoring) requires the Copermittees to develop and implement a program to identify sources of discharges of pollutants causing the high priority water quality problems within each watershed. The current source identification monitoring program conducted by the Copermittees has not been demonstrated to be effective.

Identification of sources causing high priority water quality problems is a central purpose of storm water runoff management programs. Monitoring which enables the Copermittees to identify sources of water quality problems aids the Copermittees in focusing their management efforts, improving their programs and choosing additional and/or better BMPs. In turn, the Copermittees' programs can abate identified sources, which will improve the quality of storm water runoff discharges and receiving waters. This monitoring is needed to address management question 4. Moreover, in its review of the San Diego County Copermittees' monitoring proposal, Tetra Tech, Inc. finds that "after some years of assessment monitoring, it is time to look more systematically at determining the relative urban contributions and the sources of urban runoff that contribute to identified receiving water problems."[227]

Section II.C (Non-Storm Water Dry Weather Action Levels) of the MRP describes the monitoring to be conducted by the Copermittees to determine compliance with dry weather, non-storm water action levels.

[227] Tetra Tech Inc., 2006. Review of San Diego County MS4 Monitoring Program.

Section for Dry Weather Non-Storm Water Action Level Monitoring has taken the place of Illicit Discharge Detection and Elimination Monitoring under the previous Order. This change is required to assess compliance with action levels for non-storm water discharges from the MS4 into receiving waters while the Copermittees simultaneously conduct Illicit Discharge Detection and Elimination activities. The prior Order did not require the testing of non-storm water MS4 effluent prior to discharge into receiving waters, and thus Illicit Discharge Detection and Elimination Monitoring was conducted in receiving waters that were technically considered part of the MS4 but did contain solely MS4 effluent. Discussions between the San Diego Water Board and Copermittees identified this shortcoming, which is reflected in the Copermittees Annual Reports (2007-08 and 2008-09), and the Copermittees have requested the point of monitoring for non-storm water be changed to sample MS4 effluent[228]. The required sampling frequency has great flexibility and allows Copermittees to sample a representative number of discharge points while the sampling methodology continues to be grab sampling. Additionally, the selection of representative outfalls or other identified stations has been clarified to ensure consistency with federal requirements under 40 CFR 122.26(d) .

Section II.D.2 (Sediment Toxicity Study) includes a requirement that the Copermittees conduct a sediment toxicity special study. This study has been added to the Monitoring and Reporting requirements to assess the quality of stream sediments and possible contamination due to runoff from the MS4. Toxicity tests focusing on aqueous toxicity may not account for the full toxicity of receiving waters if constituents, such as heavy metals or pesticides, are bound to sediments. Southern California studies have shown that stream sediments can exhibit significant levels of toxic metals and pesticides, including pyrethroids.[229,230] Additionally, the Copermittees have identified the presence of aqueous toxicity at both mass loading stations due to pyrethroid pesticides, but their presence in sediments is unknown.

Section II.D.3 (Trash and Litter Campaign Investigation) includes a requirement that the Copermittees conduct a Trash and Litter Impairment Investigation (see Finding C.8 and Discussion).

Section II.D.4 (Agricultural Input Study)

Section II.D.5 (MS4 and Receiving Water Maintenance Study) includes a requirement that the Copermittees investigate impacts to Beneficial Uses from routine removal of vegetation from portions of the MS4 that are also receiving waters (see Finding D.3.c

[228] Copermittees ROWD, January 2009. Section 7.8.2.
[229] Holmes, R.W., Anderson, B.S., Phillips, B.M., Hunt, J.W., Crane, D.B., Mekebri, A. and V. Connor. 2008. Statewide Investigation of the Role of Pyrethroid Pesticides in Sediment Toxicity in California's Urban Waterways. *Environmental Science Technology* 42: 7003-7009..
[230] Crane, D.B. and C. Younghans-Haug. 1992. Oxadiazon residue concentrations in sediment, fish, and shellfish from a combined residential/agricultural area in Southern California. *Bulletin of Environmental Contamination and Toxicology.* Volume 48, no. 4.

and Discussion). Receiving waters within the Copermittees jurisdiction have been routinely cleared of vegetation by the Copermittees as part of their MS4 maintenance programs. The in-stream modification of vegetation may result in changes in water quality and Beneficial Uses from changes in nutrient cycling, the storage of organic matter, infiltration, flow attenuation, temperature and erosion potential.[231] The relative contribution, if any, of maintenance activities to CWA 303(d) water quality impairments in unknown.

Section II.E (Monitoring Provisions) of the MRP includes monitoring provisions which are standard requirements for all municipal storm water permits.

III. Reporting Program

Section III of the MRP discusses submittal of the Jurisdictional Runoff Management Program Annual Reports and the Receiving Waters Monitoring Annual Reports. In effect, a description of the monitoring program will be submitted with the Jurisdictional RMPs, and the monitoring data and assessment will be submitted one month later.

[231] Fischenich, J.C. and R.R. Copeland. 2001. Environmental Considerations for Vegetation in Flood Control Channels. US Army Corps of Engineers.

U. Attachment F - Source Data

Attachment F contains data utilized for the development of Storm Water Action Levels and Non-storm Water Action Levels.

AGENDA

Santa Margarita Region
Permit Renewal Meeting

12:00 p.m. – 4:00 p.m. April 28, 2010
Location: City of Temecula

1. PROCESS / HOUSEKEEPING
   i. Format for submitting documents
   ii. Addressing Menifee, Murrieta, and Wildomar
   iii. Clarifying permittee responsibilities
   iv. Terminology
   v. Issues that may affect the schedule
   vi. Monitoring NOV

2. TODAY'S TOPICS
   i. Public Participation
   ii. Residential
   iii. Municipal

3. OVERVIEW OF NEXT WEEK
   i. NALS
   ii. SALS
   iii. IDDE

4/28/2010 SMR Permit Meeting - Sign-in Sheet

Name	Agency	e-mail
Don Allison	City of Menifee	dallison@cityofmenifee.us
TIM DEMURA	CITY OF WILDOMAR	TDEMURA@CITYOFWILDOMAR.ORG
BILL WOOLSEY	" " MURRIETA	wwoolsey@murrieta.org
WAYNE CHIU	SDRWQCB	wchiu@waterboards.ca.gov
Ben Neill	"	bneill@waterboards.ca.gov
DAVID BARKER	SDRWQCB	dbarker
ALDO LICITRA	CITY OF TEMECULA	ALDO.LICITRA@CITYOFTEMECULA.ORG
Chiara Clemente	SDRWQCB	cclemente@waterboards.ca.gov
Mike Shetler	County of Riverside	mshetler@rceo.org
JASON Uhley	RCFC&WCD	
Claudio Padres	"	cmpadres@rcflood.org

Santa Margarita Watershed MS4 Permit Renewal
Meeting with San Diego Water Board Staff

Location: City of Temecula

April 28, 2010

12:00 PM – 4:30 PM

Attendees:

Dave Barker, SDRWQCB	Jason Uhley, RFCWCD	Aldo Licitra, Temecula
Chiara Clemente, SDRWQCB	Claudio Padres, RFCWCD	Don Allison, Menifee
Ben Neil, SDRWQCB	Mike Shelter, Riverside County	Tim D'Zmura, Wildomar
Wayne Chiu, SDRWQCB	Bill Woolsey, Murrieta	Daniel Apt, RBF

Agenda Item	Discussion
1. Process/Housekeeping v. Issues that may affect the schedule	• **Timeline for adoption** o San Diego Water Board staff indicated that they are targeting the October 13th San Diego Water Board meeting for a hearing on the permit, as it may take two hearings to get it adopted and the December meeting poses some potential quorum issues. o With the public notice requirements for the hearing date (30-45 days) and time for public review and comment and San Diego Water Board response to comments (15 working days) the San Diego Water Board would like to have a public release of the permit by 7/23/10 o San Diego Water Board staff indicated that to meet the 7/23 release date, they will need to begin final prep work by 7/9/10. o The Copermittees requested that the San Diego Water Board staff remain flexible with the schedule in moving forward, especially if the meetings are productive and progress on the permit is being made. Jason noted that the Copermittees would review the schedule based on the new information and get back to the San Diego Water Board. • **Further Permit Development** o The San Diego Water Board staff indicated that they are not making further changes to the draft they provided, independently from what is being discussed at these meetings. If, however, the San Diego Water Board determines that additional changes are warranted during the draft development process, they will include these changes and notify the Copermittees. It was confirmed that the document that was provided last week is the baseline document; however it has not been vetted

	through San Diego Water Board management or legal counsel. Additional changes could result from these reviews.
1. Process/Housekeeping i. Format for submitting documents	• A word document of the permit will be used for submittals that includes the cumulative language agreed to in the meetings. With each new topic, the Copermittees will continue to build upon this single word document. • The San Diego Water Board identified that the benefit of the meetings are to hear input form the Copermittees and that the draft of the permit will be updated based on the results of the meetings. ➢ **It was agreed that the San Diego Water Board will be the keeper of the draft permit and periodically provide the Copermittees with the updated draft of the permit with revisions made in consideration of discussions and proposed language.** ➢ **If time permits the San Diego Water Board may provide the Copermittees the final draft of the document that incorporates all of the changes from the meeting discussion prior to public release.**
1. Process/Housekeeping ii. Addressing Menifee, Murrieta, and Wildomar	• **Dual Regulation of Menifee, Murrieta, and Wildomar** ➢ **The San Diego Water Board staff was open to allowing Menifee to be wholly regulated by the Santa Ana Board, and Murrieta to be regulated wholly under the San Diego Board, and will look into what will need to be done, and begin communication with the Santa Ana Board.** ▪ Ben Neill identified that he wanted the area of Menifee in Region 9 to still be subject to the Region 9 New Development and TMDL requirements. ▪ Wildomar identified that to the extent that the SMR permit requirements can be closely aligned to the SA permit requirements, this would help greatly with implementation.
1. Process/Housekeeping iv. Terminology	• The Copermittees requested that the terminology in the SMR permit be similar to the terminology used in the SA permit. ➢ **The San Diego Water Board identified that the terminology will be consistent San Diego Region wide, but are open to including a cross reference of terminology in the glossary.**
1. Process/Housekeeping	• The Copermittees identified they wanted language to be used

iii. Clarifying permittee responsibilities	throughout the permit that clarifies responsibilities of the principal permittee versus the co-Copermittees ➢ **The San Diego Water Board staff was open to having language that would clarify responsibilities in the permit.** ➢ **The Copermittees will investigate language in the SA permit and provide it to the San Diego Water Board staff.**
1. Process/Housekeeping vi. Monitoring NOV	• The Copermittees identified that in the 08-09 annual report they self reported two data discrepancies that had been discovered: Some dissolved oxygen data was not able to be collected due to a failure of the field equipment, and some samples were not processed due to a lab error. The Copermittees identified that they have included back-up meters in their packs and will be hiring a person whose sole responsibility will be data management. • San Diego Water Board staff indicated that they are still working on the final draft of the NOV, and clarified that the NOV is merely intended to document the violations; not the corrective actions. • Jason noted that he is aware that NOVs are sometimes used to document non-compliance, but that he was concerned that the NOV would include a burdensome RTR that might divert resources away from the Permit renewal process. He requested that the Board consider that in formulating their response to the data discrepancy.
2. Today's Topics i. Public Participation	• The Copermittees identified that they have no comments or suggested changes for this section of the permit.
2. Today's Topics ii. Residential - **F.3.c.(5)**	• **HOAs / CIAs** ▪ The Copermittees requested deletion of this section for several reasons: ▪ The Copermittees do not believe that HOAs are a significant problem or source in the region, ▪ Other Permit programs, including IC/ID, the proposed post-construction BMP certification program, existing water conservation programs implemented by RCWD and others and existing Permittee authorities already gives Copermittees the full authority to address the potential problem scenarios from HOAs, and ▪ Leaving this requirement in creates an additional administrative burden, with no comparable benefit to water quality. ▪ There was discussion back and forth regarding whether or not HOAs are a significant source within the watershed, and

	whether existing programs were sufficient to prevent discharges from HOAs from becoming a significant source of pollutants. ➢ **The San Diego Water Board staff was open to some language changes in the section that would clarify that the intent of the provision was not to propose new programs or reporting requirements, where HOAs are addressed thorough existing programs.** ➢ **The Copermittees will develop some draft language and submit it to the San Diego Water Board staff.**
2. Today's Topics ii. Residential - F.3.c.(1)	• The Copermittees requested the removal of "coastal lagoon, the ocean" as they do not discharge directly to these types of water bodies. ➢ **The San Diego Water Board was open to removing this text. This text may be reinserted in any future region-wide MS4 permits. .**
2. Today's Topics ii. Residential - F.3.c.(2)	• **Clarify that programs may be implemented individually or jointly** ▪ The Copermittees identified that language such as "jointly" should be added to section (c) to allow the Copermittees to continue jointly funding HHW collection facilities, and that similar language should be added throughout the permit. ➢ **The San Diego Water Board is open to this language if it is "and/or" to provide additional flexibility for an individual Copermittee to tailor their own program.** • **Clarify the BMPs can only be implemented to the MEP standard.** ▪ The Copermittees identified that the phrase "to the MEP" was requested to be added to section (d) of this provision (and similar provisions throughout), to clarify that the minimum BMPs will be implemented to the maximum extent practicable. The Copermittees described that residential area BMPs are typically ordinance or education based, and the number and level of BMPs should be flexible to allow us to continually reassess our BMPs to ensure that our resources are being spent on effective BMPs. Copermittees lack resources to 'put a cop on every street corner', so our level of enforcement of ordinances or our educational outreach efforts should be based on the severity of the issue, which will change over time. This added language helps ensure the Copermittees have the flexibility to allocate resources to real water quality problems.

	➢ **The San Diego Water Board staff confirmed that they are not looking for "a cop on every street corner", and that the designated minimum BMPs could be changed as part of the iterative process.**
2. Today's Topics ii. Residential - F.3.c.(4)	• The Copermittees requested that section (4) be moved to the Program and Effectiveness Assessment and Reporting section of the permit. ➢ **The San Diego Water Board agreed that this is also included in the PEA section and removing this section may be acceptable.**
2. Today's Topics ii. Residential - F.3.c.(6)	• Requested consolidation of all the training requirements and education requirements throughout the permit, individual unified sections. The Copermittees also requested that the San Diego Water Board review the Santa Ana Permit training requirements as an alternative approach to addressing training. ➢ **The Copermittees committed to providing the training section from the Santa Ana permit to the San Diego Water Board.** ➢ **The San Diego Water Board is open to the creation of an Education section and consolidating the education and training requirements from the different sections to the new section.**
2. Today's Topics iii. Municipal - F.3.a.(1)	• **Clarifying language** ▪ The Copermittees noted that they suggested language to clarify the introductory paragraph to each section (not only Municipal). The concern was that the structure of the sentence required complete compliance with the section as well as compliance with Sections A and B of the Order. The Copermittees believed that the JRMP sections (including the Residential Section) describe the means to achieve the goals of Section A and B of the Order and that the JRMP sections should not serve (and be enforced) as independent ends in and of themselves. ▪ Copermittees requested language in the permit be adjusted to clarify that 'municipal' areas and activities is referring to the 'CoCopermittees' areas and activities ▪ The Copermittees also asked that the term 'areas' be changed to 'facilities' as it more clearly describes what is trying to be addressed in the permit. ▪ There was discussion as to the definition of 'Facilities' and whether it would be as inclusive

	as the term 'areas'. The example of vacant land and illegal dumping or erosion was brought up. ➢ **The Copermittees will revisit the language in the permit from a "vacant land" viewpoint and see if they had any further recommendations.** ➢ **The San Diego Water Board agreed to look into defining 'municipal' in the glossary to clarify its intent to mean "Copermittee".** • **Inventory** ▪ The Copermittees identified that additional data required for the municipal inventory (i.e. name, address, 303d listings, pollutants generated) would be a substantial data collection effort for the Copermittees compared to existing Permit requirements. The Regional Board pointed out that these data were already required and expected to be in inventory under the 2004 permit. The Copermittees indicated that current inventories on spreadsheets would be able to track any additional data simply by adding another column. ▪ Discussion ensued regarding the need to track 303(d) listed waterbodies, linear features, and other requirements contained in the inventory. ➢ **The San Diego Water Board does not expect roads and other linear features to be individually identified in inventories but could simply be covered by maps. The Board staff would be satisfied if the inventory simply referenced that roads and other linear features (e.g. flood facilities, storm drains, etc.) were maintained and provided a map. The San Diego Water Board will consider updating the language in the permit to reflect this.** • **GIS** ▪ The Copermittees requested the removal of the requirement to maintain the database in GIS. ▪ **The Regional Board identified that they may not have the authority to require GIS. The Regional Board agreed to consider changing the language.**
2. Today's Topics	• **Minimum BMPs**

iii. Municipal - F.3.a.(2)	▪ The Copermittees requested that the Permit clarify that BMPs need to be designated for "pollutant generating" activities as not all municipal activities are pollutant generating. ➢ **The San Diego Water Board is open to clarifying the text.**
2. Today's Topics iii. Municipal - F.3.a.(3)	• **BMPs for Pesticides/ Herbicides/etc** ▪ The Copermittees requested that 'to the MEP' be added in the provision identifying that in some cases application of chemical pest control may be necessary for public health and safety. ▪ Discussion ensued regarding pyrethroids, general pesticide and herbicide use, and existing permit requirements (which included the MEP language). ➢ **The Regional Board agreed that the phrasing from the 2004 permit was acceptable.**
2. Today's Topics iii. Municipal - F.3.a.(4)	• **BMPs for Flood Control Structures** ▪ The San Diego Water Board staff identified that their goal is to have an assessment of all flood control facilities for identifying maintenance responsibilities, and areas causing or contributing pollutants such as erosion or impact to habitat that can be improved. ▪ The Copermittees identified that this evaluation is already being done routinely for each of their flood control structures. ➢ **The Regional Board identified their initial thinking was to have this done once but accepted a change to the language saying this would be done as part of ongoing maintenance of the flood control devices, provided the appropriate reporting is accompanied.** ➢ **The Copermittees will propose changes to reflect this agreement.**
2. Today's Topics iii. Municipal - F.3.a.(6)	• **MS4 Operation and Maintenance** ▪ The Copermittees asked to bring back their 2004 permit language that used the terms 'catch basins and storm drain inlets' in lieu of 'MS4 facilities' for clarity. ▪ The San Diego Water Board felt that facilities was broader and more encompassing and expressed concern that such language would not require cleanout of (detention) basins. ▪ Temecula identified that the timeframe of between

	May 1 and September 30 for inspection and cleanout would not be sufficient to inspect and clean all of its catch basins. San Diego Water Board pointed out that this was an existing requirement in the 2004 permit. ➢ **The Copermittees would look at an appropriate way to address basins in the language.**
2. Today's Topics iii. Municipal - F.3.a.(7)	• **Sewage** ➢ **The San Diego Water Board requested that the meeting be adjourned as it was passed the identified time for the meeting.** ➢ **The Copermittees noted it would be discussed in the next meeting.**

AGENDA

Santa Margarita Region
Permit Renewal Meeting
(Week 2)

12:00 p.m. – 3:30 p.m. May 5, 2010
Location: City of Temecula

1. PROCESS / HOUSEKEEPING

    i. Overall Schedule & Process

2. WRAP-UP FOR WEEK 1 TOPICS

3. TODAY'S TOPICS

    i. IDDE
    ii. SALs
    iii. NALs
    iv. Overview of Monitoring issues (time permitting)

4. OVERVIEW OF NEXT WEEK

    i. **A**. Prohibitions and RWL
    ii. **B.** Non-storm Water discharges
    iii. **F.1.a** through **F.1.c**

Santa Margarita Watershed MS4 Permit

Meeting Date 5/6/2010

Time 12- 3:30

Location Temecula

Name	Agency	Signature
David Gibson	SDRWQCB	
Jimmy Smith	SDRWQCB	
David Barker	SDRWQCB	David Barker
Chiara Clemente	SDRWQCB	
Ben Neill	SDRWQCB	
Wayne Chiu	SDRWQCB	Wayne Chiu
Chad Loflen	SDRWQCB	Chad Loflen
Jason Uhley	RCFC&WCD	
Claudio Padres	RCFC&WCD	
Arlene Chun	RCFC&WCD	
Mike Shetler	County of Riverside	
Alex Gann	County of Riverside	
Aldo Licitra	City of Temecula	Aldo Licitra
Bill Woolsey	City of Murrieta	Bill Woolsey
Don Allison	City of Menifee	
Tim D'Zmura	City of Wildomar	
Mack Walker	LWA	M. Walker
Daniel Apt	RBF	

Santa Margarita Watershed MS4 Permit Renewal
Meeting with San Diego Water Board Staff

Location: City of Temecula

May 6, 2010

12:00 PM – 4:00 PM

Attendees:

Dave Barker, SDRWQCB
Chiara Clemente, SDRWQCB
Ben Neil, SDRWQCB
Wayne Chiu, SDRWQCB
Chad Loften, SDRWQCB

Jason Uhley, RFCWCD
Claudio Padres, RFCWCD
Bill Woolsey, Murrieta
Aldo Licitra, Temecula
Don Allison, Menifee

Tim D'Zmura, Wildomar
Mack Walker, LWA
Daniel Apt, RBF

- ➢ Meeting Outcome
- ❖ Discussion to include in the fact sheet

Agenda Item	Discussion
1. Process/Housekeeping i. Overall Schedule & Process	• **Interim Drafts from the San Diego Water Board** ➢ **San Diego Water Board staff identified the need to set up a process to provide interim drafts to the Copermittees and will look into setting up set intervals of providing the interim drafts**. • **Schedule & Process** o San Diego Water Board staff identified a concern for the order of the schedule, and the ability to discuss all the issues. Board Staff requested that the Copermittees' big issues be discussed first. o The Copermittees noted that the original schedule discussed with Gibson was to have the hearing in December which would have better facilitated full discussions. The Copermittees reiterated that the current timelines are not consistent with the initial agreement for a December hearing, nor consistent with Jason's initial discussion with David Gibson, where Mr. Gibson stated that there was not fixed schedule and that discussions could be continue as long as they were effective. Jason noted that the current schedule is insufficient and reiterated previous Copermittee requests that if the process is working that the deadlines should be adjusted. o San Diego Water Board staff corrected that Mr. Gibson's schedule was to have the hearing **no later than** December San Diego Water Board noted that listening to the Copermittees comments and concerns was their goal for the meetings. Achieving consensus on everything is not expected. ➢ **It was mutually agreed that future meetings will go from 10 AM – 3:30PM (at the latest)**

	➢ **The Copermittees agreed to provide the Water Board an updated schedule for the meetings. In addition, The Copermittees will evaluate the schedule to see if some bigger issues could be moved earlier to allow the Copermittees sufficient time for discussion with the San Diego Water Boardbefore the public release.**
2. Wrap-up for Week 1 Topics	• <u>Municipal (F.3.a)</u> o The Copermittees overviewed some of the additional suggested language changes that were made pursuant to the 4/28 meeting discussions. ▪ Language was suggested to clarify that linear facilities do not need to be individually inventoried. ▪ Language was suggested for the evaluation of flood control structures to clarify that the Copermittees would evaluate the need for retrofit as part of ongoing routine maintenance of the MS4 system. ▪ Basins were included as part of the O&M section. ➢ **The Copermittees agreed to highlight any new changes to the suggested language in the Municipal sections compared to what was provided last week.** • <u>Residential (F.3.c.)</u> o Suggested language was discussed that would clarify that a separate compliance program would not be required for Home Owners Associations. ➢ **San Diego Water Board staff indicated that they want to be specific that existing residential requirements apply for Common Interest Areas and Home Owners Associations; however, separate annual reporting requirements are not expected for CIA/HOA Areas.** ➢ **San Diego Water Board staff reviewed the suggested language provided by the Copermittees for the previous week's meeting and will review any additional changes to language that the Copermittees have made as time permits.** ➢ **The Copermittees agreed to highlight any new changes to the suggested language in the Residential sections compared to what was provided last week.**
3. Today's Topics i. IDDE	• <u>Maintain MS4 Map (F.4.b.)</u> o The Copermittees felt that requiring the use of a GIS system was dictating the method of compliance contrary to California Water Code and therefore should be recommended but not required and noted this change was similar to the change requested last week regarding GIS systems. The Copermittees specifically requests the replacement of 'required' with 'encouraged' in the sentence discussing GIS data management. ➢ **San Diego Water Board staff agreed to look into the Copermittees concern about dictating the manner of**

	compliance. The San Diego Water Board will consider changing the wording to 'encourage' the use of GIS, rather than 'require' it. • Dry Weather Field Screening and Analytical Monitoring (F.4.d.) o There was discussion regarding the need for the inclusion of the language 'individually and/or jointly' to allow for the Copermittees to collaborate and implement programs jointly, and the resulting responsibility in case of a violation. ▪ The San Diego Water Board Staff identified that the original language in the draft would allow for the Copermittees to jointly pursue implementation of this and other requirements where the term "each Copermittee" is used. The Board staff clarified, however, that individual Copermittees would be responsible for any violation related to their individual responsibility (e.g. failure to conduct an inspection or collect data). If for example, the District conducts monitoring for the Copermittees as a contractor, through agreements; and there was a violation related to data collected on the Copermittee's behalf, that the responsibility would be on the Copermittee, not the District. The Copermittee would have to pursue the District (or any other contractor) through its agreement with that entity. ➢ **Based on the understanding above, it was agreed that the language 'individually and/or jointly' would not be needed.** • Investigation/Inspection And Follow-Up - Analytical data [F.4.e.(2)(c)] o The Copermittees requested that the 5-day period for initiating follow-up investigations would begin pending appropriate Copermittee QA/QC on the data. ➢ **The San Diego Water Board staff did not agree to make changes to the language of the permit, but offered to clarify the expected response by the Copermittee(s) in the Fact Sheet.** ❖ To be added to the Fact Sheet: The intent of the Board is that if QA/QC identifies that the data is bad and follow-up sampling or investigations supports the finding that the data were faulty, additional follow-up is no longer expected. • Elimination of Illicit Discharges And Connections (F.4.f.) o The Copermittees expressed concern over the requirement to take 'immediate action'. The concern is that 'immediate' is not defined and should be relative to the severity of the problem. ▪ Several examples were cited by Board staff indicating that 'immediately' is contextual and may be defined in the Copermittees JRMP to some extent. ❖ The San Diego Water Board staff offered to clarify in the Fact Sheet that the appropriate steps, and the level of 'immediacy' required would depend on the situation and may be defined by the Copermittees in their JRMPs. o There was discussion about including language to clarify that the Copermittees can engage the San Diego Water Board for assistance in resolving illicit discharges and connections. ➢ **The San Diego Water Board did not agree to include such language in the permit since the permit cannot be written to**

	regulate themselves, but offered to include language in the fact sheet. • <u>Prevent and Respond to Sewage Spills and other Spills – Management Measures & Coordination [F.4.h.(1)]</u> o The Copermittees noted concern regarding the requirement to 'prevent' sewage spills from entering the MS4. The concern is that the Copermittees cannot 'prevent' spills from entering the MS4, but can only assist with the response once notified of the spill. ➢ **The San Diego Water Board staff confirmed that they expect the sewer agencies to be the first responder, and discussed different meaning of "prevent" and that the Copermittees have flexibility to implement management measures and procedures to'prevent' entry into the MS4. RB staff clarified that their intent for this section is to require the Copermittees to have 'management measures and procedures' in place, and to 'coordinate with spill response teams'.** o The Copermittees identified that they already have an SSO response program that includes: coordinated procedures with the sewer agencies, procedures for cross notification of spill events, full and immediate access to our MS4 (no requirement to notify us prior to accessing for containment or cleanup), and availability of the Copermittees to assist with response when requested. ➢ **The San Diego Water Board staff indicated that such a program would likely meet the requirements of this provision, and that if the Copermittees provide a copy of this SSO response program in their updated JRMP, that San Diego Water Board staff could review it for compliance with the provision**. • <u>Education and Training (F.4.i.)</u> ➢ The San Diego Water Board Staff identified that there will be one overall Education section and training will be part of that section.
3. Today's Topics ii. NALs	• **NALs Overarching Issues** o The Copermittees noted that although the Board has identified NALs and SALs as the standard for their region, the Copermittees still believe that it is not appropriate for this permit area, and that the action levels identified in the ROWD will be a more effective and useful tool. The Copermittees indicated that they will provide official written comments to this extent, but that they will focus the meeting time with Board staff on working to fine tune the requirements to help it to be useful to the Copermittees in the management of their programs, cost efficient, and flexible to allow appropriate focusing of resources. o The Copermittees mentioned that at this meeting they were only commenting on the programmatic responses to an NAL/SAL exceedance and not covering the action levels themselves, nor any sections discussing the monitoring locations or protocols. o The Copermittees identified that the 14 day reporting requirements in provisions C.2.a and C.2.b. were not necessary to protect water quality and requested that any reports be submitted within the annual report similar to requirements for any other IC/ID event.

	➢ **The San Diego Water Board Staff indicated that that the reports required in C.2.a and C.2.b for documenting the results of the source identification efforts could be submitted with the annual report and still meet the goals of the reporting requirements.** o The Copermittees noted concern over Section C.2.e., which would require any exceedance where the source was not found, to result in identification of the pollutant as a high-priority – which in turn could potentially require new programs to be created for that pollutant – all after only a single exceedance. Suggested alternative language was discussed. ➢ **The San Diego Water Board staff concurred with the Copermittees concern. The San Diego Water Board staff made a suggestion to remove the phrase "high priority pollutant of concern", but indicated that it needed some more thought regarding how that would impact the rest of the paragraph.** ➢ **The Copermittees will provide suggested alternative language based on the discussion.** • **NAL Exceedance Response (C.2.)** o The Copermittees discussed suggested language to ensure that only the 'applicable' Copermittee is required to respond to an exceedance. The concern is that the existing language identifies that 'each' Copermittee must respond, which could be read to require all Copermittees to respond. The Copermittees clarified that only the Copermittee with jurisdiction over the surrounding area should be required to respond. ➢ **The San Diego Water Board agreed and would check on adding "applicable" where appropriate in context.** • **NAL Exceedance Response (C.2.a.)** o The San Diego Water Board staff clarified that for exceedances caused by discharges that are identified as natural in origin and in conveyance into the MS4, rather than **NO** specific action is required, the specific action required is reporting the findings and providing documentation to the San Diego Water Board. • **NAL Exceedance Response (C.2.b.)** o The Copermittees provided language to clarify that the required response to an NAL exceedance caused by an Illicit Discharge or Connection is defined in section F.4.f of the order. The Copermittees also identified that the second two sentences discussing the timeframe and content of the report to the San Diego Water Board may be able to be deleted since they are addressed through the IDDE program. ➢ **The San Diego Water Board will review the language in more detail.** • **NAL Exceedance Response (C.2.c.)** o The Copermittees provided language to clarify the difference in the required response, based on whether an exceedance is identified as an isolated event, or representative of the entire category of discharges. o The San Diego Water Board was concerned that the suggested language would limit the Copermittees response to providing "a schedule of actions" and wanted to ensure that the report would

	describe the actions that will be taken, not only a schedule for actions. ➢ **The San Diego Water Board felt that the emphasis of the requirement needs to be on addressing the exceedance and not a schedule to address the exceedanceThe San Diego Water Board offered to review the suggested language in more detail.** • **NAL Exceedance Response (C.3.)** o The Copermittees requested that the sentence addressing effectiveness assessment be moved to the beginning of the section. Additionally the Copermittees felt that there were apparent inconsistencies within the paragraph regarding use of NALs for enforcement. o San Diego Water Board considered that this section may be more appropriate as a finding rather than a provision, as the language is generally explanatory rather than describing requirements on the Copermittees. o Board staff indicated concern in changing this paragraph due to legal counsel's involvement in drafting it, but did note that the addition of the sentence addressing effectiveness assessment was a last minute change. ➢ **The San Diego Water Board will have their legal counsel look at the proposed changes and will look to see if this provision is more appropriate to be included in the Findings.** • **NAL Exceedance Response (C.5.)** o The Copermittees identified that this section might be more appropriate to include in the MRP as it is dealing with the required sampling and data. o The San Diego Water Board identified that it may be appropriate to include pre-calculated values for Table 3.a.2 based on assumed hardness values. The Copermittees indicated that they prefer the formulas, as the pre-calculated values may not be generally representative.
3. Today's Topics iii. SALs	• **SALs (D.1)** o The Copermittees discussed recommended changes to the introductory paragraph to clarify how and SAL exceedances are calculated. The suggested language indicated that an SAL is exceeded if, for a given monitoring station, a running average of twenty percent or greater of the available Wet Weather MS4 Discharge Monitoring data exceeds the Storm Water Action Level ➢ **It was agreed on the general intent of the requirement. The Board offered to re-visit this language and consider the suggested revisions.** o In the requirement to consider monitoring data, the Copermittees requested additional language to examine the need to dedicate resources to address NAL exceedances that would provide flexibility to prioritize an NAL response action before a response action to an SAL exceedance, if a resource conflict arose.

	➢ **The San Diego Water Board staff did not feel it was consistentto add the suggested language examining resources in the requirement to consider monitoring data, but agreed that flexibility is appropriate and is already included in the language.** ❖ The San Diego Water Board's intent through the language in this section is to allow flexibility to prioritize resources between responding to NALs and SALs. A clarification of the intent may be added to the Fact Sheet. • **SALs – Natural pollutants (D.4)** o The Copermittees provided suggested language to clarify that once an SAL exceedance is demonstrated to be natural in source and conveyance into the MS4, that this demonstration would not be required to be repeated for future exceedances. o There was discussion about detecting the potential addition of an anthropogenic source of the same pollutant at a later date. The Copermittees responded that if there was a significant deviation from the natural background levels of the pollutant that would be accounted for in the assessment of the magnitude of the exceedance. ➢ **The San Diego Water Board agreed that demonstrating that a pollutant is naturally sourced would not need to be repeated at the same monitoring station rather than in the same hydrologic subarea, and offered to review the language again in response to the discussion.**
4. Overview of Next Week	• The Copermittees discussed that they have not identified Irrigation Runoff (and associated conditionally exempt discharges) as being a source of pollutants in this watershed. The Copermittees requested that these conditional exemptions be restored. The Copermittees noted that if the Board made a determination that the category is a source, that they could instead include require the Copermittees to address the category through management programs (similar to the programs required for non-emergency fire-flows in Section B.3.). • The San Diego Water Board identified that discussions regarding the irrigation prohibition can begin next week. • Bill Woolsey identified the water efficiency ordinance that has been adopted in Murrieta.

AGENDA

Santa Margarita Region
MS4 Permit Meeting

10:00a.m. – 4:00 p.m. May 13, 2010
Location: City of Temecula

1. PROCESS / HOUSEKEEPING

2. WRAP-UP FOR LAST WEEK'S TOPICS

3. TODAY'S TOPICS

   i. **A**. Prohibitions and RWL
   ii. **B.** Non-storm Water discharges
   iii. **F.1.a** through **F.1.c**

4. CONCEPTUAL DISCUSSION OF NEXT WEEK'S TOPICS

   i. F.1.e - BMP Construction Verification
   ii. F.1.f - BMP Maintenance Tracking
   iii. F.1.g. - Enforcement of Development Sites
   iv. F.3.d - Retrofit

Santa Margarita Watershed MS4 Permit

Meeting Date MAY 13, 2010

Time 10:00 AM

Location TEMECULA CITY HALL

Name	Agency	Signature
David Gibson	SDRWQCB	
Jimmy Smith	SDRWQCB	
David Barker	SDRWQCB	
Chiara Clemente	SDRWQCB	
Ben Neill	SDRWQCB	
Wayne Chiu	SDRWQCB	
Chad Loflen	SDRWQCB	
Jason Uhley	RCFC&WCD	
Claudio Padres	RCFC&WCD	
Arlene Chun	RCFC&WCD	
Mike Shetler	County of Riverside	Mike Shetler
Alex Gann	County of Riverside	
Aldo Licitra	City of Temecula	Aldo Licitra
Bill Woolsey	City of Murrieta	Bill Woolsey
Don Allison	City of Menifee	
Tim D'Zmura	City of Wildomar	
Daniel Apt	RBF	
Mack Walker	LWA	M. Walker

Santa Margarita Watershed MS4 Permit
Meeting with San Diego Water Board Staff

Location: City of Temecula

May 13, 2010

10:00 PM – 3:00 PM

Attendees:

Dave Barker, SDRWQCB	Jason Uhley, RFCWCD	Aldo Licitra, Temecula
Chiara Clemente, SDRWQCB	Claudio Padres, RFCWCD	Tim D'Zmura, Wildomar
Ben Neill, SDRWQCB	Don Allison, Menifee	Mack Walker, LWA
Wayne Chiu, SDRWQCB	Bill Woolsey, Murrieta	Daniel Apt, RBF

Agenda Item	**Discussion**

1. Process/Housekeeping	• The Copermittees inquired about the status of the regulatory 'swap' with the Santa Ana Water Board, for the cities of Menifee and Murrieta.
	  o San Diego Water Board staff had no new information on the Menifee/Murrieta 'swap'.
	• The Copermittees inquired about the status of the new section for training and education, and mentioned that it is on the schedule for discussion on May 26th.
	  ➢ **San Diego Water Board staff will provide a revised draft, considering the Copermittees' comments to date, before May 26th.**
	• The Copermittees identified that due to the compressed schedule for meetings, they would like to set up separate parallel meetings with San Diego Water Board staff to discuss the MRP.
	  ➢ **San Diego Water Board staff indicated that they will consider this option depending on their availability. If the monitoring coordinator for the Copermittees can come the the San Diego Water Board office, that would make meeting easier.**

2. Wrap-up for Week 1 Topics	• The Copermittees mentioned that they had provided via e-mail the final meeting notes for the May 6th meeting, and inquired as to whether the San Diego Water Board staff had any questions or comments on those notes. ➢ **San Diego Water Board staff indicated that they had reviewed the notes and had some redlines that they would be finalizing and providing.**
3. Today's Topics **A. Prohibitions and RWL**	• **Section A.1.** o The Copermittees identified that the draft language could unintentionally prohibit sub-regional treatment (where an MS4 conveys runoff to a sub-regional BMP) by prohibiting the discharge of pollution 'into' the MS4. The Copermittees

	suggested the deletion of the words "into and" to clarify that what is prohibited is the discharge of pollution 'from' the MS4 in a manner causing, or threatening to cause, a condition of pollution, contamination, or nuisance. o San Diego Water Board staff identified that the intent of the language is to prefer local, on-site treatment *before* discharging into the MS4, however they confirmed that it is not their intent to prohibit sub-regional treatment systems that receive runoff from MS4s and treat it prior to it being discharged into receiving waters. ➢ **San Diego Water Board Staff offered to review the language for ways to clarify this intent, possibly through inclusion of a footnote** • **<u>Section A.3.a.(1)</u>** o The Copermittees requested changes that would allow the notification required under this section to be submitted with the annual report. ▪ The San Diego Water Board Staff identified that they wanted to be notified closer in time to the actual determination. ▪ The San Diego Water Board staff noted that the Santa Ana permit requires a separate notification within 2 days, and the current language provides the Copermittees 30 days to provide the notification. ➢ **San Diego Water Board staff did not agree to make any changes to the language in the provision.** o There was discussion about what information needs to be included in the notification. ✪ **The San Diego Water Board staff offered to clarify within the fact sheet that the notification required under this section would include the date of the determination, and the applicable water quality exceedance data.** • **<u>Section A.3.b.</u>** o The Copermittees identified that the draft permit had deviated from the SWRCB guidelines by requiring the Copermittees to repeat the procedure described in provision A.3.a., for all recurring exceedances of the same water quality standard. The Copermittees identified that the primary intent of their suggested language was to restore the SWRCB language. The Copermittees further explained that programs to address exceedances often span several years through development and implementation, and that the procedure in A.3.a. should not be repeated unless at the end of that implementation plan, the exceedances persist. ➢ **The San Diego Water Board offered to review the reason that they had changed the SWRCB language and**

	consider the Copermittees suggested revisions.
3. Today's Topics: **B. Non-storm Water discharges**	• **Section B.2.** o The Copermittees explained that their suggested language is to clarify that if an individual discharge is identified as an isolated source of pollutants, but that it is not representative of the category as a whole, that the individual discharge would be addressed as an illicit discharge. o The San Diego Water Board staff identified that there are two scenarios for isolated sources 1) time based 2) geographic based and would like to think about the provision in this context. ➢ **The San Diego Water Board will review the section and consider the suggested revised language.** • **Sections B.2.l., B.2.n., B.2.o. (collectively: 'irrigation runoff')** o The Copermittees requested that the conditional exemptions for 'irrigation runoff' be restored and explained that this is appropriate for several reasons: **1.** The Copermittees have not determined that irrigation runoff is a significant source of pollutants to the receiving waters in this watershed. **2.** Through Section C. of the order (NALs), there is a mechanism already in place that will require prohibition of any conditionally exempt discharge categories that *are* indeed found to be a significant source of pollutants. In addition, section C.3 specifically states that NALs "*provide an assessment of … **the appropriateness of exempted non-storm water discharges**".* o The Copermittees requested that the Board staff rely on the mechanisms they have already put in place (e.g. NALs) to identify which, if any, conditionally exempt discharges actually need to be prohibited. o The Copermittees also indicated that if the Board is nevertheless making the determination that Irrigation runoff needs to be addressed, that Pursuant to B.2. the Copermittees have the option to either: a) 'prohibit the discharge category', ***or*** b) 'develop and implement appropriate control measures to prevent the discharge of pollutants to the MS4'. Should this be the case, the Copermittees expressed that option 'b' is a more appropriate use of public funds in addressing this discharge category. The Copermittees explained that their suggested addition of section B.4 was to present an option to the San Diego Water Board to implement option 'b' (as described above). ▪ Ben Neill, of the San Diego Water Board clarified that B.2 requires the prohibition of the discharge category, unless

	it is of a nature that it cannot be prohibited through an ordinance (i.e., a discharge from Mother Nature, like a spring or rising ground water), and only then does option 'b' (see above) become applicable. ▪ The Copermittees expressed that the goal of a prohibition is to eliminate the discharge, however it is not possible to eliminate irrigation runoff. The Copermittees referenced a grant project in Dana Point which found that even after retrofitting neighborhoods with SMART irrigation systems, that irrigation runoff still had not been eliminated. o San Diego Water Board staff indicated that to meet the draft permit requirement to prohibit irrigation runoff, the Copermittees would simply have to implement and enforce an ordinance. ▪ The Copermittees expressed their concern that with a prohibition, they would be required to enforce not only in response to an NAL exceedance, but also on any instance of a resident calling in a complaint on their neighbor for a broken sprinkler, overspray, overwatering, etc – irrespective of whether or not that discharge resulted in the conveyance of pollutants to the MS4 or to receiving waters. The Copermittees indicated that this would be an unnecessary drain on, and an inefficient use of public funds. o A San Diego Water Board staff member identified that the Copermittees' '*Landscaping and Gardening'* brochure included a mention of 'over watering'. ▪ The Copermittees clarified that brochure was addressing general good-housekeeping practices associated with landscaping and gardening, and was not intending to imply that irrigation runoff had been determined to be an actual source or conveyance of pollutants to the receiving waters in Riverside County. The Copermittees also mentioned that as a cost-saving measure, many of their brochures had been adapted from existing brochures created in other regions such as Orange County. o The San Diego Water Board staff identified that if irrigation runoff is not identified as a source and conveyance of pollutants that needs to be addressed, than the Copermittees' suggested language in section B.4. would not be necessary. ➢ **No agreement was reached on this provision.** • **<u>Section B.2.q. (Non-emergency fire fighting flows)</u>** o The Copermittees identified that apparently the conditional exemption for non-emergency fire fighting flows had been inadvertently deleted in the draft, since B.3. requires a

	program to address this potential issue in lieu of a prohibition. o San Diego Water Board staff identified that the discharge category was prohibited, and that a specific program is required to address the discharge through prohibition. ➢ **No agreement was reached on the provision.**
3. Today's Topics: **<u>F.1.a through F.1.c</u>**	• **<u>Development Planning: F.1.a through F.1.c</u>** ➢ **San Diego Water Board staff identified that they accepted the language changes to F.1.c (1), and F.1.c (7)(g) and that F.1.c (5) will be removed from the permit.** o San Diego Water Board staff indicated that they would like to look for opportunities to coordinate the infiltration requirements in F.1.c.(7) with the Salt and Nutrient (groundwater) Management plan. ▪ Copermittees identified that they will look into the status of the plan. o The Copermittees identified that they thought that the "high vehicular traffic" language was overly restrictive, especially since infiltration is one of the primary BMPs used by Caltrans. There was discussion about the source of the language that had been included in the draft, and various studies that have indicated that such restrictions are unnecessary. ➢ **San Diego Water Board staff offered to remove the restrictions on infiltration within areas of 'high vehicular traffic'.** ✪ **The Copermittees will provide San Diego Water Board with copies of the various studies discussed.**
4. Conceptual Discussion of Next Week's Topics: **<u>F.1.e BMP Construction Verification</u>**	o The Copermittees identified that they did not have any overarching issues to discuss regarding this section, but that for next week, they would review the wording to see if they had any suggested changes.
4. Conceptual Discussion of Next Week's Topics: **<u>F.1.f BMP Maintenance Tracking</u>**	o The Copermittees identified that the BMP verification frequencies should account for the risk for the discharge of pollutants from the project, and not be solely based on the BMP itself. o The Copermittees also indicated that annual verifications would be excessive since most structural post-construction BMPs require maintenance less frequently. ➢ **The San Diego Water Board staff indicated that they were open to considering changes to the section that would allow the Copermittees to implement the program in a more cost-effective and efficient manner.**

4. Conceptual Discussion of Next Week's Topics: **<u>F.1.g Enforcement of Development Sites</u>**	o The Copermittees identified that they did not have any overarching issues to discuss regarding this section, but that for next week, they would review the wording to see if they had any suggested changes.
4. Conceptual Discussion of Next Week's Topics: **<u>F.3.d Retrofit</u>**	o The Copermittees identified that section F.3.d is a new requirement that will be a significant new cost to the Copermittees. It was further identified that since the Copermittees cannot require property owners to retrofit their land, that this would be an expensive planning exercise that will not likely yield any tangible benefits to attainment of beneficial uses in the receiving waters. o The Copermittees claimed that the Federal Regulations only require a program for assessing opportunities for retrofitting flood control projects. o The San Diego Water Board identified that the intent of this section is to have a program to not only retrofit public projects but also to encourage retrofit of private development, and that the section does not explicitly require retrofitting of private developments. o The Copermittees identified that a program that assesses opportunities for retrofit of public lands such as parks, recreational areas and MS4 would have a better chance for implementation, and that a sub-regional approach would be a more effective, and more cost efficient way to address pollutant discharges from existing developments. o **<u>F.3.d.(1)</u>** ▪ There was discussion about the San Diego Water Board's expected level of detail for the inventory. ➢ **The San Diego Water Board staff expressed that they did not expect a lot-by-lot inventory and evaluation of existing developments but that a broader scale was appropriate.** o **<u>F.3.d.(4)</u>** ▪ The San Diego Water Board indicated that encouraging retrofit on private developments could be accomplished as a public education and outreach campaign and that the Copermittees could get ideas from the EPA Guidance on retrofit, and other programs such as the 10,000 rain gardens program in Kansas. ➢ **The San Diego Water Board will provide the EPA Guidance to the Copermittees.** ➢ **The San Diego Water Board is willing to consider alternative language / approaches that the Copermittees may develop.**

AGENDA

Santa Margarita Region
MS4 Permit Meeting

10:00a.m. – 4:00 p.m. May 20, 2010
Location: City of Temecula

1. PROCESS / HOUSEKEEPING

2. WRAP-UP FOR LAST WEEK'S TOPICS

3. CONCEPTUAL DISCUSSION OF NEXT WEEK'S TOPICS

   i. F.2. Construction
   ii. F.6. Education and Outreach

4. TODAY'S TOPICS

   i. F.1.e. BMP Construction Verification
   ii. F.1.f. BMP Maintenance Tracking
   iii. F.1.g. Enforcement of Development Sites
   iv. F.3.d. Retrofit

Santa Margarita Watershed MS4 Permit

Meeting Date 5/20/10

Time 10a

Location City Temecula

Name	Agency	Signature
David Gibson	SDRWQCB	
Jimmy Smith	SDRWQCB	
David Barker	SDRWQCB	
Chiara Clemente	SDRWQCB	
Ben Neill	SDRWQCB	
Wayne Chiu	SDRWQCB	
Chad Loflen	SDRWQCB	
Jason Uhley	RCFC&WCD	
Claudio Padres	RCFC&WCD	
Arlene Chun	RCFC&WCD	
Mike Shetler	County of Riverside	M Shetler
Alex Gann	County of Riverside	
Aldo Licitra	City of Temecula	Aldo Licitra
Bill Woolsey	City of Murrieta	Bill Woolsey
Don Allison	City of Menifee	
Tim D'Zmura	City of Wildomar	
WARD MAXWELL	COUNTY OF RIVERSIDE	
Scott Taylor	RBF	
Daniel Apt	RBF	
Cheneha Thomas	B.S. RIV CO	

0004704

From: David Barker
To: Padres, Claudio; Uhley, Jason
CC: Licitra), Temecula (Aldo; (DonAllison), Menifee; Apt, Daniel; Ben Nei...
Date: 5/24/2010 5:06 PM
Subject: Draft Riverside MS4 Permit, Tentative Order No. R9-2010-0016
Attachments: DRAFT UL_SO R9-2010-0016 Order 05-18-10.doc; David Barker.vcf

Jason and Claudio - Attached is the San Diego RWQCB's first iteration of changes to the draft Riverside County MS4 Permit based on discussions with the Copermittees through the meeting on May 6, 2010. The attached draft permit contains proposed revisions to the following sections:

C - NALs
D - SALs
F.3.a. Municipal
F.3.c. Residential
F.4. - IDDE
F.5 Public Participation
F.6 Education

See you at the meeting on Wednesday.

David

David Barker
Supervising Engineer
California Regional Water Quality Control Board
San Diego Region
(858) 467-2989
Please take the time to fill out our electronic customer service survey
located at http://www.calepa.ca.gov/Customer/,

California Regional Water Quality Control Board
San Diego Region

Waste Discharge Requirements for Discharges from the Municipal Separate Storm Sewer Systems (MS4s) Draining the County of Riverside, the Incorporated Cities of Riverside County, and the Riverside County Flood Control and Water Conservation District within the San Diego Region

Tentative Order No. R9-2010-0016
NPDES NO. CAS0108740

TBD, 2010

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN DIEGO REGION
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http://www.waterboards.ca.gov/sandiego

To request copies of the Riverside County Municipal Storm Water Permit, please contact Ben Neill, Water Resources Control Engineer at (858) 467 – 2983, bneill@waterboards.ca.gov

Documents also are available at: http://www.waterboards.ca.gov/sandiego

Waste Discharge Requirements for Discharges from the Municipal Separate Storm Sewer Systems (MS4s) Draining the County of Riverside, the Incorporated Cities of Riverside County, and the Riverside County Flood Control and Water Conservation District within the San Diego Region

Adopted by the
California Regional Water Quality Control Board
San Diego Region
on TBD, 2010

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
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ARNOLD SCHWARZENEGGER, Governor
LINDA S. ADAMS, Agency Secretary, California Environmental Protection Agency

California Regional Water Quality Control Board
San Diego Region

David King *Vice Chair*	Recreation / Wildlife
Eric Anderson	Irrigated Agriculture
Wayne Rayfield	Water Quality
Grant Destache	Industrial Water Use
George Loveland	Water Supply
Marc Luker	Undesignated (Public)

David W. Gibson, *Executive Officer*
James Smith, *Assistant Executive Officer*

This permit was prepared under the direction of

David T. Barker P.E., *Chief, Water Resource Protection Branch*

by

Ben Neill, *Water Resource Control Engineer*
Chad Loflen, *Environmental Scientist*
Wayne Chiu P.E., *Water Resource Control Engineer*

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Attachment E – Receiving Waters And MS4 Discharge Monitoring And Reporting Program No. R9-2010-0016
Attachment F – Data

The California Regional Water Quality Control Board, San Diego Region (hereinafter San Diego Water Board), finds that:

A. BASIS FOR THE ORDER

1. This Order is based on the federal Clean Water Act (CWA), the Porter-Cologne Water Quality Control Act (Division 7 of the Water Code, commencing with Section 13000), applicable State and federal regulations, all applicable provisions of statewide Water Quality Control Plans and Policies adopted by the State Water Resources Control Board (State Water Board), the Water Quality Control Plan for the San Diego Basin adopted by the San Diego Water Board, the California Toxics Rule, and the California Toxics Rule Implementation Plan.

2. This Order reissues National Pollutant Discharge Elimination System (NPDES) Permit No. CAS0108766, which was first adopted by the San Diego Water Board on July 16, 1990 (Order No. 90-38), and then reissued on May 13, 1998 (Order No. R9-98-02). On May 26, 1998, the United States Environmental Protection Agency (EPA), Region IX, objected to Order No. 98-02 due to concerns regarding Receiving Water Limitations (RWL) language. The EPA concluded that the RWL language in the permit did not comply with the federal Clean Water Act (CWA) and its implementing regulations. On April 27, 1999, the EPA reissued the MS4 permit, which the San Diego Water Board adopted as Addendum No. 1 to Order No. R9-98-02 on November 8, 2000. On July 14, 2004, the San Diego Water Board adopted the third term MS4 permit, Order No. R9-2004-001. On January 15, 2009, the Riverside County Flood Control and Water Conservation District (District), as the Principal Copermittee, submitted a Report of Waste Discharge (ROWD) for reissuance of the municipal separate storm sewer system (MS4) Permit.

3. This Order is consistent with the following precedential Orders adopted by the State Water Resources Control Board (State Water Board) addressing MS4 NPDES Permits: Order 99-05, Order WQ-2000-11, Order WQ 2001-15, Order WQO 2002-0014, and Order WQ-2009-0008 (*SWRCB/OCC FILE A-1780).*

4. The Fact Sheet / Technical Report for the Order No. R9-2010-0016, NPDES No. CAS0108766, Waste Discharge Requirements for Discharges from the Municipal Separate Storm Sewer Systems (MS4s) Draining the County of Riverside, the Incorporated Cities of Riverside County, and the Riverside County Flood Control and Water Conservation District within the San Diego Region, includes cited regulatory and legal references and additional explanatory information and data in support of the requirements of this Permit. This information, including any supplements thereto, and any response to comments on the Tentative Orders, is hereby incorporated by reference into these findings.

B. REGULATED PARTIES

1. Each of the persons in Table 1 below, hereinafter called Copermittees or dischargers, owns or operates an MS4, through which it discharges into waters of the United States within the San Diego Region. These MS4s fall into one or more of the following categories: (1) a medium or large MS4 that services a population of greater than 100,000 or 250,000 respectively; or (2) a small MS4 that is "interrelated" to a medium or large MS4; or (3) an MS4 that contributes to a violation of a water quality standard; or (4) an MS4 which is a significant contributor of pollutants to waters of the United States (waters of the U.S).

Table 1. Municipal Copermittees

1. City of Menifee	5. County of Riverside
2. City of Murrieta	6. Riverside County Flood Control and Water Conservation District
3. City of Temecula	
4. City of Wildomar	

C. DISCHARGE CHARACTERISTICS

1. Discharges from the MS4 contain waste, as defined in the California Water Code (CWC), and pollutants that adversely affect the quality of the waters of the State. The discharge from an MS4 is a "discharge of pollutants from a point source" into waters of the U.S. as defined in the CWA.

2. MS4 storm water and non-storm water discharges are likely to contain pollutants that cause or threaten to cause a violation of water quality standards, as outlined in the San Diego Water Board's Water Quality Control Plan for the San Diego Basin (Basin Plan). Storm water and non-storm water discharges from the MS4 are subject to the conditions and requirements established in the San Diego Basin Plan for point source discharges.

3. The most common categories of pollutants in runoff include total suspended solids, sediment, pathogens (e.g., bacteria, viruses, protozoa); heavy metals (e.g., copper, lead, zinc and cadmium); petroleum products and polynuclear aromatic hydrocarbons; synthetic organics (e.g., pesticides, herbicides, and PCBs); nutrients (e.g., nitrogen and phosphorus fertilizers); oxygen-demanding substances (decaying vegetation, animal waste); detergents; and trash.

4. The discharge of pollutants and/or increased flows from MS4s may cause or threaten to cause the concentration of pollutants to exceed applicable receiving water quality objectives and/or impair or threaten to impair designated beneficial uses resulting in a condition of pollution (i.e., unreasonable impairment of water

quality for designated beneficial uses), contamination, or nuisance.

5. Pollutants in runoff can threaten and adversely affect human health. Human illnesses have been clearly linked to recreating near storm drains flowing to receiving waters. Also, runoff pollutants in receiving waters can bioaccumulate in the tissues of invertebrates and fish, which may be eventually consumed by humans.

6. Runoff discharges from MS4s often contain pollutants that cause toxicity to aquatic organisms (i.e., adverse responses of organisms to chemicals or physical agents ranging from mortality to physiological responses such as impaired reproduction or growth anomalies). Toxic pollutants impact the overall quality of aquatic systems and beneficial uses of receiving waters.

7. The Copermittees discharge runoff into lakes, drinking water reservoirs, rivers, streams, creeks, bays, estuaries, coastal lagoons, the Pacific Ocean, and tributaries thereto within one of the eleven hydrologic units (Santa Margarita Hydrologic Unit) comprising the San Diego Region as shown in Table 2. Some of the receiving water bodies have been designated as impaired by the San Diego Water Board in 2009 pursuant to CWA section 303(d).

Table 2. Common Watersheds and CWA Section 303(d) Impaired Waters

Hydrologic Area (HA) or Hydrologic Subarea (HSA) of the Santa Margarita Hydrologic Unit	**Major Receiving Water Bodies**	**303(d) Pollutant(s)/stressor or Water Quality Effect[1]**
DeLuz Creek HSA (902.21)	De Luz Creek	Iron, Manganese, Nitrogen, Sulfates
Murrieta HSA (902.32)	Long Canyon Creek (tributary to Murrieta Creek	Chlorpyrifos, E. Coli, Fecal Coliform, Iron, Manganese
Wolf HSA (902.52)	Murrieta Creek	Chlorpyrifos, Copper, Iron, Manganese, Nitrogen, Toxicity
Pauba HSA (902.51)	Redhawk Channel	Chlorpyrifos, Copper, Diazinon, E. Coli, Fecal Coliform, Iron, Manganese, Nitrogen, Phosphorus, Total Dissolved Solids
Gavilan HSA (902.22)	Sandia Creek	Iron, Sulfates
Gertrudis HSA	Santa Gertrudis Creek	Chlorpyrifos, Copper, E. Coli, Fecal

[1] The listed 303(d) pollutant(s) do not necessarily reflect impairment of the entire corresponding WMA or all corresponding major surface water bodies. The specific impaired portions of each WMA are listed in the State Water Resources Control Board's 2008 Section 303(d) List of Water Quality Limited Segments.

Table 2. Common Watersheds and CWA Section 303(d) Impaired Waters

Hydrologic Area (HA) or Hydrologic Subarea (HSA) of the Santa Margarita Hydrologic Unit	**Major Receiving Water Bodies**	**303(d) Pollutant(s)/stressor or Water Quality Effect[1]**
(902.42)		Coliform, Iron, Phosphorous
Lower Ysidora HSA (902.11)	Santa Margarita Lagoon	Eutrophic
Lower Ysidora HSA (902.11)	Santa Margarita River (Lower)	Enterococcus, Fecal Coliform, Phosphorus, Total Nitrogen as N
Gavilan HSA (902.22)	Santa Margarita River (Upper)	Toxicity
Pauba HSA (902.51)	Temecula Creek	Chlorpyrifos, Copper, Phosphorus, Total Dissolved Solids, Toxicity
French HSA (902.33)	Warm Springs Creek (Riverside County)	Chlorpyrifos, E. Coli, Fecal Coliform, Iron, Manganese, Phosphorus, Total Nitrogen as N

8. Trash is a persistent pollutant that can enter receiving waters from the MS4 resulting in accumulation and transport in receiving waters over time. Trash poses a serious threat to the Beneficial Uses of the receiving waters, including, but not limited to, human health, rare and endangered species, navigation and human recreation.

9. The Copermittees' water quality monitoring data submitted to date documents persistent violations of Basin Plan water quality objectives for various runoff-related pollutants (indicator bacteria, dissolved solids, turbidity, metals, pesticides, etc.) at various watershed monitoring stations. Persistent toxicity has also been observed at some watershed monitoring stations. In addition, bioassessment data indicates that the majority of the monitored receiving waters have Poor to Very Poor Index of Biotic Integrity ratings. In sum, the above findings indicate that runoff discharges are causing or contributing to water quality impairments, and are a leading cause of such impairments in Riverside County.

10. When natural vegetated pervious ground cover is converted to impervious surfaces such as paved highways, streets, rooftops, and parking lots, the natural absorption and infiltration abilities of the land are lost. Therefore, runoff leaving a developed area is significantly greater in runoff volume, velocity, and peak flow rate than pre-development runoff from the same area. Runoff durations can also increase as a result of flood control and other efforts to control peak flow rates. Increased volume, velocity, rate, and duration of runoff, and decreased natural clean sediment loads, greatly accelerate the erosion of downstream natural channels. Significant declines

in the biological integrity and physical habitat of streams and other receiving waters have been found to occur with as little as a 3-5 percent conversion from natural to impervious surfaces. The increased runoff characteristics from new development must be controlled to protect against increased erosion of channel beds and banks, sediment pollutant generation, or other impacts to beneficial uses and stream habitat due to increased erosive force.

11. Development creates new pollution sources as human population density increases and brings with it proportionately higher levels of car emissions, car maintenance wastes, municipal sewage, pesticides, household hazardous wastes, pet wastes, trash, etc. which can either be washed or directly dumped into the MS4. As a result, the runoff leaving the developed urban area is significantly greater in pollutant load than the pre-development runoff from the same area. These increased pollutant loads must be controlled to protect downstream receiving water quality.

12. Development and urbanization especially threaten environmentally sensitive areas (ESAs), such as water bodies designated as supporting a RARE beneficial use (supporting rare, threatened or endangered species) and CWA 303(d)-impaired water bodies. Such areas have a much lower capacity to withstand pollutant shocks than might be acceptable in other areas. In essence, development that is ordinarily insignificant in its impact on the environment may become significant in a particularly sensitive environment. Therefore, additional controls to reduce storm water pollutants from new and existing development may be necessary for areas adjacent to or discharging directly to an ESA.

13. Although dependent on several factors, the risks typically associated with properly managed infiltration of runoff (especially from residential land use areas) are not significant. The risks associated with infiltration can be managed by many techniques, including (1) designing landscape drainage features that promote infiltration of runoff, but do not “inject” runoff (injection bypasses the natural processes of filtering and transformation that occur in the soil); (2) taking reasonable steps to prevent the illegal disposal of wastes; (3) protecting footings and foundations; (4) ensuring that each drainage feature is adequately maintained in perpetuity; and (5) pretreatment.

14. Non-storm water (dry weather) discharge from the MS4 is not considered a storm water (wet weather) discharge and therefore is not subject to regulation under the Maximum Extent Practicable (MEP) standard from CWA 402(p)(3)(B)(iii), which is explicitly for “Municipal … *Stormwater Discharges* (emphasis added)” from the MS4. Rather, non-storm water discharges, per CWA 402(p)(3)(B)(ii), are to be effectively prohibited. Such dry weather non-storm water discharges have been shown to contribute significant levels of pollutants and flow in arid, developed Southern California watersheds and are to be effectively prohibited under the Clean Water Act.

15. Non-storm water discharges to the MS4 granted an influent exception [i.e., which are

exempt from the effective prohibition requirement set forth in CWA section 402(p)(3)(B)(ii)] under 40 CFR 122.26 are included within this Order. Any exempted discharges identified by Copermittees as a source of pollutants are subsequently required to be *addressed* (emphasis added) as illicit discharges through prohibition and incorporation into existing IC/ID programs. Furthermore, the Federal Register (55, page 48037) clarifies that the San Diego Water Board may also identify exempted discharges as a source of pollutants required to be addressed as illicit discharges. The San Diego Water Board and the Copermittees have identified landscape irrigation, irrigation water and lawn water, previously exempted discharges, as a source of pollutants and conveyance of pollutants to waters of the United States.

D. RUNOFF MANAGEMENT PROGRAMS

1. General

a. This Order specifies requirements necessary for the Copermittees to reduce the discharge of pollutants in storm water to the maximum extent practicable (MEP). However, since MEP is a dynamic performance standard, which evolves over time as runoff management knowledge increases, the Copermittees' runoff management programs must continually be assessed and modified to incorporate improved programs, control measures, best management practices (BMPs), etc. in order to achieve the evolving MEP standard. Absent evidence to the contrary, this continual assessment, revision, and improvement of runoff management program implementation is expected to ultimately achieve compliance with water quality standards in the Region.

b. The Copermittees have generally been implementing the jurisdictional runoff management programs required pursuant to Order No. 2004-001 since July 14, 2004. Prior to that, the Copermittees were regulated by Order No. 98-02, since May 13, 1998. MS4 discharges, however, continue to cause or contribute to violations of water quality standards as evidenced by the Copermittees monitoring results.

c. This Order contains new or modified requirements that are necessary to improve Copermittees' efforts to reduce the discharge of pollutants in storm water runoff to the MEP and achieve water quality standards. Some of the new or modified requirements, such as the revised Watershed Runoff Management Program section, are designed to specifically address high priority water quality problems. Other new or modified requirements address program deficiencies that have been noted during audits, report reviews, and other San Diego Water Board compliance assessment activities.

d. Updated individual Drainage Area Management Plans (DAMP), and Watershed Stormwater Management Plans (watershed SWMPs), which describe the Copermittees' runoff management programs in their entirety, are needed to guide

the Copermittees' runoff management efforts and aid the Copermittees in tracking runoff management program implementation. It is practicable for the Copermittees to update the JRMPs and WRMPs within one year, since significant efforts to develop these programs have already occurred. Hereinafter, the individual DAMP is referred to as the Jurisdictional Runoff Management Plans (JRMPs) and the Watershed SWMP is referred to as the Watershed Runoff Management Plan (WRMP).

e. Pollutants can be effectively reduced in storm water runoff by the application of a combination of pollution prevention, source control, and treatment control BMPs. Pollution prevention is the reduction or elimination of pollutant generation at its source and is the best "first line of defense." Source control BMPs (both structural and non-structural) minimize the contact between pollutants and flows (e.g., rerouting run-on around pollutant sources or keeping pollutants on-site and out of receiving waters). Treatment control BMPs remove pollutants that have been mobilized by wet-weather or dry-weather flows.

f. Runoff needs to be addressed during the three major phases of urban development (planning, construction, and use) in order to reduce the discharge of pollutants from storm water to the MEP, effectively prohibit non-storm water discharges and protect receiving waters. Development which is not guided by water quality planning policies and principles can unnecessarily result in increased pollutant load discharges, flow rates, and flow durations which can negatively impact receiving water beneficial uses. Construction sites without adequate BMP implementation result in sediment runoff rates which greatly exceed natural erosion rates of undisturbed lands, causing siltation and impairment of receiving waters. Existing development generates substantial pollutant loads which are discharged in runoff to receiving waters.

g. Annual reporting requirements included in this Order are necessary to meet federal requirements and to evaluate the effectiveness and compliance of the Copermittees' programs.

h. This Order establishes Storm Water Action Levels (SALs) for selected pollutants based on USEPA Rain Zone 6 (arid southwest) Phase I MS4 monitoring data for pollutants in storm water. The SALs were computed as the 90th percentile of the data set, utilizing the statistical based population approach, one of three approaches recommended by the California Water Board's Storm Water Panel in its report, 'The Feasibility of Numerical Effluent Limits Applicable to Discharges of Storm Water Associated with Municipal, Industrial and Construction Activities (June 2006). SALs are identified in Section D of this Order. Copermittees shall implement a timely, comprehensive, cost-effective storm water pollution control program to reduce the discharge of pollutants in storm water from the permitted areas so as not to exceed the SALs. Exceedance of SALs may indicate inadequacy of programmatic measures and BMPs required in this Order.

2. **Development Planning**

a. The Standard Storm Water Mitigation Plan (SSMP) requirements contained in this Order are consistent with Order WQ-2000-11 adopted by the State Water Resources Control Board (State Board) on October 5, 2000. In the precedential order, the State Board found that the design standards, which essentially require that runoff generated by 85 percent of storm events from specific development categories be infiltrated or treated, reflect the MEP standard. The order also found that the SSMP requirements are appropriately applied to the majority of the Priority Development Project categories contained in Section F.1 of this Order. The State Board also gave Regional Water Quality Control Boards the needed discretion to include additional categories and locations, such as retail gasoline outlets (RGOs), in SSMPs.

b. Controlling runoff pollution by using a combination of onsite source control and site design BMPs augmented with treatment control BMPs before the runoff enters the MS4 is important for the following reasons: (1) Many end-of-pipe BMPs (such as diversion to the sanitary sewer) are typically ineffective during significant storm events. Whereas, onsite source control BMPs can be applied during all runoff conditions; (2) End-of-pipe BMPs are often incapable of capturing and treating the wide range of pollutants which can be generated on a sub-watershed scale; (3) End-of-pipe BMPs are more effective when used as polishing BMPs, rather than the sole BMP to be implemented; (4) End-of-pipe BMPs do not protect the quality or beneficial uses of receiving waters between the pollutant source and the BMP; and (5) Offsite end-of-pipe BMPs do not aid in the effort to educate the public regarding sources of pollution and their prevention.

c. Use of Low-Impact Development (LID) site design BMPs at new development, redevelopment and retrofit projects can be an effective means for minimizing the impact of storm water runoff discharges from the development projects on receiving waters. LID is a site design strategy with a goal of maintaining or replicating the pre-development hydrologic regime through the use of design techniques. LID site design BMPs help preserve and restore the natural hydrologic cycle of the site, allowing for filtration and infiltration which can greatly reduce the volume, peak flow rate, velocity, and pollutant loads of storm water runoff. Current runoff management, knowledge, practices and technology have resulted in the use of LID BMPs as an acceptable means of meeting the storm water MEP standard.

d. Retail Gasoline Outlets (RGOs) are significant sources of pollutants in storm water runoff. RGOs are points of convergence for motor vehicles for automotive related services such as repair, refueling, tire inflation, and radiator fill-up and consequently produce significantly higher loadings of hydrocarbons and trace metals (including copper and zinc) than other developed areas.

e. Industrial sites are significant sources of pollutants in runoff. Pollutant concentrations and loads in runoff from industrial sites are similar or exceed pollutant concentrations and loads in runoff from other land uses, such as commercial or residential land uses. As with other land uses, LID site design, source control, and treatment control BMPs are needed at industrial sites in order to meet the MEP standard. These BMPs are necessary where the industrial site is larger than 10,000 square feet. The 10,000 square feet threshold is appropriate, since it is consistent with requirements in other Phase I NPDES storm water regulations throughout California.

f. If not properly designed or maintained, certain BMPs implemented or required by municipalities for runoff management may create a habitat for vectors (e.g. mosquitoes and rodents). Proper BMP design and maintenance to avoid standing water, however, can prevent the creation of vector habitat. Nuisances and public health impacts resulting from vector breeding can be prevented with close collaboration and cooperative effort between municipalities, local vector control agencies, and the California Department of Public Health during the development and implementation of runoff management programs.

g. The increased volume, velocity, frequency and discharge duration of storm water runoff from developed areas has the potential to greatly accelerate downstream erosion, impair stream habitat in natural drainages, and negatively impact beneficial uses. Development and urbanization increase pollutant loads in storm water runoff and the volume of storm water runoff. Impervious surfaces can neither absorb water nor remove pollutants and thus lose the purification and infiltration provided by natural vegetated soil. Hydromodification measures for discharges to hardened channels are needed for the future restoration of the hardened channels to their natural state, thereby restoring the chemical, physical, and biological integrity and Beneficial Uses of local receiving waters.

3. **Construction and Existing Development**

a. In accordance with federal NPDES regulations and to ensure the most effective oversight of industrial and construction site discharges, discharges of runoff from industrial and construction sites are subject to dual (State and local) storm water regulation. Under this dual system, each Copermittee is responsible for enforcing its local permits, plans, and ordinances, and the San Diego Water Board is responsible for enforcing the General Construction Activities Storm Water Permit, State Board Order 2009-0009-DWQ, NPDES No. CAS000002 (General Construction Permit) and the General Industrial Activities Storm Water Permit, State Board Order 97-03 DWQ, NPDES No. CAS000001 (General Industrial Permit) and any reissuance of these permits. NPDES municipal regulations require that municipalities develop and implement measures to address runoff from industrial and construction activities. Those measures may require the implementation of additional BMPs than are required under the statewide general permits for activities subject to both State and local regulation.

b. Identification of sources of pollutants in runoff (such as municipal areas and activities, industrial and commercial sites/sources, construction sites, and residential areas), development and implementation of BMPs to address those sources, and updating ordinances and approval processes are necessary for the Copermittees to ensure that discharges of pollutants from its MS4 in storm water are reduced to the MEP and that non-storm water discharges are not occurring. Inspections and other compliance verification methods are needed to ensure minimum BMPs are implemented. Inspections are especially important at high risk areas for pollutant discharges.

c. Historic and current development makes use of natural drainage patterns and features as conveyances for runoff. Urban streams used in this manner are part of the municipalities MS4 regardless of whether they are natural, anthropogenic, or partially modified features. In these cases, the urban stream is both an MS4 and receiving water.

d. As operators of the MS4s, the Copermittees cannot passively receive and discharge pollutants from third parties. By providing free and open access to an MS4 that conveys discharges to waters of the U.S., the operator essentially accepts responsibility for discharges into the MS4 that it does not prohibit or control. These discharges may cause or contribute to a condition of contamination or a violation of water quality standards.

e. Waste and pollutants which are deposited and accumulate in MS4 drainage structures will be discharged from these structures to waters of the U.S. unless they are removed. These discharges may cause or contribute to, or threaten to cause or contribute to, a condition of pollution in receiving waters. For this reason, pollutant discharges from storm water into MS4s must be reduced using a combination of management measures, including source control, and an effective MS4 maintenance program must be implemented by each Copermittee.

f. Enforcement of local runoff related ordinances, permits, and plans is an essential component of every runoff management program and is specifically required in the federal storm water regulations and this Order. Each Copermittee is individually responsible for adoption and enforcement of ordinances and/or policies, implementation of identified control measures/BMPs needed to prevent or reduce pollutants in storm water runoff, and for the allocation of funds for the capital, operation and maintenance, administrative, and enforcement expenditures necessary to implement and enforce such control measures/BMPs under its jurisdiction. Education is an important aspect of every effective runoff management program and the basis for changes in behavior at a societal level. Education of municipal planning, inspection, and maintenance department staffs is especially critical to ensure that in-house staffs understand how their activities impact water quality, how to accomplish their jobs while protecting water quality, and their specific roles and responsibilities for compliance with this Order. Public

education, designed to target various urban land users and other audiences, is also essential to inform the public of how individual actions affect receiving water quality and how adverse effects can be minimized.

g. Public participation during the development of runoff management programs is necessary to ensure that all stakeholder interests and a variety of creative solutions are considered.

h. Retrofitting existing development with storm water treatment controls, including LID, is necessary to address storm water discharges from existing development that may cause or contribute to a condition of pollution or a violation of water quality standards. Although SSMP BMPs are required for redevelopment, the current rate of redevelopment will not address water quality problems in a timely manner. Cooperation with private landowners is necessary to effectively identify, implement and maintain retrofit projects for the preservation, restoration, and enhancement of water quality.

4. **Watershed Runoff Management**

a. Since runoff within a watershed can flow from and through multiple land uses and political jurisdictions, watershed-based runoff management can greatly enhance the protection of receiving waters. Such management provides a means to focus on the most important water quality problems in each watershed. By focusing on the most important water quality problems, watershed efforts can maximize protection of beneficial use in an efficient manner. Effective watershed-based runoff management actively reduces pollutant discharges and abates pollutant sources causing or contributing to watershed water quality problems. Watershed-based runoff management that does not actively reduce pollutant discharges and abate pollutant sources causing or contributing to watershed water quality problems can necessitate implementation of the iterative process outlined in section A.3 of the Tentative Order. Watershed management of runoff does not require Copermittees to expend resources outside of their jurisdictions. Watershed management requires the Copermittees within a watershed to develop a watershed-based management strategy, which can then be implemented on a jurisdictional basis.

b. Some runoff issues, such as general education and training, can be effectively addressed on a regional basis. Regional approaches to runoff management can improve program consistency and promote sharing of resources, which can result in implementation of more efficient programs.

c. It is important for the Copermittees to coordinate their water quality protection and land use planning activities to achieve the greatest protection of receiving water bodies. Copermittee coordination with other watershed stakeholders, especially the State of California Department of Transportation, the United States Department of Defense, and water and sewer districts, is also important.

E. STATUTE AND REGULATORY CONSIDERATIONS

1. The Receiving Water Limitations (RWL) language specified in this Order is consistent with language recommended by the USEPA and established in State Board Water Quality Order 99-05, *Own Motion Review of the Petition of Environmental Health Coalition to Review Waste Discharge Requirements Order No. 96-03, NPDES Permit No. CAS0108740*, adopted by the State Board on June 17, 1999. The RWL in this Order require compliance with water quality standards, which for storm water discharges is to be achieved through an iterative approach requiring the implementation of improved and better-tailored BMPs over time. Compliance with receiving water limits based on applicable water quality standards is necessary to ensure that MS4 discharges will not cause or contribute to violations of water quality standards and the creation of conditions of pollution.

2. The Water Quality Control Plan for the San Diego Basin (Basin Plan), identifies the following existing and potential beneficial uses for surface waters in Riverside County: Municipal and Domestic Supply (MUN), Agricultural Supply (AGR), Industrial Process Supply (PROC), Hydropower Generation (POW), Industrial Service Supply (IND), Ground Water Recharge (GWR), Contact Water Recreation (REC1), Non-contact Water Recreation (REC2), Warm Freshwater Habitat (WARM), Cold Freshwater Habitat (COLD), Wildlife Habitat (WILD), Rare, Threatened, or Endangered Species (RARE), Spawning, Reproduction and/or Early Development (SPWN) and Preservation of Biological Habitats of Special Significance (BIOL).

3. This Order is in conformance with State Board Resolution No. 68-16, *Statement of Policy with Respect to Maintaining High Quality Waters in California*, and the federal Antidegradation Policy described in 40 CFR 131.12.

4. Section 6217(g) of the Coastal Zone Act Reauthorization Amendments of 1990 (CZARA) requires coastal states with approved coastal zone management programs to address non-point pollution impacting or threatening coastal water quality. CZARA addresses five sources of non-point pollution: agriculture, silviculture, urban, marinas, and hydromodification. This NPDES permit addresses the management measures required for the urban category, with the exception of septic systems. The adoption and implementation of this NPDES permit relieves the Copermittee from developing a non-point source plan, for the urban category, under CZARA. The San Diego Water Board addresses septic systems through the administration of other programs.

5. Section 303(d)(1)(A) of the CWA requires that “Each state shall identify those waters within its boundaries for which the effluent limitations…are not stringent enough to implement any water quality standard (WQS) applicable to such waters.” The CWA also requires states to establish a priority ranking of impaired water bodies known as

Water Quality Limited Segments and to establish Total Maximum Daily Loads (TMDLs) for such waters. This priority list of impaired water bodies is called the Section 303(d) List. The 2006 Section 303(d) List was approved by the State Board on October 25, 2006. On June 28, 2007, the 2006 303(d) list for California was given final approval by the United States Environmental Protection Agency (USEPA). The 303(d) List was recently updated, and on December 16, 2009, the 2008 303(d) List was approved by the San Diego Water Board. The 2008 List is awaiting State Board and USEPA approval.

6. This Order does not constitute an unfunded local government mandate subject to subvention under Article XIIIB, Section (6) of the California Constitution for several reasons, including, but not limited to, the following. First, this Order implements federally mandated requirements under federal Clean Water Act section 402. (33 U.S.C. § 1342(p)(3)(B).) Second, the local agency Copermittees' obligations under this Order are similar to, and in many respects less stringent than, the obligations of non-governmental and new dischargers who are issued NPDES permits for storm water and non-storm water discharges. Third, the local agency Copermittees have the authority to levy service charges, fees, or assessments sufficient to pay for compliance with this Order. Fourth, the Copermittees have requested permit coverage in lieu of compliance with the complete prohibition against the discharge of pollutants contained in federal Clean Water Act section 301, subdivision (a) (33 U.S.C. § 1311(a)) and in lieu of numeric restrictions on their storm water discharges. Fifth, the local agencies' responsibility for preventing discharges of waste that can create conditions of pollution or nuisance from conveyances that are within their ownership or control under State law predates the enactment of Article XIIIB, Section (6) of the California Constitution. Likewise, the provisions of this Order to implement total maximum daily loads (TMDLs) are federal mandates. The federal Clean Water Act requires TMDLs to be developed for water bodies that do not meet federal water quality standards. (33 U.S.C. sec. 1313(d).) Once the U.S. Environmental Protection Agency or a state develops a TMDL, federal law requires that permits must contain effluent limitations consistent with the assumptions of any applicable wasteload allocation. (40 C.F.R. sec. 122.44(d)(1)(vii)(B).)

7. Runoff treatment and/or mitigation must occur prior to the discharge of runoff into receiving waters. Treatment BMPs must not be constructed in waters of the U.S. or State unless the runoff flows are sufficiently pretreated to protect the values and functions of the water body. Federal regulations at 40 CFR 131.10(a) state that in no case shall a state adopt waste transport or waste assimilation as a designated use for any waters of the U.S. Authorizing the construction of an runoff treatment facility within a water of the U.S., or using the water body itself as a treatment system or for conveyance to a treatment system, would be tantamount to accepting waste assimilation as an appropriate use for that water body. Furthermore, the construction, operation, and maintenance of a pollution control facility in a water body can negatively impact the physical, chemical, and biological integrity, as well as the beneficial uses, of the water body. Without federal authorization (e.g., pursuant to Clean Water Act Section 404), waters of the U.S. may not be converted

into, or used as, waste treatment or conveyance facilities. Similarly, waste discharge requirements pursuant to California Water Code Section 13260 are required for the conversion or use of waters of the State as waste treatment or conveyance facilities. Diversion from waters of the U.S./State to treatment facilities and subsequent return to waters of the U.S. is allowable, provided that the effluent complies with applicable NPDES requirements.

8. The issuance of waste discharge requirements and an NPDES permit for the discharge of runoff from MS4s to waters of the U.S. is exempt from the requirement for preparation of environmental documents under the California Environmental Quality Act (CEQA) (Public Resources Code, Division 13, Chapter 3, section 21000 et seq.) in accordance with the CWC section 13389.

9. Storm water discharges from developed and developing areas in Riverside County are significant sources of certain pollutants that cause, may be causing, threatening to cause or contributing to water quality impairment in the waters of Riverside County. Furthermore, as delineated in the CWA section 303(d) list in Table 2, the San Diego Water Board has found that there is a reasonable potential that municipal storm water and non-storm water discharges from MS4s cause or may cause or contribute to an excursion above water quality standards for the following pollutants: Indicator Bacteria, Copper, Manganese, Iron, Chlorpyrifos, Sulfates, Phosphorous, Nitrogen, Toxicity and Turbidity. In accordance with CWA section 303(d), the San Diego Water Board is required to establish Total Maximum Daily Loads (TMDLs) for these pollutants to these waters to eliminate impairment and attain water quality standards. Therefore, certain early pollutant control actions and further pollutant impact assessments by the Copermittees are warranted and required pursuant to this Order.

10. This Order requires each Copermittee to effectively prohibit all types of unauthorized discharges of non-storm water into its MS4. However, historically pollutants have been identified as present in dry weather non-storm water discharges from the MS4s through 303(d) listings, monitoring conducted by the Copermittees under Order No. R9-2004-0001, and there are others expected to be present in dry weather non-storm water discharges because of the nature of these discharges. This Order includes action levels for pollutants in non-storm water, dry weather, discharges from the MS4 designed to ensure that the requirement to effectively prohibit all types of unauthorized discharges of non-storm water in the MS4 is being complied with. Action levels in the Order are based upon numeric or narrative water quality objectives and criteria as defined in the Basin Plan, the Water Quality Control Plan for Ocean Waters of California (Ocean Plan), and the State Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California (State Implementation Policy or SIP). An exceedance of an action level requires specified responsive action by the Copermittees. This Order describes what actions the Copermittees must take when an exceedance of an action level is observed. Exceedances of non-storm water action levels do not alone constitute a violation of this Order but could indicate non-compliance with the

requirement to effectively prohibit all types of unauthorized non-storm water discharges into the MS4 or other prohibitions established in this Order. Failure to undertake required source investigation and elimination action following an exceedance of a non-storm water action level (NAL or action level) is a violation of this Order. The San Diego Water Board recognizes that use of action levels will not necessarily result in detection of all unauthorized sources of non-storm water discharges because there may be some discharges in which pollutants do not exceed established action levels. However, establishing NALs at levels appropriate to protect water quality standards is expected to lead to the identification of significant sources of pollutants in dry weather non-storm water discharges.

11. In addition to federal regulations cited in the Fact Sheet / Technical Report for the Order No. R9-2010-0016, monitoring and reporting required under Order No. R9-2010-0016 is required pursuant to authority under CWC section 13383.

F. PUBLIC PROCESS

1. The San Diego Water Board has notified the Copermittees, all known interested parties, and the public of its intent to consider adoption of an Order prescribing waste discharge requirements that would serve to renew an NPDES permit for the existing discharge of runoff.

2. The San Diego Water Board has held public hearings on TBD and heard and considered all comments pertaining to the terms and conditions of this Order.

IT IS HEREBY ORDERED that the Copermittees, in order to meet the provisions contained in Division 7 of the California Water Code (CWC) and regulations adopted thereunder, and the provisions of the Clean Water Act (CWA) and regulations adopted thereunder, must each comply with the following:

A. PROHIBITIONS AND RECEIVING WATER LIMITATIONS

1. Discharges into and from municipal separate storm sewer systems (MS4s) in a manner causing, or threatening to cause, a condition of pollution, contamination, or nuisance (as defined in CWC section 13050), in waters of the state are prohibited.

2. Storm water discharges from MS4s containing pollutants which have not been reduced to the maximum extent practicable (MEP) are prohibited.[2]

3. Discharges from MS4s that cause or contribute to the violation of water quality standards (designated beneficial uses, water quality objectives developed to protect beneficial uses, and the State policy with respect to maintaining high quality waters) are prohibited.

a. Each Copermittee must comply with section A.3 and section A.4 as it applies to Prohibition 5 in Attachment A of this Order through timely implementation of control measures and other actions to reduce pollutants in storm water discharges in accordance with this Order, including any modifications. If exceedance(s) of water quality standards persist notwithstanding implementation of this Order, the Copermittee must assure compliance with section A.3 and section A.4 as it applies to Prohibition 5 in Attachment A of this Order by complying with the following procedure:

(1) Upon a determination by either the Copermittee or the San Diego Water Board that storm water MS4 discharges are causing or contributing to an exceedance of an applicable water quality standard, the Copermittee must notify the San Diego Water Board within 30 days and thereafter submit a report to the San Diego Water Board that describes best management practices (BMPs) that are currently being implemented and additional BMPs that will be implemented to prevent or reduce any pollutants that are causing or contributing to the exceedance of water quality standards. The report may be incorporated in the Annual Report unless the San Diego Water Board directs an earlier submittal. The report must include an implementation schedule. The San Diego Water Board may require modifications to the report;

[2] This prohibition does not apply to MS4 discharges which receive subsequent treatment to reduce pollutants to the MEP prior to entering receiving waters (e.g., low flow diversions to the sanitary sewer).

(2) Submit any modifications to the report required by the San Diego Water Board within 30 days of notification;

(3) Within 30 days following approval of the report described above by the San Diego Water Board, the Copermittee must revise its Jurisdictional Runoff Management Program and monitoring program to incorporate the approved modified BMPs that have been and will be implemented, the implementation schedule, and any additional monitoring required; and

(4) Implement the revised Jurisdictional Runoff Management Program and monitoring program in accordance with the approved schedule.

b. The Copermittee must repeat the procedure set forth above to comply with the receiving water limitations for continuing or recurring exceedances of the same water quality standard(s) unless directed to do otherwise by the San Diego Water Board Executive Officer.

c. Nothing in section A.3 must prevent the San Diego Water Board from enforcing any provision of this Order while the Copermittee prepares and implements the above report.

4. In addition to the above prohibitions, discharges from MS4s are subject to all Basin Plan prohibitions cited in Attachment A to this Order.

B. NON-STORM WATER DISCHARGES

1. Each Copermittee must effectively prohibit all types of non-storm water discharges into its MS4 unless such discharges are either authorized by a separate National Pollutant Discharge Elimination System (NPDES) permit; or not prohibited in accordance with sections B.2 and B.3 below.

2. The following categories of non-storm water discharges are not prohibited unless a Copermittee or the San Diego Water Board identifies the discharge category as a source of pollutants to waters of the U.S. Where the Copermittee(s) have identified a category as a source of pollutants, the category shall be addressed as an illicit discharge and prohibited through ordinance, order or similar means. The San Diego Water Board may identify categories of discharge that either requires prohibition or other controls. For such a discharge category, the Copermittee, under direction of the San Diego Water Board, must either prohibit the discharge category or develop and implement appropriate control measures to prevent the discharge of pollutants to the MS4 and report to the San Diego Water Board pursuant to Section K.1 and K.3 of this Order.

a. Diverted stream flows;
b. Rising ground waters;

c. Uncontaminated ground water infiltration [as defined at 40 CFR 35.2005(20)] to MS4s;
d. Uncontaminated pumped ground water[3];
e. Foundation drains[3]~~3~~;
f. Springs;
g. Water from crawl space pumps[3]~~3~~;
h. Footing drains[3]~~3~~;
i. Air conditioning condensation;
j. Flows from riparian habitats and wetlands;
k. Water line flushing[4,5];
l. Discharges from potable water sources not subject to NPDES Permit No. CAG679001, other than water main breaks;
m. Individual residential car washing; and
n. Dechlorinated swimming pool discharges[6].

3. Emergency fire fighting flows (i.e., flows necessary for the protection of life or property) do not require BMPs and need not be prohibited. As part of the Jurisdictional Runoff Management Plan (JRMP), each Copermittee must develop and implement a program to address pollutants from non-emergency fire fighting flows (i.e., flows from controlled or practice blazes and maintenance activities) identified by the Copermittee to be significant sources of pollutants to waters of the United States.

a. Building fire suppression system maintenance discharges (e.g. sprinkler line flushing) contain waste. Therefore, such discharges are to be prohibited by the Copermittees as illicit discharges through ordinance, order, or similar means.

4. Each Copermittee must examine all dry weather effluent analytical monitoring results collected in accordance with section F.4 of this Order and Receiving Waters and MS4 Discharge Monitoring and Reporting Program No. R9-2010-0016 to identify water quality problems which may be the result of any non-prohibited discharge category(ies) identified above in section B.2. Follow-up investigations must be conducted to identify and control, pursuant to section B.2, any non-prohibited discharge category(ies) listed above.

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[3] Requires enrollment under Order R9-2008-002. Discharges into the MS4 require authorization from the owner and operator of the MS4 system.
[4] This exemption does not include fire suppression sprinkler system maintenance and testing discharges. Those discharges may be regulated under Section B.3.
[5] Requires enrollment under Order R9-2002-0020.
[6] Including saline swimming pool discharges directly to a saline water body.

C. NON-STORM WATER DRY WEATHER ACTION LEVELS

1. Each Copermittee, beginning no later than May 1, 2011, shall implement the non-storm water dry weather action level (NAL) monitoring as described in Attachment E of this Order.

2. In response to an exceedance of an NAL, ~~each~~ the applicable Copermittee(s) must investigate and identify the source of the exceedance in a timely manner. However, if any Copermittee identifies a number of NAL exceedances ~~of NALs~~ that prevents them from adequately conducting source investigations at all sites in a timely manner, then the Copermittees may submit a prioritization plan and timeline that identifies the timeframe and planned actions to investigate and report their findings on all of the exceedances. Depending on the source of the pollutant exceedance, ~~Following the source investigation and identification,~~ the applicable Copermittee(s) must take ~~submit an~~ action ~~report dependant on the source of the pollutant exceedance~~ as follows:

a. If the Copermittee identifies the source of the exceedance as natural (non-anthropogenically influenced) in origin and in conveyance into the MS4; then the Copermittee shall report their findings and documentation of their source investigation to the San Diego Water Board ~~within fourteen days of the source identification~~in their Annual Report.

b. If the Copermittee identifies the source of the exceedance as an illicit discharge or connection, then the Copermittee~~s~~ must eliminate the discharge to their MS4 pursuant to Section F.4.f and report the findings, including any enforcement action(s) taken, and documentation of the source investigation to the San Diego Water Board ~~with~~in ~~fourteen days of~~ the ~~source identification~~ Annual Report. If the Copermittee is unable to eliminate the source of discharge prior to the Annual Report submittal~~within fourteen days~~, then the Copermittee must submit, as part of their ~~action~~Annual ~~r~~Report, their plan and timeframe to eliminate the source of the exceedance. Those dischargers seeking to continue such a discharge must become subject to a separate NPDES permit prior to continuing any such discharge.

c. If the Copermittee identifies the source of the exceedance as an exempted category of non-storm water discharge, then the Copermittees must determine if this is an isolated circumstance or if the category of discharges must be addressed through the prevention or prohibition of that category of discharge as an illicit discharge. The Copermittee must submit their findings ~~in~~ including a description of the steps taken to address the discharge and the category of discharge, to the San Diego Water Board for review in~~with~~ their ~~next subsequent~~ A~~a~~nnual ~~r~~Report. Such description shall include relevant updates to or new ordinances, orders, or other legal means of addressing the category of discharge, and the anticipated schedule for doing so. The Copermittees must also submit a summary of their findings with the Report of Waste Discharge.

d. If the Copermittee identifies the source of the exceedance as a non-storm water discharge in violation or potential violation of an existing separate NPDES permit (e.g. the groundwater dewatering permit), then the Copermittee must report, within three business days, the findings to the San Diego Water Board including all pertinent information regarding the discharger and discharge characteristics.

e. If the Copermittee is unable to identify the source of the exceedance after taking and documenting reasonable steps to do so, then the Copermittee must ~~identify the pollutant as a high priority pollutant of concern in the tributary subwatershed,~~ perform additional focused sampling. If the results of the additional sampling indicate a recurring exceedance of NALs with an unidentified source, then the Copermittees must ~~and~~ update their programs within a year to address the common contributing sources that may be causing such an exceedance~~reflect this priority~~. The Copermittee's annual report shall include these updates to their programs including, where applicable, updates to their watershed workplans (Section G.2), retrofitting consideration (Section F.3.d) and program effectiveness work plans (Section J.4).

f. The Copermittees or any interested party, may evaluate existing NALs and propose revised NALs for future Board consideration.

3. NALs can help provide an assessment of the effectiveness of the prohibition of non-storm water discharges and of the appropriateness of exempted non-storm water discharges. An exceedance of an NAL does not alone constitute a violation of the provisions of this Order.~~, but~~ ~~a~~An exceedance of an NAL may indicate a lack of compliance with the requirement that Copermittees effectively prohibit all types of unauthorized non-storm water discharges into the MS4 or other prohibitions set forth in Sections A and B of this Order. Failure to timely implement required actions specified in this Order following an exceedance of an NAL constitutes a violation of this Order. ~~However, n~~Neither ~~compliance with~~ the absence of exceedances of NALs nor compliance with required actions following observed exceedances, excuses any non-compliance with the requirement to effectively prohibit all types of unauthorized non-storm water discharges into the MS4s or any non-compliance with the prohibitions in Sections A and B of this Order. ~~NALs provide an assessment of the effectiveness of the prohibition of non-storm water discharges and of the appropriateness of exempted non-storm water discharges.~~ During any annual reporting period in which one or more exceedances of NALs have been documented the Copermittee must ~~submit with their next scheduled annual~~ report in response to Section C.2 above, a ~~report~~ description~~bing~~ of whether and how the observed exceedances did or did not result in a discharge from the MS4 that caused, or threatened to cause or contribute to a condition of pollution, contamination, or nuisance in the receiving waters.

4. Monitoring of effluent will occur at the end-of-pipe prior to discharge into the receiving waters, with a focus on Major Outfalls, as defined in 40 CFR 122.26(B 5-6)

and Attachment E of this Order. The Copermittees must develop their monitoring plans to sample a representative percentage of major outfalls and identified stations within each hydrologic subarea. At a minimum, outfalls that exceed any NALs once during any year must be monitored in the subsequent year. Any station that does not exceed an NAL, or only has exceedances that are identified as natural in origin pursuant to Section C.2.a, for 3 years may be replaced with a different station.

5. Each Copermittee shall monitor for the non-storm water dry weather action levels, which are incorporated into this Order as follows:

a. Action levels for discharges to inland surface waters:

Table 3.a.1: General Constituents

Parameter	Units	AMAL	MDAL	Instantaneous Maximum	Basis
Fecal Coliform	MPN/ 100 ml	200[A] 400[B]	-		BPO
Enterococci	MPN/ 100 ml	33	-	61[C]	BPO
Turbidity	NTU	-	20		BPO
pH	Units	Within limit of 6.5 to 8.5 at all times			BPO
Dissolved Oxygen	mg/L	Not less than 5.0 in WARM waters and not less than 6.0 in COLD waters			BPO
Total Nitrogen	mg/L	-	1.0	See MDAL	BPO
Total Phosphorus	mg/L	-	0.1	See MDAL	BPO
Methylene Blue Active Substances	mg/L	-	0.5	See MDAL	BPO
Iron	mg/L	-	0.3	See MDAL	BPO
Manganese	mg/L	-	0.05	See MDAL	BPO

A – Based on a minimum of not less than five samples for any 30-day period
B – No more than 10 percent of total samples may exceed 400 per 100 ml during any 30 day period
C – This Value has been set to Basin Plan Criteria for Designated Beach Areas
BPO – Basin Plan Objective
MDAL – Maximum Daily Action Level AMAL – Average Monthly Action Level

Table 3.a.2: Priority Pollutants

		Freshwater (CTR)	
Parameter	Units	MDAL	AMAL
Cadmium	ug/L	**	**
Copper	ug/L	*	*
Chromium III	ug/L	**	**
Chromium VI (hexavalent)	ug/L	16	8.1
Lead	ug/L	*	*
Nickel	ug/L	**	**
Silver	ug/L	*	*
Zinc	ug/L	*	*

CTR – California Toxic Rule
*- Action Levels developed on a case-by-case basis (see below)
**- Action Levels developed on a case-by-case basis (see below), but calculated criteria are not to exceed Maximum Contaminant

Levels under the California Code of Regulations[7]

The NALs for Cadmium, Copper, Chromium (III), Lead, Nickel, Silver and Zinc will be developed on a case-by-case basis because the freshwater criteria are based on site-specific water quality data (receiving water hardness). For these priority pollutants, the following equations (40 CFR 131.38.b.2) will be required:

Cadmium (Total Recoverable)	= exp(0.7852[ln(hardness)] -2.715)
Chromium III (Total Recoverable)	= exp(0.8190[ln(hardness)] + .6848)
Copper (Total Recoverable)	= exp(0.8545[ln(hardness)] - 1.702)
Lead (Total Recoverable)	= exp(1.273[ln(hardness)] - 4.705)
Nickel (Total Recoverable)	= exp(.8460[ln(hardness)] + 0.0584)
Silver (Total Recoverable)	= exp(1.72[ln(hardness)] - 6.52)
Zinc (Total Recoverable)	= exp(0.8473[ln(hardness)] + 0.884)

D. STORM WATER ACTION LEVELS

1. The Copermittees must implement the Wet Weather MS4 Discharge Monitoring as described in Attachment E of this Order, and ~~B~~beginning Year 3 after Order adoption date, the Copermittees shall begin annual evaluation of their data with Stormwater Action Levels (SALs). At each monitoring station, a running average of twenty percent or greater of exceedances of any discharge of storm water from the MS4 to waters of the United States that exceed the ~~Storm Water Action Levels (~~SALs~~)~~ for each of the pollutants listed in Table 4 (below) ~~will~~ requires ~~each~~the applicable Copermittee(s) to affirmatively augment and implement all necessary storm water controls and measures to reduce the discharge of the associated class of pollutants(s) to the MEP ~~standard~~. The Copermittees must utilize the exceedance information when adjusting and executing annual work plans, as required by this Order. Copermittees shall take the magnitude, frequency, and number of constituents exceeding the SAL(s), in addition to receiving water quality data and other information, into consideration when prioritizing and reacting to SAL exceedances in an iterative manner. Failure to appropriately consider and react to SAL exceedances in an iterative manner creates a presumption that the Copermittee(s) have not ~~complied~~ reduced pollutants in storm water discharges ~~with~~to the MEP ~~standard~~.

Table 4. Storm Water Action Levels

Pollutant	Action Level
Turbidity (NTU)	126
Nitrate & Nitrite total (mg/L)	2.6
P total (mg/L)	1.46
Cd total (µg/L)	3.0
Cu total (µg/L)	127
Pb total (µg/L)	250
Zn total (µg/L)	976

[7] California Code of Regulations, Title 22, Division 4, Chapter 15, Article 4, Section 64431.

2. The end-of-pipe assessment points for the determination of SAL compliance are all major outfalls, as defined in 40 CFR 122.26(b)(5) and (b)(6). The Copermittees must develop their monitoring plans to sample a representative percentage of the major outfalls within each hydrologic subarea. At a minimum, outfalls that exceed SALs must be monitored in the subsequent year. Any station that does not exceed an SAL for 3 years may be replaced with a different station. SAL samples must be 24 hour time weighted composites.

3. The absence of SAL exceedances does not relieve the Copermittees from implementing all other required elements of this Permit.

4. This Permit does not regulate natural sources and conveyances into the MS4 of constituents listed in Table 5. To be relieved of the requirements to take action as described in D.1 above~~prioritize pollutant/watershed combinations for BMP updates and to continue monitoring a station~~, the Copermittee must demonstrate that the likely and expected cause of the SAL exceedance is not anthropogenic in nature. This demonstration does not need to be repeated for subsequent exceedances of the same SAL at the same monitoring station.

5. The SALs will be reviewed and updated at the end of every permit cycle. The data collected pursuant to D.2 above can be used to create SALs based upon local data. It is the goal of the SALs, through the iterative and MEP process, to have outfall storm water discharges meet all applicable water quality standards.

E. LEGAL AUTHORITY

1. Each Copermittee must establish, maintain, and enforce adequate legal authority to control pollutant discharges into and from its MS4 through ordinance, statute, permit, contract or similar means. Nothing herein shall authorize a Co-Permittee or other discharger regulated under the terms of this order to divert, store or otherwise impound water if such action is reasonably anticipated to harm downstream water right holders in the exercise of their water rights. This legal authority must, at a minimum, authorize the Copermittee to:

   a. Control the contribution of pollutants in discharges of runoff associated with industrial and construction activity to its MS4 and control the quality of runoff from industrial and construction sites. This requirement applies both to industrial and construction sites which have coverage under the statewide general industrial or construction storm water permits, as well as to those sites which do not. Grading ordinances must be updated and enforced as necessary to comply with this Order;
   b. Prohibit all identified illicit discharges not otherwise allowed pursuant to section B.2;
   c. Prohibit and eliminate illicit connections to the MS4;

d. Control the discharge of spills, dumping, or disposal of materials other than storm water to its MS4;
e. Require compliance with conditions in Copermittee ordinances, permits, contracts or orders (i.e., hold dischargers to its MS4 accountable for their contributions of pollutants and flows);
f. Utilize enforcement mechanisms to require compliance with Copermittee storm water ordinances, permits, contracts, or orders;
g. Control the contribution of pollutants from one portion of the shared MS4 to another portion of the MS4 through interagency agreements among Copermittees. Control of the contribution of pollutants from one portion of the shared MS4 to another portion of the MS4 through interagency agreements with other owners of the MS4 such as the State of California Department of Transportation, the United States Department of Defense, or Native American Tribes is encouraged;
h. Carry out all inspections, surveillance, and monitoring necessary to determine compliance and noncompliance with local ordinances and permits and with this Order, including the prohibition on illicit discharges to the MS4. This means the Copermittee must have authority to enter, monitor, inspect, take measurements, review and copy records, and require regular reports from industrial facilities discharging into its MS4, including construction sites;
i. Require the use of BMPs to prevent or reduce the discharge of pollutants into MS4s from storm water to the MEP; and
j. Require documentation on the effectiveness of BMPs implemented to reduce the discharge of storm water pollutants to the MS4 to the MEP.

2. Each Copermittee must submit within 365 days of adoption of this Order, a statement certified by its chief legal counsel that the Copermittee has taken the necessary steps to obtain and maintain full legal authority to implement and enforce each of the requirements contained in 40 CFR 122.26(d)(2)(i)(A-F) and this Order. These statements must include:

a. Identification of all departments within the jurisdiction that conduct runoff related activities, and their roles and responsibilities under this Order. Include an up to date organizational chart specifying these departments and key personnel.
b. Citation of runoff related ordinances and the reasons they are enforceable;
c. Identification of the local administrative and legal procedures available to mandate compliance with runoff related ordinances and therefore with the conditions of this Order;
d. A description of how runoff related ordinances are implemented and appealed; and
e. Description of whether the municipality can issue administrative orders and injunctions or if it must go through the court system for enforcement actions.

F. JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM (JRMP)

Each Copermittee must implement all requirements of section F of this Order no later than 365 days after adoption of the Order, unless otherwise specified. Prior to 365 days after adoption of the Order, each Copermittee must at a minimum implement its Jurisdictional RMP document, as the document was developed and amended to comply with the requirements of Order No. R9-2004-001.

Each Copermittee must develop and implement an updated JRMP for its jurisdiction. Each updated JRMP must meet the requirements of section F of this Order, reduce the discharge of storm water pollutants from the MS4 to the MEP, effectively prohibit non-storm water discharges and prevent runoff discharges from the MS4 from causing or contributing to a violation of water quality standards.

1. DEVELOPMENT PLANNING COMPONENT

Each Copermittee must implement a program which meets the requirements of this section and (1) reduces Development Project discharges of storm water pollutants from the MS4 to the MEP; (2) prevents Development Project discharges from the MS4 from causing or contributing to a violation of water quality standards; (3) prevents illicit discharges into the MS4; and (4) manages increases in runoff discharge rates and durations from Development Projects that are likely to cause increased erosion of stream beds and banks, silt pollutant generation, or other impacts to beneficial uses and stream habitat due to increased erosive force.

a. GENERAL PLAN

Each Copermittee must revise as needed its General Plan or equivalent plan (e.g., Comprehensive, Master, or Community Plan) to include water quality and watershed protection principles and policies that direct land-use decisions and require implementation of consistent water quality protection measures for all development, redevelopment and retrofit projects. Examples of water quality and watershed protection principles and policies to be considered include the following:

(1) Minimize the amount of impervious surfaces and directly connected impervious surfaces in areas of new development and redevelopment and where feasible slow runoff and maximize on-site infiltration of runoff.

(2) Implement pollution prevention methods supplemented by pollutant source controls and treatment. Use small collection strategies located at, or as close as possible to, the source (i.e., the point where water initially meets the ground) to minimize the transport of urban runoff and pollutants offsite and into an MS4.

(3) Preserve, and where possible, create or restore areas that provide important water quality benefits, such as riparian corridors, wetlands, and buffer zones. Encourage land acquisition of such areas.

(4) Limit disturbances of natural water bodies and natural drainage systems caused by development including roads, highways, and bridges.

(5) Prior to making land use decisions, utilize methods available to estimate increases in pollutant loads and flows resulting from projected future development. Require incorporation of structural and non-structural BMPs to mitigate the projected increases in pollutant loads and flows.

(6) Avoid development of areas that are particularly susceptible to erosion and sediment loss; or establish development guidance that identifies these areas and protects them from erosion and sediment loss.

(7) Reduce pollutants associated with vehicles and increasing traffic resulting from development.

(8) Post-development runoff from a site shall not contain pollutant loads that cause or contribute to an exceedance of receiving water quality objectives and which have not been reduced to the MEP.

b. ENVIRONMENTAL REVIEW PROCESS

Each Copermittee must revise as needed its current environmental review processes to accurately evaluate water quality impacts and cumulative impacts and identify appropriate measures to avoid, minimize and mitigate those impacts for all Development Projects.

c. APPROVAL PROCESS CRITERIA AND REQUIREMENTS FOR ALL DEVELOPMENT PROJECTS

For all proposed Development Projects, each Copermittee during the planning process, and prior to project approval and issuance of local permits, must prescribe the necessary requirements so that Development Project discharges of storm water pollutants from the MS4 will be reduced to the MEP, will not cause or contribute to a violation of water quality standards, and will comply with Copermittee's ordinances, permits, plans, and requirements, and with this Order.

Performance Criteria: Discharges from each approved development project must be subject to the following management measures:

(1) Source control BMPs that reduce storm water pollutants of concern in runoff; prevention of illicit discharges into the MS4; prevention of irrigation runoff; storm drain system stenciling or signage; properly designed outdoor material storage areas; properly designed outdoor work areas; and properly designed trash storage areas.

(2) The following LID BMPs listed below shall be implemented at all Development Projects where applicable and feasible.

(a) Conserve natural areas, including existing trees, other vegetation, and soils,
(b) Construct streets, sidewalks, or parking lot aisles to the minimum widths necessary, provided that public safety is not compromised,
(c) Minimize the impervious footprint of the project,
(d) Minimize soil compaction to landscaped areas,
(e) Minimize disturbances to natural drainages (e.g., natural swales, topographic depressions, etc.), and
(f) Disconnect impervious surfaces through distributed pervious areas.

(3) Buffer zones for natural water bodies, where technically feasible. Where buffer zones are technically infeasible, require project proponent to implement other buffers such as trees, access restrictions, etc;

(4) Measures necessary so that grading or other construction activities meet the provisions specified in section F.2 of this Order.

(5) Where known, require industrial facility operators subject to the General Industrial permit to provide evidence of permit coverage prior to occupancy.

(6) Submittal of proof of a mechanism under which ongoing long-term maintenance of all structural post-construction BMPs will be conducted.

(7) Infiltration and Groundwater Protection

To protect groundwater quality, each Copermittee must apply restrictions to the use of treatment control BMPs that are designed to primarily function as large, centralized infiltration devices (such as large infiltration trenches and infiltration basins). Such restrictions must be designed so that the use of such infiltration treatment control BMPs must not cause or contribute to an exceedance of groundwater quality objectives. At a minimum, each treatment control BMP designed to primarily function as a centralized infiltration device must meet the restrictions below, unless it is demonstrated that a restriction is not necessary to protect groundwater quality. The Copermittees may collectively or individually develop alternative restrictions on the use of treatment control BMPs which are designed to primarily function as centralized infiltration devices. Alternative restrictions developed by the Copermittees can partially or wholly replace the restrictions listed below. The restrictions do not apply to small infiltration systems dispersed throughout a development project.

(a) Runoff must undergo pretreatment such as sedimentation or filtration prior to infiltration;

(b) All dry weather flows containing significant pollutant loads must be diverted from infiltration devices and treated through other BMPs;

(c) Pollution prevention and source control BMPs must be implemented at a level appropriate to protect groundwater quality at sites where infiltration treatment control BMPs are to be used;

(d) Infiltration treatment control BMPs must be adequately maintained so that they remove storm water pollutants to the MEP;

(e) The vertical distance from the base of any infiltration treatment control BMP to the seasonal high groundwater mark must be at least 10 feet. Where groundwater basins do not support beneficial uses, this vertical distance criteria may be reduced, provided groundwater quality is maintained;

(f) The soil through which infiltration is to occur must have physical and chemical characteristics (such as appropriate cation exchange capacity, organic content, clay content, and infiltration rate) which are adequate for proper infiltration durations and treatment of runoff for the protection of groundwater beneficial uses;

(g) Infiltration treatment control BMPs must not be used for areas of industrial or light industrial activity; areas subject to high vehicular traffic (25,000 or greater average daily traffic on main roadway or 15,000 or more average daily traffic on any intersecting roadway); automotive repair shops; car washes; fleet storage areas (bus, truck, etc.); nurseries; and other high threat to water quality land uses and activities as designated by each Copermittee unless first treated or filtered to remove pollutants prior to infiltration and a comprehensive site-specific evaluation has been conducted; and

(h) Infiltration treatment control BMPs must be located a minimum of 100 feet horizontally from any water supply wells.

(7) Where feasible, landscaping with native or low water species shall be preferred in areas that drain to the MS4 or to waters of the United States.

d. STANDARD STORM WATER MITIGATION PLANS (SSMPS) – APPROVAL PROCESS CRITERIA AND REQUIREMENTS FOR PRIORITY DEVELOPMENT PROJECTS

Within 365 days of adoption of this Order, the Copermittees must submit an updated model SSMP, to the San Diego Water Board's Executive Officer for a 30 day public review and comment period. The San Diego Water Board's Executive Officer has the discretion to determine the necessity of a public hearing. Within

180 days of determination that the Model SSMP is in compliance with this Permit's provisions, each Copermittee must update their own local SSMP, and amended ordinances consistent with the model SSMP, and shall submit both (local SSMP and amended ordinances) to the San Diego Water Board. The model SSMP must meet the requirements of section F.1.d of this Order to (1) reduce Priority Development Project discharges of storm water pollutants from the MS4 to the MEP, and (2) prevent Priority Development Project runoff discharges from the MS4 from causing or contributing to a violation of water quality standards.[8]

(1) Definition of Priority Development Project (PDP):

Priority Development Projects are:

(a) All new Development Projects that fall under the project categories or locations listed in section F.1.d.(2), and

(b) Those redevelopment projects that create, add, or replace at least 5,000 square feet of impervious surfaces on an already developed site and the existing development and/or the redevelopment project falls under the project categories or locations listed in section F.1.d.(2). Where redevelopment results in an increase of less than fifty percent of the impervious surfaces of a previously existing development, and the existing development was not subject to SSMP requirements, the numeric sizing criteria discussed in section F.1.d.(6) applies only to the addition or replacement, and not to the entire development. Where redevelopment results in an increase of more than fifty percent of the impervious surfaces of a previously existing development, the numeric sizing criteria applies to the entire development.

(c) One acre threshold: In addition to the Priority Development Project Categories identified in section F.1.d.(2), Priority Development Projects must also include all other pollutant-generating Development Projects that result in the disturbance of one acre or more of land within two years of

[8] Updated SSMP and hydromodification requirements must apply to all priority projects or phases of priority projects which have not yet begun grading or construction activities at the time any updated SSMP or hydromodification requirement commences. If lawful prior approval of a project exists, whereby application of an updated SSMP or hydromodification requirement to the project is illegal, the updated SSMP or hydromodification requirement need not apply to the project. Updated Development Planning requirements set forth in Sections F.1. (a) through (h) of this Order must apply to all projects or phases of projects, unless, at the time any updated Development Planning requirement commences, the projects or project phases meet any one of the following conditions: (i) the project or phase has begun grading or construction activities; or (ii) a Copermittee determines that lawful prior approval rights for a project or project phase exist, whereby application of the Updated Development Planning requirement to the project is legally infeasible. Where feasible, the Permittees must utilize the SSMP and hydromodification update periods to ensure that projects undergoing approval processes include application of the updated SSMP and hydromodification requirements in their plans.

adoption of this Order.[9]

(2) Priority Development Project Categories

Where a new Development Project feature, such as a parking lot, falls into a Priority Development Project Category, the entire project footprint is subject to SSMP requirements.

(a) New development projects that create 10,000 square feet or more of impervious surfaces (collectively over the entire project site) including commercial, industrial, residential, mixed-use, and public projects. This category includes development projects on public or private land which fall under the planning and building authority of the Copermittees.

(b) Automotive repair shops. This category is defined as a facility that is categorized in any one of the following Standard Industrial Classification (SIC) codes: 5013, 5014, 5541, 7532-7534, or 7536-7539.

(c) Restaurants. This category is defined as a facility that sells prepared foods and drinks for consumption, including stationary lunch counters and refreshment stands selling prepared foods and drinks for immediate consumption (SIC code 5812), where the land area for development is greater than 5,000 square feet. Restaurants where land development is less than 5,000 square feet must meet all SSMP requirements except for structural treatment BMP and numeric sizing criteria requirement F.1.d.(6) and hydromodification requirement F.1.h.

(d) All hillside development greater than 5,000 square feet. This category is defined as any development which creates 5,000 square feet of impervious surface which is located in an area with known erosive soil conditions, where the development will grade on any natural slope that is twenty-five percent or greater.

(e) Environmentally Sensitive Areas (ESAs). All development located within or directly adjacent to or discharging directly to an ESA (where discharges from the development or redevelopment will enter receiving waters within the ESA), which either creates 2,500 square feet of impervious surface on a proposed project site or increases the area of imperviousness of a proposed project site to 10 percent or more of its naturally occurring condition. “Directly adjacent” means situated within 200 feet of the ESA. “Discharging directly to” means outflow from a drainage conveyance system that is composed entirely of flows from the subject development or redevelopment site, and not commingled with flows from adjacent lands.

[9] Pollutant generating Development Projects are those projects that generate pollutants at levels greater than natural background levels.

(f) Parking lots 5,000 square feet or more or with 15 or more parking spaces and potentially exposed to runoff. Parking lot is defined as a land area or facility for the temporary parking or storage of motor vehicles used personally, for business, or for commerce.

(g) Street, roads, highways, and freeways. This category includes any paved surface that is 5,000 square feet or greater used for the transportation of automobiles, trucks, motorcycles, and other vehicles.

(h) Retail Gasoline Outlets (RGOs). This category includes RGOs that meet the following criteria: (a) 5,000 square feet or more or (b) a projected Average Daily Traffic (ADT) of 100 or more vehicles per day.

(3) Pollutants of Concern

As part of its local SSMP, each Copermittee must implement an updated procedure for identifying pollutants of concern for each Priority Development Project. The procedure must address, at a minimum: (1) Receiving water quality (including pollutants for which receiving waters are listed as impaired under CWA section 303(d)); (2) Land-use type of the Development Project and pollutants associated with that land use type; and (3) Pollutants expected to be present on site.

(4) Low Impact Development BMP Requirements

Each Copermittee must require each Priority Development Project to implement LID BMPs which will collectively minimize directly connected impervious areas, limit loss of existing infiltration capacity, and protect areas that provide important water quality benefits necessary to maintain riparian and aquatic biota, and/or are particularly susceptible to erosion and sediment loss.

(a) The Copermittees must take the following measures to ensure that LID BMPs are implemented at PDPs:

(i) Each Copermittee must require LID BMPs or make a finding of technical infeasibility for each Priority Development Project in accordance with the LID waiver program in Section F.1.d.(8);
(ii) Each Copermittee must incorporate formalized consideration, such as thorough checklists, ordinances, and/or other means, of LID BMPs into the plan review process for Priority Development Projects;
(iii) The review of each Priority Development Project must include an assessment of potential collection of storm water for on-site or off-site reuse opportunities;
(iv) The review of each Priority Development Project must include an

assessment of techniques to infiltrate, filter, store, evaporate, or retain runoff close to the source of runoff; and

(v) Within 2 years after adoption of this Order, each Copermittee must review its local codes, policies, and ordinances and identify barriers therein to implementation of LID BMPs. Following the identification of these barriers to LID implementation, where feasible, the Copermittee must take, by the end of the permit cycle, appropriate actions to remove such barriers.

(b) The following LID BMPs must be implemented at each PDP:

~~i.~~(i) Maintain or restore natural storage reservoirs and drainage corridors (including depressions, areas of permeable soils, swales, and ephemeral and intermittent streams.

~~ii.~~(ii) Projects with landscaped or other pervious areas must, where feasible, drain runoff from impervious areas (rooftops, parking lots, sidewalks, walkways, patios, etc) into pervious areas prior to discharge to the MS4. The amount of runoff from impervious areas that is to drain to pervious areas shall not exceed the total capacity of the project's pervious areas to infiltrate or treat runoff, taking into consideration the pervious areas' geologic and soil conditions, slope, and other pertinent factors.

~~iii.~~(iii) Projects with landscaped or other pervious areas must, where feasible, properly design and construct the pervious areas to effectively receive and infiltrate or treat runoff from impervious areas, prior to discharge to the MS4. Soil compaction for these areas shall be minimized. The amount of the impervious areas that are to drain to pervious areas must be based upon the total size, soil conditions, slope, and other pertinent factors.

~~iv.~~(iv) Projects with low traffic areas and appropriate soil conditions must construct walkways, trails, overflow parking lots, alleys, or other low-traffic areas with permeable surfaces, such as pervious concrete, porous asphalt, unit pavers, and granular materials.

(b) To protect ground water resources any large, centralized infiltration BMPs must comply with Section F.1.(c)(6). The restrictions do not apply to small infiltration systems dispersed throughout a development project.

(c) LID BMPs sizing criteria:

(i) LID BMPs shall be sized and designed to ensure onsite retention without runoff, of the volume of runoff produced from a 24-hour 85th percentile storm event[10] ("design capture volume");

[10] This volume is not a single volume to be applied to all of Riverside County. The size of the 85th percentile storm event is different for various parts of the County. The Copermittees are encouraged to calculate the 85th percentile storm event for each of their jurisdictions using local rain data pertinent to

(ii) If onsite retention LID BMPs are technically infeasible per section F.1.d.(7)(b), LID biofiltration BMPs may treat any volume that is not retained onsite by the LID BMPs. The LID biofiltration BMPs must be designed for an appropriate surface loading rate to prevent erosion, scour and channeling within the BMP. Due to the flow through design of biofiltration BMPs, the total volume of the BMP, including pore spaces and prefilter detention volume, must be sized to hold at least 0.75 times the design storm volume that is not retained onsite by LID retention BMPs;

(iii) If it is shown to be technically infeasible to treat the remaining volume up to and including the design capture volume using LID BMPs (retention or biofiltration), the project must implement conventional treatment control BMPs in accordance with Section F.1.d.(6) below and must participate in the LID waiver program in Section F.1.d.(7).

(e) All LID BMPs shall be designed and implemented with measures to avoid the creation of nuisance or pollution associated with vectors, such as mosquitoes, rodents, and flies.

(5) Source Control BMP Requirements

Each Copermittee must require each Priority Development Project to implement source control BMPs. The source control BMPs to be required must:

(a) Prevent illicit discharges into the MS4;
(b) Minimize storm water pollutants of concern in runoff;
(c) Eliminate irrigation runoff;
(d) Include storm drain system stenciling or signage;
(e) Include properly designed outdoor material storage areas;
(f) Include properly designed outdoor work areas;
(g) Include properly designed trash storage areas;
(h) Include water quality requirements applicable to individual priority project categories.

(6) Treatment Control BMP Requirements[11]

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their particular jurisdiction (0.6 inch standard is a rough average for the County and should only be used where appropriate rain data is not available). In addition, isopluvial maps may be used to extrapolate rainfall data to areas where insufficient data exists in order to determine the volume of the local 85th percentile storm event in such areas. Where the Copermittees will use isopluvial maps to determine the 85th percentile storm event in areas lacking rain data, the Copermittees shall describe their method for using isopluvial maps in their SSMPs.

[11] This section only applies to those PDPs not implementing LID capable of meeting the design storm criteria for the entire site and meeting technical infeasibility eligibility. Low-Impact Development (LID) and other site design BMPs that are correctly designed to effectively remove pollutants from runoff are considered treatment control BMPs.

Each Copermittee must require each Priority Development Project to implement treatment control BMPs that meet the following requirements:

(a) All treatment control BMPs for a single Priority Development Project must collectively be sized to comply with the following numeric sizing criteria:

(i) Volume-based treatment control BMPs must be designed to mitigate (infiltrate, filter, or treat) the volume of runoff produced from a 24-hour 85th percentile storm event,[12]; or

(ii) Flow-based treatment control BMPs must be designed to mitigate (infiltrate, filter, or treat) either: a) the maximum flow rate of runoff produced from a rainfall intensity of 0.2 inch of rainfall per hour, for each hour of a storm event; or b) the maximum flow rate of runoff produced by the 85th percentile hourly rainfall intensity (for each hour of a storm event), as determined from the local historical rainfall record, multiplied by a factor of two.

(b) Treatment control BMPs for all Priority Development Projects must mitigate (treat through infiltration, settling, filtration or other unit processes) the required volume or flow of runoff from all developed portions of the project, including landscaped areas.

(c) All treatment control BMPs must be located so as to remove pollutants from runoff prior to its discharge to any receiving waters. Multiple Priority Development Projects may use shared treatment control BMPs as long as construction of any shared treatment control BMP is completed prior to the use or occupation of any Priority Development Project from which the treatment control BMP will receive runoff.

(d) All treatment control BMPs for Priority Development Projects must, at a minimum:

(i) Be ranked with high or medium pollutant removal efficiency for the project's most significant pollutants of concern, as the pollutant removal efficiencies are identified in the Copermittees' Model SSMP. Treatment control BMPs with a low removal efficiency ranking must only be approved by a Copermittee when a feasibility

[12] This volume is not a single volume to be applied to all of Riverside County. The size of the 85th percentile storm event is different for various parts of the County. The Copermittees are encouraged to calculate the 85th percentile storm event for each of their jurisdictions using local rain data pertinent to their particular jurisdiction. In addition, isopluvial maps may be used to extrapolate rainfall data to areas where insufficient data exists in order to determine the volume of the local 85th percentile storm event in such areas. Where the Copermittees will use isopluvial maps to determine the 85th percentile storm event in areas lacking rain data, the Copermittees shall describe their method for using isopluvial maps in their SSMPs.

analysis has been conducted which exhibits that implementation of treatment control BMPs with high or medium removal efficiency rankings are infeasible for a Priority Development Project or portion of a Priority Development Project.

(ii) Be correctly sized and designed so as to remove storm water pollutants to the MEP.

(e) Target removal of pollutants of concern from runoff.

(f) Be implemented close to pollutant sources, and prior to discharging into waters of the U.S.

(g) Not be constructed within a waters of the U.S. or waters of the State.

(h) Include proof of a mechanism under which ongoing long-term maintenance will be conducted to ensure proper maintenance for the life of the project. The mechanisms may be provided by the project proponent or Copermittee.

(i) Be designed and implemented with measures to avoid the creation of nuisance or pollution associated with vectors, such as mosquitoes, rodents, and flies.

(7) Low Impact Development (LID) BMP Waiver Program

The Copermittees must develop, collectively or individually, a LID waiver program for incorporation into local SSMPs, which would allow a Priority Development Project to substitute implementation of all or a portion of required LID BMPs in section F.1.d(4) with implementation of treatment control BMPs and either 1) a mitigation project, 2) payment into an in-lieu funding program, and/or 3) watershed equivalent BMP(s) consistent with Section F.1.d.(11). The Copermittees shall submit the LID waiver program as part of their updated model SSMP. At a minimum, the program must meet the requirements below:

(a) Prior to implementation, the LID waiver program must clearly exhibit that it will not allow PDPs to result in a net impact (after consideration of any mitigation and in-lieu payments) from pollutant loadings over and above the impact caused by projects meeting LID requirements;

(b) For each PDP participating, a technical feasibility analysis must be included demonstrating that it is technically infeasible to implement LID BMPs that comply with the requirements of Section F.1.(d)(4). The Copermittee(s) must develop criteria for the technical feasibility analysis, examination of LID BMPs considered and alternatives chosen. Each PDP

participating must demonstrate that LID BMPs were implemented as much as feasible given the site's unique conditions. Analysis must be made of the pollutant loading for each project participating in the LID substitution program. The estimated impacts from not implementing the required LID BMPs in section F.1.d.(4) must be fully mitigated. Technical infeasibility may result from conditions including, but not limited to:

(i) Locations that cannot meet the infiltration and groundwater protection requirements in section F.1.c.(6) for large, centralized infiltration BMPs. Where infiltration is technically infeasible, the project must still examine the feasibility of other onsite retention LID BMPs;
(ii) Smart growth and infill or redevelopment locations where the density and/or nature of the project would create significant difficulty for compliance with the onsite volume retention requirements; and
(iii) Other site, geologic, soil or implementation constraints identified in the Copermittees updated local SSMP document.

(c) The LID waiver program must include mechanisms to verify that each Priority Development Project participating in the program is in compliance with all applicable SSMP requirements;

(d) The LID waiver program must develop and implement a review process verifying that the BMPs to be implemented meet the designated design criteria. The review process must also verify that each Priority Development Project participating in the program is in compliance with all applicable SSMP requirements.

(e) The LID waiver program must include performance standards for treatment control BMPs specified in compliance with section F.1.(d)(6).

(f) Each PDP that participates in the LID waiver program must mitigate for the pollutant loads expected to be discharged due to not implementing the LID BMPs in section F.1.d.(4). Mitigation projects must be implemented within the same hydrologic subarea as the PDP. Mitigation projects outside of the hydrologic subarea but within the same hydrologic unit may be approved provided that the project proponent demonstrates that mitigation projects within the same hydrologic subarea are infeasible and that the mitigation project will address similar beneficial use impacts as expected from the PDPs pollutant load types and amount. Offsite mitigation projects may include green streets projects, existing development retrofit projects, retrofit incentive programs, regional BMPs and stream restoration. Project applicants seeking to utilize these alternative compliance provisions may propose other offsite mitigation projects, which the Copermittees may approve if they meet the

requirements of this subpart.

(g) A Copermittee may choose to implement a pollutant credit system as part of the LID waiver program provided that such a credit system clearly exhibits that it will not allow PDPs to result in a net impact from pollutant loadings over and above the impact caused by projects meeting LID requirements. Any credit system that a Copermittee chooses to implement must be submitted to the Executive Officer for review and approval as part of the waiver program.

(h) The LID waiver program shall include a storm water mitigation fund developed by the Copermittee(s) to be used for water quality improvement projects which may serve in lieu of the PDP's required mitigation in section F.1.d.(8)(e). The LID waiver program's storm water mitigation fund shall, at a minimum, identify;

(i) The entity or entities that will manage the storm water mitigation fund (i.e., assume full responsibility);
(ii) The range and types of acceptable projects for which storm water mitigation funds may be expended;
(iii) The entity or entities that will assume full responsibility for each water quality improvement project, including its successful completion; and
(iv) How the dollar amount of storm water mitigation fund contributions will be determined. In-lieu payments must be proportional to the additional pollutant load discharged by not fully implementing LID.

(i) Each Copermittee must notify the San Diego Water Board in their annual report of each PDP choosing to participate in the LID waiver program. The annual report must include the following information:

(i) Name of the developer of the participating PDP;
(ii) Site location;
(iii) Reason for LID waiver including technical feasibility analysis;
(iv) Description of BMPs implemented;
(v) Total amount deposited, if any, into the storm water mitigation fund described in section F.1.d.(8)(f);
(vi) Water quality improvement project(s) proposed to be funded; and
(vii) Timeframe for implementation of water quality improvement projects.

(8) <u>Site Design and Treatment Control BMP Design Standards</u>

As part of its local SSMP, each Copermittee must develop and require Priority Development Projects to implement sitting, design, and maintenance criteria for each site design and treatment control BMP listed in its local SSMP to

determine feasibility and applicability and so that implemented site design and treatment control BMPs are constructed correctly and are effective at pollutant removal, runoff control, and vector minimization. LID techniques must be incorporated into the criteria for appropriate treatment control BMPs. Development of BMP design worksheets which can be used by project proponents is encouraged.

(9) Implementation Process

As part of its local SSMP, each Copermittee must implement a process to verify compliance with SSMP requirements. The process must identify at what point in the planning process Priority Development Projects will be required to meet SSMP requirements and at a minimum, the Priority Development Project must implement the required post-construction BMPs prior to occupancy and/or the intended use of any portion of that project. The process must also include identification of the roles and responsibilities of various municipal departments in implementing the SSMP requirements, as well as any other measures necessary for the implementation of SSMP requirements.

(10) Treatment BMP Review

(a) The Copermittees must review and update the BMPs that are listed in their local SSMPs as options for treatment control. At a minimum, the update must include removal of obsolete or ineffective BMPs and addition of LID BMPs that can be used for treatment, such as bioretention cells, bioretention swales, etc. The update must also add appropriate LID BMPs to any tables or discussions in the local SSMPs addressing pollutant removal efficiencies of treatment control BMPs. In addition, the update must include review and revision where necessary of treatment control BMP pollutant removal efficiencies.

(b) The update must incorporate findings from BMP effectiveness studies conducted by the Copermittees for projects funded wholly or in part by the State Board or Regional Boards.

(c) Each Copermittee must implement a mechanism for annually incorporating findings from local treatment BMP effectiveness studies (e.g., ones conducted by, or on-behalf of, public agencies in Riverside County) into SSMP project reviews and permitting

(11) Where a development project, greater than 100 acres in total project size or smaller than 100 acres in size yet part of a larger common plan of development that is over 100 acres, has been prepared using watershed and/or sub-watershed based water quality, hydrologic, and fluvial geomorphologic planning principles that implement regional LID BMPs in

accordance with the sizing and location criteria of this Order and acceptable to the San Diego Water Board, such standards shall govern review of projects with respect to Section F.1 of this Order and shall be deemed to satisfy this Order's requirements for LID site design, buffer zone, infiltration and groundwater protection standards, source control, treatment control, and hydromodification control standards. Regional BMPs must clearly exhibit that they will not result in a net impact from pollutant loadings over and above the impact caused by capture and retention of the design storm. Regional BMPs may be used provided that the BMPs capture and retain the volume of runoff produced from the 24-hour 85th percentile storm event as defined in section F.1.d.(6)(a)(i) and that such controls are located upstream of receiving waters. Any volume that is not retained by the LID BMPs, up to the design capture volume, must be treated using LID biofiltration. Where regional LID implementation has been shown to be technically infeasible (per section F.1.d.7.b) any volume up to and including the design capture volume, not retained by LID BMPs, nor treated by LID biofiltration, must be treated using conventional treatment control BMPs in accordance with Section F.1.d.(6) and participation in the LID waiver program in Section F.1.d.(7).

e. BMP CONSTRUCTION VERIFICATION

Prior to occupancy and/or intended use of any portion of the Priority Development Project subject to SSMP requirements, each Copermittee must inspect the constructed site design, source control, and treatment control BMPs to verify that they have been constructed and are operating in compliance with all specifications, plans, permits, ordinances, and this Order.

f. BMP MAINTENANCE TRACKING

(1) Each Copermittee must develop and maintain a watershed-based database to track and inventory all approved post-construction BMPs and BMP maintenance within its jurisdiction since July, 2005. LID BMPs implemented on a lot by lot basis at a single family residential home, such as rainbarrels, are not required to be tracked or inventoried. At a minimum, the database must include information on BMP type, location, watershed, date of construction, party responsible for maintenance, maintenance certifications or verifications, inspections, inspection findings, and corrective actions, including whether the site was referred to the local vector control agency or department.

(2) Each Copermittee must establish a mechanism not only to track post-construction BMPs, but also to ensure that appropriate easements and ownerships are properly recorded in public records and the information is conveyed to all appropriate parties when there is a change in project or site ownership.

(3) Each Copermittee must verify that approved post-construction BMPs are operating effectively and have been adequately maintained by implementing the following measures:

(a) An annual inventory of all approved BMPs within the Copermittee's jurisdiction. LID BMPs implemented on a lot by lot basis at a single family residential home, such as rainbarrels, are not required to be tracked or inventoried. The inventory must also include all BMPs approved for Priority Development Projects since July, 2005;

(b) The designation of high priority BMPs. High-priority designation must include consideration of BMP size, recommended maintenance frequency, likelihood of operational and maintenance issues, location, receiving water quality, and other pertinent factors;

(c) Verify implementation, operation, and maintenance of BMPs by inspection, self-certification, surveys, or other equally effective approaches with the following conditions:

(i) The implementation, operation, and maintenance of at least 90 percent of approved and inventoried final project public and private SSMPs (a.k.a. WQMPs) must be verified annually. All post-construction BMPs shall be verified within every four year period;
(ii) Operation and maintenance verifications must be required prior to each rainy season;
(iii) All (100 percent) projects with BMPs that are high priority must be inspected by the Copermittee annually prior to each rainy season;
(iv) All (100 percent) public agency projects with BMPs must be inspected by the Copermittee annually;
(v) At least 50 percent of projects with drainage insert treatment control BMPs must be inspected by the Copermittee annually;
(vi) Appropriate follow-up measures (including re-inspections, enforcement, maintenance, etc.) must be conducted to ensure the treatment BMPs continue to reduce storm water pollutants as originally designed;
(vii) All inspections must verify effective operation and maintenance of the treatment control BMPs, as well as compliance with all ordinances, permits, and this Order; and
(viii) Inspections must note observations of vector conditions, such as mosquitoes. Where conditions are identified as contributing to mosquito production, the Copermittee must notify their local vector control agency.

g. ENFORCEMENT OF DEVELOPMENT SITES

Each Copermittee must enforce its storm water ordinance for all Development Projects and at all development sites as necessary to maintain compliance with this Order. Copermittee ordinances or other regulatory mechanisms must include appropriate sanctions to achieve compliance. Sanctions must include the following or their equivalent: Non-monetary penalties, fines, bonding requirements, and/or permit or occupancy denials for non-compliance.

h. HYDROMODIFICATION – LIMITATIONS ON INCREASES OF RUNOFF DISCHARGE RATES AND DURATIONS[13]

Each Copermittee shall collaborate with the other Copermittees to develop and implement a Hydromodification Management Plan (HMP) to manage increases in runoff discharge rates and durations from all Priority Development Projects. The HMP shall be incorporated into the local SSMP and implemented by each Copermittee so that estimated post-project runoff discharge rates and durations shall not exceed pre-development discharge rates and durations. Where the proposed project is located on an already developed site, the pre-project discharge rate and duration shall be that of the pre-developed, naturally occurring condition. The HMP shall be submitted to the Executive Officer within 2 years of permit adoption. The HMP will be made available for public review and comment and the Executive Officer will determine the need for a public hearing.

(1) The HMP must:

(a) Identify a method for assessing susceptibility of channel segments which receive runoff discharges from Priority Development Projects. The geomorphic stability within the channel shall be assessed. A performance standard shall be created that ensures that the geomorphic stability within the channel not be compromised as a result of receiving runoff discharges from Priority Development Projects.

(b) Utilize continuous simulation of the entire rainfall record (or other analytical method proposed by the Copermittees and deemed acceptable by the San Diego Water Board) to identify a range of runoff flows[14] for which priority Development Project post-project runoff flow rates and

[13] Updated SSMP and hydromodification requirements shall apply to all priority projects or phases of priority projects which have not yet begun grading or construction activities at the time any updated SSMP or hydromodification requirement commences. If a Copermittee determines that lawful prior approval of a project exists, whereby application of an updated SSMP or hydromodification requirement to the project is legally infeasible, the updated SSMP or hydromodification requirement need not apply to the project. The Copermittees shall utilize the SSMP and hydromodification update periods to ensure that projects undergoing approval processes include application of the updated SSMP and hydromodification requirements in their plans.

[14] The identified range of runoff flows to be controlled should be expressed in terms of peak flow rates of rainfall events, such as “10% of the pre-development 2-year runoff event up to the pre-project 10-year runoff event.”

durations shall not exceed pre-development (naturally occurring) runoff flow rates and durations by more than 10 percent, where the increased flow rates and durations will result in increased potential for erosion or other significant adverse impacts to beneficial uses. In addition, the identified range of runoff flow rates and durations must compensate for the loss of sediment supply due to the development. The lower boundary of the range of runoff flows identified shall correspond with the critical channel flow that produces the critical shear stress that initiates channel bed movement or that erodes the toe of channel banks. The identified range of runoff flows may be different for specific watersheds, channels, or channel reaches. In the case of an artificially hardened (concrete lined, rip rap, etc.) channel, the lower boundary of the range of runoff flows identified shall correspond with the critical channel flow that produces the critical shear stress that initiates channel bed movement or that erodes the toe of channel banks of a comparable soft-bottomed channel.

(c) Require Priority Development Projects to implement hydrologic control measures so that Priority Development Projects' post-project runoff flow rates and durations (1) do not exceed pre-project (naturally occurring) runoff flow rates and durations by more than 10 percent for the range of runoff flows identified under section F.1.h.(1)(b), where the increased flow rates and durations will result in increased potential for erosion or other significant adverse impacts to beneficial uses; (2) do not result in channel conditions which do not meet the channel standard developed under section F.1.h.(1)(a) for channel segments downstream of Priority Development Project discharge points; and (3) compensate for the loss of sediment supply due to development.

(d) Include other performance criteria (numeric or otherwise) for Priority Development Projects as necessary to prevent runoff from the projects from increasing and/or continuing unnatural rates of erosion of channel beds and banks, silt pollutants generation, or other impacts to beneficial uses and stream habitat due to increased erosive force.

(e) Include a review of pertinent literature.

(f) Identify areas within the Santa Margarita Hydrologic Unit where historic hydromodification of receiving waters has a negative impact to benthic macroinvertebrate and benthic periphyton by identifying areas with low or very low Index of Biotic Integrity (IBI) scores.

(g) Include a protocol to evaluate potential hydrograph change impacts to downstream watercourses from Priority Development Projects. This protocol must include the use of the IBI score as a metric for assessing impacts and improvements to downstream watercourses.

(h) Include a description of how the Copermittees will incorporate the HMP requirements into their local approval processes.

(i) Include criteria on selection and design of management practices and measures (such as detention, retention, and infiltration) to control flow rates and durations and address potential hydromodification impacts.

(j) Include technical information supporting any standards and criteria proposed.

(k) Include a description of inspections and maintenance to be conducted for management practices and measures to control flow rates and durations and address potential hydromodification impacts.

(l) Include a description of pre- and post-project monitoring and other program evaluation, including IBI score, to be conducted to assess the effectiveness of implementation of the HMP.

(m) Include mechanisms for assessing and addressing cumulative impacts within a watershed on channel morphology.

(n) Include information on evaluation of channel form and condition, including slope, discharge, vegetation, underlying geology, and other information, as appropriate.

(2) In addition to the hydrologic control measures that must be implemented per section F.1.h.(1)(c), the HMP must include a suite of management measures to be used on Priority Development Projects to protect and restore downstream beneficial uses and prevent or further prevent adverse physical changes to downstream channels. The measures must be based on a prioritized consideration of the following elements in this order:

(a) Hydrologic control measures;
(b) On-site management controls;
(c) Regional controls located upstream of receiving waters; and
(d) In-stream controls.

Where stream channels are adjacent to, or are to be modified as part of a Priority Development Project, management measures must include buffer zones and setbacks. Under no circumstances will in-stream controls include the use of non-naturally occurring hardscape materials such as concrete, riprap, gabions, etc. The suite of management measures shall also include stream restoration as a viable option to achieve the channel standard in section F.1.h.(1)(a).

(3) Each individual Copermittee has the discretion to not require Section F.1.h.

at Priority Development Projects where the project:

(a) Discharges storm water runoff into underground storm drains discharging directly to bays or the ocean; or
(b) Discharges storm water runoff into conveyance channels whose bed and bank are concrete lined all the way from the point of discharge to ocean waters, enclosed bays, estuaries, or water storage reservoirs and lakes.

(4) HMP Reporting and Implementation

(a) Within 2 years of adoption of the Order, the Copermittees shall submit to the San Diego Water Board a draft HMP that has been reviewed by the public, including the analysis that identifies the appropriate limiting range of flow rates per section F.1.h.(1)(b).

(b) Within 180 days of receiving San Diego Water Board comments on the draft HMP, the Copermittees shall submit a final HMP that addressed the San Diego Water Board's comments.

(c) Within 90 days of receiving a finding of adequacy from the Executive Officer, each Copermittee shall incorporate and implement the HMP for all Priority Development Projects.

(d) Prior to approval of the HMP by the San Diego Water Board, the early implementation measures likely to be included in the HMP shall be encouraged by the Copermittees.

(5) <u>Interim Hydromodification Criteria</u>

Within one year of adoption of this Order, each Copermittee must ensure that all Priority Development Projects are implementing the following criteria by comparing the pre-development (naturally occurring) and post-project flow rates and durations using a continuous simulation hydrologic model such as US EPA's Hydrograph Simulation Program-Fortran (HSPF):

(a) For flow rates from 10 percent of the 2-year storm event to the 5 year storm event, the post-project peak flows shall not exceed pre-development (naturally occurring) peak flows.

(b) For flow rates from the 5 year storm event to the 10 year storm event the post-project peak flows may exceed pre-development (naturally occurring) flows by up to 10 percent for a 1-year frequency interval.

The interim hydromodification criteria do not apply to Priority Development Projects where the project discharges (1) storm water runoff into underground storm drains discharging directly to bays or the ocean, or (2)

storm water runoff into conveyance channels whose bed and bank are concrete lined all the way from the point of discharge to ocean waters, enclosed bays, estuaries, or water storage reservoirs and lakes.

Within one year of adoption of this Order, each Copermittee must submit a signed, certification statement to the San Diego Water Board verifying implementation of the interim hydromodification criteria.

(6) No part of section F.1.h shall alleviate the Copermittees responsibilities for implementing Low Impact Development BMPs as required under section F.1.d.(4).

~~i. Training And Education~~

~~(1)Municipal Departments and Personnel Education~~

~~Municipal Development Planning: Each Copermittee must implement an education program so that its planning and development review staffs and contractors (and Planning Boards and Elected Officials, if applicable) have an understanding of:~~

~~(a)Federal, State, and local water quality laws and regulations applicable to Development Projects;~~

~~(b)The connection between land use decisions and short and long-term water quality impacts (i.e., impacts from land development and urbanization); and~~

~~(c)Methods of minimizing impacts to receiving water quality resulting from development, including:~~

~~(i)Storm water management plan development and review;~~
~~(ii)Local sensitive water bodies, including 303(d) impairments and ESAs;~~
~~(iii)Methods to control downstream erosion impacts;~~
~~(iv)Identification of pollutants of concern;~~
~~(v)Site design BMP techniques;~~
~~(vi)Source control BMPs;~~
~~(vii)Selection of the most effective treatment control BMPs for the pollutants of concern; and~~
~~(viii)Public heath concerns related to storm water management infrastructure.~~

~~(2)Project Applicants, Developers, Contractors, Property Owners, and other Responsible Parties~~

~~(a)Each Copermittee must implement a New Development / Redevelopment~~

~~education program using all media as appropriate to:~~

~~(i)Measurably increase the knowledge of the target communities regarding MS4s, impacts of runoff on receiving waters, and potential BMP solutions for the target audience; and~~
~~(ii)To measurably change the behavior of target communities and thereby reduce pollutant releases to MS4s and the environment.~~

~~(b)Each Copermittee must educate each target community on the following topics where appropriate:~~

~~(i)The importance of educating all construction workers in the field about storm water issues and BMPs though formal or informal training;~~
~~(ii)Federal, State, and local water quality laws and regulations applicable to new development and redevelopment activities;~~
~~(iii)Site design, source control, pollution prevention, and treatment BMPs;~~
~~(iv)General runoff concepts; and~~
~~(v)Other topics of local importance, including local water quality conditions, impaired waterbodies and environmentally sensitive areas.~~

2. CONSTRUCTION COMPONENT

Each Copermittee must implement a construction program which meets the requirements of this section, prevents illicit discharges into the MS4, implements and maintains structural and non-structural BMPs to reduce pollutants in storm water runoff from construction sites to the MS4, reduces construction site discharges of storm water pollutants from the MS4 to the MEP, and prevents construction site discharges from the MS4 from causing or contributing to a violation of water quality standards.

a. ORDINANCE UPDATE

Within 365 days of adoption of this Order, each Copermittee must review and update its grading ordinances and other ordinances as necessary to achieve full compliance with this Order, including requirements for the implementation of all designated BMPs and other measures.

b. SOURCE IDENTIFICATION

Each Copermittee must maintain an updated watershed based inventory of all construction sites within its jurisdiction. The use of an automated database system, such as Geographical Information Systems (GIS) is required.

c. SITE PLANNING AND PROJECT APPROVAL PROCESS

Each Copermittee must incorporate consideration of potential water quality impacts prior to approval and issuance of construction and grading permits.

(1) Each construction and grading permit must require proposed construction sites to implement designated BMPs and other measures so that illicit discharges into the MS4 are prevented and storm water pollutants discharged from the site will be reduced to the maximum extent practicable and will not cause or contribute to a violation of water quality standards.

(2) Prior to permit issuance, the project proponent's runoff management plan (or equivalent construction BMP plan) must be required to comply, and reviewed to verify compliance, with the local grading ordinance, other applicable local ordinances, and this Order.

(3) Prior to permit issuance, each Copermittee must verify that project proponents subject to California's statewide General NPDES Permit for Storm Water Discharges Associated With Construction Activities, (hereinafter General Construction Permit), have existing coverage under the General Construction Permit.

d. BMP IMPLEMENTATION

(1) Designate BMPs: Each Copermittee must designate a minimum set of BMPs and other measures to be implemented at all construction sites. The designated minimum set of BMPs must include:

(a) Management Measures:

(i) Pollution prevention, where appropriate;
(ii) Development and implementation of a site-specific runoff management plan;
(iii) Minimization of areas that are cleared and graded to only the portion of the site that is necessary for construction;
(iv) Minimization of exposure time of disturbed soil areas;
(v) Minimization of grading during the wet season and correlation of grading with seasonal dry weather periods to the extent feasible;
(vi) Limitation of grading to a maximum disturbed area as determined by each Copermittee before either temporary or permanent erosion controls are implemented to prevent storm water pollution. The Copermittee has the option of temporarily increasing the size of disturbed soil areas by a set amount beyond the maximum, if the individual site is in compliance with applicable storm water regulations and the site has adequate control practices implemented to prevent storm water pollution;
(vii) Temporary stabilization and reseeding of disturbed soil areas as rapidly as feasible;

(viii) Wind erosion controls;
(ix) Tracking controls;
(x) Non-stormwater management measures to prevent illicit discharges and control storm water pollution sources;
(xi) Waste management measures;
(xii) Preservation of natural hydrologic features where feasible;
(xiii) Preservation of riparian buffers and corridors where feasible;
(xiv) Evaluation and maintenance of all BMPs, until removed; and
(xv) Retention, reduction, and proper management of all storm water pollutant discharges on site to the MEP standard.

(b) Erosion and Sediment Controls:

(i) Erosion prevention. Erosion prevention is to be used as the most important measure for keeping sediment on site during construction;
(ii) Sediment controls. Sediment controls are to be used as a supplement to erosion prevention for keeping sediment on-site during construction;
(iii) Slope stabilization must be used on all active slopes during rain events regardless of the season and on all inactive slopes during the rainy season and during rain events in the dry season; and
(iv) Permanent revegetation or landscaping as early as feasible.

(c) Designate enhanced BMPs[15] for 303(d) impairments and ESAs: Each Copermittee must implement, or require implementation of, enhanced measures to address the exceptional threat to water quality posed by all construction sites tributary to CWA section 303(d) water body segments impaired for sediment or turbidity. Each Copermittee must also implement, or require implementation of, enhanced, site-specific measures for construction sites within or adjacent to or discharging directly to receiving waters within environmentally sensitive areas (as defined in Attachment C of this Order).

(i) Active Sediment Treatment (AST): Each Copermittee must require implementation of advanced treatment for sediment at construction sites (or portions thereof) that are determined by the Copermittee to be an exceptional threat to water quality. In evaluating the threat to water quality, the following factors must be considered by the Copermittee:

[a] Soil erosion potential or soil type;
[b] The site's slopes;

[15] Enhanced BMPs are control actions specifically targeted to the pollutant or condition of concern and of higher quality and effectiveness than the minimum control measures otherwise required. Enhanced in this Order means better, not simply more, BMPs.

[c] Project size and type;
[d] Sensitivity of receiving water bodies;
[e] Proximity to receiving water bodies;
[f] Non-storm water discharges;
[g] Ineffectiveness of other BMPs;
[h] Proximity and sensitivity of aquatic threatened and endangered species of concern;
[i] Known effects of AST chemicals; and
[j] Any other relevant factors.

(d) Implement BMPs: Each Copermittee must implement, or require the implementation of, the designated minimum BMPs and any additional measures necessary to comply with this Order at each construction site within its jurisdiction year round. BMP implementation requirements, however, can vary based on wet and dry seasons. Dry season BMP implementation must plan for and address unseasonal rain events that may occur during the dry season (May 1 through September 30).

e. INSPECTION OF CONSTRUCTION SITES

Each Copermittee must conduct construction site inspections for compliance with its ordinances (grading, storm water, etc.), permits (construction, grading, etc.), and this Order. Priorities for inspecting sites must consider the nature and size of the construction activity, topography, and the characteristics of soils and receiving water quality.

(1) During the wet season, each Copermittee must inspect at least every two weeks, all construction sites within its jurisdiction meeting any of the following criteria:

(a) All sites 30 acres or more in size with rough grading or active slopes occurring during the wet season;

(b) All sites one acre or more, and tributary to a CWA section 303(d) water body segment impaired for sediment or within or directly adjacent to, or discharging directly to a receiving water within an ESA; and

(c) Other sites determined by the Copermittees or the San Diego Water Board as a significant threat to water quality. In evaluating threat to water quality, the following factors must be considered: (1) soil erosion potential; (2) site slope; (3) project size and type; (4) sensitivity of receiving water bodies; (5) proximity to receiving water bodies; (6) non-storm water discharges; (7) past record of non-compliance by the operators of the construction site; and (8) any other relevant factors.

(2) During the wet season, each Copermittee must inspect at least monthly, all

construction sites with one acre or more of soil disturbance not meeting the criteria specified above in section F.2.e.(1).

(3) During the wet season, each Copermittee must inspect construction sites less than one acre in size as needed to ensure compliance with its ordinances and this Order.

(4) Each Copermittee must inspect all construction sites as needed during the dry season. Sites meeting the criteria in section F.2.e.(1) must be inspected at least once in August or September each year.

(5) Re-inspections: Based upon site inspection findings, each Copermittee must implement all follow-up actions (i.e., re-inspection, enforcement) necessary to comply with this Order. Reinspection frequencies must be determined by each Copermittee based upon the severity of deficiencies, the nature of the construction activity, and the characteristics of soils and receiving water quality.

(6) Inspections of construction sites must include, but not be limited to:

(a) Check for coverage under the General Construction Permit (Notice of Intent (NOI) and/or Waste Discharge Identification No.) during initial inspections;
(b) Assessment of compliance with Copermittee ordinances and permits related to runoff, including the implementation and maintenance of designated minimum BMPs;
(c) Assessment of BMP effectiveness;
(d) Visual observations for non-storm water discharges, potential illicit connections, and potential discharge of pollutants in storm water runoff;
(e) Review of site monitoring data, if the site monitors its runoff
(f) Education and outreach on storm water pollution prevention, as needed; and
(g) Creation of a written or electronic inspection report.

(7) The Copermittees must track the number of inspections for each inventoried construction site throughout the reporting period to verify that each site is inspected at the minimum frequencies required.

f. ENFORCEMENT OF CONSTRUCTION SITES

(1) Each Copermittee must develop and implement an escalating enforcement process that achieves prompt corrective actions at construction sites for violations of the Copermittee's water quality protection permits, requirements, and ordinances. This enforcement process must include authorizing the Copermittee's construction site inspectors to take immediate enforcement actions when appropriate and necessary. The enforcement

process must include appropriate sanctions such as stop work orders, non-monetary penalties, fines, bonding requirements, and/or permit denials for non-compliance.

(2) Each Copermittee must be able to respond to complaints received from third-parties and to ensure the San Diego Water Board that corrective actions have been implemented.

g. REPORTING OF NON-COMPLIANT SITES

(1) In addition to the notification requirements in Attachment B, each Copermittee must notify the San Diego Water Board when the Copermittee issues a stop work order or other high level enforcement to a construction site in its jurisdiction as a result of storm water violations.

(2) Each Copermittee shall annually notify the San Diego Water Board, prior to the commencement of the wet season, of all construction sites with alleged violations. Information may be provided as part of the JRMP annual report if submitted prior to the rainy season. Information provided shall include, but not be limited to, the following:

(a) WDID number if enrolled under the General Construction Permit
(b) Site Location, including address
(c) Current violations or suspected violations

~~**h. TRAINING AND EDUCATION**~~

~~(1)Municipal Staff and Contractors: Requirements for municipal staff and contractors are described in the Municipal Component section of this Order.~~

~~(2)Construction Site Owner / Operator Responsibilities:~~

~~As early in the planning and development process as possible and all through the permitting and construction process, each Copermittee must implement a program to educate project applicants, developers, contractors, property owners, and other responsible parties. The education program must provide an understanding of the topics listed below, as appropriate for the audience being educated.~~

~~(a)The importance of educating all construction workers in the field about storm water issues and BMPs though formal or informal training;~~
~~(b)Federal, State, and local water quality laws and regulations applicable to construction and grading activities;~~
~~(c)Site design, source control, pollution prevention, and treatment BMPs;~~
~~(d)General runoff concepts; and~~
~~(e)Other topics of local importance, including local water quality conditions, impaired waterbodies and environmentally sensitive areas.~~

3. EXISTING DEVELOPMENT COMPONENT

a. MUNICIPAL

Each Copermittee must implement a municipal program for the Copermittee's areas and activities that meets the requirements of this section, prevents illicit discharges into the MS4, reduces municipal discharges of storm water pollutants from the MS4 to the MEP, and prevents municipal discharges from the MS4 from causing or contributing to a violation of water quality standards.

(1) Source Identification / Inventory

Each Copermittee must maintain an updated watershed-based inventory of all their municipal areas and those activities that have the potential to generate pollutants. The inventory must include the name, address (if applicable), and a description of the area/activity; which pollutants are potentially generated by the area/activity; whether the area/activity is adjacent to an ESA; and identification of whether the area/activity is tributary to a CWA section 303(d) water body segment and generates pollutants for which the water body segment is impaired. Linear facilities, such as roads, streets, and highways, do not need to be individually inventoried. The use of an automated database system, such as Geographical Information Systems (GIS) is highly recommended~~required when applicable~~.

(2) General BMP Implementation

(a) Pollution Prevention: Each Copermittee must implement pollution prevention methods in its municipal program and must require their use by appropriate ~~municipal~~ departments, personnel, and contractors~~, where appropriate~~.

(b) Designate Minimum BMPs: Each Copermittee must designate a minimum set of BMPs for all municipal areas and those activities that have the potential to generate pollutants. The designated minimum BMPs for

municipal areas and activities must be area or activity specific as appropriate.

(c) Each Copermittee~~BMPs~~ must ~~be~~ designate~~d~~ BMPs for special events that are expected to generate significant trash and litter. Controls to consider must include:

(i) Temporary screens on catch basins and storm drain inlets;
(ii) Temporary fencing to prevent windblown trash from entering adjacent water bodies and MS4 channels;
(iii) Proper management of trash and litter;
(iv) Catch basin cleaning following the special event and prior to an anticipated rain event;
(v) Street sweeping of roads, streets, highways and parking facilities following the special event; and
(vi) Other equivalent controls.

~~(c)~~(d) Designate BMPs for ESAs and 303(d) Impairments: Each Copermittee must designate enhanced measures for their municipal areas and activities tributary to CWA section 303(d) impaired water body segments when an area or those activit~~y~~ies have the potential to generate~~s~~ pollutants for which the water body segment is impaired. Each Copermittee must also designate additional controls for their municipal areas and activities within or directly adjacent to or discharging directly to ~~coastal lagoons, the ocean, or other~~ receiving waters within environmentally sensitive areas (as defined in Attachment C of this Order).

~~(d)~~(e) Implement BMPs: Each Copermittee must implement, or require the implementation of, the designated minimum and enhanced BMPs and any additional measures necessary based on its inventory to comply with this Order for each of their municipal area ~~or~~and those activit~~y~~ies ~~within its jurisdiction~~that have the potential to discharge pollution.

(3) BMP Implementation for Management of Pesticides, Herbicides, and Fertilizers

Each Copermittee must implement BMPs to reduce the contribution of storm water pollutants to the MEP associated with the application, storage, and disposal of pesticides, herbicides and fertilizers from their municipal areas and activities to MS4s and receiving waters. Such BMPs must include, at a minimum:

(a) Educational activities, permits, certifications and other measures for municipal applicators and distributors;
(b) Integrated Pest Management (IPM) measures that rely on non-chemical solutions;

(c) The use of native vegetation;
(d) Schedules for irrigation and chemical application; and
(e) The collection and proper disposal of unused pesticides, herbicides, and fertilizers.

(4) BMP implementation for Flood Control Structures

(a) Each Copermittee must implement procedures to assure that flood management projects assess the impacts on the water quality of receiving water bodies.
(b) Each Copermittee must include water quality protection measures, where feasible, when retrofitting existing flood control structural devices.
(c) Each Copermittee must evaluate its existing flood control ~~devices~~structures as part of ongoing routine maintenance, identify ~~devices~~structures causing or contributing to a condition of pollution, implement ~~identify~~ measures to reduce or eliminate the structure's effect on pollution, and evaluate the feasibility of retrofitting the structural flood control device. The inventory and evaluation must be completed by and submitted to the San Diego Water Board in each~~the 2nd year~~ JRMP Annual Report.

(5) BMP Implementation for Sweeping of Municipal Areas

Where municipal area sweeping is implemented as an MS4 BMP for municipal roads, streets, highways, and parking facilities, each Copermittee must design and implement the program based on the following criteria:

(a) Roads, streets, highways, and parking facilities identified as consistently generating the highest volumes of trash and/or debris shall be swept at least two times per month.~~Optimize pickup of trash and debris based on land uses, trash collection schedules, seasonal factors (e.g., special events, tourism, etc.) and inspections of municipal areas/activities.~~

(b) Roads, streets, highways, and parking facilities identified as consistently generating moderate volumes of trash and/or debris shall be swept at least monthly.

(c) Roads, streets, highways, and parking facilities identified as generating low volumes of trash and/or debris shall be swept as necessary, but no less than once per year.

(6) Operation and Maintenance of Municipal Separate Storm Sewer System (MS4) and ~~Structural~~ Treatment Controls

(a) Treatment Controls: Each Copermittee must implement a schedule of inspection and maintenance activities to verify proper operation of all their

municipal structural treatment controls designed to reduce storm water pollutant discharges to or from its MS4s and related drainage structures.

(b) MS4 and Facilities: Each Copermittee must implement a schedule of maintenance activities for their MS4 and ~~MS4~~ facilities (including but not limited to catch basins, storm drain inlets, detention basins~~open channels~~, etc). The maintenance activities must, at a minimum, include:

(i) Inspection and removal of accumulated waste at least once a year between May 1 and September 30 of each year for all MS4 facilities;
(ii) Additional facilities cleaning as necessary between October 1 and April 30 of each year~~ for facilities that receive or collect high volumes of trash and debris~~;
(iii) Following two years of inspections, any MS4 facility that requires inspection and cleaning less than annually may be inspected as needed, but not less than~~t~~ every other year;
(iv) Open channels and detention basins must be cleaned of observed anthropogenic litter in a timely manner;
(v) Maintenance activities within open channels must not adversely impact beneficial uses;
(vi) Record keeping of the maintenance and cleaning activities including the overall quantity of waste removed;
(vii) Proper disposal of waste removed pursuant to applicable laws; and
(viii) Measures to eliminate waste discharges during MS4 maintenance and cleaning activities.

(7) Infiltration From Sanitary Sewer to MS4/Provide Preventive Maintenance~~ of Both~~

(a) Each Copermittee must implement controls and measures to prevent and eliminate infiltration of seepage from ~~municipal~~ sanitary sewers to MS4s through thorough, routine preventive maintenance of the MS4. Each Copermittee that operates both a municipal sanitary sewer system and a MS4 must implement controls and measures to prevent and eliminate infiltration of seepage from the ~~municipal~~ sanitary sewers to the MS4s that must include overall sanitary sewer and MS4 surveys and thorough, routine preventive maintenance of both.

(b) Each Copermittee must implement controls to limit infiltration of seepage from ~~municipal~~ sanitary sewers to municipal separate storm sewer systems where necessary. Such controls must include:

(i) Adequate plan checking for construction and new development;~~,~~
(ii) Incident response training for their municipal employees that identify sanitary sewer spills;
(iii) Code enforcement inspections;

(iv) MS4 maintenance and inspections;
(v) Interagency coordination with sewer agencies; and
(vi) Proper education of their municipal staff and contractors conducting field operations on the MS4 or their municipal sanitary sewer (if applicable).

(8) Inspection of Municipal Areas and Activities

(a) At a minimum, each Copermittee must inspect the following high priority municipal areas and activities annually:

(i) Roads, Streets, Highways, and Parking Facilities;
(ii) Flood Management Projects and Flood Control Devices;
(iii) Areas and activities tributary to a CWA section 303(d) impaired water body segment, where an area or activity generates pollutants for which the water body segment is impaired.
(iv) Areas and activities within or adjacent to or discharging directly to receiving waters within environmentally sensitive areas (as defined in Attachment C of this Order);
(v) Municipal Facilities:
[a] Active or closed municipal landfills;
[b] Publicly owned treatment works (including water and wastewater treatment plants) and sanitary sewage collection systems;
[c] Solid waste transfer facilities;
[d] Land application sites;
[e] Corporate yards including maintenance and storage yards for materials, waste, equipment and vehicles; and
[f] Household hazardous waste collection facilities.
(vi) Municipal airfields;
(vii) Parks and recreation facilities;
(viii) Special event venues following special events (festivals, sporting events, etc.);
(ix) Power washing; and
(x) Other municipal areas and activities that the Copermittee determines may contribute a significant pollutant load to the MS4.

(b) Other municipal areas and activities must be inspected as needed and in response to water quality data, valid public complaints, and findings from municipal or contract staff.

(c) Based upon site inspection findings, each Copermittee must implement all follow-up actions necessary to comply with this Order.

(9) Enforcement of Municipal Areas and Activities

Each Copermittee must enforce its storm water ordinance for all their

municipal areas and activities as necessary to maintain compliance with this Order.

~~(10)Training and Education~~

~~Each Copermittee must ensure that all municipal personnel and contractors that have responsibilities for selecting, implementing, and evaluating BMPs for municipal areas and activities are adequately trained and educated to perform such tasks.~~

~~(a)Municipal Departments and Personnel Education~~

~~(i)Municipal Construction Activities: Each Copermittee must implement an education program that includes annual training prior to the rainy season so that its construction, building, code enforcement, and grading review staffs, inspectors, and other responsible construction staff have, at a minimum, an understanding of the following topics, as appropriate for the target audience:~~

~~[a]Federal, State, and local water quality laws and regulations applicable to construction and grading activities;~~
~~[b]The connection between construction activities and water quality impacts (i.e., impacts from land development and urbanization and impacts from construction material such as sediment);~~
~~[c]Proper implementation of erosion and sediment control and other BMPs to minimize the impacts to receiving water quality resulting from construction activities;~~
~~[d]The Copermittee's inspection, plan review, and enforcement policies and procedures to verify consistent application;~~
~~[e]Current advancements in BMP technologies;~~
~~[f]SSMP Requirements including treatment options, site design, source control, and applicable tracking mechanisms; and~~
~~[g]Other topics of local importance, including local water quality conditions, impaired water bodies, environmentally sensitive areas, and public health and disease vector issues associated with runoff.~~

~~(ii)Municipal Industrial/Commercial Activities: Each Copermittee must train staff responsible for conducting storm water compliance inspections and enforcement of industrial and commercial facilities at least once a year. Training must cover inspection and enforcement procedures, BMP implementation, and review of monitoring data~~

~~(iii)Municipal Other Activities: Each Copermittee must implement an education program so that municipal personnel and contractors performing activities which generate pollutants have an understanding~~

~~of the activity specific BMPs for each activity to be performed.~~

b. COMMERCIAL / INDUSTRIAL

Each Copermittee must implement a commercial / industrial program that meets the requirements of this section, prevents illicit discharges into the MS4, reduces commercial / industrial discharges of storm water pollutants from the MS4 to the MEP, and prevents commercial / industrial discharges from the MS4 from causing or contributing to a violation of water quality standards.

(1) Source Identification

(a) Each Copermittee must maintain an updated watershed-based inventory of all industrial and commercial sites/sources within its jurisdiction (regardless of ownership) that could contribute a significant pollutant load to the MS4. The inventory must include the following minimum information for each industrial and commercial site/source: name; address; pollutants potentially generated by the site/source; and identification of whether the site/source is tributary to a Clean Water Act section 303(d) water body segment and generates pollutants for which the water body segment is impaired; and a narrative description including SIC codes which best reflects the principal products or services provided by each facility.

At a minimum, the following sites/sources must be included in the inventory:

(i) Commercial Sites/Sources:

[a] Automobile repair, maintenance, fueling, or cleaning;
[b] Airplane repair, maintenance, fueling, or cleaning;
[c] Boat repair, maintenance, fueling, or cleaning;
[d] Equipment repair, maintenance, fueling, or cleaning;
[e] Automobile and other vehicle body repair or painting;
[f] Mobile automobile or other vehicle washing;
[g] Automobile (or other vehicle) parking lots and storage facilities;
[h] Retail or wholesale fueling;
[i] Pest control services;
[j] Eating or drinking establishments, including food markets;
[k] Mobile carpet, drape or furniture cleaning;
[l] Cement mixing or cutting;
[m] Masonry;
[n] Painting and coating;
[o] Botanical or zoological gardens and exhibits;
[p] Landscaping;
[q] Nurseries and greenhouses;

[r] Golf courses, parks and other recreational areas/facilities;
[s] Cemeteries;
[t] Pool and fountain cleaning;
[u] Marinas;
[v] Portable sanitary services;
[w] Building material retailers and storage;
[x] Animal facilities;
[y] Mobile pet services;
[z] Power washing services; and
[aa] Other sites and sources with a history of un-authorized discharges to the MS4.

(ii) Industrial Sites/Sources:

[a] Industrial Facilities, as defined at 40 CFR § 122.26(b)(14), including those subject to the General Industrial Permit or other individual NPDES permit;
[b] Operating and closed landfills;
[c] Facilities subject to SARA Title III; and
[d] Hazardous waste treatment, disposal, storage and recovery facilities.

(iii) ESAs and 303(d) Listed Waterbodies: All other commercial or industrial sites/sources tributary to a CWA Section 303(d) impaired water body segment, where the site/source generates pollutants for which the water body segment is impaired. All other commercial or industrial sites/sources within or directly adjacent to or discharging directly to coastal lagoons, the ocean, or other receiving waters within environmentally sensitive areas (as defined in Attachment C of this Order).

(iv) All other commercial or industrial sites/sources that the Copermittee determines may contribute a significant pollutant load to the MS4.

(2) <u>General BMP Implementation</u>

(a) Pollution Prevention: Each Copermittee must require the use of pollution prevention methods by industrial and commercial sites/sources.

(b) Designate / Update Minimum BMPs: Each Copermittee must designate a minimum set of BMPs for all industrial and commercial sites/sources. Where BMPs have already been designated, each Copermittee must review its existing BMPs for adequacy. The designated minimum BMPs must be specific to facility types and pollutant-generating activities, as appropriate.

(c) Designate Enhanced BMPs for ESAs and 303(d) Impairments: Each Copermittee must designate enhanced measures for industrial and commercial sites/sources tributary to CWA section 303(d) impaired water body segments (where a site/source generates pollutants for which the water body segment is impaired). Each Copermittee must also designate additional controls for industrial and commercial sites/sources within or directly adjacent to or discharging directly to coastal lagoons, the ocean, or other receiving waters within environmentally sensitive areas (as defined in Attachment C of this Order).

(d) Implement BMPs: Each Copermittee must implement, or require the implementation of, the designated minimum and enhanced BMPs and any additional measures necessary based on inspections, incident responses, and water quality data to comply with this Order at each industrial and commercial site/source within its jurisdiction.

(3) <u>BMP Implementation for Mobile Businesses</u>

(a) Each Copermittee must develop and implement a program to reduce the discharge of storm water pollutants from mobile businesses to the MEP and to prohibit non-storm water discharges pursuant to Section B of this Order. Each Copermittee must keep as part of their commercial source inventory a listing of mobile businesses known to operate within its jurisdiction. The program must include:

(i) Development and implementation of minimum standards and BMPs to be required for each of the various types of mobile businesses;
(ii) Development and implementation of an enforcement strategy which specifically addresses the unique characteristics of mobile businesses;
(iii) Notification of those mobile businesses known to operate within the Copermittee's jurisdiction of the minimum standards and BMP requirements and local ordinances;
(iv) Development and implementation of an outreach and education strategy; and
(v) Inspection of mobile businesses as needed to implement the program.

(b) If they choose to, the Copermittees may cooperate in developing and implementing their programs for mobile businesses, including sharing of mobile business inventories, BMP requirements, enforcement action information, and education.

(4) <u>Inspection of Industrial and Commercial Sites/Sources</u>

Each Copermittee must conduct industrial and commercial site inspections for compliance with its ordinances, permits, and this Order.

(a) Inspection Procedures: Inspections must include but not be limited to:

(i) Review of BMP implementation plans, if the site uses or is required to use such a plan;

(ii) Review of facility monitoring data, if the site monitors its runoff;

(iii) Check for coverage under the General Industrial Permit (Notice of Intent (NOI) and/or Waste Discharge Identification Number), if applicable;

(iv) Assessment of compliance with Copermittee ordinances and permits related to runoff;

(v) Assessment of BMP implementation, maintenance and effectiveness;

(vi) Visual observations for non-storm water discharges, potential illicit connections, and potential discharge of pollutants in storm water runoff; and

(vii) Education and training on storm water pollution prevention, as conditions warrant.

(b) Each Copermittee shall annually notify the San Diego Water Board, prior to the commencement of the wet season, of all Industrial Sites and Industrial Facilities subject to the General Industrial Permit or other individual NPDES permit with alleged violations. Information may be provided as part of the JRMP annual report if submitted prior to the rainy season. Information provided shall include, but not be limited to, the following:

(i) WDID number if enrolled under the General Industrial Permit;
(ii) Site Location, including address;
(iii) Current violations or suspected violations; and
(iv) Past Violation history.

(c) Frequencies: At a minimum, 25 percent of the sites inventoried as required in section F.3.b.(1) above (excluding mobile sources) including all sites determined to pose a high threat to water quality must be inspected each year. All sites must be Mobile businesses must be inspected pursuant to the enforcement strategy developed pursuant to section F.3.b.(3). In evaluating threat to water quality, each Copermittee shall consider, at a minimum, the following:

(i) Type of activity (SIC code);
(ii) Materials used at the facility;

(iii) Wastes generated;
(iv) Pollutant discharge potential;
(v) Non-storm water discharges;
(vi) Size of facility;
(vii) Proximity to receiving water bodies;
(viii) Sensitivity of receiving water bodies;
(ix) Whether the facility is subject to the General Industrial Permit or an individual NPDES permit;
(x) Whether the facility has filed a No Exposure Certification/Notice of Non-Applicability;
(xi) Facility design;
(xii) Total area of the site, area of the site where industrial or commercial activities occur, and area of the site exposed to rainfall and runoff;
(xiii) The facility's compliance history; and
(xiv) Any other relevant factors.

(d) Third-Party Inspections: Each Copermittee may develop and implement a third party inspection program for verifying industrial and commercial site/source compliance with its ordinances, permits, and this Order. The third party inspections can satisfy up to 30% of the inspection requirements in section F.3.b(4)(c), with the Copermittee having to fulfill the remaining required inspections. To the extent that third party inspections are conducted to fulfill the requirements of this Order, the Copermittee will be responsible for conducting and documenting quality assurance and quality control of the third-party inspections.

(i) Each inspection conducted by a third-party must, at a minimum, result in the following:

[a] Photo documentation of potential storm water violations identified during the third party inspection;
[b] Reporting to the Copermittee of identified significant potential violations, including imminent or observed illegal discharges, within 24 hours of the third party inspection;
[c] Reporting to the Copermittee of all inspection findings within one week of the inspection being conducted; and
[d] Copermittee follow-up and/or enforcement actions for identified potential storm water violations within two business days of the inspection or potential violation report receipt.

(e) Based upon site inspection findings, each Copermittee must implement all follow-up actions and enforcement necessary to comply with this Order.

(f) To the extent that the San Diego Water Board has conducted an inspection of an industrial site during a particular year, the requirement for the responsible Copermittee to inspect this facility during the same year

will be satisfied.

(g) The Copermittees must track the number of inspections for the inventoried industrial and commercial sites/sources throughout the reporting period to verify that the sites/sources are inspected at the minimum frequencies listed in this Order.

(5) Enforcement of Industrial and Commercial Sites/Sources

Each Copermittee must enforce its storm water ordinance for all industrial and commercial sites/sources as necessary to maintain compliance with this Order. Copermittee ordinances or other regulatory mechanisms must include appropriate sanctions to achieve compliance. Sanctions must include the following or their equivalent: Non-monetary penalties, fines, bonding requirements, and/or permit denials for non-compliance.

~~(6)Training and Education for Owners and Operators of Commercial and Industrial Activities~~

~~(a)Each Copermittee must implement an education program using all media as appropriate to (1) measurably increase the knowledge of owners and operators of commercial and industrial activities regarding MS4s, impacts of runoff on receiving waters, and potential BMP solutions for the target audience; and (2) to measurably change the behavior of target communities and thereby reduce storm water pollutant releases and eliminate prohibited non-storm water discharges to MS4s and the environment. At a minimum, the education program must meet the requirements of this section and address the following issues:~~

~~(i)Laws, regulations, permits, & requirements;~~
~~(ii)Best management practices;~~
~~(iii)General runoff concepts; and~~

~~(iv)Other topics, including public reporting mechanisms, water conservation, low-impact development techniques.~~

~~(b)~~(a) ~~BMP Notification: At least twice during the five-year period of this Order, each Copermittee must notify the owner/operator of each inventoried industrial and commercial site/source of the BMP requirements applicable to the site/source.~~

C. RESIDENTIAL

Each Copermittee must implement a residential program that meets the requirements of this section, prevents illicit discharges into the MS4, reduces residential discharges of storm water pollutants from the MS4 to the MEP, and

prevents residential discharges from the MS4 from causing or contributing to a violation of water quality standards.

(1) Threat to Water Quality Prioritization

Each Copermittee must identify residential areas and activities that pose a high threat to water quality. At a minimum, these must include:

(a) Automobile repair, maintenance, washing, and parking;
(b) Home and garden care activities and product use (pesticides, herbicides, and fertilizers);
(c) Disposal of trash, pet waste, green waste, and household hazardous waste (e.g., paints, cleaning products);
(d) Any other residential source that the Copermittee determines may contribute a significant pollutant load to the MS4;
(e) Any residential areas tributary to a CWA section 303(d) impaired water body, where the residence generates pollutants for which the water body is impaired; and
(f) Any residential areas within or directly adjacent to or discharging directly to ~~a coastal lagoon, the ocean, or other~~ receiving waters within an environmentally sensitive area (as defined in Attachment C of this Order).

(2) BMP Implementation

(a) Pollution Prevention: Each Copermittee must actively encourage the use of pollution prevention methods by residents.

(b) Designate BMPs: Each Copermittee must designate minimum BMPs for high-threat-to-water quality residential areas and activities. The designated minimum BMPs for high-threat-to-water quality residential areas and activities must be area or activity specific.

(c) Hazardous Waste BMPs: Each Copermittee must facilitate the proper management and disposal of used oil, toxic materials, and other household hazardous wastes. Such facilitation must include educational activities, public information activities, and establishment of collection sites operated individually and/or jointly by the Copermittee(s) or a private entity. Curbside collection of household hazardous wastes is encouraged.

(d) Implement BMPs: Each Copermittee must implement, or require implementation of, the designated minimum BMPs and any additional measures necessary to comply with Sections A and B of this Order.

(e) Each Copermittee must implement, or require implementation of, BMPs for residential areas and activities that have not been designated a high threat to water quality, as necessary.

(3) Enforcement of Residential Areas and Activities

Each Copermittee must enforce its storm water ordinance for all residential areas and activities as necessary to maintain compliance with this Order.

~~(4)Evaluation of Oversight of Residential Areas and Activities~~

~~Each Copermittee must annually review the effectiveness of efforts to reduce residential discharges of storm water pollutants from the MS4 and eliminate illicit residential discharges into the MS4. The evaluation must consider findings from monitoring data, municipal employee comments, inspections, complaints, and other appropriate sources.~~

~~(5)~~(4) Common Interest Areas (CIA) / Home Owner Association (HOA) Areas, and Mobile Home Parks

Each Copermittee must ensure that effective ~~implement~~ measures exist and are implemented or required to be implemented ~~specifically~~ to ensure that runoff within common interest developments, including areas managed by associations and mobile home parks, and meets the objectives of this section and Order.

(a) BMP Implementation: Each Copermittee must implement management measures based on a review of pertinent factors, including:

(i) Current ~~maintenance duties and procedures~~BMP implementation ~~used~~ by CIA/HOA maintenance associations and mobile home parks within its jurisdiction;
(ii) Whether streets and storm drains are publicly or privately owned within the CIA/HOA or mobile home park;
(iii) Whether the CIA/HOA area or mobile home park has been identified as a high priority residential area;
(iv) Proximity to 303(d)-listed waterbodies, and/or environmentally sensitive areas;
(v) Evaluation of water quality monitoring data;
(vi) Evaluation of existing illegal discharge/illicit connection activities;
(vii) Other activities conducted or authorized by the HOA that may pose a significant risk to inland or coastal receiving waters.

(b) Legal Authority and Enforcement: Within one year of adoption of this Order, each Copermittee must review, and if necessary update, its Municipal Code to ~~determine~~ verify that they have the legal authority ~~most appropriate method~~ to implement and enforce their ordinances~~runoff management measures~~ within CIA/HOA areas and mobile home parks.

~~(5)Residential Education Program~~

~~(a)Each Copermittee must implement a Residential Education Program using all media as appropriate to (1) measurably increase the knowledge regarding MS4s, impacts of runoff on receiving waters, and potential BMP solutions for the target audience; and (2) to measurably change the behavior of target communities and thereby reduce storm water and eliminate prohibited non-storm water pollutant releases to MS4s and the environment.~~

~~(b)Copermittee educational programs must emphasize underserved target audiences, residents and managers of CIA/HOA areas, high-risk behaviors, and "allowable" behaviors and discharges. At a minimum, the education program must meet the requirements of this section and address the following issues:~~

~~(i)Laws, regulations, permits, and requirements;~~
~~(ii)Best management practices;~~
~~(iii)General runoff concepts;~~
~~(iv)Existing water quality, including local water quality conditions, impaired waterbodies and environmentally sensitive areas; and~~
~~(v)Other topics, including public reporting mechanisms, water conservation, low-impact development techniques, and public health and disease vector issues associated with runoff.~~

d. Retrofitting Existing Development

Each Copermittee must develop and implement a retrofitting program that meets the requirements of this section. The goals of the existing development retrofitting program are to reduce impacts from hydromodification, promote LID, support riparian and aquatic habitat restoration, reduce the discharges of storm water pollutants from the MS4 to the MEP, and prevent discharges from the MS4 from causing or contributing to a violation of water quality standards. Where feasible, at the discretion of the Copermittee, the existing development retrofitting program may be coordinated with flood control projects and infrastructure improvement programs.

(1) Source Identification

The Copermittee must identify and inventory existing developments (i.e. municipal, industrial, commercial, residential) as candidates for retrofitting. Potential retrofitting candidates must include but are not limited to:

(a) Developments that contribute pollutants of concern to a TMDL or an ESA;
(b) Receiving waters that are channelized or otherwise hardened;
(c) Developments tributary to receiving waters that are channelized or

otherwise hardened;
(d) Developments tributary to receiving waters that are significantly eroded;
(e) Developments tributary to an ASBS or SWQPA; and
(f) Developments that cause hydraulic constriction.

(2) Each Copermittee shall evaluate and rank the inventoried existing developments to prioritize retrofitting. Criteria for evaluation must include but is not limited to:

(a) Feasibility;
(b) Cost effectiveness;
(c) Pollutant removal effectiveness;
(d) Impervious area potentially treated;
(e) Maintenance requirements;
(f) Landowner cooperation;
(g) Neighborhood acceptance;
(h) Aesthetic qualities; and
(i) Efficacy at addressing concern.

(3) Each Copermittee must consider the results of the evaluation in prioritizing work plans for the following year. Highly feasible projects expected to benefit water quality should be given a high priority to implement source control and treatment control BMPs. Where feasible, the retrofit projects should be designed in accordance with the SSMP requirements within sections F.1.d.(3) through F.1.d.(8). In addition, the Copermittee shall encourage retrofit projects to implement where feasible the Hydromodification requirements in Section F.1.h.

(4) The Copermittees will cooperate with private landowners to encourage retrofitting projects. The Copermittee must consider the following practices in cooperating and encouraging private landowners to retrofit their existing development:

(a) Demonstration retrofit projects;
(b) Retrofits on public land and easements that treat runoff from private developments;
(c) Education and outreach;
(d) Subsidies for retrofit projects;
(e) Requiring retrofit projects as enforcement, mitigation or ordinance compliance;
(f) Public and private partnerships; and
(g) Fees for existing discharges to the MS4 and reduction of fees for retrofit implementation.

(5) The completed retrofit BMPs shall be tracked and inspected in accordance with section F.1.f.

(6) Where constraints on retrofitting preclude effective BMP deployment on existing developments at locations critical to protect receiving waters, a Copermittee may propose a regional mitigation project to improve water quality. Such regional projects may include but are not limited to:

(a) Regional water quality treatment BMPs;
(b) Urban creek or wetlands restoration and preservation;
(c) Daylighting and restoring underground creeks;
(d) Localized rainfall storage and reuse to the extent such projects are fully protective of downstream water rights;
(e) Hydromodification project; and
(f) Removal of invasive plant species.

(7) A retrofit project or regional mitigation project may qualify as a Watershed Water Quality Activity provided it meets the requirements in section G. Watershed Runoff Management Program.

4. ILLICIT DISCHARGE DETECTION AND ELIMINATION

Each Copermittee must implement a program that meets the requirements of this section to actively detect and eliminate illicit discharges and disposal into the MS4. The program must address all types of illicit discharges and connections excluding those non-storm water discharges not prohibited by the Copermittee in accordance with section B of this Order.

a. PREVENT AND DETECT ILLICIT DISCHARGES AND CONNECTIONS

Each Copermittee must implement measures to prevent and detect illicit discharges to the MS4.

(1) Legal Authority: Each Copermittee must retain legal authority to prevent and eliminate illicit discharges and connections to the MS4.

(2) Inspections: Each Copermittee must include use of appropriate ~~municipal~~ Copermittee personnel and contractors to assist in identifying illicit discharges and connections during their daily activities.

(a) Visual ~~I~~inspections for illegal discharges and connections must be conducted during routine maintenance of all MS4 facilities.

(b) ~~Municipal~~ Copermittee staff and contractors conducting non-MS4 field operations must be trained to report suspected illegal discharges and connections to proper ~~municipal~~ Copermittee staff.

b. MAINTAIN MS4 MAP

Each Copermittee must maintain an updated map of its entire MS4 and the corresponding drainage areas within its jurisdiction. The use of GIS is encouraged~~required~~. The accuracy of the MS4 map must be confirmed during dry weather field screening and analytical monitoring and must be updated at least annually. The ~~GIS layers of the~~ MS4 map including any GIS layers must be submitted with the updated Jurisdictional Runoff Management Plan within 365 days after adoption of this Order.

c. FACILITATE PUBLIC REPORTING OF ILLICIT DISCHARGES AND CONNECTIONS - PUBLIC HOTLINE

Each Copermittee must promote, publicize and facilitate public reporting of illicit discharges or water quality impacts associated with discharges into or from MS4s. Each Copermittee must facilitate public reporting through development and operation of a public hotline. Public hotlines can be Copermittee-specific or shared by Copermittees. All storm water hotlines must be capable of receiving reports in both English and Spanish 24 hours per day and seven days per week. All reported incidents, and how each was resolved, shall be summarized in each Copermittee's ~~Individual~~ Annual Report.

d. DRY WEATHER FIELD SCREENING AND ANALYTICAL MONITORING

Each Copermittee must conduct dry weather field screening and analytical monitoring of MS4 outfalls and other portions of its MS4 within its jurisdiction to detect illicit discharges and connections in accordance with Receiving Waters and MS4 Discharge Monitoring and Reporting Program No. R9-2010-0016 in Attachment E of this Order.

e. INVESTIGATION / INSPECTION AND FOLLOW-UP

Each Copermittee must implement procedures to investigate and inspect portions of their MS4 that, based on the results of field screening, analytical monitoring, or other appropriate information, indicate a reasonable potential of containing illicit discharges, illicit connections, or other sources of pollutants in non-storm water.

(1) Develop response criteria for data: Each Copermittee must develop, update, and use numeric criteria action levels (or other actions level criteria where appropriate) to determine when follow-up investigations will be performed in response to water quality monitoring. The criteria must include required non-storm water action levels (see Section C) and a consideration of 303(d)-listed waterbodies and environmentally sensitive areas (ESAs) as defined in Attachment C.

(2) Respond to data: Each Copermittee must investigate portions of the MS4

for which water quality data or conditions indicates a potential illegal discharge or connection.

(a) Obvious illicit discharges (i.e. color, odor, or significant exceedances of action levels) must be investigated immediately.

(b) Field screen data: Within two business days of receiving dry weather field screening results that exceed action levels, the applicable Copermittee(s) must either initiate an investigation to identify the source of the discharge or document the rationale for why the discharge does not pose a threat to water quality and does not need further investigation. This documentation shall be included in the Annual Report.

(c) Analytical data: Within five business days of receiving analytical laboratory results that exceed action levels, the applicable Copermittee(s) must either initiate an investigation to identify the source of the discharge or document the rationale for why the discharge does not pose a threat to water quality and does not need further investigation. This documentation shall be included in the Annual Report.

(3) Respond to notifications: Each Copermittee must respond to and resolve each reported incident (e.g., public hotline, staff notification, etc.) in a timely manner. Criteria may be developed to assess the validity of, and prioritize the response to, each report.

f. ELIMINATION OF ILLICIT DISCHARGES AND CONNECTIONS

Each Copermittee must take immediate action to initiate steps necessary to eliminate all detected illicit discharges, illicit discharge sources, and illicit connections after detection. Elimination measures may include an escalating series of enforcement actions for those illicit discharges that are not a serious threat to public health or the environment. Illicit discharges that pose a serious threat to the public's health or the environment must be eliminated immediately.

g. ENFORCE ORDINANCES

Each Copermittee must implement and enforce its ordinances, orders, or other legal authority to prevent illicit discharges and connections to its MS4 and to eliminate detected illicit discharges and connections to it's MS4.

h. PREVENT AND RESPOND TO SEWAGE SPILLS (INCLUDING FROM PRIVATE LATERALS AND FAILING SEPTIC SYSTEMS) AND OTHER SPILLS

~~(1)~~Each Copermittee must implement management measures and procedures (including a notification mechanism) to prevent, respond to, contain and clean up all sewage (see below) and other spills that may discharge into its MS4 from

any source (including private laterals and failing septic systems). Copermittees must coordinate with spill response teams to prevent entry of spills into the MS4 and contamination of surface water, ground water and soil. Each Copermittee must coordinate spill prevention, containment and response activities throughout all appropriate departments, programs and agencies so that maximum water quality protection is available at all times.

~~(2)Each Copermittee must develop and implement a mechanism whereby it is notified of all sewage spills from private laterals and failing septic systems into its MS4. Each Copermittee must implement management measures and procedures to prevent, respond to, and coordinate a response to contain and clean up sewage from any such notification.~~

~~i.EDUCATION AND TRAINING~~

~~Each Copermittee must implement educational activities, public information activities, and other appropriate activities to facilitate the proper management and disposal of used oil and toxic materials.~~

5. PUBLIC PARTICIPATION COMPONENT

Each Copermittee must incorporate a mechanism for public participation in the updating, development, and implementation of the Jurisdictional Runoff Management Program.

6. EDUCATION COMPONENT

Each Copermittee must implement education programs using all media as appropriate to (1) measurably increase the knowledge regarding MS4s, impacts of runoff on receiving waters, and potential BMP solutions for the target audience; and (2) to measurably change the behavior of target communities and thereby reduce storm water and eliminate prohibited non-storm water discharges to MS4s and the environment. At a minimum, the education programs must meet the requirements of this section and address the following target communities:

- Copermittee Departments and Personnel
- New Development / Redevelopment Project Applicants, Developers, Contractors, Property Owners, and other Responsible Parties
- Construction Site Owners and Operators
- Commercial Owners and Operators
- Industrial Owners and Operators
- Residential Community and General Public
- Quasi-Governmental Agencies / Districts (i.e., educational institutions, water districts, sanitation districts, etc.)

a. General Requirements

(1) At a minimum, the Copermittee education programs must educate each target community on the following topics:

(a) Laws, regulations, permits, and requirements;
(b) Best management practices;
(c) General runoff concepts;
(d) Existing water quality, including local water quality conditions, impaired waterbodies and environmentally sensitive areas; and
(e) Other topics, including public reporting mechanisms, water conservation, low-impact development techniques, and public health and disease vector issues associated with runoff.

(2) Each Copermittee must implement educational activities, public information activities, and other appropriate activities to facilitate the proper management and disposal of used oil and toxic materials.

b. Specific Requirements

(1) Copermittee Departments and Personnel

(a) Each Copermittee must implement an education program so its staff and contractors (and Planning Boards and Elected Officials, if applicable) responsible for planning and development review, oversight, inspection and enforcement of construction activities, selecting and implementing BMPs for Copermittee areas, inspection and enforcement of industrial and commercial facilities, and other Copermittee activities which have the potential to generate pollutants have an understanding of the following topics applicable to their responsibilities:

(i) Applicable water quality laws and regulations;
(ii) The connection between land use decisions and short and long-term water quality impacts (i.e., impacts from land development and urbanization);
(iii) The connection between construction activities and water quality impacts (i.e., impacts from land development and urbanization and impacts from construction material such as sediment);
(iv) How to integrate LID BMP requirements into the local regulatory program(s) and requirements;
(v) Plan review policies and procedures to verify consistent application;
(vi) Methods of minimizing impacts to receiving water quality resulting from development, construction, and other potential pollutant generating activities, including:
[a] Identification of pollutants of concern;

[b] Storm water management plan development and review;
[c] Local sensitive water bodies, including 303(d)-impairments and ESAs;
[d] Methods to control downstream erosion impacts;
[e] Site design BMP techniques;
[f] Source control BMPs;
[g] Selection of the most effective treatment control BMPs for the pollutants of concern; and
[h] Public heath concerns related to storm water management infrastructure.

(vii) Proper implementation of erosion and sediment control, source control, treatment control, and other BMPs to minimize the impacts to receiving water quality resulting from development, construction, and other potential pollutant generating activities;
(viii) Current advancements in BMP methods and technologies;
(ix) SSMP Requirements including treatment options, site design, source control, and applicable tracking mechanisms;
(x) Inspection and enforcement procedures, BMP implementation, and review of monitoring data;
(xi) Other topics of local importance, including local water quality conditions, impaired water bodies, environmentally sensitive areas, and public health and disease vector issues associated with runoff.

(b) Each Copermittee must train its staff responsible for oversight and conducting storm water compliance inspections and enforcement of construction activities (e.g. construction, building, code enforcement, grading review staffs, inspectors, and other responsible construction staff) annually prior to the rainy season.

(c) Each Copermittee must train its staff responsible for conducting storm water compliance inspections and enforcement of industrial and commercial facilities at least once a year.

(2) New Development / Redevelopment and Construction Sites

As early in the planning and development process as possible and all through the permitting and construction process, each Copermittee must educate new development / redevelopment project applicants, developers, contractors, property owners, and other responsible parties about the importance of educating all construction workers in the field about storm water issues and BMPs though formal or informal training, in addition to the topics under Section F.6.a.(1).

(3) Commercial and Industrial Sites / Sources

At least twice during the five-year period of this Order, each Copermittee must notify the owner/operator of each of their inventoried commercial and industrial site/source of the BMP requirements applicable to the site/source.

(4) Residential and General Public

Each Copermittee shall collaboratively conduct or participate in development and implementation of a program to educate residential and general public target communities. The Copermittee residential and general public education programs must address pollutant generating activities (e.g., car washing, mobile operations, yard maintenance) and pollutant generating products (e.g., pesticides, fertilizers, household chemicals). The target audiences of the residential and general public education programs must include underserved target audiences (e.g., disadvantaged communities), residents and managers of CIA/HOA areas, and owners and residents of mobile home parks.

G. WATERSHED RUNOFF MANAGEMENT PROGRAM

Each Copermittee must collaborate with other Copermittees to identify, address, and mitigate the highest priority water quality issues/pollutants in the Upper Santa Margarita Watershed.

1. Watershed Water Quality Workplan (Watershed Workplan)

The Watershed Workplan shall describe the Copermittees' development and implementation of a collective watershed strategy to assess and prioritize the water quality problems within the watershed's receiving waters, identify and model sources of the highest priority water quality problem(s), develop a watershed-wide BMP implementation strategy to abate highest priority water quality problems, and a monitoring strategy to evaluate BMP effectiveness and changing water quality prioritization in the WMA.

The work plan shall, at a minimum:

a. Characterize the receiving water quality in the WMA. Characterization shall include use of regularly collected water quality data, reports, monitoring and analysis generated in accordance with the requirements of the Receiving Waters Monitoring and Reporting Program, as well as applicable information available from other public and private organizations.

b. Identify the highest priority water quality problem(s), in terms of constituents by location, in the WMA's receiving waters. Identified water quality problem(s) shall, at a minimum, give consideration to; TMDLs, receiving waters listed on the CWA section 303(d) list, waters with persistent violations of water quality standards, toxicity, or impacts to beneficial uses, and other pertinent conditions.

c. Identify the sources of the highest water quality problem(s) within the WMA. Efforts to determine such sources shall include, but not be limited to: use of information from the construction, industrial/commercial, municipal, and residential source identification programs required within the Jurisdictional Runoff Program (JRMP) of this Order; specific actions to model pollutant transport to receiving waters for the sake of identifying the source(s) point(s) of origin; water quality monitoring data collected as part of the Receiving Water Monitoring and Reporting Program required by this Order, and additional focused water quality monitoring to identify specific sources within the watershed.

d. Develop a watershed BMP implementation strategy to attain receiving water quality objectives in the identified highest priority water quality problem(s). The BMP implementation strategy shall include a schedule for implementation of the BMP projects to abate specific receiving water quality problems. BMPs not contributing to measured pollutant reductions or improvements to water quality must be removed and replaced with alternative BMPs. Identified watershed water quality problems may be the result of jurisdictional discharges that will need to be addressed with BMPs applied in a specific jurisdiction in order to generate a benefit to the watershed.

e. Develop a strategy to model and monitor improvements in receiving water quality directly resulting from implementation of the BMPs described in the Watershed Workplan. The modeling and monitoring strategy shall generate the necessary data to report on the measured pollutant reduction that results from proper BMP implementation. Monitoring shall, at a minimum, be conducted in the receiving water to demonstrate reduction in pollutant concentrations and progression towards attainment of receiving water quality objectives.

f. Establish a schedule for development and implementation of the Watershed strategy outlined in the Workplan. The schedule shall, at a minimum, include forecasted dates of planned actions to address Provisions E.2(a) through E.2(e) and dates for watershed review meetings through the remaining portion of this Permit cycle. Annual watershed workplan review meetings must be open to the public and appropriately publically noticed such that interested parties may come and provide comments on the watershed program.

2. Watershed Workplan Implementation – Watershed Copermittee's shall begin implementing the Watershed Workplan within 60-days of acceptance by the San Diego Water Board Executive Officer. If within 30 days of submittal, the San Diego

Water Board has not taken an action, the Workplan shall be deemed acceptable.

3. **Copermittee Collaboration** – Watershed Copermittees shall collaborate to develop and implement the Watershed Workplan. Watershed Copermittee collaboration shall include frequent regularly scheduled meetings. The Copermittees shall seek to obtain any interagency agreements, or other efforts, with non-Copermittee owners of the MS4 (such as Caltrans, Native American tribes, and school districts) to control the contribution of pollutants from one portion of the shared MS4 to another portion of the shared MS4. The Copermittees shall, as appropriate, participate in watershed management efforts to address water quality issues within the entire Santa Margarita Watershed (such as the County of San Diego and United States Marine Corps Camp Pendleton).

4. **Public Participation –** Watershed Copermittees shall implement a watershed-specific public participation mechanism within each watershed. A required component of the watershed-specific public participation shall be a minimum 30-day public review of the Watershed Workplan prior to submittal for acceptance by the San Diego Water Board Execuive Officer. Opportunity for the public to review and comment on the Watershed Workplan must occur before the workplan is implemented.

5. **Watershed Workplan Review and Updates –** Watershed Copermittees shall review and update the Watershed Workplan annually to identify needed changes to the prioritized water quality problem(s) listed in the workplan. All updates to the Watershed Workplan shall be presented during an Annual Watershed Review Meeting. Annual Watershed Review Meetings shall occur once every calendar year and be conducted by the Watershed Copermittees. Annual Watershed Review Meetings shall be open to the public and adequately noticed. Individual Watershed Copermittees shall also review and modify their jurisdictional programs and JRMP Annual Reports, as necessary, so that they are consistent with the updated Watershed Workplan.

6. **Pyrethroid Toxicity Reduction Evaluation –** The Watershed Copermittees shall incorporate the pyrethroid pollutant reduction program[16] into the Watershed Workplan. The pyrethroid pollutant reduction program shall include the following elements:

   a. Pursue state and federal regulatory change.
   b. Implement a set of source controls targeted specifically at urban pesticide use,
   c. Through the annual reporting process, monitor the implementation of those controls, assess effectiveness, and identify sources or areas where additional effort is needed,
   d. Implement additional controls as needed,

[16] The pyrethroid pollutant reduction program is described in the "Riverside County – Santa Margarita Region Pyrethroid Source Identification Toxicity Reduction Evaluaion, Final Phase II Report", January 2009 by MACTEC.

e. Continue to monitor implementation, as well as conditions within the target receiving waters, assess effectiveness, and re-evaluate control programs.

H. FISCAL ANALYSIS

1. Secure Resources: Each Copermittee must secure the resources necessary to meet all requirements of this Order.

2. Annual Analysis: Each Copermittee must conduct an annual fiscal analysis of the necessary capital and operation and maintenance expenditures necessary to accomplish the activities of the programs required by this Order. The analysis must include estimated expenditures for the reporting period, the preceding period, and the next reporting period.

a. Each analysis must include a description of the source of funds that are proposed to meet the necessary expenditures, including legal restrictions on the use of such funds.
b. Each analysis must include a narrative description of circumstances resulting in a 25 percent or greater annual change for any budget line items.

3. Annual Reporting: Each Copermittee must submit its annual fiscal analysis with the annual JRMP report.

I. TOTAL MAXIMUM DAILY LOADS

The waste load allocations (WLAs) of fully approved and adopted TMDLs are incorporated as Water Quality Based Effluent Limitations on a pollutant by pollutant, watershed by watershed basis. Early TMDL requirements, including monitoring, may be required and inserted into this Order pursuant to Finding E.10

J. PROGRAM EFFECTIVENESS ASSESSMENT AND REPORTING

1. Jurisdictional Program Effectiveness Assessments

a. OBJECTIVES OF EFFECTIVENESS ASSESSMENTS

Beginning with the Annual Report due in 2012, each Copermittee must annually assess the effectiveness of its Jurisdictional Runoff Management Program (JRMP) implementation at meeting the following objectives:

(1) Objective for 303(d) Waterbodies: Reduce storm water pollutant loadings.

(a) Each Copermittee must establish annual assessment measures or

methods specifically for reducing discharges of storm water pollutants from its MS4 into each downstream 303(d)-listed water body for which that waterbody is impaired. Assessment measures must be developed for each of the six outcome levels described by CASQA.[17]

(b) Each Copermittee must annually conduct each established assessment measure or method and evaluate the outcome. Each outcome must then be used to assess the effectiveness of implemented management measures toward reducing MS4 discharges of the specific pollutants causing or contributing to conditions of impairment.

(c) The assessment measures must target both water quality outcomes and the results of municipal enforcement activities.

(2) Objective for Environmentally-Sensitive Areas: Prevent storm water MS4 discharges from causing or contributing to conditions of pollution, nuisance, or contamination.

(a) Each Copermittee must establish annual measures or methods specifically for assessing the effectiveness of its management measures for protecting downstream ESAs from adverse effects caused by discharges from its MS4. Assessment measures must be developed for each of the six outcome levels described by CASQA.

(b) Each Copermittee must annually implement each established assessment measure or method and evaluate the outcome. Each outcome must be used to assess the effectiveness of implemented management measures toward reducing MS4 discharges of the specific pollutants causing or contributing to conditions of impairment.

(c) The assessment measures must target both water quality outcomes and the results of municipal enforcement activities.

(3) Objectives for major program component outcomes: Determined by Each Copermittee.

(a) Each Copermittee must annually develop objectives for each program component in Section F and the overall JRMP. The objectives must be established as appropriate in response to program implementation and evaluation of water quality and management practices.

(b) Assessment approaches for program implementation must include a mix of specific activities, general program components, and water quality data.

(c) The assessment measures must target both water quality outcomes and the results of municipal enforcement activities.

(4) Objectives for actions taken to protect receiving water limitations in accordance with this Order.

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[17] Effectiveness assessment outcome levels as defined by CASQA are defined in Attachment C of this Order. See "*Municipal Stormwater Program Effectiveness Assessment Guidance"* (CASQA, May 2007) for guidance for assessing program activities at the various outcome levels.

(a) Each Copermittee must develop and implement an effectiveness assessment strategy for each measure conducted in response to a determination to implement the "iterative" approach to prevent or reduce any storm water pollutants that are causing or contributing to the exceedance of water quality standards as outlined in this Order

b. ASSESSMENT REVIEW

(1) Based on the results of the effectiveness assessments, each Copermittee must annually review its jurisdictional activities and BMPs to identify modifications and improvements needed to maximize JRMP effectiveness, as necessary to achieve compliance with this Order.

(2) Each Copermittee must develop and annually conduct an Integrated Assessment[18] of each effectiveness assessment objective above (Section J.1.a) and the overall JRMP using a combination of outcomes as appropriate to the objectives.[19]

2. Program Modifications

a. Each Copermittee must develop and implement a plan and schedule to address program modifications and improvements identified during annual effectiveness assessments.

b. Jurisdictional activities/BMPs that are ineffective or less effective than other comparable jurisdictional activities/BMPs must be replaced or improved upon by implementation of more effective jurisdictional activities/BMPs. Where monitoring data exhibits persistent water quality problems that are caused or contributed to by MS4 discharges, jurisdictional activities or BMPs applicable to the water quality problems must be modified and improved to correct the water quality problems.

3. Effectiveness Assessment and Program Response Reporting

a. Each Copermittee must include a description and summary of its annual and long-term effectiveness assessments within each Annual Report. Beginning with the Annual Report due in 2011, the Program Effectiveness reporting must include:

(1) 303(d) waterbodies: A description and results of the annual assessment measures or methods specifically for reducing discharges of storm water

[18] Integrated assessment is defined in Attachment C. It is the process of evaluating whether program implementation is resulting in the protection or improvement of water quality. Integrated assessment combines assessments of program implementation and water quality.
[19] Not all program components need be addressed at each of the six outcome levels.

pollutants from its MS4 into each 303(d)-listed waterbody;

(2) ESAs: A description and results of the annual assessment measures or methods specifically for managing discharges of pollutants from its MS4 into each downstream ESA;

(3) Other Program Components: A description of the objectives and corresponding assessment measures and results used to evaluate the effectiveness of each general program component. The results must include findings from both program implementation and water quality assessment where applicable;

(4) Receiving water protection: A description and results of the annual assessment measures or methods employed specifically for actions taken to protect receiving water limitations in accordance with Section A.3 of this Order;

(5) A description of the steps taken to use dry-weather and wet-weather monitoring data to assess the effectiveness of the programs for 303(d) impairments, ESAs, and general program components;

(6) A description of activities conducted in response to investigations of illicit discharge and illicit connection activities, including how each investigation was resolved and the pollutant(s) involved;

(7) Responses to effectiveness assessments: A description of each program modification, made in response to the results of effectiveness assessments conducted pursuant to Section J.1.a, and the basis for determining (pursuant to Section J.2.b.) that each modified activity and/or BMP represents an improvement with respect to reducing the discharge of storm water pollutants from the MS4.

(8) A description of the steps that will be taken to improve the Copermittee's ability to assess program effectiveness using measurable targeted outcomes, assessment measures, assessment methods, and outcome levels 1-6. Include a time schedule for when improvement will occur; and

(9) A description of the steps that will be taken to identify aspects of the Copermittee's Jurisdictional Runoff Management Program that will be changed based on the results of the effectiveness assessment.

4. Work Plan

Each Copermittee must develop a work plan to address their high priority water quality problems in an iterative manner over the life of the permit. The goal of the work plan is to demonstrate a responsive and adaptive approach for the judicious and effective use of available resources to attack the highest priority problems. The work plan shall include, at a minimum, the following:

~~(a)~~**a.** The problems and priorities identified during the assessment;

~~(b)~~**b.** A list of priority pollutants and known or suspected sources;

~~(c)~~**c.** A brief description of the strategy employed to reduce, eliminate or mitigate the negative impacts;

~~(d)~~**d.** A description and schedule for new and/or modified BMPs. The schedule

is to include dates for significant milestones;

~~(e)~~e. A description of how the selected activities will address an identified high priority problem. This will include a description of the expected effectiveness and benefits of the new and/or modified BMPs;

~~(f)~~f. A description of implementation effectiveness metrics;

~~(g)~~g. A description of how efficacy results will be used to modify priorities and implementation; and

~~(h)~~h. A review of past activities implemented, progress in meeting water quality standards, and planned program adjustments.

The Copermittee shall submit the work plan to the San Diego Water Board within 365 days of adoption of the Order. Annual updates are also required and shall be included with the annual JRMP report. The San Diego Water Board will assess the work plan for compliance with the specific and overall requirements of the Order. To increase effectiveness and efficiencies, Copermittees may combine their implementation efforts and work plans within a hydrologic area or sub area. Each Copermittee, however, maintains individual responsibility for developing and implementing an acceptable work plan.

K. REPORTING

The Copermittees may propose alternate reporting criteria and schedules, as part of their updated JRMP, for the Executive Officer's acceptance. The Copermittees shall submit the updated JRMP within 365 days after adoption of this Order.

1. Runoff Management Plans

a. JURISDICTIONAL RUNOFF MANAGEMENT PLANS

(1) Copermittees: The written account of the overall program to be conducted by each Copermittee to meet the jurisdictional requirements of section F of this Order is referred to as the Jurisdictional Runoff Management Plan (JRMP). Each Copermittee must revise and update its existing JRMP so that it describes all activities the Copermittee will undertake to implement the requirements of this Order. Each Copermittee must submit its updated and revised JRMP to the San Diego Water Board 365 days after adoption of this Order.

(2) At a minimum, each Copermittee's JRMP must be updated and revised to demonstrate compliance with each applicable section of this Order.

b. WATERSHED WORKPLANS

(1) Copermittees: The written account of the program conducted by group of Copermittees is referred to as the Watershed Workplan. Copermittees shall be responsible for updating and revising the Watershed Workplan. Each

Watershed Workplan shall be updated and revised to describe any changes in water quality problems or priorities, and any necessary change to actions Copermittees will take to implement jurisdictional or watershed BMPs to address those identified. The Copermittees shall assemble and submit the Watershed Workplan to the San Diego Water Board no later than 365 days after adoption of this Order, and shall be prepared to implement the workplan within 60 days of the San Diego Water Board Executive Officer deeming the workplan acceptable.

(2) Each Watershed Workplan shall, at a minimum, include:

(a) An updated watershed map.
(b) Identification and description of all applicable water quality data, reports, analyses, and other information to be used to assess receiving water quality.
(c) Assessment and analysis of the watershed's water quality data, reports, analyses, and other information, used during identification and prioritization of the watershed's water quality problems.
(d) A prioritized list of water quality problems within the WMA including rationale explaining the method/logic used to determine prioritization.
(e) Identification of the likely sources, pollutant discharges, and/or other factors causing the high priority water quality problems within the WMA.
(f) A description of the strategy to be used to guide Copermittee implementation of BMPs either jurisdictionally or on a watershed-wide basis to abate the highest water quality problems
(g) A list of criteria used to evaluate BMP effectiveness and how it was applied.
(h) A GIS map of BMPs implemented and BMPs scheduled for implementation.
(i) A description of the public participation mechanisms to be used and the parties anticipated to be involved during the development and implementation of the Watershed Workplan.
(j) A description of Copermittee collaboration to accomplish development of the Watershed Workplan, including a schedule for Watershed meetings.
(k) A description of how TMDLs and 303(d)-listed water bodies were considered during prioritization of watershed water quality problems
(l) A description of the strategy to model and monitor improvement in receiving water quality directly resulting from implementation of the BMPs described in the Watershed Workplan.
(m) A scheduled annual Watershed Workplan Review Meeting once every calendar year. This meeting shall be open to the public.

2. Other Required Reports and Plans

a. SSMP Updates

(1) Copermittees must submit their updated model SSMP in accordance with the applicable requirements of section F.1 with the JRMP two years after adoption of this Order.
(2) Within 180 days of determination that the Model SSMP is in compliance with this Permit's provisions, each Copermittee must update their own local SSMP, and amended ordinances consistent with the model SSMP, and shall submit both (local SSMP and amended ordinances) to the San Diego Water Board.
(3) For SSMP-related requirements of Section F.1 with subsequent implementation due dates, updated SSMPs must be submitted with the JRMP annual report covering the applicable reporting period.

b. REPORT OF WASTE DISCHARGE

The Copermittees must submit to the San Diego Water Board, no later than 210 days in advance of the expiration date of this Order, a Report of Waste Discharge (ROWD) as an application for issuance of new waste discharge requirements. The fourth annual report for this Order may supplement the ROWD, provided it contains the minimum information below.

At a minimum, the ROWD must include the following: (1) Proposed changes to the Copermittees' runoff management programs; (2) Proposed changes to monitoring programs; (3) Justification for proposed changes; (4) Name and mailing addresses of the Copermittees; (5) Names and titles of primary contacts of the Copermittees; and (6) Any other information necessary for the reissuance of this Order.

3. Annual Reports

a. JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM (JRMP) ANNUAL REPORTS

(1) Copermittees: Each Copermittee must generate individual JRMP Annual Reports that cover implementation of its jurisdictional activities during the past annual reporting period. Each Annual Report must verify and document compliance with this Order as directed in this section. Each Copermittee must retain records through 2016, available for review, that document compliance with each requirement of this Order. The reporting period for these annual reports must be the previous fiscal year.

(2) Each Copermittee must submit their JRMP Annual Reports to the San Diego Water Board by September 30 of each year, beginning on September 30, 2011.

(3) Each JRMP Annual Report must contain, at a minimum, the following information:

(a) Information required to be reported annually in Section H (Fiscal Analysis) of this Order;
(b) Information required to be reported annually in Section J (Program Effectiveness) of this Order;
(c) The completed Reporting Checklist found in Attachment D, and
(d) Information for each program component by watershed as described in the following Table 9:

Table 9. Annual Reporting Requirements

Program Component	Reporting Requirement
New Development	1. Updated relevant sections of the General Plan and environmental review process and a description of planned updates within the next annual reporting period, if applicable
	2. Revisions to the local SSMP, including where applicable: (a) Identification and summary of where the SSMP fails to meet the requirements of this Order; (b) Updated procedures for identifying pollutants of concern for each Priority Development Project; (c) Updated treatment BMP ranking matrix; and (d) Updated site design and treatment control BMP design standards;
	3. Verification that site design, source control, and treatment BMPs were required on all applicable Priority Development Projects;
	4. Description of the application of LID and site design BMPs in the planning and approval process;
	5. Description of projects subject to the local waiver provision for numeric sizing of treatment control BMP requirements;
	6. Description and summary of the LID site design BMP substitution program, if applicable;
	7. Description and summary of the process to verify compliance with SSMP requirements;
	8. Updates to the BMPs that are listed in the local SSMP as options for treatment control;
	9. Description of the treatment control maintenance tracking process and verification that the requirements of this Order were met during the reporting period; (a) Updated watershed-based database of approved treatment control BMPs and treatment control BMP maintenance within its jurisdiction, including updates to the list of high-priority treatment BMPs;

Program Component	Reporting Requirement
	10. Description of the process for identifying and evaluating hydrologic conditions of concern and requiring a suite of management measures within all Priority Development Projects to protect downstream beneficial uses and prevent adverse physical changes to downstream stream channels;
	11. Description of enforcement activities applicable to the new development and redevelopment component and a summary of the effectiveness of those activities;
Construction	1. Updated relevant ordinances and description of planned ordinance updates within the next annual reporting period, if applicable;
	2. A description of procedures used for identifying priorities for inspecting sites and enforcing control measures that consider the nature of the construction activity, topography, and the characteristics of soils and receiving water quality;
	3. Designated minimum and enhanced BMPs;
	4. Summary of the inspection program, including the following information: (a) Number and date of inspections conducted at each facility, including the facility address; (b) Number of facilities lacking adequate BMPs; (c) The BMP violations identified during the inspection by facility; (d) Number, date, and types of enforcement actions by facility; (e) Narrative description of inspection findings and follow-up activities for each facility;
Municipal	1. Updated source inventory;
	2. Changes to the designated municipal BMPs;
	3. Descriptions of procedures to assure that flood management projects assess the impacts on the water quality of receiving water bodies;
	4. Summary and assessment of BMPs implemented at retrofitted flood control structures, including: (a) List of projects with BMP retrofits; and (b) List and description of structures retrofitted without BMPs;
	5. Description and assessment of the municipal structural treatment control operations and maintenance activities, including: (a) Number of inspections and types of facilities; and (b) Summary of findings;
	6. Description of the municipal areas/facilities operations and maintenance activities, including: (a) Number and types of facilities maintained; (b) Amount of material removed and how that material was disposed; and (c) List of facilities planned for bi-annual inspections and the justification;

Program Component	Reporting Requirement
	7. Description of the municipal areas/programs inspection activities, including: (a) Number and date of inspections conducted at each facility; (b) Number of facilities lacking adequate BMPs; (c) The BMP violations identified during the inspection by facility; (d) Number, date and types of enforcement actions by facility; (e) Narrative description of inspection findings and follow-up activities for each facility;
	8. Description of activities implemented to address sewage infiltration into the MS4;
Commercial / Industrial	1. Annual inventory of commercial / industrial sources;
	2. Summary of the inspection program, including the following information: (a) Number and date of inspections conducted at each facility including the facility address; (b) Number of facilities lacking adequate BMPs; (c) The BMP violations identified during the inspection by facility; (d) Number, date, and types of enforcement actions by facility; (e) Narrative description of inspection findings and follow-up activities for each facility;
	3. Changes to designated minimum and enhanced BMPs;
	4. A list of industrial sites, including each name, address, and SIC code, that the Copermittee suspects may require coverage under the General Industrial Permit, but has not submitted an NOI;
Residential	1. Updated minimum BMPs required for residential areas and activities;
	2. Quantification and summary of applicable runoff and storm water enforcement actions within residential areas and activities;
	3. Description of efforts to manage runoff and storm water pollution in common interest areas;
Retrofitting Existing Development	1. Updated inventory and prioritization of existing developments identified as candidates for retrofitting.
	2. Description of efforts to retrofit existing developments during the reporting year.
	3. Description of efforts taken to cooperate with private landowners to retrofit existing development.
	4. A list of retrofit projects that have been implemented, including site location, a description of the retrofit project, pollutants expected to be treated, and the tributary acreage of runoff that will be treated.
	5. A list of regional mitigation projects that have been implemented, including site location, a description of the regional mitigation project, pollutants expected to be treated, and the tributary acreage of runoff that will be treated.
	6. Any proposed retrofit or regional mitigation projects and timelines for future implementation.

Program Component	Reporting Requirement
	7. Any proposed changes to the Copermittee's overall retrofitting program.
Illicit Discharge Detection and Elimination	1. Changes to the legal authority to implement Illicit Discharge Detection and Elimination activities;
	2. Changes to the established investigation procedures;
	3. Public reporting mechanisms, including phone numbers and web pages;
	4. All data and assessments from the Dry Weather Effluent Analytical Monitoring activities;
	5. Response criteria developed for water quality data and notifications;
	6. Summaries of illicit discharges (including spills and water quality data events) and how each significant case was resolved;
	7. A description of instances when field screening and analytical data exceeded action levels, including those instances for which no investigation was conducted;
	8. A description of follow-up and enforcement actions taken in response to investigations of illicit discharges and a description of the effectiveness of those measures;
	9. A description of controls to prevent infiltration of seepage from municipal sanitary sewers to municipal separate storm sewer systems;
Work Plan	Priorities, strategy, implementation schedule and effectiveness evaluation;

(4) Each JRMP Annual Report must also include the following information regarding non-storm water discharges (see Section B.2. of this Order):

(a) Identification of non-storm water discharge categories identified as a source of pollutants to waters of the U.S;
(b) A description of ordinances, orders, or similar means to prohibit non-storm water discharge categories identified under section B.2 above ;
(c) Identification of any control measures to be required and implemented for non-storm water discharge categories identified as needing controls by the San Diego Water Board; and
(d) A description of a program to address pollutants from non-emergency fire fighting flows identified by the Copermittee to be significant sources of pollutants.

4. Interim Reporting Requirements

For the July 2010-June 2011 reporting period, the Jurisdictional RMP must be submitted on January 31, 2012. Each Jurisdictional RMP Annual Report submitted for this reporting period must, at a minimum, include comprehensive descriptions of all activities conducted to fully implement the Copermittees' Jurisdictional RMP documents, as those documents were developed to comply with the requirements of

Order No. 2004-001.

5. Universal Reporting Requirements

All submittals must include an executive summary, introduction, conclusion, recommendations, and signed certified statement. Each Copermittee must submit a signed certified statement covering its responsibilities for each applicable submittal. The Principal Copermittee must submit a signed certified statement covering its responsibilities for each applicable submittal and the sections of the submittals for which it is responsible.

L. MODIFICATION OF PROGRAMS

Modifications of Jurisdictional Runoff Management Programs and/or Watershed Runoff Management Programs may be initiated by the Executive Officer of the San Diego Water Board or by the Copermittees. Requests by Copermittees must be made to the Executive Officer, and must be submitted during the annual review process. Requests for modifications should be incorporated, as appropriate, into the Annual Reports or other deliverables required or allowed under this Order.

1. Minor Modifications: Minor modifications to Jurisdictional Runoff Management Programs, and/or Watershed Runoff Management Programs, may be accepted by the Executive Officer where the Executive Officer finds the proposed modification complies with all discharge prohibitions, receiving water limitations, and other requirements of this Order.

2. Modifications Requiring an Amendment to this Order: Proposed modifications that are not minor require amendment of this Order in accordance with this Order's rules, policies, and procedures.

M. PRINCIPAL COPERMITTEE RESPONSIBILITIES

Within 180 days of adoption of this Order, the Copermittees must designate the Principal Copermittee and notify the San Diego Water Board of the name of the Principal Copermittee. The Principal Copermittee must, at a minimum:

1. Serve as liaison between the Copermittees and the San Diego Water Board on general permit issues, and when necessary and appropriate, represent the Copermittees before the San Diego Water Board.
2. Coordinate permit activities among the Copermittees and facilitate collaboration on the development and implementation of programs required under this Order.
3. Produce and submit documents and reports as required by section K of this Order and Receiving Waters and MS4 Discharge Monitoring and Reporting Program No. R9-2010-0016 in Attachment E of this Order.

N. RECEIVING WATERS AND MS4 DISCHARGE MONITORING AND REPORTING PROGRAM

Pursuant to CWC section 13267, the Copermittees must comply with all the requirements contained in Receiving Waters and MS4 Discharge Monitoring and Reporting Program No. R9-2010-0016 in Attachment E of this Order.

O. STANDARD PROVISIONS, REPORTING REQUIREMENTS, AND NOTIFICATIONS

1. Each Copermittee must comply with Standard Provisions, Reporting Requirements, and Notifications contained in Attachment B of this Order. This includes 24 hour/5 day reporting requirements for any instance of non-compliance with this Order as described in section 5.e of Attachment B.

2. All plans, reports and subsequent amendments submitted in compliance with this Order must be implemented immediately (or as otherwise specified). All submittals by Copermittees must be adequate to implement the requirements of this Order.

I, David W. Gibson, Executive Officer, do hereby certify the foregoing is a full, true, and correct copy of an Order adopted by the California Regional Water Quality Control Board, San Diego Region, on TBD, 2010.

_____

David W. Gibson
Executive Officer

AGENDA

Santa Margarita Region
MS4 Permit Meeting

9:00a.m. – 5:00 p.m. May 26, 2010
Location: SDRWQCB

1. PROCESS / HOUSEKEEPING

2. WRAP-UP FOR LAST WEEK'S TOPICS

3. TODAY'S TOPICS

   i. F.2. Construction
   ii. F.3.d. Retrofit
   i. ~~F.6. Education~~ (Postponed to a future meeting)

4. CONCEPTUAL DISCUSSION OF FUTURE TOPICS

   i. F.1.d.(1)-(3) and (8)-(11)
   ii. F.3.b. - Commercial-Industrial
   iii. F.1.d.(4)-(7) [Time Permitting]

From: "Uhley, Jason" <JUHLEY@rcflood.org>
To: "Uhley, Jason" <JUHLEY@rcflood.org>, Ben Neill <BNeill@waterboards.ca.gov>
CC: Bill Woolsey <wwoolsey@murrieta.org>, Mike Shetler <mshetler@rceo.org>, ...
Date: 6/2/2010 10:36 PM
Subject: RE: meeting Agenda and Handouts
Attachments: 2010-06-03_AGENDA (2).docx; 2010-05-26_Sign-in Sheet.pdf; F 1 d (1)-(3) (8)-(11)_draftFinal (2).docx; F 3 b - Commercial-Industrial_draftFinal (2).docx; 2010-06-03_Draft SMR Permit (2010 06-03) ju.doc

All,

Attached are five files:

* Agenda for this Thursday.
* Updated draft permit with comments and edits added for section F.3.b., and sections F.1.d.(1)-(3), (8)-(11) for discussion on Thursday.

* Sign-in Sheet from 5/26.
* Excerpts of section F.3.b., and
* Excerpts of sections F.1.d.(1)-(3), (8)-(11).

Please note that the new development excerpt also includes an excerpt from the glossary (redevelopment definition). The excerpts are to facilitate discussion at tomorrow's meeting. Handouts will be provided.

Also, Claudio asked me to let you know that based on our retrofit discussion last week we have taken a fresh look at the redlines previously provided for that section of the permit (F.3.d). In the attached updated draft permit we removed many of our previously suggested edits, and fine tuned a few where we believe we had general agreement in the meeting. With the understanding that the fact sheet will be amended to clarify that the inventory will be on a planning level, the suggested edits that remain are those that we feel are the minimum appropriate changes to the language.

My apologies for the delays.

Regards,

Jason Uhley
951.955.1273
951.522.1213 - cell (for use tomorrow if necessary).

-----Original Message-----
From: Uhley, Jason
Sent: Wednesday, June 02, 2010 4:55 PM
To: bneill@ca.waterboards.ca.us
Cc: Bill Woolsey; Mike Shetler; Chun, Arlene; Aldo Licitra; Ken Greenberg; Wes Ganter; Ben Neill; Chiara Clemente; Chad Loflen; David Barker; Wayne Chiu
Subject: Re: meeting tomorrow 10:00 am

All,

This is just a last minute confirmation regarding our meeting tomorrow. The short week and an unfortunate tragedy in the Extended

District family has put me behind schedule with regards to an agenda and handouts. They will follow this evening.

Regards,

Jason

Sent from my iPhone

>

Santa Margarita Watershed MS4 Permit

Meeting Date 5/26/10

Time 9 - 5

Location SDRWQCB

Name	Agency	Signature
David Gibson	SDRWQCB	
Jimmy Smith	SDRWQCB	
David Barker	SDRWQCB	for DTB
Chiara Clemente	SDRWQCB	
Ben Neill	SDRWQCB	
Wayne Chiu	SDRWQCB	
Chad Loflen	SDRWQCB	
Jason Uhley	RCFC&WCD	
Claudio Padres	RCFC&WCD	
Arlene Chun	RCFC&WCD	
Mike Shetler	County of Riverside	
Alex Gann	County of Riverside	
Aldo Licitra	City of Temecula	Aldo Licitra
Bill Woolsey	City of Murrieta	Bill Woolsey
Don Allison	City of Menifee	
Tim D'Zmura	City of Wildomar	
WARD MAXWELL	COUNTY OF RIV.	
STEVE HORN	COUNTY OF RIV	
Chandra Thomas	Carney	
Daniel Hoot	RBF	
Scott Taylor	"	

AGENDA

Santa Margarita Region
MS4 Permit Meeting

10:00a.m. – 4:00 p.m. June 3rd, 2010
Location: City of Temecula

1. PROCESS / HOUSEKEEPING

2. TODAY'S TOPICS

   i. F.3.b. (Commercial/Industrial)

   ii. F.1.d.(1)-(3), (8)-(11)

d. STANDARD STORM WATER MITIGATION PLANS (SSMPS) – APPROVAL PROCESS CRITERIA AND REQUIREMENTS FOR PRIORITY DEVELOPMENT PROJECTS

Within 365 days of adoption of this Order, the Copermittees must submit an updated ~~model~~ SSMP (referred to by the Copermittees as a Water Quality Management Plan, or 'WQMP'), to the San Diego Water Board's Executive Officer for a 30 day public review and comment period. The San Diego Water Board's Executive Officer has the discretion to determine the necessity of a public hearing. Within 180 days of determination that the ~~Model~~ SSMP is in compliance with this Permit's provisions, each Copermittee must ~~update their own local SSMP, and~~ amend~~ed~~ their ordinances consistent with the ~~model~~ SSMP and begin implementation of the updated SSMP. Any updated ordinances, and shall be submitted ~~submit both (local SSMP and amended ordinances)~~ to the San Diego Water Board with the annual report. The ~~model~~ SSMP must meet the requirements of section F.1.d of this Order to (1) reduce Priority Development Project discharges of storm water pollutants from the MS4 to the MEP, and (2) prevent Priority Development Project runoff discharges from the MS4 from causing or contributing to a violation of water quality standards.[1]

(1) Definition of Priority Development Project (PDP):

Priority Development Projects are:

(a) All new Development Projects that fall under the project categories or locations listed in section F.1.d.(2), and

(b) Those redevelopment projects that create, add, or replace at least 5,000 square feet of impervious surfaces on an already developed site and the ~~existing development and/or~~ the redevelopment project falls under the project categories or locations listed in section F.1.d.(2). Where redevelopment results in an increase of less than fifty percent of the impervious surfaces of a previously existing development, and the existing development was not subject to SSMP requirements, the numeric sizing criteria discussed in section F.1.d.(6) applies only to the addition or replacement, and not to the entire development. Where redevelopment results in an increase of more than fifty

Comment [CP1]: Consistent with 2004 permit and the Santa Ana Permit.

[1] Updated SSMP and hydromodification requirements must apply to all priority projects or phases of priority projects which have not yet begun grading or construction activities at the time any updated SSMP or hydromodification requirement commences. If lawful prior approval of a project exists, whereby application of an updated SSMP or hydromodification requirement to the project is illegal, the updated SSMP or hydromodification requirement need not apply to the project. Updated Development Planning requirements set forth in Sections F.1. (a) through (h) of this Order must apply to all projects or phases of projects, unless, at the time any updated Development Planning requirement commences, the projects or project phases meet any one of the following conditions: (i) the project or phase has begun grading or construction activities; or (ii) a Copermittee determines that lawful prior approval rights for a project or project phase exist, whereby application of the Updated Development Planning requirement to the project is legally infeasible. Where feasible, the Permittees must utilize the SSMP and hydromodification update periods to ensure that projects undergoing approval processes include application of the updated SSMP and hydromodification requirements in their plans.

percent of the impervious surfaces of a previously existing development, the numeric sizing criteria applies to the entire development.

~~(2) One acre threshold: In addition to the Priority Development Project Categories identified in section F.1.d.(2), Priority Development Projects must also include all other pollutant-generating Development Projects that result in the disturbance of one acre or more of land within two years of adoption of this Order.~~[2]

~~(3)~~

(2) Priority Development Project Categories

Where a new Development Project feature, such as a parking lot, falls into a Priority Development Project Category, the entire project footprint is subject to SSMP requirements. Emergency public safety projects in any of the Priority Development Categories may be excluded if the delay caused due to the requirement for a SSMP compromises public safety, public health and/or environmental protection.

(a) New development projects that create 10,000 square feet or more of impervious surfaces (collectively over the entire project site) including commercial, industrial, residential subdivisions requiring a Final Map (i.e. detached single family home subdivisions, multi-family attached subdivisions, condominiums, apartments, etc.), mixed-use, and public projects. This category includes development projects on public or private land which fall under the planning and building authority of the Copermittees.

(b) Automotive repair shops. This category is defined as a facility that is categorized in any one of the following Standard Industrial Classification (SIC) codes: 5013, 5014, 5541, 7532-7534, or 7536-7539.

(c) Restaurants. This category is defined as a facility that sells prepared foods and drinks for consumption, including stationary lunch counters and refreshment stands selling prepared foods and drinks for immediate consumption (SIC code 5812), where the land area for development is greater than 5,000 square feet. Restaurants where land development is less than 5,000 square feet must meet all SSMP requirements except for structural treatment BMP and numeric sizing criteria requirement F.1.d.(6) and hydromodification requirement F.1.h.

(d) All hillside development greater than 5,000 square feet. This category is defined as any development which creates 5,000 square feet of impervious surface which is located in an area with known erosive soil

Comment [JEU2]: Keep requirements consistent with Santa Ana Permit. This also exceeds the SWRCB Precedential Order regarding SUSMPs.

Comment [CP3]: From the 2010 Santa Ana Permit to ensure that Emergency public safety projects that happen to meet the criteria of a PDP, are not delayed.
Example situations:
•Emergency housing erected in response to a major disaster such as an earthquake
•Emergency food cafeteria erected following a major disaster.
•Emergency command center that happens to need to be set up next to an ESA
•Etc…

Comment [CP4]: Consistent with the Santa Ana permit, these revisions clarify that this doesn't apply to individual custom home projects (unless they also qualify as hillside development).

Individual residential projects will still be required to implement the controls from F.1.c. for 'all' projects, however it is not appropriate to burden such insignificant projects with the full SSMP requirements.

[2] ~~Pollutant generating Development Projects are those projects that generate pollutants at levels greater than natural background levels.~~

conditions, where the development will grade on any natural slope that is twenty-five percent or greater.

(e) Environmentally Sensitive Areas (ESAs). All development located within or directly adjacent to or discharging directly to an ESA (where discharges from the development or redevelopment will enter receiving waters within the ESA), which either creates 2,500 square feet of impervious surface on a proposed project site or increases the area of imperviousness of a proposed project site to 10 percent or more of its naturally occurring condition. "Directly adjacent" means situated within 200 feet of the ESA. "Discharging directly to" means outflow from a drainage conveyance system that is composed entirely of flows from the subject development or redevelopment site, and not commingled with flows from adjacent lands.

(f) Impervious Parking lots 5,000 square feet or more ~~or with 15 or more parking spaces~~ and potentially exposed to runoff. Parking lot is defined as a land area or facility for the temporary parking or storage of motor vehicles used personally, for business, or for commerce.

(g) Street, roads, highways, and freeways[3]. This category includes any paved impervious surface that is 5,000 square feet or greater used for the transportation of automobiles, trucks, motorcycles, and other vehicles.

(h) Retail Gasoline Outlets (RGOs). This category includes RGOs that meet the following criteria: (a) 5,000 square feet or more or (b) a projected Average Daily Traffic (ADT) of 100 or more vehicles per day.

(3) Pollutants of Concern

As part of its local SSMP, each Copermittee must implement a~~n~~ ~~updated~~ procedure for identifying pollutants of concern for each Priority Development Project. The procedure must address, at a minimum: (1) Receiving water quality (including pollutants for which receiving waters are listed as impaired under CWA section 303(d)); (2) Land-use type of the Development Project and pollutants associated with that land use type; and (3) Pollutants expected to be present on site.

(8) Site Design and Treatment Control BMP Design Standards

As part of ~~its local~~the SSMP, each Copermittee must develop and require

Comment [CP5]: **'Impervious':** Clarify that if a project implements pervious parking lots (such as pervious concrete), that they would not be necessarily be subjected to a SSMP (unless triggered by another category). This will be a way to strongly encourage this type of LID source control.

'or with 15 or more': Consistent with 2004 SMR and 2010 Santa Ana. Make it simple and consistent, having dual checks here is adding unnecessary complexity.

Comment [CP6]: Footnote added to allow the Copermittees the option to develop road standards, that, upon approval by the EO, could be used in-lieu of a WQMP for each road project.

Comment [CP7]: There is no reason to have an *'updated'* procedure.

[3] The Copermittees may develop and submit to the Regional Board, a plan for addressing pollutant discharges from streets, roads, highways and freeways through implementation of revised standard roadway sections that utilize USEPA Green Streets guidance or similar. Upon approval of the plan by the Executive Officer, projects that incorporate those standards need not be categorized as a PDP unless also triggered by another category.

Priority Development Projects to ~~implement~~ comply with ~~sitting,~~ design, and maintenance criteria for each ~~site design~~LID and treatment control BMP listed in its local SSMP to ~~determine~~assist with determining~~determine~~ feasibility and applicability and so that implemented ~~site design~~LID and treatment control BMPs are constructed correctly and are effective at pollutant removal, runoff control, and vector minimization. LID techniques must be incorporated into the criteria for appropriate treatment control BMPs where feasible. Development of BMP design worksheets which can be used by project proponents is encouraged.

(9) Implementation Process

As part of its local SSMP, each Copermittee must implement a process to verify compliance with SSMP requirements. The process must identify at what point in the planning process Priority Development Projects will be required to meet SSMP requirements and at a minimum, the Priority Development Project must implement the required post-construction BMPs prior to occupancy and/or the intended use of any portion of that project. The process must also include identification of the roles and responsibilities of various municipal departments in implementing the SSMP requirements, as well as any other measures necessary for the implementation of SSMP requirements.

(10) Treatment BMP Review

(a) The Copermittees must review and update the BMPs that are listed in their local SSMPs as options for treatment control. At a minimum, the update must include removal of obsolete or ineffective BMPs and addition of LID BMPs that can be used for treatment, such as bioretention cells, bioretention swales, etc. The update must also add appropriate LID BMPs to any tables or discussions in the local SSMPs addressing pollutant removal efficiencies of treatment control BMPs. In addition, the update must include review and revision where necessary of treatment control BMP pollutant removal efficiencies.

(b) The update must incorporate findings from BMP effectiveness studies conducted by the Copermittees for projects funded wholly or in part by the State Board or Regional Boards.

(c) Each Copermittee must implement a mechanism for annually incorporating findings from local treatment BMP effectiveness studies (e.g., ones conducted by, or on-behalf of, public agencies in Riverside County) into SSMP project reviews and permitting

~~Where a development project, greater than 100 acres in total project size or smaller than 100 acres in size yet part of a larger common plan of development that is over 100 acres, has been prepared using~~

~~watershed and/or sub-watershed based water quality, hydrologic, and fluvial geomorphologic planning principles that implement regional LID BMPs in accordance with the sizing and location criteria of this Order and acceptable to the San Diego Water Board, such standards shall govern review of projects with respect to Section F.1 of this Order and shall be deemed to satisfy this Order's requirements for LID site design, buffer zone, infiltration and groundwater protection standards, source control, treatment control, and hydromodification control standards. Regional BMPs must clearly exhibit that they will not result in a net impact from pollutant loadings over and above the impact caused by capture and retention of the design storm. Regional BMPs may be used provided that the BMPs capture and retain the volume of runoff produced from the 24-hour 85th percentile storm event as defined in section F.1.d.(6)(a)(i) and that such controls are located upstream of receiving waters. Any volume that is not retained by the LID BMPs, up to the design capture volume, must be treated using LID biofiltration. Where regional LID implementation has been shown to be technically infeasible (per section F.1.d.7.b) any volume up to and including the design capture volume, not retained by LID BMPs, nor treated by LID biofiltration, must be treated using conventional treatment control BMPs in accordance with Section F.1.d.(6) and participation in the LID waiver program in Section F.1.d.(7).~~

Redevelopment - The creation, addition, and or replacement of impervious surface on an already developed site. Examples include the expansion of a building footprint, road widening, the addition to or replacement of a structure, and creation or addition of impervious surfaces. Replacement of impervious surfaces includes any activity that is not part of a routine maintenance activity where impervious material(s) are removed, exposing underlying soil during construction. Redevelopment does not include trenching and resurfacing associated with utility work; resurfacing existing roadways; activities conducted to maintain original line and grade, hydraulic capacity, original purpose of the facility or emergency redevelopment activity required to protect public health and safety; new sidewalk construction, pedestrian ramps, or bike lane on existing roads; and routine replacement of damaged pavement, such as pothole repair. Redevelopment also does not include retrofit projects implemented pursuant to Section F.3.d of this Order.

Comment [JEU8]: Transferred this definition from the Attachment D for use here.

Comment [JEU9]: Added from 2004 Permit and 2010 Santa Ana Permit.

Comment [JEU10]: Try not to penalize positive water quality outcomes.

b. COMMERCIAL / INDUSTRIAL

Each Copermittee must implement a commercial / industrial program that meets the requirements of this section~~,~~ to prevent~~s~~ illicit discharges into the MS4, reduce~~s~~ commercial / industrial discharges of storm water pollutants from the MS4 to the MEP, and prevent~~s~~ commercial / industrial discharges from the MS4 from causing or contributing to a violation of water quality standards.

(1) Source Identification

(a) Each Copermittee must maintain an updated watershed-based inventory of all industrial and commercial sites/sources within its jurisdiction (regardless of ownership) that could contribute a significant pollutant load to the MS4. The inventory must include the following minimum information for each industrial and commercial site/source: name; address; pollutants potentially generated by the site/source; and identification of whether the site/source is tributary to a Clean Water Act section 303(d) water body segment and generates pollutants for which the water body segment is impaired; and a narrative description including SIC codes which best reflects the principal products or services provided by each facility.

At a minimum, the ~~following~~ sites/sources listed below must be included in the inventory. Where the required inventory includes sites or information that was not required under Order R9-2004-001, the new required sites/information must be added to the Copermittee's inventory within X years. ~~:~~

(i) Commercial Sites/Sources:

[a] Automobile repair, maintenance, fueling, or cleaning;
[b] Airplane repair, maintenance, fueling, or cleaning;
[c] Boat repair, maintenance, fueling, or cleaning;
[d] Equipment repair, maintenance, fueling, or cleaning;
[e] Automobile and other vehicle body repair or painting;
[f] Mobile automobile or other vehicle washing;
[g] Automobile (or other vehicle) parking lots and storage facilities;
[h] Retail or wholesale fueling;
[i] Pest control services;
[j] Eating or drinking establishments, including such establishments within food markets;
[k] Mobile carpet, drape or furniture cleaning;
[l] Cement mixing or cutting;
[m] Masonry;
[n] Painting and coating;
[o] ~~Botanical or zoological gardens and exhibits~~;

Comment [CP1]: These have not been identified by the Copermittees as contributing a significant pollutant load to the MS4 and should be removed. This is an unnecessary new requirement.

[p] Landscaping;
[q] Nurseries and greenhouses;
[r] Golf courses, parks and other recreational areas/facilities;
[s] Cemeteries;
[t] Pool and fountain cleaning;
[u] ~~Marinas~~;
[v] Portable sanitary services;
[w] ~~Building material retailers and storage~~;
[x] ~~Animal facilities~~Boarding facilities and kennels;
[y] Mobile pet services;
[z] Power washing services; and
[aa] Other sites and sources with a history of un-authorized discharges to the MS4.

Comment [CP2]: Not applicable

Comment [CP3]: These have not been categorically identified by the Copermittees as contributing a significant pollutant load to the MS4 and should be removed. This is an unnecessary new requirement.

(ii) Industrial Sites/Sources:

[a] Industrial Facilities, as defined at 40 CFR § 122.26(b)(14), including those subject to the General Industrial Permit or other individual NPDES permit;
[b] Operating and closed landfills;
[c] Facilities subject to SARA Title III; and
[d] Hazardous waste treatment, disposal, storage and recovery facilities.

(iii) ESAs and 303(d) Listed Waterbodies: All other commercial or industrial sites/sources tributary to a CWA Section 303(d) impaired water body segment, where the site/source generates pollutants for which the water body segment is impaired. ~~All other commercial or industrial sites/sources within or directly adjacent to or discharging directly to coastal lagoons, the ocean, or other receiving waters within environmentally sensitive areas (as defined in Attachment C of this Order) as necessary to comply with this order.~~

Comment [JEU4]: This is a high cost-low return proposition. It is a significant effort and non-recoverable cost to determine which projects may be directly discharging or adjacent to receiving waters with ESAs. There are already over 30 categories of facilities that are required for inspection. There is also a process (via NALs and SALs) whereby the Permittees must develop action plans to address remaining water quality problems. Let the NAL/SAL system drive the decision making for adding facilities instead of this shot-gun approach which will net hair salons, retail stores, and other stores not likely to have any real impact on water quality.

(iv) All other commercial or industrial sites/sources that the Copermittee determines may contribute a significant pollutant load to the MS4.

(2) General BMP Implementation

(a) Pollution Prevention: Each Copermittee must require the use of pollution prevention methods by the inventoried industrial and commercial sites/sources.

(b) Designate / Update Minimum BMPs: Each Copermittee must designate a minimum set of BMPs for all inventoried industrial and commercial sites/sources. Where BMPs have already been designated, each Copermittee must review its existing BMPs for adequacy. The designated

minimum BMPs must be specific to facility types and pollutant-generating activities, as appropriate. The Copermittee may adjust the number and/or type of minimum BMPs that are required, provided that the goals of the Commercial/Industrial program are met.

(c) Designate Enhanced BMPs for ESAs and 303(d) Impairments: Each Copermittee must designate enhanced measures for inventoried industrial and commercial sites/sources tributary to CWA section 303(d) impaired water body segments (where a site/source generates pollutants for which the water body segment is impaired). Each Copermittee must also designate additional controls for industrial and commercial sites/sources within or directly adjacent to or discharging directly to ~~coastal lagoons, the ocean, or other~~ receiving waters within environmentally sensitive areas (as defined in Attachment C of this Order) as necessary to comply with this order. The Copermittee may adjust the number and/or type of enhanced BMPs that are required, provided that the goals of the Commercial/Industrial program are met.

(d) Implement BMPs: Each Copermittee must ~~implement, or~~ require the implementation of~~,~~ the designated minimum and enhanced BMPs and any additional measures necessary based on inspections, incident responses, and water quality data to comply with this Order at each industrial and commercial site/source within its jurisdiction.

(3) ~~BMP Implementation for~~ Mobile ~~Businesses~~Business Program

(a) Each Copermittee must develop and implement a program to reduce the discharge of storm water pollutants from mobile businesses to the MEP and to prohibit non-storm water discharges pursuant to Section B of this Order. Each Copermittee must keep as part of their commercial source inventory a listing of mobile businesses known to ~~operate~~ have bases of operation within its jurisdiction that have the potential to discharge pollutants. The program must include:

(i) Development and implementation of minimum standards and BMPs to be required for each of the various types of mobile businesses;
(ii) Development and implementation of an enforcement strategy which specifically addresses the unique characteristics of mobile businesses;
(iii) Notification of those mobile businesses known to ~~operate~~ have bases of operation within the Copermittee's jurisdiction, of the minimum standards and BMP requirements ~~and local ordinances~~;
(iv) Development and implementation of an outreach and education strategy; and
(v) Inspection of mobile businesses as needed to implement the program.

(b) If they choose to, the Copermittees may cooperate in developing and

Comment [CP5]: This sentence has been added pursuant to our previous discussions, where it was agreed that the list of BMPs can be changed over time through the iterative process based on the experience of the Copermittees. This language provides important clarification to that end. Request similar language be added to Municipal and Residential sections

Comment [CP6]: From the 2004 permit.

Comment [CP7]: This sentence has been added pursuant to our previous discussions, where it was agreed that the list of BMPs can be changed over time through the iterative process based on the experience of the Copermittees. This language provides important clarification to that end. Request similar language be added to Municipal and Residential sections

Comment [CP8]: The Copermittees have no authority to *implement* the BMPs on these privately owned sites, however they can require the site owner to implement such BMPs.

Comment [CP9]: This section is describing more than BMP implementation, it is describing a parallel program to address the unique characteristics of Mobile Businesses. Suggested revised heading.

Comment [CP10]: This would prevent us from implementing this regionally.

implementing their programs for mobile businesses, including, but not limited to sharing of mobile business inventories, BMP requirements, enforcement action information, and education.

(4) Inspection of Industrial and Commercial Sites/Sources

Each Copermittee must conduct industrial and commercial site inspections for compliance with its ordinances, permits, and this Order. Mobile businesses shall be inspected pursuant to section F.3.b.(3) of this order.

Comment [CP11]: Clarifying that mobile business will be subject to the inspection requirements developed in F.3.b.(3) .

(a) Inspection Procedures: Inspections must include but not be limited to:

(i) ~~Review of BMP implementation plans, if the site uses or is required to use such a plan~~;

(ii) ~~Review of facility monitoring data, if the site monitors its runoff;~~

Comment [JEU12]: Requirement (v) already addresses these issues. (i) and (ii) focus on methods. (v) focuses on outcomes. The Permittees should be allowed to determine their own methods for evaluating compliance with their ordinances.

(iii) Check for coverage under the General Industrial Permit (Notice of Intent (NOI) and/or Waste Discharge Identification Number), if applicable;

(iv) Assessment of compliance with Copermittee ordinances and Copermittee issued permits related to runoff;

(v) ~~A~~assessment of the ~~BMP~~ implementation and effectiveness of the designated minimum and/or enhanced BMPs~~, maintenance and effectiveness~~;

Comment [CP13]: This section should only be addressing the BMPs required under section F.3.b of the order. As mentioned in comments above, the maintenance of Post Construction structural BMPs is addressed in section F.1.f. of this order.

(vi) Visual observations for non-storm water discharges, potential illicit connections, and potential discharge of pollutants in storm water runoff; and

(vii) Education and training on storm water pollution prevention, as conditions warrant.

(b) Each Copermittee shall annually notify the San Diego Water Board, prior to the commencement of the wet season, of all Industrial Sites and Industrial Facilities subject to the General Industrial Permit or other individual NPDES permit with alleged violations of the Copermittees' ordinances, that pose a significant threat to water quality. Information may be provided as part of the JRMP annual report if submitted prior to the rainy season. Information provided shall include, but not be limited to, the following:

Comment [JEU14]: Permittees already Voluntarily work with RWQCB to ensure compliance. This requirement is not necessary.

Comment [JEU15]: Clarify that we are evaluating Ordinance compliance, also limit reporting to sites with significant threats to water quality.

(i) WDID number if enrolled under the General Industrial Permit;

(ii) Site Location, including address;
(iii) Current violations or suspected violations; and
(iv) ~~Past Violation history~~.

(c) Frequencies: Each Permittee shall prioritize the inventoried commercial/industrial facilities based on threat to water quality. ~~At a minimum, 25 percent of the sites inventoried as required in section F.3.b.(1) above (excluding mobile sources) including all~~ All sites determined to pose a high threat to water quality must be inspected each year. At a minimum all other inventoried facilities shall be inspected at least once every five years. All sites must be Mobile businesses must be inspected pursuant to the enforcement strategy developed pursuant to section F.3.b.(3). In evaluating threat to water quality, each Copermittee shall consider, at a minimum, the following:

(i) Type of activity (SIC code);
(ii) Materials used at the facility;
(iii) Wastes generated;
(iv) Pollutant discharge potential;
(v) Non-storm water discharges;
(vi) Size of facility;
(vii) Proximity to receiving water bodies;
(viii) Sensitivity of receiving water bodies;
(ix) Whether the facility is subject to the General Industrial Permit or an individual NPDES permit;
(x) Whether the facility has filed a No Exposure Certification/Notice of Non-Applicability;
(xi) Facility design;
(xii) Total area of the site~~, area of the site~~ where industrial or commercial activities occur, and area of the site exposed to rainfall and runoff;
(xiii) The facility's compliance history; and
(xiv) Any other relevant factors.

(d) Third-Party Inspections: Each Copermittee may develop and implement a program to utilize a private third party ~~inspection~~ certification ~~program~~ service for verifying industrial and commercial site/source compliance with its ordinances, permits, and this Order. ~~The third party inspections can satisfy up to 30% of the inspection requirements in section F.3.b(4)(c), with the Copermittee having to fulfill the remaining required inspections.~~ To the extent that third party ~~inspections~~ certifications are conducted to fulfill the requirements of this Order, the Copermittee will be responsible for conducting and documenting quality assurance and quality control of the third-party ~~inspections~~certifications.

(i) Each inspection conducted by a third-party must, at a minimum, result in the following:

Comment [CP16]: Purpose of this requirement is to alert the Board to the issue. This is broad and ambiguous.

Comment [JEU17]: 25% requirement is a record retention problem and is not necessary.

Comment [CP18]: Changes are proposed to allow the CAP program to be maintained.

Comment [CP19]: Intent of the changes are to clarify that these requirements do not apply to any cross-Copermittee inspection agreements, such as the CAP program.

Comment [CP20]: This limitation is not necessary. Section (i) below will provide the Copermittee with the assurance that the inspection is valid, complete and accurate. The Copermittee should be afforded the flexibility to find the most cost-effective way to comply with the permit.

[a] Photo documentation of potential storm water violations identified during the third party inspection;
[b] Reporting to the Copermittee of identified significant potential violations, including imminent or observed illegal discharges, within 24 hours of the third party inspection;
[c] Reporting to the Copermittee of all inspection findings within one week of the inspection being conducted; and
[d] Copermittee follow-up and/or enforcement actions for identified potential storm water violations within two business days of the inspection or potential violation report receipt.

(e) Based upon site inspection findings, each Copermittee must implement all follow-up actions and enforcement necessary to comply with this Order.

(f) To the extent that the San Diego Water Board has conducted an inspection of an industrial site during a particular year, the requirement for the responsible Copermittee to inspect this facility during the same year will be satisfied.

(g) The Copermittees must track the number of inspections for the inventoried industrial and commercial sites/sources throughout the reporting period to verify that the sites/sources are inspected at the minimum frequencies listed in this Order.

(5) Enforcement of Industrial and Commercial Sites/Sources

Each Copermittee must enforce its storm water ordinance for all industrial and commercial sites/sources as necessary to maintain compliance with this Order. Copermittee ordinances or other regulatory mechanisms must include appropriate sanctions to achieve compliance. Sanctions must include the following or their equivalent: Non-monetary penalties, fines, ~~bonding requirements,~~ and/or permit denials for non-compliance.

Comment [CP21]: The difficulty in collecting on bonds make them virtually useless as an enforcement tool.

~~Training and Education for Owners and Operators of Commercial and Industrial Activities~~

~~Each Copermittee must implement an education program using all media as appropriate to (1) measurably increase the knowledge of owners and operators of commercial and industrial activities regarding MS4s, impacts of runoff on receiving waters, and potential BMP solutions for the target audience; and (2) to measurably change the behavior of target communities and thereby reduce storm water pollutant releases and eliminate prohibited non-storm water discharges to MS4s and the environment. At a minimum, the education program must meet the requirements of this section and address the following issues:~~

~~Laws, regulations, permits, & requirements;~~
~~Best management practices;~~
~~General runoff concepts; and~~

~~Other topics, including public reporting mechanisms, water conservation, low-impact development techniques.~~

~~BMP Notification: At least twice during the five-year period of this Order, each Copermittee must notify the owner/operator of each inventoried industrial and commercial site/source of the BMP requirements applicable to the site/source.~~

California Regional Water Quality Control Board
San Diego Region

Waste Discharge Requirements for Discharges from the Municipal Separate Storm Sewer Systems (MS4s) Draining the County of Riverside, the Incorporated Cities of Riverside County, and the Riverside County Flood Control and Water Conservation District within the San Diego Region

Tentative Order No. R9-2010-0016
NPDES NO. CAS0108740

TBD, 2010

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
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To request copies of the Riverside County Municipal Storm Water Permit, please contact Ben Neill, Water Resources Control Engineer at (858) 467 – 2983, bneill@waterboards.ca.gov

Documents also are available at: http://www.waterboards.ca.gov/sandiego

Waste Discharge Requirements for Discharges from the Municipal Separate Storm Sewer Systems (MS4s) Draining the County of Riverside, the Incorporated Cities of Riverside County, and the Riverside County Flood Control and Water Conservation District within the San Diego Region

Adopted by the
California Regional Water Quality Control Board
San Diego Region
on TBD, 2010

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California Regional Water Quality Control Board
San Diego Region

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This permit was prepared under the direction of

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The California Regional Water Quality Control Board, San Diego Region (hereinafter San Diego Water Board), finds that:

A. BASIS FOR THE ORDER

1. This Order is based on the federal Clean Water Act (CWA), the Porter-Cologne Water Quality Control Act (Division 7 of the Water Code, commencing with Section 13000), applicable State and federal regulations, all applicable provisions of statewide Water Quality Control Plans and Policies adopted by the State Water Resources Control Board (State Water Board), the Water Quality Control Plan for the San Diego Basin adopted by the San Diego Water Board, the California Toxics Rule, and the California Toxics Rule Implementation Plan.

2. This Order reissues National Pollutant Discharge Elimination System (NPDES) Permit No. CAS0108766, which was first adopted by the San Diego Water Board on July 16, 1990 (Order No. 90-38), and then reissued on May 13, 1998 (Order No. R9-98-02). On May 26, 1998, the United States Environmental Protection Agency (EPA), Region IX, objected to Order No. 98-02 due to concerns regarding Receiving Water Limitations (RWL) language. The EPA concluded that the RWL language in the permit did not comply with the federal Clean Water Act (CWA) and its implementing regulations. On April 27, 1999, the EPA reissued the MS4 permit, which the San Diego Water Board adopted as Addendum No. 1 to Order No. R9-98-02 on November 8, 2000. On July 14, 2004, the San Diego Water Board adopted the third term MS4 permit, Order No. R9-2004-001. On January 15, 2009, the Riverside County Flood Control and Water Conservation District (District), as the Principal Copermittee, submitted a Report of Waste Discharge (ROWD) for reissuance of the municipal separate storm sewer system (MS4) Permit.

3. This Order is consistent with the following precedential Orders adopted by the State Water Resources Control Board (State Water Board) addressing MS4 NPDES Permits: Order 99-05, Order WQ-2000-11, Order WQ 2001-15, Order WQO 2002-0014, and Order WQ-2009-0008 (*SWRCB/OCC FILE A-1780).*

The Fact Sheet / Technical Report for the Order No. R9-2010-0016, NPDES No. CAS0108766, Waste Discharge Requirements for Discharges from the Municipal Separate Storm Sewer Systems (MS4s) Draining the County of Riverside, the Incorporated Cities of Riverside County, and the Riverside County Flood Control and Water Conservation District within the San Diego Region, includes cited regulatory and legal references and additional explanatory information and data in support of the requirements of this Permit. This information, including any supplements thereto, and any response to comments on the Tentative Orders, is hereby incorporated by reference into these findings.

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B. REGULATED PARTIES

1. Each of the persons in Table 1 below, hereinafter called Copermittees or dischargers, owns or operates an MS4, through which it discharges into waters of the United States within the San Diego Region. These MS4s fall into one or more of the following categories: (1) a medium or large MS4 that services a population of greater than 100,000 or 250,000 respectively; or (2) a small MS4 that is "interrelated" to a medium or large MS4; or (3) an MS4 which contributes to a violation of a water quality standard; or (4) an MS4 which is a significant contributor of pollutants to waters of the United States (waters of the U.S).

Table 1. Municipal Copermittees

1. City of Menifee	5. County of Riverside
2. City of Murrieta	6. Riverside County Flood Control and Water Conservation District
3. City of Temecula	
4. City of Wildomar	

C. DISCHARGE CHARACTERISTICS

1. Discharges from the MS4 contain waste, as defined in the California Water Code (CWC), and pollutants that adversely affect the quality of the waters of the State. The discharge from an MS4 is a "discharge of pollutants from a point source" into waters of the U.S. as defined in the CWA.

2. MS4 storm water and non-storm water discharges are likely to contain pollutants that cause or threaten to cause a violation of water quality standards, as outlined in the San Diego Water Board's Water Quality Control Plan for the San Diego Basin (Basin Plan). Storm water and non-storm water discharges from the MS4 are subject to the conditions and requirements established in the San Diego Basin Plan for point source discharges.

3. The most common categories of pollutants in runoff include total suspended solids, sediment, pathogens (e.g., bacteria, viruses, protozoa); heavy metals (e.g., copper, lead, zinc and cadmium); petroleum products and polynuclear aromatic hydrocarbons; synthetic organics (e.g., pesticides, herbicides, and PCBs); nutrients (e.g., nitrogen and phosphorus fertilizers); oxygen-demanding substances (decaying vegetation, animal waste); detergents; and trash.

4. The discharge of pollutants and/or increased flows from MS4s may cause or threaten to cause the concentration of pollutants to exceed applicable receiving water quality objectives and/or impair or threaten to impair designated beneficial uses resulting in a condition of pollution (i.e., unreasonable impairment of water

quality for designated beneficial uses), contamination, or nuisance.

5. Pollutants in runoff can threaten and adversely affect human health. Human illnesses have been clearly linked to recreating near storm drains flowing to receiving waters. Also, runoff pollutants in receiving waters can bioaccumulate in the tissues of invertebrates and fish, which may be eventually consumed by humans.

6. Runoff discharges from MS4s often contain pollutants that cause toxicity to aquatic organisms (i.e., adverse responses of organisms to chemicals or physical agents ranging from mortality to physiological responses such as impaired reproduction or growth anomalies). Toxic pollutants impact the overall quality of aquatic systems and beneficial uses of receiving waters.

7. The Copermittees discharge runoff into lakes, drinking water reservoirs, rivers, streams, creeks, bays, estuaries, coastal lagoons, the Pacific Ocean, and tributaries thereto within one of the eleven hydrologic units (Santa Margarita Hydrologic Unit) comprising the San Diego Region as shown in Table 2. Some of the receiving water bodies have been designated as impaired by the San Diego Water Board in 2009 pursuant to CWA section 303(d).

Table 2. Common Watersheds and CWA Section 303(d) Impaired Waters

Hydrologic Area (HA) or Hydrologic Subarea (HSA) of the Santa Margarita Hydrologic Unit	**Major Receiving Water Bodies**	**303(d) Pollutant(s)/stressor or Water Quality Effect[1]**
DeLuz Creek HSA (902.21)	De Luz Creek	Iron, Manganese, Nitrogen, Sulfates
Murrieta HSA (902.32)	Long Canyon Creek (tributary to Murrieta Creek	Chlorpyrifos, E. Coli, Fecal Coliform, Iron, Manganese
Wolf HSA (902.52)	Murrieta Creek	Chlorpyrifos, Copper, Iron, Manganese, Nitrogen, Toxicity
Pauba HSA (902.51)	Redhawk Channel	Chlorpyrifos, Copper, Diazinon, E. Coli, Fecal Coliform, Iron, Manganese, Nitrogen, Phosphorus, Total Dissolved Solids
Gavilan HSA (902.22)	Sandia Creek	Iron, Sulfates
Gertrudis HSA	Santa Gertrudis Creek	Chlorpyrifos, Copper, E. Coli, Fecal

[1] The listed 303(d) pollutant(s) do not necessarily reflect impairment of the entire corresponding WMA or all corresponding major surface water bodies. The specific impaired portions of each WMA are listed in the State Water Resources Control Board's 2008 Section 303(d) List of Water Quality Limited Segments.

Table 2. Common Watersheds and CWA Section 303(d) Impaired Waters

Hydrologic Area (HA) or Hydrologic Subarea (HSA) of the Santa Margarita Hydrologic Unit	**Major Receiving Water Bodies**	**303(d) Pollutant(s)/stressor or Water Quality Effect[1]**
(902.42)		Coliform, Iron, Phosphorous
Lower Ysidora HSA (902.11)	Santa Margarita Lagoon	Eutrophic
Lower Ysidora HSA (902.11)	Santa Margarita River (Lower)	Enterococcus, Fecal Coliform, Phosphorus, Total Nitrogen as N
Gavilan HSA (902.22)	Santa Margarita River (Upper)	Toxicity
Pauba HSA (902.51)	Temecula Creek	Chlorpyrifos, Copper, Phosphorus, Total Dissolved Solids, Toxicity
French HSA (902.33)	Warm Springs Creek (Riverside County)	Chlorpyrifos, E. Coli, Fecal Coliform, Iron, Manganese, Phosphorus, Total Nitrogen as N

8. Trash is a persistent pollutant which can enter receiving waters from the MS4 resulting in accumulation and transport in receiving waters over time. Trash poses a serious threat to the Beneficial Uses of the receiving waters, including, but not limited to, human health, rare and endangered species, navigation and human recreation.

9. The Copermittees' water quality monitoring data submitted to date documents persistent violations of Basin Plan water quality objectives for various runoff-related pollutants (indicator bacteria, dissolved solids, turbidity, metals, pesticides, etc.) at various watershed monitoring stations. Persistent toxicity has also been observed at some watershed monitoring stations. In addition, bioassessment data indicates that the majority of the monitored receiving waters have Poor to Very Poor Index of Biotic Integrity ratings. In sum, the above findings indicate that runoff discharges are causing or contributing to water quality impairments, and are a leading cause of such impairments in Riverside County.

10. When natural vegetated pervious ground cover is converted to impervious surfaces such as paved highways, streets, rooftops, and parking lots, the natural absorption and infiltration abilities of the land are lost. Therefore, runoff leaving a developed area is significantly greater in runoff volume, velocity, and peak flow rate than pre-development runoff from the same area. Runoff durations can also increase as a result of flood control and other efforts to control peak flow rates. Increased volume, velocity, rate, and duration of runoff, and decreased natural clean sediment loads,

greatly accelerate the erosion of downstream natural channels. Significant declines in the biological integrity and physical habitat of streams and other receiving waters have been found to occur with as little as a 3-5 percent conversion from natural to impervious surfaces. The increased runoff characteristics from new development must be controlled to protect against increased erosion of channel beds and banks, sediment pollutant generation, or other impacts to beneficial uses and stream habitat due to increased erosive force.

11. Development creates new pollution sources as human population density increases and brings with it proportionately higher levels of car emissions, car maintenance wastes, municipal sewage, pesticides, household hazardous wastes, pet wastes, trash, etc. which can either be washed or directly dumped into the MS4. As a result, the runoff leaving the developed urban area is significantly greater in pollutant load than the pre-development runoff from the same area. These increased pollutant loads must be controlled to protect downstream receiving water quality.

12. Development and urbanization especially threaten environmentally sensitive areas (ESAs), such as water bodies designated as supporting a RARE beneficial use (supporting rare, threatened or endangered species) and CWA 303(d)-impaired water bodies. Such areas have a much lower capacity to withstand pollutant shocks than might be acceptable in other areas. In essence, development that is ordinarily insignificant in its impact on the environment may become significant in a particularly sensitive environment. Therefore, additional controls to reduce storm water pollutants from new and existing development may be necessary for areas adjacent to or discharging directly to an ESA.

13. Although dependent on several factors, the risks typically associated with properly managed infiltration of runoff (especially from residential land use areas) are not significant. The risks associated with infiltration can be managed by many techniques, including (1) designing landscape drainage features that promote infiltration of runoff, but do not “inject” runoff (injection bypasses the natural processes of filtering and transformation that occur in the soil); (2) taking reasonable steps to prevent the illegal disposal of wastes; (3) protecting footings and foundations; (4) ensuring that each drainage feature is adequately maintained in perpetuity; and (5) pretreatment.

14. Non-storm water (dry weather) discharge from the MS4 is not considered a storm water (wet weather) discharge and therefore is not subject to regulation under the Maximum Extent Practicable (MEP) standard from CWA 402(p)(3)(B)(iii), which is explicitly for “Municipal … *Stormwater Discharges* (emphasis added)” from the MS4. Rather, non-storm water discharges, per CWA 402(p)(3)(B)(ii), are to be effectively prohibited. Such dry weather non-storm water discharges have been shown to contribute significant levels of pollutants and flow in arid, developed Southern California watersheds and are to be effectively prohibited under the Clean Water Act.

15. Non-storm water discharges to the MS4 granted an influent exception [i.e., which are exempt from the effective prohibition requirement set forth in CWA section 402(p)(3)(B)(ii)] under 40 CFR 122.26 are included within this Order. Any exempted discharges identified by Copermittees as a source of pollutants are subsequently required to be *addressed* (emphasis added) as illicit discharges through prohibition and incorporation into existing IC/ID programs. Furthermore, the Federal Register (55, page 48037) clarifies that the San Diego Water Board may also identify exempted discharges as a source of pollutants required to be addressed as illicit discharges. The San Diego Water Board and the Copermittees have identified landscape irrigation, irrigation water and lawn water, previously exempted discharges, as a source of pollutants and conveyance of pollutants to waters of the United States.

D. RUNOFF MANAGEMENT PROGRAMS

1. General

a. This Order specifies requirements necessary for the Copermittees to reduce the discharge of pollutants in storm water to the maximum extent practicable (MEP). However, since MEP is a dynamic performance standard, which evolves over time as runoff management knowledge increases, the Copermittees' runoff management programs must continually be assessed and modified to incorporate improved programs, control measures, best management practices (BMPs), etc. in order to achieve the evolving MEP standard. Absent evidence to the contrary, this continual assessment, revision, and improvement of runoff management program implementation is expected to ultimately achieve compliance with water quality standards in the Region.

b. The Copermittees have generally been implementing the jurisdictional runoff management programs required pursuant to Order No. 2004-001 since July 14, 2004. Prior to that, the Copermittees were regulated by Order No. 98-02, since May 13, 1998. MS4 discharges, however, continue to cause or contribute to violations of water quality standards as evidenced by the Copermittees monitoring results.

c. This Order contains new or modified requirements that are necessary to improve Copermittees' efforts to reduce the discharge of pollutants in storm water runoff to the MEP and achieve water quality standards. Some of the new or modified requirements, such as the revised Watershed Runoff Management Program section, are designed to specifically address high priority water quality problems. Other new or modified requirements address program deficiencies that have been noted during audits, report reviews, and other San Diego Water Board compliance assessment activities.

d. Updated individual Drainage Area Management Plans (DAMP), and Watershed Stormwater Management Plans (watershed SWMPs), which describe the

Copermittees' runoff management programs in their entirety, are needed to guide the Copermittees' runoff management efforts and aid the Copermittees in tracking runoff management program implementation. It is practicable for the Copermittees to update the JRMPs and WRMPs within one year, since significant efforts to develop these programs have already occurred. Hereinafter, the individual DAMP is referred to as the Jurisdictional Runoff Management Plans (JRMPs) and the Watershed SWMP is referred to as the Watershed Runoff Management Plan (WRMP).

e. Pollutants can be effectively reduced in storm water runoff by the application of a combination of pollution prevention, source control, and treatment control BMPs. Pollution prevention is the reduction or elimination of pollutant generation at its source and is the best "first line of defense." Source control BMPs (both structural and non-structural) minimize the contact between pollutants and flows (e.g., rerouting run-on around pollutant sources or keeping pollutants on-site and out of receiving waters). Treatment control BMPs remove pollutants that have been mobilized by wet-weather or dry-weather flows.

f. Runoff needs to be addressed during the three major phases of urban development (planning, construction, and use) in order to reduce the discharge of pollutants from storm water to the MEP, effectively prohibit non-storm water discharges and protect receiving waters. Development which is not guided by water quality planning policies and principles can unnecessarily result in increased pollutant load discharges, flow rates, and flow durations which can negatively impact receiving water beneficial uses. Construction sites without adequate BMP implementation result in sediment runoff rates which greatly exceed natural erosion rates of undisturbed lands, causing siltation and impairment of receiving waters. Existing development generates substantial pollutant loads which are discharged in runoff to receiving waters.

g. Annual reporting requirements included in this Order are necessary to meet federal requirements and to evaluate the effectiveness and compliance of the Copermittees' programs.

h. This Order establishes Storm Water Action Levels (SALs) for selected pollutants based on USEPA Rain Zone 6 (arid southwest) Phase I MS4 monitoring data for pollutants in storm water. The SALs were computed as the 90th percentile of the data set, utilizing the statistical based population approach, one of three approaches recommended by the California Water Board's Storm Water Panel in its report, 'The Feasibility of Numerical Effluent Limits Applicable to Discharges of Storm Water Associated with Municipal, Industrial and Construction Activities (June 2006). SALs are identified in Section D of this Order. Copermittees shall implement a timely, comprehensive, cost-effective storm water pollution control program to reduce the discharge of pollutants in storm water from the permitted areas so as not to exceed the SALs. Exceedance of SALs may indicate inadequacy of programmatic measures and BMPs required in this Order.

2. **Development Planning**

   a. The Standard Storm Water Mitigation Plan (SSMP) requirements contained in this Order are consistent with Order WQ-2000-11 adopted by the State Water Resources Control Board (State Board) on October 5, 2000. In the precedential order, the State Board found that the design standards, which essentially require that runoff generated by 85 percent of storm events from specific development categories be infiltrated or treated, reflect the MEP standard. The order also found that the SSMP requirements are appropriately applied to the majority of the Priority Development Project categories contained in Section F.1 of this Order. The State Board also gave Regional Water Quality Control Boards the needed discretion to include additional categories and locations, such as retail gasoline outlets (RGOs), in SSMPs.

   b. Controlling runoff pollution by using a combination of onsite source control and site design BMPs augmented with treatment control BMPs before the runoff enters the MS4 is important for the following reasons: (1) Many end-of-pipe BMPs (such as diversion to the sanitary sewer) are typically ineffective during significant storm events. Whereas, onsite source control BMPs can be applied during all runoff conditions; (2) End-of-pipe BMPs are often incapable of capturing and treating the wide range of pollutants which can be generated on a sub-watershed scale; (3) End-of-pipe BMPs are more effective when used as polishing BMPs, rather than the sole BMP to be implemented; (4) End-of-pipe BMPs do not protect the quality or beneficial uses of receiving waters between the pollutant source and the BMP; and (5) Offsite end-of-pipe BMPs do not aid in the effort to educate the public regarding sources of pollution and their prevention.

   c. Use of Low-Impact Development (LID) site design BMPs at new development, redevelopment and retrofit projects can be an effective means for minimizing the impact of storm water runoff discharges from the development projects on receiving waters. LID is a site design strategy with a goal of maintaining or replicating the pre-development hydrologic regime through the use of design techniques. LID site design BMPs help preserve and restore the natural hydrologic cycle of the site, allowing for filtration and infiltration which can greatly reduce the volume, peak flow rate, velocity, and pollutant loads of storm water runoff. Current runoff management, knowledge, practices and technology have resulted in the use of LID BMPs as an acceptable means of meeting the storm water MEP standard.

   d. Retail Gasoline Outlets (RGOs) are significant sources of pollutants in storm water runoff. RGOs are points of convergence for motor vehicles for automotive related services such as repair, refueling, tire inflation, and radiator fill-up and consequently produce significantly higher loadings of hydrocarbons and trace metals (including copper and zinc) than other developed areas.

e. Industrial sites are significant sources of pollutants in runoff. Pollutant concentrations and loads in runoff from industrial sites are similar or exceed pollutant concentrations and loads in runoff from other land uses, such as commercial or residential land uses. As with other land uses, LID site design, source control, and treatment control BMPs are needed at industrial sites in order to meet the MEP standard. These BMPs are necessary where the industrial site is larger than 10,000 square feet. The 10,000 square feet threshold is appropriate, since it is consistent with requirements in other Phase I NPDES storm water regulations throughout California.

f. If not properly designed or maintained, certain BMPs implemented or required by municipalities for runoff management may create a habitat for vectors (e.g. mosquitoes and rodents). Proper BMP design and maintenance to avoid standing water, however, can prevent the creation of vector habitat. Nuisances and public health impacts resulting from vector breeding can be prevented with close collaboration and cooperative effort between municipalities, local vector control agencies, and the California Department of Public Health during the development and implementation of runoff management programs.

g. The increased volume, velocity, frequency and discharge duration of storm water runoff from developed areas has the potential to greatly accelerate downstream erosion, impair stream habitat in natural drainages, and negatively impact beneficial uses. Development and urbanization increase pollutant loads in storm water runoff and the volume of storm water runoff. Impervious surfaces can neither absorb water nor remove pollutants and thus lose the purification and infiltration provided by natural vegetated soil. Hydromodification measures for discharges to hardened channels are needed for the future restoration of the hardened channels to their natural state, thereby restoring the chemical, physical, and biological integrity and Beneficial Uses of local receiving waters.

3. **Construction and Existing Development**

a. In accordance with federal NPDES regulations and to ensure the most effective oversight of industrial and construction site discharges, discharges of runoff from industrial and construction sites are subject to dual (State and local) storm water regulation. Under this dual system, each Copermittee is responsible for enforcing its local permits, plans, and ordinances, and the San Diego Water Board is responsible for enforcing the General Construction Activities Storm Water Permit, State Board Order 2009-0009-DWQ, NPDES No. CAS000002 (General Construction Permit) and the General Industrial Activities Storm Water Permit, State Board Order 97-03 DWQ, NPDES No. CAS000001 (General Industrial Permit) and any reissuance of these permits. NPDES municipal regulations require that municipalities develop and implement measures to address runoff from industrial and construction activities. Those measures may require the implementation of additional BMPs than are required under the

statewide general permits for activities subject to both State and local regulation.

b. Identification of sources of pollutants in runoff (such as municipal areas and activities, industrial and commercial sites/sources, construction sites, and residential areas), development and implementation of BMPs to address those sources, and updating ordinances and approval processes are necessary for the Copermittees to ensure that discharges of pollutants from its MS4 in storm water are reduced to the MEP and that non-storm water discharges are not occurring. Inspections and other compliance verification methods are needed to ensure minimum BMPs are implemented. Inspections are especially important at high risk areas for pollutant discharges.

c. Historic and current development makes use of natural drainage patterns and features as conveyances for runoff. Urban streams used in this manner are part of the municipalities MS4 regardless of whether they are natural, anthropogenic, or partially modified features. In these cases, the urban stream is both an MS4 and receiving water.

d. As operators of the MS4s, the Copermittees cannot passively receive and discharge pollutants from third parties. By providing free and open access to an MS4 that conveys discharges to waters of the U.S., the operator essentially accepts responsibility for discharges into the MS4 that it does not prohibit or control. These discharges may cause or contribute to a condition of contamination or a violation of water quality standards.

e. Waste and pollutants which are deposited and accumulate in MS4 drainage structures will be discharged from these structures to waters of the U.S. unless they are removed. These discharges may cause or contribute to, or threaten to cause or contribute to, a condition of pollution in receiving waters. For this reason, pollutant discharges from storm water into MS4s must be reduced using a combination of management measures, including source control, and an effective MS4 maintenance program must be implemented by each Copermittee.

f. Enforcement of local runoff related ordinances, permits, and plans is an essential component of every runoff management program and is specifically required in the federal storm water regulations and this Order. Each Copermittee is individually responsible for adoption and enforcement of ordinances and/or policies, implementation of identified control measures/BMPs needed to prevent or reduce pollutants in storm water runoff, and for the allocation of funds for the capital, operation and maintenance, administrative, and enforcement expenditures necessary to implement and enforce such control measures/BMPs under its jurisdiction. Education is an important aspect of every effective runoff management program and the basis for changes in behavior at a societal level. Education of municipal planning, inspection, and maintenance department staffs is especially critical to ensure that in-house staffs understand how their activities impact water quality, how to accomplish their jobs while protecting water quality,

and their specific roles and responsibilities for compliance with this Order. Public education, designed to target various urban land users and other audiences, is also essential to inform the public of how individual actions affect receiving water quality and how adverse effects can be minimized.

g. Public participation during the development of runoff management programs is necessary to ensure that all stakeholder interests and a variety of creative solutions are considered.

h. Retrofitting existing development with storm water treatment controls, including LID, is necessary to address storm water discharges from existing development that may cause or contribute to a condition of pollution or a violation of water quality standards. Although SSMP BMPs are required for redevelopment, the current rate of redevelopment will not address water quality problems in a timely manner. Cooperation with private landowners is necessary to effectively identify, implement and maintain retrofit projects for the preservation, restoration, and enhancement of water quality.

4. **Watershed Runoff Management**

a. Since runoff within a watershed can flow from and through multiple land uses and political jurisdictions, watershed-based runoff management can greatly enhance the protection of receiving waters. Such management provides a means to focus on the most important water quality problems in each watershed. By focusing on the most important water quality problems, watershed efforts can maximize protection of beneficial use in an efficient manner. Effective watershed-based runoff management actively reduces pollutant discharges and abates pollutant sources causing or contributing to watershed water quality problems. Watershed-based runoff management that does not actively reduce pollutant discharges and abate pollutant sources causing or contributing to watershed water quality problems can necessitate implementation of the iterative process outlined in section A.3 of the Tentative Order. Watershed management of runoff does not require Copermittees to expend resources outside of their jurisdictions. Watershed management requires the Copermittees within a watershed to develop a watershed-based management strategy, which can then be implemented on a jurisdictional basis.

b. Some runoff issues, such as general education and training, can be effectively addressed on a regional basis. Regional approaches to runoff management can improve program consistency and promote sharing of resources, which can result in implementation of more efficient programs.

c. It is important for the Copermittees to coordinate their water quality protection and land use planning activities to achieve the greatest protection of receiving water bodies. Copermittee coordination with other watershed stakeholders, especially the State of California Department of Transportation, the United States

Department of Defense, and water and sewer districts, is also important.

E. STATUTE AND REGULATORY CONSIDERATIONS

1. The Receiving Water Limitations (RWL) language specified in this Order is consistent with language recommended by the USEPA and established in State Board Water Quality Order 99-05, *Own Motion Review of the Petition of Environmental Health Coalition to Review Waste Discharge Requirements Order No. 96-03, NPDES Permit No. CAS0108740*, adopted by the State Board on June 17, 1999. The RWL in this Order require compliance with water quality standards, which for storm water discharges is to be achieved through an iterative approach requiring the implementation of improved and better-tailored BMPs over time. Compliance with receiving water limits based on applicable water quality standards is necessary to ensure that MS4 discharges will not cause or contribute to violations of water quality standards and the creation of conditions of pollution.

2. The Water Quality Control Plan for the San Diego Basin (Basin Plan), identifies the following existing and potential beneficial uses for surface waters in Riverside County: Municipal and Domestic Supply (MUN), Agricultural Supply (AGR), Industrial Process Supply (PROC), Hydropower Generation (POW), Industrial Service Supply (IND), Ground Water Recharge (GWR), Contact Water Recreation (REC1), Non-contact Water Recreation (REC2), Warm Freshwater Habitat (WARM), Cold Freshwater Habitat (COLD), Wildlife Habitat (WILD), Rare, Threatened, or Endangered Species (RARE), Spawning, Reproduction and/or Early Development (SPWN) and Preservation of Biological Habitats of Special Significance (BIOL).

3. This Order is in conformance with State Board Resolution No. 68-16, *Statement of Policy with Respect to Maintaining High Quality Waters in California*, and the federal Antidegradation Policy described in 40 CFR 131.12.

4. Section 6217(g) of the Coastal Zone Act Reauthorization Amendments of 1990 (CZARA) requires coastal states with approved coastal zone management programs to address non-point pollution impacting or threatening coastal water quality. CZARA addresses five sources of non-point pollution: agriculture, silviculture, urban, marinas, and hydromodification. This NPDES permit addresses the management measures required for the urban category, with the exception of septic systems. The adoption and implementation of this NPDES permit relieves the Copermittee from developing a non-point source plan, for the urban category, under CZARA. The San Diego Water Board addresses septic systems through the administration of other programs.

5. Section 303(d)(1)(A) of the CWA requires that “Each state shall identify those waters within its boundaries for which the effluent limitations…are not stringent enough to implement any water quality standard (WQS) applicable to such waters.” The CWA

also requires states to establish a priority ranking of impaired water bodies known as Water Quality Limited Segments and to establish Total Maximum Daily Loads (TMDLs) for such waters. This priority list of impaired water bodies is called the Section 303(d) List. The 2006 Section 303(d) List was approved by the State Board on October 25, 2006. On June 28, 2007, the 2006 303(d) list for California was given final approval by the United States Environmental Protection Agency (USEPA). The 303(d) List was recently updated, and on December 16, 2009, the 2008 303(d) List was approved by the San Diego Water Board. The 2008 List is awaiting State Board and USEPA approval.

6. This Order does not constitute an unfunded local government mandate subject to subvention under Article XIIIB, Section (6) of the California Constitution for several reasons, including, but not limited to, the following. First, this Order implements federally mandated requirements under federal Clean Water Act section 402. (33 U.S.C. § 1342(p)(3)(B).) Second, the local agency Copermittees' obligations under this Order are similar to, and in many respects less stringent than, the obligations of non-governmental and new dischargers who are issued NPDES permits for storm water and non-storm water discharges. Third, the local agency Copermittees have the authority to levy service charges, fees, or assessments sufficient to pay for compliance with this Order. Fourth, the Copermittees have requested permit coverage in lieu of compliance with the complete prohibition against the discharge of pollutants contained in federal Clean Water Act section 301, subdivision (a) (33 U.S.C. § 1311(a)) and in lieu of numeric restrictions on their storm water discharges. Fifth, the local agencies' responsibility for preventing discharges of waste that can create conditions of pollution or nuisance from conveyances that are within their ownership or control under State law predates the enactment of Article XIIIB, Section (6) of the California Constitution. Likewise, the provisions of this Order to implement total maximum daily loads (TMDLs) are federal mandates. The federal Clean Water Act requires TMDLs to be developed for water bodies that do not meet federal water quality standards. (33 U.S.C. sec. 1313(d).) Once the U.S. Environmental Protection Agency or a state develops a TMDL, federal law requires that permits must contain effluent limitations consistent with the assumptions of any applicable wasteload allocation. (40 C.F.R. sec. 122.44(d)(1)(vii)(B).)

7. Runoff treatment and/or mitigation must occur prior to the discharge of runoff into receiving waters. Treatment BMPs must not be constructed in waters of the U.S. or State unless the runoff flows are sufficiently pretreated to protect the values and functions of the water body. Federal regulations at 40 CFR 131.10(a) state that in no case shall a state adopt waste transport or waste assimilation as a designated use for any waters of the U.S. Authorizing the construction of an runoff treatment facility within a water of the U.S., or using the water body itself as a treatment system or for conveyance to a treatment system, would be tantamount to accepting waste assimilation as an appropriate use for that water body. Furthermore, the construction, operation, and maintenance of a pollution control facility in a water body can negatively impact the physical, chemical, and biological integrity, as well as the beneficial uses, of the water body. Without federal authorization (e.g.,

pursuant to Clean Water Act Section 404), waters of the U.S. may not be converted into, or used as, waste treatment or conveyance facilities. Similarly, waste discharge requirements pursuant to California Water Code Section 13260 are required for the conversion or use of waters of the State as waste treatment or conveyance facilities. Diversion from waters of the U.S./State to treatment facilities and subsequent return to waters of the U.S. is allowable, provided that the effluent complies with applicable NPDES requirements.

8. The issuance of waste discharge requirements and an NPDES permit for the discharge of runoff from MS4s to waters of the U.S. is exempt from the requirement for preparation of environmental documents under the California Environmental Quality Act (CEQA) (Public Resources Code, Division 13, Chapter 3, section 21000 et seq.) in accordance with the CWC section 13389.

9. Storm water discharges from developed and developing areas in Riverside County are significant sources of certain pollutants that cause, may be causing, threatening to cause or contributing to water quality impairment in the waters of Riverside County. Furthermore, as delineated in the CWA section 303(d) list in Table 2, the San Diego Water Board has found that there is a reasonable potential that municipal storm water and non-storm water discharges from MS4s cause or may cause or contribute to an excursion above water quality standards for the following pollutants: Indicator Bacteria, Copper, Manganese, Iron, Chlorpyrifos, Sulfates, Phosphorous, Nitrogen, Toxicity and Turbidity. In accordance with CWA section 303(d), the San Diego Water Board is required to establish Total Maximum Daily Loads (TMDLs) for these pollutants to these waters to eliminate impairment and attain water quality standards. Therefore, certain early pollutant control actions and further pollutant impact assessments by the Copermittees are warranted and required pursuant to this Order.

10. This Order requires each Copermittee to effectively prohibit all types of unauthorized discharges of non-storm water into its MS4. However, historically pollutants have been identified as present in dry weather non-storm water discharges from the MS4s through 303(d) listings, monitoring conducted by the Copermittees under Order No. R9-2004-0001, and there are others expected to be present in dry weather non-storm water discharges because of the nature of these discharges. This Order includes action levels for pollutants in non-storm water, dry weather, discharges from the MS4 designed to ensure that the requirement to effectively prohibit all types of unauthorized discharges of non-storm water in the MS4 is being complied with. Action levels in the Order are based upon numeric or narrative water quality objectives and criteria as defined in the Basin Plan, the Water Quality Control Plan for Ocean Waters of California (Ocean Plan), and the State Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California (State Implementation Policy or SIP). An exceedance of an action level requires specified responsive action by the Copermittees. This Order describes what actions the Copermittees must take when an exceedance of an action level is observed. Exceedances of non-storm water action levels do not alone

constitute a violation of this Order but could indicate non-compliance with the requirement to effectively prohibit all types of unauthorized non-storm water discharges into the MS4 or other prohibitions established in this Order. Failure to undertake required source investigation and elimination action following an exceedance of a non-storm water action level (NAL or action level) is a violation of this Order. The San Diego Water Board recognizes that use of action levels will not necessarily result in detection of all unauthorized sources of non-storm water discharges because there may be some discharges in which pollutants do not exceed established action levels. However, establishing NALs at levels appropriate to protect water quality standards is expected to lead to the identification of significant sources of pollutants in dry weather non-storm water discharges.

11. In addition to federal regulations cited in the Fact Sheet / Technical Report for the Order No. R9-2010-0016, monitoring and reporting required under Order No. R9-2010-0016 is required pursuant to authority under CWC section 13383.

F. PUBLIC PROCESS

1. The San Diego Water Board has notified the Copermittees, all known interested parties, and the public of its intent to consider adoption of an Order prescribing waste discharge requirements that would serve to renew an NPDES permit for the existing discharge of runoff.

2. The San Diego Water Board has held public hearings on TBD and heard and considered all comments pertaining to the terms and conditions of this Order.

IT IS HEREBY ORDERED that the Copermittees, in order to meet the provisions contained in Division 7 of the California Water Code (CWC) and regulations adopted thereunder, and the provisions of the Clean Water Act (CWA) and regulations adopted thereunder, must each comply with the following:

A. PROHIBITIONS AND RECEIVING WATER LIMITATIONS

1. Discharges ~~into and~~ from municipal separate storm sewer systems (MS4s) in a manner causing, or threatening to cause, a condition of pollution, contamination, or nuisance (as defined in CWC section 13050), in waters of the state are prohibited.

2. Storm water discharges from MS4s containing pollutants which have not been reduced to the maximum extent practicable (MEP) are prohibited.[2]

3. Discharges from MS4s that cause or contribute to the violation of water quality standards (designated beneficial uses, water quality objectives developed to protect beneficial uses, and the State policy with respect to maintaining high quality waters) are prohibited.

a. Each Copermittee must comply with section A.3 and section A.4 as it applies to Prohibition 5 in Attachment A of this Order through timely implementation of control measures and other actions to reduce pollutants in storm water discharges in accordance with this Order, including any modifications. If exceedance(s) of water quality standards persist notwithstanding implementation of this Order, the Copermittee must assure compliance with section A.3 and section A.4 as it applies to Prohibition 5 in Attachment A of this Order by complying with the following procedure:

(1) Upon a determination by either the Copermittee or the San Diego Water Board that storm water MS4 discharges are causing or contributing to an exceedance of an applicable water quality standard, the Copermittee must promptly notify the San Diego Water Board ~~within 30 days~~ and thereafter submit a report to the San Diego Water Board that describes best management practices (BMPs) that are currently being implemented and additional BMPs that will be implemented to prevent or reduce any pollutants that are causing or contributing to the exceedance of water quality standards. The notification and the report may be incorporated in the Annual Report unless the San Diego Water Board directs an earlier submittal. The report must include an implementation schedule. The San Diego Water Board may require modifications to the report;

Comment [CP1]: From 2004 Permit. Also related to edit below.

[2] This prohibition does not apply to MS4 discharges which receive subsequent treatment to reduce pollutants to the MEP prior to entering receiving waters (e.g., low flow diversions to the sanitary sewer).

(2) Submit any modifications to the report required by the San Diego Water Board within 30 days of notification;

(3) Within 30 days following approval of the report described above by the San Diego Water Board, the Copermittee must revise its Jurisdictional Runoff Management Program and monitoring program to incorporate the approved modified BMPs that have been and will be implemented, the implementation schedule, and any additional monitoring required; and

(4) Implement the revised Jurisdictional Runoff Management Program and monitoring program in accordance with the approved schedule.

b. The Copermittee ~~must~~ need not repeat the procedure set forth above to comply with the receiving water limitations for continuing or recurring exceedances of the same water quality standard(s) during the development and implementation of scheduled actions unless directed to do otherwise by the San Diego Water Board Executive Officer.

c. Nothing in section A.3 must prevent the San Diego Water Board from enforcing any provision of this Order while the Copermittee prepares and implements the above report.

4. In addition to the above prohibitions, discharges from MS4s are subject to all Basin Plan prohibitions cited in Attachment A to this Order.

B. NON-STORM WATER DISCHARGES

1. Each Copermittee must effectively prohibit all types of non-storm water discharges into its MS4 unless such discharges are either authorized by a separate National Pollutant Discharge Elimination System (NPDES) permit; or not prohibited in accordance with sections B.2 and B.3 below.

2. The following categories of non-storm water discharges are not prohibited unless a Copermittee or the San Diego Water Board identifies the discharge category as a source of pollutants to waters of the U.S. Where the Copermittee(s) have identified a category as a source of pollutants, the category shall be addressed as an illicit discharge and prohibited through ordinance, order or similar means. If an individual discharge within a category is identified as an isolated source of pollutants not representative of the category as a whole, that individual discharge shall be addressed as an illicit discharge. The San Diego Water Board may identify categories of discharge that either requires prohibition or other controls. For such a discharge category, the Copermittee, under direction of the San Diego Water Board, must either prohibit the discharge category or develop and implement appropriate control measures to prevent the discharge of pollutants to the MS4 and report to the San Diego Water Board pursuant to Section K.1 and K.3 of this Order.

Comment [CP2]: See comments/language below, including ***new*** section B.4.

a. Diverted stream flows;
b. Rising ground waters;
c. Uncontaminated ground water infiltration [as defined at 40 CFR 35.2005(20)] to MS4s;
d. Uncontaminated pumped ground water[3];
e. Foundation drains[~~3~~3~~8~~];
f. Springs;
g. Water from crawl space pumps[~~3~~3~~8~~];
h. Footing drains[~~3~~3~~8~~];
i. Air conditioning condensation;
j. Flows from riparian habitats and wetlands;
k. Water line flushing[4,5];
l. Landscape irrigation;
m. Discharges from potable water sources not subject to NPDES Permit No. CAG679001, other than water main breaks;
n. Irrigation water;
o. Lawn watering;
p. Individual residential car washing;
q. Non-emergency fire fighting flows; and
r. Dechlorinated swimming pool discharges[6].

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Comment [CP3]: Restored. Per B.2, discharge categories identified as a source of pollutants by the RB can either be prohibited - or addressed through 'appropriate control measures'.

Per B.3. below this category is not being prohibited, but is being required to be addressed through 'appropriate control measures'.

3. Emergency fire fighting flows (i.e., flows necessary for the protection of life or property) do not require BMPs and need not be prohibited. As part of the Jurisdictional Runoff Management Plan (JRMP), each Copermittee must develop and implement a program to address pollutants from non-emergency fire fighting flows (i.e., flows from controlled or practice blazes and maintenance activities) identified by the Copermittee to be significant sources of pollutants to waters of the United States.

a. Building fire suppression system maintenance discharges (e.g. sprinkler line flushing) contain waste. Therefore, such discharges are to be prohibited by the Copermittees as illicit discharges through ordinance, order, or similar means.

4. As part of the JRMP, the Copermittees must develop and implement appropriate control measures to address pollutants from landscape irrigation, irrigation water and lawn watering activities identified by the Copermittee to be a significant source of pollutants to waters of the United States. The Copermittees shall use a combination of education, source control, water efficiency/conservation ordinances and enforcement tools, as appropriate, in cooperation with local water districts, to meet

[3] Requires enrollment under Order R9-2008-002. Discharges into the MS4 require authorization from the owner and operator of the MS4 system.
[4] This exemption does not include fire suppression sprinkler system maintenance and testing discharges. Those discharges may be regulated under Section B.3.
[5] Requires enrollment under Order R9-2002-0020.
[6] Including saline swimming pool discharges directly to a saline water body.

this requirement.

5. Each Copermittee must examine all dry weather effluent analytical monitoring results collected in accordance with section F.4 of this Order and Receiving Waters and MS4 Discharge Monitoring and Reporting Program No. R9-2010-0016 to identify water quality problems which may be the result of any non-prohibited discharge category(ies) identified above in section B.2. Follow-up investigations must be conducted to identify and control, pursuant to section B.2, any non-prohibited discharge category(ies) listed above.

C. NON-STORM WATER DRY WEATHER ACTION LEVELS

1. Each Copermittee, beginning no later than May 1, 2011, shall, individually and/or jointly implement the non-storm water dry weather action level (NAL) monitoring as described in Attachment E of this Order.

2. In response to an exceedance of an NAL, the applicable~~each~~ Copermittee must investigate ~~and identify~~ the source of the exceedance in a timely manner. However, if any Copermittee identifies exceedances of NALs that prevent them from adequately conducting source investigations in a timely manner, then the Copermittees may submit a prioritization plan and timeline that identifies the timeframe and planned actions to investigate and report their findings on all of the exceedances. Depending on the findings of~~Following~~ the source investigation ~~and identification~~, the Copermittee~~s~~ must ~~submit an~~ take appropriate action ~~report dependant on the source of the pollutant exceedance~~ as follows:

Comment [CMP4]: Conflicts with 2.e.

a. If the Copermittee identifies the source of the exceedance as natural (non-anthropogenically influenced) in origin and in conveyance into the MS4; then no specific action is required, however the Copermittee shall report their findings and documentation of their source investigation to the San Diego Water Board within the applicable annual report.~~fourteen days of the source identification.~~

b. If the Copermittee identifies the source of the exceedance as an illicit discharge or connection, then the Copermittee~~s~~ must initiate appropriate actions as described in section F.4 to promptly eliminate the discharge to their MS4. A ~~and~~ report of the findings, including any enforcement action(s) taken, and documentation of the source investigation must be submitted to the San Diego Water Board within the applicable annual report.~~fourteen days of the source identification.~~ If the Copermittee is unable to eliminate the source of discharge within fourteen days of identification, then the Copermittee must ~~submit, as part of their action report, their plan~~ contact and coordinate~~timeframe to eliminate~~ the response with~~source of~~ the Regional Board.~~exceedance.~~ Those dischargers seeking to continue such a discharge must become subject to a separate NPDES permit prior to continuing any such discharge.

Comment [CMP5]: Clarify relationship to IDDE section

c. If the Copermittee identifies the source of the exceedance as an exempted category of non-storm water discharge, then the Copermittees must determine if this is an isolated circumstance or if the category of discharges must be addressed through the prevention or prohibition of that category of discharge as an illicit discharge. The Copermittee must submit their findings ~~in~~ including a description of the steps taken to address the discharge ~~and/or the category of discharge,~~ to the San Diego Water Board for review with the ~~next subsequent~~ annual report. If the Copermittee has determined that the entire category of discharge must be addressed, the annual report must describe and include a schedule for completion of the planned ~~Such description shall include~~ relevant updates to ~~or new~~ ordinances, orders, or other legal means of addressing the

category of discharge, and the~~. The~~ Copermittees must also submit a summary of their findings with the Report of Waste Discharge.

d. If the Copermittee identifies the source of the exceedance as a non-storm water discharge in violation or potential violation of an existing separate NPDES permit (e.g. the groundwater dewatering permit), then the Copermittee must report, within three business days, the findings to the San Diego Water Board including all pertinent information regarding the discharger and discharge characteristics.

e. If the Copermittee is unable to identify the source of the exceedance after taking and documenting reasonable steps to do so, then the Copermittee must report the results in the annual report, and utilize the current and historical exceedance information when adjusting and executing annual work plans, as required by this Order. ~~identify the pollutant as a high priority pollutant of concern in the tributary subwatershed, perform additional focused sampling and update their programs within a year to reflect this priority. The Copermittee's annual report shall include these updates to their programs including, where applicable, updates to their watershed workplans (Section G.2), retrofitting consideration (Section F.3.d) and program effectiveness work plans (Section J.4).~~

Comment [CP6]: C.4 below already requires this - the station will continue to be monitored until no further exceedances are detected.

f. The Copermittees or any interested party, may evaluate existing NALs and propose revised NALs for future Board consideration.

3. NALs provide an assessment of the effectiveness of the Copermittees' program to prohibit non-storm water discharges and of the appropriateness of exempted non-storm water discharges. An exceedance of an NAL does not alone constitute a violation of the provisions of this Order, but an exceedance of an NAL may indicate *that the Copermittee (s) need to re-evaluate their efforts to*~~a lack of compliance with the requirement that Copermittees~~ effectively prohibit all types of unauthorized non-storm water discharges into the MS4 or other prohibitions set forth in Sections A and B of this Order. Failure to timely implement required actions specified in this Order following an exceedance of an NAL constitutes a violation of this Order. However, neither compliance with NALs nor compliance with required actions following observed exceedances, excuses any non-compliance with the requirement to effectively prohibit all types of unauthorized non-storm water discharges into the MS4s or any non-compliance with the prohibitions in Sections A and B of this Order. ~~NALs provide an assessment of the effectiveness of the prohibition of non-storm water discharges and of the appropriateness of exempted non-storm water discharges. During any annual reporting period in which one or more exceedances of NALs have been documented the Copermittee must submit with their next scheduled annual report, a report describing whether and how the observed exceedances did or did not result in a discharge form the MS4 that caused, or threatened to cause or contribute to a condition of pollution, contamination, or nuisance in the receiving waters.~~

Comment [CP7]: This additional reporting effort does not provide any value/utility that is not already addressed under the MRP.

4. Monitoring of effluent will occur at the end-of-pipe prior to discharge into the

Comment [CMP8]: Suggest move to MRP. Focus on the process in Section D, and keep the action levels and monitoring requirements in the MRP.

receiving waters, with a focus on Major Outfalls, as defined in 40 CFR 122.26(B 5-6) and Attachment E of this Order. The Copermittees must develop their monitoring plans to sample a representative ~~percentage~~ number of major outfalls and identified stations within each hydrologic subarea. At a minimum, outfalls that exceed any NALs once during any year (except those that are identified as natural in origin pursuant to 2.a.) must be monitored in the subsequent year. Any station that does not exceed an NAL for 3 years may be replaced with a different station.

5. Each Copermittee shall monitor for the non-storm water dry weather action levels, which are incorporated into this Order as follows:

Comment [CMP9]: This section more appropriately belongs in the MRP.

We are not providing full comments on section 5 at this time, but will address with the discussions on the MRP.

a. Action levels for discharges to inland surface waters:

Table 3.a.1: General Constituents

Parameter	Units	AMAL	MDAL	Instantaneous Maximum	Basis
Fecal Coliform	MPN/ 100 ml	200[A] 400[B]	-		BPO
Enterococci	MPN/ 100 ml	33	-	61[C]	BPO
Turbidity	NTU	-	20		BPO
pH	Units	Within limit of 6.5 to 8.5 at all times			BPO
Dissolved Oxygen	mg/L	Not less than 5.0 in WARM waters and not less than 6.0 in COLD waters			BPO
Total Nitrogen	mg/L	-	1.0	See MDAL	BPO
Total Phosphorus	mg/L	-	0.1	See MDAL	BPO
Methylene Blue Active Substances	mg/L	-	0.5	See MDAL	BPO
Iron	mg/L	-	0.3	See MDAL	BPO
Manganese	mg/L	-	0.05	See MDAL	BPO

A – Based on a minimum of not less than five samples for any 30-day period
B – No more than 10 percent of total samples may exceed 400 per 100 ml during any 30 day period
C – This Value has been set to Basin Plan Criteria for Designated Beach Areas
BPO – Basin Plan Objective
MDAL – Maximum Daily Action Level AMAL – Average Monthly Action Level

Table 3.a.2: Priority Pollutants

		Freshwater (CTR)	
Parameter	Units	MDAL	AMAL
Cadmium	ug/L	**	**
Copper	ug/L	*	*
Chromium III	ug/L	**	**
Chromium VI (hexavalent)	ug/L	16	8.1
Lead	ug/L	*	*
Nickel	ug/L	**	**

Silver	ug/L	*	*
Zinc	ug/L	*	*

CTR – California Toxic Rule
*- Action Levels developed on a case-by-case basis (see below)
**- Action Levels developed on a case-by-case basis (see below), but calculated criteria are not to exceed Maximum Contaminant Levels under the California Code of Regulations[7]

The NALs for Cadmium, Copper, Chromium (III), Lead, Nickel, Silver and Zinc will be developed on a case-by-case basis because the freshwater criteria are based on site-specific water quality data (receiving water hardness). For these priority pollutants, the following equations (40 CFR 131.38.b.2) will be required:

Cadmium (Total Recoverable) = exp(0.7852[ln(hardness)] -2.715)
Chromium III (Total Recoverable) = exp(0.8190[ln(hardness)] + .6848)
Copper (Total Recoverable) = exp(0.8545[ln(hardness)] - 1.702)
Lead (Total Recoverable) = exp(1.273[ln(hardness)] - 4.705)
Nickel (Total Recoverable) = exp(.8460[ln(hardness)] + 0.0584)
Silver (Total Recoverable) = exp(1.72[ln(hardness)] - 6.52)
Zinc (Total Recoverable) = exp(0.8473[ln(hardness)] + 0.884)

D. STORM WATER ACTION LEVELS

1. The Copermittees shall individually and/or jointly implement the Wet Weather MS4 Discharge Monitoring as described in Attachment E of this Order, and ~~Beginning~~ beginning Year 3 after Order adoption date, the Copermittees shall begin annual assessment of that data for compliance with the Storm Water Action Levels (SALs) identified herein. At each monitoring station, If a running average of twenty percent or greater of the available Wet Weather MS4 Discharge Monitoring data exceeds ~~exceedances of any discharge of storm water from the MS4 to waters of the United States that exceed~~ the Storm Water Action Levels (SALs) for the pollutants listed in Table 5 (below) ~~will require each~~ the applicable Copermittee(s) will be required to affirmatively augment and implement all necessary storm water controls and measures to reduce the discharge of the associated class of pollutants(s) to the MEP ~~standard~~. The Copermittees must utilize the exceedance information when adjusting and executing annual work plans, as required by this Order. Copermittees shall take the magnitude, frequency, need to dedicate resources to addressing NAL exceedances, and number of constituents exceeding the SAL(s), in addition to receiving water quality data and other information, into consideration when reacting to SAL exceedances in an iterative manner. Failure to appropriately consider and react to SAL exceedances in an iterative manner creates a presumption that the Copermittee(s) have not complied with the MEP standard.

Comment [CP10]: Found the draft language here confusing, We provided suggested language that attempts to clarify.

Table 4. Storm Water Action Levels

Pollutant	Action Level
Turbidity (NTU)	126
Nitrate & Nitrite total (mg/L)	2.6

[7] California Code of Regulations, Title 22, Division 4, Chapter 15, Article 4, Section 64431.

P total (mg/L)	1.46
Cd total (µg/L)	3.0
Cu total (µg/L)	127
Pb total (µg/L)	250
Zn total (µg/L)	976

2. The end-of-pipe assessment points for the determination of SAL compliance are all major outfalls, as defined in 40 CFR 122.26(b)(5) and (b)(6). The Copermittees must develop their monitoring plans to sample a representative percent of the major outfalls within each hydrologic subarea. At a minimum, outfalls that exceed SALs must be monitored in the subsequent year. Any station that does not exceed an SAL for 3 years may be replaced with a different station. SAL samples must be 24 hour time weighted composites.

Comment [CMP11]: We are not providing comments on the action levels and monitoring requirements themselves (Table 4 and section D.2.) at this time, but will return to this at a subsequent meeting.

3. The absence of SAL exceedances does not relieve the Copermittees from implementing all other required elements of this Permit.

4. This Permit does not regulate natural sources and conveyances into the MS4 of constituents listed in Table 4.~~5.~~ To be relieved of the requirements to take action as described in D.1 above ~~prioritize pollutant/watershed combinations for BMP updates~~ and to continue monitoring a station, the Copermittee must demonstrate that the likely and expected cause of the SAL exceedance is not anthropogenic in nature. This demonstration does not need to be repeated, for subsequent exceedances of the same SAL in the same hydrologic subarea.

5. The SALs will be reviewed and updated at the end of every permit cycle. The data collected pursuant to ~~D.2 above~~Attachment E can be used to create SALs based upon local data. It is the goal of the SALs, through the iterative and MEP process, to have outfall storm water discharges meet all applicable water quality standards.

E. LEGAL AUTHORITY

1. Each Copermittee must establish, maintain, and enforce adequate legal authority to control pollutant discharges into and from its MS4 through ordinance, statute, permit, contract or similar means. Nothing herein shall authorize a Co-Permittee or other discharger regulated under the terms of this order to divert, store or otherwise impound water if such action is reasonably anticipated to harm downstream water right holders in the exercise of their water rights. This legal authority must, at a minimum, authorize the Copermittee to:

   a. Control the contribution of pollutants in discharges of runoff associated with industrial and construction activity to its MS4 and control the quality of runoff from industrial and construction sites. This requirement applies both to industrial and construction sites which have coverage under the statewide general industrial or construction storm water permits, as well as to those sites which do not. Grading

ordinances must be updated and enforced as necessary to comply with this Order;

b. Prohibit all identified illicit discharges not otherwise allowed pursuant to section B.2;

c. Prohibit and eliminate illicit connections to the MS4;

d. Control the discharge of spills, dumping, or disposal of materials other than storm water to its MS4;

e. Require compliance with conditions in Copermittee ordinances, permits, contracts or orders (i.e., hold dischargers to its MS4 accountable for their contributions of pollutants and flows);

f. Utilize enforcement mechanisms to require compliance with Copermittee storm water ordinances, permits, contracts, or orders;

g. Control the contribution of pollutants from one portion of the shared MS4 to another portion of the MS4 through interagency agreements among Copermittees. Control of the contribution of pollutants from one portion of the shared MS4 to another portion of the MS4 through interagency agreements with other owners of the MS4 such as the State of California Department of Transportation, the United States Department of Defense, or Native American Tribes is encouraged;

h. Carry out all inspections, surveillance, and monitoring necessary to determine compliance and noncompliance with local ordinances and permits and with this Order, including the prohibition on illicit discharges to the MS4. This means the Copermittee must have authority to enter, monitor, inspect, take measurements, review and copy records, and require regular reports from industrial facilities discharging into its MS4, including construction sites;

i. Require the use of BMPs to prevent or reduce the discharge of pollutants into MS4s from storm water to the MEP; and

j. Require documentation on the effectiveness of BMPs implemented to reduce the discharge of storm water pollutants to the MS4 to the MEP.

2. Each Copermittee must submit within 365 days of adoption of this Order, a statement certified by its chief legal counsel that the Copermittee has taken the necessary steps to obtain and maintain full legal authority to implement and enforce each of the requirements contained in 40 CFR 122.26(d)(2)(i)(A-F) and this Order. These statements must include:

a. Identification of all departments within the jurisdiction that conduct runoff related activities, and their roles and responsibilities under this Order. Include an up to date organizational chart specifying these departments and key personnel.

b. Citation of runoff related ordinances and the reasons they are enforceable;

c. Identification of the local administrative and legal procedures available to mandate compliance with runoff related ordinances and therefore with the conditions of this Order;

d. A description of how runoff related ordinances are implemented and appealed; and

e. Description of whether the municipality can issue administrative orders and

injunctions or if it must go through the court system for enforcement actions.

F. JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM (JRMP)

Each Copermittee must implement all requirements of section F of this Order no later than 365 days after adoption of the Order, unless otherwise specified. Prior to 365 days after adoption of the Order, each Copermittee must at a minimum implement its Jurisdictional RMP document, as the document was developed and amended to comply with the requirements of Order No. R9-2004-001.

Each Copermittee must develop and implement an updated JRMP for its jurisdiction. Each updated JRMP must meet the requirements of section F of this Order~~,~~ to reduce the discharge of storm water pollutants from the MS4 to the MEP, effectively prohibit non-storm water discharges and prevent runoff discharges from the MS4 from causing or contributing to a violation of water quality standards.

1. DEVELOPMENT PLANNING COMPONENT

Each Copermittee must implement a program which meets the requirements of this section ~~and~~ to (1) reduce~~s~~ Development Project discharges of storm water pollutants from the MS4 to the MEP; (2) prevent~~s~~ Development Project discharges from the MS4 from causing or contributing to a violation of water quality standards; (3) prevent~~s~~ illicit discharges into the MS4; and (4) manage~~s~~ increases in runoff discharge rates and durations from Development Projects that are likely to cause increased erosion of stream beds and banks, silt pollutant generation, or other impacts to beneficial uses and stream habitat due to increased erosive force.

Comment [CP12]: Section F.1 requires programs that address each of these, these are not mutually exclusive requirements.

a. GENERAL PLAN

Each Copermittee must revise as needed its General Plan or equivalent plan (e.g., Comprehensive, Master, or Community Plan) to include water quality and watershed protection principles and policies that direct land-use decisions and require implementation of consistent water quality protection measures for ~~all~~ development, redevelopment and retrofit projects. Examples of water quality and watershed protection principles and policies to be considered include the following:

Comment [CP13]: Consistent with 2004 permit. If you include the word all, then we should add the word 'applicable'. (…for all *applicable* development….)

(1) Minimize the amount of impervious surfaces and directly connected impervious surfaces in areas of new development and redevelopment and where feasible slow runoff and maximize on-site infiltration of runoff.

(2) Implement pollution prevention methods supplemented by pollutant source controls and treatment BMPs. Use small collection strategies located at, or as close as possible to, the source (i.e., the point where water initially meets the

ground) to minimize the transport of urban runoff and pollutants offsite and into an MS4.

(3) Preserve, and where possible, create or restore areas that provide important water quality benefits, such as riparian corridors, wetlands, and buffer zones. Encourage land acquisition of such areas.

(4) Limit disturbances of natural water bodies and natural drainage systems caused by development including roads, highways, and bridges.

(5) Prior to making land use decisions, utilize methods available to estimate increases in pollutant loads and flows resulting from projected future development. Require incorporation of ~~structural and non-structural~~ appropriate BMPs to mitigate the projected increases in pollutant loads and flows.

Comment [CP14]: From 2004 permit. Alternatively state 'structural and/**or** non structural' BMPs

(6) Avoid development of areas that are particularly susceptible to erosion and sediment loss; or establish development guidance that identifies these areas and protects them from erosion and sediment loss.

(7) Reduce pollutants associated with vehicles and increasing traffic resulting from development.

(8) Post-development runoff from a site shall not contain pollutant loads that cause or contribute to an exceedance of receiving water quality objectives and which have not been reduced to the MEP.

b. ENVIRONMENTAL REVIEW PROCESS

Each Copermittee must revise as needed its current environmental review processes to accurately evaluate water quality impacts and cumulative impacts and identify appropriate measures to avoid, minimize and mitigate those impacts for all Development Projects.

c. APPROVAL PROCESS CRITERIA AND REQUIREMENTS FOR ALL DEVELOPMENT PROJECTS

For all proposed Development Projects, each Copermittee during the planning process, and prior to project approval and issuance of local permits, must prescribe the necessary requirements so that Development Project discharges of storm water pollutants from the MS4 will be reduced to the MEP, will not cause or contribute to a violation of water quality standards, and will comply with Copermittee's ordinances, permits, plans, and requirements, and with this Order.

Performance Criteria: Discharges from each approved development project must be subject to the following management measures:

(1) Source control BMPs that reduce storm water pollutants of concern in runoff; prevent~~ion~~ of illicit discharges into the MS4; prevent~~ion~~ of irrigation runoff; storm drain system stenciling or signage; properly design~~ed~~ outdoor material storage areas; properly designed outdoor work areas; and properly designed trash storage areas.

Comment [CP15]: Subject to our discussion on section B (non storm water discharges.

(2) The following LID BMPs listed below shall be implemented at all Development Projects where applicable and feasible.

(a) Conserve natural areas, including existing trees, other vegetation, and soils,
(b) Construct streets, sidewalks, or parking lot aisles to the minimum widths necessary, provided that public safety is not compromised,
(c) Minimize the impervious footprint of the project,
(d) Minimize soil compaction to landscaped areas,
(e) Minimize disturbances to natural drainages (e.g., natural swales, topographic depressions, etc.), and
(f) Disconnect impervious surfaces through distributed pervious areas.

(3) Buffer zones for natural water bodies, where ~~technically~~ feasible. Where buffer zones are ~~technically~~ infeasible, require project proponent to implement other buffers such as trees, access restrictions, etc;

Comment [CP16]: Consistent with 2004 permit.

(4) Measures necessary so that grading or other construction activities meet the provisions specified in section F.2 of this Order.

(5) ~~Where~~ When known during permitting, require industrial facility operators subject to the General Industrial permit to provide evidence of permit coverage prior to occupancy.

(6) Submittal of proof of a mechanism under which ongoing long-term maintenance of all structural post-construction BMPs will be conducted.

(7) Infiltration and Groundwater Protection

To protect groundwater quality, each Copermittee must apply restrictions to the use of treatment control BMPs that are designed to primarily function as large, centralized infiltration devices (such as large infiltration trenches and infiltration basins). Such restrictions must be designed so that the use of such infiltration treatment control BMPs ~~must~~ does not cause or contribute to an exceedance of groundwater quality objectives. At a minimum, each treatment control BMP designed to primarily function as a centralized infiltration device must meet the restrictions below, unless it is demonstrated that a restriction is not necessary to protect groundwater quality. The Copermittees may collectively or individually develop alternative restrictions

on the use of treatment control BMPs which are designed to primarily function as centralized infiltration devices. Alternative restrictions developed by the Copermittees can partially or wholly replace the restrictions listed below. The restrictions do not apply to small infiltration systems dispersed throughout a development project.

(a) Runoff must undergo pretreatment such as sedimentation or filtration prior to infiltration;

(b) All dry weather flows containing significant pollutant loads must be diverted from infiltration devices and treated through other BMPs;

(c) Pollution prevention and source control BMPs must be implemented at a level appropriate to protect groundwater quality at sites where infiltration treatment control BMPs are to be used;

(d) Infiltration treatment control BMPs must be adequately maintained so that they remove storm water pollutants to the MEP;

(e) The vertical distance from the base of any infiltration treatment control BMP to the seasonal high groundwater mark must be at least 10 feet. Where groundwater basins do not support beneficial uses, this vertical distance criteria may be reduced, provided groundwater quality is maintained;

(f) The soil through which infiltration is to occur must have physical and chemical characteristics (such as appropriate cation exchange capacity, organic content, clay content, and infiltration rate) which are adequate for proper infiltration durations and treatment of runoff for the protection of groundwater beneficial uses;

(g) Infiltration treatment control BMPs must not be used for areas of industrial or light industrial activity; ~~areas subject to high vehicular traffic (25,000 or greater average daily traffic on main roadway or 15,000 or more average daily traffic on any intersecting roadway)~~; automotive repair shops; car washes; fleet storage areas (bus, truck, etc.); nurseries; and other high threat to water quality land uses and activities as designated by each Copermittee unless first treated or filtered to remove pollutants prior to infiltration ~~and a comprehensive site-specific evaluation has been conducted~~; and

(h) Infiltration treatment control BMPs must be located a minimum of 100 feet horizontally from any water supply wells.

(7) Where feasible, landscaping with native or low water species shall be preferred in areas that drain to the MS4 or to waters of the United States.

d. STANDARD STORM WATER MITIGATION PLANS (SSMPS) – APPROVAL PROCESS CRITERIA AND REQUIREMENTS FOR PRIORITY DEVELOPMENT PROJECTS

Within 365 days of adoption of this Order, the Copermittees must submit an updated ~~model~~ SSMP (referred to by the Copermittees as a Water Quality Management Plan, or 'WQMP'), to the San Diego Water Board's Executive Officer for a 30 day public review and comment period. The San Diego Water Board's Executive Officer has the discretion to determine the necessity of a public hearing. Within 180 days of determination that the ~~Model~~ SSMP is in compliance with this Permit's provisions, each Copermittee must ~~update their own local SSMP, and~~ amend~~ed~~ their ordinances consistent with the ~~model~~ SSMP and begin implementation of the updated SSMP. Any updated ordinances, and shall be submitted ~~submit both (local SSMP and amended ordinances)~~ to the San Diego Water Board with the annual report. The ~~model~~ SSMP must meet the requirements of section F.1.d of this Order to (1) reduce Priority Development Project discharges of storm water pollutants from the MS4 to the MEP, and (2) prevent Priority Development Project runoff discharges from the MS4 from causing or contributing to a violation of water quality standards.[8]

(1) Definition of Priority Development Project (PDP):

Priority Development Projects are:

(a) All new Development Projects that fall under the project categories or locations listed in section F.1.d.(2), and

(b) Those redevelopment projects that create, add, or replace at least 5,000 square feet of impervious surfaces on an already developed site and the ~~existing development and/or~~ the redevelopment project falls under the project categories or locations listed in section F.1.d.(2). Where redevelopment results in an increase of less than fifty percent of the impervious surfaces of a previously existing development, and the existing development was not subject to SSMP requirements, the numeric sizing criteria discussed in section F.1.d.(6) applies only to the addition or

Comment [CP17]: Consistent with 2004 permit and the Santa Ana Permit.

[8] Updated SSMP and hydromodification requirements must apply to all priority projects or phases of priority projects which have not yet begun grading or construction activities at the time any updated SSMP or hydromodification requirement commences. If lawful prior approval of a project exists, whereby application of an updated SSMP or hydromodification requirement to the project is illegal, the updated SSMP or hydromodification requirement need not apply to the project. Updated Development Planning requirements set forth in Sections F.1. (a) through (h) of this Order must apply to all projects or phases of projects, unless, at the time any updated Development Planning requirement commences, the projects or project phases meet any one of the following conditions: (i) the project or phase has begun grading or construction activities; or (ii) a Copermittee determines that lawful prior approval rights for a project or project phase exist, whereby application of the Updated Development Planning requirement to the project is legally infeasible. Where feasible, the Permittees must utilize the SSMP and hydromodification update periods to ensure that projects undergoing approval processes include application of the updated SSMP and hydromodification requirements in their plans.

replacement, and not to the entire development. Where redevelopment results in an increase of more than fifty percent of the impervious surfaces of a previously existing development, the numeric sizing criteria applies to the entire development. Redevelopment does not include routine maintenance activities that are conducted to maintain original line and grade, hydraulic capacity, original purpose of the facility, or emergency redevelopment activity required to protect public health and safety. Redevelopment also does not include retrofit projects implemented pursuant to section F.3.d of this order.

~~(c) One acre threshold: In addition to the Priority Development Project Categories identified in section F.1.d.(2), Priority Development Projects must also include all other pollutant-generating Development Projects that result in the disturbance of one acre or more of land within two years of adoption of this Order.~~[9]

(2) Priority Development Project Categories

Where a new Development Project feature, such as a parking lot, falls into a Priority Development Project Category, the entire project footprint is subject to SSMP requirements. Emergency public safety projects in any of the Priority Development Categories may be excluded if the delay caused due to the requirement for a SSMP compromises public safety, public health and/or environmental protection.

(a) New development projects that create 10,000 square feet or more of impervious surfaces (collectively over the entire project site) including commercial, industrial, residential subdivisions requiring a Final Map (i.e. detached single family home subdivisions, multi-family attached subdivisions, condominiums, apartments, etc.), mixed-use, and public projects. This category includes development projects on public or private land which fall under the planning and building authority of the Copermittees.

(b) Automotive repair shops. This category is defined as a facility that is categorized in any one of the following Standard Industrial Classification (SIC) codes: 5013, 5014, 5541, 7532-7534, or 7536-7539.

(c) Restaurants. This category is defined as a facility that sells prepared foods and drinks for consumption, including stationary lunch counters and refreshment stands selling prepared foods and drinks for immediate consumption (SIC code 5812), where the land area for development is greater than 5,000 square feet. Restaurants where land development is less than 5,000 square feet must meet all SSMP requirements except for

Comment [CP18]: 2010 Santa Ana Permit

Comment [CP19]: Important not to penalize proactive efforts to retrofit existing development.

Comment [JEU20]: Keep requirements consistent with Santa Ana Permit. This also exceeds the SWRCB Precedential Order regarding SUSMPs.

Comment [CP21]: From the 2010 Santa Ana Permit to ensure that Emergency public safety projects that happen to meet the criteria of a PDP, are not delayed.
Example situations:
•Emergency housing erected in response to a major disaster such as an earthquake
•Emergency food cafeteria erected following a major disaster.
•Emergency command center that happens to need to be set up next to an ESA
•Etc…

Comment [CP22]: Consistent with the Santa Ana permit, these revisions clarify that this doesn't apply to individual custom home projects (unless they also qualify as hillside development).

Individual residential projects will still be required to implement the controls from F.1.c. for 'all' projects, however it is not appropriate to burden such insignificant projects with the full SSMP requirements.

[9] ~~Pollutant generating Development Projects are those projects that generate pollutants at levels greater than natural background levels.~~

structural treatment BMP and numeric sizing criteria requirement F.1.d.(6) and hydromodification requirement F.1.h.

(d) All hillside development greater than 5,000 square feet. This category is defined as any development which creates 5,000 square feet of impervious surface which is located in an area with known erosive soil conditions, where the development will grade on any natural slope that is twenty-five percent or greater.

(e) Environmentally Sensitive Areas (ESAs). All development located within or directly adjacent to or discharging directly to an ESA (where discharges from the development or redevelopment will enter receiving waters within the ESA), which either creates 2,500 square feet of impervious surface on a proposed project site or increases the area of imperviousness of a proposed project site to 10 percent or more of its naturally occurring condition. "Directly adjacent" means situated within 200 feet of the ESA. "Discharging directly to" means outflow from a drainage conveyance system that is composed entirely of flows from the subject development or redevelopment site, and not commingled with flows from adjacent lands.

(f) Impervious Parking lots 5,000 square feet or more ~~or with 15 or more parking spaces~~ and potentially exposed to runoff. Parking lot is defined as a land area or facility for the temporary parking or storage of motor vehicles used personally, for business, or for commerce.

(g) Street, roads, highways, and freeways[10]. This category includes any paved impervious surface that is 5,000 square feet or greater used for the transportation of automobiles, trucks, motorcycles, and other vehicles.

(h) Retail Gasoline Outlets (RGOs). This category includes RGOs that meet the following criteria: (a) 5,000 square feet or more or (b) a projected Average Daily Traffic (ADT) of 100 or more vehicles per day.

(3) Pollutants of Concern

As part of its local SSMP, each Copermittee must implement a~~n~~ ~~updated~~ procedure for identifying pollutants of concern for each Priority Development Project. The procedure must address, at a minimum: (1) Receiving water quality (including pollutants for which receiving waters are listed as impaired under CWA section 303(d)); (2) Land-use type of the Development Project and pollutants associated with that land use type; and (3) Pollutants expected

Comment [CP23]: **'Impervious':** Clarify that if a project implements pervious parking lots (such as pervious concrete), that they would not be necessarily be subjected to a SSMP (unless triggered by another category). This will be a way to strongly encourage this type of LID source control.

'or with 15 or more': Consistent with 2004 SMR and 2010 Santa Ana. Make it simple and consistent, having dual checks here is adding unnecessary complexity.

Comment [CP24]: Footnote added to allow the Copermittees the option to develop road standards, that, upon approval by the EO, could be used in-lieu of a WQMP for each road project.

Comment [CP25]: There is no reason to have an *'updated'* procedure.

[10] The Copermittees may develop and submit to the Regional Board, a plan for addressing pollutant discharges from streets, roads, highways and freeways through implementation of revised standard roadway sections that utilize USEPA Green Streets guidance or similar. Upon approval of the plan by the Executive Officer, projects that incorporate those standards need not be categorized as a PDP unless also triggered by another category.

to be present on site.

(4) Low Impact Development BMP Requirements

Each Copermittee must require each Priority Development Project to implement LID BMPs which will collectively minimize directly connected impervious areas, limit loss of existing infiltration capacity, and protect areas that provide important water quality benefits necessary to maintain riparian and aquatic biota, and/or are particularly susceptible to erosion and sediment loss.

(a) The Copermittees must take the following measures to ensure that LID BMPs are implemented at PDPs:

(i) Each Copermittee must require LID BMPs or make a finding of technical infeasibility for each Priority Development Project in accordance with the LID waiver program in Section F.1.d.(8);
(ii) Each Copermittee must incorporate formalized consideration, such as thorough checklists, ordinances, and/or other means, of LID BMPs into the plan review process for Priority Development Projects;
(iii) The review of each Priority Development Project must include an assessment of potential collection of storm water for on-site or off-site reuse opportunities;
(iv) The review of each Priority Development Project must include an assessment of techniques to infiltrate, filter, store, evaporate, or retain runoff close to the source of runoff; and
(v) Within 2 years after adoption of this Order, each Copermittee must review its local codes, policies, and ordinances and identify barriers therein to implementation of LID BMPs. Following the identification of these barriers to LID implementation, where feasible, the Copermittee must take, by the end of the permit cycle, appropriate actions to remove such barriers.

(b) The following LID BMPs must be implemented at each PDP:

(i) Maintain or restore natural storage reservoirs and drainage corridors (including depressions, areas of permeable soils, swales, and ephemeral and intermittent streams.
(ii) Projects with landscaped or other pervious areas must, where feasible, drain runoff from impervious areas (rooftops, parking lots, sidewalks, walkways, patios, etc) into pervious areas prior to discharge to the MS4. The amount of runoff from impervious areas that is to drain to pervious areas shall not exceed the total capacity of the project's pervious areas to infiltrate or treat runoff, taking into consideration the pervious areas' geologic and soil conditions,

slope, and other pertinent factors.

(iii) Projects with landscaped or other pervious areas must, where feasible, properly design and construct the pervious areas to effectively receive and infiltrate or treat runoff from impervious areas, prior to discharge to the MS4. Soil compaction for these areas shall be minimized. The amount of the impervious areas that are to drain to pervious areas must be based upon the total size, soil conditions, slope, and other pertinent factors.

(iv) Projects with low traffic areas and appropriate soil conditions must construct walkways, trails, overflow parking lots, alleys, or other low-traffic areas with permeable surfaces, such as pervious concrete, porous asphalt, unit pavers, and granular materials.

(b) To protect ground water resources any large, centralized infiltration BMPs must comply with Section F.1.(c)(6). The restrictions do not apply to small infiltration systems dispersed throughout a development project.

(c) LID BMPs sizing criteria:

(i) LID BMPs shall be sized and designed to ensure onsite retention without runoff, of the volume of runoff produced from a 24-hour 85th percentile storm event[11] ("design capture volume");

(ii) If onsite retention LID BMPs are technically infeasible per section F.1.d.(7)(b), LID biofiltration BMPs may treat any volume that is not retained onsite by the LID BMPs. The LID biofiltration BMPs must be designed for an appropriate surface loading rate to prevent erosion, scour and channeling within the BMP. Due to the flow through design of biofiltration BMPs, the total volume of the BMP, including pore spaces and prefilter detention volume, must be sized to hold at least 0.75 times the design storm volume that is not retained onsite by LID retention BMPs;

(iii) If it is shown to be technically infeasible to treat the remaining volume up to and including the design capture volume using LID BMPs (retention or biofiltration), the project must implement conventional treatment control BMPs in accordance with Section F.1.d.(6) below and must participate in the LID waiver program in Section F.1.d.(7).

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[11] This volume is not a single volume to be applied to all of Riverside County. The size of the 85th percentile storm event is different for various parts of the County. The Copermittees are encouraged to calculate the 85th percentile storm event for each of their jurisdictions using local rain data pertinent to their particular jurisdiction (0.6 inch standard is a rough average for the County and should only be used where appropriate rain data is not available). In addition, isopluvial maps may be used to extrapolate rainfall data to areas where insufficient data exists in order to determine the volume of the local 85th percentile storm event in such areas. Where the Copermittees will use isopluvial maps to determine the 85th percentile storm event in areas lacking rain data, the Copermittees shall describe their method for using isopluvial maps in their SSMPs.

(e) All LID BMPs shall be designed and implemented with measures to avoid the creation of nuisance or pollution associated with vectors, such as mosquitoes, rodents, and flies.

(5) Source Control BMP Requirements

Each Copermittee must require each Priority Development Project to implement source control BMPs. The source control BMPs to be required must:

(a) Prevent illicit discharges into the MS4;
(b) Minimize storm water pollutants of concern in runoff;
(c) Eliminate irrigation runoff;
(d) Include storm drain system stenciling or signage;
(e) Include properly designed outdoor material storage areas;
(f) Include properly designed outdoor work areas;
(g) Include properly designed trash storage areas;
(h) Include water quality requirements applicable to individual priority project categories.

(6) Treatment Control BMP Requirements[12]

Each Copermittee must require each Priority Development Project to implement treatment control BMPs that meet the following requirements:

(a) All treatment control BMPs for a single Priority Development Project must collectively be sized to comply with the following numeric sizing criteria:

(i) Volume-based treatment control BMPs must be designed to mitigate (infiltrate, filter, or treat) the volume of runoff produced from a 24-hour 85th percentile storm event,[13]; or

(ii) Flow-based treatment control BMPs must be designed to mitigate (infiltrate, filter, or treat) either: a) the maximum flow rate of runoff produced from a rainfall intensity of 0.2 inch of rainfall per hour, for

[12] This section only applies to those PDPs not implementing LID capable of meeting the design storm criteria for the entire site and meeting technical infeasibility eligibility. Low-Impact Development (LID) and other site design BMPs that are correctly designed to effectively remove pollutants from runoff are considered treatment control BMPs.

[13] This volume is not a single volume to be applied to all of Riverside County. The size of the 85th percentile storm event is different for various parts of the County. The Copermittees are encouraged to calculate the 85th percentile storm event for each of their jurisdictions using local rain data pertinent to their particular jurisdiction. In addition, isopluvial maps may be used to extrapolate rainfall data to areas where insufficient data exists in order to determine the volume of the local 85th percentile storm event in such areas. Where the Copermittees will use isopluvial maps to determine the 85th percentile storm event in areas lacking rain data, the Copermittees shall describe their method for using isopluvial maps in their SSMPs.

each hour of a storm event; or b) the maximum flow rate of runoff produced by the 85th percentile hourly rainfall intensity (for each hour of a storm event), as determined from the local historical rainfall record, multiplied by a factor of two.

(b) Treatment control BMPs for all Priority Development Projects must mitigate (treat through infiltration, settling, filtration or other unit processes) the required volume or flow of runoff from all developed portions of the project, including landscaped areas.

(c) All treatment control BMPs must be located so as to remove pollutants from runoff prior to its discharge to any receiving waters. Multiple Priority Development Projects may use shared treatment control BMPs as long as construction of any shared treatment control BMP is completed prior to the use or occupation of any Priority Development Project from which the treatment control BMP will receive runoff.

(d) All treatment control BMPs for Priority Development Projects must, at a minimum:

(i) Be ranked with high or medium pollutant removal efficiency for the project's most significant pollutants of concern, as the pollutant removal efficiencies are identified in the Copermittees' Model SSMP. Treatment control BMPs with a low removal efficiency ranking must only be approved by a Copermittee when a feasibility analysis has been conducted which exhibits that implementation of treatment control BMPs with high or medium removal efficiency rankings are infeasible for a Priority Development Project or portion of a Priority Development Project.

(ii) Be correctly sized and designed so as to remove storm water pollutants to the MEP.

(e) Target removal of pollutants of concern from runoff.

(f) Be implemented close to pollutant sources, and prior to discharging into waters of the U.S.

(g) Not be constructed within a waters of the U.S. or waters of the State.

(h) Include proof of a mechanism under which ongoing long-term maintenance will be conducted to ensure proper maintenance for the life of the project. The mechanisms may be provided by the project proponent or Copermittee.

(i) Be designed and implemented with measures to avoid the creation of nuisance or pollution associated with vectors, such as mosquitoes,

rodents, and flies.

(7) Low Impact Development (LID) BMP Waiver Program

The Copermittees must develop, collectively or individually, a LID waiver program for incorporation into local SSMPs, which would allow a Priority Development Project to substitute implementation of all or a portion of required LID BMPs in section F.1.d(4) with implementation of treatment control BMPs and either 1) a mitigation project, 2) payment into an in-lieu funding program, and/or 3) watershed equivalent BMP(s) consistent with Section F.1.d.(11). The Copermittees shall submit the LID waiver program as part of their updated model SSMP. At a minimum, the program must meet the requirements below:

(a) Prior to implementation, the LID waiver program must clearly exhibit that it will not allow PDPs to result in a net impact (after consideration of any mitigation and in-lieu payments) from pollutant loadings over and above the impact caused by projects meeting LID requirements;

(b) For each PDP participating, a technical feasibility analysis must be included demonstrating that it is technically infeasible to implement LID BMPs that comply with the requirements of Section F.1.(d)(4). The Copermittee(s) must develop criteria for the technical feasibility analysis including a cost benefit analysis, examination of LID BMPs considered and alternatives chosen. Each PDP participating must demonstrate that LID BMPs were implemented as much as feasible given the site's unique conditions. Analysis must be made of the pollutant loading for each project participating in the LID substitution program. The estimated impacts from not implementing the required LID BMPs in section F.1.d.(4) must be fully mitigated. Technical infeasibility may result from conditions including, but not limited to:

(i) Locations that cannot meet the infiltration and groundwater protection requirements in section F.1.c.(6) for large, centralized infiltration BMPs. Where infiltration is technically infeasible, the project must still examine the feasibility of other onsite retention LID BMPs;
(ii) Smart growth and infill or redevelopment locations where the density and/or nature of the project would create significant difficulty for compliance with the onsite volume retention requirements; and
(iii) Other site, geologic, soil or implementation constraints identified in the Copermittees updated local SSMP document.

(c) The LID waiver program must include mechanisms to verify that each

Priority Development Project participating in the program is in compliance with all applicable SSMP requirements;

(d) The LID waiver program must develop and implement a review process verifying that the BMPs to be implemented meet the designated design criteria. The review process must also verify that each Priority Development Project participating in the program is in compliance with all applicable SSMP requirements.

(e) The LID waiver program must include performance standards for treatment control BMPs specified in compliance with section F.1.(d)(6).

(f) Each PDP that participates in the LID waiver program must mitigate for the pollutant loads expected to be discharged due to not implementing the LID BMPs in section F.1.d.(4). Mitigation projects must be implemented within the same hydrologic subarea as the PDP. Mitigation projects outside of the hydrologic subarea but within the same hydrologic unit may be approved provided that the project proponent demonstrates that mitigation projects within the same hydrologic subarea are infeasible and that the mitigation project will address similar beneficial use impacts as expected from the PDPs pollutant load types and amount. Offsite mitigation projects may include green streets projects, existing development retrofit projects, retrofit incentive programs, regional BMPs and stream restoration. Project applicants seeking to utilize these alternative compliance provisions may propose other offsite mitigation projects, which the Copermittees may approve if they meet the requirements of this subpart.

(g) A Copermittee may choose to implement a pollutant credit system as part of the LID waiver program provided that such a credit system clearly exhibits that it will not allow PDPs to result in a net impact from pollutant loadings over and above the impact caused by projects meeting LID requirements. Any credit system that a Copermittee chooses to implement must be submitted to the Executive Officer for review and approval as part of the waiver program.

(h) The LID waiver program shall include a storm water mitigation fund developed by the Copermittee(s) to be used for water quality improvement projects which may serve in lieu of the PDP's required mitigation in section F.1.d.(8)(e). The LID waiver program's storm water mitigation fund shall, at a minimum, identify;

(i) The entity or entities that will manage the storm water mitigation fund (i.e., assume full responsibility);
(ii) The range and types of acceptable projects for which storm water mitigation funds may be expended;

(iii) The entity or entities that will assume full responsibility for each water quality improvement project, including its successful completion; and

(iv) How the dollar amount of storm water mitigation fund contributions will be determined. In-lieu payments must be proportional to the additional pollutant load discharged by not fully implementing LID.

(i) Each Copermittee must notify the San Diego Water Board in their annual report of each PDP choosing to participate in the LID waiver program. The annual report must include the following information:

(i) Name of the developer of the participating PDP;
(ii) Site location;
(iii) Reason for LID waiver including technical feasibility analysis;
(iv) Description of BMPs implemented;
(v) Total amount deposited, if any, into the storm water mitigation fund described in section F.1.d.(8)(f);
(vi) Water quality improvement project(s) proposed to be funded; and
(vii) Timeframe for implementation of water quality improvement projects.

(8) Site Design and Treatment Control BMP Design Standards

As part of ~~its local~~the SSMP, each Copermittee must develop and require Priority Development Projects to ~~implement~~ comply with ~~sitting,~~ design, and maintenance criteria for each ~~site design~~LID and treatment control BMP listed in its local SSMP to ~~determine~~assist with determining~~determine~~ feasibility and applicability and so that implemented ~~site design~~LID and treatment control BMPs are constructed correctly and are effective at pollutant removal, runoff control, and vector minimization. LID techniques must be incorporated into the criteria for appropriate treatment control BMPs where feasible. Development of BMP design worksheets which can be used by project proponents is encouraged.

(9) Implementation Process

As part of its local SSMP, each Copermittee must implement a process to verify compliance with SSMP requirements. The process must identify at what point in the planning process Priority Development Projects will be required to meet SSMP requirements and at a minimum, the Priority Development Project must implement the required post-construction BMPs prior to occupancy and/or the intended use of any portion of that project. The process must also include identification of the roles and responsibilities of various municipal departments in implementing the SSMP requirements, as well as any other measures necessary for the implementation of SSMP requirements.

(10) Treatment BMP Review

(a) The Copermittees must review and update the BMPs that are listed in their local SSMPs as options for treatment control. At a minimum, the update must include removal of obsolete or ineffective BMPs and addition of LID BMPs that can be used for treatment, such as bioretention cells, bioretention swales, etc. The update must also add appropriate LID BMPs to any tables or discussions in the local SSMPs addressing pollutant removal efficiencies of treatment control BMPs. In addition, the update must include review and revision where necessary of treatment control BMP pollutant removal efficiencies.

(b) The update must incorporate findings from BMP effectiveness studies conducted by the Copermittees for projects funded wholly or in part by the State Board or Regional Boards.

(c) Each Copermittee must implement a mechanism for annually incorporating findings from local treatment BMP effectiveness studies (e.g., ones conducted by, or on-behalf of, public agencies in Riverside County) into SSMP project reviews and permitting

~~(11) Where a development project, greater than 100 acres in total project size or smaller than 100 acres in size yet part of a larger common plan of development that is over 100 acres, has been prepared using watershed and/or sub-watershed based water quality, hydrologic, and fluvial geomorphologic planning principles that implement regional LID BMPs in accordance with the sizing and location criteria of this Order and acceptable to the San Diego Water Board, such standards shall govern review of projects with respect to Section F.1 of this Order and shall be deemed to satisfy this Order's requirements for LID site design, buffer zone, infiltration and groundwater protection standards, source control, treatment control, and hydromodification control standards. Regional BMPs must clearly exhibit that they will not result in a net impact from pollutant loadings over and above the impact caused by capture and retention of the design storm. Regional BMPs may be used provided that the BMPs capture and retain the volume of runoff produced from the 24-hour 85th percentile storm event as defined in section F.1.d.(6)(a)(i) and that such controls are located upstream of receiving waters. Any volume that is not retained by the LID BMPs, up to the design capture volume, must be treated using LID biofiltration. Where regional LID implementation has been shown to be technically infeasible (per section F.1.d.7.b) any volume up to and including the design capture volume, not retained by LID BMPs, nor treated by LID biofiltration, must be treated using conventional treatment control BMPs in accordance with Section F.1.d.(6) and participation in the LID waiver program in Section F.1.d.(7).~~

Comment [JEU26]: Specific to OC. Our understanding is that the Permit already allows regional solutions.

e. BMP CONSTRUCTION VERIFICATION

Prior to occupancy and/or intended use of any portion of the Priority Development Project subject to SSMP requirements, each Copermittee must inspect the constructed site design, source control, and treatment control BMPs applicable to that portion of the project to verify that they have been constructed and are operating in compliance with all specifications, plans, permits, ordinances, and this Order.

f. BMP MAINTENANCE TRACKING

(1) Inventory of SSMP projects: Each Copermittee must develop and maintain a watershed-based database to track and inventory all projects constructed within their jurisdiction, that have a final SSMP (SSMP projects), and the structural~~approved~~ post-construction BMPs implemented therein. SUSMP projects built pursuant to order R9-2004-001 must also be tracked. ~~and BMP maintenance within its jurisdiction since July, 2005~~. LID BMPs implemented on a lot by lot basis ~~at a single family residential home~~, such as rain barrels, are not required to be tracked or inventoried. At a minimum, the database must include information on BMP type, location, watershed, ~~date of construction~~, party responsible for maintenance, dates and findings of maintenance ~~certifications or~~ verifications, -and any vector or nuisance problems. ~~inspections, inspection findings, and corrective actions, including whether the site was referred to the local vector control agency or department.~~

(2) Each Copermittee must establish a mechanism not only to track Priority Development Projects, and the structural post-construction BMPs implemented therein, but also to ensure that appropriate easements and ownerships are properly recorded in public records and the information is conveyed to all appropriate parties when there is a change in project or site ownership.

(3) Each Copermittee must verify that ~~approved~~ structural post-construction BMPs on the inventoried SSMP projects~~are operating effectively and~~ have been adequately maintained by implementing the following measures:

~~(a) An annual inventory of all approved BMPs within the Copermittee's jurisdiction. LID BMPs implemented on a lot by lot basis at a single family residential home, such as rainbarrels, are not required to be tracked or inventoried. The inventory must also include all BMPs approved for Priority Development Projects since July, 2005;~~

(a) The designation of 'high ~~priority~~ maintenance' SSMP Projects~~BMPs~~. 'High-~~priority~~ maintenance' designation must include consideration of land

Comment [CP27]: Changes are to allow a single database to be created for the Santa Ana and Santa Margarita watersheds, and a uniform program to be implemented county-wide. This will allow the Copermittees to comply in a more cost-effective manner and avoid confusion.

Comment [CP28]: Belongs in F.1.d.(9) above.

Comment [CP29]: We can't verify that they are 'operating'. All we can do is verify that they have been constructed correctly (pursuant to F.1.e) and that they have been maintained correctly. This combination of verifications will ensure that they will be operational. References to 'operating' have been deleted throughout.

use type, BMP ~~size~~type and effectiveness at addressing the project's pollutants of concern, ~~-~~recommended BMP maintenance frequency and~~,~~ likelihood of operational and maintenance issues, ~~location, receiving water quality,~~ and other pertinent factors;

(b) Beginning X years after adoption of this order, each Copermittee must implement a program to ~~V~~verify implementation, ~~operation,~~ and maintenance of the required structural post-construction BMPs on the inventoried SSMP projects, by inspection, self-certification, surveys, or other equally effective approaches with the following conditions:

(i) At least 90% of Municipal SSMP projects must be verified annually.

(ii) At least 90% of 'high maintenance' SSMP projects must be verified annually.

(iii) All inventoried SSMP projects must be verified at least once every five years.

(iv) At the discretion of the Copermittee, the verifications may be coordinated with the facility inspections implemented pursuant to section F.3. of this order.

(v) For verifications performed through a means other than direct Copermittee inspection, adequate documentation must be submitted to the Copermittee to provide assurance that the required maintenance has been completed.

~~(i) The implementation, operation, and maintenance of at least 90 percent of approved and inventoried final project public and private SSMPs (a.k.a. WQMPs) must be verified annually. All post-construction BMPs shall be verified within every four year period;~~

~~(ii) Operation and maintenance verifications must be required prior to each rainy season;~~

~~(iii) All (100 percent) projects with BMPs that are high priority must be inspected by the Copermittee annually prior to each rainy season;~~

~~(iv) All (100 percent) public agency projects with BMPs must be inspected by the Copermittee annually;~~

~~(v) At least 50 percent of projects with drainage insert treatment control BMPs must be inspected by the Copermittee annually;~~

(vi) Appropriate follow-up measures (including re-inspections, enforcement, maintenance, etc.) must be conducted to ensure the treatment BMPs continue to reduce storm water pollutants as originally designed;

~~(vii) All inspections must verify effective operation and maintenance of the treatment control BMPs, as well as compliance with all ordinances,~~

~~permits, and this Order; and~~

(vii) Inspections must note observations of vector conditions, such as mosquitoes. Where conditions are identified as contributing to mosquito production, the Copermittee must notify their local vector control agency.

Comment [CP30]: The Copermittees may conduct BMP inspections/certifications independently of PDP Commercial/Industrial Inspections. Keep the two separate so that the Permittees can find the most cost-effective and protective approach to address the Permit.

g. ENFORCEMENT OF DEVELOPMENT SITES

Comment [CP31]: Entire section F.1. of the permit is Development '*Planning*'. Enforcement belongs in the construction and existing development sections, not here.

Each Copermittee must enforce its storm water ordinance for all Development Projects ~~and at all development sites~~ as necessary to maintain compliance with this Order. Copermittee ordinances or other regulatory mechanisms must include appropriate sanctions to achieve compliance. Sanctions must include the following or their equivalent: Non-monetary penalties, fines, ~~bonding requirements,~~ and/or permit or occupancy denials for non-compliance.

Comment [CP32]: Term has no meaning outside of Development Projects

Comment [CP33]: These are ineffective for enforcement purposes as it is too difficult to actually pull them.

h. HYDROMODIFICATION – LIMITATIONS ON INCREASES OF RUNOFF DISCHARGE RATES AND DURATIONS[14]

Each Copermittee shall collaborate with the other Copermittees to develop and implement a Hydromodification Management Plan (HMP) to manage increases in runoff discharge rates and durations from all Priority Development Projects. The HMP shall be incorporated into the local SSMP and implemented by each Copermittee so that estimated post-project runoff discharge rates and durations shall not exceed pre-development discharge rates and durations. Where the proposed project is located on an already developed site, the pre-project discharge rate and duration shall be that of the pre-developed, naturally occurring condition. The HMP shall be submitted to the Executive Officer within 2 years of permit adoption. The HMP will be made available for public review and comment and the Executive Officer will determine the need for a public hearing.

(1) The HMP must:

(a) Identify a method for assessing susceptibility of channel segments which receive runoff discharges from Priority Development Projects. The geomorphic stability within the channel shall be assessed. A performance standard shall be created that ensures that the geomorphic stability within the channel not be compromised as a result of receiving runoff discharges from Priority Development Projects.

[14] Updated SSMP and hydromodification requirements shall apply to all priority projects or phases of priority projects which have not yet begun grading or construction activities at the time any updated SSMP or hydromodification requirement commences. If a Copermittee determines that lawful prior approval of a project exists, whereby application of an updated SSMP or hydromodification requirement to the project is legally infeasible, the updated SSMP or hydromodification requirement need not apply to the project. The Copermittees shall utilize the SSMP and hydromodification update periods to ensure that projects undergoing approval processes include application of the updated SSMP and hydromodification requirements in their plans.

(b) Utilize continuous simulation of the entire rainfall record (or other analytical method proposed by the Copermittees and deemed acceptable by the San Diego Water Board) to identify a range of runoff flows[15] for which priority Development Project post-project runoff flow rates and durations shall not exceed pre-development (naturally occurring) runoff flow rates and durations by more than 10 percent, where the increased flow rates and durations will result in increased potential for erosion or other significant adverse impacts to beneficial uses. In addition, the identified range of runoff flow rates and durations must compensate for the loss of sediment supply due to the development. The lower boundary of the range of runoff flows identified shall correspond with the critical channel flow that produces the critical shear stress that initiates channel bed movement or that erodes the toe of channel banks. The identified range of runoff flows may be different for specific watersheds, channels, or channel reaches. In the case of an artificially hardened (concrete lined, rip rap, etc.) channel, the lower boundary of the range of runoff flows identified shall correspond with the critical channel flow that produces the critical shear stress that initiates channel bed movement or that erodes the toe of channel banks of a comparable soft-bottomed channel.

(c) Require Priority Development Projects to implement hydrologic control measures so that Priority Development Projects' post-project runoff flow rates and durations (1) do not exceed pre-project (naturally occurring) runoff flow rates and durations by more than 10 percent for the range of runoff flows identified under section F.1.h.(1)(b), where the increased flow rates and durations will result in increased potential for erosion or other significant adverse impacts to beneficial uses; (2) do not result in channel conditions which do not meet the channel standard developed under section F.1.h.(1)(a) for channel segments downstream of Priority Development Project discharge points; and (3) compensate for the loss of sediment supply due to development.

(d) Include other performance criteria (numeric or otherwise) for Priority Development Projects as necessary to prevent runoff from the projects from increasing and/or continuing unnatural rates of erosion of channel beds and banks, silt pollutants generation, or other impacts to beneficial uses and stream habitat due to increased erosive force.

(e) Include a review of pertinent literature.

(f) Identify areas within the Santa Margarita Hydrologic Unit where historic hydromodification of receiving waters has a negative impact to benthic

[15] The identified range of runoff flows to be controlled should be expressed in terms of peak flow rates of rainfall events, such as "10% of the pre-development 2-year runoff event up to the pre-project 10-year runoff event."

macroinvertebrate and benthic periphyton by identifying areas with low or very low Index of Biotic Integrity (IBI) scores.

(g) Include a protocol to evaluate potential hydrograph change impacts to downstream watercourses from Priority Development Projects. This protocol must include the use of the IBI score as a metric for assessing impacts and improvements to downstream watercourses.

(h) Include a description of how the Copermittees will incorporate the HMP requirements into their local approval processes.

(i) Include criteria on selection and design of management practices and measures (such as detention, retention, and infiltration) to control flow rates and durations and address potential hydromodification impacts.

(j) Include technical information supporting any standards and criteria proposed.

(k) Include a description of inspections and maintenance to be conducted for management practices and measures to control flow rates and durations and address potential hydromodification impacts.

(l) Include a description of pre- and post-project monitoring and other program evaluation, including IBI score, to be conducted to assess the effectiveness of implementation of the HMP.

(m) Include mechanisms for assessing and addressing cumulative impacts within a watershed on channel morphology.

(n) Include information on evaluation of channel form and condition, including slope, discharge, vegetation, underlying geology, and other information, as appropriate.

(2) In addition to the hydrologic control measures that must be implemented per section F.1.h.(1)(c), the HMP must include a suite of management measures to be used on Priority Development Projects to protect and restore downstream beneficial uses and prevent or further prevent adverse physical changes to downstream channels. The measures must be based on a prioritized consideration of the following elements in this order:

(a) Hydrologic control measures;
(b) On-site management controls;
(c) Regional controls located upstream of receiving waters; and
(d) In-stream controls.

Where stream channels are adjacent to, or are to be modified as part of a

Priority Development Project, management measures must include buffer zones and setbacks. Under no circumstances will in-stream controls include the use of non-naturally occurring hardscape materials such as concrete, riprap, gabions, etc. The suite of management measures shall also include stream restoration as a viable option to achieve the channel standard in section F.1.h.(1)(a).

(3) Each individual Copermittee has the discretion to not require Section F.1.h. at Priority Development Projects where the project:

(a) Discharges storm water runoff into underground storm drains discharging directly to bays or the ocean; or
(b) Discharges storm water runoff into conveyance channels whose bed and bank are concrete lined all the way from the point of discharge to ocean waters, enclosed bays, estuaries, or water storage reservoirs and lakes.

(4) HMP Reporting and Implementation

(a) Within 2 years of adoption of the Order, the Copermittees shall submit to the San Diego Water Board a draft HMP that has been reviewed by the public, including the analysis that identifies the appropriate limiting range of flow rates per section F.1.h.(1)(b).

(b) Within 180 days of receiving San Diego Water Board comments on the draft HMP, the Copermittees shall submit a final HMP that addressed the San Diego Water Board's comments.

(c) Within 90 days of receiving a finding of adequacy from the Executive Officer, each Copermittee shall incorporate and implement the HMP for all Priority Development Projects.

(d) Prior to approval of the HMP by the San Diego Water Board, the early implementation measures likely to be included in the HMP shall be encouraged by the Copermittees.

(5) <u>Interim Hydromodification Criteria</u>

Within one year of adoption of this Order, each Copermittee must ensure that all Priority Development Projects are implementing the following criteria by comparing the pre-development (naturally occurring) and post-project flow rates and durations using a continuous simulation hydrologic model such as US EPA's Hydrograph Simulation Program-Fortran (HSPF):

(a) For flow rates from 10 percent of the 2-year storm event to the 5 year storm event, the post-project peak flows shall not exceed pre-development (naturally occurring) peak flows.

(b) For flow rates from the 5 year storm event to the 10 year storm event the post-project peak flows may exceed pre-development (naturally occurring) flows by up to 10 percent for a 1-year frequency interval.

The interim hydromodification criteria do not apply to Priority Development Projects where the project discharges (1) storm water runoff into underground storm drains discharging directly to bays or the ocean, or (2) storm water runoff into conveyance channels whose bed and bank are concrete lined all the way from the point of discharge to ocean waters, enclosed bays, estuaries, or water storage reservoirs and lakes.

Within one year of adoption of this Order, each Copermittee must submit a signed, certification statement to the San Diego Water Board verifying implementation of the interim hydromodification criteria.

(6) No part of section F.1.h shall alleviate the Copermittees responsibilities for implementing Low Impact Development BMPs as required under section F.1.d.(4).

i. TRAINING AND EDUCATION

(1) Municipal Departments and Personnel Education

Municipal Development Planning: Each Copermittee must implement an education program so that its planning and development review staffs and contractors (and Planning Boards and Elected Officials, if applicable) have an understanding of:

(a) Federal, State, and local water quality laws and regulations applicable to Development Projects;

(b) The connection between land use decisions and short and long-term water quality impacts (i.e., impacts from land development and urbanization); and

(c) Methods of minimizing impacts to receiving water quality resulting from development, including:

(i) Storm water management plan development and review;
(ii) Local sensitive water bodies, including 303(d)-impairments and ESAs;
(iii) Methods to control downstream erosion impacts;
(iv) Identification of pollutants of concern;
(v) Site design BMP techniques;
(vi) Source control BMPs;
(vii) Selection of the most effective treatment control BMPs for the

pollutants of concern; and
(viii) Public heath concerns related to storm water management infrastructure.

(2) Project Applicants, Developers, Contractors, Property Owners, and other Responsible Parties

(a) Each Copermittee must implement a New Development / Redevelopment education program using all media as appropriate to:

(i) Measurably increase the knowledge of the target communities regarding MS4s, impacts of runoff on receiving waters, and potential BMP solutions for the target audience; and
(ii) To measurably change the behavior of target communities and thereby reduce pollutant releases to MS4s and the environment.

(b) Each Copermittee must educate each target community on the following topics where appropriate:

(i) The importance of educating all construction workers in the field about storm water issues and BMPs though formal or informal training;
(ii) Federal, State, and local water quality laws and regulations applicable to new development and redevelopment activities;
(iii) Site design, source control, pollution prevention, and treatment BMPs;
(iv) General runoff concepts; and
(v) Other topics of local importance, including local water quality conditions, impaired waterbodies and environmentally sensitive areas.

2. CONSTRUCTION COMPONENT

Each Copermittee must implement a construction program which meets the requirements of this section~~,~~ to prevent~~s~~ illicit discharges into the MS4, implement~~s~~ and maintain~~s~~ structural and non-structural BMPs to reduce pollutants in storm water runoff from construction sites to the MS4, reduce~~s~~ construction site discharges of storm water pollutants from the MS4 to the MEP, and prevent~~s~~ construction site discharges from the MS4 from causing or contributing to a violation of water quality standards.

a. ORDINANCE UPDATE

Within 365 days of adoption of this Order, each Copermittee must review and update its grading ordinances and other ordinances as necessary to achieve full compliance with this Order, including requirements for the implementation of all designated BMPs and other measures.

b. SOURCE IDENTIFICATION

Each Copermittee must maintain an updated watershed based inventory of all construction sites within its jurisdiction. The use of an automated database system, such as Geographical Information Systems (GIS) is ~~required~~encouraged.

c. SITE PLANNING AND PROJECT APPROVAL PROCESS

Each Copermittee must incorporate consideration of potential water quality impacts prior to approval and issuance of construction and grading permits.

(1) Each construction and grading permit must require proposed construction sites to implement designated BMPs and other measures so that illicit discharges into the MS4 are prevented and storm water pollutants discharged from the site will be reduced to the maximum extent practicable ~~and will not cause or contribute to a violation of water quality standards~~.

(2) Prior to permit issuance, the Copermittee must inform the project proponent~~'s runoff management plan (or equivalent construction BMP plan) must be required to comply, and reviewed to verify compliance, with~~ of the applicable requirements of the local grading ordinance, other applicable local ordinances, and this Order that they will be required to comply with during construction.

(3) Prior to permit issuance, each Copermittee must verify that project proponents subject to California's statewide General NPDES Permit for Storm Water Discharges Associated With Construction Activities, (hereinafter General Construction Permit), have existing coverage under the General Construction Permit.

d. BMP IMPLEMENTATION

(1) Designate BMPs: Each Copermittee must designate a minimum set of BMPs and other measures to be implemented at all construction sites. The designated minimum set of BMPs must include:

(a) Management Measures:

(i) Pollution prevention, where appropriate;
(ii) ~~Development and implementation of a site-specific runoff management plan~~;
(iii) Minimization of areas that are cleared and graded to only the portion of the site that is necessary for construction;
(iv) Minimization of exposure time of disturbed soil areas;
(v) Minimization of grading during the wet season and correlation of grading with seasonal dry weather periods to the extent feasible;

(vi) Limitation of grading to a maximum disturbed area as determined by each Copermittee before either temporary or permanent erosion controls are implemented to prevent storm water pollution. The Copermittee has the option of temporarily increasing the size of disturbed soil areas by a set amount beyond the maximum, if the individual site is in compliance with applicable storm water regulations and the site has adequate control practices implemented to prevent storm water pollution;
(vii) Temporary stabilization and reseeding of disturbed soil areas as rapidly as feasible;
(viii) Wind erosion controls;
(ix) Tracking controls;
(x) Non-stormwater management measures to prevent illicit discharges and control storm water pollution sources;
(xi) Waste management measures;
(xii) Preservation of natural hydrologic features where feasible;
(xiii) Preservation of riparian buffers and corridors where feasible;
(xiv) Evaluation and maintenance of all BMPs, until removed; and
(xv) Retention, reduction, and proper management of all storm water pollutant discharges on site to the MEP standard.

(b) Erosion and Sediment Controls:

(i) Erosion prevention. Erosion prevention is to be used as the most important measure for keeping sediment on site during construction;
(ii) Sediment controls. Sediment controls are to be used as a supplement to erosion prevention for keeping sediment on-site during construction;
(iii) Slope stabilization must be used on all active slopes during rain events regardless of the season and on all inactive slopes during the rainy season and during rain events in the dry season; and
(iv) Permanent revegetation or landscaping as early as feasible.

(c) ~~Designate enhanced BMPs[16] for 303(d) impairments and ESAs:~~ Each Copermittee must implement, or require implementation of, enhanced measures to address the exceptional threat to water quality posed by all construction sites tributary to CWA section 303(d) water body segments impaired for sediment or turbidity. Each Copermittee must also implement, or require implementation of, enhanced, site-specific measures for construction sites within or adjacent to or discharging directly to receiving waters within environmentally sensitive areas (as defined in Attachment C of this Order).

~~[16] Enhanced BMPs are control actions specifically targeted to the pollutant or condition of concern and of higher quality and effectiveness than the minimum control measures otherwise required. Enhanced in this Order means better, not simply more, BMPs.~~

~~(i) Active Sediment Treatment (AST): Each Copermittee must require implementation of advanced treatment for sediment at construction sites (or portions thereof) that are determined by the Copermittee to be an exceptional threat to water quality. In evaluating the threat to water quality, the following factors must be considered by the Copermittee:~~

~~[a] Soil erosion potential or soil type;~~
~~[b] The site's slopes;~~
~~[c] Project size and type;~~
~~[d] Sensitivity of receiving water bodies;~~
~~[e] Proximity to receiving water bodies;~~
~~[f] Non-storm water discharges;~~
~~[g] Ineffectiveness of other BMPs;~~
~~[h] Proximity and sensitivity of aquatic threatened and endangered species of concern;~~
~~[i] Known effects of AST chemicals; and~~
~~[j] Any other relevant factors.~~

(d) Implement BMPs: Each Copermittee must implement, or require the implementation of, the designated minimum BMPs and any additional measures necessary to comply with this Order at each construction site within its jurisdiction year round. BMP implementation requirements, however, can vary based on wet and dry seasons. Dry season BMP implementation must plan for and address unseasonal rain events that may occur during the dry season (May 1 through September 30).

e. INSPECTION OF CONSTRUCTION SITES

Each Copermittee must conduct construction site inspections for compliance with its ordinances (grading, storm water, etc.), permits (construction, grading, etc.), and this Order. Priorities for inspecting sites must consider the nature and size of the construction activity, topography, and the characteristics of soils and receiving water quality.

(1) During the wet season, each Copermittee must inspect at least every ~~two weeks~~month, all construction sites within its jurisdiction meeting any of the following criteria:

(a) All sites ~~30~~ 50 acres or more in size with rough grading or active slopes occurring during the wet season;

(b) All sites one acre or more, and tributary to[17] a CWA section 303(d) water body segment impaired for sediment or within ~~or directly adjacent to,~~ or

[17] 'Tributary to' is considered to be within the same Hydrologic Sub Area.

Comment [CP34]: Changed to allow inspectors to focus on follow-up inspections and enforcement on sites that are found to be out of compliance. Change is also consistent with the Santa Ana permit requirements which will allow for more consistent and effective implementation of the program.

Comment [CP35]: Consistent with the 2004 SMR Permit and the 2009 Santa Ana permit. See also comments on the Fact sheet.

Comment [CP36]: What matters is that the project is discharging to the Receiving Waters within the ESA. This section should not apply to projects that may be 'adjacent' to, but do not discharge into the receiving waters within the ESA.

discharging directly to a receiving water within an ESA; and

(c) Other sites determined by the Copermittees or the San Diego Water Board as a significant threat to water quality. In evaluating threat to water quality, the following factors must be considered: (1) soil erosion potential; (2) site slope; (3) project size and type; (4) sensitivity of receiving water bodies; (5) proximity to receiving water bodies; (6) non-storm water discharges; (7) known past record of non-compliance by the operators of the construction site; and (8) any other relevant factors.

(2) During the wet season, each Copermittee must inspect at least ~~monthly~~twice during the wet season, all construction sites with one acre or more of soil disturbance not meeting the criteria specified above in section F.2.e.(1).

Comment [CP37]: Changed to be consistent with the Santa Ana permit, and to allow inspectors to focus on follow-up inspections and enforcement on sites that are found to be out of compliance.

(3) During the wet season, each Copermittee must inspect construction sites less than one acre in size as needed to ensure compliance with its ordinances and this Order.

(4) Each Copermittee must inspect all construction sites as needed during the dry season. Sites meeting the criteria in section F.2.e.(1) must be inspected at least once in August or September each year.

(5) Re-inspections: Based upon site inspection findings, each Copermittee must implement all follow-up actions (i.e., re-inspection, enforcement) necessary to comply with this Order. Reinspection frequencies must be determined by each Copermittee based upon the severity of deficiencies, the nature of the construction activity, and the characteristics of soils and receiving water quality.

(6) Inspections of construction sites must include, but not be limited to:

(a) ~~Check for coverage under the General Construction Permit (Notice of Intent (NOI) and/or Waste Discharge Identification No.) during initial inspections~~;

Comment [CP38]: This is already performed under F.2.c.(3). No need to repeat

(b) Assessment of compliance with Copermittee ordinances and permits related to runoff, including the implementation and maintenance of designated minimum BMPs;
(c) Assessment of BMP effectiveness;
(d) Visual observations for non-storm water discharges, potential illicit connections, and potential discharge of pollutants in storm water runoff;
(e) ~~Review of site monitoring data, if the site monitors its runoff~~;

Comment [CP39]: This is a NEW requirement that is not applicable to compliance with our ordinances. This only has utility in enforcing the CGP, which is the responsibility of the Water Board.

(f) Education and outreach on storm water pollution prevention, as needed; and
(g) Creation of a written or electronic inspection report.

(7) The Copermittees must track the number of inspections for each inventoried

construction site throughout the reporting period to verify that each site is inspected at the minimum frequencies required.

f. ENFORCEMENT OF CONSTRUCTION SITES

(1) Each Copermittee must develop and implement an escalating enforcement process ~~that~~ to achieve~~s~~ prompt corrective actions at construction sites for violations of the Copermittee's water quality protection permits, requirements, and ordinances. This enforcement process must include authorizing the Copermittee's construction site inspectors to take immediate enforcement actions when appropriate and necessary. The enforcement process must include appropriate sanctions such as stop work orders, non-monetary penalties, fines, bonding requirements, and/or permit denials for non-compliance.

Comment [CP40]: Concern for undue liability on the Copermittees if a contractor does not promptly correct the site despite appropriate Copermittee enforcement.

'that achieves' could imply that if the Contractor is not prompt in implementing corrective actions, that ***we*** are in violation.

(2) Each Copermittee must be able to respond to construction site related complaints received from third-parties and to ensure the San Diego Water Board that appropriate corrective actions have been implemented.

g. REPORTING OF NON-COMPLIANT SITES

(1) In addition to the notification requirements in Attachment B, each Copermittee must notify the San Diego Water Board when the Copermittee issues a ~~stop work order or other~~ high level enforcement (as defined in the Copermittee's JRMP) to a construction site in its jurisdiction as a result of ~~storm water~~ violations of their storm water ordinances.

(2) Each Copermittee shall annually notify the San Diego Water Board, prior to the commencement of the wet season, of all construction sites with alleged violations that pose a significant threat to water quality. Information may be provided as part of the JRMP annual report if submitted prior to the rainy season. Information provided shall include, but not be limited to, the following:

Comment [CP41]: More streamlined approach to focus notifications on those sites whose alleged violations are posing a significant threat to water quality, rather than sites that have been issued minor corrections.

(a) WDID number if enrolled under the General Construction Permit
(b) Site Location, including address
(c) Current violations or suspected violations

~~**h. TRAINING AND EDUCATION**~~

~~(1) Municipal Staff and Contractors: Requirements for municipal staff and contractors are described in the Municipal Component section of this Order.~~

~~(2) Construction Site Owner / Operator Responsibilities:~~

~~As early in the planning and development process as possible and all through~~

~~the permitting and construction process, each Copermittee must implement a program to educate project applicants, developers, contractors, property owners, and other responsible parties. The education program must provide an understanding of the topics listed below, as appropriate for the audience being educated.~~

(d) The importance of educating all construction workers in the field about storm water issues and BMPs though formal or informal training;
(e) Federal, State, and local water quality laws and regulations applicable to construction and grading activities;
(f) Site design, source control, pollution prevention, and treatment BMPs;
(g) General runoff concepts; and
(h) Other topics of local importance, including local water quality conditions, impaired waterbodies and environmentally sensitive areas.

3. EXISTING DEVELOPMENT COMPONENT

~~a.~~ MUNICIPAL

Each Copermittee must implement a municipal program for the Copermittee's facilities and activities which meets the requirements of this section, to~~,~~ prevent~~s~~ illicit discharges into the MS4, reduce~~s~~ municipal discharges of storm water pollutants from the MS4 to the MEP, and prevent~~s~~ municipal discharges from the MS4 from causing or contributing to a violation of water quality standards.

(1) Source Identification / Inventory

Each Copermittee must maintain an updated ~~watershed-based~~ inventory of all their municipal areas and activities that have the potential to discharge pollutants. The inventory must include the name, address (if applicable), and a description of the area/activity; which pollutants are potentially generated by the area/activity; whether the area/activity is adjacent to an ESA; and identification of whether the area/activity is tributary to a CWA section 303(d) water body segment and generates pollutants for which the water body segment is impaired. Linear facilities such as roads, streets, highways do not need to be individually inventoried. The use of an automated database system, such as Geographical Information Systems (GIS) is ~~required when applicable.~~encouraged.

(2) General BMP Implementation

(a) Pollution Prevention: Each Copermittee must implement pollution prevention methods in its municipal program and must require their use by appropriate municipal departments, personnel, and contractors, where appropriate.

(b) Designate Minimum BMPs: Each Copermittee must designate a minimum set of BMPs for their pollutant generating~~all municipal~~ areas and activities. The designated minimum BMPs for municipal areas and activities must be area or activity specific as appropriate. BMPs must be designated for

special events that are expected to generate significant trash and litter.

(c) Designate BMPs for ESAs and 303(d) Impairments: Each Copermittee must designate enhanced measures for their municipal areas and activities tributary to CWA section 303(d) impaired water body segments when an area or activity generates pollutants for which the water body segment is impaired. Each Copermittee must also designate additional controls for their municipal areas and activities within or directly adjacent to or discharging directly to ~~coastal lagoons, the ocean, or other~~ receiving waters within environmentally sensitive areas (as defined in Attachment C of this Order) as necessary to comply with this Order.

Comment [CMP42]: Consistent with 2004 Permit. Recognizes that need to address ESA may be situational (e.g. adjacent to ESA but no pollutant transport potential)

(d) Implement BMPs: Each Copermittee must implement, or require the implementation of, the applicable designated minimum and/or enhanced BMPs, and any additional measures necessary based on its inventory to comply with this Order for each municipal area or activity within its jurisdiction that has the potential to discharge pollutants.

(3) BMP Implementation for Management of Pesticides, Herbicides, and Fertilizers

Each Copermittee must implement BMPs to reduce the contribution of storm water pollutants to the MEP associated with the application, storage, and disposal of pesticides, herbicides and fertilizers from their municipal areas and activities to MS4s and receiving waters. Such BMPs must include, at a minimum:

(a) Educational activities, permits, certifications and other measures for municipal applicators and distributors;
(b) Integrated Pest Management (IPM) measures that rely on non-chemical solutions;
(c) The use of native vegetation;
(d) Schedules for irrigation and chemical application; and
(e) The collection and proper disposal of unused pesticides, herbicides, and fertilizers.

(4) BMP implementation for Flood Control Structures

(a) Each Copermittee must implement procedures to assure that new flood management projects assess the impacts on the water quality of receiving water bodies.
(b) Each Copermittee must include water quality protection measures, where feasible, when retrofitting existing flood control structural devices.
(c) Each Copermittee must evaluate its existing flood control structural devices as part of ongoing routine maintenance to~~,~~ identify devices causing or contributing to a condition of pollution, and identify, and where

feasible implement measures to reduce or eliminate the device's~~structure's~~ effect on pollution.~~, and evaluate the feasibility of retrofitting the structural flood control device. The inventory and evaluation must be completed by and submitted to the San Diego Water Board in the 2nd year JRMP Annual Report.~~

(5) BMP Implementation for Sweeping of Municipal Areas

Where municipal area sweeping is implemented as an MS4 BMP for municipal roads, streets, highways, and parking facilities, the~~each~~ Copermittee must design and implement the program based on the following criteria:

(a) Optimize pickup of trash and debris based on land uses, trash collection schedules, seasonal factors (e.g., special events, tourism, etc.) and inspections of municipal areas/activities.

(6) Operation and Maintenance of Municipal Separate Storm Sewer System (MS4) and Treatment ~~Structural~~ Controls

Comment [CMP43]: For consistency with subheadings

(a) Treatment Controls: Each Copermittee must implement a schedule of inspection and maintenance activities to verify proper operation of all their municipal structural treatment controls designed to reduce storm water pollutant discharges to or from its MS4s and related drainage structures.

(b) MS4~~ and Facilities~~: Each Copermittee must implement a schedule of maintenance activities for their~~the~~ MS4 ~~and MS4 facilities~~ (including catch basins, storm drain inlets, open channels, etc). The maintenance activities must, at a minimum, include:

(i) Inspection and removal of accumulated waste at least once a year between May 1 and September 30 of each year for Permittee catch basins and storm drain inlets; ~~all MS4 facilities;~~

Comment [CP44]: Consistent with 2004 permit

(ii) Additional catch basin and storm drain inlet cleaning as necessary between October 1 and April 30 of each year ~~for facilities that receive or collect high volumes of trash and debris;~~

(iii) Following two years of inspections, any MS4 catch basin or storm drain inlet~~facility~~ that requires inspection and cleaning less than annually may be inspected as needed, but not less than~~that~~ every other year;

(iv) Open channels and basins must be cleaned of observed anthropogenic litter in a timely manner;

(v) Maintenance activities within open channels must not adversely impact beneficial uses;

(vi) Record keeping of the maintenance and cleaning activities including the overall quantity of waste removed;

(vii) Proper disposal of waste removed pursuant to applicable laws; and

(viii) Measures to eliminate waste discharges during MS4 maintenance and cleaning activities.

(7) Infiltration From Sanitary Sewer to MS4/Provide Preventive Maintenance of Both

Comment [CMP45]: This section is a new requirement and is not applicable in the SMR as the Permittees do not own nor operate any Sewer systems. Request deletion of this section.

(a) Each Copermittee must implement controls and measures to prevent and eliminate infiltration of seepage from municipal sanitary sewers to MS4s through thorough, routine preventive maintenance of the MS4. Each Copermittee that operates both a municipal sanitary sewer system and a MS4 must implement controls and measures to prevent and eliminate infiltration of seepage from the municipal sanitary sewers to the MS4s that must include overall sanitary sewer and MS4 surveys and thorough, routine preventive maintenance of both.

(b) Each Copermittee must implement controls to limit infiltration of seepage from municipal sanitary sewers to municipal separate storm sewer systems where necessary. Such controls must include:

(i) Adequate plan checking for construction and new development,
(ii) Incident response training for municipal employees that identify sanitary sewer spills;
(iii) Code enforcement inspections;
(iv) MS4 maintenance and inspections;
(v) Interagency coordination with sewer agencies; and
(vi) Proper education of municipal staff and contractors conducting field operations on the MS4 or municipal sanitary sewer (if applicable).

(8) Inspection of Municipal Areas and Activities

(a) At a minimum, each Copermittee must inspect the following high priority municipal areas and activities annually:

(i) Roads, Streets, Highways, and Parking Facilities;
~~(ii) Flood Management Projects and Flood Control Devices;~~
(ii) Areas and activities tributary to a CWA section 303(d) impaired water body segment, where an area or activity generates pollutants for which the water body segment is impaired.
(iii) Areas and activities within or ~~adjacent to or~~ discharging directly to receiving waters within environmentally sensitive areas (as defined in Attachment C of this Order);
(iv) Municipal Facilities:
[a] Active or closed municipal landfills;
[b] Publicly owned treatment works (including water and wastewater treatment plants) and sanitary sewage collection systems;
[c] Solid waste transfer facilities;

Comment [CMP46]: Conflicts with (6)(b).

Comment [CMP47]: What matters is that it is discharging to receiving waters within the ESA. You could have a facility/activity adjacent to an ESA that doesn't discharge to the ESA.

[d] Land application sites;
[e] Corporate yards including maintenance and storage yards for materials, waste, equipment and vehicles; and
[f] Household hazardous waste collection facilities.

(v) Municipal airfields;
(vi) Parks and recreation facilities;
(vii) Special event venues following special events (festivals, sporting events, etc.);
(viii) Power washing facilities; and
(ix) Other municipal areas and activities that the Copermittee determines may contribute a significant pollutant load to the MS4.

(b) Other municipal areas and activities must be inspected as needed and in response to water quality data, valid public complaints, and findings from municipal or contract staff.

(c) Based upon site inspection findings, each Copermittee must implement all follow-up actions necessary to comply with this Order.

(9) Enforcement of Municipal Areas and Activities

Each Copermittee must enforce its storm water ordinance for all their municipal areas and activities as necessary to maintain compliance with this Order.

(10) Training and Education

Each Copermittee must ensure that all their municipal personnel and contractors that have responsibilities for selecting, implementing, and evaluating BMPs for their municipal areas and activities are adequately trained and educated to perform such tasks.

(a) Municipal Departments and Personnel Education

(i) Municipal Construction Activities: Each Copermittee must implement an education program that includes annual training prior to the rainy season so that its staff responsible for construction activities (e.g. construction, building, code enforcement, ~~and~~ grading review staffs, inspectors, and other responsible construction staff) have, at a minimum, an understanding of the following topics, as appropriate for the target audience:

[a] Applicable ~~Federal, State, and local~~ water quality laws and regulations applicable to construction and grading activities conducted by the target audience;

Comment [CMP48]: Based on our experience, all people need to know is that there are laws.

[b] The connection between construction activities and water quality

impacts (i.e., impacts from land development and urbanization and impacts from construction material such as sediment);

[c] Proper implementation of erosion and sediment control and other BMPs to minimize the impacts to receiving water quality resulting from construction activities;

[d] The Copermittee's inspection, plan review, and enforcement policies and procedures to verify consistent application; where regional training is offered, the training shall focus on the DAMP's generalized inspection, plan review and enforcement policies and procedures;

Comment [U49]: We do regionalized training. This level of detail can not be captured in a joint class.

[e] Current advancements in BMP technologies;

[f] SSMP Requirements including treatment options, site design, source control, and applicable tracking mechanisms; and

[g] Other topics of local importance, including local water quality conditions, impaired water bodies, environmentally sensitive areas, and public health and disease vector issues associated with runoff.

(ii) Municipal Industrial/Commercial Activities Inspectors: Each Copermittee must train staff responsible for conducting storm water compliance inspections and enforcement of industrial and commercial facilities at least once a year. Training must cover inspection and enforcement procedures, BMP implementation, and review of monitoring data

(iii) Municipal Other Activities: Each Copermittee must implement an education program so that their municipal personnel and contractors performing activities which generate pollutants have an understanding of the activity specific BMPs for each activity to be performed.

b. COMMERCIAL / INDUSTRIAL

Each Copermittee must implement a commercial / industrial program that meets the requirements of this section~~,~~ to prevent~~s~~ illicit discharges into the MS4, reduce~~s~~ commercial / industrial discharges of storm water pollutants from the MS4 to the MEP, and prevent~~s~~ commercial / industrial discharges from the MS4 from causing or contributing to a violation of water quality standards.

(1) Source Identification

(a) Each Copermittee must maintain an updated watershed-based inventory of all industrial and commercial sites/sources within its jurisdiction (regardless of ownership) that could contribute a significant pollutant load to the MS4. The inventory must include the following minimum information for each industrial and commercial site/source: name; address; pollutants potentially generated by the site/source; and identification of whether the site/source is tributary to a Clean Water Act

section 303(d) water body segment and generates pollutants for which the water body segment is impaired; and a narrative description including SIC codes which best reflects the principal products or services provided by each facility.

At a minimum, the ~~following~~ sites/sources listed below must be included in the inventory. Where the required inventory includes sites or information that was not required under Order R9-2004-001, the new required sites/information must be added to the Copermittee's inventory within X years. ~~:~~

(i) Commercial Sites/Sources:

[a] Automobile repair, maintenance, fueling, or cleaning;
[b] Airplane repair, maintenance, fueling, or cleaning;
[c] Boat repair, maintenance, fueling, or cleaning;
[d] Equipment repair, maintenance, fueling, or cleaning;
[e] Automobile and other vehicle body repair or painting;
[f] Mobile automobile or other vehicle washing;
[g] Automobile (or other vehicle) parking lots and storage facilities;
[h] Retail or wholesale fueling;
[i] Pest control services;
[j] Eating or drinking establishments, including such establishments within food markets;
[k] Mobile carpet, drape or furniture cleaning;
[l] Cement mixing or cutting;
[m] Masonry;
[n] Painting and coating;
[o] ~~Botanical or zoological gardens and exhibits~~;
[p] Landscaping;
[q] Nurseries and greenhouses;
[r] Golf courses, parks and other recreational areas/facilities;
[s] Cemeteries;
[t] Pool and fountain cleaning;
[u] ~~Marinas~~;
[v] Portable sanitary services;
[w] ~~Building material retailers and storage~~;
[x] ~~Animal facilities~~Boarding facilities and kennels;
[y] Mobile pet services;
[z] Power washing services; and
[aa] Other sites and sources with a history of un-authorized discharges to the MS4.

Comment [CP50]: These have not been identified by the Copermittees as contributing a significant pollutant load to the MS4 and should be removed. This is an unnecessary new requirement.

Comment [CP51]: Not applicable

Comment [CP52]: These have not been categorically identified by the Copermittees as contributing a significant pollutant load to the MS4 and should be removed. This is an unnecessary new requirement.

(ii) Industrial Sites/Sources:

[a] Industrial Facilities, as defined at 40 CFR § 122.26(b)(14), including

those subject to the General Industrial Permit or other individual NPDES permit;

[b] Operating and closed landfills;

[c] Facilities subject to SARA Title III; and

[d] Hazardous waste treatment, disposal, storage and recovery facilities.

~~(iii)~~ ESAs and 303(d) Listed Waterbodies: All other commercial or industrial sites/sources tributary to a CWA Section 303(d) impaired water body segment, where the site/source generates pollutants for which the water body segment is impaired. ~~All other commercial or industrial sites/sources within or directly adjacent to or discharging directly to coastal lagoons, the ocean, or other receiving waters within environmentally sensitive areas (as defined in Attachment C of this Order).~~

(iii)

(iv) All other commercial or industrial sites/sources that the Copermittee determines may contribute a significant pollutant load to the MS4.

(2) General BMP Implementation

(a) Pollution Prevention: Each Copermittee must require the use of pollution prevention methods by the inventoried industrial and commercial sites/sources.

(b) Designate / Update Minimum BMPs: Each Copermittee must designate a minimum set of BMPs for all inventoried industrial and commercial sites/sources. Where BMPs have already been designated, each Copermittee must review its existing BMPs for adequacy. The designated minimum BMPs must be specific to facility types and pollutant-generating activities, as appropriate. The Copermittee may adjust the number and/or type of minimum BMPs that are required, provided that the goals of the Commercial/Industrial program are met.

(c) Designate Enhanced BMPs for ESAs and 303(d) Impairments: Each Copermittee must designate enhanced measures for inventoried industrial and commercial sites/sources tributary to CWA section 303(d) impaired water body segments (where a site/source generates pollutants for which the water body segment is impaired). Each Copermittee must also designate additional controls for industrial and commercial sites/sources within or directly adjacent to or discharging directly to ~~coastal lagoons, the ocean, or other~~ receiving waters within environmentally sensitive areas (as defined in Attachment C of this Order) as necessary to comply with this order. The Copermittee may adjust the number and/or type of enhanced BMPs that are required, provided that the goals of the Commercial/Industrial program are met.

Comment [JEU53]: This is a high cost-low return proposition. It is a significant effort and non-recoverable cost to determine which projects may be directly discharging or adjacent to receiving waters with ESAs. There are already over 30 categories of facilities that are required for inspection. There is also a process (via NALs and SALs) whereby the Permittees must develop action plans to address remaining water quality problems. Let the NAL/SAL system drive the decision making for adding facilities instead of this shot-gun approach which will net hair salons, retail stores, and other stores not likely to have any real impact on water quality.

Comment [CP54]: This sentence has been added pursuant to our previous discussions, where it was agreed that the list of BMPs can be changed over time through the iterative process based on the experience of the Copermittees. This language provides important clarification to that end. Request similar language be added to Municipal and Residential sections

Comment [CP55]: From the 2004 permit.

Comment [CP56]: This sentence has been added pursuant to our previous discussions, where it was agreed that the list of BMPs can be changed over time through the iterative process based on the experience of the Copermittees. This language provides important clarification to that end. Request similar language be added to Municipal and Residential sections

(d) Implement BMPs: Each Copermittee must ~~implement, or~~ require the implementation of~~,~~ the designated minimum and enhanced BMPs and any additional measures necessary based on inspections, incident responses, and water quality data to comply with this Order at each industrial and commercial site/source within its jurisdiction.

Comment [CP57]: The Copermittees have no authority to *implement* the BMPs on these privately owned sites, however they can require the site owner to implement such BMPs.

(3) ~~BMP Implementation for~~ Mobile ~~Businesses~~Business Program

Comment [CP58]: This section is describing more than BMP implementation, it is describing a parallel program to address the unique characteristics of Mobile Businesses. Suggested revised heading.

(a) Each Copermittee must develop and implement a program to reduce the discharge of storm water pollutants from mobile businesses to the MEP and to prohibit non-storm water discharges pursuant to Section B of this Order. Each Copermittee must keep as part of their commercial source inventory a listing of mobile businesses known to ~~operate~~ have bases of operation within its jurisdiction that have the potential to discharge pollutants. The program must include:

(i) Development and implementation of minimum standards and BMPs to be required for each of the various types of mobile businesses;
(ii) Development and implementation of an enforcement strategy which specifically addresses the unique characteristics of mobile businesses;
(iii) Notification of those mobile businesses known to ~~operate~~ have bases of operation within the Copermittee's jurisdiction, of the minimum standards and BMP requirements ~~and local ordinances~~;
(iv) Development and implementation of an outreach and education strategy; and
(v) Inspection of mobile businesses as needed to implement the program.

Comment [CP59]: This would prevent us from implementing this regionally.

(b) If they choose to, the Copermittees may cooperate in developing and implementing their programs for mobile businesses, including, but not limited to sharing of mobile business inventories, BMP requirements, enforcement action information, and education.

(4) Inspection of Industrial and Commercial Sites/Sources

Each Copermittee must conduct industrial and commercial site inspections for compliance with its ordinances, permits, and this Order. Mobile businesses shall be inspected pursuant to section F.3.b.(3) of this order.

Comment [CP60]: Clarifying that mobile business will be subject to the inspection requirements developed in F.3.b.(3) .

(a) Inspection Procedures: Inspections must include but not be limited to:

(i) ~~Review of BMP implementation plans, if the site uses or is required to use such a plan~~;

(ii) ~~Review of facility monitoring data, if the site monitors its runoff;~~

(iii) Check for coverage under the General Industrial Permit (Notice of Intent (NOI) and/or Waste Discharge Identification Number), if applicable;

(iv) Assessment of compliance with Copermittee ordinances and Copermittee issued permits related to runoff;

(v) ~~A~~assessment of ~~BMP~~ implementation and effectiveness of the designated minimum and/or enhanced BMPs~~, maintenance and effectiveness~~;

(vi) Visual observations for non-storm water discharges, potential illicit connections, and potential discharge of pollutants in storm water runoff; and

(vii) Education and training on storm water pollution prevention, as conditions warrant.

(b) Each Copermittee shall annually notify the San Diego Water Board, prior to the commencement of the wet season, of all Industrial Sites and Industrial Facilities subject to the General Industrial Permit or other individual NPDES permit with alleged violations of the Copermittees' ordinances, that pose a significant threat to water quality. Information may be provided as part of the JRMP annual report if submitted prior to the rainy season. Information provided shall include, but not be limited to, the following:

(i) WDID number if enrolled under the General Industrial Permit;
(ii) Site Location, including address;
(iii) Current violations or suspected violations; and
(iv) ~~Past Violation history~~.

(c) Frequencies: Each Permittee shall prioritize the inventoried commercial/industrial facilities based on threat to water quality. ~~At a minimum, 25 percent of the sites inventoried as required in section F.3.b.(1) above (excluding mobile sources) including all~~ All sites determined to pose a high threat to water quality must be inspected each year. At a minimum all other inventoried facilities shall be inspected at least once every five years. All sites must be Mobile businesses must be inspected pursuant to the enforcement strategy developed pursuant to section F.3.b.(3). In evaluating threat to water quality, each Copermittee shall consider, at a minimum, the following:

(i) Type of activity (SIC code);
(ii) Materials used at the facility;

Comment [JEU61]: Requirement (v) already addresses these issues. (i) and (ii) focus on methods. (v) focuses on outcomes. The Permittees should be allowed to determine their own methods for evaluating compliance with their ordinances.

Comment [CP62]: This section should only be addressing the BMPs required under section F.3.b of the order. As mentioned in comments above, the maintenance of Post Construction structural BMPs is addressed in section F.1.f. of this order.

Comment [JEU63]: Permittees already Voluntarily work with RWQCB to ensure compliance. This requirement is not necessary.

Comment [JEU64]: Clarify that we are evaluating Ordinance compliance, also limit reporting to sites with significant threats to water quality.

Comment [CP65]: This is too vague and broad.

Comment [JEU66]: 25% requirement is a record retention problem and is not necessary.

Comment [CP67]: Changes are proposed to allow the CAP program to be maintained.

(iii) Wastes generated;
(iv) Pollutant discharge potential;
(v) Non-storm water discharges;
(vi) Size of facility;
(vii) Proximity to receiving water bodies;
(viii) Sensitivity of receiving water bodies;
(ix) Whether the facility is subject to the General Industrial Permit or an individual NPDES permit;
(x) Whether the facility has filed a No Exposure Certification/Notice of Non-Applicability;
(xi) Facility design;
(xii) Total area of the site~~, area of the site~~ where industrial or commercial activities occur, and area of the site exposed to rainfall and runoff;
(xiii) The facility's compliance history; and
(xiv) Any other relevant factors.

(d) Third-Party ~~Inspections~~Certifications: Each Copermittee may develop and implement a program to utilize a private third party ~~inspection~~ certification ~~program~~ service for verifying industrial and commercial site/source compliance with its ordinances, permits, and this Order. ~~The third party inspections can satisfy up to 30% of the inspection requirements in section F.3.b(4)(c), with the Copermittee having to fulfill the remaining required inspections.~~ To the extent that third party ~~inspections~~ certifications are conducted to fulfill the requirements of this Order, the Copermittee will be responsible for conducting and documenting quality assurance and quality control of the third-party ~~inspections~~certifications.

Comment [CP68]: Intent of the changes are to clarify that these requirements do not apply to any cross-Copermittee inspection agreements, such as the CAP program.

Comment [CP69]: This limitation is not necessary. Section (i) below will provide the Copermittee with the assurance that the inspection is valid, complete and accurate. The Copermittee should be afforded the flexibility to find the most cost-effective way to comply with the permit.

(i) Each inspection conducted by a third-party must, at a minimum, result in the following:

[a] Photo documentation of potential storm water violations identified during the third party inspection;
[b] Reporting to the Copermittee of identified significant potential violations, including imminent or observed illegal discharges, within 24 hours of the third party inspection;
[c] Reporting to the Copermittee of all inspection findings within one week of the inspection being conducted; and
[d] Copermittee follow-up and/or enforcement actions for identified potential storm water violations within two business days of the inspection or potential violation report receipt.

(e) Based upon site inspection findings, each Copermittee must implement all follow-up actions and enforcement necessary to comply with this Order.

(f) To the extent that the San Diego Water Board has conducted an inspection of an industrial site during a particular year, the requirement for

the responsible Copermittee to inspect this facility during the same year will be satisfied.

(g) The Copermittees must track the number of inspections for the inventoried industrial and commercial sites/sources throughout the reporting period to verify that the sites/sources are inspected at the minimum frequencies listed in this Order.

(5) Enforcement of Industrial and Commercial Sites/Sources

Each Copermittee must enforce its storm water ordinance for all industrial and commercial sites/sources as necessary to maintain compliance with this Order. Copermittee ordinances or other regulatory mechanisms must include appropriate sanctions to achieve compliance. Sanctions must include the following or their equivalent: Non-monetary penalties, fines, ~~bonding requirements,~~ and/or permit denials for non-compliance.

Comment [CP70]: The difficulty in collecting on bonds make them virtually useless as an enforcement tool.

~~(6) Training and Education for Owners and Operators of Commercial and Industrial Activities~~

~~(a) Each Copermittee must implement an education program using all media as appropriate to (1) measurably increase the knowledge of owners and operators of commercial and industrial activities regarding MS4s, impacts of runoff on receiving waters, and potential BMP solutions for the target audience; and (2) to measurably change the behavior of target communities and thereby reduce storm water pollutant releases and eliminate prohibited non-storm water discharges to MS4s and the environment. At a minimum, the education program must meet the requirements of this section and address the following issues:~~

~~(i) Laws, regulations, permits, & requirements;~~
~~(ii) Best management practices;~~
~~(iii) General runoff concepts; and~~

~~(iv) Other topics, including public reporting mechanisms, water conservation, low-impact development techniques.~~

~~(b) BMP Notification: At least twice during the five-year period of this Order, each Copermittee must notify the owner/operator of each inventoried industrial and commercial site/source of the BMP requirements applicable to the site/source.~~

C. RESIDENTIAL

Each Copermittee must implement a residential program which meets the requirements of this section~~,~~ to prevent~~s~~ illicit discharges into the MS4, reduce~~s~~

Comment [CP71]: Same comment as on Municipal

residential discharges of storm water pollutants from the MS4 to the MEP, and prevent~~s~~ residential discharges from the MS4 from causing or contributing to a violation of water quality standards.

(1) Threat to Water Quality Prioritization

Each Copermittee must identify residential areas and activities that pose a high threat to water quality. At a minimum, these must include:

(a) Automobile repair, maintenance, washing, and parking;
(b) Home and garden care activities and product use (pesticides, herbicides, and fertilizers);
(c) Disposal of trash, pet waste, green waste, and household hazardous waste (e.g., paints, cleaning products);
(d) Any other residential source that the Copermittee determines may contribute a significant pollutant load to the MS4;
(e) Any residential areas tributary to a CWA section 303(d) impaired water body, where the residence generates pollutants for which the water body is impaired; and
(f) Any residential areas within or directly adjacent to or discharging directly to a ~~coastal lagoon, the ocean, or other~~ receiving water~~waters~~ within an environmentally sensitive area (as defined in Attachment C of this Order).

(2) BMP Implementation

(a) Pollution Prevention: Each Copermittee must actively encourage the use of pollution prevention methods by residents and residential associations (i.e Home Owners Associations).

(b) Designate BMPs: Each Copermittee must designate minimum BMPs for ~~high-threat-to-water quality~~ residential areas and activities, including areas maintained by and activities conducted by residential associations, that pose a high-threat-to-water quality. The designated minimum BMPs ~~for high-threat-to-water quality residential areas and activities~~ must be area or activity specific and must consider factors that may be uniquely relevant to Common Interest Areas and areas managed by Home Owners' Associations.

(c) Hazardous Waste BMPs: Each Copermittee must facilitate the proper management and disposal of used oil, toxic materials, and other household hazardous wastes. Such facilitation must include educational activities, public information activities, and establishment of collection sites operated individually and/or jointly by the Copermittees or a private entity. Curbside collection of household hazardous wastes is encouraged.

Comment [CMP72]: We jointly fund operation of a permanent collection and additional rotating collection events

(d) Implement BMPs: Each Copermittee must implement, or require

implementation of, the designated minimum BMPs and any additional measures that are subsequently determined to be necessary to comply with Sections A and B of this Order.

(e) Each Copermittee must implement, or require implementation of, BMPs for residential areas and activities that have not been designated a high threat to water quality, as necessary.

(3) Enforcement of Residential Areas and Activities

Each Copermittee must enforce its storm water ordinance for all residential areas and activities as necessary to maintain compliance with this Order. In addition, pursuant to Section E of this order each Copermittee must review its Municipal Codes / Ordinances to ensure that it has the full authority to implement and enforce runoff management measures within common interest areas and those areas managed by Home Owners' Associations.

(4) Evaluation of Oversight of Residential Areas and Activities

~~Each Copermittee must annually review the effectiveness of efforts to reduce residential discharges of storm water pollutants from the MS4 and eliminate illicit residential discharges into the MS4. The evaluation must consider findings from monitoring data, municipal employee comments, inspections, complaints, and other appropriate sources.~~

(5) Common Interest Areas (CIA) / Home Owner Association (HOA) Areas

~~Each Copermittee must implement measures specifically to ensure that runoff within common interest developments, including areas managed by associations, meets the objectives of this section and Order.~~

~~(a) BMP Implementation: Each Copermittee must implement management measures based on a review of pertinent factors, including:~~

~~(i) Current maintenance duties and procedures used by CIA/HOA maintenance associations within its jurisdiction;~~
~~(ii) Whether streets and storm drains are publicly or privately owned within the CIA/HOA;~~
~~(iii) Whether the CIA/HOA area has been identified as a high priority residential area;~~
~~(iv) Proximity to 303(d)-listed waterbodies, and/or environmentally sensitive areas;~~
~~(v) Evaluation of water quality monitoring data;~~
~~(vi) Evaluation of existing illegal discharge/illicit connection activities;~~
~~(vii) Other activities conducted or authorized by the HOA that may pose a significant risk to inland or coastal receiving waters.~~

~~(b) Legal Authority and Enforcement: Within one year of adoption of this Order, each Copermittee must review its Municipal Code to determine the most appropriate method to implement and enforce runoff management measures within CIA/HOA areas.~~

(6) Residential Education Program

(a) Each Copermittee must individually and/or jointly implement a Residential Education Program using all media as appropriate to (1) measurably increase the knowledge regarding MS4s, impacts of runoff on receiving waters, and potential BMP solutions for the target audience; and (2) to measurably change the behavior of target communities and thereby reduce storm water and eliminate prohibited non-storm water pollutant releases to MS4s and the environment.

(b) Copermittee educational programs must address pollutant generating residential activities (e.g. car washing, mobile operations, yard maintenance)~~emphasize underserved target audiences, residents~~ and pollutant generating products (i.e. pesticides, fertilizers, household chemicals) as appropriate.~~managers of CIA/HOA areas, high-risk behaviors, and "allowable" behaviors and discharges.~~ At a minimum, the education program must meet the requirements of this section and address thefollowing~~the following~~ issues as appropriate to the specific outreach effort:

(i) Laws, regulations, permits, and requirements;
(ii) Best management practices;
(iii) General runoff concepts;
(iv) Existing water quality, including local water quality conditions, impaired waterbodies and environmentally sensitive areas; and
(v) Other topics, including public reporting mechanisms, water conservation, low-impact development techniques, and public health and disease vector issues associated with polluted runoff.

d. Retrofitting Existing Development

Each Copermittee must develop and implement a retrofitting program which meets the requirements of this section. The goal~~s~~ of the existing development retrofitting program ~~are~~ is to provide an option to the Copermittees to address the regional impacts of existing development through retrofit projects that: reduce impacts from hydromodification, ~~promote LID,~~ support riparian and aquatic habitat restoration, reduce the discharges of storm water pollutants from the MS4 to the MEP, and prevent discharges from the MS4 from causing or contributing to a violation of water quality standards. Where feasible, at the discretion of the Copermittee, the existing development retrofitting program may be coordinated

Comment [CP73]: Retrofit should not be for the sake of Retrofit - it should be an option available to the Copermittees to address a specific and defined problem in the most cost efficient manner.

Comment [CP74]: LID is a means to an end, not an end in and of itself.

with flood control projects and other regional infrastructure improvement programs.

~~(1) Source Identification~~

(1) The Copermittee must identify and inventory existing developments (~~i.e~~e.g. municipal, industrial, commercial, residential) within their jurisdiction that may be~~as~~ candidates for retrofitting. At a minimum, the delineation ~~Potential retrofitting candidates~~ must assess candidates within the following areas of existing development:~~include but are not limited to:~~

(a) Areas ~~Developments~~ that are known to contribute pollutants of concern to a 303(d) listed water body;~~TMDL or an ESA~~;
(b) Receiving waters that are channelized or otherwise hardened;
(c) Developments tributary to receiving waters that are channelized or otherwise hardened;
(d) Areas~~Developments~~ tributary to receiving waters that are significantly eroded;
~~(e) Developments tributary to an ASBS or SWQPA; and~~
~~(f) Developments that cause hydraulic constriction.~~

(2) Each Copermittee shall evaluate ~~and rank~~ the inventoried ~~existing developments~~retrofit candidates to prioritize retrofitting. The evaluation shall consider the following criteria, where appropriate:~~Criteria for evaluation must include but is not limited to:~~

(a) Feasibility;
(b) Cost effectiveness;
(c) Pollutant removal effectiveness;
(d) Tributary~~Impervious~~ area potentially treated;
(e) Maintenance requirements;
(f) Landowner cooperation;
(g) Neighborhood acceptance;
(h) Aesthetic qualities~~; and~~
(i) Environmental Constraints (such as regulatory permits);
(j) Efficacy at addressing concern~~.~~; and
(k) Public Health and Safety;

(3) Each Copermittee must consider the results of the evaluation in prioritizing work plans for the following year. Highly feasible projects expected to benefit water quality should be given a high priority to implement source control and treatment control BMPs. Where applicable and feasible, the retrofit projects should be designed in accordance with the SSMP requirements within sections F.1.d.(3) through F.1.d.(8). In addition, the Copermittee shall encourage retrofit projects to implement where feasible the Hydromodification

Comment [CP75]: The Copermittees would prefer to end section (1) here, and give us the flexibility to assess candidates where it makes sense, without forcing us to work within a specific framework. Alternatively, important changes/clarifications have been provided.

Comment [CP76]: Not applicable to this watershed.

Comment [CP77]: This is covered under (d) above

Comment [CP78]: The evaluation should occur when we have identified a specific problem that we are trying to address.

Comment [CP79]: Similar to section (1) the Copermittees would prefer to end section (2) here and give us the flexibility to utilize any applicable and appropriate criteria in our evaluation - and not overly define the framework we will be required to work within. Alternatively, appropriate modifications to the language have been provided.

requirements in Section F.1.h.

(4) The Copermittees ~~will~~ are highly encouraged to cooperate with private landowners to encourage retrofitting projects. The Copermittee ~~must~~ should consider the following practices in cooperating and encouraging private landowners to retrofit their existing development:

(a) Demonstration retrofit projects;
~~(b) Retrofits on public land and easements that treat runoff from private developments;~~
(b) Education and outreach;
(c) Subsidies for retrofit projects;
(d) Requiring retrofit projects as enforcement, mitigation or ordinance compliance; and
(e) Public and private partnerships~~; and~~.
~~(g) Fees for existing discharges to the MS4 and reduction of fees for retrofit implementation.~~

(5) Where ~~T~~the completed retrofit includes structural post-construction BMPs within municipal (Copermittee owned) areas, the BMPs shall be tracked and inspected in accordance with section F.1.f.

~~(7) Where constraints on retrofitting preclude effective BMP deployment on existing developments at locations critical to protect receiving waters, a Copermittee may propose a regional mitigation project to improve water quality. Such regional projects may include but are not limited to:~~

~~(a) Regional water quality treatment BMPs;~~
~~(b) Urban creek or wetlands restoration and preservation;~~
~~(c) Daylighting and restoring underground creeks;~~
~~(d) Localized rainfall storage and reuse to the extent such projects are fully protective of downstream water rights;~~
~~(e) Hydromodification project; and~~
~~(f) Removal of invasive plant species.~~

(7) A retrofit project or regional mitigation project may qualify as a Watershed Water Quality Activity provided it meets the requirements in section G. Watershed Runoff Management Program.

Comment [CP80]: The idea is to find approaches for encouraging retrofit that may be applicable locally. In response to SALs, NALs, and TMDLs, these may be one 'tool in the toolbox' that we can assess in determining the most cost-efficient way to address the problem.

Comment [CP81]: This is addressed in (1) above

Comment [CP82]: Not applicable here

Comment [CP83]: If a private landowner volunteers to retrofit their property (outside of the requirements of F.1), they shouldn't be subjected to inspections / verifications. This would be a penalty for them doing the right thing.

5/26: Water Board staff agreed to consider this language .

Comment [CP84]: The delineation proposed in F.3.d.(1) above will include an assessment for regional opportunities.

4. ILLICIT DISCHARGE DETECTION AND ELIMINATION

Each Copermittee must implement a program which meets the requirements of this section to actively detect and eliminate illicit discharges and disposal into the MS4. The program must address all types of illicit discharges and connections excluding those non-storm water discharges not prohibited by the Copermittee in accordance with

section B of this Order.

a. PREVENT AND DETECT ILLICIT DISCHARGES AND CONNECTIONS

Each Copermittee must implement measures to prevent and detect illicit discharges to the MS4.

(1) Legal Authority: Each Copermittee must retain legal authority to prevent and eliminate illicit discharges and connections to the MS4.

(2) Inspections: Each Copermittee must include use of appropriate Copermittee ~~municipal~~ personnel and contractors to assist in identifying illicit discharges and connections during their daily activities.

Comment [CMP85]: Same change recommended throughout permit

(a) Visual Inspections for illegal discharges and connections must be conducted during routine maintenance of all MS4 facilities.

(b) Copermittee~~Municipal~~ staff and contractors conducting non-MS4 field operations must be trained to report suspected illegal discharges and connections to proper Copermittee~~municipal~~ staff.

b. MAINTAIN MS4 MAP

Each Copermittee must maintain an updated map of its entire MS4 and the corresponding drainage areas within its jurisdiction. The use of GIS is encouraged.~~required.~~ The accuracy of the MS4 map must be confirmed during dry weather field screening and analytical monitoring and must be updated at least annually. The GIS layers of the MS4 map must be submitted with the updated Jurisdictional Runoff Management Plan within 365 days after adoption of this Order.

c. FACILITATE PUBLIC REPORTING OF ILLICIT DISCHARGES AND CONNECTIONS - PUBLIC HOTLINE

Each Copermittee must individually and/or jointly promote, publicize and facilitate public reporting of illicit discharges or water quality impacts associated with discharges into or from MS4s. Each Copermittee must facilitate public reporting through development and operation of a public hotline. Public hotlines can be Copermittee-specific or shared by Copermittees. All storm water hotlines must be capable of receiving reports in both English and Spanish 24 hours per day and seven days per week. All reported incidents, and how each was resolved, shall be summarized in each Copermittee's ~~Individual~~ Annual Report.

Comment [U86]: Terminology?

d. DRY WEATHER FIELD SCREENING AND ANALYTICAL MONITORING

Each Copermittee must conduct dry weather field screening and analytical monitoring of MS4 outfalls and other portions of its MS4 within its jurisdiction to

detect illicit discharges and connections in accordance with Receiving Waters and MS4 Discharge Monitoring and Reporting Program No. R9-2010-0016 in Attachment E of this Order.

e. INVESTIGATION / INSPECTION AND FOLLOW-UP

Each Copermittee must implement procedures to investigate and inspect portions of their~~the~~ MS4 that, based on the results of field screening, analytical monitoring, or other appropriate information, indicate a reasonable potential of containing illicit discharges, illicit connections, or other sources of pollutants in non-storm water.

(1) Develop response criteria for data: Each Copermittee must develop, update, and use numeric criteria action levels (or other actions level criteria where appropriate) to determine when follow-up investigations will be performed in response to water quality monitoring. The criteria must include required non-storm water action levels (see Section C) and a consideration of 303(d)-listed waterbodies and environmentally sensitive areas (ESAs) as defined in Attachment C.

(2) Respond to data: Each Copermittee must investigate portions of the MS4 for which water quality data or conditions indicates a potential illegal discharge or connection.

(a) Obvious illicit discharges (i.e. color, odor, or significant exceedances of action levels) must be investigated immediately.

(b) Field screen data: Within two business days of receiving dry weather field screening results that exceed action levels, the applicable Copermittee~~Copermittees~~ must either initiate an investigation to identify the source of the discharge or document the rationale for why the discharge does not pose a threat to water quality and does not need further investigation. This documentation shall be included in the Annual Report.

(c) Analytical data: Within five business days of receiving quality controlled analytical laboratory results that exceed action levels, the applicable Copermittee~~Copermittees~~ must either initiate an investigation to identify the source of the discharge or document the rationale for why the discharge does not pose a threat to water quality and does not need further investigation. This documentation shall be included in the Annual Report.

(3) Respond to notifications: Each Copermittee must respond to and resolve each reported incident (e.g., public hotline, staff notification, etc.) in a timely manner. Criteria may be developed to assess the validity of, and prioritize the response to, each report.

f. ELIMINATION OF ILLICIT DISCHARGES AND CONNECTIONS

Each Copermittee must take immediate action to initiate steps necessary to eliminate all detected illicit discharges, illicit discharge sources, and illicit connections after the source is found.~~detection.~~ Elimination measures may include an escalating series of enforcement actions for those illicit discharges that are not a serious threat to public health or the environment. Illicit discharges that pose a serious threat to the public's health or the environment must be eliminated immediately. The Copermittees may engage San Diego Regional Board staff as necessary to assist in resolving illicit discharges and connections.

g. ENFORCE ORDINANCES

Each Copermittee must implement and enforce its ordinances, orders, or other legal authority to prevent illicit discharges and connections to its MS4 and to eliminate detected illicit discharges and connections to its~~it's~~ MS4.

h. PREVENT AND RESPOND TO SEWAGE SPILLS (INCLUDING FROM PRIVATE LATERALS AND FAILING SEPTIC SYSTEMS) AND OTHER SPILLS

(1) Each Copermittee must implement management measures and procedures to prevent, respond to, contain and clean up all sewage (see below) and other spills that may discharge into its MS4 from any source (including private laterals and failing septic systems). Copermittees must coordinate with spill response teams to prevent entry of spills into the MS4 and contamination of surface water, ground water and soil to the MEP. Each Copermittee must coordinate spill prevention, containment and response activities throughout all appropriate Copermittee departments, programs and agencies so that maximum water quality protection is available at all times.

(2) Each Copermittee must develop and implement a mechanism whereby it is notified of all sewage spills affecting their jurisdiction. ~~from private laterals and failing septic systems into its MS4. Each Copermittee must implement management measures and procedures to prevent, respond to, and coordinate a response to contain and clean up sewage from any such notification.~~

i. EDUCATION AND TRAINING

Each Copermittee must individually and/or jointly implement educational activities, public information activities, and other appropriate activities to facilitate the proper management and disposal of used oil and toxic materials.

Comment [CP87]: From 2004 SMR Permit

Comment [CMP88]: Clarifying

Comment [CMP89]: This section seems to belong before section (1).

Comment [CP90]: This is repetitive of F.4.h.(1)

Comment [CP91]: This section will be migrated into the consolidated training and education sections. (F.6 and F.7)

5. PUBLIC PARTICIPATION COMPONENT

Each Copermittee must incorporate a mechanism for public participation in the updating, development, and implementation of the Jurisdictional Runoff Management Program.

6. EDUCATION AND OUTREACH

G. WATERSHED RUNOFF MANAGEMENT PROGRAM

Each Copermittee must collaborate with other Copermittees to identify, address, and mitigate the highest priority water quality issues/pollutants in the Upper Santa Margarita Watershed.

1. Watershed Water Quality Workplan (Watershed Workplan)

The Watershed Workplan shall describe the Copermittees' development and implementation of a collective watershed strategy to assess and prioritize the water quality problems within the watershed's receiving waters, identify and model sources of the highest priority water quality problem(s), develop a watershed-wide BMP implementation strategy to abate highest priority water quality problems, and a monitoring strategy to evaluate BMP effectiveness and changing water quality prioritization in the WMA.

The work plan shall, at a minimum:

a. Characterize the receiving water quality in the WMA. Characterization shall include use of regularly collected water quality data, reports, monitoring and analysis generated in accordance with the requirements of the Receiving Waters Monitoring and Reporting Program, as well as applicable information available from other public and private organizations.

b. Identify the highest priority water quality problem(s), in terms of constituents by location, in the WMA's receiving waters. Identified water quality problem(s) shall, at a minimum, give consideration to; TMDLs, receiving waters listed on the CWA section 303(d) list, waters with persistent violations of water quality standards, toxicity, or impacts to beneficial uses, and other pertinent conditions.

c. Identify the sources of the highest water quality problem(s) within the WMA. Efforts to determine such sources shall include, but not be limited to: use of information from the construction, industrial/commercial, municipal, and residential source identification programs required within the Jurisdictional Runoff Program (JRMP) of this Order; specific actions to model pollutant transport to

receiving waters for the sake of identifying the source(s) point(s) of origin; water quality monitoring data collected as part of the Receiving Water Monitoring and Reporting Program required by this Order, and additional focused water quality monitoring to identify specific sources within the watershed.

d. Develop a watershed BMP implementation strategy to attain receiving water quality objectives in the identified highest priority water quality problem(s). The BMP implementation strategy shall include a schedule for implementation of the BMP projects to abate specific receiving water quality problems. BMPs not contributing to measured pollutant reductions or improvements to water quality must be removed and replaced with alternative BMPs. Identified watershed water quality problems may be the result of jurisdictional discharges that will need to be addressed with BMPs applied in a specific jurisdiction in order to generate a benefit to the watershed.

e. Develop a strategy to model and monitor improvements in receiving water quality directly resulting from implementation of the BMPs described in the Watershed Workplan. The modeling and monitoring strategy shall generate the necessary data to report on the measured pollutant reduction that results from proper BMP implementation. Monitoring shall, at a minimum, be conducted in the receiving water to demonstrate reduction in pollutant concentrations and progression towards attainment of receiving water quality objectives.

f. Establish a schedule for development and implementation of the Watershed strategy outlined in the Workplan. The schedule shall, at a minimum, include forecasted dates of planned actions to address Provisions E.2(a) through E.2(e) and dates for watershed review meetings through the remaining portion of this Permit cycle. Annual watershed workplan review meetings must be open to the public and appropriately publically noticed such that interested parties may come and provide comments on the watershed program.

2. **Watershed Workplan Implementation –** Watershed Copermittee's shall begin implementing the Watershed Workplan within 60-days of acceptance by the San Diego Water Board Executive Officer. If within 30 days of submittal, the San Diego Water Board has not taken an action, the Workplan shall be deemed acceptable.

3. **Copermittee Collaboration** – Watershed Copermittees shall collaborate to develop and implement the Watershed Workplan. Watershed Copermittee collaboration shall include frequent regularly scheduled meetings. The Copermittees shall seek to obtain any interagency agreements, or other efforts, with non-Copermittee owners of the MS4 (such as Caltrans, Native American tribes, and school districts) to control the contribution of pollutants from one portion of the shared MS4 to another portion of the shared MS4. The Copermittees shall, as appropriate, participate in watershed management efforts to address water quality issues within the entire Santa Margarita Watershed (such as the County of San Diego and United States Marine Corps Camp Pendleton).

4. **Public Participation –** Watershed Copermittees shall implement a watershed-specific public participation mechanism within each watershed. A required component of the watershed-specific public participation shall be a minimum 30-day public review of the Watershed Workplan prior to submittal for acceptance by the San Diego Water Board Execuive Officer. Opportunity for the public to review and comment on the Watershed Workplan must occur before the workplan is implemented.

5. **Watershed Workplan Review and Updates –** Watershed Copermittees shall review and update the Watershed Workplan annually to identify needed changes to the prioritized water quality problem(s) listed in the workplan. All updates to the Watershed Workplan shall be presented during an Annual Watershed Review Meeting. Annual Watershed Review Meetings shall occur once every calendar year and be conducted by the Watershed Copermittees. Annual Watershed Review Meetings shall be open to the public and adequately noticed. Individual Watershed Copermittees shall also review and modify their jurisdictional programs and JRMP Annual Reports, as necessary, so that they are consistent with the updated Watershed Workplan.

6. **Pyrethroid Toxicity Reduction Evaluation –** The Watershed Copermittees shall incorporate the pyrethroid pollutant reduction program[18] into the Watershed Workplan. The pyrethroid pollutant reduction program shall include the following elements:

   a. Pursue state and federal regulatory change.
   b. Implement a set of source controls targeted specifically at urban pesticide use,
   c. Through the annual reporting process, monitor the implementation of those controls, assess effectiveness, and identify sources or areas where additional effort is needed,
   d. Implement additional controls as needed,
   e. Continue to monitor implementation, as well as conditions within the target receiving waters, assess effectiveness, and re-evaluate control programs.

H. FISCAL ANALYSIS

1. Secure Resources: Each Copermittee must secure the resources necessary to meet all requirements of this Order.

2. Annual Analysis: Each Copermittee must conduct an annual fiscal analysis of the necessary capital and operation and maintenance expenditures necessary to accomplish the activities of the programs required by this Order. The analysis must

[18] The pyrethroid pollutant reduction program is described in the "Riverside County – Santa Margarita Region Pyrethroid Source Identification Toxicity Reduction Evaluaion, Final Phase II Report", January 2009 by MACTEC.

include estimated expenditures for the reporting period, the preceding period, and the next reporting period.

a. Each analysis must include a description of the source of funds that are proposed to meet the necessary expenditures, including legal restrictions on the use of such funds.
b. Each analysis must include a narrative description of circumstances resulting in a 25 percent or greater annual change for any budget line items.

3. Annual Reporting: Each Copermittee must submit its annual fiscal analysis with the annual JRMP report.

I. TOTAL MAXIMUM DAILY LOADS

The waste load allocations (WLAs) of fully approved and adopted TMDLs are incorporated as Water Quality Based Effluent Limitations on a pollutant by pollutant, watershed by watershed basis. Early TMDL requirements, including monitoring, may be required and inserted into this Order pursuant to Finding E.10

J. PROGRAM EFFECTIVENESS ASSESSMENT AND REPORTING

1. Jurisdictional Program Effectiveness Assessments

a. OBJECTIVES OF EFFECTIVENESS ASSESSMENTS

Beginning with the Annual Report due in 2012, each Copermittee must annually assess the effectiveness of its Jurisdictional Runoff Management Program (JRMP) implementation at meeting the following objectives:

(1) Objective for 303(d) Waterbodies: Reduce storm water pollutant loadings.

(a) Each Copermittee must establish annual assessment measures or methods specifically for reducing discharges of storm water pollutants from its MS4 into each downstream 303(d)-listed water body for which that waterbody is impaired. Assessment measures must be developed for each of the six outcome levels described by CASQA.[19]
(b) Each Copermittee must annually conduct each established assessment measure or method and evaluate the outcome. Each outcome must then be used to assess the effectiveness of implemented management measures toward reducing MS4 discharges of the specific pollutants causing or contributing to conditions of impairment.

[19] Effectiveness assessment outcome levels as defined by CASQA are defined in Attachment C of this Order. See "*Municipal Stormwater Program Effectiveness Assessment Guidance"* (CASQA, May 2007) for guidance for assessing program activities at the various outcome levels.

(c) The assessment measures must target both water quality outcomes and the results of municipal enforcement activities.

(2) Objective for Environmentally-Sensitive Areas: Prevent storm water MS4 discharges from causing or contributing to conditions of pollution, nuisance, or contamination.

(a) Each Copermittee must establish annual measures or methods specifically for assessing the effectiveness of its management measures for protecting downstream ESAs from adverse effects caused by discharges from its MS4. Assessment measures must be developed for each of the six outcome levels described by CASQA.
(b) Each Copermittee must annually implement each established assessment measure or method and evaluate the outcome. Each outcome must be used to assess the effectiveness of implemented management measures toward reducing MS4 discharges of the specific pollutants causing or contributing to conditions of impairment.
(c) The assessment measures must target both water quality outcomes and the results of municipal enforcement activities.

(3) Objectives for major program component outcomes: Determined by Each Copermittee.

(a) Each Copermittee must annually develop objectives for each program component in Section F and the overall JRMP. The objectives must be established as appropriate in response to program implementation and evaluation of water quality and management practices.
(b) Assessment approaches for program implementation must include a mix of specific activities, general program components, and water quality data.
(c) The assessment measures must target both water quality outcomes and the results of municipal enforcement activities.

(4) Objectives for actions taken to protect receiving water limitations in accordance with this Order.

(a) Each Copermittee must develop and implement an effectiveness assessment strategy for each measure conducted in response to a determination to implement the “iterative” approach to prevent or reduce any storm water pollutants that are causing or contributing to the exceedance of water quality standards as outlined in this Order

b. ASSESSMENT REVIEW

(1) Based on the results of the effectiveness assessments, each Copermittee must annually review its jurisdictional activities and BMPs to identify modifications and improvements needed to maximize JRMP effectiveness, as

necessary to achieve compliance with this Order.

(2) Each Copermittee must develop and annually conduct an Integrated Assessment[20] of each effectiveness assessment objective above (Section J.1.a) and the overall JRMP using a combination of outcomes as appropriate to the objectives.[21]

2. Program Modifications

a. Each Copermittee must develop and implement a plan and schedule to address program modifications and improvements identified during annual effectiveness assessments.

b. Jurisdictional activities/BMPs that are ineffective or less effective than other comparable jurisdictional activities/BMPs must be replaced or improved upon by implementation of more effective jurisdictional activities/BMPs. Where monitoring data exhibits persistent water quality problems that are caused or contributed to by MS4 discharges, jurisdictional activities or BMPs applicable to the water quality problems must be modified and improved to correct the water quality problems.

3. Effectiveness Assessment and Program Response Reporting

a. Each Copermittee must include a description and summary of its annual and long-term effectiveness assessments within each Annual Report. Beginning with the Annual Report due in 2011, the Program Effectiveness reporting must include:

(1) 303(d) waterbodies: A description and results of the annual assessment measures or methods specifically for reducing discharges of storm water pollutants from its MS4 into each 303(d)-listed waterbody;
(2) ESAs: A description and results of the annual assessment measures or methods specifically for managing discharges of pollutants from its MS4 into each downstream ESA;
(3) Other Program Components: A description of the objectives and corresponding assessment measures and results used to evaluate the effectiveness of each general program component. The results must include findings from both program implementation and water quality assessment where applicable;
(4) Receiving water protection: A description and results of the annual assessment measures or methods employed specifically for actions taken to protect receiving water limitations in accordance with Section A.3 of this

[20] Integrated assessment is defined in Attachment C. It is the process of evaluating whether program implementation is resulting in the protection or improvement of water quality. Integrated assessment combines assessments of program implementation and water quality.
[21] Not all program components need be addressed at each of the six outcome levels.

Order;

(5) A description of the steps taken to use dry-weather and wet-weather monitoring data to assess the effectiveness of the programs for 303(d) impairments, ESAs, and general program components;

(6) A description of activities conducted in response to investigations of illicit discharge and illicit connection activities, including how each investigation was resolved and the pollutant(s) involved;

(7) Responses to effectiveness assessments: A description of each program modification, made in response to the results of effectiveness assessments conducted pursuant to Section J.1.a, and the basis for determining (pursuant to Section J.2.b.) that each modified activity and/or BMP represents an improvement with respect to reducing the discharge of storm water pollutants from the MS4.

(8) A description of the steps that will be taken to improve the Copermittee's ability to assess program effectiveness using measurable targeted outcomes, assessment measures, assessment methods, and outcome levels 1-6. Include a time schedule for when improvement will occur; and

(9) A description of the steps that will be taken to identify aspects of the Copermittee's Jurisdictional Runoff Management Program that will be changed based on the results of the effectiveness assessment.

4. Work Plan

Each Copermittee must develop a work plan to address their high priority water quality problems in an iterative manner over the life of the permit. The goal of the work plan is to demonstrate a responsive and adaptive approach for the judicious and effective use of available resources to attack the highest priority problems. The work plan shall include, at a minimum, the following:

a. The problems and priorities identified during the assessment;
b. A list of priority pollutants and known or suspected sources;
c. A brief description of the strategy employed to reduce, eliminate or mitigate the negative impacts;
d. A description and schedule for new and/or modified BMPs. The schedule is to include dates for significant milestones;
e. A description of how the selected activities will address an identified high priority problem. This will include a description of the expected effectiveness and benefits of the new and/or modified BMPs;
f. A description of implementation effectiveness metrics;
g. A description of how efficacy results will be used to modify priorities and implementation; and
h. A review of past activities implemented, progress in meeting water quality standards, and planned program adjustments.

The Copermittee shall submit the work plan to the San Diego Water Board within 365 days of adoption of the Order. Annual updates are also required and shall be included

with the annual JRMP report. The San Diego Water Board will assess the work plan for compliance with the specific and overall requirements of the Order. To increase effectiveness and efficiencies, Copermittees may combine their implementation efforts and work plans within a hydrologic area or sub area. Each Copermittee, however, maintains individual responsibility for developing and implementing an acceptable work plan.

K. REPORTING

The Copermittees may propose alternate reporting criteria and schedules, as part of their updated JRMP, for the Executive Officer's acceptance. The Copermittees shall submit the updated JRMP within 365 days after adoption of this Order.

1. Runoff Management Plans

a. JURISDICTIONAL RUNOFF MANAGEMENT PLANS

(1) Copermittees: The written account of the overall program to be conducted by each Copermittee to meet the jurisdictional requirements of section F of this Order is referred to as the Jurisdictional Runoff Management Plan (JRMP). Each Copermittee must revise and update its existing JRMP so that it describes all activities the Copermittee will undertake to implement the requirements of this Order. Each Copermittee must submit its updated and revised JRMP to the San Diego Water Board 365 days after adoption of this Order.

(2) At a minimum, each Copermittee's JRMP must be updated and revised to demonstrate compliance with each applicable section of this Order.

b. WATERSHED WORKPLANS

(1) Copermittees: The written account of the program conducted by group of Copermittees is referred to as the Watershed Workplan. Copermittees shall be responsible for updating and revising the Watershed Workplan. Each Watershed Workplan shall be updated and revised to describe any changes in water quality problems or priorities, and any necessary change to actions Copermittees will take to implement jurisdictional or watershed BMPs to address those identified. The Copermittees shall assemble and submit the Watershed Workplan to the San Diego Water Board no later than 365 days after adoption of this Order, and shall be prepared to implement the workplan within 60 days of the San Diego Water Board Executive Officer deeming the workplan acceptable.

(2) Each Watershed Workplan shall, at a minimum, include:

(a) An updated watershed map.

(b) Identification and description of all applicable water quality data, reports, analyses, and other information to be used to assess receiving water quality.
(c) Assessment and analysis of the watershed's water quality data, reports, analyses, and other information, used during identification and prioritization of the watershed's water quality problems.
(d) A prioritized list of water quality problems within the WMA including rationale explaining the method/logic used to determine prioritization.
(e) Identification of the likely sources, pollutant discharges, and/or other factors causing the high priority water quality problems within the WMA.
(f) A description of the strategy to be used to guide Copermittee implementation of BMPs either jurisdictionally or on a watershed-wide basis to abate the highest water quality problems
(g) A list of criteria used to evaluate BMP effectiveness and how it was applied.
(h) A GIS map of BMPs implemented and BMPs scheduled for implementation.
(i) A description of the public participation mechanisms to be used and the parties anticipated to be involved during the development and implementation of the Watershed Workplan.
(j) A description of Copermittee collaboration to accomplish development of the Watershed Workplan, including a schedule for Watershed meetings.
(k) A description of how TMDLs and 303(d)-listed water bodies were considered during prioritization of watershed water quality problems
(l) A description of the strategy to model and monitor improvement in receiving water quality directly resulting from implementation of the BMPs described in the Watershed Workplan.
(m) A scheduled annual Watershed Workplan Review Meeting once every calendar year. This meeting shall be open to the public.

2. Other Required Reports and Plans

a. SSMP UPDATES

(1) Copermittees must submit their updated model SSMP in accordance with the applicable requirements of section F.1 with the JRMP <u>two years after adoption</u> of this Order.
(2) Within 180 days of determination that the Model SSMP is in compliance with this Permit's provisions, each Copermittee must update their own local SSMP, and amended ordinances consistent with the model SSMP, and shall submit both (local SSMP and amended ordinances) to the San Diego Water Board.
(3) For SSMP-related requirements of Section F.1 with subsequent implementation due dates, updated SSMPs must be submitted with the JRMP annual report covering the applicable reporting period.

b. REPORT OF WASTE DISCHARGE

The Copermittees must submit to the San Diego Water Board, no later than 210 days in advance of the expiration date of this Order, a Report of Waste Discharge (ROWD) as an application for issuance of new waste discharge requirements. The fourth annual report for this Order may supplement the ROWD, provided it contains the minimum information below.

At a minimum, the ROWD must include the following: (1) Proposed changes to the Copermittees' runoff management programs; (2) Proposed changes to monitoring programs; (3) Justification for proposed changes; (4) Name and mailing addresses of the Copermittees; (5) Names and titles of primary contacts of the Copermittees; and (6) Any other information necessary for the reissuance of this Order.

3. Annual Reports

a. JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM (JRMP) ANNUAL REPORTS

(1) Copermittees: Each Copermittee must generate individual JRMP Annual Reports which cover implementation of its jurisdictional activities during the past annual reporting period. Each Annual Report must verify and document compliance with this Order as directed in this section. Each Copermittee must retain records through 2016, available for review, that document compliance with each requirement of this Order. The reporting period for these annual reports must be the previous fiscal year.

(2) Each Copermittee must submit their JRMP Annual Reports to the San Diego Water Board by September 30 of each year, beginning on September 30, 2011.

(3) Each JRMP Annual Report must contain, at a minimum, the following information:

(a) Information required to be reported annually in Section H (Fiscal Analysis) of this Order;
(b) Information required to be reported annually in Section J (Program Effectiveness) of this Order;
(c) The completed Reporting Checklist found in Attachment D, and
(d) Information for each program component by watershed as described in the following Table 9:

Table 9. Annual Reporting Requirements

Program Component	Reporting Requirement
New Development	1. Updated relevant sections of the General Plan and environmental review process and a description of planned updates within the next annual reporting period, if applicable
	2. Revisions to the local SSMP, including where applicable: (a) Identification and summary of where the SSMP fails to meet the requirements of this Order; (b) Updated procedures for identifying pollutants of concern for each Priority Development Project; (c) Updated treatment BMP ranking matrix; and (d) Updated site design and treatment control BMP design standards;
	3. Verification that site design, source control, and treatment BMPs were required on all applicable Priority Development Projects;
	4. Description of the application of LID and site design BMPs in the planning and approval process;
	5. Description of projects subject to the local waiver provision for numeric sizing of treatment control BMP requirements;
	6. Description and summary of the LID site design BMP substitution program, if applicable;
	7. Description and summary of the process to verify compliance with SSMP requirements;
	8. Updates to the BMPs that are listed in the local SSMP as options for treatment control;
	9. Description of the treatment control maintenance tracking process and verification that the requirements of this Order were met during the reporting period; (a) Updated watershed-based database of approved treatment control BMPs and treatment control BMP maintenance within its jurisdiction, including updates to the list of high-priority treatment BMPs;
	10. Description of the process for identifying and evaluating hydrologic conditions of concern and requiring a suite of management measures within all Priority Development Projects to protect downstream beneficial uses and prevent adverse physical changes to downstream stream channels;
	11. Description of enforcement activities applicable to the new development and redevelopment component and a summary of the effectiveness of those activities;
Construction	1. Updated relevant ordinances and description of planned ordinance updates within the next annual reporting period, if applicable;
	2. A description of procedures used for identifying priorities for inspecting sites and enforcing control measures which consider the nature of the construction activity, topography, and the characteristics of soils and receiving water quality;

Program Component	Reporting Requirement
	3. Designated minimum and enhanced BMPs;
	4. Summary of the inspection program, including the following information: (a) Number and date of inspections conducted at each facility, including the facility address; (b) Number of facilities lacking adequate BMPs; (c) The BMP violations identified during the inspection by facility; (d) Number, date, and types of enforcement actions by facility; (e) Narrative description of inspection findings and follow-up activities for each facility;
Municipal	1. Updated source inventory;
	2. Changes to the designated municipal BMPs;
	3. Descriptions of procedures to assure that flood management projects assess the impacts on the water quality of receiving water bodies;
	4. Summary and assessment of BMPs implemented at retrofitted flood control structures, including: (a) List of projects with BMP retrofits; and (b) List and description of structures retrofitted without BMPs;
	5. Description and assessment of the municipal structural treatment control operations and maintenance activities, including: (a) Number of inspections and types of facilities; and (b) Summary of findings;
	6. Description of the municipal areas/facilities operations and maintenance activities, including: (a) Number and types of facilities maintained; (b) Amount of material removed and how that material was disposed; and (c) List of facilities planned for bi-annual inspections and the justification;
	7. Description of the municipal areas/programs inspection activities, including: (a) Number and date of inspections conducted at each facility; (b) Number of facilities lacking adequate BMPs; (c) The BMP violations identified during the inspection by facility; (d) Number, date and types of enforcement actions by facility; (e) Narrative description of inspection findings and follow-up activities for each facility;
	8. Description of activities implemented to address sewage infiltration into the MS4;
Commercial /	1. Annual inventory of commercial / industrial sources;

Program Component	Reporting Requirement
Industrial	2. Summary of the inspection program, including the following information: (a) Number and date of inspections conducted at each facility including the facility address; (b) Number of facilities lacking adequate BMPs; (c) The BMP violations identified during the inspection by facility; (d) Number, date, and types of enforcement actions by facility; (e) Narrative description of inspection findings and follow-up activities for each facility;
	3. Changes to designated minimum and enhanced BMPs;
	4. A list of industrial sites, including each name, address, and SIC code, that the Copermittee suspects may require coverage under the General Industrial Permit, but has not submitted an NOI;
Residential	1. Updated minimum BMPs required for residential areas and activities;
	2. Quantification and summary of applicable runoff and storm water enforcement actions within residential areas and activities;
	3. Description of efforts to manage runoff and storm water pollution in common interest areas;
Retrofitting Existing Development	1. Updated inventory and prioritization of existing developments identified as candidates for retrofitting.
	2. Description of efforts to retrofit existing developments during the reporting year.
	3. Description of efforts taken to cooperate with private landowners to retrofit existing development.
	4. A list of retrofit projects that have been implemented, including site location, a description of the retrofit project, pollutants expected to be treated, and the tributary acreage of runoff that will be treated.
	5. A list of regional mitigation projects that have been implemented, including site location, a description of the regional mitigation project, pollutants expected to be treated, and the tributary acreage of runoff that will be treated.
	6. Any proposed retrofit or regional mitigation projects and timelines for future implementation.
	7. Any proposed changes to the Copermittee's overall retrofitting program.
Illicit Discharge Detection and Elimination	1. Changes to the legal authority to implement Illicit Discharge Detection and Elimination activities;
	2. Changes to the established investigation procedures;
	3. Public reporting mechanisms, including phone numbers and web pages;
	4. All data and assessments from the Dry Weather Effluent Analytical Monitoring activities;
	5. Response criteria developed for water quality data and notifications;

Program Component	Reporting Requirement
	6. Summaries of illicit discharges (including spills and water quality data events) and how each significant case was resolved;
	7. A description of instances when field screening and analytical data exceeded action levels, including those instances for which no investigation was conducted;
	8. A description of follow-up and enforcement actions taken in response to investigations of illicit discharges and a description of the effectiveness of those measures;
	9. A description of controls to prevent infiltration of seepage from municipal sanitary sewers to municipal separate storm sewer systems;
Work Plan	Priorities, strategy, implementation schedule and effectiveness evaluation;

(4) Each JRMP Annual Report must also include the following information regarding non-storm water discharges (see Section B.2. of this Order):

(a) Identification of non-storm water discharge categories identified as a source of pollutants to waters of the U.S;
(b) A description of ordinances, orders, or similar means to prohibit non-storm water discharge categories identified under section B.2 above ;
(c) Identification of any control measures to be required and implemented for non-storm water discharge categories identified as needing controls by the San Diego Water Board; and
(d) A description of a program to address pollutants from non-emergency fire fighting flows identified by the Copermittee to be significant sources of pollutants.

4. Interim Reporting Requirements

For the July 2010-June 2011 reporting period, the Jurisdictional RMP must be submitted on January 31, 2012. Each Jurisdictional RMP Annual Report submitted for this reporting period must, at a minimum, include comprehensive descriptions of all activities conducted to fully implement the Copermittees' Jurisdictional RMP documents, as those documents were developed to comply with the requirements of Order No. 2004-001.

5. Universal Reporting Requirements

All submittals must include an executive summary, introduction, conclusion, recommendations, and signed certified statement. Each Copermittee must submit a signed certified statement covering its responsibilities for each applicable submittal. The Principal Copermittee must submit a signed certified statement covering its responsibilities for each applicable submittal and the sections of the submittals for which it is responsible.

L. MODIFICATION OF PROGRAMS

Modifications of Jurisdictional Runoff Management Programs and/or Watershed Runoff Management Programs may be initiated by the Executive Officer of the San Diego Water Board or by the Copermittees. Requests by Copermittees must be made to the Executive Officer, and must be submitted during the annual review process. Requests for modifications should be incorporated, as appropriate, into the Annual Reports or other deliverables required or allowed under this Order.

1. Minor Modifications: Minor modifications to Jurisdictional Runoff Management Programs, and/or Watershed Runoff Management Programs, may be accepted by the Executive Officer where the Executive Officer finds the proposed modification complies with all discharge prohibitions, receiving water limitations, and other requirements of this Order.

2. Modifications Requiring an Amendment to this Order: Proposed modifications that are not minor require amendment of this Order in accordance with this Order's rules, policies, and procedures.

M. PRINCIPAL COPERMITTEE RESPONSIBILITIES

Within 180 days of adoption of this Order, the Copermittees must designate the Principal Copermittee and notify the San Diego Water Board of the name of the Principal Copermittee. The Principal Copermittee must, at a minimum:

1. Serve as liaison between the Copermittees and the San Diego Water Board on general permit issues, and when necessary and appropriate, represent the Copermittees before the San Diego Water Board.
2. Coordinate permit activities among the Copermittees and facilitate collaboration on the development and implementation of programs required under this Order.
3. Produce and submit documents and reports as required by section K of this Order and Receiving Waters and MS4 Discharge Monitoring and Reporting Program No. R9-2010-0016 in Attachment E of this Order.

N. RECEIVING WATERS AND MS4 DISCHARGE MONITORING AND REPORTING PROGRAM

Pursuant to CWC section 13267, the Copermittees must comply with all the requirements contained in Receiving Waters and MS4 Discharge Monitoring and Reporting Program No. R9-2010-0016 in Attachment E of this Order.

O. STANDARD PROVISIONS, REPORTING REQUIREMENTS, AND NOTIFICATIONS

1. Each Copermittee must comply with Standard Provisions, Reporting Requirements, and Notifications contained in Attachment B of this Order. This includes 24 hour/5 day reporting requirements for any instance of non-compliance with this Order as described in section 5.e of Attachment B.

2. All plans, reports and subsequent amendments submitted in compliance with this Order must be implemented immediately (or as otherwise specified). All submittals by Copermittees must be adequate to implement the requirements of this Order.

I, David W. Gibson, Executive Officer, do hereby certify the foregoing is a full, true, and correct copy of an Order adopted by the California Regional Water Quality Control Board, San Diego Region, on TBD, 2010.

_____

David W. Gibson
Executive Officer

0004912

Ben Neill - RE: Draft Riverside MS4 Permit

From: "Padres, Claudio" <CMPadres@rcflood.org>
To: Chiara Clemente <CClemente@waterboards.ca.gov>, Ben Neill <BNeill@waterboards.ca.gov>, Chad Loflen <cloflen@waterboards.ca.gov>, DavidBarker <DBarker@waterboards.ca.gov>, Wayne Chiu <wchiu@waterboards.ca.gov>
Date: 5/28/10 1:35 PM
Subject: RE: Draft Riverside MS4 Permit
CC: "Menifee (DonAllison)" <dallison@cityofmenifee.us>, "Temecula(AldoLicitra)" <Aldo.Licitra@cityoftemecula.org>, "Wildomar (Tim D'Zmura)" <tdzmura@cityofwildomar.org>, "Thomas, Chandra" <CTHOMAS@co.riverside.ca.us>, "Horn, Steve" <STHorn@co.riverside.ca.us>, "Maxwell, Ward" <WMAXWELL@co.riverside.ca.us>, <KarenA@lwa.com>, <MackW@lwa.com>, "Murrieta(Bill Woolsey)" <wwoolsey@murrieta.org>, Daniel Apt <DAPT@rbf.com>, ScottTaylor <STAYLOR@rbf.com>, "County (Alex Gann)" <agann@rceo.org>, "County(Mike Shetler)" <mshetler@rceo.org>, "Uhley, Jason" <JUHLEY@rcflood.org>
Attachments: 2010-05-13_Meeting Notes (final).doc; 2010-05-06_Meeting Notes (final).doc

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Thank you Chiara for your comments/edits on the 5/6 and 5/13 meeting notes, attached are the final copies.

For the May 6th meeting all suggested changes were incorporated. For May 13th, Water Board staff had deleted a portion of the meeting notes, and this portion has been restored (see comments on attached file). Both the Water Board and the Copermittees had agreed to memorialize these meetings in writing, and it is important that the meeting notes are an accurate representation of the meeting.

If you have any questions, please feel free to contact us. As previously mentioned I will be on vacation next week, and will be back on June 7th. In my absence Jason will be at next week's meeting (on June 3rd); he will be sending out the agenda and updated files next week in advance of the meeting.

I hope you all have a nice Memorial weekend!

-Claudio

From: Chiara Clemente [mailto:CClemente@waterboards.ca.gov]
Sent: Mon 5/24/2010 5:25 PM
To: Padres, Claudio; Ben Neill; Chad Loflen; David Barker; Wayne Chiu
Cc: Menifee (DonAllison); Temecula (AldoLicitra); Wildomar (Tim D'Zmura); Thomas, Chandra; Horn, Steve; Maxwell, Ward; KarenA@lwa.com; MackW@lwa.com; Murrieta(Bill Woolsey); Daniel Apt; ScottTaylor; County (Alex Gann); County(Mike Shetler); Chun, Arlene; Uhley, Jason
Subject: RE: Draft Riverside MS4 Permit

Hi all,
Apologies for the delay. Attached are our revisions to the 5/6/10 and 5/13/10 meeting minutes. David Barker should be sending you the revised draft shortly.

See you Wednesday,

Chiara

Chiara Clemente

0004913

Senior Environmental Scientist
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Regional Water Quality Control Board
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(858) 467-2359
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Santa Margarita Watershed MS4 Permit Renewal
Meeting with San Diego Water Board Staff

Location: City of Temecula

May 6, 2010

12:00 PM – 4:00 PM

Attendees:

Dave Barker, SDRWQCB
Chiara Clemente, SDRWQCB
Ben Neil, SDRWQCB
Wayne Chiu, SDRWQCB
Chad Loften, SDRWQCB

Jason Uhley, RFCWCD
Claudio Padres, RFCWCD
Bill Woolsey, Murrieta
Aldo Licitra, Temecula
Don Allison, Menifee

Tim D'Zmura, Wildomar
Mack Walker, LWA
Daniel Apt, RBF

- Meeting Outcome
- Discussion to include in the fact sheet

Agenda Item	Discussion
1. Process/Housekeeping i. Overall Schedule & Process	• **Interim Drafts from the San Diego Water Board** ➢ **San Diego Water Board staff identified the need to set up a process to provide interim drafts to the Copermittees and will look into setting up set intervals of providing the interim drafts**. • **Schedule & Process** o San Diego Water Board staff identified a concern for the order of the schedule, and the ability to discuss all the issues. Board Staff requested that the Copermittees' big issues be discussed first. o The Copermittees noted that the original schedule discussed with Gibson was to have the hearing in December which would have better facilitated full discussions. The Copermittees reiterated that the current timelines are not consistent with the initial agreement for a December hearing, nor consistent with Jason's initial discussion with David Gibson, where Mr. Gibson stated that there was not fixed schedule and that discussions could be continue as long as they were effective. Jason noted that the current schedule is insufficient and reiterated previous Copermittee requests that if the process is working that the deadlines should be adjusted. o San Diego Water Board staff corrected that Mr. Gibson's schedule was to have the hearing no later than December. San Diego Water Board staff noted that listening to the Copermittees comments and concerns was their goal for the meetings. Achieving consensus on everything is not expected. ➢ **It was mutually agreed that future meetings will go from 10 AM –4:00 PM (at the latest)**

	➢ **The Copermittees agreed to provide the Water Board an updated schedule for the meetings. In addition, The Copermittees will evaluate the schedule to see if some bigger issues could be moved earlier to allow the Copermittees sufficient time for discussion with the San Diego Water Boardbefore the public release.**
2. Wrap-up for Week 1 Topics	• <u>Municipal (F.3.a)</u> o The Copermittees overviewed some of the additional suggested language changes that were made pursuant to the 4/28 meeting discussions. ▪ Language was suggested to clarify that linear facilities do not need to be individually inventoried. ▪ Language was suggested for the evaluation of flood control structures to clarify that the Copermittees would evaluate the need for retrofit as part of ongoing routine maintenance of the MS4 system. ▪ Basins were included as part of the O&M section. ➢ **The Copermittees agreed to highlight any new changes to the suggested language in the Municipal sections compared to what was provided last week.** • <u>Residential (F.3.c.)</u> o Suggested language was discussed that would clarify that a separate compliance program would not be required for Home Owners Associations. ➢ **San Diego Water Board staff indicated that they want to be specific that existing residential requirements apply for Common Interest Areas and Home Owners Associations; however, separate annual reporting requirements are not expected for CIA/HOA Areas.** ➢ **San Diego Water Board staff reviewed the suggested language provided by the Copermittees for the previous week's meeting and will review any additional changes to language that the Copermittees have made as time permits.** ➢ **The Copermittees agreed to highlight any new changes to the suggested language in the Residential sections compared to what was provided last week.**
3. Today's Topics i. IDDE	• <u>Maintain MS4 Map (F.4.b.)</u> o The Copermittees felt that requiring the use of a GIS system was dictating the method of compliance contrary to California Water Code and therefore should not be required and noted this change was similar to the change requested last week regarding GIS systems. The Copermittees specifically requests the replacement of 'required' with 'encouraged' in the sentence discussing GIS data management. ➢ **San Diego Water Board staff agreed to look into the Copermittees concern about dictating the manner of compliance. The San Diego Water Board will consider changing**

	the wording to 'encourage' the use of GIS, rather than 'require' it. • Dry Weather Field Screening and Analytical Monitoring (F.4.d.) o There was discussion regarding the need for the inclusion of the language 'individually and/or jointly' to allow for the Copermittees to collaborate and implement programs jointly, and the resulting responsibility in case of a violation. ▪ The San Diego Water Board Staff identified that the original language in the draft would allow for the Copermittees to jointly pursue implementation of this and other requirements where the term "each Copermittee" is used. The Board staff clarified, however, that individual Copermittees would be responsible for any violation related to their individual responsibility (e.g. failure to conduct an inspection or collect data). If for example, the District conducts monitoring for the Copermittees as a contractor, through agreements; and there was a violation related to data collected on the Copermittee's behalf, that the responsibility would be on the Copermittee, not the District. The Copermittee would have to pursue the District (or any other contractor) through its agreement with that entity. ➢ **Based on the understanding above, it was agreed that the language 'individually and/or jointly' would not be needed.** • Investigation/Inspection And Follow-Up - Analytical data [F.4.e.(2)(c)] o The Copermittees requested that the 5-day period for initiating follow-up investigations would begin pending appropriate Copermittee QA/QC on the data. ➢ **The San Diego Water Board staff did not agree to make changes to the language of the permit, but offered to clarify the expected response by the Copermittee(s) in the Fact Sheet.** ❖ To be added to the Fact Sheet: The intent of the Board is that if QA/QC identifies that the data is bad and follow-up sampling or investigations supports the finding that the data were faulty, additional follow-up is no longer expected. • Elimination of Illicit Discharges And Connections (F.4.f.) o The Copermittees expressed concern over the requirement to take 'immediate action'. The concern is that 'immediate' is not defined and should be relative to the severity of the problem. ▪ Several examples were cited by Board staff indicating that 'immediately' is contextual and may be defined in the Copermittees JRMP to some extent. ❖ The San Diego Water Board staff offered to clarify in the Fact Sheet that the appropriate steps, and the level of 'immediacy' required would depend on the situation and may be defined by the Copermittees in their JRMPs. o There was discussion about including language to clarify that the Copermittees can engage the San Diego Water Board for assistance in resolving illicit discharges and connections. ➢ **The San Diego Water Board did not agree to include such language in the permit since the permit cannot be written to regulate themselves, but offered to include language in the fact**

	sheet. • <u>Prevent and Respond to Sewage Spills and other Spills – Management Measures & Coordination [F.4.h.(1)]</u> o The Copermittees noted concern regarding the requirement to 'prevent' sewage spills from entering the MS4. The concern is that the Copermittees cannot 'prevent' spills from entering the MS4, but can only assist with the response once notified of the spill. ➢ **The San Diego Water Board staff confirmed that they expect the sewer agencies to be the first responder, and discussed different meaning of "prevent" and that the Copermittees have flexibility to implement management measures and procedures to meet the requirement to 'prevent' entry into the MS4. RB staff clarified that their intent for this section is to require the Copermittees to have 'management measures and procedures' in place, and to 'coordinate with spill response teams'.** o The Copermittees identified that they already have an SSO response program that includes: coordinated procedures with the sewer agencies, procedures for cross notification of spill events, full and immediate access to our MS4 (no requirement to notify us prior to accessing for containment or cleanup), and availability of the Copermittees to assist with response when requested. ➢ **The San Diego Water Board staff indicated that such a program would likely meet the requirements of this provision, and that if the Copermittees provide a copy of this SSO response program in their updated JRMP, that San Diego Water Board staff could review it for compliance with the provision**. • <u>Education and Training (F.4.i.)</u> ➢ The San Diego Water Board Staff identified that there will be one overall Education section and training will be part of that section.
3. Today's Topics ii. NALs	• **NALs Overarching Issues** o The Copermittees noted that although the Board has identified NALs and SALs as the standard for their region, the Copermittees still believe that it is not appropriate for this permit area, and that the programmatic action levels identified in the ROWD will be a more effective and useful tool. The Copermittees indicated that they will provide official written comments to this extent, but that they will focus the meeting time with Board staff on working to fine tune the requirements to help it to be useful to the Copermittees in the management of their programs, cost efficient, and flexible to allow appropriate focusing of resources. o The Copermittees mentioned that at this meeting they were only commenting on the programmatic responses to an NAL/SAL exceedance and not covering the action levels themselves, nor any sections discussing the monitoring locations or protocols. o The Copermittees identified that the 14 day reporting requirements in provisions C.2.a and C.2.b. were not necessary to protect water quality and requested that any reports be submitted within the annual report similar to requirements for any other IC/ID event. ➢ **The San Diego Water Board Staff indicated that that the reports**

	required in C.2.a and C.2.b for documenting the results of the source identification efforts could be submitted with the annual report and still meet the goals of the reporting requirements. o The Copermittees noted concern over Section C.2.e., which would require any exceedance where the source was not found, to result in identification of the pollutant as a high-priority – which in turn could potentially require new programs to be created for that pollutant – all after only a single exceedance. Suggested alternative language was discussed. ➢ **The San Diego Water Board staff concurred with the Copermittees concern. The San Diego Water Board staff made a suggestion to remove the phrase "high priority pollutant of concern", but indicated that it needed some more thought regarding how that would impact the rest of the paragraph.** ➢ **The Copermittees will provide suggested alternative language based on the discussion.** • **NAL Exceedance Response (C.2.)** o The Copermittees discussed suggested language to ensure that only the 'applicable' Copermittee is required to respond to an exceedance. The concern is that the existing language identifies that 'each' Copermittee must respond, which could be read to require all Copermittees to respond. The Copermittees clarified that only the Copermittee with jurisdiction over the surrounding area should be required to respond. ➢ **The San Diego Water Board agreed and would check on adding "applicable" where appropriate in context.** • **NAL Exceedance Response (C.2.a.)** o The San Diego Water Board staff clarified that for exceedances caused by discharges that are identified as natural in origin and in conveyance into the MS4, rather than **NO** specific action is required (as identified in the suggested edits provided by the Copermittees), the specific action required is reporting the findings and providing documentation to the San Diego Water Board. • **NAL Exceedance Response (C.2.b.)** o The Copermittees provided language to clarify that the required response to an NAL exceedance caused by an Illicit Discharge or Connection is defined in section F.4.f of the order. The Copermittees also identified that the second two sentences discussing the timeframe and content of the report to the San Diego Water Board may be able to be deleted since they are addressed through the IDDE program. ➢ **The San Diego Water Board will review the language in more detail.** • **NAL Exceedance Response (C.2.c.)** o The Copermittees provided language to clarify the difference in the required response, based on whether an exceedance is identified as an isolated event, or representative of the entire category of discharges. o The San Diego Water Board was concerned that the suggested language would limit the Copermittees response to providing "a schedule of actions" and wanted to ensure that the report would

	describe the actions that will be taken, not only a schedule for actions. ➢ **The San Diego Water Board felt that the emphasis of the requirement needs to be on addressing the exceedance and not a schedule to address the exceedance. The San Diego Water Board offered to review the suggested language in more detail.** • **NAL Exceedance Response (C.3.)** o The Copermittees requested that the sentence addressing effectiveness assessment be moved to the beginning of the section. Additionally the Copermittees felt that there were apparent inconsistencies within the paragraph regarding use of NALs for enforcement. o San Diego Water Board considered that this section may be more appropriate as a finding rather than a provision, as the language is generally explanatory rather than describing requirements on the Copermittees. o Board staff indicated concern in changing this paragraph due to legal counsel's involvement in drafting it, but did note that the addition of the sentence addressing effectiveness assessment was a last minute change. ➢ **The San Diego Water Board will have their legal counsel look at the proposed changes and will look to see if this provision is more appropriate to be included in the Findings.** • **NAL Exceedance Response (C.5.)** o The Copermittees identified that this section might be more appropriate to include in the MRP as it is dealing with the required sampling and data. o The San Diego Water Board identified that it may be appropriate to include pre-calculated values for Table 3.a.2 based on assumed hardness values. The Copermittees indicated that they prefer the formulas, as the pre-calculated values may not be generally representative.
3. Today's Topics iii. SALs	• **SALs (D.1)** o The Copermittees discussed recommended changes to the introductory paragraph to clarify how and SAL exceedances are calculated. The suggested language indicated that an SAL is exceeded if, for a given monitoring station, a running average of twenty percent or greater of the available Wet Weather MS4 Discharge Monitoring data exceeds the Storm Water Action Level ➢ **It was agreed on the general intent of the requirement. The Board offered to re-visit this language and consider the suggested revisions.** o In the requirement to consider monitoring data, the Copermittees requested additional language to examine the need to dedicate resources to address NAL exceedances that would provide flexibility to prioritize an NAL response action before a response action to an SAL exceedance, if a resource conflict arose.

	➢ **The San Diego Water Board staff did not feel it was consistentto add the suggested language examining resources in the requirement to consider monitoring data, but agreed that flexibility is appropriate and is already included in the language.** ❖ The San Diego Water Board's intent through the language in this section is to allow flexibility to prioritize resources between responding to NALs and SALs. A clarification of the intent may be added to the Fact Sheet. • **SALs – Natural pollutants (D.4)** o The Copermittees provided suggested language to clarify that once an SAL exceedance is demonstrated to be natural in source and conveyance into the MS4, that this demonstration would not be required to be repeated for future exceedances. o There was discussion about detecting the potential addition of an anthropogenic source of the same pollutant at a later date. The Copermittees responded that if there was a significant deviation from the natural background levels of the pollutant that would be accounted for in the assessment of the magnitude of the exceedance. ➢ **The San Diego Water Board agreed that demonstrating that a pollutant is naturally sourced would not need to be repeated at the same monitoring station rather than in the same hydrologic subarea (as had been suggested by the Copermittees), and offered to review the language again in response to the discussion.**
4. Overview of Next Week	• The Copermittees discussed that they have not identified Irrigation Runoff (and associated conditionally exempt discharges) as being a source of pollutants in this watershed. The Copermittees requested that these conditional exemptions be restored. The Copermittees noted that if the Board made a determination that the category is a source, that they could instead include require the Copermittees to address the category through management programs (similar to the programs required for non-emergency fire-flows in Section B.3.). • The San Diego Water Board identified that discussions regarding the irrigation prohibition can begin next week. • Bill Woolsey identified the water efficiency ordinance that has been adopted in Murrieta.

Santa Margarita Watershed MS4 Permit
Meeting with San Diego Water Board Staff

Location: City of Temecula

May 13, 2010

10:00 PM – 3:00 PM

Attendees:

Dave Barker, SDRWQCB	Jason Uhley, RFCWCD	Aldo Licitra, Temecula
Chiara Clemente, SDRWQCB	Claudio Padres, RFCWCD	Tim D'Zmura, Wildomar
Ben Neill, SDRWQCB	Don Allison, Menifee	Mack Walker, LWA
Wayne Chiu, SDRWQCB	Bill Woolsey, Murrieta	Daniel Apt, RBF

Agenda Item	Discussion
1. Process/Housekeeping	• The Copermittees inquired about the status of the regulatory 'swap' with the Santa Ana Water Board, for the cities of Menifee and Murrieta. o San Diego Water Board staff had no new information on the Menifee/Murrieta 'swap'. • The Copermittees inquired about the status of the new section for training and education, and mentioned that it is on the schedule for discussion on May 26th. ➢ **San Diego Water Board staff will provide a revised draft, considering the Copermittees' comments to date, before May 26th.** • The Copermittees identified that due to the compressed schedule for meetings, they would like to set up separate parallel meetings with San Diego Water Board staff to discuss the MRP. ➢ **San Diego Water Board staff indicated that they will consider this option depending on their availability. If the monitoring coordinator for the Copermittees can come the San Diego Water Board office, that would make meeting easier.**
2. Wrap-up for Week 1 Topics	• The Copermittees mentioned that they had provided via e-mail the final meeting notes for the May 6th meeting, and inquired as to whether the San Diego Water Board staff had any questions or comments on those notes. ➢ **San Diego Water Board staff indicated that they had reviewed the notes and had some redlines that they would be finalizing and providing.**
3. Today's Topics **A. Prohibitions and RWL**	• **Section A.1.** o The Copermittees identified that the draft language could unintentionally prohibit sub-regional treatment (where an MS4 conveys runoff to a sub-regional BMP) by prohibiting the discharge of pollution 'into' the MS4. The Copermittees

	suggested the deletion of the words "into and" to clarify that what is prohibited is the discharge of pollution 'from' the MS4 in a manner causing, or threatening to cause, a condition of pollution, contamination, or nuisance. o San Diego Water Board staff identified that the intent of the language is to prefer local, on-site treatment *before* discharging into the MS4, however they confirmed that it is not their intent to prohibit sub-regional treatment systems that receive runoff from MS4s and treat it prior to it being discharged into receiving waters. ➢ **San Diego Water Board Staff offered to review the language for ways to clarify this intent, possibly through inclusion of a footnote** • **<u>Section A.3.a.(1)</u>** o The Copermittees requested changes that would allow the notification required under this section to be submitted with the annual report. ▪ The San Diego Water Board Staff identified that they wanted to be notified closer in time to the actual determination. ▪ The San Diego Water Board staff noted that the Santa Ana permit requires a separate notification within 2 days, and the current language provides the Copermittees 30 days to provide the notification. ➢ **San Diego Water Board staff did not agree to make any changes to the language in the provision.** o There was discussion about what information needs to be included in the notification. ✪ **The San Diego Water Board staff offered to clarify within the fact sheet that the notification required under this section would include the date of the determination, and the applicable water quality exceedance data.** • **<u>Section A.3.b.</u>** o The Copermittees identified that the draft permit had deviated from the SWRCB guidelines by requiring the Copermittees to repeat the procedure described in provision A.3.a., for all recurring exceedances of the same water quality standard. The Copermittees identified that the primary intent of their suggested language was to restore the SWRCB language. The Copermittees further explained that programs to address exceedances often span several years through development and implementation, and that the procedure in A.3.a. should not be repeated unless at the end of that implementation plan, the exceedances persist. ➢ **The San Diego Water Board offered to review the reason that they had changed the SWRCB language and**

	consider the Copermittees suggested revisions.
3. Today's Topics: **B. Non-storm Water discharges**	• **Section B.2.** o The Copermittees explained that their suggested language is to clarify that if an individual discharge is identified as an isolated source of pollutants, but that it is not representative of the category as a whole, that the individual discharge would be addressed as an illicit discharge. o The San Diego Water Board staff identified that there are two scenarios for isolated sources 1) time based 2) geographic based and would like to think about the provision in this context. ➢ **The San Diego Water Board will review the section and consider the suggested revised language.** • **Sections B.2.l., B.2.n., B.2.o. (collectively: 'irrigation runoff')** o The Copermittees requested that the conditional exemptions for 'irrigation runoff' be restored and explained that this is appropriate for several reasons: **1.** The Copermittees have not determined that irrigation runoff is a significant source of pollutants to the receiving waters in this watershed. **2.** Through Section C. of the order (NALs), there is a mechanism already in place that will require prohibition of any conditionally exempt discharge categories that *are* indeed found to be a significant source of pollutants. In addition, section C.3 specifically states that NALs "*provide an assessment of … **the appropriateness of exempted non-storm water discharges**".* o The Copermittees requested that the Board staff rely on the mechanisms they have already put in place (e.g. NALs) to identify which, if any, conditionally exempt discharges actually need to be prohibited. o The Copermittees also indicated that if the Board is nevertheless making the determination that Irrigation runoff needs to be addressed, that Pursuant to B.2. the Copermittees have the option to either: a) 'prohibit the discharge category', ***or*** b) 'develop and implement appropriate control measures to prevent the discharge of pollutants to the MS4'. Should this be the case, the Copermittees expressed that option 'b' is a more appropriate use of public funds in addressing this discharge category. The Copermittees explained that their suggested addition of section B.4 was to present an option to the San Diego Water Board to implement option 'b' (as described above). ▪ Ben Neill, of the San Diego Water Board stated that B.2 requires the prohibition of the discharge category, unless

	it is of a nature that it cannot be prohibited through an ordinance (i.e., a discharge from Mother Nature, like a spring or rising ground water), and only then does option 'b' (see above) become applicable. ▪ The Copermittees expressed that the goal of a prohibition is to eliminate the discharge, however it is not possible to eliminate irrigation runoff. The Copermittees referenced a grant project in Dana Point which found that even after retrofitting neighborhoods with SMART irrigation systems, that irrigation runoff still had not been eliminated. o San Diego Water Board staff indicated that to meet the draft permit requirement to prohibit irrigation runoff, the Copermittees would simply have to implement and enforce an ordinance. ▪ The Copermittees expressed their concern that with a prohibition, they would be required to enforce not only in response to an NAL exceedance, but also on any instance of a resident calling in a complaint on their neighbor for a broken sprinkler, overspray, overwatering, etc – irrespective of whether or not that discharge resulted in the conveyance of pollutants to the MS4 or to receiving waters. The Copermittees indicated that this would be an unnecessary drain on, and an inefficient use of public funds. o David Barker of the San Diego Water Board identified that for the Orange County MS4 permit, the Water Board had solid lines of evidence that demonstrated that irrigation runoff was an actual source and conveyance of pollutants to the receiving waters in Orange County, including specific studies by the Orange County Copermittees. He indicated that this (SMR) permit would need the same level of evidence and, since the Copermittees have not made such a determination, that the burden of proof was on the permitting agency (San Diego Water Board). o A San Diego Water Board staff member identified that the Copermittees' '*Landscaping and Gardening'* brochure included a mention of 'over watering'. ▪ The Copermittees clarified that brochure was addressing general good-housekeeping practices associated with landscaping and gardening, and was not intending to imply that irrigation runoff had been determined to be an actual source or conveyance of pollutants to the receiving waters in Riverside County. The Copermittees also mentioned that as a cost-saving measure, many of their brochures had been adapted from existing brochures created in other regions such as Orange County. o The San Diego Water Board staff identified that if irrigation

Comment [CP1]: This language was restored, and the words 'and conveyance' were added. Both the Water Board and the Copermittees agreed to memorialize these meetings in writing, and it is important that the meeting notes are an accurate representation of the meeting.

	runoff is not identified as a source and conveyance of pollutants that needs to be addressed, that the Copermittees' suggested language in section B.4. would not be necessary. ➢ **No agreement was reached on this provision.** • **<u>Section B.2.q. (Non-emergency fire fighting flows)</u>** o The Copermittees identified that apparently the conditional exemption for non-emergency fire fighting flows had been inadvertently deleted in the draft, since B.3. requires a program to address this potential issue in lieu of a prohibition. o San Diego Water Board staff identified that the discharge category was prohibited, and that a specific program is required to address the discharge through prohibition. ➢ **No agreement was reached on the provision.**
3. Today's Topics: **<u>F.1.a through F.1.c</u>**	• **<u>Development Planning: F.1.a through F.1.c</u>** ➢ **San Diego Water Board staff identified that they accepted the language changes to F.1.c (1), and F.1.c (7)(g) and that F.1.c (5) will be removed from the permit.** o San Diego Water Board staff indicated that they would like to look for opportunities to coordinate the infiltration requirements in F.1.c.(7) with the Salt and Nutrient (groundwater) Management plan. ▪ Copermittees identified that they will look into the status of the plan. o The Copermittees identified that they thought that the "high vehicular traffic" language was overly restrictive, especially since infiltration is one of the primary BMPs used by Caltrans. There was discussion about the source of the language that had been included in the draft, and various studies that have indicated that such restrictions are unnecessary. ➢ **San Diego Water Board staff offered to remove the restrictions on infiltration within areas of 'high vehicular traffic'.** ✪ **The Copermittees will provide San Diego Water Board with copies of the various studies discussed.**
4. Conceptual Discussion of Next Week's Topics: **<u>F.1.e BMP Construction Verification</u>**	o The Copermittees identified that they did not have any overarching issues to discuss regarding this section, but that for next week, they would review the wording to see if they had any suggested changes.
4. Conceptual Discussion of	o The Copermittees identified that the BMP verification

Next Week's Topics: **F.1.f BMP Maintenance Tracking**	frequencies should account for the risk for the discharge of pollutants from the project, and not be solely based on the BMP itself. o The Copermittees also indicated that annual verifications would be excessive since most structural post-construction BMPs require maintenance less frequently. ➢ **The San Diego Water Board staff indicated that they were open to considering changes to the section that would allow the Copermittees to implement the program in a more cost-effective and efficient manner.**
4. Conceptual Discussion of Next Week's Topics: **F.1.g Enforcement of Development Sites**	o The Copermittees identified that they did not have any overarching issues to discuss regarding this section, but that for next week, they would review the wording to see if they had any suggested changes.
4. Conceptual Discussion of Next Week's Topics: **F.3.d Retrofit**	o The Copermittees identified that section F.3.d is a new requirement that will be a significant new cost to the Copermittees. It was further identified that since the Copermittees cannot require property owners to retrofit their land, that this would be an expensive planning exercise that will not likely yield any tangible benefits to attainment of beneficial uses in the receiving waters. o The Copermittees stated that the Federal Regulations only require a program for assessing opportunities for retrofitting flood control projects. o The San Diego Water Board identified that the intent of this section is to have a program to not only retrofit public projects but also to encourage retrofit of private development, and that the section does not explicitly require retrofitting of private developments. o The Copermittees identified that a program that assesses opportunities for retrofit of public lands such as parks, recreational areas and MS4 would have a better chance for implementation, and that a sub-regional approach would be a more effective, and more cost efficient way to address pollutant discharges from existing developments. o **F.3.d.(1)** ▪ There was discussion about the San Diego Water Board's expected level of detail for the inventory. ➢ **The San Diego Water Board staff expressed that they did not expect a lot-by-lot inventory and evaluation of existing developments but that a broader scale was appropriate.** o **F.3.d.(4)** ▪ The San Diego Water Board indicated that encouraging

	retrofit on private developments could be accomplished as a public education and outreach campaign and that the Copermittees could get ideas from the EPA Guidance on retrofit, and other programs such as the 10,000 rain gardens program in Kansas. ➢ **The San Diego Water Board will provide the EPA Guidance to the Copermittees.** ➢ **The San Diego Water Board is willing to consider alternative language / approaches that the Copermittees may develop.**

From: "Uhley, Jason" <JUHLEY@rcflood.org>
To: "Uhley, Jason" <JUHLEY@rcflood.org>, Ben Neill <BNeill@waterboards.ca.gov>
CC: Bill Woolsey <wwoolsey@murrieta.org>, Mike Shetler <mshetler@rceo.org>, ...
Date: 6/2/2010 10:36 PM
Subject: RE: meeting Agenda and Handouts
Attachments: 2010-06-03_AGENDA (2).docx; 2010-05-26_Sign-in Sheet.pdf; F 1 d (1)-(3) (8)-(11)_draftFinal (2).docx; F 3 b - Commercial-Industrial_draftFinal (2).docx; 2010-06-03_Draft SMR Permit (2010 06-03) ju.doc

All,

Attached are five files:

* Agenda for this Thursday.
* Updated draft permit with comments and edits added for section F.3.b., and sections F.1.d.(1)-(3), (8)-(11) for discussion on Thursday.

* Sign-in Sheet from 5/26.
* Excerpts of section F.3.b., and
* Excerpts of sections F.1.d.(1)-(3), (8)-(11).

Please note that the new development excerpt also includes an excerpt from the glossary (redevelopment definition). The excerpts are to facilitate discussion at tomorrow's meeting. Handouts will be provided.

Also, Claudio asked me to let you know that based on our retrofit discussion last week we have taken a fresh look at the redlines previously provided for that section of the permit (F.3.d). In the attached updated draft permit we removed many of our previously suggested edits, and fine tuned a few where we believe we had general agreement in the meeting. With the understanding that the fact sheet will be amended to clarify that the inventory will be on a planning level, the suggested edits that remain are those that we feel are the minimum appropriate changes to the language.

My apologies for the delays.

Regards,

Jason Uhley
951.955.1273
951.522.1213 - cell (for use tomorrow if necessary).

-----Original Message-----
From: Uhley, Jason
Sent: Wednesday, June 02, 2010 4:55 PM
To: bneill@ca.waterboards.ca.us
Cc: Bill Woolsey; Mike Shetler; Chun, Arlene; Aldo Licitra; Ken Greenberg; Wes Ganter; Ben Neill; Chiara Clemente; Chad Loflen; David Barker; Wayne Chiu
Subject: Re: meeting tomorrow 10:00 am

All,

This is just a last minute confirmation regarding our meeting tomorrow. The short week and an unfortunate tragedy in the Extended

District family has put me behind schedule with regards to an agenda and handouts. They will follow this evening.

Regards,

Jason

Sent from my iPhone

>

Santa Margarita Watershed MS4 Permit

Meeting Date 5/26/10

Time 9 - 5

Location SDRWQCB

Name	Agency	Signature
David Gibson	SDRWQCB	
Jimmy Smith	SDRWQCB	
David Barker	SDRWQCB	for DTB
Chiara Clemente	SDRWQCB	
Ben Neill	SDRWQCB	
Wayne Chiu	SDRWQCB	
Chad Loflen	SDRWQCB	
Jason Uhley	RCFC&WCD	
Claudio Padres	RCFC&WCD	
Arlene Chun	RCFC&WCD	
Mike Shetler	County of Riverside	
Alex Gann	County of Riverside	
Aldo Licitra	City of Temecula	Aldo Licitra
Bill Woolsey	City of Murrieta	Bill Woolsey
Don Allison	City of Menifee	
Tim D'Zmura	City of Wildomar	
WARD MAXWELL	COUNTY OF RIV.	
STEVE HORN	COUNTY OF RIV	
Chandra Thomas	Carney	
Daniel Hoot	RBF	
Scott Taylor	"	

AGENDA

Santa Margarita Region
MS4 Permit Meeting

10:00a.m. – 4:00 p.m. June 3rd, 2010
Location: City of Temecula

1. PROCESS / HOUSEKEEPING

2. TODAY'S TOPICS

   i. F.3.b. (Commercial/Industrial)

   ii. F.1.d.(1)-(3), (8)-(11)

d. STANDARD STORM WATER MITIGATION PLANS (SSMPS) – APPROVAL PROCESS CRITERIA AND REQUIREMENTS FOR PRIORITY DEVELOPMENT PROJECTS

Within 365 days of adoption of this Order, the Copermittees must submit an updated ~~model~~ SSMP (referred to by the Copermittees as a Water Quality Management Plan, or 'WQMP'), to the San Diego Water Board's Executive Officer for a 30 day public review and comment period. The San Diego Water Board's Executive Officer has the discretion to determine the necessity of a public hearing. Within 180 days of determination that the ~~Model~~ SSMP is in compliance with this Permit's provisions, each Copermittee must ~~update their own local SSMP, and~~ amend~~ed~~ their ordinances consistent with the ~~model~~ SSMP and begin implementation of the updated SSMP. Any updated ordinances, and shall be submitted ~~submit both (local SSMP and amended ordinances)~~ to the San Diego Water Board with the annual report. The ~~model~~ SSMP must meet the requirements of section F.1.d of this Order to (1) reduce Priority Development Project discharges of storm water pollutants from the MS4 to the MEP, and (2) prevent Priority Development Project runoff discharges from the MS4 from causing or contributing to a violation of water quality standards.[1]

(1) Definition of Priority Development Project (PDP):

Priority Development Projects are:

(a) All new Development Projects that fall under the project categories or locations listed in section F.1.d.(2), and

(b) Those redevelopment projects that create, add, or replace at least 5,000 square feet of impervious surfaces on an already developed site and the ~~existing development and/or~~ the redevelopment project falls under the project categories or locations listed in section F.1.d.(2). Where redevelopment results in an increase of less than fifty percent of the impervious surfaces of a previously existing development, and the existing development was not subject to SSMP requirements, the numeric sizing criteria discussed in section F.1.d.(6) applies only to the addition or replacement, and not to the entire development. Where redevelopment results in an increase of more than fifty

Comment [CP1]: Consistent with 2004 permit and the Santa Ana Permit.

[1] Updated SSMP and hydromodification requirements must apply to all priority projects or phases of priority projects which have not yet begun grading or construction activities at the time any updated SSMP or hydromodification requirement commences. If lawful prior approval of a project exists, whereby application of an updated SSMP or hydromodification requirement to the project is illegal, the updated SSMP or hydromodification requirement need not apply to the project. Updated Development Planning requirements set forth in Sections F.1. (a) through (h) of this Order must apply to all projects or phases of projects, unless, at the time any updated Development Planning requirement commences, the projects or project phases meet any one of the following conditions: (i) the project or phase has begun grading or construction activities; or (ii) a Copermittee determines that lawful prior approval rights for a project or project phase exist, whereby application of the Updated Development Planning requirement to the project is legally infeasible. Where feasible, the Permittees must utilize the SSMP and hydromodification update periods to ensure that projects undergoing approval processes include application of the updated SSMP and hydromodification requirements in their plans.

percent of the impervious surfaces of a previously existing development, the numeric sizing criteria applies to the entire development.

~~(2) One acre threshold: In addition to the Priority Development Project Categories identified in section F.1.d.(2), Priority Development Projects must also include all other pollutant-generating Development Projects that result in the disturbance of one acre or more of land within two years of adoption of this Order.~~[2]

~~(3)~~

(2) Priority Development Project Categories

Where a new Development Project feature, such as a parking lot, falls into a Priority Development Project Category, the entire project footprint is subject to SSMP requirements. Emergency public safety projects in any of the Priority Development Categories may be excluded if the delay caused due to the requirement for a SSMP compromises public safety, public health and/or environmental protection.

(a) New development projects that create 10,000 square feet or more of impervious surfaces (collectively over the entire project site) including commercial, industrial, residential subdivisions requiring a Final Map (i.e. detached single family home subdivisions, multi-family attached subdivisions, condominiums, apartments, etc.), mixed-use, and public projects. This category includes development projects on public or private land which fall under the planning and building authority of the Copermittees.

(b) Automotive repair shops. This category is defined as a facility that is categorized in any one of the following Standard Industrial Classification (SIC) codes: 5013, 5014, 5541, 7532-7534, or 7536-7539.

(c) Restaurants. This category is defined as a facility that sells prepared foods and drinks for consumption, including stationary lunch counters and refreshment stands selling prepared foods and drinks for immediate consumption (SIC code 5812), where the land area for development is greater than 5,000 square feet. Restaurants where land development is less than 5,000 square feet must meet all SSMP requirements except for structural treatment BMP and numeric sizing criteria requirement F.1.d.(6) and hydromodification requirement F.1.h.

(d) All hillside development greater than 5,000 square feet. This category is defined as any development which creates 5,000 square feet of impervious surface which is located in an area with known erosive soil

Comment [JEU2]: Keep requirements consistent with Santa Ana Permit. This also exceeds the SWRCB Precedential Order regarding SUSMPs.

Comment [CP3]: From the 2010 Santa Ana Permit to ensure that Emergency public safety projects that happen to meet the criteria of a PDP, are not delayed.
Example situations:
•Emergency housing erected in response to a major disaster such as an earthquake
•Emergency food cafeteria erected following a major disaster.
•Emergency command center that happens to need to be set up next to an ESA
•Etc…

Comment [CP4]: Consistent with the Santa Ana permit, these revisions clarify that this doesn't apply to individual custom home projects (unless they also qualify as hillside development).

Individual residential projects will still be required to implement the controls from F.1.c. for 'all' projects, however it is not appropriate to burden such insignificant projects with the full SSMP requirements.

[2] ~~Pollutant generating Development Projects are those projects that generate pollutants at levels greater than natural background levels.~~

conditions, where the development will grade on any natural slope that is twenty-five percent or greater.

(e) Environmentally Sensitive Areas (ESAs). All development located within or directly adjacent to or discharging directly to an ESA (where discharges from the development or redevelopment will enter receiving waters within the ESA), which either creates 2,500 square feet of impervious surface on a proposed project site or increases the area of imperviousness of a proposed project site to 10 percent or more of its naturally occurring condition. "Directly adjacent" means situated within 200 feet of the ESA. "Discharging directly to" means outflow from a drainage conveyance system that is composed entirely of flows from the subject development or redevelopment site, and not commingled with flows from adjacent lands.

(f) Impervious Parking lots 5,000 square feet or more ~~or with 15 or more parking spaces~~ and potentially exposed to runoff. Parking lot is defined as a land area or facility for the temporary parking or storage of motor vehicles used personally, for business, or for commerce.

(g) Street, roads, highways, and freeways[3]. This category includes any paved impervious surface that is 5,000 square feet or greater used for the transportation of automobiles, trucks, motorcycles, and other vehicles.

(h) Retail Gasoline Outlets (RGOs). This category includes RGOs that meet the following criteria: (a) 5,000 square feet or more or (b) a projected Average Daily Traffic (ADT) of 100 or more vehicles per day.

(3) Pollutants of Concern

As part of its local SSMP, each Copermittee must implement a~~n~~ ~~updated~~ procedure for identifying pollutants of concern for each Priority Development Project. The procedure must address, at a minimum: (1) Receiving water quality (including pollutants for which receiving waters are listed as impaired under CWA section 303(d)); (2) Land-use type of the Development Project and pollutants associated with that land use type; and (3) Pollutants expected to be present on site.

(8) Site Design and Treatment Control BMP Design Standards

As part of ~~its local~~the SSMP, each Copermittee must develop and require

Comment [CP5]: **'Impervious':** Clarify that if a project implements pervious parking lots (such as pervious concrete), that they would not be necessarily be subjected to a SSMP (unless triggered by another category). This will be a way to strongly encourage this type of LID source control.

'or with 15 or more': Consistent with 2004 SMR and 2010 Santa Ana. Make it simple and consistent, having dual checks here is adding unnecessary complexity.

Comment [CP6]: Footnote added to allow the Copermittees the option to develop road standards, that, upon approval by the EO, could be used in-lieu of a WQMP for each road project.

Comment [CP7]: There is no reason to have an *'updated'* procedure.

[3] The Copermittees may develop and submit to the Regional Board, a plan for addressing pollutant discharges from streets, roads, highways and freeways through implementation of revised standard roadway sections that utilize USEPA Green Streets guidance or similar. Upon approval of the plan by the Executive Officer, projects that incorporate those standards need not be categorized as a PDP unless also triggered by another category.

Priority Development Projects to ~~implement~~ comply with ~~sitting,~~ design, and maintenance criteria for each ~~site design~~LID and treatment control BMP listed in its local SSMP to ~~determine~~assist with determining~~determine~~ feasibility and applicability and so that implemented ~~site design~~LID and treatment control BMPs are constructed correctly and are effective at pollutant removal, runoff control, and vector minimization. LID techniques must be incorporated into the criteria for appropriate treatment control BMPs where feasible. Development of BMP design worksheets which can be used by project proponents is encouraged.

(9) Implementation Process

As part of its local SSMP, each Copermittee must implement a process to verify compliance with SSMP requirements. The process must identify at what point in the planning process Priority Development Projects will be required to meet SSMP requirements and at a minimum, the Priority Development Project must implement the required post-construction BMPs prior to occupancy and/or the intended use of any portion of that project. The process must also include identification of the roles and responsibilities of various municipal departments in implementing the SSMP requirements, as well as any other measures necessary for the implementation of SSMP requirements.

(10) Treatment BMP Review

(a) The Copermittees must review and update the BMPs that are listed in their local SSMPs as options for treatment control. At a minimum, the update must include removal of obsolete or ineffective BMPs and addition of LID BMPs that can be used for treatment, such as bioretention cells, bioretention swales, etc. The update must also add appropriate LID BMPs to any tables or discussions in the local SSMPs addressing pollutant removal efficiencies of treatment control BMPs. In addition, the update must include review and revision where necessary of treatment control BMP pollutant removal efficiencies.

(b) The update must incorporate findings from BMP effectiveness studies conducted by the Copermittees for projects funded wholly or in part by the State Board or Regional Boards.

(c) Each Copermittee must implement a mechanism for annually incorporating findings from local treatment BMP effectiveness studies (e.g., ones conducted by, or on-behalf of, public agencies in Riverside County) into SSMP project reviews and permitting

~~Where a development project, greater than 100 acres in total project size or smaller than 100 acres in size yet part of a larger common plan of development that is over 100 acres, has been prepared using~~

~~watershed and/or sub-watershed based water quality, hydrologic, and fluvial geomorphologic planning principles that implement regional LID BMPs in accordance with the sizing and location criteria of this Order and acceptable to the San Diego Water Board, such standards shall govern review of projects with respect to Section F.1 of this Order and shall be deemed to satisfy this Order's requirements for LID site design, buffer zone, infiltration and groundwater protection standards, source control, treatment control, and hydromodification control standards. Regional BMPs must clearly exhibit that they will not result in a net impact from pollutant loadings over and above the impact caused by capture and retention of the design storm. Regional BMPs may be used provided that the BMPs capture and retain the volume of runoff produced from the 24-hour 85th percentile storm event as defined in section F.1.d.(6)(a)(i) and that such controls are located upstream of receiving waters. Any volume that is not retained by the LID BMPs, up to the design capture volume, must be treated using LID biofiltration. Where regional LID implementation has been shown to be technically infeasible (per section F.1.d.7.b) any volume up to and including the design capture volume, not retained by LID BMPs, nor treated by LID biofiltration, must be treated using conventional treatment control BMPs in accordance with Section F.1.d.(6) and participation in the LID waiver program in Section F.1.d.(7).~~

Redevelopment - The creation, addition, and or replacement of impervious surface on an already developed site. Examples include the expansion of a building footprint, road widening, the addition to or replacement of a structure, and creation or addition of impervious surfaces. Replacement of impervious surfaces includes any activity that is not part of a routine maintenance activity where impervious material(s) are removed, exposing underlying soil during construction. Redevelopment does not include trenching and resurfacing associated with utility work; resurfacing existing roadways; activities conducted to maintain original line and grade, hydraulic capacity, original purpose of the facility or emergency redevelopment activity required to protect public health and safety; new sidewalk construction, pedestrian ramps, or bike lane on existing roads; and routine replacement of damaged pavement, such as pothole repair. Redevelopment also does not include retrofit projects implemented pursuant to Section F.3.d of this Order.

Comment [JEU8]: Transferred this definition from the Attachment D for use here.

Comment [JEU9]: Added from 2004 Permit and 2010 Santa Ana Permit.

Comment [JEU10]: Try not to penalize positive water quality outcomes.

b. COMMERCIAL / INDUSTRIAL

Each Copermittee must implement a commercial / industrial program that meets the requirements of this section~~,~~ to prevent~~s~~ illicit discharges into the MS4, reduce~~s~~ commercial / industrial discharges of storm water pollutants from the MS4 to the MEP, and prevent~~s~~ commercial / industrial discharges from the MS4 from causing or contributing to a violation of water quality standards.

(1) Source Identification

(a) Each Copermittee must maintain an updated watershed-based inventory of all industrial and commercial sites/sources within its jurisdiction (regardless of ownership) that could contribute a significant pollutant load to the MS4. The inventory must include the following minimum information for each industrial and commercial site/source: name; address; pollutants potentially generated by the site/source; and identification of whether the site/source is tributary to a Clean Water Act section 303(d) water body segment and generates pollutants for which the water body segment is impaired; and a narrative description including SIC codes which best reflects the principal products or services provided by each facility.

At a minimum, the ~~following~~ sites/sources listed below must be included in the inventory. Where the required inventory includes sites or information that was not required under Order R9-2004-001, the new required sites/information must be added to the Copermittee's inventory within X years. ~~:~~

(i) Commercial Sites/Sources:

[a] Automobile repair, maintenance, fueling, or cleaning;
[b] Airplane repair, maintenance, fueling, or cleaning;
[c] Boat repair, maintenance, fueling, or cleaning;
[d] Equipment repair, maintenance, fueling, or cleaning;
[e] Automobile and other vehicle body repair or painting;
[f] Mobile automobile or other vehicle washing;
[g] Automobile (or other vehicle) parking lots and storage facilities;
[h] Retail or wholesale fueling;
[i] Pest control services;
[j] Eating or drinking establishments, including such establishments within food markets;
[k] Mobile carpet, drape or furniture cleaning;
[l] Cement mixing or cutting;
[m] Masonry;
[n] Painting and coating;
[o] ~~Botanical or zoological gardens and exhibits~~;

Comment [CP1]: These have not been identified by the Copermittees as contributing a significant pollutant load to the MS4 and should be removed. This is an unnecessary new requirement.

[p] Landscaping;
[q] Nurseries and greenhouses;
[r] Golf courses, parks and other recreational areas/facilities;
[s] Cemeteries;
[t] Pool and fountain cleaning;
[u] ~~Marinas~~;
[v] Portable sanitary services;
[w] ~~Building material retailers and storage~~;
[x] ~~Animal facilities~~Boarding facilities and kennels;
[y] Mobile pet services;
[z] Power washing services; and
[aa] Other sites and sources with a history of un-authorized discharges to the MS4.

Comment [CP2]: Not applicable

Comment [CP3]: These have not been categorically identified by the Copermittees as contributing a significant pollutant load to the MS4 and should be removed. This is an unnecessary new requirement.

(ii) Industrial Sites/Sources:

[a] Industrial Facilities, as defined at 40 CFR § 122.26(b)(14), including those subject to the General Industrial Permit or other individual NPDES permit;
[b] Operating and closed landfills;
[c] Facilities subject to SARA Title III; and
[d] Hazardous waste treatment, disposal, storage and recovery facilities.

(iii) ESAs and 303(d) Listed Waterbodies: All other commercial or industrial sites/sources tributary to a CWA Section 303(d) impaired water body segment, where the site/source generates pollutants for which the water body segment is impaired. ~~All other commercial or industrial sites/sources within or directly adjacent to or discharging directly to coastal lagoons, the ocean, or other receiving waters within environmentally sensitive areas (as defined in Attachment C of this Order) as necessary to comply with this order.~~

Comment [JEU4]: This is a high cost-low return proposition. It is a significant effort and non-recoverable cost to determine which projects may be directly discharging or adjacent to receiving waters with ESAs. There are already over 30 categories of facilities that are required for inspection. There is also a process (via NALs and SALs) whereby the Permittees must develop action plans to address remaining water quality problems. Let the NAL/SAL system drive the decision making for adding facilities instead of this shot-gun approach which will net hair salons, retail stores, and other stores not likely to have any real impact on water quality.

(iv) All other commercial or industrial sites/sources that the Copermittee determines may contribute a significant pollutant load to the MS4.

(2) General BMP Implementation

(a) Pollution Prevention: Each Copermittee must require the use of pollution prevention methods by the inventoried industrial and commercial sites/sources.

(b) Designate / Update Minimum BMPs: Each Copermittee must designate a minimum set of BMPs for all inventoried industrial and commercial sites/sources. Where BMPs have already been designated, each Copermittee must review its existing BMPs for adequacy. The designated

minimum BMPs must be specific to facility types and pollutant-generating activities, as appropriate. The Copermittee may adjust the number and/or type of minimum BMPs that are required, provided that the goals of the Commercial/Industrial program are met.

(c) Designate Enhanced BMPs for ESAs and 303(d) Impairments: Each Copermittee must designate enhanced measures for inventoried industrial and commercial sites/sources tributary to CWA section 303(d) impaired water body segments (where a site/source generates pollutants for which the water body segment is impaired). Each Copermittee must also designate additional controls for industrial and commercial sites/sources within or directly adjacent to or discharging directly to ~~coastal lagoons, the ocean, or other~~ receiving waters within environmentally sensitive areas (as defined in Attachment C of this Order) as necessary to comply with this order. The Copermittee may adjust the number and/or type of enhanced BMPs that are required, provided that the goals of the Commercial/Industrial program are met.

(d) Implement BMPs: Each Copermittee must ~~implement, or~~ require the implementation of~~,~~ the designated minimum and enhanced BMPs and any additional measures necessary based on inspections, incident responses, and water quality data to comply with this Order at each industrial and commercial site/source within its jurisdiction.

(3) ~~BMP Implementation for~~ Mobile ~~Businesses~~Business Program

(a) Each Copermittee must develop and implement a program to reduce the discharge of storm water pollutants from mobile businesses to the MEP and to prohibit non-storm water discharges pursuant to Section B of this Order. Each Copermittee must keep as part of their commercial source inventory a listing of mobile businesses known to ~~operate~~ have bases of operation within its jurisdiction that have the potential to discharge pollutants. The program must include:

(i) Development and implementation of minimum standards and BMPs to be required for each of the various types of mobile businesses;
(ii) Development and implementation of an enforcement strategy which specifically addresses the unique characteristics of mobile businesses;
(iii) Notification of those mobile businesses known to ~~operate~~ have bases of operation within the Copermittee's jurisdiction, of the minimum standards and BMP requirements ~~and local ordinances~~;
(iv) Development and implementation of an outreach and education strategy; and
(v) Inspection of mobile businesses as needed to implement the program.

(b) If they choose to, the Copermittees may cooperate in developing and

Comment [CP5]: This sentence has been added pursuant to our previous discussions, where it was agreed that the list of BMPs can be changed over time through the iterative process based on the experience of the Copermittees. This language provides important clarification to that end. Request similar language be added to Municipal and Residential sections

Comment [CP6]: From the 2004 permit.

Comment [CP7]: This sentence has been added pursuant to our previous discussions, where it was agreed that the list of BMPs can be changed over time through the iterative process based on the experience of the Copermittees. This language provides important clarification to that end. Request similar language be added to Municipal and Residential sections

Comment [CP8]: The Copermittees have no authority to *implement* the BMPs on these privately owned sites, however they can require the site owner to implement such BMPs.

Comment [CP9]: This section is describing more than BMP implementation, it is describing a parallel program to address the unique characteristics of Mobile Businesses. Suggested revised heading.

Comment [CP10]: This would prevent us from implementing this regionally.

implementing their programs for mobile businesses, including, but not limited to sharing of mobile business inventories, BMP requirements, enforcement action information, and education.

(4) Inspection of Industrial and Commercial Sites/Sources

Each Copermittee must conduct industrial and commercial site inspections for compliance with its ordinances, permits, and this Order. Mobile businesses shall be inspected pursuant to section F.3.b.(3) of this order.

Comment [CP11]: Clarifying that mobile business will be subject to the inspection requirements developed in F.3.b.(3) .

(a) Inspection Procedures: Inspections must include but not be limited to:

(i) ~~Review of BMP implementation plans, if the site uses or is required to use such a plan~~;

(ii) ~~Review of facility monitoring data, if the site monitors its runoff;~~

Comment [JEU12]: Requirement (v) already addresses these issues. (i) and (ii) focus on methods. (v) focuses on outcomes. The Permittees should be allowed to determine their own methods for evaluating compliance with their ordinances.

(iii) Check for coverage under the General Industrial Permit (Notice of Intent (NOI) and/or Waste Discharge Identification Number), if applicable;

(iv) Assessment of compliance with Copermittee ordinances and Copermittee issued permits related to runoff;

(v) ~~A~~assessment of the ~~BMP~~ implementation and effectiveness of the designated minimum and/or enhanced BMPs~~, maintenance and effectiveness~~;

Comment [CP13]: This section should only be addressing the BMPs required under section F.3.b of the order. As mentioned in comments above, the maintenance of Post Construction structural BMPs is addressed in section F.1.f. of this order.

(vi) Visual observations for non-storm water discharges, potential illicit connections, and potential discharge of pollutants in storm water runoff; and

(vii) Education and training on storm water pollution prevention, as conditions warrant.

(b) Each Copermittee shall annually notify the San Diego Water Board, prior to the commencement of the wet season, of all Industrial Sites and Industrial Facilities subject to the General Industrial Permit or other individual NPDES permit with alleged violations of the Copermittees' ordinances, that pose a significant threat to water quality. Information may be provided as part of the JRMP annual report if submitted prior to the rainy season. Information provided shall include, but not be limited to, the following:

Comment [JEU14]: Permittees already Voluntarily work with RWQCB to ensure compliance. This requirement is not necessary.

Comment [JEU15]: Clarify that we are evaluating Ordinance compliance, also limit reporting to sites with significant threats to water quality.

(i) WDID number if enrolled under the General Industrial Permit;

(ii) Site Location, including address;
(iii) Current violations or suspected violations; and
(iv) ~~Past Violation history~~.

(c) Frequencies: Each Permittee shall prioritize the inventoried commercial/industrial facilities based on threat to water quality. ~~At a minimum, 25 percent of the sites inventoried as required in section F.3.b.(1) above (excluding mobile sources) including all~~ All sites determined to pose a high threat to water quality must be inspected each year. At a minimum all other inventoried facilities shall be inspected at least once every five years. All sites must be Mobile businesses must be inspected pursuant to the enforcement strategy developed pursuant to section F.3.b.(3). In evaluating threat to water quality, each Copermittee shall consider, at a minimum, the following:

(i) Type of activity (SIC code);
(ii) Materials used at the facility;
(iii) Wastes generated;
(iv) Pollutant discharge potential;
(v) Non-storm water discharges;
(vi) Size of facility;
(vii) Proximity to receiving water bodies;
(viii) Sensitivity of receiving water bodies;
(ix) Whether the facility is subject to the General Industrial Permit or an individual NPDES permit;
(x) Whether the facility has filed a No Exposure Certification/Notice of Non-Applicability;
(xi) Facility design;
(xii) Total area of the site~~, area of the site~~ where industrial or commercial activities occur, and area of the site exposed to rainfall and runoff;
(xiii) The facility's compliance history; and
(xiv) Any other relevant factors.

(d) Third-Party Inspections: Each Copermittee may develop and implement a program to utilize a private third party ~~inspection~~ certification ~~program~~ service for verifying industrial and commercial site/source compliance with its ordinances, permits, and this Order. ~~The third party inspections can satisfy up to 30% of the inspection requirements in section F.3.b(4)(c), with the Copermittee having to fulfill the remaining required inspections.~~ To the extent that third party ~~inspections~~ certifications are conducted to fulfill the requirements of this Order, the Copermittee will be responsible for conducting and documenting quality assurance and quality control of the third-party ~~inspections~~certifications.

(i) Each inspection conducted by a third-party must, at a minimum, result in the following:

Comment [CP16]: Purpose of this requirement is to alert the Board to the issue. This is broad and ambiguous.

Comment [JEU17]: 25% requirement is a record retention problem and is not necessary.

Comment [CP18]: Changes are proposed to allow the CAP program to be maintained.

Comment [CP19]: Intent of the changes are to clarify that these requirements do not apply to any cross-Copermittee inspection agreements, such as the CAP program.

Comment [CP20]: This limitation is not necessary. Section (i) below will provide the Copermittee with the assurance that the inspection is valid, complete and accurate. The Copermittee should be afforded the flexibility to find the most cost-effective way to comply with the permit.

[a] Photo documentation of potential storm water violations identified during the third party inspection;
[b] Reporting to the Copermittee of identified significant potential violations, including imminent or observed illegal discharges, within 24 hours of the third party inspection;
[c] Reporting to the Copermittee of all inspection findings within one week of the inspection being conducted; and
[d] Copermittee follow-up and/or enforcement actions for identified potential storm water violations within two business days of the inspection or potential violation report receipt.

(e) Based upon site inspection findings, each Copermittee must implement all follow-up actions and enforcement necessary to comply with this Order.

(f) To the extent that the San Diego Water Board has conducted an inspection of an industrial site during a particular year, the requirement for the responsible Copermittee to inspect this facility during the same year will be satisfied.

(g) The Copermittees must track the number of inspections for the inventoried industrial and commercial sites/sources throughout the reporting period to verify that the sites/sources are inspected at the minimum frequencies listed in this Order.

(5) Enforcement of Industrial and Commercial Sites/Sources

Each Copermittee must enforce its storm water ordinance for all industrial and commercial sites/sources as necessary to maintain compliance with this Order. Copermittee ordinances or other regulatory mechanisms must include appropriate sanctions to achieve compliance. Sanctions must include the following or their equivalent: Non-monetary penalties, fines, ~~bonding requirements,~~ and/or permit denials for non-compliance.

Comment [CP21]: The difficulty in collecting on bonds make them virtually useless as an enforcement tool.

~~Training and Education for Owners and Operators of Commercial and Industrial Activities~~

~~Each Copermittee must implement an education program using all media as appropriate to (1) measurably increase the knowledge of owners and operators of commercial and industrial activities regarding MS4s, impacts of runoff on receiving waters, and potential BMP solutions for the target audience; and (2) to measurably change the behavior of target communities and thereby reduce storm water pollutant releases and eliminate prohibited non-storm water discharges to MS4s and the environment. At a minimum, the education program must meet the requirements of this section and address the following issues:~~

~~Laws, regulations, permits, & requirements;~~
~~Best management practices;~~
~~General runoff concepts; and~~

~~Other topics, including public reporting mechanisms, water conservation, low-impact development techniques.~~

~~BMP Notification: At least twice during the five-year period of this Order, each Copermittee must notify the owner/operator of each inventoried industrial and commercial site/source of the BMP requirements applicable to the site/source.~~

California Regional Water Quality Control Board
San Diego Region

Waste Discharge Requirements for Discharges from the Municipal Separate Storm Sewer Systems (MS4s) Draining the County of Riverside, the Incorporated Cities of Riverside County, and the Riverside County Flood Control and Water Conservation District within the San Diego Region

Tentative Order No. R9-2010-0016
NPDES NO. CAS0108740

TBD, 2010

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Waste Discharge Requirements for Discharges from the Municipal Separate Storm Sewer Systems (MS4s) Draining the County of Riverside, the Incorporated Cities of Riverside County, and the Riverside County Flood Control and Water Conservation District within the San Diego Region

Adopted by the
California Regional Water Quality Control Board
San Diego Region
on TBD, 2010

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The California Regional Water Quality Control Board, San Diego Region (hereinafter San Diego Water Board), finds that:

A. BASIS FOR THE ORDER

1. This Order is based on the federal Clean Water Act (CWA), the Porter-Cologne Water Quality Control Act (Division 7 of the Water Code, commencing with Section 13000), applicable State and federal regulations, all applicable provisions of statewide Water Quality Control Plans and Policies adopted by the State Water Resources Control Board (State Water Board), the Water Quality Control Plan for the San Diego Basin adopted by the San Diego Water Board, the California Toxics Rule, and the California Toxics Rule Implementation Plan.

2. This Order reissues National Pollutant Discharge Elimination System (NPDES) Permit No. CAS0108766, which was first adopted by the San Diego Water Board on July 16, 1990 (Order No. 90-38), and then reissued on May 13, 1998 (Order No. R9-98-02). On May 26, 1998, the United States Environmental Protection Agency (EPA), Region IX, objected to Order No. 98-02 due to concerns regarding Receiving Water Limitations (RWL) language. The EPA concluded that the RWL language in the permit did not comply with the federal Clean Water Act (CWA) and its implementing regulations. On April 27, 1999, the EPA reissued the MS4 permit, which the San Diego Water Board adopted as Addendum No. 1 to Order No. R9-98-02 on November 8, 2000. On July 14, 2004, the San Diego Water Board adopted the third term MS4 permit, Order No. R9-2004-001. On January 15, 2009, the Riverside County Flood Control and Water Conservation District (District), as the Principal Copermittee, submitted a Report of Waste Discharge (ROWD) for reissuance of the municipal separate storm sewer system (MS4) Permit.

3. This Order is consistent with the following precedential Orders adopted by the State Water Resources Control Board (State Water Board) addressing MS4 NPDES Permits: Order 99-05, Order WQ-2000-11, Order WQ 2001-15, Order WQO 2002-0014, and Order WQ-2009-0008 (*SWRCB/OCC FILE A-1780).*

The Fact Sheet / Technical Report for the Order No. R9-2010-0016, NPDES No. CAS0108766, Waste Discharge Requirements for Discharges from the Municipal Separate Storm Sewer Systems (MS4s) Draining the County of Riverside, the Incorporated Cities of Riverside County, and the Riverside County Flood Control and Water Conservation District within the San Diego Region, includes cited regulatory and legal references and additional explanatory information and data in support of the requirements of this Permit. This information, including any supplements thereto, and any response to comments on the Tentative Orders, is hereby incorporated by reference into these findings.

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B. REGULATED PARTIES

1. Each of the persons in Table 1 below, hereinafter called Copermittees or dischargers, owns or operates an MS4, through which it discharges into waters of the United States within the San Diego Region. These MS4s fall into one or more of the following categories: (1) a medium or large MS4 that services a population of greater than 100,000 or 250,000 respectively; or (2) a small MS4 that is "interrelated" to a medium or large MS4; or (3) an MS4 which contributes to a violation of a water quality standard; or (4) an MS4 which is a significant contributor of pollutants to waters of the United States (waters of the U.S).

Table 1. Municipal Copermittees

1. City of Menifee	5. County of Riverside
2. City of Murrieta	6. Riverside County Flood Control and Water Conservation District
3. City of Temecula	
4. City of Wildomar	

C. DISCHARGE CHARACTERISTICS

1. Discharges from the MS4 contain waste, as defined in the California Water Code (CWC), and pollutants that adversely affect the quality of the waters of the State. The discharge from an MS4 is a "discharge of pollutants from a point source" into waters of the U.S. as defined in the CWA.

2. MS4 storm water and non-storm water discharges are likely to contain pollutants that cause or threaten to cause a violation of water quality standards, as outlined in the San Diego Water Board's Water Quality Control Plan for the San Diego Basin (Basin Plan). Storm water and non-storm water discharges from the MS4 are subject to the conditions and requirements established in the San Diego Basin Plan for point source discharges.

3. The most common categories of pollutants in runoff include total suspended solids, sediment, pathogens (e.g., bacteria, viruses, protozoa); heavy metals (e.g., copper, lead, zinc and cadmium); petroleum products and polynuclear aromatic hydrocarbons; synthetic organics (e.g., pesticides, herbicides, and PCBs); nutrients (e.g., nitrogen and phosphorus fertilizers); oxygen-demanding substances (decaying vegetation, animal waste); detergents; and trash.

4. The discharge of pollutants and/or increased flows from MS4s may cause or threaten to cause the concentration of pollutants to exceed applicable receiving water quality objectives and/or impair or threaten to impair designated beneficial uses resulting in a condition of pollution (i.e., unreasonable impairment of water

quality for designated beneficial uses), contamination, or nuisance.

5. Pollutants in runoff can threaten and adversely affect human health. Human illnesses have been clearly linked to recreating near storm drains flowing to receiving waters. Also, runoff pollutants in receiving waters can bioaccumulate in the tissues of invertebrates and fish, which may be eventually consumed by humans.

6. Runoff discharges from MS4s often contain pollutants that cause toxicity to aquatic organisms (i.e., adverse responses of organisms to chemicals or physical agents ranging from mortality to physiological responses such as impaired reproduction or growth anomalies). Toxic pollutants impact the overall quality of aquatic systems and beneficial uses of receiving waters.

7. The Copermittees discharge runoff into lakes, drinking water reservoirs, rivers, streams, creeks, bays, estuaries, coastal lagoons, the Pacific Ocean, and tributaries thereto within one of the eleven hydrologic units (Santa Margarita Hydrologic Unit) comprising the San Diego Region as shown in Table 2. Some of the receiving water bodies have been designated as impaired by the San Diego Water Board in 2009 pursuant to CWA section 303(d).

Table 2. Common Watersheds and CWA Section 303(d) Impaired Waters

Hydrologic Area (HA) or Hydrologic Subarea (HSA) of the Santa Margarita Hydrologic Unit	**Major Receiving Water Bodies**	**303(d) Pollutant(s)/stressor or Water Quality Effect[1]**
DeLuz Creek HSA (902.21)	De Luz Creek	Iron, Manganese, Nitrogen, Sulfates
Murrieta HSA (902.32)	Long Canyon Creek (tributary to Murrieta Creek	Chlorpyrifos, E. Coli, Fecal Coliform, Iron, Manganese
Wolf HSA (902.52)	Murrieta Creek	Chlorpyrifos, Copper, Iron, Manganese, Nitrogen, Toxicity
Pauba HSA (902.51)	Redhawk Channel	Chlorpyrifos, Copper, Diazinon, E. Coli, Fecal Coliform, Iron, Manganese, Nitrogen, Phosphorus, Total Dissolved Solids
Gavilan HSA (902.22)	Sandia Creek	Iron, Sulfates
Gertrudis HSA	Santa Gertrudis Creek	Chlorpyrifos, Copper, E. Coli, Fecal

[1] The listed 303(d) pollutant(s) do not necessarily reflect impairment of the entire corresponding WMA or all corresponding major surface water bodies. The specific impaired portions of each WMA are listed in the State Water Resources Control Board's 2008 Section 303(d) List of Water Quality Limited Segments.

Table 2. Common Watersheds and CWA Section 303(d) Impaired Waters

Hydrologic Area (HA) or Hydrologic Subarea (HSA) of the Santa Margarita Hydrologic Unit	**Major Receiving Water Bodies**	**303(d) Pollutant(s)/stressor or Water Quality Effect[1]**
(902.42)		Coliform, Iron, Phosphorous
Lower Ysidora HSA (902.11)	Santa Margarita Lagoon	Eutrophic
Lower Ysidora HSA (902.11)	Santa Margarita River (Lower)	Enterococcus, Fecal Coliform, Phosphorus, Total Nitrogen as N
Gavilan HSA (902.22)	Santa Margarita River (Upper)	Toxicity
Pauba HSA (902.51)	Temecula Creek	Chlorpyrifos, Copper, Phosphorus, Total Dissolved Solids, Toxicity
French HSA (902.33)	Warm Springs Creek (Riverside County)	Chlorpyrifos, E. Coli, Fecal Coliform, Iron, Manganese, Phosphorus, Total Nitrogen as N

8. Trash is a persistent pollutant which can enter receiving waters from the MS4 resulting in accumulation and transport in receiving waters over time. Trash poses a serious threat to the Beneficial Uses of the receiving waters, including, but not limited to, human health, rare and endangered species, navigation and human recreation.

9. The Copermittees' water quality monitoring data submitted to date documents persistent violations of Basin Plan water quality objectives for various runoff-related pollutants (indicator bacteria, dissolved solids, turbidity, metals, pesticides, etc.) at various watershed monitoring stations. Persistent toxicity has also been observed at some watershed monitoring stations. In addition, bioassessment data indicates that the majority of the monitored receiving waters have Poor to Very Poor Index of Biotic Integrity ratings. In sum, the above findings indicate that runoff discharges are causing or contributing to water quality impairments, and are a leading cause of such impairments in Riverside County.

10. When natural vegetated pervious ground cover is converted to impervious surfaces such as paved highways, streets, rooftops, and parking lots, the natural absorption and infiltration abilities of the land are lost. Therefore, runoff leaving a developed area is significantly greater in runoff volume, velocity, and peak flow rate than pre-development runoff from the same area. Runoff durations can also increase as a result of flood control and other efforts to control peak flow rates. Increased volume, velocity, rate, and duration of runoff, and decreased natural clean sediment loads,

greatly accelerate the erosion of downstream natural channels. Significant declines in the biological integrity and physical habitat of streams and other receiving waters have been found to occur with as little as a 3-5 percent conversion from natural to impervious surfaces. The increased runoff characteristics from new development must be controlled to protect against increased erosion of channel beds and banks, sediment pollutant generation, or other impacts to beneficial uses and stream habitat due to increased erosive force.

11. Development creates new pollution sources as human population density increases and brings with it proportionately higher levels of car emissions, car maintenance wastes, municipal sewage, pesticides, household hazardous wastes, pet wastes, trash, etc. which can either be washed or directly dumped into the MS4. As a result, the runoff leaving the developed urban area is significantly greater in pollutant load than the pre-development runoff from the same area. These increased pollutant loads must be controlled to protect downstream receiving water quality.

12. Development and urbanization especially threaten environmentally sensitive areas (ESAs), such as water bodies designated as supporting a RARE beneficial use (supporting rare, threatened or endangered species) and CWA 303(d)-impaired water bodies. Such areas have a much lower capacity to withstand pollutant shocks than might be acceptable in other areas. In essence, development that is ordinarily insignificant in its impact on the environment may become significant in a particularly sensitive environment. Therefore, additional controls to reduce storm water pollutants from new and existing development may be necessary for areas adjacent to or discharging directly to an ESA.

13. Although dependent on several factors, the risks typically associated with properly managed infiltration of runoff (especially from residential land use areas) are not significant. The risks associated with infiltration can be managed by many techniques, including (1) designing landscape drainage features that promote infiltration of runoff, but do not “inject” runoff (injection bypasses the natural processes of filtering and transformation that occur in the soil); (2) taking reasonable steps to prevent the illegal disposal of wastes; (3) protecting footings and foundations; (4) ensuring that each drainage feature is adequately maintained in perpetuity; and (5) pretreatment.

14. Non-storm water (dry weather) discharge from the MS4 is not considered a storm water (wet weather) discharge and therefore is not subject to regulation under the Maximum Extent Practicable (MEP) standard from CWA 402(p)(3)(B)(iii), which is explicitly for “Municipal … *Stormwater Discharges* (emphasis added)” from the MS4. Rather, non-storm water discharges, per CWA 402(p)(3)(B)(ii), are to be effectively prohibited. Such dry weather non-storm water discharges have been shown to contribute significant levels of pollutants and flow in arid, developed Southern California watersheds and are to be effectively prohibited under the Clean Water Act.

15. Non-storm water discharges to the MS4 granted an influent exception [i.e., which are exempt from the effective prohibition requirement set forth in CWA section 402(p)(3)(B)(ii)] under 40 CFR 122.26 are included within this Order. Any exempted discharges identified by Copermittees as a source of pollutants are subsequently required to be *addressed* (emphasis added) as illicit discharges through prohibition and incorporation into existing IC/ID programs. Furthermore, the Federal Register (55, page 48037) clarifies that the San Diego Water Board may also identify exempted discharges as a source of pollutants required to be addressed as illicit discharges. The San Diego Water Board and the Copermittees have identified landscape irrigation, irrigation water and lawn water, previously exempted discharges, as a source of pollutants and conveyance of pollutants to waters of the United States.

D. RUNOFF MANAGEMENT PROGRAMS

1. General

a. This Order specifies requirements necessary for the Copermittees to reduce the discharge of pollutants in storm water to the maximum extent practicable (MEP). However, since MEP is a dynamic performance standard, which evolves over time as runoff management knowledge increases, the Copermittees' runoff management programs must continually be assessed and modified to incorporate improved programs, control measures, best management practices (BMPs), etc. in order to achieve the evolving MEP standard. Absent evidence to the contrary, this continual assessment, revision, and improvement of runoff management program implementation is expected to ultimately achieve compliance with water quality standards in the Region.

b. The Copermittees have generally been implementing the jurisdictional runoff management programs required pursuant to Order No. 2004-001 since July 14, 2004. Prior to that, the Copermittees were regulated by Order No. 98-02, since May 13, 1998. MS4 discharges, however, continue to cause or contribute to violations of water quality standards as evidenced by the Copermittees monitoring results.

c. This Order contains new or modified requirements that are necessary to improve Copermittees' efforts to reduce the discharge of pollutants in storm water runoff to the MEP and achieve water quality standards. Some of the new or modified requirements, such as the revised Watershed Runoff Management Program section, are designed to specifically address high priority water quality problems. Other new or modified requirements address program deficiencies that have been noted during audits, report reviews, and other San Diego Water Board compliance assessment activities.

d. Updated individual Drainage Area Management Plans (DAMP), and Watershed Stormwater Management Plans (watershed SWMPs), which describe the

Copermittees' runoff management programs in their entirety, are needed to guide the Copermittees' runoff management efforts and aid the Copermittees in tracking runoff management program implementation. It is practicable for the Copermittees to update the JRMPs and WRMPs within one year, since significant efforts to develop these programs have already occurred. Hereinafter, the individual DAMP is referred to as the Jurisdictional Runoff Management Plans (JRMPs) and the Watershed SWMP is referred to as the Watershed Runoff Management Plan (WRMP).

e. Pollutants can be effectively reduced in storm water runoff by the application of a combination of pollution prevention, source control, and treatment control BMPs. Pollution prevention is the reduction or elimination of pollutant generation at its source and is the best "first line of defense." Source control BMPs (both structural and non-structural) minimize the contact between pollutants and flows (e.g., rerouting run-on around pollutant sources or keeping pollutants on-site and out of receiving waters). Treatment control BMPs remove pollutants that have been mobilized by wet-weather or dry-weather flows.

f. Runoff needs to be addressed during the three major phases of urban development (planning, construction, and use) in order to reduce the discharge of pollutants from storm water to the MEP, effectively prohibit non-storm water discharges and protect receiving waters. Development which is not guided by water quality planning policies and principles can unnecessarily result in increased pollutant load discharges, flow rates, and flow durations which can negatively impact receiving water beneficial uses. Construction sites without adequate BMP implementation result in sediment runoff rates which greatly exceed natural erosion rates of undisturbed lands, causing siltation and impairment of receiving waters. Existing development generates substantial pollutant loads which are discharged in runoff to receiving waters.

g. Annual reporting requirements included in this Order are necessary to meet federal requirements and to evaluate the effectiveness and compliance of the Copermittees' programs.

h. This Order establishes Storm Water Action Levels (SALs) for selected pollutants based on USEPA Rain Zone 6 (arid southwest) Phase I MS4 monitoring data for pollutants in storm water. The SALs were computed as the 90th percentile of the data set, utilizing the statistical based population approach, one of three approaches recommended by the California Water Board's Storm Water Panel in its report, 'The Feasibility of Numerical Effluent Limits Applicable to Discharges of Storm Water Associated with Municipal, Industrial and Construction Activities (June 2006). SALs are identified in Section D of this Order. Copermittees shall implement a timely, comprehensive, cost-effective storm water pollution control program to reduce the discharge of pollutants in storm water from the permitted areas so as not to exceed the SALs. Exceedance of SALs may indicate inadequacy of programmatic measures and BMPs required in this Order.

2. **Development Planning**

   a. The Standard Storm Water Mitigation Plan (SSMP) requirements contained in this Order are consistent with Order WQ-2000-11 adopted by the State Water Resources Control Board (State Board) on October 5, 2000. In the precedential order, the State Board found that the design standards, which essentially require that runoff generated by 85 percent of storm events from specific development categories be infiltrated or treated, reflect the MEP standard. The order also found that the SSMP requirements are appropriately applied to the majority of the Priority Development Project categories contained in Section F.1 of this Order. The State Board also gave Regional Water Quality Control Boards the needed discretion to include additional categories and locations, such as retail gasoline outlets (RGOs), in SSMPs.

   b. Controlling runoff pollution by using a combination of onsite source control and site design BMPs augmented with treatment control BMPs before the runoff enters the MS4 is important for the following reasons: (1) Many end-of-pipe BMPs (such as diversion to the sanitary sewer) are typically ineffective during significant storm events. Whereas, onsite source control BMPs can be applied during all runoff conditions; (2) End-of-pipe BMPs are often incapable of capturing and treating the wide range of pollutants which can be generated on a sub-watershed scale; (3) End-of-pipe BMPs are more effective when used as polishing BMPs, rather than the sole BMP to be implemented; (4) End-of-pipe BMPs do not protect the quality or beneficial uses of receiving waters between the pollutant source and the BMP; and (5) Offsite end-of-pipe BMPs do not aid in the effort to educate the public regarding sources of pollution and their prevention.

   c. Use of Low-Impact Development (LID) site design BMPs at new development, redevelopment and retrofit projects can be an effective means for minimizing the impact of storm water runoff discharges from the development projects on receiving waters. LID is a site design strategy with a goal of maintaining or replicating the pre-development hydrologic regime through the use of design techniques. LID site design BMPs help preserve and restore the natural hydrologic cycle of the site, allowing for filtration and infiltration which can greatly reduce the volume, peak flow rate, velocity, and pollutant loads of storm water runoff. Current runoff management, knowledge, practices and technology have resulted in the use of LID BMPs as an acceptable means of meeting the storm water MEP standard.

   d. Retail Gasoline Outlets (RGOs) are significant sources of pollutants in storm water runoff. RGOs are points of convergence for motor vehicles for automotive related services such as repair, refueling, tire inflation, and radiator fill-up and consequently produce significantly higher loadings of hydrocarbons and trace metals (including copper and zinc) than other developed areas.

e. Industrial sites are significant sources of pollutants in runoff. Pollutant concentrations and loads in runoff from industrial sites are similar or exceed pollutant concentrations and loads in runoff from other land uses, such as commercial or residential land uses. As with other land uses, LID site design, source control, and treatment control BMPs are needed at industrial sites in order to meet the MEP standard. These BMPs are necessary where the industrial site is larger than 10,000 square feet. The 10,000 square feet threshold is appropriate, since it is consistent with requirements in other Phase I NPDES storm water regulations throughout California.

f. If not properly designed or maintained, certain BMPs implemented or required by municipalities for runoff management may create a habitat for vectors (e.g. mosquitoes and rodents). Proper BMP design and maintenance to avoid standing water, however, can prevent the creation of vector habitat. Nuisances and public health impacts resulting from vector breeding can be prevented with close collaboration and cooperative effort between municipalities, local vector control agencies, and the California Department of Public Health during the development and implementation of runoff management programs.

g. The increased volume, velocity, frequency and discharge duration of storm water runoff from developed areas has the potential to greatly accelerate downstream erosion, impair stream habitat in natural drainages, and negatively impact beneficial uses. Development and urbanization increase pollutant loads in storm water runoff and the volume of storm water runoff. Impervious surfaces can neither absorb water nor remove pollutants and thus lose the purification and infiltration provided by natural vegetated soil. Hydromodification measures for discharges to hardened channels are needed for the future restoration of the hardened channels to their natural state, thereby restoring the chemical, physical, and biological integrity and Beneficial Uses of local receiving waters.

3. **Construction and Existing Development**

a. In accordance with federal NPDES regulations and to ensure the most effective oversight of industrial and construction site discharges, discharges of runoff from industrial and construction sites are subject to dual (State and local) storm water regulation. Under this dual system, each Copermittee is responsible for enforcing its local permits, plans, and ordinances, and the San Diego Water Board is responsible for enforcing the General Construction Activities Storm Water Permit, State Board Order 2009-0009-DWQ, NPDES No. CAS000002 (General Construction Permit) and the General Industrial Activities Storm Water Permit, State Board Order 97-03 DWQ, NPDES No. CAS000001 (General Industrial Permit) and any reissuance of these permits. NPDES municipal regulations require that municipalities develop and implement measures to address runoff from industrial and construction activities. Those measures may require the implementation of additional BMPs than are required under the

statewide general permits for activities subject to both State and local regulation.

b. Identification of sources of pollutants in runoff (such as municipal areas and activities, industrial and commercial sites/sources, construction sites, and residential areas), development and implementation of BMPs to address those sources, and updating ordinances and approval processes are necessary for the Copermittees to ensure that discharges of pollutants from its MS4 in storm water are reduced to the MEP and that non-storm water discharges are not occurring. Inspections and other compliance verification methods are needed to ensure minimum BMPs are implemented. Inspections are especially important at high risk areas for pollutant discharges.

c. Historic and current development makes use of natural drainage patterns and features as conveyances for runoff. Urban streams used in this manner are part of the municipalities MS4 regardless of whether they are natural, anthropogenic, or partially modified features. In these cases, the urban stream is both an MS4 and receiving water.

d. As operators of the MS4s, the Copermittees cannot passively receive and discharge pollutants from third parties. By providing free and open access to an MS4 that conveys discharges to waters of the U.S., the operator essentially accepts responsibility for discharges into the MS4 that it does not prohibit or control. These discharges may cause or contribute to a condition of contamination or a violation of water quality standards.

e. Waste and pollutants which are deposited and accumulate in MS4 drainage structures will be discharged from these structures to waters of the U.S. unless they are removed. These discharges may cause or contribute to, or threaten to cause or contribute to, a condition of pollution in receiving waters. For this reason, pollutant discharges from storm water into MS4s must be reduced using a combination of management measures, including source control, and an effective MS4 maintenance program must be implemented by each Copermittee.

f. Enforcement of local runoff related ordinances, permits, and plans is an essential component of every runoff management program and is specifically required in the federal storm water regulations and this Order. Each Copermittee is individually responsible for adoption and enforcement of ordinances and/or policies, implementation of identified control measures/BMPs needed to prevent or reduce pollutants in storm water runoff, and for the allocation of funds for the capital, operation and maintenance, administrative, and enforcement expenditures necessary to implement and enforce such control measures/BMPs under its jurisdiction. Education is an important aspect of every effective runoff management program and the basis for changes in behavior at a societal level. Education of municipal planning, inspection, and maintenance department staffs is especially critical to ensure that in-house staffs understand how their activities impact water quality, how to accomplish their jobs while protecting water quality,

and their specific roles and responsibilities for compliance with this Order. Public education, designed to target various urban land users and other audiences, is also essential to inform the public of how individual actions affect receiving water quality and how adverse effects can be minimized.

g. Public participation during the development of runoff management programs is necessary to ensure that all stakeholder interests and a variety of creative solutions are considered.

h. Retrofitting existing development with storm water treatment controls, including LID, is necessary to address storm water discharges from existing development that may cause or contribute to a condition of pollution or a violation of water quality standards. Although SSMP BMPs are required for redevelopment, the current rate of redevelopment will not address water quality problems in a timely manner. Cooperation with private landowners is necessary to effectively identify, implement and maintain retrofit projects for the preservation, restoration, and enhancement of water quality.

4. **Watershed Runoff Management**

a. Since runoff within a watershed can flow from and through multiple land uses and political jurisdictions, watershed-based runoff management can greatly enhance the protection of receiving waters. Such management provides a means to focus on the most important water quality problems in each watershed. By focusing on the most important water quality problems, watershed efforts can maximize protection of beneficial use in an efficient manner. Effective watershed-based runoff management actively reduces pollutant discharges and abates pollutant sources causing or contributing to watershed water quality problems. Watershed-based runoff management that does not actively reduce pollutant discharges and abate pollutant sources causing or contributing to watershed water quality problems can necessitate implementation of the iterative process outlined in section A.3 of the Tentative Order. Watershed management of runoff does not require Copermittees to expend resources outside of their jurisdictions. Watershed management requires the Copermittees within a watershed to develop a watershed-based management strategy, which can then be implemented on a jurisdictional basis.

b. Some runoff issues, such as general education and training, can be effectively addressed on a regional basis. Regional approaches to runoff management can improve program consistency and promote sharing of resources, which can result in implementation of more efficient programs.

c. It is important for the Copermittees to coordinate their water quality protection and land use planning activities to achieve the greatest protection of receiving water bodies. Copermittee coordination with other watershed stakeholders, especially the State of California Department of Transportation, the United States

Department of Defense, and water and sewer districts, is also important.

E. STATUTE AND REGULATORY CONSIDERATIONS

1. The Receiving Water Limitations (RWL) language specified in this Order is consistent with language recommended by the USEPA and established in State Board Water Quality Order 99-05, *Own Motion Review of the Petition of Environmental Health Coalition to Review Waste Discharge Requirements Order No. 96-03, NPDES Permit No. CAS0108740*, adopted by the State Board on June 17, 1999. The RWL in this Order require compliance with water quality standards, which for storm water discharges is to be achieved through an iterative approach requiring the implementation of improved and better-tailored BMPs over time. Compliance with receiving water limits based on applicable water quality standards is necessary to ensure that MS4 discharges will not cause or contribute to violations of water quality standards and the creation of conditions of pollution.

2. The Water Quality Control Plan for the San Diego Basin (Basin Plan), identifies the following existing and potential beneficial uses for surface waters in Riverside County: Municipal and Domestic Supply (MUN), Agricultural Supply (AGR), Industrial Process Supply (PROC), Hydropower Generation (POW), Industrial Service Supply (IND), Ground Water Recharge (GWR), Contact Water Recreation (REC1), Non-contact Water Recreation (REC2), Warm Freshwater Habitat (WARM), Cold Freshwater Habitat (COLD), Wildlife Habitat (WILD), Rare, Threatened, or Endangered Species (RARE), Spawning, Reproduction and/or Early Development (SPWN) and Preservation of Biological Habitats of Special Significance (BIOL).

3. This Order is in conformance with State Board Resolution No. 68-16, *Statement of Policy with Respect to Maintaining High Quality Waters in California*, and the federal Antidegradation Policy described in 40 CFR 131.12.

4. Section 6217(g) of the Coastal Zone Act Reauthorization Amendments of 1990 (CZARA) requires coastal states with approved coastal zone management programs to address non-point pollution impacting or threatening coastal water quality. CZARA addresses five sources of non-point pollution: agriculture, silviculture, urban, marinas, and hydromodification. This NPDES permit addresses the management measures required for the urban category, with the exception of septic systems. The adoption and implementation of this NPDES permit relieves the Copermittee from developing a non-point source plan, for the urban category, under CZARA. The San Diego Water Board addresses septic systems through the administration of other programs.

5. Section 303(d)(1)(A) of the CWA requires that “Each state shall identify those waters within its boundaries for which the effluent limitations…are not stringent enough to implement any water quality standard (WQS) applicable to such waters.” The CWA

also requires states to establish a priority ranking of impaired water bodies known as Water Quality Limited Segments and to establish Total Maximum Daily Loads (TMDLs) for such waters. This priority list of impaired water bodies is called the Section 303(d) List. The 2006 Section 303(d) List was approved by the State Board on October 25, 2006. On June 28, 2007, the 2006 303(d) list for California was given final approval by the United States Environmental Protection Agency (USEPA). The 303(d) List was recently updated, and on December 16, 2009, the 2008 303(d) List was approved by the San Diego Water Board. The 2008 List is awaiting State Board and USEPA approval.

6. This Order does not constitute an unfunded local government mandate subject to subvention under Article XIIIB, Section (6) of the California Constitution for several reasons, including, but not limited to, the following. First, this Order implements federally mandated requirements under federal Clean Water Act section 402. (33 U.S.C. § 1342(p)(3)(B).) Second, the local agency Copermittees' obligations under this Order are similar to, and in many respects less stringent than, the obligations of non-governmental and new dischargers who are issued NPDES permits for storm water and non-storm water discharges. Third, the local agency Copermittees have the authority to levy service charges, fees, or assessments sufficient to pay for compliance with this Order. Fourth, the Copermittees have requested permit coverage in lieu of compliance with the complete prohibition against the discharge of pollutants contained in federal Clean Water Act section 301, subdivision (a) (33 U.S.C. § 1311(a)) and in lieu of numeric restrictions on their storm water discharges. Fifth, the local agencies' responsibility for preventing discharges of waste that can create conditions of pollution or nuisance from conveyances that are within their ownership or control under State law predates the enactment of Article XIIIB, Section (6) of the California Constitution. Likewise, the provisions of this Order to implement total maximum daily loads (TMDLs) are federal mandates. The federal Clean Water Act requires TMDLs to be developed for water bodies that do not meet federal water quality standards. (33 U.S.C. sec. 1313(d).) Once the U.S. Environmental Protection Agency or a state develops a TMDL, federal law requires that permits must contain effluent limitations consistent with the assumptions of any applicable wasteload allocation. (40 C.F.R. sec. 122.44(d)(1)(vii)(B).)

7. Runoff treatment and/or mitigation must occur prior to the discharge of runoff into receiving waters. Treatment BMPs must not be constructed in waters of the U.S. or State unless the runoff flows are sufficiently pretreated to protect the values and functions of the water body. Federal regulations at 40 CFR 131.10(a) state that in no case shall a state adopt waste transport or waste assimilation as a designated use for any waters of the U.S. Authorizing the construction of an runoff treatment facility within a water of the U.S., or using the water body itself as a treatment system or for conveyance to a treatment system, would be tantamount to accepting waste assimilation as an appropriate use for that water body. Furthermore, the construction, operation, and maintenance of a pollution control facility in a water body can negatively impact the physical, chemical, and biological integrity, as well as the beneficial uses, of the water body. Without federal authorization (e.g.,

pursuant to Clean Water Act Section 404), waters of the U.S. may not be converted into, or used as, waste treatment or conveyance facilities. Similarly, waste discharge requirements pursuant to California Water Code Section 13260 are required for the conversion or use of waters of the State as waste treatment or conveyance facilities. Diversion from waters of the U.S./State to treatment facilities and subsequent return to waters of the U.S. is allowable, provided that the effluent complies with applicable NPDES requirements.

8. The issuance of waste discharge requirements and an NPDES permit for the discharge of runoff from MS4s to waters of the U.S. is exempt from the requirement for preparation of environmental documents under the California Environmental Quality Act (CEQA) (Public Resources Code, Division 13, Chapter 3, section 21000 et seq.) in accordance with the CWC section 13389.

9. Storm water discharges from developed and developing areas in Riverside County are significant sources of certain pollutants that cause, may be causing, threatening to cause or contributing to water quality impairment in the waters of Riverside County. Furthermore, as delineated in the CWA section 303(d) list in Table 2, the San Diego Water Board has found that there is a reasonable potential that municipal storm water and non-storm water discharges from MS4s cause or may cause or contribute to an excursion above water quality standards for the following pollutants: Indicator Bacteria, Copper, Manganese, Iron, Chlorpyrifos, Sulfates, Phosphorous, Nitrogen, Toxicity and Turbidity. In accordance with CWA section 303(d), the San Diego Water Board is required to establish Total Maximum Daily Loads (TMDLs) for these pollutants to these waters to eliminate impairment and attain water quality standards. Therefore, certain early pollutant control actions and further pollutant impact assessments by the Copermittees are warranted and required pursuant to this Order.

10. This Order requires each Copermittee to effectively prohibit all types of unauthorized discharges of non-storm water into its MS4. However, historically pollutants have been identified as present in dry weather non-storm water discharges from the MS4s through 303(d) listings, monitoring conducted by the Copermittees under Order No. R9-2004-0001, and there are others expected to be present in dry weather non-storm water discharges because of the nature of these discharges. This Order includes action levels for pollutants in non-storm water, dry weather, discharges from the MS4 designed to ensure that the requirement to effectively prohibit all types of unauthorized discharges of non-storm water in the MS4 is being complied with. Action levels in the Order are based upon numeric or narrative water quality objectives and criteria as defined in the Basin Plan, the Water Quality Control Plan for Ocean Waters of California (Ocean Plan), and the State Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California (State Implementation Policy or SIP). An exceedance of an action level requires specified responsive action by the Copermittees. This Order describes what actions the Copermittees must take when an exceedance of an action level is observed. Exceedances of non-storm water action levels do not alone

constitute a violation of this Order but could indicate non-compliance with the requirement to effectively prohibit all types of unauthorized non-storm water discharges into the MS4 or other prohibitions established in this Order. Failure to undertake required source investigation and elimination action following an exceedance of a non-storm water action level (NAL or action level) is a violation of this Order. The San Diego Water Board recognizes that use of action levels will not necessarily result in detection of all unauthorized sources of non-storm water discharges because there may be some discharges in which pollutants do not exceed established action levels. However, establishing NALs at levels appropriate to protect water quality standards is expected to lead to the identification of significant sources of pollutants in dry weather non-storm water discharges.

11. In addition to federal regulations cited in the Fact Sheet / Technical Report for the Order No. R9-2010-0016, monitoring and reporting required under Order No. R9-2010-0016 is required pursuant to authority under CWC section 13383.

F. PUBLIC PROCESS

1. The San Diego Water Board has notified the Copermittees, all known interested parties, and the public of its intent to consider adoption of an Order prescribing waste discharge requirements that would serve to renew an NPDES permit for the existing discharge of runoff.

2. The San Diego Water Board has held public hearings on TBD and heard and considered all comments pertaining to the terms and conditions of this Order.

IT IS HEREBY ORDERED that the Copermittees, in order to meet the provisions contained in Division 7 of the California Water Code (CWC) and regulations adopted thereunder, and the provisions of the Clean Water Act (CWA) and regulations adopted thereunder, must each comply with the following:

A. PROHIBITIONS AND RECEIVING WATER LIMITATIONS

1. Discharges ~~into and~~ from municipal separate storm sewer systems (MS4s) in a manner causing, or threatening to cause, a condition of pollution, contamination, or nuisance (as defined in CWC section 13050), in waters of the state are prohibited.

2. Storm water discharges from MS4s containing pollutants which have not been reduced to the maximum extent practicable (MEP) are prohibited.[2]

3. Discharges from MS4s that cause or contribute to the violation of water quality standards (designated beneficial uses, water quality objectives developed to protect beneficial uses, and the State policy with respect to maintaining high quality waters) are prohibited.

a. Each Copermittee must comply with section A.3 and section A.4 as it applies to Prohibition 5 in Attachment A of this Order through timely implementation of control measures and other actions to reduce pollutants in storm water discharges in accordance with this Order, including any modifications. If exceedance(s) of water quality standards persist notwithstanding implementation of this Order, the Copermittee must assure compliance with section A.3 and section A.4 as it applies to Prohibition 5 in Attachment A of this Order by complying with the following procedure:

(1) Upon a determination by either the Copermittee or the San Diego Water Board that storm water MS4 discharges are causing or contributing to an exceedance of an applicable water quality standard, the Copermittee must promptly notify the San Diego Water Board ~~within 30 days~~ and thereafter submit a report to the San Diego Water Board that describes best management practices (BMPs) that are currently being implemented and additional BMPs that will be implemented to prevent or reduce any pollutants that are causing or contributing to the exceedance of water quality standards. The notification and the report may be incorporated in the Annual Report unless the San Diego Water Board directs an earlier submittal. The report must include an implementation schedule. The San Diego Water Board may require modifications to the report;

Comment [CP1]: From 2004 Permit. Also related to edit below.

[2] This prohibition does not apply to MS4 discharges which receive subsequent treatment to reduce pollutants to the MEP prior to entering receiving waters (e.g., low flow diversions to the sanitary sewer).

(2) Submit any modifications to the report required by the San Diego Water Board within 30 days of notification;

(3) Within 30 days following approval of the report described above by the San Diego Water Board, the Copermittee must revise its Jurisdictional Runoff Management Program and monitoring program to incorporate the approved modified BMPs that have been and will be implemented, the implementation schedule, and any additional monitoring required; and

(4) Implement the revised Jurisdictional Runoff Management Program and monitoring program in accordance with the approved schedule.

b. The Copermittee ~~must~~ need not repeat the procedure set forth above to comply with the receiving water limitations for continuing or recurring exceedances of the same water quality standard(s) during the development and implementation of scheduled actions unless directed to do otherwise by the San Diego Water Board Executive Officer.

c. Nothing in section A.3 must prevent the San Diego Water Board from enforcing any provision of this Order while the Copermittee prepares and implements the above report.

4. In addition to the above prohibitions, discharges from MS4s are subject to all Basin Plan prohibitions cited in Attachment A to this Order.

B. NON-STORM WATER DISCHARGES

1. Each Copermittee must effectively prohibit all types of non-storm water discharges into its MS4 unless such discharges are either authorized by a separate National Pollutant Discharge Elimination System (NPDES) permit; or not prohibited in accordance with sections B.2 and B.3 below.

2. The following categories of non-storm water discharges are not prohibited unless a Copermittee or the San Diego Water Board identifies the discharge category as a source of pollutants to waters of the U.S. Where the Copermittee(s) have identified a category as a source of pollutants, the category shall be addressed as an illicit discharge and prohibited through ordinance, order or similar means. If an individual discharge within a category is identified as an isolated source of pollutants not representative of the category as a whole, that individual discharge shall be addressed as an illicit discharge. The San Diego Water Board may identify categories of discharge that either requires prohibition or other controls. For such a discharge category, the Copermittee, under direction of the San Diego Water Board, must either prohibit the discharge category or develop and implement appropriate control measures to prevent the discharge of pollutants to the MS4 and report to the San Diego Water Board pursuant to Section K.1 and K.3 of this Order.

Comment [CP2]: See comments/language below, including ***new*** section B.4.

a. Diverted stream flows;
b. Rising ground waters;
c. Uncontaminated ground water infiltration [as defined at 40 CFR 35.2005(20)] to MS4s;
d. Uncontaminated pumped ground water[3];
e. Foundation drains[3~~3~~];
f. Springs;
g. Water from crawl space pumps[3~~3~~];
h. Footing drains[3~~3~~];
i. Air conditioning condensation;
j. Flows from riparian habitats and wetlands;
k. Water line flushing[4,5];
l. Landscape irrigation;
m. Discharges from potable water sources not subject to NPDES Permit No. CAG679001, other than water main breaks;
n. Irrigation water;
o. Lawn watering;
p. Individual residential car washing;
q. Non-emergency fire fighting flows; and
r. Dechlorinated swimming pool discharges[6].

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Comment [CP3]: Restored. Per B.2, discharge categories identified as a source of pollutants by the RB can either be prohibited - or addressed through 'appropriate control measures'.

Per B.3. below this category is not being prohibited, but is being required to be addressed through 'appropriate control measures'.

3. Emergency fire fighting flows (i.e., flows necessary for the protection of life or property) do not require BMPs and need not be prohibited. As part of the Jurisdictional Runoff Management Plan (JRMP), each Copermittee must develop and implement a program to address pollutants from non-emergency fire fighting flows (i.e., flows from controlled or practice blazes and maintenance activities) identified by the Copermittee to be significant sources of pollutants to waters of the United States.

a. Building fire suppression system maintenance discharges (e.g. sprinkler line flushing) contain waste. Therefore, such discharges are to be prohibited by the Copermittees as illicit discharges through ordinance, order, or similar means.

4. As part of the JRMP, the Copermittees must develop and implement appropriate control measures to address pollutants from landscape irrigation, irrigation water and lawn watering activities identified by the Copermittee to be a significant source of pollutants to waters of the United States. The Copermittees shall use a combination of education, source control, water efficiency/conservation ordinances and enforcement tools, as appropriate, in cooperation with local water districts, to meet

[3] Requires enrollment under Order R9-2008-002. Discharges into the MS4 require authorization from the owner and operator of the MS4 system.
[4] This exemption does not include fire suppression sprinkler system maintenance and testing discharges. Those discharges may be regulated under Section B.3.
[5] Requires enrollment under Order R9-2002-0020.
[6] Including saline swimming pool discharges directly to a saline water body.

this requirement.

5. Each Copermittee must examine all dry weather effluent analytical monitoring results collected in accordance with section F.4 of this Order and Receiving Waters and MS4 Discharge Monitoring and Reporting Program No. R9-2010-0016 to identify water quality problems which may be the result of any non-prohibited discharge category(ies) identified above in section B.2. Follow-up investigations must be conducted to identify and control, pursuant to section B.2, any non-prohibited discharge category(ies) listed above.

C. NON-STORM WATER DRY WEATHER ACTION LEVELS

1. Each Copermittee, beginning no later than May 1, 2011, shall, individually and/or jointly implement the non-storm water dry weather action level (NAL) monitoring as described in Attachment E of this Order.

2. In response to an exceedance of an NAL, the applicable~~each~~ Copermittee must investigate ~~and identify~~ the source of the exceedance in a timely manner. However, if any Copermittee identifies exceedances of NALs that prevent them from adequately conducting source investigations in a timely manner, then the Copermittees may submit a prioritization plan and timeline that identifies the timeframe and planned actions to investigate and report their findings on all of the exceedances. Depending on the findings of~~Following~~ the source investigation ~~and identification~~, the Copermittee~~s~~ must ~~submit an~~ take appropriate action ~~report dependant on the source of the pollutant exceedance~~ as follows:

Comment [CMP4]: Conflicts with 2.e.

a. If the Copermittee identifies the source of the exceedance as natural (non-anthropogenically influenced) in origin and in conveyance into the MS4; then no specific action is required, however the Copermittee shall report their findings and documentation of their source investigation to the San Diego Water Board within the applicable annual report.~~fourteen days of the source identification.~~

b. If the Copermittee identifies the source of the exceedance as an illicit discharge or connection, then the Copermittee~~s~~ must initiate appropriate actions as described in section F.4 to promptly eliminate the discharge to their MS4. A ~~and~~ report of the findings, including any enforcement action(s) taken, and documentation of the source investigation must be submitted to the San Diego Water Board within the applicable annual report.~~fourteen days of the source identification.~~ If the Copermittee is unable to eliminate the source of discharge within fourteen days of identification, then the Copermittee must ~~submit, as part of their action report, their plan~~ contact and coordinate~~timeframe to eliminate~~ the response with~~source of~~ the Regional Board.~~exceedance.~~ Those dischargers seeking to continue such a discharge must become subject to a separate NPDES permit prior to continuing any such discharge.

Comment [CMP5]: Clarify relationship to IDDE section

c. If the Copermittee identifies the source of the exceedance as an exempted category of non-storm water discharge, then the Copermittees must determine if this is an isolated circumstance or if the category of discharges must be addressed through the prevention or prohibition of that category of discharge as an illicit discharge. The Copermittee must submit their findings ~~in~~ including a description of the steps taken to address the discharge ~~and/or the category of discharge,~~ to the San Diego Water Board for review with the ~~next subsequent~~ annual report. If the Copermittee has determined that the entire category of discharge must be addressed, the annual report must describe and include a schedule for completion of the planned ~~Such description shall include~~ relevant updates to ~~or new~~ ordinances, orders, or other legal means of addressing the

category of discharge, and the~~. The~~ Copermittees must also submit a summary of their findings with the Report of Waste Discharge.

d. If the Copermittee identifies the source of the exceedance as a non-storm water discharge in violation or potential violation of an existing separate NPDES permit (e.g. the groundwater dewatering permit), then the Copermittee must report, within three business days, the findings to the San Diego Water Board including all pertinent information regarding the discharger and discharge characteristics.

e. If the Copermittee is unable to identify the source of the exceedance after taking and documenting reasonable steps to do so, then the Copermittee must report the results in the annual report, and utilize the current and historical exceedance information when adjusting and executing annual work plans, as required by this Order. ~~identify the pollutant as a high priority pollutant of concern in the tributary subwatershed, perform additional focused sampling and update their programs within a year to reflect this priority. The Copermittee's annual report shall include these updates to their programs including, where applicable, updates to their watershed workplans (Section G.2), retrofitting consideration (Section F.3.d) and program effectiveness work plans (Section J.4).~~

Comment [CP6]: C.4 below already requires this - the station will continue to be monitored until no further exceedances are detected.

f. The Copermittees or any interested party, may evaluate existing NALs and propose revised NALs for future Board consideration.

3. NALs provide an assessment of the effectiveness of the Copermittees' program to prohibit non-storm water discharges and of the appropriateness of exempted non-storm water discharges. An exceedance of an NAL does not alone constitute a violation of the provisions of this Order, but an exceedance of an NAL may indicate *that the Copermittee (s) need to re-evaluate their efforts to*~~a lack of compliance with the requirement that Copermittees~~ effectively prohibit all types of unauthorized non-storm water discharges into the MS4 or other prohibitions set forth in Sections A and B of this Order. Failure to timely implement required actions specified in this Order following an exceedance of an NAL constitutes a violation of this Order. However, neither compliance with NALs nor compliance with required actions following observed exceedances, excuses any non-compliance with the requirement to effectively prohibit all types of unauthorized non-storm water discharges into the MS4s or any non-compliance with the prohibitions in Sections A and B of this Order. ~~NALs provide an assessment of the effectiveness of the prohibition of non-storm water discharges and of the appropriateness of exempted non-storm water discharges. During any annual reporting period in which one or more exceedances of NALs have been documented the Copermittee must submit with their next scheduled annual report, a report describing whether and how the observed exceedances did or did not result in a discharge form the MS4 that caused, or threatened to cause or contribute to a condition of pollution, contamination, or nuisance in the receiving waters.~~

Comment [CP7]: This additional reporting effort does not provide any value/utility that is not already addressed under the MRP.

4. Monitoring of effluent will occur at the end-of-pipe prior to discharge into the

Comment [CMP8]: Suggest move to MRP. Focus on the process in Section D, and keep the action levels and monitoring requirements in the MRP.

receiving waters, with a focus on Major Outfalls, as defined in 40 CFR 122.26(B 5-6) and Attachment E of this Order. The Copermittees must develop their monitoring plans to sample a representative ~~percentage~~ number of major outfalls and identified stations within each hydrologic subarea. At a minimum, outfalls that exceed any NALs once during any year (except those that are identified as natural in origin pursuant to 2.a.) must be monitored in the subsequent year. Any station that does not exceed an NAL for 3 years may be replaced with a different station.

5. Each Copermittee shall monitor for the non-storm water dry weather action levels, which are incorporated into this Order as follows:

Comment [CMP9]: This section more appropriately belongs in the MRP.

We are not providing full comments on section 5 at this time, but will address with the discussions on the MRP.

a. Action levels for discharges to inland surface waters:

Table 3.a.1: General Constituents

Parameter	Units	AMAL	MDAL	Instantaneous Maximum	Basis
Fecal Coliform	MPN/ 100 ml	200[A] 400[B]	-		BPO
Enterococci	MPN/ 100 ml	33	-	61[C]	BPO
Turbidity	NTU	-	20		BPO
pH	Units	Within limit of 6.5 to 8.5 at all times			BPO
Dissolved Oxygen	mg/L	Not less than 5.0 in WARM waters and not less than 6.0 in COLD waters			BPO
Total Nitrogen	mg/L	-	1.0	See MDAL	BPO
Total Phosphorus	mg/L	-	0.1	See MDAL	BPO
Methylene Blue Active Substances	mg/L	-	0.5	See MDAL	BPO
Iron	mg/L	-	0.3	See MDAL	BPO
Manganese	mg/L	-	0.05	See MDAL	BPO

A – Based on a minimum of not less than five samples for any 30-day period
B – No more than 10 percent of total samples may exceed 400 per 100 ml during any 30 day period
C – This Value has been set to Basin Plan Criteria for Designated Beach Areas
BPO – Basin Plan Objective
MDAL – Maximum Daily Action Level AMAL – Average Monthly Action Level

Table 3.a.2: Priority Pollutants

		Freshwater (CTR)	
Parameter	Units	MDAL	AMAL
Cadmium	ug/L	**	**
Copper	ug/L	*	*
Chromium III	ug/L	**	**
Chromium VI (hexavalent)	ug/L	16	8.1
Lead	ug/L	*	*
Nickel	ug/L	**	**

Silver	ug/L	*	*
Zinc	ug/L	*	*

CTR – California Toxic Rule
*- Action Levels developed on a case-by-case basis (see below)
**- Action Levels developed on a case-by-case basis (see below), but calculated criteria are not to exceed Maximum Contaminant Levels under the California Code of Regulations[7]

The NALs for Cadmium, Copper, Chromium (III), Lead, Nickel, Silver and Zinc will be developed on a case-by-case basis because the freshwater criteria are based on site-specific water quality data (receiving water hardness). For these priority pollutants, the following equations (40 CFR 131.38.b.2) will be required:

Cadmium (Total Recoverable) = exp(0.7852[ln(hardness)] -2.715)
Chromium III (Total Recoverable) = exp(0.8190[ln(hardness)] + .6848)
Copper (Total Recoverable) = exp(0.8545[ln(hardness)] - 1.702)
Lead (Total Recoverable) = exp(1.273[ln(hardness)] - 4.705)
Nickel (Total Recoverable) = exp(.8460[ln(hardness)] + 0.0584)
Silver (Total Recoverable) = exp(1.72[ln(hardness)] - 6.52)
Zinc (Total Recoverable) = exp(0.8473[ln(hardness)] + 0.884)

D. STORM WATER ACTION LEVELS

1. The Copermittees shall individually and/or jointly implement the Wet Weather MS4 Discharge Monitoring as described in Attachment E of this Order, and ~~Beginning~~ beginning Year 3 after Order adoption date, the Copermittees shall begin annual assessment of that data for compliance with the Storm Water Action Levels (SALs) identified herein. At each monitoring station, If a running average of twenty percent or greater of the available Wet Weather MS4 Discharge Monitoring data exceeds ~~exceedances of any discharge of storm water from the MS4 to waters of the United States that exceed~~ the Storm Water Action Levels (SALs) for the pollutants listed in Table 5 (below) ~~will require each~~ the applicable Copermittee(s) will be required to affirmatively augment and implement all necessary storm water controls and measures to reduce the discharge of the associated class of pollutants(s) to the MEP ~~standard~~. The Copermittees must utilize the exceedance information when adjusting and executing annual work plans, as required by this Order. Copermittees shall take the magnitude, frequency, need to dedicate resources to addressing NAL exceedances, and number of constituents exceeding the SAL(s), in addition to receiving water quality data and other information, into consideration when reacting to SAL exceedances in an iterative manner. Failure to appropriately consider and react to SAL exceedances in an iterative manner creates a presumption that the Copermittee(s) have not complied with the MEP standard.

Comment [CP10]: Found the draft language here confusing, We provided suggested language that attempts to clarify.

Table 4. Storm Water Action Levels

Pollutant	Action Level
Turbidity (NTU)	126
Nitrate & Nitrite total (mg/L)	2.6

[7] California Code of Regulations, Title 22, Division 4, Chapter 15, Article 4, Section 64431.

P total (mg/L)	1.46
Cd total (µg/L)	3.0
Cu total (µg/L)	127
Pb total (µg/L)	250
Zn total (µg/L)	976

2. The end-of-pipe assessment points for the determination of SAL compliance are all major outfalls, as defined in 40 CFR 122.26(b)(5) and (b)(6). The Copermittees must develop their monitoring plans to sample a representative percent of the major outfalls within each hydrologic subarea. At a minimum, outfalls that exceed SALs must be monitored in the subsequent year. Any station that does not exceed an SAL for 3 years may be replaced with a different station. SAL samples must be 24 hour time weighted composites.

Comment [CMP11]: We are not providing comments on the action levels and monitoring requirements themselves (Table 4 and section D.2.) at this time, but will return to this at a subsequent meeting.

3. The absence of SAL exceedances does not relieve the Copermittees from implementing all other required elements of this Permit.

4. This Permit does not regulate natural sources and conveyances into the MS4 of constituents listed in Table 4.~~5.~~ To be relieved of the requirements to take action as described in D.1 above ~~prioritize pollutant/watershed combinations for BMP updates~~ and to continue monitoring a station, the Copermittee must demonstrate that the likely and expected cause of the SAL exceedance is not anthropogenic in nature. This demonstration does not need to be repeated, for subsequent exceedances of the same SAL in the same hydrologic subarea.

5. The SALs will be reviewed and updated at the end of every permit cycle. The data collected pursuant to ~~D.2 above~~Attachment E can be used to create SALs based upon local data. It is the goal of the SALs, through the iterative and MEP process, to have outfall storm water discharges meet all applicable water quality standards.

E. LEGAL AUTHORITY

1. Each Copermittee must establish, maintain, and enforce adequate legal authority to control pollutant discharges into and from its MS4 through ordinance, statute, permit, contract or similar means. Nothing herein shall authorize a Co-Permittee or other discharger regulated under the terms of this order to divert, store or otherwise impound water if such action is reasonably anticipated to harm downstream water right holders in the exercise of their water rights. This legal authority must, at a minimum, authorize the Copermittee to:

   a. Control the contribution of pollutants in discharges of runoff associated with industrial and construction activity to its MS4 and control the quality of runoff from industrial and construction sites. This requirement applies both to industrial and construction sites which have coverage under the statewide general industrial or construction storm water permits, as well as to those sites which do not. Grading

ordinances must be updated and enforced as necessary to comply with this Order;

b. Prohibit all identified illicit discharges not otherwise allowed pursuant to section B.2;

c. Prohibit and eliminate illicit connections to the MS4;

d. Control the discharge of spills, dumping, or disposal of materials other than storm water to its MS4;

e. Require compliance with conditions in Copermittee ordinances, permits, contracts or orders (i.e., hold dischargers to its MS4 accountable for their contributions of pollutants and flows);

f. Utilize enforcement mechanisms to require compliance with Copermittee storm water ordinances, permits, contracts, or orders;

g. Control the contribution of pollutants from one portion of the shared MS4 to another portion of the MS4 through interagency agreements among Copermittees. Control of the contribution of pollutants from one portion of the shared MS4 to another portion of the MS4 through interagency agreements with other owners of the MS4 such as the State of California Department of Transportation, the United States Department of Defense, or Native American Tribes is encouraged;

h. Carry out all inspections, surveillance, and monitoring necessary to determine compliance and noncompliance with local ordinances and permits and with this Order, including the prohibition on illicit discharges to the MS4. This means the Copermittee must have authority to enter, monitor, inspect, take measurements, review and copy records, and require regular reports from industrial facilities discharging into its MS4, including construction sites;

i. Require the use of BMPs to prevent or reduce the discharge of pollutants into MS4s from storm water to the MEP; and

j. Require documentation on the effectiveness of BMPs implemented to reduce the discharge of storm water pollutants to the MS4 to the MEP.

2. Each Copermittee must submit within 365 days of adoption of this Order, a statement certified by its chief legal counsel that the Copermittee has taken the necessary steps to obtain and maintain full legal authority to implement and enforce each of the requirements contained in 40 CFR 122.26(d)(2)(i)(A-F) and this Order. These statements must include:

a. Identification of all departments within the jurisdiction that conduct runoff related activities, and their roles and responsibilities under this Order. Include an up to date organizational chart specifying these departments and key personnel.

b. Citation of runoff related ordinances and the reasons they are enforceable;

c. Identification of the local administrative and legal procedures available to mandate compliance with runoff related ordinances and therefore with the conditions of this Order;

d. A description of how runoff related ordinances are implemented and appealed; and

e. Description of whether the municipality can issue administrative orders and

injunctions or if it must go through the court system for enforcement actions.

F. JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM (JRMP)

Each Copermittee must implement all requirements of section F of this Order no later than 365 days after adoption of the Order, unless otherwise specified. Prior to 365 days after adoption of the Order, each Copermittee must at a minimum implement its Jurisdictional RMP document, as the document was developed and amended to comply with the requirements of Order No. R9-2004-001.

Each Copermittee must develop and implement an updated JRMP for its jurisdiction. Each updated JRMP must meet the requirements of section F of this Order~~,~~ to reduce the discharge of storm water pollutants from the MS4 to the MEP, effectively prohibit non-storm water discharges and prevent runoff discharges from the MS4 from causing or contributing to a violation of water quality standards.

1. DEVELOPMENT PLANNING COMPONENT

Each Copermittee must implement a program which meets the requirements of this section ~~and~~ to (1) reduce~~s~~ Development Project discharges of storm water pollutants from the MS4 to the MEP; (2) prevent~~s~~ Development Project discharges from the MS4 from causing or contributing to a violation of water quality standards; (3) prevent~~s~~ illicit discharges into the MS4; and (4) manage~~s~~ increases in runoff discharge rates and durations from Development Projects that are likely to cause increased erosion of stream beds and banks, silt pollutant generation, or other impacts to beneficial uses and stream habitat due to increased erosive force.

Comment [CP12]: Section F.1 requires programs that address each of these, these are not mutually exclusive requirements.

a. GENERAL PLAN

Each Copermittee must revise as needed its General Plan or equivalent plan (e.g., Comprehensive, Master, or Community Plan) to include water quality and watershed protection principles and policies that direct land-use decisions and require implementation of consistent water quality protection measures for ~~all~~ development, redevelopment and retrofit projects. Examples of water quality and watershed protection principles and policies to be considered include the following:

Comment [CP13]: Consistent with 2004 permit. If you include the word all, then we should add the word 'applicable'. (…for all *applicable* development….)

(1) Minimize the amount of impervious surfaces and directly connected impervious surfaces in areas of new development and redevelopment and where feasible slow runoff and maximize on-site infiltration of runoff.

(2) Implement pollution prevention methods supplemented by pollutant source controls and treatment BMPs. Use small collection strategies located at, or as close as possible to, the source (i.e., the point where water initially meets the

ground) to minimize the transport of urban runoff and pollutants offsite and into an MS4.

(3) Preserve, and where possible, create or restore areas that provide important water quality benefits, such as riparian corridors, wetlands, and buffer zones. Encourage land acquisition of such areas.

(4) Limit disturbances of natural water bodies and natural drainage systems caused by development including roads, highways, and bridges.

(5) Prior to making land use decisions, utilize methods available to estimate increases in pollutant loads and flows resulting from projected future development. Require incorporation of ~~structural and non-structural~~ appropriate BMPs to mitigate the projected increases in pollutant loads and flows.

Comment [CP14]: From 2004 permit. Alternatively state 'structural and/**or** non structural' BMPs

(6) Avoid development of areas that are particularly susceptible to erosion and sediment loss; or establish development guidance that identifies these areas and protects them from erosion and sediment loss.

(7) Reduce pollutants associated with vehicles and increasing traffic resulting from development.

(8) Post-development runoff from a site shall not contain pollutant loads that cause or contribute to an exceedance of receiving water quality objectives and which have not been reduced to the MEP.

b. ENVIRONMENTAL REVIEW PROCESS

Each Copermittee must revise as needed its current environmental review processes to accurately evaluate water quality impacts and cumulative impacts and identify appropriate measures to avoid, minimize and mitigate those impacts for all Development Projects.

c. APPROVAL PROCESS CRITERIA AND REQUIREMENTS FOR ALL DEVELOPMENT PROJECTS

For all proposed Development Projects, each Copermittee during the planning process, and prior to project approval and issuance of local permits, must prescribe the necessary requirements so that Development Project discharges of storm water pollutants from the MS4 will be reduced to the MEP, will not cause or contribute to a violation of water quality standards, and will comply with Copermittee's ordinances, permits, plans, and requirements, and with this Order.

Performance Criteria: Discharges from each approved development project must be subject to the following management measures:

(1) Source control BMPs that reduce storm water pollutants of concern in runoff; prevent~~ion~~ of illicit discharges into the MS4; prevent~~ion~~ of irrigation runoff; storm drain system stenciling or signage; properly design~~ed~~ outdoor material storage areas; properly designed outdoor work areas; and properly designed trash storage areas.

Comment [CP15]: Subject to our discussion on section B (non storm water discharges.

(2) The following LID BMPs listed below shall be implemented at all Development Projects where applicable and feasible.

(a) Conserve natural areas, including existing trees, other vegetation, and soils,
(b) Construct streets, sidewalks, or parking lot aisles to the minimum widths necessary, provided that public safety is not compromised,
(c) Minimize the impervious footprint of the project,
(d) Minimize soil compaction to landscaped areas,
(e) Minimize disturbances to natural drainages (e.g., natural swales, topographic depressions, etc.), and
(f) Disconnect impervious surfaces through distributed pervious areas.

(3) Buffer zones for natural water bodies, where ~~technically~~ feasible. Where buffer zones are ~~technically~~ infeasible, require project proponent to implement other buffers such as trees, access restrictions, etc;

Comment [CP16]: Consistent with 2004 permit.

(4) Measures necessary so that grading or other construction activities meet the provisions specified in section F.2 of this Order.

(5) ~~Where~~ When known during permitting, require industrial facility operators subject to the General Industrial permit to provide evidence of permit coverage prior to occupancy.

(6) Submittal of proof of a mechanism under which ongoing long-term maintenance of all structural post-construction BMPs will be conducted.

(7) Infiltration and Groundwater Protection

To protect groundwater quality, each Copermittee must apply restrictions to the use of treatment control BMPs that are designed to primarily function as large, centralized infiltration devices (such as large infiltration trenches and infiltration basins). Such restrictions must be designed so that the use of such infiltration treatment control BMPs ~~must~~ does not cause or contribute to an exceedance of groundwater quality objectives. At a minimum, each treatment control BMP designed to primarily function as a centralized infiltration device must meet the restrictions below, unless it is demonstrated that a restriction is not necessary to protect groundwater quality. The Copermittees may collectively or individually develop alternative restrictions

on the use of treatment control BMPs which are designed to primarily function as centralized infiltration devices. Alternative restrictions developed by the Copermittees can partially or wholly replace the restrictions listed below. The restrictions do not apply to small infiltration systems dispersed throughout a development project.

(a) Runoff must undergo pretreatment such as sedimentation or filtration prior to infiltration;

(b) All dry weather flows containing significant pollutant loads must be diverted from infiltration devices and treated through other BMPs;

(c) Pollution prevention and source control BMPs must be implemented at a level appropriate to protect groundwater quality at sites where infiltration treatment control BMPs are to be used;

(d) Infiltration treatment control BMPs must be adequately maintained so that they remove storm water pollutants to the MEP;

(e) The vertical distance from the base of any infiltration treatment control BMP to the seasonal high groundwater mark must be at least 10 feet. Where groundwater basins do not support beneficial uses, this vertical distance criteria may be reduced, provided groundwater quality is maintained;

(f) The soil through which infiltration is to occur must have physical and chemical characteristics (such as appropriate cation exchange capacity, organic content, clay content, and infiltration rate) which are adequate for proper infiltration durations and treatment of runoff for the protection of groundwater beneficial uses;

(g) Infiltration treatment control BMPs must not be used for areas of industrial or light industrial activity; ~~areas subject to high vehicular traffic (25,000 or greater average daily traffic on main roadway or 15,000 or more average daily traffic on any intersecting roadway)~~; automotive repair shops; car washes; fleet storage areas (bus, truck, etc.); nurseries; and other high threat to water quality land uses and activities as designated by each Copermittee unless first treated or filtered to remove pollutants prior to infiltration ~~and a comprehensive site-specific evaluation has been conducted~~; and

(h) Infiltration treatment control BMPs must be located a minimum of 100 feet horizontally from any water supply wells.

(7) Where feasible, landscaping with native or low water species shall be preferred in areas that drain to the MS4 or to waters of the United States.

d. STANDARD STORM WATER MITIGATION PLANS (SSMPS) – APPROVAL PROCESS CRITERIA AND REQUIREMENTS FOR PRIORITY DEVELOPMENT PROJECTS

Within 365 days of adoption of this Order, the Copermittees must submit an updated ~~model~~ SSMP (referred to by the Copermittees as a Water Quality Management Plan, or 'WQMP'), to the San Diego Water Board's Executive Officer for a 30 day public review and comment period. The San Diego Water Board's Executive Officer has the discretion to determine the necessity of a public hearing. Within 180 days of determination that the ~~Model~~ SSMP is in compliance with this Permit's provisions, each Copermittee must ~~update their own local SSMP, and~~ amend~~ed~~ their ordinances consistent with the ~~model~~ SSMP and begin implementation of the updated SSMP. Any updated ordinances, and shall be submitted ~~submit both (local SSMP and amended ordinances)~~ to the San Diego Water Board with the annual report. The ~~model~~ SSMP must meet the requirements of section F.1.d of this Order to (1) reduce Priority Development Project discharges of storm water pollutants from the MS4 to the MEP, and (2) prevent Priority Development Project runoff discharges from the MS4 from causing or contributing to a violation of water quality standards.[8]

(1) Definition of Priority Development Project (PDP):

Priority Development Projects are:

(a) All new Development Projects that fall under the project categories or locations listed in section F.1.d.(2), and

(b) Those redevelopment projects that create, add, or replace at least 5,000 square feet of impervious surfaces on an already developed site and the ~~existing development and/or~~ the redevelopment project falls under the project categories or locations listed in section F.1.d.(2). Where redevelopment results in an increase of less than fifty percent of the impervious surfaces of a previously existing development, and the existing development was not subject to SSMP requirements, the numeric sizing criteria discussed in section F.1.d.(6) applies only to the addition or

Comment [CP17]: Consistent with 2004 permit and the Santa Ana Permit.

[8] Updated SSMP and hydromodification requirements must apply to all priority projects or phases of priority projects which have not yet begun grading or construction activities at the time any updated SSMP or hydromodification requirement commences. If lawful prior approval of a project exists, whereby application of an updated SSMP or hydromodification requirement to the project is illegal, the updated SSMP or hydromodification requirement need not apply to the project. Updated Development Planning requirements set forth in Sections F.1. (a) through (h) of this Order must apply to all projects or phases of projects, unless, at the time any updated Development Planning requirement commences, the projects or project phases meet any one of the following conditions: (i) the project or phase has begun grading or construction activities; or (ii) a Copermittee determines that lawful prior approval rights for a project or project phase exist, whereby application of the Updated Development Planning requirement to the project is legally infeasible. Where feasible, the Permittees must utilize the SSMP and hydromodification update periods to ensure that projects undergoing approval processes include application of the updated SSMP and hydromodification requirements in their plans.

replacement, and not to the entire development. Where redevelopment results in an increase of more than fifty percent of the impervious surfaces of a previously existing development, the numeric sizing criteria applies to the entire development. Redevelopment does not include routine maintenance activities that are conducted to maintain original line and grade, hydraulic capacity, original purpose of the facility, or emergency redevelopment activity required to protect public health and safety. Redevelopment also does not include retrofit projects implemented pursuant to section F.3.d of this order.

Comment [CP18]: 2010 Santa Ana Permit

Comment [CP19]: Important not to penalize proactive efforts to retrofit existing development.

~~(c) One acre threshold: In addition to the Priority Development Project Categories identified in section F.1.d.(2), Priority Development Projects must also include all other pollutant-generating Development Projects that result in the disturbance of one acre or more of land within two years of adoption of this Order.~~[9]

Comment [JEU20]: Keep requirements consistent with Santa Ana Permit. This also exceeds the SWRCB Precedential Order regarding SUSMPs.

(2) Priority Development Project Categories

Where a new Development Project feature, such as a parking lot, falls into a Priority Development Project Category, the entire project footprint is subject to SSMP requirements. Emergency public safety projects in any of the Priority Development Categories may be excluded if the delay caused due to the requirement for a SSMP compromises public safety, public health and/or environmental protection.

Comment [CP21]: From the 2010 Santa Ana Permit to ensure that Emergency public safety projects that happen to meet the criteria of a PDP, are not delayed.
Example situations:
•Emergency housing erected in response to a major disaster such as an earthquake
•Emergency food cafeteria erected following a major disaster.
•Emergency command center that happens to need to be set up next to an ESA
•Etc…

(a) New development projects that create 10,000 square feet or more of impervious surfaces (collectively over the entire project site) including commercial, industrial, residential subdivisions requiring a Final Map (i.e. detached single family home subdivisions, multi-family attached subdivisions, condominiums, apartments, etc.), mixed-use, and public projects. This category includes development projects on public or private land which fall under the planning and building authority of the Copermittees.

Comment [CP22]: Consistent with the Santa Ana permit, these revisions clarify that this doesn't apply to individual custom home projects (unless they also qualify as hillside development).

Individual residential projects will still be required to implement the controls from F.1.c. for 'all' projects, however it is not appropriate to burden such insignificant projects with the full SSMP requirements.

(b) Automotive repair shops. This category is defined as a facility that is categorized in any one of the following Standard Industrial Classification (SIC) codes: 5013, 5014, 5541, 7532-7534, or 7536-7539.

(c) Restaurants. This category is defined as a facility that sells prepared foods and drinks for consumption, including stationary lunch counters and refreshment stands selling prepared foods and drinks for immediate consumption (SIC code 5812), where the land area for development is greater than 5,000 square feet. Restaurants where land development is less than 5,000 square feet must meet all SSMP requirements except for

[9] ~~Pollutant generating Development Projects are those projects that generate pollutants at levels greater than natural background levels.~~

structural treatment BMP and numeric sizing criteria requirement F.1.d.(6) and hydromodification requirement F.1.h.

(d) All hillside development greater than 5,000 square feet. This category is defined as any development which creates 5,000 square feet of impervious surface which is located in an area with known erosive soil conditions, where the development will grade on any natural slope that is twenty-five percent or greater.

(e) Environmentally Sensitive Areas (ESAs). All development located within or directly adjacent to or discharging directly to an ESA (where discharges from the development or redevelopment will enter receiving waters within the ESA), which either creates 2,500 square feet of impervious surface on a proposed project site or increases the area of imperviousness of a proposed project site to 10 percent or more of its naturally occurring condition. "Directly adjacent" means situated within 200 feet of the ESA. "Discharging directly to" means outflow from a drainage conveyance system that is composed entirely of flows from the subject development or redevelopment site, and not commingled with flows from adjacent lands.

(f) Impervious Parking lots 5,000 square feet or more ~~or with 15 or more parking spaces~~ and potentially exposed to runoff. Parking lot is defined as a land area or facility for the temporary parking or storage of motor vehicles used personally, for business, or for commerce.

(g) Street, roads, highways, and freeways[10]. This category includes any paved impervious surface that is 5,000 square feet or greater used for the transportation of automobiles, trucks, motorcycles, and other vehicles.

(h) Retail Gasoline Outlets (RGOs). This category includes RGOs that meet the following criteria: (a) 5,000 square feet or more or (b) a projected Average Daily Traffic (ADT) of 100 or more vehicles per day.

(3) Pollutants of Concern

As part of its local SSMP, each Copermittee must implement a~~n~~ ~~updated~~ procedure for identifying pollutants of concern for each Priority Development Project. The procedure must address, at a minimum: (1) Receiving water quality (including pollutants for which receiving waters are listed as impaired under CWA section 303(d)); (2) Land-use type of the Development Project and pollutants associated with that land use type; and (3) Pollutants expected

Comment [CP23]: **'Impervious':** Clarify that if a project implements pervious parking lots (such as pervious concrete), that they would not be necessarily be subjected to a SSMP (unless triggered by another category). This will be a way to strongly encourage this type of LID source control.

'or with 15 or more': Consistent with 2004 SMR and 2010 Santa Ana. Make it simple and consistent, having dual checks here is adding unnecessary complexity.

Comment [CP24]: Footnote added to allow the Copermittees the option to develop road standards, that, upon approval by the EO, could be used in-lieu of a WQMP for each road project.

Comment [CP25]: There is no reason to have an *'updated'* procedure.

[10] The Copermittees may develop and submit to the Regional Board, a plan for addressing pollutant discharges from streets, roads, highways and freeways through implementation of revised standard roadway sections that utilize USEPA Green Streets guidance or similar. Upon approval of the plan by the Executive Officer, projects that incorporate those standards need not be categorized as a PDP unless also triggered by another category.

to be present on site.

(4) Low Impact Development BMP Requirements

Each Copermittee must require each Priority Development Project to implement LID BMPs which will collectively minimize directly connected impervious areas, limit loss of existing infiltration capacity, and protect areas that provide important water quality benefits necessary to maintain riparian and aquatic biota, and/or are particularly susceptible to erosion and sediment loss.

(a) The Copermittees must take the following measures to ensure that LID BMPs are implemented at PDPs:

(i) Each Copermittee must require LID BMPs or make a finding of technical infeasibility for each Priority Development Project in accordance with the LID waiver program in Section F.1.d.(8);
(ii) Each Copermittee must incorporate formalized consideration, such as thorough checklists, ordinances, and/or other means, of LID BMPs into the plan review process for Priority Development Projects;
(iii) The review of each Priority Development Project must include an assessment of potential collection of storm water for on-site or off-site reuse opportunities;
(iv) The review of each Priority Development Project must include an assessment of techniques to infiltrate, filter, store, evaporate, or retain runoff close to the source of runoff; and
(v) Within 2 years after adoption of this Order, each Copermittee must review its local codes, policies, and ordinances and identify barriers therein to implementation of LID BMPs. Following the identification of these barriers to LID implementation, where feasible, the Copermittee must take, by the end of the permit cycle, appropriate actions to remove such barriers.

(b) The following LID BMPs must be implemented at each PDP:

(i) Maintain or restore natural storage reservoirs and drainage corridors (including depressions, areas of permeable soils, swales, and ephemeral and intermittent streams.
(ii) Projects with landscaped or other pervious areas must, where feasible, drain runoff from impervious areas (rooftops, parking lots, sidewalks, walkways, patios, etc) into pervious areas prior to discharge to the MS4. The amount of runoff from impervious areas that is to drain to pervious areas shall not exceed the total capacity of the project's pervious areas to infiltrate or treat runoff, taking into consideration the pervious areas' geologic and soil conditions,

slope, and other pertinent factors.

(iii) Projects with landscaped or other pervious areas must, where feasible, properly design and construct the pervious areas to effectively receive and infiltrate or treat runoff from impervious areas, prior to discharge to the MS4. Soil compaction for these areas shall be minimized. The amount of the impervious areas that are to drain to pervious areas must be based upon the total size, soil conditions, slope, and other pertinent factors.

(iv) Projects with low traffic areas and appropriate soil conditions must construct walkways, trails, overflow parking lots, alleys, or other low-traffic areas with permeable surfaces, such as pervious concrete, porous asphalt, unit pavers, and granular materials.

(b) To protect ground water resources any large, centralized infiltration BMPs must comply with Section F.1.(c)(6). The restrictions do not apply to small infiltration systems dispersed throughout a development project.

(c) LID BMPs sizing criteria:

(i) LID BMPs shall be sized and designed to ensure onsite retention without runoff, of the volume of runoff produced from a 24-hour 85th percentile storm event[11] ("design capture volume");

(ii) If onsite retention LID BMPs are technically infeasible per section F.1.d.(7)(b), LID biofiltration BMPs may treat any volume that is not retained onsite by the LID BMPs. The LID biofiltration BMPs must be designed for an appropriate surface loading rate to prevent erosion, scour and channeling within the BMP. Due to the flow through design of biofiltration BMPs, the total volume of the BMP, including pore spaces and prefilter detention volume, must be sized to hold at least 0.75 times the design storm volume that is not retained onsite by LID retention BMPs;

(iii) If it is shown to be technically infeasible to treat the remaining volume up to and including the design capture volume using LID BMPs (retention or biofiltration), the project must implement conventional treatment control BMPs in accordance with Section F.1.d.(6) below and must participate in the LID waiver program in Section F.1.d.(7).

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[11] This volume is not a single volume to be applied to all of Riverside County. The size of the 85th percentile storm event is different for various parts of the County. The Copermittees are encouraged to calculate the 85th percentile storm event for each of their jurisdictions using local rain data pertinent to their particular jurisdiction (0.6 inch standard is a rough average for the County and should only be used where appropriate rain data is not available). In addition, isopluvial maps may be used to extrapolate rainfall data to areas where insufficient data exists in order to determine the volume of the local 85th percentile storm event in such areas. Where the Copermittees will use isopluvial maps to determine the 85th percentile storm event in areas lacking rain data, the Copermittees shall describe their method for using isopluvial maps in their SSMPs.

(e) All LID BMPs shall be designed and implemented with measures to avoid the creation of nuisance or pollution associated with vectors, such as mosquitoes, rodents, and flies.

(5) Source Control BMP Requirements

Each Copermittee must require each Priority Development Project to implement source control BMPs. The source control BMPs to be required must:

(a) Prevent illicit discharges into the MS4;
(b) Minimize storm water pollutants of concern in runoff;
(c) Eliminate irrigation runoff;
(d) Include storm drain system stenciling or signage;
(e) Include properly designed outdoor material storage areas;
(f) Include properly designed outdoor work areas;
(g) Include properly designed trash storage areas;
(h) Include water quality requirements applicable to individual priority project categories.

(6) Treatment Control BMP Requirements[12]

Each Copermittee must require each Priority Development Project to implement treatment control BMPs that meet the following requirements:

(a) All treatment control BMPs for a single Priority Development Project must collectively be sized to comply with the following numeric sizing criteria:

(i) Volume-based treatment control BMPs must be designed to mitigate (infiltrate, filter, or treat) the volume of runoff produced from a 24-hour 85th percentile storm event,[13]; or

(ii) Flow-based treatment control BMPs must be designed to mitigate (infiltrate, filter, or treat) either: a) the maximum flow rate of runoff produced from a rainfall intensity of 0.2 inch of rainfall per hour, for

[12] This section only applies to those PDPs not implementing LID capable of meeting the design storm criteria for the entire site and meeting technical infeasibility eligibility. Low-Impact Development (LID) and other site design BMPs that are correctly designed to effectively remove pollutants from runoff are considered treatment control BMPs.

[13] This volume is not a single volume to be applied to all of Riverside County. The size of the 85th percentile storm event is different for various parts of the County. The Copermittees are encouraged to calculate the 85th percentile storm event for each of their jurisdictions using local rain data pertinent to their particular jurisdiction. In addition, isopluvial maps may be used to extrapolate rainfall data to areas where insufficient data exists in order to determine the volume of the local 85th percentile storm event in such areas. Where the Copermittees will use isopluvial maps to determine the 85th percentile storm event in areas lacking rain data, the Copermittees shall describe their method for using isopluvial maps in their SSMPs.

each hour of a storm event; or b) the maximum flow rate of runoff produced by the 85th percentile hourly rainfall intensity (for each hour of a storm event), as determined from the local historical rainfall record, multiplied by a factor of two.

(b) Treatment control BMPs for all Priority Development Projects must mitigate (treat through infiltration, settling, filtration or other unit processes) the required volume or flow of runoff from all developed portions of the project, including landscaped areas.

(c) All treatment control BMPs must be located so as to remove pollutants from runoff prior to its discharge to any receiving waters. Multiple Priority Development Projects may use shared treatment control BMPs as long as construction of any shared treatment control BMP is completed prior to the use or occupation of any Priority Development Project from which the treatment control BMP will receive runoff.

(d) All treatment control BMPs for Priority Development Projects must, at a minimum:

(i) Be ranked with high or medium pollutant removal efficiency for the project's most significant pollutants of concern, as the pollutant removal efficiencies are identified in the Copermittees' Model SSMP. Treatment control BMPs with a low removal efficiency ranking must only be approved by a Copermittee when a feasibility analysis has been conducted which exhibits that implementation of treatment control BMPs with high or medium removal efficiency rankings are infeasible for a Priority Development Project or portion of a Priority Development Project.

(ii) Be correctly sized and designed so as to remove storm water pollutants to the MEP.

(e) Target removal of pollutants of concern from runoff.

(f) Be implemented close to pollutant sources, and prior to discharging into waters of the U.S.

(g) Not be constructed within a waters of the U.S. or waters of the State.

(h) Include proof of a mechanism under which ongoing long-term maintenance will be conducted to ensure proper maintenance for the life of the project. The mechanisms may be provided by the project proponent or Copermittee.

(i) Be designed and implemented with measures to avoid the creation of nuisance or pollution associated with vectors, such as mosquitoes,

rodents, and flies.

(7) Low Impact Development (LID) BMP Waiver Program

The Copermittees must develop, collectively or individually, a LID waiver program for incorporation into local SSMPs, which would allow a Priority Development Project to substitute implementation of all or a portion of required LID BMPs in section F.1.d(4) with implementation of treatment control BMPs and either 1) a mitigation project, 2) payment into an in-lieu funding program, and/or 3) watershed equivalent BMP(s) consistent with Section F.1.d.(11). The Copermittees shall submit the LID waiver program as part of their updated model SSMP. At a minimum, the program must meet the requirements below:

(a) Prior to implementation, the LID waiver program must clearly exhibit that it will not allow PDPs to result in a net impact (after consideration of any mitigation and in-lieu payments) from pollutant loadings over and above the impact caused by projects meeting LID requirements;

(b) For each PDP participating, a technical feasibility analysis must be included demonstrating that it is technically infeasible to implement LID BMPs that comply with the requirements of Section F.1.(d)(4). The Copermittee(s) must develop criteria for the technical feasibility analysis including a cost benefit analysis, examination of LID BMPs considered and alternatives chosen. Each PDP participating must demonstrate that LID BMPs were implemented as much as feasible given the site's unique conditions. Analysis must be made of the pollutant loading for each project participating in the LID substitution program. The estimated impacts from not implementing the required LID BMPs in section F.1.d.(4) must be fully mitigated. Technical infeasibility may result from conditions including, but not limited to:

(i) Locations that cannot meet the infiltration and groundwater protection requirements in section F.1.c.(6) for large, centralized infiltration BMPs. Where infiltration is technically infeasible, the project must still examine the feasibility of other onsite retention LID BMPs;
(ii) Smart growth and infill or redevelopment locations where the density and/or nature of the project would create significant difficulty for compliance with the onsite volume retention requirements; and
(iii) Other site, geologic, soil or implementation constraints identified in the Copermittees updated local SSMP document.

(c) The LID waiver program must include mechanisms to verify that each

Priority Development Project participating in the program is in compliance with all applicable SSMP requirements;

(d) The LID waiver program must develop and implement a review process verifying that the BMPs to be implemented meet the designated design criteria. The review process must also verify that each Priority Development Project participating in the program is in compliance with all applicable SSMP requirements.

(e) The LID waiver program must include performance standards for treatment control BMPs specified in compliance with section F.1.(d)(6).

(f) Each PDP that participates in the LID waiver program must mitigate for the pollutant loads expected to be discharged due to not implementing the LID BMPs in section F.1.d.(4). Mitigation projects must be implemented within the same hydrologic subarea as the PDP. Mitigation projects outside of the hydrologic subarea but within the same hydrologic unit may be approved provided that the project proponent demonstrates that mitigation projects within the same hydrologic subarea are infeasible and that the mitigation project will address similar beneficial use impacts as expected from the PDPs pollutant load types and amount. Offsite mitigation projects may include green streets projects, existing development retrofit projects, retrofit incentive programs, regional BMPs and stream restoration. Project applicants seeking to utilize these alternative compliance provisions may propose other offsite mitigation projects, which the Copermittees may approve if they meet the requirements of this subpart.

(g) A Copermittee may choose to implement a pollutant credit system as part of the LID waiver program provided that such a credit system clearly exhibits that it will not allow PDPs to result in a net impact from pollutant loadings over and above the impact caused by projects meeting LID requirements. Any credit system that a Copermittee chooses to implement must be submitted to the Executive Officer for review and approval as part of the waiver program.

(h) The LID waiver program shall include a storm water mitigation fund developed by the Copermittee(s) to be used for water quality improvement projects which may serve in lieu of the PDP's required mitigation in section F.1.d.(8)(e). The LID waiver program's storm water mitigation fund shall, at a minimum, identify;

(i) The entity or entities that will manage the storm water mitigation fund (i.e., assume full responsibility);
(ii) The range and types of acceptable projects for which storm water mitigation funds may be expended;

(iii) The entity or entities that will assume full responsibility for each water quality improvement project, including its successful completion; and

(iv) How the dollar amount of storm water mitigation fund contributions will be determined. In-lieu payments must be proportional to the additional pollutant load discharged by not fully implementing LID.

(i) Each Copermittee must notify the San Diego Water Board in their annual report of each PDP choosing to participate in the LID waiver program. The annual report must include the following information:

(i) Name of the developer of the participating PDP;
(ii) Site location;
(iii) Reason for LID waiver including technical feasibility analysis;
(iv) Description of BMPs implemented;
(v) Total amount deposited, if any, into the storm water mitigation fund described in section F.1.d.(8)(f);
(vi) Water quality improvement project(s) proposed to be funded; and
(vii) Timeframe for implementation of water quality improvement projects.

(8) Site Design and Treatment Control BMP Design Standards

As part of ~~its local~~the SSMP, each Copermittee must develop and require Priority Development Projects to ~~implement~~ comply with ~~sitting,~~ design, and maintenance criteria for each ~~site design~~LID and treatment control BMP listed in its local SSMP to ~~determine~~assist with determining~~determine~~ feasibility and applicability and so that implemented ~~site design~~LID and treatment control BMPs are constructed correctly and are effective at pollutant removal, runoff control, and vector minimization. LID techniques must be incorporated into the criteria for appropriate treatment control BMPs where feasible. Development of BMP design worksheets which can be used by project proponents is encouraged.

(9) Implementation Process

As part of its local SSMP, each Copermittee must implement a process to verify compliance with SSMP requirements. The process must identify at what point in the planning process Priority Development Projects will be required to meet SSMP requirements and at a minimum, the Priority Development Project must implement the required post-construction BMPs prior to occupancy and/or the intended use of any portion of that project. The process must also include identification of the roles and responsibilities of various municipal departments in implementing the SSMP requirements, as well as any other measures necessary for the implementation of SSMP requirements.

(10) Treatment BMP Review

(a) The Copermittees must review and update the BMPs that are listed in their local SSMPs as options for treatment control. At a minimum, the update must include removal of obsolete or ineffective BMPs and addition of LID BMPs that can be used for treatment, such as bioretention cells, bioretention swales, etc. The update must also add appropriate LID BMPs to any tables or discussions in the local SSMPs addressing pollutant removal efficiencies of treatment control BMPs. In addition, the update must include review and revision where necessary of treatment control BMP pollutant removal efficiencies.

(b) The update must incorporate findings from BMP effectiveness studies conducted by the Copermittees for projects funded wholly or in part by the State Board or Regional Boards.

(c) Each Copermittee must implement a mechanism for annually incorporating findings from local treatment BMP effectiveness studies (e.g., ones conducted by, or on-behalf of, public agencies in Riverside County) into SSMP project reviews and permitting

~~(11) Where a development project, greater than 100 acres in total project size or smaller than 100 acres in size yet part of a larger common plan of development that is over 100 acres, has been prepared using watershed and/or sub-watershed based water quality, hydrologic, and fluvial geomorphologic planning principles that implement regional LID BMPs in accordance with the sizing and location criteria of this Order and acceptable to the San Diego Water Board, such standards shall govern review of projects with respect to Section F.1 of this Order and shall be deemed to satisfy this Order's requirements for LID site design, buffer zone, infiltration and groundwater protection standards, source control, treatment control, and hydromodification control standards. Regional BMPs must clearly exhibit that they will not result in a net impact from pollutant loadings over and above the impact caused by capture and retention of the design storm. Regional BMPs may be used provided that the BMPs capture and retain the volume of runoff produced from the 24-hour 85th percentile storm event as defined in section F.1.d.(6)(a)(i) and that such controls are located upstream of receiving waters. Any volume that is not retained by the LID BMPs, up to the design capture volume, must be treated using LID biofiltration. Where regional LID implementation has been shown to be technically infeasible (per section F.1.d.7.b) any volume up to and including the design capture volume, not retained by LID BMPs, nor treated by LID biofiltration, must be treated using conventional treatment control BMPs in accordance with Section F.1.d.(6) and participation in the LID waiver program in Section F.1.d.(7).~~

Comment [JEU26]: Specific to OC. Our understanding is that the Permit already allows regional solutions.

e. BMP CONSTRUCTION VERIFICATION

Prior to occupancy and/or intended use of any portion of the Priority Development Project subject to SSMP requirements, each Copermittee must inspect the constructed site design, source control, and treatment control BMPs applicable to that portion of the project to verify that they have been constructed and are operating in compliance with all specifications, plans, permits, ordinances, and this Order.

f. BMP MAINTENANCE TRACKING

(1) Inventory of SSMP projects: Each Copermittee must develop and maintain a watershed-based database to track and inventory all projects constructed within their jurisdiction, that have a final SSMP (SSMP projects), and the structural~~approved~~ post-construction BMPs implemented therein. SUSMP projects built pursuant to order R9-2004-001 must also be tracked. ~~and BMP maintenance within its jurisdiction since July, 2005~~. LID BMPs implemented on a lot by lot basis ~~at a single family residential home~~, such as rain barrels, are not required to be tracked or inventoried. At a minimum, the database must include information on BMP type, location, watershed, ~~date of construction~~, party responsible for maintenance, dates and findings of maintenance ~~certifications or~~ verifications, -and any vector or nuisance problems. ~~inspections, inspection findings, and corrective actions, including whether the site was referred to the local vector control agency or department.~~

(2) Each Copermittee must establish a mechanism not only to track Priority Development Projects, and the structural post-construction BMPs implemented therein, but also to ensure that appropriate easements and ownerships are properly recorded in public records and the information is conveyed to all appropriate parties when there is a change in project or site ownership.

(3) Each Copermittee must verify that ~~approved~~ structural post-construction BMPs on the inventoried SSMP projects~~are operating effectively and~~ have been adequately maintained by implementing the following measures:

~~(a) An annual inventory of all approved BMPs within the Copermittee's jurisdiction. LID BMPs implemented on a lot by lot basis at a single family residential home, such as rainbarrels, are not required to be tracked or inventoried. The inventory must also include all BMPs approved for Priority Development Projects since July, 2005;~~

(a) The designation of 'high ~~priority~~ maintenance' SSMP Projects~~BMPs~~. 'High-~~priority~~ maintenance' designation must include consideration of land

Comment [CP27]: Changes are to allow a single database to be created for the Santa Ana and Santa Margarita watersheds, and a uniform program to be implemented county-wide. This will allow the Copermittees to comply in a more cost-effective manner and avoid confusion.

Comment [CP28]: Belongs in F.1.d.(9) above.

Comment [CP29]: We can't verify that they are 'operating'. All we can do is verify that they have been constructed correctly (pursuant to F.1.e) and that they have been maintained correctly. This combination of verifications will ensure that they will be operational. References to 'operating' have been deleted throughout.

use type, BMP ~~size~~type and effectiveness at addressing the project's pollutants of concern, ~~-~~recommended BMP maintenance frequency and~~,~~ likelihood of operational and maintenance issues, ~~location, receiving water quality,~~ and other pertinent factors;

(b) Beginning X years after adoption of this order, each Copermittee must implement a program to ~~V~~verify implementation, ~~operation,~~ and maintenance of the required structural post-construction BMPs on the inventoried SSMP projects, by inspection, self-certification, surveys, or other equally effective approaches with the following conditions:

(i) At least 90% of Municipal SSMP projects must be verified annually.

(ii) At least 90% of 'high maintenance' SSMP projects must be verified annually.

(iii) All inventoried SSMP projects must be verified at least once every five years.

(iv) At the discretion of the Copermittee, the verifications may be coordinated with the facility inspections implemented pursuant to section F.3. of this order.

(v) For verifications performed through a means other than direct Copermittee inspection, adequate documentation must be submitted to the Copermittee to provide assurance that the required maintenance has been completed.

~~(i) The implementation, operation, and maintenance of at least 90 percent of approved and inventoried final project public and private SSMPs (a.k.a. WQMPs) must be verified annually. All post-construction BMPs shall be verified within every four year period;~~

~~(ii) Operation and maintenance verifications must be required prior to each rainy season;~~

~~(iii) All (100 percent) projects with BMPs that are high priority must be inspected by the Copermittee annually prior to each rainy season;~~

~~(iv) All (100 percent) public agency projects with BMPs must be inspected by the Copermittee annually;~~

~~(v) At least 50 percent of projects with drainage insert treatment control BMPs must be inspected by the Copermittee annually;~~

(vi) Appropriate follow-up measures (including re-inspections, enforcement, maintenance, etc.) must be conducted to ensure the treatment BMPs continue to reduce storm water pollutants as originally designed;

~~(vii) All inspections must verify effective operation and maintenance of the treatment control BMPs, as well as compliance with all ordinances,~~

~~permits, and this Order; and~~

(vii) Inspections must note observations of vector conditions, such as mosquitoes. Where conditions are identified as contributing to mosquito production, the Copermittee must notify their local vector control agency.

Comment [CP30]: The Copermittees may conduct BMP inspections/certifications independently of PDP Commercial/Industrial Inspections. Keep the two separate so that the Permittees can find the most cost-effective and protective approach to address the Permit.

g. ENFORCEMENT OF DEVELOPMENT SITES

Comment [CP31]: Entire section F.1. of the permit is Development '*Planning*'. Enforcement belongs in the construction and existing development sections, not here.

Each Copermittee must enforce its storm water ordinance for all Development Projects ~~and at all development sites~~ as necessary to maintain compliance with this Order. Copermittee ordinances or other regulatory mechanisms must include appropriate sanctions to achieve compliance. Sanctions must include the following or their equivalent: Non-monetary penalties, fines, ~~bonding requirements,~~ and/or permit or occupancy denials for non-compliance.

Comment [CP32]: Term has no meaning outside of Development Projects

Comment [CP33]: These are ineffective for enforcement purposes as it is too difficult to actually pull them.

h. HYDROMODIFICATION – LIMITATIONS ON INCREASES OF RUNOFF DISCHARGE RATES AND DURATIONS[14]

Each Copermittee shall collaborate with the other Copermittees to develop and implement a Hydromodification Management Plan (HMP) to manage increases in runoff discharge rates and durations from all Priority Development Projects. The HMP shall be incorporated into the local SSMP and implemented by each Copermittee so that estimated post-project runoff discharge rates and durations shall not exceed pre-development discharge rates and durations. Where the proposed project is located on an already developed site, the pre-project discharge rate and duration shall be that of the pre-developed, naturally occurring condition. The HMP shall be submitted to the Executive Officer within 2 years of permit adoption. The HMP will be made available for public review and comment and the Executive Officer will determine the need for a public hearing.

(1) The HMP must:

(a) Identify a method for assessing susceptibility of channel segments which receive runoff discharges from Priority Development Projects. The geomorphic stability within the channel shall be assessed. A performance standard shall be created that ensures that the geomorphic stability within the channel not be compromised as a result of receiving runoff discharges from Priority Development Projects.

[14] Updated SSMP and hydromodification requirements shall apply to all priority projects or phases of priority projects which have not yet begun grading or construction activities at the time any updated SSMP or hydromodification requirement commences. If a Copermittee determines that lawful prior approval of a project exists, whereby application of an updated SSMP or hydromodification requirement to the project is legally infeasible, the updated SSMP or hydromodification requirement need not apply to the project. The Copermittees shall utilize the SSMP and hydromodification update periods to ensure that projects undergoing approval processes include application of the updated SSMP and hydromodification requirements in their plans.

(b) Utilize continuous simulation of the entire rainfall record (or other analytical method proposed by the Copermittees and deemed acceptable by the San Diego Water Board) to identify a range of runoff flows[15] for which priority Development Project post-project runoff flow rates and durations shall not exceed pre-development (naturally occurring) runoff flow rates and durations by more than 10 percent, where the increased flow rates and durations will result in increased potential for erosion or other significant adverse impacts to beneficial uses. In addition, the identified range of runoff flow rates and durations must compensate for the loss of sediment supply due to the development. The lower boundary of the range of runoff flows identified shall correspond with the critical channel flow that produces the critical shear stress that initiates channel bed movement or that erodes the toe of channel banks. The identified range of runoff flows may be different for specific watersheds, channels, or channel reaches. In the case of an artificially hardened (concrete lined, rip rap, etc.) channel, the lower boundary of the range of runoff flows identified shall correspond with the critical channel flow that produces the critical shear stress that initiates channel bed movement or that erodes the toe of channel banks of a comparable soft-bottomed channel.

(c) Require Priority Development Projects to implement hydrologic control measures so that Priority Development Projects' post-project runoff flow rates and durations (1) do not exceed pre-project (naturally occurring) runoff flow rates and durations by more than 10 percent for the range of runoff flows identified under section F.1.h.(1)(b), where the increased flow rates and durations will result in increased potential for erosion or other significant adverse impacts to beneficial uses; (2) do not result in channel conditions which do not meet the channel standard developed under section F.1.h.(1)(a) for channel segments downstream of Priority Development Project discharge points; and (3) compensate for the loss of sediment supply due to development.

(d) Include other performance criteria (numeric or otherwise) for Priority Development Projects as necessary to prevent runoff from the projects from increasing and/or continuing unnatural rates of erosion of channel beds and banks, silt pollutants generation, or other impacts to beneficial uses and stream habitat due to increased erosive force.

(e) Include a review of pertinent literature.

(f) Identify areas within the Santa Margarita Hydrologic Unit where historic hydromodification of receiving waters has a negative impact to benthic

[15] The identified range of runoff flows to be controlled should be expressed in terms of peak flow rates of rainfall events, such as "10% of the pre-development 2-year runoff event up to the pre-project 10-year runoff event."

macroinvertebrate and benthic periphyton by identifying areas with low or very low Index of Biotic Integrity (IBI) scores.

(g) Include a protocol to evaluate potential hydrograph change impacts to downstream watercourses from Priority Development Projects. This protocol must include the use of the IBI score as a metric for assessing impacts and improvements to downstream watercourses.

(h) Include a description of how the Copermittees will incorporate the HMP requirements into their local approval processes.

(i) Include criteria on selection and design of management practices and measures (such as detention, retention, and infiltration) to control flow rates and durations and address potential hydromodification impacts.

(j) Include technical information supporting any standards and criteria proposed.

(k) Include a description of inspections and maintenance to be conducted for management practices and measures to control flow rates and durations and address potential hydromodification impacts.

(l) Include a description of pre- and post-project monitoring and other program evaluation, including IBI score, to be conducted to assess the effectiveness of implementation of the HMP.

(m) Include mechanisms for assessing and addressing cumulative impacts within a watershed on channel morphology.

(n) Include information on evaluation of channel form and condition, including slope, discharge, vegetation, underlying geology, and other information, as appropriate.

(2) In addition to the hydrologic control measures that must be implemented per section F.1.h.(1)(c), the HMP must include a suite of management measures to be used on Priority Development Projects to protect and restore downstream beneficial uses and prevent or further prevent adverse physical changes to downstream channels. The measures must be based on a prioritized consideration of the following elements in this order:

(a) Hydrologic control measures;
(b) On-site management controls;
(c) Regional controls located upstream of receiving waters; and
(d) In-stream controls.

Where stream channels are adjacent to, or are to be modified as part of a

Priority Development Project, management measures must include buffer zones and setbacks. Under no circumstances will in-stream controls include the use of non-naturally occurring hardscape materials such as concrete, riprap, gabions, etc. The suite of management measures shall also include stream restoration as a viable option to achieve the channel standard in section F.1.h.(1)(a).

(3) Each individual Copermittee has the discretion to not require Section F.1.h. at Priority Development Projects where the project:

(a) Discharges storm water runoff into underground storm drains discharging directly to bays or the ocean; or
(b) Discharges storm water runoff into conveyance channels whose bed and bank are concrete lined all the way from the point of discharge to ocean waters, enclosed bays, estuaries, or water storage reservoirs and lakes.

(4) HMP Reporting and Implementation

(a) Within 2 years of adoption of the Order, the Copermittees shall submit to the San Diego Water Board a draft HMP that has been reviewed by the public, including the analysis that identifies the appropriate limiting range of flow rates per section F.1.h.(1)(b).

(b) Within 180 days of receiving San Diego Water Board comments on the draft HMP, the Copermittees shall submit a final HMP that addressed the San Diego Water Board's comments.

(c) Within 90 days of receiving a finding of adequacy from the Executive Officer, each Copermittee shall incorporate and implement the HMP for all Priority Development Projects.

(d) Prior to approval of the HMP by the San Diego Water Board, the early implementation measures likely to be included in the HMP shall be encouraged by the Copermittees.

(5) <u>Interim Hydromodification Criteria</u>

Within one year of adoption of this Order, each Copermittee must ensure that all Priority Development Projects are implementing the following criteria by comparing the pre-development (naturally occurring) and post-project flow rates and durations using a continuous simulation hydrologic model such as US EPA's Hydrograph Simulation Program-Fortran (HSPF):

(a) For flow rates from 10 percent of the 2-year storm event to the 5 year storm event, the post-project peak flows shall not exceed pre-development (naturally occurring) peak flows.

(b) For flow rates from the 5 year storm event to the 10 year storm event the post-project peak flows may exceed pre-development (naturally occurring) flows by up to 10 percent for a 1-year frequency interval.

The interim hydromodification criteria do not apply to Priority Development Projects where the project discharges (1) storm water runoff into underground storm drains discharging directly to bays or the ocean, or (2) storm water runoff into conveyance channels whose bed and bank are concrete lined all the way from the point of discharge to ocean waters, enclosed bays, estuaries, or water storage reservoirs and lakes.

Within one year of adoption of this Order, each Copermittee must submit a signed, certification statement to the San Diego Water Board verifying implementation of the interim hydromodification criteria.

(6) No part of section F.1.h shall alleviate the Copermittees responsibilities for implementing Low Impact Development BMPs as required under section F.1.d.(4).

i. TRAINING AND EDUCATION

(1) Municipal Departments and Personnel Education

Municipal Development Planning: Each Copermittee must implement an education program so that its planning and development review staffs and contractors (and Planning Boards and Elected Officials, if applicable) have an understanding of:

(a) Federal, State, and local water quality laws and regulations applicable to Development Projects;

(b) The connection between land use decisions and short and long-term water quality impacts (i.e., impacts from land development and urbanization); and

(c) Methods of minimizing impacts to receiving water quality resulting from development, including:

(i) Storm water management plan development and review;
(ii) Local sensitive water bodies, including 303(d)-impairments and ESAs;
(iii) Methods to control downstream erosion impacts;
(iv) Identification of pollutants of concern;
(v) Site design BMP techniques;
(vi) Source control BMPs;
(vii) Selection of the most effective treatment control BMPs for the

pollutants of concern; and
(viii) Public heath concerns related to storm water management infrastructure.

(2) Project Applicants, Developers, Contractors, Property Owners, and other Responsible Parties

(a) Each Copermittee must implement a New Development / Redevelopment education program using all media as appropriate to:

(i) Measurably increase the knowledge of the target communities regarding MS4s, impacts of runoff on receiving waters, and potential BMP solutions for the target audience; and
(ii) To measurably change the behavior of target communities and thereby reduce pollutant releases to MS4s and the environment.

(b) Each Copermittee must educate each target community on the following topics where appropriate:

(i) The importance of educating all construction workers in the field about storm water issues and BMPs though formal or informal training;
(ii) Federal, State, and local water quality laws and regulations applicable to new development and redevelopment activities;
(iii) Site design, source control, pollution prevention, and treatment BMPs;
(iv) General runoff concepts; and
(v) Other topics of local importance, including local water quality conditions, impaired waterbodies and environmentally sensitive areas.

2. CONSTRUCTION COMPONENT

Each Copermittee must implement a construction program which meets the requirements of this section~~,~~ to prevent~~s~~ illicit discharges into the MS4, implement~~s~~ and maintain~~s~~ structural and non-structural BMPs to reduce pollutants in storm water runoff from construction sites to the MS4, reduce~~s~~ construction site discharges of storm water pollutants from the MS4 to the MEP, and prevent~~s~~ construction site discharges from the MS4 from causing or contributing to a violation of water quality standards.

a. ORDINANCE UPDATE

Within 365 days of adoption of this Order, each Copermittee must review and update its grading ordinances and other ordinances as necessary to achieve full compliance with this Order, including requirements for the implementation of all designated BMPs and other measures.

b. SOURCE IDENTIFICATION

Each Copermittee must maintain an updated watershed based inventory of all construction sites within its jurisdiction. The use of an automated database system, such as Geographical Information Systems (GIS) is ~~required~~encouraged.

c. SITE PLANNING AND PROJECT APPROVAL PROCESS

Each Copermittee must incorporate consideration of potential water quality impacts prior to approval and issuance of construction and grading permits.

(1) Each construction and grading permit must require proposed construction sites to implement designated BMPs and other measures so that illicit discharges into the MS4 are prevented and storm water pollutants discharged from the site will be reduced to the maximum extent practicable ~~and will not cause or contribute to a violation of water quality standards~~.

(2) Prior to permit issuance, the Copermittee must inform the project proponent~~'s runoff management plan (or equivalent construction BMP plan) must be required to comply, and reviewed to verify compliance, with~~ of the applicable requirements of the local grading ordinance, other applicable local ordinances, and this Order that they will be required to comply with during construction.

(3) Prior to permit issuance, each Copermittee must verify that project proponents subject to California's statewide General NPDES Permit for Storm Water Discharges Associated With Construction Activities, (hereinafter General Construction Permit), have existing coverage under the General Construction Permit.

d. BMP IMPLEMENTATION

(1) Designate BMPs: Each Copermittee must designate a minimum set of BMPs and other measures to be implemented at all construction sites. The designated minimum set of BMPs must include:

(a) Management Measures:

(i) Pollution prevention, where appropriate;
(ii) ~~Development and implementation of a site-specific runoff management plan~~;
(iii) Minimization of areas that are cleared and graded to only the portion of the site that is necessary for construction;
(iv) Minimization of exposure time of disturbed soil areas;
(v) Minimization of grading during the wet season and correlation of grading with seasonal dry weather periods to the extent feasible;

(vi) Limitation of grading to a maximum disturbed area as determined by each Copermittee before either temporary or permanent erosion controls are implemented to prevent storm water pollution. The Copermittee has the option of temporarily increasing the size of disturbed soil areas by a set amount beyond the maximum, if the individual site is in compliance with applicable storm water regulations and the site has adequate control practices implemented to prevent storm water pollution;
(vii) Temporary stabilization and reseeding of disturbed soil areas as rapidly as feasible;
(viii) Wind erosion controls;
(ix) Tracking controls;
(x) Non-stormwater management measures to prevent illicit discharges and control storm water pollution sources;
(xi) Waste management measures;
(xii) Preservation of natural hydrologic features where feasible;
(xiii) Preservation of riparian buffers and corridors where feasible;
(xiv) Evaluation and maintenance of all BMPs, until removed; and
(xv) Retention, reduction, and proper management of all storm water pollutant discharges on site to the MEP standard.

(b) Erosion and Sediment Controls:

(i) Erosion prevention. Erosion prevention is to be used as the most important measure for keeping sediment on site during construction;
(ii) Sediment controls. Sediment controls are to be used as a supplement to erosion prevention for keeping sediment on-site during construction;
(iii) Slope stabilization must be used on all active slopes during rain events regardless of the season and on all inactive slopes during the rainy season and during rain events in the dry season; and
(iv) Permanent revegetation or landscaping as early as feasible.

(c) ~~Designate enhanced BMPs[16] for 303(d) impairments and ESAs:~~ Each Copermittee must implement, or require implementation of, enhanced measures to address the exceptional threat to water quality posed by all construction sites tributary to CWA section 303(d) water body segments impaired for sediment or turbidity. Each Copermittee must also implement, or require implementation of, enhanced, site-specific measures for construction sites within or adjacent to or discharging directly to receiving waters within environmentally sensitive areas (as defined in Attachment C of this Order).

~~[16] Enhanced BMPs are control actions specifically targeted to the pollutant or condition of concern and of higher quality and effectiveness than the minimum control measures otherwise required. Enhanced in this Order means better, not simply more, BMPs.~~

~~(i) Active Sediment Treatment (AST): Each Copermittee must require implementation of advanced treatment for sediment at construction sites (or portions thereof) that are determined by the Copermittee to be an exceptional threat to water quality. In evaluating the threat to water quality, the following factors must be considered by the Copermittee:~~

~~[a] Soil erosion potential or soil type;~~
~~[b] The site's slopes;~~
~~[c] Project size and type;~~
~~[d] Sensitivity of receiving water bodies;~~
~~[e] Proximity to receiving water bodies;~~
~~[f] Non-storm water discharges;~~
~~[g] Ineffectiveness of other BMPs;~~
~~[h] Proximity and sensitivity of aquatic threatened and endangered species of concern;~~
~~[i] Known effects of AST chemicals; and~~
~~[j] Any other relevant factors.~~

(d) Implement BMPs: Each Copermittee must implement, or require the implementation of, the designated minimum BMPs and any additional measures necessary to comply with this Order at each construction site within its jurisdiction year round. BMP implementation requirements, however, can vary based on wet and dry seasons. Dry season BMP implementation must plan for and address unseasonal rain events that may occur during the dry season (May 1 through September 30).

e. INSPECTION OF CONSTRUCTION SITES

Each Copermittee must conduct construction site inspections for compliance with its ordinances (grading, storm water, etc.), permits (construction, grading, etc.), and this Order. Priorities for inspecting sites must consider the nature and size of the construction activity, topography, and the characteristics of soils and receiving water quality.

(1) During the wet season, each Copermittee must inspect at least every ~~two weeks~~month, all construction sites within its jurisdiction meeting any of the following criteria:

(a) All sites ~~30~~ 50 acres or more in size with rough grading or active slopes occurring during the wet season;

(b) All sites one acre or more, and tributary to[17] a CWA section 303(d) water body segment impaired for sediment or within ~~or directly adjacent to,~~ or

[17] 'Tributary to' is considered to be within the same Hydrologic Sub Area.

Comment [CP34]: Changed to allow inspectors to focus on follow-up inspections and enforcement on sites that are found to be out of compliance. Change is also consistent with the Santa Ana permit requirements which will allow for more consistent and effective implementation of the program.

Comment [CP35]: Consistent with the 2004 SMR Permit and the 2009 Santa Ana permit. See also comments on the Fact sheet.

Comment [CP36]: What matters is that the project is discharging to the Receiving Waters within the ESA. This section should not apply to projects that may be 'adjacent' to, but do not discharge into the receiving waters within the ESA.

discharging directly to a receiving water within an ESA; and

(c) Other sites determined by the Copermittees or the San Diego Water Board as a significant threat to water quality. In evaluating threat to water quality, the following factors must be considered: (1) soil erosion potential; (2) site slope; (3) project size and type; (4) sensitivity of receiving water bodies; (5) proximity to receiving water bodies; (6) non-storm water discharges; (7) known past record of non-compliance by the operators of the construction site; and (8) any other relevant factors.

(2) During the wet season, each Copermittee must inspect at least ~~monthly~~twice during the wet season, all construction sites with one acre or more of soil disturbance not meeting the criteria specified above in section F.2.e.(1).

Comment [CP37]: Changed to be consistent with the Santa Ana permit, and to allow inspectors to focus on follow-up inspections and enforcement on sites that are found to be out of compliance.

(3) During the wet season, each Copermittee must inspect construction sites less than one acre in size as needed to ensure compliance with its ordinances and this Order.

(4) Each Copermittee must inspect all construction sites as needed during the dry season. Sites meeting the criteria in section F.2.e.(1) must be inspected at least once in August or September each year.

(5) Re-inspections: Based upon site inspection findings, each Copermittee must implement all follow-up actions (i.e., re-inspection, enforcement) necessary to comply with this Order. Reinspection frequencies must be determined by each Copermittee based upon the severity of deficiencies, the nature of the construction activity, and the characteristics of soils and receiving water quality.

(6) Inspections of construction sites must include, but not be limited to:

(a) ~~Check for coverage under the General Construction Permit (Notice of Intent (NOI) and/or Waste Discharge Identification No.) during initial inspections~~;

Comment [CP38]: This is already performed under F.2.c.(3). No need to repeat

(b) Assessment of compliance with Copermittee ordinances and permits related to runoff, including the implementation and maintenance of designated minimum BMPs;
(c) Assessment of BMP effectiveness;
(d) Visual observations for non-storm water discharges, potential illicit connections, and potential discharge of pollutants in storm water runoff;
(e) ~~Review of site monitoring data, if the site monitors its runoff~~;
(f) Education and outreach on storm water pollution prevention, as needed; and
(g) Creation of a written or electronic inspection report.

Comment [CP39]: This is a NEW requirement that is not applicable to compliance with our ordinances. This only has utility in enforcing the CGP, which is the responsibility of the Water Board.

(7) The Copermittees must track the number of inspections for each inventoried

construction site throughout the reporting period to verify that each site is inspected at the minimum frequencies required.

f. ENFORCEMENT OF CONSTRUCTION SITES

(1) Each Copermittee must develop and implement an escalating enforcement process ~~that~~ to achieve~~s~~ prompt corrective actions at construction sites for violations of the Copermittee's water quality protection permits, requirements, and ordinances. This enforcement process must include authorizing the Copermittee's construction site inspectors to take immediate enforcement actions when appropriate and necessary. The enforcement process must include appropriate sanctions such as stop work orders, non-monetary penalties, fines, bonding requirements, and/or permit denials for non-compliance.

Comment [CP40]: Concern for undue liability on the Copermittees if a contractor does not promptly correct the site despite appropriate Copermittee enforcement.

'that achieves' could imply that if the Contractor is not prompt in implementing corrective actions, that ***we*** are in violation.

(2) Each Copermittee must be able to respond to construction site related complaints received from third-parties and to ensure the San Diego Water Board that appropriate corrective actions have been implemented.

g. REPORTING OF NON-COMPLIANT SITES

(1) In addition to the notification requirements in Attachment B, each Copermittee must notify the San Diego Water Board when the Copermittee issues a ~~stop work order or other~~ high level enforcement (as defined in the Copermittee's JRMP) to a construction site in its jurisdiction as a result of ~~storm water~~ violations of their storm water ordinances.

(2) Each Copermittee shall annually notify the San Diego Water Board, prior to the commencement of the wet season, of all construction sites with alleged violations that pose a significant threat to water quality. Information may be provided as part of the JRMP annual report if submitted prior to the rainy season. Information provided shall include, but not be limited to, the following:

Comment [CP41]: More streamlined approach to focus notifications on those sites whose alleged violations are posing a significant threat to water quality, rather than sites that have been issued minor corrections.

(a) WDID number if enrolled under the General Construction Permit
(b) Site Location, including address
(c) Current violations or suspected violations

~~**h. TRAINING AND EDUCATION**~~

~~(1) Municipal Staff and Contractors: Requirements for municipal staff and contractors are described in the Municipal Component section of this Order.~~

~~(2) Construction Site Owner / Operator Responsibilities:~~

~~As early in the planning and development process as possible and all through~~

~~the permitting and construction process, each Copermittee must implement a program to educate project applicants, developers, contractors, property owners, and other responsible parties. The education program must provide an understanding of the topics listed below, as appropriate for the audience being educated.~~

(d) The importance of educating all construction workers in the field about storm water issues and BMPs though formal or informal training;
(e) Federal, State, and local water quality laws and regulations applicable to construction and grading activities;
(f) Site design, source control, pollution prevention, and treatment BMPs;
(g) General runoff concepts; and
(h) Other topics of local importance, including local water quality conditions, impaired waterbodies and environmentally sensitive areas.

3. EXISTING DEVELOPMENT COMPONENT

~~a.~~ MUNICIPAL

Each Copermittee must implement a municipal program for the Copermittee's facilities and activities which meets the requirements of this section, to~~,~~ prevent~~s~~ illicit discharges into the MS4, reduce~~s~~ municipal discharges of storm water pollutants from the MS4 to the MEP, and prevent~~s~~ municipal discharges from the MS4 from causing or contributing to a violation of water quality standards.

(1) Source Identification / Inventory

Each Copermittee must maintain an updated ~~watershed-based~~ inventory of all their municipal areas and activities that have the potential to discharge pollutants. The inventory must include the name, address (if applicable), and a description of the area/activity; which pollutants are potentially generated by the area/activity; whether the area/activity is adjacent to an ESA; and identification of whether the area/activity is tributary to a CWA section 303(d) water body segment and generates pollutants for which the water body segment is impaired. Linear facilities such as roads, streets, highways do not need to be individually inventoried. The use of an automated database system, such as Geographical Information Systems (GIS) is ~~required when applicable.~~encouraged.

(2) General BMP Implementation

(a) Pollution Prevention: Each Copermittee must implement pollution prevention methods in its municipal program and must require their use by appropriate municipal departments, personnel, and contractors, where appropriate.

(b) Designate Minimum BMPs: Each Copermittee must designate a minimum set of BMPs for their pollutant generating~~all municipal~~ areas and activities. The designated minimum BMPs for municipal areas and activities must be area or activity specific as appropriate. BMPs must be designated for

special events that are expected to generate significant trash and litter.

(c) Designate BMPs for ESAs and 303(d) Impairments: Each Copermittee must designate enhanced measures for their municipal areas and activities tributary to CWA section 303(d) impaired water body segments when an area or activity generates pollutants for which the water body segment is impaired. Each Copermittee must also designate additional controls for their municipal areas and activities within or directly adjacent to or discharging directly to ~~coastal lagoons, the ocean, or other~~ receiving waters within environmentally sensitive areas (as defined in Attachment C of this Order) as necessary to comply with this Order.

Comment [CMP42]: Consistent with 2004 Permit. Recognizes that need to address ESA may be situational (e.g. adjacent to ESA but no pollutant transport potential)

(d) Implement BMPs: Each Copermittee must implement, or require the implementation of, the applicable designated minimum and/or enhanced BMPs, and any additional measures necessary based on its inventory to comply with this Order for each municipal area or activity within its jurisdiction that has the potential to discharge pollutants.

(3) BMP Implementation for Management of Pesticides, Herbicides, and Fertilizers

Each Copermittee must implement BMPs to reduce the contribution of storm water pollutants to the MEP associated with the application, storage, and disposal of pesticides, herbicides and fertilizers from their municipal areas and activities to MS4s and receiving waters. Such BMPs must include, at a minimum:

(a) Educational activities, permits, certifications and other measures for municipal applicators and distributors;
(b) Integrated Pest Management (IPM) measures that rely on non-chemical solutions;
(c) The use of native vegetation;
(d) Schedules for irrigation and chemical application; and
(e) The collection and proper disposal of unused pesticides, herbicides, and fertilizers.

(4) BMP implementation for Flood Control Structures

(a) Each Copermittee must implement procedures to assure that new flood management projects assess the impacts on the water quality of receiving water bodies.
(b) Each Copermittee must include water quality protection measures, where feasible, when retrofitting existing flood control structural devices.
(c) Each Copermittee must evaluate its existing flood control structural devices as part of ongoing routine maintenance to~~,~~ identify devices causing or contributing to a condition of pollution, and identify, and where

feasible implement measures to reduce or eliminate the device's~~structure's~~ effect on pollution.~~, and evaluate the feasibility of retrofitting the structural flood control device. The inventory and evaluation must be completed by and submitted to the San Diego Water Board in the 2nd year JRMP Annual Report.~~

(5) BMP Implementation for Sweeping of Municipal Areas

Where municipal area sweeping is implemented as an MS4 BMP for municipal roads, streets, highways, and parking facilities, the~~each~~ Copermittee must design and implement the program based on the following criteria:

(a) Optimize pickup of trash and debris based on land uses, trash collection schedules, seasonal factors (e.g., special events, tourism, etc.) and inspections of municipal areas/activities.

(6) Operation and Maintenance of Municipal Separate Storm Sewer System (MS4) and Treatment ~~Structural~~ Controls

Comment [CMP43]: For consistency with subheadings

(a) Treatment Controls: Each Copermittee must implement a schedule of inspection and maintenance activities to verify proper operation of all their municipal structural treatment controls designed to reduce storm water pollutant discharges to or from its MS4s and related drainage structures.

(b) MS4~~ and Facilities~~: Each Copermittee must implement a schedule of maintenance activities for their~~the~~ MS4 ~~and MS4 facilities~~ (including catch basins, storm drain inlets, open channels, etc). The maintenance activities must, at a minimum, include:

(i) Inspection and removal of accumulated waste at least once a year between May 1 and September 30 of each year for Permittee catch basins and storm drain inlets; ~~all MS4 facilities;~~

Comment [CP44]: Consistent with 2004 permit

(ii) Additional catch basin and storm drain inlet cleaning as necessary between October 1 and April 30 of each year ~~for facilities that receive or collect high volumes of trash and debris;~~

(iii) Following two years of inspections, any MS4 catch basin or storm drain inlet~~facility~~ that requires inspection and cleaning less than annually may be inspected as needed, but not less than~~that~~ every other year;

(iv) Open channels and basins must be cleaned of observed anthropogenic litter in a timely manner;

(v) Maintenance activities within open channels must not adversely impact beneficial uses;

(vi) Record keeping of the maintenance and cleaning activities including the overall quantity of waste removed;

(vii) Proper disposal of waste removed pursuant to applicable laws; and

(viii) Measures to eliminate waste discharges during MS4 maintenance and cleaning activities.

(7) Infiltration From Sanitary Sewer to MS4/Provide Preventive Maintenance of Both

Comment [CMP45]: This section is a new requirement and is not applicable in the SMR as the Permittees do not own nor operate any Sewer systems. Request deletion of this section.

(a) Each Copermittee must implement controls and measures to prevent and eliminate infiltration of seepage from municipal sanitary sewers to MS4s through thorough, routine preventive maintenance of the MS4. Each Copermittee that operates both a municipal sanitary sewer system and a MS4 must implement controls and measures to prevent and eliminate infiltration of seepage from the municipal sanitary sewers to the MS4s that must include overall sanitary sewer and MS4 surveys and thorough, routine preventive maintenance of both.

(b) Each Copermittee must implement controls to limit infiltration of seepage from municipal sanitary sewers to municipal separate storm sewer systems where necessary. Such controls must include:

(i) Adequate plan checking for construction and new development,
(ii) Incident response training for municipal employees that identify sanitary sewer spills;
(iii) Code enforcement inspections;
(iv) MS4 maintenance and inspections;
(v) Interagency coordination with sewer agencies; and
(vi) Proper education of municipal staff and contractors conducting field operations on the MS4 or municipal sanitary sewer (if applicable).

(8) Inspection of Municipal Areas and Activities

(a) At a minimum, each Copermittee must inspect the following high priority municipal areas and activities annually:

(i) Roads, Streets, Highways, and Parking Facilities;
~~(ii) Flood Management Projects and Flood Control Devices;~~

Comment [CMP46]: Conflicts with (6)(b).

(ii) Areas and activities tributary to a CWA section 303(d) impaired water body segment, where an area or activity generates pollutants for which the water body segment is impaired.
(iii) Areas and activities within or ~~adjacent to or~~ discharging directly to receiving waters within environmentally sensitive areas (as defined in Attachment C of this Order);

Comment [CMP47]: What matters is that it is discharging to receiving waters within the ESA. You could have a facility/activity adjacent to an ESA that doesn't discharge to the ESA.

(iv) Municipal Facilities:
[a] Active or closed municipal landfills;
[b] Publicly owned treatment works (including water and wastewater treatment plants) and sanitary sewage collection systems;
[c] Solid waste transfer facilities;

[d] Land application sites;
[e] Corporate yards including maintenance and storage yards for materials, waste, equipment and vehicles; and
[f] Household hazardous waste collection facilities.

(v) Municipal airfields;
(vi) Parks and recreation facilities;
(vii) Special event venues following special events (festivals, sporting events, etc.);
(viii) Power washing facilities; and
(ix) Other municipal areas and activities that the Copermittee determines may contribute a significant pollutant load to the MS4.

(b) Other municipal areas and activities must be inspected as needed and in response to water quality data, valid public complaints, and findings from municipal or contract staff.

(c) Based upon site inspection findings, each Copermittee must implement all follow-up actions necessary to comply with this Order.

(9) Enforcement of Municipal Areas and Activities

Each Copermittee must enforce its storm water ordinance for all their municipal areas and activities as necessary to maintain compliance with this Order.

(10) Training and Education

Each Copermittee must ensure that all their municipal personnel and contractors that have responsibilities for selecting, implementing, and evaluating BMPs for their municipal areas and activities are adequately trained and educated to perform such tasks.

(a) Municipal Departments and Personnel Education

(i) Municipal Construction Activities: Each Copermittee must implement an education program that includes annual training prior to the rainy season so that its staff responsible for construction activities (e.g. construction, building, code enforcement, ~~and~~ grading review staffs, inspectors, and other responsible construction staff) have, at a minimum, an understanding of the following topics, as appropriate for the target audience:

[a] Applicable ~~Federal, State, and local~~ water quality laws and regulations applicable to construction and grading activities conducted by the target audience;

Comment [CMP48]: Based on our experience, all people need to know is that there are laws.

[b] The connection between construction activities and water quality

impacts (i.e., impacts from land development and urbanization and impacts from construction material such as sediment);

[c] Proper implementation of erosion and sediment control and other BMPs to minimize the impacts to receiving water quality resulting from construction activities;

[d] The Copermittee's inspection, plan review, and enforcement policies and procedures to verify consistent application; where regional training is offered, the training shall focus on the DAMP's generalized inspection, plan review and enforcement policies and procedures;

Comment [U49]: We do regionalized training. This level of detail can not be captured in a joint class.

[e] Current advancements in BMP technologies;

[f] SSMP Requirements including treatment options, site design, source control, and applicable tracking mechanisms; and

[g] Other topics of local importance, including local water quality conditions, impaired water bodies, environmentally sensitive areas, and public health and disease vector issues associated with runoff.

(ii) Municipal Industrial/Commercial Activities Inspectors: Each Copermittee must train staff responsible for conducting storm water compliance inspections and enforcement of industrial and commercial facilities at least once a year. Training must cover inspection and enforcement procedures, BMP implementation, and review of monitoring data

(iii) Municipal Other Activities: Each Copermittee must implement an education program so that their municipal personnel and contractors performing activities which generate pollutants have an understanding of the activity specific BMPs for each activity to be performed.

b. COMMERCIAL / INDUSTRIAL

Each Copermittee must implement a commercial / industrial program that meets the requirements of this section~~,~~ to prevent~~s~~ illicit discharges into the MS4, reduce~~s~~ commercial / industrial discharges of storm water pollutants from the MS4 to the MEP, and prevent~~s~~ commercial / industrial discharges from the MS4 from causing or contributing to a violation of water quality standards.

(1) Source Identification

(a) Each Copermittee must maintain an updated watershed-based inventory of all industrial and commercial sites/sources within its jurisdiction (regardless of ownership) that could contribute a significant pollutant load to the MS4. The inventory must include the following minimum information for each industrial and commercial site/source: name; address; pollutants potentially generated by the site/source; and identification of whether the site/source is tributary to a Clean Water Act

section 303(d) water body segment and generates pollutants for which the water body segment is impaired; and a narrative description including SIC codes which best reflects the principal products or services provided by each facility.

At a minimum, the ~~following~~ sites/sources listed below must be included in the inventory. Where the required inventory includes sites or information that was not required under Order R9-2004-001, the new required sites/information must be added to the Copermittee's inventory within X years. ~~:~~

(i) Commercial Sites/Sources:

[a] Automobile repair, maintenance, fueling, or cleaning;
[b] Airplane repair, maintenance, fueling, or cleaning;
[c] Boat repair, maintenance, fueling, or cleaning;
[d] Equipment repair, maintenance, fueling, or cleaning;
[e] Automobile and other vehicle body repair or painting;
[f] Mobile automobile or other vehicle washing;
[g] Automobile (or other vehicle) parking lots and storage facilities;
[h] Retail or wholesale fueling;
[i] Pest control services;
[j] Eating or drinking establishments, including such establishments within food markets;
[k] Mobile carpet, drape or furniture cleaning;
[l] Cement mixing or cutting;
[m] Masonry;
[n] Painting and coating;
[o] ~~Botanical or zoological gardens and exhibits~~;
[p] Landscaping;
[q] Nurseries and greenhouses;
[r] Golf courses, parks and other recreational areas/facilities;
[s] Cemeteries;
[t] Pool and fountain cleaning;
[u] ~~Marinas~~;
[v] Portable sanitary services;
[w] ~~Building material retailers and storage~~;
[x] ~~Animal facilities~~Boarding facilities and kennels;
[y] Mobile pet services;
[z] Power washing services; and
[aa] Other sites and sources with a history of un-authorized discharges to the MS4.

Comment [CP50]: These have not been identified by the Copermittees as contributing a significant pollutant load to the MS4 and should be removed. This is an unnecessary new requirement.

Comment [CP51]: Not applicable

Comment [CP52]: These have not been categorically identified by the Copermittees as contributing a significant pollutant load to the MS4 and should be removed. This is an unnecessary new requirement.

(ii) Industrial Sites/Sources:

[a] Industrial Facilities, as defined at 40 CFR § 122.26(b)(14), including

those subject to the General Industrial Permit or other individual NPDES permit;

[b] Operating and closed landfills;

[c] Facilities subject to SARA Title III; and

[d] Hazardous waste treatment, disposal, storage and recovery facilities.

~~(iii)~~ ESAs and 303(d) Listed Waterbodies: All other commercial or industrial sites/sources tributary to a CWA Section 303(d) impaired water body segment, where the site/source generates pollutants for which the water body segment is impaired. ~~All other commercial or industrial sites/sources within or directly adjacent to or discharging directly to coastal lagoons, the ocean, or other receiving waters within environmentally sensitive areas (as defined in Attachment C of this Order).~~

(iii)

(iv) All other commercial or industrial sites/sources that the Copermittee determines may contribute a significant pollutant load to the MS4.

(2) General BMP Implementation

(a) Pollution Prevention: Each Copermittee must require the use of pollution prevention methods by the inventoried industrial and commercial sites/sources.

(b) Designate / Update Minimum BMPs: Each Copermittee must designate a minimum set of BMPs for all inventoried industrial and commercial sites/sources. Where BMPs have already been designated, each Copermittee must review its existing BMPs for adequacy. The designated minimum BMPs must be specific to facility types and pollutant-generating activities, as appropriate. The Copermittee may adjust the number and/or type of minimum BMPs that are required, provided that the goals of the Commercial/Industrial program are met.

(c) Designate Enhanced BMPs for ESAs and 303(d) Impairments: Each Copermittee must designate enhanced measures for inventoried industrial and commercial sites/sources tributary to CWA section 303(d) impaired water body segments (where a site/source generates pollutants for which the water body segment is impaired). Each Copermittee must also designate additional controls for industrial and commercial sites/sources within or directly adjacent to or discharging directly to ~~coastal lagoons, the ocean, or other~~ receiving waters within environmentally sensitive areas (as defined in Attachment C of this Order) as necessary to comply with this order. The Copermittee may adjust the number and/or type of enhanced BMPs that are required, provided that the goals of the Commercial/Industrial program are met.

Comment [JEU53]: This is a high cost-low return proposition. It is a significant effort and non-recoverable cost to determine which projects may be directly discharging or adjacent to receiving waters with ESAs. There are already over 30 categories of facilities that are required for inspection. There is also a process (via NALs and SALs) whereby the Permittees must develop action plans to address remaining water quality problems. Let the NAL/SAL system drive the decision making for adding facilities instead of this shot-gun approach which will net hair salons, retail stores, and other stores not likely to have any real impact on water quality.

Comment [CP54]: This sentence has been added pursuant to our previous discussions, where it was agreed that the list of BMPs can be changed over time through the iterative process based on the experience of the Copermittees. This language provides important clarification to that end. Request similar language be added to Municipal and Residential sections

Comment [CP55]: From the 2004 permit.

Comment [CP56]: This sentence has been added pursuant to our previous discussions, where it was agreed that the list of BMPs can be changed over time through the iterative process based on the experience of the Copermittees. This language provides important clarification to that end. Request similar language be added to Municipal and Residential sections

(d) Implement BMPs: Each Copermittee must ~~implement, or~~ require the implementation of~~,~~ the designated minimum and enhanced BMPs and any additional measures necessary based on inspections, incident responses, and water quality data to comply with this Order at each industrial and commercial site/source within its jurisdiction.

Comment [CP57]: The Copermittees have no authority to *implement* the BMPs on these privately owned sites, however they can require the site owner to implement such BMPs.

(3) ~~BMP Implementation for~~ Mobile ~~Businesses~~Business Program

Comment [CP58]: This section is describing more than BMP implementation, it is describing a parallel program to address the unique characteristics of Mobile Businesses. Suggested revised heading.

(a) Each Copermittee must develop and implement a program to reduce the discharge of storm water pollutants from mobile businesses to the MEP and to prohibit non-storm water discharges pursuant to Section B of this Order. Each Copermittee must keep as part of their commercial source inventory a listing of mobile businesses known to ~~operate~~ have bases of operation within its jurisdiction that have the potential to discharge pollutants. The program must include:

(i) Development and implementation of minimum standards and BMPs to be required for each of the various types of mobile businesses;
(ii) Development and implementation of an enforcement strategy which specifically addresses the unique characteristics of mobile businesses;
(iii) Notification of those mobile businesses known to ~~operate~~ have bases of operation within the Copermittee's jurisdiction, of the minimum standards and BMP requirements ~~and local ordinances~~;
(iv) Development and implementation of an outreach and education strategy; and
(v) Inspection of mobile businesses as needed to implement the program.

Comment [CP59]: This would prevent us from implementing this regionally.

(b) If they choose to, the Copermittees may cooperate in developing and implementing their programs for mobile businesses, including, but not limited to sharing of mobile business inventories, BMP requirements, enforcement action information, and education.

(4) Inspection of Industrial and Commercial Sites/Sources

Each Copermittee must conduct industrial and commercial site inspections for compliance with its ordinances, permits, and this Order. Mobile businesses shall be inspected pursuant to section F.3.b.(3) of this order.

Comment [CP60]: Clarifying that mobile business will be subject to the inspection requirements developed in F.3.b.(3) .

(a) Inspection Procedures: Inspections must include but not be limited to:

(i) ~~Review of BMP implementation plans, if the site uses or is required to use such a plan~~;

(ii) ~~Review of facility monitoring data, if the site monitors its runoff;~~

(iii) Check for coverage under the General Industrial Permit (Notice of Intent (NOI) and/or Waste Discharge Identification Number), if applicable;

(iv) Assessment of compliance with Copermittee ordinances and Copermittee issued permits related to runoff;

(v) ~~A~~assessment of ~~BMP~~ implementation and effectiveness of the designated minimum and/or enhanced BMPs~~, maintenance and effectiveness~~;

(vi) Visual observations for non-storm water discharges, potential illicit connections, and potential discharge of pollutants in storm water runoff; and

(vii) Education and training on storm water pollution prevention, as conditions warrant.

(b) Each Copermittee shall annually notify the San Diego Water Board, prior to the commencement of the wet season, of all Industrial Sites and Industrial Facilities subject to the General Industrial Permit or other individual NPDES permit with alleged violations of the Copermittees' ordinances, that pose a significant threat to water quality. Information may be provided as part of the JRMP annual report if submitted prior to the rainy season. Information provided shall include, but not be limited to, the following:

(i) WDID number if enrolled under the General Industrial Permit;
(ii) Site Location, including address;
(iii) Current violations or suspected violations; and
(iv) ~~Past Violation history~~.

(c) Frequencies: Each Permittee shall prioritize the inventoried commercial/industrial facilities based on threat to water quality. ~~At a minimum, 25 percent of the sites inventoried as required in section F.3.b.(1) above (excluding mobile sources) including all~~ All sites determined to pose a high threat to water quality must be inspected each year. At a minimum all other inventoried facilities shall be inspected at least once every five years. All sites must be Mobile businesses must be inspected pursuant to the enforcement strategy developed pursuant to section F.3.b.(3). In evaluating threat to water quality, each Copermittee shall consider, at a minimum, the following:

(i) Type of activity (SIC code);
(ii) Materials used at the facility;

Comment [JEU61]: Requirement (v) already addresses these issues. (i) and (ii) focus on methods. (v) focuses on outcomes. The Permittees should be allowed to determine their own methods for evaluating compliance with their ordinances.

Comment [CP62]: This section should only be addressing the BMPs required under section F.3.b of the order. As mentioned in comments above, the maintenance of Post Construction structural BMPs is addressed in section F.1.f. of this order.

Comment [JEU63]: Permittees already Voluntarily work with RWQCB to ensure compliance. This requirement is not necessary.

Comment [JEU64]: Clarify that we are evaluating Ordinance compliance, also limit reporting to sites with significant threats to water quality.

Comment [CP65]: This is too vague and broad.

Comment [JEU66]: 25% requirement is a record retention problem and is not necessary.

Comment [CP67]: Changes are proposed to allow the CAP program to be maintained.

(iii) Wastes generated;
(iv) Pollutant discharge potential;
(v) Non-storm water discharges;
(vi) Size of facility;
(vii) Proximity to receiving water bodies;
(viii) Sensitivity of receiving water bodies;
(ix) Whether the facility is subject to the General Industrial Permit or an individual NPDES permit;
(x) Whether the facility has filed a No Exposure Certification/Notice of Non-Applicability;
(xi) Facility design;
(xii) Total area of the site~~, area of the site~~ where industrial or commercial activities occur, and area of the site exposed to rainfall and runoff;
(xiii) The facility's compliance history; and
(xiv) Any other relevant factors.

(d) Third-Party ~~Inspections~~Certifications: Each Copermittee may develop and implement a program to utilize a private third party ~~inspection~~ certification ~~program~~ service for verifying industrial and commercial site/source compliance with its ordinances, permits, and this Order. ~~The third party inspections can satisfy up to 30% of the inspection requirements in section F.3.b(4)(c), with the Copermittee having to fulfill the remaining required inspections.~~ To the extent that third party ~~inspections~~ certifications are conducted to fulfill the requirements of this Order, the Copermittee will be responsible for conducting and documenting quality assurance and quality control of the third-party ~~inspections~~certifications.

Comment [CP68]: Intent of the changes are to clarify that these requirements do not apply to any cross-Copermittee inspection agreements, such as the CAP program.

Comment [CP69]: This limitation is not necessary. Section (i) below will provide the Copermittee with the assurance that the inspection is valid, complete and accurate. The Copermittee should be afforded the flexibility to find the most cost-effective way to comply with the permit.

(i) Each inspection conducted by a third-party must, at a minimum, result in the following:

[a] Photo documentation of potential storm water violations identified during the third party inspection;
[b] Reporting to the Copermittee of identified significant potential violations, including imminent or observed illegal discharges, within 24 hours of the third party inspection;
[c] Reporting to the Copermittee of all inspection findings within one week of the inspection being conducted; and
[d] Copermittee follow-up and/or enforcement actions for identified potential storm water violations within two business days of the inspection or potential violation report receipt.

(e) Based upon site inspection findings, each Copermittee must implement all follow-up actions and enforcement necessary to comply with this Order.

(f) To the extent that the San Diego Water Board has conducted an inspection of an industrial site during a particular year, the requirement for

the responsible Copermittee to inspect this facility during the same year will be satisfied.

(g) The Copermittees must track the number of inspections for the inventoried industrial and commercial sites/sources throughout the reporting period to verify that the sites/sources are inspected at the minimum frequencies listed in this Order.

(5) Enforcement of Industrial and Commercial Sites/Sources

Each Copermittee must enforce its storm water ordinance for all industrial and commercial sites/sources as necessary to maintain compliance with this Order. Copermittee ordinances or other regulatory mechanisms must include appropriate sanctions to achieve compliance. Sanctions must include the following or their equivalent: Non-monetary penalties, fines, ~~bonding requirements,~~ and/or permit denials for non-compliance.

Comment [CP70]: The difficulty in collecting on bonds make them virtually useless as an enforcement tool.

~~(6) Training and Education for Owners and Operators of Commercial and Industrial Activities~~

~~(a) Each Copermittee must implement an education program using all media as appropriate to (1) measurably increase the knowledge of owners and operators of commercial and industrial activities regarding MS4s, impacts of runoff on receiving waters, and potential BMP solutions for the target audience; and (2) to measurably change the behavior of target communities and thereby reduce storm water pollutant releases and eliminate prohibited non-storm water discharges to MS4s and the environment. At a minimum, the education program must meet the requirements of this section and address the following issues:~~

~~(i) Laws, regulations, permits, & requirements;~~
~~(ii) Best management practices;~~
~~(iii) General runoff concepts; and~~

~~(iv) Other topics, including public reporting mechanisms, water conservation, low-impact development techniques.~~

~~(b) BMP Notification: At least twice during the five-year period of this Order, each Copermittee must notify the owner/operator of each inventoried industrial and commercial site/source of the BMP requirements applicable to the site/source.~~

C. RESIDENTIAL

Each Copermittee must implement a residential program which meets the requirements of this section~~,~~ to prevent~~s~~ illicit discharges into the MS4, reduce~~s~~

Comment [CP71]: Same comment as on Municipal

residential discharges of storm water pollutants from the MS4 to the MEP, and prevent~~s~~ residential discharges from the MS4 from causing or contributing to a violation of water quality standards.

(1) Threat to Water Quality Prioritization

Each Copermittee must identify residential areas and activities that pose a high threat to water quality. At a minimum, these must include:

(a) Automobile repair, maintenance, washing, and parking;
(b) Home and garden care activities and product use (pesticides, herbicides, and fertilizers);
(c) Disposal of trash, pet waste, green waste, and household hazardous waste (e.g., paints, cleaning products);
(d) Any other residential source that the Copermittee determines may contribute a significant pollutant load to the MS4;
(e) Any residential areas tributary to a CWA section 303(d) impaired water body, where the residence generates pollutants for which the water body is impaired; and
(f) Any residential areas within or directly adjacent to or discharging directly to a ~~coastal lagoon, the ocean, or other~~ receiving water~~waters~~ within an environmentally sensitive area (as defined in Attachment C of this Order).

(2) BMP Implementation

(a) Pollution Prevention: Each Copermittee must actively encourage the use of pollution prevention methods by residents and residential associations (i.e Home Owners Associations).

(b) Designate BMPs: Each Copermittee must designate minimum BMPs for ~~high-threat-to-water quality~~ residential areas and activities, including areas maintained by and activities conducted by residential associations, that pose a high-threat-to-water quality. The designated minimum BMPs ~~for high-threat-to-water quality residential areas and activities~~ must be area or activity specific and must consider factors that may be uniquely relevant to Common Interest Areas and areas managed by Home Owners' Associations.

(c) Hazardous Waste BMPs: Each Copermittee must facilitate the proper management and disposal of used oil, toxic materials, and other household hazardous wastes. Such facilitation must include educational activities, public information activities, and establishment of collection sites operated individually and/or jointly by the Copermittees or a private entity. Curbside collection of household hazardous wastes is encouraged.

Comment [CMP72]: We jointly fund operation of a permanent collection and additional rotating collection events

(d) Implement BMPs: Each Copermittee must implement, or require

implementation of, the designated minimum BMPs and any additional measures that are subsequently determined to be necessary to comply with Sections A and B of this Order.

(e) Each Copermittee must implement, or require implementation of, BMPs for residential areas and activities that have not been designated a high threat to water quality, as necessary.

(3) Enforcement of Residential Areas and Activities

Each Copermittee must enforce its storm water ordinance for all residential areas and activities as necessary to maintain compliance with this Order. In addition, pursuant to Section E of this order each Copermittee must review its Municipal Codes / Ordinances to ensure that it has the full authority to implement and enforce runoff management measures within common interest areas and those areas managed by Home Owners' Associations.

(4) Evaluation of Oversight of Residential Areas and Activities

~~Each Copermittee must annually review the effectiveness of efforts to reduce residential discharges of storm water pollutants from the MS4 and eliminate illicit residential discharges into the MS4. The evaluation must consider findings from monitoring data, municipal employee comments, inspections, complaints, and other appropriate sources.~~

(5) Common Interest Areas (CIA) / Home Owner Association (HOA) Areas

~~Each Copermittee must implement measures specifically to ensure that runoff within common interest developments, including areas managed by associations, meets the objectives of this section and Order.~~

~~(a) BMP Implementation: Each Copermittee must implement management measures based on a review of pertinent factors, including:~~

~~(i) Current maintenance duties and procedures used by CIA/HOA maintenance associations within its jurisdiction;~~
~~(ii) Whether streets and storm drains are publicly or privately owned within the CIA/HOA;~~
~~(iii) Whether the CIA/HOA area has been identified as a high priority residential area;~~
~~(iv) Proximity to 303(d)-listed waterbodies, and/or environmentally sensitive areas;~~
~~(v) Evaluation of water quality monitoring data;~~
~~(vi) Evaluation of existing illegal discharge/illicit connection activities;~~
~~(vii) Other activities conducted or authorized by the HOA that may pose a significant risk to inland or coastal receiving waters.~~

~~(b) Legal Authority and Enforcement: Within one year of adoption of this Order, each Copermittee must review its Municipal Code to determine the most appropriate method to implement and enforce runoff management measures within CIA/HOA areas.~~

(6) Residential Education Program

(a) Each Copermittee must individually and/or jointly implement a Residential Education Program using all media as appropriate to (1) measurably increase the knowledge regarding MS4s, impacts of runoff on receiving waters, and potential BMP solutions for the target audience; and (2) to measurably change the behavior of target communities and thereby reduce storm water and eliminate prohibited non-storm water pollutant releases to MS4s and the environment.

(b) Copermittee educational programs must address pollutant generating residential activities (e.g. car washing, mobile operations, yard maintenance)~~emphasize underserved target audiences, residents~~ and pollutant generating products (i.e. pesticides, fertilizers, household chemicals) as appropriate.~~managers of CIA/HOA areas, high-risk behaviors, and "allowable" behaviors and discharges.~~ At a minimum, the education program must meet the requirements of this section and address thefollowing~~the following~~ issues as appropriate to the specific outreach effort:

(i) Laws, regulations, permits, and requirements;
(ii) Best management practices;
(iii) General runoff concepts;
(iv) Existing water quality, including local water quality conditions, impaired waterbodies and environmentally sensitive areas; and
(v) Other topics, including public reporting mechanisms, water conservation, low-impact development techniques, and public health and disease vector issues associated with polluted runoff.

d. Retrofitting Existing Development

Each Copermittee must develop and implement a retrofitting program which meets the requirements of this section. The goal~~s~~ of the existing development retrofitting program ~~are~~ is to provide an option to the Copermittees to address the regional impacts of existing development through retrofit projects that: reduce impacts from hydromodification, ~~promote LID,~~ support riparian and aquatic habitat restoration, reduce the discharges of storm water pollutants from the MS4 to the MEP, and prevent discharges from the MS4 from causing or contributing to a violation of water quality standards. Where feasible, at the discretion of the Copermittee, the existing development retrofitting program may be coordinated

Comment [CP73]: Retrofit should not be for the sake of Retrofit - it should be an option available to the Copermittees to address a specific and defined problem in the most cost efficient manner.

Comment [CP74]: LID is a means to an end, not an end in and of itself.

with flood control projects and other regional infrastructure improvement programs.

~~(1) Source Identification~~

(1) The Copermittee must identify and inventory existing developments (~~i.e~~e.g. municipal, industrial, commercial, residential) within their jurisdiction that may be~~as~~ candidates for retrofitting. At a minimum, the delineation ~~Potential retrofitting candidates~~ must assess candidates within the following areas of existing development:~~include but are not limited to:~~

(a) Areas ~~Developments~~ that are known to contribute pollutants of concern to a 303(d) listed water body;~~TMDL or an ESA~~;
(b) Receiving waters that are channelized or otherwise hardened;
(c) Developments tributary to receiving waters that are channelized or otherwise hardened;
(d) Areas~~Developments~~ tributary to receiving waters that are significantly eroded;
~~(e) Developments tributary to an ASBS or SWQPA; and~~
~~(f) Developments that cause hydraulic constriction.~~

(2) Each Copermittee shall evaluate ~~and rank~~ the inventoried ~~existing developments~~retrofit candidates to prioritize retrofitting. The evaluation shall consider the following criteria, where appropriate:~~Criteria for evaluation must include but is not limited to:~~

(a) Feasibility;
(b) Cost effectiveness;
(c) Pollutant removal effectiveness;
(d) Tributary~~Impervious~~ area potentially treated;
(e) Maintenance requirements;
(f) Landowner cooperation;
(g) Neighborhood acceptance;
(h) Aesthetic qualities~~; and~~
(i) Environmental Constraints (such as regulatory permits);
(j) Efficacy at addressing concern~~.~~; and
(k) Public Health and Safety;

(3) Each Copermittee must consider the results of the evaluation in prioritizing work plans for the following year. Highly feasible projects expected to benefit water quality should be given a high priority to implement source control and treatment control BMPs. Where applicable and feasible, the retrofit projects should be designed in accordance with the SSMP requirements within sections F.1.d.(3) through F.1.d.(8). In addition, the Copermittee shall encourage retrofit projects to implement where feasible the Hydromodification

Comment [CP75]: The Copermittees would prefer to end section (1) here, and give us the flexibility to assess candidates where it makes sense, without forcing us to work within a specific framework. Alternatively, important changes/clarifications have been provided.

Comment [CP76]: Not applicable to this watershed.

Comment [CP77]: This is covered under (d) above

Comment [CP78]: The evaluation should occur when we have identified a specific problem that we are trying to address.

Comment [CP79]: Similar to section (1) the Copermittees would prefer to end section (2) here and give us the flexibility to utilize any applicable and appropriate criteria in our evaluation - and not overly define the framework we will be required to work within. Alternatively, appropriate modifications to the language have been provided.

requirements in Section F.1.h.

(4) The Copermittees ~~will~~ are highly encouraged to cooperate with private landowners to encourage retrofitting projects. The Copermittee ~~must~~ should consider the following practices in cooperating and encouraging private landowners to retrofit their existing development:

(a) Demonstration retrofit projects;
~~(b) Retrofits on public land and easements that treat runoff from private developments;~~
(b) Education and outreach;
(c) Subsidies for retrofit projects;
(d) Requiring retrofit projects as enforcement, mitigation or ordinance compliance; and
(e) Public and private partnerships~~; and~~.
~~(g) Fees for existing discharges to the MS4 and reduction of fees for retrofit implementation.~~

(5) Where ~~T~~the completed retrofit includes structural post-construction BMPs within municipal (Copermittee owned) areas, the BMPs shall be tracked and inspected in accordance with section F.1.f.

~~(7) Where constraints on retrofitting preclude effective BMP deployment on existing developments at locations critical to protect receiving waters, a Copermittee may propose a regional mitigation project to improve water quality. Such regional projects may include but are not limited to:~~

~~(a) Regional water quality treatment BMPs;~~
~~(b) Urban creek or wetlands restoration and preservation;~~
~~(c) Daylighting and restoring underground creeks;~~
~~(d) Localized rainfall storage and reuse to the extent such projects are fully protective of downstream water rights;~~
~~(e) Hydromodification project; and~~
~~(f) Removal of invasive plant species.~~

(7) A retrofit project or regional mitigation project may qualify as a Watershed Water Quality Activity provided it meets the requirements in section G. Watershed Runoff Management Program.

Comment [CP80]: The idea is to find approaches for encouraging retrofit that may be applicable locally. In response to SALs, NALs, and TMDLs, these may be one 'tool in the toolbox' that we can assess in determining the most cost-efficient way to address the problem.

Comment [CP81]: This is addressed in (1) above

Comment [CP82]: Not applicable here

Comment [CP83]: If a private landowner volunteers to retrofit their property (outside of the requirements of F.1), they shouldn't be subjected to inspections / verifications. This would be a penalty for them doing the right thing.

5/26: Water Board staff agreed to consider this language .

Comment [CP84]: The delineation proposed in F.3.d.(1) above will include an assessment for regional opportunities.

4. ILLICIT DISCHARGE DETECTION AND ELIMINATION

Each Copermittee must implement a program which meets the requirements of this section to actively detect and eliminate illicit discharges and disposal into the MS4. The program must address all types of illicit discharges and connections excluding those non-storm water discharges not prohibited by the Copermittee in accordance with

section B of this Order.

a. PREVENT AND DETECT ILLICIT DISCHARGES AND CONNECTIONS

Each Copermittee must implement measures to prevent and detect illicit discharges to the MS4.

(1) Legal Authority: Each Copermittee must retain legal authority to prevent and eliminate illicit discharges and connections to the MS4.

(2) Inspections: Each Copermittee must include use of appropriate Copermittee ~~municipal~~ personnel and contractors to assist in identifying illicit discharges and connections during their daily activities.

Comment [CMP85]: Same change recommended throughout permit

(a) Visual Inspections for illegal discharges and connections must be conducted during routine maintenance of all MS4 facilities.

(b) Copermittee~~Municipal~~ staff and contractors conducting non-MS4 field operations must be trained to report suspected illegal discharges and connections to proper Copermittee~~municipal~~ staff.

b. MAINTAIN MS4 MAP

Each Copermittee must maintain an updated map of its entire MS4 and the corresponding drainage areas within its jurisdiction. The use of GIS is encouraged.~~required.~~ The accuracy of the MS4 map must be confirmed during dry weather field screening and analytical monitoring and must be updated at least annually. The GIS layers of the MS4 map must be submitted with the updated Jurisdictional Runoff Management Plan within 365 days after adoption of this Order.

c. FACILITATE PUBLIC REPORTING OF ILLICIT DISCHARGES AND CONNECTIONS - PUBLIC HOTLINE

Each Copermittee must individually and/or jointly promote, publicize and facilitate public reporting of illicit discharges or water quality impacts associated with discharges into or from MS4s. Each Copermittee must facilitate public reporting through development and operation of a public hotline. Public hotlines can be Copermittee-specific or shared by Copermittees. All storm water hotlines must be capable of receiving reports in both English and Spanish 24 hours per day and seven days per week. All reported incidents, and how each was resolved, shall be summarized in each Copermittee's ~~Individual~~ Annual Report.

Comment [U86]: Terminology?

d. DRY WEATHER FIELD SCREENING AND ANALYTICAL MONITORING

Each Copermittee must conduct dry weather field screening and analytical monitoring of MS4 outfalls and other portions of its MS4 within its jurisdiction to

detect illicit discharges and connections in accordance with Receiving Waters and MS4 Discharge Monitoring and Reporting Program No. R9-2010-0016 in Attachment E of this Order.

e. INVESTIGATION / INSPECTION AND FOLLOW-UP

Each Copermittee must implement procedures to investigate and inspect portions of their~~the~~ MS4 that, based on the results of field screening, analytical monitoring, or other appropriate information, indicate a reasonable potential of containing illicit discharges, illicit connections, or other sources of pollutants in non-storm water.

(1) Develop response criteria for data: Each Copermittee must develop, update, and use numeric criteria action levels (or other actions level criteria where appropriate) to determine when follow-up investigations will be performed in response to water quality monitoring. The criteria must include required non-storm water action levels (see Section C) and a consideration of 303(d)-listed waterbodies and environmentally sensitive areas (ESAs) as defined in Attachment C.

(2) Respond to data: Each Copermittee must investigate portions of the MS4 for which water quality data or conditions indicates a potential illegal discharge or connection.

(a) Obvious illicit discharges (i.e. color, odor, or significant exceedances of action levels) must be investigated immediately.

(b) Field screen data: Within two business days of receiving dry weather field screening results that exceed action levels, the applicable Copermittee~~Copermittees~~ must either initiate an investigation to identify the source of the discharge or document the rationale for why the discharge does not pose a threat to water quality and does not need further investigation. This documentation shall be included in the Annual Report.

(c) Analytical data: Within five business days of receiving quality controlled analytical laboratory results that exceed action levels, the applicable Copermittee~~Copermittees~~ must either initiate an investigation to identify the source of the discharge or document the rationale for why the discharge does not pose a threat to water quality and does not need further investigation. This documentation shall be included in the Annual Report.

(3) Respond to notifications: Each Copermittee must respond to and resolve each reported incident (e.g., public hotline, staff notification, etc.) in a timely manner. Criteria may be developed to assess the validity of, and prioritize the response to, each report.

f. ELIMINATION OF ILLICIT DISCHARGES AND CONNECTIONS

Each Copermittee must take immediate action to initiate steps necessary to eliminate all detected illicit discharges, illicit discharge sources, and illicit connections after the source is found.~~detection.~~ Elimination measures may include an escalating series of enforcement actions for those illicit discharges that are not a serious threat to public health or the environment. Illicit discharges that pose a serious threat to the public's health or the environment must be eliminated immediately. The Copermittees may engage San Diego Regional Board staff as necessary to assist in resolving illicit discharges and connections.

g. ENFORCE ORDINANCES

Each Copermittee must implement and enforce its ordinances, orders, or other legal authority to prevent illicit discharges and connections to its MS4 and to eliminate detected illicit discharges and connections to its~~it's~~ MS4.

h. PREVENT AND RESPOND TO SEWAGE SPILLS (INCLUDING FROM PRIVATE LATERALS AND FAILING SEPTIC SYSTEMS) AND OTHER SPILLS

(1) Each Copermittee must implement management measures and procedures to prevent, respond to, contain and clean up all sewage (see below) and other spills that may discharge into its MS4 from any source (including private laterals and failing septic systems). Copermittees must coordinate with spill response teams to prevent entry of spills into the MS4 and contamination of surface water, ground water and soil to the MEP. Each Copermittee must coordinate spill prevention, containment and response activities throughout all appropriate Copermittee departments, programs and agencies so that maximum water quality protection is available at all times.

(2) Each Copermittee must develop and implement a mechanism whereby it is notified of all sewage spills affecting their jurisdiction. ~~from private laterals and failing septic systems into its MS4. Each Copermittee must implement management measures and procedures to prevent, respond to, and coordinate a response to contain and clean up sewage from any such notification.~~

i. EDUCATION AND TRAINING

Each Copermittee must individually and/or jointly implement educational activities, public information activities, and other appropriate activities to facilitate the proper management and disposal of used oil and toxic materials.

Comment [CP87]: From 2004 SMR Permit

Comment [CMP88]: Clarifying

Comment [CMP89]: This section seems to belong before section (1).

Comment [CP90]: This is repetitive of F.4.h.(1)

Comment [CP91]: This section will be migrated into the consolidated training and education sections. (F.6 and F.7)

5. PUBLIC PARTICIPATION COMPONENT

Each Copermittee must incorporate a mechanism for public participation in the updating, development, and implementation of the Jurisdictional Runoff Management Program.

6. EDUCATION AND OUTREACH

G. WATERSHED RUNOFF MANAGEMENT PROGRAM

Each Copermittee must collaborate with other Copermittees to identify, address, and mitigate the highest priority water quality issues/pollutants in the Upper Santa Margarita Watershed.

1. Watershed Water Quality Workplan (Watershed Workplan)

The Watershed Workplan shall describe the Copermittees' development and implementation of a collective watershed strategy to assess and prioritize the water quality problems within the watershed's receiving waters, identify and model sources of the highest priority water quality problem(s), develop a watershed-wide BMP implementation strategy to abate highest priority water quality problems, and a monitoring strategy to evaluate BMP effectiveness and changing water quality prioritization in the WMA.

The work plan shall, at a minimum:

a. Characterize the receiving water quality in the WMA. Characterization shall include use of regularly collected water quality data, reports, monitoring and analysis generated in accordance with the requirements of the Receiving Waters Monitoring and Reporting Program, as well as applicable information available from other public and private organizations.

b. Identify the highest priority water quality problem(s), in terms of constituents by location, in the WMA's receiving waters. Identified water quality problem(s) shall, at a minimum, give consideration to; TMDLs, receiving waters listed on the CWA section 303(d) list, waters with persistent violations of water quality standards, toxicity, or impacts to beneficial uses, and other pertinent conditions.

c. Identify the sources of the highest water quality problem(s) within the WMA. Efforts to determine such sources shall include, but not be limited to: use of information from the construction, industrial/commercial, municipal, and residential source identification programs required within the Jurisdictional Runoff Program (JRMP) of this Order; specific actions to model pollutant transport to

receiving waters for the sake of identifying the source(s) point(s) of origin; water quality monitoring data collected as part of the Receiving Water Monitoring and Reporting Program required by this Order, and additional focused water quality monitoring to identify specific sources within the watershed.

d. Develop a watershed BMP implementation strategy to attain receiving water quality objectives in the identified highest priority water quality problem(s). The BMP implementation strategy shall include a schedule for implementation of the BMP projects to abate specific receiving water quality problems. BMPs not contributing to measured pollutant reductions or improvements to water quality must be removed and replaced with alternative BMPs. Identified watershed water quality problems may be the result of jurisdictional discharges that will need to be addressed with BMPs applied in a specific jurisdiction in order to generate a benefit to the watershed.

e. Develop a strategy to model and monitor improvements in receiving water quality directly resulting from implementation of the BMPs described in the Watershed Workplan. The modeling and monitoring strategy shall generate the necessary data to report on the measured pollutant reduction that results from proper BMP implementation. Monitoring shall, at a minimum, be conducted in the receiving water to demonstrate reduction in pollutant concentrations and progression towards attainment of receiving water quality objectives.

f. Establish a schedule for development and implementation of the Watershed strategy outlined in the Workplan. The schedule shall, at a minimum, include forecasted dates of planned actions to address Provisions E.2(a) through E.2(e) and dates for watershed review meetings through the remaining portion of this Permit cycle. Annual watershed workplan review meetings must be open to the public and appropriately publically noticed such that interested parties may come and provide comments on the watershed program.

2. **Watershed Workplan Implementation –** Watershed Copermittee's shall begin implementing the Watershed Workplan within 60-days of acceptance by the San Diego Water Board Executive Officer. If within 30 days of submittal, the San Diego Water Board has not taken an action, the Workplan shall be deemed acceptable.

3. **Copermittee Collaboration** – Watershed Copermittees shall collaborate to develop and implement the Watershed Workplan. Watershed Copermittee collaboration shall include frequent regularly scheduled meetings. The Copermittees shall seek to obtain any interagency agreements, or other efforts, with non-Copermittee owners of the MS4 (such as Caltrans, Native American tribes, and school districts) to control the contribution of pollutants from one portion of the shared MS4 to another portion of the shared MS4. The Copermittees shall, as appropriate, participate in watershed management efforts to address water quality issues within the entire Santa Margarita Watershed (such as the County of San Diego and United States Marine Corps Camp Pendleton).

4. **Public Participation –** Watershed Copermittees shall implement a watershed-specific public participation mechanism within each watershed. A required component of the watershed-specific public participation shall be a minimum 30-day public review of the Watershed Workplan prior to submittal for acceptance by the San Diego Water Board Execuive Officer. Opportunity for the public to review and comment on the Watershed Workplan must occur before the workplan is implemented.

5. **Watershed Workplan Review and Updates –** Watershed Copermittees shall review and update the Watershed Workplan annually to identify needed changes to the prioritized water quality problem(s) listed in the workplan. All updates to the Watershed Workplan shall be presented during an Annual Watershed Review Meeting. Annual Watershed Review Meetings shall occur once every calendar year and be conducted by the Watershed Copermittees. Annual Watershed Review Meetings shall be open to the public and adequately noticed. Individual Watershed Copermittees shall also review and modify their jurisdictional programs and JRMP Annual Reports, as necessary, so that they are consistent with the updated Watershed Workplan.

6. **Pyrethroid Toxicity Reduction Evaluation –** The Watershed Copermittees shall incorporate the pyrethroid pollutant reduction program[18] into the Watershed Workplan. The pyrethroid pollutant reduction program shall include the following elements:

   a. Pursue state and federal regulatory change.
   b. Implement a set of source controls targeted specifically at urban pesticide use,
   c. Through the annual reporting process, monitor the implementation of those controls, assess effectiveness, and identify sources or areas where additional effort is needed,
   d. Implement additional controls as needed,
   e. Continue to monitor implementation, as well as conditions within the target receiving waters, assess effectiveness, and re-evaluate control programs.

H. FISCAL ANALYSIS

1. Secure Resources: Each Copermittee must secure the resources necessary to meet all requirements of this Order.

2. Annual Analysis: Each Copermittee must conduct an annual fiscal analysis of the necessary capital and operation and maintenance expenditures necessary to accomplish the activities of the programs required by this Order. The analysis must

[18] The pyrethroid pollutant reduction program is described in the "Riverside County – Santa Margarita Region Pyrethroid Source Identification Toxicity Reduction Evaluaion, Final Phase II Report", January 2009 by MACTEC.

include estimated expenditures for the reporting period, the preceding period, and the next reporting period.

a. Each analysis must include a description of the source of funds that are proposed to meet the necessary expenditures, including legal restrictions on the use of such funds.
b. Each analysis must include a narrative description of circumstances resulting in a 25 percent or greater annual change for any budget line items.

3. Annual Reporting: Each Copermittee must submit its annual fiscal analysis with the annual JRMP report.

I. TOTAL MAXIMUM DAILY LOADS

The waste load allocations (WLAs) of fully approved and adopted TMDLs are incorporated as Water Quality Based Effluent Limitations on a pollutant by pollutant, watershed by watershed basis. Early TMDL requirements, including monitoring, may be required and inserted into this Order pursuant to Finding E.10

J. PROGRAM EFFECTIVENESS ASSESSMENT AND REPORTING

1. Jurisdictional Program Effectiveness Assessments

a. OBJECTIVES OF EFFECTIVENESS ASSESSMENTS

Beginning with the Annual Report due in 2012, each Copermittee must annually assess the effectiveness of its Jurisdictional Runoff Management Program (JRMP) implementation at meeting the following objectives:

(1) Objective for 303(d) Waterbodies: Reduce storm water pollutant loadings.

(a) Each Copermittee must establish annual assessment measures or methods specifically for reducing discharges of storm water pollutants from its MS4 into each downstream 303(d)-listed water body for which that waterbody is impaired. Assessment measures must be developed for each of the six outcome levels described by CASQA.[19]
(b) Each Copermittee must annually conduct each established assessment measure or method and evaluate the outcome. Each outcome must then be used to assess the effectiveness of implemented management measures toward reducing MS4 discharges of the specific pollutants causing or contributing to conditions of impairment.

[19] Effectiveness assessment outcome levels as defined by CASQA are defined in Attachment C of this Order. See "*Municipal Stormwater Program Effectiveness Assessment Guidance"* (CASQA, May 2007) for guidance for assessing program activities at the various outcome levels.

(c) The assessment measures must target both water quality outcomes and the results of municipal enforcement activities.

(2) Objective for Environmentally-Sensitive Areas: Prevent storm water MS4 discharges from causing or contributing to conditions of pollution, nuisance, or contamination.

(a) Each Copermittee must establish annual measures or methods specifically for assessing the effectiveness of its management measures for protecting downstream ESAs from adverse effects caused by discharges from its MS4. Assessment measures must be developed for each of the six outcome levels described by CASQA.
(b) Each Copermittee must annually implement each established assessment measure or method and evaluate the outcome. Each outcome must be used to assess the effectiveness of implemented management measures toward reducing MS4 discharges of the specific pollutants causing or contributing to conditions of impairment.
(c) The assessment measures must target both water quality outcomes and the results of municipal enforcement activities.

(3) Objectives for major program component outcomes: Determined by Each Copermittee.

(a) Each Copermittee must annually develop objectives for each program component in Section F and the overall JRMP. The objectives must be established as appropriate in response to program implementation and evaluation of water quality and management practices.
(b) Assessment approaches for program implementation must include a mix of specific activities, general program components, and water quality data.
(c) The assessment measures must target both water quality outcomes and the results of municipal enforcement activities.

(4) Objectives for actions taken to protect receiving water limitations in accordance with this Order.

(a) Each Copermittee must develop and implement an effectiveness assessment strategy for each measure conducted in response to a determination to implement the “iterative” approach to prevent or reduce any storm water pollutants that are causing or contributing to the exceedance of water quality standards as outlined in this Order

b. ASSESSMENT REVIEW

(1) Based on the results of the effectiveness assessments, each Copermittee must annually review its jurisdictional activities and BMPs to identify modifications and improvements needed to maximize JRMP effectiveness, as

necessary to achieve compliance with this Order.

(2) Each Copermittee must develop and annually conduct an Integrated Assessment[20] of each effectiveness assessment objective above (Section J.1.a) and the overall JRMP using a combination of outcomes as appropriate to the objectives.[21]

2. Program Modifications

a. Each Copermittee must develop and implement a plan and schedule to address program modifications and improvements identified during annual effectiveness assessments.

b. Jurisdictional activities/BMPs that are ineffective or less effective than other comparable jurisdictional activities/BMPs must be replaced or improved upon by implementation of more effective jurisdictional activities/BMPs. Where monitoring data exhibits persistent water quality problems that are caused or contributed to by MS4 discharges, jurisdictional activities or BMPs applicable to the water quality problems must be modified and improved to correct the water quality problems.

3. Effectiveness Assessment and Program Response Reporting

a. Each Copermittee must include a description and summary of its annual and long-term effectiveness assessments within each Annual Report. Beginning with the Annual Report due in 2011, the Program Effectiveness reporting must include:

(1) 303(d) waterbodies: A description and results of the annual assessment measures or methods specifically for reducing discharges of storm water pollutants from its MS4 into each 303(d)-listed waterbody;
(2) ESAs: A description and results of the annual assessment measures or methods specifically for managing discharges of pollutants from its MS4 into each downstream ESA;
(3) Other Program Components: A description of the objectives and corresponding assessment measures and results used to evaluate the effectiveness of each general program component. The results must include findings from both program implementation and water quality assessment where applicable;
(4) Receiving water protection: A description and results of the annual assessment measures or methods employed specifically for actions taken to protect receiving water limitations in accordance with Section A.3 of this

[20] Integrated assessment is defined in Attachment C. It is the process of evaluating whether program implementation is resulting in the protection or improvement of water quality. Integrated assessment combines assessments of program implementation and water quality.
[21] Not all program components need be addressed at each of the six outcome levels.

Order;

(5) A description of the steps taken to use dry-weather and wet-weather monitoring data to assess the effectiveness of the programs for 303(d) impairments, ESAs, and general program components;

(6) A description of activities conducted in response to investigations of illicit discharge and illicit connection activities, including how each investigation was resolved and the pollutant(s) involved;

(7) Responses to effectiveness assessments: A description of each program modification, made in response to the results of effectiveness assessments conducted pursuant to Section J.1.a, and the basis for determining (pursuant to Section J.2.b.) that each modified activity and/or BMP represents an improvement with respect to reducing the discharge of storm water pollutants from the MS4.

(8) A description of the steps that will be taken to improve the Copermittee's ability to assess program effectiveness using measurable targeted outcomes, assessment measures, assessment methods, and outcome levels 1-6. Include a time schedule for when improvement will occur; and

(9) A description of the steps that will be taken to identify aspects of the Copermittee's Jurisdictional Runoff Management Program that will be changed based on the results of the effectiveness assessment.

4. Work Plan

Each Copermittee must develop a work plan to address their high priority water quality problems in an iterative manner over the life of the permit. The goal of the work plan is to demonstrate a responsive and adaptive approach for the judicious and effective use of available resources to attack the highest priority problems. The work plan shall include, at a minimum, the following:

a. The problems and priorities identified during the assessment;
b. A list of priority pollutants and known or suspected sources;
c. A brief description of the strategy employed to reduce, eliminate or mitigate the negative impacts;
d. A description and schedule for new and/or modified BMPs. The schedule is to include dates for significant milestones;
e. A description of how the selected activities will address an identified high priority problem. This will include a description of the expected effectiveness and benefits of the new and/or modified BMPs;
f. A description of implementation effectiveness metrics;
g. A description of how efficacy results will be used to modify priorities and implementation; and
h. A review of past activities implemented, progress in meeting water quality standards, and planned program adjustments.

The Copermittee shall submit the work plan to the San Diego Water Board within 365 days of adoption of the Order. Annual updates are also required and shall be included

with the annual JRMP report. The San Diego Water Board will assess the work plan for compliance with the specific and overall requirements of the Order. To increase effectiveness and efficiencies, Copermittees may combine their implementation efforts and work plans within a hydrologic area or sub area. Each Copermittee, however, maintains individual responsibility for developing and implementing an acceptable work plan.

K. REPORTING

The Copermittees may propose alternate reporting criteria and schedules, as part of their updated JRMP, for the Executive Officer's acceptance. The Copermittees shall submit the updated JRMP within 365 days after adoption of this Order.

1. Runoff Management Plans

a. JURISDICTIONAL RUNOFF MANAGEMENT PLANS

(1) Copermittees: The written account of the overall program to be conducted by each Copermittee to meet the jurisdictional requirements of section F of this Order is referred to as the Jurisdictional Runoff Management Plan (JRMP). Each Copermittee must revise and update its existing JRMP so that it describes all activities the Copermittee will undertake to implement the requirements of this Order. Each Copermittee must submit its updated and revised JRMP to the San Diego Water Board 365 days after adoption of this Order.

(2) At a minimum, each Copermittee's JRMP must be updated and revised to demonstrate compliance with each applicable section of this Order.

b. WATERSHED WORKPLANS

(1) Copermittees: The written account of the program conducted by group of Copermittees is referred to as the Watershed Workplan. Copermittees shall be responsible for updating and revising the Watershed Workplan. Each Watershed Workplan shall be updated and revised to describe any changes in water quality problems or priorities, and any necessary change to actions Copermittees will take to implement jurisdictional or watershed BMPs to address those identified. The Copermittees shall assemble and submit the Watershed Workplan to the San Diego Water Board no later than 365 days after adoption of this Order, and shall be prepared to implement the workplan within 60 days of the San Diego Water Board Executive Officer deeming the workplan acceptable.

(2) Each Watershed Workplan shall, at a minimum, include:

(a) An updated watershed map.

(b) Identification and description of all applicable water quality data, reports, analyses, and other information to be used to assess receiving water quality.
(c) Assessment and analysis of the watershed's water quality data, reports, analyses, and other information, used during identification and prioritization of the watershed's water quality problems.
(d) A prioritized list of water quality problems within the WMA including rationale explaining the method/logic used to determine prioritization.
(e) Identification of the likely sources, pollutant discharges, and/or other factors causing the high priority water quality problems within the WMA.
(f) A description of the strategy to be used to guide Copermittee implementation of BMPs either jurisdictionally or on a watershed-wide basis to abate the highest water quality problems
(g) A list of criteria used to evaluate BMP effectiveness and how it was applied.
(h) A GIS map of BMPs implemented and BMPs scheduled for implementation.
(i) A description of the public participation mechanisms to be used and the parties anticipated to be involved during the development and implementation of the Watershed Workplan.
(j) A description of Copermittee collaboration to accomplish development of the Watershed Workplan, including a schedule for Watershed meetings.
(k) A description of how TMDLs and 303(d)-listed water bodies were considered during prioritization of watershed water quality problems
(l) A description of the strategy to model and monitor improvement in receiving water quality directly resulting from implementation of the BMPs described in the Watershed Workplan.
(m) A scheduled annual Watershed Workplan Review Meeting once every calendar year. This meeting shall be open to the public.

2. Other Required Reports and Plans

a. SSMP UPDATES

(1) Copermittees must submit their updated model SSMP in accordance with the applicable requirements of section F.1 with the JRMP <u>two years after adoption</u> of this Order.
(2) Within 180 days of determination that the Model SSMP is in compliance with this Permit's provisions, each Copermittee must update their own local SSMP, and amended ordinances consistent with the model SSMP, and shall submit both (local SSMP and amended ordinances) to the San Diego Water Board.
(3) For SSMP-related requirements of Section F.1 with subsequent implementation due dates, updated SSMPs must be submitted with the JRMP annual report covering the applicable reporting period.

b. REPORT OF WASTE DISCHARGE

The Copermittees must submit to the San Diego Water Board, no later than 210 days in advance of the expiration date of this Order, a Report of Waste Discharge (ROWD) as an application for issuance of new waste discharge requirements. The fourth annual report for this Order may supplement the ROWD, provided it contains the minimum information below.

At a minimum, the ROWD must include the following: (1) Proposed changes to the Copermittees' runoff management programs; (2) Proposed changes to monitoring programs; (3) Justification for proposed changes; (4) Name and mailing addresses of the Copermittees; (5) Names and titles of primary contacts of the Copermittees; and (6) Any other information necessary for the reissuance of this Order.

3. Annual Reports

a. JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM (JRMP) ANNUAL REPORTS

(1) Copermittees: Each Copermittee must generate individual JRMP Annual Reports which cover implementation of its jurisdictional activities during the past annual reporting period. Each Annual Report must verify and document compliance with this Order as directed in this section. Each Copermittee must retain records through 2016, available for review, that document compliance with each requirement of this Order. The reporting period for these annual reports must be the previous fiscal year.

(2) Each Copermittee must submit their JRMP Annual Reports to the San Diego Water Board by September 30 of each year, beginning on September 30, 2011.

(3) Each JRMP Annual Report must contain, at a minimum, the following information:

(a) Information required to be reported annually in Section H (Fiscal Analysis) of this Order;
(b) Information required to be reported annually in Section J (Program Effectiveness) of this Order;
(c) The completed Reporting Checklist found in Attachment D, and
(d) Information for each program component by watershed as described in the following Table 9:

Table 9. Annual Reporting Requirements

Program Component	Reporting Requirement
New Development	1. Updated relevant sections of the General Plan and environmental review process and a description of planned updates within the next annual reporting period, if applicable
	2. Revisions to the local SSMP, including where applicable: (a) Identification and summary of where the SSMP fails to meet the requirements of this Order; (b) Updated procedures for identifying pollutants of concern for each Priority Development Project; (c) Updated treatment BMP ranking matrix; and (d) Updated site design and treatment control BMP design standards;
	3. Verification that site design, source control, and treatment BMPs were required on all applicable Priority Development Projects;
	4. Description of the application of LID and site design BMPs in the planning and approval process;
	5. Description of projects subject to the local waiver provision for numeric sizing of treatment control BMP requirements;
	6. Description and summary of the LID site design BMP substitution program, if applicable;
	7. Description and summary of the process to verify compliance with SSMP requirements;
	8. Updates to the BMPs that are listed in the local SSMP as options for treatment control;
	9. Description of the treatment control maintenance tracking process and verification that the requirements of this Order were met during the reporting period; (a) Updated watershed-based database of approved treatment control BMPs and treatment control BMP maintenance within its jurisdiction, including updates to the list of high-priority treatment BMPs;
	10. Description of the process for identifying and evaluating hydrologic conditions of concern and requiring a suite of management measures within all Priority Development Projects to protect downstream beneficial uses and prevent adverse physical changes to downstream stream channels;
	11. Description of enforcement activities applicable to the new development and redevelopment component and a summary of the effectiveness of those activities;
Construction	1. Updated relevant ordinances and description of planned ordinance updates within the next annual reporting period, if applicable;
	2. A description of procedures used for identifying priorities for inspecting sites and enforcing control measures which consider the nature of the construction activity, topography, and the characteristics of soils and receiving water quality;

Program Component	Reporting Requirement
	3. Designated minimum and enhanced BMPs;
	4. Summary of the inspection program, including the following information: (a) Number and date of inspections conducted at each facility, including the facility address; (b) Number of facilities lacking adequate BMPs; (c) The BMP violations identified during the inspection by facility; (d) Number, date, and types of enforcement actions by facility; (e) Narrative description of inspection findings and follow-up activities for each facility;
Municipal	1. Updated source inventory;
	2. Changes to the designated municipal BMPs;
	3. Descriptions of procedures to assure that flood management projects assess the impacts on the water quality of receiving water bodies;
	4. Summary and assessment of BMPs implemented at retrofitted flood control structures, including: (a) List of projects with BMP retrofits; and (b) List and description of structures retrofitted without BMPs;
	5. Description and assessment of the municipal structural treatment control operations and maintenance activities, including: (a) Number of inspections and types of facilities; and (b) Summary of findings;
	6. Description of the municipal areas/facilities operations and maintenance activities, including: (a) Number and types of facilities maintained; (b) Amount of material removed and how that material was disposed; and (c) List of facilities planned for bi-annual inspections and the justification;
	7. Description of the municipal areas/programs inspection activities, including: (a) Number and date of inspections conducted at each facility; (b) Number of facilities lacking adequate BMPs; (c) The BMP violations identified during the inspection by facility; (d) Number, date and types of enforcement actions by facility; (e) Narrative description of inspection findings and follow-up activities for each facility;
	8. Description of activities implemented to address sewage infiltration into the MS4;
Commercial /	1. Annual inventory of commercial / industrial sources;

Program Component	Reporting Requirement
Industrial	2. Summary of the inspection program, including the following information: (a) Number and date of inspections conducted at each facility including the facility address; (b) Number of facilities lacking adequate BMPs; (c) The BMP violations identified during the inspection by facility; (d) Number, date, and types of enforcement actions by facility; (e) Narrative description of inspection findings and follow-up activities for each facility;
	3. Changes to designated minimum and enhanced BMPs;
	4. A list of industrial sites, including each name, address, and SIC code, that the Copermittee suspects may require coverage under the General Industrial Permit, but has not submitted an NOI;
Residential	1. Updated minimum BMPs required for residential areas and activities;
	2. Quantification and summary of applicable runoff and storm water enforcement actions within residential areas and activities;
	3. Description of efforts to manage runoff and storm water pollution in common interest areas;
Retrofitting Existing Development	1. Updated inventory and prioritization of existing developments identified as candidates for retrofitting.
	2. Description of efforts to retrofit existing developments during the reporting year.
	3. Description of efforts taken to cooperate with private landowners to retrofit existing development.
	4. A list of retrofit projects that have been implemented, including site location, a description of the retrofit project, pollutants expected to be treated, and the tributary acreage of runoff that will be treated.
	5. A list of regional mitigation projects that have been implemented, including site location, a description of the regional mitigation project, pollutants expected to be treated, and the tributary acreage of runoff that will be treated.
	6. Any proposed retrofit or regional mitigation projects and timelines for future implementation.
	7. Any proposed changes to the Copermittee's overall retrofitting program.
Illicit Discharge Detection and Elimination	1. Changes to the legal authority to implement Illicit Discharge Detection and Elimination activities;
	2. Changes to the established investigation procedures;
	3. Public reporting mechanisms, including phone numbers and web pages;
	4. All data and assessments from the Dry Weather Effluent Analytical Monitoring activities;
	5. Response criteria developed for water quality data and notifications;

Program Component	Reporting Requirement
	6. Summaries of illicit discharges (including spills and water quality data events) and how each significant case was resolved;
	7. A description of instances when field screening and analytical data exceeded action levels, including those instances for which no investigation was conducted;
	8. A description of follow-up and enforcement actions taken in response to investigations of illicit discharges and a description of the effectiveness of those measures;
	9. A description of controls to prevent infiltration of seepage from municipal sanitary sewers to municipal separate storm sewer systems;
Work Plan	Priorities, strategy, implementation schedule and effectiveness evaluation;

(4) Each JRMP Annual Report must also include the following information regarding non-storm water discharges (see Section B.2. of this Order):

(a) Identification of non-storm water discharge categories identified as a source of pollutants to waters of the U.S;
(b) A description of ordinances, orders, or similar means to prohibit non-storm water discharge categories identified under section B.2 above ;
(c) Identification of any control measures to be required and implemented for non-storm water discharge categories identified as needing controls by the San Diego Water Board; and
(d) A description of a program to address pollutants from non-emergency fire fighting flows identified by the Copermittee to be significant sources of pollutants.

4. Interim Reporting Requirements

For the July 2010-June 2011 reporting period, the Jurisdictional RMP must be submitted on January 31, 2012. Each Jurisdictional RMP Annual Report submitted for this reporting period must, at a minimum, include comprehensive descriptions of all activities conducted to fully implement the Copermittees' Jurisdictional RMP documents, as those documents were developed to comply with the requirements of Order No. 2004-001.

5. Universal Reporting Requirements

All submittals must include an executive summary, introduction, conclusion, recommendations, and signed certified statement. Each Copermittee must submit a signed certified statement covering its responsibilities for each applicable submittal. The Principal Copermittee must submit a signed certified statement covering its responsibilities for each applicable submittal and the sections of the submittals for which it is responsible.

L. MODIFICATION OF PROGRAMS

Modifications of Jurisdictional Runoff Management Programs and/or Watershed Runoff Management Programs may be initiated by the Executive Officer of the San Diego Water Board or by the Copermittees. Requests by Copermittees must be made to the Executive Officer, and must be submitted during the annual review process. Requests for modifications should be incorporated, as appropriate, into the Annual Reports or other deliverables required or allowed under this Order.

1. Minor Modifications: Minor modifications to Jurisdictional Runoff Management Programs, and/or Watershed Runoff Management Programs, may be accepted by the Executive Officer where the Executive Officer finds the proposed modification complies with all discharge prohibitions, receiving water limitations, and other requirements of this Order.

2. Modifications Requiring an Amendment to this Order: Proposed modifications that are not minor require amendment of this Order in accordance with this Order's rules, policies, and procedures.

M. PRINCIPAL COPERMITTEE RESPONSIBILITIES

Within 180 days of adoption of this Order, the Copermittees must designate the Principal Copermittee and notify the San Diego Water Board of the name of the Principal Copermittee. The Principal Copermittee must, at a minimum:

1. Serve as liaison between the Copermittees and the San Diego Water Board on general permit issues, and when necessary and appropriate, represent the Copermittees before the San Diego Water Board.
2. Coordinate permit activities among the Copermittees and facilitate collaboration on the development and implementation of programs required under this Order.
3. Produce and submit documents and reports as required by section K of this Order and Receiving Waters and MS4 Discharge Monitoring and Reporting Program No. R9-2010-0016 in Attachment E of this Order.

N. RECEIVING WATERS AND MS4 DISCHARGE MONITORING AND REPORTING PROGRAM

Pursuant to CWC section 13267, the Copermittees must comply with all the requirements contained in Receiving Waters and MS4 Discharge Monitoring and Reporting Program No. R9-2010-0016 in Attachment E of this Order.

O. STANDARD PROVISIONS, REPORTING REQUIREMENTS, AND NOTIFICATIONS

1. Each Copermittee must comply with Standard Provisions, Reporting Requirements, and Notifications contained in Attachment B of this Order. This includes 24 hour/5 day reporting requirements for any instance of non-compliance with this Order as described in section 5.e of Attachment B.

2. All plans, reports and subsequent amendments submitted in compliance with this Order must be implemented immediately (or as otherwise specified). All submittals by Copermittees must be adequate to implement the requirements of this Order.

I, David W. Gibson, Executive Officer, do hereby certify the foregoing is a full, true, and correct copy of an Order adopted by the California Regional Water Quality Control Board, San Diego Region, on TBD, 2010.

_____

David W. Gibson
Executive Officer

From: "Uhley, Jason" <JUHLEY@rcflood.org>
To: "Uhley, Jason" <JUHLEY@rcflood.org>, Ben Neill <BNeill@waterboards.ca.gov>
CC: Bill Woolsey <wwoolsey@murrieta.org>, Mike Shetler <mshetler@rceo.org>, ...
Date: 6/2/2010 10:36 PM
Subject: RE: meeting Agenda and Handouts
Attachments: 2010-06-03_AGENDA (2).docx; 2010-05-26_Sign-in Sheet.pdf; F 1 d (1)-(3) (8)-(11)_draftFinal (2).docx; F 3 b - Commercial-Industrial_draftFinal (2).docx; 2010-06-03_Draft SMR Permit (2010 06-03) ju.doc

All,

Attached are five files:

* Agenda for this Thursday.
* Updated draft permit with comments and edits added for section F.3.b., and sections F.1.d.(1)-(3), (8)-(11) for discussion on Thursday.

* Sign-in Sheet from 5/26.
* Excerpts of section F.3.b., and
* Excerpts of sections F.1.d.(1)-(3), (8)-(11).

Please note that the new development excerpt also includes an excerpt from the glossary (redevelopment definition). The excerpts are to facilitate discussion at tomorrow's meeting. Handouts will be provided.

Also, Claudio asked me to let you know that based on our retrofit discussion last week we have taken a fresh look at the redlines previously provided for that section of the permit (F.3.d). In the attached updated draft permit we removed many of our previously suggested edits, and fine tuned a few where we believe we had general agreement in the meeting. With the understanding that the fact sheet will be amended to clarify that the inventory will be on a planning level, the suggested edits that remain are those that we feel are the minimum appropriate changes to the language.

My apologies for the delays.

Regards,

Jason Uhley
951.955.1273
951.522.1213 - cell (for use tomorrow if necessary).

-----Original Message-----
From: Uhley, Jason
Sent: Wednesday, June 02, 2010 4:55 PM
To: bneill@ca.waterboards.ca.us
Cc: Bill Woolsey; Mike Shetler; Chun, Arlene; Aldo Licitra; Ken Greenberg; Wes Ganter; Ben Neill; Chiara Clemente; Chad Loflen; David Barker; Wayne Chiu
Subject: Re: meeting tomorrow 10:00 am

All,

This is just a last minute confirmation regarding our meeting tomorrow. The short week and an unfortunate tragedy in the Extended

District family has put me behind schedule with regards to an agenda and handouts. They will follow this evening.

Regards,

Jason

Sent from my iPhone

>

Santa Margarita Watershed MS4 Permit

Meeting Date 5/26/10

Time 9 - 5

Location SDRWQCB

Name	Agency	Signature
David Gibson	SDRWQCB	
Jimmy Smith	SDRWQCB	
David Barker	SDRWQCB	for DTB
Chiara Clemente	SDRWQCB	
Ben Neill	SDRWQCB	
Wayne Chiu	SDRWQCB	
Chad Loflen	SDRWQCB	
Jason Uhley	RCFC&WCD	
Claudio Padres	RCFC&WCD	
Arlene Chun	RCFC&WCD	
Mike Shetler	County of Riverside	
Alex Gann	County of Riverside	
Aldo Licitra	City of Temecula	Aldo Licitra
Bill Woolsey	City of Murrieta	Bill Woolsey
Don Allison	City of Menifee	
Tim D'Zmura	City of Wildomar	
WARD MAXWELL	COUNTY OF RIV.	
STEVE HORN	COUNTY OF RIV	
Chandra Thomas	Carney	
Daniel Hoot	RBF	
Scott Taylor	"	

AGENDA

Santa Margarita Region
MS4 Permit Meeting

10:00a.m. – 4:00 p.m. June 3rd, 2010
Location: City of Temecula

1. PROCESS / HOUSEKEEPING

2. TODAY'S TOPICS

   i. F.3.b. (Commercial/Industrial)

   ii. F.1.d.(1)-(3), (8)-(11)

d. STANDARD STORM WATER MITIGATION PLANS (SSMPS) – APPROVAL PROCESS CRITERIA AND REQUIREMENTS FOR PRIORITY DEVELOPMENT PROJECTS

Within 365 days of adoption of this Order, the Copermittees must submit an updated ~~model~~ SSMP (referred to by the Copermittees as a Water Quality Management Plan, or 'WQMP'), to the San Diego Water Board's Executive Officer for a 30 day public review and comment period. The San Diego Water Board's Executive Officer has the discretion to determine the necessity of a public hearing. Within 180 days of determination that the ~~Model~~ SSMP is in compliance with this Permit's provisions, each Copermittee must ~~update their own local SSMP, and~~ amend~~ed~~ their ordinances consistent with the ~~model~~ SSMP and begin implementation of the updated SSMP. Any updated ordinances, and shall be submitted ~~submit both (local SSMP and amended ordinances)~~ to the San Diego Water Board with the annual report. The ~~model~~ SSMP must meet the requirements of section F.1.d of this Order to (1) reduce Priority Development Project discharges of storm water pollutants from the MS4 to the MEP, and (2) prevent Priority Development Project runoff discharges from the MS4 from causing or contributing to a violation of water quality standards.[1]

(1) Definition of Priority Development Project (PDP):

Priority Development Projects are:

(a) All new Development Projects that fall under the project categories or locations listed in section F.1.d.(2), and

(b) Those redevelopment projects that create, add, or replace at least 5,000 square feet of impervious surfaces on an already developed site and the ~~existing development and/or~~ the redevelopment project falls under the project categories or locations listed in section F.1.d.(2). Where redevelopment results in an increase of less than fifty percent of the impervious surfaces of a previously existing development, and the existing development was not subject to SSMP requirements, the numeric sizing criteria discussed in section F.1.d.(6) applies only to the addition or replacement, and not to the entire development. Where redevelopment results in an increase of more than fifty

Comment [CP1]: Consistent with 2004 permit and the Santa Ana Permit.

[1] Updated SSMP and hydromodification requirements must apply to all priority projects or phases of priority projects which have not yet begun grading or construction activities at the time any updated SSMP or hydromodification requirement commences. If lawful prior approval of a project exists, whereby application of an updated SSMP or hydromodification requirement to the project is illegal, the updated SSMP or hydromodification requirement need not apply to the project. Updated Development Planning requirements set forth in Sections F.1. (a) through (h) of this Order must apply to all projects or phases of projects, unless, at the time any updated Development Planning requirement commences, the projects or project phases meet any one of the following conditions: (i) the project or phase has begun grading or construction activities; or (ii) a Copermittee determines that lawful prior approval rights for a project or project phase exist, whereby application of the Updated Development Planning requirement to the project is legally infeasible. Where feasible, the Permittees must utilize the SSMP and hydromodification update periods to ensure that projects undergoing approval processes include application of the updated SSMP and hydromodification requirements in their plans.

percent of the impervious surfaces of a previously existing development, the numeric sizing criteria applies to the entire development.

~~(2) One acre threshold: In addition to the Priority Development Project Categories identified in section F.1.d.(2), Priority Development Projects must also include all other pollutant-generating Development Projects that result in the disturbance of one acre or more of land within two years of adoption of this Order.~~[2]

~~(3)~~

(2) Priority Development Project Categories

Where a new Development Project feature, such as a parking lot, falls into a Priority Development Project Category, the entire project footprint is subject to SSMP requirements. Emergency public safety projects in any of the Priority Development Categories may be excluded if the delay caused due to the requirement for a SSMP compromises public safety, public health and/or environmental protection.

(a) New development projects that create 10,000 square feet or more of impervious surfaces (collectively over the entire project site) including commercial, industrial, residential subdivisions requiring a Final Map (i.e. detached single family home subdivisions, multi-family attached subdivisions, condominiums, apartments, etc.), mixed-use, and public projects. This category includes development projects on public or private land which fall under the planning and building authority of the Copermittees.

(b) Automotive repair shops. This category is defined as a facility that is categorized in any one of the following Standard Industrial Classification (SIC) codes: 5013, 5014, 5541, 7532-7534, or 7536-7539.

(c) Restaurants. This category is defined as a facility that sells prepared foods and drinks for consumption, including stationary lunch counters and refreshment stands selling prepared foods and drinks for immediate consumption (SIC code 5812), where the land area for development is greater than 5,000 square feet. Restaurants where land development is less than 5,000 square feet must meet all SSMP requirements except for structural treatment BMP and numeric sizing criteria requirement F.1.d.(6) and hydromodification requirement F.1.h.

(d) All hillside development greater than 5,000 square feet. This category is defined as any development which creates 5,000 square feet of impervious surface which is located in an area with known erosive soil

Comment [JEU2]: Keep requirements consistent with Santa Ana Permit. This also exceeds the SWRCB Precedential Order regarding SUSMPs.

Comment [CP3]: From the 2010 Santa Ana Permit to ensure that Emergency public safety projects that happen to meet the criteria of a PDP, are not delayed.
Example situations:
•Emergency housing erected in response to a major disaster such as an earthquake
•Emergency food cafeteria erected following a major disaster.
•Emergency command center that happens to need to be set up next to an ESA
•Etc…

Comment [CP4]: Consistent with the Santa Ana permit, these revisions clarify that this doesn't apply to individual custom home projects (unless they also qualify as hillside development).

Individual residential projects will still be required to implement the controls from F.1.c. for 'all' projects, however it is not appropriate to burden such insignificant projects with the full SSMP requirements.

[2] ~~Pollutant generating Development Projects are those projects that generate pollutants at levels greater than natural background levels.~~

conditions, where the development will grade on any natural slope that is twenty-five percent or greater.

(e) Environmentally Sensitive Areas (ESAs). All development located within or directly adjacent to or discharging directly to an ESA (where discharges from the development or redevelopment will enter receiving waters within the ESA), which either creates 2,500 square feet of impervious surface on a proposed project site or increases the area of imperviousness of a proposed project site to 10 percent or more of its naturally occurring condition. "Directly adjacent" means situated within 200 feet of the ESA. "Discharging directly to" means outflow from a drainage conveyance system that is composed entirely of flows from the subject development or redevelopment site, and not commingled with flows from adjacent lands.

(f) Impervious Parking lots 5,000 square feet or more ~~or with 15 or more parking spaces~~ and potentially exposed to runoff. Parking lot is defined as a land area or facility for the temporary parking or storage of motor vehicles used personally, for business, or for commerce.

(g) Street, roads, highways, and freeways[3]. This category includes any paved impervious surface that is 5,000 square feet or greater used for the transportation of automobiles, trucks, motorcycles, and other vehicles.

(h) Retail Gasoline Outlets (RGOs). This category includes RGOs that meet the following criteria: (a) 5,000 square feet or more or (b) a projected Average Daily Traffic (ADT) of 100 or more vehicles per day.

(3) Pollutants of Concern

As part of its local SSMP, each Copermittee must implement a~~n~~ ~~updated~~ procedure for identifying pollutants of concern for each Priority Development Project. The procedure must address, at a minimum: (1) Receiving water quality (including pollutants for which receiving waters are listed as impaired under CWA section 303(d)); (2) Land-use type of the Development Project and pollutants associated with that land use type; and (3) Pollutants expected to be present on site.

(8) Site Design and Treatment Control BMP Design Standards

As part of ~~its local~~the SSMP, each Copermittee must develop and require

Comment [CP5]: **'Impervious':** Clarify that if a project implements pervious parking lots (such as pervious concrete), that they would not be necessarily be subjected to a SSMP (unless triggered by another category). This will be a way to strongly encourage this type of LID source control.

'or with 15 or more': Consistent with 2004 SMR and 2010 Santa Ana. Make it simple and consistent, having dual checks here is adding unnecessary complexity.

Comment [CP6]: Footnote added to allow the Copermittees the option to develop road standards, that, upon approval by the EO, could be used in-lieu of a WQMP for each road project.

Comment [CP7]: There is no reason to have an *'updated'* procedure.

[3] The Copermittees may develop and submit to the Regional Board, a plan for addressing pollutant discharges from streets, roads, highways and freeways through implementation of revised standard roadway sections that utilize USEPA Green Streets guidance or similar. Upon approval of the plan by the Executive Officer, projects that incorporate those standards need not be categorized as a PDP unless also triggered by another category.

Priority Development Projects to ~~implement~~ comply with ~~sitting,~~ design, and maintenance criteria for each ~~site design~~LID and treatment control BMP listed in its local SSMP to ~~determine~~assist with determining~~determine~~ feasibility and applicability and so that implemented ~~site design~~LID and treatment control BMPs are constructed correctly and are effective at pollutant removal, runoff control, and vector minimization. LID techniques must be incorporated into the criteria for appropriate treatment control BMPs where feasible. Development of BMP design worksheets which can be used by project proponents is encouraged.

(9) Implementation Process

As part of its local SSMP, each Copermittee must implement a process to verify compliance with SSMP requirements. The process must identify at what point in the planning process Priority Development Projects will be required to meet SSMP requirements and at a minimum, the Priority Development Project must implement the required post-construction BMPs prior to occupancy and/or the intended use of any portion of that project. The process must also include identification of the roles and responsibilities of various municipal departments in implementing the SSMP requirements, as well as any other measures necessary for the implementation of SSMP requirements.

(10) Treatment BMP Review

(a) The Copermittees must review and update the BMPs that are listed in their local SSMPs as options for treatment control. At a minimum, the update must include removal of obsolete or ineffective BMPs and addition of LID BMPs that can be used for treatment, such as bioretention cells, bioretention swales, etc. The update must also add appropriate LID BMPs to any tables or discussions in the local SSMPs addressing pollutant removal efficiencies of treatment control BMPs. In addition, the update must include review and revision where necessary of treatment control BMP pollutant removal efficiencies.

(b) The update must incorporate findings from BMP effectiveness studies conducted by the Copermittees for projects funded wholly or in part by the State Board or Regional Boards.

(c) Each Copermittee must implement a mechanism for annually incorporating findings from local treatment BMP effectiveness studies (e.g., ones conducted by, or on-behalf of, public agencies in Riverside County) into SSMP project reviews and permitting

~~Where a development project, greater than 100 acres in total project size or smaller than 100 acres in size yet part of a larger common plan of development that is over 100 acres, has been prepared using~~

~~watershed and/or sub-watershed based water quality, hydrologic, and fluvial geomorphologic planning principles that implement regional LID BMPs in accordance with the sizing and location criteria of this Order and acceptable to the San Diego Water Board, such standards shall govern review of projects with respect to Section F.1 of this Order and shall be deemed to satisfy this Order's requirements for LID site design, buffer zone, infiltration and groundwater protection standards, source control, treatment control, and hydromodification control standards. Regional BMPs must clearly exhibit that they will not result in a net impact from pollutant loadings over and above the impact caused by capture and retention of the design storm. Regional BMPs may be used provided that the BMPs capture and retain the volume of runoff produced from the 24-hour 85th percentile storm event as defined in section F.1.d.(6)(a)(i) and that such controls are located upstream of receiving waters. Any volume that is not retained by the LID BMPs, up to the design capture volume, must be treated using LID biofiltration. Where regional LID implementation has been shown to be technically infeasible (per section F.1.d.7.b) any volume up to and including the design capture volume, not retained by LID BMPs, nor treated by LID biofiltration, must be treated using conventional treatment control BMPs in accordance with Section F.1.d.(6) and participation in the LID waiver program in Section F.1.d.(7).~~

Redevelopment - The creation, addition, and or replacement of impervious surface on an already developed site. Examples include the expansion of a building footprint, road widening, the addition to or replacement of a structure, and creation or addition of impervious surfaces. Replacement of impervious surfaces includes any activity that is not part of a routine maintenance activity where impervious material(s) are removed, exposing underlying soil during construction. Redevelopment does not include trenching and resurfacing associated with utility work; resurfacing existing roadways; activities conducted to maintain original line and grade, hydraulic capacity, original purpose of the facility or emergency redevelopment activity required to protect public health and safety; new sidewalk construction, pedestrian ramps, or bike lane on existing roads; and routine replacement of damaged pavement, such as pothole repair. Redevelopment also does not include retrofit projects implemented pursuant to Section F.3.d of this Order.

Comment [JEU8]: Transferred this definition from the Attachment D for use here.

Comment [JEU9]: Added from 2004 Permit and 2010 Santa Ana Permit.

Comment [JEU10]: Try not to penalize positive water quality outcomes.

b. COMMERCIAL / INDUSTRIAL

Each Copermittee must implement a commercial / industrial program that meets the requirements of this section~~,~~ to prevent~~s~~ illicit discharges into the MS4, reduce~~s~~ commercial / industrial discharges of storm water pollutants from the MS4 to the MEP, and prevent~~s~~ commercial / industrial discharges from the MS4 from causing or contributing to a violation of water quality standards.

(1) Source Identification

(a) Each Copermittee must maintain an updated watershed-based inventory of all industrial and commercial sites/sources within its jurisdiction (regardless of ownership) that could contribute a significant pollutant load to the MS4. The inventory must include the following minimum information for each industrial and commercial site/source: name; address; pollutants potentially generated by the site/source; and identification of whether the site/source is tributary to a Clean Water Act section 303(d) water body segment and generates pollutants for which the water body segment is impaired; and a narrative description including SIC codes which best reflects the principal products or services provided by each facility.

At a minimum, the ~~following~~ sites/sources listed below must be included in the inventory. Where the required inventory includes sites or information that was not required under Order R9-2004-001, the new required sites/information must be added to the Copermittee's inventory within X years. ~~:~~

(i) Commercial Sites/Sources:

[a] Automobile repair, maintenance, fueling, or cleaning;
[b] Airplane repair, maintenance, fueling, or cleaning;
[c] Boat repair, maintenance, fueling, or cleaning;
[d] Equipment repair, maintenance, fueling, or cleaning;
[e] Automobile and other vehicle body repair or painting;
[f] Mobile automobile or other vehicle washing;
[g] Automobile (or other vehicle) parking lots and storage facilities;
[h] Retail or wholesale fueling;
[i] Pest control services;
[j] Eating or drinking establishments, including such establishments within food markets;
[k] Mobile carpet, drape or furniture cleaning;
[l] Cement mixing or cutting;
[m] Masonry;
[n] Painting and coating;
[o] ~~Botanical or zoological gardens and exhibits~~;

Comment [CP1]: These have not been identified by the Copermittees as contributing a significant pollutant load to the MS4 and should be removed. This is an unnecessary new requirement.

[p] Landscaping;
[q] Nurseries and greenhouses;
[r] Golf courses, parks and other recreational areas/facilities;
[s] Cemeteries;
[t] Pool and fountain cleaning;
[u] ~~Marinas~~;
[v] Portable sanitary services;
[w] ~~Building material retailers and storage~~;
[x] ~~Animal facilities~~Boarding facilities and kennels;
[y] Mobile pet services;
[z] Power washing services; and
[aa] Other sites and sources with a history of un-authorized discharges to the MS4.

Comment [CP2]: Not applicable

Comment [CP3]: These have not been categorically identified by the Copermittees as contributing a significant pollutant load to the MS4 and should be removed. This is an unnecessary new requirement.

(ii) Industrial Sites/Sources:

[a] Industrial Facilities, as defined at 40 CFR § 122.26(b)(14), including those subject to the General Industrial Permit or other individual NPDES permit;
[b] Operating and closed landfills;
[c] Facilities subject to SARA Title III; and
[d] Hazardous waste treatment, disposal, storage and recovery facilities.

(iii) ESAs and 303(d) Listed Waterbodies: All other commercial or industrial sites/sources tributary to a CWA Section 303(d) impaired water body segment, where the site/source generates pollutants for which the water body segment is impaired. ~~All other commercial or industrial sites/sources within or directly adjacent to or discharging directly to coastal lagoons, the ocean, or other receiving waters within environmentally sensitive areas (as defined in Attachment C of this Order) as necessary to comply with this order.~~

Comment [JEU4]: This is a high cost-low return proposition. It is a significant effort and non-recoverable cost to determine which projects may be directly discharging or adjacent to receiving waters with ESAs. There are already over 30 categories of facilities that are required for inspection. There is also a process (via NALs and SALs) whereby the Permittees must develop action plans to address remaining water quality problems. Let the NAL/SAL system drive the decision making for adding facilities instead of this shot-gun approach which will net hair salons, retail stores, and other stores not likely to have any real impact on water quality.

(iv) All other commercial or industrial sites/sources that the Copermittee determines may contribute a significant pollutant load to the MS4.

(2) General BMP Implementation

(a) Pollution Prevention: Each Copermittee must require the use of pollution prevention methods by the inventoried industrial and commercial sites/sources.

(b) Designate / Update Minimum BMPs: Each Copermittee must designate a minimum set of BMPs for all inventoried industrial and commercial sites/sources. Where BMPs have already been designated, each Copermittee must review its existing BMPs for adequacy. The designated

minimum BMPs must be specific to facility types and pollutant-generating activities, as appropriate. The Copermittee may adjust the number and/or type of minimum BMPs that are required, provided that the goals of the Commercial/Industrial program are met.

(c) Designate Enhanced BMPs for ESAs and 303(d) Impairments: Each Copermittee must designate enhanced measures for inventoried industrial and commercial sites/sources tributary to CWA section 303(d) impaired water body segments (where a site/source generates pollutants for which the water body segment is impaired). Each Copermittee must also designate additional controls for industrial and commercial sites/sources within or directly adjacent to or discharging directly to ~~coastal lagoons, the ocean, or other~~ receiving waters within environmentally sensitive areas (as defined in Attachment C of this Order) as necessary to comply with this order. The Copermittee may adjust the number and/or type of enhanced BMPs that are required, provided that the goals of the Commercial/Industrial program are met.

(d) Implement BMPs: Each Copermittee must ~~implement, or~~ require the implementation of~~,~~ the designated minimum and enhanced BMPs and any additional measures necessary based on inspections, incident responses, and water quality data to comply with this Order at each industrial and commercial site/source within its jurisdiction.

(3) ~~BMP Implementation for~~ Mobile ~~Businesses~~Business Program

(a) Each Copermittee must develop and implement a program to reduce the discharge of storm water pollutants from mobile businesses to the MEP and to prohibit non-storm water discharges pursuant to Section B of this Order. Each Copermittee must keep as part of their commercial source inventory a listing of mobile businesses known to ~~operate~~ have bases of operation within its jurisdiction that have the potential to discharge pollutants. The program must include:

(i) Development and implementation of minimum standards and BMPs to be required for each of the various types of mobile businesses;
(ii) Development and implementation of an enforcement strategy which specifically addresses the unique characteristics of mobile businesses;
(iii) Notification of those mobile businesses known to ~~operate~~ have bases of operation within the Copermittee's jurisdiction, of the minimum standards and BMP requirements ~~and local ordinances~~;
(iv) Development and implementation of an outreach and education strategy; and
(v) Inspection of mobile businesses as needed to implement the program.

(b) If they choose to, the Copermittees may cooperate in developing and

Comment [CP5]: This sentence has been added pursuant to our previous discussions, where it was agreed that the list of BMPs can be changed over time through the iterative process based on the experience of the Copermittees. This language provides important clarification to that end. Request similar language be added to Municipal and Residential sections

Comment [CP6]: From the 2004 permit.

Comment [CP7]: This sentence has been added pursuant to our previous discussions, where it was agreed that the list of BMPs can be changed over time through the iterative process based on the experience of the Copermittees. This language provides important clarification to that end. Request similar language be added to Municipal and Residential sections

Comment [CP8]: The Copermittees have no authority to *implement* the BMPs on these privately owned sites, however they can require the site owner to implement such BMPs.

Comment [CP9]: This section is describing more than BMP implementation, it is describing a parallel program to address the unique characteristics of Mobile Businesses. Suggested revised heading.

Comment [CP10]: This would prevent us from implementing this regionally.

implementing their programs for mobile businesses, including, but not limited to sharing of mobile business inventories, BMP requirements, enforcement action information, and education.

(4) Inspection of Industrial and Commercial Sites/Sources

Each Copermittee must conduct industrial and commercial site inspections for compliance with its ordinances, permits, and this Order. Mobile businesses shall be inspected pursuant to section F.3.b.(3) of this order.

Comment [CP11]: Clarifying that mobile business will be subject to the inspection requirements developed in F.3.b.(3) .

(a) Inspection Procedures: Inspections must include but not be limited to:

(i) ~~Review of BMP implementation plans, if the site uses or is required to use such a plan~~;

(ii) ~~Review of facility monitoring data, if the site monitors its runoff;~~

Comment [JEU12]: Requirement (v) already addresses these issues. (i) and (ii) focus on methods. (v) focuses on outcomes. The Permittees should be allowed to determine their own methods for evaluating compliance with their ordinances.

(iii) Check for coverage under the General Industrial Permit (Notice of Intent (NOI) and/or Waste Discharge Identification Number), if applicable;

(iv) Assessment of compliance with Copermittee ordinances and Copermittee issued permits related to runoff;

(v) ~~A~~assessment of the ~~BMP~~ implementation and effectiveness of the designated minimum and/or enhanced BMPs~~, maintenance and effectiveness~~;

Comment [CP13]: This section should only be addressing the BMPs required under section F.3.b of the order. As mentioned in comments above, the maintenance of Post Construction structural BMPs is addressed in section F.1.f. of this order.

(vi) Visual observations for non-storm water discharges, potential illicit connections, and potential discharge of pollutants in storm water runoff; and

(vii) Education and training on storm water pollution prevention, as conditions warrant.

(b) Each Copermittee shall annually notify the San Diego Water Board, prior to the commencement of the wet season, of all Industrial Sites and Industrial Facilities subject to the General Industrial Permit or other individual NPDES permit with alleged violations of the Copermittees' ordinances, that pose a significant threat to water quality. Information may be provided as part of the JRMP annual report if submitted prior to the rainy season. Information provided shall include, but not be limited to, the following:

Comment [JEU14]: Permittees already Voluntarily work with RWQCB to ensure compliance. This requirement is not necessary.

Comment [JEU15]: Clarify that we are evaluating Ordinance compliance, also limit reporting to sites with significant threats to water quality.

(i) WDID number if enrolled under the General Industrial Permit;

(ii) Site Location, including address;
(iii) Current violations or suspected violations; and
(iv) ~~Past Violation history~~.

(c) Frequencies: Each Permittee shall prioritize the inventoried commercial/industrial facilities based on threat to water quality. ~~At a minimum, 25 percent of the sites inventoried as required in section F.3.b.(1) above (excluding mobile sources) including all~~ All sites determined to pose a high threat to water quality must be inspected each year. At a minimum all other inventoried facilities shall be inspected at least once every five years. All sites must be Mobile businesses must be inspected pursuant to the enforcement strategy developed pursuant to section F.3.b.(3). In evaluating threat to water quality, each Copermittee shall consider, at a minimum, the following:

(i) Type of activity (SIC code);
(ii) Materials used at the facility;
(iii) Wastes generated;
(iv) Pollutant discharge potential;
(v) Non-storm water discharges;
(vi) Size of facility;
(vii) Proximity to receiving water bodies;
(viii) Sensitivity of receiving water bodies;
(ix) Whether the facility is subject to the General Industrial Permit or an individual NPDES permit;
(x) Whether the facility has filed a No Exposure Certification/Notice of Non-Applicability;
(xi) Facility design;
(xii) Total area of the site~~, area of the site~~ where industrial or commercial activities occur, and area of the site exposed to rainfall and runoff;
(xiii) The facility's compliance history; and
(xiv) Any other relevant factors.

(d) Third-Party Inspections: Each Copermittee may develop and implement a program to utilize a private third party ~~inspection~~ certification ~~program~~ service for verifying industrial and commercial site/source compliance with its ordinances, permits, and this Order. ~~The third party inspections can satisfy up to 30% of the inspection requirements in section F.3.b(4)(c), with the Copermittee having to fulfill the remaining required inspections.~~ To the extent that third party ~~inspections~~ certifications are conducted to fulfill the requirements of this Order, the Copermittee will be responsible for conducting and documenting quality assurance and quality control of the third-party ~~inspections~~certifications.

(i) Each inspection conducted by a third-party must, at a minimum, result in the following:

Comment [CP16]: Purpose of this requirement is to alert the Board to the issue. This is broad and ambiguous.

Comment [JEU17]: 25% requirement is a record retention problem and is not necessary.

Comment [CP18]: Changes are proposed to allow the CAP program to be maintained.

Comment [CP19]: Intent of the changes are to clarify that these requirements do not apply to any cross-Copermittee inspection agreements, such as the CAP program.

Comment [CP20]: This limitation is not necessary. Section (i) below will provide the Copermittee with the assurance that the inspection is valid, complete and accurate. The Copermittee should be afforded the flexibility to find the most cost-effective way to comply with the permit.

[a] Photo documentation of potential storm water violations identified during the third party inspection;
[b] Reporting to the Copermittee of identified significant potential violations, including imminent or observed illegal discharges, within 24 hours of the third party inspection;
[c] Reporting to the Copermittee of all inspection findings within one week of the inspection being conducted; and
[d] Copermittee follow-up and/or enforcement actions for identified potential storm water violations within two business days of the inspection or potential violation report receipt.

(e) Based upon site inspection findings, each Copermittee must implement all follow-up actions and enforcement necessary to comply with this Order.

(f) To the extent that the San Diego Water Board has conducted an inspection of an industrial site during a particular year, the requirement for the responsible Copermittee to inspect this facility during the same year will be satisfied.

(g) The Copermittees must track the number of inspections for the inventoried industrial and commercial sites/sources throughout the reporting period to verify that the sites/sources are inspected at the minimum frequencies listed in this Order.

(5) Enforcement of Industrial and Commercial Sites/Sources

Each Copermittee must enforce its storm water ordinance for all industrial and commercial sites/sources as necessary to maintain compliance with this Order. Copermittee ordinances or other regulatory mechanisms must include appropriate sanctions to achieve compliance. Sanctions must include the following or their equivalent: Non-monetary penalties, fines, ~~bonding requirements,~~ and/or permit denials for non-compliance.

Comment [CP21]: The difficulty in collecting on bonds make them virtually useless as an enforcement tool.

~~Training and Education for Owners and Operators of Commercial and Industrial Activities~~

~~Each Copermittee must implement an education program using all media as appropriate to (1) measurably increase the knowledge of owners and operators of commercial and industrial activities regarding MS4s, impacts of runoff on receiving waters, and potential BMP solutions for the target audience; and (2) to measurably change the behavior of target communities and thereby reduce storm water pollutant releases and eliminate prohibited non-storm water discharges to MS4s and the environment. At a minimum, the education program must meet the requirements of this section and address the following issues:~~

~~Laws, regulations, permits, & requirements;~~
~~Best management practices;~~
~~General runoff concepts; and~~

~~Other topics, including public reporting mechanisms, water conservation, low-impact development techniques.~~

~~BMP Notification: At least twice during the five-year period of this Order, each Copermittee must notify the owner/operator of each inventoried industrial and commercial site/source of the BMP requirements applicable to the site/source.~~

California Regional Water Quality Control Board
San Diego Region

Waste Discharge Requirements for Discharges from the Municipal Separate Storm Sewer Systems (MS4s) Draining the County of Riverside, the Incorporated Cities of Riverside County, and the Riverside County Flood Control and Water Conservation District within the San Diego Region

Tentative Order No. R9-2010-0016
NPDES NO. CAS0108740

TBD, 2010

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
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To request copies of the Riverside County Municipal Storm Water Permit, please contact Ben Neill, Water Resources Control Engineer at (858) 467 – 2983, bneill@waterboards.ca.gov

Documents also are available at: http://www.waterboards.ca.gov/sandiego

Waste Discharge Requirements for Discharges from the Municipal Separate Storm Sewer Systems (MS4s) Draining the County of Riverside, the Incorporated Cities of Riverside County, and the Riverside County Flood Control and Water Conservation District within the San Diego Region

Adopted by the
California Regional Water Quality Control Board
San Diego Region
on TBD, 2010

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California Regional Water Quality Control Board
San Diego Region

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This permit was prepared under the direction of

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The California Regional Water Quality Control Board, San Diego Region (hereinafter San Diego Water Board), finds that:

A. BASIS FOR THE ORDER

1. This Order is based on the federal Clean Water Act (CWA), the Porter-Cologne Water Quality Control Act (Division 7 of the Water Code, commencing with Section 13000), applicable State and federal regulations, all applicable provisions of statewide Water Quality Control Plans and Policies adopted by the State Water Resources Control Board (State Water Board), the Water Quality Control Plan for the San Diego Basin adopted by the San Diego Water Board, the California Toxics Rule, and the California Toxics Rule Implementation Plan.

2. This Order reissues National Pollutant Discharge Elimination System (NPDES) Permit No. CAS0108766, which was first adopted by the San Diego Water Board on July 16, 1990 (Order No. 90-38), and then reissued on May 13, 1998 (Order No. R9-98-02). On May 26, 1998, the United States Environmental Protection Agency (EPA), Region IX, objected to Order No. 98-02 due to concerns regarding Receiving Water Limitations (RWL) language. The EPA concluded that the RWL language in the permit did not comply with the federal Clean Water Act (CWA) and its implementing regulations. On April 27, 1999, the EPA reissued the MS4 permit, which the San Diego Water Board adopted as Addendum No. 1 to Order No. R9-98-02 on November 8, 2000. On July 14, 2004, the San Diego Water Board adopted the third term MS4 permit, Order No. R9-2004-001. On January 15, 2009, the Riverside County Flood Control and Water Conservation District (District), as the Principal Copermittee, submitted a Report of Waste Discharge (ROWD) for reissuance of the municipal separate storm sewer system (MS4) Permit.

3. This Order is consistent with the following precedential Orders adopted by the State Water Resources Control Board (State Water Board) addressing MS4 NPDES Permits: Order 99-05, Order WQ-2000-11, Order WQ 2001-15, Order WQO 2002-0014, and Order WQ-2009-0008 (*SWRCB/OCC FILE A-1780).*

The Fact Sheet / Technical Report for the Order No. R9-2010-0016, NPDES No. CAS0108766, Waste Discharge Requirements for Discharges from the Municipal Separate Storm Sewer Systems (MS4s) Draining the County of Riverside, the Incorporated Cities of Riverside County, and the Riverside County Flood Control and Water Conservation District within the San Diego Region, includes cited regulatory and legal references and additional explanatory information and data in support of the requirements of this Permit. This information, including any supplements thereto, and any response to comments on the Tentative Orders, is hereby incorporated by reference into these findings.

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B. REGULATED PARTIES

1. Each of the persons in Table 1 below, hereinafter called Copermittees or dischargers, owns or operates an MS4, through which it discharges into waters of the United States within the San Diego Region. These MS4s fall into one or more of the following categories: (1) a medium or large MS4 that services a population of greater than 100,000 or 250,000 respectively; or (2) a small MS4 that is "interrelated" to a medium or large MS4; or (3) an MS4 which contributes to a violation of a water quality standard; or (4) an MS4 which is a significant contributor of pollutants to waters of the United States (waters of the U.S).

Table 1. Municipal Copermittees

1. City of Menifee	5. County of Riverside
2. City of Murrieta	6. Riverside County Flood Control and Water Conservation District
3. City of Temecula	
4. City of Wildomar	

C. DISCHARGE CHARACTERISTICS

1. Discharges from the MS4 contain waste, as defined in the California Water Code (CWC), and pollutants that adversely affect the quality of the waters of the State. The discharge from an MS4 is a "discharge of pollutants from a point source" into waters of the U.S. as defined in the CWA.

2. MS4 storm water and non-storm water discharges are likely to contain pollutants that cause or threaten to cause a violation of water quality standards, as outlined in the San Diego Water Board's Water Quality Control Plan for the San Diego Basin (Basin Plan). Storm water and non-storm water discharges from the MS4 are subject to the conditions and requirements established in the San Diego Basin Plan for point source discharges.

3. The most common categories of pollutants in runoff include total suspended solids, sediment, pathogens (e.g., bacteria, viruses, protozoa); heavy metals (e.g., copper, lead, zinc and cadmium); petroleum products and polynuclear aromatic hydrocarbons; synthetic organics (e.g., pesticides, herbicides, and PCBs); nutrients (e.g., nitrogen and phosphorus fertilizers); oxygen-demanding substances (decaying vegetation, animal waste); detergents; and trash.

4. The discharge of pollutants and/or increased flows from MS4s may cause or threaten to cause the concentration of pollutants to exceed applicable receiving water quality objectives and/or impair or threaten to impair designated beneficial uses resulting in a condition of pollution (i.e., unreasonable impairment of water

quality for designated beneficial uses), contamination, or nuisance.

5. Pollutants in runoff can threaten and adversely affect human health. Human illnesses have been clearly linked to recreating near storm drains flowing to receiving waters. Also, runoff pollutants in receiving waters can bioaccumulate in the tissues of invertebrates and fish, which may be eventually consumed by humans.

6. Runoff discharges from MS4s often contain pollutants that cause toxicity to aquatic organisms (i.e., adverse responses of organisms to chemicals or physical agents ranging from mortality to physiological responses such as impaired reproduction or growth anomalies). Toxic pollutants impact the overall quality of aquatic systems and beneficial uses of receiving waters.

7. The Copermittees discharge runoff into lakes, drinking water reservoirs, rivers, streams, creeks, bays, estuaries, coastal lagoons, the Pacific Ocean, and tributaries thereto within one of the eleven hydrologic units (Santa Margarita Hydrologic Unit) comprising the San Diego Region as shown in Table 2. Some of the receiving water bodies have been designated as impaired by the San Diego Water Board in 2009 pursuant to CWA section 303(d).

Table 2. Common Watersheds and CWA Section 303(d) Impaired Waters

Hydrologic Area (HA) or Hydrologic Subarea (HSA) of the Santa Margarita Hydrologic Unit	**Major Receiving Water Bodies**	**303(d) Pollutant(s)/stressor or Water Quality Effect[1]**
DeLuz Creek HSA (902.21)	De Luz Creek	Iron, Manganese, Nitrogen, Sulfates
Murrieta HSA (902.32)	Long Canyon Creek (tributary to Murrieta Creek	Chlorpyrifos, E. Coli, Fecal Coliform, Iron, Manganese
Wolf HSA (902.52)	Murrieta Creek	Chlorpyrifos, Copper, Iron, Manganese, Nitrogen, Toxicity
Pauba HSA (902.51)	Redhawk Channel	Chlorpyrifos, Copper, Diazinon, E. Coli, Fecal Coliform, Iron, Manganese, Nitrogen, Phosphorus, Total Dissolved Solids
Gavilan HSA (902.22)	Sandia Creek	Iron, Sulfates
Gertrudis HSA	Santa Gertrudis Creek	Chlorpyrifos, Copper, E. Coli, Fecal

[1] The listed 303(d) pollutant(s) do not necessarily reflect impairment of the entire corresponding WMA or all corresponding major surface water bodies. The specific impaired portions of each WMA are listed in the State Water Resources Control Board's 2008 Section 303(d) List of Water Quality Limited Segments.

Table 2. Common Watersheds and CWA Section 303(d) Impaired Waters

Hydrologic Area (HA) or Hydrologic Subarea (HSA) of the Santa Margarita Hydrologic Unit	**Major Receiving Water Bodies**	**303(d) Pollutant(s)/stressor or Water Quality Effect[1]**
(902.42)		Coliform, Iron, Phosphorous
Lower Ysidora HSA (902.11)	Santa Margarita Lagoon	Eutrophic
Lower Ysidora HSA (902.11)	Santa Margarita River (Lower)	Enterococcus, Fecal Coliform, Phosphorus, Total Nitrogen as N
Gavilan HSA (902.22)	Santa Margarita River (Upper)	Toxicity
Pauba HSA (902.51)	Temecula Creek	Chlorpyrifos, Copper, Phosphorus, Total Dissolved Solids, Toxicity
French HSA (902.33)	Warm Springs Creek (Riverside County)	Chlorpyrifos, E. Coli, Fecal Coliform, Iron, Manganese, Phosphorus, Total Nitrogen as N

8. Trash is a persistent pollutant which can enter receiving waters from the MS4 resulting in accumulation and transport in receiving waters over time. Trash poses a serious threat to the Beneficial Uses of the receiving waters, including, but not limited to, human health, rare and endangered species, navigation and human recreation.

9. The Copermittees' water quality monitoring data submitted to date documents persistent violations of Basin Plan water quality objectives for various runoff-related pollutants (indicator bacteria, dissolved solids, turbidity, metals, pesticides, etc.) at various watershed monitoring stations. Persistent toxicity has also been observed at some watershed monitoring stations. In addition, bioassessment data indicates that the majority of the monitored receiving waters have Poor to Very Poor Index of Biotic Integrity ratings. In sum, the above findings indicate that runoff discharges are causing or contributing to water quality impairments, and are a leading cause of such impairments in Riverside County.

10. When natural vegetated pervious ground cover is converted to impervious surfaces such as paved highways, streets, rooftops, and parking lots, the natural absorption and infiltration abilities of the land are lost. Therefore, runoff leaving a developed area is significantly greater in runoff volume, velocity, and peak flow rate than pre-development runoff from the same area. Runoff durations can also increase as a result of flood control and other efforts to control peak flow rates. Increased volume, velocity, rate, and duration of runoff, and decreased natural clean sediment loads,

greatly accelerate the erosion of downstream natural channels. Significant declines in the biological integrity and physical habitat of streams and other receiving waters have been found to occur with as little as a 3-5 percent conversion from natural to impervious surfaces. The increased runoff characteristics from new development must be controlled to protect against increased erosion of channel beds and banks, sediment pollutant generation, or other impacts to beneficial uses and stream habitat due to increased erosive force.

11. Development creates new pollution sources as human population density increases and brings with it proportionately higher levels of car emissions, car maintenance wastes, municipal sewage, pesticides, household hazardous wastes, pet wastes, trash, etc. which can either be washed or directly dumped into the MS4. As a result, the runoff leaving the developed urban area is significantly greater in pollutant load than the pre-development runoff from the same area. These increased pollutant loads must be controlled to protect downstream receiving water quality.

12. Development and urbanization especially threaten environmentally sensitive areas (ESAs), such as water bodies designated as supporting a RARE beneficial use (supporting rare, threatened or endangered species) and CWA 303(d)-impaired water bodies. Such areas have a much lower capacity to withstand pollutant shocks than might be acceptable in other areas. In essence, development that is ordinarily insignificant in its impact on the environment may become significant in a particularly sensitive environment. Therefore, additional controls to reduce storm water pollutants from new and existing development may be necessary for areas adjacent to or discharging directly to an ESA.

13. Although dependent on several factors, the risks typically associated with properly managed infiltration of runoff (especially from residential land use areas) are not significant. The risks associated with infiltration can be managed by many techniques, including (1) designing landscape drainage features that promote infiltration of runoff, but do not “inject” runoff (injection bypasses the natural processes of filtering and transformation that occur in the soil); (2) taking reasonable steps to prevent the illegal disposal of wastes; (3) protecting footings and foundations; (4) ensuring that each drainage feature is adequately maintained in perpetuity; and (5) pretreatment.

14. Non-storm water (dry weather) discharge from the MS4 is not considered a storm water (wet weather) discharge and therefore is not subject to regulation under the Maximum Extent Practicable (MEP) standard from CWA 402(p)(3)(B)(iii), which is explicitly for “Municipal … *Stormwater Discharges* (emphasis added)” from the MS4. Rather, non-storm water discharges, per CWA 402(p)(3)(B)(ii), are to be effectively prohibited. Such dry weather non-storm water discharges have been shown to contribute significant levels of pollutants and flow in arid, developed Southern California watersheds and are to be effectively prohibited under the Clean Water Act.

15. Non-storm water discharges to the MS4 granted an influent exception [i.e., which are exempt from the effective prohibition requirement set forth in CWA section 402(p)(3)(B)(ii)] under 40 CFR 122.26 are included within this Order. Any exempted discharges identified by Copermittees as a source of pollutants are subsequently required to be *addressed* (emphasis added) as illicit discharges through prohibition and incorporation into existing IC/ID programs. Furthermore, the Federal Register (55, page 48037) clarifies that the San Diego Water Board may also identify exempted discharges as a source of pollutants required to be addressed as illicit discharges. The San Diego Water Board and the Copermittees have identified landscape irrigation, irrigation water and lawn water, previously exempted discharges, as a source of pollutants and conveyance of pollutants to waters of the United States.

D. RUNOFF MANAGEMENT PROGRAMS

1. General

a. This Order specifies requirements necessary for the Copermittees to reduce the discharge of pollutants in storm water to the maximum extent practicable (MEP). However, since MEP is a dynamic performance standard, which evolves over time as runoff management knowledge increases, the Copermittees' runoff management programs must continually be assessed and modified to incorporate improved programs, control measures, best management practices (BMPs), etc. in order to achieve the evolving MEP standard. Absent evidence to the contrary, this continual assessment, revision, and improvement of runoff management program implementation is expected to ultimately achieve compliance with water quality standards in the Region.

b. The Copermittees have generally been implementing the jurisdictional runoff management programs required pursuant to Order No. 2004-001 since July 14, 2004. Prior to that, the Copermittees were regulated by Order No. 98-02, since May 13, 1998. MS4 discharges, however, continue to cause or contribute to violations of water quality standards as evidenced by the Copermittees monitoring results.

c. This Order contains new or modified requirements that are necessary to improve Copermittees' efforts to reduce the discharge of pollutants in storm water runoff to the MEP and achieve water quality standards. Some of the new or modified requirements, such as the revised Watershed Runoff Management Program section, are designed to specifically address high priority water quality problems. Other new or modified requirements address program deficiencies that have been noted during audits, report reviews, and other San Diego Water Board compliance assessment activities.

d. Updated individual Drainage Area Management Plans (DAMP), and Watershed Stormwater Management Plans (watershed SWMPs), which describe the

Copermittees' runoff management programs in their entirety, are needed to guide the Copermittees' runoff management efforts and aid the Copermittees in tracking runoff management program implementation. It is practicable for the Copermittees to update the JRMPs and WRMPs within one year, since significant efforts to develop these programs have already occurred. Hereinafter, the individual DAMP is referred to as the Jurisdictional Runoff Management Plans (JRMPs) and the Watershed SWMP is referred to as the Watershed Runoff Management Plan (WRMP).

e. Pollutants can be effectively reduced in storm water runoff by the application of a combination of pollution prevention, source control, and treatment control BMPs. Pollution prevention is the reduction or elimination of pollutant generation at its source and is the best "first line of defense." Source control BMPs (both structural and non-structural) minimize the contact between pollutants and flows (e.g., rerouting run-on around pollutant sources or keeping pollutants on-site and out of receiving waters). Treatment control BMPs remove pollutants that have been mobilized by wet-weather or dry-weather flows.

f. Runoff needs to be addressed during the three major phases of urban development (planning, construction, and use) in order to reduce the discharge of pollutants from storm water to the MEP, effectively prohibit non-storm water discharges and protect receiving waters. Development which is not guided by water quality planning policies and principles can unnecessarily result in increased pollutant load discharges, flow rates, and flow durations which can negatively impact receiving water beneficial uses. Construction sites without adequate BMP implementation result in sediment runoff rates which greatly exceed natural erosion rates of undisturbed lands, causing siltation and impairment of receiving waters. Existing development generates substantial pollutant loads which are discharged in runoff to receiving waters.

g. Annual reporting requirements included in this Order are necessary to meet federal requirements and to evaluate the effectiveness and compliance of the Copermittees' programs.

h. This Order establishes Storm Water Action Levels (SALs) for selected pollutants based on USEPA Rain Zone 6 (arid southwest) Phase I MS4 monitoring data for pollutants in storm water. The SALs were computed as the 90th percentile of the data set, utilizing the statistical based population approach, one of three approaches recommended by the California Water Board's Storm Water Panel in its report, 'The Feasibility of Numerical Effluent Limits Applicable to Discharges of Storm Water Associated with Municipal, Industrial and Construction Activities (June 2006). SALs are identified in Section D of this Order. Copermittees shall implement a timely, comprehensive, cost-effective storm water pollution control program to reduce the discharge of pollutants in storm water from the permitted areas so as not to exceed the SALs. Exceedance of SALs may indicate inadequacy of programmatic measures and BMPs required in this Order.

2. **Development Planning**

   a. The Standard Storm Water Mitigation Plan (SSMP) requirements contained in this Order are consistent with Order WQ-2000-11 adopted by the State Water Resources Control Board (State Board) on October 5, 2000. In the precedential order, the State Board found that the design standards, which essentially require that runoff generated by 85 percent of storm events from specific development categories be infiltrated or treated, reflect the MEP standard. The order also found that the SSMP requirements are appropriately applied to the majority of the Priority Development Project categories contained in Section F.1 of this Order. The State Board also gave Regional Water Quality Control Boards the needed discretion to include additional categories and locations, such as retail gasoline outlets (RGOs), in SSMPs.

   b. Controlling runoff pollution by using a combination of onsite source control and site design BMPs augmented with treatment control BMPs before the runoff enters the MS4 is important for the following reasons: (1) Many end-of-pipe BMPs (such as diversion to the sanitary sewer) are typically ineffective during significant storm events. Whereas, onsite source control BMPs can be applied during all runoff conditions; (2) End-of-pipe BMPs are often incapable of capturing and treating the wide range of pollutants which can be generated on a sub-watershed scale; (3) End-of-pipe BMPs are more effective when used as polishing BMPs, rather than the sole BMP to be implemented; (4) End-of-pipe BMPs do not protect the quality or beneficial uses of receiving waters between the pollutant source and the BMP; and (5) Offsite end-of-pipe BMPs do not aid in the effort to educate the public regarding sources of pollution and their prevention.

   c. Use of Low-Impact Development (LID) site design BMPs at new development, redevelopment and retrofit projects can be an effective means for minimizing the impact of storm water runoff discharges from the development projects on receiving waters. LID is a site design strategy with a goal of maintaining or replicating the pre-development hydrologic regime through the use of design techniques. LID site design BMPs help preserve and restore the natural hydrologic cycle of the site, allowing for filtration and infiltration which can greatly reduce the volume, peak flow rate, velocity, and pollutant loads of storm water runoff. Current runoff management, knowledge, practices and technology have resulted in the use of LID BMPs as an acceptable means of meeting the storm water MEP standard.

   d. Retail Gasoline Outlets (RGOs) are significant sources of pollutants in storm water runoff. RGOs are points of convergence for motor vehicles for automotive related services such as repair, refueling, tire inflation, and radiator fill-up and consequently produce significantly higher loadings of hydrocarbons and trace metals (including copper and zinc) than other developed areas.

e. Industrial sites are significant sources of pollutants in runoff. Pollutant concentrations and loads in runoff from industrial sites are similar or exceed pollutant concentrations and loads in runoff from other land uses, such as commercial or residential land uses. As with other land uses, LID site design, source control, and treatment control BMPs are needed at industrial sites in order to meet the MEP standard. These BMPs are necessary where the industrial site is larger than 10,000 square feet. The 10,000 square feet threshold is appropriate, since it is consistent with requirements in other Phase I NPDES storm water regulations throughout California.

f. If not properly designed or maintained, certain BMPs implemented or required by municipalities for runoff management may create a habitat for vectors (e.g. mosquitoes and rodents). Proper BMP design and maintenance to avoid standing water, however, can prevent the creation of vector habitat. Nuisances and public health impacts resulting from vector breeding can be prevented with close collaboration and cooperative effort between municipalities, local vector control agencies, and the California Department of Public Health during the development and implementation of runoff management programs.

g. The increased volume, velocity, frequency and discharge duration of storm water runoff from developed areas has the potential to greatly accelerate downstream erosion, impair stream habitat in natural drainages, and negatively impact beneficial uses. Development and urbanization increase pollutant loads in storm water runoff and the volume of storm water runoff. Impervious surfaces can neither absorb water nor remove pollutants and thus lose the purification and infiltration provided by natural vegetated soil. Hydromodification measures for discharges to hardened channels are needed for the future restoration of the hardened channels to their natural state, thereby restoring the chemical, physical, and biological integrity and Beneficial Uses of local receiving waters.

3. **Construction and Existing Development**

a. In accordance with federal NPDES regulations and to ensure the most effective oversight of industrial and construction site discharges, discharges of runoff from industrial and construction sites are subject to dual (State and local) storm water regulation. Under this dual system, each Copermittee is responsible for enforcing its local permits, plans, and ordinances, and the San Diego Water Board is responsible for enforcing the General Construction Activities Storm Water Permit, State Board Order 2009-0009-DWQ, NPDES No. CAS000002 (General Construction Permit) and the General Industrial Activities Storm Water Permit, State Board Order 97-03 DWQ, NPDES No. CAS000001 (General Industrial Permit) and any reissuance of these permits. NPDES municipal regulations require that municipalities develop and implement measures to address runoff from industrial and construction activities. Those measures may require the implementation of additional BMPs than are required under the

statewide general permits for activities subject to both State and local regulation.

b. Identification of sources of pollutants in runoff (such as municipal areas and activities, industrial and commercial sites/sources, construction sites, and residential areas), development and implementation of BMPs to address those sources, and updating ordinances and approval processes are necessary for the Copermittees to ensure that discharges of pollutants from its MS4 in storm water are reduced to the MEP and that non-storm water discharges are not occurring. Inspections and other compliance verification methods are needed to ensure minimum BMPs are implemented. Inspections are especially important at high risk areas for pollutant discharges.

c. Historic and current development makes use of natural drainage patterns and features as conveyances for runoff. Urban streams used in this manner are part of the municipalities MS4 regardless of whether they are natural, anthropogenic, or partially modified features. In these cases, the urban stream is both an MS4 and receiving water.

d. As operators of the MS4s, the Copermittees cannot passively receive and discharge pollutants from third parties. By providing free and open access to an MS4 that conveys discharges to waters of the U.S., the operator essentially accepts responsibility for discharges into the MS4 that it does not prohibit or control. These discharges may cause or contribute to a condition of contamination or a violation of water quality standards.

e. Waste and pollutants which are deposited and accumulate in MS4 drainage structures will be discharged from these structures to waters of the U.S. unless they are removed. These discharges may cause or contribute to, or threaten to cause or contribute to, a condition of pollution in receiving waters. For this reason, pollutant discharges from storm water into MS4s must be reduced using a combination of management measures, including source control, and an effective MS4 maintenance program must be implemented by each Copermittee.

f. Enforcement of local runoff related ordinances, permits, and plans is an essential component of every runoff management program and is specifically required in the federal storm water regulations and this Order. Each Copermittee is individually responsible for adoption and enforcement of ordinances and/or policies, implementation of identified control measures/BMPs needed to prevent or reduce pollutants in storm water runoff, and for the allocation of funds for the capital, operation and maintenance, administrative, and enforcement expenditures necessary to implement and enforce such control measures/BMPs under its jurisdiction. Education is an important aspect of every effective runoff management program and the basis for changes in behavior at a societal level. Education of municipal planning, inspection, and maintenance department staffs is especially critical to ensure that in-house staffs understand how their activities impact water quality, how to accomplish their jobs while protecting water quality,

and their specific roles and responsibilities for compliance with this Order. Public education, designed to target various urban land users and other audiences, is also essential to inform the public of how individual actions affect receiving water quality and how adverse effects can be minimized.

g. Public participation during the development of runoff management programs is necessary to ensure that all stakeholder interests and a variety of creative solutions are considered.

h. Retrofitting existing development with storm water treatment controls, including LID, is necessary to address storm water discharges from existing development that may cause or contribute to a condition of pollution or a violation of water quality standards. Although SSMP BMPs are required for redevelopment, the current rate of redevelopment will not address water quality problems in a timely manner. Cooperation with private landowners is necessary to effectively identify, implement and maintain retrofit projects for the preservation, restoration, and enhancement of water quality.

4. **Watershed Runoff Management**

a. Since runoff within a watershed can flow from and through multiple land uses and political jurisdictions, watershed-based runoff management can greatly enhance the protection of receiving waters. Such management provides a means to focus on the most important water quality problems in each watershed. By focusing on the most important water quality problems, watershed efforts can maximize protection of beneficial use in an efficient manner. Effective watershed-based runoff management actively reduces pollutant discharges and abates pollutant sources causing or contributing to watershed water quality problems. Watershed-based runoff management that does not actively reduce pollutant discharges and abate pollutant sources causing or contributing to watershed water quality problems can necessitate implementation of the iterative process outlined in section A.3 of the Tentative Order. Watershed management of runoff does not require Copermittees to expend resources outside of their jurisdictions. Watershed management requires the Copermittees within a watershed to develop a watershed-based management strategy, which can then be implemented on a jurisdictional basis.

b. Some runoff issues, such as general education and training, can be effectively addressed on a regional basis. Regional approaches to runoff management can improve program consistency and promote sharing of resources, which can result in implementation of more efficient programs.

c. It is important for the Copermittees to coordinate their water quality protection and land use planning activities to achieve the greatest protection of receiving water bodies. Copermittee coordination with other watershed stakeholders, especially the State of California Department of Transportation, the United States

Department of Defense, and water and sewer districts, is also important.

E. STATUTE AND REGULATORY CONSIDERATIONS

1. The Receiving Water Limitations (RWL) language specified in this Order is consistent with language recommended by the USEPA and established in State Board Water Quality Order 99-05, *Own Motion Review of the Petition of Environmental Health Coalition to Review Waste Discharge Requirements Order No. 96-03, NPDES Permit No. CAS0108740*, adopted by the State Board on June 17, 1999. The RWL in this Order require compliance with water quality standards, which for storm water discharges is to be achieved through an iterative approach requiring the implementation of improved and better-tailored BMPs over time. Compliance with receiving water limits based on applicable water quality standards is necessary to ensure that MS4 discharges will not cause or contribute to violations of water quality standards and the creation of conditions of pollution.

2. The Water Quality Control Plan for the San Diego Basin (Basin Plan), identifies the following existing and potential beneficial uses for surface waters in Riverside County: Municipal and Domestic Supply (MUN), Agricultural Supply (AGR), Industrial Process Supply (PROC), Hydropower Generation (POW), Industrial Service Supply (IND), Ground Water Recharge (GWR), Contact Water Recreation (REC1), Non-contact Water Recreation (REC2), Warm Freshwater Habitat (WARM), Cold Freshwater Habitat (COLD), Wildlife Habitat (WILD), Rare, Threatened, or Endangered Species (RARE), Spawning, Reproduction and/or Early Development (SPWN) and Preservation of Biological Habitats of Special Significance (BIOL).

3. This Order is in conformance with State Board Resolution No. 68-16, *Statement of Policy with Respect to Maintaining High Quality Waters in California*, and the federal Antidegradation Policy described in 40 CFR 131.12.

4. Section 6217(g) of the Coastal Zone Act Reauthorization Amendments of 1990 (CZARA) requires coastal states with approved coastal zone management programs to address non-point pollution impacting or threatening coastal water quality. CZARA addresses five sources of non-point pollution: agriculture, silviculture, urban, marinas, and hydromodification. This NPDES permit addresses the management measures required for the urban category, with the exception of septic systems. The adoption and implementation of this NPDES permit relieves the Copermittee from developing a non-point source plan, for the urban category, under CZARA. The San Diego Water Board addresses septic systems through the administration of other programs.

5. Section 303(d)(1)(A) of the CWA requires that “Each state shall identify those waters within its boundaries for which the effluent limitations…are not stringent enough to implement any water quality standard (WQS) applicable to such waters.” The CWA

also requires states to establish a priority ranking of impaired water bodies known as Water Quality Limited Segments and to establish Total Maximum Daily Loads (TMDLs) for such waters. This priority list of impaired water bodies is called the Section 303(d) List. The 2006 Section 303(d) List was approved by the State Board on October 25, 2006. On June 28, 2007, the 2006 303(d) list for California was given final approval by the United States Environmental Protection Agency (USEPA). The 303(d) List was recently updated, and on December 16, 2009, the 2008 303(d) List was approved by the San Diego Water Board. The 2008 List is awaiting State Board and USEPA approval.

6. This Order does not constitute an unfunded local government mandate subject to subvention under Article XIIIB, Section (6) of the California Constitution for several reasons, including, but not limited to, the following. First, this Order implements federally mandated requirements under federal Clean Water Act section 402. (33 U.S.C. § 1342(p)(3)(B).) Second, the local agency Copermittees' obligations under this Order are similar to, and in many respects less stringent than, the obligations of non-governmental and new dischargers who are issued NPDES permits for storm water and non-storm water discharges. Third, the local agency Copermittees have the authority to levy service charges, fees, or assessments sufficient to pay for compliance with this Order. Fourth, the Copermittees have requested permit coverage in lieu of compliance with the complete prohibition against the discharge of pollutants contained in federal Clean Water Act section 301, subdivision (a) (33 U.S.C. § 1311(a)) and in lieu of numeric restrictions on their storm water discharges. Fifth, the local agencies' responsibility for preventing discharges of waste that can create conditions of pollution or nuisance from conveyances that are within their ownership or control under State law predates the enactment of Article XIIIB, Section (6) of the California Constitution. Likewise, the provisions of this Order to implement total maximum daily loads (TMDLs) are federal mandates. The federal Clean Water Act requires TMDLs to be developed for water bodies that do not meet federal water quality standards. (33 U.S.C. sec. 1313(d).) Once the U.S. Environmental Protection Agency or a state develops a TMDL, federal law requires that permits must contain effluent limitations consistent with the assumptions of any applicable wasteload allocation. (40 C.F.R. sec. 122.44(d)(1)(vii)(B).)

7. Runoff treatment and/or mitigation must occur prior to the discharge of runoff into receiving waters. Treatment BMPs must not be constructed in waters of the U.S. or State unless the runoff flows are sufficiently pretreated to protect the values and functions of the water body. Federal regulations at 40 CFR 131.10(a) state that in no case shall a state adopt waste transport or waste assimilation as a designated use for any waters of the U.S. Authorizing the construction of an runoff treatment facility within a water of the U.S., or using the water body itself as a treatment system or for conveyance to a treatment system, would be tantamount to accepting waste assimilation as an appropriate use for that water body. Furthermore, the construction, operation, and maintenance of a pollution control facility in a water body can negatively impact the physical, chemical, and biological integrity, as well as the beneficial uses, of the water body. Without federal authorization (e.g.,

pursuant to Clean Water Act Section 404), waters of the U.S. may not be converted into, or used as, waste treatment or conveyance facilities. Similarly, waste discharge requirements pursuant to California Water Code Section 13260 are required for the conversion or use of waters of the State as waste treatment or conveyance facilities. Diversion from waters of the U.S./State to treatment facilities and subsequent return to waters of the U.S. is allowable, provided that the effluent complies with applicable NPDES requirements.

8. The issuance of waste discharge requirements and an NPDES permit for the discharge of runoff from MS4s to waters of the U.S. is exempt from the requirement for preparation of environmental documents under the California Environmental Quality Act (CEQA) (Public Resources Code, Division 13, Chapter 3, section 21000 et seq.) in accordance with the CWC section 13389.

9. Storm water discharges from developed and developing areas in Riverside County are significant sources of certain pollutants that cause, may be causing, threatening to cause or contributing to water quality impairment in the waters of Riverside County. Furthermore, as delineated in the CWA section 303(d) list in Table 2, the San Diego Water Board has found that there is a reasonable potential that municipal storm water and non-storm water discharges from MS4s cause or may cause or contribute to an excursion above water quality standards for the following pollutants: Indicator Bacteria, Copper, Manganese, Iron, Chlorpyrifos, Sulfates, Phosphorous, Nitrogen, Toxicity and Turbidity. In accordance with CWA section 303(d), the San Diego Water Board is required to establish Total Maximum Daily Loads (TMDLs) for these pollutants to these waters to eliminate impairment and attain water quality standards. Therefore, certain early pollutant control actions and further pollutant impact assessments by the Copermittees are warranted and required pursuant to this Order.

10. This Order requires each Copermittee to effectively prohibit all types of unauthorized discharges of non-storm water into its MS4. However, historically pollutants have been identified as present in dry weather non-storm water discharges from the MS4s through 303(d) listings, monitoring conducted by the Copermittees under Order No. R9-2004-0001, and there are others expected to be present in dry weather non-storm water discharges because of the nature of these discharges. This Order includes action levels for pollutants in non-storm water, dry weather, discharges from the MS4 designed to ensure that the requirement to effectively prohibit all types of unauthorized discharges of non-storm water in the MS4 is being complied with. Action levels in the Order are based upon numeric or narrative water quality objectives and criteria as defined in the Basin Plan, the Water Quality Control Plan for Ocean Waters of California (Ocean Plan), and the State Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California (State Implementation Policy or SIP). An exceedance of an action level requires specified responsive action by the Copermittees. This Order describes what actions the Copermittees must take when an exceedance of an action level is observed. Exceedances of non-storm water action levels do not alone

constitute a violation of this Order but could indicate non-compliance with the requirement to effectively prohibit all types of unauthorized non-storm water discharges into the MS4 or other prohibitions established in this Order. Failure to undertake required source investigation and elimination action following an exceedance of a non-storm water action level (NAL or action level) is a violation of this Order. The San Diego Water Board recognizes that use of action levels will not necessarily result in detection of all unauthorized sources of non-storm water discharges because there may be some discharges in which pollutants do not exceed established action levels. However, establishing NALs at levels appropriate to protect water quality standards is expected to lead to the identification of significant sources of pollutants in dry weather non-storm water discharges.

11. In addition to federal regulations cited in the Fact Sheet / Technical Report for the Order No. R9-2010-0016, monitoring and reporting required under Order No. R9-2010-0016 is required pursuant to authority under CWC section 13383.

F. PUBLIC PROCESS

1. The San Diego Water Board has notified the Copermittees, all known interested parties, and the public of its intent to consider adoption of an Order prescribing waste discharge requirements that would serve to renew an NPDES permit for the existing discharge of runoff.

2. The San Diego Water Board has held public hearings on TBD and heard and considered all comments pertaining to the terms and conditions of this Order.

IT IS HEREBY ORDERED that the Copermittees, in order to meet the provisions contained in Division 7 of the California Water Code (CWC) and regulations adopted thereunder, and the provisions of the Clean Water Act (CWA) and regulations adopted thereunder, must each comply with the following:

A. PROHIBITIONS AND RECEIVING WATER LIMITATIONS

1. Discharges ~~into and~~ from municipal separate storm sewer systems (MS4s) in a manner causing, or threatening to cause, a condition of pollution, contamination, or nuisance (as defined in CWC section 13050), in waters of the state are prohibited.

2. Storm water discharges from MS4s containing pollutants which have not been reduced to the maximum extent practicable (MEP) are prohibited.[2]

3. Discharges from MS4s that cause or contribute to the violation of water quality standards (designated beneficial uses, water quality objectives developed to protect beneficial uses, and the State policy with respect to maintaining high quality waters) are prohibited.

a. Each Copermittee must comply with section A.3 and section A.4 as it applies to Prohibition 5 in Attachment A of this Order through timely implementation of control measures and other actions to reduce pollutants in storm water discharges in accordance with this Order, including any modifications. If exceedance(s) of water quality standards persist notwithstanding implementation of this Order, the Copermittee must assure compliance with section A.3 and section A.4 as it applies to Prohibition 5 in Attachment A of this Order by complying with the following procedure:

(1) Upon a determination by either the Copermittee or the San Diego Water Board that storm water MS4 discharges are causing or contributing to an exceedance of an applicable water quality standard, the Copermittee must promptly notify the San Diego Water Board ~~within 30 days~~ and thereafter submit a report to the San Diego Water Board that describes best management practices (BMPs) that are currently being implemented and additional BMPs that will be implemented to prevent or reduce any pollutants that are causing or contributing to the exceedance of water quality standards. The notification and the report may be incorporated in the Annual Report unless the San Diego Water Board directs an earlier submittal. The report must include an implementation schedule. The San Diego Water Board may require modifications to the report;

Comment [CP1]: From 2004 Permit. Also related to edit below.

[2] This prohibition does not apply to MS4 discharges which receive subsequent treatment to reduce pollutants to the MEP prior to entering receiving waters (e.g., low flow diversions to the sanitary sewer).

(2) Submit any modifications to the report required by the San Diego Water Board within 30 days of notification;

(3) Within 30 days following approval of the report described above by the San Diego Water Board, the Copermittee must revise its Jurisdictional Runoff Management Program and monitoring program to incorporate the approved modified BMPs that have been and will be implemented, the implementation schedule, and any additional monitoring required; and

(4) Implement the revised Jurisdictional Runoff Management Program and monitoring program in accordance with the approved schedule.

b. The Copermittee ~~must~~ need not repeat the procedure set forth above to comply with the receiving water limitations for continuing or recurring exceedances of the same water quality standard(s) during the development and implementation of scheduled actions unless directed to do otherwise by the San Diego Water Board Executive Officer.

c. Nothing in section A.3 must prevent the San Diego Water Board from enforcing any provision of this Order while the Copermittee prepares and implements the above report.

4. In addition to the above prohibitions, discharges from MS4s are subject to all Basin Plan prohibitions cited in Attachment A to this Order.

B. NON-STORM WATER DISCHARGES

1. Each Copermittee must effectively prohibit all types of non-storm water discharges into its MS4 unless such discharges are either authorized by a separate National Pollutant Discharge Elimination System (NPDES) permit; or not prohibited in accordance with sections B.2 and B.3 below.

2. The following categories of non-storm water discharges are not prohibited unless a Copermittee or the San Diego Water Board identifies the discharge category as a source of pollutants to waters of the U.S. Where the Copermittee(s) have identified a category as a source of pollutants, the category shall be addressed as an illicit discharge and prohibited through ordinance, order or similar means. If an individual discharge within a category is identified as an isolated source of pollutants not representative of the category as a whole, that individual discharge shall be addressed as an illicit discharge. The San Diego Water Board may identify categories of discharge that either requires prohibition or other controls. For such a discharge category, the Copermittee, under direction of the San Diego Water Board, must either prohibit the discharge category or develop and implement appropriate control measures to prevent the discharge of pollutants to the MS4 and report to the San Diego Water Board pursuant to Section K.1 and K.3 of this Order.

Comment [CP2]: See comments/language below, including ***new*** section B.4.

a. Diverted stream flows;
b. Rising ground waters;
c. Uncontaminated ground water infiltration [as defined at 40 CFR 35.2005(20)] to MS4s;
d. Uncontaminated pumped ground water[3];
e. Foundation drains[3~~8~~];
f. Springs;
g. Water from crawl space pumps[3~~8~~];
h. Footing drains[3~~8~~];
i. Air conditioning condensation;
j. Flows from riparian habitats and wetlands;
k. Water line flushing[4,5];
l. Landscape irrigation;
m. Discharges from potable water sources not subject to NPDES Permit No. CAG679001, other than water main breaks;
n. Irrigation water;
o. Lawn watering;
p. Individual residential car washing;
q. Non-emergency fire fighting flows; and
r. Dechlorinated swimming pool discharges[6].

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Comment [CP3]: Restored. Per B.2, discharge categories identified as a source of pollutants by the RB can either be prohibited - or addressed through 'appropriate control measures'.

Per B.3. below this category is not being prohibited, but is being required to be addressed through 'appropriate control measures'.

3. Emergency fire fighting flows (i.e., flows necessary for the protection of life or property) do not require BMPs and need not be prohibited. As part of the Jurisdictional Runoff Management Plan (JRMP), each Copermittee must develop and implement a program to address pollutants from non-emergency fire fighting flows (i.e., flows from controlled or practice blazes and maintenance activities) identified by the Copermittee to be significant sources of pollutants to waters of the United States.

a. Building fire suppression system maintenance discharges (e.g. sprinkler line flushing) contain waste. Therefore, such discharges are to be prohibited by the Copermittees as illicit discharges through ordinance, order, or similar means.

4. As part of the JRMP, the Copermittees must develop and implement appropriate control measures to address pollutants from landscape irrigation, irrigation water and lawn watering activities identified by the Copermittee to be a significant source of pollutants to waters of the United States. The Copermittees shall use a combination of education, source control, water efficiency/conservation ordinances and enforcement tools, as appropriate, in cooperation with local water districts, to meet

[3] Requires enrollment under Order R9-2008-002. Discharges into the MS4 require authorization from the owner and operator of the MS4 system.
[4] This exemption does not include fire suppression sprinkler system maintenance and testing discharges. Those discharges may be regulated under Section B.3.
[5] Requires enrollment under Order R9-2002-0020.
[6] Including saline swimming pool discharges directly to a saline water body.

this requirement.

5. Each Copermittee must examine all dry weather effluent analytical monitoring results collected in accordance with section F.4 of this Order and Receiving Waters and MS4 Discharge Monitoring and Reporting Program No. R9-2010-0016 to identify water quality problems which may be the result of any non-prohibited discharge category(ies) identified above in section B.2. Follow-up investigations must be conducted to identify and control, pursuant to section B.2, any non-prohibited discharge category(ies) listed above.

C. NON-STORM WATER DRY WEATHER ACTION LEVELS

1. Each Copermittee, beginning no later than May 1, 2011, shall, individually and/or jointly implement the non-storm water dry weather action level (NAL) monitoring as described in Attachment E of this Order.

2. In response to an exceedance of an NAL, the applicable~~each~~ Copermittee must investigate ~~and identify~~ the source of the exceedance in a timely manner. However, if any Copermittee identifies exceedances of NALs that prevent them from adequately conducting source investigations in a timely manner, then the Copermittees may submit a prioritization plan and timeline that identifies the timeframe and planned actions to investigate and report their findings on all of the exceedances. Depending on the findings of~~Following~~ the source investigation ~~and identification~~, the Copermittee~~s~~ must ~~submit an~~ take appropriate action ~~report dependant on the source of the pollutant exceedance~~ as follows:

Comment [CMP4]: Conflicts with 2.e.

a. If the Copermittee identifies the source of the exceedance as natural (non-anthropogenically influenced) in origin and in conveyance into the MS4; then no specific action is required, however the Copermittee shall report their findings and documentation of their source investigation to the San Diego Water Board within the applicable annual report.~~fourteen days of the source identification.~~

b. If the Copermittee identifies the source of the exceedance as an illicit discharge or connection, then the Copermittee~~s~~ must initiate appropriate actions as described in section F.4 to promptly eliminate the discharge to their MS4. A ~~and~~ report of the findings, including any enforcement action(s) taken, and documentation of the source investigation must be submitted to the San Diego Water Board within the applicable annual report.~~fourteen days of the source identification.~~ If the Copermittee is unable to eliminate the source of discharge within fourteen days of identification, then the Copermittee must ~~submit, as part of their action report, their plan~~ contact and coordinate~~timeframe to eliminate~~ the response with~~source of~~ the Regional Board.~~exceedance.~~ Those dischargers seeking to continue such a discharge must become subject to a separate NPDES permit prior to continuing any such discharge.

Comment [CMP5]: Clarify relationship to IDDE section

c. If the Copermittee identifies the source of the exceedance as an exempted category of non-storm water discharge, then the Copermittees must determine if this is an isolated circumstance or if the category of discharges must be addressed through the prevention or prohibition of that category of discharge as an illicit discharge. The Copermittee must submit their findings ~~in~~ including a description of the steps taken to address the discharge ~~and/or the category of discharge,~~ to the San Diego Water Board for review with the ~~next subsequent~~ annual report. If the Copermittee has determined that the entire category of discharge must be addressed, the annual report must describe and include a schedule for completion of the planned ~~Such description shall include~~ relevant updates to ~~or new~~ ordinances, orders, or other legal means of addressing the

category of discharge, and the~~. The~~ Copermittees must also submit a summary of their findings with the Report of Waste Discharge.

d. If the Copermittee identifies the source of the exceedance as a non-storm water discharge in violation or potential violation of an existing separate NPDES permit (e.g. the groundwater dewatering permit), then the Copermittee must report, within three business days, the findings to the San Diego Water Board including all pertinent information regarding the discharger and discharge characteristics.

e. If the Copermittee is unable to identify the source of the exceedance after taking and documenting reasonable steps to do so, then the Copermittee must report the results in the annual report, and utilize the current and historical exceedance information when adjusting and executing annual work plans, as required by this Order. ~~identify the pollutant as a high priority pollutant of concern in the tributary subwatershed, perform additional focused sampling and update their programs within a year to reflect this priority. The Copermittee's annual report shall include these updates to their programs including, where applicable, updates to their watershed workplans (Section G.2), retrofitting consideration (Section F.3.d) and program effectiveness work plans (Section J.4).~~

Comment [CP6]: C.4 below already requires this - the station will continue to be monitored until no further exceedances are detected.

f. The Copermittees or any interested party, may evaluate existing NALs and propose revised NALs for future Board consideration.

3. NALs provide an assessment of the effectiveness of the Copermittees' program to prohibit non-storm water discharges and of the appropriateness of exempted non-storm water discharges. An exceedance of an NAL does not alone constitute a violation of the provisions of this Order, but an exceedance of an NAL may indicate *that the Copermittee (s) need to re-evaluate their efforts to*~~a lack of compliance with the requirement that Copermittees~~ effectively prohibit all types of unauthorized non-storm water discharges into the MS4 or other prohibitions set forth in Sections A and B of this Order. Failure to timely implement required actions specified in this Order following an exceedance of an NAL constitutes a violation of this Order. However, neither compliance with NALs nor compliance with required actions following observed exceedances, excuses any non-compliance with the requirement to effectively prohibit all types of unauthorized non-storm water discharges into the MS4s or any non-compliance with the prohibitions in Sections A and B of this Order. ~~NALs provide an assessment of the effectiveness of the prohibition of non-storm water discharges and of the appropriateness of exempted non-storm water discharges. During any annual reporting period in which one or more exceedances of NALs have been documented the Copermittee must submit with their next scheduled annual report, a report describing whether and how the observed exceedances did or did not result in a discharge form the MS4 that caused, or threatened to cause or contribute to a condition of pollution, contamination, or nuisance in the receiving waters.~~

Comment [CP7]: This additional reporting effort does not provide any value/utility that is not already addressed under the MRP.

4. Monitoring of effluent will occur at the end-of-pipe prior to discharge into the

Comment [CMP8]: Suggest move to MRP. Focus on the process in Section D, and keep the action levels and monitoring requirements in the MRP.

receiving waters, with a focus on Major Outfalls, as defined in 40 CFR 122.26(B 5-6) and Attachment E of this Order. The Copermittees must develop their monitoring plans to sample a representative ~~percentage~~ number of major outfalls and identified stations within each hydrologic subarea. At a minimum, outfalls that exceed any NALs once during any year (except those that are identified as natural in origin pursuant to 2.a.) must be monitored in the subsequent year. Any station that does not exceed an NAL for 3 years may be replaced with a different station.

5. Each Copermittee shall monitor for the non-storm water dry weather action levels, which are incorporated into this Order as follows:

Comment [CMP9]: This section more appropriately belongs in the MRP.

We are not providing full comments on section 5 at this time, but will address with the discussions on the MRP.

a. Action levels for discharges to inland surface waters:

Table 3.a.1: General Constituents

Parameter	Units	AMAL	MDAL	Instantaneous Maximum	Basis
Fecal Coliform	MPN/ 100 ml	200[A] 400[B]	-		BPO
Enterococci	MPN/ 100 ml	33	-	61[C]	BPO
Turbidity	NTU	-	20		BPO
pH	Units	Within limit of 6.5 to 8.5 at all times			BPO
Dissolved Oxygen	mg/L	Not less than 5.0 in WARM waters and not less than 6.0 in COLD waters			BPO
Total Nitrogen	mg/L	-	1.0	See MDAL	BPO
Total Phosphorus	mg/L	-	0.1	See MDAL	BPO
Methylene Blue Active Substances	mg/L	-	0.5	See MDAL	BPO
Iron	mg/L	-	0.3	See MDAL	BPO
Manganese	mg/L	-	0.05	See MDAL	BPO

A – Based on a minimum of not less than five samples for any 30-day period
B – No more than 10 percent of total samples may exceed 400 per 100 ml during any 30 day period
C – This Value has been set to Basin Plan Criteria for Designated Beach Areas
BPO – Basin Plan Objective
MDAL – Maximum Daily Action Level AMAL – Average Monthly Action Level

Table 3.a.2: Priority Pollutants

		Freshwater (CTR)	
Parameter	Units	MDAL	AMAL
Cadmium	ug/L	**	**
Copper	ug/L	*	*
Chromium III	ug/L	**	**
Chromium VI (hexavalent)	ug/L	16	8.1
Lead	ug/L	*	*
Nickel	ug/L	**	**

Silver	ug/L	*	*
Zinc	ug/L	*	*

CTR – California Toxic Rule
*- Action Levels developed on a case-by-case basis (see below)
**- Action Levels developed on a case-by-case basis (see below), but calculated criteria are not to exceed Maximum Contaminant Levels under the California Code of Regulations[7]

The NALs for Cadmium, Copper, Chromium (III), Lead, Nickel, Silver and Zinc will be developed on a case-by-case basis because the freshwater criteria are based on site-specific water quality data (receiving water hardness). For these priority pollutants, the following equations (40 CFR 131.38.b.2) will be required:

Cadmium (Total Recoverable) = exp(0.7852[ln(hardness)] -2.715)
Chromium III (Total Recoverable) = exp(0.8190[ln(hardness)] + .6848)
Copper (Total Recoverable) = exp(0.8545[ln(hardness)] - 1.702)
Lead (Total Recoverable) = exp(1.273[ln(hardness)] - 4.705)
Nickel (Total Recoverable) = exp(.8460[ln(hardness)] + 0.0584)
Silver (Total Recoverable) = exp(1.72[ln(hardness)] - 6.52)
Zinc (Total Recoverable) = exp(0.8473[ln(hardness)] + 0.884)

D. STORM WATER ACTION LEVELS

1. The Copermittees shall individually and/or jointly implement the Wet Weather MS4 Discharge Monitoring as described in Attachment E of this Order, and ~~Beginning~~ beginning Year 3 after Order adoption date, the Copermittees shall begin annual assessment of that data for compliance with the Storm Water Action Levels (SALs) identified herein. At each monitoring station, If a running average of twenty percent or greater of the available Wet Weather MS4 Discharge Monitoring data exceeds ~~exceedances of any discharge of storm water from the MS4 to waters of the United States that exceed~~ the Storm Water Action Levels (SALs) for the pollutants listed in Table 5 (below) ~~will require each~~ the applicable Copermittee(s) will be required to affirmatively augment and implement all necessary storm water controls and measures to reduce the discharge of the associated class of pollutants(s) to the MEP ~~standard~~. The Copermittees must utilize the exceedance information when adjusting and executing annual work plans, as required by this Order. Copermittees shall take the magnitude, frequency, need to dedicate resources to addressing NAL exceedances, and number of constituents exceeding the SAL(s), in addition to receiving water quality data and other information, into consideration when reacting to SAL exceedances in an iterative manner. Failure to appropriately consider and react to SAL exceedances in an iterative manner creates a presumption that the Copermittee(s) have not complied with the MEP standard.

Comment [CP10]: Found the draft language here confusing, We provided suggested language that attempts to clarify.

Table 4. Storm Water Action Levels

Pollutant	Action Level
Turbidity (NTU)	126
Nitrate & Nitrite total (mg/L)	2.6

[7] California Code of Regulations, Title 22, Division 4, Chapter 15, Article 4, Section 64431.

P total (mg/L)	1.46
Cd total (µg/L)	3.0
Cu total (µg/L)	127
Pb total (µg/L)	250
Zn total (µg/L)	976

2. The end-of-pipe assessment points for the determination of SAL compliance are all major outfalls, as defined in 40 CFR 122.26(b)(5) and (b)(6). The Copermittees must develop their monitoring plans to sample a representative percent of the major outfalls within each hydrologic subarea. At a minimum, outfalls that exceed SALs must be monitored in the subsequent year. Any station that does not exceed an SAL for 3 years may be replaced with a different station. SAL samples must be 24 hour time weighted composites.

Comment [CMP11]: We are not providing comments on the action levels and monitoring requirements themselves (Table 4 and section D.2.) at this time, but will return to this at a subsequent meeting.

3. The absence of SAL exceedances does not relieve the Copermittees from implementing all other required elements of this Permit.

4. This Permit does not regulate natural sources and conveyances into the MS4 of constituents listed in Table 4.~~5.~~ To be relieved of the requirements to take action as described in D.1 above ~~prioritize pollutant/watershed combinations for BMP updates~~ and to continue monitoring a station, the Copermittee must demonstrate that the likely and expected cause of the SAL exceedance is not anthropogenic in nature. This demonstration does not need to be repeated, for subsequent exceedances of the same SAL in the same hydrologic subarea.

5. The SALs will be reviewed and updated at the end of every permit cycle. The data collected pursuant to ~~D.2 above~~Attachment E can be used to create SALs based upon local data. It is the goal of the SALs, through the iterative and MEP process, to have outfall storm water discharges meet all applicable water quality standards.

E. LEGAL AUTHORITY

1. Each Copermittee must establish, maintain, and enforce adequate legal authority to control pollutant discharges into and from its MS4 through ordinance, statute, permit, contract or similar means. Nothing herein shall authorize a Co-Permittee or other discharger regulated under the terms of this order to divert, store or otherwise impound water if such action is reasonably anticipated to harm downstream water right holders in the exercise of their water rights. This legal authority must, at a minimum, authorize the Copermittee to:

   a. Control the contribution of pollutants in discharges of runoff associated with industrial and construction activity to its MS4 and control the quality of runoff from industrial and construction sites. This requirement applies both to industrial and construction sites which have coverage under the statewide general industrial or construction storm water permits, as well as to those sites which do not. Grading

ordinances must be updated and enforced as necessary to comply with this Order;

b. Prohibit all identified illicit discharges not otherwise allowed pursuant to section B.2;

c. Prohibit and eliminate illicit connections to the MS4;

d. Control the discharge of spills, dumping, or disposal of materials other than storm water to its MS4;

e. Require compliance with conditions in Copermittee ordinances, permits, contracts or orders (i.e., hold dischargers to its MS4 accountable for their contributions of pollutants and flows);

f. Utilize enforcement mechanisms to require compliance with Copermittee storm water ordinances, permits, contracts, or orders;

g. Control the contribution of pollutants from one portion of the shared MS4 to another portion of the MS4 through interagency agreements among Copermittees. Control of the contribution of pollutants from one portion of the shared MS4 to another portion of the MS4 through interagency agreements with other owners of the MS4 such as the State of California Department of Transportation, the United States Department of Defense, or Native American Tribes is encouraged;

h. Carry out all inspections, surveillance, and monitoring necessary to determine compliance and noncompliance with local ordinances and permits and with this Order, including the prohibition on illicit discharges to the MS4. This means the Copermittee must have authority to enter, monitor, inspect, take measurements, review and copy records, and require regular reports from industrial facilities discharging into its MS4, including construction sites;

i. Require the use of BMPs to prevent or reduce the discharge of pollutants into MS4s from storm water to the MEP; and

j. Require documentation on the effectiveness of BMPs implemented to reduce the discharge of storm water pollutants to the MS4 to the MEP.

2. Each Copermittee must submit within 365 days of adoption of this Order, a statement certified by its chief legal counsel that the Copermittee has taken the necessary steps to obtain and maintain full legal authority to implement and enforce each of the requirements contained in 40 CFR 122.26(d)(2)(i)(A-F) and this Order. These statements must include:

a. Identification of all departments within the jurisdiction that conduct runoff related activities, and their roles and responsibilities under this Order. Include an up to date organizational chart specifying these departments and key personnel.

b. Citation of runoff related ordinances and the reasons they are enforceable;

c. Identification of the local administrative and legal procedures available to mandate compliance with runoff related ordinances and therefore with the conditions of this Order;

d. A description of how runoff related ordinances are implemented and appealed; and

e. Description of whether the municipality can issue administrative orders and

injunctions or if it must go through the court system for enforcement actions.

F. JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM (JRMP)

Each Copermittee must implement all requirements of section F of this Order no later than 365 days after adoption of the Order, unless otherwise specified. Prior to 365 days after adoption of the Order, each Copermittee must at a minimum implement its Jurisdictional RMP document, as the document was developed and amended to comply with the requirements of Order No. R9-2004-001.

Each Copermittee must develop and implement an updated JRMP for its jurisdiction. Each updated JRMP must meet the requirements of section F of this Order~~,~~ to reduce the discharge of storm water pollutants from the MS4 to the MEP, effectively prohibit non-storm water discharges and prevent runoff discharges from the MS4 from causing or contributing to a violation of water quality standards.

1. DEVELOPMENT PLANNING COMPONENT

Each Copermittee must implement a program which meets the requirements of this section ~~and~~ to (1) reduce~~s~~ Development Project discharges of storm water pollutants from the MS4 to the MEP; (2) prevent~~s~~ Development Project discharges from the MS4 from causing or contributing to a violation of water quality standards; (3) prevent~~s~~ illicit discharges into the MS4; and (4) manage~~s~~ increases in runoff discharge rates and durations from Development Projects that are likely to cause increased erosion of stream beds and banks, silt pollutant generation, or other impacts to beneficial uses and stream habitat due to increased erosive force.

Comment [CP12]: Section F.1 requires programs that address each of these, these are not mutually exclusive requirements.

a. GENERAL PLAN

Each Copermittee must revise as needed its General Plan or equivalent plan (e.g., Comprehensive, Master, or Community Plan) to include water quality and watershed protection principles and policies that direct land-use decisions and require implementation of consistent water quality protection measures for ~~all~~ development, redevelopment and retrofit projects. Examples of water quality and watershed protection principles and policies to be considered include the following:

Comment [CP13]: Consistent with 2004 permit. If you include the word all, then we should add the word 'applicable'. (…for all *applicable* development….)

(1) Minimize the amount of impervious surfaces and directly connected impervious surfaces in areas of new development and redevelopment and where feasible slow runoff and maximize on-site infiltration of runoff.

(2) Implement pollution prevention methods supplemented by pollutant source controls and treatment BMPs. Use small collection strategies located at, or as close as possible to, the source (i.e., the point where water initially meets the

ground) to minimize the transport of urban runoff and pollutants offsite and into an MS4.

(3) Preserve, and where possible, create or restore areas that provide important water quality benefits, such as riparian corridors, wetlands, and buffer zones. Encourage land acquisition of such areas.

(4) Limit disturbances of natural water bodies and natural drainage systems caused by development including roads, highways, and bridges.

(5) Prior to making land use decisions, utilize methods available to estimate increases in pollutant loads and flows resulting from projected future development. Require incorporation of ~~structural and non-structural~~ appropriate BMPs to mitigate the projected increases in pollutant loads and flows.

Comment [CP14]: From 2004 permit. Alternatively state 'structural and/**or** non structural' BMPs

(6) Avoid development of areas that are particularly susceptible to erosion and sediment loss; or establish development guidance that identifies these areas and protects them from erosion and sediment loss.

(7) Reduce pollutants associated with vehicles and increasing traffic resulting from development.

(8) Post-development runoff from a site shall not contain pollutant loads that cause or contribute to an exceedance of receiving water quality objectives and which have not been reduced to the MEP.

b. ENVIRONMENTAL REVIEW PROCESS

Each Copermittee must revise as needed its current environmental review processes to accurately evaluate water quality impacts and cumulative impacts and identify appropriate measures to avoid, minimize and mitigate those impacts for all Development Projects.

c. APPROVAL PROCESS CRITERIA AND REQUIREMENTS FOR ALL DEVELOPMENT PROJECTS

For all proposed Development Projects, each Copermittee during the planning process, and prior to project approval and issuance of local permits, must prescribe the necessary requirements so that Development Project discharges of storm water pollutants from the MS4 will be reduced to the MEP, will not cause or contribute to a violation of water quality standards, and will comply with Copermittee's ordinances, permits, plans, and requirements, and with this Order.

Performance Criteria: Discharges from each approved development project must be subject to the following management measures:

(1) Source control BMPs that reduce storm water pollutants of concern in runoff; prevent~~ion~~ of illicit discharges into the MS4; prevent~~ion~~ of irrigation runoff; storm drain system stenciling or signage; properly design~~ed~~ outdoor material storage areas; properly designed outdoor work areas; and properly designed trash storage areas.

Comment [CP15]: Subject to our discussion on section B (non storm water discharges.

(2) The following LID BMPs listed below shall be implemented at all Development Projects where applicable and feasible.

(a) Conserve natural areas, including existing trees, other vegetation, and soils,
(b) Construct streets, sidewalks, or parking lot aisles to the minimum widths necessary, provided that public safety is not compromised,
(c) Minimize the impervious footprint of the project,
(d) Minimize soil compaction to landscaped areas,
(e) Minimize disturbances to natural drainages (e.g., natural swales, topographic depressions, etc.), and
(f) Disconnect impervious surfaces through distributed pervious areas.

(3) Buffer zones for natural water bodies, where ~~technically~~ feasible. Where buffer zones are ~~technically~~ infeasible, require project proponent to implement other buffers such as trees, access restrictions, etc;

Comment [CP16]: Consistent with 2004 permit.

(4) Measures necessary so that grading or other construction activities meet the provisions specified in section F.2 of this Order.

(5) ~~Where~~ When known during permitting, require industrial facility operators subject to the General Industrial permit to provide evidence of permit coverage prior to occupancy.

(6) Submittal of proof of a mechanism under which ongoing long-term maintenance of all structural post-construction BMPs will be conducted.

(7) Infiltration and Groundwater Protection

To protect groundwater quality, each Copermittee must apply restrictions to the use of treatment control BMPs that are designed to primarily function as large, centralized infiltration devices (such as large infiltration trenches and infiltration basins). Such restrictions must be designed so that the use of such infiltration treatment control BMPs ~~must~~ does not cause or contribute to an exceedance of groundwater quality objectives. At a minimum, each treatment control BMP designed to primarily function as a centralized infiltration device must meet the restrictions below, unless it is demonstrated that a restriction is not necessary to protect groundwater quality. The Copermittees may collectively or individually develop alternative restrictions

on the use of treatment control BMPs which are designed to primarily function as centralized infiltration devices. Alternative restrictions developed by the Copermittees can partially or wholly replace the restrictions listed below. The restrictions do not apply to small infiltration systems dispersed throughout a development project.

(a) Runoff must undergo pretreatment such as sedimentation or filtration prior to infiltration;

(b) All dry weather flows containing significant pollutant loads must be diverted from infiltration devices and treated through other BMPs;

(c) Pollution prevention and source control BMPs must be implemented at a level appropriate to protect groundwater quality at sites where infiltration treatment control BMPs are to be used;

(d) Infiltration treatment control BMPs must be adequately maintained so that they remove storm water pollutants to the MEP;

(e) The vertical distance from the base of any infiltration treatment control BMP to the seasonal high groundwater mark must be at least 10 feet. Where groundwater basins do not support beneficial uses, this vertical distance criteria may be reduced, provided groundwater quality is maintained;

(f) The soil through which infiltration is to occur must have physical and chemical characteristics (such as appropriate cation exchange capacity, organic content, clay content, and infiltration rate) which are adequate for proper infiltration durations and treatment of runoff for the protection of groundwater beneficial uses;

(g) Infiltration treatment control BMPs must not be used for areas of industrial or light industrial activity; ~~areas subject to high vehicular traffic (25,000 or greater average daily traffic on main roadway or 15,000 or more average daily traffic on any intersecting roadway)~~; automotive repair shops; car washes; fleet storage areas (bus, truck, etc.); nurseries; and other high threat to water quality land uses and activities as designated by each Copermittee unless first treated or filtered to remove pollutants prior to infiltration ~~and a comprehensive site-specific evaluation has been conducted~~; and

(h) Infiltration treatment control BMPs must be located a minimum of 100 feet horizontally from any water supply wells.

(7) Where feasible, landscaping with native or low water species shall be preferred in areas that drain to the MS4 or to waters of the United States.

d. STANDARD STORM WATER MITIGATION PLANS (SSMPS) – APPROVAL PROCESS CRITERIA AND REQUIREMENTS FOR PRIORITY DEVELOPMENT PROJECTS

Within 365 days of adoption of this Order, the Copermittees must submit an updated ~~model~~ SSMP (referred to by the Copermittees as a Water Quality Management Plan, or 'WQMP'), to the San Diego Water Board's Executive Officer for a 30 day public review and comment period. The San Diego Water Board's Executive Officer has the discretion to determine the necessity of a public hearing. Within 180 days of determination that the ~~Model~~ SSMP is in compliance with this Permit's provisions, each Copermittee must ~~update their own local SSMP, and~~ amend~~ed~~ their ordinances consistent with the ~~model~~ SSMP and begin implementation of the updated SSMP. Any updated ordinances, and shall be submitted ~~submit both (local SSMP and amended ordinances)~~ to the San Diego Water Board with the annual report. The ~~model~~ SSMP must meet the requirements of section F.1.d of this Order to (1) reduce Priority Development Project discharges of storm water pollutants from the MS4 to the MEP, and (2) prevent Priority Development Project runoff discharges from the MS4 from causing or contributing to a violation of water quality standards.[8]

(1) Definition of Priority Development Project (PDP):

Priority Development Projects are:

(a) All new Development Projects that fall under the project categories or locations listed in section F.1.d.(2), and

(b) Those redevelopment projects that create, add, or replace at least 5,000 square feet of impervious surfaces on an already developed site and the ~~existing development and/or~~ the redevelopment project falls under the project categories or locations listed in section F.1.d.(2). Where redevelopment results in an increase of less than fifty percent of the impervious surfaces of a previously existing development, and the existing development was not subject to SSMP requirements, the numeric sizing criteria discussed in section F.1.d.(6) applies only to the addition or

Comment [CP17]: Consistent with 2004 permit and the Santa Ana Permit.

[8] Updated SSMP and hydromodification requirements must apply to all priority projects or phases of priority projects which have not yet begun grading or construction activities at the time any updated SSMP or hydromodification requirement commences. If lawful prior approval of a project exists, whereby application of an updated SSMP or hydromodification requirement to the project is illegal, the updated SSMP or hydromodification requirement need not apply to the project. Updated Development Planning requirements set forth in Sections F.1. (a) through (h) of this Order must apply to all projects or phases of projects, unless, at the time any updated Development Planning requirement commences, the projects or project phases meet any one of the following conditions: (i) the project or phase has begun grading or construction activities; or (ii) a Copermittee determines that lawful prior approval rights for a project or project phase exist, whereby application of the Updated Development Planning requirement to the project is legally infeasible. Where feasible, the Permittees must utilize the SSMP and hydromodification update periods to ensure that projects undergoing approval processes include application of the updated SSMP and hydromodification requirements in their plans.

replacement, and not to the entire development. Where redevelopment results in an increase of more than fifty percent of the impervious surfaces of a previously existing development, the numeric sizing criteria applies to the entire development. Redevelopment does not include routine maintenance activities that are conducted to maintain original line and grade, hydraulic capacity, original purpose of the facility, or emergency redevelopment activity required to protect public health and safety. Redevelopment also does not include retrofit projects implemented pursuant to section F.3.d of this order.

Comment [CP18]: 2010 Santa Ana Permit

Comment [CP19]: Important not to penalize proactive efforts to retrofit existing development.

~~(c) One acre threshold: In addition to the Priority Development Project Categories identified in section F.1.d.(2), Priority Development Projects must also include all other pollutant-generating Development Projects that result in the disturbance of one acre or more of land within two years of adoption of this Order.~~[9]

Comment [JEU20]: Keep requirements consistent with Santa Ana Permit. This also exceeds the SWRCB Precedential Order regarding SUSMPs.

(2) Priority Development Project Categories

Where a new Development Project feature, such as a parking lot, falls into a Priority Development Project Category, the entire project footprint is subject to SSMP requirements. Emergency public safety projects in any of the Priority Development Categories may be excluded if the delay caused due to the requirement for a SSMP compromises public safety, public health and/or environmental protection.

Comment [CP21]: From the 2010 Santa Ana Permit to ensure that Emergency public safety projects that happen to meet the criteria of a PDP, are not delayed.
Example situations:
•Emergency housing erected in response to a major disaster such as an earthquake
•Emergency food cafeteria erected following a major disaster.
•Emergency command center that happens to need to be set up next to an ESA
•Etc…

(a) New development projects that create 10,000 square feet or more of impervious surfaces (collectively over the entire project site) including commercial, industrial, residential subdivisions requiring a Final Map (i.e. detached single family home subdivisions, multi-family attached subdivisions, condominiums, apartments, etc.), mixed-use, and public projects. This category includes development projects on public or private land which fall under the planning and building authority of the Copermittees.

Comment [CP22]: Consistent with the Santa Ana permit, these revisions clarify that this doesn't apply to individual custom home projects (unless they also qualify as hillside development).

Individual residential projects will still be required to implement the controls from F.1.c. for 'all' projects, however it is not appropriate to burden such insignificant projects with the full SSMP requirements.

(b) Automotive repair shops. This category is defined as a facility that is categorized in any one of the following Standard Industrial Classification (SIC) codes: 5013, 5014, 5541, 7532-7534, or 7536-7539.

(c) Restaurants. This category is defined as a facility that sells prepared foods and drinks for consumption, including stationary lunch counters and refreshment stands selling prepared foods and drinks for immediate consumption (SIC code 5812), where the land area for development is greater than 5,000 square feet. Restaurants where land development is less than 5,000 square feet must meet all SSMP requirements except for

[9] ~~Pollutant generating Development Projects are those projects that generate pollutants at levels greater than natural background levels.~~

structural treatment BMP and numeric sizing criteria requirement F.1.d.(6) and hydromodification requirement F.1.h.

(d) All hillside development greater than 5,000 square feet. This category is defined as any development which creates 5,000 square feet of impervious surface which is located in an area with known erosive soil conditions, where the development will grade on any natural slope that is twenty-five percent or greater.

(e) Environmentally Sensitive Areas (ESAs). All development located within or directly adjacent to or discharging directly to an ESA (where discharges from the development or redevelopment will enter receiving waters within the ESA), which either creates 2,500 square feet of impervious surface on a proposed project site or increases the area of imperviousness of a proposed project site to 10 percent or more of its naturally occurring condition. "Directly adjacent" means situated within 200 feet of the ESA. "Discharging directly to" means outflow from a drainage conveyance system that is composed entirely of flows from the subject development or redevelopment site, and not commingled with flows from adjacent lands.

(f) Impervious Parking lots 5,000 square feet or more ~~or with 15 or more parking spaces~~ and potentially exposed to runoff. Parking lot is defined as a land area or facility for the temporary parking or storage of motor vehicles used personally, for business, or for commerce.

(g) Street, roads, highways, and freeways[10]. This category includes any paved impervious surface that is 5,000 square feet or greater used for the transportation of automobiles, trucks, motorcycles, and other vehicles.

(h) Retail Gasoline Outlets (RGOs). This category includes RGOs that meet the following criteria: (a) 5,000 square feet or more or (b) a projected Average Daily Traffic (ADT) of 100 or more vehicles per day.

(3) Pollutants of Concern

As part of its local SSMP, each Copermittee must implement a~~n~~ ~~updated~~ procedure for identifying pollutants of concern for each Priority Development Project. The procedure must address, at a minimum: (1) Receiving water quality (including pollutants for which receiving waters are listed as impaired under CWA section 303(d)); (2) Land-use type of the Development Project and pollutants associated with that land use type; and (3) Pollutants expected

Comment [CP23]: **'Impervious':** Clarify that if a project implements pervious parking lots (such as pervious concrete), that they would not be necessarily be subjected to a SSMP (unless triggered by another category). This will be a way to strongly encourage this type of LID source control.

'or with 15 or more': Consistent with 2004 SMR and 2010 Santa Ana. Make it simple and consistent, having dual checks here is adding unnecessary complexity.

Comment [CP24]: Footnote added to allow the Copermittees the option to develop road standards, that, upon approval by the EO, could be used in-lieu of a WQMP for each road project.

Comment [CP25]: There is no reason to have an *'updated'* procedure.

[10] The Copermittees may develop and submit to the Regional Board, a plan for addressing pollutant discharges from streets, roads, highways and freeways through implementation of revised standard roadway sections that utilize USEPA Green Streets guidance or similar. Upon approval of the plan by the Executive Officer, projects that incorporate those standards need not be categorized as a PDP unless also triggered by another category.

to be present on site.

(4) Low Impact Development BMP Requirements

Each Copermittee must require each Priority Development Project to implement LID BMPs which will collectively minimize directly connected impervious areas, limit loss of existing infiltration capacity, and protect areas that provide important water quality benefits necessary to maintain riparian and aquatic biota, and/or are particularly susceptible to erosion and sediment loss.

(a) The Copermittees must take the following measures to ensure that LID BMPs are implemented at PDPs:

(i) Each Copermittee must require LID BMPs or make a finding of technical infeasibility for each Priority Development Project in accordance with the LID waiver program in Section F.1.d.(8);
(ii) Each Copermittee must incorporate formalized consideration, such as thorough checklists, ordinances, and/or other means, of LID BMPs into the plan review process for Priority Development Projects;
(iii) The review of each Priority Development Project must include an assessment of potential collection of storm water for on-site or off-site reuse opportunities;
(iv) The review of each Priority Development Project must include an assessment of techniques to infiltrate, filter, store, evaporate, or retain runoff close to the source of runoff; and
(v) Within 2 years after adoption of this Order, each Copermittee must review its local codes, policies, and ordinances and identify barriers therein to implementation of LID BMPs. Following the identification of these barriers to LID implementation, where feasible, the Copermittee must take, by the end of the permit cycle, appropriate actions to remove such barriers.

(b) The following LID BMPs must be implemented at each PDP:

(i) Maintain or restore natural storage reservoirs and drainage corridors (including depressions, areas of permeable soils, swales, and ephemeral and intermittent streams.
(ii) Projects with landscaped or other pervious areas must, where feasible, drain runoff from impervious areas (rooftops, parking lots, sidewalks, walkways, patios, etc) into pervious areas prior to discharge to the MS4. The amount of runoff from impervious areas that is to drain to pervious areas shall not exceed the total capacity of the project's pervious areas to infiltrate or treat runoff, taking into consideration the pervious areas' geologic and soil conditions,

slope, and other pertinent factors.

(iii) Projects with landscaped or other pervious areas must, where feasible, properly design and construct the pervious areas to effectively receive and infiltrate or treat runoff from impervious areas, prior to discharge to the MS4. Soil compaction for these areas shall be minimized. The amount of the impervious areas that are to drain to pervious areas must be based upon the total size, soil conditions, slope, and other pertinent factors.

(iv) Projects with low traffic areas and appropriate soil conditions must construct walkways, trails, overflow parking lots, alleys, or other low-traffic areas with permeable surfaces, such as pervious concrete, porous asphalt, unit pavers, and granular materials.

(b) To protect ground water resources any large, centralized infiltration BMPs must comply with Section F.1.(c)(6). The restrictions do not apply to small infiltration systems dispersed throughout a development project.

(c) LID BMPs sizing criteria:

(i) LID BMPs shall be sized and designed to ensure onsite retention without runoff, of the volume of runoff produced from a 24-hour 85th percentile storm event[11] ("design capture volume");

(ii) If onsite retention LID BMPs are technically infeasible per section F.1.d.(7)(b), LID biofiltration BMPs may treat any volume that is not retained onsite by the LID BMPs. The LID biofiltration BMPs must be designed for an appropriate surface loading rate to prevent erosion, scour and channeling within the BMP. Due to the flow through design of biofiltration BMPs, the total volume of the BMP, including pore spaces and prefilter detention volume, must be sized to hold at least 0.75 times the design storm volume that is not retained onsite by LID retention BMPs;

(iii) If it is shown to be technically infeasible to treat the remaining volume up to and including the design capture volume using LID BMPs (retention or biofiltration), the project must implement conventional treatment control BMPs in accordance with Section F.1.d.(6) below and must participate in the LID waiver program in Section F.1.d.(7).

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[11] This volume is not a single volume to be applied to all of Riverside County. The size of the 85th percentile storm event is different for various parts of the County. The Copermittees are encouraged to calculate the 85th percentile storm event for each of their jurisdictions using local rain data pertinent to their particular jurisdiction (0.6 inch standard is a rough average for the County and should only be used where appropriate rain data is not available). In addition, isopluvial maps may be used to extrapolate rainfall data to areas where insufficient data exists in order to determine the volume of the local 85th percentile storm event in such areas. Where the Copermittees will use isopluvial maps to determine the 85th percentile storm event in areas lacking rain data, the Copermittees shall describe their method for using isopluvial maps in their SSMPs.

(e) All LID BMPs shall be designed and implemented with measures to avoid the creation of nuisance or pollution associated with vectors, such as mosquitoes, rodents, and flies.

(5) Source Control BMP Requirements

Each Copermittee must require each Priority Development Project to implement source control BMPs. The source control BMPs to be required must:

(a) Prevent illicit discharges into the MS4;
(b) Minimize storm water pollutants of concern in runoff;
(c) Eliminate irrigation runoff;
(d) Include storm drain system stenciling or signage;
(e) Include properly designed outdoor material storage areas;
(f) Include properly designed outdoor work areas;
(g) Include properly designed trash storage areas;
(h) Include water quality requirements applicable to individual priority project categories.

(6) Treatment Control BMP Requirements[12]

Each Copermittee must require each Priority Development Project to implement treatment control BMPs that meet the following requirements:

(a) All treatment control BMPs for a single Priority Development Project must collectively be sized to comply with the following numeric sizing criteria:

(i) Volume-based treatment control BMPs must be designed to mitigate (infiltrate, filter, or treat) the volume of runoff produced from a 24-hour 85th percentile storm event,[13]; or

(ii) Flow-based treatment control BMPs must be designed to mitigate (infiltrate, filter, or treat) either: a) the maximum flow rate of runoff produced from a rainfall intensity of 0.2 inch of rainfall per hour, for

[12] This section only applies to those PDPs not implementing LID capable of meeting the design storm criteria for the entire site and meeting technical infeasibility eligibility. Low-Impact Development (LID) and other site design BMPs that are correctly designed to effectively remove pollutants from runoff are considered treatment control BMPs.

[13] This volume is not a single volume to be applied to all of Riverside County. The size of the 85th percentile storm event is different for various parts of the County. The Copermittees are encouraged to calculate the 85th percentile storm event for each of their jurisdictions using local rain data pertinent to their particular jurisdiction. In addition, isopluvial maps may be used to extrapolate rainfall data to areas where insufficient data exists in order to determine the volume of the local 85th percentile storm event in such areas. Where the Copermittees will use isopluvial maps to determine the 85th percentile storm event in areas lacking rain data, the Copermittees shall describe their method for using isopluvial maps in their SSMPs.

each hour of a storm event; or b) the maximum flow rate of runoff produced by the 85th percentile hourly rainfall intensity (for each hour of a storm event), as determined from the local historical rainfall record, multiplied by a factor of two.

(b) Treatment control BMPs for all Priority Development Projects must mitigate (treat through infiltration, settling, filtration or other unit processes) the required volume or flow of runoff from all developed portions of the project, including landscaped areas.

(c) All treatment control BMPs must be located so as to remove pollutants from runoff prior to its discharge to any receiving waters. Multiple Priority Development Projects may use shared treatment control BMPs as long as construction of any shared treatment control BMP is completed prior to the use or occupation of any Priority Development Project from which the treatment control BMP will receive runoff.

(d) All treatment control BMPs for Priority Development Projects must, at a minimum:

(i) Be ranked with high or medium pollutant removal efficiency for the project's most significant pollutants of concern, as the pollutant removal efficiencies are identified in the Copermittees' Model SSMP. Treatment control BMPs with a low removal efficiency ranking must only be approved by a Copermittee when a feasibility analysis has been conducted which exhibits that implementation of treatment control BMPs with high or medium removal efficiency rankings are infeasible for a Priority Development Project or portion of a Priority Development Project.

(ii) Be correctly sized and designed so as to remove storm water pollutants to the MEP.

(e) Target removal of pollutants of concern from runoff.

(f) Be implemented close to pollutant sources, and prior to discharging into waters of the U.S.

(g) Not be constructed within a waters of the U.S. or waters of the State.

(h) Include proof of a mechanism under which ongoing long-term maintenance will be conducted to ensure proper maintenance for the life of the project. The mechanisms may be provided by the project proponent or Copermittee.

(i) Be designed and implemented with measures to avoid the creation of nuisance or pollution associated with vectors, such as mosquitoes,

rodents, and flies.

(7) Low Impact Development (LID) BMP Waiver Program

The Copermittees must develop, collectively or individually, a LID waiver program for incorporation into local SSMPs, which would allow a Priority Development Project to substitute implementation of all or a portion of required LID BMPs in section F.1.d(4) with implementation of treatment control BMPs and either 1) a mitigation project, 2) payment into an in-lieu funding program, and/or 3) watershed equivalent BMP(s) consistent with Section F.1.d.(11). The Copermittees shall submit the LID waiver program as part of their updated model SSMP. At a minimum, the program must meet the requirements below:

(a) Prior to implementation, the LID waiver program must clearly exhibit that it will not allow PDPs to result in a net impact (after consideration of any mitigation and in-lieu payments) from pollutant loadings over and above the impact caused by projects meeting LID requirements;

(b) For each PDP participating, a technical feasibility analysis must be included demonstrating that it is technically infeasible to implement LID BMPs that comply with the requirements of Section F.1.(d)(4). The Copermittee(s) must develop criteria for the technical feasibility analysis including a cost benefit analysis, examination of LID BMPs considered and alternatives chosen. Each PDP participating must demonstrate that LID BMPs were implemented as much as feasible given the site's unique conditions. Analysis must be made of the pollutant loading for each project participating in the LID substitution program. The estimated impacts from not implementing the required LID BMPs in section F.1.d.(4) must be fully mitigated. Technical infeasibility may result from conditions including, but not limited to:

(i) Locations that cannot meet the infiltration and groundwater protection requirements in section F.1.c.(6) for large, centralized infiltration BMPs. Where infiltration is technically infeasible, the project must still examine the feasibility of other onsite retention LID BMPs;
(ii) Smart growth and infill or redevelopment locations where the density and/or nature of the project would create significant difficulty for compliance with the onsite volume retention requirements; and
(iii) Other site, geologic, soil or implementation constraints identified in the Copermittees updated local SSMP document.

(c) The LID waiver program must include mechanisms to verify that each

Priority Development Project participating in the program is in compliance with all applicable SSMP requirements;

(d) The LID waiver program must develop and implement a review process verifying that the BMPs to be implemented meet the designated design criteria. The review process must also verify that each Priority Development Project participating in the program is in compliance with all applicable SSMP requirements.

(e) The LID waiver program must include performance standards for treatment control BMPs specified in compliance with section F.1.(d)(6).

(f) Each PDP that participates in the LID waiver program must mitigate for the pollutant loads expected to be discharged due to not implementing the LID BMPs in section F.1.d.(4). Mitigation projects must be implemented within the same hydrologic subarea as the PDP. Mitigation projects outside of the hydrologic subarea but within the same hydrologic unit may be approved provided that the project proponent demonstrates that mitigation projects within the same hydrologic subarea are infeasible and that the mitigation project will address similar beneficial use impacts as expected from the PDPs pollutant load types and amount. Offsite mitigation projects may include green streets projects, existing development retrofit projects, retrofit incentive programs, regional BMPs and stream restoration. Project applicants seeking to utilize these alternative compliance provisions may propose other offsite mitigation projects, which the Copermittees may approve if they meet the requirements of this subpart.

(g) A Copermittee may choose to implement a pollutant credit system as part of the LID waiver program provided that such a credit system clearly exhibits that it will not allow PDPs to result in a net impact from pollutant loadings over and above the impact caused by projects meeting LID requirements. Any credit system that a Copermittee chooses to implement must be submitted to the Executive Officer for review and approval as part of the waiver program.

(h) The LID waiver program shall include a storm water mitigation fund developed by the Copermittee(s) to be used for water quality improvement projects which may serve in lieu of the PDP's required mitigation in section F.1.d.(8)(e). The LID waiver program's storm water mitigation fund shall, at a minimum, identify;

(i) The entity or entities that will manage the storm water mitigation fund (i.e., assume full responsibility);
(ii) The range and types of acceptable projects for which storm water mitigation funds may be expended;

(iii) The entity or entities that will assume full responsibility for each water quality improvement project, including its successful completion; and

(iv) How the dollar amount of storm water mitigation fund contributions will be determined. In-lieu payments must be proportional to the additional pollutant load discharged by not fully implementing LID.

(i) Each Copermittee must notify the San Diego Water Board in their annual report of each PDP choosing to participate in the LID waiver program. The annual report must include the following information:

(i) Name of the developer of the participating PDP;
(ii) Site location;
(iii) Reason for LID waiver including technical feasibility analysis;
(iv) Description of BMPs implemented;
(v) Total amount deposited, if any, into the storm water mitigation fund described in section F.1.d.(8)(f);
(vi) Water quality improvement project(s) proposed to be funded; and
(vii) Timeframe for implementation of water quality improvement projects.

(8) Site Design and Treatment Control BMP Design Standards

As part of ~~its local~~the SSMP, each Copermittee must develop and require Priority Development Projects to ~~implement~~ comply with ~~sitting,~~ design, and maintenance criteria for each ~~site design~~LID and treatment control BMP listed in its local SSMP to ~~determine~~assist with determining~~determine~~ feasibility and applicability and so that implemented ~~site design~~LID and treatment control BMPs are constructed correctly and are effective at pollutant removal, runoff control, and vector minimization. LID techniques must be incorporated into the criteria for appropriate treatment control BMPs where feasible. Development of BMP design worksheets which can be used by project proponents is encouraged.

(9) Implementation Process

As part of its local SSMP, each Copermittee must implement a process to verify compliance with SSMP requirements. The process must identify at what point in the planning process Priority Development Projects will be required to meet SSMP requirements and at a minimum, the Priority Development Project must implement the required post-construction BMPs prior to occupancy and/or the intended use of any portion of that project. The process must also include identification of the roles and responsibilities of various municipal departments in implementing the SSMP requirements, as well as any other measures necessary for the implementation of SSMP requirements.

(10) Treatment BMP Review

(a) The Copermittees must review and update the BMPs that are listed in their local SSMPs as options for treatment control. At a minimum, the update must include removal of obsolete or ineffective BMPs and addition of LID BMPs that can be used for treatment, such as bioretention cells, bioretention swales, etc. The update must also add appropriate LID BMPs to any tables or discussions in the local SSMPs addressing pollutant removal efficiencies of treatment control BMPs. In addition, the update must include review and revision where necessary of treatment control BMP pollutant removal efficiencies.

(b) The update must incorporate findings from BMP effectiveness studies conducted by the Copermittees for projects funded wholly or in part by the State Board or Regional Boards.

(c) Each Copermittee must implement a mechanism for annually incorporating findings from local treatment BMP effectiveness studies (e.g., ones conducted by, or on-behalf of, public agencies in Riverside County) into SSMP project reviews and permitting

~~(11) Where a development project, greater than 100 acres in total project size or smaller than 100 acres in size yet part of a larger common plan of development that is over 100 acres, has been prepared using watershed and/or sub-watershed based water quality, hydrologic, and fluvial geomorphologic planning principles that implement regional LID BMPs in accordance with the sizing and location criteria of this Order and acceptable to the San Diego Water Board, such standards shall govern review of projects with respect to Section F.1 of this Order and shall be deemed to satisfy this Order's requirements for LID site design, buffer zone, infiltration and groundwater protection standards, source control, treatment control, and hydromodification control standards. Regional BMPs must clearly exhibit that they will not result in a net impact from pollutant loadings over and above the impact caused by capture and retention of the design storm. Regional BMPs may be used provided that the BMPs capture and retain the volume of runoff produced from the 24-hour 85th percentile storm event as defined in section F.1.d.(6)(a)(i) and that such controls are located upstream of receiving waters. Any volume that is not retained by the LID BMPs, up to the design capture volume, must be treated using LID biofiltration. Where regional LID implementation has been shown to be technically infeasible (per section F.1.d.7.b) any volume up to and including the design capture volume, not retained by LID BMPs, nor treated by LID biofiltration, must be treated using conventional treatment control BMPs in accordance with Section F.1.d.(6) and participation in the LID waiver program in Section F.1.d.(7).~~

Comment [JEU26]: Specific to OC. Our understanding is that the Permit already allows regional solutions.

e. BMP CONSTRUCTION VERIFICATION

Prior to occupancy and/or intended use of any portion of the Priority Development Project subject to SSMP requirements, each Copermittee must inspect the constructed site design, source control, and treatment control BMPs applicable to that portion of the project to verify that they have been constructed and are operating in compliance with all specifications, plans, permits, ordinances, and this Order.

f. BMP MAINTENANCE TRACKING

(1) Inventory of SSMP projects: Each Copermittee must develop and maintain a watershed-based database to track and inventory all projects constructed within their jurisdiction, that have a final SSMP (SSMP projects), and the structural~~approved~~ post-construction BMPs implemented therein. SUSMP projects built pursuant to order R9-2004-001 must also be tracked. ~~and BMP maintenance within its jurisdiction since July, 2005~~. LID BMPs implemented on a lot by lot basis ~~at a single family residential home~~, such as rain barrels, are not required to be tracked or inventoried. At a minimum, the database must include information on BMP type, location, watershed, ~~date of construction~~, party responsible for maintenance, dates and findings of maintenance ~~certifications or~~ verifications, -and any vector or nuisance problems. ~~inspections, inspection findings, and corrective actions, including whether the site was referred to the local vector control agency or department.~~

(2) Each Copermittee must establish a mechanism not only to track Priority Development Projects, and the structural post-construction BMPs implemented therein, but also to ensure that appropriate easements and ownerships are properly recorded in public records and the information is conveyed to all appropriate parties when there is a change in project or site ownership.

(3) Each Copermittee must verify that ~~approved~~ structural post-construction BMPs on the inventoried SSMP projects~~are operating effectively and~~ have been adequately maintained by implementing the following measures:

~~(a) An annual inventory of all approved BMPs within the Copermittee's jurisdiction. LID BMPs implemented on a lot by lot basis at a single family residential home, such as rainbarrels, are not required to be tracked or inventoried. The inventory must also include all BMPs approved for Priority Development Projects since July, 2005;~~

(a) The designation of 'high ~~priority~~ maintenance' SSMP Projects~~BMPs~~. 'High-~~priority~~ maintenance' designation must include consideration of land

Comment [CP27]: Changes are to allow a single database to be created for the Santa Ana and Santa Margarita watersheds, and a uniform program to be implemented county-wide. This will allow the Copermittees to comply in a more cost-effective manner and avoid confusion.

Comment [CP28]: Belongs in F.1.d.(9) above.

Comment [CP29]: We can't verify that they are 'operating'. All we can do is verify that they have been constructed correctly (pursuant to F.1.e) and that they have been maintained correctly. This combination of verifications will ensure that they will be operational. References to 'operating' have been deleted throughout.

use type, BMP ~~size~~type and effectiveness at addressing the project's pollutants of concern, ~~-~~recommended BMP maintenance frequency and~~,~~ likelihood of operational and maintenance issues, ~~location, receiving water quality,~~ and other pertinent factors;

(b) Beginning X years after adoption of this order, each Copermittee must implement a program to ~~V~~verify implementation, ~~operation,~~ and maintenance of the required structural post-construction BMPs on the inventoried SSMP projects, by inspection, self-certification, surveys, or other equally effective approaches with the following conditions:

(i) At least 90% of Municipal SSMP projects must be verified annually.

(ii) At least 90% of 'high maintenance' SSMP projects must be verified annually.

(iii) All inventoried SSMP projects must be verified at least once every five years.

(iv) At the discretion of the Copermittee, the verifications may be coordinated with the facility inspections implemented pursuant to section F.3. of this order.

(v) For verifications performed through a means other than direct Copermittee inspection, adequate documentation must be submitted to the Copermittee to provide assurance that the required maintenance has been completed.

~~(i) The implementation, operation, and maintenance of at least 90 percent of approved and inventoried final project public and private SSMPs (a.k.a. WQMPs) must be verified annually. All post-construction BMPs shall be verified within every four year period;~~

~~(ii) Operation and maintenance verifications must be required prior to each rainy season;~~

~~(iii) All (100 percent) projects with BMPs that are high priority must be inspected by the Copermittee annually prior to each rainy season;~~

~~(iv) All (100 percent) public agency projects with BMPs must be inspected by the Copermittee annually;~~

~~(v) At least 50 percent of projects with drainage insert treatment control BMPs must be inspected by the Copermittee annually;~~

(vi) Appropriate follow-up measures (including re-inspections, enforcement, maintenance, etc.) must be conducted to ensure the treatment BMPs continue to reduce storm water pollutants as originally designed;

~~(vii) All inspections must verify effective operation and maintenance of the treatment control BMPs, as well as compliance with all ordinances,~~

~~permits, and this Order; and~~

(vii) Inspections must note observations of vector conditions, such as mosquitoes. Where conditions are identified as contributing to mosquito production, the Copermittee must notify their local vector control agency.

Comment [CP30]: The Copermittees may conduct BMP inspections/certifications independently of PDP Commercial/Industrial Inspections. Keep the two separate so that the Permittees can find the most cost-effective and protective approach to address the Permit.

g. ENFORCEMENT OF DEVELOPMENT SITES

Comment [CP31]: Entire section F.1. of the permit is Development '*Planning*'. Enforcement belongs in the construction and existing development sections, not here.

Each Copermittee must enforce its storm water ordinance for all Development Projects ~~and at all development sites~~ as necessary to maintain compliance with this Order. Copermittee ordinances or other regulatory mechanisms must include appropriate sanctions to achieve compliance. Sanctions must include the following or their equivalent: Non-monetary penalties, fines, ~~bonding requirements,~~ and/or permit or occupancy denials for non-compliance.

Comment [CP32]: Term has no meaning outside of Development Projects

Comment [CP33]: These are ineffective for enforcement purposes as it is too difficult to actually pull them.

h. HYDROMODIFICATION – LIMITATIONS ON INCREASES OF RUNOFF DISCHARGE RATES AND DURATIONS[14]

Each Copermittee shall collaborate with the other Copermittees to develop and implement a Hydromodification Management Plan (HMP) to manage increases in runoff discharge rates and durations from all Priority Development Projects. The HMP shall be incorporated into the local SSMP and implemented by each Copermittee so that estimated post-project runoff discharge rates and durations shall not exceed pre-development discharge rates and durations. Where the proposed project is located on an already developed site, the pre-project discharge rate and duration shall be that of the pre-developed, naturally occurring condition. The HMP shall be submitted to the Executive Officer within 2 years of permit adoption. The HMP will be made available for public review and comment and the Executive Officer will determine the need for a public hearing.

(1) The HMP must:

(a) Identify a method for assessing susceptibility of channel segments which receive runoff discharges from Priority Development Projects. The geomorphic stability within the channel shall be assessed. A performance standard shall be created that ensures that the geomorphic stability within the channel not be compromised as a result of receiving runoff discharges from Priority Development Projects.

[14] Updated SSMP and hydromodification requirements shall apply to all priority projects or phases of priority projects which have not yet begun grading or construction activities at the time any updated SSMP or hydromodification requirement commences. If a Copermittee determines that lawful prior approval of a project exists, whereby application of an updated SSMP or hydromodification requirement to the project is legally infeasible, the updated SSMP or hydromodification requirement need not apply to the project. The Copermittees shall utilize the SSMP and hydromodification update periods to ensure that projects undergoing approval processes include application of the updated SSMP and hydromodification requirements in their plans.

(b) Utilize continuous simulation of the entire rainfall record (or other analytical method proposed by the Copermittees and deemed acceptable by the San Diego Water Board) to identify a range of runoff flows[15] for which priority Development Project post-project runoff flow rates and durations shall not exceed pre-development (naturally occurring) runoff flow rates and durations by more than 10 percent, where the increased flow rates and durations will result in increased potential for erosion or other significant adverse impacts to beneficial uses. In addition, the identified range of runoff flow rates and durations must compensate for the loss of sediment supply due to the development. The lower boundary of the range of runoff flows identified shall correspond with the critical channel flow that produces the critical shear stress that initiates channel bed movement or that erodes the toe of channel banks. The identified range of runoff flows may be different for specific watersheds, channels, or channel reaches. In the case of an artificially hardened (concrete lined, rip rap, etc.) channel, the lower boundary of the range of runoff flows identified shall correspond with the critical channel flow that produces the critical shear stress that initiates channel bed movement or that erodes the toe of channel banks of a comparable soft-bottomed channel.

(c) Require Priority Development Projects to implement hydrologic control measures so that Priority Development Projects' post-project runoff flow rates and durations (1) do not exceed pre-project (naturally occurring) runoff flow rates and durations by more than 10 percent for the range of runoff flows identified under section F.1.h.(1)(b), where the increased flow rates and durations will result in increased potential for erosion or other significant adverse impacts to beneficial uses; (2) do not result in channel conditions which do not meet the channel standard developed under section F.1.h.(1)(a) for channel segments downstream of Priority Development Project discharge points; and (3) compensate for the loss of sediment supply due to development.

(d) Include other performance criteria (numeric or otherwise) for Priority Development Projects as necessary to prevent runoff from the projects from increasing and/or continuing unnatural rates of erosion of channel beds and banks, silt pollutants generation, or other impacts to beneficial uses and stream habitat due to increased erosive force.

(e) Include a review of pertinent literature.

(f) Identify areas within the Santa Margarita Hydrologic Unit where historic hydromodification of receiving waters has a negative impact to benthic

[15] The identified range of runoff flows to be controlled should be expressed in terms of peak flow rates of rainfall events, such as "10% of the pre-development 2-year runoff event up to the pre-project 10-year runoff event."

macroinvertebrate and benthic periphyton by identifying areas with low or very low Index of Biotic Integrity (IBI) scores.

(g) Include a protocol to evaluate potential hydrograph change impacts to downstream watercourses from Priority Development Projects. This protocol must include the use of the IBI score as a metric for assessing impacts and improvements to downstream watercourses.

(h) Include a description of how the Copermittees will incorporate the HMP requirements into their local approval processes.

(i) Include criteria on selection and design of management practices and measures (such as detention, retention, and infiltration) to control flow rates and durations and address potential hydromodification impacts.

(j) Include technical information supporting any standards and criteria proposed.

(k) Include a description of inspections and maintenance to be conducted for management practices and measures to control flow rates and durations and address potential hydromodification impacts.

(l) Include a description of pre- and post-project monitoring and other program evaluation, including IBI score, to be conducted to assess the effectiveness of implementation of the HMP.

(m) Include mechanisms for assessing and addressing cumulative impacts within a watershed on channel morphology.

(n) Include information on evaluation of channel form and condition, including slope, discharge, vegetation, underlying geology, and other information, as appropriate.

(2) In addition to the hydrologic control measures that must be implemented per section F.1.h.(1)(c), the HMP must include a suite of management measures to be used on Priority Development Projects to protect and restore downstream beneficial uses and prevent or further prevent adverse physical changes to downstream channels. The measures must be based on a prioritized consideration of the following elements in this order:

(a) Hydrologic control measures;
(b) On-site management controls;
(c) Regional controls located upstream of receiving waters; and
(d) In-stream controls.

Where stream channels are adjacent to, or are to be modified as part of a

Priority Development Project, management measures must include buffer zones and setbacks. Under no circumstances will in-stream controls include the use of non-naturally occurring hardscape materials such as concrete, riprap, gabions, etc. The suite of management measures shall also include stream restoration as a viable option to achieve the channel standard in section F.1.h.(1)(a).

(3) Each individual Copermittee has the discretion to not require Section F.1.h. at Priority Development Projects where the project:

(a) Discharges storm water runoff into underground storm drains discharging directly to bays or the ocean; or
(b) Discharges storm water runoff into conveyance channels whose bed and bank are concrete lined all the way from the point of discharge to ocean waters, enclosed bays, estuaries, or water storage reservoirs and lakes.

(4) HMP Reporting and Implementation

(a) Within 2 years of adoption of the Order, the Copermittees shall submit to the San Diego Water Board a draft HMP that has been reviewed by the public, including the analysis that identifies the appropriate limiting range of flow rates per section F.1.h.(1)(b).

(b) Within 180 days of receiving San Diego Water Board comments on the draft HMP, the Copermittees shall submit a final HMP that addressed the San Diego Water Board's comments.

(c) Within 90 days of receiving a finding of adequacy from the Executive Officer, each Copermittee shall incorporate and implement the HMP for all Priority Development Projects.

(d) Prior to approval of the HMP by the San Diego Water Board, the early implementation measures likely to be included in the HMP shall be encouraged by the Copermittees.

(5) <u>Interim Hydromodification Criteria</u>

Within one year of adoption of this Order, each Copermittee must ensure that all Priority Development Projects are implementing the following criteria by comparing the pre-development (naturally occurring) and post-project flow rates and durations using a continuous simulation hydrologic model such as US EPA's Hydrograph Simulation Program-Fortran (HSPF):

(a) For flow rates from 10 percent of the 2-year storm event to the 5 year storm event, the post-project peak flows shall not exceed pre-development (naturally occurring) peak flows.

(b) For flow rates from the 5 year storm event to the 10 year storm event the post-project peak flows may exceed pre-development (naturally occurring) flows by up to 10 percent for a 1-year frequency interval.

The interim hydromodification criteria do not apply to Priority Development Projects where the project discharges (1) storm water runoff into underground storm drains discharging directly to bays or the ocean, or (2) storm water runoff into conveyance channels whose bed and bank are concrete lined all the way from the point of discharge to ocean waters, enclosed bays, estuaries, or water storage reservoirs and lakes.

Within one year of adoption of this Order, each Copermittee must submit a signed, certification statement to the San Diego Water Board verifying implementation of the interim hydromodification criteria.

(6) No part of section F.1.h shall alleviate the Copermittees responsibilities for implementing Low Impact Development BMPs as required under section F.1.d.(4).

i. TRAINING AND EDUCATION

(1) Municipal Departments and Personnel Education

Municipal Development Planning: Each Copermittee must implement an education program so that its planning and development review staffs and contractors (and Planning Boards and Elected Officials, if applicable) have an understanding of:

(a) Federal, State, and local water quality laws and regulations applicable to Development Projects;

(b) The connection between land use decisions and short and long-term water quality impacts (i.e., impacts from land development and urbanization); and

(c) Methods of minimizing impacts to receiving water quality resulting from development, including:

(i) Storm water management plan development and review;
(ii) Local sensitive water bodies, including 303(d)-impairments and ESAs;
(iii) Methods to control downstream erosion impacts;
(iv) Identification of pollutants of concern;
(v) Site design BMP techniques;
(vi) Source control BMPs;
(vii) Selection of the most effective treatment control BMPs for the

pollutants of concern; and
(viii) Public heath concerns related to storm water management infrastructure.

(2) Project Applicants, Developers, Contractors, Property Owners, and other Responsible Parties

(a) Each Copermittee must implement a New Development / Redevelopment education program using all media as appropriate to:

(i) Measurably increase the knowledge of the target communities regarding MS4s, impacts of runoff on receiving waters, and potential BMP solutions for the target audience; and
(ii) To measurably change the behavior of target communities and thereby reduce pollutant releases to MS4s and the environment.

(b) Each Copermittee must educate each target community on the following topics where appropriate:

(i) The importance of educating all construction workers in the field about storm water issues and BMPs though formal or informal training;
(ii) Federal, State, and local water quality laws and regulations applicable to new development and redevelopment activities;
(iii) Site design, source control, pollution prevention, and treatment BMPs;
(iv) General runoff concepts; and
(v) Other topics of local importance, including local water quality conditions, impaired waterbodies and environmentally sensitive areas.

2. CONSTRUCTION COMPONENT

Each Copermittee must implement a construction program which meets the requirements of this section~~,~~ to prevent~~s~~ illicit discharges into the MS4, implement~~s~~ and maintain~~s~~ structural and non-structural BMPs to reduce pollutants in storm water runoff from construction sites to the MS4, reduce~~s~~ construction site discharges of storm water pollutants from the MS4 to the MEP, and prevent~~s~~ construction site discharges from the MS4 from causing or contributing to a violation of water quality standards.

a. ORDINANCE UPDATE

Within 365 days of adoption of this Order, each Copermittee must review and update its grading ordinances and other ordinances as necessary to achieve full compliance with this Order, including requirements for the implementation of all designated BMPs and other measures.

b. SOURCE IDENTIFICATION

Each Copermittee must maintain an updated watershed based inventory of all construction sites within its jurisdiction. The use of an automated database system, such as Geographical Information Systems (GIS) is ~~required~~encouraged.

c. SITE PLANNING AND PROJECT APPROVAL PROCESS

Each Copermittee must incorporate consideration of potential water quality impacts prior to approval and issuance of construction and grading permits.

(1) Each construction and grading permit must require proposed construction sites to implement designated BMPs and other measures so that illicit discharges into the MS4 are prevented and storm water pollutants discharged from the site will be reduced to the maximum extent practicable ~~and will not cause or contribute to a violation of water quality standards~~.

(2) Prior to permit issuance, the Copermittee must inform the project proponent~~'s runoff management plan (or equivalent construction BMP plan) must be required to comply, and reviewed to verify compliance, with~~ of the applicable requirements of the local grading ordinance, other applicable local ordinances, and this Order that they will be required to comply with during construction.

(3) Prior to permit issuance, each Copermittee must verify that project proponents subject to California's statewide General NPDES Permit for Storm Water Discharges Associated With Construction Activities, (hereinafter General Construction Permit), have existing coverage under the General Construction Permit.

d. BMP IMPLEMENTATION

(1) Designate BMPs: Each Copermittee must designate a minimum set of BMPs and other measures to be implemented at all construction sites. The designated minimum set of BMPs must include:

(a) Management Measures:

(i) Pollution prevention, where appropriate;
(ii) ~~Development and implementation of a site-specific runoff management plan~~;
(iii) Minimization of areas that are cleared and graded to only the portion of the site that is necessary for construction;
(iv) Minimization of exposure time of disturbed soil areas;
(v) Minimization of grading during the wet season and correlation of grading with seasonal dry weather periods to the extent feasible;

(vi) Limitation of grading to a maximum disturbed area as determined by each Copermittee before either temporary or permanent erosion controls are implemented to prevent storm water pollution. The Copermittee has the option of temporarily increasing the size of disturbed soil areas by a set amount beyond the maximum, if the individual site is in compliance with applicable storm water regulations and the site has adequate control practices implemented to prevent storm water pollution;
(vii) Temporary stabilization and reseeding of disturbed soil areas as rapidly as feasible;
(viii) Wind erosion controls;
(ix) Tracking controls;
(x) Non-stormwater management measures to prevent illicit discharges and control storm water pollution sources;
(xi) Waste management measures;
(xii) Preservation of natural hydrologic features where feasible;
(xiii) Preservation of riparian buffers and corridors where feasible;
(xiv) Evaluation and maintenance of all BMPs, until removed; and
(xv) Retention, reduction, and proper management of all storm water pollutant discharges on site to the MEP standard.

(b) Erosion and Sediment Controls:

(i) Erosion prevention. Erosion prevention is to be used as the most important measure for keeping sediment on site during construction;
(ii) Sediment controls. Sediment controls are to be used as a supplement to erosion prevention for keeping sediment on-site during construction;
(iii) Slope stabilization must be used on all active slopes during rain events regardless of the season and on all inactive slopes during the rainy season and during rain events in the dry season; and
(iv) Permanent revegetation or landscaping as early as feasible.

(c) ~~Designate enhanced BMPs[16] for 303(d) impairments and ESAs:~~ Each Copermittee must implement, or require implementation of, enhanced measures to address the exceptional threat to water quality posed by all construction sites tributary to CWA section 303(d) water body segments impaired for sediment or turbidity. Each Copermittee must also implement, or require implementation of, enhanced, site-specific measures for construction sites within or adjacent to or discharging directly to receiving waters within environmentally sensitive areas (as defined in Attachment C of this Order).

~~[16] Enhanced BMPs are control actions specifically targeted to the pollutant or condition of concern and of higher quality and effectiveness than the minimum control measures otherwise required. Enhanced in this Order means better, not simply more, BMPs.~~

~~(i) Active Sediment Treatment (AST): Each Copermittee must require implementation of advanced treatment for sediment at construction sites (or portions thereof) that are determined by the Copermittee to be an exceptional threat to water quality. In evaluating the threat to water quality, the following factors must be considered by the Copermittee:~~

~~[a] Soil erosion potential or soil type;~~
~~[b] The site's slopes;~~
~~[c] Project size and type;~~
~~[d] Sensitivity of receiving water bodies;~~
~~[e] Proximity to receiving water bodies;~~
~~[f] Non-storm water discharges;~~
~~[g] Ineffectiveness of other BMPs;~~
~~[h] Proximity and sensitivity of aquatic threatened and endangered species of concern;~~
~~[i] Known effects of AST chemicals; and~~
~~[j] Any other relevant factors.~~

(d) Implement BMPs: Each Copermittee must implement, or require the implementation of, the designated minimum BMPs and any additional measures necessary to comply with this Order at each construction site within its jurisdiction year round. BMP implementation requirements, however, can vary based on wet and dry seasons. Dry season BMP implementation must plan for and address unseasonal rain events that may occur during the dry season (May 1 through September 30).

e. INSPECTION OF CONSTRUCTION SITES

Each Copermittee must conduct construction site inspections for compliance with its ordinances (grading, storm water, etc.), permits (construction, grading, etc.), and this Order. Priorities for inspecting sites must consider the nature and size of the construction activity, topography, and the characteristics of soils and receiving water quality.

(1) During the wet season, each Copermittee must inspect at least every ~~two weeks~~month, all construction sites within its jurisdiction meeting any of the following criteria:

(a) All sites ~~30~~ 50 acres or more in size with rough grading or active slopes occurring during the wet season;

(b) All sites one acre or more, and tributary to[17] a CWA section 303(d) water body segment impaired for sediment or within ~~or directly adjacent to,~~ or

[17] 'Tributary to' is considered to be within the same Hydrologic Sub Area.

Comment [CP34]: Changed to allow inspectors to focus on follow-up inspections and enforcement on sites that are found to be out of compliance. Change is also consistent with the Santa Ana permit requirements which will allow for more consistent and effective implementation of the program.

Comment [CP35]: Consistent with the 2004 SMR Permit and the 2009 Santa Ana permit. See also comments on the Fact sheet.

Comment [CP36]: What matters is that the project is discharging to the Receiving Waters within the ESA. This section should not apply to projects that may be 'adjacent' to, but do not discharge into the receiving waters within the ESA.

discharging directly to a receiving water within an ESA; and

(c) Other sites determined by the Copermittees or the San Diego Water Board as a significant threat to water quality. In evaluating threat to water quality, the following factors must be considered: (1) soil erosion potential; (2) site slope; (3) project size and type; (4) sensitivity of receiving water bodies; (5) proximity to receiving water bodies; (6) non-storm water discharges; (7) known past record of non-compliance by the operators of the construction site; and (8) any other relevant factors.

(2) During the wet season, each Copermittee must inspect at least ~~monthly~~twice during the wet season, all construction sites with one acre or more of soil disturbance not meeting the criteria specified above in section F.2.e.(1).

Comment [CP37]: Changed to be consistent with the Santa Ana permit, and to allow inspectors to focus on follow-up inspections and enforcement on sites that are found to be out of compliance.

(3) During the wet season, each Copermittee must inspect construction sites less than one acre in size as needed to ensure compliance with its ordinances and this Order.

(4) Each Copermittee must inspect all construction sites as needed during the dry season. Sites meeting the criteria in section F.2.e.(1) must be inspected at least once in August or September each year.

(5) Re-inspections: Based upon site inspection findings, each Copermittee must implement all follow-up actions (i.e., re-inspection, enforcement) necessary to comply with this Order. Reinspection frequencies must be determined by each Copermittee based upon the severity of deficiencies, the nature of the construction activity, and the characteristics of soils and receiving water quality.

(6) Inspections of construction sites must include, but not be limited to:

(a) ~~Check for coverage under the General Construction Permit (Notice of Intent (NOI) and/or Waste Discharge Identification No.) during initial inspections~~;

Comment [CP38]: This is already performed under F.2.c.(3). No need to repeat

(b) Assessment of compliance with Copermittee ordinances and permits related to runoff, including the implementation and maintenance of designated minimum BMPs;
(c) Assessment of BMP effectiveness;
(d) Visual observations for non-storm water discharges, potential illicit connections, and potential discharge of pollutants in storm water runoff;
(e) ~~Review of site monitoring data, if the site monitors its runoff~~;
(f) Education and outreach on storm water pollution prevention, as needed; and
(g) Creation of a written or electronic inspection report.

Comment [CP39]: This is a NEW requirement that is not applicable to compliance with our ordinances. This only has utility in enforcing the CGP, which is the responsibility of the Water Board.

(7) The Copermittees must track the number of inspections for each inventoried

construction site throughout the reporting period to verify that each site is inspected at the minimum frequencies required.

f. ENFORCEMENT OF CONSTRUCTION SITES

(1) Each Copermittee must develop and implement an escalating enforcement process ~~that~~ to achieve~~s~~ prompt corrective actions at construction sites for violations of the Copermittee's water quality protection permits, requirements, and ordinances. This enforcement process must include authorizing the Copermittee's construction site inspectors to take immediate enforcement actions when appropriate and necessary. The enforcement process must include appropriate sanctions such as stop work orders, non-monetary penalties, fines, bonding requirements, and/or permit denials for non-compliance.

Comment [CP40]: Concern for undue liability on the Copermittees if a contractor does not promptly correct the site despite appropriate Copermittee enforcement.

'that achieves' could imply that if the Contractor is not prompt in implementing corrective actions, that ***we*** are in violation.

(2) Each Copermittee must be able to respond to construction site related complaints received from third-parties and to ensure the San Diego Water Board that appropriate corrective actions have been implemented.

g. REPORTING OF NON-COMPLIANT SITES

(1) In addition to the notification requirements in Attachment B, each Copermittee must notify the San Diego Water Board when the Copermittee issues a ~~stop work order or other~~ high level enforcement (as defined in the Copermittee's JRMP) to a construction site in its jurisdiction as a result of ~~storm water~~ violations of their storm water ordinances.

(2) Each Copermittee shall annually notify the San Diego Water Board, prior to the commencement of the wet season, of all construction sites with alleged violations that pose a significant threat to water quality. Information may be provided as part of the JRMP annual report if submitted prior to the rainy season. Information provided shall include, but not be limited to, the following:

Comment [CP41]: More streamlined approach to focus notifications on those sites whose alleged violations are posing a significant threat to water quality, rather than sites that have been issued minor corrections.

(a) WDID number if enrolled under the General Construction Permit
(b) Site Location, including address
(c) Current violations or suspected violations

~~**h. TRAINING AND EDUCATION**~~

~~(1) Municipal Staff and Contractors: Requirements for municipal staff and contractors are described in the Municipal Component section of this Order.~~

~~(2) Construction Site Owner / Operator Responsibilities:~~

~~As early in the planning and development process as possible and all through~~

~~the permitting and construction process, each Copermittee must implement a program to educate project applicants, developers, contractors, property owners, and other responsible parties. The education program must provide an understanding of the topics listed below, as appropriate for the audience being educated.~~

(d) The importance of educating all construction workers in the field about storm water issues and BMPs though formal or informal training;
(e) Federal, State, and local water quality laws and regulations applicable to construction and grading activities;
(f) Site design, source control, pollution prevention, and treatment BMPs;
(g) General runoff concepts; and
(h) Other topics of local importance, including local water quality conditions, impaired waterbodies and environmentally sensitive areas.

3. EXISTING DEVELOPMENT COMPONENT

~~a.~~ MUNICIPAL

Each Copermittee must implement a municipal program for the Copermittee's facilities and activities which meets the requirements of this section, to~~,~~ prevent~~s~~ illicit discharges into the MS4, reduce~~s~~ municipal discharges of storm water pollutants from the MS4 to the MEP, and prevent~~s~~ municipal discharges from the MS4 from causing or contributing to a violation of water quality standards.

(1) Source Identification / Inventory

Each Copermittee must maintain an updated ~~watershed-based~~ inventory of all their municipal areas and activities that have the potential to discharge pollutants. The inventory must include the name, address (if applicable), and a description of the area/activity; which pollutants are potentially generated by the area/activity; whether the area/activity is adjacent to an ESA; and identification of whether the area/activity is tributary to a CWA section 303(d) water body segment and generates pollutants for which the water body segment is impaired. Linear facilities such as roads, streets, highways do not need to be individually inventoried. The use of an automated database system, such as Geographical Information Systems (GIS) is ~~required when applicable.~~encouraged.

(2) General BMP Implementation

(a) Pollution Prevention: Each Copermittee must implement pollution prevention methods in its municipal program and must require their use by appropriate municipal departments, personnel, and contractors, where appropriate.

(b) Designate Minimum BMPs: Each Copermittee must designate a minimum set of BMPs for their pollutant generating~~all municipal~~ areas and activities. The designated minimum BMPs for municipal areas and activities must be area or activity specific as appropriate. BMPs must be designated for

special events that are expected to generate significant trash and litter.

(c) Designate BMPs for ESAs and 303(d) Impairments: Each Copermittee must designate enhanced measures for their municipal areas and activities tributary to CWA section 303(d) impaired water body segments when an area or activity generates pollutants for which the water body segment is impaired. Each Copermittee must also designate additional controls for their municipal areas and activities within or directly adjacent to or discharging directly to ~~coastal lagoons, the ocean, or other~~ receiving waters within environmentally sensitive areas (as defined in Attachment C of this Order) as necessary to comply with this Order.

Comment [CMP42]: Consistent with 2004 Permit. Recognizes that need to address ESA may be situational (e.g. adjacent to ESA but no pollutant transport potential)

(d) Implement BMPs: Each Copermittee must implement, or require the implementation of, the applicable designated minimum and/or enhanced BMPs, and any additional measures necessary based on its inventory to comply with this Order for each municipal area or activity within its jurisdiction that has the potential to discharge pollutants.

(3) BMP Implementation for Management of Pesticides, Herbicides, and Fertilizers

Each Copermittee must implement BMPs to reduce the contribution of storm water pollutants to the MEP associated with the application, storage, and disposal of pesticides, herbicides and fertilizers from their municipal areas and activities to MS4s and receiving waters. Such BMPs must include, at a minimum:

(a) Educational activities, permits, certifications and other measures for municipal applicators and distributors;
(b) Integrated Pest Management (IPM) measures that rely on non-chemical solutions;
(c) The use of native vegetation;
(d) Schedules for irrigation and chemical application; and
(e) The collection and proper disposal of unused pesticides, herbicides, and fertilizers.

(4) BMP implementation for Flood Control Structures

(a) Each Copermittee must implement procedures to assure that new flood management projects assess the impacts on the water quality of receiving water bodies.
(b) Each Copermittee must include water quality protection measures, where feasible, when retrofitting existing flood control structural devices.
(c) Each Copermittee must evaluate its existing flood control structural devices as part of ongoing routine maintenance to~~,~~ identify devices causing or contributing to a condition of pollution, and identify, and where

feasible implement measures to reduce or eliminate the device's~~structure's~~ effect on pollution.~~, and evaluate the feasibility of retrofitting the structural flood control device. The inventory and evaluation must be completed by and submitted to the San Diego Water Board in the 2nd year JRMP Annual Report.~~

(5) BMP Implementation for Sweeping of Municipal Areas

Where municipal area sweeping is implemented as an MS4 BMP for municipal roads, streets, highways, and parking facilities, the~~each~~ Copermittee must design and implement the program based on the following criteria:

(a) Optimize pickup of trash and debris based on land uses, trash collection schedules, seasonal factors (e.g., special events, tourism, etc.) and inspections of municipal areas/activities.

(6) Operation and Maintenance of Municipal Separate Storm Sewer System (MS4) and Treatment ~~Structural~~ Controls

Comment [CMP43]: For consistency with subheadings

(a) Treatment Controls: Each Copermittee must implement a schedule of inspection and maintenance activities to verify proper operation of all their municipal structural treatment controls designed to reduce storm water pollutant discharges to or from its MS4s and related drainage structures.

(b) MS4~~ and Facilities~~: Each Copermittee must implement a schedule of maintenance activities for their~~the~~ MS4 ~~and MS4 facilities~~ (including catch basins, storm drain inlets, open channels, etc). The maintenance activities must, at a minimum, include:

(i) Inspection and removal of accumulated waste at least once a year between May 1 and September 30 of each year for Permittee catch basins and storm drain inlets; ~~all MS4 facilities;~~

Comment [CP44]: Consistent with 2004 permit

(ii) Additional catch basin and storm drain inlet cleaning as necessary between October 1 and April 30 of each year ~~for facilities that receive or collect high volumes of trash and debris;~~

(iii) Following two years of inspections, any MS4 catch basin or storm drain inlet~~facility~~ that requires inspection and cleaning less than annually may be inspected as needed, but not less than~~that~~ every other year;

(iv) Open channels and basins must be cleaned of observed anthropogenic litter in a timely manner;

(v) Maintenance activities within open channels must not adversely impact beneficial uses;

(vi) Record keeping of the maintenance and cleaning activities including the overall quantity of waste removed;

(vii) Proper disposal of waste removed pursuant to applicable laws; and

(viii) Measures to eliminate waste discharges during MS4 maintenance and cleaning activities.

(7) Infiltration From Sanitary Sewer to MS4/Provide Preventive Maintenance of Both

Comment [CMP45]: This section is a new requirement and is not applicable in the SMR as the Permittees do not own nor operate any Sewer systems. Request deletion of this section.

(a) Each Copermittee must implement controls and measures to prevent and eliminate infiltration of seepage from municipal sanitary sewers to MS4s through thorough, routine preventive maintenance of the MS4. Each Copermittee that operates both a municipal sanitary sewer system and a MS4 must implement controls and measures to prevent and eliminate infiltration of seepage from the municipal sanitary sewers to the MS4s that must include overall sanitary sewer and MS4 surveys and thorough, routine preventive maintenance of both.

(b) Each Copermittee must implement controls to limit infiltration of seepage from municipal sanitary sewers to municipal separate storm sewer systems where necessary. Such controls must include:

(i) Adequate plan checking for construction and new development,
(ii) Incident response training for municipal employees that identify sanitary sewer spills;
(iii) Code enforcement inspections;
(iv) MS4 maintenance and inspections;
(v) Interagency coordination with sewer agencies; and
(vi) Proper education of municipal staff and contractors conducting field operations on the MS4 or municipal sanitary sewer (if applicable).

(8) Inspection of Municipal Areas and Activities

(a) At a minimum, each Copermittee must inspect the following high priority municipal areas and activities annually:

(i) Roads, Streets, Highways, and Parking Facilities;
~~(ii) Flood Management Projects and Flood Control Devices;~~

Comment [CMP46]: Conflicts with (6)(b).

(ii) Areas and activities tributary to a CWA section 303(d) impaired water body segment, where an area or activity generates pollutants for which the water body segment is impaired.
(iii) Areas and activities within or ~~adjacent to or~~ discharging directly to receiving waters within environmentally sensitive areas (as defined in Attachment C of this Order);

Comment [CMP47]: What matters is that it is discharging to receiving waters within the ESA. You could have a facility/activity adjacent to an ESA that doesn't discharge to the ESA.

(iv) Municipal Facilities:
[a] Active or closed municipal landfills;
[b] Publicly owned treatment works (including water and wastewater treatment plants) and sanitary sewage collection systems;
[c] Solid waste transfer facilities;

[d] Land application sites;
[e] Corporate yards including maintenance and storage yards for materials, waste, equipment and vehicles; and
[f] Household hazardous waste collection facilities.

(v) Municipal airfields;
(vi) Parks and recreation facilities;
(vii) Special event venues following special events (festivals, sporting events, etc.);
(viii) Power washing facilities; and
(ix) Other municipal areas and activities that the Copermittee determines may contribute a significant pollutant load to the MS4.

(b) Other municipal areas and activities must be inspected as needed and in response to water quality data, valid public complaints, and findings from municipal or contract staff.

(c) Based upon site inspection findings, each Copermittee must implement all follow-up actions necessary to comply with this Order.

(9) Enforcement of Municipal Areas and Activities

Each Copermittee must enforce its storm water ordinance for all their municipal areas and activities as necessary to maintain compliance with this Order.

(10) Training and Education

Each Copermittee must ensure that all their municipal personnel and contractors that have responsibilities for selecting, implementing, and evaluating BMPs for their municipal areas and activities are adequately trained and educated to perform such tasks.

(a) Municipal Departments and Personnel Education

(i) Municipal Construction Activities: Each Copermittee must implement an education program that includes annual training prior to the rainy season so that its staff responsible for construction activities (e.g. construction, building, code enforcement, ~~and~~ grading review staffs, inspectors, and other responsible construction staff) have, at a minimum, an understanding of the following topics, as appropriate for the target audience:

[a] Applicable ~~Federal, State, and local~~ water quality laws and regulations applicable to construction and grading activities conducted by the target audience;

Comment [CMP48]: Based on our experience, all people need to know is that there are laws.

[b] The connection between construction activities and water quality

impacts (i.e., impacts from land development and urbanization and impacts from construction material such as sediment);

[c] Proper implementation of erosion and sediment control and other BMPs to minimize the impacts to receiving water quality resulting from construction activities;

[d] The Copermittee's inspection, plan review, and enforcement policies and procedures to verify consistent application; where regional training is offered, the training shall focus on the DAMP's generalized inspection, plan review and enforcement policies and procedures;

[e] Current advancements in BMP technologies;

[f] SSMP Requirements including treatment options, site design, source control, and applicable tracking mechanisms; and

[g] Other topics of local importance, including local water quality conditions, impaired water bodies, environmentally sensitive areas, and public health and disease vector issues associated with runoff.

Comment [U49]: We do regionalized training. This level of detail can not be captured in a joint class.

(ii) Municipal Industrial/Commercial Activities Inspectors: Each Copermittee must train staff responsible for conducting storm water compliance inspections and enforcement of industrial and commercial facilities at least once a year. Training must cover inspection and enforcement procedures, BMP implementation, and review of monitoring data

(iii) Municipal Other Activities: Each Copermittee must implement an education program so that their municipal personnel and contractors performing activities which generate pollutants have an understanding of the activity specific BMPs for each activity to be performed.

b. COMMERCIAL / INDUSTRIAL

Each Copermittee must implement a commercial / industrial program that meets the requirements of this section~~,~~ to prevent~~s~~ illicit discharges into the MS4, reduce~~s~~ commercial / industrial discharges of storm water pollutants from the MS4 to the MEP, and prevent~~s~~ commercial / industrial discharges from the MS4 from causing or contributing to a violation of water quality standards.

(1) Source Identification

(a) Each Copermittee must maintain an updated watershed-based inventory of all industrial and commercial sites/sources within its jurisdiction (regardless of ownership) that could contribute a significant pollutant load to the MS4. The inventory must include the following minimum information for each industrial and commercial site/source: name; address; pollutants potentially generated by the site/source; and identification of whether the site/source is tributary to a Clean Water Act

section 303(d) water body segment and generates pollutants for which the water body segment is impaired; and a narrative description including SIC codes which best reflects the principal products or services provided by each facility.

At a minimum, the ~~following~~ sites/sources listed below must be included in the inventory. Where the required inventory includes sites or information that was not required under Order R9-2004-001, the new required sites/information must be added to the Copermittee's inventory within X years. ~~:~~

(i) Commercial Sites/Sources:

[a] Automobile repair, maintenance, fueling, or cleaning;
[b] Airplane repair, maintenance, fueling, or cleaning;
[c] Boat repair, maintenance, fueling, or cleaning;
[d] Equipment repair, maintenance, fueling, or cleaning;
[e] Automobile and other vehicle body repair or painting;
[f] Mobile automobile or other vehicle washing;
[g] Automobile (or other vehicle) parking lots and storage facilities;
[h] Retail or wholesale fueling;
[i] Pest control services;
[j] Eating or drinking establishments, including such establishments within food markets;
[k] Mobile carpet, drape or furniture cleaning;
[l] Cement mixing or cutting;
[m] Masonry;
[n] Painting and coating;
[o] ~~Botanical or zoological gardens and exhibits~~;
[p] Landscaping;
[q] Nurseries and greenhouses;
[r] Golf courses, parks and other recreational areas/facilities;
[s] Cemeteries;
[t] Pool and fountain cleaning;
[u] ~~Marinas~~;
[v] Portable sanitary services;
[w] ~~Building material retailers and storage~~;
[x] ~~Animal facilities~~Boarding facilities and kennels;
[y] Mobile pet services;
[z] Power washing services; and
[aa] Other sites and sources with a history of un-authorized discharges to the MS4.

Comment [CP50]: These have not been identified by the Copermittees as contributing a significant pollutant load to the MS4 and should be removed. This is an unnecessary new requirement.

Comment [CP51]: Not applicable

Comment [CP52]: These have not been categorically identified by the Copermittees as contributing a significant pollutant load to the MS4 and should be removed. This is an unnecessary new requirement.

(ii) Industrial Sites/Sources:

[a] Industrial Facilities, as defined at 40 CFR § 122.26(b)(14), including

those subject to the General Industrial Permit or other individual NPDES permit;

[b] Operating and closed landfills;

[c] Facilities subject to SARA Title III; and

[d] Hazardous waste treatment, disposal, storage and recovery facilities.

~~(iii)~~ ESAs and 303(d) Listed Waterbodies: All other commercial or industrial sites/sources tributary to a CWA Section 303(d) impaired water body segment, where the site/source generates pollutants for which the water body segment is impaired. ~~All other commercial or industrial sites/sources within or directly adjacent to or discharging directly to coastal lagoons, the ocean, or other receiving waters within environmentally sensitive areas (as defined in Attachment C of this Order).~~

(iii)

(iv) All other commercial or industrial sites/sources that the Copermittee determines may contribute a significant pollutant load to the MS4.

(2) General BMP Implementation

(a) Pollution Prevention: Each Copermittee must require the use of pollution prevention methods by the inventoried industrial and commercial sites/sources.

(b) Designate / Update Minimum BMPs: Each Copermittee must designate a minimum set of BMPs for all inventoried industrial and commercial sites/sources. Where BMPs have already been designated, each Copermittee must review its existing BMPs for adequacy. The designated minimum BMPs must be specific to facility types and pollutant-generating activities, as appropriate. The Copermittee may adjust the number and/or type of minimum BMPs that are required, provided that the goals of the Commercial/Industrial program are met.

(c) Designate Enhanced BMPs for ESAs and 303(d) Impairments: Each Copermittee must designate enhanced measures for inventoried industrial and commercial sites/sources tributary to CWA section 303(d) impaired water body segments (where a site/source generates pollutants for which the water body segment is impaired). Each Copermittee must also designate additional controls for industrial and commercial sites/sources within or directly adjacent to or discharging directly to ~~coastal lagoons, the ocean, or other~~ receiving waters within environmentally sensitive areas (as defined in Attachment C of this Order) as necessary to comply with this order. The Copermittee may adjust the number and/or type of enhanced BMPs that are required, provided that the goals of the Commercial/Industrial program are met.

Comment [JEU53]: This is a high cost-low return proposition. It is a significant effort and non-recoverable cost to determine which projects may be directly discharging or adjacent to receiving waters with ESAs. There are already over 30 categories of facilities that are required for inspection. There is also a process (via NALs and SALs) whereby the Permittees must develop action plans to address remaining water quality problems. Let the NAL/SAL system drive the decision making for adding facilities instead of this shot-gun approach which will net hair salons, retail stores, and other stores not likely to have any real impact on water quality.

Comment [CP54]: This sentence has been added pursuant to our previous discussions, where it was agreed that the list of BMPs can be changed over time through the iterative process based on the experience of the Copermittees. This language provides important clarification to that end. Request similar language be added to Municipal and Residential sections

Comment [CP55]: From the 2004 permit.

Comment [CP56]: This sentence has been added pursuant to our previous discussions, where it was agreed that the list of BMPs can be changed over time through the iterative process based on the experience of the Copermittees. This language provides important clarification to that end. Request similar language be added to Municipal and Residential sections

(d) Implement BMPs: Each Copermittee must ~~implement, or~~ require the implementation of~~,~~ the designated minimum and enhanced BMPs and any additional measures necessary based on inspections, incident responses, and water quality data to comply with this Order at each industrial and commercial site/source within its jurisdiction.

Comment [CP57]: The Copermittees have no authority to *implement* the BMPs on these privately owned sites, however they can require the site owner to implement such BMPs.

(3) ~~BMP Implementation for~~ Mobile ~~Businesses~~Business Program

Comment [CP58]: This section is describing more than BMP implementation, it is describing a parallel program to address the unique characteristics of Mobile Businesses. Suggested revised heading.

(a) Each Copermittee must develop and implement a program to reduce the discharge of storm water pollutants from mobile businesses to the MEP and to prohibit non-storm water discharges pursuant to Section B of this Order. Each Copermittee must keep as part of their commercial source inventory a listing of mobile businesses known to ~~operate~~ have bases of operation within its jurisdiction that have the potential to discharge pollutants. The program must include:

(i) Development and implementation of minimum standards and BMPs to be required for each of the various types of mobile businesses;
(ii) Development and implementation of an enforcement strategy which specifically addresses the unique characteristics of mobile businesses;
(iii) Notification of those mobile businesses known to ~~operate~~ have bases of operation within the Copermittee's jurisdiction, of the minimum standards and BMP requirements ~~and local ordinances~~;
(iv) Development and implementation of an outreach and education strategy; and
(v) Inspection of mobile businesses as needed to implement the program.

Comment [CP59]: This would prevent us from implementing this regionally.

(b) If they choose to, the Copermittees may cooperate in developing and implementing their programs for mobile businesses, including, but not limited to sharing of mobile business inventories, BMP requirements, enforcement action information, and education.

(4) Inspection of Industrial and Commercial Sites/Sources

Each Copermittee must conduct industrial and commercial site inspections for compliance with its ordinances, permits, and this Order. Mobile businesses shall be inspected pursuant to section F.3.b.(3) of this order.

Comment [CP60]: Clarifying that mobile business will be subject to the inspection requirements developed in F.3.b.(3) .

(a) Inspection Procedures: Inspections must include but not be limited to:

(i) ~~Review of BMP implementation plans, if the site uses or is required to use such a plan~~;

(ii) ~~Review of facility monitoring data, if the site monitors its runoff;~~

(iii) Check for coverage under the General Industrial Permit (Notice of Intent (NOI) and/or Waste Discharge Identification Number), if applicable;

(iv) Assessment of compliance with Copermittee ordinances and Copermittee issued permits related to runoff;

(v) ~~A~~assessment of ~~BMP~~ implementation and effectiveness of the designated minimum and/or enhanced BMPs~~, maintenance and effectiveness~~;

(vi) Visual observations for non-storm water discharges, potential illicit connections, and potential discharge of pollutants in storm water runoff; and

(vii) Education and training on storm water pollution prevention, as conditions warrant.

(b) Each Copermittee shall annually notify the San Diego Water Board, prior to the commencement of the wet season, of all Industrial Sites and Industrial Facilities subject to the General Industrial Permit or other individual NPDES permit with alleged violations of the Copermittees' ordinances, that pose a significant threat to water quality. Information may be provided as part of the JRMP annual report if submitted prior to the rainy season. Information provided shall include, but not be limited to, the following:

(i) WDID number if enrolled under the General Industrial Permit;
(ii) Site Location, including address;
(iii) Current violations or suspected violations; and
(iv) ~~Past Violation history~~.

(c) Frequencies: Each Permittee shall prioritize the inventoried commercial/industrial facilities based on threat to water quality. ~~At a minimum, 25 percent of the sites inventoried as required in section F.3.b.(1) above (excluding mobile sources) including all~~ All sites determined to pose a high threat to water quality must be inspected each year. At a minimum all other inventoried facilities shall be inspected at least once every five years. All sites must be Mobile businesses must be inspected pursuant to the enforcement strategy developed pursuant to section F.3.b.(3). In evaluating threat to water quality, each Copermittee shall consider, at a minimum, the following:

(i) Type of activity (SIC code);
(ii) Materials used at the facility;

Comment [JEU61]: Requirement (v) already addresses these issues. (i) and (ii) focus on methods. (v) focuses on outcomes. The Permittees should be allowed to determine their own methods for evaluating compliance with their ordinances.

Comment [CP62]: This section should only be addressing the BMPs required under section F.3.b of the order. As mentioned in comments above, the maintenance of Post Construction structural BMPs is addressed in section F.1.f. of this order.

Comment [JEU63]: Permittees already Voluntarily work with RWQCB to ensure compliance. This requirement is not necessary.

Comment [JEU64]: Clarify that we are evaluating Ordinance compliance, also limit reporting to sites with significant threats to water quality.

Comment [CP65]: This is too vague and broad.

Comment [JEU66]: 25% requirement is a record retention problem and is not necessary.

Comment [CP67]: Changes are proposed to allow the CAP program to be maintained.

(iii) Wastes generated;
(iv) Pollutant discharge potential;
(v) Non-storm water discharges;
(vi) Size of facility;
(vii) Proximity to receiving water bodies;
(viii) Sensitivity of receiving water bodies;
(ix) Whether the facility is subject to the General Industrial Permit or an individual NPDES permit;
(x) Whether the facility has filed a No Exposure Certification/Notice of Non-Applicability;
(xi) Facility design;
(xii) Total area of the site~~, area of the site~~ where industrial or commercial activities occur, and area of the site exposed to rainfall and runoff;
(xiii) The facility's compliance history; and
(xiv) Any other relevant factors.

(d) Third-Party ~~Inspections~~Certifications: Each Copermittee may develop and implement a program to utilize a private third party ~~inspection~~ certification ~~program~~ service for verifying industrial and commercial site/source compliance with its ordinances, permits, and this Order. ~~The third party inspections can satisfy up to 30% of the inspection requirements in section F.3.b(4)(c), with the Copermittee having to fulfill the remaining required inspections.~~ To the extent that third party ~~inspections~~ certifications are conducted to fulfill the requirements of this Order, the Copermittee will be responsible for conducting and documenting quality assurance and quality control of the third-party ~~inspections~~certifications.

Comment [CP68]: Intent of the changes are to clarify that these requirements do not apply to any cross-Copermittee inspection agreements, such as the CAP program.

Comment [CP69]: This limitation is not necessary. Section (i) below will provide the Copermittee with the assurance that the inspection is valid, complete and accurate. The Copermittee should be afforded the flexibility to find the most cost-effective way to comply with the permit.

(i) Each inspection conducted by a third-party must, at a minimum, result in the following:

[a] Photo documentation of potential storm water violations identified during the third party inspection;
[b] Reporting to the Copermittee of identified significant potential violations, including imminent or observed illegal discharges, within 24 hours of the third party inspection;
[c] Reporting to the Copermittee of all inspection findings within one week of the inspection being conducted; and
[d] Copermittee follow-up and/or enforcement actions for identified potential storm water violations within two business days of the inspection or potential violation report receipt.

(e) Based upon site inspection findings, each Copermittee must implement all follow-up actions and enforcement necessary to comply with this Order.

(f) To the extent that the San Diego Water Board has conducted an inspection of an industrial site during a particular year, the requirement for

the responsible Copermittee to inspect this facility during the same year will be satisfied.

(g) The Copermittees must track the number of inspections for the inventoried industrial and commercial sites/sources throughout the reporting period to verify that the sites/sources are inspected at the minimum frequencies listed in this Order.

(5) Enforcement of Industrial and Commercial Sites/Sources

Each Copermittee must enforce its storm water ordinance for all industrial and commercial sites/sources as necessary to maintain compliance with this Order. Copermittee ordinances or other regulatory mechanisms must include appropriate sanctions to achieve compliance. Sanctions must include the following or their equivalent: Non-monetary penalties, fines, ~~bonding requirements,~~ and/or permit denials for non-compliance.

Comment [CP70]: The difficulty in collecting on bonds make them virtually useless as an enforcement tool.

~~(6) Training and Education for Owners and Operators of Commercial and Industrial Activities~~

~~(a) Each Copermittee must implement an education program using all media as appropriate to (1) measurably increase the knowledge of owners and operators of commercial and industrial activities regarding MS4s, impacts of runoff on receiving waters, and potential BMP solutions for the target audience; and (2) to measurably change the behavior of target communities and thereby reduce storm water pollutant releases and eliminate prohibited non-storm water discharges to MS4s and the environment. At a minimum, the education program must meet the requirements of this section and address the following issues:~~

~~(i) Laws, regulations, permits, & requirements;~~
~~(ii) Best management practices;~~
~~(iii) General runoff concepts; and~~

~~(iv) Other topics, including public reporting mechanisms, water conservation, low-impact development techniques.~~

~~(b) BMP Notification: At least twice during the five-year period of this Order, each Copermittee must notify the owner/operator of each inventoried industrial and commercial site/source of the BMP requirements applicable to the site/source.~~

C. RESIDENTIAL

Each Copermittee must implement a residential program which meets the requirements of this section~~,~~ to prevent~~s~~ illicit discharges into the MS4, reduce~~s~~

Comment [CP71]: Same comment as on Municipal

residential discharges of storm water pollutants from the MS4 to the MEP, and prevent~~s~~ residential discharges from the MS4 from causing or contributing to a violation of water quality standards.

(1) Threat to Water Quality Prioritization

Each Copermittee must identify residential areas and activities that pose a high threat to water quality. At a minimum, these must include:

(a) Automobile repair, maintenance, washing, and parking;
(b) Home and garden care activities and product use (pesticides, herbicides, and fertilizers);
(c) Disposal of trash, pet waste, green waste, and household hazardous waste (e.g., paints, cleaning products);
(d) Any other residential source that the Copermittee determines may contribute a significant pollutant load to the MS4;
(e) Any residential areas tributary to a CWA section 303(d) impaired water body, where the residence generates pollutants for which the water body is impaired; and
(f) Any residential areas within or directly adjacent to or discharging directly to a ~~coastal lagoon, the ocean, or other~~ receiving water~~waters~~ within an environmentally sensitive area (as defined in Attachment C of this Order).

(2) BMP Implementation

(a) Pollution Prevention: Each Copermittee must actively encourage the use of pollution prevention methods by residents and residential associations (i.e Home Owners Associations).

(b) Designate BMPs: Each Copermittee must designate minimum BMPs for ~~high-threat-to-water quality~~ residential areas and activities, including areas maintained by and activities conducted by residential associations, that pose a high-threat-to-water quality. The designated minimum BMPs ~~for high-threat-to-water quality residential areas and activities~~ must be area or activity specific and must consider factors that may be uniquely relevant to Common Interest Areas and areas managed by Home Owners' Associations.

(c) Hazardous Waste BMPs: Each Copermittee must facilitate the proper management and disposal of used oil, toxic materials, and other household hazardous wastes. Such facilitation must include educational activities, public information activities, and establishment of collection sites operated individually and/or jointly by the Copermittees or a private entity. Curbside collection of household hazardous wastes is encouraged.

Comment [CMP72]: We jointly fund operation of a permanent collection and additional rotating collection events

(d) Implement BMPs: Each Copermittee must implement, or require

implementation of, the designated minimum BMPs and any additional measures that are subsequently determined to be necessary to comply with Sections A and B of this Order.

(e) Each Copermittee must implement, or require implementation of, BMPs for residential areas and activities that have not been designated a high threat to water quality, as necessary.

(3) Enforcement of Residential Areas and Activities

Each Copermittee must enforce its storm water ordinance for all residential areas and activities as necessary to maintain compliance with this Order. In addition, pursuant to Section E of this order each Copermittee must review its Municipal Codes / Ordinances to ensure that it has the full authority to implement and enforce runoff management measures within common interest areas and those areas managed by Home Owners' Associations.

(4) Evaluation of Oversight of Residential Areas and Activities

~~Each Copermittee must annually review the effectiveness of efforts to reduce residential discharges of storm water pollutants from the MS4 and eliminate illicit residential discharges into the MS4. The evaluation must consider findings from monitoring data, municipal employee comments, inspections, complaints, and other appropriate sources.~~

(5) Common Interest Areas (CIA) / Home Owner Association (HOA) Areas

~~Each Copermittee must implement measures specifically to ensure that runoff within common interest developments, including areas managed by associations, meets the objectives of this section and Order.~~

~~(a) BMP Implementation: Each Copermittee must implement management measures based on a review of pertinent factors, including:~~

~~(i) Current maintenance duties and procedures used by CIA/HOA maintenance associations within its jurisdiction;~~
~~(ii) Whether streets and storm drains are publicly or privately owned within the CIA/HOA;~~
~~(iii) Whether the CIA/HOA area has been identified as a high priority residential area;~~
~~(iv) Proximity to 303(d)-listed waterbodies, and/or environmentally sensitive areas;~~
~~(v) Evaluation of water quality monitoring data;~~
~~(vi) Evaluation of existing illegal discharge/illicit connection activities;~~
~~(vii) Other activities conducted or authorized by the HOA that may pose a significant risk to inland or coastal receiving waters.~~

~~(b) Legal Authority and Enforcement: Within one year of adoption of this Order, each Copermittee must review its Municipal Code to determine the most appropriate method to implement and enforce runoff management measures within CIA/HOA areas.~~

(6) Residential Education Program

(a) Each Copermittee must individually and/or jointly implement a Residential Education Program using all media as appropriate to (1) measurably increase the knowledge regarding MS4s, impacts of runoff on receiving waters, and potential BMP solutions for the target audience; and (2) to measurably change the behavior of target communities and thereby reduce storm water and eliminate prohibited non-storm water pollutant releases to MS4s and the environment.

(b) Copermittee educational programs must address pollutant generating residential activities (e.g. car washing, mobile operations, yard maintenance)~~emphasize underserved target audiences, residents~~ and pollutant generating products (i.e. pesticides, fertilizers, household chemicals) as appropriate.~~managers of CIA/HOA areas, high-risk behaviors, and "allowable" behaviors and discharges.~~ At a minimum, the education program must meet the requirements of this section and address thefollowing~~the following~~ issues as appropriate to the specific outreach effort:

(i) Laws, regulations, permits, and requirements;
(ii) Best management practices;
(iii) General runoff concepts;
(iv) Existing water quality, including local water quality conditions, impaired waterbodies and environmentally sensitive areas; and
(v) Other topics, including public reporting mechanisms, water conservation, low-impact development techniques, and public health and disease vector issues associated with polluted runoff.

d. Retrofitting Existing Development

Each Copermittee must develop and implement a retrofitting program which meets the requirements of this section. The goal~~s~~ of the existing development retrofitting program ~~are~~ is to provide an option to the Copermittees to address the regional impacts of existing development through retrofit projects that: reduce impacts from hydromodification, ~~promote LID,~~ support riparian and aquatic habitat restoration, reduce the discharges of storm water pollutants from the MS4 to the MEP, and prevent discharges from the MS4 from causing or contributing to a violation of water quality standards. Where feasible, at the discretion of the Copermittee, the existing development retrofitting program may be coordinated

Comment [CP73]: Retrofit should not be for the sake of Retrofit - it should be an option available to the Copermittees to address a specific and defined problem in the most cost efficient manner.

Comment [CP74]: LID is a means to an end, not an end in and of itself.

with flood control projects and other regional infrastructure improvement programs.

~~(1) Source Identification~~

(1) The Copermittee must identify and inventory existing developments (~~i.e~~e.g. municipal, industrial, commercial, residential) within their jurisdiction that may be~~as~~ candidates for retrofitting. At a minimum, the delineation ~~Potential retrofitting candidates~~ must assess candidates within the following areas of existing development:~~include but are not limited to:~~

(a) Areas ~~Developments~~ that are known to contribute pollutants of concern to a 303(d) listed water body;~~TMDL or an ESA~~;
(b) Receiving waters that are channelized or otherwise hardened;
(c) Developments tributary to receiving waters that are channelized or otherwise hardened;
(d) Areas~~Developments~~ tributary to receiving waters that are significantly eroded;
~~(e) Developments tributary to an ASBS or SWQPA; and~~
~~(f) Developments that cause hydraulic constriction.~~

(2) Each Copermittee shall evaluate ~~and rank~~ the inventoried ~~existing developments~~retrofit candidates to prioritize retrofitting. The evaluation shall consider the following criteria, where appropriate:~~Criteria for evaluation must include but is not limited to:~~

(a) Feasibility;
(b) Cost effectiveness;
(c) Pollutant removal effectiveness;
(d) Tributary~~Impervious~~ area potentially treated;
(e) Maintenance requirements;
(f) Landowner cooperation;
(g) Neighborhood acceptance;
(h) Aesthetic qualities~~; and~~
(i) Environmental Constraints (such as regulatory permits);
(j) Efficacy at addressing concern~~.~~; and
(k) Public Health and Safety;

(3) Each Copermittee must consider the results of the evaluation in prioritizing work plans for the following year. Highly feasible projects expected to benefit water quality should be given a high priority to implement source control and treatment control BMPs. Where applicable and feasible, the retrofit projects should be designed in accordance with the SSMP requirements within sections F.1.d.(3) through F.1.d.(8). In addition, the Copermittee shall encourage retrofit projects to implement where feasible the Hydromodification

Comment [CP75]: The Copermittees would prefer to end section (1) here, and give us the flexibility to assess candidates where it makes sense, without forcing us to work within a specific framework. Alternatively, important changes/clarifications have been provided.

Comment [CP76]: Not applicable to this watershed.

Comment [CP77]: This is covered under (d) above

Comment [CP78]: The evaluation should occur when we have identified a specific problem that we are trying to address.

Comment [CP79]: Similar to section (1) the Copermittees would prefer to end section (2) here and give us the flexibility to utilize any applicable and appropriate criteria in our evaluation - and not overly define the framework we will be required to work within. Alternatively, appropriate modifications to the language have been provided.

requirements in Section F.1.h.

(4) The Copermittees ~~will~~ are highly encouraged to cooperate with private landowners to encourage retrofitting projects. The Copermittee ~~must~~ should consider the following practices in cooperating and encouraging private landowners to retrofit their existing development:

(a) Demonstration retrofit projects;
~~(b) Retrofits on public land and easements that treat runoff from private developments;~~
(b) Education and outreach;
(c) Subsidies for retrofit projects;
(d) Requiring retrofit projects as enforcement, mitigation or ordinance compliance; and
(e) Public and private partnerships~~; and~~.
~~(g) Fees for existing discharges to the MS4 and reduction of fees for retrofit implementation.~~

(5) Where ~~T~~the completed retrofit includes structural post-construction BMPs within municipal (Copermittee owned) areas, the BMPs shall be tracked and inspected in accordance with section F.1.f.

~~(7) Where constraints on retrofitting preclude effective BMP deployment on existing developments at locations critical to protect receiving waters, a Copermittee may propose a regional mitigation project to improve water quality. Such regional projects may include but are not limited to:~~

~~(a) Regional water quality treatment BMPs;~~
~~(b) Urban creek or wetlands restoration and preservation;~~
~~(c) Daylighting and restoring underground creeks;~~
~~(d) Localized rainfall storage and reuse to the extent such projects are fully protective of downstream water rights;~~
~~(e) Hydromodification project; and~~
~~(f) Removal of invasive plant species.~~

(7) A retrofit project or regional mitigation project may qualify as a Watershed Water Quality Activity provided it meets the requirements in section G. Watershed Runoff Management Program.

Comment [CP80]: The idea is to find approaches for encouraging retrofit that may be applicable locally. In response to SALs, NALs, and TMDLs, these may be one 'tool in the toolbox' that we can assess in determining the most cost-efficient way to address the problem.

Comment [CP81]: This is addressed in (1) above

Comment [CP82]: Not applicable here

Comment [CP83]: If a private landowner volunteers to retrofit their property (outside of the requirements of F.1), they shouldn't be subjected to inspections / verifications. This would be a penalty for them doing the right thing.

5/26: Water Board staff agreed to consider this language .

Comment [CP84]: The delineation proposed in F.3.d.(1) above will include an assessment for regional opportunities.

4. ILLICIT DISCHARGE DETECTION AND ELIMINATION

Each Copermittee must implement a program which meets the requirements of this section to actively detect and eliminate illicit discharges and disposal into the MS4. The program must address all types of illicit discharges and connections excluding those non-storm water discharges not prohibited by the Copermittee in accordance with

section B of this Order.

a. PREVENT AND DETECT ILLICIT DISCHARGES AND CONNECTIONS

Each Copermittee must implement measures to prevent and detect illicit discharges to the MS4.

(1) Legal Authority: Each Copermittee must retain legal authority to prevent and eliminate illicit discharges and connections to the MS4.

(2) Inspections: Each Copermittee must include use of appropriate Copermittee ~~municipal~~ personnel and contractors to assist in identifying illicit discharges and connections during their daily activities.

Comment [CMP85]: Same change recommended throughout permit

(a) Visual Inspections for illegal discharges and connections must be conducted during routine maintenance of all MS4 facilities.

(b) Copermittee~~Municipal~~ staff and contractors conducting non-MS4 field operations must be trained to report suspected illegal discharges and connections to proper Copermittee~~municipal~~ staff.

b. MAINTAIN MS4 MAP

Each Copermittee must maintain an updated map of its entire MS4 and the corresponding drainage areas within its jurisdiction. The use of GIS is encouraged.~~required.~~ The accuracy of the MS4 map must be confirmed during dry weather field screening and analytical monitoring and must be updated at least annually. The GIS layers of the MS4 map must be submitted with the updated Jurisdictional Runoff Management Plan within 365 days after adoption of this Order.

c. FACILITATE PUBLIC REPORTING OF ILLICIT DISCHARGES AND CONNECTIONS - PUBLIC HOTLINE

Each Copermittee must individually and/or jointly promote, publicize and facilitate public reporting of illicit discharges or water quality impacts associated with discharges into or from MS4s. Each Copermittee must facilitate public reporting through development and operation of a public hotline. Public hotlines can be Copermittee-specific or shared by Copermittees. All storm water hotlines must be capable of receiving reports in both English and Spanish 24 hours per day and seven days per week. All reported incidents, and how each was resolved, shall be summarized in each Copermittee's ~~Individual~~ Annual Report.

Comment [U86]: Terminology?

d. DRY WEATHER FIELD SCREENING AND ANALYTICAL MONITORING

Each Copermittee must conduct dry weather field screening and analytical monitoring of MS4 outfalls and other portions of its MS4 within its jurisdiction to

detect illicit discharges and connections in accordance with Receiving Waters and MS4 Discharge Monitoring and Reporting Program No. R9-2010-0016 in Attachment E of this Order.

e. INVESTIGATION / INSPECTION AND FOLLOW-UP

Each Copermittee must implement procedures to investigate and inspect portions of their~~the~~ MS4 that, based on the results of field screening, analytical monitoring, or other appropriate information, indicate a reasonable potential of containing illicit discharges, illicit connections, or other sources of pollutants in non-storm water.

(1) Develop response criteria for data: Each Copermittee must develop, update, and use numeric criteria action levels (or other actions level criteria where appropriate) to determine when follow-up investigations will be performed in response to water quality monitoring. The criteria must include required non-storm water action levels (see Section C) and a consideration of 303(d)-listed waterbodies and environmentally sensitive areas (ESAs) as defined in Attachment C.

(2) Respond to data: Each Copermittee must investigate portions of the MS4 for which water quality data or conditions indicates a potential illegal discharge or connection.

(a) Obvious illicit discharges (i.e. color, odor, or significant exceedances of action levels) must be investigated immediately.

(b) Field screen data: Within two business days of receiving dry weather field screening results that exceed action levels, the applicable Copermittee~~Copermittees~~ must either initiate an investigation to identify the source of the discharge or document the rationale for why the discharge does not pose a threat to water quality and does not need further investigation. This documentation shall be included in the Annual Report.

(c) Analytical data: Within five business days of receiving quality controlled analytical laboratory results that exceed action levels, the applicable Copermittee~~Copermittees~~ must either initiate an investigation to identify the source of the discharge or document the rationale for why the discharge does not pose a threat to water quality and does not need further investigation. This documentation shall be included in the Annual Report.

(3) Respond to notifications: Each Copermittee must respond to and resolve each reported incident (e.g., public hotline, staff notification, etc.) in a timely manner. Criteria may be developed to assess the validity of, and prioritize the response to, each report.

f. ELIMINATION OF ILLICIT DISCHARGES AND CONNECTIONS

Each Copermittee must take immediate action to initiate steps necessary to eliminate all detected illicit discharges, illicit discharge sources, and illicit connections after the source is found.~~detection.~~ Elimination measures may include an escalating series of enforcement actions for those illicit discharges that are not a serious threat to public health or the environment. Illicit discharges that pose a serious threat to the public's health or the environment must be eliminated immediately. The Copermittees may engage San Diego Regional Board staff as necessary to assist in resolving illicit discharges and connections.

g. ENFORCE ORDINANCES

Each Copermittee must implement and enforce its ordinances, orders, or other legal authority to prevent illicit discharges and connections to its MS4 and to eliminate detected illicit discharges and connections to its~~it's~~ MS4.

h. PREVENT AND RESPOND TO SEWAGE SPILLS (INCLUDING FROM PRIVATE LATERALS AND FAILING SEPTIC SYSTEMS) AND OTHER SPILLS

(1) Each Copermittee must implement management measures and procedures to prevent, respond to, contain and clean up all sewage (see below) and other spills that may discharge into its MS4 from any source (including private laterals and failing septic systems). Copermittees must coordinate with spill response teams to prevent entry of spills into the MS4 and contamination of surface water, ground water and soil to the MEP. Each Copermittee must coordinate spill prevention, containment and response activities throughout all appropriate Copermittee departments, programs and agencies so that maximum water quality protection is available at all times.

(2) Each Copermittee must develop and implement a mechanism whereby it is notified of all sewage spills affecting their jurisdiction. ~~from private laterals and failing septic systems into its MS4. Each Copermittee must implement management measures and procedures to prevent, respond to, and coordinate a response to contain and clean up sewage from any such notification.~~

i. EDUCATION AND TRAINING

Each Copermittee must individually and/or jointly implement educational activities, public information activities, and other appropriate activities to facilitate the proper management and disposal of used oil and toxic materials.

Comment [CP87]: From 2004 SMR Permit

Comment [CMP88]: Clarifying

Comment [CMP89]: This section seems to belong before section (1).

Comment [CP90]: This is repetitive of F.4.h.(1)

Comment [CP91]: This section will be migrated into the consolidated training and education sections. (F.6 and F.7)

5. PUBLIC PARTICIPATION COMPONENT

Each Copermittee must incorporate a mechanism for public participation in the updating, development, and implementation of the Jurisdictional Runoff Management Program.

6. EDUCATION AND OUTREACH

G. WATERSHED RUNOFF MANAGEMENT PROGRAM

Each Copermittee must collaborate with other Copermittees to identify, address, and mitigate the highest priority water quality issues/pollutants in the Upper Santa Margarita Watershed.

1. Watershed Water Quality Workplan (Watershed Workplan)

The Watershed Workplan shall describe the Copermittees' development and implementation of a collective watershed strategy to assess and prioritize the water quality problems within the watershed's receiving waters, identify and model sources of the highest priority water quality problem(s), develop a watershed-wide BMP implementation strategy to abate highest priority water quality problems, and a monitoring strategy to evaluate BMP effectiveness and changing water quality prioritization in the WMA.

The work plan shall, at a minimum:

a. Characterize the receiving water quality in the WMA. Characterization shall include use of regularly collected water quality data, reports, monitoring and analysis generated in accordance with the requirements of the Receiving Waters Monitoring and Reporting Program, as well as applicable information available from other public and private organizations.

b. Identify the highest priority water quality problem(s), in terms of constituents by location, in the WMA's receiving waters. Identified water quality problem(s) shall, at a minimum, give consideration to; TMDLs, receiving waters listed on the CWA section 303(d) list, waters with persistent violations of water quality standards, toxicity, or impacts to beneficial uses, and other pertinent conditions.

c. Identify the sources of the highest water quality problem(s) within the WMA. Efforts to determine such sources shall include, but not be limited to: use of information from the construction, industrial/commercial, municipal, and residential source identification programs required within the Jurisdictional Runoff Program (JRMP) of this Order; specific actions to model pollutant transport to

receiving waters for the sake of identifying the source(s) point(s) of origin; water quality monitoring data collected as part of the Receiving Water Monitoring and Reporting Program required by this Order, and additional focused water quality monitoring to identify specific sources within the watershed.

d. Develop a watershed BMP implementation strategy to attain receiving water quality objectives in the identified highest priority water quality problem(s). The BMP implementation strategy shall include a schedule for implementation of the BMP projects to abate specific receiving water quality problems. BMPs not contributing to measured pollutant reductions or improvements to water quality must be removed and replaced with alternative BMPs. Identified watershed water quality problems may be the result of jurisdictional discharges that will need to be addressed with BMPs applied in a specific jurisdiction in order to generate a benefit to the watershed.

e. Develop a strategy to model and monitor improvements in receiving water quality directly resulting from implementation of the BMPs described in the Watershed Workplan. The modeling and monitoring strategy shall generate the necessary data to report on the measured pollutant reduction that results from proper BMP implementation. Monitoring shall, at a minimum, be conducted in the receiving water to demonstrate reduction in pollutant concentrations and progression towards attainment of receiving water quality objectives.

f. Establish a schedule for development and implementation of the Watershed strategy outlined in the Workplan. The schedule shall, at a minimum, include forecasted dates of planned actions to address Provisions E.2(a) through E.2(e) and dates for watershed review meetings through the remaining portion of this Permit cycle. Annual watershed workplan review meetings must be open to the public and appropriately publically noticed such that interested parties may come and provide comments on the watershed program.

2. **Watershed Workplan Implementation –** Watershed Copermittee's shall begin implementing the Watershed Workplan within 60-days of acceptance by the San Diego Water Board Executive Officer. If within 30 days of submittal, the San Diego Water Board has not taken an action, the Workplan shall be deemed acceptable.

3. **Copermittee Collaboration** – Watershed Copermittees shall collaborate to develop and implement the Watershed Workplan. Watershed Copermittee collaboration shall include frequent regularly scheduled meetings. The Copermittees shall seek to obtain any interagency agreements, or other efforts, with non-Copermittee owners of the MS4 (such as Caltrans, Native American tribes, and school districts) to control the contribution of pollutants from one portion of the shared MS4 to another portion of the shared MS4. The Copermittees shall, as appropriate, participate in watershed management efforts to address water quality issues within the entire Santa Margarita Watershed (such as the County of San Diego and United States Marine Corps Camp Pendleton).

4. **Public Participation –** Watershed Copermittees shall implement a watershed-specific public participation mechanism within each watershed. A required component of the watershed-specific public participation shall be a minimum 30-day public review of the Watershed Workplan prior to submittal for acceptance by the San Diego Water Board Execuive Officer. Opportunity for the public to review and comment on the Watershed Workplan must occur before the workplan is implemented.

5. **Watershed Workplan Review and Updates –** Watershed Copermittees shall review and update the Watershed Workplan annually to identify needed changes to the prioritized water quality problem(s) listed in the workplan. All updates to the Watershed Workplan shall be presented during an Annual Watershed Review Meeting. Annual Watershed Review Meetings shall occur once every calendar year and be conducted by the Watershed Copermittees. Annual Watershed Review Meetings shall be open to the public and adequately noticed. Individual Watershed Copermittees shall also review and modify their jurisdictional programs and JRMP Annual Reports, as necessary, so that they are consistent with the updated Watershed Workplan.

6. **Pyrethroid Toxicity Reduction Evaluation –** The Watershed Copermittees shall incorporate the pyrethroid pollutant reduction program[18] into the Watershed Workplan. The pyrethroid pollutant reduction program shall include the following elements:

   a. Pursue state and federal regulatory change.
   b. Implement a set of source controls targeted specifically at urban pesticide use,
   c. Through the annual reporting process, monitor the implementation of those controls, assess effectiveness, and identify sources or areas where additional effort is needed,
   d. Implement additional controls as needed,
   e. Continue to monitor implementation, as well as conditions within the target receiving waters, assess effectiveness, and re-evaluate control programs.

H. FISCAL ANALYSIS

1. Secure Resources: Each Copermittee must secure the resources necessary to meet all requirements of this Order.

2. Annual Analysis: Each Copermittee must conduct an annual fiscal analysis of the necessary capital and operation and maintenance expenditures necessary to accomplish the activities of the programs required by this Order. The analysis must

[18] The pyrethroid pollutant reduction program is described in the "Riverside County – Santa Margarita Region Pyrethroid Source Identification Toxicity Reduction Evaluaion, Final Phase II Report", January 2009 by MACTEC.

include estimated expenditures for the reporting period, the preceding period, and the next reporting period.

a. Each analysis must include a description of the source of funds that are proposed to meet the necessary expenditures, including legal restrictions on the use of such funds.
b. Each analysis must include a narrative description of circumstances resulting in a 25 percent or greater annual change for any budget line items.

3. Annual Reporting: Each Copermittee must submit its annual fiscal analysis with the annual JRMP report.

I. TOTAL MAXIMUM DAILY LOADS

The waste load allocations (WLAs) of fully approved and adopted TMDLs are incorporated as Water Quality Based Effluent Limitations on a pollutant by pollutant, watershed by watershed basis. Early TMDL requirements, including monitoring, may be required and inserted into this Order pursuant to Finding E.10

J. PROGRAM EFFECTIVENESS ASSESSMENT AND REPORTING

1. Jurisdictional Program Effectiveness Assessments

a. OBJECTIVES OF EFFECTIVENESS ASSESSMENTS

Beginning with the Annual Report due in 2012, each Copermittee must annually assess the effectiveness of its Jurisdictional Runoff Management Program (JRMP) implementation at meeting the following objectives:

(1) Objective for 303(d) Waterbodies: Reduce storm water pollutant loadings.

(a) Each Copermittee must establish annual assessment measures or methods specifically for reducing discharges of storm water pollutants from its MS4 into each downstream 303(d)-listed water body for which that waterbody is impaired. Assessment measures must be developed for each of the six outcome levels described by CASQA.[19]
(b) Each Copermittee must annually conduct each established assessment measure or method and evaluate the outcome. Each outcome must then be used to assess the effectiveness of implemented management measures toward reducing MS4 discharges of the specific pollutants causing or contributing to conditions of impairment.

[19] Effectiveness assessment outcome levels as defined by CASQA are defined in Attachment C of this Order. See "*Municipal Stormwater Program Effectiveness Assessment Guidance"* (CASQA, May 2007) for guidance for assessing program activities at the various outcome levels.

(c) The assessment measures must target both water quality outcomes and the results of municipal enforcement activities.

(2) Objective for Environmentally-Sensitive Areas: Prevent storm water MS4 discharges from causing or contributing to conditions of pollution, nuisance, or contamination.

(a) Each Copermittee must establish annual measures or methods specifically for assessing the effectiveness of its management measures for protecting downstream ESAs from adverse effects caused by discharges from its MS4. Assessment measures must be developed for each of the six outcome levels described by CASQA.
(b) Each Copermittee must annually implement each established assessment measure or method and evaluate the outcome. Each outcome must be used to assess the effectiveness of implemented management measures toward reducing MS4 discharges of the specific pollutants causing or contributing to conditions of impairment.
(c) The assessment measures must target both water quality outcomes and the results of municipal enforcement activities.

(3) Objectives for major program component outcomes: Determined by Each Copermittee.

(a) Each Copermittee must annually develop objectives for each program component in Section F and the overall JRMP. The objectives must be established as appropriate in response to program implementation and evaluation of water quality and management practices.
(b) Assessment approaches for program implementation must include a mix of specific activities, general program components, and water quality data.
(c) The assessment measures must target both water quality outcomes and the results of municipal enforcement activities.

(4) Objectives for actions taken to protect receiving water limitations in accordance with this Order.

(a) Each Copermittee must develop and implement an effectiveness assessment strategy for each measure conducted in response to a determination to implement the “iterative” approach to prevent or reduce any storm water pollutants that are causing or contributing to the exceedance of water quality standards as outlined in this Order

b. ASSESSMENT REVIEW

(1) Based on the results of the effectiveness assessments, each Copermittee must annually review its jurisdictional activities and BMPs to identify modifications and improvements needed to maximize JRMP effectiveness, as

necessary to achieve compliance with this Order.

(2) Each Copermittee must develop and annually conduct an Integrated Assessment[20] of each effectiveness assessment objective above (Section J.1.a) and the overall JRMP using a combination of outcomes as appropriate to the objectives.[21]

2. Program Modifications

a. Each Copermittee must develop and implement a plan and schedule to address program modifications and improvements identified during annual effectiveness assessments.

b. Jurisdictional activities/BMPs that are ineffective or less effective than other comparable jurisdictional activities/BMPs must be replaced or improved upon by implementation of more effective jurisdictional activities/BMPs. Where monitoring data exhibits persistent water quality problems that are caused or contributed to by MS4 discharges, jurisdictional activities or BMPs applicable to the water quality problems must be modified and improved to correct the water quality problems.

3. Effectiveness Assessment and Program Response Reporting

a. Each Copermittee must include a description and summary of its annual and long-term effectiveness assessments within each Annual Report. Beginning with the Annual Report due in 2011, the Program Effectiveness reporting must include:

(1) 303(d) waterbodies: A description and results of the annual assessment measures or methods specifically for reducing discharges of storm water pollutants from its MS4 into each 303(d)-listed waterbody;
(2) ESAs: A description and results of the annual assessment measures or methods specifically for managing discharges of pollutants from its MS4 into each downstream ESA;
(3) Other Program Components: A description of the objectives and corresponding assessment measures and results used to evaluate the effectiveness of each general program component. The results must include findings from both program implementation and water quality assessment where applicable;
(4) Receiving water protection: A description and results of the annual assessment measures or methods employed specifically for actions taken to protect receiving water limitations in accordance with Section A.3 of this

[20] Integrated assessment is defined in Attachment C. It is the process of evaluating whether program implementation is resulting in the protection or improvement of water quality. Integrated assessment combines assessments of program implementation and water quality.
[21] Not all program components need be addressed at each of the six outcome levels.

Order;

(5) A description of the steps taken to use dry-weather and wet-weather monitoring data to assess the effectiveness of the programs for 303(d) impairments, ESAs, and general program components;

(6) A description of activities conducted in response to investigations of illicit discharge and illicit connection activities, including how each investigation was resolved and the pollutant(s) involved;

(7) Responses to effectiveness assessments: A description of each program modification, made in response to the results of effectiveness assessments conducted pursuant to Section J.1.a, and the basis for determining (pursuant to Section J.2.b.) that each modified activity and/or BMP represents an improvement with respect to reducing the discharge of storm water pollutants from the MS4.

(8) A description of the steps that will be taken to improve the Copermittee's ability to assess program effectiveness using measurable targeted outcomes, assessment measures, assessment methods, and outcome levels 1-6. Include a time schedule for when improvement will occur; and

(9) A description of the steps that will be taken to identify aspects of the Copermittee's Jurisdictional Runoff Management Program that will be changed based on the results of the effectiveness assessment.

4. Work Plan

Each Copermittee must develop a work plan to address their high priority water quality problems in an iterative manner over the life of the permit. The goal of the work plan is to demonstrate a responsive and adaptive approach for the judicious and effective use of available resources to attack the highest priority problems. The work plan shall include, at a minimum, the following:

a. The problems and priorities identified during the assessment;
b. A list of priority pollutants and known or suspected sources;
c. A brief description of the strategy employed to reduce, eliminate or mitigate the negative impacts;
d. A description and schedule for new and/or modified BMPs. The schedule is to include dates for significant milestones;
e. A description of how the selected activities will address an identified high priority problem. This will include a description of the expected effectiveness and benefits of the new and/or modified BMPs;
f. A description of implementation effectiveness metrics;
g. A description of how efficacy results will be used to modify priorities and implementation; and
h. A review of past activities implemented, progress in meeting water quality standards, and planned program adjustments.

The Copermittee shall submit the work plan to the San Diego Water Board within 365 days of adoption of the Order. Annual updates are also required and shall be included

with the annual JRMP report. The San Diego Water Board will assess the work plan for compliance with the specific and overall requirements of the Order. To increase effectiveness and efficiencies, Copermittees may combine their implementation efforts and work plans within a hydrologic area or sub area. Each Copermittee, however, maintains individual responsibility for developing and implementing an acceptable work plan.

K. REPORTING

The Copermittees may propose alternate reporting criteria and schedules, as part of their updated JRMP, for the Executive Officer's acceptance. The Copermittees shall submit the updated JRMP within 365 days after adoption of this Order.

1. Runoff Management Plans

a. JURISDICTIONAL RUNOFF MANAGEMENT PLANS

(1) Copermittees: The written account of the overall program to be conducted by each Copermittee to meet the jurisdictional requirements of section F of this Order is referred to as the Jurisdictional Runoff Management Plan (JRMP). Each Copermittee must revise and update its existing JRMP so that it describes all activities the Copermittee will undertake to implement the requirements of this Order. Each Copermittee must submit its updated and revised JRMP to the San Diego Water Board 365 days after adoption of this Order.

(2) At a minimum, each Copermittee's JRMP must be updated and revised to demonstrate compliance with each applicable section of this Order.

b. WATERSHED WORKPLANS

(1) Copermittees: The written account of the program conducted by group of Copermittees is referred to as the Watershed Workplan. Copermittees shall be responsible for updating and revising the Watershed Workplan. Each Watershed Workplan shall be updated and revised to describe any changes in water quality problems or priorities, and any necessary change to actions Copermittees will take to implement jurisdictional or watershed BMPs to address those identified. The Copermittees shall assemble and submit the Watershed Workplan to the San Diego Water Board no later than 365 days after adoption of this Order, and shall be prepared to implement the workplan within 60 days of the San Diego Water Board Executive Officer deeming the workplan acceptable.

(2) Each Watershed Workplan shall, at a minimum, include:

(a) An updated watershed map.

(b) Identification and description of all applicable water quality data, reports, analyses, and other information to be used to assess receiving water quality.
(c) Assessment and analysis of the watershed's water quality data, reports, analyses, and other information, used during identification and prioritization of the watershed's water quality problems.
(d) A prioritized list of water quality problems within the WMA including rationale explaining the method/logic used to determine prioritization.
(e) Identification of the likely sources, pollutant discharges, and/or other factors causing the high priority water quality problems within the WMA.
(f) A description of the strategy to be used to guide Copermittee implementation of BMPs either jurisdictionally or on a watershed-wide basis to abate the highest water quality problems
(g) A list of criteria used to evaluate BMP effectiveness and how it was applied.
(h) A GIS map of BMPs implemented and BMPs scheduled for implementation.
(i) A description of the public participation mechanisms to be used and the parties anticipated to be involved during the development and implementation of the Watershed Workplan.
(j) A description of Copermittee collaboration to accomplish development of the Watershed Workplan, including a schedule for Watershed meetings.
(k) A description of how TMDLs and 303(d)-listed water bodies were considered during prioritization of watershed water quality problems
(l) A description of the strategy to model and monitor improvement in receiving water quality directly resulting from implementation of the BMPs described in the Watershed Workplan.
(m) A scheduled annual Watershed Workplan Review Meeting once every calendar year. This meeting shall be open to the public.

2. Other Required Reports and Plans

a. SSMP UPDATES

(1) Copermittees must submit their updated model SSMP in accordance with the applicable requirements of section F.1 with the JRMP <u>two years after adoption</u> of this Order.
(2) Within 180 days of determination that the Model SSMP is in compliance with this Permit's provisions, each Copermittee must update their own local SSMP, and amended ordinances consistent with the model SSMP, and shall submit both (local SSMP and amended ordinances) to the San Diego Water Board.
(3) For SSMP-related requirements of Section F.1 with subsequent implementation due dates, updated SSMPs must be submitted with the JRMP annual report covering the applicable reporting period.

b. REPORT OF WASTE DISCHARGE

The Copermittees must submit to the San Diego Water Board, no later than 210 days in advance of the expiration date of this Order, a Report of Waste Discharge (ROWD) as an application for issuance of new waste discharge requirements. The fourth annual report for this Order may supplement the ROWD, provided it contains the minimum information below.

At a minimum, the ROWD must include the following: (1) Proposed changes to the Copermittees' runoff management programs; (2) Proposed changes to monitoring programs; (3) Justification for proposed changes; (4) Name and mailing addresses of the Copermittees; (5) Names and titles of primary contacts of the Copermittees; and (6) Any other information necessary for the reissuance of this Order.

3. Annual Reports

a. JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM (JRMP) ANNUAL REPORTS

(1) Copermittees: Each Copermittee must generate individual JRMP Annual Reports which cover implementation of its jurisdictional activities during the past annual reporting period. Each Annual Report must verify and document compliance with this Order as directed in this section. Each Copermittee must retain records through 2016, available for review, that document compliance with each requirement of this Order. The reporting period for these annual reports must be the previous fiscal year.

(2) Each Copermittee must submit their JRMP Annual Reports to the San Diego Water Board by September 30 of each year, beginning on September 30, 2011.

(3) Each JRMP Annual Report must contain, at a minimum, the following information:

(a) Information required to be reported annually in Section H (Fiscal Analysis) of this Order;
(b) Information required to be reported annually in Section J (Program Effectiveness) of this Order;
(c) The completed Reporting Checklist found in Attachment D, and
(d) Information for each program component by watershed as described in the following Table 9:

Table 9. Annual Reporting Requirements

Program Component	Reporting Requirement
New Development	1. Updated relevant sections of the General Plan and environmental review process and a description of planned updates within the next annual reporting period, if applicable
	2. Revisions to the local SSMP, including where applicable: (a) Identification and summary of where the SSMP fails to meet the requirements of this Order; (b) Updated procedures for identifying pollutants of concern for each Priority Development Project; (c) Updated treatment BMP ranking matrix; and (d) Updated site design and treatment control BMP design standards;
	3. Verification that site design, source control, and treatment BMPs were required on all applicable Priority Development Projects;
	4. Description of the application of LID and site design BMPs in the planning and approval process;
	5. Description of projects subject to the local waiver provision for numeric sizing of treatment control BMP requirements;
	6. Description and summary of the LID site design BMP substitution program, if applicable;
	7. Description and summary of the process to verify compliance with SSMP requirements;
	8. Updates to the BMPs that are listed in the local SSMP as options for treatment control;
	9. Description of the treatment control maintenance tracking process and verification that the requirements of this Order were met during the reporting period; (a) Updated watershed-based database of approved treatment control BMPs and treatment control BMP maintenance within its jurisdiction, including updates to the list of high-priority treatment BMPs;
	10. Description of the process for identifying and evaluating hydrologic conditions of concern and requiring a suite of management measures within all Priority Development Projects to protect downstream beneficial uses and prevent adverse physical changes to downstream stream channels;
	11. Description of enforcement activities applicable to the new development and redevelopment component and a summary of the effectiveness of those activities;
Construction	1. Updated relevant ordinances and description of planned ordinance updates within the next annual reporting period, if applicable;
	2. A description of procedures used for identifying priorities for inspecting sites and enforcing control measures which consider the nature of the construction activity, topography, and the characteristics of soils and receiving water quality;

Program Component	Reporting Requirement
	3. Designated minimum and enhanced BMPs;
	4. Summary of the inspection program, including the following information: (a) Number and date of inspections conducted at each facility, including the facility address; (b) Number of facilities lacking adequate BMPs; (c) The BMP violations identified during the inspection by facility; (d) Number, date, and types of enforcement actions by facility; (e) Narrative description of inspection findings and follow-up activities for each facility;
Municipal	1. Updated source inventory;
	2. Changes to the designated municipal BMPs;
	3. Descriptions of procedures to assure that flood management projects assess the impacts on the water quality of receiving water bodies;
	4. Summary and assessment of BMPs implemented at retrofitted flood control structures, including: (a) List of projects with BMP retrofits; and (b) List and description of structures retrofitted without BMPs;
	5. Description and assessment of the municipal structural treatment control operations and maintenance activities, including: (a) Number of inspections and types of facilities; and (b) Summary of findings;
	6. Description of the municipal areas/facilities operations and maintenance activities, including: (a) Number and types of facilities maintained; (b) Amount of material removed and how that material was disposed; and (c) List of facilities planned for bi-annual inspections and the justification;
	7. Description of the municipal areas/programs inspection activities, including: (a) Number and date of inspections conducted at each facility; (b) Number of facilities lacking adequate BMPs; (c) The BMP violations identified during the inspection by facility; (d) Number, date and types of enforcement actions by facility; (e) Narrative description of inspection findings and follow-up activities for each facility;
	8. Description of activities implemented to address sewage infiltration into the MS4;
Commercial /	1. Annual inventory of commercial / industrial sources;

Program Component	Reporting Requirement
Industrial	2. Summary of the inspection program, including the following information: (a) Number and date of inspections conducted at each facility including the facility address; (b) Number of facilities lacking adequate BMPs; (c) The BMP violations identified during the inspection by facility; (d) Number, date, and types of enforcement actions by facility; (e) Narrative description of inspection findings and follow-up activities for each facility;
	3. Changes to designated minimum and enhanced BMPs;
	4. A list of industrial sites, including each name, address, and SIC code, that the Copermittee suspects may require coverage under the General Industrial Permit, but has not submitted an NOI;
Residential	1. Updated minimum BMPs required for residential areas and activities;
	2. Quantification and summary of applicable runoff and storm water enforcement actions within residential areas and activities;
	3. Description of efforts to manage runoff and storm water pollution in common interest areas;
Retrofitting Existing Development	1. Updated inventory and prioritization of existing developments identified as candidates for retrofitting.
	2. Description of efforts to retrofit existing developments during the reporting year.
	3. Description of efforts taken to cooperate with private landowners to retrofit existing development.
	4. A list of retrofit projects that have been implemented, including site location, a description of the retrofit project, pollutants expected to be treated, and the tributary acreage of runoff that will be treated.
	5. A list of regional mitigation projects that have been implemented, including site location, a description of the regional mitigation project, pollutants expected to be treated, and the tributary acreage of runoff that will be treated.
	6. Any proposed retrofit or regional mitigation projects and timelines for future implementation.
	7. Any proposed changes to the Copermittee's overall retrofitting program.
Illicit Discharge Detection and Elimination	1. Changes to the legal authority to implement Illicit Discharge Detection and Elimination activities;
	2. Changes to the established investigation procedures;
	3. Public reporting mechanisms, including phone numbers and web pages;
	4. All data and assessments from the Dry Weather Effluent Analytical Monitoring activities;
	5. Response criteria developed for water quality data and notifications;

Program Component	Reporting Requirement
	6. Summaries of illicit discharges (including spills and water quality data events) and how each significant case was resolved;
	7. A description of instances when field screening and analytical data exceeded action levels, including those instances for which no investigation was conducted;
	8. A description of follow-up and enforcement actions taken in response to investigations of illicit discharges and a description of the effectiveness of those measures;
	9. A description of controls to prevent infiltration of seepage from municipal sanitary sewers to municipal separate storm sewer systems;
Work Plan	Priorities, strategy, implementation schedule and effectiveness evaluation;

(4) Each JRMP Annual Report must also include the following information regarding non-storm water discharges (see Section B.2. of this Order):

(a) Identification of non-storm water discharge categories identified as a source of pollutants to waters of the U.S;
(b) A description of ordinances, orders, or similar means to prohibit non-storm water discharge categories identified under section B.2 above ;
(c) Identification of any control measures to be required and implemented for non-storm water discharge categories identified as needing controls by the San Diego Water Board; and
(d) A description of a program to address pollutants from non-emergency fire fighting flows identified by the Copermittee to be significant sources of pollutants.

4. Interim Reporting Requirements

For the July 2010-June 2011 reporting period, the Jurisdictional RMP must be submitted on January 31, 2012. Each Jurisdictional RMP Annual Report submitted for this reporting period must, at a minimum, include comprehensive descriptions of all activities conducted to fully implement the Copermittees' Jurisdictional RMP documents, as those documents were developed to comply with the requirements of Order No. 2004-001.

5. Universal Reporting Requirements

All submittals must include an executive summary, introduction, conclusion, recommendations, and signed certified statement. Each Copermittee must submit a signed certified statement covering its responsibilities for each applicable submittal. The Principal Copermittee must submit a signed certified statement covering its responsibilities for each applicable submittal and the sections of the submittals for which it is responsible.

L. MODIFICATION OF PROGRAMS

Modifications of Jurisdictional Runoff Management Programs and/or Watershed Runoff Management Programs may be initiated by the Executive Officer of the San Diego Water Board or by the Copermittees. Requests by Copermittees must be made to the Executive Officer, and must be submitted during the annual review process. Requests for modifications should be incorporated, as appropriate, into the Annual Reports or other deliverables required or allowed under this Order.

1. Minor Modifications: Minor modifications to Jurisdictional Runoff Management Programs, and/or Watershed Runoff Management Programs, may be accepted by the Executive Officer where the Executive Officer finds the proposed modification complies with all discharge prohibitions, receiving water limitations, and other requirements of this Order.

2. Modifications Requiring an Amendment to this Order: Proposed modifications that are not minor require amendment of this Order in accordance with this Order's rules, policies, and procedures.

M. PRINCIPAL COPERMITTEE RESPONSIBILITIES

Within 180 days of adoption of this Order, the Copermittees must designate the Principal Copermittee and notify the San Diego Water Board of the name of the Principal Copermittee. The Principal Copermittee must, at a minimum:

1. Serve as liaison between the Copermittees and the San Diego Water Board on general permit issues, and when necessary and appropriate, represent the Copermittees before the San Diego Water Board.
2. Coordinate permit activities among the Copermittees and facilitate collaboration on the development and implementation of programs required under this Order.
3. Produce and submit documents and reports as required by section K of this Order and Receiving Waters and MS4 Discharge Monitoring and Reporting Program No. R9-2010-0016 in Attachment E of this Order.

N. RECEIVING WATERS AND MS4 DISCHARGE MONITORING AND REPORTING PROGRAM

Pursuant to CWC section 13267, the Copermittees must comply with all the requirements contained in Receiving Waters and MS4 Discharge Monitoring and Reporting Program No. R9-2010-0016 in Attachment E of this Order.

O. STANDARD PROVISIONS, REPORTING REQUIREMENTS, AND NOTIFICATIONS

1. Each Copermittee must comply with Standard Provisions, Reporting Requirements, and Notifications contained in Attachment B of this Order. This includes 24 hour/5 day reporting requirements for any instance of non-compliance with this Order as described in section 5.e of Attachment B.

2. All plans, reports and subsequent amendments submitted in compliance with this Order must be implemented immediately (or as otherwise specified). All submittals by Copermittees must be adequate to implement the requirements of this Order.

I, David W. Gibson, Executive Officer, do hereby certify the foregoing is a full, true, and correct copy of an Order adopted by the California Regional Water Quality Control Board, San Diego Region, on TBD, 2010.

_____

David W. Gibson
Executive Officer

6/3/2010 Permit Meeting
10:00 AM - 12:00 PM
City of Temecula

Name	Agency
Jason Uhley	RCFCWCD
Tim Demura.	WILDOMAR
Don Allison	Menifee
Ward Maxwell	COUNTY TRANS
ALDO LICITRA	CITY OF TEMECULA
Bill Wooley	MURRIETA
Scott Taylor	RBF Consulting
Daniel Apt	" "
Mike Shetler	County of Riverside
Chandra Thomas	County of Riverside.
Ben Neill	SD RWQCB
Chiara Clemente	"
David T Barker	SDRWQCB
Chris Loth	SDRWQCB

AGENDA

Santa Margarita Region
MS4 Permit Meeting

9:00a.m. – 1:30 p.m. June 10th, 2010
Location: SDRWQCB

1. PROCESS / HOUSEKEEPING

2. WRAP-UP FOR LAST WEEK'S TOPICS

3. TODAY'S TOPICS

   i. F.1.d.(4) - F.1.d.(7)

4. CONCEPTUAL DISCUSSION OF FUTURE TOPICS

   i. F.1.h.

Santa Margarita Watershed MS4 Permit

Meeting Date: June 10, 2010
Time: 9:00AM
Location: San Diego RB

Name	Agency	Signature
David Gibson	SDRWQCB	
Jimmy Smith	SDRWQCB	
David Barker	SDRWQCB	
Chiara Clemente	SDRWQCB	
Ben Neill	SDRWQCB	
Wayne Chiu	SDRWQCB	Wayne Chiu
Chad Loflen	SDRWQCB	
Jason Uhley	RCFC&WCD	
Claudio Padres	RCFC&WCD	
Arlene Chun	RCFC&WCD	
Mike Shetler	County of Riverside	
Alex Gann	County of Riverside	
Aldo Licitra	City of Temecula	Aldo Licitra
Bill Woolsey	City of Murrieta	Bill Woolsey
Don Allison	City of Menifee	
Tim D'Zmura	City of Wildomar	
Mark Walker	LWA	M. Walker
Daniel Apt	RBF	
Chandra Thomas		

0005153

Ben Neill - RE: Draft Riverside MS4 Permit

From: "Padres, Claudio" <CMPadres@rcflood.org>
To: David Barker <DBarker@waterboards.ca.gov>, Ben Neill <BNeill@waterboards...
Date: 6/16/10 11:43 AM
Subject: RE: Draft Riverside MS4 Permit
CC: "Menifee (DonAllison)" <dallison@cityofmenifee.us>, "Temecula (AldoLicit...
Attachments: 2010-06-17_Draft SMR Permit.doc; 2010-06-10_Meeting Notes.doc; 2010-06-03_Meeting Notes.doc; 2010-06-10_Sign-in Sheet.pdf; 2010-06-17_AGENDA.docx; 2010-06-17_Handouts.pdf

Good evening everyone,

Attached are six files:

- Summary notes from our meetings on 6/3, and 6/10.
- Sign-in Sheet from 6/10.
- Agenda for this Thursday. We will be discussing Hydromod and also will be revisiting LID based on the revised redlines included in the draft permit (attached and mentioned below)
- Updated draft permit
  - Please note: pursuant to our discussions last week on LID – we have taken a fresh look at the section, and are providing completely revised redlines for much of the LID section – the changes will be discussed at our meeting tomorrow as well as Hydromod .
- Handouts of comments / suggested edits on the Hydromod and (revised) LID sections. (Printed copies will be provided at the meeting)

Best regards,

Claudio M. Padres, P.E.
Senior Civil Engineer
NPDES Section
Direct: 951.955.8602 | Fax: 951.788.9965 | cmpadres@rcflood.org

Riverside County Flood Control and Water Conservation District
1995 Market Street, Riverside, CA 92501
Please note that the District offices are closed every Friday.

California Regional Water Quality Control Board
San Diego Region

Waste Discharge Requirements for Discharges from the Municipal Separate Storm Sewer Systems (MS4s) Draining the County of Riverside, the Incorporated Cities of Riverside County, and the Riverside County Flood Control and Water Conservation District within the San Diego Region

Tentative Order No. R9-2010-0016
NPDES NO. CAS0108740

TBD, 2010

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN DIEGO REGION
9174 Sky Park Court, Suite 100, San Diego, California 92123-4340
Phone • (858) 467-2952 • Fax (858) 571-6972
http://www.waterboards.ca.gov/sandiego

To request copies of the Riverside County Municipal Storm Water Permit, please contact Ben Neill, Water Resources Control Engineer at (858) 467 – 2983, bneill@waterboards.ca.gov

Documents also are available at: http://www.waterboards.ca.gov/sandiego

Waste Discharge Requirements for Discharges from the Municipal Separate Storm Sewer Systems (MS4s) Draining the County of Riverside, the Incorporated Cities of Riverside County, and the Riverside County Flood Control and Water Conservation District within the San Diego Region

Adopted by the
California Regional Water Quality Control Board
San Diego Region
on TBD, 2010

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN DIEGO REGION
9174 Sky Park Court, Suite 100
San Diego, California 92123-4340

Telephone (858) 467-2952

STATE OF CALIFORNIA
ARNOLD SCHWARZENEGGER, Governor
LINDA S. ADAMS, Agency Secretary, California Environmental Protection Agency

California Regional Water Quality Control Board
San Diego Region

David King *Vice Chair*	Recreation / Wildlife
Eric Anderson	Irrigated Agriculture
Wayne Rayfield	Water Quality
Grant Destache	Industrial Water Use
George Loveland	Water Supply
Marc Luker	Undesignated (Public)

David W. Gibson, *Executive Officer*
James Smith, *Assistant Executive Officer*

This permit was prepared under the direction of

David T. Barker P.E., *Chief, Water Resource Protection Branch*

by

Ben Neill, *Water Resource Control Engineer*
Chad Loflen, *Environmental Scientist*
Wayne Chiu P.E., *Water Resource Control Engineer*

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Attachment D – Scheduled Submittal Summary and Reporting Checklist Requirements
Attachment E – Receiving Waters And MS4 Discharge Monitoring And Reporting Program No. R9-2010-0016
Attachment F – Data

The California Regional Water Quality Control Board, San Diego Region (hereinafter San Diego Water Board), finds that:

A. BASIS FOR THE ORDER

1. This Order is based on the federal Clean Water Act (CWA), the Porter-Cologne Water Quality Control Act (Division 7 of the Water Code, commencing with Section 13000), applicable State and federal regulations, all applicable provisions of statewide Water Quality Control Plans and Policies adopted by the State Water Resources Control Board (State Water Board), the Water Quality Control Plan for the San Diego Basin adopted by the San Diego Water Board, the California Toxics Rule, and the California Toxics Rule Implementation Plan.

2. This Order reissues National Pollutant Discharge Elimination System (NPDES) Permit No. CAS0108766, which was first adopted by the San Diego Water Board on July 16, 1990 (Order No. 90-38), and then reissued on May 13, 1998 (Order No. R9-98-02). On May 26, 1998, the United States Environmental Protection Agency (EPA), Region IX, objected to Order No. 98-02 due to concerns regarding Receiving Water Limitations (RWL) language. The EPA concluded that the RWL language in the permit did not comply with the federal Clean Water Act (CWA) and its implementing regulations. On April 27, 1999, the EPA reissued the MS4 permit, which the San Diego Water Board adopted as Addendum No. 1 to Order No. R9-98-02 on November 8, 2000. On July 14, 2004, the San Diego Water Board adopted the third term MS4 permit, Order No. R9-2004-001. On January 15, 2009, the Riverside County Flood Control and Water Conservation District (District), as the Principal Copermittee, submitted a Report of Waste Discharge (ROWD) for reissuance of the municipal separate storm sewer system (MS4) Permit.

3. This Order is consistent with the following precedential Orders adopted by the State Water Resources Control Board (State Water Board) addressing MS4 NPDES Permits: Order 99-05, Order WQ-2000-11, Order WQ 2001-15, Order WQO 2002-0014, and Order WQ-2009-0008 (*SWRCB/OCC FILE A-1780).*

The Fact Sheet / Technical Report for the Order No. R9-2010-0016, NPDES No. CAS0108766, Waste Discharge Requirements for Discharges from the Municipal Separate Storm Sewer Systems (MS4s) Draining the County of Riverside, the Incorporated Cities of Riverside County, and the Riverside County Flood Control and Water Conservation District within the San Diego Region, includes cited regulatory and legal references and additional explanatory information and data in support of the requirements of this Permit. This information, including any supplements thereto, and any response to comments on the Tentative Orders, is hereby incorporated by reference into these findings.

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B. REGULATED PARTIES

1. Each of the persons in Table 1 below, hereinafter called Copermittees or dischargers, owns or operates an MS4, through which it discharges into waters of the United States within the San Diego Region. These MS4s fall into one or more of the following categories: (1) a medium or large MS4 that services a population of greater than 100,000 or 250,000 respectively; or (2) a small MS4 that is "interrelated" to a medium or large MS4; or (3) an MS4 which contributes to a violation of a water quality standard; or (4) an MS4 which is a significant contributor of pollutants to waters of the United States (waters of the U.S).

Table 1. Municipal Copermittees

1. City of Menifee	5. County of Riverside
2. City of Murrieta	6. Riverside County Flood Control and Water Conservation District
3. City of Temecula	
4. City of Wildomar	

C. DISCHARGE CHARACTERISTICS

1. Discharges from the MS4 contain waste, as defined in the California Water Code (CWC), and pollutants that adversely affect the quality of the waters of the State. The discharge from an MS4 is a "discharge of pollutants from a point source" into waters of the U.S. as defined in the CWA.

2. MS4 storm water and non-storm water discharges are likely to contain pollutants that cause or threaten to cause a violation of water quality standards, as outlined in the San Diego Water Board's Water Quality Control Plan for the San Diego Basin (Basin Plan). Storm water and non-storm water discharges from the MS4 are subject to the conditions and requirements established in the San Diego Basin Plan for point source discharges.

3. The most common categories of pollutants in runoff include total suspended solids, sediment, pathogens (e.g., bacteria, viruses, protozoa); heavy metals (e.g., copper, lead, zinc and cadmium); petroleum products and polynuclear aromatic hydrocarbons; synthetic organics (e.g., pesticides, herbicides, and PCBs); nutrients (e.g., nitrogen and phosphorus fertilizers); oxygen-demanding substances (decaying vegetation, animal waste); detergents; and trash.

4. The discharge of pollutants and/or increased flows from MS4s may cause or threaten to cause the concentration of pollutants to exceed applicable receiving water quality objectives and/or impair or threaten to impair designated beneficial uses resulting in a condition of pollution (i.e., unreasonable impairment of water

quality for designated beneficial uses), contamination, or nuisance.

5. Pollutants in runoff can threaten and adversely affect human health. Human illnesses have been clearly linked to recreating near storm drains flowing to receiving waters. Also, runoff pollutants in receiving waters can bioaccumulate in the tissues of invertebrates and fish, which may be eventually consumed by humans.

6. Runoff discharges from MS4s often contain pollutants that cause toxicity to aquatic organisms (i.e., adverse responses of organisms to chemicals or physical agents ranging from mortality to physiological responses such as impaired reproduction or growth anomalies). Toxic pollutants impact the overall quality of aquatic systems and beneficial uses of receiving waters.

7. The Copermittees discharge runoff into lakes, drinking water reservoirs, rivers, streams, creeks, bays, estuaries, coastal lagoons, the Pacific Ocean, and tributaries thereto within one of the eleven hydrologic units (Santa Margarita Hydrologic Unit) comprising the San Diego Region as shown in Table 2. Some of the receiving water bodies have been designated as impaired by the San Diego Water Board in 2009 pursuant to CWA section 303(d).

Table 2. Common Watersheds and CWA Section 303(d) Impaired Waters

Hydrologic Area (HA) or Hydrologic Subarea (HSA) of the Santa Margarita Hydrologic Unit	**Major Receiving Water Bodies**	**303(d) Pollutant(s)/stressor or Water Quality Effect[1]**
DeLuz Creek HSA (902.21)	De Luz Creek	Iron, Manganese, Nitrogen, Sulfates
Murrieta HSA (902.32)	Long Canyon Creek (tributary to Murrieta Creek	Chlorpyrifos, E. Coli, Fecal Coliform, Iron, Manganese
Wolf HSA (902.52)	Murrieta Creek	Chlorpyrifos, Copper, Iron, Manganese, Nitrogen, Toxicity
Pauba HSA (902.51)	Redhawk Channel	Chlorpyrifos, Copper, Diazinon, E. Coli, Fecal Coliform, Iron, Manganese, Nitrogen, Phosphorus, Total Dissolved Solids
Gavilan HSA (902.22)	Sandia Creek	Iron, Sulfates
Gertrudis HSA	Santa Gertrudis Creek	Chlorpyrifos, Copper, E. Coli, Fecal

[1] The listed 303(d) pollutant(s) do not necessarily reflect impairment of the entire corresponding WMA or all corresponding major surface water bodies. The specific impaired portions of each WMA are listed in the State Water Resources Control Board's 2008 Section 303(d) List of Water Quality Limited Segments.

Table 2. Common Watersheds and CWA Section 303(d) Impaired Waters

Hydrologic Area (HA) or Hydrologic Subarea (HSA) of the Santa Margarita Hydrologic Unit	**Major Receiving Water Bodies**	**303(d) Pollutant(s)/stressor or Water Quality Effect[1]**
(902.42)		Coliform, Iron, Phosphorous
Lower Ysidora HSA (902.11)	Santa Margarita Lagoon	Eutrophic
Lower Ysidora HSA (902.11)	Santa Margarita River (Lower)	Enterococcus, Fecal Coliform, Phosphorus, Total Nitrogen as N
Gavilan HSA (902.22)	Santa Margarita River (Upper)	Toxicity
Pauba HSA (902.51)	Temecula Creek	Chlorpyrifos, Copper, Phosphorus, Total Dissolved Solids, Toxicity
French HSA (902.33)	Warm Springs Creek (Riverside County)	Chlorpyrifos, E. Coli, Fecal Coliform, Iron, Manganese, Phosphorus, Total Nitrogen as N

8. Trash is a persistent pollutant which can enter receiving waters from the MS4 resulting in accumulation and transport in receiving waters over time. Trash poses a serious threat to the Beneficial Uses of the receiving waters, including, but not limited to, human health, rare and endangered species, navigation and human recreation.

9. The Copermittees' water quality monitoring data submitted to date documents persistent violations of Basin Plan water quality objectives for various runoff-related pollutants (indicator bacteria, dissolved solids, turbidity, metals, pesticides, etc.) at various watershed monitoring stations. Persistent toxicity has also been observed at some watershed monitoring stations. In addition, bioassessment data indicates that the majority of the monitored receiving waters have Poor to Very Poor Index of Biotic Integrity ratings. In sum, the above findings indicate that runoff discharges are causing or contributing to water quality impairments, and are a leading cause of such impairments in Riverside County.

10. When natural vegetated pervious ground cover is converted to impervious surfaces such as paved highways, streets, rooftops, and parking lots, the natural absorption and infiltration abilities of the land are lost. Therefore, runoff leaving a developed area is significantly greater in runoff volume, velocity, and peak flow rate than pre-development runoff from the same area. Runoff durations can also increase as a result of flood control and other efforts to control peak flow rates. Increased volume, velocity, rate, and duration of runoff, and decreased natural clean sediment loads,

greatly accelerate the erosion of downstream natural channels. Significant declines in the biological integrity and physical habitat of streams and other receiving waters have been found to occur with as little as a 3-5 percent conversion from natural to impervious surfaces. The increased runoff characteristics from new development must be controlled to protect against increased erosion of channel beds and banks, sediment pollutant generation, or other impacts to beneficial uses and stream habitat due to increased erosive force.

11. Development creates new pollution sources as human population density increases and brings with it proportionately higher levels of car emissions, car maintenance wastes, municipal sewage, pesticides, household hazardous wastes, pet wastes, trash, etc. which can either be washed or directly dumped into the MS4. As a result, the runoff leaving the developed urban area is significantly greater in pollutant load than the pre-development runoff from the same area. These increased pollutant loads must be controlled to protect downstream receiving water quality.

12. Development and urbanization especially threaten environmentally sensitive areas (ESAs), such as water bodies designated as supporting a RARE beneficial use (supporting rare, threatened or endangered species) and CWA 303(d)-impaired water bodies. Such areas have a much lower capacity to withstand pollutant shocks than might be acceptable in other areas. In essence, development that is ordinarily insignificant in its impact on the environment may become significant in a particularly sensitive environment. Therefore, additional controls to reduce storm water pollutants from new and existing development may be necessary for areas adjacent to or discharging directly to an ESA.

13. Although dependent on several factors, the risks typically associated with properly managed infiltration of runoff (especially from residential land use areas) are not significant. The risks associated with infiltration can be managed by many techniques, including (1) designing landscape drainage features that promote infiltration of runoff, but do not “inject” runoff (injection bypasses the natural processes of filtering and transformation that occur in the soil); (2) taking reasonable steps to prevent the illegal disposal of wastes; (3) protecting footings and foundations; (4) ensuring that each drainage feature is adequately maintained in perpetuity; and (5) pretreatment.

14. Non-storm water (dry weather) discharge from the MS4 is not considered a storm water (wet weather) discharge and therefore is not subject to regulation under the Maximum Extent Practicable (MEP) standard from CWA 402(p)(3)(B)(iii), which is explicitly for “Municipal … *Stormwater Discharges* (emphasis added)” from the MS4. Rather, non-storm water discharges, per CWA 402(p)(3)(B)(ii), are to be effectively prohibited. Such dry weather non-storm water discharges have been shown to contribute significant levels of pollutants and flow in arid, developed Southern California watersheds and are to be effectively prohibited under the Clean Water Act.

15. Non-storm water discharges to the MS4 granted an influent exception [i.e., which are exempt from the effective prohibition requirement set forth in CWA section 402(p)(3)(B)(ii)] under 40 CFR 122.26 are included within this Order. Any exempted discharges identified by Copermittees as a source of pollutants are subsequently required to be *addressed* (emphasis added) as illicit discharges through prohibition and incorporation into existing IC/ID programs. Furthermore, the Federal Register (55, page 48037) clarifies that the San Diego Water Board may also identify exempted discharges as a source of pollutants required to be addressed as illicit discharges. The San Diego Water Board and the Copermittees have identified landscape irrigation, irrigation water and lawn water, previously exempted discharges, as a source of pollutants and conveyance of pollutants to waters of the United States.

D. RUNOFF MANAGEMENT PROGRAMS

1. General

a. This Order specifies requirements necessary for the Copermittees to reduce the discharge of pollutants in storm water to the maximum extent practicable (MEP). However, since MEP is a dynamic performance standard, which evolves over time as runoff management knowledge increases, the Copermittees' runoff management programs must continually be assessed and modified to incorporate improved programs, control measures, best management practices (BMPs), etc. in order to achieve the evolving MEP standard. Absent evidence to the contrary, this continual assessment, revision, and improvement of runoff management program implementation is expected to ultimately achieve compliance with water quality standards in the Region.

b. The Copermittees have generally been implementing the jurisdictional runoff management programs required pursuant to Order No. 2004-001 since July 14, 2004. Prior to that, the Copermittees were regulated by Order No. 98-02, since May 13, 1998. MS4 discharges, however, continue to cause or contribute to violations of water quality standards as evidenced by the Copermittees monitoring results.

c. This Order contains new or modified requirements that are necessary to improve Copermittees' efforts to reduce the discharge of pollutants in storm water runoff to the MEP and achieve water quality standards. Some of the new or modified requirements, such as the revised Watershed Runoff Management Program section, are designed to specifically address high priority water quality problems. Other new or modified requirements address program deficiencies that have been noted during audits, report reviews, and other San Diego Water Board compliance assessment activities.

d. Updated individual Drainage Area Management Plans (DAMP), and Watershed Stormwater Management Plans (watershed SWMPs), which describe the

Copermittees' runoff management programs in their entirety, are needed to guide the Copermittees' runoff management efforts and aid the Copermittees in tracking runoff management program implementation. It is practicable for the Copermittees to update the JRMPs and WRMPs within one year, since significant efforts to develop these programs have already occurred. Hereinafter, the individual DAMP is referred to as the Jurisdictional Runoff Management Plans (JRMPs) and the Watershed SWMP is referred to as the Watershed Runoff Management Plan (WRMP).

e. Pollutants can be effectively reduced in storm water runoff by the application of a combination of pollution prevention, source control, and treatment control BMPs. Pollution prevention is the reduction or elimination of pollutant generation at its source and is the best "first line of defense." Source control BMPs (both structural and non-structural) minimize the contact between pollutants and flows (e.g., rerouting run-on around pollutant sources or keeping pollutants on-site and out of receiving waters). Treatment control BMPs remove pollutants that have been mobilized by wet-weather or dry-weather flows.

f. Runoff needs to be addressed during the three major phases of urban development (planning, construction, and use) in order to reduce the discharge of pollutants from storm water to the MEP, effectively prohibit non-storm water discharges and protect receiving waters. Development which is not guided by water quality planning policies and principles can unnecessarily result in increased pollutant load discharges, flow rates, and flow durations which can negatively impact receiving water beneficial uses. Construction sites without adequate BMP implementation result in sediment runoff rates which greatly exceed natural erosion rates of undisturbed lands, causing siltation and impairment of receiving waters. Existing development generates substantial pollutant loads which are discharged in runoff to receiving waters.

g. Annual reporting requirements included in this Order are necessary to meet federal requirements and to evaluate the effectiveness and compliance of the Copermittees' programs.

h. This Order establishes Storm Water Action Levels (SALs) for selected pollutants based on USEPA Rain Zone 6 (arid southwest) Phase I MS4 monitoring data for pollutants in storm water. The SALs were computed as the 90th percentile of the data set, utilizing the statistical based population approach, one of three approaches recommended by the California Water Board's Storm Water Panel in its report, 'The Feasibility of Numerical Effluent Limits Applicable to Discharges of Storm Water Associated with Municipal, Industrial and Construction Activities (June 2006). SALs are identified in Section D of this Order. Copermittees shall implement a timely, comprehensive, cost-effective storm water pollution control program to reduce the discharge of pollutants in storm water from the permitted areas so as not to exceed the SALs. Exceedance of SALs may indicate inadequacy of programmatic measures and BMPs required in this Order.

2. **Development Planning**

   a. The Standard Storm Water Mitigation Plan (SSMP) requirements contained in this Order are consistent with Order WQ-2000-11 adopted by the State Water Resources Control Board (State Board) on October 5, 2000. In the precedential order, the State Board found that the design standards, which essentially require that runoff generated by 85 percent of storm events from specific development categories be infiltrated or treated, reflect the MEP standard. The order also found that the SSMP requirements are appropriately applied to the majority of the Priority Development Project categories contained in Section F.1 of this Order. The State Board also gave Regional Water Quality Control Boards the needed discretion to include additional categories and locations, such as retail gasoline outlets (RGOs), in SSMPs.

   b. Controlling runoff pollution by using a combination of onsite source control and site design BMPs augmented with treatment control BMPs before the runoff enters the MS4 is important for the following reasons: (1) Many end-of-pipe BMPs (such as diversion to the sanitary sewer) are typically ineffective during significant storm events. Whereas, onsite source control BMPs can be applied during all runoff conditions; (2) End-of-pipe BMPs are often incapable of capturing and treating the wide range of pollutants which can be generated on a sub-watershed scale; (3) End-of-pipe BMPs are more effective when used as polishing BMPs, rather than the sole BMP to be implemented; (4) End-of-pipe BMPs do not protect the quality or beneficial uses of receiving waters between the pollutant source and the BMP; and (5) Offsite end-of-pipe BMPs do not aid in the effort to educate the public regarding sources of pollution and their prevention.

   c. Use of Low-Impact Development (LID) site design BMPs at new development, redevelopment and retrofit projects can be an effective means for minimizing the impact of storm water runoff discharges from the development projects on receiving waters. LID is a site design strategy with a goal of maintaining or replicating the pre-development hydrologic regime through the use of design techniques. LID site design BMPs help preserve and restore the natural hydrologic cycle of the site, allowing for filtration and infiltration which can greatly reduce the volume, peak flow rate, velocity, and pollutant loads of storm water runoff. Current runoff management, knowledge, practices and technology have resulted in the use of LID BMPs as an acceptable means of meeting the storm water MEP standard.

   d. Retail Gasoline Outlets (RGOs) are significant sources of pollutants in storm water runoff. RGOs are points of convergence for motor vehicles for automotive related services such as repair, refueling, tire inflation, and radiator fill-up and consequently produce significantly higher loadings of hydrocarbons and trace metals (including copper and zinc) than other developed areas.

e. Industrial sites are significant sources of pollutants in runoff. Pollutant concentrations and loads in runoff from industrial sites are similar or exceed pollutant concentrations and loads in runoff from other land uses, such as commercial or residential land uses. As with other land uses, LID site design, source control, and treatment control BMPs are needed at industrial sites in order to meet the MEP standard. These BMPs are necessary where the industrial site is larger than 10,000 square feet. The 10,000 square feet threshold is appropriate, since it is consistent with requirements in other Phase I NPDES storm water regulations throughout California.

f. If not properly designed or maintained, certain BMPs implemented or required by municipalities for runoff management may create a habitat for vectors (e.g. mosquitoes and rodents). Proper BMP design and maintenance to avoid standing water, however, can prevent the creation of vector habitat. Nuisances and public health impacts resulting from vector breeding can be prevented with close collaboration and cooperative effort between municipalities, local vector control agencies, and the California Department of Public Health during the development and implementation of runoff management programs.

g. The increased volume, velocity, frequency and discharge duration of storm water runoff from developed areas has the potential to greatly accelerate downstream erosion, impair stream habitat in natural drainages, and negatively impact beneficial uses. Development and urbanization increase pollutant loads in storm water runoff and the volume of storm water runoff. Impervious surfaces can neither absorb water nor remove pollutants and thus lose the purification and infiltration provided by natural vegetated soil. Hydromodification measures for discharges to hardened channels are needed for the future restoration of the hardened channels to their natural state, thereby restoring the chemical, physical, and biological integrity and Beneficial Uses of local receiving waters.

3. **Construction and Existing Development**

a. In accordance with federal NPDES regulations and to ensure the most effective oversight of industrial and construction site discharges, discharges of runoff from industrial and construction sites are subject to dual (State and local) storm water regulation. Under this dual system, each Copermittee is responsible for enforcing its local permits, plans, and ordinances, and the San Diego Water Board is responsible for enforcing the General Construction Activities Storm Water Permit, State Board Order 2009-0009-DWQ, NPDES No. CAS000002 (General Construction Permit) and the General Industrial Activities Storm Water Permit, State Board Order 97-03 DWQ, NPDES No. CAS000001 (General Industrial Permit) and any reissuance of these permits. NPDES municipal regulations require that municipalities develop and implement measures to address runoff from industrial and construction activities. Those measures may require the implementation of additional BMPs than are required under the

statewide general permits for activities subject to both State and local regulation.

b. Identification of sources of pollutants in runoff (such as municipal areas and activities, industrial and commercial sites/sources, construction sites, and residential areas), development and implementation of BMPs to address those sources, and updating ordinances and approval processes are necessary for the Copermittees to ensure that discharges of pollutants from its MS4 in storm water are reduced to the MEP and that non-storm water discharges are not occurring. Inspections and other compliance verification methods are needed to ensure minimum BMPs are implemented. Inspections are especially important at high risk areas for pollutant discharges.

c. Historic and current development makes use of natural drainage patterns and features as conveyances for runoff. Urban streams used in this manner are part of the municipalities MS4 regardless of whether they are natural, anthropogenic, or partially modified features. In these cases, the urban stream is both an MS4 and receiving water.

d. As operators of the MS4s, the Copermittees cannot passively receive and discharge pollutants from third parties. By providing free and open access to an MS4 that conveys discharges to waters of the U.S., the operator essentially accepts responsibility for discharges into the MS4 that it does not prohibit or control. These discharges may cause or contribute to a condition of contamination or a violation of water quality standards.

e. Waste and pollutants which are deposited and accumulate in MS4 drainage structures will be discharged from these structures to waters of the U.S. unless they are removed. These discharges may cause or contribute to, or threaten to cause or contribute to, a condition of pollution in receiving waters. For this reason, pollutant discharges from storm water into MS4s must be reduced using a combination of management measures, including source control, and an effective MS4 maintenance program must be implemented by each Copermittee.

f. Enforcement of local runoff related ordinances, permits, and plans is an essential component of every runoff management program and is specifically required in the federal storm water regulations and this Order. Each Copermittee is individually responsible for adoption and enforcement of ordinances and/or policies, implementation of identified control measures/BMPs needed to prevent or reduce pollutants in storm water runoff, and for the allocation of funds for the capital, operation and maintenance, administrative, and enforcement expenditures necessary to implement and enforce such control measures/BMPs under its jurisdiction. Education is an important aspect of every effective runoff management program and the basis for changes in behavior at a societal level. Education of municipal planning, inspection, and maintenance department staffs is especially critical to ensure that in-house staffs understand how their activities impact water quality, how to accomplish their jobs while protecting water quality,

and their specific roles and responsibilities for compliance with this Order. Public education, designed to target various urban land users and other audiences, is also essential to inform the public of how individual actions affect receiving water quality and how adverse effects can be minimized.

g. Public participation during the development of runoff management programs is necessary to ensure that all stakeholder interests and a variety of creative solutions are considered.

h. Retrofitting existing development with storm water treatment controls, including LID, is necessary to address storm water discharges from existing development that may cause or contribute to a condition of pollution or a violation of water quality standards. Although SSMP BMPs are required for redevelopment, the current rate of redevelopment will not address water quality problems in a timely manner. Cooperation with private landowners is necessary to effectively identify, implement and maintain retrofit projects for the preservation, restoration, and enhancement of water quality.

4. **Watershed Runoff Management**

a. Since runoff within a watershed can flow from and through multiple land uses and political jurisdictions, watershed-based runoff management can greatly enhance the protection of receiving waters. Such management provides a means to focus on the most important water quality problems in each watershed. By focusing on the most important water quality problems, watershed efforts can maximize protection of beneficial use in an efficient manner. Effective watershed-based runoff management actively reduces pollutant discharges and abates pollutant sources causing or contributing to watershed water quality problems. Watershed-based runoff management that does not actively reduce pollutant discharges and abate pollutant sources causing or contributing to watershed water quality problems can necessitate implementation of the iterative process outlined in section A.3 of the Tentative Order. Watershed management of runoff does not require Copermittees to expend resources outside of their jurisdictions. Watershed management requires the Copermittees within a watershed to develop a watershed-based management strategy, which can then be implemented on a jurisdictional basis.

b. Some runoff issues, such as general education and training, can be effectively addressed on a regional basis. Regional approaches to runoff management can improve program consistency and promote sharing of resources, which can result in implementation of more efficient programs.

c. It is important for the Copermittees to coordinate their water quality protection and land use planning activities to achieve the greatest protection of receiving water bodies. Copermittee coordination with other watershed stakeholders, especially the State of California Department of Transportation, the United States

Department of Defense, and water and sewer districts, is also important.

E. STATUTE AND REGULATORY CONSIDERATIONS

1. The Receiving Water Limitations (RWL) language specified in this Order is consistent with language recommended by the USEPA and established in State Board Water Quality Order 99-05, *Own Motion Review of the Petition of Environmental Health Coalition to Review Waste Discharge Requirements Order No. 96-03, NPDES Permit No. CAS0108740*, adopted by the State Board on June 17, 1999. The RWL in this Order require compliance with water quality standards, which for storm water discharges is to be achieved through an iterative approach requiring the implementation of improved and better-tailored BMPs over time. Compliance with receiving water limits based on applicable water quality standards is necessary to ensure that MS4 discharges will not cause or contribute to violations of water quality standards and the creation of conditions of pollution.

2. The Water Quality Control Plan for the San Diego Basin (Basin Plan), identifies the following existing and potential beneficial uses for surface waters in Riverside County: Municipal and Domestic Supply (MUN), Agricultural Supply (AGR), Industrial Process Supply (PROC), Hydropower Generation (POW), Industrial Service Supply (IND), Ground Water Recharge (GWR), Contact Water Recreation (REC1), Non-contact Water Recreation (REC2), Warm Freshwater Habitat (WARM), Cold Freshwater Habitat (COLD), Wildlife Habitat (WILD), Rare, Threatened, or Endangered Species (RARE), Spawning, Reproduction and/or Early Development (SPWN) and Preservation of Biological Habitats of Special Significance (BIOL).

3. This Order is in conformance with State Board Resolution No. 68-16, *Statement of Policy with Respect to Maintaining High Quality Waters in California*, and the federal Antidegradation Policy described in 40 CFR 131.12.

4. Section 6217(g) of the Coastal Zone Act Reauthorization Amendments of 1990 (CZARA) requires coastal states with approved coastal zone management programs to address non-point pollution impacting or threatening coastal water quality. CZARA addresses five sources of non-point pollution: agriculture, silviculture, urban, marinas, and hydromodification. This NPDES permit addresses the management measures required for the urban category, with the exception of septic systems. The adoption and implementation of this NPDES permit relieves the Copermittee from developing a non-point source plan, for the urban category, under CZARA. The San Diego Water Board addresses septic systems through the administration of other programs.

5. Section 303(d)(1)(A) of the CWA requires that “Each state shall identify those waters within its boundaries for which the effluent limitations…are not stringent enough to implement any water quality standard (WQS) applicable to such waters.” The CWA

also requires states to establish a priority ranking of impaired water bodies known as Water Quality Limited Segments and to establish Total Maximum Daily Loads (TMDLs) for such waters. This priority list of impaired water bodies is called the Section 303(d) List. The 2006 Section 303(d) List was approved by the State Board on October 25, 2006. On June 28, 2007, the 2006 303(d) list for California was given final approval by the United States Environmental Protection Agency (USEPA). The 303(d) List was recently updated, and on December 16, 2009, the 2008 303(d) List was approved by the San Diego Water Board. The 2008 List is awaiting State Board and USEPA approval.

6. This Order does not constitute an unfunded local government mandate subject to subvention under Article XIIIB, Section (6) of the California Constitution for several reasons, including, but not limited to, the following. First, this Order implements federally mandated requirements under federal Clean Water Act section 402. (33 U.S.C. § 1342(p)(3)(B).) Second, the local agency Copermittees' obligations under this Order are similar to, and in many respects less stringent than, the obligations of non-governmental and new dischargers who are issued NPDES permits for storm water and non-storm water discharges. Third, the local agency Copermittees have the authority to levy service charges, fees, or assessments sufficient to pay for compliance with this Order. Fourth, the Copermittees have requested permit coverage in lieu of compliance with the complete prohibition against the discharge of pollutants contained in federal Clean Water Act section 301, subdivision (a) (33 U.S.C. § 1311(a)) and in lieu of numeric restrictions on their storm water discharges. Fifth, the local agencies' responsibility for preventing discharges of waste that can create conditions of pollution or nuisance from conveyances that are within their ownership or control under State law predates the enactment of Article XIIIB, Section (6) of the California Constitution. Likewise, the provisions of this Order to implement total maximum daily loads (TMDLs) are federal mandates. The federal Clean Water Act requires TMDLs to be developed for water bodies that do not meet federal water quality standards. (33 U.S.C. sec. 1313(d).) Once the U.S. Environmental Protection Agency or a state develops a TMDL, federal law requires that permits must contain effluent limitations consistent with the assumptions of any applicable wasteload allocation. (40 C.F.R. sec. 122.44(d)(1)(vii)(B).)

7. Runoff treatment and/or mitigation must occur prior to the discharge of runoff into receiving waters. Treatment BMPs must not be constructed in waters of the U.S. or State unless the runoff flows are sufficiently pretreated to protect the values and functions of the water body. Federal regulations at 40 CFR 131.10(a) state that in no case shall a state adopt waste transport or waste assimilation as a designated use for any waters of the U.S. Authorizing the construction of an runoff treatment facility within a water of the U.S., or using the water body itself as a treatment system or for conveyance to a treatment system, would be tantamount to accepting waste assimilation as an appropriate use for that water body. Furthermore, the construction, operation, and maintenance of a pollution control facility in a water body can negatively impact the physical, chemical, and biological integrity, as well as the beneficial uses, of the water body. Without federal authorization (e.g.,

pursuant to Clean Water Act Section 404), waters of the U.S. may not be converted into, or used as, waste treatment or conveyance facilities. Similarly, waste discharge requirements pursuant to California Water Code Section 13260 are required for the conversion or use of waters of the State as waste treatment or conveyance facilities. Diversion from waters of the U.S./State to treatment facilities and subsequent return to waters of the U.S. is allowable, provided that the effluent complies with applicable NPDES requirements.

8. The issuance of waste discharge requirements and an NPDES permit for the discharge of runoff from MS4s to waters of the U.S. is exempt from the requirement for preparation of environmental documents under the California Environmental Quality Act (CEQA) (Public Resources Code, Division 13, Chapter 3, section 21000 et seq.) in accordance with the CWC section 13389.

9. Storm water discharges from developed and developing areas in Riverside County are significant sources of certain pollutants that cause, may be causing, threatening to cause or contributing to water quality impairment in the waters of Riverside County. Furthermore, as delineated in the CWA section 303(d) list in Table 2, the San Diego Water Board has found that there is a reasonable potential that municipal storm water and non-storm water discharges from MS4s cause or may cause or contribute to an excursion above water quality standards for the following pollutants: Indicator Bacteria, Copper, Manganese, Iron, Chlorpyrifos, Sulfates, Phosphorous, Nitrogen, Toxicity and Turbidity. In accordance with CWA section 303(d), the San Diego Water Board is required to establish Total Maximum Daily Loads (TMDLs) for these pollutants to these waters to eliminate impairment and attain water quality standards. Therefore, certain early pollutant control actions and further pollutant impact assessments by the Copermittees are warranted and required pursuant to this Order.

10. This Order requires each Copermittee to effectively prohibit all types of unauthorized discharges of non-storm water into its MS4. However, historically pollutants have been identified as present in dry weather non-storm water discharges from the MS4s through 303(d) listings, monitoring conducted by the Copermittees under Order No. R9-2004-0001, and there are others expected to be present in dry weather non-storm water discharges because of the nature of these discharges. This Order includes action levels for pollutants in non-storm water, dry weather, discharges from the MS4 designed to ensure that the requirement to effectively prohibit all types of unauthorized discharges of non-storm water in the MS4 is being complied with. Action levels in the Order are based upon numeric or narrative water quality objectives and criteria as defined in the Basin Plan, the Water Quality Control Plan for Ocean Waters of California (Ocean Plan), and the State Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California (State Implementation Policy or SIP). An exceedance of an action level requires specified responsive action by the Copermittees. This Order describes what actions the Copermittees must take when an exceedance of an action level is observed. Exceedances of non-storm water action levels do not alone

constitute a violation of this Order but could indicate non-compliance with the requirement to effectively prohibit all types of unauthorized non-storm water discharges into the MS4 or other prohibitions established in this Order. Failure to undertake required source investigation and elimination action following an exceedance of a non-storm water action level (NAL or action level) is a violation of this Order. The San Diego Water Board recognizes that use of action levels will not necessarily result in detection of all unauthorized sources of non-storm water discharges because there may be some discharges in which pollutants do not exceed established action levels. However, establishing NALs at levels appropriate to protect water quality standards is expected to lead to the identification of significant sources of pollutants in dry weather non-storm water discharges.

11. In addition to federal regulations cited in the Fact Sheet / Technical Report for the Order No. R9-2010-0016, monitoring and reporting required under Order No. R9-2010-0016 is required pursuant to authority under CWC section 13383.

F. PUBLIC PROCESS

1. The San Diego Water Board has notified the Copermittees, all known interested parties, and the public of its intent to consider adoption of an Order prescribing waste discharge requirements that would serve to renew an NPDES permit for the existing discharge of runoff.

2. The San Diego Water Board has held public hearings on TBD and heard and considered all comments pertaining to the terms and conditions of this Order.

IT IS HEREBY ORDERED that the Copermittees, in order to meet the provisions contained in Division 7 of the California Water Code (CWC) and regulations adopted thereunder, and the provisions of the Clean Water Act (CWA) and regulations adopted thereunder, must each comply with the following:

A. PROHIBITIONS AND RECEIVING WATER LIMITATIONS

1. Discharges ~~into and~~ from municipal separate storm sewer systems (MS4s) in a manner causing, or threatening to cause, a condition of pollution, contamination, or nuisance (as defined in CWC section 13050), in waters of the state are prohibited.

Comment [CP1]: This is inappropriate as it could preclude sub-regional treatment measures to protect water quality. Example Scenario, stormwater from an parking lot enters a storm drain, and flows to a nearby infiltration basin. <-- is it your intent to prohibit this scenario?

5/13 - Water Board Staff offered to clarify (i.e. via a footnote) that this provision was not intended to prohibit MS4 discharges that receive subsequent treatment prior to discharging into receiving waters. (possibly reference existing footnote on this page)

2. Storm water discharges from MS4s containing pollutants which have not been reduced to the maximum extent practicable (MEP) are prohibited.[2]

3. Discharges from MS4s that cause or contribute to the violation of water quality standards (designated beneficial uses, water quality objectives developed to protect beneficial uses, and the State policy with respect to maintaining high quality waters) are prohibited.

a. Each Copermittee must comply with section A.3 and section A.4 as it applies to Prohibition 5 in Attachment A of this Order through timely implementation of control measures and other actions to reduce pollutants in storm water discharges in accordance with this Order, including any modifications. If exceedance(s) of water quality standards persist notwithstanding implementation of this Order, the Copermittee must assure compliance with section A.3 and section A.4 as it applies to Prohibition 5 in Attachment A of this Order by complying with the following procedure:

(1) Upon a determination by either the Copermittee or the San Diego Water Board that storm water MS4 discharges are causing or contributing to an exceedance of an applicable water quality standard, the Copermittee must promptly notify the San Diego Water Board ~~within 30 days~~ and thereafter submit a report to the San Diego Water Board that describes best management practices (BMPs) that are currently being implemented and additional BMPs that will be implemented to prevent or reduce any pollutants that are causing or contributing to the exceedance of water quality standards. The notification and the report may be incorporated in the Annual Report unless the San Diego Water Board directs an earlier submittal. The report must include an implementation schedule. The San Diego Water Board may require modifications to the report;

Comment [CP2]: From 2004 Permit. Also related to edit below.

Comment [CP3]: Such a determination would commonly be done when analyzing the year's data as part of the annual report, so it makes sense that the notification ***is*** the report.

5/13 – Water Board staff did not agree to make any changes to the language in this paragraph, however, they offered to clarify in the fact sheet that the notification would consist of 1) the applicable data used in making the determination, and the date(s) of collection of that data.

[2] This prohibition does not apply to MS4 discharges which receive subsequent treatment to reduce pollutants to the MEP prior to entering receiving waters (e.g., low flow diversions to the sanitary sewer).

(2) Submit any modifications to the report required by the San Diego Water Board within 30 days of notification;

(3) Within 30 days following approval of the report described above by the San Diego Water Board, the Copermittee must revise its Jurisdictional Runoff Management Program and monitoring program to incorporate the approved modified BMPs that have been and will be implemented, the implementation schedule, and any additional monitoring required; and

(4) Implement the revised Jurisdictional Runoff Management Program and monitoring program in accordance with the approved schedule.

b. The Copermittee ~~must~~ need not repeat the procedure set forth above to comply with the receiving water limitations for continuing or recurring exceedances of the same water quality standard(s) during the development and implementation of scheduled actions unless directed to do otherwise by the San Diego Water Board Executive Officer.

c. Nothing in section A.3 must prevent the San Diego Water Board from enforcing any provision of this Order while the Copermittee prepares and implements the above report.

Comment [CP4]: Changes in this paragraph are to recognize that programs to address a problem will likely not solve the underlying problem within a year, so it doesn't make sense to repeat the procedure annually while the programs are still maturing.

5/13 – San Diego Water Board staff offered to review the reasons why this language had been changed from the SWRCB language, and consider restoring the original language.

4. In addition to the above prohibitions, discharges from MS4s are subject to all Basin Plan prohibitions cited in Attachment A to this Order.

B. NON-STORM WATER DISCHARGES

1. Each Copermittee must effectively prohibit all types of non-storm water discharges into its MS4 unless such discharges are either authorized by a separate National Pollutant Discharge Elimination System (NPDES) permit; or not prohibited in accordance with sections B.2 and B.3 below.

2. The following categories of non-storm water discharges are not prohibited unless a Copermittee or the San Diego Water Board identifies the discharge category as a source of pollutants to waters of the U.S. Where the Copermittee(s) have identified a category as a source of pollutants, the category shall be addressed as an illicit discharge and prohibited through ordinance, order or similar means. If an individual discharge within a category is identified as an isolated source of pollutants not representative of the category as a whole, that individual discharge shall be addressed as an illicit discharge. The San Diego Water Board may identify categories of discharge that either requires prohibition or other controls. For such a discharge category, the Copermittee, under direction of the San Diego Water Board, must either prohibit the discharge category or develop and implement appropriate control measures to prevent the discharge of pollutants to the MS4 and report to the San Diego Water Board pursuant to Section K.1 and K.3 of this Order.

Comment [CP5]: Clarifying

5/13 – San Diego Water Board staff offered to review this language to determine if any changes from were warranted.

Comment [CP6]: See comments/language below, including ***new*** section B.4.

a. Diverted stream flows;
b. Rising ground waters;
c. Uncontaminated ground water infiltration [as defined at 40 CFR 35.2005(20)] to MS4s;
d. Uncontaminated pumped ground water[3];
e. Foundation drains[3~~8~~];
f. Springs;
g. Water from crawl space pumps[3~~8~~];
h. Footing drains[3~~8~~];
i. Air conditioning condensation;
j. Flows from riparian habitats and wetlands;
k. Water line flushing[4,5];
l. Landscape irrigation;
m. Discharges from potable water sources not subject to NPDES Permit No. CAG679001, other than water main breaks;
n. Irrigation water;
o. Lawn watering;
p. Individual residential car washing;
q. Non-emergency fire fighting flows; and
r. Dechlorinated swimming pool discharges[6].

3. Emergency fire fighting flows (i.e., flows necessary for the protection of life or property) do not require BMPs and need not be prohibited. As part of the Jurisdictional Runoff Management Plan (JRMP), each Copermittee must develop and implement a program to address pollutants from non-emergency fire fighting flows (i.e., flows from controlled or practice blazes and maintenance activities) identified by the Copermittee to be significant sources of pollutants to waters of the United States.

a. Building fire suppression system maintenance discharges (e.g. sprinkler line flushing) contain waste. Therefore, such discharges are to be prohibited by the Copermittees as illicit discharges through ordinance, order, or similar means.

4. As part of the JRMP, the Copermittees must develop and implement appropriate control measures to address pollutants from landscape irrigation, irrigation water and lawn watering activities identified by the Copermittee to be a significant source of pollutants to waters of the United States. The Copermittees shall use a combination of education, source control, water efficiency/conservation ordinances and enforcement tools, as appropriate, in cooperation with local water districts, to meet

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Comment [CP7]: Irrigation runoff (and related exemptions) were restored. We have not identified irrigation runoff (et.al) as a source of pollutants to waters of the United States. Therefore per B.2, the Copermittees have the option to 'develop and implement appropriate control measures to prevent the discharge of pollutants'. See new section B.4. below.

5/13 – San Diego Water Board staff and the Copermittees had extensive discussions on this item. Reference the meeting summary for details.

Comment [CP8]: Restored. Per B.2, discharge categories identified as a source of pollutants by the RB can either be prohibited - or addressed through 'appropriate control measures'.

Per B.3. below this category is not being prohibited, but is being required to be addressed through 'appropriate control measures'.

Comment [CP9]: Requested approach to address irrigation runoff pursuant to B.2. Approach and language is the same as B.3 for non-emergency fire fighting flows.

This will likely yield the same water quality benefits as a prohibition, without making broken sprinklers illegal, and without requiring enforcement of all reported cases of overwatering. A prohibition would be an excessive drain on Copermittee resources that would provide little comparable benefit within this watershed.

5/13 – San Diego Water Board staff indicated that if 'irrigation runoff' is not prohibited, that this language would not be needed.

[3] Requires enrollment under Order R9-2008-002. Discharges into the MS4 require authorization from the owner and operator of the MS4 system.
[4] This exemption does not include fire suppression sprinkler system maintenance and testing discharges. Those discharges may be regulated under Section B.3.
[5] Requires enrollment under Order R9-2002-0020.
[6] Including saline swimming pool discharges directly to a saline water body.

this requirement.

5. Each Copermittee must examine all dry weather effluent analytical monitoring results collected in accordance with section F.4 of this Order and Receiving Waters and MS4 Discharge Monitoring and Reporting Program No. R9-2010-0016 to identify water quality problems which may be the result of any non-prohibited discharge category(ies) identified above in section B.2. Follow-up investigations must be conducted to identify and control, pursuant to section B.2, any non-prohibited discharge category(ies) listed above.

C. NON-STORM WATER DRY WEATHER ACTION LEVELS

1. Each Copermittee, beginning no later than May 1, 2011, shall, individually and/or jointly implement the non-storm water dry weather action level (NAL) monitoring as described in Attachment E of this Order.

2. In response to an exceedance of an NAL, the applicable~~each~~ Copermittee must investigate ~~and identify~~ the source of the exceedance in a timely manner. However, if any Copermittee identifies exceedances of NALs that prevent them from adequately conducting source investigations in a timely manner, then the Copermittees may submit a prioritization plan and timeline that identifies the timeframe and planned actions to investigate and report their findings on all of the exceedances. Depending on the findings of~~Following~~ the source investigation~~ and identification~~, the Copermittee~~s~~ must ~~submit an~~ take appropriate action ~~report dependant on the source of the pollutant exceedance~~ as follows:

   a. If the Copermittee identifies the source of the exceedance as natural (non-anthropogenically influenced) in origin and in conveyance into the MS4; then no specific action is required, however the Copermittee shall report their findings and documentation of their source investigation to the San Diego Water Board within the applicable annual report.~~fourteen days of the source identification.~~

   b. If the Copermittee identifies the source of the exceedance as an illicit discharge or connection, then the Copermittee~~s~~ must initiate appropriate actions as described in section F.4 to promptly eliminate the discharge to their MS4. A~~ and~~ report of the findings, including any enforcement action(s) taken, and documentation of the source investigation must be submitted to the San Diego Water Board within the applicable annual report.~~fourteen days of the source identification.~~ If the Copermittee is unable to eliminate the source of discharge within fourteen days of identification, then the Copermittee must ~~submit, as part of their action report, their plan~~ contact and coordinate~~timeframe to eliminate~~ the response with~~source of~~ the Regional Board.~~exceedance.~~ Those dischargers seeking to continue such a discharge must become subject to a separate NPDES permit prior to continuing any such discharge.

   c. If the Copermittee identifies the source of the exceedance as an exempted category of non-storm water discharge, then the Copermittees must determine if this is an isolated circumstance or if the category of discharges must be addressed through the prevention or prohibition of that category of discharge as an illicit discharge. The Copermittee must submit their findings ~~in~~ including a description of the steps taken to address the discharge~~ and/or the category of discharge,~~ to the San Diego Water Board for review with the ~~next subsequent~~ annual report. If the Copermittee has determined that the entire category of discharge must be addressed, the annual report must describe and include a schedule for completion of the planned~~ Such description shall include~~ relevant updates to ~~or new~~ ordinances, orders, or other legal means of addressing the

Comment [CP10]: 5/6 - It was agreed that this addition was not necessary, as RB Staff confirmed that their intent and the existing language does not prevent a Copermittee from engaging the District's help in complying with permit requirements.

Comment [CMP11]: Conflicts with 2.e.

Comment [CMP12]: Reporting within 14 days each time around will drain resources and keep our time focused on paperwork. Request that reporting to the regional board happen with the annual report. (Same comment throughout this section)

5/6 - RB staff agreed to change the reporting requirements throughout Section C to occur with the annual report.

Comment [CMP13]: Clarify relationship to IDDE section

Comment [CP14]: 5/6 - Per our discussion, these two sentences can be removed since the process for responding to Illicit Discharges and Connections is addressed in Section F.4.

Comment [CP15]: 5/6 - RB staff agreed to these changes.

Comment [CP16]: 5/6 - Revised suggested language to address concerns of RB staff that not only a schedule is required, but that the actual updates are required.

category of discharge, and the~~. The~~ Copermittees must also submit a summary of their findings with the Report of Waste Discharge.

d. If the Copermittee identifies the source of the exceedance as a non-storm water discharge in violation or potential violation of an existing separate NPDES permit (e.g. the groundwater dewatering permit), then the Copermittee must report, within three business days, the findings to the San Diego Water Board including all pertinent information regarding the discharger and discharge characteristics.

e. If the Copermittee is unable to identify the source of the exceedance after taking and documenting reasonable steps to do so, then the Copermittee must report the results in the annual report, and utilize the current and historical exceedance information when adjusting and executing annual work plans, as required by this Order. ~~identify the pollutant as a high priority pollutant of concern in the tributary subwatershed, perform additional focused sampling and update their programs within a year to reflect this priority. The Copermittee's annual report shall include these updates to their programs including, where applicable, updates to their watershed workplans (Section G.2), retrofitting consideration (Section F.3.d) and program effectiveness work plans (Section J.4).~~

f. The Copermittees or any interested party, may evaluate existing NALs and propose revised NALs for future Board consideration.

3. NALs provide an assessment of the effectiveness of the Copermittees' program to prohibit non-storm water discharges and of the appropriateness of exempted non-storm water discharges. An exceedance of an NAL does not alone constitute a violation of the provisions of this Order, but an exceedance of an NAL may indicate *that the Copermittee (s) need to re-evaluate their efforts to*~~a lack of compliance with the requirement that Copermittees~~ effectively prohibit all types of unauthorized non-storm water discharges into the MS4 or other prohibitions set forth in Sections A and B of this Order. Failure to timely implement required actions specified in this Order following an exceedance of an NAL constitutes a violation of this Order. However, neither compliance with NALs nor compliance with required actions following observed exceedances, excuses any non-compliance with the requirement to effectively prohibit all types of unauthorized non-storm water discharges into the MS4s or any non-compliance with the prohibitions in Sections A and B of this Order. ~~NALs provide an assessment of the effectiveness of the prohibition of non-storm water discharges and of the appropriateness of exempted non-storm water discharges. During any annual reporting period in which one or more exceedances of NALs have been documented the Copermittee must submit with their next scheduled annual report, a report describing whether and how the observed exceedances did or did not result in a discharge form the MS4 that caused, or threatened to cause or contribute to a condition of pollution, contamination, or nuisance in the receiving waters.~~

4. Monitoring of effluent will occur at the end-of-pipe prior to discharge into the

Comment [CP17]: 5/6 - Adjusted language provided pursuant to our discussion. (replaces previously provided edits.) The new proposed language addresses both of our goals as understood below.

RB Goal (as understood): want the Copermittees' programs to be responsive to NAL exceedances.

Copermittee Goal: want flexibility to assess the significance of the exceedance in determining when, and to what extent, to dedicate resources to adjusting our programs.

Comment [CP18]: C.4 below already requires this - the station will continue to be monitored until no further exceedances are detected.

Comment [CP19]: First sentence moved from below for clarity.

5/6 - Per our discussion RB Staff will discuss the recommended changes in C.3 with Legal Counsel.
It was also noted that this section may be more appropriate in the Findings.

Comment [CP20]: 5/6 - This suggested language was not included in the original comments sent 4/29, but were discussed in the 5/6 meeting.

Comment [CP21]: This additional reporting effort does not provide any value/utility that is not already addressed under the MRP.

Comment [CMP22]: Suggest move to MRP. Focus on the process in Section D, and keep the action levels and monitoring requirements in the MRP.

receiving waters, with a focus on Major Outfalls, as defined in 40 CFR 122.26(B 5-6) and Attachment E of this Order. The Copermittees must develop their monitoring plans to sample a representative ~~percentage~~ number of major outfalls and identified stations within each hydrologic subarea. At a minimum, outfalls that exceed any NALs once during any year (except those that are identified as natural in origin pursuant to 2.a.) must be monitored in the subsequent year. Any station that does not exceed an NAL for 3 years may be replaced with a different station.

5. Each Copermittee shall monitor for the non-storm water dry weather action levels, which are incorporated into this Order as follows:

a. Action levels for discharges to inland surface waters:

Comment [CMP23]: This section more appropriately belongs in the MRP.

We are not providing full comments on section 5 at this time, but will address with the discussions on the MRP.

Comment [CP24]: 5/6 - Per our discussion, the suggested language *'individually and/or jointly'* was removed.

Table 3.a.1: General Constituents

Parameter	Units	AMAL	MDAL	Instantaneous Maximum	Basis
Fecal Coliform	MPN/ 100 ml	200[A] 400[B]	-		BPO
Enterococci	MPN/ 100 ml	33	-	61[C]	BPO
Turbidity	NTU	-	20		BPO
pH	Units	Within limit of 6.5 to 8.5 at all times			BPO
Dissolved Oxygen	mg/L	Not less than 5.0 in WARM waters and not less than 6.0 in COLD waters			BPO
Total Nitrogen	mg/L	-	1.0	See MDAL	BPO
Total Phosphorus	mg/L	-	0.1	See MDAL	BPO
Methylene Blue Active Substances	mg/L	-	0.5	See MDAL	BPO
Iron	mg/L	-	0.3	See MDAL	BPO
Manganese	mg/L	-	0.05	See MDAL	BPO

A – Based on a minimum of not less than five samples for any 30-day period
B – No more than 10 percent of total samples may exceed 400 per 100 ml during any 30 day period
C – This Value has been set to Basin Plan Criteria for Designated Beach Areas
BPO – Basin Plan Objective
MDAL – Maximum Daily Action Level AMAL – Average Monthly Action Level

Table 3.a.2: Priority Pollutants

		Freshwater (CTR)	
Parameter	Units	MDAL	AMAL
Cadmium	ug/L	**	**
Copper	ug/L	*	*
Chromium III	ug/L	**	**
Chromium VI (hexavalent)	ug/L	16	8.1
Lead	ug/L	*	*
Nickel	ug/L	**	**

Silver	ug/L	*	*
Zinc	ug/L	*	*

CTR – California Toxic Rule
*- Action Levels developed on a case-by-case basis (see below)
**- Action Levels developed on a case-by-case basis (see below), but calculated criteria are not to exceed Maximum Contaminant Levels under the California Code of Regulations[7]

The NALs for Cadmium, Copper, Chromium (III), Lead, Nickel, Silver and Zinc will be developed on a case-by-case basis because the freshwater criteria are based on site-specific water quality data (receiving water hardness). For these priority pollutants, the following equations (40 CFR 131.38.b.2) will be required:

Cadmium (Total Recoverable) = exp(0.7852[ln(hardness)] -2.715)
Chromium III (Total Recoverable) = exp(0.8190[ln(hardness)] + .6848)
Copper (Total Recoverable) = exp(0.8545[ln(hardness)] - 1.702)
Lead (Total Recoverable) = exp(1.273[ln(hardness)] - 4.705)
Nickel (Total Recoverable) = exp(.8460[ln(hardness)] + 0.0584)
Silver (Total Recoverable) = exp(1.72[ln(hardness)] - 6.52)
Zinc (Total Recoverable) = exp(0.8473[ln(hardness)] + 0.884)

D. STORM WATER ACTION LEVELS

1. The Copermittees shall individually and/or jointly implement the Wet Weather MS4 Discharge Monitoring as described in Attachment E of this Order, and ~~Beginning~~ beginning Year 3 after Order adoption date, the Copermittees shall begin annual assessment of that data for compliance with the Storm Water Action Levels (SALs) identified herein. At each monitoring station, If a running average of twenty percent or greater of the available Wet Weather MS4 Discharge Monitoring data exceeds ~~exceedances of any discharge of storm water from the MS4 to waters of the United States that exceed~~ the Storm Water Action Levels (SALs) for the pollutants listed in Table 5 (below) ~~will require each~~ the applicable Copermittee(s) will be required to affirmatively augment and implement all necessary storm water controls and measures to reduce the discharge of the associated class of pollutants(s) to the MEP ~~standard~~. The Copermittees must utilize the exceedance information when adjusting and executing annual work plans, as required by this Order. Copermittees shall take the magnitude, frequency, need to dedicate resources to addressing NAL exceedances, and number of constituents exceeding the SAL(s), in addition to receiving water quality data and other information, into consideration when reacting to SAL exceedances in an iterative manner. Failure to appropriately consider and react to SAL exceedances in an iterative manner creates a presumption that the Copermittee(s) have not complied with the MEP standard.

Comment [CMP25]: Attempted to provide context and a clearer introduction to the section.

5/6 - As discussed under Section C, the language *'individually and/or jointly'* is not needed.

Comment [CP26]: Found the draft language here confusing, We provided suggested language that attempts to clarify.

Comment [CP27]:
5/6 - RB Staff confirmed that such flexibility for prioritization between NALs and SALs is appropriate and already exists in the language, therefore this language will not be added.

Table 4. Storm Water Action Levels

Pollutant	Action Level
Turbidity (NTU)	126
Nitrate & Nitrite total (mg/L)	2.6

[7] California Code of Regulations, Title 22, Division 4, Chapter 15, Article 4, Section 64431.

P total (mg/L)	1.46
Cd total (µg/L)	3.0
Cu total (µg/L)	127
Pb total (µg/L)	250
Zn total (µg/L)	976

2. The end-of-pipe assessment points for the determination of SAL compliance are all major outfalls, as defined in 40 CFR 122.26(b)(5) and (b)(6). The Copermittees must develop their monitoring plans to sample a representative percent of the major outfalls within each hydrologic subarea. At a minimum, outfalls that exceed SALs must be monitored in the subsequent year. Any station that does not exceed an SAL for 3 years may be replaced with a different station. SAL samples must be 24 hour time weighted composites.

3. The absence of SAL exceedances does not relieve the Copermittees from implementing all other required elements of this Permit.

4. This Permit does not regulate natural sources and conveyances into the MS4 of constituents listed in Table 4.~~5.~~ To be relieved of the requirements to take action as described in D.1 above ~~prioritize pollutant/watershed combinations for BMP updates~~ and to continue monitoring a station, the Copermittee must demonstrate that the likely and expected cause of the SAL exceedance is not anthropogenic in nature. This demonstration does not need to be repeated, for subsequent exceedances of the same SAL in the same hydrologic subarea.

5. The SALs will be reviewed and updated at the end of every permit cycle. The data collected pursuant to ~~D.2 above~~Attachment E can be used to create SALs based upon local data. It is the goal of the SALs, through the iterative and MEP process, to have outfall storm water discharges meet all applicable water quality standards.

Comment [CMP28]: We are not providing comments on the action levels and monitoring requirements themselves (Table 4 and section D.2.) at this time, but will return to this at a subsequent meeting.

Comment [CP29]: 5/6 - Per RB Comment

Comment [CP30]: If we have demonstrated that the source is natural, we will likely continue to see similar exceedances in the future – and we shouldn't have to go re-prove it every time.

5/6 - RB Staff confirmed that the natural source demonstration does not need to be repeated, however significant departures from the background loads may indicate an anthropogenic source.

E. LEGAL AUTHORITY

1. Each Copermittee must establish, maintain, and enforce adequate legal authority to control pollutant discharges into and from its MS4 through ordinance, statute, permit, contract or similar means. Nothing herein shall authorize a Co-Permittee or other discharger regulated under the terms of this order to divert, store or otherwise impound water if such action is reasonably anticipated to harm downstream water right holders in the exercise of their water rights. This legal authority must, at a minimum, authorize the Copermittee to:

   a. Control the contribution of pollutants in discharges of runoff associated with industrial and construction activity to its MS4 and control the quality of runoff from industrial and construction sites. This requirement applies both to industrial and construction sites which have coverage under the statewide general industrial or construction storm water permits, as well as to those sites which do not. Grading

ordinances must be updated and enforced as necessary to comply with this Order;

b. Prohibit all identified illicit discharges not otherwise allowed pursuant to section B.2;

c. Prohibit and eliminate illicit connections to the MS4;

d. Control the discharge of spills, dumping, or disposal of materials other than storm water to its MS4;

e. Require compliance with conditions in Copermittee ordinances, permits, contracts or orders (i.e., hold dischargers to its MS4 accountable for their contributions of pollutants and flows);

f. Utilize enforcement mechanisms to require compliance with Copermittee storm water ordinances, permits, contracts, or orders;

g. Control the contribution of pollutants from one portion of the shared MS4 to another portion of the MS4 through interagency agreements among Copermittees. Control of the contribution of pollutants from one portion of the shared MS4 to another portion of the MS4 through interagency agreements with other owners of the MS4 such as the State of California Department of Transportation, the United States Department of Defense, or Native American Tribes is encouraged;

h. Carry out all inspections, surveillance, and monitoring necessary to determine compliance and noncompliance with local ordinances and permits and with this Order, including the prohibition on illicit discharges to the MS4. This means the Copermittee must have authority to enter, monitor, inspect, take measurements, review and copy records, and require regular reports from industrial facilities discharging into its MS4, including construction sites;

i. Require the use of BMPs to prevent or reduce the discharge of pollutants into MS4s from storm water to the MEP; and

j. Require documentation on the effectiveness of BMPs implemented to reduce the discharge of storm water pollutants to the MS4 to the MEP.

2. Each Copermittee must submit within 365 days of adoption of this Order, a statement certified by its chief legal counsel that the Copermittee has taken the necessary steps to obtain and maintain full legal authority to implement and enforce each of the requirements contained in 40 CFR 122.26(d)(2)(i)(A-F) and this Order. These statements must include:

a. Identification of all departments within the jurisdiction that conduct runoff related activities, and their roles and responsibilities under this Order. Include an up to date organizational chart specifying these departments and key personnel.

b. Citation of runoff related ordinances and the reasons they are enforceable;

c. Identification of the local administrative and legal procedures available to mandate compliance with runoff related ordinances and therefore with the conditions of this Order;

d. A description of how runoff related ordinances are implemented and appealed; and

e. Description of whether the municipality can issue administrative orders and

injunctions or if it must go through the court system for enforcement actions.

F. JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM (JRMP)

Each Copermittee must implement all requirements of section F of this Order no later than 365 days after adoption of the Order, unless otherwise specified. Prior to 365 days after adoption of the Order, each Copermittee must at a minimum implement its Jurisdictional RMP document, as the document was developed and amended to comply with the requirements of Order No. R9-2004-001.

Each Copermittee must develop and implement an updated JRMP for its jurisdiction. Each updated JRMP must meet the requirements of section F of this Order~~,~~ to reduce the discharge of storm water pollutants from the MS4 to the MEP, effectively prohibit non-storm water discharges and prevent runoff discharges from the MS4 from causing or contributing to a violation of water quality standards.

1. DEVELOPMENT PLANNING COMPONENT

Each Copermittee must implement a program which meets the requirements of this section ~~and~~ to (1) reduce~~s~~ Development Project discharges of storm water pollutants from the MS4 to the MEP; (2) prevent~~s~~ Development Project discharges from the MS4 from causing or contributing to a violation of water quality standards; (3) prevent~~s~~ illicit discharges into the MS4; and (4) manage~~s~~ increases in runoff discharge rates and durations from Development Projects that are likely to cause increased erosion of stream beds and banks, silt pollutant generation, or other impacts to beneficial uses and stream habitat due to increased erosive force.

Comment [CP31]: Section F.1 requires programs that address each of these, these are not mutually exclusive requirements.

a. GENERAL PLAN

Each Copermittee must revise as needed its General Plan or equivalent plan (e.g., Comprehensive, Master, or Community Plan) to include water quality and watershed protection principles and policies that direct land-use decisions and require implementation of consistent water quality protection measures for ~~all~~ development, redevelopment and retrofit projects. Examples of water quality and watershed protection principles and policies to be considered include the following:

Comment [CP32]: Consistent with 2004 permit. If you include the word all, then we should add the word 'applicable'. (…for all *applicable* development….)

(1) Minimize the amount of impervious surfaces and directly connected impervious surfaces in areas of new development and redevelopment and where feasible slow runoff and maximize on-site infiltration of runoff.

(2) Implement pollution prevention methods supplemented by pollutant source controls and treatment BMPs. Use small collection strategies located at, or as close as possible to, the source (i.e., the point where water initially meets the

ground) to minimize the transport of urban runoff and pollutants offsite and into an MS4.

(3) Preserve, and where possible, create or restore areas that provide important water quality benefits, such as riparian corridors, wetlands, and buffer zones. Encourage land acquisition of such areas.

(4) Limit disturbances of natural water bodies and natural drainage systems caused by development including roads, highways, and bridges.

(5) Prior to making land use decisions, utilize methods available to estimate increases in pollutant loads and flows resulting from projected future development. Require incorporation of ~~structural and non-structural~~ appropriate BMPs to mitigate the projected increases in pollutant loads and flows.

Comment [CP33]: From 2004 permit. Alternatively state 'structural and/**or** non structural' BMPs

(6) Avoid development of areas that are particularly susceptible to erosion and sediment loss; or establish development guidance that identifies these areas and protects them from erosion and sediment loss.

(7) Reduce pollutants associated with vehicles and increasing traffic resulting from development.

(8) Post-development runoff from a site shall not contain pollutant loads that cause or contribute to an exceedance of receiving water quality objectives and which have not been reduced to the MEP.

b. ENVIRONMENTAL REVIEW PROCESS

Each Copermittee must revise as needed its current environmental review processes to accurately evaluate water quality impacts and cumulative impacts and identify appropriate measures to avoid, minimize and mitigate those impacts for all Development Projects.

c. APPROVAL PROCESS CRITERIA AND REQUIREMENTS FOR ALL DEVELOPMENT PROJECTS

For all proposed Development Projects, each Copermittee during the planning process, and prior to project approval and issuance of local permits, must prescribe the necessary requirements so that Development Project discharges of storm water pollutants from the MS4 will be reduced to the MEP, will not cause or contribute to a violation of water quality standards, and will comply with Copermittee's ordinances, permits, plans, and requirements, and with this Order.

Performance Criteria: Discharges from each approved development project must be subject to the following management measures:

(1) Source control BMPs that reduce storm water pollutants of concern in runoff; prevent~~ion~~ of illicit discharges into the MS4; prevent~~ion~~ of irrigation runoff; storm drain system stenciling or signage; properly design~~ed~~ outdoor material storage areas; properly designed outdoor work areas; and properly designed trash storage areas.

Comment [CP34]: 5/13 – San Diego Water Board staff agreed to the changes in this paragraph.

Comment [CP35]: Subject to our discussion on section B (non storm water discharges.

(2) The following LID BMPs listed below shall be implemented at all Development Projects where applicable and feasible.

(a) Conserve natural areas, including existing trees, other vegetation, and soils,
(b) Construct streets, sidewalks, or parking lot aisles to the minimum widths necessary, provided that public safety is not compromised,
(c) Minimize the impervious footprint of the project,
(d) Minimize soil compaction to landscaped areas,
(e) Minimize disturbances to natural drainages (e.g., natural swales, topographic depressions, etc.), and
(f) Disconnect impervious surfaces through distributed pervious areas.

(3) Buffer zones for natural water bodies, where ~~technically~~ feasible. Where buffer zones are ~~technically~~ infeasible, require project proponent to implement other buffers such as trees, access restrictions, etc;

Comment [CP36]: Consistent with 2004 permit.

(4) Measures necessary so that grading or other construction activities meet the provisions specified in section F.2 of this Order.

(5) ~~Where~~ When known during permitting, require industrial facility operators subject to the General Industrial permit to provide evidence of permit coverage prior to occupancy.

Comment [CP37]: 5/13 – San Diego Water Board staff agreed to this change.

(6) Submittal of proof of a mechanism under which ongoing long-term maintenance of all structural post-construction BMPs will be conducted.

(7) Infiltration and Groundwater Protection

To protect groundwater quality, each Copermittee must apply restrictions to the use of treatment control BMPs that are designed to primarily function as large, centralized infiltration devices (such as large infiltration trenches and infiltration basins). Such restrictions must be designed so that the use of such infiltration treatment control BMPs ~~must~~ does not cause or contribute to an exceedance of groundwater quality objectives. At a minimum, each treatment control BMP designed to primarily function as a centralized infiltration device must meet the restrictions below, unless it is demonstrated that a restriction is not necessary to protect groundwater quality. The Copermittees may collectively or individually develop alternative restrictions

on the use of treatment control BMPs which are designed to primarily function as centralized infiltration devices. Alternative restrictions developed by the Copermittees can partially or wholly replace the restrictions listed below. The restrictions do not apply to small infiltration systems dispersed throughout a development project.

(a) Runoff must undergo pretreatment such as sedimentation or filtration prior to infiltration;

(b) All dry weather flows containing significant pollutant loads must be diverted from infiltration devices and treated through other BMPs;

(c) Pollution prevention and source control BMPs must be implemented at a level appropriate to protect groundwater quality at sites where infiltration treatment control BMPs are to be used;

(d) Infiltration treatment control BMPs must be adequately maintained so that they remove storm water pollutants to the MEP;

(e) The vertical distance from the base of any infiltration treatment control BMP to the seasonal high groundwater mark must be at least 10 feet. Where groundwater basins do not support beneficial uses, this vertical distance criteria may be reduced, provided groundwater quality is maintained;

(f) The soil through which infiltration is to occur must have physical and chemical characteristics (such as appropriate cation exchange capacity, organic content, clay content, and infiltration rate) which are adequate for proper infiltration durations and treatment of runoff for the protection of groundwater beneficial uses;

(g) Infiltration treatment control BMPs must not be used for areas of industrial or light industrial activity; ~~areas subject to high vehicular traffic (25,000 or greater average daily traffic on main roadway or 15,000 or more average daily traffic on any intersecting roadway)~~; automotive repair shops; car washes; fleet storage areas (bus, truck, etc.); nurseries; and other high threat to water quality land uses and activities as designated by each Copermittee unless first treated or filtered to remove pollutants prior to infiltration ~~and a comprehensive site-specific evaluation has been conducted~~; and

(h) Infiltration treatment control BMPs must be located a minimum of 100 feet horizontally from any water supply wells.

(7) Where feasible, landscaping with native or low water species shall be preferred in areas that drain to the MS4 or to waters of the United States.

Comment [CP38]: 5/13 – San Diego Water Board staff agreed to remove this requirement.

Comment [CP39]: Not warranted for 'all' projects.

5/13 – San Diego Water Board staff agreed to this change.

d. STANDARD STORM WATER MITIGATION PLANS (SSMPS) – APPROVAL PROCESS CRITERIA AND REQUIREMENTS FOR PRIORITY DEVELOPMENT PROJECTS

Within 365 days of adoption of this Order, the Copermittees must submit an updated ~~model~~ SSMP (referred to by the Copermittees as a Water Quality Management Plan, or 'WQMP'), to the San Diego Water Board's Executive Officer for a 30 day public review and comment period. The San Diego Water Board's Executive Officer has the discretion to determine the necessity of a public hearing. Within 180 days of determination that the ~~Model~~ SSMP is in compliance with this Permit's provisions, each Copermittee must ~~update their own local SSMP, and~~ amend~~ed~~ their ordinances consistent with the ~~model~~ SSMP and begin implementation of the updated SSMP. Any updated ordinances, and shall be submitted ~~submit both (local SSMP and amended ordinances)~~ to the San Diego Water Board with the annual report. The ~~model~~ SSMP must meet the requirements of section F.1.d of this Order to (1) reduce Priority Development Project discharges of storm water pollutants from the MS4 to the MEP, and (2) prevent Priority Development Project runoff discharges from the MS4 from causing or contributing to a violation of water quality standards.[8]

(1) Definition of Priority Development Project (PDP):

Priority Development Projects are:

(a) All new Development Projects that fall under the project categories or locations listed in section F.1.d.(2), and

(b) Those redevelopment projects that create, add, or replace at least 5,000 square feet of impervious surfaces on an already developed site and the ~~existing development and/or~~ the redevelopment project falls under the project categories or locations listed in section F.1.d.(2). Where redevelopment results in an increase of less than fifty percent of the impervious surfaces of a previously existing development, and the existing development was not subject to SSMP requirements, the numeric sizing criteria discussed in section F.1.d.(6) applies only to the addition or

Comment [CP40]: Consistent with 2004 permit and the Santa Ana Permit.

[8] Updated SSMP and hydromodification requirements must apply to all priority projects or phases of priority projects which have not yet begun grading or construction activities at the time any updated SSMP or hydromodification requirement commences. If lawful prior approval of a project exists, whereby application of an updated SSMP or hydromodification requirement to the project is illegal, the updated SSMP or hydromodification requirement need not apply to the project. Updated Development Planning requirements set forth in Sections F.1. (a) through (h) of this Order must apply to all projects or phases of projects, unless, at the time any updated Development Planning requirement commences, the projects or project phases meet any one of the following conditions: (i) the project or phase has begun grading or construction activities; or (ii) a Copermittee determines that lawful prior approval rights for a project or project phase exist, whereby application of the Updated Development Planning requirement to the project is legally infeasible. Where feasible, the Permittees must utilize the SSMP and hydromodification update periods to ensure that projects undergoing approval processes include application of the updated SSMP and hydromodification requirements in their plans.

replacement, and not to the entire development. Where redevelopment results in an increase of more than fifty percent of the impervious surfaces of a previously existing development, the numeric sizing criteria applies to the entire development. Redevelopment does not include routine maintenance activities that are conducted to maintain original line and grade, hydraulic capacity, original purpose of the facility. Redevelopment also does not include retrofit projects implemented pursuant to section F.3.d of this order.

(c) PDPs do not include Emergency Projects as defined in attachment C of this order.

~~(c) One acre threshold: In addition to the Priority Development Project Categories identified in section F.1.d.(2), Priority Development Projects must also include all other pollutant-generating Development Projects that result in the disturbance of one acre or more of land within two years of adoption of this Order.~~[9]

(2) Priority Development Project Categories

Where a new Development Project feature, such as a parking lot, falls into a Priority Development Project Category, the entire project footprint is subject to SSMP requirements.

(a) New development projects that create 10,000 square feet or more of impervious surfaces (collectively over the entire project site) including commercial, industrial, residential subdivisions requiring a Final Map (i.e. detached single family home subdivisions, multi-family attached subdivisions, condominiums, apartments, etc.), mixed-use, and public projects. This category includes development projects on public or private land which fall under the planning and building authority of the Copermittees.

(b) Automotive repair shops. This category is defined as a facility that is categorized in any one of the following Standard Industrial Classification (SIC) codes: 5013, 5014, 5541, 7532-7534, or 7536-7539.

(c) Restaurants. This category is defined as a facility that sells prepared foods and drinks for consumption, including stationary lunch counters and refreshment stands selling prepared foods and drinks for immediate consumption (SIC code 5812), where the land area for development is greater than 5,000 square feet. Restaurants where land development is less than 5,000 square feet must meet all SSMP requirements except for structural treatment BMP and numeric sizing criteria requirement F.1.d.(6)

Comment [CP41]: 2010 Santa Ana Permit

Comment [CP42]: Important not to penalize proactive efforts to retrofit existing development.

Comment [CP43]: 6/3 - Change per our discussion. CEQA definition for 'Emergency Projects' (§ 15269) has been added to Attachment C.

Comment [CP44]: Keep requirements consistent with Santa Ana Permit. This also exceeds the SWRCB Precedential Order regarding SUSMPs.

Comment [CP45]: Consistent with the Santa Ana permit, these revisions clarify that this doesn't apply to individual custom home projects (unless they also qualify as hillside development).

Individual residential projects will still be required to implement the controls from F.1.c. for 'all' projects, however it is not appropriate to burden such insignificant projects with the full SSMP requirements.

[9] ~~Pollutant generating Development Projects are those projects that generate pollutants at levels greater than natural background levels.~~

and hydromodification requirement F.1.h.

(d) All hillside development greater than 5,000 square feet. This category is defined as any development which creates 5,000 square feet of impervious surface which is located in an area with known erosive soil conditions, where the development will grade on any natural slope that is twenty-five percent or greater.

(e) Environmentally Sensitive Areas (ESAs). All development located within or directly adjacent to or discharging directly to an ESA (where discharges from the development or redevelopment will enter receiving waters within the ESA), which either creates 2,500 square feet of impervious surface on a proposed project site or increases the area of imperviousness of a proposed project site to 10 percent or more of its naturally occurring condition. "Directly adjacent" means situated within 200 feet of the ESA. "Discharging directly to" means outflow from a drainage conveyance system that is composed entirely of flows from the subject development or redevelopment site, and not commingled with flows from adjacent lands.

(f) Impervious Parking lots 5,000 square feet or more ~~or with 15 or more parking spaces~~ and potentially exposed to runoff. Parking lot is defined as a land area or facility for the temporary parking or storage of motor vehicles used personally, for business, or for commerce.

(g) Street, roads, highways, and freeways[10]. This category includes any paved impervious surface that is 5,000 square feet or greater used for the transportation of automobiles, trucks, motorcycles, and other vehicles.

(h) Retail Gasoline Outlets (RGOs). This category includes RGOs that meet the following criteria: (a) 5,000 square feet or more or (b) a projected Average Daily Traffic (ADT) of 100 or more vehicles per day.

(3) Pollutants of Concern

As part of its local SSMP, each Copermittee must implement a~~n~~ ~~updated~~ procedure for identifying pollutants of concern for each Priority Development Project. The procedure must address, at a minimum: (1) Receiving water quality (including pollutants for which receiving waters are listed as impaired under CWA section 303(d)); (2) Land-use type of the Development Project and pollutants associated with that land use type; and (3) Pollutants expected to be present on site.

Comment [CP46]: **'Impervious':** Clarify that if a project implements pervious parking lots (such as pervious concrete), that they would not be necessarily be subjected to a SSMP (unless triggered by another category). This will be a way to strongly encourage this type of LID source control.

'or with 15 or more': Consistent with 2004 SMR and 2010 Santa Ana. Make it simple and consistent, having dual checks here is adding unnecessary complexity.

Comment [CP47]: Footnote added to allow the Copermittees the option to develop road standards, that, upon approval by the EO, could be used in-lieu of a WQMP for each road project.

Comment [CP48]: There is no reason to have an *'updated'* procedure.

[10] The Copermittees may develop and submit to the Regional Board, a plan for addressing pollutant discharges from streets, roads, highways and freeways through implementation of revised standard roadway sections that utilize USEPA Green Streets guidance or similar. Upon approval of the plan by the Executive Officer, projects that incorporate those standards need not be categorized as a PDP unless also triggered by another category.

(4) Low Impact Development BMP Requirements

Each Copermittee must require each Priority Development Project to implement LID BMPs which will collectively minimize directly connected impervious areas, limit loss of existing infiltration capacity, and protect areas that provide important water quality benefits necessary to maintain riparian and aquatic biota, and/or are particularly susceptible to erosion and sediment loss.

(a) The Copermittees must take the following measures to ensure that LID BMPs are implemented at PDPs:

(i) Each Copermittee must require LID BMPs or make a finding of technical infeasibility for each Priority Development Project in accordance with the LID waiver program in Section F.1.d.(~~8~~7);

(ii) Each Copermittee must incorporate formalized consideration, such as thorough checklists, ordinances, and/or other means, of LID BMPs into the plan review process for Priority Development Projects;

(iii) ~~The review of each Priority Development Project must include an assessment of potential collection of storm water for on-site or off-site reuse opportunities~~;

(iv) ~~The review of each Priority Development Project must include an assessment of techniques to infiltrate, filter, store, evaporate, or retain runoff close to the source of runoff; and~~

(v) Within 2 years after adoption of this Order, each Copermittee must review its local codes, policies, and ordinances and identify barriers therein to implementation of LID BMPs required by this order. Following the identification of these barriers to LID implementation, where feasible, the Copermittee must take, by the end of the permit cycle, appropriate actions to remove such barriers.

(b) The following LID BMPs must be implemented at each PDP to the extent applicable and feasible:

(i) Maintain or restore natural storage reservoirs and drainage corridors (including depressions, areas of permeable soils, swales, and ephemeral and intermittent streams.

(ii) ~~Projects with landscaped or other pervious areas must, where feasible, drain runoff from impervious areas (rooftops, parking lots, sidewalks, walkways, patios, etc) into pervious areas prior to discharge to the MS4. The amount of runoff from impervious areas that is to drain to pervious areas shall not exceed the total capacity of the project's pervious areas to infiltrate or treat runoff, taking into consideration the pervious areas' geologic and soil conditions,~~

Comment [CP49]: 6/17 - Edits previously provided on 6/10 have been **removed**

Comment [CP50]: These are duplicative of and inherently part of 4(c)? below. Further, each project should not be required to assess collection of stormwater for re-use if they opt to infiltrate it. Conversely, should an applicant choose to store and re-use their stormwater, they should not be required to assess the list of items in (iv).

Comment [CP51]: Without this statement, this section could be considered a 'take' that would require compensation from the Copermittee. For example, if a site is entirely an 'area of permeable soils', then (i) below could be read to prevent development on that site.

Comment [CP52]: This is duplicative of (iii) below. REQUEST REMOVE

~~slope, and other pertinent factors~~.

(iii) Projects with landscaped or other pervious areas must, where feasible, properly design and construct the pervious areas to effectively receive and infiltrate or treat runoff from impervious areas, prior to discharge to the MS4. Soil compaction for these areas shall be minimized. The amount of the impervious areas that are to drain to pervious areas must be based upon the total size, soil conditions, slope, and other pertinent factors.

(iv) Projects with low traffic areas and appropriate soil conditions must construct walkways, trails, overflow parking lots, alleys, or other low-traffic areas with permeable surfaces, such as pervious concrete, porous asphalt, unit pavers, and granular materials.

(b) To protect ground water resources ~~any large, centralized~~ infiltration BMPs must comply with limitations established by the Copermittees in accordance with Section F.1.(c)(~~6~~7). The restrictions ~~do~~ need not apply to small infiltration systems dispersed throughout a development project.

Comment [CP53]: 6/17 - New edits in this section are to clarify that the Copermittees are allowed to specify alternative infiltration requirements.

(c) LID BMPs sizing criteria:

(i) LID BMPs shall be sized and designed to ensure onsite retention without runoff, of the volume of runoff produced from a 24-hour 85th percentile storm event[11] ("design capture volume");

(ii) If onsite retention LID BMPs are technically infeasible per section F.1.d.(7)(b), LID biofiltration BMPs[12] may treat any portion of the 'design capture volume' that is not retained onsite by the LID BMPs. The LID biofiltration BMPs must be designed for an appropriate surface loading rate to prevent erosion, scour and channeling within the BMP. Due to the flow through design of biofiltration BMPs, the total volume of the BMP, including pore spaces and prefilter detention volume, must be sized to hold at least 0.75 times[13] the design ~~storm~~ capture volume that is not retained onsite by LID retention BMPs;

(iii) If granted a waiver per section F.1.d.(7) from implementing ~~it is shown to be technically infeasible to treat the remaining volume up~~

Comment [CP54]: The Copermittees do not believe that purely retention concepts other than infiltration will be protective of water quality in the long term due to dependence on reuse of stored runoff, and as such are not appropriate for addressing the water quality mandate of this permit.

Comment [CP55]: 6/17 - Edits previously provided on 6/10 have been **revised**

[11] This volume is not a single volume to be applied to all of Riverside County. The size of the 85th percentile storm event is different for various parts of the County. The Copermittees are encouraged to calculate the 85th percentile storm event for each of their jurisdictions using local rain data pertinent to their particular jurisdiction (0.6 inch standard is a rough average for the County and should only be used where appropriate rain data is not available). In addition, isopluvial maps may be used to extrapolate rainfall data to areas where insufficient data exists in order to determine the volume of the local 85th percentile storm event in such areas. Where the Copermittees will use isopluvial maps to determine the 85th percentile storm event in areas lacking rain data, the Copermittees shall describe their method for using isopluvial maps in their SSMPs.

[12] Including other LID BMPs listed in the Low Impact Development Manual for Southern California (SMC) or on the SWRCB LID website.

[13] Or other factor based on local studies and data on the volume reduction benefits of filtration based BMPs.

~~to and including the design capture volume using~~ LID BMPs ~~(retention or biofiltration)~~as described in (i) and (ii) above, the project must implement conventional treatment control BMPs in accordance with Section F.1.d.(6) below and must participate in the LID waiver program in Section F.1.d.(7).

Comment [CP56]: 6/17 - Edits previously provided on 6/10 have been revised - the suggested language should be clearer.

(e) All LID BMPs shall be designed and implemented with measures to avoid the creation of nuisance or pollution associated with vectors, such as mosquitoes, rodents, and flies.

(5) Source Control BMP Requirements

Each Copermittee must require each Priority Development Project to implement applicable source control BMPs. The source control BMPs to be required must:

(a) Prevent illicit discharges into the MS4;
(b) Minimize storm water pollutants of concern in runoff;
(c) ~~Eliminate~~ Minimize irrigation runoff;
(d) Include storm drain system stenciling or signage;
(e) Include properly designed outdoor material storage areas;
(f) Include properly designed outdoor work areas;
(g) Include properly designed trash storage areas;
(h) Include ~~water quality~~source control requirements applicable to individual priority project categories.

(6) Treatment Control BMP Requirements[14]

Each Copermittee must require each Priority Development Project to implement conventional treatment control BMPs to treat runoff from any portion of the project where it was infeasible to fully address the 'design capture volume' with LID BMPs as described in section F.1.d.(4) above, and in accordance with the feasibility criteria developed per F.1.d.(7). Treatment Control BMPs must ~~that~~ meet the following requirements:

Comment [CP57]: 6/17 - Edits previously provided on 6/10 have been revised. (including footnote)

Comment [CP58]: This important clarification is more appropriate in the text rather than in the footnotes

(a) All treatment control BMPs for a single Priority Development Project must collectively be sized to comply with the following numeric sizing criteria:

(i) Volume-based treatment control BMPs must be designed to mitigate (~~infiltrate,~~ filter, or treat) the remaining portion of the 'design capture volume' that was not treated with LID BMPs ~~of~~

[14] ~~This section only applies to those PDPs not implementing LID capable of meeting the design storm criteria for the entire site and meeting technical infeasibility eligibility. Low Impact Development (LID) and other site design BMPs that are correctly designed to effectively remove pollutants from runoff are considered treatment control BMPs.~~

~~runoff produced from a 24-hour 85th percentile storm event,[15];~~ or

(ii) Flow-based treatment control BMPs must be designed to mitigate (~~infiltrate,~~ filter, or treat) either: a) the maximum flow rate of runoff produced from a rainfall intensity of 0.2 inch of rainfall per hour, for each hour of a storm event; or b) the maximum flow rate of runoff produced by the 85th percentile hourly rainfall intensity (for each hour of a storm event), as determined from the local historical rainfall record, multiplied by a factor of two.

(b) ~~Treatment control BMPs for all Priority Development Projects must mitigate (treat through infiltration, settling, filtration or other unit processes) the required volume or flow of runoff from all developed portions of the project, including landscaped areas.~~

Comment [CP59]: This is addressed through the lead-in paragraph

(c) All treatment control BMPs must be located so as to remove pollutants from runoff prior to its discharge to any receiving waters. Multiple Priority Development Projects may use shared treatment control BMPs as long as construction of any shared treatment control BMP is completed prior to the use or occupation of any Priority Development Project from which the treatment control BMP will receive runoff.

(d) All treatment control BMPs for Priority Development Projects must, at a minimum:

(i) Be ranked with high or medium pollutant removal efficiency for the project's most significant pollutants of concern, as the pollutant removal efficiencies are identified in the Copermittees' ~~Model~~ SSMP. Treatment control BMPs with a low removal efficiency ranking must only be approved by a Copermittee when a feasibility analysis has been conducted which exhibits that implementation of treatment control BMPs with high or medium removal efficiency rankings are infeasible for a Priority Development Project or portion of a Priority Development Project.

(ii) Be correctly sized and designed so as to remove storm water pollutants to the MEP.

(e) Target removal of pollutants of concern from runoff.

~~[15] This volume is not a single volume to be applied to all of Riverside County. The size of the 85th percentile storm event is different for various parts of the County. The Copermittees are encouraged to calculate the 85th percentile storm event for each of their jurisdictions using local rain data pertinent to their particular jurisdiction. In addition, isopluvial maps may be used to extrapolate rainfall data to areas where insufficient data exists in order to determine the volume of the local 85th percentile storm event in such areas. Where the Copermittees will use isopluvial maps to determine the 85th percentile storm event in areas lacking rain data, the Copermittees shall describe their method for using isopluvial maps in their SSMPs.~~

(f) Be implemented close to pollutant sources, and prior to discharging into waters of the U.S.

(g) Not be constructed within a waters of the U.S. or waters of the State.

(h) Include proof of a mechanism under which ongoing long-term maintenance will be conducted to ensure proper maintenance for the life of the project. The mechanisms may be provided by the project proponent or Copermittee.

(i) Be designed and implemented with measures to avoid the creation of nuisance or pollution associated with vectors, such as mosquitoes, rodents, and flies.

(7) Low Impact Development (LID) BMP Waiver Program

The Copermittees must develop, collectively or individually, a LID waiver program for incorporation into ~~local~~ the SSMP~~s~~, which would allow a Priority Development Project to substitute implementation of all or a portion of required LID BMPs in section F.1.d(4) with implementation of treatment control BMPs and either 1) ~~a~~ on-site or off-site mitigation ~~project~~, and/or 2) payment into an in-lieu funding program~~, and/or 3) watershed equivalent BMP(s) consistent with Section F.1.d.(11)~~. The Copermittees shall submit the LID waiver program as part of their updated model SSMP. At a minimum, the program must meet the requirements below:

(a) Prior to implementation, the LID waiver program must clearly exhibit that it will not allow PDPs to result in a net impact (after consideration of any mitigation and/or in-lieu payments) from pollutant loadings over and above the impact caused by projects meeting LID requirements;

(b) For each PDP participating, ~~a technical feasibility analysis must be included demonstrating that~~ the Copermittee must make a determination that it is technically infeasible to implement LID BMPs that comply with the requirements of Section F.1.(d)(4). The Copermittee(s) must develop criteria ~~for the~~ that will be used in determining technical feasibility ~~analysis including a cost benefit analysis, examination of LID BMPs considered and alternatives chosen~~. Each PDP participating must demonstrate that LID BMPs were implemented as much as feasible given the site's unique conditions. ~~Analysis must be made of the pollutant loading for each project participating in the LID substitution program. The estimated impacts from not implementing the required LID BMPs in section F.1.d.(4) must be fully mitigated.~~ Technical infeasibility may result from conditions including, but not limited to:

Comment [CP60]: Change to integrate with 'Waiver Track 2' (described below).

Comment [CP61]: 6/17 - It was agreed that the referenced section will be removed - thus this language should not be necessary.

Comment [CP62]: 6/17 - Edits previously provided on 6/10 have been **removed** (except for 'and/or')

Comment [CP63]: 6/17 - Suggested changes to section (b) have been fully re-written. This approach more clearly requires LID BMPs to be implemented before anything else.

Comment [CP64]: Cost analysis moved to new sub-section [iv] below such that it is not a required component, but that it can be considered.

Comment [CP65]: This change is to simplify implementation of the technical feasibility process. Further the next sentence still ensures that LID BMPs are implemented as much as feasible.

Comment [CP66]: out of place... this is repetitive of (f) below

(i) Locations that cannot meet the infiltration and groundwater protection requirements established by the Copermittees in accordance with section F.1.c.(6) ~~for large, centralized infiltration BMPs~~. Where infiltration is technically infeasible, the project must still examine the feasibility of other LID BMPs that maximize onsite retention ~~LID BMPs~~ unless the PDP proponent opts to treat the remaining runoff using LID BMPs contained in the Riverside County LID Design Manual designed to hold the entire 'design capture volume' that is not retained onsite by infiltration BMPs;

(ii) Smart growth and infill or redevelopment locations where the density and/or nature of the project would create significant difficulty for compliance with the ~~onsite volume retention~~LID BMP requirements~~; and~~

(iii) Other site, geologic, soil or implementation constraints identified in the Copermittees updated ~~local~~ SSMP document~~.~~

(iv) Results of a cost-benefit analysis.

(v) Reliability of on-site demand for retained stormwater; and

(vi) Need to support downstream beneficial uses or maintain flows for water rights.

Comment [CP67]: 6/17 - Edits previously provided on 6/10 (Waiver Track 2) have been **removed**

~~(c) The LID waiver program must include mechanisms to verify that each Priority Development Project participating in the program is in compliance with all applicable SSMP requirements;~~

~~(d) The LID waiver program must develop and implement a review process verifying that the BMPs to be implemented meet the designated design criteria. The review process must also verify that each Priority Development Project participating in the program is in compliance with all applicable SSMP requirements.~~

~~(e) The LID waiver program must include performance standards for treatment control BMPs specified in compliance with section F.1.(d)(6).~~

Comment [CP68]: REQUEST REMOVE.
These sections are duplicative and confusing, the LID waiver program is a component of the SSMP, not a parallel or separate path, as such there is no reason that participation in this waiver program would exempt anyone from participation in other components of the SSMP program.

(c) Each PDP that participates in the LID waiver program must mitigate for the estimated pollutant loads expected to be discharged due to not implementing the LID BMPs in section F.1.d.(4). If mitigation cannot be accomplished on-site, off-site ~~M~~mitigation projects ~~must~~ may be implemented within the same hydrologic subarea as the PDP. Mitigation projects outside of the hydrologic subarea but within the same hydrologic unit may be approved provided that the project proponent demonstrates that mitigation projects within the same hydrologic subarea are infeasible and that the mitigation project will address similar beneficial use impacts as expected from the PDPs pollutant load ~~types and amount~~. Offsite mitigation projects may include green streets projects, existing development retrofit projects, retrofit incentive programs, regional BMPs

Comment [CP69]: 6/17 - Edits previously provided on 6/10 have been **revised.**

Comment [CP70]: Conflicts with next sentence.

Comment [CP71]: redundant

and stream restoration. Project applicants seeking to utilize these alternative compliance provisions may propose other offsite mitigation projects, which the Copermittees may approve if they meet the requirements of this subpart.

(d) A Copermittee may choose to implement a pollutant credit system ~~as part of the LID waiver program~~ provided that such a credit system clearly exhibits that it will not allow PDPs to result in a net impact from pollutant loadings over and above the impact caused by projects meeting LID requirements. Any credit system that a Copermittee chooses to implement must be submitted to the Executive Officer for review and approval as part of the waiver program.

Comment [CP72]: 6/17 – Suggested change per our discussion on 6/10. Accordingly we also suggest moving this section to new section F.1.d.(7) - Waiver program would become section F.1.d.(8), etc.

(e) ~~The LID waiver program shall~~ A Copermittee may choose to include a storm water mitigation fund developed with oversight by the Copermittee(s) to be used for water quality improvement projects which may serve in lieu of the PDP's required mitigation in section F.1.d.(8)(e). The LID waiver program's storm water mitigation fund shall, at a minimum, identify;

Comment [CP73]: 6/17 - change based on our discussion on 6/10. Goal is to allow development of the fund by others (such as WRCOG - similar to SANDAG)

(i) The entity or entities that will manage the storm water mitigation fund (i.e., assume full responsibility);
(ii) The range and types of acceptable projects for which storm water mitigation funds may be expended;
(iii) The entity or entities that will assume full responsibility for each water quality improvement project, including its successful completion; and
(iv) How the dollar amount of storm water mitigation fund contributions will be determined. In-lieu payments must be proportional to the additional pollutant load discharged by not fully implementing LID.

(f) Each Copermittee must notify the San Diego Water Board in their annual report of each PDP choosing to participate in the LID waiver program. The annual report must include the following information:

(i) Name of the developer of the participating PDP;
(ii) Site location;
(iii) Reason for LID waiver including technical feasibility analysis (where applicable);
(iv) Description of BMPs implemented;
(v) Total amount deposited, if any, into the storm water mitigation fund described in section F.1.d.(8)(f);
(vi) Water quality improvement project(s) proposed to be funded, if applicable; and
(vii) Timeframe for implementation of water quality improvement projects, if applicable.

(8) Site Design and Treatment Control BMP Design Standards

As part of ~~its local~~the SSMP, each Copermittee must develop and require Priority Development Projects to ~~implement~~ comply with ~~sitting,~~ design, and maintenance criteria for each ~~site design~~LID and treatment control BMP listed in its local SSMP to ~~determine~~assist with determining~~e~~~~determine~~ feasibility and applicability and so that implemented ~~site design~~LID and treatment control BMPs are constructed correctly and are effective at pollutant removal, runoff control, and vector minimization. LID techniques must be incorporated into the criteria for appropriate treatment control BMPs where feasible. Development of BMP design worksheets which can be used by project proponents is encouraged.

(9) Implementation Process

As part of its local SSMP, each Copermittee must implement a process to verify compliance with SSMP requirements. The process must identify at what point in the planning process Priority Development Projects will be required to meet SSMP requirements and at a minimum, the Priority Development Project must implement the required post-construction BMPs prior to occupancy and/or the intended use of any portion of that project. The process must also include identification of the roles and responsibilities of various municipal departments in implementing the SSMP requirements, as well as any other measures necessary for the implementation of SSMP requirements.

(10) Treatment BMP Review

(a) The Copermittees must review and update the BMPs that are listed in their local SSMPs as options for treatment control. At a minimum, the update must include removal of obsolete or ineffective BMPs and addition of LID BMPs that can be used for treatment, such as bioretention cells, bioretention swales, etc. The update must also add appropriate LID BMPs to any tables or discussions in the local SSMPs addressing pollutant removal efficiencies of treatment control BMPs. In addition, the update must include review and revision where necessary of treatment control BMP pollutant removal efficiencies.

(b) The update must incorporate findings from BMP effectiveness studies conducted by the Copermittees for projects funded wholly or in part by the State Board or Regional Boards.

(c) Each Copermittee must implement a mechanism for annually incorporating findings from local treatment BMP effectiveness studies (e.g., ones conducted by, or on-behalf of, public agencies in Riverside

County) into SSMP project reviews and permitting

(11) ~~Where a development project, greater than 100 acres in total project size or smaller than 100 acres in size yet part of a larger common plan of development that is over 100 acres, has been prepared using watershed and/or sub-watershed based water quality, hydrologic, and fluvial geomorphologic planning principles that implement regional LID BMPs in accordance with the sizing and location criteria of this Order and acceptable to the San Diego Water Board, such standards shall govern review of projects with respect to Section F.1 of this Order and shall be deemed to satisfy this Order's requirements for LID site design, buffer zone, infiltration and groundwater protection standards, source control, treatment control, and hydromodification control standards. Regional BMPs must clearly exhibit that they will not result in a net impact from pollutant loadings over and above the impact caused by capture and retention of the design storm. Regional BMPs may be used provided that the BMPs capture and retain the volume of runoff produced from the 24-hour 85th percentile storm event as defined in section F.1.d.(6)(a)(i) and that such controls are located upstream of receiving waters. Any volume that is not retained by the LID BMPs, up to the design capture volume, must be treated using LID biofiltration. Where regional LID implementation has been shown to be technically infeasible (per section F.1.d.7.b) any volume up to and including the design capture volume, not retained by LID BMPs, nor treated by LID biofiltration, must be treated using conventional treatment control BMPs in accordance with Section F.1.d.(6) and participation in the LID waiver program in Section F.1.d.(7).~~

Comment [CP74]: Specific to OC. Our understanding is that the Permit already allows regional solutions.

e. BMP CONSTRUCTION VERIFICATION

Prior to occupancy and/or intended use of any portion of the Priority Development Project subject to SSMP requirements, each Copermittee must inspect the constructed site design, source control, and treatment control BMPs applicable to that portion of the project to verify that they have been constructed and are operating in compliance with all specifications, plans, permits, ordinances, and this Order.

Comment [CP75]: For multi-phase projects, occupancy may be granted on one phase of the project, provided that the BMPs addressing that phase are complete.

5/20 - Water Board staff agreed to the intent that phased occupancy was acceptable, and would consider revised language that would clarify this intent.

f. BMP MAINTENANCE TRACKING

(1) Inventory of SSMP projects: Each Copermittee must develop and maintain a watershed-based database to track and inventory all projects constructed within their jurisdiction, that have a final SSMP (SSMP projects), and the structural~~approved~~ post-construction BMPs implemented therein. SUSMP projects built pursuant to order R9-2004-001 must also be tracked. ~~and BMP maintenance within its jurisdiction since July, 2005~~. LID BMPs implemented on a lot by lot basis ~~at a single family residential home~~, such as rain barrels, are not required to be tracked or inventoried. At a minimum, the database

Comment [CP76]: Tracking should be project-based, not BMP based. This allows for a more efficient database.

5/20 - Water Board staff agreed to adjust the tracking and verifications to be project based rather than BMP based.

Comment [CP77]: 5/20 - San Diego Water Board staff indicated that they would consider alternative language that would ensure that this would include various types of private residences and not be restricted to those that are zoned as SFR.

must include information on BMP type, location, watershed, ~~date of construction~~, party responsible for maintenance, dates and findings of maintenance ~~certifications or~~ verifications, ~~-~~and any vector or nuisance problems. ~~inspections, inspection findings, and corrective actions, including whether the site was referred to the local vector control agency or department.~~

(2) Each Copermittee must establish a mechanism not only to track Priority Development Projects, and the structural post-construction BMPs implemented therein, but also to ensure that appropriate easements and ownerships are properly recorded in public records and the information is conveyed to all appropriate parties when there is a change in project or site ownership.

(3) Each Copermittee must verify that ~~approved~~ structural post-construction BMPs on the inventoried SSMP projects~~are operating effectively and~~ have been adequately maintained by implementing the following measures:

~~(a) An annual inventory of all approved BMPs within the Copermittee's jurisdiction. LID BMPs implemented on a lot by lot basis at a single family residential home, such as rainbarrels, are not required to be tracked or inventoried. The inventory must also include all BMPs approved for Priority Development Projects since July, 2005;~~

(a) The designation of 'high ~~priority~~ maintenance' SSMP Projects~~BMPs~~. 'High-~~priority~~ maintenance' designation must include consideration of land use type, BMP ~~size~~type and effectiveness at addressing the project's pollutants of concern, ~~-~~recommended BMP maintenance frequency and~~,~~ likelihood of operational and maintenance issues, ~~location, receiving water quality,~~ and other pertinent factors;

(b) Beginning X years after adoption of this order, each Copermittee must implement a program to ~~V~~verify implementation, ~~operation,~~ and maintenance of the required structural post-construction BMPs on the inventoried SSMP projects, by inspection, self-certification, surveys, or other equally effective approaches with the following conditions:

(i) At least 90% of Municipal SSMP projects must be verified annually.

(ii) At least 90% of 'high maintenance' SSMP projects must be verified annually.

(iii) All inventoried SSMP projects must be verified at least once every five years.

Comment [CP78]: Changes are to allow a single database to be created for the Santa Ana and Santa Margarita watersheds, and a uniform program to be implemented county-wide. This will allow the Copermittees to comply in a more cost-effective manner and avoid confusion.

Comment [CP79]: Belongs in F.1.d.(9) above.

Comment [CP80]: We can't verify that they are 'operating'. All we can do is verify that they have been constructed correctly (pursuant to F.1.e) and that they have been maintained correctly. This combination of verifications will ensure that they will be operational. References to 'operating' have been deleted throughout.

Comment [CP81]: Duplicate of (1) above.
5/20 - Water Board staff agreed that this section was duplicative and could be removed.

Comment [CP82]: Change to project basis. High 'priority' for verifications should not be based on the BMP alone, but a more holistic assessment of the risk the site poses to water quality.

5/20 - Water Board staff agreed to the following:
•Change the section to require designation of high 'priority' SSMP projects, rather than BMPs,
•Include consideration of various factors such as those suggested by the Copermittees.
Explicitly identify that the project's past compliance history can be used in determining whether it is a high-priority or not.

Comment [CP83]: 5/20 - Water Board staff offered to consider removing the automatic 'annual' verification for municipal projects, and instead subject them to the same criteria in F.1.f.(3)(a) above to determine if they are a high-priority site.

(iv) At the discretion of the Copermittee, the verifications may be coordinated with the facility inspections implemented pursuant to section F.3. of this order.

(v) For verifications performed through a means other than direct Copermittee inspection, adequate documentation must be submitted to the Copermittee to provide assurance that the required maintenance has been completed.

~~(i) The implementation, operation, and maintenance of at least 90 percent of approved and inventoried final project public and private SSMPs (a.k.a. WQMPs) must be verified annually. All post-construction BMPs shall be verified within every four year period;~~

~~(ii) Operation and maintenance verifications must be required prior to each rainy season;~~

~~(iii) All (100 percent) projects with BMPs that are high priority must be inspected by the Copermittee annually prior to each rainy season;~~

~~(iv) All (100 percent) public agency projects with BMPs must be inspected by the Copermittee annually;~~

~~(v) At least 50 percent of projects with drainage insert treatment control BMPs must be inspected by the Copermittee annually;~~

(vi) Appropriate follow-up measures (including re-inspections, enforcement, maintenance, etc.) must be conducted to ensure the treatment BMPs continue to reduce storm water pollutants as originally designed;

~~(vii) All inspections must verify effective operation and maintenance of the treatment control BMPs, as well as compliance with all ordinances, permits, and this Order; and~~

(vii) Inspections must note observations of vector conditions, such as mosquitoes. Where conditions are identified as contributing to mosquito production, the Copermittee must notify their local vector control agency.

Comment [CP84]: The Copermittees may conduct BMP inspections/certifications independently of PDP Commercial/Industrial Inspections. Keep the two separate so that the Permittees can find the most cost-effective and protective approach to address the Permit.

g. ENFORCEMENT OF DEVELOPMENT SITES

Comment [CP85]: Entire section F.1. of the permit is Development '*Planning*'. Enforcement belongs in the construction and existing development sections, not here.

Each Copermittee must enforce its storm water ordinance for all Development Projects ~~and at all development sites~~ as necessary to maintain compliance with this Order. Copermittee ordinances or other regulatory mechanisms must include appropriate sanctions to achieve compliance. Sanctions must include the following or their equivalent: Non-monetary penalties, fines, ~~bonding requirements,~~ and/or permit or occupancy denials for non-compliance.

Comment [CP86]: Term has no meaning outside of Development Projects

Comment [CP87]: These are ineffective for enforcement purposes as it is too difficult to actually pull them.

h. HYDROMODIFICATION – LIMITATIONS ON INCREASES OF RUNOFF DISCHARGE RATES AND DURATIONS[16]

Each Copermittee shall collaborate with the other Copermittees to develop and implement a Hydromodification Management Plan (HMP) to manage increases in runoff discharge rates and durations into the receiving waters from all Priority Development Projects, where such increased rates and durations are likely to cause increased erosion of channel beds and banks, sediment pollutant generation, or other impacts to beneficial uses and stream habitat due to increased erosive force. The HMP shall be incorporated into the local SSMP and implemented by each Copermittee so that estimated post-project runoff discharge rates and durations shall not exceed pre-development discharge rates and durations. Where the proposed project is located on an already developed site, the pre-project discharge rate and duration shall be that of the pre-project~~developed, naturally occurring~~ condition. The HMP shall be submitted to the Executive Officer within 2 years of permit adoption. The HMP will be made available for public review and comment and the Executive Officer will determine the need for a public hearing.

(1) The HMP must:

(a) Identify a method for assessing the susceptibility and geomorphic stability of channel segments which receive runoff discharges from Priority Development Projects. ~~The geomorphic stability within the channel shall be assessed.~~ A performance standard shall be created that ensures that the geomorphic stability within the channel not be compromised as a result of receiving runoff discharges from Priority Development Projects.

(b) ~~Utilize continuous simulation of the entire rainfall record (or other analytical method proposed by the Copermittees and deemed acceptable by the San Diego Water Board) to identify~~ Identify a range of runoff flows[17] based on continuous simulation of the entire rainfall record (or other analytical method proposed by the Copermittees and deemed acceptable by the San Diego Water Board) for which priority Development Project post-project runoff flow rates and durations shall not exceed pre-

Comment [CP88]: Re-arrangement to ensure that we can benefit from the science already done elsewhere.

[16] Updated SSMP and hydromodification requirements shall apply to all priority development projects or phases of priority development projects which have been issued construction or grading permits ~~not yet begun grading or construction activities~~ at the time any updated SSMP or hydromodification requirement commences. If a Copermittee determines that lawful prior approval of a project exists, whereby application of an updated SSMP or hydromodification requirement to the project is legally infeasible, the updated SSMP or hydromodification requirement need not apply to the project. The Copermittees shall utilize the SSMP and hydromodification update periods to ensure that projects undergoing approval processes include application of the updated SSMP and hydromodification requirements in their plans. Hydromodification does not apply to in-stream improvements.

[17] The identified range of runoff flows to be controlled should be expressed in terms of peak flow rates of rainfall events, such as "10% of the pre-development 2-year runoff event up to the pre-project 10-year runoff event."

development (naturally occurring) runoff flow rates and durations by more than 10 percent, where the increased flow rates and durations will result in increased potential for erosion or other significant adverse impacts to beneficial uses. ~~In addition, the identified range of runoff flow rates and durations must compensate for the loss of sediment supply due to the development.~~ The lower boundary of the range of runoff flows identified shall correspond with the critical channel flow that produces the critical shear stress that initiates channel bed movement or that erodes the toe of channel banks within the domain of analysis identified pursuant to section F.1.h.(1)(m) below. The identified range of runoff flows may be different for specific watersheds, channels, or channel reaches. In the case of an artificially hardened (concrete lined, rip rap, etc.) channel where maintaining the 'artificial hardening' (e.g. lining) is not necessary for the protection of public health and safety, the lower boundary of the range of runoff flows identified shall correspond with the critical channel flow that produces the critical shear stress that initiates channel bed movement or that erodes the toe of channel banks of a comparable soft-bottomed channel.

Comment [CP89]: This is not appropriate - as it could require reduction of runoff to well below the pre-development condition - which could have significant unintended consequences. Alternative language provided below that allows for other ways to address sediment supply.

(c) ~~Require Priority Development Projects to implement~~Identify hydrologic control measures ~~so~~ that can be used to ensure that a Priority Development Projects' post-project runoff flow rates and durations (1) do not exceed pre-project (naturally occurring) runoff flow rates and durations by more than 10 percent for the range of runoff flows identified under section F.1.h.(1)(b), where the increased flow rates and durations will result in increased potential for erosion or other significant adverse impacts to beneficial uses; (2) do not result in channel conditions which do not meet the channel standard developed under section F.1.h.(1)(a) for channel segments downstream of Priority Development Project discharge points; ~~and (3)~~

Comment [CP90]: The requirement to implement is in section (2) below

(d) Identify a method to assess, and compensate for the loss of sediment supply due to development to the MEP.

Comment [CP91]: Alternative to existing language, which specified that sediment be addressed through hydrologic control only.

(e) Include other performance criteria (numeric or otherwise) for Priority Development Projects as necessary to prevent runoff from the projects from increasing and/or continuing unnatural rates of erosion of channel beds and banks, silt pollutants generation, or other impacts to beneficial uses and stream habitat due to increased erosive force.

(f) Include a review of pertinent literature.

~~(f) Identify areas within the Santa Margarita Hydrologic Unit where historic hydromodification of receiving waters has a negative impact to benthic macroinvertebrate and benthic periphyton by identifying areas with low or very low Index of Biotic Integrity (IBI) scores.~~

~~(g) Include a protocol to evaluate potential hydrograph change impacts to downstream watercourses from Priority Development Projects. This protocol must include the use of the IBI score as a metric for assessing impacts and improvements to downstream watercourses.~~

Comment [CP92]: These are not necessary to the development/implementation of the HMP and would be an unnecessary drain on already limited resources.

(g) Include a description of how the Copermittees will incorporate the HMP requirements into their local approval processes.

(h) Include criteria on selection and design of management practices and measures (such as detention, retention, and infiltration) to control flow rates and durations and address potential hydromodification impacts.

(i) Include technical information or references supporting any standards and criteria proposed.

(j) Include a description of inspections and maintenance to be conducted for management practices and measures to control flow rates and durations and address potential hydromodification impacts.

(k) Include a description of ~~pre- and post-project~~ monitoring and/or other program evaluation, ~~including~~ such as IBI score, to be conducted to assess the effectiveness of implementation of the HMP.

Comment [CP93]: Simplifications to allow us to use the most cost-effective way to assess the HMP.

(l) Include mechanisms for assessing and addressing cumulative impacts of PDPs within a watershed on channel morphology.

(m) Identify criteria for determining the appropriate downstream domain of analysis such as provided in the Field Manual for Assessing Channel Susceptibility developed by SCCWRP in cooperation with the San Diego Water Board, and presented in Technical Report No. 606.

~~(n) Include information on evaluation of channel form and condition, including slope, discharge, vegetation, underlying geology, and other information, as appropriate.~~

(2) In addition to the hydrologic control measures that must be ~~implemented~~ developed per section F.1.h.(1)(c), the HMP must include a suite of management measures to be used on Priority Development Projects to protect and restore downstream beneficial uses and prevent or further prevent adverse physical changes to downstream channels. Each PDP must implement management~~The~~ measures must be based on a prioritized consideration of the following elements in this order:

(a) Hydrologic control measures;
(b) On-site management controls;

(c) Regional controls located upstream of receiving waters; and
(d) In-stream controls.

Where stream channels are adjacent to, or are to be modified as part of a Priority Development Project, management measures must include buffer zones and setbacks. ~~Under no circumstances will in-stream controls include the use of non-naturally occurring hardscape materials such as concrete, riprap, gabions, etc.~~ The suite of management measures shall also include stream restoration as a viable option to achieve the channel standard in section F.1.h.(1)(a).

Comment [CP94]: This is addressed through the 404/401 1601 processes and is regulated outside of the authority of the Permittees.

(3) Each individual Copermittee has the discretion to not require Section F.1.h. at Priority Development Projects where the project:

(a) Discharges storm water runoff into underground storm drains discharging directly to water storage reservoirs and lakes~~bays or the ocean~~; or
(b) Discharges storm water runoff into conveyance channels whose bed and bank are concrete lined all the way from the point of discharge to ~~ocean waters, enclosed bays, estuaries, or~~ water storage reservoirs and lakes.
(c) Meets other criteria identified by the Copermittees in the approved HMP.

(4) HMP Reporting and Implementation

(a) Within 2 years of adoption of the Order, the Copermittees shall submit to the San Diego Water Board a draft HMP that has been reviewed by the public, including ~~the analysis that identifies~~ identification of the appropriate limiting range of flow rates per section F.1.h.(1)(b).

(b) Within 180 days of receiving San Diego Water Board comments on the draft HMP, the Copermittees shall submit a final HMP that addressed the San Diego Water Board's comments.

(c) Within ~~90~~ 180 days of receiving a finding of adequacy from the Executive Officer, each Copermittee shall incorporate and implement the HMP for all Priority Development Projects.

(d) Prior to approval of the HMP by the San Diego Water Board, the early implementation measures likely to be included in the HMP shall be encouraged by the Copermittees.

(5) Interim Hydromodification Criteria

~~Within one year of adoption of this Order~~Throughout the development and approval of the Final HMP, each Copermittee must continue to require ~~ensure that~~ all Priority Development Projects to comply with the

requirements of section 4.4 of the Riverside County Water Quality Management Plan, for identifying and mitigating hydrologic conditions of concern. ~~are implementing the following criteria by comparing the pre-development (naturally occurring) and post-project flow rates and durations using a continuous simulation hydrologic model such as US EPA's Hydrograph Simulation Program Fortran (HSPF):~~

~~For flow rates from 10 percent of the 2-year storm event to the 5 year storm event, the post-project peak flows shall not exceed pre-development (naturally occurring) peak flows.~~

~~For flow rates from the 5 year storm event to the 10 year storm event the post-project peak flows may exceed pre-development (naturally occurring) flows by up to 10 percent for a 1-year frequency interval.~~

~~The interim hydromodification criteria do not apply to Priority Development Projects where the project discharges (1) storm water runoff into underground storm drains discharging directly to bays or the ocean, or (2) storm water runoff into conveyance channels whose bed and bank are concrete lined all the way from the point of discharge to ocean waters, enclosed bays, estuaries, or water storage reservoirs and lakes.~~

Within one year of adoption of this Order, each Copermittee must submit a signed, certification statement to the San Diego Water Board verifying implementation of the interim hydromodification criteria.

(6) No part of section F.1.h shall alleviate the Copermittees responsibilities for requiring ~~implementing~~ implementation of Low Impact Development BMPs as required under section F.1.d.(4).

i. TRAINING AND EDUCATION

(1) Municipal Departments and Personnel Education

Municipal Development Planning: Each Copermittee must implement an education program so that its planning and development review staffs and contractors (and Planning Boards and Elected Officials, if applicable) have an understanding of:

(a) Federal, State, and local water quality laws and regulations applicable to Development Projects;

(b) The connection between land use decisions and short and long-term water quality impacts (i.e., impacts from land development and urbanization); and

(c) Methods of minimizing impacts to receiving water quality resulting from development, including:

(i) Storm water management plan development and review;
(ii) Local sensitive water bodies, including 303(d)-impairments and ESAs;
(iii) Methods to control downstream erosion impacts;
(iv) Identification of pollutants of concern;
(v) Site design BMP techniques;
(vi) Source control BMPs;
(vii) Selection of the most effective treatment control BMPs for the pollutants of concern; and
(viii) Public heath concerns related to storm water management infrastructure.

(2) Project Applicants, Developers, Contractors, Property Owners, and other Responsible Parties

(a) Each Copermittee must implement a New Development / Redevelopment education program using all media as appropriate to:

(i) Measurably increase the knowledge of the target communities regarding MS4s, impacts of runoff on receiving waters, and potential BMP solutions for the target audience; and
(ii) To measurably change the behavior of target communities and thereby reduce pollutant releases to MS4s and the environment.

(b) Each Copermittee must educate each target community on the following topics where appropriate:

(i) The importance of educating all construction workers in the field about storm water issues and BMPs though formal or informal training;
(ii) Federal, State, and local water quality laws and regulations applicable to new development and redevelopment activities;
(iii) Site design, source control, pollution prevention, and treatment BMPs;
(iv) General runoff concepts; and
(v) Other topics of local importance, including local water quality conditions, impaired waterbodies and environmentally sensitive areas.

2. CONSTRUCTION COMPONENT

Each Copermittee must implement a construction program which meets the requirements of this section~~,~~ to prevent~~s~~ illicit discharges into the MS4, implement~~s~~ and maintain~~s~~ structural and non-structural BMPs to reduce pollutants in storm water runoff from construction sites to the MS4, reduce~~s~~ construction site discharges of storm water pollutants from the MS4 to the MEP, and prevent~~s~~ construction site

discharges from the MS4 from causing or contributing to a violation of water quality standards.

a. ORDINANCE UPDATE

Within 365 days of adoption of this Order, each Copermittee must review and update its grading ordinances and other ordinances as necessary to achieve full compliance with this Order, including requirements for the implementation of all designated BMPs and other measures.

b. SOURCE IDENTIFICATION

Each Copermittee must maintain an updated watershed based inventory of all construction sites within its jurisdiction. The use of an automated database system, such as Geographical Information Systems (GIS) is ~~required~~encouraged.

c. SITE PLANNING AND PROJECT APPROVAL PROCESS

Each Copermittee must incorporate consideration of potential water quality impacts prior to approval and issuance of construction and grading permits.

(1) Each construction and grading permit must require proposed construction sites to implement designated BMPs and other measures so that illicit discharges into the MS4 are prevented and storm water pollutants discharged from the site will be reduced to the maximum extent practicable ~~and will not cause or contribute to a violation of water quality standards~~.

(2) Prior to permit issuance, the Copermittee must inform the project proponent~~'s runoff management plan (or equivalent construction BMP plan) must be required to comply, and reviewed to verify compliance, with~~ of the applicable requirements of the local grading ordinance, other applicable local ordinances, and this Order that they will be required to comply with during construction.

(3) Prior to permit issuance, each Copermittee must verify that project proponents subject to California's statewide General NPDES Permit for Storm Water Discharges Associated With Construction Activities, (hereinafter General Construction Permit), have existing coverage under the General Construction Permit.

d. BMP IMPLEMENTATION

(1) Designate BMPs: Each Copermittee must designate a minimum set of BMPs and other measures to be implemented at all construction sites. The designated minimum set of BMPs must include:

Comment [CP95]: 5/26: Water Board staff agreed to make this change.

Comment [CP96]: MEP is the standard of compliance for Stormwater discharges.

5/26: Water Board staff indicated that this sentence could be removed if the Findings clarify the standard of compliance for stormwater, and that there was no need to repeat the information throughout the permit.

Comment [CP97]:
The desired outcome of the Construction Component is to have construction sites in compliance with the Copermittees' ordinances such that water quality is not impacted. The Copermittees should be provided flexibility to implement programs they deem appropriate to meet that desired end.

A Copermittee ***may*** choose to review these plans as part of their program, but if they have another process in place that is effective in ensuring compliance with their ordinances throughout the construction process, they should not be arbitrarily required to add this NEW requirement to their program. Such a requirement would be overly specifying the method of compliance.

The changes herein are to instead require the Copermittee to notify the project proponent before issuing the permit, of the construction site requirements they will be required to comply with.

5/26: Water Board staff agreed to review the language to assess opportunities to provide flexibility to the Copermittees in the management of their programs

(a) Management Measures:

(i) Pollution prevention, where appropriate;
(ii) ~~Development and implementation of a site-specific runoff management plan~~;
(iii) Minimization of areas that are cleared and graded to only the portion of the site that is necessary for construction;
(iv) Minimization of exposure time of disturbed soil areas;
(v) Minimization of grading during the wet season and correlation of grading with seasonal dry weather periods to the extent feasible;
(vi) Limitation of grading to a maximum disturbed area as determined by each Copermittee before either temporary or permanent erosion controls are implemented to prevent storm water pollution. The Copermittee has the option of temporarily increasing the size of disturbed soil areas by a set amount beyond the maximum, if the individual site is in compliance with applicable storm water regulations and the site has adequate control practices implemented to prevent storm water pollution;
(vii) Temporary stabilization and reseeding of disturbed soil areas as rapidly as feasible;
(viii) Wind erosion controls;
(ix) Tracking controls;
(x) Non-stormwater management measures to prevent illicit discharges and control storm water pollution sources;
(xi) Waste management measures;
(xii) Preservation of natural hydrologic features where feasible;
(xiii) Preservation of riparian buffers and corridors where feasible;
(xiv) Evaluation and maintenance of all BMPs, until removed; and
(xv) Retention, reduction, and proper management of all storm water pollutant discharges on site to the MEP standard.

Comment [CP98]: Comments on F.3.2.(c)(2) are applicable here as well:

The CGP includes requirements for runoff management plans, and the Regional Board is charged with verifying compliance with the CGP. The MS4 permit should not force the Copermittees into inspecting for and enforcing on the CGP provisions.

5/26: Water Board staff agreed to remove the words 'site specifc'.

(b) Erosion and Sediment Controls:

(i) Erosion prevention. Erosion prevention is to be used as the most important measure for keeping sediment on site during construction;
(ii) Sediment controls. Sediment controls are to be used as a supplement to erosion prevention for keeping sediment on-site during construction;
(iii) Slope stabilization must be used on all active slopes during rain events regardless of the season and on all inactive slopes during the rainy season and during rain events in the dry season; and
(iv) Permanent revegetation or landscaping as early as feasible.

(c) ~~Designate enhanced BMPs[18] for 303(d) impairments and ESAs:~~ Each Copermittee must implement, or require implementation of, enhanced measures to address the exceptional threat to water quality posed by all construction sites tributary to CWA section 303(d) water body segments impaired for sediment or turbidity. Each Copermittee must also implement, or require implementation of, enhanced, site-specific measures for construction sites within or adjacent to or discharging directly to receiving waters within environmentally sensitive areas (as defined in Attachment C of this Order).

~~(i) Active Sediment Treatment (AST): Each Copermittee must require implementation of advanced treatment for sediment at construction sites (or portions thereof) that are determined by the Copermittee to be an exceptional threat to water quality. In evaluating the threat to water quality, the following factors must be considered by the Copermittee:~~

~~[a] Soil erosion potential or soil type;~~
~~[b] The site's slopes;~~
~~[c] Project size and type;~~
~~[d] Sensitivity of receiving water bodies;~~
~~[e] Proximity to receiving water bodies;~~
~~[f] Non-storm water discharges;~~
~~[g] Ineffectiveness of other BMPs;~~
~~[h] Proximity and sensitivity of aquatic threatened and endangered species of concern;~~
~~[i] Known effects of AST chemicals; and~~
~~[j] Any other relevant factors.~~

(d) Implement BMPs: Each Copermittee must implement, or require the implementation of, the designated minimum BMPs and any additional measures necessary to comply with this Order at each construction site within its jurisdiction year round. BMP implementation requirements, however, can vary based on wet and dry seasons. Dry season BMP implementation must plan for and address unseasonal rain events that may occur during the dry season (May 1 through September 30).

e. Inspection of Construction Sites

Each Copermittee must conduct construction site inspections for compliance with its ordinances (grading, storm water, etc.), permits (construction, grading, etc.), and this Order. Priorities for inspecting sites must consider the nature and size of the construction activity, topography, and the characteristics of soils and

~~[18] Enhanced BMPs are control actions specifically targeted to the pollutant or condition of concern and of higher quality and effectiveness than the minimum control measures otherwise required. Enhanced in this Order means better, not simply more, BMPs.~~

Comment [CP99]: This section is no longer relevant because the CGP has specific requirements that will ensure that sensitive and sediment impaired water bodies are appropriately addressed.

Built into the CGP is a process that establishes Risk Levels for sites that are tributary to sensitive and/or sediment impaired water bodies. Attached to each risk level are specific requirements compliance, and Action Levels and/or Effluent limits. Through the CGP, if an action level or effluent limit is exceeded, the site operator will be required to reassess and enhance their BMPs to ensure that their project is not impacting water quality in these sensitive areas. It should be noted that consistent with state law, the site owner is allowed to comply with the action levels and/or effluent limits in any lawful manner.

This section - if not removed - could undermine a site owner's ability to comply with the Construction General Permit, by arbitrarily specifying, and requiring implementation of 'enhanced' BMPs completely independent of the requirements of the CGP, and the Action Level/Effluent Limit process the ... [1]

Comment [CP100]: This language has been removed for two (main) reasons:

1) The draft permit language is overly prescribing the method of compliance in direct contradiction with State Law (CWC 13360) which states:
No waste discharge requirement or other order of a regional board …. shall specify the design, location, type of construction, or particular manner in which compliance may be had with that requirement, order, or decree, and the person so ordered shall be permitted to comply with the order in any lawful manner.

2) The Construction General Permit includes Action Levels and Effluent Limits for construction sites that pose an exceptional threat to water quality (Risk Levels 2 and 3). Through the iterative compliance with the Action Levels and Effluent Limits of the CGP, owners/operators of such high-threat construction sites will be driven to select BMPs that will be fully protective of water quality. Prescribing the method of compliance for these sites through the MS4 permit will exclude options for these site owners in complying with their Action Levels and Effluent Limi ... [2]

receiving water quality.

(1) During the wet season, each Copermittee must inspect at least every ~~two weeks~~month, all construction sites within its jurisdiction meeting any of the following criteria:

(a) All sites ~~30~~ 50 acres or more in size with rough grading or active slopes occurring during the wet season;

(b) All sites one acre or more, and ~~tributary to a CWA section 303(d) water body segment impaired for sediment or within~~ or directly adjacent to, or discharging directly to a CWA section 303(d) water body segment impaired for sediment or a receiving water within an ESA; and

(c) Other sites determined by the Copermittees or the San Diego Water Board as a significant threat to water quality. In evaluating threat to water quality, the following factors must be considered: (1) soil erosion potential; (2) site slope; (3) project size and type; (4) sensitivity of receiving water bodies; (5) proximity to receiving water bodies; (6) non-storm water discharges; (7) known past record of non-compliance by the operators of the construction site; and (8) any other relevant factors.

(2) During the wet season, each Copermittee must inspect at least ~~monthly~~twice during the wet season, all construction sites with one acre or more of soil disturbance not meeting the criteria specified above in section F.2.e.(1).

(3) During the wet season, each Copermittee must inspect construction sites less than one acre in size as needed to ensure compliance with its ordinances and this Order.

(4) Each Copermittee must inspect all construction sites as needed during the dry season. Sites meeting the criteria in section F.2.e.(1) must be inspected at least once in August or September each year.

(5) Re-inspections: Based upon site inspection findings, each Copermittee must implement all follow-up actions (i.e., re-inspection, enforcement) necessary to comply with this Order. Reinspection frequencies must be determined by each Copermittee based upon the severity of deficiencies, the nature of the construction activity, and the characteristics of soils and receiving water quality.

(6) Inspections of construction sites must include, but not be limited to:

(a) ~~Check for coverage under the General Construction Permit (Notice of Intent (NOI) and/or Waste Discharge Identification No.) during initial inspections~~;

Comment [CP101]: Changed to allow inspectors to focus on follow-up inspections and enforcement on sites that are found to be out of compliance. Change is also consistent with the Santa Ana permit requirements which will allow for more consistent and effective implementation of the program.

Comment [CP102]: Consistent with the 2004 SMR Permit and the 2009 Santa Ana permit. See also comments on the Fact sheet.

Comment [CP103]: 5/26: Water Board staff agreed that 'tributary to' was too broad. Suggested alternative is provided.

Comment [CP104]: Changed to be consistent with the Santa Ana permit, and to allow inspectors to focus on follow-up inspections and enforcement on sites that are found to be out of compliance.

Comment [CP105]: This is already performed under F.2.c.(3). No need to repeat

(b) Assessment of compliance with Copermittee ordinances and permits related to runoff, including the implementation and maintenance of designated minimum BMPs;
(c) Assessment of BMP effectiveness;
(d) Visual observations for non-storm water discharges, potential illicit connections, and potential discharge of pollutants in storm water runoff;
(e) ~~Review of site monitoring data, if the site monitors its runoff~~;
(f) Education and outreach on storm water pollution prevention, as needed; and
(g) Creation of a written or electronic inspection report.

Comment [CP106]: This is a NEW requirement that is not applicable to compliance with our ordinances. This only has utility in enforcing the CGP, which is the responsibility of the Water Board.

(7) The Copermittees must track the number of inspections for each inventoried construction site throughout the reporting period to verify that each site is inspected at the minimum frequencies required.

f. Enforcement of Construction Sites

(1) Each Copermittee must develop and implement an escalating enforcement process ~~that~~ to achieve~~s~~ prompt corrective actions at construction sites for violations of the Copermittee's water quality protection permits, requirements, and ordinances. This enforcement process must include authorizing the Copermittee's construction site inspectors to take immediate enforcement actions when appropriate and necessary. The enforcement process must include appropriate sanctions such as stop work orders, non-monetary penalties, fines, bonding requirements, and/or permit denials for non-compliance.

Comment [CP107]: Concern for undue liability on the Copermittees if a contractor does not promptly correct the site despite appropriate Copermittee enforcement.

'that achieves' could imply that if the Contractor is not prompt in implementing corrective actions, that ***we*** are in violation.

(2) Each Copermittee must be able to respond to construction site related complaints received from third-parties and to ensure the San Diego Water Board that appropriate corrective actions have been implemented.

g. Reporting of Non-compliant Sites

(1) In addition to the notification requirements in Attachment B, each Copermittee must notify the San Diego Water Board when the Copermittee issues a ~~stop work order or other~~ high level enforcement (as defined in the Copermittee's JRMP) to a construction site in its jurisdiction as a result of ~~storm water~~ violations of their storm water ordinances.

Comment [CP108]: 'other high level enforcement' is too vague and presents an unnecessary liability for the Copermittee in an audit.

5/26: Water Board staff agreed to make changes similar to as shown in these updated suggested edits.

(2) Each Copermittee shall annually notify the San Diego Water Board, prior to the commencement of the wet season, of all construction sites with alleged violations that pose a significant threat to water quality. Information may be provided as part of the JRMP annual report if submitted prior to the rainy season. Information provided shall include, but not be limited to, the following:

Comment [CP109]: More streamlined approach to focus notifications on those sites whose alleged violations are posing a significant threat to water quality, rather than sites that have been issued minor corrections.

(a) WDID number if enrolled under the General Construction Permit
(b) Site Location, including address
(c) Current violations or suspected violations

~~h. Training and Education~~

~~(1) Municipal Staff and Contractors: Requirements for municipal staff and contractors are described in the Municipal Component section of this Order.~~

~~(2) Construction Site Owner / Operator Responsibilities:~~

~~As early in the planning and development process as possible and all through the permitting and construction process, each Copermittee must implement a program to educate project applicants, developers, contractors, property owners, and other responsible parties. The education program must provide an understanding of the topics listed below, as appropriate for the audience being educated.~~

(d) The importance of educating all construction workers in the field about storm water issues and BMPs though formal or informal training;
(e) Federal, State, and local water quality laws and regulations applicable to construction and grading activities;
(f) Site design, source control, pollution prevention, and treatment BMPs;
(g) General runoff concepts; and
(h) Other topics of local importance, including local water quality conditions, impaired waterbodies and environmentally sensitive areas.

3. EXISTING DEVELOPMENT COMPONENT

~~a.~~ MUNICIPAL

Each Copermittee must implement a municipal program for the Copermittee's facilities and activities which meets the requirements of this section, to prevent~~s~~ illicit discharges into the MS4, reduce~~s~~ municipal discharges of storm water pollutants from the MS4 to the MEP, and prevent~~s~~ municipal discharges from the MS4 from causing or contributing to a violation of water quality standards.

(1) Source Identification / Inventory

Each Copermittee must maintain an updated ~~watershed-based~~ inventory of all their municipal areas and activities that have the potential to discharge pollutants. The inventory must include the name, address (if applicable), and a description of the area/activity; which pollutants are potentially generated by the area/activity; whether the area/activity is adjacent to an ESA; and identification of whether the area/activity is tributary to a CWA section 303(d) water body segment and generates pollutants for which the water body segment is impaired. Linear facilities such as roads, streets, highways do not need to be individually inventoried. The use of an automated database system, such as Geographical Information Systems (GIS) is ~~required when applicable.~~ encouraged.

(2) General BMP Implementation

(a) Pollution Prevention: Each Copermittee must implement pollution prevention methods in its municipal program and must require their use by appropriate municipal departments, personnel, and contractors, where appropriate.

(b) Designate Minimum BMPs: Each Copermittee must designate a minimum set of BMPs for their pollutant generating~~all municipal~~ areas and activities. The designated minimum BMPs for municipal areas and activities must be area or activity specific as appropriate. BMPs must be designated for

Comment [C110]: The addition of the word 'to' clarifies that the intent of this section is to have programs in place that accomplish all of these objectives.

4/28 - The programs in the JRMP each describe the means to achieve the goals of Section A and B. The JRMP sections should not serve (and be enforced) as independent ends in and of themselves. Similar change is applicable in other sections of the permit.

Comment [CP111]: **4/28** - per our discussion RB agreed to include a definition of 'Municipal' and 'areas and activities' in Attachment C,
RB agreed to the clarifying language 'potential to discharge pollutants'. Other instances of this language are applicable throughout.

5/6 - Draft definitions for 'Municipal' and 'Municipal areas and activities' were provided in hard copy.

Comment [CP112]: **4/28** – per our discussion, Linear facilities do not need to be individually inventoried

Comment [CP113]: **4/28** – RB agreed to this change

Comment [CP114]: **4/28** – per our discussion

special events that are expected to generate significant trash and litter.

(c) Designate BMPs for ESAs and 303(d) Impairments: Each Copermittee must designate enhanced measures for their municipal areas and activities tributary to CWA section 303(d) impaired water body segments when an area or activity generates pollutants for which the water body segment is impaired. Each Copermittee must also designate additional controls for their municipal areas and activities within or directly adjacent to or discharging directly to ~~coastal lagoons, the ocean, or other~~ receiving waters within environmentally sensitive areas (as defined in Attachment C of this Order) as necessary to comply with this Order.

(d) Implement BMPs: Each Copermittee must implement, or require the implementation of, the applicable designated minimum and/or enhanced BMPs, and any additional measures necessary based on its inventory to comply with this Order for each municipal area or activity within its jurisdiction that has the potential to discharge pollutants.

Comment [CP115]: 4/28 – removed per our discussion

Comment [CMP116]: Consistent with 2004 Permit. Recognizes that need to address ESA may be situational (e.g. adjacent to ESA but no pollutant transport potential)

Comment [CP117]: 4/28 – per our discussion

(3) BMP Implementation for Management of Pesticides, Herbicides, and Fertilizers

Each Copermittee must implement BMPs to reduce the contribution of storm water pollutants to the MEP associated with the application, storage, and disposal of pesticides, herbicides and fertilizers from their municipal areas and activities to MS4s and receiving waters. Such BMPs must include, at a minimum:

(a) Educational activities, permits, certifications and other measures for municipal applicators and distributors;
(b) Integrated Pest Management (IPM) measures that rely on non-chemical solutions;
(c) The use of native vegetation;
(d) Schedules for irrigation and chemical application; and
(e) The collection and proper disposal of unused pesticides, herbicides, and fertilizers.

Comment [CP118]: 4/28 – As discussed, added consistent with the 2004 permit

(4) BMP implementation for Flood Control Structures

(a) Each Copermittee must implement procedures to assure that new flood management projects assess the impacts on the water quality of receiving water bodies.
(b) Each Copermittee must include water quality protection measures, where feasible, when retrofitting existing flood control structural devices.
(c) Each Copermittee must evaluate its existing flood control structural devices as part of ongoing routine maintenance to~~,~~ identify devices causing or contributing to a condition of pollution, and identify, and where

feasible implement measures to reduce or eliminate the device's~~structure's~~ effect on pollution.~~, and evaluate the feasibility of retrofitting the structural flood control device. The inventory and evaluation must be completed by and submitted to the San Diego Water Board in the 2nd year JRMP Annual Report.~~

Comment [CP119]: 4/28 - RB agreed to have this requirement be met through ongoing routine maintenance.

Comment [CP120]: 4/28 – Since this will be an ongoing part of our maintenance programs, this specific inventory/reporting will not be required.

(5) BMP Implementation for Sweeping of Municipal Areas

Where municipal area sweeping is implemented as an MS4 BMP for municipal roads, streets, highways, and parking facilities, the~~each~~ Copermittee must design and implement the program based on the following criteria:

(a) Optimize pickup of trash and debris based on land uses, trash collection schedules, seasonal factors (e.g., special events, tourism, etc.) and inspections of municipal areas/activities.

(6) Operation and Maintenance of Municipal Separate Storm Sewer System (MS4) and Treatment ~~Structural~~ Controls

Comment [CMP121]: For consistency with subheadings

(a) Treatment Controls: Each Copermittee must implement a schedule of inspection and maintenance activities to verify proper operation of all their municipal structural treatment controls designed to reduce storm water pollutant discharges to or from its MS4s and related drainage structures.

(b) MS4~~ and Facilities~~: Each Copermittee must implement a schedule of maintenance activities for their~~the~~ MS4 ~~and MS4 facilities~~ (including catch basins, storm drain inlets, open channels, etc). The maintenance activities must, at a minimum, include:

(i) Inspection and removal of accumulated waste at least once a year between May 1 and September 30 of each year for Permittee catch basins and storm drain inlets; ~~all MS4 facilities;~~

(ii) Additional catch basin and storm drain inlet cleaning as necessary between October 1 and April 30 of each year ~~for facilities that receive or collect high volumes of trash and debris;~~

(iii) Following two years of inspections, any MS4 catch basin or storm drain inlet~~facility~~ that requires inspection and cleaning less than annually may be inspected as needed, but not less than~~that~~ every other year;

(iv) Open channels and basins must be cleaned of observed anthropogenic litter in a timely manner;

(v) Maintenance activities within open channels must not adversely impact beneficial uses;

(vi) Record keeping of the maintenance and cleaning activities including the overall quantity of waste removed;

(vii) Proper disposal of waste removed pursuant to applicable laws; and

Comment [CP122]: Consistent with 2004 permit

Comment [CP123]: 4/28 –Based on our discussion this was added. Basins generally don't pose a high risk for *discharging* waste – simply by the nature of their design, so it is appropriate to remove observed waste in a timely manner.

(viii) Measures to eliminate waste discharges during MS4 maintenance and cleaning activities.

(7) Infiltration From Sanitary Sewer to MS4/Provide Preventive Maintenance of Both

Comment [CMP124]: This section is a new requirement and is not applicable in the SMR as the Permittees do not own nor operate any Sewer systems. Request deletion of this section.

(a) Each Copermittee must implement controls and measures to prevent and eliminate infiltration of seepage from municipal sanitary sewers to MS4s through thorough, routine preventive maintenance of the MS4. Each Copermittee that operates both a municipal sanitary sewer system and a MS4 must implement controls and measures to prevent and eliminate infiltration of seepage from the municipal sanitary sewers to the MS4s that must include overall sanitary sewer and MS4 surveys and thorough, routine preventive maintenance of both.

(b) Each Copermittee must implement controls to limit infiltration of seepage from municipal sanitary sewers to municipal separate storm sewer systems where necessary. Such controls must include:

(i) Adequate plan checking for construction and new development,
(ii) Incident response training for municipal employees that identify sanitary sewer spills;
(iii) Code enforcement inspections;
(iv) MS4 maintenance and inspections;
(v) Interagency coordination with sewer agencies; and
(vi) Proper education of municipal staff and contractors conducting field operations on the MS4 or municipal sanitary sewer (if applicable).

(8) Inspection of Municipal Areas and Activities

(a) At a minimum, each Copermittee must inspect the following high priority municipal areas and activities annually:

(i) Roads, Streets, Highways, and Parking Facilities;
~~(ii) Flood Management Projects and Flood Control Devices;~~

Comment [CMP125]: Conflicts with (6)(b).

(ii) Areas and activities tributary to a CWA section 303(d) impaired water body segment, where an area or activity generates pollutants for which the water body segment is impaired.
(iii) Areas and activities within or ~~adjacent to or~~ discharging directly to receiving waters within environmentally sensitive areas (as defined in Attachment C of this Order);

Comment [CMP126]: What matters is that it is discharging to receiving waters within the ESA. You could have a facility/activity adjacent to an ESA that doesn't discharge to the ESA.

(iv) Municipal Facilities:
[a] Active or closed municipal landfills;
[b] Publicly owned treatment works (including water and wastewater treatment plants) and sanitary sewage collection systems;
[c] Solid waste transfer facilities;

[d] Land application sites;
[e] Corporate yards including maintenance and storage yards for materials, waste, equipment and vehicles; and
[f] Household hazardous waste collection facilities.

(v) Municipal airfields;
(vi) Parks and recreation facilities;
(vii) Special event venues following special events (festivals, sporting events, etc.);
(viii) Power washing facilities; and
(ix) Other municipal areas and activities that the Copermittee determines may contribute a significant pollutant load to the MS4.

(b) Other municipal areas and activities must be inspected as needed and in response to water quality data, valid public complaints, and findings from municipal or contract staff.

(c) Based upon site inspection findings, each Copermittee must implement all follow-up actions necessary to comply with this Order.

(9) Enforcement of Municipal Areas and Activities

Each Copermittee must enforce its storm water ordinance for all their municipal areas and activities as necessary to maintain compliance with this Order.

(10) Training and Education

Comment [CP127]: 4/28 - We agreed that training requirements would be consolidated into a new section (F.6?). We also agreed that we would assess the training program established in the Santa Ana permit when we define the specific requirements that will be included in that new section.

Each Copermittee must ensure that all their municipal personnel and contractors that have responsibilities for selecting, implementing, and evaluating BMPs for their municipal areas and activities are adequately trained and educated to perform such tasks.

(a) Municipal Departments and Personnel Education

(i) Municipal Construction Activities: Each Copermittee must implement an education program that includes annual training prior to the rainy season so that its staff responsible for construction activities (e.g. construction, building, code enforcement, ~~and~~ grading review staffs, inspectors, and other responsible construction staff) have, at a minimum, an understanding of the following topics, as appropriate for the target audience:

[a] Applicable ~~Federal, State, and local~~ water quality laws and regulations applicable to construction and grading activities conducted by the target audience;

Comment [CMP128]: Based on our experience, all people need to know is that there are laws.

[b] The connection between construction activities and water quality

impacts (i.e., impacts from land development and urbanization and impacts from construction material such as sediment);

[c] Proper implementation of erosion and sediment control and other BMPs to minimize the impacts to receiving water quality resulting from construction activities;

[d] The Copermittee's inspection, plan review, and enforcement policies and procedures to verify consistent application; where regional training is offered, the training shall focus on the DAMP's generalized inspection, plan review and enforcement policies and procedures;

[e] Current advancements in BMP technologies;

[f] SSMP Requirements including treatment options, site design, source control, and applicable tracking mechanisms; and

[g] Other topics of local importance, including local water quality conditions, impaired water bodies, environmentally sensitive areas, and public health and disease vector issues associated with runoff.

Comment [U129]: We do regionalized training. This level of detail can not be captured in a joint class.

(ii) Municipal Industrial/Commercial Activities Inspectors: Each Copermittee must train staff responsible for conducting storm water compliance inspections and enforcement of industrial and commercial facilities at least once a year. Training must cover inspection and enforcement procedures, BMP implementation, and review of monitoring data

(iii) Municipal Other Activities: Each Copermittee must implement an education program so that their municipal personnel and contractors performing activities which generate pollutants have an understanding of the activity specific BMPs for each activity to be performed.

b. COMMERCIAL / INDUSTRIAL

Each Copermittee must implement a commercial / industrial program that meets the requirements of this section~~,~~ to prevent~~s~~ illicit discharges into the MS4, reduce~~s~~ commercial / industrial discharges of storm water pollutants from the MS4 to the MEP, and prevent~~s~~ commercial / industrial discharges from the MS4 from causing or contributing to a violation of water quality standards.

(1) Source Identification

(a) Each Copermittee must maintain an updated watershed-based inventory of all industrial and commercial sites/sources within its jurisdiction (regardless of ownership) that could contribute a significant pollutant load to the MS4. The inventory must include the following minimum information for each industrial and commercial site/source: name; address; pollutants potentially generated by the site/source; and identification of whether the site/source is tributary to a Clean Water Act

section 303(d) water body segment and generates pollutants for which the water body segment is impaired; and a narrative description including SIC codes which best reflects the principal products or services provided by each facility.

At a minimum, the ~~following~~ sites/sources listed below must be included in the inventory. Where the required inventory includes sites or information that was not required under Order R9-2004-001, the new required sites/information must be added to the Copermittee's inventory within X years. ~~:~~

Comment [CP130]: 6/3: Per our discussion, these edits are **not** necessary as the introductory section of F provides the time period for compliance with this sub-section.

(i) Commercial Sites/Sources:

[a] Automobile repair, maintenance, fueling, or cleaning;
[b] Airplane repair, maintenance, fueling, or cleaning;
[c] Boat repair, maintenance, fueling, or cleaning;
[d] Equipment repair, maintenance, fueling, or cleaning;
[e] Automobile and other vehicle body repair or painting;
[f] Mobile automobile or other vehicle washing;
[g] Automobile (or other vehicle) parking lots and storage facilities;
[h] Retail or wholesale fueling;
[i] Pest control services;
[j] Eating or drinking establishments, including such establishments within food markets;
[k] Mobile carpet, drape or furniture cleaning;
[l] Cement mixing or cutting;
[m] Masonry;
[n] Painting and coating;
[o] ~~Botanical or zoological gardens and exhibits~~;
[p] Landscaping;
[q] Nurseries and greenhouses;
[r] Golf courses, parks and other recreational areas/facilities;
[s] Cemeteries;
[t] Pool and fountain cleaning;
[u] ~~Marinas~~;
[v] Portable sanitary services;
[w] ~~Building material retailers and storage~~;
[x] ~~Animal facilities~~ Boarding Facilities and Kennels;
[y] Mobile pet services;
[z] Power washing services; and
[aa] Other sites and sources with a history of un-authorized discharges to the MS4.

Comment [CP131]: These have not been identified by the Copermittees as contributing a significant pollutant load to the MS4 and should be removed. This is an unnecessary new requirement.

Comment [CP132]: Not applicable

Comment [CP133]: These have not been categorically identified by the Copermittees as contributing a significant pollutant load to the MS4 and should be removed. This is an unnecessary new requirement.

(ii) Industrial Sites/Sources:

[a] Industrial Facilities, as defined at 40 CFR § 122.26(b)(14), including

those subject to the General Industrial Permit or other individual NPDES permit;

[b] Operating and closed landfills;

[c] Facilities subject to SARA Title III; and

[d] Hazardous waste treatment, disposal, storage and recovery facilities.

(iii) ESAs and 303(d) Listed Waterbodies: All other commercial or industrial sites/sources tributary to a CWA Section 303(d) impaired water body segment, where the site/source generates pollutants for which the water body segment is impaired. ~~All other commercial or industrial sites/sources within or directly adjacent to or discharging directly to coastal lagoons, the ocean, or other receiving waters within environmentally sensitive areas (as defined in Attachment C of this Order).~~

(iv) All other commercial or industrial sites/sources that the Copermittee determines may contribute a significant pollutant load to the MS4, including categories of sites identified as a result of NAL/SAL investigations. .

(2) General BMP Implementation

(a) Pollution Prevention: Each Copermittee must require the use of pollution prevention methods by the inventoried industrial and commercial sites/sources.

(b) Designate / Update Minimum BMPs: Each Copermittee must designate a minimum set of BMPs for all inventoried industrial and commercial sites/sources. Where BMPs have already been designated, each Copermittee must review its existing BMPs for adequacy. The designated minimum BMPs must be specific to facility types and pollutant-generating activities, as appropriate. The Copermittee may adjust the number and/or type of minimum BMPs that are required, provided that the goals of the Commercial/Industrial program are met.

(c) Designate Enhanced BMPs for ESAs and 303(d) Impairments: Each Copermittee must designate enhanced measures for inventoried industrial and commercial sites/sources tributary to CWA section 303(d) impaired water body segments (where a site/source generates pollutants for which the water body segment is impaired). Each Copermittee must also designate additional controls for industrial and commercial sites/sources within or directly adjacent to or discharging directly to ~~coastal lagoons, the ocean, or other~~ receiving waters within environmentally sensitive areas (as defined in Attachment C of this Order) as necessary to comply with this order. The Copermittee may adjust the number and/or type of enhanced

Comment [CP134]: This is a high cost-low return proposition. It is a significant effort and non-recoverable cost to determine which projects may be directly discharging or adjacent to receiving waters with ESAs. There are already over 30 categories of facilities that are required for inspection. There is also a process (via NALs and SALs) whereby the Permittees must develop action plans to address remaining water quality problems. Let the NAL/SAL system drive the decision making for adding facilities instead of this shot-gun approach which will net hair salons, retail stores, and other stores not likely to have any real impact on water quality.

Comment [U135]: 6/3 - Added to reflect request regarding replacement of text in (iii) above with recognition of the NAL/SAL iterative process outcomes.

Comment [CP136]: This sentence has been added pursuant to our previous discussions, where it was agreed that the list of BMPs can be changed over time through the iterative process based on the experience of the Copermittees. This language provides important clarification to that end. Request similar language be added to Municipal and Residential sections

Comment [CP137]: From the 2004 permit.

BMPs that are required, provided that the goals of the Commercial/Industrial program are met.

(d) Implement BMPs: To the extent allowable by law, Eeach Copermittee must implement, or require the implementation of, the designated minimum and enhanced BMPs and any additional measures necessary based on inspections, incident responses, and water quality data to comply with this Order at each industrial and commercial site/source within its jurisdiction.

(3) BMP Implementation for Mobile BusinessesBusiness Program

(a) Each Copermittee must develop and implement a program to reduce the discharge of storm water pollutants from mobile businesses to the MEP and to prohibit non-storm water discharges pursuant to Section B of this Order. Each Copermittee must keep as part of their commercial source inventory a listing of mobile businesses associated with Section F.2.b(1)(a)(i) known to operate have bases of operation within its jurisdiction that have the potential to discharge pollutants. The program must include:

(i) Development and implementation of minimum standards and BMPs to be required for each of the various types of mobile businesses;
(ii) Development and implementation of an enforcement strategy which specifically addresses the unique characteristics of mobile businesses;
(iii) Notification of those mobile businesses known to operate have bases of operation within the Copermittee's jurisdiction, of the minimum standards and BMP requirements and local ordinances;
(iv) Development and implementation of an outreach and education strategy; and
(v) Inspection of mobile businesses as needed to implement the program.

(b) If they choose to, the Copermittees may cooperate in developing and implementing their programs for mobile businesses, including, but not limited to sharing of mobile business inventories, BMP requirements, enforcement action information, and education.

(4) Inspection of Industrial and Commercial Sites/Sources

Each Copermittee must conduct industrial and commercial site inspections for compliance with its ordinances, permits, and this Order. Mobile businesses shall be inspected pursuant to section F.3.b.(3) of this order.

(a) Inspection Procedures: Inspections must include but not be limited to:

Comment [CP138]: This sentence has been added pursuant to our previous discussions, where it was agreed that the list of BMPs can be changed over time through the iterative process based on the experience of the Copermittees. This language provides important clarification to that end. Request similar language be added to Municipal and Residential sections

Comment [CP139]: 6/3 - Added pursuant to our discussion

Comment [CP140]: The Copermittees have no authority to *implement* the BMPs on these privately owned sites, however they can require the site owner to implement such BMPs.

Comment [CP141]: This section is describing more than BMP implementation, it is describing a parallel program to address the unique characteristics of Mobile Businesses. Suggested revised heading.

Comment [CP142]: 6/3 - Per our discussion

Comment [CP143]: This would prevent us from implementing this regionally.

Comment [CP144]: Clarifying that mobile business will be subject to the inspection requirements developed in F.3.b.(3) .

(i) ~~Review of BMP implementation plans, if the site uses or is required to use such a plan~~;

(ii) ~~Review of facility monitoring data, if the site monitors its runoff;~~

(iii) Check for coverage under the General Industrial Permit (Notice of Intent (NOI) and/or Waste Discharge Identification Number), if applicable;

(iv) Assessment of compliance with Copermittee ordinances and Copermittee issued permits related to runoff;

(v) ~~A~~assessment of ~~BMP~~ implementation and effectiveness of the designated minimum and/or enhanced BMPs~~, maintenance and effectiveness~~;

(vi) Visual observations for non-storm water discharges, potential illicit connections, and potential discharge of pollutants in storm water runoff; and

(vii) Education and training on storm water pollution prevention, as conditions warrant.

(b) Each Copermittee shall annually notify the San Diego Water Board, prior to the commencement of the wet season, of all Industrial Sites and Industrial Facilities ~~subject to the General Industrial Permit or other individual NPDES permit~~ with alleged violations of the Copermittees' ordinances, that pose a significant threat to water quality. Information may be provided as part of the JRMP annual report if submitted prior to the rainy season. Information provided shall include, but not be limited to, the following:

(i) WDID number if enrolled under the General Industrial Permit;
(ii) Site Location, including address;
(iii) Current violations or suspected violations; and
(iv) ~~Past Violation history~~.

(c) Frequencies: Each Permittee shall prioritize the inventoried commercial/industrial facilities based on threat to water quality. ~~At a minimum, 25 percent of the sites inventoried as required in section F.3.b.(1) above (excluding mobile sources) including all~~ All sites determined to pose a high threat to water quality must be inspected each year. At a minimum and all other inventoried facilities shall be inspected at least once every five years. All sites must be Mobile businesses must be inspected pursuant to the enforcement strategy developed pursuant to section F.3.b.(3). In evaluating threat to water quality, each Copermittee

Comment [CP145]: Requirement (v) already addresses these issues. (i) and (ii) focus on methods. (v) focuses on outcomes. The Permittees should be allowed to determine their own methods for evaluating compliance with their ordinances.

Comment [CP146]: This section should only be addressing the BMPs required under section F.3.b of the order. As mentioned in comments above, the maintenance of Post Construction structural BMPs is addressed in section F.1.f. of this order.

Comment [CP147]: Permittees already Voluntarily work with RWQCB to ensure compliance. This requirement is not necessary.

6/3 - Pursuant to our discussion, the Fact sheet could clarify that the intent of this section is to facilitate cooperation between the Copermittees and the Water Board.

Comment [CP148]: Clarify that we are evaluating Ordinance compliance, also limit reporting to sites with significant threats to water quality.

Comment [CP149]: This is too vague and broad.

Comment [CP150]: 25% requirement is a record retention problem and is not necessary

Comment [CP151]: Changes are proposed to allow the CAP program to be maintained.

shall consider, at a minimum, the following:

(i) Type of activity (SIC code);
(ii) Materials used at the facility;
(iii) Wastes generated;
(iv) Pollutant discharge potential;
(v) Non-storm water discharges;
(vi) Size of facility;
(vii) Proximity to receiving water bodies;
(viii) Sensitivity of receiving water bodies;
(ix) Whether the facility is subject to the General Industrial Permit or an individual NPDES permit;
(x) Whether the facility has filed a No Exposure Certification/Notice of Non-Applicability;
(xi) Facility design;
(xii) Total area of the site~~, area of the site~~ where industrial or commercial activities occur, and area of the site exposed to rainfall and runoff;
(xiii) The facility's compliance history; and
(xiv) Any other relevant factors.

(d) Third-Party ~~Inspections~~Certifications: Each Copermittee may develop and implement a program to utilize a private third party ~~inspection program~~ certification service for verifying industrial and commercial site/source compliance with its ordinances, permits, and this Order. If a Copermittee wishes to initiate a third party certification program, the Copermittee must submit a report describing the proposed program, including QA/QC procedures, for approval of the Executive Officer. ~~The third party inspections can satisfy up to 30% of the inspection requirements in section F.3.b(4)(c), with the Copermittee having to fulfill the remaining required inspections.~~ To the extent that third party ~~inspections~~ certifications are conducted to fulfill the requirements of this Order, the Copermittee will be responsible for conducting and documenting quality assurance and quality control of the third-party ~~inspections~~certifications.

(i) Each inspection conducted by a third-party must, at a minimum, result in the following:

[a] Photo documentation of potential storm water violations identified during the third party inspection;
[b] Reporting to the Copermittee of identified significant potential violations, including imminent or observed illegal discharges, within 24 hours of the third party inspection;
[c] Reporting to the Copermittee of all inspection findings within one week of the inspection being conducted; and
[d] Copermittee follow-up and/or enforcement actions for identified potential storm water violations within two business days of the

Comment [CP152]: Intent of the changes are to clarify that these requirements do not apply to any cross-Copermittee inspection agreements, such as the CAP program.

Comment [CP153]: 6/3 - per our discussion

Comment [CP154]: This limitation is not necessary. Section (i) below will provide the Copermittee with the assurance that the inspection is valid, complete and accurate. The Copermittee should be afforded the flexibility to find the most cost-effective way to comply with the permit.

inspection or potential violation report receipt.

(e) Based upon site inspection findings, each Copermittee must implement all follow-up actions and enforcement necessary to comply with this Order.

(f) To the extent that the San Diego Water Board has conducted an inspection of an industrial site during a particular year, the requirement for the responsible Copermittee to inspect this facility during the same year will be satisfied.

(g) The Copermittees must track the number of inspections for the inventoried industrial and commercial sites/sources throughout the reporting period to verify that the sites/sources are inspected at the minimum frequencies listed in this Order.

(5) Enforcement of Industrial and Commercial Sites/Sources

Each Copermittee must enforce its storm water ordinance for all industrial and commercial sites/sources as necessary to maintain compliance with this Order. Copermittee ordinances or other regulatory mechanisms must include appropriate sanctions to achieve compliance. Sanctions must include the following or their equivalent: Non-monetary penalties, fines, ~~bonding requirements,~~ and/or permit denials for non-compliance.

Comment [CP155]: The difficulty in collecting on bonds make them virtually useless as an enforcement tool.

~~(6) Training and Education for Owners and Operators of Commercial and Industrial Activities~~

~~(a) Each Copermittee must implement an education program using all media as appropriate to (1) measurably increase the knowledge of owners and operators of commercial and industrial activities regarding MS4s, impacts of runoff on receiving waters, and potential BMP solutions for the target audience; and (2) to measurably change the behavior of target communities and thereby reduce storm water pollutant releases and eliminate prohibited non-storm water discharges to MS4s and the environment. At a minimum, the education program must meet the requirements of this section and address the following issues:~~

~~(i) Laws, regulations, permits, & requirements;~~
~~(ii) Best management practices;~~
~~(iii) General runoff concepts; and~~

~~(iv) Other topics, including public reporting mechanisms, water conservation, low-impact development techniques.~~

~~(b) BMP Notification: At least twice during the five-year period of this Order, each Copermittee must notify the owner/operator of each inventoried~~

~~industrial and commercial site/source of the BMP requirements applicable to the site/source.~~

C. RESIDENTIAL

Each Copermittee must implement a residential program which meets the requirements of this section~~,~~ to prevent~~s~~ illicit discharges into the MS4, reduce~~s~~ residential discharges of storm water pollutants from the MS4 to the MEP, and prevent~~s~~ residential discharges from the MS4 from causing or contributing to a violation of water quality standards.

Comment [CP156]: Same comment as on Municipal

(1) Threat to Water Quality Prioritization

Each Copermittee must identify residential areas and activities that pose a high threat to water quality. At a minimum, these must include:

(a) Automobile repair, maintenance, washing, and parking;
(b) Home and garden care activities and product use (pesticides, herbicides, and fertilizers);
(c) Disposal of trash, pet waste, green waste, and household hazardous waste (e.g., paints, cleaning products);
(d) Any other residential source that the Copermittee determines may contribute a significant pollutant load to the MS4;
(e) Any residential areas tributary to a CWA section 303(d) impaired water body, where the residence generates pollutants for which the water body is impaired; and
(f) Any residential areas within or directly adjacent to or discharging directly to a ~~coastal lagoon, the ocean, or other~~ receiving water~~waters~~ within an environmentally sensitive area (as defined in Attachment C of this Order).

(2) BMP Implementation

(a) Pollution Prevention: Each Copermittee must actively encourage the use of pollution prevention methods by residents and residential associations (i.e Home Owners Associations).

Comment [CP157]: 5/6 - Proposed language as an alternative to (5)(a). See also edits to (2)(b) below.

(b) Designate BMPs: Each Copermittee must designate minimum BMPs for ~~high-threat-to-water quality~~ residential areas and activities, including areas maintained by and activities conducted by residential associations, that pose a high-threat-to-water quality. The designated minimum BMPs ~~for high-threat-to-water quality residential areas and activities~~ must be area or activity specific and must consider factors that may be uniquely relevant to Common Interest Areas and areas managed by Home Owners' Associations.

Comment [CP158]: 5/6 - Proposed language as an alternative to (5)(a). This language meets the intent of (5)(a) without requiring dedication of resources to a separate compliance program for HOAs.

(c) Hazardous Waste BMPs: Each Copermittee must facilitate the proper

management and disposal of used oil, toxic materials, and other household hazardous wastes. Such facilitation must include educational activities, public information activities, and establishment of collection sites operated individually and/or jointly by the Copermittees or a private entity. Curbside collection of household hazardous wastes is encouraged.

Comment [CMP159]: We jointly fund operation of a permanent collection and additional rotating collection events

(d) Implement BMPs: Each Copermittee must implement, or require implementation of, the designated minimum BMPs and any additional measures that are subsequently determined to be necessary to comply with Sections A and B of this Order.

Comment [CP160]: 4/28 - Added pursuant to our discussion.

(e) Each Copermittee must implement, or require implementation of, BMPs for residential areas and activities that have not been designated a high threat to water quality, as necessary.

(3) Enforcement of Residential Areas and Activities

Each Copermittee must enforce its storm water ordinance for all residential areas and activities as necessary to maintain compliance with this Order. In addition, pursuant to Section E of this order each Copermittee must review its Municipal Codes / Ordinances to ensure that it has the full authority to implement and enforce runoff management measures within common interest areas and those areas managed by Home Owners' Associations.

Comment [CP161]: 5/6 - Proposed alternative to (5)(b), that meets the same intent of (5)(b), but integrates the requirement with the rest of the residential section, and ties the 'authority' to section E.

(4) Evaluation of Oversight of Residential Areas and Activities

~~Each Copermittee must annually review the effectiveness of efforts to reduce residential discharges of storm water pollutants from the MS4 and eliminate illicit residential discharges into the MS4. The evaluation must consider findings from monitoring data, municipal employee comments, inspections, complaints, and other appropriate sources.~~

Comment [CP162]: 4/28 – Removed per our discussion. This is already required as part of the Program Effectiveness Assessments in section J of the draft order.

(5) Common Interest Areas (CIA) / Home Owner Association (HOA) Areas

~~Each Copermittee must implement measures specifically to ensure that runoff within common interest developments, including areas managed by associations, meets the objectives of this section and Order.~~

~~(a) BMP Implementation: Each Copermittee must implement management measures based on a review of pertinent factors, including:~~

~~(i) Current maintenance duties and procedures used by CIA/HOA maintenance associations within its jurisdiction;~~
~~(ii) Whether streets and storm drains are publicly or privately owned within the CIA/HOA;~~
~~(iii) Whether the CIA/HOA area has been identified as a high priority~~

Comment [CP163]: 4/28 - pursuant to our discussion, our mutual Goal is to develop language to allow this section to be described in terms of existing programs.

5/6 - As originally written, this new permit provision would require the Copermittees to dedicate additional resources to create new compliance programs.

As an alternative, the Copermittees request to integrate the intent of this section into the rest of the residential sections as shown by the suggested language on (2)(a), (2)(b), and (3).

~~residential area;~~

~~(iv) Proximity to 303(d) listed waterbodies, and/or environmentally sensitive areas;~~

~~(v) Evaluation of water quality monitoring data;~~

~~(vi) Evaluation of existing illegal discharge/illicit connection activities;~~

~~(vii) Other activities conducted or authorized by the HOA that may pose a significant risk to inland or coastal receiving waters.~~

~~(b) Legal Authority and Enforcement: Within one year of adoption of this Order, each Copermittee must review its Municipal Code to determine the most appropriate method to implement and enforce runoff management measures within CIA/HOA areas.~~

(6) Residential Education Program

Comment [CP164]: 4/28 - We agreed that Education requirements (throughout the permit) would be consolidated into a new section (F.7?).

(a) Each Copermittee must individually and/or jointly implement a Residential Education Program using all media as appropriate to (1) measurably increase the knowledge regarding MS4s, impacts of runoff on receiving waters, and potential BMP solutions for the target audience; and (2) to measurably change the behavior of target communities and thereby reduce storm water and eliminate prohibited non-storm water pollutant releases to MS4s and the environment.

(b) Copermittee educational programs must address pollutant generating residential activities (e.g. car washing, mobile operations, yard maintenance)~~emphasize underserved target audiences, residents~~ and pollutant generating products (i.e. pesticides, fertilizers, household chemicals) as appropriate.~~managers of CIA/HOA areas, high-risk behaviors, and "allowable" behaviors and discharges.~~ At a minimum, the education program must meet the requirements of this section and address thefollowing~~the following~~ issues as appropriate to the specific outreach effort:

(i) Laws, regulations, permits, and requirements;
(ii) Best management practices;
(iii) General runoff concepts;
(iv) Existing water quality, including local water quality conditions, impaired waterbodies and environmentally sensitive areas; and
(v) Other topics, including public reporting mechanisms, water conservation, low-impact development techniques, and public health and disease vector issues associated with polluted runoff.

Comment [CP165]: Retrofit is another level of protection that can be a tool in addressing the impairments in the watershed. It should not be a mutually exclusive requirement. For example, in response to SAL exceedances, the Copermittees may determine that increased inspections and enforcement is more appropriate in one scenario, and in another scenario, targeted outreach and education, and in another, retrofit may be a more viable option.

The Copermittees believe this section should be to put in place the information that will allow us to assess if retrofit is a viable solution to any given problem.

5/26: Water Board staff offered to clarify in the fact sheet that the scope and scale of the retrofit program is intended to be broad and on the level of a planning study, and not include a detailed lot-by-lot assessment.

d. Retrofitting Existing Development

Each Copermittee must develop and implement a retrofitting program which meets the requirements of this section. The goal~~s~~ of the existing development

retrofitting program ~~are~~ is to provide an option to the Copermittees to address the regional impacts of existing development through retrofit projects that: reduce impacts from hydromodification, ~~promote LID,~~ support riparian and aquatic habitat restoration, reduce the discharges of storm water pollutants from the MS4 to the MEP, and prevent discharges from the MS4 from causing or contributing to a violation of water quality standards. Where feasible, at the discretion of the Copermittee, the existing development retrofitting program may be coordinated with flood control projects and other regional infrastructure improvement programs.

~~(1) Source Identification~~

(1) The Copermittee must identify and inventory existing developments (~~i.e~~e.g. municipal, industrial, commercial, residential) within their jurisdiction that may be~~as~~ candidates for retrofitting. At a minimum, the delineation ~~Potential retrofitting candidates~~ must assess candidates within the following areas of existing development:~~include but are not limited to:~~

(a) Areas ~~Developments~~ that are known to contribute pollutants of concern to a 303(d) listed water body;~~TMDL or an ESA~~;
(b) Receiving waters that are channelized or otherwise hardened;
(c) Developments tributary to receiving waters that are channelized or otherwise hardened;
(d) Areas~~Developments~~ tributary to receiving waters that are significantly eroded;
~~(e) Developments tributary to an ASBS or SWQPA; and~~
~~(f) Developments that cause hydraulic constriction.~~

(2) Each Copermittee shall evaluate ~~and rank~~ the inventoried ~~existing developments~~retrofit candidates to prioritize retrofitting. The evaluation shall consider the following criteria, where appropriate:~~Criteria for evaluation must include but is not limited to:~~

(a) Feasibility;
(b) Cost effectiveness;
(c) Pollutant removal effectiveness;
(d) Tributary~~Impervious~~ area potentially treated;
(e) Maintenance requirements;
(f) Landowner cooperation;
(g) Neighborhood acceptance;
(h) Aesthetic qualities~~; and~~
(i) Environmental Constraints (such as regulatory permits);
(j) Efficacy at addressing concern~~.~~; and
(k) Public Health and Safety;

Comment [CP166]: Retrofit should not be for the sake of Retrofit - it should be an option available to the Copermittees to address a specific and defined problem in the most cost efficient manner.

Comment [CP167]: LID is a means to an end, not an end in and of itself.

Comment [CP168]: The Copermittees would prefer to end section (1) here, and give us the flexibility to assess candidates where it makes sense, without forcing us to work within a specific framework. Alternatively, important changes/clarifications have been provided.

Comment [CP169]: 5/26; Water Board staff agreed to identify these as 'areas' rather than

Comment [CP170]: Not applicable to this watershed.

Comment [CP171]: This is covered under (d) above

Comment [CP172]: The evaluation should occur when we have identified a specific problem that we are trying to address.

Comment [CP173]: Similar to section (1) the Copermittees would prefer to end section (2) here and give us the flexibility to utilize any applicable and appropriate criteria in our evaluation - and not overly define the framework we will be required to work within. Alternatively, appropriate modifications to the language have been provided.

(3) Each Copermittee must consider the results of the evaluation in prioritizing work plans for the following year. Highly feasible projects expected to benefit water quality should be given a high priority to implement source control and treatment control BMPs. Where applicable and feasible, the retrofit projects should be designed in accordance with the SSMP requirements within sections F.1.d.(3) through F.1.d.(8). In addition, the Copermittee shall encourage retrofit projects to implement where feasible the Hydromodification requirements in Section F.1.h.

(4) The Copermittees ~~will~~ are highly encouraged to cooperate with private landowners to encourage retrofitting projects. The Copermittee ~~must~~ should consider the following practices in cooperating and encouraging private landowners to retrofit their existing development:

(a) Demonstration retrofit projects;
~~(b) Retrofits on public land and easements that treat runoff from private developments;~~
(b) Education and outreach;
(c) Subsidies for retrofit projects;
(d) Requiring retrofit projects as enforcement, mitigation or ordinance compliance; and
(e) Public and private partnerships~~; and~~.
~~(g) Fees for existing discharges to the MS4 and reduction of fees for retrofit implementation.~~

(5) Where ~~T~~the completed retrofit includes structural post-construction BMPs within municipal (Copermittee owned) areas, the BMPs shall be tracked and inspected in accordance with section F.1.f.

~~(7) Where constraints on retrofitting preclude effective BMP deployment on existing developments at locations critical to protect receiving waters, a Copermittee may propose a regional mitigation project to improve water quality. Such regional projects may include but are not limited to:~~

~~(a) Regional water quality treatment BMPs;~~
~~(b) Urban creek or wetlands restoration and preservation;~~
~~(c) Daylighting and restoring underground creeks;~~
~~(d) Localized rainfall storage and reuse to the extent such projects are fully protective of downstream water rights;~~
~~(e) Hydromodification project; and~~
~~(f) Removal of invasive plant species.~~

(7) A retrofit project or regional mitigation project may qualify as a Watershed Water Quality Activity provided it meets the requirements in section G. Watershed Runoff Management Program.

Comment [CP174]: The idea is to find approaches for encouraging retrofit that may be applicable locally. In response to SALs, NALs, and TMDLs, these may be one 'tool in the toolbox' that we can assess in determining the most cost-efficient way to address the problem.

Comment [CP175]: 5/26: Changes are reflective of our discussion. If this is written as a permit requirement (will/shall, etc), it may preclude the Copermittees from seeking grant funding to implement such a program.

Comment [CP176]: This is addressed in (1) above

Comment [CP177]: Not applicable here

Comment [CP178]: If a private landowner volunteers to retrofit their property (outside of the requirements of F.1), they shouldn't be subjected to inspections / verifications. This would be a penalty for them doing the right thing.

5/26: Water Board staff agreed to consider this language .

Comment [CP179]: The delineation proposed in F.3.d.(1) above will include an assessment for regional opportunities.

4. ILLICIT DISCHARGE DETECTION AND ELIMINATION

Each Copermittee must implement a program which meets the requirements of this section to actively detect and eliminate illicit discharges and disposal into the MS4. The program must address all types of illicit discharges and connections excluding those non-storm water discharges not prohibited by the Copermittee in accordance with section B of this Order.

a. PREVENT AND DETECT ILLICIT DISCHARGES AND CONNECTIONS

Each Copermittee must implement measures to prevent and detect illicit discharges to the MS4.

(1) Legal Authority: Each Copermittee must retain legal authority to prevent and eliminate illicit discharges and connections to the MS4.

(2) Inspections: Each Copermittee must include use of appropriate Copermittee ~~municipal~~ personnel and contractors to assist in identifying illicit discharges and connections during their daily activities.

(a) Visual Inspections for illegal discharges and connections must be conducted during routine maintenance of all MS4 facilities.

(b) Copermittee~~Municipal~~ staff and contractors conducting non-MS4 field operations must be trained to report suspected illegal discharges and connections to proper Copermittee~~municipal~~ staff.

Comment [CMP180]: Same change recommended throughout permit

b. MAINTAIN MS4 MAP

Each Copermittee must maintain an updated map of its entire MS4 and the corresponding drainage areas within its jurisdiction. The use of GIS is encouraged.~~required.~~ The accuracy of the MS4 map must be confirmed during dry weather field screening and analytical monitoring and must be updated at least annually. The GIS layers of the MS4 map must be submitted with the updated Jurisdictional Runoff Management Plan within 365 days after adoption of this Order.

Comment [CMP181]: The District maintains a GIS system of each Permittee's MS4 system. This requirement should not fall on each permittee individually as they may not individually have the GIS capabilities or resources to maintain the map.

5/6 - RB Staff agreed to make this change.

c. FACILITATE PUBLIC REPORTING OF ILLICIT DISCHARGES AND CONNECTIONS - PUBLIC HOTLINE

Each Copermittee must individually and/or jointly promote, publicize and facilitate public reporting of illicit discharges or water quality impacts associated with discharges into or from MS4s. Each Copermittee must facilitate public reporting through development and operation of a public hotline. Public hotlines can be Copermittee-specific or shared by Copermittees. All storm water hotlines must be capable of receiving reports in both English and Spanish 24 hours per day and

Comment [CP182]: 5/6 - As discussed under Section C, the language *'individually and/or jointly'* is not needed.

seven days per week. All reported incidents, and how each was resolved, shall be summarized in each Copermittee's ~~Individual~~ Annual Report.

Comment [U183]: Terminology?

d. Dry Weather Field Screening And Analytical Monitoring

Each Copermittee must conduct dry weather field screening and analytical monitoring of MS4 outfalls and other portions of its MS4 within its jurisdiction to detect illicit discharges and connections in accordance with Receiving Waters and MS4 Discharge Monitoring and Reporting Program No. R9-2010-0016 in Attachment E of this Order.

e. Investigation / Inspection And Follow-Up

Each Copermittee must implement procedures to investigate and inspect portions of their~~the~~ MS4 that, based on the results of field screening, analytical monitoring, or other appropriate information, indicate a reasonable potential of containing illicit discharges, illicit connections, or other sources of pollutants in non-storm water.

(1) Develop response criteria for data: Each Copermittee must develop, update, and use numeric criteria action levels (or other actions level criteria where appropriate) to determine when follow-up investigations will be performed in response to water quality monitoring. The criteria must include required non-storm water action levels (see Section C) and a consideration of 303(d)-listed waterbodies and environmentally sensitive areas (ESAs) as defined in Attachment C.

(2) Respond to data: Each Copermittee must investigate portions of the MS4 for which water quality data or conditions indicates a potential illegal discharge or connection.

(a) Obvious illicit discharges (i.e. color, odor, or significant exceedances of action levels) must be investigated immediately.

(b) Field screen data: Within two business days of receiving dry weather field screening results that exceed action levels, the applicable Copermittee~~Copermittees~~ must either initiate an investigation to identify the source of the discharge or document the rationale for why the discharge does not pose a threat to water quality and does not need further investigation. This documentation shall be included in the Annual Report.

(c) Analytical data: Within five business days of receiving quality controlled analytical laboratory results that exceed action levels, the applicable Copermittee~~Copermittees~~ must either initiate an investigation to identify the source of the discharge or document the rationale for why the discharge does not pose a threat to water quality and does not need

further investigation. This documentation shall be included in the Annual Report.

(3) Respond to notifications: Each Copermittee must respond to and resolve each reported incident (e.g., public hotline, staff notification, etc.) in a timely manner. Criteria may be developed to assess the validity of, and prioritize the response to, each report.

f. ELIMINATION OF ILLICIT DISCHARGES AND CONNECTIONS

Each Copermittee must take immediate action to initiate steps necessary to eliminate all detected illicit discharges, illicit discharge sources, and illicit connections after the source is found.~~detection.~~ Elimination measures may include an escalating series of enforcement actions for those illicit discharges that are not a serious threat to public health or the environment. Illicit discharges that pose a serious threat to the public's health or the environment must be eliminated immediately. The Copermittees may engage San Diego Regional Board staff as necessary to assist in resolving illicit discharges and connections.

Comment [CP184]: 5/6 - revised suggested language pursuant to our discussion. Immediate action to eliminate the source cannot be taken until the source is found.

g. ENFORCE ORDINANCES

Each Copermittee must implement and enforce its ordinances, orders, or other legal authority to prevent illicit discharges and connections to its MS4 and to eliminate detected illicit discharges and connections to its~~it's~~ MS4.

h. PREVENT AND RESPOND TO SEWAGE SPILLS (INCLUDING FROM PRIVATE LATERALS AND FAILING SEPTIC SYSTEMS) AND OTHER SPILLS

(1) Each Copermittee must implement management measures and procedures to prevent, respond to, contain and clean up all sewage (see below) and other spills that may discharge into its MS4 from any source (including private laterals and failing septic systems). Copermittees must coordinate with spill response teams to prevent entry of spills into the MS4 and contamination of surface water, ground water and soil to the MEP. Each Copermittee must coordinate spill prevention, containment and response activities throughout all appropriate Copermittee departments, programs and agencies so that maximum water quality protection is available at all times.

Comment [CP185]: From 2004 SMR Permit

Comment [CMP186]: Clarifying

(2) Each Copermittee must develop and implement a mechanism whereby it is notified of all sewage spills affecting their jurisdiction. ~~from private laterals and failing septic systems into its MS4. Each Copermittee must implement management measures and procedures to prevent, respond to, and coordinate a response to contain and clean up sewage from any such notification.~~

Comment [CMP187]: This section seems to belong before section (1).

Comment [CP188]: 5/6 - Revised suggested language per our discussion.

Comment [CP189]: This is repetitive of F.4.h.(1)

i. EDUCATION AND TRAINING

Comment [CP190]: This section will be migrated into the consolidated training and education sections. (F.6 and F.7)

Each Copermittee must individually and/or jointly implement educational activities, public information activities, and other appropriate activities to facilitate the proper management and disposal of used oil and toxic materials.

5. PUBLIC PARTICIPATION COMPONENT

Each Copermittee must incorporate a mechanism for public participation in the updating, development, and implementation of the Jurisdictional Runoff Management Program.

6. EDUCATION AND OUTREACH

Comment [CP191]: 5/6 – This section will contain the consolidated public education and Copermittee training requirements from the other areas of the permit.

G. WATERSHED RUNOFF MANAGEMENT PROGRAM

Each Copermittee must collaborate with other Copermittees to identify, address, and mitigate the highest priority water quality issues/pollutants in the Upper Santa Margarita Watershed.

1. Watershed Water Quality Workplan (Watershed Workplan)

The Watershed Workplan shall describe the Copermittees' development and implementation of a collective watershed strategy to assess and prioritize the water quality problems within the watershed's receiving waters, identify and model sources of the highest priority water quality problem(s), develop a watershed-wide BMP implementation strategy to abate highest priority water quality problems, and a monitoring strategy to evaluate BMP effectiveness and changing water quality prioritization in the WMA.

The work plan shall, at a minimum:

a. Characterize the receiving water quality in the WMA. Characterization shall include use of regularly collected water quality data, reports, monitoring and analysis generated in accordance with the requirements of the Receiving Waters Monitoring and Reporting Program, as well as applicable information available from other public and private organizations.

b. Identify the highest priority water quality problem(s), in terms of constituents by location, in the WMA's receiving waters. Identified water quality problem(s) shall, at a minimum, give consideration to; TMDLs, receiving waters listed on the CWA section 303(d) list, waters with persistent violations of water quality standards, toxicity, or impacts to beneficial uses, and other pertinent conditions.

c. Identify the sources of the highest water quality problem(s) within the WMA. Efforts to determine such sources shall include, but not be limited to: use of information from the construction, industrial/commercial, municipal, and residential source identification programs required within the Jurisdictional Runoff Program (JRMP) of this Order; specific actions to model pollutant transport to receiving waters for the sake of identifying the source(s) point(s) of origin; water quality monitoring data collected as part of the Receiving Water Monitoring and Reporting Program required by this Order, and additional focused water quality monitoring to identify specific sources within the watershed.

d. Develop a watershed BMP implementation strategy to attain receiving water quality objectives in the identified highest priority water quality problem(s). The BMP implementation strategy shall include a schedule for implementation of the BMP projects to abate specific receiving water quality problems. BMPs not contributing to measured pollutant reductions or improvements to water quality must be removed and replaced with alternative BMPs. Identified watershed water quality problems may be the result of jurisdictional discharges that will need to be addressed with BMPs applied in a specific jurisdiction in order to generate a benefit to the watershed.

e. Develop a strategy to model and monitor improvements in receiving water quality directly resulting from implementation of the BMPs described in the Watershed Workplan. The modeling and monitoring strategy shall generate the necessary data to report on the measured pollutant reduction that results from proper BMP implementation. Monitoring shall, at a minimum, be conducted in the receiving water to demonstrate reduction in pollutant concentrations and progression towards attainment of receiving water quality objectives.

f. Establish a schedule for development and implementation of the Watershed strategy outlined in the Workplan. The schedule shall, at a minimum, include forecasted dates of planned actions to address Provisions E.2(a) through E.2(e) and dates for watershed review meetings through the remaining portion of this Permit cycle. Annual watershed workplan review meetings must be open to the public and appropriately publically noticed such that interested parties may come and provide comments on the watershed program.

2. **Watershed Workplan Implementation –** Watershed Copermittee's shall begin implementing the Watershed Workplan within 60-days of acceptance by the San Diego Water Board Executive Officer. If within 30 days of submittal, the San Diego Water Board has not taken an action, the Workplan shall be deemed acceptable.

3. **Copermittee Collaboration** – Watershed Copermittees shall collaborate to develop and implement the Watershed Workplan. Watershed Copermittee collaboration shall include frequent regularly scheduled meetings. The Copermittees shall seek to obtain any interagency agreements, or other efforts, with non-Copermittee owners of

the MS4 (such as Caltrans, Native American tribes, and school districts) to control the contribution of pollutants from one portion of the shared MS4 to another portion of the shared MS4. The Copermittees shall, as appropriate, participate in watershed management efforts to address water quality issues within the entire Santa Margarita Watershed (such as the County of San Diego and United States Marine Corps Camp Pendleton).

4. **Public Participation –** Watershed Copermittees shall implement a watershed-specific public participation mechanism within each watershed. A required component of the watershed-specific public participation shall be a minimum 30-day public review of the Watershed Workplan prior to submittal for acceptance by the San Diego Water Board Execuive Officer. Opportunity for the public to review and comment on the Watershed Workplan must occur before the workplan is implemented.

5. **Watershed Workplan Review and Updates –** Watershed Copermittees shall review and update the Watershed Workplan annually to identify needed changes to the prioritized water quality problem(s) listed in the workplan. All updates to the Watershed Workplan shall be presented during an Annual Watershed Review Meeting. Annual Watershed Review Meetings shall occur once every calendar year and be conducted by the Watershed Copermittees. Annual Watershed Review Meetings shall be open to the public and adequately noticed. Individual Watershed Copermittees shall also review and modify their jurisdictional programs and JRMP Annual Reports, as necessary, so that they are consistent with the updated Watershed Workplan.

6. **Pyrethroid Toxicity Reduction Evaluation –** The Watershed Copermittees shall incorporate the pyrethroid pollutant reduction program[19] into the Watershed Workplan. The pyrethroid pollutant reduction program shall include the following elements:

   a. Pursue state and federal regulatory change.
   b. Implement a set of source controls targeted specifically at urban pesticide use,
   c. Through the annual reporting process, monitor the implementation of those controls, assess effectiveness, and identify sources or areas where additional effort is needed,
   d. Implement additional controls as needed,
   e. Continue to monitor implementation, as well as conditions within the target receiving waters, assess effectiveness, and re-evaluate control programs.

H. FISCAL ANALYSIS

[19] The pyrethroid pollutant reduction program is described in the "Riverside County – Santa Margarita Region Pyrethroid Source Identification Toxicity Reduction Evaluaion, Final Phase II Report", January 2009 by MACTEC.

1. Secure Resources: Each Copermittee must secure the resources necessary to meet all requirements of this Order.

2. Annual Analysis: Each Copermittee must conduct an annual fiscal analysis of the necessary capital and operation and maintenance expenditures necessary to accomplish the activities of the programs required by this Order. The analysis must include estimated expenditures for the reporting period, the preceding period, and the next reporting period.

   a. Each analysis must include a description of the source of funds that are proposed to meet the necessary expenditures, including legal restrictions on the use of such funds.
   b. Each analysis must include a narrative description of circumstances resulting in a 25 percent or greater annual change for any budget line items.

3. Annual Reporting: Each Copermittee must submit its annual fiscal analysis with the annual JRMP report.

I. TOTAL MAXIMUM DAILY LOADS

The waste load allocations (WLAs) of fully approved and adopted TMDLs are incorporated as Water Quality Based Effluent Limitations on a pollutant by pollutant, watershed by watershed basis. Early TMDL requirements, including monitoring, may be required and inserted into this Order pursuant to Finding E.10

J. PROGRAM EFFECTIVENESS ASSESSMENT AND REPORTING

1. Jurisdictional Program Effectiveness Assessments

a. OBJECTIVES OF EFFECTIVENESS ASSESSMENTS

Beginning with the Annual Report due in 2012, each Copermittee must annually assess the effectiveness of its Jurisdictional Runoff Management Program (JRMP) implementation at meeting the following objectives:

(1) Objective for 303(d) Waterbodies: Reduce storm water pollutant loadings.

(a) Each Copermittee must establish annual assessment measures or methods specifically for reducing discharges of storm water pollutants from its MS4 into each downstream 303(d)-listed water body for which that waterbody is impaired. Assessment measures must be developed for

each of the six outcome levels described by CASQA.[20]

(b) Each Copermittee must annually conduct each established assessment measure or method and evaluate the outcome. Each outcome must then be used to assess the effectiveness of implemented management measures toward reducing MS4 discharges of the specific pollutants causing or contributing to conditions of impairment.

(c) The assessment measures must target both water quality outcomes and the results of municipal enforcement activities.

(2) Objective for Environmentally-Sensitive Areas: Prevent storm water MS4 discharges from causing or contributing to conditions of pollution, nuisance, or contamination.

(a) Each Copermittee must establish annual measures or methods specifically for assessing the effectiveness of its management measures for protecting downstream ESAs from adverse effects caused by discharges from its MS4. Assessment measures must be developed for each of the six outcome levels described by CASQA.

(b) Each Copermittee must annually implement each established assessment measure or method and evaluate the outcome. Each outcome must be used to assess the effectiveness of implemented management measures toward reducing MS4 discharges of the specific pollutants causing or contributing to conditions of impairment.

(c) The assessment measures must target both water quality outcomes and the results of municipal enforcement activities.

(3) Objectives for major program component outcomes: Determined by Each Copermittee.

(a) Each Copermittee must annually develop objectives for each program component in Section F and the overall JRMP. The objectives must be established as appropriate in response to program implementation and evaluation of water quality and management practices.

(b) Assessment approaches for program implementation must include a mix of specific activities, general program components, and water quality data.

(c) The assessment measures must target both water quality outcomes and the results of municipal enforcement activities.

(4) Objectives for actions taken to protect receiving water limitations in accordance with this Order.

(a) Each Copermittee must develop and implement an effectiveness assessment strategy for each measure conducted in response to a

[20] Effectiveness assessment outcome levels as defined by CASQA are defined in Attachment C of this Order. See "*Municipal Stormwater Program Effectiveness Assessment Guidance*" (CASQA, May 2007) for guidance for assessing program activities at the various outcome levels.

determination to implement the "iterative" approach to prevent or reduce any storm water pollutants that are causing or contributing to the exceedance of water quality standards as outlined in this Order

b. ASSESSMENT REVIEW

(1) Based on the results of the effectiveness assessments, each Copermittee must annually review its jurisdictional activities and BMPs to identify modifications and improvements needed to maximize JRMP effectiveness, as necessary to achieve compliance with this Order.

(2) Each Copermittee must develop and annually conduct an Integrated Assessment[21] of each effectiveness assessment objective above (Section J.1.a) and the overall JRMP using a combination of outcomes as appropriate to the objectives.[22]

2. Program Modifications

a. Each Copermittee must develop and implement a plan and schedule to address program modifications and improvements identified during annual effectiveness assessments.

b. Jurisdictional activities/BMPs that are ineffective or less effective than other comparable jurisdictional activities/BMPs must be replaced or improved upon by implementation of more effective jurisdictional activities/BMPs. Where monitoring data exhibits persistent water quality problems that are caused or contributed to by MS4 discharges, jurisdictional activities or BMPs applicable to the water quality problems must be modified and improved to correct the water quality problems.

3. Effectiveness Assessment and Program Response Reporting

a. Each Copermittee must include a description and summary of its annual and long-term effectiveness assessments within each Annual Report. Beginning with the Annual Report due in 2011, the Program Effectiveness reporting must include:

(1) 303(d) waterbodies: A description and results of the annual assessment measures or methods specifically for reducing discharges of storm water pollutants from its MS4 into each 303(d)-listed waterbody;
(2) ESAs: A description and results of the annual assessment measures or methods specifically for managing discharges of pollutants from its MS4 into

[21] Integrated assessment is defined in Attachment C. It is the process of evaluating whether program implementation is resulting in the protection or improvement of water quality. Integrated assessment combines assessments of program implementation and water quality.
[22] Not all program components need be addressed at each of the six outcome levels.

each downstream ESA;

(3) Other Program Components: A description of the objectives and corresponding assessment measures and results used to evaluate the effectiveness of each general program component. The results must include findings from both program implementation and water quality assessment where applicable;

(4) Receiving water protection: A description and results of the annual assessment measures or methods employed specifically for actions taken to protect receiving water limitations in accordance with Section A.3 of this Order;

(5) A description of the steps taken to use dry-weather and wet-weather monitoring data to assess the effectiveness of the programs for 303(d) impairments, ESAs, and general program components;

(6) A description of activities conducted in response to investigations of illicit discharge and illicit connection activities, including how each investigation was resolved and the pollutant(s) involved;

(7) Responses to effectiveness assessments: A description of each program modification, made in response to the results of effectiveness assessments conducted pursuant to Section J.1.a, and the basis for determining (pursuant to Section J.2.b.) that each modified activity and/or BMP represents an improvement with respect to reducing the discharge of storm water pollutants from the MS4.

(8) A description of the steps that will be taken to improve the Copermittee's ability to assess program effectiveness using measurable targeted outcomes, assessment measures, assessment methods, and outcome levels 1-6. Include a time schedule for when improvement will occur; and

(9) A description of the steps that will be taken to identify aspects of the Copermittee's Jurisdictional Runoff Management Program that will be changed based on the results of the effectiveness assessment.

4. Work Plan

Each Copermittee must develop a work plan to address their high priority water quality problems in an iterative manner over the life of the permit. The goal of the work plan is to demonstrate a responsive and adaptive approach for the judicious and effective use of available resources to attack the highest priority problems. The work plan shall include, at a minimum, the following:

a. The problems and priorities identified during the assessment;

b. A list of priority pollutants and known or suspected sources;

c. A brief description of the strategy employed to reduce, eliminate or mitigate the negative impacts;

d. A description and schedule for new and/or modified BMPs. The schedule is to include dates for significant milestones;

e. A description of how the selected activities will address an identified high priority problem. This will include a description of the expected effectiveness and

benefits of the new and/or modified BMPs;

f. A description of implementation effectiveness metrics;

g. A description of how efficacy results will be used to modify priorities and implementation; and

h. A review of past activities implemented, progress in meeting water quality standards, and planned program adjustments.

The Copermittee shall submit the work plan to the San Diego Water Board within 365 days of adoption of the Order. Annual updates are also required and shall be included with the annual JRMP report. The San Diego Water Board will assess the work plan for compliance with the specific and overall requirements of the Order. To increase effectiveness and efficiencies, Copermittees may combine their implementation efforts and work plans within a hydrologic area or sub area. Each Copermittee, however, maintains individual responsibility for developing and implementing an acceptable work plan.

K. REPORTING

The Copermittees may propose alternate reporting criteria and schedules, as part of their updated JRMP, for the Executive Officer's acceptance. The Copermittees shall submit the updated JRMP within 365 days after adoption of this Order.

1. Runoff Management Plans

a. JURISDICTIONAL RUNOFF MANAGEMENT PLANS

(1) Copermittees: The written account of the overall program to be conducted by each Copermittee to meet the jurisdictional requirements of section F of this Order is referred to as the Jurisdictional Runoff Management Plan (JRMP). Each Copermittee must revise and update its existing JRMP so that it describes all activities the Copermittee will undertake to implement the requirements of this Order. Each Copermittee must submit its updated and revised JRMP to the San Diego Water Board 365 days after adoption of this Order.

(2) At a minimum, each Copermittee's JRMP must be updated and revised to demonstrate compliance with each applicable section of this Order.

b. WATERSHED WORKPLANS

(1) Copermittees: The written account of the program conducted by group of Copermittees is referred to as the Watershed Workplan. Copermittees shall be responsible for updating and revising the Watershed Workplan. Each Watershed Workplan shall be updated and revised to describe any changes in water quality problems or priorities, and any necessary change to actions Copermittees will take to implement jurisdictional or watershed BMPs to

address those identified. The Copermittees shall assemble and submit the Watershed Workplan to the San Diego Water Board no later than 365 days after adoption of this Order, and shall be prepared to implement the workplan within 60 days of the San Diego Water Board Executive Officer deeming the workplan acceptable.

(2) Each Watershed Workplan shall, at a minimum, include:

(a) An updated watershed map.
(b) Identification and description of all applicable water quality data, reports, analyses, and other information to be used to assess receiving water quality.
(c) Assessment and analysis of the watershed's water quality data, reports, analyses, and other information, used during identification and prioritization of the watershed's water quality problems.
(d) A prioritized list of water quality problems within the WMA including rationale explaining the method/logic used to determine prioritization.
(e) Identification of the likely sources, pollutant discharges, and/or other factors causing the high priority water quality problems within the WMA.
(f) A description of the strategy to be used to guide Copermittee implementation of BMPs either jurisdictionally or on a watershed-wide basis to abate the highest water quality problems
(g) A list of criteria used to evaluate BMP effectiveness and how it was applied.
(h) A GIS map of BMPs implemented and BMPs scheduled for implementation.
(i) A description of the public participation mechanisms to be used and the parties anticipated to be involved during the development and implementation of the Watershed Workplan.
(j) A description of Copermittee collaboration to accomplish development of the Watershed Workplan, including a schedule for Watershed meetings.
(k) A description of how TMDLs and 303(d)-listed water bodies were considered during prioritization of watershed water quality problems
(l) A description of the strategy to model and monitor improvement in receiving water quality directly resulting from implementation of the BMPs described in the Watershed Workplan.
(m) A scheduled annual Watershed Workplan Review Meeting once every calendar year. This meeting shall be open to the public.

2. Other Required Reports and Plans

a. SSMP UPDATES

(1) Copermittees must submit their updated model SSMP in accordance with the applicable requirements of section F.1 with the JRMP <u>two years after adoption</u> of this Order.

(2) Within 180 days of determination that the Model SSMP is in compliance with this Permit's provisions, each Copermittee must update their own local SSMP, and amended ordinances consistent with the model SSMP, and shall submit both (local SSMP and amended ordinances) to the San Diego Water Board.
(3) For SSMP-related requirements of Section F.1 with subsequent implementation due dates, updated SSMPs must be submitted with the JRMP annual report covering the applicable reporting period.

b. REPORT OF WASTE DISCHARGE

The Copermittees must submit to the San Diego Water Board, no later than 210 days in advance of the expiration date of this Order, a Report of Waste Discharge (ROWD) as an application for issuance of new waste discharge requirements. The fourth annual report for this Order may supplement the ROWD, provided it contains the minimum information below.

At a minimum, the ROWD must include the following: (1) Proposed changes to the Copermittees' runoff management programs; (2) Proposed changes to monitoring programs; (3) Justification for proposed changes; (4) Name and mailing addresses of the Copermittees; (5) Names and titles of primary contacts of the Copermittees; and (6) Any other information necessary for the reissuance of this Order.

3. Annual Reports

a. JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM (JRMP) ANNUAL REPORTS

(1) Copermittees: Each Copermittee must generate individual JRMP Annual Reports which cover implementation of its jurisdictional activities during the past annual reporting period. Each Annual Report must verify and document compliance with this Order as directed in this section. Each Copermittee must retain records through 2016, available for review, that document compliance with each requirement of this Order. The reporting period for these annual reports must be the previous fiscal year.

(2) Each Copermittee must submit their JRMP Annual Reports to the San Diego Water Board by September 30 of each year, beginning on September 30, 2011.

(3) Each JRMP Annual Report must contain, at a minimum, the following information:

(a) Information required to be reported annually in Section H (Fiscal Analysis) of this Order;
(b) Information required to be reported annually in Section J (Program

Effectiveness) of this Order;

(c) The completed Reporting Checklist found in Attachment D, and

(d) Information for each program component by watershed as described in the following Table 9:

Table 9. Annual Reporting Requirements

Program Component	Reporting Requirement
New Development	1. Updated relevant sections of the General Plan and environmental review process and a description of planned updates within the next annual reporting period, if applicable
	2. Revisions to the local SSMP, including where applicable: (a) Identification and summary of where the SSMP fails to meet the requirements of this Order; (b) Updated procedures for identifying pollutants of concern for each Priority Development Project; (c) Updated treatment BMP ranking matrix; and (d) Updated site design and treatment control BMP design standards;
	3. Verification that site design, source control, and treatment BMPs were required on all applicable Priority Development Projects;
	4. Description of the application of LID and site design BMPs in the planning and approval process;
	5. Description of projects subject to the local waiver provision for numeric sizing of treatment control BMP requirements;
	6. Description and summary of the LID site design BMP substitution program, if applicable;
	7. Description and summary of the process to verify compliance with SSMP requirements;
	8. Updates to the BMPs that are listed in the local SSMP as options for treatment control;
	9. Description of the treatment control maintenance tracking process and verification that the requirements of this Order were met during the reporting period; (a) Updated watershed-based database of approved treatment control BMPs and treatment control BMP maintenance within its jurisdiction, including updates to the list of high-priority treatment BMPs;
	10. Description of the process for identifying and evaluating hydrologic conditions of concern and requiring a suite of management measures within all Priority Development Projects to protect downstream beneficial uses and prevent adverse physical changes to downstream stream channels;

Program Component	Reporting Requirement
	11. Description of enforcement activities applicable to the new development and redevelopment component and a summary of the effectiveness of those activities;
Construction	1. Updated relevant ordinances and description of planned ordinance updates within the next annual reporting period, if applicable;
	2. A description of procedures used for identifying priorities for inspecting sites and enforcing control measures which consider the nature of the construction activity, topography, and the characteristics of soils and receiving water quality;
	3. Designated minimum and enhanced BMPs;
	4. Summary of the inspection program, including the following information: (a) Number and date of inspections conducted at each facility, including the facility address; (b) Number of facilities lacking adequate BMPs; (c) The BMP violations identified during the inspection by facility; (d) Number, date, and types of enforcement actions by facility; (e) Narrative description of inspection findings and follow-up activities for each facility;
Municipal	1. Updated source inventory;
	2. Changes to the designated municipal BMPs;
	3. Descriptions of procedures to assure that flood management projects assess the impacts on the water quality of receiving water bodies;
	4. Summary and assessment of BMPs implemented at retrofitted flood control structures, including: (a) List of projects with BMP retrofits; and (b) List and description of structures retrofitted without BMPs;
	5. Description and assessment of the municipal structural treatment control operations and maintenance activities, including: (a) Number of inspections and types of facilities; and (b) Summary of findings;
	6. Description of the municipal areas/facilities operations and maintenance activities, including: (a) Number and types of facilities maintained; (b) Amount of material removed and how that material was disposed; and (c) List of facilities planned for bi-annual inspections and the justification;

Program Component	Reporting Requirement
	7. Description of the municipal areas/programs inspection activities, including: (a) Number and date of inspections conducted at each facility; (b) Number of facilities lacking adequate BMPs; (c) The BMP violations identified during the inspection by facility; (d) Number, date and types of enforcement actions by facility; (e) Narrative description of inspection findings and follow-up activities for each facility;
	8. Description of activities implemented to address sewage infiltration into the MS4;
Commercial / Industrial	1. Annual inventory of commercial / industrial sources;
	2. Summary of the inspection program, including the following information: (a) Number and date of inspections conducted at each facility including the facility address; (b) Number of facilities lacking adequate BMPs; (c) The BMP violations identified during the inspection by facility; (d) Number, date, and types of enforcement actions by facility; (e) Narrative description of inspection findings and follow-up activities for each facility;
	3. Changes to designated minimum and enhanced BMPs;
	4. A list of industrial sites, including each name, address, and SIC code, that the Copermittee suspects may require coverage under the General Industrial Permit, but has not submitted an NOI;
Residential	1. Updated minimum BMPs required for residential areas and activities;
	2. Quantification and summary of applicable runoff and storm water enforcement actions within residential areas and activities;
	3. Description of efforts to manage runoff and storm water pollution in common interest areas;
Retrofitting Existing Development	1. Updated inventory and prioritization of existing developments identified as candidates for retrofitting.
	2. Description of efforts to retrofit existing developments during the reporting year.
	3. Description of efforts taken to cooperate with private landowners to retrofit existing development.
	4. A list of retrofit projects that have been implemented, including site location, a description of the retrofit project, pollutants expected to be treated, and the tributary acreage of runoff that will be treated.
	5. A list of regional mitigation projects that have been implemented, including site location, a description of the regional mitigation project, pollutants expected to be treated, and the tributary acreage of runoff that will be treated.
	6. Any proposed retrofit or regional mitigation projects and timelines for future implementation.

Program Component	Reporting Requirement
	7. Any proposed changes to the Copermittee's overall retrofitting program.
Illicit Discharge Detection and Elimination	1. Changes to the legal authority to implement Illicit Discharge Detection and Elimination activities;
	2. Changes to the established investigation procedures;
	3. Public reporting mechanisms, including phone numbers and web pages;
	4. All data and assessments from the Dry Weather Effluent Analytical Monitoring activities;
	5. Response criteria developed for water quality data and notifications;
	6. Summaries of illicit discharges (including spills and water quality data events) and how each significant case was resolved;
	7. A description of instances when field screening and analytical data exceeded action levels, including those instances for which no investigation was conducted;
	8. A description of follow-up and enforcement actions taken in response to investigations of illicit discharges and a description of the effectiveness of those measures;
	9. A description of controls to prevent infiltration of seepage from municipal sanitary sewers to municipal separate storm sewer systems;
Work Plan	Priorities, strategy, implementation schedule and effectiveness evaluation;

(4) Each JRMP Annual Report must also include the following information regarding non-storm water discharges (see Section B.2. of this Order):

(a) Identification of non-storm water discharge categories identified as a source of pollutants to waters of the U.S;
(b) A description of ordinances, orders, or similar means to prohibit non-storm water discharge categories identified under section B.2 above ;
(c) Identification of any control measures to be required and implemented for non-storm water discharge categories identified as needing controls by the San Diego Water Board; and
(d) A description of a program to address pollutants from non-emergency fire fighting flows identified by the Copermittee to be significant sources of pollutants.

4. Interim Reporting Requirements

For the July 2010-June 2011 reporting period, the Jurisdictional RMP must be submitted on January 31, 2012. Each Jurisdictional RMP Annual Report submitted for this reporting period must, at a minimum, include comprehensive descriptions of all activities conducted to fully implement the Copermittees' Jurisdictional RMP documents, as those documents were developed to comply with the requirements of

Order No. 2004-001.

5. Universal Reporting Requirements

All submittals must include an executive summary, introduction, conclusion, recommendations, and signed certified statement. Each Copermittee must submit a signed certified statement covering its responsibilities for each applicable submittal. The Principal Copermittee must submit a signed certified statement covering its responsibilities for each applicable submittal and the sections of the submittals for which it is responsible.

L. MODIFICATION OF PROGRAMS

Modifications of Jurisdictional Runoff Management Programs and/or Watershed Runoff Management Programs may be initiated by the Executive Officer of the San Diego Water Board or by the Copermittees. Requests by Copermittees must be made to the Executive Officer, and must be submitted during the annual review process. Requests for modifications should be incorporated, as appropriate, into the Annual Reports or other deliverables required or allowed under this Order.

1. Minor Modifications: Minor modifications to Jurisdictional Runoff Management Programs, and/or Watershed Runoff Management Programs, may be accepted by the Executive Officer where the Executive Officer finds the proposed modification complies with all discharge prohibitions, receiving water limitations, and other requirements of this Order.

2. Modifications Requiring an Amendment to this Order: Proposed modifications that are not minor require amendment of this Order in accordance with this Order's rules, policies, and procedures.

M. PRINCIPAL COPERMITTEE RESPONSIBILITIES

Within 180 days of adoption of this Order, the Copermittees must designate the Principal Copermittee and notify the San Diego Water Board of the name of the Principal Copermittee. The Principal Copermittee must, at a minimum:

1. Serve as liaison between the Copermittees and the San Diego Water Board on general permit issues, and when necessary and appropriate, represent the Copermittees before the San Diego Water Board.
2. Coordinate permit activities among the Copermittees and facilitate collaboration on the development and implementation of programs required under this Order.
3. Produce and submit documents and reports as required by section K of this Order and Receiving Waters and MS4 Discharge Monitoring and Reporting Program No. R9-2010-0016 in Attachment E of this Order.

N. RECEIVING WATERS AND MS4 DISCHARGE MONITORING AND REPORTING PROGRAM

Pursuant to CWC section 13267, the Copermittees must comply with all the requirements contained in Receiving Waters and MS4 Discharge Monitoring and Reporting Program No. R9-2010-0016 in Attachment E of this Order.

O. STANDARD PROVISIONS, REPORTING REQUIREMENTS, AND NOTIFICATIONS

1. Each Copermittee must comply with Standard Provisions, Reporting Requirements, and Notifications contained in Attachment B of this Order. This includes 24 hour/5 day reporting requirements for any instance of non-compliance with this Order as described in section 5.e of Attachment B.

2. All plans, reports and subsequent amendments submitted in compliance with this Order must be implemented immediately (or as otherwise specified). All submittals by Copermittees must be adequate to implement the requirements of this Order.

I, David W. Gibson, Executive Officer, do hereby certify the foregoing is a full, true, and correct copy of an Order adopted by the California Regional Water Quality Control Board, San Diego Region, on TBD, 2010.

_____

David W. Gibson
Executive Officer

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This section is no longer relevant because the CGP has specific requirements that will ensure that sensitive and sediment impaired water bodies are appropriately addressed.

Built into the CGP is a process that establishes Risk Levels for sites that are tributary to sensitive and/or sediment impaired water bodies. Attached to each risk level are specific requirements compliance, and Action Levels and/or Effluent limits. Through the CGP, if an action level or effluent limit is exceeded, the site operator will be required to reassess and enhance their BMPs to ensure that their project is not impacting water quality in these sensitive areas. It should be noted that consistent with state law, the site owner is allowed to comply with the action levels and/or effluent limits in any lawful manner.

This section - if not removed - could undermine a site owner's ability to comply with the Construction General Permit, by arbitrarily specifying, and requiring implementation of 'enhanced' BMPs completely independent of the requirements of the CGP, and the Action Level/Effluent Limit process therein. For example, if we specify that they must implement BMP 'A', but their site exceeds an action level, the CGP allows them to reassess and select different BMPs or combinations of BMPs to avoid future exceedances, however the MS4 permit would still require BMP 'A' regardless.

5/26: Water Board staff agreed to remove the lead-in sentence *'Designate enhanced BMPs for 303(d) impairments and ESAs'.*

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This language has been removed for two (main) reasons:

1) The draft permit language is overly prescribing the method of compliance in direct contradiction with State Law (CWC 13360) which states:

No waste discharge requirement or other order of a regional board …. shall specify the design, location, type of construction, or particular manner in which compliance may be had with that requirement, order, or decree, and the person so ordered shall be permitted to comply with the order in any lawful manner.

2) The Construction General Permit includes Action Levels and Effluent Limits for construction sites that pose an exceptional threat to water quality (Risk Levels 2 and 3). Through the iterative compliance with the Action Levels and Effluent Limits of the CGP, owners/operators of such high-threat construction sites will be driven to select BMPs that will be fully protective of water quality. Prescribing the method of compliance for these sites through the MS4 permit will exclude options for these site owners in complying with their Action Levels and Effluent Limits.

Despite these significant concerns regarding the inclusion of this new section, should the section remain, the Copermittees request and recommend that the language be changed to 'encourage' the use of ASTs rather than requiring their use.

5/26: Water Board staff identified that the California Water Code is very clear on the requirement not to specify a particular BMP, and offered to reassess the language.

Santa Margarita Watershed MS4 Permit
Meeting with San Diego Water Board Staff

Location: San Diego Regional Water Board Office

June 10 2010

9:00 AM – 1:00 PM

Attendees:

Dave Barker, SDRWQCB
Ben Neil, SDRWQCB
Chiara Clemente, SDRWQCB
Wayne Chiu, SDRWQCB

Jason Uhley, RFCWCD
Claudio Padres, RFCWCD
Chandra Thomas, Riv. County
Don Allison, Menifee

Bill Woolsey, Murrieta
Aldo Licitra, Temecula
Tim D'Zmura, Wildomar
Mack Walker, LWA
Daniel Apt, RBF

Agenda Item	**Discussion**
1. Process/Housekeeping	• Status of draft Permit: o Main Body: San Diego Water Board staff indicated that they are still reviewing the updated draft of the permit, and will likely have a draft back to the Copermittees the week after next. o MRP: has been drafted, however it also is awaiting review. o Fact Sheet: (the fact sheet was discussed at the end of the meeting) Board staff indicated that an updated Fact Sheet would be provided with the next draft of the permit. The Copermittees inquired as to whether the fact sheet could be publically released following the release of the main body, providing that the minimum 30-day review period would be met. ➢ **The Copermittees and Water Board staff agreed that the schedule for releasing the fact sheet could be discussed at the next meeting.** • The Copermitees identified that Jason Uhley and Don Allison would need to leave by 12 pm due to another meeting with the Western Riverside Council of Governments (WRCOG) but the rest of the Copermitees were available for the entire the meeting.
2. Wrap-up for Last Week's Topics	• The Copermitees identified that the notes from the 5/26 meeting were sent out and the notes from the 6/3 meeting will be provided soon. • The Copermitees provided a revised schedule that tentatively includes public education on next week's schedule. San Diego Water Board staff inquired as to whether the topic could be included on our wrap-up day, however the Copermittees identified that to meet the Water Board's schedule, the extra day had been eliminated. • The Copermitees inquired if a meeting could be scheduled to go over

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	the changes to the entire permit, identifying that 7/15 might be a good date to do this. The San Diego Water Board staff identified that they would consider having this meeting if time permitted. • The Copermittees identified that the red-line permit provided to the Water Board via-e-mail on Wednesday, included additional comments and edits on last week's topics – based on the outcome of the meeting. For example, a revised attachment C was provided that defines 'emergency projects' using the definition in CEQA.
3. Today's Topics: **<u>i. F.1.d.(4) - F.1.d.(7)</u>**	• The Copermitees provided an overview presentation of their existing commitment to, and vision for Low Impact Development in the County. The Copermittees identified that their overall program *goal* is the same as in the permit: get the best BMPs implemented. o The presentation identified that the Copermittees have five years invested in a multi-million dollar plan that includes: ▪ Development of a detailed and fully researched LID BMP manual; ▪ Implementation of a policy that focuses on a tiered approach to BMP implementation, which prioritizes landscape BMPs before detention BMPs, before proprietary/mechanical BMPs. ▪ Incorporation of a public maintenance mechanism to ensure the proper long-term maintenance of the BMP, and; ▪ Construction of a LID BMP Retrofit, demonstration and testing facility where we will construct, maintain and monitor the BMPs included in our manual to make sure they are effective as designed. o LID BMP Manual: The Copermittees identified that the LID BMP Manual is 95% complete and will be published in July, well before adoption of the permit. The manual development team coordinated with organizations across the country in creating BMP designs and fact sheets that are based in the real-world experience, and go beyond typical fact sheets by incorporating standard design geometries, specifications, materials requirements, etc, and that the resulting BMPs are actually quite conservative. An integral component of the standard designs of these BMPs is that they maximize all opportunities for infiltration, and include components that ensure that the BMPs will be maintainable. o Public Maintenance: The public maintenance program will provide an extra level of assurance to the Copermittees that the BMPs built will be properly maintained in perpetuity. Currently it is being decided what BMP locations can be maintained by the public, versus what may still have to be maintained privately. o BMP Retrofit and Demonstration Facility: The Copermittees have invested in a $2 million project that will retrofit the District

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	Headquarters in Riverside with LID BMPs from the Manual; this project will feed back into future revisions to the LID BMP Manual. Evidence has shown that the filtration BMPs have potential significant incidental infiltration, research has shown that the design volume may be reduced up to 30-40%. One component of this project will be to measure the incidental infiltration that occurs within these BMPs. o The Copermittees expressed that the permit is written with a level of prescription that presumes an opposition or resistance to LID. The level of prescription makes for a complicated implementation process that will foster confusion and inconsistent implementation. The Copermittees expressed that they have demonstrated a significant commitment to implementing LID, and requested that the permit be written in a manner that supports their existing investment and vision for LID. o The Copermittees identified that throughout the 5 years they have been researching and developing the LID manual, landscape based 'LID' BMPs have been implemented, and examples of a few of these constructed BMPs were provided in the presentation. • The Copermittees identified that in reviewing the draft permit, they were looking for ways to simplify the implementation, while supporting their vision for LID. o The Copermittees identified that the draft permit language was virtually identical to the South Orange County permit, and that the program that resulting from that permit (in Orange County) was quite complex; the Copermittees indicated that a program of similar complexity in Riverside County would be very difficult to implement consistently and obtain the intended water quality benefits. o The Copermittees explained that their proposed language maintains the goals of the existing permit language, while creating a parallel path for compliance which will be simpler to implement for both the engineers and plan checkers. The intent of the program alternative is to maintain the same prioritization with regard to LID infiltration, then LID biofiltration, and then conventional BMPs, however instead of a complicated feasibility process associated with off-site mitigation, the Copermittees' proposal was to require the conventional BMPs to be 'super sized' on-site such that they will be as effective as LID. This proposal would yield the same water quality benefit of LID, while simplifying implementation, increasing consistency, and protecting water quality.

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	F.1.d.(4)(a)(i)
	• The Copermitees identified that the language change in this section was introducing the waiver section for consistency with the proposed changes to section F.1.d.(7). The Copermittees identified that the concept of over sizing BMPs was introduced in the Orange County renewal process, and Jimmy Smith of the San Diego Water Board staff accepted the idea in concept. The Copermitees identified it was their desire to have this concept clearly identified in the permit.
	• San Diego Water Board staff inquired if there was anything in the existing language that would prevent the Copermitees from having a different process or developing different guidance than Orange County.
	  o The Copermittees surmised that the process described by the permit was likely a central driver to the complexity in the Orange County process. The Copermittees identified that in writing programs that will meet permit requirements, that Copermittees must ensure that they are covered for all likely interpretations of the language even if the end product may have been more complex than originally envisioned by the Water Board staff. The Copermittees explained that this is why they wanted to ensure that the language clearly allows for a simple path to compliance.
	• The Copermittees identified that they would utilize available data to develop sizing factors that would result in BMPs that can be as protective as LID BMPs, and that factors could be fine tuned as more data becomes available. The Copermittees identified that where insufficient data was available, surrogate pollutants such as TSS could be used for the sizing factors. The Copermittees clarified that the sizing factors would be developed up-front as part of the program so that it is very simple for the developers and the plan checkers to understand and use/check.
	
	F.1.d.(4)(a)(iii) &(iv)
	• The Copermitees identified that these sections were removed as they were counter-indicative: A site that chooses to infiltrate should not be required to assess re-use, and vice-versa.
	  ➢ **Water Board staff agreed that both assessments should not be required to be independently assessed.**
	
	F.1.d.(4)(b)
	• The Copermittees identified that in the requirement to implement particular LID (site design) BMPs the language "to the extent applicable and feasible" was added. This addition was to ensure that the permit does not inappropriately usurp property rights; for instance if a site is comprised entirely of permeable soils, the language could otherwise be read to prevent development on that

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	property.
	
	• The Copermitees identified that sub-sections (ii) and section (iii) were repetitive and addressing the same issue, and as such section (ii) was deleted.
	  ➢ San Diego Water Board Staff indicated that this change seemed agreeable.
	
	<u>F.1.d.(4)(c)(ii)</u>
	• The Copermitees identified that the language was changed to read *'if granted a waiver'* rather than *'if technically infeasible'*, and that these changes were to align with the changes made in the waiver program.
	• The Copermittees identified that a footnote was added to clarify that LID biofiltration BMPs would also include other LID BMPs identified in the SMC/CASQA LID Manual and/or the State Board website, and that other LID BMPs (such as permeable pavement) would not be inadvertently relegated to third-tier BMPs.
	  o San Diego Water Board staff identified that normally a reference to a specific manual is not placed in a permit.
	  o The Copermitees identified that the San Diego Water Board was member of the SMC that developed this manual, and indicated that permits across the state include references to specific manuals - and that such practice was normal and acceptable.
	
	<u>F.1.d.(4)(c)(ii)</u>
	• The Copermitees identified that changes in section (iii) were to align with the changes made in the waiver program, and to clarify that Conventional Treatment BMPs are not required unless waived from implementing both LID retention and LID biofiltration in accordance with sections (i) and (ii).
	• San Diego Water Board staff identified that that LID BMPs must be considered first, and criteria is needed to clarify someone can obtain a waiver from LID BMPs.
	
	  ➢ **The Copermittees will re-visit and provide alternative language to ensure that LID BMPs are considered first and language for the development of criteria to moving to over sized BMPs.**
	
	<u>F.1.d.(6)</u>
	• The Copermittees identified that language changes in the lead-in paragraph and in (6)(a)(i) were made to more clearly identify that Treatment Controls are not universally required, but that they are only required when waived from LID BMPs as identified in F.1.d.(4)(c)(i) and (ii).
	<u>F.1.d.(6)(b)</u>

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	• The Copermittees identified that this section was deleted as it was not necessary and that the requirements for treatment are inherent in the overall process.
	
	<u>F.1.d.(7)</u>
	• The Copermittees identified that the changes in the lead-in paragraph were to: 1) Clarify that the Copermittees do not create 'model' and 'local' SSMPs, but there will be one document that is uniformly implemented., and 2) to clarify that mitigation for not implementing LID can be accomplished on-site, i.e. through additional sizing factors, as well as through off-site projects.
	  ➢ **Water Board staff indicated that this change seemed acceptable.**
	
	<u>F.1.d.(7)(a)(i)</u>
	• The Copermitees identified that Waiver Track 1 is the default language from the draft permit (with minor modifications, i.e. changed section (b) to section (a)(i), etc.), and that this track allows offsite mitigation provided the project proponent demonstrates technical infeasibility.
	• The Copermittees identified that the cost-benefit analysis was moved down into (new) sub-section [d] to make the cost-benefit be an optional component of the technical feasibility. The Copermittees further explained that the relocation of this language places the burden of proof on the project proponent, rather than requiring the Copermittee to try to pre-determine the possible scenarios where cost may outweigh the incremental benefits of LID.
	  o San Diego Water Board staff identified that in Orange County they seemed to be struggling with developing criteria for the cost-benefit analysis, and that Water Board staff indicated that they thought they had removed this component from this permit.
	  o The Copermittees identified that Cost Analyses are an important factor that affects feasibility, and that such considerations are consistent with guidance from the state board, and should remain in the permit.
	  ➢ **San Diego Water Board Staff agreed that the language "including cost benefit analysis" could be moved to (new) sub-section [d].**
	  ➢ **San Diego Water Board Staff identified that the word "local" should also be removed from section (7)(a)(i)(c).**
	
	<u>F.1.d.(7)(a)(ii)</u>
	• The Copermitees identified that Waiver Track 2 allows for waivers to be granted based on the project incorporating on-site mitigation of

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	the impacts due to not implementing LID BMPs, by 'super sizing' their BMPs. • San Diego Water Board staff indicated that they are not against the concept but they want to ensure that LID will be implemented before conventional BMPs. • San Diego Water Board staff inquired as to using TSS as a surrogate for pollutant removal. • The Copermittees identified that they would use data that is available, and that where there was insufficient data, they may need to use surrogate data. The Copermittees indicated that TSS was an example of a surrogate used by many states in approval of BMPs. ➢ **The Copermittees agreed that they will take a fresh look at the LID sections (F.1.d.(4)-(7)) and provide a revised set of suggestions that is clearer and addresses the Water Board staff's concerns.** <u>F.1.d.(7)(b), (7)(c), (7)(d)</u> • The Copermittees identified that sections (7)(b), (7)(c), (7)(d) are not necessary and are repetitive of other components of the permit. The Copermittees identified that the LID Waiver program is a component of the SSMP, and would not exempt a project from any other components of the SSMP. The Copermittees recommended that these sections be removed. ➢ **San Diego Water Board staff indicated that they understood the conflict and would review them to see if they could be removed.** <u>F.1.d.(7)</u>(e) • The Copermittees identified that language was suggested to allow for on-site mitigation through additional sizing factors applied to BMPs and that sizing factors would be developed looking at available data, possibly utilizing a representative parameter such as TSS. <u>F.1.d.(7)</u>(g) • The Copermittees identified that the language change was to allow the Copermittees to develop an storm water mitigation fund as an option, but that it would not be required. The Copermittees identified that there would be a high cost to develop and manage a fund that may would rarely be used, and wanted to keep it as an option such that and if it was determined to be necessary to develop, they could at that time. The Copermittees further inquired as to whether the language would allow the fund to be developed in cooperation with an association of governments such as WRCOG. • San Diego Water Board staff identified that it would be acceptable to

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	them to have the program developed jointly with others, such as through WRCOG (Western Riverside Council of Governments), but that the existing language was not clear that this was an option. ➢ **San Diego Water Board Staff agreed to make the development of a storm water mitigation fund optional.** <u>F.1.d.(7)</u>(h) • The Copermitees identified that language changes in section (7)(h) were for clarification, since not all projects will have these components. <u>F.1.d.(7)</u>(f) • The Copermitees identified that no language changes were made in section (7)(f) but inquired if the 'pollutant crediting' described in the language could be credited prior to the feasibility process instead of afterwards as part of the waiver program. The Copermittees identified that other types of "sustainable development" have water quality benefits that should be considered on a watershed scale and not just on a site by site approach. • San Diego Water Board staff identified that to be protective of water quality, the assignment of credits would have to be assessed based on a large scale (i.e. regional) plan and inquired as to how the pollutant credit system would work. • The Copermittees suggested that the exact methodology would need to be developed but that if you encourage certain types of sustainable development, that on a regional scale you could have benefits to water quality (and the overall environment) equal to or in excess of a site-by-site approach. In concept you would adjust the treatment requirements for projects that meet certain sustainable development types and standards, based on the understanding that the more projects that comply with these sustainable development types, the greater the regional benefit to water quality. An example was provided of a mass transportation project where pollutants are removed on a regional scale through a reduction in pollutant generating activities (source control on the number of car trips in the region) rather than through treatment BMPs. • The Copermitees identified that 'smart growth', and 'sustainable development' incorporates clustering development and maintaining open space which fits well with the goals of Low Impact Development.
4. Conceptual Discussion of Future Topics: **<u>i. F.1.h.</u>**	• The Copermitees identified that the development of an HMP and the associated supporting science will require a significant allocation of resources that is unsupportable in this small region of 275,000 people. The Copermittees identified that they will be looking for ways to 'not reinvent the wheel', and to ensure that the requirements are focused on the outcomes, rather than the methods that may not be necessary

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	to implement the outcomes. The Copermittees identified that their ultimate goal is a program that is implementable within their resources. The Copermittees are looking at the hydromodification program in two aspects : o Ensure that the requirements are written such that they clearly have the flexibility to put together a program from what has already been developed by others. The Copermittees identified that with their significantly smaller resources compared to other regions that have developed HMPs, that they simply cannot support an extensive and costly effort to re-develop programs and science They explained that they want the permit to clearly allow them to aggregate a program, based on work already done by others, that makes sense, is implementable, and is appropriate to the relative scale of the resources within the. o The Copermittees also expressed that in looking through the language, there are many requirements that are unnecessary studies that do not help them get an appropriate HMP program in place. The Copermittees expressed that if they are going to have any chance of complying with the expanded HMP requirements in the draft order, that they are going to have to 'trim the fat' in the requirements and make sure the requirements are focused on the programmatic outcomes. ➢ **San Diego Water Board Staff agreed that it is appropriate to not be required to re-invent the science, and to put together a program that benefits and pulls from what have been done by others.** • The Copermittees identified that want to revise the interim requirements such that they can continue their existing interim program while developing the final HMP required by the permit. The Copermittees identified that changing requirements in the interim was unnecessary, and would divert resources from the development of the Final HMP, and create confusion among Copermittee staff and the development community. The Copermittees explained that this was an example, of the kinds of things that needed to be looked closely at so that the Copermittees limited resources can be dedicated to developing an effective final HMP. ➢ **San Diego Water Board Staff indicated that they could consider allowing the Copermittees to continue their existing increased runoff criteria, although there were some questions regarding what was included in the existing program.** • The Copermitees identified that in Ventura, the 'interim' requirements are satisfied if LID the LID standard is met. • San Diego Water Board staff identified that monitoring is critical and

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	that they expect a long-term program that builds data over multiple permit terms. This would include looking at developed vs. undeveloped areas, looking at separate hydrologic sub-areas, at least one site in the headwaters of the watershed, and looking at multiple sites down stream of PDPs to understand the changes in the channels in the long-term. Water Board staff indicated that the monitoring may observe 3 possible scenarios 1) stasis, or continued erosion at existing rates, 2) aggradation or a reduction in the rate of erosion, or 3) increased rate of degradation. Water Board staff described that the program should be designed to extract information from the observed conditions that could provide inferences regarding the effectiveness of the HMP program.
	Next Meeting: **Thursday June 17, 2010 Time TBD, location Temecula.**

Santa Margarita Watershed MS4 Permit
Meeting with San Diego Water Board Staff

Location: San Diego Regional Water Board Office

June 3 2010

10:00 AM – 1:00 PM

Attendees:

Dave Barker, SDRWQCB	Jason Uhley, RFCWCD	Don Allison, Menifee
Ben Neil, SDRWQCB	Mike Shetler, Riv. County	Bill Woolsey, Murrieta
Chiara Clemente, SDRWQCB	Ward Maxwell, Riv. County	Aldo Licitra, Temecula
Chad Loften, SDRWQCB	Chandra Thomas, Riv. County	Scott Taylor, RBF
	Tim D'Zmura, Wildomar	Daniel Apt, RBF

Agenda Item	**Discussion**
1. Process/Housekeeping	• San Diego Water Board staff indicated that they are conceptually in agreement for the Menifee and Murrieta swap, except that Menifee would still be subject to the requirements of any future TMDLs within the region. Water Board staff requested a letter from Menifee and Murrieta officially requesting the swap. ➢ The Copermittees (Menifee and Murrieta) will develop a letter requesting the Menifee and Murrieta swap. The letter will incorporate: 1) Recognition that the "swap" is limited to MS4 Permit requirements, and that the Copermittees would still be subject to other applicable WDRs/NPDES Permits/TMDLs issued by the respective Boards, 2) The basis for the request (e.g. cost savings from reduced reporting, training, administration of MS4 Permits, etc.), 3) Anything pertinent from the pending discussion that R9 RB staff will have with R8 RB staff, and 4) A summary of the areas subject to the 'swap'. • San Diego Water Board staff indicated that they will try to have another iteration of the draft SMR permit provided to the Copermittees by next week. • The Copermitees identified that the RTR will be completed soon. • The Copermitees identified that today's session will be shorter but next week may be a longer session and the possibility of having the meeting at the San Diego Water Board office.

Agenda Item	Discussion
2. Today's Topics: **i. F.3.b. Commerical/Industrial**	F.3.b.(1)(a) • The Copermittees identified that the intent of the changes to this section were to clarify when the revised inventory would be due. • San Diego Water Board staff indicated that the introductory text to Section F made it very clear that new program elements were due within 365 days of permit adoption. Changes were not necessary. ➢ **The Copermittees agreed that the original language was acceptable.** F.3.b.(1)(a)(i) • The Copermittees identified that the Regional Board has added several new facilities that must be inventoried and therefore inspected. The Copermittees identified that this is inappropriate several reasons: 1) Neither the Copermittees nor the Regional Board staff have at any prior time identified any deficiencies in the Copermittees' inspection programs or the facilities inspected as part thereof, 2) the iterative NAL/SAL process should be allowed to dictate when and how the list should be updated, and 3) The inclusion of unnecessary facilities in the inspection program could significantly increase costs for the Copermittees, especially as the CAP program, which uses highly trained and certified Environmental Health and CUPA inspectors, only covers a fixed set of facilities. • The San Diego Water Board Staff reviewed the changes proposed by the Copermittees, and discussion ensued regarding the Copermittees' proposed change from 'animal facilities' to 'boarding facilities and kennels'. Concern was expressed that such language would inadvertently capture things like CAFOs and people with large numbers of horses, but not operating businesses. Board Staff and Permittee staff agreed that CAFOs were not intended to be inspected under this program unless such an inspection was triggered by an IC/ID. ➢ **San Diego Water Board Staff agreed to revisit the types of facilities required to be inventoried.** F.3.b.(1)(a)(iii) • The Copermittees noted that the Draft Permit includes a new requirement to inventory and inspect all businesses adjacent to, or discharging directly to ESAs. The Copermittees identified that such a requirement would result in a significant mapping and analysis exercise that would result in any business near an ESA being captured by the business inspection program independent of its threat to water quality (e.g. clothing stores, office space, and other indoor retail). The Permittees noted the existing facility list is already very comprehensive and further identified that IC/ID and NAL/SAL exceedances would lead the Permittees to review programs and

Agenda Item	Discussion
	where necessary, make adjustments to their inspection programs. ➢ **San Diego Water Board Staff indicated that they would be accepting of the changes if language was added that formally recognized the NAL/SAL iterative approach.** ➢ **The Copermittees offered to develop and provide updated language that clarifies those NAL/SAL exceedances could be a basis for adding facility types to the inspection program. (Please see changes to F.3.b.(1)(a)(iv))** <u>F.3.b.(2)(b) and (c)</u> • The Copermittees explained that the suggested changes were to clarify that the minimum and enhanced BMPs could be changed over time - based on the experience of the Copermittees. ➢ **San Diego Water Board Staff indicated they understand the intent of the changes and will review the language.** <u>F.3.b.(2)(d)</u> • The Copermittees identified that suggested changes were proposed to clarify that the Copermittees do not have authority to 'implement' BMPs on private development. The Permittees did note that the can take action to contain and prevent spills to the MS4 as part of IC/ID investigations, but these actions typically require a cooperative landowner or must be conducted off-property. • Discussion ensued and it was clarified that in situations where public health and safety are at risk, the Permittees may have the right to implement BMPs on site. San Diego Water Board staff indicated that "injunctive relief" takes a long time. • San Diego Water Board staff offered to review the language and identified that there could be clarification included in the legal authority section of the permit for section (d) that BMP implementation would not go beyond legal authority. ➢ **The Copermittees will develop language identifying that nothing in the permit will require going beyond the Copermitees legal authority. (see section F.3.b.(2)(d))** <u>F.3.b.(3)</u> • The Copermittees identified that their suggested language adds the term 'base of operations' consistent with the 2004 Permit and 2010 Santa Ana Permit. The Copermittees indicated that they prefer this language as it allows the Permittees to designate one Permittee as being responsible for providing the mobile operator with information on laws/ordinances, minimum BMPs and other requirements of the Program. The Copermittees identified that the base of operations is typically determined through business license applications or IC/ID investigations, and is part of a broader regionalized approach to

Agenda Item	Discussion
	regulating mobile businesses that the Copermittees believe is more effective as it allows for a consistent message. • San Diego Water Board Staff indicated that the base of operations is not where pollution occurs and additional BMPs may be necessary for specific mobile situations to be protective of water bodies. The Copermittees noted that the basis for regulating the base of operations was to simplify the administration of the program. By assigning each Permittee the obligation to conduct outreach and evaluate the operations of the mobile businesses that were based in their jurisdictions, the program is simplified. Each Permittee still has obligations to respond to illicit discharges and enforce against mobile operators that may be illegally operating within their jurisdictions. ➢ **San Diego Water Board staff agreed to review the suggested language.** ➢ **David Barker of the San Diego Water Board staff identified that there was no objection to including the "bases of operation language".** ➢ **San Diego Water Board Staff and Copermitees agreed that in section a) that a reference could be made back to the list in section_F.3.b.(1)(a)(i) instead of the suggested language "that have the potential to discharges pollutants"** <u>F.3.b.(4)(a)</u> • The Copermittees identified that the draft permit introduces changes (from the 2004 permit) that tend to increase the focus on the methods rather than the outcomes for inspections. The Copermittees noted however, that there were no specific problems identified with the Copermittees existing inspection programs as part of the ROWD or past discussions. The Copermittees noted that this was disconcerting as the current inspection program uses highly trained and certified Environmental Health and CUPA inspectors to evaluate stormwater compliance. The Copermittees identified that these inspectors tend to be much more effective than an average business license inspector for a stormwater program; however Environmental Health and HAZMAT's continued participation was dependent on the stormwater inspections not interfering with their ability to pursue their core duties. Adding the new inspection requirements may have unintended consequences of eliminating the ability to use these highly qualified and trained resources. The Copermittees recommended that the inspection requirements continue to be outcome focused. • Discussion ensued regarding the usefulness and appropriateness of monitoring data and BMP plan evaluations. Regional Board Staff identified that the BMP Implementation plans should be reviewed but not every time you go to a site, and that it helps an inspector get

Agenda Item	Discussion
	familiar with the site. ➢ San Diego Water Board Staff agreed to review the revised language. <u>F.3.b.(4)(b)</u> • The Copermitees inquired as to the level of reports that San Diego Water Board staff wanted, as in the past there had been mixed messages from Water Board staff regarding providing these types of reports. • San Diego Water Board Staff identified that the intent of the language in the section was for better coordination with the Copermittees and not to necessarily produce extra reports. • Discussion ensued regarding existing coordination, the level of detail currently specified in the reports, the cost of preparing the reports, and the usefulness of the reports. It was generally agreed that this section needed further consideration. ➢ **San Diego Water Board Staff agreed to take a close look at the data being provided and only require the data that was useful and the data they have time to review.** <u>F.3.b.(4)(c)</u> • The Copermitees identified that the frequencies identified of 25% annually would create tracking and reporting issues due to high turn-over of businesses and could interfere with the CAP as well. The Co-Permittees indentified that they strongly preferred the inspection language from the 2004 permit. • San Diego Water Board Staff had no comment on the suggested changes provided by the Copermittees. <u>F.3.b.(4)(d)</u> • The Copermittees noted that they changed the word "Inspections" to "Certifications" to clarify that inspectors hired by the Permittees were not subject to these requirements. • The Copermittees inquired as to the intent behind the limit that no more than 30% of the required inspections be performed by a third party, and noted that this limitation did not exist in the OC Permit. The Copermittees noted that they did not currently intend on using this provision, however given the current economic and political climate, the Permittees may need that flexibility in the future. • Discussion ensued and David Barker suggested that the 30% be removed and that any third-party certification program would be subject to Regional Board approval. ➢ San Diego Water Board Staff agreed to remove the 30%

Agenda Item	Discussion
	limitation and further clarify that, before using third party certifications, a program including a QA/QC protocol would first be submitted to the Regional Board for EO approval. ➢ **The Copermitees will develop language for submission of a program for EO approval.** <u>F.3.b.(5)</u> • The Copermitees identified that "bonding" was ineffective way to effectuate a response in an enforcement action.
2. Today's Topics: **<u>i. F.1.d.(1)-(3), (8)-(11)</u>**	<u>F.1.d.(1)(b)</u> • The Copermittees identified that in describing redevelopment projects, the draft permit added the language "existing development and/or". The Copermittees identified that this language was confusing and unnecessary. • The San Diego Water Board staff identified that this was included to try to limit the applicability of the redevelopment language. Much discussion ensued and the Copermittees indicated that they preferred the term be removed, even if removing the language would broaden the applicability of the redevelopment requirements. <u>F.1.d.(1)(c)</u> • The Copermittees identified that this section adds a new requirement that all projects that disturb over 1-acre become PDP. The Copermittees noted that this is a new requirement, and asked Regional Board staff the basis for this addition. The Copermittees identified that they want the section removed as it does not add anything new (thresholds for all other forms of development are much lower than one acre) and it creates an unnecessary complexity, which introduces training and implementation problems as it is significantly different from what is being implemented in the rest of the county. ➢ **San Diego Water Board Staff agreed to review the intent of the section and respond to the Copermitees.** <u>F.1.d.(2)</u> • The Copermittees requested that emergency projects be exempted from SSMP requirements, and suggested CEQA language to be included as the basis of the exemption. • Discussion ensued regarding emergency project definitions and requirements. The San Diego Water Board staff indicated that it may be appropriate to evaluate the exemption on a case by case basis. The Copermittees noted that the CEQA definition could be used and would provide a clear basis for the exemption that already exists in state law. ➢ **The Copermittees will provide additional edits based on the**

Agenda Item	Discussion
	CEQA exemptions for emergency projects. ➢ **San Diego Water Board Staff agreed to review the language developed by the Copermitees.** <u>F.1.d.(2)(a)</u> • The Copermittees identified their specific concern that individual homeowner projects could now be defined as a PDP and be subjected to the full SSMP and HMP requirements. The Copermittees noted that with a 10,000 sq. ft impervious threshold, that a decent size lot could quickly add up to 10,000 sq. ft.; however, such lots are typically hydrologically disconnected and have very low pollutant generation potential. The Copermittees identified that their experience has been that these projects require an excessive amount of time and handholding to get through the existing WQMP plan check process and that under the new permit, these projects would unnecessarily demand even more of limited staff resources. The Copermittees noted that the Santa Ana Board agreed that individual homeowner projects would not be defined PDPs homes due to the limited water quality impacts, the unnecessary costs to the homeowners and the impact on Copermittee resources. ➢ **The San Diego Water Board staff indicated that this may be an area where there is disagreement.** <u>F.1.d.(2)(f)</u> • The Copermittees identified that the two metrics for parking lots were not necessary as they represent about the same sized impervious area. The Copermittees noted that their suggested changes made the requirement simpler to implement and consistent with the 2004 permit without really changing the outcome. Having one metric reduces the chance for error or confusion by Copermittee staff. <u>F.1.d.(2)(g)</u> • The Copermittees identified that a footnote was included to provide the Copermittees with an option to develop roadway guidelines that would be submitted to the Regional Board for review and approval and the guidelines could be used in lieu of a developing a project-specific SSMP. • The San Diego Water Board staff indicated that this would be acceptable if the design standards meet the SSMP requirements. • The Copermitees identified that due to the nature and right of way constraints for roads that meeting the WQMP requirements may not always be feasible, which was the purpose for doing the study. The Copermittees noted that the Regional Board was not bound to accept the study, merely to consider it.

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	F.1.d.(8) • The Copermitees identified that this section was removed in the suggested edits, because it was specific to an Orange County development and really had no bearing for Riverside County. The Copermittees expressed that it is their understanding that what was allowed by this requirement is already explicitly allowed by other provisions of the draft permit. ➢ **Regional Board staff concurred.**
	Next Meeting: **Thursday June 10, 2010 10 AM - 3:30 PM location TBD.**

Santa Margarita Watershed MS4 Permit

Meeting Date: June 10, 2010
Time: 9:00AM
Location: San Diego RB

Name	Agency	Signature
David Gibson	SDRWQCB	
Jimmy Smith	SDRWQCB	
David Barker	SDRWQCB	
Chiara Clemente	SDRWQCB	
Ben Neill	SDRWQCB	
Wayne Chiu	SDRWQCB	Wayne Chiu
Chad Loflen	SDRWQCB	
Jason Uhley	RCFC&WCD	
Claudio Padres	RCFC&WCD	
Arlene Chun	RCFC&WCD	
Mike Shetler	County of Riverside	
Alex Gann	County of Riverside	
Aldo Licitra	City of Temecula	Aldo Licitra
Bill Woolsey	City of Murrieta	Bill Woolsey
Don Allison	City of Menifee	
Tim D'Zmura	City of Wildomar	
Mark Walker	LWA	M. Walker
Daniel Apt	RBF	
Chandra Thomas		

AGENDA

Santa Margarita Region
MS4 Permit Meeting

10:00.m. – 4:00 p.m. June 17th, 2010
Location: Temecula

1. PROCESS / HOUSEKEEPING

2. WRAP-UP FOR LAST WEEK'S TOPICS

   (Last week's topic - LID - will be revisited as part of 'today's' topics)

3. TODAY'S TOPICS

   i. F.1.h.
   ii. F.1.d.(4) - F.1.d.(7) (Revisit based on last week's discussion)

4. CONCEPTUAL DISCUSSION OF FUTURE TOPICS

   i. No discussion of future topics this week.

(4) Low Impact Development BMP Requirements

Each Copermittee must require each Priority Development Project to implement LID BMPs which will collectively minimize directly connected impervious areas, limit loss of existing infiltration capacity, and protect areas that provide important water quality benefits necessary to maintain riparian and aquatic biota, and/or are particularly susceptible to erosion and sediment loss.

(a) The Copermittees must take the following measures to ensure that LID BMPs are implemented at PDPs:

(i) Each Copermittee must require LID BMPs or make a finding of technical infeasibility for each Priority Development Project in accordance with the LID waiver program in Section F.1.d.(~~8~~7);

(ii) Each Copermittee must incorporate formalized consideration, such as thorough checklists, ordinances, and/or other means, of LID BMPs into the plan review process for Priority Development Projects;

(iii) ~~The review of each Priority Development Project must include an assessment of potential collection of storm water for on-site or off-site reuse opportunities~~;

(iv) ~~The review of each Priority Development Project must include an assessment of techniques to infiltrate, filter, store, evaporate, or retain runoff close to the source of runoff; and~~

(v) Within 2 years after adoption of this Order, each Copermittee must review its local codes, policies, and ordinances and identify barriers therein to implementation of LID BMPs required by this order. Following the identification of these barriers to LID implementation, where feasible, the Copermittee must take, by the end of the permit cycle, appropriate actions to remove such barriers.

(b) The following LID BMPs must be implemented at each PDP to the extent applicable and feasible:

(i) Maintain or restore natural storage reservoirs and drainage corridors (including depressions, areas of permeable soils, swales, and ephemeral and intermittent streams.

(ii) ~~Projects with landscaped or other pervious areas must, where feasible, drain runoff from impervious areas (rooftops, parking lots, sidewalks, walkways, patios, etc) into pervious areas prior to discharge to the MS4. The amount of runoff from impervious areas that is to drain to pervious areas shall not exceed the total capacity of the project's pervious areas to infiltrate or treat runoff, taking into consideration the pervious areas' geologic and soil conditions,~~

Comment [CP49]: 6/17 - Edits previously provided on 6/10 have been **removed**

Comment [CP50]: These are duplicative of and inherently part of 4(c)? below. Further, each project should not be required to assess collection of stormwater for re-use if they opt to infiltrate it. Conversely, should an applicant choose to store and re-use their stormwater, they should not be required to assess the list of items in (iv).

Comment [CP51]: Without this statement, this section could be considered a 'take' that would require compensation from the Copermittee. For example, if a site is entirely an 'area of permeable soils', then (i) below could be read to prevent development on that site.

Comment [CP52]: This is duplicative of (iii) below. REQUEST REMOVE

~~slope, and other pertinent factors~~.

(iii) Projects with landscaped or other pervious areas must, where feasible, properly design and construct the pervious areas to effectively receive and infiltrate or treat runoff from impervious areas, prior to discharge to the MS4. Soil compaction for these areas shall be minimized. The amount of the impervious areas that are to drain to pervious areas must be based upon the total size, soil conditions, slope, and other pertinent factors.

(iv) Projects with low traffic areas and appropriate soil conditions must construct walkways, trails, overflow parking lots, alleys, or other low-traffic areas with permeable surfaces, such as pervious concrete, porous asphalt, unit pavers, and granular materials.

(b) To protect ground water resources ~~any large, centralized~~ infiltration BMPs must comply with limitations established by the Copermittees in accordance with Section F.1.(c)(~~6~~7). The restrictions ~~do~~ need not apply to small infiltration systems dispersed throughout a development project.

Comment [CP53]: 6/17 - New edits in this section are to clarify that the Copermittees are allowed to specify alternative infiltration requirements.

(c) LID BMPs sizing criteria:

(i) LID BMPs shall be sized and designed to ensure onsite retention without runoff, of the volume of runoff produced from a 24-hour 85th percentile storm event[11] ("design capture volume");

(ii) If onsite retention LID BMPs are technically infeasible per section F.1.d.(7)(b), LID biofiltration BMPs[12] may treat any portion of the 'design capture volume' that is not retained onsite by the LID BMPs. The LID biofiltration BMPs must be designed for an appropriate surface loading rate to prevent erosion, scour and channeling within the BMP. Due to the flow through design of biofiltration BMPs, the total volume of the BMP, including pore spaces and prefilter detention volume, must be sized to hold at least 0.75 times[13] the design ~~storm~~ capture volume that is not retained onsite by LID retention BMPs;

(iii) If granted a waiver per section F.1.d.(7) from implementing ~~it is shown to be technically infeasible to treat the remaining volume up~~

Comment [CP54]: The Copermittees do not believe that purely retention concepts other than infiltration will be protective of water quality in the long term due to dependence on reuse of stored runoff, and as such are not appropriate for addressing the water quality mandate of this permit.

Comment [CP55]: 6/17 - Edits previously provided on 6/10 have been **revised**

[11] This volume is not a single volume to be applied to all of Riverside County. The size of the 85th percentile storm event is different for various parts of the County. The Copermittees are encouraged to calculate the 85th percentile storm event for each of their jurisdictions using local rain data pertinent to their particular jurisdiction (0.6 inch standard is a rough average for the County and should only be used where appropriate rain data is not available). In addition, isopluvial maps may be used to extrapolate rainfall data to areas where insufficient data exists in order to determine the volume of the local 85th percentile storm event in such areas. Where the Copermittees will use isopluvial maps to determine the 85th percentile storm event in areas lacking rain data, the Copermittees shall describe their method for using isopluvial maps in their SSMPs.

[12] Including other LID BMPs listed in the Low Impact Development Manual for Southern California (SMC) or on the SWRCB LID website.

[13] Or other factor based on local studies and data on the volume reduction benefits of filtration based BMPs.

~~to and including the design capture volume using~~ LID BMPs ~~(retention or biofiltration)~~ as described in (i) and (ii) above, the project must implement conventional treatment control BMPs in accordance with Section F.1.d.(6) below and must participate in the LID waiver program in Section F.1.d.(7).

Comment [CP56]: 6/17 - Edits previously provided on 6/10 have been revised - the suggested language should be clearer.

(e) All LID BMPs shall be designed and implemented with measures to avoid the creation of nuisance or pollution associated with vectors, such as mosquitoes, rodents, and flies.

(5) Source Control BMP Requirements

Each Copermittee must require each Priority Development Project to implement applicable source control BMPs. The source control BMPs to be required must:

(a) Prevent illicit discharges into the MS4;
(b) Minimize storm water pollutants of concern in runoff;
(c) ~~Eliminate~~ Minimize irrigation runoff;
(d) Include storm drain system stenciling or signage;
(e) Include properly designed outdoor material storage areas;
(f) Include properly designed outdoor work areas;
(g) Include properly designed trash storage areas;
(h) Include ~~water quality~~source control requirements applicable to individual priority project categories.

(6) Treatment Control BMP Requirements[14]

Each Copermittee must require each Priority Development Project to implement conventional treatment control BMPs to treat runoff from any portion of the project where it was infeasible to fully address the 'design capture volume' with LID BMPs as described in section F.1.d.(4) above, and in accordance with the feasibility criteria developed per F.1.d.(7). Treatment Control BMPs must ~~that~~ meet the following requirements:

Comment [CP57]: 6/17 - Edits previously provided on 6/10 have been revised. (including footnote)

Comment [CP58]: This important clarification is more appropriate in the text rather than in the footnotes

(a) All treatment control BMPs for a single Priority Development Project must collectively be sized to comply with the following numeric sizing criteria:

(i) Volume-based treatment control BMPs must be designed to mitigate (~~infiltrate,~~ filter, or treat) the remaining portion of the 'design capture volume' that was not treated with LID BMPs ~~of~~

[14] ~~This section only applies to those PDPs not implementing LID capable of meeting the design storm criteria for the entire site and meeting technical infeasibility eligibility. Low Impact Development (LID) and other site design BMPs that are correctly designed to effectively remove pollutants from runoff are considered treatment control BMPs.~~

~~runoff produced from a 24-hour 85th percentile storm event,[15]~~; or

(ii) Flow-based treatment control BMPs must be designed to mitigate (~~infiltrate,~~ filter, or treat) either: a) the maximum flow rate of runoff produced from a rainfall intensity of 0.2 inch of rainfall per hour, for each hour of a storm event; or b) the maximum flow rate of runoff produced by the 85th percentile hourly rainfall intensity (for each hour of a storm event), as determined from the local historical rainfall record, multiplied by a factor of two.

(b) ~~Treatment control BMPs for all Priority Development Projects must mitigate (treat through infiltration, settling, filtration or other unit processes) the required volume or flow of runoff from all developed portions of the project, including landscaped areas.~~

Comment [CP59]: This is addressed through the lead-in paragraph

(c) All treatment control BMPs must be located so as to remove pollutants from runoff prior to its discharge to any receiving waters. Multiple Priority Development Projects may use shared treatment control BMPs as long as construction of any shared treatment control BMP is completed prior to the use or occupation of any Priority Development Project from which the treatment control BMP will receive runoff.

(d) All treatment control BMPs for Priority Development Projects must, at a minimum:

(i) Be ranked with high or medium pollutant removal efficiency for the project's most significant pollutants of concern, as the pollutant removal efficiencies are identified in the Copermittees' ~~Model~~ SSMP. Treatment control BMPs with a low removal efficiency ranking must only be approved by a Copermittee when a feasibility analysis has been conducted which exhibits that implementation of treatment control BMPs with high or medium removal efficiency rankings are infeasible for a Priority Development Project or portion of a Priority Development Project.

(ii) Be correctly sized and designed so as to remove storm water pollutants to the MEP.

(e) Target removal of pollutants of concern from runoff.

~~[15] This volume is not a single volume to be applied to all of Riverside County. The size of the 85th percentile storm event is different for various parts of the County. The Copermittees are encouraged to calculate the 85th percentile storm event for each of their jurisdictions using local rain data pertinent to their particular jurisdiction. In addition, isopluvial maps may be used to extrapolate rainfall data to areas where insufficient data exists in order to determine the volume of the local 85th percentile storm event in such areas. Where the Copermittees will use isopluvial maps to determine the 85th percentile storm event in areas lacking rain data, the Copermittees shall describe their method for using isopluvial maps in their SSMPs.~~

(f) Be implemented close to pollutant sources, and prior to discharging into waters of the U.S.

(g) Not be constructed within a waters of the U.S. or waters of the State.

(h) Include proof of a mechanism under which ongoing long-term maintenance will be conducted to ensure proper maintenance for the life of the project. The mechanisms may be provided by the project proponent or Copermittee.

(i) Be designed and implemented with measures to avoid the creation of nuisance or pollution associated with vectors, such as mosquitoes, rodents, and flies.

(7) Low Impact Development (LID) BMP Waiver Program

The Copermittees must develop, collectively or individually, a LID waiver program for incorporation into ~~local~~ the SSMP~~s~~, which would allow a Priority Development Project to substitute implementation of all or a portion of required LID BMPs in section F.1.d(4) with implementation of treatment control BMPs and either 1) ~~a~~ on-site or off-site mitigation ~~project~~, and/or 2) payment into an in-lieu funding program~~, and/or 3) watershed equivalent BMP(s) consistent with Section F.1.d.(11)~~. The Copermittees shall submit the LID waiver program as part of their updated model SSMP. At a minimum, the program must meet the requirements below:

(a) Prior to implementation, the LID waiver program must clearly exhibit that it will not allow PDPs to result in a net impact (after consideration of any mitigation and/or in-lieu payments) from pollutant loadings over and above the impact caused by projects meeting LID requirements;

(b) For each PDP participating, ~~a technical feasibility analysis must be included demonstrating that~~ the Copermittee must make a determination that it is technically infeasible to implement LID BMPs that comply with the requirements of Section F.1.(d)(4). The Copermittee(s) must develop criteria ~~for the~~ that will be used in determining technical feasibility ~~analysis including a cost benefit analysis, examination of LID BMPs considered and alternatives chosen~~. Each PDP participating must demonstrate that LID BMPs were implemented as much as feasible given the site's unique conditions. ~~Analysis must be made of the pollutant loading for each project participating in the LID substitution program. The estimated impacts from not implementing the required LID BMPs in section F.1.d.(4) must be fully mitigated.~~ Technical infeasibility may result from conditions including, but not limited to:

Comment [CP60]: Change to integrate with 'Waiver Track 2' (described below).

Comment [CP61]: 6/17 - It was agreed that the referenced section will be removed - thus this language should not be necessary.

Comment [CP62]: 6/17 - Edits previously provided on 6/10 have been **removed** (except for 'and/or')

Comment [CP63]: 6/17 - Suggested changes to section (b) have been fully re-written. This approach more clearly requires LID BMPs to be implemented before anything else.

Comment [CP64]: Cost analysis moved to new sub-section [iv] below such that it is not a required component, but that it can be considered.

Comment [CP65]: This change is to simplify implementation of the technical feasibility process. Further the next sentence still ensures that LID BMPs are implemented as much as feasible.

Comment [CP66]: out of place... this is repetitive of (f) below

(i) Locations that cannot meet the infiltration and groundwater protection requirements established by the Copermittees in accordance with section F.1.c.(6)~~ for large, centralized infiltration BMPs~~. Where infiltration is technically infeasible, the project must still examine the feasibility of other LID BMPs that maximize onsite retention~~ LID BMPs~~ unless the PDP proponent opts to treat the remaining runoff using LID BMPs contained in the Riverside County LID Design Manual designed to hold the entire 'design capture volume' that is not retained onsite by infiltration BMPs;

(ii) Smart growth and infill or redevelopment locations where the density and/or nature of the project would create significant difficulty for compliance with the ~~onsite volume retention~~LID BMP requirements~~; and~~

(iii) Other site, geologic, soil or implementation constraints identified in the Copermittees updated ~~local~~ SSMP document~~.~~

(iv) Results of a cost-benefit analysis.

(v) Reliability of on-site demand for retained stormwater; and

(vi) Need to support downstream beneficial uses or maintain flows for water rights.

Comment [CP67]: 6/17 - Edits previously provided on 6/10 (Waiver Track 2) have been **removed**

~~(c) The LID waiver program must include mechanisms to verify that each Priority Development Project participating in the program is in compliance with all applicable SSMP requirements;~~

~~(d) The LID waiver program must develop and implement a review process verifying that the BMPs to be implemented meet the designated design criteria. The review process must also verify that each Priority Development Project participating in the program is in compliance with all applicable SSMP requirements.~~

~~(e) The LID waiver program must include performance standards for treatment control BMPs specified in compliance with section F.1.(d)(6).~~

Comment [CP68]: REQUEST REMOVE. These sections are duplicative and confusing, the LID waiver program is a component of the SSMP, not a parallel or separate path, as such there is no reason that participation in this waiver program would exempt anyone from participation in other components of the SSMP program.

~~(f)~~(c) Each PDP that participates in the LID waiver program must mitigate for the estimated pollutant loads expected to be discharged due to not implementing the LID BMPs in section F.1.d.(4). If mitigation cannot be accomplished on-site, off-site ~~M~~mitigation projects ~~must~~ may be implemented within the same hydrologic subarea as the PDP. Mitigation projects outside of the hydrologic subarea but within the same hydrologic unit may be approved provided that the project proponent demonstrates that mitigation projects within the same hydrologic subarea are infeasible and that the mitigation project will address similar beneficial use impacts as expected from the PDPs pollutant load~~ types and amount~~. Offsite mitigation projects may include green streets projects, existing development retrofit projects, retrofit incentive programs, regional BMPs

Comment [CP69]: 6/17 - Edits previously provided on 6/10 have been **revised.**

Comment [CP70]: Conflicts with next sentence.

Comment [CP71]: redundant

and stream restoration. Project applicants seeking to utilize these alternative compliance provisions may propose other offsite mitigation projects, which the Copermittees may approve if they meet the requirements of this subpart.

~~(g)~~(d) A Copermittee may choose to implement a pollutant credit system ~~as part of the LID waiver program~~ provided that such a credit system clearly exhibits that it will not allow PDPs to result in a net impact from pollutant loadings over and above the impact caused by projects meeting LID requirements. Any credit system that a Copermittee chooses to implement must be submitted to the Executive Officer for review and approval as part of the waiver program.

Comment [CP72]: 6/17 – Suggested change per our discussion on 6/10. Accordingly we also suggest moving this section to new section F.1.d.(7) - Waiver program would become section F.1.d.(8), etc.

~~(h)~~(e) ~~The LID waiver program shall~~ A Copermittee may choose to include a storm water mitigation fund developed with oversight by the Copermittee(s) to be used for water quality improvement projects which may serve in lieu of the PDP's required mitigation in section F.1.d.(8)(e). The LID waiver program's storm water mitigation fund shall, at a minimum, identify;

Comment [CP73]: 6/17 - change based on our discussion on 6/10. Goal is to allow development of the fund by others (such as WRCOG -similar to SANDAG)

(i) The entity or entities that will manage the storm water mitigation fund (i.e., assume full responsibility);
(ii) The range and types of acceptable projects for which storm water mitigation funds may be expended;
(iii) The entity or entities that will assume full responsibility for each water quality improvement project, including its successful completion; and
(iv) How the dollar amount of storm water mitigation fund contributions will be determined. In-lieu payments must be proportional to the additional pollutant load discharged by not fully implementing LID.

~~(i)~~(f) Each Copermittee must notify the San Diego Water Board in their annual report of each PDP choosing to participate in the LID waiver program. The annual report must include the following information:

(i) Name of the developer of the participating PDP;
(ii) Site location;
(iii) Reason for LID waiver including technical feasibility analysis (where applicable);
(iv) Description of BMPs implemented;
(v) Total amount deposited, if any, into the storm water mitigation fund described in section F.1.d.(8)(f);
(vi) Water quality improvement project(s) proposed to be funded, if applicable; and
(vii) Timeframe for implementation of water quality improvement projects, if applicable.

h. HYDROMODIFICATION – LIMITATIONS ON INCREASES OF RUNOFF DISCHARGE RATES AND DURATIONS[16]

Each Copermittee shall collaborate with the other Copermittees to develop and implement a Hydromodification Management Plan (HMP) to manage increases in runoff discharge rates and durations into the receiving waters from all Priority Development Projects, where such increased rates and durations are likely to cause increased erosion of channel beds and banks, sediment pollutant generation, or other impacts to beneficial uses and stream habitat due to increased erosive force. The HMP shall be incorporated into the local SSMP and implemented by each Copermittee so that estimated post-project runoff discharge rates and durations shall not exceed pre-development discharge rates and durations. Where the proposed project is located on an already developed site, the pre-project discharge rate and duration shall be that of the pre-project~~developed, naturally occurring~~ condition. The HMP shall be submitted to the Executive Officer within 2 years of permit adoption. The HMP will be made available for public review and comment and the Executive Officer will determine the need for a public hearing.

(1) The HMP must:

(a) Identify a method for assessing the susceptibility and geomorphic stability of channel segments which receive runoff discharges from Priority Development Projects. ~~The geomorphic stability within the channel shall be assessed.~~ A performance standard shall be created that ensures that the geomorphic stability within the channel not be compromised as a result of receiving runoff discharges from Priority Development Projects.

(b) ~~Utilize continuous simulation of the entire rainfall record (or other analytical method proposed by the Copermittees and deemed acceptable by the San Diego Water Board) to identify~~ Identify a range of runoff flows[17] based on continuous simulation of the entire rainfall record (or other analytical method proposed by the Copermittees and deemed acceptable by the San Diego Water Board) for which priority Development Project post-project runoff flow rates and durations shall not exceed pre-

Comment [CP88]: Re-arrangement to ensure that we can benefit from the science already done elsewhere.

[16] Updated SSMP and hydromodification requirements shall apply to all priority development projects or phases of priority development projects which have been issued construction or grading permits ~~not yet begun grading or construction activities~~ at the time any updated SSMP or hydromodification requirement commences. If a Copermittee determines that lawful prior approval of a project exists, whereby application of an updated SSMP or hydromodification requirement to the project is legally infeasible, the updated SSMP or hydromodification requirement need not apply to the project. The Copermittees shall utilize the SSMP and hydromodification update periods to ensure that projects undergoing approval processes include application of the updated SSMP and hydromodification requirements in their plans. Hydromodification does not apply to in-stream improvements.

[17] The identified range of runoff flows to be controlled should be expressed in terms of peak flow rates of rainfall events, such as "10% of the pre-development 2-year runoff event up to the pre-project 10-year runoff event."

development (naturally occurring) runoff flow rates and durations by more than 10 percent, where the increased flow rates and durations will result in increased potential for erosion or other significant adverse impacts to beneficial uses. ~~In addition, the identified range of runoff flow rates and durations must compensate for the loss of sediment supply due to the development.~~ The lower boundary of the range of runoff flows identified shall correspond with the critical channel flow that produces the critical shear stress that initiates channel bed movement or that erodes the toe of channel banks within the domain of analysis identified pursuant to section F.1.h.(1)(m) below. The identified range of runoff flows may be different for specific watersheds, channels, or channel reaches. In the case of an artificially hardened (concrete lined, rip rap, etc.) channel where maintaining the 'artificial hardening' (e.g. lining) is not necessary for the protection of public health and safety, the lower boundary of the range of runoff flows identified shall correspond with the critical channel flow that produces the critical shear stress that initiates channel bed movement or that erodes the toe of channel banks of a comparable soft-bottomed channel.

Comment [CP89]: This is not appropriate - as it could require reduction of runoff to well below the pre-development condition - which could have significant unintended consequences. Alternative language provided below that allows for other ways to address sediment supply.

(c) ~~Require Priority Development Projects to implement~~Identify hydrologic control measures ~~so~~ that can be used to ensure that a Priority Development Projects' post-project runoff flow rates and durations (1) do not exceed pre-project (naturally occurring) runoff flow rates and durations by more than 10 percent for the range of runoff flows identified under section F.1.h.(1)(b), where the increased flow rates and durations will result in increased potential for erosion or other significant adverse impacts to beneficial uses; (2) do not result in channel conditions which do not meet the channel standard developed under section F.1.h.(1)(a) for channel segments downstream of Priority Development Project discharge points; ~~and (3)~~

Comment [CP90]: The requirement to implement is in section (2) below

~~(c)~~(d) Identify a method to assess, and compensate for the loss of sediment supply due to development to the MEP.

Comment [CP91]: Alternative to existing language, which specified that sediment be addressed through hydrologic control only.

~~(d)~~(e) Include other performance criteria (numeric or otherwise) for Priority Development Projects as necessary to prevent runoff from the projects from increasing and/or continuing unnatural rates of erosion of channel beds and banks, silt pollutants generation, or other impacts to beneficial uses and stream habitat due to increased erosive force.

~~(e)~~(f) Include a review of pertinent literature.

~~(f) Identify areas within the Santa Margarita Hydrologic Unit where historic hydromodification of receiving waters has a negative impact to benthic macroinvertebrate and benthic periphyton by identifying areas with low or very low Index of Biotic Integrity (IBI) scores.~~

~~(g) Include a protocol to evaluate potential hydrograph change impacts to downstream watercourses from Priority Development Projects. This protocol must include the use of the IBI score as a metric for assessing impacts and improvements to downstream watercourses.~~

Comment [CP92]: These are not necessary to the development/implementation of the HMP and would be an unnecessary drain on already limited resources.

~~(h)~~(g) Include a description of how the Copermittees will incorporate the HMP requirements into their local approval processes.

~~(i)~~(h) Include criteria on selection and design of management practices and measures (such as detention, retention, and infiltration) to control flow rates and durations and address potential hydromodification impacts.

~~(j)~~(i) Include technical information or references supporting any standards and criteria proposed.

~~(k)~~(j) Include a description of inspections and maintenance to be conducted for management practices and measures to control flow rates and durations and address potential hydromodification impacts.

~~(l)~~(k) Include a description of ~~pre- and post-project~~ monitoring and/or other program evaluation, ~~including~~ such as IBI score, to be conducted to assess the effectiveness of implementation of the HMP.

Comment [CP93]: Simplifications to allow us to use the most cost-effective way to assess the HMP.

(l) Include mechanisms for assessing and addressing cumulative impacts of PDPs within a watershed on channel morphology.

(m) Identify criteria for determining the appropriate downstream domain of analysis such as provided in the Field Manual for Assessing Channel Susceptibility developed by SCCWRP in cooperation with the San Diego Water Board, and presented in Technical Report No. 606.

~~(n) Include information on evaluation of channel form and condition, including slope, discharge, vegetation, underlying geology, and other information, as appropriate.~~

(2) In addition to the hydrologic control measures that must be ~~implemented~~ developed per section F.1.h.(1)(c), the HMP must include a suite of management measures to be used on Priority Development Projects to protect and restore downstream beneficial uses and prevent or further prevent adverse physical changes to downstream channels. Each PDP must implement management~~The~~ measures must be based on a prioritized consideration of the following elements in this order:

(a) Hydrologic control measures;
(b) On-site management controls;

(c) Regional controls located upstream of receiving waters; and
(d) In-stream controls.

Where stream channels are adjacent to, or are to be modified as part of a Priority Development Project, management measures must include buffer zones and setbacks. ~~Under no circumstances will in-stream controls include the use of non-naturally occurring hardscape materials such as concrete, riprap, gabions, etc.~~ The suite of management measures shall also include stream restoration as a viable option to achieve the channel standard in section F.1.h.(1)(a).

Comment [CP94]: This is addressed through the 404/401 1601 processes and is regulated outside of the authority of the Permittees.

(3) Each individual Copermittee has the discretion to not require Section F.1.h. at Priority Development Projects where the project:

(a) Discharges storm water runoff into underground storm drains discharging directly to water storage reservoirs and lakes~~bays or the ocean~~; or
(b) Discharges storm water runoff into conveyance channels whose bed and bank are concrete lined all the way from the point of discharge to ~~ocean waters, enclosed bays, estuaries, or~~ water storage reservoirs and lakes.
(c) Meets other criteria identified by the Copermittees in the approved HMP.

(4) HMP Reporting and Implementation

(a) Within 2 years of adoption of the Order, the Copermittees shall submit to the San Diego Water Board a draft HMP that has been reviewed by the public, including ~~the analysis that identifies~~ identification of the appropriate limiting range of flow rates per section F.1.h.(1)(b).

(b) Within 180 days of receiving San Diego Water Board comments on the draft HMP, the Copermittees shall submit a final HMP that addressed the San Diego Water Board's comments.

(c) Within ~~90~~ 180 days of receiving a finding of adequacy from the Executive Officer, each Copermittee shall incorporate and implement the HMP for all Priority Development Projects.

(d) Prior to approval of the HMP by the San Diego Water Board, the early implementation measures likely to be included in the HMP shall be encouraged by the Copermittees.

(5) <u>Interim Hydromodification Criteria</u>

~~Within one year of adoption of this Order~~Throughout the development and approval of the Final HMP, each Copermittee must continue to require ~~ensure that~~ all Priority Development Projects to comply with the

requirements of section 4.4 of the Riverside County Water Quality Management Plan, for identifying and mitigating hydrologic conditions of concern. ~~are implementing the following criteria by comparing the pre-development (naturally occurring) and post-project flow rates and durations using a continuous simulation hydrologic model such as US EPA's Hydrograph Simulation Program-Fortran (HSPF):~~

~~For flow rates from 10 percent of the 2-year storm event to the 5-year storm event, the post-project peak flows shall not exceed pre-development (naturally occurring) peak flows.~~

~~For flow rates from the 5-year storm event to the 10-year storm event the post-project peak flows may exceed pre-development (naturally occurring) flows by up to 10 percent for a 1-year frequency interval.~~

~~The interim hydromodification criteria do not apply to Priority Development Projects where the project discharges (1) storm water runoff into underground storm drains discharging directly to bays or the ocean, or (2) storm water runoff into conveyance channels whose bed and bank are concrete lined all the way from the point of discharge to ocean waters, enclosed bays, estuaries, or water storage reservoirs and lakes.~~

Within one year of adoption of this Order, each Copermittee must submit a signed, certification statement to the San Diego Water Board verifying implementation of the interim hydromodification criteria.

(6) No part of section F.1.h shall alleviate the Copermittees responsibilities for requiring ~~implementing~~ implementation of Low Impact Development BMPs as required under section F.1.d.(4).

i. TRAINING AND EDUCATION

(1) Municipal Departments and Personnel Education

Municipal Development Planning: Each Copermittee must implement an education program so that its planning and development review staffs and contractors (and Planning Boards and Elected Officials, if applicable) have an understanding of:

(a) Federal, State, and local water quality laws and regulations applicable to Development Projects;

(b) The connection between land use decisions and short and long-term water quality impacts (i.e., impacts from land development and urbanization); and

AGENDA

Santa Margarita Region
MS4 Permit Meeting

10:00.m. – 4:00 p.m. June 17th, 2010
Location: Temecula

1. PROCESS / HOUSEKEEPING

2. WRAP-UP FOR LAST WEEK'S TOPICS

   (Last week's topic - LID - will be revisited as part of 'today's' topics)

3. TODAY'S TOPICS

   i. F.1.h.
   ii. F.1.d.(4) - F.1.d.(7) (Revisit based on last week's discussion)

4. CONCEPTUAL DISCUSSION OF FUTURE TOPICS

   i. No discussion of future topics this week.

Santa Margarita Watershed MS4 Permit

Meeting Date 6/17/2010

Time 10am

Location Temecula

Name	Agency	Signature
David Gibson	SDRWQCB	
Jimmy Smith	SDRWQCB	
David Barker	SDRWQCB	David Barker
Chiara Clemente	SDRWQCB	
Ben Neill	SDRWQCB	
Wayne Chiu	SDRWQCB	Wayne Chiu
Chad Loflen	SDRWQCB	
Jason Uhley	RCFC&WCD	
Claudio Padres	RCFC&WCD	
Arlene Chun	RCFC&WCD	
Mike Shetler	County of Riverside	
Alex Gann	County of Riverside	
Aldo Licitra	City of Temecula	Aldo Licitra
Bill Woolsey	City of Murrieta	Bill Woolsey
Don Allison	City of Menifee	Don Allison
Tim D'Zmura	City of Wildomar	
Chandra T.	Riv Co	
Scott Taylor	RBF	
Daniel Apt	RBF	

AGENDA

Santa Margarita Region
MS4 Permit Meeting

10:00.m. – 4:00 p.m. June 23rd, 2010
Location: Murrieta City Hall
24601 Jefferson Ave., Murrieta CA 92562

1. PROCESS / HOUSEKEEPING

   - Schedule Extension
   - MRP
   - Draft Update
   - Menifee/Murrieta/Wildomar letter

2. WRAP-UP FOR LAST WEEK'S TOPICS

   - Summary of outcomes/discussions for LID/Hydromod

3. TODAY'S TOPICS

   i. ~~E - Legal Authority~~ (Postponed)
   ii. G - Watershed Plan
   iii. H - Fiscal Analysis.
   iv. I - TMDLs

4. CONCEPTUAL DISCUSSION OF FUTURE TOPICS

   i. J - Effectiveness
   ii. K - Reporting
   iii. L - O

Santa Margarita Watershed MS4 Permit

Meeting Date 6/23/2010

Time 10a

Location Murrieta

Name	Agency	Signature
David Gibson	SDRWQCB	
Jimmy Smith	SDRWQCB	
David Barker	SDRWQCB	
Chiara Clemente	SDRWQCB	
Ben Neill	SDRWQCB	
Wayne Chiu	SDRWQCB	
Chad Loflen	SDRWQCB	
Jason Uhley	RCFC&WCD	
Claudio Padres	RCFC&WCD	
Arlene Chun	RCFC&WCD	
Mike Shetler	County of Riverside	
Alex Gann	County of Riverside	
Aldo Licitra	City of Temecula	
Bill Woolsey	City of Murrieta	Bill Woolsey
Don Allison	City of Menifee	
Tim D'Zmura	City of Wildomar	
Chandler Thomas	RIV County	
Daniel Apt	RBF	

AGENDA

Santa Margarita Region
MS4 Permit Meeting

10:00 a.m. – 4:00 p.m. July 1st, 2010
Location: RBF Temecula Office
40810 County Center, Suite 100
Temecula, CA 92591

1. PROCESS / HOUSEKEEPING

   - Updated Schedule
   - MRP / Draft Update
   - Menifee/Murrieta/Wildomar letter

2. WRAP-UP FOR LAST WEEK'S TOPICS

   - No planned discussion

3. TODAY'S TOPICS

   - E - Legal Authority
   - J - Effectiveness
   - K - Reporting
   - L - O

4. CONCEPTUAL DISCUSSION OF FUTURE TOPICS

   - Next Week : Findings (no conceptual discussion planned)

Santa Margarita Watershed MS4 Permit

Meeting Date 7/1/2010

Time 10:00 am

Location RBF - Temecula

Name	Agency	Signature
David Gibson	SDRWQCB	
Jimmy Smith	SDRWQCB	
David Barker	SDRWQCB	
Chiara Clemente	SDRWQCB	
Ben Neill	SDRWQCB	
Wayne Chiu	SDRWQCB	Wayne Chiu
Chad Loflen	SDRWQCB	
Jason Uhley	RCFC&WCD	
Claudio Padres	RCFC&WCD	
Amy McNeill	RCFC&WCD	Amy McNeill
Arlene Chun	RCFC&WCD	
Mike Shetler	County of Riverside	Mike Shetler
Alex Gann	County of Riverside	
Aldo Licitra	City of Temecula	
Bill Woolsey	City of Murrieta	Bill Woolsey
Don Allison	City of Menifee	
Tim D'Zmura	City of Wildomar	
Mack Walker	Lamy Walker Assc.	M. Walker
Daniel Apt	RBF	

AGENDA

Santa Margarita Region
MS4 Permit Meeting

10:00 a.m. – 4:00 p.m. July 8th, 2010
Location: Temecula City Hall

1. PROCESS / HOUSEKEEPING

    - Menifee/Murrieta/Wildomar letter

2. WRAP-UP FOR LAST WEEK'S TOPICS

3. TODAY'S TOPICS

    - Partial Discussion of MRP
    - Partial Review of 2nd draft of permit (as provided on 5/18 - time permitting)
    - ~~Findings~~ (postponed)

0005291

Sign-In Sheet 7/8/2010

Name	Agency
Claudio Padres	RCFC&WCD
Amy McNeill	RCFC + WCD
Tim D'Zmura	WILDOMAR
ALDO LICITRA	TEMECULA
Daniel Apt	RBF
Mike Shetler	Co of Riverside EO
Chandra Thomas	Co. of Riverside TLMA-B&S
Ben Neill	SDRWQCB
Wayne Chiy	"
BILL WOOLSEY	MURRIETA
MATT RICH	MACTEC E&C
Arlene Chun	RCFC&WCD
Bob Collacott	URS
Chiara Clemente	RWQCB
DAVID BARKER	SAN DIEGO RWQCB

AGENDA

Santa Margarita Region
MS4 Permit Meeting

10:00 a.m. – 4:00 p.m. July 15th, 2010
Location: San Diego Regional Water Quality Control Board
9174 Sky Park Court, Suite 100
San Diego, CA. 92123-4340

1. PROCESS / HOUSEKEEPING
   - Menifee/Murrieta/Wildomar letter update
2. WRAP-UP FOR LAST WEEK'S TOPICS
   - If needed
3. TODAY'S TOPICS
   - MRP, Costs, Permit

CITY OF MURRIETA

July 20, 2010

Mr. Kurt Berchtold
Executive Officer
California Regional Water Quality
Control Board - Santa Ana Region
3737 Main Street, Suite 500
Riverside, CA 92501-3339

Mr. David W. Gibson
Executive Officer
California Regional Water Quality
Control Board – San Diego Region
9174 Sky Park Court, Suite 100
San Diego, CA 92123-4340

Dear Messrs. Berchtold and Gibson:

Re: Request for Designating the San Diego Regional Board as Regulating Discharges from MS4 owned by the City of Murrieta

The City of Murrieta is located within southwestern Riverside County, and covers an area of approximately 21,503 square miles. While the city is located primarily within the Santa Margarita Watershed and therefore is under the jurisdiction of the San Diego Regional Board, approximately 375 acres (or 1.7%) of the city extends into the Santa Ana Watershed which is under the jurisdiction of the Santa Ana Regional Board. Attached for your reference is a map of the city, overlaid with the jurisdictional boundary between the two Regional Boards. As a result of this situation, the city is subject to two Municipal Separate Storm Sewer System (MS4) Permits issued by the respective Regional Boards.

Pursuant to discussions with staff at both Regional Boards, and consistent with California Water Code section 13228, the City of Murrieta hereby requests that the Santa Ana Regional Board designate the San Diego Regional Board for regulation of all portions of the city, regardless of Regional Board jurisdictional boundaries, for matters pertaining to MS4 permitting.

The remainder of this letter contains a discussion of the basis for this request; a description of the understood limitations of this designation; a description of the additional portion of the city that, pursuant to this designation, would be regulated by the San Diego Regional Board, and any other associated requests.

1 Town Square, 24601 Jefferson Avenue • Murrieta, California 92562
phone: 951.304.CITY (2489) • fax: 951.698.4509 • web: murrieta.org

Mr. Kurt Berchtold
Santa Ana Regional Water Quality Control Board
Mr. David W. Gibson
San Diego Regional Water Quality Control Board
Re: Request for Area Exchange

Basis for the request

The City is currently a named permittee on order R8-2010-0033 issued by the Santa Ana Regional Board (Santa Ana Permit), and order R9-2004-001 with the San Diego Regional Board (San Diego Permit) - which is currently up for renewal. While having the same goal of reducing the discharge of pollutants from the MS4 system, these two orders include requirements that accomplish that goal in different ways. As a result, programs designed to be in compliance with the Santa Ana Permit are similar, but necessarily different than programs designed for compliance with the San Diego Permit. When this situation is applied within a single city, such as the City of Murrieta, having two differing programs creates significant confusion among both city staff and the public, which can lead to inefficient and inconsistent implementation of the programs and less effective protection of water quality. Additionally, and no less significant, there is a duplicative administrative and financial burden that is inherent in complying with two MS4 permits: two sets of programs have to be developed; staff have to be trained to two sets of requirements, and at differing frequencies; business inspections must inspect for and track different information, at differing frequencies; two sets of annual reports have to be created, with each report being required to include different information; etc.

The purpose of the City's request is to reduce the aforementioned complexity to allow for the more effective and focused utilization of the City's resources to the benefit of water quality.

Understood Limitations

This request by the City of Murrieta is made with the understanding that:

- For the purposes of MS4 permitting only, the San Diego Regional Board would regulate the entirety of the City of Murrieta. As a result, the City of Murrieta would be subject to a single MS4 permit, which would be issued by the San Diego Regional Board.
- Enforcement of any provisions of the MS4 permit issued to the City of Murrieta can be performed by either San Diego Regional Board or Santa Ana Regional Board however compliance will be based on the permit issued by the San Diego Regional Board.
- Any TMDLs and associated MS4 permit requirements issued by the Santa Ana Regional Board, which include the City of Murrieta as a responsible party, will be incorporated into the MS4 permit issued by the San Diego Regional Board by reference, including reference to any associated provisions, findings or elements of the fact sheet.
- Other Waste Discharge Requirements, or other Orders issued or enforced by the Santa Ana Regional Board would remain wholly under the jurisdiction of the Santa Ana Regional Board.
- One Annual Report will be prepared in accordance to the San Diego MS4 permit that includes the 375 acres that is currently in the Santa Ana watershed.

Mr. Kurt Berchtold
Santa Ana Regional Water Quality Control Board
Mr. David W. Gibson
San Diego Regional Water Quality Control Board
Re: Request for Area Exchange

Description of the area of the City subject to the designation:

Some facts about the City of Murrieta and the portion within the jurisdiction of the Santa Ana Regional Board are described below. Also enclosed with this letter is a map of the City with the subject area highlighted.

- Total Area of the City of Murrieta is 21,503 square miles.
- Area within the Santa Ana Watershed is 375 acres or 0.6 square miles.
- Percent of City of Murrieta in the Santa Ana Watershed is 1.7%.
- Top three land uses within the portion of the City of Murrieta in the Santa Ana Watershed are residential (65%), business park office (23%), and commercial (6%) (as % of area within Santa Ana Watershed)

In conclusion, the requested designation of regulatory authority to the San Diego Regional Board will not only reduce the complexity and administrative burden upon the City of Murrieta, but will allow the City to better focus and effectively utilize their available resources to the best benefit to water quality.

If you have any questions regarding this request, please contact me at 951.461.6078.

Very truly yours,

Patrick A. Thomas
Director of Public Works
City of Murrieta

Attachments: Map of the City of Murrieta

CC:
Bill Woolsey, City of Murrieta
Jason Uhley, Riverside County Flood Control

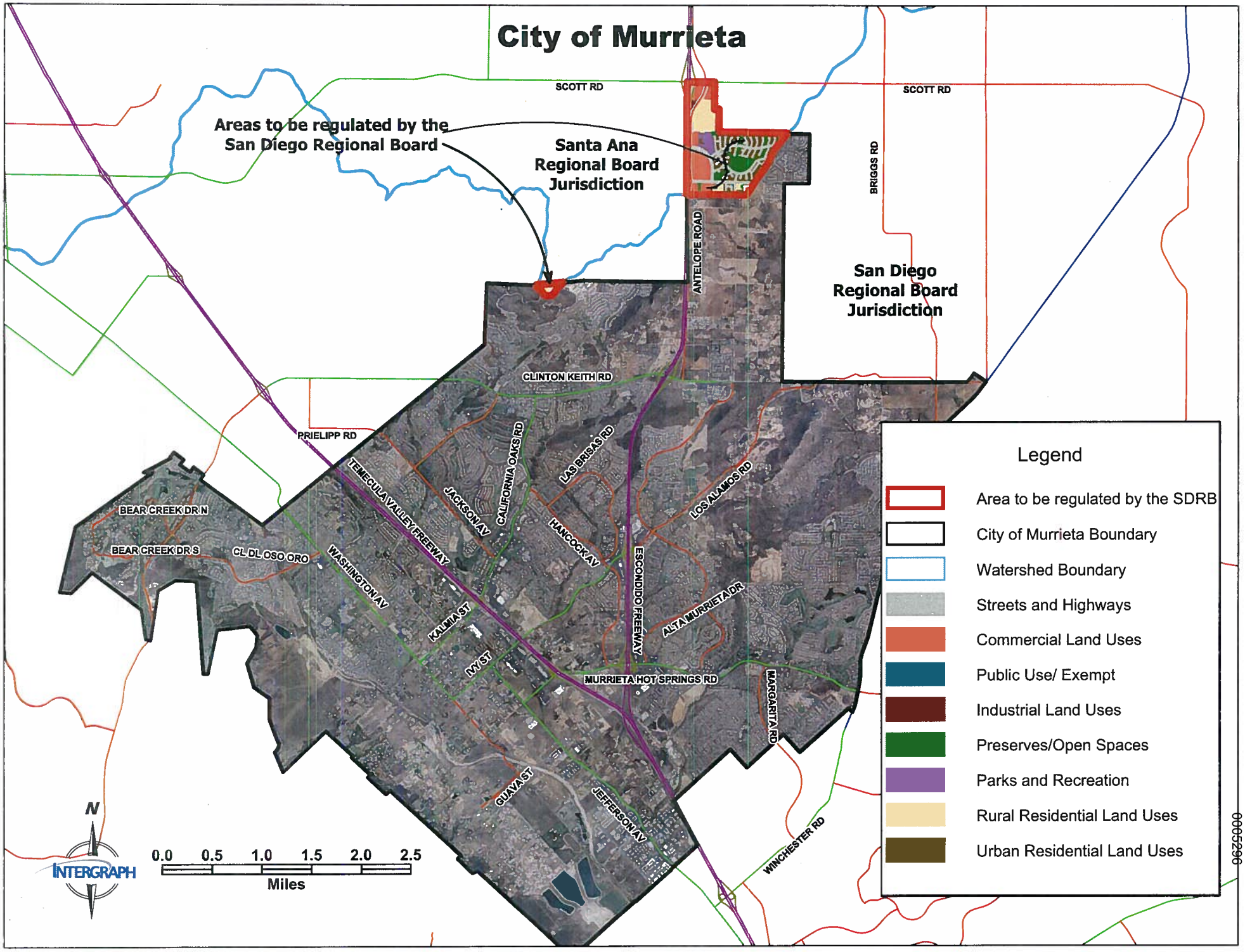
City of Murrieta
Areas to be regulated by the San Diego Regional Board
Santa Ana Regional Board Jurisdiction
San Diego Regional Board Jurisdiction
SCOTT RD
SCOTT RD
BRIGGS RD
ANTELOPE ROAD
CLINTON KEITH RD
PRIELIPP RD
TEMECULA VALLEY FREEWAY
JACKSON AV
CALIFORNIA OAKS RD
LAS BRISAS RD
HANCOCK AV
LOS ALAMOS RD
ESCONDIDO FREEWAY
ALTA MURRIETA DR
MARGARITA RD
MURRIETA HOT SPRINGS RD
BEAR CREEK DR N
BEAR CREEK DR S
CL DL OSO ORO
WASHINGTON AV
KALMIA ST
IVY ST
GUAVA ST
JEFFERSON AV
WINCHESTER RD
N
INTERGRAPH
0.0 0.5 1.0 1.5 2.0 2.5
Miles
Legend
Area to be regulated by the SDRB
City of Murrieta Boundary
Watershed Boundary
Streets and Highways
Commercial Land Uses
Public Use/ Exempt
Industrial Land Uses
Preserves/Open Spaces
Parks and Recreation
Rural Residential Land Uses
Urban Residential Land Uses

0005296

0005297

Bridgette Moore, Mayor
Marsha Swanson, Mayor Pro Tem
Sheryl Ade, Council Member
Bob Cashman, Council Member
Scott Farnam, Council Member

23873 Clinton Keith Road, Suite 201
Wildomar, CA 92595
951.677.7751 Phone
951.698.1463 Fax
www.CityofWildomar.org

July 21, 2010

Mr. Kurt Berchtold
Executive Officer
California Regional Water Quality
Control Board - Santa Ana Region
3737 Main Street, Suite 500
Riverside, CA 92501-3339

Mr. David W. Gibson
Executive Officer
California Regional Water Quality
Control Board – San Diego Region
9174 Sky Park Court, Suite 100
San Diego, CA 92123-4340

Dear Messrs Berchtold and Gibson:

Re: Request for Designating the San Diego Regional Board as Regulating Discharges from MS4 owned by the City of Wildomar

The City of Wildomar is located within southwestern Riverside County, and covers an area of approximately 23.7 square miles. While the city is located primarily within the Santa Margarita Watershed and therefore is under the jurisdiction of the San Diego Regional Board, approximately 4,768 acres (or 31.4 %) of the city extends into the Santa Ana Watershed which is under the jurisdiction of the Santa Ana Regional Board. Attached for your reference is a map of the city, overlaid with the jurisdictional boundary between the two Regional Boards. As a result of this situation, the city is subject to two Municipal Separate Storm Sewer System (MS4) Permits issued by the respective Regional Boards.

Pursuant to discussions with staff at both Regional Boards, and consistent with California Water Code section 13228, the City of Wildomar hereby requests that the Santa Ana Regional Board designate the San Diego Regional Board for regulation of all portions of the city, regardless of Regional Board jurisdictional boundaries, for matters pertaining to MS4 permitting.

The remainder of this letter contains a discussion of the basis for this request; a description of the understood limitations of this designation; a description of the additional portion of the city that, pursuant to this designation, would be regulated by the San Diego Regional Board, and any other associated requests.

Basis for the request

The City is currently a named permittee on order R8-2010-0033 issued by the Santa Ana Regional Board (Santa Ana Permit), and submitted a Notice of Intent as part of the Report of Waste Discharge to participate in the upcoming permit issued by the San Diego Regional Board. While having the same goal of reducing the discharge of pollutants from the MS4 system, these two orders include requirements that accomplish that goal in different ways. As a result, programs designed to be in compliance with the Santa Ana Permit are similar, but necessarily different than programs designed for compliance with the San Diego Permit. When this situation is applied within a single city, such as the City of Wildomar, having two differing programs creates significant confusion among both city staff and the public, which can lead to inefficient and inconsistent implementation of the programs and less effective protection of water quality. Additionally, and no less significant, there is a duplicative administrative and financial burden that is inherent in complying with two MS4 permits: two sets of programs have to be developed; staff have to be trained to two sets of requirements, and at differing frequencies; business inspections must inspect for and track different information, at differing frequencies; two sets of annual reports have to be created, with each report being required to include different information; etc.

The purpose of the City's request is to reduce the aforementioned complexity to allow for the more effective and focused utilization of the City's resources to the benefit of water quality.

Understood Limitations

This request by the City of Wildomar is made with the understanding that:

- For the purposes of MS4 permitting only, the San Diego Regional Board would regulate the entirety of the City of Wildomar. As a result, the City of Wildomar would be subject to a single MS4 permit, which would be issued by the San Diego Regional Board.
- Enforcement of any provisions of the MS4 permit issued to the City of Wildomar can be performed by either San Diego Regional Board or Santa Ana Regional Board however compliance will be based on the permit issued by the San Diego Regional Board.
- Any TMDLs and associated MS4 permit requirements issued by the Santa Ana Regional Board, which include the City of Wildomar as a responsible party, will be incorporated into the MS4 permit issued by the San Diego Regional Board by reference, including reference to any associated provisions, findings or elements of the fact sheet.
- Other Waste Discharge Requirements, or other Orders issued or enforced by the Santa Ana Regional Board would remain wholly under the jurisdiction of the Santa Ana Regional Board.

Description of the area of the City subject to the designation:

Some facts about the City of Wildomar and the portion within the jurisdiction of the Santa Ana Regional Board are described below. Also enclosed with this letter is a map of the City with the subject area highlighted.

- Total Area of the City of Wildomar is 23.7 square miles.
- Area within the Santa Ana Watershed is 4,768 acres or 7.45 square miles.
- Percent of the City of Wildomar in the Santa Ana Watershed is 31.4%.
- Top three land uses within the portion of the City of Wildomar in the Santa Ana Watershed are residential (58.5%), Preserve/Open Space (25.6%) and Agriculture (6.7 %) (as % of area within Santa Ana Watershed)

In conclusion, the requested designation of regulatory authority to the San Diego Regional Board will not only reduce the complexity and administrative burden upon the City of Wildomar, but will allow the City to better focus and effectively utilize their available resources to the best benefit to water quality.

If you have any questions regarding this request, please contact Tim D'Zmura at 951-677-7751.

Very truly yours,

Frank Oviedo, City Manager
City of Wildomar

Attachments:
Map of the City of Wildomar

ec:

Tim D'Zmura, City of Wildomar
Jason Uhley, Riverside County Flood Control

City of Wildomar

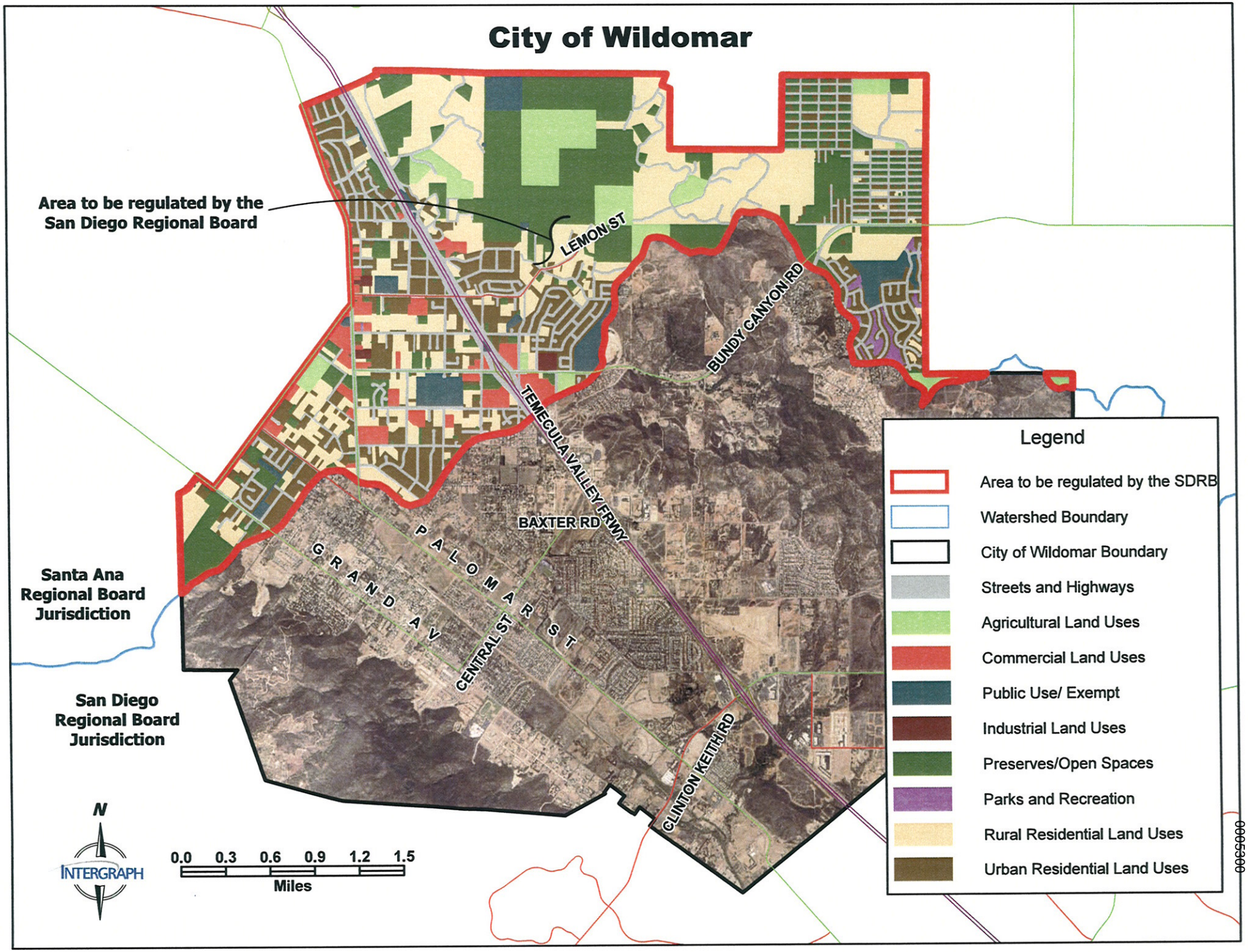

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July 22, 2010

SAN DIEGO REGIONAL
WATER QUALITY
CONTROL BOARD

2010 JUL 23 A 9:4

Mr. Kurt Berchtold
Executive Officer
California Regional Water Quality
Control Board - Santa Ana Region
3737 Main Street, Suite 500
Riverside, CA 92501-3339

Mr. David W. Gibson
Executive Officer
California Regional Water Quality
Control Board – San Diego Region
9174 Sky Park Court, Suite 100
San Diego, CA 92123-4340

Re: **Request for Designating the Santa Ana Regional Board as Regulating Discharges from MS4 within the City of Menifee**

Dear Messrs. Berchtold and Gibson:

The City of Menifee is located within southwestern Riverside County, and covers an area of approximately 60 square miles. While the city is located primarily within the Santa Ana Watershed and therefore is under the jurisdiction of the Santa Ana Regional Board, approximately 800 acres (or 3%) of the city extends into the Santa Margarita Watershed which is under the jurisdiction of the San Diego Regional Board. The land use in this area is rural residential and residential. Attached for your reference is a map of the city, overlaid with the jurisdictional boundary between the two Regional Boards. As a result of this situation, the city is subject to two Municipal Separate Storm Sewer System (MS4) Permits issued by the respective Regional Boards.

Pursuant to discussions with staff at both Regional Boards, and consistent with California Water Code section 13228, the City of Menifee hereby requests that the San Diego Regional Board designate the Santa Ana Regional Board for regulation of all portions of the city, regardless of Regional Board jurisdictional boundaries, for matters pertaining to MS4 permitting.

The remainder of this letter contains a discussion of the basis for this request; a description of the understood limitations of this designation; and any other associated requests.

Basis for the request

The City is currently a named permittee on order R8-2010-0033 issued by the Santa Ana Regional Board (Santa Ana Permit), and submitted a Notice of Intent as part of the Report of Waste Discharge to participate in the upcoming permit issued by the San Diego Regional Board. While having the same goal of reducing the discharge of pollutants from the MS4 system, these two orders include requirements that accomplish that goal in different ways. As a result, programs designed to be in compliance with the Santa Ana Permit are similar, but necessarily different than programs designed

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for compliance with the San Diego Permit. When this situation is applied within a single city, such as the City of Menifee, having two differing programs creates significant confusion among both city staff and the public, which can lead to inefficient and inconsistent implementation of the programs and less effective protection of water quality. Additionally, and no less significant, there is a duplicative administrative and financial burden that is inherent in complying with two MS4 permits: two sets of programs have to be developed; staff have to be trained to two sets of requirements, and at differing frequencies; business inspections must inspect for and track different information, at differing frequencies; two sets of annual reports have to be created, with each report being required to include different information; etc.

The purpose of the City's request is to reduce the aforementioned complexity to allow for the more effective and focused utilization of the City's resources to the benefit of water quality.

Understood Limitations

This request by the City of Menifee is made with the understanding that:

- For the purposes of MS4 permitting only, the Santa Ana Regional Board would regulate the entirety of the City of Menifee. As a result, the City of Menifee would be subject to a single MS4 permit, which would be issued by the Santa Ana Regional Board.
- Construction NOIs for all municipal construction projects within the City of Menifee will be submitted in accordance with the process identified by the Santa Ana Regional Board.
- Enforcement of any provisions of the MS4 permit issued to the City of Menifee can be performed by either the San Diego Regional Board or the Santa Ana Regional Board however compliance will be based on the permit issued by the Santa Ana Regional Board.
- Any TMDLs and associated MS4 permit requirements issued by the San Diego Regional Board, which include the City of Menifee as a responsible party, will be incorporated into the MS4 permit issued by the Santa Ana Regional Board by reference, including reference to any associated provisions, findings or elements of the fact sheet.
- Other Waste Discharge Requirements, or other Orders issued or enforced by the San Diego Regional Board would remain wholly under the jurisdiction of the San Diego Regional Board.

Other Requests:

Understanding that the requested designation applies to the MS4 permit requirements, the Santa Ana Permit incorporates a simplified process in section XIV.G.1. for applying for coverage under the General Construction Permit (Order 2009-0009-DWQ) for municipal projects. This process includes submission of the NOI or Permit Registration Documents (PRDs) directly to the Executive Officer, and waived application fees. To avoid unnecessary confusion among staff, and potential for

inadvertent non-compliance, the City of Menifee specifically requests that this portion of the MS4 permit would be applicable within the entire City, including those portions of the city within the jurisdiction of the San Diego Regional Board.

In conclusion, the requested designation of regulatory authority to the Santa Ana Regional Board will not only reduce the complexity and administrative burden upon the City of Menifee, but will allow the City to better focus and effectively utilize their available resources to the best benefit to water quality. The City of Menifee is focused on protecting the receiving waters (Canyon Lake) immediately adjacent to the City. The City is taking specific actions and pursuing funding requests to insure future compliance. The City has accepted responsibility for a 105 acre preserve immediately upstream of Canyon Lake under permits by ACOE and CAF&G. We appreciate the San Diego Regional Board's flexibility in allowing the City of Menifee to remain focused on these important responsibilities in District 8 and not having to address separate permit issues.

If you have any questions regarding this request, please contact Don Allison at 951-672-6777.

Very truly yours,

Donald Allison

Mr. Donald Allison, P.E.
City Engineer/Public Works Director
City of Menifee

Attachment:

Map of the City of Menifee with Redesignation Area

cc: Steve Harding, City Manager, City of Menifee
Karen Feld, City Attorney, City of Menifee
Jason Uhley, Riverside County Flood Control

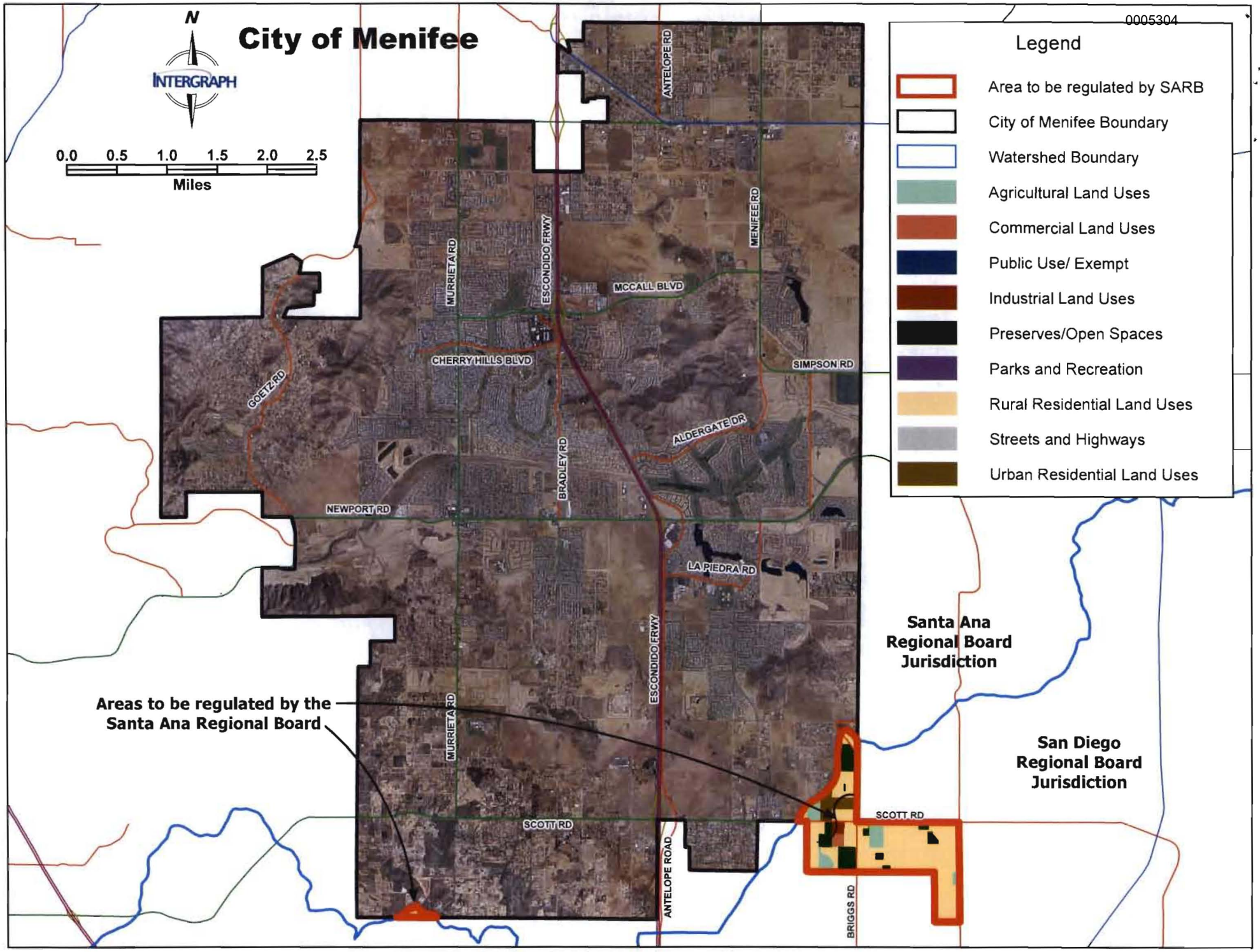
City of Menifee
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Miles
Legend
Area to be regulated by SARB
City of Menifee Boundary
Watershed Boundary
Agricultural Land Uses
Commercial Land Uses
Public Use/ Exempt
Industrial Land Uses
Preserves/Open Spaces
Parks and Recreation
Rural Residential Land Uses
Streets and Highways
Urban Residential Land Uses
ANTELOPE RD
MENIFEE RD
MURRIETA RD
ESCONDIDO FRWY
MCCALL BLVD
CHERRY HILLS BLVD
SIMPSON RD
GOETZ RD
ALDERGATE DR
BRADLEY RD
NEWPORT RD
LA PIEDRA RD
Santa Ana Regional Board Jurisdiction
San Diego Regional Board Jurisdiction
Areas to be regulated by the Santa Ana Regional Board
SCOTT RD
ANTELOPE ROAD
BRIGGS RD

California Regional Water Quality Control Board

San Diego Region

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(858) 467-2952 • Fax (858) 571-6972
http:// www.waterboards.ca.gov/sandiego

July 23, 2010

In reply refer to:
NWU:749045:bneill

Mr. Warren D. Williams
General Manager – Chief Engineer
Riverside County Flood Control & Water Conservation District
1995 Market Street
Riverside, CA 92501

Dear Mr. Williams, et al:

Riverside County Municipal Storm Water Permit Reissuance
Tentative Order No. R9-2010-0016

The California Regional Water Quality Control Board, San Diego Region, (San Diego Water Board) is pleased to transmit to you Tentative Order No. R9-2010-0016, *Waste Discharge Requirements for Discharges from the Municipal Separate Storm Sewer Systems (MS4s) Draining the County of Riverside, the Incorporated Cities of Riverside County, and the Riverside County Flood Control and Water Conservation District within the San Diego Region* (Tentative Order).

The Tentative Order reissues the National Pollutant Discharge Elimination System (NPDES) MS4 Permit No. CAS0108740, to the County of Riverside, the Riverside County Flood Control and Water Conservation District, and the Cities of Murrieta, Wildomar, and Temecula (Copermittees). Tentative Order No. R9-2010-0016 will, when adopted, supersede and replace the current Riverside County MS4 Permit, Order No. R9-2004-001 issued in July 2004.

The San Diego Water Board hereby notifies the public that Tentative Order No. R9-2010-0016, the Riverside County MS4 Permit, is available for review and public comment. The Tentative Order, Attachments, Monitoring and Reporting Program and Fact Sheet are available on the San Diego Water Board's website at:

http://www.waterboards.ca.gov/sandiego/water_issues/programs/stormwater/rsd_stormwater.shtml

Proposed Jurisdiction Transfers
Under the terms of the Tentative Order the San Diego Water Board will assume jurisdiction for portions of the Cities of Murrieta and Wildomar currently regulated by the California Regional Water Quality Control board, Santa Ana Region's (Santa Ana Water Board) MS4 Permit, Order No. R8-2010-0033. The Santa Ana Water Board will likewise assume jurisdiction under their MS4 Permit portions of the City of Menifee that are currently regulated under the San Diego Water Board's MS4 Permit. These arrangements are being implemented in response to the Cities' requests to consolidate these areas under the jurisdiction of one Regional Water Board and through a pending agreement with Santa Ana Water Board.

Public Hearing
The San Diego Water Board will conduct a public hearing to receive oral comments and consider adoption of the Tentative Order. The hearing is scheduled for October 13, 2010, at the Rancho California Water District Board Room, 42135 Winchester Road, Temecula, California. Further notice of the hearing will be provided to the Copermittees and interested persons at least 30 days in advance. All interested persons will be permitted to speak at the hearing and will be expected to orally summarize their written comments.

Comment Period
Copermittee comments and comments from the public and other interested persons on the Tentative Order are appreciated. The public review and comment period is now open for a 45-day comment period. Written comments on the Tentative Order should be submitted as soon as possible and must be received no later than by 5:00 PM on Tuesday, September 7, 2010. Written comments received after the close of the 45-day comment period will not be accepted and will not be incorporated into the administrative record if doing so would jeopardize any party. Written comments received by the close of the 45-day comment period will be provided to the San Diego Water Board for their review at the October 13, 2010 hearing.

If you wish to receive future notices and information on this specific permit, please subscribe to the electronic emailing list titled "Riverside County MS4 Permit" located on this web page: http://www.waterboards.ca.gov/sandiego/misc/mailing_lists.html.

If you would like a paper copy of the permit or have any questions or need further clarification, please contact Mr. Ben Neill at (858) 467-2983 or via email at bneill@waterboards.ca.gov or Ms. Chiara Clemente at (858) 467-2359 or via email at cclemente@waterboards.ca.gov for information regarding Tentative Order No. R9-2010-0016.

Respectfully,

DAVID BARKER, P.E.
Supervising Water Resource Control Engineer
California Regional Water Quality Control Board, San Diego Region

DWG:cmc:bin
DB

Enclosures:
1. Tentative Order No. R9-2010-0016, with attachments
2. Fact Sheet for Tentative Order No. R9-2010-0016

Distribution List via email:
County of Riverside: Michael Shetler, Chandra Santiago, Ward Maxwell and Alex Gann
City of Murrieta, Bill Woolsey and Patrick Thomas
City of Wildomar, Tim Dzmura
City of Temecula, Aldo Licitra and Greg Butler
City of Menifee, Don Allison
Riverside County Flood Control & Water Conservation District: Claudio Padres, Jason Uhley, Amy McNeill, and Arlene Chun
RBF Consulting: Scott Taylor and Daniel Apt
Larry Walker and Associates: Mack Walker

Cc via email: Santa Ana Regional Water Quality Control Board, Michael Adackaparra
U.S. Environmental Protection Agency, Region IX, Eugene Bromley, Cindy Lin and John Kemmerer

California Regional Water Quality Control Board
San Diego Region

Waste Discharge Requirements for Discharges from the Municipal Separate Storm Sewer Systems (MS4s) Draining the County of Riverside, the Incorporated Cities of Riverside County, and the Riverside County Flood Control and Water Conservation District within the San Diego Region

Tentative Order No. R9-2010-0016
NPDES NO. CAS0108740

October 13, 2010

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN DIEGO REGION
9174 Sky Park Court, Suite 100, San Diego, California 92123-4340
Phone • (858) 467-2952 • Fax (858) 571-6972
http://www.waterboards.ca.gov/sandiego

To request copies of the Riverside County Municipal Storm Water Permit, please contact Ben Neill, Water Resources Control Engineer at (858) 467 – 2983, bneill@waterboards.ca.gov

Documents also are available at: http://www.waterboards.ca.gov/sandiego

Waste Discharge Requirements for Discharges from the Municipal Separate Storm Sewer Systems (MS4s) Draining the County of Riverside, the Incorporated Cities of Riverside County, and the Riverside County Flood Control and Water Conservation District within the San Diego Region

Adopted by the
California Regional Water Quality Control Board
San Diego Region
on October 13, 2010

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN DIEGO REGION
9174 Sky Park Court, Suite 100
San Diego, California 92123-4340

Telephone (858) 467-2952

STATE OF CALIFORNIA

ARNOLD SCHWARZENEGGER, Governor
LINDA S. ADAMS, Agency Secretary, California Environmental Protection Agency

California Regional Water Quality Control Board
San Diego Region

David King *Chair*	Recreation / Wildlife
Grant Destache *Vice Chair*	Industrial Water Use
Eric Anderson	Irrigated Agriculture
Wayne Rayfield	Water Quality
George Loveland	Water Supply
Marc Luker	Undesignated (Public)

David W. Gibson, *Executive Officer*
James Smith, *Assistant Executive Officer*

This permit was prepared under the direction of

David T. Barker P.E., *Supervising Water Resource Control Engineer, Surface Water Basins Branch*
Chiara Clemente, *Senior Environmental Scientist, Northern Watershed Unit*

by

Benjamin Isaac Neill, *Water Resource Control Engineer*
Chad Lörtscher Loflen, *Environmental Scientist*
Wayne Chiu P.E., *Water Resource Control Engineer*

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Attachment F – Data

The California Regional Water Quality Control Board, San Diego Region (hereinafter San Diego Water Board), finds that:

A. BASIS FOR THE ORDER

1. This Order is based on the federal Clean Water Act (CWA), the Porter-Cologne Water Quality Control Act (Division 7 of the Water Code, commencing with Section 13000), applicable State and federal regulations, all applicable provisions of statewide Water Quality Control Plans and Policies adopted by the State Water Resources Control Board (State Water Board), the Water Quality Control Plan for the San Diego Basin adopted by the San Diego Water Board (Basin Plan), the California Toxics Rule, and the California Toxics Rule Implementation Plan.

2. This Order reissues National Pollutant Discharge Elimination System (NPDES) Permit No. CAS0108766, which was first adopted by the San Diego Water Board on July 16, 1990 (Order No. 90-38), and then reissued on May 13, 1998 (Order No. 98-02). On May 26, 1998, the United States Environmental Protection Agency (USEPA), Region IX, objected to Order No. 98-02 due to concerns regarding Receiving Water Limitations (RWL) language. The USEPA concluded that the RWL language in the permit did not comply with the CWA and its implementing regulations. On April 27, 1999, the USEPA reissued the MS4 permit, which the San Diego Water Board adopted as Addendum No. 1 to Order No. 98-02 on November 8, 2000. On July 14, 2004, the San Diego Water Board adopted the third term MS4 permit, Order No. R9-2004-001. On January 15, 2009, the Riverside County Flood Control and Water Conservation District (RCFCD), as the Principal Copermittee, submitted a Report of Waste Discharge (ROWD) for reissuance of the municipal separate storm sewer system (MS4) Permit.

3. This Order is consistent with the following precedential Orders adopted by the State Water Board addressing MS4 NPDES Permits: Order 99-05, Order WQ-2000-11, Order WQ 2001-15, Order WQO 2002-0014, and Order WQ-2009-0008 (*SWRCB/OCC FILE A-1780).*

4. The Fact Sheet / Technical Report for the Order No. R9-2010-0016, NPDES No. CAS0108766, Waste Discharge Requirements for Discharges from the MS4s Draining the County of Riverside, the Incorporated Cities of Riverside County, and the Riverside County Flood Control and Water Conservation District within the San Diego Region, includes cited regulatory and legal references and additional explanatory information and data in support of the requirements of this Order. This information, including any supplements thereto, and any response to comments on the Tentative Orders, is hereby incorporated by reference into these findings.

B. REGULATED PARTIES

1. Each of the persons in Table 1 below, hereinafter called Copermittees or dischargers, owns or operates an MS4, through which it discharges into waters of the United States (U.S.) within the San Diego Region. These MS4s fall into one or more of the following categories: (1) a medium or large MS4 that services a population of greater than 100,000 or 250,000 respectively; or (2) a small MS4 that is "interrelated" to a medium or large MS4; or (3) an MS4 that contributes to a violation of a water quality standard; or (4) an MS4 which is a significant contributor of pollutants to waters of the U.S.

Table 1. Municipal Copermittees

1. City of Murrieta	4. County of Riverside
2. City of Temecula	5. Riverside County Flood Control and Water Conservation District
3. City of Wildomar	
6. City of Menifee[1]	

The Cities of Murrieta, Menifee and Wildomar also discharge into the waters of the U.S. in the California Regional Water Quality Control Board, Santa Ana Region (Santa Ana Water Board), so are located partially within both the San Diego and Santa Ana Water Board boundaries. As allowed by California Water Code (CWC) §13228, these Cities submitted written requests to be regulated for MS4 purposes under a permit adopted by only one Water Board. As authorized by CWC §13228 and pursuant to a written agreement between the San Diego Water Board and the Santa Ana Water Board, the Cities of Murrieta and Wildomar are wholly regulated by the San Diego Water Board under this Order, including those portions of the Cities jurisdiction not within the San Diego Water Board's region. Similarly, the City of Menifee is wholly regulated by the Santa Ana Water Board under Order No. R8-2010-0033, including those portions of the City of Menifee within the San Diego Water Board's region.[1]

C. DISCHARGE CHARACTERISTICS

1. Discharges from the MS4 contain waste, as defined in the CWC, and pollutants that adversely affect the quality of the waters of the State. The discharge from an MS4 is a "discharge of pollutants from a point source" into waters of the U.S. as defined in the CWA.

2. MS4 storm water and non-storm water discharges are likely to contain pollutants that cause or threaten to cause a violation of water quality standards, as outlined in the Basin Plan. Storm water and non-storm water discharges from the MS4 are subject

[1] Until an agreement is finalized, the City of Menifee is included as a Copermittee in this Order.

to the conditions and requirements established in the Basin Plan for point source discharges.

3. The most common categories of pollutants in runoff include total suspended solids, sediment, pathogens (e.g., bacteria, viruses, protozoa), heavy metals (e.g., copper, lead, zinc and cadmium), petroleum products and polynuclear aromatic hydrocarbons, synthetic organics (e.g., pesticides, herbicides, and PCBs), nutrients (e.g., nitrogen and phosphorus fertilizers), oxygen-demanding substances (decaying vegetation, animal waste), detergents, and trash.

4. The discharge of pollutants and/or increased flows from MS4s may cause or threaten to cause the concentration of pollutants to exceed applicable receiving water quality objectives and/or impair or threaten to impair designated beneficial uses resulting in a condition of pollution (i.e., unreasonable impairment of water quality for designated beneficial uses), contamination, or nuisance.

5. Pollutants in runoff can threaten and adversely affect human health. Human illnesses have been clearly linked to recreating near storm drains flowing to receiving waters. Also, runoff pollutants in receiving waters can bioaccumulate in the tissues of invertebrates and fish, which may be eventually consumed by humans.

6. Runoff discharges from MS4s often contain pollutants that cause toxicity to aquatic organisms (i.e., adverse responses of organisms to chemicals or physical agents ranging from mortality to physiological responses such as impaired reproduction or growth anomalies). Toxic pollutants impact the overall quality of aquatic systems and beneficial uses of receiving waters.

7. The Copermittees discharge runoff into lakes, drinking water reservoirs, rivers, streams, creeks, bays, estuaries, coastal lagoons, the Pacific Ocean, and tributaries thereto within one of the eleven hydrologic units (Santa Margarita Hydrologic Unit) comprising the San Diego Region as shown in Table 2. Some of the receiving water bodies have been designated as impaired by the San Diego Water Board in 2009 pursuant to CWA section 303(d).

Table 2. Common Watersheds and CWA Section 303(d) Impaired Waters in the San Diego Region.

Hydrologic Area (HA) or Hydrologic Subarea (HSA) of the Santa Margarita Hydrologic Unit	**Major Receiving Water Bodies**	**303(d) Pollutant(s)/stressor or Water Quality Effect[2]**
DeLuz Creek HSA (902.21)	De Luz Creek	Iron, Manganese, Nitrogen, Sulfates
Murrieta HSA (902.32)	Long Canyon Creek (tributary to Murrieta Creek	Chlorpyrifos, E. Coli, Fecal Coliform, Iron, Manganese
Wolf HSA (902.52)	Murrieta Creek	Chlorpyrifos, Copper, Iron, Manganese, Nitrogen, Toxicity
Pauba HSA (902.51)	Redhawk Channel	Chlorpyrifos, Copper, Diazinon, E. Coli, Fecal Coliform, Iron, Manganese, Nitrogen, Phosphorus, Total Dissolved Solids
Gavilan HSA (902.22)	Sandia Creek	Iron, Sulfates
Gertrudis HSA (902.42)	Santa Gertrudis Creek	Chlorpyrifos, Copper, E. Coli, Fecal Coliform, Iron, Phosphorous
Lower Ysidora HSA (902.11)	Santa Margarita Lagoon	Eutrophic
Lower Ysidora HSA (902.11)	Santa Margarita River (Lower)	Enterococcus, Fecal Coliform, Phosphorus, Total Nitrogen as N
Gavilan HSA (902.22)	Santa Margarita River (Upper)	Toxicity
Pauba HSA (902.51)	Temecula Creek	Chlorpyrifos, Copper, Phosphorus, Total Dissolved Solids, Toxicity
French HSA (902.33)	Warm Springs Creek (Riverside County)	Chlorpyrifos, E. Coli, Fecal Coliform, Iron, Manganese, Phosphorus, Total Nitrogen as N

[2] The listed 303(d) pollutant(s) do not necessarily reflect impairment of the entire corresponding WMA or all corresponding major surface water bodies. The specific impaired portions of each WMA are listed in the State Water Resources Control Board's 2008 Section 303(d) List of Water Quality Limited Segments.

8. Trash is a persistent pollutant that can enter receiving waters from the MS4, accumulate, and be transported downstream into receiving waters over time. Trash poses a serious threat to the beneficial uses of the receiving waters, including, but not limited to, human health, rare and endangered species, navigation and human recreation.

9. The Copermittees' water quality monitoring data submitted to date documents persistent violations of Basin Plan water quality objectives for various runoff-related pollutants (indicator bacteria, dissolved solids, turbidity, metals, pesticides, etc.) at various watershed monitoring stations. Persistent toxicity has also been observed at some watershed monitoring stations. In addition, bioassessment data indicate that the majority of the monitored receiving waters have Poor to Very Poor Index of Biotic Integrity ratings. In sum, the above findings indicate that runoff discharges are causing or contributing to water quality impairments, and are a leading cause of such impairments in Riverside County.

10. When natural vegetated pervious ground cover is converted to impervious surfaces such as paved highways, streets, rooftops, and parking lots, the natural absorption and infiltration abilities of the land are lost. Therefore, runoff leaving a developed area is significantly greater in runoff volume, velocity, and peak flow rate than pre-development runoff from the same area. Runoff durations can also increase as a result of flood control and other efforts to control peak flow rates. Increased volume, velocity, rate, and duration of runoff, and decreased natural clean sediment loads, greatly accelerate the erosion of downstream natural channels. Significant declines in the biological integrity and physical habitat of streams and other receiving waters have been found to occur with as little as a 3-5 percent conversion from natural to impervious surfaces. The increased runoff characteristics from new development must be controlled to protect against increased erosion of channel beds and banks, sediment pollutant generation, or other impacts to beneficial uses and stream habitat due to increased erosive force.

11. Development creates new pollution sources as human population density increases and brings with it proportionately higher levels of car emissions, car maintenance wastes, municipal sewage, pesticides, household hazardous wastes, pet wastes, trash, etc. which can either be washed or directly dumped into the MS4. As a result, the runoff leaving the developed urban area is significantly greater in pollutant load than the pre-development runoff from the same area. These increased pollutant loads must be controlled to protect downstream receiving water quality.

12. Development and urbanization especially threaten environmentally sensitive areas (ESAs), such as water bodies designated as supporting a RARE beneficial use (supporting rare, threatened or endangered species) and CWA 303(d)-impaired water bodies. Such areas have a much lower capacity to withstand pollutant loads than other, more sensitive areas. In essence, development that is ordinarily insignificant in its impact on the environment may become significant in a particularly sensitive environment. Therefore, additional controls to reduce storm water

pollutants from new and existing development may be necessary for areas adjacent to or discharging directly to an ESA.

13. Although dependent on several factors, the risks typically associated with properly managed infiltration of runoff (especially from residential land use areas) are not significant. The risks associated with infiltration can be managed by many techniques, including (1) designing landscape drainage features that promote infiltration of runoff, but do not "inject" runoff (injection bypasses the natural processes of filtering and transformation that occur in the soil); (2) taking reasonable steps to prevent the illegal disposal of wastes; (3) protecting footings and foundations; (4) ensuring that each drainage feature is adequately maintained in perpetuity; and (5) pretreatment.

14. Non-storm water (dry weather) discharge from the MS4 is not considered a storm water (wet weather) discharge and therefore is not subject to regulation under the Maximum Extent Practicable (MEP) standard from CWA 402(p)(3)(B)(iii), which is explicitly for "Municipal … *Stormwater Discharges* (emphasis added)" from the MS4. Rather, non-storm water discharges into the storm sewers, per CWA 402(p)(3)(B)(ii), are to be effectively prohibited. Such dry weather non-storm water discharges have been shown to contribute significant levels of pollutants and flow in arid, developed Southern California watersheds and are to be effectively prohibited under the CWA.

15. Non-storm water discharges to the MS4 granted an influent exception [i.e., which are exempt from the effective prohibition requirement set forth in CWA section 402(p)(3)(B)(ii)] under 40 CFR 122.26 are included within this Order. Any exempted discharges identified by Copermittees as a source of pollutants are subsequently required to be *addressed* (emphasis added) as illicit discharges through prohibition and incorporation into existing IC/ID programs. Furthermore, the USEPA contemplates that permitting agencies such as the San Diego Water Board may also identify exempted discharges as a source of pollutants required to be addressed as illicit discharges (See VOl. 55 Fed. Reg. 48037). The San Diego Water Board and the Copermittees have identified landscape irrigation, irrigation water and lawn water, previously exempted discharges, as a source of pollutants and conveyance of pollutants to waters of the U.S.

D. RUNOFF MANAGEMENT PROGRAMS

1. General

a. This Order specifies requirements necessary for the Copermittees to reduce the discharge of pollutants in storm water to the MEP. However, since MEP is a dynamic performance standard, which evolves over time as runoff management knowledge increases, the Copermittees' runoff management programs must continually be assessed and modified to incorporate improved programs, control measures, best management practices (BMPs), etc. in order to achieve the

evolving MEP standard. Absent evidence to the contrary, this continual assessment, revision, and improvement of runoff management program implementation is expected to ultimately achieve compliance with water quality standards in the Region.

b. The Copermittees have generally been implementing the jurisdictional runoff management programs (JRMPs) required pursuant to Order No. R9-2004-001 since July 14, 2005. Prior to that, the Copermittees were regulated by Order No. 98-02, since May 13, 1998. MS4 discharges, however, continue to cause or contribute to violations of water quality standards as evidenced by the Copermittees' monitoring results.

c. This Order contains new or modified requirements that are necessary to improve Copermittees' efforts to reduce the discharge of pollutants in storm water runoff to the MEP and achieve water quality standards. Some of the new or modified requirements, such as the revised Watershed Water Quality Workplan (Watershed Workplan) section, are designed to specifically address high priority water quality problems. Other requirements, such as for unpaved roads, are a result of San Diego Water Board's identification of water quality problems through investigations and complaints during the previous permit period. Other new or modified requirements address program deficiencies that have been noted during audits, report reviews, and other San Diego Water Board compliance assessment activities. Additional changes in the monitoring program provide consistency with the Code of Federal Regulations, USEPA guidance, State Water Board guidance, and the Southern California Monitoring Coalition recommendations.

d. Updated individual Drainage Area Management Plans (DAMP), and Watershed Stormwater Management Plans (watershed SWMPs), which describe the Copermittees' runoff management programs in their entirety, are needed to guide the Copermittees' runoff management efforts and aid the Copermittees in tracking runoff management program implementation. Hereinafter, the individual DAMP is referred to as the JRMPs and the Watershed SWMP is referred to as the Watershed Workplan. It is practicable for the Copermittees to update the JRMPs and Watershed Workplans within the timeframe specified in this Order, since significant efforts to develop these programs have already occurred.

e. Pollutants can be effectively reduced in storm water runoff by the application of a combination of pollution prevention, source control, and treatment control BMPs. Pollution prevention is the reduction or elimination of pollutant generation at its source and is the best "first line of defense." Source control BMPs (both structural and non-structural) minimize the contact between pollutants and flows (e.g., rerouting run-on around pollutant sources or keeping pollutants on-site and out of receiving waters). Treatment control BMPs remove pollutants that have been mobilized by wet-weather or dry-weather flows.

f. Runoff needs to be addressed during the three major phases of urban development (planning, construction, and use) in order to reduce the discharge of pollutants from storm water to the MEP, effectively prohibit non-storm water discharges and protect receiving waters. Development which is not guided by water quality planning policies and principles can unnecessarily result in increased pollutant load discharges, flow rates, and flow durations which can negatively impact receiving water beneficial uses. Construction sites without adequate BMP implementation result in sediment runoff rates which greatly exceed natural erosion rates of undisturbed lands, causing siltation and impairment of receiving waters. Existing development generates substantial pollutant loads which are discharged in runoff to receiving waters.

g. Annual reporting requirements included in this Order are necessary to meet federal requirements and to evaluate the effectiveness and compliance of the Copermittees' programs.

h. This Order establishes Storm Water Action Levels (SALs) for selected pollutants based on USEPA Rain Zone 6 (arid southwest) Phase I MS4 monitoring data for pollutants in storm water. The SALs were computed as the 90th percentile of the data set, utilizing the statistical based population approach, one of three approaches recommended by the State Water Board's Storm Water Panel in its report, 'The Feasibility of Numerical Effluent Limits Applicable to Discharges of Storm Water Associated with Municipal, Industrial and Construction Activities (June 2006). SALs are identified in Section D of this Order. Copermittees must implement a timely, comprehensive, cost-effective storm water pollution control program to reduce the discharge of pollutants in storm water from the permitted areas so as not to exceed the SALs. Exceedance of SALs may indicate inadequacy of programmatic measures and BMPs required in this Order.

2. **Development Planning**

a. The Standard Storm Water Mitigation Plan (SSMP) requirements contained in this Order are consistent with Order WQ-2000-11 adopted by the State Water Board on October 5, 2000. In the precedential order, the State Water Board found that the design standards, which essentially require that runoff generated by 85 percent of storm events from specific development categories be infiltrated or treated, reflect the MEP standard. The order also found that the SSMP requirements are appropriately applied to the majority of the Priority Development Project categories that are also contained in Section F.1 of this Order. The State Water Board also gave California Regional Water Quality Control Boards (Regional Water Boards) the needed discretion to include additional categories and locations, such as retail gasoline outlets (RGOs), in SSMPs.

b. Controlling runoff pollution by using a combination of onsite source control and site design BMPs augmented with treatment control BMPs before the runoff enters the MS4 is important for the following reasons: (1) Many end-of-pipe BMPs (such as diversion to the sanitary sewer) are typically ineffective during significant storm events. (2) Whereas, onsite source control BMPs can be applied during all runoff conditions end-of-pipe BMPs are often incapable of capturing and treating the wide range of pollutants which can be generated on a sub-watershed scale; (3) End-of-pipe BMPs are more effective when used as polishing BMPs, rather than the sole BMP to be implemented; (4) End-of-pipe BMPs do not protect the quality or beneficial uses of receiving waters between the pollutant source and the BMP; and (5) Offsite end-of-pipe BMPs do not aid in the effort to educate the public regarding sources of pollution and their prevention.

c. Use of Low-Impact Development (LID) site design BMPs at new development, redevelopment and retrofit projects can be an effective means for minimizing the impact of storm water runoff discharges from the development projects on receiving waters. LID is a site design strategy with a goal of maintaining or replicating the pre-development hydrologic regime through the use of design techniques. LID site design BMPs help preserve and restore the natural hydrologic cycle of the site, allowing for filtration and infiltration which can greatly reduce the volume, peak flow rate, velocity, and pollutant loads of storm water runoff. Current runoff management, knowledge, practices and technology have resulted in the use of LID BMPs as an acceptable means of meeting the storm water MEP standard.

d. RGOs are significant sources of pollutants in storm water runoff. RGOs are points of convergence for motor vehicles for automotive related services such as repair, refueling, tire inflation, and radiator fill-up and consequently produce significantly higher loadings of hydrocarbons and trace metals (including copper and zinc) than other developed areas.

e. Industrial sites are significant sources of pollutants in runoff. Pollutant concentrations and loads in runoff from industrial sites are similar or exceed pollutant concentrations and loads in runoff from other land uses, such as commercial or residential land uses. As with other land uses, LID site design, source control, and treatment control BMPs are needed at industrial sites in order to meet the MEP standard. These BMPs are necessary where the industrial site is larger than 10,000 square feet. The 10,000 square feet threshold is appropriate, since it is consistent with requirements in other Phase I NPDES storm water regulations throughout California.

f. If not properly designed or maintained, certain BMPs implemented or required by municipalities for runoff management may create a habitat for vectors (e.g. mosquitoes and rodents). Proper BMP design and maintenance to avoid standing water, however, can prevent the creation of vector habitat. Nuisances

and public health impacts resulting from vector breeding can be prevented with close collaboration and cooperative effort between municipalities, local vector control agencies, and the California Department of Public Health during the development and implementation of runoff management programs.

g. The increased volume, velocity, frequency and discharge duration of storm water runoff from developed areas has the potential to greatly accelerate downstream erosion, impair stream habitat in natural drainages, and negatively impact beneficial uses. Development and urbanization increase pollutant loads in storm water runoff and the volume of storm water runoff. Impervious surfaces can neither absorb water nor remove pollutants and thus lose the purification and infiltration provided by natural vegetated soil. Hydromodification measures for discharges to hardened channels are needed for the future restoration of the hardened channels to their natural state, thereby restoring the chemical, physical, and biological integrity and beneficial uses of local receiving waters.

3. **Construction and Existing Development**

a. In accordance with federal NPDES regulations and to ensure the most effective oversight of industrial and construction site discharges, discharges of runoff from industrial and construction sites are subject to dual (State and local) storm water regulation. Under this dual system, each Copermittee is responsible for enforcing its local permits, plans, and ordinances, and the San Diego Water Board is responsible for enforcing the General Construction Activities Storm Water Permit, State Water Board Order 2009-0009-DWQ, NPDES No. CAS000002 (General Construction Permit) and the General Industrial Activities Storm Water Permit, State Water Board Order 97-03 DWQ, NPDES No. CAS000001 (General Industrial Permit) and any reissuance of these permits. NPDES municipal regulations require that municipalities develop and implement measures to address runoff from industrial and construction activities. Those measures may include the implementation of other BMPs in addition to those BMPs that are required under the statewide general permits for activities subject to both State and local regulation.

b. Identification of sources of pollutants in runoff (such as municipal areas and activities, industrial and commercial sites/sources, construction sites, and residential areas), development and implementation of BMPs to address those sources, and updating ordinances and approval processes are necessary for the Copermittees to ensure that discharges of pollutants from its MS4 in storm water are reduced to the MEP and that non-storm water discharges are not occurring. Inspections and other compliance verification methods are needed to ensure minimum BMPs are implemented. Inspections are especially important at areas that are at high risk for pollutant discharges.

c. Historic and current development makes use of natural drainage patterns and features as conveyances for runoff. Urban streams used in this manner are part of the municipalities' MS4s regardless of whether they are natural, anthropogenic, or partially modified features. In these cases, the urban stream is both an MS4 and receiving water.

d. As operators of the MS4s, the Copermittees cannot passively receive and discharge pollutants from third parties. By providing free and open access to an MS4 that conveys discharges to waters of the U.S., the operator essentially accepts responsibility for discharges into the MS4 that it does not prohibit or otherwise control. These discharges may cause or contribute to a condition of contamination or a violation of water quality standards.

e. Waste and pollutants which are deposited and accumulate in MS4 drainage structures will be discharged from these structures to waters of the U.S. unless they are removed. These discharges may cause or contribute to, or threaten to cause or contribute to, a condition of pollution in receiving waters. For this reason, pollutant discharges from storm water into MS4s must be reduced using a combination of management measures, including source control and an effective MS4 maintenance program implemented by each Copermittee.

f. Enforcement of local runoff related ordinances, permits, and plans is an essential component of every runoff management program and is specifically required in the federal storm water regulations and this Order. Each Copermittee is individually responsible for adoption and enforcement of ordinances and/or policies, implementation of identified control measures/BMPs needed to prevent or reduce pollutants in storm water runoff, and for the allocation of funds for the capital, operation and maintenance, administrative, and enforcement expenditures necessary to implement and enforce such control measures/BMPs under its jurisdiction. Education is an important aspect of every effective runoff management program and the basis for changes in behavior at a societal level. Education of municipal planning, inspection, and maintenance department staffs is especially critical to ensure that in-house staffs understand how their activities impact water quality, how to accomplish their jobs while protecting water quality, and understand their specific roles and responsibilities for compliance with this Order. Public education, designed to target various urban land users and other audiences, is also essential to inform the public of how individual actions affect receiving water quality and how adverse effects can be minimized.

g. Public participation during the development of runoff management programs is necessary to ensure that all stakeholder interests and a variety of creative solutions are considered.

h. Retrofitting existing development with storm water treatment controls, including LID, is necessary to address storm water discharges from existing development that may cause or contribute to a condition of pollution or a violation of water

quality standards. Although SSMP BMPs are required for redevelopment, the current rate of redevelopment will not address water quality problems in a timely manner. Cooperation with private landowners is necessary to effectively identify, implement and maintain retrofit projects for the preservation, restoration, and enhancement of water quality.

4. **Watershed Runoff Management**

   a. Since runoff within a watershed can flow from and through multiple land uses and political jurisdictions, watershed-based runoff management can greatly enhance the protection of receiving waters. Such management provides a means to focus on the most important water quality problems in each watershed. By focusing on the most important water quality problems, watershed efforts can maximize protection of beneficial use in an efficient manner. Effective watershed-based runoff management actively reduces pollutant discharges and abates pollutant sources causing or contributing to watershed water quality problems. Watershed-based runoff management that does not actively reduce pollutant discharges and abate pollutant sources causing or contributing to watershed water quality problems can necessitate implementation of the iterative process outlined in section A.3 of this Order. Watershed management of runoff does not require Copermittees to expend resources outside of their jurisdictions. In some cases, however, this added flexibility provides more, and possibly more effective, alternatives for minimizing waste discharges. Watershed management requires the Copermittees within a watershed to develop a watershed-based management strategy, which can then be implemented on a jurisdictional basis.

   b. Some runoff issues, such as general education and training, can be effectively addressed on a regional basis. Regional approaches to runoff management can improve program consistency and promote sharing of resources, which can result in implementation of more efficient programs.

   c. It is important for the Copermittees to coordinate their water quality protection and land use planning activities to achieve the greatest protection of receiving water bodies. Copermittee coordination with other watershed stakeholders, especially the State of California Department of Transportation, the U.S. federal government, sovereign American Indian tribes, and water and sewer districts, is also important.

E. STATUTE AND REGULATORY CONSIDERATIONS

1. The RWL language specified in this Order is consistent with language recommended by the USEPA and established in State Water Board Order WQ-99-05, *Own Motion Review of the Petition of Environmental Health Coalition to Review Waste Discharge Requirements Order No. 96-03, NPDES Permit No. CAS0108740*, adopted by the

State Water Board on June 17, 1999. The RWL language in this Order requires compliance with water quality standards, which for storm water discharges is to be achieved through an iterative approach requiring the implementation of improved and better-tailored BMPs over time. Compliance with receiving water limits based on applicable water quality standards is necessary to ensure that MS4 discharges will not cause or contribute to violations of water quality standards and the creation of conditions of pollution, contamination, or nuisance.

2. The Basin Plan, identifies the following existing and potential beneficial uses for surface waters in Riverside County: Municipal and Domestic Supply (MUN), Agricultural Supply (AGR), Industrial Process Supply (PROC), Hydropower Generation (POW), Industrial Service Supply (IND), Ground Water Recharge (GWR), Contact Water Recreation (REC1), Non-contact Water Recreation (REC2), Warm Freshwater Habitat (WARM), Cold Freshwater Habitat (COLD), Wildlife Habitat (WILD), Rare, Threatened, or Endangered Species (RARE), Spawning, Reproduction and/or Early Development (SPWN) and Preservation of Biological Habitats of Special Significance (BIOL).

3. This Order is in conformance with State Water Board Resolution No. 68-16, *Statement of Policy with Respect to Maintaining High Quality Waters in California*, and the federal Antidegradation Policy described in 40 CFR 131.12.

4. Section 6217(g) of the Coastal Zone Act Reauthorization Amendments of 1990 (CZARA) requires coastal states with approved coastal zone management programs to address non-point pollution impacting or threatening coastal water quality. CZARA addresses five sources of non-point pollution: agriculture, silviculture, urban, marinas, and hydromodification. This NPDES permit addresses the management measures required for the urban category, with the exception of septic systems. The adoption and implementation of this NPDES permit relieves the Copermittee from developing a non-point source plan, for the urban category, under CZARA. The San Diego Water Board addresses septic systems through the administration of other programs.

5. Section 303(d)(1)(A) of the CWA requires that "Each state shall identify those waters within its boundaries for which the effluent limitations…are not stringent enough to implement any water quality standard (WQS) applicable to such waters." The CWA also requires states to establish a priority ranking of impaired water bodies known as Water Quality Limited Segments and to establish Total Maximum Daily Loads (TMDLs) for such waters. This priority list of impaired water bodies is called the Section 303(d) List. The 2006 Section 303(d) List was approved by the State Water Board on October 25, 2006. On June 28, 2007, the 2006 303(d) list for California was given final approval by the USEPA. The 303(d) List was recently updated, and on December 16, 2009, the 2008 303(d) List was approved by the San Diego Water Board. The 2008 List is awaiting State Water Board and USEPA approval.

6. This Order does not constitute an unfunded local government mandate subject to subvention under Article XIIIB, Section (6) of the California Constitution for several reasons, including, but not limited to, the following. First, this Order implements federally mandated requirements under CWA §402. (33 U.S.C. § 1342(p)(3)(B).) Second, the local agency Copermittees' obligations under this Order are similar to, and in many respects less stringent than, the obligations of non-governmental and new dischargers who are issued NPDES permits for storm water and non-storm water discharges. Third, the local agency Copermittees have the authority to levy service charges, fees, or assessments sufficient to pay for compliance with this Order. Fourth, the Copermittees have requested permit coverage in lieu of compliance with the complete prohibition against the discharge of pollutants contained in CWA §301, subdivision (a) (33 U.S.C. § 1311(a)) and in lieu of numeric restrictions on their MS4 discharges (i.e. effluent limitations). Fifth, the local agencies' responsibility for preventing discharges of waste that can create conditions of pollution or nuisance from conveyances that are within their ownership or control under State law predates the enactment of Article XIIIB, Section (6) of the California Constitution. Likewise, the provisions of this Order to implement TMDLs are federal mandates. The CWA requires TMDLs to be developed for water bodies that do not meet federal water quality standards. (33 U.S.C. sec. 1313(d).) Once the USEPA or a state develops a TMDL, federal law requires that permits must contain effluent limitations consistent with the assumptions of any applicable wasteload allocation. (40 C.F.R. sec. 122.44(d)(1)(vii)(B).)

7. Runoff treatment and/or mitigation must occur prior to the discharge of runoff into receiving waters. Treatment BMPs must not be constructed in waters of the U.S. or State unless the runoff flows are sufficiently pretreated to protect the values and functions of the water body. Federal regulations at 40 CFR 131.10(a) state that in no case shall a state adopt waste transport or waste assimilation as a designated use for any waters of the U.S. Authorizing the construction of an runoff treatment facility within a water of the U.S., or using the water body itself as a treatment system or for conveyance to a treatment system, would be tantamount to accepting waste assimilation as an appropriate use for that water body. Furthermore, the construction, operation, and maintenance of a pollution control facility in a water body can negatively impact the physical, chemical, and biological integrity, as well as the beneficial uses, of the water body. Without federal authorization (e.g., pursuant to CWA § 404), waters of the U.S. may not be converted into, or used as, waste treatment or conveyance facilities. Similarly, waste discharge requirements pursuant to CWC §13260 are required for the conversion or use of waters of the State as waste treatment or conveyance facilities. Diversion from waters of the U.S./State to treatment facilities and subsequent return to waters of the U.S. is allowable, provided that the effluent complies with applicable NPDES requirements.

8. The issuance of waste discharge requirements and an NPDES permit for the discharge of runoff from MS4s to waters of the U.S. is exempt from the requirement for preparation of environmental documents under the California Environmental Quality Act (CEQA) (Public Resources Code, Division 13, Chapter 3, section 21000 et seq.) in accordance with the CWC section 13389.

9. Storm water discharges from developed and developing areas in Riverside County are significant sources of certain pollutants that cause, may be causing, threatening to cause or contributing to water quality impairment in the waters of Riverside County. Furthermore, as delineated in the CWA section 303(d) list in Table 2, the San Diego Water Board has found that there is a reasonable potential that municipal storm water and non-storm water discharges from MS4s cause or may cause or contribute to an excursion above water quality standards for the following pollutants: Indicator Bacteria, Copper, Manganese, Iron, Chlorpyrifos, Sulfates, Phosphorous, Nitrogen, Toxicity, and Turbidity. In accordance with CWA section 303(d), the San Diego Water Board is required to establish TMDLs for these pollutants to these waters to eliminate impairment and attain water quality standards. Therefore, certain early pollutant control actions and further pollutant impact assessments by the Copermittees are warranted and required pursuant to this Order.

10. This Order requires each Copermittee to effectively prohibit all types of unauthorized discharges of non-storm water into its MS4. However, historically pollutants have been identified as present in dry weather non-storm water discharges from the MS4s through 303(d) listings, monitoring conducted by the Copermittees under Order No. R9-2004-0001, and there are others expected to be present in dry weather non-storm water discharges because of the nature of these discharges. This Order includes action levels for pollutants in non-storm water, dry weather discharges from the MS4. The non-storm water action levels are designed to ensure that the Order's requirement to effectively prohibit all types of unauthorized discharges of non-storm water into the MS4 is being complied with. Non-storm water action levels in the Order are based upon numeric or narrative water quality objectives and criteria as defined in the Basin Plan, the State Water Board's Water Quality Control Plan for Ocean Waters of California (Ocean Plan), and the State Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California (State Implementation Policy or SIP). An exceedance of an action level requires specified responsive action by the Copermittees. This Order describes what actions the Copermittees must take when an exceedance of an action level is observed. Exceedances of non-storm water action levels do not alone constitute a violation of this Order but could indicate non-compliance with the requirement to effectively prohibit all types of unauthorized non-storm water discharges into the MS4 or other prohibitions established in this Order. Failure to undertake required source investigation and elimination action following an exceedance of a non-storm water action level (NAL or action level) is a violation of this Order. The San Diego Water Board recognizes that use of action levels will not necessarily result in detection of all unauthorized sources of non-storm water discharges because there may be some discharges in which pollutants do not exceed established action

levels. However, establishing NALs at levels appropriate to protect water quality standards is expected to lead to the identification of significant sources of pollutants in dry weather non-storm water discharges.

11. In addition to federal regulations cited in the Fact Sheet / Technical Report for the Order No. R9-2010-0016, monitoring and reporting required under Order No. R9-2010-0016 is required pursuant to authority under CWC section 13383.

12. With this Order, the San Diego Water Board has completed the re-issuance of the fourth iteration of the Phase I MS4 NPDES Permits for the Copermittees in the portions of San Diego County, Orange County, and Riverside County within the San Diego Region. The NPDES Permit requirements issued to the Copermittees in each county have substantially the same core requirements such as discharge prohibitions, receiving water limitations, jurisdictional components, and monitoring. In addition, the Copermittees cooperate regionally to develop monitoring with the Southern California Stormwater Monitoring Coalition and to develop program effectiveness with the California Stormwater Quality Association. Regional programs could improve the Copermittees' compliance with other permit components such as development of the Hydromodification Management Plans and Retrofitting Existing Development with more consistent implementation and cost sharing. Re-issuing the NPDES Permit requirements within five years for three counties under three different permits requires the San Diego Water Board to expend significant time and resources for issuance of the permits through three separate public proceedings, thereby greatly reducing the time and resources available to oversee compliance. Multiple permits also create confusion for determining compliance among regulated entities, especially the land development community. The San Diego Water Board recognizes that issuing a single MS4 permit for all Phase I entities in the San Diego Region will provide consistent implementation, improve communication among agencies within watersheds crossing multiple jurisdictions, and minimize staff resources spent with each permit renewal. The San Diego Water Board plans to develop a single regional MS4 permit prior to the expiration of this Order that will transfer the Copermittees' enrollment to the regional permit upon expiration of this Order.

F. PUBLIC PROCESS

1. The San Diego Water Board has notified the Copermittees, all known interested parties, and the public of its intent to consider adoption of an Order prescribing waste discharge requirements that would serve to renew an NPDES permit for the existing MS4 discharges of pollutants in waters of the U.S.

2. The San Diego Water Board has held a public hearing on October 13, 2010 and heard and considered all comments pertaining to the terms and conditions of this Order.

IT IS HEREBY ORDERED that the Copermittees, in order to meet the provisions contained in Division 7 of the CWC and regulations adopted thereunder, and the provisions of the CWA and regulations adopted thereunder, must each comply with the following:

A. PROHIBITIONS AND RECEIVING WATER LIMITATIONS

1. Discharges into and from MS4s in a manner causing, or threatening to cause, a condition of pollution, contamination, or nuisance (as defined in CWC section 13050), in receiving waters of the state are prohibited.[3]

2. Storm water discharges from MS4s containing pollutants which have not been reduced to the MEP are prohibited.[3]

3. Discharges from MS4s that cause or contribute to the violation of water quality standards (designated beneficial uses, water quality objectives developed to protect beneficial uses, and the State policy with respect to maintaining high quality waters) are prohibited.

a. Each Copermittee must comply with section A.3 and section A.4 as it applies to Prohibition 5 in Attachment A of this Order through timely implementation of control measures and other actions to reduce pollutants in storm water discharges in accordance with this Order, including any modifications. If exceedance(s) of water quality standards persist notwithstanding implementation of this Order, the Copermittee must assure compliance with section A.3 and section A.4 as it applies to Prohibition 5 in Attachment A of this Order by complying with the following procedure:

(1) Upon a determination by either the Copermittee or the San Diego Water Board that storm water MS4 discharges are causing or contributing to an exceedance of an applicable water quality standard, the Copermittee must notify the San Diego Water Board within 30 days and thereafter submit a report to the San Diego Water Board that describes best management practices (BMPs) that are currently being implemented and additional BMPs that will be implemented to prevent or reduce any pollutants that are causing or contributing to the exceedance of water quality standards. The report may be incorporated in the Annual Report unless the San Diego Water Board[4] directs an earlier submittal. The report must include an

[3] This prohibition does not apply to MS4 discharges which receive subsequent treatment to reduce pollutants in storm water discharges to the MEP prior to entering receiving waters (e.g., low flow diversions to the sanitary sewer). Runoff treatment and/or mitigation must occur prior to the discharge of runoff into receiving waters per finding E.7.

[4] The San Diego Water Board by prior resolution has delegated all matters that may legally be delegated to its Executive Officer to act on its behalf pursuant to CWC §13223. Therefore, the Executive Officer is

implementation schedule. The San Diego Water Board may require modifications to the report

(2) Submit any modifications to the report required by the San Diego Water Board within 30 days of notification;

(3) Within 30 days following acceptance of the report described above by the San Diego Water Board, the Copermittee must revise its JRMP and monitoring program to incorporate the approved modified BMPs that have been and will be implemented, the implementation schedule, and any additional monitoring required; and

(4) Implement the revised JRMP and monitoring program in accordance with the approved schedule.

b. The Copermittee must repeat the procedure set forth above to comply with the receiving water limitations for continuing or recurring exceedances of the same water quality standard(s) following implementation of scheduled actions unless directed to do otherwise by the San Diego Water Board's Executive Officer.

c. Nothing in section A.3 prevents the San Diego Water Board from enforcing any provision of this Order while the Copermittee prepares and implements the above report.

4. In addition to the above prohibitions, discharges from MS4s are subject to all Basin Plan prohibitions cited in Attachment A to this Order.

B. NON-STORM WATER DISCHARGES

1. Each Copermittee must effectively prohibit all types of non-storm water discharges into its MS4 unless such discharges are either authorized by a separate NPDES permit; or not prohibited in accordance with sections B.2 and B.3 below.

2. The following categories of non-storm water discharges are not prohibited unless a Copermittee or the San Diego Water Board identifies the discharge category as a source of pollutants to waters of the U.S. Where the Copermittee(s) have identified a category as a source of pollutants, the category must be addressed as an illicit discharge and prohibited through ordinance, order or similar means. The San Diego Water Board may identify categories of discharge that either require prohibition, or other controls for non-anthropogenic sources. For a discharge category determined to be a source of pollutants, the Copermittee, under direction of the San Diego Water Board, must either prohibit the discharge category or develop and implement

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authorized to act on the San Diego Water Board's behalf on any matter within this Order unless such delegation is unlawful under CWC §13223 or this Order explicitly states otherwise.

appropriate control measures for non-anthropogenic sources to prevent the discharge of pollutants to the MS4 and report to the San Diego Water Board pursuant to Section K.1 and K.3 of this Order. The discharge categories are:

a. Diverted stream flows;
b. Rising ground waters;
c. Uncontaminated ground water infiltration [as defined at 40 CFR 35.2005(20)] to MS4s;
d. Uncontaminated pumped ground water[5];
e. Foundation drains[5];
f. Springs;
g. Water from crawl space pumps[5];
h. Footing drains[5];
i. Air conditioning condensation;
j. Flows from riparian habitats and wetlands;
k. Water line flushing[6,7];
l. Discharges from potable water sources not subject to NPDES Permit No. CAG679001, other than water main breaks;
m. Individual residential car washing; and
n. Dechlorinated swimming pool discharges[8].

3. Emergency fire fighting flows (i.e., flows necessary for the protection of life or property) do not require BMPs and need not be prohibited.

a. As part of the JRMP, each Copermittee must develop and implement a program to address pollutants from non-emergency fire fighting flows (i.e., flows from controlled or practice blazes and maintenance activities) identified as significant sources of pollutants to waters of the U.S.
b. Building fire suppression system maintenance discharges (e.g. sprinkler line flushing) contain waste. Therefore, such discharges are to be prohibited by the Copermittees as illicit discharges through ordinance, order, or similar means.

4. Each Copermittee must examine all dry weather effluent analytical monitoring results collected in accordance with section F.4 of this Order and Receiving Waters and MS4 Discharge Monitoring and Reporting Program No. R9-2010-0016 to identify water quality problems which may be the result of any non-prohibited discharge category(ies) identified above in section B.2. Follow-up investigations must be conducted to identify and control, pursuant to section B.2, any non-prohibited discharge category(ies) listed above.

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[5] Requires enrollment under Order R9-2008-002. Discharges into the MS4 require authorization from the owner and operator of the MS4 system.
[6] This exemption does not include fire suppression sprinkler system maintenance and testing discharges. Those discharges may be regulated under Section B.3.
[7] Requires enrollment under Order R9-2002-0020.
[8] Excluding saline swimming pool discharges.

C. NON-STORM WATER DRY WEATHER ACTION LEVELS

1. Each Copermittee, beginning no later than July 1, 2012, must implement the non-storm water dry weather action level (NAL) monitoring as described in Attachment E of this Order.

2. In response to an exceedance of an NAL, the Copermittee(s) having jurisdiction must investigate and identify the source of the exceedance in a timely manner. However, if any Copermittee identifies a number of NAL exceedances that prevents it from adequately conducting source investigations at all sites in a timely manner, then that Copermittee may submit a prioritization plan and timeline that identifies the timeframe and planned actions to investigate and report its findings on all of the exceedances. Depending on the source of the pollutant exceedance, the Copermittee(s) having jurisdiction must take action as follows:

a. If the Copermittee identifies the source of the exceedance as natural (non-anthropogenically influenced) in origin and in conveyance into the MS4; then the Copermittee must report its findings and documentation of its source investigation to the San Diego Water Board in its Annual Report.

b. If the Copermittee identifies the source of the exceedance as an illicit discharge or connection, then the Copermittee must eliminate the discharge to its MS4 pursuant to Section F.4.f and report the findings, including any enforcement action(s) taken, and documentation of the source investigation to the San Diego Water Board in the Annual Report. If the Copermittee is unable to eliminate the source of discharge prior to the Annual Report submittal, then the Copermittee must submit, as part of its Annual Report, its plan and timeframe to eliminate the source of the exceedance. Those dischargers seeking to continue such a discharge must become subject to a separate NPDES permit prior to continuing any such discharge.

c. If the Copermittee identifies the source of the exceedance as an exempted category of non-storm water discharge, then the Copermittees must determine if this is an isolated circumstance or if the category of discharges must be addressed through the prevention or prohibition of that category of discharge as an illicit discharge. The Copermittee must submit its findings including a description of the steps taken to address the discharge and the category of discharge, to the San Diego Water Board for review in its Annual Report. Such description must include relevant updates to or new ordinances, orders, or other legal means of addressing the category of discharge, and the anticipated schedule for doing so. The Copermittees must also submit a summary of its findings with the Report of Waste Discharge.

d. If the Copermittee identifies the source of the exceedance as a non-storm water discharge in violation or potential violation of an existing separate NPDES permit

(e.g. the groundwater dewatering permit), then the Copermittee must report, within three business days, the findings to the San Diego Water Board including all pertinent information regarding the discharger and discharge characteristics.

e. If the Copermittee is unable to identify the source of the exceedance after taking and documenting reasonable steps to do so, then the Copermittee must perform additional focused sampling. If the results of the additional sampling indicate a recurring exceedance of NALs with an unidentified source, then the Copermittee must update its programs within a year to address the common contributing sources that may be causing such an exceedance. The Copermittee's annual report must include these updates to its programs including, where applicable, updates to their watershed workplans (Section G.2), retrofitting consideration (Section F.3.d) and program effectiveness work plans (Section J.4).

f. The Copermittees or any interested party, may evaluate existing NALs and propose revised NALs for future Board consideration.

3. NALs can help provide an assessment of the effectiveness of the prohibition of non-storm water discharges and of the appropriateness of exempted non-storm water discharges. An exceedance of an NAL does not alone constitute a violation of the provisions of this Order. An exceedance of an NAL may indicate a lack of compliance with the requirement that Copermittees effectively prohibit all types of unauthorized non-storm water discharges into the MS4 or other prohibitions set forth in Sections A and B of this Order. Failure to timely implement required actions specified in this Order following an exceedance of an NAL constitutes a violation of this Order. Neither the absence of exceedances of NALs nor compliance with required actions following observed exceedances, excuses any non-compliance with the requirement to effectively prohibit all types of unauthorized non-storm water discharges into the MS4s or any non-compliance with the prohibitions in Sections A and B of this Order. During any annual reporting period in which one or more exceedances of NALs have been documented the Copermittee must report in response to Section C.2 above, a description of whether and how the observed exceedances did or did not result in a discharge from the MS4 that caused, or threatened to cause or contribute to a condition of pollution, contamination, or nuisance in the receiving waters.

4. Monitoring of effluent will occur at the end-of-pipe prior to discharge into the receiving waters, with a focus on Major Outfalls, as defined in 40 CFR 122.26(B 5-6) and Attachment E of this Order. The Copermittees must develop their monitoring plans to sample a representative percentage of major outfalls and identified stations within each hydrologic subarea. At a minimum, outfalls that exceed any NALs once during any year must be monitored in the subsequent year. Any station that does not exceed an NAL, or only has exceedances that are identified as natural in origin and conveyance into the MS4 pursuant to Section C.2.a, for 3 successive years may be replaced with a different station.

5. Each Copermittee must monitor for the non-storm water dry weather action levels, which are incorporated into this Order as follows:

a. Action levels for discharges to inland surface waters:

Table 3.a.1: General Constituents

Parameter	Units	AMAL	MDAL	Instantaneous Maximum	Basis
Fecal Coliform	MPN/ 100 ml	200[A] 400[B]	-		BPO
Enterococci	MPN/ 100 ml	33	-	61[C]	BPO
Turbidity	NTU	-	20		BPO
pH	Units	Within limit of 6.5 to 8.5 at all times			BPO
Dissolved Oxygen	mg/L	Not less than 5.0 in WARM waters and not less than 6.0 in COLD waters			BPO
Total Nitrogen	mg/L	-	1.0	See MDAL	BPO
Total Phosphorus	mg/L	-	0.1	See MDAL	BPO
Methylene Blue Active Substances	mg/L	-	0.5	See MDAL	BPO
Iron	mg/L	-	0.3	See MDAL	BPO
Manganese	mg/L	-	0.05	See MDAL	BPO

A – Based on a minimum of not less than five samples for any 30-day period
B – No more than 10 percent of total samples may exceed 400 per 100 ml during any 30 day period
C – This Value has been set to Basin Plan Criteria for Designated Beach Areas
BPO – Basin Plan Objective
MDAL – Maximum Daily Action Level AMAL – Average Monthly Action Level

Table 3.a.2: Priority Pollutants

		Freshwater (CTR)	
Parameter	Units	MDAL	AMAL
Cadmium	ug/L	**	**
Copper	ug/L	*	*
Chromium III	ug/L	**	**
Chromium VI (hexavalent)	ug/L	16	8.1
Lead	ug/L	*	*
Nickel	ug/L	**	**
Silver	ug/L	*	*
Zinc	ug/L	*	*

CTR – California Toxic Rule
*- Action Levels developed on a case-by-case basis (see below)
**- Action Levels developed on a case-by-case basis (see below), but calculated criteria are not to exceed Maximum Contaminant Levels under the California Code of Regulations[9]

The NALs for Cadmium, Copper, Chromium (III), Lead, Nickel, Silver and Zinc will be developed on a case-by-case basis because the freshwater criteria are based on

[9] California Code of Regulations, Title 22, Division 4, Chapter 15, Article 4, Section 64431.

site-specific water quality data (receiving water hardness). For these priority pollutants, the following equations (40 CFR 131.38.b.2) will be required:

Cadmium (Total Recoverable)	= exp(0.7852[ln(hardness)] -2.715)
Chromium III (Total Recoverable)	= exp(0.8190[ln(hardness)] + .6848)
Copper (Total Recoverable)	= exp(0.8545[ln(hardness)] - 1.702)
Lead (Total Recoverable)	= exp(1.273[ln(hardness)] - 4.705)
Nickel (Total Recoverable)	= exp(.8460[ln(hardness)] + 0.0584)
Silver (Total Recoverable)	= exp(1.72[ln(hardness)] - 6.52)
Zinc (Total Recoverable)	= exp(0.8473[ln(hardness)] + 0.884)

D. STORM WATER ACTION LEVELS

1. The Copermittees must implement the Wet Weather MS4 Discharge Monitoring as described in Attachment E of this Order, and beginning three years after the Order adoption date, the Copermittees must annually evaluate their data compared to the Stormwater Action Levels (SALs). At each monitoring station, a running average of twenty percent or greater of exceedances of any discharge of storm water from the MS4 to waters of the U.S. that exceed the SALs for each of the pollutants listed in Table 4 (below) requires the Copermittee(s) having jurisdiction to affirmatively augment and implement all necessary storm water controls and measures to reduce the discharge of the associated class of pollutants(s) to the MEP. The Copermittees must utilize the exceedance information when adjusting and executing annual work plans, as required by this Order. Copermittees must take the magnitude, frequency, and number of constituents exceeding the SAL(s), in addition to receiving water quality data and other information, into consideration when prioritizing and reacting to SAL exceedances in an iterative manner. Failure to appropriately consider and react to SAL exceedances in an iterative manner creates a presumption that the Copermittee(s) have not reduced pollutants in storm water discharges to the MEP.

Table 4. Storm Water Action Levels

Pollutant	Action Level
Turbidity (NTU)	126
Nitrate & Nitrite total (mg/L)	2.6
P total (mg/L)	1.46
Cd total (µg/L)	3.0
Cu total (µg/L)	127
Pb total (µg/L)	250
Zn total (µg/L)	976

2. The end-of-pipe assessment points for the determination of SAL compliance are all major outfalls, as defined in 40 CFR 122.26(b)(5) and (b)(6). The Copermittees must develop their monitoring plans to sample a representative percentage of the major outfalls within each hydrologic subarea. At a minimum, outfalls that exceed SALs must be monitored in the subsequent year. Any station that does not exceed

an SAL for 3 successive years may be replaced with a different station. SAL samples must be 24 hour time-weighted composites.

3. The absence of SAL exceedances does not relieve the Copermittees from implementing all other required elements of this Order.

4. This Order does not regulate natural sources and conveyances into the MS4 of constituents listed in Table 5. To be relieved of the requirements to take action as described in D.1 above, the Copermittee must demonstrate that the likely and expected cause of the SAL exceedance is not anthropogenic in nature. This demonstration does not need to be repeated for subsequent exceedances of the same SAL at the same monitoring station.

5. The SALs will be reviewed and updated at the end of every permit cycle. The data collected pursuant to D.2 above and Attachment E can be used to create SALs based upon local data. The purpose of establishing the SALs is that through the iterative and MEP process, outfall storm water discharges will meet all applicable water quality standards.

E. LEGAL AUTHORITY

1. Each Copermittee must establish, maintain, and enforce adequate legal authority to control pollutant discharges into and from its MS4 through ordinance, statute, permit, contract or similar means. Nothing herein shall authorize a Copermittee or other discharger regulated under the terms of this order to divert, store or otherwise impound water if such action is reasonably anticipated to harm downstream water rights holders in the exercise of their water rights. This legal authority must, at a minimum, authorize the Copermittee to:

a. Control the contribution of pollutants in discharges of runoff associated with industrial and construction activity to its MS4 and control the quality of runoff from industrial and construction sites. This requirement applies both to industrial and construction sites which have coverage under the statewide general industrial or construction storm water permits, as well as to those sites which do not. Grading ordinances must be updated and enforced as necessary to comply with this Order;

b. Prohibit all identified illicit discharges not otherwise allowed pursuant to section B.2;

c. Prohibit and eliminate illicit connections to the MS4;

d. Control the discharge of spills, dumping, or disposal of materials other than storm water to its MS4;

e. Require compliance with conditions in Copermittee ordinances, permits, contracts or orders (i.e., hold dischargers to its MS4 accountable for their contributions of pollutants and flows);

f. Utilize enforcement mechanisms to require compliance with Copermittee storm

water ordinances, permits, contracts, or orders;

g. Control the contribution of pollutants from one portion of the shared MS4 to another portion of the MS4 through interagency agreements among Copermittees.

h. Control of the contribution of pollutants from one portion of the shared MS4 to another portion of the MS4 through interagency agreements with other owners of the MS4 such as the State of California Department of Transportation, the U.S. federal government, or sovereign Native American Tribes is encouraged;

i. Carry out all inspections, surveillance, and monitoring necessary to determine compliance and noncompliance with local ordinances and permits and with this Order, including the prohibition on illicit discharges to the MS4. This means the Copermittee must have authority to enter, monitor, inspect, take measurements, review and copy records, and require regular reports from industrial facilities discharging into its MS4, including construction sites;

j. Require the use of BMPs to prevent or reduce the discharge of pollutants into MS4s from storm water to the MEP; and

k. Require documentation on the effectiveness of BMPs implemented to reduce the discharge of storm water pollutants to the MS4 to the MEP.

2. Each Copermittee must submit on or before June 30, 2012, a statement certified by its chief legal counsel that the Copermittee has taken the necessary steps to obtain and maintain full legal authority to implement and enforce each of the requirements contained in 40 CFR 122.26(d)(2)(i)(A-F) and this Order. These statements must include:

a. Citation of runoff related ordinances and the reasons they are enforceable;

b. Identification of the local administrative and legal procedures available to mandate compliance with runoff related ordinances and therefore with the conditions of this Order, and a statement as to whether enforcement actions can be completed administratively or whether they must be commenced and completed in the judicial system; and

c. A brief description of how runoff related ordinances are adopted and the process by which they may be challenged.

F. JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM (JRMP)

Each Copermittee must implement all requirements of section F of this Order no later than July 1, 2012, unless otherwise specified. Upon adoption of this Order and until an updated JRMP is developed and implemented or July 1, 2012, whichever occurs first,, each Copermittee must at a minimum implement its JRMP document, as the document was developed and amended to comply with the requirements of Order No. R9-2004-001.

Each Copermittee must develop and implement an updated JRMP for its jurisdiction no later than July 1, 2012. Each updated JRMP must meet the requirements of section F

of this Order, reduce the discharge of storm water pollutants from the MS4 to the MEP, effectively prohibit non-storm water discharges, and prevent runoff discharges from the MS4 from causing or contributing to a violation of water quality standards. In addition, each Copermittee's JRMP must identify all departments and positions within its jurisdiction that conduct runoff related activities, and their roles and responsibilities under this Order. This identification must include an up to date organizational chart specifying these departments and key personnel.

1. DEVELOPMENT PLANNING COMPONENT

Each Copermittee must implement a program which meets the requirements of this section and (1) reduces Development Project discharges of storm water pollutants from the MS4 to the MEP; (2) prevents Development Project discharges from the MS4 from causing or contributing to a violation of water quality standards; (3) prevents illicit discharges into the MS4; and (4) manages increases in runoff discharge rates and durations from Development Projects that are likely to cause increased erosion of stream beds and banks, silt pollutant generation, or other impacts to beneficial uses and stream habitat due to increased erosive force.

a. GENERAL PLAN

Each Copermittee must revise as needed its General Plan or equivalent plan (e.g., Comprehensive, Master, or Community Plan) to include water quality and watershed protection principles and policies that direct land-use decisions and require implementation of consistent water quality protection measures for all development, redevelopment, and retrofit projects. Examples of water quality and watershed protection principles and policies to be considered include the following:

(1) Minimize the amount of impervious surfaces and directly connected impervious surfaces in areas of new development and redevelopment and where feasible slow runoff and maximize on-site infiltration of runoff.

(2) Implement pollution prevention methods supplemented by pollutant source controls and treatment BMPs. Use small collection strategies located at, or as close as possible to, the source (i.e., the point where water initially meets the ground) to minimize the transport of urban runoff and pollutants offsite and into an MS4.

(3) Preserve, and where possible, create, or restore areas that provide important water quality benefits, such as riparian corridors, wetlands, and buffer zones. Encourage land acquisition of such areas.

(4) Limit disturbances of natural water bodies and natural drainage systems caused by development including roads, highways, and bridges.

(5) Prior to making land use decisions, utilize methods available to estimate increases in pollutant loads and flows resulting from projected future development. Require incorporation of BMPs to mitigate the projected increases in pollutant loads and flows.

(6) Avoid development of areas that are particularly susceptible to erosion and sediment loss; or establish development guidance that identifies these areas and protects them from erosion and sediment loss.

(7) Reduce pollutants associated with vehicles and increasing traffic resulting from development.

(8) Post-development runoff from a site must not contain pollutant loads that cause or contribute to an exceedance of receiving water quality objectives and which have not been reduced to the MEP.

b. ENVIRONMENTAL REVIEW PROCESS

Each Copermittee must revise as needed its current environmental review processes to accurately evaluate water quality impacts and cumulative impacts and identify appropriate measures to avoid, minimize, and mitigate those impacts for all Development Projects.

c. APPROVAL PROCESS CRITERIA AND REQUIREMENTS FOR ALL DEVELOPMENT PROJECTS

For all proposed Development Projects, each Copermittee, during the planning process, and prior to project approval and issuance of local permits, must prescribe the necessary requirements so that Development Project discharges of storm water pollutants from the MS4 will be reduced to the MEP, will not cause or contribute to a violation of water quality standards, and will comply with the Copermittee's ordinances, permits, plans, and requirements, and with this Order.

Performance Criteria: Discharges from each approved development project must be subject to the following management measures:

(1) Source control BMPs that reduce storm water pollutants of concern in runoff; prevent illicit discharges into the MS4; prevent irrigation runoff; storm drain system stenciling or signage; properly design outdoor material storage areas; properly design outdoor work areas; and properly design trash storage areas.

(2) The following LID BMPs listed below must be implemented at all Development Projects where applicable and feasible.

(a) Conserve natural areas, including existing trees, other vegetation, and soils,
(b) Construct streets, sidewalks, or parking lot aisles to the minimum widths necessary, provided that public safety is not compromised,
(c) Minimize the impervious footprint of the project,
(d) Minimize soil compaction to landscaped areas,
(e) Minimize disturbances to natural drainages (e.g., natural swales, topographic depressions, etc.), and
(f) Disconnect impervious surfaces through distributed pervious areas.

(3) Buffer zones for natural water bodies, where technically feasible. Where buffer zones are technically infeasible, require project proponent to implement other buffers such as trees, access restrictions, etc;

(4) Other measures necessary so that grading or other construction activities meet the provisions specified in section F.2 of this Order.

(5) Submittal of documentation of a mechanism under which ongoing long-term maintenance of all structural post-construction BMPs will be conducted.

(6) Infiltration and Groundwater Protection

To protect groundwater quality, each Copermittee must apply restrictions to the use of treatment control BMPs that are designed to primarily function as large, centralized infiltration devices (such as large infiltration trenches and infiltration basins). Such restrictions must be designed so that the use of such infiltration treatment control BMPs does not cause or contribute to an exceedance of groundwater quality objectives. At a minimum, each treatment control BMP designed to primarily function as a centralized infiltration device must meet the restrictions below, unless the Development Project demonstrates to the Copermittee that a restriction is not necessary to protect groundwater quality. The Copermittees may collectively or individually develop alternative restrictions on the use of treatment control BMPs which are designed to primarily function as centralized infiltration devices. Alternative restrictions developed by the Copermittees can partially or wholly replace the restrictions listed below. The restrictions do not apply to small infiltration systems dispersed throughout a development project.

(a) Runoff must undergo pretreatment such as sedimentation or filtration prior to infiltration;

(b) All dry weather flows containing significant pollutant loads must be diverted from infiltration devices and treated through other BMPs;

(c) Pollution prevention and source control BMPs must be implemented at a level appropriate to protect groundwater quality at sites where infiltration

treatment control BMPs are to be used;

(d) Infiltration treatment control BMPs must be adequately maintained so that they remove storm water pollutants to the MEP;

(e) The vertical distance from the base of any infiltration treatment control BMP to the seasonal high groundwater mark must be at least 10 feet. Where groundwater basins do not support beneficial uses, this vertical distance criteria may be reduced, provided groundwater quality is maintained;

(f) The soil through which infiltration is to occur must have physical and chemical characteristics (such as appropriate cation exchange capacity, organic content, clay content, and infiltration rate) which are adequate for proper infiltration durations and treatment of runoff for the protection of groundwater beneficial uses;

(g) Infiltration treatment control BMPs must not be used for areas of industrial or light industrial activity; and other high threat to water quality land uses and activities as designated by each Copermittee unless first treated or filtered to remove pollutants prior to infiltration; and

(h) Infiltration treatment control BMPs must be located a minimum of 100 feet horizontally from any water supply wells.

(7) Where feasible, landscaping with native or low water species shall be preferred in areas that drain to the MS4 or to waters of the U.S.

(8) Rain water harvesting, where feasible, must be implemented as part of the site design and construction, and to supplement offsite beneficial uses.

d. STANDARD STORM WATER MITIGATION PLANS (SSMPS) – APPROVAL PROCESS CRITERIA AND REQUIREMENTS FOR PRIORITY DEVELOPMENT PROJECTS

On or before June 30, 2012, the Copermittees must submit an updated SSMP, to the San Diego Water Board's Executive Officer for a 30 day public review and comment period. The San Diego Water Board's Executive Officer has the discretion to determine whether to hold a public hearing or to limit public input to written comments. Within 180 days of determination that the SSMP is in compliance with this Order's provisions, each Copermittee must amend its local ordinances consistent with the updated SSMP, and begin implementing the updated SSMP. Any updated local ordinances must be submitted to the San Diego Water Board with the Annual Report. The SSMP must meet the requirements of section F.1.d of this Order to (1) reduce Priority Development Project discharges of storm water pollutants from the MS4 to the MEP, and (2)

prevent Priority Development Project runoff discharges from the MS4 from causing or contributing to a violation of water quality standards.[10]

(1) Definition of Priority Development Project:

Priority Development Projects are:

(a) All new Development Projects that fall under the project categories or locations listed in section F.1.d.(2), and

(b) Those redevelopment projects that create, add, or replace at least 5,000 square feet of impervious surfaces on an already developed site and the existing development and/or the redevelopment project falls under the project categories or locations listed in section F.1.d.(2). Where redevelopment results in an increase of less than fifty percent of the impervious surfaces of a previously existing development, and the existing development was not subject to SSMP requirements, the numeric sizing criteria discussed in section F.1.d.(6) applies only to the addition or replacement, and not to the entire development. Where redevelopment results in an increase of more than fifty percent of the impervious surfaces of a previously existing development, the numeric sizing criteria applies to the entire development.

(c) One acre threshold: In addition to the Priority Development Project Categories identified in section F.1.d.(2), Priority Development Projects must also include all other post-construction pollutant-generating new Development Projects that result in the disturbance of one acre or more of land by July 1, 2012.[11]

[10] Updated SSMP and hydromodification requirements must apply to all priority projects or phases of priority projects which have not yet begun grading or construction activities at the time any updated SSMP or hydromodification requirement commences. If lawful prior approval of a project exists, whereby application of an updated SSMP or hydromodification requirement to the project is illegal, the updated SSMP or hydromodification requirement need not apply to the project. Updated Development Planning requirements set forth in Sections F.1. (a) through (h) of this Order must apply to all projects or phases of projects, unless, at the time any updated Development Planning requirement commences, the projects or project phases meet any one of the following conditions: (i) the project or phase has begun grading or construction activities; or (ii) a Copermittee determines that lawful prior approval rights for a project or project phase exist, whereby application of the Updated Development Planning requirement to the project is legally infeasible. Where feasible, the Permittees must utilize the SSMP and hydromodification update periods to ensure that projects undergoing approval processes include application of the updated SSMP and hydromodification requirements in its plans.

[11] Pollutant generating Development Projects are those projects that generate pollutants at levels greater than natural background levels.

(2) Priority Development Project Categories

Where a new Development Project feature, such as a parking lot, falls into a Priority Development Project Category, the entire project footprint is subject to SSMP requirements.

(a) New development projects that create 10,000 square feet or more of impervious surfaces (collectively over the entire project site) including commercial, industrial, residential, mixed-use, and public projects. This category includes development projects on public or private land which fall under the planning and building authority of the Copermittees.

(b) Automotive repair shops. This category is defined as a facility that is categorized in any one of the following Standard Industrial Classification (SIC) codes: 5013, 5014, 5541, 7532-7534, or 7536-7539.

(c) Restaurants. This category is defined as a facility that sells prepared foods and drinks for consumption, including stationary lunch counters and refreshment stands selling prepared foods and drinks for immediate consumption (SIC code 5812), where the land area for development is greater than 5,000 square feet. Restaurants where land development is less than 5,000 square feet must meet all SSMP requirements except for structural treatment BMP and numeric sizing criteria requirement F.1.d.(6) and hydromodification requirement F.1.h.

(d) All hillside development greater than 5,000 square feet. This category is defined as any development which creates 5,000 square feet of impervious surface which is located in an area with known erosive soil conditions, where the development will grade on any natural slope that is twenty-five percent or greater.

(e) Environmentally Sensitive Areas (ESAs). All development located within, or directly adjacent to, or discharging directly to an ESA (where discharges from the development or redevelopment will enter receiving waters within the ESA), which either creates 2,500 square feet of impervious surface on a proposed project site or increases the area of imperviousness of a proposed project site to 10 percent or more of its naturally occurring condition. “Directly adjacent” means situated within 200 feet of the ESA. “Discharging directly to” means outflow from a drainage conveyance system that is composed entirely of flows from the subject development or redevelopment site, and not commingled with flows from adjacent lands.

(f) Impervious parking lots 5,000 square feet or more and potentially exposed to runoff. Parking lot is defined as a land area or facility for the temporary parking or storage of motor vehicles used personally, for business, or for commerce.

(g) Street, roads, highways, and freeways. This category includes any paved impervious surface that is 5,000 square feet or greater used for the transportation of automobiles, trucks, motorcycles, and other vehicles. To the extent that the Copermittees develop revised standard roadway design and post-construction BMP guidance that comply with the provisions of Section F.1 of the Order, then public works projects that implement the revised standard roadway sections do not have to develop a project specific SSMP. The standard roadway design and post-construction BMP guidance must be submitted with the Copermittee's updated SSMP.

(h) Retail Gasoline Outlets (RGOs). This category includes RGOs that meet the following criteria: (a) 5,000 square feet or more or (b) a projected Average Daily Traffic (ADT) of 100 or more vehicles per day.

(3) Pollutants of Concern

As part of its local SSMP, each Copermittee must implement an updated procedure for identifying pollutants of concern for each Priority Development Project. The procedure must address, at a minimum: (1) Receiving water quality (including pollutants for which receiving waters are listed as impaired under CWA section 303(d)); (2) Land-use type of the Development Project and pollutants associated with that land use type; and (3) Pollutants expected to be present on site.

(4) Low Impact Development BMP Requirements

Each Copermittee must require each Priority Development Project to implement LID BMPs which will collectively minimize directly connected impervious areas, limit loss of existing infiltration capacity, and protect areas that provide important water quality benefits necessary to maintain riparian and aquatic biota, and/or are particularly susceptible to erosion and sediment loss.

(a) The Copermittees must take the following measures to ensure that LID BMPs are implemented at Priority Development Projects:

(i) Each Copermittee must require LID BMPs or make a finding of technical infeasibility for each Priority Development Project in accordance with the LID waiver program in Section F.1.d.(7);

(ii) Each Copermittee must incorporate formalized consideration, such as thorough checklists, ordinances, and/or other means, of LID

BMPs into the plan review process for Priority Development Projects;

(iii) On or before July 1, 2012, each Copermittee must review its local codes, policies, and ordinances and identify barriers therein to implementation of LID BMPs. Following the identification of these barriers to LID implementation, where feasible, the Copermittee must take, by the end of the permit cycle, appropriate actions to remove such barriers. The Copermittees must include this review with the updated JRMP.

(b) The following LID BMPs must be implemented at each Priority Development Project:

(i) Maintain or restore natural storage reservoirs and drainage corridors (including depressions, areas of permeable soils, swales, and ephemeral and intermittent streams) to the extent feasible[12].

(ii) Projects with landscaped or other pervious areas must, where feasible, properly design and construct the pervious areas to effectively receive and infiltrate, retain and/or treat runoff from impervious areas, prior to discharge to the MS4. Soil compaction for these areas must be minimized. The amount of the impervious areas that are to drain to pervious areas must be based upon the total size, soil conditions, slope, and other pertinent factors.

(iii) Projects with low traffic areas and appropriate soil conditions must construct walkways, trails, overflow parking lots, alleys, or other low-traffic areas with permeable surfaces, such as pervious concrete, porous asphalt, unit pavers, and granular materials.

(c) LID BMPs sizing criteria:

(i) LID BMPs must be sized and designed to ensure onsite retention without runoff, of the volume of runoff produced from a 24-hour 85th percentile storm event[13] ("design capture volume");

(ii) If onsite infiltration LID BMPs are technically infeasible per section F.1.d.(7)(b), other LID BMPs may treat any volume that is not retained onsite provided that the other LID BMPs are sized to hold

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[12] Priority Development Projects proposing to dredge or fill materials in waters of the U.S. and/or waters of the State must obtain a CWA §401 Water Quality Certification and/or Waste Discharge Requirements.

[13] This volume is not a single volume to be applied to all of Riverside County. The size of the 85th percentile storm event is different for various parts of the County. The Copermittees are encouraged to calculate the 85th percentile storm event for each of its jurisdictions using local rain data pertinent to its particular jurisdiction (0.6 inch standard is a rough average for the County and should only be used where appropriate rain data is not available). In addition, isopluvial maps may be used to extrapolate rainfall data to areas where insufficient data exists in order to determine the volume of the local 85th percentile storm event in such areas. Where the Copermittees will use isopluvial maps to determine the 85th percentile storm event in areas lacking rain data, the Copermittees must describe their method for using isopluvial maps in its SSMPs.

the design storm volume that is not infiltrated. The LID BMPs must be designed for an appropriate surface loading rate to prevent erosion, scour and channeling within the BMP.

(d) If it is shown to be technically infeasible per Section F.1.d.(7)(b) to retain and/or treat the remaining volume up to and including the design capture volume using LID BMPs, then the project must implement conventional treatment control BMPs in accordance with Section F.1.d.(6) below and must participate in the LID waiver program in Section F.1.d.(7).

(e) All LID BMPs must be designed and implemented with measures to avoid the creation of nuisance or pollution associated with vectors, such as mosquitoes, rodents, and flies.

(5) Source Control BMP Requirements

Each Copermittee must require each Priority Development Project to implement applicable source control BMPs. The source control BMPs to be required must:

(a) Prevent illicit discharges into the MS4;
(b) Minimize storm water pollutants of concern in runoff;
(c) Eliminate irrigation runoff;
(d) Include storm drain system stenciling or signage;
(e) Include properly designed outdoor material storage areas;
(f) Include properly designed outdoor work areas;
(g) Include properly designed trash storage areas;
(h) Include water quality protection requirements applicable to individual priority project categories.

(6) Treatment Control BMP Requirements

Each Copermittee must require each Priority Development Project that meets the Copermittee's technical infeasibility criteria in Section F.1.d(7) below, to implement conventional treatment control BMPs to treat the portion of the "design capture volume" that was not treated by LID BMPs per Section F.1.d(4) above. Conventional treatment control BMPs must meet the following requirements:

(a) All treatment control BMPs for a single Priority Development Project must collectively be sized to comply with the following numeric sizing criteria:

(i) Volume-based treatment control BMPs must be designed to mitigate (infiltrate, filter, or treat) the remaining portion of the design capture volume that was not retained and/or treated with LID BMPs; or

(ii) Flow-based treatment control BMPs must be designed to mitigate (filter, or treat) either: a) the maximum flow rate of runoff produced from a rainfall intensity of 0.2 inch of rainfall per hour, for each hour of a storm event; or b) the maximum flow rate of runoff produced by the 85th percentile hourly rainfall intensity (for each hour of a storm event), as determined from the local historical rainfall record, multiplied by a factor of two.

(b) All treatment control BMPs for Priority Development Projects must, at a minimum:

(i) Be ranked with high or medium pollutant removal efficiency for the project's most significant pollutants of concern, as the pollutant removal efficiencies are identified in the Copermittees' SSMP. Treatment control BMPs with a low removal efficiency ranking must only be approved by a Copermittee when a feasibility analysis has been conducted which exhibits that implementation of treatment control BMPs with high or medium removal efficiency rankings are infeasible for a Priority Development Project or portion of a Priority Development Project.

(ii) Be correctly sized and designed so as to remove storm water pollutants to the MEP.

(c) Target removal of pollutants of concern from runoff.

(d) Be implemented close to pollutant sources, and prior to discharging into waters of the U.S.

(e) Include proof of a mechanism under which ongoing long-term maintenance will be conducted to ensure proper maintenance for the life of the project. The mechanisms may be provided by the project proponent or Copermittee.

(f) Be designed and implemented with measures to avoid the creation of nuisance or pollution associated with vectors, such as mosquitoes, rodents, and flies.

(7) Low Impact Development (LID) BMP Waiver Program

The Copermittees must develop, collectively or individually, a LID waiver program for incorporation into the SSMP, which would allow a Priority Development Project to substitute implementation of all or a portion of required LID BMPs in Section F.1.d(4) with implementation of treatment control BMPs and either 1) on-site mitigation, 2) an off-site mitigation project, and/or 3) other mitigation developed by the Copermittees. The Copermittees

must submit the LID waiver program as part of their updated SSMP. At a minimum, the program must meet the requirements below:

(a) Prior to implementation, the LID waiver program must clearly exhibit that it will not allow Priority Development Projects to result in a net impact (after consideration of any mitigation) from pollutant loadings over and above the impact caused by projects meeting LID requirements;

(b) For each Priority Development Project participating, the Copermittee must find that it is technically infeasible to implement LID BMPs that comply with the requirements of Section F.1.(d)(4). The Copermittee(s) must develop criteria to determine the technical feasibility of implementing LID BMPs . Each Priority Development Project participating must demonstrate that LID BMPs were implemented as much as feasible given the site's unique conditions. Technical infeasibility may result from conditions including, but not limited to:

(i) Locations that cannot meet the infiltration and groundwater protection requirements in section F.1.c.(6) for large, centralized infiltration BMPs. Where infiltration is technically infeasible, the project must still examine the feasibility of other onsite LID BMPs;
(ii) Insufficient demand for storm water reuse;
(iii) Smart growth and infill or redevelopment locations where the density and/or nature of the project would create significant difficulty for compliance with the LID BMP requirements; and
(iv) Other site, geologic, soil, or implementation constraints identified in the Copermittees updated SSMP document.

(c) Each Priority Development Project that participates in the LID waiver program must mitigate for the pollutant loads expected to be discharged due to not implementing the LID retention BMPs in section F.1.d.(4). The pollutant loading must be estimated for each project participating in the LID waiver program. The estimated impacts from not implementing the required LID retention BMPs in section F.1.d.(4) must be fully mitigated. Mitigation projects must be implemented within the same hydrologic unit as the Priority Development Project. Mitigation projects outside of the hydrologic subarea but within the same hydrologic unit may be approved provided that the project proponent demonstrates that mitigation projects within the same hydrologic subarea are infeasible and that the mitigation project will address similar beneficial use impacts as expected from the Priority Development Projects pollutant load. Onsite mitigation may include increasing the conventional treatment sizing factors to achieve pollutant load removal equal to or greater than the pollutant load removal expected from implementing onsite retention of the design capture volume. Offsite mitigation projects may include green streets projects, existing development retrofit projects, retrofit incentive programs, regional

BMPs and/or riparian restoration projects. Project applicants seeking to utilize these alternative compliance provisions may propose other offsite mitigation projects, which the Copermittees may approve if they meet the requirements of this subpart.

(d) A Copermittee may choose to implement additional mitigation programs (e.g., pollutant credit system, mitigation fund) as part of the LID waiver program provided that the mitigation program clearly exhibits that it will not allow Priority Development Projects to result in a net impact from pollutant loadings over and above the impact caused by projects meeting LID requirements. Any additional mitigation programs that a Copermittee chooses to implement must be submitted to the San Diego Water Board Executive Officer for review and acceptance prior to implementation.

(8) LID and Treatment Control BMP Standards

(a) As part of the SSMP, each Copermittee must develop and require Priority Development Projects to implement siting, design, and maintenance criteria for each LID and treatment control BMP listed in the SSMP to determine feasibility and applicability and so that implemented LID and treatment control BMPs are constructed correctly and are effective at pollutant removal, runoff control, and vector minimization. Development of BMP design worksheets which can be used by project proponents is encouraged.

(b) LID and treatment control BMPs implemented at any Priority Development Projects must mitigate (treat through infiltration, settling, filtration or other unit processes) the required volume or flow of runoff from all developed portions of the project, including landscaped areas.

(c) All LID and treatment control BMPs must be located so as to remove pollutants from runoff prior to its discharge to any receiving waters. Multiple Priority Development Projects may use shared post-construction BMPs as long as construction of any shared BMP is completed prior to the use or occupation of any Priority Development Project from which the BMP will receive runoff. Post construction BMPs must not be constructed within a waters of the U.S. or waters of the State.

(9) Implementation Process

(a) As part of its local SSMP, each Copermittee must implement a process to verify compliance with SSMP requirements. The process must identify at what point in the planning process Priority Development Projects will be required to meet SSMP requirements and at a minimum, the Priority Development Project must implement the required post-construction BMPs prior to occupancy and/or the intended use of any portion of that

project. The process must also include identification of the roles and responsibilities of various municipal departments in implementing the SSMP requirements, as well as any other measures necessary for the implementation of SSMP requirements.

(b) Each Copermittee must establish a mechanism not only to track post-construction BMPs, but also to ensure that appropriate easements and ownerships are properly recorded in public records and the information is conveyed to all appropriate parties when there is a change in project or site ownership.

(10) Post-construction BMP Review

(a) The Copermittees must review and update the BMPs that are listed in their SSMP as options for treatment control. At a minimum, the update must include removal of obsolete or ineffective BMPs and addition of LID BMPs that can be used for treatment, such as bioretention cells, bioretention swales, etc. The update must also add appropriate LID BMPs to any tables or discussions in the local SSMPs addressing pollutant removal efficiencies of treatment control BMPs. In addition, the update must include review and revision where necessary of treatment control BMP pollutant removal efficiencies.

(b) The update must incorporate findings from BMP effectiveness studies conducted by the Copermittees for projects funded wholly or in part by the State Water Board or Regional Water Boards.

(c) Each Copermittee must implement a mechanism for annually incorporating findings from local treatment BMP effectiveness studies (e.g., ones conducted by, or on-behalf of, public agencies in Riverside County) into SSMP project reviews and permitting

e. BMP CONSTRUCTION VERIFICATION

Prior to occupancy and/or intended use of any portion of the Priority Development Project subject to SSMP requirements, each Copermittee must inspect the constructed site design, source control, and treatment control BMPs applicable to the constructed portion of the project to verify that they have been constructed and are operating in compliance with all specifications, plans, permits, ordinances, and this Order.

f. BMP MAINTENANCE TRACKING

(1) Inventory of SSMP projects: Each Copermittee must develop and maintain a watershed-based database to track and inventory all projects constructed, that have a final approved SSMP (SSMP projects), and its structural post-

construction BMPs within its jurisdiction since July, 2005. LID BMPs implemented on a lot by lot basis in low density residential areas, such as rain barrels, are not required to be tracked or inventoried. At a minimum, the database must include information on BMP type(s), location, watershed, date of construction, party responsible for maintenance, dates and findings of maintenance verifications, and corrective actions, including whether the site was referred to the local vector control agency or department.

(2) Each Copermittee must verify that approved post-construction BMPs are operating effectively and have been adequately maintained by implementing the following measures:

(a) The designation of high priority SSMP Projects must consider the following:

(i) BMP size,
(ii) Recommended maintenance frequency,
(iii) Likelihood of operational and maintenance issues,
(iv) Location,
(v) Receiving water quality,
(vi) Compliance record,
(vii) Land use,
(viii) and other pertinent factors;

At a minimum, high priority projects include those projects that generate pollutants (prior to treatment) within the tributary area of a 303(d) listed waterbody impaired for that pollutant; or those projects generating pollutants within the tributary area for an observed action level exceedance of that pollutant.

(b) Beginning on July 1, 2012, each Copermittee must verify that the required structural post-construction BMPs on the inventoried SSMP projects have been implemented, are maintained, and operating effectively through inspections, self-certifications, surveys, or other equally effective approaches with the following conditions:

(i) The implementation, operation, and maintenance of all (100 percent) approved and inventoried final project public and private SSMPs (a.k.a. WQMPs) must be verified every five years;

(ii) All (100 percent) projects with BMPs that are high priority must be inspected by the Copermittee annually prior to each rainy season;
(iii) All (100 percent) Copermittee projects with BMPs must be inspected by the Copermittee annually;
(iv) At least 20 percent of all approved and inventoried SSMP projects must be inspected by the Copermittee annually;

(v) At the discretion of the Copermittee, its inspections may be coordinated with the facility inspections implemented pursuant to section F.3. of this Order;
(vi) For verifications performed through a means other than direct Copermittee inspection, adequate documentation must be submitted to the Copermittee to provide assurance that the required maintenance has been completed;
(vii) Appropriate follow-up measures (including re-inspections, enforcement, maintenance, etc.) must be conducted to ensure the treatment BMPs continue to reduce storm water pollutants as originally designed; and
(viii) Inspections must note observations of vector conditions, such as mosquitoes. Where conditions are identified as contributing to mosquito production, the Copermittee must notify its local vector control agency.

g. ENFORCEMENT OF DEVELOPMENT SITES

Each Copermittee must enforce its storm water ordinance for all development projects as necessary to maintain compliance with this Order. Copermittee ordinances or other regulatory mechanisms must include appropriate sanctions to achieve compliance. Sanctions must include the following tools or their equivalent: Non-monetary penalties, fines, bonding requirements, liens, and/or permit or occupancy denials for non-compliance.

h. HYDROMODIFICATION – LIMITATIONS ON INCREASES OF RUNOFF DISCHARGE RATES AND DURATIONS[14]

Each Copermittee shall collaborate with the other Copermittees to develop and implement a Hydromodification Management Plan (HMP) to manage increases in runoff discharge rates and durations from all Priority Development Projects. The HMP must be incorporated into the SSMP and implemented by each Copermittee so that estimated post-project runoff discharge rates and durations must not exceed pre-development discharge rates and durations. Where the proposed project is located on an already developed site, the pre-project discharge rate and duration must be that of the pre-developed, naturally occurring condition. The draft HMP must be submitted to the San Diego Water Board on or before June 30, 2013. The HMP will be made available for public

[14] Updated SSMP and hydromodification requirements must apply to all Priority Development Projects or phases of Priority Development Projects which have not yet begun grading or construction activities at the time any updated SSMP or hydromodification requirement commences. If a Copermittee determines that lawful prior approval of a project exists, whereby application of an updated SSMP or hydromodification requirement to the project is legally infeasible, the updated SSMP or hydromodification requirement need not apply to the project. The Copermittees must utilize the SSMP and hydromodification update periods to ensure that projects undergoing approval processes include application of the updated SSMP and hydromodification requirements in its plans.

review and comment and the San Diego Water Board Executive Officer will determine whether to hold a public hearing before the full San Diego Water Board or whether public input will be through written comments to the Executive Officer only.

(1) The HMP must:

(a) Identify a method for assessing susceptibility and geomorphic stability of channel segments which receive runoff discharges from Priority Development Projects. A performance standard must be established that ensures that the geomorphic stability within the channel will not be compromised as a result of receiving runoff discharges from Priority Development Projects.

(b) Identify a range of runoff flows[15] based on continuous simulation of the entire rainfall record (or other analytical method proposed by the Copermittees and deemed acceptable by the San Diego Water Board) for which Priority Development Project post-project runoff flow rates and durations must not exceed pre-development (naturally occurring) runoff flow rates and durations by more than 10 percent, where the increased flow rates and durations will result in increased potential for erosion or other significant adverse impacts to beneficial uses. The lower boundary of the range of runoff flows identified must correspond with the critical channel flow that produces the critical shear stress that initiates channel bed movement or that erodes the toe of channel banks. The identified range of runoff flows may be different for specific watersheds, channels, or channel reaches. In the case of an artificially hardened (concrete lined, rip rap, etc.) channel, the lower boundary of the range of runoff flows identified must correspond with the critical channel flow that produces the critical shear stress that initiates channel bed movement or that erodes the toe of channel banks of a comparable natural channel (i.e. non-hardened, pre-development).

(c) Identify a method to assess and compensate for the loss of sediment supply to streams due to development. A performance and/or design standard must be created and required to be met by Priority Development Projects to ensure that the loss of sediment supply due to development does not cause or contribute to increased erosion within channel segments downstream of Priority Development Project discharge points.

(d) Designate and require Priority Development Projects to implement control measures so that (1) post-project runoff flow rates and durations do not exceed pre-development (naturally occurring) runoff flow rates and

[15] The identified range of run off flows to be controlled should be expressed in terms of peak flow rates of rainfall events, such as "10% of the pre-development 2-year runoff event up to the pre-development 10-year runoff event."

durations by more than 10 percent for the range of runoff flows identified under section F.1.h.(1)(b), where the increased flow rates and durations will result in increased potential for erosion or other significant adverse impacts to beneficial uses; (2) post-project runoff flow rates and durations do not result in channel conditions which do not meet the channel standard developed under section F.1.h.(1)(a) for channel segments downstream of Priority Development Project discharge points; and (3) the design of the project and/or control measures compensate for the loss of sediment supply due to development.

(e) Include a protocol to evaluate potential hydrograph change impacts to downstream watercourses from Priority Development Projects to meet the range of runoff flows identified under Section F.1.h.(1)(b).

(f) Include other performance criteria (numeric or otherwise) for Priority Development Projects as necessary to prevent runoff from the projects from increasing and/or continuing unnatural rates of erosion of channel beds and banks, silt pollutants generation, or other impacts to beneficial uses and stream habitat due to increased erosive force.

(g) Include a review of pertinent literature.

(h) Identify areas within the Santa Margarita Hydrologic Unit for potential opportunities to restore or rehabilitate stream channels with historic hydromodification of receiving waters that are tributary to documented low or very low Index of Biotic Integrity (IBI) scores.

(i) Include a description of how the Copermittees will incorporate the HMP requirements into their local approval processes.

(j) Include criteria on selection and design of management practices and measures (such as detention, retention, and infiltration) to control flow rates and durations and address potential hydromodification impacts.

(k) Include technical information, including references, supporting any standards and criteria proposed.

(l) Include a description of inspections and maintenance to be conducted for management practices and measures to control flow rates and durations and address potential hydromodification impacts.

(m) Include a description of monitoring and other program evaluations to be conducted to assess the effectiveness of implementation of the HMP. Monitoring and other program evaluations must include an evaluation of changes to physical (e.g., cross-section, slope, discharge rate, vegetation, pervious/impervious area) and biological (e.g., habitat quality, benthic flora

and fauna, IBI scores) conditions of receiving water channels as areas with Priority Development Projects are constructed (i.e. pre- and post-project), as appropriate.

(n) Include mechanisms for assessing and addressing cumulative impacts of Priority Development Projects within a watershed on channel morphology.

(2) In addition to the control measures that must be implemented by Priority Development Projects per section F.1.h.(1)(d), the HMP must include a suite of management measures to be used on Priority Development Projects to mitigate hydromodification impacts, protect and restore downstream beneficial uses and prevent or further prevent adverse physical changes to downstream channels. The measures must be based on a prioritized consideration of the following elements in this order:

(a) Site design control measures;
(b) On-site management measures;
(c) Regional control measures located upstream of receiving waters; and
(d) In-stream management and control measures.

Where stream channels are adjacent to, or are to be modified as part of a Priority Development Project, management measures must include buffer zones and setbacks. The suite of management measures must also include stream restoration as a viable option to achieve the channel standard in section F.1.h.(1)(a). In-stream controls used as management measures to protect and restore downstream beneficial uses and for preventing or minimizing further adverse physical changes must not include the use of non-naturally occurring hardscape materials such as concrete, riprap, gabions, etc. to reinforce stream channels.

(3) As part of the HMP, the Copermittees may develop a waiver program that allows a redevelopment Priority Development Project, as defined in Section F.1.d.(1)(b), to implement offsite mitigation measures. A waiver may be granted if onsite management and control measures are technically infeasible to fully achieve post-project runoff flow rates and durations that do not exceed the pre-development (naturally occurring) runoff flow rates and durations. Redevelopment projects that are granted a waiver under the program must not have post-project runoff flow rates and durations that exceed the pre-project runoff flow rates and durations. The incremental hydromodification impacts from not achieving the pre-development (naturally occurring) runoff flow rates and durations for the project site must be fully mitigated. The offsite mitigation must be within the same stream channel system to which the project discharges. Mitigation projects not within the same stream channel system but within the same hydrologic unit may be approved provided that the project proponent demonstrates that mitigation

within the same stream channel is infeasible and that the mitigation project will address similar impacts as expected from the project.

(4) Each individual Copermittee has the discretion to not require Section F.1.h. at Priority Development Projects where the project:

(a) Discharges storm water runoff into underground storm drains discharging directly to water storage reservoirs and lakes;
(b) Discharges storm water runoff into conveyance channels whose bed and bank are concrete lined all the way from the point of discharge to water storage reservoirs and lakes; or
(c) Discharges storm water runoff into other areas identified in the HMP as acceptable to not need to meet the requirements of Section F.1.h by the San Diego Water Board Executive Officer.

(5) <u>HMP Reporting and Implementation</u>

(a) On or before June 30 , 2013, the Copermittees must submit to the San Diego Water Board a draft HMP that has been reviewed by the public, including the identification of the appropriate limiting range of flow rates per section F.1.h.(1)(b).

(b) Within 180 days of receiving San Diego Water Board comments on the draft HMP, the Copermittees must submit a final HMP that addressed the San Diego Water Board's comments.

(c) Within 90 days of receiving a determination of adequacy from the San Diego Water Board, each Copermittee must incorporate and implement the HMP for all Priority Development Projects.

(d) Prior to acceptance of the HMP by the San Diego Water Board, the early implementation measures likely to be included in the HMP must be encouraged by the Copermittees.

(6) <u>Interim Hydromodification Criteria</u>

Immediately following adoption of this Order and until the final HMP required by this Order has been determined by the San Diego Water Board to be adequate, each Copermittee must ensure that all Priority Development Projects are implementing the hydromodification (aka Hydrologic Condition of Concern) requirements found in Section 4.4 of the 2006 Riverside County WQMP (updated in 2009) unless one of the following conditions in lieu of those specified in the WQMP are met:

(a) Runoff from the Priority Development Project discharges (1) directly to a conveyance channel or storm drain that is concrete lined all the way from

the point of discharge to the ocean, bay, lagoon, water storage reservoir or lake; and (2) the discharge is in full compliance with Copermittee requirements for connections and discharges to the MS4 (including both quality and quantity requirements); and (3) the discharge will not cause increased upstream or downstream erosion or adversely impact downstream habitat; and (4) the discharge is authorized by the Copermittee.

(b) The Priority Development Project disturbs less than one acre. The Copermittee has the discretion to require a project specific WQMP to address hydrologic condition concerns on projects less than one acre on a case by case basis. The disturbed area calculation should include all disturbances associated with larger common plans of development.

(c) The runoff flow rate, volume, velocity, and duration for the post-development condition of the Priority Development Project do not exceed the pre-development (i.e. naturally occurring) condition for the 2-year, 24-hour and 10-year, 24-hour rainfall events. This condition must be substantiated by hydrologic modeling acceptable to the Copermittee.

Once a final HMP is determined to be adequate and is required to be implemented, compliance with the final HMP is required by this Order and compliance with the 2004 WQMP (updated in 2009) or the in-lieu interim hydromodification criteria set forth above no longer satisfies the requirements of this Order.

(7) No part of section F.1.h eliminates the Copermittees' responsibilities for implementing the Low Impact Development requirements under section F.1.d.(4).

i. UNPAVED ROADS DEVELOPMENT

The Copermittees must develop, where they do not already exist, and implement or require implementation of erosion and sediment control BMPs after construction of new unpaved roads. At a minimum, the BMPs must include:

(1) Practices to minimize road related erosion and sediment transport;
(2) Grading of unpaved roads to slope outward where consistent with road engineering safety standards;
(3) Installation of water bars as appropriate;
(4) Unpaved roads and culvert designs that do not impact creek functions and where applicable, that maintain migratory fish passage;

2. CONSTRUCTION COMPONENT

Each Copermittee must implement a construction program which meets the requirements of this section, prevents illicit discharges into the MS4, implements and maintains structural and non-structural BMPs to reduce pollutants in storm water runoff from construction sites to the MS4, reduces construction site discharges of storm water pollutants from the MS4 to the MEP, and prevents construction site discharges from the MS4 from causing or contributing to a violation of water quality standards.

a. ORDINANCE UPDATE

By July 1, 2012, each Copermittee must review and update its grading ordinances and other ordinances as necessary to achieve full compliance with this Order, including requirements for the implementation of all designated BMPs and other measures.

b. SOURCE IDENTIFICATION

Each Copermittee must maintain an updated watershed-based inventory of all construction sites within its jurisdiction. The use of an automated database system, such as Geographical Information Systems (GIS) is strongly encouraged.

c. SITE PLANNING AND PROJECT APPROVAL PROCESS

Each Copermittee must incorporate consideration of potential water quality impacts prior to approval and issuance of construction and grading permits.

(1) Each construction and grading permit must require proposed construction sites to implement designated BMPs and other measures so that illicit discharges into the MS4 are prevented, storm water pollutants discharged from the site will be reduced to the MEP, and construction discharges from the MS4 are prevented from causing or contributing to a violation of water quality standards.

(2) Prior to permit issuance, the project proponent's runoff management plan (or equivalent construction BMP plan) must be required to comply, and reviewed to verify compliance with the local grading ordinance, other applicable local ordinances, and this Order.

(3) Prior to permit issuance, each Copermittee must verify that project

proponents subject to California's statewide General NPDES Permit for Storm Water Discharges Associated With Construction Activities, (hereinafter General Construction Permit), have existing coverage under the General Construction Permit.

d. BMP IMPLEMENTATION

(1) Designate BMPs: Each Copermittee must designate a minimum set of BMPs and other measures to be implemented at all construction sites. The designated minimum set of BMPs must include:

(a) Management Measures:

(i) Pollution prevention, where appropriate;
(ii) Development and implementation of a runoff management plan;
(iii) Minimization of areas that are cleared and graded to only the portion of the site that is necessary for construction;
(iv) Minimization of exposure time of disturbed soil areas;
(v) Minimization of grading during the rainy season and correlation of grading with seasonal dry weather periods to the extent feasible;
(vi) Limitation of grading to a maximum disturbed area as determined by each Copermittee before either temporary or permanent erosion controls are implemented to prevent storm water pollution. The Copermittee has the option of temporarily increasing the size of disturbed soil areas by a set amount beyond the maximum, if the individual site is in compliance with applicable storm water regulations and the site has adequate control practices implemented to prevent storm water pollution;
(vii) Temporary stabilization and reseeding of disturbed soil areas as rapidly as feasible;
(viii) Wind erosion controls;
(ix) Tracking controls;
(x) Non-stormwater management measures to prevent illicit discharges and control storm water pollution sources;
(xi) Waste management measures;
(xii) Preservation of natural hydrologic features where feasible;
(xiii) Preservation of riparian buffers and corridors where feasible;
(xiv) Evaluation and maintenance of all BMPs, until removed; and
(xv) Retention, reduction, and proper management of all storm water pollutant discharges on site to the MEP standard.

(b) Erosion and Sediment Controls:

(i) Erosion prevention. Erosion prevention is to be used as the most important measure for keeping sediment on site during

construction;

(ii) Sediment controls. Sediment controls are to be used as a supplement to erosion prevention for keeping sediment on-site during construction;

(iii) Slope stabilization must be used on all active slopes during rain events regardless of the season and on all inactive slopes during the rainy season and during rain events in the dry season;

(iv) Permanent revegetation or landscaping as early as feasible; and

(v) Erosion and sediment controls must be required during the construction of unpaved roads.

(2) Each Copermittee must implement, or require implementation of, enhanced[16] measures to address the threat to water quality posed by all construction sites tributary to CWA section 303(d) water body segments impaired for sediment or turbidity. Each Copermittee must also implement, or require implementation of, enhanced, measures for construction sites within, or adjacent to, or discharging directly to receiving waters within environmentally sensitive areas (as defined in Attachment C of this Order).

(3) Active/Passive Sediment Treatment (AST): Each Copermittee must require implementation of AST for sediment at construction sites (or portions thereof) that are determined by the Copermittee to be an exceptional threat to water quality. In evaluating the threat to water quality, the following factors must be considered by the Copermittee:

(a) Soil erosion potential or soil type;
(b) The site's slopes;
(c) Project size and type;
(d) Sensitivity of receiving water bodies;
(e) Proximity to receiving water bodies;
(f) Non-storm water discharges;
(g) Ineffectiveness of other BMPs;
(h) Proximity and sensitivity of aquatic threatened and endangered species of concern;
(i) Known effects of AST chemicals; and
(j) Any other relevant factors.

(4) Implement BMPs: Each Copermittee must implement, or require the implementation of, the designated minimum BMPs and any additional measures necessary to comply with this Order at each construction site within its jurisdiction year round. BMP implementation requirements,

[16] Enhanced BMPs are control actions specifically targeted to the pollutant or condition of concern and of higher quality and effectiveness than the minimum control measures otherwise required. Enhanced in this Order means better, not simply more, BMPs.

however, can vary based on wet and dry seasons. Dry season BMP implementation must plan for and address unseasonal rain events that may occur during the dry season (May 1 through September 30).

e. INSPECTION OF CONSTRUCTION SITES

Each Copermittee must conduct construction site inspections for compliance with its ordinances (grading, storm water, etc.), permits (construction, grading, etc.), and this Order. Priorities for inspecting sites must consider the nature and size of the construction activity, topography, and the characteristics of soils and receiving water quality.

(1) During the rainy season, each Copermittee must inspect at least every two weeks, all construction sites within its jurisdiction meeting any of the following criteria:

(a) All sites 30 acres or more in size with rough grading or with active, unstabilized slopes occurring during the rainy season;

(b) All sites one acre or more, and within the same hydrologic subarea and tributary to a CWA section 303(d) water body segment impaired for sediment; or within, directly adjacent to, or discharging directly to a receiving water within an ESA; and

(c) Other sites determined by the Copermittees or the San Diego Water Board as a significant threat to water quality. In evaluating threat to water quality, the following factors must be considered: (1) soil erosion potential; (2) site slope; (3) project size and type; (4) sensitivity of receiving water bodies; (5) proximity to receiving water bodies; (6) non-storm water discharges; (7) known past record of non-compliance by the operators of the construction site; and (8) any other relevant factors.

(2) During the rainy season, each Copermittee must inspect at least monthly, all construction sites with one acre or more of soil disturbance not meeting the criteria specified above in section F.2.e.(1).

(3) During the rainy season, each Copermittee must inspect construction sites less than one acre in size as needed to ensure compliance with its ordinances and this Order.

(4) Each Copermittee must inspect all construction sites as needed during the dry season. Sites meeting the criteria in section F.2.e.(1) must be inspected at least once in August or September each year.

(5) Re-inspections: Based upon site inspection findings, each Copermittee must implement all follow-up actions (i.e., re-inspection, enforcement) necessary to comply with this Order. Reinspection frequencies must be determined by each Copermittee based upon the severity of deficiencies, the nature of the construction activity, and the characteristics of soils and receiving water quality.

(6) Inspections of construction sites must include, but not be limited to:

(a) Check for coverage under the General Construction Permit (Notice of Intent (NOI) and/or Waste Discharge Identification No.) during initial inspections;
(b) Assessment of compliance with Copermittee ordinances and permits related to runoff, including the implementation and maintenance of designated minimum BMPs;
(c) Assessment of BMP effectiveness;
(d) Visual observations for non-storm water discharges, potential illicit connections, and potential discharge of pollutants in storm water runoff;
(e) Review of site monitoring data results, if the site monitors its runoff
(f) Education and outreach on storm water pollution prevention, as needed; and
(g) Creation of a written or electronic inspection report.

(7) The Copermittees must track the number of inspections for each inventoried construction site throughout the reporting period to verify that each site is inspected at the minimum frequencies required.

f. ENFORCEMENT OF CONSTRUCTION SITES

(1) Each Copermittee must develop and implement an escalating enforcement process that achieves prompt corrective actions at construction sites for violations of the Copermittee's water quality protection permits, requirements, and ordinances. This enforcement process must include authorizing the Copermittee's construction site inspectors to take immediate enforcement actions when appropriate and necessary. The enforcement process must include appropriate sanctions such as stop work orders, non-monetary penalties, fines, bonding requirements, and/or permit denials for non-compliance.

(2) Each Copermittee must be able to respond to construction complaints received from third-parties and to ensure the San Diego Water Board that corrective actions have been implemented, if warranted.

g. REPORTING OF NON-COMPLIANT SITES

(1) In addition to the notification requirements in Attachment B, each Copermittee must notify the San Diego Water Board when the Copermittee issues high level enforcement (as defined in the Copermittee's JRMP) to a construction site that poses a significant threat to water quality in its jurisdiction as a result of violations of its storm water ordinances.

(2) Each Copermittee must annually notify the San Diego Water Board, prior to the commencement of the rainy season, of all construction sites with alleged violations that pose a significant threat to water quality. Information may be provided as part of the JRMP annual report if submitted prior to the rainy season. Information provided must include, but not be limited to, the following:

(a) WDID number if enrolled under the General Construction Permit
(b) Site Location, including address
(c) Current violations or suspected violations

3. EXISTING DEVELOPMENT COMPONENT

a. MUNICIPAL

Each Copermittee must implement a municipal program for the Copermittee's areas and activities that meets the requirements of this section, prevents illicit discharges into the MS4, reduces municipal discharges of storm water pollutants from the MS4 to the MEP, and prevents municipal discharges from the MS4 from causing or contributing to a violation of water quality standards.

(1) Source Identification / Inventory

Each Copermittee must maintain an updated watershed-based inventory of all its municipal areas and those activities that have the potential to generate pollutants. The inventory must include the name, address (if applicable), and a description of the area/activity; which pollutants are potentially generated by the area/activity; whether the area/activity is adjacent to an ESA; and identification of whether the area/activity is tributary to a CWA section 303(d) water body segment and generates pollutants for which the water body segment is impaired. Linear facilities, such as roads, streets, and highways, do not need to be individually inventoried. The use of an automated database system, such as Geographical Information Systems (GIS) is highly recommended.

(2) General BMP Implementation

(a) Pollution Prevention: Each Copermittee must implement pollution prevention methods in its municipal program and must require their use by appropriate departments, personnel, and contractors.

(b) Designate Minimum BMPs: Each Copermittee must designate a minimum set of BMPs for all municipal areas and those activities that have the potential to generate pollutants. The designated minimum BMPs for municipal areas and activities must be area or activity specific as appropriate.

(c) Each Copermittee must designate BMPs for special events that are expected to generate significant trash and litter. Controls to consider must include:

(i) Temporary screens on catch basins and storm drain inlets;
(ii) Temporary fencing to prevent windblown trash from entering adjacent water bodies and MS4 channels;
(iii) Proper management of trash and litter;
(iv) Catch basin cleaning following the special event and prior to an anticipated rain event;
(v) Street sweeping of roads, streets, highways and parking facilities following the special event; and
(vi) Other equivalent controls.

(d) Designate BMPs for ESAs and 303(d) Impairments: Each Copermittee must designate enhanced measures for its municipal areas and activities tributary to CWA section 303(d) impaired water body segments when an area or those activities have the potential to generate pollutants for which the water body segment is impaired. Each Copermittee must also designate additional controls for its municipal areas and activities within or directly adjacent to or discharging directly to receiving waters within environmentally sensitive areas (as defined in Attachment C of this Order).

(e) Implement BMPs: Each Copermittee must implement, or require the implementation of, the designated minimum and enhanced BMPs and any additional measures necessary based on its inventory to comply with this Order for each of its municipal area and those activities that have the potential to discharge pollution.

(3) BMP Implementation for Management of Pesticides, Herbicides, and Fertilizers

Each Copermittee must implement BMPs to reduce the contribution of storm water pollutants to the MEP associated with the application, storage, and

disposal of pesticides, herbicides and fertilizers from its municipal areas and activities to MS4s and receiving waters. Such BMPs must include, at a minimum:

(a) Educational activities, permits, certifications and other measures for municipal applicators and distributors;
(b) Integrated Pest Management (IPM) measures that rely on non-chemical solutions;
(c) The use of native vegetation;
(d) Schedules for irrigation and chemical application; and
(e) The collection and proper disposal of unused pesticides, herbicides, and fertilizers.

(4) BMP implementation for Flood Control Structures

(a) Each Copermittee must implement procedures to assure that flood management projects assess the impacts on the water quality of receiving water bodies.
(b) Each Copermittee must include water quality protection measures, where feasible, when retrofitting existing flood control structural devices.
(c) Each Copermittee must evaluate its existing flood control structures as part of ongoing routine maintenance, identify structures causing or contributing to a condition of pollution, implement measures to reduce or eliminate the structure's effect on pollution, and evaluate the feasibility of retrofitting the structural flood control device. The inventory and evaluation must be completed by and submitted to the San Diego Water Board in each JRMP Annual Report.

(5) BMP Implementation for Sweeping of Municipal Areas

Where municipal area sweeping is implemented as an MS4 BMP for municipal roads, streets, highways, and parking facilities, each Copermittee must design and implement the program based on the following criteria:

(a) Roads, streets, highways, and parking facilities identified as consistently generating the highest volumes of trash and/or debris must be swept at least two times per month.

(b) Roads, streets, highways, and parking facilities identified as consistently generating moderate volumes of trash and/or debris must be swept at least monthly.

(c) Roads, streets, highways, and parking facilities identified as generating low volumes of trash and/or debris must be swept as necessary, but no less than once per year.

(6) Operation and Maintenance of Municipal Separate Storm Sewer System (MS4) and Treatment Controls

(a) Treatment Controls: Each Copermittee must implement a schedule of inspection and maintenance activities to verify proper operation of all its municipal structural treatment controls designed to reduce storm water pollutant discharges to or from its MS4s and related drainage structures.

(b) MS4 and Facilities: Each Copermittee must implement a schedule of maintenance activities for its MS4 and facilities (including but not limited to catch basins, storm drain inlets, detention basins, etc). The maintenance activities must, at a minimum, include:

(i) Inspection and removal of accumulated waste at least once a year between May 1 and September 30 of each year for all MS4 facilities;
(ii) Additional facilities cleaning as necessary between October 1 and April 30 of each year;
(iii) Following two years of inspections, any MS4 facility that requires inspection and cleaning less than annually may be inspected as needed, but not less than every other year;
(iv) Open channels and basins must be cleaned of observed anthropogenic litter in a timely manner;
(v) Maintenance activities within open channels must not adversely impact beneficial uses;
(vi) Record keeping of the maintenance and cleaning activities including the overall quantity of waste removed;
(vii) Proper disposal of waste removed pursuant to applicable laws; and
(viii) Measures to eliminate waste discharges during MS4 maintenance and cleaning activities.

(7) Infiltration From Sanitary Sewer to MS4/Provide Preventive Maintenance

(a) Each Copermittee must implement controls and measures to prevent and eliminate infiltration of seepage from sanitary sewers to MS4s through thorough, routine preventive maintenance of the MS4. Each Copermittee that operates both a municipal sanitary sewer system and a MS4 must implement controls and measures to prevent and eliminate infiltration of seepage from the sanitary sewers to the MS4s that must include overall sanitary sewer and MS4 surveys and thorough, routine preventive maintenance of both.

(b) Each Copermittee must implement controls to limit infiltration of seepage from sanitary sewers to municipal separate storm sewer systems where necessary. Such controls must include:

(i) Adequate plan checking for construction and new development;
(ii) Incident response training for its municipal employees that identify sanitary sewer spills;
(iii) Code enforcement inspections;
(iv) MS4 maintenance and inspections;
(v) Interagency coordination with sewer agencies; and
(vi) Proper education of its municipal staff and contractors conducting field operations on the MS4 or its municipal sanitary sewer (if applicable).

(8) Inspection of Municipal Areas and Activities

(a) At a minimum, each Copermittee must inspect the following high priority municipal areas and activities annually:

(i) Roads, Streets, Highways, and Parking Facilities;
(ii) Flood Management Projects and Flood Control Devices not otherwise inspected per Section F.3.a.(6)(b);
(iii) Areas and activities tributary to a CWA section 303(d) impaired water body segment, where an area or activity generates pollutants for which the water body segment is impaired.
(iv) Areas and activities within or adjacent to or discharging directly to receiving waters within environmentally sensitive areas (as defined in Attachment C of this Order);
(v) Municipal Facilities:
[a] Active or closed municipal landfills;
[b] Publicly owned treatment works (including water and wastewater treatment plants) and sanitary sewage collection systems;
[c] Solid waste transfer facilities;
[d] Land application sites;
[e] Corporate yards including maintenance and storage yards for materials, waste, equipment and vehicles; and
[f] Household hazardous waste collection facilities.
(vi) Municipal airfields;
(vii) Parks and recreation facilities;
(viii) Special event venues following special events (festivals, sporting events, etc.);
(ix) Power washing activities; and
(x) Other municipal areas and activities that the Copermittee determines may contribute a significant pollutant load to the MS4.

(b) Other municipal areas and activities must be inspected as needed and in response to water quality data, valid public complaints, and findings from municipal or contract staff.

(c) Based upon site inspection findings, each Copermittee must implement all follow-up actions necessary to comply with this Order.

(9) Enforcement of Municipal Areas and Activities

Each Copermittee must enforce its storm water ordinance for all its municipal areas and activities as necessary to maintain compliance with this Order.

(10) Unpaved Roads Maintenance

(a) The Copermittees must develop, where they do not already exist, and implement or require implementation of BMPs for erosion and sediment control measures during maintenance activities on unpaved roads, particularly in or adjacent to receiving waters.

(b) The Copermittees must develop and implement or require implementation of appropriate BMPs to minimize impacts on streams and wetlands during unpaved road maintenance activities.

(c) The Copermittees must regularly maintain their unpaved roads adjacent to streams and riparian habitat to reduce erosion and sediment transport;

(d) Re-grading of unpaved roads during maintenance must be sloped outward where consistent with road engineering safety standards;

(e) Through their regular maintenance of unpaved roads, the Copermittees must examine the feasibility of replacing existing culverts or design of new culverts or bridge crossings to reduce erosion and maintain natural stream geomorphology.

b. COMMERCIAL / INDUSTRIAL

Each Copermittee must implement a commercial / industrial program that meets the requirements of this section, prevents illicit discharges into the MS4, reduces commercial / industrial discharges of storm water pollutants from the MS4 to the MEP, and prevents commercial / industrial discharges from the MS4 from causing or contributing to a violation of water quality standards.

(1) Source Identification

(a) Each Copermittee must maintain an updated watershed-based inventory of all industrial and commercial sites/sources within its jurisdiction (regardless of ownership) that could contribute a significant pollutant load to the MS4. The inventory must include the following minimum information for each industrial and commercial site/source: name;

address; pollutants potentially generated by the site/source; and identification of whether the site/source is tributary to a CWA §303(d) water body segment and generates pollutants for which the water body segment is impaired; and a narrative description including SIC codes which best reflects the principal products or services provided by each facility.

At a minimum, the following sites/sources must be included in the inventory:

(i) Commercial Sites/Sources:

[a] Automobile repair, maintenance, fueling, or cleaning;
[b] Airplane repair, maintenance, fueling, or cleaning;
[c] Boat repair, maintenance, fueling, or cleaning;
[d] Equipment repair, maintenance, fueling, or cleaning;
[e] Automobile and other vehicle body repair or painting;
[f] Mobile automobile or other vehicle washing;
[g] Automobile (or other vehicle) parking lots and storage facilities;
[h] Retail or wholesale fueling;
[i] Pest control services;
[j] Eating or drinking establishments, including such retail establishments with food markets;
[k] Mobile carpet, drape or furniture cleaning;
[l] Cement mixing or cutting;
[m] Masonry;
[n] Painting and coating;
[o] Botanical or zoological gardens and exhibits;
[p] Landscaping;
[q] Nurseries and greenhouses;
[r] Golf courses, parks and other recreational areas/facilities;
[s] Cemeteries;
[t] Pool and fountain cleaning;
[u] Marinas;
[v] Portable sanitary services;
[w] Building material retailers and storage;
[x] Animal boarding facilities and kennels;
[y] Mobile pet services;
[z] Power washing services;
[aa] Plumbing services; and
[bb] Other sites and sources with a history of un-authorized discharges to the MS4.

(ii) Industrial Sites/Sources:

[a] Industrial Facilities, as defined at 40 CFR § 122.26(b)(14), including those subject to the General Industrial Permit or other individual NPDES permit;
[b] Operating and closed landfills;
[c] Facilities subject to SARA Title III; and
[d] Hazardous waste treatment, disposal, storage and recovery facilities.

(iii) ESAs and 303(d) Listed Waterbodies: All other commercial or industrial sites/sources tributary to a CWA Section 303(d) impaired water body segment, where the site/source generates pollutants for which the water body segment is impaired. All other commercial or industrial sites/sources within or directly adjacent to or discharging directly to receiving waters within environmentally sensitive areas (as defined in Attachment C of this Order) or that generate pollutants tributary to an observed exceedance of an action level.

(iv) All other commercial or industrial sites/sources that the Copermittee determines may contribute a significant pollutant load to the MS4.

(2) General BMP Implementation

(a) Pollution Prevention: Each Copermittee must require the use of pollution prevention methods by the inventoried industrial and commercial sites/sources.

(b) Designate / Update Minimum BMPs: Each Copermittee must designate a minimum set of BMPs for all inventoried industrial and commercial sites/sources. Where BMPs have already been designated, each Copermittee must review and update its existing BMPs for adequacy within one year of permit adoption. Copermittees may continue to regularly review and update their designated BMPs for adequacy and subsequently submit any updates in their Annual Report. The designated minimum BMPs must be specific to facility types and pollutant-generating activities, as appropriate.

(c) Designate Enhanced BMPs for ESAs and 303(d) Impairments: Each Copermittee must designate enhanced measures for inventoried industrial and commercial sites/sources tributary to CWA section 303(d) impaired water body segments (where a site/source generates pollutants for which the water body segment is impaired). Each Copermittee must also designate additional controls for industrial and commercial sites/sources within or directly adjacent to or discharging directly to coastal lagoons, the ocean, or other receiving waters within environmentally sensitive areas (as

defined in Attachment C of this Order). Copermittees may continue to regularly review and update their designated enhanced BMPs for adequacy and subsequently submit any updates in their next Annual Report.

(d) Implement BMPs: Each Copermittee must implement, or require the implementation of, the designated minimum and enhanced BMPs and any additional measures necessary based on inspections, incident responses, and water quality data to comply with this Order at each industrial and commercial site/source within its jurisdiction.

(3) Mobile Businesses Program

(a) Each Copermittee must develop and implement a program to reduce the discharge of storm water pollutants from mobile businesses to the MEP and to prohibit non-storm water discharges pursuant to Section B of this Order. Each Copermittee must keep as part of its commercial source inventory a listing of mobile businesses known to operate within its jurisdiction that conduct services listed above in section F.3.b.(1)(a). The program must include:

(i) Development and implementation of minimum standards and BMPs to be required for each of the various types of mobile businesses;
(ii) Development and implementation of an enforcement strategy which specifically addresses the unique characteristics of mobile businesses;
(iii) Notification of those mobile businesses known to operate within the Copermittee's jurisdiction of the minimum standards and BMP requirements;
(iv) Development and implementation of an outreach and education strategy; and
(v) Inspection of mobile businesses as needed to implement the program.

(b) If they choose to, the Copermittees may cooperate in developing and implementing their programs for mobile businesses, including sharing of mobile business inventories, BMP requirements, enforcement action information, and education.

(4) Inspection of Industrial and Commercial Sites/Sources

Each Copermittee must conduct industrial and commercial site inspections for compliance with its ordinances, permits, and this Order. Mobile businesses must be inspected as needed pursuant to section F.3.b.(3).

(a) Inspection Procedures: Inspections must include but not be limited to:

(i) Review of BMP implementation plans, if the site uses or is required to use such a plan;
(ii) Review of facility monitoring data, if the site monitors its runoff;
(iii) Check for coverage under the General Industrial Permit (Notice of Intent (NOI) and/or Waste Discharge Identification Number), if applicable;
(iv) Assessment of compliance with Copermittee ordinances and Copermittee issued permits related to runoff;
(v) Assessment of the implementation, maintenance and effectiveness of the designated minimum and/or enhanced BMPs;
(vi) Visual observations for non-storm water discharges, potential illicit connections, and potential discharge of pollutants in storm water runoff; and
(vii) Education and training on storm water pollution prevention, as conditions warrant.

(b) Each Copermittee must annually notify the San Diego Water Board, prior to the commencement of the rainy season, of all Industrial Sites and Industrial Facilities subject to the General Industrial Permit or other individual NPDES permit with alleged violations of the Copermittees ordinances, that pose a significant threat to water quality.

(c) Frequencies: At a minimum all sites determined to pose a high threat to water quality must be inspected each year. All inventoried sites must be inspected at least once during a five year period. In evaluating threat to water quality, each Copermittee must consider, at a minimum, the following:

(i) Type of activity (SIC code);
(ii) Materials used at the facility;
(iii) Wastes generated;
(iv) Pollutant discharge potential, including whether the facility generates a pollutant that exceeds an action level;
(v) Non-storm water discharges;
(vi) Size of facility;
(vii) Proximity to receiving water bodies;
(viii) Sensitivity of receiving water bodies;
(ix) Whether the facility is subject to the General Industrial Permit or an individual NPDES permit;
(x) Whether the facility has filed a No Exposure Certification/Notice of Non-Applicability;
(xi) Facility design;
(xii) Total area of the site, portion of the site where industrial or commercial activities occur, and area of the site exposed to rainfall and runoff;
(xiii) The facility's compliance history; and
(xiv) Any other relevant factors.

(d) Third-Party Certifications: Each Copermittee may propose to develop and implement a third party certification program subject to San Diego Water Board Executive Officer acceptance. This program would verify industrial and commercial site/source compliance with the Copermittees' ordinances, permits, and this Order. To the extent that third party certifications are conducted to fulfill the requirements of Section F.3.b.(4) above, the Copermittee retains responsibility for compliance with this Order and will be responsible for conducting and documenting quality assurance and quality control of the third-party certifications.

(i) The Copermittee's proposed third party certification program must include the following:

[a] A description of the procedures and measures for quality assurance and quality control;
[b] A listing of sites/sources that may and may not participate in the program;
[c] The representative percentage of certifications that would qualify to satisfy the inspection requirements in section F.3.b(4)(c) above;
[d] Photo documentation of potential storm water violations identified during the third party inspection;
[e] Reporting to the Copermittee of identified significant potential violations, including imminent or observed illegal discharges, within 24 hours of the third party inspection;
[f] Reporting to the Copermittee of all findings within one week of the inspection being conducted; and
[g] Copermittee follow-up and/or enforcement actions for identified potential storm water violations within two business days of the potential violation report receipt.

(e) Based upon site inspection findings, each Copermittee must implement all follow-up actions and enforcement necessary to comply with this Order.

(f) To the extent that the San Diego Water Board has conducted an inspection of an industrial site during a particular year, the requirement for the responsible Copermittee to inspect this facility during the same year is deemed satisfied.

(g) The Copermittees must track the number of inspections for the inventoried industrial and commercial sites/sources throughout the reporting period to verify that the sites/sources are inspected at the minimum frequencies listed in this Order.

(5) Enforcement of Industrial and Commercial Sites/Sources

Each Copermittee must enforce its storm water ordinance for all industrial and commercial sites/sources as necessary to maintain compliance with this Order. Copermittee ordinances or other regulatory mechanisms must include appropriate sanctions to achieve compliance. Sanctions must include the following tools or their equivalent: Non-monetary penalties, fines, bonding requirements, liens and/or permit denials for non-compliance.

C. RESIDENTIAL

Each Copermittee must implement a residential program that meets the requirements of this section, prevents illicit discharges into the MS4, reduces residential discharges of storm water pollutants from the MS4 to the MEP, and prevents residential discharges from the MS4 from causing or contributing to a violation of water quality standards.

(1) Threat to Water Quality Prioritization

Each Copermittee must identify residential areas and activities that pose a high threat to water quality. At a minimum, these must include:

(a) Automobile repair, maintenance, washing, and parking;
(b) Home and garden care activities and product use (pesticides, herbicides, and fertilizers);
(c) Disposal of trash, pet waste, green waste, and household hazardous waste (e.g., paints, cleaning products);
(d) Any other residential source that the Copermittee determines may contribute a significant pollutant load to the MS4;
(e) Any residential areas tributary to a CWA section 303(d) impaired water body, where the residence generates pollutants for which the water body is impaired; and
(f) Any residential areas within or directly adjacent to or discharging directly to receiving waters within an environmentally sensitive area (as defined in Attachment C of this Order).

(2) BMP Implementation

(a) Pollution Prevention: Each Copermittee must actively encourage the use of pollution prevention methods by residents.

(b) Designate BMPs: Each Copermittee must designate minimum BMPs for high-threat-to-water quality residential areas and activities. The designated minimum BMPs for high-threat-to-water quality residential areas and activities must be area or activity specific.

(c) Hazardous Waste BMPs: Each Copermittee must facilitate the proper management and disposal of used oil, toxic materials, and other household hazardous wastes. Such facilitation must include educational activities, public information activities, and establishment of collection sites operated individually and/or jointly by the Copermittee(s) or a private entity. Curbside collection of household hazardous wastes is encouraged.

(d) Implement BMPs: Each Copermittee must implement, or require implementation of, the designated minimum BMPs and any additional measures necessary to comply with Sections A and B of this Order.

(e) Each Copermittee must implement, or require implementation of, BMPs for residential areas and activities that have not been designated a high threat to water quality, as necessary.

(3) Enforcement of Residential Areas and Activities

Each Copermittee must enforce its storm water ordinance for all residential areas and activities as necessary to maintain compliance with this Order.

(4) Common Interest Areas (CIA) / Home Owner Association (HOA) Areas, and Mobile Home Parks

Each Copermittee must ensure that effective measures exist and are implemented or required to be implemented to ensure that runoff within and from common interest developments, including areas managed by associations and mobile home parks, and meets the objectives of this section and Order.

(a) BMP Implementation: Each Copermittee must implement or require implementation of management measures based on a review of pertinent factors, including:

(i) Maintenance duties and procedures typically used by CIA/HOA maintenance associations within its jurisdiction;
(ii) Whether streets and storm drains are publicly or privately owned within the CIA/HOA or mobile home park;
(iii) Whether the CIA/HOA area or mobile home park has been identified as a high priority residential area based on an evaluation of the site potential to generate pollutants contributing to a 303(d) listed waterbody or an observed action level exceedance;
(iv) Other activities conducted or authorized by the HOA that may pose a significant risk to inland receiving waters.

(b) Legal Authority and Enforcement: By July 1, 2012, each Copermittee must review, and if necessary update, its Municipal Code to verify that they have the legal authority to implement and enforce its ordinances within CIA/HOA areas and mobile home parks.

(5) Privately Owned Unpaved Roads Maintenance

(a) The Copermittees must require implementation of BMPs for erosion and sediment control during maintenance activities on privately owned unpaved roads, particularly in or adjacent to stream channels or wetlands.

(b) The Copermittees must enforce their ordinances against illegal construction and maintenance grading activities on privately owned unpaved roads, so as to prevent impacts to water quality.

d. RETROFITTING EXISTING DEVELOPMENT

Each Copermittee must develop and implement a retrofitting program that meets the requirements of this section. The goals of the existing development retrofitting program are to reduce impacts from hydromodification, promote LID, support riparian and aquatic habitat restoration, reduce the discharges of storm water pollutants from the MS4 to the MEP, and prevent discharges from the MS4 from causing or contributing to a violation of water quality standards. Where feasible, at the discretion of the Copermittee, the existing development retrofitting program may be coordinated with flood control projects and other infrastructure improvement programs.

(1) The Copermittee(s) must identify and inventory existing areas of development (i.e. municipal, industrial, commercial, residential) as candidates for retrofitting. Potential retrofitting candidates must include but are not limited to:

(a) Areas of development that generate pollutants of concern to a TMDL or an ESA;
(b) Receiving waters that are channelized or otherwise hardened;
(c) Areas of development tributary to receiving waters that are channelized or otherwise hardened;
(d) Areas of development tributary to receiving waters that are significantly eroded;
(e) Areas of development tributary to an ASBS or SWQPA; and

(2) Each Copermittee must evaluate and rank the inventoried areas of existing developments to prioritize retrofitting. Criteria for evaluation must include but is not limited to:

(a) Feasibility;
(b) Cost effectiveness;
(c) Pollutant removal effectiveness, including reducing pollutants exceeding action level;
(d) Tributary area potentially treated;
(e) Maintenance requirements;
(f) Landowner cooperation;
(g) Neighborhood acceptance;
(h) Aesthetic qualities;
(i) Efficacy at addressing concern; and
(j) Potential improvements on public health and safety

(3) Each Copermittee must consider the results of the evaluation in prioritizing work plans for the following year in accordance with Sections G.1 and J. Highly feasible projects expected to benefit water quality should be given a high priority to implement source control and treatment control BMPs. Where feasible, the retrofit projects may be designed in accordance with the SSMP requirements within sections F.1.d.(3) through F.1.d.(8) and the Hydromodification requirements in Section F.1.h.

(4) The Copermittees must cooperate with private landowners to encourage site specific retrofitting projects. The Copermittee must consider the following practices in cooperating and encouraging private landowners to retrofit their existing development:

(a) Demonstration retrofit projects;
(b) Retrofits on public land and easements that treat runoff from private developments;
(c) Education and outreach;
(d) Subsidies for retrofit projects;
(e) Requiring retrofit projects as enforcement, mitigation or ordinance compliance;
(f) Public and private partnerships; and
(g) Fees for existing discharges to the MS4 and reduction of fees for retrofit implementation.

(5) The completed retrofit BMPs must be tracked in accordance with Section F.1.f. Retrofit BMPs on publicly owned properties must be inspected per section F.1.f . Privately owned retrofit BMPs must be inspected as needed to ensure proper operation and maintenance.

(6) Where constraints on retrofitting preclude effective BMP deployment on existing developments at locations critical to protect receiving waters (as identified in section F.3.d.(1)), a Copermittee may propose a regional mitigation project to improve water quality. Such regional projects may include but are not limited to:

(a) Regional water quality treatment BMPs;
(b) Urban creek or wetlands restoration and preservation;
(c) Daylighting and restoring underground creeks;
(d) Localized rainfall storage and reuse to the extent such projects are fully protective of downstream water rights;
(e) Hydromodification project; and
(f) Removal of invasive plant species.

(7) A retrofit project or regional mitigation project may qualify as a Watershed Water Quality Activity provided it meets the requirements in section G. Watershed Workplan.

4. ILLICIT DISCHARGE DETECTION AND ELIMINATION

Each Copermittee must implement a program that meets the requirements of this section to actively detect and eliminate illicit discharges and disposal into the MS4. The program must address all types of illicit discharges and connections excluding those non-storm water discharges not prohibited by the Copermittee in accordance with section B of this Order.

a. PREVENT AND DETECT ILLICIT DISCHARGES AND CONNECTIONS

Each Copermittee must implement measures to prevent and detect illicit discharges to the MS4.

(1) Legal Authority: Each Copermittee must retain legal authority to prevent and eliminate illicit discharges and connections to the MS4.

(2) Inspections: Each Copermittee must include use of appropriate Copermittee personnel and contractors to assist in identifying illicit discharges and connections during their daily activities.

(a) Visual inspections for illegal discharges and connections must be conducted during routine maintenance of all MS4 facilities.

(b) Copermittee staff and contractors conducting non-MS4 field operations must be trained to report suspected illegal discharges and connections to proper Copermittee staff.

b. MAINTAIN MS4 MAP

Each Copermittee must maintain an updated map of its entire MS4 and the corresponding drainage areas within its jurisdiction. The use of GIS is strongly

encouraged. The MS4 map must include all segments of the storm sewer system owned, operated, and maintained by the Copermittee, as well as all known locations of inlets that discharge and/or collect runoff into the Copermittee's MS4, all known locations of access points (i.e. manholes) to the Copermittee's MS4, all known locations of connections with other MS4s (e.g. Caltrans), and all known locations of all the outfalls that discharge runoff from the Copermittee's MS4. The accuracy of the MS4 map must be confirmed during dry weather field screening and analytical monitoring and must be updated at least annually. The MS4 map including any GIS layers must be submitted with the updated JRMP.

c. Facilitate Public Reporting Of Illicit Discharges And Connections - Public Hotline

Each Copermittee must promote, publicize and facilitate public reporting of illicit discharges or water quality impacts associated with discharges into or from MS4s. Each Copermittee must facilitate public reporting through development and operation of a public hotline. Public hotlines can be Copermittee-specific or shared by Copermittees. All storm water hotlines must be capable of receiving reports in both English and Spanish 24 hours per day and seven days per week. All reported incidents, and how each was resolved, must be summarized in each Copermittee's Annual Report.

d. Dry Weather Field Screening And Analytical Monitoring

Each Copermittee must conduct dry weather field screening and analytical monitoring of MS4 outfalls and other portions of its MS4 within its jurisdiction to detect illicit discharges and connections in accordance with Receiving Waters and MS4 Discharge Monitoring and Reporting Program No. R9-2010-0016 in Attachment E of this Order.

e. Investigation / Inspection And Follow-Up

Each Copermittee must implement procedures to investigate and inspect portions of its MS4 that, based on the results of field screening, analytical monitoring, or other appropriate information, indicate a reasonable potential of containing illicit discharges, illicit connections, or other sources of pollutants in non-storm water.

(1) Develop response criteria for data: Each Copermittee must develop, update, and use numeric criteria action levels (or other actions level criteria where appropriate) to determine when follow-up investigations will be performed in response to water quality monitoring. The criteria must include required non-storm water action levels (see Section C) and a consideration of 303(d)-listed waterbodies and environmentally sensitive areas (ESAs) as defined in Attachment C.

(2) Respond to data: Each Copermittee must investigate portions of the MS4 for which water quality data or conditions indicates a potential illegal discharge or connection.

(a) Obvious illicit discharges (i.e. color, odor, or significant exceedances of action levels) must be investigated immediately.

(b) Field screen data: Within two business days of receiving dry weather field screening results that exceed action levels, the Copermittee(s) having jurisdiction must either initiate an investigation to identify the source of the discharge or document the rationale for why the discharge does not pose a threat to water quality and does not need further investigation. This documentation must be included in the Annual Report.

(c) Analytical data: Within five business days of receiving analytical laboratory results that exceed action levels, the Copermittee(s) having jurisdiction must either initiate an investigation to identify the source of the discharge or document the rationale for why the discharge does not pose a threat to water quality and does not need further investigation. This documentation must be included in the Annual Report.

(3) Respond to notifications: Each Copermittee must respond to and resolve each reported incident (e.g., public hotline, staff notification, etc.) made to the Copermittee in a timely manner. Criteria may be developed to assess the validity of, and prioritize the response to, each report.

f. ELIMINATION OF ILLICIT DISCHARGES AND CONNECTIONS

Each Copermittee must take immediate action to initiate steps necessary to eliminate all detected illicit discharges, illicit discharge sources, and illicit connections after detection within its jurisdiction. Elimination measures may include an escalating series of enforcement actions for those illicit discharges that are not a serious threat to public health or the environment. Illicit discharges that pose a serious threat to the public's health or the environment must be eliminated immediately.

g. ENFORCE ORDINANCES

Each Copermittee must implement and enforce its ordinances, orders, or other legal authority to prevent illicit discharges and connections to its MS4 and to eliminate detected illicit discharges and connections to its MS4.

h. Prevent And Respond To Sewage Spills (Including From Private Laterals And Failing Septic Systems) And Other Spills

Each Copermittee must implement management measures and procedures (including a notification mechanism) to prevent, respond to, contain and clean up all sewage (see below) and other spills that may discharge into its MS4 from any source (including private laterals and failing septic systems). Copermittees must coordinate with spill response teams to prevent entry of spills into the MS4 and contamination of surface water, ground water and soil. Each Copermittee must coordinate spill prevention, containment and response activities throughout all appropriate departments, programs and agencies so that maximum water quality protection is available at all times.

5. PUBLIC PARTICIPATION COMPONENT

Each Copermittee must incorporate a mechanism for public participation in the updating, development, and implementation of the JRMP.

6. EDUCATION COMPONENT

Each Copermittee must implement education programs to (1) measurably increase the knowledge regarding MS4s, impacts of runoff on receiving waters, and potential BMP solutions for the target audience; and (2) to measurably change the behavior of target communities and thereby reduce pollutants in storm water discharges and eliminate prohibited non-storm water discharges to MS4s and the environment. At a minimum, the education programs must meet the requirements of this section and address the following target communities:

- Copermittee Departments and Personnel
- New Development / Redevelopment Project Applicants, Developers, Contractors, Property Owners, and other Responsible Parties
- Construction Site Owners and Operators
- Commercial Owners and Operators
- Industrial Owners and Operators
- Residential Community and General Public
- Quasi-Governmental Agencies / Districts (i.e., educational institutions, water districts, sanitation districts, etc.)

a. General Requirements

(1) At a minimum, the Copermittee education programs must educate each target community on the following topics:

(a) Applicable water quality laws, regulations, permits, and requirements;
(b) Best management practices;
(c) General runoff concepts;
(d) Existing water quality, including local water quality conditions, impaired waterbodies and environmentally sensitive areas; and
(e) Other topics, such as public reporting mechanisms, water conservation, low-impact development techniques, and public health and vector issues associated with runoff.

(2) Each Copermittee must implement educational activities, public information activities, and other appropriate activities to facilitate the proper management and disposal of used oil and toxic materials.

b. Specific Requirements

(1) Copermittee Departments and Personnel

(a) Each Copermittee must implement an education program so its staff and contractors (and Planning Boards and Elected Officials, if applicable) responsible for implementing the requirements of this Order have an understanding of the following topics as applicable to their responsibilities:

(i) Applicable water quality laws and regulations;
(ii) The potential effects and impacts that Copermittee departments and personnel activities related to their job duties can have on water quality);
(iii) Plan review policies and procedures to verify consistent application;
(iv) Methods of minimizing impacts to receiving water quality resulting from development, construction, and other potential pollutant generating activities;
(v) Proper implementation of erosion and sediment control, source control, treatment control, and other BMPs to minimize the impacts to receiving water quality resulting from development, construction, and other potential pollutant generating activities;
(vi) Applicable recordkeeping and tracking mechanisms;
(vii) Inspection and enforcement procedures, BMP implementation, and review of monitoring data.

(b) Each Copermittee must train its staff responsible for oversight and conducting storm water compliance inspections and enforcement of construction activities (e.g. construction, building, code enforcement, grading review staffs, inspectors, and other responsible construction staff) annually prior to the rainy season.

(c) Each Copermittee must train its staff responsible for conducting storm water compliance inspections and enforcement of industrial and commercial facilities at least once a year.

(2) New Development / Redevelopment and Construction Sites

As early in the planning and development process as possible and all through the permitting and construction process, each Copermittee must notify parties responsible for the project about the importance of educating all construction workers in the field about storm water issues and BMPs, in addition to the topics under Section F.6.a.(1).

(3) Commercial and Industrial Sites / Sources

At least once during the five-year period of this Order, each Copermittee must notify the owner/operator of each of its inventoried commercial and industrial site/source of the BMP requirements applicable to the site/source.

(4) Residential and General Public

Each Copermittee shall collaboratively conduct or participate in development and implementation of a program to educate residential and general public target communities. The Copermittee residential and general public education programs must address potential pollutant generating activities (e.g., car washing, mobile operations, yard maintenance) and pollutant generating products (e.g., pesticides, fertilizers, household chemicals). The target audiences of the residential and general public education programs must include underserved target audiences (e.g., disadvantaged communities), residents and managers of CIA/HOA areas, and owners and residents of mobile home parks.

G. WATERSHED WATER QUALITY WORKPLAN

Each Copermittee must collaborate with other Copermittees to develop and implement a Watershed Water Quality Workplan (Watershed Workplan) to identify, prioritize, address, and mitigate the highest priority water quality issues/pollutants in the Upper Santa Margarita Watershed.

1. Watershed Workplan Components:

The work plan must, at a minimum:

a. Characterize the receiving water quality in the watershed. Characterization must include assessment and analysis of regularly collected water quality data, reports, monitoring and analysis generated in accordance with the requirements

of the Receiving Waters Monitoring and Reporting Program, as well as applicable information available from other public and private organizations. This characterization must include an updated watershed map.

b. Identify and prioritize water quality problem(s) in terms of constituents by location, in the watershed's receiving waters. In identifying water quality problem(s), the Copermittees must, at a minimum, give consideration to TMDLs, receiving waters listed on the CWA section 303(d) list, waters with persistent violations of water quality standards, toxicity, or other impacts to beneficial uses, and other pertinent conditions.

c. Identify the likely sources, pollutant discharges and/or other factors causing the highest water quality problem(s) within the watershed. Efforts to determine such sources must include, but not be limited to: use of information from the construction, industrial/commercial, municipal, and residential source identification programs required within the JRMP of this Order; water quality monitoring data collected as part of the Receiving Water Monitoring and Reporting Program required by this Order, and additional focused water quality monitoring to identify specific sources within the watershed.

d. Develop a watershed BMP implementation strategy to attain receiving water quality objectives in the identified highest priority water quality problem(s) and locations. The BMP implementation strategy must include a schedule for implementation of the BMP projects to abate specific receiving water quality problems and a list of criteria to be used to evaluate BMP effectiveness. Identified watershed water quality problems may be the result of jurisdictional discharges that will need to be addressed with BMPs applied in a specific jurisdiction in order to generate a benefit to the watershed. This implementation strategy must include a map of implemented and proposed BMPs.

e. Develop a strategy to monitor improvements in receiving water quality directly resulting from implementation of the BMPs described in the Watershed Workplan. The monitoring strategy must review the necessary data to report on the measured pollutant reduction that results from proper BMP implementation. Monitoring must, at a minimum, be conducted in the receiving water to demonstrate reduction in pollutant concentrations and progression towards attainment of receiving water quality objectives.

f. Establish a schedule for development and implementation of the Watershed strategy outlined in the Workplan. The schedule must, at a minimum, include forecasted dates of planned actions to address Provisions E.2(a) through E.2(e) and dates for watershed review meetings through the remaining portion of this Permit cycle. Annual watershed workplan review meetings must be open to the public and appropriately publically noticed such that interested parties may come and provide comments on the watershed program.

2. **Watershed Workplan Implementation –** Watershed Copermittee's must implement the Watershed Workplan within 90 days of submittal unless otherwise directed by the San Diego Water Board.

3. **Copermittee Collaboration** – Watershed Copermittees must collaborate to develop and implement the accepted Watershed Workplan. Watershed Copermittee collaboration must include frequent regularly scheduled meetings. The Copermittees must pursue efforts to obtain any interagency agreements, or other coordination efforts, with non-Copermittee owners of the MS4 (such as Caltrans, Native American tribes, and school districts) to control the contribution of pollutants from one portion of the shared MS4 to another portion of the shared MS4. The Copermittees must, as appropriate, participate in watershed management efforts to address water quality issues within the entire Santa Margarita Watershed (such as the County of San Diego and U.S. Marine Corps Camp Pendleton).

4. **Public Participation –** Watershed Copermittees must implement a watershed-specific public participation mechanism within each watershed. A required component of the watershed-specific public participation mechanism must be a minimum 30-day public review of and opportunity to comment on the Watershed Workplan prior to submittal to the San Diego Water Board. The Workplan must include a description of the public participation mechanisms to be used and identification of the persons or entities anticipated to be involved during the development and implementation of the Watershed Workplan.

5. **Watershed Workplan Review and Updates –** Watershed Copermittees must review and update the Watershed Workplan annually to identify needed changes to the prioritized water quality problem(s) listed in the workplan. All updates to the Watershed Workplan must be presented during an Annual Watershed Review Meeting. Annual Watershed Review Meetings must occur once every calendar year and be conducted by the Watershed Copermittees. Annual Watershed Review Meetings must be open to the public and adequately noticed. Individual Watershed Copermittees must also review and modify their jurisdictional programs and JRMP Annual Reports, as necessary, so that they are consistent with the updated Watershed Workplan.

6. **Pyrethroid Toxicity Reduction Evaluation –** The Watershed Copermittees must incorporate the pyrethroid pollutant reduction program[17] into the Watershed Workplan. The pyrethroid pollutant reduction program must include the following elements:

   a. Pursue state and federal regulatory change.
   b. Implement a set of source controls targeted specifically at urban pyrethroid use,
   c. Through the annual reporting process, monitor the implementation of those

[17] The pyrethroid pollutant reduction program is described in the "Riverside County – Santa Margarita Region Pyrethroid Source Identification Toxicity Reduction Evaluation, Final Phase II Report", January 2009 by MACTEC.

controls, assess effectiveness, and identify sources or areas where additional effort is needed,

d. Implement additional controls as needed,

e. Continue to monitor implementation, as well as conditions within the target receiving waters, assess effectiveness, and re-evaluate control programs.

H. FISCAL ANALYSIS

1. Secure Resources: Each Copermittee must exercise its full authority to secure the resources necessary to meet all requirements of this Order.

2. Annual Analysis: Each Copermittee must conduct an annual fiscal analysis of the necessary capital and operation and maintenance expenditures necessary to accomplish the activities of the programs required by this Order. The analysis must include estimated expenditures for the current reporting period, the preceding period, and the next reporting period.

a. Each analysis must include a description of the source of funds that are proposed to meet the necessary expenditures.

b. Each analysis must include a narrative description of circumstances resulting in a 25 percent or greater annual change for any budget line items.

3. Annual Reporting: Each Copermittee must submit its annual fiscal analysis with the annual JRMP report.

I. TOTAL MAXIMUM DAILY LOADS

1. The waste load allocations (WLAs) of fully approved and adopted TMDLs are incorporated as Water Quality Based Effluent Limitations on a pollutant by pollutant, watershed by watershed basis. Early TMDL requirements, including monitoring, may be required and inserted into this Order pursuant to Finding E.10.

2. The Cities of Wildomar and Murrieta must comply with the requirements and WLAs assigned to the discharges from their MS4s contributing to the Lake Elsinore/Canyon Lake (San Jacinto Watershed) Nutrient TMDLs as specified in Section VI.D.2 of the Santa Ana Water Board's Order R8-2010-0033 and subsequent revisions thereto.

J. PROGRAM EFFECTIVENESS ASSESSMENT AND REPORTING

Beginning with the Annual Report due in 2013, each Copermittee must annually assess and report upon the effectiveness of its JRMP and Watershed Workplan implementation to (1) reduce the discharge of storm water pollutants from its MS4 to

the MEP; (2) prohibit non-stormwater discharges; and (3) prevent runoff discharges from the MS4 from causing or contributing to a violation of water quality standards.

1. Program Effectiveness Assessments

a. IDENTIFY EFFECTIVENESS ASSESSMENTS

With the JRMP and Watershed Workplan submittal, each Copermittee must establish assessment measures or methods for each of the six outcome levels described by CASQA[18], using data from each JRMP program component, the MRP, and the Watershed Workplan.

(1) Assessment interval: For each established assessment measure or method, an assessment interval must be established as appropriate to the measure or method.

(2) Projected Timeframe: For each established assessment measure or method, each Copermittee must identify the projected timeframe within which the associated outcome level can adequately assess change.

b. PERFORM ASSESSMENTS

(1) Annually: Each year, the Copermittee must perform each applicable assessment based on the associated assessment interval, and determine whether the desired outcome has been met;

(2) With the submittal of the Report of Waste Discharge, the Copermittees must determine whether their program implementation is resulting in the protection and/or improvement of water quality through an Integrated Assessment;

2. Respond to Assessments

a. Where the assessments indicate that the desired outcome level has not been achieved at the end of the projected timeframe, the Copermittee must review its applicable activities and BMPs to identify any modifications and improvements needed to maximize effectiveness, as necessary to comply with this Order. If the Copermittee determines that the existing activities/BMPs are adequate, or that the projected timeframe should be extended, justification and an updated timeframe for attainment of the outcome level must be provided in the Annual Report.

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[18] Effectiveness assessment outcome levels as defined by CASQA are defined in Attachment C of this Order. See "*Municipal Stormwater Program Effectiveness Assessment Guidance"* (CASQA, May 2007) for guidance for assessing program activities at the various outcome levels.

b. Each Copermittee must develop and implement a work plan and schedule to address any program modifications and improvements in response to the findings of its assessment. The work plan and schedule must be provided and updated with the applicable Annual Report. The work plan must include, at a minimum, the following:

(1) The problems and priorities identified during the assessment;
(2) A list of priority pollutants and known or suspected sources;
(3) A brief description of the strategy employed to reduce, eliminate or mitigate the negative impacts;
(4) A description and schedule for new and/or modified BMPs. The schedule is to include dates for significant milestones;
(5) A description of how the selected activities will address an identified high priority problem. This will include a description of the expected effectiveness and benefits of the new and/or modified BMPs;
(6) A description of implementation effectiveness metrics;
(7) A description of how efficacy results will be used to modify priorities and implementation; and
(8) A review of past activities implemented, progress in meeting water quality standards, and planned program adjustments.

3. Assessment and Response Reporting

Each Copermittee must include a summary of its effectiveness assessments within each Annual Report. Beginning with the FY 2012-2013 Annual Report, the Program Effectiveness reporting must include:

a. The results of each of the effectiveness assessments performed pursuant to J.1.b, including the demonstrated CASQA effectiveness level(s);

b. Responses to effectiveness assessments; A description of any program modifications planned in accordance with section J.2, including the work plan and identified schedule for implementation. The description must include the basis for determining that each modified activity and/or BMP represents an improvement expected to result in improved water quality;

c. A description of any steps to be implemented to improve the Copermittee's ability to assess program effectiveness.

K. REPORTING

The Copermittees may propose alternate reporting criteria and schedules, as part of their updated JRMP, for the Executive Officer's acceptance.

1. Runoff Management Plans

a. JURISDICTIONAL RUNOFF MANAGEMENT PLANS

(1) The written account of the overall program to be conducted by each Copermittee to meet the jurisdictional requirements of section F of this Order is referred to as the Jurisdictional Runoff Management Plan (JRMP). Each Copermittee must revise and update its existing JRMP so that it describes all activities the Copermittee will undertake to implement the requirements of this Order. Each Copermittee must submit its updated and revised JRMP to the San Diego Water Board no later than June 30, 2012.

(2) At a minimum, each Copermittee's JRMP must be updated and revised to demonstrate compliance with each applicable section of this Order.

b. WATERSHED WORKPLANS

Copermittees must update and revise the Watershed Workplan to describe any changes in water quality problems or priorities, and any necessary change to actions Copermittees will take to implement jurisdictional or watershed BMPs to address those identified. The Copermittees must assemble and submit the Watershed Workplan to the San Diego Water Board no later than June 30, 2012, and must implement the Workplan within 90 days unless otherwise directed by the San Diego Water Board.

2. Other Required Reports and Plans

a. SSMP UPDATES

(1) Copermittees must submit their updated SSMP in accordance with the applicable requirements of section F.1 with the JRMP by June 30, 2012.
(2) Within 180 days of determination that the SSMP is in compliance with this Order's provisions, each Copermittee must amend its ordinances consistent with the SSMP and implement the updated SSMP. Any amended or new ordinances must be submitted to the San Diego Water Board within 30 days of adoption.

b. HMP

(1) By June 30, 2013, the Copermittees must submit to the San Diego Water Board Executive Officer a draft HMP that has been reviewed by the public, including identification of the appropriate limiting range of flow rates in accordance with the applicable requirements of section F.1.h.

(2) Within 180 of receiving San Diego Water Board comments on the draft HMP, the Copermittees must submit a final HMP that addressed the San Diego Water Board's comments.

(3) Within 90 days of receiving a finding of adequacy from the Executive Officer each Copermittee must incorporate and implement the HMP for all Priority Development Projects.

(4) Prior to acceptance of the HMP by the San Diego Water Board, the early implementation measures likely to be included in the HMP shall be encouraged by the Copermittees.

c. REPORT OF WASTE DISCHARGE

The Copermittees must submit to the San Diego Water Board, no later than 180 days in advance of the expiration date of this Order, a Report of Waste Discharge (ROWD) as an application for issuance of new waste discharge requirements. The fourth annual report for this Order may supplement the ROWD, provided the ROWD contains the minimum information below.

At a minimum, the ROWD must include the following: (1) Proposed changes to the Copermittees' runoff management programs; (2) Proposed changes to monitoring programs; (3) Justification for proposed changes; (4) Name and mailing addresses of the Copermittees; (5) Names and titles of primary contacts of the Copermittees; (6) Any other information necessary for the reissuance of this Order and (7) Any other information required by federal regulations for permit reapplications.

3. Annual Reports

a. JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM (JRMP) ANNUAL REPORTS

(1) Each Copermittee must generate individual JRMP Annual Reports that cover implementation of its jurisdictional activities during the past annual reporting period. Each Annual Report must verify and document compliance with this Order as directed in this section. Each Copermittee must retain records in accordance with the Standard Provisions in Attachment B of this Order,

available for review, that document compliance with each requirement of this Order. The reporting period for these annual reports must be the previous fiscal year.

(2) Each Copermittee must submit its JRMP Annual Reports to the San Diego Water Board by October 31of each year, beginning on October 31, 2013.

(3) Each JRMP Annual Report must contain, at a minimum, the following information, as applicable to the Copermittee:

(a) Information required to be reported annually in Section H (Fiscal Analysis) of this Order;
(b) Information required to be reported annually in Section J (Program Effectiveness) of this Order;
(c) The completed Reporting Checklist found in Attachment D, and
(d) Information for each program component as described in the following Table 9:

Table 9. Annual Reporting Requirements

Program Component	Reporting Requirement
New Development	1. All updated relevant sections of the General Plan and environmental review process and a description of any planned updates within the next annual reporting period, if applicable
	2. All revisions to the SSMP, including where applicable: (a) Identification and summary of where the SSMP fails to meet the requirements of this Order; (b) Updated procedures for identifying pollutants of concern for each Priority Development Project; (c) Updated treatment BMP ranking matrix; and (d) Updated site design and treatment control BMP design standards;
	3. Number of Priority Development Projects reviewed and approved during the reporting period. Brief description of BMPs required at approved Priority Development Projects. Verification that site design, source control, and treatment BMPs were required on all applicable Priority Development Projects;
	4. Name and location of all Priority Development Projects that were granted a waiver from implementing LID BMPs pursuant to section F.1.d.(4) during the reporting period;
	5. Updated watershed-based BMP maintenance tracking database of approved treatment control BMPs and treatment control BMP maintenance within its jurisdiction, including updates to the list of high-priority Priority Development Projects; and verification that the requirements of this Order were met during the reporting period.

Program Component	Reporting Requirement
New Development	6. Name and brief description of all approved Priority Development Projects required to implement hydrologic control measures in compliance with section F.1.h including a brief description of the management measures planned to protect downstream beneficial uses and prevent adverse physical changes to downstream stream channels;
	7. Number and description of all enforcement activities applicable to the new development and redevelopment component and a summary of the effectiveness of those activities;
Construction	1. All updated relevant ordinances and description of planned ordinance updates within the next annual reporting period, if applicable;
	2. A description of any changes to procedures used for identifying priorities for inspecting sites and enforcing control measures that consider the nature of the construction activity, topography, and the characteristics of soils and receiving water quality;
	3. Any changes to the designated minimum and enhanced BMPs;
	4. Summary of the inspection program, including the following information: (a) Total number and date of inspections conducted at each facility; (b) Number, date, and types of enforcement actions by facility; (c) Brief description of each high-level enforcement actions at construction sites including the effectiveness of the enforcement. Supporting paper (or electronic) files must be maintained by the Copermittees and made available upon San Diego Water Board request. Supporting files must include a record of inspection dates, the results of each inspection , photographs (if any), and a summary of any enforcement actions taken.
Municipal	1. Updated source inventory;
	2.All changes to the designated municipal BMPs;
	3. Descriptions of any changes to procedures to assure that flood management projects assess the impacts on the water quality of receiving water bodies;
	4. Summary and assessment of BMPs retrofits implemented at flood control structures, including: (a) List of projects retrofitted; and (b) List and description of structures evaluated for retrofitting; (c) List of structures still needing to be evaluated and the schedule for evaluation.;
	5. Summary of the municipal structural treatment control operations and maintenance activities, including: (a) Number of inspections and types of facilities; and (b) Summary of findings;

Program Component	Reporting Requirement
Municipal	6. Summary of the MS4 and MS4 facilities operations and maintenance activities, including: (a) Number and types of facilities maintained; (b) Amount of material removed; and (c) List of facilities planned for bi-annual inspections and the justification;
	7. Summary of the municipal areas/programs inspection activities, including: (a) Number and date of inspections conducted at each facility; (c) The BMP violations identified during the inspection by facility; (d) Number, date and types of enforcement actions by facility; (e) Summary of inspection findings and follow-up activities for each facility;
	8. Description of activities implemented to address sewage infiltration into the MS4;
	9. Description of BMPs and their implementation for unpaved roads construction and maintenance.
Commercial / Industrial	1. Updated inventory of commercial / industrial sources;
	2. Summary of the inspection program, including the following information: (a) Number and date of inspections conducted at each facility or mobile business;; (c) The BMP violations identified during the inspection by facility; (d) Number, date, and types of enforcement actions by facility or mobile business; (e) Brief description of each high-level enforcement actions at commercial/industrial sites including the effectiveness of the enforcement and follow-up activities for each facility;.
	3. All changes to designated minimum and enhanced BMPs;
	4. A list of industrial sites, including each name, address, and SIC code, that the Copermittee suspects may require coverage under the General Industrial Permit, but has not submitted an NOI;
Residential	1. All updated minimum BMPs required for residential areas and activities;
	2. Quantification and summary of applicable runoff and storm water enforcement actions within residential areas and activities;
	3. Description of efforts to manage runoff and storm water pollution in common interest areas and mobile home parks;
Retrofitting Existing Development	1. Updated inventory and prioritization of existing developments identified as candidates for retrofitting.
	2. Description of efforts to retrofit existing developments during the reporting year.

Program Component	Reporting Requirement
Retrofitting Existing Development	3. Description of efforts taken to encourage private landowners to retrofit existing development.
	4. A list of all retrofit projects that have been implemented, including site location, a description of the retrofit project, pollutants expected to be treated, and the tributary acreage of runoff that will be treated.
	5. Any proposed retrofit or regional mitigation projects and timelines for future implementation.
	6. Any proposed changes to the Copermittee's overall retrofitting program.
Illicit Discharge Detection and Elimination	1. Any changes to the legal authority to implement Illicit Discharge Detection and Elimination activities;
	2. Any Changes to the established investigation procedures;
	3. Any changes to public reporting mechanisms, including phone numbers and web pages;
	4. Summaries of illicit discharges (including spills and water quality data events) and how each significant case was resolved;
	5. A description of instances when field screening and analytical data exceeded action levels, including those instances for which no investigation was conducted;
	6. A description of follow-up and enforcement actions taken in response to investigations of illicit discharges and a description of the outcome of the investigation/enforcement actions;
Workplans	Updated workplans including priorities, strategy, implementation schedule and effectiveness evaluation;

(4) Each JRMP Annual Report must also include the following information regarding non-storm water discharges (see Section B.2. of this Order):

(a) Identification of non-storm water discharge categories identified as a source of pollutants to waters of the U.S;
(b) A description of any updates to ordinances, orders, or similar means to prohibit non-storm water discharge categories identified under section B.2 above ;
(c) Identification of any control measures to be required and implemented for non-storm water discharge categories identified as needing controls by the San Diego Water Board; and
(d) A description of a program to address pollutants from non-emergency fire fighting flows identified by the Copermittee to be significant sources of pollutants.

4. Interim Reporting Requirements

For the reporting periods, prior to submittal of the JRMP, Each JRMP Annual Report must be submitted in accordance with the requirements and deadlines described in Order No. 2004-001.

5. Universal Reporting Requirements

All submittals must include an executive summary, introduction, conclusion, recommendations, and signed certified statement. Each Copermittee must submit a signed certified statement covering its responsibilities for each applicable submittal. The Principal Copermittee must submit a signed certified statement covering its responsibilities for each applicable submittal and the sections of the submittals for which it is responsible.

L. MODIFICATION OF PROGRAMS

Modifications of JRMPs and/or Watershed Workplan may be initiated by the Executive Officer of the San Diego Water Board or by the Copermittees. Requests by Copermittees must be made to the Executive Officer, and must be submitted during the annual review process. Requests for modifications should be incorporated, as appropriate, into the Annual Reports or other deliverables required or allowed under this Order.

1. Minor modifications to JRMPs, and/or Watershed Workplan, may be accepted by the Executive Officer where the Executive Officer finds the proposed modification complies with all discharge prohibitions, receiving water limitations, and other requirements of this Order.

2. Proposed modifications that are not minor require amendment of this Order in accordance with this Order's rules, policies, and procedures.

M. PRINCIPAL COPERMITTEE RESPONSIBILITIES

Within 180 days of adoption of this Order, the Copermittees must designate the Principal Copermittee and notify the San Diego Water Board of the name of the Principal Copermittee. The Principal Copermittee must, at a minimum:

1. Serve as liaison between the Copermittees and the San Diego Water Board on general permit issues, and when necessary and appropriate, represent the Copermittees before the San Diego Water Board.

2. Coordinate permit activities among the Copermittees and facilitate collaboration on the development and implementation of programs required under this Order.

3. Produce and submit documents and reports as required by section K of this Order and Receiving Waters and MS4 Discharge Monitoring and Reporting Program No. R9-2010-0016 in Attachment E of this Order.

N. RECEIVING WATERS AND MS4 DISCHARGE MONITORING AND REPORTING PROGRAM

Pursuant to CWC section 13267, the Copermittees must comply with all the requirements contained in Receiving Waters and MS4 Discharge Monitoring and Reporting Program No. R9-2010-0016 in Attachment E of this Order.

O. STANDARD PROVISIONS, REPORTING REQUIREMENTS, AND NOTIFICATIONS

1. Each Copermittee must comply with Standard Provisions, Reporting Requirements, and Notifications contained in Attachment B of this Order. This includes 24 hour/5 day reporting requirements for any instance of non-compliance with this Order as described in section 5.e of Attachment B.

2. All plans, reports and subsequent amendments submitted in compliance with this Order must be implemented immediately (or as otherwise specified). All submittals by Copermittees must be adequate to implement the requirements of this Order.

I, David W. Gibson, Executive Officer, do hereby certify the foregoing is a full, true, and correct copy of an Order adopted by the California Regional Water Quality Control Board, San Diego Region, on October 13, 2010.

\\TENTATIVE
David W. Gibson
Executive Officer

ATTACHMENT A

BASIN PLAN PROHIBITIONS

California Water Code Section 13243 provides that a Regional Board, in a water quality control plan, may specify certain conditions or areas where the discharge of waste or certain types of waste is not permitted. The following discharge prohibitions are applicable to any person, as defined by Section 13050(c) of the California Water Code, who is a citizen, domiciliary, or political agency or entity of California whose activities in California could affect the quality of waters of the state within the boundaries of the San Diego Region.

1. The discharge of waste to waters of the state in a manner causing, or threatening to cause a condition of pollution, contamination or nuisance as defined in California Water Code Section 13050, is prohibited.

2. The discharge of waste to land, except as authorized by waste discharge requirements or the terms described in California Water Code Section 13264 is prohibited.

3. The discharge of pollutants or dredged or fill material to waters of the United States except as authorized by a NPDES permit or a dredged or fill material permit (subject to the exemption described in California Water Code Section 13376) is prohibited.

4. Discharges of recycled water to lakes or reservoirs used for municipal water supply or to inland surface water tributaries thereto are prohibited, unless this Regional Board issues a NPDES permit authorizing such a discharge; the proposed discharge has been approved by the State Department of Health Services and the operating agency of the impacted reservoir; and the discharger has an approved fail-safe long-term disposal alternative.

5. The discharge of waste to inland surface waters, except in cases where the quality of the discharge complies with applicable receiving water quality objectives, is prohibited. Allowances for dilution may be made at the discretion of the Regional Board. Consideration would include streamflow data, the degree of treatment provided and safety measures to ensure reliability of facility performance. As an example, discharge of secondary effluent would probably be permitted if streamflow provided 100:1 dilution capability.

6. The discharge of waste in a manner causing flow, ponding, or surfacing on lands not owned or under the control of the discharger is prohibited, unless the discharge is authorized by the Regional Board.

7. The dumping, deposition, or discharge of waste directly into waters of the state, or adjacent to such waters in any manner which may permit its being transported into the waters, is prohibited unless authorized by the Regional Board.

8. Any discharge to a storm water conveyance system that is not composed entirely of "storm water" is prohibited unless authorized by the Regional Board. [The federal regulations, 40 CFR 122.26(b)(13), define storm water as storm water

runoff, snow melt runoff, and surface runoff and drainage. 40 CFR 122.26(b)(2) defines an illicit discharge as any discharge to a storm water conveyance system that is not composed entirely of storm water except discharges pursuant to a NPDES permit and discharges resulting from fire fighting activities. [§122.26 amended at 56 FR 56553, November 5, 1991; 57 FR 11412, April 2, 1992].

9. The unauthorized discharge of treated or untreated sewage to waters of the state or to a storm water conveyance system is prohibited.

10. The discharge of industrial wastes to conventional septic tank/subsurface disposal systems, except as authorized by the terms described in California Water Code Section 13264, is prohibited.

11. The discharge of radioactive wastes amenable to alternative methods of disposal into the waters of the state is prohibited.

12. The discharge of any radiological, chemical, or biological warfare agent into waters of the state is prohibited.

13. The discharge of waste into a natural or excavated site below historic water levels is prohibited unless the discharge is authorized by the Regional Board.

14. The discharge of sand, silt, clay, or other earthen materials from any activity, including land grading and construction, in quantities which cause deleterious bottom deposits, turbidity or discoloration in waters of the state or which unreasonably affect, or threaten to affect, beneficial uses of such waters is prohibited.

15. The discharge of treated or untreated sewage from vessels to Mission Bay, Oceanside Harbor, Dana Point Harbor, or other small boat harbors is prohibited.

ATTACHMENT B

STANDARD PROVISIONS, REPORTING REQUIREMENTS, AND NOTIFICATIONS

1. STANDARD PROVISIONS – PERMIT COMPLIANCE [40 CFR 122.41]

(a) *Duty to comply* [40 CFR 122.41(a)].

(1) The Copermittee must comply with all of the conditions of this Order. Any noncompliance constitutes a violation of the Clean Water Act (CWA) and the California Water Code (CWC) and is grounds for enforcement action, for permit termination, revocation and reissuance, or modification; or denial of a permit renewal application.

(2) The Copermittee shall comply with effluent standards or prohibitions established under section 307(a) of the CWA toxic pollutants and with standards for sewage sludge use or disposal established under section 405(d) of the CWA within the time provided in the regulations that establish these standards or prohibitions or standards for sewage sludge use or disposal, even if the Order has not yet been modified to incorporate the requirement.

(b) *Need to halt or reduce activity not a defense* [40 CFR 122.41(c)]. It shall not be a defense for the Copermittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this Order.

(c) *Duty to mitigate* [40 CFR 122.41(d)]. The Copermittee shall take all reasonable steps to minimize or prevent any discharge or prevent any discharge or sludge use or disposal in violation of this Order that has a reasonable likelihood of adversely affecting human health or the environment.

(d) *Proper operation and maintenance* [40 CFR 122.41(e)]. The Copermittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the Copermittee to achieve compliance with the conditions of this Order. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures. This provision requires the operation of back-up or auxiliary facilities or similar systems that are installed by the Copermittee only when necessary to achieve compliance with the conditions of this Order.

(e) *Property rights* [40 CFR 122.41(g)].

(1) This Order does not convey any property rights of any sort or any exclusive privilege.
(2) The issuance of this Order does not authorize any injury to persons or property or invasion of other private rights, or any infringement of State or local law or regulations.

(f) *Inspection and entry* [40 CFR 122.41(i)]. The Copermittee shall allow the Regional Water Quality Control Board, San Diego Region (Regional Board), State Water Resources Control Board (SWRCB), United States Environmental Protection Agency

(USEPA), and/or their authorized representatives (including an authorized contractor acting as their representative), upon presentation of credentials and other documents as may be required by law, to:

(1) Enter upon the Copermittee's premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of this Order;
(2) Have access to and copy, at reasonable times, any records that must be kept under the conditions of this Order;
(3) Inspect and photograph, at reasonable times, any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this Order; and
(4) Sample or monitor, at reasonable times, for the purpose of assuring Order compliance or as otherwise authorized by the CWA or the CWC, any substances or parameters at any location.

(g) *Bypass* [40 CFR 122.41(m)]

(1) Definitions:

i) "Bypass" means the intentional diversion of waste streams from any portion of a treatment facility.
ii) "Severe property damage" means substantial physical damage to property, damage to the treatment facilities, which causes them to become inoperable, or substantial and permanent loss of natural resources that can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production.

(2) Bypass not exceeding limitations - The Copermittee may allow any bypass to occur which does not cause exceedances of effluent limitations, but only if it also is for essential maintenance to assure efficient operation. These bypasses are not subject to the provisions listed in Standard Provisions – Permit Compliance (g)(3), (g)(4) and (g)(5) below.

(3) Prohibition of Bypass - Bypass is prohibited, and the Regional Board may take enforcement action against a Copermittee for bypass, unless:

i) Bypass was unavoidable to prevent loss of life, personal injury, or severe property damage;
ii) There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate back-up equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass which occurred during normal periods of equipment downtime or preventive maintenance; and
iii) The Copermittee submitted notice as required under Standard Provisions – Permit Compliance (g)(3) above.

(4) Notice

i) Anticipated bypass. If the Copermittee knows in advance of the need for a

bypass, it shall submit a notice, if possible at least ten days before the date of the bypass.

ii) Unanticipated bypass. The Copermittee shall submit notice of an unanticipated bypass as required in Standard Provisions 5(e) below (24-hour notice).

(h) *Upset* [40 CFR 122.41(n)] Upset means an exceptional incident in which there is unintentional and temporary noncompliance with technology based effluent limitations because of factors beyond the reasonable control of the Copermittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation.

(1) Effect of an upset. An upset constitutes an affirmative defense to an action brought for noncompliance with such technology based permit effluent limitations if the requirements of Standard Provisions – Permit Compliance (h)(2) below are met. No determination made during administrative review of claims that noncompliance was caused by upset, and before an action for noncompliance, is final administrative action subject to judicial review.

(2) Conditions necessary for a demonstration of upset. A Copermittee who wishes to establish the affirmative defense of upset shall demonstrate, through properly signed, contemporaneous operating logs, or other relevant evidence that:

i) An upset occurred and that the Copermittee can identify the cause(s) of the upset;
ii) The permitted facility was at the time being properly operated;
iii) The Copermittee submitted notice of the upset as required in Standard Provisions – Permit Compliance (5)(e)(ii)(B) below (24-hour notice); and
iv) The Copermittee complied with any remedial measures required under Standard Provisions – Permit Compliance 1(c) above.

(3) Burden of Proof. In any enforcement proceeding, the Copermittee seeking to establish the occurrence of an upset has the burden of proof.

2. STANDARD PROVISIONS – PERMIT ACTION

(a) *General* [40 CFR 122.41(f)] This Order may be modified, revoked and reissued, or terminated for cause. The filing of a request by the Copermittee for modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance does not stay any Order condition.

(b) *Duty to reapply* [40 CFR 122.41(b)]. If the Copermittee wishes to continue an activity regulated by this Order after the expiration date of this Order, the Copermittee must apply for and obtain new permit.

(c) *Transfers*. This Order is not transferable to any person except after notice to the Regional Board. The Regional Board may require modification or revocation and reissuance of the Order to change the name of the Copermittee and incorporate such other requirements as may be necessary under the CWA and the CWC.

3. STANDARD PROVISIONS – MONITORING

(a) Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity. [40 CFR Section 122.41 (j) (1)]

(b) Monitoring results must be conducted according to test procedures under 40 CFR Part 136, or in the case of sludge use or disposal, approved under 40 CFR Part 136 unless otherwise specified in 40 CFR Part 503 unless other test procedures have been specified in this Order [40 CFR Section 122.41(j)(4)][40 CFR Section 122.44(i)(1)(iv)].

4. STANDARD PROVISIONS – RECORDS

(a) Except for records of monitoring information required by this Order related to the Copermittee's sewage sludge use and disposal activities, which shall be retained for a period of at least five years (or longer as required by 40 CFR Part 503), the Copermittee shall retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this Order, and records of all data used to complete the application for this Order, for a period of at least three (3) years from the date of the sample, measurement, report or application, This period may be extended by request of the Regional Water Board Executive Officer at any rime [40 CFR Section 122.41(j)(2)].

(b) *Records of monitoring information* [40 CFR 122.41(j) (3)] shall include:

(1) The date, exact place, and time of sampling or measurements;
(2) The individual(s) who performed the sampling or measurements;
(3) The date(s) analyses were performed;
(4) The individual(s) who performed the analyses;
(5) The analytical techniques or methods used; and
(6) The results of such analyses.

(c) *Claims of confidentiality* [40 CFR Section 122.7(b)] of the following information will be denied:

(1) The name and address of any permit applicant or Copermittee; and
(2) Permit applications and attachments, permits and effluent data.

5. STANDARD PROVISIONS – REPORTING

(a) *Duty to provide information* [40 CFR 122.41(h)]. The Copermittee shall furnish to the Regional Board, SWRCB, or USEPA within a reasonable time, any information which the Regional Board, SWRCB, or USPEA may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this Order or to determine compliance with this Order. Upon request, the Copermittee shall also furnish to the Regional Board, SWRCB, or USEPA, copies of records required to be kept by this Order.

(b) *Signatory and Certification Requirements* [40 CFR 122.41(k)]

(1) All applications, reports, or information submitted to the Regional Board, SWRCB, or USEPA shall be signed and certified in accordance with Standard Provisions – Reporting 5(b)ii), 5(b)iii), 5(b)iv), and 5(b) (see 40 CFR 122.22)

(2) *Applications* [40 CFR 122.22(a)(3)] All permit applications shall be signed by either a principal executive officer or ranking elected official.

(3) *Reports* [40 CFR 122.22(b)]. All reports required by this Order, and other information requested by the Regional Board, SWRCB, or USEPA shall be signed by a person described in Standard Provisions – Reporting 5(b)(2) above, or by a duly authorized representative of that person. A person is a duly authorized representative only if:

i) The authorization is made in writing by a person described in Standard Provisions-Reporting 5(b)(2) above;

ii) The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity, such as the position of plant manager, operator of a well or a well field, superintendent, position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters for the company. (A duly authorized representative may thus be either a named individual or any individual occupying a named position.); and,

iii) The written authorization is submitted to the Regional Water Board and State Water Board.

(4) *Changes to authorization* [40 CFR Section 122.22(c)] If an authorization under Standard Provisions – Reporting 5(b)(3)of this reporting requirement is no longer accurate because a different individual or position has responsibility for the overall operation of the facility, a new authorization satisfying the requirements of Standard Provisions – Reporting 5(b)(3) above must be submitted to the Regional Water Board and State Water Board prior to or together with any reports, information, or applications to be signed by an authorized representative.

(5) *Certification* [40 CFR Section 122.22(d)] Any person signing a document under Standard Provisions – Reporting 5(b)(2), or 5(b)(3) above shall make the following certification:

”I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.”

(c) *Monitoring reports*. [40 CFR 122.41(l)(4)]

(1) Monitoring results shall be reported at the intervals specified in the Receiving Waters and Runoff Monitoring and Reporting Program No. R9-2009-0002.

(2) Monitoring results must be reported on a Discharge Monitoring Report (DMR) form or forms provided or specified by the Regional Board or SWRCB for reporting results of mentoring of sludge use or disposal practices.

(3) If the Copermittee monitors any pollutant more frequently than required by this Order using test procedures approved under 40 CFR Part 136 or, in the case of sludge use or disposal, approved under 40 CFR Part 136 unless otherwise specified in 40 CFR Part 503, or as specified in this Order, the results of this monitoring shall be included in the calculation and reporting of the data submitted in the DMR or sludge reporting form specified by the Regional Board.

(4) Calculations for all limitations, which require averaging of measurements, shall utilize an arithmetic mean unless otherwise specified in this Order.

(d) *Compliance schedules*. [40 CFR Section 122.41(l)(5)] Reports of compliance or noncompliance with, or any progress reports on, interim and final requirements contained in any compliance schedule of this Order shall be submitted no later than 14 days following each schedule date.

(e) *Twenty-four hour reporting* [40 CFR Section 122.41(l)(6)]

(1) The Copermittee shall report any noncompliance that may endanger health or the environment. Any information shall be provided orally within 24 hours from the time the Copermittee becomes aware of the circumstances. A written submission shall also be provided within five (5) days of the time the Copermittee becomes aware of the circumstances. The written submission shall contain a description of the noncompliance and its cause; the period of noncompliance, including exact dates and times, and if the noncompliance has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance.

(2) The following shall be included as information, which must be reported within 24 hours under this paragraph:

i) Any unanticipated bypass that exceeds any effluent limitation in the Order (See 40 CFR 122.41(g)).
ii) Any upset which exceeds any effluent limitation in this Order.

(3) The Regional Board may waive the above-required written report under this provision on a case-by-case basis if the oral report has been received within 24 hours.

(f) *Planned changes*. [40 CFR Section 122.41(l)(1)] The Copermittee shall give notice to the Regional Board as soon as possible of any planned physical alterations or additions to the permitted facility. Notice is required under this provision only when:

(1) The alteration or addition to a permitted facility may meet one of the criteria for

determining whether a facility is a new source in 40 CFR 122.29(b); or

(2) The alteration or addition could significantly change the nature or increase the quantity of pollutants discharged. This notification applies to pollutants, which are not subject to effluent limitations in this Order.

(3) The alteration or addition results in a significant change in the Copermittee's sludge use or disposal practices, and such alteration, addition, or change may justify the application of permit conditions that are different from or absent in the existing Order, including notification of additional use or disposal sites not reported during the permit application process or not reported pursuant to an approved land application plan.

(g) *Anticipated noncompliance*. [40 CFR Section 122.41(l)(7)] The Copermittee shall give advance notice to the Regional Board or SWRCB of any planned changes in the permitted facility or activity, which may result in noncompliance with Order requirements.

(h) *Other noncompliance* [40 CFR Section 122.41(l) 7)] The Copermittee shall report all instances of noncompliance not reported under Standard Provisions 5(c), 5(d), and 5(e) above, at the time monitoring reports are submitted. The reports shall contain the information listed in Standard Provision – Reporting 5(e) above.

(i) *Other information* [40 CFR Section 122.41(l)(8)] When the Copermittee becomes aware that it failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application or in any report to the Regional Board, SWRCB, or USEPA, the Copermittee shall promptly submit such facts or information.

6. STANDARD PROVISIONS – ENFORCEMENT

(a) The Regional Board is authorized to enforce the terms of this permit under several provisions of the CWC, including, but not limited to, Sections 13385, 13386, and 13387.

7. ADDITIONAL STANDARD PROVISIONS

(a) *Municipal separate storm sewer systems* [40 CFR 122.42(c)]. The operator of a large or medium municipal separate storm sewer system or a municipal separate storm sewer that has been designated by the Director under 40 CFR 122.26(a)(1)(v) must submit an annual report by the anniversary of the date of the issuance of the permit for such system. The report shall include:

(1) The status of implementing the components of the storm water management program that are established as permit conditions;

(2) Proposed changes to the storm water management programs that are established as permit conditions. Such proposed changes shall be consistent with 40 CFR 122.26(d)(2)(iii); and

(3) Revisions, if necessary, to the assessment of controls and the fiscal analysis

reported in the permit application under 40 CFR 122.26(d)(2)(iv) and 40 CFR 122.26(d)(2)(v);

(4) A summary of data, including monitoring data, that is accumulated throughout the reporting year;

(5) Annual expenditures and budget for year following each annual report;

(6) A summary describing the number and nature of enforcement actions, inspections, and public education programs; and

(7) Identification of water quality improvements or degradation.

(b) *Storm water discharges* [40 CFR 122.42(d)]. The initial permits for discharges composed entirely of storm water issued pursuant to 40 CFR 122.26(e)(7) shall require compliance with the conditions of the permit as expeditiously as practicable, but in no event later than three years after the date of issuance of the permit.

(c) *Other Effluent Limitations and Standards* [40 CFR 122.44(b)(1)]. If any toxic effluent standard or prohibition (including any schedule of compliance specified in such effluent standard or prohibition) is promulgated under Section 307(a) of the CWA for a toxic pollutant which is present in the discharge and that standard or prohibition is more stringent than any limitation on the pollutant in this Order, the Regional Board may institute proceedings under these regulations to modify or revoke and reissue the Order to conform to the toxic effluent standard or prohibition.

(d) *Discharge is a privilege* [CWC section 13263(g)]. No discharge of waste into the waters of the State, whether or not such discharge is made pursuant to waste discharge requirements, shall create a vested right to continue such discharge. All discharges of waste into waters of the State are privileges, not rights.

(e) *Review and revision of Order* [CWC section 13263(e)]. Upon application by any affected person, or on its own motion, the Regional Board may review and revise this permit.

(f) *Termination or modification of Order* [CWC section13381]. This permit may be terminated or modified for causes, including, but not limited to, all of the following:

(1) Violation of any condition contained in this Order.
(2) Obtaining this Order by misrepresentation, or failure to disclose fully all relevant facts.
(3) A change in any condition that requires either a temporary or permanent reduction or elimination of the permitted discharge.

(g) *Transfers*. When this Order is transferred to a new owner or operator, such requirements as may be necessary under the CWC may be incorporated into this Order.

(h) *Conditions not stayed*. The filing of a request by the Copermittee for modification, revocation and reissuance, or termination of this Order, or a notification of planned change in or anticipated noncompliance with this Order does not stay any condition of this Order.

(i) *Availability*. A copy of this Order shall be kept at a readily accessible location and shall be available to on-site personnel at all times.

(j) *Duty to minimize or correct adverse impacts*. The Copermittees shall take all reasonable steps to minimize or correct any adverse impact on the environment resulting from noncompliance with this Order, including such accelerated or additional monitoring as may be necessary to determine the nature and impact of the noncompliance.

(k) *Interim Effluent Limitations.* The Copermittee shall comply with any interim effluent limitations as established by addendum, enforcement action, or revised waste discharge requirements which have been, or may be, adopted by this Regional Board.

(l) *Responsibilities, liabilities, legal action, penalties* [CWC sections 13385 and 13387]. The Porter-Cologne Water Quality Control Act provides for civil and criminal penalties comparable to, and in some cases greater than, those provided for under the CWA.

Nothing in this Order shall be construed to protect the Copermittee from its liabilities under federal, state, or local laws.

Except as provided for in 40CFR 122.41(m) and (n), nothing in this Order shall be construed to relieve the Copermittee from civil or criminal penalties for noncompliance.

Nothing in this Order shall be construed to preclude the institution of any legal action or relieve the Copermittee from any responsibilities, liabilities, or penalties to which the Copermittee is or may be subject to under Section 311 of the CWA.

Nothing in this Order shall be construed to preclude institution of any legal action or relieve the Copermittee from any responsibilities, liabilities, or penalties established pursuant to any applicable state law or regulation under authoring preserved by Section 510 of the CWA.

(m) *Noncompliance*. Any noncompliance with this Order constitutes violation of the CWC and is grounds for denial of an application for modification of the Order (also see 40 CFR 122.41(a).

(n) *Director*. For purposes of this Order, the term “Director” used in parts of 40 CFR incorporated into this Order by reference and/or applicable to this Order shall have the same meaning as the term “Regional Board” used elsewhere in this Order, except that in 40 CFR 122.41(h) and (I), “Director” shall mean “Regional Board, SWRCB, and USEPA.”

(o) The Regional Board has, in prior years, issued a limited number of individual NPDES permits for non-storm water discharges to MS4s. The Regional Board or SWRCB may in the future, upon prior notice to the Copermittee(s), issue an NPDES permit for any non-storm water discharge (or class of non-storm water discharges) to a MS4. Copermittees may prohibit any non-storm water discharge (or class of non-storm water discharges) to a MS4 that is authorized under such separate NPDES permits.

(p) *Effective date*. This Order shall become effective on the date of its adoption provided the USEPA has no objection. If the USEPA objects to its issuance, this Order shall not become effective until such objection is withdrawn. This Order supersedes Order No. 2001-01 upon the effective date of this Order.

(q) *Expiration*. This Order expires five years after adoption.

(r) *Continuation of expired order* [23 CCR 2235.4]. After this Order expires, the terms and conditions of this Order are automatically continued pending issuance of a new permit if all requirements of the federal NPDES regulations on the continuation of expired permits (40 CFR 122.6) are complied with.

(s) *Applications*. Any application submitted by a Copermittee for reissuance or modification of this Order shall satisfy all applicable requirements specified in federal regulations as well as any additional requirements for submittal of a Report of Waste Discharge specified in the CWC and the California Code of Regulations.

(t) *Confidentiality*. Except as provided for in 40 CFR 122.7, no information or documents submitted in accordance with or in application for this Order will be considered confidential, and all such information and documents shall be available for review by the public at the Regional Board office.

(u) *Severability*. The provisions of this Order are severable, and if any provision of this Order, or the application of any provisions of this Order to any circumstance, is held invalid, the application of such provision to other circumstances and the remainder of this Order shall not be affected thereby.

(v) R*eport submittal*. The Copermittee shall submit reports and provide notifications as required by this Order to the following:

NORTHERN WATERSHED UNIT
CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN DIEGO REGION
9174 SKY PARK COURT, SUITE 100
SAN DIEGO CA 92123-4340
Telephone: (858) 467-2952 Fax: (858) 571-6972

EUGENE BROMLEY
US ENVIRONMENTAL PROTECTION AGENCY
REGION IX
PERMITS ISSUANCE SECTION (W-5-1)
75 HAWTHORNE STREET
SAN FRANCISCO CA 94105

Unless otherwise directed, the Copermittee shall submit one hard copy for the official record and one electronic copy of each report required under this Order to the Regional Board and one electronic copy to the EPA.

DRAFT

ATTACHMENT C

ACRONYMS AND ABBREVIATIONS

ADT	Average Daily Traffic
AMAL	Average Monthly Action Level
ASBS	Area of Special Biological Significance
AST	Active/Passive Sediment Treatment
BMP	Best Management Practice
Basin Plan	Water Quality Control Plan for the San Diego Basin
BU	Beneficial Use
CASQA	California Stormwater Quality Association
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
CWA	Clean Water Act
CWC	California Water Code
CZARA	Coastal Zone Act Reauthorization Amendments of 1990
DAMP	Drainage Area Management Plan
DNQ	Detected, but not Quantified
EIA	Effective Impervious Area
ESAs	Environmentally Sensitive Areas
GIS	Geographic Information System
HMP	Hydromodification Management Plan
IBI	Index of Biotic Integrity
JRMP	Jurisdictional Runoff Management Plan
LID	Low Impact Development
MDAL	Maximum Daily Action Level
MEP	Maximum Extent Practicable
ML	Minimum Level
MS4	Municipal Separate Storm Sewer System
NOI	Notice of Intent
NPDES	National Pollutant Discharge Elimination System
Copermittees	County of Riverside, the 4 incorporated cities within the County of Riverside in the San Diego Region, and the Riverside County Flood Control District
RGOs	Retail Gasoline Outlets
ROWD	Riverside County Copermittees' Report of Waste Discharge (application for NPDES reissuance)
RWLs	Receiving Water Limitations
SAL	Storm Water Action Level
San Diego Water Board	California Regional Water Quality Control Board, San Diego Region
SIC	Standard Industrial Classification Code
SSMP	Standard Urban Storm Water Mitigation Plan
State Board	State Water Resources Control Board
SWQPA	State Water Quality Protected Area
TMDL	Total Maximum Daily Load

USEPA	United States Environmental Protection Agency
WLA	Waste Load Allocation
WQMP	Water Quality Management Plan
WRMP	Watershed Runoff Management Plan

DEFINITIONS

Active/Passive Sediment Treatment - Using mechanical, electrical or chemical means to flocculate or coagulate suspended sediment for removal from runoff from construction sites prior to discharge.

Anthropogenic Litter – Trash generated from human activities, not including sediment.

Average Monthly Action Level – the highest allowable average of daily discharges over a calendar month, calculated as the sum of all daily discharges measured during a calendar month divided by the number of daily discharges measured during that month.

Basin Plan – Water Quality Control Plan, San Diego Basin, Region 9, and amendments, developed by the Regional Board.

Beneficial Uses - The uses of water necessary for the survival or well being of man, plants, and wildlife. These uses of water serve to promote tangible and intangible economic, social, and environmental goals. "Beneficial Uses" of the waters of the State that may be protected include, but are not limited to, domestic, municipal, agricultural and industrial supply; power generation; recreation; aesthetic enjoyment; navigation; and preservation and enhancement of fish, wildlife, and other aquatic resources or preserves. Existing beneficial uses are uses that were attained in the surface or ground water on or after November 28, 1975; and potential beneficial uses are uses that would probably develop in future years through the implementation of various control measures. "Beneficial Uses" are equivalent to "Designated Uses" under federal law. [California Water Code Section 13050(f)].

Best Management Practices (BMPs) - Defined in 40 CFR 122.2 as schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the pollution of waters of the United States. BMPs also include treatment requirements, operating procedures and practices to control plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage. In the case of municipal storm water permits, BMPs are typically used in place of numeric effluent limits.

Bioassessment - The use of biological community information to evaluate the biological integrity of a water body and its watershed. With respect to aquatic ecosystems, bioassessment is the collection and analysis of samples of the benthic macroinvertebrate community together with physical/habitat quality measurements associated with the sampling site and the watershed to evaluate the biological condition (i.e. biological integrity) of a water body.

Biocriteria - Under the CWA, numerical values or narrative expressions that define a desired biological condition for a water body that are legally enforceable. The USEPA

defines biocriteria as: "numerical values or narrative expressions that describe the reference biological integrity of aquatic communities inhabiting waters of a given designated aquatic life use… (that)…describe the characteristics of water body segments least impaired by human activities."

Biofiltration - refers to practices that use vegetation and amended soils to detain and treat runoff from impervious areas. Treatment is through filtration, infiltration, adsorption, ion exchange, and biological uptake of pollutants.

Biological Integrity - Defined in Karr J.R. and D.R. Dudley. 1981. Ecological perspective on water quality goals. Environmental Management 5:55-68 as: "A balanced, integrated, adaptive community of organisms having a species composition, diversity, and functional organization comparable to that of natural habitat of the region." Also referred to as ecosystem health.

Clean Water Act Section 402(p) [33 USC 1342(p)] - The federal statute requiring municipal and industrial dischargers to obtain NPDES permits for their discharges of storm water.

Clean Water Act Section 303(d) Water Body - An impaired water body in which water quality does not meet applicable water quality standards and/or is not expected to meet water quality standards, even after the application of technology based pollution controls required by the CWA. The discharge of runoff to these water bodies by the Copermittees is significant because these discharges can cause or contribute to violations of applicable water quality standards.

Construction Site – Any project, including projects requiring coverage under the General Construction Permit, that involves soil disturbing activities including, but not limited to, clearing, grading, disturbances to ground such as stockpiling, and excavation.

Contamination - As defined in the Porter-Cologne Water Quality Control Act, contamination is "an impairment of the quality of waters of the State by waste to a degree which creates a hazard to the public health through poisoning or through the spread of disease. 'Contamination' includes any equivalent effect resulting from the disposal of waste whether or not waters of the State are affected."

Critical Channel Flow (Qc) – The channel flow that produces the critical shear stress that initiates bed movement or that erodes the toe of channel banks. When measuring Qc, it should be based on the weakest boundary material – either bed or bank.

CWA – Federal Clean Water Act

CWC – California Water Code

Daily Discharge – Daily Discharge is defined as either: (1) the total mass of the constituent discharged over the calendar day or any 24 hour period that reasonably represents a calendar day for purposes of sampling (as specified in the permit), for a constituent with limitations expressed in units of mass or; (2) the unweighted arithmetic mean measurement of the constituent over the day for a constituent with limitations expressed in other units of measurement (e.g. concentration.)

The Daily Discharge may be determined by the analytical results of a composite sample taken over the course of one day (a calendar day, or other 24 hour period other than a day), or by the arithmetic mean of analytical results from one or more grab samples taken over the course of a day.

Detected, but not Quantified – those sample results less than the reporting level, but greater than or equal to the laboratory's Method of Detection Limit (MDL.)

Development Projects - Construction, rehabilitation, redevelopment, or reconstruction of any public or private residential project, industrial, commercial, or any other projects.

Dilution Credit – the amount of dilution granted to a discharger in the calculation of a WQBEL, based on the allowance of a specific mixing zone. It is calculated from the dilution ratio, or determined through conducting of a mixing zone study, or modeling of the discharge and receiving water.

Dry Season – May 1 through September 30 of each year.

Dry Weather – weather is considered dry if the preceding 72 hours has been without precipitation.

Effectiveness Assessment Outcome Level 1 - Compliance with Activity-based Permit Requirements – Level 1 outcomes are those directly related to the implementation of specific activities prescribed by this Order or established pursuant to it.

Effectiveness Assessment Outcome Level 2 - Changes in Attitudes, Knowledge, and Awareness – Level 2 outcomes are measured as increases in knowledge and awareness among target audiences such as residents, businesses, and municipal employees.

Effectiveness Assessment Outcome Level 3 - Behavioral Change and BMP Implementation – Level 3 outcomes measure the effectiveness of activities in affecting behavioral change and BMP implementation.

Effectiveness Assessment Outcome Level 4 - Load Reductions – Level 4 outcomes measure load reductions which quantify changes in the amounts of pollutants associated with specific sources before and after a BMP or other control measure is employed.

Effectiveness Assessment Outcome Level 5 - Changes in Runoff and Discharge Quality – Level 5 outcomes are measured as changes in one or more specific constituents or stressors in discharges into or from MS4s.

Effectiveness Assessment Outcome Level 6 - Changes in Receiving Water Quality – Level 6 outcomes measure changes to receiving water quality resulting from discharges into and from MS4s, and may be expressed through a variety of means such as compliance with water quality objectives or other regulatory benchmarks, protection of biological integrity, or beneficial use attainment.

Enclosed Bays – Enclosed bays are indentations along the coast that enclose an area of oceanic water within distinct headlands or harbor works. Enclosed bays include all

bays where the narrowest distance between the headlands or outermost bay works is less than 75 percent of the greatest dimension of the enclosed portion of the bay. Enclosed bays do not include inland surface waters or ocean waters.

Erosion – When land is diminished or worn away due to wind, water, or glacial ice. Often the eroded debris (silt or sediment) becomes a pollutant via storm water runoff. Erosion occurs naturally but can be intensified by land clearing activities such as farming, development, road building, and timber harvesting.

Environmentally Sensitive Areas (ESAs) - Areas that include but are not limited to all Clean Water Act Section 303(d) impaired water bodies; areas designated as Areas of Special Biological Significance by the State Water Resources Control Board (Water Quality Control Plan for the San Diego Basin (1994) and amendments); State Water Quality Protected Areas; water bodies designated with the RARE beneficial use by the State Water Resources Control Board (Water Quality Control Plan for the San Diego Basin (1994) and amendments); areas designated as preserves or their equivalent under the Natural Communities Conservation Program within the Cities and County of Orange; and any other equivalent environmentally sensitive areas which have been identified by the Copermittees.

Estuaries – waters, including coastal lagoons, located at the mouth of streams that serve as areas of mixing fresh and ocean waters. Coastal lagoons and mouths of streams that are temporarily separated from the ocean by sandbars shall be considered estuaries. Estuarine waters shall be considered to extend from a bay or the open ocean to a point upstream where there is no significant mixing of fresh water and ocean water. Estuaries do not include inland surface waters or ocean waters.

Feasibility Analysis – Detailed description of the selection process for the treatment control BMPs for a Priority Development Project, including justification of why one BMP is selected over another. For a Priority Development Project where a treatment control BMP with a low removal efficiency ranking (as identified by the Model SUSMP) is proposed, the analysis shall include a detailed and adequate justification exhibiting the reasons implementation of a treatment control BMP with a higher removal efficiency is infeasible for the Priority Development Project or portion of the Priority Development Project.

Flow Duration – The long-term period of time that flows occur above a threshold that causes significant sediment transport and may cause excessive erosion damage to creeks and streams (not a single storm event duration). The simplest way to visualize this is to consider a histogram of pre- and post-project flows using long-term records of hourly data. To maintain pre-project flow duration means that the total number of hours (counts) within each range of flows in a flow-duration histogram cannot increase between the pre- and post-project condition. Flow duration within the range of geomorphologically significant flows is important for managing erosion.

GIS – Geographic Information System

Grading - The cutting and/or filling of the land surface to a desired slope or elevation.

Hazardous Material – Any substance that poses a threat to human health or the environment due to its toxicity, corrosiveness, ignitability, explosive nature or chemical

reactivity. These also include materials named by the USEPA in 40 CFR 116 to be reported if a designated quantity of the material is spilled into the waters of the U.S. or emitted into the environment.

Hazardous Waste - Hazardous waste is defined as "any waste which, under Section 600 of Title 22 of this code, is required to be managed according to Chapter 30 of Division 4.5 of Title 22 of this code" [CCR Title 22, Division 4.5, Chapter 11, Article 1].

Household Hazardous Waste – Paints, cleaning products, and other wastes generated during home improvement or maintenance activities.

Hydromodification – The change in the natural watershed hydrologic processes and runoff characteristics (i.e., interception, infiltration, overland flow, interflow and groundwater flow) caused by urbanization or other land use changes that result in increased stream flows and sediment transport. In addition, alteration of stream and river channels, such as stream channelization, concrete lining, installation of dams and water impoundments, and excessive streambank and shoreline erosion are also considered hydromodification, due to their disruption of natural watershed hydrologic processes.

Illicit Connection – Any connection to the MS4 that conveys an illicit discharge.

Illicit Discharge - Any discharge to the MS4 that is not composed entirely of storm water except discharges pursuant to a NPDES permit and discharges resulting from fire fighting activities [40 CFR 122.26(b)(2)].

Implementation Assessment – Assessment conducted to determine the effectiveness of Copermittee programs and activities in achieving measurable targeted outcomes, and in determining whether priority sources of water quality problems are being effectively addressed.

Inactive Slopes – Slopes on which no grading or other soil disturbing activities are conducted for 10 or more days.

Inland Surface Waters – all surface waters of the State that do not include the ocean, enclosed bays, or estuaries.

Integrated Assessment – Assessment to be conducted to evaluate whether program implementation is properly targeted to and resulting in the protection and improvement of water quality.

Jurisdictional Runoff Management Plan (JRMP) – A written description of the specific jurisdictional runoff management measures and programs that each Copermittee will implement to comply with this Order and ensure that storm water pollutant discharges in runoff are reduced to the MEP and do not cause or contribute to a violation of water quality standards.

Low Impact Development (LID) – A storm water management and land development strategy that emphasizes conservation and the use of on-site natural features integrated with engineered, small-scale hydrologic controls to more closely reflect pre-development hydrologic functions.

Maximum Daily Action Level (MDAL) – is the highest allowable daily discharge of a pollutant, over a calendar day (or 24 hour period). For pollutants with action levels expressed in units of mass, the daily discharge is calculated as the total mass of the pollutant discharged over the day. For pollutants with action levels expressed in other units of measurement, the daily discharge is calculated as the arithmetic mean measurement of the pollutant over the day.

Maximum Extent Practicable (MEP) – The technology-based standard established by Congress in CWA section 402(p)(3)(B)(iii) for storm water that operators of MS4s must meet. Technology-based standards establish the level of pollutant reductions that dischargers must achieve, typically by treatment or by a combination of source control and treatment control BMPs. MEP generally emphasizes pollution prevention and source control BMPs primarily (as the first line of defense) in combination with treatment methods serving as a backup (additional line of defense). MEP considers economics and is generally, but not necessarily, less stringent than BAT. A definition for MEP is not provided either in the statute or in the regulations. Instead the definition of MEP is dynamic and will be defined by the following process over time: municipalities propose their definition of MEP by way of their runoff management programs. Their total collective and individual activities conducted pursuant to the runoff management programs becomes their proposal for MEP as it applies both to their overall effort, as well as to specific activities (e.g., MEP for street sweeping, or MEP for MS4 maintenance). In the absence of a proposal acceptable to the Regional Board, the Regional Board defines MEP.

In a memo dated February 11, 1993, entitled "Definition of Maximum Extent Practicable," Elizabeth Jennings, Senior Staff Counsel, SWRCB addressed the achievement of the MEP standard as follows:

> "*To achieve the MEP standard, municipalities must employ whatever Best Management Practices (BMPs) are technically feasible (i.e., are likely to be effective) and are not cost prohibitive. The major emphasis is on technical feasibility. Reducing pollutants to the MEP means choosing effective BMPs, and rejecting applicable BMPs only where other effective BMPs will serve the same purpose, or the BMPs would not be technically feasible, or the cost would be prohibitive. In selecting BMPs to achieve the MEP standard, the following factors may be useful to consider:*
>
> *a. Effectiveness: Will the BMPs address a pollutant (or pollutant source) of concern?*
> *b. Regulatory Compliance: Is the BMP in compliance with storm water regulations as well as other environmental regulations?*
> *c. Public Acceptance: Does the BMP have public support?*
> *d. Cost: Will the cost of implementing the BMP have a reasonable relationship to the pollution control benefits to be achieved?*
> *e. Technical Feasibility: Is the BMP technically feasible considering soils, geography, water resources, etc?*
>
> *The final determination regarding whether a municipality has reduced pollutants to the maximum extent practicable can only be made by the Regional or State Water Boards, and not by the municipal discharger. If a municipality reviews a*

lengthy menu of BMPs and chooses to select only a few of the least expensive, it is likely that MEP has not been met. On the other hand, if a municipal discharger employs all applicable BMPs except those where it can show that they are not technically feasible in the locality, or whose cost would exceed any benefit derived, it would have met the standard. Where a choice may be made between two BMPs that should provide generally comparable effectiveness, the discharger may choose the least expensive alternative and exclude the more expensive BMP. However, it would not be acceptable either to reject all BMPs that would address a pollutant source, or to pick a BMP base solely on cost, which would be clearly less effective. In selecting BMPs the municipality must make a serious attempt to comply and practical solutions may not be lightly rejected. In any case, the burden would be on the municipal discharger to show compliance with its permit. After selecting a menu of BMPs, it is the responsibility of the discharger to ensure that all BMPs are implemented."

Minimum Level – the concentration at which the entire analytical system must give a recognizable signal and acceptable calibration point. The ML is the concentration in a sample that is equivalent to the concentration of the lowest calibration standard analyzed by a specific analytical procedure, assuming that all the method sample weights, volumes and processing steps have been followed.

Monitoring Year – the monitoring year includes a full wet season and dry season, beginning annually on October 1st and ending on September 30th.

Municipal Separate Storm Sewer System (MS4) – A conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, or storm drains): (i) Owned or operated by a State, city, town, borough, county, parish, district, association, or other public body (created by or pursuant to State law) having jurisdiction over disposal of sewage, industrial wastes, storm water, or other wastes, including special districts under State law such as a sewer district, flood control district or drainage district, or similar entity, or an Indian tribe or an authorized Indian tribal organization, or designated and approved management agency under section 208 of the CWA that discharges to waters of the United States; (ii) Designated or used for collecting or conveying storm water; (iii) Which is not a combined sewer; (iv) Which is not part of the Publicly Owned Treatment Works (POTW) as defined at 40 CFR 122.26.

National Pollutant Discharge Elimination System (NPDES) - The national program for issuing, modifying, revoking and reissuing, terminating, monitoring and enforcing permits, and imposing and enforcing pretreatment requirements, under Sections 307, 318, 402, and 405 of the CWA.

NOI – Notice of Intent

Non-Storm Water - All discharges to and from a MS4 that do not originate from precipitation events (i.e., all discharges from a MS4 other than storm water). Non-storm water includes illicit discharges, non-prohibited discharges, and NPDES permitted discharges.

Nuisance - As defined in the Porter-Cologne Water Quality Control Act a nuisance is "anything which meets all of the following requirements: 1) Is injurious to health, or is

indecent, or offensive to the senses, or an obstruction to the free use of property, so as to interfere with the comfortable enjoyment of life or property. 2) Affects at the same time an entire community or neighborhood, or any considerable number of persons, although the extent of the annoyance or damage inflicted upon individuals may be unequal. 3) Occurs during, or as a result of, the treatment or disposal of wastes."

Ocean Waters – the territorial marine waters of the State as defined by California law to the extent these waters are outside of enclosed bays, estuaries, and coastal lagoons. Discharges to ocean waters are regulated in accordance with the State Board's California Ocean Plan.

Order – Order No. R9-2009-0002 (NPDES No. CAS0108740)

Person - A person is defined as an individual, association, partnership, corporation, municipality, State or Federal agency, or an agent or employee thereof [40 CFR 122.2].

Point Source - Any discernible, confined, and discrete conveyance, including, but not limited to, any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operations, landfill leachate collection systems, vessel, or other floating craft from which pollutants are or may be discharged. This term does not include return flows from irrigated agriculture or agricultural storm water runoff.

Pollutant - Any agent that may cause or contribute to the degradation of water quality such that a condition of pollution or contamination is created or aggravated.

Pollution - As defined in the Porter-Cologne Water Quality Control Act: "the alteration of the quality of the waters of the State by waste, to a degree that unreasonably affects the either of the following: 1) The waters for beneficial uses; or 2) Facilities that serve these beneficial uses." Pollution may include contamination.

Pollutants of Concern – Pollutants for which water bodies are listed as impaired under CWA section 303(d), pollutants associated with the land use type of a development, and/or pollutants commonly associated with runoff. Pollutants commonly associated with runoff include total suspended solids; sediment; pathogens (e.g., bacteria, viruses, protozoa); heavy metals (e.g., copper, lead, zinc, and cadmium); petroleum products and polynuclear aromatic hydrocarbons; synthetic organics (e.g., pesticides, herbicides, and PCBs); nutrients (e.g., nitrogen and phosphorus fertilizers); oxygen-demanding substances (decaying vegetation, animal waste, and anthropogenic litter).

Pollution Prevention - Pollution prevention is defined as practices and processes that reduce or eliminate the generation of pollutants, in contrast to source control BMPs, treatment control BMPs, or disposal.

Post-Construction BMPs - A subset of BMPs including structural and non-structural controls which detain, retain, filter, or educate to prevent the release of pollutants to surface waters during the final functional life of developments.

Pre-Project or Pre-Development Runoff Conditions (Discharge Rates, Durations, Etc.) – Runoff conditions that exist onsite immediately before the planned development activities occur. This definition is not intended to be interpreted as that period before any

human-induced land activities occurred. This definition pertains to redevelopment as well as initial development.

Principal Copermittee – County of Orange

Priority Development Projects - New development and redevelopment project categories listed in Section F.1.d(2) of Order No. R9-2009-0002.

Rainy Season – (aka Wet Season) is the period of time from October 1 forward to April 30 when the San Diego region experiences the most rainfall.

Receiving Waters – Waters of the United States.

Receiving Water Limitations (RWLs) - Waste discharge requirements issued by the Regional Board typically include both: (1) "Effluent Limitations" (or "Discharge Limitations") that specify the technology-based or water-quality-based effluent limitations; and (2) "Receiving Water Limitations" that specify the water quality objectives in the Basin Plan as well as any other limitations necessary to attain those objectives. In summary, the "Receiving Water Limitations" provision is the provision used to implement the requirement of CWA section 301(b)(1)(C) that NPDES permits must include any more stringent limitations necessary to meet water quality standards.

Redevelopment - The creation, addition, and or replacement of impervious surface on an already developed site. Examples include the expansion of a building footprint, road widening, the addition to or replacement of a structure, and creation or addition of impervious surfaces. Replacement of impervious surfaces includes any activity that is not part of a routine maintenance activity where impervious material(s) are removed, exposing underlying soil during construction. Redevelopment does not include trenching and resurfacing associated with utility work; resurfacing existing roadways; new sidewalk construction, pedestrian ramps, or bikelane on existing roads; and routine replacement of damaged pavement, such as pothole repair.

Retain – to keep or hold in a particular place, condition, or position without discharge to surface waters.

Runoff - All flows in a storm water conveyance system that consists of the following components: (1) storm water (wet weather flows) and (2) non-storm water including dry weather flows.

San Diego Water Board – As used in this document the term "San Diego Water Board" is synonymous with the term "Regional Board" as defined in Water Code section 13050(b) and is intended to refer to the California Regional Water Quality Control Board for the San Diego Region as specified in Water Code Section 13200.

Sediment - Soil, sand, and minerals washed from land into water. Sediment resulting from anthropogenic sources (i.e. human induced land disturbance activities) is considered a pollutant. This Order regulates only the discharges of sediment from anthropogenic sources and does not regulate naturally occurring sources of sediment. Sediment can destroy fish-nesting areas, clog animal habitats, and cloud waters so that sunlight does not reach aquatic plants.

Shared Treatment Control BMP - BMPs used by multiple developments to infiltrate, filter, or treat the required volume or flow prior to discharge to a receiving water. This could include, for example, a treatment BMP at the end of an enclosed storm drain that collects runoff from several commercial developments.

Source Control BMP – Land use or site planning practices, or structural or nonstructural measures that aim to prevent runoff pollution by reducing the potential for contamination at the source of pollution. Source control BMPs minimize the contact between pollutants and runoff.

State Water Quality Protection Area – A nonterrestrial marine or estuarine area designated to protect marine species or biological communities from an undesirable alteration in natural water quality, including, but not limited to, areas of special biological significance that have been designated by the State Water Resources Control Board through its water quality control planning process. Areas of special biological significance are a subset of State Water Quality Protection Areas, and require special protection as determined by the State Water Resources Control Board pursuant to the California Ocean Plan adopted and reviewed pursuant to Article 4 (commencing with Section 13160) of Chapter 3 of Division 7 of the California Water Code and pursuant to the Water Quality Control Plan for Control of Temperature in the Coastal and Interstate Waters and Enclosed Bays and Estuaries of California (California Thermal Plan) adopted by the state board.

Storm Water – Per 40 CFR 122.26(b)(13), means storm water runoff, snowmelt runoff and surface runoff and drainage. Surface runoff and drainage pertains to runoff and drainage resulting from precipitation events.

Standard Storm Water Mitigation Plan (SSMP) – A plan developed to mitigate the impacts of runoff from Priority Development Projects.

Third Party Inspectors - Industrial and commercial facility inspectors who are not contracted or employed by a regulatory agency or group of regulatory agencies, such as the Regional Board or Copermittees. The third party inspector is not a regular facility employee self-inspecting their own facility. The third party inspector could be a contractor or consultant employed by a facility or group of businesses to conduct inspections.

Total Maximum Daily Load (TMDL) - The maximum amount of a pollutant that can be discharged into a water body from all sources (point and non-point) and still maintain water quality standards. Under CWA section 303(d), TMDLs must be developed for all water bodies that do not meet water quality standards after application of technology-based controls.

Toxicity - Adverse responses of organisms to chemicals or physical agents ranging from mortality to physiological responses such as impaired reproduction or growth anomalies). The water quality objectives for toxicity provided in the Water Quality Control Plan, San Diego Basin, Region 9, (Basin Plan), state in part…"All waters shall be free of toxic substances in concentrations that are toxic to, or that produce detrimental physiological responses in human, plant, animal, or aquatic life….The survival of aquatic life in surface waters subjected to a waste discharge or other controllable water quality factors, shall not be less than that for the same water body in areas unaffected by the waste discharge".

Treatment Control BMP – Any engineered system designed to remove pollutants by simple gravity settling of particulate pollutants, filtration, biological uptake, media absorption or any other physical, biological, or chemical process.

Unpaved Road – is a long, narrow stretch without pavement used for traveling by motor passenger vehicle between two or more points. Unpaved roads are generally constructed of dirt, gravel, aggregate or macadam and may be improved or unimproved.

Waste - As defined in CWC Section 13050(d), "waste includes sewage and any and all other waste substances, liquid, solid, gaseous, or radioactive, associated with human habitation, or of human or animal origin, or from any producing, manufacturing, or processing operation, including waste placed within containers of whatever nature prior to, and for purposes of, disposal."

Article 2 of CCR Title 23, Chapter 15 (Chapter 15) contains a waste classification system that applies to solid and semi-solid waste, which cannot be discharged directly or indirectly to water of the state and which therefore must be discharged to land for treatment, storage, or disposal in accordance with Chapter 15. There are four classifications of waste (listed in order of highest to lowest threat to water quality): hazardous waste, designated waste, non-hazardous solid waste, and inert waste.

Water Quality Assessment – Assessment conducted to evaluate the condition of non-storm water and storm water discharges, and the water bodies which receive these discharges.

Water Quality Objective - Numerical or narrative limits on constituents or characteristics of water designated to protect designated beneficial uses of the water. [California Water Code Section 13050 (h)]. California's water quality objectives are established by the State and Regional Water Boards in the Water Quality Control Plans. Numeric or narrative limits for pollutants or characteristics of water designed to protect the beneficial uses of the water. In other words, a water quality objective is the maximum concentration of a pollutant that can exist in a receiving water and still generally ensure that the beneficial uses of the receiving water remain protected (i.e., not impaired). Since water quality objectives are designed specifically to protect the beneficial uses, when the objectives are violated the beneficial uses are, by definition, no longer protected and become impaired. This is a fundamental concept under the Porter Cologne Act. Equally fundamental is Porter Cologne's definition of pollution. A condition of pollution exists when the water quality needed to support designated beneficial uses has become unreasonably affected or impaired; in other words, when the water quality objectives have been violated. These underlying definitions (regarding beneficial use protection) are the reason why all waste discharge requirements implementing the federal NPDES regulations require compliance with water quality objectives. (Water quality objectives are also called water quality criteria in the CWA.)

Water Quality Standards - The beneficial uses (e.g., swimming, fishing, municipal drinking water supply, etc.,) of water and the water quality objectives necessary to protect those uses.

Waters of the State - Any water, surface or underground, including saline waters within the boundaries of the State [CWC section 13050 (e)]. The definition of the Waters of the

State is broader than that for the Waters of the United States in that all water in the State is considered to be a Waters of the State regardless of circumstances or condition. Under this definition, a MS4 is always considered to be a Waters of the State.

Waters of the United States - As defined in the 40 CFR 122.2, the Waters of the U.S. are defined as: "(a) All waters, which are currently used, were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide; (b) All interstate waters, including interstate "wetlands;" (c) All other waters such as intrastate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, "wetlands," sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds the use, degradation or destruction of which would affect or could affect interstate or foreign commerce including any such waters: (1) Which are or could be used by interstate or foreign travelers for recreational or other purposes; (2) From which fish or shellfish are or could be taken and sold in interstate or foreign commerce; or (3) Which are used or could be used for industrial purposes by industries in interstate commerce; (d) All impoundments of waters otherwise defined as waters of the United States under this definition: (e) Tributaries of waters identified in paragraphs (a) through (d) of this definition; (f) The territorial seas; and (g) "Wetlands" adjacent to waters (other than waters that are themselves wetlands) identified in paragraphs (a) through (f) of this definition. Waters of the United States do not include prior converted cropland. Notwithstanding the determination of an area's status as prior converted cropland by any other federal agency, for the purposes of the Clean Water Act, the final authority regarding Clean Water Act jurisdiction remains with the EPA."

Watershed - That geographical area which drains to a specified point on a water course, usually a confluence of streams or rivers (also known as drainage area, catchment, or river basin).

Watershed Runoff Management Plan (WRMP) – A written description of the specific watershed runoff management measures and programs that each watershed group of Copermittees will implement to comply with this Order and ensure that storm water pollutant discharges in runoff are reduced to the MEP and do not cause or contribute to a violation of water quality standards.

WDRs – Waste Discharge Requirements

DRAFT

ATTACHMENT D

SCHEDULED SUBMITTALS SUMMARY AND REPORTING CHECKLIST

Submittal	Permit Section	Completion Date	Frequency
Prohibitions on dry-weather discharges not listed in Section B.2	B.2	July 1, 2012, then in JRMP Annual Report	Annual
Submit Certified Statement of Adequate Legal Authority	E.2	June 30, 2012	One time
Updated SSMP	F.1.d, K.2.a	June 30, 2012	One time
Identify and remove barriers to LID implementation	F.1.d.(4)(a)(v)	With JRMP Annual Report	Annual
Hydromodification Management Plan	F.1.h.(5), K.2.b	June 30, 2013	One Time for Draft
Flood Control Structure BMP Inventory and Evaluation	F.3.a.(4)	With JRMP Annual Report	Annual
Retrofitting Program	F.3.d.(3)	With JRMP Annual Report	Annual
Updated Watershed Workplans	G.1 K.1.b	June 30, 2012	One time
Fiscal Analysis	H.3	With JRMP Annual Report	Annual
Updated Jurisdictional Runoff Management Plans	K.1.a	June 30, 2012	One time
Report of Waste Discharge	K.2.c	At least 180 days prior to expiration of this Order	One time
Principal Copermittee submits JRMP Annual Reports to Regional Board	K.3.a.(2)	October 31, 2013 and annually thereafter	Annual
Principal Copermittee submits Notification of Principal Copermittee	M	180 days after adoption of the Order	One Time

Jurisdictional Runoff Management Program Annual Report Checklist

In the JRMP Annual Report each Copermittee shall provide an Annual Report Checklist. The Annual Report Checklist must be no longer than 2 pages, be current as of the 1st day of the rainy season of that year, and include a signed certification statement. The Annual Report Summary Checklist must provide the following information:

Order Requirements
Were All Requirements of this Order Met?

Construction
Number of Active Sites
Number of Inactive Sites
Number of Sites Inspected
Number of Inspections
Number of Violations
Number of Construction Enforcement Actions Taken

New Development
Number of Development Plan Reviews
Number of Grading Permits Issued
Number of Projects Exempted from Interim/Final Hydromodification Requirements

Post Construction Development
Number of Priority Development Projects
Number of SUSMP Required Post-Construction BMP Inspections
Number of SUSMP Required Post-Construction BMP Violations
Number of SUSMP Required Post-Construction BMP Enforcement Actions Taken

Illicit Discharges and Connections
Number of IC/ID Inspections
Number of IC/ID Detections by Staff
Number of IC/ID Detections from the Public
Number of IC/ID Eliminations
Number of IC/ID Violations
Number of IC/ID Enforcement Actions Taken

MS4 Maintenance
Number of Inspections Conducted
Amount of Waste Removed
Total Miles of MS4 Inspected

Municipal/Commercial/Industrial
Number of Facilities
Number of Inspections Conducted
Number of Facilities Inspected
Number of Violations
Number of Enforcement Actions Taken

Attachment E

RECEIVING WATERS AND MS4 DISCHARGE MONITORING AND REPORTING PROGRAM NO. R9-2010-0016

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I. PURPOSE

A. This Receiving Waters and MS4 Discharge Monitoring and Reporting Program (MRP) is intended to meet the following goals:
   1. Assess compliance with Order No. R9-2010-0016;
   2. Measure and improve the effectiveness of the Copermittees' runoff management programs;
   3. Assess the chemical, physical, and biological impacts to receiving waters resulting from MS4 discharges;
   4. Characterize storm water discharges;
   5. Identify sources of specific pollutants;
   6. Prioritize drainage and sub-drainage areas that need management actions;
   7. Detect and eliminate illicit discharges and illicit connections to the MS4;
   8. Assess the overall health of receiving waters; and
   9. Provide information to implement required BMP improvements.

B. This Receiving Waters and MS4 Discharges Monitoring and Reporting Program is designed to answer the following core management questions[1]:
   1. Are conditions in receiving waters protective, or likely to be protective, of beneficial uses?
   2. What is the extent and magnitude of the current or potential receiving water problems?
   3. What is the relative MS4 discharge contribution to the receiving water problem(s)?
   4. What are the sources of MS4 discharge that contribute to receiving water problem(s)?
   5. Are conditions in receiving waters getting better or worse?

II. MONITORING PROGRAM

The Monitoring Program is designed to assess the condition of receiving waters, monitor pollutants in storm and non-storm water effluent from the MS4, and conduct Special Studies to address conditions of concern. Where feasible, the Monitoring Program is designed to allow the Copermittees to combine required monitoring elements or efforts that are not mutually exclusive while still meeting the requirements of the Order.

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[1] Core management questions from "*Model Monitoring Program for Municipal Separate Storm Sewer Systems in Southern California: A report from the Stormwater Monitoring Coalition's Model Monitoring Technical Committee.*" Technical Report No. 419. August 2004.

A. Receiving Waters Monitoring Program

Each Copermittee must collaborate with the other Copermittees to develop, conduct, and report on a year-round watershed based Receiving Waters Monitoring Program. The monitoring program design, implementation, analysis, assessment, and reporting must be conducted on a watershed basis for the Santa Margarita Hydrologic Unit (HU) and must be designed to meet the goals and answer the questions listed in section I above. The monitoring program must include the following components:

1. MASS LOADING STATION (MLS) MONITORING

a. Locations: The following existing mass loading stations must continue to be monitored: Lower Temecula Creek, Lower Murrieta Creek at the USGS Weir, and a permanent reference station.[2] Copermittees may propose, for San Diego Water Board review and approval, changing the location of a mass loading station.

b. Frequency: Each mass loading station must be monitored each year three times during wet weather events and twice during dry weather flow conditions.

c. Timing: Each mass loading station must be monitored for the first wet weather event of the season which meets USEPA's criteria described in 40 CFR 122.21(g)(7). Monitoring of the third wet weather event must be conducted after February 1. Dry weather mass loading monitoring events must be sampled at least three months apart between May and October. If flows are not evident for the second event, then sampling must be conducted during non-rain events in the following wet weather season.

d. Protocols: Protocols for mass loading sampling and analysis including analytical methods, target reporting limits, and data reporting formats must be compatible with the State Water Resources Control Board's (State Water Board's) State Surface Water Ambient Monitoring Program (SWAMP). If the mass loading sampling and analysis are determined to be impracticable with the SWAMP standards, the Copermittees must provide a written explanation and discussion in the submittal of the Planned Monitoring Program. Wet weather samples must be time-weighted composites, collected for the duration of the entire runoff event. Where such monitoring is not practical, such as for large watersheds with significant groundwater recharge flows, composites must be collected at a minimum during the first 3 hours of

[2] A map depicting mass loading stations can be found in the Fact Sheet for Order R9-2010-0016.

flow. Dry weather event sampling must be time-weighted composites composed of 24 discrete hourly samples, whereby the mass loads of pollutants are calculated as the product of the composite sample concentration and the total volume of water discharged past the monitoring point during the time of sample collection.

(1) Automatic samplers must be used to collect samples from mass loading stations.

(2) Grab samples must be analyzed for temperature, pH, specific conductance, biochemical oxygen demand, oil and grease, E. coli , fecal coliform, enterococcus and for total petroleum hydrocarbons whenever a sheen is observed.

e. Copermittees must measure or estimate flow rates and volumes for each mass loading station sampling event to determine mass loadings of pollutants. Data from nearby USGS gauging stations may be utilized, or flow rates may be estimated in accordance with the USEPA Storm Water Sampling Guidance Document (EPA-833-B-92-001), Section 3.2.1.

f. In the event that the required number of sampling events are not conducted during one monitoring year at any given station, the Copermittees must provide a written explanation for the reduced number of sampling events in the subsequent Receiving Waters Monitoring Annual Report. The explanation must include, at a minimum, streamflow data from the nearest USGS gauging station, a full description of any equipment failures and subsequent remedies if applicable, efforts made to resample a future event, and any quality assurance or quality control issues encountered. The explanation must also include a description of steps taken to prevent further sampling failures.

g. The following constituents must be analyzed for each monitoring event at each station:

Table 1. Analytical Testing for Mass Loading (II.A.1) and Stream Assessment (II.A.2)

Conventionals, Nutrients, Hydrocarbons	Pesticides	Metals (Total and Dissolved)	Bacteriological (mass loading)
• Total Dissolved Solids • Total Suspended Solids • Turbidity • Total Hardness • pH • Specific Conductance • Temperature • Dissolved Oxygen • Total Phosphorus • Dissolved Phosphorus • Nitrite ˚ • Nitrate ˚ • Total Kjeldahl Nitrogen • Ammonia • Biological Oxygen Demand, 5-day • Chemical Oxygen Demand • Total Organic Carbon • Dissolved Organic Carbon • Methylene Blue Active Substances • Oil and Grease • Sulfate	• Diazinon • Chlorpyrifos • Malathion • Carbamates • Pyrethroids	• Arsenic • Cadmium • Total Chromium • Hexavalent Chromium • Copper • Lead • Iron • Manganese • Nickel • Selenium • Zinc • Mercury • Silver • Thallium	• E. coli • Fecal Coliform • Enterococcus
˚ Nitrate and nitrate may be combined and reported as nitrate + nitrite.			

h. Toxicity testing must be conducted for each monitoring event at each station according to the following Table 2:

Table 2. Toxicity Testing for Mass Loading (II.A.1) and Stream Assessment (II.A.2)

Program Component	***Dry Weather Flows***	***Storm Water Flows***
	Freshwater Organisms	**Freshwater Organisms**
Mass Loading	3 chronic* 3 acute*	3 acute*
Bioassessment**	3 chronic* 3 acute*	n/a
Sediment Toxicity Special Study	1 chronic 1 acute	n/a

Table Notes
* Toxicity testing must include use of *Pimephales promelas* (fathead minnow), *Hyalella azteca* and *Pseudokirchneriella subcapitata (*formerly *Selenastrum capricornutum,* unicellular algae).
** Duplicative toxicity testing is not required for Stream Assessment Monitoring stations co-located at mass loading stations since Stream Assessment Monitoring must be conducted in conjunction with dry weather mass loading.

Species Notes:
1. Acute toxicity may be determined during the course of chronic toxicity monitoring per U.S. EPA protocols.

i. The presence of acute toxicity must be determined in accordance with USEPA protocol (EPA-821-R-02-012). The presence of chronic freshwater toxicity must be determined in accordance with USEPA protocol (EPA-821-R-02-013).

2. Stream Assessment Monitoring

Copermittees must conduct Stream Assessment Monitoring using multiple lines of evidence to assess the condition of biological communities in freshwater receiving waters. Stream assessment must include the collection and reporting of the following specified instream biological, chemical, and physical (including habitat) data.

a. Locations: At a minimum, the program must consist of station identification, sampling, monitoring, and analysis of data for six stream assessment stations in order to determine the biological, chemical and physical integrity of streams within the County of Riverside. The two existing mass loading stations at Murrieta and Temecula Creeks must continue to be monitored. Two reference stream assessment stations, including the existing Adobe Creek station, must be identified, sampled, monitored, and analyzed. Locations of reference stations

must be identified according to protocols outlined in "A Quantitative Tool for Assessing the Integrity of Southern Coastal California Streams," by Ode, et al. 2005.[3]

b. Frequency: Stream assessment stations must be monitored in May or June (to represent the influence of wet weather on the communities) and September or October (to represent the influence of dry weather flows on the communities). The timing of monitoring of stream assessment stations located at mass loading stations must coincide with dry weather monitoring of those mass loading stations.

c. Parameters / Methods: Stream assessment monitoring must include bioassessment, aquatic chemistry, and aqueous toxicity.

(1) Aquatic chemistry and aqueous toxicity must be conducted as outlined in Tables 1 and 2 using the same parameters and methods as the mass loading station monitoring.

(2) Bioassessment analysis procedures must include calculation of the Index of Biotic Integrity (IBI) for benthic macroinvertebrates for all bioassessment stations, as outlined in "A Quantitative Tool for Assessing the Integrity of Southern Coastal California Streams," by Ode, et al. 2005.

(3) Monitoring of stream assessment stations must be conducted according to bioassessment Standard Operating Procedures (SOP) developed by the Surface Water Ambient Monitoring Program (SWAMP), as amended.[4] In collecting macroinvertebrate samples, the discharger must use the "Reachwide Benthos (Multihabitat) Procedure." The discharger must conduct, concurrently with all required macroinvertebrate collections, the "full" suite of physical/habitat characterization measurements specified in the SWAMP Bioassessment SOP, and as summarized in the *SWAMP Stream Habitat Characterization Form — Full Version*. [5]

(4) Monitoring of stream assessment stations must incorporate assessment of algae using SWAMP's SOP for Collecting Stream

[3] Ode, et al. 2005. "A Quantitative Tool for Assessing the Integrity of Southern Coastal California Streams." Environmental Management. Vol. 35, No. 1, pp. 1-13.
[4] Ode, P.R.. 2007. Standard operating procedures for collecting macroinvertebrate samples and associated physical and chemical data for ambient bioassessments in California. California State Water Resources Control Board Surface Water Ambient Monitoring Program (SWAMP) Bioassessment SOP 001.
[5] Available at:
http://www.waterboards.ca.gov/water_issues/programs/swamp/docs/reports/fieldforms_fullversion052908.pdf

Algae Samples.[6] Assessment of freshwater algae must include algal taxonomic composition (diatoms and soft algae) and algal biomass. Future bioassessment must incorporate algal IBI scores, when developed.

d. A qualified professional environmental laboratory must perform all sampling, laboratory, quality assurance, and analytical procedures in accordance with the Southern California Regional Watershed Monitoring Program Bioassessment Quality Assurance Project Plan.[7] The Copermittees must utilize future Quality Assurance Project Plans as developed by SWAMP.

(1) The Copermittees must have and follow a quality assurance (QA) plan that covers the required stream assessment monitoring. External QA checks must be funded by the Copermittees, and performed by the California Department of Fish and Game's Aquatic Bioassessment Laboratory. An alternate laboratory with equivalent expertise and performance may be used if approved in advance in writing by San Diego Water Board.

(2) Identified organisms must be archived (i.e., retained) by the Copermittee(s) for a period of not less than three years from the date that all QA steps are completed. The identified organisms must be relinquished to the San Diego Water Board upon request by the San Diego Water Board.

(3) The macroinvertebrate results (i.e., taxonomic identifications consistent with the specified SAFIT STEs, and number of organisms within each taxa) must be submitted to the San Diego Water Board in electronic format. SWAMP is currently developing standardized formats for reporting bioassessment data. All bioassessment data collected after those formats become available must be submitted using the SWAMP formats. Until those formats are available, the biological data must be submitted in MS-Excel[8] (or equivalent) format.

The physical/habitat data must be reported using the standard format titled *SWAMP Stream Habitat Characterization Form — Full Version*.

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[6] Fetcher et al. 2009. Standard Operating Procedures for Collecting Stream Algae Samples and Associated Physical Habitat and Chemical Data for Ambient Bioassessments in California.
[7] Version 1.0 of the Southern California Regional Watershed Monitoring Program Bioassessment Quality Assurance Program Plan was released on June 25, 2009.
[8] Any version of Excel, 2000 or later, may be used.

3. FOLLOW-UP ANALYSIS AND ACTIONS (TIE AND TRE TRIAD APPROACH)

When results from the required monitoring indicate adverse water quality effects at a mass loading station or stream assessment station as defined in Table 3, Copermittees within the watershed(s) that discharge to that location must evaluate the extent and causes of MS4 discharge pollution to the adverse effects in receiving waters and prioritize and implement management actions to eliminate non-storm water discharges and/or reduce storm water sources from the MS4 as described in Table 3. Toxicity Identification Evaluations (TIEs) must be conducted to determine the cause of toxicity as outlined in Table 3 below. Other follow-up activities, which must be conducted by the Copermittees, are also identified in Table 3. Once the cause of toxicity has been identified by a TIE, the Copermittees must perform source identification projects as needed and implement the measures necessary to reduce or eliminate the pollutant discharges and abate the sources causing the toxicity.

Table 3. Triad Approach to Determining Follow-Up Actions[9]

	Chemistry	Toxicity	Benthic Alteration	Example Conclusions	Possible Actions or Decisions
1.	Exceedance of water quality objectives	Evidence of toxicity	Indications of alteration	Strong evidence of pollution-induced degradation	Use TIE to identify contaminants of concern, based on TIE metric Initiate upstream source identification as a high priority
2.	No persistent exceedances of water quality objectives	No evidence of toxicity	No indications of alteration	No evidence of current pollution-induced degradation Potentially harmful pollutants not yet concentrated enough to cause visible impact	No immediate action necessary Conduct periodic broad scans for new and/or potentially harmful pollutants
3.	Exceedance of water quality objectives	No evidence of toxicity	No indications of alteration	Contaminants are not bioavailable Test organisms not sensitive to problem pollutants	TIE would not provide useful information with no evidence of toxicity Continue monitoring for toxic and benthic impacts Initiate upstream source identification as a low priority Consider whether different or additional test organisms should be evaluated
4.	No persistent exceedances of water quality objectives	Evidence of toxicity	No indications of alteration	Unmeasured contaminant(s) or conditions have the potential to cause degradation Pollutant causing toxicity at very low levels	Recheck chemical analyses; verify toxicity test results Consider additional advanced chemical analyses Use TIE to identify contaminants of concern, based on TIE metric Initiate upstream source identification as a medium priority
5.	No persistent exceedances of water quality objectives	No evidence of toxicity	Indications of alteration	Alteration may not be due to toxic contamination Test organisms not sensitive to problem pollutants	No action necessary due to toxic chemicals Initiate upstream source identification (for physical sources) as a high priority Consider whether different or additional test organisms should be evaluated
6.	Exceedance of water quality objectives	Evidence of toxicity	No indications of alteration	Toxic contaminants are bioavailable, but in situ effects are not demonstrable Benthic analysis not sensitive enough to detect impact Potentially harmful pollutants not yet concentrated enough to change community	Determine if chemical and toxicity tests indicate persistent degradation Recheck benthic analyses; consider additional data analyses If recheck indicates benthic alteration, perform TIE to identify contaminants of concern, based on TIE metric Initiate upstream source identification as a high priority If recheck shows no effect, use TIE to identify contaminants of concern, based on TIE metric Initiate upstream source identification as a medium priority
7.	No persistent exceedances of water quality objectives	Evidence of toxicity	Indications of alteration	Unmeasured toxic contaminants are causing degradation Pollutant causing toxicity at very low levels Benthic impact due to habitat disturbance, not toxicity	Recheck chemical analyses and consider additional advanced analyses Use TIE to identify contaminants of concern, based on TIE metric Initiate upstream source identification as a high priority Consider potential role of physical habitat disturbance
8.	Exceedance of water quality objectives	No evidence of toxicity	Indications of alteration	Test organisms not sensitive to problem pollutants Benthic impact due to habitat disturbance, not toxicity	TIE would not provide useful information with no evidence of toxicity Initiate upstream source identification as a high priority Consider whether different or additional test organisms should be evaluated Consider potential role of physical habitat disturbance

4. REGIONAL MONITORING PROGRAMS

The San Diego Water Board recognizes the importance and advantages of participation by Copermittees in Regional Monitoring Programs. As such, the Copermittees may propose participation in additional regional monitoring programs to supplement and/or replace monitoring required under this Order. The regional monitoring plan must be submitted to the San Diego Water Board[10] for review and approval. Documentation of

[9] Model Monitoring Program for Municipal Separate Storm Sewer Systems in Southern California. Stormwater Monitoring Coalition August 2004. See Table 5-4 for definitions.

[10] For the purposes of Receiving Waters and MS4 Discharge Monitoring and Reporting Program No. R9-2010-0016, review and approval by the San Diego Water Board of draft monitoring plans, proposals or protocols shall be conducted by the San Diego Water Board Executive Officer.

participation and monitoring must be included in the annual report(s).

B. Wet Weather MS4 Discharge Monitoring

Each Copermittee must collaborate with the other Copermittees to develop, conduct, and report on a year-round, watershed-based, Wet Weather MS4 Discharge Monitoring Program. The monitoring program design, implementation, analysis, assessment, and reporting must be conducted on a watershed basis for each of the hydrologic subareas within the Santa Margarita HU under jurisdiction of the Copermittees. The monitoring program must be designed to meet the goals, and answer the questions, listed in Section I above, as well as to implement required Storm Water Action Levels (SALs) in the Order. The monitoring program must include the following components;

1. MS4 OUTFALL MONITORING

The Copermittees must collaborate to develop and implement a monitoring program to characterize pollutant discharges from MS4 outfalls in each watershed during wet weather. The program must include the rationale and criteria for selection of outfalls to be monitored. The program must, at a minimum, include collection of samples for pollutants listed in Table 4 (below). This monitoring program must be designed to sample a representative percentage[11] of the major outfalls within each hydrologic subarea and must begin no later than the 2012-2013 monitoring year.

a. The program must comply with Section D of this Order for Storm Water Action Levels (SALs). Samples must be collected during the first 24 hours of the storm water discharge or for the entire storm water discharge if it is less than 24 hours.

(1) Grab samples may be utilized only for pH, indicator bacteria, DO, temperature and hardness.

(2) All other constituents must be sampled using 24-hour composite samples or for the entire storm water discharge if the storm event is less than 24 hours.

b. Sampling to compare MS4 outfall discharges with total metal SALs must include a measurement of receiving water hardness at each

[11] A representative percentage determination must consider hydrologic conditions, total drainage area of the site, population density of the site, traffic density, age of the structures or buildings in the area, and land use types (commercial, residential and industrial).

outfall. If a total metal concentration exceeds a SAL in Section D of the Order, that concentration must be compared to the California Toxic Rule criteria and the USEPA 1-hour maximum concentration for the detected level of receiving water hardness associated with that sample. If it is determined that the sample's total metal concentration for that specific pollutant exceeds the SAL but does not exceed the applicable 1-hour criteria for the measured level of hardness, then the SAL shall be considered not exceeded for that measurement.

Table 4. Analytical Testing for Wet Weather MS4 Discharges

Conventionals, Nutrients, Hydrocarbons	Pesticides	Metals (Total and Dissolved)	Bacteriological
• Total Dissolved Solids • Total Suspended Solids • Turbidity★ • Total Hardness • pH • Specific Conductance • Temperature • Dissolved Oxygen • Total Phosphorus★ • Dissolved Phosphorus • Nitrite °★ • Nitrate °★ • Total Kjeldahl Nitrogen • Ammonia • Biological Oxygen Demand, 5-day • Chemical Oxygen Demand • Total Organic Carbon • Dissolved Organic Carbon • Oil and Grease • Sulfate	• Diazinon • Chlorpyrifos • Pyrethroids	• Arsenic • Cadmium★ • Chromium • Copper★ • Lead★ • Nickel • Selenium • Zinc★ • Mercury • Silver • Thallium • Iron • Manganese	• Fecal Coliform • Enterococcus • E. coli

° Nitrate and nitrate may be combined and reported as nitrate + nitrite.
★Pollutant for which there is a Storm Water Action Level

2. SOURCE IDENTIFICATION MONITORING

The Copermittees must collaborate to develop and implement a monitoring program to identify sources of pollutants causing the priority water quality problems within each hydrologic subarea. The monitoring program must include focused monitoring which moves upstream into each watershed as necessary to identify sources. This monitoring program must be implemented within each hydrologic subarea and must begin no later than the 2012-2013 monitoring year.

3. COMMENCEMENT OF MS4 OUTFALL AND SOURCE IDENTIFICATION MONITORING

The Principal Copermittee must submit to the San Diego Water Board for review and approval, a detailed draft of the wet weather MS4 discharge monitoring program to be implemented. The description must identify and provide the rationale for all constituents monitored, locations of monitoring, frequency of monitoring, and analyses to be conducted with the data generated. The draft must be submitted with the proposed monitoring program (Section III.A.1).

C. Non-Storm Water Dry Weather Action Levels and Illicit Discharge Detection and Elimination

Each Copermittee must collaborate with the other Copermittees to conduct, and report on a year-round watershed based Dry Weather Non-storm Water MS4 Discharge Monitoring Program. The monitoring program's implementation, analysis, assessment, and reporting must be conducted to assess compliance with section B and C of this Order, meet the goals of the MRP, and conduct Illicit Discharge Detection and Elimination Activities under Section F.4 of this Order. The monitoring program must also be designed to assess the contribution of dry weather flows to Clean Water Act Section 303(d) listed impairments. The monitoring program must include the following components:

1. MS4 OUTFALL MONITORING

Each Copermittee's program must be designed to determine levels of pollutants in effluent discharges from the MS4 into receiving waters. Each Copermittee must conduct the following dry weather field screening and analytical monitoring tasks:

a. Dry Weather Non-storm Water Effluent Analytical Monitoring Station Identification

(1) Sampling Stations must be located at major outfalls pursuant to section C of this Order. Other outfall sampling points (or any other point of access such as manholes) identified by the Copermittees as potential high risk sources of polluted effluent or as identified under Section C.4 of the Order must be sampled.

(2) Each Copermittee must clearly identify each dry weather effluent analytical monitoring station on its MS4 Map as either a separate GIS layer or a map overlay hereinafter referred to as a Dry Weather

Non-storm Water Effluent Analytical Stations Map.

b. Develop Dry Weather Non-storm Water Effluent Analytical Monitoring Procedures

Each Copermittee must develop and/or update written procedures for effluent analytical monitoring including field observations, monitoring, and analyses to be conducted. These procedures must be consistent with 40 CFR part 136. At a minimum, the procedures must meet the following guidelines and criteria:

(1) Determining Sampling Frequency: Effluent analytical monitoring must be conducted at major outfalls and identified stations. The Copermittees must sample a representative number of major outfalls and identified stations within each hydrologic subarea.[12] The sampling must be done to assess compliance with dry weather non-storm water action levels pursuant to section C of this Order. All monitoring conducted must be preceded by a minimum of 72 hours of dry weather.

(2) Sampling of non-storm water discharges may be done utilizing grab samples. If a ponded MS4 discharge is observed at a monitoring station, the Copermittee(s) must record the observation and collect at least one (1) grab sample. If flow is evident, a 1-hour composite sample may be taken. The Copermittee(s) must estimate the flow by measuring the width of water surface, approximate depth of water, and approximate flow velocity.

(3) Effluent samples must undergo analytical laboratory analysis for (a) all constituents described in *Table 1. Analytical Testing for Mass Loading and Stream Assessment* of this Order; (b) Constituents with assigned non-storm water action levels under Section C of this Order; and (c) Total Residual Chlorine.

(4) If the station is dry (i.e. no flowing or ponded MS4 discharge is observed), the Copermittee(s) must make and record all applicable observations on the MS4 outfall and receiving waters, including any evidence of past non-storm water flows and the presence of trash.

[12] A representative percentage determination must consider hydrologic conditions, total drainage area of the site, population density of the site, traffic density, age of the structures or buildings in the area, and land use types (commercial, residential and industrial).

2. SOURCE IDENTIFICATION MONITORING

The Copermittees must collaborate to develop and implement a monitoring program to identify sources of pollutants in non-storm water discharges in accordance with Sections C and F.4 of this Order. The source identification portion of the monitoring program must include: the following components:

a. Development and/or update of response criteria for dry weather non-storm water effluent analytical monitoring results:

(1) Response criteria must include action levels described in Section C of this Order.

(2) Response criteria must include evaluation of LC_{50} levels for toxicity to appropriate test organisms.

b. Develop and/or update Illicit Discharge Detection and Elimination response procedures for source identification follow up investigations and elimination in the event of exceedance of dry weather non-storm water effluent analytical monitoring response criteria (see above). These procedures must be consistent with procedures required in section C, F.4.d, and F.4.e. of this Order.

3. COMMENCEMENT OF MS4 OUTFALL AND SOURCE IDENTIFICATION MONITORING

The Copermittees must commence implementation of dry weather effluent analytical monitoring under the requirements of this Order no later than **July 1, 2012**. If monitoring indicates an illicit connection or illegal discharge, the Copermittee(s) must conduct the follow-up investigation and elimination activities described in sections C, F.4.d and F.4.e of this Order. In the interim period until the dry weather non-storm water effluent analytical monitoring program of this Order is implemented, each Copermittee must continue to implement dry weather field screening and analytical monitoring as it was most recently implemented pursuant to Order No. 2004-001.

D. High Priority Inland Aquatic Habitat Monitoring

The Copermittees must develop and submit to the San Diego Water Board by April 01, 2012, an inland aquatic habitat monitoring program for areas supporting high priority aquatic and/or riparian species. The goal of the monitoring program is to assess if MS4 storm water and non-storm water discharges are affecting high priority inland aquatic habitat. The monitoring

will assist the Copermittees in preventing the degradation of high quality waters within the jurisdiction of this Order that support high priority species by identifying discharges from MS4s which may cause or have the potential to cause impairment of beneficial uses within these areas.[13] High priority species include those federally and/or state listed as endangered, threatened, or as a species of concern. The design and goal of the monitoring program must be consistent with the criteria listed in Section I.B of this Monitoring Program, including evaluation of the protection of high priority species in receiving waters. The Copermittees must implement the program unless otherwise directed in writing by the San Diego Water Board.

The monitoring program must include the following components:

1. OUTFALL AND RECEIVING WATER MONITORING

   The program must be designed to determine levels of pollutants in storm water and non-storm water effluent discharges from the MS4 discharged into high priority inland aquatic habitat(s) and the level of those pollutants found in ambient receiving waters subject to the discharge. The Copermittees must conduct the following field screening and analytical monitoring tasks:

   a. MS4 and Receiving Waters Monitoring Station Identification

      (1) MS4 discharge stations must be major outfalls that directly discharge into high priority inland aquatic habitat. MS4 discharge stations may be selected in conjunction with monitoring required under Section II.B and II.C of the Receiving Waters and MS4 Discharge Monitoring Program.

      (2) Receiving water station(s) must be located upstream and downstream of the discharge within the high priority inland aquatic habitat. Receiving water stations must be located to prevent any significant co-mingling of receiving water flows with other sources.

   b. Develop Analytical Monitoring Procedures

      Each Copermittee must develop procedures for analytical monitoring (these procedures must be consistent with 40 CFR part 136), including field observations, pollutants to be monitored, analyses to be conducted, and quality assurance/control. At a minimum, the procedures must meet the following guidelines and criteria:

[13] In accordance with requirements of State Water Resources Control Board Resolution No. 68-16, Statement of Policy with Respect to Maintaining High Quality Waters in California.

(1) Determining Sampling Frequency: The Copermittees must sample a representative number of major outfalls and receiving waters that are considered high priority inland aquatic habitat. Sampling of the discharge and receiving waters must be paired and occur during both storm and non-storm conditions.

(2) Sampling in receiving waters may be done utilizing grab samples, though composite samples are encouraged. Sampling of storm and non-storm water discharges from the MS4 must be done in accordance with Section II.B and II.C. If ponded receiving waters is/are observed at a monitoring station, the Copermittees must make written observations and collect at least one (1) grab sample. The Copermittee(s) must estimate the flow by measuring the width of water surface, approximate depth of water, and approximate flow velocity

(3) The proposed constituents for which samples will undergo analytical laboratory analysis.

(4) Procedures for recording applicable observations when monitoring stations are dry (i.e. no flowing water or ponded conditions).

3. ASSESSMENT OF MONITORING RESULTS

The program must include a discussion of monitoring results within the monitoring annual report. The discussion must include an evaluation of the contribution of MS4 discharges to ambient water conditions within high priority inland aquatic habitats, as well as any actions taken to prevent and/or reduce sources of those pollutants.

4. SOURCE IDENTIFICATION MONITORING

The Copermittees must collaborate to conduct source identification monitoring in accordance with Section II.B and II.C of the Monitoring and Reporting Program of this Order.

E. Special Studies

1. The Copermittees must conduct special studies, including any monitoring and/or modeling required for TMDL development and implementation, as directed by the San Diego Water Board.

2. Sediment Toxicity Study

The Copermittees must develop and submit to the San Diego Water Board by April 01, 2012, a special study workplan to investigate the toxicity of sediment in streams and potential impact on benthic macroinvertebrate IBI scores. The Sediment Toxicity Special Study must be implemented in conjunction with the Stream Assessment Monitoring in II.A.2. The Copermittees must implement the special study unless otherwise directed in writing by the San Diego Water Board.

The Sediment Toxicity Special Study must include the following elements:

a. Sampling Locations: At least 4 stream assessment locations must be sampled, including 1 reference site and 1 mass loading site. Selection of sites must be done with consideration of subjectivity of receiving waters to discharges from residential and agricultural land uses.

b. Frequency: At a minimum, sampling must occur once per year at each site for at least 2 years. Sampling must be done in conjunction with the stream assessment sampling required under Section II.A.2 of the Monitoring and Reporting Program of this Order.

c. Parameters/Methods: At a minimum, sediment toxicity analysis must include the measurement of metals, pyrethroids and organochlorine pesticides. The analysis must include estimates of bioavailability based upon sediment grain size, organic carbon and receiving water temperature at the sampling site. Acute and chronic toxicity testing must be done using *Hyalella azteca* in accordance with Table 2.

d. Results: Results and a Discussion must be included in the Monitoring Annual Report (see III.A). The Discussion must include an assessment of the relationship between observed IBI scores under Section II.A.2 and all variables measured.

3. Trash and Litter Investigation

The Copermittees must develop and submit to the San Diego Water Board by September 01, 2012, a special study workplan to assess trash (including litter) as a pollutant within receiving waters on a watershed based scale. Litter is defined in California Government Code 68055.1g as "…improperly discarded waste material, including, but not limited to, convenience food, beverage, and other product packages or container constructed of steel, aluminum, glass, paper, plastic and other natural and synthetic, materials, thrown or deposited on lands and waters of the state,

but not including the properly discarded waste of the primary processing of agriculture, mining, logging, sawmilling, or manufacturing." A lead Copermittee must be selected for the Santa Margarita HU for the purposes of this Special Study. The Copermittees must implement the special study unless otherwise directed in writing by the San Diego Water Board

The Trash and Litter Investigation must include the following elements:

a. Locations: The lead Copermittee must identify suitable sampling locations within the Santa Margarita HU.

b. Frequency: Trash at each location must be monitored a minimum of twice during the wet season following a qualified monitoring storm event (minimum of 0.1 inches preceded by 72 hours of dry weather) and twice during the dry season.

c. Protocol: The lead Copermittee for the Santa Margarita HU must use the "Final Monitoring Workplan for the Assessment of Trash in San Diego County Watersheds" and "A Rapid Trash Assessment Method Applied to Waters of the San Francisco Bay Region" to develop a monitoring protocol for the Santa Margarita HU.

d. Results and Discussion from the Trash and Litter Study must be included in the Monitoring Annual Report. The Results and Discussion must, at a minimum, include source identification, an evaluation of BMPs for trash reduction and prevention, and a description of any BMPs implemented in response to study results.

4. Agricultural, Federal and Tribal Input Study

The Copermittees must develop and submit to the San Diego Water Board by September 01, 2012, a special study workplan to investigate the water quality of agricultural, federal and tribal runoff that is discharged into their MS4 (see Finding D.3.c of the Order). The Copermittees must implement the special study unless otherwise directed in writing by the San Diego Water Board.

The Agricultural, Federal and Tribal Input Special Study must include the following elements:

a. Locations: The Copermittees must identify a representative number of sampling stations within their MS4 that receive discharges of agricultural, federal, and tribal runoff that has not co-mingled with any

other source. At least one station from each category must be identified.

b. Frequency: One storm event must be monitored at each sampling location each year for at least 2 years.

c. Parameters/Methods: At a minimum, analysis must include those constituents listed in Table 1 of the MRP (see II.A.1). Grab samples may be utilized, though composite samples are preferred. Copermittees must also measure or estimate flow rates and volumes of discharges into the MS4.

d. Results: Results and Discussion from the Agricultural, Federal and Tribal Input Study must be included in the Monitoring Annual Report.

5. MS4 and Receiving Water Maintenance Study

The Copermittees must develop and submit to the San Diego Water Board by April 01, 2012, a special study workplan to investigate receiving waters that are also considered part of the MS4 (see Finding D.3.c of the Order) and which are subject to continual vegetative clearance activities (e.g. mowing). The study must be designed to assess the effects of vegetation removal activities and water quality, including, but not limited to, modification of biogeochemical functions, in-stream temperatures, receiving water bed and bank erosion potential and sediment transport. The Copermittees must implement the special study unless otherwise directed in writing by the San Diego Water Board.

The MS4 and Receiving Water Maintenance Special Study must include the following elements:

a. Locations: The Copermittees must identify suitable sampling locations, including at least one reference system that is not subject to maintenance activities.

b. Parameters/Methods: At a minimum, the Copermittees must monitor pre and post maintenance activities for indicator bacteria, turbidity (NTU), temperature, dissolved oxygen and nutrients (Nitrite, Nitrate, Total Kjeldahl Nitrogen, Ammonia and Total Phosphorous). Copermittees must also measure or estimate flow rates and volumes.

c. Results and Discussion from the MS4 and Receiving Water Maintenance Study must be included in the Annual Monitoring Report. The Discussion must include relevance of findings to CWA Section

303(d) listed impaired waters.

6. Intermittent and Ephemeral Stream Perennial Conversion Study

The Copermittees must develop and submit to the San Diego Water Board by April 01, 2013, a special study workplan to investigate the extent of any impacts to beneficial uses from the conversion of historically ephemeral or intermittent receiving waters to perennially flowing waters due to the continued discharge of currently exempted non-storm water from the MS4 and/or discharges into MS4s covered under a separate NPDES permit into receiving waters. The goal of the study is to assess if any impacts to beneficial uses, including, but not limited to, WILD, WARM, COLD or RARE, have occurred due to continuous discharge of currently exempted non-storm water discharges, and if the discharges should no longer be exempt. The Copermittees must implement the special study unless otherwise directed in writing by the San Diego Water Board.

The Intermittent and Ephemeral Stream Perennial Conversion Special Study must include the following elements:

a. Locations: The Copermittees must investigate their MS4 and adjacent downstream receiving waters to identify portions that have historically been ephemeral or intermittent but currently exhibit perennial flow due to exempted non-storm water discharges. Investigation must include historic habitat assessments, USGS gauging information, and historic aerial photography. Sampling must occur at a minimum of 2 identified perennially converted locations. Should the Copermittees be unable to locate any converted waters, a full description of the investigation must be documented in the annual report.

b. Parameters/Methods: The Copermittees must conduct water quality monitoring of the non-storm water discharge in accordance with Section C of this Order. In addition, the Copermittees must select a minimum of 2 downstream sampling points within the receiving waters subject the discharge and conduct the following:

(1) Grab samples must be taken and analyzed for indicator bacteria, nutrients (Nitrite, Nitrate, Total Kjeldahl Nitrogen, Ammonia and Total Phosphorous), turbidity (NTU), temperature, dissolved oxygen, total hardness, pH and 303(d) listed pollutants for all receiving waters at or downstream of the sampling site. The Copermittees must measure or estimate flow rates and volumes at each sampling point.

(2) Sampling at each site must include a quantitative and qualitative evaluation of beneficial uses. At a minimum, sampling must include observation estimation of active bed and bank erosion and erosion potential, invasive/non-native plant cover, aquatic non-native species, and potential vector control requirements.

c. Results and Discussion from the Intermittent and Ephemeral Stream Perennial Conversion Study must be included in the Annual Monitoring Report.

F. Monitoring Provisions

All monitoring activities must meet the following requirements:

1. Where procedures are not otherwise specified in this Receiving Waters Monitoring and Reporting Program, sampling, analysis and quality assurance/quality control must be conducted in accordance with the Quality Assurance Management Plan (QAMP) for the State of California's Surface Water Ambient Monitoring Program (SWAMP), adopted by the State Water Resources Control Board (SWRCB).

2. Samples and measurements taken for the purpose of monitoring must be representative of the monitored activity [40 CFR 122.41(j)(1)].

3. The Copermittees must retain records of all monitoring information, including all calibration and maintenance of monitoring instrumentation, copies of all reports required by this Order, and records of all data used to complete the Report of Waste Discharge and application for this Order, for a period of at least five (5) years from the date of the sample, measurement, report, or application. This period may be extended by request of the San Diego Water Board or USEPA at any time and must be extended during the course of any unresolved litigation regarding this discharge. [40 CFR 122.41(j)(2), CWC section 13383(a)]

4. Records of monitoring information must include [40 CFR 122.41(j)(3)]:

   a. The date, exact place, and time of sampling or measurements;
   b. The individual(s) who performed the sampling or measurements;
   c. The date(s) analyses were performed;
   d. The individual(s) who performed the analyses;
   e. The analytical techniques or methods used; and
   f. The results of such analyses.

5. All sampling, sample preservation, and analyses must be conducted according to test procedures approved under 40 CFR part 136, unless other test procedures have been specified in this Receiving Waters Monitoring and Reporting Program or approved by the San Diego Water Board [40 CFR 122.41(j)(4)].

6. The CWA provides that any person who falsifies, tampers with, or knowingly renders inaccurate any monitoring device or method required to be maintained under this Order must, upon conviction, be punished by a fine of not more than $10,000, or by imprisonment for not more than two years, or both. If a conviction of a person is for a violation committed after a first conviction of such person under this paragraph, punishment is a fine of not more than $20,000 per day of violation, or by imprisonment of not more than four years, or both. [40 CFR 122.41(j)(5)]

7. Calculations for all limitations which require averaging of measurements must utilize an arithmetic mean unless otherwise specified in this Receiving Waters Monitoring and Reporting Program. [40 CFR 122.41(l)(4)(iii)]

8. All chemical, bacteriological, and toxicity analyses must be conducted at a laboratory certified for such analyses by the California Department of Health Services or a laboratory approved by the San Diego Water Board.

9. For priority toxic pollutants that are identified in the California Toxics Rule (CTR) (65 Fed. Reg. 31682), the Copermittees must instruct their laboratories to establish calibration standards that are equivalent to or lower than the Minimum Levels (MLs) published in Appendix 4 of the Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California (SIP). If a Copermittee can demonstrate that a particular ML is not attainable, in accordance with procedures set forth in 40 CFR 136, the lowest quantifiable concentration of the lowest calibration standard analyzed by a specific analytical procedure (assuming that all the method specified sample weights, volumes, and processing steps have been followed) may be used instead of the ML listed in Appendix 4 of the SIP. The Copermittee must submit documentation from the laboratory to the San Diego Water Board for approval prior to raising the ML for any priority toxic pollutant.

10. The San Diego Water Board may make revisions to this Receiving Waters and MS4 Discharge Monitoring and Reporting Program at any time during the term of Order No. R9-2010-0016 and may include a reduction or increase in the number of parameters to be monitored, locations monitored, the frequency of monitoring, or the number and size of

samples collected.

11. The Clean Water Act provides that any person who knowingly makes any false statement, representation, or certification in any record or other document submitted or required to be maintained under this permit, including monitoring reports or reports of compliance or non-compliance must, upon conviction, be punished by a fine of not more than $10,000 per violation, or by imprisonment for not more than six months per violation, or by both. [40 CFR 122.41(k)(2)]

12. Monitoring must be conducted according the USEPA test procedures approved under 40 CFR 136, "Guidelines Establishing Test Procedures for Analysis of Pollutants under the Clean Water Act" as amended, unless other test procedures have been specified in this Receiving Waters and MS4 Discharge Monitoring and Reporting Program, in Order No. R9-2010-0016, or by the San Diego Water Board.

13. If a Copermittee(s) monitors any pollutant more frequently than required by the permit using test procedures approved under 40 CFR part 136, unless otherwise specified in the Order, the results of this monitoring must be included in the calculation and reporting of the data submitted in the reports requested by the San Diego Water Board. [40 CFR 122.41(l)(4)(ii)]

III. REPORTING PROGRAM

A. Monitoring Reporting

1. Planned Monitoring Program: The Principal Copermittee must submit to the San Diego Water Board by **June 1, 2012,** a proposed workplan describing the Receiving Waters and MS4 Discharge Monitoring Program to be implemented. Any updates to the planned monitoring program workplan proposed by the Copermittees shall be submitted with each Monitoring Annual Report. The Copermittees shall implement the proposed workplan unless otherwise directed in writing by the San Diego Water Board.

2. Monitoring Annual Report: The Principal Copermittee must submit the Receiving Waters and MS4 Discharge Monitoring Annual Report to the San Diego Water Board on October 1 of each year, beginning on **October 1, 2013**. Receiving Waters and MS4 Discharge Monitoring Annual Reports must meet the following requirements:

a. Annual monitoring reports must include the data/results, methods of evaluating the data, graphical summaries of the data, and an explanation/discussion of the data for each monitoring program component.

b. Annual monitoring reports must include a watershed-based analysis of the findings of each monitoring program component (mass loading, bioassessment, etc…). Each watershed-based analysis must include:

   (1) Identification and prioritization of water quality problems within each watershed.
   (2) Identification and description of the nature and magnitude of potential sources of the water quality problems within each watershed.
   (3) Evaluation and presentation of pollutant load and concentration increases or decreases at each mass loading station over time.
   (4) Evaluation of pollutant loads and concentrations measured at mass loading stations with respect to land use, population, sources, and other characteristics of watersheds using tools such as multiple linear regression, factor analysis, and cluster analysis.
   (5) Identification of links between source activities/conditions and observed receiving water impacts.
   (6) Identification of recommended future monitoring to identify and address sources of water quality problems.
   (7) Results and discussion of any TIE conducted, together with actions that will be implemented to reduce the discharge of pollutants in storm water, eliminate any discharge of pollutants in non-storm water, and abate the sources causing the toxicity.

c. Annual monitoring reports must include an analysis and interpretation of the data for each watershed with respect to the management questions listed in section I.B of this Receiving Waters Monitoring and Reporting Program.

d. Annual monitoring reports must include a discussion describing how each of the goals listed in section I.A of this MRP is addressed by the Copermittees' monitoring program for the monitoring year covered by the report.

e. Annual monitoring reports must include identification and analysis of any long-term trends in storm water or receiving water quality. Trend analysis must use nonparametric approaches, such as the Mann-Kendall test, including exogenous variables in a multiple regression model, and/or using a seasonal nonparametric trend model, where

applicable.

f. Annual monitoring reports must provide an estimation of total pollutant loads (wet weather loads plus dry weather loads) due to MS4 Discharge for each of the hydrologic subareas, including for 303(d) pollutants specified in Table 2 of the Order.

g. Annual monitoring reports must, for each monitoring program component listed above, include an assessment of compliance with applicable water quality standards.

h. Annual monitoring reports must describe monitoring station locations by latitude and longitude coordinates, frequency of sampling, quality assurance/quality control procedures, and sampling and analysis protocols.

i. Annual monitoring reports must use a standard report format and include the following elements:

(1) A stand alone comprehensive executive summary addressing all sections of the monitoring report;
(2) Comprehensive interpretations and conclusions; and
(3) Recommendations for future actions.

j. All monitoring reports submitted to the Principal Copermittee or the San Diego Water Board must contain the certified perjury statement described in Attachment B of this Order No. R9-2010-0016.

k. Annual monitoring reports must be reviewed prior to submittal to the San Diego Water Board by a committee of the Copermittees (consisting of no less than three different Copermittee members).

l. Annual monitoring reports must be submitted in both electronic and paper formats. Electronic formats must be CEDEN or SWAMP-uploadable.[14]

3. Monitoring programs and reports must comply with section II.F of Receiving Waters and MS4 Discharge Monitoring and Reporting Program No. R9-2010-0016 and Attachment B of this Order.

4. Following completion of an annual cycle of monitoring in October, the Copermittees must make the monitoring data and results available to the San Diego Water Board at the San Diego Water Board's request.

[14] For updates to the SWAMP templates and formats, see http://www.waterboards.ca.gov/swamp.

B. Interim Reporting Requirements

For the October 2010 to October 2012 monitoring period, the Principal Copermittee must submit the Receiving Waters Monitoring Annual Report as required under Order No. 2004-0001. The Receiving Waters Monitoring Annual Report must address the monitoring conducted to comply with the requirements of Order No. 2004-0001.

C. Reporting Dates

Table 5. Table of Required MRP Reporting Dates and Frequencies.

Submittal	Section	Completion Date	Frequency
Description of Proposed Monitoring Program	III.A.1	June 1, 2012	One Time
Receiving Waters and MS4 Discharge Monitoring Annual Reports, Including Proposed Updates to the Monitoring Program	III.A.2	Starting October 1, 2013	Annual
Copermittees submit Interim Monitoring Program Annual Report	III.B	As required under Order No. 2004-001	One Time
Draft Wet Weather MS4 Discharge Monitoring Program	II.B	June 01, 2012	One Time
Draft High Priority Inland Aquatic Habitat Monitoring	II.D	April 01, 2012	One Time
Draft Sediment Toxicity Special Study	II.E.2	April 01, 2012	One Time
Draft Trash and Litter Impairment Special Study	II.E.3	September 01, 2012	One Time
Draft Agricultural, Federal and Tribal Input Study	II.E.4	September 01, 2012	One Time
Draft MS4 and Receiving Water Maintenance Study	II.E.5	April 01, 2012	One Time
Draft Intermittent and Ephemeral Stream Perennial Conversion Study	II.E.6	April 01, 2013	One Time

Attachment F

SOURCE DATA

I. STORM WATER ACTION LEVELS DATABASE.....2

II. NUMERIC ACTION LEVELS EVALUATION DATA[1] 9

[1] Represented data from monitoring conducted by the Copermittees and provided in the 2008-09 Annual Monitoring Report.

I. STORM WATER ACTION LEVELS DATABASE

N02+NO3 (mg/l)	Phosphorous Total (mg/l)	Cadmium Total (ug/l)	Copper Total (ug/l)	Lead Total (ug/l)	Zinc Total (ug/l)	Turbidity (NTU)
4.70	7.90	9.80	800.00	660.00	22500.00	10
4.20	7.19	6.00	340.00	620.00	18000.00	15
3.90	4.96	6.00	320.00	540.00	11000.00	15
3.90	4.50	6.00	270.00	520.00	9970.00	16
3.60	4.40	6.00	244.00	460.00	9100.00	22
3.60	4.24	6.00	230.00	450.00	8800.00	23
3.60	2.59	5.30	220.00	450.00	6500.00	23
3.50	2.59	5.00	220.00	440.00	5500.00	24
3.30	2.50	4.10	210.00	430.00	5000.00	24
3.30	2.50	4.00	210.00	400.00	4900.00	30
3.10	2.50	4.00	209.00	380.00	4600.00	31
3.00	2.27	4.00	209.00	360.00	4300.00	33
2.96	2.00	4.00	200.00	350.00	3800.00	36
2.90	2.00	4.00	200.00	330.00	3800.00	36
2.70	2.00	4.00	200.00	320.00	3400.00	39
2.70	2.00	3.90	200.00	320.00	3390.00	40
2.60	1.90	3.80	200.00	320.00	3100.00	45
2.60	1.90	3.40	180.00	310.00	2500.00	50
2.60	1.80	3.40	180.00	310.00	2200.00	50
2.50	1.80	3.20	166.00	310.00	2100.00	60
2.50	1.70	3.10	163.00	310.00	1829.00	61
2.32	1.70	3.00	160.00	300.00	1700.00	62
2.30	1.70	3.00	150.00	290.00	1500.00	65
2.20	1.60	3.00	140.00	280.00	1400.00	65
2.20	1.60	3.00	140.00	270.00	1300.00	66
2.10	1.60	3.00	140.00	270.00	1300.00	69
2.10	1.53	3.00	140.00	270.00	1285.00	70
2.10	1.50	3.00	140.00	270.00	1200.00	72
2.10	1.50	3.00	130.00	260.00	1100.00	80
2.00	1.47	3.00	130.00	260.00	1054.00	84
2.00	1.46	3.00	128.00	250.00	1000.00	97
2.00	1.40	3.00	120.00	250.00	980.00	111
2.00	1.40	3.00	120.00	250.00	960.00	140
1.90	1.40	3.00	120.00	245.00	850.00	151
1.90	1.30	2.90	120.00	230.00	850.00	157
1.90	1.30	2.80	120.00	230.00	850.00	590
1.90	1.30	2.70	111.00	225.00	850.00	
1.90	1.30	2.60	111.00	220.00	840.00	
1.80	1.30	2.50	110.00	220.00	780.00	
1.80	1.30	2.40	110.00	210.00	768.00	
1.70	1.24	2.40	110.00	210.00	760.00	

1.70	1.20	2.30	110.00	200.00	750.00	
1.70	1.20	2.20	110.00	200.00	740.00	
1.70	1.20	2.10	110.00	190.00	740.00	
1.70	1.20	2.00	100.00	190.00	730.00	
1.70	1.10	2.00	100.00	190.00	720.00	
1.70	1.10	2.00	100.00	190.00	710.00	
1.60	1.10	2.00	100.00	170.00	710.00	
1.60	1.10	2.00	100.00	170.00	700.00	
1.60	1.06	2.00	100.00	170.00	700.00	
1.60	1.00	2.00	99.00	160.00	690.00	
1.60	0.96	2.00	94.00	160.00	690.00	
1.60	0.96	2.00	91.00	150.00	680.00	
1.60	0.94	2.00	91.00	150.00	680.00	
1.53	0.94	2.00	90.00	150.00	670.00	
1.50	0.92	2.00	90.00	150.00	660.00	
1.50	0.91	2.00	89.00	150.00	660.00	
1.50	0.85	2.00	87.00	140.00	660.00	
1.50	0.85	2.00	87.00	140.00	650.00	
1.50	0.85	2.00	84.00	140.00	630.00	
1.50	0.83	2.00	83.00	130.00	610.00	
1.40	0.83	2.00	82.00	130.00	610.00	
1.40	0.83	2.00	81.00	130.00	597.00	
1.40	0.81	2.00	81.00	130.00	590.00	
1.40	0.81	2.00	77.00	130.00	590.00	
1.40	0.81	2.00	77.00	123.00	576.00	
1.40	0.80	2.00	76.00	120.00	570.00	
1.40	0.80	2.00	74.00	120.00	570.00	
1.32	0.78	2.00	72.00	120.00	560.00	
1.30	0.78	1.90	72.00	120.00	560.00	
1.30	0.77	1.90	72.00	120.00	540.00	
1.30	0.77	1.90	72.00	115.00	540.00	
1.30	0.76	1.80	72.00	110.00	520.00	
1.30	0.76	1.80	71.00	110.00	520.00	
1.30	0.75	1.80	70.00	110.00	520.00	
1.30	0.75	1.70	70.00	110.00	510.00	
1.29	0.75	1.60	67.00	102.00	500.00	
1.20	0.74	1.60	66.00	100.00	500.00	
1.20	0.73	1.60	66.00	100.00	490.00	
1.20	0.72	1.60	66.00	100.00	480.00	
1.20	0.72	1.60	65.00	100.00	475.00	
1.20	0.72	1.60	65.00	100.00	470.00	
1.20	0.71	1.50	63.00	99.00	470.00	
1.20	0.71	1.50	63.00	97.00	462.00	
1.20	0.69	1.40	62.00	97.00	460.00	
1.20	0.68	1.30	62.00	97.00	460.00	
1.20	0.68	1.30	60.00	95.00	450.00	
1.20	0.68	1.20	60.00	91.00	440.00	

1.10	0.68	1.20	59.00	90.00	440.00	
1.10	0.68	1.20	56.59	90.00	440.00	
1.10	0.67	1.20	55.00	87.00	430.00	
1.10	0.66	1.10	55.00	86.00	430.00	
1.10	0.66	1.10	54.00	86.00	430.00	
1.10	0.65	1.10	54.00	84.00	420.00	
1.10	0.65	1.10	54.00	82.00	420.00	
1.10	0.65	1.10	53.00	82.00	410.00	
1.10	0.65	1.00	53.00	81.00	409.00	
1.00	0.63	1.00	52.00	78.00	400.00	
1.00	0.62	1.00	51.00	78.00	400.00	
1.00	0.61	1.00	50.00	78.00	400.00	
1.00	0.60	1.00	50.00	77.00	390.00	
1.00	0.60	1.00	50.00	76.00	390.00	
1.00	0.59	1.00	50.00	76.00	390.00	
0.99	0.57	1.00	50.00	69.00	390.00	
0.99	0.57	1.00	50.00	69.00	390.00	
0.98	0.56	1.00	50.00	67.00	370.00	
0.97	0.56	1.00	50.00	66.00	370.00	
0.96	0.55	1.00	49.00	66.00	370.00	
0.96	0.55	1.00	49.00	66.00	360.00	
0.95	0.55	1.00	49.00	65.00	360.00	
0.95	0.53	1.00	48.00	64.00	360.00	
0.93	0.53	1.00	48.00	61.00	360.00	
0.93	0.53	1.00	47.00	57.00	350.00	
0.93	0.52	1.00	46.08	57.00	350.00	
0.93	0.52	1.00	46.00	56.00	350.00	
0.92	0.52	1.00	46.00	56.00	340.00	
0.90	0.52	1.00	44.25	53.00	340.00	
0.88	0.51	1.00	44.00	53.00	340.00	
0.87	0.51	1.00	44.00	52.60	340.00	
0.86	0.50	1.00	44.00	52.00	340.00	
0.85	0.49	1.00	44.00	51.00	340.00	
0.84	0.49	1.00	43.00	51.00	334.00	
0.83	0.48	1.00	43.00	50.00	330.00	
0.81	0.48	1.00	43.00	50.00	330.00	
0.81	0.48	1.00	42.00	50.00	330.00	
0.80	0.47	1.00	42.00	50.00	330.00	
0.80	0.47	1.00	42.00	50.00	330.00	
0.78	0.47	1.00	41.00	50.00	330.00	
0.78	0.46	1.00	40.00	50.00	330.00	
0.77	0.46	1.00	40.00	50.00	320.00	
0.77	0.46	1.00	40.00	50.00	320.00	
0.77	0.45	1.00	40.00	50.00	320.00	
0.74	0.45	1.00	40.00	50.00	320.00	
0.73	0.44	1.00	39.00	49.00	310.00	
0.72	0.44	1.00	39.00	47.00	310.00	

0.69	0.44	1.00	39.00	46.00	310.00	
0.69	0.44	1.00	39.00	46.00	308.00	
0.69	0.44	1.00	39.00	44.00	300.00	
0.67	0.44	1.00	39.00	44.00	300.00	
0.67	0.44	1.00	37.00	43.00	300.00	
0.66	0.43	1.00	37.00	42.00	300.00	
0.66	0.42	1.00	37.00	41.00	290.00	
0.65	0.42	1.00	37.00	41.00	285.00	
0.63	0.41	1.00	37.00	41.00	280.00	
0.62	0.41	1.00	36.00	41.00	280.00	
0.62	0.41	1.00	36.00	41.00	280.00	
0.62	0.40	1.00	36.00	40.10	280.00	
0.60	0.40	1.00	36.00	40.00	280.00	
0.59	0.40	1.00	35.00	39.30	280.00	
0.59	0.40	1.00	35.00	39.00	280.00	
0.58	0.40	1.00	34.00	39.00	280.00	
0.57	0.40	1.00	34.00	39.00	280.00	
0.57	0.40	1.00	33.40	38.00	270.00	
0.55	0.40	1.00	33.00	38.00	270.00	
0.52	0.40	1.00	33.00	38.00	270.00	
0.50	0.40	1.00	33.00	37.00	270.00	
0.50	0.39	1.00	33.00	36.00	270.00	
0.46	0.39	1.00	33.00	36.00	270.00	
0.42	0.39	1.00	32.26	36.00	260.00	
0.42	0.38	1.00	32.01	36.00	260.00	
0.35	0.38	1.00	32.00	35.00	260.00	
0.10	0.38	1.00	32.00	34.00	260.00	
0.06	0.37	1.00	32.00	34.00	260.00	
	0.36	1.00	32.00	33.00	250.00	
	0.36	1.00	32.00	33.00	250.00	
	0.36	1.00	32.00	33.00	250.00	
	0.36	1.00	31.00	33.00	250.00	
	0.35	1.00	31.00	32.00	247.00	
	0.35	1.00	31.00	32.00	242.13	
	0.35	1.00	31.00	31.94	240.00	
	0.35	1.00	30.00	30.00	240.00	
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	0.34	1.00	29.00	30.00	220.00	
	0.33	1.00	28.00	29.00	220.00	
	0.33	1.00	28.00	29.00	220.00	
	0.33	0.98	28.00	29.00	210.00	
	0.33	0.94	28.00	29.00	210.00	
	0.33	0.94	27.19	28.00	210.00	

	0.33	0.92	27.00	28.00	210.00	
	0.32	0.90	27.00	28.00	210.00	
	0.32	0.90	27.00	27.00	210.00	
	0.32	0.86	26.00	27.00	210.00	
	0.32	0.80	26.00	26.31	205.00	
	0.32	0.80	26.00	26.00	202.79	
	0.31	0.71	25.00	26.00	202.00	
	0.31	0.70	25.00	25.00	200.00	
	0.30	0.70	25.00	25.00	200.00	
	0.30	0.60	24.00	25.00	200.00	
	0.30	0.60	24.00	24.60	200.00	
	0.30	0.59	23.00	24.00	200.00	
	0.30	0.59	23.00	24.00	200.00	
	0.30	0.52	23.00	24.00	200.00	
	0.30	0.50	23.00	24.00	194.49	
	0.29	0.50	23.00	23.00	190.00	
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	0.29	0.50	21.00	23.00	180.00	
	0.28	0.50	21.00	22.20	180.00	
	0.28	0.50	20.36	22.00	180.00	
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	0.26	0.40	19.00	21.00	170.00	
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	0.25	0.30	18.00	19.00	160.00	
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	0.25	0.30	17.00	18.50	160.00	
	0.25	0.30	17.00	18.00	160.00	
	0.24	0.20	17.00	18.00	160.00	
	0.24	0.20	17.00	18.00	160.00	
	0.24	0.20	17.00	18.00	160.00	
	0.23	0.04	17.00	17.00	160.00	
	0.23		17.00	17.00	150.00	
	0.23		17.00	17.00	150.00	
	0.23		17.00	17.00	150.00	
	0.22		16.00	17.00	150.00	
	0.22		16.00	17.00	150.00	
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	0.22		16.00	17.00	145.00	
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	0.21		14.00	14.00	140.00	
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	0.20		13.00	13.00	130.00	
	0.20		13.00	12.00	130.00	
	0.20		13.00	12.00	130.00	
	0.19		13.00	12.00	130.00	
	0.19		12.00	12.00	127.00	
	0.19		12.00	12.00	124.00	
	0.19		12.00	12.00	122.05	
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	0.19		11.00	11.00	120.00	
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	0.18		10.00	10.00	120.00	
	0.18		10.00	10.00	112.11	
	0.18		10.00	10.00	110.00	
	0.18		10.00	10.00	110.00	
	0.18		9.60	10.00	110.00	
	0.18		9.60	10.00	110.00	
	0.17		9.10	10.00	110.00	
	0.17		9.10	10.00	110.00	
	0.17		9.00	10.00	110.00	
	0.17		8.30	9.60	110.00	
	0.17		8.20	9.40	110.00	
	0.16		8.00	9.10	108.00	
	0.15		8.00	9.00	100.00	
	0.15		7.70	9.00	100.00	
	0.15		7.70	9.00	100.00	
	0.15		7.00	9.00	100.00	
	0.15		7.00	8.00	100.00	
	0.15		6.80	8.00	100.00	
	0.14		6.80	8.00	99.00	
	0.14		6.80	8.00	98.00	
	0.14		6.50	8.00	97.00	

	0.14		6.50	8.00	93.40	
	0.14		6.30	8.00	92.00	
	0.14		6.30	7.60	92.00	
	0.14		6.10	7.50	90.00	
	0.13		5.60	7.00	90.00	
	0.13		5.40	7.00	90.00	
	0.13		5.20	6.00	86.00	
	0.13		5.00	6.00	83.00	
	0.13		4.90	6.00	81.00	
	0.12		4.50	5.90	81.00	
	0.12		4.10	5.80	80.00	
	0.12		4.10	5.40	80.00	
	0.11		3.90	5.00	80.00	
	0.11		3.40	5.00	80.00	
	0.11		2.60	5.00	80.00	
	0.11		2.60	5.00	79.00	
	0.10		2.60	5.00	73.00	
	0.10		2.30	5.00	72.00	
	0.10		2.00	4.80	70.00	
	0.10		2.00	4.80	70.00	
	0.09		1.70	4.70	70.00	
	0.08		1.50	4.60	70.00	
	0.06		1.50	4.00	64.00	
	0.03		1.50	4.00	63.00	
			1.40	3.80	61.00	
			1.40	3.00	60.00	
				3.00	56.00	
				2.30	44.00	
				2.00	40.00	
				1.60	37.00	
					35.00	
					30.00	
					26.00	
					24.00	
					20.00	
					10.00	
					5.00	

II. NUMERIC ACTION LEVELS EVALUATION DATA

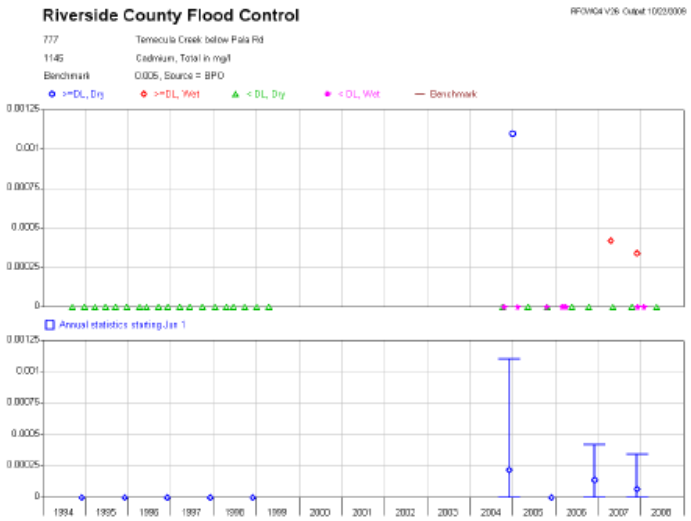

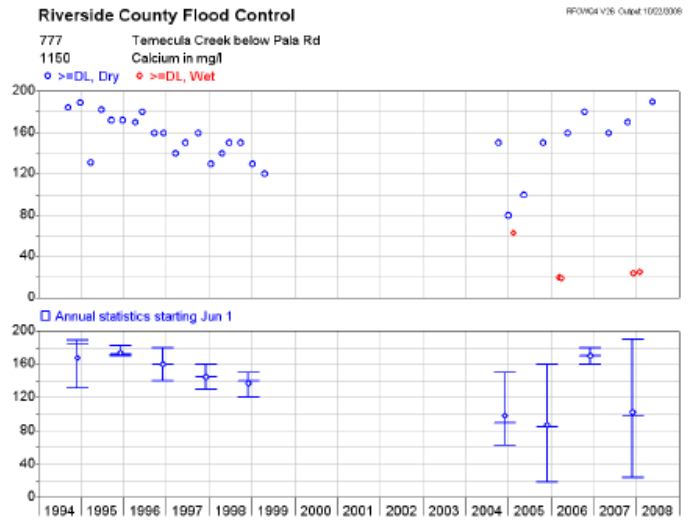

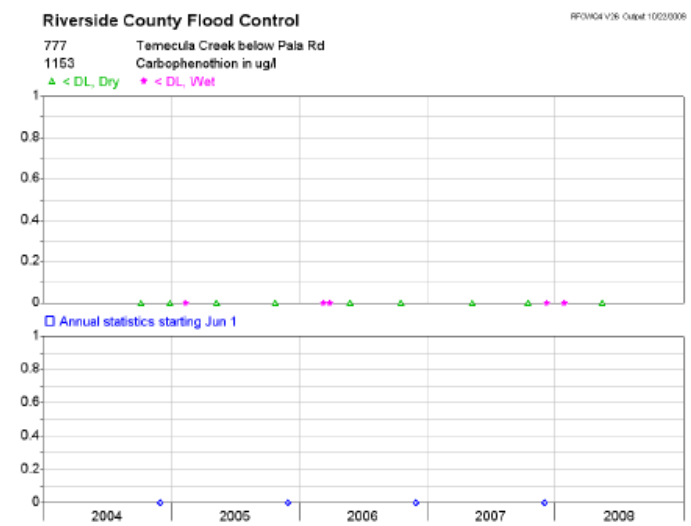

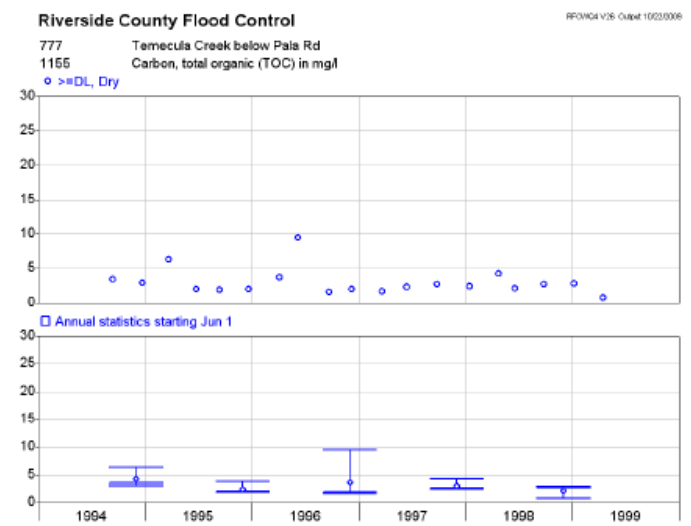

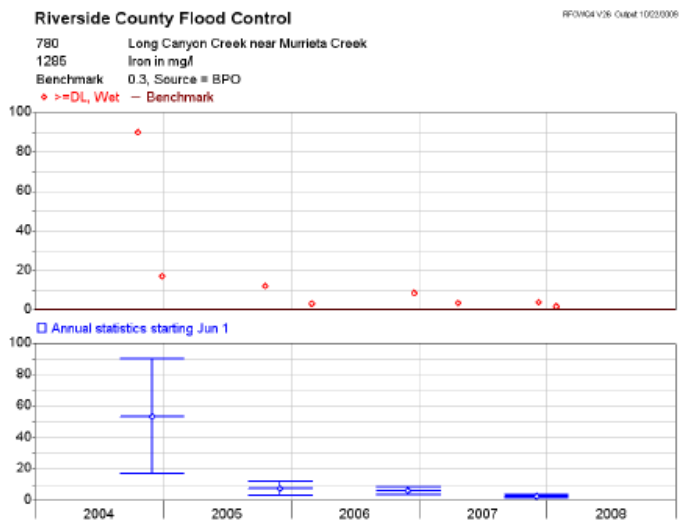
Riverside County Flood Control
780 Long Canyon Creek near Murrieta Creek
1285 Iron in mg/l
Benchmark 0.3, Source = BPO
>=DL, Wet
Benchmark
Annual statistics starting Jun 1
2004
2005
2006
2007
2008

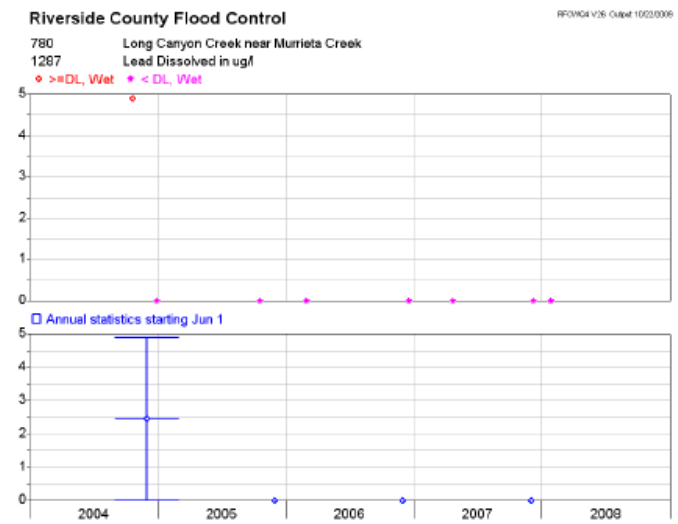
Riverside County Flood Control
780 Long Canyon Creek near Murrieta Creek
1287 Lead Dissolved in ug/l
>=DL, Wet
< DL, Wet
Annual statistics starting Jun 1
2004
2005
2006
2007
2008

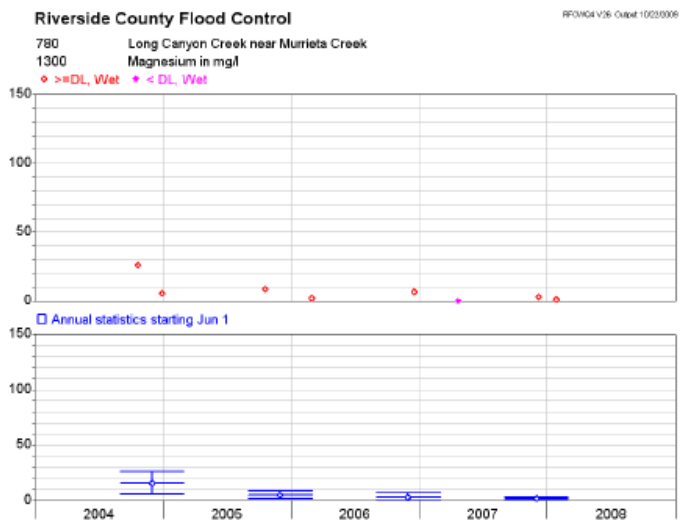
Riverside County Flood Control
780 Long Canyon Creek near Murrieta Creek
1300 Magnesium in mg/l
>=DL, Wet
< DL, Wet
Annual statistics starting Jun 1
2004
2005
2006
2007
2008

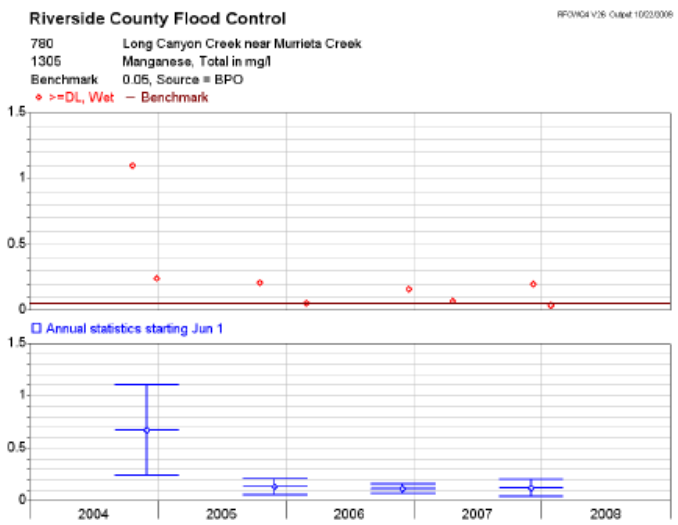
Riverside County Flood Control
780 Long Canyon Creek near Murrieta Creek
1305 Manganese, Total in mg/l
Benchmark 0.05, Source = BPO
>=DL, Wet
Benchmark
Annual statistics starting Jun 1
2004
2005
2006
2007
2008

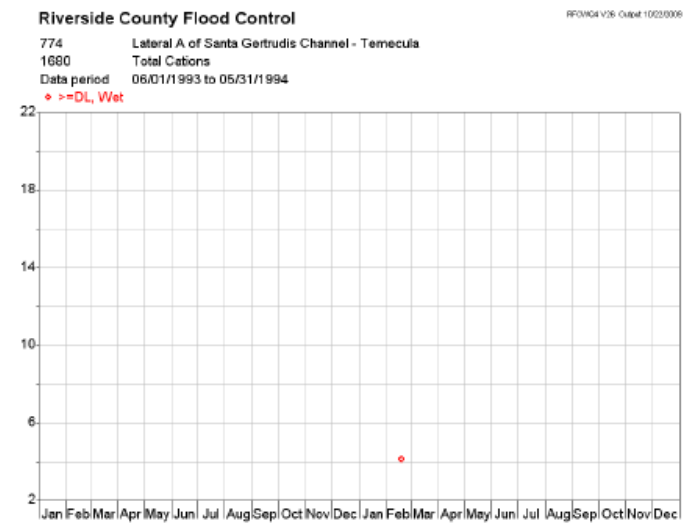
Riverside County Flood Control
774 Lateral A of Santa Gertrudis Channel - Temecula
1680 Total Cations
Data period 06/01/1993 to 05/31/1994
>=DL, Wet
22
18
14
10
6
2
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

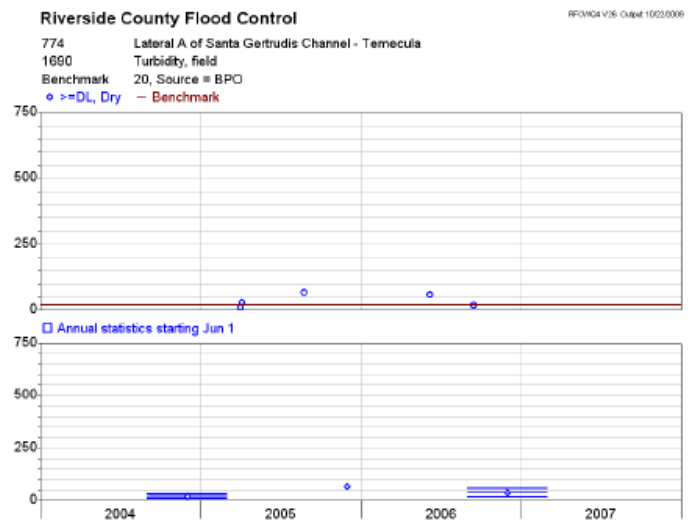
Riverside County Flood Control
774 Lateral A of Santa Gertrudis Channel - Temecula
1690 Turbidity, field
Benchmark 20, Source = BPO
>=DL, Dry
Benchmark
750
500
250
0
Annual statistics starting Jun 1
750
500
250
0
2004
2005
2006
2007

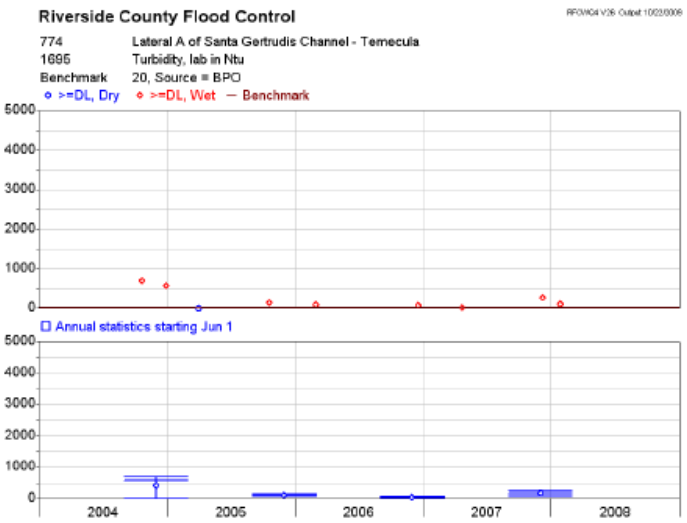
Riverside County Flood Control
774 Lateral A of Santa Gertrudis Channel - Temecula
1695 Turbidity, lab in Ntu
Benchmark 20, Source = BPO
>=DL, Dry
>=DL, Wet
Benchmark
5000
4000
3000
2000
1000
0
Annual statistics starting Jun 1
5000
4000
3000
2000
1000
0
2004
2005
2006
2007
2008

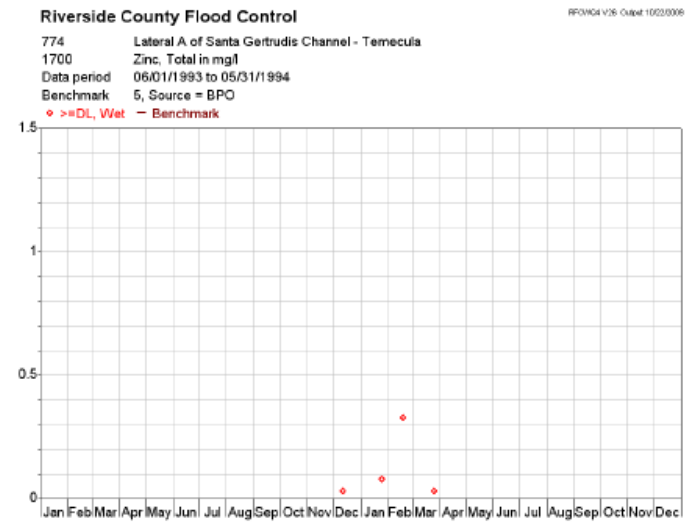
Riverside County Flood Control
774 Lateral A of Santa Gertrudis Channel - Temecula
1700 Zinc, Total in mg/l
Data period 06/01/1993 to 05/31/1994
Benchmark 5, Source = BPO
>=DL, Wet
Benchmark
1.5
1
0.5
0
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

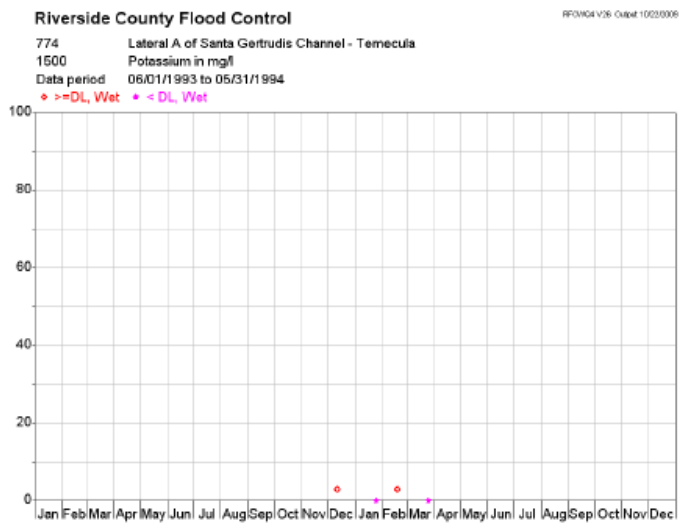
Riverside County Flood Control
774 Lateral A of Santa Gertrudis Channel - Temecula
1500 Potassium in mg/l
Data period 06/01/1993 to 05/31/1994
>=DL, Wet
< DL, Wet
100
80
60
40
20
0
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

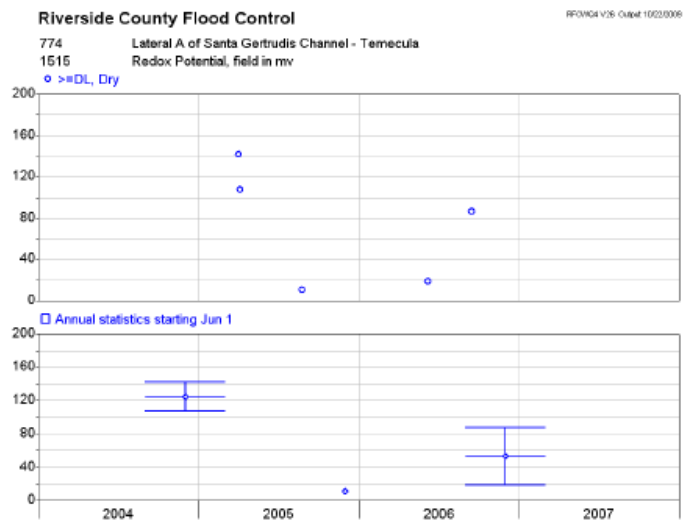
Riverside County Flood Control
774 Lateral A of Santa Gertrudis Channel - Temecula
1515 Redox Potential, field in mv
>=DL, Dry
Annual statistics starting Jun 1
200
160
120
80
40
0
2004
2005
2006
2007

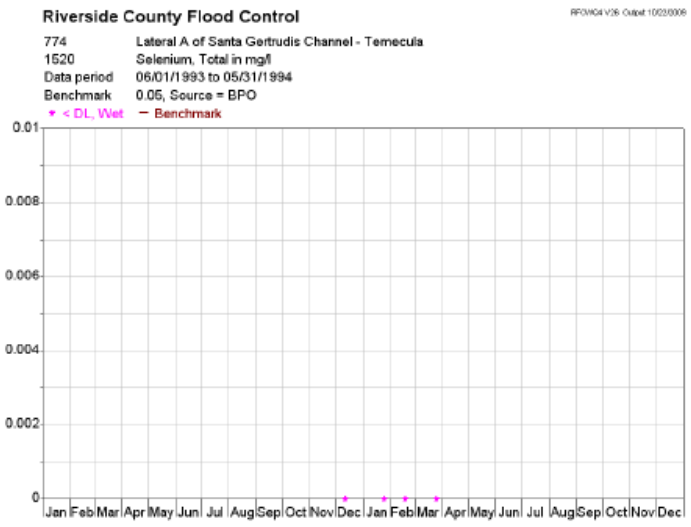
Riverside County Flood Control
774 Lateral A of Santa Gertrudis Channel - Temecula
1520 Selenium, Total in mg/l
Data period 06/01/1993 to 05/31/1994
Benchmark 0.05, Source = BPO
< DL, Wet
Benchmark
0.01
0.008
0.006
0.004
0.002
0
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

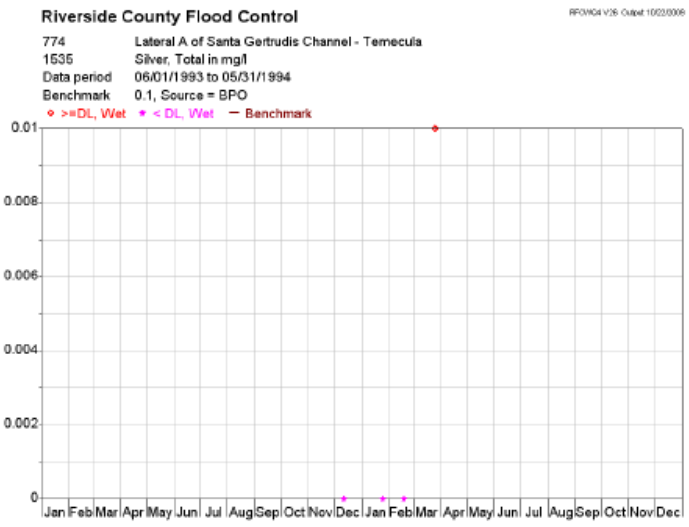
Riverside County Flood Control
774 Lateral A of Santa Gertrudis Channel - Temecula
1535 Silver, Total in mg/l
Data period 06/01/1993 to 05/31/1994
Benchmark 0.1, Source = BPO
>=DL, Wet
< DL, Wet
Benchmark
0.01
0.008
0.006
0.004
0.002
0
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

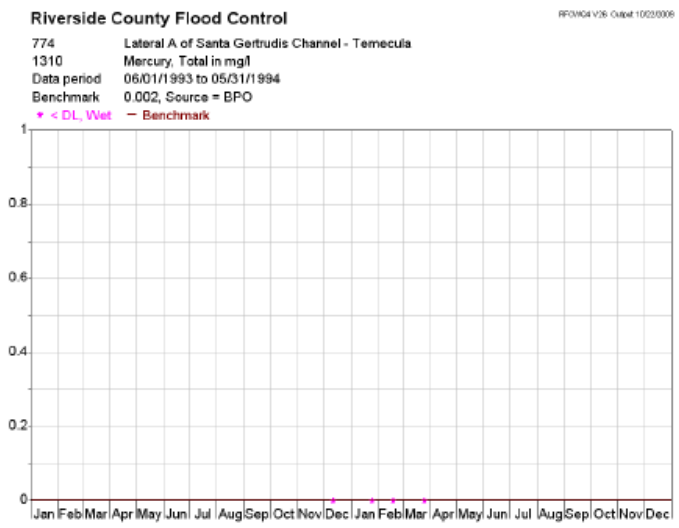
Riverside County Flood Control
774 Lateral A of Santa Gertrudis Channel - Temecula
1310 Mercury, Total in mg/l
Data period 06/01/1993 to 05/31/1994
Benchmark 0.002, Source = BPO
< DL, Wet
Benchmark
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

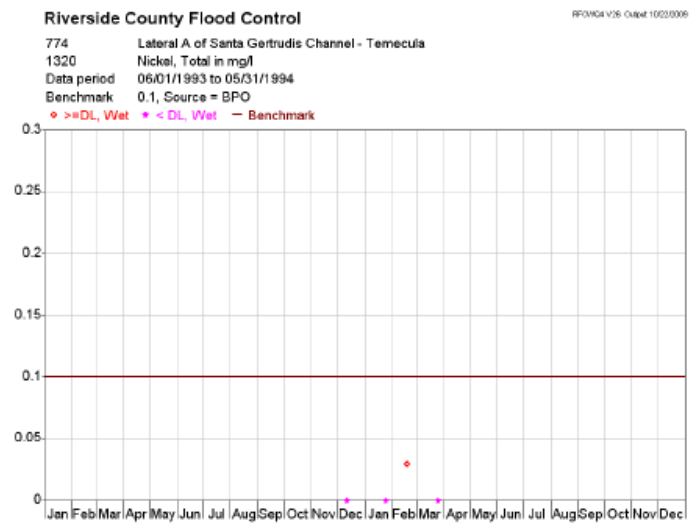
Riverside County Flood Control
774 Lateral A of Santa Gertrudis Channel - Temecula
1320 Nickel, Total in mg/l
Data period 06/01/1993 to 05/31/1994
Benchmark 0.1, Source = BPO
>=DL, Wet
< DL, Wet
Benchmark
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

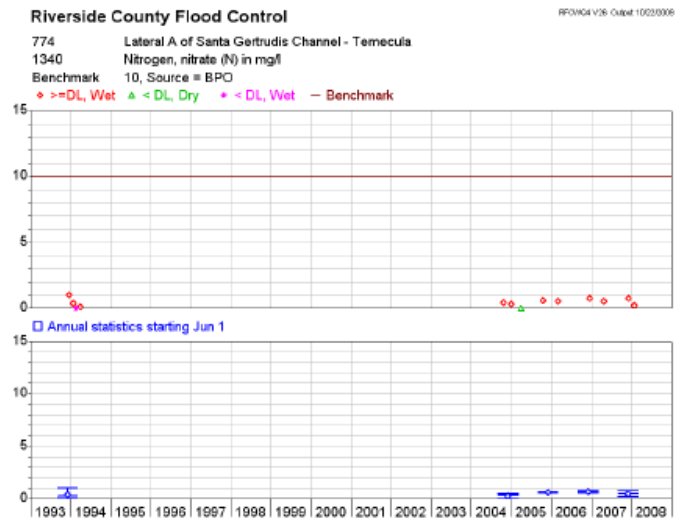
Riverside County Flood Control
774 Lateral A of Santa Gertrudis Channel - Temecula
1340 Nitrogen, nitrate (N) in mg/l
Benchmark 10, Source = BPO
>=DL, Wet
< DL, Dry
< DL, Wet
Benchmark
Annual statistics starting Jun 1
1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008

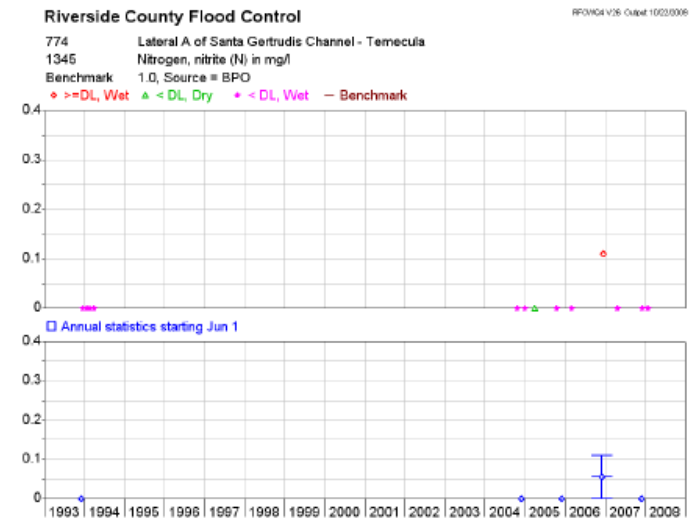
Riverside County Flood Control
774 Lateral A of Santa Gertrudis Channel - Temecula
1345 Nitrogen, nitrite (N) in mg/l
Benchmark 1.0, Source = BPO
>=DL, Wet
< DL, Dry
< DL, Wet
Benchmark
Annual statistics starting Jun 1
1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008

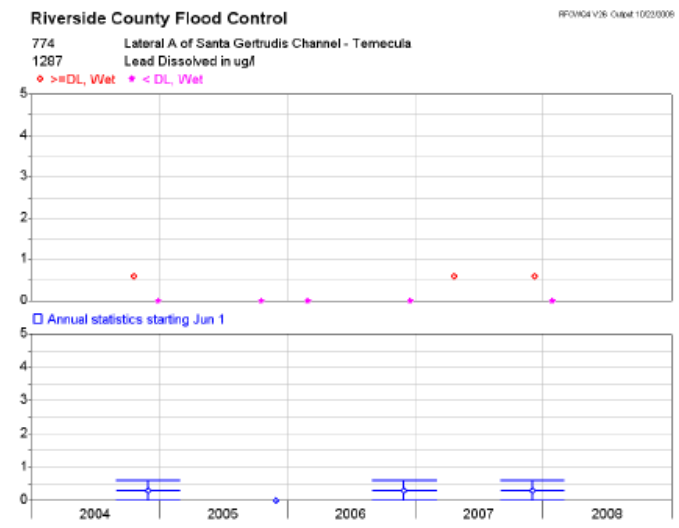
Riverside County Flood Control
774 Lateral A of Santa Gertrudis Channel - Temecula
1287 Lead Dissolved in ug/l
>=DL, Wet
< DL, Wet
Annual statistics starting Jun 1
2004
2005
2006
2007
2008

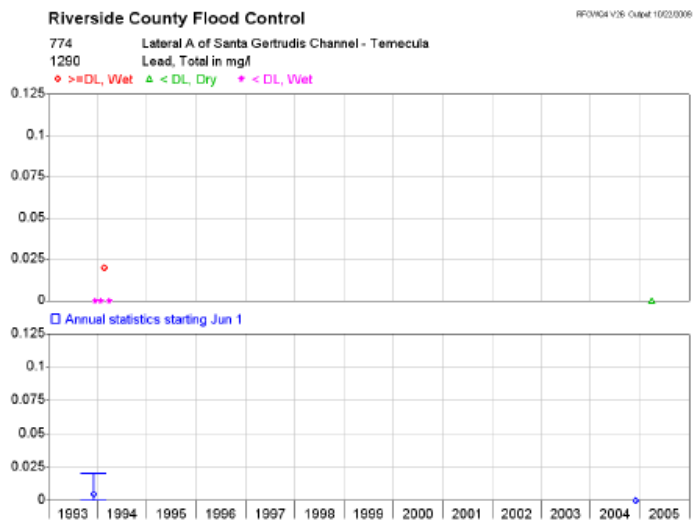
Riverside County Flood Control
774 Lateral A of Santa Gertrudis Channel - Temecula
1290 Lead, Total in mg/l
>=DL, Wet
< DL, Dry
< DL, Wet
Annual statistics starting Jun 1
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005

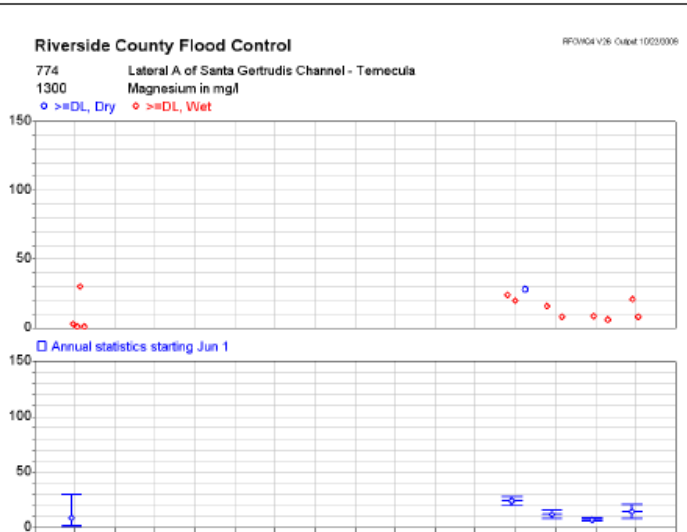
Riverside County Flood Control
774 Lateral A of Santa Gertrudis Channel - Temecula
1300 Magnesium in mg/l
>=DL, Dry
>=DL, Wet
Annual statistics starting Jun 1
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008

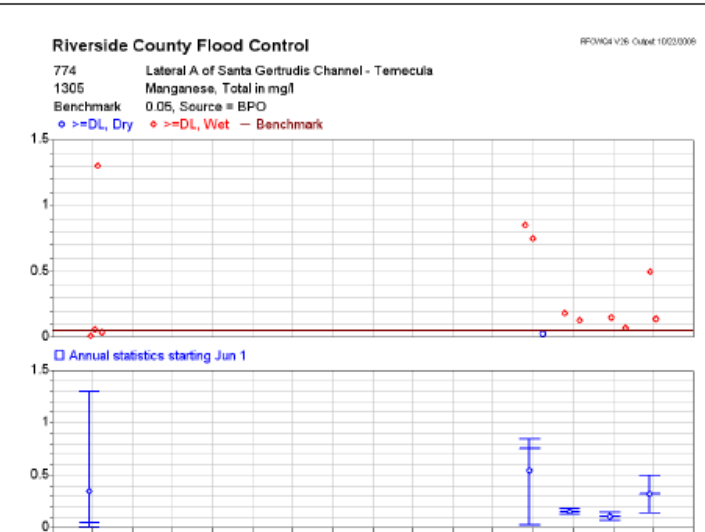
Riverside County Flood Control
774 Lateral A of Santa Gertrudis Channel - Temecula
1305 Manganese, Total in mg/l
Benchmark 0.05, Source = BPO
>=DL, Dry
>=DL, Wet
Benchmark
Annual statistics starting Jun 1
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008

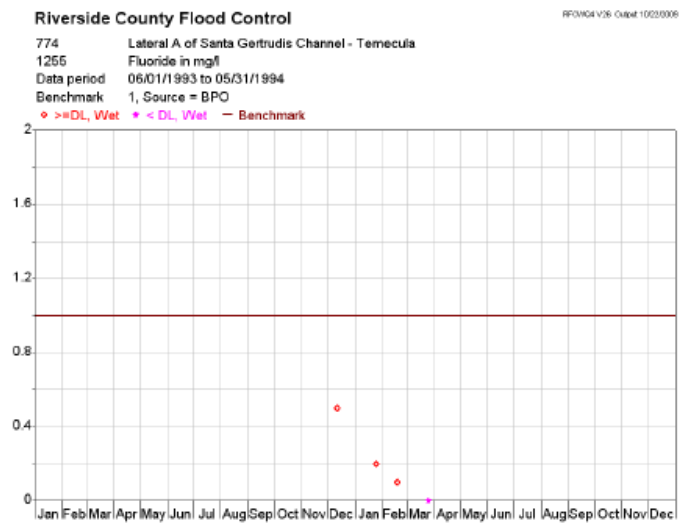
Riverside County Flood Control
774 Lateral A of Santa Gertrudis Channel - Temecula
1255 Fluoride in mg/l
Data period 06/01/1993 to 05/31/1994
Benchmark 1, Source = BPO
>=DL, Wet
< DL, Wet
Benchmark
2
1.6
1.2
0.8
0.4
0
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

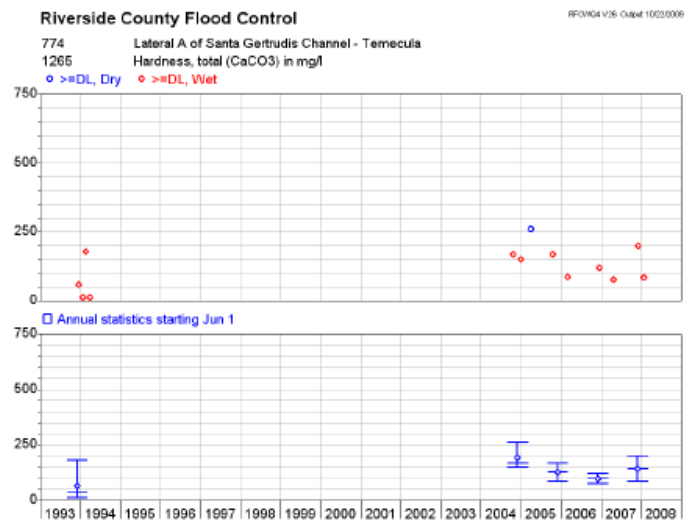
Riverside County Flood Control
774 Lateral A of Santa Gertrudis Channel - Temecula
1265 Hardness, total (CaCO3) in mg/l
>=DL, Dry
>=DL, Wet
750
500
250
0
Annual statistics starting Jun 1
1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008

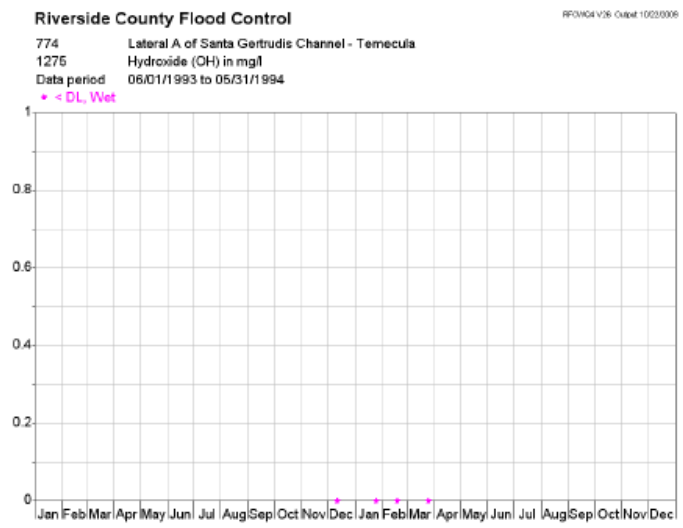
Riverside County Flood Control
774 Lateral A of Santa Gertrudis Channel - Temecula
1275 Hydroxide (OH) in mg/l
Data period 06/01/1993 to 05/31/1994
< DL, Wet
1
0.8
0.6
0.4
0.2
0
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

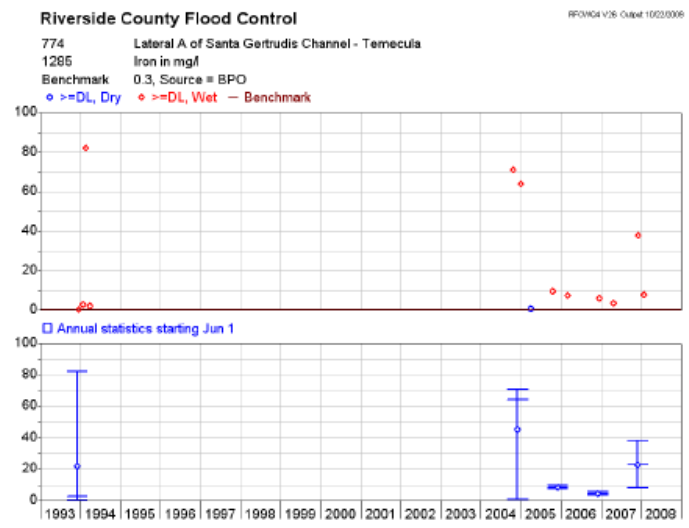
Riverside County Flood Control
774 Lateral A of Santa Gertrudis Channel - Temecula
1285 Iron in mg/l
Benchmark 0.3, Source = BPO
>=DL, Dry
>=DL, Wet
Benchmark
100
80
60
40
20
0
Annual statistics starting Jun 1
1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008

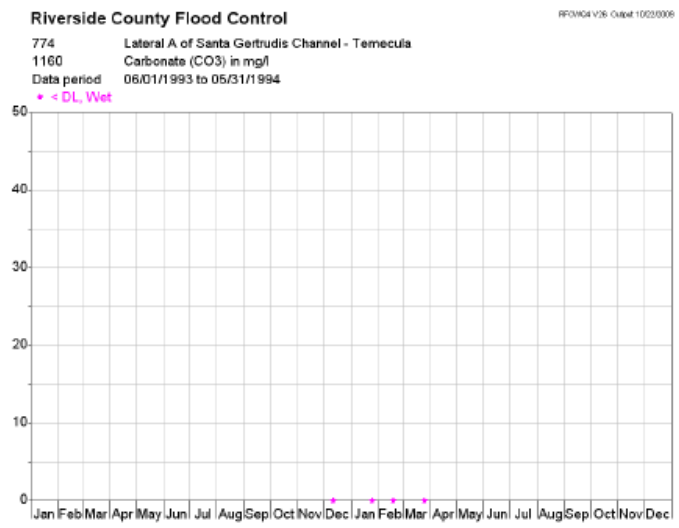
Riverside County Flood Control
774 Lateral A of Santa Gertrudis Channel - Temecula
1160 Carbonate (CO3) in mg/l
Data period 06/01/1993 to 05/31/1994
< DL, Wet
50
40
30
20
10
0
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

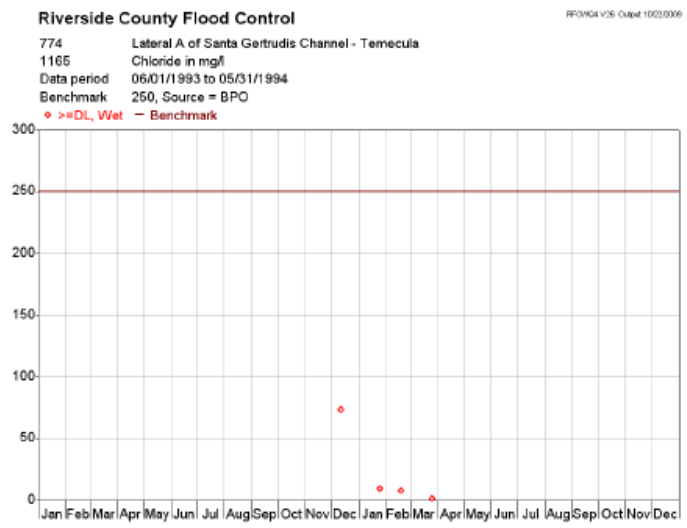
Riverside County Flood Control
774 Lateral A of Santa Gertrudis Channel - Temecula
1165 Chloride in mg/l
Data period 06/01/1993 to 05/31/1994
Benchmark 250, Source = BPO
>=DL, Wet
Benchmark
300
250
200
150
100
50
0
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

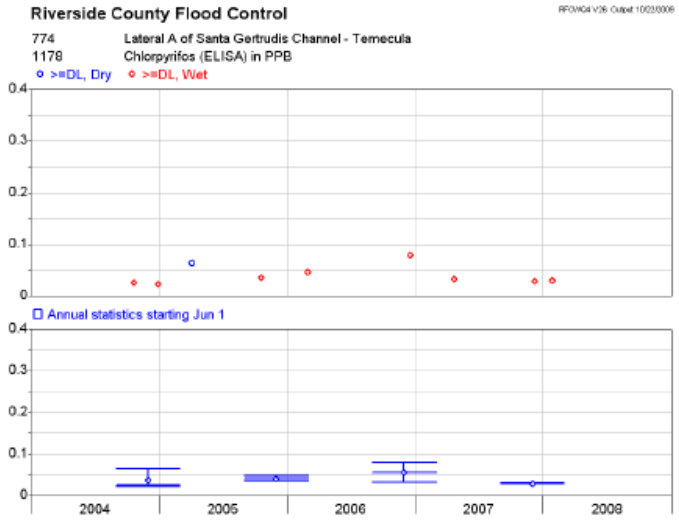
Riverside County Flood Control
774 Lateral A of Santa Gertrudis Channel - Temecula
1178 Chlorpyrifos (ELISA) in PPB
>=DL, Dry
>=DL, Wet
0.4
0.3
0.2
0.1
0
Annual statistics starting Jun 1
0.4
0.3
0.2
0.1
0
2004
2005
2006
2007
2008

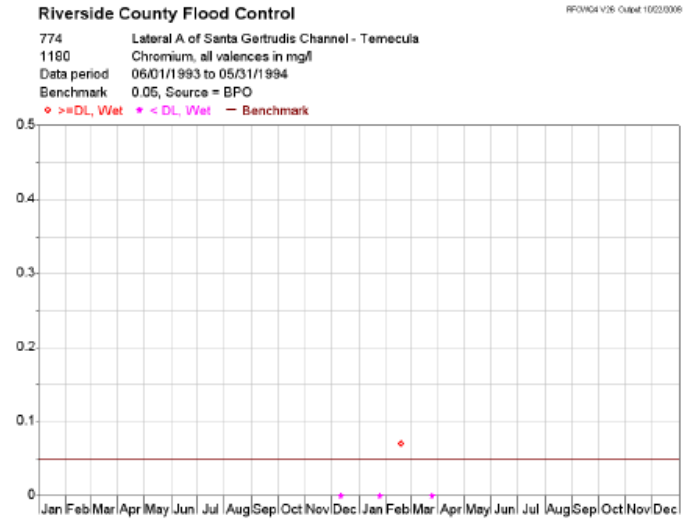
Riverside County Flood Control
774 Lateral A of Santa Gertrudis Channel - Temecula
1180 Chromium, all valences in mg/l
Data period 06/01/1993 to 05/31/1994
Benchmark 0.05, Source = BPO
>=DL, Wet
< DL, Wet
Benchmark
0.5
0.4
0.3
0.2
0.1
0
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

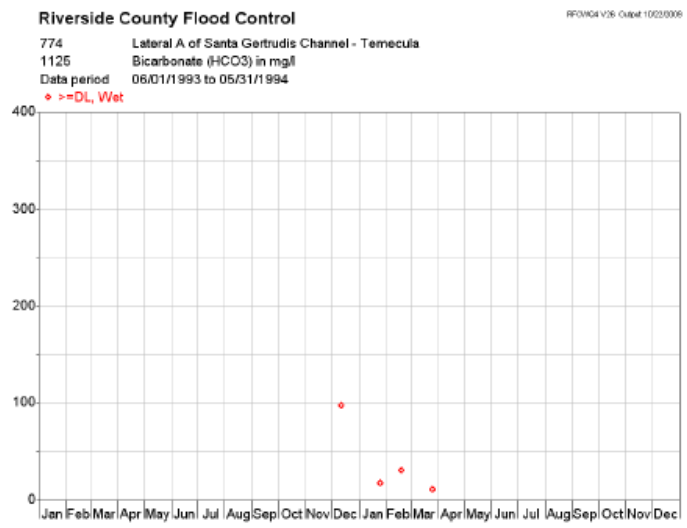
Riverside County Flood Control
774 Lateral A of Santa Gertrudis Channel - Temecula
1125 Bicarbonate (HCO3) in mg/l
Data period 06/01/1993 to 05/31/1994
>=DL, Wet
400
300
200
100
0
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

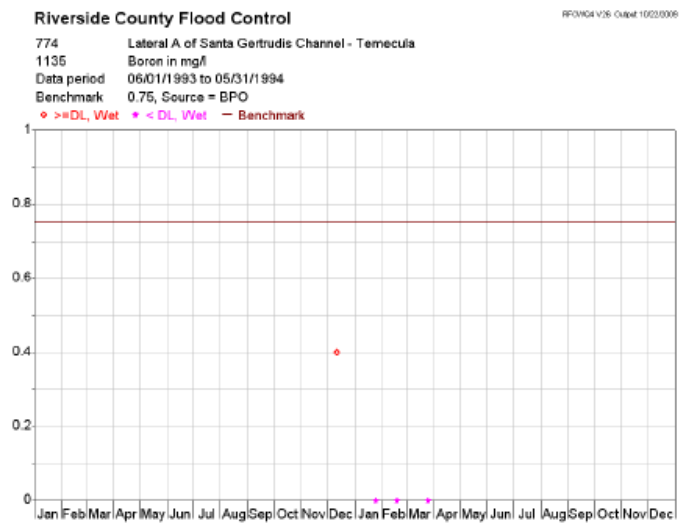
Riverside County Flood Control
774 Lateral A of Santa Gertrudis Channel - Temecula
1135 Boron in mg/l
Data period 06/01/1993 to 05/31/1994
Benchmark 0.75, Source = BPO
>=DL, Wet
< DL, Wet
Benchmark
1
0.8
0.6
0.4
0.2
0
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

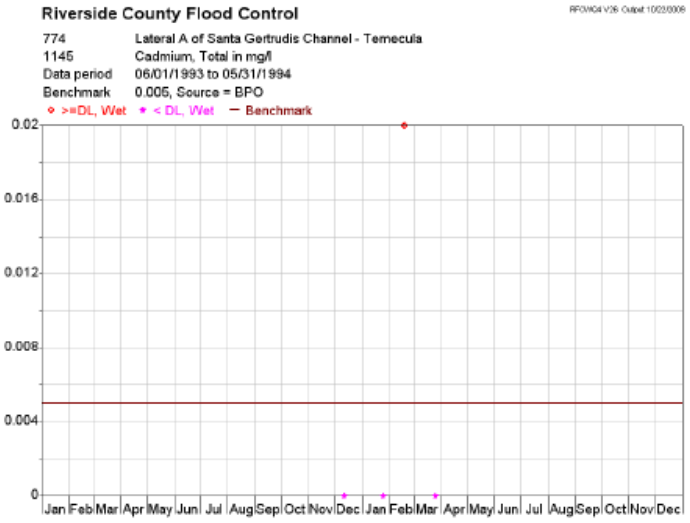
Riverside County Flood Control
774 Lateral A of Santa Gertrudis Channel - Temecula
1145 Cadmium, Total in mg/l
Data period 06/01/1993 to 05/31/1994
Benchmark 0.005, Source = BPO
>=DL, Wet
< DL, Wet
Benchmark
0.02
0.016
0.012
0.008
0.004
0
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

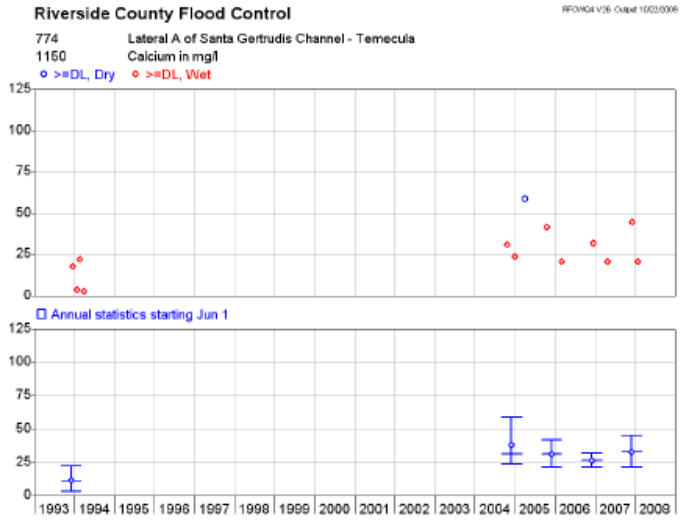
Riverside County Flood Control
774 Lateral A of Santa Gertrudis Channel - Temecula
1150 Calcium in mg/l
>=DL, Dry
>=DL, Wet
125
100
75
50
25
0
Annual statistics starting Jun 1
1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008

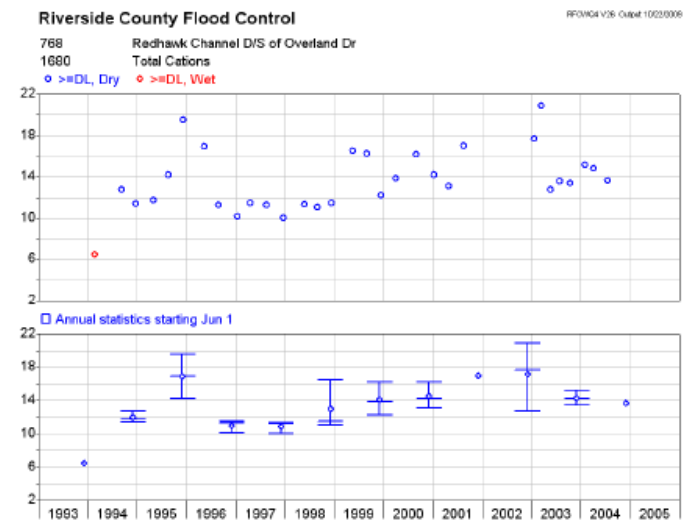
Riverside County Flood Control
768 Redhawk Channel D/S of Overland Dr
1680 Total Cations
>=DL, Dry
>=DL, Wet
Annual statistics starting Jun 1

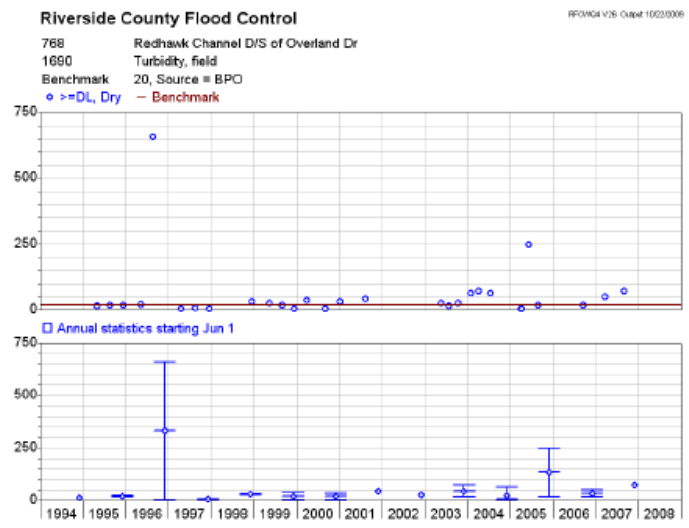
Riverside County Flood Control
768 Redhawk Channel D/S of Overland Dr
1690 Turbidity, field
Benchmark 20, Source = BPO
>=DL, Dry
Benchmark
Annual statistics starting Jun 1

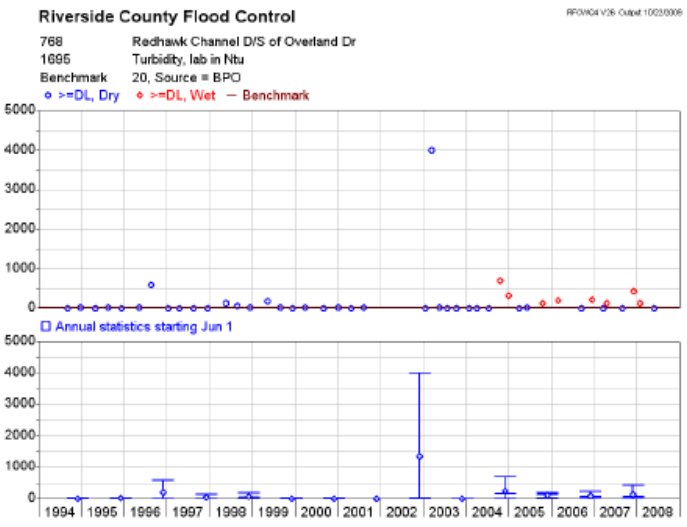
Riverside County Flood Control
768 Redhawk Channel D/S of Overland Dr
1695 Turbidity, lab in Ntu
Benchmark 20, Source = BPO
>=DL, Dry
>=DL, Wet
Benchmark
Annual statistics starting Jun 1

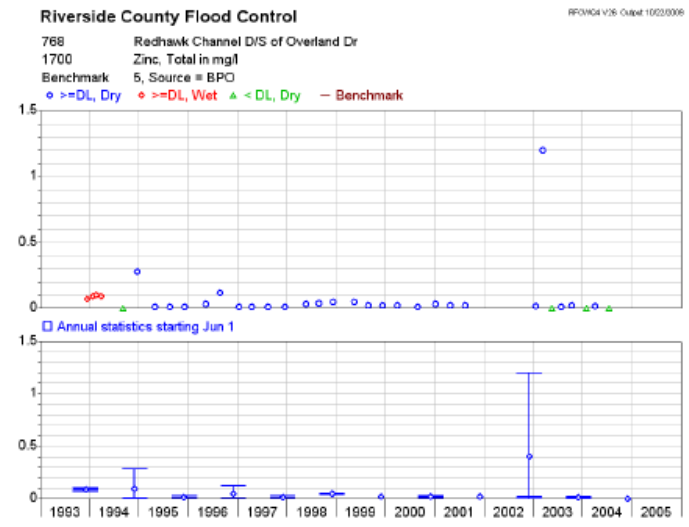
Riverside County Flood Control
768 Redhawk Channel D/S of Overland Dr
1700 Zinc, Total in mg/l
Benchmark 5, Source = BPO
>=DL, Dry
>=DL, Wet
< DL, Dry
Benchmark
Annual statistics starting Jun 1

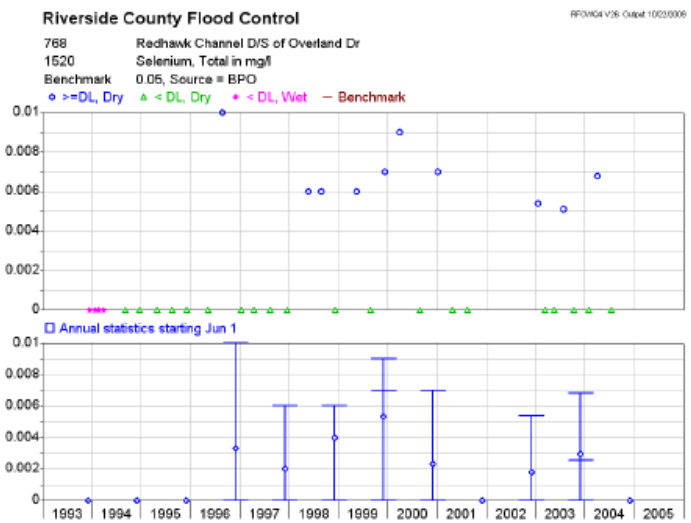
Riverside County Flood Control
768 Redhawk Channel D/S of Overland Dr
1520 Selenium, Total in mg/l
Benchmark 0.05, Source = BPO
>=DL, Dry
< DL, Dry
< DL, Wet
Benchmark
Annual statistics starting Jun 1
0.01
0.008
0.006
0.004
0.002
0
1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005

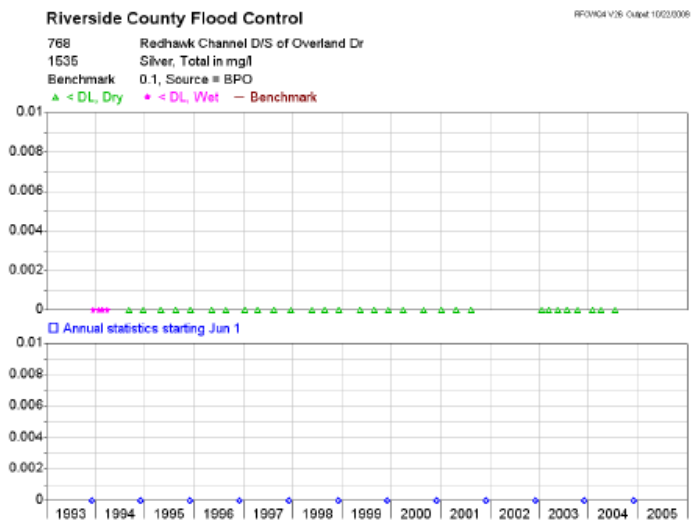
Riverside County Flood Control
768 Redhawk Channel D/S of Overland Dr
1535 Silver, Total in mg/l
Benchmark 0.1, Source = BPO
< DL, Dry
< DL, Wet
Benchmark
Annual statistics starting Jun 1
0.01
0.008
0.006
0.004
0.002
0
1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005

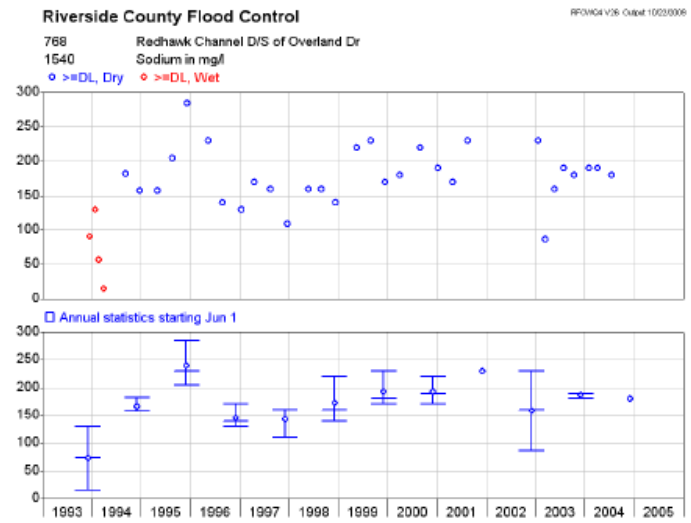
Riverside County Flood Control
768 Redhawk Channel D/S of Overland Dr
1540 Sodium in mg/l
>=DL, Dry
>=DL, Wet
Annual statistics starting Jun 1
300
250
200
150
100
50
0
1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005

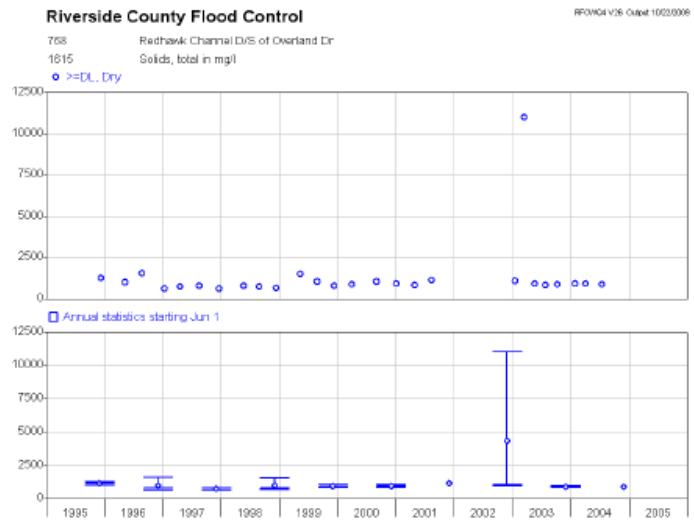
Riverside County Flood Control
768 Redhawk Channel D/S of Overland Dr
1615 Solids, total in mg/l
>=DL, Dry
Annual statistics starting Jun 1
12500
10000
7500
5000
2500
0
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005

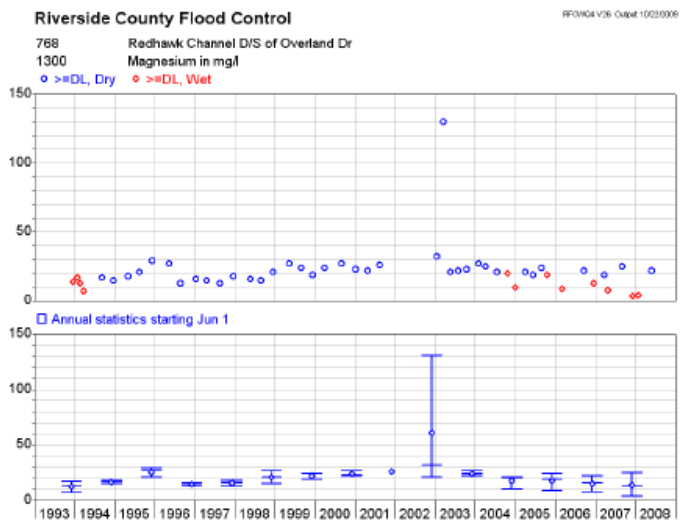
Riverside County Flood Control
768 Redhawk Channel D/S of Overland Dr
1300 Magnesium in mg/l
>=DL, Dry
>=DL, Wet
Annual statistics starting Jun 1
1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008

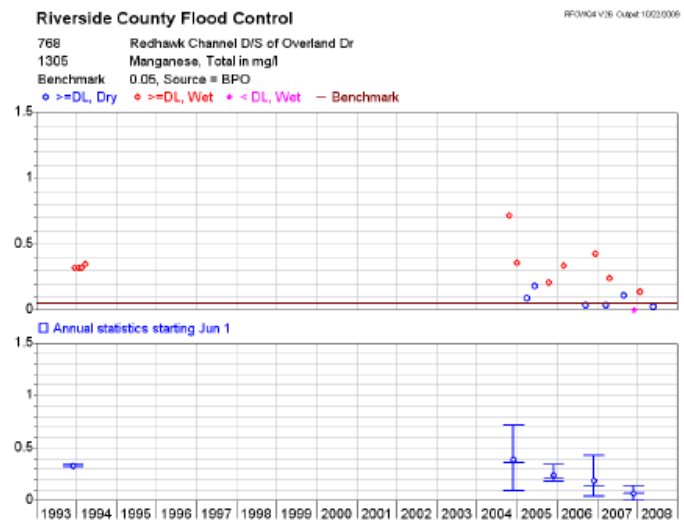
Riverside County Flood Control
768 Redhawk Channel D/S of Overland Dr
1305 Manganese, Total in mg/l
Benchmark 0.05, Source = BPO
>=DL, Dry
>=DL, Wet
< DL, Wet
Benchmark
Annual statistics starting Jun 1
1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008

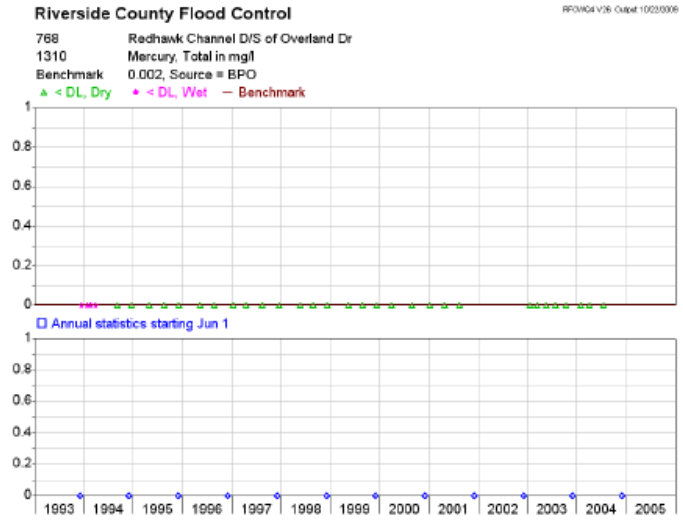
Riverside County Flood Control
768 Redhawk Channel D/S of Overland Dr
1310 Mercury, Total in mg/l
Benchmark 0.002, Source = BPO
< DL, Dry
< DL, Wet
Benchmark
Annual statistics starting Jun 1
1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005

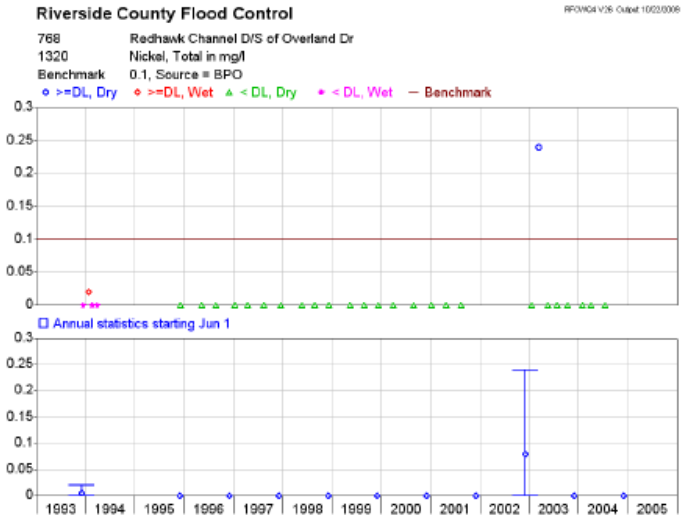
Riverside County Flood Control
768 Redhawk Channel D/S of Overland Dr
1320 Nickel, Total in mg/l
Benchmark 0.1, Source = BPO
>=DL, Dry
>=DL, Wet
< DL, Dry
< DL, Wet
Benchmark
Annual statistics starting Jun 1
1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005

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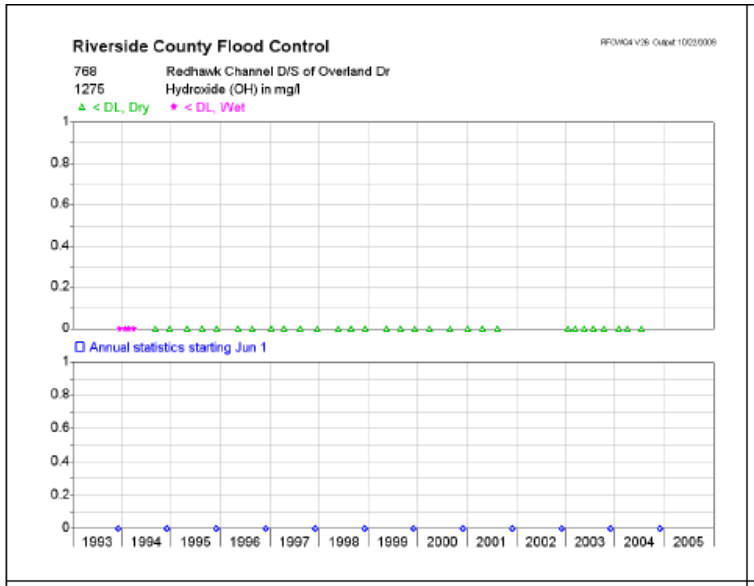
Riverside County Flood Control
768 Redhawk Channel D/S of Overland Dr
1275 Hydroxide (OH) in mg/l
< DL, Dry
< DL, Wet
Annual statistics starting Jun 1
1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005

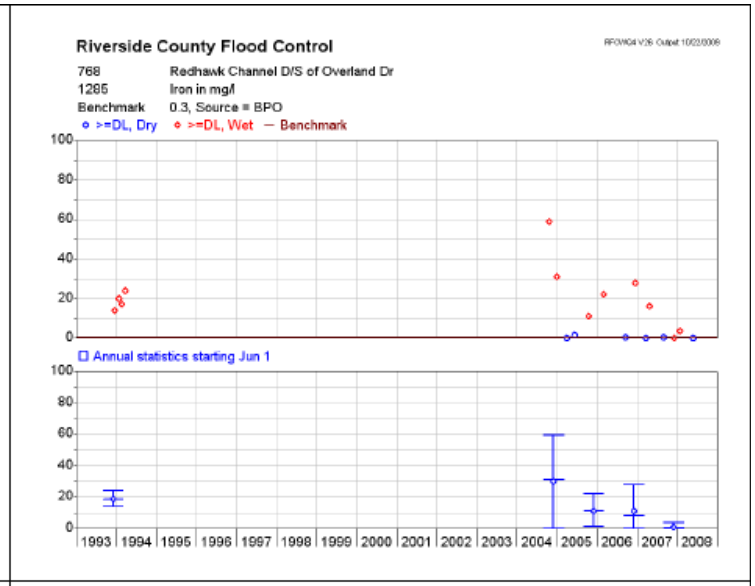
Riverside County Flood Control
768 Redhawk Channel D/S of Overland Dr
1285 Iron in mg/l
Benchmark 0.3, Source = BPO
>=DL, Dry
>=DL, Wet
Benchmark
Annual statistics starting Jun 1
1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008

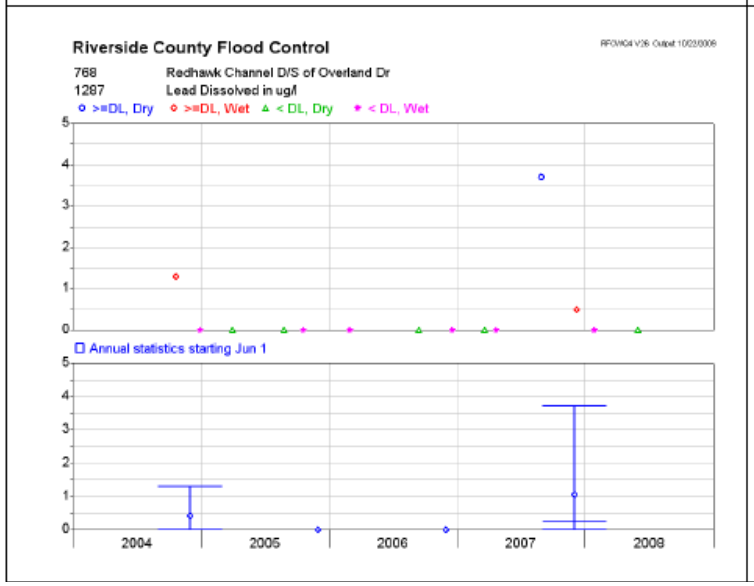
Riverside County Flood Control
768 Redhawk Channel D/S of Overland Dr
1287 Lead Dissolved in ug/l
>=DL, Dry
>=DL, Wet
< DL, Dry
< DL, Wet
Annual statistics starting Jun 1
2004 2005 2006 2007 2008

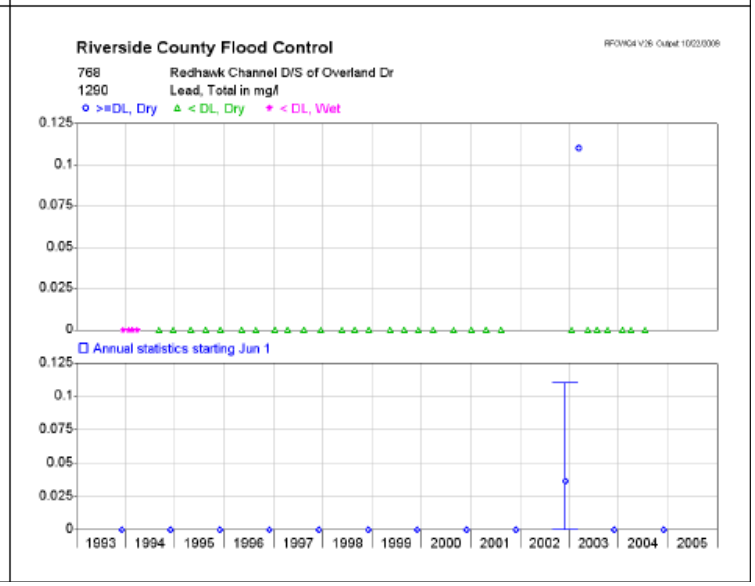
Riverside County Flood Control
768 Redhawk Channel D/S of Overland Dr
1290 Lead, Total in mg/l
>=DL, Dry
< DL, Dry
< DL, Wet
Annual statistics starting Jun 1
1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005

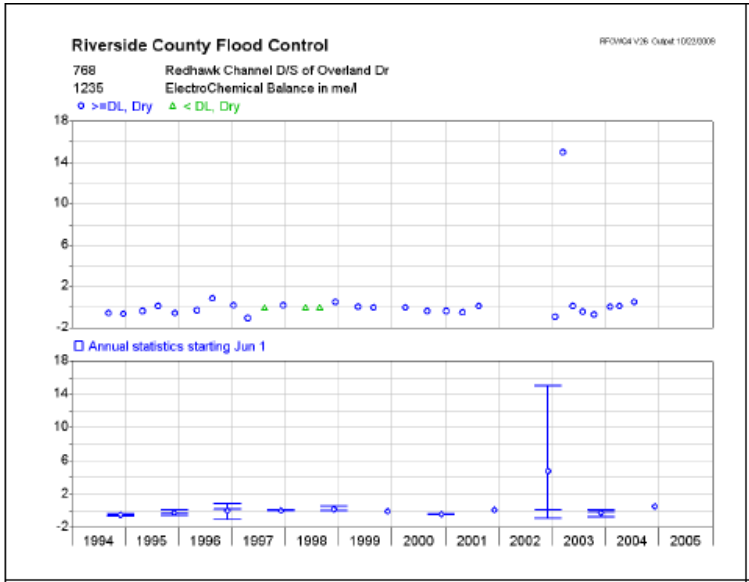
Riverside County Flood Control
768 Redhawk Channel D/S of Overland Dr
1235 ElectroChemical Balance in me/l
>=DL, Dry
< DL, Dry
Annual statistics starting Jun 1

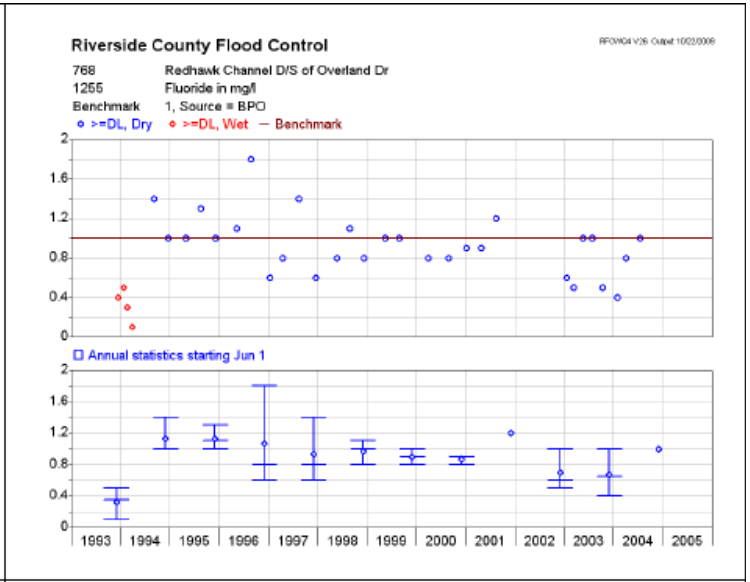
Riverside County Flood Control
768 Redhawk Channel D/S of Overland Dr
1255 Fluoride in mg/l
Benchmark 1, Source = BPO
>=DL, Dry
>=DL, Wet
Benchmark
Annual statistics starting Jun 1

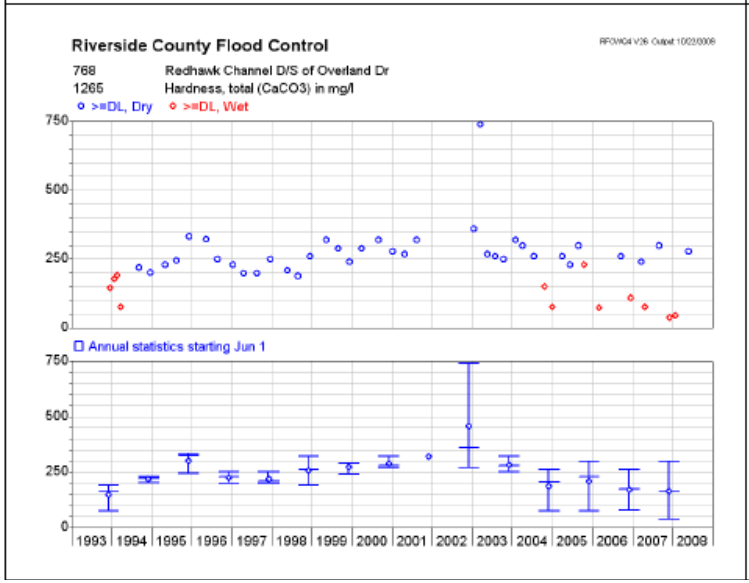
Riverside County Flood Control
768 Redhawk Channel D/S of Overland Dr
1265 Hardness, total (CaCO3) in mg/l
>=DL, Dry
>=DL, Wet
Annual statistics starting Jun 1

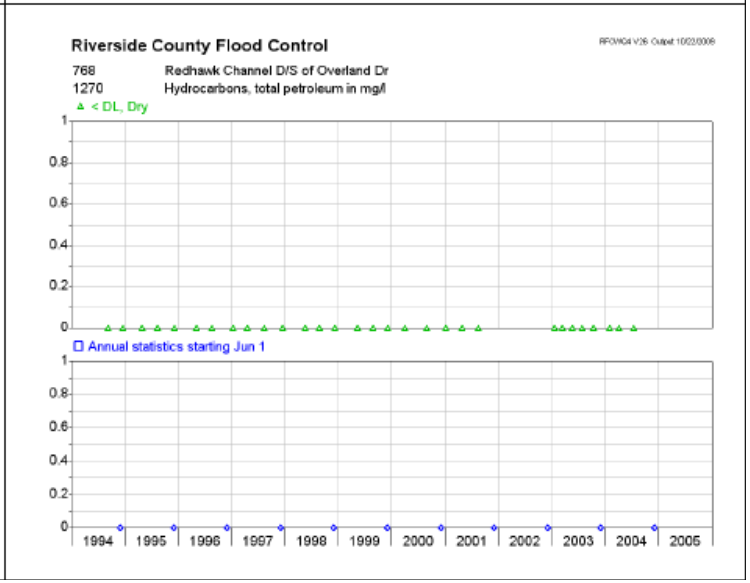
Riverside County Flood Control
768 Redhawk Channel D/S of Overland Dr
1270 Hydrocarbons, total petroleum in mg/l
< DL, Dry
Annual statistics starting Jun 1

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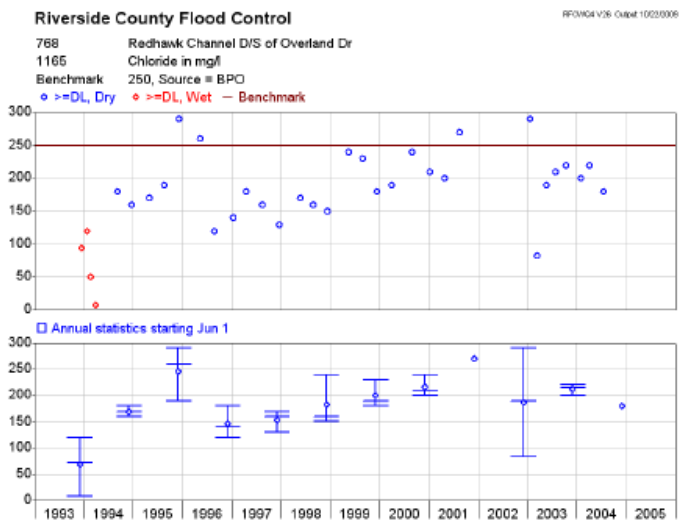
Riverside County Flood Control
768 Redhawk Channel D/S of Overland Dr
1165 Chloride in mg/l
Benchmark 250, Source = BPO
>=DL, Dry
>=DL, Wet
Benchmark
Annual statistics starting Jun 1
1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005

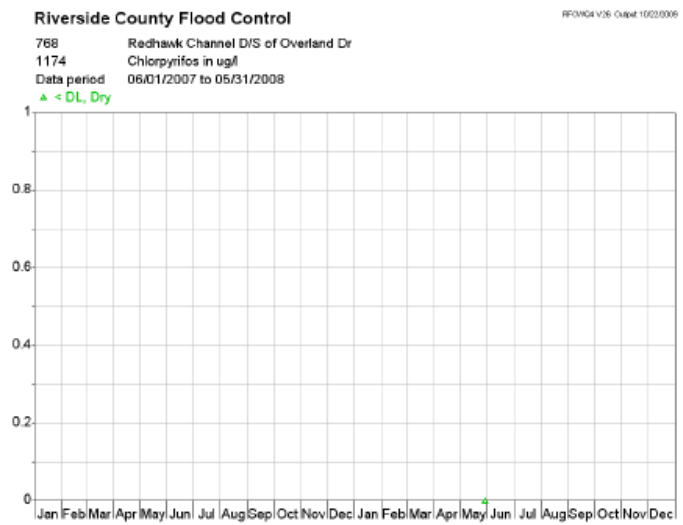
Riverside County Flood Control
768 Redhawk Channel D/S of Overland Dr
1174 Chlorpyrifos in ug/l
Data period 06/01/2007 to 05/31/2008
< DL, Dry
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

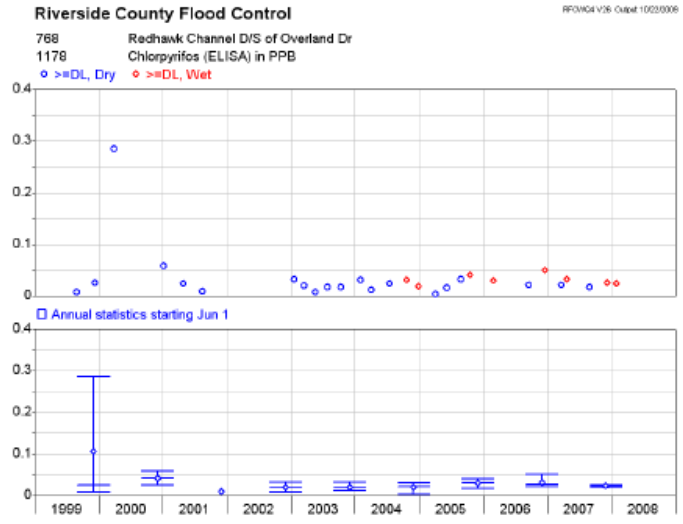
Riverside County Flood Control
768 Redhawk Channel D/S of Overland Dr
1178 Chlorpyrifos (ELISA) in PPB
>=DL, Dry
>=DL, Wet
Annual statistics starting Jun 1
1999 2000 2001 2002 2003 2004 2005 2006 2007 2008

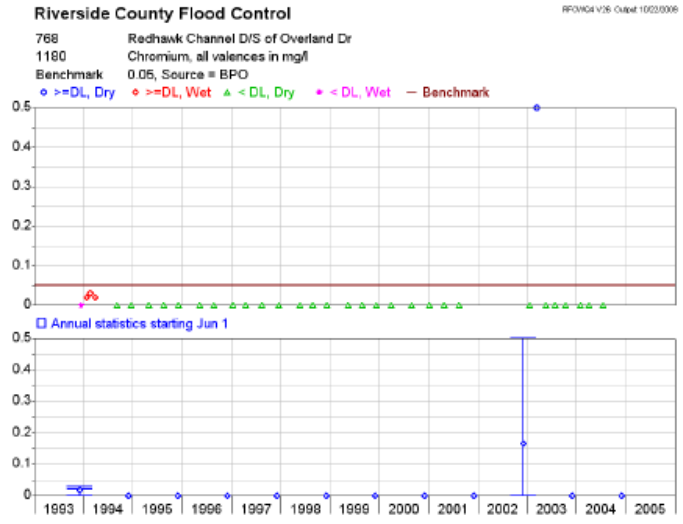
Riverside County Flood Control
768 Redhawk Channel D/S of Overland Dr
1180 Chromium, all valences in mg/l
Benchmark 0.05, Source = BPO
>=DL, Dry
>=DL, Wet
< DL, Dry
< DL, Wet
Benchmark
Annual statistics starting Jun 1
1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005

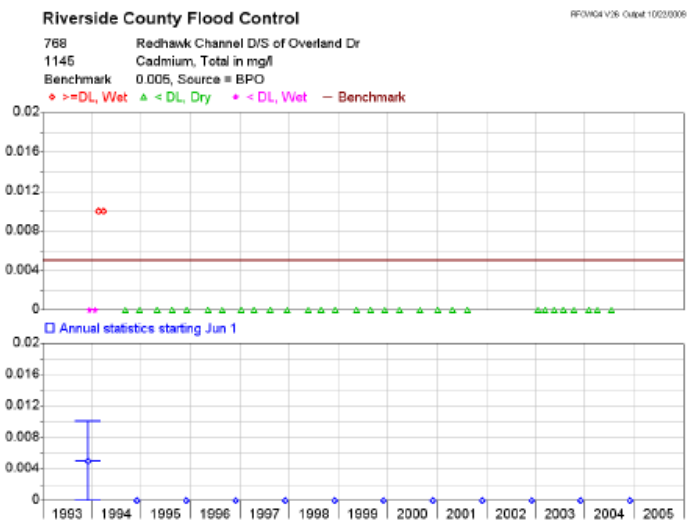
Riverside County Flood Control
768 Redhawk Channel D/S of Overland Dr
1145 Cadmium, Total in mg/l
Benchmark 0.005, Source = BPO
>=DL, Wet
< DL, Dry
< DL, Wet
Benchmark
Annual statistics starting Jun 1

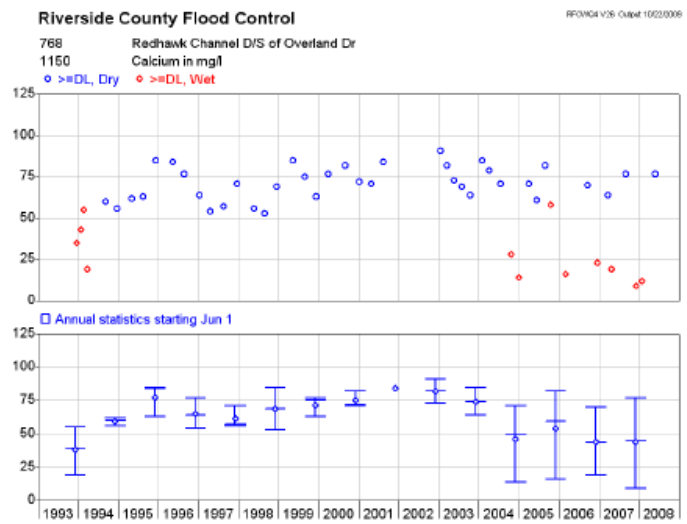
Riverside County Flood Control
768 Redhawk Channel D/S of Overland Dr
1150 Calcium in mg/l
>=DL, Dry
>=DL, Wet
Annual statistics starting Jun 1

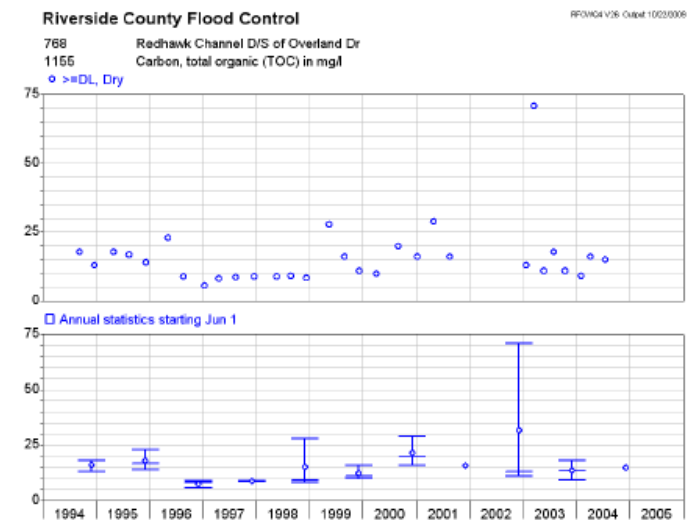
Riverside County Flood Control
768 Redhawk Channel D/S of Overland Dr
1155 Carbon, total organic (TOC) in mg/l
>=DL, Dry
Annual statistics starting Jun 1

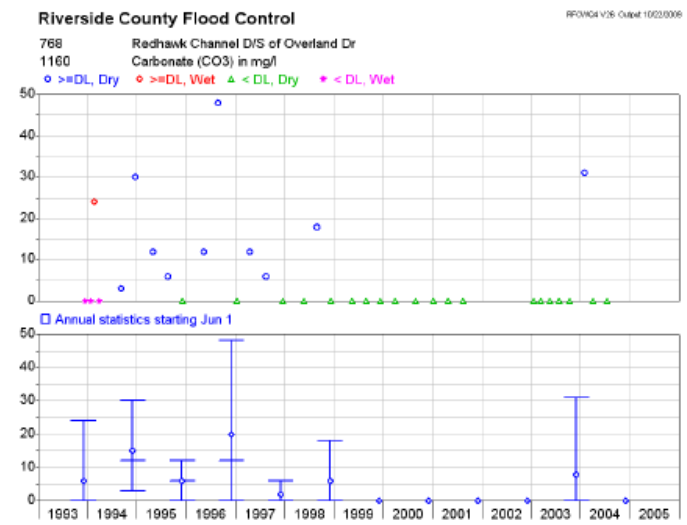
Riverside County Flood Control
768 Redhawk Channel D/S of Overland Dr
1160 Carbonate (CO3) in mg/l
>=DL, Dry
>=DL, Wet
< DL, Dry
< DL, Wet
Annual statistics starting Jun 1

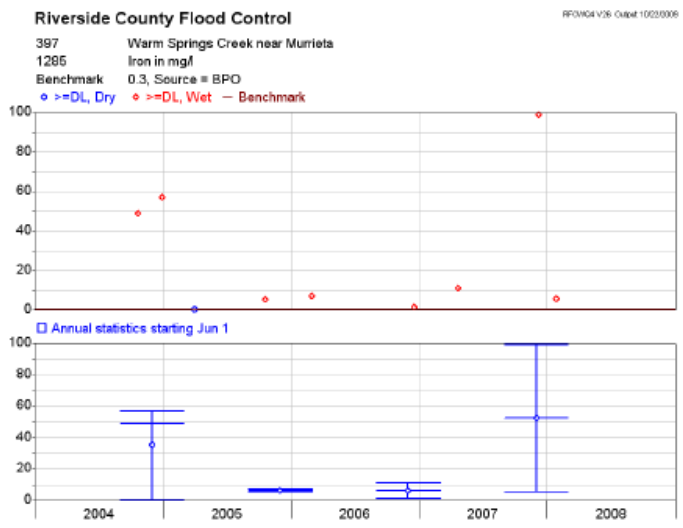
Riverside County Flood Control
397 Warm Springs Creek near Murrieta
1285 Iron in mg/l
Benchmark 0.3, Source = BPO
>=DL, Dry
>=DL, Wet
Benchmark
Annual statistics starting Jun 1
2004
2005
2006
2007
2008

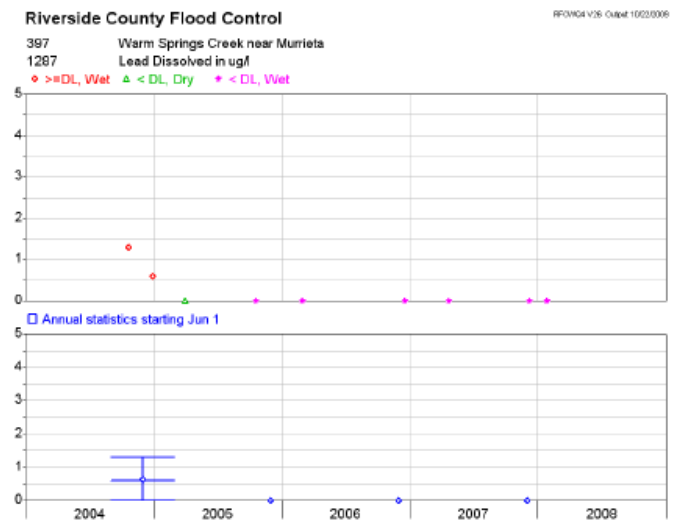
Riverside County Flood Control
397 Warm Springs Creek near Murrieta
1287 Lead Dissolved in ug/l
>=DL, Wet
< DL, Dry
< DL, Wet
Annual statistics starting Jun 1
2004
2005
2006
2007
2008

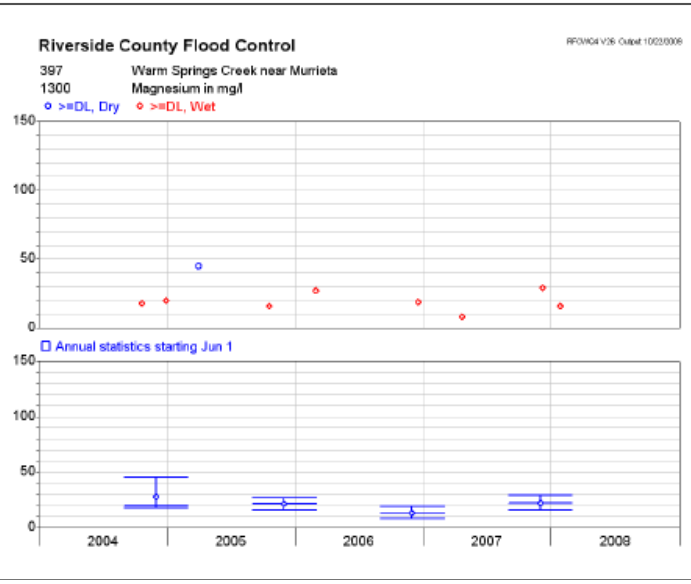
Riverside County Flood Control
397 Warm Springs Creek near Murrieta
1300 Magnesium in mg/l
>=DL, Dry
>=DL, Wet
Annual statistics starting Jun 1
2004
2005
2006
2007
2008

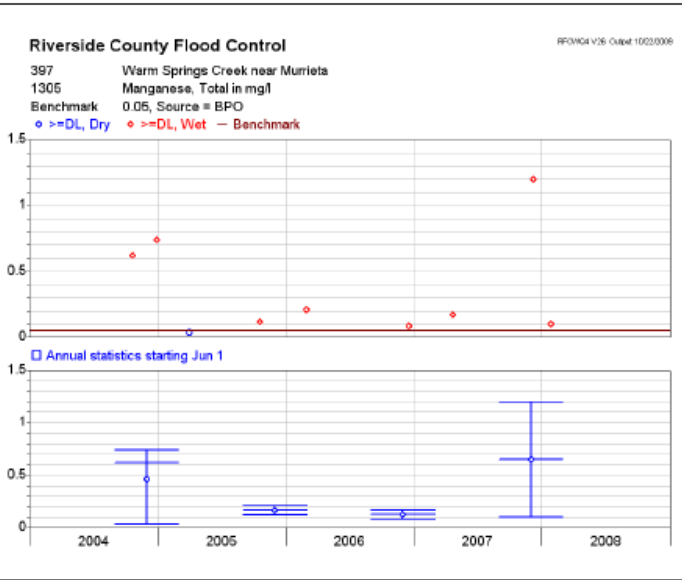
Riverside County Flood Control
397 Warm Springs Creek near Murrieta
1305 Manganese, Total in mg/l
Benchmark 0.05, Source = BPO
>=DL, Dry
>=DL, Wet
Benchmark
Annual statistics starting Jun 1
2004
2005
2006
2007
2008

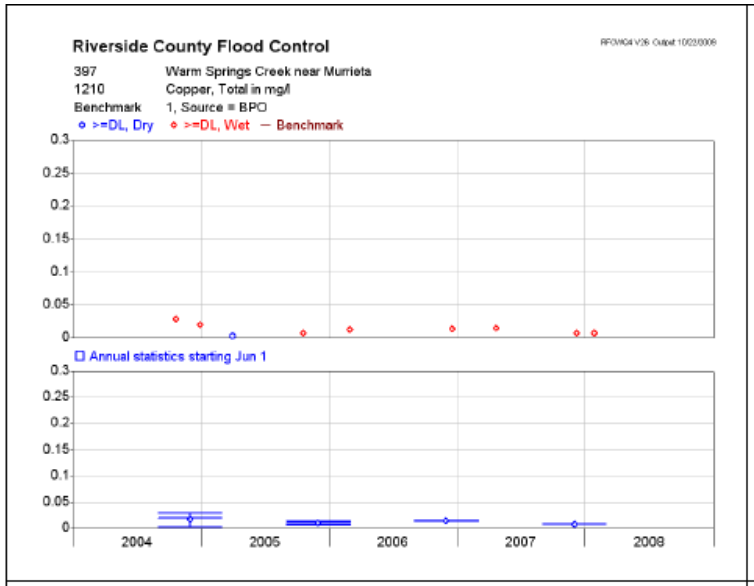
Riverside County Flood Control
397 Warm Springs Creek near Murrieta
1210 Copper, Total in mg/l
Benchmark 1, Source = BPO
>=DL, Dry
>=DL, Wet
Benchmark
Annual statistics starting Jun 1
2004
2005
2006
2007
2008

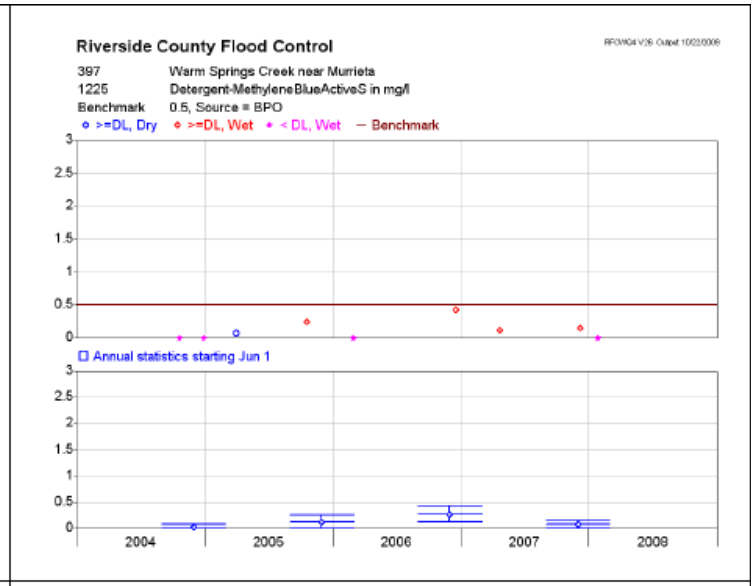
Riverside County Flood Control
397 Warm Springs Creek near Murrieta
1225 Detergent-MethyleneBlueActiveS in mg/l
Benchmark 0.5, Source = BPO
>=DL, Dry
>=DL, Wet
< DL, Wet
Benchmark
Annual statistics starting Jun 1
2004
2005
2006
2007
2008

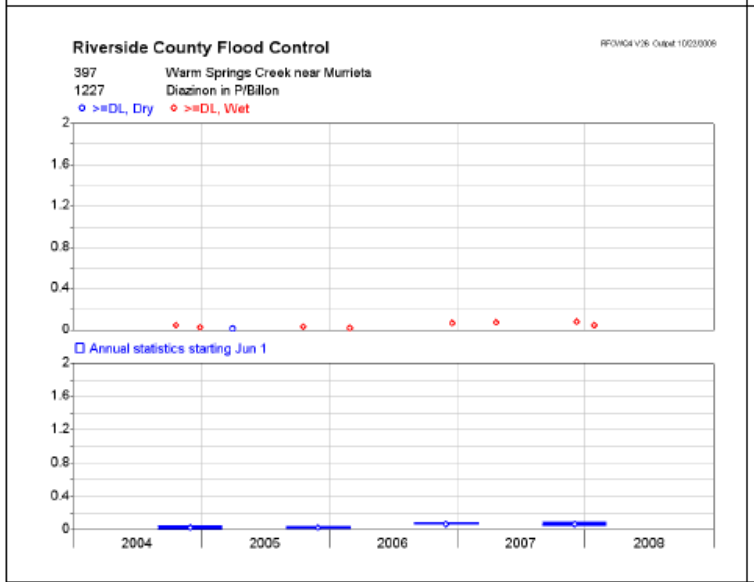
Riverside County Flood Control
397 Warm Springs Creek near Murrieta
1227 Diazinon in P/Billon
>=DL, Dry
>=DL, Wet
Annual statistics starting Jun 1
2004
2005
2006
2007
2008

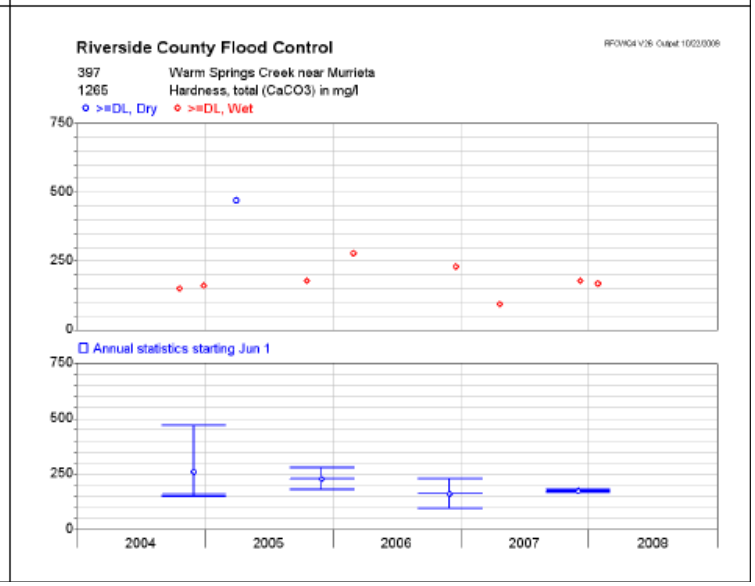
Riverside County Flood Control
397 Warm Springs Creek near Murrieta
1265 Hardness, total (CaCO3) in mg/l
>=DL, Dry
>=DL, Wet
Annual statistics starting Jun 1
2004
2005
2006
2007
2008

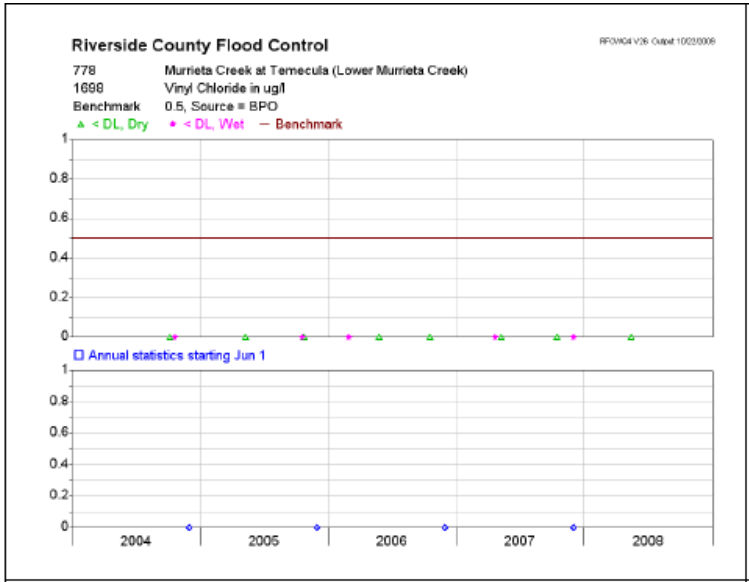
Riverside County Flood Control
778 Murrieta Creek at Temecula (Lower Murrieta Creek)
1698 Vinyl Chloride in ug/l
Benchmark 0.5, Source = BPO
< DL, Dry
< DL, Wet
Benchmark
Annual statistics starting Jun 1
2004
2005
2006
2007
2008

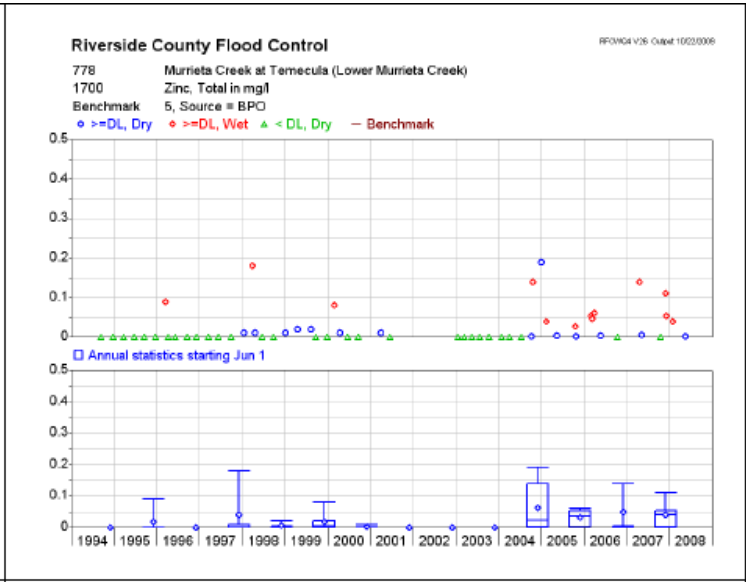
Riverside County Flood Control
778 Murrieta Creek at Temecula (Lower Murrieta Creek)
1700 Zinc, Total in mg/l
Benchmark 5, Source = BPO
>=DL, Dry
>=DL, Wet
< DL, Dry
Benchmark
Annual statistics starting Jun 1
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008

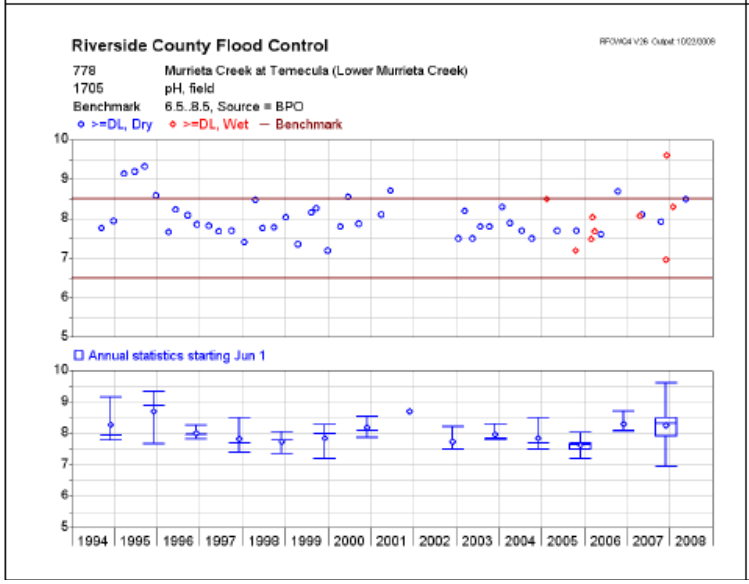
Riverside County Flood Control
778 Murrieta Creek at Temecula (Lower Murrieta Creek)
1705 pH, field
Benchmark 6.5..8.5, Source = BPO
>=DL, Dry
>=DL, Wet
Benchmark
Annual statistics starting Jun 1
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008

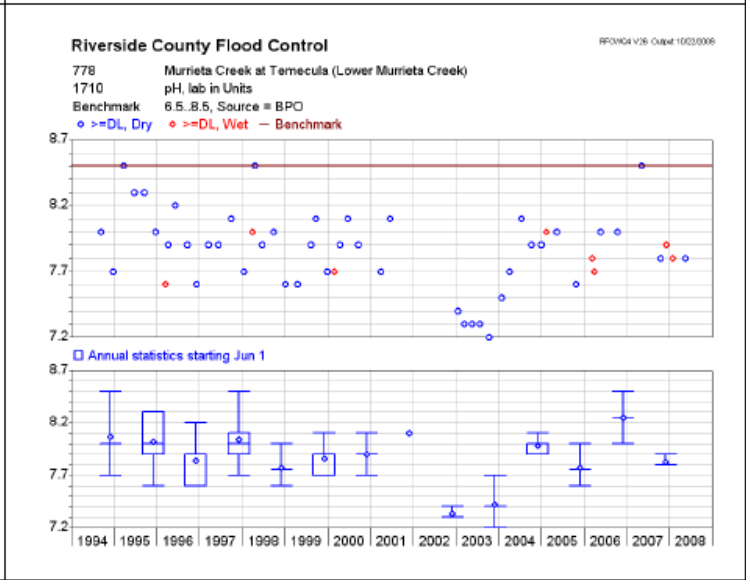
Riverside County Flood Control
778 Murrieta Creek at Temecula (Lower Murrieta Creek)
1710 pH, lab in Units
Benchmark 6.5..8.5, Source = BPO
>=DL, Dry
>=DL, Wet
Benchmark
Annual statistics starting Jun 1
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008

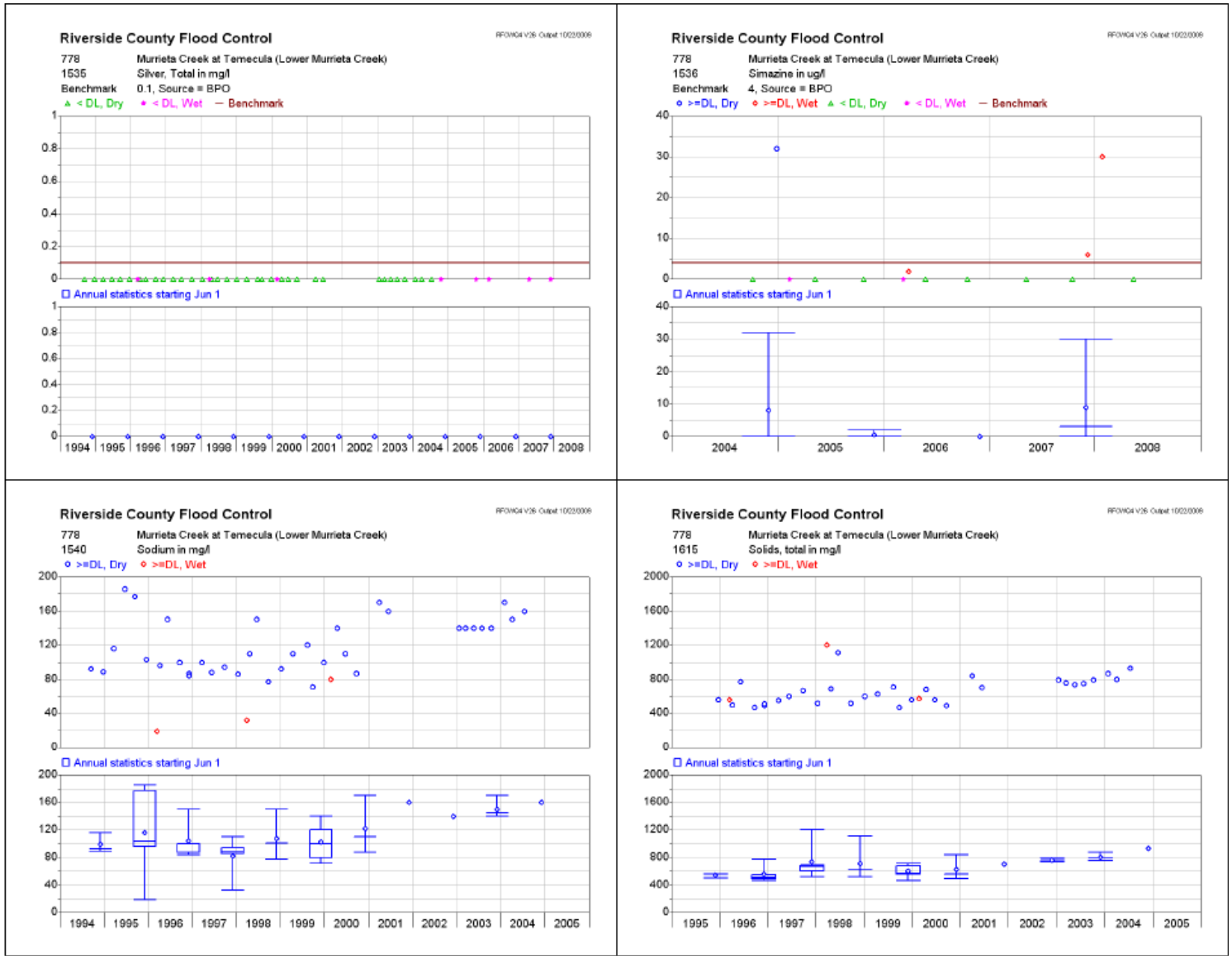
Riverside County Flood Control
778 Murrieta Creek at Temecula (Lower Murrieta Creek)
1535 Silver, Total in mg/l
Benchmark 0.1, Source = BPO
< DL, Dry
< DL, Wet
Benchmark
Annual statistics starting Jun 1
Riverside County Flood Control
778 Murrieta Creek at Temecula (Lower Murrieta Creek)
1536 Simazine in ug/l
Benchmark 4, Source = BPO
>=DL, Dry
>=DL, Wet
< DL, Dry
< DL, Wet
Benchmark
Annual statistics starting Jun 1
Riverside County Flood Control
778 Murrieta Creek at Temecula (Lower Murrieta Creek)
1540 Sodium in mg/l
>=DL, Dry
>=DL, Wet
Annual statistics starting Jun 1
Riverside County Flood Control
778 Murrieta Creek at Temecula (Lower Murrieta Creek)
1615 Solids, total in mg/l
>=DL, Dry
>=DL, Wet
Annual statistics starting Jun 1

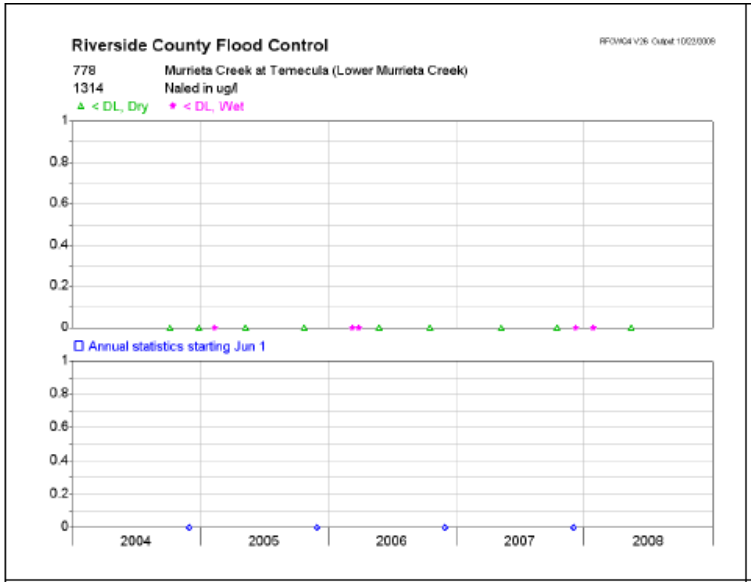
Riverside County Flood Control
778 Murrieta Creek at Temecula (Lower Murrieta Creek)
1314 Naled in ug/l
< DL, Dry
< DL, Wet
Annual statistics starting Jun 1
2004
2005
2006
2007
2008

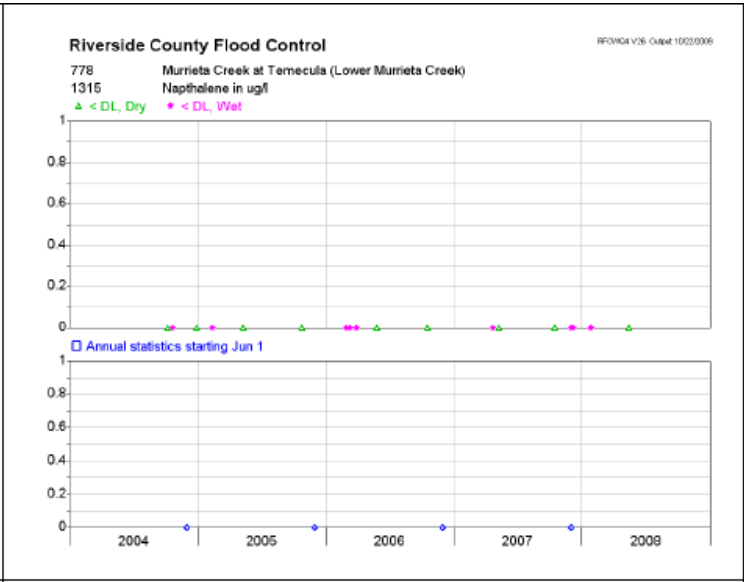
Riverside County Flood Control
778 Murrieta Creek at Temecula (Lower Murrieta Creek)
1315 Napthalene in ug/l
< DL, Dry
< DL, Wet
Annual statistics starting Jun 1
2004
2005
2006
2007
2008

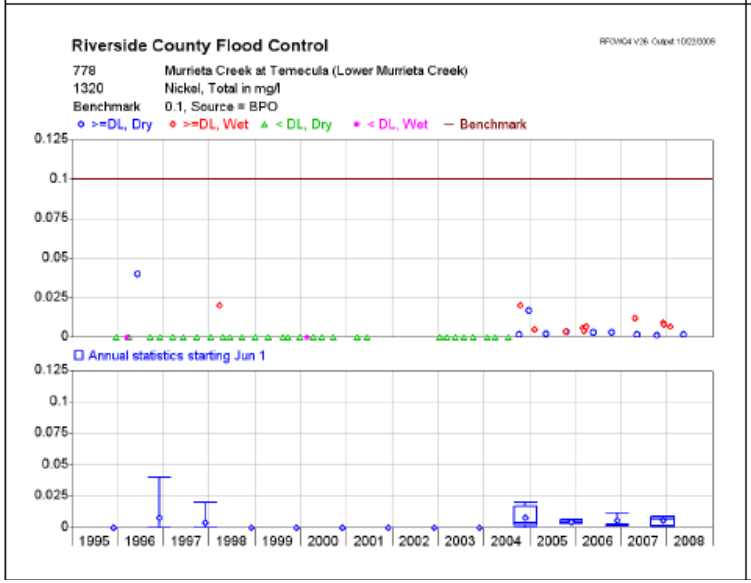
Riverside County Flood Control
778 Murrieta Creek at Temecula (Lower Murrieta Creek)
1320 Nickel, Total in mg/l
Benchmark 0.1, Source = BPO
>=DL, Dry
>=DL, Wet
< DL, Dry
< DL, Wet
Benchmark
Annual statistics starting Jun 1
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008

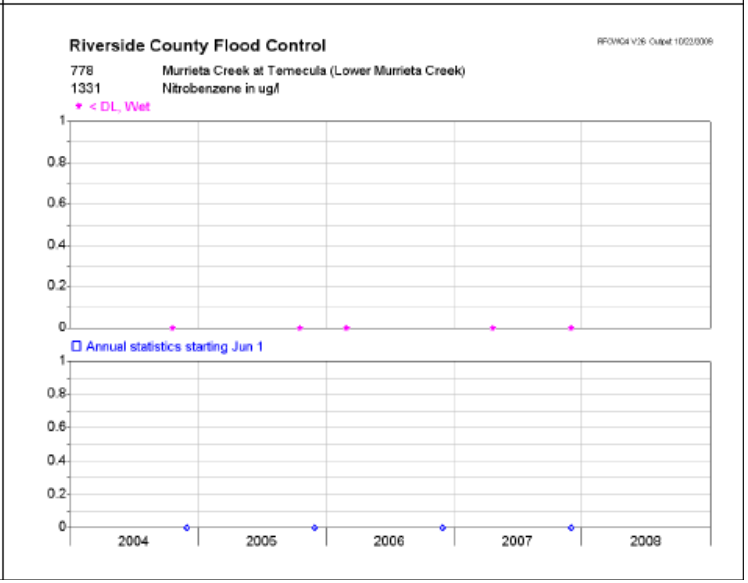
Riverside County Flood Control
778 Murrieta Creek at Temecula (Lower Murrieta Creek)
1331 Nitrobenzene in ug/l
< DL, Wet
Annual statistics starting Jun 1
2004
2005
2006
2007
2008

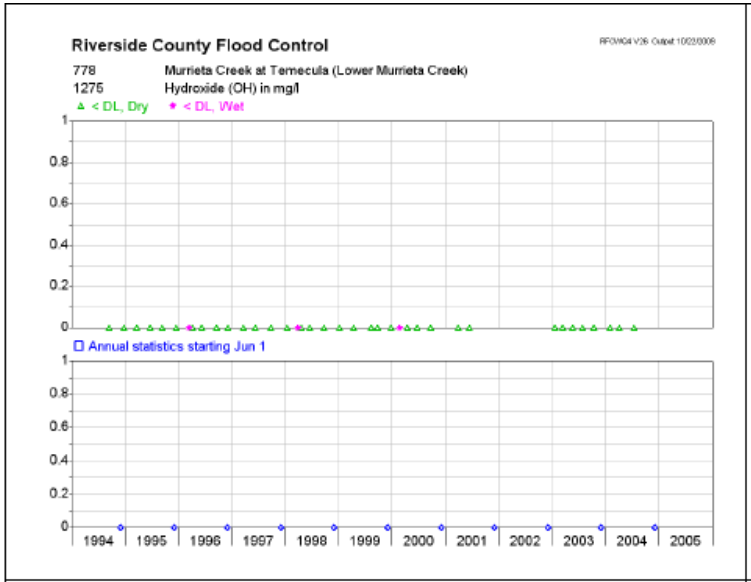
Riverside County Flood Control
778 Murrieta Creek at Temecula (Lower Murrieta Creek)
1275 Hydroxide (OH) in mg/l
< DL, Dry
< DL, Wet
Annual statistics starting Jun 1
1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005

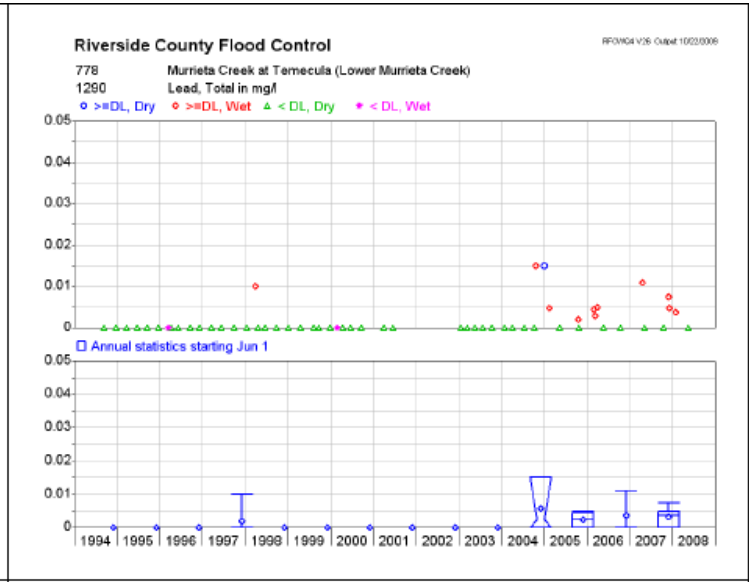
Riverside County Flood Control
778 Murrieta Creek at Temecula (Lower Murrieta Creek)
1290 Lead, Total in mg/l
>=DL, Dry
>=DL, Wet
< DL, Dry
< DL, Wet
Annual statistics starting Jun 1
1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008

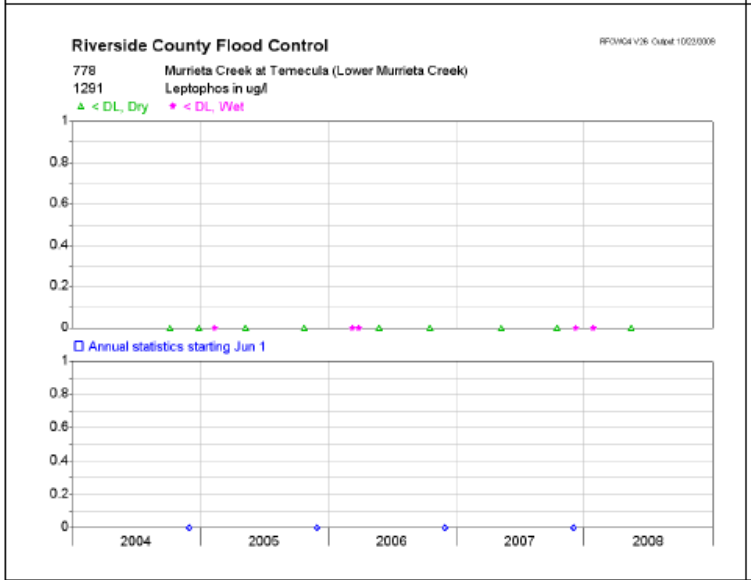
Riverside County Flood Control
778 Murrieta Creek at Temecula (Lower Murrieta Creek)
1291 Leptophos in ug/l
< DL, Dry
< DL, Wet
Annual statistics starting Jun 1
2004 2005 2006 2007 2008

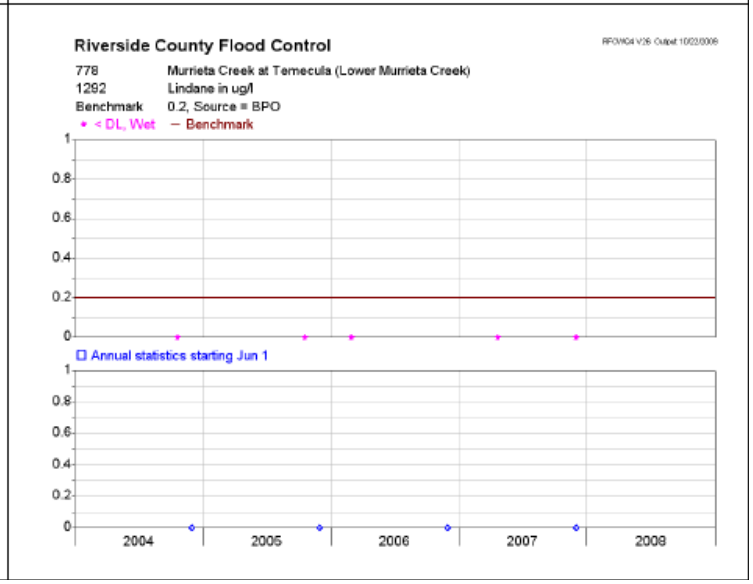
Riverside County Flood Control
778 Murrieta Creek at Temecula (Lower Murrieta Creek)
1292 Lindane in ug/l
Benchmark 0.2, Source = BPO
< DL, Wet
Benchmark
Annual statistics starting Jun 1
2004 2005 2006 2007 2008

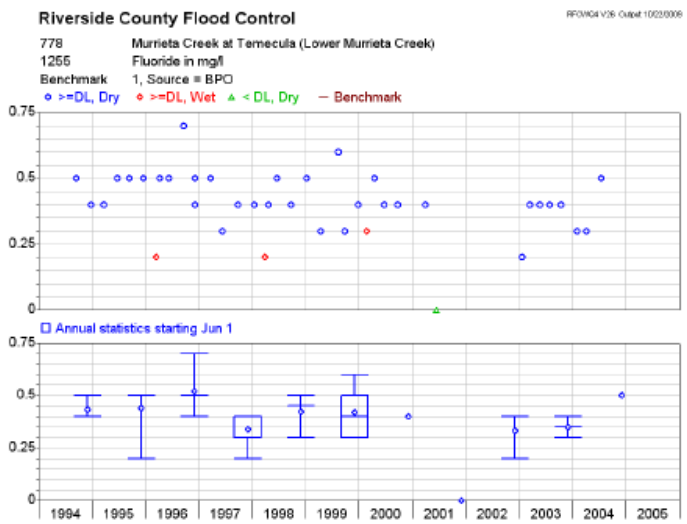
Riverside County Flood Control
778 Murrieta Creek at Temecula (Lower Murrieta Creek)
1255 Fluoride in mg/l
Benchmark 1, Source = BPO
>=DL, Dry
>=DL, Wet
< DL, Dry
Benchmark
Annual statistics starting Jun 1
0.75
0.5
0.25
0
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005

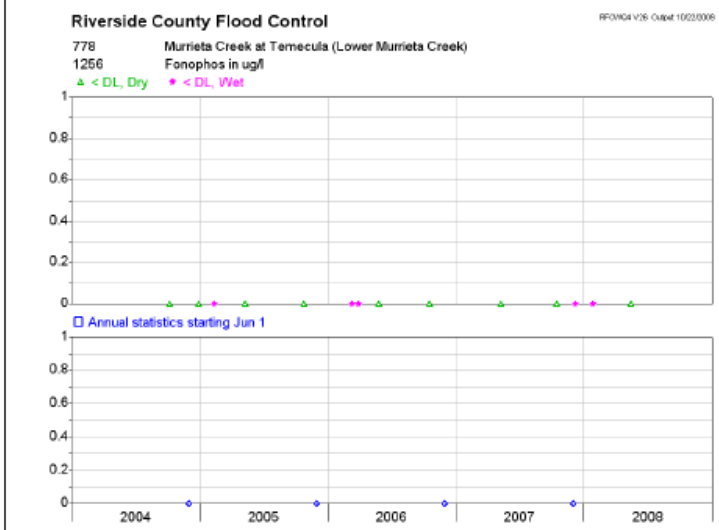
Riverside County Flood Control
778 Murrieta Creek at Temecula (Lower Murrieta Creek)
1256 Fonophos in ug/l
< DL, Dry
< DL, Wet
Annual statistics starting Jun 1
1
0.8
0.6
0.4
0.2
0
2004
2005
2006
2007
2008

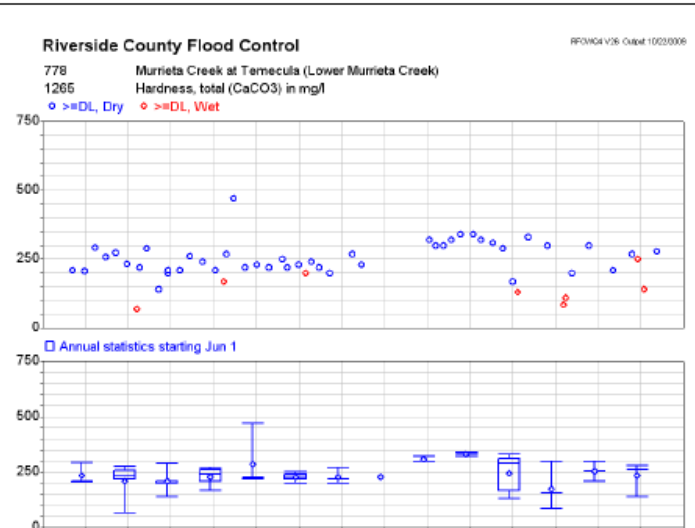
Riverside County Flood Control
778 Murrieta Creek at Temecula (Lower Murrieta Creek)
1265 Hardness, total (CaCO3) in mg/l
>=DL, Dry
>=DL, Wet
Annual statistics starting Jun 1
750
500
250
0
1994
1995
1996
1997
1998
1999
2000
2001
2002
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2005
2006
2007
2008

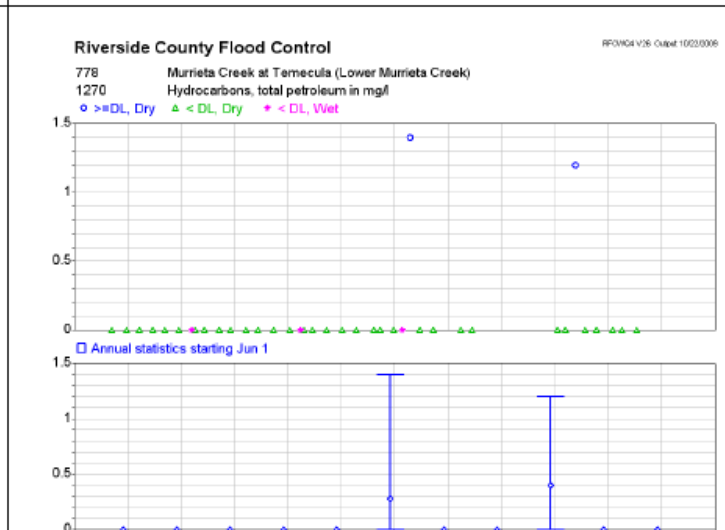
Riverside County Flood Control
778 Murrieta Creek at Temecula (Lower Murrieta Creek)
1270 Hydrocarbons, total petroleum in mg/l
>=DL, Dry
< DL, Dry
< DL, Wet
Annual statistics starting Jun 1
1.5
1
0.5
0
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005

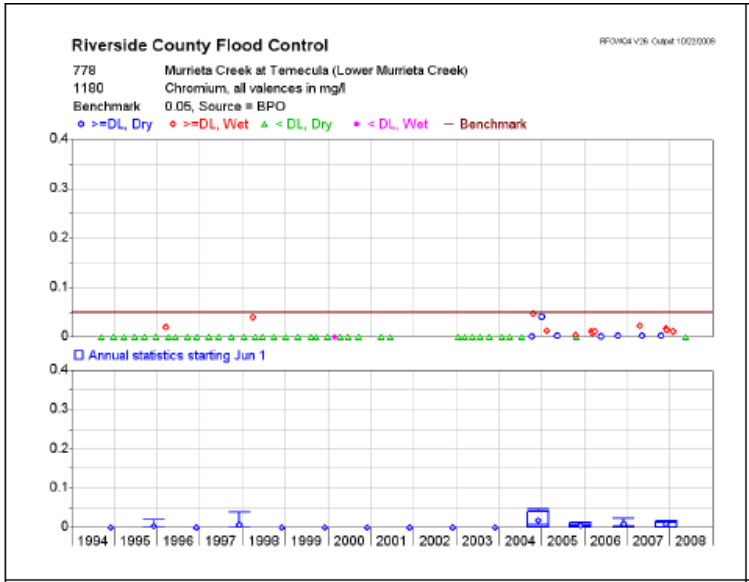
Riverside County Flood Control
778 Murrieta Creek at Temecula (Lower Murrieta Creek)
1180 Chromium, all valences in mg/l
Benchmark 0.05, Source = BPO
>=DL, Dry
>=DL, Wet
< DL, Dry
< DL, Wet
Benchmark
Annual statistics starting Jun 1
1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008

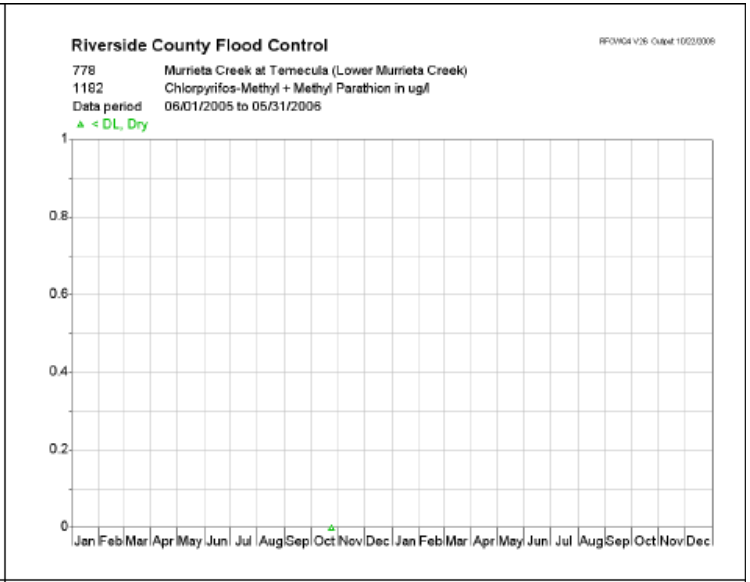
Riverside County Flood Control
778 Murrieta Creek at Temecula (Lower Murrieta Creek)
1182 Chlorpyrifos-Methyl + Methyl Parathion in ug/l
Data period 06/01/2005 to 05/31/2006
< DL, Dry
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

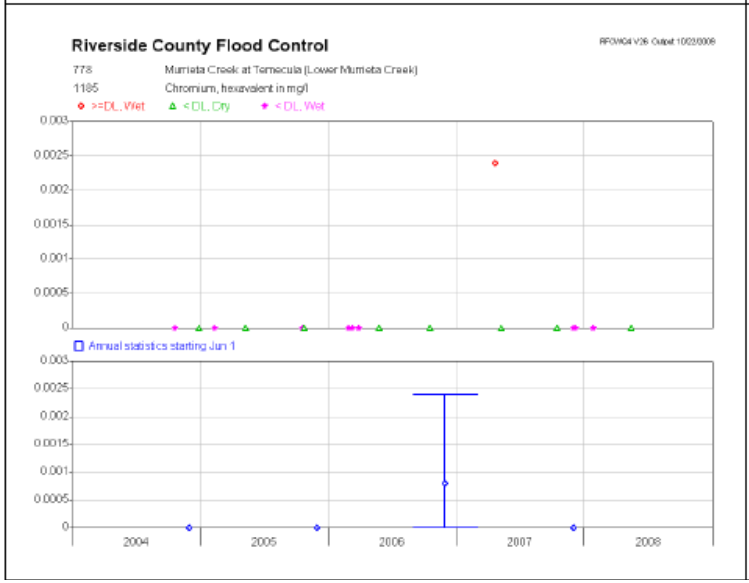
Riverside County Flood Control
778 Murrieta Creek at Temecula (Lower Murrieta Creek)
1185 Chromium, hexavalent in mg/l
>=DL, Wet
< DL, Dry
< DL, Wet
Annual statistics starting Jun 1
2004 2005 2006 2007 2008

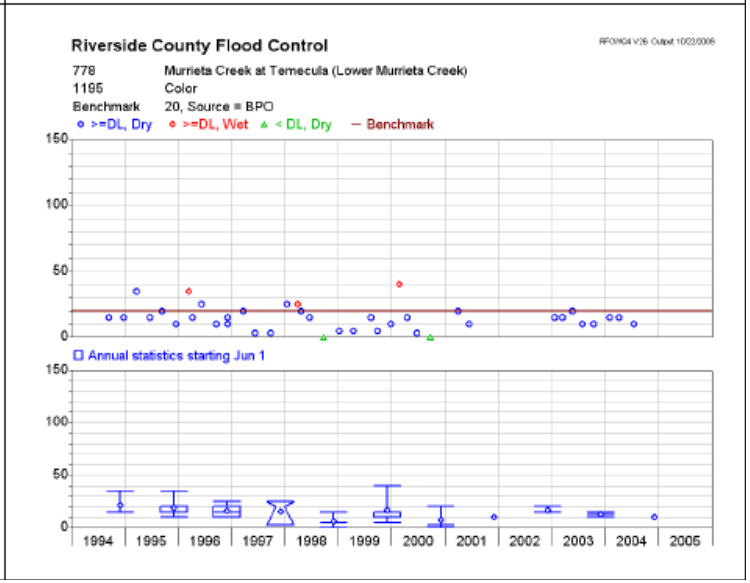
Riverside County Flood Control
778 Murrieta Creek at Temecula (Lower Murrieta Creek)
1195 Color
Benchmark 20, Source = BPO
>=DL, Dry
>=DL, Wet
< DL, Dry
Benchmark
Annual statistics starting Jun 1
1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005

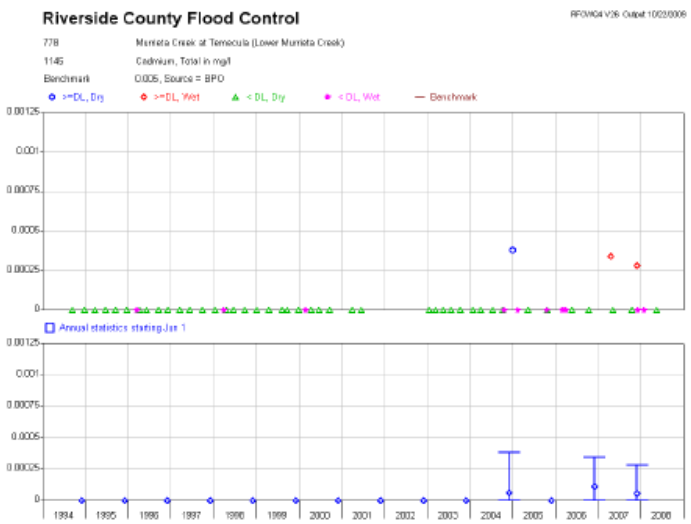
Riverside County Flood Control
778 Murrieta Creek at Temecula (Lower Murrieta Creek)
1145 Cadmium, Total in mg/l
Benchmark 0.005, Source = BPO
>=DL, Dry
>=DL, Wet
< DL, Dry
< DL, Wet
Benchmark
Annual statistics starting Jun 1

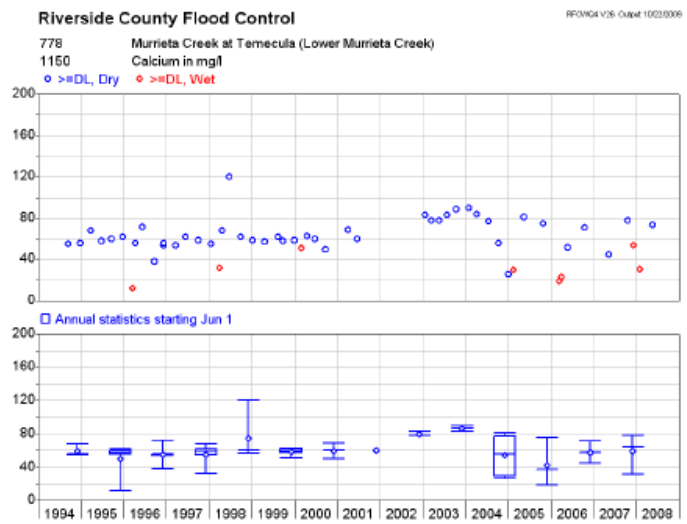
Riverside County Flood Control
778 Murrieta Creek at Temecula (Lower Murrieta Creek)
1150 Calcium in mg/l
>=DL, Dry
>=DL, Wet
Annual statistics starting Jun 1
1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008

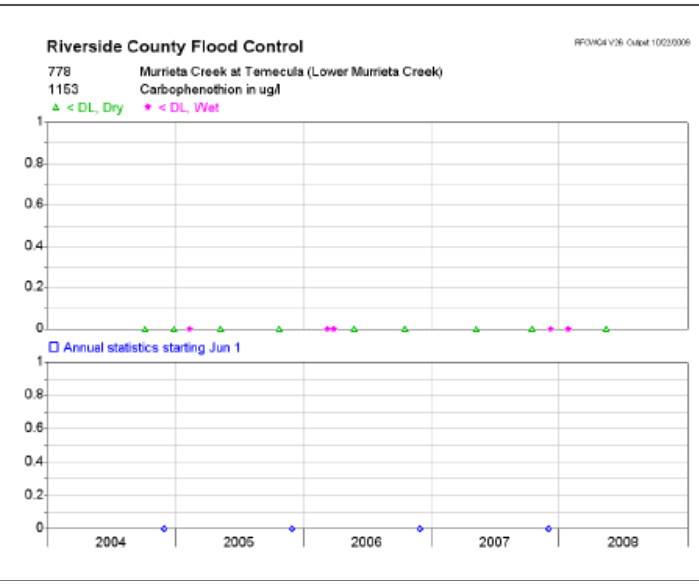
Riverside County Flood Control
778 Murrieta Creek at Temecula (Lower Murrieta Creek)
1153 Carbophenothion in ug/l
< DL, Dry
< DL, Wet
Annual statistics starting Jun 1
2004 2005 2006 2007 2008

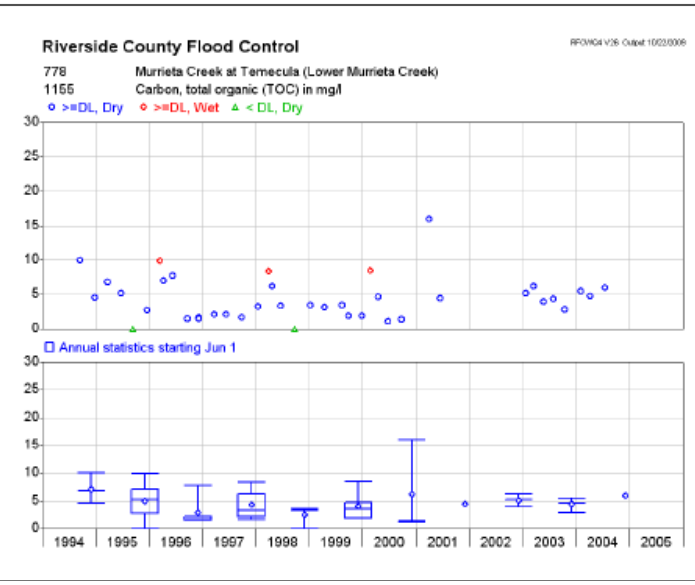
Riverside County Flood Control
778 Murrieta Creek at Temecula (Lower Murrieta Creek)
1155 Carbon, total organic (TOC) in mg/l
>=DL, Dry
>=DL, Wet
< DL, Dry
Annual statistics starting Jun 1
1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005

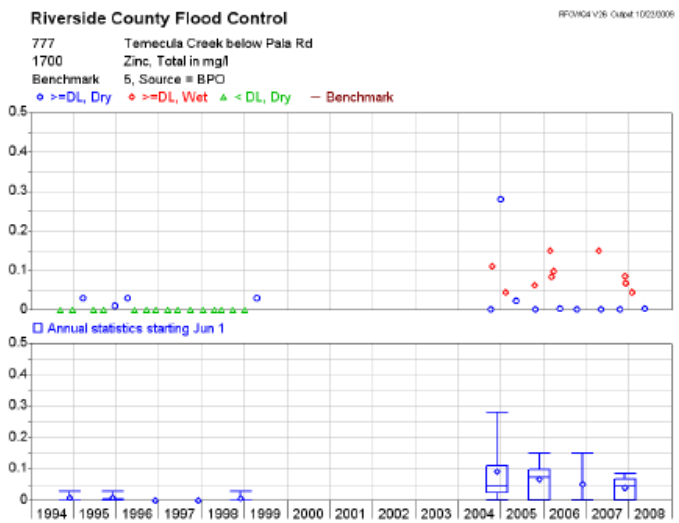
Riverside County Flood Control
777 Temecula Creek below Pala Rd
1700 Zinc, Total in mg/l
Benchmark 5, Source = BPO
>=DL, Dry
>=DL, Wet
< DL, Dry
Benchmark
Annual statistics starting Jun 1
1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008

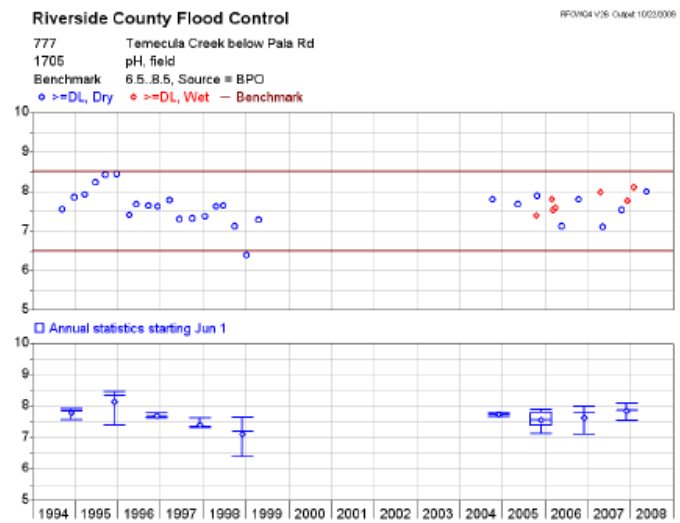
Riverside County Flood Control
777 Temecula Creek below Pala Rd
1705 pH, field
Benchmark 6.5..8.5, Source = BPO
>=DL, Dry
>=DL, Wet
Benchmark
Annual statistics starting Jun 1
1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008

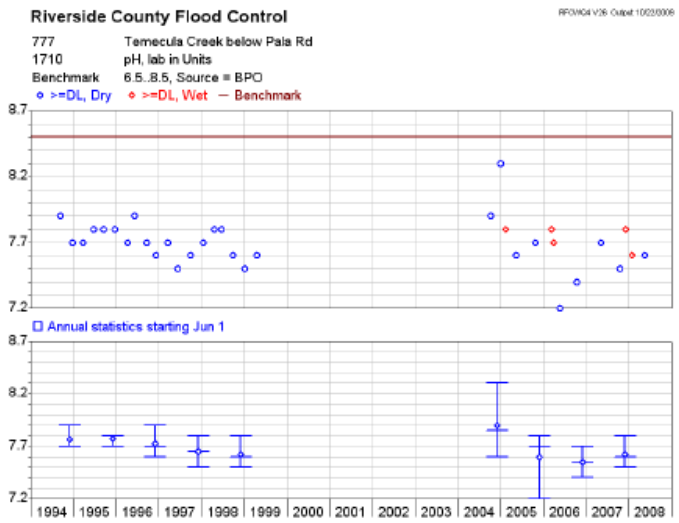
Riverside County Flood Control
777 Temecula Creek below Pala Rd
1710 pH, lab in Units
Benchmark 6.5..8.5, Source = BPO
>=DL, Dry
>=DL, Wet
Benchmark
Annual statistics starting Jun 1
1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008

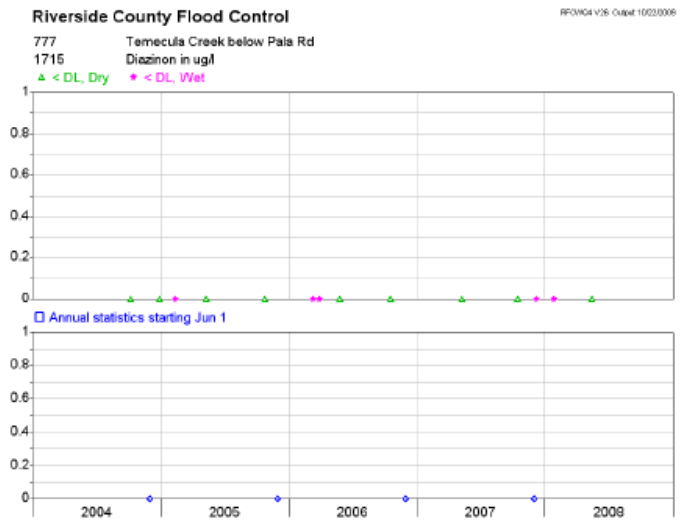
Riverside County Flood Control
777 Temecula Creek below Pala Rd
1715 Diazinon in ug/l
< DL, Dry
< DL, Wet
Annual statistics starting Jun 1
2004 2005 2006 2007 2008

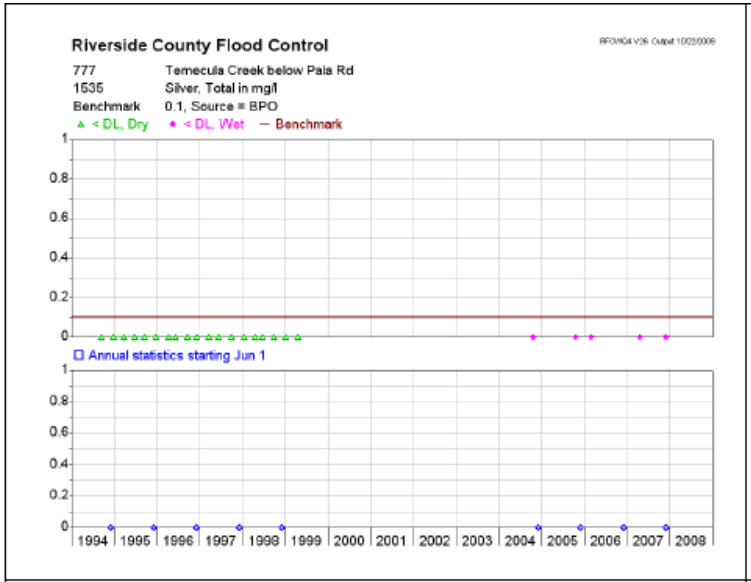
Riverside County Flood Control
777 Temecula Creek below Pala Rd
1535 Silver, Total in mg/l
Benchmark 0.1, Source = BPO
< DL, Dry
< DL, Wet
Benchmark
Annual statistics starting Jun 1
1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008

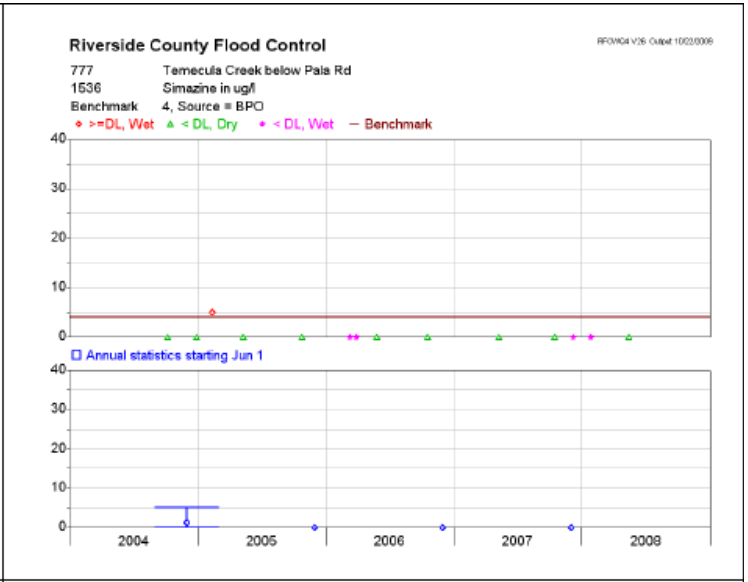
Riverside County Flood Control
777 Temecula Creek below Pala Rd
1536 Simazine in ug/l
Benchmark 4, Source = BPO
>=DL, Wet
< DL, Dry
< DL, Wet
Benchmark
Annual statistics starting Jun 1
2004 2005 2006 2007 2008

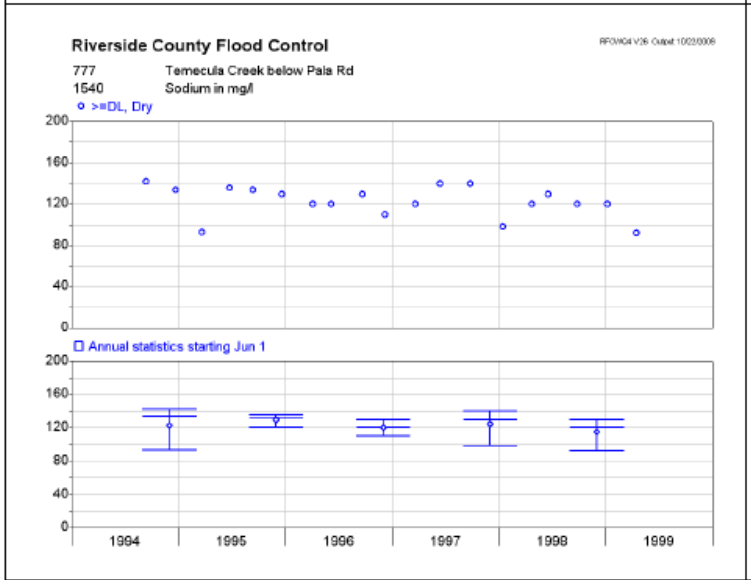
Riverside County Flood Control
777 Temecula Creek below Pala Rd
1540 Sodium in mg/l
>=DL, Dry
Annual statistics starting Jun 1
1994 1995 1996 1997 1998 1999

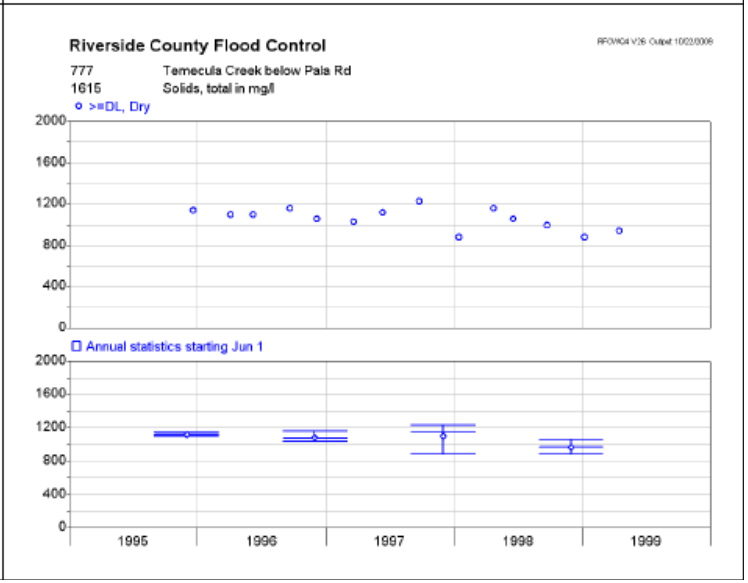
Riverside County Flood Control
777 Temecula Creek below Pala Rd
1615 Solids, total in mg/l
>=DL, Dry
Annual statistics starting Jun 1
1995 1996 1997 1998 1999

Riverside County Flood Control
777 Temecula Creek below Pala Rd
1314 Naled in ug/l
< DL, Dry
< DL, Wet
Annual statistics starting Jun 1
2004
2005
2006
2007
2008
Riverside County Flood Control
777 Temecula Creek below Pala Rd
1315 Napthalene in ug/l
< DL, Dry
< DL, Wet
Annual statistics starting Jun 1
Riverside County Flood Control
777 Temecula Creek below Pala Rd
1320 Nickel, Total in mg/l
Benchmark 0.1, Source = BPO
>=DL, Dry
>=DL, Wet
< DL, Dry
Benchmark
Annual statistics starting Jun 1
1995
1996
1997
1998
1999
2000
2001
2002
2003
Riverside County Flood Control
777 Temecula Creek below Pala Rd
1331 Nitrobenzene in ug/l
< DL, Wet
Annual statistics starting Jun 1

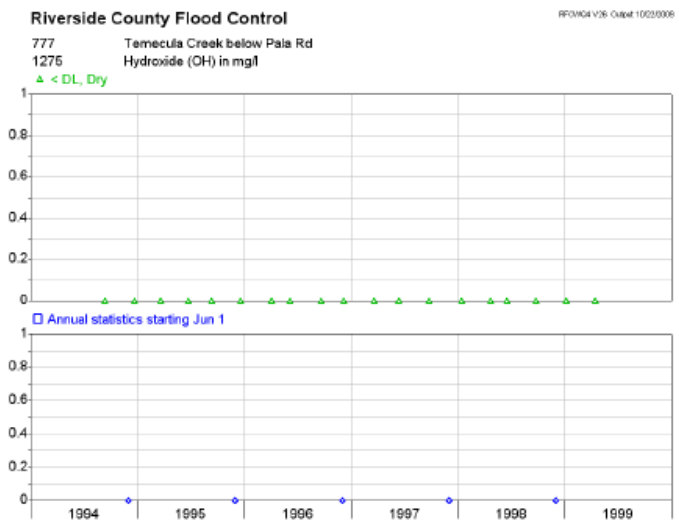
Riverside County Flood Control
777 Temecula Creek below Pala Rd
1275 Hydroxide (OH) in mg/l
< DL, Dry
Annual statistics starting Jun 1
1994
1995
1996
1997
1998
1999

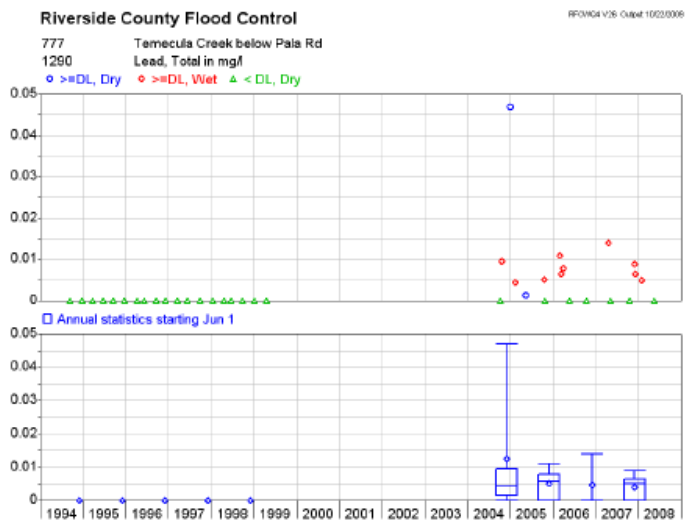
Riverside County Flood Control
777 Temecula Creek below Pala Rd
1290 Lead, Total in mg/l
>=DL, Dry
>=DL, Wet
< DL, Dry
Annual statistics starting Jun 1
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008

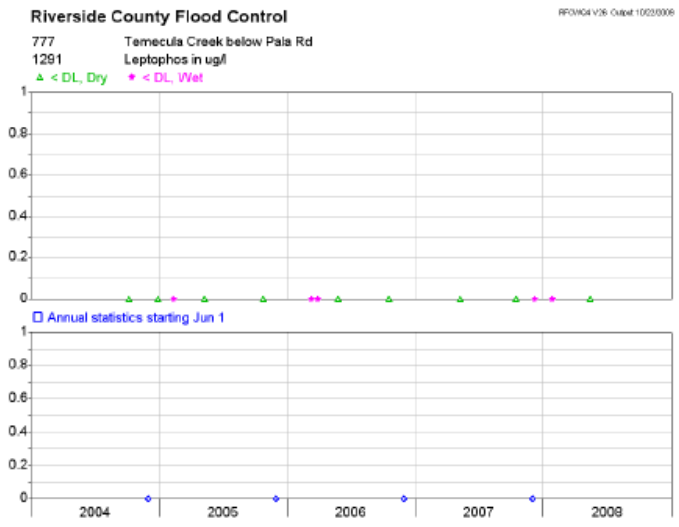
Riverside County Flood Control
777 Temecula Creek below Pala Rd
1291 Leptophos in ug/l
< DL, Dry
< DL, Wet
Annual statistics starting Jun 1
2004
2005
2006
2007
2008

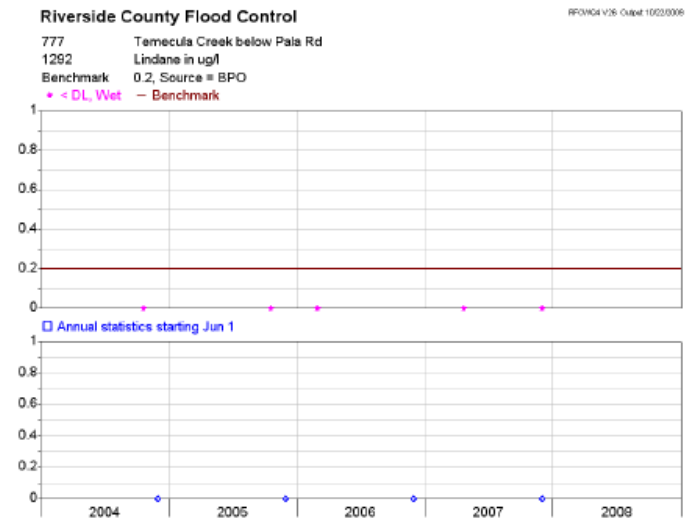
Riverside County Flood Control
777 Temecula Creek below Pala Rd
1292 Lindane in ug/l
Benchmark 0.2, Source = BPO
< DL, Wet
Benchmark
Annual statistics starting Jun 1
2004
2005
2006
2007
2008

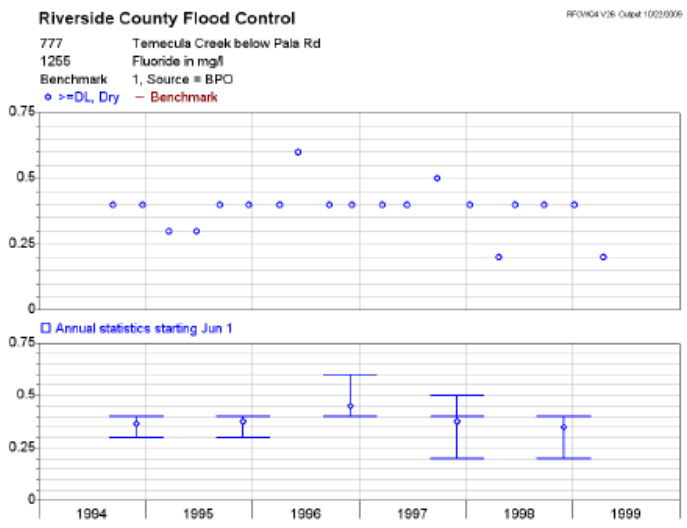
Riverside County Flood Control
777 Temecula Creek below Pala Rd
1255 Fluoride in mg/l
Benchmark 1, Source = BPO
>=DL, Dry
Benchmark
Annual statistics starting Jun 1
0.75
0.5
0.25
0
1994
1995
1996
1997
1998
1999

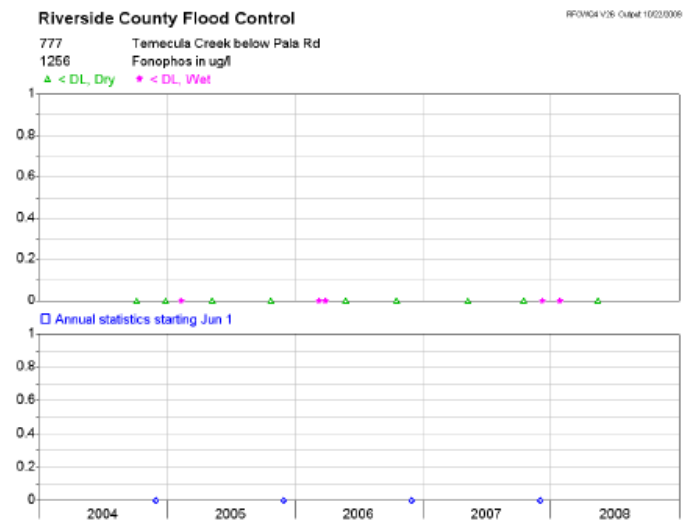
Riverside County Flood Control
777 Temecula Creek below Pala Rd
1256 Fonophos in ug/l
< DL, Dry
< DL, Wet
Annual statistics starting Jun 1
1
0.8
0.6
0.4
0.2
0
2004
2005
2006
2007
2008

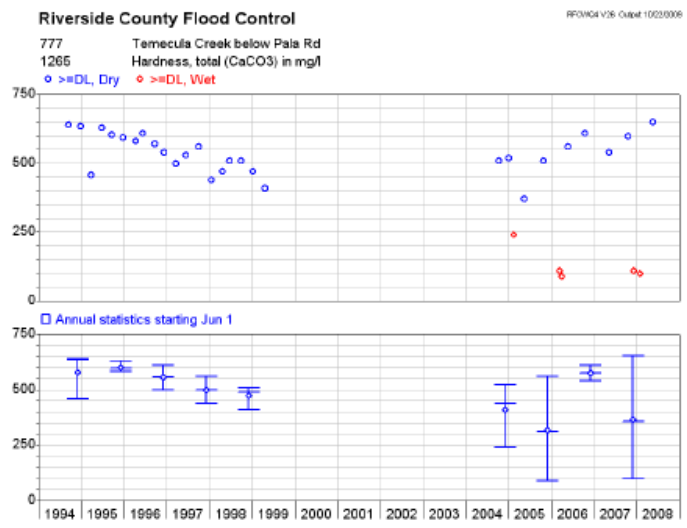
Riverside County Flood Control
777 Temecula Creek below Pala Rd
1265 Hardness, total (CaCO3) in mg/l
>=DL, Dry
>=DL, Wet
Annual statistics starting Jun 1
750
500
250
0
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008

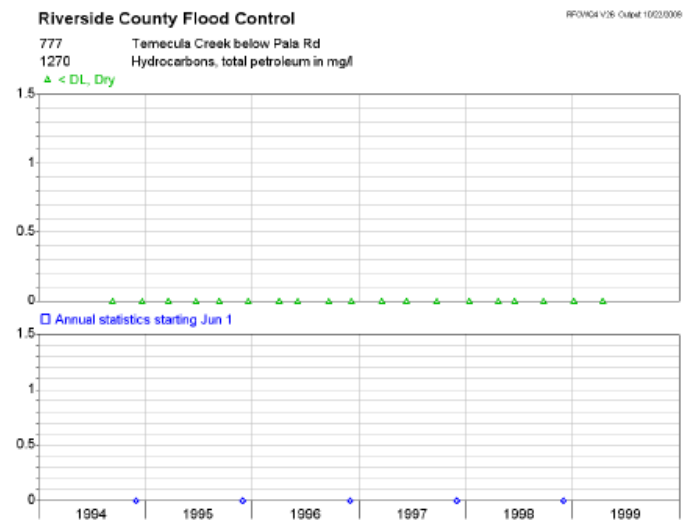
Riverside County Flood Control
777 Temecula Creek below Pala Rd
1270 Hydrocarbons, total petroleum in mg/l
< DL, Dry
Annual statistics starting Jun 1
1.5
1
0.5
0
1994
1995
1996
1997
1998
1999

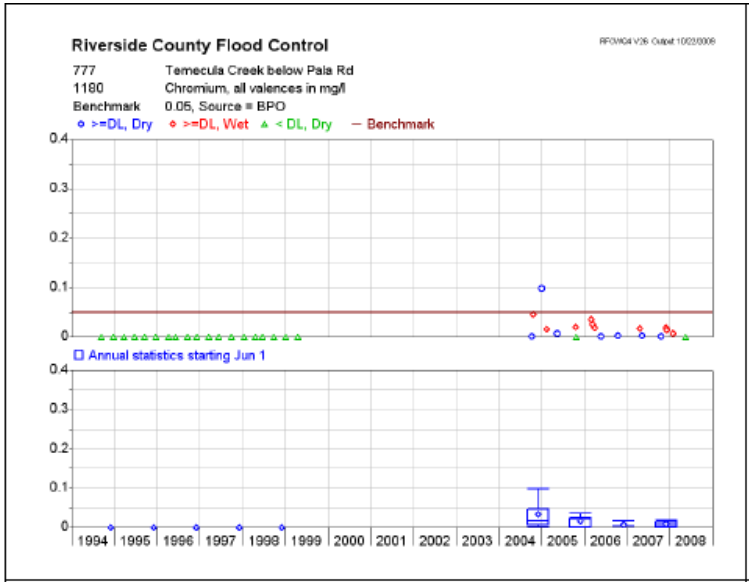
Riverside County Flood Control
777 Temecula Creek below Pala Rd
1180 Chromium, all valences in mg/l
Benchmark 0.05, Source = BPO
>=DL, Dry
>=DL, Wet
< DL, Dry
Benchmark
Annual statistics starting Jun 1
1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008

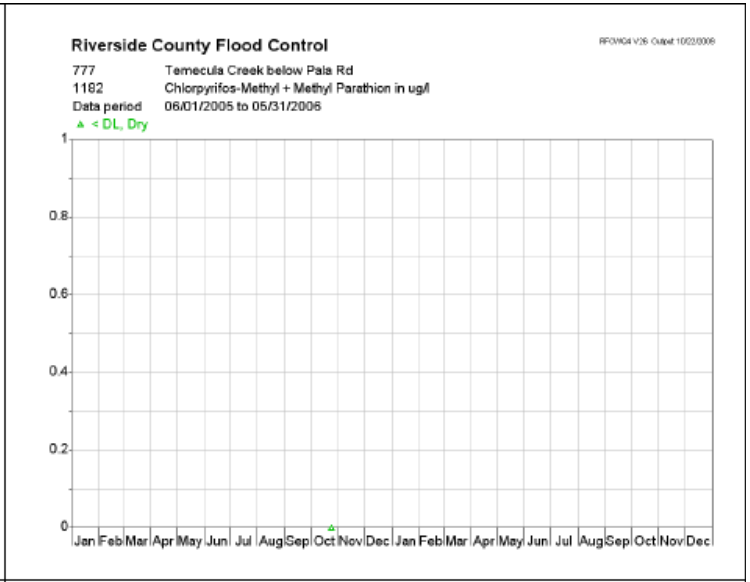
Riverside County Flood Control
777 Temecula Creek below Pala Rd
1182 Chlorpyrifos-Methyl + Methyl Parathion in ug/l
Data period 06/01/2005 to 05/31/2006
< DL, Dry
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

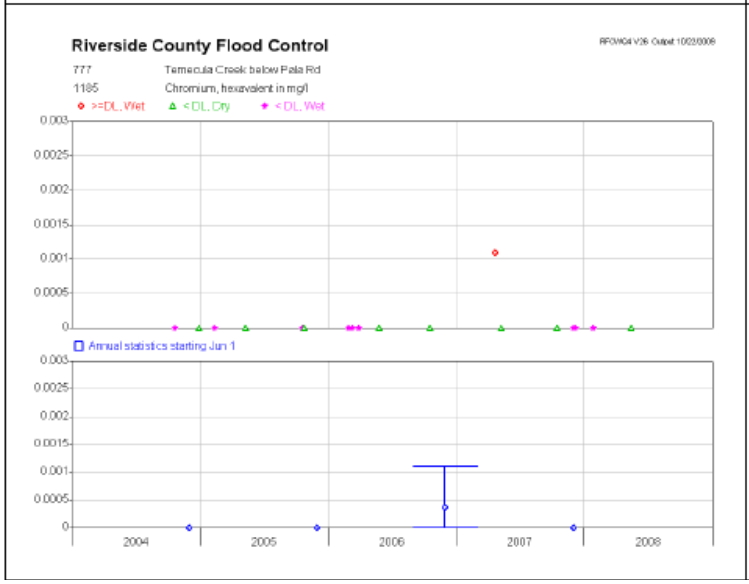
Riverside County Flood Control
777 Temecula Creek below Pala Rd
1185 Chromium, hexavalent in mg/l
>=DL, Wet
< DL, Dry
< DL, Wet
Annual statistics starting Jun 1
2004 2005 2006 2007 2008

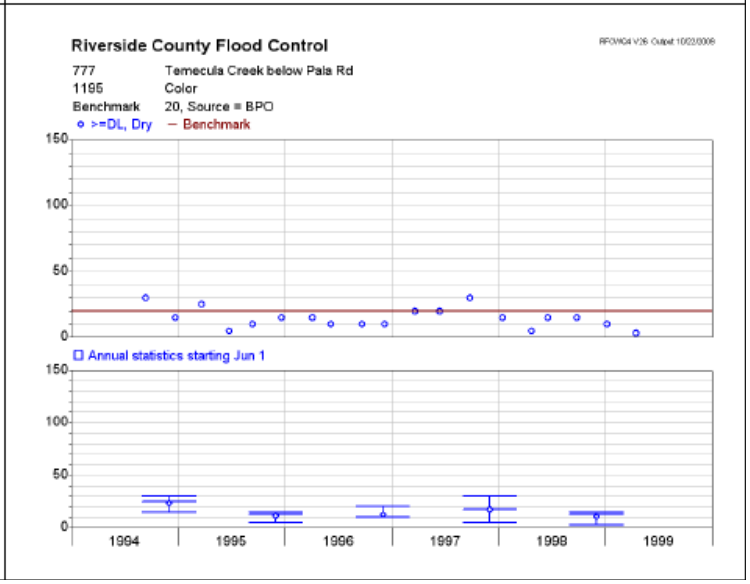
Riverside County Flood Control
777 Temecula Creek below Pala Rd
1195 Color
Benchmark 20, Source = BPO
>=DL, Dry
Benchmark
Annual statistics starting Jun 1
1994 1995 1996 1997 1998 1999

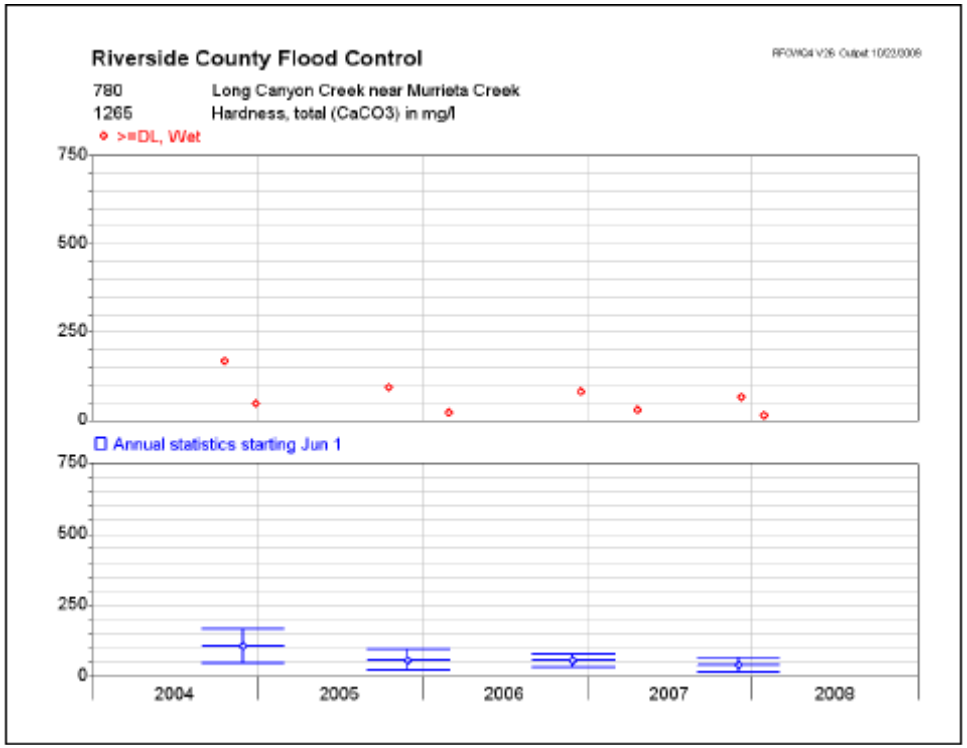
Riverside County Flood Control
780 Long Canyon Creek near Murrieta Creek
1265 Hardness, total (CaCO3) in mg/l
>=DL, Wet
750
500
250
0
Annual statistics starting Jun 1
750
500
250
0
2004
2005
2006
2007
2008

July 26, 2010

San Diego Water Quality Board
Re: Tentative Order No. R9-2010-0016

Dear Board:

I have been involved in trying to find a solution to the erosion problems in the unincorporated hills of Temecula for almost three years.

I live in Rancho Glenoaks, a community of about 8 miles of dirt roads within approximately 640 acres. These roads were dedicated to the County of Riverside in 1982 by the developer. The unprofessional continuous grading of these roads by our HOA road committee has caused silt and sediment to flow through blue line tributaries to San Gertrudis Creek, down to DePortola and into the Santa Margarita watershed.

I was alerted to this problem when my own blue line creek bed habitat was destroyed by sand and silt. The road adjoining my property eroded into the creek and debris and vegetation clogged the undersized, poorly installed culvert created under the road by the original developer.

In my quest for a solution to the damage that was being done to my oaks, native habitat and environment, I contacted the County of Riverside. I believe I spoke to more than one person in every department of the County. I was told to contact Fish & Game, Flood Control, RCD, etc., etc. – always reaching a dead-end. (I even contacted the EPA and every environmental agency I could find!) I was told not to contact water quality as the County would be fined for allowing this erosion to continue. Every agency continually told me there was nothing they could do – even as I contacted them again and again. I still can not understand what any of these state and federal agencies are about. They seem to be just words and ordinances that mean nothing.

Finally, last year, Code Enforcement contacted the board of directors of our homeowner's association and tried to educate them on the importance of BMPs; however, oaks are still dying and sediment from grading of the roads is still being pushed into our many watersheds as the road committee continues to grade as they always do - not even recognizing the pollution they are causing to our stream channels. Our tributaries flow to a 100-year flood zone that is continuing to be destroyed. This watercourse/flood zone is on private property. Inhabitants of this community drive through this watercourse, crossing a creek bed, having no concern for the destruction they are continuing to cause.

I contacted an agency called Pacific Watershed Associates, who are hydrologists that specialize in assessing, redesigning and repairing road-related erosion problems, and offer environmental services, with funding being administered by state and federal grants. PWA states: "These programs can cover the costs of both the assessment and implementation"; however, I have been unable to convince the BOD of our HOA that we

need professional help. They have told me that I cannot represent this HOA, and it is my understanding that I cannot apply for grants as an individual.

I have now found that the new requirements for Copermittees include a draft for "Unpaved Roads Construction and Maintenance" that spells out "sediment control measures during construction and maintenance activities on unpaved roads, including developing and implementing appropriate training and technical assistance resources".

This has given me new hope that these hills have a chance of being returned to the once beautiful land that I loved so many years ago. Is it possible that this new order can require help from the County to solve the erosion problems in Rancho Glenoaks, as well as others in the same situation as I? I truly hope it can happen. The County and environmental agencies need to take responsibility.

Tressa Coco
39740 Via Carmelo
Temecula, CA 92592

951-302-0421

NATURAL RESOURCES DEFENSE COUNCIL

August 13, 2010

Via electronic mail

Executive Officer David Gibson and Members of the Board
California Regional Water Quality Control Board, San Diego Region
9174 Sky Park Court, Suite 100
San Diego, CA 92123

Re: Comments on Tentative Order R9-2010-0016.

Dear Mr. Gibson and Members of the Board:

We write on behalf of the Natural Resources Defense Council ("NRDC"). We have reviewed the July 23, 2010 draft of Tentative Order No. R9-2010-0016, NPDES No. CAS0108740 ("Permit"), the latest draft of the Municipal Separate Storm Sewer System NPDES Permit for Riverside County, and appreciate the opportunity to submit the following comments. Overall, we support the draft Permit's inclusion of Low Impact Development ("LID") based onsite retention requirements for new development and significant redevelopment. However, we are concerned that as written, the Permit fails to fully implement provisions present in other MS4 permits throughout California, thereby failing to meet the Clean Water Act's "maximum extent practicable" standard (*see* 33 U.S.C. 1342(p)(3)(b)(iii)), and is in critical aspects vague or otherwise requires clarification to ensure that its terms are enforceable.

In particular, we focus our comments here on the Permit's Development Planning Component, which is crucial to addressing the root causes of stormwater pollution. As the U.S. EPA has noted:

> Most stormwater runoff is the result of the man-made hydrologic modifications that normally accompany development. The addition of impervious surfaces, soil compaction, and tree and vegetation removal result in alterations to the movement of water through the environment. As interception, evapotranspiration, and infiltration are reduced and precipitation is converted to overland flow, these modifications affect not only the characteristics of the developed site but also the watershed in which the development is located. Stormwater has been identified as one of the leading sources of pollution for all waterbody types in the United

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> States. Furthermore, the impacts of stormwater pollution are not static; they usually increase with more development and urbanization.[1]

In order to address this source of pollution, the U.S. EPA has stated that "permit[s] must include clear, measurable, enforceable provisions for implementation of LID. . . ."[2]

1. The Permit Should Ensure that Only Water Retained Onsite Counts Toward the Design Capture Volume

Section F.1.d mandates that "[e]ach Copermittee must require LID BMPs or make a finding of technical infeasibility for each Priority Development Project in accordance with the LID waiver program in section F.1.d.(7)." LID BMPs then "must be sized and designed to ensure onsite retention without runoff, of the volume of runoff produced from a 24-hour 85th percentile storm event (design capture volume)." Permit at ¶ F.1.d.(4)(c)(i). However, the Permit also allows that "[i]f onsite infiltration LID BMPs are technically infeasible per section F.1.d.(7)(b), other LID BMPs may treat any volume that is not retained onsite provided that the other LID BMPs are sized to hold the design storm volume that is not infiltrated." Permit at ¶ F.1.d.(4)(c)(ii). This language is problematic for several reasons, outlined below.

First, this section erroneously states that where infiltration BMPs alone are technically infeasible, other LID BMPs may be employed to treat the volume of runoff *not retained* onsite. This language improperly excludes any requirement that a site first use all LID practices that *retain* water onsite—including those other than infiltration such as evapotranspiration or capture and onsite reuse—to meet the design capture requirement where feasible, even where infiltration may not be. A Priority Development Project should not be permitted to participate in the Permit's offsite mitigation program or to employ other means of addressing the design capture volume where LID based options for the onsite retention of stormwater are available. The Permit's language in section F.1.d.(4)(c) must therefore reflect that a finding of infeasibility may only be made where use of any and all LID practices that retain water onsite, including evapotranspiration and capture, is infeasible.

Second, this section would allow for measures that do not retain water onsite, described by the Permit as "other LID BMPs," to count toward the design capture requirement. Practices that allow for the discharge of any volume of stormwater to receiving waters would have to be 100% effective at removing pollutants—a condition almost certain not to be attained—in order to provide the equivalent water quality benefit derived from retaining the same volume of stormwater onsite. The Permit should be revised such that it clearly states that only water

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[1] U.S. Environmental Protection Agency (December 2007) *Reducing Stormwater Costs through Low Impact Development (LID) Strategies and Practices*, at v.

[2] Letter from Douglas E. Eberhardt, EPA, to Michael Adackapara, Santa Ana Regional Water Quality Control Board (February 13, 2009), at 2-3.

retained onsite may count towards the design capture requirement and that a site using BMPs that allow for offsite discharge must participate in the LID Waiver Program to address the volume not retained onsite.[3]

Of particular concern in this regard is that the Permit does not define the term "LID BMPs." As a result, the Permit would allow virtually any practice, potentially including conventional stormwater management techniques, which have been demonstrated to be far less effective at removing pollutants than LID-based retention practices,[4] to count toward meeting the Permit's design capture requirement. While we argue here that practices that do not retain stormwater onsite, such as biofiltration, should not count towards the onsite retention standard at all, should the Board determine to allow the use of such practices, it should clearly define the term "LID BMPs," or more appropriately, delete the phrase and explicitly state which practices may be used. The Board should additionally ensure that conventional or structural treatment practices that are not LID based may not count toward the Permit's LID requirements.

Further troubling is that, in allowing "LID BMPs" to count toward the design capture requirement, the Permit includes no performance requirements or metrics, and requires only that "other LID BMPs [shall be] sized to hold the design storm volume that is not infiltrated," or that "LID BMPs must be designed for an appropriate surface loading rate to prevent erosion, scour and channeling within the BMP." Permit at ¶ F.1.d.(4)(c)(ii). The Permit should be revised to require that, in addition to the above standard, any practices that allow for the discharge of stormwater in-lieu of onsite retention must, at a minimum, reduce the pollutant load in such discharge to equivalent levels as would be achieved through use of onsite retention. The Board should further ensure that discharges resulting from other BMPs not contribute to erosion or other volume based impacts to receiving waters, as opposed to impacts only within the BMP.[5] Given that practices that do not incorporate onsite retention have been shown to be less effective at reducing pollution in stormwater runoff, we suggest that biofiltration or other practices allowing for discharge of runoff may be allowed, if at all, only if accompanied by a "multiplier"

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[3] We do not oppose the use of, for example, biofiltration as a means of addressing stormwater runoff when onsite retention of the design storm is demonstrated to be technically infeasible, however, when biofiltration is used it should trigger a requirement to provide alternative or in-lieu compliance under Section F.1.d.(7) and should not be a means of satisfying these requirements.

[4] R. Horner, *Investigation of the Feasibility and Benefits of Low-Impact Site Design Practices ("LID") for Ventura County* (February 2007); R. Horner, *Investigation of Low-Impact Site Design Practices for the San Diego Region* (2008).

[5] This approach was recently adopted by the Los Angeles Regional Board in Order No. R4-2010-0108, the Ventura County MS4 Permit, which requires that use of biofiltration practices that discharge a portion of the design capture volume must achieve equivalent environmental benefits as would onsite retention practices. Los Angeles Regional Water Quality Control Board, Order No. R4-2010-0108, at E.III.1.(b).

or "mitigation factor," requiring treatment of between 1.5 to 2.0 times the volume required to be treated through onsite retention.[6]

2. The Low Impact Development Waiver Program Should Require Use of Practices that Retain Water Onsite

The Permit requires that the "LID waiver program must clearly exhibit that it will not allow Priority Development Projects to result in a net impact (after consideration of any mitigation) from pollutant loadings over and above the impact caused by projects meeting LID requirements." Permit at ¶ F.1.d.(7)(a). While we support the use of a performance requirement for waiver projects in general, we note that as currently drafted, the Permit allows for its "LID Requirements" to be met through use of unspecified "LID BMPs" with no express performance requirement or standard. We suggest, in order to ensure that any alternative or in-lieu program adequately protects surface waters in Riverside County, that the Permit language be changed to state that Priority Development Projects shall not result in a net impact "from pollutant loadings over and above the impact caused by projects meeting the onsite LID retention requirements." This requirement would tie use of alternative or in-lieu programs specifically to achieving equivalent benefits to onsite retention, and remove any confusion over what standard of performance is required under this provision of the Permit.

Further, the Permit's inclusion of a provision allowing for a LID waiver program to authorize implementation of either "an off-site mitigation project," or "other mitigation developed by the Copermittees" should be clarified to require that any such project or mitigation measure must incorporate practices that result in the onsite retention of stormwater runoff equivalent to the volume not retained onsite by the Priority Development Project.

Such a move could help to ensure compliance with the Clean Water Act, would protect Riverside County's aquatic resources, and would further serve important policy goals of the State. Given our current state of drought, Governor Schwarzenegger has issued a proclamation calling on water agencies to take additional actions to protect and enhance water supplies.[7] By requiring offsite mitigation through practices that retain stormwater runoff, captured or infiltrated water could be used to increase water supplies through onsite use or recharging groundwater, in furtherance of this goal. In contrast, the draft Permit would currently allow most or all of that water to be discharged through use of biofiltration or "other LID BMPs," without any volume retained to increase water supplies.

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[6] *Id*. See Also, State of West Virginia (June 22, 2009) Department of Environmental Protection, Division of Water and Waste Management, General National Pollution Discharge Elimination System Water Pollution Control Permit, NPDES Permit No. WV0116025 at 15.

[7] Gov. Arnold Schwarzenegger, Proclamation, State of Emergency: Water Shortage, Feb. 27, 2009, available at http://gov.ca.gov/proclamation/11557.

Conclusion

We appreciate the efforts made to date to implement sound LID standards in the Permit, and would be pleased to respond to any questions you may have about our comments. We believe the above suggested changes will significantly improve the effectiveness of the permit, and we urge that the Board implement these modifications before it is adopted.

Sincerely,

Noah Garrison
Natural Resources Defense Council

CITY OF MURRIETA

September 2, 2010

Mr. David King, Chairman
California Regional Water Quality Control Board
San Diego Region
9174 Sky Park Court, Suite 100
San Diego, CA 92123-4353

RE: COMMENTS TO PROPOSED TENTATIVE ORDER NO. R9-2010-0016, REISSUANCE OF RIVERSIDE COUNTY MS4 NPDES PERMIT

Dear Honorable Board Members:

The City of Murrieta is pleased to have this opportunity to comment on the draft of the Riverside County Municipal Separate Storm Sewer System (MS4) Permit, Tentative Order R9-2010-0016. City staff has reviewed the MS4 permit and has serious concerns about the financial implications on our region. Based on our research, the new requirements will significantly increase the City's program cost, and it is doubtful the City will be able to comply with the MS4 permit as drafted.

The City is committed to effectively utilizing public funds for the various services our citizens require, including the protection of our natural resources such as our water quality. The proposed MS4 permit, however, would require the City to expend significant additional resources, while the current and forecasted economic conditions have constrained our ability to meet the basic needs of our citizens. The City has been forced to make significant budget reductions due to reductions in sales tax and property tax revenue. The proposed MS4 permit will drastically increase our program cost, likely by twice the current budget.

On several occasions, Regional Water Quality Control Board (RWQCB) staff has stated their desire is to have similar requirements in all three MS4 permits issued by the Board, yet scaled or focused as appropriate to each region. Yet the proposed MS4 permit seems to contradict that goal. Recently, RWQCB issued Order R9-2009-001 to the south Orange County MS4 permittees. R9-2009-001, by our analysis, is less stringent. This despite the fact that Orange County has double the population of Riverside County with much higher property tax revenues to be able to budget for the necessary programs to comply with the permit. These metrics (population and tax revenues) often determine the strength of such programs. Unfortunately, these metrics do not appear to be considered in the proposed MS4 permit for Riverside County.

RWQCB staff has expressed their opinion that the cities are able to create new fees or tax assessments to pay for the requirements they have placed in the proposed MS4 permit. We strongly disagree with this assertion. Fees can only be collected from new development if there is a nexus to offset impacts created by development. There is simply no mechanism to impose a new fee or assessment on existing development to fund the stormwater program. Furthermore, due to Proposition 218, any tax or fee increase must be approved by the voters. California history has not

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been sympathetic to those cities that have attempted to increase clean water fees. For example, the City of Encinitas, a relatively prosperous coastal city, attempted to pass a clean water fee in 2006, and it was defeated by 61 percent of the voters at a time when the economy was doing well. It does not bode well to think that voters in Riverside County would approve a fee increase during one of the worst economies in the history of our nation.

Due to the historic decrease in property tax and sales tax revenues, the primary funding mechanism for the City to implement programs, it is unlikely we would be able to comply with the proposed MS4 permit. In order to do so, the City would have to make budget cuts to other programs. Considering we have already considerably cut our budget two years in a row, implemented layoffs and furloughs, and put other cost savings measures into practice, a further decrease to critical city services to fund the additional requirements is impractical. Of greatest concern to the City is that the proposed MS4 permit does not take the current economic climate into consideration, and yet has more costly and stringent requirements than other permits throughout the region that are more suitable to fund such programs. In our opinion, this seems inequitable and unfair.

The City of Murrieta joins the vast majority of Californians in supporting a balanced, cost-effective strategy to guarantee clean water. However, we remain concerned that the MS4 permit will impose additional costs on the City that we cannot afford at this time. Additionally, it seems the new regulations are inequitable compared to other regions. Therefore, the City is opposed to the proposed permit in its current form. Increasing the cost to the public on a region that is one of the hardest hit during this economic crisis seems excessive. Instead, the City would be more supportive of efforts that would phase in requirements once revenue levels can support the additional costs. Moreover, we request that the Board direct their staff to prioritize what permit requirements are necessary to address the most critical issues that will give the most efficient use of available funds. This will allow the City to allocate the funds they have for these programs while not increasing current expenditures.

Thank you again for the opportunity to comment on the MS4 proposal. The City of Murrieta looks forward to working towards a solution with the Regional Water Quality Control Board on this issue. If I can be of any assistance, please do not hesitate to contact me at (951) 461-6015.

Respectfully,

Kelly A. Bennett

Kelly A. Bennett, Esq.
Mayor

Cc: City Council
Dave Gibson, Dave Barker, Chiara Clemente, Ben Neil, Chad Loften, and Wayne Chiu: San Diego Regional Board Staff
Rick Dudley, City Manager
Jim Holston, Assistant City Manager
Patrick Thomas, Director of Public Works
Bill Woolsey, Associate Engineer

Construction Industry Coalition on Water Quality

September 7, 2010

David Barker, Supervising Water Resources Control Engineer
San Diego Regional Water Quality Control Board
9174 Sky Park Court, Suite 100
San Diego, CA 92123

Public Comments Regarding Tentative Order R9-2010-0016, Waste Discharge Requirements for Discharges from the Municipal Separate Storm Sewer System (MS4); the National Pollutant Discharge Elimination System (NPDES) MS4 Permit No. CAS0108740, to the County of Riverside, the Riverside County Flood Control and Water Conservation District, and the Cities of Murrieta, Wildomar, and Temecula

Dear Mr. Barker:

On behalf of the more than 3,000 member companies of the Construction Industry Coalition on Water Quality (CICWQ), we would like to thank the San Diego Regional Water Quality Control Board (Regional Board) for the opportunity to offer this public comment on the revised tentative order (Tentative Order or Permit) No. R9-2010-0016. This letter provides brief constructive suggestions that we have for the Tentative Order and is in support of those comments (written and oral) that we have made to the Regional Board previously on several occasions during the South Orange County MS4 permit adoption process (permit adopted in December 2009).

We have concerns with the Tentative Order relating to the implementation of Low Impact Development (LID) best management practices as described in Program Provisions, F.1.d.(4). Of these concerns, the principal issues that we raise here are: i) the exclusion of economic feasibility when a project proponent is required to evaluate and install LID best practices and; ii) the requirement for onsite retention of stormwater with no discharge.

Exclusion of Economic Feasibility in Considering Appropriate LID BMPs

The exclusion of economic feasibility in provisions F.1.d.(4)(a), F.1.d.(4)(c), and F.1.d.(7)(b) is readily apparent (only technical feasibility is mentioned) and we urge correction and explicit recognition of conducting both technical and economic feasibility analysis when evaluating the appropriate combination of LID controls that meet the Permit's performance sizing criteria as defined in F.1.d.(4)(c). In particular, the Tentative Order requires in F.1.d.(4)(a) that "each copermittee must require LID BMPs or make a finding of technical infeasibility for each priority development project" and in F.1.d.(4)(c) that "if onsite infiltration LID BMPs are technically infeasible per section F.1.d(7)(b), other LID BMPs may be allowed for use to treat stormwater onsite provided that other LID BMPs are sized to hold the design storm volume that

is not infiltrated." In both instances, economic feasibility is excluded and this omission must be corrected given the importance of balancing technical and economic feasibility. In fact, the San Diego Regional Board recognized the importance of economic feasibility in the South Orange County MS4 permit and included the following language in the adopted permit (R9—2009-0002, Section F.(7)(b)):

"For each PDP participating, a technical feasibility analysis must be included demonstrating that it is technically infeasible to implement LID BMPs that comply with the requirements of Section F.1.(d)(4). ***The Copermittee(s) must develop criteria for the technical feasibility analysis including a cost benefit analysis, examination of LID BMPs considered and alternatives chosen****." (Emphasis added).*

We ask that the Board make the south Riverside County permit language at least consistent with that included in the adopted south Orange County MS4 permit and explicitly allow economic feasibility to be considered when evaluating appropriate LID BMPs to meet the onsite performance standard.

Onsite Retention of Stormwater with No Discharge

We appreciate the Board's recognition in the Fact Sheet that properly engineered LID filtration BMPs are available to a project developer to meet the LID performance standard. However, we are troubled by the pervasive use of the terms "without runoff" and "hold the design storm volume that is not infiltrated" in the Tentative Order. These terms continue to propagate the incorrect application of LID in that stormwater that has undergone filtration and/or treatment cannot be of equal or better quality than that retained on site given the performance criteria specified in F.1.d.(4)(c). We again urge the Regional Board to eliminate these terms and expressly allow biofiltration and biotreatment LID practices to meet the onsite performance standard without having to perform an exhaustive technical and economic feasibility analysis and to not relegate these controls to a lesser status.

If you have any questions or want to discuss the content of our comment letter, please feel free to contact me at (909) 525-0623, or mgrey@biasc.org.

Respectfully,

Mark Grey, Ph.D.
Technical Director
Construction Industry Coalition on Water Quality

THE CITY OF SAN DIEGO

September 7, 2010

Electronic Submission to: bneill@waterboards.ca.gov

Mr. David Gibson, Executive Director
San Diego Regional Water Quality Control Board
9174 Sky Park Court, Suite 100
San Diego, CA 92123

Ben Neill, WRC Engineer
San Diego Regional Water Quality Control Board
9174 Sky Park Court, Suite 100
San Diego, CA 92123

Dear Sirs:

Subject: City of San Diego Comments on the Tentative Municipal Storm Water Permit for Riverside County (NWU:749045:bneill)

The City of San Diego wishes to provide the Regional Water Quality Control Board with comments regarding the tentative Riverside County Municipal Storm Water Permit. We understand the need to continue moving forward with water quality improvements and want to work with you on permit revisions to maximize our water quality efforts in a cost effective and efficient manner.

If you have any questions or require more information, please don't hesitate to contact me at (858) 541-4328.

Sincerely,

Ruth Kolb
Program Manager

Enclosure: City of San Diego Comments on Draft Riverside County Municipal Permit (Tentative Order No. R9-2010-0016)

cc: Tony Heinrichs
Kris McFadden
Drew Kleis
Chron File

CITY OF SAN DIEGO COMMENTS ON DRAFT RIVERSIDE COUNTY MUNICIPAL PERMIT (TENTATIVE ORDER NO. R9-2010-0016)				
Permit Section	**Permit Page**	**Section Title/Topic**	**Reason for Proposed Changes/Comments**	**Comments/Proposed Changes**
FINDINGS				
D.3.	10	Construction & Existing Development	Make findings consistent with JRMP.	Provide separate sections for Construction vs. Existing Development.
D.3.c.	11	Construction & Existing Development	Definition of "urban stream" contradicts 40CFR 122.	Provide clearer definition as to what an "urban stream" is.
DISCHARGE AND LEGAL PROVISIONS				
B.2.	18	Non-Storm Water Discharges	Discharge category found to be a source of pollutants requires implementation of appropriate control measures to **prevent** the discharge of pollutants to the MS4.	Should state: Implement appropriate control measures to **reduce** the discharge of pollutants to the **MEP**.
B.2.foot note 8	19	Non-Storm Water Discharges	Discharges into MS4 require authorization from owner and operator of the MS4 system, specifically for uncontaminated pumped ground water, foundation drains, and water from crawl space pumps.	Support change, and recommend that dischargers are required to obtain authorization prior to the commencement of the discharge.
B.3.a.	19	Non-Storm Water Discharges	States that building fire suppression system maintenance discharges contain **waste** and must be prohibited.	Not clear what **waste** the discharges contain and the basis for prohibiting it.
B.4.	19	Non-Storm Water Discharges	Must identify and **control** any non-prohibited discharge that creates water quality problems.	Should define what is meant by **control** the discharge.
C.2.c.	20	Non-Storm Water dry weather Numeric effluent limitations	This requires the Copermittee to determine whether a discharge type should be exempt.	This is the responsibility of the Regional Board.
C.4.	21	Non-storm water dry weather numeric effluent limitation	Copermittees must develop monitoring plans to sample a representative percentage of major outfalls and identified stations within each hydrologic subarea.	Make consistent with 40CFR.
C.5 Tables 3a.1, 3.a.2	22	Non-Storm Water dry weather Numeric effluent limitations	The NELs as defined are receiving water standards. This would apply receiving water standards to the water within the MS4. Some of the NELs are not appropriately applied. (Fecal Coliform 400 for AMEL, this is a single sample standard not an average standard).	There needs to be a way to account for receiving water quality.

CITY OF SAN DIEGO COMMENTS ON DRAFT RIVERSIDE COUNTY MUNICIPAL PERMIT (TENTATIVE ORDER NO. R9-2010-0016)				
Permit Section	**Permit Page**	**Section Title/Topic**	**Reason for Proposed Changes/Comments**	**Comments/Proposed Changes**
C.5.a.	22	Discharges to inland surface waters	Non-storm water discharges from MS4 to inland surface waters	What about when an MS4 flow discharges to dry sediment and not to actual water?
C.5.	22	Table 3.a.1	Need to define WARM & COLD water for DO effluent limitations.	Should use > < with specific temperatures.
C.5.a.	22	Table 3.a.1	Fecal coliform AMELs are inappropriate for multiple reasons.	Imposes AB411 standards for Rec 1 waters on non-storm water, non-recreational flows. If it must be applied then B should move to Instantaneous Maximum column.
C.5.a.	22	Table 3.a.1	Enterococcus inappropriately set to Ocean Plan Designated beach area standards.	This is non-storm water, non-recreational flow. Why is it being held to beach standards when 5+ years of paired sampling data do not indicate strong links between even higher levels of bacteria than being allowed, and detected AB411 exceedances.
C.5.a.	22	Table 3.a.1	MDEL limits.	Where are MDELs defined in 40CFR?
C.5.a.	22	Table 3.a.1	Table 4.a.1 does not list an instantaneous maximum for Fecal Coliform .	Should list a maximum if less than 5 samples collected in 30-day period.
C.5.a.	22	Table 3.a.1	Table 4.a.1 subject storm drain flows to the very stringent AB-411 Rec-1 Criteria standards.	The maximums should be adjusted to attainable limits.
C.5.a.	22	Table 3.a.1	Turbidity.	What is the justification for turbidity limitations in Region 9 being so much lower than other regions in the state?
C.5.a.	22	Non-Storm Water Dry Weather Numeric Effluent Limitations	..freshwater criteria are based on site-specific water quality data (**receiving** water hardness).	Should be changed to **effluent** water hardness.
C.5.a	22	Table 3.a.1	pH.	6.5-8.5 for freshwater 6-9 for saline waters – based on?
D.1.	23	Storm water Action Levels	This requires "implementation of all necessary storm water controls and measures to reduce…" when there is no evidence of a receiving water exceedance. The assessment point is "end-of-pipe" and SALs do not have any justification for applicability.	This seems to require an action when there is no evidence of a receiving water violation.
D.Table 4	23	Storm water Action Levels	Metals SALs are in direct contradiction with statement on "table 3.a.2: Priority Pollutants" page 22	Contradiction between NEL section and SAL in terms of metals values.

CITY OF SAN DIEGO COMMENTS ON DRAFT RIVERSIDE COUNTY MUNICIPAL PERMIT (TENTATIVE ORDER NO. R9-2010-0016)				
Permit Section	**Permit Page**	**Section Title/Topic**	**Reason for Proposed Changes/Comments**	**Comments/Proposed Changes**
D.2.	23	Storm Water Action Levels	"...assessment points for determination of SAL compliance are all major outfalls...." Seems to contradict the following sentence "...monitoring plans to sample a representative percent of the outfalls...."	Sentences seem to contradict each other.
D.5.	25	Storm Water Action Levels	"...to have outfall storm water discharges meet all applicable water quality standards."	This applies receiving water standards to the storm drain.
F.1 – DEVELOPMENT PLANNING				
d(2)(d).	31	Hillside development category	It is not clear what is intended to be included this category. A steep hillside development with known erosion soil conditions would need to address erosion. Treatment control and hydromodification requirements are not justified.	Remove this from the Priority Development Project Categories, and define elsewhere in Section F.1 how these projects would need to include measures that protect slopes from erosion.
d(4)(c)(i).	33	Retention of 85th percentile storm event	Retention of the 85th percentile storm event does not mimic the natural hydrology. The amount of runoff under natural conditions is dependent on soil type and other factors.	Retention requirements should be revised with intent of matching hydrology under natural conditions.
d(7).	37	LID waiver program	It may be unrealistic for municipalities to implement the various processes required under this section within the amount of time allowed.	Provide a feasible time schedule for municipalities to put such a program in place.
F.2 – CONSTRUCTION				
d(1)(c)(i).	50	AST mandate	It is neither wise nor necessary to mandate use of a particular technology for managing sediment from construction sites. The Construction General Permit has adequate and more appropriate measures for ensuring sediment discharges will not create a pollution problem.	Remove the requirement that Copermittees mandate use of AST. Allow Copermittees to rely on the Risk based approach that was developed for the Construction General Permit, which does not mandate a particular technology.
e(2).	49	Inspection of Construction Sites	This section requires inspection of construction sites of 1 acre or more at least monthly	Propose language that is definitive and require construction site inspections monthly for sites of 1 acre or more
F.3.a – EXISTING DEVELOPMENT: MUNICIPAL ACTIVITIES				
(3).	55	BMP Implementation for Management of Pesticides, Herbicides and Fertilizers	Reduction of pesticides, herbicides, and fertilizers into the storm water to the MS4 and receiving waters.	Support inclusion of "storm water" and "and receiving waters" in the opening paragraph.

CITY OF SAN DIEGO COMMENTS ON DRAFT RIVERSIDE COUNTY MUNICIPAL PERMIT (TENTATIVE ORDER NO. R9-2010-0016)				
Permit Section	**Permit Page**	**Section Title/Topic**	**Reason for Proposed Changes/Comments**	**Comments/Proposed Changes**
(6)(b)(i).	56	Operation and Maintenance of Municipal Separate Storm Sewer System and Structural Controls	Inspecting and cleaning all MS4 facilities between May 1 and September 30 is infeasible for those Copermittees that have tens of thousands of structures.	Inspection and removal of accumulated waste at least once a year between May 1 and September 30 of each year for ~~all~~ MS4 facilities that receive or collect high volumes of trash and debris.
(7).	54	Infiltration From Sanitary Sewer to MS4/Provide Preventative Maintenance of Both	Sections (a) and (b) are redundant.	Delete Section (b) as the implementation of the provisions in Section (a) would maximize pollutant reductions by providing greater flexibility to Copermittees to manage their programs.
F.3.b – Existing Development: Commercial/Industrial				
F.3.c – EXISTING DEVELOPMENT: RESIDENTIAL				
F.3.d – RETROFITTING EXISTING DEVELOPMENT				
F.4 – ILLICIT DISCHARGE DETECTION AND ELIMINATION				
d.	67	Dry Weather Field Screening and Analytical Monitoring	Paragraph makes a reference to attachment E, which does not in fact contain a description of this particular program.	Include a description of the Dry Weather Field Screening and Analytical Monitoring Program in Attachment E.
e.	67	Investigation/Inspection and follow-up	...based on results of **field screening**...	Field screening is not included as a component of any monitoring programs and should be removed from this sentence.
e.	67	Investigation / Inspection and Follow Up	References a monitoring effort that does not exist anywhere else in the permit (field screening)	The inconsistency in the permit for the different programs and the referenced sections need to be straightened out. Add description of referenced program to Attachment E.
e(1).	72	Develop response criteria for data	Contradictory paragraph. Numeric action levels must be developed, but "the criteria must consider numeric effluent limitation (see Section C)".	The NELs from Section C or develop numeric action levels? Recommend selecting one criteria.
F.5 – PUBLIC PARTICIPATION				

CITY OF SAN DIEGO COMMENTS ON DRAFT RIVERSIDE COUNTY MUNICIPAL PERMIT (TENTATIVE ORDER NO. R9-2010-0016)				
Permit Section	**Permit Page**	**Section Title/Topic**	**Reason for Proposed Changes/Comments**	**Comments/Proposed Changes**
G. – WATERSHED RUNOFF MANAGEMENT PLAN				
G.2.	73	Watershed Water Quality Workplan	The workplan is for development of a BMP strategy and implementation of BMPs to improve urban runoff water quality contributions to the receiving water. Calling it a "Water Quality" workplan is misleading because the regulated parties under this permit are not responsible for every contribution to every water body in the entire watershed. The requirements should focus on urban runoff contributions to the receiving waters for which the regulated parties are responsible.	Revise the section to state: The Watershed Workplan shall describe the Permittees' development and implementation of a collective watershed strategy to assess and prioritize the water quality problems due to runoff discharging to the watershed's receiving waters, identify and/or model sources of the highest priority water quality problem(s), develop a watershed-wide BMP implementation strategy to abate highest priority water quality problems and the relative contribution from runoff discharges, and a monitoring strategy to evaluate BMP effectiveness and changing water quality prioritization in the WMA.
1.e.	72	Develop strategy to model and monitor improvements	The use of the word "proper" for installation of BMPs is subjective and not defined by this permit. There may be many different ways to "properly" design and install a BMP, and the regulated parties may or may not choose to test different ways for each BMP to determine which works best.	Revise to state: Develop a strategy to model and/or monitor improvements in runoff discharge quality resulting from implementation of the BMPs described in the Watershed Workplan. The modeling and/or monitoring strategy shall generate the necessary data to report on the measured pollutant reduction that results from BMP implementation.
H. – Fiscal Analysis				
I. – Total Maximum Daily Loads				
J. – Program Effectiveness Assessment				
K. – Reporting				
1.b.	77	Watershed Workplans	The reference to a watershed workplan should use a consistent naming convention. It is referred to as a "Watershed Workplan" in Section K.1.b., and a "Watershed Water Quality Workplan" in Section G.2.	The reference to a watershed workplan should use a consistent naming convention.
L. – MODIFICATION OF PROGRAMS				

CITY OF SAN DIEGO COMMENTS ON DRAFT RIVERSIDE COUNTY MUNICIPAL PERMIT (TENTATIVE ORDER NO. R9-2010-0016)				
Permit Section	**Permit Page**	**Section Title/Topic**	**Reason for Proposed Changes/Comments**	**Comments/Proposed Changes**
M. – PRINCIPAL COPERMITTEE RESPONSIBILITIES				
N. – RECEIVING WATERS MONITORING AND REPORTING PROGRAM				
O. – STANDARD PROVISIONS, REPORTING REQUIREMENTS, AND NOTIFICATIONS				
Attachments (A Through E)				
E. II. A.1.g, Table 1	5	Mass Loading Station Monitoring	Typo at the base of the table: "Nitrate and nitrate may be combined…"	Change to: "Nitrite and nitrate may be combined…"
E.II.B.1.b.	12	MS4 Outfall Monitoring	Comparing Metals SALs with CTR values	Question is if you can use the "1 hour maximum concentration" criteria in this way?
E.II.C.a. (1).	13	Dry weather non-storm water effluent analytical monitoring stations	"Stations must be all major outfalls" plus "other outfall points…"	This far exceeds CWA 500 point maximum for dry weather monitoring.
E.II.C. b.2.	13	Dry weather non-storm water effluent analytical monitoring stations	If flow is evident a 1 hour composite sample may be taken.	Should elaborate on sampling procedures for flowing outfalls.
E.II.C.b. (2).	13	Dry weather non-storm water effluent analytical monitoring stations	"if flow is evident a 1 hour composite sample may be taken"	There is no definition of what comprises a composite sample. This would significantly increase this program.

COUNTY OF RIVERSIDE

TRANSPORTATION AND LAND MANAGEMENT AGENCY

Transportation Department

0005508

Juan C. Perez, P.E., T.E.
Director of Transportation

September 7, 2010

Chairman David King and Members of the Board
San Diego Regional Water Quality Control Board
Attn: Executive Director Gibson
9174 Sky Park Court, Suite 100
San Diego CA 92123-4353

RE: Draft Tentative Order No. R9-2010-0016 (NPDES No. CAS0108740) - Proposed Unpaved Road Requirements

Dear Mr. Gibson:

The Riverside County Transportation Department has reviewed the proposed requirements applicable to unpaved roads presented in the Draft Municipal Separate Storm Sewer System Permit (Draft Tentative Order No. R9-2010-0016 (NPDES No. CAS0108740) for the Santa Margarita Region of Riverside County (Draft MS4 Permit) and has identified several major concerns. We appreciated the opportunity to meet recently with you and staff to discuss our concerns. Primarily, they have to do with requirements being imposed through this permit that go well above-and-beyond what is required in the Orange County permit to regulate the operation and maintenance of unpaved roads.

SUMMARY

There are many different categories of unpaved roads within the unincorporated County area. These include County-Maintained unpaved roads, dedicated and accepted public roads (which are not County maintained), roads dedicated but not accepted, private roads, utility access roads, roads through tribal lands, and others. These roads are maintained by numerous entities besides the County, such as Homeowners Associations, Quasi-public entities like County Service Areas, Community Service Districts, public and private utilities, Tribes, and in many cases, individual property owners. The County in fact is prohibited by law from spending general gas tax dollars (our main funding source) for maintenance of roads not in the County Maintained Road System, and is not financially able to take on new unpaved roads into the County Maintained System until they are improved to County Standards.

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The proposed permit requirements would therefore impose an undue and substantial regulatory burden on the County and would create a class of potential unwitting "violators" that are not familiar with these requirements, including hundreds if not thousands of property owners that have been maintaining unpaved roads for many decades as needed to access their property. The special requirements for development and maintenance of unpaved roads were proposed by Regional Board staff for inclusion in the draft MS4 Permit very late in the process, after a number of weeks of discussions on the overall permit language and just prior to release for the Santa Margarita Region for public comment. During those discussions, unpaved roads were not raised by Regional Board staff as a source requiring additional regulatory attention.

Given the complexity of these jurisdictional issues, and the number of stakeholders that would be impacted, we respectfully request that the regulation of unpaved roads be removed from this permit. Alternatively, unpaved roads could be considered as part of a separate general permit to allow for proper stakeholder involvement and vetting, at the least within those areas of the permit (see below) that have to do with maintenance provisions. Given the complexity of this issue and the impact on thousands of properties, another option is to achieve a water quality benefit through education programs, not using limited resources on regulation and enforcement. We also note that unpaved road regulation was not included in the recent Orange County permit. Orange County receives approximately 8 times the amount of funding on a per mile basis towards their County-Maintained roads as does Riverside County, so imposing additional requirements on the Riverside County permit magnifies the undue regulatory and financial burden.

The Draft MS4 Permit includes requirements for unpaved roads that are either redundant to existing regulatory requirements or that impose new regulation requirements at a time that the County can ill afford to start new programs. The language proposed needs clarification to avoid potential misinterpretations that may result in operational disruptions to the transportation system and/or compliance costs way out of proportion to the potential impact on receiving water quality. Although the Department supports implementation of erosion and sediment control best management practices (BMPs) as appropriate for development of new unpaved roads, it does not agree that the statements in the Fact Sheet and Findings support identification of unpaved roads as a significant source of pollutants warranting special regulation. The following summarizes the Department's specific concerns and perspectives.

UNPAVED ROAD DEVELOPMENT REQUIREMENTS

Requirements for the development of unpaved road projects are addressed in section F.1.i. on page 45 of the Draft MS4 Permit. This requirement states:

i. Unpaved Roads Development

The Copermittees must develop, where they do not already exist, and implement or require implementation of erosion and sediment control BMPs after construction of new unpaved roads. At a minimum, the BMPs must include:

(1) Practices to minimize road related erosion and sediment transport;
(2) Grading of unpaved roads to slope outward where consistent with road engineering safety standards;
(3) Installation of water bars as appropriate;
(4) Unpaved roads and culvert designs that do not impact creek functions and where applicable, that maintain migratory fish passage;

It is our contention that construction of new unpaved roads is already adequately regulated through development regulations. New unpaved roads built through development fall under the definition of a "project", and as such are already required to develop and implement project-specific SUSMPs, which include identification of BMPs in the same manner as required of other development projects. Unpaved road projects are also required to comply with the General Permit-Construction which requires preparation of a SWPPP. These requirements are implemented by the Permittees during the development review process and in issuance of grading permits. We also note that the development process already achieves a gradual "retirement" of unpaved roads, as the County requires in many cases that new development replace unpaved access roads with paved access.

Additional separate requirements for development of unpaved roads are redundant to these requirements and may only complicate compliance. However, if the Board wishes to include permit language to further clarify what is already required through these permits, we would be pleased to work with the Board to help craft appropriate language.

UNPAVED ROAD MAINTENANCE

This is our primary issue of major concern, particularly since the proposed language would appear to impose regulatory requirements on roads that are not part of the County Maintained Road System that we operate.

Requirements for the maintenance of unpaved road projects are addressed in section F.3.a.(10) on page 56 of the Draft MS4 Permit. This requirement states:

(10) Unpaved Roads Maintenance

(a) The Copermittees must develop, where they do not already exist, and implement or require implementation of BMPs for erosion and sediment control

measures during maintenance activities on unpaved roads, particularly in or adjacent to receiving waters.
(b) The Copermittees must develop and implement or require implementation of appropriate BMPs to minimize impacts on streams and wetlands during unpaved road maintenance activities.
(c) The Copermittees must regularly maintain their unpaved roads adjacent to streams and riparian habitat to reduce erosion and sediment transport;
(d) Re-grading of unpaved roads during maintenance must be sloped outward where consistent with road engineering safety standards;
(e) Through their regular maintenance of unpaved roads, the Copermittees must examine the feasibility of replacing existing culverts or design of new culverts or bridge crossings to reduce erosion and maintain natural stream geomorphology.

As we have stated, this issue should be addressed through a broad general permit or an education program. However, if the Board finds it necessary to impose additional permit requirements on maintenance activities, which go well beyond the Board's previous definitions of a "project", we respectfully request that this language be re-written to make it clear that it applies to those roads within the County (or City) Maintained Road System.

UNPAVED ROADS ARE NOT A SIGNIFICANT SOURCE OF WATER QUALITY IMPAIRMENT

Findings D.1.C, pg 57-59, states:

> "During the previous permit period, the San Diego Water Board identified, through investigations and complaints, sediment discharges from unpaved roads as a significant source of water quality problems in the Riverside County portion of the San Diego Region. Enforcement and inspection activities conducted by the San Diego Water Board during the previous permit term have found a lack of source control for many unpaved roads within the jurisdiction of the Copermittees".

The Department supports the continued application of development and construction requirements and maintenance of temporary post-maintenance erosion and sediment control BMPs as specified in existing permits. However, we do not believe that sufficient justification has been presented to support the identification of unpaved roads as a significant source of water quality problems in the Santa Margarita Region. In these days of uncertain state funding and dwindling local funding sources, every dollar spent on additional regulatory requirements needs to be weighed against the benefit of otherwise using funding on basic public health-and-safety needs such as road maintenance and safety improvements.

The discussion of Finding D.1.c. states that the inclusion of unpaved road requirements were based on findings by the San Diego Regional Board during typical compliance assurance activities, audits, or receipt of complaints. However no feedback from these activities were reported to the Permittees at the MS4 Permit discussions prior to the proposal of the unpaved road requirements just before the draft permit was released.

The Department has reviewed the documents cited by Regional Board staff in the discussion of Finding D.1.c. and the conditions in the Santa Margarita River are vastly different from those in Pennsylvania and Northern California cited in those documents. Nevertheless, these documents do not suggest that unpaved roads are a significant source requiring special attention in MS4 permits. Further, neither the Permittee's monitoring data nor our observations support a conclusion that unpaved roads are a significant source of pollutants warranting special regulatory attention and we request that this finding be deleted unless significant data specific to the Santa Margarita Region can be produced. In particular, the Department requests a copy of the investigations and complaints along with the data that supports a significant source of water quality problems on unpaved roads, including a listing of roadways where water quality problems have been identified.

Thank you for the opportunity to review and comment on the Draft MS4 Permit. The County of Riverside Transportation Department is committed to managing the roads and highways within our County Maintained Road System in a manner that protects water quality. Our goal is to work constructively with the Regional Board staff to improve the effectiveness with which we address water quality issues, and put limited public and private dollars into those programs that provide the best return. We would be pleased to meet with you to discuss regulation of unpaved roads further and to explain our unpaved road development, construction, and maintenance practices.

Please feel free to contact me or Ward Maxwell at 951-955-6740 if you have any questions regarding our comments on the proposed unpaved road requirements or our requests for modification of the draft Santa Margarita Region MS4 Permit.

Sincerely,

Juan C. Perez
Director of Transportation

CC: George A. Johnson, TLMA Director
Mike Shelter, Executive Office
Patty Romo, Deputy Director of Transportation
Ward Maxwell, Engineering Project Manager
Jason Uhley, Flood Control

WARREN D. WILLIAMS
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RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

September 7, 2010

Chairman David King and Members of the Board
San Diego Regional Water Quality Control Board
9174 Sky Park Court, Suite 100
San Diego, California 92123-4353

Dear Chairman King:

Re: Tentative Order R9-2010-0016, NPDES No. CAS0108740, Riverside County Municipal Separate Storm Sewer System Permit Reissuance *NWU:749045:bneill*

The Riverside County Flood Control and Water Conservation District (District) is submitting this comment letter on the above listed Tentative Order, on behalf of the Riverside County MS4 Permittees within the San Diego Region (Copermittees). Tentative Order R9-2010-0016 (draft MS4 Permit) was drafted by Board staff to serve as the reissuance of Order R9-2004-0001 (existing MS4 Permit) which covers the Santa Margarita Region of Riverside County. This letter was developed in consultation with the Copermittees and reflects our most critical concerns. The Board's careful consideration of these critical concerns will be appreciated.

This comment letter is organized as follows:

Executive Summary 2
Background 4
- Receiving Waters and Water quality Conditions 4
- Proactive Permittee Programs to Protect Local Resources 5
- Economic Conditions 6
- Approach to the Permit Renewal 7
- Outcome of the Discussions with Board Staff 7

Priority Issues and Solutions 8
- Monitoring and Reporting Program (Attachment 4) 8
- Unpaved Roads Requirements (Sections F.1.i., F.3.a.(11), F.3.c.(5)) 10
- Post-Construction BMP Inspections 11
- Commercial and Industrial Inspections 12
- Retrofit 15
- Irrigation Runoff 16

Conclusion 17

In addition, the following attachments provide support for our priority issues and solutions, provide additional legal comments and/or summarize additional technical changes recommended to the draft MS4 Permit. Attachment 9 is a full redline markup of the draft MS4 Permit incorporating all of our recommended edits. Attachment 9 also includes additional minor edits not found elsewhere in this letter or its attachments.

Attachment 1 – Summary of Proactive Efforts to Manage Stormwater
Attachment 2 – Economic Assessment
Attachment 3 – Language Changes Supported by Board Staff and Copermittees
Attachment 4– Monitoring and Reporting Program Requirements
Attachment 5 – Proposed Unpaved Road Requirements of the Draft 2010 Santa Margarita Region MS4 Permit
Attachment 6 – Prohibition of Irrigation Runoff
Attachment 7 – General Legal Comments
Attachment 8 – District Specific Comments
Attachment 9 – Redline Comments of MS4 Permit and Attachments
Attachment 10 - Fact Sheet Comments

EXECUTIVE SUMMARY

It is the goal of the Copermittees to obtain an MS4 permit that is both protective of the beneficial uses of the receiving waters in the Santa Margarita Region and respectful of the unprecedented economic conditions impacting the Copermittees. Further, the Copermittees have no interest in repeating the three-year Orange County MS4 Permit adoption process. In an effort to achieve our goal and head off a renewal process similar to Orange County's, the Copermittees approached David Gibson, Regional Board Executive Officer, in February 2010 regarding implementing a win-win process for developing the draft MS4 Permit.

In response, the Executive Officer authorized Board staff to meet with the Copermittees to foster communication and understanding. The Copermittees appreciate the Executive Officer's decision to dedicate staff time to meetings regarding the individual requirements of the South Orange County MS4 Permit and the appropriateness of those individual requirements to the Santa Margarita Region. The meetings provided an opportunity to foster a mutual understanding of the goals and objectives of Board staff and the capabilities and limitations of the Copermittees. As a result, the Permittees and Regional Board staff worked collaboratively to develop language for consideration in the Tentative Order.

However, the process did not resolve several significant issues due to the following constraints:

1. The process needed to be cut short as the Board expected the draft MS4 Permit to be heard in October. Copermittee staff requested that the hearing be delayed to allow the process to complete several times, but these requests were denied;

2. Regional Board staff indicated that the Board had adopted the South Orange County MS4 Permit as a model permit and, therefore, the Board would have to approve any major revisions to the provisions established in that MS4 Permit; and

3. Regional Board staff indicated that the Board would have to resolve our issues with several new provisions of the draft MS4 Permit addressing unpaved roads, inspection programs and monitoring requirements, all requirements that exceed the provisions of the Orange County MS4 Permit.

Although the collaborative process has improved the draft MS4 Permit with respect to several provisions of the Orange County MS4 Permit, Board staff also introduced several costly compliance and monitoring requirements, many of these requirements were introduced during the very latter part of the collaborative process. As described within this letter and its attachments, **the remaining issues and these new requirements result in a Permit that is economically infeasible** and has no substantiated nexus to demonstrated impairments of beneficial uses within the Santa Margarita Region caused by MS4 discharges. **At a minimum, the Priority issues outlined below must be addressed before the Copermittees can support the draft MS4 Permit.**

The Copermittees note that despite being directed to take several important issues to the Board, we have not been provided an opportunity for a formal or informal workshop before the Board. By contrast, the South Orange County MS4 Copermittees had at least three workshops and five formal hearings prior to adoption of that permit. Although we do not want to duplicate the Orange County renewal process, it is common practice to allow at least one workshop on significant permit issues before holding an adoption hearing. Given the issues outlined in this letter and in the attachments, there are numerous issues worthy of at least one workshop.

The Copermittees also have significant concern with the use of the South Orange County MS4 Permit as a model for our MS4 Permit area. As outlined in more detail throughout this letter and the attachments, the South Orange County and Santa Margarita Region MS4 Permit areas vary widely with regard to the water resources to be protected and available tax revenue to fund local programs and services, including compliance with MS4 permit requirements. Orange County has substantial coastal water resources with active recreational use, twice the population, and significantly higher tax revenues. The per capita cost for the residents within the Santa Margarita Region to comply with the requirements of the draft MS4 Permit is significantly greater than the per capita cost faced in South Orange County, with each dollar spent effectively hitting our residents three to four times harder. The expansion of regional program elements (e.g., coordination, monitoring, reporting, program development, effectiveness assessment) will result in an annual doubling of these costs, with a peak increase of nearly 300% for these programs alone. The Copermittees simply cannot economically support, nor does the Santa Margarita Region warrant, the same level of programs as South Orange County to protect our local receiving waters.

In summary, the meetings between Regional Board staff and Copermittee staff were honest, good faith and productive efforts to bridge the gaps between the requirements of the Orange County MS4 Permit and the specific needs of, and resources available to, the Upper Santa Margarita Watershed (the draft MS4 Permit area). However, given the constraints identified herein, the differing impacts on beneficial uses and current economic realities, the current draft MS4 Permit cannot be supported by the Copermittees.

> ***The Copermittees, therefore, request that the Board direct staff to work with the Copermittees to resolve the issues identified in this letter prior to considering adoption of the Permit.***

In the interest of developing economically feasible requirements for Board consideration, the balance of this letter and its attachments propose and justify changes to the draft MS4 Permit that will reduce costs to an achievable level, while continuing to raise the bar, where appropriate, to effectively protect the beneficial uses of receiving waters in the Santa Margarita Region. Please note that the Copermittees have many other concerns in addition to those identified in this letter with provisions in the draft MS4 Permit. These concerns are discussed in the Attachments to this letter, the redline of the Permit and the letters drafted by individual Copermittees.

BACKGROUND

Receiving Waters and Water Quality Conditions

This draft Permit proposes to regulate discharges from the MS4 owned by the Copermittees within the Santa Margarita Region of Riverside County. The MS4 in the Santa Margarita Region primarily discharges into Murrieta and Temecula Creeks and immediate tributaries thereto.

Unlike several of the watersheds in South Orange County, which exhibit perennial flow, the Santa Margarita Region is an ephemeral watershed. The only areas of perennial flow in the Santa Margarita Region are located at the formation of the Santa Margarita River right at the County line and in mountain areas outside of the urbanized areas serviced by the MS4s. The creeks in the urbanized areas of the watershed serviced by the MS4s are ephemeral and flows are only observed during and immediately after significant storm events. Any non-stormwater flows quickly disappear by seepage into the alluvial sands. Additionally, rising groundwater has been observed in Murrieta and Temecula Creeks for a short distance at various locations upstream of the confluence with the Santa Margarita River; however such conditions existed prior to urbanization.[1]

Since the initial MS4 permit was issued in 1990, the Copermittees have been actively and successfully implementing programs to manage their MS4 discharges. As described in the 2009 report of waste discharge (ROWD) submitted by the Copermittees, there have been no statistically

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[1] [1] State of California Department of Public Works Division of Water Resources, Bulletin No. 57, "Santa Margarita River Investigation," Volume I, June 1956, p. 48.

significant increases in pollutant concentrations since issuance of the initial MS4 permit in 1990, despite the fact that the Santa Margarita Region has experienced over 300% population growth over the same time period. Further, although staff points out several recent 303(d) listings as basis for the need to enhance regulations, these listings were based on data that mostly predates our existing management programs implemented under the 2004 NPDES MS4 Permit. Further, the Permittees have submitted additional data for the current round of listings that should result in the removal of some of these additional listings based on more recent data. Additionally, the likely sources of these impairments include natural background concentrations in soils and groundwater (iron and manganese), natural and/or agricultural source loads (nutrients, total dissolved solids, sulfates and bacteria), and/or federally authorized uses of products (pesticides and copper). Although all of these sources can have urban components, it is also clear that these sources are mostly non-point in nature and not solely urban sourced, as implied in the Fact Sheet and Findings.

Proactive Permittee Programs to Protect Local Resources

Murrieta and Temecula Creeks and their tributaries are an important economic, environmental and social resource for the Santa Margarita Region. The Copermittees are cognizant of these benefits and have implemented or initiated proactive programs beyond the requirements of the current and previous MS4 permits to ensure that these resources remain viable and are protected for future generations. These programs are described in Attachment 1 and include:

- Integrated Planning, including the development of an Integrated Regional Water Management Plan that is actively coordinated with San Diego and Orange Counties.

- Management of New Development, including a progressive LID BMP implementation program five years in the making. The program includes a comprehensive LID BMP design manual, proposed public maintenance mechanism and a $3,000,000 LID BMP Testing and Demonstration Facility.

- Water Quality Monitoring and Assessment, including active participation in the Southern California Stormwater Monitoring Coalition, California Stormwater Quality Association (CASQA) and Santa Margarita Region Executive Management Team, and including funding of several special studies designed to improve the science of stormwater management.

- Statewide Stormwater Leadership, including active leadership in promoting changes in the regulations of pesticides at the state and federal level and strong leadership and representation within the CASQA organization.

- Habitat and Aquatic Resource Conservation, including development of the largest and most comprehensive Multiple Species Habitat Conservation Plan in California.

Economic Conditions

As the draft MS4 Permit for the Santa Margarita Region of Riverside County was modeled on the MS4 Permit developed for South Orange County, it is important to carefully contrast the economic resources available to the Counties:

- The population of the Santa Margarita Region (289,765) is 48% less than the population of South Orange County (553,161).[2]

- The 2009 per capita income in Riverside County ($29,177) is 38% less than the per capita income in Orange County ($46,898).[3]

- The current unemployment rate in Riverside County is 15.3 percent, which is 56% higher than the unemployment rate in Orange County (9.8 percent).[4]

Property and sales tax revenues are the primary sources of funding for local programs and services, including compliance with MS4 Permit requirements. Based on population and average home value, South Orange County generates over <u>four times</u> the property tax revenue generated in the Santa Margarita Region. Based on data presented in the Los Angeles Economic Development Corporation's July 2010 Economic Forecast, South Orange County generates <u>2.6 times</u> the taxable sales generated in the Santa Margarita Region. As a less affluent area with a relatively small population, the Copermittees in the Santa Margarita Region receive significantly less property and sales tax revenue than municipalities in South Orange County and are less able to fund additional MS4 Permit compliance costs. These issues are discussed in detail in Attachment 2.

The recession also has impacted the economy in the Santa Margarita Region more than in South Orange County and it is projected that tax revenues will continue at a reduced level for an extended period, with **recovery not expected within the Permit term**. The poor economy has resulted in reductions of reserves to minimum levels and cuts or eliminations in virtually all local services and programs in the Santa Margarita Region. As a result any increases in funding for the water quality mandates contained in the draft MS4 Permit can come only by reducing funding for public safety or other existing state and federal mandates.

Modeling the draft MS4 Permit on the South Orange County permit represented a significant expansion of compliance requirements and compliance costs relative to the existing MS4 Permit issued to the Santa Margarita Region Copermittees. The requirements in the draft MS4 Permit have been expanded to include additional compliance and monitoring requirements beyond the South

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[2] Richard Boon, County of Orange, personal communication, September 1, 2010.
[3] Economic Forecast, Los Angeles Economic Development Corporation, July 2010.
[4] Monthly Labor Force Data for Counties, July 2010 – Preliminary, Labor Market Information Division, Employment Development Department, August 20, 2010. http://www.calmis.ca.gov/file/lfmonth/countyur-400c.pdf

Orange County permit, further increasing compliance costs. We would submit that such an approach is fundamentally unfair and could be viewed as arbitrary.

Approach to the Permit Renewal

As noted above, the Copermittees share the Board's goal of continually improving both the effectiveness and the efficiency of the MS4 compliance program. To that end, the Copermittees proposed program revisions in the ROWD that were designed to effectively manage/address the discharge of pollutants from their MS4, while making effective and responsible use of sharply reduced and further declining public funds. The ROWD recognized the Copermittees' proactive efforts and integrated those efforts into our recommendations for enhancing the MS4 Permit program. Further, the Copermittees met with Regional Board staff prior to the submittal of the ROWD in January 2009 to ensure that we had identified and addressed all of staff's concerns.

In March 2010, the Copermittees met with the Regional Board staff to discuss a collaborative process for renewing the draft Permit. At that time, the Executive Officer identified that the Board's fundamental goals for the renewal would be to develop a permit that is:

- Socially responsible;
- Environmentally responsible;
- Affordable; and
- Protective of water quality.

The Copermittees proposed initiating the discussions by focusing on the existing MS4 Permit and identifying what provisions needed to be changed to address local water quality conditions, the approach outlined in the ROWD. Regional Board staff preferred to start with the South Orange County permit and require the Copermittees to justify why programs in the Santa Margarita Region should be different than those proposed for Orange County. Regional Board staff also noted that none of the major provisions of the South Orange County permit could likely be altered, as that permit was now a model for the San Diego Region. In the interest of moving the process forward in light of the current economy, the Copermittees agreed to proceed based on the Board staff's terms.

Outcome of Discussions with Board Staff

The discussions resulted in several improvements to the draft Permit including:

- Streamlined and more useful reporting and effectiveness assessment requirements.
- Greatly improved Development Planning / Low Impact Development (LID) requirements (further discussed in Attachment 3).

- Language clarifications to more clearly state the intent of various requirements and to eliminate ambiguity.

- Enhanced understanding of the permit requirements and intent.

However, the addition of several new requirements not originally in the Orange County MS4 Permit as well as the constraints of working from within the boundaries of the existing Orange County MS4 Permit, resulted in an economically infeasible draft MS4 Permit that exceeds the water resource protection needs of the Santa Margarita Region and is too expensive for implementation by the Copermittees. Unless the permit requirements are revised to address specific local needs and resources, the Copermittees will not be able to implement the Permit requirements in a manner that is protective of water quality.

PRIORITY ISSUES AND SOLUTIONS

The Copermittees have identified specific and focused changes to the Permit that will allow the Copermittees to address staff's primary water quality concerns, while reducing compliance costs in a manner that is appropriate for the local watersheds. As previously noted, Board staff has directed the Copermittees to bring these changes directly to the Board for consideration, although we are hopeful that by summarizing them in writing that they may be addressed ahead of the scheduled October 13th hearing.

Monitoring and Reporting Program (Attachment 4)
Prior to the submittal of the ROWD, the Copermittees met with Board staff to propose changes to the Monitoring and Reporting Program (MRP). In these discussions, Board staff identified two areas for needed improvement:

- Relocation of Illicit Connection / Illicit Discharge (IC/ID) monitoring stations to MS4 outfalls, and

- Incorporation of Action Levels

In more recent discussions, Board staff noted that the MRP needed significant modification to reflect the South Orange County MRP, but would be scaled to be appropriate to the smaller Santa Margarita Region.

Unfortunately, the final MRP requirements have been expanded well beyond the South Orange County MRP requirements, resulting in a program that is completely out of proportion with the needs and resources of the Santa Margarita Region. In fact, the proposed MRP requirements will result in a **500% increase in monitoring program costs**, costing our residents **over two and a half times the per capita costs for South Orange County**.

Per Capita Monitoring Cost Comparison

Draft Permit	OC Permit
$5.13 per capita	~$2.00 per capita

The Copermittees recognize that monitoring and data collection is necessary. However, the MRP requirements exceed what is necessary to address management questions related to water quality, are beyond requirements dictated in the South Orange County MRP, and are beyond the Copermittees' ability to fund. Not only are the level of requirements inappropriate for the Santa Margarita Region, but they disregard the economic realities faced by the Copermittees. As such, the MRP falls far short of meeting the Executive Officer's stated goals of affordability.

In the interest of finding ways to offer Board staff a comparable program in a more cost effective and appropriate manner, the Copermittees have identified nine adjustments to the MRP that will **save approximately seven hundred and eighty thousand dollars ($780,000)** ***annually*** and bring per capita monitoring costs more in line with the South Orange County MRP, while maintaining the core components of the MRP. Table 1 summarizes the key changes and the respective cost savings. It is important to note that any change highlighted in RED reflects bringing the program in line with the South Orange County MRP. Figure 1 below shows graphically the comparative costs for the draft MRP with and without the requested adjustments. Please note that the 100% baseline in Figure 2 reflects the current cost of the Copermittees' current MRP.

Table 1 - Cost Savings resulting from proposed MRP changes[1]

Component	Requested Change	Cost reduction
Mass Loading Stations	1) Wet Weather - 3 wet -> 2 wet	**~$79,000**
	2) Dry Weather - Composite -> Grab	**~$66,000**
Toxicity Testing (MLS and Bioassessment)	3) 3 organisms -> 2 organisms	**~$14,000**
Bioassessment	4) 6 stations -> 3 stations	**~$158,000**
	5) 2X each -> 1X each	**~$95,000**
Action Levels	6) 'Representative Number/Percent' -> Representative - and remove 'within each sub area'	**~$241,000**
	7) SAL Composites -> Grab	**~$165,000**
Inland Aquatic Habitat Monitoring	8) Eliminate requirement	**~$140,000**
Special Studies	9) 6 special studies -> 4 studies, and Replace with more locally appropriate studies	**~$220,000/year**
TOTAL ESTIMATED SAVINGS	Net savings of all recommended changes (annualized)	***~780,000/year***

Note: Red text refers to requirements currently in the South Orange County MRP.

1. See Attachment 4 for detail descriptions of requested changes.

Figure 1

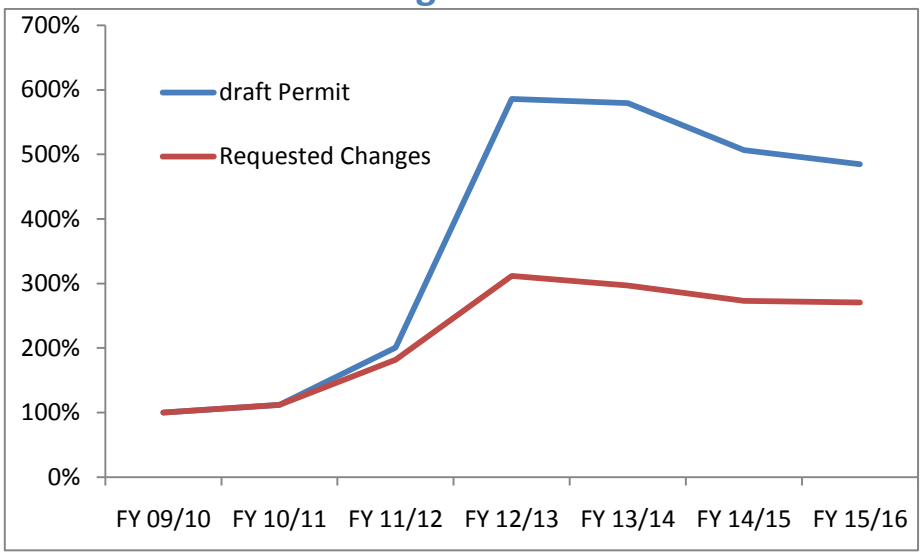

Draft Permit	OC Permit	Proposed Changes
~~$5.13/ per capita~~	~$2.00/per capita	**$2.54/per capita**

Although the requested adjustments to the MRP will not eliminate cost increases, and will result in an MRP which is more expensive, on a per capita basis, than the South Orange County MRP, they provide a more manageable program for the Copermittees.

The Copermittees request that the Board make the adjustments identified in Attachment 4 above before Permit adoption.

Each of these requested adjustments and justifications for each is further discussed in Attachment 4 to this letter.

Unpaved Roads Requirements (Sections F.1.i, F.3.a.(11), F.3.c.(5))
The requirements for unpaved roads are particularly cumbersome, onerous and unreasonable. Our detailed analysis of these requirements is provided in Attachment 5. In summary, the proposed unpaved road requirements may result in substantial and unnecessary additional Copermittee costs that are not justified by the facts in the Santa Margarita Region. The Copermittees believe that the existing MS4 Permit requirements for new development, construction, maintenance and IC/ID adequately address regulation of unpaved roads that threaten water quality. If the Regional Board believes that unpaved roads require further regulation, the Copermittees believe that the appropriate regulatory mechanism is a general permit (Waste Discharge Requirements or NPDES permit) that would apply to *all* unpaved roads in the San Diego Region, rather than only those that are under the jurisdiction of the Copermittees.

The Copermittees request that Sections F.1.i, F.3.a.(11) and F.3.c.(5) regulating unpaved roads be deleted from the draft MS4 Permit.

However, should the Water Board insist on retaining unpaved road requirements in this Permit, the Copermittees request the following revisions. These revisions are needed to ensure that all parties have a clear understanding of the requirements as clarified in Attachment 9. In summary, the Copermittees request:

- Clarification that these requirements apply to those unpaved roads that the Copermittees maintain in their road system.
    - This should be commonly understood, but the clarification is important to include due to complex legal limitations and rights associated with access, ownership, and maintenance of unpaved roads.
- Removal of language that specifies specific BMPs that must be implemented.
    - Specifying the method of compliance is prohibited pursuant to CWC Section 13360, and inappropriately forces the Copermittees to adopt particular solutions that may not best fit the situation.
- Removal of requirement for BMPs for private unpaved roads.
    - The proposed requirements would require the creation of an additional and unnecessary program element addressing privately owned unpaved roads. The Copermittees believe that a focused public outreach program should be implemented to educate property owners and associations about the need to properly maintain unpaved roads. This education program combined with existing IC/ID enforcement capabilities seems a more reasoned and responsible response to addressing this issue.

Should Sections F.1.i, F.3.a.(11) and F.3.c.(5) regulating unpaved roads not be removed from the Permit, the Copermittees request they be modified as noted above. Specific redline edits to address the requested changes are contained in Attachment 9.

Post-Construction BMP Inspections

Section F.1.f of the draft MS4 Permit includes new requirements for the Copermittees to verify that Post-Construction BMPs are being appropriately maintained. The new requirements appropriately develop a risk-based approach to inspections, defining eight factors that the Copermittees must consider in determining 'high-priority' projects.

However, language in Section F.1.f.(2)(a) removes that discretion by stating:

> *'At a minimum, high priority projects include those projects that generate pollutants (prior to treatment) within the tributary area of a 303(d) listed waterbody impaired for that pollutant; or those projects generating pollutants within the tributary area for an observed action level exceedance of that pollutant.'*

This language is excessively broad, and will require virtually all sites in the watershed to be designated as 'high priority' and, therefore, subject to annual inspections. This language is inconsistent with the goals of a socially responsible and affordable permit and should be modified for several reasons:

- Inspections frequencies should be based on risk of discharge. Annual inspections are not needed for all sites that *generate* a specific pollutant. For example, if a site generates a pollutant associated with 303(d) listing, but the site retains runoff onsite or stores those pollutants indoors, annual inspections would be unnecessary. However, sites that store 303(d) listed pollutants outdoors or otherwise have a high risk of discharge should be inspected more frequently.

- The language dilutes Copermittee resources by requiring annual inspections of low-risk sites, preventing the Copermittees from appropriately concentrating resources on problematic sites/sources. This is because when an action level is exceeded then all parties in the watershed are assumed guilty until proven innocent.

While the Copermittees are not opposed to implementing a program to verify that these BMPs are being maintained, it is critically important that they be provided the flexibility to determine which sites warrant annual inspections. **Specifically, the Permittees request that the language in F.1.f.(2)(a) be amended as follows prior to adoption of the Permit:**

> *At a **minimum**, high priority projects include those projects that ~~generate pollutants (prior to treatment) within the tributary area of a 303(d) listed waterbody impaired for that pollutant; or those projects generating pollutants within the tributary area for~~ have been determined to be the source of an observed action level exceedance. ~~of that pollutant.~~*

Commercial and Industrial Inspections

Section F.3.b. of the draft Permit includes requirements to inventory and inspect Commercial and Industrial businesses. The draft Permit expands upon existing inventory and inspection requirements in two problematic ways:

- It requires significantly more businesses to be inspected, and

- It includes new requirements specifying what the Copermittees are required to inspect when they are onsite.

More inspections

Sections F.3.b.(1)(a)(i) and (ii) identify 42 categories of businesses that must be inventoried and inspected based on risk of pollutant discharge. However, Section F.3.b.(1)(a)(iii) adds virtually any business in the Permit area, independent of pollutant discharge risk:

> *'**All** other commercial or industrial sites/sources **within or directly adjacent to or discharging directly to receiving waters within environmentally sensitive areas** (as defined in Attachment C of this Order) or **that generate** pollutants tributary to an observed exceedance of an action level.' (Bold emphasis added)*

In effect, section F.3.b.(1)(a)(iii) adds the following additional businesses:

- EVERY business that is adjacent to (or within) an Environmentally Sensitive Area (ESA), regardless of whether the business generates or discharges any pollutants, and

- EVERY business that 'generates' pollutants which happens to be upstream of an action level exceedance, *regardless* of whether the site has ever *discharged any* pollutants.

This language expands the list of sites far beyond the current requirements, and well beyond those sites that actually pose a threat to water quality. This is clearly unnecessary and should be removed for several reasons:

- It inappropriately separates 'risk' from the 'response', by requiring the Copermittees to inspect businesses irrespective of the risk that the business poses to water quality. For example, this language would require the Copermittees to expend resources and time inspecting hair salons, office buildings and other activities that happen to be adjacent to an ESA. This inappropriate broad-brush approach to permitting actually works to discredit the Copermittees' NPDES programs and dilute resources, rather than enhancing protection of water quality.

- It will further remove the flexibility that the Copermittees need to be able to re-allocate resources to inspecting and following up with sites/sources that are problematic.

Therefore, the Copermittees request that the language in F.3.b.(1)(a)(iii) be amended as follows prior to adoption of the Permit:

> *All other commercial or industrial sites/sources ~~within or directly adjacent to or discharging directly to receiving waters within environmentally sensitive areas (as~~*

~~defined in Attachment C of this Order) or that generate pollutants tributary to~~ that have been determined to be the source of an observed exceedance of an action level.

Additional items to review during inspections

Section F.3.b.(4)(a) specifies what the Copermittees must review when performing an inspection. The new requirements in subsections (i) and (ii) to review BMP implementation plans, and review facility monitoring data, respectively, are an unnecessary new mandate. They should be removed for several reasons:

- The requirements burden the Copermittees with reviewing information that is required under General Permits and is the responsibility of the Regional Board to enforce.

- The requirements would significantly increase the inspection time for sites with General Permits and endanger an existing collaborative inspection program (Complaince/Assistance Program (CAP)) that leverages the time highly trained Environmental Health Inspectors spend onsite for Certified Unified Program Agencies (CUPA) and Food Services inspections to also conduct NPDES inspections. The CAP program not only utilizes highly trained Environmental Health inspectors, but also regionalizes the inspections and, therefore, provides multiple benefits including uniformity, reduction in total number of inspections and higher-quality inspections. The Environmental Health HazMat inspection program administrators have indicated that they cannot accommodate the additional time required to implement the new requirements, as they would unduly cut into their ability to meet their own state-mandated inspection frequencies.

- By virtue of eliminating the CAP program, the requirements would effectively mandate a more fractured and disconnected set of inspections for the businesses, contrary to CAL EPA mandates for consolidated inspections, and in turn diluting the effectiveness of the program.

The Copermittees request that the language in F.3.b.(1)(a)(iii) be amended as follows prior to adoption of the Permit:

(a) Inspection Procedures: Inspections must include but not be limited to:
- *(i) ~~Review of BMP implementation plans, if the site uses or is required to use such a plan~~;*
- *(ii) ~~Review of facility monitoring data, if the site monitors its runoff~~;*
- *(iii) Check for coverage under the General Industrial Permit (Notice of Intent (NOI) and/or Waste Discharge Identification Number), if applicable;*
- *(iv) Assessment of compliance with Copermittee ordinances and Copermittee issued permits related to runoff;*
- *(v) Assessment of the implementation, maintenance and effectiveness of the designated minimum and/or enhanced BMPs;*

Retrofit

Section F.3.d. proposes a program to develop an inventory of existing developments that may be candidates for future water quality retrofits. The requirement goes on to encourage the Copermittees to collaborate with local property owners to promote urban retrofit in an effort to accelerate reductions in pollutant loading from existing urban areas.

Although laudable, this requirement has two significant problems:

1) The program is self-defeating as it contains no "carrots" to lure private property owners into participating in the program. Any property owner that is interested in volunteering in this effort would be required to fully comply with all provisions of the draft MS4 Permit. This includes preparation of compliance documents such as SSMPs, LID and hydromodification studies, subjecting themselves to additional regulatory scrutiny through business and BMP inspection programs required by the MS4 Permit, and otherwise incurring a myriad of costs and requirements. These costs and requirements would provide a strong disincentive to participate in a retrofit program. This program will only work if it is modified to remove these disincentives.

2) Current and projected economic conditions will limit the interest and participation of private property owners. Long-term economic predictions for Riverside County indicate that assessed valuations and property values will likely remain stagnant for the term of this Permit. Similarly, sales tax and unemployment are not expected to significantly improve either.

Without Co-Permittee resources to supplement private retrofit projects, the current economic dis-incentives for private redevelopment that are built into the program and the current impact of the economy on private property owners, there is no real value to the program.

PREFERRED POLICY CHOICE: The Permittees strongly request that this program be deleted for the aforementioned reasons.

Alternatively, and at minimum, the Copermittees request that the schedule for completion of the retrofitting program be revised to provide for development during the term of the Permit and submittal of the proposed program with the next ROWD. This will allow the Copermittees to defer expenditures related to development of the program until later in the Permit term when it is hoped that economic conditions and local revenues will improve. The Copermittees expect few opportunities for retrofit until the economy improves. Due to the Copermittees' limited ability to require retrofit on private property, our best opportunities for retrofit may be associated with approvals of proposed modifications of existing developments.

ALTERNATE POLICY CHOICE: If the Retrofit requirements are not removed, the Copermittees request that the Regional Board modify Section <u>F.3.d. as follows:</u>

Each Copermittee must develop and implement a retrofitting program that meets the requirements of this section upon submittal of the ROWD.

Irrigation Runoff

The draft MS4 Permit categorically prohibits the discharge of landscape irrigation; irrigation water; lawn watering; (collectively 'irrigation runoff') and non-emergency fire fighting flow runoff to the MS4. The basis for this requirement comes from the current Orange County stormwater permit within the San Diego Region (NPDES No. CAS0108740), which prohibits such discharges.

Although irrigation runoff may have been shown to be a problem in South Orange County, it has **not** been shown to be causing problems in receiving waters in the Santa Margarita Region. Attachment 6 summarizes the unique conditions and other facts that warrant the restoration of irrigation runoff as a non-prohibited non-stormwater discharge category. It is important to reiterate the three key points made in Attachment 6:

- Unlike the watersheds in South Orange County, the Santa Margarita Region is an ephemeral watershed;

- Unlike South Orange County, the Copermittees have **not** identified landscape irrigation, irrigation water or lawn water as an actual source of pollutants or conveyance of pollutants to waters of the U.S.;

- The draft MS4 Permit requires Copermittees to eliminate irrigation runoff ***TO THE MS4,*** which by definition, requires elimination of discharges to streets, curbs and gutters.

As noted above, the prohibition appears to hold the Copermittees responsible for any amount of irrigation runoff discharged to the curb and gutter, *regardless* of whether or not the discharge ever reaches receiving waters or causes or contributes to the exceedance of a water quality standard. This fact, combined with the fact that irrigation runoff has not been shown to be causing impairments in the local receiving waters, will make enforcement difficult to justify with residents and will likely result in community outrage over bans on irrigation. Further the Copermittees are not water purveyors, and as such, have little control over residential irrigation runoff outside of sending code enforcement officers out to look for incidents of excessive irrigation runoff. This is a very inefficient use of resources. In any event, the provisions as written will do little for water quality but potentially much for community outrage against water quality programs. The Copermittees do not believe this is the intent of the Board.

It is further worth noting that the Permit already contains an investigation and remediation process via Non-Stormwater Action Levels (NALs) by which the Copermittees will identify the source of problematic non-stormwater discharges. Should the source be found to be a conditionally exempt non-stormwater discharge, the permit requires the Copermittees to address that discharge or the entire category of discharges as appropriate. By allowing the NAL process to determine when and where

conditionally exempt discharges need to be prohibited, the Copermittees are better positioned to justify any enforcement actions.

PREFERRED POLICY CHOICE: the Copermittees request that the Regional Board restore the conditional exemption for landscape irrigation, irrigation water and lawn watering as outlined in Attachments 6 and 7.

Alternatively, if the Regional Board nevertheless insists on prohibiting Irrigation Runoff, the Copermittees request that the draft MS4 Permit be revised to allow for irrigation runoff to be managed as a JRMP program, rather than as a prohibited discharge to the MS4. This alternative request is consistent with how the Permit currently deals with non-emergency fire fighting discharges, which was also removed from the list of non-prohibited non-storm water discharges. The Executive Officer stated that he would be open to consideration of a program for irrigation runoff that would address discharges from the MS4. This alternative approach allows the Copermittees to develop a program that focuses on irrigation runoff problem areas, as opposed to holding the Copermittees responsible for eliminating any instant case of over-irrigation to a street independent of threat to receiving water quality.

ALTERNATIVE POLICY CHOICE: The Copermittees request that the Regional Board clarify that irrigation runoff is only prohibited where it is discharged *from* an MS4 (into receiving waters) by adding the following language:

B.4. *As part of the JRMP, the Copermittees must develop and implement a program to address pollutants from landscape irrigation, irrigation water and lawn watering identified as significant sources of pollutants to waters of the United States.*

Legal Issues
The Copermittees have identified legal issues that raise fundamental questions regarding several of the key elements of the Tentative Order.

The Copermittees request review of the legal issues and revision of the Tentative Order prior to adoption.

Each of the legal issues and requested adjustments and justifications for each requested revision is further discussed in Attachments 7 and 8 to this letter.

CONCLUSION

It is fundamental that the MS4 Permit be economically, technically, and legally feasible. To be credible, and to pass legal muster, MS4 Permit requirements must demonstrable a nexus to water quality improvements. Instead the current requirements, although well intended but not always well

developed, will put the Copermittees in non-compliance since we cannot afford to implement all the requirements and consequently this will not lead to water quality improvement.

The present economic crisis has made daily headlines over the past three years and Riverside County has been identified as the 11th most impacted county in the nation. In the ROWD and throughout the development of the draft MS4 Permit, the Copermittees have provided abundant publicly available information regarding the impact of this crisis on their revenues, staffing, and programs. Virtually every program and service, including public safety services, has been impacted, and others have been eliminated. Contingency reserves have been depleted to the lowest levels allowable to maintain operations. At this point, the Copermittees cannot increase water quality compliance spending without real risks to reducing spending on existing state and federal mandates or other much-needed local programs and services. As proposed, the draft MS4 Permit is economically infeasible.

In an effort to promote a viable 4th-term MS4 Permit, the Copermittees proactively engaged Regional Board staff in a collaborative dialogue with the intent of developing an economically feasible MS4 Permit that was protective of receiving water quality in the Santa Margarita Region. However, the following constraints have limited the benefits of the process:

1. The discussions were curtailed because the Board expected the draft MS4 Permit to be heard in October;

2. The Board had adopted the South Orange County MS4 Permit as a "model" permit, and, therefore, would have to approve any major revisions to the provisions of that Permit; and

3. The inclusion of several new provisions of the draft MS4 Permit addressing unpaved roads, inspection programs and monitoring requirements go well beyond the Orange County Permit.

As noted in the Executive Summary, the MS4 Permit adopted for South Orange County was ultimately developed for a region with substantial coastal resources and perennial streams, twice the population, significantly higher property tax revenues, and more affluent tax payers.

By contrast, the ephemeral conditions found in the Santa Margarita Region result in stream channels that are dry during dry weather conditions and receive less rain during wet season conditions. The stream flow conditions in the Santa Margarita Region are entirely unlike the significant perennial flow conditions found in South Orange County. The proposed changes contained herein address these realities. The proposed changes also address necessary changes to ensure that the Copermittees can continue to afford implementation of the draft MS4 Permit given the significant economic disadvantages faced by the Santa Margarita Region, disadvantages that have been exacerbated by the impacts of the recession.

The requirements in the Permit must protect beneficial uses in a cost effective manner. It is always a balance to protect water quality and avoid unnecessary increases in program compliance costs. Balancing local water quality needs and funding limitations should be paramount in the current economic climate. Proposed program expansions must be carefully weighed against economic realities and be justified by conditions actually found in the Santa Margarita Region. As described, unpaved roads and business inspections have been effectively addressed by existing programs, yet the draft MS4 Permit proposes requirements that can only be met by establishment of new compliance programs and, in the case of the business inspections, elimination of the highly effective CAP.

The legislature created Regional Boards to protect our beneficial uses while carefully considering the technical and economical feasibility of such protection. Even in the best of economic times, state and local government must carefully manage public revenues. A policy-level decision by the Regional Board is necessary to direct staff to work with the Copermittees to address the comments contained herein. The Copermittees request your support in our effort to develop an economically, technically, and legally feasible MS4 Permit that is appropriate to the Santa Margarita Region. As noted in the opening Executive Summary of this comment letter we specifically request that you direct Regional Board provide staff with direction to resolve the issues identified in this letter and attachments.

Thank you for your time and consideration. We look forward to discussing this issue further at the October 13th hearing.

Very truly yours,

JASON E. UHLEY
Chief of the Watershed Protection Division

JEU:bjp

Attachment 1: Summary of Proactive Efforts to Manage Stormwater

Introduction

Murrieta and Temecula Creeks and their tributaries are an important economic, environmental and social resource for the Santa Margarita Region. As an example, Murrieta Creek serves as the backdrop for Old Town Temecula, an important local tourist attraction. Several ecological preserves that are utilized by local residents and tourists are also located within the Santa Margarita Region. The Permittees are cognizant of these resources and their benefits and have implemented or initiated proactive programs beyond the requirements of the NPDES MS4 Permits to ensure that these resources remain viable and are protected for future generations.

Integrated Planning

Upper Santa Margarita River Integrated Water Management (IRWM) Plan
The County of Riverside, Riverside County Flood Control and Water Conservation District (District) and Rancho California Water District proactively entered into an agreement to form this program to manage the Upper Santa Margarita River Watershed. These three agencies have proactively engaged tribes, local stakeholders, and other local, state and federal agencies in an effort to develop a comprehensive plan to manage the watershed. Further, we have also built bridges to the San Diego County and Orange County IRWM programs to ensure proactive inter-regional planning of cross-jurisdiction watersheds such as the Santa Margarita River Watershed. The three-party agreement reached by the IRWM programs within the San Diego Region is the only one of its kind in California.

Santa Margarita River Executive Management Team
The Permittees also coordinate more technical issues with San Diego County, the U.S. Bureau of Reclamation, Camp Pendleton, and other stakeholders to address coordination of monitoring and analysis of monitoring data within the region.

Murrieta Creek Flood Control, Environmental Restoration and Recreation Project
Murrieta Creek poses a severe flood threat to the cities of Murrieta and Temecula. Overflow flooding from the undersized creek has periodically wreaked havoc on the communities – most recently in 1993 when nearly $20 million in damages was incurred by the public and private sectors.

In 1997, at the request of District, the U.S. Army Corps of Engineers initiated studies on the Creek. The outcome of this endeavor was Congressional authorization in 2000 of a $90 million, multi-faceted project known as the Murrieta Creek Flood Control, Environmental Restoration and Recreation Project. What was once viewed only as a needed local flood control project was now a federally cost shared, community endorsed corridor project that would not only safeguard the two cities from the ravages of uncontrolled flooding, but would celebrate the unique character of the communities by restoring and enhancing the environmental distinctiveness of the Creek bottom, utilizing the top of the river banks for hiking, biking and equestrian trails, and developing a 240-acre flow attenuation basin that would encompass 160 acres of new environmental habitat and a 50 acre sports park. The project is currently undergoing design of Phase II.

Attachment 1: Summary of Proactive Efforts to Manage Stormwater

Management of New Development

LID BMP Design Manual

The County, with input from the Permittees has spent the last five years developing and field testing a manual promoting Low Impact Development (LID). The manual is due to be published by December 31, 2010. The development of the manual was informed by meetings with authors of key LID manuals from throughout the nation, field visits to existing LID BMP sites to evaluate design and maintenance characteristics, and years of research into design methodologies and water quality effectiveness data. The manual includes detailed design criteria, standard drawings, maintenance requirements and other key information that will ensure that LID BMPs deployed in the Santa Margarita Region will provide long-term water quality benefits.

Public BMP Maintenance Mechanism

The District has also been developing a plan for public maintenance of post-construction BMPs that meet specified requirements. This mechanism will go hand-in-hand with the release of the LID BMP Design Manual. Development projects that design their BMPs to the criteria in the manual and place the BMPs consistent with our guidelines will be able to opt into a public maintenance mechanism that will provide for consistent and ongoing maintenance of post-construction BMPs throughout the region.

Management of New Development

LID BMP Testing and Demonstration Facility

The LID BMPs incorporated into our LID BMP Design Manual are being incorporated into a $3,000,000 retrofit of the District's headquarters in the City of Riverside. The project will provide a regional center for LID BMP training and demonstration, include a five-year study to collect water quality and field data on the effectiveness of the BMP designs and maintenance programs, and facilitate a cycle of continuous improvement for LID BMP techniques.

Southern California Stormwater Monitoring Coalition

The Permittees voluntarily participate in a collaborative effort with the other Counties in southern California to conduct special studies to advance the science of stormwater management. These studies include regional bioassessment programs, inter-lab calibration programs, hydromodification management studies, programs to develop the scientific methods used to monitor for toxics, biological indicators and chemistry, and more.

Statewide Stormwater Leadership

Pesticide Regulation

The Permittees have proactively met with management of California Department of Pesticide Regulation and USEPA staff regarding negative receiving water impacts of authorized pesticides use in California. District staff have also submitted multiple comments and provided testimony at applicable state and federal listening sessions regarding the need to change the regulatory framework to better protect receiving waters.

Attachment 1: Summary of Proactive Efforts to Manage Stormwater

California Stormwater Quality Association (CASQA)

The District proactively participates in the activities of this pre-eminent organization addressing stormwater issues in California. District staff serves on the Board of Directors, as the Chairs for the Legislative Committee and Conference and on several committees including Monitoring, Pesticides, and Policy and Permitting. This organization and these committees are developing the programs and science that are driving the management of stormwater programs forward.

Habitat and Aquatic Resource Conservation

Western Riverside County Multiple Species Habitat Conservation Plan (MSHCP)

The Permittees have established the MSHCP to identify and proactively protect critical habitat for threatened and endangered species in Riverside County. The MSHCP establishes several key linkage corridors along existing streams and creeks to ensure protection of the habitat and safe paths of migration for species. The MSHCP will ultimately conserve over 40% of the lands within the Santa Margarita Region of Riverside County. Further, the plan proposes to purchase and preserve several of the remaining natural stream systems in the region for use as habitat conservation and species corridors.

Special Area Management Plan (SAMP)

The Permittees have also entered into ongoing negotiations with the San Diego Regional Water Quality Control Board and United States Army Corps of Engineers staff regarding a SAMP to proactively identify and protect the most important aquatic resources in the Santa Margarita Region of Riverside County.

Economic Assessment
Draft 2010 Santa Margarita Region MS4 Permit
September 2, 2010

The Draft Municipal Separate Storm Sewer System Permit (Draft Tentative Order No. R9-2010-0016; NPDES No. CAS0108740) for the Santa Margarita Region of Riverside County (draft Permit) proposes new and expanded compliance requirements that would significantly increase the Copermittee compliance costs. Further, the draft Permit expands the compliance requirements and compliance costs beyond those required by the recently adopted MS4 Permit for South Orange County, a more populous and affluent area with significantly greater tax revenues to support the compliance programs. These additional requirements and costs are proposed at a time when the Copermittees have been severely impacted by the most significant economic downturn since the Great Depression. These impacts include high levels of unemployment and homes in default, sharply reduced Copermittee revenues and increased demands on public services. Moreover, these impacts have fallen disproportionately on communities in Riverside County relative to South Orange County and San Diego County, due in large part to the crash of the housing market.

Due to their reduced revenues, the Copermittees budgets and staffing have been significantly reduced for virtually all services and programs operated by the Copermittees, including police, fire, and paramedic services. Funding has been focused on essential public safety and existing state and federally mandated programs. Increases in funding for the water quality mandates contained in the draft Permit can only come from reduced funding for these basic priorities. Therefore, the expanded compliance requirements proposed in the draft Permit are economically infeasible. This paper describes the general economic conditions in the Santa Margarita Region, the Copermittees' current budget and budget projections, their assessment of projected increases in compliance costs, and economic forecasts provided by other parties.

POPULATION

Riverside County, which is subject to three NPDES MS4 permits, has a total population of 2,153,186. However, only 289,765 persons (approximately 13 percent) reside within the Santa Margarita Region.[1] Population and housing projections for the Santa Margarita Region are summarized in Table 1. MS4 discharges in Riverside County are regulated by separate NPDES stormwater permits issued by the Colorado River, Santa Ana, and San Diego Regional Water Quality Control Boards. Although these three MS4 permits address the same federal regulatory requirements, the provisions in the draft Permit are often not well aligned with the requirements of the other two MS4 permits. As such, the cost for complying with those requirements is borne entirely by the 289,765 residents within the Santa Margarita Region.

[1] Riverside County Projections 2010 (RCP-10), Transportation and Land Management Agency, Administrative Services, Center for Demographic Research, June 23, 2010.

Attachment 2: Economic Assessment

Table 1: Santa Margarita Region Population & Housing Projections 2010[2]

	Population / Housing Units		
Jurisdiction	**2010**	**2015**	**2020**
Murrieta	101,680/34,812	105,513/36,162	109,343/37,512
Temecula	102,727/33,194	109,136/35,270	112,242/36,321
Wildomar	32,720/11,123	37,289/12,722	42,475/14,537
Unincorporated	52,638/17,546	54,584/18,195	59,878/19,959
Total	**289,765/96,675**	**306,522/102,349**	**323,938/108,329**

CURRENT ECONOMIC CONDITIONS

Unemployment

Higher unemployment directly impacts the revenue streams available to the County and the Cities for funding programs and services. As illustrated in Figure 1, the unemployment rate in Riverside County is currently 15.3 percent, which is 42 percent higher than the unemployment rate in San Diego County (9.8 percent) and 56 percent higher than the unemployment rate in Orange County (9.8 percent).[3]

SOURCES OF LOCAL REVENUE

The Copermittee's primary revenue sources for implementation of programs and services are property taxes, sales taxes, and development/construction permit fees. Each of these sources has declined substantially since the beginning of the recession in FY 2006/2007. The 2009 per capita income in Riverside County ($29,177) is 31% lower than the per capita income in San Diego County ($42,094) and 32% lower than the per capita income in Orange County ($46,898).[4] The population of the Santa Margarita Region (289,765) is 48% lower than the population of South Orange County (553,161[5]) and 91% lower than the population of San Diego County. As a less affluent area with relatively small

[2] Riverside County Projections 2010 (RCP-10), Transportation and Land Management Agency, Administrative Services, Center for Demographic Research, June 23, 2010.

[3] Monthly Labor Force Data for Counties, July 2010 – Preliminary, Labor Market Information Division, Employment Development Department, August 20, 2010. http://www.calmis.ca.gov/file/lfmonth/countyur-400c.pdf

population, the Santa Margarita Region has far less revenue than South Orange County and San Diego County to fund local programs and services, and MS4 permit compliance costs.

Per Capita Income[6]

	Riverside County	Orange County	San Diego County
2006	29,148	49,098	42,110
2007	29,950	49,790	43,816
2008	30,088	49,650	44,438
2009	29,177	46,898	42,094
2010 (forecast)	28,117	47,435	42,651

Figure 1. Unemployment Rates of California Counties (title for figure on next page)

[4] Economic Forecast, Los Angeles Economic Development Corporation, July 2010.
[5] Richard Boon, County of Orange, personal communication, September 1, 2010.
[6] Economic Forecast, Los Angeles Economic Development Corporation, July 2010.

Attachment 2: Economic Assessment

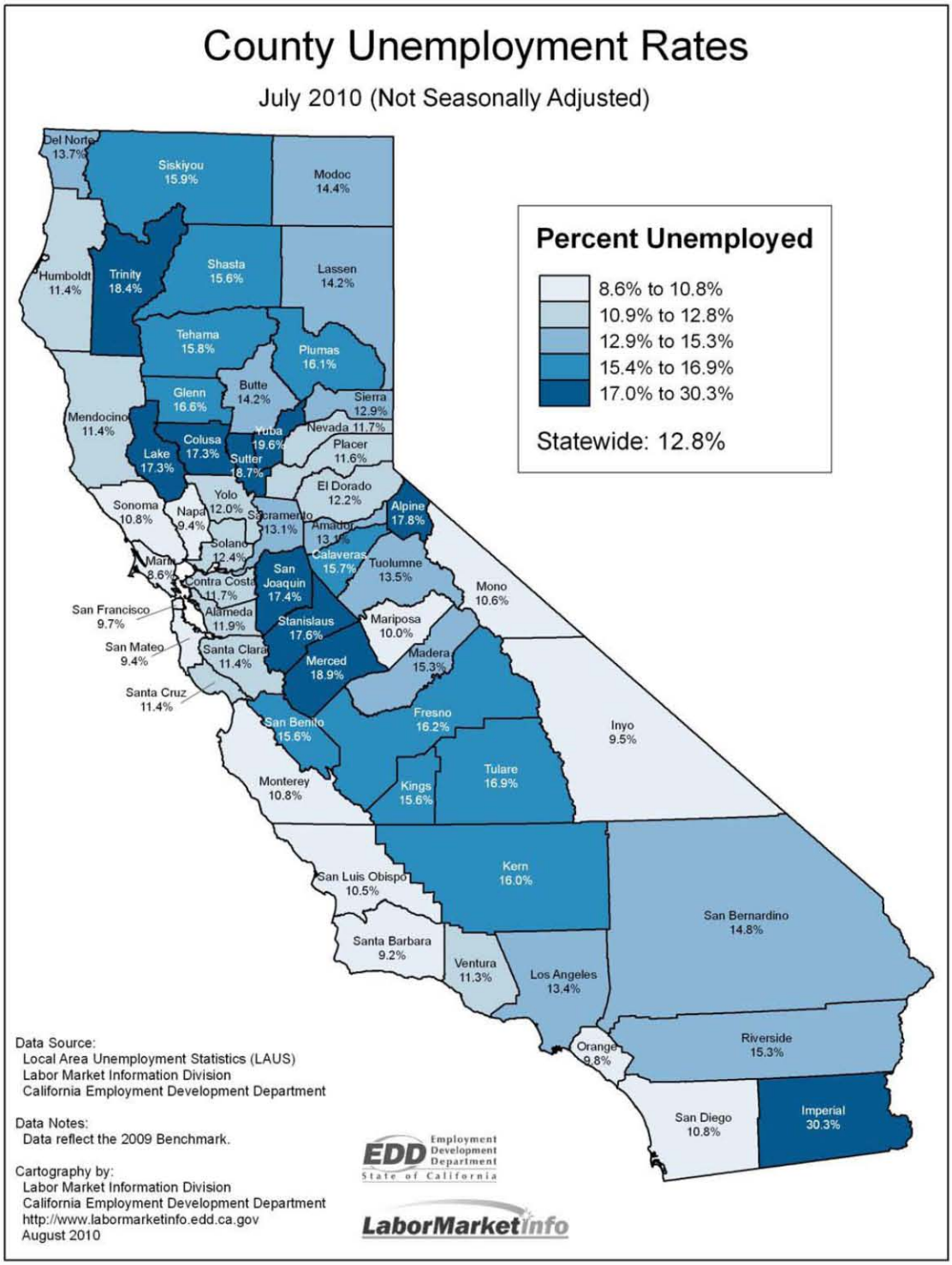

Home Values/Property Tax Revenue

Property tax revenue, which is a major source of funding for the County and Cities, is a direct function of the total inventory of real estate and the assessed values of the real estate. With a small population relative to South Orange County and San Diego County and a limited amount of commercial and industrial property, the Santa Margarita Region is supported by a much smaller inventory of real estate from which to obtain property tax revenue. The high rate of foreclosures in Riverside County has also resulted in significant declines in real estate values and, consequently, property tax revenue. The Riverside County Auditor-Controller projects that property values will fall over 10 percent in FY 2009-10 and could fall further in FY 2010/2011.[7] Figure 3 illustrates the decline in median home values in the Santa Margarita Region and South Orange County. Although home values in both areas have declined, home values in the Santa Margarita Region have declined at a greater rate and the difference in home values between the two areas has grown with the recession.

Figure 3. Median Home Values[8]

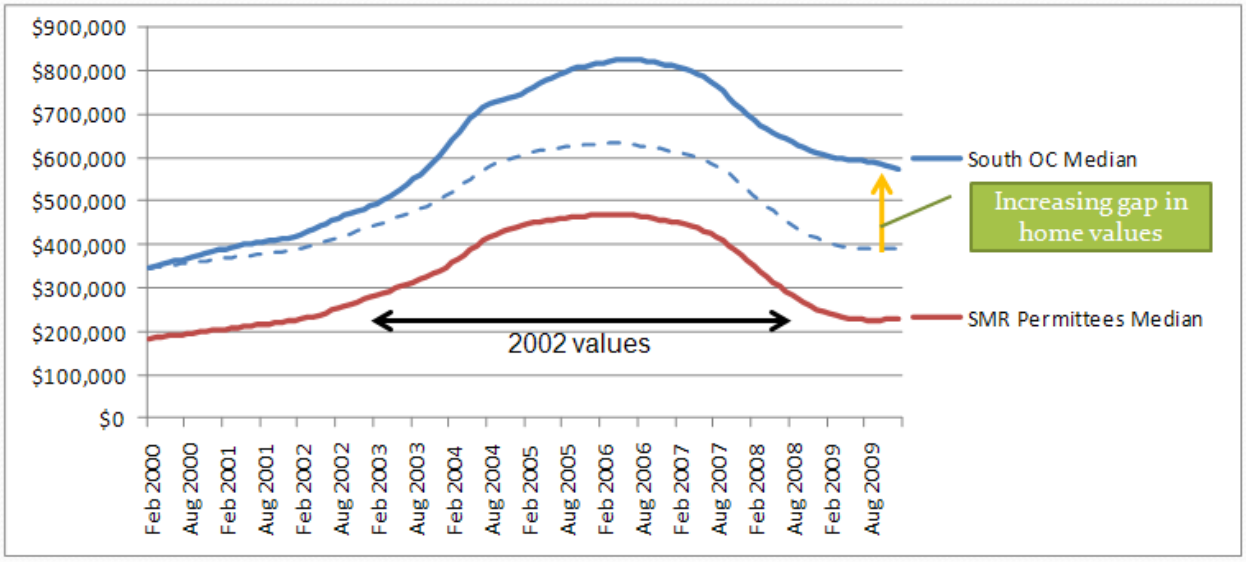

The Inland Empire (Riverside and San Bernardino Counties) registered more defaults and foreclosures than any other area of Southern California.[9] The Inland Empire was ranked No. 5 in nationwide foreclosure activity during the first half of 2010, with almost 4.5 percent of households in default. A total 63,717 mortgage default notices, auction sale notices, and bank repossessions were recorded in the Riverside-San Bernardino-Ontario metropolitan area between January and June 2010, according to RealtyTrac. Accordingly, one in 23 households were in some stage of foreclosure during this six-month period. Additionally, almost 45 percent of homeowners with a mortgage in Riverside and San Bernardino Counties owe more on their homes than the homes are worth. As illustrated in Figure 3, Orange County

[7] Comprehensive Annual Financial Report of the County of Riverside for the Fiscal Year Ended June 30, 2009, Robert E. Byrd, Riverside County Auditor-Controller, December 9, 2009. P. vii. http://www.auditorcontroller.org/opencms/publications/FinancialPub/cafr/CAFR_2009/Introductory.pdf
[8] Source: www.zillow.com
[9] Economic Forecast, Los Angeles Economic Development Corporation, July 2010, p. 50.

and San Diego County have not been impacted by "upside-down mortgages" to the same extent as has Riverside County.

Figure 3. "Upside-Down Mortgages"

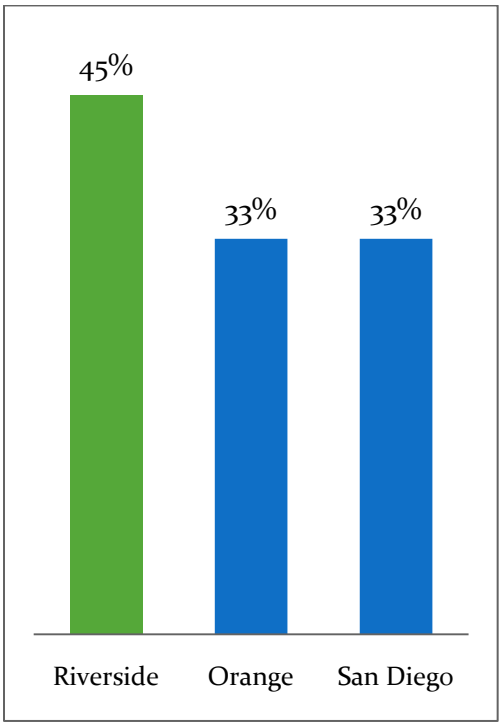

One expert, Professor Mason Gaffney of the UC Riverside Economics Department believes that the housing market is in a vicious cycle simply because there are too many homes. According to Professor Gaffney, because demand is down, prices will go down, and more people will go "upside-down" on their mortgage, and then go into foreclosure. Professor Gaffney estimates that the bottom of the housing market will not be seen for another three years, due to the previous overbuilding in Riverside County.[10]

Although the recession has impacted property values throughout Southern California, Riverside County remains at a distinct disadvantage relative to Orange and San Diego Counties. The average home value in Riverside County is $207, 900, which is 58% less than the average home value in South Orange County ($499,500) and 45% less than the average home value in San Diego County ($378,800).[11] As a result, property tax revenues per home in Riverside County are 58% less than in Orange County and 45% less than in San Diego County. The larger populations and number of homes in Orange and San Diego Counties multiply this disparity in property tax revenue that can be used to help fund NPDES compliance programs. Based on population and average home value, South Orange County generates over <u>four times</u> the property tax revenue generated in the Santa Margarita Region, and San Diego County generates <u>20 times</u> the property tax revenue of the Santa Margarita Region. Clearly, the Copermittees in the Santa Margarita Region receive significantly less property tax revenue than either Orange or San Diego Counties and are less able to fund additional MS4 permit compliance costs.

[10] Ibid.
[11] Zillow Home Value Index – Riverside County, Zillow.com. August 10, 2010.

Attachment 2: Economic Assessment

Sales Tax Revenue

The next most significant revenue source for program funding is sales tax. Sales tax revenue is a function of population and relative income. As described, the Santa Margarita Region has a less affluent and smaller population than South Orange County and San Diego County on which to generate sales tax revenue.

The high levels of unemployment in Riverside County have reduced disposable income which has further depressed sales tax revenues. Retail sales in Riverside County fell by nearly 27% in 2008 and 2009.[12] Statewide sales and use tax revenues for the second quarter of 2010 declined approximately 10.4 percent. Additionally, taxable sales for the first quarter of 2010 remained flat compared to a year earlier.[13] Although data specific to the Santa Margarita Region is not available, it is anticipated that taxable sales have been impacted more significantly than in Orange and San Diego Counties due to the higher unemployment rate in Riverside County.

Taxable sales are directly proportional to sales tax revenue. Based on data presented in the Los Angeles Economic Development Corporation's July 2010 Economic Forecast, South Orange County generates 2.6 times the taxable sales generated in the Santa Margarita Region and San Diego County generates 13.3 times the taxable sales of the Santa Margarita Region. Clearly, the Copermittees in the Santa Margarita Region receive significantly less sales tax revenue than either Orange or San Diego Counties and are less able to fund additional MS4 permit compliance costs.

Development and Construction Permit Fees

Prior to the recession, development and construction permit fees funded a variety of compliance activities related to review, approval, inspection and enforcement associated with development and construction activities. Since the recession, revenues from these fees have been virtually eliminated. As a result, Copermittee inspection and enforcement of development and construction activities, including abandoned projects, has been funded by the Copermittees' general funds. General fund budgets are in turn supported by sales and property tax revenues which, as described, have declined significantly.

New Fees or Taxes

Another potential source of funding would be the establishment of a new fee or tax. Such revenues would be subject to the requirements of Proposition 218. Recent efforts to pass supplemental fees have been mixed and given the current economic conditions, this option appears infeasible. For example, on the March 2006 ballot, an attempt by the City of Encinitas to pass a Clean Water Fee was defeated by the voters.[14] It is notable that this rejection of a Clean Water Fee occurred prior to the recession in a relatively affluent coastal city.

Economic Forecasts

The Riverside County Executive Office assessed Riverside County's economy in a report to the Board of Supervisors submitted with the FY 2010/2011 Recommended Budget. In this assessment, it was noted that the economy is still staggering and that economic news has been mixed. Although a slightly rising

[12] Economic Forecast, Los Angeles Economic Development Corporation, July 2010, p. 51.
[13] News release "Local Sales Tax Allocations Reduced in Many Areas of the State," California Board of Equalization, August 27, 2010. http://www.boe.ca.gov/news/2010/92-10-G.pdf
[14] FY 2008-2009 JURMP Annual Report, City of Encinitas, p. 10-3.

stock market and other nationwide measures could be interpreted to signal improvement, persistently high unemployment and personal and national debt call for caution, and a double-dip recession is possible. Locally, while some experts project revenues will shrink again in FY 2011/2012, Riverside County's economic consultants foresee a long and gradual muted recovery and the County will be managing with drastically reduced budgets for an extended period. Budget reductions of approximately $21 million are projected for FY 2011/2012. The County projects that it will see a balanced but significantly reduced budget in FY 2012/2013, with a total budget of $670 million (compared to $736 in 2007). Based on this assessment and reports in the media, it appears that the economy in Riverside County will stabilize at a reduced level and may not recover during the term of the SMR MS4 Permit.

Projected Increases in Compliance Costs

The draft Permit proposes a significant expansion of compliance requirements that would significantly increase the Copermittee compliance costs. The draft Permit was developed by starting with the MS4 Permit for South Orange County. The requirements proposed in the draft Permit that would significantly increase compliance costs include:

Regional Compliance Requirements

- Monitoring and special studies (See Attachment 4)
- Hyrdomodification Management Plan (including monitoring)
- Retrofit study
- Other general program updates (JRMP)

Individual Copermittee Compliance Requirements

- Enforcement of Irrigation runoff prohibition (See Attachment 6)
- Significantly Increased business and BMP inspections
- BMP retrofit requirements
- Regulation of unpaved roads (See attachment #5)
- Hydromodification requirements
- Monitoring Source Identifications
- Expanded IC/ID requirements

Estimates for implementation of the regional compliance requirements have been prepared and Figure 4 illustrates the disparity between projected Copermittee revenues and costs for implementation of the proposed regional programs. Due to the fact that calculating costs for implementing entirely new programs is excessively difficult, cost estimates for the implementation of individual Copermittee compliance requirements have not been completed, although it is expected that their individual costs will parallel the regional costs presented in Figure 4.

Attachment 2: Economic Assessment

Figure 3. Projected Revenues vs MS4 Permit Compliance Costs

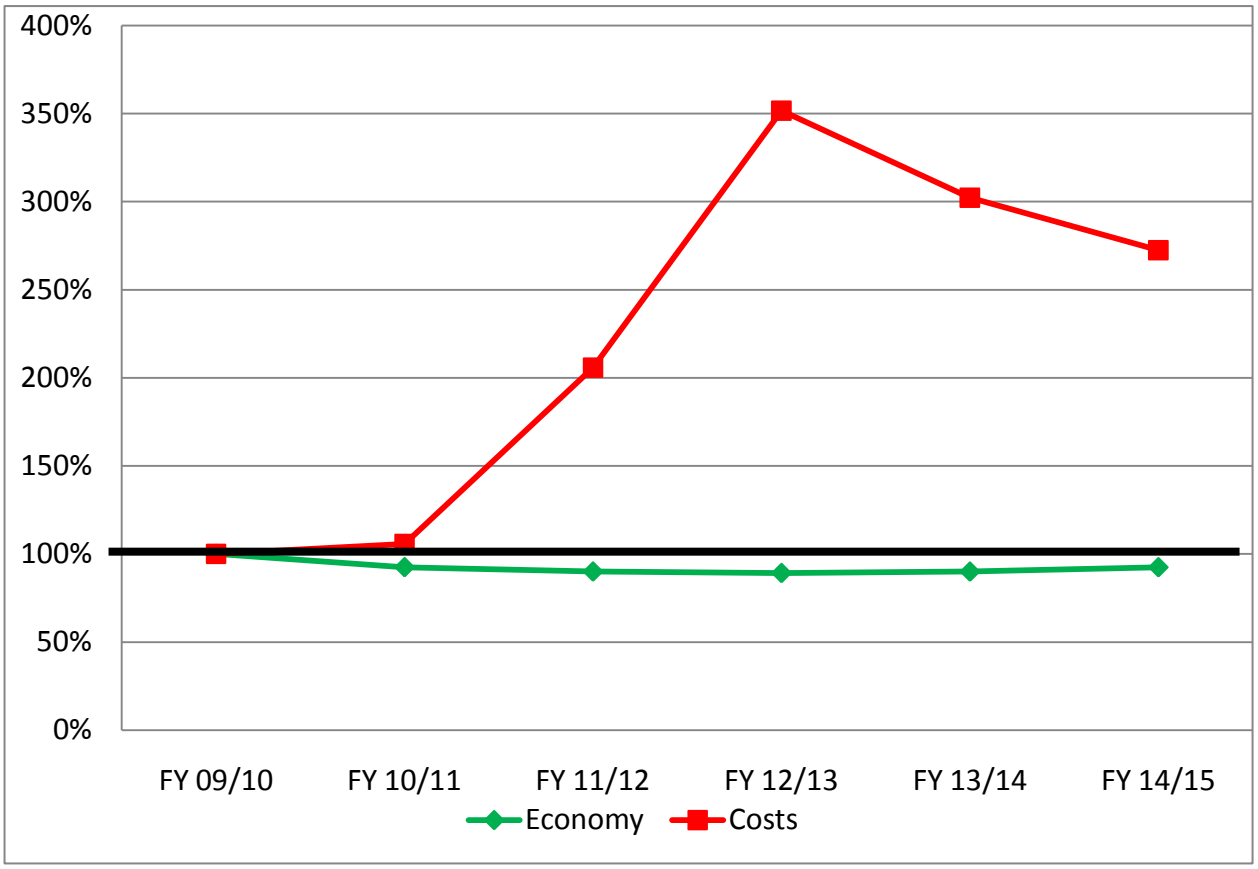

ECONOMIC SUMMARY

As all sources of revenues have been reduced significantly, the Copermittees have been required to reduce staffing through layoffs, attrition and furlough; reduce funding across the board for public services and programs, and, in some cases, completely eliminate public services and programs. For example, it is estimated that County of Riverside staffing has been reduced by 2,500 since FY 2006/2007 mostly in the form of early retirement and layoffs. It is estimated that an additional 500-700 staff positions will be eliminated by the County in FY 2011/2012.

Due to the loss of revenue, virtually all Copermittee programs or services have been reduced, including fire and police. As an example, the Riverside County FY 2010/2011 Recommended Budget for Riverside County proposes:

- Public safety department cuts of 3 – 5 percent
- Other department cuts averaging 19 percent
- Continued staff reductions

Attachment 2: Economic Assessment

After three years of modest cuts culminating in a 25% decrease, the Board of Supervisors approved an additional 19% cut in the general fund and a 4% cut to public safety for FY 2010/2011. These additional cuts will decrease spending by an additional $71 million. The remaining budget gap will be filled from general fund reserves set aside for economic uncertainty. Since FY 2006/2007 Riverside County general fund reserves have declined from over $300 million to $30 million. The County cannot decrease the reserve fund any further without affecting the County's ability to obtain credit. According to the Associated Press Economic Stress Index, of counties with populations of at least 25,000, Riverside County was identified as the eleventh most economically stressed county in the nation based on its June 2010 stress scores.[15]

All County departments have been directed to only provide those core services that the County is mandated to provide. At this point, the Copermittees are struggling to maintain the existing compliance programs required by the 2004 MS4 Permit with available staff and funding. Implementation of expanded or new Permit compliance requirements would require the Copermittees to either further reduce implementation of other mandated programs or reduce the level of implementation of MS4 Permit compliance programs - at risk of receiving an NOV and ACL. In other words, the Copermittees cannot increase MS4 Permit compliance expenditures without directly impacting compliance with other state or federally-mandated programs.

CONCLUSION

The draft Permit was developed by starting with the MS4 Permit for South Orange County. This represented a significant expansion of compliance requirements and compliance costs relative to the 2004 Permit issued to the Copermittees in the Santa Margarita Region, and by no means are the costs incremental in nature. South Orange County is a permit area with twice the population, 2.6 times the sales tax revenue, and over four times the property tax revenue of the Santa Margarita Region. The draft Permit was then expanded to include additional compliance and monitoring requirements, further increasing compliance costs. Plainly, it is unrealistic to impose greater, or even the same Permit requirements on the Santa Margarita Region, as have been imposed on South Orange County.

In addition to having a lower property tax revenue based on lower property tax base and lower per capita retail sales, the Santa Margarita Region has also been hit harder by the recession, which has further diminished funding resources. It is projected that revenues will continue at a reduced level for an extended period with recovery not expected within the term of the Permit term. Therefore, the available resources to fund public safety, existing state and federal mandates, and expanded water quality permit requirements are much less than San Diego and Orange Counties.

The economy has resulted in reductions of reserves to minimum levels and virtually all local services and programs have been reduced or eliminated. As increases in funding for the water quality mandates contained in the draft Permit can only come from reduced funding for public safety, existing state and federal mandates, the expanded compliance requirements proposed in the draft Permit are economically infeasible.

[15] "20 Most Stressed, 20 Least Stressed Counties, The Associated Press, August 2, 2010.

Attachment 3: Language Changes Supported by Board Staff and Copermittees

Introduction

This document highlights the agreed upon revisions resulting from detailed discussions between Water Board Staff and the Copermittees on program implementation. The intent of these revisions is to ensure that requirements in the Draft MS4 Permit continue to be protective of water quality while allowing the Copermittees flexibility in resource allocation and cost efficiencies. This collaborative process enhanced a mutual understanding of these goals and, consequently, many of the Permit's requirements are streamlined, clearer, implementable and protective. This document highlights specifically the Low Impact Development (LID) and the Interim Hydromodification requirements that have been revised from the Orange County NPDES MS4 Permit in order to recognize the Copermittees' advanced efforts.

Important Program Revisions

Low Impact Development (LID)

The Copermittees strongly support the language in the draft Permit with regard to Low Impact Development (LID) BMPs (Section F.1.d.(4)). Through discussions with staff, the Copermittees have presented their commitment and vision for LID, emphasizing that their programs' goals are in line with the intent of the LID language found in the Orange County permit. The District and the County, with input from the Copermittees, have invested five years into developing a well thought through LID program including:

- The design of a detailed and thoroughly researched LID BMP Manual,
- An implementation policy focused on a tiered approach to BMP selection,
- Incorporation of a public maintenance mechanism, and
- Construction of a $3,000,000 LID BMP retrofit, demonstration and testing facility.

These various features are already in effect in the unincorporated County, or in the process of being finalized, for broader use.

The LID BMP manual provides the development community guidance for designing LID BMPs that will be effective at reducing pollutants from the site to the MEP. While the current program is based on a tiered approach that encourages landscaped LID BMPs first, above detention BMPs, and those above proprietary/mechanical BMPs, this tiered approach will be further revised to support Staff's goal for more onsite BMPs to infiltrate runoff, although some Copermittees are still concerned with the infiltration mandate. Specifically, this tiered approach will prioritize BMPs for new development and redevelopment that:

- Provide for the harvest and reuse of stormwater through safe infiltration of site runoff, similar to natural conditions where such runoff can then help replenish the groundwater table,
- Treat site stormwater runoff on a project scale, generally providing a more robust system as compared to individual lot features,

Attachment 3: Language Changes Supported by Board Staff and Copermittees

- Are the most protective of surface water resources, providing 100% 'removal' of pollutants for the water quality volume infiltrated,
- Even for runoff that is biotreated, provide substantial benefit by ensuring that BMP designs maximize the opportunities for incidental infiltration and runoff capture,
- Focus on passive/landscape BMPs that do not require extensive or special maintenance, or that rely on external factors to function for water quality purposes,
- Provide hydromodification mitigation by more closely mimicking pre-development hydrology,
- Ensure that all sites will have runoff water quality that is consistent.

Not only are the Copermittees committed to implementing effective BMPs, they are also committed to effective maintenance. The District's proposed public maintenance mechanism will bolster BMP maintenance for areas where private BMP maintenance has historically been found to be lacking, thus ensuring a higher level of protection for receiving waters. Lastly, the retrofit, demonstration and testing facility will be used to confirm the effectiveness of BMPs included within the BMP manual, provide Copermittees data to review and enhance the program, and provide a demonstration of BMPs for the Copermittees, developers, and the general public.

The Copermittees also believe the passive-treatment BMPs, as opposed to capture and re-use BMPs, are the most reliable for the ongoing protection of water quality. For example, properly designed infiltration BMPs provide benefit during and between storms, without intervention from site owners, operators or occupants, and only require occasional and relatively simple landscape contractor maintenance on an annual basis. This concept has been integrated into the LID BMP Manual through conservative designs that provide a significant margin of safety against failure, and have design features that facilitate proactive maintenance (e.g., integrated landscape features). For the purposes of requiring BMPs that will be most protective of water quality, the Copermittees have de-emphasized the use of BMPs that harvest stormwater for on-site use, since the BMP will not operate passively, and if the BMP 'use' or maintenance should not occur, the BMP will bypass 100% of runoff without treatment. The Copermittees believe that the draft Permit appropriately encourages such water conservation technologies, while not mandating their use.

Regional Board Staff has recognized the efforts, thoughtfulness, and funding that the County has invested in their LID BMP approach, and have, in coordination with the Copermittees, developed a prioritization process that supports the Copermittees' investment in a plan for LID, while ensuring that an appropriate prioritization for the most effective BMPs is implemented. As such, infiltration BMPs must be used for all sites unless it is technically infeasible to infiltrate. Technical infeasibility will be based on criteria that will be developed by the Copermittees and approved by the Regional Board. Only when infiltration is deemed infeasible through the approved analysis can other LID BMPs be used in place of infiltration. These LID BMPs must be consistent with the Copermittees design manual or other regional LID manuals, which have been developed to ensure these LID BMPs are designed to have the greatest pollutant removal

over the life of a project. If LID BMPs are found to be technically infeasible due to poor site or other conditions, then conventional BMPS must be implemented and the project must participate in the LID waiver/mitigation program that will ensure pollutant removal effectiveness consistent with the preferred LID BMPs.

One other important consideration for new development and LID requirements in MS4 permits is the ability for the project proponent (developer) to understand and easily comply with the requirements, such that they can easily be incorporated into projects. Recently adopted MS4 permits, such as the south Orange County MS4 Permit, have very complicated new development and LID requirements. The result of such requirements is a WQMP guidance document that can be confusing, and may be difficult to implement consistently and in a way that will provide consistent protection of water quality. The Copermittees and Regional Board staff, working together, have crafted new development LID requirements that are easily understood, and will ensure the highest likelihood of integration of LID features consistently into projects.

Interim Hydromodification Criteria

Pursuant to discussions between the Copermittees and Water Board staff, the proposed interim hydromodification criteria is aligned with the Copermittees' existing hydromodification program. This agreed language ensures that adequate hydromodification protection measures continue to be in place, while allowing the Copermittees to focus resources and funds on developing the Final Hydromodification Management Program and avoid diversion of scarce resources to developing new interim criteria that will only be in effect for a short duration. In addition, this approach will save the development community from confusion as to which requirements are in effect.

The Copermittees' current hydromodification mitigation program is described in the WQMP, but has been slightly modified as presented in the draft MS4 Permit. Although the Copermittees request the minimal changes to the language shown in the attached redlines, the Copermittees otherwise support the currently drafted interim hydromodification requirements. Under the proposed interim requirements, project applicants must either demonstrate numerically that the project will not adversely impact downstream alluvial channels, or, they must mitigate both the two-year and 10-year recurrence interval storms to pre-project levels in the post-project condition. All analysis must be performed by a registered civil engineer specializing in water resources. Mitigation of both the two-year and the 10-year storms to pre-project levels has been demonstrated to be consistent with the range of flows that are the primary determinants of the stream geomorphology in the southern California area. By maintaining these storm events at pre-project levels, impacts to the downstream alluvial channel should be mitigated to a level of less than significant. Additionally, the Copermittees believe that the onsite LID requirements will further reduce the need for on-site hydromodification controls that would otherwise be required with conventional treatment BMPs. The final comprehensive hydromodification mitigation program will further develop more detailed analysis methods, as well as establish a monitoring program to help verify the effectiveness of the HMP requirements.

Attachment 3: Language Changes Supported by Board Staff and Copermittees

Revisions tentatively agreed to with Board Staff

Per discussions between the Water Board Staff and Copermittees the following revisions were agreed upon.

Section	Alternate Permit Language	Page in T.O.
Non-Stormwater Dry Weather Action Levels (NALs)		
C.2	In response to an exceedance of an NAL, the Copermittee(s) having jurisdiction must investigate and seek to identify the source of the exceedance in a timely manner.	20
Legal Authority		
E.1	Each Copermittee must establish, maintain, and enforce adequate legal authority within their jurisdiction to control pollutant discharges into and from its MS4 through ordinance, statute, permit, contract or similar means.	24
E.2	Each Copermittee must submit on or before June 30, 2012, a statement certified by its chief legal counsel that the Copermittee has taken the necessary steps to obtain and maintain full legal authority within their jurisdiction to implement and enforce each of the requirements contained in 40 CFR 122.26(d)(2)(i)(A-F) and this Order.	25
Jurisdictional Runoff Management Program - JRMP (Development Planning)		
F.1.c.(8)	Rain water harvesting, where feasible, ~~must~~ shall be ~~implemented~~ encouraged as part of the site design and construction~~, and to supplement offsite beneficial uses.~~	29
F.1.d.(4)(b)(i) Footnote	Maintain or restore natural storage reservoirs and drainage corridors (including depressions, areas of permeable soils, swales, and ephemeral and intermittent streams) to the extent feasible[12]. [12] Priority Development Projects proposing to dredge or fill materials in waters of the U.S. must obtain a CWA §401 Water Quality Certification .~~and/or~~Priority Development Projects proposing to dredge or fill materials in waters of the State must obtain ~~a CWA §401 Water Quality Certification and/or~~ Waste Discharge Requirements.	34

Attachment 3: Language Changes Supported by Board Staff and Copermittees

Section	**Alternate Permit Language**	**Page in T.O.**
F.1.f.(1)	Inventory of SSMP projects: Each Copermittee must develop and maintain a watershed-based database to track and inventory all projects within their jurisdiction, that have a final approved SSMP (SSMP projects), and its structural post-construction BMPs implemented therein ~~within its jurisdiction~~ since July, 2005. LID BMPs implemented on a lot by lot basis ~~in low density residential areasfor~~ at single family residential homes, such as rain barrels, are not required to be tracked or inventoried.	38-39
F.1.f.(2)(b)(iv)	~~At least 20 percent of all approved and inventoried SSMP projects must be inspected by the Copermittee annually;~~	39
F.1.h.(2)	In addition to the control measures that must be implemented by Priority Development Projects per section F.1.h.(1)(d), the HMP must include a suite of management measures ~~to~~ that can be used on Priority Development Projects to mitigate hydromodification impacts, protect and restore downstream beneficial uses and prevent or further prevent adverse physical changes to downstream channels.	43
F.1.h.(3)	As part of the HMP, the Copermittees may develop a waiver program that allows a redevelopment Priority Development Project, as defined in Section F.1.d.(1)(b), to implement offsite mitigation measures. A waiver may be granted if onsite management and control measures are technically infeasible to fully achieve post-project runoff flow rates and durations that do not exceed the pre-development (naturally occurring) runoff flow rates and durations. Redevelopment projects that are granted a waiver under the program must not have post-project runoff flow rates and durations that exceed the pre-project runoff flow rates and durations. The estimated incremental hydromodification impacts from not achieving the pre-development (naturally occurring) runoff flow rates and durations for the project site must be fully mitigated.	43
Commercial / Industrial		
F.3.b.(2)(b)	Designate / Update Minimum BMPs: Each Copermittee must designate a minimum set of BMPs for all inventoried industrial and commercial sites/sources. Where BMPs have already been designated, each Copermittee must review and update its existing BMPs for adequacy ~~within one year of permit adoption~~by no later than the submittal of the JRMP. Copermittees may continue to regularly review and update their designated BMPs for adequacy and subsequently submit any updates in their Annual Report.	58

Attachment 3: Language Changes Supported by Board Staff and Copermittees

Section	Alternate Permit Language	Page in T.O.
F.3.b.(4)(b) And **NEW** F.3.b.(6)(a)	F.3.b.(4)(b) ~~Each Copermittee must annually notify the San Diego Water Board, prior to the commencement of the rainy season, of all Industrial Sites and Industrial Facilities subject to the General Industrial Permit or other individual NPDES permit with alleged violations of the Copermittees ordinances, that pose a significant threat to water quality~~. F.3.b.(6)(a) – New (6) Reporting of Non-Compliant Sites (a) Each Copermittee must annually notify the San Diego Water Board, prior to the commencement of the wet season, of any unresolved high level enforcement action (as defined in the Copermittees' JRMP) that poses a significant threat to water quality in its jurisdiction as a result of violations of their stormwater ordinances.	60-62
Retrofit		
F.3.d.	Each Copermittee must develop and implement a retrofitting program that meets the requirements of this section. The goals of the existing development retrofitting program are to provide a means to the Copermittees to address the impacts of existing development through retrofit projects that reduce impacts from hydromodification, promote LID, support riparian and aquatic habitat restoration, reduce the discharges of stormwater pollutants from the MS4 to the MEP, and prevent discharges from the MS4 from causing or contributing to a violation of water quality standards.	64
F.3.d.(5)	The completed retrofit BMPs must be tracked in accordance with Section F.1.f. Retrofit BMPs on publicly owned properties must be inspected per section F.1.f. Privately owned retrofit BMPs must be inspected as needed ~~to ensure proper operation and maintenance~~.	65
IDDE		
F.4.b	Remove the following language: ~~all known locations of access points (i.e. manholes) to the Copermittee's MS4~~	67

Attachment 3: Language Changes Supported by Board Staff and Copermittees

Section	**Alternate Permit Language**	**Page in T.O.**
Education		
F.6.	~~Quasi-Governmental Agencies / Districts (i.e., educational institutions, water districts, sanitation districts, etc.)~~	
Watershed Workplan		
G.1.d.	Develop a watershed BMP implementation strategy to attain receiving water quality objectives in the identified highest priority water quality problem(s) and locations. The BMP implementation strategy must include a schedule for implementation of the BMP ~~project~~s to abate specific receiving water quality problems and a list of criteria to be used to evaluate BMP effectiveness. Identified watershed water quality problems may be the result of jurisdictional discharges that will need to be addressed with BMPs applied in a specific jurisdiction in order to generate a benefit to the watershed. This implementation strategy must include a map of any implemented and/or proposed structural BMPs.	72
Principal Copermittee Responsibilities		
M.3.	~~Produce and submit~~Coordinate the submittal of the documents and reports as required by section K of this Order and Receiving Waters and MS4 Discharge Monitoring and Reporting Program No. R9-2010-0016 in Attachment E of this Order.	84

Attachment 4: Monitoring and Reporting Program Requirements

Introduction

Tentative Order R9-2010-0016 (draft MS4 Permit) includes proposed requirements within Attachment E Monitoring and Reporting Program (draft MRP) that are not necessary to address management questions related to water quality, beyond requirements dictated to Orange County and beyond the Copermittees' ability to fund. Due to the expansion of monitoring requirements proposed by Regional Board staff, costs for monitoring program compliance are two and half times more expensive for Santa Margarita Region residents than to South Orange County residents. The Copermittees recognize monitoring and data collection are necessary to assist with program effectiveness assessment and address stormwater management questions within the Santa Margarita Region. However, the proposed revisions provided within this paper allow these assessments and questions to be answered in a more cost effective manner while retaining all major components of the draft MRP. The proposed revisions prune requirements that are not necessary to answer key management questions for this MS4 program, eliminate elements that may be of general interest and therefore should be handled at a more regional, state or federal level and/or correct provisions that are contrary to, or not aligned with, methods of practice established by the Southern California Stormwater Monitoring Coalition or other MS4 Permits approved by your Board. The changes proposed herein result in annual savings of approximately $780,000 while maintaining the integrity of the MRP. Even with these proposed revisions, this MRP is significantly more expensive than the Copermittees' current program.

Table 1 - Cost Savings resulting from proposed MRP changes

Section	Component	Requested Change	Cost reduction
A	**Mass Loading Stations**	1) Wet Weather - 3 wet -> 2 wet	**~$79,000**
		2) Dry Weather - Composite -> Grab	**~$66,000**
B	**Toxicity Testing (MLS and Bioassessment)**	3) 3 organisms -> 2 organisms	**~$14,000**
C	**Bioassessment**	4) 6 stations -> 3 stations	**~$158,000**
		5) 2X each -> 1X each	**~$95,000**
D	**Action Levels**	6) 'Representative Number/Percent' -> Representative - and remove 'within each sub area'	**~$241,000**
		7) SAL Composites -> Grab	**~$165,000**
E	**Inland Aquatic Habitat Monitoring**	8) Eliminate requirement	**~$140,000**
F	**Special Studies**	9) 6 special studies -> 4 studies, and Replace with more locally appropriate studies	**~$220,000/year**
	TOTAL ESTIMATED SAVINGS	Net savings of all recommended changes (annualized)	***~780,000/year***

Note: Red text refers to the requirements that are beyond the MRP requirements in the OC permit.

Attachment 4: Monitoring and Reporting Program Requirements

Draft Monitoring and Reporting Program Requirements

Background

Prior to the release of the first draft of the MRP requirements to the Copermittees, Water Board staff indicated the program would be similar to the South Orange County MS4 Permit (OC Permit) yet scaled appropriately to the Santa Margarita Region. The first draft of the MRP was not released until three weeks prior to the public release draft MRP. To our surprise, instead of being appropriately scaled, the draft MRP actually exceeded the scope and costs of the OC Permit MRP. Due to limited time, Water Board staff recommended the discussions regarding MRP requirements be brought before the Regional Board at the appointed October 13, 2010 Board Hearing. This was particularly frustrating as it was not consistent with our mutual goal to resolve technical issues at the staff level and bring only necessary policy issues to the Regional Board.

One of the most significant issues with the MRP is that the Copermittees proposed several new special studies in the ROWD. The Copermittees moved forward on these studies in good faith, including a $3,000,000 LID Demonstration and Testing Facility at the District headquarters in Riverside. The final MRP does not recognize any of these efforts, and instead mandates six new special studies and a habitat monitoring program. Initially, Board staff indicated that these six studies were for discussion and that it was not their intent to include all of the studies, however, later Board staff changed their position and mandated all of the studies. Further, the habitat monitoring program was actually removed from the Orange County MS4 Permit due to the addition of the NAL/SAL monitoring which was expected to effectively address the underlying habitat monitoring questions. These unnecessary additions put the Copermittees in the precarious position of having to abandon special studies that were already deemed by local stakeholders to be of critical value to managing stormwater within our region.

Cost Saving Requirement Revisions – Overview

The proposed draft MRP includes additional stations, constituents, data analysis and multiple special studies that exceed other programs such as South Orange County's or established standards of practice. These elements will not add substantively to the understanding of MS4 water quality impacts within the Santa Margarita Region and vastly exceed the ability of the Copermittees ability to pay and staff. Table 1 summarizes the Copermittees' requested revisions to the draft MRP and the costs savings from each revision.

These changes are also critical as the draft MRP proposes a program that exceeds available monitoring staffing and equipment resources. The District is currently in the process of recruiting for budgeted positions that were based on the monitoring program contained in our ROWD. However, review of the MRP has determined that our estimations were woefully inadequate. The MRP special studies and other requirements require scientists and other staff with specialized training and backgrounds that are not readily available. The District will likely have to find staff with generalized knowledge in related fields and spend significant resources training them to be knowledgeable in the science of stormwater management. Even if we were to consult out most of the work, we would still need specialized staff to scope, manage and review the consultants' work. It is not feasible to find, recruit and train the necessary staff and also deploy the proposed MRP in the time allotted. The Copermittees' proposed revisions scale

requirements to a more financially attainable and manageable level. Detailed justifications for each revision are described below.

Cost Saving Requirement Revisions – Section A

Mass Loading Station Monitoring - Attachment E: II.A.1.b & II.A.1.c

Revision: Request wet weather monitoring to be required twice a year instead of three times a year.

Justification: (1) The Water Board Staff has referenced the SMC guidance and indicated not enough data has been collected to warrant a requirement change from three wet weather samples to two. However this guidance states once three wet weather samples have been collected for three years, sampling for two wet weather events is acceptable. This data has been collected by the Copermittees. The Copermittees successfully collected three wet weather events for three reporting periods; in addition, the Copermittees have over 10 years of data to form the basis of future analyses. Although the methods of collection have changed, our statistical analysis indicates that there is no statistically significant difference between data sets collected during prior terms and the current term. (2) The current OC and SD Permits require only two wet weather samples. (3) The Santa Margarita Region is semi arid with ephemeral flows, sampling for a third storm event has proven, and will continue to prove difficult and may result in non compliance due to climate (lack of storm events). (4) The cost to Copermittees to fund a third wet weather monitoring event during this permit term is significant.

Mass Loading Station Monitoring - Attachment E: II.A.1.d

Revision: Request dry weather sampling method to be changed from composite sampling to grab samples.

Justification: (1) The Copermittees currently conduct dry weather sampling using an instantaneous grab sample. The MRP proposes 24-hour composite sampling, which represents a significant cost increase due to the need to construct infrastructure at the sampling sites to secure and facilitate portable automatic sampling equipment. (2) Composite samples will mask illicit discharges which is one of the primary reasons for dry weather monitoring. (3) Due to dry weather flows' steady nature, the flows can be accurately characterized using a grab sample. (4) The SMC Regional Bioassessment Program, which effectively defines the standard of practice for receiving waters monitoring, has found that chemistry samples must be collected at the most downstream transect (Transect A) to be representative of the flow through the assessed reach. This program therefore uses Grab samples collected immediately prior to benthomacroinvertebrate (BMI) and periphyton sampling. If composite sampling was required, it similarly must be done at the downstream transect; however, the composites would not be representative as they would pick up sediment, nutrients and other pollutants that had been unnaturally introduced by the BMI and periphyton collection activities. This would create an unrepresentative sample and the sampling equipment would be at risk of failure due to the suspension of sediment.

Cost Saving Requirement Revisions – Section B

Toxicity Testing - Attachment E: II.A.1.h

Revision: Request change in toxicity testing from three organisms to two organisms.

Justification: (1) The MRP specified in the OC Permit requires toxicity testing of two organisms and this permit should not go beyond requirements found within the OC Permit due to limited funding and resources. This is an example of a simple change where cost-savings can be realized. (2) The USEPA only has chronic toxicity protocols for *Pseudokirchneriella. Subcapitata* (formerly, *Selenastrum capricornutum*). Therefore there are no established protocols for the other two species, and data collection results will be difficult to compare to other regions.

Cost Saving Requirement Revisions – Section C

Stream Assessment Monitoring - Attachment E: II.A.2.a

Revision: Request that three stream assessment stations be monitored instead of six stations.

Justification: (1) The existing MS4 Permit requires three stream assessment stations annually. These stations are our mass loading stations. It should be noted that this is an ephemeral watershed. The current stations were selected because they were the only stations that had flowing water during the bioassessment sampling periods, not because they were necessary representative of urban runoff (although they are downstream of the entire MS4 system). Specifically, during dry weather, none of the current receiving waters stations receive runoff from the MS4 due to the ephemeral nature of the watershed. Similarly, efforts to find flowing water for the Regional Bioassessment Program have been challenging. For example, in 2009, the first year of the program, 35 random sites were evaluated before one perennial site could be identified. In 2010, 39 random sites were evaluated. The final sites that were selected were actually our CURRENT mass loading stations as they were the first randomly selected sites that had flow. This lack of flow was recognized by SCCWRP in establishing the distribution of Regional Bioassessment Stations in southern California. This is why southwest Riverside County is only assigned one Bioassessment station. (2) As is demonstrated above, the Copermittees are not likely to find three additional flowing stations that are indicative of impacts from MS4 discharges. The Permit requirement therefore puts the Copermittees in unavoidable non-compliance with the Permit. (3) The cost of monitoring the additional three stations is substantial, and given the relative size of the MS4 system and population of RC to OC, the additional stations are not appropriate on an environmental, economic or social justice scale.

Stream Assessment Monitoring - Attachment E: II.A.2.b

Revision: Request frequency be changed from twice per year to once per year for stream assessment monitoring.

Justification: (1) The Water Board Staff and Executive Officer agreed to make this change as a trade for the Copermittees participation in the SMC Regional Bioassment special study. The change was based on findings by the Southern California Coastal Watershed Research Project (SCCWRP) scientiests indicating that there is no seasonally signficant difference in bioassesment scores. The Copermittees volunteered to implement th Regional Bioassessment Program ahead of the necessary changes to the NPDES MS4 Permit program to reduce the bioassessment sampling events in a good faith effort. (2) To determine if two sampling events are in fact necessary, the Copermittees evaluated the difference in biological community scores between Spring and Fall for data collected at Lower Murrieta, Lower Temecula and

Adobe Creeks during May and October from 2007 through 2009. Utilizing a Two-Way Analysis of Variance of Southern California Index of Biological Integrity (IBI) scores, with season (Spring/Fall) and year (2007 through 2009) as variables, results indicated no statistical difference between years for any of the Permittee's three sites. No seasonal statistical difference in IBI scores ($p \geq 0.19$) was noted within any of the three stations, indicating that the IBI scores were consistent across seasons, regardless of the year. This data confirmed SCCWRP findings that there is not a change in the biological communities between the Spring and Fall seasons. (3) Further, the MRP within the OC Permit states that stations with year-round flow conditions may be monitored in May/June or September/October. Current assessment stations at Murrieta Creek, Temecula Creek, and Adobe Creek are perennial stations. Consistency across programs would denote assessments of these creeks once per year.

Cost Saving Requirement Revisions – Section D

MS4 Outfall Monitoring - Action Levels - Attachment E: II.B.1 and II.C.1.b.(1)

Revision: Request "a representative percentage of the major outfalls within each hydrologic subarea" (**II.B.1)** and "a representative number of major outfalls within each hydrologic subarea" (**II.C.1.b.(1)**) be changed to "representative major outfalls" as shown in the redlines attached to this comment letter.

Justification: (1) The draft MRP requires sampling of a representative number or representative percentage of major outfalls. This is a problematic compliance target as it focuses the program on a particular and open-ended "number" or "percent" of outfalls. By revising the language to require monitoring of "representative major outfalls", the burden is on the Copermittees to come up with a program that is truly representative, without requirements to meet an arbitrary number or percent of outfalls. The Copermittees are concerned about subareas that have many outfalls, which could require sampling of more sites than are economically feasible. These costs could escalate beyond the initial sampling event because if a NAL or SAL exceedance is recorded, source assessments studies are triggered that require additional staff time and resources. If this requirement is not revised, costs will quickly rise beyond the Copermittees' ability to sustain the MS4 compliance program.

MS4 Outfall Monitoring - Action Levels - Attachment E: II.B.1 and II.C.1.b.(1)

Revision: Request the following text revisions in footnote:

> "A representative ~~percentage~~ determination must consider hydrologic conditions, total drainage area of the site, ~~population density of the site, traffic density, age of the structures or buildings in the area, and~~ land use types (commercial, residential and industrial) , costs and other considerations as appropriate."

Justification: (1) The Copermittees originally asked for clarification on what factors would be considered for "representative percentage" and Water Board staff agreed to cost being included. The failure to include cost as a factor results in a program that reduces resources and diminishes funds quickly. The revision of the above allows for cost to be included through "other considerations as appropriate". (2) Deletion of percentage is consistent with previous comments. (3) Hydrologic conditions, population density of the site, traffic density and age of the structures or building in the area are all proposed

deletions because each subarea may not be sensitive to these factors and if one of this factors is applicable it will be included under the addition "other considerations as appropriate".

MS4 Outfall Monitoring - Action Levels - Attachment E: II.B.1.a

Revision: Request samples for Storm Water Action Levels (SALs) to be changed from 24-hour composite to grab.

Justification: (1) Composite sampling would result in significant increased cost due to the cost of purchasing additional automatic sampling equipment and constructing the necessary infrastructure to support its use. (2) Grab samples are likely more conservative. The Copermittees propose that grab samples be collected first and then, if a problem is indicated, the Copermittees would specify needed follow-up monitoring in the Source Assessment Monitoring Plan. (3) Freed resources can be dedicated to other key components of the program, such as follow-up source assessment studies.

Cost Saving Requirement Revisions – Section E

High Priority Inland Aquatic Habitat Monitoring - Attachment E: II.D

Revision: Request removal of the High Priority Inland Aquatic Habitat Monitoring requirements.

Justification: (1) This is an entirely new monitoring program. This monitoring program was initially proposed in the Orange County NPDES MS4 Permit, but later deleted when the NAL/SAL monitoring requirement was added. This trade was made as it was expected that the outfall monitoring data from the NAL and SAL program would effectively answer the underlying management question – "are MS4s impairing beneficial uses in priority aquatic habitat areas?" The underlying logic for removing the requirement in Orange County similarly applies here. Given the current economic conditions and the fact that this was considered and deleted from the OC Permit; the Copermittees respectfully request that this requirement similarly be deleted from the Riverside County MRP.

Cost Saving Requirement Revisions – Section F

Special Studies - Attachment E: II.E

Revision: Request alteration of Special Study Program.

Justification: The Draft Permit requires six special studies to be conducted (TMDL Development and Implementation, Sediment Toxicity, Trash and Litter Investigation, Agricultural, Federal and Tribal Input Study, MS4 and Receiving Water Maintenance Study and Intermittent and Ephemeral Stream Perennial Conversion Study). *This is in excess of the four special studies required by the OC MRP*. Given the larger MS4 Permit Area, population and resources available to South Orange County, the additional studies proposed on Riverside County are inappropriate from a social, economic and environmental justice standpoint. (1) Water Board staff acknowledged multiple studies were added to the draft MRP with the intention of that would be eliminated. (2) The issues addressed by these studies are not all specific to the Santa Margarita Region and would be more appropriate to be evaluated as part of a broader regional study, such as the Sediment Toxicity study. (3) The Agricultural, Federal, and Tribal Input Study is specifically inappropriate as it requires the Copermittees to monitor the discharges of other entities subject to separate NPDES regulations. (4) The Intermittent and Ephemeral Stream Perennial

Conversion Study is specifically inappropriate as it incorrectly presumes that such ephemeral streams are actually being converted to perennial systems within the permit area due to MS4 discharges. Some additional specific points include:

- Sediment Toxicity – In the waterbodies found in the Santa Margarita watershed (which are intermittent at best and dry most of the time) the idea of investigating sediment toxicity and its impacts on benthic macroinvertebrates seems a reach. Current sediment toxicity monitoring in the State is focused on year round streams and estuaries (e.g. the Delta). Furthermore the current state of sediment toxicity monitoring is at best in its infancy as is the State's policy regarding Sediment Quality Objectives. It would seem that a more reasonable approach associate with sediment toxicity is to allow the science to catch up with the policy and for the Copermittees to learn from these other statewide efforts.

- Agricultural, Federal, and Tribal Input Study - Ongoing monitoring efforts in the Central Valley and the Los Angeles Regions for the Agriculture Waiver Program are more robust and statistically valid to make any efforts by Riverside County to be pale in comparison and likely insignificant. Likewise, monitoring in watersheds (e.g. Lake Tahoe, and the northwest part of the State) where water bodies are impaired by sediment and where Federal and Tribal land uses have inputs to the impaired water bodies is significant and should take precedent over any efforts in Riverside County. As previously noted, it is inappropriate to require the Copermittees to not only monitor their own discharges, but also expend resources monitoring the discharges of others. The Regional Board has authorities to require these sources to collect their own data and should exercise that authority appropriately if such studies are required.

- MS4 and Receiving Water Maintenance Study - It is likely that every flood control district in the State and Caltrans would be impacted by the MS4 and Receiving Water Maintenance Study; therefore it would be imperative to have a well thought out, comprehensive, and regional study to answer the questions being posed in the MRP. Requiring the Copermittees to take on this responsibility is misleading and will not be sufficient to answer the broad questions being posed in the MRP. A more reasonable approach would be to model a regional program similar to the current SCCWRP efforts to assess hydromodification requirements for southern California.

- Intermittent and Ephemeral Stream Perennial Conversion Study – Finally, review of historical water resource data by the Copermittees (as indicated in the ROWD), USGS and state and federal courts have all found that the construction of Vale and Skinner dams has significantly increased the ephemeral nature of local watersheds, resulting in much drier conditions than naturally occurred. This is why Rancho California Water District is required to discharge raw water down the Santa Margarita River at the County Line. Requiring a study to study the impacts of ephemeral conversion demonstrates a clear lack of understanding of historical and current receiving water conditions. Further, similar to our comment above regarding the MS4 and Receiving Water Maintenance Study, this study is better addressed at a regional or statewide level. It is not possible to develop a sufficient local database to statistically validate any impacts from non-stormwater discharges within any reasonable timeframe. Furthermore any minimal

monitoring effort that could be provide by the Copermittees would not comprehensively address the questions being proposed in the MRP and would be a waste of resources. Again a regional approach, whether it be SCCWRP or other combination of stormwater Copermittees, would be a more logical and constructive approach to address this issue. The Copermittees have proposed maintaining two of the special studies (TMDL Development and Trash Assessment), while replacing the other four with locally preferred special studies already in place (Regional Bioasessment Program and LID BMP design, maintenance, and effectiveness study). The Copermittees believe the alternate proposal provides information that is directly relevant and beneficial to the Santa Margarita Region. This would result in an annual cost savings of $314,000 per year. This would maintain parity with the OC Permit, which only has four special studies, three of which are identical to the studies proposed below (TMDL Development, Regional Bioassessment, Trash and Litter investigation). Specific language to incorporate the new studies is included in the redline markup of the MRP.

The Copermittees propose the following studies, the write-up for which can be found in Attachment 9 to the comment letter:

1. TMDL Development and Implementation

2. **LID BMP design, maintenance and effectiveness study and demonstration**

   This study will be valuable in ensuring BMPs that are required are effective and the benefit and integration of LID BMPs into a site is understood. This proposed study would directly affect the Copermittees ability to ensure effective LID BMPs are being implemented.

3. **Regional Bioassessment study**

   All the Southern California counties have committed to participate in this study, with the understanding that it would be written into the MS4 permits as a special study for which they would get credit. The Copermittees have been proactively implementing this study without a MS4 Permit requirement, and want to be able to continue to support these regional studies.

4. Trash and Litter Investigation

Other Changes

Table 1: Analytical Testing for Mass Load (A.1) and Bioassessment (A.2)

Revision: Request "Carbamates" be removed as a constituent for analytical testing in Table 1.

Justification: The testing of carbamates should be dictated by the completion of toxicity identification evaluations (TIEs). The use of carbaryl in urban areas throughout California dropped approximately 80% between 2004 and 2008[1]. This drop is also matched by an 80% reduction in the number of USEPA-registered carbaryl products between 2004 and 2008. A downward trend since 2006 likely reflects a long-

[1] TDC Environmental, LLC (2010). *Annual Urban Pesticide Use Data Report 2010.* Prepared for the Urban Pesticide Pollution Prevention Project (UP3 Project) and the San Francisco Estuary Partnership (SFEP) through grant agreement from the State Water Resources Control Board (Agreement 09-305-550-1). June.

term reduction in the availability of carbaryl products due to USEPA regulatory requirements.[2] Further, once the USEPA completes its regulatory process for the full implementation of new carbayl restrictions[3], urban carbaryl use is likely to continue to decline.

Revision: Request "Hexavalent Chromium" be removed as a constituent for analytical testing in Table 1.

Justification: Since 2004, monitoring in the Santa Margarita Region has reflected that out of 62 total samples, there were 60 non-detected levels of Hexavalent chromium. The 2 detected levels of Hexavalent chromium occurred in April 2007 in wet weather samples. It may be notes that 2007 was the driest year on record for the region and analyzed samples reflect an extended period between wet weather events.

Revision: Request "Biological Oxygen Demand, 5day" and "Chemical Oxygen Demand" be removed as constituents for analytical testing in Table 1.

Justification: The reference in the Fact Sheet supporting the inclusion of these constituents is to the initial Phase 1 application requirements. It should be noted that the initial constituent list is not required of future permits. Further, these constituents are costly to analyze and do not provide new information that is relevant to the management of the NPDES MS4 Program.

Revision: Request "Total Organic Carbon" and "Dissolved Organic Carbon" be removed as constituents for analytical testing in Table 1.

Justification: The reference within the Fact Sheet does not require these constituents and there is a significant cost in analyzing the constituents. It is not clear what additional information these constituents provide that would be useful in managing the MS4 program that is not already addressed through the collection of other constituents.

Table 4: Analytical Testing for Wet Weather MS4 Discharges

Revision: Request "Biological Oxygen Demand, 5day" and "Chemical Oxygen Demand" be removed as constituents for analytical testing in Table 4.

Justification: The reference in the Fact Sheet supporting the inclusion of these constituents is to the initial Phase 1 application requirements. It should be noted that the initial constituent list is not required of future permits. Further, these constituents are costly to analyze and do not provide new information that is relevant to the management of the NPDES MS4 Program.

Revision: Request "Total Organic Carbon" and "Dissolved Organic Carbon" be removed as constituents for analytical testing in Table 4.

Justification: The reference within the Fact Sheet does not require these constituents and there is a significant cost in analyzing the constituents. It is not clear what additional information these constituents

[2] USEPA (2008). Amended Reregistration Eligibility Decision (RED) for Carbaryl. EPA-738-R-08-010. August.
[3] USEPA (2007). Reregistration Eligibility Decision (RED) for Carbaryl. EPA-738-R-07-018. September.

provide that would be useful in managing the MS4 program that is not already addressed through the collection of other constituents.

Attachment E: II.B.2

Revision: Request the following text revisions:

> "The Copermittees must collaborate to develop and implement a ~~monitoring~~program to identify sources of pollutants causing the priority water quality problems within each hydrologic subarea. The ~~monitoring~~ program must include focused monitoring ~~which moves upstream into each watershed~~ as necessary to identify source areas, or other methods to identify the societal sources of pollutants, as appropriate. This ~~monitoring~~ program must ~~be implemented within each hydrologic subarea and must begin~~ no later than the 2012-2013 monitoring year."

Justification: As drafted, the permit requires source identifications to start at the end point of the watershed and move upstream. The requested revisions are intended to provide flexibility to allocate resources appropriately based on field judgements. The second part of the revision is to acknowledge some pollutant contributions to the MS4 are in-fact, non-point source, and cannot be pinpointed through focused source ID Monitoring.

Attachment E: II.C.1.b.(2)

Revision: Request text additions:

> "Sampling of non-storm water discharges may be done utilizing grab samples. If a ponded MS4 discharge is observed at a monitoring station, the Copermittee(s) must record the observation and collect at least one (1) grab sample, however ponded water samples will not be used in determining action level exceedances. If flow is evident, a 1-hour composite sample may be taken. The Copermittee(s) must estimate the flow using techniques such as by measuring the width of water surface, approximate depth of water, and approximate flow velocity."

Justification: The first text addition is to avoid triggering action levels due to increased concentrations caused by evaporation of ponded water. Evaporation of ponded water will result in increased concentrations of any constituents contained in the water. NALs are based on Water Quality Objectives that are based on stable, flowing stream conditions. The second text addition is to allow flexibility in measuring stream flows. In some cases, flow gauges or flow meters may be available to estimate flow.

Attachment E: III.A.2.

Revision: Request text additions:

Attachment 4: Monitoring and Reporting Program Requirements

> Monitoring Annual Report: The Principal Copermittee must submit the Receiving Waters and MS4 Discharge Monitoring Annual Report to the San Diego Water Board on October 1 of each year, beginning on **October 1, 2013**. Receiving Waters and MS4 Discharge Monitoring Annual Reports must cover the monitoring activities and results from the previous fiscal year, and must meet the following requirements:

Justification: All of the Copermittees' activities are tracked and reported on a Fiscal Year basis. This facilitates clearer data and cost tracking, and results that can be more effectively integrated into the JRMP reports in a clear and understandable manner, since the reporting periods are aligned. This change is important, so as to allow for a simpler transition from the existing monitoring and data tracking methods, to those that will be developed for compliance with the permit.

Attachment E: III.A.2.e

Revision: Request the following text revisions:

> "~~Annual~~ The 4th year monitoring report must include identification and analysis of any long-term trends in the Copermittees' MS4 storm water discharges or receiving water quality. Appropriate statistical methods shall be used to evaluate the water quality data. ~~Trend analysis must use nonparametric approaches, such as the Mann-Kendall test, including exogenous variables in a multiple regression model, and/or using a seasonal nonparametric trend model, where applicable~~"

Justification: The first edit is to require the long term statistical analyses be performed on a time schedule consistent with submission of the ROWD. Requiring long-term statistical trend analyses on an annual basis is unnecessary and inappropriately increases analysis and reporting costs and complexity. The second edit recognizes a multitude of different statistical methods could be used and others may be more appropriate to the dataset than those identified in the draft MRP.

Attachment E: III.A.2.f

Revision: Request elimination of requirement for annual monitoring reports to include total pollutant loads (wet weather loads plus dry weather loads) due to MS4 Discharge for each of the hydrologic subareas.

Justification: Many assumptions go into the calculations of total loads, making their use in statistical analyses questionable at best. The Copermittees have continued to provide this data, but do not see that it has any value.

Note: Other redlines noted but not included in this paper are for clarification purposes and to make sure permit language is consistent with requested changes throughout Attachment E.

Attachment 5: Proposed Unpaved Road Requirements of the Draft 2010 Santa Margarita Region MS4 Permit

Executive Summary

The Draft Municipal Separate Storm Sewer System Permit (Draft Tentative Order No. R9-2010-0016; NPDES No. CAS0108740) for the Santa Margarita Region of Riverside County (Draft MS4 Permit) includes proposed findings and requirements for development and maintenance of unpaved roads that are redundant to existing regulatory requirements. The proposed requirements for maintenance of unpaved roads may lead to the unintended consequence of discouraging maintenance of the majority of the unpaved roads in the Santa Margarita Region, which may increase the potential for erosion and sediment discharge from such roads. Statements in the Fact Sheet and Findings, monitoring data, and Permittee observations and experience do not support identification of unpaved roads as a significant source of pollutants to receiving waters in the Santa Margarita Region, thereby warranting additional regulation of unpaved roads.

The Copermittees request that the proposed requirements for development and maintenance of unpaved roads be removed from the Draft MS4 Permit. The Copermittees believe that enhancement of existing programs by identifying Best Management Practices (BMPs) specific to maintenance of unpaved roads and providing public education to owners and contractors providing maintenance of privately maintained unpaved roads will be as effective as the program in the draft Permit at substantially less cost. If the San Diego Regional Board determines that unpaved roads within their jurisdiction require further regulation, the Permittees believe that the appropriate regulatory mechanism is a General Permit (Waste Discharge Requirements or NPDES Permit) since the Draft MS4 Permit addresses only a fraction of unpaved roads within the jurisdiction of the San Diego Regional Board.

Attachment 5: Proposed Unpaved Road Requirements of the Draft 2010 Santa Margarita Region MS4 Permit

1.0 Background

The stream system in the Santa Margarita Region is ephemeral, with only small isolated segments exhibiting natural perennial flow due to rising groundwater. Such a stream system does not support fish migration. Runoff from the Santa Margarita Region naturally exhibits high sediment loads due to precipitation patterns, limited vegetative cover, soil types and steep topography.

Most existing unpaved roads in the Santa Margarita Region are private roads on private property that have not been engineered and have evolved through use. Such unpaved roads consist of earthen materials that have been compacted by vehicular use and do not include improved drainage, engineered grading or surface improvement. However, proposed unpaved road projects are subject to the development requirements of the MS4 Permit and the Construction General Permit and would be engineered.

In contrast to paved roads, unpaved roads are predominantly lightly traveled and found in rural areas serving economically disadvantaged residents. Many of these roads remain unpaved for economic reasons. Moreover, some residents do not want paved roads as they desire to preserve the rural/rustic nature of their communities.

Maintenance of unpaved roads in the Santa Margarita Region is generally limited to smoothing washboard depressions that have been created by vehicle use and to improve drainage by properly sloping the surface. The smoothed road surface is compacted by the grading equipment and, subsequently, by regular traffic use. This routine maintenance activity is intended to maintain original lines and grade, and the original purpose of the unpaved road. Repair of landslides and washouts, and replacement of culverts is also performed as needed, in some instances on an emergency basis. Landslide and washout repairs may require the implementation and maintenance of temporary erosion and sediment control BMPs until the disturbed area is stabilized.

The Permittees voluntarily provide limited maintenance of Copermittee maintained, dedicated and accepted unpaved roads for public access. This voluntary maintenance is provided for public safety, including emergency vehicle access, and to maintain utility of the public easement. There is no requirement that the Permittees provide this maintenance.

Most unpaved roads in the Santa Margarita Region are not maintained by the Permittees, but instead are private roads located on private property. Permittee staff is only allowed to enter private property if a crime or illegal activity is observed. The County of Riverside has not accepted maintenance of unpaved roads since the late 1940s and now only accepts paved roads that have been designed and constructed to County standards. Murrieta and Temecula will only approve new subdivisions with paved roadways constructed to their standards. In some instances, the Permittees maintain unpaved roads under contract to Home Owners' Associations or through Community Service Areas. However, the Permittees are prohibited by law from using Gas Tax funds for maintenance of unpaved roads on private property.

Other entities that are not under the legal authority of the Permittees also own unpaved roads in the Santa Margarita Region. These entities include:

- Agricultural Operators
- Eastern Municipal Water District
- Federal Lands
- Metropolitan Water District of Southern California
- Nature Conservancy
- Railroads
- Rancho California Water District
- Southern California Edison
- State of California
- Tribal Lands

2.0 Findings Addressing Proposed Requirements for Unpaved Roads

Finding D.1.c of the Draft MS4 Permit states:

> This Order contains new or modified requirements that are necessary to improve Copermittees' efforts to reduce the discharge of pollutants in storm water runoff to the MEP and achieve water quality standards. Some of the new or modified requirements, such as the revised Watershed Water Quality Workplan (Watershed Workplan) section, are designed to specifically address these high priority water quality problems. Other requirements, such as for unpaved roads, are a result of San Diego Water Board's identification of water quality problems through investigations and complaints during the previous permit period. Other new or modified requirements address program deficiencies that have been noted during audits, report reviews, and other San Diego Water Board compliance assessment activities. Additional changes in the monitoring program provide consistency with the Code of Federal Regulations, USEPA guidance, State Water Board guidance, and the Southern California Monitoring Coalition recommendations.

The discussion of Finding D.1.c states:

> The Copermittees are required to update and expand their runoff management programs on jurisdictional and watershed levels in order to improve their efforts to reduce the contribution of storm water pollutants in runoff to the MEP and meet water quality standards. Changes to Order No. R9-2004-001's requirements have been made to help ensure these two standards are achieved by the Copermittees.
>
> The Orders' jurisdictional requirements have changed based on findings by the San Diego Water Board during typical compliance assurance activities, audits, or receipt of complaints. Where the audits found common implementation problems, requirements have been altered to better ensure compliance. In addition, the San Diego Water Board conducted reviews of the jurisdictional annual reports submitted by the Copermittees. Updates to the requirements for the Copermittees' programs are also based in part on

information found in the Copermittees' ROWD requirements that were included in the San Diego and Orange County MS4 permits, and discussions with the Riverside County Copermittees.

To better focus on attainment of water quality standards, the Order's jurisdictional and watershed requirements have been improved. The conditions of the receiving waters now drive management actions, which in turn focus diminishing resources on the highest priority water quality problems within the receiving waters in the watershed. Improvements to jurisdictional and watershed requirements were also made to facilitate a mutually clear understanding of the requirements between the San Diego Water Board and Copermittees.

During the previous permit period, the San Diego Water Board identified, through investigations and complaints, sediment discharges from unpaved roads as a significant source of water quality problems in the Riverside County portion of the San Diego Region. Enforcement and inspection activities conducted by the San Diego Water Board during the previous permit term have found a lack of source control for many unpaved roads within the jurisdiction of the Copermittees. Unpaved roads are a source of sediment that can be discharged in runoff to receiving waters, especially during storm events. Erosion of unpaved roadways occurs when soil particles are loosened and carried away from the roadway base, ditch, or road bank by water, wind, traffic, or other transport means. Exposed soils, high runoff velocities and volumes, sandy or silty soil types, and poor compaction increase the potential for erosion. Road construction, culvert installation, and other maintenance activities can disturb the soil and drainage patterns to streams in undeveloped areas, causing excess runoff and thereby erosion and the release of sediment. Poorly designed roads can act as preferential drainage pathways that carry runoff and sediment into natural streams, impacting water quality. In addition, other public works activities along unpaved roads have the potential to significantly affect sediment discharge and transport within streams and other waterways, which can degrade the beneficial uses of those waterways.

USEPA also recognizes that discharges from unpaved roads are a threat to water quality. USEPA guidance emphasizes the threat of unpaved roads to water quality:

"Dirt and gravel roads are a major potential source of these pollutants [sediment] and pollutants that bind to sediment such as oils, nutrients, pesticides, herbicides, and other toxic substances]. Many roads have unstable surfaces and bases. Roads act like dams, concentrating flows that accelerate erosion of road materials and roadsides. Both unstable surfaces and accelerated erosion then lead to sediment and dust."

There are several guidance documents, developed by the USEPA, the US Forest Service, the University of California, and others, that include design and construction specifications and BMPs that are readily available for implementation by private and

> public entities. Implementing design and other source control BMPs for unpaved roads in the region is necessary to reduce and minimize the impacts of sediment discharged during storm events from unpaved roads to the MS4s and receiving waters.

Comment: The evidence cited in the Finding, water quality monitoring data, and Permittee observations and experience since establishment of the MS4 Permit in 1990 do not identify unpaved roads as a significant source of pollutants resulting in water quality impairments. The Copermittees support the continued application of development and construction requirements and maintenance of temporary erosion and sediment control BMPs as specified in existing permits.

The requirements for development and maintenance of unpaved roads were proposed by Regional Board staff for inclusion in the Draft MS4 Permit just prior to its release for public comment. Prior to that time, and dating from the original establishment of the MS4 Permit requirements in 1990, unpaved roads had not once been mentioned by Regional Board staff as a significant source of water quality impairment requiring additional regulatory.

The discussion of Finding D.1.c. states that the inclusion of unpaved road requirements was based on "investigations and complaints" reviewed by the San Diego Regional Board. However, Regional Board staff identified only one recent case regarding an unpaved road in the Santa Margarita Region as a problem. The Copermittee in question has investigated this case and it is being addressed as an enforcement action. Although the Copermittees have not had the opportunity to review the investigations and complaints cited by Regional Board staff, no feedback from these investigations was reported to the Copermittees at the MS4 Permit discussions prior to the proposal of the unpaved road requirements. This indicates to the Copermittees that unpaved roads do not in fact present a significant water quality concern.

The Copermittees have reviewed the documents cited by Regional Board staff in the discussion of Finding D.1.c. and the conditions in the Santa Margarita Region are vastly different from those in Pennsylvania and Northern California cited in those documents. These areas receive regular precipitation, have significant vegetative cover, and perennial streams, some of which may support migrating fish. Nothing in these documents suggests that unpaved roads are a significant source requiring special attention in the Santa Margarita Region. Further, no data collected during Copermittee monitoring nor their observations support a conclusion that unpaved roads are a significant source of pollutants warranting special regulatory attention.

The lack of evidentiary support for the unpaved roads provisions makes their inclusion in the Draft MS4 Permit arbitrary and capricious. The Copermittees therefore request deletion of Finding D.1.C.

3.0 Fact Sheet Addressing Proposed Requirements for Unpaved Roads

Page 146 of the Fact Sheet states:

> **Section F.1.i** (Unpaved Roads Development) specifically requires the Copermittees to implement or require implementation of BMPs for erosion and sediment control after construction of all new unpaved roads. As discussed for Finding D.1c, design and source control BMPs for unpaved roads are needed to minimize the discharge of sediment to the MS4s and receiving waters,

especially during storm events. There are several guidance documents available (see Discussion for Finding D.1.c) that include design and source control BMPs that can be readily implemented by the Copermittees for the development of new unpaved roads.

Page 155 of the Fact Sheet states:

> **Section F.3.a.(10)** (Unpaved Roads Maintenance) requires the Copermittees to implement or require implementation of BMPs for erosion and sediment control during and after maintenance activities on unpaved roads, particularly in or adjacent to stream channels or wetlands. As discussed for Finding D.1c, source control BMPs for unpaved roads are needed to minimize the discharge of sediment to the MS4s and receiving waters. There are several guidance documents available (see Discussion for Finding D.1.c) that include BMPs that can be readily implemented by the Copermittees for the development of new unpaved roads. This requirement is necessary to ensure the Copermittees minimize the discharge of sediment from their unpaved roads used for their maintenance activities.

Page 160 of the Fact Sheet states:

> **Section F.3.c.(5)** (Privately Owned Unpaved Roads Maintenance) includes requirements for privately owned unpaved roads. The Copermittees must require implementation of BMPs for erosion and sediment control during maintenance activities on privately owned unpaved roads, particularly roads that are in or adjacent to receiving waters. As discussed for Finding D.1.c, BMPs for unpaved roads are needed to minimize the discharge of sediment to the MS4s and receiving waters. There are several guidance documents available (see Discussion for Finding D.1.c) that include design and source control BMPs that can the Copermittees can readily require to be implemented.
>
> In addition, where the Copermittees identify illegal construction and maintenance grading activities on privately owned unpaved roads, the Copermittees must enforce their ordinances to prevent illicit discharges of sediment and other pollutants from privately owned unpaved roads to their MS4s and receiving waters.

Comment: For the reasons set forth above, there is no evidence that unpaved roads require special regulatory attention in the MS4 Permit. Moreover, proposed requirements specific to unpaved roads are redundant to existing requirements in both the existing Permit and the draft MS4 Permit, the state General Construction Permit, and the Copermittees' Stormwater ordinances. To the extent that unpaved roads are of concern to Regional Board staff, those concerns can be effectively addressed by minor adjustments to these existing compliance programs. In a time of tight regulatory budgets, adding these additional requirements, especially where there is no demonstrated need for them, is arbitrary and capricious. The Copermittees request deletion of requirements specific to unpaved roads (see discussion below) as well as these statements in the Fact Sheet.

Attachment 5: Proposed Unpaved Road Requirements of the Draft 2010 Santa Margarita Region MS4 Permit

4.0 Draft MS4 Permit Requirements for Unpaved Roads

4.1 Unpaved Road Development Requirements

Proposed requirements for the development of unpaved road projects appear on page 45 in section F.1.i of the Draft MS4 Permit. The proposed requirements state:

> **i. Unpaved Roads Development**
>
> The Copermittees must develop, where they do not already exist, and implement or require implementation of erosion and sediment control BMPs after construction of new unpaved roads. At a minimum, the BMPs must include:
>
> (1) Practices to minimize road related erosion and sediment transport;
>
> (2) Grading of unpaved roads to slope outward where consistent with road engineering safety standards;
>
> (3) Installation of water bars as appropriate;
>
> (4) Unpaved roads and culvert designs that do not impact creek functions and where applicable, that maintain migratory fish passage.

Virtually all unpaved road development activities would be greater than one acre and/or be part of a priority development project of one acre or more. Such development projects are required to prepare and implement project-specific Standard Urban Stormwater Mitigation Plans (SUSMPs) under Section F of both the existing MS4 Permit and the Draft MS4 Permit. The SUSMPs identify post-construction BMPs that will be implemented for all elements of the project, including the unpaved road elements of the project. Unpaved road projects are also required to comply with the state General Construction Permit, which requires preparation of a SWPPP that identifies construction-phase BMPs and post-construction BMPs. These development and construction phase requirements are applicable to unpaved roads and are imposed by the Copermittees during the development review process, during the issuance of grading permits and during construction inspections. Either the general requirements for development projects in the existing or Draft MS4 Permit and/or the General Construction Permit already require identification and implementation of post-construction BMPs, including erosion and sediment control BMPs, when developing new unpaved roads. Therefore, additional requirements for development of unpaved roads are redundant and the Copermittees request that these redundant requirements be removed from the Draft MS4 Permit.

4.2 Unpaved Road Maintenance Requirements

Proposed requirements for the maintenance of unpaved roads appear on page 56 in Section F.3.a(10) and on page 64 in Section F.3.c.(5) of the Draft MS4 Permit. The proposed requirements state:

> **F.3.a. (10) <u>Unpaved Roads Maintenance</u>**

(a) The Copermittees must develop, where they do not already exist, and implement or require implementation of BMPs for erosion and sediment control measures during such maintenance activities on unpaved roads, particularly in or adjacent to receiving waters.

(b) The Copermittees must develop and implement or require implementation of appropriate BMPs to minimize impacts on streams and wetlands during unpaved road maintenance activities.

(c) The Copermittees must regularly maintain their unpaved roads adjacent to streams and riparian habitat to reduce erosion and sediment transport;

(d) Re-grading of unpaved roads during maintenance must be sloped outward where consistent with road engineering safety standards;

(e) Through their regular maintenance of unpaved roads, the Copermittees must examine the feasibility of replacing existing culverts or design of new culverts or bridge crossings to reduce erosion and maintain natural stream geomorphology.

F.3.c. (5) <u>Privately Owned Unpaved Roads Maintenance</u>

(a) The Copermittees must require implementation of BMPs for erosion and sediment control during maintenance activities on privately owned unpaved roads, particularly in or adjacent to stream channels or wetlands.

(b) The Copermittees must enforce their ordinances against illegal construction and maintenance grading activities on privately owned unpaved roads, so as to prevent impacts to water quality.

The documents.[1,2,3] cited in Finding D.1.c discuss shaping of the surface of unpaved roads during smoothing, and maintenance of temporary sediment and erosion control BMPs associated with maintenance activities, such as repair of landslides and wash outs. The temporary erosion and sediment control BMPs identified include straw bales and silt fencing. The documents do not describe conditions in the Santa Margarita Region, but rather in Pennsylvania and Northern California.

Unpaved Roads Maintained by Copermittees

The conditions in the Santa Margarita Region are vastly different from the conditions found in Pennsylvania and Northern California. Nevertheless, the Copermittees conduct surface grading and maintain temporary erosion and sediment control BMPs as appropriate following completion of maintenance on unpaved roads. These BMPs associated with the routine maintenance of unpaved roads

[1] USEPA 2006 "Environmentally Sensitive Maintenance for Dirt and Gravel Roads." Gesford and Anderson,USEPA-PA-2005.

[2] US Forest Service, 1996. Forest Service Specifications for Construction of Roads & Bridges. EM-7720-100. Revised August 1996.

[3] University of California Division of Agriculture and Natural Resources, 2007. Rural Roads: A Construction and Maintenance Guide of California Landowners. Publication 8262.

will be documented and procedures formalized in the Riverside County Drainage Area Management Plan (DAMP).

Unpaved Roads Maintained by Others

As previously described, the vast majority of unpaved roads within the jurisdiction of the Copermittees are not maintained by the Copermittees, but are maintained by others, typically private property owners. As these are public easements over private property, however, the underlying property owner is under no legal obligation to provide maintenance. To provide reasonable access, maintenance of such unpaved roads is voluntarily provided by property owners and, in some cases, home owners' associations. State law prohibits the use of Gas Tax funds by the Copermittees for the maintenance of unpaved roads on private property. Requirements for implementation and maintenance of temporary erosion and sediment control BMPs in areas under the legal jurisdiction of the Copermittees are addressed by the general requirements of the Copermittees' stormwater ordinances and, where grading activities are significant, through the Copermittees' grading ordinances. As maintenance of unpaved roads on private property is voluntary, more aggressive regulation of such private roads may in fact discourage routine maintenance of unpaved roads, likely resulting in an increase in erosion and sediment discharge from such roads.

As an alternative, maintenance of unpaved roads can be effectively addressed by enhancing existing programs. There is no need to create a new compliance program requirement specific to unpaved roads, especially where such programs cannot in any event be implemented by the Copermittees on private property. The Copermittees believe that a better approach is to provide public education to property owners and grading contractors in areas served by unpaved roads, focusing on the proper methods of shaping unpaved road surfaces and the benefits of implementing and maintaining temporary erosion and sediment controls.

The Copermittees request that these proposed provisions be removed from the Draft MS4 Permit.

5.0 Alternative Regulation of Unpaved Roads

There is nothing unique about potential discharges from unpaved roads under the legal jurisdiction of the Copermittees such that they would require special regulation. As discussed above, there is significant mileage of unpaved roads in the Santa Margarita Region that are not under the legal jurisdiction of the Copermittees. If there is concern about the impact of unpaved roads on water quality (a concern that, for the reasons already stated, is not supported by the evidence), there is no reason to believe that unpaved roads not under the legal jurisdiction of the Copermittees do not present the same potential to affect receiving water quality.

If it is determined that development and maintenance of unpaved roads requires special additional regulation, then such regulation should apply equally and on the same schedule to all unpaved roads under the jurisdiction of the San Diego Regional Board, not just those under the legal authority of the Copermittees. The Copermittees request that, if staff continues to maintain that unpaved roads require additional regulation, those requirements be addressed through a general permit for unpaved roads, and not in the Draft MS4 Permit.

6.0 Conclusion

No evidence, whether statements in the Fact Sheet and Findings, monitoring data, or Copermittee observations and experience, supports identification of unpaved roads as a significant source of pollutants to receiving waters in the Santa Margarita Region warranting additional regulation. The proposed unpaved road requirements are redundant to requirements of existing permits, including the state General Construction Permit, as well as existing Copermittee ordinances and programs. To the extent that unpaved roads may be a source of pollutants to the MS4 and thence to receiving waters, the Copermittees believe that enhancement of existing programs by documenting BMPs specific to maintenance of unpaved roads and providing public education to owners and contractors who provide maintenance of privately maintained unpaved roads will be as effective in reducing such pollutants, at a much reduced cost.

If the Regional Board determines that unpaved roads within its jurisdiction require further regulation, the appropriate method for addressing those roads is through a General Permit (Waste Discharge Requirements or NPDES Permit) rather than the Draft MS4 Permit, since a General Permit would address all unpaved roads in the San Diego Region, not just the subset of unpaved roads under the legal jurisdiction of the Copermittees.

Attachment 6: Prohibition of Irrigation Runoff

Introduction

The Draft Municipal Separate Storm Sewer System Permit (Draft Tentative Order No. R9-2010-0016 (NPDES No. CAS0108740) for the Santa Margarita Region of Riverside County (Draft SMR MS4 Permit) categorically prohibits the discharge of landscape irrigation; irrigation water; lawn watering; (collectively 'irrigation runoff') and non-emergency fire fighting flows runoff to the MS4. The basis for this requirement comes from the current Orange County Stormwater Permit within the San Diego Region (NPDES No. CAS0108740), which prohibits such discharges.

Context of Requested Changes

Stream and Watershed Characteristics

Unlike the watersheds in South Orange County, the Santa Margarita Region is an ephemeral watershed that includes Murrieta and Temecula Creeks which are perennial interrupted streams, i.e., they include some reaches in which the flow is continuous and others where flow is ephemeral. However, the areas of perennial flow in the Santa Margarita Region are located in mountain area tributaries outside of the urbanized areas serviced by the MS4s. These perennial flows quickly disappear by seepage into the sands and gravels and resurface upstream of the confluence of Murrieta and Temecula Creeks. The creeks in the urbanized areas of the watershed, located primarily in the valley, are ephemeral and flows are only observed during and immediately following significant storm events[1].

Rising groundwater is currently observed in Murrieta Creek below its confluence with the Santa Gertrudis Channel, an observation consistent with the observations made by the State of California in 1956.[2] Rising groundwater is also observed in Temecula Creek approximately one quarter mile upstream of the Interstate 15 Bridge. In 1956, the State observed more extensive rising groundwater conditions occurring as far upstream as the Highway 79 Bridge. Based on the virtual absence of non-stormwater flows and the rising groundwater conditions observed in lower Murrieta and Temecula Creeks prior to development of the watershed, there is no evidence that the rising groundwater currently observed is due to Urban Runoff nor that Urban Runoff has affected the quality of rising groundwater.

Irrigation Runoff is Not a Source of Pollutants

Finding C.15 states:

> *Non-storm water discharges to the MS4 granted an influent exception [i.e., which are exempt from the effective prohibition requirement set forth in CWA section 402(p)(3)(B)(ii)] under 40 CFR 122.26 are included within this Order. Any exempted discharges identified by Copermittees as a source of pollutants are subsequently required to be addressed (emphasis added) as illicit discharges through prohibition and incorporation into existing IC/ID programs. Furthermore, the USEPA contemplates that permitting agencies such as the San Diego Water Board may also identify exempted discharges as a source of pollutants required to be addressed as illicit discharges (See VOl.*

[1] Riverside Flood Control and Water Conservation District, "Hydrologic Data for 1975-76 Season," March 1982, p. 49.

[2] State of California Department of Public Works Division of Water Resources, Bulletin No. 57, "Santa Margarita River Investigation," Volume I, June 1956, p. 48.

> *55 Fed. Reg. 48037). The San Diego Water Board and the Copermittees have identified landscape irrigation, irrigation water and lawn water, previously exempted discharges, as a source of pollutants and conveyance of pollutants to waters of the U.S. Of course, rising groundwater is exempt from regulation under 40 CFR 122.26 as a non-prohibited non-storm water discharge.*

The last sentence of this Finding does not accurately reflect the facts. Unlike Orange County, and despite Board staff's contentions in the fact sheet the Copermittees have **not** identified landscape irrigation, irrigation water or lawn water as a source of pollutants or conveyance of pollutants to waters of the U.S. Rather, this statement is based on the efforts in Orange County where that County found that the significant perennial flows throughout the urbanized areas were caused by irrigation runoff. Not only has irrigation runoff not been found to be a source of pollutants to waters of the U.S. in the Santa Margarita Region as a category, no individual discharges of irrigation runoff in the region have been found to be a source of pollutants. As described in the Stream Flow Characteristics section above, during dry weather there is no perennial flow in the waters of the U.S. in the urbanized area until rising groundwater occurs just before the confluence of Murrieta and Temecula Creeks. This is unlike streams in South Orange County, that it was found that the significant perennial flows throughout the urbanized areas were caused by irrigation runoff. In the Santa Margarita Region, any weather runoff that does reach receiving waters quickly seeps into the alluvial soils.

Second, the Discussion of Finding C.15 in the Fact Sheet fails to demonstrate the need for a prohibition of this irrigation runoff as a non-stormwater runoff *category*. The discussion references conditions outside of and unlike those found in the Santa Margarita Region and misconstrues statements in public education materials that encourage runoff management as justification for the proposed prohibitions. Finally, no justification is provided in this discussion or elsewhere to support the prohibition of the non-emergency fire fighting flows runoff as a category.

Prohibition Not Economically Justifiable

A prohibition of irrigation runoff will result in significant costs to the public and the Copermittees as the prohibition is ***TO THE MS4***, which is defined to include streets, curbs and gutters. As the MS4 Permit has eliminated the MEP protections for dry weather non-stormwater discharges (see also legal comments in Attachment 7 to the comment letter), this makes the Copermittees responsible for every incidence of over-irrigation, regardless of whether such discharges ever affect receiving waters. As such, the cost to eliminate these discharges is not commensurate with any measurable environmental benefit. The Copermittees cannot impose fees to recover the costs of enforcing this new requirement and, as described in the Economics White Paper (Attachment 2 to the comment letter), the Copermittees have even fewer resources to carry out the requirements of the current MS4 Permit than in past years, much less carry out the additional requirements set forth in the draft Permit, including the development and implementation of a new program to prohibit irrigation runoff.

As this prohibition would also apply to Copermittees' facilities, retrofit of existing facilities would likely be immediately required to ensure compliance. The City of Murrieta, for example, has estimated that retrofit of their sprinklers to a drip system to avoid irrigation runoff from their facilities alone would cost $250,000.

Attachment 6: Prohibition of Irrigation Runoff

Irrigation Runoff Addressed by Existing Requirements and Programs

Management of irrigation runoff is currently addressed by existing requirements and programs and the additional requirements proposed in the draft Permit are unnecessary. The use of reclaimed water is regulated under Waste Discharge Requirements (WDRs) issued by the Regional Board.

The draft Permit also provides other mechanisms to address irrigation runoff. **First**, if a discharge of irrigation runoff was determined to be a source of stormwater pollutants, the Copermittees already have the legal authority to take appropriate enforcement action to control the discharge as an illegal discharge, under their existing storm water ordinances. **Second**, the non-stormwater action level monitoring required by this draft Permit will identify any potentially problematic non-stormwater discharges and identify the source of those discharges. Should the source be determined to be irrigation runoff, it will require the Copermittees to address that discharge. Both mechanisms are better suited (financially and legally) to deal with irrigation runoff than a complete prohibition provision in the absence of local data showing it as a problem.

Finally, local water purveyors are better equipped and able to address irrigation runoff. As an example, Rancho California Water District and Eastern Municipal Water District actively promote water conservation programs, which are supported by the Metropolitan Water District of Southern California. The County and the cities have adopted water conservation ordinances as required by the Water Conservation in Landscaping Act (AB 1881, Laird). Given these facts, there is even less justification for an extensive and expensive program to address an irrigation runoff issue that is not, in fact, a source of pollutants causing or contributing to a violation of water quality standards in the Santa Margarita Region.

Preferred Requested Permit Revisions

Specifically, the Permittees request that the language in the Permit be amended as follows prior to adoption of the Permit:

Delete Finding C.15

As the last sentence of this Finding is not supported by fact, the Permittees request that it be deleted as noted in the following text and the entirety of the Discussion of Finding C.15 in the Fact Sheet be deleted.

> *Non-storm water discharges to the MS4 granted an influent exception [i.e., which are exempt from the effective prohibition requirement set forth in CWA section 402(p)(3)(B)(ii)] under 40 CFR 122.26 are included within this Order. Any exempted discharges identified by Copermittees as a source of pollutants are subsequently required to be addressed (emphasis added) as illicit discharges through prohibition and incorporation into existing IC/ID programs. Furthermore, the USEPA contemplates that permitting agencies such as the San Diego Water Board may also identify exempted discharges as a source of pollutants required to be addressed as illicit discharges (See VOl. 55 Fed. Reg. 48037). ~~The San Diego Water Board and the Copermittees have identified landscape irrigation, irrigation water and lawn water, previously exempted discharges, as a source of pollutants and conveyance of pollutants to waters of the U.S.~~*

Attachment 6: Prohibition of Irrigation Runoff

Restore Conditional Exemption

The Permittees request that the landscape irrigation; irrigation water; lawn watering; and non-emergency fire fighting flows runoff categories be restored to the list of non-prohibited, non-stormwater discharges identified in B.2 of the draft SMR MS4 Permit as noted below. In the event that an individual irrigation runoff discharge is determined to be a source of pollutants as identified by the non-stormwater dry weather action level (NAL) process, appropriate action can be taken by the Permittees to control that source.

B.2. Non-Stormwater Discharges

> This item includes a listing of discharges that are not prohibited unless a discharge is determined to be a source of pollutants to waters of the U.S. Landscape irrigation, irrigation water, lawn watering and non-emergency fire fighting flows were deleted from this list as noted:

a. Diverted stream flows;
b. Rising groundwaters;
c. Uncontaminated groundwater infiltration [as defined at 40 CFR 35.2005(20)] to MS4s;
d. Uncontaminated pumped groundwater[3];
e. Foundation drains[3];
f. Springs;
g. Water from crawl space pumps[3];
h. Footing drains[3];
i. Air conditioning condensation;
j. Flows from riparian habitats and wetlands;
k. Water line flushing[4,5;]
l. <u>Landscape irrigation;</u>
m. Discharges from potable water sources not subject to NPDES Permit No. CAG679001, other than water main breaks;
n. <u>Irrigation water;</u>
o. <u>Lawn watering;</u>
p. Individual residential car washing;
q. <u>Non-emergency fire fighting flows; and</u>
r. Dechlorinated swimming pool discharges

Additional Clarifications

It is not practicable for the Copermittees to <u>prevent or eliminate</u> irrigation runoff. The Permittees request that the following requirements be revised as noted to provide achievable compliance requirements:
F.1.c.(1) Approval Process Criteria and Requirements for All Development Projects states:

[3] Requires enrollment under Order R9-2008-002. Discharges into the MS4 require authorization from the owner and operator of the MS4 system.
[4] This exemption does not include fire suppression sprinkler system maintenance and testing discharges. Those discharges may be regulated under Section B.3.
[5] Requires enrollment under Order R9-2002-0020.

Performance Criteria: Discharges from each approved development project must be subject to the following management measures:

(1) Source control BMPs that reduce stormwater pollutants of concern in runoff;~~prevent~~ reduce the potential for illicit discharges into the MS4; ~~prevent~~ reduce the potential for irrigation runoff; storm drain system stenciling or signage; properly design outdoor material storage areas; properly design outdoor work areas; and properly design trash storage areas.

F.1.d.(5) Source Control BMP Requirements states:

Each Copermittee must require each Priority Development Project to implement applicable source control BMPs. The source control BMPs to be required must:

(a) Prevent illicit discharges into the MS4;
(b) Minimize storm water pollutants of concern in runoff;
(c) ~~Eliminate~~ Reduce the potential for irrigation runoff;
(d) Include storm drain system stenciling or signage;
(e) Include properly designed outdoor material storage areas;
(f) Include properly designed outdoor work areas;
(g) Include properly designed trash storage areas;
(h) Include water quality protection requirements applicable to individual priority project categories.

Alternative Requested Permit Revisions

Regulate irrigation runoff discharges from the MS4, rather than as prohibited discharge to the MS4

If the Regional Board nevertheless insists on prohibiting irrigation runoff, the Copermittees request that the draft MS4 Permit be revised to allow for irrigation runoff to be managed as a Jurisdiction Runoff Management Plan (JRMP) program, rather than as a prohibited discharge to the MS4. This alternative request is consistent with how the Permit currently deals with non-emergency fire fighting discharges, which was also removed from the list of non-prohibited non-stormwater discharges. The Executive Officer stated that he would be open to consideration of a program for irrigation runoff that would address discharges from the MS4. This alternative approach allows the Copermittees to develop a program that focuses on irrigation runoff problem areas, as opposed to holding the Copermittees responsible for eliminating any instant case of over-irrigation independent of threat to receiving water quality.

As the alternative to restoring the conditional exemption, the Copermittees request the Board to ADD Provision B.4 as follows:

B.4. *As part of the JRMP, the Copermittees must develop and implement a program to address pollutants from landscape irrigation, irrigation water and lawn watering identified as significant sources of pollutants to waters of the United States.*

Attachment 7: General Legal Comments

LEGAL COMMENTS OF THE RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT ON TENTATIVE ORDER NO. R9-2010-0016, WASTE DISCHARGE REQUIREMENTS FOR DISCHARGES FROM THE MUNICIPAL SEPARATE STORM SEWER SYSTEMS (MS4s) DRAINING THE COUNTY OF RIVERSIDE, THE INCORPORATED CITIES OF RIVERSIDE COUNTY, AND THE RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT WITHIN THE SAN DIEGO REGION

The following comments are made by the Riverside County Flood Control and Water Conservation District (District) with respect to legal issues raised by the above-referenced Tentative Order (Order). These comments are being made on behalf of the District and, with respect to issues common to the other Copermittees, also on behalf of the County of Riverside and the Cities of Menifee (to the extent that this City will remain as a Co-Permittee under the Order), Murrieta, Temecula and Wildomar. We also understand that the County and the individual Cities will be filing comments on the Order under separate cover. The comments contained in this document are intended to complement, but not supersede, the individual comments of the County and the City. Also, the District will be filing separate comments concerning issues specific to it.

The District reserves the right to make additional legal comments on the Order prior to the close of the public hearing to adopt the order. In addition, legal comments may also be included in the Technical Comments separately filed herewith by the District.

The redlined version of the Order submitted with the District's comment letter also addresses the following and additional comments, along with requested changes in the text of the Order.

General Comments:

1. *Dual Requirement to Adopt Programs and Guarantee Results*

Throughout Part F. of the Tentative Order relating to the Jurisdictional Runoff Management Program, the language requires not only that the Copermittees adopt programs intended to achieve control of pollutants but also requires such programs to achieve certain ends. See, for example, Part F.1., where each Copermittee must implement a development planning program which meets the requirements of Section F of the Tentative Order *and* which requires such a program to (1) reduce development project discharges from the MS4 to the MEP, (2) prevent such discharges "from causing or contributing to a violation of water quality standards", (3) prevents illicit discharges to the MS4, and (4) manages increases in runoff discharge rates. A similar requirement is set forth in other provisions, including Part F.3, relating to existing development, Part F.3.b., relating to commercial/industrial programs, Part F.3.c., relating to residential programs and Part F.6, relating to the education component where, in each case, the Copermittees are required to develop programs <u>and ensure their performance</u>.

This dual requirement, to develop a program and then to ensure that it achieves the intended ends, is unlawful, as it goes beyond the requirements of the MS4 regulations and requires the Copermittees to guarantee the results of activities that will often be in the control of third parties.

Attachment 7: General Legal Comments

The MS4 regulations require that the MS4 permittees develop the required programs. See, for example, 40 CFR § 122.26(d)(2)(iv(A)((2), which requires the Copermittees to, among other things, develop and implement a management program including a "description of planning procedures including a comprehensive master plan to develop, implement and enforce controls to reduce the discharge of pollutants from municipal separate storm sewers which receive discharges from areas of new development and significant redevelopment". The Copermittees certainly could be liable under the permit if they failed to adequately "develop, implement and enforce controls". However, the MS4 regulations do not require that the Copermittees guarantee, under threat of being found in violation of the permit, that such controls achieve the desired ends of the management programs. It should be also noted that in many other parts of the Order, the Copermittees are directed to develop programs "designed" to achieve water quality goals.

Further, the iterative BMP approach required by the State Water Resources Control Board ("State Board") in precedential State Board Order WQ 99-05 and subsequent rulings would be made meaningless if the Copermittees were strictly liable for ensuring in their programs that discharges did not cause or contribute to a violation of a water quality standard. It is appropriate for the Board to set forth in these sections the "elements needed in the Copermittees' program to fulfill the goals of [the] directive", as set forth in staff's Response to Comment 297 on the Orange County MS4 permit, Order No. R9-2009-0002. However, the Board has no authority to require the Copermittees to guarantee that such goals will be fulfilled, as the current language appears to require.

In addition to the portions of the Order cited, the Copermittees also request changes to similar provisions found at Sections F.1.d, F.1.d.5, F.2, F.3.a, F.4, and G. The attached redline identifies those and any additional parts.

2. *Requirement to Follow State Law on Requirements Not Required by Federal Law*

A number of requirements in the Tentative Order exceed the requirements of federal law. The Board may have discretion to impose such requirements under state law (*Defenders of Wildlife v. Browner*, 191 F.3d 1159 (9th Cir. 1999), however, the California Supreme Court has determined that to the extent such state law requirements are included in an NPDES permit, the Board must consider the factors set forth in Water Code § 13263(a) and § 13241, including the water quality that could reasonably be achieved by the requirements and economic considerations. *City of Burbank v. State Water Resources Control Board* (2005) 35 Cal. 4th 613. See also Water Code § 13000, setting forth that the activities and factors which may affect the quality of the waters of the state "shall be regulated to attain the highest water quality which is reasonable, considering all demands being made on those waters and the total values involved, beneficial and detrimental, economic and social, tangible and intangible".

The Fact Sheet and findings for the Tentative Order do not establish that staff has considered such factors or, to the limited extent the factors were considered, staff used out-of-date and incomplete information. In particular, the economic analysis contained in Section VI of the Fact Sheet uses out-of-date information on the economic viability of the cities in the Santa Margarita Region, ignoring the impact of the national recession, which has hit the Region with particular force and which has caused a major reduction in property tax and sale tax revenues available to

fund water quality activities under the Order. For a more complete economic analysis, please see Attachment 2 to the comment letter.

Findings in Tentative Order:

Finding A.4: This finding states that responses to comments on the Order would be "incorporated by reference" into the findings supporting the Order.

Comment: Incorporating responses to comments as to which interested parties have no chance to comment prior to the hearing on the Order raises a due process concern.

Finding C.14: This finding states, in relevant part, that "[n]on-storm water (dry weather) discharge from the MS4 is not considered a storm water (wet weather) discharge and therefore is not subject to regulation under the Maximum Extent Practicable (MEP) standard . . . .". The finding further asserts that such discharges are to be "effectively prohibited" from discharge into the MS4.

Comment: The rationale for this finding, as set forth in the Fact Sheet, relies on a State Board precedential decision, Order No. WQ 2009-0008. This order has been vacated by order of the Los Angeles County Superior Court in *County of Los Angeles v. State Water Resources Control Board*, Case No. BS 122724 (July 16, 2010). Thus, the order has no further effect and cannot be cited or relied upon by the Board in support of this finding or any other finding or directive in the Order.

Moreover, the finding incorrectly states that discharges of non-stormwater from the MS4 are not subject to the MEP standard. This parsing of "stormwater" and "non- stormwater" is not found in the Clean Water Act, which states only that the MS4 permit "shall require controls to reduce the discharge of *pollutants* to the maximum extent practicable . . . .". 33 U.S.C. 1342(p)(3)(B)(iii) (emphasis supplied). The preamble to the MS4 regulations promulgated by U.S. EPA moreover also acknowledges that "MEP control measures" would be implemented to address not only pollutants in "stormwater" but also from "non-stormwater discharges."

> As the preamble states:
>
> [Copermittees are required] to develop management programs for four types of pollutant sources which discharge to large and medium municipal storm sewer systems. Discharges from [such systems] are usually expected to be composed primarily of: (1) Runoff from commercial and residential areas; (2) storm water runoff from industrial areas; (3) runoff from construction sites; and (4) *non-storm water discharges*. Part 2 of the permit application has been designed to allow [permittees] the opportunity to propose *MEP control measures for each of these components of the discharge"*. 55 Fed. Reg. at 48052 (emphasis supplied).

This language sets forth EPA's understanding of the plain language of the Act: "pollutants" must be controlled to the MEP from the MS4 "discharge", not merely stormwater. While State Board Order No. WQ 2009-0008 improperly attempted to ignore this distinction and liken non-stormwater discharges to prohibited "illicit discharges", that order has been vacated and cannot be cited by the Board.

Moreover, the interpretation that the Clean Water Act requires controls of dry weather discharges from the MS4 in the same manner as if such discharges were from an industrial wastewater source ignores the factual complexity of the MS4 discharge. For example, some of that discharge will be composed of exempt discharges, such as car washing runoff, swimming pool drainage, rising groundwater, foundation drains and other such sources. As to these types of discharges, U.S. EPA stated that "it is unlikely Congress intended to require municipalities to effectively prohibit . . . *seemingly innocent flows that are characteristic of human existence in urban environments and which discharge to municipal separate storm sewers"*. 55 Fed. Reg. at 48037 (emphasis added). Other parts of that discharge will be comprised of industrial discharges separately permitted by the Board, such as well development discharges. These discharges cannot be distinguished from possible illicit discharges, yet they must still be treated to the MEP. There is no requirement in the Clean Water Act, or in the implementing regulations, to ensure that these mixed dry weather discharges must be "effectively prohibited" in the same way that an industrial plant would be required to control its discharges.

Finding C.15: This finding states, in relevant part, that the Board and the Copermittees have identified "landscape irrigation, irrigation water and lawn water, previously exempted discharges, as a source of pollutants and conveyance of pollutants to waters of the U.S." The finding further asserts that such non-exempt discharges are required to be "addressed" as "illicit discharges" and effectively prohibited from entry into the MS4.

Comment: The rationale for this prohibition lacks both a factual and legal basis. The factual issues are discussed in the District's technical comments on this issue. With regard to legal issues, the justification for removing the preexisting exemption for these discharges (referred to hereafter as "irrigation water") is completely lacking. First, given that the justification is based on State Board Order WQ 2009-0008, which likens dry weather discharges to "illicit discharges" required to be "effectively prohibited" from entry into the MS4, the vacation of this order by the Los Angeles County Superior court eliminates this Order as a justification for the prohibition.

Second, EPA, in the preamble to the federal MS4 regulations, required that a *permittee* must make a finding that the "irrigation water" discharges must be a "source of pollutants to waters of the United States . . . .". 55 Fed. Reg. 48037. Moreover, such discharges must represent a "significant" source of pollutants to waters of the United States "under certain conditions". U.S. EPA *Guidance Manual for the Preparation of Part 2 of the NPDES Permit Application for Discharges from Municipal Separate Storm Sewer Systems,* November 1992 ("EPA Part 2 Guidance Manual"), at p. 6-33. These conditions require a focus not on an entire category of discharges, but rather a discharger-by-discharger examination.

In the MS4 regulatory preamble, EPA stated that "[i]n general, municipalities will not be held responsible for prohibiting some specific components of discharges or flows listed below through their [MS4], even though such components may be considered non-storm water discharges, unless such discharges *are specifically identified on a case-by-case basis as needing to be addressed"*. 55 Fed. Reg. 47995 (emphasis supplied). In the Guidance Manual, EPA states:

> If an applicant knows . . . that landscape irrigation water from a ***particular site*** flows through and picks up pesticides **or *excess*** nutrients from fertilizer applications, there may

> be a reasonable potential for a storm water discharge to result in a water quality impact. In such an event, the applicant should contact the NPDES permitting authority to request that the authority order ***the discharger*** . . . to obtain a separate NPDES permit (or in this case, the discharge could be controlled through the storm water management program of the MS4).
>
> EPA Part 2 Guidance Manual, p. 6-33 (emphasis added).

Third, the finding asserts that the Board has the authority to "identify exempted discharges as a source of pollutants" and that it has identified the irrigation discharges "as a source of pollutants and conveyance of pollutants to waters of the U.S." Read in the context of the previously cited language, however, the Board has no power greater than a municipality and must identify specific discharges, and not entire categories of discharges. See 55 Fed. Reg. 48037. And, as noted in the white paper on irrigation runoff, the Copermittees have not, in fact, identified irrigation discharges as a source of pollutants or a "conveyance of pollutants" to waters of the United States.

Finding D.1.b.: This finding states that "MS4 discharges, however, continue to cause *or contribute to* violations of water quality standards as evidenced by the Copermittees' monitoring results". (Emphasis added)

Comment: With respect to discharges that "contribute to" violations of water quality standards, it should be noted that for concentration-based water quality standards, an MS4 discharge at concentrations *below* the water quality standard cannot, as a matter of simple scientific fact, *contribute to* a violation of such a water quality standard. If the discharge is below the standard in question, that discharge will never exceed the water quality standard, no matter the volume of the discharge.

Finding D.2.g: This finding, which concerns the effects of urbanization on the characteristics of stormwater flow, states in part that "[h]ydromodification measures for discharges to hardened channels are needed for the future restoration of the hardened channels to their natural state . . . ."

Comment: Hardened flood control channels are in place in the Santa Margarita Region due to the need to protect the lives and property of Riverside County residents from floodwaters. Such channels, and other flood control structures, have been established by the District in accordance with its statutory obligations set down by the Legislature in California Water Code App. § 48-9. In particular, we draw the Board's attention to that section of the Water Code setting forth the power of the District to "control the flood and storm waters of said district" and to save and conserve in any manner all or any of such waters and protect from damage from such flood or storm waters the watercourses, watersheds, public highways, life and property in said district." Water Code App. § 48-9(8).

The Board has no statutory jurisdiction under the MS4 program to alter any flood control structures or channels of the District or to some jurisdiction over the construction or location of such structures or channels. Any such alteration or construction must be done with the cooperation and agreement of the District and in accord with the District's statutory mandate to protect the citizens of Riverside County. Please see changes in redline.

Attachment 7: General Legal Comments

Finding D.3.c: This finding states in part that "urban streams", whether natural, anthropogenic or partially modified, are considered part of the "MS4" if they are used as a conveyance for runoff.

Comment: The definition of "MS4" does *not* include any natural watercourse. This is evident both from the definition of "MS4" in the federal Clean Water Act regulations and from EPA's comments in the preamble to those regulations. First, the definition of "MS4", in relevant part, states that it consists of "a conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, manmade channels or storm drains" "owned or operated by" a municipality "having jurisdiction over disposal of . . . storm water" that is "designed or used for collecting or conveying storm water". 40 CFR § 122.26(b)(8). Nothing in that definition even suggests that natural watercourses are part of the MS4, only improved watercourses.

Second, U.S. EPA, in the preamble to the original MS4 regulations, stated unequivocally that "[t]he Agency also wants to clarify that streams, wetlands and other water bodies that are waters of the United States are not storm sewers for the purpose of this rule". 53 Fed Reg. 49442 (December 7, 1988).[1]

Moreover, none of the Copermittees "own" or "operate" a natural stream. Such streams are waters of the State and are "owned" by the people of California.

The authority cited in the Fact Sheet for this finding, a response filed with the State Board in opposition to a petition challenging an MS4 permit issued by the Board to San Diego County, contradicts the federal definition and, under the Supremacy Clause, cannot be employed. Please see changes in redline.

Finding E.1: This finding states that the RWL language in the Tentative Order "requires compliance with water quality standards, which for stormwater discharges compliance is to be achieved through an iterative approach requiring the implementation of improved and better-tailored BMPs over time".

Comment: The District has two comments regarding this finding, one relating to the language of the finding and one relating to the Fact Sheet discussion of the finding. First, the language of State Board Order WQ 99-05, which establishes the RWL language required to be placed in MS4 permits statewide, is not limited to "stormwater" discharges, but rather to all discharges into receiving waters. See State Board Order WQ 99-05. This is consistent also with the requirement that "discharges" from the MS4, not merely stormwater discharges, must be controlled to the MEP and are not required to meet numeric effluent limitations. 33 U.S.C. § 1342(p)(3)(B)(iii). Second, while the language of the finding correctly states that compliance with water quality standards "is to be achieved through an iterative approach", language in the Fact Sheet improperly contradicts this finding by asserting that compliance with the iterative BMP process

[1] EPA saw no need to further clarify this point in the final rulemaking for the MS4 regulations. The absence of any discussion of this point in the final rulemaking does not, contrary to comments made by Board staff in responses to comments on the South Orange County MS4 Permit, Order No. R9-2009-0002, indicate that EPA abandoned this reading of the Act.

"does not shield the discharger from enforcement actions for continued non-compliance with water quality standards". Fact Sheet, page 91.

Such an interpretation contradicts the plain language of Order WQ 99-05 and appears to represent an "end-run" around the entire iterative process and the concept of MEP, which is a flexible concept, intended to allow the development of site-specific permit conditions based on the judgment of the permit writer. See, e.g., 55 Fed. Reg. 48038. The interpretation is, therefore, not consonant with the requirements of the State Board precedential order and the MS4 regulations and should be deleted from the Fact Sheet.

Finding E.6: This finding purports to determine that the Tentative Order "does not constitute an unfunded local government mandate subject to subvention under Article XIIIB, Section(6) of the California Constitution".

Comment: This finding has no place in the Tentative Order. The exclusive jurisdiction over a determination as to whether a mandate constitutes an unfunded state mandate lies with the Commission on State Mandates. The Commission has exclusive authority to determine, in the first instance, whether a requirement constitutes an unfunded state mandate. Government Code §§ 17751 and 17552; *Lucia Mar Unified School District v. Honig* (1988) 44 Cal.3d 830, 837; *Hayes v. Commission on State Mandates* (1992) 11 Cal.App.4th 1546, 1596-97. The findings of an agency that has no jurisdiction to make those findings are entitled to no weight.

Second, the finding is erroneous on several grounds. It is erroneous in its assertion that the Tentative Order "implements federally mandated requirements under CWA §402". While true, the Order also contains separate state-mandated requirements. As the California Supreme Court has held, NPDES permits (like the Tentative Order) can contain both federal and state requirements. See *City of Burbank, supra,* 35 Cal. 4th at 618, 628. Where those non-federal requirements constitute a new program or higher level of service ordered by the state or exceed federal requirements, those requirements can qualify as a state mandate requiring a subvention of funds. See *Long Beach Unified School District v State of California* (1990) 225 Cal.App.3d 155, 172-73. Even if the requirement derives from federal law, the requirement can still constitute an unfunded state mandate if the state agency has a choice as to whether to impose the requirement on the permittees, e.g., *Hayes,* 11 Cal.App.4th at 1593-94.

Recently, the Commission on State Mandates held that both the Los Angeles County MS4 Permit and the San Diego County MS4 Permit contained requirements that constituted an unfunded state mandate, not required by federal law. *In re Test Claim on Los Angeles Regional Quality Control Board Order No. 01-182,* July 31, 2009; *In re Test Claim on San Diego Regional Water Quality Control Board Order No. R9-2007-0001,* March 26, 2010.

The finding further asserts that the obligations to be imposed on the Copermittees are "similar to, and in many respects less stringent than" obligations on non-governmental discharges. A similar argument was considered and rejected by the Commission in the Los Angeles and San Diego MS4 Permit Test Claims. The District disagrees with this assertion, as there are numerous requirements in the Tentative Order that are uniquely applicable to governmental entities. This is, however, a question that would be addressed by the Commission on State Mandates were a test claim to be filed, the only procedure for the determination of this issue.

Attachment 7: General Legal Comments

The finding further asserts that Copermittees "have the authority to levy service charges, fees, or assessments to pay for compliance with this Order". This finding is both erroneous on the facts and without any basis in the record. The question of how a state mandate is to be funded is beyond the scope of the Board's expertise and, again, is exclusively within the jurisdiction of the Commission on State Mandates. The finding also asserts that the "Copermittees requested permit coverage in lieu of compliance with the complete prohibition against the discharge of pollutants contained in CWA §301, subdivision (a)". A similar argument was made and rejected in the Los Angeles and San Diego MS4 Permit Test Claims. The finding further asserts that prohibitions against conditions of pollution or nuisance predate the enactment of Article XIIIB Section 6 of the California Constitution. The requirements of the Tentative Order far exceed such requirements. And, in any event, whether such requirements predate Article XIIIB Section 6 is an issue for the Commission on State Mandates.

The finding is not supported by evidence in the record and is in fact contradicted by controlling legal precedent. Even were it to be included in the Tentative Order, it is entitled to no weight since the Board lacks jurisdiction to make such a finding. For these reasons, the finding and any associated discussion in the Fact Sheet should be deleted. Please see changes in redline.

Directives in Tentative Order:

Section A.1: This directive mandates, among other things, that discharges "into" MS4s that would cause or threaten to cause a condition of "pollution, contamination, or nuisance" in receiving waters of the state are prohibited.

Comment: While the Board in this Order has jurisdiction to prohibit discharges "from" the MS4, it cannot regulate conditions within the MS4, since these are not in fact "receiving waters of the state". In any event, the language is superfluous, since regulation of a discharge from the MS4, which is subject matter of the Tentative Order, accomplishes the same end. Please see the accompanying redline.

Section A.3: This directive both recites the prohibition against discharges that cause or contribute to the violation of water quality standards and introduces the iterative process required by the State Board for MS4 permittees.

Comment: To clarify that the iterative process specifically applies to the Copermittees' compliance requirements in Section A.3, language has been added in the redline.

Section A.3.b: This directive relates to the requirement that the Copermittees repeat the iterative process to comply with receiving water limitations for continuing or recurring exceedances of the limitations.

Comment: Clarifying language changes are requested in the redline.

Section A.3.c: This directive indicates that nothing prevents the Board from enforcing any provision of the Order while the Copermittees are preparing and implementing the receiving water limitation report.

Attachment 7: General Legal Comments

Comment: Clarifying language changes are included in the redline to make clear that so long as the Copermittees are in compliance with the requirements of Section A.3, they are not in violation of the section.

Section B.2: This section categorizes the types of non-stormwater discharges that are not prohibited from discharge into the MS4, and thus not subject to the "effectively prohibit" requirement in Section B.1. However, this section improperly omits several categories of non-stormwater discharges, landscape irrigation, irrigation water, lawn watering and non-emergency fire fighting flows. In addition, this section states that the Water Board may require controls for "non-anthropogenic sources".

Comment: As discussed above in the District's comment concerning Findings C.14 and C.15, the Board lacks authority to delete an entire category of discharge from the non-stormwater designation. Such authority must be exercised primarily by the Copermittees, based on their evaluation of source-specific facts. And, the ability of the RWQCB to liken such flows to "illicit discharges", apparently authorized by State Board Order No. WQ 2009-0008, is no longer in effect, as that Order has been vacated. Moreover, there is no requirement in the MS4 regulations for controls on "non-anthropogenic sources". Such natural sources are not within the control of the MS4 Copermittees. Moreover, controlling such natural sources as rising groundwater or springs by sealing the MS4 could raise concerns about interference with water rights. Given the natural source of such springs, the incidental presence of pollutants in the waters would have occurred whether an MS4 was in existence or not. Please see the accompanying redline as well as the District's technical comments on this directive.

Section C: This section establishes "non-stormwater dry weather action levels" ("NAL") monitoring and the requirements to be followed when NALs exceedances are identified.

Comment: In addition to the District's technical comments on this part, the District has the following concerns regarding legal aspects of this directive. The District wishes to incorporate its comments on Findings C.14 and C.15, which discuss the requirements applicable to any discharge from an MS4, which is that the Copermittees control pollutants in such discharges to the MEP. Such a requirement applies not only to discharges of stormwater, but also dry weather discharges, which may (as discussed above) include not only non-exempted non-stormwater discharges but also discharges from exempted non-stormwater sources (those identified in Section B.2 of the Order) as well as discharges from sources holding separate NPDES permits. We note that Section C.2.d. requires prompt notice to the RWQCB of a source that may require a separate NPDES permit. The Board must be prepared to address such sources and not require further investigation by the Copermittees.

As also noted above, in the preamble to the MS4 regulations, U.S. EPA indicated that the MEP control requirement would apply to all discharges from MS4s, including "non-stormwater discharges". 55 Fed. Reg. 48052.

Section E.1.a: This directive requires the Copermittees to have legal authority to, among other things, "control the quality of runoff from industrial and construction sites", including sites that have coverage under the general industrial and construction stormwater permits.

Attachment 7: General Legal Comments

Comment: As separate NPDES permits, the general construction and general industrial stormwater permits allow discharge into the MS4 so long as those permits are being complied with. Copermittees do not have authority to contradict the requirements of the general permits. This requirement is vague and ambiguous, and goes beyond the requirements of the MS4 regulations, which require that Copermittees demonstrate that they have legal authority to control discharges into their MS4 systems.

Sections E.1.j and k: These directives require the Copermittees to have legal authority to require the use of BMPs to prevent or reduce the discharge of pollutants into MS4s from stormwater to the MEP and to require documentation on such BMPs.

Comment*:* The Copermittees are required under the Clean Water Act to control discharge of pollutants *from* their MS4 to the MEP standard. 33 U.S.C. § 1342(p)(3). There is no requirement that discharges *into* the MS4 meet this standard, though the Copermittees are free to impose such a standard voluntarily. These provisions are not required and should either be removed or made optional for the Copermittees. The requirements of these directives are also duplicative of Section E.1.i., which already requires the Copermittees to have the legal authority to require reports from dischargers to the MS4.

Section F.1.h(h): This directive requires that where Priority Development Projects are adjacent to or will modify stream channels, the use of hardscape and other materials is forbidden.

Comment: As noted above, the District has a statutory mandate to protect the lives and property of the citizens of Riverside County from floodwaters. If, in the professional judgment of the District's engineers, hardscape or other engineering improvements are required in a stream channel affected by this directive due to flood control concerns, the District must be allowed to make that judgment. The Board does not have the hydrologic/hydraulic expertise, nor is it authorized by the Legislature to make flood control judgments and presumably would not wish to be a defendant in a lawsuit brought by flood victims whose lives or property was affected by the inability of the District to make necessary flood control decisions.

In making this comment, the District wants to be clear that it is not unwilling to accommodate potential future channel rehabilitation efforts where flood control will not be affected. Please see the accompanying redline for suggested language to address these concerns.

Section F.2.a: This directive requires the Copermittees to update their grading and other ordinances as necessary to comply with the Order and including requirements for implementing all designated BMPs and other measures.

Comment: The drafting and enforcement of ordinances by a municipality is a municipal function that cannot be directed by the Regional Board. Article XI, section 7 of the Constitution guarantees municipalities the right to "make and enforce within [their] limits all local police, sanitary and other ordinances and regulations not in conflict with general laws". Thus, specific requirements as to the content of ordinances cannot be directed by the Board. The redline requests deletion of this directive.

Section F.3.b.(5): This directive requires that the Copermittee stormwater ordinances must contain certain enforcement components.

Attachment 7: General Legal Comments

Comment: The drafting and enforcement of ordinances by a municipality is a municipal function that cannot be directed by the Regional Board. Article XI, section 7 of the Constitution guarantees municipalities the right to "make and enforce within [their] limits all local police, sanitary and other ordinances and regulations not in conflict with general laws". Thus, specific requirements as to the content of ordinances cannot be directed by the Board. The redline requests deletion of this requirement.

Section F.3.c.(4): This directive requires that each Copermittee "must ensure that effective measures exist and are implement or required to be implemented to ensure that runoff within and from common interest developments, including areas managed by associations and mobile home parks, and meets the objectives of this section and Order".

Comment: The Fact Sheet inappropriately states that the Tentative Order "interprets common interest areas as property subject to the codes and ordinance and enforcement mechanisms of the city or county in which it resides and, therefore, holds the local government responsible for the discharge of wastes from storm water conveyance systems located within these areas".

The Tentative Order regulates discharges from the MS4. Drainage systems and the runoff handled *within* a private development or common interest area generally are not part of the Copermittees' MS4, as the Copermittees (unless they actually maintain their MS4 within such areas) have no right to maintain or regulate such internal systems, beyond the enforcement of local ordinances regulating discharges *into* the Copermittees' MS4 or through the requirement to install and maintain BMPs. Discharges from such systems are thus no different than discharges from any other private property within the Copermittees' jurisdiction. The first full paragraph in this section should be deleted because it is merely prefatory language to the specific requirements set forth in the remainder of the section.

Section F.3.c.(5): This directive requires the Copermittees to enforce their ordinances with respect to grading activities on privately owned unpaved roads "so as to prevent impacts to water quality".

Comment: In addition to the general objection to the requirement to regulate unpaved roads, found in a separate white paper and in the general comment letter, this specific directive violates the constitutional requirement that the drafting and enforcement of ordinances by a municipality is a municipal function that cannot be directed by the Regional Board. Article XI, section 7 of the Constitution guarantees municipalities the right to "make and enforce within [their] limits all local police, sanitary and other ordinances and regulations not in conflict with general laws". Thus, specific requirements as to the content of ordinances cannot be directed by the Board. Moreover, the scope of the Order is to address discharges from the MS4, not discharges from non-point or non-MS4 sources that may affect "water quality". The redline requests deletion of this requirement.

Section F.6: This directive includes a description of the purposes of the education program with respect to stormwater and non-stormwater discharges.

Comment: The redline includes revisions that correctly state the requirements of the Clean Water Act.

Attachment 7: General Legal Comments

Section H.1: This directive requires that each "Copermittees must exercise its full authority to secure the resources necessary to meet all requirements of this Order".

Comment: There is no statutory or regulatory authority for this requirement. The MS4 regulations require *only* that the Copermittees submit a "fiscal analysis" of the resources required to accomplish permit program activities, including a description of the sources of funds. 40 CFR § 122.26(d)(2)(vi). Moreover, this requirement is inherently vague and ambiguous and is, therefore, especially troublesome given the economic conditions now faced by the County and the Cities within the Santa Margarita region. This directive should be deleted, or at minimum, revised as shown in the redlines.

Standard Provisions, Attachment B:

In the Standard Provisions, it is stated that the Order "may be modified, revoked and reissued, or terminated for cause", citing 40 CFR § 122.41(f). However, the Standard Provisions do not cite 40 CFR § 122.62 or provide that any such modification, revocation or reissuance may only be carried out upon prior notice and hearing. See Water Code § 13263 (regional board, "after any necessary hearing", may prescribe requirements for waste discharges). The Standard Provisions should make clear that any modification, revocation or reissuance of the Order can only be accomplished at a noticed public hearing, with opportunity for comment.

Attachment 8: District-Specific Comments

DISTRICT-SPECIFIC COMMENTS OF THE RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT ON TENTATIVE ORDER NO. R9-2010-0016, WASTE DISCHARGE REQUIREMENTS FOR DISCHARGES FROM THE MUNICIPAL SEPARATE STORM SEWER SYSTEMS (MS4s) DRAINING THE COUNTY OF RIVERSIDE

The following comments are made by the Riverside County Flood Control and Water Conservation District (District) with respect to District-specific issues raised by the above referenced Tentative Order (Order) as the Order pertains to the District. These comments are in addition to the comments made by the District and on behalf of the other Copermittees, the County of Riverside and the Cities of Menifee (to the extent that this City will remain as a Copermittee under the Order), Murrieta, Temecula and Wildomar. We also understand that the County and the individual Cities will be filing comments on the Order under separate cover. These comments are intended to supplement those comments filed by the District on behalf of itself and the other Copermittees.

The District reserves the right to make additional comments on the Order prior to the close of the public hearing to adopt the Order.

The focus of these comments is to apprise Regional Board staff of the limited jurisdiction of the District within the Santa Margarita Region and to suggest language clarifying the requirements of the Order to reflect the District's limited jurisdiction. While aspects of the Order clearly apply to the District as an owner and operator of the Municipal Separate Storm Sewer System (MS4) serving the watershed, because of the limited nature of the District's jurisdiction over land areas within the watershed, many cannot. For example, the District, unlike other Copermittees, does not control activities on land not directly owned by the District, nor does it have ordinances or issue permits governing the use of such land. The District simply does not have statutory authority to govern the activities of the residents within a municipal area, unlike the other Copermittees.

Thus, a number of the provisions in the Order are not applicable to the District in the same manner and some are entirely not applicable. This letter highlights those provisions. The comments noted below also are reflected in the redline of the Order submitted with these and other comment white papers.

Comments on Findings

1. Need for New Finding B.2: Section B in the findings describes the regulated parties. The District requests a new finding B.2, which provides as follows:

> The Riverside County Flood Control and Water Conservation District (District) is not a municipality but rather operates various elements of the MS4 system within the San Diego Region in the form of flood control structures, including channels. Such channels and other flood control structures have been constructed and are operated by the District in accordance with its statutory obligations established by the Legislature in California Water Code App. § 48-9, to "control the flood and storm waters of said district" and to save and conserve in any manner all or any of such waters and protect from damage from such flood or storm waters the watercourses, watersheds, public highways, life and property in said district." Water Code App. § 48-9(8). As

a creature of state law, and not a municipal corporation, the District does not exercise jurisdiction over land areas within the San Diego Region and the activities carried out on those land areas outside of its limited rights-of-way. Please see redline.

2. Findings, Section D.3: This section of the Findings referring to "Construction and Existing Development" is of limited applicability to the District, since the only construction projects that would be overseen by the District are of or within its own facilities. The redline sets forth a change to clarify this limited applicability.

COMMENTS ON DIRECTIVES

1. Section F.1.a: The District, as a non-municipality, does not prepare a General Plan or equivalent because it does not govern development within a geographical area. Thus, the requirements of this section of the Order are not applicable to it. Please see redline.

2. Section F.1.d.(4)(a)(iii): Since the District, as a non-municipality, does not have land use codes, policies and ordinances, this provision, relating to the removal of "barriers to LID implementation," is not applicable to it. Please see redline.

3. Section F.1.d.(9): The only Priority Development Projects (PDP) relevant to the District would be the District's owned non-flood control channel projects, since it has no authority to permit private or non-District facilities and exercises jurisdiction over no private land areas within the watershed, and because the construction of flood control channels is subject to the jurisdiction of the U.S. Army Corps of Engineers through the Clean Water Act Section 404 permit program, not the NPDES permit program under Section 402 of the Clean Water Act. Thus, this directive, which requires the verification of compliance by third parties with Standard Stormwater Mitigation Plan (SSMP) requirements, is not applicable to the District. Please see redline.

4. Section F.1.e: As noted above, the only PDPs over which the District would have authority are its own projects. Thus, this directive, which requires inspection of BMPs at PDPs constructed by third parties, is not applicable to the District. Please see redline.

5. Section F.1.g: Since the District is not a municipality, and does not permit third parties to build development projects, this provision is not applicable to it. (It should be noted that this directive also has been objected to by the District on behalf of itself and the other Copermittees.)

6. Sections F.2, F.2.a and F.2.f.: These directives require each Copermittee to comply with each of the requirements of the section, to review and update its grading and other ordinances, and implement an enforcement process for Construction sites. These requirements are not applicable to the District in the same manner as the other Copermittees, as the District is not a municipality and does not issue grading or other permits for private land use activities. Please see redline.

7. Sections F.3.b-c: These directives, which require the development of commercial/industrial and residential programs, are applicable to a municipality but not to the District, which does not have land area occupied by either commercial/industrial or residential developments. Such requirements may be applicable to the municipal Copermittees, but not to the District, which only operates MS4 within the

Permit area. The District's rights-of-way are limited to that which is necessary to properly operate flood control infrastructure. Please see redline.

8. Section F.3.d: This directive requires development of a retrofitting program for "municipal, industrial, commercial and residential" areas of development. The District only maintains MS4 facilities within the Santa Margarita Region, and does not have jurisdiction over other areas of development. The Order should make clear that any retrofitting requirements (which are the subject of separate comments by the District on behalf of other Copermittees) apply only to development with the jurisdiction of the Copermittee. Clarifying changes are set forth in the redline.

9. Section F.6: This directive contains requirements for education of various target communities, including commercial and industrial owners and operators and residential communities, most of which are not within the jurisdiction of the District. The Order should make clear that such educational programs must be consistent with the jurisdiction of the Copermittees. Clarifying changes are set forth in the redline.

Attachment 9: Santa Margarita Region MS4 Copermittees Comments on Tentative Order R9-2010-0016 and Attachment E

California Regional Water Quality Control Board
San Diego Region

Waste Discharge Requirements for Discharges from the Municipal Separate Storm Sewer Systems (MS4s) Draining the County of Riverside, the Incorporated Cities of Riverside County, and the Riverside County Flood Control and Water Conservation District within the San Diego Region

Tentative Order No. R9-2010-0016
NPDES NO. CAS0108740

October 13, 2010

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
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To request copies of the Riverside County Municipal Storm Water Permit, please contact Ben Neill, Water Resources Control Engineer at (858) 467 – 2983, bneill@waterboards.ca.gov

Documents also are available at: http://www.waterboards.ca.gov/sandiego

Waste Discharge Requirements for Discharges from the Municipal Separate Storm Sewer Systems (MS4s) Draining the County of Riverside, the Incorporated Cities of Riverside County, and the Riverside County Flood Control and Water Conservation District within the San Diego Region

Adopted by the
California Regional Water Quality Control Board
San Diego Region
on October 13, 2010

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California Regional Water Quality Control Board
San Diego Region

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Eric Anderson	Irrigated Agriculture
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DRAFT

The California Regional Water Quality Control Board, San Diego Region (hereinafter San Diego Water Board), finds that:

A. BASIS FOR THE ORDER

1. This Order is based on the federal Clean Water Act (CWA), the Porter-Cologne Water Quality Control Act (Division 7 of the Water Code, commencing with Section 13000), applicable State and federal regulations, all applicable provisions of statewide Water Quality Control Plans and Policies adopted by the State Water Resources Control Board (State Water Board), the Water Quality Control Plan for the San Diego Basin adopted by the San Diego Water Board (Basin Plan), the California Toxics Rule, and the California Toxics Rule Implementation Plan.

2. This Order reissues National Pollutant Discharge Elimination System (NPDES) Permit No. CAS0108766, which was first adopted by the San Diego Water Board on July 16, 1990 (Order No. 90-38), and then reissued on May 13, 1998 (Order No. 98-02). On May 26, 1998, the United States Environmental Protection Agency (USEPA), Region IX, objected to Order No. 98-02 due to concerns regarding Receiving Water Limitations (RWL) language. The USEPA concluded that the RWL language in the permit did not comply with the CWA and its implementing regulations. On April 27, 1999, the USEPA reissued the MS4 permit, which the San Diego Water Board adopted as Addendum No. 1 to Order No. 98-02 on November 8, 2000. On July 14, 2004, the San Diego Water Board adopted the third term MS4 permit, Order No. R9-2004-001. On January 15, 2009, the Riverside County Flood Control and Water Conservation District (RCFCD), as the Principal Copermittee, submitted a Report of Waste Discharge (ROWD) for reissuance of the municipal separate storm sewer system (MS4) Permit.

3. This Order is consistent with the following precedential Orders adopted by the State Water Board addressing MS4 NPDES Permits: Order 99-05, Order WQ-2000-11, Order WQ 2001-15, Order WQO 2002-0014, and ~~Order WQ 2009-0008~~ (*SWRCB/OCC FILE A-1780).*

4. The Fact Sheet / Technical Report for the Order No. R9-2010-0016, NPDES No. CAS0108766, Waste Discharge Requirements for Discharges from the MS4s Draining the County of Riverside, the Incorporated Cities of Riverside County, and the Riverside County Flood Control and Water Conservation District within the San Diego Region, includes cited regulatory and legal references and additional explanatory information and data in support of the requirements of this Order. ~~This information, including any supplements thereto, and any response to comments on the Tentative Orders, is hereby incorporated by reference into these findings.~~

Comment [CP1]: This order has been vacated and can no longer be referenced

Comment [CP2]: This is inappropriate. The information in the fact sheet is/are not 'findings', they are explanations. Further a finding cannot be created through a response to comments.

B. REGULATED PARTIES

1. Each of the persons in Table 1 below, hereinafter called Copermittees or dischargers, owns or operates an MS4, through which it discharges into waters of the United States (U.S.) within the San Diego Region. These MS4s fall into one or more of the following categories: (1) a medium or large MS4 that services a population of greater than 100,000 or 250,000 respectively; or (2) a small MS4 that is "interrelated" to a medium or large MS4; or (3) an MS4 that contributes to a violation of a water quality standard; or (4) an MS4 which is a significant contributor of pollutants to waters of the U.S.

Table 1. Municipal Copermittees

1. City of Murrieta	4. County of Riverside
2. City of Temecula	5. Riverside County Flood Control and Water Conservation District
3. City of Wildomar	
6. City of Menifee[1]	

The Cities of Murrieta, Menifee and Wildomar also discharge into the waters of the U.S. in the California Regional Water Quality Control Board, Santa Ana Region (Santa Ana Water Board), so are located partially within both the San Diego and Santa Ana Water Board boundaries. As allowed by California Water Code (CWC) §13228, these Cities submitted written requests to be regulated for MS4 purposes under a permit adopted by only one Water Board. As authorized by CWC §13228 and pursuant to a written agreement between the San Diego Water Board and the Santa Ana Water Board, the Cities of Murrieta and Wildomar are wholly regulated by the San Diego Water Board under this Order, including those portions of the Cities jurisdiction not within the San Diego Water Board's region. Similarly, the City of Menifee is wholly regulated by the Santa Ana Water Board under Order No. R8-2010-0033, including those portions of the City of Menifee within the San Diego Water Board's region.[1]

2. The Riverside County Flood Control and Water Conservation District (District) is not a municipality but rather operates various elements of the MS4 system within the San Diego Region in the form of flood control structures, including channels. Such channels and other flood control structures have been constructed and are operated by the District in accordance with its statutory obligations established by the Legislature in California Water Code App. § 48-9, to "control the flood and storm waters of said district" and to save and conserve in any manner all or any of such waters and protect from damage from such flood or storm waters the watercourses, watersheds, public highways, life and property in said district." Water Code App. § 48-9(8). As a creature of state law, and not a municipal corporation, the District

[1] Until an agreement is finalized, the City of Menifee is included as a Copermittee in this Order.

does not exercise jurisdiction over land areas within the San Diego Region and the activities carried out on those land areas.

Comment [DB3]: See legal comments in Attachment 8

C. DISCHARGE CHARACTERISTICS

1. Discharges from the MS4 may contain waste, as defined in the CWC, and pollutants that adversely affect the quality of the waters of the State. The discharge of pollutants from an MS4 is a "discharge of pollutants from a point source" into waters of the U.S. as defined in the CWA.

2. MS4 storm water and non-storm water discharges are likely to contain pollutants that cause or threaten to cause a violation of water quality standards, as outlined in the Basin Plan. Storm water and non-storm water discharges from the MS4 are subject to the conditions and requirements established in the Basin Plan for point source discharges.

3. The most common categories of pollutants in runoff include total suspended solids, sediment, pathogens (e.g., bacteria, viruses, protozoa), heavy metals (e.g., copper, lead, zinc and cadmium), petroleum products and polynuclear aromatic hydrocarbons, synthetic organics (e.g., pesticides, herbicides, and PCBs), nutrients (e.g., nitrogen and phosphorus fertilizers), oxygen-demanding substances (decaying vegetation, animal waste), detergents, and trash.

4. The discharge of pollutants and/or increased flows from MS4s may cause or threaten to cause the concentration of pollutants to exceed applicable receiving water quality objectives and/or impair or threaten to impair designated beneficial uses resulting in a condition of pollution (i.e., unreasonable impairment of water quality for designated beneficial uses), contamination, or nuisance.

5. Pollutants in runoff can threaten and adversely affect human health. Human illnesses ~~have been clearly linked to~~ can be caused by recreating near storm drains flowing to receiving waters. Also, runoff pollutants in receiving waters can bioaccumulate in the tissues of invertebrates and fish, which may be eventually consumed by humans.

Comment [CP4]: No link has been demonstrated within this watershed. (Partially due to lack of recreation in receiving waters)

The findings should be accurate for reflective of the specific area the permit is regulating.

6. Runoff discharges from MS4s often contain pollutants that cause toxicity to aquatic organisms (i.e., adverse responses of organisms to chemicals or physical agents ranging from mortality to physiological responses such as impaired reproduction or growth anomalies). Toxic pollutants impact the overall quality of aquatic systems and beneficial uses of receiving waters.

7. The Copermittees' MS4 discharges runoff into lakes, drinking water reservoirs, rivers, streams, creeks, bays, estuaries, coastal lagoons, the Pacific Ocean, and tributaries thereto within one of the eleven hydrologic units (Santa Margarita Hydrologic Unit) comprising the San Diego Region as shown in Table 2. Some of

the receiving water bodies have been designated as impaired by the San Diego Water Board in 2009 pursuant to CWA section 303(d).

Table 2. Common Watersheds and CWA Section 303(d) Impaired Waters in the San Diego Region.

Hydrologic Area (HA) or Hydrologic Subarea (HSA) of the Santa Margarita Hydrologic Unit	**Major Receiving Water Bodies**	**303(d) Pollutant(s)/stressor or Water Quality Effect[2]**
DeLuz Creek HSA (902.21)	De Luz Creek	Iron, Manganese, Nitrogen, Sulfates
Murrieta HSA (902.32)	Long Canyon Creek (tributary to Murrieta Creek	Chlorpyrifos, E. Coli, Fecal Coliform, Iron, Manganese
Wolf HSA (902.52)	Murrieta Creek	Chlorpyrifos, Copper, Iron, Manganese, Nitrogen, Toxicity
Pauba HSA (902.51)	Redhawk Channel	Chlorpyrifos, Copper, Diazinon, E. Coli, Fecal Coliform, Iron, Manganese, Nitrogen, Phosphorus, Total Dissolved Solids
Gavilan HSA (902.22)	Sandia Creek	Iron, Sulfates
Gertrudis HSA (902.42)	Santa Gertrudis Creek	Chlorpyrifos, Copper, E. Coli, Fecal Coliform, Iron, Phosphorous
Lower Ysidora HSA (902.11)	Santa Margarita Lagoon	Eutrophic
Lower Ysidora HSA (902.11)	Santa Margarita River (Lower)	Enterococcus, Fecal Coliform, Phosphorus, Total Nitrogen as N
Gavilan HSA	Santa Margarita River (Upper)	Toxicity

[2] The listed 303(d) pollutant(s) do not necessarily reflect impairment of the entire corresponding WMA or all corresponding major surface water bodies. The specific impaired portions of each WMA are listed in the State Water Resources Control Board's 2008 Section 303(d) List of Water Quality Limited Segments.

Table 2. Common Watersheds and CWA Section 303(d) Impaired Waters in the San Diego Region.

Hydrologic Area (HA) or Hydrologic Subarea (HSA) of the Santa Margarita Hydrologic Unit	**Major Receiving Water Bodies**	**303(d) Pollutant(s)/stressor or Water Quality Effect[2]**
(902.22)		
Pauba HSA (902.51)	Temecula Creek	Chlorpyrifos, Copper, Phosphorus, Total Dissolved Solids, Toxicity
French HSA (902.33)	Warm Springs Creek (Riverside County)	Chlorpyrifos, E. Coli, Fecal Coliform, Iron, Manganese, Phosphorus, Total Nitrogen as N

8. Trash is a ~~persistent~~ pollutant that can enter receiving waters from the MS4, accumulate, and be transported downstream into receiving waters over time. Trash poses a serious threat to the beneficial uses of the receiving waters, including, but not limited to, human health, rare and endangered species, navigation and human recreation.

9. The Copermittees' water quality monitoring data submitted to date documents persistent ~~violations~~ exceedances of Basin Plan water quality objectives for various runoff-related pollutants (indicator bacteria, dissolved solids, turbidity, metals, pesticides, etc.) at various watershed monitoring stations. Persistent toxicity has also been observed at some watershed monitoring stations. In addition, bioassessment data indicate that the majority of the monitored receiving waters have Poor to Very Poor Index of Biotic Integrity ratings. In sum, the above findings indicate that runoff discharges are causing or contributing to water quality impairments, and are a leading cause of such impairments in Riverside County.

Comment [CP5]: It is only a violation if the pollutant has not been reduced to the MEP in accordance with a Permit.

10. When natural vegetated pervious ground cover is converted to impervious surfaces such as paved highways, streets, rooftops, and parking lots, the natural absorption and infiltration abilities of the land are lost. Therefore, runoff leaving a developed area ~~is~~ can be significantly greater in runoff volume, velocity, and peak flow rate than pre-development runoff from the same area. Runoff durations can also increase as a result of flood control and other efforts to control peak flow rates. Increased volume, velocity, rate, and duration of runoff, and decreased natural clean sediment loads, greatly accelerate the erosion of downstream natural channels. Significant declines in the biological integrity and physical habitat of streams and other receiving waters have been found to occur with as little as a 3-5 percent conversion from

natural to impervious surfaces. The increased runoff characteristics from new development must be controlled to protect against increased erosion of channel beds and banks, sediment pollutant generation, or other impacts to beneficial uses and stream habitat due to increased erosive force.

11. Development creates new pollution sources as human population density increases and brings with it proportionately higher levels of car emissions, car maintenance wastes, municipal sewage, pesticides, household hazardous wastes, pet wastes, trash, etc. which can either be washed or directly dumped into the MS4. As a result, the runoff leaving the developed urban area is typically significantly greater in pollutant load than the pre-development runoff from the same area. These increased pollutant loads must be controlled to protect downstream receiving water quality.

12. Development and urbanization especially threaten environmentally sensitive areas (ESAs), such as water bodies designated as supporting a RARE beneficial use (supporting rare, threatened or endangered species) and CWA 303(d)-impaired water bodies. Such areas have a much lower capacity to withstand pollutant loads than other, more sensitive areas. In essence, development that is ordinarily insignificant in its impact on the environment may become significant in a particularly sensitive environment. Therefore, additional controls to reduce storm water pollutants from new and existing development may be necessary for areas adjacent to or discharging directly to an ESA.

13. Although dependent on several factors, the risks typically associated with properly managed infiltration of runoff (especially from residential land use areas) are not significant. The risks associated with infiltration can be managed by many techniques, including (1) designing landscape drainage features that promote infiltration of runoff, but do not "inject" runoff (injection bypasses the natural processes of filtering and transformation that occur in the soil); (2) taking reasonable steps to prevent the illegal disposal of wastes; (3) protecting footings and foundations; (4) ensuring that each drainage feature is adequately maintained in perpetuity; and (5) pretreatment.

~~14. Non-storm water (dry weather) discharge from the MS4 is not considered a storm water (wet weather) discharge and therefore is not subject to regulation under the Maximum Extent Practicable (MEP) standard from CWA 402(p)(3)(B)(iii), which is explicitly for "Municipal … *Stormwater Discharges* (emphasis added)" from the MS4. Rather, non-storm water discharges into the storm sewers, per CWA 402(p)(3)(B)(ii), are to be effectively prohibited. Such dry weather non-storm water discharges have been shown to contribute significant levels of pollutants and flow in arid, developed Southern California watersheds and are to be effectively prohibited under the CWA.~~

Comment [DB6]: See legal comments in Attachment 7 Discharges of pollutants from the MS4, of whatever source, are subject to the MEP standard. The MEP standard applies to municipal discharges, not to only municipal storm water discharges.

~~15.~~ Non-storm water discharges to the MS4 granted an influent exception [i.e., which are exempt from the effective prohibition requirement set forth in CWA section 402(p)(3)(B)(ii)] under 40 CFR 122.26 are included within this Order. Any exempted

discharges identified by Copermittees as a source of pollutants are subsequently required to be *addressed* (emphasis added) as illicit discharges through prohibition and incorporation into existing IC/ID programs. Furthermore, the USEPA contemplates that permitting agencies such as the San Diego Water Board may also identify exempted discharges as a source of pollutants required to be addressed as illicit discharges (See VOl. 55 Fed. Reg. 48037). ~~The San Diego Water Board and the Copermittees havehas identified landscape irrigation, irrigation water and lawn water, previously exempted discharges, as a source of pollutants and conveyance of pollutants to waters of the U.S.~~

Comment [CP7]: This is a false statement – the Copermittees have not made this determination (or 'identification') See also comments within the letter and attachments thereto

~~16.~~14.

D. RUNOFF MANAGEMENT PROGRAMS

1. General

a. This Order specifies requirements necessary for the Copermittees to reduce the discharge of pollutants in storm water to the MEP. However, since MEP is a dynamic performance standard, which evolves over time as runoff management knowledge increases, the Copermittees' runoff management programs m*ust contin*ually be assessed and modified to incorporate improved programs, control measures, best management practices (BMPs), etc. in order to achieve the evolving MEP standard. Absent evidence to the contrary, this continual assessment, revision, and improvement of runoff management program implementation is expected to ultimately achieve compliance with water quality standards in the Region. However, it is recognized that there are other sources of pollutants into the receiving waters other than the Copermittees' MS4, and there are certain activities and sources that generate pollutants present in MS4 discharges may be beyond the ability of Copermittees to prevent or eliminate. Examples of these activities and sources include, but are not limited to: emissions from internal combustion engines, brake pad wear and tear, atmospheric deposition, bacteria and wildlife and leaching of naturally occurring nutrients and minerals from local soils. This Order is not intended to address these background or naturally occurring pollutants or flows.

b. The Copermittees have generally been implementing the jurisdictional runoff management programs (JRMPs) required pursuant to Order No. R9-2004-001 since July 14, 2005. Prior to that, the Copermittees were regulated by Order No. 98-02, since May 13, 1998. MS4 discharges, however, continue to cause or contribute to violations of water quality standards as evidenced by the Copermittees' monitoring results.

c. This Order contains new or modified requirements that are necessary to improve Copermittees' efforts to reduce the discharge of pollutants in storm water runoff to the MEP and achieve water quality standards. Some of the new or modified requirements, such as the revised Watershed Water Quality Workplan (Watershed Workplan) section, are designed to specifically address high priority

water quality problems. Other requirements, such as for unpaved roads, are a result of San Diego Water Board's identification of water quality problems through investigations and complaints during the previous permit period. Other new or modified requirements address program deficiencies that have been noted during audits, report reviews, and other San Diego Water Board compliance assessment activities. Additional changes in the monitoring program provide consistency with the Code of Federal Regulations, USEPA guidance, State Water Board guidance, and the Southern California Monitoring Coalition recommendations.

d. Updated individual ~~Drainage Area~~Storm Water Management Plans (~~DAMP~~Individual SWMP), and Watershed Stormwater Management Plans (watershed SWMPs), which, together with the DAMP describe the Copermittees' runoff management programs in their entirety, are needed to guide the Copermittees' runoff management efforts and aid the Copermittees in tracking runoff management program implementation. Hereinafter, the individual ~~DAMP~~ SWMP is referred to as the JRMPs and the Watershed SWMP is referred to as the Watershed Workplan. It is practicable for the Copermittees to update the JRMPs and Watershed Workplans within the timeframe specified in this Order, since significant efforts to develop these programs have already occurred.

Comment [CP8]: Terminology in this paragraph was not correct for the Santa Margarita Region

e. Pollutants can be effectively reduced in storm water runoff by the application of a combination of pollution prevention, source control, and treatment control BMPs. Pollution prevention is the reduction or elimination of pollutant generation at its source and is the best "first line of defense." Source control BMPs (both structural and non-structural) minimize the contact between pollutants and flows (e.g., rerouting run-on around pollutant sources or keeping pollutants on-site and out of receiving waters). Treatment control BMPs remove pollutants that have been mobilized by wet-weather or dry-weather flows.

f. Runoff needs to be addressed during the three major phases of urban development (planning, construction, and use) in order to reduce the discharge of pollutants from storm water to the MEP, effectively prohibit non-storm water discharges and protect receiving waters. Development which is not guided by water quality planning policies and principles can unnecessarily result in increased pollutant load discharges, flow rates, and flow durations which can negatively impact receiving water beneficial uses. Construction sites without adequate BMP implementation can result in sediment runoff rates which greatly exceed natural erosion rates of undisturbed lands, causing siltation and impairment of receiving waters. Existing development can generates substantial pollutant loads which are can be discharged in runoff to receiving waters.

g. Annual reporting requirements included in this Order are necessary to meet federal requirements and to evaluate the effectiveness and compliance of the Copermittees' programs.

h. This Order establishes Storm Water Action Levels (SALs) for selected pollutants based on USEPA Rain Zone 6 (arid southwest) Phase I MS4 monitoring data for pollutants in storm water. The SALs were computed as the 90th percentile of the data set, utilizing the statistical based population approach, one of three approaches recommended by the State Water Board's Storm Water Panel in its report, 'The Feasibility of Numerical Effluent Limits Applicable to Discharges of Storm Water Associated with Municipal, Industrial and Construction Activities (June 2006). SALs are identified in Section D of this Order. Copermittees must implement a timely, comprehensive, cost-effective storm water pollution control program to reduce the discharge of pollutants in storm water from the permitted areas so as not to exceed the SALs to the MEP. Exceedance of SALs may indicate inadequacy of programmatic measures and BMPs required in this Order.

2. **Development Planning**

a. The Standard Storm Water Mitigation Plan (SSMP) requirements contained in this Order are consistent with Order WQ-2000-11 adopted by the State Water Board on October 5, 2000. In the precedential order, the State Water Board found that the design standards, which essentially require that runoff generated by 85 percent of storm events from specific development categories be infiltrated or treated, reflect the MEP standard. The order also found that the SSMP requirements are appropriately applied to the majority of the Priority Development Project categories that are also contained in Section F.1 of this Order. The State Water Board also gave California Regional Water Quality Control Boards (Regional Water Boards) the needed discretion to include additional categories and locations, such as retail gasoline outlets (RGOs), in SSMPs.

b. Controlling runoff pollution by using a combination of onsite source control and site design BMPs augmented with treatment control BMPs before the runoff enters the MS4 is important for the following reasons: (1) Many end-of-pipe BMPs (such as diversion to the sanitary sewer) are typically ineffective during significant storm events. (2) Whereas, onsite source control BMPs can be applied during all runoff conditions end-of-pipe BMPs are often incapable of capturing and treating the wide range of pollutants which can be generated on a sub-watershed scale; (3) End-of-pipe BMPs are more effective when used as polishing BMPs, rather than the sole BMP to be implemented; (4) End-of-pipe BMPs do not protect the quality or beneficial uses of receiving waters between the pollutant source and the BMP; and (5) Offsite end-of-pipe BMPs do not aid in the effort to educate the public regarding sources of pollution and their prevention.

c. Use of Low-Impact Development (LID) site design BMPs at new development, redevelopment and retrofit projects can be an effective means for minimizing the

impact of storm water runoff discharges from the development projects on receiving waters. LID is a site design strategy with a goal of maintaining or replicating the pre-development hydrologic regime through the use of design techniques. LID site design BMPs help preserve and restore the natural hydrologic cycle of the site, allowing for filtration and infiltration which can greatly reduce the volume, peak flow rate, velocity, and pollutant loads of storm water runoff. Current runoff management, knowledge, practices and technology have resulted in the use of LID BMPs as an acceptable means of meeting the storm water MEP standard.

d. RGOs ~~are~~ can be significant sources of pollutants in storm water runoff. RGOs are points of convergence for motor vehicles for automotive related services such as repair, refueling, tire inflation, and radiator fill-up and consequently produce significantly higher loadings of hydrocarbons and trace metals (including copper and zinc) than other developed areas.

e. Industrial sites ~~are~~ can be significant sources of pollutants in runoff. Pollutant concentrations and loads in runoff from industrial sites are similar or exceed pollutant concentrations and loads in runoff from other land uses, such as commercial or residential land uses. As with other land uses, LID site design, source control, and treatment control BMPs are needed at industrial sites in order to meet the MEP standard. These BMPs are necessary where the industrial site is larger than 10,000 square feet. The 10,000 square feet threshold is appropriate, since it is consistent with requirements in other Phase I NPDES storm water regulations throughout California.

f. If not properly designed or maintained, certain BMPs implemented or required by municipalities for runoff management may create a habitat for vectors (e.g. mosquitoes and rodents). Proper BMP design and maintenance to avoid standing water, however, can prevent the creation of vector habitat. Nuisances and public health impacts resulting from vector breeding can be prevented with close collaboration and cooperative effort between municipalities, local vector control agencies, and the California Department of Public Health during the development and implementation of runoff management programs.

g. The increased volume, velocity, frequency and discharge duration of storm water runoff from developed areas has the potential to greatly accelerate downstream erosion, impair stream habitat in natural drainages, and negatively impact beneficial uses. Development and urbanization increase pollutant loads in storm water runoff and the volume of storm water runoff. Impervious surfaces can neither absorb water nor remove pollutants and thus lose the purification and infiltration provided by natural vegetated soil. Hydromodification measures for discharges to hardened channels ~~are~~ may be needed ~~for the~~so as to not prevent potential future ~~restoration~~ rehabilitation of the hardened channels ~~to their natural state~~, thereby restoring the chemical, physical, and biological integrity and beneficial uses of local receiving waters. Any rehabilitation of hardened channels

must take into account flood control considerations, which are within the jurisdiction of the Riverside County Flood Control and Water Conservation District, under Water Code App. Section 48.

Comment [DB9]: See legal comments in Attachment 7

3. **Construction and Existing Development**

   a. In accordance with federal NPDES regulations and to ensure the most effective oversight of industrial and construction site discharges, discharges of runoff from industrial and construction sites are subject to dual (State and local) storm water regulation. Under this dual system, each Copermittee, consistent with its jurisdiction, is responsible for enforcing its local permits, plans, and ordinances, and the San Diego Water Board is responsible for enforcing the General Construction Activities Storm Water Permit, State Water Board Order 2009-0009-DWQ, NPDES No. CAS000002 (General Construction Permit) and the General Industrial Activities Storm Water Permit, State Water Board Order 97-03 DWQ, NPDES No. CAS000001 (General Industrial Permit) and any reissuance of these permits. NPDES municipal regulations require that municipalities develop and implement measures to address runoff from industrial and construction activities. Those measures may include the implementation of other BMPs in addition to those BMPs that are required under the statewide general permits for activities subject to both State and local regulation.

   b. Identification of sources of pollutants in runoff (such as municipal areas and activities, industrial and commercial sites/sources, construction sites, and residential areas), development and implementation of BMPs to address those sources, and updating ordinances and approval processes are necessary for the Copermittees to ensure that discharges of pollutants from its MS4 in storm water are reduced to the MEP and that illegal non-storm water discharges are not occurring. Inspections and other compliance verification methods are needed to ensure minimum BMPs are implemented. Inspections are especially important at areas that are at high risk for pollutant discharges.

Comment [CP10]: Not all non-storm water discharges need to be prohibited.

   c. Historic and current development ~~sometime~~may makes use of natural drainage patterns and features as conveyances for runoff. ~~Urban streams owned or operated by the Copermittees that are used in this manner are part of the municipalities' MS4s regardless of whether they are natural, anthropogenic, or partially modified features. In these cases, the urban stream is both an MS4 and receiving water.~~

Comment [DB11]: The MS4 can never be comprised of natural waterbodies. See definition in federal MS4 regulations and legal comments in Attachment 7

   ~~d. As operators of the MS4s, the Copermittees cannot passively receive and discharge pollutants from third parties. By providing free and open access to an MS4 that conveys discharges to waters of the U.S., the operator essentially accepts responsibility for discharges into the MS4 that it does not prohibit or otherwise control. These discharges may cause or contribute to a condition of~~

~~contamination or a violation of water quality standards.~~

~~e.~~d. Waste and pollutants which are deposited and accumulate in MS4 drainage structures will be discharged from these structures to waters of the U.S. unless they are removed. These discharges may cause or contribute to, or threaten to cause or contribute to, a condition of pollution in receiving waters. For this reason, pollutant discharges from storm water into MS4s must be reduced using a combination of management measures, including source control and an effective MS4 maintenance program implemented by each Copermittee.

~~f.~~e. Enforcement of local runoff related ordinances, permits, and plans is an essential component of every runoff management program and is specifically required in the federal storm water regulations and this Order. Each Copermittee is, to the extent of its legal authority, individually responsible for adoption and enforcement of ordinances and/or policies, implementation of identified control measures/BMPs needed to prevent or reduce pollutants in storm water runoff, and for the allocation of funds for the capital, operation and maintenance, administrative, and enforcement expenditures necessary to implement and enforce such control measures/BMPs under its jurisdiction. Education is an important aspect of every effective runoff management program and the basis for changes in behavior at a societal level. Education of municipal planning, inspection, and maintenance department staffs is especially critical to ensure that in-house staffs understand how their activities impact water quality, how to accomplish their jobs while protecting water quality, and understand their specific roles and responsibilities for compliance with this Order. Public education, designed to target various urban land users and other audiences, is also essential to inform the public of how individual actions affect receiving water quality and how adverse effects can be minimized.

~~g.~~f. Public participation during the development of runoff management programs is necessary to ensure that all stakeholder interests and a variety of creative solutions are considered.

g. Retrofitting existing development with storm water treatment controls, including LID, ~~is~~ may be necessary to address storm water discharges from existing development that may cause or contribute to a condition of pollution or a violation of water quality standards. Although SSMP BMPs are required for redevelopment, the current rate of redevelopment will not address water quality problems in a timely manner. Cooperation with private landowners is necessary to effectively identify, implement and maintain retrofit projects for the preservation, restoration, and enhancement of water quality.

h. Emergency Copermittee public works projects required to protect public health and safety are exempted from these requirements until the emergency ends, at which time they need to comply with the requirements.

Comment [DB12]: The MS4 operators are obligated to take storm water under state law, and therefore must "passively" receive such waters, whether or not they contain pollutants. Moreover, a number of separately permitted sources discharge into the MS4 through rights granted under the NPDES program. Control over such permitted sources is the responsibility of the owner of that permitted discharge in question, .

4. **Watershed Runoff Management**

a. Since runoff within a watershed can flow from and through multiple land uses and political jurisdictions, watershed-based runoff management can greatly enhance the protection of receiving waters. Such management provides a means to focus on the most important water quality problems in each watershed. By focusing on the most important water quality problems, watershed efforts can maximize protection of beneficial use in an efficient manner. Effective watershed-based runoff management actively reduces pollutant discharges and abates pollutant sources causing or contributing to watershed water quality problems. Watershed-based runoff management that does not actively reduce pollutant discharges and abate pollutant sources causing or contributing to watershed water quality problems can necessitate implementation of the iterative process outlined in section A.3 of this Order. Watershed management of runoff does not require Copermittees to expend resources outside of their jurisdictions. In some cases, however, this added flexibility provides more, and possibly more effective, alternatives for minimizing waste discharges. Watershed management requires the Copermittees within a watershed to develop a watershed-based management strategy, which can then be implemented on a jurisdictional basis.

~~a.~~b. The Copermittees have jointly pursued several watershed based management programs including the Upper Santa Margarita River Integrated Regional Watershed Management Plan (USMR IRWM). The USMR IRWM management team, which includes the County of Riverside and the Riverside County Flood Control and Water Conservation District, has also formed cooperative agreements with the San Diego and Orange County IRWM programs to integrate watershed planning efforts of the three counties. These efforts have identified and prioritized key watershed management issues related to the protection and restoration of beneficial uses in the Permit Area. The Board encourages the Copermittees to use these forums to prioritize actions and support the allocation of resources to protect water quality.

~~b.~~c. Some runoff issues, such as general education, monitoring, and training, can be effectively addressed on a regional basis. Regional approaches to runoff management can improve program consistency and promote sharing of resources, which can result in implementation of more efficient programs.

~~c.~~d. It is important for the Copermittees to coordinate their water quality protection and land use planning activities to achieve the greatest protection of receiving water bodies. Copermittee coordination with other watershed stakeholders, especially the State of California Department of Transportation, the U.S. federal government, sovereign American Indian tribes, and water and sewer districts, is also important.

E. STATUTE AND REGULATORY CONSIDERATIONS

1. The RWL language specified in this Order is consistent with language recommended by the USEPA and established in State Water Board Order WQ-99-05, *Own Motion Review of the Petition of Environmental Health Coalition to Review Waste Discharge Requirements Order No. 96-03, NPDES Permit No. CAS0108740*, adopted by the State Water Board on June 17, 1999. The RWL language in this Order requires compliance with water quality standards, which for ~~storm water~~MS4 discharges is to be achieved through an iterative approach requiring the implementation of improved and better-tailored BMPs over time. Compliance with receiving water limits based on applicable water quality standards is necessary to ensure that MS4 discharges will not cause or contribute to violations of water quality standards and the creation of conditions of pollution, contamination, or nuisance.

Comment [DB13]: See legal comments in Attachment 7

2. The Basin Plan, identifies the following existing and potential beneficial uses for surface waters in Riverside County: Municipal and Domestic Supply (MUN), Agricultural Supply (AGR), Industrial Process Supply (PROC), Hydropower Generation (POW), Industrial Service Supply (IND), Ground Water Recharge (GWR), Contact Water Recreation (REC1), Non-contact Water Recreation (REC2), Warm Freshwater Habitat (WARM), Cold Freshwater Habitat (COLD), Wildlife Habitat (WILD), Rare, Threatened, or Endangered Species (RARE), Spawning, Reproduction and/or Early Development (SPWN) and Preservation of Biological Habitats of Special Significance (BIOL).

3. This Order is in conformance with State Water Board Resolution No. 68-16, *Statement of Policy with Respect to Maintaining High Quality Waters in California*, and the federal Antidegradation Policy described in 40 CFR 131.12.

4. Section 6217(g) of the Coastal Zone Act Reauthorization Amendments of 1990 (CZARA) requires coastal states with approved coastal zone management programs to address non-point pollution impacting or threatening coastal water quality. CZARA addresses five sources of non-point pollution: agriculture, silviculture, urban, marinas, and hydromodification. This NPDES permit addresses the management measures required for the urban category, with the exception of septic systems. The adoption and implementation of this NPDES permit relieves the Copermittee from developing a non-point source plan, for the urban category, under CZARA. The San Diego Water Board addresses septic systems through the administration of other programs.

5. Section 303(d)(1)(A) of the CWA requires that "Each state shall identify those waters within its boundaries for which the effluent limitations…are not stringent enough to implement any water quality standard (WQS) applicable to such waters." The CWA also requires states to establish a priority ranking of impaired water bodies known as Water Quality Limited Segments and to establish Total Maximum Daily Loads

(TMDLs) for such waters. This priority list of impaired water bodies is called the Section 303(d) List. The 2006 Section 303(d) List was approved by the State Water Board on October 25, 2006. On June 28, 2007, the 2006 303(d) list for California was given final approval by the USEPA. The 303(d) List was recently updated, and on December 16, 2009, the 2008 303(d) List was approved by the San Diego Water Board. The 2008 List is awaiting State Water Board and USEPA approval.

6. ~~This Order does not constitute an unfunded local government mandate subject to subvention under Article XIIIB, Section (6) of the California Constitution for several reasons, including, but not limited to, the following. First, this Order implements federally mandated requirements under CWA §402. (33 U.S.C. § 1342(p)(3)(B).) Second, the local agency Copermittees' obligations under this Order are similar to, and in many respects less stringent than, the obligations of non-governmental and new dischargers who are issued NPDES permits for storm water and non-storm water discharges. Third, the local agency Copermittees have the authority to levy service charges, fees, or assessments sufficient to pay for compliance with this Order. Fourth, the Copermittees have requested permit coverage in lieu of compliance with the complete prohibition against the discharge of pollutants contained in CWA §301, subdivision (a) (33 U.S.C. § 1311(a)) and in lieu of numeric restrictions on their MS4 discharges (i.e. effluent limitations). Fifth, the local agencies' responsibility for preventing discharges of waste that can create conditions of pollution or nuisance from conveyances that are within their ownership or control under State law predates the enactment of Article XIIIB, Section (6) of the California Constitution. Likewise, the provisions of this Order to implement TMDLs are federal mandates. The CWA requires TMDLs to be developed for water bodies that do not meet federal water quality standards. (33 U.S.C. sec. 1313(d).) Once the USEPA or a state develops a TMDL, federal law requires that permits must contain effluent limitations consistent with the assumptions of any applicable wasteload allocation. (40 C.F.R. sec. 122.44(d)(1)(vii)(B).)~~

7. Runoff treatment and/or mitigation must occur prior to the discharge of runoff into receiving waters. Treatment BMPs must not be constructed in waters of the U.S. ~~or State~~ unless the runoff flows are sufficiently pretreated to protect the values and functions of the water body. Federal regulations at 40 CFR 131.10(a) state that in no case shall a state adopt waste transport or waste assimilation as a designated use for any waters of the U.S. Authorizing the construction of an runoff treatment facility within a water of the U.S., or using the water body itself as a treatment system or for conveyance to a treatment system, would be tantamount to accepting waste assimilation as an appropriate use for that water body. Furthermore, the construction, operation, and maintenance of a pollution control facility in a water body can negatively impact the physical, chemical, and biological integrity, as well as the beneficial uses, of the water body. Without federal authorization (e.g., pursuant to CWA § 404), waters of the U.S. may not be converted into, or used as, waste treatment or conveyance facilities. Similarly, waste discharge requirements pursuant to CWC §13260 are required for the conversion or use of waters of the

Comment [DB14]: This finding is inaccurate and inappropriate, as the Commission on State Mandates, and not the Regional Board, has exclusive jurisdiction in determining whether a requirement is an unfunded state mandate. See legal comment white paper.

Comment [CP15]: The federal regulations (that do not allow waste assimilation), do not apply to waters of the state.

State as waste treatment or conveyance facilities. Diversion from waters of the U.S./State to treatment facilities and subsequent return to waters of the U.S. is allowable, provided that the effluent complies with applicable NPDES requirements.

8. The issuance of waste discharge requirements and an NPDES permit for the discharge of runoff from MS4s to waters of the U.S. is exempt from the requirement for preparation of environmental documents under the California Environmental Quality Act (CEQA) (Public Resources Code, Division 13, Chapter 3, section 21000 et seq.) in accordance with the CWC section 13389.

9. Storm water discharges from developed and developing areas in Riverside County are ~~significant~~ potential sources of certain pollutants that can cause, may be causing, threatening to cause or contributing to water quality impairment in the waters of Riverside County. Furthermore, as delineated in the CWA section 303(d) list in Table 2, the San Diego Water Board has found that there is a reasonable potential that municipal storm water and non-storm water discharges from MS4s cause or may cause or contribute to an excursion above water quality standards for the following pollutants: Indicator Bacteria, Copper, Manganese, Iron, Chlorpyrifos, Sulfates, Phosphorous, Nitrogen, Toxicity~~, and Turbidity~~. In accordance with CWA section 303(d), the San Diego Water Board is required to establish TMDLs for these pollutants to these waters to eliminate impairment and attain water quality standards. Therefore, certain early pollutant control actions and further pollutant impact assessments by the Copermittees are warranted and required pursuant to this Order.

Comment [CP16]: This is not on the 303(d) list.

10. This Order requires each Copermittee to effectively prohibit all types of unauthorized discharges of non-storm water into its MS4. However, historically pollutants have been identified as present in dry weather ~~non-storm water discharges from the MS4s~~ conditions within the receiving waters through 303(d) listings, monitoring conducted by the Copermittees under Order No. R9-2004-0001, and there are others expected to be present in dry weather non-storm water discharges because of the nature of these discharges. These pollutants in the receiving waters may be associated with activities that may or may not be under the authority of the Copermittees to address. This Order includes action levels for pollutants in non-storm water, dry weather discharges from the MS4. The non-storm water action levels are designed to ensure that the Order's requirement to effectively prohibit all types of unauthorized discharges of non-storm water into the MS4 from areas under the authority of the Copermittees is being complied with. Non-storm water action levels in the Order are based upon numeric or narrative water quality objectives and criteria as defined in the Basin Plan, the State Water Board's Water Quality Control Plan for Ocean Waters of California (Ocean Plan), and the State Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California

(State Implementation Policy or SIP). An exceedance of an action level requires specified responsive action by the Copermittees. This Order describes what actions the Copermittees must take when an exceedance of an action level is observed. Exceedances of non-storm water action levels do not alone constitute a violation of this Order but could indicate non-compliance with the requirement to effectively prohibit all types of unauthorized non-storm water discharges into the MS4 or other prohibitions established in this Order. Failure to undertake required source investigation and elimination action following an exceedance of a non-storm water action level (NAL or action level) is a violation of this Order. The San Diego Water Board recognizes that use of action levels will not necessarily result in detection of all unauthorized sources of non-storm water discharges because there may be some discharges in which pollutants do not exceed established action levels. However, establishing NALs at levels appropriate to protect water quality standards is expected to lead to the identification of significant sources of pollutants in dry weather non-storm water discharges.

11. In addition to federal regulations cited in the Fact Sheet / Technical Report for the Order No. R9-2010-0016, monitoring and reporting required under Order No. R9-2010-0016 is required pursuant to authority under CWC section 13383.

12. With this Order, the San Diego Water Board has completed the re-issuance of the fourth iteration of the Phase I MS4 NPDES Permits for the Copermittees in the portions of San Diego County, Orange County, and Riverside County within the San Diego Region. The NPDES Permit requirements issued to the Copermittees in each county have substantially the same core requirements such as discharge prohibitions, receiving water limitations, jurisdictional components, and monitoring. In addition, the Copermittees cooperate regionally to develop monitoring with the Southern California Stormwater Monitoring Coalition and to develop program effectiveness with the California Stormwater Quality Association. Regional programs could improve the Copermittees' compliance with other permit components such as development of the Hydromodification Management Plans and Retrofitting Existing Development with more consistent implementation and cost sharing. Re-issuing the NPDES Permit requirements within five years for three counties under three different permits requires the San Diego Water Board to expend significant time and resources for issuance of the permits through three separate public proceedings, thereby greatly reducing the time and resources available to oversee compliance. Multiple permits also create confusion for determining compliance among regulated entities, especially the land development community. The San Diego Water Board recognizes that issuing a single MS4 permit for all Phase I entities in the San Diego Region will provide consistent implementation, improve communication among agencies within watersheds crossing multiple jurisdictions, and minimize staff resources spent with each permit renewal. The San Diego Water Board plans to develop a single regional MS4 permit prior to the expiration of this Order that will transfer the Copermittees' enrollment to the regional permit upon expiration of this Order.

F. PUBLIC PROCESS

1. The San Diego Water Board has notified the Copermittees, all known interested parties, and the public of its intent to consider adoption of an Order prescribing waste discharge requirements that would serve to renew an NPDES permit for the existing MS4 discharges of pollutants in waters of the U.S.

2. The San Diego Water Board has held a public hearing on October 13, 2010 and heard and considered all comments pertaining to the terms and conditions of this Order.

IT IS HEREBY ORDERED that the Copermittees, in order to meet the provisions contained in Division 7 of the CWC and regulations adopted thereunder, and the provisions of the CWA and regulations adopted thereunder, must each comply with the following to the extent of their legal authority~~ies~~ established under the California Constitution and any~~their~~ enabling acts:

A. PROHIBITIONS AND RECEIVING WATER LIMITATIONS

1. Discharges ~~into and~~ from MS4s in a manner causing, or threatening to cause, a condition of pollution, contamination, or nuisance (as defined in CWC section 13050), in receiving waters of the state are prohibited.[3]

Comment [DB17]: See legal comment white paper. The scope of this Order is the discharge from MS4s. Moreover, MS4s are not receiving waters.

2. Storm water discharges from MS4s containing pollutants which have not been reduced to the MEP are prohibited.[3]

3. Subject to the requirements of section A.3.a., d~~D~~ischarges from MS4s that cause or contribute to the violation of water quality standards (designated beneficial uses, water quality objectives developed to protect beneficial uses, and the State policy with respect to maintaining high quality waters) are prohibited.

Comment [DB18]: This change clarifies that the iterative process reflected in Part A.3 applies to the entire provision.

a. Each Copermittee must comply with section A.3 and section A.4 as it applies to Prohibition 5 in Attachment A of this Order through timely implementation of control measures and other actions to reduce pollutants in storm water discharges in accordance with this Order, including any modifications. If exceedance(s) of water quality standards persist notwithstanding implementation of this Order, the Copermittee must assure compliance with section A.3 and section A.4 as it applies to Prohibition 5 in Attachment A of this Order by complying with the following procedure:

(1) Upon a determination by either the Copermittee or the San Diego Water Board that storm water MS4 discharges are causing or contributing to an exceedance of an applicable water quality standard, the Copermittee must notify the San Diego Water Board within 30 days and thereafter submit a report to the San Diego Water Board that describes best management practices (BMPs) that are currently being implemented and additional BMPs that will be implemented to prevent or reduce any pollutants that are causing or contributing to the exceedance of water quality standards. The report may be incorporated in the Annual Report unless the San Diego Water

[3] This prohibition does not apply to MS4 discharges which receive subsequent treatment to reduce pollutants in storm water discharges to the MEP prior to entering receiving waters (e.g., low flow diversions to the sanitary sewer). Runoff treatment and/or mitigation must occur prior to the discharge of runoff into receiving waters per finding E.7.

Board[4] directs an earlier submittal. The report must include an implementation schedule. The San Diego Water Board may require modifications to the report

(2) Submit any modifications to the report required by the San Diego Water Board within 30 days of notification;

(3) Within 30 days following acceptance of the report described above by the San Diego Water Board, the Copermittee must revise its JRMP and monitoring program to incorporate the approved modified BMPs that have been and will be implemented, the implementation schedule, and any additional monitoring required; and

(4) Implement the revised JRMP and monitoring program in accordance with the approved schedule.

b. The Copermittee must repeat the procedure set forth above to comply with the receiving water limitations for continuing or recurring exceedances of the same water quality standard(s) that occur following ~~implementation~~ completion of scheduled actions unless directed to do otherwise by the San Diego Water Board's Executive Officer.

c. Nothing in section A.3 prevents the San Diego Water Board from enforcing any provision of this Order while the Copermittee prepares and implements the above report but the Copermittees shall not be liable for violation of section A.3 provided that they are in compliance with the requirements of this section.

Comment [DB19]: This change reiterates that the iterative process is in effect so long as the Copermittees remain in compliance with the process set forth in section A.3.

4. In addition to the above prohibitions, discharges from MS4s are subject to all Basin Plan prohibitions cited in Attachment A to this Order.

B. NON-STORM WATER DISCHARGES

1. Each Copermittee must effectively prohibit all types of non-storm water discharges into its MS4 unless such discharges are either authorized by a separate NPDES permit; or not prohibited in accordance with sections B.2, ~~and~~ B.3, and B.4 below.

Comment [CP20]: Change consistent with the addition of B.4. below, and the comments thereto.

2. The following categories of non-storm water discharges are not prohibited unless a Copermittee or the San Diego Water Board identifies the discharge category as a source of pollutants to waters of the U.S. Where the Copermittee(s) have identified a category as a source of pollutants, the category must be addressed as an illicit discharge and prohibited through ordinance, order or similar means. The San Diego

[4] The San Diego Water Board by prior resolution has delegated all matters that may legally be delegated to its Executive Officer to act on its behalf pursuant to CWC §13223. Therefore, the Executive Officer is authorized to act on the San Diego Water Board's behalf on any matter within this Order unless such delegation is unlawful under CWC §13223 or this Order explicitly states otherwise.

Water Board may identify categories of discharge that either require prohibition, or other controls ~~for non-anthropogenic sources~~. For a discharge category determined to be a source of pollutants, the Copermittee, under direction of the San Diego Water Board, must either prohibit the discharge category or develop and implement appropriate control measures ~~for non-anthropogenic sources~~ to prevent the discharge of pollutants to the MS4 and report to the San Diego Water Board pursuant to Section K.1 and K.3 of this Order. The discharge categories are:

a. Diverted stream flows;
b. Rising ground waters;
c. Uncontaminated ground water infiltration [as defined at 40 CFR 35.2005(20)] to MS4s;
d. Uncontaminated pumped ground water[5];
e. Foundation drains[5];
f. Springs;
g. Water from crawl space pumps[5];
h. Footing drains[5];
i. Air conditioning condensation;
j. Flows from riparian habitats and wetlands;
k. Water line flushing[6,7];
l. Landscape irrigation;
m. Discharges from potable water sources not subject to NPDES Permit No. CAG679001, other than water main breaks;
n. Irrigation water;
o. Lawn watering;
p. Individual residential car washing; and
q. Dechlorinated swimming pool discharges[8].

3. Emergency fire fighting flows (i.e., flows necessary for the protection of life or property) do not require BMPs and need not be prohibited.

a. As part of the JRMP, each Copermittee must develop and implement a program to address pollutants from non-emergency fire fighting flows (i.e., flows from controlled or practice blazes and maintenance activities) identified as significant sources of pollutants to waters of the U.S.
b. Building fire suppression system maintenance discharges (e.g. sprinkler line flushing) may contain waste. Therefore, such discharges are to be prohibited by the Copermittees as illicit discharges through ordinance, order, or similar means.

4. As part of the JRMP, the Copermittees must develop and implement a program to

[5] Requires enrollment under Order R9-2008-002. Discharges into the MS4 require authorization from the owner and operator of the MS4 system.
[6] This exemption does not include fire suppression sprinkler system maintenance and testing discharges. Those discharges may be regulated under Section B.3.
[7] Requires enrollment under Order R9-2002-0020.
[8] Excluding saline swimming pool discharges.

Comment [DB21]: See legal comments in Attachment 7

Comment [DB22]: See legal comments white paper.

Comment [CP23]: See discussion in the comment letter, and Attachment 6

Comment [CP24]: As noted in the comment letter and Attachment 6, irrigation runoff has not been shown to be an actual source of pollutants to the receiving waters in this watershed.

As such the comment letter requests that THE CONDTIONAL EXEMPTION BE RESTORED as shown in the redlines above.

Should the Board decide to prohibit the discharge anyway, the Copermittees request that at a minimum that the category of discharges be managed through a JRMP program similar to non-emergency fire fighting flows, as shown in these redlines

address pollutants from landscape irrigation, irrigation water and lawn watering identified as significant sources of pollutants to waters of the United States.

4.5. Each Copermittee must examine all dry weather effluent analytical monitoring results collected in accordance with section F.4 of this Order and Receiving Waters and MS4 Discharge Monitoring and Reporting Program No. R9-2010-0016 to identify water quality problems which may be the result of any non-prohibited discharge category(ies) identified above in section B.2. Follow-up investigations must be conducted to identify and control, pursuant to section B.2, any non-prohibited discharge category(ies) listed above.

C. NON-STORM WATER DRY WEATHER ACTION LEVELS

1. Each Copermittee, beginning no later than July 1, 2012, must implement the non-storm water dry weather action level (NAL) monitoring as described in Attachment E of this Order.

2. In response to an exceedance of an NAL, the Copermittee(s) having jurisdiction must investigate and seek to identify the source of the exceedance in a timely manner. However, if any Copermittee identifies a number of NAL exceedances that prevents it from adequately conducting source investigations at all sites in a timely manner, then that Copermittee may submit a prioritization plan and timeline that identifies the timeframe and planned actions to investigate and report its findings on all of the exceedances. Depending on the source of the pollutant exceedance, the Copermittee(s) having jurisdiction must take action as follows:

Comment [CP25]: Per discussions with Board staff on 8/18

a. If the Copermittee identifies the source of the exceedance as natural (non-anthropogenically influenced) in origin and in conveyance into the MS4; then the Copermittee must report its findings and documentation of its source investigation to the San Diego Water Board in its Annual Report.

b. If the Copermittee identifies the source of the exceedance as an illicit discharge or connection, then the Copermittee must eliminate the discharge to its MS4 pursuant to Section F.4.f and report the findings, including any enforcement action(s) taken, and documentation of the source investigation to the San Diego Water Board in the Annual Report. If the Copermittee is unable to eliminate the source of discharge prior to the Annual Report submittal, then the Copermittee must submit, as part of its Annual Report, its plan and timeframe to eliminate the source of the exceedance. Those dischargers seeking to continue such a discharge must become subject to a separate NPDES permit prior to continuing any such discharge.

c. If the Copermittee identifies the source of the exceedance as an exempted category of non-storm water discharge, then the Copermittees must determine if this is an isolated circumstance or if the category of discharges must be

addressed through the prevention or prohibition of that category of discharge as an illicit discharge. The Copermittee must submit its findings including a description of the steps taken to address the discharge and the category of discharge, to the San Diego Water Board for review in its Annual Report. Such description must include relevant updates to or new ordinances, orders, or other legal means of addressing the category of discharge, and the anticipated schedule for doing so. The Copermittees must also submit a summary of its findings with the Report of Waste Discharge.

d. If the Copermittee identifies the source of the exceedance as a non-storm water discharge in violation or potential violation of an existing separate NPDES permit (e.g. the groundwater dewatering permit), then the Copermittee must report, within three business days, the findings to the San Diego Water Board including all pertinent information regarding the discharger and discharge characteristics.

e. If the Copermittee is unable to identify the source of the exceedance after taking and documenting reasonable steps to do so, then the Copermittee must perform additional focused sampling. If the results of the additional sampling indicate a recurring exceedance of NALs with an unidentified source, then the Copermittee must update its programs within a year to address the common contributing sources that may be causing such an exceedance. The Copermittee's annual report must include these updates to its programs including, where applicable, updates to their watershed workplans (Section G.2), retrofitting consideration (Section F.3.d) and program effectiveness work plans (Section J.4).

f. The Copermittees or any interested party, may evaluate existing NALs and propose revised NALs for future Board consideration.

3. NALs can help provide an assessment of the effectiveness of the prohibition of non-storm water discharges and of the appropriateness of exempted non-storm water discharges. An exceedance of an NAL does not alone constitute a violation of the provisions of this Order. An exceedance of an NAL may indicate a ~~lack of compliance with the requirement that~~ need to enhance the Copermittees efforts to effectively prohibit all types of unauthorized non-storm water discharges into the MS4 or other prohibitions set forth in Sections A and B of this Order. Failure to timely implement required actions specified in this Order following an exceedance of an NAL constitutes a violation of this Order. Neither the absence of exceedances of NALs nor compliance with required actions following observed exceedances, excuses any non-compliance with the requirement to effectively prohibit all types of unauthorized non-storm water discharges into the MS4s or any non-compliance with the prohibitions in Sections A and B of this Order. During any annual reporting period in which one or more exceedances of NALs have been documented the Copermittee must report in response to Section C.2 above, a description of whether and how the observed exceedances did or did not result in a discharge from the MS4 that caused, or threatened to cause or contribute to a condition of pollution, contamination, or nuisance in the receiving waters.

Comment [CP26]: 'lack of compliance' is in contradiction with the second sentence. The proposed language is more appropriate.

4. Monitoring of effluent will occur at the end-of-pipe prior to discharge into the receiving waters, with a focus on Major Outfalls, as defined in 40 CFR 122.26(B 5-6) and Attachment E of this Order. ~~The Copermittees must develop their monitoring plans to sample a representative percentage of major outfalls and identified stations within each hydrologic subarea.~~ At a minimum, outfalls that exceed any NALs once during any year must be monitored in the subsequent year. Any station that does not exceed an NAL, or only has exceedances that are identified as natural in origin and conveyance into the MS4 pursuant to Section C.2.a, for 3 successive years may be replaced with a different station.

Comment [CP27]: The previous sentence requires outfalls to be selected consistent with Attachment E. This sentence is not needed and is duplicative of Attachment E.

At a minimum, this language will need to be modified to be consistent with changes being requested in the Attachment 4 to the Comment Letter, including any footnotes.

5. Each Copermittee must monitor for the non-storm water dry weather action levels, which are incorporated into this Order as follows:

   a. Action levels for discharges to inland surface waters:

Table 3.a.1: General Constituents

Parameter	Units	AMAL	MDAL	Instantaneous Maximum	Basis
Fecal Coliform	MPN/ 100 ml	200[A] 400[B]	-		BPO
Enterococci	MPN/ 100 ml	33	-	~~61[C]~~ 151[C]	BPO
Turbidity	NTU	-	20		BPO
pH	Units	Within limit of 6.5 to 8.5 at all times			BPO
Dissolved Oxygen	mg/L	Not less than 5.0 in WARM waters and not less than 6.0 in COLD waters			BPO
Total Nitrogen	mg/L	-	1.0	See MDAL	BPO
Total Phosphorus	mg/L	-	0.1	See MDAL	BPO
Methylene Blue Active Substances	mg/L	-	0.5	See MDAL	BPO
Iron	mg/L	-	0.3	See MDAL	BPO
Manganese	mg/L	-	0.05	See MDAL	BPO

A – Based on a minimum of not less than five samples for any 30-day period
B – No more than 10 percent of total samples may exceed 400 per 100 ml during any 30 day period
C – This Value has been set to Basin Plan Criteria for ~~Designated Beach~~infrequently used Areas
BPO – Basin Plan Objective
MDAL – Maximum Daily Action Level AMAL – Average Monthly Action Level

Comment [CP28]: This value was incorrectly referencing the criteria for beach areas and needs to be updated to reflect the shown values for infrequently used areas.

Table 3.a.2: Priority Pollutants

		Freshwater (CTR)	
Parameter	Units	MDAL	AMAL
Cadmium	ug/L	**	**
Copper	ug/L	*	*
Chromium III	ug/L	**	**
Chromium VI (hexavalent)	ug/L	16	8.1
Lead	ug/L	*	*
Nickel	ug/L	**	**

Silver	ug/L	*	*
Zinc	ug/L	*	*

CTR – California Toxic Rule
*- Action Levels developed on a case-by-case basis (see below)
**- Action Levels developed on a case-by-case basis (see below), but calculated criteria are not to exceed Maximum Contaminant Levels under the California Code of Regulations[9]

The NALs for Cadmium, Copper, Chromium (III), Lead, Nickel, Silver and Zinc will be developed on a case-by-case basis because the freshwater criteria are based on site-specific water quality data (receiving water hardness). For these priority pollutants, the following equations (40 CFR 131.38.b.2) will be required:

Cadmium (Total Recoverable) = exp(0.7852[ln(hardness)] -2.715)
Chromium III (Total Recoverable) = exp(0.8190[ln(hardness)] + .6848)
Copper (Total Recoverable) = exp(0.8545[ln(hardness)] - 1.702)
Lead (Total Recoverable) = exp(1.273[ln(hardness)] - 4.705)
Nickel (Total Recoverable) = exp(.8460[ln(hardness)] + 0.0584)
Silver (Total Recoverable) = exp(1.72[ln(hardness)] - 6.52)
Zinc (Total Recoverable) = exp(0.8473[ln(hardness)] + 0.884)

D. STORM WATER ACTION LEVELS

1. The Copermittees must implement the Wet Weather MS4 Discharge Monitoring as described in Attachment E of this Order, and beginning three years after the Order adoption date, the Copermittees must annually evaluate their data compared to the Stormwater Action Levels (SALs). At each monitoring station, a running average of twenty percent or greater of exceedances of any discharge of storm water from the MS4 to waters of the U.S. that exceed the SALs for each of the pollutants listed in Table 4 (below) requires the Copermittee(s) having jurisdiction to affirmatively augment and implement all necessary storm water controls and measures to reduce the discharge of the associated class of pollutants(s) to the MEP. The Copermittees must utilize the exceedance information when adjusting and executing annual work plans, as required by this Order. Copermittees must take the magnitude, frequency, and number of constituents exceeding the SAL(s), in addition to receiving water quality data and other information, into consideration when prioritizing and reacting to SAL exceedances in an iterative manner. Failure to appropriately consider and react to SAL exceedances in an iterative manner creates a presumption that the Copermittee(s) have not reduced pollutants in storm water discharges to the MEP.

Table 4. Storm Water Action Levels

Pollutant	Action Level
Turbidity (NTU)	126
Nitrate & Nitrite total (mg/L)	2.6
P total (mg/L)	1.46

[9] California Code of Regulations, Title 22, Division 4, Chapter 15, Article 4, Section 64431.

Cd total (µg/L)	3.0
Cu total (µg/L)	127
Pb total (µg/L)	250
Zn total (µg/L)	976

2. The end-of-pipe assessment points for the determination of SAL compliance are ~~all~~ major outfalls, as defined in 40 CFR 122.26(b)(5) and (b)(6) and Attachment E of this Order. ~~The Copermittees must develop their monitoring plans to sample a representative percentage of the major outfalls within each hydrologic subarea.~~ At a minimum, outfalls that exceed SALs must be monitored in the subsequent year. Any station that does not exceed an SAL for 3 successive years may be replaced with a different station. SAL samples must be 24 hour time-weighted composites.

3. The absence of SAL exceedances does not relieve the Copermittees from implementing all other required elements of this Order.

4. This Order does not regulate natural sources and conveyances into the MS4 of constituents listed in Table 5. To be relieved of the requirements to take action as described in D.1 above, the Copermittee must demonstrate that the likely and expected cause of the SAL exceedance is not anthropogenic in nature. This demonstration does not need to be repeated for subsequent exceedances of the same SAL at the same monitoring station.

5. The SALs will be reviewed and updated at the end of every permit cycle. The data collected pursuant to D.2 above and Attachment E can be used to create SALs based upon local data. The purpose of establishing the SALs is that through the iterative and MEP process, outfall storm water discharges will meet all applicable water quality standards.

Comment [CP29]: Conflicts with attachment E, which states to select 'representative' outfalls.

Comment [CP30]: Consistent with NALs section

Comment [CP31]: The previous sentence requires outfalls to be selected consistent with Attachment E. This sentence is not needed and is duplicative of Attachment E.

At a minimum, this language will need to be modified to be consistent with changes being requested in the Attachment 4 to this comment letter, including any footnotes.

E. LEGAL AUTHORITY

1. Each Copermittee must, to the extent of their legal authority established under the California Constitution and any enabling acts, establish, maintain, and enforce adequate legal authority within their legal authority to control pollutant discharges into and from its MS4 through ordinance, statute, permit, contract or similar means. Nothing herein shall authorize a Copermittee or other discharger regulated under the terms of this order to divert, store or otherwise impound water if such action is reasonably anticipated to harm downstream water rights holders in the exercise of their water rights. This legal authority must, at a minimum, authorize the Copermittee to:

   a. Control the contribution of pollutants in discharges of runoff associated with industrial and construction activity to its MS4 and control the quality of runoff from industrial and construction sites. This requirement applies both to industrial and construction sites which have coverage under the statewide general industrial or

construction storm water permits, as well as to those sites which do not. Grading ordinances must be updated and enforced as necessary to comply with this Order;

b. Prohibit all identified illicit discharges not otherwise allowed pursuant to section B.2;

c. Prohibit and eliminate illicit connections to the MS4;

d. Control the discharge of spills, dumping, or disposal of materials other than storm water to its MS4;

e. Require compliance with conditions in Copermittee ordinances, permits, contracts or orders (i.e., hold dischargers to its MS4 accountable for their contributions of pollutants and flows);

f. Utilize enforcement mechanisms to require compliance with Copermittee storm water ordinances, permits, contracts, or orders;

g. Control the contribution of pollutants from one portion of the shared MS4 to another portion of the MS4 through interagency agreements among Copermittees.

h. Control of the contribution of pollutants from one portion of the shared MS4 to another portion of the MS4 through interagency agreements with other owners of the MS4 such as the State of California Department of Transportation, the U.S. federal government, or sovereign Native American Tribes is encouraged;

i. Carry out all inspections, surveillance, and monitoring necessary to determine compliance and noncompliance with local ordinances and permits and with this Order, including the prohibition on illicit discharges to the MS4. This means the Copermittee must have authority to enter, monitor, inspect, take measurements, review and copy records, and require regular reports from industrial facilities discharging into its MS4, including construction sites;

j. Require the use of BMPs to prevent or reduce the discharge of pollutants ~~into~~ fromMS4s ~~from storm water~~ to the MEP; and

k. Require documentation on the effectiveness of BMPs implemented to reduce the discharge of ~~storm water~~ pollutants from~~to~~ the MS4 to the MEP.

2. Each Copermittee must submit on or before June 30, 2012, a statement certified by its chief legal counsel that the Copermittee has taken the necessary steps to obtain and maintain full legal authority within their jurisdiction to implement and enforce each of the requirements contained in 40 CFR 122.26(d)(2)(i)(A-F) and this Order. As applicable to each Copermittee, ~~T~~these statements must include:

a. Citation of runoff related ordinances and the reasons they are enforceable;

b. Identification of the local administrative and legal procedures available to mandate compliance with runoff related ordinances and therefore with the conditions of this Order, and a statement as to whether enforcement actions can be completed administratively or whether they must be commenced and completed in the judicial system; and

c. A brief description of how runoff related ordinances are adopted and the process by which they may be challenged.

Comment [DB32]: See legal comments in Attachment 7. The Copermittees' responsibility under the Clean Water Act is to reduce the discharge of pollutants from the MS4 to the MEP. Therefore, the purpose of the BMP is to reduce pollutants in such discharges.

Comment [CP33]: To address limitations of the District

F. JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM (JRMP)

Each Copermittee must implement all requirements of section F of this Order no later than July 1, 2012, unless otherwise specified. Upon adoption of this Order and until an updated JRMP is developed and implemented or July 1, 2012, whichever occurs first,, each Copermittee must at a minimum implement its ~~JRMP~~ Individual SWMP document, as the document was developed and amended to comply with the requirements of Order No. R9-2004-001.

Each Copermittee must develop and implement an updated JRMP for its jurisdiction no later than July 1, 2012. Each updated JRMP must meet the requirements of section F of this Order, reduce the discharge of storm water pollutants from the MS4 to the MEP, effectively prohibit non-storm water discharges, and prevent runoff discharges from the MS4 from causing or contributing to a violation of water quality standards. In addition, each Copermittee's JRMP must identify all departments and positions within its jurisdiction that conduct runoff related activities, and their roles and responsibilities under this Order. This identification must include an up to date organizational chart specifying these departments and key personnel.

1. DEVELOPMENT PLANNING COMPONENT

Each Copermittee must implement a program which meets the requirements of this section as applicable to their authority, that ~~and~~ is designed to (1) reduce~~s~~ Development Project discharges of storm water pollutants from the MS4 to the MEP; (2) prevent~~s~~ Development Project discharges from the MS4 from causing or contributing to a violation of water quality standards; (3) prevent~~s~~ illicit discharges into the MS4; and (4) manage~~s~~ increases in runoff discharge rates and durations from Development Projects that are likely to cause increased erosion of stream beds and banks, silt pollutant generation, or other impacts to beneficial uses and stream habitat due to increased erosive force.

Comment [DB34]: See legal comments in Attachment 8

Comment [DB35]: See general comment 1 in Attachment 7

a. GENERAL PLAN

Each Copermittee (except the District) must revise as needed its General Plan or equivalent plan (e.g., Comprehensive, Master, or Community Plan) to include water quality and watershed protection principles and policies that direct land-use decisions and require implementation of consistent water quality protection measures for all development, redevelopment, and retrofit projects. Examples of water quality and watershed protection principles and policies to be considered include the following:

Comment [CP36]: See legal comments in Attachment 8

(1) Minimize the amount of impervious surfaces and directly connected impervious surfaces in areas of new development and redevelopment and where feasible slow runoff and maximize on-site infiltration of runoff.

(2) Implement pollution prevention methods supplemented by pollutant source controls and treatment BMPs. Use small collection strategies located at, or as close as possible to, the source (i.e., the point where water initially meets the ground) to minimize the transport of urban runoff and pollutants offsite and into an MS4.

(3) Preserve, and where possible, create, or restore areas that provide important water quality benefits, such as riparian corridors, wetlands, and buffer zones. Encourage land acquisition of such areas.

(4) Limit disturbances of natural water bodies and natural drainage systems caused by development including roads, highways, and bridges.

(5) Prior to making land use decisions, utilize methods available to estimate increases in pollutant loads and flows resulting from projected future development. Require incorporation of BMPs to mitigate the projected increases in pollutant loads and flows.

(6) Avoid development of areas that are particularly susceptible to erosion and sediment loss; or establish development guidance that identifies these areas and protects them from erosion and sediment loss.

(7) Reduce pollutants associated with vehicles and increasing traffic resulting from development.

(8) Post-development runoff from a site must not contain pollutant loads that cause or contribute to an exceedance of receiving water quality objectives and which have not been reduced to the MEP.

b. ENVIRONMENTAL REVIEW PROCESS

Each Copermittee must revise as needed its current environmental review processes to accurately evaluate water quality impacts and cumulative impacts and identify appropriate measures to avoid, minimize, and mitigate those impacts for all Development Projects.

c. APPROVAL PROCESS CRITERIA AND REQUIREMENTS FOR ALL DEVELOPMENT PROJECTS

For all proposed Development Projects, each Copermittee, during the planning process, and prior to project approval and issuance of local permits, must prescribe the necessary requirements so that Development Project discharges ~~of storm water pollutants from the MS4 will be reduced to the MEP, will not cause or contribute to a violation of water quality standards, and~~ will comply with the Copermittee's ordinances, permits, plans, and requirements, and with this Order.

Comment [CP37]: This is duplicative of section A and is not needed. Further, the end of this sentence specifically requires compliance with this order.

Performance Criteria: Discharges from each approved development project must be subject to the following management measures:

(1) Source control BMPs that reduce storm water pollutants of concern in runoff; prevent illicit discharges into the MS4; ~~prevent~~ minimize irrigation runoff; storm drain system stenciling or signage; properly design outdoor material storage areas; properly design outdoor work areas; and properly design trash storage areas.

(2) The following LID BMPs listed below must be implemented at all Development Projects where applicable and feasible.

(a) Conserve natural areas, including existing trees, other vegetation, and soils,
(b) Construct streets, sidewalks, or parking lot aisles to the minimum widths necessary, provided that public safety is not compromised,
(c) Minimize the impervious footprint of the project,
(d) Minimize soil compaction to landscaped areas,
(e) Minimize disturbances to natural drainages (e.g., natural swales, topographic depressions, etc.), and
(f) Disconnect impervious surfaces through distributed pervious areas.

(3) Buffer zones for natural water bodies, where technically feasible. Where buffer zones are technically infeasible, require project proponent to implement other buffers such as trees, access restrictions, etc;

(4) Other measures necessary so that grading or other construction activities meet the provisions specified in section F.2 of this Order.

(5) Submittal of documentation of a mechanism under which ongoing long-term maintenance of all structural post-construction BMPs will be conducted.

(6) Infiltration and Groundwater Protection

To protect groundwater quality, each Copermittee must apply restrictions to the use of treatment control BMPs that are designed to primarily function as large, centralized infiltration devices (such as large infiltration trenches and infiltration basins). Such restrictions must be designed so that the use of such infiltration treatment control BMPs does not cause or contribute to an exceedance of groundwater quality objectives. At a minimum, each treatment control BMP designed to primarily function as a centralized infiltration device must meet the restrictions below, unless the Development Project demonstrates to the Copermittee that a restriction is not necessary to protect groundwater quality. The Copermittees may collectively or individually develop alternative restrictions on the use of treatment control BMPs which

are designed to primarily function as centralized infiltration devices. Alternative restrictions developed by the Copermittees can partially or wholly replace the restrictions listed below. The restrictions do not apply to small infiltration systems dispersed throughout a development project.

(a) Runoff must undergo pretreatment such as sedimentation or filtration prior to infiltration;

(b) All dry weather flows containing significant pollutant loads must be diverted from infiltration devices and treated through other BMPs;

(c) Pollution prevention and source control BMPs must be implemented at a level appropriate to protect groundwater quality at sites where infiltration treatment control BMPs are to be used;

(d) Infiltration treatment control BMPs must be adequately maintained so that they remove storm water pollutants to the MEP;

(e) The vertical distance from the base of any infiltration treatment control BMP to the seasonal high groundwater mark must be at least 10 feet. Where groundwater basins do not support beneficial uses, this vertical distance criteria may be reduced, provided groundwater quality is maintained;

(f) The soil through which infiltration is to occur must have physical and chemical characteristics (such as appropriate cation exchange capacity, organic content, clay content, and infiltration rate) which are adequate for proper infiltration durations and treatment of runoff for the protection of groundwater beneficial uses;

(g) Infiltration treatment control BMPs must not be used for areas of industrial or light industrial activity; and other high threat to water quality land uses and activities as designated by each Copermittee unless first treated or filtered to remove pollutants prior to infiltration; and

(h) Infiltration treatment control BMPs must be located a minimum of 100 feet horizontally from any water supply wells.

(7) Where feasible, landscaping with native or low water species shall be preferred in areas that drain to the MS4 or to waters of the U.S.

(8) Rain water harvesting, where feasible~~, must be implemented~~ shall be encouraged as part of the site design and construction,~~ and to supplement offsite beneficial uses~~.

d. STANDARD STORM WATER MITIGATION PLANS (SSMPS) – APPROVAL PROCESS

CRITERIA AND REQUIREMENTS FOR PRIORITY DEVELOPMENT PROJECTS

On or before June 30, 2012, the Copermittees must submit an updated SSMP, to the San Diego Water Board's Executive Officer for a 30 day public review and comment period. The San Diego Water Board's Executive Officer has the discretion to determine whether to hold a public hearing or to limit public input to written comments. Within 180 days of determination that the SSMP is in compliance with this Order's provisions, each Copermittee must amend its local ordinances consistent with the updated SSMP, and begin implementing the updated SSMP. Any updated local ordinances must be submitted to the San Diego Water Board with the applicable Annual Report . The SSMP must meet the requirements of section F.1.d of this Order to (1) be designed to reduce Priority Development Project discharges of storm water pollutants from the MS4 to the MEP, and (2) be designed to prevent Priority Development Project runoff discharges from the MS4 from causing or contributing to a violation of water quality standards.[10]

Comment [CP38]: Per discussions with Board staff on 8/18

Comment [DB39]: See general comment 1 in Attachment 7.

Comment [DB40]: See general comment 1 in Attachment 7.

(1) Definition of Priority Development Project:

Priority Development Projects are:

(a) All new Development Projects that fall under the project categories or locations listed in section F.1.d.(2), and

(b) Those redevelopment projects that create, add, or replace at least 5,000 square feet of impervious surfaces on an already developed site and the existing development and/or the redevelopment project falls under the project categories or locations listed in section F.1.d.(2). Where redevelopment results in an increase of less than fifty percent of the impervious surfaces of a previously existing development, and the existing development was not subject to SSMP requirements, the numeric sizing criteria discussed in section F.1.d.(6) applies only to the addition or replacement, and not to the entire development. Where redevelopment results in an increase of more than fifty percent of the impervious surfaces

[10] Updated SSMP and hydromodification requirements must apply to all priority projects or phases of priority projects which have not yet begun grading or construction activities at the time any updated SSMP or hydromodification requirement commences. If lawful prior approval of a project exists, whereby application of an updated SSMP or hydromodification requirement to the project is illegal, the updated SSMP or hydromodification requirement need not apply to the project. Updated Development Planning requirements set forth in Sections F.1. (a) through (h) of this Order must apply to all projects or phases of projects, unless, at the time any updated Development Planning requirement commences, the projects or project phases meet any one of the following conditions: (i) the project or phase has begun grading or construction activities; or (ii) a Copermittee determines that lawful prior approval rights for a project or project phase exist, whereby application of the Updated Development Planning requirement to the project is legally infeasible. Where feasible, the Permittees must utilize the SSMP and hydromodification update periods to ensure that projects undergoing approval processes include application of the updated SSMP and hydromodification requirements in its plans.

of a previously existing development, the numeric sizing criteria applies to the entire development.

(c) Redevelopment also does not include projects that are implemented solely pursuant to section F.3.d of this order.

~~(b)~~(d) PDPs do not include Emergency projects required to protect public health and safety, consistent with CEQA § 15269.

~~(c) One acre threshold: In addition to the Priority Development Project Categories identified in section F.1.d.(2), Priority Development Projects must also include all other post-construction pollutant-generating new Development Projects that result in the disturbance of one acre or more of land by July 1, 2012.~~[11]

Comment [CP41]: Important not to penalize proactive efforts to retrofit existing development.

Comment [amm42]: Request deletion as disturbance threshold inappropriately captures non-development related activity (maintenance, agricultural, etc.) Further, the one acre threshold is not appropriately supported in the Fact Sheet.

(2) Priority Development Project Categories

Where a new Development Project feature, such as a parking lot, falls into a Priority Development Project Category, the entire project footprint is subject to SSMP requirements.

(a) New development projects that create 10,000 square feet or more of impervious surfaces (collectively over the entire project site) including commercial, industrial, residential (excluding individual single family home projects not part of a larger common plan of development), mixed-use, and public projects. This category includes development projects on public or private land which fall under the planning and building authority of the Copermittees.

(b) Automotive repair shops. This category is defined as a facility that is categorized in any one of the following Standard Industrial Classification (SIC) codes: 5013, 5014, 5541, 7532-7534, or 7536-7539.

(c) Restaurants. This category is defined as a facility that sells prepared foods and drinks for consumption, including stationary lunch counters and refreshment stands selling prepared foods and drinks for immediate consumption (SIC code 5812), where the land area for development is greater than 5,000 square feet. Restaurants where land development is less than 5,000 square feet must meet all SSMP requirements except for

[11] ~~Pollutant generating Development Projects are those projects that generate pollutants at levels greater than natural background levels.~~

LID and structural treatment BMP and numeric sizing criteria requirement F.1.d.(4) and F.1.d.(6) and hydromodification requirement F.1.h.

(d) All hillside development greater than 5,000 square feet. This category is defined as any development which creates 5,000 square feet of impervious surface which is located in an area with known erosive soil conditions, where the development will grade on any natural slope that is twenty-five percent or greater.

(e) Environmentally Sensitive Areas (ESAs). All development located within, or directly adjacent to, or discharging directly to an ESA (where discharges from the development or redevelopment will enter receiving waters within the ESA), which either creates 2,500 square feet of impervious surface on a proposed project site or increases the area of imperviousness of a proposed project site to 10 percent or more of its naturally occurring condition. "Directly adjacent" means situated within 200 feet of the ESA. "Discharging directly to" means outflow from a drainage conveyance system that is composed entirely of flows from the subject development or redevelopment site, and not commingled with flows from adjacent lands.

(f) Impervious parking lots 5,000 square feet or more and potentially exposed to runoff. Parking lot is defined as a land area or facility for the temporary parking or storage of motor vehicles used personally, for business, or for commerce.

(g) Street, roads, highways, and freeways. This category includes any paved impervious surface that is 5,000 square feet or greater used for the transportation of automobiles, trucks, motorcycles, and other vehicles. To the extent that the Copermittees develop revised standard roadway design and post-construction BMP guidance that comply with the provisions of Section F.1 of the Order, then public works projects that implement the ~~revised standard roadway sections~~designs/guidance do not have to develop a project specific SSMP. The standard roadway design and post-construction BMP guidance must be submitted with the Copermittee's updated SSMP.

(h) Retail Gasoline Outlets (RGOs). This category includes RGOs that meet the following criteria: (a) 5,000 square feet or more or (b) a projected Average Daily Traffic (ADT) of 100 or more vehicles per day.

(3) Pollutants of Concern

As part of its local SSMP, each Copermittee must implement an updated procedure for identifying pollutants of concern for each Priority Development Project. The procedure must address, at a minimum: (1) Receiving water quality (including pollutants for which receiving waters are listed as impaired under CWA section 303(d)); (2) Land-use type of the Development Project and pollutants associated with that land use type; and (3) Pollutants expected to be present on site.

(4) Low Impact Development BMP Requirements

Each Copermittee must require each Priority Development Project to implement LID BMPs which will collectively minimize directly connected impervious areas, limit loss of existing infiltration capacity, and protect areas that provide important water quality benefits necessary to maintain riparian and aquatic biota, and/or are particularly susceptible to erosion and sediment loss.

(a) The Copermittees must take the following measures to ensure that LID BMPs are implemented at Priority Development Projects:

(i) Each Copermittee must require LID BMPs or make a finding of technical infeasibility for each Priority Development Project in accordance with the LID waiver program in Section F.1.d.(7);

(ii) Each Copermittee must incorporate formalized consideration, such as thorough checklists, ordinances, and/or other means, of LID BMPs into the plan review process for Priority Development Projects;

(iii) On or before July 1, 2012, each Copermittee, to the extent of its jurisdiction, must review its local codes, policies, and ordinances and identify barriers therein to implementation of LID BMPs. Following the identification of these barriers to LID implementation, where feasible, the Copermittee must take, by the end of the permit cycle, appropriate actions to remove such barriers. The Copermittees must include this review with the updated JRMP.

Comment [DB43]: See legal comments in Attachment 8.

(b) The following LID BMPs must be implemented at each Priority Development Project:

(i) Maintain or restore natural storage reservoirs and drainage corridors (including depressions, areas of permeable soils, swales, and ephemeral and intermittent streams) to the extent feasible[12].

(ii) Projects with landscaped or other pervious areas must, where feasible, properly design and construct the pervious areas to

Comment [CP44]: Footnote edits per discussions with Board staff on 8/18

[12] Priority Development Projects proposing to dredge or fill materials in waters of the U.S. must obtain a CWA §401 Water Quality Certification. Discharges of dredge or fill materials in ~~and/or~~ waters of the State must obtain ~~a CWA §401 Water Quality Certification and/or~~ Waste Discharge Requirements.

effectively receive and infiltrate, retain and/or treat runoff from impervious areas, prior to discharge to the MS4. Soil compaction for these areas must be minimized. The amount of the impervious areas that are to drain to pervious areas must be based upon the total size, soil conditions, slope, and other pertinent factors.

(iii) ~~Projects with low traffic areas and appropriate soil conditions must construct walkways, trails, overflow parking lots, alleys, or other low-traffic areas with permeable surfaces, such as pervious concrete, porous asphalt, unit pavers, and granular materials~~.

Comment [CP45]: This requirement is clearly specifying the method of compliance in contradiction with state law (CWC 13360).

(c) LID BMPs sizing criteria:

(i) LID BMPs must be sized and designed to ensure onsite retention without runoff, of the volume of runoff produced from a 24-hour 85th percentile storm event[13] ("design capture volume");

(ii) If onsite infiltration LID BMPs are technically infeasible per section F.1.d.(7)(b), other LID BMPs may treat any volume that is not retained onsite provided that the other LID BMPs are sized to hold the design storm volume that is not infiltrated. The LID BMPs must be designed for an appropriate surface loading rate to prevent erosion, scour and channeling within the BMP.

(d) If it is shown to be technically infeasible per Section F.1.d.(7)(b) to retain and/or treat the remaining volume up to and including the design capture volume using LID BMPs, then the project must implement conventional treatment control BMPs in accordance with Section F.1.d.(6) below and must participate in the LID waiver program in Section F.1.d.(7).

(e) All LID BMPs must be designed and implemented with measures to avoid the creation of nuisance or pollution associated with vectors, such as mosquitoes, rodents, and flies.

(5) Source Control BMP Requirements

Each Copermittee must require each Priority Development Project to implement applicable source control BMPs. The source control BMPs to be required must be designed to:

Comment [DB46]: See general comment 1 in Attachment 7 .

[13] This volume is not a single volume to be applied to all of Riverside County. The size of the 85th percentile storm event is different for various parts of the County. The Copermittees are encouraged to calculate the 85th percentile storm event for each of its jurisdictions using local rain data pertinent to its particular jurisdiction (0.6 inch standard is a rough average for the County and should only be used where appropriate rain data is not available). In addition, isopluvial maps may be used to extrapolate rainfall data to areas where insufficient data exists in order to determine the volume of the local 85th percentile storm event in such areas. Where the Copermittees will use isopluvial maps to determine the 85th percentile storm event in areas lacking rain data, the Copermittees must describe their method for using isopluvial maps in its SSMPs.

(a) Prevent illicit discharges into the MS4;
(b) Minimize storm water pollutants of concern in runoff;
(c) ~~Eliminate~~ Minimize irrigation runoff;
(d) Include storm drain system stenciling or signage;
(e) Include properly designed outdoor material storage areas;
(f) Include properly designed outdoor work areas;
(g) Include properly designed trash storage areas;
(h) Include water quality protection requirements applicable to individual priority project categories.

(6) Treatment Control BMP Requirements

Each Copermittee must require each Priority Development Project that meets the Copermittee's technical infeasibility criteria in Section F.1.d(7) below, to implement conventional treatment control BMPs to treat the portion of the "design capture volume" that was not treated by LID BMPs per Section F.1.d(4) above. Conventional treatment control BMPs must meet the following requirements:

(a) All treatment control BMPs for a single Priority Development Project must collectively be sized to comply with the following numeric sizing criteria:

(i) Volume-based treatment control BMPs must be designed to mitigate (infiltrate, filter, or treat) the remaining portion of the design capture volume that was not retained and/or treated with LID BMPs; or

(ii) Flow-based treatment control BMPs must be designed to mitigate (filter, or treat) either: a) the maximum flow rate of runoff produced from a rainfall intensity of 0.2 inch of rainfall per hour, for each hour of a storm event; or b) the maximum flow rate of runoff produced by the 85th percentile hourly rainfall intensity (for each hour of a storm event), as determined from the local historical rainfall record, multiplied by a factor of two.

(b) All treatment control BMPs for Priority Development Projects must, at a minimum:

(i) Be ranked with high or medium pollutant removal efficiency for the project's most significant pollutants of concern, as the pollutant removal efficiencies are identified in the Copermittees' SSMP. Treatment control BMPs with a low removal efficiency ranking must only be approved by a Copermittee when a feasibility analysis has been conducted which exhibits that implementation of treatment control BMPs with high or medium removal efficiency rankings are infeasible for a Priority Development Project or portion of a Priority

Development Project.

(ii) Be correctly sized and designed so as to remove storm water pollutants to the MEP.

(c) Target removal of pollutants of concern from runoff.

(d) Be implemented close to pollutant sources, and prior to discharging into waters of the U.S.

(e) Include proof of a mechanism under which ongoing long-term maintenance will be conducted to ensure proper maintenance for the life of the project. The mechanisms may be provided by the project proponent or Copermittee.

(f) Be designed and implemented with measures to avoid the creation of nuisance or pollution associated with vectors, such as mosquitoes, rodents, and flies.

(7) Low Impact Development (LID) BMP Waiver Program

The Copermittees must develop, collectively or individually, a LID waiver program for incorporation into the SSMP, which would allow a Priority Development Project to substitute implementation of all or a portion of required LID BMPs in Section F.1.d(4) with implementation of treatment control BMPs and either 1) on-site mitigation, 2) an off-site mitigation project, and/or 3) other mitigation developed by the Copermittees. The Copermittees must submit the LID waiver program as part of their updated SSMP. At a minimum, the program must meet the requirements below:

(a) Prior to implementation, the LID waiver program must clearly exhibit that it will not allow Priority Development Projects to result in a net impact (after consideration of any mitigation) from pollutant loadings over and above the impact caused by projects meeting LID requirements;

(b) For each Priority Development Project participating, the Copermittee must find that it is technically infeasible to implement LID BMPs that comply with the requirements of Section F.1.(d)(4). The Copermittee(s) must develop criteria to determine the technical feasibility of implementing LID BMPs . Each Priority Development Project participating must demonstrate that LID BMPs were implemented as much as feasible given the site's unique conditions. Technical infeasibility may result from conditions including, but not limited to:

(i) Locations that cannot meet the infiltration and groundwater protection requirements in section F.1.c.(6) for large, centralized infiltration BMPs. Where infiltration is technically infeasible, the

project must still examine the feasibility of other onsite LID BMPs;

(ii) Insufficient demand for storm water reuse;

(iii) Smart growth and infill or redevelopment locations where the density and/or nature of the project would create significant difficulty for compliance with the LID BMP requirements;

~~(iii)~~(iv) Results of a Cost-Benefit Analysis; and

~~(iv)~~(v) Other site, geologic, soil, or implementation constraints identified in the Copermittees updated SSMP document.

Comment [CP47]: This had been agreed to in discussions with RB staff, but was omitted from the draft.

(c) Each Priority Development Project that participates in the LID waiver program must mitigate for the pollutant loads expected to be discharged due to not implementing the LID retention BMPs in section F.1.d.(4). The pollutant loading must be estimated for each project participating in the LID waiver program. The estimated impacts from not implementing the required LID retention BMPs in section F.1.d.(4) must be fully mitigated. Mitigation projects must be implemented within the same hydrologic unit as the Priority Development Project. Mitigation projects outside of the hydrologic subarea but within the same hydrologic unit may be approved provided that the project proponent demonstrates that mitigation projects within the same hydrologic subarea are infeasible and that the mitigation project will address similar beneficial use impacts as expected from the Priority Development Projects pollutant load. Onsite mitigation may include increasing the conventional treatment sizing factors to achieve pollutant load removal equal to or greater than the pollutant load removal expected from implementing onsite retention of the design capture volume. Offsite mitigation projects may include green streets projects, existing development retrofit projects, retrofit incentive programs, regional BMPs and/or riparian restoration projects. Project applicants seeking to utilize these alternative compliance provisions may propose other offsite mitigation projects, which the Copermittees may approve if they meet the requirements of this subpart.

(d) A Copermittee may choose to implement additional mitigation programs (e.g., pollutant credit system, mitigation fund) as part of the LID waiver program provided that the mitigation program clearly exhibits that it will not allow Priority Development Projects to result in a net impact from pollutant loadings over and above the impact caused by projects meeting LID requirements. Any additional mitigation programs that a Copermittee chooses to implement must be submitted to the San Diego Water Board Executive Officer for review and acceptance prior to implementation.

(8) LID and Treatment Control BMP Standards

(a) As part of the SSMP, each Copermittee must develop and require Priority Development Projects to implement siting, design, and maintenance criteria for each LID and treatment control BMP listed in the SSMP to

determine feasibility and applicability and so that implemented LID and treatment control BMPs are constructed correctly and are effective at pollutant removal, runoff control, and vector minimization. Development of BMP design worksheets which can be used by project proponents is encouraged.

(b) LID and treatment control BMPs implemented at any Priority Development Projects must mitigate (treat through infiltration, settling, filtration or other unit processes) the required volume or flow of runoff from all developed portions of the project, including landscaped areas.

(c) All LID and treatment control BMPs must be located so as to remove pollutants from runoff prior to its discharge to any receiving waters. Multiple Priority Development Projects may use shared post-construction BMPs as long as construction of any shared BMP is completed prior to the use or occupation of any Priority Development Project from which the BMP will receive runoff. Post construction BMPs must not be constructed within a waters of the U.S. or waters of the State.

(9) Implementation Process

(a) As part of its local SSMP, each Copermittee, to the extent of its jurisdiction, must implement a process to verify compliance with SSMP requirements. The process must identify at what point in the planning process Priority Development Projects will be required to meet SSMP requirements and at a minimum, the Priority Development Project must implement the required post-construction BMPs prior to occupancy and/or the intended use of any portion of that project. The process must also include identification of the roles and responsibilities of various municipal departments in implementing the SSMP requirements, as well as any other measures necessary for the implementation of SSMP requirements.

Comment [DB48]:

(b) Each Copermittee, to the extent of its jurisdiction, must establish a mechanism not only to track post-construction BMPs, but also to ensure that appropriate easements and ownerships are properly recorded in public records and the information is conveyed to all appropriate parties when there is a change in project or site ownership.

Comment [DB49]:

(10) Post-construction BMP Review

(a) The Copermittees must review and update the BMPs that are listed in their SSMP as options for treatment control. At a minimum, the update must include removal of obsolete or ineffective BMPs and addition of LID BMPs that can be used for treatment, such as bioretention cells, bioretention swales, etc. The update must also add appropriate LID BMPs to any tables or discussions in the local SSMPs addressing pollutant

removal efficiencies of treatment control BMPs. In addition, the update must include review and revision where necessary of treatment control BMP pollutant removal efficiencies.

(b) The update must incorporate findings from BMP effectiveness studies conducted by the Copermittees for projects funded wholly or in part by the State Water Board or Regional Water Boards.

(c) Each Copermittee must implement a mechanism for annually incorporating findings from local treatment BMP effectiveness studies (e.g., ones conducted by, or on-behalf of, public agencies in Riverside County) into SSMP project reviews and permitting

e. BMP CONSTRUCTION VERIFICATION

Prior to occupancy and/or intended use of any portion of the Priority Development Project subject to SSMP requirements, each Copermittee, to the extent of its jurisdiction, must inspect the constructed site design, source control, and treatment control BMPs applicable to the constructed portion of the project to verify that they have been constructed and are operating in compliance with all specifications, plans, permits, ordinances, and this Order.

Comment [DB50]: See District-specific comments in Attachment 8.

f. BMP MAINTENANCE TRACKING

(1) Inventory of SSMP projects: Each Copermittee must develop and maintain a watershed-based database to track and inventory all projects ~~constructed~~ within their jurisdiction, that have a final approved SSMP (SSMP projects), and its structural post-construction BMPs, ~~within its jurisdiction since July, 2005~~. LID BMPs implemented on a lot by lot basis ~~in low density residential areas~~ at single family residential homes~~,~~ such as rain barrels, are not required to be tracked or inventoried. At a minimum, the database must include information on BMP type(s), location, watershed, date of construction, party responsible for maintenance, dates and findings of maintenance verifications, and corrective actions, including whether the site was referred to the local vector control agency or department.

Comment [CP51]: Per discussions with Board staff on 8/18

Comment [CP52]: Logistical issue for populating a database with BMPs that have as-of-yet not been individually tracked, and a potential legal issues for verifications of those BMPs that were built without requirements for such verifications.

Comment [CP53]: Per discussions with Board staff on 8/18

(2) Each Copermittee must verify that approved post-construction BMPs are operating effectively and have been adequately maintained by implementing the following measures:

(a) The designation of high priority SSMP Projects must consider the following:

(i) BMP size,
(ii) Recommended maintenance frequency,
(iii) Likelihood of operational and maintenance issues,

(iv) Location,
(v) Receiving water quality,
(vi) Compliance record,
(vii) Land use,
(viii) and other pertinent factors;

At a minimum, high priority projects include those projects that ~~generate pollutants (prior to treatment) within the tributary area of a 303(d) listed waterbody impaired for that pollutant; or those projects generating pollutants within the tributary area for~~have been determined to be the source of an observed action level exceedance~~ of that pollutant~~.

Comment [CP54]: See discussion in comment letter

(b) Beginning on July 1, 2012, each Copermittee must implement a program to verify that the required structural post-construction BMPs on the inventoried SSMP projects have been implemented, are maintained, and operating effectively through inspections, self-certifications, surveys, or other equally effective approaches with the following conditions:

(i) The implementation, operation, and maintenance of all (100 percent) approved and inventoried final project public and private SSMPs (a.k.a. WQMPs) must be verified every five years;

(ii) All (100 percent) projects with BMPs that are high priority must be inspected by the Copermittee annually prior to each rainy season;
(iii) All (100 percent) Copermittee projects with BMPs must be inspected by the Copermittee annually;
~~(iv) At least 20 percent of all approved and inventoried SSMP projects must be inspected by the Copermittee annually;~~
~~(v)~~(iv) At the discretion of the Copermittee, its inspections may be coordinated with the facility inspections implemented pursuant to section F.3. of this Order;
~~(vi)~~(v) For verifications performed through a means other than direct Copermittee inspection, adequate documentation must be submitted to the Copermittee to provide assurance that the required maintenance has been completed;
~~(vii)~~(vi) Appropriate follow-up measures (including re-inspections, enforcement, maintenance, etc.) must be conducted to ensure the treatment BMPs continue to reduce storm water pollutants as originally designed; and
~~(viii)~~(vii) Inspections must note observations of vector conditions, such as mosquitoes. Where conditions are identified as contributing to mosquito production, the Copermittee must notify its local vector control agency.

Comment [CP55]: Per discussions with Board staff on 8/18

g. ENFORCEMENT OF DEVELOPMENT SITES

Each Copermittee must, to the extent of its jurisdiction, enforce its storm water ordinance for all development projects as necessary to maintain compliance with this Order. Copermittee ordinances or other regulatory mechanisms must include appropriate sanctions to achieve compliance. Sanctions must include the following tools or their equivalent: Non-monetary penalties, fines, bonding requirements, liens, and/or permit or occupancy denials for non-compliance.

Comment [CP56]: See District-specific comments in Attachment 8

h. HYDROMODIFICATION – LIMITATIONS ON INCREASES OF RUNOFF DISCHARGE RATES AND DURATIONS[14]

Each Copermittee shall collaborate with the other Copermittees to develop and implement a Hydromodification Management Plan (HMP) to manage increases in runoff discharge rates and durations from all Priority Development Projects. The HMP must be incorporated into the SSMP and implemented by each Copermittee so that estimated post-project runoff discharge rates and durations must not exceed pre-development discharge rates and durations. Where the proposed project is located on an already developed site, the pre-project discharge rate and duration must be that of the pre-~~developed, naturally occurring~~project condition. The draft HMP must be submitted to the San Diego Water Board on or before June 30, ~~2013~~2014. The HMP will be made available for public review and comment and the San Diego Water Board Executive Officer will determine whether to hold a public hearing before the full San Diego Water Board or whether public input will be through written comments to the Executive Officer only.

Comment [CP57]: It is not appropriate to require a single property owner to mitigate the effects caused by previous owners of that land. The current property owners can only be held responsible for their own actions.

(1) The HMP must:

(a) Identify a method for assessing susceptibility and geomorphic stability of channel segments which receive runoff discharges from Priority Development Projects. A performance standard must be established that ensures that the geomorphic stability within the channel will not be compromised as a result of receiving runoff discharges from Priority Development Projects.

(b) Identify a range of runoff flows[15] based on continuous simulation of the entire rainfall record (or other analytical method proposed by the

[14] Updated SSMP and hydromodification requirements must apply to all Priority Development Projects or phases of Priority Development Projects which have not yet begun grading or construction activities at the time any updated SSMP or hydromodification requirement commences. If a Copermittee determines that lawful prior approval of a project exists, whereby application of an updated SSMP or hydromodification requirement to the project is legally infeasible, the updated SSMP or hydromodification requirement need not apply to the project. The Copermittees must utilize the SSMP and hydromodification update periods to ensure that projects undergoing approval processes include application of the updated SSMP and hydromodification requirements in its plans.

[15] The identified range of run off flows to be controlled should be expressed in terms of peak flow rates of rainfall events, such as "10% of the pre-development 2-year runoff event up to the pre-development 10-year runoff event."

Copermittees and deemed acceptable by the San Diego Water Board) for which Priority Development Project post-project runoff flow rates and durations must not exceed pre-development ~~(naturally occurring)~~ runoff flow rates and durations by more than 10 percent, where the increased flow rates and durations will result in increased potential for erosion or other significant adverse impacts to beneficial uses. The lower boundary of the range of runoff flows identified must correspond with the critical channel flow that produces the critical shear stress that initiates channel bed movement or that erodes the toe of channel banks. The identified range of runoff flows may be different for specific watersheds, channels, or channel reaches. In the case of an artificially hardened (concrete lined, rip rap, etc.) channel, the lower boundary of the range of runoff flows identified must correspond with the critical channel flow that produces the critical shear stress that initiates channel bed movement or that erodes the toe of channel banks of a comparable natural channel (i.e. non-hardened, pre-development).

(c) Identify a method to assess and compensate for the loss of sediment supply to streams due to development. A performance and/or design standard must be created and required to be met by Priority Development Projects to ensure that the loss of sediment supply due to development does not cause or contribute to increased erosion within channel segments downstream of Priority Development Project discharge points.

(d) Designate and require Priority Development Projects to implement control measures so that (1) post-project runoff flow rates and durations do not exceed pre-development ~~(naturally occurring)~~ runoff flow rates and durations by more than 10 percent for the range of runoff flows identified under section F.1.h.(1)(b), where the increased flow rates and durations will result in increased potential for erosion or other significant adverse impacts to beneficial uses; (2) post-project runoff flow rates and durations do not result in channel conditions which do not meet the channel standard developed under section F.1.h.(1)(a) for channel segments downstream of Priority Development Project discharge points; and (3) the design of the project and/or control measures ~~compensate for~~minimize the loss of sediment supply due to development.

(e) Include a protocol to evaluate potential hydrograph change impacts to downstream watercourses from Priority Development Projects to meet the range of runoff flows identified under Section F.1.h.(1)(b).

(f) Include other performance criteria (numeric or otherwise) for Priority Development Projects as necessary to prevent runoff from the projects from increasing and/or continuing unnatural rates of erosion of channel beds and banks, silt pollutants generation, or other impacts to beneficial uses and stream habitat due to increased erosive force.

(g) Include a review of pertinent literature.

~~(h) Identify areas within the Santa Margarita Hydrologic Unit for potential opportunities to restore or rehabilitate stream channels with historic hydromodification of receiving waters that are tributary to documented low or very low Index of Biotic Integrity (IBI) scores.~~

Comment [CP58]: This is not a necessary component of the HMP and unnecessarily increases costs.

~~(i)~~(h) Include a description of how the Copermittees will incorporate the HMP requirements into their local approval processes.

~~(j)~~(i) Include criteria on selection and design of management practices and measures (such as detention, retention, and infiltration) to control flow rates and durations and address potential hydromodification impacts.

~~(k)~~(j) Include technical information, including references, supporting any standards and criteria proposed.

~~(l)~~(k) Include a description of inspections and maintenance to be conducted for management practices and measures to control flow rates and durations and address potential hydromodification impacts.

~~(m)~~(l) Include a description of monitoring and other program evaluations to be conducted to assess the effectiveness of implementation of the HMP. Monitoring and other program evaluations must include an evaluation of changes to physical (e.g., cross-section, slope, discharge rate, vegetation, pervious/impervious area) and biological (e.g., habitat quality, benthic flora and fauna, IBI scores) conditions of receiving water channels as areas with Priority Development Projects are constructed (i.e. pre- and post-project), as appropriate.

~~(n)~~(m) Include mechanisms for assessing and addressing cumulative impacts of Priority Development Projects within a watershed on channel morphology.

(2) In addition to the control measures that must be implemented by Priority Development Projects per section F.1.h.(1)(d), the HMP must include a suite of management measures ~~to~~ that can be be used on Priority Development Projects to mitigate hydromodification impacts, protect and restore downstream beneficial uses and prevent or further prevent adverse physical changes to downstream channels. The measures must be based on a prioritized consideration of the following elements in this order:

Comment [CP59]: Per discussions with Board staff on 8/18

(a) Site design control measures;
(b) On-site management measures;
(c) Regional control measures located upstream of receiving waters; and

(d) In-stream management and control measures.

Where stream channels are adjacent to, or are to be modified as part of a Priority Development Project, management measures must include buffer zones and setbacks. The suite of management measures must also include stream restoration as a viable option to achieve the channel standard in section F.1.h.(1)(a). Whenever feasible, In-stream controls that are implemented by a PDP to mitigate that project's impact on hydromodification ~~used as management measures to protect and restore downstream beneficial uses and for preventing or minimizing further adverse physical changes~~ must not include the use of non-naturally occurring hardscape materials such as concrete, riprap, gabions, etc. to reinforce stream channels.

(3) As part of the HMP, the Copermittees may develop a waiver program that allows a redevelopment Priority Development Project, as defined in Section F.1.d.(1)(b), to implement offsite mitigation measures. A waiver may be granted if onsite management and control measures are technically infeasible to fully achieve post-project runoff flow rates and durations that do not exceed the pre-development (naturally occurring) runoff flow rates and durations. Redevelopment projects that are granted a waiver under the program must not have post-project runoff flow rates and durations that exceed the pre-project runoff flow rates and durations. The estimated incremental hydromodification impacts from not achieving the pre-development (naturally occurring) runoff flow rates and durations for the project site must be fully mitigated. The offsite mitigation must be within the same stream channel system to which the project discharges. Mitigation projects not within the same stream channel system but within the same hydrologic unit may be approved provided that the project proponent demonstrates that mitigation within the same stream channel is infeasible and that the mitigation project will address similar impacts as expected from the project.

(4) Each individual Copermittee has the discretion to not require Section F.1.h. at Priority Development Projects where the project:

(a) Discharges storm water runoff into underground storm drains discharging directly to water storage reservoirs and lakes;
(b) Discharges storm water runoff into conveyance channels whose bed and bank are concrete lined all the way from the point of discharge to water storage reservoirs and lakes; or
(c) Discharges storm water runoff into other areas identified in the HMP as acceptable to not need to meet the requirements of Section F.1.h ~~by the San Diego Water Board Executive Officer~~.

(5) HMP Reporting and Implementation

Comment [CP60]: Per discussions with Board staff on 8/18

Additionally, "wherever feasible" is an appropriate addition to this language for three reasons:

1)Based on the prioritization already identified in this section, instream controls will be a 'last resort'
2)If a project were to need to mitigate in-stream, preventing any man made materials would unnecessarily eliminate potentially viable solutions, even to the extent of eliminating options that would rehabilitate stream functions and uses.
3)The Water Board will still have oversight of the final in-stream plans through the 401 certifications, which will allow the Board to additionally ensure that such instream controls to not adversely affect the stream.

Comment [CP61]: Per discussions with Board staff on 8/18

Comment [CP62]: This is not needed and makes the language confusing. The HMP must be approved by the board anyway. See legal comment white paper.

(a) On or before June 30 , 2013, the Copermittees must submit to the San Diego Water Board a draft HMP that has been reviewed by the public, including the identification of the appropriate limiting range of flow rates per section F.1.h.(1)(b).

(b) Within 180 days of receiving San Diego Water Board comments on the draft HMP, the Copermittees must submit a final HMP that addressed the San Diego Water Board's comments.

(c) Within 90 days of receiving a determination of adequacy from the San Diego Water Board issued at a noticed public hearing, each Copermittee must incorporate and implement the HMP for all Priority Development Projects.

~~(d) Prior to acceptance of the HMP by the San Diego Water Board, the early implementation measures likely to be included in the HMP must be encouraged by the Copermittees.~~

Comment [CP63]: As seen in the San Diego HMP process, things can change after submitting it to the Board for approval. This requirement will create problems where a project implements the early measures, and such early measures may conflict with the final requirements, thereby forcing the project to re-design.

(6) Interim Hydromodification Criteria

Immediately following adoption of this Order and until the final HMP required by this Order has been determined by the San Diego Water Board to be adequate, each Copermittee must ensure that all Priority Development Projects are implementing the hydromodification (aka Hydrologic Condition of Concern) requirements found in Section 4.4 of the 2006 Riverside County WQMP (updated in 2009) unless one of the following conditions in lieu of those specified in the WQMP are met:

(a) Runoff from the Priority Development Project discharges (1) directly to a conveyance channel or storm drain that is concrete lined all the way from the point of discharge to the ocean, bay, lagoon, water storage reservoir or ~~lake~~Murrieta or Temecula creeks; and (2) the discharge is in full compliance with Copermittee requirements for connections and discharges to the MS4 (including both quality and quantity requirements); and (3) the discharge will not cause increased upstream or downstream erosion or adversely impact downstream habitat; and (4) the discharge is authorized by the Copermittee.

Comment [CP64]: All the way to the ocean is unreasonable and unnecessary. In the interim, very few projects are expected within the watershed, and the cumulative effects of such few projects is negligible.

(b) The Priority Development Project disturbs less than one acre. The Copermittee has the discretion to require a project specific WQMP to address hydrologic condition concerns on projects less than one acre on a case by case basis. The disturbed area calculation should include all disturbances associated with larger common plans of development.

(c) The runoff flow rate, volume, velocity, and duration for the post-

development condition of the Priority Development Project do not exceed the pre-development (i.e. naturally occurring) condition for the 2-year, 24-hour and 10-year, 24-hour rainfall events. This condition must be substantiated by hydrologic modeling acceptable to the Copermittee.

Once a final HMP is determined to be adequate and is required to be implemented, compliance with the final HMP is required by this Order and compliance with the 2004 WQMP (updated in 2009) or the in-lieu interim hydromodification criteria set forth above no longer satisfies the requirements of this Order.

(7) No part of section F.1.h eliminates the Copermittees' responsibilities for implementing the Low Impact Development requirements under section F.1.d.(4).

i. UNPAVED ROADS DEVELOPMENT

The Copermittees must develop, where they do not already exist, and implement or require implementation of erosion and sediment control BMPs after construction of new unpaved roads that are within their legal authority to regulate. At a minimum, the BMPs must include:

(1) Practices to minimize road related erosion and sediment transport;
~~(2) Grading of unpaved roads to slope outward where consistent with road engineering safety standards;~~
~~(3) Installation of water bars as appropriate;~~
~~(4)~~(2)Unpaved roads and culvert designs that ~~do not~~minimize impacts to creek functions and where applicable, that maintain migratory fish passage;

Comment [CP65]: Pursuant to the comment letter:

THE COPERMITTEES REQUEST THIS SECTION BE DELETED IN ITS ENTIRETY.

See the comment letter, attachment 5, for further discussion of the issues and justification for this request.

Should the board decide to include such requirements despite the request and justifications provided in the comment letter, the edits shown below are the minimum changes that should be made.

Comment [CP66]: These are specifying the method of compliance.

2. CONSTRUCTION COMPONENT

Each Copermittee must implement a construction program as applicable to its jurisdiction, which meets the requirements of this section, and is designed to prevent~~s~~ illicit discharges into the MS4, implement~~s~~ and maintain~~s~~ structural and non-structural BMPs to reduce pollutants in storm water runoff from construction sites to the MS4, reduce~~s~~ construction site discharges of storm water pollutants from the MS4 to the MEP, and prevent~~s~~ construction site discharges from the MS4 from causing or contributing to a violation of water quality standards.

Comment [DB67]: See general comment 1 in Attachment 7

a. ORDINANCE UPDATE

By July 1, 2012, each Copermittee (except the District) must review and update its grading ordinances and other ordinances as necessary to comply with the

Comment [CP68]: See District Legal Comments in Attachment 8

requirements of ~~achieve full compliance with~~ this Order~~, including requirements for the implementation of all designated BMPs and other measures.~~

Comment [DB69]: See legal comments in Attachment 7

b. SOURCE IDENTIFICATION

Each Copermittee must maintain an updated watershed-based inventory of all construction sites within its jurisdiction. The use of an automated database system, such as Geographical Information Systems (GIS) is strongly encouraged.

c. SITE PLANNING AND PROJECT APPROVAL PROCESS

Each Copermittee must incorporate consideration of potential water quality impacts prior to approval and issuance of construction and grading permits.

(1) Each construction and grading permit must require proposed construction sites to implement designated BMPs and other measures so that illicit discharges into the MS4 are prevented, storm water pollutants discharged from the site will be reduced to the MEP, and construction discharges from the MS4 are prevented from causing or contributing to a violation of water quality standards.

(2) Prior to permit issuance, the project proponent's runoff management plan (or equivalent construction BMP plan) must be required to comply~~, and reviewed to verify compliance~~ with the local grading ordinance, other applicable local ordinances, and this Order.

Comment [CP70]: Specifying method of compliance

(3) Prior to permit issuance, each Copermittee must verify that project proponents subject to California's statewide General NPDES Permit for Storm Water Discharges Associated With Construction Activities, (hereinafter General Construction Permit), have existing coverage under the General Construction Permit.

d. BMP IMPLEMENTATION

(1) Designate BMPs: Each Copermittee must designate a minimum set of BMPs and other measures to be implemented at all construction sites within their jurisdiction. The designated minimum set of BMPs must include:

(a) Management Measures:

(i) Pollution prevention, where appropriate;

(ii) ~~Development and~~ implementation of a runoff management plan;

Comment [CP71]: Conflicts with the 'off-the-shelf' approach that may be appropriate for some sites. This issue was discussed with staff.

(iii) Minimization of areas that are cleared and graded to only the portion of the site that is necessary for construction;
(iv) Minimization of exposure time of disturbed soil areas;
(v) Minimization of grading during the rainy season and correlation of grading with seasonal dry weather periods to the extent feasible;
(vi) Limitation of grading to a maximum disturbed area as determined by each Copermittee before either temporary or permanent erosion controls are implemented to prevent storm water pollution. The Copermittee has the option of temporarily increasing the size of disturbed soil areas by a set amount beyond the maximum, if the individual site is in compliance with applicable storm water regulations and the site has adequate control practices implemented to prevent storm water pollution;
(vii) Temporary stabilization and reseeding of disturbed soil areas as rapidly as feasible;
(viii) Wind erosion controls;
(ix) Tracking controls;
(x) Non-stormwater management measures to prevent illicit discharges and control storm water pollution sources;
(xi) Waste management measures;
(xii) Preservation of natural hydrologic features where feasible;
(xiii) Preservation of riparian buffers and corridors where feasible;
(xiv) Evaluation and maintenance of all BMPs, until removed; and
(xv) Retention, reduction, and proper management of all storm water pollutant discharges on site to the MEP standard.

(b) Erosion and Sediment Controls:

(i) Erosion prevention. Erosion prevention is to be used as the most important measure for keeping sediment on site during construction;
(ii) Sediment controls. Sediment controls are to be used as a supplement to erosion prevention for keeping sediment on-site during construction;
(iii) Slope stabilization must be used on all active slopes during rain events regardless of the season and on all inactive slopes during the rainy season and during rain events in the dry season;
(iv) Permanent revegetation or landscaping as early as feasible; and
(v) Erosion and sediment controls must be required during the construction of unpaved roads.

(2) Each Copermittee must implement, or require implementation of,

enhanced[16] measures to address the threat to water quality posed by all construction sites tributary to CWA section 303(d) water body segments impaired for sediment or turbidity. Each Copermittee must also implement, or require implementation of, enhanced, measures for construction sites within, or adjacent to, or discharging directly to receiving waters within environmentally sensitive areas (as defined in Attachment C of this Order).

~~(3) Active/Passive Sediment Treatment (AST): Each Copermittee must require implementation of AST for sediment at construction sites (or portions thereof) that are determined by the Copermittee to be an exceptional threat to water quality. In evaluating the threat to water quality, the following factors must be considered by the Copermittee:~~

Comment [CP72]: Specifying method of compliance, in violation of CWC 13360.

~~(a) Soil erosion potential or soil type;~~
~~(b) The site's slopes;~~
~~(c) Project size and type;~~
~~(d) Sensitivity of receiving water bodies;~~
~~(e) Proximity to receiving water bodies;~~
~~(f) Non-storm water discharges;~~
~~(g) Ineffectiveness of other BMPs;~~
~~(h) Proximity and sensitivity of aquatic threatened and endangered species of concern;~~
~~(i) Known effects of AST chemicals; and~~
~~(j) Any other relevant factors.~~

~~(4)~~(3) Implement BMPs: Each Copermittee must implement, or require the implementation of, the designated minimum BMPs and any additional measures necessary to comply with this Order at each construction site within its jurisdiction year round. BMP implementation requirements, however, can vary based on wet and dry seasons. Dry season BMP implementation must plan for and address unseasonal rain events that may occur during the dry season (May 1 through September 30).

e. Inspection of Construction Sites

Each Copermittee must conduct construction site inspections for compliance with its ordinances (grading, storm water, etc.), permits (construction, grading, etc.), and this Order. Priorities for inspecting sites must consider the nature and size of the construction activity, topography, and the characteristics of soils and receiving water quality.

[16] Enhanced BMPs are control actions specifically targeted to the pollutant or condition of concern and should be of higher quality and effectiveness than the minimum control measures otherwise required. ~~Enhanced in this Order means better, not simply more, BMPs.~~

(1) During the rainy season, each Copermittee must inspect at least ~~every two weeks~~monthly, all construction sites within its jurisdiction meeting any of the following criteria:

(a) All sites ~~30~~ 50 acres or more in size with rough grading or with active, unstabilized slopes occurring during the rainy season;

(b) All sites one acre or more, and within the same hydrologic subarea and tributary to a CWA section 303(d) water body segment impaired for sediment; or within, directly adjacent to, or discharging directly to a receiving water within an ESA; and

(c) Other sites determined by the Copermittees or the San Diego Water Board as a significant threat to water quality. In evaluating threat to water quality, the following factors must be considered: (1) soil erosion potential; (2) site slope; (3) project size and type; (4) sensitivity of receiving water bodies; (5) proximity to receiving water bodies; (6) non-storm water discharges; (7) known past record of non-compliance by the operators of the construction site; and (8) any other relevant factors.

(2) During the rainy season, each Copermittee must inspect at least ~~monthly~~twice during the wet season, all construction sites with one acre or more of soil disturbance not meeting the criteria specified above in section F.2.e.(1).

(3) During the rainy season, each Copermittee must inspect construction sites less than one acre in size as needed to ensure compliance with its ordinances and this Order.

(4) Each Copermittee must inspect all construction sites as needed during the dry season. Sites meeting the criteria in section F.2.e.(1) must be inspected at least once in August or September each year.

(5) Re-inspections: Based upon site inspection findings, each Copermittee must implement all follow-up actions (i.e., re-inspection, enforcement) necessary to comply with this Order. Reinspection frequencies must be determined by each Copermittee based upon the severity of deficiencies, the nature of the construction activity, and the characteristics of soils and receiving water quality.

(6) Inspections of construction sites must include, but not be limited to:

(a) Check for coverage under the General Construction Permit (Notice of Intent (NOI) and/or Waste Discharge Identification No.) during initial

Comment [CP73]: This section is setting the minimum frequencies, and as such should provide flexibility to inspect more frequently those sites that warrant additional focus / follow-up. The changes shown to F.2.e.(1) and (2) are to provide such flexibility.
Additionally these frequencies are consistent with Riverside County's Santa Ana MS4 permit – which promotes consistency within the areas serviced by the County.

Comment [CP74]: See comment above

inspections;

(b) Assessment of compliance with Copermittee ordinances and permits related to runoff, including the implementation and maintenance of designated minimum BMPs;

(c) Assessment of BMP effectiveness;

(d) Visual observations for non-storm water discharges, potential illicit connections, and potential discharge of pollutants in storm water runoff;

(e) ~~Review of site monitoring data results, if the site monitors its runoff~~

(f) Education and outreach on storm water pollution prevention, as needed; and

(g) Creation of a written or electronic inspection report.

Comment [CP75]: This is a new and inappropriate requirement. Monitoring data is only required under the Statewide General Construction Permit, which is the Regional Board's responsibility to inspect and review.

Copermittee review of data which falls under the regional board's responsibility should be optional.

(7) The Copermittees must track the number of inspections for each inventoried construction site throughout the reporting period to verify that each site is inspected at the minimum frequencies required.

f. ENFORCEMENT OF CONSTRUCTION SITES

(1) Each Copermittee must develop and implement an escalating enforcement process that achieves prompt corrective actions at construction sites within their jurisdiction, for violations of the Copermittee's water quality protection permits, requirements, and ordinances. This enforcement process must include authorizing the Copermittee's construction site inspectors to take immediate enforcement actions when appropriate and necessary. The enforcement process must include appropriate sanctions such as stop work orders, non-monetary penalties, fines, bonding requirements, and/or permit denials for non-compliance.

(2) Each Copermittee must be able to respond to construction complaints received from third-parties and to ensure the San Diego Water Board that corrective actions have been implemented, if warranted.

g. REPORTING OF NON-COMPLIANT SITES

(1) In addition to the notification requirements in Attachment B, each Copermittee must notify the San Diego Water Board when the Copermittee issues high level enforcement (as defined in the Copermittee's JRMP) to a construction site that poses a significant threat to water quality in its jurisdiction as a result of violations of its storm water ordinances.

(2) Each Copermittee must annually notify the San Diego Water Board, prior to the commencement of the rainy season, of all construction sites with alleged

violations that pose a significant threat to water quality. Information may be provided as part of the JRMP annual report if submitted prior to the rainy season. Information provided must include, but not be limited to, the following:

(a) WDID number if enrolled under the General Construction Permit
(b) Site Location, including address
(c) Current violations or suspected violations

3. EXISTING DEVELOPMENT COMPONENT

a. MUNICIPAL

Each Copermittee must implement a municipal program for the Copermittee's areas and activities that meets the requirements of this section, and is designed to prevent~~s~~ illicit discharges into the MS4, reduce~~s~~ municipal discharges of storm water pollutants from the MS4 to the MEP, and prevent~~s~~ municipal discharges from the MS4 from causing or contributing to a violation of water quality standards.

Comment [DB76]: See general comment 1 in Attachment 7

(1) Source Identification / Inventory

Each Copermittee must maintain an updated watershed-based inventory of all its municipal areas and those activities that have the potential to generate and discharge pollutants. The inventory must include the name, address (if applicable), and a description of the area/activity; which pollutants are potentially generated by the area/activity; whether the area/activity is adjacent to an ESA; and identification of whether the area/activity is tributary to and within the same hydrologic sub area as a CWA section 303(d) water body segment and generates pollutants for which the water body segment is impaired. Linear facilities, such as roads, streets, and highways, do not need to be individually inventoried. The use of an automated database system, such as Geographical Information Systems (GIS) is highly recommended.

Comment [CP77]: Sites that do not have the potential to discharge pollutants, cannot affect discharges from the MS4.

Comment [CP78]: Per discussions with Board staff on 8/18

(2) General BMP Implementation

(a) Pollution Prevention: Each Copermittee must implement pollution prevention methods in its municipal program and must require their use by appropriate departments, personnel, and contractors.

(b) Designate Minimum BMPs: Each Copermittee must designate a minimum set of BMPs for all municipal areas and those activities that have the potential to generate and discharge pollutants. The designated minimum

Comment [CP79]: See comment above

BMPs for municipal areas and activities must be area or activity specific as appropriate.

(c) Each Copermittee must designate BMPs for special events that are expected to generate significant trash and litter. Controls to consider must include:

(i) Temporary screens on catch basins and storm drain inlets;
(ii) Temporary fencing to prevent windblown trash from entering adjacent water bodies and MS4 channels;
(iii) Proper management of trash and litter;
(iv) Catch basin cleaning following the special event and prior to an anticipated rain event;
(v) Street sweeping of roads, streets, highways and parking facilities following the special event; and
(vi) Other equivalent controls.

(d) Designate BMPs for ESAs and 303(d) Impairments: Each Copermittee must designate enhanced measures for its municipal areas and activities tributary to and within the same hydrologic sub area as a CWA section 303(d) impaired water body segments when an area or those activities have the potential to generate pollutants for which the water body segment is impaired. Each Copermittee must also designate additional controls for its municipal areas and activities within or directly adjacent to or discharging directly to receiving waters within environmentally sensitive areas (as defined in Attachment C of this Order).

Comment [CP80]: Per discussions with Board staff on 8/18

(e) Implement BMPs: Each Copermittee must implement, or require the implementation of, the designated minimum and enhanced BMPs and any additional measures necessary based on its inventory to comply with this Order for each of its municipal area and those activities that have the potential to discharge pollution.

(3) BMP Implementation for Management of Pesticides, Herbicides, and Fertilizers

Each Copermittee must implement BMPs to reduce the contribution of storm water pollutants to the MEP associated with the application, storage, and disposal of pesticides, herbicides and fertilizers from its municipal areas and activities from its MS4~~to MS4s and receiving waters~~. Such BMPs must include, at a minimum:

Comment [DB81]: The Copermittees are required to reduce pollutants in discharges from the MS4. See legal comments in Attachment 7

(a) Educational activities, permits, certifications and other measures for municipal applicators and distributors;
(b) Integrated Pest Management (IPM) measures that ~~rely on~~ emphasize non-chemical solutions;

Comment [CP82]: There are cases where pesticides may be necessary due to health concerns (rodent infestations, etc) The concept of IPM does not preclude the use of chemical solutions where such solutions are needed or appropriate.

(c) ~~The use of native vegetation~~;
(d) Schedules for irrigation and chemical application; and
(e) The collection and proper disposal of unused pesticides, herbicides, and fertilizers.

(4) BMP implementation for Flood Control Structures

(a) Each Copermittee must implement procedures to assure that flood management projects assess the impacts on the water quality of receiving water bodies.
(b) Each Copermittee must include water quality protection measures, where feasible, when retrofitting existing flood control structural devices.
(c) Each Copermittee must evaluate its existing flood control structures ~~as part of ongoing routine maintenance~~, identify structures causing or contributing to a condition of pollution, ~~implement~~identify measures to reduce or eliminate the structure's effect on pollution, and evaluate the feasibility of retrofitting the structural flood control device. The inventory and evaluation must be completed by and submitted to the San Diego Water Board in ~~each~~ the 2nd year (i.e. FY 2012/2013) JRMP Annual Report.

(5) ~~BMP Implementation for Sweeping of Municipal Areas~~

~~Where municipal area sweeping is implemented as an MS4 BMP for municipal roads, streets, highways, and parking facilities, each Copermittee must design and implement the program based on the following criteria:~~

~~(a) Roads, streets, highways, and parking facilities identified as consistently generating the highest volumes of trash and/or debris must be swept at least two times per month.~~

~~(b) Roads, streets, highways, and parking facilities identified as consistently generating moderate volumes of trash and/or debris must be swept at least monthly.~~

~~(c) Roads, streets, highways, and parking facilities identified as generating low volumes of trash and/or debris must be swept as necessary, but no less than once per year.~~

(6) Operation and Maintenance of Municipal Separate Storm Sewer System (MS4) and Treatment Controls

(a) Treatment Controls: Each Copermittee must implement a schedule of inspection and maintenance activities to verify proper operation of all its municipal structural treatment controls designed to reduce storm water pollutant discharges to or from its MS4s and related drainage structures.

Comment [CP83]: This is clearly overly specifying method of compliance, and is illegal pursuant to CWC 13360.

Comment [CP84]: This is not required by the federal regulations as an ongoing permit requirement.

Accordingly, the Copermittees, request deletion of the section.

Should the board decide not to remove the section, at a minimum, the language should be restored to not require anything more than the O.C. Permit.

Comment [CP85]: These are new requirements that are not necessary, and were not included in the draft OC Permit.

Further it is overly specific in forcing the Copermittees to identify high/moderate/ and low (trash) volume streets. Such specificity is not necessary.

(b) MS4 ~~and Facilities~~: Each Copermittee must implement a schedule of maintenance activities for its MS4 ~~and facilities (including but not limited to catch basins, storm drain inlets, detention basins, etc).~~ . The maintenance activities must, at a minimum, include:

(i) Inspection and removal of accumulated waste at least once a year between May 1 and September 30 of each year for all ~~MS4 facilities~~catch basins and storm drain inlets, with~~;~~ Additional ~~facilities~~ cleaning as necessary between October 1 and April 30 of each year;
(ii) Following two years of inspections, any MS4 ~~facility~~ that requires inspection and cleaning less than annually may be inspected as needed, but not less than every other year;
(iii) Open channels and basins must be cleaned of observed anthropogenic litter in a timely manner;
(iv) Maintenance activities within open channels must not adversely impact beneficial uses within those channels;
(v) Record keeping of the maintenance and cleaning activities including the overall quantity of waste removed;
(vi) Proper disposal of waste removed pursuant to applicable laws; and
(vii) Measures to eliminate waste discharges during MS4 maintenance and cleaning activities.

(7) Infiltration From Sanitary Sewer to MS4/ Provide ~~Preventive~~ Maintenance

(8) Each Copermittee must implement controls and measures to prevent and eliminate infiltration of seepage from sanitary sewers to MS4s ~~through thorough, routine preventive maintenance of the MS4~~. Each Copermittee that operates both a municipal sanitary sewer system and a MS4 must implement controls and measures to prevent and eliminate infiltration of seepage from the sanitary sewers to the MS4s that must include overall sanitary sewer and MS4 surveys and thorough, routine preventive maintenance of both.

(a) Each Copermittee must implement controls to limit infiltration of seepage from sanitary sewers to municipal separate storm sewer systems where necessary. Such controls must include:

(i) Adequate plan checking for construction and new development;
(ii) Incident response training for its municipal employees that identify sanitary sewer spills;
(iii) Code enforcement inspections;
(iv) MS4 maintenance and inspections;
(v) Interagency coordination with sewer agencies; and

Comment [CP86]: The term 'facilities' is confusing and unnecessary.

Request use of the language from the 2004 MS4 permit as shown in these redlines (though (b)(ii)). This is much clearer and simple to comply with.

Comment [CP87]: Although the shown redlines will be much clearer, should board staff reject such changes, at a minimum the word 'detention basins' should be removed as it would otherwise conflict with subpart (iii)below.

Comment [CP88]: The MS4 Copermittees that do not own nor operate a sewer system cannot prevent seepage by maintaining their MS4.

(vi) Proper education of its municipal staff and contractors conducting field operations on the MS4 or its municipal sanitary sewer (if applicable).

(9) Inspection of Municipal Areas and Activities

(a) At a minimum, each Copermittee must inspect their following high priority municipal areas and activities annually:

(i) Roads, Streets, Highways, and Parking Facilities;
(ii) Flood Management Projects and Flood Control Devices not otherwise inspected per Section F.3.a.(6)(b);
(iii) Areas and activities tributary to and within the same hydrologic sub area as a CWA section 303(d) impaired water body segment, where an area or activity ~~generates~~ has the potential to discharge pollutants[17] for which the water body segment is impaired.
(iv) Areas and activities within or adjacent to or discharging directly to receiving waters within environmentally sensitive areas (as defined in Attachment C of this Order);
(v) Municipal Facilities:
[a] Active or closed municipal landfills;
[b] Publicly owned treatment works (including water and wastewater treatment plants) and sanitary sewage collection systems;
[c] Solid waste transfer facilities;
[d] Land application sites;
[e] Corporate yards including maintenance and storage yards for materials, waste, equipment and vehicles; and
[f] Household hazardous waste collection facilities.
(vi) Municipal airfields;
(vii) Parks and recreation facilities;
(viii) Special event venues following special events (festivals, sporting events, etc.);
(ix) Power washing activities; and
(x) Other municipal areas and activities that the Copermittee determines may contribute a significant pollutant load to the MS4.

(b) Other municipal areas and activities must be inspected as needed and in response to water quality data, valid public complaints, and findings from municipal or contract staff.

(c) Based upon site inspection findings, each Copermittee must implement all follow-up actions necessary to comply with this Order.

[17] A project is considered to have the potential to discharge a pollutant if it does not have LID or treatment controls BMPs in place that treat the design capture volume for the areas of the site generating that pollutant.

Comment [CP89]: Per discussions with Board staff on 8/18

Comment [CP90]: See footnote explaining this change. The idea is that if a project has LID or Treatment Control BMPs in place – it should no longer be a mandatory high-priority site for municipal inspection purposes. It would then be subject to the requirements of Section F.1.f.

(10) Enforcement of Municipal Areas and Activities

Each Copermittee must enforce its storm water ordinance for all its municipal areas and activities as necessary to maintain compliance with this Order.

(11) Copermittee Maintained Unpaved Roads Maintenance

(a) The Copermittees must develop, where they do not already exist, and implement or require implementation of BMPs for erosion and sediment control measures during their maintenance activities on unpaved roads, ~~particularly~~ in or adjacent to receiving waters.

(b) The Copermittees must develop and implement or require implementation of appropriate BMPs to minimize impacts on streams and wetlands during their unpaved road maintenance activities.

(c) ~~The Copermittees must regularly maintain their unpaved roads adjacent to streams and riparian habitat to reduce erosion and sediment transport~~;

(d) ~~Re-grading of unpaved roads during maintenance must be sloped outward where consistent with road engineering safety standards~~;

(e) Through their ~~regular~~ maintenance of unpaved roads, the Copermittees must examine the feasibility of replacing existing culverts or design of new culverts or bridge crossings to reduce erosion and maintain natural stream geomorphology.

Comment [CP91]: Pursuant to the comment letter:

THE COPERMITTEES REQUEST THIS SECTION BE DELETED IN ITS ENTIRETY.

See the comment letter, attachment 5, for further discussion of the issues and justification for this request.

Should the board decide to include such requirements despite the request and justifications provided in the comment letter, the edits shown below are the minimum changes that should be made.

Comment [CP92]: Regular maintenance of unpaved roads may have unintended negative effects by virtue of further loosening soil to maintain the roads. This requirement should be removed, or revised to only be required where necessary to resolve significant problems impacting streams and riparian habitat.

Comment [CP93]: Specifying method of compliance

b. COMMERCIAL / INDUSTRIAL

Each Copermittee (except the District) must implement a commercial / industrial program that meets the requirements of this section for facilities whose operation is under its jurisdiction, and is designed to prevent~~s~~ illicit discharges into the MS4, reduce~~s~~ commercial / industrial discharges of storm water pollutants from the MS4 to the MEP, and prevent~~s~~ commercial / industrial discharges from the MS4 from causing or contributing to a violation of water quality standards.

Comment [CP94]: See District-specific Legal comments

Comment [DB95]: See general comment 1 in Attachment 7

(1) Source Identification

(a) Each Copermittee must maintain an updated watershed-based inventory of all industrial and commercial sites/sources within its jurisdiction (regardless of ownership) that could contribute a significant pollutant load to the MS4. The inventory must include the following minimum information for each industrial and commercial site/source: name; address; pollutants potentially generated by the site/source; and

identification of whether the site/source is tributary to a CWA §303(d) water body segment and generates pollutants for which the water body segment is impaired; and a narrative description including SIC codes which best reflects the principal products or services provided by each facility.

At a minimum, the following sites/sources must be included in the inventory:

(i) Commercial Sites/Sources:

[a] Automobile repair, maintenance, fueling, or cleaning;
[b] Airplane repair, maintenance, fueling, or cleaning;
[c] Boat repair, maintenance, fueling, or cleaning;
[d] Equipment repair, maintenance, fueling, or cleaning;
[e] Automobile and other vehicle body repair or painting;
[f] Mobile automobile or other vehicle washing;
[g] Automobile (or other vehicle) parking lots and storage facilities;
[h] Retail or wholesale fueling;
[i] Pest control services;
[j] Eating or drinking establishments, including such retail establishments with food markets;
[k] Mobile carpet, drape or furniture cleaning;
[l] Cement mixing or cutting;
[m] Masonry;
[n] Painting and coating;
[o] Botanical or zoological gardens and exhibits;
[p] Landscaping;
[q] Nurseries and greenhouses;
[r] Golf courses, parks and other recreational areas/facilities;
[s] Cemeteries;
[t] Pool and fountain cleaning;
[u] ~~Marinas~~;
[v] Portable sanitary services;
[w] Building material retailers and storage;
[x] Animal boarding facilities and kennels;
[y] Mobile pet services;
[z] Power washing services;
[aa] Plumbing services; and
[bb] Other sites and sources with a history of un-authorized discharges to the MS4.

Comment [CP96]: Clearly not applicable within this permit area.

(ii) Industrial Sites/Sources:

[a] Industrial Facilities, as defined at 40 CFR § 122.26(b)(14), including those subject to the General Industrial Permit or other individual NPDES permit;
[b] Operating and closed landfills;
[c] Facilities subject to SARA Title III; and
[d] Hazardous waste treatment, disposal, storage and recovery facilities.

(iii) ~~ESAs and~~ 303(d) Listed Waterbodies: All other commercial or industrial sites/sources tributary to and within the same hydrologic sub area as a CWA Section 303(d) impaired water body segment, where the site/source generates pollutants for which the water body segment is impaired. All other commercial or industrial sites/sources ~~within or directly adjacent to or discharging directly to receiving waters within environmentally sensitive areas (as defined in Attachment C of this Order) or that generate pollutants tributary to~~ determined to be the source of an observed exceedance of an action level.

(iv) All other commercial or industrial sites/sources that the Copermittee determines may contribute a significant pollutant load to the MS4.

(2) General BMP Implementation

(a) Pollution Prevention: Each Copermittee must require the use of pollution prevention methods by the inventoried industrial and commercial sites/sources, where appropriate.

(b) Designate / Update Minimum BMPs: Each Copermittee must designate a minimum set of BMPs for all inventoried industrial and commercial sites/sources. Where BMPs have already been designated, each Copermittee must review and update its existing BMPs for adequacy ~~within one year of permit adoption~~by no later than the submittal of the JRMP. Copermittees may continue to regularly review and update their designated BMPs for adequacy and subsequently submit any updates in their Annual Report. The designated minimum BMPs must be specific to facility types and pollutant-generating activities, as appropriate.

(c) Designate Enhanced BMPs for ESAs and 303(d) Impairments: Each Copermittee must designate enhanced measures for inventoried industrial and commercial sites/sources tributary to and within the same hydrologic subarea as a CWA section 303(d) impaired water body segments (where a site/source generates pollutants for which the water body segment is impaired). Each Copermittee must also designate additional controls for industrial and commercial sites/sources within or directly adjacent to or discharging directly to coastal lagoons, the ocean, or other receiving

Comment [CP97]: See discussion in the comment letter.

Comment [CP98]: Per discussions with Board staff on 8/18

Comment [CP99]: See discussion in the comment letter.

Comment [c100]: From 2004 permit

Comment [CP101]: Per discussions with Board staff on 8/18

Comment [CP102]: Per discussions with Board staff on 8/18

waters within environmentally sensitive areas (as defined in Attachment C of this Order). Copermittees may continue to regularly review and update their designated enhanced BMPs for adequacy and subsequently submit any updates in their next Annual Report.

(d) Implement BMPs: Each Copermittee must implement, or require the implementation of, the designated minimum and enhanced BMPs and any additional measures necessary based on inspections, incident responses, and water quality data to comply with this Order at each industrial and commercial site/source within its jurisdiction.

(3) Mobile Businesses Program

(a) Each Copermittee must develop and implement a program designed to reduce the discharge of storm water pollutants from the MS4 attributable to ~~from~~ mobile businesses to the MEP ~~and to prohibit non-storm water discharges pursuant to Section B of this Order~~. Each Copermittee must keep as part of its commercial source inventory a listing of mobile businesses known to ~~operate~~ have bases of operation within its jurisdiction that conduct services listed above in section F.3.b.(1)(a). The program must include:

(i) Development and implementation of minimum standards and BMPs to be required for each of the various types of mobile businesses;
(ii) Development and implementation of an enforcement strategy which specifically addresses the unique characteristics of mobile businesses;
(iii) Notification of those mobile businesses known to ~~operate~~ have bases of operation within the Copermittee's jurisdiction of the minimum standards and BMP requirements;
(iv) Development and implementation of an outreach and education strategy; and
(v) Inspection of mobile businesses as needed to implement the program.

(b) If they choose to, the Copermittees may cooperate in developing and implementing their programs for mobile businesses, including sharing of mobile business inventories, BMP requirements, enforcement action information, and education.

(4) Inspection of Industrial and Commercial Sites/Sources

Each Copermittee must conduct industrial and commercial site inspections for compliance with its ordinances, permits, and this Order. Mobile businesses must be inspected as needed pursuant to section F.3.b.(3).

(a) Inspection Procedures: Inspections must include but not be limited to:

Comment [DB103]: See general comment 1 Attachment 7 to the comment letter

Comment [DB104]: This change reflects the purpose of the Order, which is to reduce pollutants discharged from the MS4.

Comment [CP105]: This is an appropriate change, as it sets clear responsibility among the Copermittees.

(i) ~~Review of BMP implementation plans, if the site uses or is required to use such a plan~~;
(ii) ~~Review of facility monitoring data, if the site monitors its runoff~~;
(iii) Check for coverage under the General Industrial Permit (Notice of Intent (NOI) and/or Waste Discharge Identification Number), if applicable;
(iv) Assessment of compliance with Copermittee ordinances and Copermittee issued permits related to runoff;
(v) Assessment of the implementation, maintenance and effectiveness of the designated minimum and/or enhanced BMPs;
(vi) Visual observations for non-storm water discharges, potential illicit connections, and potential discharge of pollutants in storm water runoff; and
(vii) Education and training on storm water pollution prevention, as conditions warrant.

Comment [CP106]: See discussion in comment letter.

~~(b) Each Copermittee must annually notify the San Diego Water Board, prior to the commencement of the rainy season, of all Industrial Sites and Industrial Facilities subject to the General Industrial Permit or other individual NPDES permit with alleged violations of the Copermittees ordinances, that pose a significant threat to water quality.~~

Comment [CP107]: Per discussions with Board staff on 8/18. (comparable language added to F.3.b.(5)(b))

~~(c)~~(b) Frequencies: At a minimum all sites determined to pose a high threat to water quality must be inspected each year. All inventoried sites must be inspected at least once during a five year period. In evaluating threat to water quality, each Copermittee must consider, at a minimum, the following:

(i) Type of activity (SIC code);
(ii) Materials used at the facility;
(iii) Wastes generated;
(iv) Pollutant discharge potential, including whether the facility generates a pollutant that exceeds an action level;
(v) Non-storm water discharges;
(vi) Size of facility;
(vii) Proximity to receiving water bodies;
(viii) Sensitivity of receiving water bodies;
(ix) Whether the facility is subject to the General Industrial Permit or an individual NPDES permit;
(x) Whether the facility has filed a No Exposure Certification/Notice of Non-Applicability;
(xi) Facility design;
(xii) Total area of the site, portion of the site where industrial or commercial activities occur, and area of the site exposed to rainfall and runoff;
(xiii) The facility's compliance history; and

(xiv) Any other relevant factors.

~~(d)~~(c) Third-Party Certifications: Each Copermittee may propose to develop and implement a third party certification program subject to San Diego Water Board Executive Officer acceptance. This program would verify industrial and commercial site/source compliance with the Copermittees' ordinances, permits, and this Order. To the extent that third party certifications are conducted to fulfill the requirements of Section F.3.b.(4) above, the Copermittee retains responsibility for compliance with this Order and will be responsible for conducting and documenting quality assurance and quality control of the third-party certifications.

(i) The Copermittee's proposed third party certification program must include the following:

[a] A description of the procedures and measures for quality assurance and quality control;
[b] A listing of sites/sources that may and may not participate in the program;
[c] The representative percentage of certifications that would qualify to satisfy the inspection requirements in section F.3.b(4)(c) above;
[d] Photo documentation of potential storm water violations identified during the third party inspection;
[e] Reporting to the Copermittee of identified significant potential violations, including imminent or observed illegal discharges, within 24 hours of the third party inspection;
[f] Reporting to the Copermittee of all findings within one week of the inspection being conducted; and
[g] Copermittee follow-up and/or enforcement actions for identified potential storm water violations within two business days of the potential violation report receipt.

~~(e)~~(d) Based upon site inspection findings, each Copermittee must implement all follow-up actions and enforcement necessary to comply with this Order.

~~(f)~~(e) To the extent that the San Diego Water Board has conducted an inspection of an industrial site during a particular year, the requirement for the responsible Copermittee to inspect this facility during the same year is deemed satisfied.

~~(g)~~(f) The Copermittees must track the number of inspections for the inventoried industrial and commercial sites/sources throughout the reporting period to verify that the sites/sources are inspected at the minimum frequencies listed in this Order.

(5) Enforcement of Industrial and Commercial Sites/Sources

Each Copermittee must enforce its storm water ordinance for all industrial and commercial sites/sources as necessary to maintain compliance with this Order. ~~Copermittee ordinances or other regulatory mechanisms must include appropriate sanctions to achieve compliance. Sanctions must include the following tools or their equivalent: Non-monetary penalties, fines, bonding requirements, liens and/or permit denials for non-compliance.~~

(a) Each Copermittee shall annually notify the San Diego Water Board, prior to the commencement of the wet season, of any unresolved high level enforcement action (as defined in the Copermittee's JRMP) that poses a significant threat to water quality in its jurisdiction as a result of violations of their storm water ordinances.

Comment [DB108]: See legal comments in Attachment 7

Comment [CP109]: Per discussions with Board staff on 8/18, language such as this would serve as an alternative to F.3.b.(4)(b) above.This proposed language is more consistent with the requirements in the Construction section.

c. RESIDENTIAL

Each Copermittee (except the District) must implement a residential program that meets the requirements of this section, and is designed to prevent~~s~~ illicit discharges into the MS4, reduce~~s~~ residential discharges of storm water pollutants from the MS4 to the MEP, and prevent~~s~~ residential discharges from the MS4 from causing or contributing to a violation of water quality standards.

Comment [DB110]: See legal comments in Attachment 8

Comment [DB111]: See general comment 1 in Attachment 7

(1) Threat to Water Quality Prioritization

Each Copermittee must, within its jurisdiction, identify residential areas and activities that pose a high threat to water quality. At a minimum, these must include:

(a) Automobile repair, maintenance, washing, and parking;
(b) Home and garden care activities and product use (pesticides, herbicides, and fertilizers);
(c) Disposal of trash, pet waste, green waste, and household hazardous waste (e.g., paints, cleaning products);
(d) Any other residential source that the Copermittee determines may contribute a significant pollutant load to the MS4;
(e) Any residential areas tributary to and within the same hydrologic sub area as a CWA section 303(d) impaired water body, where the residential area ~~ce generates~~ discharges pollutants for which the water body is impaired; and
(f) ~~Any residential areas within or directly adjacent to or discharging directly to receiving waters within an environmentally sensitive area (as defined in~~

Comment [CP112]: Per discussions with Board staff on 8/18

Comment [CP113]: These requirements should be focused on discharges of pollutants

Comment [CP114]: This inappropriately separates the risk (pollutant discharge potential) from the action (regulation, minimum BMPs, etc), and should not be a mandated component of this permit.

~~Attachment C of this Order)~~.

(2) BMP Implementation

(a) Pollution Prevention: Each Copermittee must actively encourage the use of pollution prevention methods by residents.

(b) Designate BMPs: Each Copermittee must designate minimum BMPs for high-threat-to-water quality residential areas and activities. The designated minimum BMPs for high-threat-to-water quality residential areas and activities must be area or activity specific.

(c) Hazardous Waste BMPs: Each Copermittee must facilitate the proper management and disposal of used oil, toxic materials, and other household hazardous wastes. Such facilitation must include educational activities, public information activities, and establishment of collection sites operated individually and/or jointly by the Copermittee(s) or a private entity. Curbside collection of household hazardous wastes is encouraged.

(d) Implement BMPs: Each Copermittee must implement, or require implementation of, the designated minimum BMPs and any additional measures necessary to comply with Sections A and B of this Order.

(e) Each Copermittee must implement, or require implementation of, BMPs for residential areas and activities that have not been designated a high threat to water quality, as necessary.

(3) Enforcement of Residential Areas and Activities

Each Copermittee must enforce its storm water ordinance for all residential areas and activities as necessary to maintain compliance with this Order.

(4) Common Interest Areas (CIA) / Home Owner Association (HOA) Areas, and Mobile Home Parks

Each Copermittee must ensure that effective measures exist and are implemented or required to be implemented to ensure that runoff within and from common interest developments, including areas managed by associations and mobile home parks, and meets the objectives of this section and Order.

(a) BMP Implementation: Each Copermittee must implement or require implementation of management measures based on ~~a review of~~ pertinent factors, including:

(i) Maintenance duties and procedures typically used by CIA/HOA

maintenance associations within its jurisdiction;

(ii) Whether streets and storm drains are publicly or privately owned within the CIA/HOA or mobile home park;

(iii) Whether the CIA/HOA area or mobile home park has been identified as a high priority residential area based on ~~an evaluation of~~ the site potential to generate pollutants contributing to a 303(d) listed waterbody or an observed action level exceedance;

(iv) Other activities conducted or authorized by the HOA that may pose a significant risk to inland receiving waters.

(b) Legal Authority and Enforcement: By July 1, 2012, each Copermittee must review, and if necessary update, its Municipal Code to verify that they have the legal authority to implement and enforce its ordinances within CIA/HOA areas and mobile home parks.

(5) Privately Owned Unpaved Roads Maintenance

~~(a) The Copermittees must require implementation of BMPs for erosion and sediment control during maintenance activities on privately owned unpaved roads, particularly in or adjacent to stream channels or wetlands.~~

~~(b) The Copermittees must enforce their ordinances against illegal construction and maintenance grading activities on privately owned unpaved roads, so as to prevent impacts to water quality.~~

Comment [CP115]: Pursuant to the comment letter:

THE COPERMITTEES REQUEST THIS SECTION BE DELETED IN ITS ENTIRETY.

See further discussion on this issue in Attachment 5 to this comment letter

d. Retrofitting Existing Development

Each Copermittee must develop and implement a retrofitting program that meets the requirements of this section upon submittal of the ROWD. The goals of the existing development retrofitting program are to provide an means to the Copermittees to address the impacts of existing development through retrofit projects that reduce impacts from hydromodification, promote LID, support riparian and aquatic habitat restoration, reduce the discharges of storm water pollutants from the MS4 to the MEP, and prevent discharges from the MS4 from causing or contributing to a violation of water quality standards. Where feasible, at the discretion of the Copermittee, the existing development retrofitting program may be coordinated with flood control projects and other infrastructure improvement programs.

Comment [CP116]: Clarifying edit Per discussions with Board staff on 8/18

(1) The Copermittee(s) must identify and inventory existing areas of development (i.e. municipal, industrial, commercial, residential) within their jurisdiction as candidates for retrofitting. Potential retrofitting candidates must include but are not limited to:

Comment [CP117]: See District-specific comment white paper. (Attachment 8)

(a) Areas of development that generate pollutants of concern to a TMDL or an ESA;
(b) Receiving waters that are channelized or otherwise hardened;
(c) Areas of development tributary to receiving waters that are channelized or otherwise hardened;
(d) Areas of development tributary to receiving waters that are significantly eroded;
(e) Areas of development tributary to an ASBS or SWQPA; and

(2) Each Copermittee must evaluate and rank their inventoried areas of existing developments to prioritize retrofitting. Criteria for evaluation must include but is not limited to:

(a) Feasibility;
(b) Cost effectiveness;
(c) Pollutant removal effectiveness, including reducing pollutants exceeding action level;
(d) Tributary area potentially treated;
(e) Maintenance requirements;
(f) Landowner cooperation;
(g) Neighborhood acceptance;
(h) Aesthetic qualities;
~~(h)~~(i) Environmental Constraints (such as regulatory permits)
~~(i)~~(j) Efficacy at addressing concern; and
~~(j)~~(k) Potential ~~improvements~~ effects on public health and safety

(3) Each Copermittee must consider the results of the evaluation in prioritizing work plans for the following year in accordance with Sections G.1 and J. Highly feasible projects expected to benefit water quality should be given a high priority to implement source control and treatment control BMPs. Where feasible, the retrofit projects may be designed in accordance with the SSMP requirements within sections F.1.d.(3) through F.1.d.(8) and the Hydromodification requirements in Section F.1.h.

(4) The Copermittees (except the District) must cooperate with private landowners to encourage site specific retrofitting projects. The Copermittee must consider the following practices in cooperating and encouraging private landowners to retrofit their existing development:

(a) Demonstration retrofit projects;
(b) Retrofits on public land and easements that treat runoff from private developments;
(c) Education and outreach;
(d) Subsidies for retrofit projects;
(e) Requiring retrofit projects as enforcement, mitigation or ordinance compliance;

Comment [CP118]: See District-specific comment white paper, Attachment 8.

Comment [CP119]: There may be external constraints by other regulatory agencies that may affect the ranking of a particular candidate.

Comment [CP120]: A particular retrofit opportunity may have both positive and/or negative effects on public health and safety, and both should be considered.

Comment [CP121]: See District-specific comment white paper. (Attachment 8)

(f) Public and private partnerships; and
(g) Fees for existing discharges to the MS4 and reduction of fees for retrofit implementation.

(5) The known completed retrofit BMPs must be tracked in accordance with Section F.1.f. Retrofit BMPs on publicly owned properties must be inspected per section F.1.f . Privately owned retrofit BMPs must be inspected as needed ~~to ensure proper operation and maintenance~~.

Comment [CP122]: Per discussions with Board staff on 8/18

Comment [CP123]: Per discussions with Board staff on 8/18

(6) Where constraints on retrofitting preclude effective BMP deployment on existing developments at locations critical to protect receiving waters (as identified in section F.3.d.(1)), a Copermittee may propose a regional mitigation project to improve water quality. Such regional projects may include but are not limited to:

(a) Regional water quality treatment BMPs;
(b) Urban creek or wetlands restoration and preservation;
(c) Daylighting and restoring underground creeks;
(d) Localized rainfall storage and reuse to the extent such projects are fully protective of downstream water rights;
(e) Hydromodification project; and
(f) Removal of invasive plant species.

(7) A retrofit project or regional mitigation project may qualify as a Watershed Water Quality Activity provided it meets the requirements in section G. Watershed Workplan.

4. ILLICIT DISCHARGE DETECTION AND ELIMINATION

Each Copermittee must implement a program that meets the requirements of this section and is designed to actively detect and eliminate illicit discharges and disposal into the MS4. The program must address all types of illicit discharges and connections excluding those non-storm water discharges not prohibited by the Copermittee in accordance with section B of this Order.

Comment [DB124]: See general comment 1 in Attachment 7

a. PREVENT AND DETECT ILLICIT DISCHARGES AND CONNECTIONS

Each Copermittee must implement measures to prevent and detect illicit discharges to the MS4.

~~(1) Legal Authority: Each Copermittee must retain legal authority to prevent and eliminate illicit discharges and connections to the MS4.~~

Comment [DB125]: This measure is already covered in Part E of the Order.

~~(2)~~(1)Inspections: Each Copermittee must include use of appropriate

Copermittee personnel and contractors to assist in identifying illicit discharges and connections during their daily activities.

(a) Visual inspections for illegal discharges and connections must be conducted during routine maintenance of all MS4 facilities.

(b) Copermittee staff and contractors conducting non-MS4 field operations must be trained to report suspected illegal discharges and connections to proper Copermittee staff.

b. MAINTAIN MS4 MAP

Each Copermittee must maintain an updated map of its entire MS4 and the corresponding drainage areas within its jurisdiction. The use of GIS is strongly encouraged. The MS4 map must include all segments of the storm sewer system owned, operated, and maintained by the Copermittee, as well as all known locations of inlets that discharge and/or collect runoff into the Copermittee's MS4~~, all known locations of access points (i.e. manholes) to the Copermittee's MS4, all known locations of connections with other MS4s (e.g. Caltrans),~~ and all known locations of all the outfalls that discharge runoff from the Copermittee's MS4. The accuracy of the MS4 map must be confirmed during dry weather field screening and analytical monitoring and must be updated at least annually. The MS4 map including any GIS layers must be submitted with the updated JRMP.

Comment [CP126]: These are not required under the federal regulations, and are not necessary for the Copermittees' programs.

c. FACILITATE PUBLIC REPORTING OF ILLICIT DISCHARGES AND CONNECTIONS - PUBLIC HOTLINE

Each Copermittee must promote, publicize and facilitate public reporting of illicit discharges or water quality impacts associated with discharges into or from MS4s. Each Copermittee must facilitate public reporting through development and operation of a public hotline. Public hotlines can be Copermittee-specific or shared by Copermittees. All storm water hotlines must be capable of receiving reports in both English and Spanish 24 hours per day and seven days per week. All reported incidents, and how each was resolved, must be summarized in each Copermittee's Annual Report.

d. DRY WEATHER FIELD SCREENING AND ANALYTICAL MONITORING

Each Copermittee must conduct dry weather field screening and analytical monitoring of MS4 outfalls and other portions of its MS4 within its jurisdiction to detect illicit discharges and connections in accordance with Receiving Waters and MS4 Discharge Monitoring and Reporting Program No. R9-2010-0016 in Attachment E of this Order.

e. INVESTIGATION / INSPECTION AND FOLLOW-UP

Each Copermittee must implement procedures to investigate and inspect portions of its MS4 that, based on the results of field screening, analytical monitoring, or other appropriate information, indicate a reasonable potential of containing illicit discharges, illicit connections, or other sources of pollutants in non-storm water.

(1) Develop response criteria for data: Each Copermittee must develop, update, and use numeric criteria action levels (or other actions level criteria where appropriate) to determine when follow-up investigations will be performed in response to water quality monitoring. The criteria must include required non-storm water action levels (see Section C) and a consideration of 303(d)-listed waterbodies and environmentally sensitive areas (ESAs) as defined in Attachment C.

(2) Respond to data: Each Copermittee must investigate portions of the MS4 for which water quality data or conditions indicates a potential illegal discharge or connection.

(a) Obvious illicit discharges (i.e. color, odor, or significant exceedances of action levels) must be investigated immediately.

(b) Field screen data: Within two business days of receiving dry weather field screening results that exceed action levels, the Copermittee(s) having jurisdiction must either initiate an investigation to identify the source of the discharge or document the rationale for why the discharge does not pose a threat to water quality and does not need further investigation. This documentation must be included in the Annual Report.

(c) Analytical data: Within five business days of receiving analytical laboratory results that exceed action levels, the Copermittee(s) having jurisdiction must either initiate an investigation to identify the source of the discharge or document the rationale for why the discharge does not pose a threat to water quality and does not need further investigation. This documentation must be included in the Annual Report.

(3) Respond to notifications: Each Copermittee must respond to and resolve each reported incident (e.g., public hotline, staff notification, etc.) made to the Copermittee in a timely manner. Criteria may be developed to assess the validity of, and prioritize the response to, each report.

f. ELIMINATION OF ILLICIT DISCHARGES AND CONNECTIONS

Each Copermittee must take immediate action to initiate steps necessary to eliminate all detected illicit discharges, illicit discharge sources, and illicit connections after detection within its jurisdiction. Elimination measures may include an escalating series of enforcement actions for those illicit discharges

that are not a serious threat to public health or the environment. Illicit discharges that pose a serious threat to the public's health or the environment must be eliminated immediately.

~~g. ENFORCE ORDINANCES~~

~~Each Copermittee must implement and enforce its ordinances, orders, or other legal authority to prevent illicit discharges and connections to its MS4 and to eliminate detected illicit discharges and connections to its MS4.~~

Comment [DB127]: This requirement is already covered in Part E.1 of the Order.

~~h.~~g. PREVENT AND RESPOND TO SEWAGE SPILLS (INCLUDING FROM PRIVATE LATERALS AND FAILING SEPTIC SYSTEMS) AND OTHER SPILLS

Each Copermittee must implement management measures and procedures (including a notification mechanism) to ~~prevent,~~ respond to, contain and clean up all sewage (see below) and other spills that may discharge into its MS4 from any source (including private laterals and failing septic systems). Copermittees must coordinate with spill response teams to prevent entry of spills into the MS4 and contamination of surface water, ground water and soil. Each Copermittee must coordinate spill prevention, containment and response activities throughout all appropriate Copermittee departments, programs and agencies so that maximum water quality protection is available at all times.

Comment [CP128]: The Copermittees do not own nor operate such systems, and as such cannot 'prevent' such spills from occurring.

Comment [CP129]: Per discussions with Board staff on 8/18

5. PUBLIC PARTICIPATION COMPONENT

Each Copermittee must incorporate a mechanism for public participation in the updating, development, and implementation of the JRMP.

6. EDUCATION COMPONENT

Each Copermittee must implement education programs designed to (1) measurably increase the knowledge regarding MS4s, impacts of runoff on receiving waters, and potential BMP solutions for the target audience; and (2) to measurably change the behavior of target communities and thereby reduce pollutants in ~~storm water~~ discharges from MS4s to the MEP~~and eliminate prohibited non-storm water discharges to MS4s and the environment~~. At a minimum, the education programs must meet the requirements of this section and address the following target communities within their jurisdiction:

Comment [DB130]: See general comment 1 in Attachment 7 to the comment letter .

Comment [DB131]: See legal comments white paper in Attachment 8 to the comment letter .

Comment [DB132]: See District-specific comment white paper in Attachment 8 to the comment letter .

- Copermittee Departments and Personnel

- New Development / Redevelopment Project Applicants, Developers, Contractors, Property Owners, and other Responsible Parties
- Construction Site Owners and Operators
- Commercial Facility Owners and Operators
- Industrial Facility Owners and Operators
- Residential Community and General Public
- ~~Quasi-Governmental Agencies / Districts (i.e., educational institutions, water districts, sanitation districts, etc.)~~

Comment [CP133]: These entities are subject to individual NPDES regulations, and the Copermittees should not be required to educate them on the general requirements below.

a. General Requirements

(1) At a minimum, the Copermittee education programs must implement educational programs for ~~educate~~ each target community on the following topics as appropriate to the community's activities and their impact discharges from the MS4 :

Comment [CP134]: The language should be clear that the minimum topics should be tailored as appropriate to the target audience.

(a) Applicable water quality laws, regulations, permits, and/or other requirements;
(b) Best management practices;
(c) General runoff concepts;
(d) Existing water quality, including local water quality conditions, impaired waterbodies and environmentally sensitive areas; and
(e) Other topics as determined by the Copermittee, such as public reporting mechanisms, water conservation, low-impact development techniques, and public health and vector issues associated with runoff.

(2) Each Copermittee must implement educational activities, public information activities, and other appropriate activities to facilitate the proper management and disposal of used oil and toxic materials.

b. Specific Requirements

(1) Copermittee Departments and Personnel

(a) Each Copermittee must implement an education program so its staff and contractors (and Planning Boards and Elected Officials, if applicable) responsible for implementing the requirements of this Order have an understanding of the following topics, as applicable to their responsibilities:

(i) Applicable water quality laws and regulations;
(ii) The potential effects and impacts that Copermittee departments and personnel activities related to their job duties can have on water quality);

(iii) Plan review policies and procedures to verify consistent application;
(iv) Methods of minimizing impacts to receiving water quality resulting from development, construction, and other potential pollutant generating activities;
(v) Proper implementation of erosion and sediment control, source control, treatment control, and other BMPs to minimize the impacts to receiving water quality resulting from development, construction, and other potential pollutant generating activities;
(vi) Applicable recordkeeping and tracking mechanisms;
(vii) Inspection and enforcement procedures and~~,~~ BMP implementation, ~~and review of monitoring data~~.

Comment [CP135]: As discussed in the comment letter, this is a requirement for other NPDES permits, and it is inappropriate to mandate upon the Copermittees.

(b) Each Copermittee must train its staff responsible for oversight and conducting storm water compliance inspections and enforcement of construction activities (e.g. construction, building, code enforcement, grading review staffs, inspectors, and other responsible construction staff) annually prior to the rainy season.

(c) Each Copermittee must train its staff responsible for conducting storm water compliance inspections and enforcement of industrial and commercial facilities at least once a year.

(2) New Development / Redevelopment and Construction Sites

As early in the planning and development process as possible and all through the permitting and construction process, each Copermittee must notify parties responsible for the project about the importance of educating all construction workers in the field about storm water issues and BMPs, in addition to the topics under Section F.6.a.(1).

(3) Commercial and Industrial Sites / Sources

At least once during the five-year period of this Order, each Copermittee must notify the owner/operator of each of its inventoried commercial and industrial site/source of the BMP requirements applicable to the site/source.

(4) Residential and General Public

Each Copermittee shall collaboratively conduct or participate in development and implementation of a program to educate residential and general public target communities. The Copermittee residential and general public education programs must address potential pollutant generating activities (e.g., car washing, mobile operations, yard maintenance) and pollutant generating products (e.g., pesticides, fertilizers, household chemicals). ~~The target audiences of the residential and general public education programs must include underserved target audiences (e.g., disadvantaged~~

~~communities), residents and managers of CIA/HOA areas, and owners and residents of mobile home parks.~~

Comment [DB136]: The requirement to educate the residential and general public communities will necessarily include these underserved audiences.

G. WATERSHED WATER QUALITY WORKPLAN

Each Copermittee must collaborate with other Copermittees to develop and implement a Watershed Water Quality Workplan (Watershed Workplan) designed to identify, prioritize, address, and mitigate the highest priority water quality issues/pollutants in the Upper Santa Margarita Watershed relating to discharges from the MS4.

Comment [DB137]: See general comment 1 in Attachment 7 to the comment letter .

1. Watershed Workplan Components:

The work plan must, at a minimum:

a. Characterize the receiving water quality in the watershed. Characterization must include assessment and analysis of regularly collected water quality data, reports, monitoring and analysis generated in accordance with the requirements of the Receiving Waters Monitoring and Reporting Program, as well as applicable information available from other public and private organizations. This characterization must include an updated watershed map.

b. Identify and prioritize water quality problem(s) in terms of constituents by location, in the watershed's receiving waters. In identifying water quality problem(s), the Copermittees must, at a minimum, give consideration to TMDLs, receiving waters listed on the CWA section 303(d) list, waters with persistent violations of water quality standards, toxicity, or other impacts to beneficial uses, and other pertinent conditions.

c. Identify the likely sources, pollutant discharges and/or other factors causing the highest water quality problem(s) within the watershed resulting from discharges from the MS4. Efforts to determine such sources must include, but not be limited to: use of information from the construction, industrial/commercial, municipal, and residential source identification programs required within the JRMP of this Order; water quality monitoring data collected as part of the Receiving Water Monitoring and Reporting Program required by this Order, and additional focused water quality monitoring to identify specific sources within the watershed.

d. Develop a watershed BMP implementation strategy to attain receiving water quality objectives in the identified highest priority water quality problem(s) and locations. The BMP implementation strategy must include a schedule for implementation of the BMP ~~project~~s to abate specific receiving water quality problems and a list of criteria to be used to evaluate BMP effectiveness. Identified watershed water quality problems may be the result of jurisdictional discharges that will need to be addressed with BMPs applied in a specific jurisdiction in order to generate a benefit to the watershed. This implementation

Comment [CP138]: Changes in this section are requested pursuant to discussions with Board staff on 8/18

strategy must include a map of any implemented and/or proposed structural BMPs.

e. Develop a strategy to monitor improvements in receiving water quality directly resulting from implementation of the BMPs described in the Watershed Workplan. The monitoring strategy must review the necessary data to report on the measured pollutant reduction that results from proper BMP implementation. Monitoring must, at a minimum, be conducted in the receiving water to demonstrate reduction in pollutant concentrations and progression towards attainment of receiving water quality objectives.

f. Establish a schedule for development and implementation of the Watershed strategy outlined in the Workplan. The schedule must, at a minimum, include forecasted dates of planned actions to address Provisions E.2(a) through E.2(e) and dates for watershed review meetings through the remaining portion of this Permit cycle. Annual watershed workplan review meetings must be open to the public and appropriately publically noticed such that interested parties may come and provide comments on the watershed program.

2. **Watershed Workplan Implementation –** Watershed Copermittee's must implement the Watershed Workplan within 90 days of submittal unless otherwise directed by the San Diego Water Board.

3. **Copermittee Collaboration** – Watershed Copermittees must collaborate to develop and implement the accepted Watershed Workplan. Watershed Copermittee collaboration must include frequent regularly scheduled meetings. The Copermittees must pursue ~~efforts to obtain any~~ interagency agreements, or other coordination efforts, with non-Copermittee owners of the MS4 (such as Caltrans, Native American tribes, and school districts) where determined by the Copermittee as necessary to control the contribution of pollutants from one portion of the shared MS4 to another portion of the shared MS4. The Copermittees must, as appropriate, participate in watershed management efforts to address water quality issues within the entire Santa Margarita Watershed (such as the County of San Diego and U.S. Marine Corps Camp Pendleton).

Comment [CP139]: Goal is to pursue these agreements where we determine it is needed. Otherwise this requirement is diverting our time and resources from other more important efforts.

4. **Public Participation –** Watershed Copermittees must implement a watershed-specific public participation mechanism within each watershed. A required component of the watershed-specific public participation mechanism must be a minimum 30-day public review of and opportunity to comment on the Watershed Workplan prior to submittal to the San Diego Water Board. The Workplan must include a description of the public participation mechanisms to be used and identification of the persons or entities anticipated to be involved during the development and implementation of the Watershed Workplan.

5. **Watershed Workplan Review and Updates –** Watershed Copermittees must review and update the Watershed Workplan annually to identify needed changes to

the prioritized water quality problem(s) listed in the workplan. All updates to the Watershed Workplan must be presented during an Annual Watershed Review Meeting. Annual Watershed Review Meetings must occur once every calendar year and be conducted by the Watershed Copermittees. Annual Watershed Review Meetings must be open to the public and adequately noticed. Individual Watershed Copermittees must also review and modify their jurisdictional programs and JRMP Annual Reports, as necessary, so that they are consistent with the updated Watershed Workplan.

6. **Pyrethroid Toxicity Reduction Evaluation –** The Watershed Copermittees must incorporate the pyrethroid pollutant reduction program[18] into the Watershed Workplan. The pyrethroid pollutant reduction program must include the following elements:

   a. Pursue state and federal regulatory change.
   b. Implement a set of source controls targeted specifically at urban pyrethroid use,
   c. Through the annual reporting process, monitor the implementation of those controls, assess effectiveness, and identify sources or areas where additional effort is needed,
   d. Implement additional controls as needed,
   e. Continue to monitor implementation, as well as conditions within the target receiving waters, assess effectiveness, and re-evaluate control programs.

H. FISCAL ANALYSIS

1. Secure Resources: Each Copermittee must ~~exercise its full authority to~~ secure the resources necessary to meet all requirements of this Order. If the Copermittees are unable to secure the funding necessary to implement the requirements of this order, the Copermittees may request modification of the Order consistent with the MEP standard.

Comment [CP140]: This clarifies that the Copermittees have the option to request modification of the order for reasons such as inability to obtain the requisite funding for the programs.

2. Annual Analysis: Each Copermittee must conduct an annual fiscal analysis of the necessary capital and operation and maintenance expenditures necessary to accomplish the activities of the programs required by this Order. The analysis must include estimated expenditures for the current reporting period, the preceding period, and the next reporting period.

   a. Each analysis must include a description of the source of funds that are proposed to meet the necessary expenditures.
   b. Each analysis must include a narrative description of circumstances resulting in a 25 percent or greater annual change for any budget line items.

[18] The pyrethroid pollutant reduction program is described in the "Riverside County – Santa Margarita Region Pyrethroid Source Identification Toxicity Reduction Evaluation, Final Phase II Report", January 2009 by MACTEC.

3. Annual Reporting: Each Copermittee must submit its annual fiscal analysis with the annual JRMP report.

I. TOTAL MAXIMUM DAILY LOADS

1. The waste load allocations (WLAs) of fully approved and adopted TMDLs are incorporated as Water Quality Based Effluent Limitations on a pollutant by pollutant, watershed by watershed basis. Early TMDL requirements, including monitoring, may be required and inserted into this Order pursuant to Finding E.10.

2. The Cities of Wildomar and Murrieta must comply with the requirements and WLAs assigned to the discharges from their MS4s contributing to the Lake Elsinore/Canyon Lake (San Jacinto Watershed) Nutrient TMDLs as specified in Section VI.D.2 of the Santa Ana Water Board's Order R8-2010-0033, -including the relevant sections of the fact sheet and findings, and subsequent revisions thereto.

J. PROGRAM EFFECTIVENESS ASSESSMENT AND REPORTING

Beginning with the Annual Report due in 2013, each Copermittee must annually assess and report upon the effectiveness of its JRMP and Watershed Workplan implementation to (1) reduce the discharge of storm water pollutants from its MS4 to the MEP; (2) prohibit non-stormwater discharges; and (3) prevent runoff discharges from the MS4 from causing or contributing to a violation of water quality standards.

1. Program Effectiveness Assessments

a. IDENTIFY EFFECTIVENESS ASSESSMENTS

With the JRMP and Watershed Workplan submittal, each Copermittee must establish assessment measures or methods for each of the six outcome levels described by CASQA[19], using data from each JRMP program component as appropriate, the MRP, and the Watershed Workplan.

(1) Assessment interval: For each established assessment measure or method, an assessment interval must be established as appropriate to the measure or method.

(2) Projected Timeframe: For each established assessment measure or method, each Copermittee must identify the projected timeframe within which the associated outcome level can adequately assess change.

[19] Effectiveness assessment outcome levels as defined by CASQA are defined in Attachment C of this Order. See "*Municipal Stormwater Program Effectiveness Assessment Guidance"* (CASQA, May 2007) for guidance for assessing program activities at the various outcome levels.

b. PERFORM ASSESSMENTS

(1) Annually: Each year, the Copermittee must perform each applicable assessment based on the associated assessment interval, and determine whether the desired outcome has been met;

(2) With the submittal of the Report of Waste Discharge, the Copermittees must determine whether their program implementation is resulting in the protection and/or improvement of water quality through an Integrated Assessment;

2. Respond to Assessments

a. Where the assessments indicate that the desired outcome level has not been achieved at the end of the projected timeframe, the Copermittee must review its applicable activities and BMPs to identify any modifications and improvements needed to maximize effectiveness, as necessary to comply with this Order. If the Copermittee determines that the existing activities/BMPs are adequate, or that the projected timeframe should be extended, justification and an updated timeframe for attainment of the outcome level must be provided in the Annual Report.

b. Each Copermittee must develop and implement a work plan and schedule to address any program modifications and improvements in response to the findings of its assessment. The work plan and schedule must be provided and updated with the applicable Annual Report. The work plan must include, at a minimum, the following:

(1) A description of the program modifications / improvements that will be implemented to achieve the intended outcome level.
(2) A schedule for development and implementation of the program modifications / improvements, including any significant milestones.
(3) Establishment of appropriate assessment measure(s) or method(s), assessment interval(s), and projected timeframe(s) in accordance with Section J.1.a. for the program modifications / improvements.
~~(1) The problems and priorities identified during the assessment;~~
~~(2) A list of priority pollutants and known or suspected sources;~~
~~(3) A brief description of the strategy employed to reduce, eliminate or mitigate the negative impacts;~~
~~(4) A description and schedule for new and/or modified BMPs. The schedule is to include dates for significant milestones;~~
~~(5) A description of how the selected activities will address an identified high priority problem. This will include a description of the expected effectiveness and benefits of the new and/or modified BMPs;~~
~~(6) A description of implementation effectiveness metrics;~~
~~(7) A description of how efficacy results will be used to modify priorities and~~

Comment [CP141]: Although the Copermittees prefer to not be required to develop another compliance document, the edits below are intended to focus such a document on information that is relevant to the Copermittes' response.

~~implementation; and~~

~~(8) A review of past activities implemented, progress in meeting water quality standards, and planned program adjustments.~~

3. Assessment and Response Reporting

Each Copermittee must include a summary of its effectiveness assessments within each Annual Report. Beginning with the FY 2012-2013 Annual Report, the Program Effectiveness reporting must include:

a. The results of each of the effectiveness assessments performed pursuant to J.1.b, including the demonstrated CASQA effectiveness level(s);

b. Responses to effectiveness assessments; A description of any program modifications planned in accordance with section J.2, including the work plan and identified schedule for implementation. The description must include the basis for determining that each modified activity and/or BMP represents an improvement expected to result in improved water quality;

c. A description of any steps to be implemented to improve the Copermittee's ability to assess program effectiveness.

K. REPORTING

The Copermittees may propose alternate reporting criteria and schedules, as part of their updated JRMP, for the Executive Officer's acceptance.

1. Runoff Management Plans

a. JURISDICTIONAL RUNOFF MANAGEMENT PLANS

(1) The written account of the overall program to be conducted by each Copermittee to meet the jurisdictional requirements of section F of this Order is referred to as the Jurisdictional Runoff Management Plan (JRMP). Each Copermittee must revise and update its existing JRMP so that it describes all activities the Copermittee will undertake to implement the requirements of this Order. Each Copermittee must submit its updated and revised JRMP to the San Diego Water Board <u>no later than June 30, 2012</u>.

(2) At a minimum, each Copermittee's JRMP must be updated and revised to

demonstrate compliance with each applicable section of this Order.

b. WATERSHED WORKPLANS

Copermittees must update and revise the Watershed Workplan to describe any changes in water quality problems or priorities, and any necessary change to actions Copermittees will take to implement jurisdictional or watershed BMPs to address those identified. The Copermittees must assemble and submit the Watershed Workplan to the San Diego Water Board no later than June 30, 2012, and must implement the Workplan within 90 days unless otherwise directed by the San Diego Water Board.

2. Other Required Reports and Plans

a. SSMP UPDATES

(1) Copermittees must submit their updated SSMP in accordance with the applicable requirements of section F.1 with the JRMP by June 30, 2012.
(2) Within 180 days of determination that the SSMP is in compliance with this Order's provisions, each Copermittee must amend its ordinances consistent with the SSMP and implement the updated SSMP. Any amended or new ordinances must be submitted to the San Diego Water Board within ~~30 days of adoption~~the applicable annual report.

Comment [CP142]: Per discussions with Board staff on 8/18

b. HMP

(1) By June 30, 2013, the Copermittees must submit to the San Diego Water Board Executive Officer a draft HMP that has been reviewed by the public, including identification of the appropriate limiting range of flow rates in accordance with the applicable requirements of section F.1.h.

(2) Within 180 of receiving San Diego Water Board comments on the draft HMP, the Copermittees must submit a final HMP that addressed the San Diego Water Board's comments.

(3) Within 90 days of receiving a finding of adequacy from the Executive Officer each Copermittee must incorporate and implement the HMP for all Priority Development Projects.

(4) Prior to acceptance of the HMP by the San Diego Water Board, the early implementation measures likely to be included in the HMP shall be

encouraged by the Copermittees.

c. REPORT OF WASTE DISCHARGE

The Copermittees must submit to the San Diego Water Board, no later than 180 days in advance of the expiration date of this Order, a Report of Waste Discharge (ROWD) as an application for issuance of new waste discharge requirements. The fourth annual report for this Order ~~may supplement~~serve as the ROWD, provided ~~the ROWD~~it contains the minimum information below.

At a minimum, the ROWD must include the following: (1) Proposed changes to the Copermittees' runoff management programs; (2) Proposed changes to monitoring programs; (3) Justification for proposed changes; (4) Name and mailing addresses of the Copermittees; (5) Names and titles of primary contacts of the Copermittees; (6) Any other information necessary for the reissuance of this Order and (7) Any other information required by federal regulations for permit reapplications.

3. Annual Reports

a. JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM (JRMP) ANNUAL REPORTS

(1) Each Copermittee must generate individual JRMP Annual Reports that cover implementation of its jurisdictional activities during the past annual reporting period. Each Annual Report must verify and document compliance with this Order as directed in this section. Each Copermittee must retain records in accordance with the Standard Provisions in Attachment B of this Order, available for review, that document compliance with each requirement of this Order. The reporting period for these annual reports must be the previous fiscal year.

(2) Each Copermittee must submit its JRMP Annual Reports to the San Diego Water Board by October 31of each year, beginning on October 31, 2013.

(3) Each JRMP Annual Report must contain, at a minimum, the following information, as applicable to the Copermittee:

(a) Information required to be reported annually in Section H (Fiscal Analysis) of this Order;
(b) Information required to be reported annually in Section J (Program Effectiveness) of this Order;
(c) The completed Reporting Checklist found in Attachment D, and
(d) Information for each program component as described in the following Table 9:

Table 9. Annual Reporting Requirements

Program Component	Reporting Requirement
New Development	1. All updated relevant sections of the General Plan and environmental review process and a description of any planned updates within the next annual reporting period, if applicable
	2. All revisions to the SSMP, including where applicable: (a) Identification and summary of where the SSMP fails to meet the requirements of this Order; (b) Updated procedures for identifying pollutants of concern for each Priority Development Project; (c) Updated treatment BMP ranking matrix; and (d) Updated site design and treatment control BMP design standards;
	3. Number of Priority Development Projects reviewed and approved during the reporting period. Brief description of BMPs required at approved Priority Development Projects. Verification that site design, source control, and treatment BMPs were required on all applicable Priority Development Projects;
	4. Name (or other identifier) and location of all Priority Development Projects that were granted a waiver from implementing LID BMPs pursuant to section F.1.d.(4) during the reporting period;
	5. Updated watershed-based BMP maintenance tracking database of approved treatment control BMPs and treatment control BMP maintenance within its jurisdiction, including updates to the list of high-priority Priority Development Projects; and verification that the requirements of this Order were met during the reporting period.
New Development	6. Name and brief description of all approved Priority Development Projects ~~required to~~exempted from implementing hydrologic control measures in compliance with section F.1.h ~~including a brief description of the management measures planned to protect downstream beneficial uses and prevent adverse physical changes to downstream stream channels;~~
	7. Number and description of all enforcement activities applicable to the new development and redevelopment component and a summary of the effectiveness of those activities;
Construction	1. All updated relevant ordinances and description of planned ordinance updates within the next annual reporting period, if applicable;
	2. A description of any changes to procedures used for identifying priorities for inspecting sites and enforcing control measures ~~that consider the nature of the construction activity, topography, and the characteristics of soils and receiving water quality~~;
	3. Any changes to the designated minimum and enhanced BMPs;

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Program Component	Reporting Requirement
	4. Summary of the inspection program, including the following information: (a) Total number and date of inspections conducted at each facility; ~~(b) Number, date, and types of enforcement actions by facility~~; (c) Brief description of each high-level enforcement actions at construction sites including the ~~effectiveness~~ outcome of the enforcement. Supporting paper (or electronic) files must be maintained by the Copermittees and made available upon San Diego Water Board request. Supporting files must include a record of inspection dates, the results of each inspection , photographs (if any), and a summary of any enforcement actions taken.
Municipal	1. Updated source inventory;
	2.All changes to the designated municipal BMPs;
	3. Descriptions of any changes to procedures to assure that flood management projects assess the impacts on the water quality of receiving water bodies;
	4. Summary and assessment of BMPs retrofits implemented at flood control structures, including: (a) List of projects retrofitted; and (b) List and description of structures evaluated for retrofitting; (c) List of structures still needing to be evaluated and the schedule for evaluation.;
	5. Summary of the municipal structural treatment control operations and maintenance activities, including: (a) Number of inspections and types of facilities; and (b) Summary of findings;
Municipal	6. Summary of the MS4 and MS4 facilities operations and maintenance activities, including: (a) Number and types of facilities maintained; (b) Amount of material removed; and (c) Updates to the List of facilities planned for bi-annual inspections and the justification;
	7. Summary of the municipal areas/programs inspection activities, including: (a) Number and date of inspections conducted at each facility; ~~(c) The BMP violations identified during the inspection by facility;~~ ~~(d) Number, date and types of enforcement actions by facility~~; (e) Summary of inspection findings and follow-up activities for each facility;
	8. Description of activities implemented to address sewage infiltration into the MS4;
	~~9. Description of BMPs and their implementation for unpaved roads construction and maintenance.~~

Comment [CP143]: As drafted (without the changes shown) the requirements will be a significant and lengthy reporting exercise. Request keeping this as a 'summary' report on compliance with the inspection frequencies, and identifying any follow-up actions (as shown via the markup).

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Program Component	Reporting Requirement
Commercial / Industrial	1. Updated inventory of commercial / industrial sources;
	2. Summary of the inspection program, including the following information: (a) Number and date of inspections conducted at each facility or mobile business;; ~~(c) The BMP violations identified during the inspection by facility;~~ (d) Number, date, and types of high-level enforcement actions by facility or mobile business, and the outcome of each; ~~(e) Brief description of each high-level enforcement actions at commercial/industrial sites including the effectiveness of the enforcement and follow-up activities for each facility;.~~
	3. All changes to designated minimum and enhanced BMPs;
	4. A list of industrial sites, including each name, address, and SIC code, that the Copermittee suspects may require coverage under the General Industrial Permit, but has not submitted an NOI;
Residential	1. All updated minimum BMPs required for residential areas and activities;
	2. Quantification and summary of applicable runoff and storm water enforcement actions within residential areas and activities;
	3. Description of efforts to manage runoff and storm water pollution in common interest areas and mobile home parks;
Retrofitting Existing Development	1. Updated inventory and prioritization of existing developments identified as candidates for retrofitting.
	2. Description of efforts to retrofit existing developments during the reporting year.
Retrofitting Existing Development	3. Description of efforts taken to encourage private landowners to retrofit existing development.
	4. A list of all known retrofit projects that have been implemented within the reporting period, including site location, a description of the retrofit project, pollutants expected to be treated, and the tributary acreage of runoff that will be treated.
	5. Any proposed retrofit or regional mitigation projects and timelines for future implementation.
	6. Any proposed changes to the Copermittee's overall retrofitting program.
Illicit Discharge Detection and Elimination	1. Any changes to the legal authority to implement Illicit Discharge Detection and Elimination activities;
	2. Any Changes to the established investigation procedures;
	3. Any changes to public reporting mechanisms, including phone numbers and web pages;
	4. Summaries of illicit discharges (including spills and water quality data events) and how each significant case was resolved;
	5. A description of instances when field screening and analytical data exceeded action levels, including those instances for which no investigation was conducted;

Comment [CP144]: As drafted (without the changes shown) the requirements will be a significant and lengthy reporting exercise. Request keeping this as a 'summary' report on compliance with the inspection frequencies, and identifying the high-level enforcement actions (as shown via the markup).

Program Component	Reporting Requirement
	6. A description of follow-up and enforcement actions taken in response to investigations of illicit discharges and a description of the outcome of the investigation/enforcement actions;
Workplans	Updated workplans including priorities, strategy, implementation schedule and effectiveness evaluation;

(4) Each JRMP Annual Report must also include the following information regarding non-storm water discharges (see Section B.2. of this Order):

(a) Identification of non-storm water discharge categories identified as a source of pollutants to waters of the U.S;
(b) A description of any updates to ordinances, orders, or similar means to prohibit non-storm water discharge categories identified under section B.2 above ;
(c) Identification of any control measures to be required and implemented for non-storm water discharge categories identified as needing controls by the San Diego Water Board; and
(d) A description of a program to address pollutants from non-emergency fire fighting flows identified by the Copermittee to be significant sources of pollutants.

4. Interim Reporting Requirements

For the reporting periods, prior to submittal of the JRMP, Each JRMP Annual Report must be submitted in accordance with the requirements and deadlines described in Order No. 2004-001.

5. Universal Reporting Requirements

All submittals must include an executive summary, ~~introduction, conclusion, recommendations,~~ and signed certified statement. Each Copermittee must submit a signed certified statement covering its responsibilities for each applicable submittal. The Principal Copermittee must submit a signed certified statement covering its responsibilities for each applicable submittal and the sections of the submittals for which it is responsible.

Comment [CP145]: Per discussions with Board staff on 8/18

L. MODIFICATION OF PROGRAMS

Modifications of JRMPs and/or Watershed Workplan may be initiated by the Executive Officer of the San Diego Water Board or by the Copermittees. Requests by Copermittees must be made to the Executive Officer, and must be submitted during the annual review process. Requests for modifications should be incorporated, as appropriate, into the Annual Reports or other deliverables required or allowed under this Order.

1. Minor modifications to JRMPs, and/or Watershed Workplan, may be accepted by the Executive Officer where the Executive Officer finds the proposed modification complies with all discharge prohibitions, receiving water limitations, and other requirements of this Order.

2. Proposed modifications that are not minor require amendment of this Order in accordance with this Order's rules, policies, and procedures.

M. PRINCIPAL COPERMITTEE RESPONSIBILITIES

Within 180 days of adoption of this Order, the Copermittees must designate the Principal Copermittee and notify the San Diego Water Board of the name of the Principal Copermittee. The Principal Copermittee must, at a minimum:

1. Serve as liaison between the Copermittees and the San Diego Water Board on general permit issues, and when necessary and appropriate, represent the Copermittees before the San Diego Water Board.

2. Coordinate permit activities among the Copermittees and facilitate collaboration on the development and implementation of programs required under this Order.

3. ~~Produce and submit~~Coordinate the submittal of the documents and reports as required by section K of this Order and Receiving Waters and MS4 Discharge Monitoring and Reporting Program No. R9-2010-0016 in Attachment E of this Order.

Comment [CP146]: Per discussions with Board staff on 8/18

N. RECEIVING WATERS AND MS4 DISCHARGE MONITORING AND REPORTING PROGRAM

Pursuant to CWC section 13267, the Copermittees must comply with all the requirements contained in Receiving Waters and MS4 Discharge Monitoring and Reporting Program No. R9-2010-0016 in Attachment E of this Order.

O. STANDARD PROVISIONS, REPORTING REQUIREMENTS, AND NOTIFICATIONS

1. Each Copermittee must comply with Standard Provisions, Reporting Requirements,

and Notifications contained in Attachment B of this Order. This includes 24 hour/5 day reporting requirements for any instance of non-compliance with this Order as described in section 5.e of Attachment B.

2. All plans, reports and subsequent amendments submitted in compliance with this Order must be implemented immediately (or as otherwise specified). All submittals by Copermittees must be adequate to implement the requirements of this Order.

I, David W. Gibson, Executive Officer, do hereby certify the foregoing is a full, true, and correct copy of an Order adopted by the California Regional Water Quality Control Board, San Diego Region, on October 13, 2010.

\\TENTATIVE
David W. Gibson
Executive Officer

I. PURPOSE

A. This Receiving Waters and MS4 Discharge Monitoring and Reporting Program (MRP) is intended to meet the following goals as they relate to discharges from the Copermittees' MS4:
   1. Assess compliance with Order No. R9-2010-0016;
   2. Measure and improve the effectiveness of the Copermittees' runoff management programs;
   3. Assess the chemical, physical, and biological impacts to receiving waters resulting from MS4 discharges;
   4. Characterize storm water discharges;
   5. Identify sources of specific pollutants;
   6. Prioritize drainage and sub-drainage areas that need management actions;
   7. Detect and eliminate illicit discharges and illicit connections to the MS4;
   8. Assess the overall health of receiving waters; and
   9. Provide information to implement required BMP improvements.

B. This Receiving Waters and MS4 Discharges Monitoring and Reporting Program is designed to answer the following core management questions[1]:
   1. Are conditions in receiving waters protective, or likely to be protective, of beneficial uses?
   2. What is the extent and magnitude of the current or potential receiving water problems?
   3. What is the relative MS4 discharge contribution to the receiving water problem(s)?
   4. What are the sources of pollutants in MS4 discharges that contribute to receiving water problem(s)?
   5. Are conditions in receiving waters getting better or worse?

II. MONITORING PROGRAM

The Monitoring Program is designed to assess the condition of receiving waters, monitor pollutants in storm and non-storm water effluent from the MS4, and conduct Special Studies to address conditions of concern. Where feasible, the Monitoring Program is designed to allow the Copermittees to

[1] Core management questions from "*Model Monitoring Program for Municipal Separate Storm Sewer Systems in Southern California: A report from the Stormwater Monitoring Coalition's Model Monitoring Technical Committee.*" Technical Report No. 419. August 2004.

combine required monitoring elements or efforts that are not mutually exclusive while still meeting the requirements of the Order.

A. Receiving Waters Monitoring Program

Each Copermittee must collaborate with the other Copermittees to develop, conduct, and report on a year-round watershed based Receiving Waters Monitoring Program. The monitoring program design, implementation, analysis, assessment, and reporting must be conducted on a watershed basis for the Santa Margarita Hydrologic Unit (HU) and must be designed to meet the goals and answer the questions listed in section I above. The monitoring program must include the following components:

1. MASS LOADING STATION (MLS) MONITORING

a. Locations: The following existing mass loading stations must continue to be monitored: Lower Temecula Creek, Lower Murrieta Creek at the USGS Weir, and a permanent reference station.[2] Copermittees may propose, for San Diego Water Board review and approval, changing the location of a mass loading station.

b. Frequency: Each mass loading station must be monitored each year ~~three~~ two times during wet weather events and twice during dry weather flow conditions.

Comment [CP1]: See discussion in Attachment 4 to the Comment Letter

c. Timing: Each mass loading station must be monitored for the first wet weather event of the season which meets USEPA's criteria described in 40 CFR 122.21(g)(7). Monitoring of the ~~third~~ second wet weather event must be conducted after February 1. Dry weather mass loading monitoring events must be sampled at least three months apart between May and October. If flows are not evident for the second event, then sampling must be conducted during non-rain events in the following wet weather season.

Comment [CP2]: Consistent with above

d. Protocols: Protocols for mass loading sampling and analysis including analytical methods, target reporting limits, and data reporting formats must be compatible with the State Water Resources Control Board's (State Water Board's) State Surface Water Ambient Monitoring Program (SWAMP). If the mass loading sampling and analysis are determined to be impracticable with the SWAMP standards, the Copermittees must provide a written explanation and discussion in the submittal of the Planned

[2] A map depicting mass loading stations can be found in the Fact Sheet for Order R9-2010-0016.

Monitoring Program. Wet weather samples must be time-weighted composites, ~~collected for the duration of the entire runoff event. Where such monitoring is not practical, such as for large watersheds with significant groundwater recharge flows, composites must be~~ collected at a minimum during the first 3 hours of flow or for the duration of the entire runoff event if it is less than three hours. Grab samples are acceptable for Dry weather event sampling ~~must be time-weighted composites composed of 24 discrete hourly samples, whereby the mass loads of pollutants are calculated as the product of the composite sample concentration and the total volume of water discharged past the monitoring point during the time of sample collection~~.

Comment [CP3]: As discussed in our meeting, this is a large watershed with significant GW recharge flows

Comment [CP4]: See discussion in Attachment 4 to the Comment Letter

(1) Automatic samplers must be used to collect wet weather samples from mass loading stations.

(2) Grab samples must be analyzed for temperature, pH, specific conductance, biochemical oxygen demand, oil and grease, total coliform, fecal coliform, enterococcus and for total petroleum hydrocarbons whenever a sheen is observed.

e. Copermittees must measure or estimate flow rates and volumes for each mass loading station sampling event to determine mass loadings of pollutants. Data from nearby USGS gauging stations may be utilized, or flow rates may be estimated in accordance with the USEPA Storm Water Sampling Guidance Document (EPA-833-B-92-001), Section 3.2.1.

f. In the event that the required number of sampling events are not conducted during one monitoring year at any given station, the Copermittees must provide a written explanation for the reduced number of sampling events in the subsequent Receiving Waters Monitoring Annual Report. The explanation must include, at a minimum, streamflow data from the nearest USGS gauging station, a full description of any equipment failures and subsequent remedies, efforts made to resample a future event, and any quality assurance or quality control issues encountered. The explanation must also include a description of steps taken to prevent further sampling failures.

g. The following constituents must be analyzed for each monitoring event at each station:

Table 1. Analytical Testing for Mass Loading (A.1) and Bioassessment (A.2)

Comment [CP5]: See discussion in Attachment 4 to the Comment Letter

Conventionals, Nutrients, Hydrocarbons	Pesticides	Metals (Total and Dissolved)	Bacteriological (mass loading)
• Total Dissolved Solids • Total Suspended Solids • Turbidity • Total Hardness • pH • Specific Conductance • Temperature • Dissolved Oxygen • Total Phosphorus • Dissolved Phosphorus • Nitrite ◌̊ • Nitrate ◌̊ • Total Kjeldahl Nitrogen • Ammonia • ~~Biological Oxygen Demand, 5-day~~ • ~~Chemical Oxygen Demand~~ • ~~Total Organic Carbon~~ • ~~Dissolved Organic Carbon~~ • Methylene Blue Active Substances • Oil and Grease • Sulfate	• Diazinon • Chlorpyrifos • Malathion • ~~Carbamates~~ • Pyrethroids	• Arsenic • Cadmium • Total Chromium • ~~Hexavalent Chromium~~ • Copper • Lead • Iron • Manganese • Nickel • Selenium • Zinc • Mercury • Silver • Thallium	• Total Coliform • Fecal Coliform • Enterococcus

◌̊ Nitrate and nitrate may be combined and reported as nitrate + nitrite.

h. Toxicity testing must be conducted for each monitoring event at each station according to the following Table 2:

Table 2. Toxicity Testing for Mass Loading (A.1) and Bioassessment (A.2)

Program Component	*Dry Weather Flows*	*Storm Water Flows*
	Freshwater Organisms	**Freshwater Organisms**
Mass Loading	~~3~~ 2 chronic* ~~3~~ 2 acute*	~~3~~ 2 acute*
Bioassessment**	~~3~~ 2 chronic* ~~3~~ 2 acute*	n/a
Sediment Toxicity Special Study	1 chronic 1 acute	n/a

Table Notes
* Toxicity testing must include use of *Pimephales promelas* (fathead minnow), *Hyalella azteca* ~~and *Pseudokirchneriella subcapitata (formerly Selenastrum capricornutum, unicellular algae*~~).
** Duplicative toxicity testing is not required for bioassessment stations located at mass loading stations as bioassessment must be conducted in conjunction with dry weather mass loading

Species Notes:
1. Acute toxicity may be determined during the course of chronic toxicity monitoring per U.S. EPA protocols.

Comment [CP6]: See discussion in Attachment 4 to the Comment Letter

Comment [CP7]: Consistent with the changes discussed in the comment letter

i. The presence of acute toxicity must be determined in accordance with USEPA protocol (EPA-821-R-02-012). The presence of chronic freshwater toxicity must be determined in accordance with USEPA protocol (EPA-821-R-02-013).

2. Stream Assessment Monitoring

Copermittees must conduct Stream Assessment Monitoring using multiple lines of evidence to assess the condition of biological communities in freshwater receiving waters. Stream assessment must include the collection and reporting of the following specified instream biological, chemical, physical (including habitat) data.

a. Locations: At a minimum, the program must consist of station identification, sampling, monitoring, and analysis of data for ~~six~~ three stream assessment stations in order to determine the biological and physical integrity of streams within the County of Riverside. The two existing mass loading stations at Murrieta and Temecula Creeks ~~must continue to be monitored. Two reference stream bioassessment stations, including~~and the existing Adobe Creek reference station, must continue to be monitored.~~be~~

Comment [CP8]: See discussion in Attachment 4 to the Comment Letter

~~identified, sampled, monitored, and analyzed~~. Copermittees may propose, for San Diego Water Board review and approval, changing the location of a Bioassessment station. Locations of alternate reference stations must be identified according to protocols outlined in "A Quantitative Tool for Assessing the Integrity of Southern Coastal California Streams," by Ode, et al. 2005.[3]

Comment [CP9]: Language from MLS section. This is to allow for changes in MLS locations, and then allow the stream assessment stations to follow.

b. Frequency: Stream assessment stations must be monitored in May or June (to represent the influence of wet weather on the communities) ~~and~~ or September or October (to represent the influence of dry weather flows on the communities). The timing of monitoring of stream assessment stations must coincide with dry weather monitoring of mass loading stations.

Comment [CP10]: See discussion in Attachment 4 to the Comment Letter

c. Parameters / Methods: Stream assessment monitoring must include bioassessment, aquatic chemistry, and aqueous toxicity.

(1) Aquatic chemistry and aqueous toxicity must be conducted as outlined in Tables 1 and 2 using the same parameters and methods as the mass loading station monitoring.

(2) Bioassessment analysis procedures must include calculation of the Index of Biotic Integrity (IBI) for benthic macroinvertebrates for all bioassessment stations, as outlined in "A Quantitative Tool for Assessing the Integrity of Southern Coastal California Streams," by Ode, et al. 2005.

(3) ~~Monitoring of stream bioassessment stations~~Bioassessment must be conducted according to bioassessment Standard Operating Procedures (SOP) developed by the Surface Water Ambient Monitoring Program (SWAMP), as amended.[4] In collecting macroinvertebrate samples, the discharger must use the "Reachwide Benthos (Multihabitat) Procedure." The discharger must conduct, concurrently with all required macroinvertebrate collections, the "full" suite of physical/habitat characterization measurements specified in the SWAMP Bioassessment SOP, and as summarized in the *SWAMP*

Comment [CP11]: Only the Bioassessment component of stream assessment monitoring must be conducted according to the SOP.

[3] Ode, et al. 2005. "A Quantitative Tool for Assessing the Integrity of Southern Coastal California Streams." Environmental Management. Vol. 35, No. 1, pp. 1-13.
[4] Ode, P.R.. 2007. Standard operating procedures for collecting macroinvertebrate samples and associated physical and chemical data for ambient bioassessments in California. California State Water Resources Control Board Surface Water Ambient Monitoring Program (SWAMP) Bioassessment SOP 001.

Stream Habitat Characterization Form — Full Version. [5]

(4) Monitoring of stream assessment stations must incorporate assessment of algae using SWAMP's SOP for Collecting Stream Algae Samples.[6] Assessment of freshwater algae must include algal taxonomic composition (diatoms and/or soft algae) and algal biomass. Future bioassessment must incorporate algal IBI scores, when developed.

d. A qualified professional environmental laboratory must perform all Bioassessment sampling, laboratory, quality assurance, and analytical procedures in accordance with the Southern California Regional Watershed Monitoring Program Bioassessment Quality Assurance Project Plan.[7] The Copermittees must utilize future Quality Assurance Project Plans as developed by SWAMP.

Comment [CP12]: This section is referring to the Bioassessment component of stream assessment monitoring

(1) The Copermittees must have and follow a quality assurance (QA) plan that covers the required stream assessment monitoring. External QA check must be funded by the Copermittees, and performed by the California Department of Fish and Game's Aquatic Bioassessment Laboratory. An alternate laboratory with equivalent expertise and performance may be used if approved in advance in writing by San Diego Water Board.

(2) Identified organisms must be archived (i.e., retained) by the Copermittee(s) for a period of not less than three years from the date that all QA steps are completed. The identified organisms must be relinquished to the San Diego Water board upon request by the San Diego Board.

(3) The macroinvertebrate results (i.e., taxonomic identifications consistent with the specified SAFIT STEs, and number of organisms within each taxa) must be submitted to the San Diego Water Board in electronic format. SWAMP is currently developing standardized formats for reporting bioassessment data. All bioassessment data collected after those formats become available must be submitted using the SWAMP

[5] Available at: http://www.waterboards.ca.gov/water_issues/programs/swamp/docs/reports/fieldforms_fullversion052908.pdf

[6] Fetcher et al. 2009. Standard Operating Procedures for Collecting Stream Algae Samples and Associated Physical Habitat and Chemical Data for Ambient Bioassessments in California.

formats. Until those formats are available, the biological data must be submitted in MS-Excel[87] (or equivalent) format.

~~(4)~~ The physical/habitat data must be reported using the standard format titled *SWAMP Stream Habitat Characterization Form — Full Version*.

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3. Follow-up Analysis and Actions (TIE and TRE Triad Approach)

When results from the required monitoring indicate water quality impacts at a mass loading station or stream assessment station as defined in Table 3, Copermittees within the watershed(s) that discharge to that location must evaluate the extent and causes of MS4 discharge pollution in receiving waters and prioritize and implement management actions to eliminate or reduce sources of pollutants from the MS4 as described in Table 3. Toxicity Identification Evaluations (TIEs) must be conducted to determine the cause of toxicity as outlined in Table 3 below. Other follow-up activities, which must be conducted by the Copermittees, are also identified in Table 3. Once the cause of toxicity has been identified by a TIE, the Copermittees must perform source identification projects as needed and implement the measures necessary to reduce or eliminate the pollutant discharges and abate the sources causing the toxicity.

[8] Any version of Excel, 2000 or later, may be used.

approval. Documentation of participation and monitoring must be included in the annual report(s).

B. Wet Weather MS4 Discharge Monitoring

Each Copermittee must collaborate with the other Copermittees to develop, conduct, and report on a year-round, watershed-based, Wet Weather MS4 Discharge Monitoring Program. The monitoring program design, implementation, analysis, assessment, and reporting must be conducted on a watershed basis for each of the hydrologic subareas within the Santa Margarita HU under jurisdiction of the Copermittees. The monitoring program must be designed to meet the goals, and answer the questions, listed in Section I above, as well as to implement required Storm Water Action Levels (SALs) in the Order. The monitoring program must include the following components;

1. MS4 OUTFALL MONITORING

The Copermittees must collaborate to develop and implement a monitoring program to characterize pollutant discharges from MS4 outfalls in each watershed during wet weather. The program must include the rationale and criteria for selection of outfalls to be monitored. The program must, at a minimum, include collection of samples for pollutants listed in Table 4 (below). This monitoring program must be designed to sample ~~a~~ representative ~~percentage~~[11] ~~of the~~ major outfalls ~~within each hydrologic subarea~~ and must begin no later than the 2012-2013 monitoring year.

a. The program must comply with Section D of this Order for Storm Water Action Levels (SALs). ~~Samples must be collected during the first 24 hours of the storm water discharge or for the entire storm water discharge if it is less than 24 hours~~.

(1) Sampling may be done utilizing grab samples, though composite samples are encouraged. ~~Grab samples may be utilized only for pH, indicator bacteria, DO, temperature and hardness.~~

~~(2) All other constituents must be sampled using 24-hour composite samples or for the entire storm water discharge if the storm event is less than 24 hours.~~

b. Sampling to compare MS4 outfall discharges with total metal SALs must include a measurement of receiving water hardness at each

[11] A representative ~~percentage~~ determination must consider ~~hydrologic conditions,~~ total drainage area of the site, ~~population density of the site, traffic density, age of the structures or buildings in the area, and~~ land use

Comment [CP13]: See discussion in Attachment 4 to the Comment Letter, including footnote

Comment [CP14]: See discussion in Attachment 4 to the Comment Letter

Language from the Inland Aquatic Habitat Monitoring section.

types (commercial, residential and industrial), and other considerations as appropriate.

outfall. If a total metal concentration exceeds a SAL in Section D of the Order, that concentration must be compared to the California Toxic Rule criteria and the USEPA 1-hour maximum concentration for the detected level of receiving water hardness associated with that sample. If it is determined that the sample's total metal concentration for that specific pollutant exceeds the SAL but does not exceed the applicable 1-hour criteria for the measured level of hardness, then the SAL shall be considered not exceeded for that measurement.

Table 4. Analytical Testing for Wet Weather MS4 Discharges

Conventionals, Nutrients, Hydrocarbons	Pesticides	Metals (Total and Dissolved)	Bacteriological
• Total Dissolved Solids • Total Suspended Solids • Turbidity★ • Total Hardness • pH • Specific Conductance • Temperature • Dissolved Oxygen • Total Phosphorus★ • Dissolved Phosphorus • Nitrite ♢★ • Nitrate ♢★ • Total Kjeldahl Nitrogen • Ammonia • ~~Biological Oxygen Demand, 5-day~~ • ~~Chemical Oxygen Demand~~ • ~~Total Organic Carbon~~ • ~~Dissolved Organic Carbon~~ • Oil and Grease • Sulfate	• Diazinon • Chlorpyrifos • Pyrethroids	• Arsenic • Cadmium★ • Chromium • Copper★ • Lead★ • Nickel • Selenium • Zinc★ • Mercury • Silver • Thallium • Iron • Manganese	• Fecal Coliform • Enterococcus • E. coli
♢ Nitrate and nitrate may be combined and reported as nitrate + nitrite. ★Pollutant for which there is a Storm Water Action Level			

Comment [CP15]: See discussion in Attachment 4 to the Comment Letter

2. SOURCE IDENTIFICATION ~~MONITORING~~

Comment [CP16]: Source identifications for wet weather may or may not include "monitoring".

See discussion in Attachment 4 to the Comment Letter

The Copermittees must collaborate to develop and implement a ~~monitoring~~ program to identify sources of pollutants causing the priority water quality problems within each hydrologic subarea. The ~~monitoring~~ program must include focused monitoring ~~which moves upstream into each watershed~~ as necessary to identify source areas,

Comment [CP17]: This presumes we are starting at the 'bottom of the watershed'. We may approach this differently, but would come up with something to help identify source areas.

or other methods to identify the societal sources of pollutants, as appropriate. This ~~monitoring~~ program must ~~be implemented within each hydrologic subarea and must~~ begin no later than the 2012-2013 monitoring year.

Comment [CP18]: This is necessary because some pollutants have broad societal sources that cannot be pinpointed through focused source ID 'Monitoring'.

3. COMMENCEMENT OF MS4 OUTFALL AND SOURCE IDENTIFICATION MONITORING

The Principal Copermittee must submit to the San Diego Water Board for review and approval, a detailed draft of the wet weather MS4 discharge monitoring program to be implemented. The description must identify and provide the rationale for all constituents monitored, locations of monitoring, frequency of monitoring, and analyses to be conducted with the data generated. The draft must be submitted With the proposed monitoring program (Secion III.A.1).

C. Non-Storm Water Dry Weather Action Levels and Illicit Discharge Detection and Elimination

Each Copermittee must collaborate with the other Copermittees to conduct, and report on a year-round watershed based Dry Weather Non-storm Water MS4 Discharge Monitoring Program. The monitoring program's implementation, analysis, assessment, and reporting must be conducted to assess compliance with section B and C of this Order, meet the goals of the MRP, and conduct Illicit Discharge Detection and Elimination Activities under Section F.4 of this Order. The monitoring program must also be designed to assess the contribution of dry weather flows to Clean Water Act Section 303(d) listed impairments. The monitoring program must include the following components:

1. MS4 OUTFALL MONITORING

Each Copermittee's program must be designed to determine levels of pollutants in effluent discharges from the MS4 into receiving waters. Each Copermittee must conduct the following dry weather field screening and analytical monitoring tasks:

a. Dry Weather Non-storm Water Effluent Analytical Monitoring Station Identification

(1) Sampling Stations must be located at major outfalls pursuant to section C of this Order. Other outfall sampling points (or any other point of access such as manholes) identified by the

Copermittees as potential high risk sources of polluted effluent or as identified under Section C.4 of the Order must be sampled.

(2) Each Copermittee must clearly identify each dry weather effluent analytical monitoring station on its MS4 Map as either a separate GIS layer or a map overlay hereinafter referred to as a Dry Weather Non-storm Water Effluent Analytical Stations Map.

b. Develop Dry Weather Non-storm Water Effluent Analytical Monitoring Procedures

Each Copermittee must develop and/or update written procedures for effluent analytical monitoring including field observations, monitoring, and analyses to be conducted. These procedures must be consistent with 40 CFR part 136. At a minimum, the procedures must meet the following guidelines and criteria:

(1) Determining Sampling Frequency: Effluent analytical monitoring must be conducted at major outfalls and identified stations. The Copermittees must sample ~~a~~ representative ~~number of~~ major outfalls and identified stations ~~within each hydrologic subarea~~.[12] The sampling must be done to assess compliance with dry weather non-storm water action levels pursuant to section C of this Order. All monitoring conducted must be preceded by a minimum of 72 hours of dry weather.

Comment [CP19]: See discussion in Attachment 4 to the Comment Letter, including footnote

(2) Sampling of non-storm water discharges may be done utilizing grab samples. If a ponded MS4 discharge is observed at a monitoring station, the Copermittee(s) must record the observation and collect at least one (1) grab sample See discussion in Attachment 4 to the Comment Letter. ~~.~~ If flow is evident, a 1-hour composite sample may be taken. The Copermittee(s) must estimate the flow using techniques such as by measuring the width of water surface, approximate depth of water, and approximate flow velocity.

(3) Effluent samples must undergo analytical laboratory analysis for (a) all constituents described in *Table 4. Analytical Testing for Wet Weather MS4 Discharges* ~~*Table 1. Analytical Testing for Mass Loading and Bioassessment*~~ of this Order; (b) Constituents with assigned non-storm water action levels under Section C of this Order; and (c) Total Residual Chlorine.

Comment [CP20]: Table 4 is more appropriate – consistency for all MS4 outfall stations.

[12] A representative ~~percentage~~ determination must consider ~~hydrologic conditions~~, total drainage area of the site, ~~population density of the site, traffic density, age of the structures or buildings in the area~~, and land use

types (commercial, residential and industrial) , and other considerations as appropriate.

(4) If the station is dry (i.e. no flowing or ponded MS4 discharge is observed), the Copermittee(s) must make and record all applicable observations on the ~~MS4 outfall and receiving waters~~monitoring site, including any evidence of past non-storm water flows and the presence of trash.

2. SOURCE IDENTIFICATION MONITORING

The Copermittees must collaborate to develop and implement a monitoring program to identify sources of pollutants in non-storm water discharges in accordance with Sections C and F.4 of this Order. The source identification portion of the monitoring program must include: the following components:

a. Development and/or update of response criteria for dry weather non-storm water effluent analytical monitoring results:

(1) Response Criteria must include action levels described in Section C of this Order.

(2) Response Criteria must include evaluation of LC_{50} levels for toxicity to appropriate test organisms.

b. Develop and/or update Illicit Discharge Detection and Elimination response procedures for source identification follow up investigations and elimination in the event of exceedance of dry weather non-storm water effluent analytical monitoring result criteria (see above). These procedures must be consistent with procedures required in section C, F.4.d, and F.4.e. of this Order.

3. COMMENCEMENT OF MS4 OUTFALL AND SOURCE IDENTIFICATION MONITORING

The Copermittees must commence implementation of dry weather effluent analytical monitoring under the requirements of this Order no later than **July 1, 2012**. If monitoring indicates an illicit connection or illegal discharge, the Copermittee(s) must conduct the follow-up investigation and elimination activities described in sections C, F.4.d and F.4.e of this Order. In the interim period until the dry weather non-storm water effluent analytical monitoring program of this Order is implemented, each Copermittee must continue to implement dry weather field screening and analytical monitoring as it was most recently implemented pursuant to Order No. 2004-001.

D. ~~**High Priority Inland Aquatic Habitat Monitoring**~~

Comment [CP21]: See discussion in Attachment 4 to the Comment Letter

The Copermittees must develop and submit for approval to the San Diego Water Board by April 01, 2012, an inland aquatic habitat monitoring program for areas supporting high priority aquatic and/or riparian species. The goal of the monitoring program is to assess if MS4 storm water and non-storm water discharges are affecting high priority inland aquatic habitat. The monitoring will assist the Copermittees in preventing the degradation of high quality waters within the jurisdiction of this Order that support high priority species by identifying discharges from MS4s which may cause or have the potential to cause impairment of beneficial uses within these areas.[1310] High priority species include those federally and/or state listed as endangered, threatened, or as a species of concern. The design and goal of the monitoring program must be consistent with the criteria listed in Section I.B of this Monitoring Program, including evaluation of the protection of high priority species in receiving waters. The Copermittees must implement the program unless otherwise directed in writing by the San Diego Water Board.

The monitoring program must include the following components:

1. OUTFALL AND RECEIVING WATER MONITORING

   The program must be designed to determine levels of pollutants in storm water and non-storm water effluent discharges from the MS4 discharged into high priority inland aquatic habitat(s) and the level of those pollutants found in ambient receiving waters subject to the discharge. The Copermittees must conduct the following field screening and analytical monitoring tasks:

   a. MS4 and Receiving Waters Monitoring Station Identification

      (1) MS4 Discharge Stations must be major outfalls that directly discharge into high priority inland aquatic habitat. MS4 Discharge Stations may be selected in conjunction with monitoring required under Section II.B and II.C of the Receiving Waters and MS4 Discharge Monitoring Program.

      (2) Receiving water station(s) must be located upstream and downstream of the discharge within the high priority inland aquatic habitat. Receiving water stations must be located to prevent any significant co-mingling of receiving water flows with

[10] [13]In accordance with requirements of State Water Resources Control Board Resolution No. 68-16, Statement of Policy with Respect to Maintaining High Quality Waters in California.

other sources.

b. Develop Analytical Monitoring Procedures

Each Copermittee must develop procedures for analytical monitoring (these procedures must be consistent with 40 CFR part 136), including field observations, pollutants to be monitored, analyses to be conducted, and quality assurance/control. At a minimum, the procedures must meet the following guidelines and criteria:

(1) Determining Sampling Frequency: The Copermittees must sample ~~a~~ representative ~~number of~~ major outfalls and receiving waters that are considered high priority inland aquatic habitat. Sampling of the discharge and receiving waters must be paired and occur during both storm and non-storm conditions.

(2) Sampling may be done utilizing grab samples, though composite samples are encouraged. ~~Sampling of storm and non-storm water discharges from the MS4 must be done in accordance with Section II.B and II.C.~~ If ponded discharge or receiving waters is/are observed at a monitoring station, the Copermittees must make written observations and collect at least one (1) grab sample. The Copermittee(s) must estimate the flow using techniques such as by measuring the width of water surface, approximate depth of water, and approximate flow velocity

(3) The proposed constituents for which samples will undergo analytical laboratory analysis.

(4) Procedures for recording applicable observations when monitoring stations are dry (i.e. no flowing water or ponded conditions).

3. ASSESSMENT OF MONITORING RESULTS

The program must include a discussion of monitoring results within the monitoring annual report. The discussion must include an evaluation of the contribution of MS4 discharges to ambient water conditions within high priority inland aquatic habitats, as well as any actions taken to prevent and/or reduce sources of those pollutants.

4. SOURCE IDENTIFICATION MONITORING

The Copermittees must collaborate to conduct source identification monitoring in accordance with Section II.B and II.C of the Monitoring and Reporting Program of this Order.

E. Special Studies

1. The Copermittees must conduct special studies, including any monitoring required for TMDL development and implementation, as directed by the San Diego Water Board.

2. Stormwater Monitoring Coalition Regional Monitoring of Southern California's Coastal Watersheds:

   The Copermittees must implement the monitoring program developed by the Bioassessment Workgroup of the Stormwater Monitoring Coalition, for Regional Monitoring of the Southern California's Coastal Watersheds within the San Juan Hydrologic Unit. Each Copermittee must evaluate the results of the monitoring program within and downstream of its jurisdiction and integrate the results into program assessments and modifications.

3. Low Impact Development Integrated Management Practices, testing and demonstration facility

   The Southern California Stormwater Monitoring Coalition (SMC) is conducting a study to measure the effectiveness of various LID BMPs. The Copermittees must participate in that study through implementation of their plan to construct an LID IMP Testing and Demonstration Facility at the District's headquarters. The project shall monitor effectiveness of the tested BMPs at pollutant reduction. The results of this study shall be summarized in the fourth year annual report and utilized in future revisions to the County's LID BMP manual.

~~2.~~4. ~~Sediment Toxicity Study~~

The Copermittees must develop and submit for approval to the San Diego Water Board by April 01, 2012, a special study workplan to investigate the toxicity of sediment in streams and potential impact on benthic macroinvertebrate IBI scores. The Sediment Toxicity Special Study must be implemented in conjunction with the Stream Assessment Monitoring in II.A.2.. The Copermittees must implement the special study unless otherwise directed in writing by the San Diego Water Board.

Comment [CP22]: See discussion in Attachment 4 to the Comment Letter

Comment [CP23]: See discussion in Attachment 4 to the Comment Letter

Comment [CP24]: Request remove **See discussion in Attachment 4 to the Comment Letter**

The Sediment Toxicity Special Study must include the following elements:

a. Sampling Locations: At ~~least 4~~the bioassessment locations identified pursuant to II.A.2. must be sampled, including 1 reference site and 1 mass loading site. Selection of sites must be done with consideration of subjectivity of receiving waters to discharges from residential and agricultural land uses.

b. Frequency: At a minimum, sampling must occur once per year at each site for at least 2 years. Sampling must be done in conjunction with the bioassessment sampling required under Section II.A.2 of the Monitoring and Reporting Program of this Order.

c. Parameters/Methods: At a minimum, sediment toxicity analysis must include the measurement of metals, pyrethroids and organochlorine pesticides. The analysis must include estimates of bioavailability based upon sediment grain size, organic carbon and receiving water temperature at the sampling site. Acute and chronic toxicity testing must be done using *Hyalella azteca* in accordance with Table 2.

d. Results: Results and a Discussion must be included in the Monitoring Annual Report (see III.A). The Discussion must include an assessment of the relationship between observed IBI scores under Section II.A.2 and all variables measured.

~~3.~~5. Trash and Litter Investigation

The Copermittees must develop and submit for approval to the San Diego Water Board by September 01, 2012, a special study workplan to assess trash (including litter) as a pollutant within receiving waters on a watershed based scale. Litter is defined in California Government Code 68055.1g as "…improperly discarded waste material, including, but not limited to, convenience food, beverage, and other product packages or container constructed of steel, aluminum, glass, paper, plastic and other natural and synthetic, materials, thrown or deposited on lands and waters of the state, but not including the properly discarded waste of the primary processing of agriculture, mining, logging, sawmilling, or manufacturing." A lead Copermittee must be selected for the Santa Margarita HU for the purposes of this Special Study. The Copermittees must implement the special study unless

otherwise directed in writing by the San Diego Water Board

The Trash and Litter Investigation must include the following elements:

a. Locations: The lead Copermittee must identify suitable sampling locations within the Santa Margarita HU.

b. Frequency: Trash at each location must be monitored a minimum of twice during the wet season following a qualified monitoring storm event (minimum of 0.1 inches preceded by 72 hours of dry weather) and twice during the dry season.

c. Protocol: The lead Copermittee for the watershed must use the "Final Monitoring Workplan for the Assessment of Trash in San Diego County Watersheds" and "A Rapid Trash Assessment Method Applied to Waters of the San Francisco Bay Region" to develop a monitoring protocol for the Santa Margarita HU.

d. Results and Discussion from the Trash and Litter Impairment Study must be included in the Monitoring Annual Report. The Results and Discussion must, at a minimum, include source identification, an evaluation of BMPs for trash reduction and prevention, and a description of any BMPs implemented in response to study results.

4.6. ~~Agricultural, Federal and Tribal Input Study~~

Comment [CP25]: Request remove
See discussion in Attachment 4 to the Comment Letter

The Copermittees must develop and submit for approval to the San Diego Water Board by September 01, 2012, a special study workplan to investigate the water quality of agricultural, federal and tribal runoff that is discharged into their MS4 (see Finding D.3.c of the Order). The Copermittees must implement the special study unless otherwise directed in writing by the San Diego Water Board.

The Agricultural, Federal and Tribal Input Special Study must include the following elements:

a. Locations: The Copermittees must identify a representative number of sampling stations within their MS4 that receive discharges of agricultural, federal, and tribal runoff that has not co-mingled with any other source. At least one station from each category must be identified.

b. Frequency: One storm event must be monitored at each sampling location each year for at least 2 years.

c. Parameters/Methods: At a minimum, analysis must include those constituents listed in Table 1 of the MRP (see II.A.1). Grab samples may be utilized, though composite samples are preferred. Copermittees must also measure or estimate flow rates and volumes of discharges into the MS4.

d. Results: Results and Discussion from the Agricultural, Federal and Tribal Input Study must be included in the Monitoring Annual Report.

~~5. MS4 and Receiving Water Maintenance Study~~

Comment [CP26]: Request remove
See discussion in Attachment 4 to the Comment Letter

The Copermittees must develop and submit for approval to the San Diego Water Board by April 01, 2012, a special study workplan to investigate receiving waters that are also considered part of the MS4 (see Finding D.3.c of the Order) and which are subject to continual vegetative clearance activities (e.g. mowing). The study must be designed to assess the effects of vegetation removal activities and water quality, including, but not limited to, modification of biogeochemical functions, in-stream temperatures, receiving water bed and bank erosion potential and sediment transport. The Copermittees must implement the special study unless otherwise directed in writing by the San Diego Water Board.

The MS4 and Receiving Water Maintenance Special Study must include the following elements:

~~a.~~e. Locations: The Copermittees must identify suitable sampling locations, including at least one reference system that is not subject to maintenance activities.

~~b.~~f. Parameters/Methods: At a minimum, the Copermittees must monitor pre and post maintenance activities for indicator bacteria, turbidity (NTU), temperature, dissolved oxygen and nutrients (Nitrite, Nitrate, Total Kjeldahl Nitrogen, Ammonia and Total Phosphorous). Copermittees must also measure or estimate flow rates and volumes.

~~c.~~g. Results and Discussion from the MS4 and Receiving Water Maintenance Study must be included in the Annual Monitoring Report. The Discussion must include relevance of findings to CWA

Section 303(d) listed impaired waters.

6.7. ~~Intermittent and Ephemeral Stream Perennial Conversion Study~~

Comment [CP27]: Request remove
See discussion in Attachment 4 to the Comment Letter

The Copermittees must develop and submit for approval to the San Diego Water Board by April 01, 2013, a special study workplan to investigate the extent of any impacts to beneficial uses from the conversion of historically ephemeral or intermittent receiving waters to perennially flowing waters due to the continued discharge of currently exempted non-storm water from the MS4 and/or discharges into MS4s covered under a separate NPDES permit into receiving waters. The goal of the study is to assess if any impacts to beneficial uses, including, but not limited to, WILD, WARM, COLD or RARE, have occurred due to continuous discharge of currently exempted non-storm water discharges, and if the discharges should no longer be exempt. The Copermittees must implement the special study unless otherwise directed in writing by the San Diego Water Board.

The Intermittent and Ephermeral Stream Perennial Conversion Special Study must include the following elements:

a. Locations: The Copermittees must investigate their MS4 and adjacent downstream receiving waters to identify portions that have historically been ephemeral or intermittent but currently exhibit perennial flow due to exempted non-storm water discharges. Investigation must include historic habitat assessments, USGS gauging information, and historic aerial photography. Sampling must occur at a minimum of 2 identified perennially converted locations. Should the Copermittees be unable to locate any converted waters, a full description of the investigation must be documented in the annual report.

b. Parameters/Methods: The Copermittees must conduct water quality monitoring of the non-storm water discharge in accordance with Section C of this Order. In addition, the Copermittees must select a minimum of 2 downstream sampling points within the receiving waters subject the discharge and conduct the following:

(1) Grab samples must be taken and analyzed for indicator bacteria, nutrients (Nitrite, Nitrate, Total Kjeldahl Nitrogen, Ammonia and Total Phosphorous), turbidity (NTU), temperature, dissolved oxygen, total hardness, pH and 303(d) listed pollutants for all receiving waters at or downstream of the sampling site. The Copermittees must measure or estimate flow

2. Monitoring Annual Report: The Principal Copermittee must submit the Receiving Waters and MS4 Discharge Monitoring Annual Report to the San Diego Water Board on October 1 of each year, beginning on **October 1, 2013**. Receiving Waters and MS4 Discharge Monitoring Annual Reports must cover the monitoring activities and results from the previous fiscal year, and must meet the following requirements:

Comment [CP28]: See discussion in Attachment 4 to the Comment Letter

a. Annual monitoring reports must include the data/results, methods of evaluating the data, graphical summaries of the data, and an explanation/discussion of the data for each monitoring program component.

b. Annual monitoring reports must include a watershed-based analysis of the findings of each monitoring program component (mass loading, bioassessment, etc…). Each watershed-based analysis must include:

(1) Identification and prioritization of water quality problems within each watershed.
(2) Identification and description of the nature and magnitude of potential sources of the water quality problems within each watershed.
(3) Evaluation and presentation of pollutant load and concentration increases or decreases at each mass loading station over time.
(4) Evaluation of pollutant loads and concentrations measured at mass loading stations with respect to land use, population, sources, and other characteristics of watersheds using tools such as multiple linear regression, factor analysis, and cluster analysis.
(5) Identification of links between source activities/conditions and observed receiving water impacts.
(6) Identification of recommended future monitoring to identify and address sources of water quality problems.
(7) Results and discussion of any TIE conducted, together with actions that will be implemented to reduce the discharge of pollutants in storm water MS4 discharges, eliminate any discharge of pollutants in non-storm water MS4 discharges, and abate the sources causing the toxicity.

c. Annual monitoring reports must include an analysis and interpretation of the data for each watershed with respect to the management questions listed in section I.B of this Receiving Waters Monitoring and Reporting Program.

d. Annual monitoring reports must include a discussion describing how each of the goals listed in section I.A of this MRP is addressed by the Copermittees' monitoring program for the monitoring year covered by the report.

e. ~~Annual~~ The 4th year monitoring report~~s~~ must include identification and analysis of any long-term trends in the Copermittees' MS4 storm water discharges or receiving water quality. Appropriate statistical methods shall be used to evaluate the water quality data. ~~Trend analysis must use nonparametric approaches, such as the Mann-Kendall test, including exogenous variables in a multiple regression model, and/or using a seasonal nonparametric trend model, where applicable.~~

f. ~~Annual monitoring reports must provide an estimation of total pollutant loads (wet weather loads plus dry weather loads) due to MS4 Discharge for each of the hydrologic subareas, including for 303(d) pollutants specified in Table 2 of the Order~~.

g. Annual monitoring reports must, for each monitoring program component listed above, include an assessment of compliance with applicable water quality standards.

h. Annual monitoring reports must describe monitoring station locations by latitude and longitude coordinates, frequency of sampling, quality assurance/quality control procedures, and sampling and analysis protocols.

i. Annual monitoring reports must use a standard report format and include the following elements:

(1) A stand alone comprehensive executive summary addressing all sections of the monitoring report;
(2) Comprehensive interpretations and conclusions; and
(3) Recommendations for future actions.

j. All monitoring reports submitted to the Principal Copermittee or the San Diego Water Board must contain the certified perjury statement described in Attachment B of this Order No. R9-2010-0016.

k. Annual monitoring reports must be reviewed prior to submittal to the San Diego Water Board by a committee of the Copermittees (consisting of no less than three different Copermittee members).

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Comment [CP29]: See discussion in Attachment 4 to the Comment Letter

Comment [CP30]: See discussion in Attachment 4 to the Comment Letter

l. Annual monitoring reports must be submitted in both electronic and paper formats. Electronic formats must be CEDEN or SWAMP-uploadable.[1411]

3. Monitoring programs and reports must comply with section II.F of Receiving Waters and MS4 Discharge Monitoring and Reporting Program No. R9-2010-0016 and Attachment B of this Order.

4. Following completion of an annual cycle of monitoring in October, the Copermittees must make the monitoring data and results available to the San Diego Water Board at the San Diego Water Board's request.

B. Interim Reporting Requirements

Prior to July 1, 2012 ~~For the October 2010 to October 2012 monitoring period,~~ the Principal Copermittee must submit the Receiving Waters Monitoring Annual Report as required under Order No. 2004-0001. The Receiving Waters Monitoring Annual Report must address the monitoring conducted to comply with the requirements of Order No. 2004-0001.

Comment [CP31]: The existing monitoring program is reported on a fiscal year basis. Need to align the monitoring report with the fiscal year and the JRMP annual report.

Also consistent with the change requested in III.A.2.

C. Reporting Dates

Table 5. Table of Required MRP Reporting Dates and Frequencies.

Comment [CP32]: See discussion in Attachment 4 to the Comment Letter related to the special studies changes.

Submittal	Section	Completion Date	Frequency
Description of Proposed Monitoring Program	III.A.1	June 1, 2012	One Time
Receiving Waters and MS4 Discharge Monitoring Annual Reports, Including Proposed Updates to the Monitoring Program	III.A.2	Starting October 1, 2013	Annual
Copermittees submit Interim Monitoring Program Annual Report	III.B	As required under Order No. 2004-001	One Time
Draft Wet Weather MS4 Discharge Monitoring Program	II.B	July 01, 2012	One Time
~~Draft High Priority Inland Aquatic Habitat Monitoring~~	~~II.D~~	~~April 01, 2012~~	~~One Time~~
~~Draft Sediment Toxicity Special Study~~	~~II.E.2~~	~~April 01, 2012~~	~~One Time~~
Draft Trash and Litter Impairment Special Study	II.E.3	September 01, 2012	One Time

[11] [14] For updates to the SWAMP templates and formats, see http://www.waterboards.ca.gov/swamp.

Submittal	Section	Completion Date	Frequency
~~Draft Agricultural, Federal and Tribal Input Study~~	~~II.E.4~~	~~September 01, 2012~~	~~One Time~~
~~Draft MS4 and Receiving Water Maintenance Study~~	~~II.E.5~~	~~April 01, 2012~~	~~One Time~~
~~Draft Intermittent and Ephemeral Stream Perennial Conversion Study~~	~~II.E.6~~	~~April 01, 2013~~	~~One Time~~

Attachment 10: Fact Sheet Comments

Introduction

These comments on the Fact Sheet should be read in conjunction with the other white papers submitted as part of the comments on the Tentative Order.

Fact Sheet Text, Page 7:

> "The First and Second Term Permits, Order Nos. 90-46 and 98-02, provided maximum flexibility**.** San Diego Water Board Order No. 90-46 contained the "essentials" of the 1990 regulations, but the requirements were written in very broad, generic terms. This was done in order to provide the maximum amount of flexibility to the Copermittees in implementing the new requirements (flexibility was, in fact, the stated reason for issuing the permit in advance of the final regulations). From staff's perspective however, "flexibility" in the form of lack of specificity, combined with the Copermittees' *lack of funding and political will,* also provided the Copermittees with ample reasons to take few substantive steps towards achieving water quality standards. The situation was exacerbated by the San Diego Water Board's own lack of storm water resources for oversight."

<u>Problem with Text</u>:
The statement regarding a 'lack of funding and political will' is unsupported and inflammatory, and provides no benefit in a public document.

<u>Suggestion:</u>
Delete this statement.

Fact Sheet Text, Page 12 and 13:

> "It is very difficult to ascertain the true cost of implementation of the Copermittees' management programs because of inconsistencies in reporting by the Copermittees. Reported costs of compliance for the same program element can vary widely from city to city, often by a very wide margin that is not easily explained.[6] Despite these problems, efforts have been made to identify management program costs, which can be helpful in understanding the costs of program implementation….
>
> A study on Phase I MS4 program cost was also conducted by the California Regional Water Quality Control Board, Los Angeles Region (Los Angeles Water Board), where program costs reported in the municipalities' annual reports were assessed. The Los Angeles Water Board estimated that average per household cost to implement the MS4 program in Los Angeles County was $12.50. 8 Since the Los Angeles County permit is very similar to Order No. R9-2004-001, this estimate is also useful in assessing general program costs in Riverside County.
>
> The State Water Board also commissioned a study by the California State University, Sacramento to assess costs of the Phase I MS4 program. This study includes an assessment of costs incurred by Phase I MS4s throughout the State to implement their programs. Annual cost per household in the study ranged from $18-46, with the Fresno-Clovis Metropolitan Area (FCMA) representing the lower end of the range, and the City of Encinitas (in San Diego County) representing the upper end of the range.9 Included in the study is the City of Corona, which is in Riverside County

> under the jurisdiction of the California Regional Water Quality Control Board, Santa Ana Region (Santa Ana Water Board).
>
> The annual cost per household for the City of Corona's program was estimated to be $32, which should be similar to the costs to implement the MS4 programs in the Riverside County portion of the San Diego Region. In contrast, the cost of the City of Encinitas' program, with an annual cost per household estimated to be $46, may represent the upper range of Riverside County MS4 programs. However, the City of Encinitas's program cost can be considered as the high end of the spectrum for management program costs because the City has a consent decree with environmental groups regarding its program, and City of Encinitas has received recognition for implementing a superior program.
>
> The annual costs for the City of Corona and City of Encinitas were estimated from data collected in 2003-2004. Between 2003 and 2008, the number of households in both cities has increased by approximately 3 percent and 7 percent, respectively.10 In contrast, between 2003 and 2008 the number of households in the City of Temecula has increased from 23,199 to 31,135 (34 percent)11 and the City of Murrieta has increased from 22,020 to 32,664 (48 percent).12 This significant increase in number of households indicates a significant increase in the tax base (sales and property tax) available to fund the implementation of the MS4 programs for the City of Temecula and City of Murrieta, as well as for the County of Riverside and recently incorporated cities."

<u>Problem with Text:</u>
The text notes that it is difficult to compare costs between Cities for stormwater program implementation since the cost accounting varies widely, and the specific issues also vary widely. Despite this fact, the fact sheet goes on to make just such comparisons and further implies that the Santa Margarita Region Cities are underfunding their programs by comparison. For example, the City of Encinitas is cited as an example of a city that is spending on the upper end for a stormwater program. The City of Encinitas varies significantly from the cities in the Santa Margarita area in that it must address a major outfall (Cottonwood Creek) at its primary beach (Moonlight Beach). Cottonwood Creek has perennial dry weather flow from urban sources and exceeds REC-1 and REC-2 water quality standards. Since Cottonwood Creek discharges at Moonlight Beach, frequent sanitary standard exceedences were noted on a year–round basis. The City of Encinitas constructed a dry weather flow treatment plant near Moonlight Beach to treat Cottonwood Creek to correct this problem. No such compliance problems exist for the Copermittees. The comparisons in this part of the fact sheet are not valid.

In addition, the Fact Sheet leaves the inaccurate impression that the Copermittees have ample financial resources to fund MS4 programs by completely ignoring the effects of the current national recession. (See Attachment 2). As pointed out in Attachment 2 (Economic Assessment), declines in home values and tax receipts have crippled the ability of the Copermittees to finance such programs. The Fact Sheet selectively examines the period 2003-2008, when there was significant growth, but ignores the period 2008-2010, when that growth ended and the economy declined precipitously, affecting property and sale tax receipts as well as other sources of revenue.

Attachment 10: Fact Sheet Comments

Suggestion:
Delete the text on Page 13 and 14 of the Fact Sheet.

Fact Sheet Text Page 15:

> "The vast majority of costs that will be incurred as a result of implementing OrderNo. R9-2010-0016 is not new. Storm water management programs have been in place in Riverside County for over 15 years. As shown in the discussion above, the amount spent for MS4 Permit compliance per household in the municipalities in the Riverside County portion of the San Diego Region is already low compared to other regions. Any increase in cost to the Copermittees, however, is still expected to be incremental in nature. Since Order No. R9-2010-0016 "fine tunes" the requirements of Order No. R9-2004-001, these cost increases are expected to be modest.
>
> Where there may be additional elements that will incur new costs, the Riverside County Copermittees are given the time to develop the budgets and funding mechanisms to phase those elements into their programs. Additionally, development of these additional elements by the Riverside County Copermittees will have the benefit of the experiences and work already done by the San Diego County and Orange County Copermittees."

Problem with Text:
The Fact Sheet states that the vast majority of costs for implementing the Tentative Order are 'not new'. This is not correct. Almost every program in the Tentative Order has been amended and require new resources. Specific programs include, but are not limited to, the monitoring program (over fivefold increase in costs), hydromodification management programs, new development programs, inspection programs, irrigation runoff prohibitions, retrofit studies and MS4 maintenance programs. The very prescriptive and detailed requirements of the Tentative Order impose new requirements on the Copermittees at a time when funding sources are drying up. The Copermittees estimate that implementation of the regional components of the new Order (as written) will cost approximately $11,500,000 (e.g. the costs to write the new compliance documents, develop the retrofit, hydromodification programs and develop and implement the new monitoring program). These costs are on top of the current expenditures to implement the existing regional monitoring program (approximately $5,000,000 for the five-year permit term). These costs are further amplified by the direct cost of implementation that will be incurred by the individual Permittees (e.g. the cost to implement the new compliance documents and hydromodification programs). The text further indicates that the Tentative Order provides time for the Permittees to 'develop…funding mechanisms'. This statement assumes that the Copermittees have the ability to collect additional funds from taxpayers to support the stormwater program implementation. This is false, since any such funds, outside of inspection or plan review fees, would be required to be submitted to a vote of the people pursuant to Propostion 218. In the current economic and political climate, a successful vote to increase taxes is extremely remote. The Copermittees further note that in the City of Encinitas in Orange County, cited by the staff as an example of proactive MS4 regulation, a minimal stormwater proposition recently was voted down.

Suggestion:
Delete the text noted above in the Fact Sheet and add a discussion on the difficulties of funding expansions to the Copermittees' stormwater programs due to Proposition 218.

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Fact Sheet Text Page 16:

> "For example, household willingness to pay for improvements in fresh water quality for fishing and boating has been estimated by USEPA to be $158-210.18. This estimate can be considered conservative, since it does not include important considerations such as marine waters benefits, wildlife benefits, or flood control benefits. The California State University, Sacramento study reports that the annual household willingness to pay for statewide clean water is approximately $180.19. When viewed in comparison to household costs for existing management programs, household willingness to pay estimates exhibit that per household costs incurred by the Riverside County Copermittees to implement their management programs are very low."

Problem with Text:
The discussion in the referenced text is not represented correctly. The figure cited in the California State University, Sacramento study includes the cost of wastewater treatment. The author of the study notes:

'The survey question was for restoring water quality for all waters throughout the state from all impairment, not just within a city or region and not just for impairment from stormwater pollution.' The current cost for sewer fees exceed $200 per year, Thus, the vast majority of the "household willingness" figure relates to sanitary sewer costs, and not to the costs of addressing stormwater.

Suggestion:
Delete this text in the fact sheet and note that the cost consumers are currently paying for clean water in the Permit area exceeds that which studies cited have found they are willing to pay.

Fact Sheet Text Page 17:

> "University of California, Los Angeles assessed the costs and benefits of implementing various approaches for achieving compliance with the MS4 permits in the Los Angeles Region. The study found that non-structural systems would cost $2.8 billion but provide $5.6 billion in benefit. If structural systems were determined to be needed, the study found that total costs would be $5.7 to $7.4 billion, while benefits could reach $18 billion.[21] Costs are anticipated to be borne over many years – probably ten years at least. As can be seen, the benefits of the programs are expected to considerably exceed their costs. Such findings are corroborated by USEPA, which found that the benefits of implementation of its Phase II storm water rule would also outweigh the costs."

Problem with Text:
It is a basic principle that public spending should have a positive cost-benefit. The Fact Sheet implies that since spending on stormwater has a positive cost-benefit, such spending should be increased. The reality is that there are also other public spending priorities such as police, fire, ambulance, and public utilities competing for the same funding, all of which have positive cost-benefit ratios. Moreover, the UCLA study specifically focused on the benefit of improving beach water quality, which is a very significant economic factor in terms of tourism in coastal Los Angeles County. No beaches exist in the Santa Margarita Region, and given the ephemeral nature of many of the Region's waterways, attempting to extrapolate the UCLA study is not appropriate. In the absence of a similar cost-benefit study being undertaken in the Santa Margarita Region, the studies cited by staff do not provide any basis for the conclusions reached in the Fact Sheet.

Attachment 10: Fact Sheet Comments

Suggestion:
As the fundamental basis for this comment is flawed, in the absence of any local data for inland waterbodies in semi-arid climates, the text should be deleted.

Fact Sheet Text Page 35:

> "Trash, as litter in both solid and liquid form, is consistently found on and adjacent to roadways. A California Department of Transportation Litter Management Pilot Study found that of roadway trash, plastics and Styrofoam accounted for 33 percent of trash by weight, and 43 percent by volume. Further, the study found that approximately 80 percent of the litter associated with roadways was floatable, indicating that, without capture, this litter would enter Waters of the State after a storm event, resulting in the impairment of Beneficial Uses.[45] The study, however, relied upon a mesh capture size of 0.25 inches (6.35 millimeters). This size is too large to effectively capture plastic pre-production pellets (a.k.a. "nurdles"), which are roughly 3 mm in size, and likely underestimated the total contribution of plastics. Furthermore, pre-production plastic pellets, which are small enough to be easily digested, have been found to carry persistent organic pollutants, including PCBs and DDT."

Problem with Text:
While the Fact Sheet suggests that there is a compelling argument to address trash along Caltrans highways, such a problem is not found on municipal streets. The Caltrans studies found that a substantial portion of the litter load comes from uncovered loads on commercial and private vehicles. The low speed roadways operated by the Copermittees do not create similar conditions or handle similar traffic. Further, the text discusses pre-production plastics (nurdles), yet fails to acknowledge that there are no industries within the Copermittees' jurisdiction that manufacture or use this material. The Fact Sheet's citation of studies that have no bearing on actual conditions within the Santa Margarita Region cannot be used to justify programs in the Tentative Order addressing such non-existent conditions. The ROWD has a more informed discussion of trash issues based on actual conditions in the Santa Margarita Region.

Suggestion:
Revise the fact sheet text to discuss the current findings relative to trash in the Permit region based on the ROWD.

Fact Sheet Text Page 50 and 51

> Pg. 50 - "To date the San Diego Water Board and the Copermittees have identified overspray and drainage from potable and reclaimed water landscape irrigation as a substantial source and conveyance mechanism for pollutants into waters of the United States."
>
> Pg. 51 – "The San Diego Water Board and the Copermittees have identified irrigation water as a source of pollutants and conveyance of pollutants to waters of the United States, when applied improperly in excess and thereafter entering the MS4, in the following documents:"

Problem with Text:
The documents cited in the Fact Sheet do not support the conclusion that irrigation water is a source of pollutants or conveyance of pollutants in the *Santa Margarita Region*. First, the comments in the public education document cited in the Fact Sheet were borrowed from an Orange County publication, and do not represent any official conclusion by the Copermittees that irrigation water represents a water quality

threat. Plainly over-irrigation is to be discouraged, as even if the water is clean, it adds to the Copermittees' costs of addressing such waters. Second, this public education document is the *only* document from a Santa Margarita Region source. The other documents cited by staff are studies conducted in other areas, with different hydrology and climate. For a more comprehensive assessment of the irrigation runoff issues, please see Attachment 6 (Prohibition of Irrigation Runoff).

Suggestion:
Delete the referenced text and the quotes referencing Permittee education materials. Also remove the improperly supported irrigation runoff prohibition.

Revise the text to accurately reflect the lack of any connection between irrigation runoff and impairments of receiving waters in the Santa Margarita Region.

Fact Sheet Text Page 58:

> "Enforcement and inspection activities conducted by the San Diego Water Board during the previous permit term have found a lack of source control for many unpaved roads within the jurisdiction of the Copermittees."

Problem with Text:
The Copermittees submit that there is no evidence reflecting any substantial water quality problem relating to MS4 discharges affected by unpaved roads. Moreover, the mileage of unpaved roads in the jurisdiction of the Copermittees is a small percentage of the total mileage of unpaved roads in the Santa Margarita Region, given that many of these roads are operated by such jurisdictions as the U.S. Forest Service. Please see Attachment 5 (Unpaved Roads). Further, the Fact Sheet notes on page 27 that Permits "will cover municipal systems discharges in unincorporated portions of the county, it is the intent of EPA that management plans and other components of the program focus on the urbanized and developing area of the County". Dedicating resources to unpaved roads diverts already limited resources from the urbanized areas intended to be addressed by USEPA regulations.

Suggestion:
The references and associated program requirements should be removed from the Permit and addressed through a separate general permit for unpaved roads, if in fact unpaved roads are a significant source of pollutants.

Fact Sheet Text Page 69:

> "The order also found that the SSMP requirements are appropriately applied to the majority of the Priority Development Project categories that are also contained in section F.1 of this Order. The State Water Board also gave California Regional Water Quality Control Boards (Regional Water Boards) the needed discretion to include additional categories and locations, such as retail gasoline outlets(RGOs), in SSMPs "
>
> "The provisions of the SSMP section of the Order are also consistent with those previously issued by the San Diego Water Board for Riverside County (Order No. R9-2004-001), Southern Orange County (Order Nos. R9-2002-0001 and R9-2009-0002) and San Diego County."

Attachment 10: Fact Sheet Comments

Problem with Text:
Several PDP categories or thresholds are not supported by Order WQ 2000-11 such as the 10,000 square feet requirement for residential areas nor the 1-acre threshold for all development projects. Further the Order ignores other applicable portions of Order WQ 2000-11. Specifically, the memo from State Board Chief Counsel Craig S. Wilson transmitted WQ Order 2000-11 to the Regional Board executive officers states that with regard to discretion that:

> "3. The Order allows broader discretion by the Regional Water Boards to decide whether to include additional types of development in future SUSMPs. These areas for potential future inclusion in SUSMPs include retail gasoline outlets, ministerial projects (only discretionary projects are included in the approved SUSMPs), and projects in environmentally sensitive areas. **If Boards include these types of developments in future permits, the Order explains the types of evidence and findings that are necessary."**

Order 2000-11 requires that revisions to regulatory thresholds be justified economically. The Copermittees have expressed their concern with requirement F.1.d.(2)(a) regulating residential developments of 10,000 sq. ft. or more and requirement F.1.d.(1)(c) regulating any project 1-acre or more. These thresholds, and their relative impact on project proponents, have not been adequately justified. The Permittees have noted that these regulations will negatively impact the construction of custom homes (individual lot developments). The relative economic impact of meeting the SSMP requirements for individual homeowners has not been justified in the fact sheet.

Suggestion:
As shown in the redline markup (Attachment 9); The 1-acre SSMP threshold (F.1.d.(1)(c)) should be deleted and the 10,000 square feet threshold for residential areas (F.1.d.(2)(a)) should be made the same as the requirement contained in the Riverside County Santa Ana NPDES MS4 Permit.

Fact Sheet Text Page76:

> "The success of future stream restoration and stabilization is, however, dependent on preventing and reducing physical impacts from activities upstream. Therefore, hydromodification management measures are necessary upstream of modified (e.g. concrete, rip rap, etc.) channels in addition to non-modified channels."

Problem with Text:
In some areas, hardened channels may be needed for flood control and public safety. In those areas, channel restoration may not be feasible and onsite controls are not warranted. The protection of public safety from flooding is a statutorily required duty of the District. See Water Code App. Section 48-9. Any provisions of the Tentative Order that would presume to challenge this duty must be deleted. The District assumes that the Regional Board and staff are not placing themselves in the position of making flood control judgments, as the agency is neither charged by the Legislature with such obligation nor is the agency equipped to do so.

Suggestion:
Revise the text to add "except where hardened channels are required for the protection of public safety"

Attachment 10: Fact Sheet Comments

Fact Sheet Text Page 77:

> "Since municipalities are the lead permitting authority for industrial land use and construction activities, they are also the lead for enforcement regarding runoff discharges from these sites."

Problem with Text:
This is a leap of logic we should probably not let pass. The Copermittees can greatly influence the design and construction, but the Industrial Permit is focused on the operation of the facility, and that is where the authority of the Board lies - and is arguably the most important aspect of runoff quality from the site.

Suggestion:
Delete the sentence.

Fact Sheet Text Page 79:

> "To clarify, an unaltered natural drainage, which receives runoff from a point source (channeled by a Copermittee to drain an area within their jurisdiction), which then conveys the runoff to an altered natural drainage or a man-made MS4, is both an MS4 and a receiving water."

Problem with Text:
As noted in Attachment 7 (General Legal Comments) regarding Finding D.3.c., a natural drainage, whether or not it conveys point source runoff to a man-made MS4, is not itself part of the MS4.

Suggestion:
Delete text.

Fact Sheet Text Page 79:

> "As operators of the MS4s, the Copermittees cannot passively receive and discharge pollutants from third parties. By providing free and open access to an MS4 that conveys discharges to waters of the U.S., the operator essentially accepts responsibility for discharges into the MS4 that it does not prohibit or otherwise control. These discharges may cause or contribute to a condition of contamination or a violation of water quality standards."

Problem with Text:
First, the Copermittees, as operators of the MS4, are required to address storm drainage. During storm conditions in particular, the District is required to handle flood waters so as to protect the lives and property of residents of Riverside County. The failure to do so is a violation of state law. See Water Code App. Section 48-9. Thus, the Copermittees must "passively receive and discharge" waters from third parties, which waters may contain pollutants. Moreover, the operator of the MS4 is NOT accepting responsibility for discharges from other MS4 systems. There is no provision for joint liability under the federal Clean Water Act or the California Water Code. The former directs its prohibitions against a "discharger," and no others. 33 U.S.C. §§ 1319 and 1342. A party is responsible only for its own discharges or those over which it has control. *Jones v. E.R. Snell Contractor, Inc.*, 333 F.Supp.2d 1344, 1348 (N.D. Ga. 2004); *United States v. Sargent County Water Dist.*, 876 F.Supp. 1081, 1088 (D.N.D. 1992).

The Clean Water Act MS4 regulations, moreover, specifically provide that Copermittees under an MS4 Permit are required to "comply with permit conditions relating to discharges from the municipal separate storm sewers for which they are operators." 40 C.F.R. § 122.26(a)(3)(vi) (emphasis supplied). Moreover,

the Regional Board, as the permitting agency for stormwater and Industrial Permits, and the State Board as the overall agency responsible for compliance with the Clean Water Act in California, are responsible for ensuring that the discharges from such permitted facilities, whether or not they enter the MS4, are in compliance with the requirements of those permits. Finally, many sources of pollutants are beyond the control of the MS4 operators but are within the control of other agencies, if those agencies elect to exercise their authority. A major example is the discharge of metals from motor vehicle brake pads, which contributes to exceedances of copper, zinc and potentially other metals in stormwater. The MS4 operators cannot control the composition of brake pads, nor can the MS4 operators control air emissions from domestic and foreign sources that discharge pollutants onto the surface area of the region, which can then wash into the MS4 systems.

Suggestion:
Delete cited text.

Fact Sheet Text Page 81:

> "Since treatment generally does not occur within the MS4, in such cases reduction of storm water pollutants to the MEP must occur prior to discharges entering the MS4."

Problem with Text:
Nothing in the MS4 regulations prohibits use of the MS4 for treatment. Frankly, some of the most effective treatment facilities for pollutants may be located in the MS4 as part of regional treatment systems. An example are catch basins, which collect trash and other debris and detention and retention basins that can be used to capture, treat and infiltrate runoff.

Suggestion:
Delete cited text.

Fact Sheet Text Page 84:

> "When appropriately applied as in this Order, retrofitting existing development meets MEP."

Problem with Text:
Only retrofits that are applied with the requirements of the Order meet MEP, which is not the case.

Suggestion:
Delete the text.

Fact Sheet Text Page 88:

> "The RWL language in the Order requires storm water compliance with water quality standards through an iterative approach for implementing improved and better-tailored BMPs over time. The iterative BMP process requires the implementation of increasingly stringent BMPs until receiving water quality standards are achieved. This is necessary because implementation of BMPs alone cannot ensure attainment of receiving water quality standards."

Problem with Text:
61 Federal Register 57425 (1996), Interim Permitting Approach for Water Quality-Based Effluent Limitations in Storm Water Permits states "expanded or better-tailored BMPs in subsequent permits, where necessary, to provide for the attainment of water quality standards."

Attachment 10: Fact Sheet Comments

Suggestion:
The second sentence should be revised to reflect the actual text from federal regulations (specifically "in subsequent permits"). Further the last sentence does not make sense and is contrary to the proceeding text and should be deleted.

Fact Sheet Text Page 112:

> "The San Diego Water Board has responded to complaints about and observed runoff from over-irrigation entering the MS4s in the Riverside County portion of the San Diego Region."

Problem with Text:
There is no evidence in the fact sheet supporting this statement.

Suggestion:
Provide evidence or delete statement.

Fact Sheet Text Page 130:

> "This section requires the use of native and/or low water use plants for landscaping."

Problem with Text:
There was an agreement that this would be suggested but not a requirement. This requirement also mandates the means of compliance, in violation of Water Code section 13360.

Suggestion:
Change the text:

> "Section ~~requires~~ suggests the use of native and/or low water use plants for landscaping,"

Fact Sheet Text Page 136:

> "This requirement is needed because to date, the Copermittees have generally approved low removal efficiency treatment control BMPs without justification or evidence that use of higher efficiency treatment BMPs was considered and found to be infeasible."

Problem with Text:
The Copermittees challenge the accuracy of this Statement. Riverside County has been requiring landscaped based low impact development BMPs since 2005. The District has also spent a substantial sum of money and time developing BMP manuals with specific criteria to ensure the effectiveness of BMPs.

Suggestion:
Delete the unsupported and offensive statement.

Fact Sheet Text Page 142:

> "Where streams are hardened and/or buried to convey storm water, they cannot provide adequate water quality."

Problem with Text:
Unsupported and incorrect. Hardened channels can be designed to provide both flood protection and natural stream function. For example, hardened levees can be designed to be set back and backfilled with native material, effectively providing a natural substrate for stream function. Similarly, porous channel materials such as gabions can provide both flood protection and substrate for native habitat. Finally,

even underground systems can be connected to regional treatment systems that provide requisite water quality benefits where appropriate.

Suggestion:
Delete.

Fact Sheet Text Page 145:

> "Redevelopment projects, however, must be able to achieve post-project runoff flow rates and durations that are less than or equal to pre-project and down to pre-development runoff flow rates and durations to be eligible to receive a waiver under the program."

Problem with Text:
This requirement is self-defeating. By placing regulatory obligations on redevelopments that make the cost of redevelopment greater than the cost of developing on virgin land, the Permit effectively promotes inner-city blight as existing structures are abandoned and suburban development is promoted due to economic factors. The Permit should include accommodations for redevelopment to ensure that existing developed areas are economically preferable for new development and to prevent the onset of unnecessary additional impervious area.

Suggestion:
The Permit and fact sheet should be revised to offer exemptions for hydromodification requirements for redevelopments where such improvements are infeasible.

Fact Sheet Text Page 160:

> "Retrofitting existing development is practicable for a municipality through a systematic evaluation, prioritization and implementation plan focused on impaired water bodies, pollutants of concern, areas of downstream."

Problem with Text:
Although the current requirement simply calls for a study, it is expected that future permits will require implementation of said study. This study exceeds the requirements for Copermittees to evaluate opportunities for retrofit of the MS4 contained in the federal regulations and federal Clean Water Act. There are no revenues to promote such a program.

Suggestion:
The Board should recognize in the fact sheet that without funding provided by the state, there is no revenue for such a program.

Fact Sheet Text Page 161:

> **"Section F.3.d.(4)** requires each Copermittee to cooperate with private property owners to encourage the implementation of site specific retrofitting projects. Because the Copermittees have limited authority to directly require retrofitting projects on private property, the Copermittees must encourage private property owners to implement retrofitting projects through indirect programs and incentives."

Problem with Text:
If the Board wishes to promote urban retrofit, then they also need to incentivize the program. Currently, property owners wishing to volunteer for urban retrofit projects are required to comply with the SSMP,

including hydromodification and LID requirements, opt into BMP inspection programs and subject themselves to ongoing scrutiny through business inspection programs required by the Permit. The permit places an ECONOMIC DISINCENTIVE in the way of promoting a general good for the watershed. The purpose of this requirement is to promote acceleration of water quality benefits from existing urban areas. The requirements, as written, promote a program that is doomed to failure.

Suggestion:
The Board should clearly exempt urban retrofit projects from the new development requirements of the Permit if they wish to accelerate water quality improvements from existing urban areas.

Fact Sheet Text Page 162:

> "Periodic inspections may be performed to ensure the site owner has not removed the retrofit BMPs."

Problem with Text:
Similar to the prior comment, this creates a disincentive to retrofit BMPs.

Suggestion:
Delete.

Fact Sheet Text Page 163:

> **"Section F.4.b** …access points (i.e. manholes), connections…"

Problem with Text:
The text from the Phase I rule implementing the NPDES regulations and the requirement of the storm drain system map is:

(from Federal Register, Vol 55, No 222, Friday Nov 18, 1990):

> "[submit] a USGS 7.5 minute topographic map...[showing] The location of known municipal storm sewer system outfalls discharging to waters of the United States...the location of major structural controls for storm water discharge (retention basins etc) and the identification of publicly owned parks, recreation areas and other open lands."

The proposed requirements exceed the federal regulatory requirements for MS4 mapping. Further, the mapping of manholes is a significant economic burden that would have no benefit for our staff. Manholes are typically placed at regular intervals (300 – 500 feet) on underground storm drain systems. Once a map providing the location of the MS4 system is available, manholes are quickly located through visual inspection in the field. Further, storm drain plans that are available to Permittee staff can be used to locate specific manholes where absolutely necessary. The economic costs of mapping potentially thousands of manholes is not offset by any known benefit.

Suggestion:
Delete requirement to map manholes.

Attachment 10: Fact Sheet Comments

Fact Sheet Text Page 198:

> "**Section II.D** (High Priority Inland Aquatic Habitat) of the MRP describes required monitoring to be done in order to assess if MS4 storm water and/or non-storm water discharges are affecting high priority aquatic and/or riparian species."

Problem with Text:
This requirement was deleted from the Orange County NPDES MS4 Permit when the provision to assess outfalls using NALs and SALs was added. It is not clear why such an accommodation would not also be provided to the Riverside County NPDES MS4 Program. This region has significantly less economic resources than south Orange County or San Diego County to implement monitoring programs. The Permittees specifically request this be deleted as impacts to aquatic habitat will be detected through the NAL/SAL program.

Suggestion:
This requirement should be deleted.

San Diego Bay Council

A coalition of San Diego environmental organizations dedicated to protection and restoration of San Diego's Coastal water resources

September 7, 2010

via Electronic Mail to:
Ben Neill: *bneill@waterboards.ca.gov*
Chiara Clemente: *cclemente@waterboards.ca.gov*

RE: Riverside County Municipal Storm Water Permit Reissuance
Tentative Order No. R9-2010-0016

Dear Mr. Gibson:

Please accept these comments on behalf of the San Diego Bay Council ("Bay Council"), a coalition of environmental organizations dedicated to the protection and restoration of regional coastal waters in San Diego. Member organizations, representing 22,000 San Diegans, act through community involvement, regulatory participation, and legal action to ensure the protection restoration of San Diego Bay, Mission Bay, and the region's coastal waters.

The Bay Council appreciates and welcomes the opportunity to comment on the Regional Water Quality Control Board's ("Regional Board") draft Municipal Storm Water Permit ("Permit") for Riverside County. As with the recently adopted Orange County permit (Order No. R9-2009-0002), this draft Permit represents a significant improvement to past storm water permits in not only the San Diego region, but the entire state. The Bay Council applauds the Regional Board for its leadership in advancing municipal storm water permits to reflect the iterative approach of the maximum extent practicable ("MEP") standard mandated by the Clean Water Act.

I. Permit Improvement Highlights

Although the Bay Council is composed of local San Diego organizations, it nonetheless has great interest in the Permit, as it will pave the way for the forthcoming San Diego County municipal storm water permit and perhaps the regionwide permit. (Permit Findings. E.12.). Moreover, the Santa Margarita Watershed links Riverside and San Diego Counties. Therefore, the Bay Council is pleased to see the Regional Board continue its progress in developing storm water permits that will result in greater protections for water quality throughout the region. These areas warrant specific mention.

A. Hydromodification Requirements Are More Protective

Bay Council member San Diego Coastkeeper was part of the Technical Advisory Committee for the San Diego region Hydromodification Management Plan (HMP) development. Many of Coastkeeper's concerns, as well as committee member NRDC's, focused on the standard set in the San Diego HMP. The hydromodification susceptibility and the resulting BMP sizing tools were set to meet predevelopment standards, not the naturally occurring condition. It was ultimately the San Diego MS4 Permit language—which defines predevelopment as the condition onsite immediately before the

planned development—that constrained the development of the HMP. (Order No. R9-2007-0001, C-7). This Permit, however, is in line with Coastkeeper and NRDC's view that predevelopment and pre-project are the naturally occurring condition—as opposed to simply the condition immediately preceding the new development. This definition will create a more robust and effective HMP for the Riverside area, protecting natural stream hydrology as opposed to merely preventing further degradation. (Permit, F.1.h). Further, the required prioritization of BMPs will ensure the most effective BMPs are evaluated first, instead of the least expensive or easiest to implement BMPs. (Permit, F.1.g.(2).

B. Unpaved Road BMPs and Flood Control Maintenance Requirements Are a Welcome New Addition

A new addition to this Permit is the regulation of unpaved roads, which now require implementation of BMPs. (F.1.i.; F.3.a.(10); F.3.c.(5)). Not only will these new permit provisions help alleviate sediment and erosion problems; they will also promote smart maintenance and planning. For example, the permit requirement that BMPs include "[u]npaved roads and culvert designs that do not impact creek functions and where applicable, that maintain migratory fish passage" will help maintain natural water courses. (F.1.i). The following requirement will also serve to promote long-term maintenance and planning to protect water quality and geomorphology:

> Through their regular maintenance of unpaved roads, the Copermittees must examine the feasibility of replacing existing culverts or design of new culverts or bridge crossings to reduce erosion and maintain natural stream geomorphology.

(F.3.a.(10)(e)). These types of Permit conditions will incentivize municipalities to plan ahead, and will prevent the perpetuation of the currently fragmented maintenance activities.

In addition, municipal flood control structure BMP implementation will also serve to benefit Copermittees in maintaining their storm water systems. (F.3.a.(4)(a)-(c)). The requirement that Copermittees assess flood management project impacts on water quality, evaluate existing flood control structures as part of ongoing maintenance, and inventory such activities in the JRMP Annual Report is particularly important to avoid poor planning such as evidenced in the City of San Diego's Master Storm Water System Maintenance Program. (Id.)

C. Retrofit Requirements Will Expedite the Water Quality Improvement Process

Largely ignored in the past, the retrofit requirements in the Permit will help Copermittees tackle the storm water issues that cannot be solved through new construction and development standards alone. Many water quality issues are historical, due to poor planning and the proliferation of impervious surfaces. Permit-required assessment of retrofit opportunities, and permissive language with regard to implementation of retrofits will spur Copermittees to action, but allow them flexibility to choose the most effective projects. (F.3.d.). The novel idea of using retrofits as an enforcement or mitigation measure will also likely prove more appealing than simple monetary penalties.

D. The Removal of Over-Irrigation as an Exempt Non-Stormwater Discharge Addresses Both Water Quality and Water Supply Issues

Bay Council has been collectively, and through its individual organizations, advocating for conservation and smart water use for years. Every drop of water that remains at its source is a drop that has not contributed to urban runoff. Nonetheless, many municipalities have been reluctant to enforce over-irrigation as either a water supply or water quality issue, citing the previous permit

exemption as authority for such practice. Now, with the removal of this exemption, municipalities will not only be required to enforce over-irrigation runoff, but will be able to use the revised Permit as authority for urging residents, developments, and commercial and industrial facilities to conserve water.

E. Numeric Limits Will Help Assess Water Quality Improvements and BMP Effectiveness

As with the Orange County permit, this Permit is a great leap forward in achieving the MEP standard. With the Orange County permit paving the way, the Regional Board has created a mechanism to evaluate BMP effectiveness and ensure the iterative approach is truly progressive. As Bay Council members have previously commented on the Orange County permit, the Regional Board has broad authority to impose numeric effluent limits.[1] The Bay Council fully supports the Regional Board in requiring both non-storm water dry weather action levels ("NALs") and storm water action levels ("SALs"). (Permit, C. and D.).

II. Copermittees Must Stop Using Cost as An Excuse For Non-compliance

Though the Permit, as other past permits, requires a Fiscal Analysis, the Copermittees are surely to view this component of the Permit as another draconian measure that requires them to "check the box" as opposed to viewing this Permit condition as a tool. Copermittees should rather use the Fiscal Analysis requirement to plan ahead, financing necessary projects and measures not only for Permit compliance, but to achieve actual water quality improvements. (H.1.).

The current practice with respect to the Fiscal Analysis component of storm water permits is exemplified in the City of San Diego's 2009 Annual Report. This Report provides a "Future Projection" analysis consisting of two paragraphs which simply reiterate funds are generated from general fund and non-general fund sources, and costs will continue to rise.[2] Earlier in the same section, the City provides an explanation of how funds are generally used, but provides no insight into the amount of money applicable to each funding source.

Such cursory fiscal analysis is common in Annual Reports, while municipalities refuse to face the real problem. They continuously fail to adequately pass on the true costs of compliance. Time and again, environmental groups and the Regional Board are faced with the same excuse: protecting water quality and restoring beneficial uses is too expensive. From Permit approval to Permit implementation, the same excuse persists. Nonetheless, the reluctance of the Copermittees to adequately fund their respective storm water programs is not the result of a lack of desire to improve water quality by municipal staff or managers, but rather poor decisionmaking and lack of political will. Decisionmakers at the city and county level must pass their costs on to those reaping the benefits. Recent news articles highlight the City's reluctance to increase storm water fees, requiring 95 cents per month per residence across the board, while to recoup its costs, the City should be charging $3 per month.[3]

Now is the time for the Regional Board to clearly articulate in the Permit: noncompliance due to cost will not be tolerated. The Permit is a tool underutilized by Copermittees to obtain necessary funds

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[1] *Defenders of Wildlife v. Browner* (9th Cir. 1999) 191 F.3d. 1159; 1166-67("Under 33 U.S.C. § 1342(p)(3)(B)(iii), the EPA's choice to include either management practices or numeric limitations in the permits was within its discretion." citing *Natural Resources Defense Council*, *Inc. v. United States EPA*, (9th Cir. 1992) 966 F.2d 1292, 1308); *see also*, *City of Abilene v. United States EPA*, (5th Cir. 2003) 325 F.3d 657, 661.
[2] http://www.sandiego.gov/stormwater/pdf/urmp09ar.pdf (p. 10-4).
[3] http://www.voiceofsandiego.org/government/article_f4be2cbd-c631-51fc-a428-a7e64773eac4.html; http://www.voiceofsandiego.org/government/thehall/article_4531d4ce-95ba-11df-8ab8-001cc4c03286.html; http://www.sdcitybeat.com/sandiego/article-8041-show-us-the-money.html

and plan for the future. If the Copermittees once again fail to use Permit section H., they risk enforcement action. We urge the Regional Board to make clear that noncompliance due to cost is not an excuse. After almost three decades, Copermittees should no longer be allowed to claim poverty as an excuse for post-approval weakening of permits and the requirements therein.

III. Specific Permit Areas Require Further Improvement

Notwithstanding the many advances in the current permit, a few aspects of the permit remain incomplete. Our specific comments and suggestions with respect to these topics are below.

A. Residential Carwashing Should Not Be an Allowed Non-Stormwater Discharge

Individual residential car washing is currently listed as exempt from the prohibition against non-stormwater discharge. However, this allowance contradicts other permit sections that evidence the negative water quality impact residential car washing poses. Indeed, car washing is specifically listed as a threat to water quality in the residential permit section. (F.6.b.(3)). It is also provided as an example topic for discussion in the education component for residential and general public outreach. (F.6.b.(4)). Clearly a threat to water quality, and a water supply issue, residential car washing should not be made exempt simply because it requires a change in public behavior. Just as over-irrigation should not be exempt non-storm water, neither should this source of urban runoff.

B. NAL Requirements Are Too Lax

As mentioned above, the Bay Council is extremely supportive of the inclusion of NALs and SALs in this Permit. However, the vague Permit language leaves much to be desired. The Permit requires investigation and source identification for a NAL exceedance in a “timely manner”. (Permit C.2. and C.3.). It is entirely unclear what constitutes a “timely manner”. Further, because the NALs are an illicit discharge identification and elimination tool, time is of the essence. (C.2.b.). In many instances, a NAL exceedance must be investigated contemporaneously with the return of monitoring results, or the source will evade detection. Therefore, the Regional Board should impose a strict numeric deadline for “timely action”. We suggest the Copermittee begin investigation of the source of the exceedance the business day following receipt of the monitoring results. The investigation should be expedited, and should not take more than two weeks.

In addition, development of the monitoring plan for dry weather is largely left to the Copermittees. (Permit, Attachment E, C.1.b.). Sampling frequency must simply be “representative” of major outfalls and identified stations within each hydrologic subarea. (Id.). The actual frequency of sampling is not mentioned at all. As with most plans developed by Copermittees, this monitoring plan will surely be greatly and artificially constrained by costs. Therefore, we urge the Regional Board to set a minimum monitoring frequency that is scientifically sound, as opposed to a cost-driven frequency.

C. Publicly and Electronically Available Documents and Monitoring Will Help Inform the Public and Regional Board, and Reduce Annual Report Burdens

Most Copermittees expend tremendous resources on preparing and submitting their Annual Reports, but view this requirement as overly burdensome and largely an exercise in futility. After reading numerous and varied municipality Annual Reports, we tend to agree. Annual Reports are massive documents with surface-level detail, no depth, and very little substance. Copermittees are loath to point out any failures or inadequacies in their storm water programs, and virtually never

highlight deficiencies. Instead, systemic issues such as lack of enforcement and funding, evident during field visits, remain unmentioned in Annual Reports.

Therefore, the Bay Council suggests a more appropriate tool for public involvement, reporting, and monitoring progress would be real-time or quarterly electronic reporting. The State Water Resources Control Board has moved into the digital age, making a variety of documents and reports publicly available via the internet.[4] We encourage the Regional Board to work with Copermittees, utilizing the permissive Permit language to explore such a possibility. Neither the Regional Board, nor the individual Copermittee, is served by rigid reporting requirements that result in largely unread or useless documents. (Permit, K.)

Specifically, the dry and wet weather monitoring results should be available publicly online as soon as the results are received. NAL and SAL exceedance real-time reporting would benefit Copermittees as the public could aid in investigations or prove an otherwise valuable source of information. Such real-time reporting might also prove a successful deterrent to illicit discharges. The Copermittees should further report inspections, BMP maintenance tracking, and SSMP project inventories quarterly. Construction site, municipal, industrial, and commercial inspections should also be reported quarterly. This type of information is invaluable to the public and the Regional Board, but is largely unavailable to either as Annual Reports are an attempt to summarize such information compiled over long periods of time. Smaller doses would prove more useful and easily digestible.

D. HMP Exemptions Will Prevent Rehabilitation of Channelized Streams

As with the San Diego HMP, the exemption for conveyance channels whose bed and bank are concrete lined all the way from the point of discharge to water storage reservoirs and lakes will prevent rehabilitation of these areas, especially in light of the retrofit requirements elsewhere in the Permit. (Permit, F.1.h.(4)(b)). Moreover, this exemption encourages continued channelization efforts. We urge the Regional Board to remove this exemption.

E. The Regional Board Should Develop Plans – Rather Than Copermittees

With the HMP and with all other plans required by the Permit, such as monitoring, it is imperative that the Regional Board play the lead role. Bay Council understands, given budget constraints and furlough restrictions, the Regional Board has fewer resources and more work to do. Nonetheless, as permit requirements are delegated to Copermittees for development and planning, water quality suffers and NGOs and the public are left out of the process.

As with the San Diego HMP, this Permit requires Copermittee-driven HMP development. However, the San Diego process serves to shed light on the likely result: an artificially cost-constrained plan with frequent exercise of exemptions. Therefore, it is critical that the Regional Board play a lead role in the development of the HMP and all other plans.

If the current practice remains, Copermittees will expend large sums of money in developing a plan made publicly available (and indeed reviewed by the Regional Board) at the end of the process. Often the Regional Board and public are faced with two equally unappealing options: force the Copermittees to start anew and delay implementation; or accept an inadequate plan. The final product in this type of planning further represents a financial commitment by Copermittees. Because of this financial investment, Copermittees that may have been able to proceed in a different direction at the

[4] Geotracker, DMR, CIWQS, and ESI.

beginning stages of development, are unable to afford (or unwilling to pay for) repeating the process after the plan is fully developed.

A possible remedy is a cost-share plan, or outside consultant who is employed by the Regional Board, reports to the Regional Board, but is paid via Copermittee funds. In order to foster a truly public process, and scientifically driven compliance (as opposed to cost-constrained), the Regional Board must remain the ultimate decisionmaker, with staff developing plans—not Copermittees.

Therefore, we urge the Regional Board to commit to heavy oversight if not a cost-share mechanism to take charge of the development of these plans in order to ensure timely completion and true advancement of water quality.

F. The Watershed Water Quality Workplan Presents A Unique Opportunity for Public Involvement

The Permit requires identification of sources causing the highest water quality problems within the Upper Santa Margarita Watershed. (Permit, G.1.c.). A relatively easy aid to identification of such sources is expanded public outreach. We urge the Copermittees to survey the public and NGOs in the area in ranking water quality problems. In addition, Copermittees should provide bilingual public notice of annual watershed workplan meetings by sending such notices directly to area residents or holding special semi-annual workshops, especially in underserved communities. Copermittees might find the public particularly useful in source identification and BMP implementation strategies. This could further serve as an effective tool to meet the education and public participation Permit requirements. (Permit, G.4.). Lastly, we urge the Copermittees in Riverside County to reach out to Copermittees in the lower portion of the Watershed to coordinate source identification and monitoring activities.

IV. Conclusion

The San Diego Bay Council applauds the Regional Board for many of the Permit measures, while offering suggestions for needed improvements. We look forward to continued participation in the review process and approval hearing. Thank you for your consideration of these comments.

Sincerely,

Bruce Reznik
Executive Director
San Diego Coastkeeper

Marco Gonzalez
Legal Director
Coastal Environmental Rights Foundation

Joe Geever
CA Policy Coordinator
Surfrider Foundation

James A. Peugh,
Conservation Chair
San Diego Audubon Society

City of Temecula

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September 7th, 2010

Mr. David King
Chairman
San Diego Regional Water Quality Control Board
9174 Sky Park Court, Suite 100
San Diego, California 92123-4353

Chairman King,

The City of Temecula (City) is one of five permittees within Riverside County that would be regulated under the Santa Margarita River (SMR) Municipal Separate Storm Sewer System (MS4) Order (Tentative Order R9-2010-0016). The City has reviewed Tentative Order No. R9-2010-0016, including its findings, attachments, and accompanying Fact Sheet, and submits the following comments for your consideration. There are several extensive new and expanded requirements proposed throughout the Order. These requirements are based on a model permit adopted in Orange County and are in excess of what is necessary to protect receiving waters within the Permit Area. As currently written, these requirements extend far beyond our financial ability to effectively implement them. The City expresses its concern that this Order will pit the limited funds currently available for critical services against unnecessarily stringent requirements mandated throughout this Order.

While the City shares the Regional Board's goal of protecting the quality of water in our local creeks, it is not fiscally responsible to adopt a new Model Permit that does not accurately reflect the needs of the local watershed. The Regional Board must allow the City to prioritize and balance finite public resources in order to provide numerous vital public services. The City's responsibilities also include providing for public safety (police and fire services), installing and maintaining infrastructure (roads, drainage facilities, etc.), public facilities (parks, libraries, community centers, etc.), providing recreational programs, conserving land (MSHCP), promoting habitat conservation, etc. All of these needs are equally important, but public funding mechanisms do not allow any one of them to be funded without consideration to competing needs, priorities, and expected outcomes. New requirements must carefully weigh the benefits achieved against their real costs to implement. From a public agency perspective, all expenditures must be justified and supported by the general public.

Although the Order has been slightly modified from the previous version issued to the South Orange

County permittees, it continues to retain numerous provisions that do not apply to this region and are unnecessarily costly and administratively burdensome to the City and, ultimately, to our citizens. To this end, the City agrees with, and supports, the comments provided by the Riverside County Flood Control and Water Conservation District on behalf of the SMR permitees, and also submits the following information to explain why the requirements in the Order will be difficult to fund and cause unavoidable non-compliance.

Economic conditions have forced significant workforce reductions since 2007. Three rounds of staff reductions have occurred due to the City's severe budget cuts. To date, 75 project-employees and 48 full-time employees were cut from the City budget. In addition, two contract fire-prevention positions had to be cut as well. The City's workforce has been reduced, thus far, by 25%. Consequently, no new positions are being proposed and the City unfunded thirteen previously authorized positions, adding to the 26 existing unfunded positions from last year. In total 39 positions are no longer funded. Furthermore, positions that become vacant from hereon will no longer be refilled.

Historic and ongoing revenue reductions are causing significant cuts in the number and level of service to all other City programs. The City has experienced tremendous losses as a result of the nationwide recession. Preliminary year-end revenues for fiscal year 09-10 are projected to be $50.5M; compared to a $67.7M annual revenue just three years ago. That equates to general fund revenues decreasing nearly 26%. Despite falling revenues, the costs to maintain remaining city services, particularly public safety, continue to rise. Annual expenditures to maintain current levels of service are expected to rise to $59M by the end of the Permit term. If revenues do not increase, or even flat-line as currently projected, the City will not be able to maintain the current level of service for other programs including public safety. Despite this well recognized trend, Tentative Order R9-2010-0016 proposes significant increases in level of service for this program.

One of the harder hit areas is development driven revenue streams. The Planning Department user fee revenue fell by 42%, while that of the Building and Safety Department fell by as much as 49%. The City's Land Development division revenue dropped significantly from $1.8M in fiscal year 06-07 down to $484K in fiscal year 09-10, a 73% decrease due to the drastic reduction in development activity within the City. In like manner, Development Impact Fees (DIF) tumbled from $6.5M to $1.1M, an 83% drop, in that same period. These examples show the true impacts to the City that are crippling our ability to continue providing even the most minimum level of services required by law and expected of the public.

The City's Capital Improvement Program (CIP) budget has been decimated. The majority of the projects in the City's CIP are funded with either one-time outside funding sources, DIF or Capital Project Reserves (General funds). The City's ability to supplement or provide matching dollars for this program has been severely impacted. In fiscal year 06-07 the General Fund contributed $11.2M toward the CIP, that figure is down to $2.4M in fiscal year 09-10, a 79% decrease. At this point, only projects with outside funding sources or the most significant traffic circulation projects are moving forward, while many other projects are being postponed indefinitely.

Many of the most significant and inappropriate cost ramifications of the Order are as a result of new requirements that exceed the current "model" Orange County NPDES MS4 Permit. Specifically, there were significant changes to the Monitoring and Reporting Program (MRP) as well as the addition of a series of new special studies requiring special expertise. The City estimates that

the annual cost to support the changes to the regional component of the Order will increase our current cost by 3 times. In addition, there will also be additional annual costs associated with implementing the required changes to the City's NON-regional components. These components have been projected to increase the City's existing annual costs by no less than 1.5 times.

There are no new revenue sources available to fund these program expansions. Revenue reductions are occurring in almost all revenue categories. Although the City's largest single revenue source, Sales Tax, is projected to increase slightly in the coming year, Sales Tax revenues are still over $8.0M below the FY06-07 value of $30.1M. Some of the more significant decreases from last fiscal year alone include: $283K in Property Tax revenue, $232K in Motor Vehicle in Lieu revenue, $499K reduction in Investment Interest revenue, $182K in Development fees, $212K in Franchise Fees, $332K in reimbursement revenues, and $280K in other existing miscellaneous revenue sources. Other potential sources of funding, including taxes, fee increases, surcharges, establishment of utilities, etc., have all been evaluated and determined not to be feasible or realistically available to the City. Further, with the high unemployment and foreclosure rates within Riverside County, the voters are not willing to support new taxes or bonds in the current economic climate.

This information leads to the inevitable conclusion that implementation costs of the new Order will exceed our currently available resources and cause additional impacts to other City departments, which will then begin affecting the number and level of services the City currently provides. **It is important to note that the federal regulations regulating MS4 discharges have not changed since 1987. There is no policy basis for the significant changes proposed by this Tentative Order. The majority of the changes proposed to this Tentative Order are to accommodate Regional Board staff wishes to move to a model MS4 Permit that treats Riverside, Orange and San Diego County's equally. These changes were not specifically designed to address the local needs of this watershed**. Further, the Permit does not reflect the relative resources available to each Permit area. The area regulated by this Tentative Order has only half the taxpaying population of the Orange County NPDES MS4 Permit and 1/10th the taxpaying population of the San Diego County NPDES MS4 Permit. These relative economic discrepancies create not only a social injustice, but impacts that will be exacerbated by the State's reduced funding of other state mandated City services.

There are numerous legal concerns that need to be considered. As such, the following provides ten categorical points for consideration. However, these ten points do not represent all of the legal inconsistencies that exist in the Order. To this end, the City agrees with, and supports, the legal comments provided by the Riverside County Flood Control and Water Conservation District on behalf of the SMR permitees.

The City has serious concerns regarding the legality of the provisions contained in this Tentative Order. The prescriptive nature of this Order will ensure that any resident or business challenging these conditions would not only sue the municipality charged with implementing these requirements, but would also bring suit against the Regional Board itself to obtain the requested relief. The City does not believe this was the intent of the Regional Board.

1. THE TENTATIVE ORDER ATTEMPTS TO REDEFINE WHAT CONSTITUTES A WATER OF THE UNITED STATES

Section 3.C of the Findings section on page 11 of the Tentative Order states:

> "Historic and current development makes use of natural drainage patterns and features as conveyances for urban runoff. Urban streams used in this manner are part of the municipalities MS4 regardless of whether they are natural, man-made, or partially modified features. In these cases, the urban stream is both an MS4 and a receiving water."

The City does not believe that such a finding is warranted or lawful under either the clear statutory provisions of the Clean Water Act or recent judicial interpretations of the Act. The language in the Tentative Order could be construed as seeking to regulate all discharges into MS4s, changing the very nature of MS4s so as to constitute a receiving water.

This is contrary to the plain language of section 402(p)(3)(B) of the Clean Water Act, which requires: "Permits for discharges from municipal storm sewers . . ." 33 U.S.C. § 1342(p)(3)(B) (emphasis added.). Based on this assertion, the Regional Board does not have the authority to regulate water entering into MS4s as receiving waters of the United States.

Furthermore, even if the statutory language indicated that Permits were required for discharges into MS4s, recent holdings from the United States Supreme Court conclusively show such structures would not constitute a water of the United States. According to the plurality decision in *Rapanos v. United States* (2006) 126 S. Ct. 2208, 2225:

> "In sum, on its only plausible interpretation, the phrase 'the waters of the United States' includes only those relatively permanent, standing or continuously flowing bodies of water 'forming geographic features' that are described in ordinary parlance as 'streams[,] ... oceans, rivers, [and] lakes.' *See* Webster's Second 2882. ***The phrase does not include channels through which water flows intermittently or ephemerally, or channels that periodically provide drainage for rainfall.*** The Corps' expansive interpretation of the 'the waters of the United States' is thus not 'based on a permissible construction of the statute."

(Emphasis added.). The MS4 systems and urban streams that the Regional Board is seeking to regulate as receiving waters are intermittent, ephemeral, and used only periodically as drainage for rainfall. As such, these systems and streams would not constitute a water of the United States. Because the Clean Water Act extends solely to waters of the United States, the Regional Board has no authority to regulate MS4s or urban streams as defined in its Permit.

Even under Justice Kennedy's more lenient interpretation of what constitutes a water of the United States, the Regional Board has still not adequately met the requirements for establishing that an MS4 or urban stream is subject to regulation as a Water of the United States. According to Justice Kennedy, the Regional Board must establish that the MS4 system and urban streams bear a significant nexus to the other regulated waters so as to qualify for regulation as a water of the United States. *Rapanos,* 126 S. Ct. at 2249. Such a determination must be made on a case-by-case basis, and must contain some measure of the significance of the connection for downstream water quality. *Id.* at 2250-2251. In other words, the Regional Board must conduct an analysis of the "quantity and regularity of flow" in the relevant MS4s and urban streams prior to holding that these structures merit regulation under the Clean Water Act. *Id.* at 2251. Absent conclusive findings, the Regional Board is without authority to regulate MS4s and urban streams as receiving waters under the Clean Water Act.

The City requests that the Board members direct staff to modify the language in the Tentative Order to ensure regulations of only those systems and streams discharging directly into waters of the United States as defined according to the Supreme Court's holding in *Rapanos* in order to avoid random interpretations of the CWA.

2. THE TENTATIVE ORDER UNLAWFULLY PURPORTS TO RESTRICT THE LOCATION OF TREATMENT OPTIONS

Section F.1.d.(6)(d) on page 35 of the Tentative Order states:

> "All treatment control BMPs for Priority Development Projects must, at a minimum, be implemented close to pollutant sources (where shared BMPs are not proposed), and prior to discharging into waters of the U.S."

The implementation of this provision presents a number of potentially serious problems.

First, this provision of the Tentative Order violates Water Code section 13360. According to Water Code section 13360(a):

> "No waste discharge requirement or other order of a regional board or the state board or decree of a court issued under this division shall specify the design, ***location***, type of construction, or particular manner in which compliance may be had with that requirement, order, or decree, and the person so ordered shall be permitted to comply with the order in any lawful manner."

(Emphasis added.) As noted above, the Regional Board is already attempting to define MS4s and urban streams as waters of the United States. *Supra*, p. 11. The proposed regulation would therefore effectively limit the ability for Permittees to implement any BMPs in any area except at the exact location of the source generating pollutants and would exclude Permittees from choosing to implement what may be less-costly, more effective BMPs in other areas. But Water Code section 13360(a) expressly prohibits this type of regulation.

Second, the comparison to wetlands regulation misconstrues USEPA guidance on this issue. The USEPA guidance document referenced by the Regional Board does not preclude Permittees from locating structural controls within a natural wetland. Rather, the guidelines simply state:

> "***To the extent possible***, municipalities should avoid locating structural controls in natural wetlands. Before considering siting of controls in a natural wetland, the municipality should demonstrate that it is not possible or practicable to construct them in sites that do not contain natural wetlands...."

(Fact Sheet, p. 96, fn. 154, *citing* USEPA, 1992. Guidance Manual for the Preparation of Part II of the NPDES Permit Applications for Discharges from Municipal Separate Storm Sewer Systems. EPA 833-B-92-002. (Emphasis added.)) While the Permittees may agree that they should generally avoid in stream treatment to the extent possible, outright prohibition of an option would be counterproductive.

The City requests that the Board members direct staff to modify the language in the Tentative Order to allow permittees to make the determination of the exact placement location of BMPs.

3. THE TENTATIVE ORDER IMPROPERLY INTRUDES UPON THE CITY'S LAND USE AUTHORITY IN VIOLATION OF THE TENTH AMENDMENT OF THE U.S. CONSTITUTION

To the extent that this Tentative Order relies on federal authority under the Clean Water Act to impose land use regulations and dictate specific methods of compliance, it violates the Tenth Amendment of the U.S. Constitution. Furthermore, to the extent the Tentative Order **requires** a Municipal Permittee to modify its city ordinances in a specific manner; it also violates the Tenth Amendment.

According to the Tenth Amendment:

> "The powers not delegated to the United States by the Constitution, nor prohibited by it to the States, are reserved to the States respectively, or to the people."

Article XI, section 7 of the California Constitution, California guarantees municipalities the right to "make and enforce within [their] limits all local police, sanitary and other ordinances and regulations not in conflict with general laws." The United States Supreme Court has held that the ability to enact land use regulations is delegated to municipalities as part of their inherent police powers to protect the public health, safety, and welfare of its residents. *See **Berman v. Parker*** (1954) 348 U.S. 26, 32-33. Because it is a constitutionally conferred power, land use powers cannot be overridden by State or federal statutes.

From the City's perspective, under the guise of federal law, the Regional Board is attempting to dictate the precise manner in which cities must exercise their police powers. The City does not believe that such a requirement is consistent with the Tenth Amendment.

The City requests that the Board members direct staff to modify the language in the Tentative Order to ensure consistency with the Tenth Amendment, rather than applying random interpretations of it, with regard to issuing requirements which dictate the precise method of compliance.

4. THE TENTATIVE ORDER CONSTITUTES AN UNFUNDED STATE MANDATE

The Regional Board seeks to impose new provisions that require a higher level of service of existing programs that are not required or mandated under the Clean Water Act or any federal regulations thereunder. Yet, according to the Fiscal Analysis provided in Section H.1. of the Tentative Order:

> "Each Copermittee must exercise its full authority to secure the resources necessary to meet all requirements of this Order."

(Tentative Order, p. 74.) To the extent the Tentative Order imposes additional programs on the Permittees without providing additional funds, they are unfunded mandates.

The Commission on State Mandates recently held that both the Los Angeles County MS4 Permit and the San Diego County MS4 Permit contained provisions that constituted unfunded state mandates. *In re Test Claim on Los Angeles Regional Quality Control Board Order No. 01-182* (July 31, 2009); *In re Test Claim on San Diego Regional Water Quality Control Board Order No. R9-2007-0001* (March 26, 2010). As such, the Regional Board cannot merely dismiss the suggestion that the Tentative Order does contain provisions that constitute unfunded state mandates.

The imposition of unfunded programs and mandates in the Tentative Order is inconsistent with the provisions of the California Constitution, specifically Article XIII B, Section 6, which requires a state agency mandating a new program or a higher level of service to provide a "subvention" of funds to reimburse local governments for the costs of the program or increased level of service.

Article XIII B, Section 6 of the Constitution prevents the state from shifting the cost of government from itself to local agencies without providing a "subvention of funds to reimburse that local government for the costs of the program or increased level of service . . ." State agencies are not free to shift state costs to local agencies without providing funding merely because those costs were imposed upon the state by the federal government. If the state freely chooses to impose additional costs upon a local agency as a means of implementing its policy, then those costs should be reimbursed by the state agency. *See Hayes v. Commission on State Mandates* (1992) 11 Cal. App. 4th 1564, 1593-1594. If the state refuses to appropriate money to reimburse a city, the enforcement of the state mandate can potentially be enjoined by a court. *See Lucia Mar Unified School District v. Honig* (1988) 44 Cal. 3d 830, 833-834.

The Tentative Order will require a substantial capital investment, which individual cities will have to fund, despite the fact that no funding mechanism, nor any assistance, financial or otherwise, from the Regional Board is provided to the Permittees. To our knowledge, the Regional Board has made no provision to provide any level of financial relief to the permittees for any of the provisions proposed in the Tentative Order.

The Tentative Order explicitly provides that the Tentative Order does not constitute an unfunded state mandate for four reasons in paragraph 6 of page 14 of the Tentative Order. The City disagrees with all four stated reasons. . To the extent the Tentative Order imposes additional programs on the City and its co-permittees without providing additional funds, they are unfunded mandates.

A. The Tentative Order Imposes Requirements that Go Beyond Federal Law

To the extent the Tentative Order imposes requirements that go beyond what is required by federal law, the Regional Board is required to consider and address among other things the constitutional prohibition on unfunded state mandates. In fact, there are many specific obligations in the Tentative Order that are not federally mandated.

For example, Section E, on page 24 of the Tentative Order, requires that each permittee submit a certification statement, signed by its chief legal counsel, that the permittee has taken the steps necessary to obtain and maintain full legal authority to implement and enforce each of the requirements in 40 CFR 122.26(d)(2)(i)(A-F) and the Tentative Order. The Clean Water Act does not require the certification statement mandated by the Regional Board. 40 CFR 122.26(d)(2)(i) only requires "[a] demonstration that the applicant can operate pursuant to legal authority established by statute, ordinance or series of contracts...." Arguably, the City can demonstrate its legal authority by submitting copies of ordinances, resolution or contracts certified by the City Clerk. The Clean Water Act does not require permittees to submit a certification statement.

Furthermore, the Tentative Order goes beyond federal law in that it is at least twice as long, and in some cases, three times as long as other MS4 Permits developed by other Regional Boards in the State of California such as the Lahonten Regional Board and the Central Valley Regional Board. This means that either some Regional Boards are failing to impose federally mandated requirements pursuant to the Clean Water Act, or the San Diego Regional Board is imposing requirements that go

beyond federal law.

B. The Fact that Industrial Dischargers are More Strictly Regulated than Municipal Dischargers is Irrelevant to the Unfunded Mandate Issue

The Tentative Order asserts that the Order does not constitute an unfunded mandate because the Order regulates discharges of waste from municipal sources more leniently than they could regulate discharges from non-governmental dischargers. *See* paragraph 6 on page 14 of Tentative Order. The City fails to see how this statutory distinction between the regulation of municipal dischargers and industrial dischargers affects whether the Order imposes requirements on co-permittees that go beyond federal law. Municipalities are not industrial sites. Municipal discharges are not industrial discharges.

C. The City Does Not Have the Authority to Randomly Levy Fees at Will to Pay For Compliance With the Order

The Tentative Order also alleges that the Order does not constitute an unfunded mandate because co-permittees have the authority to levy service fees to pay for compliance with the Order. *See* paragraph 6 on page 14 of Tentative Order. Pursuant to Government Code Section 17556(d), if a local agency can levy service fees to pay for a State mandate, the State is not required to provide funding for the mandate.

The City does not have the authority to levy service fees to pay for the State mandate. The Tentative Order presumes, but makes no specific findings that co-permittees have the authority to levy such service fees. In fact, to the extent such service fees are "property-related," co-permittees can only levy them once approved by the affected property owners or electorate. *See* California Constitution, Article XIIID, Section 6(c); *Howard Jarvis Taxpayers Ass'n, v. City of Salinas*, 98 Cal. App. 4th 1351 (2002). The *City of Salinas* case dealt precisely with this issue. The City of Salinas established a fee to recover costs related to compliance with its MS4 Permit. The fee was based largely on the amount of impervious area on a developed parcel. The Court held that this fee was property-related and, thus, subject to voter-approval requirements. *Salinas*, 98 Cal. App. 4th at 1356. Only if the fee was a use-based charge, directly based on use of city services (such as the metered use of water), could the fee avoid the voter-approval requirements of Article XIIID. The City of Salinas's method to allocate the fee based on the amount of impervious area so as to assure that the fee charged would be proportional to the burden being placed on the City's storm drain system was not sufficiently direct to qualify as a use-based fee exempt from the requirements of Article XIIID. *Id.* at 1355.

Because storm water running off of real property and into the MS4 is not a precise measurement, it would be impossible to meet the direct usage requirements of the *City of Salinas*. Accordingly, without voter approval, which would be almost impossible to successfully obtain during the current economic crisis, the City of Temecula does not have the authority to levy service fees to pay for compliance with the Order.

D. The City Does Not Have a Real Choice in Requesting Permit Coverage

The fourth reason provided in the Tentative Order for why the Order does not constitute an unfunded mandate is that co-permittees requested permit coverage under the Order. Thus, according to the

Tentative Order, co-permittees have not been mandated to do anything.

The City adamantly disagrees. It is disingenuous for Regional Board staff to suggest that co-permittees have voluntarily chosen coverage under the Order and that the Order cannot be considered a State mandate.

The City requests that the Board members direct staff to modify the language in the Tentative Order to include State-sponsored relief for the permittees to carry out the requirements in the Order. To the extent that these requirements will require additional funds, the Board should direct staff to assist the permittees in securing such funds.

5. THE TENTATIVE ORDER IMPROPERLY ATTEMPTS TO HOLD THE CITY RESPONSIBLE FOR SEWAGE SPILLS WHEN THIS RESPONSIBILITY HAS BEEN CLEARLY ASSIGNED TO LOCAL WATER DISTRICTS

Section F.4.h. of the Tentative Order states:

> "Each Copermittee must implement management measures and procedures (including a notification mechanism) to prevent, respond to, contain and clean up all sewage (see below) and other spills that may discharge into its MS4 from any source (including private laterals and failing septic systems.) Copermittees must coordinate with spill response teams to prevent entry of spills into the MS4 and contamination of surface water, ground water and soil. Each Copermittee must coordinate spill prevention, containment and response activities throughout all appropriate departments, programs and agencies so that maximum water quality protection is available at all times."

(Tentative Order, p. 69).

For many cities, implementation of this provision is simply not feasible. The City of Temecula does not own or operate its own sewage system. All of the sewer systems in the City's jurisdiction are owned, operated, and maintained by water districts, specifically the Rancho California Water District and Eastern Municipal Water District. These water districts have their own separate Regional Board Orders/NPDES permits. The City does not have the equipment or expertise to manage a sewage spill of any size, and its staff is not adequately trained to respond to potential spills. All of the water districts in the City's jurisdiction already respond to sewer spills (including sewer spills from private laterals). Furthermore, this provision is duplicative because the Regional Board is seeking to make the City responsible for a task already delegated to the water districts. By making the City responsible for sewer spills, there is a high risk of creating confusion in determining who (water districts or the City) will respond to a spill and who is responsible for associated costs and reporting requirements. Such an act would result in a tremendous waste of scarce public resources.

The State Water Resources Control Board has previously issued a stay on this exact issue. After extensive hearings and briefing on the matter, the State Board issued Order WQO 2002-0014 on August 15, 2002, granting a stay as to this provision. In that Order, the State Board held:

> "The record shows that three separate water districts operate these sewers within Mission Viejo, and are regulated by a sanitary sewer NPDES permit issued by the Regional Board. Mission Viejo alleged that the duplication of effort that would

> ensue by having Mission Viejo also be responsible for preventing and responding to sanitary sewage spills could lead to delayed responses as agencies try to determine jurisdiction and primary responsibility. Orange County's cost table for the upcoming year estimated total copermittee costs at $56,512 to implement this requirement. While these costs, by themselves do not constitute substantial harm, we find that the duplicative nature of the costs, combined with potential response delay and confusion, do."

(State Board Order WQO 2002-0014, p. 6).

In deciding to grant a stay as to this provision, the State Board concluded:

> "**The regulation of sanitary sewer overflows by municipal storm water entities, while other public entities are already charged with that responsibility in separate NPDES permits, may result in significant confusion and unnecessary control activities.** For example, the Permit appears to assign primary spill prevention and response coordination authority to the co-permittees. While the federal regulations clearly assign some spill prevention and response duties to the co-permittees, we find that the extent of these duties is a substantial question of law and fact."

(State Board Order WQO 2002-0014, p. 8. (Emphasis added)).

Given the previous findings of the State Board on this same issue, the City requests that the Board members direct staff to modify the language in the Tentative Order to reduce duplicity of effort and the implementation of unnecessary control activities.

6. THE TENTATIVE ORDER IMPROPERLY DELETES CATEGORIES OF EXEMPT NON-STORMWATER DISCHARGES

Federal law requires that MS4 permits include a requirement that the Permittees effectively prohibit the discharge of non-stormwater into the MS4. 33 U.S.C. 1342(p)(3)(B)(ii). Federal regulations exempt certain discharge categories from this effective prohibition requirement. 40 C.F.R. 122.26(d)(2)(iv)(B)(1). A Permittee must address a discharge in one of these exempt categories only when a Permittee identifies the discharge as a source of pollutants to waters of the United States. *Id.*

The Tentative Order impermissibly deletes three of the non-stormwater discharge categories – landscape irrigation, irrigation water, and lawn watering (collectively, "irrigation"). (See subparagraphs a-n on page 19 of Tentative Order.) The federal regulations require that permittees address discharges within an exempt category when they identify a discharge as a source of pollutants to waters of the United States. Neither the regulations nor EPA's guidance allow the Regional Board to delete entire categories of exempt non-stormwater discharges when the Permittees identify a discharge within one of the categories as a source of pollutants.

Accordingly, since the permittees have not identified irrigation runoff as a source of pollutants, the City requests that the Board members direct staff to restore the irrigation categories of exempt non-stormwater discharges in the Tentative Order.

7. THE TENTATIVE ORDER'S RETROFITTING REQUIREMENT IMPOSES POTENTIALLY SIGNIFICANT COSTS WITHOUT ANY CORRESPONDING GAINS IN WATER QUALITY

The Tentative Order requires the Permittees to develop and implement a program to retrofit existing development with additional structural measures to control runoff. (See Section F.3.d (Retrofitting Existing Development) on page 64 of the Tentative Order). This new provision is in addition to the New Development/Redevelopment provisions in the Tentative Order. However, the City does not have the ability under existing statutes and under the California and the United States Constitutions to force private landowners to retrofit existing developments to improve water quality when these landowners didn't have any plans to retrofit their properties in the first place. As such, the expense entailed in developing and implementing a retrofitting program will not be matched by any gains in water quality. Federal law does not require retrofitting of existing development. In fact, EPA's regulations acknowledge that MS4 regulation would have to be limited largely to undeveloped sites and sites being developed/redeveloped. Accordingly, the City requests that the Board members direct staff to either remove this provision in its entirety from the Tentative Order, or modify the language to exclude private property.

8. THE TENTATIVE ORDER LACKS FLEXIBILITY IN IMPLEMENTING LOW IMPACT DEVELOPMENT AND HYDROMODIFICATION REQUIREMENTS

The Tentative Order requires that development projects include prescriptive Low Impact Development ("LID") requirements. (*See, e.g.*, Section F.1 of the Tentative Order). The Tentative Order also requires the Permittees to develop and implement a Hydromodification Management Plan ("HMP") for the same development projects. (Section F.1.h. of the Tentative Order) However, the LID and HMP provisions are not required by federal law and violate state law in that, among other things, they prescribe how the Permittees are to comply with the MEP standard. *See* Water Code § 13360(a). Moreover, the LID and HMP provisions in this Tentative Order are overbroad and will not necessarily result in any improvement to the quality of water entering Waters of the U.S.. For example, HMP requirements for hardened channels will not have any water quality benefits. Finally, to the extent the LID requirements would interfere with downstream or upstream water rights holders, compliance with the requirements potentially expose the Permittees to common law liability.

In addition, the Regional Board's imposition of a highly prescriptive Low Impact Development strategy may have an unintended consequence—potential lawsuits from downstream users of the surface water that the City is now purportedly "diverting for reuse or infiltration." As one attorney expert in the field of water law has put it:

> "First, to the extent that one can obtain a right to capture diffuse surface waters . . . any capture of diffuse surface waters without a permit from the State Water Resources Control Board could well be a trespass against the State of California. Second, even if one cannot obtain a 'right' to diffuse surface waters, though, the capture of such waters in a manner that interferes with the diversion of the same water once it reaches a watercourse constitutes injury to legal users of water that rely on such diffuse surface water contributing to the water that they are able to divert."

D. Aladjem, "Who Owns the Water? The Looming Conflict Between Low Impact Development and the Water Rights System" at p.5 (Paper presented at American Bar Association 17th Environmental Law Fall Section Meeting, Sept. 24, 2009).

The City believes that the law in this area, particularly with respect to ownership of diffuse surface waters, is quite uncertain. The City also believes that, to the extent that the Regional Board imposes these additional obligations upon the City pursuant to the Permit, then the Regional Board should insert sufficient findings and authorization for the capture of surface water through LID systems to protect the City against claims of either a trespass against the State or claims of unlawful diversion of stormwater that would otherwise flow into watercourses that might be the subject of claims of diversion rights by downstream users.

Because the LID and HMP provisions are not required by federal law and violate state law, the City requests that the Board members direct staff to insert sufficient findings and authorization for the capture of surface water through LID systems to protect the City against claims of either a trespass against the State or claims of unlawful diversion of stormwater. In addition, the City also requests that the Board members direct staff to modify the language in the Tentative Order to provide the Permittees with required flexibility in implementing the LID and HMP requirements.

9. THE TENTATIVE ORDER DOES NOT CONSIDER COSTS TO IMPLEMENT THE STORMWATER AND NON-STORMWATER ACTION LEVELS AS REQUIRED BY FEDERAL LAW, AND THE WATER QUALITY BENEFITS ACHIEVED BY THESE REQUIREMENTS HAVE NOT BEEN ADEQUATELY CONSIDERED BY THE REGIONAL BOARD

Federal law requires that permittees effectively prohibit the discharge of pollutants in non-stormwater into the MS4 and to reduce the discharge of pollutants in stormwater from the MS4 to the maximum extent practicable. To assist the Permittees in meeting these two standards, the Tentative Order imposes action levels on pollutants in the discharge of stormwater (SALs) and non-stormwater (NALs) from the MS4. (Sections C and D on pages 20 and 23, respectively, of the Tentative Order.). Ideally, action levels would be a tool that would help the City focus resources on more significant water quality problems. However, the City is concerned that, depending on how the provisions are interpreted, the cost to implement the action levels may far outweigh any benefit to water quality. Moreover, rather than a tool to help the Permittees, the action levels may be used against the Permittees.

As an initial matter, the City objects to the distinction made in the Tentative Order between the discharge of stormwater from the MS4 and the discharge of non-stormwater from the MS4. Federal law does not support this distinction. Under federal law, permittees must control the discharge of ***pollutants*** from the MS4 to the maximum extent practicable, regardless of whether the pollutants are in ***stormwater*** or ***non-stormwater***. Permittee's obligation with respect to non-stormwater is to effectively prohibit the discharge of pollutants in non-stormwater into the MS4. To the extent the Permit imposes separate requirements on the discharge of pollutants in non-stormwater from the MS4, such requirements must be supported by state law.

Because neither the SALs or NALs are required by federal law, the Regional Board must comply with state law in imposing these requirements. For example, in issuing waste discharge requirements under State law, the Regional Board must consider certain factors, including the water quality conditions that could be reasonably achieved and economic considerations. Water Code §§ 13263(a) and 13241. The City is hopeful that the Tentative Order's SAL and NAL provisions will provide the City with flexibility to prioritize its response to any actual exceedances. However, if the City is required to respond to and address all exceedances without reasonable prioritization, the cost will be significant. Because some exceedances will not be indicative of impacts to water quality, the cost to implement the SALs and NALs may have little if any commensurate environmental benefit. There is

nothing in the record that suggests that the Regional Board has considered these water quality and economic factors.

Accordingly, the City requests that the Board members direct staff to provide the analysis required under state law to ensure that economic factors are considered and that the water quality goals are reasonably achievable through implementation of the SALs and NALs.

10. THE TENTATIVE ORDER IMPROPERLY INCORPORATES TOTAL MAXIMUM DAILY LOAD WASTELOAD ALLOCATIONS

The Tentative Order includes limitations based on wasteload allocations ("WLAs") developed in fully approved and adopted Total Maximum Daily Loads ("TMDLs"). (Section I of the Tentative Order.) The Tentative Order characterizes the limitations as Water Quality Based Effluent Limitations. However, the WLAs are to be achieved in the receiving water. Accordingly, the City considers the limitations to be receiving water limitations. *See, e.g.*, State Board Order WQ 2009-0008. The Permittees are to comply with the limitations by implementing best management practices ("BMPs").

Federal and state policy provide that an iterative BMP approach is appropriate in MS4 permits for achieving receiving water limitations. *See, e.g.*, State Board Order WQ 99-05. Where existing BMPs are not sufficient to meet the receiving water limitations, permittees are to implement more effective BMPs. This approach is consistent with the MEP standard governing the discharge of all pollutants from the MS4. The City submits that to be consistent with federal and state policy, the Permit must be clarified to provide for compliance with WLAs through an iterative BMP approach. To the extent the Regional Board can rely on state law to support the TMDL provisions, the City submits that the Regional Board has not complied with relevant requirements (*e.g.*, Water Code §§ 13000, 13263(a), 13241, etc.). Accordingly, the City requests that the Board members direct staff to revise the Tentative Order's TMDL provisions to be consistent with federal and state law and policy.

As a public agency, we have the obligation to carry out our duties in a responsible, realistic, and reasoned manner. Requirements that tether public agencies to impractical positions are counterproductive and violate our sacred charge as representatives of the people. It must be emphasized that the City is very committed to water quality protection, but in a manner that balances this goal with the resources, needs, and expected results of the community. In submitting these comments, the City hopes it has provided a better perspective, from a local level, of the impacts that the current state of the economy has had on the City, the additional hardships that will be incurred to fund and implement the Order at this time, and the magnitude of legal liability it will expose both of our agencies to.

The City recommends that the Permit be remanded to staff with direction to address the unnecessary economic impacts imposed by the Permit. The monitoring program, unfunded roads mandates, retrofitting, and changes to the various existing inspection programs must, at minimum, be addressed. We request that the Board members direct staff to continue meeting with the permittees prior to adopting the permit and to work through these concerns, or at least defer the costly provisions until the permittees can adequately fund the requirements rather than fall into unavoidable non-compliance. The 2007 ROWD prepared by the Permittees addressed necessary changes to Water Quality Protection programs by building on existing programs and leveraging other available local resources. The programs in the 2007 ROWD should be carefully reconsidered in lieu of the model program elements proposed by Board staff. Thank you.

If you have any questions regarding this information, please contact Aldo Licitra, our Associate Engineer for NPDES, at 951-308-6387.

Sincerely,

Greg Butler
Director of Public Works/City Engineer

Cc: Shawn Nelson, City Manager
City Council

DEPARTMENT OF THE ARMY
6010 Hidden Valley Road Suite 105
Carlsbad, CA 92011

September 7, 2010

REPLY TO
ATTENTION OF:
Office of the Chief
Regulatory Division

ATTN: **NWU:749045:bneili**

David Gibson, Executive Officer
Regional Water Quality Control Board
9174 Sky Park Court, Suite 100,
San Diego, California 92123-4353

Dear Mr. Gibson:

Thank you for the opportunity to comment on the San Diego Region – Riverside County Storm Water Permit. As you are aware, the U.S. Army Corps of Engineers has been developing a Special Area Management Plan (SAMP) for the San Jacinto and Santa Margarita Watersheds. There is direct overlap between the Santa Margarita portion of the SAMP and the San Diego Region – Riverside County Storm Water Permit.

The language proposed in the permit and the actions and studies proposed would complement the work being done for the SAMP. Ideally, the regulatory processing and permitting for the State and Federal agencies would be aligned and streamlined for the cities and County within this area. We remain committed to working with the Regional Water Quality Control Board (Board) and the jurisdictions to bring this idea to fruition.

Within the permit itself, the Watershed Water Quality work plan and the Jurisdictional Runoff Management Program are of particular interest. Unfortunately due to time constraints, we are not able to do a thorough review and comparison of the language at this time, but would like to work with the Board and the affected jurisdictions to streamline permitting and improved the water quality in the watershed.

The studies mentioned in the permit appear to have great value, and we would encourage the jurisdictions to complete them and applaud the Board for including them in the permit. Although all the studies mentioned in the permit are worthwhile, we draw particular interest to and support the inclusion of the MS4 and Receiving Water Maintenance Study and the Intermittent and the Ephemeral Stream Perennial Conversion Study in the final permit.

There are many additional comments that could be made regarding the permit; however,

due to staffing and time limitations, these comments are abbreviated and limited. We would like to dedicate time in the near future to work with your staff and the jurisdictions in supporting actions to comply with the Clean Water Act and provide clean water to all of our communities.

Thank you for receiving our comments, should you have any questions, please contact me at 760.602.4830 or via e-mail at therese.orourke@usace.army.mil. Please refer to this letter and SPL-2010-00860-TOR in your reply.

Sincerely,

Therese O'Rourke Bradford
Chief, South Coast Branch
Regulatory Division

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105-3901

SEP 07 2010

Mr. Ben Neill
Northern Watersheds Protection Unit
San Diego Regional Water Quality Control Board
9174 Sky Park Court, Suite 100
San Diego, CA 92123

Re: Draft MS4 Permit for Riverside County

Dear Mr. Neill:

The following are EPA Region 9's comments on the draft NPDES permit for the municipal separate storm sewer system (MS4) serving the portion of Riverside County within the jurisdiction of the San Diego Regional Board (SDRB), which was public noticed on July 23, 2010. We would first like to point out there appears to be an error in the NPDES permit number for the draft permit (page i). Permit No. CAS0108740 proposed for the Riverside County MS4 permit, is also the number used for the SDRB's MS4 permit for South Orange County. We suggest the SDRB retain the permit number used for the previous permit for Riverside County, which is CAS0108766.

As you know, Region 9 has been working with Regional Boards throughout the State over the last several years in an effort to develop clear, measurable and enforceable requirements for MS4 permits. We have focused most of our attention on requirements related to low impact development (LID) and TMDL implementation, given the potential environmental benefits to be derived from these particular components of the stormwater permit program. Since there are no approved wasteload allocations applicable to the Riverside County MS4 discharges at this time, the following comments focus on LID requirements, but also address several other issues as well. However, with regards to TMDLs, section I of the draft permit would incorporate applicable requirements of future TMDLs when fully approved, and we support this provision.

A. LID Requirements

We recommend section F.1.d.(4)(c)(ii) of the draft permit (page 33) be revised as follows:

> "If onsite ~~infiltration~~ retention LID BMPs are technically infeasible per section F.1.d.(7)(b), other LID BMPs may treat any volume that is not retained onsite provided that the other LID BMPs are sized to achieve equivalent stormwater volume and pollutant load reduction as if the entire design capture volume were retained onsite ~~to hold the design storm volume that is not infiltrated~~."

The proposed language in the draft Riverside County MS4 permit (which only mentions infiltration as an LID BMP) is inconsistent with the analogous section in the adopted South Orange County MS4 permit, and would not require a consideration of LID measures such as evapotranspiration, or capture and reuse of stormwater in determining the feasibility of the permit's onsite retention requirement in section F.1.d.(7)(a). The revised approach we've suggested here is derived from the requirements of the Ventura County MS4 permit (section E.III.1.b) adopted by the Los Angeles Regional Board in July 2010, and we believe it is more consistent with the intent of LID for stormwater, i.e., retention of stormwater onsite, and section F.1.d.(7)(a) of the draft permit. Further, although the draft permit includes a rough definition of "LID" in Attachment C-2, the permit is still not entirely clear concerning what is intended by the term "LID BMPs." We suggest additional descriptive information such as the following (also derived from the Ventura County MS4 permit) be added to Finding 2.c (page 9) or the definitions section of the draft Riverside County permit:

> "LID site design BMPs, utilizing infiltration, storage for reuse, evapotranspiration, or biofiltration/bioretention help preserve and restore the natural hydrologic cycle of the site~~, allowing for filtration and infiltration~~ which can greatly reduce the volume, peak flow rate, velocity, and pollutant loads of storm water runoff."

B. Comments on Other Issues

1. Issues Related to Non-Stormwater Discharges

We understand that concerns have been raised regarding the proposed numeric action levels for non-stormwater dry weather discharges (section C of the draft Riverside County MS4 permit). However, we would point out that these requirements are consistent with requirements adopted by the SDRB in December 2009 for the MS4 permit for South Orange County. Such requirements are also consistent with our efforts to ensure MS4 permit requirements are more measurable and enforceable, and we would encourage the SDRB to retain the proposed requirements in the final Riverside County MS4 permit.

We also understand that concerns have been raised regarding the deletion of landscape irrigation, irrigation water, and lawn watering from the list of non-stormwater discharges which are not necessarily prohibited by the permit (section B.2). We previously supported this same revision in a letter to the SDRB dated June 18, 2009 commenting on the draft South Orange County MS4 permit; we support the revision in the Riverside County MS4 permit as well. In our previous letter, we noted that the fact sheet for the Orange County MS4 permit had identified these categories of discharges as significant sources of pollutants, and as such, it would be appropriate for the SDRB to remove these discharges from the list of non-prohibited non-stormwater discharges in the Orange County MS4 permit. The fact sheet for the draft Riverside County MS4 permit

includes similar information on the discharges, and we believe removal of the discharges from the list of non-prohibited discharges would be appropriate in both counties.

2. Stormwater Action Levels (SALs)

In a previous letter to the SDRB dated September 28, 2009, we supported the SALs proposed for the South Orange County MS4 permit; we noted the proposed requirements would help clarify the term "maximum extent practicable" (MEP), and would be consistent with our goal of including more measurable and enforceable requirements in MS4 permits. The proposed SAL requirements in the Riverside County MS4 permit are consistent with requirements for South Orange County, and for the same reasons noted in the case of South Orange County, we would also support the proposed requirements for the Riverside County MS4 permit.

3. Retrofitting Requirements for Existing Development

As you know, EPA is considering requirements for retrofitting BMPs into existing developments as one of the key components of national stormwater rulemaking currently underway to improve the stormwater program (74 FR 68621, December 28, 2009). We note that the proposed retrofitting requirements for Riverside County are very similar to the requirements of the MS4 permit adopted by the SDRB in December 2009 for South Orange County. Given the potential environmental benefits of retrofitting in reducing pollutant discharges in stormwater runoff, we strongly encourage the SDRB to retain the proposed requirements in the final Riverside County MS4 permit.

4. Hydromodification Requirements

We have reviewed the proposed requirements related to hydromodification in the draft Riverside County MS4 permit (section F.1.h), and we would encourage the SDRB to retain these requirements in the final permit. The proposed requirements in the Riverside County permit are similar to requirements in other recently-adopted Southern California MS4 permits, and the requirements will further the objectives of the LID provisions in the permit.

5. Requirements for Unpaved Roads

We understand that concerns have been raised regarding the new requirements in the draft Riverside County MS4 permit to implement additional controls for stormwater discharges from unpaved roads (sections F.1.i, F.3.a.10 and F.3.c.5 of the permit). We believe the new requirements are fully supported by the fact sheet and the Findings for the permit (Finding D.1.c), which identify the discharges as a significant source of pollutants. As such, we urge the SDRD to retain the proposed requirements in the final permit. Lastly, we would note the proposed requirements are similar to requirements in

the Municipal Regional Permit for MS4s in the San Francisco Bay Area adopted in 2009 by the San Francisco Bay Regional Board.

6. Monitoring Requirements

We understand that concerns have been raised about the monitoring requirements of the draft Riverside County MS4 permit (Attachment E to the permit). However, the proposed requirements are consistent with the requirements of other recent MS4 permits adopted by the SDRB such as the 2009 South Orange County MS4 permit. We strongly encourage the SDRB to retain the requirements in the final permit. Measuring the effectiveness of the stormwater program continues to be a challenge and thus, is an important priority for EPA; we believe the proposed monitoring details and requirements will improve permittee and Regional Board's ability to measure program effectiveness.

We appreciate the opportunity to provide comments on the draft permit. If you would like to discuss this matter further, please contact Eugene Bromley of the NPDES Permits Office at (415) 972-3510.

Sincerely,

David Smith, Manager
NPDES Permits Office (WTR-5)

UNITED STATES MARINE CORPS
MARINE CORPS BASE
BOX 555008
CAMP PENDLETON, CALIFORNIA 92055-5008

In Reply Refer to:
5090.7B
ENVSEC/426
September 7, 2010

Executive Officer
Attention: Mr. Ben Neill
California Regional Water Quality Control Board
San Diego Region
9174 Sky Park Court, Suite 100
San Diego, CA 92123

Subj: San Diego Regional Water Quality Control Board, Order No. R9-2010-0016, NPDES No. CAS0108740, County of Riverside, the Incorporated Cities of Riverside County, and the Riverside County Flood Control Water Conservation District

Marine Corps Base Camp Pendleton supports the Regional Water Quality Control Board's efforts to promote water quality and low impact development and appreciates the opportunity to review and comment upon the subject draft permit. Camp Pendleton's Director of Water Resources has expressed concerns over potential unintended consequences to water rights and water supply that could result from requirements contained in the draft permit. Please consider the enclosed comments.

If you have any questions, please contact Ms. Gabrielle Skipper at (760) 725-9760. Thank you.

Sincerely,

A. C. ENTINGH
Head, Environmental Compliance Department
Assistant Chief of Staff, Environmental Security
By direction of the Commanding Officer

Enclosures: Director of Office of Water Resources Letter

UNITED STATES MARINE CORPS
OFFICE OF WATER RESOURCES
MARINE CORPS BASE
BOX 555013
CAMP PENDLETON, CALIFORNIA 92055-5013

07 Sept 10

MEMORANDUM

From: Director, Office of Water Resources, AC/S Facilities, Camp Pendleton
To: Compliance Department Head, AC/S Environmental Security, Camp Pendleton

Subj: San Diego Regional Water Quality Control Board ("Regional Board"), Order No. R9-2010-0016, NPDES No. CAS0108740, County of Riverside, the Incorporated Cities of Riverside County, and the Riverside County Flood Control Water District Conservation

The Office of Water Resources (OWR) respectfully requests that the below comments regarding the Proposed Tentative Order be forwarded to Regional Board for consideration. Submitting such comments will help ensure that the national defense priorities of Camp Pendleton, particularly as they pertain to water supply and water rights, are not frustrated by the potential unintended consequences of the Proposed Tentative Order.

The Office of Water Resources Supports Low Impact Development (LID) in Concept:

The Office of Water Resources (OWR) supports the concept of LID from a water quality perspective. Cleaner water coming onto Camp Pendleton not only sustains healthy ecosystems, but also ensures water in Camp Pendleton's aquifers is safe and suitable for potable use. Although, implementation of LID is expected to improve the quality of water that reaches Camp Pendleton via the Santa Margarita River (SMR), if improperly structured, LID has the potential to reduce the volume of high quality water that would otherwise arrive downstream to support beneficial uses on Camp Pendleton. Beneficial uses on Camp Pendleton, which are supported by historic baseflows in the SMR, include—but are not limited to--providing seventy percent of Camp Pendleton's water supply and sustaining populations of threatened and endangered species.

The Proposed Tentative Order Remains Problematic From a Water Supply Perspective:

OWR appreciates that the Regional Board has already included provisions in the Proposed Tentative Order that appear oriented towards protecting downstream water users from encroachment of historical flows. However OWR remains concerned that some provisions in the Proposed Tentative Order could be read to incentivize removal of native SMR water from the watershed in a manner that has the potential to reduce SMR baseflows. We have suggested revisions to the Proposed Tentative Order at the end of this memorandum that we believe will further reduce the risk to our water supply.

Treatment of Runoff Before Discharge into Receiving Waters:

Finding E.7 on (page 14) raises a potential dilemma for MS4 operators that could facilitate large scale impoundment and export of stormflows for "runoff treatment" to the detriment of downstream water right holders. Specifically, Finding E.7 states that"[t]reatment and/or mitigation must occur prior to the discharge of runoff into receiving waters." Because achieving water quality standards may require extensive treatment—particularly to achieve the existing nutrient standards in the Basin

Plan, there is real risk that developers of large scale development/retrofit projects will impound large amounts of water onsite in lined facilities or export the water to a watershed with less stringent water quality objectives where the water can be discharged (or reclaimed for consumptive use) at significant savings to the MS4 or project developer.

To address this concern, the Regional Board should consider adding a section to the Findings in the Proposed Tentative Order which clarifies that impoundment or export of stormwater/rainwater for the purpose of avoiding pertinent discharge standards and/or basin plan objectives is not a proper use of stormwater absent demonstration of compliance with California Water Code Sections 1200-1225.

Along these lines, and to reduce risk that stormwater capture will reduce historic baseflows or otherwise diminish the water rights of downstream water users, we recommend the following additional revisions to the Proposed Tentative Order:

1. Revise Section F.1c.8 (page 29) to read as follows:

   Rain water harvesting, where feasible *and fully protective of downstream water rights*, must be implemented as part of the site design and construction, and to supplement offsite beneficial uses.

2. Amend Section F.3.d.2 to add an additional criterion, along the lines below for prioritizing retrofit of existing development:

   (k) the extent such projects are fully protective of downstream water rights[1]

J.N. JUNGREIS

[1] This recommended amendment will promote consistency with Section F.3.d.6(d) and ensure that the prioritization of retrofit projects properly considers the ramifications of retrofit on downstream baseflows.

Bridgette Moore, Mayor
Marsha Swanson, Mayor Pro Tem
Sheryl Ade, Council Member
Bob Cashman, Council Member
Scott Farnam, Council Member

23873 Clinton Keith Road, Suite 201
Wildomar, CA 92595
951.677.7751 Phone
951.698.1463 Fax
www.CityofWildomar.org

September 7th, 2010

Mr. David King
Chairman
San Diego Regional Water Quality Control Board
9174 Sky Park Court, Suite 100
San Diego, California 92123-4353

Re: Tentative Order R9-2010-0016, NPDES No. CAS0108740, Riverside County Municipal Separate Storm Sewer System Permit Reissuance *NWU:749045:bneill*

Chairman King:

The City of Wildomar is providing these comments on the above listed Tentative Order, and appreciates the Board's consideration of the issues described herein. Tentative Order R9-2010-0016 (draft Permit) has been drafted by Board staff to serve as the reissuance of Order R9-2004-0001 (existing Permit) which was originally issued to the County of Riverside, the Riverside County Flood Control and Water Conservation District (District), and the cities of Temecula and Murrieta. Additionally the draft Permit adds the recently incorporated City of Wildomar.

The City would like to thank the Board and the Executive Officer for committing their staff's time for a number of meetings with the City and fellow Copermittees in the development of the draft Permit. This collaborative approach to permit development is crucial to developing effective programs, and the City strongly believes that only through such effective communication and collaboration will our mutual goals of protecting water quality be realized. As a result of the meetings, the Permittees and Regional Board staff worked collaboratively to develop language for consideration in the Tentative Order.

We are most appreciative of the Board staff's consideration of allowing Wildomar to be regulated by one region with respect to the MS4 permit requirements. Although the City will still be mandated to participate in the Lake Elsinore/Canyon Lake TMDL as part of Region 8, the option of having the entire City regulated by one region will greatly help with the implementation of the permit requirements.

While the collaborative discussions have been fruitful and have resulted in a draft permit that is substantively improved over the initial draft, we unfortunately cannot support the tentative order as currently drafted due to (1) the projected cost exceeding our available resources and (2) shortcomings in the permit language itself.

The City therefore requests that the Board direct staff to work with the Copermittees to resolve the issues identified in this and the Riverside County Flood Control letter, including attachments, prior to considering adoption of the Permit.

This letter provides additional background, information and perspective specific to the City of Wildomar for the Board's consideration.

Background

City of Wildomar

Wildomar is one of the newest cities in the state having officially become a city on July 1, 2008. It is home to approximately 25,000 residents and encompasses about 24 square miles between the cities of Murrieta and Lake Elsinore in south western Riverside County. Wildomar is a community of old and new, mature homes and property with horses and other animals mixed with modern housing tracts. The name Wildomar was coined from the names of its three original founders – the "WIL" from William Collier, the "DO" from Donald Graham and the "MAR" from Margaret Collier Graham.

Economic Conditions

The adopted 2010-11 city **budget reflects the harsh reality of the City having <u>only 64% of the revenue</u> shown in the Comprehensive Fiscal Analysis (CFA) that was used for incorporation**. An examination of the major sources of revenue in the City reveals a grim picture:

Revenue Source	Estimate in Comprehensive Fiscal Analysis (CFA)	Revised Estimate for 2010-11 Budget	Difference
Taxes *(sales, property, franchise, etc.)*	$7.9 million	$5.1 million	**35% ↓**
Permits, Licenses, Fees	$2.5 million	$0.9 million	**25% ↓**
Total General Fund	$14.1 million	$9 million	**36% ↓**

The City is somewhat fortunate in that it can adjust to the demands of services and available funding because of its contract service arrangements for police and fire services provided to the community. However, the **City currently has only three authorized positions**: City Manager, Assistant City Manager/Finance Director and City Clerk. All other services are provided by contract services. The equivalent staff for city hall operations is approximately 13 staff members.

While it is difficult to estimate the exact cost of the permit, based on available budget estimates and assumptions made on the level of effort needed to implement and administer the permit as currently

drafted, the City's cost will be in the range of $250,000 – $350,000 in the first two years and $150,000-$250,000 in years three through five. **This cost was simply not contemplated in the Comprehensive Fiscal Analysis (CFA) that was used for incorporation**. While the collaborative process has resulted in successes that should not be overlooked, the shortcomings have resulted in a permit that cannot meet its core purpose of protecting water quality, by virtue of not being economically feasible for the City to implement.

Shortcomings:

Despite the noteworthy and important improvements in the permit, the publically released draft remains **far beyond the economic reach of the City**. Further in as much as the requirements are unattainable, and the public's resources are spread too thin, the Permit cannot, and **will not be effective at protecting water quality**. There are several fundamental issues that have caused or contributed to the shortcomings of the collaborative process:

- The baseline OC permit was designed for a region with significantly more resources than Riverside County
- New programs were added which go well beyond the OC permit requirements
- Several major programmatic changes were introduced at the end of the process
- The continuing recession

Priority Issues and Solutions

The Copermittees have identified specific and focused changes to the Permit that will allow the Copermittees to address staff's primary water quality concerns, while reducing compliance costs in a manner that is appropriate for the local watersheds. The City of Wildomar supports these changes. As previously noted, Board staff has directed the Copermittees to bring these changes directly to the Board for consideration, although we are hopeful that by summarizing them in writing that they may be addressed ahead of the scheduled October 13 hearing.

Monitoring and Reporting Program

Prior to the submittal of the ROWD, the Copermittees met with Board staff to propose changes to the Monitoring and Reporting Program (MRP). In these discussions, Board staff identified two areas for needed improvement:

- Relocation of Illicit Connection / Illicit Discharge (IC/ID) monitoring stations to MS4 outfalls, and
- Incorporation of Action Levels

In more recent discussions, Board staff noted that the MRP needed significant modification to reflect the South Orange County MRP, but would be scaled to be appropriate to the smaller Santa Margarita Region.

Unfortunately, the final MRP requirements have been expanded well beyond the South Orange County MRP requirements, resulting in a program that is completely out of proportion with the needs and resources of the Santa Margarita Region. In fact, the proposed MRP requirements will result in a **500% increase in monitoring program costs**, costing our residents **over two and a half times the per capita costs for South Orange County**.

Per Capita Monitoring Cost Comparison

Draft Permit	OC Permit
$5.13 per capita	~$2.00 per capita

The Copermittees recognize that monitoring and data collection is necessary. However, the MRP requirements exceed what is necessary to address management questions related to water quality, are beyond requirements dictated in the South Orange County MRP, and are beyond the Copermittees' ability to fund. Not only are the level of requirements inappropriate for the Santa Margarita Region, but they disregard the economic realities faced by the Copermittees. As such, the MRP falls far short of meeting the Executive Officer's stated goals of affordability.

In the interest of finding ways to offer Board staff a comparable program in a more cost effective and appropriate manner, the Copermittees have identified nine adjustments to the MRP that will **save approximately seven hundred and eighty thousand dollars ($780,000)** ***annually*** and bring per capita monitoring costs more in line with the South Orange County MRP, while maintaining the core components of the MRP. Table 1 summarizes the key changes and the respective cost savings. It is important to note that any change highlighted in RED reflects bringing the program in line with the South Orange County MRP. Figure 1 below shows graphically the comparative costs for the draft MRP with and without the requested adjustments. Please note that the 100% baseline in Figure 2 reflects the current cost of the Copermittees' current MRP.

Table 1 - Cost Savings resulting from proposed MRP changes[1]

Component	Requested Change	Cost reduction
Mass Loading Stations	1) Wet Weather - 3 wet -> 2 wet	**~$79,000**
	2) Dry Weather - Composite -> Grab	**~$66,000**
Toxicity Testing (MLS and Bioassessment)	3) 3 organisms -> 2 organisms	**~$14,000**
Bioassessment	4) 6 stations -> 3 stations	**~$158,000**
	5) 2X each -> 1X each	**~$95,000**
Action Levels	6) 'Representative Number/Percent' -> Representative - and remove 'within each sub area'	**~$241,000**
	7) SAL Composites -> Grab	**~$165,000**
Inland Aquatic Habitat Monitoring	8) Eliminate requirement	**~$140,000**
Special Studies	9) 6 special studies -> 4 studies, and Replace with more locally appropriate	**~$220,000/year**

	studies	
TOTAL ESTIMATED SAVINGS	Net savings of all recommended changes (annualized)	***~780,000/year***

Note: Red text refers to requirements currently in the South Orange County MRP.

Figure 1

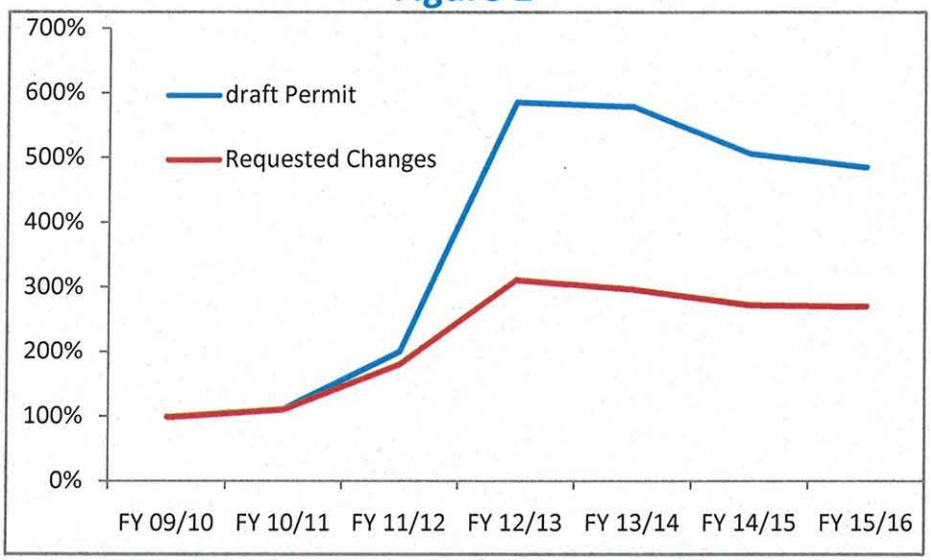

Draft Permit	OC Permit	Proposed Changes
~~$5.13/ per capita~~	~$2.00/per capita	**$2.54/per capita**

Although the requested adjustments to the MRP will not eliminate cost increases, and will result in an MRP which is more expensive, on a per capita basis, than the South Orange County MRP, they provide a more manageable program for the Copermittees.

The City requests that the Board make the adjustments identified above before Permit adoption.

Unpaved Roads Requirements (Sections F.1.i, F.3.a.(11), F.3.c.(5))

The requirements for unpaved roads are particularly cumbersome, onerous and unreasonable. In summary, the proposed unpaved road requirements may result in substantial and unnecessary additional Copermittee costs that are not justified by the facts in the Santa Margarita Region. The Copermittees believe that the existing MS4 Permit requirements for new development, construction, maintenance and IC/ID adequately address regulation of unpaved roads that threaten water quality. If the Regional Board believes that unpaved roads require further regulation, the Copermittees believe that the appropriate regulatory mechanism is a general permit (Waste Discharge Requirements or NPDES permit) that would

apply to *all* unpaved roads in the San Diego Region, rather than only those that are under the jurisdiction of the Copermittees.

The City requests that Sections F.1.i, F.3.a.(11) and F.3.c.(5) regulating unpaved roads be deleted from the draft MS4 Permit.

However, should the Water Board insist on retaining unpaved road requirements in this Permit, the Copermittees request the following revisions. These revisions are needed to ensure that all parties have a clear understanding of the requirements. In summary, the Copermittees request:

- Clarification that these requirements apply to those unpaved roads that the Copermittees maintain in their road system.
    - This should be commonly understood, but the clarification is important to include due to complex legal limitations and rights associated with access, ownership, and maintenance of unpaved roads.
- Removal of language that specifies specific BMPs that must be implemented.
    - Specifying the method of compliance is prohibited pursuant to CWC section 13360, and inappropriately forces the Copermittees to adopt particular solutions that may not best fit the situation.
- Removal of requirement for BMPs for private unpaved roads.
    - The proposed requirements would require the creation of an additional and unnecessary program element addressing privately owned unpaved roads. The Copermittees believe that a focused public outreach program should be implemented to educate property owners and associations about the need to properly maintain unpaved roads. This education program combined with existing IC/ID enforcement capabilities seems a more reasoned and responsible response to addressing this issue.

Should Sections F.1.i, F.3.a.(11) and F.3.c.(5) regulating unpaved roads not be removed from the Permit, the City requests they be modified as noted above.

Post-Construction BMP Inspections

Section F.1.f of the draft MS4 Permit includes new requirements for the Copermittees to verify that Post-Construction BMPs are being appropriately maintained. The new requirements appropriately develop a risk-based approach to inspections, defining eight factors that the Copermittees must consider in determining 'high-priority' projects.

However, language in Section F.1.f.(2)(a) removes that discretion by stating:

> *'At a minimum, high priority projects include those projects that generate pollutants (prior to treatment) within the tributary area of a 303(d) listed waterbody impaired for that pollutant; or those projects generating pollutants within the tributary area*

for an observed action level exceedance of that pollutant.'

This language is excessively broad, and will require virtually all sites in the watershed to be designated as 'high priority' and therefore subject to annual inspections. This language is inconsistent with the goals of a socially responsible and affordable permit and should be modified for several reasons:

- Inspections frequencies should be based on risk of discharge. Annual inspections are not needed for all sites that *generate* a specific pollutant. For example, if a site generates a pollutant associated with 303(d) listing, but the site retains runoff onsite or stores those pollutants indoors, annual inspections would be unnecessary. However, sites that store 303(d) listed pollutants outdoors or otherwise have a high risk of discharge should be inspected more frequently.

- The language dilutes Copermittee resources by requiring annual inspections of low-risk sites, preventing the Copermittees from appropriately concentrating resources on problematic sites/sources. This is because when an action level is exceeded then all parties in the watershed are assumed guilty until proven innocent.

While the Copermittees are not opposed to implementing a program to verify that these BMPs are being maintained, it is critically important that they be provided the flexibility to determine which sites warrant annual inspections. **Specifically, the City requests that the language in F.1.f.(2)(a) be amended as follows prior to adoption of the Permit:**

> *At a **minimum**, high priority projects include those projects that ~~generate pollutants (prior to treatment) within the tributary area of a 303(d) listed waterbody impaired for that pollutant; or those projects generating pollutants within the tributary area for~~ have been determined to be the source of an observed action level exceedance. ~~of that pollutant.~~*

Commercial and Industrial Inspections

Section F.3.b. of the draft Permit includes requirements to inventory and inspect Commercial and Industrial businesses. The draft Permit expands upon existing inventory and inspection requirements in two problematic ways:

- It requires *significantly* more businesses to be inspected, and

- It includes new requirements specifying what the Copermittees are required to inspect when they are onsite.

More inspections

Sections F.3.b.(1)(a)(i) and (ii) identify forty-two (42) categories of businesses that must be inventoried and inspected based on risk of pollutant discharge. However, Section F.3.b.(1)(a)(iii) adds virtually any business in the Permit area, independent of pollutant discharge risk:

> *'**All** other commercial or industrial sites/sources **within or directly adjacent to or discharging directly to receiving waters within environmentally sensitive areas** (as defined in Attachment C of this Order) or **that generate** pollutants tributary to an observed exceedance of an action level.' (Bold emphasis added)*

In effect, section F.3.b.(1)(a)(iii) adds the following additional businesses:

- EVERY business that is adjacent to (or within) an Environmentally Sensitive Area (ESA), regardless of whether the business generates or discharges *any* pollutants, and
- EVERY business that '*generates*' pollutants which happens to be upstream of an action level exceedance, *regardless* of whether the site has ever *discharged any* pollutants.

This language expands the list of sites far beyond the current requirements, and well beyond those sites that actually pose a threat to water quality. This is clearly unnecessary and should be removed for several reasons:

- It inappropriately separates 'risk' from the 'response', by requiring the Copermittees to inspect businesses irrespective of the risk that the business poses to water quality. For example, this language would require the Copermittees to expend resources and time inspecting hair salons, office buildings and other activities that happen to be adjacent to an ESA. This inappropriate broad-brush approach to permitting actually works to discredit the Copermittees NPDES programs and dilute resources, rather than enhancing protection of water quality.
- It will further remove the flexibility that the Copermittees need to be able to re-allocate resources to inspecting and following up with sites/sources that are problematic.

Therefore, the City requests that the language in F.3.b.(1)(a)(iii) be amended as follows prior to adoption of the Permit:

> *All other commercial or industrial sites/sources ~~within or directly adjacent to or discharging directly to receiving waters within environmentally sensitive areas (as defined in Attachment C of this Order) or that generate pollutants tributary to~~ that have been determined to be the source of an observed exceedance of an action level.*

Additional items to review during inspections

Section F.3.b.(4)(a) specifies what the Copermittees must review when performing an inspection. The new requirements in sub sections (i) and (ii) to review BMP implementation plans, and review facility monitoring data, respectively, are an unnecessary new mandate. They should be removed for several reasons:

- The requirements burden the Copermittees with reviewing information that is required under General Permits and is the responsibility of the Regional Board to enforce.
- The requirements would significantly increase the inspection time for sites with General Permits and endanger an existing collaborative inspection program (Complaince/Assistance Program (CAP)) that leverages the time highly trained Environmental Health Inspectors spend onsite for Certified Unified Program Agencies (CUPA) and Food Services inspections to also conduct NPDES inspections. The CAP program not only utilizes highly trained Environmental Health inspectors, but also regionalizes the inspections and therefore provides multiple benefits including uniformity, reduction in total number of inspections and higher-quality inspections. The

Environmental Health HazMat inspection program administrators have indicated that they cannot accommodate the additional time required to implement the new requirements, as they would unduly cut into their ability to meet their own state-mandated inspection frequencies.

- By virtue of eliminating the CAP program, the requirements would effectively mandate a more fractured and disconnected set of inspections for the businesses, contrary to CAL EPA mandates for consolidated inspections, and in turn diluting the effectiveness of the program.

The City requests that the language in F.3.b.(1)(a)(iii) be amended as follows prior to adoption of the Permit:

(a) Inspection Procedures: Inspections must include but not be limited to:

(i) ~~*Review of BMP implementation plans, if the site uses or is required to use such a plan*~~*;*

(ii) ~~*Review of facility monitoring data, if the site monitors its runoff*~~*;*

(iii) Check for coverage under the General Industrial Permit (Notice of Intent (NOI) and/or Waste Discharge Identification Number), if applicable;

(iv) Assessment of compliance with Copermittee ordinances and Copermittee issued permits related to runoff;

(v) Assessment of the implementation, maintenance and effectiveness of the designated minimum and/or enhanced BMPs;

Retrofit

Section F.3.d. proposes a program to develop an inventory of existing developments that may be candidates for future water quality retrofits. The requirement goes on to encourage the Copermittees to collaborate with local property owners to promote urban retrofit in an effort to accelerate reductions in pollutant loading from existing urban areas.

Although laudable, this requirement has two significant problems:

1) The program is self-defeating as it contains no "carrots" to lure private property owners into participating in the program. Any property owner that is interested in volunteering in this effort would be required to fully comply with all provisions of the draft MS4 Permit. This includes preparation of compliance documents such as SSMPs, LID and hydromodification studies, subjecting themselves to additional regulatory scrutiny through business and BMP inspection programs required by the MS4 Permit, and otherwise incurring a myriad of costs and requirements. These costs and requirements would provide a strong disincentive to participate in a retrofit program. This program will only work if it is modified to remove these disincentives.

2) Current and projected economic conditions will limit the interest and participation of private property owners. Long-term economic predictions for Riverside County indicate that assessed valuations and property values will likely remain stagnant for the term of this Permit. Similarly, sales tax and unemployment are not expected to significantly improve either.

Without Co-Permittee resources to supplement private retrofit projects, the current economic dis-incentives for private redevelopment that are built into the program and the current impact of the economy on private property owners, there is no real value to the program.

PREFERRED POLICY CHOICE: The City strongly requests that this program be deleted for the aforementioned reasons.

Alternatively, and at minimum, the Copermittees request that the schedule for completion of the retrofitting program be revised to provide for development during the term of the Permit and submittal of the proposed program with the next ROWD. This will allow the Copermittees to defer expenditures related to development of the program until later in the Permit term when it is hoped that economic conditions and local revenues will improve. The Copermittees expect few opportunities for retrofit until the economy improves. Due to the Copermittee's limited ability to require retrofit on private property, our best opportunities for retrofit may be associated with approvals of proposed modifications of existing developments.

ALTERNATE POLICY CHOICE: If the Retrofit requirements are not removed, the City requests that the Regional Board modify Section F.3.d. as follows:

> *Each Copermittee must develop and implement a retrofitting program that meets the requirements of this section upon submittal of the ROWD.*

Irrigation Runoff

The Draft MS4 Permit categorically prohibits the discharge of landscape irrigation; irrigation water; lawn watering; (collectively 'irrigation runoff') and non-emergency fire fighting flow runoff to the MS4. The basis for this requirement comes from the current Orange County storm water permit within the San Diego Region (NPDES No. CAS0108740), which prohibits such discharges.

Although irrigation runoff may have been shown to be a problem in South Orange County, it has **not** been shown to be causing problems in receiving waters in the Santa Margarita Region. Attachment 6 summarizes the unique conditions and other facts that warrant the restoration of irrigation runoff as a non-prohibited non-storm water discharge category. It is important to reiterate the three key points made in Attachment 6

- Unlike the watersheds in South Orange County, the Santa Margarita Region is an ephemeral watershed;
- Unlike South Orange County, the Copermittees have **not** identified landscape irrigation, irrigation water or lawn water as an actual source of pollutants or conveyance of pollutants to waters of the U.S.;
- The draft MS4 Permit requires Copermittees to eliminate irrigation runoff ***TO THE MS4,*** which by definition, requires elimination of discharges to streets, curbs and gutters.

As noted above, the prohibition appears to hold the Copermittees responsible for any amount of irrigation runoff discharged to the curb and gutter, *regardless* of whether or not the discharge ever reaches receiving waters or causes or contributes to the exceedance of a water quality standard. This fact, combined with the fact that irrigation runoff has not been shown to be causing impairments in the local receiving waters, will make enforcement difficult to justify with residents and will likely result in community outrage over bans on irrigation. Further the Copermittees are not water purveyors, and as such, have little control over residential irrigation runoff outside of sending code enforcement officers out to look for incidents of

excessive irrigation runoff. This is a very inefficient use of resources. In any event, the provisions as written will do little for water quality but potentially much for community outrage against water quality programs. The Copermittees do not believe this is the intent of the Board.

It is further worth noting that the Permit already contains an investigation and remediation process via Non-Storm water Action Levels (NALs) by which the Copermittees will identify the source of problematic non-storm water discharges. . Should the source be found to be a conditionally exempt non-storm water discharge, the permit requires the Copermittees to address that discharge or the entire category of discharges as appropriate. By allowing the NAL process to determine when and where conditionally exempt discharges need to be prohibited, the Copermittees are better positioned to justify any enforcement actions.

PREFERRED POLICY CHOICE: The City requests that the Regional Board restore the conditional exemption for landscape irrigation, irrigation water and lawn watering.

Alternatively, if the Regional Board nevertheless insists on prohibiting Irrigation Runoff, the Copermittees request that the draft MS4 Permit be revised to allow for irrigation runoff to be managed as a JRMP program, rather than as a prohibited discharge to the MS4. This alternative request is consistent with how the Permit currently deals with non-emergency fire fighting discharges, which was also removed from the list of non-prohibited non-storm water discharges. The Executive Officer stated that he would be open to consideration of a program for irrigation runoff that would address discharges from the MS4. This alternative approach allows the Copermittees to develop a program that focuses on irrigation runoff problem areas, as opposed to holding the Copermittees responsible for eliminating any instant case of over-irrigation to a street independent of threat to receiving water quality.

ALTERNATIVE POLICY CHOICE: The City requests that the Regional Board clarify that irrigation runoff is only prohibited where it is discharged *from* an MS4 (into receiving waters) by adding the following language:

B.4. *As part of the JRMP, the Copermittees must develop and implement a program to address pollutants from landscape irrigation, irrigation water and lawn watering identified as significant sources of pollutants to waters of the United States.*

Legal Issues

The Copermittees have identified legal issues that raise fundamental questions regarding several of the key elements of the Tentative Order.

The City requests review of the legal issues raised in the RCFC comment letter and revision of the Tentative Order prior to adoption.

Conclusion

The City of Wildomar is very appreciative of the process and consideration given thus far to our concerns related to the draft permit. With very few exceptions, your staff has done an excellent job in communicating and explaining the proposed requirements. As a result of the discussions with your staff, we believe that sections of the permit have been refined in a manner that will benefit both the board and the city.

We understand that the federal regulations require that municipalities obtain a permit and renew it every 5 years. We understand that each city must develop a storm water management program designed to control the discharge of pollutants into and from the MS4 (or from being dumped directly into the MS4). We also understand that the purpose of the permit is to protect local waterbodies since storm drains typically dump their water into streams, bays, and/or the ocean without being treated.

However, at this time, we need the Board's help in meeting these requirements. **Specifically, we need time: time to fully flesh out new permit language (some that has never appeared in an MS4 permit before!) and time to allow the city (and the economy!) to recover from the devastating impacts of the recession – we simply can't afford the permit as currently drafted.**

Thank you in advance for your consideration of the issues raised in this comment letter. We look forward to the opportunity to continue working with you, your Executive Director and your staff on the refinement and implementation of this important permit.

Sincerely,

Frank Oviedo
City Manager

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Reducing Stormwater Costs through Low Impact Development (LID) Strategies and Practices

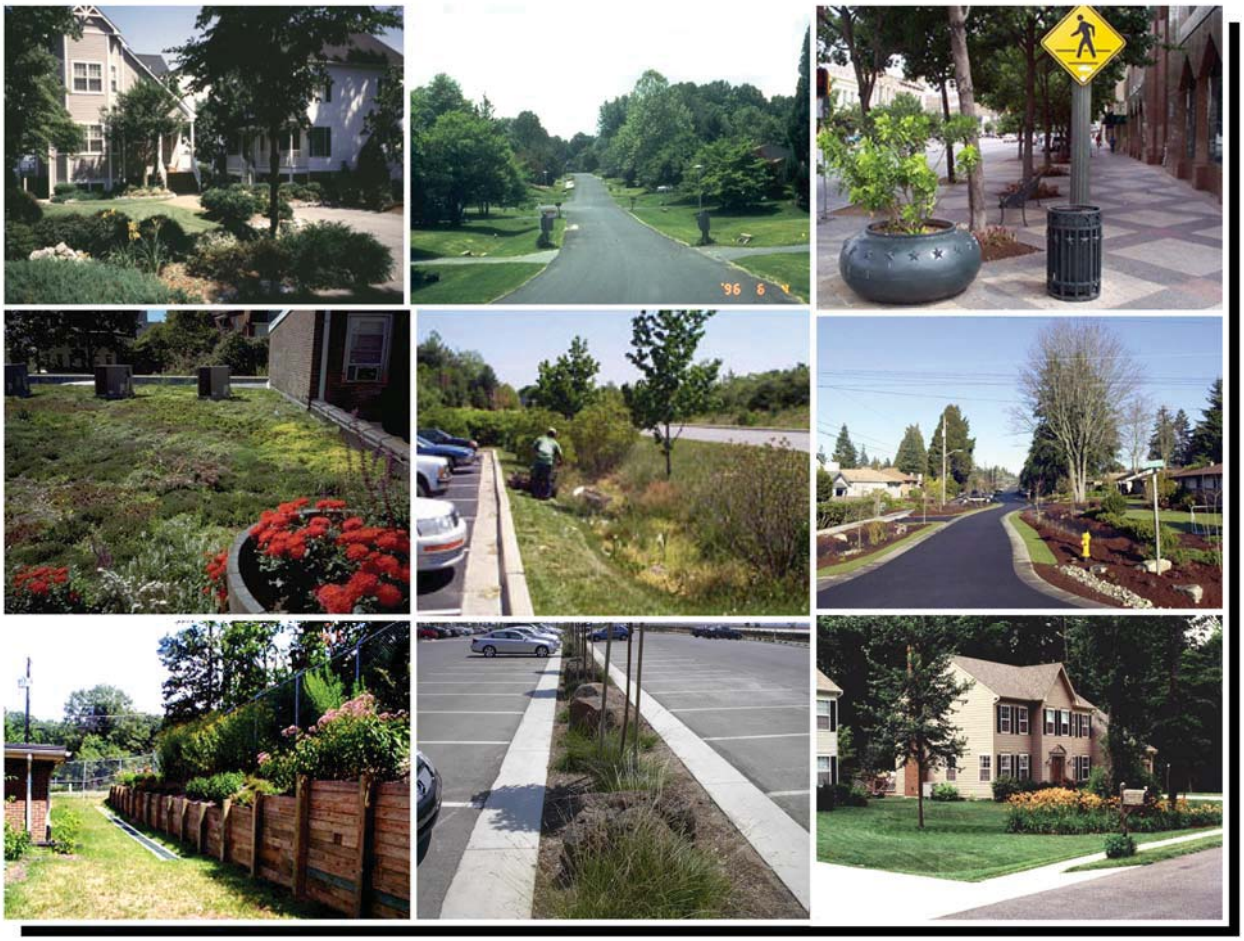

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Reducing Stormwater Costs through Low Impact Development (LID) Strategies and Practices

December 2007

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Nonpoint Source Control Branch (4503T)

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FOREWORD

One of the most exciting new trends in water quality management today is the movement by many cities, counties, states, and private-sector developers toward the increased use of Low Impact Development (LID) to help protect and restore water quality. LID comprises a set of approaches and practices that are designed to reduce runoff of water and pollutants from the site at which they are generated. By means of infiltration, evapotranspiration, and reuse of rainwater, LID techniques manage water and water pollutants at the source and thereby prevent or reduce the impact of development on rivers, streams, lakes, coastal waters, and ground water.

Although the increase in application of these practices is growing rapidly, data regarding both the effectiveness of these practices and their costs remain limited. This document is focused on the latter issue, and the news is good. In the vast majority of cases, the U.S. Environmental Protection Agency (EPA) has found that implementing well-chosen LID practices saves money for developers, property owners, and communities while protecting and restoring water quality.

While this study focuses on the cost reductions and cost savings that are achievable through the use of LID practices, it is also the case that communities can experience many amenities and associated economic benefits that go beyond cost savings. These include enhanced property values, improved habitat, aesthetic amenities, and improved quality of life. This study does not monetize and consider these values in performing the cost calculations, but these economic benefits are real and significant. For that reason, EPA has included a discussion of these economic benefits in this document and provided references for interested readers to learn more about them.

Readers interested in increasing their knowledge about LID and Green Infrastructure, which encompasses LID along with other aspects of green development, should see www.epa.gov/npdes/greeninfrastructure and www.epa.gov/nps/lid. It is EPA's hope that as professionals and citizens continue to become more knowledgeable about the effectiveness and costs of LID, the use of LID practices will continue to increase at a rapid pace.

EXECUTIVE SUMMARY

This report summarizes 17 case studies of developments that include Low Impact Development (LID) practices and concludes that applying LID techniques can reduce project costs and improve environmental performance. In most cases, LID practices were shown to be both fiscally and environmentally beneficial to communities. In a few cases, LID project costs were higher than those for conventional stormwater management practices. However, in the vast majority of cases, significant savings were realized due to reduced costs for site grading and preparation, stormwater infrastructure, site paving, and landscaping. Total capital cost savings ranged from 15 to 80 percent when LID methods were used, with a few exceptions in which LID project costs were higher than conventional stormwater management costs.

EPA has identified several additional areas that will require further study. First, in all cases, there were benefits that this study did not monetize and did not factor into the project's bottom line. These benefits include improved aesthetics, expanded recreational opportunities, increased property values due to the desirability of the lots and their proximity to open space, increased total number of units developed, increased marketing potential, and faster sales. Second, more research is also needed to quantify the environmental benefits that can be achieved through the use of LID techniques and the costs that can be avoided. Examples of environmental benefits include reduced runoff volumes and pollutant loadings to downstream waters, and reduced incidences of combined sewer overflows. Finally, more research is needed to monetize the cost reductions that can be achieved through improved environmental performance, reductions in long-term operation and maintenance costs, and/or reductions in the life cycle costs of replacing or rehabilitating infrastructure.

INTRODUCTION

BACKGROUND

Most stormwater runoff is the result of the man-made hydrologic modifications that normally accompany development. The addition of impervious surfaces, soil compaction, and tree and vegetation removal result in alterations to the movement of water through the environment. As interception, evapotranspiration, and infiltration are reduced and precipitation is converted to overland flow, these modifications affect not only the characteristics of the developed site but also the watershed in which the development is located. Stormwater has been identified as one of the leading sources of pollution for all waterbody types in the United States. Furthermore, the impacts of stormwater pollution are not static; they usually increase with more development and urbanization.

Extensive development in the United States is a relatively recent phenomenon. For the past two decades, the rate of land development across the country has been twice the rate of population growth. Approximately 25 million acres were developed between 1982 and 1997, resulting in a 34 percent increase in the amount of developed land with only a 15 percent increase in population.[1,2] The 25 million acres developed during this 15-year period represent nearly 25 percent of the total amount of developed land in the contiguous states. The U.S. population is expected to increase by 22 percent from 2000 to 2025. If recent development trends continue, an additional 68 million acres of land will be developed during this 25-year period.[3]

Water quality protection strategies are often implemented at three scales: the region or large watershed area, the community or neighborhood, and the site or block. Different stormwater approaches are used at different scales to afford the greatest degree of protection to waterbodies because the influences of pollution are often found at all three scales. For example, decisions about where and how to grow are the first and perhaps most important decisions related to water quality. Growth and development can give a community the resources needed to revitalize a downtown, refurbish a main street, build new schools, and develop vibrant places to live, work, shop, and play. The environmental impacts of development, however, can pose challenges for communities striving to protect their natural resources. Development that uses land efficiently and protects undisturbed natural lands allows a community to grow and still protect its water resources.

Strategies related to these broad growth and development issues are often implemented at the regional or watershed scale. Once municipalities have determined where to grow and where to preserve, various stormwater management techniques are applied at the neighborhood or community level. These measures, such as road width requirements, often transcend specific development sites and can be applied throughout a neighborhood. Finally, site-specific stormwater strategies, such as rain gardens and infiltration areas, are incorporated within a particular development. Of course, some stormwater management strategies can be applied at several scales. For example, opportunities to maximize infiltration can occur at the neighborhood and site levels.

Many smart growth approaches can decrease the overall amount of impervious cover associated with a development's footprint. These approaches include directing development to already degraded land; using narrower roads; designing smaller parking lots; integrating retail, commercial, and residential uses; and designing more compact residential lots. These development approaches, combined with other techniques aimed at reducing the impact of development, can offer communities superior stormwater management.

Stormwater management programs have struggled to provide adequate abatement and treatment of stormwater at the current levels of development. Future development will create even greater challenges for maintaining and improving water quality in the nation's waterbodies. The past few decades of stormwater management have resulted in the current convention of control-and-treatment strategies. They are largely engineered, end-of-pipe practices that have been focused on controlling peak flow rate and suspended solids concentrations. Conventional practices, however, fail to address the widespread and cumulative hydrologic modifications within the watershed that increase stormwater volumes and runoff rates and cause excessive erosion and stream channel degradation. Existing practices also fail to adequately treat for other pollutants of concern, such as nutrients, pathogens, and metals.

Low Impact Development

Low Impact Development (LID)[4] is a stormwater management strategy that has been adopted in many localities across the country in the past several years. It is a stormwater management approach and set of practices that can be used to reduce runoff and pollutant loadings by managing the runoff as close to its source(s) as possible. A set or system of small-scale practices, linked together on the site, is often used. LID approaches can be used to reduce the impacts of development and redevelopment activities on water resources. In the case of new development, LID is typically used to achieve or pursue the goal of maintaining or closely replicating the predevelopment hydrology of the site. In areas where development has already occurred, LID can be used as a retrofit practice to reduce runoff volumes, pollutant loadings, and the overall impacts of existing development on the affected receiving waters.

In general, implementing integrated LID practices can result in enhanced environmental performance while at the same time reducing development costs when compared to traditional stormwater management approaches. LID techniques promote the use of natural systems, which can effectively remove nutrients, pathogens, and metals from stormwater. Cost savings are typically seen in reduced infrastructure because the total volume of runoff to be managed is minimized through infiltration and evapotranspiration. By working to mimic the natural water cycle, LID practices protect downstream resources from adverse pollutant and hydrologic impacts that can degrade stream channels and harm aquatic life.

It is important to note that typical, real-world LID designs usually incorporate more than one type of practice or technique to provide integrated treatment of runoff from a site. For example, in lieu of a treatment pond serving a new subdivision, planners might incorporate a bioretention area in each yard, disconnect downspouts from driveway surfaces, remove curbs, and install grassed swales in common areas. Integrating small

practices throughout a site instead of using extended detention wet ponds to control runoff from a subdivision is the basis of the LID approach.

When conducting cost analyses of these practices, examples of projects where actual practice-by-practice costs were considered separately were found to be rare because material and labor costs are typically calculated for an entire site rather than for each element within a larger system. Similarly, it is difficult to calculate the economic benefits of individual LID practices on the basis of their effectiveness in reducing runoff volume and rates or in treating pollutants targeted for best management practice (BMP) performance monitoring.

The following is a summary of the different categories of LID practices, including a brief description and examples of each type of practice.

Conservation designs can be used to minimize the generation of runoff by preserving open space. Such designs can reduce the amount of impervious surface, which can cause increased runoff volumes. Open space can also be used to treat the increased runoff from the built environment through infiltration or evapotranspiration. For example, developers can use conservation designs to preserve important features on the site such as wetland and riparian areas, forested tracts, and areas of porous soils. Development plans that outline the smallest site disturbance area can minimize the stripping of topsoil and compaction of subsoil that result from grading and equipment use. By preserving natural areas and not clearing and grading the entire site for housing lots, less total runoff is generated on the development parcel. Such simplistic, nonstructural methods can reduce the need to build large structural runoff controls like retention ponds and stormwater conveyance systems and thereby decrease the overall infrastructure costs of the project. Reducing the total area of impervious surface by limiting road widths, parking area, and sidewalks can also reduce the volume of runoff that must be treated. Residential developments that incorporate conservation design principles also can benefit residents and their quality of life due to increased access and proximity to communal open space, a greater sense of community, and expanded recreational opportunities.

Examples of Conservation Design

- Cluster development
- Open space preservation
- Reduced pavement widths (streets, sidewalks)
- Shared driveways
- Reduced setbacks (shorter driveways)
- Site fingerprinting during construction

Infiltration practices are engineered structures or landscape features designed to capture and infiltrate runoff. They can be used to reduce both the volume of runoff discharged from the site and the infrastructure needed to convey, treat, or control runoff. Infiltration practices can also be used to recharge ground water. This benefit is especially important in areas where maintaining drinking water supplies and stream baseflow is of special concern because of limited precipitation or a high ratio of withdrawal to recharge rates. Infiltration of runoff can also help to maintain stream temperatures because the infiltrated water that moves laterally to replenish stream baseflow typically has a lower temperature than overland flows, which might be subject

Examples of Infiltration Practices

- Infiltration basins and trenches
- Porous pavement
- Disconnected downspouts
- Rain gardens and other vegetated treatment systems

to solar radiation. Another advantage of infiltration practices is that they can be integrated into landscape features in a site-dispersed manner. This feature can result in aesthetic benefits and, in some cases, recreational opportunities; for example, some infiltration areas can be used as playing fields during dry periods.

Runoff storage practices. Impervious surfaces are a central part of the built environment, but runoff from such surfaces can be captured and stored for reuse or gradually infiltrated, evaporated, or used to irrigate plants. Using runoff storage practices has several benefits. They can reduce the volume of runoff discharged to surface waters, lower the peak flow hydrograph to protect streams from the erosive forces of high flows, irrigate landscaping, and provide aesthetic benefits such as landscape islands, tree boxes, and rain gardens. Designers can take advantage of the void space beneath paved areas like parking lots and sidewalks to provide additional storage. For example, underground vaults can be used to store runoff in both urban and rural areas.

Examples of Runoff Storage Practices

- Parking lot, street, and sidewalk storage
- Rain barrels and cisterns
- Depressional storage in landscape islands and in tree, shrub, or turf depressions
- Green roofs

Runoff conveyance practices. Large storm events can make it difficult to retain all the runoff generated on-site by using infiltration and storage practices. In these situations, conveyance systems are typically used to route excess runoff through and off the site. In LID designs, conveyance systems can be used to slow flow velocities, lengthen the runoff time of concentration, and delay peak flows that are discharged off-site. LID conveyance practices can be used as an alternative to curb-and-gutter systems, and from a water quality perspective they have advantages over conventional approaches designed to rapidly convey runoff off-site and alleviate on-site flooding. LID conveyance practices often have rough surfaces, which slow runoff and increase evaporation and settling of solids. They are typically permeable and vegetated, which promotes infiltration, filtration, and some biological uptake of pollutants. LID conveyance practices also can perform functions similar to those of conventional curbs, channels, and gutters. For example, they can be used to reduce flooding around structures by routing runoff to landscaped areas for treatment, infiltration, and evapotranspiration.

Examples of Runoff Conveyance Practices

- Eliminating curbs and gutters
- Creating grassed swales and grass-lined channels
- Roughening surfaces
- Creating long flow paths over landscaped areas
- Installing smaller culverts, pipes, and inlets
- Creating terraces and check dams

Filtration practices are used to treat runoff by filtering it through media that are designed to capture pollutants through the processes of physical filtration of solids and/or cation exchange of dissolved pollutants. Filtration practices offer many of the same benefits as infiltration, such as reductions in the volume of runoff transported off-site, ground water recharge, increased stream baseflow, and reductions in thermal impacts to receiving waters. Filtration practices also have the added advantage of providing increased pollutant removal benefits. Although pollutant build-up and removal may be of concern, pollutants are typically captured in the upper soil horizon and can be removed by replacing the topsoil.

Examples of Filtration Practices

- Bioretention/rain gardens
- Vegetated swales
- Vegetated filter strips/buffers

Low impact landscaping. Selection and distribution of plants must be carefully planned when designing a functional landscape. Aesthetics are a primary concern, but it is also important to consider long-term maintenance goals to reduce inputs of labor, water, and chemicals. Properly preparing soils and selecting species adapted to the microclimates of a site greatly increases the success of plant establishment and growth, thereby stabilizing soils and allowing for biological uptake of pollutants. Dense, healthy plant growth offers such benefits as pest resistance (reducing the need for pesticides) and improved soil infiltration from root growth. Low impact landscaping can thus reduce impervious surfaces, improve infiltration potential, and improve the aesthetic quality of the site.

Examples of Low Impact Landscaping

- Planting native, drought-tolerant plants
- Converting turf areas to shrubs and trees
- Reforestation
- Encouraging longer grass length
- Planting wildflower meadows rather than turf along medians and in open space
- Amending soil to improve infiltration

EVALUATIONS OF BENEFITS AND COSTS

To date, the focus of traditional stormwater management programs has been concentrated largely on structural engineering solutions to manage the hydraulic consequences of the increased runoff that results from development. Because of this emphasis, stormwater management has been considered primarily an engineering endeavor. Economic analyses regarding the selection of solutions that are not entirely based on pipes and ponds have not been a significant factor in management decisions. Where costs have been considered, the focus has been primarily on determining capital costs for conventional infrastructure, as well as operation and maintenance costs in dollars per square foot or dollars per pound of pollutant removed.

Little attention has been given to the benefits that can be achieved through implementing LID practices. For example, communities rarely attempt to quantify and monetize the pollution prevention benefits and avoided treatment costs that might accrue from the use of conservation designs or LID techniques. To be more specific, the benefits of using LID practices to decrease the need for combined sewer overflow (CSO) storage and conveyance systems should be factored into the economic analyses. One of the major factors preventing LID practices from receiving equal consideration in the design or selection process is the difficulty of monetizing the environmental benefits of these practices. Without good data and relative certainty that these alternatives will work and not increase risk or cost, current standards of practice are difficult to change.

This report is an effort to compare the projected or known costs of LID practices with those of conventional development approaches. At this point, monetizing the economic and environmental benefits of LID strategies is much more difficult than monetizing traditional infrastructure costs or changes in property values due to improvements in existing utilities or transportation systems. Systems of practices must be analyzed to determine net performance and monetary benefits based on the capacity of the systems to both treat for pollutants and reduce impacts through pollution prevention. For example, benefits might come in the form of reduced stream channel degradation, avoided stream restoration costs, or reduced drinking water treatment costs.

One of the chief impediments to getting useful economic data to promote more widespread use of LID techniques is the lack of a uniform baseline with which to compare the costs and benefits of LID practices against the costs of conventional stormwater treatment and control. Analyzing benefits is further complicated in cases where the environmental performance of the conservation design or LID system exceeds that of the conventional runoff management system, because such benefits are not easily monetized. The discussion below is intended to provide a general discussion of the range of economic benefits that may be provided by LID practices in a range of appropriate circumstances.

OVERVIEW OF BENEFITS

The following is a brief discussion of some of the actual and assumed benefits of LID practices. Note that environmental and ancillary benefits typically are not measured as part of development projects, nor are they measured as part of pilot or demonstration projects, because they can be difficult to isolate and quantify. Many of the benefits described below are assumed on the basis of limited studies and anecdotal evidence.

The following discussion is organized into three categories: (1) environmental benefits, which include reductions in pollutants, protection of downstream water resources, ground water recharge, reductions in pollutant treatment costs, reductions in the frequency and severity of CSOs, and habitat improvements; (2) land value benefits, which include reductions in downstream flooding and property damage, increases in real estate value, increased parcel lot yield, increased aesthetic value, and improvement of quality of life by providing open space for recreation; and (3) compliance incentives.

Environmental Benefits

Pollution abatement. LID practices can reduce both the volume of runoff and the pollutant loadings discharged into receiving waters. LID practices result in pollutant removal through settling, filtration, adsorption, and biological uptake. Reductions in pollutant loadings to receiving waters, in turn, can improve habitat for aquatic and terrestrial wildlife and enhance recreational uses. Reducing pollutant loadings can also decrease stormwater and drinking water treatment costs by decreasing the need for regional stormwater management systems and expansions in drinking water treatment systems.

Protection of downstream water resources. The use of LID practices can help to prevent or reduce hydrologic impacts on receiving waters, reduce stream channel degradation from erosion and sedimentation, improve water quality, increase water supply, and enhance the recreational and aesthetic value of our natural resources. LID practices can be used to protect water resources that are downstream in the watershed. Other potential benefits include reduced incidence of illness from contact recreation activities such as swimming and wading, more robust and safer seafood supplies, and reduced medical treatment costs.

Ground water recharge. LID practices also can be used to infiltrate runoff to recharge ground water. Growing water shortages nationwide increasingly indicate the need for water resource management strategies designed to integrate stormwater, drinking water, and wastewater programs to maximize benefits and minimize costs. Development pressures typically result in increases in the amount of impervious surface and volume of runoff. Infiltration practices can be used to replenish ground water and increase stream baseflow. Adequate baseflow to streams during dry weather is important because low ground water levels can lead to greater fluctuations in stream depth, flows, and temperatures, all of which can be detrimental to aquatic life.

Water quality improvements/reduced treatment costs. It is almost always less expensive to keep water clean than it is to clean it up. The Trust for Public Land[5] noted Atlanta's tree cover has saved more than $883 million by preventing the need for stormwater retention facilities. A study of 27 water suppliers conducted by the Trust for Public Land and the American Water Works Association[6] found a direct relationship between forest cover in a watershed and water supply treatment costs. In other words, communities with higher percentages of forest cover had lower treatment costs. According to the study, approximately 50 to 55 percent of the variation in treatment costs can be explained by the percentage of forest cover in the source area. The researchers also found that for every 10 percent increase in forest cover in the source area, treatment and chemical costs decreased approximately 20 percent, up to about 60 percent forest cover.

Reduced incidence of CSOs. Many municipalities have problems with CSOs, especially in areas with aging infrastructure. Combined sewer systems discharge sanitary wastewater during storm events. LID techniques, by retaining and infiltrating runoff, reduce the frequency and amount of CSO discharges to receiving waters. Past management efforts typically have been concentrated on hard engineering approaches focused on treating the total volume of sanitary waste together with the runoff that is discharged to the combined system. Recently, communities like Portland (Oregon), Chicago, and Detroit have been experimenting with watershed approaches aimed at reducing the total volume of runoff generated that must be handled by the combined system. LID techniques have been the primary method with which they have experimented to reduce runoff. A Hudson Riverkeeper report concluded, based on a detailed technical analysis, that New York City could reduce its CSO's more cost-effectively with LID practices than with conventional, hard infrastructure CSO storage practices. [7]

Habitat improvements. Innovative stormwater management techniques like LID or conservation design can be used to improve natural resources and wildlife habitat, maintain or increase land value, or avoid expensive mitigation costs.

Land Value and Quality of Life Benefits

Reduced downstream flooding and property damage. LID practices can be used to reduce downstream flooding through the reduction of peak flows and the total amount or volume of runoff. Flood prevention reduces property damage and can reduce the initial capital costs and the operation and maintenance costs of stormwater infrastructure. Strategies designed to manage runoff on-site or as close as possible to its point of generation can reduce erosion and sediment transport as well as reduce flooding and downstream erosion. As a result, the costs for cleanups and streambank restoration can be reduced or avoided altogether. The use of LID techniques also can help protect or restore floodplains, which can be used as park space or wildlife habitat.[8]

Real estate value/property tax revenue. Homeowners and property owners are willing to pay a premium to be located next to or near aesthetically pleasing amenities like water features, open space, and trails. Some stormwater treatment systems can be beneficial to developers because they can serve as a "water" feature or other visual or recreational amenity that can be used to market the property. These designs should be visually attractive and safe for the residents and should be considered an integral part of planning the development. Various LID projects and smart growth studies have shown that people are willing to pay more for clustered homes than conventionally designed subdivisions. Clustered housing with open space appreciated at a higher rate than conventionally designed subdivisions. EPA's *Economic Benefits of Runoff Controls*[9] describes numerous examples where developers and subsequent homeowners have received premiums for proximity to attractive stormwater management practices.

Lot yield. LID practices typically do not require the large, contiguous areas of land that are usually necessary when traditional stormwater controls like ponds are used. In cases where LID practices are incorporated on individual house lots and along roadsides as part of the landscaping, land that would normally be dedicated for a stormwater pond or other large structural control can be developed with additional housing lots.

Aesthetic value. LID techniques are usually attractive features because landscaping is an integral part of the designs. Designs that enhance a property's aesthetics using trees, shrubs, and flowering plants that complement other landscaping features can be selected. The use of these designs may increase property values or result in faster sale of the property due to the perceived value of the "extra" landscaping.

Public spaces/quality of life/public participation. Placing water quality practices on individual lots provides opportunities to involve homeowners in stormwater management and enhances public awareness of water quality issues. An American Lives, Inc., real estate study found that 77.7 percent of potential homeowners rated natural open space as "essential" or "very important" in planned communities.[10]

Compliance Incentives

Regulatory compliance credits. Many states recognize the positive benefits LID techniques offer, such as reduced wetland impacts. As a result, they might offer regulatory compliance credits, streamlined or simpler permit processes, and other incentives similar to those offered for other green practices. For example, in Maryland the volume required for the permanent pool of a wet pond can be reduced if rooftop runoff is infiltrated on-site using LID practices. This procedure allows rooftop area to be subtracted from the total impervious area, thereby reducing the required size of the permanent pool. In addition, a LID project can have less of an environmental impact than a conventional project, thus requiring smaller impact fees.

Cost Considerations

Traditional approaches to stormwater management involve conveying runoff off-site to receiving waters, to a combined sewer system, or to a regional facility that treats runoff from multiple sites. These designs typically include hard infrastructure, such as curbs, gutters, and piping. LID-based designs, in contrast, are designed to use natural drainage features or engineered swales and vegetated contours for runoff conveyance and treatment. In terms of costs, LID techniques like conservation design can reduce the amount of materials needed for paving roads and driveways and for installing curbs and gutters. Conservation designs can be used to reduce the total amount of impervious surface, which results in reduced road and driveway lengths and reduced costs. Other LID techniques, such as grassed swales, can be used to infiltrate roadway runoff and eliminate or reduce the need for curbs and gutters, thereby reducing infrastructure costs. Also, by infiltrating or evaporating runoff, LID techniques can reduce the size and cost of flood-control structures. Note that more research is needed to determine the optimal combination of LID techniques and detention practices for flood control.

It must be stated that the use of LID techniques might not always result in lower project costs. The costs might be higher because of the costs of plant material, site preparation, soil amendments, underdrains and connections to municipal stormwater systems, and increased project management.

Another factor to consider when comparing costs between traditional and LID designs is the amount of land required to implement a management practice. Land must be set aside for both traditional stormwater management practices and LID practices, but the former require the use of land *in addition to* individual lots and other community areas, whereas bioretention areas and swales can be incorporated into the landscaping of yards, in rights-

of-way along roadsides, and in or adjacent to parking lots. The land that would have been set aside for ponds or wetlands can in many cases be used for additional housing units, yielding greater profits.

Differences in maintenance requirements should also be considered when comparing costs. According to a 1999 EPA report, maintenance costs for retention basins and constructed wetlands were estimated at 3 to 6 percent of construction costs, whereas maintenance costs for swales and bioretention practices were estimated to be 5 to 7 percent of construction costs.[11] However, much of the maintenance for bioretention areas and swales can be accomplished as part of routine landscape maintenance and does not require specialized equipment. Wetland and pond maintenance, on the other hand, involves heavy equipment to remove accumulated sediment, oils, trash, and vegetation in forebays and open ponds.

Finally, in some circumstances LID practices can offset the costs associated with regulatory requirements for stormwater control. In urban redevelopment projects where land is not likely to be available for large stormwater management practices, developers can employ site-dispersed BMPs in sidewalk areas, in courtyards, on rooftops, in parking lots, and in other small outdoor spaces, thereby avoiding the fees that some municipalities charge when stormwater mitigation requirements cannot otherwise be met. In addition, stormwater utilities often provide credits for installing runoff management practices such as LID practices.[12]

CASE STUDIES

The case studies presented below are not an exhaustive list of LID projects nationwide. These examples were selected on the basis of the quantity and quality of economic data, quantifiable impacts, and types of LID practices used. Economic data are available for many other LID installations, but those installations often cannot be compared with conventional designs because of the unique nature of the design or the pilot status of the project. Table 1 presents a summary of the LID practices employed in each case study.

Table 1. Summary of LID Practices Employed in the Case Studies

Name	LID Techniques							
	Biore-tention	Cluster Building	Reduced Impervious Area	Swales	Permeable Pavement	Vegetated Landscaping	Wetlands	Green Roofs
2nd Avenue SEA Street	✓		✓	✓				
Auburn Hills	✓		✓	✓		✓	✓	
Bellingham Parking Lot Retrofits	✓							
Central Park Commercial Redesigns	✓			✓				
Crown Street	✓		✓	✓				
Gap Creek			✓			✓		
Garden Valley	✓	✓		✓	✓		✓	
Kensington Estates		✓	✓		✓	✓	✓	
Laurel Springs	✓	✓	✓	✓				
Mill Creek		✓	✓	✓				
Poplar Street Apartments	✓			✓			✓	
Portland Downspout Disconnection*			✓					
Prairie Crossing	✓		✓	✓		✓		
Prairie Glen	✓	✓	✓	✓		✓	✓	
Somerset	✓			✓				
Tellabs Corporate Campus	✓			✓		✓	✓	
Toronto Green Roofs								✓

*Although impervious area stays the same, the disconnection program reduces directly connected impervious area.

The case studies contain an analysis of development costs, which are summarized in Table 2. Note that some case study results do not lend themselves well to a traditional vs.

LID cost comparison and therefore are not included in Table 2 (as noted). *Conventional development cost* refers to costs incurred or estimated for a traditional stormwater management approach, whereas *LID cost* refers to costs incurred or estimated for using LID practices. *Cost difference* is the difference between the conventional development cost and the LID cost. *Percent difference* is the cost savings relative to the conventional development cost.

Table 2. Summary of Cost Comparisons Between Conventional and LID Approaches[a]

Project	Conventional Development Cost	LID Cost	Cost Difference[b]	Percent Difference[b]
2nd Avenue SEA Street	$868,803	$651,548	$217,255	25%
Auburn Hills	$2,360,385	$1,598,989	$761,396	32%
Bellingham City Hall	$27,600	$5,600	$22,000	80%
Bellingham Bloedel Donovan Park	$52,800	$12,800	$40,000	76%
Gap Creek	$4,620,600	$3,942,100	$678,500	15%
Garden Valley	$324,400	$260,700	$63,700	20%
Kensington Estates	$765,700	$1,502,900	–$737,200	-96%
Laurel Springs	$1,654,021	$1,149,552	$504,469	30%
Mill Creek[c]	$12,510	$9,099	$3,411	27%
Prairie Glen	$1,004,848	$599,536	$405,312	40%
Somerset	$2,456,843	$1,671,461	$785,382	32%
Tellabs Corporate Campus	$3,162,160	$2,700,650	$461,510	15%

[a] The Central Park Commercial Redesigns, Crown Street, Poplar Street Apartments, Prairie Crossing, Portland Downspout Disconnection, and Toronto Green Roofs study results do not lend themselves to display in the format of this table.
[b] Negative values denote increased cost for the LID design over conventional development costs.
[c] Mill Creek costs are reported on a per-lot basis.

2ND AVENUE SEA STREET, SEATTLE, WASHINGTON

The 2nd Avenue Street Edge Alternative (SEA) Street project was a pilot project undertaken by Seattle Public Utilities to redesign an entire 660-foot block with a number of LID techniques. The goals were to reduce stormwater runoff and to provide a more "livable" community. Throughout the design and construction process, Seattle Public Utilities worked collaboratively with street residents to develop the final street design.[13]

The design reduced imperviousness, included retrofits of bioswales to treat and manage stormwater, and added 100 evergreen trees and 1,100 shrubs.[14] Conventional curbs and gutters were replaced with bioswales in the rights-of-way on both sides of the street, and the street width was reduced from 25 feet to 14 feet. The final constructed design reduced imperviousness by more than 18 percent. An estimate for the final total project cost was $651,548. A significant amount of community outreach was involved, which raised the level of community acceptance. Community input is important for any project, but because this was a pilot study, much more was spent on communication and redesign than what would be spent for a typical project.

The costs for the LID retrofit were compared with the estimated costs of a conventional street retrofit (Table 3). Managing stormwater with LID techniques resulted in a cost savings of 29 percent. Also, the reduction in street width and sidewalks reduced paving costs by 49 percent.

Table 3. Cost Comparison for 2nd Avenue SEA Street [15]

Item	Conventional Development Cost	SEA Street Cost	Cost Savings*	Percent Savings*	Percent of Total Savings*
Site preparation	$65,084	$88,173	–$23,089	–35%	–11%
Stormwater management	$372,988	$264,212	$108,776	29%	50%
Site paving and sidewalks	$287,646	$147,368	$140,278	49%	65%
Landscaping	$78,729	$113,034	–$34,305	–44%	–16%
Misc. (mobilization, etc.)	$64,356	$38,761	$25,595	40%	12%
Total	**$868,803**	**$651,548**	**$217,255**	—	—

* Negative values denote increased cost for the LID design over conventional development costs.

The avoided cost for stormwater infrastructure and reduced cost for site paving accounted for much of the overall cost savings. The nature of the design, which included extensive use of bioswales and vegetation, contributed to the increased cost for site preparation and landscaping. Several other SEA Street projects have been completed or are under way, and cost evaluations are expected to be favorable.

For this site, the environmental performance has been even more significant than the cost savings. Hydrologic monitoring of the project indicates a 99 percent reduction in total potential surface runoff, and runoff has not been recorded at the site since December 2002, a period that included the highest-ever 24-hour recorded rainfall at Seattle-Tacoma Airport.[16] The site is retaining more than the original design estimate of 0.75 inch of rain. A modeling analysis indicates that if a conventional curb-and-gutter system had been installed along 2nd Avenue instead of the SEA Street design, 98 times more stormwater would have been discharged from the site.[17]

Auburn Hills Subdivision, Southwestern Wisconsin

Auburn Hills in southwestern Wisconsin is a residential subdivision developed with conservation design principles. Forty percent of the site is preserved as open space; this open space includes wetlands, green space and natural plantings, and walking trails. The subdivision was designed to include open swales and bioretention for stormwater management. To determine potential savings from using conservation design, the site construction costs were compared with the estimated cost of building the site as a conventional subdivision.[18] Reduced stormwater management costs accounted for approximately 56 percent of the total cost savings. A cost comparison is provided in Table 4. Other savings not shown in Table 4 were realized as a result of reduced sanitary sewer, water distribution, and utility construction costs.

Table 4. Cost Comparison for Auburn Hills Subdivision [19]

Item	Conventional Development Cost	Auburn Hills LID Cost	Cost Savings*	Percent Savings*	Percent of Total Savings*
Site preparation	$699,250	$533,250	$166,000	24%	22%
Stormwater management	$664,276	$241,497	$422,779	64%	56%
Site paving and sidewalks	$771,859	$584,242	$187,617	24%	25%
Landscaping	$225,000	$240,000	–$15,000	-7%	-2%
Total	**$2,360,385**	**$1,598,989**	**$761,396**	**—**	**—**

* Negative values denote increased cost for the LID design over conventional development costs.

The clustered design used in the development protected open space and reduced clearing and grading costs. Costs for paving and sidewalks were also decreased because the cluster design reduced street length and width. Stormwater savings were realized primarily through the use of vegetated swales and bioswales. These LID practices provided stormwater conveyance and treatment and also lowered the cost of conventional stormwater infrastructure. The increase in landscaping costs resulted from additional open space present on-site compared to a conventional design, as well as increased street sweeping. Overall, the subdivision's conservation design retained more natural open space for the benefit and use of the homeowners and aided stormwater management by preserving some of the site's natural hydrology.[20]

Bellingham, Washington, Parking Lot Retrofits

The City of Bellingham, Washington, retrofitted two parking lots—one at City Hall and the other at Bloedel Donovan Park—with rain gardens in lieu of installing underground vaults to manage stormwater.[21] At City Hall, 3 parking spaces out of a total of 60 were used for the rain garden installation. The Bloedel Donovan Park retrofit involved converting to a rain garden a 550-square-foot area near a catch basin. Both installations required excavation, geotextile fabric, drain rock, soil amendments, and native plants. Flows were directed to the rain gardens by curbs. An overflow system was installed to accommodate higher flows during heavy rains.

The City compared actual rain garden costs to estimates for conventional underground vaults based on construction costs for similar projects in the area ($12.00 per cubic foot of storage). Rain garden costs included labor, vehicle use/rental, and materials. Table 5 shows that the City Hall rain garden saved the City $22,000, or 80 percent, over the underground vault option; the Bloedel Donovan Park installation saved $40,000, or 76 percent.

Table 5. Cost Comparison for Bellingham's Parking Lot Rain Garden Retrofits[22]

Project	Conventional Vault Cost	Rain Garden Cost	Cost Savings	Percent Savings
City Hall	$27,600	$5,600	$22,000	80%
Bloedel Donovan Park	$52,800	$12,800	$40,000	76%

Central Park Commercial Redesigns, Fredericksburg, VA (A Modeling Study)

The Friends of the Rappahannock undertook a cost analysis involving the redesign of site plans for several stores in a large commercial development in the Fredericksburg, Virginia, area called Central Park.[23,24] Table 6 contains a side-by-side analysis of the cost additions and reductions for each site for scenarios where LID practices (bioretention areas and swales) were incorporated into the existing, traditional site designs. In five of the six examples, the costs for the LID redesigns were higher than those for the original designs, although they never exceeded $10,000, or 10 percent of the project. One example yielded a $5,694 savings. The fact that these projected costs for LID were comparable to the costs for traditional designs convinced the developer to begin incorporating LID practices into future design projects.[25]

Table 6. Site Information and Cost Additions/Reductions Using LID Versus Traditional Designs

Name	Total BMP Area (ft^2)	Total Impervious Area Treated (ft^2)	Percent of Impervious Area Treated	Cost Additions[a]	Cost Reductions[b]	Change in Cost After Redesign
Breezewood Station Alternative 1	4,800	64,165	98.4%	$36,696	$34,785	+ $1,911
Breezewood Station Alternative 2	3,500	38,775	59.5%	$24,449	$21,060	+ $3,389
Olive Garden	1,780	31,900	59.1%	$14,885	$11,065	+ $3,790
Kohl's, Best Buy, & Office Depot	14,400	354,238	56.3%	$89,433	$80,380	+ $9,053
First Virginia Bank	1,310	20,994	97.7%	$6,777	$1,148	+ $5,629
Chick-Fil-A[c]	1,326	28,908	82.2%	$6,846	$12,540	– $5,694

[a] Additional costs for curb, curb blocks, storm piping, inlets, underdrains, soil, mulch, and vegetation as a result of the redesign.
[b] Reduced cost for curb, storm piping, roof drain piping, and inlets as a result of the redesign.
[c] Cost reduction value includes the cost of a Stormceptor unit that is not needed as part of the redesign.

Crown Street, Vancouver, British Columbia

In 1995 the Vancouver City Council adopted a Greenways program that is focused on introducing pedestrian-friendly green space into the City to connect trails, environmental areas, and urban space. As a part of this program, the City has adopted strategies to manage stormwater runoff from roadways. Two initiatives are discussed here.

The Crown Street redevelopment project, completed in 2005, retrofitted a 1,100-foot block of traditional curb-and-gutter street with a naturalized streetscape modeled after the Seattle SEA Street design. Several LID features were incorporated into the design. The total imperviousness of the street was decreased by reducing the street width from 28 feet to 21 feet with one-

way sections of the road narrowed to 10 feet. Roadside swales that use vegetation and structural grass (grass supported by a grid and soil structure that prevents soil compaction and root damage) were installed to collect and treat stormwater through infiltration.[26]

Modeling predicts that the redesigned street will retain 90 percent of the annual rainfall volume on-site; the remaining 10 percent of runoff will be treated by the system of vegetated swales before discharging.[27,28] The City chose to use the LID design because stormwater runoff from Crown Street flows into the last two salmon-bearing creeks in Vancouver.[29] Monitoring until 2010 will assess the quality of stormwater runoff and compare it with both the modeling projections and the runoff from a nearby curb-and-gutter street.

The cost of construction for the Crown Street redevelopment was $707,000. Of this, $311,000 was attributed to the cost of consultant fees and aesthetic design features, which were included in the project because it was the first of its kind in Vancouver. These added costs would not be a part of future projects. Discounting the extra costs, the $396,000 construction cost is 9 percent higher than the estimated $364,000 conventional curb-and-gutter design cost.[30] The City has concluded that retrofitting streets that have an existing conventional stormwater system with naturalized designs will cost marginally more than making curb-and-gutter improvements, but installing naturalized street designs in new developments will be less expensive than installing conventional drainage systems.[31,32]

One goal of Vancouver's Greenways program is to make transportation corridors more pedestrian-friendly. A method used to achieve this goal is to extend curbs at intersections out into the street to lessen the crossing distance and improve the line of sight for pedestrians. When this initiative began, the City relocated stormwater catch basins that would have been enclosed within the extended curb. Now, at certain intersections, the City uses the new space behind the curb to install "infiltration bulges" to collect and infiltrate roadway runoff. The infiltration bulges are constructed of permeable soils and vegetation. (The City of Portland, Oregon, has installed similar systems, which they call "vegetated curb extensions.") The catch basins are left in place, and any stormwater that does not infiltrate into the soil overflows into the storm drain system.[33]

The infiltration bulges have resulted in savings for the City. Because the stormwater infiltration bulges are installed in conjunction with planned roadway improvements, the only additional costs associated with the stormwater project are the costs of a steel curb insert to allow stormwater to enter the bulge and additional soil excavation costs. These additional costs are more than offset by the $2,400 to $4,000 cost that would have been required to relocate the catch basins. To date, the City has installed nine infiltration bulges, three of which are maintained by local volunteers as part of a Green Streets program in which local residents adopt city green space.[34]

Gap Creek Subdivision, Sherwood, Arkansas

Gap Creek's original subdivision plan was revised to include LID concepts. The revised design increased open space from the originally planned 1.5 acres to 23.5 acres. Natural drainage areas were preserved and buffered by greenbelts. Traffic-calming circles were used, allowing the developer to reduce street widths from 36 to 27 feet. In addition, trees were kept close to the curb line. These design techniques allowed the development of 17 additional lots.

The lots sold for $3,000 more and cost $4,800 less to develop than comparable conventional lots. A cost comparison is provided in Table 7. For the entire development, the combination of cost savings and lot premiums resulted in an additional profit to the developer of $2.2 million.[35,36]

Table 7. Cost Comparison for Gap Creek Subdivision[37]

Total Cost of Conventional Design	Gap Creek LID Cost	Cost Savings	Percent Savings	Savings per Lot
$4,620,600	$3,942,100	$678,500	15%	$4,800

Garden Valley, Pierce County, Washington (A Modeling Study)

The Garden Valley subdivision is a 9.7-acre site in Pierce County, Washington. A large wetland on the eastern portion of the site and a 100-foot buffer account for 43 percent of the site area. Designers evaluated a scenario in which roadway widths were reduced and conventional stormwater management practices were replaced with swales, bioretention, and soil amendments. The use of these LID elements would have allowed the cost for stormwater management on the site to be reduced by 72 percent. A cost comparison is provided in Table 8.[38] Other costs expected with the LID design were a $900 initial cost for homeowner education with $170 required annually thereafter. Annual maintenance costs for the LID design (not included above) were expected to be $600 more than those for the conventional design, but a $3,000 annual savings in the stormwater utility bill was expected to more than offset higher maintenance costs.

Table 8. Cost Comparison for Garden Valley Subdivision[39]

Item	Conventional Development Cost	Garden Valley LID Cost	Cost Savings*	Percent Savings*
Stormwater management	$214,000	$59,800	$154,200	72%
Site paving	$110,400	$200,900	–$90,500	–82%
Total	**$324,400**	**$260,700**	**$63,700**	**—**

* Negative values denote increased cost for the LID design over conventional development costs.

The design incorporated the use of narrower roadways coupled with Grasscrete parking along the roadside, which increased the overall site paving costs. However, this added cost was more than offset by the savings realized by employing LID for stormwater management. The LID practices were expected to increase infiltration and reduce stormwater discharge rates, which can improve the health and quality of receiving streams.

Kensington Estates, Pierce County, Washington (A Modeling Study)

A study was undertaken to evaluate the use of LID techniques at the Kensington Estates subdivision, a proposed 24-acre development consisting of single-family homes on 103 lots. The study assumed that conventional stormwater management practices would be replaced entirely by LID techniques, including reduced imperviousness, soil amendments, and bioretention areas. The design dictated that directly connected impervious areas on-site were to be minimized. Three wetlands and an open space tract would treat stormwater discharging from LID installations. Open space buffers were included in the design. The LID proposal also included rooftop rainwater collection systems on each house.[40,41]

The proposed LID design reduced effective impervious area from 30 percent in the conventional design to approximately 7 percent, and it was approximately twice as expensive as the traditional design. A cost comparison is provided in Table 9.

Table 9. Cost Comparison for Kensington Estates Subdivision[42]

Item	Conventional Development Cost	Kensington Estate LID Cost	Additional Cost
Stormwater management	$243,400	$925,400	$ 682,000
Site paving	$522,300	$577,500	$55,200
Total	**$765,700**	**$1,502,900**	**$737,200**

Although the study assumed that roadways in the LID design would be narrower than those in the conventional design, site paving costs increased because the LID design assumed that Grasscrete parking would be included along the roadside to allow infiltration. The use of Grasscrete increased the overall site paving costs.

The avoidance of conventional stormwater infrastructure with the use of LID afforded significant cost savings. The LID measures eliminated the need for a detention pond and made more lots available for development. The significant cost for the rooftop rainwater collection systems was assumed to be offset somewhat by savings on stormwater utility bills.[43]

The study also anticipated that the use of LID would reduce stormwater peak flow discharge rates and soil erosion. Furthermore, greater on-site infiltration increases ground water recharge, resulting in increased natural baseflows in streams and a reduction in dry channels. Proposed clustering of buildings would allow wetlands and open space to be preserved and create a more walkable community. The reduced road widths were anticipated to decrease traffic speeds and accident rates.

Laurel Springs Subdivision, Jackson, Wisconsin

The Laurel Springs subdivision in Jackson, Wisconsin, is a residential subdivision that was developed as a conservation design community. The use of cluster design helped to preserve open space and minimize grading and paving. The use of bioretention and vegetated swales lowered the costs for stormwater management.

The costs of using conservation design to develop the subdivision were compared with the estimated cost of developing the site with conventional practices (Table 10).[44] The total savings realized with conservation design were just over $504,469, or approximately 30 percent of the estimated conventional construction cost. Savings from stormwater management accounted for 60 percent of the total cost savings. Other project savings were realized with reduced sanitary sewer, water distribution, and utility construction costs.

Table 10. Cost Comparison for Laurel Springs Subdivision[45]

Item	Conventional Development Cost	Laurel Springs LID Cost	Cost Savings	Percent Savings	Percent of Total Savings
Site preparation	$441,600	$342,000	$99,600	23%	20%
Stormwater management	$439,956	$136,797	$303,159	69%	60%
Site paving and sidewalks	$607,465	$515,755	$91,710	15%	18%
Landscaping	$165,000	$155,000	$10,000	6%	2%
Total	**$1,654,021**	**$1,149,552**	**$504,469**	—	—

In addition to preserving open space and reducing the overall amount of clearing and grading, the cluster design also reduced street lengths and widths, thereby lowering costs for paving and sidewalks. Vegetated swales and bioswales largely were used to replace conventional stormwater infrastructure and led to significant savings. Each of these factors helped to contribute to a more hydrologically functional site that reduced the total amount of stormwater volume and managed stormwater through natural processes.

MILL CREEK SUBDIVISION, KANE COUNTY, ILLINOIS

The Mill Creek subdivision is a 1,500-acre, mixed-use community built as a conservation design development. Approximately 40 percent of the site is identified as open space; adjacent land use is mostly agricultural. The subdivision was built using cluster development. It uses open swales for stormwater conveyance and treatment, and it has a lower percentage of impervious surface than conventional developments. An economic analysis compared the development cost for 40 acres of Mill Creek with the development costs of 30 acres of a conventional development with similar building density and location.[46]

When compared with the conventional development, the conservation site design techniques used at Mill Creek saved approximately $3,411 per lot. Nearly 70 percent of these savings resulted from reduced costs for stormwater management, and 28 percent of the savings were found in reduced costs for site preparation. A cost comparison is provided in Table 11. Other savings not included in the table were realized with reduced construction costs for sanitary sewers and water distribution.

Table 11. Cost Comparison for Mill Creek Subdivision[47]

Item	Conventional Development Cost per Lot	Mill Creek LID Cost per Lot	Cost Savings per Lot	Percent Savings per Lot	Percent of Total Savings
Site preparation	$2,045	$1,086	$959	47%	28%
Stormwater management	$4,535	$2,204	$2,331	51%	68%
Site paving and sidewalks	$5,930	$5,809	$121	2%	4%
Total	**$12,510**	**$9,099**	**$3,411**	—	—

The use of cluster development and open space preservation on the site decreased site preparation costs. The majority of the cost savings were achieved by avoiding the removal and stockpiling of topsoil. In addition to cost savings from avoided soil disturbance, leaving soils intact also retains the hydrologic function of the soils and aids site stormwater management by reducing runoff volumes and improving water quality. The site's clustered design was also responsible for a decrease in costs for paving and sidewalks because the designers intentionally aimed to decrease total road length and width.

The designers used open swales as the primary means for stormwater conveyance. Coupled with other site techniques to reduce runoff volumes and discharge rates, significant savings in stormwater construction were avoided because of reduced storm sewer installation; sump pump connections; trench backfill; and catch basin, inlet, and cleanout installation.

In addition to the cost savings, the conservation design at Mill Creek had a positive effect on property values: lots adjacent to walking/biking trails include a $3,000 premium, and lots adjacent to or with views of open space include a $10,000 to $17,500 premium. The

600 acres of open space on the site include 127 acres of forest preserve with quality wetlands, 195 acres of public parks, and 15 miles of walking/biking trails.[48]

Poplar Street Apartments, Aberdeen, North Carolina

The use of bioretention, topographical depressions, grass channels, swales, and stormwater basins at the 270-unit Poplar Street Apartment complex improved stormwater treatment and lowered construction costs. The design allowed almost all conventional underground storm drains to be eliminated from the design. The design features created longer flow paths, reduced runoff volume, and filtered pollutants from runoff. According to the U.S. Department of Housing and Urban Development, use of LID techniques resulted in a $175,000 savings (72 percent).[49]

Portland Downspout Disconnection Program, Portland, Oregon

The City of Portland, Oregon, implemented a Downspout Disconnection Program as part of its CSO elimination program. Every year, billions of gallons of stormwater mixed with sewage pour into the Willamette River and Columbia Slough through CSOs. When roof runoff flows into Portland's combined sewer system, it contributes to CSOs. The City has reduced the frequency of CSOs to the Columbia Slough and hopes to eliminate 94 percent of the overflows to the Willamette River by 2011.[50]

The Downspout Disconnection Program gives homeowners, neighborhood associations, and community groups the chance to work as partners with the Bureau of Environmental Services and the Office of Neighborhood Involvement to help reduce CSOs. Residents of selected neighborhoods disconnect their downspouts from the combined sewer system and allow their roof water to drain to gardens and lawns. Residents can do the work themselves and earn $53 per downspout, or they can have community groups and local contractors disconnect for them. Community groups earn $13 for each downspout they disconnect. (Materials are provided by the City.)

More than 44,000 homeowners have disconnected their downspouts, removing more than 1 billion gallons of stormwater per year from the combined sewer system. The City estimates that removing the 1 billion gallons will result in a $250 million reduction in construction costs for an underground pipe to store CSOs by reducing the capacity needed to handle the flows. The City has spent $8.5 million so far to implement this program and will continue to encourage more homeowners and businesses to disconnect their downspouts to achieve additional CSO and water quality benefits.

Prairie Crossing Subdivision, Grayslake, Illinois

The Prairie Crossing subdivision is a conservation development on 678 acres, of which 470 acres is open space. The site was developed as a mixed-use community with 362 residential units and 73 acres of commercial property, along with schools, a community center, biking trails, a lakefront beach, and a farm. The site uses bioretention cells and vegetated swales to manage stormwater.[51]

A cost analysis was performed to compare the actual construction costs of Prairie Crossing with the estimated costs of a conventional design on the site with the same layout. Cost savings with conservation design were realized primarily in four areas: stormwater management, curb and gutter installation, site paving, and sidewalk installation. The total savings were estimated to be almost $1.4 million, or nearly $4,000 per lot (Table 12). Savings from stormwater management accounted for approximately 15 percent of the total savings. The cost savings shown are relative to the estimated construction cost for the items in a conventional site design based on local codes and standards.

Table 12. Cost Comparison for Prairie Crossing Subdivision[52]

Item	Cost Savings	Percent Savings
Reduced Road Width	$178,000	13%
Stormwater Management	$210,000	15%
Decreased Sidewalks	$648,000	47%
Reduced Curb and Gutter	$339,000	25%
Total	**$1,375,000**	**—**

Reduced costs for sidewalks accounted for nearly half of the total cost savings. This savings is attributed in part to the use of alternative materials rather than concrete for walkways in some locations. In addition, the design and layout of the site, which retained a very high percentage of open space, contributed to the cost savings realized from reducing paving, the length and number of sidewalks, and curbs and gutters. The use of alternative street edges, vegetated swales, and bioretention and the preservation of natural areas all reduced the need for and cost of conventional stormwater infrastructure.[53] Benefits are associated with the mixed-use aspect of the development as well: residents can easily access schools, commercial areas, recreation, and other amenities with minimal travel. Proximity to these resources can reduce traffic congestion and transportation costs. Also, mixed-use developments can foster a greater sense of community and belonging than other types of development. All of these factors tend to improve quality of life.

Prairie Glen Subdivision, Germantown, Wisconsin

The Prairie Glen subdivision is nationally recognized for its conservation design approach. A significant portion of the site (59 percent) was preserved as open space. Wetlands were constructed to manage stormwater runoff, and the open space allowed the reintroduction of native plants and wildlife habitat. The site layout incorporated hiking trails, which were designed to allow the residents to have easy access to natural areas.[54]

To evaluate the cost benefits of Prairie Glen's design, the actual construction costs were compared with the estimated costs of developing the site conventionally. When compared with conventional design, the conservation design at Prairie Glen resulted in a savings of nearly $600,000. Savings for stormwater management accounted for 25 percent of the total savings. Table 13 provides a cost comparison. Other savings not included in the table were realized with reduced sanitary sewer, water distribution, and utility construction costs.

Table 13. Cost Comparison for Prairie Glen Subdivision[55]

Item	Conventional Development Cost	Prairie Glen LID Cost	Cost Savings*	Percent Savings*	Percent of Total Savings*
Site preparation	$277,043	$188,785	$88,258	32%	22%
Stormwater management	$215,158	$114,364	$100,794	47%	25%
Site paving and sidewalks	$462,547	$242,707	$219,840	48%	54%
Landscaping	$50,100	$53,680	–$3,580	–7%	–1%
Total	**$1,004,848**	**$599,536**	**$405,312**	**—**	**—**

* Negative values denote increased cost for the LID design over conventional development costs.

The cluster design and preservation of a high percentage of open space resulted in a significant reduction in costs for paving and sidewalks. These reduced costs accounted for 54 percent of the cost savings for the overall site. Reduced costs for soil excavation and stockpiling were also realized. The use of open-channel drainage and bioretention minimized the need for conventional stormwater infrastructure and accounted for the bulk of the savings in stormwater management. Landscaping costs increased due to the added amount of open space on the site.

Somerset Subdivision, Prince George's County, Maryland

The Somerset subdivision, outside Washington, D.C., is an 80-acre site consisting of nearly 200 homes. Approximately half of the development was built using LID techniques; the other half was conventionally built using curb-and-gutter design with detention ponds for stormwater management. Bioretention cells and vegetated swales were used in the LID portion of the site to replace conventional stormwater infrastructure. Sidewalks were also eliminated from the design. To address parking concerns, some compromises were made: because of local transportation department concern that roadside parking would damage the swales, roads were widened by 10 feet.[56] (Note that there are alternative strategies to avoid increasing impervious surface to accommodate parking, such as installing porous pavement parking lanes next to travel lanes.)

Most of the 0.25-acre lots have a 300- to 400-square-foot bioretention cell, also called a rain garden. The cost to install each cell was approximately $500—$150 for excavation and $350 for plants. The total cost of bioretention cell installation in the LID portion of the site was $100,000 (swale construction was an additional cost). The construction cost for the detention pond in the conventionally designed portion of the site was $400,000, excluding curbs, gutters, and sidewalks.[57,58] By eliminating the need for a stormwater pond, six additional lots could be included in the LID design. A comparison of the overall costs for the traditional and LID portions of the site is shown in Table 14.

Table 14. Cost Comparison for Somerset Subdivision

Conventional Development Cost	Somerset LID Cost	Cost Savings	Percent Savings	Savings per Lot
$2,456,843	$1,671,461	$785,382	32%	$4,000

In terms of environmental performance, the LID portion of the subdivision performed better than the conventional portion.[59] A paired watershed study compared the runoff between the two portions of the site, and monitoring indicated that the average annual runoff volume from the LID watershed was approximately 20 percent less than that from the conventional watershed. The number of runoff-producing rain events in the LID watershed also decreased by 20 percent. Concentrations of copper were 36 percent lower; lead, 21 percent lower; and zinc, 37 percent lower in LID watershed runoff than in conventional watershed runoff. The homeowners' response to the bioretention cells was positive; many perceived the management practices as a free landscaped area.

TELLABS CORPORATE CAMPUS, NAPERVILLE, ILLINOIS

The Tellabs corporate campus is a 55-acre site with more than 330,000 square feet of office space. After reviewing preliminary planning materials that compared the costs of conventional and conservation design, the company chose to develop the site with conservation design approaches. Because the planning process included estimating costs for the two development approaches, this particular site provides good information on commercial/industrial use of LID.[60]

Development of the site included preserving trees and some of the site's natural features and topography. For stormwater management, the site uses bioswales, as well as other infiltration techniques, in parking lots and other locations. The use of LID techniques for stormwater management accounted for 14 percent of the total cost savings for the project. A cost comparison is provided in Table 15. Other cost savings not shown in Table 15 were realized with reduced construction contingency costs, although design contingency costs were higher.

Table 15. Cost Comparison for Tellabs Corporate Campus[61]

Item	Conventional Development Cost	Tellabs LID Cost	Cost Savings	Percent Savings	Percent of Total Savings
Site preparation	$2,178,500	$1,966,000	$212,500	10%	46%
Stormwater management	$480,910	$418,000	$62,910	13%	14%
Landscape development	$502,750	$316,650	$186,100	37%	40%
Total	**$3,162,160**	**$2,700,650**	**$461,510**	—	—

Savings in site preparation and landscaping had the greatest impact on costs. Because natural drainage pathways and topography were maintained to the greatest extent possible, grading and earthwork were minimized; 6 fewer acres were disturbed using the conservation design approach. Landscaping at the site maximized natural areas and restored native prairies and wetland areas. The naturalized landscape eliminated the need for irrigation systems and lowered maintenance costs when compared to turf grass, which requires mowing and regular care. In the end, the conservation approach preserved trees and open space and provided a half acre of wetland mitigation. The bioswales used for stormwater management complemented the naturalized areas and allowed the site to function as a whole; engineered stormwater techniques augmented the benefits of the native areas and wetlands.[62]

TORONTO GREEN ROOFS, TORONTO, ONTARIO (A MODELING STUDY)

Toronto is home to more than 100 green roofs. To evaluate the benefits of greatly expanded use of green roofs in the city, a study was conducted using a geographic information system to model the effects of installing green roofs on all flat roofs larger than 3,750 square feet. (The model assumed that each green roof would cover at least 75 percent of the roof area.) If the modeling scenario were implemented, 12,000 acres of green roofs (8 percent of the City's land area) would be installed.[63] The study quantified five primary benefits from introducing the green roofs: (1) reduced stormwater flows into the separate storm sewer system, (2) reduced stormwater flows into the combined sewer system, (3) improved air quality, (4) mitigation of urban heat island effects, and (5) reduced energy consumption.[64]

The study predicted economic benefits of nearly $270 million in municipal capital cost savings and more than $30 million in annual savings. Of the total savings, more than $100 million was attributed to stormwater capital cost savings, $40 million to CSO capital cost savings, and nearly $650,000 to CSO annual cost savings. The cost of installing the green roofs would be largely borne by private building owners and developers; the cost to Toronto would consist of the cost of promoting and overseeing the program and would be minimal. Costs for green roof installations in Canada have averaged $6 to $7 per square foot. The smallest green roof included in the study, at 3,750 square feet, would cost between $22,000 and $27,000. The total cost to install 12,000 acres of green roofs would be $3 billion to $3.7 billion.[65,66] Although the modeled total costs exceed the monetized benefits, the costs would be spread across numerous private entities.

CONCLUSION

The 17 case studies presented in this report show that LID practices can reduce project costs and improve environmental performance. In most cases, the case studies indicate that the use of LID practices can be both fiscally and environmentally beneficial to communities. As with almost all such projects, site-specific factors influence project outcomes, but in general, for projects where open space was preserved and cluster development designs were employed, infrastructure costs were lower. In some cases, initial costs might be higher because of the cost of green roofs, increased site preparation costs, or more expensive landscaping practices and plant species. However, in the vast majority of cases, significant savings were realized during the development and construction phases of the projects due to reduced costs for site grading and preparation, stormwater infrastructure, site paving, and landscaping. Total capital cost savings ranged from 15 to 80 percent when LID methods were used, with a few exceptions in which LID project costs were higher than conventional stormwater management costs.

EPA has identified several additional areas that will require further study. First, in all the cases, there were benefits that this study did not monetize and factor into the project's bottom line. These benefits include improved aesthetics, expanded recreational opportunities, increased property values due to the desirability of the lots and their proximity to open space, increased number of total units developed, the value of increased marketing potential, and faster sales.

Second, more research is also needed to quantify the environmental benefits that can be achieved through the use of LID techniques and the costs that can be avoided by using these practices. For example, substantial downstream benefits can be realized through the reduction of the peak flows, discharge volumes, and pollutant loadings discharged from the site. Downstream benefits also might include reductions in flooding and channel degradation, costs for water quality improvements, costs of habitat restoration, costs of providing CSO abatement, property damage, drinking water treatment costs, costs of maintaining/dredging navigable waterways, and administrative costs for public outreach and involvement.

Finally, additional research is needed monetize the cost reductions that can be achieved through improved environmental performance, reductions in long-term operation and maintenance costs and/or reductions in the life cycle costs of replacing or rehabilitating infrastructure.

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identified practices seeks to maintain and use vegetation and open space, optimize natural hydrologic processes to reduce stormwater volumes and discharge rates, and use multiple treatment mechanisms to remove a large range of pollutants. In the context of this report, case studies ascribing to one of the above, or similar, labels were evaluated, and these terms are used interchangeably throughout the report.

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
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February 13, 2009

Michael Adackapara
Division Chief
Santa Ana Regional Water Quality Control Board
3737 Main Street, Suite 500
Riverside, CA 92501-3348

Re: Draft MS4 Permit for Orange County and Incorporated Cities within Orange County (NPDES Permit No. CAS618030)

Dear Mr. Adackapara:

The following are EPA Region 9's comments on the November 10, 2008 "First Draft" of the renewed Areawide Urban Stormwater Permit for Orange County and incorporated cities within Orange County within the jurisdiction of the Santa Ana Regional Water Quality Control Board.

EPA is generally supportive of the approach taken by the Santa Ana Regional Board in the draft permit. The following comments are informed by our review of other Municipal Separate Storm Sewer System (MS4) permits throughout our Region, and our review of the implementation of these permits via audits of nearly 50 MS4 programs.

The renewed Orange County MS4 permit will be the fourth permit issued for these municipal stormwater discharges. It is appropriate for the permit provisions to evolve based on lessons learned from past permits. The renewed permit is an opportunity to include clear permit provisions that support water quality benefits. Our comments concern two aspects of the draft permit.

1. Implementation of Low Impact Development (LID) Requirements

EPA agrees with the draft permit's approach for incorporating LID techniques, also known as green infrastructure. On a national level, EPA is advocating LID as an approach to stormwater management that is cost-effective, sustainable, and environmentally-sound. Ongoing efforts to promote the use of these techniques are described in EPA's January 2008 Action Strategy for Managing Wet Weather with Green Infrastructure. Materials regarding EPA's policies in this area can be found at: http://cfpub.epa.gov/npdes/greeninfrastructure/information.cfm#greenpolicy.

On page 20 of 89 of the draft permit, Finding #62 states, "The USEPA has determined that by limiting the effective impervious area of a development site to 5% or less, downstream impacts can be minimized." While it is true that EPA agrees that limiting effective impervious area (EIA) to 5% or less will have positive impacts on water quality,

EPA has not made a determination that the 5% EIA concept is necessarily the only or always the best method to implement LID. We recommend replacing Finding #62 with the following:

> "USEPA has determined that LID/green infrastructure can be a cost-effective and environmentally preferable approach for the control of stormwater pollution that will minimize downstream impacts by limiting the effective impervious area of development. LID and the reduction of impervious areas may achieve multiple environmental and economic benefits in addition to reducing downstream water quality impacts, such as enhanced water supplies, cleaner air, reduced urban temperatures, increased energy efficiency and other community benefits such as aesthetics, recreation, and wildlife areas. EPA has reviewed studies[1] that have evaluated the % EIA concept and we believe that it is a reasonable and effective metric for incorporating LID principles into stormwater permits."

EPA's primary objective for incorporating LID into renewed MS4 permits, especially for those representing the fourth generation of permits regulating these discharges, is that the permit must include clear, measurable, enforceable provisions for implementation of LID. In our review of MS4 programs in our Region, we have found it common for permits to rely on the development of plans to achieve certain permit controls, rather than including clearly prescriptive requirements in the permits. While the permittees generally make significant and sincere efforts in their development of these plans, the plans often result in a reliance on qualitative provisions rather than specific measurable criteria. As a result, we've often found uncertainty among both the MS4 permittees and the permitting agencies as to specific permit controls. The incorporation of LID techniques into MS4 permits provides an opportunity to establish clear, measurable performance measures for the implementation of LID.

Section XII of the draft permit, entitled "New Development (Including Significant Re-Development)," appropriately sets a 5% EIA limit as a means for measuring the utilization of site controls, including LID techniques, for limiting stormwater runoff. This section of the draft permit also appropriately includes measurable requirements for controlling hydromodification by comparing post-development runoff to pre-development flows. EPA is in agreement with these permit provisions. While these approaches are not the only means available for including measurable requirements for the implementation of LID and the control of hydromodification in municipal stormwater permits to promote water quality improvements, EPA is supportive of the approaches you've chosen. We understand there is an alternative proposal to include a specific, measurable design storm volume which must be managed using LID techniques. Conceptually, we are supportive of such an approach, although we would be

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[1] See for example the analysis prepared by Dr. Richard Horner entitled "Investigation of the Feasibility and Benefits of Low-Impact Site Design Practices ("LID") for Ventura County" submitted to the Los Angeles Regional Board by NRDC.

interested in reviewing specific permit language. We would not support replacing these approaches with qualitative provisions that do not include measurable goals.

We support the concept of alternatives and in-lieu programs for LID outlined in section XII.E. However, this section should be restructured to require that these waiver programs be approved prior to their utilization. If a permittee intends to grant waivers, they should be required to first establish the water quality credit system described in section XII.E.3. Section XII.E.3 should be moved to the beginning of section XII.E (thus renumbered as XII.E.1). The permit should require that any credit system that the permittees establish must (not "should") be submitted to the Executive Officer for review and approval. Any approved alternative programs should include measurable requirements, consistent with our comments above regarding the need for clear, measurable and enforceable permit conditions. In the section which is currently section XII.E.1 (which would become XII.E.2) the first sentence should be revised to note that if a BMP is not feasible, the permittee may grant a waiver pursuant to their approved Credit System.

2. Incorporation of Total Maximum Daily Loads (TMDLs)

The permit appropriately includes the relevant TMDLs, but the permit should more explicitly state that the wasteload allocations (WLAs) established by these TMDLs are intended to be enforceable permit effluent limitations and that compliance is a permit requirement. As a general matter, it is also our view that the permit language should clarify what monitoring will be done to determine compliance with WLAs. We recognize that the permit includes several different sections which describe monitoring efforts. However, with respect to the specific TMDLs described in section XVIII, the requirements for monitoring receiving waters (and end-of-pipe monitoring for sediments) are not always clear. If required monitoring to determine compliance with WLAs is specified in existing, separate monitoring plans, these existing plans should be clearly identified. With respect to existing plans, there should be confirmation that the plans clearly identify what monitoring will be conducted, and that monitoring results will enable the Board to clearly determine compliance with WLAs. If these referenced plans have not yet been prepared, the permit should contain required plan submittal dates, along with the expectations for the content of the plans to enable the Board to determine compliance with WLAs.

To further support WLA requirements in the permit, we recommend that Finding #52 for the permit include the following statement: "NPDES regulations at 40 CFR 122.44(d)(1)(vii)(B) require that permits be consistent with Waste Load Allocations (WLAs) approved by EPA. In the case of this permit, where there are EPA-approved TMDLs for waters in Orange County, this permit must incorporate provisions consistent with the WLAs associated with municipal stormwater, aka "urban runoff," from these TMDLs."

Section XVIII.B (technical TMDLs with no implementation plans)

i. Please note that the parenthetical statement in section XVIII.B.1.c should refer to paragraph 2, not paragraphs 4 & 5.

ii. In section XVIII.B.2, the permit references the Newport Bay/San Diego Creek organochlorine (OC) compounds TMDLs adopted by the Regional Board in September 2007. Despite having been adopted by the Regional Board, these TMDLs and the implementation plan have not yet been submitted to the State Board for approval. Until they are submitted to the State Board, and in turn approved by the State Board, OAL, and EPA, they are not applicable. Rather, the permit should recognize that the EPA TMDLs adopted in June 2002 are the currently applicable TMDLs.

iii. Based on our review of the Newport Bay/San Diego Creek TMDLs, it appears that the concentrations in Tables 1A/1B do not accurately reflect the WLAs for urban runoff in EPA's 2002 TMDLs. In addition to correcting these Tables, the permit should clarify that the WLAs are intended to be enforceable effluent limits. Compliance with the WLAs could be required in accordance with the time frame envisioned by the Board's implementation plan since this would be consistent with the intent of the EPA TMDLs.

iv. This section currently requires activities (the Regional Monitoring Plan (RMP) and Toxicity Reduction and Investigation Program (TRIP)) geared toward compliance with the Regional Board's as-yet unapproved OC TMDLs. These activities are similar to those contemplated for compliance with EPA's OC TMDLs. However, it should be confirmed that the monitoring results will enable determinations regarding compliance with the approved and currently applicable EPA TMDLs. Monitoring plans must clearly identify monitoring locations, the frequency of required monitoring, and required submittal of monitoring results. As recommended by the EPA TMDL, the monitoring plan should include water column and sediment monitoring. In addition, fish tissue monitoring should be included (if not already in the existing plan) since this was identified as an important environmental indicator in EPA's TMDL.

v. The permit should include conditions consistent with the WLAs for metals and selenium established by EPA in June 2002 for Newport Bay, San Diego Creek and the Rhine Channel. The description of the selenium TMDL for Newport Bay on page 67 describes selenium as naturally occurring. However, the TMDL suggests that selenium loads are made up of both naturally occurring and anthropogenic sources. The permit's required monitoring of selenium should not be limited to sources of naturally occurring selenium. Section XVIII.B.3 of the permit mentions that revised TMDLs for selenium are being developed by the Regional Board, but until the revised TMDLs and implementation plan are approved, the WLAs from the existing TMDLs are applicable. The EPA TMDLs for selenium and metals do not include a compliance deadline, but rather suggest a phased, iterative approach for compliance with the WLAs. Consistent with the recommendations of the EPA TMDLs, we suggest the permit require the

development and submittal of a compliance plan (with an implementation schedule) to the Board by the permittees. Detailed requirements for a monitoring program to determine compliance with the WLAs, including monitoring locations, frequency of sampling, and reporting should also be required.

vi. Section XVIII.B.3 of the permit refers to the activities and plans underway for revised nutrient TMDLs. We understand that these ongoing activities are focused on revisions to the nutrient TMDL implementation plan, not the TMDLs themselves. The permit should be corrected accordingly.

vii. Section XVIII.B.3 of the permit lays out an open-ended approach to the development of a monitoring plan for selenium and nitrogen. A specific deadline for the submittal of the monitoring plan should be included in the permit.

viii. We support the approach provided for incorporating the Coyote Creek WLAs, by establishing a date certain for submittal of a source control plan and monitoring plan. The permit should clarify the monitoring plan must include the frequency of sampling, and any other details to be required in using the collected data to determine compliance with WLAs.

Section XVIII.C (TMDLs beyond the permit term)

Tables 5a and 5b (in section XVIII.C.1) contain errors in that the first two rows of each table both include, "Total Maximum Daily Load for Fecal Coliform." It appears that one of these rows should present the WLA for urban runoff. The permit should also clarify that the urban runoff WLAs are intended to be permit effluent limits; we suggest that language be added to the permit such as: "The permittees shall comply with the wasteload allocations for urban runoff in Tables 5a and 5b in accordance with the deadlines in Tables 5a and 5b."

Section XVIII.D (TMDLs with compliance schedules within the permit term)

i. The permit (section XVIII.D.1) should clarify that the diazinon and chlorpyrifos WLAs are intended to be permit effluent limits; we would suggest that language be added to the permit such as: "The permittees shall comply with the following wasteload allocations in Tables 6a and 6b." Immediate compliance should be required unless an alternate date is provided in the implementation plan. We would also recommend that the fact sheet discuss the current compliance status of the permittees with the WLAs; given the phase-out of these pesticides within urban areas, compliance may have already been achieved.

ii. Regarding the nutrient TMDLs, the fact sheet (page 9) indicates the current and future targets for nutrients are already being met. In contrast, the permit (page 71) indicates that

the *overall* allocations have been met, leaving questions about the urban runoff WLA. Recent monitoring reports submitted to the Regional Board show that the urban runoff allocations for both the total nitrogen and total phosphorus loads are not currently being met. This discrepancy should be clarified in the fact sheet. Further, the permit should be clarified to indicate that the urban runoff WLAs in the Tables 7, 8 and 9 are intended to be permit effluent limits.

iii. Regarding the Newport Bay sediment TMDL, the permit should include firm dates for the submittal of monitoring data presenting the 10-year running averages.

Section XVIII.E.2 refers to "numeric effluent limits." For clarity, and for consistency with the rest of section XVIII, we suggest this be revised to: "Based on the TMDLs, numeric effluent limits have been specified to ensure consistency with the wasteload allocations."

We appreciate the opportunity to provide our views on this draft permit. If you'd like to discuss these comments, please contact John Tinger of the NDPES Permits Office at (415) 972-3518, or Eugene Bromley of the NPDES Permits Office at (415) 972-3510.

Sincerely,

Douglas E. Eberhardt, Chief
NPDES Permits Office

INVESTIGATION OF THE FEASIBILITY AND BENEFITS OF LOW-IMPACT SITE DESIGN PRACTICES ("LID") FOR VENTURA COUNTY

Richard R. Horner†

ABSTRACT

The Clean Water Act NPDES permit that regulates municipal separate storm sewer systems (MS4s) in Ventura County, California will be reissued in 2007. The draft permit includes provisions for requiring the use of low impact development practices (LID) for certain kinds of development and redevelopment projects. Using six representative development project case studies, the author investigated the practicability and relative benefits of the permit's LID requirements. The results showed that (1) LID site design and source control techniques are more effective than conventional best management practices (BMPs) in reducing runoff rates; (2) Effective Impervious Area (EIA) can practicably be capped at three percent, a standard more protective than that proposed in the draft permit; and (3) in five out of six case studies, LID methods would reduce site runoff volume and pollutant loading to zero in typical rainfall scenarios.

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INTRODUCTION

The Assessment in Relation to Municipal Permit Conditions

This purpose of this study is to investigate the relative water quality and water reuse benefits of three levels of storm water treatment best management practices (BMPs): (1) basic "treat-and-release" BMPs (e.g., drain inlet filters, CDS units), (2) commonly used BMPs that expose runoff to soils and vegetation (extended-detention basins and biofiltration swales and filter strips), and (3) low-impact development (LID) practices. The factors considered in the investigation are runoff volume, pollutant loading, and the availability of water for infiltration or other reuse. In order to assess the differential impact of storm water reduction approaches on these factors, this study examines six case studies typical of development covered by the Ventura County Municipal Separate Storm Sewer System Permit.

Low-impact development methods reduce storm runoff and its contaminants by decreasing their generation at sources, infiltrating into the soil or evaporating storm flows before they can enter surface receiving waters, and treating flow remaining on the surface through contact with vegetation and soil, or a combination of these strategies. Soil-based LID practices often use soil enhancements such as compost, and thus improve upon the performance of more traditional basins and biofilters. For the study's purposes, verification of the practicability and utility of LID practices was based on a modified version of the Planning and Land Development Program (Part 4, section E) in the Draft Ventura County Municipal Separate Storm Sewer System Permit ("Draft Permit"). The Draft Permit requires that Effective Impervious Area (EIA) of certain types of new development and redevelopment projects be limited to five percent of

total development project area. EIA is defined as hardened surface hydrologically connected via sheet flow or a discrete hardened conveyance to a drainage system or receiving water body. (Draft Permit p. 50) The study modified this requirement to three percent, as a way to test both the feasibility of meeting the higher, five percent standard in the draft permit and because as the lower, three percent EIA is essential to protect the Ventura County aquatic environment (see Attachment A).

The Draft Permit further requires minimizing the overall percentage of impervious surfaces in new development and redevelopment projects to support storm water infiltration. The Draft Permit also directs an integrated approach to minimizing and mitigating storm water pollution, using a suite of strategies including source control, LID, and treatment control BMPs. (Draft Permit p. 50) It is noted in this section of the document that impervious surfaces can be rendered "ineffective" if runoff is dispersed through properly designed vegetated swales. In testing the practicability of the draft permit's requirements and a three percent EIA standard, this study broadened this approach to encompass not only vegetated swales (channels for conveyance at some depth and velocity) but also vegetated filter strips (surfaces for conveyance in thin sheet flow) and bioretention areas (shallow basins with a range of vegetation types in which runoff infiltrates through soil either to groundwater or a subdrain for eventual surface discharge). The Draft Permit's stipulation of "properly designed" facilities was interpreted to entail, among other requirements, either determination that existing site soils can support runoff reduction through infiltration or that soils will be amended using accepted LID techniques to attain this objective. Finally, the study further broadened implementation options to include water harvesting (collection and storage for use in, for example, irrigation or gray water systems), roof downspout infiltration trenches, and porous pavements.

The Draft permit was interpreted to require management of EIA, other impervious area (what might be termed Not-Connected Impervious Area, NCIA), and pervious areas as follows:

- Runoff from EIA is subject to treatment control and the Draft Permit's Hydromodification Mitigation Control requirements before discharge.

- NCIA must be drained onto a properly designed vegetated surface or its runoff managed by one of the other options discussed in the preceding paragraph. To the extent NCIA runoff is not eliminated prior to discharge from the site in one of these ways, it is subject to treatment control and the Draft Permit's Hydromodification Mitigation Control requirements before discharge.

- Runoff from pervious areas is subject to treatment control and the Draft Permit's Hydromodification Mitigation Control requirements before discharge. This provision applies to pervious areas that both do and do not receive drainage from NCIA.

Where treatment control BMPs are required to manage runoff from the site, the Draft Permit's Volumetric or Hydrodynamic (Flow Based) Treatment Control design bases were assumed to apply. The former basis applies to storage-type BMPs, like ponds, and requires capturing and treating either the runoff volume from the 85th percentile 24-hour rainfall event for the location, the volume of annual runoff to achieve 80 percent or more volume treatment, or the volume of runoff produced from a 0.75 inch storm event. The calculations in this analysis used the 0.75-inch quantity. The Hydrodynamic basis applies to flow-through BMPs, like swales, and requires treating the runoff flow rate produced from a rain event equal to at least 0.2 inches per hour intensity (or one of two other approximately equivalent options).

Scope of the Assessment

With respect to each of the six development case studies, three assessments were undertaken: a baseline scenario incorporating no storm water management controls; a second scenario employing conventional BMPs; and a third development scenario employing LID storm water management strategies.

To establish a baseline for each case study, annual storm water runoff volumes were estimated, as well as concentrations and mass loadings of four pollutants: (1) total suspended solids (TSS), (2) total recoverable copper (TCu), (3) total recoverable zinc (TZn), and (4) total phosphorus (TP). These baseline estimates were based on the anticipated land use and cover with no storm water management efforts.

Two sets of calculations were then conducted using the parameters defined for the six case studies.

The first group of calculations estimated the extent to which basic BMPs reduce runoff volumes and pollutant concentrations and loadings, and what impact, if any, such BMPs have on recharge rates or water retention on-site.

The second group of calculations estimated the extent to which commonly used soil-based BMPs and LID site design strategies ameliorate runoff volumes and pollutant concentrations and loadings, and the effect such techniques have on recharge rates. When evaluating LID strategies, it was presumed that EIA would be limited to three percent and runoff from EIA, NCIA, and pervious areas would be managed as indicated above. The assessment of basins, biofiltration, and low-impact design practices analyzed the expected infiltration capacity of the case study sites. It also considered related LID techniques and practices, such as source reduction strategies, that could work in concert with infiltration to serve the goals of: (1) preventing increase in annual runoff volume from the pre- to the post-developed state, (2) preventing increase in annual pollutant mass loadings between the two development states, and (3) avoiding exceedances of California Toxics Rule (CTR) acute saltwater criteria for copper and zinc.

The results of this analysis show that:

- Developments implementing no post-construction BMPs result in storm water runoff volume and pollutant loading that are substantially increased, and recharge rates that are substantially decreased, compared to pre-development conditions.

- Developments implementing basic post-construction treatment BMPs achieve reduced pollutant loading compared to developments with no BMPs, but storm water runoff volume and recharge rates are similar to developments with no BMPs.

- Developments implementing traditional basins and biofilters, and even more so low-impact post-construction BMPs, achieve significant reduction of pollutant loading and runoff volume as well as greatly enhanced recharge rates compared to both developments with no BMPs and developments with basic treatment BMPs.

- Typical development categories, ranging from single family residential to large commercial, can feasibly implement low-impact post-construction BMPs designed in compliance with the draft permit's requirements, as modified to include a lower, three percent EIA requirement.

This report covers the methods employed in the investigation, data sources, and references for both. It then presents the results, discusses their consequences, draws conclusions, and makes recommendations relative to the feasibility of utilizing low-impact development practices in Ventura County developments.

CASE STUDIES

Six case studies were selected to represent a range of urban development types considered to be representative of coastal Southern California, including Ventura County. These case studies involved: a multi-family residential complex (MFR), a relatively small-scale (23 homes) single-family residential development (Sm-SFR), a restaurant (REST), an office building (OFF), a relatively large (1000 homes) single-family residential development (Lg-SFR) and a sizeable commercial retail installation (COMM).[1]

Parking spaces were estimated to be 176 sq ft in area, which corresponds to 8 ft width by 22 ft length dimensions. Code requirements vary by jurisdiction, with the tendency now to drop below the traditional 200 sq ft average. About 180 sq ft is common, but various standards for full- and compact-car spaces, and for the mix of the two, can raise or lower the average.[2] The 176 sq ft size is considered to be a reasonable value for conventional practice.

Roadways and walkways assume a wide variety of patterns. Exclusive of the two SFR cases, simple, square parking lots with roadways around the four sides and square buildings with walkways also around the four sides were assumed. Roadways and walkways were taken to be 20 ft and 6 ft wide, respectively.

Single-family residences were assumed each to have a driveway 20 ft wide and 30 ft long. It was further assumed that each would have a sidewalk along the front of the lot, which was calculated to be 5749 sq ft in area. Assuming a square lot, the front dimension would be 76 ft. A 40-ft walkway was included within the property. Sidewalks and walkways were taken to be 4 ft wide.

Exclusive of the COMM case, the total area for all of these impervious features was subtracted from the total site area to estimate the pervious area, which was assumed to have conventional landscaping cover (grass, small herbaceous decorative plants, bushes, and a few trees). For the COMM scenario, the hypothetical total impervious cover was enlarged by 10 percent to represent the landscaping, on the belief that a typical retail commercial establishment would typically be mostly impervious.

Table 1 (page 5) summarizes the characteristics of the six case studies. The table also provides the recorded or estimated areas in each land use and cover type.

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[1] Building permit records from the City of San Marcos in San Diego County provided data on total site areas for the first four case studies, including numbers of buildings, building footprint areas (including porch and garage for Sm-SFR), and numbers of parking spaces associated with the development projects. While the building permit records made no reference to features such as roadways, walkways, and landscaping normally associated with development projects, these features were taken into account in the case studies using assumptions described herein. Larger developments were not represented in the sampling of building permits from the San Marcos database. To take larger development projects into account in the subsequent analysis, the two larger scale case studies were hypothesized. The Lg-SFR scenario scaled up all land use estimates from the Sm-SFR case in the ratio of 1000:23. The hypothetical COMM scenario consisted of a building with a 2-acre footprint and 500 parking spaces. As with the smaller-scale cases, these hypothetical developments were assumed to have roadways, walkways, and landscaping, as described herein.

[2] J. Gibbons, *Parking Lots*, NONPOINT EDUCATION FOR MUNICIPAL OFFICERS, Technical Paper No. 5 (1999) (http://nemo.uconn.edu/tools/publications/tech_papers/tech_paper_5.pdf).

Table 1. Case Study Characteristics and Land Use and Land Cover Areas

	MFR[a]	Sm-SFR[a]	REST[a]	OFF[a]	Lg-SFR[a]	COMM[a]
No. buildings	11	23	1	1	1000	1
Total area (ft^2)	476,982	132,227	33,669	92,612	5,749,000	226,529
Roof area (ft^2)	184,338	34,949	3,220	7,500	1,519,522	87,120
No. parking spaces	438	-	33	37	-	500
Parking area (ft^2)	77,088	-	5808	6512	-	88,000
Access road area (ft^2)	22,212	-	6097	6456	-	23,732
Walkway area (ft^2)	33,960	10,656	1362	2078	463,289	7,084
Driveway area (ft^2)	-	13,800	-	-	600,000	-
Landscape area (ft^2)	159,384	72,822	17,182	70,066	3,166,190	20,594

[a] MFR—multi-family residential; Sm-SFR—small-scale single-family residential;
REST—restaurant; OFF—office building; Lg-SFR—large-scale single-family residential; COMM—retail commercial

METHODS OF ANALYSIS

Annual Storm Water Runoff Volumes

Annual surface runoff volumes produced were estimated for both pre- and post-development conditions for each case study site. Runoff volume was computed as the product of annual precipitation, contributing drainage area, and a runoff coefficient (ratio of runoff produced to rainfall received). For impervious areas the following equation was used:

$$C = (0.009)\, I + 0.05$$

where I is the impervious percentage. This equation was derived by Schueler (1987) from Nationwide Urban Runoff Program data (U.S. Environmental Protection Agency 1983). With I = 100 percent for fully impervious surfaces, C is 0.95.

The basis for pervious area runoff coefficients was the Natural Resource Conservation Service's (NRCS) Urban Hydrology for Small Watersheds (NRCS 1986, as revised from the original 1975 edition). This model estimates storm event runoff as a function of precipitation and a variable representing land cover and soil, termed the curve number (CN). Larger events are forecast to produce a greater amount of runoff in relation to amount of rainfall because they more fully saturate the soil. Therefore, use of the model to estimate annual runoff requires selecting some event or group of events to represent the year. A 0.75-inch rainfall event was used in the analysis here for the relative comparison between pre- and post-development and applied to deriving a runoff coefficient for annual estimates, recognizing that smaller storms would produce less and larger storms more runoff.

To select CN for the pre-development case, an analysis performed in the area of the Cedar Fire in San Diego County was used in which CN was determined before and after the 2003 fire.[3] In the San Diego analysis, CN = 83 was estimated for the pre-existing land cover, which was generally chaparral, a vegetative cover also typical of Ventura County. As indicated below, soils are also similar in Ventura and San Diego Counties, making the parameter selection reasonable for use in both locations. For post-development landscaping, CN = 86 was selected based on tabulated data in NRCS (1986) and professional judgment.

Pre- and post-development runoff quantities were computed with these CN values and the 0.75-inch rainfall, and then divided by the rainfall to obtain runoff coefficients. The results were 0.07

[3] American Forests, *San Diego Urban Ecosystem Analysis After the Cedar Fire* (Feb. 3, 2006) (http://www.ufei.org/files/pubs/SanDiegoUrbanEcosystemAnalysis-PostCedarFire.pdf).

and 0.12, respectively. Finally, total annual runoff volumes were estimated based on an average annual precipitation in the City of Ventura of 14.71 inches.[4]

Storm Water Runoff Pollutant Discharges

Annual pollutant mass discharges were estimated as the product of annual runoff volumes produced by the various land use and cover types and pollutant concentrations typical of those areas. Again, the 0.75-inch precipitation event was used as a basis for volumes. Storm water pollutant data have typically been measured and reported for general land use types (e.g., single-family residential, commercial). However, an investigation of low-impact development practices of the type this study sought to conduct demands data on specific land coverages. The literature offers few data on this basis. Those available and used herein were assembled by a consultant to the City of Seattle for a project in which the author participated. They appear in Attachment B (Herrera Environmental Consultants, Inc. undated).

Pollutant concentrations expected to occur typically in the mixed runoff from the several land use and cover types making up a development were estimated by mass balance; i.e., the concentrations from the different areas of the sites were combined in proportion to their contribution to the total runoff.

The Effect of Conventional Treatment BMPs on Runoff Volume, Pollutant Discharges, and Recharge Rates

The first question in analyzing how BMPs reduce runoff volumes and pollutant discharges was, What BMPs are being employed in Ventura County developments under the permit now in force? This permit is open-ended and provides regulated entities with a large number of choices and few fixed requirements. These options presumably include manufactured BMPs, such as drain inlet inserts (DIIs) and continuous deflective separation (CDS) units. Developments may also select such non-proprietary devices as extended-detention basins (EDBs) and biofiltration swales and filter strips. EDBs hold water for two to three days for solids settlement before releasing whatever does not infiltrate or evaporate. Biofiltration treats runoff through various processes mediated by vegetation and soil. In a swale, runoff flows at some depth in a channel, whereas a filter strip is a broad surface over which water sheet flows. Each of these BMP types was applied to each case study, although it is not clear that these BMPs, in actuality, have been implemented consistently within Ventura County to date.

The principal basis for the analysis of BMP performance was the California Department of Transportation's (CalTrans, 2004) BMP Retrofit Pilot Program, performed in San Diego and Los Angeles Counties. One important result of the program was that BMPs with a natural surface infiltrate and evaporate (probably, mostly infiltrate) a substantial amount of runoff, even if conditions do not appear to be favorable for an infiltration basin. On average, the EDBs, swales, and filter strips lost 40, 50 and 30 percent, respectively, of the entering flow before the discharge point. DIIs and CDS units do not contact runoff with a natural surface, and therefore do not reduce runoff volume.

The CalTrans program further determined that BMP effluent concentrations were usually a function of the influent concentrations, and equations were developed for the functional

[4] Ventura County Watershed Protection District (http://www.vcwatershed.org/fws/specialmedia.htm). The City of Ventura is considered to be representative of most of the developed and developing areas in Ventura County. However, there is some variation around the county, with the maximum precipitation registered at Ojai (annual average 21.32 inches). Ojai is about 15 miles inland and lies at elevation 745 ft at the foot of the Topatopa Mountains, the orographic effect of which influences its meteorology. Ojai's higher rainfall was taken into account in the calculations, and the report notes the few instances where it affected the conclusions.

relationships in these cases. BMPs generally reduced influent concentrations proportionately more when they were high. In relatively few situations influent concentrations were constant at an "irreducible minimum" level regardless of inflow concentrations.

In analyzing the effects of BMPs on the case study runoff, the first step was to reduce the runoff volumes estimated with no BMPs by the fractions observed to be lost in the pilot study. The next task was estimating the effluent concentrations from the relationships in the CalTrans report. The final step was calculating discharge pollutant loadings as the product of the reduced volumes and predicted effluent concentrations. As before, typical pollutant concentrations in the mixed runoff were established by mass balance.

Estimating Infiltration Capacity of the Case Study Sites

Infiltrating sufficient runoff to maintain pre-development hydrologic characteristics and prevent pollutant transport is the most effective way to protect surface receiving waters. Successfully applying infiltration requires soils and hydrogeological conditions that will pass water sufficiently rapidly to avoid overly-lengthy ponding, while not allowing percolating water to reach ground-water before the soil column captures pollutants.

The study assumed that infiltration would occur in surface facilities and not in below-ground trenches. The use of trenches is certainly possible, and was judged to be an approved BMP by CalTrans after the pilot study. However, the intent of this investigation was to determine the ability of pervious areas to manage the site runoff. This was accomplished by determining the infiltration capability of the pervious areas in their original condition for each development case study, and further assessing the pervious areas' infiltration capabilities if soils were modified according to low impact development practices.

The chief basis for this aspect of the work was an assessment of infiltration capacity and benefits for Los Angeles' San Fernando Valley (Chralowicz et al. 2001). The Chralowicz study posited providing 0.1-0.5 acre for infiltration basins to serve each 5 acres of contributing drainage area. At 2-3 ft deep, it was estimated that such basins could infiltrate 0.90-1.87 acre-ft/year of runoff in San Fernando Valley conditions. Soils there are generally various loam textures with infiltration rates of approximately 0.5-2.0 inches/hour. The most prominent soils in Ventura County, at least relatively near the coast, are loams, sandy loams, loamy sands, and silty clay loams, thus making the conclusions of the San Fernando Valley study applicable for these purposes.[5] This information was used to estimate how much of each case study site's annual runoff would be infiltratable, and if the pervious portion would provide sufficient area for infiltration. For instance, if sufficient area were available, the infiltration configuration would not have to be in basin form but could be shallower and larger in surface area. This study's analyses assumed the use of bioretention areas rather than traditional infiltration basins.

Volume and Pollutant Source Reduction Strategies

As mentioned above, the essence of low-impact development is reducing runoff problems before they can develop, at their sources, or exploiting the infiltration and treatment abilities of soils and vegetation. If a site's existing infiltration and treatment capabilities are inadequate to preserve pre-development hydrology and prevent runoff from causing or contributing to violations of water quality standards, then LID-based source reduction strategies can be implemented, infiltration and treatment capabilities can be upgraded, or both.

[5] Cabrillo Port Liquefied Natural Gas Deepwater Port Draft EIS/EIR (Oct. 2004) (http://www.cabrilloport.ene.com/files/eiseir/4.05%20%20-Agriculture%20and%20Soils.pdf).

Source reduction can be accomplished through various LID techniques. Soil can be upgraded to store runoff until it can infiltrate, evaporate, or transpire from plants through compost addition. Soil amendment, as this practice is known, is a standard LID technique.

Upgraded soils are used in bioretention cells that hold runoff and effect its transfer to the subsurface zone. This standard LID tool can be used where sufficient space is available. This study analyzed whether the six development case study sites would have sufficient space to effectively reduce runoff using bioretention cells, assuming the soils and vegetation could be amended and enhanced where necessary.

Conventional pavements can be converted to porous asphalt or concrete or replaced with concrete or plastic unit pavers or grid systems. For such approaches to be most effective, the soils must be capable of infiltrating the runoff passing through, and may require renovation.

Source reduction can be enhanced by the LID practice of water harvesting, in which water from impervious surfaces is captured and stored for reuse in irrigation or gray water systems. For example, runoff from roofs and parking lots can be harvested, with the former being somewhat easier because of the possibility of avoiding pumping to use the water and fewer pollutants. Harvesting is a standard technique for Leadership in Energy and Environmental Design (LEED) buildings.[6] Many successful systems of this type are in operation, such as the Natural Resources Defense Council offices (Santa Monica, CA), the King County Administration Building (Seattle, WA), and two buildings on the Portland State University campus (Portland, OR). This investigation examined how water harvesting could contribute to storm water management for case study sites where infiltration capacity, available space, or both appeared to be limited.

RESULTS OF THE ANALYSIS

1. "Base Case" Analysis: Development without Storm Water Controls

Comparison of Pre- and Post-Development Runoff Volumes

Table 2 (page 9) presents a comparison between the estimated runoff volumes generated by the respective case study sites in the pre- and post-development conditions, assuming implementation of no storm water controls on the developed sites. On sites dominated by impervious land cover, most of the infiltration that would recharge groundwater in the undeveloped state is expected to be lost to surface runoff after development. This greatly increased surface flow would raise peak flow rates and volumes in receiving water courses, raise flooding risk, and transport pollutants. Only the office building, the plan for which retained substantial pervious area, would lose less than half of the site's pre-development recharge.

[6] New Buildings Institute, Inc., *Advanced Buildings* (2005) (http://www.poweryourdesign.com/LEEDGuide.pdf).

Table 2. Pre- and Post-Development without BMPs: Distribution of Surface Runoff Versus Recharge to Groundwater

Annual Volume (acre-ft)	MFR[a]	Sm-SFR[a]	REST[a]	OFF[a]	Lg-SFR[a]	COMM[a]
Precipitation[b]	13.4	3.72	0.95	2.60	162	6.37
Pre-development runoff[c]	0.94	0.26	0.07	0.18	11	0.45
Pre-development recharge[d]	12.5	3.46	0.88	2.42	150	5.92
Post-development impervious runoff[c]	8.48	1.59	0.44	0.60	69	5.50
Post-development pervious runoff[c]	0.54	0.25	0.06	0.24	11	0.07
Post-development total runoff[c]	9.02	1.83	0.50	0.84	80	5.57
Post-development recharge[d]	4.39	1.88	0.45	1.76	82	0.80
Post-development recharge loss (% of pre-development recharge)	8.08 (65%)	1.57 (46%)	0.43 (49%)	0.66 (27%)	68 (45%)	5.12 (86%)

[a] MFR—multi-family residential; Sm-SFR—small-scale single-family residential; REST—restaurant; OFF—office building; Lg-SFR—large-scale single-family residential;
COMM—retail commercial
[b] Volume of precipitation on total project area
[c] Quantity of water discharged from the site on the surface
[d] Quantity of water infiltrating the soil; the difference between precipitation and runoff

Pollutant Concentrations and Loadings

Table 3 presents the pollutant concentrations from the literature and loadings calculated as described for the various land use and cover types represented by the case studies. Landscaped areas are expected to release the highest TSS concentration, although relatively low TSS mass loading because of the low runoff coefficient. The highest copper concentrations and loadings are expected from parking lots. Roofs, especially commercial roofs, top the list for both zinc concentrations and loadings. Landscaping would issue by far the highest phosphorus, although access roads and driveways would contribute the highest mass loadings.

Table 3. Pollutant Concentrations and Loadings for Case Study Land Use and Cover Types

Land Use	Concentrations				Loadings			
	TSS (mg/L)	TCu (mg/L)	TZn (mg/L)	TP (mg/L)	Lbs. TSS/ acre-year	Lbs. TCu/ acre-year	Lbs. TZn/ acre-year	Lbs. TP/ acre-year
Residential roof	25	0.013	0.159	0.11	79	0.041	0.503	0.348
Commercial roof	18	0.014	0.281	0.14	57	0.044	0.889	0.443
Access road/driveway	120	0.022	0.118	0.66	380	0.070	0.373	2.088
Parking	75	0.036	0.097	0.14	237	0.114	0.307	0.443
Walkway	25	0.013	0.059	0.11	79	0.041	0.187	0.348
Landscaping	213	0.013	0.059	2.04	85	0.005	0.024	0.815

The CTR acute criteria for copper and zinc are 0.0048 mg/L and 0.090 mg/L, respectively. Table 3 shows that all developed land uses are expected to discharge copper above the criterion, based on the mass balance calculations using concentrations from Table 3. Any surface release from the case study sites would violate the criterion at the point of discharge, although dilution by the receiving water would lower the concentration below the criterion at some point. Even if copper mass loadings are reduced by BMPs, any surface discharge would exceed the criterion initially, but it would be easier to dilute below that level. In contrast, runoff from some land covers would not violate the acute zinc criterion. Because of this difference, the evaluation considered whether or not the zinc criterion would be exceeded in each analysis, whereas there was no point in this analysis for copper. There are no equivalent water quality

criteria for TSS and TP; hence, their concentrations were not further analyzed in the different scenarios.

Table 4 shows the overall loadings, as well as zinc concentrations, expected to be delivered from the case study developments should they not be fitted with any BMPs. As Table 4 shows, all cases are forecast to exceed the 0.090 mg/L acute zinc criterion, and the retail commercial development does so by a wide margin. Because of its size, the large residential development dominates the mass loading emissions.

Table 4. Case Study Pollutant Concentration and Loading Estimates without BMPs

	MFR[a]	Sm-SFR[a]	REST[a]	OFF[a]	Lg-SFR[a]	COMM[a]
TZn (mg/L)	0.127	0.123	0.128	0.133	0.123	0.175
Lbs. TSS/year	1321	345	125	242	15016	853
Lbs. TCu/year	0.46	0.074	0.032	0.045	3.21	0.37
Lbs. TZn/year	3.09	0.607	0.174	0.301	26.4	2.64
Lbs. TP/year	6.58	2.39	0.72	1.78	104	3.36

[a] MFR—multi-family residential; Sm-SFR—small-scale single-family residential; REST—restaurant; OFF—office building; Lg-SFR—large-scale single-family residential; COMM—retail commercial

2. "Conventional BMP" Analysis: Effect of Basic Treatment BMPs

Effect of Basic Treatment BMPs on Post-Development Runoff Volumes

The current permit allows regulated parties to select from a range of BMPs in order to treat or infiltrate a given quantity of annual rainfall. The range includes drain inlet inserts, CDS units, and other manufactured BMPs, detention vaults, and sand filters, all of which isolate runoff from the soil; as well as basins and biofiltration BMPs built in soil and generally having vegetation. Treatment BMPs that do not permit any runoff contact with soils discharge as much storm water runoff as equivalent sites with no BMPs, and hence yield zero savings in recharge. As mentioned above, the CalTrans (2004) study found that BMPs with a natural surface can reduce runoff by substantial margins (30-50 percent for extended-detention basins and biofiltration).

With such a wide range of BMPs in use, runoff reduction ranging from 0 to 50 percent, and a lack of clearly ascertainable requirements, it is not possible to make a single estimate of how much recharge savings are afforded by maximal implementation of the current permit. We made the following assumptions regarding implementation of BMPs. Assuming natural-surface BMPs perform at the average of the three types tested by CalTrans (2004), i.e., 40 percent runoff reduction, the estimate can be bounded as shown in Table 5 (page 11). The table demonstrates that allowing free choice of BMPs without regard to their ability to direct water into the ground forfeits substantial groundwater recharge benefits when hardened-surface BMPs are selected. Use of soil-based conventional BMPs could cut recharge losses from half or e more of the full potential to about one-quarter to one-third or less, except with the highly impervious commercial development. This analysis shows the wisdom of draining impervious to pervious surfaces, even if those surfaces are not prepared in any special way. But as subsequent analyses showed, soil amendment can gain considerably greater benefits.

Table 5. Pre- and Post-Development with Conventional BMPs: Distribution of Surface Runoff Versus Recharge to Groundwater

Annual Volume (acre-ft)	MFR[a]	Sm-SFR[a]	REST[a]	OFF[a]	Lg-SFR[a]	COMM[a]
Precipitation[b]	13.4	3.72	0.95	2.60	162	6.37
Pre-development runoff[c]	0.94	0.26	0.07	0.18	11	0.45
Pre-development recharge	12.5	3.46	0.88	2.42	150	5.92
Post-development impervious runoff[c, d]	5.09-8.48	0.95-1.59	0.26-0.44	0.36-0.60	41-69	3.30-5.50
Post-development pervious runoff[c, d]	0.32-0.54	0.15-0.25	0.04-0.06	0.14-0.24	6.6-11	0.04-0.07
Post-development total runoff[c, d]	5.41-9.02	1.10-1.83	0.30-0.50	0.50-0.84	48-80	3.34-5.57
Post-development recharge[d, e]	4.39-7.99	1.88-2.62	0.45-0.65	1.76-2.10	82-114	0.80-3.03
Post-development recharge loss (% of pre-development recharge)[d, e]	4.51-8.08 (36-65%)	0.84-1.57 (24-46%)	0.23-0.43 (26-49%)	0.32-0.66 (13-27%)	36-68 (24-45%)	2.89-5.12 (49-86%)

[a] MFR—multi-family residential; Sm-SFR—small-scale single-family residential; REST—restaurant; OFF—office building; Lg-SFR—large-scale single-family residential; COMM—retail commercial. Ranges represent 40 percent runoff volume reduction, with full site coverage by BMPs having a natural surface, to no reduction, with BMPs isolating runoff from soil.
[b] Volume of precipitation on total project area
[c] Quantity of water discharged from the site on the surface
[d] Ranging from the quantity with hardened bed BMPs to the quantity with soil-based BMPs
[e] Quantity of water infiltrating the soil; the difference between precipitation and runoff

Effect of Basic Treatment BMPs on Pollutant Discharges

Table 6 (page 12) presents estimates of zinc effluent concentrations and mass loadings of the various pollutants discharged from four types of conventional treatment BMPs. The manufactured CDS BMPs in this table, which do not expose runoff to soil or vegetation, are not expected to drop any of the concentrations sufficiently to meet the acute zinc criterion at the discharge point. The loading reduction results show the CDS units always performing below 50 percent reduction for all pollutants analyzed, and most often in the vicinity of 20 percent, with zero copper reduction.

When treated with swales or filter strips, effluents from each development case study site are expected to fall below the CTR acute zinc criterion. All but the large commercial site would meet the criterion with EDB treatment. These natural-surface BMPs, if fully implemented and well maintained, are predicted to prevent the majority of the pollutant masses generated on most of the development sites from reaching a receiving water. Only total phosphorus reduction falls below 50 percent for two case studies. Otherwise, mass loading reductions range from about 60 to above 80 percent for the EDB, swale, and filter strip. This data indicates that draining impervious to pervious surfaces, even if those surfaces are not prepared in any special way, pays water quality as well as hydrologic dividends.

Table 6. Pollutant Concentration and Loading Reduction Estimates with Conventional BMPs

	MFR[a]	Sm-SFR[a]	REST[a]	OFF[a]	Lg-SFR[a]	COMM[a]
Effluent Concentrations:						
CDS TZn (mg/L)[a]	0.095	0.095	0.098	0.102	0.095	0.131
EDB TZn (mg/L)[a]	0.085	0.086	0.084	0.084	0.086	0.098
Swale TZn (mg/L)	0.055	0.054	0.055	0.056	0.054	0.068
Filter strip TZn (mg/L)	0.039	0.039	0.039	0.041	0.039	0.048
Loading Reductions:						
CDS TSS loading reduction	15.7%	19.9%	22.0%	24.0%	19.9%	16.9%
CDS TCu loading reduction	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
CDS TZn loading reduction	22.7%	22.4%	22.9%	23.1%	22.4%	25.1%
CDS TP loading reduction	30.6%	41.5%	40.7%	45.9%	41.5%	20.3%
EDB TSS loading reduction	68.1%	73.7%	79.0%	81.1%	73.7%	71.7%
EDB TCu loading reduction	61.9%	55.7%	66.2%	63.0%	55.7%	66.8%
EDB TZn loading reduction	59.7%	59.6%	60.4%	61.9%	59.6%	66.6%
EDB TP loading reduction	61.9%	69.7%	69.1%	72.9%	69.7%	54.5%
Swale TSS loading reduction	68.8%	71.1%	73.1%	73.9%	71.1%	69.4%
Swale TCu loading reduction	72.5%	68.5%	78.2%	73.3%	68.5%	75.8%
Swale TZn loading reduction	78.4%	78.1%	84.3%	78.8%	78.1%	80.7%
Swale TP loading reduction	66.3%	70.7%	67.2%	76.2%	70.7%	55.0%
Filter strip TSS loading reduction	69.9%	75.4%	80.6%	82.6%	75.4%	72.3%
Filter strip TCu loading reduction	74.4%	69.1%	78.2%	75.4%	69.1%	78.7%
Filter strip TZn loading reduction	78.3%	77.9%	78.4%	78.7%	77.9%	80.9%
Filter strip TP loading reduction	48.4%	53.1%	63.7%	59.8%	53.1%	34.6%

[a] MFR—multi-family residential; Sm-SFR—small-scale single-family residential; REST—restaurant; OFF—office building; Lg-SFR—large-scale single-family residential; COMM—retail commercial; CDS— continuous deflective separation unit; EDB—extended-detention basin

3. LID Analysis: Development According to Modified Draft Permit Provisions

(a) Hydrologic Analysis

The LID analysis was first performed according to the Draft Permit provisions under the Planning and Land Development Program (Part 4, section E). In this analysis, however, EIA was limited to three instead of five percent, under the reasoning presented in Attachment A. All runoff from NCIA was assumed to drain to vegetated surfaces, as provided in the Draft Permit.

One goal of this exercise was to identify methods that reduce runoff production in the first place. It was hypothesized that implementation of source reduction techniques could allow all of the case study sites to infiltrate substantial proportions of the developed site runoff, advancing the hydromodification mitigation objective of the Draft Permit. When runoff is dispersed into the soil instead of being rapidly collected and conveyed away, it recharges groundwater, supplementing a resource that maintains dry season stream flow and wetlands. An increased water balance can be tapped by humans for potable, irrigation, and process water supply. Additionally, runoff volume reduction would commensurately decrease pollutant mass loadings.

Accordingly, the analysis considered the practicability of more than one scenario by which the draft permit's terms could be met, as modified to reflect three percent EIA. In one option, all roof runoff is harvested and stored for some beneficial use. A second option disperses runoff into the soil via roof downspout infiltration trenches. The former option is probably best suited to cases like the large commercial and office buildings, while distribution in the soil would fit best with residences and relatively small commercial developments. The analysis was repeated with the assumptions of harvesting OFF and COMM roof runoff for some beneficial use and dispersing roof runoff from the remaining four cases in roof downspout infiltration systems.

Expected Infiltration Capacities of the Case Study Sites

The first inquiry on this subject sought to determine how much of the total annual runoff each property is expected to infiltrate. This assessment tested the feasibility of draining all but three percent of impervious area to pervious land on the sites. Based on the findings of Chralowicz et al. (2001), it was assumed that an infiltration zone of 0.1-0.5 acres in area and 2-3 ft deep would serve a drainage catchment area in the size range 0-5 acres and infiltrate 0.9-1.9 acre-ft/year. The conclusions of Chralowicz et al. (2001) were extrapolated to conservatively assume that 0.5 acre would be required to serve each additional five acres of catchment, and would infiltrate an incremental 1.4 acre-ft/year (the midpoint of the 0.9-1.9 acre-ft/year range). According to these assumptions, the following schedule of estimates applies:

Pervious Area Available for Infiltration	Catchment Served acres	Infiltration Capacity
0.5 acres	0-5 acres	1.4 acre-ft/year
1.0 acres	5-10 acres	2.8 acre-ft/year
1.5 acres	10-15 acres	4.2 acre-ft/year
(Etc.)	...	...

As a formula, infiltration capacity ≈ 2.8 x available pervious area. To apply the formula conservatively, the available area was reduced to the next lower 0.5-acre increment before multiplying by 2.8.

As shown in Table 7, five of the six sites have adequate or greater capacity to infiltrate the full annual runoff volume from NCIA and pervious areas where EIA is limited to three percent of the total site area (four at the higher Ojai rainfall). Indeed, five of the six development types have sufficient pervious area to infiltrate *all* runoff, including runoff from EIA areas. With the most representative rainfall, only the large commercial development, with little available pervious area, falls short of the needed capacity to infiltrate all rainfall, but it still has the capacity to meet the terms of the draft permit, as modified for this analysis. These results are based on infiltrating in the native soils with no soil amendment. For any development project at which infiltration-oriented BMPs are considered, it is important that infiltration potential be carefully assessed using site-specific soils and hydrogeologic data. In the event such an investigation reveals a marginal condition (e.g., hydraulic conductivity, spacing to groundwater) for infiltration basins, soils could be enhanced to produce bioretention zones to assist infiltration. Notably, the four case studies with far greater than necessary infiltration capacity would offer substantial flexibility in designing infiltration, allowing ponding at less than 2-3 ft depth.

Table 7. Infiltration and Runoff Volume With 3 Percent EIA and All NCIA Draining to Pervious Areas

	MFR[a]	Sm-SFR[a]	REST[a]	OFF[a]	Lg-SFR[a]	COMM[a]
EIA runoff (acre-ft/year)	0.38	0.11	0.03	0.07	4.6	0.18
NCIA + pervious area runoff (acre-ft/year)	**8.63**	**1.73**	**0.47**	**0.76**	**75.0**	**5.39**
Total runoff (acre-ft/year)	9.01	1.84	0.50	0.83	79.6	5.57
Pervious area available for infiltration (acres)	3.66	1.67	0.39	1.61	72.7	0.47
Estimated infiltration capacity (acre-ft/year)[b]	**9.8**	**4.2**	**1.4**	**4.2**	**203**	**1.4**
Infiltration capacity [c]	> 100%[d]	> 100%	> 100%	> 100%	> 100%	~26% [d]

[a] MFR—multi-family residential; Sm-SFR—small-scale single-family residential; REST—restaurant; OFF—office building; Lg-SFR—large-scale single-family residential; COMM—retail commercial;
[b] Based on Chralowicz et al. (2001) according to the schedule described above
[c] Compare runoff production from NCIA + pervious area (**row 3**) with estimated infiltration capacity (**row 6**)
[d] At Ojai rainfall levels, capacity would be ~78 percent at the MFR site and ~18 percent at the COMM site.

As Table 7 shows, five of the six case study sites have the capacity to infiltrate *all* runoff produced onsite by draining impervious surfaces to pervious areas. Even runoff from the area assumed to be EIA could be infiltrated in most cases based on the amount of pervious area available in typical development projects. By showing that it is possible under normal site conditions and using native soils to retain *all* runoff in typical developments, these results demonstrate that a three percent EIA requirement, which would not demand that all runoff be retained, is feasible and practicable.

Additional Source Reduction Capabilities of the Case Study Sites: Water Harvesting Example

Infiltration is one of a wide variety of LID-based source reduction techniques. Where site conditions such as soil quality or available area limit a site's infiltration capacity, other source LID measures can enhance a site's runoff retention capability. For example, soil amendment, which improves infiltration, is a standard LID technique. Water harvesting is another. Such practices can also be used where infiltration capacity is adequate, but the developer desires greater flexibility for land use on-site. Table 8 shows the added implementation flexibility created by subtracting roof runoff by harvesting it or efficiently directing it into the soil through downspout dispersion systems, further demonstrating the feasibility of meeting the draft permit's proposed requirements, as modified to include a three percent EIA standard.

Table 8. Infiltration and Runoff Volume Reduction Analysis Including Roof Runoff Harvesting or Disposal in Infiltration Trenches (Assuming 3 Percent EIA and All NCIA Draining to Pervious Areas)

	MFR[a]	Sm-SFR[a]	REST[a]	OFF[a]	Lg-SFR[a]	COMM[a]
EIA runoff (acre-ft/year)	0.38	0.11	0.03	0.07	4.6	0.18
Roof runoff (acre-ft/year)	4.92	0.93	0.09	0.20	41	2.33
Other NCIA + pervious area runoff (acre-ft/year)	**3.71**	**0.79**	**0.39**	**0.56**	**35**	**3.06**
Total runoff (acre-ft/year)	9.01	1.84	0.50	0.83	79.6	5.57
Pervious area available for infiltration (acres)	3.66	1.67	0.39	1.61	72.7	0.47
Estimated infiltration capacity (acre-ft/year)[b]	**9.8**	**4.2**	**1.4**	**4.2**	**203**	**1.4**
Infiltration capacity [c]	> 100%	> 100%	> 100%	> 100%	> 100%	~45% [d]

[a] MFR—multi-family residential; Sm-SFR—small-scale single-family residential; REST—restaurant; OFF—office building; Lg-SFR—large-scale single-family residential; COMM—retail commercial;
[b] Based on Chralowicz et al. (2001) according to the schedule described above
[c] Comparison of runoff production from NCIA + pervious area (**row 3**) with estimated infiltration capacity (**row 6**)
[d] If the higher rainfall at Ojai is assumed, capacity would be ~32 percent of the amount needed for the COMM case.

Effect of Full LID Approach on Recharge

Table 9 (page 15) shows the recharge benefits of preventing roofs from generating runoff and infiltrating as much as possible of the runoff from the remainder of the case study sites. The data show that LID methods offer significant benefits relative to the baseline (no storm water controls) in all cases. These benefits are particularly impressive in developments with relatively high site imperviousness, such as in the MFR and COMM cases. In the latter case the full LID approach (excluding the common and effective practice of soil amendment) would cut loss of the potential water resource represented by recharge and harvesting from 86 to 37 percent.

Table 9. Comparison of Water Captured Annually (in acre-ft) from Development Sites for Beneficial Use With a Full LID Approach Compared to Development With No BMPs

	MFR[a]	Sm-SFR[a]	REST[a]	OFF[a]	Lg-SFR[a]	COMM[a]
Pre-development recharge[b] (acre-ft)	12.5	3.46	0.88	2.42	150	5.92
No BMPs:						
post-development recharge [b] (acre-ft)	4.39	1.88	0.45	1.76	82	0.80
post-development runoff (acre-ft)	8.08	1.57	0.43	0.66	68	5.12
post-development % recharge lost	65%	46%	49%	27%	45%	86%
Full LID approach:						
post-development runoff capture (acre-ft)[c]	12.5	3.46	0.88	2.42	150	3.73
post-development runoff (acre-ft)	0	0	0	0	0	2.19
post-development % recharge lost	0%	0%	0%	0%	0%	37%

[a] MFR—multi-family residential; Sm-SFR—small-scale single-family residential; REST—restaurant; OFF—office building; Lg-SFR—large-scale single-family residential; COMM—retail commercial
[b] Quantity of water infiltrating the soil; the difference between precipitation and runoff
[c] Water either entirely infiltrated in BMPs and recharged to groundwater or partially harvested from roofs and partially infiltrated in BMPs. For the first five case studies, EIA was not distinguished from the remainder of the development, because these sites have the potential to capture all runoff.

(b) Water Quality Analysis

As outlined above, it was assumed that EIA discharges, as well as runoff from all pervious surfaces, are subject to treatment control. For purposes of the analysis, treatment control was assumed to be provided by conventional sand filtration. This choice is appropriate for study purposes for two reasons. First, sand filters can be installed below grade, and land above can be put to other uses. Under the Draft Permit's approach, pervious area should be reserved for receiving NCIA drainage, and using sand filters would not draw land away from that service or other site uses. A second reason for the choice is that sand filter performance data equivalent to the data used in analyzing other conventional BMPs are available from the CalTrans (2004) work. Sand filters may or may not expose water to soil, depending on whether or not they have a hard bed. This analysis assumed a hard bed, meaning that no infiltration would occur and thus there would be no additional recharge in sand filters. Performance would be even better than shown in the analytical results if sand filters were built in earth.

Pollutant Discharge Reduction Through LID Techniques

The preceding analyses demonstrated that each of the six case studies could feasibly comply with the draft permit's requirements, as modified to include a more protective three percent EIA standard. Moreover, for five of the six case studies, *all* storm water discharges could be eliminated at least under most meteorological conditions by dispersing runoff from impervious surfaces to pervious areas. Therefore, pollutant additions to receiving waters would also be eliminated. This demonstrates not only that a lower EIA (three percent) is a feasible and practicable approach to maintaining the natural hydrology of land being developed, as discussed above, but that a lower EIA is a feasible and practicable way to eliminate the discharge of pollutants that could cause or contribute to violations of water quality standards.

While the high proportion of impervious area present on the large commercial site relative to pervious area would not allow eliminating all discharge, harvesting roof water and draining NCIA to properly-prepared pervious area would substantially decrease the volume discharged. Deployment of treatment control BMPs (e.g. sand filter treatment) could cut contaminant discharges from pollutants in the remaining volume of runoff to low levels.

Table 10 presents the pollutant reductions from the untreated case achievable through the complete LID approach described above in comparison to conventional treatments (from Table 6). Assuming EIA still discharges through sand filters, pollutant loadings from the untreated condition are expected to decrease by more than 96 percent for all but the COMM case. In that challenging case loadings would still fall by at least 89 percent for TSS and the metals and by 83 percent for total phosphorus, assuming City of Ventura rainfall levels, and slightly less assuming the higher Ojai rainfall levels. Thus, the Draft Permit's basic premise of disconnecting most impervious area, supplemented by specially managing roof water, is shown by both water quality and hydrologic results to be feasible and to afford broad and significant environmental benefits.

Table 10. Pollutant Loading Reduction Estimates With a Full LID Approach Relative to Conventional BMPs

	MFR[a]	Sm-SFR[a]	REST[a]	OFF[a]	Lg-SFR[a]	COMM[a]
Conventional TSS loading reduction[b]	15.7-69.9%	19.9-75.4%	22.0-80.6%	24.0-82.6%	19.9-75.4%	16.9-72.3%
Conventional TCu loading reduction[b]	0.0-74.4%	0.0-69.1%	0.0-78.2%	0.0-75.4%	0.0-69.1%	0.0-78.7%
Conventional TZn loading reduction[b]	22.7-78.4%	22.4-78.1%	22.9-84.3%	23.1-78.8%	22.4-78.1%	25.1-80.9%
Conventional TP loading reduction[b]	30.6-66.3%	41.5-70.7%	40.7-69.1%	45.9-76.2%	41.5-70.7%	20.3-55.0%
LID TSS loading reduction[c]	99.4%	99.3%	99.5%	99.4%	99.3%	89.0% [d]
LID TCu loading reduction[c]	98.1%	96.7%	98.0%	96.2%	96.7%	90.6% [d]
LID TZn loading reduction[c]	99.1%	98.8%	98.9%	98.3%	98.8%	94.8% [d]
LID TP loading reduction[c]	98.1%	98.6%	98.8%	98.7%	98.6%	83.1%[d]

[a] MFR—multi-family residential; Sm-SFR—small-scale single-family residential; REST—restaurant; OFF—office building; Lg-SFR—large-scale single-family residential; COMM—retail commercial; CDS— continuous deflective separation unit; EDB—extended-detention basin; NCIA—not connected impervious area; EIA—effective (connected) impervious area
[b] Range from Table 6 represented by treatment by CDS unit, EDB, biofiltration swale, or biofiltration strip
[c] Based on directing roof runoff to downspout infiltration trenches (MFR, Sm-SFR, REST, and Lg-SFR) or harvesting it (OFF and COMM), draining other NCIA to pervious areas, and treating EIA with sand filters
[d] If the higher rainfall at Ojai is assumed, reduction estimates for TSS, TCu, TZn, and TP would be 84.0, 86.3, 92.5, and 75.5 percent, respectively.

SUMMARY AND CONCLUSIONS

This paper demonstrated that common Ventura County area residential and commercial development types subject to the Municipal NPDES Permit are likely, without storm water management, to reduce groundwater recharge from the predevelopment state by approximately half in most cases to a much higher fraction with a large ratio of impervious to pervious area. With no treatment, runoff from these developments is expected to exceed CTR acute copper and zinc criteria at the point of discharge and to deliver large pollutant mass loadings to receiving waters.

Conventional soil-based BMP solutions that promote and are component parts of low-impact development approaches, by contrast, regain about 30-50 percent of the recharge lost in development without storm water management, although commercially-manufactured filtration and hydrodynamic BMPs for storm water management give no benefits in this area. It is expected the soil-based BMPs generally would release effluent that meets the acute zinc criterion at the point of discharge, although it would still exceed the copper limit. Excepting phosphorus, it was found that these BMPs would capture and prevent the movement to receiving waters of the majority of the pollutant loadings considered in the analysis.

It was found that a three percent Effective Impervious Area standard can be met in typical developments, and that by draining all site runoff to pervious areas, runoff can be eliminated entirely in most development types. This result was reached assuming the use of native soils. Soil enhancement (typically, with compost) can further advance infiltration. Draining impervious surfaces onto the loam soils typical of Ventura County, in connection with limiting directly connected impervious area to three percent of the site total area, should eliminate storm runoff from some development types and greatly reduce it from more highly impervious types. Adding roof runoff elimination to the LID approach (by harvesting or directing it to downspout infiltration trenches) should eliminate runoff from all but mostly impervious developments. Even in the development scenario involving the highest relative proportion of impervious surface, losses of rainfall capture for beneficial uses could be reduced from more than 85 to less than 40 percent, and pollutant mass loadings would fall by 83-95 percent from the untreated scenario when draining to pervious areas was supplemented with water harvesting. These results demonstrate the basic soundness of the Draft Permit's concept to limit directly connected impervious area and drain the remainder over pervious surfaces.

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ATTACHMENT A

JUSTIFICATION OF PROPOSED EFFECTIVE IMPERVIOUS AREA LIMITATION

Summary

The literature shows that adverse impacts to the physical habitat and biological integrity of receiving waters occur as a result of the conversion of natural areas to impervious cover. These effects are observed at the lowest levels of impervious cover in associated catchments (two to three percent) and are pronounced by the point that impervious cover reaches five percent. To protect biological productivity, physical habitat, and other beneficial uses, effective impervious area should be capped at no more than three percent.

I. Impacts to physical habitat of California receiving waters observed at three percent impervious cover

Stein *et al*.[7] note that while studies from parts of the country with climates more humid than California's indicate that physical degradation of stream channels can initially be detected when watershed impervious cover approaches 10%, biological effects, which may be more difficult to detect, may occur at lower levels (CWP 2003).[8] Recent studies from both northern and southern California indicate that intermittent and ephemeral streams in California are more susceptible to the effects of hydromodification than streams from other regions of the US, with stream degradation being recognized when the associated catchment's impervious cover is as little as 3-5% (Coleman *et al*. 2005).[9] Furthermore, supplemental landscape irrigation in semi-arid regions, like California, can substantially increase the frequency of erosive flows (AQUA TERRA Consultants 2004).[10]

Coleman, *et al*.[3] report that the ephemeral/intermittent streams in southern California (northwestern Los Angeles County through southern Ventura County to central Orange County) appear to be more sensitive to changes in percent impervious cover than streams in other areas. Stream channel response can be represented using an *enlargement curve*, which relates the percent of impervious cover to a change in cross-sectional area. The data for southern California streams forms a relationship very similar in shape to the enlargement curves developed for other North American streams. However, the curve for southern California streams is above the general curve for streams in other climates. This suggests that a specific enlargement ratio is produced at a lower value of impervious surface area in southern California than in other parts of North America. Specifically, the estimated threshold of response is approximately 2-3% impervious cover, as compared to 7-10% for other portions of the U.S. It is important to note that this conclusion applies specifically to streams with a catchment drainage area less than 5 square miles.

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[7] Stein, E.D., S. Zaleski, (2005) *Managing Runoff to Protect Natural Streams: The Latest Developments on Investigation and Management of Hydromodification in California*. (Proceedings of a Special Technical Workshop Co-sponsored by California Stormwater Quality Association (CASQA), Stormwater Monitoring Coalition (SMC), University of Southern California Sea Grant (USC Sea Grant), Technical Report #475).

[8] Center for Watershed Protection (CWP), (2003) *Impacts of Impervious Cover on Aquatic Systems*. Ellicott City, MD.

[9] Coleman, D., C. MacRae, and E.D. Stein, (2005) *Effect of Increases in Peak Flows and Imperviousness on the Morphology of Southern California Streams.* Southern California Coastal Water Research Project Technical Report #450, Westminster, CA.

[10] AQUA TERRA Consultants, (2004) *Urbanization and Channel Stability Assessment in the Arroyo Simi Watershed of Ventura County CA*. FINAL REPORT. Prepared for Ventura County Watershed Protection Division, Ventura CA.

This study concludes that disconnecting impervious areas from the drainage network and adjacent impervious areas is a key approach to protecting channel stability. Utilizing this strategy can make it practical to keep the effective impervious cover (*i.e.* the amount hydrologically connected to the stream) equal to or less than the identified threshold of 2-3%.

II. Impacts to biological integrity of receiving waters observed with any conversion from natural to impervious surface

Two separate studies conducted by Horner *et al*.[11,12] in the Puget Sound region (Washington State), Montgomery County, Maryland, and Austin, Texas built a database totaling more than 650 reaches on low-order streams in watersheds ranging from no urbanization and relatively little human influence (the reference state, representing "best attainable" conditions) to highly urban (>60 percent total impervious area, "TIA"). Biological health was assessed according to the benthic index of biotic integrity (B-IBI) and, in Puget Sound, the ratio of young-of-the-year coho salmon (*Oncorhynchus kisutch*), a relatively stress-intolerant fish, to cutthroat trout (*Oncorhynchus clarki*), a more stress-tolerant species. The following discussion summarizes the results and conclusions of these two studies.

There is no single cause for the decline of water resource conditions in urbanizing watersheds. Instead, it is the cumulative effects of multiple stressors that are responsible for degraded aquatic habitat and water quality. Imperviousness, while not a perfect yardstick, appears to be a useful predictor of ecological condition. However, a range of stream conditions can be associated with any given level of imperviousness. In general, only streams that retain a significant proportion of their natural vegetative land-cover <u>and</u> have very low levels of watershed imperviousness appear to retain their natural ecological integrity. It is this change in watershed land-cover that is largely responsible for the shift in hydrologic regime from a sub-surface flow dominated system to one dominated by surface runoff.

While the decline in ecological integrity is relatively continuous and is consistent for all parameters, the impact on physical conditions appears to be more pronounced earlier in the urbanization process than chemical degradation. It is generally acknowledged, based on field research and hydrologic modeling, that it is the shift in hydrologic conditions that is the driving force behind physical changes in urban stream-wetland ecosystems.

Multiple scales of impact operate within urbanizing watersheds: landscape-level impacts, including the loss of natural forest cover and the increase in impervious surface area throughout the watershed; riparian corridor-specific impacts such as encroachment, fragmentation, and loss of native vegetation; and local impacts such as water diversions, exotic vegetation, stream channelization, streambank hardening, culvert installation, and pollution from the widespread use of pesticides and herbicides. All of these stressors contribute to the overall cumulative impact.

The researchers found that there is no clear threshold of urbanization below which there exists a "no-effect" condition. Instead, there appears to be a relatively continuous decline in almost all measures of water quality or ecological integrity. Losses of integrity occur from the lowest levels of TIA and are already pronounced by the point that TIA reaches 5 percent.

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[11] Horner, R. R., C. W. May, (2002) *The Limitations of Mitigation-Based Stormwater Management in the Pacific Northwest and the Potential of a Conservation Strategy based on Low-Impact Development Principles*. (Proceedings of the American Society of Engineers Stormwater Conference, Portland, OR).

[12] Horner, R.R., E. H. Livingston, C. W. May, J. Maxted, (2006) *BMPs, Impervious Cover, and Biological Integrity of Small Streams*. (Proceedings of the Eighth Biennial Stormwater Research and Watershed Management Conference, Tampa, FL).

Similarly, the Alliance for the Chesapeake Bay[13] reports that small-watershed studies by the Maryland Department of Natural Resources Biological Stream Survey have shown that some sensitive species are affected by even low amounts of impervious cover. In one study, no brook trout were observed in any stream whose watershed had more than 2 percent impervious cover, and brook trout were rare in any watershed with more than 0.5 percent impervious cover.

III. Ventura County's watersheds include biologically-significant water bodies

The literature discussed above is relevant to the watersheds of Ventura County, which contain rivers and streams that currently or historically support a variety of beneficial uses that may be impaired by water quality degradation and stream hydromodification as a result of storm water runoff from impervious land cover. Unlike some Southern California watersheds, Ventura County still has many natural stream systems with a high degree of natural functionality.

For instance, the Ventura River watershed in northwestern Ventura County "supports a large number of sensitive aquatic species,"[14] including steelhead trout, a federally-listed endangered species. Although "local populations of steelhead and rainbow trout have nearly been eliminated along the Ventura River" itself, the California Department of Fish and Game has "recognized the potential for the restoration of the estuary and enhancement of steelhead populations in the Ventura River."[15] Steelhead may also be present in tributaries such as San Antonio Creek.[16] Thriving rainbow trout populations exist in tributaries of the Ventura River including Matilija Creek and Coyote Creek.[17] The Ventura River either does or is projected to support the following beneficial uses: warm freshwater habitat; cold freshwater habitat; wildlife habitat; rare, threatened, or endangered species; migration of aquatic organisms; and spawning and reproduction.[18] Furthermore, the Ventura River Estuary also supports commercial fishing, shellfish harvesting, and wetland habitat.[19] The Ventura River receives municipal storm drain discharges from Ojai, San Buenaventura, and unincorporated areas of Ventura County.[20]

The Santa Clara River watershed in northern Ventura County "is the largest river system in southern California that remains in a relatively natural state."[21] Sespe Creek is one of the Santa Clara's largest tributaries, and "supports significant steelhead spawning and rearing habitat."[22] Other creeks in the Santa Clara River watershed that support steelhead are Piru Creek and Santa Paula Creek. Sespe Creek and the Santa Clara River also provide spawning habitat for the Pacific lamprey. Rainbow trout populations exist in tributaries of the Santa Clara River including Sespe Creek.[23] The creeks and the Santa Clara river do or are projected to support the following beneficial uses: warm freshwater habitat; cold freshwater habitat; wildlife habitat; preservation of biological habitats rare, threatened, or endangered species; migration of aquatic organisms; and spawning and reproduction.[24] Los Padres National Forest covers much of the Santa Clara River watershed, but increasing development in floodplain areas has been

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[13] Karl Blankenship, BAY JOURNAL,"It's a hard road ahead for meeting new sprawl goal: States will try to control growth of impervious" (July/August 2004), at http://www.bayjournal.com/article.cfm?article=66.
[14] Los Angeles Region Water Quality Control Plan (1994) p. 1-18 ("Basin Plan").
[15] Basin Plan, p. 1-16; Ventura County Environmental & Energy Resources Division, "Endangered Steelhead Trout in Ventura County: Past, Present, and Future," available at http://www.wasteless.org/Eye_articles/steelhead.htm.
[16] Ventura County Environmental & Energy Resources Division, "Steelhead Spawning in Ventura County," (2005), available at http://www.wasteless.org/Eye_articles/steehead2005.html.
[17] Ventura County Environmental & Energy Resources Division, "Endangered Steelhead Trout in Ventura County: Past, Present, and Future," available at http://www.wasteless.org/Eye_articles/steelhead.htm.
[18] Basin Plan, Table 2-1.
[19] Basin Plan, Table 2-4.
[20] Ventura County Watershed Protection District, *Report of Waste Discharge* (January 2005) at p. 3.
[21] Basin Plan, p. 1-16.
[22] Basin Plan, p. 1-16.
[23] Ventura County Environmental & Energy Resources Division, "Endangered Steelhead Trout in Ventura County: Past, Present, and Future," available at http://www.wasteless.org/Eye_articles/steelhead.htm.
[24] Basin Plan, Table 2-1.

identified as a threat to the river system's water quality.[25] Furthermore, the Santa Clara estuary supports the additional beneficial uses of shellfish harvesting and wetlands habitat.[26] The Santa Clara River receives municipal storm drain discharges from Fillmore, Oxnard, San Buenaventura, Santa Paula, and unincorporated areas of Ventura County.[27]

The Calleguas Creek watershed "empties into Mugu Lagoon, one of southern California's few remaining large wetlands."[28] It supports or is projected to support the following beneficial uses: estuarine habitat; marine habitat; wildlife habitat; preservation of biological habitats; rare, threatened, or endangered species; migration of aquatic organisms; spawning and reproduction; shellfish harvesting; and wetlands habitat.[29] Historically, Calleguas Creek drained largely agricultural areas. But this watershed has been under increasing pressure from sedimentation due to increased surface flow from municipal discharges and urban wastewaters, among other sources.[30] Increasing residential developments on steep slopes has been identified as a substantial contributing factor to the problem of accelerated erosion in the watershed (and sedimentation in the Lagoon). Calleguas Creek receives municipal storm drain discharges from Camarillo, Moorpark, Simi Valley, Thousand Oaks, and unincorporated areas of Ventura County.[31]

Ventura County's coastal streams also support a variety of beneficial uses:[32]

- Little Sycamore Canyon Creek in southern Ventura County (warm freshwater habitat; wildlife habitat; rare, threatened or endangered species; and spawning and reproduction);
- Lake Casitas tributaries (warm freshwater habitat; cold freshwater habitat; wildlife habitat; rare, threatened or endangered species; spawning and reproduction; and wetland habitat);
- Javon Canyon and Padre Juan Canyon (warm freshwater habitat; cold freshwater habitat; wildlife habitat; and spawning and reproduction); and
- Los Sauces Creek in northern Ventura County (warm freshwater habitat; cold freshwater habitat; wildlife habitat; migration of aquatic species; and spawning and reproduction).

IV. Conclusion

In order to protect the biological habitat, physical integrity, and other beneficial uses of the water bodies in Ventura County, effective impervious area should be capped at no more than three percent.

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[25] Basin Plan, pp. 1-16, 1-18.
[26] Basin Plan, Table 2-4.
[27] Ventura County Watershed Protection District, *Report of Waste Discharge* (January 2005) at p. 3.
[28] Basin Plan, p. 1-18.
[29] Basin Plan, Table 2-1.
[30] Basin Plan, pp. 1-16, 1-18.
[31] Ventura County Watershed Protection District, *Report of Waste Discharge* (January 2005) at p. 3.
[32] Basin Plan, Table 2-1.

ATTACHMENT B

POLLUTANT CONCENTRATIONS FOR URBAN SOURCE AREAS (HERRERA ENVIRONMENTAL CONSULTANTS, INC. UNDATED)

Source Area	Study	Location	Sample Size (n)	TSS (mg/L)	TCu (ug/L)	TPb (ug/L)	TZn (ug/L)	TP (mg/L)	Notes
Roofs									
Residential	Steuer, et al. 1997	MI	12	36	7	25	201	0.06	2
Residential	Bannerman, et al. 1993	WI	~48	27	15	21	149	0.15	3
Residential	Waschbusch, et al. 2000	WI	25	15	n.a.	n.a.	n.a.	0.07	3
Residential	FAR 2003	NY		*19*	*20*	*21*	*312*	*0.11*	4
Residential	Gromaire, et al. 2001	France		*29*	*37*	*493*	*3422*	*n.a.*	5
Representative Residential Roof Values				**25**	**13**	**22**	**159**	**0.11**	
Commercial	Steuer, et al. 1997	MI	12	24	20	48	215	0.09	2
Commercial	Bannerman, et al. 1993	WI	~16	15	9	9	330	0.20	3
Commercial	Waschbusch, et al. 2000	WI	25	18	n.a.	n.a.	n.a.	0.13	3
Representative Commercial Roof Values				**18**	**14**	**26**	**281**	**0.14**	
Parking Areas									
Res. Driveways	Steuer, et al. 1997	MI	12	157	34	52	148	0.35	2
Res. Driveways	Bannerman, et al. 1993	WI	~32	173	17	17	107	1.16	3
Res. Driveways	Waschbusch, et al. 2000	WI	25	34	n.a.	n.a.	n.a.	0.18	3
Driveway	FAR 2003	NY		*173*	*17*		*107*	*0.56*	4
Representative Residential Driveway Values				**120**	**22**	**27**	**118**	**0.66**	
Comm./ Inst. Park. Areas	Pitt, et al. 1995	AL	16	110	116	46	110	n.a.	1
Comm. Park. Areas	Steuer, et al. 1997	MI	12	110	22	40	178	0.2	2
Com. Park. Lot	Bannerman, et al. 1993	WI	5	58	15	22	178	0.19	3
Parking Lot	Waschbusch, et al. 2000	WI	25	51	n.a.	n.a.	n.a.	0.1	3
Parking Lot	Tiefenthaler, et al. 2001	CA	5	36	28	45	293	n.a.	6
Loading Docks	Pitt, et al. 1995	AL	3	40	22	55	55	n.a.	1
Highway Rest Areas	CalTrans 2003	CA	53	*63*	*16*	*8*	*142*	*0.47*	7
Park and Ride Facilities	CalTrans 2003	CA	179	*69*	*17*	*10*	*154*	*0.33*	7
Comm./ Res. Parking	FAR 2003	NY		*27*	*51*	*28*	*139*	*0.15*	4
Representative Parking Area/Lot Values				**75**	**36**	**26**	**97**	**0.14**	

Landscaping/Lawns									
Landscaped Areas	Pitt, et al. 1995	AL	6	33	81	24	230	n.a.	1
Landscaping	FAR 2003	NY		*37*	*94*	*29*	*263*	n.a.	4
Representative Landscaping Values				**33**	**81**	**24**	**230**	**n.a.**	
Lawns - Residential	Steuer, et al. 1997	MI	12	262	n.a.	n.a.	n.a.	2.33	2
Lawns - Residential	Bannerman, et al. 1993	WI	~30	397	13	n.a.	59	2.67	3
Lawns	Waschbusch, et al. 2000	WI	25	59	n.a.	n.a.	n.a.	0.79	3
Lawns	Waschbusch, et al. 2000	WI	25	122	n.a.	n.a.	n.a.	1.61	3
Lawns - Fertilized	USGS 2002	WI	58	n.a.	n.a.	n.a.	n.a.	2.57	3
Lawns - Non-P Fertilized	USGS 2002	WI	38	n.a.	n.a.	n.a.	n.a.	1.89	3
Lawns - Unfertilized	USGS 2002	WI	19	n.a.	n.a.	n.a.	n.a.	1.73	3
Lawns	FAR 2003	NY	3	*602*	*17*	*17*	*50*	*2.1*	4
Representative Lawn Values				**213**	**13**	**n.a.**	**59**	**2.04**	

Notes:
Representative values are weighted means of collected data. Italicized values were omitted from these calculations.
1 - Grab samples from residential, commercial/institutional, and industrial rooftops. Values represent mean of DETECTED concentrations
2 - Flow-weighted composite samples, geometric mean concentrations
3 - Geometric mean concentrations
4 - Citation appears to be erroneous - original source of data is unknown. Not used to calculate representative value
5 - Median concentrations. Not used to calculate representative values due to site location and variation from other values.
6 - Mean concentrations from simulated rainfall study
7 - Mean concentrations. Not used to calculate representative values due to transportation nature of land use.

INVESTIGATION OF THE FEASIBILITY AND BENEFITS OF LOW-IMPACT SITE DESIGN PRACTICES ("LID") FOR THE SAN DIEGO REGION

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INTRODUCTION

This purpose of this study is to investigate the relative impact of three levels of storm water treatment best management practices (BMPs) on certain water quality and water reuse factors: basic "treat-and-release" BMPs (e.g., drain inlet filters, CDS units), commonly used BMPs that expose runoff to soils and vegetation (extended-detention basins and biofiltration swales and filter strips), and low-impact design (LID) practices. Low-impact methods reduce storm runoff and its contaminants by decreasing their generation at sources, infiltrating into the soil or evaporating storm flows before they can enter surface receiving waters, treating flow remaining on the surface through contact with vegetation and soil, or a combination of these strategies. Soil-based LID practices often use soil enhancements such as compost, and thus improve upon the performance of more traditional basins and biofilters. The factors considered in the investigation are runoff volume, pollutant loading, and the availability of water for infiltration or other reuse. In order to assess the differential impact of storm water reduction approaches on these factors, this study examines six case studies typical of development in the San Diego region that would require Standard Urban Stormwater Management Plans (SUSMPs).

With respect to each of the six development models, three assessments were undertaken. To establish a baseline, for each case study annual storm water runoff volumes were estimated, as well as concentrations and mass loadings of four pollutants: (1) total suspended solids (TSS), (2) total recoverable copper (TCu), (3) total recoverable zinc (TZn), and (4) total phosphorus (TP). These baseline estimates were based on the anticipated land use and cover with no storm water management efforts.

Two sets of calculations were then conducted using the parameters defined for the six case studies. The first group of calculations estimated the extent to which the basic BMPs reduce runoff volumes and pollutant concentrations and loadings, and what impact, if any, such BMPs have on recharge rates or water retention on-site. The second group of calculations estimated the extent to which commonly used soil-based BMPs and low-impact site design strategies ameliorate runoff volumes and pollutant concentrations and loadings, and the effect such techniques have on recharge rates.

The assessment of basins, biofiltration, and low-impact design practices analyzed the expected infiltration capacity of the case study sites. It also considered related LID techniques and practices, such as source reduction strategies, that work in concert with infiltration to serve the goals of: (1) preventing increase in annual runoff volume from the pre- to the post-developed state, (2) preventing increase in annual pollutant mass loadings between the two development states, and (3) avoiding exceedences of California Toxics Rule (CTR) acute saltwater criteria for copper and zinc.

The results of this analysis show that in developments implementing no post-construction BMPs, storm water runoff volume and pollutant loading are substantially increased and recharge rates are substantially decreased compared to pre-development conditions. Second, developments implementing basic post-construction treatment BMPs achieve reduced pollutant loading compared to developments with no BMPs, but storm water runoff volume and recharge rates are similar to developments with no BMPs. Third, developments implementing traditional basins and biofilters, and even more so low-impact post-construction BMPs, achieve significant reduction of pollutant loading and runoff volume as well as greatly enhanced recharge rates compared to both developments with no BMPs and developments with basic treatment BMPs.

This report covers the methods employed in the investigation, data sources, and references for both. It then presents the results, discusses their consequences, and draws conclusions, and makes recommendations relative to utilizing low-impact site design practices in SUSMPs.

CASE STUDIES

Four case studies were derived directly from building permit records for development projects in the City of San Marcos: a multi-family residential complex (MFR), a relatively small-scale (23 homes) single-family residential development (Sm-SFR), a restaurant (REST), and an office building (OFF). The records provided data on total site areas, numbers of buildings, building footprint areas (including porch and garage for Sm-SFR), and numbers of parking spaces associated with the development projects. While the building permit records made no reference to features such as roadways, walkways, and landscaping normally associated with development projects, these features were taken into account in the case studies through some reasonable assumptions, as detailed below. Larger developments were not represented in the sampling of building permits from the San Marcos database. To take larger development projects into account in the subsequent analysis, two larger scale case studies were hypothesized: a relatively large single-family residential development (Lg-SFR) and a sizeable commercial retail installation (COMM). The Lg-SFR scenario assumed 1000 homes, and scaled up all land use estimates from the Sm-SFR case in the ratio of 1000:23. The hypothetical COMM scenario consisted of a building with a 2-acre footprint and 500 parking spaces. As with the smaller-scale cases, these hypothetical developments were assumed to have roadways, walkways, and landscaping, which were also handled as follows.

Parking spaces were estimated to be 176 sq ft in area, which corresponds to 8 ft width by 22 ft length dimensions. Code requirements vary by jurisdiction, with the tendency now to drop below the traditional 200 sq ft average. About 180 sq ft is common, but various standards for full- and compact-car spaces, and for the mix of the two, can raise or lower the average (http://nemo.uconn.edu/publications/tech_papers/tech_paper_5.pdf). The 176 sq ft size is considered to be a reasonable value for conventional practice.

Roadways and walkways assume a wide variety of patterns, of course. Exclusive of the two SFR cases, simple, square parking lots with roadways around the four sides and square buildings with walkways also around the four sides were assumed. Roadways and walkways were taken to be 20 ft and 6 ft wide, respectively.

Single-family residences were assumed each to have a driveway 20 ft wide and 30 ft long. It was further assumed that each would have a sidewalk along the front of the lot, which was calculated to be 5749 sq ft in area. Assuming a square lot, the front dimension would be 76 ft. A 40-ft walkway was included within the property. Sidewalks and walkways were taken to be 4 ft wide.

Exclusive of the COMM case, the total area for all of these impervious features was subtracted from the total site area to estimate the pervious area, which was assumed to have conventional landscaping cover (grass, small herbaceous decorative plants, bushes, and a few trees). For the hypothetical COMM scenario, the hypothetical total impervious cover was enlarged by 10 percent to represent the landscaping, on the belief that a typical retail commercial establishment would typically be mostly impervious.

Table 1 summarizes the characteristics of the six case studies. The table also provides the recorded or estimated areas in each land use and cover type.

Table 1. Case Study Characteristics and Land Use and Land Cover Areas

	MFR[a]	Sm-SFR[a]	REST[a]	OFF[a]	Lg-SFR[a]	COMM[a]
San Marcos permit nos.	24718	30315-30337	31515	35339	Hypoth.	Hypoth.
San Marcos permit date	3/5/04	3/5/04	3/11/04	5/16/06	-	-
No. of buildings	11	23	1	1	1000	1
Total area (ft^2)	476982	132227	33669	92612	5749000	226529
Roof area (ft^2)	184338	34949	3220	7500	1519522	87120
Parking spaces	438	-	33	37	-	500
Parking area (ft^2)	77088	-	5808	6512	-	88000
Access road area (ft^2)	22212	-	6097	6456	-	23732
Walkway area (ft^2)	33960	10656	1362	2078	463289	7084
Driveway area (ft^2)	-	13800	-	-	600000	-
Landscape area (ft^2)	159384	72822	17182	70066	3166190	20594

[a] MFR—multi-family residential; Sm-SFR—small-scale single-family residential; REST—restaurant; OFF—office building; Lg-SFR—large-scale single-family residential; COMM—retail commercial

METHODS OF ANALYSIS

Annual Storm Water Runoff Volumes

For each case study site the annual surface runoff volumes produced were estimated for both pre- and post-development conditions. Runoff volume was computed as the product of annual precipitation, contributing drainage area, and a runoff coefficient (ratio of runoff produced to rainfall received). For impervious areas the following equation was used: $C = 0.009\ I + 0.05$, where I is the impervious percentage. This equation was derived by Schueler (1987) from Nationwide Urban Runoff Program data (U.S. Environmental Protection Agency 1983). With I = 100 percent for fully impervious surfaces, C is 0.95.

The basis for pervious area runoff coefficients was the Natural Resource Conservation Service's (NRCS) Urban Hydrology for Small Watersheds (NRCS 1986, as revised from the original 1975 edition). This model estimates storm event runoff as a function of precipitation and a variable representing land cover and soil, termed the curve number (CN). Larger events are forecast to produce a greater amount of runoff in relation to amount of rainfall because they more fully saturate the soil. Therefore, use of the model to estimate annual runoff requires selecting some event or group of events to represent the year. Jurisdictions under the San Diego municipal storm water permit generally perform water quality analyses with respect to the 85th percentile rainfall quantity (the 85th percentile rainfall is the amount exceeding the precipitation in 85 percent of all events over time). That event was used in the analysis here for the relative comparison between pre- and post-development and applied to deriving a runoff coefficient for annual estimates, recognizing that smaller storms would produce less and larger storms more runoff. This meteorological statistic for San Marcos is 0.75 inch of rainfall (http://www.co.san-diego.ca.us/dpw/watersheds/pubs/susmp_85precip.pdf).

To select CN for the pre-development case, an analysis performed in the area of the Cedar Fire in San Diego was used in which CN was determined before and after the 2003 fire (http://www.ufei.org/files/pubs/SanDiegoUrbanEcosystemAnalysis-PostCedarFire.pdf). Here, CN = 83 was estimated for the pre-existing land cover, which was generally chaparral. For post-development landscaping, CN = 86 was selected based on tabulated data in NRCS (1986) and professional judgment.

Pre- and post-development runoff quantities were computed with these CN values and the 85th percentile rainfall, and then divided by the rainfall to obtain runoff coefficients. The results were 0.07 and 0.12, respectively. Finally, total annual runoff volumes were estimated based on an average annual precipitation of 10.26 inches (http://www.wrcc.dri.edu/cgi-bin/cliMONtpre.pl?casand).

Storm Water Runoff Pollutant Discharges

Annual pollutant mass discharges were estimated as the product of annual runoff volumes produced by the various land use and cover types and pollutant concentrations typical of those areas. Again, the 85th percentile precipitation event was used as a basis for volumes. Storm water pollutant data have typically been measured and reported for general land use types (e.g., single-family residential, commercial). However, an investigation of low-impact site design of the type this study sought to conduct demands data on specific land coverages. The literature offers few data on this basis. Those available and used herein were assembled by a consultant to the City of Seattle for a project in which the author participated. They appear in Attachment A (Herrera Environmental Consultants, Inc. undated).

Pollutant concentrations expected to occur typically in the mixed runoff from the several land use and cover types making up a development were estimated by mass balance; i.e., the concentrations from the different areas of the sites were combined in proportion to their contribution to the total runoff.

The Effect of Conventional Treatment BMPs on Runoff Volume, Pollutant Discharges, and Recharge Rates

The first question in analyzing how BMPs reduce runoff volumes and pollutant discharges was, What BMPs are being employed in San Diego SUSMPs? The currently applicable SUSMP program associated with the San Diego County MS4 permit provides regulated entities with a large number of choices. These options include manufactured BMPs, such as drain inlet inserts (DIIs) and continuous deflective separation (CDS) units. Developments may also select such non-proprietary devices as extended-detention basins (EDBs) and biofiltration swales and filter strips. EDBs hold water for two to three days for solids settlement before releasing whatever does not infiltrate or evaporate. Biofiltration treats runoff through various processes mediated by vegetation and soil. In a swale, runoff flows at some depth in a channel, whereas a filter strip is a broad surface over which water sheet flows. Each of these BMP types was applied to each case study.

The principal basis for the analysis of BMP performance was the California Department of Transportation's BMP Retrofit Pilot Program (Caltrans, 2004), performed in San Diego and Los Angeles Counties. One important result of the program was that BMPs with a natural surface infiltrate and evaporate (probably, mostly infiltrate) a substantial amount of runoff, even if conditions do not appear to be favorable for an infiltration basin. On average, the EDBs, swales, and filter strips respectively lost 40, 50 and 30 percent of the entering flow before the discharge point. DIIs and CDS units do not contact runoff with a natural surface, and therefore do not reduce runoff volume.

The Caltrans program further determined that BMP effluent concentrations were usually a function of the influent concentrations and developed equations for the functional relationships in these cases. BMPs generally reduced influent concentrations proportionately more when they were high. In a relatively few situations influent concentrations were constant at an "irreducible minimum" level regardless of inflow concentrations.

In analyzing the effects of BMPs on the case study sites' runoff, the first step was to reduce the runoff volumes estimated with no BMPs by the fractions observed to be lost in the pilot study. The next task was estimating the effluent concentrations from the relationships in the Caltrans report. The final step was calculating discharge pollutant loadings as the product of the reduced volumes and predicted effluent concentrations. As before, typical pollutant concentrations in the mixed runoff were established by mass balance.

Estimating Infiltration Capacity of the Case Study Sites

Infiltrating sufficient runoff to maintain pre-development hydrologic characteristics and prevent pollutant transport is the most effective way to protect surface receiving waters. Successfully applying infiltration requires soils and hydrogeological conditions that will pass water sufficiently rapidly to avoid overly lengthy ponding, while not allowing percolating water to reach groundwater before the soil column captures pollutants.

The study assumed that infiltration would occur in surface facilities and not in below-ground trenches. The use of trenches is certainly possible, and was judged to be an approved BMP by Caltrans after the pilot study. However, the intent of the investigation was to determine the ability of pervious areas to manage the site runoff. It determined what contribution these areas could make in their original condition, and then assessed how they could serve further if soils were modified using a low-impact site design technique.

The chief basis for this aspect of the work was an assessment of infiltration capacity and benefits for Los Angeles' San Fernando Valley (Chralowicz et al. 2001). The Chralowicz study posited providing 0.1-0.5 acre for infiltration basins to serve 5 acres of contributing drainage area. At 2-3 ft deep, it was estimated that such basins could infiltrate 0.90-1.87 acre-ft/year of runoff in San Fernando Valley conditions. Soils there are generally various loam textures with infiltration rates of approximately 0.5-2.0 inches/hour. Soils are similar in the San Marcos area (http://websoilsurvey.nrcs.usda.gov/app), thus making the conclusions of this study applicable for these purposes. This information was used to estimate how much of each case study site's annual runoff would be infiltratable and if the pervious portion would provide sufficient area.

Volume and Pollutant Source Reduction Strategies

As pointed out earlier, the essence of low-impact site design is reducing runoff problems before they can develop, at their sources, or exploiting the infiltration and treatment abilities of soils and vegetation. If these abilities are not adequate to preserve pre-development hydrology and prevent runoff from causing or contributing to violations of water quality standards, then the choice is to practice source reduction, upgrade infiltration and treatment capabilities, or both.

Soils can be upgraded to store runoff until it can infiltrate, evaporate, or transpire from plants through compost addition, a standard low-impact site design technique. Bioretention cells with these upgraded soils can be built to hold runoff and effect its

transfer to the subsurface zone, another standard low-impact tool. Of course, the space needed must be available to do so. This phase of the analysis determined for the case study sites if that space would indeed be available, assuming the soils and vegetation could be built up to use it effectively.

Source reduction can be accomplished through low-impact site design in various ways. Conventional pavements can be converted to porous asphalt or concrete or replaced with concrete or plastic unit pavers or grid systems. Of course, the soils must be capable of infiltrating the runoff passing through and may require renovation of the same type as discussed for bioretention. Water can also be "harvested," that is, captured and stored for reuse in irrigation or gray water systems. Many successful systems of this type are in operation, for example Natural Resources Defense Council offices, Santa Monica, CA; King County Administration Building, Seattle, WA; two buildings on the Portland State University campus, Portland, OR. Harvesting is a standard technique for Leadership in Energy and Environmental Design (LEED) buildings (http://www.poweryourdesign.com/LEEDGuide.pdf). Runoff from roofs and parking lots can be harvested, with the former being somewhat easier because of the possibility of avoiding pumping to use the water and fewer pollutants. The investigation concluded by determining how harvesting could contribute to storm water management for case study sites where infiltration capacity, available space, or both appeared to be limited.

RESULTS OF THE ANALYSIS

1. "Base Case" Analysis: Development Without Traditional BMP or LID Approaches

Comparison of Pre- and Post-Development Runoff Volumes

Table 2 presents a comparison between the estimated runoff volumes generated by the respective case study sites in the pre- and post-development conditions, assuming implementation of no BMPs on the developed sites. On sites dominated by impervious land cover, most of the infiltration that would recharge groundwater in the undeveloped state is expected to be lost to surface runoff after development. This greatly increased surface flow would raise peak flow rates and volumes in receiving water courses, raise flooding risk, and transport pollutants. Only the office building, the plan for which retained substantial pervious area, would not lose half or more of the pre-development recharge.

Table 2. Pre- and Post-Development Without BMPs: Distribution of Surface Runoff Versus Recharge to Groundwater

Annual Volume (acre-ft)	MFR[a]	Sm-SFR[a]	REST[a]	OFF[a]	Lg-SFR[a]	COMM[a]
Precipitation[b]	9.35	2.59	0.66	1.82	113	4.44
Pre-development runoff[c]	0.65	0.18	0.05	0.13	8	0.31
Pre-development recharge[d]	8.69	2.41	0.61	1.69	105	4.13
Post-development impervious runoff[c]	5.91	1.11	0.31	0.42	48	3.83
Post-development pervious runoff[c]	0.37	0.17	0.04	0.16	7	0.05
Post-development total runoff[c]	6.29	1.28	0.35	0.58	56	3.88
Post-development recharge[d]	3.06	1.31	0.31	1.23	57	0.56
Post-development recharge loss (% of pre-development recharge)	5.63 (65%)	1.10 (46%)	0.30 (49%)	0.46 (27%)	48 (46%)	3.57 (86%)

[a] MFR—multi-family residential; Sm-SFR—small-scale single-family residential; REST—restaurant; OFF—office building; Lg-SFR—large-scale single-family residential; COMM—retail commercial
[b] Volume of precipitation on total project area
[c] Quantity of water discharged from the site on the surface
[d] Quantity of water infiltrating the soil; the difference between precipitation and runoff

Pollutant Concentrations and Loadings

Table 3 presents the pollutant concentrations from the literature and loadings calculated as described for the various land use and cover types represented by the case studies. Landscaped areas are expected to release the highest TSS concentration, although relatively low TSS mass loading because of the low runoff coefficient. The highest copper concentrations and loadings are expected from parking lots. Roofs, especially commercial roofs, top the list for both zinc concentrations and loadings. Landscaping would issue by far the highest phosphorus, although access roads and driveways would contribute the highest mass loadings.

Table 3. Pollutant Concentration and Loading for Case Study Land Use and Cover Types

	Concentrations					Loadings		
Land Use	TSS (mg/L)	TCu (mg/L)	TZn (mg/L)	TP (mg/L)	Lbs. TSS/ acre-year	Lbs. TCu/ acre-year	Lbs. TZn/ acre-year	Lbs. TP/ acre-year
Residential roof	25	0.013	0.159	0.11	55	0.029	0.350	0.242
Commercial roof	18	0.014	0.281	0.14	40	0.031	0.619	0.309
Access road/driveway	120	0.022	0.118	0.66	264	0.048	0.260	1.455
Parking	75	0.036	0.097	0.14	165	0.079	0.214	0.309
Walkway	25	0.013	0.059	0.11	55	0.029	0.130	0.242
Landscaping	213	0.013	0.059	2.04	59	0.004	0.016	0.568

The CTR acute criteria for copper and zinc are 0.0048 mg/L and 0.090 mg/L, respectively. It may be seen in Table 3 that all developed land uses are expected to discharge copper above the criterion, based on the mass balance calculations using concentrations from Table 3. Any surface release from the case study sites would violate the criterion at the point of discharge, although dilution by the receiving water would lower the concentration below the criterion at some point. Even if copper mass loadings are reduced by BMPs, any surface discharge would exceed the criterion initially, but it would be easier to dilute below that level. In contrast, runoff from some land covers would not violate the acute zinc criterion. Because of this difference, the evaluation considered whether or not the zinc criterion would be exceeded in each analysis, whereas there was no point in this analysis for copper. There are no equivalent water quality criteria for TSS and TP; hence, their concentrations were not further analyzed in the different scenarios.

Table 4 follows with the overall loadings, as well as zinc concentrations, expected to be delivered from the case study developments should they not be fitted with any BMPs. As Table 4 shows, all cases are forecast to exceed the 0.090 mg/L acute zinc criterion, and the retail commercial development does so by a wide margin. Because of its size, the large residential development dominates the mass loading emissions.

Table 4. Case Study Pollutant Concentration and Loading Estimates Without BMPs

	MFR[a]	Sm-SFR[a]	REST[a]	OFF[a]	Lg-SFR[a]	COMM[a]
TZn (mg/L)	0.127	0.123	0.128	0.133	0.123	0.175
Lbs. TSS/year	920	241	87	169	10461	594
Lbs. TCu/year	0.32	0.051	0.022	0.032	2.24	0.25
Lbs. TZn/year	2.16	0.423	0.121	0.210	18.38	1.84
Lbs. TP/year	4.58	1.66	0.50	1.24	72.35	2.34

[a] MFR—multi-family residential; Sm-SFR—small-scale single-family residential; REST—restaurant; OFF—office building; Lg-SFR—large-scale single-family residential; COMM—retail commercial

2. "Traditional SUSMP" Analysis: Effects of Basic Treatment BMPs

Post-Development Runoff Volumes

The current SUSMP program permits regulated parties to select from a range of BMPs in order to treat or infiltrate a given quantity of annual rainfall. According to Regional Board staff and third party reviews of the program (Tetra Tech, Inc. 2005), a wide variety of BMPs are selected. Many projects rely on drain inlet inserts, CDS units, and similar manufactured BMPs. Regulated entities currently can select these or other "treat-and-release" techniques in order to satisfy the current San Diego County MS4 Permit. As a category, such treatment BMPs do not permit any collected runoff contact with soils. Therefore, they discharge as much storm water runoff as equivalent sites with no BMPs, and afford zero savings in recharge.

Effects of BMPs on Pollutant Discharges

Table 5 presents estimates of zinc effluent concentrations and mass loadings of the various pollutants discharged from four types of conventional treatment BMPs. The "basic" BMPs in this table, the CDS units, are not expected to drop any of the concentrations sufficiently to meet the acute zinc criterion at the discharge point. The loading reduction results show the CDS unit always performing below 50 percent and most often in the vicinity of 20 percent, with zero copper reduction.

The Caltrans study (2004) produced less data on drain inlet insert performance. These devices were found to reduce pollutant mass loadings by the following amounts (average of the performance of two models): TSS—8.5 percent, TCu—1.0 percent, and TZn—1.5 percent.

3. LID Analysis: Relative Effect of Conventional Soil-Based BMPs and Low-Impact Development Approaches

Annual surface runoff and recharge predicted to occur with the three soil-based BMP types commonly employed in California were estimated. An assumption was full service of all portions of the case study sites with one of these practices. Although the analysis assumed use of one or another of the BMP types throughout each site, a project designer could elect to use more than one BMP to serve different portions. Table 6 gives the estimates, along with the savings in recharge afforded by the LID site design techniques relative to a condition with no BMPs. The percentages of savings exactly reflect the degree of infiltration observed in the Caltrans pilot study: 40, 50, and 30 percent, respectively, for EDBs, swales, and filter strips.

Table 5. Case Study Pollutant Concentration and Loading Estimates With BMPs

	MFR[a]	Sm-SFR[a]	REST[a]	OFF[a]	Lg-SFR[a]	COMM[a]
Effluent Concentrations:						
CDS TZn (mg/L)[a]	0.095	0.095	0.098	0.102	0.095	0.131
EDB TZn (mg/L)[a]	0.085	0.086	0.084	0.084	0.086	0.098
Swale TZn (mg/L)	0.055	0.054	0.055	0.056	0.054	0.068
Filter strip TZn (mg/L)	0.039	0.039	0.039	0.041	0.039	0.048
Loading Reductions:						
CDS TSS loading reduction	15.7%	19.9%	22.0%	24.0%	19.9%	16.9%
CDS TCu loading reduction	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
CDS TZn loading reduction	22.7%	22.4%	22.9%	23.1%	22.4%	25.1%
CDS TP loading reduction	30.6%	41.5%	40.7%	45.9%	41.5%	20.3%
EDB TSS loading reduction	68.1%	73.7%	79.0%	81.1%	73.7%	71.7%
EDB TCu loading reduction	61.9%	55.7%	66.2%	63.0%	55.7%	66.8%
EDB TZn loading reduction	59.7%	59.6%	60.4%	61.9%	59.6%	66.6%
EDB TP loading reduction	61.9%	69.7%	69.1%	72.9%	69.7%	54.5%
Swale TSS loading reduction	68.8%	71.1%	73.1%	73.9%	71.1%	69.4%
Swale TCu loading reduction	72.5%	68.5%	78.2%	73.3%	68.5%	75.8%
Swale TZn loading reduction	78.4%	78.1%	84.3%	78.8%	78.1%	80.7%
Swale TP loading reduction	66.3%	70.7%	67.2%	76.2%	70.7%	55.0%
Filter strip TSS loading reduction	69.9%	75.4%	80.6%	82.6%	75.4%	72.3%
Filter strip TCu loading reduction	74.4%	69.1%	78.2%	75.4%	69.1%	78.7%
Filter strip TZn loading reduction	78.3%	77.9%	78.4%	78.7%	77.9%	80.9%
Filter strip TP loading reduction	48.4%	53.1%	63.7%	59.8%	53.1%	34.6%

[a] MFR—multi-family residential; Sm-SFR—small-scale single-family residential; REST—restaurant; OFF—office building; Lg-SFR—large-scale single-family residential; COMM—retail commercial
CDS— continuous deflective separation unit; EDB—extended-detention basin

Effects of BMPs on Pollutant Discharges

Table 5 presents estimates of zinc effluent concentrations and mass loadings of the various pollutants discharged from the EDBs, swales, and filter strips. Effluents from each case study site are expected to fall below the CTR acute zinc criterion if treated with swales or filter strips. All but the large commercial site would meet the criterion with EDB treatment. These infiltration-oriented BMPs, swales, filters, and EDBs, if fully implemented and well maintained, are predicted to prevent the majority of the pollutant masses generated on most of the development sites from reaching a receiving water. Only total phosphorus reduction falls below 50 percent for two case studies. Mass loading reductions range above 80 percent for the EDB, swale, and filter strip.

Table 6. Distribution of Surface Runoff Versus Recharge to Groundwater With BMPs

Annual Volume (acre-ft)	MFR[a]	Sm-SFR[a]	REST[a]	OFF[a]	Lg-SFR[a]	COMM[a]
Total runoff with EDBs[a, b]	3.77	0.77	0.21	0.35	33	2.33
Recharge with EDBs [c]	5.58	1.83	0.45	1.46	79	2.11
Recharge savings with EDBs[d]	2.52	0.51	0.14	0.23	22	1.55
Total runoff with swales[b]	3.14	0.64	0.17	0.29	28	1.94
Recharge with swales[c]	6.20	1.95	0.49	1.52	85	2.50
Recharge savings with swales[d]	3.14	0.64	0.17	0.29	28	1.94
Total runoff with filter strips[b]	4.40	0.89	0.24	0.41	39	2.72
Recharge with filter strips[c]	4.95	1.70	0.42	1.41	74	1.72
Recharge savings with filter strips[d]	1.89	0.38	0.10	0.18	17	1.16

[a] MFR—multi-family residential; Sm-SFR—small-scale single-family residential; REST—restaurant; OFF—office building; Lg-SFR—large-scale single-family residential; COMM—retail commercial; EDBs—extended-detention basins
[b] Quantity of water discharged from the site on the surface
[c] Quantity of water infiltrating the soil; the difference between precipitation and runoff
[d] Difference between recharge with and without BMP (the latter from Table 2)

Expected Infiltration Capacities of the Case Study Sites

Table 7 summarizes the results of the infiltration analysis. The first inquiry on this subject sought to determine how much of the total annual runoff each property is expected to infiltrate. Based on the findings of Chralowicz et al. (2001), it was assumed that a site in the size range 0-5 acres could infiltrate 0.9-1.9 acre-ft/year with an infiltration device of feasible size, one in the range 5-10 acres could recharge 1.8-3.8 acre-ft/year, etc. As shown in the table, three of the six sites should be able to infiltrate the full annual runoff volume. The remainder could recharge to the ground about half or somewhat more of the annual production. These figures pertain to infiltrating in the native soils, with no soil improvements through composting such as often performed in low-impact site design.

Next, it was sought to determine whether the sites, as planned, have sufficient pervious area for surface infiltration facilities. Again, the results of Chralowicz et al. (2001) were used, and it was assumed that infiltration would take 0.1-0.5 acres on a site of 0-5 acres total area, 0.2-1.0 acres on a 5-10 acre property, etc. A site low in the range would likely need a smaller infiltration area than one higher in the size range. Five of the six case study sites clearly have more pervious area than required for infiltration facilities. The commercial retail development was the only development project that came close to lacking sufficient pervious area.

Table 7. Summary of Infiltration Analysis

	MFR[a]	Sm-SFR[a]	REST[a]	OFF[a]	Lg-SFR[a]	COMM[a]
Total annual runoff (acre-ft)	6.29	1.28	0.35	0.58	56	3.88
Project area (acres)	11.0	3.0	0.8	2.1	132	5.2
Infiltration capacity (acre-ft)	2.7-5.7	0.9-1.9	0.9-1.9	0.9-1.9	24-51	1.8-3.8
Infiltration assessment	~Half+	All	All	All	~Half+	~Half+
Infiltration area needed (acres)	0.3-1.5	0.1-0.5	0.1-0.5	0.1-0.5	2.7-14	0.2-1.0
Pervious area available (acres)	3.7	1.7	0.4	1.6	72.7	0.5
Adequate area?	Yes	Yes	Yes	Yes	Yes	Maybe

[a] MFR—multi-family residential; Sm-SFR—small-scale single-family residential; REST—restaurant; OFF—office building; Lg-SFR—large-scale single-family residential; COMM—retail commercial

As Table 7 shows, the case study sites offer considerable promise to manage storm water by infiltration. For any development project at which infiltration-oriented BMPs are

considered, it is important that infiltration potential be carefully assessed using site-specific soils and hydrogeologic data. In the event such an investigation reveals a marginal condition (e.g., hydraulic conductivity, spacing to groundwater) for infiltration basins, soils could be enhanced to produce bioretention zones to assist infiltration.

Volume and Pollutant Source Reduction Through Low-Impact Site Design

The preceding analysis showed that half the sites potentially could infiltrate all runoff produced in an average year, and also have the land to do so. The other three could recharge half or more of the runoff, and at least two have adequate land. One goal of this exercise was to identify alternatives that would reduce runoff production in the first place. It was hypothesized that implementation of source reduction techniques could allow all of the case study sites to infiltrate all of the remaining runoff. Additionally, runoff volume reduction would commensurately decrease pollutant mass loadings.

This analysis considered scenarios in which all roof runoff is either harvested and stored for some beneficial use or is spread over lawns or into the soil via roof downspout infiltration trenches. The former option is probably best suited to cases like the retail and office buildings, while distribution on or in the soil would fit best with residences and relatively small commercial developments like the restaurant. Table 8 shows the consequences of preventing roofs from generating runoff.

With the subtraction of roof runoff, all sites have the capacity to infiltrate all of the annual runoff volume. Comparison of the third and last rows of the table indicates the significant role of roof runoff, especially in the residential cases. With roof runoff included, the only case that was doubtful in having enough pervious area for full infiltration was the commercial case study site. Harvesting runoff from its 2-acre roof brings it into the situation of having sufficient land. These results show that a combination of roof runoff source reduction and land treatment of the remaining runoff for maximum infiltration appears to be an entirely feasible plan to manage storm water from a range of typical San Diego area developments.

Table 8. Summary of Roof Runoff Source Reduction Analysis

	MFR[a]	Sm-SFR[a]	REST[a]	OFF[a]	Lg-SFR[a]	COMM[a]
Annual impervious (minus roof) runoff (acre-ft)	2.48	0.46	0.25	0.28	19.8	2.21
Annual pervious runoff (acre-ft)	0.37	0.17	0.04	0.16	7.5	0.05
Total annual runoff (minus roof) (acre-ft)	2.85	0.63	0.29	0.44	27.3	2.26
Project area (acres)	11.0	3.04	0.77	2.13	132	5.20
Infiltration capacity (acre-ft)	2.7-5.7	0.9-1.9	0.9-1.9	0.9-1.9	24-51	1.8-3.8
Infiltration assessment	All	All	All	All	All	All
Total annual runoff (with roof) (acre-ft)	6.29	1.28	0.35	0.58	56	3.88

[a] MFR—multi-family residential; Sm-SFR—small-scale single-family residential; REST—restaurant; OFF—office building; Lg-SFR—large-scale single-family residential; COMM—retail commercial

Table 9 summarizes the water retention and reuse benefits of the full LID approach involving infiltration by design, supplemented by harvesting from roofs in the MFR, Lg-SFR, and COMM cases. Infiltration contributes to the groundwater resource, while harvesting captures water for use in such applications as irrigation and gray water distribution systems. LID methods offer significant benefits relative to no BMPs in all cases. These benefits are particularly impressive with relatively high site imperviousness, such as in the MFR and COMM cases.

Table 9. Comparison of Water Captured Annually (in acre-ft) from Development Sites for Beneficial Use With a Full LID Approach Compared to Development Without Any BMPs

Water Capture	MFR[a]	Sm-SFR[a]	REST[a]	OFF[a]	Lg-SFR[a]	COMM[a]
Without BMPs[b]	3.06	1.31	0.31	1.23	57	0.56
With full LID approach[c]	9.35	2.59	0.66	1.82	113	4.44
LID benefit[d]	6.29	1.28	0.35	0.58	56	3.88

[a] MFR—multi-family residential; Sm-SFR—small-scale single-family residential; REST—restaurant; OFF—office building; Lg-SFR—large-scale single-family residential; COMM—retail commercial
[b] Water incidentally infiltrated on pervious areas remaining on the development site and recharged to groundwater
[c] Water either entirely infiltrated in BMPs and recharged to groundwater or partially harvested from roofs and partially infiltrated in BMPs
[d] Water capture for which LID approaches are directly responsible; the difference between capture with the full LID approach and without BMPs

SUMMARY AND CONCLUSIONS

This paper demonstrated that common San Diego area residential and commercial development types subject to SUSMPs are likely, without storm water management, to reduce groundwater recharge from the predevelopment state by approximately half in most cases to a much higher fraction with a large ratio of impervious to pervious area. With no treatment, runoff from these developments is expected to exceed CTR acute copper and zinc criteria at the point of discharge and to deliver large pollutant mass loadings to receiving waters.

Many San Diego SUSMP projects have been getting mostly traditional commercially manufactured filtration and hydrodynamic BMPs for storm water management. Such BMPs are included in the SUSMP menu of options currently, and they do have some beneficial impact on runoff quality compared to development without BMPs. However, they are not optimal solutions. These devices do not stem the loss of groundwater recharge, still allow zinc as well as copper water quality criteria violations from all development types analyzed, and capture relatively small fractions of the pollutant mass loadings produced in urban areas.

Conventional soil-based BMP solutions that promote and are component parts of low-impact development approaches, by contrast, regain 30-50 percent of the recharge lost in development without storm water management. It is expected they generally would release effluent that meets the acute zinc criterion at the point of discharge, although it would still exceed the copper limit. Excepting phosphorus, it was found that these BMPs would capture and prevent the movement to receiving waters of the majority of the pollutant loadings considered in the analysis.

It was found that the loam soils typical of the San Marcos area, where the case studies were set, should infiltrate at least half of all the runoff produced in an average year, and all of it for some development types and site designs. Soil enhancement (typically, with

compost) can advance infiltration and lower its risk of failure. Using additive LID approaches, including specifically subtracting the roof runoff by harvesting it for reuse or distributing it in the soil with infiltration trenches, reduces overall runoff sufficiently to conclude that all development examples assessed could infiltrate their surface runoff production.

RECOMMENDATIONS

Low-impact site design techniques emphasize runoff volume and pollutant reduction at their sources and management of runoff and pollutants through vegetation and soil treatment. This type of treatment can infiltrate and evaporate much or even all of the runoff produced in design events. This report shows low-impact site design techniques to be capable of regaining the groundwater recharge lost in development to a greater extent than conventional BMPs. At the same time LID techniques substantially preserve pre-development hydrologic conditions and prevent most or all pollutant transport to receiving waters.

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ATTACHMENT A

Pollutant Concentrations for Urban Source Areas (Herrera Environmental Consultants, Inc. undated)

Source Area	Study	Location	Sample Size (n)	TSS (mg/L)	TCu (ug/L)	TPb (ug/L)	TZn (ug/L)	TP (mg/L)	Notes
Roofs									
Residential	Steuer, et al. 1997	MI	12	36	7	25	201	0.06	2
Residential	Bannerman, et al. 1993	WI	~48	27	15	21	149	0.15	3
Residential	Waschbusch, et al. 2000	WI	25	15	n.a.	n.a.	n.a.	0.07	3
Residential	FAR 2003	NY		*19*	*20*	*21*	*312*	*0.11*	4
Residential	Gromaire, et al. 2001	France		*29*	*37*	*493*	*3422*	*n.a.*	5
Representative Residential Roof Values				**25**	**13**	**22**	**159**	**0.11**	
Commercial	Steuer, et al. 1997	MI	12	24	20	48	215	0.09	2
Commercial	Bannerman, et al. 1993	WI	~16	15	9	9	330	0.20	3
Commercial	Waschbusch, et al. 2000	WI	25	18	n.a.	n.a.	n.a.	0.13	3
Representative Commercial Roof Values				**18**	**14**	**26**	**281**	**0.14**	
Parking Areas									
Res. Driveways	Steuer, et al. 1997	MI	12	157	34	52	148	0.35	2
Res. Driveways	Bannerman, et al. 1993	WI	~32	173	17	17	107	1.16	3
Res. Driveways	Waschbusch, et al. 2000	WI	25	34	n.a.	n.a.	n.a.	0.18	3
Driveway	FAR 2003	NY		*173*	*17*		*107*	*0.56*	4
Representative Residential Driveway Values				**120**	**22**	**27**	**118**	**0.66**	
Comm./ Inst. Park. Areas	Pitt, et al. 1995	AL	16	110	116	46	110	n.a.	1
Comm. Park. Areas	Steuer, et al. 1997	MI	12	110	22	40	178	0.2	2
Com. Park. Lot	Bannerman, et al. 1993	WI	5	58	15	22	178	0.19	3
Parking Lot	Waschbusch, et al. 2000	WI	25	51	n.a.	n.a.	n.a.	0.1	3
Parking Lot	Tiefenthaler, et al. 2001	CA	5	36	28	45	293	n.a.	6
Loading Docks	Pitt, et al. 1995	AL	3	40	22	55	55	n.a.	1
Highway Rest Areas	CalTrans 2003	CA	53	*63*	*16*	*8*	*142*	*0.47*	7
Park and Ride Facilities	CalTrans 2003	CA	179	*69*	*17*	*10*	*154*	*0.33*	7

Comm./ Res. Parking	FAR 2003	NY		*27*	*51*	*28*	*139*	*0.15*	4
Representative Parking Area/Lot Values				**75**	**36**	**26**	**97**	**0.14**	
Landscaping/Lawns									
Landscaped Areas	Pitt, et al. 1995	AL	6	33	81	24	230	n.a.	1
Landscaping	FAR 2003	NY		*37*	*94*	*29*	*263*	n.a.	4
Representative Landscaping Values				**33**	**81**	**24**	**230**	**n.a.**	
Lawns - Residential	Steuer, et al. 1997	MI	12	262	n.a.	n.a.	n.a.	2.33	2
Lawns - Residential	Bannerman, et al. 1993	WI	~30	397	13	n.a.	59	2.67	3
Lawns	Waschbusch, et al. 2000	WI	25	59	n.a.	n.a.	n.a.	0.79	3
Lawns	Waschbusch, et al. 2000	WI	25	122	n.a.	n.a.	n.a.	1.61	3
Lawns - Fertilized	USGS 2002	WI	58	n.a.	n.a.	n.a.	n.a.	2.57	3
Lawns - Non-P Fertilized	USGS 2002	WI	38	n.a.	n.a.	n.a.	n.a.	1.89	3
Lawns - Unfertilized	USGS 2002	WI	19	n.a.	n.a.	n.a.	n.a.	1.73	3
Lawns	FAR 2003	NY	3	*602*	*17*	*17*	*50*	*2.1*	4
Representative Lawn Values				**213**	**13**	**n.a.**	**59**	**2.04**	

Notes:

Representative values are weighted means of collected data. Italicized values were omitted from these calculations.

1 - Grab samples from residential, commercial/institutional, and industrial rooftops. Values represent mean of DETECTED concentrations

2 - Flow-weighted composite samples, geometric mean concentrations

3 - Geometric mean concentrations

4 - Citation appears to be erroneous - original source of data is unknown. Not used to calculate representative value

5 - Median concentrations. Not used to calculate representative values due to site location and variation from other values.

6 - Mean concentrations from simulated rainfall study

7 - Mean concentrations. Not used to calculate representative values due to transportation nature of land use.

STATE OF CALIFORNIA

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
LOS ANGELES REGION

ORDER R4-2010-0108
NPDES PERMIT NO. CAS004002
WASTE DISCHARGE REQUIREMENTS
FOR
STORM WATER (WET WEATHER) AND NON-STORM WATER (DRY WEATHER) DISCHARGES FROM THE MUNICIPAL SEPARATE STORM SEWER SYSTEMS WITHIN THE VENTURA COUNTY WATERSHED PROTECTION DISTRICT, COUNTY OF VENTURA AND THE INCORPORATED CITIES THEREIN.

July 8, 2010

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STATE OF CALIFORNIA

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FINDINGS

The California Regional Water Quality Control Board, Los Angeles Region (hereinafter called Regional Water Board), finds that:

A. Permit Parties and History

1. Ventura County Watershed Protection District (Principal Permittee and Co-permittee), County of Ventura, cities of Camarillo, Fillmore, Moorpark, Ojai, Oxnard, Port Hueneme, San Buenaventura (Ventura), Santa Paula, Simi Valley and Thousand Oaks (hereinafter referred to separately as Permittees) have joined together to form the Ventura Countywide Storm Water Quality Management Program to discharge wastes. The Permittees discharge or contribute to discharges of storm water and non-storm water from municipal separate storm sewer systems (MS4s), also called storm drain systems, into the Watershed Management Areas of Ventura River, Santa Clara River, Calleguas Creek, Malibu Creek and Miscellaneous Ventura Coastal all within Ventura County and Los Angeles County (see Attachment "A").

2. Prior to the issuance of this permit, storm water discharges from the Ventura County MS4 were covered under the countywide waste discharge requirements contained in Order No. 09-0057, adopted by the Regional Water Board on May 7, 2009, which replaced Order No. 00-108, adopted by the Regional Water Board on July 27, 2000, which replaced Order No. 94-082, adopted by the Regional Water Board on August 22, 1994. Order No. 09-0057 also served as a National Pollutant Discharge Elimination System (NPDES) permit for the discharge of municipal storm water.

3. On June 8, 2009, the Building Industry Legal Defense Foundation, Construction Industry Coalition on Water Quality, and the Building Industry Association of Southern California, Inc. (collectively, "BIA") submitted a petition to the State Water Resources Control Board (State Water Board) challenging Order No. 09-0057. On

March 10, 2010, the State Water Board requested that the Regional Water Board agree to a voluntary remand of Order No. 09-0057 in order to address perceived procedural issues in connection with adoption of Order No. 09-0057. The State Water Board also requested that BIA agree to place its petition in abeyance. On March 11, 2010, the Regional Water Board agreed to a voluntary remand, and stated its intention to hold a hearing to reconsider the permit in July 2010. Since BIA did not agree to place its petition in abeyance, BIA's petition was thereafter dismissed by operation of law. On May 5, 2010, the Regional Water Board notified the Permittees, the parties and other interested persons of its intent to reconsider Order No. 09-0057 and has provided them with an opportunity to submit written comments on provisions of the permit that were not previously subject to notice and comment.

4. The Ventura County Board of Supervisors approved the concept of a countywide NPDES permit program and the use of the Flood Management District (presently the Watershed Protection District) benefit assessment authority to finance it on April 14, 1992. On June 30, 1992, the Ventura County Board of Supervisors adopted a benefit assessment levy for storm water and flood management in the unincorporated areas of Ventura County and the cities within the County, to be used in part to finance the implementation of a countywide NPDES municipal storm water permit program. The Ventura County MS4 Permittees have entered into an agreement with the Watershed Protection District to finance the activities related to the Ventura County MS4 Permit for shared and district wide expenses. The Permittees are also given the option to use the Benefit Assessment Program to finance their respective activities related to reducing the discharge of storm water pollutants under the MS4 Permit.

5. The Regional Water Board may require a separate NPDES permit for any entity that discharges storm water into the watersheds of Ventura County. Such an entity can be any State or Federal facility, special district or other public or private party.

B. Nature of Discharge

1. Storm water discharges consist of surface water runoff generated from various land uses in all the hydrologic drainage basins, which discharge into Waters of the State. The quality of these discharges varies and is affected by geology, land use, season, hydrology, and sequence and duration of hydrologic events. Based on the Ventura Countywide Storm Water Monitoring Program's Water Quality Monitoring Reports which were required under Order No. 00-108, the dry weather and wet weather Pollutants of Concern (POC) in urban stormwater include chloride, fecal indicator bacteria, conventional pollutants, metals, nitrogen, organic compounds, and pesticides. The POC are identified in Attachment "B" of this Order. Many of the POC listed are causing impairments identified on the federal Clean Water Act (CWA) § 303(d) list of impaired waterbodies.

The State Water Board submits a report (a list of water quality limited segments (§ 303[d] list)) on the State's water quality to the U.S. EPA pursuant to § 305(b) of the

1972 CWA, and Title 40, CFR 130.7, every 2 years. The Report provides water quality information to the general public and serves as the basis for the U.S. EPA's National Water Quality Inventory Report to Congress. Section 303(d) requires that all waters that are not attaining standards after the implementation of those controls required by 1977, shall be included on the list. Title 40 CFR 130.7(b)(3) defines "water quality standard applicable to such waters" as "those water quality standards established under § 303 of the Clean Water Act, including numeric criteria, narrative criteria, waterbody uses, and antidegradation requirements."

2. Common pollutants in urban storm water and their respective sources include, but are not limited to: bacteria from illegal discharges, illicit connections and animal waste; Polycyclic Aromatic Hydrocarbons (PAHs) from the products of internal combustion engine operation and parking lot sealants; nitrogen compounds from fertilizer application; pesticides from pest mitigating applications and from plant mitigating applications; bis (2-ethylhexyl) phthalate from the break down of plastic products; mercury from atmospheric fallout and improper disposal of mercury switches; lead from fuels, paints and automotive parts; copper from brake pad wear and roofing materials; zinc from tire wear and galvanized sheeting and fencing; sediment from land disturbance and erosion; trash; and dioxins as products of combustion.

3. In general, the pollutants that are found in municipal storm water runoff can harm human health and aquatic ecosystems. In addition, the high volumes and high velocities of storm water discharged from MS4s into receiving waters can adversely impact aquatic ecosystems and stream habitat and cause stream bank erosion and physical modifications; these changes are collectively termed hydromodification. Hydromodification and discharges of runoff and stormwater from urbanized areas remain a leading cause of impairment of surface waters in California and nationwide (U.S. EPA 2009).

4. Ammonia as Nitrogen, and Nitrate plus Nitrite as Nitrogen are biostimulatory substances that can cause or contribute to eutrophic effects such as low dissolved oxygen and algae growth impairing aquatic and wildlife habitats as well as recreational uses. At elevated concentrations, ammonia is highly toxic to fish and other aquatic life.

5. Elevated bacterial indicator densities impair the water contact recreation (REC-1) beneficial use at beaches, creeks, lakes, estuaries, lagoons, and marinas. Swimming in waters with elevated bacterial indicator densities has been associated with adverse health effects. Specifically, local and national epidemiological studies indicate that there is a causal relationship between adverse health effects and recreational water quality, as measured by bacterial indicator densities (Pruss, 1998, Review of epidemiological studies on health effects from exposure to recreational waters, International Journal of Epidemiology; Haile et al., 1996, An epidemiological study of possible adverse health effects of swimming in Santa Monica Bay, Santa Monica Bay Restoration Project; and Haile et al., 1999, The health effects of swimming in

ocean water contaminated by storm drain runoff, Epidemiology). Sources of elevated bacteria to marine and fresh waters may also include illegal discharges from improperly maintained standard septic systems, on-site wastewater treatment systems (OWTS) and illicit discharges from private drains.

6. Pesticides are substances used to prevent, destroy, repel or mitigate pests such as insects, weeds, and microorganisms. Their effects can be direct (e.g. fish die from exposure to a pesticide entering waterways, or birds do not reproduce after ingesting contaminated fish), or indirect (a hawk becomes sick from eating a mouse dying from pesticide poisoning). Pesticide categories include: Organochlorine, Organophosphorus, Organophosphate, and Pyrethroid.

7. Polychlorinated Biphenyls (PCBs) are a subset of the synthetic organic chemicals known as chlorinated hydrocarbons. Concern over PCBs' toxicity, persistence (chemical stability) in the environment and bioconcentration in aquatic organisms has led to prohibitions on PCBs.

8. Rising groundwater and swimming pool water have been found to be sources of pollutants such as salts (chloride). Salts increase the salinity of otherwise freshwater systems and disrupt physiological processes. The Regional Water Board has waterbodies listed on the CWA § 303(d) list for impairment due to salts and has adopted Basin Plan amendments to include Total Maximum Daily Loads (TMDLs) for salts. This Order includes provisions to control the discharges from these activities in order to directly or indirectly reduce or eliminate the discharge of salts to fresh water systems where salts may impair water quality and beneficial uses.

9. Trash and debris are pervasive pollutants which accumulate in streams, rivers, bays, and the ocean throughout Southern California. They pose a serious threat to our oceans and coasts, navigation, biological resources, recreation, human health and safety, aesthetics, and economies.

10. Municipal storm water (wet weather) and non-storm water (dry weather) discharges may contain pollutants that cause or threaten to cause an exceedance of the water quality standards, as outlined in the Los Angeles Region's Basin Plan. Wet weather and dry weather discharges from the MS4 are subject to conditions and requirements established in the Basin Plan for point source discharges. Discharges from the MS4 may not cause or contribute to exceedances of water quality standards.

11. Biological communities act to integrate the effects of water quality conditions in a stream by responding with changes in their population abundances and species composition over time. These populations are sensitive to multiple aspects of water and habitat quality, and provide expressions of ecological health easier to understand than the results of chemical and toxicity tests. Biological assessments and criteria address the cumulative impacts of all stressors, especially habitat degradation, and chemical contamination, which result in a loss of biological diversity. Biological

information can help provide an ecologically based assessment of the status of a waterbody. Bioassessment is a cost-effective tool and protocol for assessing the biological and physical habitat conditions of streams and rivers for evaluation of the overall health of a watershed. The Principal Permittee consents to participate in the Southern California Storm Water Monitoring Coalition (SMC) Southern California Regional Bioassessment Monitoring Program.

12. Studies indicate that facilities with paved surfaces subject to frequent motor vehicular traffic (such as: strip malls, parking lots, commercial business parks, and fast food restaurants), or facilities that perform vehicle repair, maintenance, or fueling (automotive service facilities) are potential sources of POC in storm water (*California Stormwater Quality Association, Stormwater Best Management Practice Handbook, Municipal, January 2003).*

13. Retail Gasoline Outlets (RGOs) are points of convergence for vehicular traffic and are similar to parking lots and urban roads. Studies indicate that storm water discharges from RGOs have high concentrations of hydrocarbons and heavy metals (*California Stormwater Quality Association, Stormwater Best Management Practice Handbook, Municipal, January 2003).*

14. The industries and businesses listed in this Order that are to be inspected by Permittees have the potential to discharge contaminated storm water into the MS4. This storm water is an environmental threat because it can adversely impact public health and safety, and the quality of receiving waters. For example, pretreatment program compliance inspections and audits performed in the Los Angeles and Ventura Counties indicate that automotive service and food service facilities sometimes discharge polluted storm water to the MS4s. The POC in such wash waters include oil and grease, toxic chemicals, and food waste. Spills from clogged sanitary sewer lines have a high likelihood to reach the receiving waters via MS4s. Overall, the most common POC identified in storm water discharge to the MS4s are: (i) heavy metals, (ii) oil and grease/ PAHs, (iii) sediments, (iv) oxygen demanding substances, (v) litter/ trash/ debris, (vi) nutrients, (vii) other toxic materials, such as pesticides. Municipal storm water monitoring data and industrial storm water monitoring data indicate that industrial and commercial sites continue to contribute significant quantities of pollutants in storm water runoff.

15. Development and urbanization increase pollutant loads, volume, and discharge velocity. First, natural vegetated pervious ground cover is converted to impervious surfaces (paved) such as highways, streets, rooftops and parking lots. While natural vegetated soil can both absorb rainwater and remove pollutants providing an effective natural purification process, in contrast, impervious surfaces (such as pavement and concrete) can neither absorb water nor remove pollutants, and thus the natural purification characteristics are lost. Second, urban development creates new pollution sources as the increased density of human population brings proportionately higher levels of vehicle emissions, vehicle maintenance wastes, municipal sewage waste,

pesticides, household hazardous wastes, pet wastes, trash, and other anthropogenic pollutants. Development and urbanization especially threaten environmentally sensitive areas. Such areas have a much lower capacity to withstand pollutant shocks than might be acceptable in the general circumstance. In essence, development that is ordinarily insignificant in its impact on the environment may become significant in a particularly sensitive environment. These environmentally sensitive areas (ESAs) designated by the State in the Ventura County watershed are defined in Part 6 (Definitions).

16. The increased volume, increased velocity, and discharge duration of storm water runoff from developed areas has the potential to accelerate downstream erosion and impair stream habitat in natural drainages. Studies have demonstrated a direct relationship between the degree of imperviousness of an area and waterbody degradation *(Impacts of Impervious Cover on Aquatic Systems, Center for Watershed Protection, March 2003; Management Strategies for Urban Stream Rehabilitation, Booth, D. et al., February 2003).* Significant declines in the biological integrity and physical habitat of streams and other receiving waters have been found to occur with as little as 3-10 percent conversion from natural to impervious surfaces in a subwatershed. Recent studies conducted in California indicate that intermittent and ephemeral streams are even more susceptible to the effects of hydromodification than streams from other regions of the U.S. with stream degradation being recognized when the associated catchment's impervious cover is as little as 3-5% *(Managing Runoff to Protect Natural Streams: The Latest Development on Investigation and Management of Hydromodification in California, Stein, E. and Zaleski, S., December 2005*; *Effect of Increase in Peak Flows and Imperviousness on the Morphology of Southern California Streams, Coleman, D., April 2005).* The percentage of impervious cover is one indicator and predictor of potential water quality degradation expected from new development.

17. The Order requires projects where it has been demonstrated to be technically infeasible to achieve less than 30% Effective Impervious Area, to mitigate off-site 1.5 times the volume that would normally be required to be retained on site. The increase in off-site mitigation is warranted because it has been concluded that, at impervious land cover over 30%, impacts on streams and wetlands become more severe, and degradation is almost unavoidable without special measures (Prince George's County, MD 1999; BASMAA 1999; Center for Watershed Protection 2003). The off-site mitigation volume requirement may be met through retention and/or biofiltration.

18. Low Impact Development (LID) is an effective approach to minimizing the adverse effects of urbanization and development on waterbodies and their beneficial uses that has been endorsed by California and other states. The California Ocean Protection Council (OPC), in a resolution adopted on May 15, 2008, found that LID is a practicable and superior approach that new and redevelopment projects can implement to minimize and mitigate increases in runoff and runoff pollutants and the resulting impacts on downstream uses, coastal resources and communities. In its

Strategic Plan Update 2008-2012, the State Water Board reiterated sustainability as a key principle, stating its commitment to "enhancing and encouraging sustainability within the administration of Water Board programs and activities by promoting water management strategies such as low impact development..." (SWRCB 2008).

19. LID is a comprehensive source control strategy first pioneered by Prince George's County, Maryland in 1997 to help address the growing economic and environmental limitations of conventional stormwater management practices. As LID was developed by a local government, it is sensitive to addressing local government's unique environmental and regulatory needs in the most economical manner possible by reducing costs associated with stormwater infrastructure design, construction, maintenance and enforcement. LID also provides for local government's need for economic vitality through reasonable and continued growth and redevelopment. LID allows for greater development potential with less environmental impacts through the use of smarter designs and advanced technologies to achieve a better balance between conservation, growth, ecosystem protection and public health / quality of life. (Low Impact Development: Smart Technology For Clean Water Definitions, Issues, Roadblocks, and Next Steps, Coffman, Larry)

20. The implementation of LID techniques across the United States and Canada has demonstrated that the proper implementation of LID techniques results in more benefits than single purpose stormwater and flood control infrastructure, including increased water quality protection, enhanced property values, improved aquatic and terrestrial habitat, aesthetic amenities, and improved quality of life (Reducing Stormwater Costs through Low Impact Development (LID) Strategies and Practices, USEPA Doc No. EPA 841-F-07-006, December 2007). Further, properly implemented LID techniques can help mimic the pre-project runoff volume and time of concentration, thus minimizing the adverse effects of hydromodification on stream habitat and biological condition (A Review of Low Impact Development Policies: Removing Institutional Barriers to Adoption, Low Impact Development Center and State of California, State Water Resources Control Board, December 2007). The requirements of this Order facilitate the implementation of LID strategies to protect water quality, reduce runoff volume, and to garner additional benefits.

21. The implementation of LID techniques have been associated with the following environmental benefits: improved air quality due to the increased use of trees and vegetation, reduced urban temperatures due to the shade offered by increased vegetation and the reduction of heat absorbing materials (concrete, etc.), the moderation of climate change due to reduced urban temperatures, increased energy efficiency due to lower ambient temperatures when LID practices are implemented on and around buildings, and aesthetic benefits due to the increased use of trees and vegetation (U.S. EPA Technical Guidance on Implementing the Storm Water Runoff Requirements for Federal Projects under Section 438 of the Energy Independence and Security Act).

22. Furthermore, the implementation of LID not only benefits water quality, but also enhances water supply. LID is consistent with and supports the Governor's 20 x 2020 Water Conservation Plan (February 2010); the State Board's 2008-2012 Strategic Plan Update (i.e. to promote sustainable local water supplies); the State Board's Recycled Water Policy (Resolution No. 2009-0011) objective to increase [beneficial] use of stormwater; requirements of the Water Conservation in Landscaping Act of 2006 (AB 1881, Laird), which requires cities and counties to adopt landscape water conservation ordinances by January 1, 2010; and the Department of Water Resources' Water Efficient Landscape Ordinance (Cal. Code Regs. §492.15).

23. This Order requires specified New Development and Redevelopment projects to control pollutants, pollutant loads, and runoff volume emanating from impervious surfaces by specifying a 5% Effective Impervious Area (EIA) site limitation and a fixed runoff volume to be retained on site. There is a growing acceptance by stormwater professionals and local governments to integrate LID strategies that limit impervious area, and associated onsite retention criteria, into stormwater management programs and MS4 permits. For example, West Virginia's Small MS4 Permit # WV0116025, requires the on-site retention of the volume of runoff produced from the first inch of a 24-hour storm; the U.S. EPA's Technical Guidance on Implementing the Storm Water Runoff Requirements for Federal Projects under Section 438 of the Energy Independence and Security Act, requires the on-site retention of the volume of runoff produced from the 95th percentile storm event where technically feasible; the City of Philadelphia requires the onsite retention of the volume of runoff produced from the first inch of a 24-hour storm; and the City of Portland, Oregon requires the onsite infiltration of the runoff volume from a 10-year, 24-hour design storm.

24. Based on a study conducted by Horner (2007) in Ventura County, it was found that a 5% EIA threshold can be met in typical developments. This result was reached assuming the use of native soils typical to Ventura County; soil enhancements can further increase onsite infiltration potential. Using six different development types, the Horner study tested the feasibility of draining all but 3% of impervious area to pervious land on the sites. Five of the six sites had adequate or greater capacity to infiltrate the full annual runoff volume from the "Not-Connected Impervious Area" (NCIA) and pervious areas where EIA is limited to 3% of the total site area. By showing that it is possible to retain all runoff from pervious areas where EIA is limited to 3% of the total site area under typical site conditions (i.e. native soils) and a wide range of development types, the study results provide support for the feasibility of the 5% EIA threshold.

25. Horner (2007) also found that developments implementing low impact strategies can achieve significant reductions in pollutant loading and runoff volume as well as greatly enhanced recharge rates compared to both developments with no BMPs and developments with traditional treatment BMPs.

26. In some circumstances, however, site conditions and the type of development can limit the feasibility of retaining, infiltrating, and reusing stormwater at sites due to a variety of site specific conditions. Factors that affect the feasibility of a fixed volume capture standard include, but are not limited to: successive storms, soil infiltration capacity, subsurface pollution, and infill in urban core centers (e.g. R. Horner, *Investigation of the Feasibility and Benefits of Low-Impact Site Design Practices ("LID") for Ventura County* (February 2007); E. Strecker, A. Poresky, D. Christsen, *Memorandum: Rainwater Harvesting and Reuse Scenarios and Cost Consideration* (April, 2009)).

27. A major concern expressed by commenters is the 30% EIA limitation may not allow some projects to be built. Part of the rationale supporting the feasibility of on site retention in Order 09-0057 was derived from the Richard Horner (2007) study. The Horner study purports to demonstrate that stormwater infiltration is feasible throughout Ventura County and is the key study for an upper-bound EIA requirement. Horner's approach to demonstrate feasibility is to estimate stormwater runoff volume and compare it to infiltration capacity. While the Horner report has value at a general level and complements findings of other studies in Southern California and elsewhere. Staff has the following concerns with the Horner study conclusions with regard to the universal feasibility of achieving less than 30% EIA:

    - The Horner analysis is based on engineered infiltration basins rather than undisturbed pervious cover.
    - The Horner analysis cites the UCSB infiltration studies which are based on a relatively high permeability soils. However, the EIR cited in the study by Horner shows a significant quantity percentage of the Ventura County soils are described as sandy loamy and are classified as "low permeability and slow draining.
    - The Horner analysis normalizes runoff rates and infiltration capacity to an annual basis which may not address the critical conditions appropriate for the seasonal precipitation patterns in Ventura County.
    - Horner states the study was limited in scope such that its universal applicability throughout Ventura County is not well supported.

    Staff recognizes the significance of the 30% EIA threshold but cannot justify a strict cap.

28. In a letter dated April 10, 2009, the Ventura County Permittees, NRDC and Heal the Bay presented an agreement to the Regional Water Board proposing new development/redevelopment criteria, including on-site retention requirements, a 5% EIA limitation, infeasibility criteria, a 30% EIA cap, and off-site mitigation provisions; the elimination of Municipal Action Levels (MALs); and weekly, year-round beach water quality monitoring at 10 sites. The letter was signed by representatives of the parties, including NRDC, Heal the Bay, Ventura, Oxnard, Simi Valley, and the County of Ventura. At the Regional Board hearing on May 7, 2009,

the Ventura County Permittees, NRDC, and Heal the Bay reiterated their support for the agreement set forth in their joint April 10, 2009 comment letter and advocated that the agreement be incorporated into the permit in its entirety.

29. Specific LID strategies include bioretention and rainwater harvesting for reuse. Bioretention is a method of treating stormwater by pooling water on the surface and allowing filtering and settling of suspended solids and sediment at the mulch layer, prior to entering the plant/soil/microbe complex media for infiltration and pollutant removal. Rain Gardens / bioretention techniques are used to accomplish water quality improvement and water quantity reduction. Prince George's County, Maryland, and Alexandria, Virginia have used this BMP since 1992 with success in many urban and suburban settings. Rain Gardens can be integrated into a site with a high degree of flexibility and can balance nicely with other structural management systems, including porous asphalt parking lots, infiltration trenches, as well as non-structural stormwater BMPs. The Rain Garden vegetation serves to filter (water quality) and transpire (water quantity) runoff, and the root systems can enhance infiltration. The plants take up pollutants; the soil medium filters out pollutants and allows storage and infiltration of stormwater runoff; and the infiltration bed provides additional volume control ("Rain Gardens", River-Friendly Landscaping Coalition, Sacramento, CA). Properly designed bioretention techniques mimic natural forest ecosystems through species diversity, density and distribution of vegetation, and the use of native species, resulting in a system that is resistant to insects, disease, pollution, and climatic stresses (Draft - Pennsylvania Stormwater Management Manual).

    As an alternative to redirection of stormwater to functional landscape, rain gutter flows can be directed into rain barrels or cisterns for later use in irrigating lawns and gardens. Disconnections of rain gutters can effectively be implemented on existing properties with little change to present site designs. The benefits of urban area rainwater harvesting can be huge, providing supplemental water for many local uses. Such as irrigating a vegetable garden and surrounding landscape, which also leaves more treated water in the municipal water supply to help cities through times of drought or other shortages. A number of cities in the Los Angeles Region, including Los Angeles, Long Beach and Santa Monica, have implemented successful rainwater harvesting incentive programs.

30. Traditional approaches to stormwater management involve conveying runoff off-site to receiving waters, to a combined sewer system, or to a regional facility that treats runoff from multiple sites. These designs typically include hard infrastructure, such as curbs, gutters, and piping. LID-based designs, in contrast, are designed to use natural drainage features or engineered swales and vegetated contours for runoff conveyance and treatment. In terms of costs, LID techniques like conservation design can reduce the amount of materials needed for paving roads and driveways and for installing curbs and gutters. Conservation designs can be used to reduce the total amount of impervious surface, which results in reduced road and driveway lengths and reduced costs. Other LID techniques, such as grassed swales, can be used to infiltrate roadway

runoff and eliminate or reduce the need for curbs and gutters, thereby reducing infrastructure costs. Also, by infiltrating or evaporating runoff, LID techniques can reduce the size and cost of flood-control structures (Reducing Stormwater Costs through Low Impact Development (LID) Strategies and Practices, U.S. EPA).

The U.S. EPA looked at 17 case studies throughout the country to determine if LID strategies were a cost effective alternative to conventional storm water control measures. They found that the use of LID practices can be both fiscally and environmentally beneficial to communities. They found total capital cost savings ranging from 15% to 80% when LID strategies were used compared with traditional stormwater control measures, with only a few cases noted where LID projects resulted in higher costs than traditional storm water controls. In the majority of the cases, costs for projects implementing LID strategies were found to be less due to reduced costs for site grading and preparation, stormwater infrastructure, site paving, and landscaping (Reducing Stormwater Costs through Low Impact Development (LID) Strategies and Practices, U.S. EPA).

31. The use of LID strategies also has the potential to create larger economic benefits, including but not limited to, reduced need for flood control, which could save up to $400 million; increased property values, which could amount to up to $5 billion; and creation of additional groundwater supplies worth up to $7.2 billion (Devinny et al. 2004; MacMullan, E., Assessing Low Impact Developments Using a Benefit-Cost Approach, 2nd National Low Impact Development Conference, March 12-14, 2007).

32. The Regional Water Board adopted a Conditional Waiver of Waste Discharge Requirements for Discharges from Irrigated Lands (Order No. R4-2005-0080) on November 3, 2005. The objective of the program is to monitor runoff from irrigated agriculture facilities in the coastal watersheds of Ventura and Los Angeles Counties. The Basin Plan, which designates beneficial uses and establishes water quality objectives for the Region, recognizes that agricultural activities can generate pollutants such as sediment, pesticides, and nutrients that upon discharge to receiving water can degrade water quality and impair beneficial uses. A category identified by the Conditional Waiver as a source of pollutants is nursery operations. This Order includes requirements for the municipal operator to confirm that nursery operators implement pollutant reduction and control measures with the objective of reducing pollutants in storm water runoff discharges.

33. Research conducted on the contribution of aerial deposition of trace heavy metals in Los Angeles County watersheds indicates that dry indirect deposition may account for a significant load of pollutants into surface waters. Similar patterns of aerial deposition likely occur in Ventura County. Of the atmospherically deposited pollutants on the watersheds, ten to twenty percent may account før the total load for copper, zinc, nickel, lead, and chromium to the waterbodies. Land reservoirs and sequestration may account for the remaining eighty to ninety percent of the atmospherically deposited pollutants on the watersheds. Emissions of semi-volatile

organics such as polycyclic aromatic hydrocarbons (PAHs) and pesticides and their subsequent deposition may contribute to the contamination of receiving waters but appear to be less significant. The remaining percentage is stored in land reservoirs and eventually shows up in receiving waters.

C. Permit Background

1. The essential components of the Storm Water Management Program, as required by the Code of Federal Regulations (CFR) [40 CFR 122.26(d)] are:
   (a) Adequate Legal Authority.
   (b) Fiscal Resources.
   (c) Storm Water Quality Management Program (SMP)
      (1) Public Information and Participation Program
      (2) Industrial/ Commercial Facilities Program
      (3) Planning and Land Development Program
      (4) Development Construction Program
      (5) Public Agency Activities Program
      (6) Illicit Connection and Illicit Discharges Elimination Program
   (d) Reporting Program (Monitoring Report and Program Report)

2. The Ventura County SMP, dated November 2001 (revision 2) identifies seven program areas, which are listed below and were previously approved under Board Order No. 00-108. For purposes of consistency, they are titled as follows:
   (a) Ventura County SMP.
      (1) Program Management
      (2) Programs for Residents
      (3) Programs for Industrial/ Commercial Businesses
      (4) Programs for Planning and Land Development
      (5) Programs for Construction Sites
      (6) Programs for Public Agency Activities
      (7) Programs for Illicit Connections/ Illegal Discharges
   (b) For purposes of region-wide consistency, the program titles are revised and consolidated into the six areas listed in the preceding C.1(c). All Permittee storm water documents submitted to the Regional Water Board are to follow the organization enumerated in C.1(c).

3. The Permittees filed a Report of Waste Discharge (ROWD), dated January 26, 2005. The Permittees applied for renewal of their waste discharge requirements for a 5-year period, which serves as an NPDES permit to discharge wastes to surface waters.

4. The Regional Water Board reviewed the ROWD and determined it to be partially complete under the reapplication policy for MS4s issued by the United States Environmental Protection Agency (U.S. EPA) (61 Fed. Reg. 41697). The Regional Water Board has prepared this Order so that implementation of provisions contained

in this Order by Permittees will meet the requirements of the federal NPDES regulations at 40 CFR 122.26.

5. The Permittees ROWD contained a proposed Storm Water Management Program and a Monitoring Program to be considered by the Regional Water Board for incorporation into an MS4 NPDES Permit as permit conditions and to demonstrate compliance with federal law.

6. To-date, the monitoring program has consisted of mass emission, receiving water (tributaries), and land-use monitoring stations, toxicity testing, special studies for bioassessment of the Ventura River and hydrology, identification of ESAs, implementation of the Storm Water Quality Urban Impact Mitigation Plan (SQUIMP), and has provided support for volunteer monitoring programs. This Order requires a monitoring program consisting of mass emission, toxicity, TMDL storm water (wet weather) MS4 water quality-based effluent limits, TMDL non-storm water (dry weather) MS4 water quality-based effluent limits, Pyrethroid assessment study, continuation of the hydromodification study, low impact development study, and participation in the Southern California Regional Bioassessment Program and Southern California Bight Project (SCBP).

7. The Principal Permittee is a member of the Southern California Coastal Water Research Project (SCCWRP) Commission. The Principal Permittee also participates in the Regional Monitoring Programs and research partnerships, such as the Southern California Storm Water Monitoring Coalition (SMC) and the Bioassessment Working Group.

D. Permit Coverage

1. The area covered by this Order includes all areas within Ventura County boundaries and all areas within each co-permittee's boundaries (see Figure 1) that drain into the MS4.

2. The Permittees covered under this Order were designated on a system-wide basis under Phase I of the CWA § 402(p)(3)(B)(i). The action of covering all Ventura County municipalities under a single MS4 permit on a system-wide basis was consistent with the provisions of 40 CFR 122.26(a)(3)(iv), which states that one permit application may be submitted for all or a portion of all municipal separate storm sewers within adjacent or interconnected large or medium municipal separate storm sewer systems; and the Regional Water Board may issue one system-wide permit covering all, or a portion of all municipal separate storm sewers in adjacent or interconnected large or medium municipal separate storm sewer systems.

3. Federal, State, Regional, or local entities within the Permittees' boundaries or in jurisdictions outside the Ventura County Watershed Protection District, and not currently named in this Order, may operate storm drain facilities and/ or discharge

storm water to storm drains and receiving waters covered by this Order. The Permittees may lack legal jurisdiction over these entities under State and Federal constitutions. The Regional Water Board will coordinate with these entities to implement programs that are consistent with the requirements of this Order. The Regional Water Board may consider such facilities for coverage under its NPDES permitting scheme pursuant to USEPA Phase II storm water regulations. Permittees have expressed their intention to work cooperatively to control the contribution of pollutants from one portion of the MS4 to another portion of the system. Permittees shall make good faith efforts to control the contribution of pollutants to the MS4 from non-permittee dischargers such as Caltrans, the U.S. Department of Defense, and other state and federal facilities.

4. TMDLs are numerical calculations of the maximum amount of a pollutant that a waterbody can receive and still meet water quality standards, and an allocation of that amount to the pollutant's sources. A TMDL is the sum of the allowable loads of a single pollutant from all contributing point sources (Waste Load Allocation (WLA)) and non-point sources (Load Allocation (LA)). Discharges from the MS4s are considered point sources discharges, because the MS4 is a point source.

5. This Order incorporates applicable WLAs that have been adopted by the Regional Water Board and have been approved by the Office of Administrative Law and the U.S. EPA. The TMDL WLAs in the Order are expressed as water quality-based effluent limits in a manner consistent with the assumptions and requirements of the TMDL from which they are derived.

6. The CWA and the California Water Code contain specific provisions on how wastewater discharges from point sources are to be permitted. Stormwater discharges (both dry weather and wet weather) are considered point source discharges.

7. Permittees should work cooperatively to control the contribution of pollutants from one portion of the MS4 to another portion of the system through inter-agency agreements or other formal arrangements.

E. Federal, State and Regional Regulations

1. The Water Quality Act of 1987 added § 402(p) to the CWA (33U.S.C. § 1251-1387). This section requires the U.S. EPA to establish regulations setting forth NPDES requirements for storm water discharges in 2 phases.
   (a) U.S. EPA Phase I storm water regulations were directed at MS4s serving a population of 100,000 or more, including interconnected systems and storm water discharges associated with industrial activities, including construction activities. The Phase 1 Final Rule was published on November 16, 1990 (55 Fed. Reg. 47990).
   (b) U.S. EPA Phase II storm water regulations are directed at storm water discharges not covered in Phase I, including small MS4s (population of less than 100,000),

small construction projects (less than 5 acres), municipal facilities with delayed coverage under the Intermodal Surface Transportation Efficiency Act of 1991, and other discharges for which the U.S. EPA Administrator or the State determines that the storm water discharge contributes to a violation of a water quality standard, or is a significant contributor of pollutants to waters of the U.S. The Phase II Final Rule was published on December 8, 1999 (64 Fed. Reg. 68722).

2. The U.S. EPA published an Interpretative Policy Memorandum on Reapplication Requirements for MS4 permits on August 9, 1996 (61 Fed. Reg. 41697). This policy requires that MS4 reapplication for reissuance for a subsequent five-year permit term contain certain basic information and information for proposed changes and improvements to the storm water management program and monitoring program.

3. The U.S. EPA has entered into a Memorandum of Agreement (MOA) with the U.S. Fish and Wildlife Service, and the National Marine Fisheries Service for enhancing coordination regarding the protection of endangered and threatened species under section 7 of the Endangered Species Act, and the CWA's water quality standards and NPDES programs. Among other actions, the MOA establishes a framework for coordination of actions by the U.S. EPA, the Services, and CWA delegated States on CWA permit issuance under § 402 of the CWA [66 Fed. Reg. 11202-11217].

4. The CWA allows the U.S. EPA to authorize states with an approved environmental regulatory program to administer the NPDES program in lieu of the U.S. EPA. The State of California is a delegated State. The Porter-Cologne Water Quality Control Act (California Water Code) authorizes the State Water Resources Control Board (State Water Board), through the Regional Water Boards, to regulate and control the discharge of wastes that could affect the quality of waters of the State, including waters of the United States, and tributaries thereto.

5. Under CWA § 303(d) of the CWA, States are required to identify a list of impaired water-bodies and develop and implement TMDLs for these waterbodies (33 USC § 1313 (d)(1)). The most recent 303(d) list's U.S. EPA approval date was June 28, 2007. The U.S. EPA entered into a consent decree with the Natural Resources Defense Council (NRDC), Heal the Bay, and the Santa Monica Baykeeper on March 22, 1999, under which all TMDLs for the Los Angeles Region must be adopted within 13 years from that date. This Order incorporates provisions incorporating approved WLAs for municipal storm water discharges and requires amending the SMP after subsequent pollutant loads have been allocated and approved.

6. Collectively, the restrictions contained in the TMDL Provisions for Storm Water (Wet Weather) Discharges and Non-Storm Water (Dry Weather) Discharges of this Order on individual pollutants are no more stringent than required to implement the provisions of the TMDL, which have been adopted and approved in a manner that is consistent with the CWA. Where a TMDL has been approved, NPDES permits must

contain effluent limits and conditions consistent with the assumptions and requirements of the available WLAs in TMDLs (40 CFR 122.44(d)(1)(vii)(B)).

7. This Order does not constitute an unfunded local government mandate subject to subvention under Article XIIIB, Section (6) of the California Constitution for several reasons, including, but not limited to, the following. This Order implements federally mandated requirements under CWA § 402, subdivision (p)(3)(B)(33 U.S.C. § 1342(p)(3)(B)) This includes federal requirements to effectively prohibit non-storm water discharges, to reduce the discharge of pollutants to the maximum extent practicable, and to include such other provisions as the Administrator or the State determines appropriate for the control of such pollutants. Federal cases have held these provisions require the development of permits and permit provisions on a case-by-case basis to satisfy federal requirements. (Natural Resources Defense Council, Inc. v. U.S. E.P.A. (9th Cir. 1992) 966 F.2d 1292, 1308, fn. 17.) The authority exercised under this Order is not reserved state authority under the Clean Water Act's savings clause (cf. Burbank v. State Water Resources Control Bd. (2005) 35 Cal.4th 613, 627-628 [relying on 33 U.S.C. § 1370, which allows a state to develop requirements which are not "less stringent" than federal requirements]), but instead, is part of a federal mandate to develop pollutant reduction requirements for municipal separate storm sewer systems. To this extent, it is entirely federal authority that forms the legal basis to establish the permit provisions. (See, City of Rancho Cucamonga v. Regional Water Quality Control Bd.-Santa Ana Region (2006) 135 Cal.App.4th 1377, 1389; Building Industry Ass'n of San Diego County v. State Water Resources Control Bd. (2004) 124 Cal.App.4th 866, 882-883.)

   Likewise, the provisions of this Order to implement TMDLs are federal mandates. The CWA requires TMDLs to be developed for waterbodies that do not meet federal water quality standards (33 U.S.C. § 1313(d)). Once the U.S. EPA or a state develops a TMDL, federal law requires that permits must contain effluent limitations consistent with the assumptions of any applicable wasteload allocation. (40 CFR 122.44(d)(1)(vii)(B)).

   Second, the local agency Permittees' obligations under this Order are similar to, and in many respects less stringent than, the obligations of non-governmental dischargers who are issued NPDES permits for storm water discharges. With a few inapplicable exceptions, the Clean Water Act regulates the discharge of pollutants from point sources (33 U.S.C. § 1342) and the Porter-Cologne regulates the discharge of waste (Wat. Code, § 13263), both without regard to the source of the pollutant or waste. As a result, the "costs incurred by local agencies" to protect water quality reflect an overarching regulatory scheme that places similar requirements on governmental and nongovernmental dischargers. (See *County of Los Angeles v. State of California* (1987) 43 Cal.3d 46, 57-58 [finding comprehensive workers compensation scheme did not create a cost for local agencies that was subject to state subvention].)

The Clean Water Act and the Porter-Cologne Water Quality Control Act largely regulate storm water with an even hand, but to the extent there is any relaxation of this even-handed regulation, it is in favor of the local agencies. Generally, the Clean Water Act requires point source dischargers, including discharges of storm water associated with industrial or construction activity, to comply strictly with water quality standards. (33 U.S.C. § 1311(b)(1)(C), *Defenders of Wildlife v. Browner* (1999) 191 F.3d 1159, 1164-1165 [noting that industrial storm water discharges must strictly comply with water quality standards].) As discussed in prior State Water Resources Control Board decisions, certain provisions of this Order do not require strict compliance with water quality standards. (SWRCB Order No. WQ 2001-15, p. 7.) Therefore, certain provisions of this Order regulate the discharge of waste in municipal storm water more leniently than the discharge of waste from non-governmental sources.

Third, the local agency Permittees have the authority to levy service charges, fees, or assessments sufficient to pay for compliance with this Order subject to certain voting requirements contained in the California Constitution. (See California Constitution XIII D, section 6, subdivision (c); see also *Howard Jarvis Taxpayers Association v. City of Salinas* (2002) 98 Cal. App. 4th 1351, 1358-1359.). The fact sheet demonstrates that numerous activities contribute to the pollutant loading in the municipal separate storm sewer system. Local agencies can levy service charges, fees, or assessments on these activities, independent of real property ownership. (See, e.g., *Apartment Ass'n of Los Angeles County, Inc. v. City of Los Angeles* (2001) 24 Cal.4th 830, 842 [upholding inspection fees associated with renting property].) The ability of a local agency to defray the cost of a program without raising taxes indicates that a program does not entail a cost subject to subvention. (*County of Fresno v. State of California* (1991) 53 Cal.3d 482, 487-488.)

Fourth, the Permittees have requested permit coverage in lieu of compliance with the complete prohibition against the discharge of pollutants contained in federal Clean Water Act section 301, subdivision (a) (33 U.S.C. § 1311(a)) and in lieu of numeric restrictions on their discharges. (See finding C.5., supra.) To the extent that the local agencies have voluntarily availed themselves of the permit, the program is not a state mandate. (Accord *County of San Diego v. State of California* (1997) 15 Cal.4th 68, 107-108.) Likewise, where MS4 Permittees are regulated under a Best Management Practices (BMP) based storm water management program rather than end-of-pipe numeric limits, there exists no compulsion of a specific regulatory scheme that would violate the 10th Amendment to the United States Constitution. (See *City of Abilene v. U.S. E.P.A.* (5th Cir. 2003) 325 F.3d 657, 662-663 [noting that municipalities can choose between a management permit or a permit with numeric limits].) The local agencies' voluntary decision to file a report of waste discharge proposing a program-based permit is a voluntary decision not subject to subvention. (See *Environmental Defense Center v. USEPA* (9th Cir. 2003) 344 F.3d 832, 845-848.)

Fifth, the local agencies' responsibility for preventing discharges of waste that can create conditions of pollution or nuisance from conveyances that are within their ownership or control under state law predates the enactment of Article XIIIB, Section (6) of the California Constitution.

8. Under § 6217(g) of the Coastal Zone Act Reauthorization Amendments of 1990 (CZARA), Coastal States with approved coastal zone management programs are required to address non-point pollution impacting or threatening coastal water quality. CZARA addresses five sources of non-point pollution: 1) agriculture; 2) silviculture; 3) urban; 4) marinas; and 5) hydromodification. This Waste Discharge Requirement addresses the management measures required for the urban category and the hydromodification category, with the exception of septic systems.

9. The Regional Water Board addresses septic systems through the administration of non-Chapter 15 regulatory programs and the implementation of Regional Water Board Order No.R4-2004-0146. Septic systems are also addressed under State Assembly Bill (AB) 885 (2000). The Regional Water Board will implement and enforce regulations issued by the State Board pursuant to AB 885. Taken together, these State and Local agency requirements when imposed on septic system operators are expected to reduce the bacterial contamination of storm water from improperly maintained septic systems.

10. The State Water Board has issued waste discharge requirements for discharges from utility vaults (CAG990002). The Regional Water Board has issued waste discharge requirements for discharges from well heads and hydrostatic pipe testing (CAG674001). These discharges to the MS4 shall be conducted under coverage of a separate NPDES permit specific to that activity.

11. On May 18, 2000, the U.S. EPA established numeric criteria for priority toxic pollutants for the State of California (California Toxics Rule (CTR) 65 Fed. Reg. 31682 (40 CFR 131.38)) for the protection of human health and aquatic life. These apply as ambient water quality criteria for inland surface waters, enclosed bays and estuaries.

12. The State Water Board adopted a revised Water Quality Control Plan for Ocean Waters of California (Ocean Plan) in 2005. The California Ocean Plan establishes water quality objectives for California's ocean waters and provides the basis for regulation of wastes discharged into the State's coastal waters. It applies to point and nonpoint source discharges. The Ocean Plan identifies the applicable beneficial uses of marine waters that include preservation and enhancement of designated Areas of Special Biological Significance (ASBS) (now called "State Water Quality Protection Areas") and establishes a set of narrative and numerical water quality objectives designed to protect beneficial uses. The SWRCB adopted the California Ocean Plan, and both the SWRCB and the six coastal Regional Water Quality Control Boards (RWQCBs) implement and interpret the California Ocean Plan..

13. This Regional Water Board adopted a revised Water Quality Control Plan (Basin Plan) for the Los Angeles Region on June 13, 1994. The Basin Plan specifies the beneficial uses of Ventura County waterbodies and their tributary streams, and contains both narrative and numerical water quality objectives for these receiving waters. The following beneficial uses identified in the Basin Plan apply to all or portions of each watershed covered by this Order:
    (a) Municipal and domestic supply
    (b) Agricultural supply
    (c) Industrial service supply
    (d) Industrial process supply
    (e) Ground water recharge
    (f) Freshwater replenishment
    (g) Navigation
    (h) Hydropower generation
    (i) Water contact recreation
    (j) Non-contact water recreation
    (k) Ocean commercial and sport fishing
    (l) Warm freshwater habitat
    (m) Cold freshwater habitat
    (n) Preservation of Areas of Special Biological Significance
    (o) Saline water habitat
    (p) Wildlife habitat
    (q) Preservation of rare and endangered species
    (r) Marine habitat
    (s) Fish migration
    (t) Fish spawning
    (u) Shellfish harvesting

14. On March 22, 1999 the Consent Decree in Heal the Bay, Inc.; Santa Monica Baykeeper, Inc. v. Browner, Case No. 98-4825 SBA was approved. Under Establishment of TMDLs- The parties understand that California has the initial opportunity pursuant to § 303(d) of the CWA to adopt and submit to U.S. EPA for approval TMDLs to be established under this Consent Decree. TMDLs developed by Regional Water Boards are generally adopted through Basin Plan amendments. Basin plan amendments adopted by the State Board pursuant to Water Code section 13246, and the regulatory portions must be approved by the Office of Administrative Law pursuant to Government Code section 11353(b). TMDLs established pursuant to CWA section 303(d)(1) must be submitted to U.S. EPA for approval pursuant to section 303(d)(2), and incorporated into the state's water quality management plan.

15. The Regional Water Board has adopted amendments to the Basin Plan, to incorporate TMDLs for the following:
    (a) The following TMDLs have been or will be incorporated into the Basin Plan within the term of the Order.

(1) Santa Clara River - Nitrogen Compounds
   (A) Regional Water Board Resolution No. 2003-011
   (B) State Water Board Resolution No. 2003-0073
   (C) OAL file No. 04-0123-35
   (D) U.S. EPA approval date March 18, 2004
   (E) Final fee exemption date March 23, 2004 (effective date).
   (F) Compliance is 1 year after effective date (March 23, 2005)

(2) Malibu Creek and Lagoon - Bacteria.
   (A) Regional Water Board Resolution No. 2004-019
   (B) State Water Board Resolution No. 2005-0072
   (C) OAL file No. 05-1018-03 S
   (D) U.S. EPA approval date January 10, 2006
   (E) Final fee exemption date January 24, 2006 (effective date)
   (F) Compliance for Summer Dry is 3 years after effective date (January 24, 2009)
   (G) Compliance for Winter Dry is 6 years after effective date (January 24, 2012)
   (H) Compliance for Wet Weather is 10 years after effective date (January 24, 2016), which is beyond the term of this Order

(3) Toxicity, Chlorpyrifos and Diazinon in the Calleguas Creek, Its Tributaries and Mugu Lagoon.
   (A) Regional Water Board Resolution No. 2005-009
   (B) State Water Board Resolution No. 2005-0067
   (C) OAL file No. 05-1110-02 S
   (D) U.S. EPA approval date March 14, 2006
   (E) Final fee exemption date March 24, 2006 (effective date)
   (F) Compliance for Toxicity and Interim WLA is effective date (March 24, 2006)
   (G) Compliance for Final WLA is 2 years after effective date (March 24, 2008)

(4) Organochlorine (OC) Pesticides, Polychlorinated Biphenyls (PCBs), and Siltation in Calleguas Creek, Its Tributaries and Mugu Lagoon.
   (A) Regional Water Board Resolution No. 2005-010
   (B) State Water Board Resolution No. 2005-0068
   (C) OAL file No. 05-1206-03 S
   (D) U.S. EPA approval date March 14, 2006
   (E) Final fee exemption date March 24, 2006 (effective date)
   (F) Compliance for Interim WLA is effective date (March 24, 2006)
   (G) Compliance for Final WLA is 20 years after effective date (March 24, 2026), which is beyond the term of this Order

(5) Calleguas Creek Watershed Metals

(A) Regional Water Board Resolution No. 2006-012
(B) State Water Board Resolution No. 2006-0078
(C) OAL file No. 06-1222-015 S
(D) U.S. EPA approval date March 26, 2007
(E) Final fee exemption date March 27, 2007 (effective date)
(F) Compliance for Interim WLA is effective date (March 27, 2007)
(G) Compliance for Final WLA is Within 15 years after the effective date (March 27, 2022), which is beyond the term of this Order

(6) Revolon Slough & Beardsley Wash Trash TMDL
(A) Regional Water Board Resolution No. 2007-007
(B) State Water Board Resolution No 2007-0076
(C) OAL file No 2007-1227-05 S
(D) U.S. EPA approval date February 27, 2008
(E) Final fee exemption date March 6, 2008 (effective date)
(F) Compliance for Trash Monitoring & Reporting Plan Submittal is 6 months from effective date (September 6, 2008)
(G) Compliance for Final WLA is 8 years from effective date (March 6, 2016)

(7) Ventura River Estuary Trash TMDL
(A) Regional Water Board Resolution No. 2007-008
(B) State Water Board Resolution No 2007-0072
(C) OAL file No 2007-1227-01 S
(D) U.S. EPA approval date February 27, 2008
(E) Final fee exemption date March 6, 2008 (effective date)
(F) Compliance for Trash Monitoring & Reporting Plan Submittal is 6 months from effective date (September 6, 2008)
(G) Compliance for Final WLA is 8 years from effective date (March 6, 2016)

(8) Harbor Beaches of Ventura County Bacteria TMDL
(A) Regional Water Board Resolution No. 2007-017
(B) State Water Board Resolution No 2008-0072
(C) OAL file No 2007-1023-01 S
(D) U.S. EPA approval date December 18, 2008
(E) Final fee exemption date January 17, 2009 (effective date)

16. The Regional Water Board adopted and approved requirements for new development and significant redevelopment projects in Ventura County to control the discharge of storm water pollutants in post-construction storm water, on January 26, 2000, in Board Resolution No. R-00-02. The Regional Water Board Executive Officer issued the approved Standard Urban Storm Water Mitigation Plans (SUSMPs) on March 8, 2000 for Los Angles County and the Cities in Los Angeles County. Since 2000, new development and redevelopment water quality criteria have been implemented by the Permittees to be consistent with SUSMP. The State Board affirmed the Regional

Water Board action and SUSMPs in State Board Order No. WQ 2000-11, issued on October 5, 2000.

(a) A statewide policy memorandum (dated December 26, 2000), which interprets the Order to provide broad discretion to Regional Water Boards and identifies potential future areas for inclusion in SUSMPs and the types of evidence and findings necessary. Such areas include ministerial projects, projects in environmentally sensitive areas, and water quality design criteria for Retail Gasoline Outlets (RGOs, see Part 6 for definition). The Regional Water Board properly justified the extensions of SUSMPs and water quality criteria to ministerial projects, projects in environmentally sensitive areas, and RGOs, during the adoption of Regional Water Board Order 01-182. The Regional Water Board's action was upheld by the County of Los Angeles Superior Court (In Re: *County of Los Angeles v. State Water Resources Control Board* (2006) 143 Cal.App.4th 985).

(b) The State Water Board's Chief Counsel interpreted the Order to encourage regional solutions and endorsed a mitigation fund or "bank" as alternatives for new development and significant redevelopment. The Regional Water Board has included provisions for regional solutions and the establishment of a mitigation bank in this Order.

17. The Regional Water Board supports Watershed Management planning to address water quality protection in the region. The objective of the Watershed Management planning is to provide a comprehensive and integrated strategy towards water resource protection, enhancement, and restoration while balancing economic and environmental impacts within a hydrologically defined drainage basin or watershed. It emphasizes cooperative relationships between regulatory agencies, the regulated community, environmental groups, and other stakeholders in the watershed to achieve the greatest environmental improvements with available resources.

18. To facilitate compliance with federal regulations, the State Water Board has issued the following 4 Statewide General NPDES Permits associated with storm water:

(a) Industrial General Permit (IASGP- Industrial Activities Storm Water General Permit), NPDES No. CAS000001, issued on November 19, 1991, reissued on September 17, 1992 and April 17, 1997, currently under review for reissuance.

(b) Construction General Permit (CASGP- Construction Activities Storm Water General Permit), NPDES No. CAS000002, issued on August 20, 1992, reissued August 19, 1999, and September 2, 2009.

(c) Small Linear Underground/ Overhead Construction Projects General Permit (small LUPs), NPDES No. CAS000005, issued on June 18, 2003.

(d) Small MS4 Permit WQ Order No. 2003-0005-DWQ, NPDES No. CAS000004, adopted on April 30, 2003.

19. Facilities discharging storm water associated with industrial activities, construction projects that disturb one or more acres of soil, or construction projects that disturb less than one acre but are part of a larger common plan of development or sale that in

total disturbs 1 or more acres, and construction activities associated with small linear underground/ overhead projects that result in land disturbances greater than one acre, but less than five acres (small LUPs), are all required to obtain individual NPDES permits for storm water discharges, or be covered by the statewide General Permits by completing and filing a Notice of Intent (NOI) with the State Board. The U.S. EPA guidance anticipates coordination of the state-administered programs for industrial and construction activities with the local agency program to reduce pollutants in storm water discharges to the MS4.

20. State Water Board Resolution No. 68-16 contains the state Antidegradation Policy, titled "Statement of Policy with Respect to Maintaining High Quality Waters in California" (Resolution 68-16), which applies to all waters of the state, including ground waters of the state, whose quality meets or exceeds (is better than) water quality objectives. Resolution No. 68-16 is considered to incorporate the federal Antidegradation Policy (40 CFR 131.12) where the federal policy applies, (State Water Board Order WQO 86-17). Administrative policies that implement both, federal and state antidegradation policies acknowledge that an activity that results in a minor water quality lowering, even if incrementally small, can result in violation of Antidegradation Policies through cumulative effects, for example, when the waste is a cumulative, persistent, or bioaccumulative pollutant.

    (a) Federal Antidegradation Policy (40 CFR 131.12) states that the State shall develop and adopt a statewide antidegradation policy and identify the methods for implementing such policy pursuant to this subpart. The antidegradation policy and implementation methods shall, at a minimum, be consistent with the following:

    (1) Existing instream water uses and the level of water quality necessary to protect the existing uses shall be maintained and protected.

    (2) Where the quality of the waters exceed levels necessary to support propagation of fish, shellfish, and wildlife and recreation in and on the water, that quality shall be maintained and protected unless the State finds, after full satisfaction of the intergovernmental coordination and public participation provisions of the State's continuing planning process, that allowing lower water quality is necessary to accommodate important economic or social development in the area in which the waters are located. In allowing such degradation or lower water quality, the State shall assure water quality adequate to protect existing uses fully. Further, the State shall assure that there shall be achieved the highest statutory and regulatory requirements for all new and existing point sources and all cost-effective and reasonable best management practices for nonpoint source control.

    (3) Where high quality waters constitute an outstanding National resource, such as waters of National and State parks and wildlife refuges and waters of exceptional recreational or ecological significance, that water quality shall be maintained and protected.

(4) In those cases where potential water quality impairment associated with a thermal discharge is involved, the antidegradation policy and implementing method shall be consistent with section 316 of the Act.

(b) State Water Board Resolution No. 68-16 establishes essentially a 2-step process for compliance with the policy.

(1) Step 1- if a discharge will degrade high quality water, the discharge may be allowed if any change in water quality:

(A) Will be consistent with maximum benefit to the people of the State.

(B) Will not unreasonably affect present and anticipated beneficial use of such water.

(C) Will not result in water quality less than that prescribed in state policies (e.g., water quality objectives in Water Quality Control Plans).

(2) Step 2- any activities that result in discharges to high quality waters are required to:

(A) Meet waste discharge requirements that will result in the best practicable treatment or control of the discharge necessary to avoid a pollution or nuisance.

(B) Maintain the highest water quality consistent with the maximum benefit to the people of the State.

21. The State Water Board on June 17, 1999, adopted Order No. WQ 99-05, which specifies standard receiving water limitation language to be included in all municipal storm water permits issued by the State and Regional Water Boards.

22. Cal. Water Code § 13263(a) requires that waste discharge requirements issued by Water Boards shall implement any relevant water quality control plans that have been adopted; shall take into consideration the beneficial uses to be protected and the water quality objectives reasonably required for that purpose; other waste discharges; and the need to prevent nuisance.

23. Clean Water Act section 402(p)(3)(B)(iii) requires municipal separate storm sewer system (MS4) operators to reduce the discharge of pollutants to the "maximum extent practicable" (MEP). The MEP requirement is analogous to a technology-based requirement in that it focuses upon the feasibility of pollutant reduction measures rather than achievement of water quality standards in the receiving waters to achieve improvements in the quality of the storm water that is discharged. Compliance with the MEP requirement can range from implementation of structural and nonstructural best management practices to installation of end-of-pipe treatment systems. MEP generally provides the MS4 operators the flexibility to determine what controls should be implemented through the development of a storm water management plan, subject to the Regional Water Board's approval. Nevertheless, MEP does not define the limits of pollution control measures that may be required of MS4 operators, and the requirement to implement controls that reduce pollutants to the MEP is not limited by the goal of attaining water quality standards. In some circumstances, compliance with MEP may result in controls more stringent than applicable WQS,

and in others, less stringent. The Regional Water Board may use its discretion to impose other provisions beyond MEP, as it determines appropriate for the control of pollutants, including ensuring strict compliance with water quality standards. (Defenders of Wildlife v. Browner (1999) 191 F.3d 1159, 1168.)

24. The California Supreme Court has ruled that although Water Code section 13263 requires the Water Boards to consider the factors set forth in Water Code section 13241 when issuing an NPDES permit, the Water Boards may not consider the factors to justify imposing pollutant restrictions that are less stringent than the applicable federal regulations require (City of Burbank v. State Water Resources Control Bd. (2005) 35 Cal.4th 613). However, when the pollutant restrictions in an NPDES are more stringent than federal law requires, Water Code section 13263 requires that the Water Boards consider the factors described in section 13241 as they apply to those specific restrictions.

25. The City of Burbank case related to NPDES permits for publicly owned treatment works, not permits for municipal separate storm sewer systems (MS4s). Among other requirements, federal law requires MS4 permits to include requirements to effectively prohibit non-storm water discharges into the storm sewers, in addition to requiring controls to reduce the discharge of pollutants to the maximum extent practicable. Therefore, a 13241 analysis is not required for permit requirements that implement the effective prohibition on the discharge of non-storm water into the MS4, or for practicable controls to reduce the discharge of pollutants to the maximum extent, as those requirements are mandated by federal law.

26. The requirements in this Order may be more specific or detailed than those enumerated in federal regulations under 40 CFR 122.26 or in U.S. EPA guidance. However, the requirements have been designed to be consistent with and within the federal statutory mandates described in CWA § 402(p)(3)(B)(ii) and (iii) and the related federal regulations. Consistent with federal law, all of the conditions in this permit could have been included in a permit adopted by U.S. EPA in the absence of the in lieu authority of California to issue NPDES permits.

27. The Board finds that all requirements in this order are practicable. Moreover, while commenters have alleged that the permit requirements are "beyond MEP," no commenter has presented evidence that demonstrates that any particular permit requirement is not actually practicable.

28. Notwithstanding findings 23 through 27, the Regional Water Board has developed an economic analysis of the permit's requirements, consistent with Water Code section 13241. That analysis is contained in the "Economic Considerations of the Proposed Storm Water (Wet Weather) and Non-Storm Water (Dry Weather) Discharges form the Municipal Separate Storm Sewer Systems within the Ventura County Watershed Protection District, County of Ventura and the Incorporated Cities Therein, June 2, 2008, which is contained in the administrative record for this Order. The Regional

Water Board has considered all of the evidence that has been presented regarding the 13241 factors in adopting this permit, both as contained in the economic analysis and as reflected in the fact sheet and comments (and responses thereto) submitted to the many drafts of this permit. The Regional Water Board finds that the requirements in this Order are reasonably necessary to protect beneficial uses identified in the Basin Plan, and the economic information related to costs of compliance and other 13241 factors are not sufficient to justify failing to protect those beneficial uses. Where appropriate, additional time to implement certain measures and achieve water quality objectives can be provided through the iterative storm water management plan process.

F. Implementation

1. The California Environmental Quality Act (CEQA) (Cal. Pub. Resources Code § 2100 et seq.) requires that public agencies consider the environmental impacts of the projects they approve for development. CEQA applies to projects that are considered discretionary (a governmental agency can use its judgment in deciding whether and how to carry out or approve a project, § 15357) and does not apply to ministerial projects (the law requires a governmental agency to act on a project in a set way without allowing the agency to use its own judgment, § 15369). A ministerial project may be made discretionary by adopting local ordinance provisions or imposing conditions to create decision-making discretion in approving the project. In the alternative, Permittees may establish standards and objective criteria administratively for storm water mitigation for ministerial projects. For water quality purposes regardless of whether a project is discretionary or ministerial, the Regional Water Board considers that all new development and significant redevelopment activity in specified categories, that receive approval or permits from a municipality, are subject to storm water mitigation requirements in a manner that is consistent with and complies with the provisions of CEQA.

2. The objective of this Order is to ensure that discharges from the MS4 in Ventura County comply with water quality standards, including protecting the beneficial uses of receiving waters. To meet this objective, the Order requires that Best Management Practices (BMPs) will be implemented to reduce the discharge of pollutants in storm water to the maximum extent practicable (MEP), and achieve water quality objectives and standards. The U.S. EPA envisioned that municipal storm water programs would be implemented in an iterative manner and improved with each iteration by using information and experience gained during the previous permit term (*Interpretative Policy Memorandum on Reapplication Requirements for MS4 permits* - 61 Fed. Reg. 41697). Municipalities are required to evaluate what is effective and make improvements in order to protect beneficial uses of receiving waters. This Order requires implementation of an effective combination of pollution control and pollution prevention measures, education, public outreach, planning, and implementation of source control BMPs and Structural and Treatment Control BMPs.

The better–tailored BMPs combined with the performance objectives outlined in this Order have the purpose of attaining water quality objectives and standards (*Interim Permitting Approach for Water Quality-Based Effluent Limitations in Storm Water Permits*- 61 Fed. Reg. 43761). Where WLAs have been adopted for storm water (wet weather) and non-storm water (dry weather) discharges from MS4s, this Order requires Permittees to implement controls to achieve the WLAs within the compliance schedule provided in the TMDLs.

3. The implementation of measures set forth in this Order are reasonably expected to reduce the discharge of pollutants conveyed in storm water discharges into receiving waters, and to meet the TMDL WLAs for discharges from MS4s that have been adopted by the Regional Water Board.

4. The U.S. EPA has recommended that all future TMDLs and TMDL amendments be expressed as daily increments consistent with a federal court ruling (*Friends of the Earth, Inc. v. EPA, et al.* No. 05-5015 (D.C. Cir. 2006)). However, this interpretation does not affect the discretionary authority of the Regional Water Board to express NPDES permit limits and conditions in non daily terms because there is no express or implied statutory limitation (CWA §502(11)) (*Establishing TMDL "Daily Loads" in Light of the Decision by the U.S. Court of Appeals for the D.C. Circuit in Friends of the Earth, Inc. v. EPA, et al. (April 2006) and Implications for NPDES Permits*, U.S. EPA Office of Water, memorandum, Nov 15, 2006). This Order translates MS4 TMDL WLAs adopted by the Regional Water Board into forms "consistent with the assumptions and requirements of the TMDL".

5. During the term of the Order, the Permittees shall implement all necessary control measures to reduce pollutant(s) which cause or continue to cause or contribute to water quality impairments, but for which TMDLs have not yet been developed or approved, to eliminate the water quality impairment(s). Successful efforts to reverse the wet weather impairments during the permit term for such pollutants, may avoid the need for a WLA for wet weather or the need to develop a TMDL in the future.

6. This Order promotes land development and redevelopment strategies that consider water quality and water management benefits associated with smart growth techniques. Such measures may include hydromodification mitigation requirements, minimization of effective impervious area, integrated water resources planning, and low impact development guidelines. (Reference: *Protecting Water Resources with Smart Growth*, EPA 231-R- 04-002, U.S. EPA 2004; *Using Smart Growth Techniques as Storm Water Best Management Practices,* EPA 231-B-05-002, U.S. EPA 2005; *Parking Spaces/Community Places: Finding the Balance through Smart Growth Solutions*, EPA 231-K-06-001, U.S. EPA 2006; *Protecting Water Resources with Higher-Density Development*, EPA 231-R-06-001, U.S. EPA 2006.)

7. The implementation of an effective Public Information and Participation Program is a critical component of a storm water management program. While commercial and

industrial facilities are traditionally subject to multiple environmental regulations and receive environmental protection guidance from multiple sources, the general public, in comparison, receives significantly less education in environmental protection. An effective Public Information and Participation Program is required because:

(a) Activities conducted by the public such as vehicle maintenance, improper household waste materials disposal, improper pet waste disposal and the improper application of fertilizers and pesticides have the potential to generate a significant amount of pollutants that could be discharged in storm water.

(b) An increase in public knowledge of storm water regulations, proper storage and disposal of household wastes, proper disposal of pet wastes and appropriate home vehicle maintenance practices can lead to a significant reduction of pollutants discharged in storm water.

8. This Order also provides flexibility for Permittees to seek authorization from the Regional Water Board Executive Officer to substitute a BMP under this Order with an alternative BMP, if they can provide information and documentation on the effectiveness of the alternative, equal to or greater than the prescribed BMP in meeting the objectives of this Order.

9. This Order contemplates that the Permittees are responsible for considering potential storm water impacts when making planning decisions in order to fulfill the Permittees' CWA requirement to reduce the discharge of pollutants in municipal storm water to the MEP and attain water quality objectives from new development and redevelopment activities. However, the Permittees retain authority to make the final land-use decisions and retain full statutory authority for deciding what land uses are appropriate at specific locations within each Permittee's jurisdiction. This Order and its requirements are not intended to restrict or control local land use decision-making authority.

10. The State Water Board amended the Policy for the Implementation of Toxics Standards In Inland Surface Waters, Enclosed Bays and Estuaries of California (State Implementation Policy – SIP) on February 24, 2005. The SIP does not apply directly to the stormwater discharges. However, this Order includes a Monitoring Program that incorporates Minimum Levels (MLs) established under the State Implementation Policy. The MLs represent the lowest quantifiable concentration for priority toxic pollutants that is measurable with the use of proper method-based analytical procedures and factoring out matrix interference. The SIP's MLs therefore represent the best available science for determining MLs and are appropriate for a storm water monitoring program. The use of MLs allows the detection of toxic priority pollutants at concentrations of concern using recent advances in chemical analytical methods.

11. The International Storm Water Best Management Practices (BMP) Database was established in 1996 as a cooperative initiative between the U.S. EPA and the American Society of Civil Engineers (ASCE) to provide scientifically sound information to improve the design, selection and performance of storm water BMPs.

The BMP database includes standardized BMP monitoring and reporting protocols, a storm water BMP database, BMP performance evaluation protocols, and BMP monitoring guidance. The storm water BMP database is updated approximately semi-annually to add new BMP studies and performance data. The International Storm Water Database is now maintained by the Water Environment Research Foundation (WERF).

12. This Order is not intended to prohibit the inspection for or abatement of vectors by the State Department of Public Health or local vector agencies in accordance with CA Health and Safety Code, § 116110 et seq. Certain Treatment Control BMPs if not properly designed, operated or maintained may create habitats for vectors (e.g. mosquitoes and rodents). This Order contemplates that the Permittees will closely cooperate and collaborate with local vector control agencies and the State Department of Public Health for the implementation, operation, and maintenance of Treatment Control BMPs in order to minimize the risk to public health from vector borne diseases.

13. This Order contemplates that Permittees will ensure that implemented Treatment Control BMPs will not pose a safety or health hazard to the public. This Order contemplates that Permittees will ensure that the maintenance of implemented Treatment Control BMPs will comply with all applicable health and safety regulations, such as, but not limited to requirements for worker entry into confined spaces under OSHA Safety and Training education, § 1926.21(b)(6)(i).

14. This Order incorporates presumptive BMPs to reduce pollutants in storm water discharges from construction sites to the MEP. The BMPs are identified in Table 6 (BMPs at Construction sites less than 1 acre), Table 7 (BMPs at Construction Sites 1 acre or greater but less than 5 acres), and Table 8 (BMPs at Construction sites 5 acres or greater). These BMPs include erosion control, sediment control, and construction site waste management practices. The BMPs listed in part 4.F of the Order were selected based on the Water Boards' experience of regulating such sites since 1992, and are referenced in the *California Stormwater Quality Association (CASQA) Storm Water Best Management Practice Handbook Construction (January 2003)* and from the *Stormwater Quality Handbooks, Project Planning and Design Guide, Stormwater Pollution Prevention Plan (SWPPP) and Water Pollution Control Plan (WPCP) Preparation Manual, Construction Site Best Management Practices (BMPs) Reference Manual, March 2007* (Caltrans Document Number CTSW-RT-06-171.11-1) which serve as an industry standard for California. The BMPs identified in the Tables are technically feasible, practicable, and cost-effective. Where an identified BMP may be impracticable on a particular site, this Order includes a provision to select and implement an alternative BMP, through the BMP substitution provisions in subpart 4.A.2.

15. This Order incorporates presumptive BMPs to reduce pollutants in storm water discharges from commercial and industrial sites to the MEP. The BMPs are

identified in Table 2 (BMPs at Restaurants), Table 3 (BMPs at Automotive Service Facilities), Table 4 (BMPs at Retail Gasoline Outlets), and Table 5 (BMPs at Nurseries). These BMPs include the implementation of good housekeeping practices designed to control pollutants at the source, promote the use of proper waste management practices, and implement control practices to keep pollutants away from any entrance to the storm drainage system. The BMPs listed in part 4.D of the Order were selected based on the Water Boards' experience of regulating such sites since 1992 and referenced in the California Stormwater Quality Association (CASQA) Storm Water Best Management Practice Handbook Commercial/Industrial Activity (January 2003) and from the Caltrans Storm Water Quality Handbook Maintenance Staff Guide May 2003 (Caltrans Document Number CTSW-RT-02-057), which serve as an industry standard for California. The BMPs identified in the Tables are technically feasible, practicable, and cost-effective. Where an identified BMP may be impracticable, this Order includes a provision to select and implement an alternative BMP, through the BMP substitution provisions in subpart 4.A.2.

16. This Order incorporates presumptive BMPs to reduce pollutants in storm water discharges from Public Agency Activities to the MEP. The BMPs are identified in Table 10 (BMPs at Vehicle Maintenance/ Material Storage Facilities/ Corporation Yards). These BMPs include the implementation of good housekeeping practices designed to control pollutants at the source, promote the use of proper waste management practices, implement control practices to keep pollutants away from any entrance to the storm drainage system and from being deposited or discharged directly into waters of the U.S. The BMPs listed in part 4.G of the Order were selected based on the Water Boards' experience of regulating such sites since 1990, and are referenced in the Caltrans Storm Water Quality Handbook Maintenance Staff Guide May 2003 (Caltrans Document Number CTSW-RT-02-057), which serves as a statewide standard for the California Department of Transportation (Caltrans). The BMPs identified in the Table are technically feasible, practicable, and cost-effective, and are the standard of practice for Caltrans sites statewide. Where an identified BMP may be impracticable, this Order includes a provision to select and implement an alternative BMP, through the BMP substitution provisions in subpart 4.A.2.

17. This Order incorporates BMPs to ensure that authorized Non-Storm Water Discharges are not a source of pollutants to the MS4, Table 1 (Required Conditions for Non-Storm Water Discharges). The BMPs included are for the purpose of dechlorination and/or for prevention of erosion and sediment loss, or to reduce other harmful pollutants during the discharge of authorized non-storm water discharges to the MS4. The BMPs listed in part 1.A of the Order were selected from the *American Water Works Association AWWA Guidelines For The Development Of Your Best Management Practices (BMP) Manual For Drinking Water System Releases Developed by the CA-NV AWWA Environmental Compliance Committee (2005)* which serves as an industry standard for California, from the results of studies directed by the Los Angeles Water Board, - *Evaluation of Non-Storm Water Discharges to California Storm Drains and Potential Policies for Effective*

Prohibition Methods, Final Report, University of California, Los Angeles, Contract No. 5-104-140-0 (1997), and *Water Quality Concerns and Regulatory Controls for Non Storm Water Discharges to Storm Drains*, Duke L.D. and M. Kihara, Journal of the American Water Resources Association, Vol. 34: 661-676, (1998), and from the Water Boards' experience of controlling authorized non-storm discharges to the MS4 since 1990. The BMPs identified in the Table are technically feasible, practicable, and cost-effective. Where an identified BMP may be impracticable, this Order includes a provision to select and implement an alternative BMP, through the BMP substitution provisions in subpart 4.A.2.

18. In accordance with Federal regulations at 40 CFR 124.8, a Fact Sheet has been prepared to explain the principal facts and the significant factual, legal, methodological, policy, and economic matters considered in preparing the Order. This Fact Sheet has been made a part of the Administrative Record.

19. The State Water Board adopted statewide General Waste Discharge Requirements for Sanitary Sewer Systems, (WQ Order No. 2006-0003) on May 2, 2006, to provide a consistent, statewide regulatory framework to address sanitary sewer overflows ("SSO Orders"). The SSO Order establishes requirements for public agencies that own or operate sanitary sewer systems to develop and implement sewer system management plans and to report SSOs. SSOs that enter MS4s have the potential to impair the recreational use of receiving waters, and to harm public health. This Order establishes coordination, response, and notification requirements for MS4 Permittees when SSOs result in a discharge to the MS4 system.

20. This Order takes into consideration the housing needs in the area under the Permittees' jurisdiction by balancing the implementation of Smart Growth and Low Impact Development techniques with the protection of the water resources of the region. Although not required, the Regional Water Board considered the need for housing and the appropriate techniques to allow for reasonable development while protecting the receiving waters from degradation.

21. This Order may have an effect on costs required for compliance with the provisions contained herein. Although not required, the Regional Water Board has considered costs in preparing this Order. Though also not required, the Regional Water Board has also considered the factors set forth in Water Code section 13241.

G. Public Notification

1. The issuance of waste discharge requirements pursuant to California Water Code section 13370 et seq. is exempt from the California Environmental Quality Act in accordance with California Water Code section 13389. *County of Los Angeles et al., v. California Water Boards et al.*, (2006), 143 Cal.App.4th 985.

2. The Regional Water Board has notified the Permittees, and interested agencies and persons of its intent to reconsider Order No. 09-0057 and issue waste discharge requirements for this discharge, and has provided them with an opportunity to make statements and submit their comments.

3. The Regional Water Board staff has conducted more than 35 meetings from February 9, 2007 through December 19, 2008, with Permittees, their representatives (Larry Walker Associates, and Somach, Simmons & Dunn), and various stakeholders (Building Industry Association of Southern California/Greater Los Angeles Ventura Chapter (BIA/LAV), California State Dept. of Public Health, Calleguas Municipal Water District, California Stormwater Quality Association (CASQA), City of Downey, City of Los Angeles-EMD, Coalition for Practical Regulation (CPR), Construction Industry Coalition on Water Quality (CICWQ), County of Orange, Geosyntec Consultants, Golden State, Heal the Bay; Local Government Commission, Los Angeles City; Los Angeles County Department of Public Works, Los Angeles County-SD, Los Angeles Department of Water and Power, Metropolitan Water District, Natural Resources Defense Council (NRDC), Richard Watson and Associates, San Bernardino Flood Control District, Santa Monica Bay Restoration Commission, Southern California Coastal Water Research Project, University of California Sea Grant, Ventura CoastKeeper). On April 5, 2007 and September 20, 2007, the Regional Water Board conducted workshops to discuss drafts of the NPDES Order and received input from the Permittees and the public regarding proposed changes.

4. This Order shall serve as a NPDES permit, pursuant to CWA § 402, and shall take effect on (Order adoption date) provided the Regional Administrator of the U.S. EPA has no objections.

5. Pursuant to Cal. Water Code § 13320, any aggrieved party may seek review of this Order by filing a petition with the State Board within 30 days of the date of adoption of the Order by the Regional Water Board. A petition must be sent to:

   State Water Resources Control Board
   Office of the Chief Counsel
   P.O. Box 100
   Sacramento, CA 95812-0100

6. This Order may be modified or alternatively revoked or reissued prior to its expiration date or any administrative extension thereto, in accordance with 40 CFR 122.41(f) and 122.62.

IT IS HEREBY ORDERED that the Permittees, in order to meet the provisions contained in Division 7 of the Cal. Water Code and regulations adopted thereunder, and the provisions of the CWA and regulations adopted thereunder, shall comply with the following:

PART 1 - DISCHARGE PROHIBITIONS

A. Prohibitions - Non-Storm Water Discharges

1. The Permittees shall, within their respective jurisdictions, effectively prohibit non-storm discharges into the MS4 and receiving waters, except where such discharges:
   (a) Originate from a State, Federal, or other source for which they are pre-empted from regulating by State or Federal law; or
   (b) Are covered by a separate individual or general NPDES permit, or conditional waiver for irrigated lands; or
   (c) Flows from fire fighting activities.
   (d) Fall within one of the categories below, are not a source of pollutants that exceed water quality standards, and meet all conditions where specified by the Regional Water Board Executive Officer:
      (1) Category A – Natural flows
         (A) Stream diversions authorized by the State Water Board
         (B) Natural springs and rising ground water
         (C) Uncontaminated ground water infiltration [as defined by 40 CFR 35.2005(20)][1]
         (D) Flows from riparian habitats or wetlands
      (2) Category B – Flows incidental to urban activities, providing conditions listed in table below:
         (A) Discharges from potable water sources[2]
         (B) Gravity flow from foundation, footing and crawl space drains.
         (C) Air conditioning condensate
         (D) Reclaimed and potable landscape irrigation runoff
         (E) Dechlorinated/ debrominated swimming pool discharges [see def. part 6]
         (F) Non-commercial car washing by residents or non-profit organizations
         (G) Sidewalk rinsing
         (H) Pooled non-storm water from treatment BMPs[3]

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[1] NPDES permit for ground water dewatering is required within the Los Angeles Region including Ventura County.

[2] The term applies to low volume, incidental and infrequent releases that are innocuous from a water quality perspective. Those releases for dewatering or hydro-testing or flushing of water supply and distribution mains and incidental and infrequent releases from well heads shall be allowed with the implementation of appropriate BMPs until such time as a new General Permit is adopted that addresses those types of releases. Discharges from hydrostatic pipe testing shall be subject to separate NPDES general permit coverage (CAG674001) and discharges from utility vaults shall be conducted under coverage of a separate NPDES permit specific to that activity.

[3] All storm water BMPs shall at a minimum be maintained at a frequency as specified by the manufacturer, and designed to drain within 72 hours of the end of a rain. Storm water treatment BMPs may be drained to the MS4 under this Order if the discharge is not a source of pollutants. Sediments shall be disposed of properly, in compliance with all applicable local, state, and federal policies, acts, laws, regulations, ordinances, and statutes.

Table 1 – Required Conditions for Non-Storm Water Discharges

Type of Discharges:	Conditions under which allowed:	Required conditions for discharge to occur:
Stream diversions permitted by the State Board	Authorization by the State Water Board	Permittees shall comply with all conditions in the authorization.
Natural springs and rising ground water	1. Ground water dewatering requires a separate NPDES permit. 2. Segregate flow to prevent introduction of pollutants.	Permittees shall comply with all conditions in the authorization.
Uncontaminated ground water infiltration [as defined by 40 CFR 35.2005(20)] (Utility vault dewatering requires a separate NPDES permit.)	NPDES permit for ground water dewatering is required within the Los Angeles Region including Ventura County	Permittees shall comply with all conditions in the authorization.
Flows from riparian habitats or wetlands	Provided that all necessary permits or authorizations are received prior to diverting the stream flow.	Permittees shall comply with all conditions in the authorization.
Discharges from potable water sources	See Footnote #2. Provided discharges from water lines and potable water sources shall be dechlorinated, pH adjusted if necessary, reoxygenated, and volumetrically and velocity controlled to prevent resuspension of sediments.	See Footnote #2. To be discharged, this type of water shall be dechlorinated using aeration and/ or sodium thiosulfate and/ or other appropriate means and/or be allowed to infiltrate to the ground. BMPs such as sand bags or gravel bags, or other appropriate means shall be utilized to prevent sediment transport. All sediments shall be collected and disposed of in a legal and appropriate manner.
Drains for foundation, footing and crawl drains	Dewatering requires a separate NPDES permit.	Permittees shall comply with all conditions in the authorization.
Air conditioning condensate	Segregation of flow to prevent introduction of pollutants. Percolation whenever possible.	Permittees shall comply with all conditions in the authorization.
Water from crawl space pumps	Dewatering requires a separate NPDES permit within the Los Angeles Region including Ventura County	Permittees shall comply with all conditions in the authorization.
Reclaimed and potable landscape irrigation runoff	Segregation of flow to prevent introduction of pollutants.	Implement conservation programs to minimize this type of discharge by using less water.
Dechlorinated/ debrominated	Where the discharge is not excepted by the sanitary sewer operator. Swimming pool	Pool water may be dechlorinated using time,

Type of Discharges:	Conditions under which allowed:	Required conditions for discharge to occur:
swimming pool discharges [see definition Part 6]	discharges are to be dechlorinated, pH adjusted if necessary, aerated to remove chlorine if necessary, and volumetrically and velocity controlled to prevent resuspension of sediments. Cleaning waste water and filter back wash shall not be discharged to municipal separate storm sewers. No discharges are allowed containing salts in excess of Water Quality Standards. Chlorine residual in discharge shall not exceed 0.1mg/L.	aeration, and/ or sodium thiosulfate.
Non-commercial car washing by residents or non-profit organizations	Preferably at a commercial carwash or designated area where wash water can percolate. Pumps or vacuums may be used to direct water to pervious areas.	Permittees shall comply with all conditions in the authorization.
Sidewalk rinsing	This may be undertaken only if high pressure low volume is used as described in the glossary under "Sidewalk Rinsing".	
Pooled storm water from treatment BMPs	All storm water BMPs shall at a minimum be maintained at a frequency as specified by the manufacturer. All storm water BMPs shall be designed to drain within 72 hours of the end of the rain event to avoid the breeding of vectors. Storm water treatment BMPs may be drained to the MS4 under this Order if the discharge is not a source of pollutants. The discharge shall cease before the discharge has become a source of a pollutant(s), (bottom sediment included). Sediments shall be disposed of properly, in compliance with all applicable local, state, and federal policies, acts, laws, regulations, ordinances, and statutes.	

2. If the Regional Water Board Executive Officer determines that any of the preceding categories of non-storm water discharges are a source of pollutants that exceed water quality standards, the Permittee(s) shall either:
   (a) Prohibit the discharge from entering the MS4; <u>or</u>
   (b) Authorize the discharge category and require implementation of appropriate or additional BMPs to ensure that the discharge will not be a source of pollutants; <u>or</u>
   (c) Require or obtain coverage under a separate RWQCB or SWRCB permit for discharge into the MS4.

PART 2 – RECEIVING WATER LIMITATIONS

1. Discharges from the MS4 that cause or contribute to a violation of water quality standards are prohibited.

2. Discharges from the MS4 of storm water, or non-storm water, for which a Permittee is responsible, shall not cause or contribute to a condition of nuisance.

3. The Permittee shall comply with Receiving Water Limitations 1 and 2 through timely implementation of control measures and other actions to reduce pollutants in the storm water discharges in accordance with the requirements of this Order including any modifications. The Permittees' Program shall be designed to achieve compliance with Receiving Water Limitations 1 and 2. If exceedance(s) of water quality objectives or water quality standards (collectively WQS) persist, notwithstanding implementation of this permit, the Permittees shall ensure compliance with Receiving Water Limitations 1 and 2 by complying with the following procedure:
   (a) Upon determination by either the Permittees or the Regional Water Board that discharges are causing or contributing to an exceedance of an applicable WQS, the Permittee(s) upstream of the point of discharge shall promptly notify and thereafter submit a report to the Regional Water Board Executive Officer that describes BMPs that are currently being implemented and additional BMPs that will be implemented to prevent or reduce any pollutants that are causing or contributing to the exceedance of WQSs. The report may be included with the Annual Report, unless the Regional Water Board Executive Officer directs an earlier submittal. The Regional Water Board Executive Officer may require modifications to the report.
   (b) Submit any modifications to the report required by the Regional Water Board Executive Officer within 30 days of notification.
   (c) Within 30 days following approval of the Report described above by the Regional Water Board Executive Officer, the Permittees shall revise their Program and monitoring program to incorporate the approved modified BMPs that have been and will be implemented, the implementation schedule, and any additional monitoring required.
   (d) Implement the revised Program and monitoring program according to the approved schedule.

4. Permittees shall annually report the effectiveness of BMPs in reducing exceedances of receiving water limitations. The Regional Water Board Executive Officer may direct implementation of additional BMPs if there are continuing or recurring exceedances of the same receiving water limitation.

PART 3 - STORM WATER QUALITY MANAGEMENT PROGRAM IMPLEMENTATION

A. General Requirements

1. Each Permittee shall, at a minimum, adopt and implement applicable terms of this Order within its jurisdictional boundary. The Principal Permittee shall be responsible for program coordination as described in this Order as well as compliance with applicable portions of the permit within its jurisdiction. This Order shall be implemented no later than July 8, 2010, unless a later date has been specified for a particular provision in this Order and provided the Regional Administrator of the U.S. EPA has no objections.

2. Each Permittee shall comply with the requirements of 40 CFR 122.26(d)(2) and implement programs and control measures so as to reduce the discharges of pollutants in storm water to the MEP and achieve water quality standards.

3. Each Permittee shall require that treatment control BMPs being implemented under the provisions of this Order shall be designed, at a minimum, to achieve the BMP performance criteria for storm water pollutants likely to be discharged as identified in Attachment "C", for an 85th percentile 24-hour runoff event determined as the maximized capture storm water volume for the area using a 48 to 72-hour draw down time, from the formula recommended in Urban Runoff Quality Management, WEF Manual of Practice No. 23/ASCE Manual of Practice No. 87, (1998). Expected BMP pollutant removal performance for effluent quality was developed from the WERF-ASCE/ U.S. EPA International BMP Database. Permittees shall select Treatment BMPs based on the primary class of pollutants likely to be discharged from the site/facility (e.g. metals from an auto repair shop). Permittees may develop guidance for appropriate Treatment BMPs for project type based on Attachment "C". For the treatment of pollutants causing impairments within the drainage of the impaired waterbody, permittees shall select BMPs from the top three performing BMP categories or alternative BMPs that are designed to meet or exceed the performance of the highest performing BMP for the pollutant causing impairment.

4. Each Permittee shall implement programs and measures to comply with the TMDLs' WLAs for the MS4 as specified in Part 5.

5. If TMDL requirements, including Implementation Plans and Reports, address substantially similar requirements as the MS4 permit, the Executive Officer may approve the applicable reports, plans, data or submittals under the applicable TMDL as fulfilling requirements under the MS4.

B. Legal Authority

1. Permittees shall possess the necessary legal authority to prohibit, including, but not limited to:
   (a) Illicit connections and illicit discharges, and to remove illicit connections.
   (b) The discharge of non-storm water to the MS4 from:
      (1) Washing or cleaning of gas stations, auto repair garages, or other types of automotive service facilities
      (2) Mobile auto washing, carpet cleaning, steam cleaning, sandblasting and other such mobile commercial and industrial operations
      (3) Areas where repair of machinery and equipment which are visibly leaking oil, fluid or antifreeze, is undertaken
      (4) Storage areas for materials containing grease, oil, or other hazardous substances, and uncovered receptacles containing hazardous materials
      (5) Swimming pools[1] that have a concentration greater than:
         (A) Chlorine/ bromine- 0.1mg/L
         (B) Chloride- 250mg/L
      (6) Swimming pool filter backwash
      (7) Decorative fountains and ponds
      (8) Industrial/ Commercial areas, including restaurant mats
      (9) Concrete truck cement, pumps, tools, and equipment washout
      (10) Spills, dumping, or disposal of materials other, such as:
         (A) Litter, landscape and construction debris, garbage, food, animal waste, fuel or chemical wastes, batteries, and any other materials which have the potential to adversely impact water quality; <u>and</u>
         (B) Any pesticide, fungicide or herbicide
      (11) Stationary and mobile pet grooming facilities
      (12) Trash container leachate

2. The Permittees shall possess adequate legal authority to:
   (a) Control through interagency agreement, the contribution of pollutants from one portion of the MS4 to another portion of the MS4.
   (b) Require persons within their jurisdiction to comply with conditions in the Permittees' ordinances, permits, contracts, model programs, or orders (i.e. hold dischargers to its MS4 accountable for their contributions of pollutants and flows).
   (c) Utilize enforcement measures (e.g., stop work orders, notice of violations, fines, referral to City, County, and/ or District Attorneys, referral to strikeforces, etc.) by ordinances, permits, contracts, orders, administrative authority, and civil and criminal prosecution.[2]

[1] MS4s discharging directly to the ocean are not subject to this prohibition.
[2] In the case of private responsible parties such as, HOAs, the Permittee must retain enforcement authority.

(d) Control pollutants, including potential contribution[1] in discharges of storm water runoff associated with industrial activities, including construction activities to its MS4, and control the quality of storm water runoff from industrial sites, including construction sites.
(e) Carry out all inspections, surveillance and monitoring procedures necessary to determine compliance and non-compliance with permit conditions including the prohibition on illicit discharges to the MS4.
(f) Require the use of control measures to prevent or reduce the discharge of pollutants to achieve water quality objectives.
(g) Require that Treatment Control BMPs be properly operated and maintained.

3. Each Permittee has adopted a Storm Water Quality Ordinance based upon a countywide model. Each Permittee shall ensure, no later than [two years after Order adoption date], that its Storm Water Quality Ordinance authorizes the Permittee to enforce all requirements of this Order.

4. Each Permittee shall submit no later than (two years after Order adoption date), a statement by its legal counsel that the Permittee has obtained and possesses all necessary legal authority to comply with this Order through adoption of ordinances and/ or municipal code modifications.

C. Fiscal Resources

1. The Permittees shall implement the activities required to comply with the provisions of this Order.[2] Each Permittee shall:
   (a) Submit an Annual Budget Summary that shall include:
      (1) Budgets for the upcoming report year (estimated expenditure) for the following specific categories (estimated percentages and written explanations where necessary):
         (A) Program Management Activities.
            (i) Overall Administrative costs
         (B) Program Implementation Activities (permit related activities only). Provide figures breakdown of expenditures for the categories below:
            (i) Illicit connection/ illicit discharge program.
            (ii) Development planning and approval
            (iii) Construction program including inspection activities
            (iv) Industrial/ Commercial program including inspection activities
            (v) Public Agency Activities
               (I) Maintenance and inspection of Treatment Control BMPs
               (II) Municipal Street Sweeping

[1] "Potential contributions" and "potential to discharge," means adequate legal authority to prevent an actual discharge of pollutants to the municipal separate storm sewer system.
[2] The sources of funding may be the general funds, and/or Benefit Assessment, plan review fees, permit fees, industrial/ commercial user fee, revenue bonds, grants or other similar funding mechanism.

(III) Municipal Drainage Maintenance including catch basin clean-outs
(IV) Other costs associated with storm water management (describe)
(vi) Public Information and Participation.
(vii) Monitoring Program
(viii) Miscellaneous Expenditures (describe)

D. Modifications/ Revisions

1. No later than (two years after the Order adoption date), each Permittee shall modify its storm water management programs, protocols, practices, and municipal codes to make them consistent with the requirements herein.

E. Designation and Responsibilities of the Principal Permittee

1. The Ventura County Watershed Protection District is hereby designated as the Principal Permittee. The Principal Permittee shall:
   (a) Participate in the County Environmental Crimes Task Force
   (b) Coordinate and facilitate activities necessary to comply with the requirements of this Order, but the Principal Permittee is not responsible for ensuring compliance of any other individual Permittee
   (c) Coordinate permit activities among Permittees and act as liaison between the Permittees and the Regional Water Board on permitting issues
   (d) Provide technical and administrative support for committees that will be organized to implement this Order and its requirements
   (e) Evaluate, assess, and synthesize the results of the monitoring program and the effectiveness of the implementation of BMPs
   (f) Convene the Committee Meetings constituted pursuant to subpart 4.F.1., below, upon designation of representatives
   (g) Implement the Countywide Monitoring Program required under the Order and evaluate, assess and synthesize the results of the monitoring program
   (h) Provide personnel and fiscal resources for the collection, processing and submittal to the Regional Water Board of monitoring and annual reports, and summaries of other reports required under this Order

F. Responsibilities of the Permittees

1. Each Permittee is required to comply with the requirements of this Order applicable to discharges within its boundaries (see Findings- Permit Coverage D.1 and D.2). Permittees are not responsible for the implementation of the provisions applicable to the Principal Permittee or other Permittees. Each Permittee shall:
   (a) Comply with the requirements of this Order and any modifications thereto

(b) Coordinate among its internal departments and agencies, as necessary, to facilitate the implementation of the requirements of this Order applicable to such Permittees in an efficient and cost-effective manner
(c) Participate in intra-agency coordination (e.g., Planning Department, Fire Department, Building and Safety, Code Enforcement, Public Health, Parks and Recreation, and others) necessary to successfully implement the provisions of this Order
(d) Report, in addition to the Budget Summary, any supplemental dedicated budgets for the same categories
(e) Participate in Committee Meetings, as necessary

PART 4 - SPECIAL PROVISIONS (BASELINE)

A. General Requirements

1. This Order and the provisions herein are intended to develop, achieve, and implement a timely, comprehensive, cost-effective storm water pollution control program to reduce the discharge of pollutants in storm water to the MEP and not cause or contribute to exceedances of water quality standards for the permitted areas in the County of Ventura.

2. Best Management Practice Substitution
   (a) The Regional Water Board Executive Officer may approve any site-specific BMP substitution upon written request by a Permittee(s) and after public notice, if the Permittee can document that:
      (1) The proposed alternative BMP or program will meet or exceed the objective of the original BMP or program in the reduction of storm water pollutants.
      (2) The fiscal burden of the original BMP or program is greater than the proposed alternative and does not achieve a greater improvement in storm water quality.
      (3) The proposed alternative BMP or program will be implemented within a similar period of time.
      (4) BMP substitution will be in accordance with the public review provisions of the Order (Part 7.C.1 and Part 7.C.2).

B. Watershed Initiative Participation

1. The Principal Permittee shall participate in water quality meetings for watershed management and planning, including but not limited to the following:
   (a) Southern California Stormwater Monitoring Coalition (SMC)
   (b) Other Watershed planning groups as appropriate

2. The Principal Permittee shall participate in the following regional water quality programs, and projects for watershed management and planning:

(a) SMC Regional Monitoring Programs
  (1) Southern California Regional Bioassessment
    (A) Level of effort per watershed
      (i) Probabilistic sites per watershed
        (I) Ventura River - Six
        (II) Santa Clara River - Three
        (III) Calleguas Creek - Six
      (ii) Integrator sites per watershed
        (I) Ventura River - One
        (II) Santa Clara River - One
        (III) Calleguas Creek – One
      (iii) Fixed bioassessment sites
        (I) The Permittees shall perform bioassessment at one fixed urban site in each major watershed. Site selection shall be determined by the results of the first year SMC results, as approved by the Executive Officer.
(b) Southern California Bight Projects
  (1) Regional Monitoring Survey – 2008, and successive years.

C. Public Information and Participation Program (PIPP)

1. The Principal Permittee shall implement a Public Information and Participation Program (PIPP) that includes, but is not limited to, the requirements listed in this part. The Principal Permittee shall coordinate with Permittees to implement specific PIPP requirements. The objectives of the PIPP are as follows:

   (a) To increase the knowledge of the target audience about the MS4, the adverse impacts of storm water pollution on receiving waters and potential solutions to mitigate the impacts

   (b) To change the waste disposal and storm water pollution generation behavior of target audiences by encouraging implementation of appropriate solutions

   (c) To involve and engage communities in Ventura County to participate in mitigating the impacts of storm water pollution

2. Residential Program
   (a) "No Dumping" Message
   Each Permittee shall label all storm drain inlets that they own with a legible "no dumping" message. In addition, signs with prohibitive language discouraging illegal dumping shall be posted at designated public access points to creeks, other relevant waterbodies, and channels. Signage and storm drain messages shall be legible and maintained.
   (b) Public Reporting
   Each Permittee shall identify staff who will serve as the contact person(s) for reporting clogged catch basin inlets and illicit discharges/dumping, faded or missing catch basin labels, and general storm water management information.

Permittees shall include this information, updated by July 1 of each year, in public information media such as the government pages of the telephone book, and internet web sites. The Principal Permittee shall compile a list of the general public reporting contacts submitted by all Permittees and make this information available on the web site (http://www.vcstormwater.org/contact.htm) and upon request. Each Permittee is responsible for providing current, updated information to the Principal Permittee.

(c) Outreach and Education

(1) Collaboratively, the Permittees shall implement the following activities:

(A) Conduct a Storm Water pollution prevention advertising campaign.

(B) Conduct Storm Water pollution prevention public service announcements.

(C) Distribute storm water pollution prevention public education materials no later than (365 days after Order adoption date) to:

(i) Automotive parts stores

(ii) Home improvement centers/ lumber yards/ hardware stores

(iii) Pet shops/ feed stores

(D) Public education materials shall include, but are not limited to information on the proper disposal, storage, and use of:

(i) Vehicle waste fluids

(ii) Household waste materials

(iii) Construction waste materials

(iv) Pesticides and fertilizers (including integrated pest management practices-IPM)

(v) Green waste (including lawn clippings and leaves)

(vi) Animal wastes

(E) Work with existing local watershed groups or organize watershed Citizen Advisory Groups/ Committees to develop effective methods to educate the public about storm water pollution no later than (365 days after Order adoption date).

(F) Organize events targeted to residents and population subgroups; and

(G) Maintain the Countywide storm water website (www.vcstormwater.org), which shall include educational material listed in the preceding subpart C.2(c)(1)(D).

(2) The Principal Permittee shall develop a strategy to educate ethnic communities through culturally effective methods. Details of this strategy should be incorporated into the PIPP, and implemented, no later than (365 days after Order adoption date).

(3) Each Permittee shall continue the existing outreach program to residents on the proper disposal of litter, green waste, pet waste, proper vehicle maintenance, lawn care and water conservation practices.

(4) Each Permittee shall conduct educational activities within its jurisdiction and participate in countywide events.

(5) The Permittees shall make a minimum of 5 million impressions per year to the general public related to storm water quality, with a minimum of 2.5

million impressions via newspaper, local TV access, local radio and/ or internet access.

(6) The Principal Permittee, in cooperation with the Permittees, shall provide schools within each School District in the County with materials, including, but not limited to, videos, live presentations, and other information necessary to educate a minimum of 50 percent of all school children (K-12) every 2 years on storm water pollution. Alternatively, a Permittee may submit a plan to the Regional Water Board Executive Officer for consideration no later than (90 days after Order adoption date), to provide outreach in lieu of the school curriculum. Pursuant to Water Code section 13383.6, the Permittees, in lieu of providing educational materials/ funding to School Districts in the County, may opt to provide an equivalent amount of funds or fraction thereof to the Environmental Education Account established within the State Treasury.

(7) Each Permittee shall provide the contact information for their appropriate staff responsible for storm water public education activities to the Principal Permittee and contact information changes no later than 30 days after a change occurs.

(8) The Permittees shall develop and implement a behavioral change assessment strategy no later than (365 days after Order adoption date) in order to determine whether the PIPP is demonstrably effective in changing the behavior of the public. The strategy shall be developed based on current sociological data and studies.

(d) Pollutant-Specific Outreach

The Principal Permittee, in cooperation with the Permittees, shall coordinate to develop outreach programs that focus on metals, urban pesticides, bacteria and nutrients as the pollutants of concern no later than (365 days after Order adoption date). Metals may be appropriately addressed through the Industrial/ Commercial Facilities Program (e.g. the distribution of educational materials on appropriate BMPs for metal fabrication and recycling facilities that have been identified as a potential source). Region-wide pollutants may be included in the Principal Permittee's mass media outreach program.

3. Businesses Program

(a) Corporate Outreach

(1) The Permittees shall work with other regional or statewide agencies and, associations such as the California Storm Water Quality Association (CASQA), to develop and implement a Corporate Outreach program to educate and inform corporate franchise operators and/or local facility managers about storm water regulations and BMPs. Once developed, the program shall target a minimum of four Retail Gasoline Outlets (RGO) franchisers and cover a minimum of 80% of RGO franchisees in the county, four retail automotive parts franchisers, two home improvement center franchisers and six restaurant franchisers. Corporate outreach for all target facilities shall be conducted not less than twice during the term of this

Order, with the first outreach contact to begin no later than two years after Order adoption date. At a minimum, this program shall include:

(A) Confer with franchise operators and/or local facility managers to explain storm water regulations.

(B) Distribution and discussion of educational material regarding storm water pollution and BMPs, and provide managers with recommendations to facilitate employee and facility compliance with storm water regulations.

(b) Business Assistance Program

(1) The Permittees shall implement a Business Assistance Program to provide technical information to small businesses to facilitate their efforts to reduce the discharge of pollutants in storm water. The Program shall include:

(A) On-site, telephone or e-mail consultation regarding the responsibilities of businesses to reduce the discharge of pollutants, procedural requirements, and available guidance documents.

(B) Distribution of storm water pollution prevention education materials to operators of auto repair shops, car wash facilities (including mobile car detailing), mobile carpet cleaning services, commercial pesticide applicator services and restaurants.

D. Industrial/ Commercial Facilities Program

I. Each Permittee shall require implementation of pollutant reduction and control measures, unless precluded by local ordinances, at industrial and commercial facilities, with the objective of reducing pollutants in storm water. Except where specified otherwise in this Order, pollutant reduction and control measures may be used alone or in combination, and may include Treatment Control, Source Control BMPs, and operation and maintenance procedures, which may be applied before, during, and/ or after pollutant generating activities. At a minimum, the Industrial/ Commercial Facilities Control Program shall include requirements to:

(a) Track

(b) Inspect

(c) Ensure compliance with municipal ordinances at industrial and commercial facilities that are critical sources of pollutants in storm water

1. Inventory of Critical Sources

(a) Each Permittee shall maintain a watershed-based inventory or database of all facilities within its jurisdiction that are critical sources of storm water pollution. Critical Sources to be tracked are summarized below, and specified in Attachment "D":

(1) Commercial Facilities

(A) Restaurants

(B) Automotive service facilities

(C) RGOs and automotive dealerships

(D) Nurseries and nursery centers
(2) U.S. EPA Phase I, II Facilities
(3) Other Federally-mandated Facilities [as specified in 40 CFR 122.26(d)(2)(iv)(C)]
(A) Municipal landfills
(B) Hazardous waste treatment, disposal, and recovery facilities
(C) Facilities subject to SARA Title III (also known as the Emergency Planning and Community Right-to-Know Act (EPCRA))

(b) Each Permittee shall include the following minimum fields of information for each critical source industrial and commercial facility
(1) Name of facility and name of owner/ operator.
(2) Address of facility
(3) Coverage under the IASGP or other individual or general NPDES permits or any applicable waiver issued by the Regional or State Board pertaining to runoff discharges.
(4) A narrative description including Standard Industrial Classification (SIC) System/ North American Industry Classification System (NAICS) codes that best describe the industrial activities performed and principal products used at each facility and status of exposure to storm water.

(c) The Regional Water Board recommends that Permittees include additional fields of information, such as material usage and/ or industrial output, and discrepancies between SIC System/ NAICS Code designations (as reported by facility operators) and identify the actual type of industrial activity that has the potential to pollute storm water. In addition, the Regional Water Board recommends the use of an automated database system, such as a Geographical Information System (GIS) or Internet-based system.

(d) Each Permittee shall update its inventory of critical sources at least annually. The update may be accomplished through collection of new information obtained through field activities or through other readily available inter and intra-agency informational databases (e.g. business licenses, pretreatment permits, sanitary sewer hook-up permits, and similar information).

2. Inspect Critical Sources

(a) Commercial Facilities

Permittee shall inspect all facilities identified in subpart 4.D.1. twice during the 5-year term of the Order, provided that the first inspection occurs no later than (2 years after Order adoption date). A minimum interval of 6 months between the first and the second mandatory compliance inspection is required. In addition, each Permittee shall implement the activities outlined in the following subparts. At each facility, inspectors shall verify that the operator is implementing the source control BMPs. The Permittees may require implementation of additional BMPs where storm water flows from the MS4 discharge to an environmentally sensitive area (ESA, see Part 6 for definition) or a CWA § 303(d) listed waterbody (see subpart 3(b) below).

(1) Restaurants-
Level of inspections: Each Permittee shall inspect all restaurants within its jurisdiction to confirm that storm water BMPs are being effectively implemented in compliance with State law, County and municipal ordinances. BMPs in Table 2 (BMPs at Restaurants) shall be implemented, unless the pollutant generating activity does not occur.

Table 2 - BMPs at Restaurants

Pollutant-Generating Activity	BMP Narrative Description	2003 California Stormwater BMP Handbook Industrial and Commercial BMP Identification #
Waste/ Hazardous Materials Storage, Handling and Disposal	Implementation of effective storage, handling and disposal procedures for hazardous materials.	By Municipality
Unauthorized Non-Storm Water Discharges	Effective elimination of non-storm water discharges.	SC-10
Accidental Spills/ Leaks	Implementation of effective spills/ leaks prevention and response procedures.	SC-11
Outdoor Storage of Raw Materials	Implementation of effective source control practices and structural devices.	SC-33
Storage and Handling of Solid Waste	Implementation of effective solid waste storage/ handling practices and appropriate control measures	SC-34
Parking/ Storage Area Maintenance	Implementation of effective parking/ storage area designs and housekeeping/ maintenance practices	SC-43
Storm Water Conveyance System Maintenance	Implementation of proper conveyance system operation and maintenance protocols.	SC-44

(2) Automotive Service Facilities-

Level of Inspection: Each Permittee shall confirm that BMPs are being effectively implemented at each facility within its jurisdiction, in compliance with County and municipal ordinances. The inspections shall verify that BMPs in Table 3 (BMPs at Automotive Service Facilities) are being implemented, unless the pollutant generating activity does not occur.

Table 3 - BMPs at Automotive Service Facilities

Pollutant-Generating Activity	**BMP Narrative Description**	**2003 California Stormwater BMP Handbook Industrial and Commercial BMP Identification #**
Unauthorized Non-Storm Water Discharges	Effective elimination of non-storm water discharges.	SC-10
Accidental Spills/ Leaks	Implementation of effective spills/ leaks prevention and response procedures.	SC-11
Vehicle/ Equipment Fueling	Implementation of effective fueling source control devices and practices.	SC-20
Vehicle/ Equipment Cleaning	Implementation of effective equipment/ vehicle cleaning practices and appropriate wash water management practices	SC-21
Vehicle/ Equipment Repair	Implementation of effective vehicle/ equipment repair practices and source control devices.	SC-22
Outdoor Liquid Storage	Implementation of effective outdoor liquid storage source controls and practices.	SC-31
Outdoor Storage of Raw Materials	Implementation of effective source control practices and structural devices.	SC-33
Storage and Handling of Solid Waste	Implementation of effective solid waste storage/ handling practices and appropriate control measures	SC-34
Parking/ Storage Area Maintenance	Implementation of effective parking/ storage area designs and housekeeping/ maintenance practices	SC-43
Storm Water Conveyance System Maintenance Practices	Implementation of proper conveyance system operation and maintenance protocols.	SC-44

(3) Retail Gasoline Outlets and Automotive Dealerships-
Level of Inspections: Each Permittee shall confirm that BMPs are being effectively implemented at each facility within its jurisdiction, in compliance with County and municipal ordinances. The inspections shall verify that BMPs in Table 4 (BMPs at Retail Gasoline Outlets) are being implemented, unless the pollutant generating activity does not occur.

Table 4 - BMPs at Retail Gasoline Outlets

Pollutant-Generating Activity	**BMP Narrative Description**	**2003 California Stormwater BMP Handbook Industrial and Commercial BMP Identification #**
Unauthorized Non-Storm Water Discharges	Effective elimination of non-storm water discharges.	SC-10
Accidental Spills/ Leaks	Implementation of effective spills/ leaks prevention and response procedures.	SC-11
Vehicle/ Equipment Fueling	Implementation of effective fueling source control devices and practices.	SC-20
Vehicle/ Equipment Cleaning	Implementation of effective wash water control devices.	SC-21
Outdoor Storage of Raw Materials	Implementation of effective source control practices and structural devices.	SC-33
Storage and Handling of Solid Waste	Implementation of effective solid waste storage/ handling practices and appropriate control measures	SC-34
Building and Grounds Maintenance	Implementation of effective facility maintenance practices.	SC-41
Parking/ Storage Area Maintenance	Implementation of effective parking/ storage area designs and housekeeping/ maintenance practices	SC-43

(4) Commercial Nurseries and Nursery Centers (Merchant Wholesalers, Nondurable Goods, and Retail Trade)-

Level of Inspection: Each Permittee shall confirm that BMPs are being effectively implemented at each facility within its jurisdiction, in compliance with County and municipal ordinances. The inspections shall verify that BMPs in Table 5 (BMPs at Nurseries) are being implemented, unless the pollutant generating activity does not occur.

Table 5 - BMPs at Nurseries

Pollutant-Generating Activity	BMP Narrative Description	2003 California Stormwater BMP Handbook Industrial and Commercial BMP Identification #
Unauthorized Non-Storm Water Discharges	Effective elimination of non-storm water discharges.	SC-10
Outdoor Loading/ Unloading	Implementation of effective outdoor loading/ unloading practices.	SC-30
Outdoor Liquid Storage	Implementation of effective outdoor liquid storage source controls and practices.	SC-31
Outdoor Equipment Operations	Implementation of effective outdoor equipment source control devices and practices.	SC-32
Outdoor Storage of Raw Materials	Implementation of effective source control practices and structural devices.	SC-33
Building and Grounds Maintenance	Implementation of effective facility maintenance practices.	SC-41

(b) Industrial Facilities

Each Permittee shall conduct compliance inspections as specified below.

(1) **Frequency of Inspection**

(A) Each Permittee shall perform an initial inspection at all industrial facilities identified by the U.S. EPA in 40 CFR 122.26(c) no later than (2 years after Order adoption date). After the initial inspection, all facilities determined as having exposure of industrial activities to storm water are subject to a second mandatory compliance inspection. A minimum interval of 6 months between the first and the second compliance inspection is required.

(B) Following the first mandatory compliance inspection, a Permittee shall perform a second mandatory compliance inspection yearly at a minimum of 20% of the facilities determined not to have exposure of industrial activities to storm water. The purpose of this inspection is to verify the continuity of the no exposure status. Facilities determined

as having exposure will be notified that they must obtain coverage under the IASGP. A facility need not be inspected more than twice during the term of the Order unless subject to an enforcement action. A minimum interval of 6 months in between the first and the second compliance inspection is required.

(C) Applicable to all facilities: A Permittee need not inspect facilities that have been inspected by the Regional Water Board within the previous 24 month interval. However, if the Regional Water Board performed only one inspection, the Permittee shall conduct the second required mandatory compliance inspection.

(2) **Level of Inspection:** Each Permittee shall confirm that each operator:

(A) Has a current Waste Discharge Identification (WDID) number for facilities discharging storm water associated with industrial activity, and that a Storm Water Pollution Prevention Plan (SWPPP) is available on-site.

(B) Is effectively implementing BMPs in compliance with County and municipal ordinances. Facilities must implement the source control BMPs identified in subpart 4.D.2. and Appendix D, *California Stormwater Industrial and Commercial BMP Handbook (2003)*; or

(C) Has applied and has a current No Exposure Certification (and WDID number) for facilities subject to this requirement.

3. Ensure Compliance of Critical Sources

(a) **BMP Implementation:** Facilities must implement the source control BMPs identified in Part 4.D.2. and, as applicable, Appendix D, *California Stormwater Industrial and Commercial BMP Handbook (2003)*. In the event that a Permittee determines that a BMP is infeasible at any site, the Permittee shall require implementation of similar BMPs that will achieve the equivalent reduction of pollutants in the storm water discharges. Likewise, for those BMPs that are not protective of water quality standards, Permittees may require additional site-specific controls.

(b) **Environmentally Sensitive Areas (ESAs) and Impaired Waters:** For critical sources that discharge to MS4s that directly discharge to ESAs or to CWA § 303(d) listed impaired waterbodies, the Permittees shall require operators to implement additional pollutant specific controls to reduce pollutants in storm water runoff that are causing or contributing to exceedances of water quality objectives. A Regional Water Board approved TMDL Implementation Plan for the receiving water will substitute for this requirement.

(c) **Progressive Enforcement:** Each Permittee shall implement a progressive enforcement policy to ensure that facilities are brought into compliance with all storm water requirements within a reasonable time period as specified below.

(1) In the event that a Permittee determines, based on an inspection conducted, that an operator has failed to adequately implement all necessary BMPs, that Permittee shall take progressive enforcement actions which, at a minimum,

shall include a follow-up inspection within 4 weeks from the date of the initial inspection.

(2) In the event that a Permittee determines that an operator has failed to adequately implement BMPs after a follow-up inspection, that Permittee shall take enforcement action as established through authority in its municipal code and ordinances or through the judicial system.

(3) Each Permittee shall maintain records and make them available on request to the Regional Water Board, including inspection reports, warning letters, notices of violations, and other enforcement records, demonstrating a good faith effort to bring facilities into compliance.

4. Interagency Coordination

(a) **Referral of Violations of the Municipal Storm Water Ordinances and California Water Code § 13260:** A Permittee may refer a violation(s) of § 13260 by Industrial and Commercial facilities to the Regional Water Board provided that under its municipal storm water ordinance the Permittee has made a good faith effort of progressive enforcement. At a minimum, a Permittee's good faith effort must be documented with:

(1) Two follow-up inspections
(2) Two warning letters or notices of violation

(b) **Referral of Violations of the Industrial Activities Storm Water General Permit (IASGP), including Requirements to File a Notice of Intent or No Exposure Certification:** For those facilities in violation of the municipal storm water ordinance and subject to the IASGP, Permittees may escalate referral of such violations to the Regional Water Board (electronically on a quarterly basis to the Regional Water Board's Storm Water Site at MS4stormwaterrb4@waterboards.ca.gov) after one inspection and one written notice (copied to the Regional Water Board) to the operator regarding the violation. In making such referrals, Permittees shall include, at a minimum, the following documentation:

(1) Name of the facility
(2) Operator of the facility
(3) Owner of the facility
(4) WDID Number (if applicable)
(5) Industrial activity being conducted at the facility that is subject to the IASGP
(6) Records of communication with the facility operator regarding the violation, which shall include at least an inspection report
(7) The written notice of the violation copied to the Regional Water Board

(c) **Investigation of Complaints Regarding Facilities – Transmitted by the Regional Water Board Staff:** Each Permittee shall initiate, within one business day,[1] investigation of complaints (other than non-storm water discharges) to the MS4 from facilities within its jurisdiction. The initial investigation shall include, at a minimum, a limited inspection of the facility to confirm the complaint to determine if the facility is effectively complying with the municipal storm water urban runoff ordinances and, if necessary, to oversee corrective action.

(d) **Assistance of Regional Water Board Enforcement Actions:** As directed by the Regional Water Board Executive Officer, Permittees shall assist Regional Water Board enforcement actions by: helping in identification of current owners, operators, and lessees of facilities; providing staff, when available, for joint inspections with Regional Water Board inspectors; appearing as witnesses in Regional Water Board enforcement hearings; and providing copies of inspection reports and other progressive enforcement documentation.

(e) **Participation in a Task Force:** The Permittees shall participate with the Regional Water Board, and other public agencies on an enforcement task force such as the Storm Water Task Force, to communicate concerns regarding special cases of storm water violations by industrial and commercial facilities and to develop a coordinated approach to enforcement action.

E. Planning and Land Development Program

I. Purpose

1. The Permittees shall implement a Planning and Land Development Program pursuant to part 4.E. for all New Development and Redevelopment projects subject to this Order to:
   (a) Lessen the water quality impacts of development by using smart growth practices such as compact development, directing development towards existing communities via infill or redevelopment, safeguarding of environmentally sensitive areas, mixing of land uses (e.g., homes, offices, and shops), transit accessibility, and better pedestrian and bicycle amenities.
   (b) Minimize the adverse impacts from storm water runoff on the biological integrity of Natural Drainage Systems and the beneficial uses of waterbodies in accordance with requirements under CEQA (Cal. Pub. Resources Code § 21100).
   (c) Minimize the percentage of effective impervious surfaces on land developments to mimic predevelopment water balance through infiltration, evapotranspiration and reuse.

[1] Permittees may comply with the Permit by taking initial steps (such as logging, prioritizing, and tasking) to "initiate" the investigation within that one business day. However, the Regional Water Board would expect that the initial investigation, including a site visit, to occur within four business days.

(d) Minimize pollutant loadings from impervious surfaces such as roof-tops, parking lots, and roadways through the use of properly designed, technically appropriate BMPs (including Source Control BMPs such as good housekeeping practices), Low Impact Development Strategies, and Treatment Control BMPs.
(e) Properly select, design and maintain Treatment Control BMPs and Hydromodification Control BMPs to address pollutants that are likely to be generated, assure long-term function, and to avoid the breeding of vectors.[1]
(f) Prioritize the selection of BMPs suites to remove storm water pollutants, reduce storm water runoff volume, and beneficially reuse storm water to support an integrated approach to protecting water quality and managing water resources in the following order of preference:
  (1) Infiltration BMPs
  (2) BMPs that store and reuse storm water runoff.
  (3) BMPs that incorporate vegetation to promote pollutant removal and runoff volume reduction and integrate multiple uses
  (4) BMPs which percolate runoff through engineered soil and allow it to discharge downstream slowly
  (5) Approved modular/ proprietary treatment control BMPs that are based on LID concepts and that meet pollution removal goals

II. Applicability

1. New Development Projects.
(a) Development projects subject to Permittee conditioning and approval for the design and implementation of post-construction controls to mitigate storm water pollution, prior to completion of the project(s), are:
  (1) All development projects equal to 1 acre or greater of disturbed area and adding more than 10,000 square feet of impervious surface area
  (2) Industrial park 10,000 square feet or more of surface area
  (3) Commercial strip mall 10,000 square feet or more of impervious surface area
  (4) Retail gasoline outlet 5,000 square feet or more of surface area
  (5) Restaurant (SIC 5812) 5,000 square feet or more of surface area
  (6) Parking lot 5,000 square feet or more of impervious surface area, <u>or</u> with 25 or more parking spaces
  (7) Streets, roads, highways, and freeway construction of 10,000 square feet or more of impervious surface area shall incorporate USEPA guidance regarding Managing Wet Weather with Green Infrastructure: Green Streets to the maximum extent practicable.
  (8) Automotive service facilities (SIC 5013, 5014, 5511, 5541, 7532-7534 and 7536-7539) [5,000 square feet or more of surface area]

[1] Treatment BMPs when designed to drain within 72 hours of the end of rainfall minimize the potential for the breeding of vectors.

(9) Redevelopment projects in subject categories that meet Redevelopment thresholds (identified in subpart E.II.2 below)

(10) Projects located in or directly adjacent to, or discharging directly to an Environmentally Sensitive Area (ESA), where the development will:
- (A) Discharge storm water runoff that is likely to impact a sensitive biological species or habitat; and
- (B) Create 2,500 square feet or more of impervious surface area

(11) Single-family hillside homes. To the extent that a Permittee may lawfully impose conditions, mitigation measures or other requirements on the development or construction of a single-family home in a hillside area as defined in the applicable Permittee's Code and Ordinances, each Permittee shall require that during the construction of a single-family hillside home, the following measures to be implemented:
- (A) Conserve natural areas
- (B) Protect slopes and channels
- (C) Provide storm drain system stenciling and signage
- (D) Divert roof runoff to vegetated areas before discharge unless the diversion would result in slope instability
- (E) Direct surface flow to vegetated areas before discharge unless the diversion would result in slope instability

2. Redevelopment Projects

(a) Redevelopment projects subject to Permittee conditioning and approval for the design and implementation of post-construction controls to mitigate storm water pollution, prior to completion of the project(s), are:

(1) Land-disturbing activity that results in the creation or addition or replacement of 5,000 square feet or more of impervious surface area on an already developed site on development categories identified in subpart 4.E.III.1.

(2) Where Redevelopment results in an alteration to more than fifty percent of impervious surfaces of a previously existing development, and the existing development was not subject to post development storm water quality control requirements, the entire project must be mitigated.

(3) Where Redevelopment results in an alteration to less than fifty percent of impervious surfaces of a previously existing development, and the existing development was not subject to post development storm water quality control requirements, only the alteration must be mitigated, and not the entire development.

(b) Redevelopment does not include routine maintenance activities that are conducted to maintain original line and grade, hydraulic capacity, original purpose of facility or emergency redevelopment activity required to protect public health and safety. Impervious surface replacement, such as the reconstruction of parking lots and roadways which does not disturb additional area and maintains the original grade and alignment, is considered a routine maintenance activity. Redevelopment does not include the repaving of existing roads to maintain original line and grade.

(c) Existing single-family dwelling and accessory structures are exempt from the Redevelopment requirements unless such projects create, add, or replace 10,000 square feet of impervious surface area.

3. Effective Date –The New Development and Redevelopment requirements contained in Section E of the Order shall begin (90 calendar days) after Regional Water Board Executive Officer approval of the changes to the Technical Guidance Manual needed to comply with this permit. After that date all discretionary permit projects or project phases that have not been deemed complete for processing, or discretionary permit projects without vesting tentative maps that have not requested and received an extension of previously granted approvals must comply with the requirements in Section E. Projects that have been deemed complete prior to the update of the technical design manual are not subject to this section. For Permittee's projects the effective date shall be the date the governing body or their designee approves initiation of the project design.

III. New Development/ Redevelopment Performance Criteria

1. Integrated Water Quality/ Flow Reduction/Resources Management Criteria
   (a) Except as provided in subpart 4.E.III.1.(c) below, Permittees shall require all New Development and Redevelopment projects identified in subpart 4.E.II to control pollutants, pollutant loads, and runoff volume emanating from impervious surfaces through infiltration, storage for reuse, evapotranspiration, or bioretention/ biofiltration by reducing the percentage of Effective Impervious Area (EIA) to 5 percent or less of the total project area.
   (b) Impervious surfaces may be rendered "ineffective", and thus not count toward the 5 percent EIA limitation, if the stormwater runoff from those surfaces is fully retained on-site for the design storm event specified in provision (c), below. To satisfy the EIA limitation and low-impact development requirements, the permittees must require stormwater runoff to be infiltrated, reused, or evapotranspired on-site through a stormwater management technique allowed under the terms of this permit and implementing documents. If on-site retention is determined to be technically infeasible pursuant to 4.E.III.2(b), an on-site biofiltration system that achieves equivalent stormwater volume and pollutant load reduction as would have been achieved by on-site retention shall satisfy the EIA limitation. An on-site biofiltration system that releases above the design volume shall achieve 1.5 times the amount of stormwater volume and pollutant load reduction as would have been achieved by on-site retention and, thereby, shall satisfy the EIA limitation.
   (c) The permittees shall require all features constructed or otherwise utilized to render impervious surfaces "ineffective", as described in provision (b), above, to be properly sized to infiltrate, store for reuse, or evapotranspire, without any runoff at least the volume of water, or in the case of biofiltration with release above the design volume, 1.5 times the volume of water, that results from:

(1) The 85th percentile 24-hour runoff event determined as the maximized capture stormwater volume for the area using a 48 to 72-hour draw down time, from the formula recommended in Urban Runoff Quality Management, WEF Manual of Practice No. 23/ASCE Manual of Practice No. 87, (1998);
(2) The volume of annual runoff based on unit basin storage water quality volume, to achieve 80 percent or more volume treatment by the method recommended in the Ventura County Technical Guidance Manual for Storm Water Quality Control Measures (July 2002 and its revisions); or
(3) The volume of runoff produced from a 0.75 inch storm event.

(d) To address any impervious surfaces that may not be rendered "ineffective", surface discharge of stormwater runoff if any, that results from New Development and Redevelopment projects identified in subpart 4.E.II which have complied with subparts 4.E.III.1.(a)-(c), above, shall be mitigated in accordance with subpart 4.E.III.4.

2. Alternative Compliance for Technical Infeasibility

(a) To encourage smart growth and infill development of existing urban centers where on-site compliance with post-construction requirements may be technically infeasible, the permittees may allow projects that are unable to meet the Integrated Water Quality/Flow Reduction/Resources Management Criteria in subpart 4.E.III.1, above, to comply with this permit through the alternative compliance measures described in subpart 4.E.III.2.(c), below.

(b) To utilize alternative compliance measures, the project applicant must demonstrate that compliance with the applicable post-construction requirements would be technically infeasible by submitting a site-specific hydrologic and/or design analysis conducted and endorsed by a registered professional engineer, geologist, architect, and/or landscape architect. Technical infeasibility may result from conditions including the following:
(1) Locations where seasonal high groundwater is within 5 feet of the surface
(2) Locations within 100 feet of a groundwater well used for drinking water
(3) Brownfield development sites or other locations where pollutant mobilization is a documented concern
(4) Locations with potential geotechnical hazards
(5) Smart growth and infill or redevelopment locations where the density and/ or nature of the project would create significant difficulty for compliance with the on-site volume retention requirement
(6) Other site or implementation constraints identified in the LID Technical Guidance document required by subpart 4.E.IV.4.

(c) Alternative Compliance Measures. When a permittee finds that a project applicant has demonstrated technical infeasibility, the permittee shall identify alternative compliance measures that the project will need to comply with as a substitute for the otherwise applicable post-construction requirements listed in subparts 4.E.III.1.(a)-(c) of this permit. The Ventura County Technical Guidance Manual shall be revised to identify the alternative compliance measures and shall include the following requirement:

(1) Minimum on-site requirement. The project must take all feasible measures to reduce the percentage of Effective Impervious Area to no more than 30 percent of the total project area and treat all remaining runoff pursuant to the design and sizing requirements of subparts 4.E.III.1.(b)-(d).

(2) Offsite mitigation volume. The difference in volume between the amount of stormwater infiltrated, reused, and/ or evapotranspired and/or biofiltered by the project on-site and the otherwise applicable requirements of subparts 4.E.III.1.(a)-(c) (the "offsite mitigation volume'), above, must be mitigated by the project applicant either by performing offsite mitigation that is approved by the permittee or by providing sufficient funding for public or private offsite mitigation to achieve equivalent stormwater volume and pollutant load reduction through infiltration, reuse, evapotranspiration and/ or biofiltration.

- For projects with demonstrable technical infeasibility that cannot reduce the Effective Impervious Area to 5% or less of the total project, but are able to reduce the Effective Impervious Area to no more than 30 percent of the total project, mitigation or payment in lieu must be equivalent to the amount of stormwater not managed on site.
- For projects with demonstrable technical infeasibility that cannot reduce the Effective Impervious Area to 30% of the total project or less, mitigation or payment in lieu must be for 1.5 times the amount of stormwater not managed on site

(3) Location of off site mitigation. Offsite mitigation projects must be located in the same sub-watershed (defined as draining to the same hydrologic area in the Basin Plan) as the new development or redevelopment project. A list of eligible public and private offsite mitigation projects available for funding shall be identified by the Permittees and provided to the project applicant. Off site mitigation projects include green streets projects, parking lot retrofits, other site specific LID BMPs, and regional BMPs. Project applicants seeking to utilize these alternative compliance provisions may propose other offsite mitigation projects, which the Permittees may approve if they meet the requirements of this subpart.

(4) Timing and Reporting Requirements for Offsite Mitigation Projects. The Permittee(s) shall develop a schedule for the completion of offsite mitigation projects, including milestone dates to identify fund, design, and construct the projects. Offsite mitigation projects shall be completed as soon as possible, and at the latest, within 4 years of the certificate of occupancy for the first project that contributed funds toward the construction of the offsite mitigation project, unless a longer period is otherwise authorized by the Executive Officer. For public offsite mitigation projects, the permittees must provide in their annual reports a summary of total offsite mitigation funds raised to date and a description (including location, general design concept, volume of water expected to be retained, and total estimated budget) of all pending public offsite mitigation projects. Funding sufficient to address the offsite mitigation volume must be

transferred to the permittee (for public offsite mitigation projects) or to an escrow account (for private offsite mitigation projects) within one year of the initiation of construction.

(5) The project applicant must demonstrate that the EIA achieved on-site is as close to 5 percent EIA as technically feasible, given the site's constraints.

(d) Watershed equivalence. Regardless of the methods through which permittees allow project applicants to implement alternative compliance measures, the sub-watershed -wide (defined as draining to the same hydrologic area in the Basin Plan) result of all development must be at least the same level of water quality protection as would have been achieved if all projects utilizing these alternative compliance provisions had complied with subparts 4.E.III.1.(a)-(d) of the permit. The permittees shall provide in their annual report to the Regional Board a list of mitigation project descriptions and pollutant and flow reduction analyses (compiled from design specifications submitted by project applicants and approved by the permittee(s)) comparing the expected aggregate results of alternative compliance projects to the results that would otherwise have been achieved by meeting the 5 percent EIA requirement on-site.

3. Hydromodification (Flow/ Volume/ Duration) Control Criteria

(a) Each Permittee shall require all New Development and Redevelopment projects identified in subpart 4.E.II to implement hydrologic control measures, to prevent accelerated downstream erosion and to protect stream habitat in natural drainage systems. The purpose of the hydrologic controls is to minimize changes in post-development hydrologic storm water runoff discharge rates, velocities, and duration. This shall be achieved by maintaining the project's pre-project storm water runoff flow rates and durations.

(1) Description

(A) Hydromodification control in natural drainage systems shall be achieved by maintaining the Erosion Potential (E_p) in streams at a value of 1, unless an alternative value can be shown to be protective of the natural drainage systems from erosion, incision, and sedimentation that can occur as a result of flow increases from impervious surfaces and damage stream habitat (see Attachment "E" - Determination of Erosion Potential)

(B) Hydromodification control may include one, or a combination of on-site, regional subregional hydromodification control BMPs, LID strategies, or stream restoration measures, with preference given to LID strategies and hydromodification control BMPs. Any in-stream restoration measure shall not adversely affect the beneficial uses of the natural drainage systems

(C) Natural drainage systems, which include unlined or unimproved (not engineered) creeks, streams, rivers and their tributaries, are located in the following watersheds:

(i) Ventura River

(ii) Santa Clara River

(iii) Calleguas Creek
(iv) Malibu Creek
(v) Miscellaneous Ventura Coastal

(D) The Southern California Storm Water Monitoring Coalition (SMC) is developing a regional methodology to eliminate or mitigate the adverse impacts of hydromodification as a result of urbanization, including hydromodification assessment and management tools.
(i) The SMC has identified the following objectives for the Hydromodification Control Study (HCS):
(I) Establishment of a stream classification for Southern California streams
(II) Development of a deterministic or predictive relationship between changes in watershed impervious cover and stream-bed/ stream bank enlargement
(III) Development of a numeric model to predict stream-bed/ stream bank enlargement and evaluate the effectiveness of mitigation strategies

(E) The Permittees shall participate in the SMC HCS to develop:
(i) A regional stream classification system
(ii) A numerical model to predict the hydrological changes resulting from new development
(iii) A numerical model to identify effective mitigation strategies

(F) Until the completion of the SMC HCS, Permittees shall implement the Interim Hydromodification Control Criteria, described in subpart 4.E.III.3(a)(3)(A) below, to control the potential adverse impacts of changes in hydrology that may result from new development and redevelopment projects identified in subpart 4.E.II

(G) Existing single-family structures are exempt from the Hydromodification control requirements unless such projects disturb one acre or more of land or create, add, or replace 10,000 square feet or more of impervious surface area

(2) Exemptions to Hydromodification Controls. Permittees may exempt the following New Development and Redevelopment projects from implementation of Hydromodification controls where assessments of downstream channel conditions and proposed discharge hydrology indicate that adverse Hydromodification effects to present and future beneficial uses of Natural Drainage Systems are unlikely:
(A) All projects that disturb less than one acre.
(B) Projects that are replacement, maintenance or repair of a Permittee's existing flood control facility, storm drain, or transportation network.
(C) Redevelopment Projects in the Urban Core that do not increase the effective impervious area or decrease the infiltration capacity of pervious areas compared to the pre-project conditions.

(D) Projects that have any increased discharge go directly or via a storm drain to a sump, lake, area under tidal influence, into a waterway that has a 100-year peak flow (Q100) of 25,000 cfs or more, or other receiving water that is not susceptible to Hydromodification impacts;

(E) Projects that discharge directly or via a storm drain into concrete or improved (not natural) channels (e.g., rip rap, sackcrete, etc.), which, in turn, discharge into receiving water that is not susceptible to Hydromodification impacts (as in D above).

(3) Interim Hydromodification Control Criteria

(A) The Interim Hydromodification Control Criteria to protect natural drainage systems until Permittees complete Hydromodification Control Plans (HCPs), described in subpart 4.E.III.3(a)(4) below, are as follows:

(i) **Projects disturbing land area of less than fifty acres** will be subject to LID and/or source or treatment BMPs as addressed in this permit. The combined effects of LID and the treatment BMPs are considered adequate for Hydromodification control for projects that disturb less than 50 acres.

(ii) **Projects disturbing land areas of fifty acres or greater** Projects in this category shall develop and implement a Hydromodification Analysis Study (HAS) that demonstrates that post development conditions are expected to approximate the pre-project erosive effect of sediment transporting flows in receiving waters. The HAS must lead to the incorporation into the project design features intended to approximate, to the extent feasible, an Erosion Potential value of 1 or any alternative value that can be shown to be protective of the natural drainage systems from erosion, incision, and sedimentation that can occur as a result of flow increases from impervious surfaces and damage stream habitat in natural drainage systems, or

(I) Alternatively, project proponents in this category may elect to develop, in partnership with Permittees, an equivalent implementation method based on flow duration control in the form of nomographs relating planned impervious area and local soil type (infiltration rates) to determine hydromodification control BMP volume and land area requirements for the proposed project. The nomographs shall be derived from continuous simulation modeling using Ventura County specific rain gauge records and soil types, and calibrated using data from a local undeveloped watershed with similar conditions; or

(II) Alternatively, the Co-Permittees may revise the Ventura County Technical Guidance Manual for Stormwater

Quality Control Measures to address projects that disturb more than 50 acres.

(4) Final Criteria

(A) The Permittees shall develop and implement watershed specific HCPs no later than (180 days) after the completion of the SMC HCS.

(i) The HCP shall identify:

(I) Stream classifications

(II) Flow rate and duration control methods

(III) Sub-watershed mitigation strategies

(IV) Stream restoration measures, which will maintain the stream and tributary Erosion Potential at 1 unless an alternative value can be shown to be protective of the natural drainage systems from erosion, incision, and sedimentation that can occur as a result of flow increases from impervious surfaces and damage stream habitat in natural drainage system tributaries

(B) The HCP shall contain the following elements:

(i) Hydromodification Management Standards

(ii) Natural Drainage Areas and Hydromodification Management Control Areas

(iii) New Development and Redevelopment Projects subject to the HCP

(iv) Description of authorized Hydromodification Management Control BMPs

(v) Hydromodification Management Control BMP Design Criteria.

(vi) For flow duration control methods, the range of flows to control for, and goodness of fit criteria

(vii) Allowable low critical flow, Q_c, which initiates sediment transport

(viii) Description of the approved Hydromodification Model.

(ix) Any alternate Hydromodification Management Model and Design

(x) Stream Restoration Measures Design Criteria

(xi) Monitoring and Effectiveness Assessment

(xii) Record Keeping

(C) The HCP shall be deemed in effect upon Executive Officer approval.

4. Water Quality Mitigation Criteria

(a) Each Permittee shall require all New Development and Redevelopment projects identified in subpart 4.E.II to implement post-construction storm water treatment BMPs and control measures to mitigate storm water pollution as follows:

(1) Projects disturbing land areas less than 50 acres

(A) Volumetric Treatment Control BMP

(i) The 85th percentile 24-hour runoff event determined as the maximized capture storm water volume for the area using a 48 to

72-hour draw down time, from the formula recommended in *Urban Runoff Quality Management, WEF Manual of Practice No. 23/ASCE Manual of Practice No. 87, (1998)*; or

(ii) The volume of annual runoff based on unit basin storage water quality volume, to achieve 80 percent or more volume treatment by the method recommended in the Ventura County Technical Guidance Manual for Storm Water Quality Control Measures (July 2002 and its revisions); or

(iii) The volume of runoff produced from a 0.75 inch storm event, prior to its discharge to a storm water conveyance system;[1] and/ or

(B) Flow Based Treatment Control BMP

(i) The flow of runoff produced from a rain event equal to at least 0.2 inches per hour intensity; or

(ii) The flow of runoff produced from a rain event equal to at least 2 times the 85th percentile hourly rainfall intensity as determined from local rainfall records; or

(iii) Eight percent of the 50-year storm design flow rate as determined from the method recommended in the Ventura County Technical Guidance Manual for Storm Water Quality Control Measures (July 2002 and its revisions)

(2) Projects disturbing land area of 50 acres or greater

(A) Eighty percent of the average runoff volume using an appropriate public domain continuous flow model (such as Storm Water Management Model (SWMM) or Hydrologic Engineering Center – Hydrologic Simulation Program – Fortran (HEC-HSPF), using the local rainfall record and relevant BMP Performance data.

IV. Implementation

1. Maintenance Agreement and Transfer

(a) Prior to issuing approval for final occupancy each Permittee shall require that all new development and redevelopment projects subject to post-construction BMP requirements provide an operation and maintenance plan and verification of ongoing maintenance provisions for LID practices, Treatment Control BMPs, and Hydromodification Control BMPs including but not limited to: final map conditions, legal agreements, covenants, conditions or restrictions, CEQA mitigation requirements, conditional use permits, and/ or other legally binding maintenance agreements.

(1) Verification at a minimum shall include the developer's signed statement accepting responsibility for maintenance until the responsibility is legally transferred; and either

[1] This option is available only for construction projects that disturb land area less than 5 acres.

(A) A signed statement from the public entity assuming responsibility for BMP maintenance; or
(B) Written conditions in the sales or lease agreement, which require the property owner or tenant to assume responsibility for BMP maintenance and conduct a maintenance inspection at least once a year; or
(C) Written text in project covenants, conditions, and restrictions (CCRs) for residential properties assigning BMP maintenance responsibilities to the Home Owners Association (HOA); or
(D) Any other legally enforceable agreement or mechanism that assigns responsibility for the maintenance of BMPs.

(b) Each Permittee shall require all development projects subject to post-construction BMP requirements to provide a plan for the operation and maintenance of all structural and treatment controls. The Operation and Maintenance plan shall follow the Technical Guidance Manual Appendix D "Maintenance Plan Guidance" (or subsequent guidance manual) for each BMP component. The plan shall be submitted for examination of relevance to keeping the BMPs in proper working order. Where BMPs are transferred to Permittee for ownership and maintenance, the plan shall also include all relevant costs for upkeep of BMPs in the transfer. Operation and Maintenance plans for private BMPs shall be kept on-site for periodic review by Permittee inspectors.

2. Tracking, Inspection, and Enforcement of Post-Construction BMPs

(a) Each Permittee shall implement a tracking system and an inspection and enforcement program for new development and redevelopment post-construction storm water BMPs as set forth in part 4.E. no later than (one year after Order adoption date).

(1) Implement a GIS or other electronic system for tracking projects that have been conditioned for post-construction BMPs. The electronic system, at a minimum, should contain the following information:

(A) Municipal Project ID
(B) State WDID No
(C) Project Acreage
(D) BMP Type and Description
(E) BMP Location (coordinates)
(F) Date of Acceptance
(G) Date of Maintenance Agreement
(H) Maintenance Records
(I) Inspection Date and Summary
(J) Corrective Action
(K) Date Certificate of Occupancy Issued
(L) Replacement or Repair Date

(b) Inspect all development sites upon completion of construction and prior to the issuance of occupancy certificates to ensure proper installation of LID measures,

structural BMPs, treatment control BMPs and Hydromodification control BMPs. The inspection may be combined with other inspections provided it is conducted by trained personnel.

(c) Verify proper maintenance and operation of post-construction BMPs previously approved for new development and redevelopment and operated by the Permittees. The post construction BMP maintenance inspection program shall incorporate the following elements:
   (1) Post-construction BMP Maintenance Inspection checklist.
   (2) Inspection at least once every 2 years, beginning (Order adoption date), of post-construction BMPs to assess operation conditions with particular attention to:
   (3) Criteria and procedures for post construction Treatment Control and Hydromodification Control BMP repair, replacement, or re-vegetation.

(d) For post construction BMPs operated and maintained by parties other than the Permittees, the Permittees shall require annual reports by the other parties demonstrating proper maintenance and operations.

(e) Undertake enforcement as appropriate based on the results of the inspection.

3. Alternative Post Construction Storm Water Mitigation Programs

(a) A Permittee or a coalition of Permittees may apply to the Regional Water Board for approval of a Redevelopment Project Area Master Plan (RPAMP) for redevelopment projects within the Redevelopment Project Areas, in consideration of exceptional site constraints that inhibit site-by-site or project-by-project implementation of post-construction requirements.

(b) Upon review and a determination by the Regional Water Board Executive Officer that the proposal is technically valid and appropriate, the Regional Water Board may consider for approval such a program if its implementation will:
   (1) Result in equivalent or superior reduction of storm water pollutant loads in comparison to individual projects regulated by this permit.
   (2) Satisfy, on a Redevelopment Project Area-wide basis, the hydromodification criteria of this section.
   (3) Reduce the percentage of Effective Impervious Area (EIA) to a target of 5 percent or less of the Redevelopment Project Area, using properly sized storm water treatment/ collection features, as described in this Section.
   (4) Be fiscally sustainable and have secure funding; and
   (5) Be completed in four years of the adoption date of this permit.

(c) The RPAMP should prioritize the implementation of LID storm water mitigation measures, as described in this section.

(d) A Permittee or a coalition of Permittees may apply to the Regional Water Board for approval of a Redevelopment Project Area Master Plan (RPAMP) that takes into consideration the balancing of water quality protection with the needs for adequate housing, population growth, public transportation and management, land recycling, and urban revitalization.

(e) For the RPAMP to be considered, a technical panel of the Local Government Commission or an equivalent state or regional planning agency must have

reviewed and approved the proposed RPAMP, prior to its submittal to the Regional Water Board. The Regional Water Board Executive Officer may then consider the RPAMP for approval, or elect to submit it to the Regional Water Board for consideration.

(f) The RPAMP, on approval, may substitute in part or wholly for post-construction requirements.

(g) Redevelopment Project Areas include the following:
  (1) City Center areas
  (2) Historic District areas
  (3) Brownfield areas
  (4) Infill Development areas
  (5) Urban Transit Villages
  (6) Any other redevelopment area so designated by the Regional Water Board

(h) Nothing in these provisions shall be construed as to delay the implementation of post-construction control requirements, as approved in this Order.

4. Developer Technical Guidance and Information

(a) The Permittees shall update the Ventura County Technical Guidance Manual for Storm Water Quality Control Measures to include, at a minimum, the following:
  (1) Hydromodification Control criteria described in this Order, including numerical criteria.
  (2) Expected BMP pollutant removal performance including effluent quality (ASCE/ U.S. EPA International BMP Database, CASQA New Development BMP Handbook, technical reports, local data on BMP performance, and the scientific literature appropriate for southern California geography and climate).
  (3) Selection of appropriate BMPs for storm water pollutants of concern.
  (4) Data on Observed Local Effectiveness and performance of implemented BMPs.
  (5) BMP Maintenance and Cost Considerations.
  (6) Guiding principles to facilitate integrated water resources planning and management in the selection of BMPs, including water conservation, groundwater recharge, public recreation, multipurpose parks, open space preservation, and redevelopment retrofits.
  (7) LID principles and specifications, including the objectives and specifications for integration of LID strategies in the areas of:
    (A) Site Assessment.
    (B) Site Planning and Layout.
    (C) Vegetative Protection, Revegetation, and Maintenance.
    (D) Techniques to Minimize Land Disturbance.
    (E) Techniques to Implement LID Measures at Various Scales
    (F) Integrated Water Resources Management Practices.
    (G) LID Design and Flow Modeling Guidance.
    (H) Hydrologic Analysis.
    (I) LID Credits.

(b) Permittees shall update the Technical Guidance Manual within (120 days after Order adoption date).
(c) The Permittees shall facilitate implementation of LID by providing key industry, regulatory, and other stakeholders with information regarding LID objectives and specifications contained in the LID Technical Guidance Section through a training program. The LID training program will include the following:
  (1) LID targeted sessions and materials for builders, design professionals, regulators, resource agencies, and stakeholders
  (2) A combination of awareness on national efforts and local experience gained through LID pilot projects and demonstration projects
  (3) Materials and data from LID pilot projects and demonstration projects including case studies
  (4) Guidance on how to integrate LID requirements into the local regulatory program(s) and requirements
  (5) Availability of the LID Technical Guidance regarding integration of LID measures at various project scales
  (6) Guidance on the relationship among LID strategies, Source Control BMPs, Treatment Control BMPs, and Hydromodification Control requirements
(d) The Permittees shall submit revisions to the Ventura County Technical Guidance Manual to the Regional Water Board for Executive Officer approval.

5. Project Coordination
(a) Each Permittee shall facilitate a process for effective approval of post-construction storm water control measures. The process shall include:
  (1) Detailed BMP review including BMP sizing calculations, BMP pollutant removal performance, and municipal approval; and
  (2) An established structure for communication and delineated authority between and among municipal departments that have jurisdiction over project review, plan approval, and project construction through memoranda of understanding (MOU) or an equivalent agreement.

V. State Statute Conformity

1. California Environmental Quality Act (CEQA) Document Update
(a) Each Permittee shall incorporate into its CEQA process no later than (365 days after Order adoption date) those additional procedures necessary for considering potential storm water quality impacts and providing for appropriate mitigation when preparing and reviewing CEQA documents.
  (1) The procedures shall require consideration of the following:
    (A) Potential impact of project construction on storm water runoff.
    (B) Potential impact of project post-construction activity on storm water runoff.
    (C) Potential for discharge of storm water from areas from material storage, vehicle or equipment fueling, vehicle or equipment

maintenance (including washing), waste handling, hazardous materials handling or storage, delivery areas or loading docks, or other outdoor work areas.

(D) Potential for discharge of storm water to impair the beneficial uses of the receiving waters.

(E) Potential for the discharge of storm water to cause significant harm on the biological integrity of the waterways and waterbodies.

(F) Potential for significant changes in the flow velocity or volume of storm water runoff to cause harm to or impair the beneficial uses of natural drainage systems.

(G) Potential for significant increases in erosion at the project site or surrounding areas.

2. General Plan Update

(a) Each Permittee shall amend, revise or update its General Plan to include watershed and storm water quality and quantity management considerations and policies when any of the following General Plan elements are updated or amended:

(1) Land Use
(2) Housing
(3) Conservation
(4) Open Space

(b) Each Permittee shall provide the Regional Water Board with the draft amendment or revision when a listed General Plan element or General Plan is noticed for comment in accordance with Cal. Govt. Code § 65350 *et seq.*

F. Development Construction Program

(I) Each Permittee shall implement a construction program that prevents illicit construction-related discharges of pollutants into the MS4, implements and maintains structural and non-structural BMPs to reduce pollutants in stormwater runoff from construction sites, reduces construction site discharges of pollutants from the MS4 to the MEP, and prevents construction site discharges from the MS4 from causing or contributing to a violation of water quality standards.

1. BMP Implementation - Construction Sites Less Than One Acre

(a) Each Permittee shall require the implementation of an effective combination of erosion and sediment control BMPs from Table 6 to prevent erosion and sediment loss, and the discharge of construction wastes.[1]

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[1] The BMPs are taken from the *California BMP Handbook, Construction, January 2003* and the *Caltrans Stormwater Quality Handbooks, Construction Site Best Management Practices (BMPs) Manual, March 2003*, and addenda.

Table 6 - BMPs at Construction sites less than 1 acre

Minimum Set of BMPs for All Construction Sites	CASQA Handbook	Caltrans Handbook
For Erosion Control		
Scheduling	EC-1	SS-1
Preservation of Existing Vegetation	EC-2	SS-2
Sediment Controls		
Silt Fence	SE-1	SC-1
Sand Bag Barrier	SE-8	SC-8
Stabilized Construction Site Entrance/Exit	TC-1	TC-1
Non-Storm Water Management		
Water Conservation Practices	NS-1	NS-1
Dewatering Operations (Groundwater dewatering only under NPDES Permit No. CAG994004).[1]	NS-2	NS-2
Waste Management		
Material Delivery and Storage	WM-1	WM-1
Stockpile Management	WM-3	WM-2
Spill Prevention and Control	WM-4	WM-4
Solid Waste Management	WM-5	WM-5
Concrete Waste Management	WM-8	WM-8
Sanitary/ Septic Waste Management	WM-9	WM-9

2. BMP Implementation - Construction Sites One Acre but Less than 5 acres.
   (a) Each Permittee shall require the implementation of an effective combination of appropriate erosion and sediment control BMPs from Table 7 in addition to the ones identified in Table 6 to prevent erosion and sediment loss, and the discharge of construction wastes:

Table 7 - BMPs at Construction sites 1 acre or greater but less than 5 acres

BMPs	CASQA Handbook	Caltrans Handbook
For Erosion Control		
Hydraulic Mulch	EC-3	SS-3
Hydroseeding	EC-4	SS-4
Soil Binders	EC-5	SS-5
Straw Mulch	EC-6	SS-6
Geotextiles and Mats	EC-7	SS-7
Wood Mulching	EC-8	SS-8
Sediment Controls		
Fiber Rolls	SE-5	SC-5
Gravel Bag Berm	SE-6	SC-6
Street Sweeping and/ or Vacuum	SE-7	SC-7
Storm Drain Inlet Protection	SE-10	SC-10
Additional Controls		
Wind Erosion Controls	WE-1	WE-1

[1] Ponded storm water may be discharged at a concentration of Total Suspended Solids (TSS) of 100mg/L or less.

BMPs	CASQA Handbook	Caltrans Handbook
Stabilized Construction Entrance/ Exit	TC-1	TC-1
Stabilized Construction Roadway	TC-2	TC-2
Entrance/ Exit Tire Wash	TC-3	TC-3
Non-Storm Water Management		
Vehicle and Equipment Washing	NS-8	NS-8
Vehicle and Equipment Fueling	NS-9	NS-9

3. BMP Implementation - Construction Sites 5 acres and Greater
   (a) Each Permittee shall require the implementation of an effective combination of the following BMPs in Table 8 (BMPs at Construction sites 5 acres or greater) in addition to the ones identified in Table 6 (BMPs at Construction sites less than 1 acre) and Table 7 (BMPs at Construction sites 1acre or greater but less than 5 acres) at all construction sites 5 acres and greater to prevent erosion and sediment loss, and the discharge of construction wastes. Erosion control BMPs shall be preferred to sediment control BMPs.

Table 8 - BMPs at Construction sites 5 acres or greater

BMPs	CASQA Handbook	Caltrans Handbook
Sediment Controls		
Sediment Basin	SE-2	SC-2
Check Dam	SE-4	SC-4
Tracking Control BMPs		
Stabilized Construction Entrance/ Exit	TR-1	TC-1
Non-Storm Water Management		
Vehicle and Equipment Maintenance	NS-10	NS-10
Waste Management		
Material Delivery and Storage	WM-1	WM-1
Spill Prevention and Control	WM-4	WM-4
Concrete Waste Management	WM-8	WM-8
Sanitary/ Septic Waste Management	WM-9	WM-9

4. Enhanced Construction BMP Implementation.
   (a) Each Permittee shall implement, or require implementation of, enhanced practices that preclude impacts to water quality posed by all construction sites on hillsides as defined in this Order and construction sites that directly discharge to a waterbody listed on the CWA § 303 (d) list for siltation or sediment, or that occur within or directly adjacent to an Environmentally Sensitive Area (ESAs). Construction sites located on hillsides, adjacent to CWA 303(d) listed waters for siltation or sediment, and directly adjacent to ESAs are termed "High risk sites."
   (b) Each Permittee shall require implementation of enhanced practices for high risk sites which shall include increased BMP inspection and maintenance requirements.
      (1) Each Permittee shall require that high risk sites shall be inspected by the project proponent's Qualified SWPPP Developer or Qualified SWPPP Practitioner or personnel or consultants who are Certified Professionals in Erosion and Sediment Control (CPESC) at the time of BMP installation, at least weekly during the wet season, and at least once each 24 hour period during a storm event that generates runoff from the site, to identify BMPs that need maintenance to operate effectively, that have failed or could fail to operate as intended.
      (2) During the wet season, the area of disturbance shall be limited to the area that can be controlled with an effective combination of erosion and sediment control BMPs. Enhanced sediment controls should be used in combination with erosion controls and should target portions of the site that cannot be effectively controlled by standard erosion controls described above. Effective sediment and erosion control BMPs proposed by the proponent shall include the BMPs listed in Table 9 below. The project proponents are responsible to implement the BMPs below unless shown unnecessary. The Permittee shall require that the project proponent retain records of the inspection and a determination and rationale of the BMPs selected to control runoff.

Table 9 - Enhanced Construction BMP Implementation.

CONSTRUCTION SITE BMPs	CASQA Handbook	Caltrans Handbook
Erosion Controls		
Scheduling	EC-1	SS-1
Preservation of Existing Vegetation	EC-2	SS-2
Hydraulic Mulch	EC-3	SS-3
Hydroseeding	EC-4	SS-4
Soil Binders	EC-5	SS-5
Straw Mulch	EC-6	SS-6
Geotextiles and Mats	EC-7	SS-7
Wood Mulching	EC-8	SS-8
Slope Drains	EC-11	SS-11
Sediment Controls		

CONSTRUCTION SITE BMPs	CASQA Handbook	Caltrans Handbook
Silt Fence	SE-1	SC-1
Fiber Rolls	SE-5	SC-5
Sediment Basin	SE-2	SC-2
Check Dam	SE-4	SC-4
Gravel Bag Berm	SE-6	SC-6
Street Sweeping and/or Vacuum	SE-7	SC-7
Sand Bag Barrier	SE-8	SC-8
Storm Drain Inlet Protection	SE-10	SC-10
Additional Controls		
Wind Erosion Controls	WE-1	WE-1
Stabilized Construction Entrance/Exit	TC-1	TC-1
Stabilized Construction Roadway	TC-2	TC-2
Entrance/Exit Tire Wash	TC-3	TC-3
Advanced Treatment Systems[1]		
Non-Storm Water Management		
Water Conservation Practices	NS-1	NS-1
Dewatering Operations (Groundwater dewatering only under NPDES Permit No. CAG994004).19	NS-2	NS-2
Vehicle and Equipment Washing	NS-8	NS-8
Vehicle and Equipment Fueling	NS-9	NS-9
Vehicle and Equipment Maintenance	NS-10	NS-10
Waste Management		
Material Delivery and Storage	WM-1	WM-1
Stockpile Management	WM-3	WM-2
Spill Prevention and Control	WM-4	WM-4
Solid Waste Management	WM-5	WM-5
Concrete Waste Management	WM-8	WM-8
Sanitary/Septic Waste Management	WM-9	WM-9

5. Local Agency Requirements
   (a) Each Permittee shall require for all construction sites 1 acre or greater, compliance with all conditions identified in the preceding subparts F.1 - F.4, and the following requirements:
      (1) Local Storm Water Pollution Prevention Plan (Local SWPPP),
         (A) Each Permittee shall require the preparation and submittal of a Local SWPPP, for the Permittee's review and written approval prior to issuance of a grading or construction permit for construction or demolition projects. The Permittees' approval signature shall be contained within the first pages of the Local SWPPP

[1] If appropriate given natural background stormwater runoff and receiving water quality conditions.

(i) The Permittee shall not approve any Local SWPPP unless it contains appropriate site-specific construction site BMPs, specific locations, and maintenance schedules.

(ii) The Local SWPPP must include the rationale used for selecting or rejecting BMPs for various construction phases and weather conditions. The project architect, or engineer of record, or authorized qualified designee, must sign a statement on the Local SWPPP to the effect:

(I) *"As the architect/ engineer of record, I have selected appropriate BMPs to effectively minimize the negative impacts of this project's construction activities on storm water quality. The project owner and contractor are aware that the selected BMPs must be installed, monitored, and maintained to ensure their effectiveness. The BMPs not selected for implementation are redundant or deemed not applicable to the proposed construction activity."*

(2) Certification Statement

(A) Each Permittee shall require that each landowner or the landowner's agent sign a statement on the Local SWPPP to the effect:

(i) *"I certify that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to ensure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, to the best of my knowledge and belief, the information submitted is true, accurate, and complete. I am aware that submitting false and/ or inaccurate information, failing to update the Local SWPPP to reflect current conditions, or failing to properly and/ or adequately implement the Local SWPPP may result in revocation of grading and/ or other permits or other sanctions provided by law."*

(ii) The Local SWPPP certification shall be signed by the property owner or owner's representative/designee. If the Local SWPPP or SWPPP is being prepared by the local agency then the appropriate authority of the local agency shall sign the document.

6. Roadway Paving or Repaving Operations (For Private or Public Projects)

(a) Each Permittee shall require that for any project that includes roadbed or street paving, repaving, patching, digouts, or resurfacing roadbed surfaces, that the following BMPs be implemented for each project:

(1) Restrict paving and repaving activity to exclude periods of rainfall or predicted rainfall unless required by emergency conditions

(2) Install sand bags or gravel bags and filter fabric at all susceptible storm drain inlets and at manholes to prevent spills of paving products and tack coat

(3) Prevent the discharge of release agents including soybean oil, other oils, or diesel to the storm water drainage system or receiving waters.
(4) Minimize non storm water runoff from water use for the roller and for evaporative cooling of the asphalt
(5) Clean equipment over absorbent pads, drip pans, plastic sheeting or other material to capture all spillage and dispose of properly
(6) Collect liquid waste in a container, with a secure lid, for transport to a maintenance facility to be reused, recycled or disposed of properly
(7) Collect solid waste by vacuuming or sweeping and securing in an appropriate container for transport to a maintenance facility to be reused, recycled or disposed of properly
(8) Cover the "cold-mix" asphalt (i.e., pre-mixed aggregate and asphalt binder) with protective sheeting during a rainstorm
(9) Cover loads with tarp before haul-off to a storage site, and do not overload trucks
(10) Minimize airborne dust by using water spray during grinding
(11) Avoid stockpiling soil, sand, sediment, asphalt material and asphalt grindings materials or rubble in or near storm water drainage system or receiving waters
(12) Protect stockpiles with a cover or sediment barriers during a rain

7. Electronic Site Tracking System
(a) Each Permittee shall use an electronic system to track grading permits, encroachment permits, demolition permits, building permits, or construction permits (and any other municipal authorization to move soil and/ or construct or destruct that involves land disturbance) issued by each Permittee. To satisfy this requirement, the use of a database or GIS system is encouraged, but not required.

8. Inspections
(a) Each Permittee shall inspect all construction sites for the implementation of storm water quality controls a minimum of once during the wet season. Concurrently, each Permittee shall ensure that:
(1) The Local SWPPP is reviewed for compliance with local codes, ordinances, and permits.
(2) A follow-up inspection takes place within two weeks for inspected sites that have not adequately implemented their Local SWPPP.
(b) Each Permittee shall take additional enforcement actions to achieve compliance as specified in municipal codes, if compliance with municipal codes, ordinances, or permits has not been attained.
(c) Each Permittee can refer sites to the Regional Water Board for joint enforcement actions for violation of municipal storm water ordinances and the Construction Activities Storm Water General Permit (CASGP), or Small Linear Underground/ Overhead Construction Projects General Permit (small LUPs), after conducting a minimum of 2 site inspections and issuing a minimum of 2 written notices to the operator regarding the violation (copied to the Regional Water Board). In making

such referrals, Permittees shall include, at a minimum, the following documentation:

(1) Name of the site
(2) WDID number
(3) Site developer
(4) Site owner
(5) Records of communication with the site operator regarding the violation(s), which shall include at least an inspection report
(6) Written notice of the violation copied to the Regional Water

(d) Prior to approving and/ or signing off for occupancy and issuing the Certificate of Occupancy for all construction projects subject to post-construction controls, each Permittee shall inspect the constructed site design, source control and treatment control BMPs to verify that they have been constructed in compliance with all specifications, plans, permits, ordinances, and this Order. The initial/ acceptance BMP verification inspection does not constitute a maintenance and operation inspection, as required in the preceding subpart E.IV.2(c).

9. State Conformity Requirements

(a) Each Permittee shall ensure that no grading permit, encroachment permit, demolition permit, building permit, electrical permit, or construction permit (or any other municipal authorization to move soil and/ or construct or destruct that involves land disturbance) is issued for any project requiring coverage under the CASGP or Small LUP General Permit[1] unless:

(1) Proof of filing a Notice of Intent for coverage under a State NPDES permit is demonstrated).
(2) Demonstration or Certification that a SWPPP has been prepared by the project developer.
(3) Proof of Change of Information form (COI) and a copy of the modified SWPPP(s) at any time a transfer of ownership takes place for the entire development or portions of the common plan of development where construction activities are still on-going.

10. Interagency Coordination

(a) **Referral of Violations:**
A Permittee may refer a violator of the municipal storm water ordinance and CWC § 13260 to the Regional Water Board provided that the Permittee has made a good faith effort at progressive enforcement consistent with the preceding subpart F.8(c). At a minimum, the Permittee's good faith effort shall be documented with:

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[1] NPDES Permit No. CAS000005, Waste Discharge Requirements For Discharges of Storm Water Runoff Associated with Small Linear Underground/ Overhead Construction Projects (Small LUP General Permit) for any linear land disturbing activity or activities (cumulatively) that will cause one acre or more of land disturbance but not more than 5 acres.

(1) A minimum of 2 follow-up inspection reports (inspections completed within 3 months).
(2) A minimum of two warning letters or NOVs.

(b) **Referral of Non-filers under the CASGP or the Small LUP General Permit:** Each Permittee shall refer non-filers (i.e., those projects which cannot demonstrate that they have a WDID number) under the CASGP or Small LUP General Permit, to the Regional Water Board, no later than 15 days after making a determination of failure to file. In making such referrals, Permittees shall include, at a minimum, the following documentation:
(1) Project location address
(2) Project description
(3) Developer or owners name with complete mailing address
(4) Project size
(5) Records of communication with the developer or owner regarding filing requirements

(c) **Investigation of Complaints Regarding Facilities – Transmitted by the Regional Water Board Staff:**
(1) Each Permittee shall initiate, within one business day,[1] an initial investigation of complaint(s) (other than non-storm water discharges) on the construction site(s) within its jurisdiction.
(A) The initial investigation shall include, at a minimum, an inspection on the facility and its perimeter to confirm the complaint and to determine if the site operator is effectively complying with the municipal storm water/ urban runoff ordinances, and to oversee corrective action.

(d) **Support of Regional Water Board Enforcement Actions – As directed by the Regional Water Board Executive Officer:**
(1) Each Permittee shall support Regional Water Board enforcement actions by:
(A) Assisting in identification of current owners, operators, and lessees of properties and sites.
(B) Providing staff, when available, for joint inspections with Regional Water Board inspectors.
(C) Appearing to testify as witnesses in Regional Water Board enforcement hearings.
(D) Providing copies of inspection reports and other progressive enforcement documentation.

[1] Permittees may comply with the Permit by taking initial steps (such as logging, prioritizing, and tasking) to "initiate" the investigation within that one business day. However, the Regional Water Board would expect that the initial investigation, including a site visit, to occur within four business days.

G. Public Agency Activities Program

I. Each Permittee shall implement a Public Agency Activities Program to minimize storm water pollution impacts from public agency activities. Public Agency requirements consist of:
   i. Public Construction Activities Management.
   ii. Vehicle Maintenance/ Material Storage Facilities/ Corporation Yards Management/ Municipal Operations.
   iii. Vehicle and Equipment Wash Areas
   iv. Landscape and Recreational Facilities Management
   v. Storm Drain Operation and Management
   vi. Streets and Roads Maintenance
   vii. Public Industrial Activities Management
   viii. Emergency Procedures
   ix. Employee Training
   x. Infrastructure Maintenance

1. Public Construction Activities Management
   (a) Each Permittee shall implement and comply with the Planning and Land Development Program requirements in part 4.E. of this Order at Permittee owned or operated public construction projects for project types identified in part 4.E of this Order.
   (b) Each Permittee shall implement and comply with the appropriate Development Construction Program requirements in part 4.F. of this Order at Permittee owned or operated construction projects as applicable.
   (c) For public projects including those under a Capital Improvement Project Plan that disturb less than one acre of soil the Permittees shall require the development and implementation of a Storm Water Pollution Control Plan. The SWPCP shall include BMPs as identified in Table 6.
2. Vehicle Maintenance/ Material Storage Facilities/ Corporation Yards Management/ Long Term Maintenance Programs
   (a) Each Permittee shall implement the activity specific BMPs[1] listed in Table 10 when such activities occur at Permittee owned/leased facilities and job sites including but not limited to vehicle/ equipment maintenance facilities, material storage facilities, and corporation yards, and at any area that includes the activities as described in the following Tables. Additionally, for any activity or area described in the footnote below,[2] each Permittee shall also implement the BMPs in the Caltrans Storm Water Quality Handbook Maintenance Staff Guide

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[1] These BMPs are identified in Appendix B of the *Caltrans Storm Water Quality Handbook Maintenance Staff Guide, May 2003*, and its addenda. Other BMPs may be substituted upon approval by the Executive Officer.
[2] Scheduling and Planning; Spill Prevention and Control; Sanitary/ Septic Waste Management; Material Use; Safer Alternative Products; Vehicle/ Equipment Cleaning, Fueling, and Maintenance; Illicit Connections Detection, Reporting and Removal; Illegal Spill / Discharge Control and Maintenance Facility Housekeeping Practices.

described as B-4 in Table 10 (BMPs at Vehicle Maintenance/ Material Storage Facilities/ Corporation Yards).

Table 10 - BMPs at Vehicle Maintenance/ Material Storage Facilities/ Corporation Yards
From the Caltrans Storm Water Quality Handbook Maintenance Staff Guide **Appendix B**

Activity Specific BMPs	**Page**
General BMPs	B-4
Flexible Pavement	B-9
Asphalt Cement Crack and Joint Grinding/ Sealing	B-9
Asphalt Paving	B-10
Structural Pavement Failure (Digouts) Pavement Grinding and Paving	B-11
Emergency Pothole Repairs	B-13
Sealing Operations	B-14
Rigid Pavement	B-15
Portland Cement Crack and Joint Sealing	B-15
Mudjacking and Drilling	B-16
Concrete Slab and Spall Repair	B-17
Slope/ Drains/ Vegetation	B-19
Shoulder Grading	B-19
Nonlandscaped Chemical Vegetation Control	B-21
Nonlandscaped Mechanical Vegetation Control/ Mowing	B-23
Nonlandscaped Tree and Shrub Pruning, Brush Chipping, Tree and Shrub Removal	B-24
Fence Repair	B-25
Drainage Ditch and Channel Maintenance	B-26
Drain and Culvert Maintenance	B-28
Curb and Sidewalk Repair	B-30
Litter/ Debris/ Graffiti	B-32
Sweeping Operations	B-32
Litter and Debris Removal	B-33
Emergency Response and Cleanup Practices	B-34
Graffiti Removal	B-36
Landscaping	B-37
Chemical Vegetation Control	B-37
Manual Vegetation Control	B-39
Landscaped Mechanical Vegetation Control/ Mowing	B-40
Landscaped Tree and Shrub Pruning, Brush Chipping, Tree and Shrub Removal	B-41
Irrigation Line Repairs	B-42
Irrigation (Watering), Potable and Nonpotable	B-43
Environmental	B-44
Storm Drain Stenciling	B-44
Roadside Slope Inspection	B-45
Roadside Stabilization	B-46
Storm Water Treatment Devices	B-48
Traction Sand Trap Devices	B-49
Public Facilities	B-50
Public Facilities	B-50
Bridges	B-52
Welding and Grinding	B-52
Sandblasting, Wet Blast with Sand Injection and Hydroblasting	B-54
Painting	B-56
Bridge Repairs	B-57

Activity Specific BMPs	Page
Other Structures	B-59
Pump Station Cleaning	B-59
Tube and Tunnel Maintenance and Repair	B-61
Tow Truck Operations	B-63
Toll Booth Lane Scrubbing Operations	B-64
Electrical	B-65
Sawcutting for Loop Installation	B-65
Traffic Guidance	B-67
Thermoplastic Striping and Marking	B-67
Paint Striping and Marking	B-68
Raised/ Recessed Pavement Marker Application and Removal	B-70
Sign Repair and Maintenance	B-71
Median Barrier and Guard Rail Repair	B-73
Emergency Vehicle Energy Attenuation Repair	B-75
Snow and Ice Control	B-76
Snow Removal	B-76
Ice Control	B-77
Storm Maintenance	B-78
Minor Slides and Slipouts Cleanup/ Repair	B-78
Management and Support	B-80
Building and Grounds Maintenance	B-80
Storage of Hazardous Materials (Working Stock)	B-82
Material Storage Control (Hazardous Waste)	B-84
Outdoor Storage of Raw Materials	B-85
Vehicle and Equipment Fueling	B-86
Vehicle and Equipment Cleaning	B-87
Vehicle and Equipment Maintenance and Repair	B-88
Aboveground and Underground Tank Leak and Spill Control	B-90

3. Vehicle and Equipment Wash Areas
   (a) Each Permittee shall eliminate discharges of wash waters from vehicle and equipment washing no later than (365 days after Order adoption date) by implementing any of the following measures at existing facilities with vehicle or equipment wash areas:
      (1) Self-contain, and haul off for disposal
      (2) Equip with a clarifier
      (3) Equip with an alternative pre-treatment device; <u>or</u>
      (4) Plumb to the sanitary sewer
   (b) Each Permittee shall ensure that any municipal facilities constructed, redeveloped, or replaced has all vehicle and equipment wash areas plumbed to the sanitary sewer or be self contained and all wastewater/ washwater hauled for legal disposal.

4. Landscape, Park, and Recreational Facilities Management
   (a) Integrated Pest Management (IPM)
   IPM is an ecosystem-based strategy that focuses on long-term prevention of pests or their damage through a combination of techniques such as biological control,

habitat manipulation, modification of cultural practices, and use of resistant varieties. Each Permittee shall implement an IPM program within (365 days after Order adoption date) that includes the following:

(1) Pesticides are used only if monitoring indicates they are needed according to established guidelines.
(2) Treatments are made with the goal of removing only the target organism.
(3) Pest controls are selected and applied in a manner that minimizes risks to human health, beneficial, non-target organisms, and the environment.
(4) Its use of pesticides, including Organophosphates and Pyrethroids do not threaten water quality.
(5) Partner with other agencies and organizations to encourage the use of IPM.
(6) Adopt and verifiably implement policies, procedures, and/ or ordinances requiring the minimization of pesticide use and encouraging the use of IPM techniques (including beneficial insects) in the Permittees' overall operations and on municipal property.
(7) Policies, procedures, and ordinances shall include commitments and timelines to reduce the use of pesticides that cause impairment of surface waters by implementing the following procedures:
    (A) Quantify pesticide use by its staff and hired contractors.
    (B) Prepare and annually update an inventory of pesticides used by all internal departments, divisions, and other operational units.
    (C) Demonstrate reductions in pesticide use.

(b) Each Permittee shall implement the following requirements no later than (180 days after Order adoption date):

(1) Use a standardized protocol for the routine and non-routine application of pesticides (including pre-emergents), and fertilizers.
(2) Ensure no application of pesticides or fertilizers are applied to an area immediately prior to, during, or immediately after a rain event, or when water is flowing off the area.
(3) Ensure that no banned or unregistered pesticides are stored or applied.
(4) Ensure that all staff applying pesticides are certified in the appropriate category by the California Department of Pesticide Regulation, or are under the direct supervision of a pesticide applicator certified in the appropriate category.
(5) Implement procedures to encourage the retention and planting of native vegetation to reduce water, pesticide and fertilizer needs; and
(6) Store pesticides and fertilizers indoors or under cover on paved surfaces or use secondary containment.
    (A) Reduce the use, storage, and handling of hazardous materials to reduce the potential for spills.
    (B) Regularly inspect storage areas.
(7) Comply with the provisions and the monitoring requirements for application of aquatic pesticides to surface waters (WQ Order No. 2004-0008-DWQ) (Vector Control) and Order No. 2004-0009-DWQ (Weed Control).

5. Storm Drain Operation and Management
   (a) Catch Basin Cleaning
      (1) Each Permittee shall designate catch basin inlets within its jurisdiction as one of the following:
         Priority A: Catch basins that are designated as consistently generating the highest volumes of trash.
         Priority B: Catch basins that are designated as consistently generating moderate volumes of trash.
         Priority C: Catch basins that are designated as generating low volumes of trash.
         Within one year of Order adoption (July 8, 2011), Permittees shall submit a map or list of Catch Basins with their GPS coordinates and their designations. The map or list shall contain the rationale or data to support designations.
      (2) Each Permittee shall inspect catch basins according to the following schedule:
         Priority A: A minimum of 3 times during the wet season and once during the dry season every year.
         Priority B: A minimum of once during the wet season and once during the dry season every year.
         Priority C: A minimum of once per year.
         Catch basins shall be cleaned as necessary on the basis of inspections. Permittees shall maintain inspection records for Regional Water Board review.
      (3) In addition to the preceding schedule, Permittees shall ensure that any catch basin that is determined to be at least 25% full of trash shall be cleaned out.

   (b) Trash Management at Public Events
      (1) Each Permittee shall require for any event in the public right of way or wherever it is foreseeable that substantial quantities of trash and litter may be generated, the following measures:
         (A) Proper management of trash and litter generated; and
         (B) Arrangement for temporary screens to be placed on catch basins; or
         (C) Provide clean out of catch basins, trash receptacles, and grounds in the event area within 24 hours subsequent to the event.
   (c) Trash Receptacles
      (1) Each Permittee shall install trash receptacles, or equivalent trash capturing devices in areas subject to high trash generation within its jurisdiction no later than one year after Order adoption date (July 8, 2011).
      (2) Each Permittee shall ensure that all trash receptacles are cleaned out and maintained as necessary to prevent trash overflow.
   (d) Catch Basin Labels
      (1) Each Permittee shall inspect the legibility of the catch basin stencil or label nearest each catch basin and inlet before the wet season begins.

(2) Each Permittee shall record and re-stencil or re-label within 15 days of inspection, catch basins with illegible stencils.

(e) Additional Trash Management Practices

(1) Each Permittee shall install trash excluders, or equivalent devices on or in catch basins or outfalls to prevent the discharge of trash to the storm drain system or receiving water no later than two years after Order adoption date in areas defined as Priority A (subpart 5.(a)(1)) except in sites where the application of such BMP(s) alone will cause flooding. Lack of maintenance that causes flooding is not an acceptable exception to the requirement to install BMPs. Alternatively the Permittee may implement alternative or enhanced BMPs beyond the provisions of this permit (such as but not limited to increased street sweeping, adding trash cans near trash generation sites, prompt enforcement of trash accumulation, increased trash collection on public property, increased litter prevention messages or trash nets within the MS4) that provide substantially equivalent removal of trash. Permittees shall demonstrate that BMPs, which substituted for trash excluders provide equivalent trash removal performance as excluders. When outfall trash capture is provided, revision of the schedule for inspection and cleanout of catch basins in task 5.(a)(2) may be proposed by the Permittee for approval by the Executive Officer.

(f) Storm Drain Maintenance

(1) Each Permittee shall implement a program for Storm Drain Maintenance no later than 90 days after Order adoption (October 6, 2010) that includes the following:

(A) Visual monitoring of Permittee-owned open channels and other drainage structures for debris at least annually.

(B) Remove trash and debris from open channel storm drains a minimum of once per year before the wet season.

(C) Eliminate the discharge of contaminants during MS4 maintenance and clean outs.

(D) Quantify the amount of materials removed using techniques appropriate for quantifying solid waste and ensure the materials are properly disposed of.

(g) Spill Response Plan

(1) Each Permittee shall implement a response plan for spills to the MS4 within their respective jurisdiction. The response Plan shall clearly identify agencies responsible and telephone numbers and e-mail address for contact and shall contain at a minimum the following:

(A) Investigation of all complaints received within 24 hours of the incident report.

(B) Response within 2 hours to spills for containment upon notification, except where such overflows occur on private property, in which case the response should be within 2 hours of gaining legal access to the property.

(C) Notification to appropriate public health agencies and the Office of Emergency Services (OES).

(h) Permittee Owned Treatment Control BMPs

(1) Each Permittee shall implement an inspection and maintenance program for all Permittee owned treatment control BMPs, including post-construction treatment control BMPs.

(2) Each Permittee shall ensure proper operation of all treatment control BMPs and maintain them as necessary for proper operation, including all post-construction treatment control BMPs.

(3) Any residual water produced by a treatment control BMP and not being internal to the BMP performance when being maintained shall be:

(A) Hauled away and legally disposed of; or

(B) Applied to the land without runoff; or

(C) Discharged to the sanitary sewer system (with permits or authorization); or

(D) Treated or filtered to remove bacteria, sediments, nutrients, and meet the limitations set in Table 11 (Discharge Limitations for Dewatering Treatment BMPs) prior to discharge to the MS4.

Table 11 - Discharge Limitations for Dewatering Treatment BMPs[1]

Parameter	Units	Limitation
Total Suspended Solids	mg/L	100
Turbidity	NTU	50
Oil and Grease	mg/L	10

6. Streets and Roads Maintenance

(a) Maintenance

(1) Each Permittee shall perform street sweeping of curbed streets in commercial areas and areas subject to high trash generation to control trash and debris at least two times per month.

(b) Road Reconstruction

(1) Each Permittee shall require that for any project that includes roadbed or street paving, repaving, patching, digouts, or resurfacing roadbed surfaces, that the following BMPs be implemented for each project.

(A) Restrict paving and repaving activity to exclude periods of rainfall or predicted rainfall[2] unless required by emergency conditions.

(B) Install sand bags or gravel bags and filter fabric at all susceptible storm drain inlets and at manholes to prevent spills of paving products and tack coat;

(C) Prevent the discharge of release agents including soybean oil, other oils, or diesel to the storm water drainage system or receiving waters.

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[1] Technology based effluent limits.

[2] A probability of precipitation (POP) of 50% is required.

(D) Minimize non storm water runoff from water use for the roller and for evaporative cooling of the asphalt.
(E) Clean equipment over absorbent pads, drip pans, plastic sheeting or other material to capture all spillage and dispose of properly.
(F) Collect liquid waste in a container, with a secure lid, for transport to a maintenance facility to be reused, recycled or disposed of properly.
(G) Collect solid waste by vacuuming or sweeping and securing in an appropriate container for transport to a maintenance facility to be reused, recycled or disposed of properly.
(H) Cover the "cold-mix" asphalt (i.e., pre-mixed aggregate and asphalt binder) with protective sheeting during a rainstorm.
(I) Cover loads with tarp before haul-off to a storage site, and do not overload trucks.
(J) Minimize airborne dust by using water spray during grinding.
(K) Avoid stockpiling soil, sand, sediment, asphalt material and asphalt grindings materials or rubble in or near storm water drainage system or receiving waters.
(L) Protect stockpiles with a cover or sediment barriers during a rain.

7. Emergency Procedures
   (a) Each Permittee may conduct repairs of essential public service systems and infrastructure in emergency situations with a self-waiver of the provisions of this Order.
      (1) Where the self-waiver has been invoked, the Permittee shall submit to the Regional Water Board Executive Officer a statement of the occurrence of the emergency, an explanation of the circumstances, and the measures that were implemented to reduce the threat to water quality, no later than 30 business days after the situation of emergency has passed.
      (2) Minor repairs of essential public service systems and infrastructure in emergency situations (can be completed in less than one day) are not subject to the notification provisions. Appropriate BMPs to reduce the threat to water quality shall be implemented.

8. Municipal Employee and Municipal Contractor Training
   (a) Each Permittee shall, no later than one year after Order adoption (July 8, 2011) and annually thereafter before June 30, train all of their employees and contractors in targeted positions (whose interactions, jobs, and activities affect storm water quality) on the requirements of the overall storm water management program to:
      (1) Promote a clear understanding of the potential for activities to pollute storm water.
      (2) Identify opportunities to require, implement, and maintain appropriate BMPs in their line of work.
   (b) Each Permittee shall, no later than one year after Order adoption (July 8, 2011) and annually thereafter before June 30, train all of their employees and

contractors who use or have the potential to use pesticides or fertilizers (whether or not they normally apply these as part of their work). Training programs shall address:

(1) The potential for pesticide-related surface water toxicity.
(2) Proper use, handling, and disposal of pesticides.
(3) Least toxic methods of pest prevention and control, including IPM.
(4) Reduction of pesticide use.

(c) Each Permittee shall, no later than one year after Order adoption (July 8, 2011) and annually thereafter before June 30, train all of their employees and contractors who are responsible for illicit connections and illicit/ illegal discharges. Training programs shall address:

(1) Identification
(2) Investigation
(3) Termination
(4) Cleanup
(5) Reporting of Incidents
(6) Documentation of Incidents

H. Illicit Connections and Illicit Discharges Elimination Program

I. Each Permittee shall implement an Illicit Connections and Illicit Discharges (IC/ IDs) program to eliminate IC/IDs to the storm drain system, and shall document, track, and report all such cases in accordance with the elements and performance measures specified in the following subsections.

1. General

(a) Implementation - Each Permittee shall implement an IC/ ID Program. The IC/ ID procedures shall be documented and made available for public review.

(b) Tracking - All Permittees shall, no later than May 7, 2012, map at a scale and in a format specified by the Principal Permittee all known connections to their storm drain system. All Permittees shall map at a scale and in a format specified by the Principal Permittee incidents of illicit connections and discharges since January 2009 on their baseline maps, and shall transmit this information to the Principal Permittee no later than May 7, 2012. Permittees shall use this information to identify priority areas for further investigation and elimination of IC/ ID.

2. Public Reporting

(a) Permittees shall establish and maintain a phone hotline and internet site to receive all reports of IC/ ID complaints.

(b) Permittees shall document the location of the reported IC/ ID and the actions undertaken in response to all IC/ ID complaints.

3. Illicit Connections

(a) <u>Screening for Illicit Connections</u>

(1) Each Permittee shall submit to the Principal Permittee:

(A) A map at a scale and in a format specified by the Principal Permittee showing the location and length of underground pipes 18 inches and greater in diameter, and channels within their permitted area and operated by the Permittee in accordance with the following schedule:
(i) All channeled portions of the storm drain system no later than 90 days after Order adoption date (October 6, 2010).
(ii) All portions of the storm drain system consisting of storm drain pipes 36 inches in diameter or greater, no later than May 7, 2012.
(iii) All portions of the storm drain system consisting of storm drain pipes 18 inches in diameter or greater, no later than May 7, 2014.
(B) The status of suspected, confirmed, and terminated illicit connections.

(2) Permittees shall conduct field screening of their storm drain systems in accordance with screening procedures described in the Illicit Discharge Detection and Elimination, A Guidance Manual for Program Development and Technical Assessments (2004)[1] or other equally effective alternative methods not listed in the manual. Permittees shall conduct field screening of their storm drain system that has not been previously screened and reported to the Regional Water Board, for illicit connections in accordance with the following schedule:
(A) All portions of the storm drain system consisting of storm drain pipes 36 inches in diameter or greater, no later than May 7, 2012.
(B) High priority areas identified during the mapping of illicit connections and discharges, no later than May 7, 2012.
(C) All portions of storm drain systems 50 years or older in age, no later than May 7, 2012.

(3) Each Permittee shall maintain a list containing all connections under investigation for possible illicit connection and their status.

(b) Response to Illicit Connections

(1) Investigation -
Each Permittee, upon discovery or upon receiving a report of a suspected illicit connection, shall complete an investigation within 21 days, to determine the following:
(A) Source of the connection.
(B) Nature and volume of discharge through the connection.
(C) Responsible party for the connection.

(2) Termination -
Each Permittee, upon confirmation of an illicit storm drain connection, shall ensure the following:
(A) Termination of the connection within 180 days of completion of the investigation, using formal enforcement authority to eliminate the illicit connection.

(3) Documentation -

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[1] *Illicit Discharge Detection and Elimination, A Guidance Manual for Program Development and Technical Assessments*. The Center for Watershed Protection, Pitt R., October 2004. Chapter 13, 13.1,13.2, 13.3, 13.4

Each Permittee shall keep records of all illicit connection investigations and the formal enforcement taken to eliminate all illicit connections.

4. Illicit Discharges
   (a) Investigation -
   Each Permittee shall investigate an illicit/ illegal discharge during or immediately following containment and cleanup activities, and shall take appropriate enforcement action to eliminate the illegal discharge.
   (b) Abatement and Cleanup -
   Each Permittee shall respond, within 1 business day of discovery or a report of a suspected illicit/ illegal discharge, with actions to abate, contain, and/or clean up all illegal discharges, including hazardous waste.
   (c) Documentation -
   Each Permittee shall maintain records of all illicit/ illegal discharge discoveries, reports of suspected illicit/ illegal discharges, their response to the illicit/ illegal discharges and suspected illicit/ illegal discharges, and the formal enforcement taken to eliminate all illicit/ illegal discharges.

I. REPORTING PROGRAM

1. The Principal Permittee in consultation with the Permittees and Regional Water Board staff shall convene an adhoc working group to develop an Electronic Reporting Program, the basis of which shall be the requirements in this Order. The Committee shall no later than one year after Order adoption date (July 8, 2011) submit the electronic reporting form in each subsequent year.

2. Each Permittee shall submit information required in the Reporting Program in a method as appropriate to the format approved by the Regional Water Board Executive Officer.

3. The Principal Permittee shall submit by December 15th of each year, an Annual Report to the Regional Water Board Executive Officer in the form one hard copy and three compact disk (CD) copies (or an electronic equivalent).

4. The Annual Report shall document the status of the Municipal Storm Water Program, an integrated summary of the results of analyses from:
   (a) The monitoring program described under Part 1- Monitoring Report.
   (b) The requirements described under Part 2- Program Report.

5. Plans shall be submitted to the Regional Water Board Executive Officer in the form of one hard copy and three compact disk (CD) copies (or an electronic equivalent).

6. Study Reports shall be submitted to the Regional Water Board Executive Officer in the form of one hard copy and three compact disk (CD) copies (or an electronic equivalent).

7. Progress Reports shall be submitted to the Regional Water Board Executive Officer in the form of one hard copy and three compact disk (CD) copies (or an electronic equivalent).

PART 5 - TOTAL MAXIMUM DAILY LOAD PROVISIONS

I. Part 5 of this Order incorporates provisions to assure that Ventura County MS4 Permittees comply with WLAs and other requirements of TMDLs covering impaired waters impacted by the Permittees' discharges.

II. Each Permittee shall attain the storm water WLAs incorporated into this Order by implementing BMPs in accordance with the TMDL Technical Reports, Implementation Plans, or as identified as a result of TMDL special studies specified in the Basin Plan Amendment.

III. The Permittees shall comply with the following Wasteload Allocations, consistent with the assumptions and requirements of the Wasteload Allocations documented in the Implementation Plans, including compliance schedules, associated with the State adoption and approval of the TMDL at compliance monitoring points established in each TMDL (40 CFR 122.44(d)(1)(vii)(B).

IV. TMDLs in effect and covered in this Order are the following:
1. TMDL for Nutrients for Malibu Creek Watershed (Effective date: March 21, 2003)
2. TMDL for Nitrogen Compounds and Related Effects in Calleguas Creek (Effective date: July 16, 2003)
3. TMDL for Nitrogen Compounds for the Santa Clara River (Effective date: March 23, 2004).
4. TMDL for Chloride in Santa Clara River, Reach 3 (Effective date: June 18, 2003)
5. TMDL for Chloride in Upper Santa Clara River (Effective date: May 4, 2005)
6. TMDL for Toxicity, Chlorpyrifos and Diazinon in the Calleguas Creek, its Tributaries and Mugu Lagoon - (Effective date: March 24, 2006).
7. TMDL for Organochlorine Pesticides, Polychlorinated Biphenyls, and Siltation in Calleguas Creek, its Tributaries and Mugu Lagoon (Effective date: March 24, 2006).
8. TMDL for Bacteria in Malibu Creek and Lagoon (Effective date: January 24, 2006).
9. TMDL for Metals and Selenium in the Calleguas Creek, its Tributaries and Mugu Lagoon (Effective date: March 26, 2007)
10. TMDL for Trash in Revolon Slough and Beardsley Wash (Effective date: March 6, 2008).
11. TMDL for Boron, Chloride, Sulfate, and TDS in Calleguas Creek Watershed (Effective date: December 2, 2008)

12. TMDL for Trash in the Ventura River Estuary (Effective date: March 6, 2008).
13. TMDL for Bacteria in Harbor Beaches of Ventura County (Effective date: September 23, 2008).

V. TMDL Interim WLAs incorporated into this Order due to compliance dates which exceed the term of this Order are the following:

1. Final Wet Weather Bacteria WLAs for Malibu Creek and Lagoon – (Compliance date: January 24, 2016).
2. Final Chloride WLAs for Upper Santa Clara River – (Compliance date: May 4, 2016)
3. Final Organochlorine Pesticides, Polychlorinated Biphenyls, and Siltation WLAs for Calleguas Creek, its Tributaries and Mugu Lagoon – (Compliance date: March 24, 2026).
4. Final Metals and Selenium WLAs for Calleguas Creek, its Tributaries and Mugu Lagoon (Compliance date: March 26, 2022)
5. Final Boron, Chloride, Sulfate, and TDS WLAs for Calleguas Creek watershed (Compliance date: December 2, 2023)

VI. TMDL WLAs and Other TMDL Provisions Incorporated into this Order are as follows:

1. TMDL for Nutrients for Malibu Creek Watershed

(a) Summer Load Allocations

	Nitrogen (lbs/day)	Phosphorus (lbs/day)
- Runoff from developed areas	26	2.6
- Golf Course Fertilization	37	6.6
- Dry Weather Urban Runoff	52	4.6
- Other	56	4.1

(b) Winter concentration-based Load Allocations

	Nitrogen (Nitrate-N + Nitrite-N) (mg/L)
- Runoff from Developed Areas	8
- Golf Course Fertilization	8
- Dry Weather Urban Runoff	8
- Other	8

(c) Compliance Monitoring:
This TMDL was established and approved by U.S. EPA and did not include an implementation plan.

(d) Actions and Special Studies required for Malibu Creek MS4 permittees
(1) Extent of algal impairment. EPA recommends studies to investigate the current extent of impairment due to excessive algal growth in the creek by

surveying algal biomass and species composition at multiple sites within the creek.
(2) Limiting factor analysis. EPA recommends further study to assess whether total nitrogen or total phosphorus or other parameters such as flow and light limit algal growth in the Malibu Creek watershed.
(3) Fate of nutrients in Malibu Lagoon. EPA recommends this special study to determine if the expected upstream reductions in nutrient loadings would result in desired improvements in water quality in the lagoon.

2. TMDL for Nitrogen Compounds and Related Effects in Calleguas Creek Watershed

The stormwater permitted discharges were considered minor sources of nitrogen to the Calleguas Creek. Therefore, WLAs are not assigned to storm water permitted discharges. The monitoring program of this TMDL includes data collection to quantify loadings and associated WLAs from these sources.

3. TMDL for Nitrogen Compounds in the Santa Clara River

(a) Waste Load Allocations:
(1) The Ventura County MS4 permittees discharging to the Santa Clara River (the cities of Fillmore and Santa Paula) ("Santa Clara MS4 permittees") shall implement BMPs to achieve the following MS4 wasteload allocations applicable to River Reach 3:

Ammonia nitrogen 30-day average	2.0 mg/L
Ammonia nitrogen 1-hour average	4.2 mg/L
Nitrate + Nitrite nitrogen 30-day average	8.1 mg/L

(b) Compliance Monitoring:
(1) Compliance with the WLAs is to be determined through receiving water monitoring conducted in accordance with the Santa Clara River Nitrogen TMDL Monitoring Program approved by the Executive Officer.
(2) If any WLA is exceeded at a compliance monitoring site, permittees shall implement BMPs in accordance with the TMDL Technical Reports, Implementation Plans or as identified as a result of TMDL special studies identified in the Basin Plan Amendment. Following these actions, Regional Water Board staff will evaluate the need for enforcement action.
(c) Actions and Special Studies required of Santa Clara MS4 permittees:
(1) Annual Progress Reports. Santa Clara River MS4 permittees, either independently or in conjunction with other stakeholders, shall submit an annual progress report with respect to achievement of the WLAs.

4. TMDL for Chloride in Santa Clara River, Reach 3

(a) Waste Load Allocation:
MS4 permittees discharging to Santa Clara River, Reach 3 shall implement BMPs to achieve the following MS4 WLAs:

Chloride (mg/L) 80

(b) Compliance Monitoring: This TMDL was established and approved by U.S. EPA and did not include an implementation plan.

(c) Actions and Special Studies required of Santa Clara MS4 permittees:

(1) Annual Progress Reports. Santa Clara River MS4 permittees, either independently or in conjunction with other stakeholders, shall submit an annual progress report with respect to achievement of the WLAs.

5. TMDL for Chloride in Upper Santa Clara River

(a) Waste Load Allocation:
MS4 permittees discharging to Upper Santa Clara River shall implement BMPs to achieve the following WLAs
Chloride (mg/L) 100

(b) Compliance monitoring:

(1) Compliance with the WLAs is to be determined through receiving water monitoring conducted in accordance with the Santa Clara River Chloride TMDL Monitoring Program approved by the Executive Officer.

(2) If any WLA is exceeded at a compliance monitoring site, permittees shall implement BMPs in accordance with the TMDL Technical Reports and Implementation Plans. Following these actions, Regional Water Board staff will evaluate the need for enforcement action.

(c) Actions and Special Studies required of Santa Clara MS4 permittees:

(1) Annual Progress Reports. Santa Clara River MS4 permittees, either independently or in conjunction with other stakeholders, shall submit an annual progress report with respect to achievement of the WLAs.

6. TMDL for Toxicity, Chlorpyrifos, and Diazinon in the Calleguas Creek, its Tributaries and Mugu Lagoon.

(a) Waste Load Allocations:

(1) MS4 permittees discharging to Calleguas Creek, its tributaries and Mugu Lagoon (Ventura County Watershed Protection District, County of Ventura and the cities of Camarillo, Moorpark, Oxnard, Simi Valley and Thousand Oaks) ("Calleguas MS4 permittees") shall implement BMPs to achieve the following MS4 WLAs:

Toxicity WLA	1.0 TUc
Chlorpyrifos WLA	0.014 ug/L
Diazinon WLA	0.10 ug/L

(2) Pursuant to the TMDL, the final storm water WLAs for Toxicity, Chlorpyrifos and Diazinon, listed above, are receiving water concentrations measured in-stream at the base of each subwatershed within the Calleguas Creek watershed.

(b) Compliance Monitoring:

(1) Compliance with the WLAs is to be determined through the measurement of in-stream water quality at the base of each of the Calleguas Creek subwatersheds, in accordance with the Calleguas Creek Watershed TMDL Monitoring Program approved by the Executive Officer.

(2) If any WLA is exceeded at a compliance monitoring site, permittees shall implement BMPs in accordance with the TMDL Technical Reports, Implementation Plans or as identified as a result of TMDL special studies identified in the Basin Plan Amendment. Following these actions, Regional Water Board staff will evaluate the need for enforcement action.

(3) If as a result of compliance monitoring and subsequent investigations it is determined that a Calleguas MS4 permittee is responsible for exceedance of the in-stream Toxicity WLA, that permittee shall initiate the TRE/TIE process as outlined in U.S. EPA's "Understanding and Accounting for Method Variability in Whole Effluent Toxicity Applications Under the National Pollutant Discharge Elimination System Program" (2000) or the approved Toxicity TMDL monitoring plan, and take appropriate action to eliminate the identified source of the toxicity.

(c) Actions and Special Studies required of Calleguas MS4 permittees:

(1) Special Study #1. Together with Calleguas POTW permittees, investigate the pesticides that will replace diazinon and chlorpyrifos in the urban environment, their potential impact on receiving waters and potential control measures. Special Study #1 was completed by March 24, 2008.

(2) Special Study #2. Together with Calleguas Agricultural Dischargers, consider results of monitoring of sediment concentrations by source/land use type through the special study required in the Calleguas OC Pesticide, PCB and Siltation TMDL Implementation Plan. Complete within 6 months of completion of the OCs TMDL special study #1.

(3) Pesticide Collection Program. Together with Calleguas POTW permittees, develop and implement a collection program for diazinon and chlorpyrifos and an educational program. Collection and education could occur through existing programs such as household hazardous waste collection events. The Pesticide Collection Program is to be implemented by March 24, 2009.

(4) Special Study #3. Together with Calleguas Agricultural Dischargers, consider the findings of transport rates developed through the OC Pesticide, PCB and Siltation TMDL Implementation Plan. Complete within 6 months of completion of the OCs TMDL special study #1.

7. TMDL for Organochlorine (OC) Pesticides, Polychlorinated Biphenyls (PCBs) and Siltation in the Calleguas Creek, its Tributaries and Mugu Lagoon.

(a) Waste Load Allocations:

(1) MS4 permittees discharging to Calleguas Creek, its tributaries or Mugu Lagoon (Ventura County Watershed Protection District, County of Ventura and the cities of Camarillo, Moorpark, and Simi Valley) ("Calleguas MS4 permittees") shall implement BMPs to achieve the interim WLAs listed in Table 12.

Table 12 - Interim Sediment Concentration WLAs (ng/g)

Constituent	Subwatershed					
	Mugu Lagoon	Calleguas Creek	Revolon Slough	Arroyo Las Posas	Arroyo Simi	Conejo Creek
Chlordane	25	17	48	3.3	3.3	3.4
4,4-DDD	69	66	400	290	14.0	5.3
4,4-DDE	300	470	1600	950	170	20
4.4-DDT	39	110	690	670	25	2
Dieldrin	19	3	5.7	1.1	1.1	3
PCBs	180	3800	7600	25700	25700	3800
Toxaphene	22900	260	790	230	230	260

(2) Pursuant to the TMDL, the interim storm water WLAs for OC Pesticides, PCBs and Siltation, listed above, are annual average, sediment-based concentrations measured in surface waters at the base of each subwatershed within the Calleguas Creek watershed.

(b) Compliance Monitoring:

(1) Compliance with the WLAs is to be determined through the measurement of in-stream water quality at the base of each of the Calleguas Creek subwatersheds, in accordance with the Calleguas Creek Watershed TMDL Monitoring Program approved by the Executive Officer.

(2) If any WLA is exceeded at a compliance monitoring site, permittees shall implement BMPs in accordance with the TMDL Technical Reports, Implementation Plans or as identified as a result of TMDL special studies identified in the Basin Plan Amendment. Following these actions, Regional Water Board staff will evaluate the need for enforcement action.

(c) Actions and Special Studies required of Calleguas MS4 permittees:

(1) Pesticide Collection Program. Together with Calleguas POTW permittees, implement a collection program and source control measures pursuant to a work plan approved by the Executive Officer. The Pesticide Collection Program is to be implemented by March 24, 2011.

(2) Special Study #1. Together with Calleguas POTW permittees, Calleguas Agricultural Dischargers, and the Point Mugu Naval Base, submit a work plan to quantify sedimentation in the Calleguas Creek Watershed, evaluate management methods to control siltation and contaminated sediment transport to Calleguas Creek, identify appropriate BMPs to reduce sediment loadings and evaluate the effect of sediment on habitat preservation in Mugu Lagoon for approval by the Executive Officer. This special study is also to evaluate the concentration of OC pesticides and PCBs in sediments from various sources/land use types. Special Study #1 is to be completed by March 24, 2014.

(3) Special Study #2. Together with Calleguas Agricultural Dischargers, identify areas of high OC concentrations and evaluate the effects of watershed protection and land use practices on water quality. Such practices

include but are not limited to management of sediment reduction practices and structures, streambank stabilization, and other projects related to stormwater conveyance and flood control improvements in the Calleguas Creek watershed. Special Study #2 is to be completed based on the schedule provided in the workplan, submitted in March, 2007

(4) Special Study #3 – Together with Calleguas POTW permittees, Calleguas Agricultural Dischargers, and the Point Mugu Naval Base, evaluate natural attenuation rates and evaluate methods to accelerate organochlorine pesticide and polychlorinated biphenyl attenuation and examine the attainability of wasteload and load allocations in the Calleguas Creek Watershed. Special Study #3 is to be completed by March 24, 2016.

8. TMDL for Metals and Selenium in the Calleguas Creek, its Tributaries and Mugu Lagoon.

(a) Waste Load Allocations:

(1) MS4 permittees discharging to Calleguas Creek, its tributaries or Mugu Lagoon (Ventura County Watershed Protection District, County of Ventura and the cities of Camarillo, Moorpark, Oxnard, Simi Valley and Thousand Oaks) ("Calleguas MS4 permittees") shall implement BMPs to achieve the interim WLAs listed in Table 13 and Table 14.

Table 13 - Interim WLAs for Copper, Nickel and Selenium (ug/L)

Constituent	Calleguas and Conejo Creek (a)			Revolon Slough		
	Dry Daily Maximum (ug/L)	Dry Monthly Average (ug/L)	Daily Maximum (ug/L)	Dry Daily Maximum (ug/L)	Dry Monthly Average (ug/L	Daily Maximum (ug/L)
Copper	23	19	204	23	19	204
Nickel	15	13	(a)	15	13	(a)
Selenium	(b)	(b)	(b)	14(c)	13(c)	(a)

(A) The current loads do not exceed the TMDL under wet conditions, interim limits are not required

(B) Selenium allocations have not been developed for this reach as it is not on the 303(d) list

(C) Attainment of interim limits will be evaluated in consideration of background loading data, if available

(2) Pursuant to the TMDL, the interim storm water WLAs for copper, nickel, and selenium are receiving water concentrations measured in-stream at the base of Calleguas Creek and Revolon Slough and in Mugu Lagoon.

Table 14 – Interim Mass-based WLAs for mercury

Annual Cumulative Flow (million gallons per year)	Calleguas Creek (lbs/yr)	Revolon Slough (lbs/yr)
0-15,000	3.3	1.7
15,000-25,000	10.5	4
Above 25,000	64.6	10.2

(3) Pursuant to the TMDL, the interim storm water WLAs for mercury are suspended sediment loads measured in-stream at the base of Calleguas Creek and Revolon Slough and in Mugu Lagoon.

(4) Determination of the applicable interim WLA will be determined by calculating the total annual flow (October 1-September 30) in the Calleguas Creek watershed as measured by the flow gage at CSUCI.

(b) Compliance Monitoring:

(1) Compliance with the WLAs is to be determined through the measurement of in-stream water quality and total suspended solids (TSS) at the base of Calleguas Creek, Revolon Slough and in Mugu Lagoon, in accordance with the Calleguas Creek Watershed TMDL Monitoring Program approved by the Executive Officer.

(2) If any WLA is exceeded at a compliance monitoring site, permittees shall implement BMPs in accordance with the TMDL Technical Reports, Implementation Plans or as identified as a result of TMDL special studies identified in the Basin Plan Amendment. Following these actions, Regional Water Board staff will evaluate the need for enforcement action.

(c) Actions and Special Studies required of Calleguas MS4 permittees:

(1) Conduct a source control study, develop and submit an Urban Water Quality Management Program (UWQMP) for copper, mercury, nickel, and selenium. Complete by March 26, 2009.

(2) Implement the UWQMP within one year of approval by Executive Officer.

(3) In cooperation with agricultural dischargers, evaluate the results of the OCs TMDL special study on sediment transport rates for applicability to the metals and selenium TMDL. Complete within 6 months of completion of the OCs TMDL special study #1.

(4) In cooperation with agricultural dischargers, include monitoring for copper, mercury, nickel and selenium in the OC pesticides TMDL special study – Monitoring of Sediment by Source and Land Use Type. The special study is to be completed by March 26, 2014.

(5) Evaluate the results of the OC Pesticides TMDL Special Study – Effects of BMPs on Sediment and Siltation, to determine the impacts on metals and selenium. Complete within 6 months of completion of the OC Pesticides special study #1.

(6) Evaluate the effectiveness of BMPs implemented under the UWQMP in controlling metals and selenium discharges. This is to be completed by March 26, 2013.
(7) Re-evaluate agricultural and urban waste load allocations for copper, mercury, nickel and selenium based on the evaluation of BMP effectiveness. By March 26, 2012, urban dischargers will have a required 25% reduction in the difference between the loadings at the time of the TMDL preparation and the final WLAs effective in 2022.
(8) In cooperation with POTW permittees and agricultural dischargers, conduct a study to identify selenium contaminated groundwater sources. Special Study is to be completed within one year of the approval of the workplan.
(9) In cooperation with agricultural dischargers, conduct a study to investigate metals "hot spots" and natural soils concentrations. This special study is to be completed within 2 years of the approval of the workplan.

9. TMDL for Bacteria in Malibu Creek and Lagoon
(a) Waste Load Allocations:
(1) MS4 permittees discharging to Malibu Creek or its tributaries (Ventura County Watershed Protection District, County of Ventura and the cities of Thousand Oaks and Simi Valley) ("Malibu MS4 permittees") shall achieve the WLAs identified in Resolution 2004-19. These WLAs are expressed as the number of daily or weekly sample days that may exceed the single sample limits or 30-day geometric mean bacteria targets in Resolution 2004-19.

Table 15 - Bacteria Targets

Parameters	Unit	Fresh Water Targets	
		Geometric Mean	Single Sample
E. coli	mg	126/ 100	235/ 100
Fecal coliform	mg	200/ 100	400/ 100

(2) The summer dry weather wasteload allocations are to be achieved no later than January 24, 2009. The winter dry weather wasteload allocations are to be achieved no later than January 24, 2012.
(b) Compliance Monitoring:
(1) Achievement of the WLAs is to be determined through receiving water monitoring conducted in accordance with the Malibu Creek and Lagoon Bacteria TMDL Compliance Monitoring Program approved by the Executive Officer.
(2) If any WLA is exceeded at a compliance monitoring site, permittees shall implement BMPs in accordance with the TMDL Technical Reports, Implementation Plans or as identified as a result of TMDL special studies identified in the Basin Plan Amendment. Following these actions, Regional Water Board staff will evaluate the need for enforcement action.
(c) Actions and Special Studies required of Malibu MS4 permittees:

(1) If TMDL compliance monitoring indicates that the Malibu MS4 permittees are causing or contributing to an exceedance of the WLAs in the receiving waters, the permittees shall conduct a source identification study and implement additional controls sufficient to achieve the WLAs in the receiving waters.

10. TMDL for Trash in Revolon Slough and Beardsley Wash
    (a) Wasteload Allocations
        (1) MS4 permittees discharging to Revolon Slough and Beardsley Wash (Ventura County Watershed Protection District, County of Ventura and the cities of Camarillo and Oxnard) shall implement BMPs to achieve the WLAs of zero trash.
    (b) Compliance Monitoring
        (1) Responsible jurisdictions will develop a TMRP for Executive Officer approval that describes the methodologies that will be used to assess and monitor trash in Revolon Slough and Beardsley Wash and/or within responsible jurisdiction land areas. The TMRP shall include a plan to establish the trash Baseline WLAs.
        (2) If any WLA is exceeded at a compliance monitoring site, permittees shall implement BMPs in accordance with the TMDL Technical Reports, Implementation Plans or as identified as a result of TMDL special studies identified in the Basin Plan Amendment. Following these actions, Regional Water Board staff will evaluate the need for enforcement action.
    (c) Actions and Special Studies required of Revolon Slough and Beardsley Wash MS4 permittees
        (1) Per the adopted Basin Plan Amendment, compliance with the TMDL may be either through a progressive implementation schedule of full capture devices or implementation of other measures to attain the required trash reduction.

11. TMDL for Trash in the Ventura River Estuary
    (a) Wasteload Allocations
        (1) MS4 permittees discharging to the Ventura River Estuary (Ventura County Watershed Protection District, County of Ventura and the City of Ventura) shall implement BMPs to achieve the WLAs of zero trash.
    (b) Compliance Monitoring
        (1) Responsible jurisdictions will develop a TMRP for Executive Officer approval that describes the methodologies that will be used to assess and monitor trash in the Ventura River Estuary and/or within responsible jurisdiction land areas. The TMRP shall include a plan to establish the trash Baseline WLAs.
        (2) If any WLA is exceeded at a compliance monitoring site, permittees shall implement BMPs in accordance with the TMDL Technical Reports, Implementation Plans or as identified as a result of TMDL special studies

identified in the Basin Plan Amendment. Following these actions, Regional Water Board staff will evaluate the need for enforcement action.

(c) Actions and Special Studies required of Revolon Slough and Beardsley Wash MS4 permittees

(1) Per the adopted Basin Plan Amendment, compliance with the TMDL may be either through a progressive implementation schedule of full capture devices or implementation of other measures to attain the required trash reduction.

12. TMDL for Boron, Chloride, Sulfate and TDS in Calleguas Creek Watershed

(a) Waste Load Allocation

Table 16 - Interim Dry Weather WLAs for Permitted Stormwater Dischargers

Constituent	Interim Limit 30-day average (mg/L)
Boron Total	1.3
Chloride Total	230
Sulfate Total	1289
TDS Total	1720

Table 17 - Final Dry Weather WLAs for Permitted Stormwater Dischargers

Subwatershed	Critical Condition Flow Rate (mgd)	Chloride Allocation (lb/day)	TDS Allocation (lb/day)	Sulfate Allocation (lb/day)	Boron Allocation (lb/day)
Simi	1.39	1,738	9,849	2,897	12
Las Posas	0.13	157	887	261	N/A
Conejo	1.26	1,576	8,931	2,627	N/A
Camarillo	0.06	72	406	119	N/A
Pleasant Valley (Calleguas)	0.12	150	850	250	N/A
Pleasant Valley (Revolon)	0.25	314	1,778	523	2

(b) Compliance Monitoring

(1) A monitoring plan will be submitted to the RWQCB for Executive Officer approval on June 2, 2009. Monitoring will begin one year after Executive Officer approval of the monitoring plan to allow time for the installation of automated monitoring equipment.

(2) Compliance with the WLAs is to be determined through the measurement of in-stream water quality at the base of each of the Calleguas Creek

subwatersheds, in accordance with the Calleguas Creek Watershed TMDL Monitoring Program approved by the Executive Officer.

(3) If any WLA is exceeded at a compliance monitoring site, permittees shall implement BMPs in accordance with the TMDL Technical Reports, Implementation Plans or as identified as a result of TMDL special studies identified in the Basin Plan Amendment. Following these actions, Regional Water Board staff will evaluate the need for enforcement action.

(c) Actions and Special Studies required of Calleguas Creek Watershed MS4 permittees

Responsible jurisdictions including MS4 permittees shall submit compliance monitoring plan to the Los Angeles Regional Water Board for Executive Officer approval on June 2, 2009. Monitoring shall begin as outlined in the approved monitoring plan one year after approval of the work plan.

Responsible jurisdictions including MS4 permittees shall demonstrate that implementation actions have reduced the boron, sulfate, TDS, and chloride imbalance by 20%, 40%, 70% by December 2 of 2011, 2015, and 2018 respectively. Stormwater dischargers shall achieve WLAs, which shall be expressed as NPDES mass-based limits specified in accordance with federal regulations and state policy on water quality control by December 2, 2023.

13. TMDL for Bacteria in Harbor Beaches of Ventura County

(a) Waste Load Allocations

(1) MS4 permittees discharging to the Channel Islands Harbor Beaches (the County of Ventura, the Ventura County Watershed Protection District (VCWPD) and associated Municipal Separate Storm Sewer System (MS4) permittees in the Channel Islands Harbor subwatershed, and the City of Oxnard shall implement BMPs to achieve the interim WLAs listed in Table 18. All WLAs for summer dry-weather single sample bacteria densities at the Harbor Beaches of Ventura County are zero (0) days of allowable exceedances; winter dry weather and wet weather final WLAs are listed in Table 19 below.

The Basin Plan objectives that serve as the numeric targets for this TMDL are (single sample limits):

a. Total coliform density shall not exceed 10,000/100 ml.
b. Fecal coliform density shall not exceed 400/100 ml.
c. Enterococcus density shall not exceed 104/100 ml.
d. Total coliform density shall not exceed 1,000/100ml, if the ratio of fecal-to-total coliform exceeds 0.1.

Table 18 - Interim WLAs for Single Sample Exceedance Days

Location	Summer Dry Weather		Winter Dry Weather		Wet Weather	
	Daily Sampling	Weekly Sampling	Daily Sampling	Weekly Sampling	Daily Sampling	Weekly Sampling
Kiddie Beach	54	8	23	4	32	5
Hobie Beach	40	6	25	4	38	6

Table19 - Final Allowable Exceedance Days by Location

Location	Summer Dry-weather		Winter Dry-weather		Wet-weather	
	Daily Sampling	Weekly Sampling	Daily Sampling	Weekly Sampling	Daily Sampling	Weekly Sampling
Hobie Beach	0	0	3	1	17	3
Kiddie Beach	0	0	3	1	17	3

(2) Pursuant to the TMDL, the interim storm water WLAs for bacteria are from samples taken at existing monitoring sites in ankle to knee- high depths.

(b) Compliance Monitoring

(1) Compliance and monitoring for Harbor Beaches of Ventura County is based on existing monitoring protocols and locations. Monitoring shall continue at sampling locations (VCEHD 36000 and VCEHD37000) and at the current weekly monitoring frequency, consistent with AB411 compliance monitoring. Monitoring shall be conducted on a year-round basis at the current monitoring locations including the summer months (i.e., April to October) and winter months (i.e., November to March). Bacteria sampling shall be conducted in ankle- to knee-high water, consistent with AB411. However, if additional monitoring stations are added or if changes are made to the sampling frequencies or existing monitoring locations, then submittal of a monitoring plan is required for Executive Officer approval.

(2) If any WLA is exceeded at a compliance monitoring site, permittees shall implement BMPs in accordance with the TMDL Technical Reports, Implementation Plans or as identified as a result of TMDL special studies identified in the Basin Plan Amendment. Following these actions, Regional Water Board staff will evaluate the need for enforcement action.

(c) Actions and Special Studies required of Harbor Beaches of Ventura County MS4 permittees

(1) Per the adopted Basin Plan Amendment, compliance with the TMDL may be either through structural and non-structural BMPs or implementation of other measures to attain the required source control.

(2) Special studies are not required for implementation of the TMDL though conducting special studies is within the discretion of the responsible parties.

PART 6 - DEFINITIONS

The following are definitions for terms in this Order:

Adverse Impact - means a detrimental effect upon water quality or beneficial uses caused by a discharge or loading of a pollutant or pollutants.

Agriculture - means the science, art, and business of cultivating the soil, producing crops, and raising livestock.

Antidegradation Policies - means policies which protect surface and ground waters from degradation, and federal policies, which protect high quality surface waters. In particular, this policy protects waterbodies where existing quality is higher than that necessary for the protection of beneficial uses including the protection of fish and wildlife propagation and recreation on and in the water. (*Statement of Policy with Respect to Maintaining High Quality Water in California*, State Board Resolution No. 68-16; 40 CRF 131.12).

Applicable Standards and Limitations - means all State, interstate, and Federal standards and limitations to which a "discharge" or a related activity is subject under the CWA, including effluent limitations, water quality standards, standards of performance, toxic effluent standards or prohibitions, best management practices, and pretreatment standards under § 301, § 302, § 303, § 304, § 306, § 307, § 308, § 403, and § 404 of CWA.

Areas of Special Biological Significance (ASBS) - means all those areas of this state listed as ASBS, listed specifically within the California Ocean Plan or so designated by the State Board which, among other areas, includes the area from Mugu Lagoon to Latigo Point: Ocean water within a line originating from Laguna Point at 34° 5' 40" north, 119° 6'30" west, thence southeasterly following the mean high tideline to a point at Latigo Point defined by the intersection of the mean high tide line and a line extending due south of Benchmark 24; thence due south to a distance of 1000 feet offshore or to the 100 foot isobath, whichever distance is greater; thence northwesterly following the 100 foot isobath or maintaining a 1,000-foot distance from shore, whichever maintains the greater distance from shore, to a point lying due south of Laguna Point, thence due north to Laguna Point.

Authorized Discharge - means any discharge that is authorized pursuant to an NPDES permit, waste discharge requirement, conditional waiver from waste discharge requirements, or meets the conditions set forth in this Order.

Automotive Repair Shop - means a facility that is categorized in any one of the following Standard Industrial Classification (SIC) codes: 5013, 5014, 5541, 7532-7534, or 7536-7539.

Automotive Service Facilities - means a facility that is categorized in any one of the following Standard Industrial Classification (SIC) and North American Industry Classification System (NAICS) codes. For inspection purposes, Permittees need not inspect facilities with SIC codes

5013, 5014, 5541, 5511, provided that these facilities have no outside activities or materials that may be exposed to storm water.

SIC Code	Corresponding NAICS Code
5013	425120, 441310, 425110, & 423120
5014	425120, 425110, 423130, & 441320
5511	441110
5541	447110, & 447190
7532	811121
7533	811112
7534	326212, & 811198
7536	811122
7537	811113
7538	811111
7539	811198, & 811118

Bacteria Total Maximum Daily Load (TMDL) Dry Weather - defined in the Bacteria TMDLs as those days with less than 0.1 inch of rainfall and those days occurring more than 3 days after a rain.

Bacteria Total Maximum Daily Load (TMDL) Wet Weather - defined in the Bacteria TMDLs as a day with 0.1 inch or more of rain and 3 days following the rain event.

Basin Plan - means the Water Quality Control Plan, Los Angeles Region, Basin Plan for the Coastal Watersheds of Los Angeles and Ventura Counties, adopted by the Regional Water Board on June 13, 1994 and subsequent amendments.

Beneficial Uses - means the existing or potential uses of receiving waters in the permit area as designated by the Regional Water Board in the Basin Plan.

Best Management Practices (BMPs) - means methods, measures, or practices designed and selected to reduce or eliminate the discharge of pollutants to surface waters from point and nonpoint source discharges including storm water. BMPs include structural and nonstructural controls, and operation and maintenance procedures, which can be applied before, during, and/or after pollution producing activities.

California Environmental Quality Act (CEQA) - means a California statute that requires state and local agencies to identify significant environmental impacts of their actions and to avoid or mitigate those impacts, if feasible (Reference: California Public Resources Code § 21000 et seq.)

Channel - means an open conduit either naturally or artificially created which periodically or continuously contains moving water, or which forms a connecting link between two waterbodies.

Chronic Toxicity - means a measurement of a sublethal effect (e.g., reduced growth, reproduction) to experimental test organisms exposed to an effluent or ambient waters compared to that of the control organisms.

Commercial Area(s) - means any geographic area of the Permittees' jurisdiction that is not heavy industrial or residential. A commercial area includes, but is not limited to areas surrounding: commercial activity, hospitals, laboratories and other medical facilities, educational institutions, recreational facilities, plant nurseries, car wash facilities, mini-malls and other business complexes, shopping malls, hotels, office buildings, public warehouses and other light industrial complexes.

Commercial Development - means any development on private land that is not heavy industrial or residential. The category includes, but is not limited to: hospitals, laboratories and other medical facilities, educational institutions, recreational facilities, plant nurseries, car wash facilities, mini-malls and other business complexes, shopping malls, hotels, office buildings, public warehouses and other light industrial complexes.

Construction - Construction activity includes any construction or demolition activity, clearing, grading, grubbing, or excavation or any other activity that results in a land disturbance. Construction does not include emergency construction activities required to immediately protect public health and safety or routine maintenance activities required to maintain the integrity of structures by performing minor repair and restoration work, maintain original line and grade, hydraulic capacity, or original purpose of the facility. See "Routine Maintenance" definition for further explanation. Where clearing, grading or excavating of underlying soil takes place during a repaving operation, State General Construction Permit coverage is required if more than one acre is disturbed or the activities are part of a larger plan.

Construction Activities Storm Water General Permit (CASGP) - means the general NPDES permit adopted by the State Board, which authorizes the discharge of storm water from construction activities under certain conditions.

Control - means to minimize, reduce, eliminate, or prohibit by technological, legal, contractual or other means, the discharge of pollutants from an activity or activities.

Critical Sources - means commercial facilities and businesses that have a potential to contribute pollutants to stormwater runoff if effective BMPs are not implemented. Attachment "D" specifies the commercial facilities and businesses that have been identified as Critical Sources.

Dechlorinated/ Debrominated Swimming Pool Discharge - means any swimming pool discharge with a residual chlorine or bromine level of 0.1mg/L or less; and does not contain any detergents, wastes, algaecides, or cyanuric acid in excess of 50 ppm, or any other chemicals including salts from pools commonly referred to as "salt water pools". The term does not include swimming pool filter backwash or swimming pool water containing bacteria.

Development - means any construction, rehabilitation, redevelopment or reconstruction of any public or private residential project (whether single-family, multi-unit or planned unit development); industrial, commercial, retail and any other non-residential projects, including public agency projects; or mass grading for future construction.

Directly Adjacent - means situated within 200 feet of the contiguous zone required for the continued maintenance, function, and structural stability of the environmentally sensitive area.

Directly Discharging - means outflow from a drainage conveyance system that is composed entirely or predominately of flows from the subject, property, development, subdivision, or industrial facility and not commingled with the flows from adjacent lands.

Discharge - means when used without qualification the "discharge of a pollutant."

Discharging Directly - means outflow from a drainage conveyance system that is composed entirely or predominantly of flows from the subject, property, development, subdivision, or industrial facility, and not commingled with the flows from adjacent lands.

Discharge of a Pollutant - means any addition of any "pollutant" or combination of pollutants to "waters of the United States" from any "point source" or, any addition of any pollutant or combination of pollutants to the waters of the "contiguous zone" or the ocean from any point source other than a vessel or other floating craft, which is being used as a means of transportation. The term discharge includes additions of pollutants into waters of the United States from: surface runoff which is collected or channeled by man; discharges through pipes, sewers, or other conveyances owned by a State, municipality, or other person which do not lead to a treatment works; and discharges through pipes, sewers, or other conveyances, leading into privately owned treatment works.

Disturbed Area - means any area that is altered as a result of land disturbance. Examples include but are not limited to: clearing, grading, grubbing, stockpiling and/ or excavation, etc...

Dry Day - means a non-wet day for Malibu Creek and Lagoon Bacteria TMDL WLA. A wet day is defined as a day with a 0.1 inch or more of rain and 3 days following the rain event.

Effect Concentration (EC) - means a point estimate of the toxicant concentration that would cause an observable adverse effect (e.g., death, immobilization, or serious incapacitation) in a given percent of the test organisms, calculated from a continuous model (e.g., Probit Model). EC_{25} is a point estimate of the toxicant concentration that would cause an observable adverse effect in 25 percent of the test organisms.

Effective Impervious Surface - means that portion of the surface area that is hydrologically connected via sheet flow over a hardened conveyance or impervious surface without any intervening medium to mitigate flow volume.

Effluent limitation - means any restriction imposed by the Permitting Authority (PA) on quantities, discharge rates, concentrations, and/ or mass loadings of "pollutants" which are "discharged" from "point sources" into "waters of the United States," the waters of the "contiguous zone," or the ocean.

Emergency - means a sudden, unexpected occurrence, involving a clear and imminent danger, demanding immediate action to prevent or mitigate loss of, or damage to, life, health, property, or essential public services. "Emergency" includes such occurrences as fire, flood, earthquake, or other soil or geologic movements, as well as such occurrences as riot, accident, or sabotage. (Reference: California Public Resources Code § 21060.3. Emergency).

End-of-Pipe - means the end of the major outfall as defined in 40 CFR 122.26 (b)(5) and 40 CFR 122.26 (b)(6).

Endpoint - means a biological measurement used to quantify the results obtained from analytical methods such as whole effluent toxicity testing [e.g., lethal concentration (LC_{50}); inhibition concentration (IC_{25}); and no observed effect concentration (NOEC)]. Such endpoints are quantitative measurements of the responses of test organisms (e.g., survival, growth, mobility, reproduction, and weight gain or loss) in response to exposure to a serial dilution of effluent.

Environment - means the physical conditions, which exist within the area and which will be affected by a proposed project including land, air, water, minerals, flora, fauna, ambient noise, and objects of historical or aesthetic significance. The area involved shall be the area in which significant effects would occur either directly or indirectly as a result of the project. The "environment" includes both natural and man-made conditions.

Environmentally Sensitive Area (ESA) - means an area "in which plant or animal life or their habitats are either rare or especially valuable because of their special nature or role in an ecosystem and which would be easily disturbed or degraded by human activities and developments" (Reference: California Public Resources Code § 30107.5). ESAs will include Clean Water Act 303d Listed Water Bodies in all reaches that are unimproved, all California Coastal Commission's Environmentally Sensitive Habitat Areas as delineated on maps in Local Coastal Plans and Regional Water Quality Control Board's Basin Plan Rare, Threatened or Endangered Species (RARE) and Preservation of Biological Habitats (BIOL) designated waterbodies. The California Department of Fish and Game's Significant Natural Areas map will be considered for inclusion as the department field verifies the designated locations. Watershed restoration projects will be considered for inclusion as the department field verifies the designated locations.

Erosivity Factor - The Erosivity Factor is a criterion that to assess the risk of erosion on disturbed land. It is described in "Predicting soil erosion by water: A guide to conservation planning with the Revised Universal Soil Loss Equation (RUSLE), Agricultural Handbook 703, USDA-ARS, U.S. Government Printing Office, Washington, D.C., 1997 by Renard, K.C., G.R. Foster, G.A. Weesies, D.K. McCool, and D.C. Yoder.

Federal Clean Water Act (CWA) - means (formerly referred to as the Federal Water Pollution Control Act or Federal Water Pollution Control Act Amendments of 1972) Public Law 92—500, as amended by Public Law 95—217, Public Law 95—576, Public Law 96—483 and Public Law 77—117, codified at 33 U.S.C. 1251 et seq.

First Storm Event - means the first storm event of the wet season that produces at least 0.25 inches of rain.

Forest Land - means land at least 10 percent stocked with live trees, or land that had this minimum tree stocking in the past and is not currently developed for nonforest use. The minimum area recognized is 1 acre.

Groundwater Dewatering - means the active practice of removing standing water from soil excavations using a pump(s) or other means.

Hillside - means property located in an area with known erosive soil conditions, where the development will result in grading on any slope that is 20% or greater or an area designated by the Municipality under a General Plan or ordinance as a "hillside area".

Horse Stables - means a property where at least one horse is stabled at least part of the year.

Hydromodification - means the alteration away from a natural state of stream flows or the beds or banks of rivers, streams, or creeks, including ephemeral washes, which results in hydrogeomorphic changes.

Illegal Discharge - means any discharge to the municipal separate storm sewer (storm drain system) that is prohibited under local, state, or federal statutes, ordinances, codes, or regulations. The term illegal discharge includes all non-storm water discharges not composed entirely of storm water except discharges pursuant to an NPDES permit, discharges that are identified in part 1, "Discharge Prohibitions" of this order, or discharges authorized by the Regional Water Board Executive Officer.

Illicit Connection - means any engineered conveyance that is connected to the storm drain system without a permit or municipal authorization. It also means any engineered conveyance through which discharges of pollutants to the separate storm drainage systems, which are not composed entirely of storm water or are not authorized by an NPDES permit, may occur.

Illicit Discharge - means any discharge to a municipal separate storm sewer (storm drain system) that is prohibited under local, state, or federal statutes, ordinances, codes, or regulations. The term illicit discharge includes all non-storm water discharges not composed entirely of storm water except discharges pursuant to a NPDES permit (other than the NPDES permit for discharges from the municipal separate storm sewer) and discharges that are identified in part 1, "Discharge Prohibitions" of this order, or authorized by the Regional Water Board Executive Officer.

Illicit Disposal - means any disposal, either intentionally or unintentionally, of material(s) or waste(s) that can pollute storm water.

Industrial/ Commercial Facility - means any facility involved and/ or used in the production, manufacture, storage, transportation, distribution, exchange or sale of goods and/ or

commodities, and any facility involved and/ or used in providing professional and non-professional services. This category of facilities includes, but is not limited to, any facility defined by either the Standard Industrial Classifications (SIC) or the North American Industry Classification System (NAICS). Facility ownership (federal, state, municipal, private) and profit motive of the facility are not factors in this definition.

Industrial Activities Storm Water General Permit (IASGP) - means the general NPDES permit adopted by the State Board, which authorizes the discharge of storm water from certain industrial activities under certain conditions.

Industrial Park - means a land development that is set aside for industrial development. Industrial parks are usually located close to transport facilities, especially where more than one transport modalities coincide: highways, railroads, airports, and navigable rivers. It includes office parks, which have offices and light industry.

Inhibition Concentration (IC) - means a point estimate of the toxicant concentration that would cause a given percent reduction in a non-lethal biological measurement (e.g., reproduction or growth), calculated from a continuous model (i.e., Interpolation Method). IC25 is a point estimate of the toxic concentration that would cause a 25-percent reduction in a non-lethal biological measurement.

Inspection - means entry and the conduct of an on-site review of a facility and its operations, at reasonable times, to determine compliance with specific municipal or other legal requirements. The steps involved in performing an inspection, include, but are not limited to:

1. Pre-inspection documentation research
2. Request for entry
3. Interview of facility personnel
4. Facility walk-through
5. Visual observation of the condition of facility premises
6. Examination and copying of records as required
7. Sample collection (if necessary or required)
8. Exit conference (to discuss preliminary evaluation)
9. Report preparation, and if appropriate, recommendations for coming into compliance

Integrated Pest Management (IPM) - means a sustainable approach to managing pests by combining biological, cultural, physical and chemical tools in a way that minimizes economic, health, and environmental risks.

Large Municipal Separate Storm Sewer System (MS4) - means all MS4s that serve a population greater than 250,000 (1990 Census) as defined in 40 CFR 122.26 (b)(4). The Regional Water Board designated Ventura County as a large MS4 in 1990, based on: (i) the U.S. Census Bureau 1990 population count of 669,016 thousand, and (ii) the interconnectivity of the MS4s in the incorporated and unincorporated areas within the County.

Local SWPPP - means the Local Storm Water Pollution Prevention Plan (LSWPPP) required by the local agency for a project that disturbs one or more acres of land. Shall mean a plan identifying potential pollutant sources from a construction site and describing proposed design, placement and implementation of BMPs, to effectively prevent non-storm water discharges and reduce pollutants in storm water discharges to the storm drain system, during construction activities. Also referred as a Storm Water Pollution Control Plan (SWPCP).

Low Impact Development (LID) – means a design strategy with the goal of maintaining or replicating the pre-development hydrologic regime through the use of design techniques to create a functionally equivalent hydrologic site design. Hydrologic functions of storage, infiltration and ground water recharge, as well as the volume and frequency of discharges are maintained through the use of integrated and distributed micro-scale storm water retention and detention areas, reduction of impervious surfaces, and the lengthening of runoff flow paths and flow time. Other strategies include the preservation/protection of environmentally sensitive site features such as riparian buffers, wetlands, steep slopes, valuable (mature) trees, flood plains, woodlands, and highly permeable soils.

Major Municipal Separate Storm Sewer Outfall ("or major outfall") - means a major municipal separate storm sewer outfall that discharges from a single pipe with an inside diameter of 36 inches or more or its equivalent (discharge from a single conveyance other than circular pipe which is associated with a drainage area of more than 50 acres); or for municipal separate storm sewers that receive storm water from lands zoned for industrial activity (based on comprehensive zoning plans or the equivalent), an outfall that discharges from a single pipe with an inside diameter of 12 inches or more or from its equivalent (discharge from other than a circular pipe associated with a drainage area of 2 acres or more), as defined in 40 CFR 122.26 (b)(5).

Major Outfall - means a major municipal separate storm sewer outfall, as defined in 40 CFR 122.26 (b)(6).

Maximum Extent Practicable (MEP) – The technology-based permit requirement established by Congress in CWA section 402(p)(3)(B)(iii) that municipal dischargers of storm water must meet. Technology-based requirements, including MEP, establish a level of pollutant control that is derived from available technology or other controls. MEP requires municipal dischargers to perform at maximum level that is practicable. Compliance with MEP may be achieved by emphasizing pollution prevention and source control BMPs in combination with structural and treatment methods where appropriate. The MEP approach is an ever evolving and advancing concept, which considers technical and economic feasibility.

Method Detection Limit (MDL) - means the minimum concentration of a substance that can be measured and reported with 99 percent confidence that the analyte concentration is greater than zero, as defined in 40 CFR 136, Appendix "G" of this Order.

Minimum Level (ML) - means the concentration at which the entire analytical system must give a recognizable signal and acceptable calibration point. The ML is the concentration in a sample that is equivalent to the concentration of the lowest calibration standard analyzed by a specific analytical procedure, assuming that all the method specified sample weights, volumes, and processing steps have been followed. The ML value represents the lowest quantifiable concentration in a sample based on the proper application of all method-based analytical procedures and the absence of any matrix interferences. Assuming that all method-specific analytical steps are followed, the ML value will also represent, after the appropriate application of method-specific factors, the lowest standard in the calibration curve for that specific analytical technique.

Minimum Significant Difference (MSD) - means a measure of test sensitivity that establishes the minimum difference required between a control and a test treatment in order for that difference to be considered statistically significant.

Municipal Separate Storm Sewer System (MS4) - means a conveyance or system of conveyances (including roads w/ drainage systems, municipal streets, catch basins, curbs, gutters, ditches, manmade channels, or storm drains), as defined in 40 CFR 122.26(b)(8):

1. Owned or operated by a State, city, town, borough, county, parish, district, association, or other public body (created by or pursuant to State law) including special districts under State law such as a sewer district, flood control district or drainage district, or similar entity, or an Indian tribe or an authorized Indian tribal organization, or a designated and approved management agency under § 208 of the Federal Clean Water Act (CWA) that discharges into waters of the United States
2. Designed or used for collecting or conveying storm water
3. Which is not a combined sewer
4. Which is not part of a Publicly Owned Treatment Works (POTW), as defined in 40 CFR 122.2

NAICS - means North American Industry Classification System.

National Pollutant Discharge Elimination System (NPDES) - means the national program for issuing, modifying, revoking and reissuing, terminating, monitoring and enforcing permits, and imposing and enforcing pretreatment requirements, under CWA § 307, 402, 318, and 405.

Natural Drainage Systems - means unlined or unimproved (not engineered) creeks, streams, rivers or similar waterways.

New Development - means land disturbing activities; structural development, including construction or installation of a building or structure, creation and replacement of impervious surfaces; and land subdivision.

Non-Storm Water Discharge - means any discharge to a storm drain that is not composed entirely of storm water.

No Observed Effect Concentration (NOEC) - means the highest tested concentration of an effluent or toxicant that causes no observable adverse effect on the test organisms (i.e., the highest concentration of toxicant at which the values for the observed responses are not statistically different from the controls).

Nuisance - means anything that meets all of the following requirements: (1) is injurious to health, or is indecent or offensive to the senses, or an obstruction to the free use of property, so as to interfere with the comfortable enjoyment of life or property; (2) affects at the same time an entire community or neighborhood, or any considerable number of persons, although the extent of the annoyance or damage inflicted upon individuals may be unequal; (3) occurs during, or as a result of, the treatment or disposal of wastes.

Nursery - means nursery operations that are generally classified under 4 broad NAICS classification sectors: (a) 111xxx - Crop Production – Agriculture; (b) 424xxx - Merchant Wholesalers, Nondurable Goods; (c) 44xxxx - Retail Trade; and (d) 454xxx - Non-store retailers. Retail nursery operations shall be covered by this Order. This Order does not cover wholesale nursery stock operations or agricultural nursery operations, unless such operations are not covered by another Regional Water Board Order.

(1) **Retail Nursery Operations** - means Nursery, Garden Center, and Farm Supply Stores typically classified under NAICS Code 444220 and non-store retailers typically classified under NAICS Code 454xxx. Retail nursery operations are primarily engaged in retailing nursery and garden products, such as trees, shrubs, plants, seeds, bulbs, floriculture products and sod, which are predominantly grown elsewhere. These establishments may sell a limited amount of a product they grow themselves.

Open Channel - means a storm drainage channel that is not a natural water course.

Parking Lot - means land area or facility for the parking or storage of motor vehicles used for businesses, commerce, industry, or personal use.

Percent Minimum Significant Difference (PMSD) - means the minimum significant difference divided by the control mean, expressed as a percent (see minimum significant difference).

Permit - means an authorization, license, or equivalent control document issued by U.S. EPA or an "approved State" to implement the requirements of 40 CFR Parts 122, 123, and 124. "Permit" includes an NPDES "general permit" (§ 122.28). Permit does not include any permit, which has not yet been the subject of final agency action, such as a "draft permit" or a "proposed permit."

Permittee(s) - means co-permittee(s) and any agency named in this Order as being responsible for permit conditions within its jurisdiction, as defined by Federal Regulation. Permittees to this Order include the Ventura Water Protection District, Ventura County, and the

cities of Camarillo, Fillmore, Moorpark, Ojai, Oxnard, Port Hueneme, San Buenaventura, Santa Paula, Simi Valley and Thousand Oaks.

Point Source - means any discernible, confined and discrete conveyance, including but not limited to any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, or vessel or other floating craft, from which pollutants are or may be discharged. This term does not include agricultural storm water discharges and return flows from irrigated agriculture.

Point Zero - means in the context of the TMDLs, the point at which water from the storm drain or creek initially mixes with water.

Pollutants - means those "pollutants" defined in CWA § 502(6) (33.U.S.C.§ 1362(6)), and incorporated by reference into California Water Code § 13373.

Pollutants of Concern - means constituents that have exceeded Basin Plan Objectives, and CTR- Chronic or Acute Objectives during monitoring at Mass Emission, Receiving Water, and Land Use stations.

Potable Water Sources - means the potable water system for the treatment, distribution, and provision of water for residential, commercial, industrial, or institutional use that meets all California safe drinking water regulatory standards for human consumption.

Pre-Developed Condition - means native vegetation and soils that existed at a site prior to first development. The pre-developed condition may be assumed to be an area with the typical vegetation, soil, and storm water runoff characteristics of open space areas in coastal Southern California unless reasonable historic information is provided that the area was atypical.

Priority Pollutants - means those constituents referred to in 40 CFR 401.15 and listed in the U.S. EPA NPDES Application Form 2C, pp. V-3 through V-9.

Project - means all development, redevelopment, and land disturbing activities. The term is not limited to "Project" as defined under CEQA (Reference: California Public Resources Code § 21065).

Qualified SWPPP Developer or Qualified SWPPP Practitioner – refer to State of California General Construction Stormwater Permit for definition.

Rare, Threatened, or Endangered Species (RARE) - means a beneficial use for waterbodies in the Los Angeles Region, as designated in the Basin Plan (Tables 2-1, 2-3, and 2-4), that supports habitats necessary, at least in part, for the survival and successful maintenance of plant or animal species established under state or federal law as rare, threatened, or endangered.

Redevelopment - means land-disturbing activity that results in the creation, addition, or replacement of 5,000 square feet or more of impervious surface area on an already developed

site. Redevelopment includes, but is not limited to: the expansion of a building footprint; addition or replacement of a structure; replacement of impervious surface area that is not part of a routine maintenance activity; and land disturbing activities related to structural or impervious surfaces. It does not include routine maintenance to maintain original line and grade, hydraulic capacity, or original purpose of facility, nor does it include emergency construction activities required to immediately protect public health and safety.

Regional Administrator - means the Regional Administrator of the Regional Office of the U.S. EPA or the authorized representative of the Regional Administrator.

Report of Waste Discharge (ROWD) - means an application for renewal of the NPDES Permit for Waste Discharge Requirements for Municipal Separate Storm Sewer Discharges Within the Ventura County Watershed Protection District, County of Ventura and the Incorporated Cities Therein.

Restaurant - means a facility that sells prepared foods and drinks for consumption, including stationary lunch counters and refreshment stands selling prepared foods and drinks for immediate consumption (SIC Code 5812).

Restoration - means the reestablishment of predisturbance aquatic functions and related physical, chemical and biological characteristics (Reference: National Research Council. 1992. Restoration of Aquatic Ecosystems: Science, Technology and Public Policy. National Academy Press, Washington, D.C.).

Retail Gasoline Outlet (RGO) - means any facility engaged in selling gasoline and lubricating oils- SIC 5541 and NAICS 447110 & 447190.

1. RGOs: 447190 Other Gasoline Stations:
   This industry comprises establishments known as gasoline stations (except those with convenience stores) primarily engaged in one of the following: (1) retailing automotive fuels (e.g., diesel fuel, gasohol, gasoline) or (2) retailing these fuels in combination with activities, such as providing repair services; selling automotive oils, replacement parts, and accessories; and/ or providing food services.
2. RGOs: 447110 Gasoline Stations with Convenience Stores:
   Retailing automotive fuels in combination with a convenience store or food mart.

Routine Maintenance – Routine maintenance projects include, but are not limited to projects conducted to:

1. Maintain the original line and grade, hydraulic capacity, or original purpose of the facility.
2. Perform as needed restoration work to preserve the original design grade, integrity and hydraulic capacity of flood control facilities.
3. Includes road shoulder work, regrading dirt or gravel roadways and shoulders and performing ditch cleanouts.
4. Update existing lines* and facilities to comply with applicable codes, standards, and regulations regardless if such projects result in increased capacity.
5. Repair leaks

Routine maintenance does not include construction of new** lines or facilities resulting from compliance with applicable codes, standards and regulations.
* Update existing lines includes replacing existing lines with new materials or pipes.
** New lines are those that are not associated with existing facilities and are not part of a project to update or replace existing lines.

Screening - means using proactive methods to identify illicit connections through a continuously narrowing process. The methods may include: performing baseline monitoring of open channels, conducting special investigations using a prioritization approach, analyzing maintenance records for catch basin and storm drain cleaning and operation, and verifying all permitted connections into the storm drains. Special investigation techniques may include: dye testing, visual inspection, smoke testing, flow monitoring, infrared, aerial and thermal photography, and remote control camera operation.

Sidewalk Rinsing - means only sidewalk rinsing using high pressure and low volume of water with no additives and at an average usage of 0.006 gallons per square foot of surface area to be rinsed. Any waste generated from the activity must be collected and properly and legally disposed of. It does not mean hosing of any sidewalk or street with a garden hose with a pressure nozzle.

Site - means the land or water area where any "facility or activity" is physically located or conducted, including adjacent land used in connection with the facility or activity.

Small Construction - means any soil disturbing activities less than 5 acres.

Smart Growth - development in or near cities intended to lessen or reverse suburban sprawl, decrease the use of automobiles, and shorten daily travel. It uses compact building design to cluster together residential, shopping, and work areas and encourages walking and public transportation. Smart Growth is considered a stormwater BMP in the 2005 publication *Using Smart Growth Techniques as Stormwater Best Management Practices*, EPA 231-B-05-002.

Source Control BMP - means any schedules of activities, prohibitions of practices, maintenance procedures, managerial practices or operational practices that aim to prevent storm water pollution by reducing the potential for contamination at the source of pollution.

Southern California Stormwater Monitoring Coalition (SMC) - means the Stormwater Monitoring Coalition, which is a collaborative research/ monitoring partnership of the Southern California Water Boards, Municipal Storm Water Agencies, and municipalities to develop the methodologies and assessment tools to more effectively understand urban storm water and non-storm water (anthropogenic) impacts to receiving waters and to conduct research/ monitoring through Subsequent Research Implementation Agreements. The first original cooperative agreement was entered into on February 8, 2001.

Stream - means a body of flowing water; natural water course containing water at least part of the year. In hydrology, it is generally applied to the water flowing in a natural channel as distinct from a canal (Reference: US Geological Survey).

Strip Mall - means a commercial development that is a shopping center where the stores are arranged in a row, with a sidewalk in front. Strip malls are typically developed as a unit and have large parking lots in front. They face major traffic arterials and tend to be self-contained with few pedestrian connections to surrounding neighborhoods. It is also called a plaza.

Storm Event Monitoring - means a rainfall event that produces more than 0.25 inch of precipitation and is separated from the previous storm event by at least 1 week of dry weather, for the purpose of monitoring.

Storm Water - means storm water runoff, snow melt runoff, and surface runoff and drainage, as defined in 40 CFR 122.26(b)(13).

Storm Water Discharge Associated with Industrial Activity - means industrial discharge, as defined in 40 CFR 122.26(b)(14).

Storm Water Quality Management Program - means the Ventura Countywide Storm Water Quality Management Plan, which includes descriptions of programs, collectively developed by the Permittees in accordance with provisions of the NPDES Permit, to comply with applicable federal and state law, as the same is amended from time to time.

Structural BMP - means any structural facility designed and constructed to mitigate the adverse impacts of storm water runoff pollution (e.g. canopy, structural enclosure). The category may include both Treatment Control BMPs and Source Control BMPs.

Summer Dry Weather - means dry weather days occurring from April 1 through October 31 of each year.

t-Test (formally Student's t-test) - means a statistical analysis comparing two sets of replicate observations, in the case of WET, only two test concentrations (e.g., a control and 100% effluent). The purpose of this test is to determine if the means of the two sets of observations are different [e.g., if the 100% effluent concentration differs from the control (i.e., the test pass or fails)].

Targeted Employees - means management and staff who perform or direct activities that directly or indirectly have an effect of storm water quality. The employees generally are employed in the following areas: department of public works, engineering, sanitation, storm water maintenance, drainage and flood control, transportation, streets and roads, parks and recreation, public landscaping and corporation yards, planning or community development, code enforcement, building and safety, harbor or port departments, airports, or general services and fleet services.

Total Maximum Daily Load (TMDL) - means the sum of the individual waste load allocations for point sources and load allocations for nonpoint sources and natural background.

Toxicity Identification Evaluation (TIE) - means a set of procedures to identify the specific chemical(s) responsible for toxicity through a process of chemical/ physical manipulations of samples followed by toxicity tests. These procedures are performed in 3 phases (Phase I- Toxicity Characterization Procedure, Phase II- Toxicity Identification Procedure, and Phase III- Toxicity Confirmation Procedure) using aquatic organism toxicity tests.

Toxicity Reduction Evaluation (TRE) - means a study conducted in a step-wise process to identify the causative agents of effluent or ambient toxicity, isolate the sources of toxicity, evaluate the effectiveness of toxicity control options, and then confirm the reduction in toxicity.

Toxicity Test - means a procedure using living organisms to determine whether a chemical or an effluent is toxic. A toxicity test measures the degree of the effect of a specific chemical or effluent on exposed test organisms.

Toxic Unit (TU) - means a measure of toxicity in an effluent as determined by the acute toxicity units (TUa) or chronic toxicity units (TUc) measured. The larger the TU, the greater the toxicity.

Toxic Unit - Chronic (TUc) - means 100 times the reciprocal of the effluent concentration that causes no observable effect on the test organisms in a chronic toxicity test (TUc = 100/NOEC or 100/EC25) (see NOEC).

Treatment - means the application of engineered systems that use physical, chemical, or biological processes to remove pollutants. Such processes include, but are not limited to, filtration, gravity settling, media absorption, biodegradation, biological uptake, chemical oxidation and UV radiation.

Treatment Control BMP - means any engineered system designed to remove pollutants by simple gravity settling of particulate pollutants, filtration, biological uptake, media absorption or any other physical, biological, or chemical process.

Urbanization - means the process of changing of land use and land patterns from rural characteristics to urban (city-like) characteristics. These changes include (i) the replacement of pervious surfaces with impervious surfaces such as rooftops and buildings, and impervious materials such as asphalt and concrete; and (ii) the conversion of rural land to house new residents, support new businesses, and facilitate vehicular traffic flow.

U.S. EPA Phase I Facilities - means facilities in specified industrial categories that are required to obtain an NPDES permit for storm water discharges, as required by 40 CFR 122.26(c). These categories include:

1. Facilities subject to storm water effluent limitation guidelines, new source performance standards, or toxic pollutant effluent standards (40 CFR N)
2. Manufacturing facilities

3. Oil and gas/ mining facilities
4. Hazardous waste treatment, storage, or disposal facilities
5. Landfills, land application sites, and open dumps
6. Recycling facilities
7. Steam electric power generating facilities
8. Transportation facilities
9. Sewage of wastewater treatment works
10. Light manufacturing facilities

Vehicle Maintenance/ Material Storage Facilities/ Corporation Yards - means any Permittee owned or operated facility or portion thereof that:

1. Conducts industrial activity, operates or stores equipment or materials, and provides services similar to Federal Phase I facilities;
2. Performs fleet vehicle service/ maintenance including repair, maintenance, washing, or fueling;
3. Performs maintenance and/ or repair of machinery/ equipment; or
4. Stores chemicals, raw materials, or waste materials.

Waste Load Allocations (WLAs) - means a portion of a receiving water's Total Maximum Daily Pollutant Load (TMDL) that is allocated to one of its existing or future point sources of pollution (Reference: 40 CFR 130.2(h)).

Water Quality Objectives - means water quality criteria contained in the Basin Plan, the California Ocean Plan, the National Toxics Rule, the California Toxics Rule, and other state or federally approved surface water quality plans. Such plans are used by the Regional Water Board to regulate all discharges, including storm water discharges.

Water Quality Standards - means the State Water Quality Standards, which are comprised of beneficial uses, water quality objectives and the State's Antidegradation Policy.

Waters of the State - means any surface water or groundwater, including saline waters, within boundaries of the state (Reference: California Water Code § 13050).

Waters of the United States or Waters of the US - means:

1. All waters that are currently used, were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide;
2. All interstate waters, including interstate "wetlands";
3. All other waters such as intrastate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, "wetlands," sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds where the use, degradation, or destruction of which would affect or could affect interstate or foreign commerce including any such waters:
   a. Which are or could be used by interstate or foreign travelers for recreational or other purposes
   b. From which fish or shellfish are or could be taken and sold in interstate or

foreign commerce; or

c. Which are used or could be used for industrial purposes by industries in interstate commerce

4. All impoundments of waters otherwise defined as waters of the United States under this definition;
5. Tributaries of waters identified in the preceding paragraph (1) through (4) of this definition;
6. The territorial sea; and
7. "Wetlands" adjacent to waters (other than waters that are themselves wetlands) identified in the preceding paragraph (1) through (6) of this definition. (Reference: 33 CFR 328)

Watercourse - means any natural or artificial channel for passage of water, including the VCFCD jurisdictional channels included in the List of Channels within the Comprehensive Plan of the VCFCD, as approved by the Board of Supervisors of the VCFCD on October 4, 1993, and any amendments thereto.

Watershed Management - means approach for water resources protection. It is a strategy for integrating and managing resources, both human and fiscal that focuses on regulation of point sources, to a more regional approach that acknowledges environmental impacts from other activities.

Watershed Management Areas (WMA) - means the geographically-defined watershed areas where the Regional Water Board will implement the watershed approach. These generally involve a single large watershed within which exists smaller subwatersheds but in some cases may be an area that does not meet the strict hydrologic definition of a watershed e.g., several small Ventura coastal waterbodies in the region are grouped together into one WMA.

Wet Season - means the calendar period beginning October 1 through April 15.

Winter Dry Weather - means dry weather days occurring from November 1 - March 31 of each year.

Whole Effluent Toxicity - means the aggregate toxic effect of an effluent measured directly by a toxicity test.

PART 7 - STANDARD PROVISIONS

A. General Requirements

1. The Permittee shall comply with all provisions and requirements of this Order.

2. Should the Permittee discover that it failed to submit any relevant facts or that it submitted incorrect information in a report it shall promptly submit the missing or correct information.

3. The Permittee shall report all instances of non-compliance not otherwise reported at the time monitoring reports are submitted.

4. This Order includes Attachment "I", the Reporting Program, which is a part of this Order and must be complied with.

B. Regional Water Board Review

1. The Regional Water Board may review any formal determinate or approval made by the Regional Water Board Executive Officer pursuant to the provisions of this Order.
   (a) Permittee(s) or a member of the public may request such review upon petition within 30 day of the effective date of the notification of such decision to the Permittee(s) and interested parties on file at the Regional Water Board.

C. Public Review

1. All documents submitted to the Regional Water Board in compliance with the terms and conditions of this Order shall be made available to members of the public pursuant to the Freedom of Information Act (5 U.S.C. § 552), as amended, and the Public Records Act (California Government Code § 6250 et seq.).

2. All documents submitted to the Regional Water Board Executive Officer for approval shall be made available to the public for a 30-day period to allow for public comment.

D. Duty to Comply [40 CFR 122.41(a)]

1. Each Permittee must comply with all of the terms, requirements, and conditions of this Order. Any violation of this order constitutes a violation of the Clean Water Act, its regulations and the California Water Code, and is grounds for enforcement action, Order termination, Order revocation and reissuance, denial of an application for reissuance, or a combination thereof [40 CFR 122.41(a), Cal. Wat. Code § 13261, 13263, 13265, 13268, 13300, 13301, 13304, 13340, 13350].

2. A copy of these waste discharge specifications shall be maintained by each Permittee so as to be available during normal business hours to Permittee employees and members of the public.

3. Any discharge of wastes at any point(s) other than specifically described in this Order is prohibited, and constitutes a violation of the Order.

E. Duty to Mitigate [40 CFR 122.41 (d)]

1. Each Permittee shall take all reasonable steps to minimize or prevent any discharge that has a reasonable likelihood of adversely affecting human health or the environment.

F. Inspection and Entry; Investigations; Responsibilities [40 CFR 122.41(i), Cal. Water Code § 13225 and § 13267]

1. The Regional Water Board, U.S. EPA, and other authorized representatives shall be allowed:
   (a) Entry upon premises where a regulated facility is located or conducted, or where records are kept under conditions of this Order;
   (b) Access to copy any records, at reasonable times that are kept under the conditions of this Order;
   (c) To inspect at reasonable times any facility, equipment (including monitoring and control equipment), practices, or operations regulated or required under this Order;
   (d) To photograph, sample, and monitor at reasonable times for the purpose of assuring compliance with this Order, or as otherwise authorized by the CWA and the CAL. WATER CODE;
   (e) To review any water quality control plan or waste discharge requirements, or in connection with any action relating to any plan or requirement to investigate the quality of any waters of the state within its region; and,
   (f) To require as necessary any state or local agency to investigate and report on any technical factors involved in water quality control or to obtain and submit analyses of water.

G. Proper Operation and Maintenance [40 CFR 122.41 (e), Cal. Water Code § 13263(f)]

1. The Permittees shall at all times properly operate and maintain all facilities and systems of treatment (and related appurtenances) that are installed or used by the Permittees to achieve compliance with this Order. Proper operation and maintenance includes:
   (a) Adequate laboratory controls; and
   (b) Appropriate quality assurance procedures.

2. This provision requires the operation of backup or auxiliary facilities or similar system that are installed by a Permittee only when necessary to achieve compliance with the conditions of this Order.

H. Signatory Requirements [40 CFR 122.41(k) & 122.22]

1. Except as otherwise provided in this Order, all applications, reports, or information submitted to the Regional Water Board shall be signed by the City Manager or Mayor, or authorized designee and certified as set forth in 40 CFR 122.22.

I. Reopener and Modification [40 CFR 122.41(f) & 122.62]

1. This Order may only be modified, revoked, or reissued, prior to the expiration date, by the Regional Water Board, in accordance with the procedural requirements of the Cal. Water Code and CCR Title 23 for the issuance of waste discharge requirements, 40 CFR 122.62, and upon prior notice and hearing, to:
   (a) Address changed conditions identified in the required reports or other sources deemed significant by the Regional Water Board;
   (b) Incorporate applicable requirements or statewide water quality control plans adopted by the State Board or amendments to the Basin Plan, including TMDLs;
   (c) Comply with any applicable requirements, guidelines, and/ or regulations issued or approved pursuant to CWA § 402(p); and/ or,
   (d) Consider any other federal, or state laws or regulations that became effective after adoption of this Order.

2. After notice and opportunity for a hearing, this Order may be terminated or modified for cause, including, but not limited to:
   (a) Violation of any term or condition contained in this Order;
   (b) Obtaining this Order by misrepresentation, or failure to disclose all relevant facts; or,
   (c) A change in any condition that requires either a temporary or permanent reduction or elimination of the authorized discharge.

3. The filing of a request by the Principal Permittee or Permittees for a modification, revocation and re-issuance, or termination, or a notification of planned changes or anticipated noncompliance does not stay any condition of this Order.

4. This Order may be modified to make corrections or allowances for changes in the permitted activity listed in this section, following the procedures at 40 CFR 122.63, if processed as a minor modification. Minor modifications may only:
   (a) Correct typographical errors; or
   (b) Require more frequent monitoring or reporting by the Permittee.

J. Severability

1. The provisions of this Order are severable; and if any provision of this Order or the application of any provision of this Order to any circumstance is held invalid, the application of such provision to other circumstances and the remainder of this Order shall not be affected.

K. Duty to Provide Information [40 CFR 122.41(h)]

1. The Permittees shall furnish, within a reasonable time, any information the Regional Water Board or U.S. EPA may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this Order.

2. The Permittees shall also furnish to the Regional Water Board, upon request, copies of records required to be kept by this Order.

L. Twenty-Four Hour Reporting [40 CFR 122.41(l)(6)][1]

1. The Permittees shall report to the Regional Water Board any noncompliance that may endanger health or the environment. Any information shall be provided orally within 24 hours from the time any Permittee becomes aware of the circumstances. A written submission shall also be provided within 5 days of the time the Permittee becomes aware of the circumstances. The written submission shall contain a description of the noncompliance and its cause; the period of noncompliance, including exact dates and times and, if the noncompliance has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance.

2. The Regional Water Board may waive the required written report on a case-by-case basis.

M. Bypass [40 CFR 122.41(m)][2]

1. Bypass (the intentional diversion of waste streams from any portion of a treatment facility) is prohibited. The Regional Water Board may take enforcement action against Permittees for bypass unless:
   (a) Bypass was unavoidable to prevent loss of life, personal injury or severe property damage. (Severe property damage means substantial physical damage to property, damage to the treatment facilities that causes them to become inoperable, or substantial and permanent loss of natural resources that can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production.);
   (b) There were no feasible alternatives to bypass, such as the use of auxiliary treatment facilities, retention of untreated waste, or maintenance during normal periods of equipment down time. This condition is not satisfied if adequate back-up equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass that could occur during normal periods of equipment downtime or preventive maintenance;

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[1] This provision applies to incidents where effluent limitations (numerical or narrative) as provided in this Order or in the Ventura County SMP are exceeded, and which endanger public health or the environment.
[2] This provision applies to the operation and maintenance of storm water controls and BMPs as provided in this Order or in the Ventura County SMP.

(c) The Permittee submitted a notice at least ten days in advance of the need for a bypass to the Regional Water Board; or,
(d) Permittees may allow a bypass to occur that does not cause effluent limitations to be exceeded, but only if it is for essential maintenance to assure efficient operation. In such a case, the above bypass conditions are not applicable. The Permittee shall submit notice of an unanticipated bypass as required.

N. Upset [40 CFR 122.41(n)][1]

1. Upset means an exceptional incident in which there is unintentional and temporary noncompliance with technology based permit effluent limitations because of factors beyond the reasonable control of the Permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation.
2. A Permittee that wishes to establish the affirmative defense of an upset in an action brought for non compliance shall demonstrate, through properly signed, contemporaneous operating logs, or other relevant evidence that:
   (a) An upset occurred and that the Permittee can identify the cause(s) of the upset;
   (b) The permitted facility was being properly operated by the time of the upset;
   (c) The Permittee submitted notice of the upset as required; and,
   (d) The Permittee complied with any remedial measures required.
3. No determination made before an action for noncompliance, such as during administrative review of claims that non-compliance was caused by an upset, is final administrative action subject to judicial review.
4. In any enforcement proceeding, the Permittee seeking to establish the occurrence of an upset has the burden of proof.

O. Property Rights [40 CFR 122.41(g)]

1. This Order does not convey any property rights of any sort, or any exclusive privilege.

P. Enforcement

1. Violation of any of the provisions of the NPDES permit or any of the provisions of this Order may subject the violator to any of the penalties described herein, or any combination thereof, at the discretion of the prosecuting authority; except that only one kind of penalties may be applied for each kind of violation. The CWA provides the following:
   (a) Criminal Penalties for:

[1] This provision applies to incidents where effluent limitations (numerical or narrative) as provided in this Order or in the Ventura County SMP are exceeded, and which endanger public health or the environment.

(1) Negligent Violations [CWA § 309 (c)(1)(B)]:
The CWA provides that any person who negligently violates permit conditions implementing CWA § 301, 302, 306, 307, 308, 318, or 405 is subject to a fine of not less than $2,500 nor more than $25,000 per day for each violation, or by imprisonment for not more than 1 year, or both.

(2) Knowing Violations [CWA § 309 (c)(2)(B)]:
The CWA provides that any person who knowingly violates permit conditions implementing CWA § 301, 302, 306, 307, 308, 318, or 405 is subject to a fine of not less than $5,000 nor more than $50,000 per day of violation, or by imprisonment for not more than 3 years, or both.

(3) Knowing Endangerment [CWA § 309 (c)(3)(A)]:
The CWA provides that any person who knowingly violates permit conditions implementing CWA § 301, 302, 307, 308, 318, or 405 and who knows at that time that he is placing another person in imminent danger of death or serious bodily injury is subject to a fine of not more than $250,000, or by imprisonment for not more than 15 years, or both.

(4) False Statement [CWA § 309 (c)(4)]:
The CWA provides that any person who knowingly makes any false material statement, representation, or certification in any application, record, report, plan, or other document filed or required to be maintained under the Act or who knowingly falsifies, tampers with, or renders inaccurate, any monitoring device or method required to be maintained under the Act, shall upon conviction, be punished by a fine of not more than $10,000 or by imprisonment for not more than two years, or by both. If a conviction is for a violation committed after a first conviction of such person under this paragraph, punishment shall be by a fine of not more than $20,000 per day of violation, or by imprisonment of not more than four years, or by both.

(b) Civil Penalties [[CWA § 309 (d)]
The CWA provides that any person who violates a permit condition implementing CWA § 301, 302, 306, 307, 308, 318, or 405 is subject to a civil penalty not to exceed $27,500 per day for each violation.

2. Violation of any of the provisions of the NPDES permit or any of the provisions of this Order may subject the violator to any of the penalties described herein, or any combination thereof, at the discretion of the prosecuting authority; except that only one kind of penalties may be applied for each kind of violation. The Cal. Water Code §13885 provides the following:
   (a) Any person who violates any of the following shall be liable civilly in accordance with this section:
      (1) Section 13375 or 13376.
      (2) Any waste discharge requirements or dredged or fill material permit issued pursuant to this chapter or any water quality certification issued pursuant to Section 13160.
      (3) Any requirements established pursuant to Section 13383.

(4) Any order or prohibition issued pursuant to Section 13243 or Article 1 (commencing with Section 13300) of Chapter 5, if the activity subject to the order or prohibition is subject to regulation under this chapter.
(5) Any requirements of Section 301, 302, 306, 307, 308, 318, 401, or 405 of the Clean Water Act, as amended.
(6) Any requirement imposed in a pretreatment program approved pursuant to waste discharge requirements issued under Section 13377 or approved pursuant to a permit issued by the administrator.

Q. Need to Halt or Reduce Activity not a Defense [40 CFR 122.41(c)]

1. It shall not be a defense for a Permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this Order.

R. Termination of Board Order

1. Except for enforcement purposes, Regional Water Board Order No. 09-0057 is hereby terminated.

S. Board Order Expiration Date

1. This Order expires on July 8, 2015. The Permittees must submit a Report of Waste Discharge (ROWD) and a proposed Storm Water Quality Management Program in accordance with CCR Title 23 as application for reissuance of waste discharge requirements no later than 180 days in advance of such date.

T. MS4 Annual Reporting Program [40 CFR 122.42(c)]

1. The Annual Program Reporting shall include the following information:
   (a) *Municipal separate storm sewer systems.*
   The operator of a large or medium municipal separate storm sewer system or a municipal separate storm sewer that has been designated by the Director under 40 CFR 122.26(a)(1)(v) of this part must submit an annual report by the anniversary of the date of the issuance of the permit for such system. The report shall include:
   (1) The status of implementing the components of the storm water management program that are established as permit conditions;
   (2) Proposed changes to the storm water management programs that are established as permit condition. Such proposed changes shall be consistent with 40 CFR 122.26(d)(2)(iii) of this part;
   (3) Revisions, if necessary, to the assessment of controls and the fiscal analysis reported in the permit application under 40 CFR 122.26(d)(2)(iv) and (d)(2)(v) of this part;
   (4) A summary of data, including monitoring data that is accumulated throughout the reporting year;

(5) Annual expenditures and budget for year following each annual report;
(6) A summary describing the number and nature of enforcement actions, inspections, and public education programs; and
(7) Identification of water quality improvements or degradation.

I, Samuel Unger, Interim Executive Officer, do hereby certify that the foregoing is a full, true, and correct copy of an order adopted by the California Regional Water Quality Control Board, Los Angeles Region, on July 8, 2010.

Samuel Unger
Interim Executive Officer

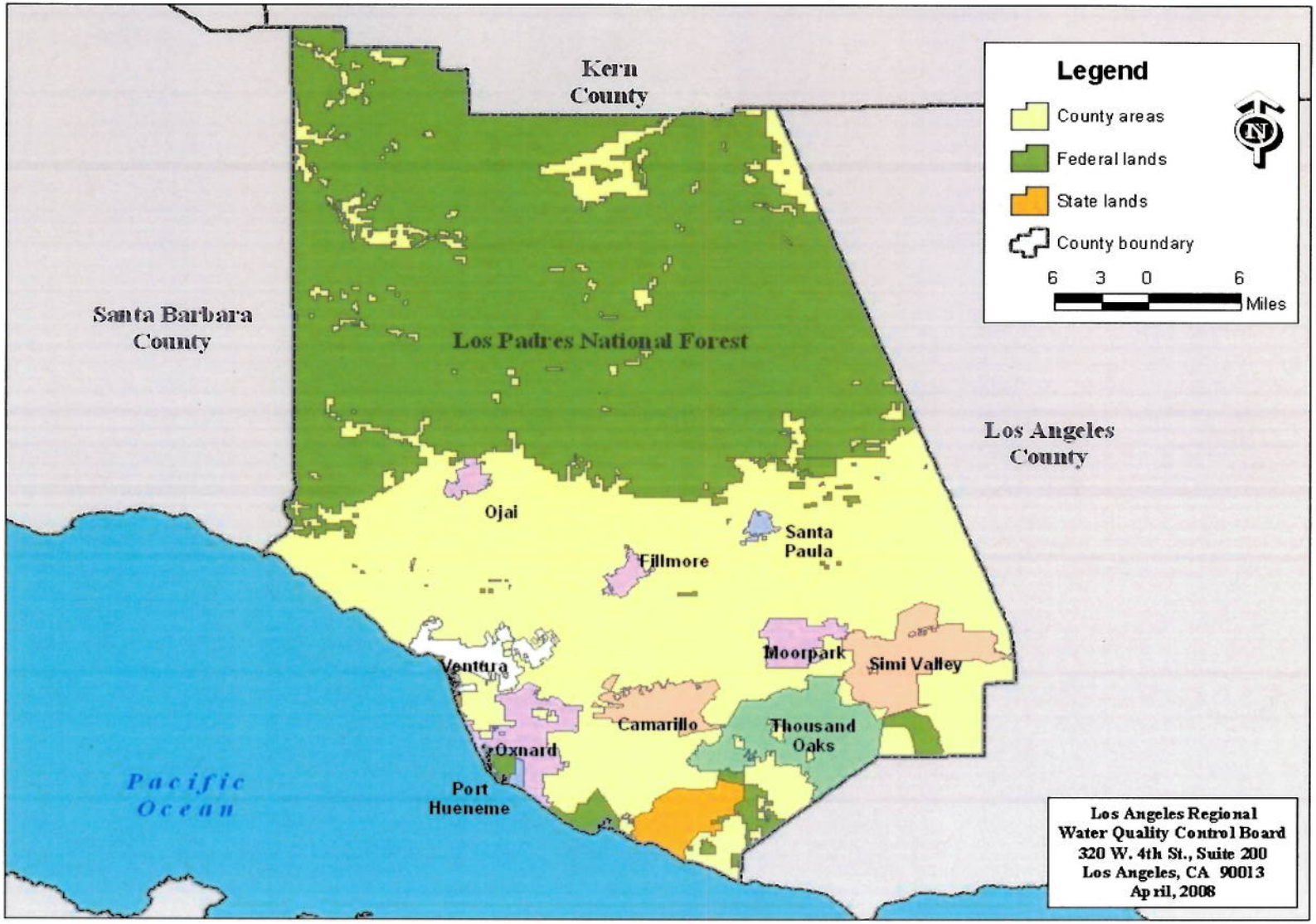

Figure 1

00065981

State of West Virginia
Department of Environmental Protection
Division of Water and Waste Management
601 57th Street, SE
Charleston, WV 25304-2345

General
National Pollution Discharge Elimination System
Water Pollution Control Permit

Permit No.: WV0116025

Subject: Stormwater Discharges From small Municipal Separate Storm Sewer Systems

Issue Date: June 22, 2009

Effective Date: July 22, 2009

Expiration Date: July 22, 2014

Supersedes: WV/NPDES General Water Pollution Control Permit No. WV0116025, issued March 7, 2003

To Whom It May Concern:

This is to certify that operators of small municipal separate storm sewer systems (MS4s) located in the State of West Virginia who have satisfied the registration requirements and agreeing to be regulated under the terms and conditions of this general permit are hereby granted coverage under the General WV/NPDES Water Pollution Control Permit to discharge stormwater into waters of the State.

All operators of regulated small municipal separate storm sewer systems are required to apply for and obtain coverage in accordance with this permit, unless waived in accordance with CFR § 122.32(a).

This permit is subject to the following terms and conditions:

The information submitted on and with the site registration application form, once approved, will hereby be known as the stormwater management program (SWMP). The information submitted on and with the site registration application, also known as the SWMP, once approved, will hereby be made terms and conditions of the permit with like effect as if all such information were set forth herein, and other conditions set forth in Parts I, II, III, IV, Appendices A through D and the SWMP approval letter.

The validity of this permit is contingent upon the payment of the applicable annual permit fee, as required by Chapter 22, Article 11, Section 10 of the Code of West Virginia.

Part I

Coverage under this General Permit

A. Permit Area

1. This permit covers all areas of the State of West Virginia.

B. Eligibility

1. Jurisdictions including, but not limited to; municipalities, counties, transportation facilities, Federal and State owned prison systems, and universities that are located within the boundaries of a Bureau of the Census defined "Urbanized Area" (UA) based on the latest decennial census.

2. Municipalities that are designated by the Division of Water and Waste Management (DWWM) under 40 CFR 122.32(a)(2). Designation criteria are included in Appendix D of this general permit.

C. This permit authorizes the following non-stormwater discharges provided they have been determined not to be substantial contributors of pollutants to a particular small MS4 applying for coverage under this permit. However, the DWWM recommends that your stormwater management program include public education and outreach activities directed at reducing these discharges even if they are not substantial contributors of pollutants to your system.

1. Uncontaminated water line flushing
2. Landscape irrigation,
3. Diverted stream flows,
4. Uncontaminated ground water infiltration (as defined at 40 CFR 35.2005(20)),
5. Uncontaminated pumped groundwater,
6. Discharges from potable water sources,
7. Foundation drains,
8. Air conditioning condensate,
9. Irrigation water,
10. Springs,
11. Water from crawl space pumps,
12. Footing drains,
13. Lawn watering runoff,
14. Water from individual residential car washing,
15. Flows from riparian habitats and wetlands,
16. Residual street wash water,
17. Discharges or flows from fire fighting activities, and
18. A discharge authorized by a separate National Pollutant Discharge Elimination System (NPDES) permit.

D. This permit does not relieve entities that cause illicit discharges, including spills, of oil or hazardous substances, from responsibilities and liabilities under State and Federal law and regulations pertaining to those discharges.

E. This permit does not authorize a violation of West Virginia State Water Quality Standards (Title 47 CSR Series 2) and West Virginia Ground Water Quality Standards (Title 47 CSR Series 58).

F. Continuation of this general permit

If this general permit is not reissued or replaced prior to the expiration date, it will be administratively continued in accordance with 47 CSR 10 and remain in force and effect. If you were authorized to discharge under this general permit prior to the expiration date, any discharges authorized under this permit will automatically remain covered by this general permit until the earliest of:

- Your authorization for coverage under a reissued general permit or a replacement of this general permit following your timely and appropriate submittal of a complete application requesting authorization to discharge under the new general permit and compliance with the requirements of the new permit; or

- Your submittal of notification that the facility has ceased operations; or issuance or denial of an individual permit for the facility's discharge; or

- A formal permit decision by DWWM not to reissue this general permit, at which time DWWM will identify a reasonable time period of covered dischargers to seek coverage under an alternative general permit or individual permit. Coverage under this permit will cease at the end of this time period.

Part II

Notice of Intent (NOI) and Stormwater Management Program (SWMP) Applications

A. Applications

Within thirty (30) days of the effective date of this permit, all operators of small MS4s shall submit a Notice of Intent (NOI) on the form provided in Appendix A of this permit.

Within six months of the effective date of this permit, all operators of regulated small MS4s shall submit on a site registration application their stormwater management program (SWMP) to the DWWM. A SWMP can be submitted on the site registration application form provided by DWWM, or in a prescribed manner acceptable to the DWWM that contains all necessary components.

NOIs and SWMPs shall be submitted to:

WVDEP - Division of Water and Waste Management
MS4 / NPDES Stormwater Permitting
601 57th Street, SE
Charleston, WV 25304

B. Requirements of SWMP

1. The permittee must develop a stormwater management program designed to reduce the discharge of pollutants from its small municipal separate storm sewer system to the maximum extent practicable (MEP), to protect water quality, and satisfy the appropriate requirements of the Clean Water Act.

2. The permittee shall, to the maximum extent practicable, use known, available, and

reasonable methods of prevention, control and treatment to prevent and control stormwater pollution from entering waters of the State.

3. In order to meet public notice requirements of NPDES permits, the permittee shall make available to the public, in accordance with Code of State Regulations; Title 47, Series 10, Section 12, the opportunity to comment on MS4 stormwater management programs.

4. The SWMP must include the minimum control measures described in Section C of this part along with measurable goals and milestones appropriate for each measure and justifications for each milestone. Information about developing measureable goals can be found on the USEPAs website: http://cfpub.epa.gov/npdes/stormwater/measurablegoals/part3.cfm

5. Subject to the five-year limitation noted below in this paragraph, extension of milestones will be granted for good cause shown. Failure to implement effective best management practices (BMPs) is not good cause to extend milestones.

6. The SWMP must also provide details on how the permittee will implement and enforce the program. The terms and conditions of this permit and the permittees approved SWMP must be fully implemented, except where noted, within five years of the effective date of this permit.

7. The SWMP shall include an ongoing program for gathering, tracking, maintaining, and using information to evaluate the stormwater management program development, implementation and permit compliance.

8. If the permittees small MS4 discharges into waters listed on the Clean Water Act Section 303(d) list of impaired waters or waters with an approved Total Maximum Daily Load (TMDL), the SWMP must document how the proposed BMP's will control the discharge of the pollutants of concern, as described in Part III.D. Permittees discharging to waters with an approved TMDL shall meet the applicable wasteload allocations of that TMDL.

9. An annual report prescribed in Part IV.D of this permit shall be submitted to DWWM each year on the anniversary of the SWMP approval.

10. In instances where this permit specifies that the MS4 regulate public projects and facilities, the MS4 is expected to only regulate those entities where they have jurisdiction and/or authority. It is understood that there are some public entities that are not subject to the authority of the MS4.

C. Stormwater Management Program for small MS4s

a. Requirements

1. Permittees implementing BMPs specific to their current SWMP shall continue to do so until such time as their SWMP with new and updated BMPs is approved. However, permittees should begin implementation of the terms and conditions of this permit as soon as this permit becomes effective, as full implementation is required within five years.

2. a. Coordination among entities covered under the small MS4 general permit may be necessary to comply with certain conditions of the SWMP. The SWMP shall

include, when applicable, coordination mechanisms among entities covered under the small MS4 general permit to encourage coordinated stormwater related policies, programs and projects within adjoining or shared areas. Entities covered under the small MS4 permit include, but are not limited to, municipalities, transportation agencies, universities, colleges, hospitals, prisons, and military bases.

b. Coordination mechanisms shall specify roles and responsibilities for the control of stormwater and its associated pollutants between physically interconnected MS4s covered by the small MS4 general permit.

c. Coordination mechanisms shall coordinate stormwater management activities for shared water bodies among permittees with the goal of avoiding conflicting plans, policies and regulations.

b. Minimum Control Measures

The SWMP shall include all components described in Part II, Sections B and C. In accordance with 40 CFR 122.35(a), a small MS4 may rely on another entity to implement one or more of the components in this section. If the permittee is relying on another entity to implement any component of the SWMP, that entity must be fully disclosed in the SWMP.

1. **Public Education and Outreach**

The SWMP shall include an education program aimed at residents, businesses, industries, elected officials, policy makers, planning staff and other employees of the permittee. The goal of the education program is to reduce or eliminate behaviors and practices that cause or contribute to adverse stormwater impacts. An education program may be developed locally or regionally.

The minimum performance measures are:

a. The permittee shall continue to implement their education and outreach program for the area served by the MS4 that was established during the previous permit cycle. The outreach program shall be designed to achieve measurable improvements in the target audience's understanding of stormwater pollution and steps they can take to reduce their impacts. Newly permitted MS4s shall *begin* implementation of the requirements contained in Part II.C.1. within six months of the approval of their SWMP.

Education and outreach efforts shall target the following audiences and subject areas:

i. General public

- General impacts of stormwater flows into surface waters.
- Impacts from impervious surfaces.
- Source control BMPs and environmental stewardship actions and opportunities in the areas of pet waste, vehicle maintenance, landscaping, and rain water reuse.

ii. General public, businesses, including home-based and mobile businesses

- BMPs for use and storage of automotive chemicals, hazardous cleaning supplies, carwash soaps and other hazardous materials.
- Impacts of illicit discharges and how to report them.

iii. Homeowners, landscapers and property managers

- Yard care techniques that protect water quality.
- BMPs for use and storage of pesticides and fertilizers.
- BMPs for carpet cleaning and auto repair and maintenance.
- Runoff reduction techniques, including site design, pervious paving, retention of forests and mature trees.
- Stormwater pond maintenance.

iv. Engineers, contractors, developers, review staff and land use planners

- Technical standards for construction site sediment and erosion control.
- Runoff reduction techniques, including site design, pervious pavement, alternative parking lot design, retention of forests and mature trees.
- Stormwater treatment and flow control BMPs.
- Impacts of increased stormwater flows into receiving water bodies.

b. Each permittee shall measure the understanding and adoption of the targeted behaviors among the targeted audiences. The resulting measurements shall be used to direct education and outreach resources most effectively, as well as to evaluate changes in adoption of the targeted behaviors.

c. Each permittee shall track and maintain records of public education and outreach activities.

2. **Public Involvement and Participation**

The SWMP shall include ongoing opportunities for public involvement through advisory councils, watershed associations and/or committees, participation in developing rate structures, stewardship programs, environmental activities or other similar activities. The permittee shall facilitate opportunities for direct action, educational, and volunteer programs such as riparian planting, volunteer monitoring programs, storm drain marking or stream cleanup programs. Each permittee shall comply with any applicable State and local public notice requirements when developing their SWMP.

The minimum performance measures are:

a. No later than six months from the effective date of this permit, all permittees shall create opportunities for the public to participate in the decision making processes involving the development, implementation and update of the permittees SWMP. Each permittee shall develop and implement a process for consideration of public comments on their SWMP.

b. No later than six months from the effective date of this permit, all permittees shall establish a method of routine communication to groups such as watershed associations and environmental organizations that are located in the same watershed/s as the permittee, or organizations that conduct environmental stewardship projects located in the same watershed/s or in close proximity to the permittee. This is to make these groups aware of opportunities for their direct involvement and assistance in stormwater activities that are in their watershed.

c. Each permittee shall make their SWMP and their annual report required under this permit available to the public when requested. The current SWMP and the latest annual report

shall be posted on the permittees website. To comply with the posting requirement, a permittee that does not maintain a website may submit the updated SWMP and annual report in electronic format to the DWWM for electronic distribution when it is requested.

3. **Illicit Discharge Detection and Elimination**

The SWMP shall include an ongoing program to detect and remove illicit connections, discharges as defined in 40 CFR 122.26(b)(2), and improper disposal, including any spills not under the purview of another responding authority, into the municipal separate storm sewers owned or operated by the permittee. Newly permitted MS4s shall *begin* implementation of the requirements contained in Part II.C.3 of this permit within one year of the approval of their SWMP.

The minimum performance measures are:

a. The Permittees existing municipal storm sewer system map/s that were created during the first permit cycle shall be updated on an annual basis and shall include the following information:

   i. The location of all known storm sewer outfalls, receiving waters and structural stormwater BMPs owned, operated or maintained by the permittee. The location and type of all other stormwater conveyances located within the boundaries of the permittees MS4 watershed. The permittee may opt to include land use on the map also. In the process of updating the map, when stormwater outfalls become known, they are to be added to the permittees map.

   ii. An update of known connections to the municipal separate storm sewer authorized or allowed by the permittee after the effective date of this permit.

   iii. Geographic areas that discharge stormwater into the permittees MS4, which may not be located within the municipal boundary.

   iv. Each permittee shall maintain their storm sewer system map at their local office, and make it available upon request. Any paper maps submitted to DWWM shall be a scale of 1” = 500 ft. and on pages sized 24”x36” or 22”x36” and folded to 8 x 11 inches.

b. Each permittee shall implement a program or system to review and update their Illicit Discharge Detection and Elimination (IDDE) Ordinance or other regulatory mechanism to effectively prohibit and eliminate non-stormwater, illegal discharges, and/or dumping into the permittees municipal separate storm sewer system to the regulatory extent allowable under State and Local law. The ordinance or other regulatory mechanism shall be reviewed on an annual basis and updated when necessary. The IDDE program shall be adequately funded to fulfill the general permit requirements.

   i. The regulatory mechanism does not need to prohibit the following categories of non-stormwater discharges, *unless* they are identified to be significant sources of pollutants to waters of the State:

      - Diverted stream flows,
      - Rising ground waters,
      - Uncontaminated ground water infiltration (as defined at 40 CFR 35.2005(20)),
      - Uncontaminated pumped groundwater,

- Foundation drains,
- Air conditioning condensation,
- Irrigation water from agricultural sources
- Springs,
- Water from crawl space sump pumps,
- Footing drains,
- Flows from riparian habitats and wetlands,
- Non-stormwater discharges covered by another NPDES permit,
- Discharges or flows from fire fighting activities

ii. The regulatory mechanism shall prohibit the following categories of non-stormwater discharges *unless* the stated conditions are met:

- Discharges from potable or non-potable water sources, including but not limited to; hyperchlorinated water line flushing, pipeline hydrostatic test water and other water discharges with a potential to violate water quality standards. For planned discharges to the MS4, the discharge shall be dechlorinated to a concentration of 0.1ppm or less, pH adjusted, if necessary, and volumetrically and velocity controlled to prevent resuspension of sediments in the MS4.

- Discharges from lawn watering and other irrigation runoff. These shall be minimized through; at a minimum, public education activities described in Part II, Section C.1. of this permit.

- Street, parking lot and sidewalk wash water, water used to control dust, and routine external building wash down, that does not use detergents. The permittee shall reduce these discharges through; at a minimum, public education activities described in Part II, Section C.1. of this permit. To avoid washing pollutants into the MS4, permittees must minimize the amount of street wash and dust control water used. At active construction sites, street sweeping must be performed prior to washing the street.

iii. The permittees SWMP shall, at a minimum, address each category in ii above in accordance with the conditions stated therein.

iv. The SWMP shall further address any category of discharges in i or ii above if the discharges are identified as significant sources of pollutants to waters of the State.

v. The ordinance or other regulatory mechanism shall include escalating enforcement procedures and actions.

vi. The permittee shall develop an enforcement strategy and implement the enforcement provisions of the ordinance or other regulatory mechanism.

c. Each permittee shall continue to assess, update and implement their ongoing program to detect and address non-stormwater discharges, spills, illicit connections and illegal dumping into the permittees MS4. New permittees shall develop the aforementioned program. This program shall include:

i. Procedures for locating priority areas likely to have illicit discharges, including at a minimum, evaluating land uses associated with business/industrial activities

present; areas where complaints have been registered in the past; and areas with storage of large quantities of materials that could result in spills.

ii. Field assessment activities, including visual inspection of priority outfalls identified in i, above, during dry weather and for the purposes of verifying outfall locations, identifying previously unknown outfalls, and detecting illicit discharges.

- Receiving waters shall be prioritized for visual inspection no later than three years from the effective date of this permit, including a field assessment of at least two water bodies. At a minimum, one field assessment shall be made each year thereafter.

- Screening for illicit connections shall be conducted consistent with: Illicit Discharge Detection and Elimination: A Guidance Manual for Program Development and Technical Assessments, Center for Watershed Protection, October 2004, or another methodology of comparable effectiveness.

iii. Procedures for characterizing the nature of, and potential public or environmental threat posed by, any illicit discharges found by or reported to the Permittee. Procedures shall include detailed instructions for evaluating whether the discharge must be immediately contained and steps to contain the discharge.

Compliance with this provision shall be achieved by investigating within fifteen (15) days, any complaints, reports or monitoring information that indicates a potential illicit discharge, spill, or illegal dumping, and immediately investigating problems and violations determined to be emergencies or otherwise judged to be urgent or severe. In some instances, when imminent water quality impairments are deemed severe or urgent, the incident should be referred to WVDEP.

iv. Procedures for tracing the source of an illicit discharge; including visual inspections, and when necessary, opening manholes, using mobile cameras, collecting and analyzing water samples, and/or other detailed inspection procedures.

v. Procedures for removing the source of the discharge; including notification of appropriate authorities; notification of the property owner; follow up inspections, and if necessary; escalating enforcement and legal actions if the discharge is not eliminated.

Compliance with this provision shall be achieved by initiating an investigation within fifteen (15) days of a report or discovery of a suspected illicit connection to determine the source of the connection, the nature and volume of discharge through the connection, and the party responsible for the connection. The permittee shall establish a system to prioritize responding to and verifying elimination of illicit connections. The permittee shall assign a higher priority on illicit connections that pose an imminent threat to water quality.

d. Permittees shall inform public employees, businesses, and the general public of hazards associated with illegal discharges and improper disposal of waste.

i. Distribute appropriate information to target audiences pursuant to Part II, Section C.1. of this permit.

ii. Publicly list and publicize a hotline or other local telephone number for public reporting of spills and other illicit discharges. Keep a record of calls received and follow-up actions taken in accordance with Part II, Section C.3. of this permit; include a summary in the annual report.

e. Permittees shall adopt and implement procedures for program evaluation and assessment, including tracking the number and type of spills or illicit discharges identified, inspections made; and any feedback received from public education efforts. A summary of this information shall be included in the Permittees annual report.

f. Each permittee shall provide appropriate training for municipal staff on the identification and reporting of illicit discharges into MS4s.

i. Permittees shall ensure that all municipal field staff who are responsible for identification, investigation, termination, cleanup, and reporting illicit discharges, including spills, improper disposal and illicit connections are trained to conduct these activities. Follow up training shall be provided on an annual basis to address changes in procedures, techniques or requirements. Permittees shall document and maintain records of the training provided and the staff trained.

ii. Permittees shall develop and implement an ongoing training program for all municipal staff, which, as part of their normal job responsibilities, might come into contact with or otherwise observe an illicit discharge or illicit connection to the storm sewer system. Employees shall be trained on the identification of an illicit discharge/connection, and on the proper procedures for reporting and responding to the illicit discharge/connection. Follow up training shall be provided on an annual basis to strengthen knowledge of illicit discharges/connections and to address changes in procedures, techniques or requirements. Permittees shall document and maintain records of the training provided and the staff trained.

4. <u>Controlling Runoff from Construction Sites</u>

The SWMP shall include an ongoing program to assess, implement, and enforce the existing program to reduce pollutants in stormwater runoff to your small MS4 from construction site activities that result in a land disturbance of one acre or greater. Reduction of stormwater discharges from construction activity disturbing less than one acre must be included in your program if that construction activity is part of a larger common plan of development or sale that will disturb one acre or more. Permittee may opt to include in this program construction sites that are less than one acre. Newly permitted MS4s shall *begin* implementation of the requirements contained in Part II.C.4 of this permit within one year of the approval of their SWMP.

The minimum performance measures are:

a. Permittees shall implement a program or system to review and update their ordinance or other regulatory mechanism that addresses stormwater runoff from construction sites one acre or greater. Newly permitted MS4s that do not yet have an ordinance in place shall begin development an ordinance or other regulatory mechanism within twelve months of the effective date of this permit. The ordinance or other enforceable mechanism shall include, at a minimum:

i. Implementation of erosion and sediment control BMPs at regulated construction sites. Sediment and erosion control BMPs shall be consistent with the BMPs contained in West Virginia's Erosion and Sediment Control Best Management Practices Manual and/or other State manuals, as appropriate, listed in Appendix E.

ii. Requirements for construction site operators to implement appropriate erosion and sediment control BMPs. More stringent requirements may be used, and certain requirements may be tailored to local circumstances through the use of basin or watershed plans or other similar water quality and quantity planning efforts. Such local requirements shall provide equal protection of receiving waters and equal levels of pollutant control to those provided by DWWM WV/NPDES stormwater permits.

iii. Requirements for construction site operators to control waste such as discarded building materials, concrete truck washout, chemicals, litter, and sanitary waste at the construction site that may cause adverse impacts to water quality.

iv. Requirements for demonstration that registration under the WV/NPDES construction stormwater general permit has been obtained for those sites one acre and greater. Provided that the DWWM has not approved the permittee as a 'Qualifying Local Program' in which coverage under WV/NPDES construction stormwater permit will be issued by the permittee and not by the DWWM.

v. Establishment of authority for site plan review, which incorporate consideration of potential water quality impacts and review of individual pre-construction site plans to ensure consistency with local and State sediment and erosion control requirements.

vi. Establishment of authority for receipt and consideration of comments and information submitted by the public.

vii. Establishment of authority for site inspections and enforcement of control measures including steps to identify priority sites for inspection and enforcement based on the nature of the construction activity, topography, and the characteristics of soils and receiving water quality.

viii. Adequate funding for site inspections and enforcement of control measures.

ix. Measures to provide educational and training measures for construction site operators, including requiring a stormwater pollution prevention plan for construction sites within your jurisdiction.

b. The program shall include a permitting and/or approval process with plan review, inspection and enforcement capability, for both private sector and public sector construction sites. At a minimum, the construction site runoff program shall be applied to all sites that disturb a land area of one acre or greater, including projects less than one acre that are part of a larger common plan of development. For newly permitted MS4s the permitting and/or approval process shall be in place no later than two years from the

approval date of their SWMP. In addition to an Ordinance described in Part II, Section C.4.a, the following elements shall be incorporated into this program:

i. Procedures to incorporate plan review of new and redevelopment projects with the planning and approval process of these same projects with other municipal departments within the permittees MS4.

ii. Procedures for routine inspections of permitted construction sites during construction to verify proper installation and maintenance of required erosion and sediment controls. Enforcement shall be conducted as necessary based on the inspection.

iii. Development of an enforcement strategy to respond to issues of non-compliance.

iv. Procedures for providing educational and training measures for construction site operators and the permittees inspectors.

v. Development of an application process whereby the construction site operator will describe the sediment and erosion control measures to be taken on the site. This application process can include submittal of the stormwater pollution prevention plan that was used to obtain registration under DWWM WV/NPDES construction stormwater permit. The application shall include a listing of all water bodies into which the construction site will discharge and whether or not they are on the 303(d) list for impaired waters.

vi. Development of procedures for keeping records of all regulated construction activities within your MS4, inspection reports, warning letters, and any other enforcement documentation. A summary of inspection and enforcement activities that are conducted shall be included in the annual report.

5. **Controlling Runoff from New Development and Redevelopment**

The SWMP shall include an ongoing program to develop, assess, implement, and enforce their program to reduce pollutants in stormwater runoff to your small MS4 from new development and redevelopment activities. This program shall be applied to all sites that disturb a land area one acre or greater, including projects less than one acre that are part of a larger common plan of development or sale. The program shall apply to private sector and public sector development, including roads. The program must ensure that controls are in place that will increase groundwater recharge of stormwater runoff where and when possible, and would protect water quality and reduce the discharge of pollutants. Except where otherwise stated, newly permitted MS4s shall *begin* implementation of the requirements contained in Part II.C.5 of this permit within two years after the approval date of their SWMP.

The program shall include the following measures:

a. Long-term Stormwater Controls

The permittee shall protect the physical, chemical and biological integrity of receiving waters, and their designated uses, from the impacts of stormwater discharges through the implementation of watershed protection elements and site and neighborhood design elements. The purpose of *watershed protection* elements is to manage the impacts of

stormwater on receiving waters that occur because of regional or watershed-scale management decisions. The primary purpose of *site and neighborhood design* elements is to manage the impacts of stormwater on receiving waters that occur because of site and neighborhood design management decisions. The technical principles of these management practices have many complementary similarities, and must be implemented in tandem.

All elements and standards are required, and must be described in the stormwater management program plan.

i. Watershed Protection

The permittee shall incorporate watershed protection elements into the subdivision ordinance or equivalent document. In addition, the permittee shall incorporate watershed protection elements into all relevant policy and/or planning documents as they come up for regular review. If a relevant planning document is not scheduled for review during the term of this permit, the permittee must identify the elements that cannot be implemented until that document is revised, and provide the DWWM a schedule for incorporation and implementation that cannot exceed seven years from the effective date of this permit. Planning documents include, but are not limited to; comprehensive or master plans, subdivision ordinances, general land use plan, zoning code, transportation master plan, specific area plans, such as sector plan, site area plans, corridor plans, or unified development ordinances.

A. *Watershed protection elements.* As relevant, policy and/or planning documents must include the following, except where noted:

(1) Minimize the amount of impervious surfaces (roads, parking lots, roofs, etc.) within each watershed, by minimizing the creation, extension and widening of parking lots, roads and associated development.

(2) Preserve, protect, create and restore ecologically sensitive areas that provide water quality benefits and serve critical watershed functions. These areas may include, but are not limited to; riparian corridors, headwaters, floodplains and wetlands.

(3) Implement stormwater management practices that prevent or reduce thermal impacts to streams, including requiring vegetated buffers along waterways, and disconnecting discharges to surface waters from impervious surfaces such as parking lots.

(4) Seek to avoid or prevent hydromodification of streams and other water bodies caused by development, including roads, highways, and bridges.

(5) Implement standards to protect trees, and other vegetation with important evapotranspirative qualities.

(6) Implement policies to protect native soils, prevent topsoil stripping, and prevent compaction of soils.

B. *Measurable Goals.* For each of the six watershed elements in i.A, the permittee shall develop quantifiable objectives that include a time frame for achieving them. Short-term

objectives (less than five years) and long-term objectives (greater than five years) are appropriate for many of these elements.

C. *Reporting.* Annual reports must include status of implementation of these elements with respect to incorporation into relevant documents and implementation via relevant policies. Reports should include proposed time frames, changes and measurable goals.

ii. Site and Neighborhood Design

The permittee shall develop a program to protect water resources by requiring all new and redevelopment projects to control stormwater discharge rates, volumes, velocities, durations and temperatures. These standards shall apply at a minimum to all new development and redevelopment disturbing one acre or greater, including projects less than one acre that are part of a larger common plan of development or sale. The permittee shall *begin* implementation of the requirements contained in Part II.C.5.a.ii [other than Part II.C.5.a.ii.A(3) and Part II.C.5.a.ii.A.(4)] within four years after the approval of the SWMP.

A. *Performance Standards.* The permittee must implement and enforce via ordinance and/or other enforceable mechanism(s) the following requirements for new and redevelopment:

1. Site design standards for all new and redevelopment that require, in combination or alone, management measures that keep and manage on site the first one inch of rainfall from a 24-hour storm preceded by 48 hours of no measurable precipitation. Runoff volume reduction can be achieved by canopy interception, soil amendments, evaporation, rainfall harvesting, engineered infiltration, extended filtration and/or evapotranspiration and any combination of the aforementioned practices. This first one inch of rainfall must be 100% managed with no discharge to surface waters, except when the permittee chooses to implement the conditions in paragraph 4 below. This can be achieved through on site utilization of practices to include dry swales, bioretention, rain tanks and cisterns, soil amendments, roof top disconnections, permeable pavement, porous concrete, permeable pavers, reforestation, grass channels, green roofs and other practices that alone or combined will capture the first one inch of rainfall runoff volume. Extended filtration practices that are designed to capture and retain up to one inch of rainfall may discharge volume in excess of the first inch through an under drain system. An Underground Injection Control permit may be required when certain conditions are met.

2. The following additional water quality requirements, as applicable:

   i. A project that is a potential hot spot with reasonable potential for pollutant loading(s) must provide water quality treatment for associated pollutants (e.g., petroleum hydrocarbons at a vehicle fueling facility) before infiltration.

   ii. A project that is a potential hot spot with reasonable potential for pollutant loading(s) that cannot implement adequate preventive or water quality treatment measures to ensure compliance with groundwater and/or surface water quality standards, must properly convey stormwater to a NPDES-permitted wastewater treatment facility or via a licensed waste hauler to a permitted treatment and disposal facility.

iii. A project that discharges or proposes to discharge to any surface water or ground water that is used as a source of drinking water must comply with all applicable requirements relating to source water protection.

3. When considered at the watershed scale, certain types of development can either reduce existing impervious surfaces, or at least create less 'accessory' impervious surfaces. Incentive standards may be applied to these types of projects. A reduction of 0.2 inches from the one inch runoff reduction standard may be applied to any of the following types of development. Reductions are additive up to a maximum reduction of 0.75 inches for a project that meets four or more criteria. The permittee may choose to be more restrictive and allow a reduction of less than 0.75 inches if they choose. In no case will the reduction be greater than 0.75 inches.

   a) Redevelopment
   b) Brownfield redevelopment
   c) High density (>7 units per acre)
   d) Vertical Density, (Floor to Area Ratio (FAR) of 2 or >18 units per acre)
   e) Mixed use and Transit Oriented Development (within ½ mile of transit)

4. For projects that cannot meet 100% of the runoff reduction requirement on site, two alternatives are available: off-site mitigation and payment in lieu. If these alternatives are chosen, then the permittee must develop and fairly apply criteria for determining the circumstances under which these alternatives will be available. A determination that standards cannot be met on site may not be based solely on the difficulty or cost of implementing measures, but must include multiple criteria that would rule out an adequate combination of the practices set forth in section 1, above, such as: too small a lot outside of the building footprint to create the necessary infiltrative capacity even with amended soils; soil instability as documented by a thorough geotechnical analysis; a site use that is inconsistent with capture and reuse of stormwater; too much shade or other physical conditions that preclude adequate use of plants. In instances where alternatives to complete on site management of the first inch of rainfall are chosen, technical justification as to the infeasibility of on site management is required to be documented.

   These alternatives are available, in combination or alone, for up to 0.6 inches of the original obligation at a 1:1.5 ratio, i.e., mitigation or payment in lieu must be for 1.5 times the amount of stormwater not managed on site. If, as demonstrated to the permittee, it is technically infeasible to manage on site a portion of all of the remaining 0.4 inches, off site mitigation or payment in lieu will be applied at a 1:2 ratio for that portion. For any of these options to be available, the permittee must create an inventory of appropriate mitigation projects, and develop appropriate institutional standards and management systems to value, evaluate and track transactions.

i. *Off-site mitigation.* Runoff reduction practices may be implemented at another location in the same sewershed/watershed as the original project, approved by the permittee. The permittee shall identify priority areas within the sewershed/watershed in which mitigation projects can be completed. Mitigation must be for retrofit or redevelopment projects, and cannot be applied to new development. The permittee shall determine who will be responsible for long term maintenance on mitigation projects.

ii. *Payment in lieu.* Payment in lieu may be made to the permittee, who will apply the funds to a public stormwater project. MS4s shall maintain a publicly accessible database of approved in lieu projects.

5. When public (local or otherwise) streets or parking lots, that are greater than 5000 square feet but less than one acre, are modified or reconstructed runoff reduction practices shall be included in the design work. These requirements apply only to projects begun after the effective date of this permit.

B. *Plan Review, Approval and Enforcement*. To ensure that all new development and redevelopment projects conform to the standards stipulated in Part II, Section C.5.ii, the permittee shall develop project review, approval and enforcement procedures. The review, approval and enforcement procedures shall apply at a minimum to all new development and redevelopment disturbing greater than or equal to one acre, including projects less than one acre that are part of a larger common plan of development or sale, and shall include:

(1) Requirements to submit for review and approval a pre-application concept plan that describes how the performance standards will be met. A pre-application meeting attended by a project land owner or developer, the project design engineer, and municipal planning staff to discuss conceptual designs may also meet this requirement.

(2) Development of procedures for the site plan review and approval process(es) that include inter-departmental consultations, as needed, and a required re-approval process when changes to an approved plan are desired.

(3) A requirement for submittal of ‘as-built’ certifications within 90 days of completion of a project.

(4) A post-construction verification process to ensure that stormwater standards are being met, that includes enforceable procedures for bringing noncompliant projects into compliance.

(5) A description of a program to educate both internal staff and external project proponents of the requirements of Part II, Section C.5 of this permit.

C. *Maintenance Agreements*. The permittee shall require that all development subject to the requirements of Part II, Section C.5.ii. of this permit develop a maintenance agreement and maintenance plan for approved stormwater management practices. The permittee shall require that property owners or operators provide verification of maintenance for the approved stormwater management practices. These agreements shall allow the permittee, or its designee, to conduct inspections of the stormwater management practices and also account for transfer of responsibility in leases and/or deed transfers. The agreement shall also allow the permittee, or its designee, to perform necessary maintenance or corrective actions neglected by the property owner/operator, and bill or recoup costs from the property owner/operator when the owner/operator has not performed the necessary maintenance within thirty (30) days of notification by the permittee or its designee. Verification shall include one or more of the following as applicable:

(1) The owner/developer's signed statement accepting responsibility for maintenance until the maintenance responsibility is legally transferred to another party; and/or

(2) Written conditions in the sales or lease agreement that require the recipient to assume responsibility for maintenance; and/or

(3) Written conditions in project conditions, covenants and restrictions for residential properties assigning maintenance responsibilities to a home owner's association, or other appropriate group, for maintenance of structural and treatment control stormwater management practices; and/or

(4) Any other legally enforceable agreement that assigns permanent responsibility for maintenance of structural or treatment control stormwater management practices.

D. *Inventory and Tracking of Management Practices*. The permittee shall develop a system designed to track stormwater management practices deployed at new development and redevelopment projects. Tracking of stormwater management practices shall begin during the plan review and approval process with a database or geographic information system (GIS). The database or tracking system shall include information on both public and private sector projects that are within the jurisdiction of the permittee. In addition to the standard information collected for all projects (such as project name, owner, location, start/end date, etc.), the tracking system shall also include:

1. Source control stormwater management practices (type, number, design or performance specifications)

2. Treatment control stormwater management practices (type, number, design or performance specifications)

3. Latitude and longitude coordinates of stormwater BMP controls using a global positioning system

4. Digital photographs of stormwater management practice controls

5. Maintenance requirements of stormwater management practices (frequency of required maintenance and inspections)

6. Inspection information (date, findings, follow up activities, compliance status)

E. *Stormwater BMP Inspections*. In order to ensure that all stormwater BMPs are operating correctly and are properly maintained, the permittee shall, at a minimum:

1. Develop an inspection calendar for stormwater BMPs. Inspections should be performed so that all stormwater BMP's are inspected at least once during the permit cycle.

2. Complete inspection reports shall include:

i. Facility type,
ii. Inspection date,
iii. Name and signature of inspector,

iv. GIS location and nearest street address,
v. Management practice ownership information (name, address, phone number, fax, and email),
vi. A description of the stormwater BMP condition including the quality of: vegetation and soils; inlet and outlet channels and structures; embankments, slopes, and safety benches; spillways, weirs, and other control structures; and sediment and debris accumulation in storage and forebay areas as well as in and around inlet and outlet structures,
vii. Photographic documentation of all critical stormwater BMP components, and
viii. Specific maintenance items or violations that need to be corrected by the stormwater BMP owner along with deadlines and reinspection dates.

3. Develop an enforcement and response plan to ensure that stormwater BMPs are properly maintained. This plan shall include procedures to enforce correction orders and include a contingency plan if correction orders are not followed through by the responsible party. The permittee shall promptly notify the stormwater BMP owner or operator of any deficiencies discovered during a maintenance inspection. The permittee shall follow its enforcement response plan to ensure that management practices are maintained. The permittee must conduct a subsequent inspection to ensure completion of all required repairs.

F. *Reporting*. The permittee shall demonstrate compliance with the requirements for post-construction controls by summarizing the following in the Annual Report:

(1) A description of how the permittees legal authority addresses the watershed protection elements in Part II, Section C.5.

(2) A summary of the number and types of projects that the permittee reviewed for new and development considerations.

(3) A summary of the number and types of stormwater BMPs approved in new and redevelopment projects, including the number of approved projects that qualified for each of the incentives described in Part II, Section C.5.a.ii.A.3, and that qualified for each of the alternatives described in Part II, Section C.5.a.ii.A.4.

(4) A summary of the number and types of maintenance agreements approved.

(5) A summary of stormwater BMP maintenance inspections conducted by the permittee, including a summary of the number requiring maintenance or repair, the number brought into compliance and the number of enforcement actions taken.

(6) A summary of any evaluation data collected for long-term stormwater controls, including water quality information, stormwater BMP performance, and model results.

b. Assessments

The permittee shall conduct the following assessment to provide a foundation for program improvements to be implemented during the next permit term.

1. Street/Parking Design Assessment.

Permittee shall submit to DWWM a report assessing current street design guidelines and parking requirements that affect the creation of impervious cover, with the third year annual report. The assessment shall include recommendations and proposed schedules for incorporating policies and standards into relevant documents and procedures to maximize vegetation and to minimize impervious cover attributable to parking and street designs. The local planning commission and the local transportation commission should be involved in the assessment.

6. **Pollution Prevention & Good Housekeeping for Municipal Operations**

Each permittee shall continue to implement their operations and maintenance (O&M) program that includes a training component and has the ultimate goal of preventing or reducing polluted runoff from municipal operations. Newly permitted MS4s shall have one year from the approval date of their SWMP to *begin* implementation of the requirements contained in Part II.C.6 of this permit.

The minimum performance measures are:

a. Develop and implement an operation and maintenance program that incorporates good housekeeping components at all municipal facilities, including but not limited to; municipal waste water treatment facility, potable drinking water facility, municipal fleet operations, maintenance garages, parks and recreation, street and infrastructure maintenance, and grounds maintenance operations.

   i. Each permittee shall develop and establish maintenance standards at all municipal facilities that will help protect the physical, chemical and biological integrity of receiving waters.

   ii. Each permittee shall establish an inspection schedule in which to perform inspections to determine if maintenance standards are being met. Inspections shall be performed no less than once per calendar year.

   iii. Each permittee shall develop procedures for record keeping and tracking inspections and maintenance at all municipal facilities.

b. Establish and implement policies and procedures to reduce the discharge of pollutants in stormwater runoff from all lands owned or maintained by the permittee and subject to this permit, including but not limited to: parks, open space, road right-of-way, maintenance yards, water/sewer infrastructure and stormwater treatment and flow practices. These policies and procedures shall address, but are not limited to:

   i. Application of fertilizer, pesticides, and herbicides including the development of nutrient management and integrated pest management plans.

   ii. Sediment and erosion control.

   iii. Landscape maintenance and vegetation disposal.

   iv. Trash management.

   v. Building exterior cleaning and maintenance.

   vi. Chemical and material storage.

vii. Street sweeping and inlet/catch basin cleaning.

c. Using training materials that are available from WVDEP, USEPA or other organizations, develop and implement an on-going training program for employees of the permittee whose construction, operations or maintenance job functions may impact stormwater quality. The training program shall include, but is not limited to, employees who work in the following areas:

- Street/sewer and right-of-way construction and maintenance,
- Water and sewer departments,
- Parks and recreation department,
- Municipal water treatment and waste water treatment,
- Fleet maintenance,
- Fire departments,
- Building maintenance and janitorial,
- Garage and mechanic crew,
- Contractors and subcontractors who may be contracted to work in the above described areas,
- Personnel responsible for answering questions about the permittees stormwater program, this includes persons who may take phone calls about the program,
- Any other department of the permittee that may impact stormwater runoff

i. The training program shall address the importance of protecting water quality, the requirements of this permit, operation and maintenance standards, inspection procedures, selecting appropriate BMPs, ways to perform their job activities to prevent or minimize impacts to water quality, and procedures for reporting water quality concerns, including potential illicit discharges. Follow-up and refresher training shall be provided at a minimum of once every twelve months, and shall include any changes in procedures, techniques or requirements. Permittees shall document and maintain records of training provided.

d. **Industrial Stormwater coverage for Municipal Operations**

Each permittee that owns or operates a publicly owned treatment works, including sanitary boards, maintenance garages and/or any other industrial activity must obtain coverage for their stormwater discharges, unless coverage is already granted under DWWM WV/NPDES General Permit for Storm Water Discharges associated with Industrial activity, or an individual WV/NPDES permit.

The following monitoring requirements apply:

Pollutants of Concern	Cut-off Concentration	Measurement Frequency
BOD-5	30 mg/l	Once/Six months
COD	120 mg/l	Once/Six months
TSS	100 mg/l	Once/Six months
Ammonia Nitrogen	4 mg/l	Once/Six months
Oil & Grease	15 mg/l	Once/Six months
pH	6.0 – 9.00 s.u.	Once/Six months

Permittees that receive discharges into their small MS4 from their sewage treatment works must, in addition to the above listed monitoring requirements, also meet the following monitoring requirements for those discharges:

Pollutants of Concern	Cut-off Concentration	Measurement Frequency
Fecal Coliform, General	400 counts/100 ml	Once/Six months

Samples shall be collected once every six months, during the spring and fall seasons. Monitoring results shall be submitted to the DWWM with the annual report.

Stormwater samples shall be collected during the "first flush" of rainfall runoff, at least twenty minutes, but not more than fifty minutes after rainfall of at least 0.5 inches has begun, preceded by a period of dry weather of at least 48 hours.

Part III. Special Conditions

A. **Sharing Responsibility**

If you are relying on another MS4 regulated under the stormwater regulations to satisfy one or more of your permit obligations, you must note that fact in your stormwater management program. This other entity must, in fact, implement the control measure(s); the measure of component thereof, must be at least as stringent as the corresponding WV/NPDES permit requirement; and the other entity must agree to implement the control measure on your behalf. This agreement between the two or more parties must be documented in writing in the stormwater management plan and be retained by the permittee for the duration of this permit, including any automatic extensions of the permit term.

B. Discharge Compliance with Water Quality Standards

This general permit requires, at a minimum, that permittees develop, implement and enforce a stormwater management program designed to reduce the discharge of pollutants to the maximum extent practicable, to protect water quality, and satisfy the appropriate requirements of the Clean Water Act. If stormwater discharges have a reasonable potential to cause or contribute to violations of water quality standards in the receiving water, additional controls are required. Full implementation of selected BMPs, using known, available, and reasonable methods of prevention, control and treatment to prevent and control stormwater pollution from entering waters of the State of West Virginia is considered an acceptable effort to reduce pollutants from the municipal storm drain system to the maximum extent practicable.

C. Requiring an Individual Permit

The DWWM may require any person authorized by this permit to apply for and/or obtain an individual WV/NPDES permit. Where the DWWM requires application for an individual WV/NPDES permit, the DWWM will notify the permittee in writing that a permit application is required. This notification shall include a brief statement of the reasons for this decision, an application form and a statement setting a deadline for the permittee to file the application.

D. Discharge to Impaired Waters

1. **303(d) Listed Waters**:

This permit does not authorize new sources or new discharges of pollutants of concern to impaired waters unless consistent with an approved Total Maximum Daily Load (TMDL) and applicable state law. Impaired waters are those that do not meet applicable water quality standards. Impaired

waters are identified on the West Virginia, Section 303(d) list until a TMDL is developed and approved by USEPA. Pollutants of concern are those pollutants for which the water body is listed as impaired. A list of impaired water bodies in West Virginia can be found at: http://www.wvdep.org/item.cfm?ssid=11&ss1id=720

a. MS4s that discharge into a receiving water which has been listed on the West Virginia Section 303(d) list of impaired waters, and with discharges that contain the pollutant(s) for which the water body is impaired, must document in the SWMP how the BMPs will control the discharge of the pollutant(s) of concern, and must demonstrate that there will be no increase of the pollutants of concern.

b. If a TMDL is approved during this permit cycle by USEPA for any waterbody into which an MS4 discharges, the MS4 must review the applicable TMDL to see if it includes requirements for control of stormwater discharges. Within six (6) months of the TMDL approval, the MS4 must modify its stormwater management program to include best management practices specifically targeted to achieve the wasteload allocations prescribed by the TMDL. The MS4 must include a monitoring component in the SWMP to assess the effectiveness of the BMPs in achieving the wasteload allocations. Monitoring shall be specifically for the pollutants of concern and be of sufficient frequency to determine if the stormwater BMPs are adequate to meet wasteload allocations. Monitoring can entail a number of activities including but not limited to; outfall monitoring to in-stream monitoring to modeling. For more information see the USEPA/State guidance titled: *Evaluating the effectiveness of municipal stormwater programs* and *Understanding Impaired Waters and Total Maximum Daily Load (TMDL) Requirements for Municipal Stormwater Programs.* Both of these guidance documents can be found on WVDEP's website: http://www2.wvdep.org/dwwm/stormwater/MS4_docs.htm

After monitoring results are carefully considered, the permittee shall ascertain if the SWMP and the mix of BMPs need to be modified to comply with wasteload allocations.

2. **Discharging into Waters with Approved TMDLs**

If a MS4 discharges into a water body with an approved TMDL, and the TMDL contains requirements for control of pollutants from the MS4 stormwater discharges, then the SWMP must include BMPs specifically targeted to achieve the wasteload allocations prescribed by the TMDL. A monitoring component to assess the effectiveness of the BMPs in achieving the wasteload allocations must also be included in the SWMP. Monitoring shall be specifically for the pollutants of concern and be of sufficient frequency to determine if the stormwater BMPs are adequate to meet wasteload allocations. Monitoring can entail a number of activities including but not limited to; outfall monitoring to in-stream monitoring to modeling. For more information see the USEPA/State guidance titled: *Evaluating the effectiveness of municipal stormwater programs* and *Understanding Impaired Waters and Total Maximum Daily Load (TMDL) Requirements for Municipal Stormwater Programs.* Both of these guidance documents can be found on WVDEP's website: http://www2.wvdep.org/dwwm/stormwater/MS4_docs.htm

After monitoring results are carefully considered, the permittee shall ascertain if the SWMP and the mix of BMPs need to be modified to comply with wasteload allocations.

E. Endangered and Threatened Species

If a MS4 discharges to a stream where federally endangered or threatened species or its habitat are present, the applicant shall contact the US Fish and Wildlife Service to insure that requirements of the Federal Endangered Species Act are met.

Part IV. Monitoring, Recordkeeping, Reporting and Program Review

A. Evaluating the Stormwater Management Program

MS4s shall evaluate the effectiveness of their stormwater management programs and BMPs implemented to comply with this general permit. The permittee shall use a sufficient number of known, available, and reasonable methods necessary to evaluate the effectiveness of the SWMP. This information shall be submitted in the annual report in accordance with Part IV, Section D. For more information about evaluating your stormwater management program see the USEPA/States guidance titled: *Evaluating the effectiveness of municipal stormwater programs.* This guidance document can be found on WVDEP's website: http://www2.wvdep.org/dwwm/stormwater/MS4_docs.htm

B. Stormwater Monitoring

The permittee shall monitor stormwater from a minimum of one outfall that is representative of the stormwater discharge from the MS4. A representative outfall is one located in the most densely populated section of the MS4. The permittee shall, at a minimum, monitor one outfall for the following parameters:

Parameter	EPA Method No.	Method Detection Limit (mg/l)
Total Kjeldahl Nitrogen	351.4	0.03
Nitrate Nitrogen	300.0	0.002
Nitrite Nitrogen	300.0	0.004
Total Phosphorous	365.4	0.01

The DWWM recognizes there is not an EPA approved method to directly test for Total Nitrogen. The Total Nitrogen value to be reported on the permittees Discharge Monitoring Reports' (DMRs) shall be the sum of the following parameters; Total Kjeldahl Nitrogen, Nitrate, and Nitrite.

If all three constituents of total nitrogen are not detected at its method detection limit (MDL), the permittee shall sum the actual MDLs for each constituent and report the result as less than the calculation.

When calculating the sum of the constituents for total nitrogen, the permittee shall use actual analytical results when these results are greater than or equal to the MDL for a particular constituent and should use zero (0) for a constituent if one or two of the constituents are less than the MDL.

The methods and detection levels in the table above are recommended to be used unless the permittee desires to use an EPA approved method with a detection level equal to or lower than those specified above.

Stormwater samples shall be collected once every six months, during the spring and fall seasons.

Stormwater samples shall be collected during the "first flush" of rainfall runoff, at least twenty minutes, but not more than fifty minutes after rainfall of at least 0.5 inches has begun, preceded by a period of dry weather of at least 48 hours.

C. Recordkeeping and Public Availability of SWMP and Annual Report

The permittee shall keep records under this general permit for at least three years after termination of this general permit. Records shall be submitted to the DWWM only when permittees are specifically asked to do so.

The permittee shall make their SWMP and their annual report available to the public at reasonable times during regular business hours. In addition, the SWMP and the annual report shall be posted on the permittees website. If the permittee does not maintain or utilize a website, an electronic copy of the SWMP and annual report shall be submitted to DWWM for distribution when it is requested.

D. Reporting

Annually, the permittee shall submit a report to the DWWM. The report shall include:

1. A description of the activities undertaken and implemented for each of the minimum control measures;

2. An explanation of how the permittee measured the effectiveness of each of the activities implemented;

3. The status of compliance with each of the BMPs that were specified in the permittees stormwater management program;

4. An assessment of the progress toward achieving the identified measurable goals for each of the minimum control measures;

5. Results of information collected and analyzed, including monitoring data, during the annual reporting period;

6. A summary of the stormwater activities the permittee plans to undertake during the next annual reporting period;

7. A change in any identified measurable goals that apply to the minimum control measures;

8. A description of the status of the street and parking design assessment;

9. A description of the coordination efforts with other MS4's, County Governments, colleges, universities, correctional facilities, prisons, and any other entity regarding the implementation of the minimum control measures including the status of any memorandum of understanding (MOU) or other agreement executed between the permittee/s and any other entity;

10. A summary of construction site inspections and enforcement activities as described in Part II, Section C.4.b.vi.;

11. A summary of post construction controls as described in Part II, Section C.5.a.ii.F., and Part II, Section C.5.a.i.C.,

12. A description of specific BMPs *that were implemented* in order to reduce pollutants of concern in impaired receiving waters and waters in which a TMDL has been developed, and

13. A fiscal analysis of capital and operating expenditures to implement the minimum control measures. The fiscal analysis shall include only those expenditures by the locality seeking coverage under this general permit and not those for minimum control measures implemented by other entities.

E. Program Review

In order to assess the effectiveness of the permittees NPDES program for eliminating non-storm water discharges and reducing the discharge of pollutants to the maximum extent possible, the DWWM will review program implementation and annual reports. Additional periodic evaluations may be conducted to determine compliance with permit conditions.

The permittee must comply with all terms and conditions of this permit. Permit noncompliance constitutes a violation of the federal Clean Water Act (CWA) and State Act, Chapter 22, Article 11 & Article 12 and is grounds for enforcement action; for permit modification, suspension or revocation.

Failure to comply with the terms and conditions of this permit, with the plans and specifications submitted with the site registration application, the most currently approved SWMP, and the appropriate appendices shall constitute grounds for the revocation or suspension of this permit and for the invocation of all the enforcement procedures set forth in Chapter 22, Article 11 of the Code of West Virginia.

This permit is issued in accordance with the provisions of Chapter 22, Article 11 of the Code of West Virginia

BY: _____

Scott G. Mandirola
Acting Director

Appendix A

WV/NPDES GENERAL PERMIT NUMBER WV0116025

SMALL MUNICIPAL SEPARATE STORM SEWER SYSTEMS

NOTICE OF INTENT (NOI)

1. MS4 Operator Information:

Name of city, county, or other jurisdiction that operates a Phase II MS4:

_____

Contact Person: _____ Telephone: _____

E-mail address of contact person: _____

Address: _____

City: _____ State:_____ Zip Code: _____

2. Receiving stream(s): _____

3. Fee - $17.50 per acre of area served by the MS4. Maximum fee is $1750.00

Amount enclosed: _____

NOTE:

The Notice of Intent provides MS4 entities initial coverage under the WV/NPDES MS4 General Permit. This permit requires the permittee to submit their Stormwater Management Program within six months of the issuance date of the General Permit.

I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED ON THIS FORM. I AM ALSO AWARE THAT THE STORMWATER MANAGEMENT PROGRAM/SITE REGISTRATION APPLICATION MUST BE SUBMITTED WITHIN SIX MONTHS OF THE ISSUANCE DATE OF THE GENERAL PERMIT NO. WV0116025.

I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT.

OFFICIAL SIGNATURE _____ DATE _____

PRINT NAME _____

Return To: WVDEP - DWWM
MS4/NPDES
601 57th Street, SE
Charleston, WV 25304

Appendix B

Definitions

Accessory Impervious Surfaces means those additional impervious surfaces that are created to service new development; including roads, shopping centers, office parks and parking lots.

Best Management Practices (BMP's) means schedules of activities, prohibitions of practices, maintenance procedures, policies, and other management practices to prevent or reduce the pollution of waters of the State of West Virginia. BMP's also include treatment requirements, operating procedures, and practices to control site runoff, spillage or leaks, waste disposal or drainage from material storage. BMP's can include structural as well as non-structural practices.

Bioretention is the water quality and water quantity stormwater management practice using the chemical, biological and physical properties of plants, microbes and soils for the removal of pollution from stormwater runoff.

Canopy Interception is the interception of precipitation, by leaves and branches of trees and vegetation that does not reach the soil.

Clean Water Act (CWA) means Public Law 92-500, as amended by Public Law 95-217, Public Law 97-117 and Public Law 95-576; U.S.C. 1251 et seq.

Common Plan of Development is a contiguous construction project where multiple separate and distinct construction activities may be taking place at different times on different schedules but under one plan. The "plan" is broadly defined as any announcement or piece of documentation or physical demarcation indicating construction activities may occur on a specific plot; included in this definition are most subdivisions and industrial parks.

Cut off concentration is a concentration at which stormwater could potentially impair, or contribute to impairing water quality.

Director means the Director of the Division of Water and Waste Management, West Virginia Department of Environmental Protection, or his/her designated representative.

Engineered Infiltration is an underground device or system designed to accept stormwater and slowly exfiltrates it into the underlying soil. This device or system is designed based on soil tests that define the infiltration rate.

Evaporation means rainfall that is changed or converted into a vapor.

Evapotranspiration means the sum of evaporation and transpiration of water from the earth's surface to the atmosphere. It includes evaporation of liquid or solid water plus the transpiration from plants.

Extended Filtration is a structural stormwater practice which filters stormwater runoff through vegetation and engineered soil media. A portion of the stormwater runoff drains into an underdrain system which slowly releases it after the storm is over.

Hydromodification means the alteration of the natural flow of water through a landscape, and often takes the form of channel straightening, widening, deepening, or relocating existing, natural stream channels. It can also involve excavation of borrow pits or canals, building of levees, streambank

erosion, or other conditions or practices that change the depth, width or location of waterways. Hydromodification usually results in water quality and habitat impacts.

Illicit Discharge means any non-permitted discharge to a regulated small MS4 or to waters of the State of West Virginia that does not consist entirely of stormwater or authorized non-stormwater discharges covered under a NPDES permit.

Infiltration is the process by which stormwater penetrates into soil.

Land Use means the way in which land is used, especially in farming and municipal planning.

Maintenance Agreement means a formal agreement or contract between a local government and a property owner designed to guarantee that specific maintenance functions are performed.

Municipal Field Staff means employees of the municipality and its departments that spend a portion of their employment in the marketplace, outside of the company office.

Municipal Separate Storm Sewer System (MS4) means conveyances for stormwater, including, but not limited to, roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, human made channels or storm drains owned or operated by any municipality, sewer or sewage board, State agency or Federal agency or other public entity that discharges directly to surface waters of the State of West Virginia.

Municipal Staff means employees of the municipality and its departments.

Notice of Intent (NOI) means a notification of intent to seek coverage under this general permit, to discharge stormwater into waters of the State of West Virginia.

NPDES means National Pollutant Discharge Elimination System, a provision of the Clean Water Act which prohibits the discharge of pollutants into waters of the United States. This federally mandated permit program is used for regulating point source discharges.

Outfall means the point source where the MS4 discharges from a pipe, ditch or other discreet conveyance directly or indirectly to water of the State of West Virginia, or to another MS4.

Planning documents are documents a municipality or jurisdiction uses for planning. They include, but are not limited to; comprehensive or master plans, subdivision ordinances, general land use plan, zoning code, transportation master plan, specific area plans, such as sector plan, site area plans, corridor plans, or unified development ordinances.

Pollutants of Concern are those pollutants which cause a water body to be placed on the Section 303(d) list of impaired waters.

Qualifying Local Program means a WV DEP formally recognized state, municipal or county program that meets or exceeds the provisions of WV DEP stormwater construction program in accordance with 40 CFR 122.44(s).

Rainfall and Rainwater Harvesting is the collection, conveyance, and storage of rainwater. The scope, method, technologies, system complexity, purpose, and end uses vary from rain barrels for garden irrigation in urban areas, to large-scale collection of rainwater for all domestic uses.

Receiving waters or receiving water means the 'water resources' that receive the discharge from the permittee.

Runoff Reduction practices and/or techniques are the collective assortment of stormwater practices that reduce the volume of stormwater from discharging off site. These include stormwater practices that infiltrate, evapotranspirate and reuse stormwater on site.

Secretary means the Secretary of the West Virginia Department of Environmental Protection, or his/her designated representative.

Site Registration Application means the forms designed by the Director for the purpose of obtaining coverage under the small MS4 general permit. The information contained on the site registration application once approved becomes the "stormwater management program" for the permittee.

Soil amendments are components added to in situ or native soils to increase the spacing between soil particles so that the soil can absorb and hold more moisture. The amendment of soils changes various other physical, chemical and biological characteristics so that the soils become more effective in maintaining water quality.

Source control stormwater management means practices that control stormwater *before* pollutants have been introduced into stormwater.

Stormwater Hotspots are commercial, industrial, institutional, municipal, or transportation related operations that may produce higher levels of stormwater pollutants, and/or present a higher potential risk for spills, leaks, or illicit discharges. Hotspots may include: gas stations, petroleum wholesalers, vehicle maintenance and repair, auto recyclers, recycling centers and scrap yards, landfills, solid waste facilities, wastewater treatment plants, airports, railroad stations and associated maintenance facilities, and highway maintenance facilities.

Stormwater Pollution Prevention Plan (SWPPP) means the erosion and sediment control plan for a construction site.

Stormwater Management Practice means practices that manage stormwater, including structural and vegetative components of a stormwater system.

Total Maximum Daily Load (TMDL): A calculation of the maximum amount of a pollutant that a waterbody can receive and still meet water quality standards. A TMDL is the sum of individual wasteload allocations for point sources (WLA), load allocations for nonpoint sources and natural background (LA), and must consider seasonal variation and include a margin of safety. The TMDL comes in the form of a technical document or plan. (40 CFR 130.2 and 130.7)

Treatment control stormwater management means practices that 'treat' stormwater after pollutants have been incorporated into the stormwater.

Wasteload allocation (WLA): The portion of a receiving water's loading capacity that is allocated to one of its existing or future point sources of pollution. WLAs constitute a type of water quality-based effluent limitation (40 CFR 130.2(h)).

Water Quality Treatment means any passive or active process that removes pollutants from stormwater, and/or prevents pollutants from encountering stormwater.

Water Resources, 'Water' or 'Waters' means any and all water on or beneath the surface of the ground, whether percolating, standing, diffused or flowing, wholly or partially within this state, or bordering this state and within its jurisdiction, and includes, without limiting the generality of the foregoing, natural or artificial lakes, rivers, streams, creeks, branches, brooks, ponds (except farm ponds, industrial settling basins and ponds and water treatment facilities), impounding reservoirs, springs, wells, watercourses and wetlands.

Appendix C

I. MANAGEMENT CONDITIONS:

1. Duty to Comply
a) The permittee must comply with all conditions of this permit. Permit noncompliance constitutes a violation of the CWA and State Act and is grounds for enforcement action; for permit modification, revocation and reissuance, suspension or revocation; or for denial of a permit renewal application.
b) The permittee shall comply with all effluent standards or prohibitions established under Section 307(a) of the CWA for toxic pollutants within the time provided in the regulations that establish these standards or prohibitions, even if the permit has not yet been modified to incorporate the requirement.
2. Duty to Reapply
If the permittee wishes to continue an activity regulated by this permit after the expiration date of this permit, the permittee must apply for a new permit at least 180 days prior to expiration of the permit.
3. Duty to Mitigate
The permittee shall take all reasonable steps to minimize or prevent any discharge in violation of this permit, which has a reasonable likelihood of adversely affecting human health or the environment.
4. Permit Actions
This permit may be modified, revoked and reissued, suspended, or revoked for cause. The filing of a request by the permittee for permit modification, revocation and reissuance, or revocation, or a notification of planned changes or anticipated noncompliance, does not stay any permit condition.
5. Property Rights
This permit does not convey any property rights of any sort or any exclusive privilege.
6. Signatory Requirements
All applications, reports, or information submitted to the Chief shall be signed and certified as required in Title 47, Series 10 , Section 4.6 of the West Virginia Legislative Rules.
7. Transfers
This permit is not transferable to any person except after notice to the Chief. The Chief may require modification or revocation and reissuance of the permit to change the name of the permittee and incorporate such other requirements as may be necessary. .
8. Duty to Provide Information
The permittee shall furnish to the Chief, within a reasonable specified time, any information which the Chief may request to determine whether cause exists for modifying, revoking and reissuing, suspending, or revoking this permit, or to determine compliance with this permit. The permittee shall also furnish to the Chief, upon request, copies of records required to be kept by this permit.
9. Other Information
Where the permittee becomes aware that it failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application or in any report to the Chief, it shall promptly submit such facts or information.
10. Inspection and Entry
The permittee shall allow the Chief, or an authorized representative, upon the presentation of credentials and other documents as may be required by law, to:
a) Enter upon the permittee's premises in which an effluent source or activity is located, or where records must be kept under the conditions of this permit;
b) Have access to and copy at reasonable times, any records that must be kept under the conditions of this permit;
c) Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this permit; and
d) Sample or monitor at reasonable times, for the purposes of assuring permit compliance or as otherwise authorized by the State Act, any substances or parameters at any location.
11. Permit Modification
This permit may be modified, suspended, or revoked in whole or in part during its term in accordance with the provisions of Chapter 22-11-12 of the Code of West Virginia.
12. Water Quality
The effluent or effluents covered by this permit are to be of such quality so as not to cause violation of applicable water quality standards adopted by the Environmental Quality Board.
13. Outlet Markers
A permanent marker at the establishment shall be posted in accordance with Title 47, Series 11, Section 9 of the West Virginia Legislative Rules.
14. Liabilities
a) Any person who violates a permit condition implementing sections 301, 302, 306, 307, 308, 318, or 405 of the Clean Water Act is subject to a civil penalty not to exceed $10,000 per day of such violation. Any person who willfully or negligently violates permit conditions implementing sections 301, 302, 306, 307, or 308 of the Clean Water Act is subject to a fine of not less than $2,500 nor more than $25,000 per day of violation, or by imprisonment for not more than 1 year, or both.
b) Any person who falsifies, tampers with, or knowingly renders inaccurate any monitoring device or method required to be maintained under this permit shall, upon conviction, be punished by a fine of not more than $10,000 per violation, or by imprisonment for not more than 6 months per violation, or by both.
c) Any person who knowingly makes any false statement, representation, or certification in any record or other document submitted or required to be maintained under this permit, including monitoring reports or reports of compliance or noncompliance shall, upon conviction, be punished by a fine of not more than $10,000 per violation, or by imprisonment for not more than 6 months per violation, or by both.
d) Nothing in I.14 a), b), and c) shall be construed to limit or prohibit any other authority the Chief may have under the State Water Pollution Control Act, Chapter 22, Article 11.

II. OPERATION AND MAINTENANCE:

1. Proper Operation and Maintenance
The permittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the permittee to achieve compliance with the conditions of this permit. Proper operation and maintenance also includes adequate laboratory controls, and appropriate quality assurance procedures. Unless otherwise required by Federal or State law, this provision requires the operation of back-up auxiliary facilities or similar systems which are installed by the permittee only when the operation is necessary to achieve compliance with the conditions of the permit. For domestic waste treatment facilities, waste treatment operators as classified by the WV Bureau of Public Health Laws, W. Va. Code Chapter 16-1, will be required except that in circumstances where the domestic waste treatment facility is receiving any type of industrial waste, the Chief may require a more highly skilled operator.

2. Need to Halt or Reduce Activity Not a Defense
It shall not be a defense for a permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of the permit.

3. Bypass
a) Definitions
(1) "Bypass" means the intentional diversion of waste streams from any portion of a treatment facility; and
(2) "Severe property damage" means substantial physical damage to property, damage to the treatment facilities which causes them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production.
b) Bypass not exceeding limitations. The permittee may allow any bypass to occur which does not cause effluent limitations to be exceeded, but only if it also is for essential maintenance to assure efficient operation. These bypasses are not subject to the provision of II.3.c) and II.3.d) of this permit.
c) (1) If the permittee knows in advance of the need for a bypass, it shall submit prior notice, if possible at least ten (10) days before the date of the bypass;
(2) If the permittee does not know in advance of the need for bypass, notice shall be submitted as required in IV.2.b) of this permit.
d) Prohibition of bypass
(1) Bypass is permitted only under the following conditions, and the Chief may take enforcement action against a permittee for a bypass, unless;
(A) Bypass was unavoidable to prevent loss of life, personal injury, or severe property damage;
(B) There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate backup equipment should have been installed in the exercise of reasonable engineering judgement to prevent a bypass which occurred during normal periods of equipment downtime or preventative maintenance; and
(C) The permittee submitted notices as required under II.3.c) of this permit.
(2) The Chief may approve an anticipated bypass, after considering its adverse effects, if the Chief determines that it will meet the three conditions listed in II.3.d.(1) of this permit.

4. Upset
a) Definition. "Upset" means an exceptional incident in which there is unintentional and temporary noncompliance with technology-based permit effluent limitations because of factors beyond the reasonable control of the permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventative maintenance, or careless or improper operation.

b) Effect of an upset. An upset constitutes an affirmative defense to an action brought for noncompliance with such technology-based permit effluent limitation if the requirements of II.4.c) are met. No determination made during administrative review of claims that noncompliance was caused by upset, and before an action for noncompliance, is final administrative action subject to judicial review.

c) Conditions necessary for a demonstration of upset. A permittee who wishes to establish the affirmative defense of upset shall demonstrate, through properly signed, contemporaneous operating logs, or other relevant evidence that:
(1) An upset occurred and that the permittee can identify the cause(s) of the upset;
(2) The permitted facility was at the time being properly operated;
(3) The permittee submitted notice of the upset as required in IV.2.b) of this permit.
(4) The permittee complied with any remedial measures required under I.3. of this permit.

d) Burden of proof. In any enforcement proceeding the permittee seeking to establish the occurrence of an upset has the burden of proof.

5. Removed Substances
Where removed substances are not otherwise covered by the terms and conditions of this permit or other existing permit by the Chief, any solids, sludges, filter backwash or other pollutants (removed in the course of treatment or control of wastewaters) and which are intended for disposal within the State, shall be disposed of only in a manner and at a site subject to the approval by the Chief. If such substances are intended for disposal outside the State or for reuse, i.e., as a material used for making another product, which in turn has another use, the permittee shall notify the Chief in writing of the proposed disposal or use of such substances, the identity of the prospective disposer or users, and the intended place of disposal or use, as appropriate.

III. MONITORING AND REPORTING

1. Representative Sampling
Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity.

2. Reporting
a) Permittee shall submit, according to the enclosed format, a Discharge Monitoring Report (DMR) indicating in terms of concentration, and/or quantities, the values of the constituents listed in Part A analytically determined to be in the plant effluent(s). DMR submissions shall be made in accordance with the terms contained in Section C of this permit.
b) Enter reported average and maximum values under "Quantity" and "Concentration" in the units specified for each parameter, as appropriate.
c) Specify the number of analyzed samples that exceed the allowable permit conditions in the columns labeled "N.E." (i.e., number exceeding).
d) Specify frequency of analysis for each parameter as number of analyses/specified period (e.g.,3/month is equivalent to 3 analyses performed every calendar month). If continuous, enter "Cont.". The frequency listed on format is the minimum required.

3. Test Procedures
Samples shall be taken, preserved and analyzed in accordance with the latest edition of 40 CFR Part 136, unless other test procedures have been specified elsewhere in this permit.

4. Recording of Results
For each measurement or sample taken pursuant to the permit, the permittee shall record the following information.
a) The date, exact place, and time of sampling or measurement;
b) The date(s) analyses were performed;
c) The individual(s) who performed the sampling or measurement;
d) The individual(s) who performed the analyses; if a commercial laboratory is used, the name and address of the laboratory;
e) The analytical techniques or methods used, and
f) The results of such analyses. Information not required by the DMR form is not to be submitted to this agency, but is to be retained as required in III.6.

5. Additional Monitoring by Permittee
If the permittee monitors any pollutant at any monitoring point specified in this permit more frequently than required by this permit, using approved test procedures or others as specified in this permit, the results of this monitoring shall be included in the calculation and reporting of the data submitted in the Discharge Monitoring Report Form. Such increased frequency shall also be indicated. Calculations for all limitations which require averaging of measurements shall utilize an arithmetic mean unless otherwise specified in the permit.

6. Records Retention
The permittee shall retain records of all monitoring information, including all calibration and maintenance records and all original chart recordings for continuous monitoring instrumentation, copies of all reports required by this permit, and records of all data used to complete the application for the permit, for a period of at least three (3) years from the date of the sample, measurement, report or application. This period may be extended by request of the Chief at any time.

7. Definitions
a) "Daily discharge" means the discharge of a pollutant measured during a calendar day or within any specified period that reasonably represents the calendar day for purposes of sampling. For pollutants with limitations expressed in units of mass, the daily discharge is calculated as the total mass of the pollutant discharged over the day. For pollutants with limitations expressed in other units of measurement, the daily discharge is calculated as the average measurement of the pollutant over the day.
b) "Average monthly discharge limitation" means the highest allowable average of daily discharges over a calendar month, calculated as the sum of all daily discharges measured during a calendar month divided by the number of daily discharges measured during that month.
c) "Maximum daily discharge limitation" means the highest allowable daily discharge.
d) "Composite Sample" is a combination of individual samples obtained at regular intervals over a time period. Either the volume of each individual sample is proportional to discharge flow rates or the sampling interval (for constant volume samples) is proportional to the flow rates over the time period used to produce the composite. The maximum time period between individual samples shall be two hours.
e) "Grab Sample" is an individual sample collected in less than 15 minutes.
f) "is" = immersion stabilization - a calibrated device is immersed in the effluent stream until the reading is stabilized.
g) The "daily average temperature" means the arithmetic average of temperature measurements made on an hourly basis, or the mean value plot of the record of a continuous automated temperature recording instrument, either during a calendar month, or during the operating month if flows are of shorter duration.
h) The "daily maximum temperature" means the highest arithmetic average of the temperatures observed for any two (2) consecutive hours during a 24 hour day, or during the operating day if flows are of shorter duration.
i) The "daily average fecal coliform" bacteria is the geometric average of all samples collected during the month.
j) "Measured Flow" means any method of liquid volume measurement, the accuracy of which has been previously demonstrated in engineering practice, or which a relationship to absolute volume has been obtained.
k) "Estimate" means to be based on a technical evaluation of the sources contributing to the discharge including, but not limited to pump capabilities, water meters and batch discharge volumes.
l) "Non-contact cooling water" means the water that is contained in a leak-free system, i.e., no contact with any gas, liquid, or solid other than the container for transport; the water shall have no net poundage addition of any pollutant over intake water levels, exclusive of approved anti-fouling agents.

IV. OTHER REPORTING

1. Reporting Spills and Accidental Discharges
Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the permittee from any responsibilities, liabilities or penalties established pursuant to Title 47, Series 11, Section 2 of the West Virginia Legislative Rules promulgated pursuant to Chapter 22, Article 11.

Attached is a copy of the West Virginia Spill Alert System for use in complying with Title 47, Series 11, Section 2 of the Legislative rules as they pertain to the reporting of spills and accidental discharges.

2. Immediate Reporting
a) The permittee shall report any noncompliance which may endanger health or the environment immediately after becoming aware of the circumstances by using the Agency's designated spill alert telephone number. A written submission shall be provided within five (5) days of the time the permittee becomes aware of the circumstances. The written submission shall contain a description of the noncompliance and its cause; the period of noncompliance, including exact dates and times, and if the noncompliance has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent recurrence of the noncompliance.
b) The following shall also be reported immediately:
(1) Any unanticipated bypass which exceeds any effluent limitation in the permit;
(2) Any upset which exceeds any effluent limitation in the permit; and
(3) Violation of a maximum daily discharge limitation for any of the pollutants listed by the Chief in the permit to be reported immediately. This list shall include any toxic pollutant or hazardous substance, or any pollutant specifically identified as the method to control a toxic pollutant or hazardous substance.
c) The Chief may waive the written report on a case-by-case basis if the oral report has been received in accordance with the above.
d) Compliance with the requirements of IV.2 of this section shall not relieve a person of compliance with Title 47, Series 11, Section 2.

3. Reporting Requirements
a) Planned changes. The permittee shall give notice to the Chief of any planned physical alterations or additions to the permitted facility which may affect the nature or quantity of the discharge. Notice is required when:
(1) The alteration or addition to a permitted facility may meet one of the criteria for determining whether a facility is a new source in Section 13.7.b of Series 10, Title 47; or
(2) The alteration or addition could significantly change the nature or increase the quantity of pollutants discharged. This notification applies to pollutants which are subject neither to effluent limitations in the permit, nor to notification requirements under IV.2 of this section.
b) Anticipated noncompliance. The permittee shall give advance notice to the Chief of any planned changes in the permitted facility or activity which many result in noncompliance with permit requirements.
c) In addition to the above reporting requirements, all existing manufacturing, commercial, and silvicultural discharges must notify the Chief in writing as soon as they know or have reason to believe:
(1) That any activity has occurred or will occur which would result in the discharge, on a routine or frequent basis, or any toxic pollutant which is not limited in the permit, if that discharge will exceed the highest of the following "notification levels":
(A) One hundred micrograms per liter (100 ug/l);
(B) Two hundred micrograms per liter (200 ug/l) for acrolein and acrylonitrile; five hundred micrograms per liter (500 ug/l) for 2,4-dinitro phenol; and for 2-methyl 4,6-dinitrophenol; and one milligram per liter (1 mg/l) for antimony;
(C) Five (5) times the maximum concentration value reported for that pollutant in the permit application in accordance with Section 4.4.b.9 of Series10, Title 47.
(D) The level established by the Chief in accordance with Section 6.3.g of Series 10, Title 47;
(2) That any activity has occurred or will occur which would result in any discharge (on a non-routine or infrequent basis) of a toxic which is not limited in the permit, if that discharge will exceed the highest of the following "notification levels":
(A) Five hundred micrograms per liter (500 ug/l);
(B) One milligram per liter (1 mg/l) for antimony;
(C) Ten (10) times the maximum concentration value reported for that pollutant in the permit application in accordance with Section 4.4.b.7 of Series 10, Title 47;
(D) The level established by the Chief in accordance with Section 6.3.g of Series 10, Title 47.
(3) That they have begun or expect to begin to use or manufacture as an intermediate or final product or by-product of any toxic pollutant which was not reported in the permit application under Section 4.4.b.9 of Series 10, Title 47 and which will result in the discharge on a routine or frequent basis of that toxic pollutant at levels which exceed five times the detection limit for that pollutant under approved analytical procedure.
(4) That they have begun or expect to begin to use or manufacture as an intermediate or final product or by-product of any toxic pollutant which was not reported in the permit application under Section 4.4.b.9 of Series 10, Title 47 and which will result in the discharge on a non-routine or infrequent basis of that toxic pollutant at levels which exceed ten times the detection limit for that pollutant under approved analytical procedure.

4. Other Noncompliance
The permittee shall report all instances of noncompliance not reported under the above paragraphs at the time monitoring reports are submitted. The reports shall contain the information listed in IV.2.a). Should other applicable noncompliance reporting be required, these terms and conditions will be found in Section C of this permit.

Appendix D

Designation Criteria for small MS4s with a population greater than 1,000.

The DWWM will use the following designation criteria to evaluate and determine if the subject MS4s require permit coverage:

1. Discharge to sensitive waters

2. High growth or growth potential

3. High population density

4. Contiguity to an urbanized area

5. Significant contributor of pollutants to waters of the State

6. Ineffective protection of water quality by other programs

Appendix E

Sediment and Erosion Control BMP manuals:

1. West Virginia BMP manual; http://www.wvdep.org/dwwm/stormwater/BMP/index.html

2. Maryland Soil Erosion and Sediment Control BMP manual; http://www.mde.state.md.us/Programs/WaterPrograms/SedimentandStormwater/erosionsedimentcontrol/standards.asp

3. Virginia Erosion and Sediment Control Handbook; http://www.dcr.virginia.gov/soil_&_water/e&s-ftp.shtml

4. USEPA has a listing of available state stormwater manuals here; http://yosemite.epa.gov/R10/WATER.NSF/0/17090627a929f2a488256bdc007d8dee?OpenDocument

5. West Virginia Department of Transportation, Division of Highways, Erosion and Sediment Control Manual, March 1, 2003. http://www.wvdot.com/engineering/TOC_engineering.htm

Santa Margarita Watershed MS4 Permit

Meeting Date: August 18th, 2010

Time: 10:00am - 3:00pm

Location: San Diego Regional Water Quality Control Board

Name	Agency	Signature
David Gibson	SDRWQCB	
Jimmy Smith	SDRWQCB	
David Barker	SDRWQCB	
Chiara Clemente	SDRWQCB	
Ben Neill	SDRWQCB	
Wayne Chiu	SDRWQCB	
Chad Loflen	SDRWQCB	
Jason Uhley	RCFC&WCD	
Claudio Padres	RCFC&WCD	
Amy McNeill	RCFC&WCD	Amy McNeill
Arlene Chun	RCFC&WCD	
Mike Shetler	County of Riverside	
Alex Gann	County of Riverside	
Aldo Licitra	City of Temecula	Aldo Licitra
Bill Woolsey	City of Murrieta	Bill Woolsey
Don Allison	City of Menifee	
Tim D'Zmura	City of Wildomar	
Daniel Apt	RBF	
Scott Taylor	RBF	

Santa Margarita Watershed MS4 Permit

Meeting Date: August 25th, 2010

Time: 9:30am to 12:30pm

Location: San Diego Regional Water Quality Control Board

Name	Agency	Signature
David Gibson	SDRWQCB	
Jimmy Smith	SDRWQCB	
David Barker	SDRWQCB	
Chiara Clemente	SDRWQCB	
Ben Neill	SDRWQCB	
Wayne Chiu	SDRWQCB	
Chad Loflen	SDRWQCB	
Jason Uhley	RCFC&WCD	
Claudio Padres	RCFC&WCD	
Amy McNeill	RCFC&WCD	
Arlene Chun	RCFC&WCD	
Mike Shetler	County of Riverside	
Alex Gann	County of Riverside	
Aldo Licitra	City of Temecula	
Bill Woolsey	City of Murrieta	
Don Allison	City of Menifee	
Tim D'Zmura	City of Wildomar	
WARD MAXWELL	RCTD	
Daniel Apt	RBF	
SHAWN NEWON	CITY OF TEMECULA	
GARRY BUTLER	" " "	
JUAN C. PEREZ	COUNTY OF RIVERSIDE	
Scott Taylor	RBF	
Pat Thomas	City of Murrieta	
Bob Collacott	U/RS	

From: "Padres, Claudio" <CMPadres@rcflood.org>
To: <cclemente@waterboards.ca.gov>
CC: Ben Neill <BNeill@waterboards.ca.gov>, David Barker <DBarker@waterboards...
Date: 9/28/2010 10:09 AM
Subject: Request for Alternate Hearing Procedures
Attachments: Hearing Request.pdf

<<Hearing Request.pdf>> Chiara,

Attached please find a request from the Copermittees for an alternate hearing procedures.
Please let me know if you have any questions.

Best Regards,

Claudio M. Padres, P.E.
Senior Civil Engineer - NPDES
Riverside County Flood Control
And Water Conservation District
951.955.8602

WARREN D. WILLIAMS
General Manager-Chief Engineer

0006022

1995 MARKET STREET
RIVERSIDE, CA 92501
951.955.1200
FAX 951.788.9965
www.rcflood.org

RIVERSIDE COUNTY FLOOD CONTROL
AND WATER CONSERVATION DISTRICT

September 28, 2010

Mr. David W. Gibson, Executive Officer
San Diego Regional Water Quality Control Board
9174 Sky Park Court, Suite 100
San Diego, CA 92123-4340

Dear Mr. Gibson:

Re: October 13, 2010 Board Meeting
Agenda Item 5: Tentative Order
No. R9-2010-0016

In accordance with Note D to the October 13, 2010 meeting agenda notice, the Riverside County Flood Control and Water Conservation District (District), on behalf of itself and the County of Riverside and the Cities of Menifee (to the extent that this City will be subject to the tentative order), Murrieta, Temecula and Wildomar (collectively, the "Permittees") are writing to request alternate hearing procedures for the Regional Board's consideration of Tentative Order No. R9-2010-0016, noticed as Agenda Item Number 5 on the October 13, 2010 Regional Board Meeting Agenda.

The Permittees are making this request for three reasons. First, the Tentative Order is a complex document, containing a number of provisions that have not been included in previous municipal stormwater permits issued by this Board. The Permittees have identified concerns and suggestions regarding these provisions and wish to be able to have sufficient time to share those concerns and suggestions directly with Regional Board members. Second, the Permittees have not been afforded a workshop on the terms of the Tentative Order, thus, Board members will not have had the benefit of hearing directly from the Permittees with respect to the provisions of the Order. Third, while the Permittees have submitted written comments highlighting their primary concerns on the Tentative Order, Regional Board staff has not responded to these written comments as of the deadline for this Notice and Board staff has indicated that they will not be willing to meet with us to resolve remaining issues until after the response to comments has been published.

In light of these reasons and in accordance with Note D, the Permittees hereby request alternate hearing procedures for Agenda Item 5 of the October 13th Board Meeting. As expressed previously to Regional Board staff, the specific format and time needed by the Permittees at the hearing will necessarily be dependent on the Regional Board staff's pending response to comments. Therefore, the Permittees additionally request a meeting between the Permittees and Regional Board staff on the second working day (Monday through Thursday) following the release of the response to comments. The purpose of this meeting will be to discuss and finalize the needed modifications to the hearing procedures, pursuant to this request.

0006023

On behalf of the Permittees, the District would like to thank Regional Board staff for the direct discussions that have occurred over the past several months. Those honest and direct discussions resulted in several key improvements to the Tentative Order. However, as we noted in our August 25, 2010 meeting, the process was cut short by the staff desire to hear the Permit on October 13th, resulting in issues which unavoidably must be taken to the Board for resolution. Further, the process as laid out by the Regional Board staff did not provide the Permittees with a workshop before the Board, or substantive time to respond to any revisions that may be proposed in the Response to Comments. Thus, sufficient time is required at the October 13th hearing so that the Permittees will have an adequate opportunity to verbally and directly convey their comments to the Board.

Please contact the undersigned with the Board's response to this request. Thank you for your attention to the Permittees' request.

Very truly yours,

JASON E. UHLEY
Chief of Watershed Protection Division

ec: Santa Margarita Region MS4 Permittees

CP:cw:bjp
P8/133470

0006024

Ben Neill - Re: Tentative Order R9-2010-0016 (NWU:749045:bneill)

From: Chiara Clemente
To: Padres, Claudio
Date: 9/29/10 1:26 PM
Subject: Re: Tentative Order R9-2010-0016 (NWU:749045:bneill)
CC: Allison), Menifee (Don; Chiu, Wayne; D'Zmura), Wildomar (Tim; Gann), ...
Attachments: R8 letter final.pdf; R9 letter final_color.pdf; Chiara Clemente.vcf

All,
Attached are the R8 and R9 letters of agreement for the transfer of MS4 oversight in Menifee, Murrieta, and Wildomar. Please note the limitations cited and the effective date (i.e. adoption of the permit). Let me know if you have questions, concerns, or would like to discuss.

These letters, along with the draft response to comments will (hopefully) be in the first agenda mailout to our Board. Our IT is currently out, but we will try to have the materials posted to our website as soon as possible.

Thank you,
Chiara

Chiara Clemente
Senior Environmental Scientist
Regional Water Quality Control Board
9174 Sky Park Court, Suite 100
San Diego, CA 92123
(858) 467-2359
(858) 571-6972 (fax)
http://www.waterboards.ca.gov/sandiego

California Regional Water Quality Control Board

San Diego Region

Linda S. Adams
Secretary for Environmental Protection

Over 50 Years Serving San Diego, Orange, and Riverside Counties
Recipient of the 2004 Environmental Award for Outstanding Achievement from USEPA

Arnold Schwarzenegger
Governor

9174 Sky Park Court, Suite 100, San Diego, California 92123-4353
(858) 467-2952 • Fax (858) 571-6972
http:// www.waterboards.ca.gov/sandiego

Supporting Document No. 6
Item No. 5
October 13, 2010

September 28, 2010

Patrick A. Thomas
Director of Public Works
City of Murrieta
1 Town Square
24601 Jefferson Avenue
Murrieta, CA 92562

Frank Oviedo
City Manager
City of Wildomar
23873 Clinton Keith Road, Suite 201
Wildomar, CA 92595

Donald Allison, P.E.
City Engineer/Public Works Director
City of Menifee
29714 Haun Road
Menifee, CA 92586

Dear Messrs. Thomas, Oviedo and Allison:

SUBJECT: DESIGNATIONS OF SAN DIEGO WATER BOARD AND SANTA ANA WATER BOARD FOR PURPOSES OF REGULATION OF MUNICIPAL SEPARATE STORM SEWER SYSTEMS - CITIES OF MENIFEE, MURRIETA AND WILDOMAR, RIVERSIDE COUNTY

This letter constitutes the California Regional Water Quality Control Board, San Diego Region's (San Diego Water Board, San Diego Regional Board, or Region 9) written agreement pursuant to Water Code section 13228, subdivision (a) to designate the Santa Ana Regional Water Quality Control Board (Santa Ana Water Board or Region 8) as the regulator of the City of Menifee within Region 9's geographic jurisdiction for municipal separate storm sewer system (MS4) permit purposes[1], and further constitutes the San Diego Water Board's written agreement to accept designation from the Santa Ana Water Board to regulate the Cities of Murrieta and Wildomar, including those portions of each city that fall within Region 8's geographic jurisdiction, for MS4 permit purposes.[2] As discussed below, this agreement is subject to several important limitations recognized by the Cities.

---

[1] The San Diego Water Board intends to consider the adoption of a new MS4 permit (Tentative Order No. R9-2010-0016) that would regulate the relevant portions of Murrieta and Wildomar on October 13, 2010.

[2] Until the new San Diego Water Board MS4 permit is adopted, including regulation of the Cities of Murrieta and Wildomar for MS4 purposes regardless of geographic boundaries, portions of Murrieta and Wildomar remain regulated in part by Order No. R8-2010-0033. Murrieta and Wildomar would become regulated by the San Diego Water Board, with certain limitations described below, when the San Diego Water Board adopts tentative Order No. R9-2010-0016, scheduled for consideration on October 13, 2010.

Background

The Cities each lay partially within both the San Diego and Santa Ana Water Boards' geographic jurisdictional boundaries. Portions of the Cities are currently regulated by the Santa Ana Water Board under Order No. R8-2010-0033 for MS4 discharges. Because the Cities of Wildomar and Menifee were incorporated after 2004, the San Diego Water Board's existing MS4 permit, Order No. R9-2004-001, regulates portions of Murrieta, but does not regulate Wildomar or Menifee. On July 20, 21 and 22, 2010, Murrieta, Wildomar and Menifee, respectively, submitted letters addressed jointly to the Executive Officers of the San Diego Water Board and the Santa Ana Water Board requesting that they each be regulated by one MS4 permit, pursuant to Water Code section 13228. (The Cities' letters, which include maps provided by the Cities depicting their respective geographic locations, are attached to this letter as Exhibits 1-3.) Murrieta and Wildomar requested that the Santa Ana Water Board designate the San Diego Water Board as the regulator for all portions of their respective cities, including those portions within Region 8's geographic boundary, for their MS4-related discharges. Likewise, the City of Menifee requested that the San Diego Water Board designate the Santa Ana Water Board as the regulator for all portions of Menifee, including those portions of the city that fall within Region 9's jurisdictional boundary, for matters pertaining to MS4 discharges. As the basis for their requests, the Cities cite the desire to reduce the complexities associated with being regulated by two separate MS4 permits and a desire to increase effectiveness and efficiencies in using city resources to benefit water quality. As described below, each city recognizes appropriate and important limitations to this agreement.

Limitations on San Diego Water Board Designation Agreement

As explained in their respective letters, each city recognizes the following common limitations to this agreement: (1) the requested designation applies only to MS4 permitting so that each city is subject to a single MS4 permit; (2) the Cities of Murrieta and Wildomar recognize that other waste discharge requirements (WDRs) or orders issued and/or enforced by the San Diego Water Board remain wholly under the San Diego Water Board's jurisdiction; likewise, the City of Menifee recognizes that WDRs and/or other orders issued or enforced by the Santa Ana Water Board remain wholly under the Santa Ana Water Board's jurisdiction; and (3) each Water Board retains the authority to enforce provisions of the MS4 permit issued to each city[3] but compliance

---

The Santa Ana Water Board may amend its order to remove Murrieta and Wildomar after the San Diego Water Board's adoption of Tentative Order No. R9-2010-0016, but this designation becomes effective upon the San Diego water Board's action.

[3] Primary enforcement responsibility lies with the permitting Water Board.

will be determined based upon the MS4 permit in which a particular city is regulated as a co-permittee (see Wat. Code § 13228, subd. (b)).

The Cities also expressly acknowledged the following reciprocal limitation concerning Total Maximum Daily Loads (TMDLs). Murrieta and Wildomar understand and agree that "[a]ny TMDLs and associated MS4 permit requirements issued by the Santa Ana Regional Board, which include [Murrieta and Wildomar] as responsible part[ies], will be incorporated into the MS4 permit issued by the San Diego Regional Board by reference, including reference to any associated provisions, findings or elements of the fact sheet." (City of Murrieta, Letter to Kurt Berchtold and David Gibson, July 20, 2010, p. 2; City of Wildomar, Letter to Kurt Berchtold and David Gibson, July 21, 2010, p. 2.) Similarly, the City of Menifee understands that "[a]ny TMDLs and associated MS4 permit requirements issued by the San Diego Regional Board, which include the City of Menifee as a responsible party, will be incorporated into the MS4 permit issued by the Santa Ana Regional Board by reference, including reference to any associated provisions, findings or elements of the fact sheet." (City of Menifee, Letter to Kurt Berchtold and David Gibson, July 22, 2010, p. 2.)

The Cities further recognize they will be subject to different processes for submitting Permit Registration Documents (PRDs) for municipal construction projects subject to the State Water Resources Control Board's (State Water Board's) Construction General Storm Water Permit. Under the Santa Ana Water Board's MS4 permit, Order No. R8-2010-0033, PRDs for municipal construction projects are submitted to the State Water Board through the Stormwater Multi-Application Reporting and Tracking System (SMARTS) without the filing fee. The City of Menifee will follow the process set forth by the Santa Ana Water Board under Order No. R8-2010-0033 for construction PRDs for all municipal construction projects within the City of Menifee. In contrast, the San Diego Water Board's existing (R9-2004-0001) and proposed (R9-2010-0016) MS4 permits include no similar process. Therefore, the Cities of Murrieta and Wildomar will submit PRDs[4] in accordance with the manner prescribed in State Water Board's Construction General Storm Water Permit, including appropriate fees.

Similarly, Region 8 MS4 requirements do not require separate coverage under the General Industrial Storm Water Permit (97-03-DWQ) for municipal yards. As such, the City of Menifee need not get coverage under the State Water Board's General Industrial Storm Water Permit for its corporate yards. Murrieta and Wildomar shall get coverage under the General Industrial Storm Water Permit for <u>all</u> their corporate yards.

Complaints received for discharges flowing from municipal, construction, industrial, and commercial sites to MS4s within the Cities of Murrieta and Wildomar will be forwarded to the San Diego Water Board for review. Complaints regarding discharges from

[4] In the form of a Notice of Intent (NOI).

municipal, construction, industrial, and commercial sites to MS4s within the City of Menifee will be referred to the Santa Ana Water Board for review.

Each Water Board remains responsible for overseeing construction and industrial sites under the statewide General Permits for Construction and Industrial Activities (State Water Board Orders No. 2009-0009 DWQ and No. 97-03 DWQ, respectively) based on the Water Board's geographic jurisdictional boundary. The Santa Ana Water Board shall notify the San Diego Water Board of any non-compliance found during routine inspections of sites within the Santa Ana Water Board boundary that discharge into the MS4s for the Cities of Murrieta and Wildomar. The San Diego Water Board shall notify the Santa Ana Water Board of any non-compliance found during routine inspections of sites within the San Diego Water Board boundary that discharge into the City of Menifee's MS4.

For de minimus types of discharges listed in the Region 8 MS4 Permit, the City of Menifee does not have to get separate coverage under Region 8's General De Minimus Permit (R8-2009-0003). De minimus types of discharges to Region 8's jurisdiction from the Cities of Wildomar and Murrieta shall be regulated under Region 8's General De Minimus Permit, R8-2009-0003.

Finally, the City of Murrieta notes that its annual report under the San Diego MS4 permit will include the 375 acres currently within the Santa Ana watershed. While not noted by the Cities of Wildomar and Menifee, the San Diego Water Board expects that the annual report filed by each city would be a single report covering the entire geographic area of the city, regardless of geographic jurisdiction, using the format prescribed in its respective permit and submitted to the appropriate regulating board.

For the reasons outlined above, the San Diego Water Board agrees to the Cities' regulatory designation requests and notes that tentative Order No. R9-2010-0016 will be revised to reflect this agreement. This agreement shall become effective with the adoption of tentative Order No. R9-2010-0016. The San Diego Water Board does not anticipate the need, but reserves the right, to modify or terminate this agreement in the future, upon sufficient notice, and for good cause.

Respectfully,

DAVID W. GIBSON
Executive Officer

Enclosure

cc: Kurt Berchtold, Executive Officer, Santa Ana Water Board

California Regional Water Quality Control Board
Santa Ana Region

Linda S. Adams
Secretary for Environmental Protection

3737 Main Street, Suite 500, Riverside, California 92501-3348
Phone (951) 782-4130 • FAX (951) 781-6288
www.waterboards.ca.gov/santaana

Arnold Schwarzenegger
Governor

September 28, 2010

Patrick A. Thomas
Director of Public Works
City of Murrieta
1 Town Square
24601 Jefferson Avenue
Murrieta, CA 92562

Frank Oviedo
City Manager
City of Wildomar
23873 Clinton Keith Road, Suite 201
Wildomar, CA 92595

Donald Allison, P.E.
City Engineer/Public Works Director
City of Menifee
29714 Haun Road
Menifee, CA 92586

Dear Messrs. Thomas, Oviedo and Allison:

DESIGNATIONS OF SAN DIEGO REGIONAL WATER QUALITY CONTROL BOARD AND SANTA ANA REGIONAL WATER QUALITY CONTROL BOARD FOR PURPOSES OF REGULATION OF MUNICIPAL SEPARATE STORM SEWER SYSTEMS - CITIES OF MENIFEE, MURRIETA AND WILDOMAR, RIVERSIDE COUNTY

This letter constitutes the Santa Ana Regional Water Quality Control Board's (Santa Ana Water Board's or Region 8's) written agreement pursuant to Water Code section 13228, subdivision (a), to designate the San Diego Regional Water Quality Control Board (San Diego Water Board or Region 9) as the regulator of the Cities of Murrieta and Wildomar, including those portions of each city that fall within Region 8's geographic jurisdiction, for municipal separate storm sewer system (MS4) permit purposes[1], and further constitutes the Santa Ana Water Board's written agreement to accept designation from the San Diego Water Board to regulate the City of Menifee within Region 9's geographic jurisdiction for MS4 permit purposes under Order No. R8-2010-0033.[2]

[1] At the time this letter was signed, the San Diego Water Board intended to consider the adoption of a new MS4 permit (Tentative Order No. R9-2010-0016) that would regulate the relevant portions of Murrieta and Wildomar.

[2] Until the new San Diego Water Board MS4 permit is adopted, including regulation of the Cities of Murrieta and Wildomar for MS4 purposes regardless of geographic boundaries, portions of Murrieta and Wildomar remain regulated in part by Order No. R8-2010-0033. Murrieta and Wildomar would become regulated by the San Diego Water Board, with certain limitations described below, when the San Diego Water Board adopts tentative Order No. R9-2010-0016, scheduled for consideration on October 13, 2010.

As discussed below, this agreement is subject to several important limitations recognized by the Cities of Menifee, Wildomar, and Murrieta (collectively, the Cities).

Background

The Cities each lay partially within both the San Diego and Santa Ana Water Boards' geographic jurisdictional boundaries. Portions of the Cities are currently regulated by the Santa Ana Water Board under Order No. R8-2010-0033 for MS4 discharges. Because the Cities of Wildomar and Menifee were incorporated after 2004, the San Diego Water Board's existing MS4 permit, Order No. R9-2004-0001, only regulates portions of Murrieta. On July 20, 21 and 22, 2010, Murrieta, Wildomar and Menifee, respectively, submitted letters addressed jointly to the Executive Officers of the San Diego Water Board and the Santa Ana Water Board requesting that they each be regulated by one MS4 permit, pursuant to Water Code section 13228. (The Cities' letters, which include maps provided by the Cities depicting their respective geographic locations, are attached to this letter as Exhibits 1-3.) Murrieta and Wildomar requested that the Santa Ana Water Board designate the San Diego Water Board as the regulator for all portions of their respective cities, including those portions within Region 8's geographic boundary, for their MS4-related discharges. Likewise, the City of Menifee requested that the San Diego Water Board designate the Santa Ana Water Board as the regulator for all portions of Menifee, including those portions of the city that fall within Region 9's jurisdictional boundary, for matters pertaining to MS4 discharges. As the basis for their requests, the Cities cite the desire to reduce the complexities associated with being regulated by two separate MS4 permits and a desire to increase effectiveness and efficiencies in using city resources to benefit water quality. As described below, each city recognizes appropriate and important limitations to this agreement.

Limitations on the Santa Ana Water Board Designation Agreement

As explained in their respective letters, each city recognizes the following common limitations to this agreement: (1) the requested designation applies only to MS4 permitting so that each city is subject to a single MS4 permit; (2) the Cities of Murrieta and Wildomar recognize that other waste discharge requirements (WDRs) or orders issued and/or enforced by the San Diego Water Board remain wholly under the San Diego Water Board's jurisdiction; likewise, the City of Menifee recognizes that WDRs and/or other orders issued or enforced by the Santa Ana Water Board remain wholly under the Santa Ana Water Board's jurisdiction; and (3) each Water Board retains the authority to enforce provisions of the MS4 permit issued to each city but compliance will

---

The Santa Ana Water Board intends to amend Order No. R8-2010-033 to remove Murrieta and Wildomar after the San Diego Water Board's adoption of Tentative Order No. R9-2010-0016. This designation becomes effective upon the San Diego Water Board's action.

be determined based upon the MS4 permit in which a particular city is a named as a co-permittee (see Wat. Code § 13228, subd. (b)).

The Cities also expressly acknowledged the following reciprocal limitation concerning Total Maximum Daily Loads (TMDLs). Murrieta and Wildomar understand and agree that "[a]ny TMDLs and associated MS4 permit requirements issued by the Santa Ana Regional Board, which include [Murrieta and Wildomar] as responsible part[ies], will be incorporated into the MS4 permit issued by the San Diego Regional Board by reference, including reference to any associated provisions, findings or elements of the fact sheet." (City of Murrieta, Letter to Kurt Berchtold and David Gibson, July 20, 2010, p. 2; City of Wildomar, Letter to Kurt Berchtold and David Gibson, July 21, 2010, p. 2.) Similarly, the City of Menifee understands that "[a]ny TMDLs and associated MS4 permit requirements issued by the San Diego Regional Board, which include the City of Menifee as a responsible party, will be incorporated into the MS4 permit issued by the Santa Ana Regional Board by reference, including reference to any associated provisions, findings or elements of the fact sheet." (City of Menifee, Letter to Kurt Berchtold and David Gibson, July 22, 2010, p. 2.)

The Cities further recognize they will be subject to different processes for submitting Permit Registration Documents (PRDs) for municipal construction projects subject to the State Water Resources Control Board's (State Water Board's) Construction General Storm Water Permit. Under the Santa Ana Water Board's MS4 permit, Order No. R8-2010-0033, PRDs for municipal construction projects are submitted to the State Water Board through the Stormwater Multi-Application Reporting and Tracking System (SMARTS) without the filing fee. The City of Menifee will follow the process set forth by the Santa Ana Water Board under Order No. R8-2010-0033 for construction PRDs for all municipal construction projects within the City of Menifee. In contrast, the San Diego Water Board's existing (R9-2004-0001) and proposed (R9-2010-0016) MS4 permits include no similar process. Therefore, the Cities of Murrieta and Wildomar will submit PRDs[3] in accordance with the manner prescribed in State Water Board's Construction General Storm Water Permit, including appropriate fees.

Similarly, Region 8 MS4 requirements do not require separate coverage under the General Industrial Storm Water Permit (97-03-DWQ) for corporate yards. As such, the City of Menifee need not obtain coverage under the State Water Board's General Industrial Storm Water Permit for its corporate yards. Murrieta and Wildomar shall get coverage under the General Industrial Storm Water Permit for <u>all</u> their corporate yards.

Complaints received for discharges flowing from municipal, construction, industrial, and commercial sites to MS4s within the Cities of Murrieta and Wildomar will be forwarded to the San Diego Water Board for review. Complaints regarding discharges from municipal, construction, industrial, and commercial sites to MS4s within the City of

[3] The PRDs include a Notice of Intent (NOI).

Menifee will be referred to the Santa Ana Water Board for review. Each Water Board remains responsible for overseeing construction and industrial sites under the statewide General Permits for Construction and Industrial Activities (State Water Board Orders No. 2009-0009 DWQ and No. 97-03 DWQ, respectively) based on the Water Board's geographic jurisdictional boundary. The Santa Ana Water Board shall notify the San Diego Water Board of any non-compliance found during routine inspections of sites within the Santa Ana Water Board boundary that discharge into the MS4s for the Cities of Murrieta and Wildomar. The San Diego Water Board shall notify the Santa Ana Water Board of any non-compliance found during routine inspections of sites within the San Diego Water Board boundary that discharge into the City of Menifee's MS4.

For de minimus types of discharges listed in the Region 8 MS4 Permit, the City of Menifee does not have to obtain separate coverage under Region 8's General De Minimus Permit (R8-2009-0003). De minimus types of discharges to Region 8's jurisdiction from the Cities of Wildomar and Murrieta shall be regulated under Region 8's General De Minimus Permit, R8-2009-0003.

Finally, the City of Murrieta notes that its annual report under the San Diego MS4 permit will include the 375 acres currently within the Santa Ana watershed. While not noted by the Cities of Wildomar and Menifee, the Santa Ana Water Board expects that the annual report filed by each city would be a single report covering the entire geographic area of the city, regardless of geographic jurisdiction, using the format prescribed in its respective permit and submitted to the appropriate regulating board.

For the reasons outlined above, the Santa Ana Water Board agrees to the Cities' regulatory designation requests and notes that Order No. R8-2010-0033 will be revised to reflect this agreement. This agreement shall become effective with the adoption of tentative Order No. R9-2010-0016.

The Santa Ana Water Board does not anticipate the need, but reserves the right, to modify or terminate this agreement in the future, upon sufficient notice, and for good cause.

Respectfully,

Kurt V. Berchtold
Executive Officer

Enclosure

cc: David Gibson, Executive Officer, San Diego Regional Water Quality Control Board
Jason Uhley, Riverside County Flood Control and Water Conservation District

**CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD,
SAN DIEGO REGION**

Draft Response to Comments

On Tentative Order No. R9-2010-0016
October 13, 2010

A. Background

This document provides responses to the written comments received on the draft permit for reissuance of NPDES Waste Discharge Requirements for Discharges from the Municipal Separate Storm Sewer Systems (MS4s) draining the County of Riverside, the Incorporated Cities of Riverside County, and the Riverside County Flood Control and Water Conservation District within the San Diego Region (Tentative Order No. R9-2010-0016, NPDES Permit No. CAS0108766).

The Tentative Order was distributed on July 23, 2010. This document summarizes and responds to written comments received between July 23, 2010 and September 7, 2010 on the Tentative Order. Interested parties had a full 45-days to review the Tentative Order prior to the deadline for submission of written comments that would be responded to in writing prior to the October Hearing on the Tentative Order.

B. Contents of This Document

Thirteen interested parties submitted comments on the Tentative Order. This resulted in the submission of over 350 comments. Comments came from the public, MS4 Copermittees, governmental and non-governmental organizations, United States Marine Corps Camp Pendleton and one business coalition. The San Diego Water Board reviewed and considered every written comment received. Responses to specific comments are provided within this document. Each specific comment has been assigned a comment number, and comments are generally grouped by commenter. A legend for commenters can be found in Table 1(below). For the reader's information, Table 2 provides an accounting of the comments by subject.

Comments received were concerned with a variety of topics in the Tentative Order. Consideration of written comments has resulted in proposed revisions to the requirements in the Tentative Order and can be found in the Draft Updates and Errata Sheet. In this response to comments, the comments have not been summarized or paraphrased. When comments received from one commenter were similar to other comments received, the California Regional Water Quality Control Board, San Diego Region's (San Diego Water Board) response usually references back to a previous comment number in order to minimize redundancy. Please note that due to limitations of the comment database system employed to handle these numerous comments, some formatting from the original comment has been lost and typographical errors may be present due to optical character recognition transfer. Readers are recommended to review the comments as submitted in their original format to fully appreciate the commenter's sentiments. The original comment letters can be found as Supporting Document 8.

C. Order Adoption

The San Diego Water Board is scheduled to consider adoption of the Tentative Order on October 13, 2010.

Table 1. Commenter Legend.

Commenter	Commenter Number	# of Comments
Tressa Coco, Riverside County resident	1	1
Natural Resources Defense Counsel	2	6
City of Murrieta	3	2
Riverside County Flood Control & Water Conservation District	4	244
City of Temecula	5	17
United States Army Corps of Engineers	6	1
United States Environmental Protection Agency	7	10
City of Wildomar	8	7
City of San Diego	9	43
San Diego Bay Council	10	15
United States Marine Corps Base Camp Pendleton	11	2
Construction Industry Coalition on Water Quality	12	2
County of Riverside Transportation Department	13	4

Table 2. Comment Subjects

Comment Subject	Number of Comments
Action Levels	27
Commercial / Industrial	9
Construction	8
Discharge Prohibitions	5
Economic	24
Finding	15
General	32
Hydromodification	14
IDDE	9
Legal	50
Low Impact Development	19
Monitoring	49
Municipal	13
New Development	16
Overirrigation	17
Reporting	3
Retrofit	12
Total Maximum Daily Load	1
Unpaved Roads	29
Watershed Workplan	3

Draft Response to Comments on R9-2010-0016
As of September 29, 2010

Comment # 1 **Commentor** 1 **Comment Subject** Unpaved Roads

Specific Comment

I have now found that the new requirements for Copermittees include a draft for "Unpaved Roads Construction and Maintenance" that spells out "sediment control measures during construction and maintenance activities on unpaved roads, including developing and implementing appropriate training and technical assistance resources". This has given me new hope that these hills have a chance of being returned to the once beautiful land that I loved so many years ago. Is it possible that this new order can require help from the County to solve the erosion problems in Rancho Glenoaks, as well as others in the same situation as I? I truly hope it can happen. The County and environmental agencies need to take responsibility.

Comment Response

Through several investigations and complaints during the previous permit period, unpaved roads were identified as significant sources of water quality pollutants, namely sediment, within Riverside County. The proposed Tentative Order can help solve erosion problems from unpaved roads throughout the watershed. The Tentative Order's provisions address the unpaved roads as a source of pollution during design, construction and ongoing maintenance phases. Rancho Glenoaks, however, is a private road, and as a result of comments received from the Copermittees, the Tentative Order has been revised to remove requirements for private roads. Please see the errata sheet for exact language changes.

Comment # 2 **Commentor** 2 **Comment Subject** LID

Specific Comment

First, this section erroneously states that where infiltration BMPs alone are technically infeasible, other LID BMPs may be employed to treat the volume of runoff not retained onsite. This language improperly excludes any requirement that a site first use all LID practices that retain water onsite—including those other than infiltration such as evapotranspiration or capture and onsite reuse—to meet the design capture requirement where feasible, even where infiltration may not be. A Priority Development Project should not be permitted to participate in the Permit's offsite mitigation program or to employ other means of addressing the design capture volume where LID based options for the onsite retention of stormwater are available. The Permit's language in section F.1.d.(4)(c) must therefore reflect that a finding of infeasibility may only be made where use of any and all LID practices that retain water onsite, including evapotranspiration and capture, is infeasible.

Comment Response

The San Diego Water Board agrees with the comment and has made the suggested changes in the errata to the Tentative Order. With the changes, the Tentative Order is consistent with the adopted South Orange County MS4 permit and the Ventura County MS4 permit.

Comment # 3 **Commentor** 2 **Comment Subject** LID

Specific Comment

Second, this section would allow for measures that do not retain water onsite, described by the Permit as "other LID BMPs," to count toward the design capture requirement. Practices that allow for the discharge of any volume of stormwater to receiving waters would have to be 100% effective at removing pollutants—a condition almost certain not to be attained—in order to provide the equivalent water quality benefit derived from retaining the same volume of stormwater onsite. The Permit should be revised such that it clearly states that only water retained onsite may count towards the design capture requirement and that a site using BMPs that allow for offsite discharge must participate in the LID Waiver Program to address the volume not retained onsite.

Comment Response

Please see the response to comment 12. Other LID BMPs that allow for the discharge of any volume of the design storm event must achieve equivalent volume and pollutant load reduction.

Comment # 4 **Commentor** 2 **Comment Subject** LID

Specific Comment

Of particular concern in this regard is that the Permit does not define the term "LID BMPs." As a result, the Permit would allow virtually any practice, potentially including conventional stormwater management techniques, which have been demonstrated to be far less effective at removing pollutants than LID-based retention practices, to count toward meeting the Permit's design capture requirement. While we argue here that practices that do not retain stormwater onsite, such as biofiltration, should not count towards the onsite retention standard at all, should the Board determine to allow the use of such practices, it should clearly define the term "LID BMPs," or more appropriately, delete the phrase and explicitly state which practices may be used. The Board should additionally ensure that conventional or structural treatment practices that are not LID based may not count toward the Permit's LID requirements.

Comment Response

Comment noted. A definition of LID BMPs has been provided in the errata for Attachment C.

Comment # 5 **Commentor** 2 **Comment Subject** LID

Specific Comment

Further troubling is that, in allowing "LID BMPs" to count toward the design capture requirement, the Permit includes no performance requirements or metrics, and requires only that "other LID BMPs [shall be] sized to hold the design storm volume that is not infiltrated," or that "LID BMPs must be designed for an appropriate surface loading rate to prevent erosion, scour and channeling within the BMP." Permit at ¶ F.1.d.(4)(c)(ii). The Permit should be revised to require that, in addition to the above standard, any practices that allow for the discharge of stormwater in-lieu of onsite retention must, at a minimum, reduce the pollutant load in such discharge to equivalent levels as would be achieved through use of onsite retention. The Board should further ensure that discharges resulting from other BMPs not contribute to erosion or other volume based impacts to receiving waters, as opposed to impacts only within the BMP. Given that practices that do not incorporate onsite retention have been shown to be less effective at reducing pollution in stormwater runoff, we suggest that biofiltration or other practices allowing for discharge of runoff may be allowed, if at all, only if accompanied by a "multiplier" or "mitigation factor," requiring treatment of between 1.5 to 2.0 times the volume required to be treated through onsite retention.

Comment Response

Please see the response to comment 12. The Tentative Order does not include a multiplier or mitigation for LID BMPs that do not incorporate onsite retention due to the requirement that such practices must achieve equivalent pollutant load reduction as retention BMPs.

Comment # 6 **Commentor** 2 **Comment Subject** LID

Specific Comment

The Permit requires that the "LID waiver program must clearly exhibit that it will not allow Priority Development Projects to result in a net impact (after consideration of any mitigation) from pollutant loadings over and above the impact caused by projects meeting LID requirements." Permit at ¶ F.1.d.(7)(a). While we support the use of a performance requirement for waiver projects in general, we note that as currently drafted, the Permit allows for its "LID Requirements" to be met through use of unspecified "LID BMPs" with no express performance requirement or standard. We suggest, in order to ensure that any alternative or in-lieu program adequately protects surface waters in Riverside County, that the Permit language be changed to state that Priority Development Projects shall not result in a net impact "from pollutant loadings over and above the impact caused by projects meeting the onsite LID retention requirements." This requirement would tie use of alternative or in-lieu programs specifically to achieving equivalent benefits to onsite retention, and remove any confusion over what standard of performance is required under this provision of the Permit.

Comment Response

Comment noted, meeting the onsite LID retention requirement is the San Diego Water Board's intent. Clarifying language has been included in the errata. Please also see the responses to comments 76 and 78.

Comment # 7 **Commentor** 2 **Comment Subject** LID

Specific Comment

Further, the Permit's inclusion of a provision allowing for a LID waiver program to authorize implementation of either "an off-site mitigation project," or "other mitigation developed by the Copermittees" should be clarified to require that any such project or mitigation measure must incorporate practices that result in the onsite retention of stormwater runoff equivalent to the volume not retained onsite by the Priority Development Project.

Such a move could help to ensure compliance with the Clean Water Act, would protect Riverside County's aquatic resources, and would further serve important policy goals of the State. Given our current state of drought, Governor Schwarzenegger has issued a proclamation calling on water agencies to take additional actions to protect and enhance water supplies. By requiring offsite mitigation through practices that retain stormwater runoff, captured or infiltrated water could be used to increase water supplies through onsite use or recharging groundwater, in furtherance of this goal. In contrast, the draft Permit would currently allow most or all of that water to be discharged through use of biofiltration or "other LID BMPs," without any volume retained to increase water supplies.

Comment Response

The San Diego Water Board disagrees with the proposed change. Limiting the LID waiver program to projects that provide equivalent retention of runoff only would limit the potential for other equally environmentally beneficial mitigation projects such as creek restoration or stream daylighting.

Comment # 8	**Commentor** 3	**Comment Subject** Economic

Specific Comment

RWQCB staff has expressed their opinion that the Cities are able to create new fees or tax assessments to pay for the requirements they have placed in the proposed MS4 permit. We strongly disagree with this assertion. Fees can only be collected from new development if there is a nexus to offset impacts created by development. There is simply no mechanism to impose a new fee or assessment on existing development to fund the storm water program. Furthermore, due to Proposition 218, any tax or fee increase must be approved by the voters.

Comment Response

The San Diego Water Board is aware of the challenges with developing new fees and/or tax assessments to fund storm water programs. These challenges are not limited to the City of Murrieta or the other Riverside County Copermittees. The Copermittees appear to be relying primarily on sales and property tax revenues and developer fees to fund their storm water programs. These sources of funding, unfortunately, can fluctuate significantly from year to year.

If the Copermittees choose to fund their storm water programs solely through revenues generated by sales and property taxes and developer fees, then they must be able to plan and prepare for times when those revenues decrease by setting aside funds when there are significant increases in revenue, such as during the intense and significant growth period experienced by the area between 2003 and 2008. Unfortunately, the Copermittees did not do the planning and preparation for this eventuality.

The Copermittees appear to dismiss the possibility of developing fees to fund their storm water program before attempting to do so, and the City only cites a case of failure rather than looking for and trying to emulate cases of success. While “imposing” new fees by edict may not be possible, developing and informing the residents that new fees for water quality protection are necessary is possible and probable. Several municipalities throughout California have been successful in developing new fees that are dedicated for funding their storm water programs, which are associated with sources that can cause and/or convey pollutants to and from the MS4. For example, the City of Poway assesses a storm water fee as part of their trash collection service, because trash generation can be a good indication of potential for storm water pollution. The City of Brea was successful in developing an “urban run-off” fee rate that is based on the type of development and associated with maintaining their storm sewer system. The City of San Diego includes a storm drain fee as part of their water and sanitary sewer services to pay for the cleaning, repair, and maintenance of the City's storm drain system. These types of fees are typically more sustainable than relying on general funds from sales and property tax revenue, which can fluctuate significantly from year to year. The San Diego Water Board encourages the Copermittees to explore other sources of revenue to fund their storm water programs instead of relying on property and sales taxes and developer fees.

In addition, several guidances are available for municipalities to assist in developing sustainable funding sources for their storm water programs such as USEPA's "Funding Stormwater Programs" (EPA 833-F-07-012), the National Association of Flood and Stormwater Management Agencies "Guidance for Municipal Stormwater Funding," Natural Resources Defense Council "Stormwater Strategies: Community Responses to Runoff Pollution, Chapter 4: Funding and Gaining Support for Stormwater Programs," and USEPA Watershed Academy "Catalog of Federal Funding Sources for Watershed Protection." These guidances describe storm water funding alternatives to property taxes, sales tax and general fund revenues such as service fees, stormwater utilities, special assessment districts, system development charges, grants, low-interest loans, and environmental tax shifting.

Comment # 9 **Commentor** 3 **Comment Subject** Economic

Specific Comment

Due to the historic decrease in property tax and sales tax revenues, the primary funding mechanism for the City to implement programs, it is unlikely we would be able to comply with the proposed MS4 permit. In order to do so, the City would have to make budget cuts to other programs. Considering we have already considerably cut our budget two years in a row, implemented layoffs and furloughs, and put other cost savings measures into practice, a further decrease to critical city services to fund the additional requirements is impractical. Of greatest concern to the City is that the proposed MS4 permit does not take the current economic climate into consideration, and yet has more costly and stringent requirements than other permits throughout the region that are more suitable to fund such programs. In our opinion, this seems inequitable and unfair.

The City of Murrieta joins the vast majority of Californians in supporting a balanced, cost-effective strategy to guarantee clean water. However, we remain concerned that the MS4 permit will impose additional costs on the City that we cannot afford at this time. Additionally, it seems the new regulations are inequitable compared to other regions. Therefore, the City is opposed to the proposed permit in its current form. Increasing the cost to the public on a region that is one of the hardest hit during this economic crisis seems excessive. Instead, the City would be more supportive of efforts that would phase in requirements once revenue levels can support the additional costs. Moreover, we request that the Board direct their staff to prioritize what permit requirements are necessary to address the most critical issues that will give the most efficient use of available funds. This will allow the City to allocate the funds they have for these programs while not increasing current expenditures.

Comment Response

The San Diego Water Board considers protection of water quality to be a "critical city service," especially when this water provides a potable drinking water source to USMC Camp Pendleton. The San Diego Water Board has taken the current economic climate into consideration along with the economic information provided by the Copermittees. We disagree that Tentative Order is more costly and stringent than other permits in the region.

As discussed in the response to comment 8, if the Copermittees choose to fund their storm water programs solely through revenues generated by sales and property taxes and developer fees, then they must be able to plan and prepare for times when those revenues decrease by setting aside funds when there are significant increases in revenue.

Between 2000 and 2008, the population of the portion of Riverside County in the San Diego Region grew from approximately 150,000 to over 250,000, at least a 65 percent increase. During that time, there was a significant growth in sales and property tax revenue and developer fees generated. That time period also was an opportune time for the Copermittees to develop, propose, and implement new and sustainable fees to fund their storm water programs, which municipalities in other parts of the region were successfully able to achieve.

The Copermittees have been well aware of the new and enhanced MS4 Permit requirements that were adopted for San Diego County in 2007, which were being developed in 2006, and similar requirements that were adopted for Orange County in 2009, which were being developed between 2007 and 2009. The Riverside County Copermittees had approximately 4 years to plan and prepare for the requirements that are now in the Tentative Order. Unfortunately, rather than planning and preparing for the new requirements that were likely to be included in the new Riverside County MS4 Permit, the Copermittees chose to continue doing the minimum that was required in their current permit, and less than what was required in some situations. The Copermittees also chose to continue funding their storm water programs primarily through sales and property tax revenues and developer fees, rather than trying to develop dedicated and more sustainable storm water fees.

The San Diego Water Board, however, has been sensitive to the current economic hardships that are being experienced by the Riverside County Copermittees. Between March and July 2010, we met with the Copermittees over a dozen times and modified the permit requirements and schedules for implementation to phase in the requirements with these economic concerns in mind. Many of the modifications were made because the Copermittees requested the changes. Many of the modifications to the implementation schedule that were agreed upon during those meetings between the Copermittees and the San Diego Water Board were also based on prioritizing the permit requirements to address the most critical issues. The Tentative Order provides the Riverside County Copermittees more time than the San Diego County and Orange County Copermittees to develop and implement several elements of the permit, as well as reducing the potential development costs for those elements.

Comment # 10 **Commentor** 6 **Comment Subject** General

Specific Comment

Thank you for the opportunity to comment on the San Diego Region - Riverside County Storm Water Permit. As you are aware, the U.S. Army Corps of Engineers has been developing a Special Area Management Plan (SAMP) for the San Jacinto and Santa Margarita Watersheds. There is direct overlap between the Santa Margarita portion of the SAMP and the San Diego Region - Riverside County Storm Water Permit.

The language proposed in the permit and the actions and studies proposed would complement the work being done for the SAMP. Ideally, the regulatory processing and permitting for the State and Federal agencies would be aligned and streamlined for the cities and County within this area. We remain committed to working with the Regional Water Quality Control Board (Board) and the jurisdictions to bring this idea to fruition.

Within the permit itself, the Watershed Water Quality work plan and the Jurisdictional Runoff Management Program are of particular interest. Unfortunately due to time constraints, we are not able to do a thorough review and comparison of the language at this time, but would like to work with the Board and the affected jurisdictions to streamline permitting and improved the water quality in the watershed.

The studies mentioned in the permit appear to have great value, and we would encourage the jurisdictions to complete them and applaud the Board for including them in the permit. Although all the studies mentioned in the permit are worthwhile, we draw particular interest to and support the inclusion of the MS4 and Receiving Water Maintenance Study and the Intermittent and the Ephemeral Stream Perennial Conversion Study in the final permit.

There are many additional comments that could be made regarding the permit; however, due to staffing and time limitations, these comments are abbreviated and limited. We would like to dedicate time in the near future to work with your staff and the jurisdictions in supporting actions to comply with the Clean Water Act and provide clean water to all of our communities.

Comment Response

Comment noted.

Comment # 11 **Commentor** 7 **Comment Subject** LID

Specific Comment

As you know, Region 9 has been working with Regional Boards throughout the State over the last several years in an effort to develop clear, measurable and enforceable requirements for MS4 permits. We have focused most of our attention on requirements related to low impact development (LID) and TMDL implementation, given the potential environmental benefits to be derived from these particular components of the stormwater permit program. Since there are no approved wasteload allocations applicable to the Riverside County MS4 discharges at this time, the following comments focus on LID requirements, but also address several other issues as well. However, with regards to TMDLs, section I of the draft permit would incorporate applicable requirements of future TMDLs when fully approved, and we support this provision.

Comment Response

Comment noted.

Comment # 12 **Commentor** 7 **Comment Subject** LID

Specific Comment

We recommend section F.1.d.(4)(c)(ii) ofthe draft permit (page 33) be revised as follows:

"If onsite [infiltration] retention LID BMPs are technically infeasible per section F .1.d.(7)(b), other LID BMPs may treat any volume that is not retained onsite provided that the other LID BMPs are sized to achieve equivalent stormwater volume and pollutant load reduction as if the entire design capture volume were retained onsite [to hold the design storm volume that is not infiltrated]."

The proposed language in the draft Riverside County MS4 permit (which only mentions infiltration as an LID BMP) is inconsistent with the analogous section in the adopted South Orange County MS4 permit, and would not require a consideration of LID measures such as evapotranspiration, or capture and reuse of stormwater in determining the feasibility of the permit's onsite retention requirement in section F.l.d.(7)(a). The revised approach we've suggested here is derived from the requirements of the Ventura County MS4 permit (section E.III.l.b) adopted by the Los Angeles Regional Board in July 2010, and we believe it is more consistent with the intent of LID for stormwater, i.e., retention of storm water onsite, and section F.l.d.(7)(a) of the draft permit.

Comment Response

The San Diego Water Board agrees with the comment and has made the suggested changes in the errata to the Tentative Order. With the changes, the Tentative Order is consistent with the adopted South Orange County MS4 permit and the Ventura County MS4 permit. The consistent requirements will be easier for the regulated building industry to comply with and understand.

Comment # 13 **Commentor** 7 **Comment Subject** LID

Specific Comment

Further, although the draft permit includes a rough definition of "LID" in Attachment C-2, the permit is still not entirely clear concerning what is intended by the term "LID BMPs." We suggest additional descriptive information such as the following (also derived from the Ventura County MS4 permit) be added to Finding 2.c (page 9) or the definitions section of the draft Riverside County permit:

"LID site design BMPs, utilizing infiltration, storage for reuse, evapotranspiration, or biofiltration/bioretention help preserve and restore the natural hydrologic cycle of the site, [allovving for filtration and infiltration] which can greatly reduce the volume, peak flow rate, velocity, and pollutant loads of storm water runoff."

Comment Response

The San Diego Water Board agrees with the comment and has made changes in the errata to Attachment C of Tentative Order. A definition of LID BMPs has been added to the errata for Attachment C of the Tentative Order. LID BMPs may be retention or flow through. The Tentative Order allows for both types, but emphasizes retention.

Comment # 14 **Commentor** 7 **Comment Subject** Action Levels

Specific Comment

We understand that concerns have been raised regarding the proposed numeric action levels for non-stormwater dry weather discharges (section C of the draft Riverside County MS4 permit). However, we would point out that these requirements are consistent with requirements adopted by the SDRB in December 2009 for the MS4 permit for South Orange County. Such requirements are also consistent with our efforts
to ensure MS4 permit requirements are more measurable and enforceable, and we would encourage the SDRB to retain the proposed requirements in the final Riverside County MS4 permit.

Comment Response

Comment noted.

Comment # 15 **Commentor** 7 **Comment Subject** Overirrigation

Specific Comment

We also understand that concerns have been raised regarding the deletion of landscape irrigation, irrigation water, and lawn watering from the list of non-stormwater discharges which are not necessarily prohibited by the permit (section B.2). We previously supported this same revision in a letter to the SDRB dated June 18, 2009 commenting on the draft South Orange County MS4 permit; we support the revision in the Riverside County MS4 permit as well. In our previous letter, we noted that the fact sheet for the Orange County MS4 permit had identified these categories of discharges as significant sources of pollutants, and as such, it would be appropriate for the SDRB to remove these discharges from the list of non-prohibited non-stormwater discharges in the Orange County MS4 permit. The fact sheet for the draft Riverside County MS4 permit includes similar information on the discharges, and we believe removal of the discharges from the list of non-prohibited discharges would be appropriate in both counties.

Comment Response

Comment noted.

Comment # 16 **Commentor** 7 **Comment Subject** Action Levels

Specific Comment

In a previous letter to the SDRB dated September 28,2009, we supported the SALs proposed for the South Orange County MS4 permit; we noted the proposed requirements would help clarify the term "maximum extent practicable" (MEP), and would be consistent with our goal of including more measurable and enforceable requirements in MS4 permits. The proposed SAL requirements in the Riverside County MS4 permit are consistent with requirements for South Orange County, and for the same reasons noted in the case of South Orange County, we would also support the proposed requirements for the Riverside County MS4 permit.

Comment Response

Comment noted.

Comment # 17 **Commentor** 7 **Comment Subject** Retrofit

Specific Comment

As you know, EPA is considering requirements for retrofitting BMPs into existing developments as one of the key components of national stormwater rulemaking currently underway to improve the stormwater program (74 FR 68621, December 28,2009). We note that the proposed retrofitting requirements for Riverside County are very similar to the requirements of the MS4 permit adopted by the SDRB in December 2009 for South Orange County. Given the potential environmental benefits of retrofitting in reducing pollutant discharges in stormwater runoff, we strongly encourage the SDRB to retain the proposed requirements in the final Riverside County MS4 permit.

Comment Response

Comment noted.

Comment # 18 **Commentor** 7 **Comment Subject** Hydromod

Specific Comment

We have reviewed the proposed requirements related to hydromodification in the draft Riverside County MS4 permit (section F.1.h), and we would encourage the SDRB to retain these requirements in the final permit. The proposed requirements in the Riverside County permit are similar to requirements in other recently-adopted Southern California MS4 permits, and the requirements will further the objectives of the LID provisions in the permit.

Comment Response

Comment noted.

Comment # 19	**Commentor** 7	**Comment Subject** Unpaved Roads

Specific Comment

We understand that concerns have been raised regarding the new requirements in the draft Riverside County MS4 permit to implement additional controls for stormwater discharges from unpaved roads (sections F.Li, F.3.a.l and F.3.c.5 of the permit). We believe the new requirements are fully supported by the fact sheet and the Findings for the permit (Finding D.1.c), which identify the discharges as a significant source of pollutants. As such, we urge the SDRD to retain the proposed requirements in the final permit. Lastly, we would note the proposed requirements are similar to requirements in the Municipal Regional Permit for MS4s in the San Francisco Bay Area adopted in 2009 by the San Franc.isco Bay Regional Board.

Comment Response

Comment noted. The Copermittees have brought up concerns addressing the regulation of privately owned and maintained unpaved roads; therefore those regulations have been removed. Please see the errata sheet for exact language changes.

Comment # 20	**Commentor** 7	**Comment Subject** Monitoring

Specific Comment

We understand that concerns have been raised about the monitoring requirements of the draft Riverside County MS4 permit (Attachment E to the permit). However, the proposed requirements are consistent with the requirements of other recent MS4 permits adopted by the SDRB such as the 2009 South Orange County MS4 permit. We strongly encourage the SDRB to retain the requirements in the final permit. Measuring the effectiveness of the stormwater program continues to be a challenge and thus, is an important priority for EPA; we believe the proposed monitoring details and requirements will improve permittee and Regional Board's ability to measure program effectiveness.

Comment Response

Comment noted.

Comment # 21	**Commentor** 9	**Comment Subject** Finding

Specific Comment

Make findings consistent with JRMP.

Provide separate sections for Construction vs. Existing Development.

Comment Response

The recommendation is appreciated, but not necessary. No changes were made based on this comment.

Comment # 22 **Commentor** 9 **Comment Subject** Finding

Specific Comment

Definition of "urban stream" contradicts 40CFR 122.

Provide clearer definition as to what an "urban stream" is.

Comment Response

The San Diego Water Board disagrees that the definition of "urban stream" contradicts 40CFR 122. An MS4 is defined in the federal regulations as a conveyance or system of conveyances owned or operated by a Copermittee, and designed or used for collecting or conveying runoff. Therefore, the San Diego Water Board considers natural drainages that are used by the Copermittees as conveyances of runoff, as both part of the MS4 and as receiving waters. Please see the Fact Sheet discussion on Finding D.3.c.

The State Water Board supports this approach. In reviewing a Petition on Order No. R9-2001-0001, the State Water Board stated "We also agree with the Regional Water Board's concern, as stated in its response, that there may be instances where MS4s use 'waters of the United States as part of their sewer system […]" State Water Resources Control Board Order WQ 2001-15.

The Rapanos decision further supports the conclusion that urban streams can be both receiving waters and MS4s by confirming that ephemeral and intermittent streams can be waters of the U.S. subject to regulation under CWA Section 404 and also be considered point sources of pollution discharges regulated under CWA Section 402. (See discussion in Section V of the Opinion of Justice Scalia and Section A (p.14) of the Concurring Opinion of Justice Kennedy.) No changes were made based on this comment.

Comment # 23 **Commentor** 9 **Comment Subject** Discharge Prohibitions

Specific Comment

Discharge category found to be a source of pollutants requires implementation of appropriate control measures to prevent the discharge of pollutants to the MS4.

Should state: Implement appropriate control measures to reduce the discharge of pollutants to the MEP.

Comment Response

The commenter cited the text incorrectly. Section B.2 states, "For a discharge category determined to be a source of pollutants, the Copermittee, under direction of the San Diego Water Board, must either prohibit the discharge category or develop and implement appropriate control measures for non-anthropogenic sources to prevent the discharge of pollutants to the MS4 ..."

MEP does not apply to non-storm water discharges. The Clean Water Act specifically makes a clear distinction between the regulation of storm water and non-storm water discharges by effectively prohibiting non-storm water discharges from entering the MS4. Since non-storm water discharges are to be effectively prohibited, then clearly the very next requirement (402(p)(3)(B)(iii) that requires polluant discharges from the MS4 be reduced to the MEP) intends that the discharge of pollutants only apply to storm water. Please see the Fact Sheet discussion for Finding C.14 for further clarification. No changes were made based on this comment.

Comment # 24 **Commentor** 9 **Comment Subject** Discharge Prohibitions

Specific Comment

Discharges into MS4 require authorization from owner and operator of the MS4 system, specifically for uncontaminated pumped ground water, foundation drains, and water from crawl space pumps

Support change, and recommend that dischargers are required to obtain authorization prior to the commencement of the discharge.

Comment Response

The San Diego Water Board appreciates the support of the commenter. The commenter incorrectly cites the footnote as Footnote 8. The correct footnote, Footnote 5, clearly states "Discharges into the MS4 require authorization from the owner and operator of the MS4 system." Please note this is a requirement for enrollees under the referenced NPDES permit (R9-2008-0002)

Comment # 25 **Commentor** 9 **Comment Subject** Discharge Prohibitions

Specific Comment

States that building fire suppression system maintenance discharges contain waste and must be prohibited.

Not clear what waste the discharges contain and the basis for prohibiting it.

Comment Response

The San Diego Water Board is concerned with non-storm water discharges associated with building fire suppression system maintenance and testing. The San Diego Water Board has found that such activities do not qualify as fire fighting flows as the activities are strictly maintenance in purpose. While building fire suppression systems lines may be filled with potable water, the systems are not utilized until: a) a fire occurs and triggers the system, or b) the system undergoes required maintenance. The San Diego Water Board has found that water within the lines may contain metals that that may be a significant source of pollutants upon discharge. Furthermore, many of these discharges occur to MS4s, which discharge to receiving waters 303(d) listed for toxicity under the 2008 CWA Section 303(d) List. As such, these non-storm water discharges are no longer exempted from prohibition. The exemption from prohibition for water line flushing does not apply to building fire suppression system maintenance.

Comment # 26 **Commentor** 9 **Comment Subject** Discharge Prohibitions

Specific Comment

Must identify and control any non-prohibited discharge that creates water quality problems.

Should define what is meant by control the discharge.

Comment Response

The commenter cited the text incorrectly. Section B.4 states, "Follow-up investigations must be conducted to identify and control, pursuant to section B.2, any non-prohibited discharge category(ies) listed above." Please see the response to comment 23 or section B.2 of the Tentative Order for what is meant by "control." No changes were made based on this comment.

Comment # 27	**Commentor** 9	**Comment Subject** Action Levels

Specific Comment

This requires the Copermittee to determine whether a discharge type should be exempt.

This is the responsibility of the Regional Board.

Comment Response

This is the responsibility of both the San Diego Water Board and/or the discharger. Either the San Diego Water Board or the discharger may identify categories that should not be exempt.

The Code of Federal Regulations states at 40 CFR 122.26 (d)(2)(iv)(B)(1) explicitly states:

"… this program description shall address all types of illicit discharges, however the following category of non-storm water discharges or flows shall be addressed where such discharges are identified by the municipality as source of pollutants to water of the United States…"

Furthermore, in addition to the regulations under 40 CFR 122.26(d), the Federal Register (55 Fed Reg 48037) clearly states that "the Director [i.e. San Diego Water Board] may include permit conditions that either require municipalities to prohibit or otherwise control any of these types of discharges where appropriate."

Comment # 28	**Commentor** 9	**Comment Subject** Action Levels

Specific Comment

Copermittees must develop monitoring plans to sample a representative percentage of major outfalls and identified stations within each hydrologic subarea.

Make consistent with 40CFR.

Comment Response

The San Diego Water Board finds it difficult to respond to the comment without a more specific reference to 40 CFR. In all actions, the San Diego Water Board seeks to be consistent with State and Federal regulations.

The NPDES regulations do not specify the exact location to be used for monitoring, and the Copermittee is ultimately responsible for providing a safe and accessible sampling point that is representative of the discharge (40 CFR 122.41(j)). The San Diego Water Board has prescribed the monitoring requirements in an effort to be consistent with the current monitoring done by the Copermitttees under the existing Order.

Comment # 29 **Commentor** 9 **Comment Subject** Action Levels

Specific Comment

The NELs as defined are receiving water standards. This would apply receiving water standards to the water within the MS4. Some of the NELs are not appropriately applied. (Fecal Coliform 400 for AMEL, this is a single sample standard not an average standard).

There needs to be a way to account for receiving water quality.

Comment Response

The Tentative Order does not have numeric effluent limitations, but does include numeric action levels. The establishment of the dry weather non-storm water action levels considers the discharge under critical conditions, including flow. As such, no mixing zone is allowed for discharges under the Tentative Order. For further information please see the Tentative Order Fact Sheet.

Water "within" the MS4, where also not considered receiving waters, are not required to meet receiving water standards (see Comment Response No. 22). Under the Tentative Order, the "discharge" of non-storm water from the MS4 must be effectively prohibited.

In regards to the referenced fecal coliform standard, the clarification was made in the Orange County MS4 Permit, Order No. R9-2009-0002. The standard has been included in the AMAL because it is based on a 30-day period.

Comment # 30 **Commentor** 9 **Comment Subject** Action Levels

Specific Comment

Non-storm water discharges from MS4 to inland surface waters

What about when an MS4 flow discharges to dry sediment and not to actual water?

Comment Response

The described situation would be considered critical conditions for flow. The consideration of critical flow conditions is required under 40 CFR 122.44(d). A discussion regarding flow is also found in the Fact Sheet:

"The San Diego Region has predominately intermittent and ephemeral rivers and streams (Inland Surface Waters) which vary in flow volume and duration at spatial and temporal scales. Therefore, it is assumed that any non-storm water discharge from the MS4 into the receiving water is likely to be of a quantity and duration that does not allow for dilution or mixing. For ephemeral systems, non-storm water discharges from the MS4 are likely to be the only surface flows present within the receiving water during the dry season."

Comment # 31 **Commentor** 9 **Comment Subject** Action Levels

Specific Comment

Need to define WARM & COLD water for DO effluent limitations.

Should use> < with specific temperatures.

Comment Response

Table 3.a.1 does define WARM and COLD waters for DO effluent limitations.

While the suggested use of >< for DO in the table is appreciated, this change has not been made as the language used in the table is directly from the Basin Plan for the San Diego Region.

Comment # 32	**Commentor** 9	**Comment Subject** Action Levels

Specific Comment

Fecal coliform AMELs are inappropriate for multiple reasons.

Imposes AB411 standards for Rec 1 waters on non-storm water, non-recreational flows. If it must be applied then B should move to Instantaneous Maximum column.

Comment Response

The Tentative Order includes non-storm water action levels that are protective of receiving waters, including those downstream of the discharge. The non-storm water action levels are based on the REC-1 water quality objectives in the Basin Plan, not AB411 standards. Please note that all the receiving waters in the Upper Santa Margarita Watershed are designated as having an existing or potential REC-1 beneficial use.

Comment # 33	**Commentor** 9	**Comment Subject** Action Levels

Specific Comment

Enterococcus inappropriately set to Ocean Plan Designated beach area standards.

This is non-storm water, non-recreational flow. Why is it being held to beach standards when 5+ years of paired sampling data do not indicate strong links between even higher levels of bacteria than being allowed, and detected AB411 exceedances.

Comment Response

Please see the response to comment 32.

Comment # 34	**Commentor** 9	**Comment Subject** Action Levels

Specific Comment

MDEL limits.

Where are MDELs defined in 40CFR?

Comment Response

The Tentative Order does not have numeric effluent limitations, but does include numeric action levels. Although the Tentative Order does not have effluent limitations, please see 40 CFR 122.2 and 122.45. A definition for MDAL, consistent with 40 CFR 122.2 and existing State and Regional Water Board NPDES permits and resolutions is provided in Attachment C for further clarification.

Comment # 35	**Commentor** 9	**Comment Subject** Action Levels

Specific Comment

Table 4.a.1 does not list an instantaneous maximum for Fecal Coliform.

Should list a maximum if less than 5 samples collected in 30-day period.

Comment Response

Please see the response to comment 29.

Comment # 36 **Commentor** 9 **Comment Subject** Action Levels

Specific Comment

Table 4.a.1 subject storm drain flows to the very stringent AB-411Rec-1 Criteria standards.

The maximums should be adjusted to attainable limits.

Comment Response

Please see the response to comment 32.

Comment # 37 **Commentor** 9 **Comment Subject** Action Levels

Specific Comment

Turbidity

What is the justification for turbidity limitations in Region 9 being so much lower than other regions in the state?

Comment Response

The water quality objectives for turbidity are provided in the Basin Plan for the San Diego Region. The water quality objectives in the Basin Plan have been established to protect the beneficial uses of waters within the San Diego Region. The water quality objectives in the San Diego Basin Plan were appropriately used in the development of water quality-based action levels for non-storm water discharges. Please note that issues pertaining to any proposed modifications of the water quality objectives in the Basin Plan are to be addressed under the Triennial Review process. More information may be found at: http://www.waterboards.ca.gov/sandiego/water_issues/programs/basin_plan/tri_review.shtml

Comment # 38 **Commentor** 9 **Comment Subject** Action Levels

Specific Comment

.. freshwater criteria are based on site-specific water quality data (receiving water hardness).

Should be changed to effluent water hardness.

Comment Response

Site-specific water quality data (receiving water hardness) is required under State Water Board Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California. No changes were made based on this comment.

Comment # 39 **Commentor** 9 **Comment Subject** Action Levels

Specific Comment

pH

6.5-8.5 for freshwater 6-9 for saline waters - based on?

Comment Response

As cited in Table 3.a.1, pH is based upon water quality objectives found within the Basin Plan for the San Diego Region.

Comment # 40 **Commentor** 9 **Comment Subject** Action Levels

Specific Comment

This requires "implementation of all necessary storm water controls and measures to reduce ... " when there is no evidence of a receiving water exceedance. The assessment point is "end-of-pipe" and SALs do not have any justification for applicability.

This seems to require an action when there is no evidence of a receiving water violation.

Comment Response

SALs are applicable as a tool to be used by the Copermittee(s) to determine the level of effectiveness of BMPs utilized within the drainage area discharging at the SAL outfall. This is part of the iterative process to reduce the discharge of pollutants in storm water from the MS4 to the MEP.

Comment # 41 **Commentor** 9 **Comment Subject** Action Levels

Specific Comment

Metals SALs are in direct contradiction with statement on "table 3.a.2: Priority Pollutants" page 22

Contradiction between NEL section and SAL in terms of metals values.

Comment Response

Storm Water Action Levels (SALs) are for discharges of storm water from the MS4. Section C is for non-storm water discharges. The SALs were computed utilizing USEPA nationwide MS4 discharge data (Arid West Region), and SALs for metals have been set as the 90th percentile for this dataset. Additionally, the SALs for metals incorporate synoptic water hardness measurements. Please see Attachment E Section II.B.1.b.

Comment # 42 **Commentor** 9 **Comment Subject** Action Levels

Specific Comment

" .. . assessment points for determination of SAL compliance are all major outfalls .. .. " Seems to contradict the following sentence
" ... monitoring plans to sample a representative percent of the outfalls .... "

Sentences seem to contradict each other.

Comment Response

Section D of the Order has been clarified in response to the comment. The word "all" has been removed, as the Copermittees are to sample a representative percent of major outfalls within each hydrologic subarea, not all major outfalls.

Comment # 43 **Commentor** 9 **Comment Subject** Action Levels

Specific Comment

" ... to have outfall storm water discharges meet all applicable water quality standards."

This applies receiving water standards to the storm drain.

Comment Response

The comment references the cited text out of context. The full text of the provision clarifies "that through the iterative and MEP process, outfall storm water discharges will meet all applicable water quality standards." This is consistent with section A.3 and State Water Board Order WQ 99-05.

Comment # 44 **Commentor** 9 **Comment Subject** LID

Specific Comment

It is not clear what is intended to be included in this category. A steep hillside development with known erosion soil conditions would need to address erosion. Treatment control and hydromodification requirements are not justified.

Remove this from the Priority Development Project Categories, and define elsewhere in Section F.1 how these projects would need to include measures that protect slopes from erosion.

Comment Response

This requirement is identical to that in the current Riverside County MS4 Permit (Order No. R9-2004-001), the San Diego MS4 Permit (Order No. R9-2007-0001), and the Santa Ana Water Board Riverside County MS4 Permit (Order No. R8-2010-0033). These provisions are based on the Los Angeles Water Board's SUSMP upheld by the precedential State Water Board Order WQ-2000-11. The State Water Board's order found that hillside residences can be a significant source of pollutants and/or runoff following development and it is appropriate that the design standards apply so that BMPs for these categories of development result in the infiltration or treatment of a significant amount of the runoff.

Treatment control and hydromodification requirements are even more necessary for hillside developments. Hillside developments that include impervious surfaces will have surface runoff discharging at much higher volumes and velocities than developments with flatter and more gradual slopes. The treatment control and hydromodification requirements will reduce the pollutants and increased erosive forces in runoff discharging from these developments. No changes were made in response to this comment.

Comment # 45 **Commentor** 9 **Comment Subject** LID

Specific Comment

Retention of the 85th percentile storm event does not mimic the natural hydrology. The amount of runoff under natural conditions is dependent on soil type and other factors.

Retention requirements should be revised with intent of matching hydrology under natural conditions.

Comment Response

Retention of the 85th percentile storm event provides for a high level of pollutant removal to protect water quality. This design storm does not necessarily result in zero discharge. The design storm is approximately 0.6 inches of rainfall for most of the developed area of the Riverside County portion of the San Diego Region. Larger storms will produce runoff to receiving waters. Also, retention of the design storm will begin to compensate for decades of previous, unchecked development creating impervious surfaces that have resulted in the increased runoff volumes and flow rates discharged to receiving waters. Retention of the storm value will also provide groundwater recharge that, where hydrologically connected, can create surface flows downstream.

Comment # 46 **Commentor** 9 **Comment Subject** LID

Specific Comment

It may be unrealistic for municipalities to implement the various processes required under this section within the amount of time allowed.

Provide a feasible time schedule for municipalities to put such a program in place.

Comment Response

The San Diego Water Board disagrees that it is unrealistic to implement a LID BMP waiver program within the amount of time allowed. No changes were made in resposne to this comment.

Comment # 47 **Commentor** 9 **Comment Subject** Construction

Specific Comment

It is neither wise nor necessary to mandate use of a particular technology for managing sediment from construction sites. The Construction General Permit has adequate and more appropriate measures for ensuring sediment discharges will not create a pollution problem.

Remove the requirement that Copermittees mandate use of AST. Allow Copermittees to rely on the Risk based approach that was developed for the Construction General Permit, which does not mandate a particular technology.

Comment Response

The San Diego Water Board disagrees with the recommended change. The Tentative Order does not mandate the use of a particular technology for managing sediment from construction sites. The Tentative Order defines Active/Passive Sediment Treatment (AST) variously as using mechanical or chemical means to flocculate and remove suspended sediment from runoff at construction sites prior to discharge. Examples of coagulants include chitosan, modified starches, alum, electro-coagulation, carbonic acid, ferric chloride, and polyacrylamides. Examples of sedimentation devices include settling basins, ponds, baker tanks, weir tanks, tube settlers, and centrifuges. Examples of polishing filter types include sand, engineered media, membrane and hydrocarbon. For certain construction sites, with specific soil types that are difficult to settle, AST is likely the only method to meet the 20 NTU water quality objective specified in the Basin Plan. The requirements provide sufficient flexibility to the Copermittees to mandate the specific method of compliance and to determine which sites are required to implement AST. No changes were made based on this comment.

Comment # 48 **Commentor** 9 **Comment Subject** Construction

Specific Comment

This section requires inspection of construction sites of 1 acre or more at least monthly.

Propose language that is definitive and require construction site inspections monthly for sites of 1 acre or more.

Comment Response

Section F.2.e.(3) requires the Copermittees to inspect at least monthly, all sites with one acre or more of soil disturbance. This language requires a minimum frequency. The Copermittees may choose to inspect these types of construction sites at a higher frequency, if warranted. No changes were made based on this comment.

Comment # 49 **Commentor** 9 **Comment Subject** Municipal

Specific Comment

Reduction of pesticides, herbicides, and fertilizers into the storm water to the MS4 and receiving waters.

Support inclusion of "storm water" and "and receiving waters" in the opening paragraph.

Comment Response

The San Diego Water Board appreciates the commenter's support for the inclusion of "storm water" and "receiving waters" in the opening paragraph to section F.3.a.(3). "Storm water" and "receiving waters" will remain included in the opening paragraph of section F.3.a.(3).

Comment # 50	**Commentor** 9	**Comment Subject** Municipal

Specific Comment

Inspecting and cleaning all MS4 facilities between May 1 and September 30 is infeasible for those Copermittees that have tens of thousands of structures.

Inspection and removal of accumulated waste at least once a year between May 1 and September 30 of each year for (all) MS4 facilities [that receive or collect high volumes of trash and debris.]

Comment Response

The Tentative Order provides in section F.3.a.(6)(iii) that, "Following two years of inspections, any MS4 facility that requires inspection and cleaning less than annually may be inspected as needed, but not less than every other year." This requirement provides the Copermittees the ability to prioritize their MS4 maintenance activities following a sufficient data collection period.

Comment # 51	**Commentor** 9	**Comment Subject** Municipal

Specific Comment

Sections (a) and (b) are redundant.

Delete Section (b) as the implementation of the provisions in Section (a) would maximize pollutant reductions by providing greater flexibility to Copermittees to manage their programs.

Comment Response

Section F.3.a.(7)(b) has been retained within the Tentative Order. Please note that as an illicit discharge into the MS4, sewage infiltration is to be eliminated, not reduced. Federal regulation (40 CFR 122.26(d)) require that Copermittees use controls, as necessary, to limit the infiltration of sewage into the MS4 system. As an illicit discharge, it is expected that these controls will prevent and eliminate infiltration and seepage from the sanitary sewer. The controls listed under section F.3.a.(7)(b) are BMP measures that currently should be a part of the Copermittees' IC/ID program to prevent and eliminate illicit discharges. It is unclear how removal of this section would provide greater flexibility, as Copermittees are already required to implement these BMPs. No changes were made based on this comment.

Comment # 52 **Commentor** 5 **Comment Subject** Economic

Specific Comment

While the City shares the Regional Board's goal of protecting the quality of water in our local creeks, it is not fiscally responsible to adopt a new Model Permit that does not accurately reflect the needs of the local watershed. The Regional Board must allow the City to prioritize and balance finite public resources in order to provide numerous vital public services. The City's responsibilities also include providing for public safety (police and fire services), installing and maintaining infrastructure (roads, drainage facilities, etc.), public facilities (parks, libraries, community centers, etc.), providing recreational programs, conserving land (MSHCP), promoting habitat conservation, etc. All of these needs are equally important, but public funding mechanisms do not allow anyone of them to be funded without consideration to competing needs, priorities, and expected outcomes. New requirements must carefully weigh the benefits achieved against their real costs to implement. From a public agency perspective, all expenditures must be justified and supported by the general public.

Comment Response

The San Diego Water Board is aware of the many and competing needs that the municipalities are responsible for. The mission of the San Diego Water Board, however, is to preserve, enhance, and restore the quality of the waters in the region. Our responsibility is to protect the beneficial uses of the waters of the state. The Tentative Order does reflect the water quality needs of the local watershed with requirements such as the regulation of unpaved roads and watershed specific action levels.

The Copermittees' programs have already been found to be deficient. USEPA audits conducted in January 2008 (USEPA Region IX MS4 Inspection Report Riverside County Flood Control and Water Conservation District and County of Riverside, dated 03/31/2008), and subsequent enforcement action by the San Diego Water Board (Notice of Violation No. R9-2008-0053 and No. R9-2010-0074) documented significant short-comings in the Copermittees' programs.

While we try to take other needs into consideration when developing the requirements included in the Tentative Order, the requirements must be able to fulfill our mission and responsibilities. The Copermittees must be able to meet the requirements of the Tentative Order for the protection of water quality. We understand that the provisions in the Tentative Order may require the Copermitttees to modify, reduce, or find additional efficiencies in their operations, but the Copermittees are still allowed to prioritize and balance their finite public resources. As the Copermittees' regulatory and administrative requirements and responsibilities expand and increase with their population and growth, which are not limited and related to only managing the MS4 system, the Copermittees will also need to identify ways to expand and increase their resources for those ever increasing and/or changing needs.

Please see the responses to comments 8 and 9 for a discussion about the Copermittees' revenue sources for funding their storm water programs.

Comment # 53 **Commentor** 9 **Comment Subject** IDDE

Specific Comment

Paragraph makes a reference to attachment E, which does not in fact contain a description of this particular program.

Include a description of the Dry Weather Field Screening and Analytical Monitoring Program in Attachment E.

Comment Response

The commenter is incorrect that Attachment E does not contain a description of this program. Section II.C of the MRP (Attachment E) includes a description of the dry weather field screening and analytical monitoring of MS4 detect illicit discharges and connections.

Comment # 54 **Commentor** 9 **Comment Subject** IDDE

Specific Comment

... based on results of field screening …

Field screening is not included as a component of any monitoring programs and should be removed from this sentence.

Comment Response

The San Diego Water Board disagrees, as field screening is the quantitative and/or qualitative monitoring of MS4 outfalls for non-storm water discharges and associated observations regarding a discharge. For example, if a field screening of an MS4 major outfall detects a high turbidity from sediment in a non-storm water discharge, Section F.4.e directs that this screening should be used for investigating and inspecting that portion of the MS4. According to Section II.C.1.b of the MRP (Attachment E), "Each Copermittee must develop and/or update written procedures for effluent analytical monitoring including field observations, monitoring, and analyses to be conducted." "[F]ield observations, monitoring and analyses" all can be performed by sampling personnel in the field, with visual observations and with portable monitoring and water quality analysis equipment (e.g. YSI meter, turbidity meter, pH strips). These components of the monitoring program would be part of the "field screening". No changes were made based on this comment.

Comment # 55 **Commentor** 9 **Comment Subject** IDDE

Specific Comment

References a monitoring effort that does not exist anywhere else in the permit (field screening)

The inconsistency in the permit for the different programs and the referenced sections need to be straightened out. Add description of referenced program to Attachment E.

Comment Response

Please see the response to comment 54.

Comment # 56 **Commentor** 9 **Comment Subject** IDDE

Specific Comment

Contradictory paragraph. Numeric action levels must be developed, but "the criteria must consider numeric effluent limitation (see Section C)".

The NELs from Section C or develop numeric action levels? Recommend selecting one criteria.

Comment Response

The commenter cited the text incorrectly. Section F.4.e.(1) clearly states, "The criteria must include required non-storm water action levels (see Section C) and a consideration of 303(d)-listed waterbodies and environmentally sensitive areas (ESAs) as defined in Attachment C."

Comment # 57 **Commentor** 9 **Comment Subject** Watershed Workplan

Specific Comment

The workplan is for development of a BMP strategy and implementatlon of BMPs to improve urban runoff water quality contributions to the receiving water. Calling it a "Water Quality" workplan is misleading because the regulated parties under this permit are not responsible for every contribution to every water body in the entire watershed.

The requirements should focus on urban runoff contributions to the receiving waters for which the regulated parties are responsible.

Revise the section to state: The Watershed Workplan shall describe the Permittees' development and implementation of a collective watershed strategy to assess and prioritize the water quality problems due to runoff discharging to the wathershed's receiving waters, identify and/or model sources of the highest priority water quality problem(s), develop a watershed-wide BMP implementation strategy to abate highest priority water quality problems and the relative contribution from runoff discharges, and a monitoring strategy to evaluate BMP effectiveness and changing water quality prioritzation in the WMA.

Comment Response

The Tentative Order is for the discharges from the Copermittees' MS4s. Pollutant contributions that are not discharged from the Copermittees' MS4s are not addressed by this permit or required to be addressed by the Watershed Workplan section. No changes were made based on this comment.

Comment # 58 **Commentor** 9 **Comment Subject** Watershed Workplan

Specific Comment

The use of the word "proper" for installation of BMPs is subjective and not defined by this permit. There may be many different ways to "properly" design and install a BMP, and the regulated parties may or may not choose to test different ways for each BMP to determine which works best.

Revise to state: Develop a strategy to model and/or monitor improvements in runoff discharge quality resulting from implementation of the BMPs described in the Watershed Workplan. The modeling and/or monitoring strategy shall generate the necessary data to report on the measured pollutant reduction that results from BMP implementation.

Comment Response

The term "proper" for describing BMP implementation is purposely left undefined in the Tentative Order. The Copermittees must determine what is the proper BMP implementation through manufacturer suggestions or BMP guidance manuals (e.g. CASQA). In some cases, "proper" BMP design and implementation may later be found to be faulty. The Tentative Order provides the Copermittee the flexibility to adjust and maintain BMPs to improve pollutant removal effectiveness. No changes were made based on this comment.

Comment # 59 **Commentor** 9 **Comment Subject** General

Specific Comment

The reference to a watershed workplan should use a consistent naming convention. It is referred to as a "Watershed Workplan" in Section K.1.b., and a "Watershed Water Quality Workplan" in Section G.2.

The reference to a watershed workplan should use a consistent naming convention.

Comment Response

Section G is for the "Watershed Water Quality Workplan (Watershed Workplan)." Therefore, the "Watershed Water Quality Workplan" is subsequently referred to as the "Watershed Workplan" throughout the remainder of the Tentative Order. After the term "Watershed Water Quality Workplan" is defined as “Watershed Workplan”, the term “Watershed Water Quality Workplan” in no longer used in Section G, nor Section K. No changes were made based on this comment.

Comment # 60	**Commentor** 9	**Comment Subject** Monitoring

Specific Comment

Typo at the base of the table: "Nitrate and nitrate may be combined…"

Change to" "Nitrite and nitrate may be combined…"

Comment Response

The correction made been made to the text as shown in the errata.

Comment # 61	**Commentor** 9	**Comment Subject** Monitoring

Specific Comment

Comparing Metals SALs with CTR values

Question is if you can use the "1 hour maximum concentration" criteria in this way?

Comment Response

Although the SALs have been set at a conservative level, it is possible that a SAL for metals may be exceeded but, given the hardness of the receiving water, applicable CTR water quality criteria may not be exceeded. The 1 hour CTR criteria was chosen for storm events as this CTR criteria represents the highest concentration of pollutant which aquatic life can be exposed to for a short time without deleterious effects. The continuous CTR criteria is less representative of pollutants in storm water as the continuous criteria represents the maximum concentration over an extended time period (4 days).

Comment # 62	**Commentor** 9	**Comment Subject** Monitoring

Specific Comment

"Stations must be all major outfalls" plus "other outfall points…"

This far exceeds CWA 500 point maximum for dry weather monitoring.

Comment Response

The section referenced by the commentor does not read “stations must be all major outfalls.” It reads: “Sampling Stations must be located at major outfalls pursuant to section C of this Order.”

Comment # 63	**Commentor** 9	**Comment Subject** Monitoring

Specific Comment

If flow is evident a 1 hour composite sample may be taken.

Should elaborate on sampling procedures for flowing outfalls.

Comment Response

This section does not require the collection of a 1-hour composite sample, but suggests that one may be taken. This lends the Copermittee(s) maximum flexibility in evaluating if a composite is required to address IC/ID investigations on a case-by-case basis. If a composite sample is taken, it also is up to the Copermittee(s) to determine if a time or flow-based composite should be taken.

Comment # 64	**Commentor** 9	**Comment Subject** Monitoring

Specific Comment

"if flow is evident a 1 hour composite sample may be taken"

There is not definition of what comprises a composite sample. This would significantly increase this program.

Comment Response

Please see the response to comment 63.

Comment # 65	**Commentor** 5	**Comment Subject** Economic

Specific Comment

Although the Order has been slightly modified from the previous version issued to the South Orange County permittees, it continues to retain numerous provisions that do not apply to this region and are unnecessarily costly and administratively burdensome to the City and, ultimately, to our citizens.

Comment Response

The San Diego Water Board disagrees that there are provisions in the Tentative Order that do not apply to the portion of Riverside County in the San Diego Region and the commentor does not explain which provisions are allegedly unnecessary and costly. All of the provisions in the Tentative Order are applicable and can be applied in this part of the San Diego Region, as well as all other parts of the region. The San Diego Water Board has also modified the Tentative Order in several ways, in response to recommendations by the Riverside County Copermittees, to align it more with regional needs and to minimize or reduce the incremental increase in costs that will be necessary to improve their programs to meet the new and enhanced requirements. These modifications are discussed in the response to comment 9.

Comment # 66 **Commentor** 5 **Comment Subject** General

Specific Comment

It is important to note that the federal regulations regulating MS4 discharges have not changed since 1987. There is no policy basis for the significant changes proposed by this Tentative Order. The majority of the changes proposed to this Tentative Order are to accommodate Regional Board staff wishes to move to a model MS4 Permit that treats Riverside, Orange and San Diego County's equally. These changes were not specifically designed to address the local needs of this watershed.

Comment Response

The San Diego Water Board agrees that the federal regulations regulating MS4 discharges have not changed since 1987. There are two main reasons for the changes that have been made. The first and foremost reason is to correct deficiencies in the requirements to be more protective of receiving waters, which is more consistent with the federal regulations. The second reason is to make the requirements for the three counties in the San Diego Region more consistent among each other. In addition, although the federal regulations for MS4 discharges have not changed since 1987, the water quality in the Upper Santa Margarita watershed has continued to deteriorate along with a subsequent increase in urban development within the watershed during the same time period. The receiving waters within the Upper Santa Margarita watershed continue to not meet water quality standards as evidenced by increased number of CWA section 303(d) listed waterbodies.

As the City is aware, the San Diego Water Board met with the Riverside County Copermittees on more than a dozen occasions between March and July 2010 to modify the requirements to be more specific to the needs of the Upper Santa Margarita watershed. While we acknowledge that the requirements are now more consistent with the San Diego County and Orange County MS4 Permits, many of the changes were specifically designed to address the local needs of the Upper Santa Margarita watershed.

The increased complexity in a fourth round MS4 permit is consistent with federal regulations and guidance; and appropriate where numeric effluent limitations are not required as explained in the USEPA's Interim Permitting Approach for Water Quality-Based Effluent Limitations in Storm Water Permits, "The interim permitting approach uses best management pracitces (BMPs) in first-round permits, and expanded or better-tailored BMPs in subsequent permits, where necessary, to provide for the attainment of water quality standards."

Comment # 67 **Commentor** 10 **Comment Subject** General

Specific Comment

The Bay Council appreciates and welcomes the opportunity to comment on the Regional Water Quality Control Board's ("Regional Board") draft Municipal Storm Water Permit ("Permit") for Riverside County. As with the recently adopted Orange County permit (Order No. R9-2009-0002), this draft Permit represents a significant improvement to past storm water permits in not only the San Diego region, but the entire state. The Bay Council applauds the Regional Board for its leadership in advancing municipal storm water permits to reflect the iterative approach of the maximum extent practicable ("MEP") standard mandated by the Clean Water Act.

Comment Response

Comment noted.

Comment # 68 **Commentor** 10 **Comment Subject** Hydromod

Specific Comment

Bay Council member San Diego Coastkeeper was part of the Technical Advisory Committee for the San Diego region Hydromodification Management Plan (HMP) development. Many of Coastkeeper's concerns, as well as committee member NRDC's, focused on the standard set in the San Diego HMP. The hydromodification susceptibility and the resulting BMP sizing tools were set to meet predevelopment standards, not the naturally occurring condition. It was ultimately the San Diego MS4 Permit language—which defines predevelopment as the condition onsite immediately before the planned development—that constrained the development of the HMP. (Order No. R9-2007-0001, C-7). This Permit, however, is in line with Coastkeeper and NRDC's view that predevelopment and preproject are the naturally occurring condition—as opposed to simply the condition immediately preceding the new development. This definition will create a more robust and effective HMP for the Riverside area, protecting natural stream hydrology as opposed to merely preventing further degradation. (Permit, F.1.h). Further, the required prioritization of BMPs will ensure the most effective BMPs are evaluated first, instead of the least expensive or easiest to implement BMPs. (Permit, F.1.g.(2).

Comment Response

Comment noted.

Comment # 69 **Commentor** 10 **Comment Subject** Unpaved Roads

Specific Comment

A new addition to this Permit is the regulation of unpaved roads, which now require implementation of BMPs. (F.1.i.; F.3.a.(10); F.3.c.(5)). Not only will these new permit provisions help alleviate sediment and erosion problems; they will also promote smart maintenance and planning. For
example, the permit requirement that BMPs include "[u]npaved roads and culvert designs that do not impact creek functions and where applicable, that maintain migratory fish passage" will help maintain natural water courses. (F.1.i). The following requirement will also serve to promote long-term maintenance and planning to protect water quality and geomorphology:

"Through their regular maintenance of unpaved roads, the Copermittees must examine the feasibility of replacing existing culverts or design of new culverts or bridge crossings to reduce erosion and maintain natural stream geomorphology."

(F.3.a.(10)(e)). These types of Permit conditions will incentivize municipalities to plan ahead, and will prevent the perpetuation of the currently fragmented maintenance activities.

Comment Response

Comment noted. The Copermittees have brought up concerns addressing the regulation of privately owned and maintained unpaved roads; therefore those regulations have been removed. Please see the errata sheet for exact language changes.

Comment # 70 **Commentor** 10 **Comment Subject** General

Specific Comment

In addition, municipal flood control structure BMP implementation will also serve to benefit Copermittees in maintaining their storm water systems. (F.3.a.(4)(a)-(c)). The requirement that Copermittees assess flood management project impacts on water quality, evaluate existing flood
control structures as part of ongoing maintenance, and inventory such activities in the JRMP Annual Report is particularly important to avoid poor planning such as evidenced in the City of San Diego's Master Storm Water System Maintenance Program. (Id.)

Comment Response

Comment noted.

Comment # 71	**Commentor** 10	**Comment Subject** Retrofit

Specific Comment

Largely ignored in the past, the retrofit requirements in the Permit will help Copermittees tackle the storm water issues that cannot be solved through new construction and development standards alone. Many water quality issues are historical, due to poor planning and the proliferation of impervious surfaces. Permit-required assessment of retrofit opportunities, and permissive language with regard to implementation of retrofits will spur Copermittees to action, but allow them flexibility to choose the most effective projects. (F.3.d.). The novel idea of using retrofits as an enforcement or mitigation measure will also likely prove more appealing than simple monetary penalties.

Comment Response

Comment noted.

Comment # 72 **Commentor** 5 **Comment Subject** Legal

Specific Comment

1. THE TENTATIVE ORDER ATTEMPTS TO REDEFINE WHAT CONSTITUTES A WATER OF THE UNITED STATES

Section 3.C of the Findings section on page 11 of the Tentative Order states:

"Historic and current development makes use of natural drainage patterns and features as conveyances for urban runoff. Urban streams used in this manner are part of the municipalities MS4 regardless of whether they are natural, man-made, or partially modified features. In these cases, the urban stream is both an MS4 and a receiving water."

The City does not believe that such a finding is warranted or lawful under either the clear statutory provisions of the Clean Water Act or recent judicial interpretations of the Act. The language in the Tentative Order could be construed as seeking to regulate all discharges into MS4s, changing the very nature of MS4s so as to constitute a receiving water.

This is contrary to the plain language of section 402(P)(3)(B) of the Clean Water Act, which requires: "Permits for discharges from municipal storm sewers ... " 33 U.S.C. § 1342(P)(3)(B) (emphasis added.). Based on this assertion, the Regional Board does not have the authority to regulate water entering into MS4s as receiving waters of the United States.

Furthermore, even if the statutory language indicated that Permits were required for discharges into MS4s, recent holdings from the United States Supreme Court conclusively show such structures would not constitute a water of the United States. According to the plurality decision in Rapanos v. United States (2006) 126 S. Ct. 2208, 2225:

"In sum, on its only plausible interpretation, the phrase 'the waters of the United States' includes only those relatively permanent, standing or continuously flowing bodies of water 'forming geographic features' that are described in ordinary parlance as 'streams[,] ... oceans, rivers, [and] lakes.' See Webster's Second 2882. The phrase does not include channels through which water flows intermittently or ephemerally, or channels that periodically provide drainage for rainfall. The Corps' expansive interpretation of the 'the waters of the United States' is thus not 'based on a permissible construction of the statute."

(Emphasis added.). The MS4 systems and urban streams that the Regional Board is seeking to regulate as receiving waters are intermittent, ephemeral, and used only periodically as drainage for rainfall. As such, these systems and streams wonld not constitute a water of the United States. Because the Clean Water Act extends solely to waters of the United States, the Regional Board has no authority to regulate MS4s or urban streams as defined in its Permit.

Even under Justice Kennedy's more lenient interpretation of what constitutes a water of the United States, the Regional Board has still not adequately met the requirements for establishing that an MS4 or urban stream is subject to regulation as a Water of the United States. According to Justice Kennedy, the Regional Board must establish that the MS4 system and urban streams bear a significant nexus to the other regulated waters so as to qualify forregulation as a water of the United States. Rapanos, 126 S. Ct. at 2249. Such a determination must be made on a case-by-case basis, and must contain some measure of the significance of the connection for downstream water quality. Id. at 2250-2251. In other words, the Regional Board must conduct an analysis of the "quantity and regularity of flow" in the relevant MS4s and urban streams prior to holding that these structures merit regulation under the Clean Water Act. ld. at 2251. Absent conclusive findings, the Regional Board is without authority to regulate MS4s and urban streams as receiving waters under the Clean Water Act.

The City requests that the Board members direct staff to modify the language in the Tentative Order to ensure regulations of only those systems and streams discharging directly into waters of the United States as defined according to the Supreme Court's holding in Rapanos in order to avoid random interpretations of the CWA.

Comment Response

The Tentative Order does not attempt to redefine what constitutes waters of the United States (waters of the U.S.). Section D.3.c of the Findings defines what constitutes the MS4. In some cases, waters of the U.S. and waters of the state may be considered part of the MS4.

The San Diego Water Board is authorized to regulate storm water discharges from the MS4, which are considered point sources under the Clean Water Act, to waters of the U.S. Discharges from the MS4 that are not composed entirely of storm water (i.e. non-storm water discharges) are prohibited. Pollutants that are deposited in the MS4 that can be conveyed by

storm water cannot cause of contribute to a condition of nuisance, pollution, or contamination in waters of the U.S. Thus, discharges into the MS4 that are not composed entirely of storm water (i.e. pollutants in storm water and non-storm water) and can be a significant source of pollutants are prohibited.

The definition of the MS4 and waters of the U.S. are consistent with the Clean Water Act and NPDES regulations in the Tentative Order. Please also see the response to comment 22.

Comment # 73	**Commentor**	10	**Comment Subject**	Overirrigation

Specific Comment

Bay Council has been collectively, and through its individual organizations, advocating for conservation and smart water use for years. Every drop of water that remains at its source is a drop that has not contributed to urban runoff. Nonetheless, many municipalities have been reluctant to enforce over-irrigation as either a water supply or water quality issue, citing the previous permit exemption as authority for such practice. Now, with the removal of this exemption, municipalities will not only be required to enforce over-irrigation runoff, but will be able to use the revised Permit as authority for urging residents, developments, and commercial and industrial facilities to conserve water.

Comment Response

Comment noted.

Comment # 74 **Commentor** 5 **Comment Subject** New Development

Specific Comment

2. THE TENTATIVE ORDER UNLAWFULLY PURPORTS TO RESTRICT THE LOCATION OF TREATMENT OPTIONS

Section F.1.d.(6)(d) on page 35 of the Tentative Order states:

"All treatment control BMPs for Priority Development Projects must, at a minimum, be implemented close to pollutant sources (where shared BMPs are not proposed), and prior to discharging into waters of the U.S."

The implementation of this provision presents a number of potentially serious problems. First, this provision of the Tentative Order violates Water Code section 13360. According to Water Code section 13360(a):

"No waste discharge requirement or other order of a regional board or the state board or decree of a court issued under this division shall specify the design, location, type of construction, or particular manner in which compliance may be had with that requirement, order, or decree, and the person so ordered shall be permitted to comply with the order in any lawful manner."

(Emphasis added.) As noted above, the Regional Board is already attempting to define MS4s and urban streams as waters of the United States. Supra, p. II. The proposed regulation would therefore effectively limit the ability for Permittees to implement any BMPs in any area except at the exact location of the source generating pollutants and would exclude Permittees from choosing to implement what may be less-costly, more effective BMPs in other areas, but Water Code section 13360(a) expressly prohibits this type of regulation.

Second, the comparison to wetlands regulation misconstrues USEPA guidance on this issue. The USEP A guidance document referenced by the Regional Board does not preclude Permittees from locating structural controls within a natural wetland. Rather, the guidelines simply state:

"To the extent possible, municipalities should avoid locating structural controls in natural wetlands. Before considering siting of controls in a natural wetland, the municipality should demonstrate that it is not possible or practicable to construct them in sites that do not contain natural wetlands .... "

(Fact Sheet, p. 96, fu. 154, citing USEPA, 1992. Guidance Manual for the Preparation of Part II of the NPDES Permit Applications for Discharges from Municipal Separate Stonn Sewer Systems. EPA 833-B-92-002. (Emphasis added.) While the Permittees may agree that they should generally avoid in stream treatment to the extent possible, outright prohibition of an option would be counterproductive.

The City requests that the Board members direct staff to modify the language in the Tentative Order to allow permittees to make the determination of the exact placement location of BMPs.

Comment Response

The Tentative Order is consistent with the California Water Code. The Tentative Order does not specify the exact placement location of BMPs. The Tentative Order does, however, include some limitations for the placement location of BMPs to minimize or eliminate the discharge of pollutants to waters of the U.S. Additionally, treatment BMPs must not be constructed in waters of the U.S. or state unless the runoff flows are sufficiently pretreated to protect the values and functions of the water body. Federal regulations at 40 CFR 131.10(a) state that in no case shall a state adopt waste transport or waste assimilation as a designated use for any waters of the U.S. The limitations for the placement location of BMPs are appropriate. No changes were made based on this comment.

Comment # 75	**Commentor** 10	**Comment Subject** Action Levels

Specific Comment

As with the Orange County permit, this Permit is a great leap forward in achieving the MEP standard. With the Orange County permit paving the way, the Regional Board has created a mechanism to evaluate BMP effectiveness and ensure the iterative approach is truly progressive. As Bay Council members have previously commented on the Orange County permit, the Regional Board has broad authority to impose numeric effluent limits.1 The Bay Council fully supports the Regional Board in requiring both non-storm water dry weather action levels (“NALs”) and storm water action levels (“SALs”). (Permit, C. and D.).

Comment Response

Comment noted.

Comment # 76 **Commentor** 5 **Comment Subject** Legal

Specific Comment

3. THE TENTATIVE ORDER IMPROPERLY INTRUDES UPON THE CITY'S LAND USE AUTHORITY IN VIOLATION OF THE TENTH AMENDMENT OF THE U.S. CONSTITUTION

To the extent that this Tentative Order relies on federal authority under the Clean Water Act to impose land use regulations and dictate specific methods of compliance, it violates the Tenth Amendment of the U.S. Constitution. Furthermore, to the extent the Tentative Order requires a Municipal Permittee to modify its city ordinances in a specific manner; it also violates the Tenth Amendment.

According to the Tenth Amendment:

"The powers not delegated to the United States by the Constitution, nor prohibited by it to the States, are reserved to the States respectively, or to the people."

Article XI, section 7 of the California Constitution, California guarantees municipalities the right to "make and enforce within [their] limits all local police, sanitary and other ordinances and regulations not in conflict with general laws." The United States Supreme Court has held that the ability to enact land use regulations is delegated to municipalities as part of their inherent police powers to protect the public health, safety, and welfare of its residents. See Berman v. Parker (1954) 348 U.S. 26, 32- 33. Because it is a constitutionally conferred power, land use powers cannot be overridden by State or federal statutes.

From the City's perspective, under the guise of federal law, the Regional Board is attempting to dictate the precise manner in which cities must exercise their police powers. The City does not believe that such a requirement is consistent with the Tenth Amendment.

The City requests that the Board members direct staff to modify the language in the Tentative Order to ensure consistency with the Tenth Amendment, rather than applying random interpretations of it, with regard to issuing requirements which dictate the precise method of compliance.

Comment Response

The San Diego Water Board disagrees that the Tentative Order intrudes upon the City's land use authority. The Tentative Order requires the City to be protective of water quality in the City's land use decisions. The requirements of the Tentative Order provide the Copermittees with sufficient flexibility to choose how they will achieve compliance. The requirements provide the Copermittees with numerous compliance options. As such, the requirements do not specify design, location, type of construction, or particular manner in which compliance may be had.

Where the Tentative Order includes detailed requirements, it is to be in compliance with CWA section 402(p)(3)(B)(iii), which mandates that MS4 permits "shall require controls to reduce the discharge of pollutants to the maximum extent practicable, including management practices, control techniques and system, design and engineering methods, and such other provisions as the Administrator or the State determines appropriate for the control of such pollutants." Clearly, the CWA provides the San Diego Water Board with the discretion to include specific requirements in the Tentative Order. This discretion is supported in the preamble to the Phase I NPDES storm water regulations, which states "this rule sets out permit application requirements that are sufficiently flexible to allow the development of site-specific permit conditions" (FR 48038). USEPA has issued regulations and guidance documents that discuss the types of BMPs, for example, that must be included in storm water permits in order to reduce the dicharge of pollutants in storm water to the maximum extent practicable. Thus, federal law mandates that permits issued to MS4s must require management practices that will result in the reduction of pollutants to the maximum extent practicable. The state is required, by federal law, to select the BMPs. See NRDC v USEPA (9th Cir. 1992) 966 F .2d 1292; Environmental Defense Center v USEPA (9th Cir. 2002) 344 F .3d 832, 855; City of Rancho Cucamonga v Regional Water Quality Control Bd., Santa Ana Region (2006) 135 Cal.App.4th 1377, 1389.

The Copermittees are able to implement effective runoff management programs because they possess land use authority. Municipal NPDES requirements compel Copermittees to exercise that authority in a manner that protects water quality from adverse effects of MS4 discharges.The Tentative Order therefore does not conflict with the Tenth Amendment of the U.S. Constitution. Copermittees are responsible for accepting flows into their MS4. For each Copermittee that accepts flows into their MS4, federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B,C,E, and F) provide that each Copermittee's permit

application "shall consist of: (i) Adequate legal authority. A demonstration that the applicant can operate pursuant to legal authority established by statute, ordinance or series of contracts which authorizes or enables the applicant at a minimum to: […] (B) Prohibit through ordinance, order or similar means, illicit discharges to the municipal separate storm sewer; (C) Control through ordinance, order or similar means the discharge to a municipal separate storm sewer of spills, dumping or disposal of materials other than storm water; […] (E) Require compliance with condition in ordinances, permits, contracts or orders; and (F) Carry out all inspection, surveillance and monitoring procedures necessary to determine compliance and noncompliance with permit conditions including the prohibition on illicit discharges to the municipal separate storm sewer."

The Tentative Order includes the requirements of the federal regulations and does not conflict with the Tenth Amendment of the U.S. Constitution. Nor do its requirements infringe on municipalities' police power rights under Article XI, section 7 of the California Constitution. Failure of a municipal discharger to develop and implement appropriate and effective runoff management programs that comply with the NPDES requirements for MS4s would subject the municipal discharger to enforcement by the San Diego Water Board, and potentially by its citizens. The burden of proving the deficiency of the runoff management programs would be defined by the provisions describing the necessary elements of the program, and by the extent to which the program reduces pollutants in the MS4.

Comment # 77 **Commentor** 5 **Comment Subject** Legal

Specific Comment

4. THE TENTATIVE ORDER CONSTITUTES AN UNFUNDED STATE MANDATE

The Regional Board seeks to impose new provisions that require a higher level of service of existing programs that are not required or mandated under the Clean Water Act or any federal regulations thereunder. Yet, according to the Fiscal Analysis provided in Section H.1. of the Tentative Order:

"Each Copermittee must exercise its full authority to secure the resources necessary to meet all requirements of this Order."

(Tentative Order, p. 74.) To the extent the Tentative Order imposes additional programs on the Permittees without providing additional funds, they are unfunded mandates. The Commission on State Mandates recently held that both the Los Angeles County MS4 Permit and the San Diego County MS4 Permit contained provisions that constituted unfunded state mandates. In re Test Claim on Los Angeles Regional Quality Control Board Order No. 01-182 (July 31,2009); In re Test Claim on San Diego Regional Water Quality Control Board Order No. R9-2007-0001 (March 26, 2010). As such, the Regional Board cannot merely dismiss the suggestion that the Tentative Order does contain provisions that constitute unfunded state mandates.

The imposition of unfunded programs and mandates in the Tentative Order is inconsistent with the provisions of the California Constitution, specifically Article XIII.B, Section 6, which requires a state agency mandating a new program or a higher level of service to provide a "subvention" of funds to reimburse local governments for the costs of the program or increased level of service.

Article XIII.B, Section 6 of the Constitution prevents the state from shifting the cost of government from itself to local agencies without providing a "subvention of funds to reimburse that local government for the costs of the program or increased level of service ... " State agencies are not free to shift state costs to local agencies without providing funding merely because those costs were imposed upon the state by the federal government. If the state freely chooses to impose additional costs upon a local agency as a means of implementing its policy, then those costs should be reimbursed by the state agency. See Hayes v. Commission on State Mandates (1992) 11 Cal. App. 4th 1564, 1593-1594. If the state refuses to appropriate money to reimburse a city, the enforcement of the state mandate can potentially be enjoined by a court. See Lucia Mar Unified School District v ..Honig (1988) 44 Cal. 3d 830, 833-834.

The Tentative Order will require a substantial capital investment, which individual cities will have to fund, despite the fact that no funding mechanism, nor any assistance, financial or otherwise, from the Regional Board is provided to the Permittees. To our knowledge, the Regional Board has made no provision to provide any level of financial relief to the permittees for any of the provisions proposed in the Tentative Order.

The Tentative Order explicitly provides that the Tentative Order does not constitute an unfunded state mandate for four reasons in paragraph 6 of page 14 of the Tentative Order. The City disagrees with all four stated reasons. To the extent the Tentative Order imposes additional programs on the City and its co-pennittees without providing additional funds, they are unfunded mandates.

Comment Response

The San Diego Water Board disagrees that the Tentative Order constitutes an unfunded mandate. The San Diego Water Board disagrees that the provisions in the Tentative Order are not required or mandated under the Clean Water Act. We acknowledge that several of the elements of the Tentative Order have been improved upon by including more specific requirements. The additional specificity which will likely require modifications to the Copermittees' existing programs, however, does not mean that there are now unfunded state mandates.

We also acknowledge that the Commission on State Mandates (Commission) recently held that the San Diego County MS4 Permit contained provisions that constituted unfunded state mandates and so partially approved the San Diego County MS4 claimants' Test Claim. First, the Commission did not determine the validity of those permit provisions; it only addressed funding and determined that the State must reimburse the claimants for the costs of complying with them. Second, the Commission's decisions only affect those Orders (MS4 permits) directly identified by the Commission. No other permits are affected, even if those permits have similar provisions. Third, the San Diego Water Board is not precluded from adopting similar or identical provisions in the Riverside County MS4 permit and the State is not required to provide funding for any permit provisions unless and until the Commission, through a Test Claim proceeding, makes a determination that

one or more provisions in the Riverside County MS4 permit are unfunded state mandates requiring reimbursement. Finally, the State Water Board and San Diego Water Board have challenged the Commission's determination in Sacramento Superior Court on grounds including that the affected permit provisions are in fact federal, and not state, mandates. The San Diego Water Board maintains at this time that the provisions of the Tentative Order are not unfunded state mandates and will continue to include appropriate provisions in the MS4 Permits to protect the water quality and beneficial uses of the waters of the region.

Comment # 78 **Commentor** 5 **Comment Subject** Legal

Specific Comment

A. The Tentative Order Imposes Requirements that Go Beyond Federal Law

To the extent the Tentative Order imposes requirements that go beyond what is required by federal law, the Regional Board is required to consider and address among other things the constitutional prohibition on unfunded state mandates. In fact, there are many specific obligations in the Tentative Order that are not federally mandated.

For example, Section E, on page 24 of the Tentative Order, requires that each permittee submit a certification statement, signed by its chief legal counsel, that the permittee has taken the steps necessary to obtain and maintain full legal authority to implement and enforce each of the requirements in 40 CFR 122.26(d)(2)(i)(A-F) and the Tentative Order. The Clean Water Act does not require the certification statement mandated by the Regional Board. 40 CFR 122.26(d)(2)(i) only requires "[a] demonstration that the applicant can operate pursuant to legal authority established by statute, ordinance or series of contracts .... " Arguably, the City can demonstrate its legal authority by submitting copies of ordinances, resolution or contracts certified by the City Clerk. The Clean Water Act does not require permittees to submit a certification statement.

Furthermore, the Tentative Order goes beyond federal law in that it is at least twice as long, and in some cases, three times as long as other MS4 Permits developed by other Regional Boards in the State of California such as the Lahonten Regional Board and the Central Valley Regional Board. This means that either some Regional Boards are failing to impose federally mandated requirements pursuant to the Clean Water Act, or the San Diego Regional Board is imposing requirements that go beyond federal law.

Comment Response

The Tentative Order is consistent with federal requirements and does not go beyond federal law. The provisions of the Tentative Order represent the MEP with specific requirements that are necessary to protect water quality.

MS4 Permits from different regions cannot be compared without looking at the different issues facing each region. The length of a permit is not indicative of consistency with the Clean Water Act. The discharges that the Lahontan and Central Valley Regions are most concerned with are typically nonpoint source discharges that cannot be regulated under NPDES requirements (e.g., agriculture and silviculture). There are, however, examples of MS4 Permits with similar provisions and lengths in the Los Angeles and San Francisco Bay Regions. Each region implements the requirements of the Clean Water Act by including provisions in the MS4 Permits with the specificity that is necessary to protect water quality and beneficial uses for the waters in that region.

The requirements in the Tentative Order include the specificity that has been demonstrated to be necessary to direct the programs of the Copermittees to be protective of water quality. Without the additional specificity, which would make the language subject to greater interpretation and less enforceable, the Copermittees often assert that they have “met the minimum requirements of the permit” and do not attempt to go any further to try and improve water quality. Thus, additional specificity to the provisions of the MS4 Permit are warranted to direct the Copermittees to implement requirements that will be more protective of water quality, consistent with the Clean Water Act, and do not constitute an unfunded mandate.

Finally, a municipality's legal counsel appears to be the most appropriate official to interpret the municipality's legal authorities and to make the demonstration, that based upon his or her legal evaluation, that the municipality's legal authorities are adequate to carry out the federal requirements. Simply providing copies of ordincances, resolutions or statues is insufficient to make the necessary demonstration that the municipality has and will maintain ful legal authorities.

Please also see the response to comment 77.

Comment # 79	**Commentor** 5	**Comment Subject** Legal

Specific Comment

B. The Fact that Industrial Dischargers are More Strictly Regulated than Municipal Dischargers is Irrelevant to the Unfunded Mandate Issue

The Tentative Order asserts that the Order does not constitute an unfunded mandate because the Order regulates discharges of waste from municipal sources more leniently than they could regulate discharges from non-governmental dischargers. See paragraph 6 on page 14 of Tentative Order. The City fails to see how this statutory distinction between the regulation of municipal dischargers and industrial dischargers affects whether the Order imposes requirements on co-permittees that go beyond federal law. Municipalities are not industrial sites. Municipal discharges are not industrial discharges.

Comment Response

The San Diego Water Board disagrees that the fact that industrial dischargers are more strictly regulated that municipal dischargers is irrelevant to the unfunded mandate issue. The fact that the obligations of non-governmental and new dischargers who are issued NPDES permits for storm water and non-storm water discharges are more stringent is very pertinent. The NPDES requirements for non-governmental dischargers typically include numeric effluent limitations for a discharge so it will not cause or contribute to a condition of pollution in the receiving waters. Any excursion above these numeric effluent limitations in the discharge is a violation of the permit. Compliance is achieved when the numeric effluent limitations are met.

The NPDES requirements in the MS4 Permit do not include such effluent limitations, but allows compliance through iterative implementation of BMPs and improving storm water management programs, which is less stringent. Compliance means improving BMPs and storm water and non-storm water management programs when water quality is not adequately protected.

To date, the Copermittees have been unable to adequately protect water quality in the receiving waters, as demonstrated by the increasing number of Clean Water Action section 303(d) listed impaired water bodies. The Copermittees often state that they have "met the minimum requirements of the permit" and do not attempt to go any further to try and improve their programs to protect water quality. In the absence of numeric effluent limitation, the provisions of the MS4 Permit must include the level of specificity to direct the Copermittees to improve their storm water and non-storm water management programs to be more protective of water quality. The additional specificity does not go beyond federal law.

In addition, one of the statutory bases for establishing that a permit provision amounts to an unfunded state mandate requiring reimbursement is for the municipality to show that the requirements are unique to local government and do not apply generally to all residents and entities in the state. The federal mandate in the Clean Water Act applies to many dischargers, both public and private, and is not unique to local government. In addition , CalTrans, for example, is a state, not local, govermental entity and is subject to MS4 permits throughout the state. Industrial dischargers are also subject to storm water regulation, albeit more stringent than is typically applied to municiapl dischargers. Thus, it appears that the commenter misunderstands at least one of the bases for establishing the existence of an unfunded state mandate when it states that it fails to see how this statutory distinction affects whether the Order imposes requriements that exceed federal law.

Comment # 80 **Commentor** 5 **Comment Subject** Legal

Specific Comment

C. The City Does Not Have the Authority to Randomly Levy Fees at Will to Pay For Compliance With the Order

The Tentative Order also alleges that the Order does not constitute an unfunded mandate because copermittees have the authority to levy service fees to pay for compliance with the Order. See paragraph 6 on page 14 of Tentative Order. Pursuant to Government Code Section 17556(d), if a local agency can levy service fees to pay for a State mandate, the State is not required to provide funding for the mandate.

The City does not have the authority to levy service fees to pay for the State mandate. The Tentative Order presumes, but makes no specific findings that co-permittees have the authority to levy such service fees. In fact, to the extent such service fees are "property-related," copermittees can only levy them once approved by the affected property owners or electorate. See California Constitution, Article XllID, Section 6(c); Howard Jarvis Taxpayers Ass'n, v. City of Salinas, 98 Cal. App. 4th 1351 (2002). The City of Salinas case dealt precisely with this issue. The City of Salinas established a fee to recover costs related to compliance with its MS4 Permit. The fee was based largely on the amount of impervious area on a developed parcel. The Court held that this fee was property-related and, thus, subject to voter-approval requirements. Salinas, 98 Cal. App. 4th at 1356. Only if the fee was a use-based charge, directly based on use of city services (such as the metered use of water), could the fee avoid the voter-approval requirements of Article XllID. The City of Salinas's method to allocate the fee based on the amount of impervious area so as to assure that the fee charged would be proportional to the burden being placed on the City's storm drain system was not sufficiently direct to qualify as a use-based fee exempt from the requirements of Article XIIlD. ld. at 1355.

Because storm water running off of real property and into the MS4 is not a precise measurement, it would be impossible to meet the direct usage requirements of the City of Salinas. Accordingly, without voter approval, which would be almost impossible to successfully obtain during the current economic crisis, the City of Temecula does not have the authority to levy service fees to pay for compliance with the Order.

Comment Response

Please see the responses to comments 8, 9 and 77. In addition, the San Diego Water Board disagrees with the Commission on State Mandates that San Diego County MS4 Test Claimants lacked appropriate authority to levy fees sufficient to pay for some unfunded state mandates if adoption of the fee is contingent on the outcome of an election and believes that those claimants have sufficient fee authority within the meaning of Government Code section 17556, subdivision (d). Section 6 of article XIII B of the California Constitution requires subvention only when the costs in question can be recovered solely from tax revenues. When local agencies have the legal authority to levy charges, fees or assessments, they do not have to spend tax proceeds to fund activities and no subvention is therefore required. The San Diego Water Board notes that this issue is one of first impression for the court and has not been finally adjudicated. In any event, even if the Commission were ultimately to determine that provisions in this Tentative Order require reimbursement and that Copermittees lack fee authority under Government Code section 17556, subdivision (d), the San Diego Water Board is not precluded from adopting provisions in the Tentative Order in the first place and is not required to first provide a funding source before or upon adoption of the Tentative Order. There is a process in place for establishing what are appropriate amounts for reimbursement to carry out particular permit provisions that the Commission has determined requires subvention by the State.

Comment # 81	**Commentor** 5	**Comment Subject** Legal

Specific Comment

D. The City Does Not Have a Real Choice in Requesting Permit Coverage

The fourth reason provided in the Tentative Order for why the Order does not constitute an unfunded mandate is that co-permittees requested permit coverage under the Order. Thus, according to the Tentative Order, co-permittees have not been mandated to do anything.

The City adamantly disagrees. It is disingenuous for Regional Board staff to suggest that copermittees have voluntarily chosen coverage under the Order and that the Order cannot be considered a State mandate.

The City requests that the Board members direct staff to modify the language in the Tentative Order to include State-sponsored relief for the permittees to carry out the requirements in the Order. To the extent that these requirements will require additional funds, the Board should direct staff to assist the permittees in securing such funds.

Comment Response

The Copermittees do have a choice. The Copermittees may request coverage under the MS4 Permit or comply with the complete prohibition against the discharge of pollutants contained in Clean Water Action section 301, subdivision (a) (33 U.S.C. § 1311(a)). These choices are provided by the federal Clean Water Act, not state laws. Thus, meeting the requirements of the MS4 Permit is a federal mandate, and not an unfunded state mandate. Please see the responses to comments 77 and 80.

Comment # 82 **Commentor** 5 **Comment Subject** IDDE

Specific Comment

5. THE TENTATIVE ORDER IMPROPERLY ATTEMPTS TO HOLD THE CITY RESPONSIBLE FOR SEWAGE SPILLS WHEN THIS RESPONSIBILITY HAS BEEN CLEARLY ASSIGNED TO LOCAL WATER DISTRICTS

Section F.4.h. of the Tentative Order states:

"Each Copermittee must implement management measures and procedures (including a notification mechanism) to prevent, respond to, contain and clean up all sewage (see below) and other spills that may discharge into its MS4 from any source (including private laterals and failing septic systems.) Copermittees must coordinate with spill response teams to prevent entry of spills into the MS4 and contamination of surface water, ground water and soil. Each Copermittee must coordinate spill prevention, containment and response activities throughout all appropriate departments, programs and agencies so that maximum water quality protection is available at all times."

(Tentative Order, p. 69).

For many cities, implementation of this provision is simply not feasible. The City of Temecula does not own or operate its own sewage system. All of the sewer systems in the City's jurisdiction are owned, operated, and maintained by water districts, specifically the Rancho California Water District and Eastern Municipal Water District. These water districts have their own separate Regional Board Orders/NPDES permits. The City does not have the equipment or expertise to manage a sewage spill of any size, and its staff is not adequately trained to respond to potential spills. All of the water districts in the City's jurisdiction already respond to sewer spills (including sewer spills from private laterals). Furthermore, this provision is duplicative because the Regional Board is seeking to make the City responsible for a task already delegated to the water districts. By making the City responsible for sewer spills, there is a high risk of creating confusion in determining who (water districts or the City) will respond to a spill and who is responsible for associated costs and reporting requirements. Such an act would result in a tremendous waste of scarce public resources.

The State Water Resources Control Board has previously issued a stay on this exact issue. After extensive hearings and briefing on the matter, the State Board issued Order WQO 2002-0014 on August 15, 2002, granting a stay as to this provision. In that Order, the State Board held:

"The record shows that three separate water districts operate these sewers within Mission Viejo, and are regulated by a sanitary sewer NPDES permit issued by the Regional Board. Mission Viejo alleged that the duplication of effort that would ensue by having Mission Viejo also be responsible for preventing and responding to sanitary sewage spills could lead to delayed responses as agencies try to determine jurisdiction and primary responsibility. Orange County's cost table for the upcoming year estimated total copermittee costs at $56,512 to implement this requirement. While these costs, by themselves do not constitute substantial harm, we find that the duplicative nature of the costs, combined with potential response delay and confusion, do."

(State Board Order WQO 2002-0014, p. 6).

In deciding to grant a stay as to this provision, the State Board concluded:

"The regulation of sanitary sewer overflows by municipal storm water entities, while other public entities are already charged with that responsibility in separate NPDES permits, may result in significant confusion and unnecessary control activities. For example, the Permit appears to assign primary spill prevention and response coordination authority to the co-permittees. While the federal regulations clearly assign some spill prevention and response duties to the copermittees, we find that the extent of these duties is a substantial question of law and fact."

(State Board Order WQO 2002-0014, p. 8. (Emphasis added).

Given the previous findings of the State Board on this same issue, the City requests that the Board members direct staff to modify the language in the Tentative Order to reduce duplicity of effort and the implementation of unnecessary control activities.

Comment Response

The Tentative Order does not hold the Copermittees responsible for sewage spills. Section F.4.h of the Tentative Order requires each Copermittee to "prevent, respond to, contain and clean up" spills that may discharge into its MS4. The Tentative Order holds the Copermittees responsible for preventing sewage spills from entering and/or responding to spills that have entered their MS4. Preventing sewage from entering the MS4 may be done in coordination with the sanitary sewer agencies, who are responsible for responding to sewage spills, but ultimately each Copermittee is responsible for whatever enters its MS4. This is consistent with State Water Board Order WQO 2002-0014.

When the State Water Board stayed the sewage provision from San Diego Water Board Order No. R9-2002-01, it found that the costs of the requirement did not constitute harm, but agreed that harm could ensue from potential response delay and confusion (State Water Board Order WQO 2002-0014). Subsequently, the Copermittees and the local sewer agencies have developed mature relationships regarding sewage spill response. As a result, the concerns expressed by the State Water Board are no longer warranted. For instance, the Copermittees have developed and implemented procedures for spill response and sewage spill response. Regardless of where the spill originates, if the spill has entered or may enter the storm drain system, the Copermittees must respond to assist with the cleanup and remediation of the area.

Comment # 83 **Commentor** 5 **Comment Subject** Overirrigation

Specific Comment

6. THE TENTATIVE ORDER IMPROPERLY DELETES CATEGORIES OF EXEMPT NONSTORMWATER DISCHARGES

Federal law requires that MS4 permits include a requirement that the Permittees effectively prohibit the discharge of non-stormwater into the MS4. 33 U.S.C. 1342(p)(3)(B)(ii). Federal regulations exempt certain discharge categories from this effective prohibition requirement. 40 C.F.R. 122.26(d)(2)(iv)(B)(l). A Permittee must address a discharge in one of these exempt categories only when a Permittee identifies the discharge as a source of pollutants to waters of the United States. ld.

The Tentative Order impermissibly deletes three of the non-stormwater discharge categories - landscape irrigation, irrigation water, and lawn watering (collectively, "irrigation"). (See subparagraphs a-n on page 19 of Tentative Order.) The federal regulations require that permittees address discharges within an exempt category when they identify a discharge as a source of pollutants to waters of the United States. Neither the regulations nor EPA's guidance allow the Regional Board to delete entire categories of exempt non-stormwater discharges then the Permittees identify a discharge within one of the categories as a source of pollutants.

Accordingly, since the permittees have not identified irrigation runoff as a source of pollutants, the City requests that the Board members direct staff to restore the irrigation categories of exempt nonstormwater discharges in the Tentative Order.

Comment Response

The San Diego Water Board may also identify a discharge as a source of pollutants to waters of the United States. Please see the response to comment 27.

In this case, the San Diego Water Board has identified non-storm water runoff from landscape irrigation, irrigation water, and lawn watering (collectively, "irrigation") as a significant source of pollutants discharging to the MS4. We have cited a number of documents, from the state and all three counties of the San Diego Region, in the Fact Sheet (see Discussion of Finding C.15) to justify the removal of these categories from the list of categories of non-storm water discharges into the MS4 not required to be prohibited.

Comment # 84	**Commentor** 5	**Comment Subject** Retrofit

Specific Comment

7. THE TENTATIVE ORDER'S RETROFITTING REQUIREMENT IMPOSES POTENTIALLY SIGNIFICANT COSTS WITHOUT ANY CORRESPONDING GAINS IN WATER QUALITY

The Tentative Order requires the Permittees to develop and implement a program to retrofit existing development with additional structural measures to control runoff. (See Section F.3.d (Retrofitting Existing Development) on page 64 of the Tentative Order). This new provision is in addition to the New Development/Redevelopment provisions in the Tentative Order. However, the City does not have the ability under existing statutes and under the California and the United States Constitutions to force private landowners to retrofit existing developments to improve water quality when these landowners didn't have any plans to retrofit their properties in the first place. As such, the expense entailed in developing and implementing a retrofitting program will not be matched by any gains in water quality. Federal law does not require retrofitting of existing development. In fact, EPA's regulations acknowledge that MS4 regulation would have to be limited largely to undeveloped sites and sites being developed/redeveloped. Accordingly, the City requests that the Board members direct staff to either remove this provision in its entirety from the Tentative Order, or modify the language to exclude private property.

Comment Response

The San Diego Water Board disagrees that the retrofitting requirements impose significant costs without any corresponding gains in water quality. As recognized in USEPA guidance, waters in the region cannot be protected without also addressing degradation caused by storm water discharges from existing development. The USEPA recommends that storm water programs include a retrofit plan or program for retrofitting existing development. To actually improve the quality of receiving waters, discharges from existing developed sites need to be mitigated, which generally means implementation of measures to retrofit existing development sites with storm water control measures that can retain and/or treat storm water on site. Retrofitting existing development is possible and reasonable to significantly improve water quality in receiving waters.

The retrofitting requirements in the Tentative Order do not, as the commenter asserts, require the Copermittees “to force” private landowners to retrofit existing development. Implementing retrofitting projects is not actually required by the Tentative Order. The retrofitting requirements do, however, require the Copermittees to identify areas of existing development where retrofitting projects are feasible and to find ways to cooperate with and encourage private land owners to implement retrofitting projects.

Comment # 85 **Commentor** 5 **Comment Subject** Legal

Specific Comment

8. THE TENTATIVE ORDER LACKS FLEXIBILITY IN IMPLEMENTING LOW IMPACT DEVELOPMENT AND HYDROMODIFICATION REQUIREMENTS

The Tentative Order requires that development projects include prescriptive Low Impact Development ("LID") requirements. (See, e.g., Section F.1 of the Tentative Order). The Tentative Order also requires the Permittees to develop and implement a Hydromodification Management Plan ("HMP") for the same development projects. (Section F.1.h. of the Tentative Order) However, the LID and HMP provisions are not required by federal law and violate state law in that, among other things, they prescribe how the Permittees are to comply with the MEP standard. See Water Code §13360(a). Moreover, the LID and HMP provisions in this Tentative Order are overbroad and will not necessarily result in any improvement to the quality of water entering Waters of the U.S.. For example, HMP requirements for hardened channels will not have any water quality benefits. Finally, to the extent the LID requirements would interfere with downstream or upstream water rights holders, compliance with the requirements potentially expose the Permittees to common law liability.

In addition, the Regional Board's imposition of a highly prescriptive Low Impact Development strategy may have an unintended consequence-potential lawsuits from downstream users of the surface water that the City is now purportedly "diverting for reuse or infiltration." As one attorney expert in the field of water law has put it:

"First, to the extent that one can obtain a right to capture diffuse surface waters ... any capture of diffuse surface waters without a permit from the State Water Resources Control Board could well be a trespass against the State of California. Second, even if one cannot obtain a 'right' to diffuse surface waters, though, the capture of such waters in a manner that interferes with the diversion of the same water once it reaches a watercourse constitutes injury to legal users of water that rely on such diffuse surface water contributing to the water that they are able to divert."

D. Aladjem, "Who Owns the Water? The Looming Conflict Between Low hnpact Development and the Water Rights System" at p.5 (paper presented at American Bar Association 17th Enviromnental Law Fall Section Meeting, Sept. 24, 2009).

The City believes that the law in this area, particularly with respect to ownership of diffuse surface waters, is quite uncertain. The City also believes that, to the extent that the Regional Board imposes these additional obligations upon the City pursuant to the Permit, then the Regional Board should insert sufficient findings and authorization for the capture of surface water through LID systems to protect the City against claims of either a trespass against the State or claims of unlawful diversion of stormwater that would otherwise flow into watercourses that might be the subject of claims of diversion rights by downstream users.

Because the LID and HMP provisions are not required by federal law and violate state law, the City requests that the Board members direct staff to insert sufficient findings and authorization for the capture of surface water through LID systems to protect the City against claims of either a trespass against the State or claims of unlawful diversion of stormwater. In addition, the City also requests that the Board members direct staff to modify the language in the Tentative Order to provide the Permittees with required flexibility in implementing the LID and HMP requirements.

Comment Response

The Tentative Order provides flexibility to implement the LID and HMP requirements. We fail to understand how the commenter can assert that the LID and HMP provisions are too prescriptive (implying too little flexibility), and then assert that the same provisions allow too much flexibility. The LID and HMP provisions provide flexibility that is consistent with both federal and state laws.

The Tentative Order includes design and performance standards for the LID requirements. The Tentative Order requires the Copermittees to develop an HMP which must include design and performance standards. The Tentative Order does not specify the methods for implementation of those design and performance standards. The method of compliance is left to the discretion of the Copermittees. The Tentative Order also allows a waiver of design and performance standards providing more flexibility to Copermittees and project proponents. The Tentative Order does not mandate method of compliance and is consistent with state laws.

The LID and HMP provisions have been included to provide more specificity, in the form of design and performance criteria, to direct the Copermittees to improve their storm water and non-storm water management programs to be more

protective of water quality. The additional specificity is consistent with federal law.

In regards to the potential water rights issues, the San Diego Water Board does not perceive a conflict and the commenter has not established that implementation of LID and HMP requirements in fact has the potential to impair existing water rights or that the San Diego Water Board is precluded from adoption water quality provisions that may potentially impair existing water rights. The concept of LID is to infiltrate and retain as much of the water on site. The concept for the HMP is to mimic the natural infiltration, runoff and drainage patterns as much as possible. In both situations, the expected and desired result is more groundwater recharge and more natural in-stream flow conditions. More groundwater and higher groundwater levels would provide more water supply to water purveyors in the watershed, and would also likely result in more downstream flow when the groundwater re-surfaces in the lower parts of the watershed. The LID and HMP provisions also provide higher quality water in downstream flows.

Comment # 86 **Commentor** 5 **Comment Subject** Legal

Specific Comment

9. THE TENTATIVE ORDER DOES NOT CONSIDER COSTS TO IMPLEMENT THE STORMWATER AND NON-STORMWATER ACTION LEVELS AS REQUIRED BY FEDERAL LAW, AND THE WATER QUALITY BENEFITS ACHIEVED BY THESE REQUIREMENTS HAVE NOT BEEN ADEQUATELY CONSIDERED BY THE REGIONAL BOARD

Federal law requires that permittees effectively prohibit the discharge of pollutants in nonstormwater into the MS4 and to reduce the discharge of pollutants in stormwater from the MS4 to the maximum extent practicable. To assist the Permittees in meeting these two standards, the Tentative Order imposes action levels on pollutants in the discharge of stormwater (SALs) and nonstormwater (NALs) from the MS4. (Sections C and D on pages 20 and 23, respectively, of the Tentative Order.). Ideally, action levels would be a tool that would help the City focus resources on more significant water quality problems. However, the City is concerned that, depending on how the provisions are interpreted, the cost to implement the action levels may far outweigh any benefit to water quality. Moreover, rather than a tool to help the Permittees, the action levels may be used against the Permittees.

As an initial matter, the City objects to the distinction made in the Tentative Order between the discharge of stormwater from the MS4 and the discharge of non-stormwater from the MS4. Federal law does not support this distinction. Under federal law, permittees must control the discharge of pollutants from the MS4 to the maximum extent practicable, regardless of whether the pollutants are in storm water or non-stormwater. Permittee's obligation with respect to non-stormwater is to effectively prohibit the discharge of pollutants in non-stormwater into the MS4. To the extent the Permit imposes separate requirements on the discharge of pollutants in non-stormwater from the MS4, such requirements must be supported by state law.

Because neither the SALs or NALs are required by federal law, the Regional Board must comply with state law in imposing these requirements. For example, in issuing waste discharge requirements under State law, the Regional Board must consider certain factors, including the water quality conditions that could be reasonably achieved and economic considerations. Water Code §§ 13263(a) and 13241. The City is hopeful that the Tentative Order's SAL and NAL provisions will provide the City with flexibility to prioritize its response to any actual exceedances. However, if the City is required to respond to and address all exceedances without reasonable prioritization, the cost will be significant. Because some exceedances will not be indicative of impacts to water quality, the cost to implement the SALs and NALs may have little if any commensurate environmental benefit. There is nothing in the record that suggests that the Regional Board has considered these water quality and economic factors.

Accordingly, the City requests that the Board members direct staff to provide the analysis required under state law to ensure that economic factors are considered and that the water quality goals are reasonably achievable through implementation of the SALs and NALs.

Comment Response

The provisions of the MS4 Permit are based on and fully supported by federal requirements, as demonstrated by the broad and specific legal authority cited in the Fact Sheet . The San Diego Water Board considered economic information in developing the Tentative Order, but federal NPDES regulations do not require that the San Diego Water Board conduct a cost-benefit analysis. The San Diego Water Board did, however, modify the requirements in the Tentative Order based on the economic considerations provided by the Copermittees. Please see the response to comment 9 for additional discussion about modifications made to the Tentative Order based on the economic considerations.

The Clean Water Act makes a clear distinction between the regulation of stormwater and non-stormwater discharges by requiring that MS4 Copermittees effectively prohibit non-stormwater discharges from entering the MS4. Since non-stormwater discharges are to be effectively prohibited, then clearly the very next requirement (402(p)(3)(B)(iii) that requires polluant discharges from the MS4 be reduced to the MEP) intends that the discharge of pollutants be limited to storm water. Please see the Fact Sheet discussion for Finding C.14 for further clarification.

Comment # 87	**Commentor** 5	**Comment Subject** TMDL

Specific Comment

10. THE TENTATIVE ORDER IMPROPERLY INCORPORATES TOTAL MAXIMUM DAILY LOAD W ASTELOAD ALLOCATIONS

The Tentative Order includes limitations based on wasteload allocations ("WLAs") developed in fully approved and adopted Total Maximum Daily Loads ("TMDLs"). (Section I of the Tentative Order.) The Tentative Order characterizes the limitations as Water Quality Based Effluent Limitations. However, the WLAs are to be achieved in the receiving water. Accordingly, the City considers the limitations to be receiving water limitations. See, e.g., State Board Order WQ 2009-0008. The Permittees are to comply with the limitations by implementing best management practices ("BMPs").

Federal and state policy provide that an iterative BMP approach is appropriate in MS4 permits for achieving receiving water limitations. See, e.g., State Board Order WQ 99-05. Where existing BMPs are not sufficient to meet the receiving water limitations, permittees are to implement more effective BMPs. This approach is consistent with the MEP standard governing the discharge of all pollutants from the MS4. The City submits that to be consistent with federal and state policy, the Permit must be clarified to provide for compliance with WLAs through an iterative BMP approach. To the extent the Regional Board can rely on state law to support the TMDL provisions, the City submits that the Regional Board has not complied with relevant requirements (e.g., Water Code§§ 13000, 13263(a), 13241, etc.). Accordingly, the City requests that the Board members direct staff to revise the Tentative Order's TMDL provisions to be consistent with federal and state law and policy.

Comment Response

The Tentative Order properly characterizes wasteload allocations (WLAs) assigned to MS4s for fully approved and adopted Total Maximum Daily Loads (TMDLs) as water quality based effluent limitations (WQBELs). Federal regulations (40 CFR 122.44(d)(1)(vii)(B)) require that NPDES requirements incorporate WQBELs that must be consistent with the requirements and assumptions of any available WLAs. In accordance with 40 CFR 122.44(k)(2)&(3), WQBELs may be expressed as numeric effluent limitations, when feasible, and/or as a BMP program of expanded or better-tailored BMPs. Currently, no TMDLs have been developed for the Upper Santa Margarita Watershed. When a TMDL is developed, it will be included in Section I of the Order. Depending on how the TMDL is developed, and the requirements and assumptions included in the TMDL to assign the WLA to the MS4 discharges, the WQBELs included in the MS4 Permit may be in the form of numeric effluent limitations, receiving water limitations, an expanded or better-tailored BMP program, or a combination of them.

Comment # 88 **Commentor** 10 **Comment Subject** Economic

Specific Comment

Though the Permit, as other past permits, requires a Fiscal Analysis, the Copermittees are surely to view this component of the Permit as another draconian measure that requires them to "check the box" as opposed to viewing this Permit condition as a tool. Copermittees should rather use the Fiscal Analysis requirement to plan ahead, financing necessary projects and measures not only for Permit compliance, but to achieve actual water quality improvements. (H.1.).

The current practice with respect to the Fiscal Analysis component of storm water permits is exemplified in the City of San Diego's 2009 Annual Report. This Report provides a "Future Projection" analysis consisting of two paragraphs which simply reiterate funds are generated from general fund and non-general fund sources, and costs will continue to rise. Earlier in the same section, the City provides an explanation of how funds are generally used, but provides no insight into the amount of money applicable to each funding source.

Such cursory fiscal analysis is common in Annual Reports, while municipalities refuse to face the real problem. They continuously fail to adequately pass on the true costs of compliance. Time and again, environmental groups and the Regional Board are faced with the same excuse: protecting water quality and restoring beneficial uses is too expensive. From Permit approval to Permit implementation, the same excuse persists. Nonetheless, the reluctance of the Copermittees to adequately fund their respective storm water programs is not the result of a lack of desire to improve water quality by municipal staff or managers, but rather poor decisionmaking and lack of political will. Decisionmakers at the city and county level must pass their costs on to those reaping the benefits. Recent news articles highlight the City's reluctance to increase storm water fees, requiring 95 cents per month per residence across the board, while to recoup its costs, the City should be charging $3 per month.

Now is the time for the Regional Board to clearly articulate in the Permit: noncompliance due to cost will not be tolerated. The Permit is a tool underutilized by Copermittees to obtain necessary funds and plan for the future. If the Copermittees once again fail to use Permit section H., they risk enforcement action. We urge the Regional Board to make clear that noncompliance due to cost is not an excuse. After almost three decades, Copermittees should no longer be allowed to claim poverty as an excuse for post-approval weakening of permits and the requirements therein.

Comment Response

The San Diego Water Board does not consider the ability of a Copermittee to fund a program in determining compliance with the provisions of the MS4 Permit. We agree that the Copermittees are responsible for securing the resources necessary for meeting the requirements of the Tentative Order. Please see the responses to comments 8 and 9. In addition, the "Need to halt or reduce activity is not a defense" per the standard provisions in Attachment B.1(b) and 40 CFR 122.41(c). Also, at Attachment B.(7)(m) and 40 CFR 122.41.(a) states that "ANY noncompliance with this Order constitutes violation of the CWA and is grounds for denial of an application or modification of the Order."

Comment # 89 **Commentor** 10 **Comment Subject** General

Specific Comment

Individual residential car washing is currently listed as exempt from the prohibition against nonstormwater discharge. However, this allowance contradicts other permit sections that evidence the negative water quality impact residential car washing poses. Indeed, car washing is specifically listed as a threat to water quality in the residential permit section. (F.6.b.(3)). It is also provided as an example topic for discussion in the education component for residential and general public outreach. (F.6.b.(4)). Clearly a threat to water quality, and a water supply issue, residential car washing should not be made exempt simply because it requires a change in public behavior. Just as over-irrigation should not be exempt non-storm water, neither should this source of urban runoff.

Comment Response

Neither the San Diego Water Board nor the Copermittees have yet identified residential car washing as a significant source of pollutants that must be prohibited. We invite the commentor to provide the San Diego Water Board with data and studies to satisfy their request in future permits. Please see the response to comment 27.

Comment # 90 **Commentor** 10 **Comment Subject** Action Levels

Specific Comment

As mentioned above, the Bay Council is extremely supportive of the inclusion of NALs and SALs in this Permit. However, the vague Permit language leaves much to be desired. The Permit requires investigation and source identification for a NAL exceedance in a "timely manner". (Permit C.2. and C.3.). It is entirely unclear what constitutes a "timely manner". Further, because the NALs are an illicit discharge identification and elimination tool, time is of the essence. (C.2.b.). In many instances, a NAL exceedance must be investigated contemporaneously with the return of monitoring results, or the source will evade detection. Therefore, the Regional Board should impose a strict numeric deadline for "timely action". We suggest the Copermittee begin investigation of the source of the exceedance the business day following receipt of the monitoring results. The investigation should be expedited, and should not take more than two weeks.

Comment Response

The San Diego Water Board chose the phrase "timely manner" to allow Copermittees flexibility to prioritize investigations and source identification when a multitude of action level exceedances are identified. Also, the phrase "timely manner" allows for the differing return times of field data and lab data. Certainly, field analysis indicating an exceedance should be immediately responded to whereas lab analysis may take weeks to return data which then would initiate an investigation. It is unacceptable to wait for a lengthy QA/QC analysis prior to initiating an investigation; nor is it acceptable to solely rely on subsequent monitoring actions to address the cause of an exceedance.

Comment # 91 **Commentor** 10 **Comment Subject** Monitoring

Specific Comment

In addition, development of the monitoring plan for dry weather is largely left to the Copermittees. (Permit, Attachment E, C.1.b.). Sampling frequency must simply be "representative" of major outfalls and identified stations within each hydrologic subarea. (Id.). The actual frequency of sampling is not mentioned at all. As with most plans developed by Copermittees, this monitoring plan will surely be greatly and artificially constrained by costs. Therefore, we urge the Regional Board to set a minimum monitoring frequency that is scientifically sound, as opposed to a cost-driven frequency.

Comment Response

The referenced section has been written to provide flexibility to the Copermittees when selecting the number and frequency of monitoring major outfalls and identified stations that are a "representative percentage." Thus, the San Diego Water Board expects that the Copermittees will utilize current 303(d) listings, land use, the history of IC/ID complaints and the sensitivity of receiving waters in the selection and sampling of outfalls in order to, at a minimum, obtain a representative percentage over the permit term. The Copermittees have also identified in their ROWD that their current monitoring approach is not consistent with IC/ID requirements. It should be noted that the Copermittees, by being extended a chance to propose the program, have an opportunity to examine other MS4 non-storm water IC/ID programs in the region. Finally, the San Diego Water Board requires the Copermittees to submit their proposed monitoring plan for review prior to implementation.

Comment # 92 **Commentor** 8 **Comment Subject** Monitoring

Specific Comment

Prior to the submittal of the ROWD, the Copermittees met with Board staff to propose changes to the Monitoring and Reporting Program (MRP). In these discussions, Board staff identified two areas for needed improvement:

• Relocation of Illicit Connection I Illicit Discharge (IC/ID) monitoring stations to MS4 outfalls, and
• Incorporation of Action Levels

In more recent discussions, Board staff noted that the MRP needed significant modification to reflect the South Orange County MRP, but would be scaled to be appropriate to the smaller Santa Margarita Region.

[Per Capita Monitoring Cost Comparison Table]

Unfortunately, the final MRP requirements have been expanded well beyond the South Orange County MRP requirements, resulting in a program that is completely out of proportion with the needs and resources of the Santa Margarita Region. In fact, the proposed MRP requirements will result in a 500% increase in monitoring program costs, costing our residents over two and a half times the per capita costs for South Orange County.

The Copermittees recognize that monitoring and data collection is necessary. However, the MRP requirements exceed what is necessary to address management questions related to water quality, are beyond requirements dictated in the South Orange County MRP, and are beyond the Copermittees' ability to fund. Not only are the level of requirements inappropriate for the Santa Margarita Region, but they disregard the economic realities faced by the Copermittees. As such, the MRP fa lls far short of meeting the Executive Officer's stated goals of affordability.

In the interest of finding ways to offer Board staff a comparable program in a more cost effective and appropriate manner, the Copermittees have identified nine adjustments to the MRP that will save approximately seven hundred and eighty thousand dollars ($780,000) annually and bring per capita monitoring costs more in line with the South Orange County MRP, while maintaining the core components of the MRP. Table I summarizes the key changes and the respective cost savings. It is important to note that any change highlighted in RED reflects bringing the program in line with the South Orange County MRP. Figure I below shows graphically the comparative costs for the draft MRP with and without the requested adjustments. Please note that the 100% baseline in Figure 2 reflects the current cost of the Copermittees' current MRP.

[Table 1 - Cost Savings resulting from proposed MRP changes]
[Figure 1 - graph comparing draft permit costs with Requested Changes]
[Cost comparison table with Proposed Changes]

Although the requested adjustments to the MRP will not eliminate cost increases, and will result in an MRP which is more expensive, on a per capita basis, than the South Orange County MRP, they provide a more manageable program for the Copermittees.

The City requests that the Board make the adjustments identified above before Permit adoption.

Comment Response

The two areas discussed during the ROWD meetings were identified because they were proposed by the Copermittees in the ROWD. San Diego Water Board Staff also have made it clear through the process that water quality monitoring requirements under the Tentative Order were expected to be relatively consistent with San Diego and Orange County, as well as the 2004 SMC Report.

San Diego Water Board staff contend that the monitoring required in the Tentative Order has not been expanded “well beyond the South Orange County MRP requirements.” The MRP in the Tentative Order has actually been scaled back where appropriate, and many elements of the San Diego and Orange County MRPs are absent from the Riverside MRP. Furthermore, San Diego and Orange County MRPs in 2007 and 2009, respectively, had reduced monitoring requirements based upon the level of data collection during the previous permit terms. USEPA audits conducted in January 2008 (USEPA Region IX MS4 Inspection Report Riverside County Flood Control and Water Conservation District and County of Riverside, dated 03/31/2008), and subsequent enforcement action by the San Diego Water Board (Notice of Violation No. R9-2008-0053 and No. R9-2010-0074) documented significant short-comings in the Copermittees MRP. Thus,

reductions similar to those for Orange and San Diego County are not warranted.

The San Diego Water Board agrees that monitoring and data collection is necessary, and would go farther to state that water quality monitoring is a critical component of MS4 permits. The San Diego Water Board is attempting to make monitoring requirements for MS4 permits relatively consistent for Copermittees throughout the San Diego Region (see Finding E.12 and Discussion in the Fact Sheet). This is also consistent with Senate Bill 72 (Kuehl), which addressed the standardization of sampling and analysis protocols in municipal stormwater monitoring programs. In response to Senate Bill 72, the Stormwater Monitoring Coalition's Model Monitoring Technical Committee developed a Model Monitoring Program for Municipal Separate Storm Sewer Systems in Southern California in 2004. The San Diego Water Board, as well as Riverside County Copermittees, were represented during the development of the model monitoring program. The monitoring program under the current order (R9-2004-0001) includes some, but not all, recommended monitoring program elements in the 2004 report. In contrast, the San Diego and Orange County MS4 permits contain monitoring programs whose structure and requirements are built upon the 2004 report.

The MRP in the draft tentative order is built upon the 2004 report, and program elements mirror those in the San Diego and Orange County MRPs. Similar to the San Diego and Orange County MRPs, flexibility has been included to aid the Copermittees in determining some level of cost, as well as monitoring direction and focus. It is important to note that the MRP in the current Order does not meet the level of water quality monitoring required in San Diego and Orange County, as well as that prescribed in the 2004 report. Thus, it is expected that additional resources will be required for the Copermitttees to develop a MRP that will sufficiently characterize water quality while meeting the goals and objectives in the 2004 report. As noted above, during the term of the current Order, the Copermittees MRP were audited for permit compliance. These audits found significant deficiencies in the Copermittees MRP. In response, the Copermittees have stated that funds have been spent to meet monitoring requirements under the current Order. It is unknown if the increase in monitoring costs stated by the Copermittees is based upon levels of spending before or after money was allocated in the Copermittees' attempts to bring monitoring into compliance with the current MRP.

Furthermore, USEPA (61 Fed Reg 43761) has addressed the question regarding the quantity of storm water monitoring required for MS4 NPDES permits: "The amount and types of monitoring necessary will vary depending on the individual circumstances of each storm water discharge. EPA encourages dischargers and permitting authorities to carefully evaluate monitoring needs and storm water program objectives so as to select useful and cost-effective monitoring approaches. For most dischargers, storm water monitoring can be conducted for two basic reasons: 1) to identify if problems are present, either in receiving water or in the discharge, and to characterize the cause(s) of such problems; and 2) to assess the effectiveness of storm water controls in reducing contaminants and making improvements to water quality." Again, 2008 USEPA audits found that the monitoring in the current MRP to be insufficient. For example:

"it is unclear how the District is using its monitoring programs to measure the effectiveness of the BMPs it has implemented and to accordingly identify modifications and improvements needed to its SWMP (or DAMP as it is referred to by the permittee)."

And:

"The number and location of illicit discharge monitoring stations did not appear to be effective or sufficient to represent the MS4 and detect illicit discharges that may occur throughout the system."

It is also important to note that while the San Diego Water Board is attempting to make MRP requirements relatively consistent, there are differences in the Riverside MRP when compared to Orange and San Diego County. First, although the Copermittees permit area includes Santa Margarita HU and the San Mateo HA, which drains to portions of San Diego County, the MRP within the Tentative Order does not require any monitoring of downstream receiving waters outside of Riverside County. This is despite the fact that these areas are subject to the discharge from MS4s in Riverside County. While Orange and San Diego County MRPs include monitoring requirements for bays, estuaries, lagoons, and the ocean, the Riverside MRP does not. MRP requirements under the draft Tentative Order are limited to inland surface waters.

Comment # 93	**Commentor** 8	**Comment Subject** Unpaved Roads

Specific Comment

The requirements for unpaved roads are particularly cumbersome, onerous and unreasonable. In summary, the proposed unpaved road requirements may result in substantial and unnecessary additional Copermittee costs that are not justified by the facts in the Santa Margarita Region. The Copermittees believe that the existing MS4 Permit requirements for new development, construction, maintenance and
IC/ID adequately address regulation of unpaved roads that threaten water quality. If the Regional Board believes that unpaved roads require further regulation, the Copermittees believe that the appropriate regulatory mechanism is a general permit (Waste Discharge Requirements or NPDES permit) that would apply to all unpaved roads in the San Diego Region, rather than only those that are under the jurisdiction of the Copermittees.

The City requests that Sections F.1.i, F.3.a.(11) and F.3.c.(5) regulating unpaved roads be deleted from the draft MS4 Permit.

However, should the Water Board insist on retaining unpaved road requirements in this Permit, the Copermittees request the following revisions. These revisions are needed to ensure that all parties have a clear understanding of the requirements. In summary, the Copermittees request:

• Clarification that these requirements apply to those unpaved roads that the Copennittees maintain in their road system.
  - This should be commonly understood, but the clarification is important to include due to complex legal limitations and rights associated with access, ownership, and maintenance of unpaved roads.
• Removal of language that specifies specific BMPs that must be implemented.
  - Specifying the method ofcompliance is prohibited pursuant to CWC section 13360, and inappropriately forces the Copermittees to adopt paliicular solutions that may not best fit the situation.
• Removal of requirement for BMPs for private unpaved roads.
  - The proposed requirements would require the creation of an additional and unnecessary program element addressing privately owned unpaved roads. The Copermittees believe that a focused public outreach program should be implemented to educate property owners and associations about the need to properly maintain unpaved roads. This education program combined with existing IC/ID enforcement capabilities seems a more reasoned and responsible response to addressing this issue.

Should Sections F.1.i, F.3.a.(1l) and F.3.c.(5) regulating unpaved roads not be removed from the Permit, the City requests they be modified as noted above.

Comment Response

Please see the responses to comments 101, and 138-141.

Comment # 94	**Commentor** 8	**Comment Subject** New Development

Specific Comment

Section F.I.f of the draft MS4 Permit includes new requirements for the Copermittees to verify that Post-Construction BMPs are being appropriately maintained. The new requirements appropriately develop a risk-based approach to inspections, defining eight factors that the Copermittees must consider in determining 'high-priority' projects.

However, language in Section F.1.f.(2)(a) removes that discretion by stating:

'At a minimum, high priority projects include those projects that generate pollutants (prior to treatment) within the tributary area of a 303(d) listed waterbody impaired for that pollutant; or those projects generating pollutants within the tributary area for an observed action level exceedance of that pollutant.'

This language is excessively broad, and will require virtually all sites in the watershed to be designated as ' high priority' and therefore subject to annual in spections. This language is inconsistent with the goals of a socia lly responsible and affordable permit and should be modified for several reasons:

• Inspections frequencies should be based on risk of discharge. Annual inspections are not needed for all sites that generate a specific pollutant. For example, if a site generates a pollutant associated with 303(d) listing, but the site retains runoff onsite or stores those pollutants indoors,
annual inspections would be unnecessary. However, sites that store 303(d) listed pollutants outdoors or otherwise have a high risk of discharge should be inspected more frequently.

• The language dilutes Copermittee resources by requiring annual inspections of low-risk sites, preventing the Copermittees from appropriately concentrat ing resources on problematic sites/sources. This is because when an action level is exceeded then all parties in the watershed
are assumed guilty until proven innocent.

While the Copermittees are not opposed to implementing a program to verify that these BMPs are being maintained, it is critica lly important that they be provided the flexibility to determine which sites warrant annual inspections. Specifically, the City requests that the language in F.1.f.(2)(a) be amended as follows prior to adoption of the Permit:

'At a minimum, high priority projects include those projects that have been determined to be the source of an observed action level exceedance.' [final proposed text - proposed amended language in underline/strikeout text not shown]

Comment Response

The San Diego Water Board recognizes that the language in F.1.f.(2)(a) may be too broad and may result in identifying many SSMP projects as high priority projects. Thus, we have revised the language to provide more specificity, which will limit the number of SSMP project sites that will need to be inspected.

Comment # 95 **Commentor** 10 **Comment Subject** Reporting

Specific Comment

Most Copermittees expend tremendous resources on preparing and submitting their Annual Reports, but view this requirement as overly burdensome and largely an exercise in futility. After reading numerous and varied municipality Annual Reports, we tend to agree. Annual Reports are massive documents with surface-level detail, no depth, and very little substance. Copermittees are loath to point out any failures or inadequacies in their storm water programs, and virtually never highlight deficiencies. Instead, systemic issues such as lack of enforcement and funding, evident during field visits, remain unmentioned in Annual Reports.

Therefore, the Bay Council suggests a more appropriate tool for public involvement, reporting, and monitoring progress would be real-time or quarterly electronic reporting. The State Water Resources Control Board has moved into the digital age, making a variety of documents and reports publicly available via the internet. We encourage the Regional Board to work with Copermittees, utilizing the permissive Permit language to explore such a possibility. Neither the Regional Board, nor the individual Copermittee, is served by rigid reporting requirements that result in largely unread or useless documents. (Permit, K.)

Specifically, the dry and wet weather monitoring results should be available publicly online as soon as the results are received. NAL and SAL exceedance real-time reporting would benefit Copermittees as the public could aid in investigations or prove an otherwise valuable source of
information. Such real-time reporting might also prove a successful deterrent to illicit discharges. The Copermittees should further report inspections, BMP maintenance tracking, and SSMP project inventories quarterly. Construction site, municipal, industrial, and commercial inspections should also be reported quarterly. This type of information is invaluable to the public and the Regional Board, but is largely unavailable to either as Annual Reports are an attempt to summarize such information compiled over long periods of time. Smaller doses would prove more useful and easily digestible.

Comment Response

The San Diego Water Board agrees with the comment regarding the importance of making information, especially water quality monitoring results, available to the public for review. Although real-time data reporting is an admirable goal, the feasibility of real-time uploading is unknown. The San Diego Water Board does not want to include permit requirements where real-time uploading somehow limits IDDE monitoring and response which may be time-sensitive.

The MRP (Attachment E to the Tentative Order) requires the data collected to be SWAMP compatible, and other Regional Water Boards have already required Copermittees to upload data into on-line databases. Thus, the MRP section has been modified to require the Copermittees to upload water quality data into the California Environmental Data Exchange Network (CEDEN, http://www.ceden.org/) to facilitate the exchange of data between resource agencies, Copermittees, research institutions, and the public.

Comment # 96	**Commentor** 8	**Comment Subject** Commercial/Industrial

Specific Comment

Sections F.3.b.(1)(a)(i) and (ii) identify forty-two (42) categories of businesses that must be inventoried and inspected based on risk of pollutant discharge. However, Section FJ .b.(I)(a)(iii) adds virtually any business in the Permit area, independent of pollutant discharge risk:

'All other commercial or industrial sites/sources within or directly adjacent to or discharging directly to receiving waters within environmentally sensitive areas (as defined in Attachment C of this Order) or that generate pollutants tributary to an observed exceedance of an action level.'

[n effect, section F.3.b.(I)(a)(iii) adds the following additional businesses:

• EVERY business that is adjacent to (or within) an Environmentally Sensitive Area (ESA), regardless of whether the business generates or discharges any pollutants, and

• EVERY business that 'generates' pollutants which happens to be upstream of an action level exceedance, regardless of whether the site has ever discharged any pollutants.

This language expands the list of sites far beyond the current requirements, and well beyond those sites that actually pose a threat to water quality. This is clearly unnecessary and should be removed for several reasons:

• It inappropriately separates 'risk' from the 'response' , by requiring the Copermittees to inspect businesses irrespective of the risk that the business poses to water quality. For example, this language would require the Copermittees to expend resources and time inspecting hair salons, office buildings and other activities that happen to be adjacent to an ESA. This inappropriate broad-brush approach to permitting actually works to discredit the Copermittees NPDES programs and dilute resources, rather than enhancing protection of water quality.

• It will further remove the flexibility that the Copermittees need to be able to re-allocate resources to inspecting and following up with sites/sources that are problematic.

Therefore, the City requests that the language in F.3.b.(1)(a)(iii) be amended as follows prior to adoption of the Permit:

'All other commercial or industrial sites/sources that have been determined to be the source of an observed exceedance of an action level.'
[final proposed text - proposed amended language in underline/strikeout text not shown]

Comment Response

The San Diego Water Board recognizes that the language in F.3.b.(1)(a)(iii) may be too broad and may result in including too many commercial/industrial sites in the inspection requirements. Thus, we have revised the language to provide more specificity, which will limit the number of commercial/industrial sites that will need to be inspected.

Comment # 97	**Commentor** 10	**Comment Subject** Hydromod

Specific Comment

As with the San Diego HMP, the exemption for conveyance channels whose bed and bank are concrete lined all the way from the point of discharge to water storage reservoirs and lakes will prevent rehabilitation of these areas, especially in light of the retrofit requirements elsewhere in the Permit. (Permit, F.1.h.(4)(b)). Moreover, this exemption encourages continued channelization efforts. We urge the Regional Board to remove this exemption.

Comment Response

The San Diego Water Board does not agree that this exemption encourages continued channelization efforts. The exemption may only be used if the concrete lined channels already exist and does not prevent future retrofitting or rehabilitation. Also, the exemption cannot be used as justification to install additional concrete lined channels if they do not already exist. We also do not expect there to be many existing concrete lined channels that can be utilized for the exemption. Removal of this exemption may be considered in future iterations of the MS4 Permit.

Comment # 98	**Commentor** 8	**Comment Subject** Commercial/Industrial

Specific Comment

Section F.3.b.(4)(a) specifies what the Copermittees must review when performing an inspection. The new requirements in sub sections (i) and (ii) to review BMP implementation plans, and review facility monitoring data, respectively, are an unnecessary new mandate. They should be removed for several reasons:

• The requirements burden the Copermittees with reviewing information that is required under General Permits and is the responsibility of the Regional Board to enforce.

• The requirements would significantly increase the inspection time for sites with General Permits and endanger an existing collaborative inspection program (Compliance/ Assistance Program (CAP)) that leverages the time that highly trained Environmental Health Inspectors spend onsite for Certified Unified Program Agencies (CUPA) and Food Services inspections to also conduct NPDES inspections. The CAP program not only utilizes highly trained Environmental Health inspectors, but also regionalizes the inspections and therefore provides multiple benefits including uniformity, reduction in total number of inspections and higher-quality inspections. The Environmental Health HazMat inspection program administrators have indicated that they cannot accommodate the additional time required to implement the new requirements, as they would unduly cut into their ability to meet their own state-mandated inspection frequencies.

• By virtue of eliminating the CAP program, the requirements would effectively mandate a more fractured and disconnected set of inspections for the businesses, contrary to CAL EPA mandates for consolidated inspections, and in turn diluting the effectiveness of the program.

The City requests that the language in F.3.b.(1)(a)(iii) be amended as follows prior to adoption of the Permit:

(a) Inspection Procedures: Inspections must include but not be limited to:
(i) [Delete]
(ii) [Delete]
(iii) Check for coverage under the General Industrial Permit (Notice of Intent (NOI) and/or Waste Discharge Identification Number), if applicable;
(iv) Assessment of compliance with Copermittee ordinances and Copermittee issued permits related to runoff;
(v) Assessment of the implementation, maintenance and effectiveness of the designated minimum and/or enhanced BMPs;

Comment Response

The San Diego Water Board disagrees with the proposed changes. The San Diego Water Board disagrees that including a review of the BMP management plans and monitoring data, if available, would significantly increase inspection times and endanger the Copermittees' CAP program. Availability of BMP management plans and monitoring data are expected to be limited to few industrial sites not otherwise inspected by the CAP.

Inspectors can obtain valuable information for conducting their site inspections if a BMP management plan (.e.g., SWPPP or SPCC) is available for review, and if the site has collected monitoring data. Reviewing a BMP management plan can actually reduce inspection time by providing the inspector information about where BMPs and storm drain inlets are implemented and/or located. Reviewing monitoring data can inform the inspector of the types of pollutants that may be generated at a site and compliance with local ordinances, and will only take a few minutes to review. HazMat inspectors should already be inspecting these types of information. CAP inspectors can easily be trained to review these types of information. The Tentative Order does not prohibit the Copermittees continued coordination with CAP to conduct inspections and compliance oversight.

The Copermittees expressed some concern that BMP implementation plans may be interpreted as the SSMP that is developed for the site. The Tentative Order has been modified to clarify that BMP management plans do not include SSMPs (or WQMPs) that are developed for the development of the site. As such, clarifying language has been included in the errata for the Tentative Order.

Comment # 99 **Commentor** 8 **Comment Subject** Retrofit

Specific Comment

Section F.3.d, proposes a program to develop an inventory of existing developments that may be candidates for future water quality retrofits, The requirement goes on to encourage the Copermittees to collaborate with local property owners to promote urban retrofit in an effort to accelerate reductions in pollutant loading from existing urban areas.

Although laudable, this requirement has two significant problems:

1) The program is self-defeating as it contains no "carrots" to lure private property owners into participating in the program, Any property owner that is interested in volunteering in this effort would be required to fully comply with all provisions of the draft MS4 Permit. This includes preparation of compliance documents such as SSMPs, LID and hydromodification studies, subjecting themselves to additional regulatory scrutiny through business and BMP inspection programs required by the MS4 Permit, and otherwise incurring a myriad of costs and requirements. These costs and requirements would provide a strong disincentive to participate in a retrofit program, This program will only work if it is modified to remove these disincentives.

2) Current and projected economic conditions will limit the interest and participation of private property owners, Long-term economic predictions for Riverside County indicate that assessed valuations and property values wi ll likely remain stagnant for the term of this Permit. Similarly, sales tax and unemployment are not expected to significantly improve either.

Without Co-Permittee resources to supplement private retrofit projects, the current economic disincentives for private redevelopment that are built into the program and the current impact of the economy on private property owners, there is no real value to the program.

PREFERRED POLICY CHOICE: The City strongly requests that this program be deleted for the aforementioned reasons.

Alternatively, and at minimum, the Copermittees request that the schedule for completion of the retrofitting program be revised to provide for development during the term of the Permit and submittal of the proposed program with the next ROWD. This will allow the Copermittees to defer expenditures related to development of the program until later in the Permit term when it is hoped that economic conditions and local revenues will improve. The Copermittees expect few opportunities for retrofit until the economy improves. Due to the Copermittee's limited ability to require retrofit on private property, our best opportunities for retrofit may be associated with approvals of proposed modifications of existing developments.

ALTERNATE POLICY CHOICE: If the Retrofit requirements are not removed, the City requests that the Regional Board modify Section F.3.d. as follows:

Each Copermittee must develop and implement a retrofitting program that meets the requirements of this section upon submittal of the ROWD.

Comment Response

The San Diego Water Board disagrees with the commenter's concerns. First, the San Diego Water Board disagrees that all retrofit projects on privately owned properties will be or must be subject to SSMP redvelopment requirements. Most retrofit projects will easily be less than 1 acre in size and not create, add, or replace 5,000 square feet of impervious surface. Thus, those projects would not be subject to the SSMP, LID, and HMP requirements.

Second, the San Diego Water Board disagrees with the assumption that the current economic conditions will limit interest from private property owners. Retrofit interest already exist through the CWA Section 401 certification program, Supplemental Environmental Projects (SEPs), and grant programs. Retrofits do not have to be expensive. Retrofits could be as simple as redirecting downspouts from roofs to pervious or landscaped areas instead of to hardscaped areas discharging directly to the MS4. Private property owners will show interest if they become educated about the benefits of retrofits, especially if they are inexpensive and easy to implement.

The San Diego Water Board disagrees with the commenter's request to remove or delay the retrofitting requirements from the Tentative Order. Discharges from existing development sites need to be mitigated, which generally means implementation of measures to retrofit existing development sites with storm water control measures that can retain and/or treat storm water on site. Retrofitting existing development is possible and reasonable to significantly improve water

quality in receiving waters. The USEPA supports including the retrofitting existing development requirements in the Tentative Order (see comment 17).

Finally, the San Diego Water Board has already reduced the scope of this effort, and delayed submittal requirements as a result of discussions with the Copermittees prior to release of the Tentative Order. Any further reduction or delay would result in significant missed opportunities for implementing feasible retrofitting projects. The Copermittees must begin the planning and preparation sooner rather than later to identify opportunities for implementing retrofit projects to protect water quality from discharges of pollutants from existing development. No changes were made based on this comment.

Comment # 100 **Commentor** 8 **Comment Subject** Overirrigation

Specific Comment

The Draft MS4 Permit categorically prohibits the discharge of landscape irrigation; irrigation water; lawn watering; (collectively 'irrigation runoff) and non-emergency fire fighting flow runoff to the MS4. The basis for this requirement comes from the current Orange County storm water permit within the San Diego Region (NPDES No. CASOI08740), which prohibits such discharges.

Although irrigation runoff may have been shown to be a problem in South Orange County, it has not been shown to be causing problems in receiving waters in the Santa Margarita Region. Attachment 6 summarizes the unique conditions and other facts that warrant the restoration of irrigation runoffas a nonprohibited non-storm water discharge category. lt is important to reiterate the three key points made in
Attachment 6

• Unlike the watersheds in South Orange County, the Santa Margarita Region is an ephemeral watershed;

• Unlike South Orange County, the Copermittees have not identified landscape irrigation, irrigation water or lawn water as an actual source of pollutants or conveyance of pollutants to waters of the U.S.;

• The draft MS4 Permit requires Copermittees to eliminate irrigation runoff TO THE MS4, which by definition, requires elimination of discharges to streets, curbs and gutters.

As noted above, the prohibition appears to hold the Copermittees responsible for any amount of irrigation runoff discharged to the curb and gutter, regardless of whether or not the discharge ever reaches receiving waters or causes or contributes to the exceedance of a water quality standard. This fact, combined with the fact that irrigation runoff has not been shown to be causing impairments in the local receiving waters, will make enforcement difficult to justify with residents and will likely result in community outrage over bans on irrigation. Further the Copermittees are not water purveyors, and as such, have little control over residential irrigation runoff outside of sending code enforcement officers out to look for incidents of excessive irrigation runoff. This is a very inefficient use of resources. In any event, the provisions as written will do little for water quality but potentially much for community outrage against water quality programs. The Copermittees do not believe this is the intent of the Board. It is further worth noting that the Permit already contains an investigation and remediation process via Non-Storm water Action Levels (NALs) by which the Copermittees will identify the source of problematic non-storm water discharges. Should the source be found to be a conditionally exempt nonstorm water discharge, the permit requires the Copennittees to address that discharge or the entire category of discharges as appropriate. By allowing the NAL process to determine when and where conditionally exempt discharges need to be prohibited, the Copermittees are better positioned to justify any enforeement actions.

PREFERRED POLICY CHOICE: The City requests that the Regional Board restore the conditional exemption for landscape irrigation, irrigation water and lawn watering.

Alternatively, if the Regional Board nevertheless insists on prohibiting Irrigation Runoff, the Copermittees request that the draft MS4 Permit be revised to allow for irrigation runoff to be managed as a JRMP program, rather than as a prohibited discharge to the MS4. This alternative request is eonsistent with how the Permit currently deals with non-emergency fire fighting discharges, which was also removed from the list of non-prohibited non-storm water discharges. The Executive Officer stated that he would be open to consideration of a program for irrigation runoff that would address discharges from the MS4. This alternative approach allows the Copennittees to develop a program that focuses on irrigation runoff problem areas, as opposed to holding the Copermittees responsible for eliminating any instant case of over-irrigation to a street independent of threat to receiving water quality.

ALTERNATIVE POLICY CHOICE: The City requests that the Regional Board clarify that irrigation runoff is only prohibited where it is discharged/rom an MS4 (into receiving waters) by adding the following language:

B.4. As part ofthe JRMP, the Copermittees must develop and implement a program to address pollutants from landscape irrigation, irrigation water and lawn watering identified as significant sources of pollutants to waters ofthe United States.

Comment Response

The San Diego Water Board agrees, in part, that the basis for prohibiting the discharge of overirrigation runoff and non-emergency fire fighting flow runoff into the MS4 is the Orange County MS4 Permit. The San Diego Water Board has also cited several other sources to justify the prohibition in the Fact Sheet. The San Diego Water Board does not agree with the commenter's recommendation to restore the overirrgation runoff categories as non-prohibited non-storm water categories. Please see the responses to comment 25, 27, 83, and 175.

The San Diego Water Board disagrees that the prohibition will make enforcement difficult to justify with residents and will likely result in community outrage over bans on irrigation. This is not a ban on irrigation; rather, overirrigation discharging to the MS4. The prohibition is consistent with the Water Conservation in Landscaping Act (AB1881), which already required cities and counties to adopted landscape water conservation ordinances prohibiting runoff from inefficient landscape irrigation by Janaury 1, 2010. The cities and counties are required to adopt ordinances that prohibit runoff from "the target landscape" to "adjacent property, non-irrigated areas, walks, roadways, parking lots, or structures." The Copermittees are already required to enforce these ordinances.

The San Diego Water Board disagrees with the the commenter's "Preferred Policy Choice". The change proposed by the commenter's "Alternative Policy Chioce" is not necessary. In the event that overirrigation runoff is identifed as an illicit discharge to "adjacent property, non-irrigated areas, walks, roadways, parking lots, or structures", which includes the Copermittees' MS4s, the Copermittees are expected to address the illicit discharge through their IC/ID programs. No changes were made based on this comment.

Comment # 101 **Commentor** 13 **Comment Subject** Unpaved Roads

Specific Comment

There are many different categories of unpaved roads within the unincorporated County area. These include County-Maintained unpaved roads, dedicated and accepted public roads (which are not County maintained), roads dedicated but not accepted, private roads, utility access roads, roads through tribal lands, and others. These roads are maintained by numerous entities besides the County, such as Homeowners Associations, quasi-public entities like County Service Areas, Community Service Districts, public and private utilities, Tribes, and in many cases, individual property owners. The County in fact is prohibited by law from spending general gas tax dollars (our main funding source) for maintenance of roads not in the County Maintained Road System, and is not financially able to take on new unpaved roads into the County Maintained System until they are improved to County Standards.

The proposed permit requirements would therefore impose an undue and substantial regulatory burden on the County and would create a class of potential unwitting "violators" that are not familiar with these requirements, including hundreds if not thousands of property owners that have been maintaining unpaved roads for many decades as needed to access their property. The special requirements for development and maintenance of unpaved roads were proposed by Regional Board staff for inclusion in the draft MS4 Permit very late in the process, after a number of weeks of discussions on the overall permit language and just prior to release for the Santa Margarita Region for public comment. During those discussions, unpaved roads were not raised by Regional Board staff as a source requiring additional regulatory attention.

Given the complexity of these jurisdictional issues, and the number of stakeholders that would be impacted, we respectfully request that the regulation of unpaved roads be removed from this permit. Alternatively, unpaved roads could be considered as part of a separate general permit to allow for proper stakeholder involvement and vetting, at the least within those areas of the permit (see below) that have to do with maintenance
provIsions. Given the complexity of this issue and the impact on thousands of properties, another option is to achieve a water quality benefit through education programs, not using limited resources on regulation and enforcement. We also note that unpaved road regulation was not included in the recent Orange County permit. Orange County receives approximately 8 times the amount of funding on a per mile
basis towards their County-Maintained roads as does Riverside County, so imposing additional requirements on the Riverside County permit magnifies the undue regulatory and financial burden.

Comment Response

The Tenative Order's requirements for the maintanence of unpaved roads does not require the County to maintain any roads that are not within the County's Maintained Road System. Rather, if a road is not maintained by the County, the Tenative Order requires the County to ensure the party(ies) responsible for maintaining the road conduct road maintenance for the protection of water quality. As such, the commenter's concern about spending general gas tax dollars or taking on new unpaved roads into the County Maintained System is unfounded.

Contrary to the commentor's assertion, the unpaved roads requirements were not proposed "very late" in the process. It was proposed and discussed proir to the release of the Tentattive Order, and modifications were made as a result of these discussions (also prior to the release of the Tentative Order). The County Department of Transportation had the same public comment period timeframe to review and comment on the Tentative Order's provision as any other public or private agency or individual, if not more. Furthermore, any concerns about process does not diminish or negate the water quality impacts currently caused by unpaved roads. Please also see the response to comment 104.

Within south Orange County, unpaved roads were not identified as a source or potential source of water quality pollution; therefore the requirements were not included in the Orange County MS4 Permit (Order No. R9-2009-0002). South Orange County is mostly in a built-out condition and has very few unpaved roads in comparison to Riverside County. In addition, the San Diego Water Board has not received the same level of complaints or investigations for unpaved roads in Orange County.

Nevertheless, the San Diego Water Board is sensitive to the Copermittee's perceived difficulties with protecting water quality from runoff from privately maintained unpaved roads and has removed the regulation of unpaved roads maintained by private parties, section F.3.c.(5). The San Diego Water Board reserves the right to include provisions for unpaved roads that protect water quality in future MS4 permits, WDRs or individual/general NPDES permits.

Comment # 102	**Commentor** 13	**Comment Subject** Unpaved Roads

Specific Comment

Requirements for the development of unpaved road projects are addressed in section F.1.i. on page 45 of the Draft MS4 Permit. This requirement states:

i. Unpaved Roads Development
The Copermittees must develop, where they do not already exist, and implement or require implementation of erosion and sediment control BMPs after construction of new unpaved roads. At a minimum, the BMPs must include:
(1) Practices to minimize road related erosion and sediment transport;
(2) Grading of unpaved roads to slope outward where consistent with road engineering safety standards;
(3) Installation of water bars as appropriate;
(4) Unpaved roads and culvert designs that do not impact creek functions and where applicable, that maintain migratory fish passage;

It is our contention that construction of new unpaved roads is already adequately regulated through development regulations. New unpaved roads built through development fall under the definition of a "project", and as such are already required to develop and implement project-specific SUSMPs, which include identification of BMPs in the same manner as required of other development projects. Unpaved road projects
are also required to comply with the General Permit-Construction which requires preparation of a SWPPP. These requirements are implemented by the Permittees during the development review process and in issuance of grading permits. We also note that the development process already achieves a gradual "retirement" of unpaved roads, as the County requires in many cases that new development replace unpaved access roads with paved access.

Additional separate requirements for development of unpaved roads are redundant to these requirements and may only complicate compliance. However, if the Board wishes to include permit language to further clarify what is already required through these permits, we would be pleased to work with the Board to help craft appropriate language.

Comment Response

The definition of a new development Priority Development Project requiring a SSMP only addresses roads with impervious surfaces or ones that are greater than one acre. Further, the Construction Stormwater Permit (Order 2009-0009-DWQ) and associated SWPPP, do not address post-construction BMPs in areas that are already regulated by a Phase I MS4 permit.

The requirements are not redundant but rather specific to the unique water quality impacts caused by unpaved roads development. To whatever extent there exists overlap with the existing SSMP and grading permit approval processes, this should result in minimal additional efforts for the Copermittees to implement.

Comment # 103	**Commentor** 13	**Comment Subject** Unpaved Roads

Specific Comment

This is our primary issue of major concern, particularly since the proposed language would appear to impose regulatory requirements on roads that are not part of the County Maintained Road System that we operate.

Requirements for the maintenance of unpaved road projects are addressed in section F.3.a.(10) on page 56 of the Draft MS4 Permit. This requirement states:

(10) Unpaved Roads Maintenance
(a) The Copermittees must develop, where they do not already exist, and implement or require implementation of BMPs for erosion and sediment control measures during maintenance activities on unpaved roads, particularly in or adjacent to receiving waters.
(b) The Copermittees must develop and implement or require implementation of appropriate BMPs to minimize impacts on streams and wetlands during unpaved road maintenance activities.
(c) The Copermittees must regularly maintain their unpaved roads adjacent to streams and riparian habitat to reduce erosion and sediment transport;
(d) Re-grading of unpaved roads during maintenance must be sloped outward where consistent with road engineering safety standards;
(e) Through their regular maintenance of unpaved roads, the Copermittees must examine the feasibility of replacing existing culverts or design of new culverts or bridge crossings to reduce erosion and maintain natural stream geomorphology.

As we have stated, this issue should be addressed through a broad general permit or an education program. However, if the Board finds it necessary to impose additional permit requirements on maintenance activities, which go well beyond the Board's previous definitions of a "project", we respectfully request that this language be rewritten to make it clear that it applies to those roads within the County (or City) Maintained Road System.

Comment Response

The Copermittees are encouraged to include unpaved roads as part of their education program. The San Diego Water Board reserves the right to issue a broad general permit regulating the discharges from unpaved roads. Uuntil such time, it is appropriate to regulate unpaved roads through the MS4 permit per 40 CFR 122.26 (d)(iv)(A)(3) which does not distinguish between paved or unpaved roads. This is supported by the San Francisco Bay Area MS4 permit adopted in 2009. Please also see the response to comment 101.

Comment # 104 **Commentor** 13 **Comment Subject** Finding

Specific Comment

Findings D.l.C, pg 57-59, states:

"During the previous permit period, the San Diego Water Board identified, through investigations and complaints, sediment discharges from unpaved roads as a significant source of water quality problems in the Riverside County portion of the San Diego Region. Enforcement and inspection activities conducted by the San Diego Water Board during the previous permit term have found a lack of source control for many unpaved roads within the jurisdiction of the Copermittees".

The Department supports the continued application of development and construction requirements and maintenance of temporary post-maintenance erosion a[1d sediment control BMPs as specified in existing permits. However, we do not believe that sufficient justification has been presented to support the identification of unpaved roads as a Significant source of water quality problems in the Santa Margarita Region. In these days of uncertain state funding and dwindling local funding sources, every dollar spent on additional regulatory requirements needs to be weighed against the benefit of otherwise using funding on basic public health-and-safety needs such as road maintenance and safety improvements.

The discussion of Finding D.1.c. states that the inclusion of unpaved road requirements were based on findings by the San Diego Regional Board during typical compliance assurance activities, audits, or receipt of complaints. However no feedback from these activities were reported to the Permittees at the MS4 Permit discussions prior to the proposal of the unpaved road requirements just before the draft permit was released.

The Department has reviewed the documents cited by Regional Board staff in the discussion of Finding D.1.e. and the conditions in the Santa Margarita River are vastly different from those in Pennsylvania and Northern California cited in those documents. Nevertheless, these documents do not suggest that unpaved roads are a significant source requiring special attention in MS4 permits. Further, neither the Permittee's monitoring data nor our observations support a conclusion that unpaved roads are a significant source of pollutants warranting special regulatory attention and we request that this finding be deleted unless significant data specific to the Santa Margarita Region can be produced. In particular, the Department requests a copy of the investigations and complaints along with the data that supports a significant source of water quality problems on unpaved roads, including a listing of roadways where water quality problems have been identified.

Comment Response

The San Diego Water Board disagrees with the commenter about the events leading to the inclusion of the unpaved road requirements in the Tentative Order. While the inclusion may not have been discussed at the beginning of the more than a dozen meetings that took place before the Tentative Order was released to the public, it was discussed multiple times before the release. The need to include the unpaved road provisions was identified after an early meeting with the Copermittees about the municipal program component of the Tentative Order. The Copermittees were provided the draft unpaved roads provisions as soon as they were drafted. After the Copermittees reviewed the draft language, it was discussed during at least two subsequent meetings. After the discussions with the Copermittees, the language was modified significantly based on the comments and recommendations of the Copermittees. Please also see the response to comment 101.

The San Diego Water Board has received several complaints about and observed several instances where sediment from unpaved roads has discharged into waters of the U.S. and/or State, causing a condition of pollution and/or nuisance. The commenter is welcome to review the documentation and records regarding these complaints and investigations, which are available to the public at the San Diego Water Board. Please also see the response to comment 138.

The San Diego Water Board took into consideration the Copermittees' concerns in the development of the unpaved roads requirements. The San Diego Water Board worked with the Copermittees in the development of the unpaved roads requirements and made changes where appropriate (in addition, see the responses to comments 101 and 139-141). The San Diego Water Board maintains that the Tentative Order should include provisions that specifically address pollutants from unpaved roads.

Comment # 105 **Commentor** 12 **Comment Subject** LID

Specific Comment

The exclusion of economic feasibility in provisions F.1.d.(4)(a), F.1.d.(4)(c), and F.1.d.(7)(b) is readily apparent (only technical feasibility is mentioned) and we urge correction and explicit recognition of conducting both technical and economic feasibility analysis when evaluating the appropriate combination of LID controls that meet the Permit's performance sizing criteria as defined in F.1.d.(4)(c). In particular, the Tentative Order requires in F.1.d.(4)(a) that "each copermittee must require LID BMPs or make a finding of technical infeasibility for each priority development project" and in F.1.d.(4)(c) that "if onsite infiltration LID BMPs are technically infeasible per section F.1.d(7)(b), other LID BMPs may be allowed for use to treat stormwater onsite provided that other LID BMPs are sized to hold the design storm volume that is not infiltrated." In both instances, economic feasibility is excluded and this omission must be corrected given the importance of balancing technical and economic feasibility. In fact, the San Diego Regional Board recognized the importance of economic feasibility in the South Orange County MS4 permit and included the following language in the adopted permit (R9—2009-0002, Section F.(7)(b)):

"For each PDP participating, a technical feasibility analysis must be included demonstrating that it is technically infeasible to implement LID BMPs that comply with the requirements of Section F.1.(d)(4). The Copermittee(s) must develop criteria for the technical feasibility analysis including a cost benefit analysis, examination of LID BMPs considered and alternatives chosen."

We ask that the Board make the south Riverside County permit language at least consistent with that included in the adopted south Orange County MS4 permit and explicitly allow economic feasibility to be considered when evaluating appropriate LID BMPs to meet the onsite performance standard.

Comment Response

The San Diego Water Board found the addition of an economic feasibility analysis on a project proponent could be unnecessarily burdensome. A cost benefit analysis for LID BMPs is unnecessary because USEPA studies have demonstrated that LID is both fiscally and environmentally beneficial (USEPA, "Reducing Stormwater Costs through Low Impact Development (LID) Startegies and Practices, December 2007, EPA 841-F-07-006). In the vast majority of cases, significant savings were realized due to reduced costs for site grading and preparation, stormwater infrastructure, site paving, and landscaping.

Comment # 107 **Commentor** 12 **Comment Subject** LID

Specific Comment

We appreciate the Board's recognition in the Fact Sheet that properly engineered LID filtration BMPs are available to a project developer to meet the LID performance standard. However, we are troubled by the pervasive use of the terms "without runoff" and "hold the design storm volume that is not infiltrated" in the Tentative Order. These terms continue to propagate the incorrect application of LID in that stormwater that has undergone filtration and/or treatment cannot be of equal or better quality than that retained on site given the performance criteria specified in F.1.d.(4)(c). We again urge the Regional Board to eliminate these terms and expressly allow biofiltration and biotreatment LID practices to meet the onsite performance standard without having to perform an exhaustive technical and economic feasibility analysis and to not relegate these controls to a lesser status.

Comment Response

Comment noted. The errata in the Tentative Order clarifies that LID filtration BMPs that provide equal or better quality than that retained on site may be used and are preferred to conventional post-construction storm water treatment BMPs.

Comment # 108	**Commentor** 11	**Comment Subject** LID

Specific Comment

The Office of Water Resources Supports Low Impact Development (LID) in Concept:

The Office of Water Resources (OWR) supports the concept of LID from a water quality perspective. Cleaner water coming onto Camp Pendleton not only sustains healthy ecosystems, but also ensures water in Camp Pendleton's aquifers is safe and suitable for potable use. Although, implementation of LID is expected to improve the quality of water that reaches Camp Pendleton via the Santa Margarita River (SMR), if improperly structured, LID has the potential to reduce the volume of high quality water that would otherwise arrive downstream to support beneficial uses on Camp Pendleton. Beneficial uses on Camp Pendleton, which are supported by historic baseflows in the SMR, include-but are not limited to--providing seventy percent of Camp Pendleton's water supply and sustaining populations of threatened and endangered species.

Comment Response

Comment noted.

Comment # 109 **Commentor** 11 **Comment Subject** Legal

Specific Comment

The Proposed Tentative Order Remains Problematic From a Water Supply Perspective:

OWR appreciates that the Regional Board has already included provisions in the Proposed Tentative Order that appear oriented towards protecting downstream water users from encroachment of historical flows. However OWR remains concerned that some provisions in the Proposed Tentative Order could be read to incentivize removal of native SMR water from the watershed in a manner that has the potential to reduce SMR baseflows. We have suggested revisions to the Proposed Tentative Order at the end of this memorandum that we believe will further reduce the risk to our water supply.

Treatment of Runoff Before Discharge into Receiving Waters:

Finding E.7 on (page 14) raises a potential dilemma for MS4 operators that could facilitate large scale impoundment and export of stormflows for "runoff treatment" to the detriment of downstream water right holders. Specifically, Finding E.7 states that"[t]reatment and/or mitigation must occur prior to the discharge of runoff into receiving waters." Because achieving water quality standards may require extensive treatment-particularly to achieve the existing nutrient standards in the Basin Plan, there is real risk that developers of large scale development/retrofit projects will impound large amounts of water onsite in lined facilities or export the water to a watershed with less stringent water quality objectives where the water can be discharged (or reclaimed for consumptive use) at significant savings to the MS4 or project developer.

To address this concern, the Regional Board should consider adding a section to the Findings in the Proposed Tentative Order which clarifies that impoundment or export of storrnwater/rainwater for the purpose of avoiding pertinent discharge standards and/or basin plan objectives is not a proper use of stormwater absent demonstration of compliance with California Water Code Sections 1200-1225.

Along these lines, and to reduce risk that storrnwater capture will reduce historic baseflows or otherwise diminish the water rights of downstream water users, we recommend the following additional revisions to the Proposed Tentative Order:

1. Revise Section F.lc.8 (page 29) to read as follows:

Rain water harvesting, where feasible andfully protective ofdownstream water rights, must be implemented as part of the site design and construction, and to supplement offsite beneficial uses.

2. Amend Section F.3.d.2 to add an additional criterion, along the lines below for prioritizing retrofit of existing development:

(k) the extent such projects are fully protective of downstream waterrights
[footnote to F.3.d.(2)(k): This recommended amendment will promote consistency with Section F.3.d.6(d) and ensure that the prioritization of retrofit projects properly considers the ramifications of retrofit on downstream baseflows.]

Comment Response

The San Diego Water Board believes that significant export of stormwater flows outside of the watershed will require waste discharge requirements. Section F.1.c.(8), Infiltration and Groudnwater Protection, has been modified to include language that is intended to be protective of downstream water rights.

Section F.1.c.(8) has been modified to clarify that the requirement is for the reduction of pollutants in storm water discharges to the MEP. The San Diego Water Board does not have the water rights expertise to evaluate the full scope and legal implications of the commenter's water rights. The San Diego Water Board's understanding is that through current agreements Camp Pendleton is guaranteed base flows from the upstream water districts regardless of the amount of runoff. The Tentative Order clarifies under section E.1 that nothing within the Tentative Order authorizes an action that reasonably anticipated harm downstream water rights holders.

Comment # 110 **Commentor** 10 **Comment Subject** Hydromod

Specific Comment

With the HMP and with all other plans required by the Permit, such as monitoring, it is imperative that the Regional Board play the lead role. Bay Council understands, given budget constraints and furlough restrictions, the Regional Board has fewer resources and more work to do. Nonetheless, as permit requirements are delegated to Copermittees for development and planning, water quality suffers and NGOs and the public are left out of the process.

As with the San Diego HMP, this Permit requires Copermittee-driven HMP development. However, the San Diego process serves to shed light on the likely result: an artificially cost-constrained plan with frequent exercise of exemptions. Therefore, it is critical that the Regional Board play a lead role in the development of the HMP and all other plans.

If the current practice remains, Copermittees will expend large sums of money in developing a plan made publicly available (and indeed reviewed by the Regional Board) at the end of the process. Often the Regional Board and public are faced with two equally unappealing options: force the
Copermittees to start anew and delay implementation; or accept an inadequate plan. The final product in this type of planning further represents a financial commitment by Copermittees. Because of this financial investment, Copermittees that may have been able to proceed in a different direction at the beginning stages of development, are unable to afford (or unwilling to pay for) repeating the process after the plan is fully developed.

A possible remedy is a cost-share plan, or outside consultant who is employed by the Regional Board, reports to the Regional Board, but is paid via Copermittee funds. In order to foster a truly public process, and scientifically driven compliance (as opposed to cost-constrained), the Regional Board must remain the ultimate decisionmaker, with staff developing plans—not Copermittees. Therefore, we urge the Regional Board to commit to heavy oversight if not a cost-share mechanism to take charge of the development of these plans in order to ensure timely completion and true advancement of water quality.

Comment Response

The San Diego Water Board understands and appreciates the concern expressed by the commenter. While we appreciate the recommendations provided, they are not necessary at this time. Because of their current economic issues, the Riverside County Copermittees have expressed, on many occasions, their desire to borrow heavily from the HMPs already developed (e.g., San Diego County, Santa Clara County, Contra Costa County) or are in development (e.g., Orange County), and work already performed by SCCWRP. The Tentative Order allows this. The San Diego Water Board remains the ultimate decision maker for approving the elements included in the Riverside County HMP, and as such, will ensure that the requirements of the Tentative Order are met for the development of the Riverside County HMP.

Comment # 111 **Commentor** 10 **Comment Subject** Watershed Workplan

Specific Comment

The Permit requires identification of sources causing the highest water quality problems within the Upper Santa Margarita Watershed. (Permit, G.1.c.). A relatively easy aid to identification of such sources is expanded public outreach. We urge the Copermittees to survey the public and NGOs in the area in ranking water quality problems. In addition, Copermittees should provide bilingual public notice of annual watershed workplan meetings by sending such notices directly to area residents or holding special semi-annual workshops, especially in underserved communities. Copermittees might find the public particularly useful in source identification and BMP implementation strategies. This could further serve as an effective tool to meet the education and public participation Permit requirements. (Permit, G.4.). Lastly, we urge the Copermittees in Riverside County to reach out to Copermittees in the lower portion of the Watershed to coordinate source identification and monitoring activities.

Comment Response

Comment noted.

Comment # 112	**Commentor** 4	**Comment Subject** General

Specific Comment

This document highlights the agreed upon revisions resulting from detailed discussions between Water Board Staff and the Copermittees on program implementation. The intent of these revisions is to ensure that requirements in the Draft MS4 Permit continue to be protective of water quality while allowing the Copermittees flexibility in resource allocation and cost efficiencies. This collaborative process enhanced a mutual understanding of these goals and, consequently, many of the Permit's requirements are streamlined, clearer, implementable and protective. This document highlights specifically the Low Impact Development (LID) and the Interim Hydromodification requirements that have been revised from the Orange County NPDES MS4 Permit in order to recognize the Copermittees' advanced efforts.

Comment Response

Comment noted.

Comment # 113 **Commentor** 4 **Comment Subject** General

Specific Comment

[From Attachment 1 to RCFC&WCD comment letter]

Summary of Proactive Efforts to Manage Stormwater

Introduction

Murrieta and Temecula Creeks and their tributaries are an important economic, environmental and social resource for the Santa Margarita Region. As an example, Murrieta Creek serves as the backdrop for Old Town Temecula, an important local tourist attraction. Several ecological preserves that are utilized by local residents and tourists are also located within the Santa Margarita Region. The Permittees are cognizant of these resources and their benefits and have implemented or initiated proactive programs beyond the requirements of the NPDES MS4 Permits to ensure that these resources remain viable and are protected for future generations.

Integrated Planning
-Upper Santa Margarita River Integrated Water Management (IRWM) Plan
-Santa Margarita River Executive Management Team
-Murrieta Creek Flood Control, Environmental Restoration and Recreation Project

Management of New Development
-LID BMP Design Manual
-Public BMP Maintenance Mechanism

Management of New Development
-LID BMP Testing and Demonstration Facility
-Southern California Stormwater Monitoring Coalition

Statewide Stormwater Leadership
-Pesticide Regulation
-California Stormwater Quality Association (CASQA)

Habitat and Aquatic Resource Conservation
-Western Riverside County Multiple Species Habitat Conservation Plan (MSHCP)
-Special Area Management Plan (SAMP)

Comment Response

The San Diego Water Board is aware of the Copermittees' efforts to manage storm water as listed in Attachment 1. The Copermittees characterize these efforts as "proactive" because they were not specifically required in Order No. R9-2004-001. In many cases, these efforts were in response to findings during the implemention of Order No. R9-2004-001, in response to the requirements of the recently adopted Santa Ana Water Board Order No. R8-2010-0033, in response to efforts initiated by the Orange County and/or San Diego County Copermittees, in response to USEPA contracted audits and/or in anticipation of the requirements expected to be in the Tentative Order. We expect that the efforts of the Riverside County Copermittees listed in Attachment 1 will facilitate the implementation of several elements of the Tentative Order, but we also expect the Copermittees to continue identifying efforts and opportunities that will improve their storm water management programs to improve water quality in the Upper Santa Margarita Watershed.

Comment # 114 **Commentor** 4 **Comment Subject** Economic

Specific Comment

[From Attachment 2 to the RCFC&WCD comment letter]

Due to their reduced revenues, the Copermittees budgets and staffing have been significantly reduced for virtually all services and programs operated by the Copermittees, including police, fire, and paramedic services. Funding has been focused on essential public safety and existing state and federally mandated programs. Increases in funding for the water quality mandates contained in the draft Permit can only come from reduced funding for these basic priorities. Therefore, the expanded compliance requirements proposed in the draft Permit are economically infeasible.

Comment Response

Please see the response to comment 9.

Comment # 115 **Commentor** 4 **Comment Subject** Economic

Specific Comment

[From Attachment 2 to the RCFC&WCD comment letter]

POPULATION

Riverside County, which is subject to three NPDES MS4 permits, has a total population of 2,153,186. However, only 289,765 persons (approximately 13 percent) reside within the Santa Margarita Region. Population and housing projections for the Santa Margarita Region are summarized in Table 1. MS4 discharges in Riverside County are regulated by separate NPDES stormwater permits issued by the Colorado River, Santa Ana, and San Diego Regional Water Quality Control Boards. Although these three MS4 permits address the same federal regulatory requirements, the provisions in the draft Permit are often not well aligned with the requirements of the other two MS4 permits. As such, the cost for complying with those requirements is borne entirely by the 289,765 residents within the Santa Margarita Region.

Comment Response

The San Diego Water Board is aware that Riverside County is subject to regulation by three MS4 Permits from three separate Regional Water Boards. The San Diego Water Board agrees that the costs for complying with the requirements of the Tentative Order should be borne primarily by the residents in the Upper Santa Margarita Watershed, but we do not agree the provisions of the permit are not well aligned with the requirements of the other MS4 Permits.

As the RCFC&WCD is aware, the San Diego Water Board met with the Riverside County Copermittees on more than a dozen occasions between March and July 2010. The San Diego Water Board modified the Tentative Order in several ways, in response to recommendations by the Riverside County Copermittees during those meetings, to make it more aligned and compatible with Santa Ana Water Board Order No. R8-2010-0033.

The commenter cites figures for the population of the Upper Santa Margarita Watershed compared to all of Riverside County. The commenter, however, fails to acknowledge that the population growth in this part of Riverside County has also grown substantially since 2000. According to the 2000 census, the population in the Upper Santa Margarita Watershed was approximately 150,000. As reported by the Copermittees in their 2008-2009 Annual Report, the population in the Upper Santa Margarita Watershed was over 250,000 as of January 1, 2009, an increase of at least 65 percent since 2000. According to the commenter, the projected population for the Upper Santa Margarita Watershed is approximately 290,000 in 2010, an additional increase of approximately 15 percent since January 1, 2009. The population has almost doubled in the last 10 years. Such a significant increase in population also means a significant increase in development and need for expanded storm water and non-storm water management programs.

Because many of the provisions of the Tentative Order have been modified to be more aligned with the requirements of Santa Ana Water Board Order No. R8-2010-0033, the Riverside County Copermittees will be able to benefit from efforts that are being implemented for the Santa Ana Region, which will provide some cost efficiencies for complying with the requirements for both regions.

Comment # 116	**Commentor** 4	**Comment Subject** Economic

Specific Comment

[From Attachment 2 to the RCFC&WCD comment letter]

CURRENT ECONOMIC CONDITIONS

Unemployment
Higher unemployment directly impacts the revenue streams available to the County and the Cities for funding programs and services. As illustrated in Figure 1, the unemployment rate in Riverside County is currently 15.3 percent, which is 42 percent higher than the unemployment rate in San Diego County (9.8 percent) and 56 percent higher than the unemployment rate in Orange County (9.8 percent).

Comment Response

The San Diego Water Board recognizes that Riverside County is currently experiencing economic difficulties and high unemployment. The unemployment figure cited from Figure 1 may be true for Riverside County as a whole, but does not necessarily provide an accurate representation of the unemployment rate in the Upper Santa Margarita Watershed. The Upper Santa Margarita Watershed area is located between San Diego and Orange Counties, with lower than average unemployment rates for the state, which could have a localized influence on the unemployment rate in the Upper Santa Margarita Watershed. Unemployment in Riverside County, as a whole, is also heavily influenced by agriculture, and seasonal agricultural workers that are not currently employed affects the overall unemployment rate.

Also, as noted in the response to comment 115, the population in the Upper Santa Margarita Watershed is projected to grow approximately 15 percent in 2010 compared to January 1, 2009. This growth may indicate that there will soon be additional economic activity and unemployment will decrease in the near future.

Please see the responses to comments 8 and 9 for a discussion about the Copermittees' revenue sources for funding their storm water programs.

Comment # 117 **Commentor** 4 **Comment Subject** LID

Specific Comment

The Copermittees strongly support the language in the draft Permit with regard to Low Impact Development (LID) BMPs (Section F.1.d.(4)). Through discussions with staff, the Copermittees have presented their commitment and vision for LID, emphasizing that their programs' goals are in line with the intent of the LID language found in the Orange County permit. The District and the County, with input from the Copermittees, have invested five years into developing a well thought through LID program including: The design of a detailed and thoroughly researched LID BMP Manual, An implementation policy focused on a tiered approach to BMP selection, Incorporation of a public maintenance mechanism, and Construction of a $3,000,000 LID BMP retrofit, demonstration and testing facility.

These various features are already in effect in the unincorporated County, or in the process of being finalized, for broader use.

Regional Board Staff has recognized the efforts, thoughtfulness, and funding that the County has invested in their LID BMP approach, and have, in coordination with the Copermittees, developed a prioritization process that supports the Copermittees' investment in a plan for LID, while ensuring that an appropriate prioritization for the most effective BMPs is implemented. As such, infiltration BMPs must be used for all sites unless it is technically infeasible to infiltrate. Technical infeasibility will be based on criteria that will be developed by the Copermittees and approved by the Regional Board. Only when infiltration is deemed infeasible through the approved analysis can other LID BMPs be used in place of infiltration. These LID BMPs must be consistent with the Copermittees design manual or other regional LID manuals, which have been developed to ensure these LID BMPs are designed to have the greatest pollutant removal over the life of a project. If LID BMPs are found to be technically infeasible due to poor site or other conditions, then conventional BMPS must be implemented and the project must participate in the LID waiver/mitigation program that will ensure pollutant removal effectiveness consistent with the preferred LID BMPs.

Comment Response

The San Diego Water Board appreciates the support of the commenter. Based on several comments received during the public comment period, minor changes were made to the provisions in section F.1.d.(4) of the Tentative Order without affecting the overall intent of the language or the Copermittee's existing programs. Please see the errata sheet for the specific changes made.

Comment # 118 **Commentor** 4 **Comment Subject** LID

Specific Comment

One other important consideration for new development and LID requirements in MS4 permits is the ability for the project proponent (developer) to understand and easily comply with the requirements, such that they can easily be incorporated into projects. Recently adopted MS4 permits, such as the south Orange County MS4 Permit, have very complicated new development and LID requirements. The result of such requirements is a WQMP guidance document that can be confusing, and may be difficult to implement consistently and in a way that will provide consistent protection of water quality. The Copermittees and Regional Board staff, working together, have crafted new development LID requirements that are easily understood, and will ensure the highest likelihood of integration of LID features consistently into projects.

Comment Response

Comment noted. Through several meetings with the Copermittees, the requirements for LID implementation were clarified and streamlined to reduce confusion and easily understand. To that end, the requirements are similar to the South Orange County MS4 Permit to consistently apply LID requirements throughout the San Diego Region.

Comment # 119 **Commentor** 4 **Comment Subject** Hydromod

Specific Comment

Pursuant to discussions between the Copermittees and Water Board staff, the proposed interim hydromodification criteria is aligned with the Copermittees' existing hydromodification program. This agreed language ensures that adequate hydromodification protection measures continue to be in place, while allowing the Copermittees to focus resources and funds on developing the Final Hydromodification Management Program and avoid diversion of scarce resources to developing new interim criteria that will only be in effect for a short duration. In addition, this approach will save the development community from confusion as to which requirements are in effect.

The Copermittees' current hydromodification mitigation program is described in the WQMP, but has been slightly modified as presented in the draft MS4 Permit. Although the Copermittees request the minimal changes to the language shown in the attached redlines, the Copermittees otherwise support the currently drafted interim hydromodification requirements. Under the proposed interim requirements, project applicants must either demonstrate numerically that the project will not adversely impact downstream alluvial channels, or, they must mitigate both the two-year and 10-year recurrence interval storms to pre-project levels in the post-project condition. All analysis must be performed by a registered civil engineer specializing in water resources. Mitigation of both the two-year and the 10-year storms to pre-project levels has been demonstrated to be consistent with the range of flows that are the primary determinants of the stream geomorphology in the southern California area. By maintaining these storm events at pre-project levels, impacts to the downstream alluvial channel should be mitigated to a level of less than significant. Additionally, the Copermittees believe that the onsite LID requirements will further reduce the need for on-site hydromodification controls that would otherwise be required with conventional treatment BMPs. The final comprehensive hydromodification mitigation program will further develop more detailed analysis methods, as well as establish a monitoring program to help verify the effectiveness of the HMP requirements.

Comment Response

The San Diego Water Board agrees that the interim hydromodification criteria in the Tentative Order are aligned with the Copermittees' existing hydromodification program. The minor proposed modifications to Tentative Order sections F.1.h.(2) and F.1.h.(3) as shown on Attachment 3 to the RCFC&WCD's comment letter are acceptable. The San Diego Water Board does not agree to the proposed modifications to Tentative Order section F.1.h.(6)(a) as shown on Attachment 9 to the RCFC&WCD's comment letter.

Also, the commenter states that "project applicants must either demonstrate numerically that the project will not adversely impact downstream alluvial channels, or, they must mitigate both the two-year and 10-year recurrence interval storms to pre-project levels in the post-project condition." This is an incorrect statement. To clarify, projects subject to the interim hydromodication criteria must mitigate to "pre-development" levels, not "pre-project" levels. The use of the term "pre-development" is used in section 4.4 of the Riverside County Copermittees WQMP, and is assumed to mean the same as "pre-development" as used in the Tentative Order.

Comment # 120 **Commentor** 4 **Comment Subject** General

Specific Comment

Revisions tentatively agreed to with Board Staff
Per discussions between the Water Board Staff and Copermittees the following revisions were agreed upon.

See table in Riverside County Flood Control Comment Letter Attachment 3, page 4.

Comment Response

Comment noted. Please see the errata sheet for changes that the San Diego Water Board agreed to make to the Tentative Order.

Comment # 121	**Commentor** 4	**Comment Subject** General

Specific Comment

The process needed to be cut short as the Board expected the draft MS4 Permit to be heard in October. Copermittee staff requested that the hearing be delayed to allow the process to complete several times, but these requests were denied;

Comment Response

The San Diego Water Board disagrees that the process was cut short. The existing Order was scheduled for renewal in 2009. The San Diego Water Board originally intended to release the Tentative Order for public comment in March 2010 and hold a public hearing in June 2010. At the request of the Riverside County Copermittees, the San Diego Water Board agreed to delay the release to allow the Riverside County Copermittees to meet with the San Diego Water Board to discuss issues they were concerned about. The San Diego Water Board met with the Copermittees over a dozen times between March and July 2010, on a weekly basis. During those meetings, practically every provision contained in the directives in the Tentative Order, as well as in the Monitoring and Reporting Program in Attachment E, was discussed. The Copermittees were given great latitude in choosing the topic and length of discussions at those meetings. Additional meetings were held with the Copermittees in August following the public release of the Tentative Order to further discuss the Copermittees' concerns. During many of the later meetings the Copermittees were repeating several of their concerns without new information and recommending the same changes to the Tentative Order that the San Diego Water Board would not agree to.

The San Diego Water Board has spent a significant amount of time and resources meeting with the Copermittees. The process was long enough for the San Diego Water Board to listen to and consider all of the concerns expressed by the Copermittees prior to releasing the Tentative Order.

Comment # 122 **Commentor** 4 **Comment Subject** Economic

Specific Comment

[From Attachment 2 to the RCFC&WCD comment letter]

SOURCES OF LOCAL REVENUE

The Copermittee's primary revenue sources for implementation of programs and services are property taxes, sales taxes, and development/construction permit fees. Each of these sources has declined substantially since the beginning of the recession in FY 2006/2007. The 2009 per capita income in Riverside County ($29,177) is 31% lower than the per capita income in San Diego County ($42,094) and 32% lower than the per capita income in Orange County ($46,898). The population of the Santa Margarita Region (289,765) is 48% lower than the population of South Orange County (553,1615) and 91% lower than the population of San Diego County. As a less affluent area with relatively small population, the Santa Margarita Region has far less revenue than South Orange County and San Diego County to fund local programs and services, and MS4 permit compliance costs.

Comment Response

The San Diego Water Board recognizes that the per capita income of the different counties vary. The per capita income cited may be true for Riverside County as a whole, but does not necessarily provide an accurate representation of the per capita income in the Upper Santa Margarita Watershed. The Upper Santa Margarita Watershed area is located between San Diego and Orange Counties, which could have a localized influence on the per capita income in the Upper Santa Margarita Watershed as a commuter community. Riverside County, as a whole, is heavily influenced by agriculture, and agricultural workers typically receive low wages, which may affect the per capita income for Riverside County as a whole.

As noted in the response to comment 115, the commenter fails to acknowledge that the population growth in the Upper Santa Margarita Watershed has also grown substantially since 2000. The population has almost doubled in the last 10 years. The population of South Orange County has grown at a significantly lower rate. Such a significant increase in population also means a significant increase in property and sales tax revenues. If the Copermittees choose to fund their storm water programs solely through revenues generated by sales and property taxes and developer fees, then they must be able to plan and prepare for times when those revenues decrease by setting aside funds when there are significant increases in revenue.

Please see the responses to comments 8 and 9 for a discussion about the Copermittees' revenue sources for funding their storm water programs.

Comment # 123 **Commentor** 4 **Comment Subject** General

Specific Comment

Regional Board staff indicated that the Board had adopted the South Orange County MS4 Permit as a model permit and, therefore, the Board would have to approve any major revisions to the provisions established in that MS4 Permit; and

Comment Response

The San Diego Water Board must approve and adopt all MS4 NPDES permits regardless if the revisions or changes are major or minor.

Comment # 124	**Commentor** 4	**Comment Subject** General

Specific Comment

Regional Board staff indicated that the Board would have to resolve our issues with several new provisions of the draft MS4 Permit addressing unpaved roads, inspection programs and monitoring requirements, all requirements that exceed the provisions of the Orange County MS4 Permit.

Comment Response

To the extent that the Copermittees disagree with the San Diego Water Board regarding the Tentative Order's provisions, the Copermittees have the right to submit both written and oral comments directly to the San Diego Water Board at the adoption hearing.

Comment # 125	**Commentor** 4	**Comment Subject** Legal

Specific Comment

The Copermittees note that despite being directed to take several important issues to the Board, we have not been provided an opportunity for a formal or informal workshop before the Board. By contrast, the South Orange County MS4 Copermittees had at least three workshops and five formal hearings prior to adoption of that permit. Although we do not want to duplicate the Orange County renewal process, it is common practice to allow at least one workshop on significant permit issues before holding an adoption hearing. Given the issues outlined in this letter and in the attachments, there are numerous issues worthy of at least one workshop.

Comment Response

The decision whether or not to hold a workshop is discretionary and the decision not to hold a workshop in the matter was due to the general lack of public interest in the permit, the similarity between the Tentative Order and the recently adopted South Orange County MS4 Permit and the several weeks of meetings with the Copermittees between March and July of 2010. San Diego Water Board members generally do not attend public workshops. When they do attend, they listen to discussion but do not provide feedback. No San Diego Water Board members were present at any of the Orange County workshops. The Orange County workshops were held because of the broad public interest and were held in tandem with meetings with those Copermittees. All issues important to the Copermittees and addressed in the comment letter were discussed with San Diego Water Board staff during the many, frequent meetings held prior to public release of the Tentative Order.

Comment # 126 **Commentor** 4 **Comment Subject** Economic

Specific Comment

[From Attachment 2 to the RCFC&WCD comment letter]

Home Values/Property Tax Revenue

Property tax revenue, which is a major source of funding for the County and Cities, is a direct function of the total inventory of real estate and the assessed values of the real estate. With a small population relative to South Orange County and San Diego County and a limited amount of commercial and industrial property, the Santa Margarita Region is supported by a much smaller inventory of real estate from which to obtain property tax revenue. The high rate of foreclosures in Riverside County has also resulted in significant declines in real estate values and, consequently, property tax revenue. The Riverside County Auditor-Controller projects that property values will fall over 10 percent in FY 2009-10 and could fall further in FY 2010/2011. Figure 3 illustrates the decline in median home values in the Santa Margarita Region and South Orange County. Although home values in both areas have declined, home values in the Santa Margarita Region have declined at a greater rate and the difference in home values between the two areas has grown with the recession.

The Inland Empire (Riverside and San Bernardino Counties) registered more defaults and foreclosures than any other area of Southern California.9 The Inland Empire was ranked No. 5 in nationwide foreclosure activity during the first half of 2010, with almost 4.5 percent of households in default. A total 63,717 mortgage default notices, auction sale notices, and bank repossessions were recorded in the Riverside-San Bernardino-Ontario metropolitan area between January and June 2010, according to RealtyTrac. Accordingly, one in 23 households were in some stage of foreclosure during this six-month period. Additionally, almost 45 percent of homeowners with a mortgage in Riverside and San Bernardino Counties owe more on their homes than the homes are worth. As illustrated in Figure 3, Orange County and San Diego County have not been impacted by "upside-down mortgages" to the same extent as has Riverside County.

One expert, Professor Mason Gaffney of the UC Riverside Economics Department believes that the housing market is in a vicious cycle simply because there are too many homes. According to Professor Gaffney, because demand is down, prices will go down, and more people will go "upside-down" on their mortgage, and then go into foreclosure. Professor Gaffney estimates that the bottom of the housing market will not be seen for another three years, due to the previous overbuilding in Riverside County.10

Although the recession has impacted property values throughout Southern California, Riverside County remains at a distinct disadvantage relative to Orange and San Diego Counties. The average home value in Riverside County is $207, 900, which is 58% less than the average home value in South Orange County ($499,500) and 45% less than the average home value in San Diego County ($378,800).11 As a result, property tax revenues per home in Riverside County are 58% less than in Orange County and 45% less than in San Diego County. The larger populations and number of homes in Orange and San Diego Counties multiply this disparity in property tax revenue that can be used to help fund NPDES compliance programs. Based on population and average home value, South Orange County generates over four times the property tax revenue generated in the Santa Margarita Region, and San Diego County generates 20 times the property tax revenue of the Santa Margarita Region. Clearly, the Copermittees in the Santa Margarita Region receive significantly less property tax revenue than either Orange or San Diego Counties and are less able to fund additional MS4 permit compliance costs.

Comment Response

The San Diego Water Board recognizes that Riverside County is currently experiencing economic difficulties. If, however, the Copermittees choose to fund their storm water programs primarily through revenues generated by sales and property taxes and developer fees, then they must be able to plan and prepare for times when those revenues decrease by setting aside funds when there are significant increases in revenue. The Upper Santa Margarita Watershed had a substantial increase in the total inventory of taxable properties during the past housing boom of the early 2000s. Even while assessed values have decreased, the valuation has not dropped below 2004 levels and the inventory continues to increase.

Please see the responses to comments 8 and 9 for a discussion about the Copermittees' revenue sources for funding their storm water programs.

Comment # 127 **Commentor** 4 **Comment Subject** Economic

Specific Comment

[From Attachment 2 to the RCFC&WCD comment letter]

Sales Tax Revenue
The next most significant revenue source for program funding is sales tax. Sales tax revenue is a function of population and relative income. As described, the Santa Margarita Region has a less affluent and smaller population than South Orange County and San Diego County on which to generate sales tax revenue.

The high levels of unemployment in Riverside County have reduced disposable income which has further depressed sales tax revenues. Retail sales in Riverside County fell by nearly 27% in 2008 and 2009.12 Statewide sales and use tax revenues for the second quarter of 2010 declined approximately 10.4 percent. Additionally, taxable sales for the first quarter of 2010 remained flat compared to a year earlier. Although data specific to the Santa Margarita Region is not available, it is anticipated that taxable sales have been impacted more significantly than in Orange and San Diego Counties due to the higher unemployment rate in Riverside County.

Taxable sales are directly proportional to sales tax revenue. Based on data presented in the Los Angeles Economic Development Corporation's July 2010 Economic Forecast, South Orange County generates 2.6 times the taxable sales generated in the Santa Margarita Region and San Diego County generates 13.3 times the taxable sales of the Santa Margarita Region. Clearly, the Copermittees in the Santa Margarita Region receive significantly less sales tax revenue than either Orange or San Diego Counties and are less able to fund additional MS4 permit compliance costs.

Comment Response

The San Diego Water Board recognizes that Riverside County is currently experiencing economic difficulties. If, however, the Copermittees choose to fund their storm water programs primarily through revenues generated by sales and property taxes and developer fees, then they must be able to plan and prepare for times when those revenues decrease by setting aside funds when there are significant increases in revenue.

Please see the responses to comments 8 and 9 for a discussion about the Copermittees' revenue sources for funding their storm water programs.

Comment # 128 **Commentor** 4 **Comment Subject** Economic

Specific Comment

[From Attachment 2 to the RCFC&WCD comment letter]

New Fees or Taxes
Another potential source of funding would be the establishment of a new fee or tax. Such revenues would be subject to the requirements of Proposition 218. Recent efforts to pass supplemental fees have been mixed and given the current economic conditions, this option appears infeasible. For example, on the March 2006 ballot, an attempt by the City of Encinitas to pass a Clean Water Fee was defeated by the voters. It is notable that this rejection of a Clean Water Fee occurred prior to the recession in a relatively affluent coastal city.

Comment Response

Please see the response to comment 8.

Comment # 129	**Commentor** 4	**Comment Subject** Economic

Specific Comment

[From Attachment 2 to the RCFC&WCD comment letter]

Economic Forecasts

The Riverside County Executive Office assessed Riverside County's economy in a report to the Board of Supervisors submitted with the FY 2010/2011 Recommended Budget. In this assessment, it was noted that the economy is still staggering and that economic news has been mixed. Although a slightly rising stock market and other nationwide measures could be interpreted to signal improvement, persistently high unemployment and personal and national debt call for caution, and a double-dip recession is possible. Locally, while some experts project revenues will shrink again in FY 2011/2012, Riverside County's economic consultants foresee a long and gradual muted recovery and the County will be managing with drastically reduced budgets for an extended period. Budget reductions of approximately $21 million are projected for FY 2011/2012. The County projects that it will see a balanced but significantly reduced budget in FY 2012/2013, with a total budget of $670 million (compared to $736 in 2007). Based on this assessment and reports in the media, it appears that the economy in Riverside County will stabilize at a reduced level and may not recover during the term of the SMR MS4 Permit.

Comment Response

Please see the response to comment 9.

Comment # 130 **Commentor** 4 **Comment Subject** Economic

Specific Comment

[From Attachment 2 to the RCFC&WCD comment letter]

Projected Increases in Compliance Costs
The draft Permit proposes a significant expansion of compliance requirements that would significantly increase the Copermittee compliance costs. The draft Permit was developed by starting with the MS4 Permit for South Orange County. The requirements proposed in the draft Permit that would significantly increase compliance costs include:

Regional Compliance Requirements
-Monitoring and special studies (See Attachment 4)
-Hyrdomodification Management Plan (including monitoring)
-Retrofit study
-Other general program updates (JRMP)

Individual Copermittee Compliance Requirements
-Enforcement of Irrigation runoff prohibition (See Attachment 6)
-Significantly Increased business and BMP inspections
-BMP retrofit requirements
-Regulation of unpaved roads (See attachment #5)
-Hydromodification requirements
-Monitoring Source Identifications
-Expanded IC/ID requirements

Estimates for implementation of the regional compliance requirements have been prepared and Figure 4 illustrates the disparity between projected Copermittee revenues and costs for implementation of the proposed regional programs. Due to the fact that calculating costs for implementing entirely new programs is excessively difficult, cost estimates for the implementation of individual Copermittee compliance requirements have not been completed, although it is expected that their individual costs will parallel the regional costs presented in Figure 4.

Comment Response

The San Diego Water Board has been sensitive to the current economic hardships that are being experienced by the Riverside County Copermittees. Between March and July 2010, we met with the Copermittees over a dozen times and modified the requirements and schedules for implementation to phase in the requirements with these economic concerns in mind. Many of the modifications were made because the Copermittees requested the changes. Many of the modifications to the implementation schedule that were agreed upon during those meetings between the Copermittees and the San Diego Water Board were also based on prioritizing the permit requirements to address the most critical issues. The Tentative Order now provides the Riverside County Copermittees more time than the San Diego County and Orange County Copermittees to develop and implement several elements of the permit, as well as reducing the potential development costs for those elements.

The San Diego Water Board recognizes there will be increases in costs to improve the Copermittees' storm water management programs. The improvements are necessary, especially given the intense growth and development that has occurred in the Upper Santa Margarita Watershed during the third-term of the MS4 Permit. We do not agree that the increases in costs will be as projected in Figure 4 since the Copermittees have already begun developing several of the program elements (as listed in Attachment 1 to the RCFC&WCD comment letter), and will be able to benefit from the experiences and the work already completed by the San Diego County and Orange County Copermittees.

Comment # 131 **Commentor** 4 **Comment Subject** General

Specific Comment

The Copermittees also have significant concern with the use of the South Orange County MS4 Permit as a model for our MS4 Permit area. As outlined in more detail throughout this letter and the attachments, the South Orange County and Santa Margarita Region MS4 Permit areas vary widely with regard to the water resources to be protected and available tax revenue to fund local programs and services, including compliance with MS4 permit requirements. Orange County has substantial coastal water resources with active recreational use, twice the population, and significantly higher tax revenues. The per capita cost for the residents within the Santa Margarita Region to comply with the requirements of the draft MS4 Permit is significantly greater than the per capita cost faced in South Orange County, with each dollar spent effectively hitting our residents three to four times harder. The expansion of regional program elements (e.g., coordination, monitoring, reporting, program development, effectiveness assessment) will result in an annual doubling of these costs, with a peak increase of nearly 300% for these programs alone. The Copermittees simply cannot economically support, nor does the Santa Margarita Region warrant, the same level of programs as South Orange County to protect our local receiving waters.

Comment Response

The federal requirements regulating MS4 discharges from Orange County and Riverside County are the same, providing flexibility for regional differences in implementation. To that extent, the Tentative Order has significant differences from the adopted South Orange County MS4 Permit to address Riverside County. These differences were identified by the San Diego Water Board or requested by the Copermittees. These changes include requirements addressing unpaved roads, watershed specific non-storm water dry weather action levels, specific monitoring provisions, special studies, street sweeping provisions, streamlined LID requirements, Hydromodification Management Plan changes, a lengthened implementation timeline, more specific action level response language, specific education requirements, standard roadway designs, specific LID waiver provisions, a HMP waiver provision, specific interim hydromodification criteria, requirement of Passive Sediment Treatment Systems, specific reporting requirements, retrofitting examination of areas of development, and unique program effectiveness assessment requirements. To some extent, the discharges, programs and land use from the Copermittees' MS4s are similar and thus have similar requirements.

Comment # 132 **Commentor** 4 **Comment Subject** General

Specific Comment

In summary, the meetings between Regional Board staff and Copermittee staff were honest, good faith and productive efforts to bridge the gaps between the requirements of the Orange County MS4 Permit and the specific needs of, and resources available to, the Upper Santa Margarita Watershed (the draft MS4 Permit area). However, given the constraints identified herein, the differing impacts on beneficial uses and current economic realities, the current draft MS4 Permit cannot be supported by the Copermittees.

The Copermittees, therefore, request that the Board direct staff to work with the Copermittees to resolve the issues identified in this letter prior to considering adoption of the Permit.

Comment Response

Please see the response to comment 121.

Comment # 133	**Commentor** 4	**Comment Subject** General

Specific Comment

Unlike several of the watersheds in South Orange County, which exhibit perennial flow, the Santa Margarita Region is an ephemeral watershed. The only areas of perennial flow in the Santa Margarita Region are located at the formation of the Santa Margarita River right at the County line and in mountain areas outside of the urbanized areas serviced by the MS4s. The creeks in the urbanized areas of the watershed serviced by the MS4s are ephemeral and flows are only observed during and immediately after significant storm events. Any non-stormwater flows quickly disappear by seepage into the alluvial sands. Additionally, rising groundwater has been observed in Murrieta and Temecula Creeks for a short distance at various locations upstream of the confluence with the Santa Margarita River; however such conditions existed prior to urbanization.

Comment Response

Please see the response to comment 175.

Comment # 134 **Commentor** 4 **Comment Subject** Economic

Specific Comment

[From Attachment 2 to the RCFC&WCD comment letter]

ECONOMIC SUMMARY

As all sources of revenues have been reduced significantly, the Copermittees have been required to reduce staffing through layoffs, attrition and furlough; reduce funding across the board for public services and programs, and, in some cases, completely eliminate public services and programs. For example, it is estimated that County of Riverside staffing has been reduced by 2,500 since FY 2006/2007 mostly in the form of early retirement and layoffs. It is estimated that an additional 500-700 staff positions will be eliminated by the County in FY 2011/2012.

Due to the loss of revenue, virtually all Copermittee programs or services have been reduced, including fire and police. As an example, the Riverside County FY 2010/2011 Recommended Budget for Riverside County proposes:

-Public safety department cuts of 3 – 5 percent
-Other department cuts averaging 19 percent
-Continued staff reductions

After three years of modest cuts culminating in a 25% decrease, the Board of Supervisors approved an additional 19% cut in the general fund and a 4% cut to public safety for FY 2010/2011. These additional cuts will decrease spending by an additional $71 million. The remaining budget gap will be filled from general fund reserves set aside for economic uncertainty. Since FY 2006/2007 Riverside County general fund reserves have declined from over $300 million to $30 million. The County cannot decrease the reserve fund any further without affecting the County's ability to obtain credit. According to the Associated Press Economic Stress Index, of counties with populations of at least 25,000, Riverside County was identified as the eleventh most economically stressed county in the nation based on its June 2010 stress scores.

All County departments have been directed to only provide those core services that the County is mandated to provide. At this point, the Copermittees are struggling to maintain the existing compliance programs required by the 2004 MS4 Permit with available staff and funding. Implementation of expanded or new Permit compliance requirements would require the Copermittees to either further reduce implementation of other mandated programs or reduce the level of implementation of MS4 Permit compliance programs - at risk of receiving an NOV and ACL. In other words, the Copermittees cannot increase MS4 Permit compliance expenditures without directly impacting compliance with other state or federally-mandated programs.

Comment Response

The San Diego Water Board is aware of the many and competing needs that the municipalities are responsible for. The mission of the San Diego Water Board, however, is to preserve, enhance, and restore the quality of the waters in the region. Our responsibility is to protect the beneficial uses of the waters of the state.

While we try to take other needs into consideration when developing the requirements included in the Tentative Order, the requirements must be able fulfill our mission and responsibilities. We understand that the provisions in the Tentative Order may require the Copermitttees to modify, reduce, or find additional efficiencies in their operations, but the Copermittees are still responsible for implementing and improving their storm water and non-storm water programs to protect water quality.

The San Diego Water Board has been sensitive to the current economic hardships that are being experienced by the Riverside County Copermittees. Between March and July 2010, we met with the Copermittees over a dozen times and modified the permit requirements and schedules for implementation to phase in the requirements with these economic concerns in mind. Through this process and series of meetings, the San Diego Water Board has tried to accommodate the needs of the Riverside County Copermittees as much as possible.

Comment # 135	**Commentor** 4	**Comment Subject** General

Specific Comment

Since the initial MS4 permit was issued in 1990, the Copermittees have been actively and successfully implementing programs to manage their MS4 discharges. As described in the 2009 report of waste discharge (ROWD) submitted by the Copermittees, there have been no statistically significant increases in pollutant concentrations since issuance of the initial MS4 permit in 1990, despite the fact that the Santa Margarita Region has experienced over 300% population growth over the same time period. Further, although staff points out several recent 303(d) listings as basis for the need to enhance regulations, these listings were based on data that mostly predates our existing management programs implemented under the 2004 NPDES MS4 Permit. Further, the Permittees have submitted additional data for the current round of listings that should result in the removal of some of these additional listings based on more recent data. Additionally, the likely sources of these impairments include natural background concentrations in soils and groundwater (iron and manganese), natural and/or agricultural source loads (nutrients, total dissolved solids, sulfates and bacteria), and/or federally authorized uses of products (pesticides and copper). Although all of these sources can have urban components, it is also clear that these sources are mostly non-point in nature and not solely urban sourced, as implied in the Fact Sheet and Findings.

Comment Response

The San Diego Water Board disagrees that the Copermittees' programs have been successfully implemented. The San Diego Water Board disagrees that there have been no statistically significant increases in pollutant concenrtrations. The Copermittees' ROWD states that not enough data has been collected to date by the current and past MRPs to statistically detect any change or trend in water quality. If not enough data has been collected, how can any statistically significant increases in pollutant concentrations be detected?

Enough data, however, have been collected to see a statistically significant increase in 303(d) listings for the waters in the Upper Santa Margarita Watershed. On the 2002 303(d) List there were 3 water body/pollutant combinations listed. On the 2008 303(d) List there were over 50 water body/pollutant combinations listed. This signicant increase in 303(d) listings indicates that water quality has degraded, not improved.

The San Diego Water Board would be pleased if the data provided by the Copermittees supports the removal of some of these listings. Even if some listings are removed, there would be a significant number of listings that would still need to be addressed. In any case, the Copermittees must continue to improve their programs to prevent discharges of pollutants from their MS4s and protect the water quality of the receiving waters of the Upper Santa Margarita Watershed.

Comment # 136	**Commentor** 4	**Comment Subject** Economic

Specific Comment

[From Attachment 2 to the RCFC&WCD comment letter]

CONCLUSION

The draft Permit was developed by starting with the MS4 Permit for South Orange County. This represented a significant expansion of compliance requirements and compliance costs relative to the 2004 Permit issued to the Copermittees in the Santa Margarita Region, and by no means are the costs incremental in nature. South Orange County is a permit area with twice the population, 2.6 times the sales tax revenue, and over four times the property tax revenue of the Santa Margarita Region. The draft Permit was then expanded to include additional compliance and monitoring requirements, further increasing compliance costs. Plainly, it is unrealistic to impose greater, or even the same Permit requirements on the Santa Margarita Region, as have been imposed on South Orange County.

In addition to having a lower property tax revenue based on lower property tax base and lower per capita retail sales, the Santa Margarita Region has also been hit harder by the recession, which has further diminished funding resources. It is projected that revenues will continue at a reduced level for an extended period with recovery not expected within the term of the Permit term. Therefore, the available resources to fund public safety, existing state and federal mandates, and expanded water quality permit requirements are much less than San Diego and Orange Counties.

The economy has resulted in reductions of reserves to minimum levels and virtually all local services and programs have been reduced or eliminated. As increases in funding for the water quality mandates contained in the draft Permit can only come from reduced funding for public safety, existing state and federal mandates, the expanded compliance requirements proposed in the draft Permit are economically infeasible.

Comment Response

The San Diego Water Board recognizes that there are differences in the economic characteristics between the counties in the San Diego Region, but we do not agree that those differences should affect the provisions included in the Tentative Order to protect water quality. If anything, because of the signicant growth and development experienced by the Upper Santa Margarita Watershed within the last 10 years, the new and enhanced requirements are more necessary than ever. Significant changes in the Tentative Order's schedules and compliance requirements have been made to accommodate the Copermittees and the watersheds unique status.

The population of the Upper Santa Margarita Watershed has almost doubled in the last 10 years. The significant increase in population has resulted in a significant increase in development in the area. On the 2002 303(d) List, there were 3 water body/pollutant combinations listed for the waters in the Upper Santa Margarita Watershed. On the 2008 303(d) List, there are over 50 water body/pollutant combinations listed for the waters in the Upper Santa Margarita Watershed.

We understand that the current economic situation is challenging for the Copermittees. While the current economic environment is a cause for concern in the short term, it also provides the Copermittees an opportunity to find and implement improvements and efficiencies to their storm water programs before the next period of growth and development. In any case, the Copermittees must improve their storm water programs to be more protective of water quality.

Comment # 137 **Commentor** 4 **Comment Subject** Economic

Specific Comment

As the draft MS4 Permit for the Santa Margarita Region of Riverside County was modeled on the MS4 Permit developed for South Orange County, it is important to carefully contrast the economic resources available to the Counties:

The population of the Santa Margarita Region (289,765) is 48% less than the population of South Orange County (553,161).

The 2009 per capita income in Riverside County ($29,177) is 38% less than the per capita income in Orange County ($46,898).

The current unemployment rate in Riverside County is 15.3 percent, which is 56% higher than the unemployment rate in Orange County (9.8 percent).

Property and sales tax revenues are the primary sources of funding for local programs and services, including compliance with MS4 Permit requirements. Based on population and average home value, South Orange County generates over four times the property tax revenue generated in the Santa Margarita Region. Based on data presented in the Los Angeles Economic Development Corporation's July 2010 Economic Forecast, South Orange County generates 2.6 times the taxable sales generated in the Santa Margarita Region. As a less affluent area with a relatively small population, the Copermittees in the Santa Margarita Region receive significantly less property and sales tax revenue than municipalities in South Orange County and are less able to fund additional MS4 Permit compliance costs. These issues are discussed in detail in Attachment 2.

The recession also has impacted the economy in the Santa Margarita Region more than in South Orange County and it is projected that tax revenues will continue at a reduced level for an extended period, with recovery not expected within the Permit term. The poor economy has resulted in reductions of reserves to minimum levels and cuts or eliminations in virtually all local services and programs in the Santa Margarita Region. As a result any increases in funding for the water quality mandates contained in the draft MS4 Permit can come only by reducing funding for public safety or other existing state and federal mandates.

Modeling the draft MS4 Permit on the South Orange County permit represented a significant expansion of compliance requirements and compliance costs relative to the existing MS4 Permit issued to the Santa Margarita Region Copermittees. The requirements in the draft MS4 Permit have been expanded to include additional compliance and monitoring requirements beyond the South Orange County permit, further increasing compliance costs. We would submit that such an approach is fundamentally unfair and could be viewed as arbitrary.

Comment Response

Please see the responses to comments 8, 9, 115, 116, 122, 126, 127, 130, 134, and 136. The commenter is not consistent in the scope of statistical comparison of the two regions. For example, the population comparison is only for the Upper Santa Margarita Watershed while the economic indicators are compared for the whole of Riverside County. Factors within Riverside County yet outside of the Upper Santa Margarita Watershed may influence the statistics, e.g. agriculture in the Coachella Valley.

Comment # 138 **Commentor** 4 **Comment Subject** Unpaved Roads

Specific Comment

The requirements for unpaved roads are particularly cumbersome, onerous and unreasonable. Our detailed analysis of these requirements is provided in Attachment 5. In summary, the proposed unpaved road requirements may result in substantial and unnecessary additional Copermittee costs that are not justified by the facts in the Santa Margarita Region. The Copermittees believe that the existing MS4 Permit requirements for new development, construction, maintenance and IC/ID adequately address regulation of unpaved roads that threaten water quality. If the Regional Board believes that unpaved roads require further regulation, the Copermittees believe that the appropriate regulatory mechanism is a general permit (Waste Discharge Requirements or NPDES permit) that would apply to all unpaved roads in the San Diego Region, rather than only those that are under the jurisdiction of the Copermittees

The Copermittees request that Sections F.1.i, F.3.a.(11) and F.3.c.(5) regulating unpaved roads be deleted from the draft MS4 Permit.

Comment Response

The commenter does not provide any substantial data or reasoning to support their assertion that the requirements are "cumbersome, onerous and unreasonable." Despite the Copermittees' belief that existing MS4 Permit requirements adequately address pollution from unpaved roads, the San Diego Water Board has discovered numerous cases of unpaved roads creating or causing water quality impacts. Examples of unpaved roads causing water quality problems within the past year include Fairway Hills Estates, Rancho Glen Oaks, Santiago Road, and Lake Village Association. The San Diego Water Board reserves the right to issue a general permit to regulate unpaved roads; but until such time the unpaved roads are addressed through the MS4 permit. Please see the responses to comments 103 and 104.

Comment # 139 **Commentor** 4 **Comment Subject** Unpaved Roads

Specific Comment

Clarification that these requirements apply to those unpaved roads that the Copermittees maintain in their road system.

This should be commonly understood, but the clarification is important to include due to complex legal limitations and rights associated with access, ownership, and maintenance of unpaved roads.

Comment Response

Comment noted. Appropriate changes addressing the comment have been included in the errata.

Comment # 140 **Commentor** 4 **Comment Subject** Unpaved Roads

Specific Comment

Removal of language that specifies specific BMPs that must be implemented.

Specifying the method of compliance is prohibited pursuant to CWC Section 13360, and inappropriately forces the Copermittees to adopt particular solutions that may not best fit the situation.

Comment Response

Comment noted. Clarifying language has been included in the errata.

Comment # 141 **Commentor** 4 **Comment Subject** Unpaved Roads

Specific Comment

Removal of requirement for BMPs for private unpaved roads.

The proposed requirements would require the creation of an additional and unnecessary program element addressing privately owned unpaved roads. The Copermittees believe that a focused public outreach program should be implemented to educate property owners and associations about the need to properly maintain unpaved roads. This education program combined with existing IC/ID enforcement capabilities seems a more reasoned and responsible response to addressing this issue.

Comment Response

The San Diego Water Board is sensitive to the Copermittees' concerns. Upon considering various factors, we have removed the requirements for privately owned unpaved roads in the errata. The San Diego Water Board reserves the right to include this provision in future MS4 permits or general permits. The San Diego Water Board still expects the Copermittees to address illicit discharges from privately owned unpaved roads to their MS4 systems through their IC/ID programs.

Comment # 142 **Commentor** 4 **Comment Subject** Monitoring

Specific Comment

Since the initial MS4 permit was issued in 1990, the Copermittees have been actively and successfully implementing programs to manage their MS4 discharges. As described in the 2009 report of waste discharge (ROWD) submitted by the Copermittees, there have been no statistically significant increases in pollutant concentrations since issuance of the initial MS4 permit in 1990, despite the fact that the Santa Margarita Region has experienced over 300% population growth over the same time period. Further, although staff points out several recent 303(d) listings as basis for the need to enhance regulations, these listings were based on data that mostly predates our existing management programs implemented under the 2004 NPDES MS4 Permit. Further, the Permittees have submitted additional data for the current round of listings that should result in the removal of some of these additional listings based on more recent data. Additionally, the likely sources of these impairments include natural background concentrations in soils and groundwater (iron and manganese), natural and/or agricultural source loads (nutrients, total dissolved solids, sulfates and bacteria), and/or federally authorized uses of products (pesticides and copper). Although all of these sources can have urban components, it is also clear that these sources are mostly non-point in nature and not solely urban sourced, as implied in the Fact Sheet and Findings.

Comment Response

The San Diego Water Board finds the comment to be confusing and misleading on multiple accounts. First, the ROWD states that not enough data has been collected to date by the current and past MRPs to statistically detect any change or trend in water quality. Thus, if not enough data has been collected, how can any statistically significant increases in pollutant concentrations be detected? Secondly, the recent 303(d) listings referenced in the comment refer to the 2008 303(d) list, which relies on data collected up to that listing, including data collected under the current Order. New listings and re-listings for the 2008 list relied on data collected from 2004-2006. The list is required to be updated every 2 years, so it is unclear how new listings are based primarily on data prior to 2004. Lastly, it should be noted that speculation regarding likely sources of pollutants for 303(d) listed receiving waters should not take the place of active source identification, which been largely absent under the current Order.

Comment # 143	**Commentor** 4	**Comment Subject** Monitoring

Specific Comment

Monitoring and Reporting Program (Attachment 4)
Prior to the submittal of the ROWD, the Copermittees met with Board staff to propose changes to the Monitoring and Reporting Program (MRP). In these discussions, Board staff identified two areas for needed improvement:

• Relocation of Illicit Connection I Illicit Discharge (IC/ID) monitoring stations to MS4 outfalls, and
• Incorporation of Action Levels

In more recent discussions, Board staff noted that the MRP needed significant modification to reflect the South Orange County MRP, but would be scaled to be appropriate to the smaller Santa Margarita Region.

Unfortunately, the final MRP requirements have been expanded well beyond the South Orange County MRP requirements, resulting in a program that is completely out of proportion with the needs and resources of the Santa Margarita Region. In fact, the proposed MRP requirements will result in a 500% increase in monitoring program costs, costing our residents over two and a half times the per capita costs for South Orange County.

[Per Capita Monitoring Cost Comparison Table]

The Copermittees recognize that monitoring and data collection is necessary. However, the MRP requirements exceed what is necessary to address management questions related to water quality, are beyond requirements dictated in the South Orange County MRP, and are beyond the Copermittees' ability to fund. Not only are the level of requirements inappropriate for the Santa Margarita Region, but they disregard the economic realities faced by the Copermittees. As such, the MRP falls far short of meeting the Executive Officer's stated goals of affordability.

In the interest of finding ways to offer Board staff a comparable program in a more cost effective and appropriate manner, the Copermittees have identified nine adjustments to the MRP that will save approximately seven hundred and eighty thousand dollars ($780,000) allllually and bring per capita monitoring costs more in line with the South Orange County MRP, whi le maintaining the core components of the MRP. Table I summarizes the key changes and the respective cost savings. It is important to note that any change highlighted in RED reflects bringing the program in line with the South Orange County MRP. Figure I below shows graphically the comparative costs for the draft MRP with and without the requested adjustments. Please note that the 100% baseline in Figure 2 reflects the current cost of the Copermittees' current MRP.

[Table 1 - Cost Savings resulting from proposed MRP changes]
[Figure 1 - graph comparing draft permit costs with Requested Changes]
[Cost comparison table with Proposed Changes]

Although the requested adjustments to the MRP will not eliminate cost increases, and will result in an MRP which is more expensive, on a per capita basis, than the South Orange County MRP, they provide a more manageable program for the Copermittees.

The Copermittees requests that the Board make the adjustments identified in Attachment 4 before Permit adoption.

Comment Response

See the response to comment 92.

Comment # 144	**Commentor** 4	**Comment Subject** Monitoring

Specific Comment

[From Attachment 4 to the RCFC&WCD comment letter]

Prior to the release of the first draft of the MRP requirements to the Copermittees, Water Board staff indicated the program would be similar to the South Orange County MS4 Permit (OC Permit) yet scaled appropriately to the Santa Margarita Region. The first draft of the MRP was not released until three weeks prior to the public release draft MRP. To our surprise, instead of being appropriately scaled, the draft MRP actually exceeded the scope and costs of the OC Permit MRP. Due to limited time, Water Board staff recommended the discussions regarding MRP requirements be brought before the Regional Board at the appointed October 13, 2010 Board Hearing. This was particularly frustrating as it was not consistent with our mutual goal to resolve technical issues at the staff level and bring only necessary policy issues to the Regional Board.

Comment Response

Please see the response to comment 92. For clarification, San Diego Water Board allowed the Copermittees to select and prioritize topics for discussion at these meetings. Dedicated discussions regarding the MRP occurred at multiple meetings, including prior to public release of the Tentative Order. Some modifications and agreements were made regarding the MRP, but many issues came to an impasse at the staff level. Where impasse was met, staff provided a recommendation that the discussions be brought to the Board following review of public comments.

Comment # 145 **Commentor** 4 **Comment Subject** New Development

Specific Comment

Section F.1.f of the draft MS4 Permit includes new requirements for the Copermittees to verify that Post-Construction BMPs are being appropriately maintained. The new requirements appropriately develop a risk-based approach to inspections, defining eight factors that the Copermittees must
consider in determining 'high-priority' projects.

However, language in Section F.1.f.(2)(a) removes that discretion by stating:
'At a minimum, high priority projects include those projects that generate pollutants (prior to treatment) within the tributary area of a 303(d) listed waterbody impaired for that pollutant; or those projects generating pollutants within the tributary area for an observed action level exceedance of that pollutant.'

This language is excessively broad, and will require virtually all sites in the watershed to be designated as 'high priority' and, therefore, subject to annual inspections. This language is inconsistent with the goals of a socially responsible and affordable permit and should be modified for
several reasons:

Inspections frequencies should be based on risk of discharge. Annual inspections are not needed for all sites that generate a specific pollutant. For example, if a site generates a pollutant associated with 303(d) listing, but the site retains runoff onsite or stores those pollutants indoors, annual inspections would be unnecessary. However, sites that store 303(d) listed pollutants outdoors or otherwise have a high risk of discharge should be inspected more frequently.

The language dilutes Copermittee resources by requiring annual inspections of low-risk sites, preventing the Copermittees from appropriately concentrating resources on problematic sites/sources. This is because when an action level is exceeded then all parties in the watershed are assumed guilty until proven innocent.

While the Copermittees are not opposed to implementing a program to verify that these BMPs are being maintained, it is critically important that they be provided the flexibility to determine which sites warrant annual inspections. Specifically, the Permittees request that the language in
F.1.f.(2)(a) be amended as follows prior to adoption of the Permit:

At a minimum, high priority projects include those projects that have been determined to be the source of an observed action level exceedance.

Comment Response

Please see the response to comment 94.

Comment # 146 **Commentor** 4 **Comment Subject** Commercial/Industrial

Specific Comment

Section F.3.b. of the draft Permit includes requirements to inventory and inspect Commercial and Industrial businesses. The draft Permit expands upon existing inventory and inspection requirements in two problematic ways:

It requires significantly more businesses to be inspected, and

It includes new requirements specifying what the Copermittees are required to inspect when they are onsite.

Comment Response

Please see the response to comments 96 and 98.

Comment # 147	**Commentor** 4	**Comment Subject** Commercial/Industrial

Specific Comment

Sections F.3.b.(1)(a)(i) and (ii) identify 42 categories of businesses that must be inventoried and inspected based on risk of pollutant discharge. However, Section F.3.b.(1)(a)(iii) adds virtually any business in the Permit area, independent of pollutant discharge risk:

'All other commercial or industrial sites/sources within or directly adjacent to or discharging directly to receiving waters within environmentally sensitive areas (as defined in Attachment C of this Order) or that generate pollutants tributary to an observed exceedance of an action level.' (Bold emphasis added)

In effect, section F.3.b.(1)(a)(iii) adds the following additional businesses:

EVERY business that is adjacent to (or within) an Environmentally Sensitive Area (ESA), regardless of whether the business generates or discharges any pollutants, and

EVERY business that 'generates' pollutants which happens to be upstream of an action level exceedance, regardless of whether the site has ever discharged any pollutants.

This language expands the list of sites far beyond the current requirements, and well beyond those sites that actually pose a threat to water quality. This is clearly unnecessary and should be removed for several reasons:

It inappropriately separates 'risk' from the 'response', by requiring the Copermittees to inspect businesses irrespective of the risk that the business poses to water quality. For example, this language would require the Copermittees to expend resources and time inspecting hair salons, office buildings and other activities that happen to be adjacent to an ESA. This inappropriate broad-brush approach to permitting actually works to discredit the Copermittees' NPDES programs and dilute resources, rather than enhancing protection of water quality.

It will further remove the flexibility that the Copermittees need to be able to re-allocate resources to inspecting and following up with sites/sources that are problematic.

Therefore, the Copermittees request that the language in F.3.b.(1)(a)(iii) be amended as follows prior to adoption of the Permit:

All other commercial or industrial sites/sources that have been determined to be the source of an observed exceedance of an action level.

Comment Response

Please see the response to comment 96.

Comment # 148	**Commentor** 4	**Comment Subject** Commercial/Industrial

Specific Comment

Additional items to review during inspections:

Section F.3.b.(4)(a) specifies what the Copermittees must review when performing an inspection. The new requirements in subsections (i) and (ii) to review BMP implementation plans, and review facility monitoring data, respectively, are an unnecessary new mandate. They should be removed for several reasons:

The requirements burden the Copermittees with reviewing information that is required under General Permits and is the responsibility of the Regional Board to enforce.

The requirements would significantly increase the inspection time for sites with General Permits and endanger an existing collaborative inspection program (Complaince/Assistance Program (CAP)) that leverages the time highly trained Environmental Health Inspectors spend onsite for Certified Unified Program Agencies (CUPA) and Food Services inspections to also conduct NPDES inspections. The CAP program not only utilizes highly trained Environmental Health inspectors, but also regionalizes the inspections and, therefore, provides multiple benefits including uniformity, reduction in total number of inspections and higher-quality inspections. The Environmental Health HazMat inspection program administrators have indicated that they cannot accommodate the additional time required to implement the new requirements, as they would unduly cut into their ability to meet their own state-mandated inspection frequencies.

By virtue of eliminating the CAP program, the requirements would effectively mandate a more fractured and disconnected set of inspections for the businesses, contrary to CAL EPA mandates for consolidated inspections, and in turn diluting the effectiveness of the program.

The Copermittees request that the language in F.3.b.(1)(a)(iii) be amended as follows prior to adoption of the Permit:

(a) Inspection Procedures: Inspections must include but not be limited to:

(iii) Check for coverage under the General Industrial Permit (Notice of Intent (NOI) and/or Waste Discharge Identification Number), if applicable;
(iv) Assessment of compliance with Copermittee ordinances and Copermittee issued permits related to runoff;
(v) Assessment of the implementation, maintenance and effectiveness of the designated minimum and/or enhanced BMPs;

Comment Response

Please see the response to comment 98.

Comment # 149	**Commentor** 4	**Comment Subject** Retrofit

Specific Comment

Section F.3.d. proposes a program to develop an inventory of existing developments that may be candidates for future water quality retrofits. The requirement goes on to encourage the Copermittees to collaborate with local property owners to promote urban retrofit in an effort to accelerate reductions in pollutant loading from existing urban areas.

Although laudable, this requirement has two significant problems:

1) The program is self-defeating as it contains no "carrots" to lure private property owners into participating in the program. Any property owner that is interested in volunteering in this effort would be required to fully comply with all provisions of the draft MS4 Permit. This includes preparation of compliance documents such as SSMPs, LID and hydromodification studies, subjecting themselves to additional regulatory scrutiny through business and BMP inspection programs required by the MS4 Permit, and otherwise incurring a myriad of costs and requirements. These costs and requirements would provide a strong disincentive to participate in a retrofit program. This program will only work if it is modified to remove these disincentives.

2) Current and projected economic conditions will limit the interest and participation of private property owners. Long-term economic predictions for Riverside County indicate that assessed valuations and property values will likely remain stagnant for the term of this Permit. Similarly, sales tax and unemployment are not expected to significantly improve either.

Without Co-Permittee resources to supplement private retrofit projects, the current economic disincentives for private redevelopment that are built into the program and the current impact of the economy on private property owners, there is no real value to the program.

PREFERRED POLICY CHOICE: The Permittees strongly request that this program be deleted for the aforementioned reasons.

Alternatively, and at minimum, the Copermittees request that the schedule for completion of the retrofitting program be revised to provide for development during the term of the Permit and submittal of the proposed program with the next ROWD. This will allow the Copermittees to defer expenditures related to development of the program until later in the Permit term when it is hoped that economic conditions and local revenues will improve. The Copermittees expect few opportunities for retrofit until the economy improves. Due to the Copermittees' limited ability to require retrofit on private property, our best opportunities for retrofit may be associated with approvals of proposed modifications of existing developments.

ALTERNATE POLICY CHOICE: If the Retrofit requirements are not removed, the Copermittees request that the Regional Board modify Section F.3.d. as follows:

Each Copermittee must develop and implement a retrofitting program that meets the requirements of this section upon submittal of the ROWD.

Comment Response

Please see the response to comment 99.

Comment # 150 **Commentor** 4 **Comment Subject** Monitoring

Specific Comment

[From Attachment 4 to the RCFC&WCD comment letter]

One of the most significant issues with the MRP is that the Copermittees proposed several new special studies in the ROWD. The Copermittees moved forward on these studies in good faith, including a $3,000,000 LID Demonstration and Testing Facility at the District headquarters in Riverside. The final MRP does not recognize any of these efforts, and instead mandates six new special studies and a habitat monitoring program. Initially, Board staff indicated that these six studies were for discussion and that it was not their intent to include all of the studies, however, later Board staff changed their position and mandated all of the studies. Further, the habitat monitoring program was actually removed from the Orange County MS4 Permit due to the addition of the NAL/SAL monitoring which was expected to effectively address the underlying habitat monitoring questions. These unnecessary additions put the Copermittees in the precarious position of having to abandon special studies that were already deemed by local stakeholders to be of critical value to managing stormwater within our region.

Comment Response

San Diego Water Board staff did review the proposed special studies within the ROWD. Staff have made changes to the Special Studies to include the SMC Bioassessment study while concurrently removing the requirement for twice-annual bioassessment monitoring, and removed an additional special study on unpaved roads prior to public release of the MRP. In the 2004 SMC report, special studies are recommended when preliminary source identification work identifies a receiving water problem and/or to answer receiving water questions related to MS4 discharges not addressed by core monitoring programs. In addition, many of the special studies are regional issues, and the MRP allows Copermittees to propose participation in regional efforts to supplement and/or replace MRP requirements. San Diego Water Board staff did not include the Copermittees request to include a site-design LID special study in the MRP because it does not qualify as a MRP special study and the proposed study is outside of our jurisdictional region. Given the purpose of including special studies in the MRP, the proposed LID special study has no relation to a receiving water problem, question, or evaluation (including source identification monitoring). While the San Diego Water Board does not want in any way to discount the importance of LID demonstration and BMP testing, the study would only have an indirect relationship to the MRP.

In regards to the High Priority Inland Aquatic Habitat Monitoring ("habitat monitoring program"), this requirement was included as an important core MRP element per recommendations by the 2004 SMC report, of which the Copermittees took part. The High Priority Inland Aquatic Habitat Monitoring requirements were constructed to allow the Copermittees a maximum level of flexibility when proposing their monitoring program. For example, the Copermittees could choose to select some SAL/NAL monitoring outfalls and stream assessment monitoring at a site they deem to be High Priority Inland Aquatic Habitat. Furthermore, unlike Orange and San Diego County, the Copermittees' monitoring is limited only to inland surface waters. In regards to the removal of the High Priority Inland Aquatic Habitat requirement from Orange County, the removal was made under the Board's direction to attempt to make Orange County's MRP as "cost-neutral" as possible while prioritizing focus areas for monitoring. This direction was made due to the performance of the Orange County monitoring program during the previous permit term. The removal of the requirement was not a "trade" for NAL/SAL monitoring. MS4 effluent monitoring was already an existing MRP element prior to inclusion of NALs and SALs.

Comment # 151	**Commentor** 4	**Comment Subject** Monitoring

Specific Comment

[From Attachment 4 to the RCFC&WCD comment letter]

The proposed draft MRP includes additional stations, constituents, data analysis and multiple special studies that exceed other programs such as South Orange County's or established standards of practice. These elements will not add substantively to the understanding of MS4 water quality impacts within the Santa Margarita Region and vastly exceed the ability of the Copermittees to pay and staff. Table 1 summarizes the Copermittees' requested revisions to the draft MRP and the costs savings from each revision.

These changes are also critical as the draft MRP proposes a program that exceeds available monitoring staffing and equipment resources. The District is currently in the process of recruiting for budgeted positions that were based on the monitoring program contained in our ROWD. However, review of the MRP has determined that our estimations were woefully inadequate. The MRP special studies and other requirements require scientists and other staff with specialized training and backgrounds that are not readily available. The District will likely have to find staff with generalized knowledge in related fields and spend significant resources training them to be knowledgeable in the science of stormwater management. Even if we were to consult out most of the work, we would still need specialized staff to scope, manage and review the consultants' work. It is not feasible to find, recruit and train the necessary staff and also deploy the proposed MRP in the time allotted. The Copermittees' proposed revisions scale requirements to a more financially attainable and manageable level. Detailed justifications for each revision are described below.

Comment Response

Please see the response to comment 92.

Comment # 152 **Commentor** 4 **Comment Subject** Monitoring

Specific Comment

[From Attachment 4 to the RCFC&WCD comment letter]

Revision: Request wet weather monitoring to be required twice a year instead of three times a year.

Justification: (1) The Water Board Staff has referenced the SMC guidance and indicated not enough data has been collected to warrant a requirement change from three wet weather samples to two. However this guidance states once three wet weather samples have been collected for three years, sampling for two wet weather events is acceptable. This data has been collected by the Copermittees. The Copermittees successfully collected three wet weather events for three reporting periods; in addition, the Copermittees have over 10 years of data to form the basis of future analyses. Although the methods of collection have changed, our statistical analysis indicates that there is no statistically significant difference between data sets collected during prior terms and the current term. (2) The current OC and SD Permits require only two wet weather samples. (3) The Santa Margarita Region is semi arid with ephemeral flows, sampling for a third storm event has proven, and will continue to prove difficult and may result in non compliance due to climate (lack of storm events). (4) The cost to Copermittees to fund a third wet weather monitoring event during this permit term is significant.

Comment Response

The referenced SMC guidance recommends 3 storm events for at least 3 years, after which a power analysis should be conducted to determine what, if any, changes should be made. The ROWD provided an analysis that stated not enough data was available statistically detect any trends. Furthermore, two issues remain regarding the mass loading data collected to date:

1) Much of the mass loading monitoring had deficiencies that were documented in the 2008 USEPA audits. For example, the audits found the Copermittees collected grab in lieu of manual composite samples. These deficiencies make answering MRPs core management questions, as well as meeting the goals, very difficult. Composite sampling enables a better calculation of the extent and magnitude of impacts on receiving waters (i.e. loading, first flush, event mean concentrations, etc...)

2) The required list of pollutants have not been monitored at mass loading stations under the current Order.

The current Orange and San Diego County MRPs have a reduced frequency because they have collected a large number of samples from representative storms, have done composite sampling, and have sampled the first storm event of the rainy season. The statement regarding inability to sample storms in the Santa Margarita HU is addressed in the 2008 USEPA Audit Inspection Report.

Lastly, the draft MRP is consistent with the Santa Ana MRP (Order No. R8-2010-0033), which requires mass loading sampling for 3 storm events annually.

Comment # 153	**Commentor** 4	**Comment Subject** Monitoring

Specific Comment

[From Attachment 4 to the RCFC&WCD comment letter]

Revision: Request dry weather sampling method to be changed from composite sampling to grab samples.

Justification: (1) The Copermittees currently conduct dry weather sampling using an instantaneous grab sample. The MRP proposes 24-hour composite sampling, which represents a significant cost increase due to the need to construct infrastructure at the sampling sites to secure and facilitate portable automatic sampling equipment. (2) Composite samples will mask illicit discharges which is one of the primary reasons for dry weather monitoring. (3) Due to dry weather flows' steady nature, the flows can be accurately characterized using a grab sample. (4) The SMC Regional Bioassessment Program, which effectively defines the standard of practice for receiving waters monitoring, has found that chemistry samples must be collected at the most downstream transect (Transect A) to be representative of the flow through the assessed reach. This program therefore uses Grab samples collected immediately prior to benthomacroinvertebrate (BMI) and periphyton sampling. If composite sampling was required, it similarly must be done at the downstream transect; however, the composites would not be representative as they would pick up sediment, nutrients and other pollutants that had been unnaturally introduced by the BMI and periphyton collection activities. This would create an unrepresentative sample and the sampling equipment would be at risk of failure due to the suspension of sediment.

Comment Response

The purpose of dry weather mass loading is to determine concentrations and mass loads of pollutants within receiving waters during dry weather conditions. This is critical in order to meet the goals and answer the core management questions of the MRP. A 24-hour composite is required because flows may not have a steady nature during the course of 24 hours. The Copermittees are expected to utilize the concentration and loading information from the composite sampling to identify pollutants of concern that should be closely monitored for in their IC/ID monitoring. It is doubtful that 2 dry weather grab samples per year at a mass loading station will be representative of illicit discharges occurring upstream. It should also be noted that the SMC bioassessment monitoring does not include mass loading monitoring as part of receiving water monitoring. For bioassessment (stream assessment) conducted at mass loading stations, composite sampling is required to coincide with bioassessment monitoring in accordance with water chemistry sampling protocol in the bioassessment SOP. A statement to that effect has been added to the draft MRP.

Comment # 154	**Commentor** 4	**Comment Subject** Monitoring

Specific Comment

[From Attachment 4 to the RCFC&WCD comment letter]

Revision: Request change in toxicity testing from three organisms to two organisms.

Justification: (1) The MRP specified in the OC Permit requires toxicity testing of two organisms and this permit should not go beyond requirements found within the OC Permit due to limited funding and resources. This is an example of a simple change where cost-savings can be realized. (2) The USEPA only has chronic toxicity protocols for Pseudokirchneriella subcapitata (formerly, Selenastrum capricornutum). Therefore there are no established protocols for the other two species, and data collection results will be difficult to compare to other regions.

Comment Response

The toxicity testing required within the Orange County MRP is inappropriate for comparison to the Riverside County draft MRP, as the Orange County MRP includes toxicity testing for inland surfaces waters (2 organisms) as well as estuarine and marine organisms (1-2 organisms). Thus, Orange County actually includes the same number or additional organisms for toxicity testing at mass loading stations.

Furthermore, the testing of 3 organisms is recommended by USEPA and is discussed in the fact sheet. For clarification purposes, USEPA has published chronic toxicity protocols (see EPA-821-R-02-013) for
1) the fathead minnow, Pimephales promelas
2) the cladoceran, Ceriodaphnia dubia
3) the alga, Selenastrum capriconutum

In this respect, the draft MRP is consistent with the Santa Ana MRP (Order No. R8-2010-0033), which requires toxicity testing for 3 organisms of different phyla at mass loading stations.

Comment # 155 **Commentor** 4 **Comment Subject** Monitoring

Specific Comment

[From Attachment 4 to the RCFC&WCD comment letter]

Revision: Request that three stream assessment stations be monitored instead of six stations.

Justification: (1) The existing MS4 Permit requires three stream assessment stations annually. These stations are our mass loading stations. It should be noted that this is an ephemeral watershed. The current stations were selected because they were the only stations that had flowing water during the bioassessment sampling periods, not because they were necessary representative of urban runoff (although they are downstream of the entire MS4 system). Specifically, during dry weather, none of the current receiving waters stations receive runoff from the MS4 due to the ephemeral nature of the watershed. Similarly, efforts to find flowing water for the Regional Bioassessment Program have been challenging. For example, in 2009, the first year of the program, 35 random sites were evaluated before one perennial site could be identified. In 2010, 39 random sites were evaluated. The final sites that were selected were actually our CURRENT mass loading stations as they were the first randomly selected sites that had flow. This lack of flow was recognized by SCCWRP in establishing the distribution of Regional Bioassessment Stations in southern California. This is why southwest Riverside County is only assigned one Bioassessment station. (2) As is demonstrated above, the Copermittees are not likely to find three additional flowing stations that are indicative of impacts from MS4 discharges. The Permit requirement therefore puts the Copermittees in unavoidable non-compliance with the Permit. (3) The cost of monitoring the additional three stations is substantial, and given the relative size of the MS4 system and population of RC to OC, the additional stations are not appropriate on an environmental, economic or social justice scale.

Comment Response

The San Diego Water Board understands that there are areas within the Santa Margarita HU that have largely ephemeral and intermittent flows.

In response to the comment:

1) The existing Order requires three stream assessment stations monitored twice per year, not annually as the commentor states. Thus, 6 sampling events are currently required. Based upon discussions with the Copermttees, the draft MRP has been modified from requiring 6 stations twice per year to 6 stations once per year. Thus, the frequency of monitoring will remain unchanged from the current Order, and the Copermittees and required to sampling in the spring following storm flows.

2) For the Regional Bioassessment Monitoring Program, it is important to note the station selection criteria for inclusion in the program. For example, stations selected must be representative of certain land use criteria, as well as have sufficient flows during September. The draft MRP requires the Copermittees to select 3 additional stations for monitoring. The Copermittees already have selected 1 additional station to monitor as part of the Regional Bioassessment Monitoring Program. Thus, 2 additional stations, which are not required to be monitored in the fall, will need to be selected. The San Diego Water Board does not agree that this will put the Copermittees in unavoidable non-compliance.

3) As stated above, the frequency of monitoring will remain the same as in the current Order. In regards to the relative frequency of monitoring when compared to Orange County, the initial Orange County draft had 12 stations monitored twice per year. Following discussions with the Orange County Copermittees, this was reduced to 9 stations annually. Orange County also participates in the Regional Bioassessment Monitoring Program.

Comment # 156	**Commentor** 4	**Comment Subject** Monitoring

Specific Comment

[From Attachment 4 to the RCFC&WCD comment letter]

Revision: Request frequency be changed from twice per year to once per year for stream assessment monitoring.

Justification: (1) The Water Board Staff and Executive Officer agreed to make this change as a trade for the Copermittees participation in the SMC Regional Bioassment special study. The change was based on findings by the Southern California Coastal Watershed Research Project (SCCWRP) scientiests indicating that there is no seasonally signficant difference in bioassesment scores. The Copermittees volunteered to implement th Regional Bioassessment Program ahead of the necessary changes to the NPDES MS4 Permit program to reduce the ioassessment sampling events in a good faith effort. (2) To determine if two sampling events are in fact necessary, the Copermittees evaluated the difference in biological community scores between Spring and Fall for data collected at Lower Murrieta, Lower Temecula and Adobe Creeks during May and October from 2007 through 2009. Utilizing a Two-Way Analysis of Variance of Southern California Index of Biological Integrity (IBI) scores, with season (Spring/Fall) and year (2007 through 2009) as variables, results indicated no statistical difference between years for any of the Permittee's three sites. No seasonal statistical difference in IBI scores ($p \geq 0.19$) was noted within any of the three stations, indicating that the IBI scores were consistent across seasons, regardless of the year. This data confirmed SCCWRP findings that there is not a change in the biological communities between the Spring and Fall seasons. (3) Further, the MRP within the OC Permit states that stations with year-round flow conditions may be monitored in May/June or September/October. Current assessment stations at Murrieta Creek, Temecula Creek, and Adobe Creek are perennial stations. Consistency across programs would denote assessments of these creeks once per year.

Comment Response

Pursuant to discussions with the Copermittees, the frequency has been changed to 6 sites once per year. The monitoring will be required to be conducted in the spring.

Comment # 157 **Commentor** 4 **Comment Subject** Monitoring

Specific Comment

[From Attachment 4 to the RCFC&WCD comment letter]

Revision: Request "a representative percentage of the major outfalls within each hydrologic subarea" (II.B.1) and "a representative number of major outfalls within each hydrologic subarea" (II.C.1.b.(1)) be changed to "representative major outfalls" as shown in the redlines attached to this comment letter.

Justification: (1) The draft MRP requires sampling of a representative number or representative percentage of major outfalls. This is a problematic compliance target as it focuses the program on a particular and open-ended "number" or "percent" of outfalls. By revising the language to require monitoring of "representative major outfalls", the burden is on the Copermittees to come up with a program that is truly representative, without requirements to meet an arbitrary number or percent of outfalls. The Copermittees are concerned about subareas that have many outfalls, which could require sampling of more sites than are economically feasible. These costs could escalate beyond the initial sampling event because if a NAL or SAL exceedance is recorded, source assessments studies are triggered that require additional staff time and resources. If this requirement is not revised, costs will quickly rise beyond the Copermittees' ability to sustain the MS4 compliance program.

Comment Response

The language in the draft MRP is consistent with requirements under 40 CFR 122.26 for non-storm water field screening (122.26(d)(1)) and storm water characterization (122.26(d)(2)) requirements. The language “a representative percentage of the major outfalls within each hydrologic subarea” leaves it up to the Copermittees to determine what number would be a representative percentage. The comment speculates that areas with many outfalls would require sampling of more sites than economically feasible. The San Diego Water Board does not expect the Copermittees to propose a program with a frequency that is not economically feasible nor statistically defensible. In regards to rising costs, the SAL/NAL requirements in the Order have specific language which allows for prioritization of source identification if a situation arises where the number of exceedances of action levels exceeds the ability to adequately respond. Additionally, in discussions with the Copermittees, the Copermittees were unable to provide an accurate numerical count of MS4 outfalls within the permit coverage area. Lastly, the Copermittees to date have not characterized their storm and non-storm water MS4 effluent, as monitoring is currently conducted in the receiving waters. Effluent monitoring is a critical component of MS4 programs, and as a permanent MRP element, the San Diego Water Board expects that the Copermittees will be able to collect data over the permit term that provides a representative percentage or number of MS4 outfalls that discharge for differing watershed conditions in each hydrologic subarea. The lack of representative stations was also documented in the 2008 USEPA audits. Thus, no change has been made to the draft MRP.

Comment # 158	**Commentor** 4	**Comment Subject** Monitoring

Specific Comment

[From Attachment 4 to the RCFC&WCD comment letter]

Revision: Request the following text revisions in footnote:

"A representative determination must consider hydrologic conditions, total drainage area of the site, land use types (commercial, residential and industrial) , costs and other considerations as appropriate."

Justification: (1) The Copermittees originally asked for clarification on what factors would be considered for "representative percentage" and Water Board staff agreed to cost being included. The failure to include cost as a factor results in a program that reduces resources and diminishes funds quickly. The revision of the above allows for cost to be included through "other considerations as appropriate". (2) Deletion of percentage is consistent with previous comments. (3) Hydrologic conditions, population density of the site, traffic density and age of the structures or building in the area are all proposed "A representative percentage determination must consider hydrologic conditions, total drainage area of the site, population density of the site, traffic density, age of the structures or buildings in the area, and land use types (commercial, residential and industrial) , costs and other considerations as appropriate." deletions because each subarea may not be sensitive to these factors and if one of this factors is applicable it will be included under the addition "other considerations as appropriate".

Comment Response

Please see section VI of the Fact Sheet for a discussion regarding cost considerations in NPDES storm water permits. To clarify, the San Diego Water Board did not agree to include cost as a specific criteria for determining a “representative percentage” of sampling points. The San Diego Water Board agreed to clarify what factors (consistent with 40 CFR 122.26) to consider when evaluating representativeness under the MRP in order to meet the goals and answer the questions of the MRP. The existing language provides sufficient flexibility for the Copermittees to consider their program cost-efficiencies when evaluating factors in the draft MRP for proposing water quality monitoring. It is unclear how the “failure to include cost as a factor results in a program that reduces resources and diminishes funds quickly.” It is expected that sufficient water quality monitoring will require resources and funds. No changes were made based on this comment.

Comment # 159	**Commentor** 4	**Comment Subject** Monitoring

Specific Comment

[From Attachment 4 to the RCFC&WCD comment letter]

Revision: Request samples for Storm Water Action Levels (SALs) to be changed from 24-hour composite to grab.

Justification: (1) Composite sampling would result in significant increased cost due to the cost of purchasing additional automatic sampling equipment and constructing the necessary infrastructure to support its use. (2) Grab samples are likely more conservative. The Copermittees propose that grab samples be collected first and then, if a problem is indicated, the Copermittees would specify needed follow-up monitoring in the Source Assessment Monitoring Plan. (3) Freed resources can be dedicated to other key components of the program, such as follow-up source assessment studies.

Comment Response

The request to modify SALs to composites is not warranted on multiple accounts:

1) The draft MRP has flexibility that allows the Copermittees to select a representative percentage of sites, and frequency of sampling.

2) Grab samples may or may not be more conservative depending upon the time of sampling. Composite samples are what the SALs were calculated from, are what is required under 40CFR 122.21(g)(7), and composites provide additional information crucial to storm water programs (see the responses to comments 152 and 153, for example see 40 CFR 122.26(d)(2)(iii)(B)).

3) If grab samples are not representative of the discharge, it may actually waste resources on unnecessary follow-up source monitoring.

Comment # 160 **Commentor** 4 **Comment Subject** Overirrigation

Specific Comment

The draft MS4 Permit categorically prohibits the discharge of landscape irrigation; irrigation water; lawn watering; (collectively 'irrigation runoff') and non-emergency fire fighting flow runoff to the MS4. The basis for this requirement comes from the current Orange County stormwater permit within the San Diego Region (NPDES No. CAS0108740), which prohibits such discharges.

Although irrigation runoff may have been shown to be a problem in South Orange County, it has not been shown to be causing problems in receiving waters in the Santa Margarita Region. Attachment 6 summarizes the unique conditions and other facts that warrant the restoration of irrigation runoff as a non-prohibited non-stormwater discharge category. It is important to reiterate the three key points
made in Attachment 6:

Unlike the watersheds in South Orange County, the Santa Margarita Region is an ephemeral watershed;

Unlike South Orange County, the Copermittees have not identified landscape irrigation, irrigation water or lawn water as an actual source of pollutants or conveyance of pollutants to waters of the U.S.;

The draft MS4 Permit requires Copermittees to eliminate irrigation runoff TO THE MS4, which by definition, requires elimination of discharges to streets, curbs and gutters.

As noted above, the prohibition appears to hold the Copermittees responsible for any amount of irrigation runoff discharged to the curb and gutter, regardless of whether or not the discharge ever reaches receiving waters or causes or contributes to the exceedance of a water quality standard. This fact, combined with the fact that irrigation runoff has not been shown to be causing impairments in the local receiving waters, will make enforcement difficult to justify with residents and will likely result in community outrage over bans on irrigation. Further the Copermittees are not water purveyors, and as such, have little control over residential irrigation runoff outside of sending code enforcement officers out to look for incidents of excessive irrigation runoff. This is a very inefficient use of resources. In any event, the provisions as written will do little for water quality but potentially much for community outrage against water quality programs. The Copermittees do not believe this is the intent of the Board.

It is further worth noting that the Permit already contains an investigation and remediation process via Non-Stormwater Action Levels (NALs) by which the Copermittees will identify the source of problematic non-stormwater discharges. Should the source be found to be a conditionally exempt non-stormwater discharge, the permit requires the Copermittees to address that discharge or the entire category of discharges as appropriate. By allowing the NAL process to determine when and where conditionally exempt discharges need to be prohibited, the Copermittees are better positioned to justify any enforcement actions.

PREFERRED POLICY CHOICE: the Copermittees request that the Regional Board restore the conditional exemption for landscape irrigation, irrigation water and lawn watering as outlined in Attachments 6 and 7.

Alternatively, if the Regional Board nevertheless insists on prohibiting Irrigation Runoff, the Copermittees request that the draft MS4 Permit be revised to allow for irrigation runoff to be managed as a JRMP program, rather than as a prohibited discharge to the MS4. This alternative request is consistent with how the Permit currently deals with non-emergency fire fighting discharges, which was also removed from the list of non-prohibited non-storm water discharges. The Executive Officer stated that he would be open to consideration of a program for irrigation runoff that
would address discharges from the MS4. This alternative approach allows the Copermittees to develop a program that focuses on irrigation runoff problem areas, as opposed to holding the Copermittees responsible for eliminating any instant case of over-irrigation to a street independent of threat to receiving water quality.

ALTERNATIVE POLICY CHOICE: The Copermittees request that the Regional Board clarify that irrigation runoff is only prohibited where it is discharged from an MS4 (into receiving waters) by adding the following language:

B.4. As part of the JRMP, the Copermittees must develop and implement a program to address pollutants from landscape irrigation, irrigation water and lawn watering identified as significant sources of pollutants to waters of the United States.

Comment Response

Please see the response to comment 100.

Comment # 161 **Commentor** 4 **Comment Subject** Monitoring

Specific Comment

[From Attachment 4 to the RCFC&WCD comment letter]

Revision: Request removal of the High Priority Inland Aquatic Habitat Monitoring requirements.

Justification: (1) This is an entirely new monitoring program. This monitoring program was initially proposed in the Orange County NPDES MS4 Permit, but later deleted when the NAL/SAL monitoring requirement was added. This trade was made as it was expected that the outfall monitoring data from the NAL and SAL program would effectively answer the underlying management question – "are MS4s impairing beneficial uses in priority aquatic habitat areas?" The underlying logic for removing the requirement in Orange County similarly applies here. Given the current economic conditions and the fact that this was considered and deleted from the OC Permit; the Copermittees respectfully request that this requirement similarly be deleted from the Riverside County MRP.

Comment Response

Please see the response to comment 150.

Comment # 162 **Commentor** 4 **Comment Subject** Economic

Specific Comment

It is fundamental that the MS4 Permit be economically, technically, and legally feasible. To be credible, and to pass legal muster, MS4 Permit requirements must demonstrable a nexus to water quality improvements. Instead the current requirements, although well intended but not always well developed, will put the Copermittees in non-compliance since we cannot afford to implement all the requirements and consequently this will not lead to water quality improvement.

The present economic crisis has made daily headlines over the past three years and Riverside County has been identified as the 11th most impacted county in the nation. In the ROWD and throughout the development of the draft MS4 Permit, the Copermittees have provided abundant publicly available information regarding the impact of this crisis on their revenues, staffing, and programs. Virtually every program and service, including public safety services, has been impacted, and others have been eliminated. Contingency reserves have been depleted to the lowest levels allowable to maintain operations. At this point, the Copermittees cannot increase water quality compliance spending without real risks to reducing spending on existing state and federal mandates or other much-needed local programs and services. As proposed, the draft MS4 Permit is economically infeasible.

Comment Response

Please see the responses to comments 8, 9, 52, 134, and 136. The Tentative Order is economically, technically, and legally feasible as evidenced in the supporting Fact Sheet.

Comment # 163	**Commentor** 4	**Comment Subject** General

Specific Comment

In an effort to promote a viable 4th-term MS4 Permit, the Copermittees proactively engaged Regional Board staff in a collaborative dialogue with the intent of developing an economically feasible MS4 Permit that was protective of receiving water quality in the Santa Margarita Region. However, the following constraints have limited the benefits of the process:

1. The discussions were curtailed because the Board expected the draft MS4 Permit to be heard in October;

2. The Board had adopted the South Orange County MS4 Permit as a "model" permit, and, therefore, would have to approve any major revisions to the provisions of that Permit; and

3. The inclusion of several new provisions of the draft MS4 Permit addressing unpaved roads, inspection programs and monitoring requirements go well beyond the Orange County Permit.

Comment Response

Please see the responses to comments 121 and 131. The commentor presents a paradoxical argument of on the one hand complaining that the San Diego Water Board uses the South Orange County MS4 permit as a model permit and on the other hand complaining about uniques provisions in the Tentative Order that are not in the South Orange County MS4 permit.

Comment # 164	**Commentor** 4	**Comment Subject** Economic

Specific Comment

As noted in the Executive Summary, the MS4 Permit adopted for South Orange County was ultimately developed for a region with substantial coastal resources and perennial streams, twice the population, significantly higher property tax revenues, and more affluent tax payers.

Comment Response

Please see the responses to comments 8, 9, 115, 116, 122, 126, 127, 130, 134, and 136.

Comment # 165 **Commentor** 4 **Comment Subject** Monitoring

Specific Comment

[From Attachment 4 to the RCFC&WCD comment letter]

Revision: Request alteration of Special Study Program.

Justification: The Draft Permit requires six special studies to be conducted (TMDL Development and Implementation, Sediment Toxicity, Trash and Litter Investigation, Agricultural, Federal and Tribal Input Study, MS4 and Receiving Water Maintenance Study and Intermittent and Ephemeral Stream Perennial Conversion Study). This is in excess of the four special studies required by the OC MRP. Given the larger MS4 Permit Area, population and resources available to South Orange County, the additional studies proposed on Riverside County are inappropriate from a social, economic and environmental justice standpoint. (1) Water Board staff acknowledged multiple studies were added to the draft MRP with the intention that would be eliminated. (2) The issues addressed by these studies are not all specific to the Santa Margarita Region and would be more appropriate to be evaluated as part of a broader regional study, such as the Sediment Toxicity study. (3) The Agricultural, Federal, and Tribal Input Study is specifically inappropriate as it requires the Copermittees to monitor the discharges of other entities subject to separate NPDES regulations. (4) The Intermittent and Ephemeral Stream Perennial Conversion Study is specifically inappropriate as it incorrectly presumes that such ephemeral streams are actually being converted to perennial systems within the permit area due to MS4 discharges.

Comment Response

Please see the responses to comments 92 and 150. San Diego Water Board staff included special studies for issues of concern to the San Diego Water Board specific to the Santa Margarita Watershed, based upon our corrent knoledge of the watershed, including complaints and enforcement within the region, to answer specific questions outside the scope of the core MRP requirements, and as a result of issues raised in the ROWD. Based upon discussion with the Copermittees, one of the Special Studies was removed from the draft MRP prior to public release. For those remaining, San Diego Water Board staff included studies thought to be of importance from a water quality standpoint, and their removal or inclusion is appropriately considered by the Board.

Additionally, Copermittees are correct that some studies have a regional context and are of regional importance. Thus, as in the Orange County MRP, the Copermittees can propose to participate in a regional monitoring approach to supplement and/or replace MRP requirements. This is subject to Executive Officer approval.

Please see the response to comment 167 in regards to the Sediment Toxicity Study.

Please see the response to comment 168 in regards to the Agricultural, Federal, and Tribal Input Study.

Please see the response to comment 172 in regards to the Intermittent and Ephemeral Stream Perennial Conversion Study.

Comment # 166 **Commentor** 4 **Comment Subject** General

Specific Comment

By contrast, the ephemeral conditions found in the Santa Margarita Region result in stream channels that are dry during dry weather conditions and receive less rain during wet season conditions. The stream flow conditions in the Santa Margarita Region are entirely unlike the significant perennial flow conditions found in South Orange County. The proposed changes contained herein address these realities. The proposed changes also address necessary changes to ensure that the Copermittees can continue to afford implementation of the draft MS4 Permit given the significant economic disadvantages faced by the Santa Margarita Region, disadvantages that have been exacerbated by the impacts of the recession.

Comment Response

Please see the response to comment 175

Comment # 167 **Commentor** 4 **Comment Subject** Monitoring

Specific Comment

[From Attachment 4 to the RCFC&WCD comment letter]

Sediment Toxicity – In the waterbodies found in the Santa Margarita watershed (which are intermittent at best and dry most of the time) the idea of investigating sediment toxicity and its impacts on benthic macroinvertebrates seems a reach. Current sediment toxicity monitoring in the State is focused on year round streams and estuaries (e.g. the Delta). Furthermore the current state of sediment toxicity monitoring is at best in its infancy as is the State's policy regarding Sediment Quality Objectives. It would seem that a more reasonable approach associate with sediment toxicity is to allow the science to catch up with the policy and for the Copermittees to learn from these other statewide efforts.

Comment Response

As discussed in the Fact Sheet, Pyrethroid pesticides were identified from TIEs conducted in response to toxicity observed during sampling as part of the triad approach at Temecula and Murrieta Creek. This monitoring was water chemistry specific and did not include sediment monitoring for pesticides. Additionally, Temecula Creek, Murrieta Creek and the Santa Margarita River were 303(d) listed for toxicity for the 2008 list. In regards to current sediment toxicity monitoring, southern California specific monitoring has shown sediments to contain pyrethroids, specifically following storm events from residential areas. Thus, irrespective of watershed hydrology (i.e. intermittent streams), pyrethroids can have a large impact on the benthos during periods of flow both during and following storm events, which may be reflected in the observed low IBI scores.

The commentor also includes some discussion regarding the science behind sediment toxicity monitoring and the status of sediment quality objectives policy at a statewide level. It is important to note that the science is well-established as documented in peer-reviewed studies, and the rate of development of state policy does not provide a sufficient basis for removal of the special study. It is unclear how the science needs to "catch up with the policy," and how this warrants not evaluating the receiving waters for a pollutant already documented to be present in toxic amounts.

Comment # 168 **Commentor** 4 **Comment Subject** Monitoring

Specific Comment

[From Attachment 4 to the RCFC&WCD comment letter]

Agricultural, Federal, and Tribal Input Study - Ongoing monitoring efforts in the Central Valley and the Los Angeles Regions for the Agriculture Waiver Program are more robust and statistically valid to make any efforts by Riverside County to be pale in comparison and likely insignificant. Likewise, monitoring in watersheds (e.g. Lake Tahoe, and the northwest part of the State) where water bodies are impaired by sediment and where Federal and Tribal land uses have inputs to the impaired water bodies is significant and should take precedent over any efforts in Riverside County. As previously noted, it is inappropriate to require the Copermittees to not only monitor their own discharges, but also expend resources monitoring the discharges of others. The Regional Board has authorities to require these sources to collect their own data and should exercise that authority appropriately if such studies are required.

Comment Response

This special study was included based upon information provided in the Copermittees' ROWD, as the Copermittees stated their concern regarding the quality of storm water being discharged into their MS4s from Agricultural, Federal and Tribal areas without sufficient supporting data. The Copermittees are responsible for flows into, through and from their MS4s, and they cannot passively accept discharges from third parties (see Finding D.3.d and Discussion in the Fact Sheet). This special study is intended to identify those flows and determine the level of pollutants being discharged into their MS4s.

The information from this study will be useful in determining whether pollutant contributions from agricultural, federal, and tribal areas are actually a significant source of pollutants entering the Copermittees' MS4 systems, as they assert. This study can also be done in conjunction with the monitoring that will be performed by the irrigated agriculture community for Conditional Waiver No. 4.

Comment # 169 **Commentor** 4 **Comment Subject** Monitoring

Specific Comment

[From Attachment 4 to the RCFC&WCD comment letter]

MS4 and Receiving Water Maintenance Study - It is likely that every flood control district in the State and Caltrans would be impacted by the MS4 and Receiving Water Maintenance Study; therefore it would be imperative to have a well thought out, comprehensive, and regional study to answer the questions being posed in the MRP. Requiring the Copermittees to take on this responsibility is misleading and will not be sufficient to answer the broad questions being posed in the MRP. A more reasonable approach would be to model a regional program similar to the current SCCWRP efforts to assess hydromodification requirements for southern California.

Comment Response

Although MS4/receiving water maintenance activities are conducted throughout the region, they are not conducted in the same manner and magnitude as is the practice in Riverside County. This special study was included with the intention that the study would serve as a pilot study to assist in the San Diego Water Board's determination if further investigation is warranted. The special study requirements are flexible and require, at a minimum, 2 sites (1 reference and 1 maintained) with pre and post monitoring for 9 pollutants. There is no specific requirement for sampling frequencies, durations or specific locations. However, the Copermittees are encouraged to propose a regional approach or program, which is allowed under the draft MRP, with EO approval.

Comment # 170 **Commentor** 4 **Comment Subject** Economic

Specific Comment

The requirements in the Permit must protect beneficial uses in a cost effective manner. It is always a balance to protect water quality and avoid unnecessary increases in program compliance costs. Balancing local water quality needs and funding limitations should be paramount in the current economic climate. Proposed program expansions must be carefully weighed against economic realities and be justified by conditions actually found in the Santa Margarita Region. As described, unpaved roads and business inspections have been effectively addressed by existing programs, yet the draft MS4 Permit proposes requirements that can only be met by establishment of new compliance programs and, in the case of the business inspect ions, elimination of the highly effective CAP.

Comment Response

Please see the responses to comments 52, 130, and 134. Through meeting with the Copermittees over a dozen times spanning several months, the Tentative Order was modified to address cost effectiveness.

Comment # 171 **Commentor** 4 **Comment Subject** General

Specific Comment

The legislature created Regional Boards to protect our beneficial uses while carefully considering the technical and economical feasibility of such protection. Even in the best of economic times, state and local government must carefully manage public revenues. A policy-level decision by the Regional Board is necessary to direct staff to work with the Copermittees to address the comments contained herein . The Copermittees request your support in our effort to develop an economically, technically, and legally feasible MS4 Permit that is appropriate to the Santa Margarita Region. As noted in the opening Executive Summary of this comment letter we specifically request that you direct Regional Board provide staff with direction to resolve the issues identified in this letter and attachments.

Comment Response

Please see the responses to comments 8, 9, 52, 121, 134, 136, 162, and 170.

Comment # 172	**Commentor** 4	**Comment Subject** Monitoring

Specific Comment

[From Attachment 4 to the RCFC&WCD comment letter]

Intermittent and Ephemeral Stream Perennial Conversion Study – Finally, review of historical water resource data by the Copermittees (as indicated in the ROWD), USGS and state and federal courts have all found that the construction of Vale and Skinner dams has significantly increased the ephemeral nature of local watersheds, resulting in much drier conditions than naturally occurred. This is why Rancho California Water District is required to discharge raw water down the Santa Margarita River at the County Line. Requiring a study to study the impacts of ephemeral conversion demonstrates a clear lack of understanding of historical and current receiving water conditions. Further, similar to our comment above regarding the MS4 and Receiving Water Maintenance Study, this study is better addressed at a regional or statewide level. It is not possible to develop a sufficient local database to statistically validate any impacts from non-stormwater discharges within any reasonable timeframe. Furthermore any minimal monitoring effort that could be provide by the Copermittees would not comprehensively address the questions being proposed in the MRP and would be a waste of resources. Again a regional approach, whether it be SCCWRP or other combination of stormwater Copermittees, would be a more logical and constructive approach to address this issue.

Comment Response

The San Diego Water Board does not disagree with the impact of impoundments upon downstream hydrology, including historical conditions within the Santa Margarita HU. However, the commentor misunderstands the context of the special study. The purpose of the investigation is to assess if exempted non-storm water discharges from the MS4 are negatively impacting beneficial uses through the conversion of waters that historically were ephemeral or intermittent into perennial systems. For ephemeral systems, any discharge of effluent becomes the receiving water, and as such, can alter beneficial uses due to pollutants, flow, invasives species, etc… which would otherwise not be present. As described, this special study is meant to coincide with non-storm water discharge monitoring and provide a qualitative and quantitative evaluation of beneficial uses for receiving waters subject to the non-storm water discharges. This is expected to aid the Copermittees IC/ID efforts to determine if the discharges are causing a condition of pollution, contamination, or nuisance due to the non-storm water flows. The San Diego Water Board contends this is not a waste of resources.

The special study has been written with a great deal of flexibility and does not require the development of a database for statistical validation of results as the commentor states. Additionally, it is unclear what questions are proposed in the special study that could not be comprehensively addressed.

Again, the Copermittees may propose a regional approach under the draft MRP to supplement and/or replace monitoring requirements. While a regional approach may be warranted, the study's intent is to provide site-specific non-storm water evaluations within the Santa Margarita HU.

Comment # 173	**Commentor** 4	**Comment Subject** Monitoring

Specific Comment

[From Attachment 4 to the RCFC&WCD comment letter]

The Copermittees have proposed maintaining two of the special studies (TMDL Development and Trash Assessment), while replacing the other four with locally preferred special studies already in place (Regional Bioasessment Program and LID BMP design, maintenance, and effectiveness study). The Copermittees believe the alternate proposal provides information that is directly relevant and beneficial to the Santa Margarita Region. This would result in an annual cost savings of $314,000 per year. This would maintain parity with the OC Permit, which only has four special studies, three of which are identical to the studies proposed below (TMDL Development, Regional Bioassessment, Trash and Litter investigation). Specific language to incorporate the new studies is included in the redline markup of the MRP.

The Copermittees propose the following studies, the write-up for which can be found in Attachment 9 to the comment letter:

1. TMDL Development and Implementation

2. LID BMP design, maintenance and effectiveness study and demonstration
This study will be valuable in ensuring BMPs that are required are effective and the benefit and integration of LID BMPs into a site is understood. This proposed study would directly affect the Copermittees ability to ensure effective LID BMPs are being implemented.

3. Regional Bioassessment study
All the Southern California counties have committed to participate in this study, with the understanding that it would be written into the MS4 permits as a special study for which they would get credit. The Copermittees have been proactively implementing this study without a MS4 Permit requirement, and want to be able to continue to support these regional studies.

4. Trash and Litter Investigation

Comment Response

The San Diego Water Board is amenable to the addition of the Regional Bioassessment as a special study, and has modified the Stream Assessment Montioring Frequency to once annually, in exchange. The draft MRP has been modified accordingly. The San Diego Water Board disagrees with including the LID special study (see the response to comment 150).

Comment # 174 **Commentor** 4 **Comment Subject** Unpaved Roads

Specific Comment

[From Attachment 5 to the RCFC&WCD comment letter]

The Draft Municipal Separate Storm Sewer System Permit (Draft Tentative Order No. R9-2010-0016; NPDES No. CAS0108740) for the Santa Margarita Region of Riverside County (Draft MS4 Permit) includes proposed findings and requirements for development and maintenance of unpaved roads that are redundant to existing regulatory requirements. The proposed requirements for maintenance of unpaved roads may lead to the unintended consequence of discouraging maintenance of the majority of the unpaved roads in the Santa Margarita Region, which may increase the potential for erosion and sediment discharge from such roads. Statements in the Fact Sheet and Findings, monitoring data, and Permittee observations and experience do not support identification of unpaved roads as a significant source of pollutants to receiving waters in the Santa Margarita Region, thereby warranting additional regulation of unpaved roads.

The Copermittees request that the proposed requirements for development and maintenance of unpaved roads be removed from the Draft MS4 Permit. The Copermittees believe that enhancement of existing programs by identifying Best Management Practices (BMPs) specific to maintenance of unpaved roads and providing public education to owners and contractors providing maintenance of privately maintained unpaved roads will be as effective as the program in the draft Permit at substantially less cost. If the San Diego Regional Board determines that unpaved roads within their jurisdiction require further regulation, the Permittees believe that the appropriate regulatory mechanism is a General Permit (Waste Discharge Requirements or NPDES Permit) since the Draft MS4 Permit addresses only a fraction of unpaved roads within the jurisdiction of the San Diego Regional Board.

Comment Response

San Diego Water Board disagrees with the conclusion that these requirements are redundant to existing regulatory requirements.

Also, the comment fails to explain the reasoning or logic behind their assertion why requiring maintenance of unpaved roads will discourage the maintenance of the majority of unpaved roads. If indeed a reduction in maintenance does occur, to whatever extent that reduction results in water quality impacts, it must be addressed through the requirements proposed.

The San Diego Water Board has identified unpaved roads as a significant source of pollutants; please see the response to comment 138 for recent examples. The requirement to regulate unpaved roads has not been removed from the Tentative Order. Certain changes have been made to the exact language as requested by the Copermittees. The San Diego Water Board strongly encourages the Copermittees to educate the public on proper maintenance of unpaved roads. The San Diego Water Board reserves the right to issue a general permit regulating unpaved roads.

Comment # 175 **Commentor** 4 **Comment Subject** General

Specific Comment

[From Attachment 5 to the RCFC&WCD comment letter]

The stream system in the Santa Margarita Region is ephemeral, with only small isolated segments exhibiting natural perennial flow due to rising groundwater. Such a stream system does not support fish migration. Runoff from the Santa Margarita Region naturally exhibits high sediment loads due to precipitation patterns, limited vegetative cover, soil types and steep topography.

Comment Response

The San Diego Water Board disagrees with the comment as an over generalization of the stream conditions within the Santa Margarita watershed. The Santa Margarita River has historic fish migration and historic perennial flows. Groundwater harvesting has drawn down the water table and reduced surface flow availability. In addition, urbanization has created localized perennial flows and wetlands in historically ephemeral areas, much like other areas throughout the region.

Comment # 176 **Commentor** 4 **Comment Subject** Unpaved Roads

Specific Comment

[From Attachment 5 to the RCFC&WCD comment letter]

Most existing unpaved roads in the Santa Margarita Region are private roads on private property that have not been engineered and have evolved through use. Such unpaved roads consist of earthen materials that have been compacted by vehicular use and do not include improved drainage, engineered grading or surface improvement. However, proposed unpaved road projects are subject to the development requirements of the MS4 Permit and the Construction General Permit and would be engineered.

In contrast to paved roads, unpaved roads are predominantly lightly traveled and found in rural areas serving economically disadvantaged residents. Many of these roads remain unpaved for economic reasons. Moreover, some residents do not want paved roads as they desire to preserve the rural/rustic nature of their communities.

Comment Response

San Diego Water Board staff disagree that proposed unpaved road projects are already subject to the development requirements of the MS4 Permit and the Construction General Permit (see the response to comment 102)

The status of ownership may increase an unpaved roads' threat to water quality due to a private owner being less likely to be informed on the threat to water quality or have the ability to maintain the unpaved road. The frequency of travel may also correlate to a threat to water quality. Less frequently used roads are also less likely to be maintained, thereby being an increased threat to water quality. If residents choose to have unpaved roads as their preferred access for aesthetic reasons, those roads must have BMPs and be maintained to not cause a water quality impairment.

Comment # 177 **Commentor** 4 **Comment Subject** Monitoring

Specific Comment

[From Attachment 4 to the RCFC&WCD comment letter]

Revision: Request "Carbamates" be removed as a constituent for analytical testing in Table 1.

Justification: The testing of carbamates should be dictated by the completion of toxicity identification evaluations (TIEs). The use of carbaryl in urban areas throughout California dropped approximately 80% between 2004 and 2008. This drop is also matched by an 80% reduction in the number of USEPA registered carbaryl products between 2004 and 2008. A downward trend since 2006 likely reflects a long-term reduction in the availability of carbaryl products due to USEPA regulatory requirements. Further, once the USEPA completes its regulatory process for the full implementation of new carbayl restrictions3, urban carbaryl use is likely to continue to decline.

Comment Response

The Copermittees have not monitored for carbamates, and thus no evidence of their presence in the discharge is available. While the reduction in registration and projected use likely limits the possibility of the presence of carbamates in the future, it does not warrant removal of carbamates from the required monitoring list. Should toxicity be detected, the inclusion of carbamates will assist with conducting TIEs. It is also important to note that other pesticides required to be monitored regularly (chlorpyrifos) and through TIEs (pyrethroids) have been detected. Thus, it is probable carbamates are present. No change has been made to the draft MRP.

Comment # 178 **Commentor** 4 **Comment Subject** Unpaved Roads

Specific Comment

[From Attachment 5 to the RCFC&WCD comment letter]

Maintenance of unpaved roads in the Santa Margarita Region is generally limited to smoothing washboard depressions that have been created by vehicle use and to improve drainage by properly sloping the surface. The smoothed road surface is compacted by the grading equipment and, subsequently, by regular traffic use. This routine maintenance activity is intended to maintain original lines and grade, and the original purpose of the unpaved road. Repair of landslides and washouts, and replacement of culverts is also performed as needed, in some instances on an emergency basis. Landslide and washout repairs may require the implementation and maintenance of temporary erosion and sediment control BMPs until the disturbed area is stabilized.

The Permittees voluntarily provide limited maintenance of Copermittee maintained, dedicated and accepted unpaved roads for public access. This voluntary maintenance is provided for public safety, including emergency vehicle access, and to maintain utility of the public easement. There is no requirement that the Permittees provide this maintenance.

Comment Response

Unpaved roads should be maintained to prevent landslide and washouts that subsequently cause a water quality impairment. Regardless of ownership, the Copermittee can, through their storm water ordinances, require private owners of unpaved roads to maintain the road to prevent erosion and sedimententation downstream in receiving waters. The San Diego Water Board, however, is sensitive to the Copermittees' concerns. The unpaved roads requirements have been revised. Please see the responses to comments 101 and 139-141.

Comment # 179 **Commentor** 4 **Comment Subject** Unpaved Roads

Specific Comment

[From Attachment 5 to the RCFC&WCD comment letter]

Most unpaved roads in the Santa Margarita Region are not maintained by the Permittees, but instead are private roads located on private property. Permittee staff is only allowed to enter private property if a crime or illegal activity is observed. The County of Riverside has not accepted maintenance of unpaved roads since the late 1940s and now only accepts paved roads that have been designed and constructed to County standards. Murrieta and Temecula will only approve new subdivisions with paved roadways constructed to their standards. In some instances, the Permittees maintain unpaved roads under contract to Home Owners' Associations or through Community Service Areas. However, the Permittees are prohibited by law from using Gas Tax funds for maintenance of unpaved roads on private property.

Other entities that are not under the legal authority of the Permittees also own unpaved roads in the Santa Margarita Region. These entities include: Agricultural Operators, Eastern Municipal Water District, Federal Lands, Metropolitan Water District of Southern California, Nature Conservancy, Railroads, Rancho California Water District, Southern California Edison, State of California, Tribal Lands

Comment Response

The Tentative Order only regulates those unpaved roads within the Copermittee's jurisdiction. Outside of their jurisdicion, other regulatory mechanisms will be required to address pollution from unpaved roads.

Comment # 180 **Commentor** 4 **Comment Subject** Monitoring

Specific Comment

[From Attachment 4 to the RCFC&WCD comment letter]

Revision: Request "Hexavalent Chromium" be removed as a constituent for analytical testing in Table 1.

Justification: Since 2004, monitoring in the Santa Margarita Region has reflected that out of 62 total samples, there were 60 non-detected levels of Hexavalent chromium. The 2 detected levels of Hexavalent chromium occurred in April 2007 in wet weather samples. It may be notes that 2007 was the driest year on record for the region and analyzed samples reflect an extended period between wet weather events. Table 1 has been modified to reflect this change.

Comment Response

Based upon data collected to date, the requirement to monitor Hexavalent Chromium has been reduced to the 1st storm event of the season and 1 dry weather event at mass loading stations. Following results collected during the term of the Tentative Order, the inclusion of Hexavalent Chromium will be evaluated for continued monitoring. Table 1 has been modified to include this clarification.

Comment # 181 **Commentor** 4 **Comment Subject** Monitoring

Specific Comment

[From Attachment 4 to the RCFC&WCD comment letter]

Revision: Request "Biological Oxygen Demand, 5day" and "Chemical Oxygen Demand" be removed as constituents for analytical testing in Table 1.

Justification: The reference in the Fact Sheet supporting the inclusion of these constituents is to the initial Phase 1 application requirements. It should be noted that the initial constituent list is not required of future permits. Further, these constituents are costly to analyze and do not provide new information that is relevant to the management of the NPDES MS4 Program.

Comment Response

Biological and Chemical Oxygen Demand (BOD/COD) provide an indication of pollution from excess sources of organic waste (biologically available and inert) such as sewage, animal waste, and plant over-production due to nutrient enrichment. The initial NPDES application requires the collection of a minimum number of constituents, including a list of constituents that are used to characterize storm water discharges. The comment does not provide any supporting evidence or documentation that warrants removal of these constituents. No changes were made based on this comment.

Comment # 182 **Commentor** 4 **Comment Subject** Unpaved Roads

Specific Comment

[From Attachment 5 to the RCFC&WCD comment letter]

The evidence cited in the Finding, water quality monitoring data, and Permittee observations and experience since establishment of the MS4 Permit in 1990 do not identify unpaved roads as a significant source of pollutants resulting in water quality impairments. The Copermittees support the continued application of development and construction requirements and maintenance of temporary erosion and sediment control BMPs as specified in existing permits.

The requirements for development and maintenance of unpaved roads were proposed by Regional Board staff for inclusion in the Draft MS4 Permit just prior to its release for public comment. Prior to that time, and dating from the original establishment of the MS4 Permit requirements in 1990, unpaved roads had not once been mentioned by Regional Board staff as a significant source of water quality impairment requiring additional regulatory.

The discussion of Finding D.1.c. states that the inclusion of unpaved road requirements was based on "investigations and complaints" reviewed by the San Diego Regional Board. However, Regional Board staff identified only one recent case regarding an unpaved road in the Santa Margarita Region as a problem. The Copermittee in question has investigated this case and it is being addressed as an enforcement action. Although the Copermittees have not had the opportunity to review the investigations and complaints cited by Regional Board staff, no feedback from these investigations was reported to the Copermittees at the MS4 Permit discussions prior to the proposal of the unpaved road requirements. This indicates to the Copermittees that unpaved roads do not in fact present a significant water quality concern.

The Copermittees have reviewed the documents cited by Regional Board staff in the discussion of Finding D.1.c. and the conditions in the Santa Margarita Region are vastly different from those in Pennsylvania and Northern California cited in those documents. These areas receive regular precipitation, have significant vegetative cover, and perennial streams, some of which may support migrating fish. Nothing in these documents suggests that unpaved roads are a significant source requiring special attention in the Santa Margarita Region. Further, no data collected during Copermittee monitoring nor their observations support a conclusion that unpaved roads are a significant source of pollutants warranting special regulatory attention.

The lack of evidentiary support for the unpaved roads provisions makes their inclusion in the Draft MS4 Permit arbitrary and capricious. The Copermittees therefore request deletion of Finding D.1.C.

Comment Response

Contrary to the comment, the San Diego Water Board has identified several unpaved roads potentially causing water quality problems. Therefore, "continued application of development and construction requirements and maintenance of temporary erosion and sediment control BMPs" is clearly insufficient, and, to some extent inappropriate, since unpaved roads are not temporary.

The BMPs cited in USEPA and State of California can be equally effective at addressing sediment and erosion on unpaved roads in the Santa Margarita Watershed. In no way does a BMP manual infer similar geology, climate or habitat. The fact that the watershed has less vegetative cover and flashy flows undesrcores the need for proper BMPs in the watershed.

Finally, the statement that ," no data collected during Copermittee monitoring nor their observations support a conclusion that unpaved roads are a significant source of pollutants warranting special regulatory attention" is not surprising since no such data was collected. This was the basis for the San Diego Water Board proposing a Special Study on unpaved roads in earier drafts (prior to public release).

Please see the responses to comments 101, 103, and 138.

Comment # 183 **Commentor** 4 **Comment Subject** Monitoring

Specific Comment

[From Attachment 4 to the RCFC&WCD comment letter]

Revision: Request "Total Organic Carbon" and "Dissolved Organic Carbon" be removed as constituents for analytical testing in Table 1.

Justification: The reference within the Fact Sheet does not require these constituents and there is a significant cost in analyzing the constituents. It is not clear what additional information these constituents provide that would be useful in managing the MS4 program that is not already addressed through the collection of other constituents.

Comment Response

The reference in the Fact Sheet has been updated to reflect the reference for monitoring of organic carbon. Please also see the response to comment 181.

Comment # 184 **Commentor** 4 **Comment Subject** Unpaved Roads

Specific Comment

[From Attachment 5 to the RCFC&WCD comment letter]

For the reasons set forth above, there is no evidence that unpaved roads require special regulatory attention in the MS4 Permit. Moreover, proposed requirements specific to unpaved roads are redundant to existing requirements in both the existing Permit and the draft MS4 Permit, the state General Construction Permit, and the Copermittees' Stormwater ordinances. To the extent that unpaved roads are of concern to Regional Board staff, those concerns can be effectively addressed by minor adjustments to these existing compliance programs. In a time of tight regulatory budgets, adding these additional requirements, especially where there is no demonstrated need for them, is arbitrary and capricious. The Copermittees request deletion of requirements specific to unpaved roads (see discussion below) as well as these statements in the Fact Sheet.

Comment Response

Please see the response to comment 138 and 182. The Copermittees' existing permit requirements have failed to adequately address pollution coming from unpaved roads.

Comment # 185 **Commentor** 4 **Comment Subject** Unpaved Roads

Specific Comment

[From Attachment 5 to the RCFC&WCD comment letter]

Virtually all unpaved road development activities would be greater than one acre and/or be part of a priority development project of one acre or more. Such development projects are required to prepare and implement project-specific Standard Urban Stormwater Mitigation Plans (SUSMPs) under Section F of both the existing MS4 Permit and the Draft MS4 Permit. The SUSMPs identify post-construction BMPs that will be implemented for all elements of the project, including the unpaved road elements of the project. Unpaved road projects are also required to comply with the state General Construction Permit, which requires preparation of a SWPPP that identifies construction-phase BMPs and post-construction BMPs. These development and construction phase requirements are applicable to unpaved roads and are imposed by the Copermittees during the development review process, during the issuance of grading permits and during construction inspections. Either the general requirements for development projects in the existing or Draft MS4 Permit and/or the General Construction Permit already require identification and implementation of post-construction BMPs, including erosion and sediment control BMPs, when developing new unpaved roads. Therefore, additional requirements for development of unpaved roads are redundant and the Copermittees request that these redundant requirements be removed from the Draft MS4 Permit.

Comment Response

The San Diego Water Board disagrees with the comment's over generalization that virtually all unpaved road development activity would be greater than one acre. In particular, small roads crossing ephemeral stream can cause significant impacts through improperly engineered, designed and maintained culvert systems. Please see the response to comment 102.

Comment # 186 **Commentor** 4 **Comment Subject** Unpaved Roads

Specific Comment

[From Attachment 5 to the RCFC&WCD comment letter]

The documents cited in Finding D.1.c discuss shaping of the surface of unpaved roads during smoothing, and maintenance of temporary sediment and erosion control BMPs associated with maintenance activities, such as repair of landslides and wash outs. The temporary erosion and sediment control BMPs identified include straw bales and silt fencing. The documents do not describe conditions in the Santa Margarita Region, but rather in Pennsylvania and Northern California.

The conditions in the Santa Margarita Region are vastly different from the conditions found in Pennsylvania and Northern California. Nevertheless, the Copermittees conduct surface grading and maintain temporary erosion and sediment control BMPs as appropriate following completion of maintenance on unpaved roads. These BMPs associated with the routine maintenance of unpaved roads will be documented and procedures formalized in the Riverside County Drainage Area Management Plan (DAMP).

Comment Response

Finding D.1.c in the Tentative Order does not include any document citations. The Fact Sheet discussion for Finding D.1.c. does include some examples of existing BMP manuals that the Copermittees may draw upon as a cost -saving resource in designating BMPs for unpaved roads maintenance. The BMP manuals are in no way used to describe the geology, habitat and climate of the Santa Margarita Region. The manuals do include useful information regarding the impacts of unpaved roads reardless of location. See comment 182 response.

Comment # 187 **Commentor** 4 **Comment Subject** Unpaved Roads

Specific Comment

[From Attachment 5 to the RCFC&WCD comment letter]

As previously described, the vast majority of unpaved roads within the jurisdiction of the Copermittees are not maintained by the Copermittees, but are maintained by others, typically private property owners. As these are public easements over private property, however, the underlying property owner is under no legal obligation to provide maintenance. To provide reasonable access, maintenance of such unpaved roads is voluntarily provided by property owners and, in some cases, home owners' associations. State law prohibits the use of Gas Tax funds by the Copermittees for the maintenance of unpaved roads on private property. Requirements for implementation and maintenance of temporary erosion and sediment control BMPs in areas under the legal jurisdiction of the Copermittees are addressed by the general requirements of the Copermittees' stormwater ordinances and, where grading activities are significant, through the Copermittees' grading ordinances. As maintenance of unpaved roads on private property is voluntary, more aggressive regulation of such private roads may in fact discourage routine maintenance of unpaved roads, likely resulting in an increase in erosion and sediment discharge from such roads.

As an alternative, maintenance of unpaved roads can be effectively addressed by enhancing existing programs. There is no need to create a new compliance program requirement specific to unpaved roads, especially where such programs cannot in any event be implemented by the Copermittees on private property. The Copermittees believe that a better approach is to provide public education to property owners and grading contractors in areas served by unpaved roads, focusing on the proper methods of shaping unpaved road surfaces and the benefits of implementing and maintaining temporary erosion and sediment controls.

The Copermittees request that these proposed provisions be removed from the Draft MS4 Permit.

Comment Response

Please see the responses to comments 101, 102, 176, and 182.

Comment # 188 **Commentor** 4 **Comment Subject** Unpaved Roads

Specific Comment

[From Attachment 5 to the RCFC&WCD comment letter]

There is nothing unique about potential discharges from unpaved roads under the legal jurisdiction of the Copermittees such that they would require special regulation. As discussed above, there is significant mileage of unpaved roads in the Santa Margarita Region that are not under the legal jurisdiction of the Copermittees. If there is concern about the impact of unpaved roads on water quality (a concern that, for the reasons already stated, is not supported by the evidence), there is no reason to believe that unpaved roads not under the legal jurisdiction of the Copermittees do not present the same potential to affect receiving water quality.

If it is determined that development and maintenance of unpaved roads requires special additional regulation, then such regulation should apply equally and on the same schedule to all unpaved roads under the jurisdiction of the San Diego Regional Board, not just those under the legal authority of the Copermittees. The Copermittees request that, if staff continues to maintain that unpaved roads require additional regulation, those requirements be addressed through a general permit for unpaved roads, and not in the Draft MS4 Permit.

Comment Response

Because unpaved roads are a significant concern to water quality, the San Diego Water Board will regulate discharges from them under the appropriate mechanism. Please see the responses to comments 101 and 179.

Comment # 189	**Commentor** 4	**Comment Subject** Unpaved Roads

Specific Comment

[From Attachment 5 to the RCFC&WCD comment letter]

No evidence, whether statements in the Fact Sheet and Findings, monitoring data, or Copermittee observations and experience, supports identification of unpaved roads as a significant source of pollutants to receiving waters in the Santa Margarita Region warranting additional regulation. The proposed unpaved road requirements are redundant to requirements of existing permits, including the state General Construction Permit, as well as existing Copermittee ordinances and programs. To the extent that unpaved roads may be a source of pollutants to the MS4 and thence to receiving waters, the Copermittees believe that enhancement of existing programs by documenting BMPs specific to maintenance of unpaved roads and providing public education to owners and contractors who provide maintenance of privately maintained unpaved roads will be as effective in reducing such pollutants, at a much reduced cost.

If the Regional Board determines that unpaved roads within its jurisdiction require further regulation, the appropriate method for addressing those roads is through a General Permit (Waste Discharge Requirements or NPDES Permit) rather than the Draft MS4 Permit, since a General Permit would address all unpaved roads in the San Diego Region, not just the subset of unpaved roads under the legal jurisdiction of the Copermittees.

Comment Response

Please see the responses to comments 101 and 138.

Comment # 190 **Commentor** 4 **Comment Subject** General

Specific Comment

[From Attachment 6 to the RCFC&WCD comment letter]

Unlike the watersheds in South Orange County, the Santa Margarita Region is an ephemeral watershed that includes Murrieta and Temecula Creeks which are perennial interrupted streams, i.e., they include some reaches in which the flow is continuous and others where flow is ephemeral. However, the areas of perennial flow in the Santa Margarita Region are located in mountain area tributaries outside of the urbanized areas serviced by the MS4s. These perennial flows quickly disappear by seepage into the sands and gravels and resurface upstream of the confluence of Murrieta and Temecula Creeks. The creeks in the urbanized areas of the watershed, located primarily in the valley, are ephemeral and flows are only observed during and immediately following significant storm events.

Rising groundwater is currently observed in Murrieta Creek below its confluence with the Santa Gertrudis Channel, an observation consistent with the observations made by the State of California in 1956. Rising groundwater is also observed in Temecula Creek approximately one quarter mile upstream of the Interstate 15 Bridge. In 1956, the State observed more extensive rising groundwater conditions occurring as far upstream as the Highway 79 Bridge. Based on the virtual absence of non-stormwater flows and the rising groundwater conditions observed in lower Murrieta and Temecula Creeks prior to development of the watershed, there is no evidence that the rising groundwater currently observed is due to Urban Runoff nor that Urban Runoff has affected the quality of rising groundwater.

Comment Response

The San Diego Water Board recognizes that many of the streams should be ephemeral in the Upper Santa Margarita Watershed. The San Diego Water Board disagrees that the perennial flows in the upper parts of the watershed are all natural. This is the reason the Intermittent and Ephemeral Stream Perennial Conversion special study was included in the MRP. The San Diego Water Board recognizes that rising groundwater is likely to contribute to flows that are observed in some reaches. The San Diego Water Board does not contend that rising groundwater is necessarily due to non-storm water discharges. The San Diego Water Board does not agree that non-storm water discharges are not affecting groundwater quality. Much of the available groundwater monitoring data in the region indicate that there are elevated levels of nitrates and other forms of nutrients, as well as other pollutants that can likely be attributed to non-storm water discharges that infiltrate to groundwater.

The commenter misrepresents the State of California's 1956 report on the Santa Margarita Watershed. The report cites that flows in the watershed are highly "seasonal" not "ephemeral". In addition, the report demonstrates the seasonality with flow data in a table that shows diminished flows in the summer, but not an absence of flows, at the river gauge.

Also see the response to comment 175.

Comment # 191 **Commentor** 4 **Comment Subject** Monitoring

Specific Comment

[From Attachment 4 to the RCFC&WCD comment letter]

Revision: Request "Biological Oxygen Demand, 5day" and "Chemical Oxygen Demand" be removed as constituents for analytical testing in Table 4.

Justification: The reference in the Fact Sheet supporting the inclusion of these constituents is to the initial Phase 1 application requirements. It should be noted that the initial constituent list is not required of future permits. Further, these constituents are costly to analyze and do not provide new information that is relevant to the management of the NPDES MS4 Program.

Comment Response

Please see the response to comment 181. It is important to note that no data has been collected to date to characterize discharges of storm water effluent from the Copermittees' MS4s. No changes were made based on this comment.

Comment # 192 **Commentor** 4 **Comment Subject** Monitoring

Specific Comment

[From Attachment 4 to the RCFC&WCD comment letter]

Revision: Request "Total Organic Carbon" and "Dissolved Organic Carbon" be removed as constituents for analytical testing in Table 4.

Justification: The reference within the Fact Sheet does not require these constituents and there is a significant cost in analyzing the constituents. It is not clear what additional information these constituents provide that would be useful in managing the MS4 program that is not already addressed through the collection of other constituents.

Comment Response

Please see the responses to comments 181 and 183. It is important to note that no data has been collected to date to characterize discharges of storm water effluent from the Copermittees' MS4s. No changes were made based on this comment.

Comment # 193 **Commentor** 4 **Comment Subject** Monitoring

Specific Comment

[From Attachment 4 to the RCFC&WCD comment letter]

Revision: Request the following text revisions:

"The Copermittees must collaborate to develop and implement a program to identify sources of pollutants causing the priority water
quality problems within each hydrologic subarea. The program must include focused monitoring as necessary to identify source areas, or other methods to identify the societal sources of pollutants, as appropriate. This program must begin no later than the 2012-2013 monitoring year."

Justification: As drafted, the permit requires source identifications to start at the end point of the watershed and move upstream. The requested revisions are intended to provide flexibility to allocate resources appropriately based on field judgements. The second part of the revision is to acknowledge some pollutant contributions to the MS4 are in-fact, non-point source, and cannot be pinpointed through focused source ID Monitoring.

Comment Response

A key component of receiving water and effluent monitoring is to conduct source identification monitoring to identify specific sources and/or areas for pollutants causing priority water quality problems. This is done in conjunction with source identification as required under the Tentative Order on a watershed basis, moving upstream to identify specific sources and contributing areas. As stated in the fact sheet, all monitoring conducted under Order No. R9-2004-001 focused on receiving water conditions rather than MS4 effluent discharges. Outside of required toxicity identification and reduction evaluations, no source identification effluent monitoring was conducted for observed exceedances of water quality standards in receiving waters. The utilization of "other methods to identify the societal sources of pollutants," is not considered water quality monitoring, and thus does not fall under the MRP but rather the Tentative Order (i.e. construction site locations). See the Fact Sheet for further discussion. No changes were made based on this comment.

Comment # 194 **Commentor** 4 **Comment Subject** Monitoring

Specific Comment

[From Attachment 4 to the RCFC&WCD comment letter]

Revision: Request text additions:

"Sampling of non-storm water discharges may be done utilizing grab samples. If a ponded MS4 discharge is observed at a monitoring station, the Copermittee(s) must record the observation and collect at least one (1) grab sample, however ponded water samples will not be used in determining action level exceedances. If flow is evident, a 1-hour composite sample may be taken. The Copermittee(s) must estimate the flow using techniques such as by measuring the width of water surface, approximate depth of water, and approximate flow velocity."

Justification: The first text addition is to avoid triggering action levels due to increased concentrations caused by evaporation of ponded water. Evaporation of ponded water will result in increased concentrations of any constituents contained in the water. NALs are based on Water Quality Objectives that are based on stable, flowing stream conditions. The second text addition is to allow flexibility in measuring stream flows. In some cases, flow gauges or flow meters may be available to estimate flow.

Comment Response

In response to the comment regarding ponded MS4 discharge and concerns over higher concentrations, there are multiple factors to consider. Non-storm water discharge sampling requires sampling of the effluent discharged from the MS4 into receiving waters. First, if an MS4 discharge is ponded within the receiving water due to the receiving water's natural hydrology, then an increased concentration due to receiving water conditions (i.e. evaporation) is not a sufficient rationale for causing a condition of pollution, contamination, or nuisance as a result of the discharge. This is also reflected within the action level calculations, specifically in consideration of the appropriateness of granting dilution credits. Second, if an MS4 discharge is ponded within the MS4 prior to the discharge point, then action levels would also still apply, as there is visible evidence of a non-storm water discharge into the MS4 system which may be an illicit discharge. The ponding does not warrant foregoing proper IC/ID investigations.

In regards to the flow estimation language, edits have been made to ensure there is flexibility in measuring the flow of the effluent. For clarification, the commentor requests "flexibility in measuring stream flows", and the referenced flow estimation is for effluent discharge. The draft MRP has been modified to include this clarification.

Comment # 195 **Commentor** 4 **Comment Subject** Monitoring

Specific Comment

[From Attachment 4 to the RCFC&WCD comment letter]

Revision: Request text additions:

Monitoring Annual Report: The Principal Copermittee must submit the Receiving Waters and MS4 Discharge Monitoring Annual Report to the San Diego Water Board on October 1 of each year, beginning on October 1, 2013. Receiving Waters and MS4 Discharge Monitoring Annual Reports must cover the monitoring activities and results from the previous fiscal year, and must meet the following requirements:

Justification: All of the Copermittees' activities are tracked and reported on a Fiscal Year basis. This facilitates clearer data and cost tracking, and results that can be more effectively integrated into the JRMP reports in a clear and understandable manner, since the reporting periods are aligned. This change is important, so as to allow for a simpler transition from the existing monitoring and data tracking methods, to those that will be developed for compliance with the permit.

Comment Response

The San Diego Water Board finds this to be a reasonable request and has modified the draft MRP language.

Comment # 196 **Commentor** 4 **Comment Subject** Monitoring

Specific Comment

[From Attachment 4 to the RCFC&WCD comment letter]

Revision: Request the following text revisions:

"The 4th year monitoring report must include identification and analysis of any long-term trends in the Copermittees' MS4 storm water discharges or receiving water quality. Appropriate statistical methods shall be used to evaluate the water quality data."

Justification: The first edit is to require the long term statistical analyses be performed on a time schedule consistent with submission of the ROWD. Requiring long-term statistical trend analyses on an annual basis is unnecessary and inappropriately increases analysis and reporting costs and complexity. The second edit recognizes a multitude of different statistical methods could be used and others may be more appropriate to the dataset than those identified in the draft MRP.

Comment Response

The first proposed edit to reduce trend analysis to the 4th year monitoring report for submission with the ROWD is not appropriate for multiple reasons. This does not meet the goals of the MRP (I.A). For example, goal number 2 is to "Measure and improve the effectiveness of the Copermittees' runoff management programs." Trend analysis should be utilized as a tool to meet this goal, which arguably should not be done on a permit re-issuance basis. The proposed edit would also not answer the core management questions the MRP is designed to answer (I.B). For example, question 5 asks "are conditions in receiving waters getting better or worse?" Again, this should not be answered only on a permit re-issuance basis.

In regards to the second proposed edit, the commentor misconstrues the MRP language. The MRP language only requires a trend analysis to include a non-parametric approach, and provides some examples ("Trend analysis must use nonparametric approaches, such as"). A non-parametric approach is required to be included because stormwater data in southern California are not normally distributed, and comparison of statistical calculations on transformed data with a non-parametric approach aids in evaluating conducted trend analysis. No changes were made based on this comment.

Comment # 197 **Commentor** 4 **Comment Subject** Monitoring

Specific Comment

[From Attachment 4 to the RCFC&WCD comment letter]

Revision: Request elimination of requirement for annual monitoring reports to include total pollutant loads (wet weather loads plus dry weather loads) due to MS4 Discharge for each of the hydrologic subareas.

Justification: Many assumptions go into the calculations of total loads, making their use in statistical analyses questionable at best. The Copermittees have continued to provide this data, but do not see that it has any value.

Comment Response

The San Diego Water Board recognizes that multiple assumptions are integrated into the estimation of total pollutant loading from MS4 discharges. However, this does not warrant the removal of the calculation requirement, as load calculations play an important role in estimating the impact of MS4 discharges on receiving waters. Importantly, estimation of pollutant loading should be utilized by the Copermittees to meet the goals and answers the questions under I.A and I.B. Furthermore, the Copermittees have not conducted MS4 effluent monitoring under previous or the current Order, so it is expected that pollutant loading estimations under the draft MRP, which requires storm and non-storm water effluent monitoring, will be more accurate.

It is also important to note that the collection of MS4 effluent and receiving waters data and subsequent MS4 load estimation will assist in the evaluation of 303(d) listings and TMDL development. No changes were made based on this comment.

Comment # 199	**Commentor** 4	**Comment Subject** Overirrigation

Specific Comment

[From Attachment 6 to the RCFC&WCD comment letter]

The last sentence of this Finding [C.15] does not accurately reflect the facts. Unlike Orange County, and despite Board staff's contentions in the fact sheet the Copermittees have not identified landscape irrigation, irrigation water or lawn water as a source of pollutants or conveyance of pollutants to waters of the U.S. Rather, this statement is based on the efforts in Orange County where that County found that the significant perennial flows throughout the urbanized areas were caused by irrigation runoff. Not only has irrigation runoff not been found to be a source of pollutants to waters of the U.S. in the Santa Margarita Region as a category, no individual discharges of irrigation runoff in the region have been found to be a source of pollutants. As described in the Stream Flow Characteristics section above, during dry weather there is no perennial flow in the waters of the U.S. in the urbanized area until rising groundwater occurs just before the confluence of Murrieta and Temecula Creeks. This is unlike streams in South Orange County, that it was found that the significant perennial flows throughout the urbanized areas were caused by irrigation runoff. In the Santa Margarita Region, any weather runoff that does reach receiving waters quickly seeps into the alluvial soils.

Comment Response

Please see the responses to comments 27, 83, 175 and 233.

Comment # 200	**Commentor** 4	**Comment Subject** Overirrigation

Specific Comment

[From Attachment 6 to the RCFC&WCD comment letter]

Second, the Discussion of Finding C.15 in the Fact Sheet fails to demonstrate the need for a prohibition of this irrigation runoff as a non-stormwater runoff category. The discussion references conditions outside of and unlike those found in the Santa Margarita Region and misconstrues statements in public education materials that encourage runoff management as justification for the proposed prohibitions. Finally, no justification is provided in this discussion or elsewhere to support the prohibition of the non-emergency fire fighting flows runoff as a category.

Comment Response

Please see the responses to comments 25, 27, and 83.

Comment # 201	**Commentor** 4	**Comment Subject** Overirrigation

Specific Comment

[From Attachment 6 to the RCFC&WCD comment letter]

A prohibition of irrigation runoff will result in significant costs to the public and the Copermittees as the prohibition is TO THE MS4, which is defined to include streets, curbs and gutters. As the MS4 Permit has eliminated the MEP protections for dry weather non-stormwater discharges (see also legal comments in Attachment 7 to the comment letter), this makes the Copermittees responsible for every incidence of over-irrigation, regardless of whether such discharges ever affect receiving waters. As such, the cost to eliminate these discharges is not commensurate with any measurable environmental benefit. The Copermittees cannot impose fees to recover the costs of enforcing this new requirement and, as described in the Economics White Paper (Attachment 2 to the comment letter), the Copermittees have even fewer resources to carry out the requirements of the current MS4 Permit than in past years, much less carry out the additional requirements set forth in the draft Permit, including the development and implementation of a new program to prohibit irrigation runoff.

As this prohibition would also apply to Copermittees' facilities, retrofit of existing facilities would likely be immediately required to ensure compliance. The City of Murrieta, for example, has estimated that retrofit of their sprinklers to a drip system to avoid irrigation runoff from their facilities alone would cost $250,000.

Comment Response

Please see the response to comment 23. The San Diego Water Board disagrees that including the prohibition of irrigation runoff in the Tentative Order will result in significant costs to the public and Copermittees. The prohibition is consistent with the Water Conservation in Landscaping Act (AB1881), which already required cities and counties to adopted landscape water conservation ordinances prohibiting runoff from inefficient landscape irrigation by Janaury 1, 2010. The cities and counties are required to adopt ordinances that prohibit runoff from "the target landscape" to "adjacent property, non-irrigated areas, walks, roadways, parking lots, or structures." The Copermittees are already required to enforce these ordinances.

In the event that overirrigation runoff is identifed as an illicit discharge to "adjacent property, non-irrigated areas, walks, roadways, parking lots, or structures", which includes the Copermittees' MS4s, the Copermittees are expected to address the illicit discharge through their IC/ID programs. In addition, the San Diego Water Board encourages the Copermittees to identify and implement retrofit projects and education programs that can help to minimize or eliminate the potential for illicit discharges of overirrigation runoff into their MS4s.

Comment # 202 **Commentor** 4 **Comment Subject** Overirrigation

Specific Comment

[From Attachment 6 to the RCFC&WCD comment letter]

Management of irrigation runoff is currently addressed by existing requirements and programs and the additional requirements proposed in the draft Permit are unnecessary. The use of reclaimed water is regulated under Waste Discharge Requirements (WDRs) issued by the Regional Board.

The draft Permit also provides other mechanisms to address irrigation runoff. First, if a discharge of irrigation runoff was determined to be a source of stormwater pollutants, the Copermittees already have the legal authority to take appropriate enforcement action to control the discharge as an illegal discharge, under their existing storm water ordinances. Second, the non-stormwater action level monitoring required by this draft Permit will identify any potentially problematic non-stormwater discharges and identify the source of those discharges. Should the source be determined to be irrigation runoff, it will require the Copermittees to address that discharge. Both mechanisms are better suited (financially and legally) to deal with irrigation runoff than a complete prohibition provision in the absence of local data showing it as a problem.

Finally, local water purveyors are better equipped and able to address irrigation runoff. As an example, Rancho California Water District and Eastern Municipal Water District actively promote water conservation programs, which are supported by the Metropolitan Water District of Southern California. The County and the cities have adopted water conservation ordinances as required by the Water Conservation in Landscaping Act (AB 1881, Laird). Given these facts, there is even less justification for an extensive and expensive program to address an irrigation runoff issue that is not, in fact, a source of pollutants causing or contributing to a violation of water quality standards in the Santa Margarita Region.

Comment Response

The San Diego Water Board disagrees that the requirements in the Tentative Order are unnecessary. The San Diego Water Board has identified runoff from overirrigation as a significant source and conveyance of pollutants to the MS4 and receiving waters. This justifies the requirements of the Tentative Order. Please see the responses to comments 27 and 83.

In addition, the prohibition is consistent with the Water Conservation in Landscaping Act (AB1881), which already required cities and counties to adopted landscape water conservation ordinances prohibiting runoff from inefficient landscape irrigation by Janaury 1, 2010. The cities and counties are required to adopt ordinances that prohibit runoff from "the target landscape" to "adjacent property, non-irrigated areas, walks, roadways, parking lots, or structures." The Copermittees are already required to enforce these ordinances.

The San Diego Water Board agrees that NALs may idenify illicit discharges from overirrigation. In the event that an individual irrigation runoff discharge is identifed as an illicit discharge to the MS4, whether or not an NAL exceedance has been observed, the Copermittees are expected to address the illicit discharge through their IC/ID programs.

Comment # 203	**Commentor** 4	**Comment Subject** Overirrigation

Specific Comment

[From Attachment 6 to the RCFC&WCD comment letter]

Specifically, the Permittees request that the language in the Permit be amended as follows prior to adoption of the Permit:

Delete Finding C.15

As the last sentence of this Finding is not supported by fact, the Permittees request that it be deleted as noted in the following text and the entirety of the Discussion of Finding C.15 in the Fact Sheet be deleted.

Non-storm water discharges to the MS4 granted an influent exception [i.e., which are exempt from the effective prohibition requirement set forth in CWA section 402(p)(3)(B)(ii)] under 40 CFR 122.26 are included within this Order. Any exempted discharges identified by Copermittees as a source of pollutants are subsequently required to be addressed (emphasis added) as illicit discharges through prohibition and incorporation into existing IC/ID programs. Furthermore, the USEPA contemplates that permitting agencies such as the San Diego Water Board may also identify exempted discharges as a source of pollutants required to be addressed as illicit discharges (See VOl. 55 Fed. Reg. 48037).

Comment Response

Please see the responses to comments 27 and 83. No changes were made based on this comment.

Comment # 204	**Commentor** 4	**Comment Subject** Overirrigation

Specific Comment

[From Attachment 6 to the RCFC&WCD comment letter]

The Permittees request that the landscape irrigation; irrigation water; lawn watering; and non-emergency fire fighting flows runoff categories be restored to the list of non-prohibited, non-stormwater discharges identified in B.2 of the draft SMR MS4 Permit as noted below. In the event that an individual irrigation runoff discharge is determined to be a source of pollutants as identified by the non-stormwater dry weather action level (NAL) process, appropriate action can be taken by the Permittees to control that source.

B.2. Non-Stormwater Discharges
This item includes a listing of discharges that are not prohibited unless a discharge is determined to be a source of pollutants to waters of the U.S. Landscape irrigation, irrigation water, lawn watering and non-emergency fire fighting flows were deleted from this list as noted:
a. Diverted stream flows;
b. Rising groundwaters;
c. Uncontaminated groundwater infiltration [as defined at 40 CFR 35.2005(20)] to MS4s;
d. Uncontaminated pumped groundwater3;
e. Foundation drains3;
f. Springs;
g. Water from crawl space pumps3;
h. Footing drains3;
i. Air conditioning condensation;
j. Flows from riparian habitats and wetlands;
k. Water line flushing4,5;
l. Landscape irrigation;
m. Discharges from potable water sources not subject to NPDES Permit No. CAG679001, other than water main breaks;
n. Irrigation water;
o. Lawn watering;
p. Individual residential car washing;
q. Non-emergency fire fighting flows; and
r. Dechlorinated swimming pool discharges

Comment Response

Please see the responses to comments 27 and 83. In the event that an individual irrigation runoff discharge is identifed as an illicit discharge to the MS4, which may be after an NAL exceedance has been observed, the Copermittees are expected to address the illicit discharge through their IC/ID programs. No changes were made based on this comment.

Comment # 205	**Commentor** 4	**Comment Subject** Overirrigation

Specific Comment

[From Attachment 6 to the RCFC&WCD comment letter]

It is not practicable for the Copermittees to prevent or eliminate irrigation runoff. The Permittees request that the following requirements be revised as noted to provide achievable compliance requirements:

F.1.c.(1) Approval Process Criteria and Requirements for All Development Projects states:

Performance Criteria: Discharges from each approved development project must be subject to the following management measures:

(1) Source control BMPs that reduce stormwater pollutants of concern in runoff;prevent reduce the potential for illicit discharges into the MS4; prevent reduce the potential for irrigation runoff; storm drain system stenciling or signage; properly design outdoor material storage areas; properly design outdoor work areas; and properly design trash storage areas.

F.1.d.(5) Source Control BMP Requirements states:

Each Copermittee must require each Priority Development Project to implement applicable source control BMPs. The source control BMPs to be required must:

(a) Prevent illicit discharges into the MS4;
(b) Minimize storm water pollutants of concern in runoff;
(c) Eliminate Reduce the potential for irrigation runoff;
(d) Include storm drain system stenciling or signage;
(e) Include properly designed outdoor material storage areas;
(f) Include properly designed outdoor work areas;
(g) Include properly designed trash storage areas;
(h) Include water quality protection requirements applicable to individual priority project categories.

Comment Response

The San Diego Water Board disagrees with the proposed changes. The San Diego Water Board disagrees that it is not practicable for the Copermittees to prevent or eliminate irrigation runoff from entering their MS4 systems. The Copermittees are required by AB 1811 to prohibit overirrigation runoff. Please see the responses to comments 27, 83, and 201. The Copermittees are expected to implement their jursidictional programs, especially their IC/ID programs, to prevent or eliminate irrigation runoff from entering their MS4 systems. No changes were made based on this comment.

Comment # 206	**Commentor** 4	**Comment Subject** Overirrigation

Specific Comment

[From Attachment 6 to the RCFC&WCD comment letter]

Regulate irrigation runoff discharges from the MS4, rather than as prohibited discharge to the MS4:

If the Regional Board nevertheless insists on prohibiting irrigation runoff, the Copermittees request that the draft MS4 Permit be revised to allow for irrigation runoff to be managed as a Jurisdiction Runoff Management Plan (JRMP) program, rather than as a prohibited discharge to the MS4. This alternative request is consistent with how the Permit currently deals with non-emergency fire fighting discharges, which was also removed from the list of non-prohibited non-stormwater discharges. The Executive Officer stated that he would be open to consideration of a program for irrigation runoff that would address discharges from the MS4. This alternative approach allows the Copermittees to develop a program that focuses on irrigation runoff problem areas, as opposed to holding the Copermittees responsible for eliminating any instant case of over-irrigation independent of threat to receiving water quality.

As the alternative to restoring the conditional exemption, the Copermittees request the Board to ADD Provision B.4 as follows:

B.4. As part of the JRMP, the Copermittees must develop and implement a program to address pollutants from landscape irrigation, irrigation water and lawn watering identified as significant sources of pollutants to waters of the United States.

Comment Response

The San Diego Water Board disagrees with the requested change. The Copermittees are expected to implement their jursidictional programs, especially their IC/ID programs, to prevent or eliminate irrigation runoff from entering their MS4 systems. No changes were made based on this comment. Please see response to comment 201.

Comment # 207 **Commentor** 4 **Comment Subject** Legal

Specific Comment

[From Attachment 7 to the RCFC&WCD comment letter]

Throughout Part F. of the Tentative Order relating to the Jurisdictional Runoff Management Program, the language requires not only that the Copermittees adopt programs intended to achieve control of pollutants but also requires such programs to achieve certain ends. See, for example, Part F.1., where each Copermittee must implement a development planning program which meets the requirements of Section F of the Tentative Order and which requires such a program to (1) reduce development project discharges from the MS4 to the MEP, (2) prevent such discharges "from causing or contributing to a violation of water quality standards", (3) prevents illicit discharges to the MS4, and (4) manages increases in runoff discharge rates. A similar requirement is set forth in other provisions, including Part F.3, relating to existing development, Part F.3.b., relating to commercial/industrial programs, Part F.3.c., relating to residential programs and Part F.6, relating to the education component where, in each case, the Copermittees are required to develop programs and ensure their performance.

This dual requirement, to develop a program and then to ensure that it achieves the intended ends, is unlawful, as it goes beyond the requirements of the MS4 regulations and requires the Copermittees to guarantee the results of activities that will often be in the control of third parties. The MS4 regulations require that the MS4 permittees develop the required programs. See, for example, 40 CFR § 122.26(d)(2)(iv(A)((2), which requires the Copermittees to, among other things, develop and implement a management program including a "description of planning
procedures including a comprehensive master plan to develop, implement and enforce controls to reduce the discharge of pollutants from municipal separate storm sewers which receive discharges from areas of new development and significant redevelopment". The Copermittees certainly could be liable under the permit if they failed to adequately "develop, implement and enforce controls". However, the MS4 regulations do not require that the Copermittees guarantee, under threat of being found in violation of the permit, that such controls achieve the desired ends of the management programs. It should be also noted that in many other parts of the Order, the Copermittees are directed to develop programs "designed" to achieve water quality goals.

Further, the iterative BMP approach required by the State Water Resources Control Board ("State Board") in precedential State Board Order WQ 99-05 and subsequent rulings would be made meaningless if the Copermittees were strictly liable for ensuring in their programs that discharges did not cause or contribute to a violation of a water quality standard. It is appropriate for the Board to set forth in these sections the "elements needed in the Copermittees' program to fulfill the goals of [the] directive", as set forth in staff's Response to Comment 297 on the Orange County MS4 permit, Order No. R9-2009-0002. However, the Board has no authority to require the Copermittees to guarantee that such goals will be fulfilled, as the current language appears to require.

In addition to the portions of the Order cited, the Copermittees also request changes to similar provisions found at Sections F.1.d, F.1.d.5, F.2, F.3.a, F.4, and G. The attached redline identifies those and any additional parts.

Comment Response

40 CFR 122.44(d)(1) requires municipal storm water permits to include any requirements necessary to "[a]chieve water quality standards established under section 303 of the CWA, including State narrative criteria for water quality." 40 CFR 122.44(d)(1)(i) requires NPDES permits to include limitations to "control all pollutants or pollutant parameters (either conventional, nonconventional, or toxic pollutants) which the Director determines are or may be discharged at a level which will cause, have reasonable potential to cause, or contribute to an excursion above any State water quality standard, including State narrative criteria for water quality." Please also see the response to comment 76.

The Tentative Order's requirements are wholly lawful in accordance with the Clean Water Act, the Code of Federal Regulations and the California Water Code. The dual requirements are not in conflict, but work in harmony. The requirements set forth minimum programmatic actions that are expected to result in MS4 discharges meeting water quality standards. Where the Copermittees have implemented the minimum programmatic actions yet their discharges continue to violate water quality standards, the Copermittees must modify their programs and implement additional actions that are not specified within the Tentative Order to achieve water quality standards. The Tentative Order does not require strict compliance with water quality standards. See Defenders of Wildlife v Browner (9th Cir. 1999) 191 F.3d 1159, 1167-1168.

Comment # 208 **Commentor** 4 **Comment Subject** Legal

Specific Comment

[From Attachment 7 to the RCFC&WCD comment letter]

A number of requirements in the Tentative Order exceed the requirements of federal law. The Board may have discretion to impose such requirements under state law (Defenders of Wildlife v. Browner, 191 F.3d 1159 (9th Cir. 1999), however, the California Supreme Court has determined that to the extent such state law requirements are included in an NPDES permit, the Board must consider the factors set forth in Water Code § 13263(a) and § 13241, including the water quality that could reasonably be achieved by the requirements and economic considerations. City of Burbank v. State Water Resources Control Board (2005) 35 Cal. 4th 613. See also Water Code §13000, setting forth that the activities and factors which may affect the quality of the waters of the state "shall be regulated to attain the highest water quality which is reasonable, considering all demands being made on those waters and the total values involved, beneficial and detrimental, economic and social, tangible and intangible".

The Fact Sheet and findings for the Tentative Order do not establish that staff has considered such factors or, to the limited extent the factors were considered, staff used out-of-date and incomplete information. In particular, the economic analysis contained in Section VI of the Fact Sheet uses out-of-date information on the economic viability of the cities in the Santa Margarita Region, ignoring the impact of the national recession, which has hit the Region with particular force and which has caused a major reduction in property tax and sale tax revenues available to fund water quality activities under the Order. For a more complete economic analysis, please see Attachment 2 to the comment letter.

Comment Response

The federal statute provides that, in adopting MS4 permits, the permit "shall require . . . such other provisions as the Administrator or the State determines appropriate for the control of such pollutants." (See Defenders of Wildlife v Browner (9th Cir. 1999) 191 F.3d 1159) U.S. EPA and states have authority under federal law to go beyond the MEP standard and require strict compliance with water quality standards. (Building Industry Association of San Diego County v. State Water Resources Control Board, et al. (2004) 124 Cal.App 4th 866. The BIA court was persuaded that USEPA or the states have authority to require strict compliance with water quality standards under the "such other provisions as the Administrator . . . Determines appropriate for the control of such pollutants" language in CWA section 402(p)(3)(B)(iii). (Building Industry, 124 Cal.App 4th at 882-884.) In other words, even if the Permit somehow exceeded the federal minimum requirements of MEP, any discretion to exceed MEP originate in federal law, which requires the San Diego Water Board to include such other permit provisions as it deems appropriate.

However, in the Tentative Order, the San Diego Water Board has chosen not to exercise its discretion to go beyond MEP and require strict compliance with water quality standards. Thus, the Tentative Order's provisions clearly fall within the federal mandated requirements. The San Diego Water Board disagrees with the commenter's assertion that requirements in the Tentative Order exceed the requirements of federal law thus needing to consider the cited factors. However, where provided and available, staff has considered economic information in crafting the Tentative Order. Please see the responses to comments 8, 9, 77-79, and 86.

The economic analysis contained in section VI of the Fact Sheet is from up to date information, as reported by the Copermittees' Annual Reports, with information as of January 1, 2009. While we recognize that Riverside County is experiencing a period of economic hardship, the Copermittees do not provide an completely accurate characterization of the economic conditions. Please see the responses to comments 115, 116, 122, and 126-130.

Comment # 209 **Commentor** 4 **Comment Subject** Finding

Specific Comment

[From Attachment 8 to the RCFC&WCD comment letter]

Need for New Finding B.2: Section B in the findings describes the regulated parties. The District requests a new finding B.2, which provides as follows:

The Riverside County Flood Control and Water Conservation District (District) is not a municipality but rather operates various elements of the MS4 system within the San Diego Region in the form of flood control structures, including channels. Such channels and other flood control structures have been constructed and are operated by the District in accordance with its statutory obligations established by the Legislature in California Water Code App. § 48-9, to "control the flood and storm waters of said district" and to save and conserve in any manner all or any of such waters and protect from damage from such flood or storm waters the watercourses, watersheds, public highways, life and property in said district." Water Code App. § 48-9(8). As a creature of state law, and not a municipal corporation, the District does not exercise jurisdiction over land areas within the San Diego Region and the activities carried out on those land areas outside of its limited rights-of-way. Please see redline.

Comment Response

The San Diego Water Board disagrees with the requested change. As stated in the comment, the RCFC&WCD constructs and maintains channels and flood control structures, which are considered part of the MS4. The RCFC&WCD has jurisdiction within its right-of-way. The RCFC&WCD is responsible for implementing the requirements of the Tentative Order within its jurisdiction as is any other Copermittee. No changes were made based on this comment.

Comment # 210 **Commentor** 4 **Comment Subject** Legal

Specific Comment

[From Attachment 7 to the RCFC&WCD comment letter]

Finding A.4: This finding states that responses to comments on the Order would be "incorporated by reference" into the findings supporting the Order.

Comment: Incorporating responses to comments as to which interested parties have no chance to comment prior to the hearing on the Order raises a due process concern.

Comment Response

Finding A.4 has been modified to remove responses to comments as "incorporated by reference" into the findings of the Tentative Order. Although not part of the findings, the responses to comments remains part of the record and have been considered by the San Diego Water Board in adopting the Tentatie Order.

Comment # 211 **Commentor** 4 **Comment Subject** Finding

Specific Comment

[From Attachment 8 to the RCFC&WCD comment letter]

Findings, Section D.3: This section of the Findings referring to "Construction and Existing Development" is of limited applicability to the District, since the only construction projects that would be overseen by the District are of or within its own facilities. The redline sets forth a change to clarify this limited applicability.

Comment Response

The San Diego Water Board disagrees that the Findings referring to "Construction and Existing Development" are of limited applicability to the RCFC&WCD. Please see the response to comment 209. No changes were made based on this comment.

Comment # 212 **Commentor** 4 **Comment Subject** New Development

Specific Comment

[From Attachment 8 to the RCFC&WCD comment letter]

Section F.1.a: The District, as a non-municipality, does not prepare a General Plan or equivalent because it does not govern development within a geographical area. Thus, the requirements of this section of the Order are not applicable to it. Please see redline.

Comment Response

The requested changes are not necessary. The language also says "or equivalent plan". The RCFCD&WCD has Master Drainage Plans and Area Drainage Plans that must include watershd protection principles. No changes were made based on this comment.

Comment # 213 **Commentor** 4 **Comment Subject** New Development

Specific Comment

[From Attachment 8 to the RCFC&WCD comment letter]

Section F.1.d.(4)(a)(iii): Since the District, as a non-municipality, does not have land use codes, policies and ordinances, this provision, relating to the removal of "barriers to LID implementation," is not applicable to it. Please see redline.

Comment Response

The requested changes are not necessary. The RCFC&WCD has standard contract and bid specifications, encroachment permits and internal policies and procedures that all apply to this requirement. No changes were made based on this comment.

Comment # 214 **Commentor** 4 **Comment Subject** New Development

Specific Comment

[From Attachment 8 to the RCFC&WCD comment letter]

Section F.1.d.(9): The only Priority Development Projects (PDP) relevant to the District would be the District's owned non-flood control channel projects, since it has no authority to permit private or non-District facilities and exercises jurisdiction over no private land areas within the watershed, and because the construction of flood control channels is subject to the jurisdiction of the U.S. Army Corps of Engineers through the Clean Water Act Section 404 permit program, not the NPDES permit program under Section 402 of the Clean Water Act. Thus, this directive, which requires the verification of compliance by third parties with Standard Stormwater Mitigation Plan (SSMP) requirements, is not applicable to the District. Please see redline.

Comment Response

The requested changes are not necessary. The RCFC&WCD is required to verify compliance with SSMP requirements and track post-construction BMPs for its own projects. No changes were made based on this comment.

Comment # 215	**Commentor** 4	**Comment Subject** New Development

Specific Comment

[From Attachment 8 to the RCFC&WCD comment letter]

Section F.1.e: As noted above, the only PDPs over which the District would have authority are its own projects. Thus, this directive, which requires inspection of BMPs at PDPs constructed by third parties, is not applicable to the District. Please see redline.

Comment Response

The requested changes are not necessary. The RCFC&WCD is required to verify the construction of BMPs for its own projects. No changes were made based on this comment.

Comment # 216 **Commentor** 4 **Comment Subject** Legal

Specific Comment

[From Attachment 7 to the RCFC&WCD comment letter]

Finding C.14: This finding states, in relevant part, that "[n]on-storm water (dry weather) discharge from the MS4 is not considered a storm water (wet weather) discharge and therefore is not subject to regulation under the Maximum Extent Practicable (MEP) standard . . . .". The finding further asserts that such discharges are to be "effectively prohibited" from discharge into the MS4.

Comment: The rationale for this finding, as set forth in the Fact Sheet, relies on a State Board precedential decision, Order No. WQ 2009-0008. This order has been vacated by order of the Los Angeles County Superior Court in County of Los Angeles v. State Water Resources Control Board, Case No. BS 122724 (July 16, 2010). Thus, the order has no further effect and cannot be cited or relied upon by the Board in support of this finding or any other finding or directive in the Order.

Moreover, the finding incorrectly states that discharges of non-stormwater from the MS4 are not subject to the MEP standard. This parsing of "stormwater" and "non- stormwater" is not found in the Clean Water Act, which states only that the MS4 permit "shall require controls to reduce the discharge of pollutants to the maximum extent practicable . . . .". 33 U.S.C. 1342(p)(3)(B)(iii) (emphasis supplied). The preamble to the MS4 regulations promulgated by U.S. EPA moreover also acknowledges that "MEP control measures" would be implemented to address not only pollutants in "stormwater" but also from "non-stormwater discharges."

As the preamble states:

[Copermittees are required] to develop management programs for four types of pollutant sources which discharge to large and medium municipal storm sewer systems. Discharges from [such systems] are usually expected to be composed primarily of: (1) Runoff from commercial and residential areas; (2) storm water runoff from industrial areas; (3) runoff from construction sites; and (4) non-storm water discharges. Part 2 of the permit application has been designed to allow [permittees] the opportunity to propose MEP control measures for each of these components of the discharge". 55 Fed. Reg. at 48052 (emphasis supplied).

This language sets forth EPA's understanding of the plain language of the Act: "pollutants" must be controlled to the MEP from the MS4 "discharge", not merely stormwater. While State Board Order No. WQ 2009-0008 improperly attempted to ignore this distinction and liken non-stormwater discharges to prohibited "illicit discharges", that order has been vacated and cannot be cited by the Board.

Moreover, the interpretation that the Clean Water Act requires controls of dry weather discharges from the MS4 in the same manner as if such discharges were from an industrial wastewater source ignores the factual complexity of the MS4 discharge. For example, some of that discharge will be composed of exempt discharges, such as car washing runoff, swimming pool drainage, rising groundwater, foundation drains and other such sources. As to these types of discharges, U.S. EPA stated that "it is unlikely Congress intended to require municipalities to effectively prohibit . . . seemingly innocent flows that are characteristic of human existence in urban environments and which discharge to municipal separate storm sewers". 55 Fed. Reg. at 48037 (emphasis added). Other parts of that discharge will be comprised of industrial discharges separately permitted by the Board, such as well development discharges. These discharges cannot be distinguished from possible illicit discharges, yet they must still be treated to the MEP. There is no requirement in the Clean Water Act, or in the implementing regulations, to ensure that these mixed dry weather discharges must be "effectively prohibited" in the same way that an industrial plant would be required to control its discharges.

Comment Response

Please see the responses to comments 86 and 223.

Comment # 217 **Commentor** 4 **Comment Subject** New Development

Specific Comment

[From Attachment 8 to the RCFC&WCD comment letter]

Section F.1.g: Since the District is not a municipality, and does not permit third parties to build development projects, this provision is not applicable to it. (It should be noted that this directive also has been objected to by the District on behalf of itself and the other Copermittees.)

Comment Response

The requested changes are not necessary. The RCFC&WCD is required to enforce its storm water requirements and ensure compliance with the requirements of the Tentative Order for its own development projects. No changes were made based on this comment.

Comment # 218 **Commentor** 4 **Comment Subject** Construction

Specific Comment

[From Attachment 8 to the RCFC&WCD comment letter]

Sections F.2, F.2.a and F.2.f.: These directives require each Copermittee to comply with each of the requirements of the section, to review and update its grading and other ordinances, and implement an enforcement process for Construction sites. These requirements are not applicable to the District in the same manner as the other Copermittees, as the District is not a municipality and does not issue grading or other permits for private land use activities. Please see redline.

Comment Response

The San Diego Water Board disagrees that these requirements are not applicable to the RCFC&WCD in the same manner as the other Copermittees. The RCFC&WCD can review and update its grading and other requirements for construction projects implemented by the RCFC&WCD. The RCFC&WCD must enforce those requirements to ensure they are in compliance with the requirements of the Tentative Order. No changes were made based on this comment.

Comment # 219 **Commentor** 4 **Comment Subject** Commercial/Industrial

Specific Comment

[From Attachment 8 to the RCFC&WCD comment letter]

Sections F.3.b-c: These directives, which require the development of commercial/industrial and residential programs, are applicable to a municipality but not to the District, which does not have land area occupied by either commercial/industrial or residential developments. Such requirements may be applicable to the municipal Copermittees, but not to the District, which only operates MS4 within the Permit area. The District's rights-of-way are limited to that which is necessary to properly operate flood control infrastructure. Please see redline.

Comment Response

The San Diego Water Board disagrees that the proposed changes are necessary to make a distinction for the RCFC&WCD. If the RCFC&WCD does not have any commercial/industrial and residential land uses within their jurisdiction, they can report it in their Annual Report. The San Diego Water Board would not expect the RCFC&WCD to implement these programs if these land uses are not within their jurisdiction. No changes were made based on this comment.

Comment # 220 **Commentor** 4 **Comment Subject** Retrofit

Specific Comment

[From Attachment 8 to the RCFC&WCD comment letter]

Section F.3.d: This directive requires development of a retrofitting program for "municipal, industrial, commercial and residential" areas of development. The District only maintains MS4 facilities within the Santa Margarita Region, and does not have jurisdiction over other areas of development. The Order should make clear that any retrofitting requirements (which are the subject of separate comments by the District on behalf of other Copermittees) apply only to development with the jurisdiction of the Copermittee. Clarifying changes are set forth in the redline.

Comment Response

The San Diego Water Board disagrees with the requested changes. As stated in the comment, the RCFC&WCD maintains MS4 facilities within the Santa Margarita Region. MS4 facilities are considered municipal. There are potential retrofit opportunities for RCFC&WCD maintained MS4 facilities. Where there may be private property owners within other jurisdictions that could impact the RCFC&WCD MS4 facilities, the RCFC&WCD could work with those jurisdictions to identify ways to cooperate and encourage those private property owners to implement retrofit BMPs. No changes were made based on this comment.

Comment # 221 **Commentor** 4 **Comment Subject** General

Specific Comment

[From Attachment 8 to the RCFC&WCD comment letter]

Section F.6: This directive contains requirements for education of various target communities, including commercial and industrial owners and operators and residential communities, most of which are not within the jurisdiction of the District. The Order should make clear that such educational programs must be consistent with the jurisdiction of the Copermittees. Clarifying changes are set forth in the redline.

Comment Response

Through meetings with the Copermittees, modifications to the education section were made to accommodate the concern raised by the RCFC&WCD. Section F.6 requires each Copermittee to implement education programs. The Tentative Order is silent on how those education programs are implemented (i.e. for each jurisdiction, or regional). On several occasions, the RCFC&WCD has indicated that the Copermittees have a regional education program. As such, the RCFC&WCD is participating in educating and reaching out to the target communities in all the municipalities. No additional clarification is necessary.

Comment # 222 **Commentor** 4 **Comment Subject** General

Specific Comment

Attachment 9: Santa Margarita Region MS4 Copermittee Comments on Tentative Order R9-2010-0016 and Attachment E.

This attachment provides an underline strikeout text of Copermittee requested changes to the Tentative Order and Attachment E.

Comment Response

Where specific comments were provided in the underline-strikeout text, the San Diego Water Board has responded to those comments under a separate comment ID. Where comments were not provided in the text or where the comments were not otherwise addressed in other attachments of their comment letter, the San Diego Water Board has considered the change and either accepted the change as shown in the Errata or did not agree with the proposed change.

Comment # 223 **Commentor** 4 **Comment Subject** Legal

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

This order [WQ-2009-0008] has been vacated and can no longer be referenced

Comment Response

The San Diego Water Board disagrees with the commenter that discharges of non-storm water from the MS4 are subject only to the MEP standard. Non-storm water discharges into the MS4 are required to be effectively prohibited by the Copermittees. The San Diego Water Board acknowledges that State Water Board Order WQ-2009-0008 is no longer a precedential order by which the San Diego Water Board is bound, the court's opinion in County of Los Angeles v State Water Resources Control Board (Case No. BS 122724 (July 16, 2010)) does not address the substantive analysis and conclusions reached by the State Water Board in Order WQ-2009-0008. Rather, it vacates the permit issued by the Los Angeles Water Board that underlies Order WQ-2009-0008 on procedural grounds. The San Diego Water Board continues to agree with the State Water Board's findings and rationale as expressed in the Order. Findings in the Tentative Order will be revised to reflect that although Order WQ 2009-0008 is no longer a precedential order, the San Diego Water Board independently agrees with its findings and rationale.

Comment # 224 **Commentor** 4 **Comment Subject** Legal

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

This is inappropriate. The information in the fact sheet is/are not 'findings', they are explanations. Further a finding cannot be created through a response to comments.

Comment Response

Please see the response to comment 210. While the San Diego Water Board has modified the finding stating that responses to comments are incorporated as findings, it is appropriate to incorporate by reference the Fact Sheet into the Tentative Order.

Comment # 225 **Commentor** 4 **Comment Subject** Finding

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

No link has been demonstrated within this watershed. (Partially due to lack of recreation in receiving waters)

The findings should be accurate for reflective of the specific area the permit is regulating.

Comment Response

The San Diego Water Board contends that the finding is accurate for the specific area the permit is regulating. A landmark study, conducted by the Santa Monica Bay Restoration Project, found that there was an increased occurrence of illness in people that swam in proximity to a flowing storm drain. Although the Upper Santa Margarita Watershed is inland, the watershed drains to the Pacific Ocean, and pollutants generated in the area may impact coastal waters. For example, the Santa Margarita River system provides the main source of beach sand for the beaches in northern San Diego County. In addition, residents from the Upper Santa Margarita Watershed, who recreate at southern California beaches, benefit from clean water. Also, the waters in the Upper Santa Margarita Watershed are designated with water contact recreation (REC-1) beneficial use, and waders may come in direct contact with storm drain discharges. No changes were made based on this comment

Comment # 226 **Commentor** 4 **Comment Subject** Legal

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

[Copermittees request the word "violations" be replaced with the word "exceedances" in the Finding C.9 that states (in summary) that water quality monitoring data documents persistent violations of Basin Plan water quality objectives.]

It is only a violation if the pollutant has not been reduced to the MEP in accordance with a Permit.

Comment Response

Section A.2 of the current Riverside County MS4 Permit (Order No. R9-2004-001) prohibits [storm water and non-storm water] discharges from MS4s that cause or contribute to exceedances of water quality objectives for surface water or groundwater. Thus, the San Diego Water Board characterizes exceedances of the water quality objectives in the Basin Plan as violations of water quality objectives, especially if discharges from the MS4 is causing or contributing to those exceedances. This prohibition remains in the Tentative Order (see section A.3), but now also includes response requirements (see sections A.3.a-c).

Section A.3 of Order No. R9-2004-001 prohibits [storm water] discharges from MS4s containing pollutants which have not been reduced to the MEP. MEP only applies to storm water discharges. Please see response to comment 23. If pollutants in storm water discharges are not reduced to the MEP, the discharges would also be in violation of this prohibition. This prohibition remains in the Tentative Order (see section A.2). No changes were made based on this comment.

Comment # 227 **Commentor** 4 **Comment Subject** Finding

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

See legal comments in Attachment 7 Discharges of pollutants from the MS4, of whatever source, are subject to the MEP standard. The MEP standard applies to municipal discharges, not to only municipal storm water discharges.

Comment Response

Please see the response to comment 86.

Comment # 228 **Commentor** 4 **Comment Subject** Overirrigation

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

This is a false statement – the Copermittees have not made this determination (or 'identification') See also comments within the letter and attachments thereto.

Comment Response

Please see the responses to comments 27 and 83.

Comment # 229	**Commentor** 4	**Comment Subject** Finding

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

[Copermittees request the terms "Drainage Area Management Plan" be replaced with "Storm Water Management Plans" and that Storm Water Management Plans together with the DAMP describe the Copermittee's runoff management programs.]

Terminology in this paragraph was not correct for the Santa Margarita Region

Comment Response

Comment noted, the recommended changes have been made to the Tentative Order and reflected in the errata.

Comment # 230 **Commentor** 4 **Comment Subject** Legal

Specific Comment

[From Attachment 7 to the RCFC&WCD comment letter]

Finding C.15: This finding states, in relevant part, that the Board and the Copermittees have identified "landscape irrigation, irrigation water and lawn water, previously exempted discharges, as a source of pollutants and conveyance of pollutants to waters of the U.S." The finding further asserts that such non-exempt discharges are required to be "addressed" as "illicit discharges" and effectively prohibited from entry into the MS4.

Comment: The rationale for this prohibition lacks both a factual and legal basis. The factual issues are discussed in the District's technical comments on this issue. With regard to legal issues, the justification for removing the preexisting exemption for these discharges (referred to hereafter as "irrigation water") is completely lacking. First, given that the justification is based on State Board Order WQ 2009-0008, which likens dry weather discharges to "illicit discharges" required to be "effectively prohibited" from entry into the MS4, the vacation of this order by the Los Angeles County Superior court eliminates this Order as a justification for the prohibition.

Second, EPA, in the preamble to the federal MS4 regulations, required that a permittee must make a finding that the "irrigation water" discharges must be a "source of pollutants to waters of the United States . . . .". 55 Fed. Reg. 48037. Moreover, such discharges must represent a "significant" source of pollutants to waters of the United States "under certain conditions". U.S. EPA Guidance Manual for the Preparation of Part 2 of the NPDES Permit Application for Discharges from Municipal Separate Storm Sewer Systems, November 1992 ("EPA Part 2 Guidance Manual"), at p. 6-33. These conditions require a focus not on an entire category of discharges, but rather a discharger-by-discharger examination.

In the MS4 regulatory preamble, EPA stated that "[i]n general, municipalities will not be held responsible for prohibiting some specific components of discharges or flows listed below through their [MS4], even though such components may be considered non-storm water discharges, unless such discharges are specifically identified on a case-by-case basis as needing to be addressed". 55 Fed. Reg. 47995 (emphasis supplied). In the Guidance Manual, EPA states:

If an applicant knows . . . that landscape irrigation water from a particular site flows through and picks up pesticides or excess nutrients from fertilizer applications, there may be a reasonable potential for a storm water discharge to result in a water quality impact. In such an event, the applicant should contact the NPDES permitting authority to request that the authority order the discharger . . . to obtain a separate NPDES permit (or in this case, the discharge could be controlled through the storm water management program of the MS4).

EPA Part 2 Guidance Manual, p. 6-33 (emphasis added).

Third, the finding asserts that the Board has the authority to "identify exempted discharges as a source of pollutants" and that it has identified the irrigation discharges "as a source of pollutants and conveyance of pollutants to waters of the U.S." Read in the context of the previously cited language, however, the Board has no power greater than a municipality and must identify specific discharges, and not entire categories of discharges. See 55 Fed. Reg. 48037. And, as noted in the white paper on irrigation runoff, the Copermittees have not, in fact, identified irrigation discharges as a source of pollutants or a "conveyance of pollutants" to waters of the United States.

Comment Response

Please see the responses to comments 27, 83 and 223. The Fact Sheet describes that overirrigation discharges are a significant source of pollutants into and from the MS4 to water of the US.

The San Diego Water Board disagrees with the comment that: "These conditions require a focus not on an entire category of discharges, but rather a discharger-by-discharger examination." The Federal Register (as referenced in the above comment), in discussion of exempted categories of non-storm discharges states: "in general, municipalities will not be held responsible for prohibiting some specific components of discharges or flows listed below through their municipal separate storm sewer system, even though such components may be considered non-storm water discharges, unless such discharges are specifically identified on a case-by-case basis as needing to be addressed." (Vol. 55 Fed Reg 47995). The San Diego Water Board maintains that 40 CFR 122.26(d)(2)(iv)(B)(1) and the discussion in the Federal Register are clear in discussion of "components" and "categories" of non-storm water discharges, and that the exempted components and categories of non-storm water discharges are required to be addressed through prohibition on a category by category basis, not on a discharger by discharger basis, when identified as a source of pollutants.

The discussion in the Federal Register further clarifies that once a category of exempted non-storm water discharges has been identified and prohibited, "operators of such non-storm water discharges need to obtain NPDES permits for these discharges under the present framework of the CWA..." as "such illicit discharges are not authorized under the CWA" (55 Fed Reg 47995). This is consistent with existing NPDES permits applicable to categories of discharges.

Furthermore, in addition to the regulations under 40 CFR 122.26(d), the discussion in the Federal Register (55 Fed Reg 48037) clearly states that "the Director may include permit conditions that either require municipalities to prohibit or otherwise control any of these types of discharges where appropriate."

Comment # 231 **Commentor** 4 **Comment Subject** Legal

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

Not all non-storm water discharges need to be prohibited.

Comment Response

The Clean Water Act requires all non-storm water discharges to the MS4 be effectively prohibited. Section 402(p)(3)(B)(ii) reads "Municipal Discharge -- Permits for discharges from municipal storm sewers … shall include a requirement to effectively prohibit non-stormwater discharges into the storm sewers;"

Comment # 232 **Commentor** 4 **Comment Subject** Legal

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

The MS4 can never be comprised of natural waterbodies. See definition in federal MS4 regulations and legal comments in Attachment 7.

Comment Response

Please see the response to comment 22.

Comment # 233 **Commentor** 4 **Comment Subject** Finding

Specific Comment

[From Attachment 7 to the RCFC&WCD comment letter]

Finding D.1.b.: This finding states that "MS4 discharges, however, continue to cause or contribute to violations of water quality standards as evidenced by the Copermittees' monitoring results". (Emphasis added)

Comment: With respect to discharges that "contribute to" violations of water quality standards, it should be noted that for concentration-based water quality standards, an MS4 discharge at concentrations below the water quality standard cannot, as a matter of simple scientific fact, contribute to a violation of such a water quality standard. If the discharge is below the standard in question, that discharge will never exceed the water quality standard, no matter the volume of the discharge.

Comment Response

The Copermittees' water quality monitoring data submitted to date documents persistent violations of Basin Plan water quality objectives for various runoff-related pollutants (indicator bacteria, dissolved solids, turbidity, metals, pesticides, etc.) at various watershed monitoring stations. Additionally, available monitoring data submitted to the San Diego Water Board have resulted in a significant increase in 303(d) listings for the waters in the Upper Santa Margarita Watershed. On the 2002 303(d) List there were 3 water body/pollutant combinations listed. On the 2008 303(d) List there were over 50 water body/pollutant combinations listed. The 303(d) impaired water body listings are based on violations of water quality standards in the Basin Plan.

The commenter does not consider other ways that discharges to and from the MS4 can contribute to violations of water quality standards. Pollutants in discharges to the MS4 may be deposited within the MS4 and accumulate over time. Those accumulated pollutants could contribute to a violation of water quality standards when the next storm event washes those pollutants from the MS4 to the receiving waters.

Non-storm water discharges from the MS4 during dry weather may discharge at concentrations below the water quality standards, but can still contribute to a violation of water quality standards. Non-storm water discharges to the receiving waters, which may be dry at the time, could pool and concentrate the pollutants within the receiving water body as the water evaporates. The concentrated pollutants in the receiving water body could contribute to violations of water quality standards with the next storm event.

No changes were made based on this comment.

Comment # 234 **Commentor** 4 **Comment Subject** Legal

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

The MS4 operators are obligated to take storm water under state law, and therefore must "passively" receive such waters, whether or not they contain pollutants. Moreover, a number of separately permitted sources discharge into the MS4 through rights granted under the NPDES program. Control over such permitted sources is the responsibility of the owner of that permitted discharge in question.

Comment Response

Please see the response to comment 81. The Copermittees are responsible for flows into, through and from their MS4s, and they cannot passively accept discharges from third parties (see Finding D.3.d and Discussion in the Fact Sheet). If the Copermittees identify sources regulated under separate NPDES permits that are discharging pollutants into their MS4 systems and causing exceedances of water quality standards in the receiving waters, the Copermittees should identify those sources, with supporting data and documentation, to the San Diego Water Board so the NPDES requirements for those sources can be enforced and/or revised.

Comment # 235 **Commentor** 4 **Comment Subject** Finding

Specific Comment

[From Attachment 7 to the RCFC&WCD comment letter]

Finding D.2.g: This finding, which concerns the effects of urbanization on the characteristics of stormwater flow, states in part that "[h]ydromodification measures for discharges to hardened channels are needed for the future restoration of the hardened channels to their natural state . . . ."

Comment: Hardened flood control channels are in place in the Santa Margarita Region due to the need to protect the lives and property of Riverside County residents from floodwaters. Such channels, and other flood control structures, have been established by the District in accordance with its statutory obligations set down by the Legislature in California Water Code App. § 48-9. In particular, we draw the Board's attention to that section of the Water Code setting forth the power of the District to "control the flood and storm waters of said district" and to save and conserve in any manner all or any of such waters and protect from damage from such flood or storm waters the watercourses, watersheds, public highways, life and property in said district." Water Code App. § 48-9(8).

The Board has no statutory jurisdiction under the MS4 program to alter any flood control structures or channels of the District or to some jurisdiction over the construction or location of such structures or channels. Any such alteration or construction must be done with the cooperation and agreement of the District and in accord with the District's statutory mandate to protect the citizens of Riverside County. Please see changes in redline.

Comment Response

The Tentative Order does not require the alteration of any existing flood control structures or channels. Implementing hydromodification measures for discharges from development projects to hardened channels will allow those hardened channels to be restored to a more natural (i.e. non-hardened) state some day in the future. If those hydromodification measures are not implemented, there is not the possibility that those hardened channels could be restored to a more natural state.

Nor does the RCFC&WCD have a statutory obligation to degrade or destroy water quality and beneficial uses to control flood waters. Rather the opposite; per the federal Clean Water Act Section 101(a), the RCFC&WCD is required to "[r]estore and maintain the chemical, physical, and biological integrity of the Nation's waters." Controlling flood waters while protecting water quality are not mutually exclusive and can be done synergistically to provide economic, environmental and societal benefits. No changes were made based on this comment.

Comment # 236 **Commentor** 4 **Comment Subject** Legal

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

This finding is inaccurate and inappropriate, as the Commission on State Mandates, and not the Regional Board, has exclusive jurisdiction in determining whether a requirement is an unfunded state mandate. See legal comment white paper.

Comment Response

Please see the response to comment 77.

Comment # 237 **Commentor** 4 **Comment Subject** Finding

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

The federal regulations (that do not allow waste assimilation), do not apply to waters of the state.

Comment Response

The San Diego Water Board disagrees with the proposed change. Waste assimilation is not considered a beneficial use of waters of the U.S. or waters of the state. No changes were made based on this comment.

Comment # 238 **Commentor** 4 **Comment Subject** Finding

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

[Copermittees requested deletion of ", and Turbidity" from Finding E.9.]

This is not on the 303(d) list.

Comment Response

The commenter is correct that turbidity is not on the 303(d) list. Finding E.9 has been modified to accurately list the pollutants causing impairments as shown in the 2008 303(d) List.

Comment # 239 **Commentor** 4 **Comment Subject** Legal

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

See legal comment white paper. The scope of this Order is the discharge from MS4s. Moreover, MS4s are not receiving waters.

Comment Response

Please see the responses to comments 22, 233, and 290.

Comment # 240 **Commentor** 4 **Comment Subject** Legal

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

[Copermittees requested adding "Subject to the requirements of section A..3.a" to the opening sentence of section A.3.]

This change clarifies that the iterative process reflected in Part A.3 applies to the entire provision.

Comment Response

The requested changes are not necessary as it simply references the immediately following subsection. No changes were made based on this comment.

Comment # 241 **Commentor** 4 **Comment Subject** Legal

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

[Copermittees request adding "but the Copermittees shall not be liable for violation of section A.3 provided that they are in compliance with the requirements of this section" to the end of the sentence for section A.3.c.]

This change reiterates that the iterative process is in effect so long as the Copermittees remain in compliance with the process set forth in section A.3.

Comment Response

The San Diego Water Board disagrees with the proposed changes. The requested change makes the referenced provision entirely unenforceable and therefore, likely not complied with. The Copermittees must implement the iterative process. The San Diego Water Board reserves the enforcement authority to determine liability for a permit violation. The Tentative Order does not provide any "safe harbor" provisions for violations of water quality standards. No changes were made based on this comment.

Comment # 242 **Commentor** 4 **Comment Subject** Discharge Prohibitions

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

As noted in the comment letter and Attachment 6, irrigation runoff has not been shown to be an actual source of pollutants to the receiving waters in this watershed.

As such the comment letter requests that THE CONDTIONAL EXEMPTION BE RESTORED as shown in the redlines above.

Should the Board decide to prohibit the discharge anyway, the Copermittees request that at a minimum that the category of discharges be managed through a JRMP program similar to non-emergency fire fighting flows, as shown in these redlines.

Comment Response

Please see the response to comment 83. Irrigation runoff has been shown to be a source and conveyance of pollutants to receiving waters. The San Diego Water Board disagrees with the proposed changes. The Copermittees are expected to prevent discharges from overirrigation into the MS4 and eliminate those discharges through their IC/ID programs. No changes were made based on this comment.

Comment # 243 **Commentor** 4 **Comment Subject** Legal

Specific Comment

[From Attachment 7 to the RCFC&WCD comment letter]

Finding D.3.c: This finding states in part that "urban streams", whether natural, anthropogenic or partially modified, are considered part of the "MS4" if they are used as a conveyance for runoff.

Comment: The definition of "MS4" does not include any natural watercourse. This is evident both from the definition of "MS4" in the federal Clean Water Act regulations and from EPA's comments in the preamble to those regulations. First, the definition of "MS4", in relevant part, states that it consists of "a conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, manmade channels or storm drains" "owned or operated by" a municipality "having jurisdiction over disposal of . . . storm water" that is "designed or used for collecting or conveying storm water". 40 CFR § 122.26(b)(8). Nothing in that definition even suggests that natural watercourses are part of the MS4, only improved watercourses.

Second, U.S. EPA, in the preamble to the original MS4 regulations, stated unequivocally that "[t]he Agency also wants to clarify that streams, wetlands and other water bodies that are waters of the United States are not storm sewers for the purpose of this rule". 53 Fed Reg. 49442 (December 7, 1988).1

Moreover, none of the Copermittees "own" or "operate" a natural stream. Such streams are waters of the State and are "owned" by the people of California.

The authority cited in the Fact Sheet for this finding, a response filed with the State Board in opposition to a petition challenging an MS4 permit issued by the Board to San Diego County, contradicts the federal definition and, under the Supremacy Clause, cannot be employed. Please see changes in redline.

Comment Response

Please see the response to comment 22.

Comment # 244 **Commentor** 4 **Comment Subject** Action Levels

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

‘lack of compliance’ is in contradiction with the second sentence. The proposed language is more appropriate.

Comment Response

The San Diego Water Board disagrees that the two sentences are in contradiction. The second sentence has the clarifying phrase "does not alone" constitute a violation. In addition, the third sentence does not state that an NAL exceedance is unequivocally a lack of compliance; but only that an NAL exceedance "may indicate" a lack of compliance. The requested change has not been made.

Comment # 245 **Commentor** 4 **Comment Subject** Legal

Specific Comment

[From Attachment 7 to the RCFC&WCD comment letter]

Finding E.1: This finding states that the RWL language in the Tentative Order "requires compliance with water quality standards, which for stormwater discharges compliance is to be achieved through an iterative approach requiring the implementation of improved and better-tailored BMPs over time".

Comment: The District has two comments regarding this finding, one relating to the language of the finding and one relating to the Fact Sheet discussion of the finding. First, the language of State Board Order WQ 99-05, which establishes the RWL language required to be placed in MS4 permits statewide, is not limited to "stormwater" discharges, but rather to all discharges into receiving waters. See State Board Order WQ 99-05. This is consistent also with the requirement that "discharges" from the MS4, not merely stormwater discharges, must be controlled to the MEP and are not required to meet numeric effluent limitations. 33 U.S.C. § 1342(p)(3)(B)(iii). Second, while the language of the finding correctly states that compliance with water quality standards "is to be achieved through an iterative approach", language in the Fact Sheet improperly contradicts this finding by asserting that compliance with the iterative BMP process "does not shield the discharger from enforcement actions for continued non-compliance with water quality standards". Fact Sheet, page 91.

Such an interpretation contradicts the plain language of Order WQ 99-05 and appears to represent an "end-run" around the entire iterative process and the concept of MEP, which is a flexible concept, intended to allow the development of site-specific permit conditions based on the judgment of the permit writer. See, e.g., 55 Fed. Reg. 48038. The interpretation is, therefore, not consonant with the requirements of the State Board precedential order and the MS4 regulations and should be deleted from the Fact Sheet.

Comment Response

Please see the responses to comments 23, 207 and 290. The Tentative Order and Fact Sheet are consistent with Order WQ 99-05 as well as Order WQ-2001-015 (In the Matter of the Petitions of Building Industry Association of San Diego County and Western States Petroleum Association).

Comment # 246 **Commentor** 4 **Comment Subject** Action Levels

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

The previous sentence requires outfalls to be selected consistent with Attachment E. This sentence is not needed and is duplicative of Attachment E.

At a minimum, this language will need to be modified to be consistent with changes being requested in the Attachment 4 to the Comment Letter, including any footnotes.

Comment Response

The sentence simply reiterates the San Diego Water Board's requirement that a representative percentage of major outfalls are sampled. The requested change has not been made.

Comment # 247 **Commentor** 4 **Comment Subject** Action Levels

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

This value was incorrectly referencing the criteria for beach areas and needs to be updated to reflect the shown values for infrequently used areas.

Comment Response

The value is correct. For the application of Enterococcus REC-1 water quality objectives, unless otherwise specified in the Basin Plan, all waterbodies in the San Diego Region designated with REC-1 beneficial use are assumed to have a "designated beach" usage frequency. Until a lower usage frequency is designated in the Basin Plan for one or more water bodies in the Upper Santa Margarita Watershed, the water quality objective based on the "designated beach" usage frequency is the appropriate and correct value to be included in the action levels.

Comment # 248 **Commentor** 4 **Comment Subject** Action Levels

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

Conflicts with attachment E, which states to select 'representative' outfalls.

Comment Response

Comment noted. The requested change has been made in the errata.

Comment # 249 **Commentor** 4 **Comment Subject** Action Levels

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

[The Copermittees request addition of language that end-of-pipe assessment points for SAL complaince are major outfalls as also defined by Attachment E of the Tentative Order.]

Consistent with NALs section

Comment Response

Comment noted. This is a reasonable request and the change has been made in the errata document.

Comment # 250 **Commentor** 4 **Comment Subject** Legal

Specific Comment

[From Attachment 7 to the RCFC&WCD comment letter]

Finding E.6: This finding purports to determine that the Tentative Order "does not constitute an unfunded local government mandate subject to subvention under Article XIIIB, Section(6) of the California Constitution".

Comment: This finding has no place in the Tentative Order. The exclusive jurisdiction over a determination as to whether a mandate constitutes an unfunded state mandate lies with the Commission on State Mandates. The Commission has exclusive authority to determine, in the first instance, whether a requirement constitutes an unfunded state mandate. Government Code §§ 17751 and 17552; Lucia Mar Unified School District v. Honig (1988) 44 Cal.3d 830, 837; Hayes v. Commission on State Mandates (1992) 11 Cal.App.4th 1546, 1596-97. The findings of an agency that has no jurisdiction to make those findings are entitled to no weight.

Second, the finding is erroneous on several grounds. It is erroneous in its assertion that the Tentative Order "implements federally mandated requirements under CWA §402". While true, the Order also contains separate state-mandated requirements. As the California Supreme Court has held, NPDES permits (like the Tentative Order) can contain both federal and state requirements. See City of Burbank, supra, 35 Cal. 4th at 618, 628. Where those non-federal requirements constitute a new program or higher level of service ordered by the state or exceed federal requirements, those requirements can qualify as a state mandate requiring a subvention of funds. See Long Beach Unified School District v State of California (1990) 225 Cal.App.3d 155, 172-73. Even if the requirement derives from federal law, the requirement can still constitute an unfunded state mandate if the state agency has a choice as to whether to impose the requirement on the permittees, e.g., Hayes, 11 Cal.App.4th at 1593-94.

Recently, the Commission on State Mandates held that both the Los Angeles County MS4 Permit and the San Diego County MS4 Permit contained requirements that constituted an unfunded state mandate, not required by federal law. In re Test Claim on Los Angeles Regional Quality Control Board Order No. 01-182, July 31, 2009; In re Test Claim on San Diego Regional Water Quality Control Board Order No. R9-2007-0001, March 26, 2010.

The finding further asserts that the obligations to be imposed on the Copermittees are "similar to, and in many respects less stringent than" obligations on non-governmental discharges. A similar argument was considered and rejected by the Commission in the Los Angeles and San Diego MS4 Permit Test Claims. The District disagrees with this assertion, as there are numerous requirements in the Tentative Order that are uniquely applicable to governmental entities. This is, however, a question that would be addressed by the Commission on State Mandates were a test claim to be filed, the only procedure for the determination of this issue.

The finding further asserts that Copermittees "have the authority to levy service charges, fees, or assessments to pay for compliance with this Order". This finding is both erroneous on the facts and without any basis in the record. The question of how a state mandate is to be funded is beyond the scope of the Board's expertise and, again, is exclusively within the jurisdiction of the Commission on State Mandates. The finding also asserts that the "Copermittees requested permit coverage in lieu of compliance with the complete prohibition against the discharge of pollutants contained in CWA §301, subdivision (a)". A similar argument was made and rejected in the Los Angeles and San Diego MS4 Permit Test Claims. The finding further asserts that prohibitions against conditions of pollution or nuisance predate the enactment of Article XIIIB Section 6 of the California Constitution. The requirements of the Tentative Order far exceed such requirements. And, in any event, whether such requirements predate Article XIIIB Section 6 is an issue for the Commission on State Mandates.

The finding is not supported by evidence in the record and is in fact contradicted by controlling legal precedent. Even were it to be included in the Tentative Order, it is entitled to no weight since the Board lacks jurisdiction to make such a finding. For these reasons, the finding and any associated discussion in the Fact Sheet should be deleted. Please see changes in redline.

Comment Response

This comment contradicts comments made by other commenters that insist that the San Diego Water Board must recognize that certain Tentative Order provisions constitute unfunded state mandates and may not properly be adopted unless the State first provides funding to the Copermittees to carry out those provisions. The San Diego Water Board agrees that the Commission on State Mandates ultimately has jurisdiction to determine that a provision in an executive order constitutes an unfunded state mandate requiring state subvention. Finding E.6 is nonetheless appropriate and necessary to express the San

Diego Water Board's opinion that the Tentative Order is the result of a federal and not a state mandate. Please also see the responses to comments 8 and 77-81.

Comment # 251 **Commentor** 4 **Comment Subject** Action Levels

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

The previous sentence requires outfalls to be selected consistent with Attachment E. This sentence is not needed and is duplicative of Attachment E.

At a minimum, this language will need to be modified to be consistent with changes being requested in the Attachment 4 to this comment letter, including any footnotes.

Comment Response

Please see the response to comment 246.

Comment # 252 **Commentor** 4 **Comment Subject** Legal

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

See legal comments in Attachment 7. The Copermittees' responsibility under the Clean Water Act is to reduce the discharge of pollutants from the MS4 to the MEP. Therefore, the purpose of the BMP is to reduce pollutants in such discharges

Comment Response

Please see the response to comment 23. No changes were made based on this comment.

Comment # 253 **Commentor** 4 **Comment Subject** Legal

Specific Comment

[From Attachment 7 to the RCFC&WCD comment letter]

Section A.1: This directive mandates, among other things, that discharges "into" MS4s that would cause or threaten to cause a condition of "pollution, contamination, or nuisance" in receiving waters of the state are prohibited.

Comment: While the Board in this Order has jurisdiction to prohibit discharges "from" the MS4, it cannot regulate conditions within the MS4, since these are not in fact "receiving waters of the state". In any event, the language is superfluous, since regulation of a discharge from the MS4, which is subject matter of the Tentative Order, accomplishes the same end. Please see the accompanying redline.

Comment Response

Please see the responses to comments 23, 72, 233 and 290. No changes were made based on this comment.

Comment # 254 **Commentor** 4 **Comment Subject** Legal

Specific Comment

[From Attachment 7 to the RCFC&WCD comment letter]

Section A.3: This directive both recites the prohibition against discharges that cause or contribute to the violation of water quality standards and introduces the iterative process required by the State Board for MS4 permittees.

Comment: To clarify that the iterative process specifically applies to the Copermittees' compliance requirements in Section A.3, language has been added in the redline.

Comment Response

The proposed change is not necessary. Please see response to comment 23, 207 and 290. No changes were made based on this comment.

Comment # 255 **Commentor** 4 **Comment Subject** Legal

Specific Comment

[From Attachment 7 to the RCFC&WCD comment letter]

Section A.3.b: This directive relates to the requirement that the Copermittees repeat the iterative process to comply with receiving water limitations for continuing or recurring exceedances of the limitations.

Comment: Clarifying language changes are requested in the redline.

Comment Response

The proposed change is not necessary. Please see response to comment 23, 207 and 290. No changes were made based on this comment.

Comment # 256 **Commentor** 4 **Comment Subject** Legal

Specific Comment

[From Attachment 7 to the RCFC&WCD comment letter]

Section A.3.c: This directive indicates that nothing prevents the Board from enforcing any provision of the Order while the Copermittees are preparing and implementing the receiving water limitation report.

Comment: Clarifying language changes are included in the redline to make clear that so long as the Copermittees are in compliance with the requirements of Section A.3, they are not in violation of the section.

Comment Response

The San Diego Water Board disagrees with the proposed change. Please see response to comment 241. No changes were made based on this comment.

Comment # 257 **Commentor** 4 **Comment Subject** Legal

Specific Comment

[From Attachment 7 to the RCFC&WCD comment letter]

Section B.2: This section categorizes the types of non-stormwater discharges that are not prohibited from discharge into the MS4, and thus not subject to the "effectively prohibit" requirement in Section B.1. However, this section improperly omits several categories of non-stormwater discharges, landscape irrigation, irrigation water, lawn watering and non-emergency fire fighting flows. In addition, this section states that the Water Board may require controls for "non-anthropogenic sources".

Comment: As discussed above in the District's comment concerning Findings C.14 and C.15, the Board lacks authority to delete an entire category of discharge from the non-stormwater designation. Such authority must be exercised primarily by the Copermittees, based on their evaluation of source-specific facts. And, the ability of the RWQCB to liken such flows to "illicit discharges", apparently authorized by State Board Order No. WQ 2009-0008, is no longer in effect, as that Order has been vacated. Moreover, there is no requirement in the MS4 regulations for controls on "non-anthropogenic sources". Such natural sources are not within the control of the MS4 Copermittees. Moreover, controlling such natural sources as rising groundwater or springs by sealing the MS4 could raise concerns about interference with water rights. Given the natural source of such springs, the incidental presence of pollutants in the waters would have occurred whether an MS4 was in existence or not. Please see the accompanying redline as well as the District's technical comments on this directive.

Comment Response

Please see the responses to comments 27 and 83 in regards to the removal of landscape irrigation, irrigation water, lawn watering from the list of discharge categories that do not have to be prohibited from entering the MS4. The requirement to implement appropriate control measures for non-anthropogenic sources identified as sources of pollutants discharging into or from the MS4 is consistent with the federal regulations. To date, neither the Copermittees nor the San Diego Water Board has identified non-anthropogenic sources as significant sources of pollutants discharging into or from the MS4. No changes were based on this comment. Please also see the response to comment 223 concerning Order No. WQ-2009-0008.

Comment # 258 **Commentor** 4 **Comment Subject** Legal

Specific Comment

[From Attachment 7 to the RCFC&WCD comment letter]

Section C: This section establishes "non-stormwater dry weather action levels" ("NAL") monitoring and the requirements to be followed when NALs exceedances are identified.

Comment: In addition to the District's technical comments on this part, the District has the following concerns regarding legal aspects of this directive. The District wishes to incorporate its comments on Findings C.14 and C.15, which discuss the requirements applicable to any discharge from an MS4, which is that the Copermittees control pollutants in such discharges to the MEP. Such a requirement applies not only to discharges of stormwater, but also dry weather discharges, which may (as discussed above) include not only non-exempted non-stormwater discharges but also discharges from exempted non-stormwater sources (those identified in Section B.2 of the Order) as well as discharges from sources holding separate NPDES permits. We note that Section C.2.d. requires prompt notice to the RWQCB of a source that may require a separate NPDES permit. The Board must be prepared to address such sources and not require further investigation by the Copermittees. As also noted above, in the preamble to the MS4 regulations, U.S. EPA indicated that the MEP control requirement would apply to all discharges from MS4s, including "non-stormwater discharges". 55 Fed. Reg. 48052.

Comment Response

Please see the response to comment 23, 86 and 290.

Comment # 259 **Commentor** 4 **Comment Subject** General

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

[The Copermittees requested adding "to the extent of their legal authority established under the California Constitution and any enabling acts" to first sentence of section E.1.]

To address limitations of the District

Comment Response

The proposed change is not necessary. The Code of Federal Regulations requires the Copermittees including RCFC&WCD to have adequate legal authority to comply with the Tentative Order. No changes were made based on this comment.

Comment # 260 **Commentor** 4 **Comment Subject** Legal

Specific Comment

[From Attachment 7 to the RCFC&WCD comment letter]

Section E.1.a: This directive requires the Copermittees to have legal authority to, among other things, "control the quality of runoff from industrial and construction sites", including sites that have coverage under the general industrial and construction stormwater permits.

Comment: As separate NPDES permits, the general construction and general industrial stormwater permits allow discharge into the MS4 so long as those permits are being complied with. Copermittees do not have authority to contradict the requirements of the general permits. This requirement is vague and ambiguous, and goes beyond the requirements of the MS4 regulations, which require that Copermittees demonstrate that they have legal authority to control discharges into their MS4 systems.

Comment Response

The Copermittees must enforce their ordinances to prevent or eliminate discharges to their MS4s that can cause or contribute to a condition of pollution in receiving waters. Please see the response to comment 76. If construction or industrial sites are discharging pollutants that are causing a condition of pollution in receiving waters, they are likely in violation of their NPDES requirements. The Copermittees have the authority to enforce their ordinances. The Copermittees can report these violations to the San Diego Water Board, and the San Diego Water Board can also enforce the the NPDES requirements.

40 CFR 122.26 (d)(2)(i)(A) specifically requires the Copermitees to "Control through ordinance, permit, contract, order or similar means, the contribution of pollutants to the muniucipal storm sewer by storm water dischagres associated with industrial acitivity and the quality of storm water discharged form sites of industrial activity;" Construction activity is a subset of industrial activity. The USEPA in the Code of Federal Regulations purposefully required a dual permitting system, MS4 and individual, for industrial activites due to their heightened threat to water quality. The Copermitees' ordinances and requirements do not contradict the general industrial stormwater permits; rather the Copermittees can apply more stringent controls than those that are required under general permits.

Comment # 261 **Commentor** 4 **Comment Subject** LID

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

[The Copermittees requested deletion of "of storm water pollutants from the MS4 will be reduced to the MEP, will not cause or contribute to a violation of water quality standards, and" from first sentence of section F.1.c.]

This is duplicative of section A and is not needed. Further, the end of this sentence specifically requires compliance with this order.

Comment Response

The San Diego Water Board disagrees with the proposed change. The text was included to reiterate the requirements of section A and no changes were made in response to this comment.

Comment # 262 **Commentor** 4 **Comment Subject** Legal

Specific Comment

[From Attachment 7 to the RCFC&WCD comment letter]

Sections E.1.j and k: These directives require the Copermittees to have legal authority to require the use of BMPs to prevent or reduce the discharge of pollutants into MS4s from stormwater to the MEP and to require documentation on such BMPs.

Comment: The Copermittees are required under the Clean Water Act to control discharge of pollutants from their MS4 to the MEP standard. 33 U.S.C. § 1342(p)(3). There is no requirement that discharges into the MS4 meet this standard, though the Copermittees are free to impose such a standard voluntarily. These provisions are not required and should either be removed or made optional for the Copermittees. The requirements of these directives are also duplicative of Section E.1.i., which already requires the Copermittees to have the legal authority to require reports from dischargers to the MS4.

Comment Response

Please see the responses to comments 22, 23, 233, and 290.

Comment # 263 **Commentor** 4 **Comment Subject** New Development

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

Important not to penalize proactive efforts to retrofit existing development.

Comment Response

The San Diego Water Board disagrees with the proposed change. Please see the response to comment 353. No changes were made based on this comment.

Comment # 264 **Commentor** 4 **Comment Subject** New Development

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

[The Copermittees requested deletion of section F.1.d.(1)(c), which defines new Development Projects that disturb one or more acres of land as a Priority Development Project.]

Request deletion as disturbance threshold inappropriately captures non-development related activity (maintenance, agricultural, etc.) Further, the one acre threshold is not appropriately supported in the Fact Sheet.

Comment Response

The San Diego Water Board disagrees with the proposed change. Please see the response to comment 331. No changes were made based on this comment.

Comment # 265 **Commentor** 4 **Comment Subject** Legal

Specific Comment

[From Attachment 7 to the RCFC&WCD comment letter]

Section F.1.h(h): This directive requires that where Priority Development Projects are adjacent to or will modify stream channels, the use of hardscape and other materials is forbidden.

Comment: As noted above, the District has a statutory mandate to protect the lives and property of the citizens of Riverside County from floodwaters. If, in the professional judgment of the District's engineers, hardscape or other engineering improvements are required in a stream channel affected by this directive due to flood control concerns, the District must be allowed to make that judgment. The Board does not have the hydrologic/hydraulic expertise, nor is it authorized by the Legislature to make flood control judgments and presumably would not wish to be a defendant in a lawsuit brought by flood victims whose lives or property was affected by the inability of the District to make necessary flood control decisions.

In making this comment, the District wants to be clear that it is not unwilling to accommodate potential future channel rehabilitation efforts where flood control will not be affected. Please see the accompanying redline for suggested language to address these concerns.

Comment Response

Section F.1.h.(h) requires to Copermittees, as part of the HMP, to identify areas within the Santa Margarita Hydrologic Unit for potential opportunities to restore or rehabilitate stream channels with historic hydromodication of receiving waters that are tributary to documented low or very low IBI scores.

The hydromodication requirements do not allow the use of non-naturally occuring hardscape materials for stream restoration if the purpose of the stream restoration is to mitigate erosion impacts expected from potential hydromodication caused by the Priority Development Project. The hydromodification requirements do not necessarily apply if the stream restoration project is not part of a Priority Development Project.

The requirements within the Tentative Order do not limit the RCFC&WCD's authority to provide flood control to protect public safety. The RCFC&WCD's mandate for flood control does not allow the degradation and destruction of water quality or beneficial uses to fulfill that mandate. As public stewards, the RCFC&WCD must protect water quality and beneficial uses while providing flood control to protect the lives and property of the citizens of Riverside County. Existing projects and studies have demonstrated the hydraulic, economic and societal benefits to providing increased flood control through natural systems that also protect water quality. No changes were made based on this comment. Please also see the response to comment 233.

Comment # 266 **Commentor** 4 **Comment Subject** New Development

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

This requirement is clearly specifying the method of compliance in contradiction with state law (CWC 13360).

Comment Response

The San Diego Water Board has made appropriate changes in the errata to address the commentor's concern.

Comment # 267 **Commentor** 4 **Comment Subject** LID

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

This had been agreed to in discussions with RB staff, but was omitted from the draft.

Comment Response

The San Diego Water Board did not agree to make this change during the discussions with the Copermittees. Please see the response to comment 105. No changes were made in response to this comment.

Comment # 268 **Commentor** 4 **Comment Subject** New Development

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

Logistical issue for populating a database with BMPs that have as of- yet not been individually tracked, and potential legal issues for verifications of those BMPs that were built without requirements for such verifications.

Comment Response

The San Diego Water Board is concerned that apparently the Copermittees are unaware of whether or not post-construction BMPs were implemented as designed during the current permit term. This comment only reinforces the San Diego Water Board's position that the post-construction BMP verification and maintenance tracking requirements are necessary. This also reinforces the need for the Copermittees to review their records, identify these projects and BMPs, and verify and track the maintenance of those BMPs. The San Diego Water Board disagrees with the proposed change. No changes were made based on this comment.

Comment # 269	**Commentor** 4	**Comment Subject** Hydromod

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

It is not appropriate to require a single property owner to mitigate the effects caused by previous owners of that land. The current property owners can only be held responsible for their own actions.

Comment Response

The San Diego Water Board disagrees with the proposed change and the basis for the proposed change. If a project is a Priority Development Project (PDP) subject to the HMP requirements, then it is entirely appropriate for the owner, whether new or current, to be responsible for restoring the runoff from the site to a pre-development, more natural condition. If PDPs in undeveloped areas are expected to implement HMP requirements, there is no reason there should be a disparity for the application of the HMP requirements for PDPs in already developed areas. In fact, implementing the HMP requirements is even more necessary in already developed areas because of the ongoing hydromodication and water quality impacts caused by those existing developments. This is also consistent with, and can work in conjunction with, the retrofitting requirements in section F.3.d.

The San Diego Water Board recognizes that there may be some conditions in already developed areas that could limit the full implementation of the HMP requirements on site. Therefore, as recommended by the Riverside County Copermittees, we have included a provision in the Tentative Order that allows the Copermittees to develop a waiver program for re-development PDPs (see section F.1.h.(3)). No changes were made based on this comment.

Comment # 270	**Commentor** 4	**Comment Subject** Hydromod

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

This is not a necessary component of the HMP and unnecessarily increases costs.

Comment Response

The San Diego Water Board disagrees with the commenter that this is not a necessary component. Without having this knowledge, the Copermittees will not be able to plan and prepare for implementing the HMP requirements in the Upper Santa Margarita Watershed in a way that can coherently and efficiently restore or rehabilitate stream channels with historic hydromodification of receiving waters when those opportunities present themselves. No changes were made based on this comment.

Comment # 271 **Commentor** 4 **Comment Subject** Hydromod

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

Per discussions with Board staff on 8/18

Additionally, "wherever feasible" is an appropriate addition to this language for three reasons:

1) Based on the prioritization already identified in this section, instream controls will be a 'last resort'

2) If a project were to need to mitigate in-stream, preventing any man made materials would unnecessarily eliminate potentially viable solutions, even to the extent of eliminating options that would rehabilitate stream functions and uses.

3) The Water Board will still have oversight of the final in-stream plans through the 401 certifications, which will allow the Board to additionally ensure that such instream controls to not adversely affect the stream.

Comment Response

The San Diego Water Board disagrees with the proposed changes. The San Diego Water Board did not agree to make the proposed changes during the meeting with the Copermittees on August 18, 2010, as implied by the commenter. Please see the response to comment 265. No changes were made based on this comment.

Comment # 272 **Commentor** 4 **Comment Subject** Hydromod

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

This is not needed and makes the language confusing. The HMP must be approved by the board anyway. See legal comment white paper.

Comment Response

The San Diego Water Board disagrees that the language is confusing. The language is to clarify that it is not fully at the discretion of the Copermittees to identify these types of areas. No changes were made based on this comment.

Comment # 273 **Commentor** 4 **Comment Subject** Hydromod

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

As seen in the San Diego HMP process, things can change after submitting it to the Board for approval. This requirement will create problems where a project implements the early measures, and such early measures may conflict with the final requirements, thereby forcing the project to redesign.

Comment Response

The San Diego Water Board disagrees with the proposed change. Presumably, the HMP that is developed by the Riverside County Copermittees will include requirements that are more stringent than the interim hydromodification criteria. Many of those requirements are likely to be agreed upon prior to the acceptance of the final HMP. Where there is relative certainty that the HMP requirements will be accepted by the San Diego Water Board, the Copermittees should encourage the implementation of those expected requirements as early as possible. No changes were made based on this comment.

Comment # 274 **Commentor** 4 **Comment Subject** Hydromod

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

All the way to the ocean is unreasonable and unnecessary. In the interim, very few projects are expected within the watershed, and the cumulative effects of such few projects is negligible.

Comment Response

Please see the response to comment 119. The inclusion of "ocean, bay, lagoon" is simply to list all potential types of water bodies that could be included as part of the exemption. In the interim, any projects that do not quailfy for the exemptions provided in Section F.1.h.(6)(a)-(c) must meet the interim hydromodification criteria. We expect there to be very few projects that will be able to qualify for the exemptions.

Comment # 275 **Commentor** 4 **Comment Subject** Legal

Specific Comment

[From Attachment 7 to the RCFC&WCD comment letter]

Section F.2.a: This directive requires the Copermittees to update their grading and other ordinances as necessary to comply with the Order and including requirements for implementing all designated BMPs and other measures.

Comment: The drafting and enforcement of ordinances by a municipality is a municipal function that cannot be directed by the Regional Board. Article XI, section 7 of the Constitution guarantees municipalities the right to "make and enforce within [their] limits all local police, sanitary and other ordinances and regulations not in conflict with general laws". Thus, specific requirements as to the content of ordinances cannot be directed by the Board. The redline requests deletion of this directive.

Comment Response

Please see the response to comment 76.

Comment # 276 **Commentor** 4 **Comment Subject** Unpaved Roads

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

Pursuant to the comment letter:

THE COPERMITTEES REQUEST THIS SECTION BE DELETED IN ITS ENTIRETY.

See the comment letter, attachment 5, for further discussion of the issues and justification for this request.

Should the board decide to include such requirements despite the request and justifications provided in the comment letter, the edits shown below are the minimum changes that should be made.

Comment Response

The San Diego Water Board disagrees with the request to delete the section in its entirety. The San Diego Water Board has made appropriate changes in the errata to address the commentor's concern.

Comment # 277 **Commentor** 4 **Comment Subject** Legal

Specific Comment

[From Attachment 7 to the RCFC&WCD comment letter]

Section F.3.b.(5): This directive requires that the Copermittee stormwater ordinances must contain certain enforcement components.

Comment: The drafting and enforcement of ordinances by a municipality is a municipal function that cannot be directed by the Regional Board. Article XI, section 7 of the Constitution guarantees municipalities the right to "make and enforce within [their] limits all local police, sanitary and other ordinances and regulations not in conflict with general laws". Thus, specific requirements as to the content of ordinances cannot be directed by the Board. The redline requests deletion of this requirement.

Comment Response

Please see the response to comment 76.

Comment # 278 **Commentor** 4 **Comment Subject** Unpaved Roads

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

[The Copermittees requested deletion of sections F.1.i.(2) and F.1.i.(3) as required BMPs for unpaved roads development.]

These are specifying the method of compliance.

Comment Response

Comment noted. Clarifying language has been included in the errata.

Comment # 279 **Commentor** 4 **Comment Subject** Construction

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

[Copermittees request deletion of requirement that Copermittes must review a project proponent's runoff management plan to verify compliance.]

Specifying method of compliance.

Comment Response

The San Diego Water Board disagrees that the requirement for a project proponent's runoff management plan to be "reviewed to verify compliance" with local grading ordinance is specifying method of compliance. The requirement directs the Copermittees to do the review, but does not specify how the review is to be performed. The requirement includes a performance standard, that the plan complies with "local grading ordinance". No changes were made based on this comment.

Comment # 280 **Commentor** 4 **Comment Subject** Legal

Specific Comment

[From Attachment 7 to the RCFC&WCD comment letter]

Section F.3.c.(4): This directive requires that each Copermittee "must ensure that effective measures exist and are implement or required to be implemented to ensure that runoff within and from common interest developments, including areas managed by associations and mobile home parks, and meets the objectives of this section and Order".

Comment: The Fact Sheet inappropriately states that the Tentative Order "interprets common interest areas as property subject to the codes and ordinance and enforcement mechanisms of the city or county in which it resides and, therefore, holds the local government responsible for the discharge of wastes from storm water conveyance systems located within these areas".

The Tentative Order regulates discharges from the MS4. Drainage systems and the runoff handled within a private development or common interest area generally are not part of the Copermittees' MS4, as the Copermittees (unless they actually maintain their MS4 within such areas) have no right to maintain or regulate such internal systems, beyond the enforcement of local ordinances regulating discharges into the Copermittees' MS4 or through the requirement to install and maintain BMPs. Discharges from such systems are thus no different than discharges from any other private property within the Copermittees' jurisdiction. The first full paragraph in this section should be deleted because it is merely prefatory language to the specific requirements set forth in the remainder of the section.

Comment Response

The comment fails to address the San Diego Water Board's contention that common interest areas are subject to the codes and ordinance and enforcement mechanisms of the city or county. The comment has not provided any data or documentation to the contrary. Municipalities consistently enforce their ordinances and regulations within common interest areas. In fact, nothing within the law limits the municipality from taking enforcement within a common interest area. As such, the San Diego Water Board disagrees with the commenter's claim that the Copermittees have no rights to regulate common interest areas including their MS4s. On the contrary, the Copermittees have a public duty to do such to protect public and environmental health and safety.

The Copermittees are responsible for flows into, through and from their MS4s, and they cannot passively accept discharges from third parties (see Finding D.3.d and Discussion in the Fact Sheet), including from common interest areas.

Comment # 281 **Commentor** 4 **Comment Subject** Construction

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

[The Copermittees requested deletion of "Development and" from beginning of section F.2.d.(1)(a)(ii).]

Conflicts with the ‘off-the-shelf’ approach that may be appropriate for some sites. This issue was discussed with staff.

Comment Response

The San Diego Water Board disagrees with the proposed change. The “development” of a runoff management plan as a management measure for construction sites does not conflict with an “off-the-shelf” approach that may be appropriate for some sites. A runoff management plan may be developed for an “off-the-shelf” approach. No changes were made based on this comment.

Comment # 282 **Commentor** 4 **Comment Subject** Legal

Specific Comment

[From Attachment 7 to the RCFC&WCD comment letter]

Section F.3.c.(5): This directive requires the Copermittees to enforce their ordinances with respect to grading activities on privately owned unpaved roads "so as to prevent impacts to water quality".

Comment: In addition to the general objection to the requirement to regulate unpaved roads, found in a separate white paper and in the general comment letter, this specific directive violates the constitutional requirement that the drafting and enforcement of ordinances by a municipality is a municipal function that cannot be directed by the Regional Board. Article XI, section 7 of the Constitution guarantees municipalities the right to "make and enforce within [their] limits all local police, sanitary and other ordinances and regulations not in conflict with general laws". Thus, specific requirements as to the content of ordinances cannot be directed by the Board. Moreover, the scope of the Order is to address discharges from the MS4, not discharges from non-point or non-MS4 sources that may affect "water quality". The redline requests deletion of this requirement.

Comment Response

The commenter is incorrect in their interpretation of the cited section of the constitution. The Code of Federal Regulations that governs the issuance of municipal storm water NPDES permits specifically requires at section 40 CFR 122.26 (d)(2)(i) that the Copermittees have adequate legal authority established by statute, ordinance or series of contracts." Please see the Fact Sheet discussion on the broad and specific legal authority to require section E. LEGAL AUTHORITY. Also, please see the response to comment 76.

Comment # 283 **Commentor** 4 **Comment Subject** Construction

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

[The Copermittees requested deletion of section F.2.d.(3), to remove the Active/Passive Sediment Treatment requirements in their entirety.]

Specifying method of compliance, in violation of CWC 13360.

Comment Response

Please see the response to comment 47. The San Diego Water Board disagrees that section F.2.d.(3) specifies method of compliance. Section F.2.d.(3) directs the Copermittees to require implementation of Active/Passive Sediment Treatment (AST) at construction site if the Copermittee determines it to be an “exceptional” threat to water quality. The Tentative Order does not specify what AST technologies are required to be implemented. Furthermore, the Tentative Order provides flexibility for the Copermittees to determine which construction sites are “exceptional” threats to water quality. No changes were made based on this comment.

Comment # 284 **Commentor** 4 **Comment Subject** Construction

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

This section is setting the minimum frequencies, and as such should provide flexibility to inspect more frequently those sites that warrant additional focus / followup. The changes shown to F.2.e.(1) and (2) are to provide such flexibility. Additionally these frequencies are consistent with Riverside County's Santa Ana MS4 permit – which promotes consistency within the areas
serviced by the County.

Comment Response

The San Diego Water Board disagrees with the proposed changes. The inspection frequencies in the Tentative Order are consistent with the inspection frequencies for San Diego and Orange Counties. These inspection frequencies are necessary because the San Diego Water Board has found that these types of construction sites can pose a significant threat to water quality and require more scrutiny during the wet season. No changes were made based on this comment.

Comment # 285 **Commentor** 4 **Comment Subject** Legal

Specific Comment

[From Attachment 7 to the RCFC&WCD comment letter]

Section F.6: This directive includes a description of the purposes of the education program with respect to stormwater and non-stormwater discharges.

Comment: The redline includes revisions that correctly state the requirements of the Clean Water Act.

Comment Response

The proposed change is not necessary. Please see responses to comments 22, 23, and 290. No changes were made based on this comment.

Comment # 286 **Commentor** 4 **Comment Subject** Construction

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

This is a new and inappropriate requirement. Monitoring data is only required under the Statewide General Construction Permit, which is the Regional Board's responsibility to inspect and review. Copermittee review of data which falls under the regional board's responsibility should be optional.

Comment Response

The San Diego Water Board disagrees with the proposed change. If monitoring data are available, the inspector should review the data. Monitoring data can provide valuable information to an inspector and may help to identify any potential issues that may be on a construction site. No changes were made based on this comment.

Comment # 287 **Commentor** 4 **Comment Subject** Legal

Specific Comment

[From Attachment 7 to the RCFC&WCD comment letter]

Section H.1: This directive requires that each "Copermittees must exercise its full authority to secure the resources necessary to meet all requirements of this Order".

Comment: There is no statutory or regulatory authority for this requirement. The MS4 regulations require only that the Copermittees submit a "fiscal analysis" of the resources required to accomplish permit program activities, including a description of the sources of funds. 40 CFR § 122.26(d)(2)(vi). Moreover, this requirement is inherently vague and ambiguous and is, therefore, especially troublesome given the economic conditions now faced by the County and the Cities within the Santa Margarita region. This directive should be deleted, or at minimum, revised as shown in the redlines.

Comment Response

Please see the responses to comments 8, 9, 88, and 321. Without securing the resources necessary to meet all requirements of the Order, the Copermittee would be unable to meet the intended outcome of 40 CFR § 122.26(d)(2)(i) (i.e. carry out all inspection, surveillance and monitoring procedures necessary to determine compliance and noncompliance with permit conditions).

Comment # 288 **Commentor** 4 **Comment Subject** Municipal

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

Sites that do not have the potential to discharge pollutants, cannot affect discharges from the MS4.

Comment Response

The San Diego Water Board disagrees with the proposed change. Sites that do not have the potential to discharge pollutants are only through the implementation and maintenance of BMPs. Through inventorying their sites and conducting appropriate inspection and enforcement, the Copermittees can ensure that the sites continue to not have the potential to discharge pollutants. No changes were made based on this comment.

Comment # 289 **Commentor** 4 **Comment Subject** Legal

Specific Comment

[From Attachment 7 to the RCFC&WCD comment letter]

In the Standard Provisions, it is stated that the Order "may be modified, revoked and reissued, or terminated for cause", citing 40 CFR § 122.41(f). However, the Standard Provisions do not cite 40 CFR § 122.62 or provide that any such modification, revocation or reissuance may only be carried out upon prior notice and hearing. See Water Code § 13263 (regional board, "after any necessary hearing", may prescribe requirements for waste discharges). The Standard Provisions should make clear that any modification, revocation or reissuance of the Order can only be accomplished at a noticed public hearing, with opportunity for comment.

Comment Response

The requested change is unnecessary. In any matter, the San Diego Water Board is obligated to comply with existing federal and state regulations regarding revocation, reissuance or termination of the Tentative Order. No change made based on this comment.

Comment # 290 **Commentor** 4 **Comment Subject** Legal

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

The Copermittees are required to reduce pollutants in discharges from the MS4. See legal comments in Attachment 7

Comment Response

Please see response to comments 22, 23, 72, and 233. The Order's approach to regulating discharges into and from the MS4 is in accordance with State Water Board Order WQ 2001-15. In that order, the State Water Board reviewed the San Diego County MS4 Permit (Order No. 2001-01) requirements and made one change to one prohibition. The Order upheld all other requirements of the current permit. Order No. R9-2010-0016 incorporates the one change made by the State Water Board, and continues the approach of Order No. 2001-01 (the basis for the current permit), as it was upheld by the State Water Board in Order WQ 2001-15. State Water Board Order WQ 2001-15 supports such requirements, stating: "It is important to emphasize that dischargers into MS4s continue to be required to implement a full range of BMPs, including source control."

Oftentimes, the MS4 does not include structural BMPs at the outfalls to reduce pollutants of concern to the MEP from the MS4. Therefore, the municipalities must require and/or implement a full range of best management practices including source controls on discharges into the MS4 to comply with the MEP standard for discharges from the MS4. The requirements addressing "into and from" do not preclude the use of BMPs, structural or non-structural either within the MS4 or at the outfall, that reduce the discharge of pollutants from the MS4 to the MEP.

Comment # 291 **Commentor** 4 **Comment Subject** Municipal

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

There are cases where pesticides may be necessary due to health concerns (rodent infestations, etc) The concept of IPM does not preclude the use of chemical solutions where such solutions are needed or appropriate.

Comment Response

The Tentative Order does not preclude the use of chemical solutions for the management of pesticides, herbicides, and fertilizers where absolutely necessary. Non-chemical solutions are preferred and should be utilized first. In any case, the use of chemical solutions must comply with the requirements of the Tentative Order.

Comment # 292 **Commentor** 4 **Comment Subject** Municipal

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

[The Copermittees requested deletion of section F.3.a.(3)(c), requiring the use of native vegetation as a BMP.]

This is clearly overly specifying method of compliance, and is illegal pursuant to CWC 13360.

Comment Response

The San Diego Water Board disagrees that section F.3.a.(3)(c) is specifying method of compliance. The requirement provides a limitation as to which types of plants may be used, but does not specify which plants must be used; nor specifically where such plants should be used. The designation of the BMPs is up to the Copermittees to determine the circumstances when the use of such BMP is appropriate. No changes were made based on this comment.

Comment # 293 **Commentor** 4 **Comment Subject** Municipal

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

[The Copermittees highlighted section F.3.a.(4)(c), requiring the Copermittees to evaluate its existing flood control structures as part of ongoing routine maintenance.]

This is not required by the federal regulations as an ongoing permit requirement.

Accordingly, the Copermittees, request deletion of the section.

Should the board decide not to remove the section, at a minimum, the language should be restored to not require anything more than the
O.C. Permit.

Comment Response

This change was made at the Copermittees request during several months of meetings. According to the Copermittees, they preferred to evaluate their existing flood control structures as part of ongoing routine maintenance. No changes were made based on this comment.

Comment # 294 **Commentor** 4 **Comment Subject** Municipal

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

[The Copermittees requested deletion of section F.3.a.(5), rwhich includes requirements for sweeping of municipal areas.]

These are new requirements that are not necessary, and were not included in the draft OC Permit.

Further it is overly specific in forcing the Copermittees to identify high/moderate/ and low (trash) volume streets. Such specificity is not necessary.

Comment Response

The commenter is incorrect. Similar requirements were included in the Orange County MS4 Permit (Order No. R9-2009-0002). The Orange County Copermittees have shown they are proactively implementing street sweeping, thus less specificity was included in their requirements. The Riverside County Copermittees have not demonstrated that they are proactively implementing their programs, thus more specificity was included. These requirements are the same as in the San Diego County MS4 Permit (Order No. R9-2007-0001). No changes were made based on this comment.

Comment # 295 **Commentor** 4 **Comment Subject** Municipal

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

The term ‘facilities’ is confusing and unnecessary.

Request use of the language from the 2004 MS4 permit as shown in these redlines (though (b)(ii)). This is much clearer and simple to comply with.

Comment Response

The proposed change is not necessary. The San Diego Water Board prefers the term 'facilities' as more encompassing of devices needing cleaning. No changes were made based on this comment.

Comment # 296	**Commentor** 4	**Comment Subject** Municipal

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

Although the shown redlines will be much clearer, should board staff reject such changes, at a minimum the word 'detention basins' should be removed as it would otherwise conflict with subpart (iii)below.

Comment Response

The proposed change is not necessary. Section F.3.a.(6)(b)(iv) only addresses the cleaning of anthropogenic litter and does not address other sediment or debris cleaning activities that the Copermittees should do. Therefore, no conflict exists. No changes were made based on this comment.

Comment # 297	**Commentor** 4	**Comment Subject** Municipal

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

The MS4 Copermittees that do not own nor operate a sewer system cannot prevent seepage by maintaining their MS4.

Comment Response

The San Diego Water Board disagrees that the Copermittees cannot prevent sewage seeping into their MS4s by maintaining their MS4s. Through routine maintenance of their MS4, the Copermittees may identify sanitary sewer seepage and then take appropriate actions to temporarily divert the sewage, contact the responsible party for the sewage seepage to stop the seepage, or jacket the storm drain to prevent the sewage seepage. No changes were made based on this comment.

Comment # 298	**Commentor** 4	**Comment Subject** Municipal

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

See footnote explaining this change. The idea is that if a project has LID or Treatment Control BMPs in place – it should no longer be a mandatory high-priority site for municipal inspection purposes. It would then be subject to the requirements of Section F.1.f.

Comment Response

The San Diego Water Board disagrees with the proposed change. See the response to comment 288. No changes were made based on this comment.

Comment # 299 **Commentor** 4 **Comment Subject** Unpaved Roads

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

Pursuant to the comment letter:

THE COPERMITTEES REQUEST THIS SECTION BE DELETED IN ITS ENTIRETY.

See the comment letter, attachment 5, for further discussion of the issues and justification for this request.

Should the board decide to include such requirements despite the request and justifications provided in the comment letter, the edits shown below are the minimum changes that should be made.

Comment Response

Please see the response to comment 276.

Comment # 300 **Commentor** 4 **Comment Subject** Unpaved Roads

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

Regular maintenance of unpaved roads may have unintended negative effects by virtue of further loosening soil to maintain the roads. This requirement should be removed, or revised to only be required where necessary to resolve significant problems impacting streams and riparian habitat.

Comment Response

The requirement has been edited to require maintenance of unpaved roads "as necessary" to protect water quality.

Comment # 301 **Commentor** 4 **Comment Subject** Unpaved Roads

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

[The Copermittees requested deletion of section F.3.a.(11)(d), regarding re-grading of Copermittee maintained unpaved roads.]

Specifying method of compliance.

Comment Response

Comment noted. Clarifying language has been included in the errata.

Comment # 302	**Commentor** 4	**Comment Subject** Commercial/Industrial

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

[Copermittees request deletion of "marinas" from the list of commercial sites/sources required to be included in their inventory.]

Clearly not applicable within this permit area.

Comment Response

The requested change raises serious concerns that apparently the Copermittees are unaware that marinas are currently or have historically been in business at Lake Skinner, Vail Lake, and Diamond Valley Lake. As such, the Copermittees may be in violation of existing permit requirements under Order No. R9-2004-001. If it is not currently applicable, the Copermittees' inventory should not include such facilities. If, however, such a facility exists or does become established in the future, the Copermittees must include it in their inventory. No changes were made based on this comment.

Comment # 303	**Commentor** 4	**Comment Subject** Legal

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

This change reflects the purpose of the Order, which is to reduce pollutants discharged from the MS4.

Comment Response

The San Diego Water Board disagrees with the proposed change. Please see the responses to comments 22, 23, and 290. No changes were made based on this comment.

Comment # 304	**Commentor** 4	**Comment Subject** Commercial/Industrial

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

[Copermittees request language changed in the Mobile Business Program to read: Each Copermittee must keep as part of its commercial source inventory a listing of mobile business know to [delete: "operate" and replace with: "have bases of operation"] within tits jurisdiction that conduct services etc.]

This is an appropriate change, as it sets clear responsibility among the Copermittees.

Comment Response

The San Diego Water Board disagrees with the proposed change. The proposed change is already required under section F.3.b.(1)(a) and would make section F3.b.(3) unnecessary. No changes were made based on this comment.

Comment # 305 **Commentor** 4 **Comment Subject** General

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

[The Copermittees requested changes to section F.3.c.(1)(e), regarding the criterion to prioritize residential areas tributary to 303(d) listed water bodies as high priority.]

These requirements should be focused on discharges of pollutants

Comment Response

The San Diego Water Board disagrees with the proposed change. This requirement is focused on areas that can generate pollutants which may contribute to a 303(d) listed impairment. No changes were made based on this comment.

Comment # 306 **Commentor** 4 **Comment Subject** General

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

[The Copermittees requested deletion of section F.3.c.(1)(f), regarding the criterion to prioritize residential areas within or directly adjacent to or discharging directly to an ESA as high priority.]

This inappropriately separates the risk (pollutant discharge potential) from the action (regulation, minimum BMPs, etc), and should not be a mandated component of this permit.

Comment Response

The San Diego Water Board disagrees with the proposed change. This requirement is focused on areas that can generate pollutants which may impact an enironmentally sensitive area. No changes were made based on this comment.

Comment # 307 **Commentor** 4 **Comment Subject** Unpaved Roads

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

Pursuant to the comment letter:

THE COPERMITTEES REQUEST THIS SECTION BE DELETED IN ITS ENTIRETY.

See further discussion on this issue in Attachment 5 to this comment letter

Comment Response

Please see the response to comment 276.

Comment # 308	**Commentor** 4	**Comment Subject** Retrofit

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

[The Copermittees requested adding "Environmental Constraints (such as regulatory permits)" as a criterion for evaluating areas of existing development for retrofitting.]

There may be external constraints by other regulatory agencies that may affect the ranking of a particular candidate.

Comment Response

The San Diego Water Board disagrees with the requested change. Section F.3.d.(2) states that the evaluation criteria "is not limited to" the criteria included in the Tentative Order. The Copermittees may identify other criteria during their evaluation. The requested change is not necessary. No changes were made based on this comment.

Comment # 309	**Commentor** 4	**Comment Subject** Retrofit

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

A particular retrofit opportunity may have both positive and/or negative effects on public health and safety, and both should be considered.

Comment Response

Please see response to comment 308.

Comment # 310	**Commentor** 4	**Comment Subject** General

Specific Comment

[From Attachment 10 to the RCFC&WCD comment letter]

Fact Sheet Text, Page 7:
"The First and Second Term Permits, Order Nos. 90-46 and 98-02, provided maximum flexibility. San Diego Water Board Order No. 90-46 contained the "essentials" of the 1990 regulations, but the requirements were written in very broad, generic terms. This was done in order to provide the maximum amount of flexibility to the Copermittees in implementing the new requirements (flexibility was, in fact, the stated reason for issuing the permit in advance of the final regulations). From staff's perspective however, "flexibility" in the form of lack of specificity, combined with the Copermittees' lack of funding and political will, also provided the Copermittees with ample reasons to take few substantive steps towards achieving water quality standards. The situation was exacerbated by the San Diego Water Board's own lack of storm water resources for oversight."

Problem with Text:
The statement regarding a 'lack of funding and political will' is unsupported and inflammatory, and provides no benefit in a public document.

Suggestion:
Delete this statement.

Comment Response

The San Diego Water Board disagrees with the assertion that the statement is unsupported and inflammatory. During a time of increased economic activity, the Copermittees chose to do the minimum that is required in the current Order No. R9-2004-001 instead of identifying ways to improve upon those requirements and secure funding sources. The Copermittees chose to rely on funding sources that are not sustainable. The Copermittees chose not to actively pursue dedicated resources to support their storm water and non-storm water management programs. Now, with the current economic environment, the Copermittees use the reduction in the sources for their general funds as an excuse for not being able to support and expand their programs. Please see the responses to comments 8 and 9. No changes were made based on this comment.

Comment # 311 **Commentor** 4 **Comment Subject** Economic

Specific Comment

[From Attachment 10 to the RCFC&WCD comment letter]

Fact Sheet Text, Page 12 and 13:
"It is very difficult to ascertain the true cost of implementation of the Copermittees' management programs because of inconsistencies in reporting by the Copermittees. Reported costs of compliance for the same program element can vary widely from city to city, often by a very wide margin that is not easily explained. Despite these problems, efforts have been made to identify management program costs, which can be helpful in understanding the costs of program implementation….

A study on Phase I MS4 program cost was also conducted by the California Regional Water Quality Control Board, Los Angeles Region (Los Angeles Water Board), where program costs reported in the municipalities' annual reports were assessed. The Los Angeles Water Board estimated that average per household cost to implement the MS4 program in Los Angeles County was $12.50. 8 Since the Los Angeles County permit is very similar to Order No. R9-2004-001, this estimate is also useful in assessing general program costs in Riverside County.

The State Water Board also commissioned a study by the California State University, Sacramento to assess costs of the Phase I MS4 program. This study includes an assessment of costs incurred by Phase I MS4s throughout the State to implement their programs. Annual cost per household in the study ranged from $18-46, with the Fresno-Clovis Metropolitan Area (FCMA) representing the lower end of the range, and the City of Encinitas (in San Diego County) representing the upper end of the range.9 Included in the study is the City of Corona, which is in Riverside County under the jurisdiction of the California Regional Water Quality Control Board, Santa Ana Region (Santa Ana Water Board).

The annual cost per household for the City of Corona's program was estimated to be $32, which should be similar to the costs to implement the MS4 programs in the Riverside County portion of the San Diego Region. In contrast, the cost of the City of Encinitas' program, with an annual cost per household estimated to be $46, may represent the upper range of Riverside County MS4 programs. However, the City of Encinitas's program cost can be considered as the high end of the spectrum for management program costs because the City has a consent decree with environmental groups regarding its program, and City of Encinitas has received recognition for implementing a superior program.

The annual costs for the City of Corona and City of Encinitas were estimated from data collected in 2003-2004. Between 2003 and 2008, the number of households in both cities has increased by approximately 3 percent and 7 percent, respectively.10 In contrast, between 2003 and 2008 the number of households in the City of Temecula has increased from 23,199 to 31,135 (34 percent) and the City of Murrieta has increased from 22,020 to 32,664 (48 percent). This significant increase in number of households indicates a significant increase in the tax base (sales and property tax) available to fund the implementation of the MS4 programs for the City of Temecula and City of Murrieta, as well as for the County of Riverside and recently incorporated cities."

Problem with Text:
The text notes that it is difficult to compare costs between Cities for stormwater program implementation since the cost accounting varies widely, and the specific issues also vary widely. Despite this fact, the fact sheet goes on to make just such comparisons and further implies that the Santa Margarita Region Cities are underfunding their programs by comparison. For example, the City of Encinitas is cited as an example of a city that is spending on the upper end for a stormwater program. The City of Encinitas varies significantly from the cities in the Santa Margarita area in that it must address a major outfall (Cottonwood Creek) at its primary beach (Moonlight Beach). Cottonwood Creek has perennial dry weather flow from urban sources and exceeds REC-1 and REC-2 water quality standards. Since Cottonwood Creek discharges at Moonlight Beach, frequent sanitary standard exceedences were noted on a year–round basis. The City of Encinitas constructed a dry weather flow treatment plant near Moonlight Beach to treat Cottonwood Creek to correct this problem. No such compliance problems exist for the Copermittees. The comparisons in this part of the fact sheet are not valid.

In addition, the Fact Sheet leaves the inaccurate impression that the Copermittees have ample financial resources to fund MS4 programs by completely ignoring the effects of the current national recession. (See Attachment 2). As pointed out in Attachment 2 (Economic Assessment), declines in home values and tax receipts have crippled the ability of the Copermittees to finance such programs. The Fact Sheet selectively examines the period 2003-2008, when there was significant growth, but ignores the period 2008-2010, when that growth ended and the economy declined precipitously, affecting property and sale tax receipts as well as other sources of revenue.

Suggestion: Delete the text on Page 13 and 14 of the Fact Sheet.

Comment Response

Please see the responses to comments 9, 115, 116, 122, 126-130, and 208.

In addition to the City of Encinitas, the comparison in the Fact Sheet also includes the City of Corona, which is in Riverside County. The City of Encinitas was included in the comparison to provide a contrast in the varying amounts expended by different municipalities. The City of Corona was included in the comparison to provide a more region specific cost comparison. The comparison showed that the Cities of Murrieta and Temecula expended significantly less for their storm water management program, on a per household basis, compared to to the City of Corona, all of which are in the same county. According to the information provided in their FY 2008-2009 Annual Reports, the City of Corona reportedly spent approximately 50-60 percent more per household than the Cities of Murrieta and Temecula. The information was provided by the Cities. The comparison is accurate and valid. No changes were made based on this comment.

Comment # 312 **Commentor** 4 **Comment Subject** Legal

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

[The Copermittees requested deletion of section F.4.a.(1), requiring each Copermittee to retain legal authority to prevent and eliminate illicit discharges and connections to the MS4.]

This measure is already covered in Part E of the Order.

Comment Response

This level of specificity provides clarity to the Copermittee's to ensure their compliance with the Tentative Order's provisions. The proposed change is not necessary. No changes were made based on this comment.

Comment # 313 **Commentor** 4 **Comment Subject** IDDE

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

[The Copermittees requested deletion of "all known locations of access points (i.e. manholes) to the Copermittee's MS4, all known
locations of connections with other MS4s (e.g. Caltrans)" from section F.4.b.]

These are not required under the federal regulations, and are not necessary for the Copermittees' programs.

Comment Response

Section F.4.b of the Tentative Order and the corresponding text in the Fact Sheet have been modified to remove the requirement to include access points (i.e. manholes) in the MS4 Map.

Comment # 314 **Commentor** 4 **Comment Subject** IDDE

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

[The Copermittees requested deletion of section F.4.g, requiring each Copermittee to implement and enforce its ordinances, orders, or other legal authority.]

This requirement is already covered in Part E.1 of the Order.

Comment Response

This level of specificity provides clarity to the Copermittee's to ensure their compliance with the Tentative Order's provisions. The proposed change is not necessary. No changes were made based on this comment.

Comment # 315 **Commentor** 4 **Comment Subject** IDDE

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

The Copermittees do not own nor operate such systems, and as such cannot 'prevent' such spills from occurring.

Comment Response

Section F.4.g does not require the prevention of the spills from occurring, but the prevention of the spills from entering the MS4. Please see the response to comment 82. No changes were made based on this comment.

Comment # 316 **Commentor** 4 **Comment Subject** General

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

These entities are subject to individual NPDES regulations, and the Copermittees should not be required to educate them on the general requirements below.

Comment Response

Section F.6 has been modified as recommended.

Comment # 317 **Commentor** 4 **Comment Subject** General

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

The language should be clear that the minimum topics should be tailored as appropriate to the target audience.

Comment Response

Section F.6.a.(1) has been modified to clarify that the Copermittees' education programs must educate as appropriate to the target community's potential storm water and non-storm water discharges.

Comment # 318 **Commentor** 4 **Comment Subject** General

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

[The Copermittees requested deletion of "and review of monitoring data" from section F.6.b.(1)(a)(vii).]

As discussed in the comment letter, this is a requirement for other NPDES permits, and it is inappropriate to mandate upon the Copermittees.

Comment Response

The San Diego Water Board disagrees with the proposed change. Copermittee personnel (e.g., inspectors) should be educated on how to review monitoring data, especially if monitoring data are available for review at a site that is being inspected. Monitoring data provide valuable information to an inspector. No changes have been made based on this comment.

Comment # 319 **Commentor** 4 **Comment Subject** General

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

The requirement to educate the residential and general public communities will necessarily include these underserved audiences.

Comment Response

The San Diego Water Board agrees that the requirement will necessarily include these underserved audiences. Removing the text as proposed is not necessary. No changes were made based on this comment.

Comment # 320 **Commentor** 4 **Comment Subject** General

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

Goal is to pursue these agreements where we determine it is needed. Otherwise this requirement is diverting our time and resources from other more important efforts.

Comment Response

The Tentative Order describes that interagency agreements are necessary to control the contribution of pollutants from one portion of the shared MS4 to another portion of the shared MS4. If the agencies do not share portions of the MS4, then such agreements are not necessary.

Comment # 321 **Commentor** 4 **Comment Subject** Economic

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

This clarifies that the Copermittees have the option to request modification of the order for reasons such as inability to obtain the requisite funding for the programs.

Comment Response

The San Diego Water Board does not agree with the proposed change. The Copermittees are responsible for securing the resources necessary to meet the requirements of the Order. Please see the responses to comments 8 and 9. The Copermittees are free to request modification to the Order at any time. Until those modification are made, the Copermittees' storm water and non-storm water programs must be able to be protective of water quality and meet the requirements of the Order. In addition, the "Need to halt or reduce activity is not a defense" per the standard provisions in Attachment B.1(b) and 40 CFR 122.41(c). No changes were made based on this comment.

Comment # 322 **Commentor** 4 **Comment Subject** General

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

Although the Copermittees prefer to not be required to develop another compliance document, the edits below are intended to focus such a document on information that is relevant to the Copermittes' response.

Comment Response

The requested information is vital to formulating and implementing an appropriate workplan that addresses water quality. The level of detail is specific to provide the Copermittees more certainty on the status of their compliance. The suggested language is vague and open to multiple interpretations that would create confusion and uncertainty on the status of compliance.

Comment # 323 **Commentor** 4 **Comment Subject** Reporting

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

As drafted (without the changes shown) the requirements will be a significant and lengthy reporting exercise.

Request keeping this as a 'summary' report on compliance with the inspection frequencies, and identifying any follow-up actions (as shown via
the markup)

Comment Response

The San Diego Water Board disagrees with the requested changes and feels the reporting requirements are similar in breadth as current reporting requirements. No changes were made based on this comment.

Comment # 324	**Commentor** 4	**Comment Subject** Reporting

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

As drafted (without the changes shown) the requirements will be a significant and lengthy reporting exercise.

Request keeping this as a 'summary' report on compliance with the inspection frequencies, and identifying the high-level enforcement actions
(as shown via the markup).

Comment Response

The San Diego Water Board disagrees with the requested changes and feels the reporting requirements are similar in breadth as current reporting requirements. No changes were made based on this comment.

Comment # 325 **Commentor** 4 **Comment Subject** Economic

Specific Comment

[From Attachment 10 to the RCFC&WCD comment letter]

Fact Sheet Text Page 15:
"The vast majority of costs that will be incurred as a result of implementing Order No. R9-2010-0016 is not new. Storm water management programs have been in place in Riverside County for over 15 years. As shown in the discussion above, the amount spent for MS4 Permit compliance per household in the municipalities in the Riverside County portion of the San Diego Region is already low compared to other regions. Any increase in cost to the Copermittees, however, is still expected to be incremental in nature. Since Order No. R9-2010-0016 "fine tunes" the requirements of Order No. R9-2004-001, these cost increases are expected to be modest.

Where there may be additional elements that will incur new costs, the Riverside County Copermittees are given the time to develop the budgets and funding mechanisms to phase those elements into their programs. Additionally, development of these additional elements by the Riverside County Copermittees will have the benefit of the experiences and work already done by the San Diego County and Orange County Copermittees."

Problem with Text:
The Fact Sheet states that the vast majority of costs for implementing the Tentative Order are 'not new'. This is not correct. Almost every program in the Tentative Order has been amended and require new resources. Specific programs include, but are not limited to, the monitoring program (over fivefold increase in costs), hydromodification management programs, new development programs, inspection programs, irrigation runoff prohibitions, retrofit studies and MS4 maintenance programs. The very prescriptive and detailed requirements of the Tentative Order impose new requirements on the Copermittees at a time when funding sources are drying up. The Copermittees estimate that implementation of the regional components of the new Order (as written) will cost approximately $11,500,000 (e.g. the costs to write the new compliance documents, develop the retrofit, hydromodification programs and develop and implement the new monitoring program). These costs are on top of the current expenditures to implement the existing regional monitoring program (approximately $5,000,000 for the five-year permit term). These costs are further amplified by the direct cost of implementation that will be incurred by the individual Permittees (e.g. the cost to implement the new compliance documents and hydromodification programs). The text further indicates that the Tentative Order provides time for the Permittees to 'develop…funding mechanisms'. This statement assumes that the Copermittees have the ability to collect additional funds from taxpayers to support the stormwater program implementation. This is false, since any such funds, outside of inspection or plan review fees, would be required to be submitted to a vote of the people pursuant to Propostion 218. In the current economic and political climate, a successful vote to increase taxes is extremely remote. The Copermittees further note that in the City of Encinitas in Orange County, cited by the staff as an example of proactive MS4 regulation, a minimal stormwater proposition recently was voted down.

Suggestion: Delete the text noted above in the Fact Sheet and add a discussion on the difficulties of funding expansions to the Copermittees' stormwater programs due to Proposition 218.

Comment Response

Please see the responses to comments 8 and 9. No changes were made based on this comment.

Comment # 326	**Commentor** 4	**Comment Subject** Economic

Specific Comment

[From Attachment 10 to the RCFC&WCD comment letter]

Fact Sheet Text Page 16:
"For example, household willingness to pay for improvements in fresh water quality for fishing and boating has been estimated by USEPA to be $158-210. This estimate can be considered conservative, since it does not include important considerations such as marine waters benefits, wildlife benefits, or flood control benefits. The California State University, Sacramento study reports that the annual household willingness to pay for statewide clean water is approximately $180. When viewed in comparison to household costs for existing management programs, household willingness to pay estimates exhibit that per household costs incurred by the Riverside County Copermittees to implement their management programs are very low."

Problem with Text:
The discussion in the referenced text is not represented correctly. The figure cited in the California State University, Sacramento study includes the cost of wastewater treatment. The author of the study notes:

'The survey question was for restoring water quality for all waters throughout the state from all impairment, not just within a city or region and not just for impairment from stormwater pollution.' The current cost for sewer fees exceed $200 per year, Thus, the vast majority of the "household willingness" figure relates to sanitary sewer costs, and not to the costs of addressing stormwater.

Suggestion: Delete this text in the fact sheet and note that the cost consumers are currently paying for clean water in the Permit area exceeds that which studies cited have found they are willing to pay.

Comment Response

The commenter is correct that the figure cited in the California State University, Sacramento study is for "for restoring water quality for all waters throughout the state from all impairment, not just within a city or region and not just for impairment from stormwater pollution." The survey was about restoring water quality for all waters throughout the state, and does not state, as the commenter asserts, that the cited figure includes the cost of wastewater treatment. Thus, the figure indicates that the household willingness to pay for statewide clean water is higher than what the households in the Upper Santa Margarita Watershed are paying toward the Copermittees' storm water programs. No changes were made based on this comment.

Comment # 327 **Commentor** 4 **Comment Subject** Economic

Specific Comment

[From Attachment 10 to the RCFC&WCD comment letter]

Fact Sheet Text Page 17:
"University of California, Los Angeles assessed the costs and benefits of implementing various approaches for achieving compliance with the MS4 permits in the Los Angeles Region. The study found that non-structural systems would cost $2.8 billion but provide $5.6 billion in benefit. If structural systems were determined to be needed, the study found that total costs would be $5.7 to $7.4 billion, while benefits could reach $18 billion. Costs are anticipated to be borne over many years – probably ten years at least. As can be seen, the benefits of the programs are expected to considerably exceed their costs. Such findings are corroborated by USEPA, which found that the benefits of implementation of its Phase II storm water rule would also outweigh the costs."

Problem with Text:
It is a basic principle that public spending should have a positive cost-benefit. The Fact Sheet implies that since spending on stormwater has a positive cost-benefit, such spending should be increased. The reality is that there are also other public spending priorities such as police, fire, ambulance, and public utilities competing for the same funding, all of which have positive cost-benefit ratios. Moreover, the UCLA study specifically focused on the benefit of improving beach water quality, which is a very significant economic factor in terms of tourism in coastal Los Angeles County. No beaches exist in the Santa Margarita Region, and given the ephemeral nature of many of the Region's waterways, attempting to extrapolate the UCLA study is not appropriate. In the absence of a similar cost-benefit study being undertaken in the Santa Margarita Region, the studies cited by staff do not provide any basis for the conclusions reached in the Fact Sheet.

Suggestion:
As the fundamental basis for this comment is flawed, in the absence of any local data for inland waterbodies in semi-arid climates, the text should be deleted.

Comment Response

The San Diego Water Board disagrees with the commenter's assertion that the basis for the text in the Fact Sheet is flawed. The waters in the Upper Santa Margarita Watershed are designated with water contact recreation (REC-1) and rare, threatened, and endanged species (RARE) beneficial uses. The Upper Santa Margarita Watershed also has valuable resources that are worth protecting and provide value and benefits to the community. In general, the study shows that the costs of implementing programs to restore and protect water quality would provide benefits that exceed and outweigh the costs of implementing those programs. No changes were made based on this comment.

Comment # 328	**Commentor** 4	**Comment Subject** Finding

Specific Comment

[From Attachment 10 to the RCFC&WCD comment letter]

Fact Sheet Text Page 35:
"Trash, as litter in both solid and liquid form, is consistently found on and adjacent to roadways. A California Department of Transportation Litter Management Pilot Study found that of roadway trash, plastics and Styrofoam accounted for 33 percent of trash by weight, and 43 percent by volume. Further, the study found that approximately 80 percent of the litter associated with roadways was floatable, indicating that, without capture, this litter would enter Waters of the State after a storm event, resulting in the impairment of Beneficial Uses. The study, however, relied upon a mesh capture size of 0.25 inches (6.35 millimeters). This size is too large to effectively capture plastic pre-production pellets (a.k.a. "nurdles"), which are roughly 3 mm in size, and likely underestimated the total contribution of plastics. Furthermore, pre-production plastic pellets, which are small enough to be easily digested, have been found to carry persistent organic pollutants, including PCBs and DDT."

Problem with Text:
While the Fact Sheet suggests that there is a compelling argument to address trash along Caltrans highways, such a problem is not found on municipal streets. The Caltrans studies found that a substantial portion of the litter load comes from uncovered loads on commercial and private vehicles. The low speed roadways operated by the Copermittees do not create similar conditions or handle similar traffic. Further, the text discusses pre-production plastics (nurdles), yet fails to acknowledge that there are no industries within the Copermittees' jurisdiction that manufacture or use this material. The Fact Sheet's citation of studies that have no bearing on actual conditions within the Santa Margarita Region cannot be used to justify programs in the Tentative Order addressing such non-existent conditions. The ROWD has a more informed discussion of trash issues based on actual conditions in the Santa Margarita Region.

Suggestion:
Revise the fact sheet text to discuss the current findings relative to trash in the Permit region based on the ROWD.

Comment Response

The San Diego Water Board disagrees that the Fact Sheet requires revisions regarding trash. The discussion in the Fact Sheet includes information specific to high density urban areas in Southern California as well. The Caltrans study referenced in the Fact Sheet was provided as additional information about the amount and types of trash that can be found along Caltrans maintained roadways which can be discharged from the Caltrans MS4 system to the Copermittees' MS4 systems. No changes were made based on this comment.

Comment # 329	**Commentor** 4	**Comment Subject** Overirrigation

Specific Comment

[From Attachment 10 to the RCFC&WCD comment letter]

Fact Sheet Text Page 50 and 51
Pg. 50 - "To date the San Diego Water Board and the Copermittees have identified overspray and drainage from potable and reclaimed water landscape irrigation as a substantial source and conveyance mechanism for pollutants into waters of the United States."
Pg. 51 – "The San Diego Water Board and the Copermittees have identified irrigation water as a source of pollutants and conveyance of pollutants to waters of the United States, when applied improperly in excess and thereafter entering the MS4, in the following documents:"

Problem with Text:
The documents cited in the Fact Sheet do not support the conclusion that irrigation water is a source of pollutants or conveyance of pollutants in the Santa Margarita Region. First, the comments in the public education document cited in the Fact Sheet were borrowed from an Orange County publication, and do not represent any official conclusion by the Copermittees that irrigation water represents a water quality threat. Plainly over-irrigation is to be discouraged, as even if the water is clean, it adds to the Copermittees' costs of addressing such waters. Second, this public education document is the only document from a Santa Margarita Region source. The other documents cited by staff are studies conducted in other areas, with different hydrology and climate. For a more comprehensive assessment of the irrigation runoff issues, please see Attachment 6 (Prohibition of Irrigation Runoff).

Suggestion:
Delete the referenced text and the quotes referencing Permittee education materials. Also remove the improperly supported irrigation runoff prohibition.

Revise the text to accurately reflect the lack of any connection between irrigation runoff and impairments of receiving waters in the Santa Margarita Region.

Comment Response

Please see the reponse to comment 83. Also, there are two public education documents used by the Riverside County Copermittees cited, one of which is a survey developed by the Copermittees. These documents exhibit an explicit concern with pollutants contained in and conveyed by irrigation runoff. These documents may have been "borrowed", but the fact that they are being distributed by the Copermittees as part of their public participation program does make them an "official" publication. No changes were made based on this comment.

Comment # 330	**Commentor** 4	**Comment Subject** Unpaved Roads

Specific Comment

[From Attachment 10 to the RCFC&WCD comment letter]

Fact Sheet Text Page 58:
"Enforcement and inspection activities conducted by the San Diego Water Board during the previous permit term have found a lack of source control for many unpaved roads within the jurisdiction of the Copermittees."

Problem with Text:
The Copermittees submit that there is no evidence reflecting any substantial water quality problem relating to MS4 discharges affected by unpaved roads. Moreover, the mileage of unpaved roads in the jurisdiction of the Copermittees is a small percentage of the total mileage of unpaved roads in the Santa Margarita Region, given that many of these roads are operated by such jurisdictions as the U.S. Forest Service. Please see Attachment 5 (Unpaved Roads). Further, the Fact Sheet notes on page 27 that Permits "will cover municipal systems discharges in unincorporated portions of the county, it is the intent of EPA that management plans and other components of the program focus on the urbanized and developing area of the County". Dedicating resources to unpaved roads diverts already limited resources from the urbanized areas intended to be addressed by USEPA regulations.

Suggestion:
The references and associated program requirements should be removed from the Permit and addressed through a separate general permit for unpaved roads, if in fact unpaved roads are a significant source of pollutants.

Comment Response

Please see the responses to comments 101, 138, and 179. Although the USEPA intends the regulations to "focus" on urban areas, the regulations are not limited to urban areas. As necessary in the rural areas, the Copermittees must enforce their ordinances to maintain compliance with the Tentative Order thereby protecting water quality.

Comment # 331 **Commentor** 4 **Comment Subject** New Development

Specific Comment

[From Attachment 10 to the RCFC&WCD comment letter]

Fact Sheet Text Page 69:
"The order also found that the SSMP requirements are appropriately applied to the majority of the Priority Development Project categories that are also contained in section F.1 of this Order. The State Water Board also gave California Regional Water Quality Control Boards (Regional Water Boards) the needed discretion to include additional categories and locations, such as retail gasoline outlets(RGOs), in SSMPs "

"The provisions of the SSMP section of the Order are also consistent with those previously issued by the San Diego Water Board for Riverside County (Order No. R9-2004-001), Southern Orange County (Order Nos. R9-2002-0001 and R9-2009-0002) and San Diego County."

Problem with Text:
Several PDP categories or thresholds are not supported by Order WQ 2000-11 such as the 10,000 square feet requirement for residential areas nor the 1-acre threshold for all development projects. Further the Order ignores other applicable portions of Order WQ 2000-11. Specifically, the memo from State Board Chief Counsel Craig S. Wilson transmitted WQ Order 2000-11 to the Regional Board executive officers states that with regard to discretion that:

"3. The Order allows broader discretion by the Regional Water Boards to decide whether to include additional types of development in future SUSMPs. These areas for potential future inclusion in SUSMPs include retail gasoline outlets, ministerial projects (only discretionary projects are included in the approved SUSMPs), and projects in environmentally sensitive areas. If Boards include these types of developments in future permits, the Order explains the types of evidence and findings that are necessary."

Order 2000-11 requires that revisions to regulatory thresholds be justified economically. The Copermittees have expressed their concern with requirement F.1.d.(2)(a) regulating residential developments of 10,000 sq. ft. or more and requirement F.1.d.(1)(c) regulating any project 1-acre or more. These thresholds, and their relative impact on project proponents, have not been adequately justified. The Permittees have noted that these regulations will negatively impact the construction of custom homes (individual lot developments). The relative economic impact of meeting the SSMP requirements for individual homeowners has not been justified in the fact sheet.

Suggestion:
As shown in the redline markup (Attachment 9); The 1-acre SSMP threshold (F.1.d.(1)(c)) should be deleted and the 10,000 square feet threshold for residential areas (F.1.d.(2)(a)) should be made the same as the requirement contained in the Riverside County Santa Ana NPDES MS4 Permit.

Comment Response

The 10,000 square feet threshold is appropriate, since it is consistent with requirements in other Phase I NPDES storm water regulations throughout California. The 10,000 square feet threshold is also included in the Santa Ana Water Board Riverside County MS4 Permit (Order No. R8-2010-0033), but section F.1.d.(2)(a) of the Tentative Order does not differentiate residential new development projects.

This one-acre threshold is appropriate, since it was selected to be consistent with the State Water Board's Phase II NPDES requirements for small municipalities (Order No. 2003-0005-DWQ). The one-acre threshold is consistent with the San Diego County MS4 Permit (Order No. R9-2007-0001) and Orange County MS4 Permit (Order No. R9-2009-0002). The one-acre threshold is also included to be consistent with the State Water Board's Construction General Permit (Order No. 2009-0009-WQO), to ensure all Development Projects subject to the post-construction BMP requirements of the Construction General Permit will implement SSMP post-construction BMP requirements.

No changes were made based on this comment.

Comment # 332 **Commentor** 4 **Comment Subject** Hydromod

Specific Comment

[From Attachment 10 to the RCFC&WCD comment letter]

Fact Sheet Text Page76:
"The success of future stream restoration and stabilization is, however, dependent on preventing and reducing physical impacts from activities upstream. Therefore, hydromodification management measures are necessary upstream of modified (e.g. concrete, rip rap, etc.) channels in addition to non-modified channels."

Problem with Text:
In some areas, hardened channels may be needed for flood control and public safety. In those areas, channel restoration may not be feasible and onsite controls are not warranted. The protection of public safety from flooding is a statutorily required duty of the District. See Water Code App. Section 48-9. Any provisions of the Tentative Order that would presume to challenge this duty must be deleted. The District assumes that the Regional Board and staff are not placing themselves in the position of making flood control judgments, as the agency is neither charged by the Legislature with such obligation nor is the agency equipped to do so.

Suggestion:
Revise the text to add "except where hardened channels are required for the protection of public safety"

Comment Response

Please see the responses to comments 235 and 265. No changes were made based on this comment.

Comment # 333 **Commentor** 4 **Comment Subject** Commercial/Industrial

Specific Comment

[From Attachment 10 to the RCFC&WCD comment letter]

Fact Sheet Text Page 77:
"Since municipalities are the lead permitting authority for industrial land use and construction activities, they are also the lead for enforcement regarding runoff discharges from these sites."

Problem with Text:
This is a leap of logic we should probably not let pass. The Copermittees can greatly influence the design and construction, but the Industrial Permit is focused on the operation of the facility, and that is where the authority of the Board lies - and is arguably the most important aspect of runoff quality from the site.

Suggestion:
Delete the sentence.

Comment Response

The San Diego Water Board maintains that it is logical for the municipalities to be the lead for enforcement regarding runoff discharges from these sites into their MS4. The Copermittees are responsible for enforcing their ordinances within their jurisdiction regarding discharges to their MS4 systems. The Copermittees have land use permitting authority for industrial land use and construction activities and can require implementation of BMPs to reduce or eliminate runoff discharges into their MS4 systems. No changes were made based on this comment.

Comment # 334	**Commentor** 4	**Comment Subject** Legal

Specific Comment

[From Attachment 10 to the RCFC&WCD comment letter]

Fact Sheet Text Page 79:
"To clarify, an unaltered natural drainage, which receives runoff from a point source (channeled by a Copermittee to drain an area within their jurisdiction), which then conveys the runoff to an altered natural drainage or a man-made MS4, is both an MS4 and a receiving water."

Problem with Text:
As noted in Attachment 7 (General Legal Comments) regarding Finding D.3.c., a natural drainage, whether or not it conveys point source runoff to a man-made MS4, is not itself part of the MS4.

Suggestion:
Delete text.

Comment Response

Please see the response to comment 22.

Comment # 335	**Commentor** 4	**Comment Subject** Legal

Specific Comment

[From Attachment 10 to the RCFC&WCD comment letter]

Fact Sheet Text Page 79:
"As operators of the MS4s, the Copermittees cannot passively receive and discharge pollutants from third parties. By providing free and open access to an MS4 that conveys discharges to waters of the U.S., the operator essentially accepts responsibility for discharges into the MS4 that it does not prohibit or otherwise control. These discharges may cause or contribute to a condition of contamination or a violation of water quality standards."

Problem with Text:
First, the Copermittees, as operators of the MS4, are required to address storm drainage. During storm conditions in particular, the District is required to handle flood waters so as to protect the lives and property of residents of Riverside County. The failure to do so is a violation of state law. See Water Code App. Section 48-9. Thus, the Copermittees must "passively receive and discharge" waters from third parties, which waters may contain pollutants. Moreover, the operator of the MS4 is NOT accepting responsibility for discharges from other MS4 systems. There is no provision for joint liability under the federal Clean Water Act or the California Water Code. The former directs its prohibitions against a "discharger," and no others. 33 U.S.C. §§ 1319 and 1342. A party is responsible only for its own discharges or those over which it has control. Jones v. E.R. Snell Contractor, Inc., 333 F.Supp.2d 1344, 1348 (N.D. Ga. 2004); United States v. Sargent County Water Dist., 876 F.Supp. 1081, 1088 (D.N.D. 1992).

The Clean Water Act MS4 regulations, moreover, specifically provide that Copermittees under an MS4 Permit are required to "comply with permit conditions relating to discharges from the municipal separate storm sewers for which they are operators." 40 C.F.R. § 122.26(a)(3)(vi) (emphasis supplied). Moreover, the Regional Board, as the permitting agency for stormwater and Industrial Permits, and the State Board as the overall agency responsible for compliance with the Clean Water Act in California, are responsible for ensuring that the discharges from such permitted facilities, whether or not they enter the MS4, are in compliance with the requirements of those permits. Finally, many sources of pollutants are beyond the control of the MS4 operators but are within the control of other agencies, if those agencies elect to exercise their authority. A major example is the discharge of metals from motor vehicle brake pads, which contributes to exceedances of copper, zinc and potentially other metals in stormwater. The MS4 operators cannot control the composition of brake pads, nor can the MS4 operators control air emissions from domestic and foreign sources that discharge pollutants onto the surface area of the region, which can then wash into the MS4 systems.

Suggestion:
Delete cited text.

Comment Response

The text cited from the Fact Sheet is a Finding that is included as part of the Findings of the Tentative Order. The San Diego Water Board disagrees with the recommendation to delete the finding from the Fact Sheet or the Tentative Order. Please see the responses to comments 81, 233-235, 260, and 265.

Comment # 336 **Commentor** 4 **Comment Subject** Legal

Specific Comment

[From Attachment 10 to the RCFC&WCD comment letter]

Fact Sheet Text Page 81:
"Since treatment generally does not occur within the MS4, in such cases reduction of storm water pollutants to the MEP must occur prior to discharges entering the MS4."

Problem with Text:
Nothing in the MS4 regulations prohibits use of the MS4 for treatment. Frankly, some of the most effective treatment facilities for pollutants may be located in the MS4 as part of regional treatment systems. An example are catch basins, which collect trash and other debris and detention and retention basins that can be used to capture, treat and infiltrate runoff.

Suggestion:
Delete cited text.

Comment Response

The San Diego Water Board agrees that nothing in the MS4 regulations prohibits use of treatment devices within the MS4 to treat pollutants prior to discharge into receiving waters, subject to appropriate NPDES requirements. Although more often than not, structural treatment controls within the MS4 are costly and maintenance intensive, and therefore not implemented by the Copermittees. The text clarifies the most common case; that treatment controls for priority pollutants do not exist within the MS4 and the most cost efficient and effective controls are at the source of the pollutants prior to entering the MS4. Please see the response to comment 290. No changes were made based on this comment.

Comment # 337 **Commentor** 4 **Comment Subject** Retrofit

Specific Comment

[From Attachment 10 to the RCFC&WCD comment letter]

Fact Sheet Text Page 84:
"When appropriately applied as in this Order, retrofitting existing development meets MEP."

Problem with Text:
Only retrofits that are applied with the requirements of the Order meet MEP, which is not the case.

Suggestion:
Delete the text.

Comment Response

If retrofits are applied appropriately, in compliance with the requirements of the Tentative Order, the San Diego Water Board considers that as controlling pollutants in storm water discharges from existing development to the MEP. No changes were made based on this comment.

Comment # 338	**Commentor** 4	**Comment Subject** Monitoring

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

[Copermittees requested deletion of "Where such monitoring is not practical, such as for large watersheds with significant groundwater recharge flows, composites must be" from Attachment E, section II.A.1.d.]

As discussed in our meeting, this is a large watershed with significant GW recharge flows.

Comment Response

This requirement is referring to the watershed area for the specific monitoring stations and not for the Santa Margarita Watershed as a whole. The practicality of collecting a sample for the duration of the event is based on the availablilty of flows during that storm event which may be impacted by the condition of the watershed depending on the size of the storm event, i.e. small storm events in a large watershed with significant groundwater recharge may not have flows during the duration of the entire runoff event.

Comment # 339	**Commentor** 4	**Comment Subject** Monitoring

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

Language from MLS section. This is to allow for changes in MLS locations, and then allow the stream assessment stations to follow.

Comment Response

The San Diego Water Board agrees with this request with the caveat that the bioassessment stations location remains with the mass loading station. The following language has been added "Copermittees may propose, for San Diego Water Board review and approval, changing the location of stream assessment monitoring stations where the mass loading stations location has changed pursuant to section II.A.1.a."

Comment # 340	**Commentor** 4	**Comment Subject** Monitoring

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

Only the Bioassessment component of stream assessment monitoring must be conducted according to the SOP.

Comment Response

Section II.A.2.c.(3) requires that the monitoring at the stream assessment stations be conducted according to the most current applicable SOPs developed by SWAMP, and includes a footnote with current SOPs. These SOPs are also applicable to the following water chemistry constituents: Temperature, pH, Dissolved Oxygen, Specific Conductance, and Alkalinity. The Tentative Order has been revised to clarify this.

Comment # 341 **Commentor** 4 **Comment Subject** Legal

Specific Comment

[From Attachment 10 to the RCFC&WCD comment letter]

Fact Sheet Text Page 88:
"The RWL language in the Order requires storm water compliance with water quality standards through an iterative approach for implementing improved and better-tailored BMPs over time. The iterative BMP process requires the implementation of increasingly stringent BMPs until receiving water quality standards are achieved. This is necessary because implementation of BMPs alone cannot ensure attainment of receiving water quality standards."

Problem with Text:
61 Federal Register 57425 (1996), Interim Permitting Approach for Water Quality-Based Effluent Limitations in Storm Water Permits states "expanded or better-tailored BMPs in subsequent permits, where necessary, to provide for the attainment of water quality standards."

Suggestion:
The second sentence should be revised to reflect the actual text from federal regulations (specifically "in subsequent permits"). Further the last sentence does not make sense and is contrary to the proceeding text and should be deleted.

Comment Response

The cited guidance is for NPDES storm water permit writing and not for storm water program management. The implementation of improved and better-tailored BMPs does not have to wait for subsequent permit iterations. A proactive storm water program will continuously review and improve their BMPs for the attainment of water quality standards. The last sentence has not been changed because it refers to the iterative process and not BMPs alone. No changes were made based on this comment.

Comment # 342 **Commentor** 4 **Comment Subject** Monitoring

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

This section is referring to the Bioassessment component of stream assessment monitoring.

Comment Response

This section is referring to the stream assessment monitoring. See response to comment No. 340.

Comment # 343	**Commentor** 4	**Comment Subject** Overirrigation

Specific Comment

[From Attachment 10 to the RCFC&WCD comment letter]

Fact Sheet Text Page 112:
"The San Diego Water Board has responded to complaints about and observed runoff from over-irrigation entering the MS4s in the Riverside County portion of the San Diego Region."

Problem with Text:
There is no evidence in the fact sheet supporting this statement.

Suggestion:
Provide evidence or delete statement.

Comment Response

This finding states the fact that the San Diego Wate Board has received and responded to complaints about and observed runoff from overirrigation entering the MS4s in the Riverside County portion of the San Diego Region. The documentation is available in the records available to the public at the San Diego Water Board. No changes were made based on this comment.

Comment # 344	**Commentor** 4	**Comment Subject** Monitoring

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

This presumes we are starting at the 'bottom of the watershed'. We may approach this differently, but would come up with something to help identify source areas.

Comment Response

Please see the response to comment 193.

Comment # 345	**Commentor** 4	**Comment Subject** Monitoring

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

This is necessary because some pollutants have broad societal sources that cannot be pinpointed through focused source ID 'Monitoring'.

Comment Response

Please see the response to comment 193.

Comment # 346	**Commentor** 4	**Comment Subject** Monitoring

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

Table 4 is more appropriate – consistency for all MS4 outfall stations.

Comment Response

The San Diego Water Board does not agree with the proposed change. Table 1 is appropriate. No changes were made based on this comment.

Comment # 347 **Commentor** 4 **Comment Subject** LID

Specific Comment

[From Attachment 10 to the RCFC&WCD comment letter]

Fact Sheet Text Page 130:
"This section requires the use of native and/or low water use plants for landscaping."

Problem with Text:
There was an agreement that this would be suggested but not a requirement. This requirement also mandates the means of compliance, in violation of Water Code section 13360.

Suggestion:
Change the text:
"Section suggests the use of native and/or low water use plants for landscaping,"

Comment Response

No change is needed in response to the comment. The full text of the the fact sheet accurately reflects the language in the Tentative Order which requires the use of native and/or low water use plants for landscaping where feasible.

Comment # 348 **Commentor** 4 **Comment Subject** Monitoring

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

The existing monitoring program is reported on a fiscal year basis. Need to align the monitoring report with the fiscal year and the JRMP annual report. Also consistent with the change requested in III.A.2.

Comment Response

Please see the response to comment 195.

Comment # 349 **Commentor** 4 **Comment Subject** New Development

Specific Comment

[From Attachment 10 to the RCFC&WCD comment letter]

Fact Sheet Text Page 136:
"This requirement is needed because to date, the Copermittees have generally approved low removal efficiency treatment control BMPs without justification or evidence that use of higher efficiency treatment BMPs was considered and found to be infeasible."

Problem with Text:
The Copermittees challenge the accuracy of this Statement. Riverside County has been requiring landscaped based low impact development BMPs since 2005. The District has also spent a substantial sum of money and time developing BMP manuals with specific criteria to ensure the effectiveness of BMPs.

Suggestion:
Delete the unsupported and offensive statement.

Comment Response

The statement is accurate. The Fact Sheet references a Program Evaluation Report from 2008, in which an audit of the Copermittees' SSMP programs found that many SSMP reports do not describe the selection of treatment control BMPs. Where treatment control BMPs were implemented for a SSMP project, no justification or evidence was provided for the selection of those treatment control BMPs. The pollutant removal efficiency of those treatment control BMPs was not known or evaluated in the SSMP report. The requirement is necessary to ensure that the Copermittees ensure the use of treatment control BMPs with the highest feasible pollutant removal efficiency. No changes were made based on this comment.

Comment # 350 **Commentor** 4 **Comment Subject** Hydromod

Specific Comment

[From Attachment 10 to the RCFC&WCD comment letter]

Fact Sheet Text Page 142:
"Where streams are hardened and/or buried to convey storm water, they cannot provide adequate water quality."

Problem with Text:
Unsupported and incorrect. Hardened channels can be designed to provide both flood protection and natural stream function. For example, hardened levees can be designed to be set back and backfilled with native material, effectively providing a natural substrate for stream function. Similarly, porous channel materials such as gabions can provide both flood protection and substrate for native habitat. Finally, even underground systems can be connected to regional treatment systems that provide requisite water quality benefits where appropriate.

Suggestion:
Delete.

Comment Response

The San Diego Water Board disagrees with the commenter. We fail to see how a channel that is lined with hardscape materials or an underground pipe would be able to support habitat necessary to support rare, threatened, or endangered species (i.e. RARE beneficial use). The Finding in the Fact Sheet is correct to state that hardened stream channels (i.e. lined with hardcape materials) and underground systems (i.e. pipes) cannot provide water quality and other necessary conditions to support beneficial uses. No changes were made based on this comment.

Comment # 351	**Commentor** 4	**Comment Subject** Hydromod

Specific Comment

[From Attachment 10 to the RCFC&WCD comment letter]

Fact Sheet Text Page 145:
"Redevelopment projects, however, must be able to achieve post-project runoff flow rates and durations that are less than or equal to pre-project and down to pre-development runoff flow rates and durations to be eligible to receive a waiver under the program."

Problem with Text:
This requirement is self-defeating. By placing regulatory obligations on redevelopments that make the cost of redevelopment greater than the cost of developing on virgin land, the Permit effectively promotes inner-city blight as existing structures are abandoned and suburban development is promoted due to economic factors. The Permit should include accommodations for redevelopment to ensure that existing developed areas are economically preferable for new development and to prevent the onset of unnecessary additional impervious area.

Suggestion:
The Permit and fact sheet should be revised to offer exemptions for hydromodification requirements for redevelopments where such improvements are infeasible.

Comment Response

The San Diego Water Board disagrees that the requirement is self-defeating. Language has been added to the fact sheet clarifying the difference between pre-project and pre-development. The waiver provides the appropriate level of accomodations to redevelopment projects while protecting water quality. In addition, the San Diego Water Boad believes the commentor over estimates the extent to which development may be preffered on pristine land over redevelopment with the current landuse zoning and dedicated open space requirements. Please see the response to comment 269. No changes were made based on this comment.

Comment # 352	**Commentor** 4	**Comment Subject** Retrofit

Specific Comment

[From Attachment 10 to the RCFC&WCD comment letter]

Fact Sheet Text Page 160:
"Retrofitting existing development is practicable for a municipality through a systematic evaluation, prioritization and implementation plan focused on impaired water bodies, pollutants of concern, areas of downstream [hydromodification, feasibility and effective communication and cooperation with private property owners]."

Problem with Text:
Although the current requirement simply calls for a study, it is expected that future permits will require implementation of said study. This study exceeds the requirements for Copermittees to evaluate opportunities for retrofit of the MS4 contained in the federal regulations and federal Clean Water Act. There are no revenues to promote such a program.

Suggestion:
The Board should recognize in the fact sheet that without funding provided by the state, there is no revenue for such a program.

Comment Response

The San Diego Water Board disagrees that funding must be provided by the State for the Copermittees to implement a retrofitting program. Retrofitting is anticipated to be most feasible and implementable at publicly owned properties and areas. Retrofit opportunities at publicly owned properties and areas can be implemented whenever maintenance or upgrades are necessary, which should already be included in the Copermittee's budget. If private owners choose to retrofit their properties, the cost may be borne by the property owner and may not require additional resources from the Copermittees. Also, retrofit opportunities may be funded by the CWA Section 401 certification project proponents, Supplemental Environmental Project (SEP) proponents, and grant programs.

The requirement to implement retrofits is fully supported by the federal regulations to reduce storm water pollutants to the MEP. 40 CFR 122.26 (d)(2)(iv) provides that the Copermittees storm water program shall include control techniques and engineering methods. Retrofitting BMPs are such control techniques and engineering methods for discharges from existing developments. 40 CFR 122.26(d)(2)(iv)(A) specifies that the Copermittee's program must include "a description of structural and source control measures to reduce pollutants from runoff from commercial and residential areas". Retrofitting BMPs are both structural and source control measures to reduce pollutants. 40 CFR 122.44(d)(1) requires municipal storm water permits to include any requirements necessary to "[a]chieve water quality standards established under section 303 of the CWA, including State narrative criteria for water quality." To date, the receiving waters with the Copermittees' jurisdiction are not meeting water quality standards as evidenced by the San Diego Region Clean Water Act Section 303(d) List of Water Quality Limited Segments. Experience has shown that retrofitting existing development is necessary to meet water quality standards.

Retrofits do not have to be expensive. Retrofits could be as simple as redirecting downspouts from roofs to pervious or landscaped areas instead of to hardscaped areas discharging directly to the MS4. The San Diego Water Board encourages the Copermittees to identify simple, low-cost retrofit opportunities that can be easily implemented, in addition to other more expensive retrofit opportunities, as part of their retrofitting program.

Comment # 353	**Commentor** 4	**Comment Subject** Retrofit

Specific Comment

[From Attachment 10 to the RCFC&WCD comment letter]

Fact Sheet Text Page 161:
"Section F.3.d.(4) requires each Copermittee to cooperate with private property owners to encourage the implementation of site specific retrofitting projects. Because the Copermittees have limited authority to directly require retrofitting projects on private property, the Copermittees must encourage private property owners to implement retrofitting projects through indirect programs and incentives."

Problem with Text:
If the Board wishes to promote urban retrofit, then they also need to incentivize the program. Currently, property owners wishing to volunteer for urban retrofit projects are required to comply with the SSMP, including hydromodification and LID requirements, opt into BMP inspection programs and subject themselves to ongoing scrutiny through business inspection programs required by the Permit. The permit places an ECONOMIC DISINCENTIVE in the way of promoting a general good for the watershed. The purpose of this requirement is to promote acceleration of water quality benefits from existing urban areas. The requirements, as written, promote a program that is doomed to failure.

Suggestion:
The Board should clearly exempt urban retrofit projects from the new development requirements of the Permit if they wish to accelerate water quality improvements from existing urban areas.

Comment Response

The San Diego Water board disagrees that urban retrofit project should be exempt from the new development requirements. The San Diego Water Board disagrees with the commenter than all retrofit projects on privately owned properties will be or must be subject to SSMP requirements (See response to Comment #99).

Many retrofit projects could easily be less than 1 acre in size. For example, as described in the response to comment 352, a retrofit project could be a simple as redirecting downspouts from roofs to pervious or landscaped areas instead of hardscaped areas discharging directly to the MS4. To take such a project one step further, the owner of the property may wish add a planter box that can receive roof runoff, which can retain, filter, and evapotranspire the runoff, as well as provide aesthetic value. Or, the property owner could direct the roof runoff to a series of rain barrels that allow the overflow to discharge to a landscaped area or pervious surface. These types of retrofits are unlikely be subject to SSMP requirements.

On the other hand, if a private owner is planning to implement a project that is subject to SSMP requirements, that would essentially mean the project is a redevelopment Priority Development Project (PDP). Such projects would be adding, creating, or replacing at least 5,000 square feet of impervious surface. It is necessary for these redevelopment PDPs to implement the LID and HMP requirements to protect water quality from the runoff that is generated from the impervious surface. If, however, the project were to redevelop the site and replace at least 5,000 square feet of impervious surface with pervious surface, and not add or create at least 5,000 square feet of impervious surface, that project may no longer meet the definition of a PDP. Section F.3.d.(4) provides several practices to encourage retrofit projects to be implemented by private property owners. The San Diego Water Board encourage the Copermittees to implement these practices and identify other practices that may be effective in incentivizing retrofit projects for private property owners. In the unlikely event that a retrofit project triggers the redevelopment PDP criteria, then that project would most likely be self mitigating.

Comment # 354 **Commentor** 4 **Comment Subject** Retrofit

Specific Comment

[From Attachment 10 to the RCFC&WCD comment letter]

Fact Sheet Text Page 162:
"Periodic inspections may be performed to ensure the site owner has not removed the retrofit BMPs."

Problem with Text:
Similar to the prior comment, this creates a disincentive to retrofit BMPs.

Suggestion:
Delete.

Comment Response

The San Diego Water Board disagrees that this creates a disincentive to retrofit BMPs. The Tentative Order only requires retrofit BMPs implemented by private property owners to be inspected as needed. An inspection does not have to be intrusive. The inspection could be as simple as driving by and verifying that the retrofit BMP is still there.

The water quality benefit of a retrofit BMP is only realized though continued proper operation of that BMP. Knowing where there are retrofit BMPs and that those BMPs are being maintained properly is important information for the Copermittees to reduce storm water pollutants to the MEP. Knowing if the retrofit BMP has been removed is also important information for the Copermittees. No changes were made based on this comment.

Comment # 355 **Commentor** 4 **Comment Subject** IDDE

Specific Comment

[From Attachment 10 to the RCFC&WCD comment letter]

Fact Sheet Text Page 163:
"Section F.4.b …access points (i.e. manholes), connections…"

Problem with Text:
The text from the Phase I rule implementing the NPDES regulations and the requirement of the storm drain system map is:

(from Federal Register, Vol 55, No 222, Friday Nov 18, 1990):

"[submit] a USGS 7.5 minute topographic map...[showing] The location of known municipal storm sewer system outfalls discharging to waters of the United States...the location of major structural controls for storm water discharge (retention basins etc) and the identification of publicly owned parks, recreation areas and other open lands."

The proposed requirements exceed the federal regulatory requirements for MS4 mapping. Further, the mapping of manholes is a significant economic burden that would have no benefit for our staff. Manholes are typically placed at regular intervals (300 – 500 feet) on underground storm drain systems. Once a map providing the location of the MS4 system is available, manholes are quickly located through visual inspection in the field. Further, storm drain plans that are available to Permittee staff can be used to locate specific manholes where absolutely necessary. The economic costs of mapping potentially thousands of manholes is not offset by any known benefit.

Suggestion:
Delete requirement to map manholes.

Comment Response

Please see response to comment 313.

Comment # 356	**Commentor** 4	**Comment Subject** Monitoring

Specific Comment

[From Attachment 10 to the RCFC&WCD comment letter]

Fact Sheet Text Page 198:
"Section II.D (High Priority Inland Aquatic Habitat) of the MRP describes required monitoring to be done in order to assess if MS4 storm water and/or non-storm water discharges are affecting high priority aquatic and/or riparian species."

Problem with Text:
This requirement was deleted from the Orange County NPDES MS4 Permit when the provision to assess outfalls using NALs and SALs was added. It is not clear why such an accommodation would not also be provided to the Riverside County NPDES MS4 Program. This region has significantly less economic resources than south Orange County or San Diego County to implement monitoring programs. The Permittees specifically request this be deleted as impacts to aquatic habitat will be detected through the NAL/SAL program.

Suggestion:
This requirement should be deleted.

Comment Response

Please see the response to comment 150.

NOTICE OF PUBLIC MEETING

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN DIEGO REGION

TENTATIVE ORDER R9-2010-0016
Riverside County Municipal Storm Water Permit

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October 13, 2010 at 9:00 am
Rancho California Water District
District Board Room
42135 Winchester Road
Temecula, California

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Please contact Mr. Ben Neill at (858) 467-2952 or via e-mail at bneill@waterboards.ca.gov for information regarding the meeting or Tentative Order No. R9-2010-0016.

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DAVID W. GIBSON
Executive Officer

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0006240

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(2010 & 2011 C.C.P.)

STATE OF CALIFORNIA
County of San Diego

I am a citizen of the United States and a resident of the County aforesaid: I am over the age of eighteen years and not a party to or interested in the above-entitled matter. I am the principal clerk of the printer of

North County Times

Formerly known as the Blade-Citizen and The Times-Advocate and which newspapers have been adjudicated newspapers of general circulation by the Superior Court of the County of San Diego, State of California, for the City of Oceanside and the City of Escondido, Court Decree number 171349, for the County of San Diego, that the notice of which the annexed is a printed copy (set in type not smaller than nonpariel), has been published in each regular and entire issue of said newspaper and not in any supplement thereof on the following dates, to-wit:

September 09th, 2010

I certify (or declare) under penalty of perjury that the foregoing is true and correct.

Dated at **Escondido,** California

This 09th, day of September, 2010

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NOTICE OF PUBLIC MEETING

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD - SAN DIEGO REGION

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DAVID W. GIBSON
Executive Officer

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State of California)
County of ORANGE) ss

Notice Type: HRG - NOTICE OF HEARING

Ad Description: Riverside MS4 hearing

I am a citizen of the United States and a resident of the State of California; I am over the age of eighteen years, and not a party to or interested in the above entitled matter. I am the principal clerk of the printer and publisher of the THE REGISTER, a newspaper published in the English language in the city of SANTA ANA, county of ORANGE, and adjudged a newspaper of general circulation as defined by the laws of the State of California by the Superior Court of the County of ORANGE, State of California, under date 11/19/1905, Case No. A21046. That the notice, of which the annexed is a printed copy, has been published in each regular and entire issue of said newspaper and not in any supplement thereof on the following dates, to-wit:

09/10/2010

Executed on: 09/10/2010
At SANTA ANA, California

I certify (or declare) under penalty of perjury that the foregoing is true and correct.

Julie Trammell
Signature

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CNS#: 1940377

NOTICE OF PUBLIC MEETING

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD - SAN DIEGO REGION

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Executive Officer

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THE REGISTER

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P.O. BOX 60460
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The Undersigned, declares under penalty of perjury under the laws of the State of California: That she is a resident of the County of San Diego. That she is and at all times herein mentioned was a citizen of the United States, over the age of twenty-one years, and that she is not a party to, nor interested in the above entitled matter; that she is Chief Clerk for the publisher of

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a newspaper of general circulation , printed and published daily in the City of San Diego, County of San Diego, and which newspaper is published for the dissemination of local news and intelligence of a general character, and which newspaper at all the times herein mentioned had and still has a bona fide subscription list of paying subscribers, and which newspaper has been established, printed and published at regular intervals in the said City of San Diego, County of San Diego, for a period exceeding one year next preceding the date of publication of the notice hereinafter referred to, and which newspaper is not devoted to nor published for the interests, entertainment or instruction of a particular class, profession, trade, calling, race, or denomination, or any number of same; that the notice of which the annexed is a printed copy, has been published in said newspaper in accordance with the instructions of the person(s) requesting publication, and not in any supplement thereof on the following dates, to wit:

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NOTICE OF PUBLIC MEETING

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CNS-1940376#

THE PRESS-ENTERPRISE

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(2010, 2015.5 C.C.P.)

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09-08-10

I Certify (or declare) under penalty of perjury that the foregoing is true and correct.

Date: Sep. 8, 2010
At: Riverside, California

Natalie Mea

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NOTICE OF PUBLIC MEETING
CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD - SAN DIEGO REGION
TENTATIVE ORDER R9-2010-0016
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9/8/10
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STATE OF CALIFORNIA
County of San Diego

I am a citizen of the United States and a resident of the County aforesaid: I am over the age of eighteen years and not a party to or interested in the above-entitled matter. I am the principal clerk of the printer of

North County Times

Formerly known as the Blade-Citizen and The Times-Advocate and which newspapers have been adjudicated newspapers of general circulation by the Superior Court of the County of San Diego, State of California, for the City of Oceanside and the City of Escondido, Court Decree number 171349, for the County of San Diego, that the notice of which the annexed is a printed copy (set in type not smaller than nonpariel), has been published in each regular and entire issue of said newspaper and not in any supplement thereof on the following dates, to-wit:

September 09th, 2010

I certify (or declare) under penalty of perjury that the foregoing is true and correct.

Dated at **Escondido,** California

This 09th, day of September, 2010

Jane Allshouse
NORTH COUNTY TIMES
Legal Advertising

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NOTICE OF PUBLIC MEETING

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD - SAN DIEGO REGION

TENTATIVE ORDER R9-2010-0016
Riverside County Municipal Storm Water Permit

The California Regional Water Quality Control Board, San Diego Region (San Diego Water Board) hereby notifies the public of its intent to consider adoption of Tentative Order No. R9-2010-0016, the Riverside County Municipal Storm Water Permit, at a public meeting scheduled for the following time and location[1]:

October 13, 2010 at 9:00 am
Rancho California Water District
District Board Room
42135 Winchester Road
Temecula, California

Tentative Order No. R9-2010-0016 (Tentative Order) will replace the current Riverside County Municipal Storm Water Permit, R9-2004-0001. The Tentative Order regulates the discharge of storm water pollutants from the municipal separate storm sewer system. Additional information may be found on the San Diego Water Board website at: http://www.waterboards.ca.gov/sandiego. As indicated in the July 23, 2010 Notice of Written Comment Period, written comments on the Tentative Order received by 5 p.m. on September 7, 2010, will be provided to the San Diego Water Board members for their consideration prior to the public hearing. Written comments received after the deadline will not be accepted and will not be incorporated into the administrative record if doing so would jeopardize any party. Interested persons are invited to attend the public hearing to provide oral comments on the Tentative Order. Written comments will not be accepted at the public hearing, but can be orally summarized.

Please contact Mr. Ben Neill at 858-467-2952 or via e-mail at bneill@waterboards.ca.gov for information regarding the meeting or Tentative Order No. R9-2010-0016.

All documents, comments received, and other information related to the above-mentioned item are on file and may be reviewed at the San Diego Water Board office, 9174 Sky Park Court, Suite 100, San Diego, CA 92123, telephone 858-467-2952, FAX 858-571-6972. Review of information and files may be conducted Monday through Friday from 8 am to 5 pm. To insure that space is available we suggest that you contact our office to schedule an appointment. Or send an e-mail to File_Review@waterboards.ca.gov. Please bring the foregoing to the attention of any person known to you who would be interested in these matters.

DAVID W. GIBSON
Executive Officer

[1] If it is necessary to modify the meeting date or location, a further public notice will be issued.
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State of California)
County of ORANGE) ss

Notice Type: HRG - NOTICE OF HEARING

Ad Description: Riverside MS4 hearing

I am a citizen of the United States and a resident of the State of California; I am over the age of eighteen years, and not a party to or interested in the above entitled matter. I am the principal clerk of the printer and publisher of the THE REGISTER, a newspaper published in the English language in the city of SANTA ANA, county of ORANGE, and adjudged a newspaper of general circulation as defined by the laws of the State of California by the Superior Court of the County of ORANGE, State of California, under date 11/19/1905, Case No. A21046. That the notice, of which the annexed is a printed copy, has been published in each regular and entire issue of said newspaper and not in any supplement thereof on the following dates, to-wit:

09/10/2010

Executed on: 09/10/2010
At SANTA ANA, California

I certify (or declare) under penalty of perjury that the foregoing is true and correct.

Julie Trammell
Signature

* A 0 0 0 0 0 1 8 3 3 8 0 3 *

CNS#: 1940377

NOTICE OF PUBLIC MEETING

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD - SAN DIEGO REGION

TENTATIVE ORDER R9-2010-0016 Riverside County Municipal Storm Water Permit

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DAVID W. GIBSON
Executive Officer

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THE REGISTER

THE PRESS-ENTERPRISE

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Ad Desc.: PUBLIC MEETING / 1940375

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09-08-10

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Date: Sep. 8, 2010
At: Riverside, California

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NOTICE OF PUBLIC MEETING
CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD - SAN DIEGO REGION
TENTATIVE ORDER R9-2010-0016
Riverside County Municipal Storm Water Permit

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DAVID W. GIBSON
Executive Officer

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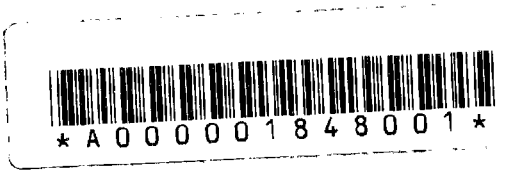

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STATE OF CALIFORNIA} ss.
County of San Diego}

The Undersigned, declares under penalty of perjury under the laws of the State of California: That she is a resident of the County of San Diego. That she is and at all times herein mentioned was a citizen of the United States, over the age of twenty-one years, and that she is not a party to, nor interested in the above entitled matter; that she is Chief Clerk for the publisher of

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a newspaper of general circulation , printed and published daily in the City of San Diego, County of San Diego, and which newspaper is published for the dissemination of local news and intelligence of a general character, and which newspaper at all the times herein mentioned had and still has a bona fide subscription list of paying subscribers, and which newspaper has been established, printed and published at regular intervals in the said City of San Diego, County of San Diego, for a period exceeding one year next preceding the date of publication of the notice hereinafter referred to, and which newspaper is not devoted to nor published for the interests, entertainment or instruction of a particular class, profession, trade, calling, race, or denomination, or any number of same; that the notice of which the annexed is a printed copy, has been published in said newspaper in accordance with the instructions of the person(s) requesting publication, and not in any supplement thereof on the following dates, to wit:

Sep 8, 2010

Emily Flenn
Chief Clerk for the Publisher

9/13/10

Date

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NOTICE OF PUBLIC MEETING

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD - SAN DIEGO REGION

TENTATIVE ORDER R9-2010-0016 Riverside County Municipal Storm Water Permit

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DAVID W. GIBSON
Executive Officer

(1) If it is necessary to modify the meeting date or location, a further public notice will be issued.
9/8/10
CNS-1940376#

0006248

Ben Neill - RB9 - Riverside County MS4 Permit Agenda Documents

From: <lyris@swrcb18.waterboards.ca.gov>
To: Ben Neill <bneill@waterboards.ca.gov>
Date: 10/7/10 2:09 PM
Subject: RB9 - Riverside County MS4 Permit Agenda Documents

This is a message from the California Regional Water Quality Control Board, San Diego Region.

Dear Interested Parties,

The agenda supporting documents provided to the Board Members for next week's meeting are on our website here:

http://www.waterboards.ca.gov/sandiego/board_info/agendas/2010/oct/Oct13.shtml

The Riverside County MS4 Permit is agenda item #5. Supporting Document No. 3 is the Draft Updates and Errata for the Tentative Order. Supporting Document No. 8 is the Draft Response to comments.

Feel free to contact me if you have any questions.

Reminder the meeting is scheduled for 9 am on Wednesday, October 13, at the Rancho California Water District Board Room, 42135 Winchester Road, Temecula, California.

Sincerely,

Ben Neill
(858) 467-2983

Ben Neill
Water Resource Control Engineer
Northern Watershed Protection Unit
San Diego Regional Water Quality Control Board
9174 Sky Park Ct., Suite 100
San Diego, CA 92123
Tel: (858) 467-2983
Fax: (858) 571-6972

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0006249

Ben Neill - RB9 - Riverside County MS4 Permit Order R9-2010-0016

From: <lyris@swrcb18.waterboards.ca.gov>
To: Ben Neill <bneill@waterboards.ca.gov>
Date: 10/8/10 3:30 PM
Subject: RB9 - Riverside County MS4 Permit Order R9-2010-0016

This is a message from the California Regional Water Quality Control Board, San Diego Region (San Diego Water Board).

Dear Interested Parties,

The San Diego Water Board's meeting for Wednesday, October 13, 2010, in Temecula has been canceled including Item 5 the Reissuance of the Riverside County MS4 Permit, Order No. R9-2010-0016. You will receive another message once the item has been rescheduled.

Feel free to contact me if you have any questions.

Sincerely,

Ben Neill
bneill@waterboards.ca.gov
(858) 467-2983

Ben Neill
Water Resource Control Engineer
Northern Watershed Protection Unit
San Diego Regional Water Quality Control Board
9174 Sky Park Ct., Suite 100
San Diego, CA 92123
Tel: (858) 467-2983
Fax: (858) 571-6972

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State of California
Regional Water Quality Control Board
San Diego Region

EXECUTIVE OFFICER SUMMARY REPORT
October 13, 2010

ITEM: 5

SUBJECT: PUBLIC HEARING: Reissuance of NPDES Waste Discharge Requirements for Discharges from the Municipal Separate Storm Sewer Systems (MS4s) draining the County of Riverside, the Incorporated Cities of Riverside County, and the Riverside County Flood Control and Water Conservation District, within the San Diego Region. (Tentative Order No. R9-2010-0016, (NPDES Permit No. CAS0108766) *(Chiara Clemente, Ben Neill, Wayne Chiu)*

PURPOSE: Today's public hearing provides the San Diego Water Board the opportunity to hear public testimony on, and consider adoption of the Tentative Order No. R9-2010-0016.

PUBLIC NOTICE: The public review and comment period for the Tentative Order began on July 23, 2010. Interested persons and the public have been notified in accordance with California Water Code Section 13167.5, the State Water Resources Control Board Administrative Procedures Manual (Chapter 1), and Code of Federal Regulations Title 40 CFR Part 25 (Supporting Document No. 7).

- A notice of this item was distributed to all known interested persons and posted on the San Diego Water Board web site on July 23, 2010;
- A notice of this meeting was also posted for the general public in the Orange County Register on September 10, 2010; in the Riverside Press-Enterprise on September 8, 2010; in the San Diego North County Times on September 9, 2010; and in the San Diego Union Tribune on September 8, 2010;
- A notice was included on the October 13, 2010 San Diego Water Board meeting agenda.

DISCUSSION: Tentative Order No. R9-2010-0016 is the proposed reissuance of the Municipal Storm Water Permit (Order No. R9-2004-0001) for portions of Riverside County within the San Diego Region. The Tentative Order serves as both

Waste Discharge Requirements and as a federal National Pollutant Discharge Elimination System permit.

The Tentative Order would, if adopted, require the County of Riverside, the incorporated cities of Riverside County, and the Riverside County Flood Control and Water Conservation District (Copermittees), within the San Diego Region to continue to prohibit the discharge of non-storm water from their separate storm sewer systems (MS4s) and to reduce the discharge of pollutants in storm water from their MS4 to the maximum extent practicable (MEP). These requirements are mandated by Clean Water Act Section 402(p).

In lieu of numeric effluent limitations, pollutant discharge reduction is accomplished through the Copermittees' implementation of comprehensive runoff management programs. These runoff management programs are to be implemented on jurisdictional and watershed levels, depending upon the scale of the water quality issues being addressed.

Background and Permitting Approach Summary

The Tentative Order (No. R9-2010-0016) with the Fact Sheet (Supporting Document Nos. 1 & 2) builds upon the current Riverside County MS4 Permit, R9-2004-001, while tailoring similar requirements from the South Orange County MS4 permit (R9-2009-0002), to meet the unique needs of the Copermittees and the conditions of the Santa Margarita Watershed (Supporting Document 4). The Tentative Order includes changes made in response to (1) the Report of Waste Discharge (ROWD); (2) new information; and (3) knowledge and experience gained by the Copermittees and the San Diego Water Board during the current permit cycle.

To draft a permit that is sufficiently protective of water quality and enforceable (i.e. all parties are easily able to assess compliance in the same manner), the Tentative Order addresses issues known to exist in Riverside County (e.g. unpaved roads, insufficient monitoring, etc.) and brings the MS4 requirements in this Tentative Order to the current standard set forth in other southern California MS4 permits (e.g. for Low Impact Development, retrofit, hydromodification, etc.). This level of specificity is not only beneficial to developing a regional permit; but more

importantly, it is essential in meeting the maximum extent practicable standard.

Prior to the issuance of the Tentative Order, San Diego Water Board staff met with the Copermittees seventeen (17) separate times over six months to discuss at length the conditions to be included in the Tentative Order (Please see the timeline in Supporting Document No. 5). The Tentative Order being considered today was then distributed to the public for review and comment on July 23, 2010. Following the issuance of the Tentative Order, San Diego Water Board staff held two more meetings with the Copermittees to discuss the proposed requirements.

Staff is sensitive to the cost considerations raised by the Copermittees. To the extent that the Copermittee recommendations did not conflict with the goals of the Clean Water Act and the mission of the San Diego Water Board, the requested changes were made. Many of the changes were made prior to public release and/or as a result of discussions with the Copermittees.

Examples of these include:

1. Finalizing an agreement with the Santa Ana Water Board, Region 8, at the request of the Cities of Murrieta, Wildomar and Menifee, that allows the Cities of Murrieta and Wildomar to be wholly regulated under this tentative order, and the City of Menifee to be wholly regulated with the Region 8 MS4 permit, pursuant to CWC Section 13228. (Supporting Document No. 6)
2. Staggering and delaying reporting deadlines as much as practicable, while still obtaining the necessary information in time to make informed decisions.
3. Decreasing monitoring frequency for Stream Assessment Stations (from twice annually to once annually) in return for Copermittee participation in Stormwater Monitoring Coalition monitoring efforts.
4. Consolidating and streamlining permitting language in the Low Impact Development, Education and Effectiveness Assessment sections.
5. Allowing the development of a standard roadway design/section in lieu of a post-construction storm water mitigation plan.

6. Reducing the scope and magnitude of the required retrofit program.
7. Removing a special study on unpaved roads.
8. Revising requirements on hydromodification to (a) match interim criteria with existing efforts, (b) allow utilization of data prepared by San Diego and Orange Counties, and (c) provide a waiver for redevelopment projects.
9. Removing requirements to use Geographical Information Systems in mapping.
10. Removing requirements to individually inventory roads, streets, or highways.
11. Providing allowances for either Active or Passive Sediment Treatment systems at construction sites.
12. Providing greater flexibility in utilizing third-party inspections of commercial and industrial sites.
13. Reducing inventory and inspection requirements, as related to 303(d) listed water bodies.
14. Revising inspection requirements for private retrofit projects to occur as necessary.
15. Removing language requiring the oversight and enforcement of unpaved private roads maintenance.

Comments on the Revised Tentative Order

The San Diego Water Board has received fourteen letters containing written comments and responded in writing to the over 350 comments, which includes 244 comments from the Riverside County Flood Control and Water Conservation District. Written comments received by September 7, 2010 are included as Supporting Document No. 9. The San Diego Water Board's response to these comments is included as Supporting Document No. 8.

Revisions to Tentative Order No. R9-2010-0016

Minor revisions to Tentative Order No. R9-2010-0016 and its Fact Sheet are included as Supporting Document No. 3. The changes are made either in response to comments received and/or to correct typographical errors.

Procedures for Today's Meeting

The purpose of today's item is to consider comments and adoption on Tentative Order No. R9-2010-0016, as modified. Oral comments will be accepted as part of the hearing. Staff

will provide verbal responses to significant public comments raised on revisions to the Tentative Order. Time allotted for oral comments may be limited at the discretion of the San Diego Water Board.

KEY ISSUES: Based upon review of written comments, the following issues are of significant concern.

1. Economic Considerations – The Copermittees expressed concerns that the new requirements in the Tentative Order are cost prohibitive to implement. The San Diego Water Board staff has considered the economic information provided by the Copermittees and made appropriate changes in the Tentative Order's requirements. Please see the discussion above; the Fact Sheet Section VI pages 12 to 17 and discussion about Finding E.6 on pages 94 to 96; and responses to comments Nos. 8, 9, 52, 77, 78, 86, 88, 115, 122, 126, 130, 134, and 208.

2. Over irrigation prohibition –The Copermittees are opposed to removal of the current exemption of the prohibition against over-irrigation discharges. The Tentative Order appropriately removed the exemption of over-irrigation discharged according to federal regulations. USEPA and non-governmental environmental organizations support removal of the exemption. Please see the Fact Sheet discussion about Finding C.15 on pages 50 to 54 and about Section B.2 on pages 108 to 112; and also responses to comments Nos. 15, 27, 73, 83, 100, 201, 202, 230 and 257.

3. Monitoring Requirements- The Copermittees believe that the monitoring requirements are excessive and unwarranted and have proposed alternatives to scale down associated costs. The monitoring proposed (with proposed changes) is appropriate in consideration of the Copermittee's record of noncompliance and limited monitoring data available for the watershed. USEPA supports the currently proposed requirements and finds them "consistent with requirements of other recent MS4 permits adopted." Please see Attachment E; the Fact Sheet discussion on pages 188 to 201; and responses to comments Nos. 20, 90, 92, 95, 142, 144, 150, 152-159, 165, 167-169, 172, 173, 177, 180, 181, 193-197, 338, 339, and 340.

4. Unpaved roads requirement – The Copermittees believe that regulation of unpaved roads should be removed and vetted

through a separate general order. The Tentative Order includes requirements to minimize pollution discharges from unpaved roads that are based on similar requirements in the San Franciso Bay Water Board, Region 2, Multi-region MS4 Permit. Where appropriate, the requirements have been modified to address the Copermittees' concerns. USEPA, non-governmental environmental organizations, and a local resident have written in support of the originally proposed language. Please see the Fact Sheet discussion about Finding D.1.c on pages 58 and 59, Section F.1.i on page 146, Section F.3.a.(10) on page 155, and Section F.3.c.(5) on page 160; and also please see response to comments Nos. 1, 19, 69, 101-104, 138-141, 174, 176, 178, 182, 185, 186, 282, and 300.

5. Low-Impact Development – The USEPA and the Natural Resources Defense Council recommended that requirements pertaining to low-impact development (LID) be more consistent with those in other Southern California MS4 permits. To accommodate these comments, modifications have been proposed that prefer onsite retention and allow equivalent biofiltration practices. Please see the Fact Sheet discussion about Finding D.2.c on pages 71 to 73, Section F.1.d.(4) on pages 132 to 135, and Section F.1.d.(7) on pages 136 to 138. Please also see response to comments Nos. 7, 12, 13, 85, 105, 107, 108, 112, 117, and 118.

LEGAL CONCERNS: None.

SUPPORTING DOCUMENTS:

1. Tentative Order No. R9-2010-0016, with attachments
2. Fact Sheet / Technical Report for Tentative Order No. R9-2010-0016
3. Draft Updates and Errata for the revised Tentative Order
4. Map of Riverside County within the San Diego Region
5. Timeline of Events
6. Letters of Agreement from Santa Ana Water Board and San Diego Water Board Executive Officers
7. Notice of Public Hearing

8. Draft Responses to written comments on Tentative Order No. R9-2010-0016 received between July 23, 2010 and September 7, 2010

9. Written Comment letters received between July 23, 2010 and September 7, 2010 on the Tentative Order

RECOMMENDATION: It is recommended that the Board receive public testimony at today's hearing, close the public comment period, and adopt the Tentative Order (with updates and errata).

Supporting Document No. 1
Item No. 5
0006257
October 13, 2010

California Regional Water Quality Control Board
San Diego Region

Waste Discharge Requirements for Discharges from the Municipal Separate Storm Sewer Systems (MS4s) Draining the County of Riverside, the Incorporated Cities of Riverside County, and the Riverside County Flood Control and Water Conservation District within the San Diego Region

Tentative Order No. R9-2010-0016
NPDES NO. CAS0108740

October 13, 2010

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Adopted by the
California Regional Water Quality Control Board
San Diego Region
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The California Regional Water Quality Control Board, San Diego Region (hereinafter San Diego Water Board), finds that:

A. BASIS FOR THE ORDER

1. This Order is based on the federal Clean Water Act (CWA), the Porter-Cologne Water Quality Control Act (Division 7 of the Water Code, commencing with Section 13000), applicable State and federal regulations, all applicable provisions of statewide Water Quality Control Plans and Policies adopted by the State Water Resources Control Board (State Water Board), the Water Quality Control Plan for the San Diego Basin adopted by the San Diego Water Board (Basin Plan), the California Toxics Rule, and the California Toxics Rule Implementation Plan.

2. This Order reissues National Pollutant Discharge Elimination System (NPDES) Permit No. CAS0108766, which was first adopted by the San Diego Water Board on July 16, 1990 (Order No. 90-38), and then reissued on May 13, 1998 (Order No. 98-02). On May 26, 1998, the United States Environmental Protection Agency (USEPA), Region IX, objected to Order No. 98-02 due to concerns regarding Receiving Water Limitations (RWL) language. The USEPA concluded that the RWL language in the permit did not comply with the CWA and its implementing regulations. On April 27, 1999, the USEPA reissued the MS4 permit, which the San Diego Water Board adopted as Addendum No. 1 to Order No. 98-02 on November 8, 2000. On July 14, 2004, the San Diego Water Board adopted the third term MS4 permit, Order No. R9-2004-001. On January 15, 2009, the Riverside County Flood Control and Water Conservation District (RCFCD), as the Principal Copermittee, submitted a Report of Waste Discharge (ROWD) for reissuance of the municipal separate storm sewer system (MS4) Permit.

3. This Order is consistent with the following precedential Orders adopted by the State Water Board addressing MS4 NPDES Permits: Order 99-05, Order WQ-2000-11, Order WQ 2001-15, Order WQO 2002-0014, and Order WQ-2009-0008 (*SWRCB/OCC FILE A-1780).*

4. The Fact Sheet / Technical Report for the Order No. R9-2010-0016, NPDES No. CAS0108766, Waste Discharge Requirements for Discharges from the MS4s Draining the County of Riverside, the Incorporated Cities of Riverside County, and the Riverside County Flood Control and Water Conservation District within the San Diego Region, includes cited regulatory and legal references and additional explanatory information and data in support of the requirements of this Order. This information, including any supplements thereto, and any response to comments on the Tentative Orders, is hereby incorporated by reference into these findings.

B. REGULATED PARTIES

1. Each of the persons in Table 1 below, hereinafter called Copermittees or dischargers, owns or operates an MS4, through which it discharges into waters of the United States (U.S.) within the San Diego Region. These MS4s fall into one or more of the following categories: (1) a medium or large MS4 that services a population of greater than 100,000 or 250,000 respectively; or (2) a small MS4 that is "interrelated" to a medium or large MS4; or (3) an MS4 that contributes to a violation of a water quality standard; or (4) an MS4 which is a significant contributor of pollutants to waters of the U.S.

Table 1. Municipal Copermittees

1. City of Murrieta	4. County of Riverside
2. City of Temecula	5. Riverside County Flood Control and Water Conservation District
3. City of Wildomar	
6. City of Menifee[1]	

The Cities of Murrieta, Menifee and Wildomar also discharge into the waters of the U.S. in the California Regional Water Quality Control Board, Santa Ana Region (Santa Ana Water Board), so are located partially within both the San Diego and Santa Ana Water Board boundaries. As allowed by California Water Code (CWC) §13228, these Cities submitted written requests to be regulated for MS4 purposes under a permit adopted by only one Water Board. As authorized by CWC §13228 and pursuant to a written agreement between the San Diego Water Board and the Santa Ana Water Board, the Cities of Murrieta and Wildomar are wholly regulated by the San Diego Water Board under this Order, including those portions of the Cities jurisdiction not within the San Diego Water Board's region. Similarly, the City of Menifee is wholly regulated by the Santa Ana Water Board under Order No. R8-2010-0033, including those portions of the City of Menifee within the San Diego Water Board's region.[1]

C. DISCHARGE CHARACTERISTICS

1. Discharges from the MS4 contain waste, as defined in the CWC, and pollutants that adversely affect the quality of the waters of the State. The discharge from an MS4 is a "discharge of pollutants from a point source" into waters of the U.S. as defined in the CWA.

2. MS4 storm water and non-storm water discharges are likely to contain pollutants that cause or threaten to cause a violation of water quality standards, as outlined in the Basin Plan. Storm water and non-storm water discharges from the MS4 are subject

[1] Until an agreement is finalized, the City of Menifee is included as a Copermittee in this Order.

to the conditions and requirements established in the Basin Plan for point source discharges.

3. The most common categories of pollutants in runoff include total suspended solids, sediment, pathogens (e.g., bacteria, viruses, protozoa), heavy metals (e.g., copper, lead, zinc and cadmium), petroleum products and polynuclear aromatic hydrocarbons, synthetic organics (e.g., pesticides, herbicides, and PCBs), nutrients (e.g., nitrogen and phosphorus fertilizers), oxygen-demanding substances (decaying vegetation, animal waste), detergents, and trash.

4. The discharge of pollutants and/or increased flows from MS4s may cause or threaten to cause the concentration of pollutants to exceed applicable receiving water quality objectives and/or impair or threaten to impair designated beneficial uses resulting in a condition of pollution (i.e., unreasonable impairment of water quality for designated beneficial uses), contamination, or nuisance.

5. Pollutants in runoff can threaten and adversely affect human health. Human illnesses have been clearly linked to recreating near storm drains flowing to receiving waters. Also, runoff pollutants in receiving waters can bioaccumulate in the tissues of invertebrates and fish, which may be eventually consumed by humans.

6. Runoff discharges from MS4s often contain pollutants that cause toxicity to aquatic organisms (i.e., adverse responses of organisms to chemicals or physical agents ranging from mortality to physiological responses such as impaired reproduction or growth anomalies). Toxic pollutants impact the overall quality of aquatic systems and beneficial uses of receiving waters.

7. The Copermittees discharge runoff into lakes, drinking water reservoirs, rivers, streams, creeks, bays, estuaries, coastal lagoons, the Pacific Ocean, and tributaries thereto within one of the eleven hydrologic units (Santa Margarita Hydrologic Unit) comprising the San Diego Region as shown in Table 2. Some of the receiving water bodies have been designated as impaired by the San Diego Water Board in 2009 pursuant to CWA section 303(d).

Table 2. Common Watersheds and CWA Section 303(d) Impaired Waters in the San Diego Region.

Hydrologic Area (HA) or Hydrologic Subarea (HSA) of the Santa Margarita Hydrologic Unit	**Major Receiving Water Bodies**	**303(d) Pollutant(s)/stressor or Water Quality Effect[2]**
DeLuz Creek HSA (902.21)	De Luz Creek	Iron, Manganese, Nitrogen, Sulfates
Murrieta HSA (902.32)	Long Canyon Creek (tributary to Murrieta Creek	Chlorpyrifos, E. Coli, Fecal Coliform, Iron, Manganese
Wolf HSA (902.52)	Murrieta Creek	Chlorpyrifos, Copper, Iron, Manganese, Nitrogen, Toxicity
Pauba HSA (902.51)	Redhawk Channel	Chlorpyrifos, Copper, Diazinon, E. Coli, Fecal Coliform, Iron, Manganese, Nitrogen, Phosphorus, Total Dissolved Solids
Gavilan HSA (902.22)	Sandia Creek	Iron, Sulfates
Gertrudis HSA (902.42)	Santa Gertrudis Creek	Chlorpyrifos, Copper, E. Coli, Fecal Coliform, Iron, Phosphorous
Lower Ysidora HSA (902.11)	Santa Margarita Lagoon	Eutrophic
Lower Ysidora HSA (902.11)	Santa Margarita River (Lower)	Enterococcus, Fecal Coliform, Phosphorus, Total Nitrogen as N
Gavilan HSA (902.22)	Santa Margarita River (Upper)	Toxicity
Pauba HSA (902.51)	Temecula Creek	Chlorpyrifos, Copper, Phosphorus, Total Dissolved Solids, Toxicity
French HSA (902.33)	Warm Springs Creek (Riverside County)	Chlorpyrifos, E. Coli, Fecal Coliform, Iron, Manganese, Phosphorus, Total Nitrogen as N

[2] The listed 303(d) pollutant(s) do not necessarily reflect impairment of the entire corresponding WMA or all corresponding major surface water bodies. The specific impaired portions of each WMA are listed in the State Water Resources Control Board's 2008 Section 303(d) List of Water Quality Limited Segments.

8. Trash is a persistent pollutant that can enter receiving waters from the MS4, accumulate, and be transported downstream into receiving waters over time. Trash poses a serious threat to the beneficial uses of the receiving waters, including, but not limited to, human health, rare and endangered species, navigation and human recreation.

9. The Copermittees' water quality monitoring data submitted to date documents persistent violations of Basin Plan water quality objectives for various runoff-related pollutants (indicator bacteria, dissolved solids, turbidity, metals, pesticides, etc.) at various watershed monitoring stations. Persistent toxicity has also been observed at some watershed monitoring stations. In addition, bioassessment data indicate that the majority of the monitored receiving waters have Poor to Very Poor Index of Biotic Integrity ratings. In sum, the above findings indicate that runoff discharges are causing or contributing to water quality impairments, and are a leading cause of such impairments in Riverside County.

10. When natural vegetated pervious ground cover is converted to impervious surfaces such as paved highways, streets, rooftops, and parking lots, the natural absorption and infiltration abilities of the land are lost. Therefore, runoff leaving a developed area is significantly greater in runoff volume, velocity, and peak flow rate than pre-development runoff from the same area. Runoff durations can also increase as a result of flood control and other efforts to control peak flow rates. Increased volume, velocity, rate, and duration of runoff, and decreased natural clean sediment loads, greatly accelerate the erosion of downstream natural channels. Significant declines in the biological integrity and physical habitat of streams and other receiving waters have been found to occur with as little as a 3-5 percent conversion from natural to impervious surfaces. The increased runoff characteristics from new development must be controlled to protect against increased erosion of channel beds and banks, sediment pollutant generation, or other impacts to beneficial uses and stream habitat due to increased erosive force.

11. Development creates new pollution sources as human population density increases and brings with it proportionately higher levels of car emissions, car maintenance wastes, municipal sewage, pesticides, household hazardous wastes, pet wastes, trash, etc. which can either be washed or directly dumped into the MS4. As a result, the runoff leaving the developed urban area is significantly greater in pollutant load than the pre-development runoff from the same area. These increased pollutant loads must be controlled to protect downstream receiving water quality.

12. Development and urbanization especially threaten environmentally sensitive areas (ESAs), such as water bodies designated as supporting a RARE beneficial use (supporting rare, threatened or endangered species) and CWA 303(d)-impaired water bodies. Such areas have a much lower capacity to withstand pollutant loads than other, more sensitive areas. In essence, development that is ordinarily insignificant in its impact on the environment may become significant in a particularly sensitive environment. Therefore, additional controls to reduce storm water

pollutants from new and existing development may be necessary for areas adjacent to or discharging directly to an ESA.

13. Although dependent on several factors, the risks typically associated with properly managed infiltration of runoff (especially from residential land use areas) are not significant. The risks associated with infiltration can be managed by many techniques, including (1) designing landscape drainage features that promote infiltration of runoff, but do not "inject" runoff (injection bypasses the natural processes of filtering and transformation that occur in the soil); (2) taking reasonable steps to prevent the illegal disposal of wastes; (3) protecting footings and foundations; (4) ensuring that each drainage feature is adequately maintained in perpetuity; and (5) pretreatment.

14. Non-storm water (dry weather) discharge from the MS4 is not considered a storm water (wet weather) discharge and therefore is not subject to regulation under the Maximum Extent Practicable (MEP) standard from CWA 402(p)(3)(B)(iii), which is explicitly for "Municipal … *Stormwater Discharges* (emphasis added)" from the MS4. Rather, non-storm water discharges into the storm sewers, per CWA 402(p)(3)(B)(ii), are to be effectively prohibited. Such dry weather non-storm water discharges have been shown to contribute significant levels of pollutants and flow in arid, developed Southern California watersheds and are to be effectively prohibited under the CWA.

15. Non-storm water discharges to the MS4 granted an influent exception [i.e., which are exempt from the effective prohibition requirement set forth in CWA section 402(p)(3)(B)(ii)] under 40 CFR 122.26 are included within this Order. Any exempted discharges identified by Copermittees as a source of pollutants are subsequently required to be *addressed* (emphasis added) as illicit discharges through prohibition and incorporation into existing IC/ID programs. Furthermore, the USEPA contemplates that permitting agencies such as the San Diego Water Board may also identify exempted discharges as a source of pollutants required to be addressed as illicit discharges (See VOl. 55 Fed. Reg. 48037). The San Diego Water Board and the Copermittees have identified landscape irrigation, irrigation water and lawn water, previously exempted discharges, as a source of pollutants and conveyance of pollutants to waters of the U.S.

D. RUNOFF MANAGEMENT PROGRAMS

1. General

a. This Order specifies requirements necessary for the Copermittees to reduce the discharge of pollutants in storm water to the MEP. However, since MEP is a dynamic performance standard, which evolves over time as runoff management knowledge increases, the Copermittees' runoff management programs must continually be assessed and modified to incorporate improved programs, control measures, best management practices (BMPs), etc. in order to achieve the

evolving MEP standard. Absent evidence to the contrary, this continual assessment, revision, and improvement of runoff management program implementation is expected to ultimately achieve compliance with water quality standards in the Region.

b. The Copermittees have generally been implementing the jurisdictional runoff management programs (JRMPs) required pursuant to Order No. R9-2004-001 since July 14, 2005. Prior to that, the Copermittees were regulated by Order No. 98-02, since May 13, 1998. MS4 discharges, however, continue to cause or contribute to violations of water quality standards as evidenced by the Copermittees' monitoring results.

c. This Order contains new or modified requirements that are necessary to improve Copermittees' efforts to reduce the discharge of pollutants in storm water runoff to the MEP and achieve water quality standards. Some of the new or modified requirements, such as the revised Watershed Water Quality Workplan (Watershed Workplan) section, are designed to specifically address high priority water quality problems. Other requirements, such as for unpaved roads, are a result of San Diego Water Board's identification of water quality problems through investigations and complaints during the previous permit period. Other new or modified requirements address program deficiencies that have been noted during audits, report reviews, and other San Diego Water Board compliance assessment activities. Additional changes in the monitoring program provide consistency with the Code of Federal Regulations, USEPA guidance, State Water Board guidance, and the Southern California Monitoring Coalition recommendations.

d. Updated individual Drainage Area Management Plans (DAMP), and Watershed Stormwater Management Plans (watershed SWMPs), which describe the Copermittees' runoff management programs in their entirety, are needed to guide the Copermittees' runoff management efforts and aid the Copermittees in tracking runoff management program implementation. Hereinafter, the individual DAMP is referred to as the JRMPs and the Watershed SWMP is referred to as the Watershed Workplan. It is practicable for the Copermittees to update the JRMPs and Watershed Workplans within the timeframe specified in this Order, since significant efforts to develop these programs have already occurred.

e. Pollutants can be effectively reduced in storm water runoff by the application of a combination of pollution prevention, source control, and treatment control BMPs. Pollution prevention is the reduction or elimination of pollutant generation at its source and is the best "first line of defense." Source control BMPs (both structural and non-structural) minimize the contact between pollutants and flows (e.g., rerouting run-on around pollutant sources or keeping pollutants on-site and out of receiving waters). Treatment control BMPs remove pollutants that have been mobilized by wet-weather or dry-weather flows.

f. Runoff needs to be addressed during the three major phases of urban development (planning, construction, and use) in order to reduce the discharge of pollutants from storm water to the MEP, effectively prohibit non-storm water discharges and protect receiving waters. Development which is not guided by water quality planning policies and principles can unnecessarily result in increased pollutant load discharges, flow rates, and flow durations which can negatively impact receiving water beneficial uses. Construction sites without adequate BMP implementation result in sediment runoff rates which greatly exceed natural erosion rates of undisturbed lands, causing siltation and impairment of receiving waters. Existing development generates substantial pollutant loads which are discharged in runoff to receiving waters.

g. Annual reporting requirements included in this Order are necessary to meet federal requirements and to evaluate the effectiveness and compliance of the Copermittees' programs.

h. This Order establishes Storm Water Action Levels (SALs) for selected pollutants based on USEPA Rain Zone 6 (arid southwest) Phase I MS4 monitoring data for pollutants in storm water. The SALs were computed as the 90th percentile of the data set, utilizing the statistical based population approach, one of three approaches recommended by the State Water Board's Storm Water Panel in its report, 'The Feasibility of Numerical Effluent Limits Applicable to Discharges of Storm Water Associated with Municipal, Industrial and Construction Activities (June 2006). SALs are identified in Section D of this Order. Copermittees must implement a timely, comprehensive, cost-effective storm water pollution control program to reduce the discharge of pollutants in storm water from the permitted areas so as not to exceed the SALs. Exceedance of SALs may indicate inadequacy of programmatic measures and BMPs required in this Order.

2. **Development Planning**

a. The Standard Storm Water Mitigation Plan (SSMP) requirements contained in this Order are consistent with Order WQ-2000-11 adopted by the State Water Board on October 5, 2000. In the precedential order, the State Water Board found that the design standards, which essentially require that runoff generated by 85 percent of storm events from specific development categories be infiltrated or treated, reflect the MEP standard. The order also found that the SSMP requirements are appropriately applied to the majority of the Priority Development Project categories that are also contained in Section F.1 of this Order. The State Water Board also gave California Regional Water Quality Control Boards (Regional Water Boards) the needed discretion to include additional categories and locations, such as retail gasoline outlets (RGOs), in SSMPs.

b. Controlling runoff pollution by using a combination of onsite source control and site design BMPs augmented with treatment control BMPs before the runoff enters the MS4 is important for the following reasons: (1) Many end-of-pipe BMPs (such as diversion to the sanitary sewer) are typically ineffective during significant storm events. (2) Whereas, onsite source control BMPs can be applied during all runoff conditions end-of-pipe BMPs are often incapable of capturing and treating the wide range of pollutants which can be generated on a sub-watershed scale; (3) End-of-pipe BMPs are more effective when used as polishing BMPs, rather than the sole BMP to be implemented; (4) End-of-pipe BMPs do not protect the quality or beneficial uses of receiving waters between the pollutant source and the BMP; and (5) Offsite end-of-pipe BMPs do not aid in the effort to educate the public regarding sources of pollution and their prevention.

c. Use of Low-Impact Development (LID) site design BMPs at new development, redevelopment and retrofit projects can be an effective means for minimizing the impact of storm water runoff discharges from the development projects on receiving waters. LID is a site design strategy with a goal of maintaining or replicating the pre-development hydrologic regime through the use of design techniques. LID site design BMPs help preserve and restore the natural hydrologic cycle of the site, allowing for filtration and infiltration which can greatly reduce the volume, peak flow rate, velocity, and pollutant loads of storm water runoff. Current runoff management, knowledge, practices and technology have resulted in the use of LID BMPs as an acceptable means of meeting the storm water MEP standard.

d. RGOs are significant sources of pollutants in storm water runoff. RGOs are points of convergence for motor vehicles for automotive related services such as repair, refueling, tire inflation, and radiator fill-up and consequently produce significantly higher loadings of hydrocarbons and trace metals (including copper and zinc) than other developed areas.

e. Industrial sites are significant sources of pollutants in runoff. Pollutant concentrations and loads in runoff from industrial sites are similar or exceed pollutant concentrations and loads in runoff from other land uses, such as commercial or residential land uses. As with other land uses, LID site design, source control, and treatment control BMPs are needed at industrial sites in order to meet the MEP standard. These BMPs are necessary where the industrial site is larger than 10,000 square feet. The 10,000 square feet threshold is appropriate, since it is consistent with requirements in other Phase I NPDES storm water regulations throughout California.

f. If not properly designed or maintained, certain BMPs implemented or required by municipalities for runoff management may create a habitat for vectors (e.g. mosquitoes and rodents). Proper BMP design and maintenance to avoid standing water, however, can prevent the creation of vector habitat. Nuisances

and public health impacts resulting from vector breeding can be prevented with close collaboration and cooperative effort between municipalities, local vector control agencies, and the California Department of Public Health during the development and implementation of runoff management programs.

g. The increased volume, velocity, frequency and discharge duration of storm water runoff from developed areas has the potential to greatly accelerate downstream erosion, impair stream habitat in natural drainages, and negatively impact beneficial uses. Development and urbanization increase pollutant loads in storm water runoff and the volume of storm water runoff. Impervious surfaces can neither absorb water nor remove pollutants and thus lose the purification and infiltration provided by natural vegetated soil. Hydromodification measures for discharges to hardened channels are needed for the future restoration of the hardened channels to their natural state, thereby restoring the chemical, physical, and biological integrity and beneficial uses of local receiving waters.

3. **Construction and Existing Development**

a. In accordance with federal NPDES regulations and to ensure the most effective oversight of industrial and construction site discharges, discharges of runoff from industrial and construction sites are subject to dual (State and local) storm water regulation. Under this dual system, each Copermittee is responsible for enforcing its local permits, plans, and ordinances, and the San Diego Water Board is responsible for enforcing the General Construction Activities Storm Water Permit, State Water Board Order 2009-0009-DWQ, NPDES No. CAS000002 (General Construction Permit) and the General Industrial Activities Storm Water Permit, State Water Board Order 97-03 DWQ, NPDES No. CAS000001 (General Industrial Permit) and any reissuance of these permits. NPDES municipal regulations require that municipalities develop and implement measures to address runoff from industrial and construction activities. Those measures may include the implementation of other BMPs in addition to those BMPs that are required under the statewide general permits for activities subject to both State and local regulation.

b. Identification of sources of pollutants in runoff (such as municipal areas and activities, industrial and commercial sites/sources, construction sites, and residential areas), development and implementation of BMPs to address those sources, and updating ordinances and approval processes are necessary for the Copermittees to ensure that discharges of pollutants from its MS4 in storm water are reduced to the MEP and that non-storm water discharges are not occurring. Inspections and other compliance verification methods are needed to ensure minimum BMPs are implemented. Inspections are especially important at areas that are at high risk for pollutant discharges.

c. Historic and current development makes use of natural drainage patterns and features as conveyances for runoff. Urban streams used in this manner are part of the municipalities' MS4s regardless of whether they are natural, anthropogenic, or partially modified features. In these cases, the urban stream is both an MS4 and receiving water.

d. As operators of the MS4s, the Copermittees cannot passively receive and discharge pollutants from third parties. By providing free and open access to an MS4 that conveys discharges to waters of the U.S., the operator essentially accepts responsibility for discharges into the MS4 that it does not prohibit or otherwise control. These discharges may cause or contribute to a condition of contamination or a violation of water quality standards.

e. Waste and pollutants which are deposited and accumulate in MS4 drainage structures will be discharged from these structures to waters of the U.S. unless they are removed. These discharges may cause or contribute to, or threaten to cause or contribute to, a condition of pollution in receiving waters. For this reason, pollutant discharges from storm water into MS4s must be reduced using a combination of management measures, including source control and an effective MS4 maintenance program implemented by each Copermittee.

f. Enforcement of local runoff related ordinances, permits, and plans is an essential component of every runoff management program and is specifically required in the federal storm water regulations and this Order. Each Copermittee is individually responsible for adoption and enforcement of ordinances and/or policies, implementation of identified control measures/BMPs needed to prevent or reduce pollutants in storm water runoff, and for the allocation of funds for the capital, operation and maintenance, administrative, and enforcement expenditures necessary to implement and enforce such control measures/BMPs under its jurisdiction. Education is an important aspect of every effective runoff management program and the basis for changes in behavior at a societal level. Education of municipal planning, inspection, and maintenance department staffs is especially critical to ensure that in-house staffs understand how their activities impact water quality, how to accomplish their jobs while protecting water quality, and understand their specific roles and responsibilities for compliance with this Order. Public education, designed to target various urban land users and other audiences, is also essential to inform the public of how individual actions affect receiving water quality and how adverse effects can be minimized.

g. Public participation during the development of runoff management programs is necessary to ensure that all stakeholder interests and a variety of creative solutions are considered.

h. Retrofitting existing development with storm water treatment controls, including LID, is necessary to address storm water discharges from existing development that may cause or contribute to a condition of pollution or a violation of water

quality standards. Although SSMP BMPs are required for redevelopment, the current rate of redevelopment will not address water quality problems in a timely manner. Cooperation with private landowners is necessary to effectively identify, implement and maintain retrofit projects for the preservation, restoration, and enhancement of water quality.

4. **Watershed Runoff Management**

   a. Since runoff within a watershed can flow from and through multiple land uses and political jurisdictions, watershed-based runoff management can greatly enhance the protection of receiving waters. Such management provides a means to focus on the most important water quality problems in each watershed. By focusing on the most important water quality problems, watershed efforts can maximize protection of beneficial use in an efficient manner. Effective watershed-based runoff management actively reduces pollutant discharges and abates pollutant sources causing or contributing to watershed water quality problems. Watershed-based runoff management that does not actively reduce pollutant discharges and abate pollutant sources causing or contributing to watershed water quality problems can necessitate implementation of the iterative process outlined in section A.3 of this Order. Watershed management of runoff does not require Copermittees to expend resources outside of their jurisdictions. In some cases, however, this added flexibility provides more, and possibly more effective, alternatives for minimizing waste discharges. Watershed management requires the Copermittees within a watershed to develop a watershed-based management strategy, which can then be implemented on a jurisdictional basis.

   b. Some runoff issues, such as general education and training, can be effectively addressed on a regional basis. Regional approaches to runoff management can improve program consistency and promote sharing of resources, which can result in implementation of more efficient programs.

   c. It is important for the Copermittees to coordinate their water quality protection and land use planning activities to achieve the greatest protection of receiving water bodies. Copermittee coordination with other watershed stakeholders, especially the State of California Department of Transportation, the U.S. federal government, sovereign American Indian tribes, and water and sewer districts, is also important.

E. STATUTE AND REGULATORY CONSIDERATIONS

1. The RWL language specified in this Order is consistent with language recommended by the USEPA and established in State Water Board Order WQ-99-05, *Own Motion Review of the Petition of Environmental Health Coalition to Review Waste Discharge Requirements Order No. 96-03, NPDES Permit No. CAS0108740*, adopted by the

State Water Board on June 17, 1999. The RWL language in this Order requires compliance with water quality standards, which for storm water discharges is to be achieved through an iterative approach requiring the implementation of improved and better-tailored BMPs over time. Compliance with receiving water limits based on applicable water quality standards is necessary to ensure that MS4 discharges will not cause or contribute to violations of water quality standards and the creation of conditions of pollution, contamination, or nuisance.

2. The Basin Plan, identifies the following existing and potential beneficial uses for surface waters in Riverside County: Municipal and Domestic Supply (MUN), Agricultural Supply (AGR), Industrial Process Supply (PROC), Hydropower Generation (POW), Industrial Service Supply (IND), Ground Water Recharge (GWR), Contact Water Recreation (REC1), Non-contact Water Recreation (REC2), Warm Freshwater Habitat (WARM), Cold Freshwater Habitat (COLD), Wildlife Habitat (WILD), Rare, Threatened, or Endangered Species (RARE), Spawning, Reproduction and/or Early Development (SPWN) and Preservation of Biological Habitats of Special Significance (BIOL).

3. This Order is in conformance with State Water Board Resolution No. 68-16, *Statement of Policy with Respect to Maintaining High Quality Waters in California*, and the federal Antidegradation Policy described in 40 CFR 131.12.

4. Section 6217(g) of the Coastal Zone Act Reauthorization Amendments of 1990 (CZARA) requires coastal states with approved coastal zone management programs to address non-point pollution impacting or threatening coastal water quality. CZARA addresses five sources of non-point pollution: agriculture, silviculture, urban, marinas, and hydromodification. This NPDES permit addresses the management measures required for the urban category, with the exception of septic systems. The adoption and implementation of this NPDES permit relieves the Copermittee from developing a non-point source plan, for the urban category, under CZARA. The San Diego Water Board addresses septic systems through the administration of other programs.

5. Section 303(d)(1)(A) of the CWA requires that "Each state shall identify those waters within its boundaries for which the effluent limitations…are not stringent enough to implement any water quality standard (WQS) applicable to such waters." The CWA also requires states to establish a priority ranking of impaired water bodies known as Water Quality Limited Segments and to establish Total Maximum Daily Loads (TMDLs) for such waters. This priority list of impaired water bodies is called the Section 303(d) List. The 2006 Section 303(d) List was approved by the State Water Board on October 25, 2006. On June 28, 2007, the 2006 303(d) list for California was given final approval by the USEPA. The 303(d) List was recently updated, and on December 16, 2009, the 2008 303(d) List was approved by the San Diego Water Board. The 2008 List is awaiting State Water Board and USEPA approval.

6. This Order does not constitute an unfunded local government mandate subject to subvention under Article XIIIB, Section (6) of the California Constitution for several reasons, including, but not limited to, the following. First, this Order implements federally mandated requirements under CWA §402. (33 U.S.C. § 1342(p)(3)(B).) Second, the local agency Copermittees' obligations under this Order are similar to, and in many respects less stringent than, the obligations of non-governmental and new dischargers who are issued NPDES permits for storm water and non-storm water discharges. Third, the local agency Copermittees have the authority to levy service charges, fees, or assessments sufficient to pay for compliance with this Order. Fourth, the Copermittees have requested permit coverage in lieu of compliance with the complete prohibition against the discharge of pollutants contained in CWA §301, subdivision (a) (33 U.S.C. § 1311(a)) and in lieu of numeric restrictions on their MS4 discharges (i.e. effluent limitations). Fifth, the local agencies' responsibility for preventing discharges of waste that can create conditions of pollution or nuisance from conveyances that are within their ownership or control under State law predates the enactment of Article XIIIB, Section (6) of the California Constitution. Likewise, the provisions of this Order to implement TMDLs are federal mandates. The CWA requires TMDLs to be developed for water bodies that do not meet federal water quality standards. (33 U.S.C. sec. 1313(d).) Once the USEPA or a state develops a TMDL, federal law requires that permits must contain effluent limitations consistent with the assumptions of any applicable wasteload allocation. (40 C.F.R. sec. 122.44(d)(1)(vii)(B).)

7. Runoff treatment and/or mitigation must occur prior to the discharge of runoff into receiving waters. Treatment BMPs must not be constructed in waters of the U.S. or State unless the runoff flows are sufficiently pretreated to protect the values and functions of the water body. Federal regulations at 40 CFR 131.10(a) state that in no case shall a state adopt waste transport or waste assimilation as a designated use for any waters of the U.S. Authorizing the construction of an runoff treatment facility within a water of the U.S., or using the water body itself as a treatment system or for conveyance to a treatment system, would be tantamount to accepting waste assimilation as an appropriate use for that water body. Furthermore, the construction, operation, and maintenance of a pollution control facility in a water body can negatively impact the physical, chemical, and biological integrity, as well as the beneficial uses, of the water body. Without federal authorization (e.g., pursuant to CWA § 404), waters of the U.S. may not be converted into, or used as, waste treatment or conveyance facilities. Similarly, waste discharge requirements pursuant to CWC §13260 are required for the conversion or use of waters of the State as waste treatment or conveyance facilities. Diversion from waters of the U.S./State to treatment facilities and subsequent return to waters of the U.S. is allowable, provided that the effluent complies with applicable NPDES requirements.

8. The issuance of waste discharge requirements and an NPDES permit for the discharge of runoff from MS4s to waters of the U.S. is exempt from the requirement for preparation of environmental documents under the California Environmental Quality Act (CEQA) (Public Resources Code, Division 13, Chapter 3, section 21000 et seq.) in accordance with the CWC section 13389.

9. Storm water discharges from developed and developing areas in Riverside County are significant sources of certain pollutants that cause, may be causing, threatening to cause or contributing to water quality impairment in the waters of Riverside County. Furthermore, as delineated in the CWA section 303(d) list in Table 2, the San Diego Water Board has found that there is a reasonable potential that municipal storm water and non-storm water discharges from MS4s cause or may cause or contribute to an excursion above water quality standards for the following pollutants: Indicator Bacteria, Copper, Manganese, Iron, Chlorpyrifos, Sulfates, Phosphorous, Nitrogen, Toxicity, and Turbidity. In accordance with CWA section 303(d), the San Diego Water Board is required to establish TMDLs for these pollutants to these waters to eliminate impairment and attain water quality standards. Therefore, certain early pollutant control actions and further pollutant impact assessments by the Copermittees are warranted and required pursuant to this Order.

10. This Order requires each Copermittee to effectively prohibit all types of unauthorized discharges of non-storm water into its MS4. However, historically pollutants have been identified as present in dry weather non-storm water discharges from the MS4s through 303(d) listings, monitoring conducted by the Copermittees under Order No. R9-2004-0001, and there are others expected to be present in dry weather non-storm water discharges because of the nature of these discharges. This Order includes action levels for pollutants in non-storm water, dry weather discharges from the MS4. The non-storm water action levels are designed to ensure that the Order's requirement to effectively prohibit all types of unauthorized discharges of non-storm water into the MS4 is being complied with. Non-storm water action levels in the Order are based upon numeric or narrative water quality objectives and criteria as defined in the Basin Plan, the State Water Board's Water Quality Control Plan for Ocean Waters of California (Ocean Plan), and the State Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California (State Implementation Policy or SIP). An exceedance of an action level requires specified responsive action by the Copermittees. This Order describes what actions the Copermittees must take when an exceedance of an action level is observed. Exceedances of non-storm water action levels do not alone constitute a violation of this Order but could indicate non-compliance with the requirement to effectively prohibit all types of unauthorized non-storm water discharges into the MS4 or other prohibitions established in this Order. Failure to undertake required source investigation and elimination action following an exceedance of a non-storm water action level (NAL or action level) is a violation of this Order. The San Diego Water Board recognizes that use of action levels will not necessarily result in detection of all unauthorized sources of non-storm water discharges because there may be some discharges in which pollutants do not exceed established action

levels. However, establishing NALs at levels appropriate to protect water quality standards is expected to lead to the identification of significant sources of pollutants in dry weather non-storm water discharges.

11. In addition to federal regulations cited in the Fact Sheet / Technical Report for the Order No. R9-2010-0016, monitoring and reporting required under Order No. R9-2010-0016 is required pursuant to authority under CWC section 13383.

12. With this Order, the San Diego Water Board has completed the re-issuance of the fourth iteration of the Phase I MS4 NPDES Permits for the Copermittees in the portions of San Diego County, Orange County, and Riverside County within the San Diego Region. The NPDES Permit requirements issued to the Copermittees in each county have substantially the same core requirements such as discharge prohibitions, receiving water limitations, jurisdictional components, and monitoring. In addition, the Copermittees cooperate regionally to develop monitoring with the Southern California Stormwater Monitoring Coalition and to develop program effectiveness with the California Stormwater Quality Association. Regional programs could improve the Copermittees' compliance with other permit components such as development of the Hydromodification Management Plans and Retrofitting Existing Development with more consistent implementation and cost sharing. Re-issuing the NPDES Permit requirements within five years for three counties under three different permits requires the San Diego Water Board to expend significant time and resources for issuance of the permits through three separate public proceedings, thereby greatly reducing the time and resources available to oversee compliance. Multiple permits also create confusion for determining compliance among regulated entities, especially the land development community. The San Diego Water Board recognizes that issuing a single MS4 permit for all Phase I entities in the San Diego Region will provide consistent implementation, improve communication among agencies within watersheds crossing multiple jurisdictions, and minimize staff resources spent with each permit renewal. The San Diego Water Board plans to develop a single regional MS4 permit prior to the expiration of this Order that will transfer the Copermittees' enrollment to the regional permit upon expiration of this Order.

F. PUBLIC PROCESS

1. The San Diego Water Board has notified the Copermittees, all known interested parties, and the public of its intent to consider adoption of an Order prescribing waste discharge requirements that would serve to renew an NPDES permit for the existing MS4 discharges of pollutants in waters of the U.S.

2. The San Diego Water Board has held a public hearing on October 13, 2010 and heard and considered all comments pertaining to the terms and conditions of this Order.

IT IS HEREBY ORDERED that the Copermittees, in order to meet the provisions contained in Division 7 of the CWC and regulations adopted thereunder, and the provisions of the CWA and regulations adopted thereunder, must each comply with the following:

A. PROHIBITIONS AND RECEIVING WATER LIMITATIONS

1. Discharges into and from MS4s in a manner causing, or threatening to cause, a condition of pollution, contamination, or nuisance (as defined in CWC section 13050), in receiving waters of the state are prohibited.[3]

2. Storm water discharges from MS4s containing pollutants which have not been reduced to the MEP are prohibited.[3]

3. Discharges from MS4s that cause or contribute to the violation of water quality standards (designated beneficial uses, water quality objectives developed to protect beneficial uses, and the State policy with respect to maintaining high quality waters) are prohibited.

a. Each Copermittee must comply with section A.3 and section A.4 as it applies to Prohibition 5 in Attachment A of this Order through timely implementation of control measures and other actions to reduce pollutants in storm water discharges in accordance with this Order, including any modifications. If exceedance(s) of water quality standards persist notwithstanding implementation of this Order, the Copermittee must assure compliance with section A.3 and section A.4 as it applies to Prohibition 5 in Attachment A of this Order by complying with the following procedure:

(1) Upon a determination by either the Copermittee or the San Diego Water Board that storm water MS4 discharges are causing or contributing to an exceedance of an applicable water quality standard, the Copermittee must notify the San Diego Water Board within 30 days and thereafter submit a report to the San Diego Water Board that describes best management practices (BMPs) that are currently being implemented and additional BMPs that will be implemented to prevent or reduce any pollutants that are causing or contributing to the exceedance of water quality standards. The report may be incorporated in the Annual Report unless the San Diego Water Board[4] directs an earlier submittal. The report must include an

[3] This prohibition does not apply to MS4 discharges which receive subsequent treatment to reduce pollutants in storm water discharges to the MEP prior to entering receiving waters (e.g., low flow diversions to the sanitary sewer). Runoff treatment and/or mitigation must occur prior to the discharge of runoff into receiving waters per finding E.7.

[4] The San Diego Water Board by prior resolution has delegated all matters that may legally be delegated to its Executive Officer to act on its behalf pursuant to CWC §13223. Therefore, the Executive Officer is

implementation schedule. The San Diego Water Board may require modifications to the report

(2) Submit any modifications to the report required by the San Diego Water Board within 30 days of notification;

(3) Within 30 days following acceptance of the report described above by the San Diego Water Board, the Copermittee must revise its JRMP and monitoring program to incorporate the approved modified BMPs that have been and will be implemented, the implementation schedule, and any additional monitoring required; and

(4) Implement the revised JRMP and monitoring program in accordance with the approved schedule.

b. The Copermittee must repeat the procedure set forth above to comply with the receiving water limitations for continuing or recurring exceedances of the same water quality standard(s) following implementation of scheduled actions unless directed to do otherwise by the San Diego Water Board's Executive Officer.

c. Nothing in section A.3 prevents the San Diego Water Board from enforcing any provision of this Order while the Copermittee prepares and implements the above report.

4. In addition to the above prohibitions, discharges from MS4s are subject to all Basin Plan prohibitions cited in Attachment A to this Order.

B. NON-STORM WATER DISCHARGES

1. Each Copermittee must effectively prohibit all types of non-storm water discharges into its MS4 unless such discharges are either authorized by a separate NPDES permit; or not prohibited in accordance with sections B.2 and B.3 below.

2. The following categories of non-storm water discharges are not prohibited unless a Copermittee or the San Diego Water Board identifies the discharge category as a source of pollutants to waters of the U.S. Where the Copermittee(s) have identified a category as a source of pollutants, the category must be addressed as an illicit discharge and prohibited through ordinance, order or similar means. The San Diego Water Board may identify categories of discharge that either require prohibition, or other controls for non-anthropogenic sources. For a discharge category determined to be a source of pollutants, the Copermittee, under direction of the San Diego Water Board, must either prohibit the discharge category or develop and implement

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authorized to act on the San Diego Water Board's behalf on any matter within this Order unless such delegation is unlawful under CWC §13223 or this Order explicitly states otherwise.

appropriate control measures for non-anthropogenic sources to prevent the discharge of pollutants to the MS4 and report to the San Diego Water Board pursuant to Section K.1 and K.3 of this Order. The discharge categories are:

a. Diverted stream flows;
b. Rising ground waters;
c. Uncontaminated ground water infiltration [as defined at 40 CFR 35.2005(20)] to MS4s;
d. Uncontaminated pumped ground water[5];
e. Foundation drains[5];
f. Springs;
g. Water from crawl space pumps[5];
h. Footing drains[5];
i. Air conditioning condensation;
j. Flows from riparian habitats and wetlands;
k. Water line flushing[6,7];
l. Discharges from potable water sources not subject to NPDES Permit No. CAG679001, other than water main breaks;
m. Individual residential car washing; and
n. Dechlorinated swimming pool discharges[8].

3. Emergency fire fighting flows (i.e., flows necessary for the protection of life or property) do not require BMPs and need not be prohibited.

a. As part of the JRMP, each Copermittee must develop and implement a program to address pollutants from non-emergency fire fighting flows (i.e., flows from controlled or practice blazes and maintenance activities) identified as significant sources of pollutants to waters of the U.S.
b. Building fire suppression system maintenance discharges (e.g. sprinkler line flushing) contain waste. Therefore, such discharges are to be prohibited by the Copermittees as illicit discharges through ordinance, order, or similar means.

4. Each Copermittee must examine all dry weather effluent analytical monitoring results collected in accordance with section F.4 of this Order and Receiving Waters and MS4 Discharge Monitoring and Reporting Program No. R9-2010-0016 to identify water quality problems which may be the result of any non-prohibited discharge category(ies) identified above in section B.2. Follow-up investigations must be conducted to identify and control, pursuant to section B.2, any non-prohibited discharge category(ies) listed above.

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[5] Requires enrollment under Order R9-2008-002. Discharges into the MS4 require authorization from the owner and operator of the MS4 system.
[6] This exemption does not include fire suppression sprinkler system maintenance and testing discharges. Those discharges may be regulated under Section B.3.
[7] Requires enrollment under Order R9-2002-0020.
[8] Excluding saline swimming pool discharges.

C. NON-STORM WATER DRY WEATHER ACTION LEVELS

1. Each Copermittee, beginning no later than July 1, 2012, must implement the non-storm water dry weather action level (NAL) monitoring as described in Attachment E of this Order.

2. In response to an exceedance of an NAL, the Copermittee(s) having jurisdiction must investigate and identify the source of the exceedance in a timely manner. However, if any Copermittee identifies a number of NAL exceedances that prevents it from adequately conducting source investigations at all sites in a timely manner, then that Copermittee may submit a prioritization plan and timeline that identifies the timeframe and planned actions to investigate and report its findings on all of the exceedances. Depending on the source of the pollutant exceedance, the Copermittee(s) having jurisdiction must take action as follows:

a. If the Copermittee identifies the source of the exceedance as natural (non-anthropogenically influenced) in origin and in conveyance into the MS4; then the Copermittee must report its findings and documentation of its source investigation to the San Diego Water Board in its Annual Report.

b. If the Copermittee identifies the source of the exceedance as an illicit discharge or connection, then the Copermittee must eliminate the discharge to its MS4 pursuant to Section F.4.f and report the findings, including any enforcement action(s) taken, and documentation of the source investigation to the San Diego Water Board in the Annual Report. If the Copermittee is unable to eliminate the source of discharge prior to the Annual Report submittal, then the Copermittee must submit, as part of its Annual Report, its plan and timeframe to eliminate the source of the exceedance. Those dischargers seeking to continue such a discharge must become subject to a separate NPDES permit prior to continuing any such discharge.

c. If the Copermittee identifies the source of the exceedance as an exempted category of non-storm water discharge, then the Copermittees must determine if this is an isolated circumstance or if the category of discharges must be addressed through the prevention or prohibition of that category of discharge as an illicit discharge. The Copermittee must submit its findings including a description of the steps taken to address the discharge and the category of discharge, to the San Diego Water Board for review in its Annual Report. Such description must include relevant updates to or new ordinances, orders, or other legal means of addressing the category of discharge, and the anticipated schedule for doing so. The Copermittees must also submit a summary of its findings with the Report of Waste Discharge.

d. If the Copermittee identifies the source of the exceedance as a non-storm water discharge in violation or potential violation of an existing separate NPDES permit

(e.g. the groundwater dewatering permit), then the Copermittee must report, within three business days, the findings to the San Diego Water Board including all pertinent information regarding the discharger and discharge characteristics.

e. If the Copermittee is unable to identify the source of the exceedance after taking and documenting reasonable steps to do so, then the Copermittee must perform additional focused sampling. If the results of the additional sampling indicate a recurring exceedance of NALs with an unidentified source, then the Copermittee must update its programs within a year to address the common contributing sources that may be causing such an exceedance. The Copermittee's annual report must include these updates to its programs including, where applicable, updates to their watershed workplans (Section G.2), retrofitting consideration (Section F.3.d) and program effectiveness work plans (Section J.4).

f. The Copermittees or any interested party, may evaluate existing NALs and propose revised NALs for future Board consideration.

3. NALs can help provide an assessment of the effectiveness of the prohibition of non-storm water discharges and of the appropriateness of exempted non-storm water discharges. An exceedance of an NAL does not alone constitute a violation of the provisions of this Order. An exceedance of an NAL may indicate a lack of compliance with the requirement that Copermittees effectively prohibit all types of unauthorized non-storm water discharges into the MS4 or other prohibitions set forth in Sections A and B of this Order. Failure to timely implement required actions specified in this Order following an exceedance of an NAL constitutes a violation of this Order. Neither the absence of exceedances of NALs nor compliance with required actions following observed exceedances, excuses any non-compliance with the requirement to effectively prohibit all types of unauthorized non-storm water discharges into the MS4s or any non-compliance with the prohibitions in Sections A and B of this Order. During any annual reporting period in which one or more exceedances of NALs have been documented the Copermittee must report in response to Section C.2 above, a description of whether and how the observed exceedances did or did not result in a discharge from the MS4 that caused, or threatened to cause or contribute to a condition of pollution, contamination, or nuisance in the receiving waters.

4. Monitoring of effluent will occur at the end-of-pipe prior to discharge into the receiving waters, with a focus on Major Outfalls, as defined in 40 CFR 122.26(B 5-6) and Attachment E of this Order. The Copermittees must develop their monitoring plans to sample a representative percentage of major outfalls and identified stations within each hydrologic subarea. At a minimum, outfalls that exceed any NALs once during any year must be monitored in the subsequent year. Any station that does not exceed an NAL, or only has exceedances that are identified as natural in origin and conveyance into the MS4 pursuant to Section C.2.a, for 3 successive years may be replaced with a different station.

5. Each Copermittee must monitor for the non-storm water dry weather action levels, which are incorporated into this Order as follows:

a. Action levels for discharges to inland surface waters:

Table 3.a.1: General Constituents

Parameter	Units	AMAL	MDAL	Instantaneous Maximum	Basis
Fecal Coliform	MPN/ 100 ml	200[A] 400[B]	-		BPO
Enterococci	MPN/ 100 ml	33	-	61[C]	BPO
Turbidity	NTU	-	20		BPO
pH	Units	Within limit of 6.5 to 8.5 at all times			BPO
Dissolved Oxygen	mg/L	Not less than 5.0 in WARM waters and not less than 6.0 in COLD waters			BPO
Total Nitrogen	mg/L	-	1.0	See MDAL	BPO
Total Phosphorus	mg/L	-	0.1	See MDAL	BPO
Methylene Blue Active Substances	mg/L	-	0.5	See MDAL	BPO
Iron	mg/L	-	0.3	See MDAL	BPO
Manganese	mg/L	-	0.05	See MDAL	BPO

A – Based on a minimum of not less than five samples for any 30-day period
B – No more than 10 percent of total samples may exceed 400 per 100 ml during any 30 day period
C – This Value has been set to Basin Plan Criteria for Designated Beach Areas
BPO – Basin Plan Objective
MDAL – Maximum Daily Action Level AMAL – Average Monthly Action Level

Table 3.a.2: Priority Pollutants

		Freshwater (CTR)	
Parameter	Units	MDAL	AMAL
Cadmium	ug/L	**	**
Copper	ug/L	*	*
Chromium III	ug/L	**	**
Chromium VI (hexavalent)	ug/L	16	8.1
Lead	ug/L	*	*
Nickel	ug/L	**	**
Silver	ug/L	*	*
Zinc	ug/L	*	*

CTR – California Toxic Rule
*- Action Levels developed on a case-by-case basis (see below)
**- Action Levels developed on a case-by-case basis (see below), but calculated criteria are not to exceed Maximum Contaminant Levels under the California Code of Regulations[9]

The NALs for Cadmium, Copper, Chromium (III), Lead, Nickel, Silver and Zinc will be developed on a case-by-case basis because the freshwater criteria are based on

[9] California Code of Regulations, Title 22, Division 4, Chapter 15, Article 4, Section 64431.

site-specific water quality data (receiving water hardness). For these priority pollutants, the following equations (40 CFR 131.38.b.2) will be required:

Cadmium (Total Recoverable)	= exp(0.7852[ln(hardness)] -2.715)
Chromium III (Total Recoverable)	= exp(0.8190[ln(hardness)] + .6848)
Copper (Total Recoverable)	= exp(0.8545[ln(hardness)] - 1.702)
Lead (Total Recoverable)	= exp(1.273[ln(hardness)] - 4.705)
Nickel (Total Recoverable)	= exp(.8460[ln(hardness)] + 0.0584)
Silver (Total Recoverable)	= exp(1.72[ln(hardness)] - 6.52)
Zinc (Total Recoverable)	= exp(0.8473[ln(hardness)] + 0.884)

D. STORM WATER ACTION LEVELS

1. The Copermittees must implement the Wet Weather MS4 Discharge Monitoring as described in Attachment E of this Order, and beginning three years after the Order adoption date, the Copermittees must annually evaluate their data compared to the Stormwater Action Levels (SALs). At each monitoring station, a running average of twenty percent or greater of exceedances of any discharge of storm water from the MS4 to waters of the U.S. that exceed the SALs for each of the pollutants listed in Table 4 (below) requires the Copermittee(s) having jurisdiction to affirmatively augment and implement all necessary storm water controls and measures to reduce the discharge of the associated class of pollutants(s) to the MEP. The Copermittees must utilize the exceedance information when adjusting and executing annual work plans, as required by this Order. Copermittees must take the magnitude, frequency, and number of constituents exceeding the SAL(s), in addition to receiving water quality data and other information, into consideration when prioritizing and reacting to SAL exceedances in an iterative manner. Failure to appropriately consider and react to SAL exceedances in an iterative manner creates a presumption that the Copermittee(s) have not reduced pollutants in storm water discharges to the MEP.

Table 4. Storm Water Action Levels

Pollutant	Action Level
Turbidity (NTU)	126
Nitrate & Nitrite total (mg/L)	2.6
P total (mg/L)	1.46
Cd total (µg/L)	3.0
Cu total (µg/L)	127
Pb total (µg/L)	250
Zn total (µg/L)	976

2. The end-of-pipe assessment points for the determination of SAL compliance are all major outfalls, as defined in 40 CFR 122.26(b)(5) and (b)(6). The Copermittees must develop their monitoring plans to sample a representative percentage of the major outfalls within each hydrologic subarea. At a minimum, outfalls that exceed SALs must be monitored in the subsequent year. Any station that does not exceed

an SAL for 3 successive years may be replaced with a different station. SAL samples must be 24 hour time-weighted composites.

3. The absence of SAL exceedances does not relieve the Copermittees from implementing all other required elements of this Order.

4. This Order does not regulate natural sources and conveyances into the MS4 of constituents listed in Table 5. To be relieved of the requirements to take action as described in D.1 above, the Copermittee must demonstrate that the likely and expected cause of the SAL exceedance is not anthropogenic in nature. This demonstration does not need to be repeated for subsequent exceedances of the same SAL at the same monitoring station.

5. The SALs will be reviewed and updated at the end of every permit cycle. The data collected pursuant to D.2 above and Attachment E can be used to create SALs based upon local data. The purpose of establishing the SALs is that through the iterative and MEP process, outfall storm water discharges will meet all applicable water quality standards.

E. LEGAL AUTHORITY

1. Each Copermittee must establish, maintain, and enforce adequate legal authority to control pollutant discharges into and from its MS4 through ordinance, statute, permit, contract or similar means. Nothing herein shall authorize a Copermittee or other discharger regulated under the terms of this order to divert, store or otherwise impound water if such action is reasonably anticipated to harm downstream water rights holders in the exercise of their water rights. This legal authority must, at a minimum, authorize the Copermittee to:

a. Control the contribution of pollutants in discharges of runoff associated with industrial and construction activity to its MS4 and control the quality of runoff from industrial and construction sites. This requirement applies both to industrial and construction sites which have coverage under the statewide general industrial or construction storm water permits, as well as to those sites which do not. Grading ordinances must be updated and enforced as necessary to comply with this Order;

b. Prohibit all identified illicit discharges not otherwise allowed pursuant to section B.2;

c. Prohibit and eliminate illicit connections to the MS4;

d. Control the discharge of spills, dumping, or disposal of materials other than storm water to its MS4;

e. Require compliance with conditions in Copermittee ordinances, permits, contracts or orders (i.e., hold dischargers to its MS4 accountable for their contributions of pollutants and flows);

f. Utilize enforcement mechanisms to require compliance with Copermittee storm

water ordinances, permits, contracts, or orders;

g. Control the contribution of pollutants from one portion of the shared MS4 to another portion of the MS4 through interagency agreements among Copermittees.

h. Control of the contribution of pollutants from one portion of the shared MS4 to another portion of the MS4 through interagency agreements with other owners of the MS4 such as the State of California Department of Transportation, the U.S. federal government, or sovereign Native American Tribes is encouraged;

i. Carry out all inspections, surveillance, and monitoring necessary to determine compliance and noncompliance with local ordinances and permits and with this Order, including the prohibition on illicit discharges to the MS4. This means the Copermittee must have authority to enter, monitor, inspect, take measurements, review and copy records, and require regular reports from industrial facilities discharging into its MS4, including construction sites;

j. Require the use of BMPs to prevent or reduce the discharge of pollutants into MS4s from storm water to the MEP; and

k. Require documentation on the effectiveness of BMPs implemented to reduce the discharge of storm water pollutants to the MS4 to the MEP.

2. Each Copermittee must submit on or before June 30, 2012, a statement certified by its chief legal counsel that the Copermittee has taken the necessary steps to obtain and maintain full legal authority to implement and enforce each of the requirements contained in 40 CFR 122.26(d)(2)(i)(A-F) and this Order. These statements must include:

a. Citation of runoff related ordinances and the reasons they are enforceable;

b. Identification of the local administrative and legal procedures available to mandate compliance with runoff related ordinances and therefore with the conditions of this Order, and a statement as to whether enforcement actions can be completed administratively or whether they must be commenced and completed in the judicial system; and

c. A brief description of how runoff related ordinances are adopted and the process by which they may be challenged.

F. JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM (JRMP)

Each Copermittee must implement all requirements of section F of this Order no later than July 1, 2012, unless otherwise specified. Upon adoption of this Order and until an updated JRMP is developed and implemented or July 1, 2012, whichever occurs first,, each Copermittee must at a minimum implement its JRMP document, as the document was developed and amended to comply with the requirements of Order No. R9-2004-001.

Each Copermittee must develop and implement an updated JRMP for its jurisdiction no later than July 1, 2012. Each updated JRMP must meet the requirements of section F

of this Order, reduce the discharge of storm water pollutants from the MS4 to the MEP, effectively prohibit non-storm water discharges, and prevent runoff discharges from the MS4 from causing or contributing to a violation of water quality standards. In addition, each Copermittee's JRMP must identify all departments and positions within its jurisdiction that conduct runoff related activities, and their roles and responsibilities under this Order. This identification must include an up to date organizational chart specifying these departments and key personnel.

1. DEVELOPMENT PLANNING COMPONENT

Each Copermittee must implement a program which meets the requirements of this section and (1) reduces Development Project discharges of storm water pollutants from the MS4 to the MEP; (2) prevents Development Project discharges from the MS4 from causing or contributing to a violation of water quality standards; (3) prevents illicit discharges into the MS4; and (4) manages increases in runoff discharge rates and durations from Development Projects that are likely to cause increased erosion of stream beds and banks, silt pollutant generation, or other impacts to beneficial uses and stream habitat due to increased erosive force.

a. GENERAL PLAN

Each Copermittee must revise as needed its General Plan or equivalent plan (e.g., Comprehensive, Master, or Community Plan) to include water quality and watershed protection principles and policies that direct land-use decisions and require implementation of consistent water quality protection measures for all development, redevelopment, and retrofit projects. Examples of water quality and watershed protection principles and policies to be considered include the following:

(1) Minimize the amount of impervious surfaces and directly connected impervious surfaces in areas of new development and redevelopment and where feasible slow runoff and maximize on-site infiltration of runoff.

(2) Implement pollution prevention methods supplemented by pollutant source controls and treatment BMPs. Use small collection strategies located at, or as close as possible to, the source (i.e., the point where water initially meets the ground) to minimize the transport of urban runoff and pollutants offsite and into an MS4.

(3) Preserve, and where possible, create, or restore areas that provide important water quality benefits, such as riparian corridors, wetlands, and buffer zones. Encourage land acquisition of such areas.

(4) Limit disturbances of natural water bodies and natural drainage systems caused by development including roads, highways, and bridges.

(5) Prior to making land use decisions, utilize methods available to estimate increases in pollutant loads and flows resulting from projected future development. Require incorporation of BMPs to mitigate the projected increases in pollutant loads and flows.

(6) Avoid development of areas that are particularly susceptible to erosion and sediment loss; or establish development guidance that identifies these areas and protects them from erosion and sediment loss.

(7) Reduce pollutants associated with vehicles and increasing traffic resulting from development.

(8) Post-development runoff from a site must not contain pollutant loads that cause or contribute to an exceedance of receiving water quality objectives and which have not been reduced to the MEP.

b. ENVIRONMENTAL REVIEW PROCESS

Each Copermittee must revise as needed its current environmental review processes to accurately evaluate water quality impacts and cumulative impacts and identify appropriate measures to avoid, minimize, and mitigate those impacts for all Development Projects.

c. APPROVAL PROCESS CRITERIA AND REQUIREMENTS FOR ALL DEVELOPMENT PROJECTS

For all proposed Development Projects, each Copermittee, during the planning process, and prior to project approval and issuance of local permits, must prescribe the necessary requirements so that Development Project discharges of storm water pollutants from the MS4 will be reduced to the MEP, will not cause or contribute to a violation of water quality standards, and will comply with the Copermittee's ordinances, permits, plans, and requirements, and with this Order.

Performance Criteria: Discharges from each approved development project must be subject to the following management measures:

(1) Source control BMPs that reduce storm water pollutants of concern in runoff; prevent illicit discharges into the MS4; prevent irrigation runoff; storm drain system stenciling or signage; properly design outdoor material storage areas; properly design outdoor work areas; and properly design trash storage areas.

(2) The following LID BMPs listed below must be implemented at all Development Projects where applicable and feasible.

(a) Conserve natural areas, including existing trees, other vegetation, and soils,
(b) Construct streets, sidewalks, or parking lot aisles to the minimum widths necessary, provided that public safety is not compromised,
(c) Minimize the impervious footprint of the project,
(d) Minimize soil compaction to landscaped areas,
(e) Minimize disturbances to natural drainages (e.g., natural swales, topographic depressions, etc.), and
(f) Disconnect impervious surfaces through distributed pervious areas.

(3) Buffer zones for natural water bodies, where technically feasible. Where buffer zones are technically infeasible, require project proponent to implement other buffers such as trees, access restrictions, etc;

(4) Other measures necessary so that grading or other construction activities meet the provisions specified in section F.2 of this Order.

(5) Submittal of documentation of a mechanism under which ongoing long-term maintenance of all structural post-construction BMPs will be conducted.

(6) Infiltration and Groundwater Protection

To protect groundwater quality, each Copermittee must apply restrictions to the use of treatment control BMPs that are designed to primarily function as large, centralized infiltration devices (such as large infiltration trenches and infiltration basins). Such restrictions must be designed so that the use of such infiltration treatment control BMPs does not cause or contribute to an exceedance of groundwater quality objectives. At a minimum, each treatment control BMP designed to primarily function as a centralized infiltration device must meet the restrictions below, unless the Development Project demonstrates to the Copermittee that a restriction is not necessary to protect groundwater quality. The Copermittees may collectively or individually develop alternative restrictions on the use of treatment control BMPs which are designed to primarily function as centralized infiltration devices. Alternative restrictions developed by the Copermittees can partially or wholly replace the restrictions listed below. The restrictions do not apply to small infiltration systems dispersed throughout a development project.

(a) Runoff must undergo pretreatment such as sedimentation or filtration prior to infiltration;

(b) All dry weather flows containing significant pollutant loads must be diverted from infiltration devices and treated through other BMPs;

(c) Pollution prevention and source control BMPs must be implemented at a level appropriate to protect groundwater quality at sites where infiltration

treatment control BMPs are to be used;

(d) Infiltration treatment control BMPs must be adequately maintained so that they remove storm water pollutants to the MEP;

(e) The vertical distance from the base of any infiltration treatment control BMP to the seasonal high groundwater mark must be at least 10 feet. Where groundwater basins do not support beneficial uses, this vertical distance criteria may be reduced, provided groundwater quality is maintained;

(f) The soil through which infiltration is to occur must have physical and chemical characteristics (such as appropriate cation exchange capacity, organic content, clay content, and infiltration rate) which are adequate for proper infiltration durations and treatment of runoff for the protection of groundwater beneficial uses;

(g) Infiltration treatment control BMPs must not be used for areas of industrial or light industrial activity; and other high threat to water quality land uses and activities as designated by each Copermittee unless first treated or filtered to remove pollutants prior to infiltration; and

(h) Infiltration treatment control BMPs must be located a minimum of 100 feet horizontally from any water supply wells.

(7) Where feasible, landscaping with native or low water species shall be preferred in areas that drain to the MS4 or to waters of the U.S.

(8) Rain water harvesting, where feasible, must be implemented as part of the site design and construction, and to supplement offsite beneficial uses.

d. STANDARD STORM WATER MITIGATION PLANS (SSMPS) – APPROVAL PROCESS CRITERIA AND REQUIREMENTS FOR PRIORITY DEVELOPMENT PROJECTS

On or before June 30, 2012, the Copermittees must submit an updated SSMP, to the San Diego Water Board's Executive Officer for a 30 day public review and comment period. The San Diego Water Board's Executive Officer has the discretion to determine whether to hold a public hearing or to limit public input to written comments. Within 180 days of determination that the SSMP is in compliance with this Order's provisions, each Copermittee must amend its local ordinances consistent with the updated SSMP, and begin implementing the updated SSMP. Any updated local ordinances must be submitted to the San Diego Water Board with the Annual Report. The SSMP must meet the requirements of section F.1.d of this Order to (1) reduce Priority Development Project discharges of storm water pollutants from the MS4 to the MEP, and (2)

prevent Priority Development Project runoff discharges from the MS4 from causing or contributing to a violation of water quality standards.[10]

(1) Definition of Priority Development Project:

Priority Development Projects are:

(a) All new Development Projects that fall under the project categories or locations listed in section F.1.d.(2), and

(b) Those redevelopment projects that create, add, or replace at least 5,000 square feet of impervious surfaces on an already developed site and the existing development and/or the redevelopment project falls under the project categories or locations listed in section F.1.d.(2). Where redevelopment results in an increase of less than fifty percent of the impervious surfaces of a previously existing development, and the existing development was not subject to SSMP requirements, the numeric sizing criteria discussed in section F.1.d.(6) applies only to the addition or replacement, and not to the entire development. Where redevelopment results in an increase of more than fifty percent of the impervious surfaces of a previously existing development, the numeric sizing criteria applies to the entire development.

(c) One acre threshold: In addition to the Priority Development Project Categories identified in section F.1.d.(2), Priority Development Projects must also include all other post-construction pollutant-generating new Development Projects that result in the disturbance of one acre or more of land by July 1, 2012.[11]

[10] Updated SSMP and hydromodification requirements must apply to all priority projects or phases of priority projects which have not yet begun grading or construction activities at the time any updated SSMP or hydromodification requirement commences. If lawful prior approval of a project exists, whereby application of an updated SSMP or hydromodification requirement to the project is illegal, the updated SSMP or hydromodification requirement need not apply to the project. Updated Development Planning requirements set forth in Sections F.1. (a) through (h) of this Order must apply to all projects or phases of projects, unless, at the time any updated Development Planning requirement commences, the projects or project phases meet any one of the following conditions: (i) the project or phase has begun grading or construction activities; or (ii) a Copermittee determines that lawful prior approval rights for a project or project phase exist, whereby application of the Updated Development Planning requirement to the project is legally infeasible. Where feasible, the Permittees must utilize the SSMP and hydromodification update periods to ensure that projects undergoing approval processes include application of the updated SSMP and hydromodification requirements in its plans.

[11] Pollutant generating Development Projects are those projects that generate pollutants at levels greater than natural background levels.

(2) Priority Development Project Categories

Where a new Development Project feature, such as a parking lot, falls into a Priority Development Project Category, the entire project footprint is subject to SSMP requirements.

(a) New development projects that create 10,000 square feet or more of impervious surfaces (collectively over the entire project site) including commercial, industrial, residential, mixed-use, and public projects. This category includes development projects on public or private land which fall under the planning and building authority of the Copermittees.

(b) Automotive repair shops. This category is defined as a facility that is categorized in any one of the following Standard Industrial Classification (SIC) codes: 5013, 5014, 5541, 7532-7534, or 7536-7539.

(c) Restaurants. This category is defined as a facility that sells prepared foods and drinks for consumption, including stationary lunch counters and refreshment stands selling prepared foods and drinks for immediate consumption (SIC code 5812), where the land area for development is greater than 5,000 square feet. Restaurants where land development is less than 5,000 square feet must meet all SSMP requirements except for structural treatment BMP and numeric sizing criteria requirement F.1.d.(6) and hydromodification requirement F.1.h.

(d) All hillside development greater than 5,000 square feet. This category is defined as any development which creates 5,000 square feet of impervious surface which is located in an area with known erosive soil conditions, where the development will grade on any natural slope that is twenty-five percent or greater.

(e) Environmentally Sensitive Areas (ESAs). All development located within, or directly adjacent to, or discharging directly to an ESA (where discharges from the development or redevelopment will enter receiving waters within the ESA), which either creates 2,500 square feet of impervious surface on a proposed project site or increases the area of imperviousness of a proposed project site to 10 percent or more of its naturally occurring condition. “Directly adjacent” means situated within 200 feet of the ESA. “Discharging directly to” means outflow from a drainage conveyance system that is composed entirely of flows from the subject development or redevelopment site, and not commingled with flows from adjacent lands.

(f) Impervious parking lots 5,000 square feet or more and potentially exposed to runoff. Parking lot is defined as a land area or facility for the temporary parking or storage of motor vehicles used personally, for business, or for commerce.

(g) Street, roads, highways, and freeways. This category includes any paved impervious surface that is 5,000 square feet or greater used for the transportation of automobiles, trucks, motorcycles, and other vehicles. To the extent that the Copermittees develop revised standard roadway design and post-construction BMP guidance that comply with the provisions of Section F.1 of the Order, then public works projects that implement the revised standard roadway sections do not have to develop a project specific SSMP. The standard roadway design and post-construction BMP guidance must be submitted with the Copermittee's updated SSMP.

(h) Retail Gasoline Outlets (RGOs). This category includes RGOs that meet the following criteria: (a) 5,000 square feet or more or (b) a projected Average Daily Traffic (ADT) of 100 or more vehicles per day.

(3) Pollutants of Concern

As part of its local SSMP, each Copermittee must implement an updated procedure for identifying pollutants of concern for each Priority Development Project. The procedure must address, at a minimum: (1) Receiving water quality (including pollutants for which receiving waters are listed as impaired under CWA section 303(d)); (2) Land-use type of the Development Project and pollutants associated with that land use type; and (3) Pollutants expected to be present on site.

(4) Low Impact Development BMP Requirements

Each Copermittee must require each Priority Development Project to implement LID BMPs which will collectively minimize directly connected impervious areas, limit loss of existing infiltration capacity, and protect areas that provide important water quality benefits necessary to maintain riparian and aquatic biota, and/or are particularly susceptible to erosion and sediment loss.

(a) The Copermittees must take the following measures to ensure that LID BMPs are implemented at Priority Development Projects:

(i) Each Copermittee must require LID BMPs or make a finding of technical infeasibility for each Priority Development Project in accordance with the LID waiver program in Section F.1.d.(7);

(ii) Each Copermittee must incorporate formalized consideration, such as thorough checklists, ordinances, and/or other means, of LID

BMPs into the plan review process for Priority Development Projects;

(iii) On or before July 1, 2012, each Copermittee must review its local codes, policies, and ordinances and identify barriers therein to implementation of LID BMPs. Following the identification of these barriers to LID implementation, where feasible, the Copermittee must take, by the end of the permit cycle, appropriate actions to remove such barriers. The Copermittees must include this review with the updated JRMP.

(b) The following LID BMPs must be implemented at each Priority Development Project:

(i) Maintain or restore natural storage reservoirs and drainage corridors (including depressions, areas of permeable soils, swales, and ephemeral and intermittent streams) to the extent feasible[12].

(ii) Projects with landscaped or other pervious areas must, where feasible, properly design and construct the pervious areas to effectively receive and infiltrate, retain and/or treat runoff from impervious areas, prior to discharge to the MS4. Soil compaction for these areas must be minimized. The amount of the impervious areas that are to drain to pervious areas must be based upon the total size, soil conditions, slope, and other pertinent factors.

(iii) Projects with low traffic areas and appropriate soil conditions must construct walkways, trails, overflow parking lots, alleys, or other low-traffic areas with permeable surfaces, such as pervious concrete, porous asphalt, unit pavers, and granular materials.

(c) LID BMPs sizing criteria:

(i) LID BMPs must be sized and designed to ensure onsite retention without runoff, of the volume of runoff produced from a 24-hour 85th percentile storm event[13] ("design capture volume");

(ii) If onsite infiltration LID BMPs are technically infeasible per section F.1.d.(7)(b), other LID BMPs may treat any volume that is not retained onsite provided that the other LID BMPs are sized to hold

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[12] Priority Development Projects proposing to dredge or fill materials in waters of the U.S. and/or waters of the State must obtain a CWA §401 Water Quality Certification and/or Waste Discharge Requirements.

[13] This volume is not a single volume to be applied to all of Riverside County. The size of the 85th percentile storm event is different for various parts of the County. The Copermittees are encouraged to calculate the 85th percentile storm event for each of its jurisdictions using local rain data pertinent to its particular jurisdiction (0.6 inch standard is a rough average for the County and should only be used where appropriate rain data is not available). In addition, isopluvial maps may be used to extrapolate rainfall data to areas where insufficient data exists in order to determine the volume of the local 85th percentile storm event in such areas. Where the Copermittees will use isopluvial maps to determine the 85th percentile storm event in areas lacking rain data, the Copermittees must describe their method for using isopluvial maps in its SSMPs.

the design storm volume that is not infiltrated. The LID BMPs must be designed for an appropriate surface loading rate to prevent erosion, scour and channeling within the BMP.

(d) If it is shown to be technically infeasible per Section F.1.d.(7)(b) to retain and/or treat the remaining volume up to and including the design capture volume using LID BMPs, then the project must implement conventional treatment control BMPs in accordance with Section F.1.d.(6) below and must participate in the LID waiver program in Section F.1.d.(7).

(e) All LID BMPs must be designed and implemented with measures to avoid the creation of nuisance or pollution associated with vectors, such as mosquitoes, rodents, and flies.

(5) Source Control BMP Requirements

Each Copermittee must require each Priority Development Project to implement applicable source control BMPs. The source control BMPs to be required must:

(a) Prevent illicit discharges into the MS4;
(b) Minimize storm water pollutants of concern in runoff;
(c) Eliminate irrigation runoff;
(d) Include storm drain system stenciling or signage;
(e) Include properly designed outdoor material storage areas;
(f) Include properly designed outdoor work areas;
(g) Include properly designed trash storage areas;
(h) Include water quality protection requirements applicable to individual priority project categories.

(6) Treatment Control BMP Requirements

Each Copermittee must require each Priority Development Project that meets the Copermittee's technical infeasibility criteria in Section F.1.d(7) below, to implement conventional treatment control BMPs to treat the portion of the "design capture volume" that was not treated by LID BMPs per Section F.1.d(4) above. Conventional treatment control BMPs must meet the following requirements:

(a) All treatment control BMPs for a single Priority Development Project must collectively be sized to comply with the following numeric sizing criteria:

(i) Volume-based treatment control BMPs must be designed to mitigate (infiltrate, filter, or treat) the remaining portion of the design capture volume that was not retained and/or treated with LID BMPs; or

(ii) Flow-based treatment control BMPs must be designed to mitigate (filter, or treat) either: a) the maximum flow rate of runoff produced from a rainfall intensity of 0.2 inch of rainfall per hour, for each hour of a storm event; or b) the maximum flow rate of runoff produced by the 85th percentile hourly rainfall intensity (for each hour of a storm event), as determined from the local historical rainfall record, multiplied by a factor of two.

(b) All treatment control BMPs for Priority Development Projects must, at a minimum:

(i) Be ranked with high or medium pollutant removal efficiency for the project's most significant pollutants of concern, as the pollutant removal efficiencies are identified in the Copermittees' SSMP. Treatment control BMPs with a low removal efficiency ranking must only be approved by a Copermittee when a feasibility analysis has been conducted which exhibits that implementation of treatment control BMPs with high or medium removal efficiency rankings are infeasible for a Priority Development Project or portion of a Priority Development Project.

(ii) Be correctly sized and designed so as to remove storm water pollutants to the MEP.

(c) Target removal of pollutants of concern from runoff.

(d) Be implemented close to pollutant sources, and prior to discharging into waters of the U.S.

(e) Include proof of a mechanism under which ongoing long-term maintenance will be conducted to ensure proper maintenance for the life of the project. The mechanisms may be provided by the project proponent or Copermittee.

(f) Be designed and implemented with measures to avoid the creation of nuisance or pollution associated with vectors, such as mosquitoes, rodents, and flies.

(7) <u>Low Impact Development (LID) BMP Waiver Program</u>

The Copermittees must develop, collectively or individually, a LID waiver program for incorporation into the SSMP, which would allow a Priority Development Project to substitute implementation of all or a portion of required LID BMPs in Section F.1.d(4) with implementation of treatment control BMPs and either 1) on-site mitigation, 2) an off-site mitigation project, and/or 3) other mitigation developed by the Copermittees. The Copermittees

must submit the LID waiver program as part of their updated SSMP. At a minimum, the program must meet the requirements below:

(a) Prior to implementation, the LID waiver program must clearly exhibit that it will not allow Priority Development Projects to result in a net impact (after consideration of any mitigation) from pollutant loadings over and above the impact caused by projects meeting LID requirements;

(b) For each Priority Development Project participating, the Copermittee must find that it is technically infeasible to implement LID BMPs that comply with the requirements of Section F.1.(d)(4). The Copermittee(s) must develop criteria to determine the technical feasibility of implementing LID BMPs . Each Priority Development Project participating must demonstrate that LID BMPs were implemented as much as feasible given the site's unique conditions. Technical infeasibility may result from conditions including, but not limited to:

(i) Locations that cannot meet the infiltration and groundwater protection requirements in section F.1.c.(6) for large, centralized infiltration BMPs. Where infiltration is technically infeasible, the project must still examine the feasibility of other onsite LID BMPs;
(ii) Insufficient demand for storm water reuse;
(iii) Smart growth and infill or redevelopment locations where the density and/or nature of the project would create significant difficulty for compliance with the LID BMP requirements; and
(iv) Other site, geologic, soil, or implementation constraints identified in the Copermittees updated SSMP document.

(c) Each Priority Development Project that participates in the LID waiver program must mitigate for the pollutant loads expected to be discharged due to not implementing the LID retention BMPs in section F.1.d.(4). The pollutant loading must be estimated for each project participating in the LID waiver program. The estimated impacts from not implementing the required LID retention BMPs in section F.1.d.(4) must be fully mitigated. Mitigation projects must be implemented within the same hydrologic unit as the Priority Development Project. Mitigation projects outside of the hydrologic subarea but within the same hydrologic unit may be approved provided that the project proponent demonstrates that mitigation projects within the same hydrologic subarea are infeasible and that the mitigation project will address similar beneficial use impacts as expected from the Priority Development Projects pollutant load. Onsite mitigation may include increasing the conventional treatment sizing factors to achieve pollutant load removal equal to or greater than the pollutant load removal expected from implementing onsite retention of the design capture volume. Offsite mitigation projects may include green streets projects, existing development retrofit projects, retrofit incentive programs, regional

BMPs and/or riparian restoration projects. Project applicants seeking to utilize these alternative compliance provisions may propose other offsite mitigation projects, which the Copermittees may approve if they meet the requirements of this subpart.

(d) A Copermittee may choose to implement additional mitigation programs (e.g., pollutant credit system, mitigation fund) as part of the LID waiver program provided that the mitigation program clearly exhibits that it will not allow Priority Development Projects to result in a net impact from pollutant loadings over and above the impact caused by projects meeting LID requirements. Any additional mitigation programs that a Copermittee chooses to implement must be submitted to the San Diego Water Board Executive Officer for review and acceptance prior to implementation.

(8) LID and Treatment Control BMP Standards

(a) As part of the SSMP, each Copermittee must develop and require Priority Development Projects to implement siting, design, and maintenance criteria for each LID and treatment control BMP listed in the SSMP to determine feasibility and applicability and so that implemented LID and treatment control BMPs are constructed correctly and are effective at pollutant removal, runoff control, and vector minimization. Development of BMP design worksheets which can be used by project proponents is encouraged.

(b) LID and treatment control BMPs implemented at any Priority Development Projects must mitigate (treat through infiltration, settling, filtration or other unit processes) the required volume or flow of runoff from all developed portions of the project, including landscaped areas.

(c) All LID and treatment control BMPs must be located so as to remove pollutants from runoff prior to its discharge to any receiving waters. Multiple Priority Development Projects may use shared post-construction BMPs as long as construction of any shared BMP is completed prior to the use or occupation of any Priority Development Project from which the BMP will receive runoff. Post construction BMPs must not be constructed within a waters of the U.S. or waters of the State.

(9) Implementation Process

(a) As part of its local SSMP, each Copermittee must implement a process to verify compliance with SSMP requirements. The process must identify at what point in the planning process Priority Development Projects will be required to meet SSMP requirements and at a minimum, the Priority Development Project must implement the required post-construction BMPs prior to occupancy and/or the intended use of any portion of that

project. The process must also include identification of the roles and responsibilities of various municipal departments in implementing the SSMP requirements, as well as any other measures necessary for the implementation of SSMP requirements.

(b) Each Copermittee must establish a mechanism not only to track post-construction BMPs, but also to ensure that appropriate easements and ownerships are properly recorded in public records and the information is conveyed to all appropriate parties when there is a change in project or site ownership.

(10) Post-construction BMP Review

(a) The Copermittees must review and update the BMPs that are listed in their SSMP as options for treatment control. At a minimum, the update must include removal of obsolete or ineffective BMPs and addition of LID BMPs that can be used for treatment, such as bioretention cells, bioretention swales, etc. The update must also add appropriate LID BMPs to any tables or discussions in the local SSMPs addressing pollutant removal efficiencies of treatment control BMPs. In addition, the update must include review and revision where necessary of treatment control BMP pollutant removal efficiencies.

(b) The update must incorporate findings from BMP effectiveness studies conducted by the Copermittees for projects funded wholly or in part by the State Water Board or Regional Water Boards.

(c) Each Copermittee must implement a mechanism for annually incorporating findings from local treatment BMP effectiveness studies (e.g., ones conducted by, or on-behalf of, public agencies in Riverside County) into SSMP project reviews and permitting

e. BMP CONSTRUCTION VERIFICATION

Prior to occupancy and/or intended use of any portion of the Priority Development Project subject to SSMP requirements, each Copermittee must inspect the constructed site design, source control, and treatment control BMPs applicable to the constructed portion of the project to verify that they have been constructed and are operating in compliance with all specifications, plans, permits, ordinances, and this Order.

f. BMP MAINTENANCE TRACKING

(1) Inventory of SSMP projects: Each Copermittee must develop and maintain a watershed-based database to track and inventory all projects constructed, that have a final approved SSMP (SSMP projects), and its structural post-

construction BMPs within its jurisdiction since July, 2005. LID BMPs implemented on a lot by lot basis in low density residential areas, such as rain barrels, are not required to be tracked or inventoried. At a minimum, the database must include information on BMP type(s), location, watershed, date of construction, party responsible for maintenance, dates and findings of maintenance verifications, and corrective actions, including whether the site was referred to the local vector control agency or department.

(2) Each Copermittee must verify that approved post-construction BMPs are operating effectively and have been adequately maintained by implementing the following measures:

(a) The designation of high priority SSMP Projects must consider the following:

(i) BMP size,
(ii) Recommended maintenance frequency,
(iii) Likelihood of operational and maintenance issues,
(iv) Location,
(v) Receiving water quality,
(vi) Compliance record,
(vii) Land use,
(viii) and other pertinent factors;

At a minimum, high priority projects include those projects that generate pollutants (prior to treatment) within the tributary area of a 303(d) listed waterbody impaired for that pollutant; or those projects generating pollutants within the tributary area for an observed action level exceedance of that pollutant.

(b) Beginning on July 1, 2012, each Copermittee must verify that the required structural post-construction BMPs on the inventoried SSMP projects have been implemented, are maintained, and operating effectively through inspections, self-certifications, surveys, or other equally effective approaches with the following conditions:

(i) The implementation, operation, and maintenance of all (100 percent) approved and inventoried final project public and private SSMPs (a.k.a. WQMPs) must be verified every five years;

(ii) All (100 percent) projects with BMPs that are high priority must be inspected by the Copermittee annually prior to each rainy season;
(iii) All (100 percent) Copermittee projects with BMPs must be inspected by the Copermittee annually;
(iv) At least 20 percent of all approved and inventoried SSMP projects must be inspected by the Copermittee annually;

(v) At the discretion of the Copermittee, its inspections may be coordinated with the facility inspections implemented pursuant to section F.3. of this Order;
(vi) For verifications performed through a means other than direct Copermittee inspection, adequate documentation must be submitted to the Copermittee to provide assurance that the required maintenance has been completed;
(vii) Appropriate follow-up measures (including re-inspections, enforcement, maintenance, etc.) must be conducted to ensure the treatment BMPs continue to reduce storm water pollutants as originally designed; and
(viii) Inspections must note observations of vector conditions, such as mosquitoes. Where conditions are identified as contributing to mosquito production, the Copermittee must notify its local vector control agency.

g. ENFORCEMENT OF DEVELOPMENT SITES

Each Copermittee must enforce its storm water ordinance for all development projects as necessary to maintain compliance with this Order. Copermittee ordinances or other regulatory mechanisms must include appropriate sanctions to achieve compliance. Sanctions must include the following tools or their equivalent: Non-monetary penalties, fines, bonding requirements, liens, and/or permit or occupancy denials for non-compliance.

h. HYDROMODIFICATION – LIMITATIONS ON INCREASES OF RUNOFF DISCHARGE RATES AND DURATIONS[14]

Each Copermittee shall collaborate with the other Copermittees to develop and implement a Hydromodification Management Plan (HMP) to manage increases in runoff discharge rates and durations from all Priority Development Projects. The HMP must be incorporated into the SSMP and implemented by each Copermittee so that estimated post-project runoff discharge rates and durations must not exceed pre-development discharge rates and durations. Where the proposed project is located on an already developed site, the pre-project discharge rate and duration must be that of the pre-developed, naturally occurring condition. The draft HMP must be submitted to the San Diego Water Board on or before June 30, 2013. The HMP will be made available for public

[14] Updated SSMP and hydromodification requirements must apply to all Priority Development Projects or phases of Priority Development Projects which have not yet begun grading or construction activities at the time any updated SSMP or hydromodification requirement commences. If a Copermittee determines that lawful prior approval of a project exists, whereby application of an updated SSMP or hydromodification requirement to the project is legally infeasible, the updated SSMP or hydromodification requirement need not apply to the project. The Copermittees must utilize the SSMP and hydromodification update periods to ensure that projects undergoing approval processes include application of the updated SSMP and hydromodification requirements in its plans.

review and comment and the San Diego Water Board Executive Officer will determine whether to hold a public hearing before the full San Diego Water Board or whether public input will be through written comments to the Executive Officer only.

(1) The HMP must:

(a) Identify a method for assessing susceptibility and geomorphic stability of channel segments which receive runoff discharges from Priority Development Projects. A performance standard must be established that ensures that the geomorphic stability within the channel will not be compromised as a result of receiving runoff discharges from Priority Development Projects.

(b) Identify a range of runoff flows[15] based on continuous simulation of the entire rainfall record (or other analytical method proposed by the Copermittees and deemed acceptable by the San Diego Water Board) for which Priority Development Project post-project runoff flow rates and durations must not exceed pre-development (naturally occurring) runoff flow rates and durations by more than 10 percent, where the increased flow rates and durations will result in increased potential for erosion or other significant adverse impacts to beneficial uses. The lower boundary of the range of runoff flows identified must correspond with the critical channel flow that produces the critical shear stress that initiates channel bed movement or that erodes the toe of channel banks. The identified range of runoff flows may be different for specific watersheds, channels, or channel reaches. In the case of an artificially hardened (concrete lined, rip rap, etc.) channel, the lower boundary of the range of runoff flows identified must correspond with the critical channel flow that produces the critical shear stress that initiates channel bed movement or that erodes the toe of channel banks of a comparable natural channel (i.e. non-hardened, pre-development).

(c) Identify a method to assess and compensate for the loss of sediment supply to streams due to development. A performance and/or design standard must be created and required to be met by Priority Development Projects to ensure that the loss of sediment supply due to development does not cause or contribute to increased erosion within channel segments downstream of Priority Development Project discharge points.

(d) Designate and require Priority Development Projects to implement control measures so that (1) post-project runoff flow rates and durations do not exceed pre-development (naturally occurring) runoff flow rates and

[15] The identified range of run off flows to be controlled should be expressed in terms of peak flow rates of rainfall events, such as "10% of the pre-development 2-year runoff event up to the pre-development 10-year runoff event."

durations by more than 10 percent for the range of runoff flows identified under section F.1.h.(1)(b), where the increased flow rates and durations will result in increased potential for erosion or other significant adverse impacts to beneficial uses; (2) post-project runoff flow rates and durations do not result in channel conditions which do not meet the channel standard developed under section F.1.h.(1)(a) for channel segments downstream of Priority Development Project discharge points; and (3) the design of the project and/or control measures compensate for the loss of sediment supply due to development.

(e) Include a protocol to evaluate potential hydrograph change impacts to downstream watercourses from Priority Development Projects to meet the range of runoff flows identified under Section F.1.h.(1)(b).

(f) Include other performance criteria (numeric or otherwise) for Priority Development Projects as necessary to prevent runoff from the projects from increasing and/or continuing unnatural rates of erosion of channel beds and banks, silt pollutants generation, or other impacts to beneficial uses and stream habitat due to increased erosive force.

(g) Include a review of pertinent literature.

(h) Identify areas within the Santa Margarita Hydrologic Unit for potential opportunities to restore or rehabilitate stream channels with historic hydromodification of receiving waters that are tributary to documented low or very low Index of Biotic Integrity (IBI) scores.

(i) Include a description of how the Copermittees will incorporate the HMP requirements into their local approval processes.

(j) Include criteria on selection and design of management practices and measures (such as detention, retention, and infiltration) to control flow rates and durations and address potential hydromodification impacts.

(k) Include technical information, including references, supporting any standards and criteria proposed.

(l) Include a description of inspections and maintenance to be conducted for management practices and measures to control flow rates and durations and address potential hydromodification impacts.

(m) Include a description of monitoring and other program evaluations to be conducted to assess the effectiveness of implementation of the HMP. Monitoring and other program evaluations must include an evaluation of changes to physical (e.g., cross-section, slope, discharge rate, vegetation, pervious/impervious area) and biological (e.g., habitat quality, benthic flora

and fauna, IBI scores) conditions of receiving water channels as areas with Priority Development Projects are constructed (i.e. pre- and post-project), as appropriate.

(n) Include mechanisms for assessing and addressing cumulative impacts of Priority Development Projects within a watershed on channel morphology.

(2) In addition to the control measures that must be implemented by Priority Development Projects per section F.1.h.(1)(d), the HMP must include a suite of management measures to be used on Priority Development Projects to mitigate hydromodification impacts, protect and restore downstream beneficial uses and prevent or further prevent adverse physical changes to downstream channels. The measures must be based on a prioritized consideration of the following elements in this order:

(a) Site design control measures;
(b) On-site management measures;
(c) Regional control measures located upstream of receiving waters; and
(d) In-stream management and control measures.

Where stream channels are adjacent to, or are to be modified as part of a Priority Development Project, management measures must include buffer zones and setbacks. The suite of management measures must also include stream restoration as a viable option to achieve the channel standard in section F.1.h.(1)(a). In-stream controls used as management measures to protect and restore downstream beneficial uses and for preventing or minimizing further adverse physical changes must not include the use of non-naturally occurring hardscape materials such as concrete, riprap, gabions, etc. to reinforce stream channels.

(3) As part of the HMP, the Copermittees may develop a waiver program that allows a redevelopment Priority Development Project, as defined in Section F.1.d.(1)(b), to implement offsite mitigation measures. A waiver may be granted if onsite management and control measures are technically infeasible to fully achieve post-project runoff flow rates and durations that do not exceed the pre-development (naturally occurring) runoff flow rates and durations. Redevelopment projects that are granted a waiver under the program must not have post-project runoff flow rates and durations that exceed the pre-project runoff flow rates and durations. The incremental hydromodification impacts from not achieving the pre-development (naturally occurring) runoff flow rates and durations for the project site must be fully mitigated. The offsite mitigation must be within the same stream channel system to which the project discharges. Mitigation projects not within the same stream channel system but within the same hydrologic unit may be approved provided that the project proponent demonstrates that mitigation

within the same stream channel is infeasible and that the mitigation project will address similar impacts as expected from the project.

(4) Each individual Copermittee has the discretion to not require Section F.1.h. at Priority Development Projects where the project:

(a) Discharges storm water runoff into underground storm drains discharging directly to water storage reservoirs and lakes;
(b) Discharges storm water runoff into conveyance channels whose bed and bank are concrete lined all the way from the point of discharge to water storage reservoirs and lakes; or
(c) Discharges storm water runoff into other areas identified in the HMP as acceptable to not need to meet the requirements of Section F.1.h by the San Diego Water Board Executive Officer.

(5) <u>HMP Reporting and Implementation</u>

(a) On or before June 30 , 2013, the Copermittees must submit to the San Diego Water Board a draft HMP that has been reviewed by the public, including the identification of the appropriate limiting range of flow rates per section F.1.h.(1)(b).

(b) Within 180 days of receiving San Diego Water Board comments on the draft HMP, the Copermittees must submit a final HMP that addressed the San Diego Water Board's comments.

(c) Within 90 days of receiving a determination of adequacy from the San Diego Water Board, each Copermittee must incorporate and implement the HMP for all Priority Development Projects.

(d) Prior to acceptance of the HMP by the San Diego Water Board, the early implementation measures likely to be included in the HMP must be encouraged by the Copermittees.

(6) <u>Interim Hydromodification Criteria</u>

Immediately following adoption of this Order and until the final HMP required by this Order has been determined by the San Diego Water Board to be adequate, each Copermittee must ensure that all Priority Development Projects are implementing the hydromodification (aka Hydrologic Condition of Concern) requirements found in Section 4.4 of the 2006 Riverside County WQMP (updated in 2009) unless one of the following conditions in lieu of those specified in the WQMP are met:

(a) Runoff from the Priority Development Project discharges (1) directly to a conveyance channel or storm drain that is concrete lined all the way from

the point of discharge to the ocean, bay, lagoon, water storage reservoir or lake; and (2) the discharge is in full compliance with Copermittee requirements for connections and discharges to the MS4 (including both quality and quantity requirements); and (3) the discharge will not cause increased upstream or downstream erosion or adversely impact downstream habitat; and (4) the discharge is authorized by the Copermittee.

(b) The Priority Development Project disturbs less than one acre. The Copermittee has the discretion to require a project specific WQMP to address hydrologic condition concerns on projects less than one acre on a case by case basis. The disturbed area calculation should include all disturbances associated with larger common plans of development.

(c) The runoff flow rate, volume, velocity, and duration for the post-development condition of the Priority Development Project do not exceed the pre-development (i.e. naturally occurring) condition for the 2-year, 24-hour and 10-year, 24-hour rainfall events. This condition must be substantiated by hydrologic modeling acceptable to the Copermittee.

Once a final HMP is determined to be adequate and is required to be implemented, compliance with the final HMP is required by this Order and compliance with the 2004 WQMP (updated in 2009) or the in-lieu interim hydromodification criteria set forth above no longer satisfies the requirements of this Order.

(7) No part of section F.1.h eliminates the Copermittees' responsibilities for implementing the Low Impact Development requirements under section F.1.d.(4).

i. UNPAVED ROADS DEVELOPMENT

The Copermittees must develop, where they do not already exist, and implement or require implementation of erosion and sediment control BMPs after construction of new unpaved roads. At a minimum, the BMPs must include:

(1) Practices to minimize road related erosion and sediment transport;
(2) Grading of unpaved roads to slope outward where consistent with road engineering safety standards;
(3) Installation of water bars as appropriate;
(4) Unpaved roads and culvert designs that do not impact creek functions and where applicable, that maintain migratory fish passage;

2. CONSTRUCTION COMPONENT

Each Copermittee must implement a construction program which meets the requirements of this section, prevents illicit discharges into the MS4, implements and maintains structural and non-structural BMPs to reduce pollutants in storm water runoff from construction sites to the MS4, reduces construction site discharges of storm water pollutants from the MS4 to the MEP, and prevents construction site discharges from the MS4 from causing or contributing to a violation of water quality standards.

a. ORDINANCE UPDATE

By July 1, 2012, each Copermittee must review and update its grading ordinances and other ordinances as necessary to achieve full compliance with this Order, including requirements for the implementation of all designated BMPs and other measures.

b. SOURCE IDENTIFICATION

Each Copermittee must maintain an updated watershed-based inventory of all construction sites within its jurisdiction. The use of an automated database system, such as Geographical Information Systems (GIS) is strongly encouraged.

c. SITE PLANNING AND PROJECT APPROVAL PROCESS

Each Copermittee must incorporate consideration of potential water quality impacts prior to approval and issuance of construction and grading permits.

(1) Each construction and grading permit must require proposed construction sites to implement designated BMPs and other measures so that illicit discharges into the MS4 are prevented, storm water pollutants discharged from the site will be reduced to the MEP, and construction discharges from the MS4 are prevented from causing or contributing to a violation of water quality standards.

(2) Prior to permit issuance, the project proponent's runoff management plan (or equivalent construction BMP plan) must be required to comply, and reviewed to verify compliance with the local grading ordinance, other applicable local ordinances, and this Order.

(3) Prior to permit issuance, each Copermittee must verify that project

proponents subject to California's statewide General NPDES Permit for Storm Water Discharges Associated With Construction Activities, (hereinafter General Construction Permit), have existing coverage under the General Construction Permit.

d. BMP IMPLEMENTATION

(1) Designate BMPs: Each Copermittee must designate a minimum set of BMPs and other measures to be implemented at all construction sites. The designated minimum set of BMPs must include:

(a) Management Measures:

(i) Pollution prevention, where appropriate;
(ii) Development and implementation of a runoff management plan;
(iii) Minimization of areas that are cleared and graded to only the portion of the site that is necessary for construction;
(iv) Minimization of exposure time of disturbed soil areas;
(v) Minimization of grading during the rainy season and correlation of grading with seasonal dry weather periods to the extent feasible;
(vi) Limitation of grading to a maximum disturbed area as determined by each Copermittee before either temporary or permanent erosion controls are implemented to prevent storm water pollution. The Copermittee has the option of temporarily increasing the size of disturbed soil areas by a set amount beyond the maximum, if the individual site is in compliance with applicable storm water regulations and the site has adequate control practices implemented to prevent storm water pollution;
(vii) Temporary stabilization and reseeding of disturbed soil areas as rapidly as feasible;
(viii) Wind erosion controls;
(ix) Tracking controls;
(x) Non-stormwater management measures to prevent illicit discharges and control storm water pollution sources;
(xi) Waste management measures;
(xii) Preservation of natural hydrologic features where feasible;
(xiii) Preservation of riparian buffers and corridors where feasible;
(xiv) Evaluation and maintenance of all BMPs, until removed; and
(xv) Retention, reduction, and proper management of all storm water pollutant discharges on site to the MEP standard.

(b) Erosion and Sediment Controls:

(i) Erosion prevention. Erosion prevention is to be used as the most important measure for keeping sediment on site during

construction;

(ii) Sediment controls. Sediment controls are to be used as a supplement to erosion prevention for keeping sediment on-site during construction;

(iii) Slope stabilization must be used on all active slopes during rain events regardless of the season and on all inactive slopes during the rainy season and during rain events in the dry season;

(iv) Permanent revegetation or landscaping as early as feasible; and

(v) Erosion and sediment controls must be required during the construction of unpaved roads.

(2) Each Copermittee must implement, or require implementation of, enhanced[16] measures to address the threat to water quality posed by all construction sites tributary to CWA section 303(d) water body segments impaired for sediment or turbidity. Each Copermittee must also implement, or require implementation of, enhanced, measures for construction sites within, or adjacent to, or discharging directly to receiving waters within environmentally sensitive areas (as defined in Attachment C of this Order).

(3) Active/Passive Sediment Treatment (AST): Each Copermittee must require implementation of AST for sediment at construction sites (or portions thereof) that are determined by the Copermittee to be an exceptional threat to water quality. In evaluating the threat to water quality, the following factors must be considered by the Copermittee:

(a) Soil erosion potential or soil type;
(b) The site's slopes;
(c) Project size and type;
(d) Sensitivity of receiving water bodies;
(e) Proximity to receiving water bodies;
(f) Non-storm water discharges;
(g) Ineffectiveness of other BMPs;
(h) Proximity and sensitivity of aquatic threatened and endangered species of concern;
(i) Known effects of AST chemicals; and
(j) Any other relevant factors.

(4) Implement BMPs: Each Copermittee must implement, or require the implementation of, the designated minimum BMPs and any additional measures necessary to comply with this Order at each construction site within its jurisdiction year round. BMP implementation requirements,

[16] Enhanced BMPs are control actions specifically targeted to the pollutant or condition of concern and of higher quality and effectiveness than the minimum control measures otherwise required. Enhanced in this Order means better, not simply more, BMPs.

however, can vary based on wet and dry seasons. Dry season BMP implementation must plan for and address unseasonal rain events that may occur during the dry season (May 1 through September 30).

e. INSPECTION OF CONSTRUCTION SITES

Each Copermittee must conduct construction site inspections for compliance with its ordinances (grading, storm water, etc.), permits (construction, grading, etc.), and this Order. Priorities for inspecting sites must consider the nature and size of the construction activity, topography, and the characteristics of soils and receiving water quality.

(1) During the rainy season, each Copermittee must inspect at least every two weeks, all construction sites within its jurisdiction meeting any of the following criteria:

(a) All sites 30 acres or more in size with rough grading or with active, unstabilized slopes occurring during the rainy season;

(b) All sites one acre or more, and within the same hydrologic subarea and tributary to a CWA section 303(d) water body segment impaired for sediment; or within, directly adjacent to, or discharging directly to a receiving water within an ESA; and

(c) Other sites determined by the Copermittees or the San Diego Water Board as a significant threat to water quality. In evaluating threat to water quality, the following factors must be considered: (1) soil erosion potential; (2) site slope; (3) project size and type; (4) sensitivity of receiving water bodies; (5) proximity to receiving water bodies; (6) non-storm water discharges; (7) known past record of non-compliance by the operators of the construction site; and (8) any other relevant factors.

(2) During the rainy season, each Copermittee must inspect at least monthly, all construction sites with one acre or more of soil disturbance not meeting the criteria specified above in section F.2.e.(1).

(3) During the rainy season, each Copermittee must inspect construction sites less than one acre in size as needed to ensure compliance with its ordinances and this Order.

(4) Each Copermittee must inspect all construction sites as needed during the dry season. Sites meeting the criteria in section F.2.e.(1) must be inspected at least once in August or September each year.

(5) Re-inspections: Based upon site inspection findings, each Copermittee must implement all follow-up actions (i.e., re-inspection, enforcement) necessary to comply with this Order. Reinspection frequencies must be determined by each Copermittee based upon the severity of deficiencies, the nature of the construction activity, and the characteristics of soils and receiving water quality.

(6) Inspections of construction sites must include, but not be limited to:

(a) Check for coverage under the General Construction Permit (Notice of Intent (NOI) and/or Waste Discharge Identification No.) during initial inspections;
(b) Assessment of compliance with Copermittee ordinances and permits related to runoff, including the implementation and maintenance of designated minimum BMPs;
(c) Assessment of BMP effectiveness;
(d) Visual observations for non-storm water discharges, potential illicit connections, and potential discharge of pollutants in storm water runoff;
(e) Review of site monitoring data results, if the site monitors its runoff
(f) Education and outreach on storm water pollution prevention, as needed; and
(g) Creation of a written or electronic inspection report.

(7) The Copermittees must track the number of inspections for each inventoried construction site throughout the reporting period to verify that each site is inspected at the minimum frequencies required.

f. ENFORCEMENT OF CONSTRUCTION SITES

(1) Each Copermittee must develop and implement an escalating enforcement process that achieves prompt corrective actions at construction sites for violations of the Copermittee's water quality protection permits, requirements, and ordinances. This enforcement process must include authorizing the Copermittee's construction site inspectors to take immediate enforcement actions when appropriate and necessary. The enforcement process must include appropriate sanctions such as stop work orders, non-monetary penalties, fines, bonding requirements, and/or permit denials for non-compliance.

(2) Each Copermittee must be able to respond to construction complaints received from third-parties and to ensure the San Diego Water Board that corrective actions have been implemented, if warranted.

g. REPORTING OF NON-COMPLIANT SITES

(1) In addition to the notification requirements in Attachment B, each Copermittee must notify the San Diego Water Board when the Copermittee issues high level enforcement (as defined in the Copermittee's JRMP) to a construction site that poses a significant threat to water quality in its jurisdiction as a result of violations of its storm water ordinances.

(2) Each Copermittee must annually notify the San Diego Water Board, prior to the commencement of the rainy season, of all construction sites with alleged violations that pose a significant threat to water quality. Information may be provided as part of the JRMP annual report if submitted prior to the rainy season. Information provided must include, but not be limited to, the following:

(a) WDID number if enrolled under the General Construction Permit
(b) Site Location, including address
(c) Current violations or suspected violations

3. EXISTING DEVELOPMENT COMPONENT

a. MUNICIPAL

Each Copermittee must implement a municipal program for the Copermittee's areas and activities that meets the requirements of this section, prevents illicit discharges into the MS4, reduces municipal discharges of storm water pollutants from the MS4 to the MEP, and prevents municipal discharges from the MS4 from causing or contributing to a violation of water quality standards.

(1) Source Identification / Inventory

Each Copermittee must maintain an updated watershed-based inventory of all its municipal areas and those activities that have the potential to generate pollutants. The inventory must include the name, address (if applicable), and a description of the area/activity; which pollutants are potentially generated by the area/activity; whether the area/activity is adjacent to an ESA; and identification of whether the area/activity is tributary to a CWA section 303(d) water body segment and generates pollutants for which the water body segment is impaired. Linear facilities, such as roads, streets, and highways, do not need to be individually inventoried. The use of an automated database system, such as Geographical Information Systems (GIS) is highly recommended.

(2) General BMP Implementation

(a) Pollution Prevention: Each Copermittee must implement pollution prevention methods in its municipal program and must require their use by appropriate departments, personnel, and contractors.

(b) Designate Minimum BMPs: Each Copermittee must designate a minimum set of BMPs for all municipal areas and those activities that have the potential to generate pollutants. The designated minimum BMPs for municipal areas and activities must be area or activity specific as appropriate.

(c) Each Copermittee must designate BMPs for special events that are expected to generate significant trash and litter. Controls to consider must include:

(i) Temporary screens on catch basins and storm drain inlets;
(ii) Temporary fencing to prevent windblown trash from entering adjacent water bodies and MS4 channels;
(iii) Proper management of trash and litter;
(iv) Catch basin cleaning following the special event and prior to an anticipated rain event;
(v) Street sweeping of roads, streets, highways and parking facilities following the special event; and
(vi) Other equivalent controls.

(d) Designate BMPs for ESAs and 303(d) Impairments: Each Copermittee must designate enhanced measures for its municipal areas and activities tributary to CWA section 303(d) impaired water body segments when an area or those activities have the potential to generate pollutants for which the water body segment is impaired. Each Copermittee must also designate additional controls for its municipal areas and activities within or directly adjacent to or discharging directly to receiving waters within environmentally sensitive areas (as defined in Attachment C of this Order).

(e) Implement BMPs: Each Copermittee must implement, or require the implementation of, the designated minimum and enhanced BMPs and any additional measures necessary based on its inventory to comply with this Order for each of its municipal area and those activities that have the potential to discharge pollution.

(3) BMP Implementation for Management of Pesticides, Herbicides, and Fertilizers

Each Copermittee must implement BMPs to reduce the contribution of storm water pollutants to the MEP associated with the application, storage, and

disposal of pesticides, herbicides and fertilizers from its municipal areas and activities to MS4s and receiving waters. Such BMPs must include, at a minimum:

(a) Educational activities, permits, certifications and other measures for municipal applicators and distributors;
(b) Integrated Pest Management (IPM) measures that rely on non-chemical solutions;
(c) The use of native vegetation;
(d) Schedules for irrigation and chemical application; and
(e) The collection and proper disposal of unused pesticides, herbicides, and fertilizers.

(4) BMP implementation for Flood Control Structures

(a) Each Copermittee must implement procedures to assure that flood management projects assess the impacts on the water quality of receiving water bodies.
(b) Each Copermittee must include water quality protection measures, where feasible, when retrofitting existing flood control structural devices.
(c) Each Copermittee must evaluate its existing flood control structures as part of ongoing routine maintenance, identify structures causing or contributing to a condition of pollution, implement measures to reduce or eliminate the structure's effect on pollution, and evaluate the feasibility of retrofitting the structural flood control device. The inventory and evaluation must be completed by and submitted to the San Diego Water Board in each JRMP Annual Report.

(5) BMP Implementation for Sweeping of Municipal Areas

Where municipal area sweeping is implemented as an MS4 BMP for municipal roads, streets, highways, and parking facilities, each Copermittee must design and implement the program based on the following criteria:

(a) Roads, streets, highways, and parking facilities identified as consistently generating the highest volumes of trash and/or debris must be swept at least two times per month.

(b) Roads, streets, highways, and parking facilities identified as consistently generating moderate volumes of trash and/or debris must be swept at least monthly.

(c) Roads, streets, highways, and parking facilities identified as generating low volumes of trash and/or debris must be swept as necessary, but no less than once per year.

(6) Operation and Maintenance of Municipal Separate Storm Sewer System (MS4) and Treatment Controls

(a) Treatment Controls: Each Copermittee must implement a schedule of inspection and maintenance activities to verify proper operation of all its municipal structural treatment controls designed to reduce storm water pollutant discharges to or from its MS4s and related drainage structures.

(b) MS4 and Facilities: Each Copermittee must implement a schedule of maintenance activities for its MS4 and facilities (including but not limited to catch basins, storm drain inlets, detention basins, etc). The maintenance activities must, at a minimum, include:

(i) Inspection and removal of accumulated waste at least once a year between May 1 and September 30 of each year for all MS4 facilities;
(ii) Additional facilities cleaning as necessary between October 1 and April 30 of each year;
(iii) Following two years of inspections, any MS4 facility that requires inspection and cleaning less than annually may be inspected as needed, but not less than every other year;
(iv) Open channels and basins must be cleaned of observed anthropogenic litter in a timely manner;
(v) Maintenance activities within open channels must not adversely impact beneficial uses;
(vi) Record keeping of the maintenance and cleaning activities including the overall quantity of waste removed;
(vii) Proper disposal of waste removed pursuant to applicable laws; and
(viii) Measures to eliminate waste discharges during MS4 maintenance and cleaning activities.

(7) Infiltration From Sanitary Sewer to MS4/Provide Preventive Maintenance

(a) Each Copermittee must implement controls and measures to prevent and eliminate infiltration of seepage from sanitary sewers to MS4s through thorough, routine preventive maintenance of the MS4. Each Copermittee that operates both a municipal sanitary sewer system and a MS4 must implement controls and measures to prevent and eliminate infiltration of seepage from the sanitary sewers to the MS4s that must include overall sanitary sewer and MS4 surveys and thorough, routine preventive maintenance of both.

(b) Each Copermittee must implement controls to limit infiltration of seepage from sanitary sewers to municipal separate storm sewer systems where necessary. Such controls must include:

(i) Adequate plan checking for construction and new development;
(ii) Incident response training for its municipal employees that identify sanitary sewer spills;
(iii) Code enforcement inspections;
(iv) MS4 maintenance and inspections;
(v) Interagency coordination with sewer agencies; and
(vi) Proper education of its municipal staff and contractors conducting field operations on the MS4 or its municipal sanitary sewer (if applicable).

(8) Inspection of Municipal Areas and Activities

(a) At a minimum, each Copermittee must inspect the following high priority municipal areas and activities annually:

(i) Roads, Streets, Highways, and Parking Facilities;
(ii) Flood Management Projects and Flood Control Devices not otherwise inspected per Section F.3.a.(6)(b);
(iii) Areas and activities tributary to a CWA section 303(d) impaired water body segment, where an area or activity generates pollutants for which the water body segment is impaired.
(iv) Areas and activities within or adjacent to or discharging directly to receiving waters within environmentally sensitive areas (as defined in Attachment C of this Order);
(v) Municipal Facilities:
[a] Active or closed municipal landfills;
[b] Publicly owned treatment works (including water and wastewater treatment plants) and sanitary sewage collection systems;
[c] Solid waste transfer facilities;
[d] Land application sites;
[e] Corporate yards including maintenance and storage yards for materials, waste, equipment and vehicles; and
[f] Household hazardous waste collection facilities.
(vi) Municipal airfields;
(vii) Parks and recreation facilities;
(viii) Special event venues following special events (festivals, sporting events, etc.);
(ix) Power washing activities; and
(x) Other municipal areas and activities that the Copermittee determines may contribute a significant pollutant load to the MS4.

(b) Other municipal areas and activities must be inspected as needed and in response to water quality data, valid public complaints, and findings from municipal or contract staff.

(c) Based upon site inspection findings, each Copermittee must implement all follow-up actions necessary to comply with this Order.

(9) Enforcement of Municipal Areas and Activities

Each Copermittee must enforce its storm water ordinance for all its municipal areas and activities as necessary to maintain compliance with this Order.

(10) Unpaved Roads Maintenance

(a) The Copermittees must develop, where they do not already exist, and implement or require implementation of BMPs for erosion and sediment control measures during maintenance activities on unpaved roads, particularly in or adjacent to receiving waters.

(b) The Copermittees must develop and implement or require implementation of appropriate BMPs to minimize impacts on streams and wetlands during unpaved road maintenance activities.

(c) The Copermittees must regularly maintain their unpaved roads adjacent to streams and riparian habitat to reduce erosion and sediment transport;

(d) Re-grading of unpaved roads during maintenance must be sloped outward where consistent with road engineering safety standards;

(e) Through their regular maintenance of unpaved roads, the Copermittees must examine the feasibility of replacing existing culverts or design of new culverts or bridge crossings to reduce erosion and maintain natural stream geomorphology.

b. COMMERCIAL / INDUSTRIAL

Each Copermittee must implement a commercial / industrial program that meets the requirements of this section, prevents illicit discharges into the MS4, reduces commercial / industrial discharges of storm water pollutants from the MS4 to the MEP, and prevents commercial / industrial discharges from the MS4 from causing or contributing to a violation of water quality standards.

(1) Source Identification

(a) Each Copermittee must maintain an updated watershed-based inventory of all industrial and commercial sites/sources within its jurisdiction (regardless of ownership) that could contribute a significant pollutant load to the MS4. The inventory must include the following minimum information for each industrial and commercial site/source: name;

address; pollutants potentially generated by the site/source; and identification of whether the site/source is tributary to a CWA §303(d) water body segment and generates pollutants for which the water body segment is impaired; and a narrative description including SIC codes which best reflects the principal products or services provided by each facility.

At a minimum, the following sites/sources must be included in the inventory:

(i) Commercial Sites/Sources:

[a] Automobile repair, maintenance, fueling, or cleaning;
[b] Airplane repair, maintenance, fueling, or cleaning;
[c] Boat repair, maintenance, fueling, or cleaning;
[d] Equipment repair, maintenance, fueling, or cleaning;
[e] Automobile and other vehicle body repair or painting;
[f] Mobile automobile or other vehicle washing;
[g] Automobile (or other vehicle) parking lots and storage facilities;
[h] Retail or wholesale fueling;
[i] Pest control services;
[j] Eating or drinking establishments, including such retail establishments with food markets;
[k] Mobile carpet, drape or furniture cleaning;
[l] Cement mixing or cutting;
[m] Masonry;
[n] Painting and coating;
[o] Botanical or zoological gardens and exhibits;
[p] Landscaping;
[q] Nurseries and greenhouses;
[r] Golf courses, parks and other recreational areas/facilities;
[s] Cemeteries;
[t] Pool and fountain cleaning;
[u] Marinas;
[v] Portable sanitary services;
[w] Building material retailers and storage;
[x] Animal boarding facilities and kennels;
[y] Mobile pet services;
[z] Power washing services;
[aa] Plumbing services; and
[bb] Other sites and sources with a history of un-authorized discharges to the MS4.

(ii) Industrial Sites/Sources:

[a] Industrial Facilities, as defined at 40 CFR § 122.26(b)(14), including those subject to the General Industrial Permit or other individual NPDES permit;
[b] Operating and closed landfills;
[c] Facilities subject to SARA Title III; and
[d] Hazardous waste treatment, disposal, storage and recovery facilities.

(iii) ESAs and 303(d) Listed Waterbodies: All other commercial or industrial sites/sources tributary to a CWA Section 303(d) impaired water body segment, where the site/source generates pollutants for which the water body segment is impaired. All other commercial or industrial sites/sources within or directly adjacent to or discharging directly to receiving waters within environmentally sensitive areas (as defined in Attachment C of this Order) or that generate pollutants tributary to an observed exceedance of an action level.

(iv) All other commercial or industrial sites/sources that the Copermittee determines may contribute a significant pollutant load to the MS4.

(2) General BMP Implementation

(a) Pollution Prevention: Each Copermittee must require the use of pollution prevention methods by the inventoried industrial and commercial sites/sources.

(b) Designate / Update Minimum BMPs: Each Copermittee must designate a minimum set of BMPs for all inventoried industrial and commercial sites/sources. Where BMPs have already been designated, each Copermittee must review and update its existing BMPs for adequacy within one year of permit adoption. Copermittees may continue to regularly review and update their designated BMPs for adequacy and subsequently submit any updates in their Annual Report. The designated minimum BMPs must be specific to facility types and pollutant-generating activities, as appropriate.

(c) Designate Enhanced BMPs for ESAs and 303(d) Impairments: Each Copermittee must designate enhanced measures for inventoried industrial and commercial sites/sources tributary to CWA section 303(d) impaired water body segments (where a site/source generates pollutants for which the water body segment is impaired). Each Copermittee must also designate additional controls for industrial and commercial sites/sources within or directly adjacent to or discharging directly to coastal lagoons, the ocean, or other receiving waters within environmentally sensitive areas (as

defined in Attachment C of this Order). Copermittees may continue to regularly review and update their designated enhanced BMPs for adequacy and subsequently submit any updates in their next Annual Report.

(d) Implement BMPs: Each Copermittee must implement, or require the implementation of, the designated minimum and enhanced BMPs and any additional measures necessary based on inspections, incident responses, and water quality data to comply with this Order at each industrial and commercial site/source within its jurisdiction.

(3) Mobile Businesses Program

(a) Each Copermittee must develop and implement a program to reduce the discharge of storm water pollutants from mobile businesses to the MEP and to prohibit non-storm water discharges pursuant to Section B of this Order. Each Copermittee must keep as part of its commercial source inventory a listing of mobile businesses known to operate within its jurisdiction that conduct services listed above in section F.3.b.(1)(a). The program must include:

(i) Development and implementation of minimum standards and BMPs to be required for each of the various types of mobile businesses;
(ii) Development and implementation of an enforcement strategy which specifically addresses the unique characteristics of mobile businesses;
(iii) Notification of those mobile businesses known to operate within the Copermittee's jurisdiction of the minimum standards and BMP requirements;
(iv) Development and implementation of an outreach and education strategy; and
(v) Inspection of mobile businesses as needed to implement the program.

(b) If they choose to, the Copermittees may cooperate in developing and implementing their programs for mobile businesses, including sharing of mobile business inventories, BMP requirements, enforcement action information, and education.

(4) Inspection of Industrial and Commercial Sites/Sources

Each Copermittee must conduct industrial and commercial site inspections for compliance with its ordinances, permits, and this Order. Mobile businesses must be inspected as needed pursuant to section F.3.b.(3).

(a) Inspection Procedures: Inspections must include but not be limited to:

(i) Review of BMP implementation plans, if the site uses or is required to use such a plan;
(ii) Review of facility monitoring data, if the site monitors its runoff;
(iii) Check for coverage under the General Industrial Permit (Notice of Intent (NOI) and/or Waste Discharge Identification Number), if applicable;
(iv) Assessment of compliance with Copermittee ordinances and Copermittee issued permits related to runoff;
(v) Assessment of the implementation, maintenance and effectiveness of the designated minimum and/or enhanced BMPs;
(vi) Visual observations for non-storm water discharges, potential illicit connections, and potential discharge of pollutants in storm water runoff; and
(vii) Education and training on storm water pollution prevention, as conditions warrant.

(b) Each Copermittee must annually notify the San Diego Water Board, prior to the commencement of the rainy season, of all Industrial Sites and Industrial Facilities subject to the General Industrial Permit or other individual NPDES permit with alleged violations of the Copermittees ordinances, that pose a significant threat to water quality.

(c) Frequencies: At a minimum all sites determined to pose a high threat to water quality must be inspected each year. All inventoried sites must be inspected at least once during a five year period. In evaluating threat to water quality, each Copermittee must consider, at a minimum, the following:

(i) Type of activity (SIC code);
(ii) Materials used at the facility;
(iii) Wastes generated;
(iv) Pollutant discharge potential, including whether the facility generates a pollutant that exceeds an action level;
(v) Non-storm water discharges;
(vi) Size of facility;
(vii) Proximity to receiving water bodies;
(viii) Sensitivity of receiving water bodies;
(ix) Whether the facility is subject to the General Industrial Permit or an individual NPDES permit;
(x) Whether the facility has filed a No Exposure Certification/Notice of Non-Applicability;
(xi) Facility design;
(xii) Total area of the site, portion of the site where industrial or commercial activities occur, and area of the site exposed to rainfall and runoff;
(xiii) The facility's compliance history; and
(xiv) Any other relevant factors.

(d) Third-Party Certifications: Each Copermittee may propose to develop and implement a third party certification program subject to San Diego Water Board Executive Officer acceptance. This program would verify industrial and commercial site/source compliance with the Copermittees' ordinances, permits, and this Order. To the extent that third party certifications are conducted to fulfill the requirements of Section F.3.b.(4) above, the Copermittee retains responsibility for compliance with this Order and will be responsible for conducting and documenting quality assurance and quality control of the third-party certifications.

(i) The Copermittee's proposed third party certification program must include the following:

[a] A description of the procedures and measures for quality assurance and quality control;
[b] A listing of sites/sources that may and may not participate in the program;
[c] The representative percentage of certifications that would qualify to satisfy the inspection requirements in section F.3.b(4)(c) above;
[d] Photo documentation of potential storm water violations identified during the third party inspection;
[e] Reporting to the Copermittee of identified significant potential violations, including imminent or observed illegal discharges, within 24 hours of the third party inspection;
[f] Reporting to the Copermittee of all findings within one week of the inspection being conducted; and
[g] Copermittee follow-up and/or enforcement actions for identified potential storm water violations within two business days of the potential violation report receipt.

(e) Based upon site inspection findings, each Copermittee must implement all follow-up actions and enforcement necessary to comply with this Order.

(f) To the extent that the San Diego Water Board has conducted an inspection of an industrial site during a particular year, the requirement for the responsible Copermittee to inspect this facility during the same year is deemed satisfied.

(g) The Copermittees must track the number of inspections for the inventoried industrial and commercial sites/sources throughout the reporting period to verify that the sites/sources are inspected at the minimum frequencies listed in this Order.

(5) Enforcement of Industrial and Commercial Sites/Sources

Each Copermittee must enforce its storm water ordinance for all industrial and commercial sites/sources as necessary to maintain compliance with this Order. Copermittee ordinances or other regulatory mechanisms must include appropriate sanctions to achieve compliance. Sanctions must include the following tools or their equivalent: Non-monetary penalties, fines, bonding requirements, liens and/or permit denials for non-compliance.

c. RESIDENTIAL

Each Copermittee must implement a residential program that meets the requirements of this section, prevents illicit discharges into the MS4, reduces residential discharges of storm water pollutants from the MS4 to the MEP, and prevents residential discharges from the MS4 from causing or contributing to a violation of water quality standards.

(1) Threat to Water Quality Prioritization

Each Copermittee must identify residential areas and activities that pose a high threat to water quality. At a minimum, these must include:

(a) Automobile repair, maintenance, washing, and parking;
(b) Home and garden care activities and product use (pesticides, herbicides, and fertilizers);
(c) Disposal of trash, pet waste, green waste, and household hazardous waste (e.g., paints, cleaning products);
(d) Any other residential source that the Copermittee determines may contribute a significant pollutant load to the MS4;
(e) Any residential areas tributary to a CWA section 303(d) impaired water body, where the residence generates pollutants for which the water body is impaired; and
(f) Any residential areas within or directly adjacent to or discharging directly to receiving waters within an environmentally sensitive area (as defined in Attachment C of this Order).

(2) BMP Implementation

(a) Pollution Prevention: Each Copermittee must actively encourage the use of pollution prevention methods by residents.

(b) Designate BMPs: Each Copermittee must designate minimum BMPs for high-threat-to-water quality residential areas and activities. The designated minimum BMPs for high-threat-to-water quality residential areas and activities must be area or activity specific.

(c) Hazardous Waste BMPs: Each Copermittee must facilitate the proper management and disposal of used oil, toxic materials, and other household hazardous wastes. Such facilitation must include educational activities, public information activities, and establishment of collection sites operated individually and/or jointly by the Copermittee(s) or a private entity. Curbside collection of household hazardous wastes is encouraged.

(d) Implement BMPs: Each Copermittee must implement, or require implementation of, the designated minimum BMPs and any additional measures necessary to comply with Sections A and B of this Order.

(e) Each Copermittee must implement, or require implementation of, BMPs for residential areas and activities that have not been designated a high threat to water quality, as necessary.

(3) Enforcement of Residential Areas and Activities

Each Copermittee must enforce its storm water ordinance for all residential areas and activities as necessary to maintain compliance with this Order.

(4) Common Interest Areas (CIA) / Home Owner Association (HOA) Areas, and Mobile Home Parks

Each Copermittee must ensure that effective measures exist and are implemented or required to be implemented to ensure that runoff within and from common interest developments, including areas managed by associations and mobile home parks, and meets the objectives of this section and Order.

(a) BMP Implementation: Each Copermittee must implement or require implementation of management measures based on a review of pertinent factors, including:

(i) Maintenance duties and procedures typically used by CIA/HOA maintenance associations within its jurisdiction;
(ii) Whether streets and storm drains are publicly or privately owned within the CIA/HOA or mobile home park;
(iii) Whether the CIA/HOA area or mobile home park has been identified as a high priority residential area based on an evaluation of the site potential to generate pollutants contributing to a 303(d) listed waterbody or an observed action level exceedance;
(iv) Other activities conducted or authorized by the HOA that may pose a significant risk to inland receiving waters.

(b) Legal Authority and Enforcement: By July 1, 2012, each Copermittee must review, and if necessary update, its Municipal Code to verify that they have the legal authority to implement and enforce its ordinances within CIA/HOA areas and mobile home parks.

(5) Privately Owned Unpaved Roads Maintenance

(a) The Copermittees must require implementation of BMPs for erosion and sediment control during maintenance activities on privately owned unpaved roads, particularly in or adjacent to stream channels or wetlands.

(b) The Copermittees must enforce their ordinances against illegal construction and maintenance grading activities on privately owned unpaved roads, so as to prevent impacts to water quality.

d. RETROFITTING EXISTING DEVELOPMENT

Each Copermittee must develop and implement a retrofitting program that meets the requirements of this section. The goals of the existing development retrofitting program are to reduce impacts from hydromodification, promote LID, support riparian and aquatic habitat restoration, reduce the discharges of storm water pollutants from the MS4 to the MEP, and prevent discharges from the MS4 from causing or contributing to a violation of water quality standards. Where feasible, at the discretion of the Copermittee, the existing development retrofitting program may be coordinated with flood control projects and other infrastructure improvement programs.

(1) The Copermittee(s) must identify and inventory existing areas of development (i.e. municipal, industrial, commercial, residential) as candidates for retrofitting. Potential retrofitting candidates must include but are not limited to:

(a) Areas of development that generate pollutants of concern to a TMDL or an ESA;
(b) Receiving waters that are channelized or otherwise hardened;
(c) Areas of development tributary to receiving waters that are channelized or otherwise hardened;
(d) Areas of development tributary to receiving waters that are significantly eroded;
(e) Areas of development tributary to an ASBS or SWQPA; and

(2) Each Copermittee must evaluate and rank the inventoried areas of existing developments to prioritize retrofitting. Criteria for evaluation must include but is not limited to:

(a) Feasibility;
(b) Cost effectiveness;
(c) Pollutant removal effectiveness, including reducing pollutants exceeding action level;
(d) Tributary area potentially treated;
(e) Maintenance requirements;
(f) Landowner cooperation;
(g) Neighborhood acceptance;
(h) Aesthetic qualities;
(i) Efficacy at addressing concern; and
(j) Potential improvements on public health and safety

(3) Each Copermittee must consider the results of the evaluation in prioritizing work plans for the following year in accordance with Sections G.1 and J. Highly feasible projects expected to benefit water quality should be given a high priority to implement source control and treatment control BMPs. Where feasible, the retrofit projects may be designed in accordance with the SSMP requirements within sections F.1.d.(3) through F.1.d.(8) and the Hydromodification requirements in Section F.1.h.

(4) The Copermittees must cooperate with private landowners to encourage site specific retrofitting projects. The Copermittee must consider the following practices in cooperating and encouraging private landowners to retrofit their existing development:

(a) Demonstration retrofit projects;
(b) Retrofits on public land and easements that treat runoff from private developments;
(c) Education and outreach;
(d) Subsidies for retrofit projects;
(e) Requiring retrofit projects as enforcement, mitigation or ordinance compliance;
(f) Public and private partnerships; and
(g) Fees for existing discharges to the MS4 and reduction of fees for retrofit implementation.

(5) The completed retrofit BMPs must be tracked in accordance with Section F.1.f. Retrofit BMPs on publicly owned properties must be inspected per section F.1.f . Privately owned retrofit BMPs must be inspected as needed to ensure proper operation and maintenance.

(6) Where constraints on retrofitting preclude effective BMP deployment on existing developments at locations critical to protect receiving waters (as identified in section F.3.d.(1)), a Copermittee may propose a regional mitigation project to improve water quality. Such regional projects may include but are not limited to:

(a) Regional water quality treatment BMPs;
(b) Urban creek or wetlands restoration and preservation;
(c) Daylighting and restoring underground creeks;
(d) Localized rainfall storage and reuse to the extent such projects are fully protective of downstream water rights;
(e) Hydromodification project; and
(f) Removal of invasive plant species.

(7) A retrofit project or regional mitigation project may qualify as a Watershed Water Quality Activity provided it meets the requirements in section G. Watershed Workplan.

4. ILLICIT DISCHARGE DETECTION AND ELIMINATION

Each Copermittee must implement a program that meets the requirements of this section to actively detect and eliminate illicit discharges and disposal into the MS4. The program must address all types of illicit discharges and connections excluding those non-storm water discharges not prohibited by the Copermittee in accordance with section B of this Order.

a. PREVENT AND DETECT ILLICIT DISCHARGES AND CONNECTIONS

Each Copermittee must implement measures to prevent and detect illicit discharges to the MS4.

(1) Legal Authority: Each Copermittee must retain legal authority to prevent and eliminate illicit discharges and connections to the MS4.

(2) Inspections: Each Copermittee must include use of appropriate Copermittee personnel and contractors to assist in identifying illicit discharges and connections during their daily activities.

(a) Visual inspections for illegal discharges and connections must be conducted during routine maintenance of all MS4 facilities.

(b) Copermittee staff and contractors conducting non-MS4 field operations must be trained to report suspected illegal discharges and connections to proper Copermittee staff.

b. MAINTAIN MS4 MAP

Each Copermittee must maintain an updated map of its entire MS4 and the corresponding drainage areas within its jurisdiction. The use of GIS is strongly

encouraged. The MS4 map must include all segments of the storm sewer system owned, operated, and maintained by the Copermittee, as well as all known locations of inlets that discharge and/or collect runoff into the Copermittee's MS4, all known locations of access points (i.e. manholes) to the Copermittee's MS4, all known locations of connections with other MS4s (e.g. Caltrans), and all known locations of all the outfalls that discharge runoff from the Copermittee's MS4. The accuracy of the MS4 map must be confirmed during dry weather field screening and analytical monitoring and must be updated at least annually. The MS4 map including any GIS layers must be submitted with the updated JRMP.

c. Facilitate Public Reporting Of Illicit Discharges And Connections - Public Hotline

Each Copermittee must promote, publicize and facilitate public reporting of illicit discharges or water quality impacts associated with discharges into or from MS4s. Each Copermittee must facilitate public reporting through development and operation of a public hotline. Public hotlines can be Copermittee-specific or shared by Copermittees. All storm water hotlines must be capable of receiving reports in both English and Spanish 24 hours per day and seven days per week. All reported incidents, and how each was resolved, must be summarized in each Copermittee's Annual Report.

d. Dry Weather Field Screening And Analytical Monitoring

Each Copermittee must conduct dry weather field screening and analytical monitoring of MS4 outfalls and other portions of its MS4 within its jurisdiction to detect illicit discharges and connections in accordance with Receiving Waters and MS4 Discharge Monitoring and Reporting Program No. R9-2010-0016 in Attachment E of this Order.

e. Investigation / Inspection And Follow-Up

Each Copermittee must implement procedures to investigate and inspect portions of its MS4 that, based on the results of field screening, analytical monitoring, or other appropriate information, indicate a reasonable potential of containing illicit discharges, illicit connections, or other sources of pollutants in non-storm water.

(1) Develop response criteria for data: Each Copermittee must develop, update, and use numeric criteria action levels (or other actions level criteria where appropriate) to determine when follow-up investigations will be performed in response to water quality monitoring. The criteria must include required non-storm water action levels (see Section C) and a consideration of 303(d)-listed waterbodies and environmentally sensitive areas (ESAs) as defined in Attachment C.

(2) Respond to data: Each Copermittee must investigate portions of the MS4 for which water quality data or conditions indicates a potential illegal discharge or connection.

(a) Obvious illicit discharges (i.e. color, odor, or significant exceedances of action levels) must be investigated immediately.

(b) Field screen data: Within two business days of receiving dry weather field screening results that exceed action levels, the Copermittee(s) having jurisdiction must either initiate an investigation to identify the source of the discharge or document the rationale for why the discharge does not pose a threat to water quality and does not need further investigation. This documentation must be included in the Annual Report.

(c) Analytical data: Within five business days of receiving analytical laboratory results that exceed action levels, the Copermittee(s) having jurisdiction must either initiate an investigation to identify the source of the discharge or document the rationale for why the discharge does not pose a threat to water quality and does not need further investigation. This documentation must be included in the Annual Report.

(3) Respond to notifications: Each Copermittee must respond to and resolve each reported incident (e.g., public hotline, staff notification, etc.) made to the Copermittee in a timely manner. Criteria may be developed to assess the validity of, and prioritize the response to, each report.

f. ELIMINATION OF ILLICIT DISCHARGES AND CONNECTIONS

Each Copermittee must take immediate action to initiate steps necessary to eliminate all detected illicit discharges, illicit discharge sources, and illicit connections after detection within its jurisdiction. Elimination measures may include an escalating series of enforcement actions for those illicit discharges that are not a serious threat to public health or the environment. Illicit discharges that pose a serious threat to the public's health or the environment must be eliminated immediately.

g. ENFORCE ORDINANCES

Each Copermittee must implement and enforce its ordinances, orders, or other legal authority to prevent illicit discharges and connections to its MS4 and to eliminate detected illicit discharges and connections to its MS4.

h. Prevent And Respond To Sewage Spills (Including From Private Laterals And Failing Septic Systems) And Other Spills

Each Copermittee must implement management measures and procedures (including a notification mechanism) to prevent, respond to, contain and clean up all sewage (see below) and other spills that may discharge into its MS4 from any source (including private laterals and failing septic systems). Copermittees must coordinate with spill response teams to prevent entry of spills into the MS4 and contamination of surface water, ground water and soil. Each Copermittee must coordinate spill prevention, containment and response activities throughout all appropriate departments, programs and agencies so that maximum water quality protection is available at all times.

5. PUBLIC PARTICIPATION COMPONENT

Each Copermittee must incorporate a mechanism for public participation in the updating, development, and implementation of the JRMP.

6. EDUCATION COMPONENT

Each Copermittee must implement education programs to (1) measurably increase the knowledge regarding MS4s, impacts of runoff on receiving waters, and potential BMP solutions for the target audience; and (2) to measurably change the behavior of target communities and thereby reduce pollutants in storm water discharges and eliminate prohibited non-storm water discharges to MS4s and the environment. At a minimum, the education programs must meet the requirements of this section and address the following target communities:

- Copermittee Departments and Personnel
- New Development / Redevelopment Project Applicants, Developers, Contractors, Property Owners, and other Responsible Parties
- Construction Site Owners and Operators
- Commercial Owners and Operators
- Industrial Owners and Operators
- Residential Community and General Public
- Quasi-Governmental Agencies / Districts (i.e., educational institutions, water districts, sanitation districts, etc.)

a. General Requirements

(1) At a minimum, the Copermittee education programs must educate each target community on the following topics:

(a) Applicable water quality laws, regulations, permits, and requirements;
(b) Best management practices;
(c) General runoff concepts;
(d) Existing water quality, including local water quality conditions, impaired waterbodies and environmentally sensitive areas; and
(e) Other topics, such as public reporting mechanisms, water conservation, low-impact development techniques, and public health and vector issues associated with runoff.

(2) Each Copermittee must implement educational activities, public information activities, and other appropriate activities to facilitate the proper management and disposal of used oil and toxic materials.

b. Specific Requirements

(1) Copermittee Departments and Personnel

(a) Each Copermittee must implement an education program so its staff and contractors (and Planning Boards and Elected Officials, if applicable) responsible for implementing the requirements of this Order have an understanding of the following topics as applicable to their responsibilities:

(i) Applicable water quality laws and regulations;
(ii) The potential effects and impacts that Copermittee departments and personnel activities related to their job duties can have on water quality);
(iii) Plan review policies and procedures to verify consistent application;
(iv) Methods of minimizing impacts to receiving water quality resulting from development, construction, and other potential pollutant generating activities;
(v) Proper implementation of erosion and sediment control, source control, treatment control, and other BMPs to minimize the impacts to receiving water quality resulting from development, construction, and other potential pollutant generating activities;
(vi) Applicable recordkeeping and tracking mechanisms;
(vii) Inspection and enforcement procedures, BMP implementation, and review of monitoring data.

(b) Each Copermittee must train its staff responsible for oversight and conducting storm water compliance inspections and enforcement of construction activities (e.g. construction, building, code enforcement, grading review staffs, inspectors, and other responsible construction staff) annually prior to the rainy season.

(c) Each Copermittee must train its staff responsible for conducting storm water compliance inspections and enforcement of industrial and commercial facilities at least once a year.

(2) New Development / Redevelopment and Construction Sites

As early in the planning and development process as possible and all through the permitting and construction process, each Copermittee must notify parties responsible for the project about the importance of educating all construction workers in the field about storm water issues and BMPs, in addition to the topics under Section F.6.a.(1).

(3) Commercial and Industrial Sites / Sources

At least once during the five-year period of this Order, each Copermittee must notify the owner/operator of each of its inventoried commercial and industrial site/source of the BMP requirements applicable to the site/source.

(4) Residential and General Public

Each Copermittee shall collaboratively conduct or participate in development and implementation of a program to educate residential and general public target communities. The Copermittee residential and general public education programs must address potential pollutant generating activities (e.g., car washing, mobile operations, yard maintenance) and pollutant generating products (e.g., pesticides, fertilizers, household chemicals). The target audiences of the residential and general public education programs must include underserved target audiences (e.g., disadvantaged communities), residents and managers of CIA/HOA areas, and owners and residents of mobile home parks.

G. WATERSHED WATER QUALITY WORKPLAN

Each Copermittee must collaborate with other Copermittees to develop and implement a Watershed Water Quality Workplan (Watershed Workplan) to identify, prioritize, address, and mitigate the highest priority water quality issues/pollutants in the Upper Santa Margarita Watershed.

1. Watershed Workplan Components:

The work plan must, at a minimum:

a. Characterize the receiving water quality in the watershed. Characterization must include assessment and analysis of regularly collected water quality data, reports, monitoring and analysis generated in accordance with the requirements

of the Receiving Waters Monitoring and Reporting Program, as well as applicable information available from other public and private organizations. This characterization must include an updated watershed map.

b. Identify and prioritize water quality problem(s) in terms of constituents by location, in the watershed's receiving waters. In identifying water quality problem(s), the Copermittees must, at a minimum, give consideration to TMDLs, receiving waters listed on the CWA section 303(d) list, waters with persistent violations of water quality standards, toxicity, or other impacts to beneficial uses, and other pertinent conditions.

c. Identify the likely sources, pollutant discharges and/or other factors causing the highest water quality problem(s) within the watershed. Efforts to determine such sources must include, but not be limited to: use of information from the construction, industrial/commercial, municipal, and residential source identification programs required within the JRMP of this Order; water quality monitoring data collected as part of the Receiving Water Monitoring and Reporting Program required by this Order, and additional focused water quality monitoring to identify specific sources within the watershed.

d. Develop a watershed BMP implementation strategy to attain receiving water quality objectives in the identified highest priority water quality problem(s) and locations. The BMP implementation strategy must include a schedule for implementation of the BMP projects to abate specific receiving water quality problems and a list of criteria to be used to evaluate BMP effectiveness. Identified watershed water quality problems may be the result of jurisdictional discharges that will need to be addressed with BMPs applied in a specific jurisdiction in order to generate a benefit to the watershed. This implementation strategy must include a map of implemented and proposed BMPs.

e. Develop a strategy to monitor improvements in receiving water quality directly resulting from implementation of the BMPs described in the Watershed Workplan. The monitoring strategy must review the necessary data to report on the measured pollutant reduction that results from proper BMP implementation. Monitoring must, at a minimum, be conducted in the receiving water to demonstrate reduction in pollutant concentrations and progression towards attainment of receiving water quality objectives.

f. Establish a schedule for development and implementation of the Watershed strategy outlined in the Workplan. The schedule must, at a minimum, include forecasted dates of planned actions to address Provisions E.2(a) through E.2(e) and dates for watershed review meetings through the remaining portion of this Permit cycle. Annual watershed workplan review meetings must be open to the public and appropriately publically noticed such that interested parties may come and provide comments on the watershed program.

2. **Watershed Workplan Implementation –** Watershed Copermittee's must implement the Watershed Workplan within 90 days of submittal unless otherwise directed by the San Diego Water Board.

3. **Copermittee Collaboration** – Watershed Copermittees must collaborate to develop and implement the accepted Watershed Workplan. Watershed Copermittee collaboration must include frequent regularly scheduled meetings. The Copermittees must pursue efforts to obtain any interagency agreements, or other coordination efforts, with non-Copermittee owners of the MS4 (such as Caltrans, Native American tribes, and school districts) to control the contribution of pollutants from one portion of the shared MS4 to another portion of the shared MS4. The Copermittees must, as appropriate, participate in watershed management efforts to address water quality issues within the entire Santa Margarita Watershed (such as the County of San Diego and U.S. Marine Corps Camp Pendleton).

4. **Public Participation –** Watershed Copermittees must implement a watershed-specific public participation mechanism within each watershed. A required component of the watershed-specific public participation mechanism must be a minimum 30-day public review of and opportunity to comment on the Watershed Workplan prior to submittal to the San Diego Water Board. The Workplan must include a description of the public participation mechanisms to be used and identification of the persons or entities anticipated to be involved during the development and implementation of the Watershed Workplan.

5. **Watershed Workplan Review and Updates –** Watershed Copermittees must review and update the Watershed Workplan annually to identify needed changes to the prioritized water quality problem(s) listed in the workplan. All updates to the Watershed Workplan must be presented during an Annual Watershed Review Meeting. Annual Watershed Review Meetings must occur once every calendar year and be conducted by the Watershed Copermittees. Annual Watershed Review Meetings must be open to the public and adequately noticed. Individual Watershed Copermittees must also review and modify their jurisdictional programs and JRMP Annual Reports, as necessary, so that they are consistent with the updated Watershed Workplan.

6. **Pyrethroid Toxicity Reduction Evaluation –** The Watershed Copermittees must incorporate the pyrethroid pollutant reduction program[17] into the Watershed Workplan. The pyrethroid pollutant reduction program must include the following elements:

   a. Pursue state and federal regulatory change.
   b. Implement a set of source controls targeted specifically at urban pyrethroid use,
   c. Through the annual reporting process, monitor the implementation of those

[17] The pyrethroid pollutant reduction program is described in the "Riverside County – Santa Margarita Region Pyrethroid Source Identification Toxicity Reduction Evaluation, Final Phase II Report", January 2009 by MACTEC.

controls, assess effectiveness, and identify sources or areas where additional effort is needed,

d. Implement additional controls as needed,

e. Continue to monitor implementation, as well as conditions within the target receiving waters, assess effectiveness, and re-evaluate control programs.

H. FISCAL ANALYSIS

1. Secure Resources: Each Copermittee must exercise its full authority to secure the resources necessary to meet all requirements of this Order.

2. Annual Analysis: Each Copermittee must conduct an annual fiscal analysis of the necessary capital and operation and maintenance expenditures necessary to accomplish the activities of the programs required by this Order. The analysis must include estimated expenditures for the current reporting period, the preceding period, and the next reporting period.

a. Each analysis must include a description of the source of funds that are proposed to meet the necessary expenditures.

b. Each analysis must include a narrative description of circumstances resulting in a 25 percent or greater annual change for any budget line items.

3. Annual Reporting: Each Copermittee must submit its annual fiscal analysis with the annual JRMP report.

I. TOTAL MAXIMUM DAILY LOADS

1. The waste load allocations (WLAs) of fully approved and adopted TMDLs are incorporated as Water Quality Based Effluent Limitations on a pollutant by pollutant, watershed by watershed basis. Early TMDL requirements, including monitoring, may be required and inserted into this Order pursuant to Finding E.10.

2. The Cities of Wildomar and Murrieta must comply with the requirements and WLAs assigned to the discharges from their MS4s contributing to the Lake Elsinore/Canyon Lake (San Jacinto Watershed) Nutrient TMDLs as specified in Section VI.D.2 of the Santa Ana Water Board's Order R8-2010-0033 and subsequent revisions thereto.

J. PROGRAM EFFECTIVENESS ASSESSMENT AND REPORTING

Beginning with the Annual Report due in 2013, each Copermittee must annually assess and report upon the effectiveness of its JRMP and Watershed Workplan implementation to (1) reduce the discharge of storm water pollutants from its MS4 to

the MEP; (2) prohibit non-stormwater discharges; and (3) prevent runoff discharges from the MS4 from causing or contributing to a violation of water quality standards.

1. Program Effectiveness Assessments

a. IDENTIFY EFFECTIVENESS ASSESSMENTS

With the JRMP and Watershed Workplan submittal, each Copermittee must establish assessment measures or methods for each of the six outcome levels described by CASQA[18], using data from each JRMP program component, the MRP, and the Watershed Workplan.

(1) Assessment interval: For each established assessment measure or method, an assessment interval must be established as appropriate to the measure or method.

(2) Projected Timeframe: For each established assessment measure or method, each Copermittee must identify the projected timeframe within which the associated outcome level can adequately assess change.

b. PERFORM ASSESSMENTS

(1) Annually: Each year, the Copermittee must perform each applicable assessment based on the associated assessment interval, and determine whether the desired outcome has been met;

(2) With the submittal of the Report of Waste Discharge, the Copermittees must determine whether their program implementation is resulting in the protection and/or improvement of water quality through an Integrated Assessment;

2. Respond to Assessments

a. Where the assessments indicate that the desired outcome level has not been achieved at the end of the projected timeframe, the Copermittee must review its applicable activities and BMPs to identify any modifications and improvements needed to maximize effectiveness, as necessary to comply with this Order. If the Copermittee determines that the existing activities/BMPs are adequate, or that the projected timeframe should be extended, justification and an updated timeframe for attainment of the outcome level must be provided in the Annual Report.

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[18] Effectiveness assessment outcome levels as defined by CASQA are defined in Attachment C of this Order. See "*Municipal Stormwater Program Effectiveness Assessment Guidance"* (CASQA, May 2007) for guidance for assessing program activities at the various outcome levels.

b. Each Copermittee must develop and implement a work plan and schedule to address any program modifications and improvements in response to the findings of its assessment. The work plan and schedule must be provided and updated with the applicable Annual Report. The work plan must include, at a minimum, the following:

(1) The problems and priorities identified during the assessment;
(2) A list of priority pollutants and known or suspected sources;
(3) A brief description of the strategy employed to reduce, eliminate or mitigate the negative impacts;
(4) A description and schedule for new and/or modified BMPs. The schedule is to include dates for significant milestones;
(5) A description of how the selected activities will address an identified high priority problem. This will include a description of the expected effectiveness and benefits of the new and/or modified BMPs;
(6) A description of implementation effectiveness metrics;
(7) A description of how efficacy results will be used to modify priorities and implementation; and
(8) A review of past activities implemented, progress in meeting water quality standards, and planned program adjustments.

3. Assessment and Response Reporting

Each Copermittee must include a summary of its effectiveness assessments within each Annual Report. Beginning with the FY 2012-2013 Annual Report, the Program Effectiveness reporting must include:

a. The results of each of the effectiveness assessments performed pursuant to J.1.b, including the demonstrated CASQA effectiveness level(s);

b. Responses to effectiveness assessments; A description of any program modifications planned in accordance with section J.2, including the work plan and identified schedule for implementation. The description must include the basis for determining that each modified activity and/or BMP represents an improvement expected to result in improved water quality;

c. A description of any steps to be implemented to improve the Copermittee's ability to assess program effectiveness.

K. REPORTING

The Copermittees may propose alternate reporting criteria and schedules, as part of their updated JRMP, for the Executive Officer's acceptance.

1. Runoff Management Plans

a. JURISDICTIONAL RUNOFF MANAGEMENT PLANS

(1) The written account of the overall program to be conducted by each Copermittee to meet the jurisdictional requirements of section F of this Order is referred to as the Jurisdictional Runoff Management Plan (JRMP). Each Copermittee must revise and update its existing JRMP so that it describes all activities the Copermittee will undertake to implement the requirements of this Order. Each Copermittee must submit its updated and revised JRMP to the San Diego Water Board no later than June 30, 2012.

(2) At a minimum, each Copermittee's JRMP must be updated and revised to demonstrate compliance with each applicable section of this Order.

b. WATERSHED WORKPLANS

Copermittees must update and revise the Watershed Workplan to describe any changes in water quality problems or priorities, and any necessary change to actions Copermittees will take to implement jurisdictional or watershed BMPs to address those identified. The Copermittees must assemble and submit the Watershed Workplan to the San Diego Water Board no later than June 30, 2012, and must implement the Workplan within 90 days unless otherwise directed by the San Diego Water Board.

2. Other Required Reports and Plans

a. SSMP UPDATES

(1) Copermittees must submit their updated SSMP in accordance with the applicable requirements of section F.1 with the JRMP by June 30, 2012.
(2) Within 180 days of determination that the SSMP is in compliance with this Order's provisions, each Copermittee must amend its ordinances consistent with the SSMP and implement the updated SSMP. Any amended or new ordinances must be submitted to the San Diego Water Board within 30 days of adoption.

b. HMP

(1) By June 30, 2013, the Copermittees must submit to the San Diego Water Board Executive Officer a draft HMP that has been reviewed by the public, including identification of the appropriate limiting range of flow rates in accordance with the applicable requirements of section F.1.h.

(2) Within 180 of receiving San Diego Water Board comments on the draft HMP, the Copermittees must submit a final HMP that addressed the San Diego Water Board's comments.

(3) Within 90 days of receiving a finding of adequacy from the Executive Officer each Copermittee must incorporate and implement the HMP for all Priority Development Projects.

(4) Prior to acceptance of the HMP by the San Diego Water Board, the early implementation measures likely to be included in the HMP shall be encouraged by the Copermittees.

c. REPORT OF WASTE DISCHARGE

The Copermittees must submit to the San Diego Water Board, no later than 180 days in advance of the expiration date of this Order, a Report of Waste Discharge (ROWD) as an application for issuance of new waste discharge requirements. The fourth annual report for this Order may supplement the ROWD, provided the ROWD contains the minimum information below.

At a minimum, the ROWD must include the following: (1) Proposed changes to the Copermittees' runoff management programs; (2) Proposed changes to monitoring programs; (3) Justification for proposed changes; (4) Name and mailing addresses of the Copermittees; (5) Names and titles of primary contacts of the Copermittees; (6) Any other information necessary for the reissuance of this Order and (7) Any other information required by federal regulations for permit reapplications.

3. Annual Reports

a. JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM (JRMP) ANNUAL REPORTS

(1) Each Copermittee must generate individual JRMP Annual Reports that cover implementation of its jurisdictional activities during the past annual reporting period. Each Annual Report must verify and document compliance with this Order as directed in this section. Each Copermittee must retain records in accordance with the Standard Provisions in Attachment B of this Order,

available for review, that document compliance with each requirement of this Order. The reporting period for these annual reports must be the previous fiscal year.

(2) Each Copermittee must submit its JRMP Annual Reports to the San Diego Water Board by October 31of each year, beginning on October 31, 2013.

(3) Each JRMP Annual Report must contain, at a minimum, the following information, as applicable to the Copermittee:

(a) Information required to be reported annually in Section H (Fiscal Analysis) of this Order;
(b) Information required to be reported annually in Section J (Program Effectiveness) of this Order;
(c) The completed Reporting Checklist found in Attachment D, and
(d) Information for each program component as described in the following Table 9:

Table 9. Annual Reporting Requirements

Program Component	Reporting Requirement
New Development	1. All updated relevant sections of the General Plan and environmental review process and a description of any planned updates within the next annual reporting period, if applicable
	2. All revisions to the SSMP, including where applicable: (a) Identification and summary of where the SSMP fails to meet the requirements of this Order; (b) Updated procedures for identifying pollutants of concern for each Priority Development Project; (c) Updated treatment BMP ranking matrix; and (d) Updated site design and treatment control BMP design standards;
	3. Number of Priority Development Projects reviewed and approved during the reporting period. Brief description of BMPs required at approved Priority Development Projects. Verification that site design, source control, and treatment BMPs were required on all applicable Priority Development Projects;
	4. Name and location of all Priority Development Projects that were granted a waiver from implementing LID BMPs pursuant to section F.1.d.(4) during the reporting period;
	5. Updated watershed-based BMP maintenance tracking database of approved treatment control BMPs and treatment control BMP maintenance within its jurisdiction, including updates to the list of high-priority Priority Development Projects; and verification that the requirements of this Order were met during the reporting period.

Program Component	Reporting Requirement
New Development	6. Name and brief description of all approved Priority Development Projects required to implement hydrologic control measures in compliance with section F.1.h including a brief description of the management measures planned to protect downstream beneficial uses and prevent adverse physical changes to downstream stream channels;
	7. Number and description of all enforcement activities applicable to the new development and redevelopment component and a summary of the effectiveness of those activities;
Construction	1. All updated relevant ordinances and description of planned ordinance updates within the next annual reporting period, if applicable;
	2. A description of any changes to procedures used for identifying priorities for inspecting sites and enforcing control measures that consider the nature of the construction activity, topography, and the characteristics of soils and receiving water quality;
	3. Any changes to the designated minimum and enhanced BMPs;
	4. Summary of the inspection program, including the following information: (a) Total number and date of inspections conducted at each facility; (b) Number, date, and types of enforcement actions by facility; (c) Brief description of each high-level enforcement actions at construction sites including the effectiveness of the enforcement. Supporting paper (or electronic) files must be maintained by the Copermittees and made available upon San Diego Water Board request. Supporting files must include a record of inspection dates, the results of each inspection , photographs (if any), and a summary of any enforcement actions taken.
Municipal	1. Updated source inventory;
	2.All changes to the designated municipal BMPs;
	3. Descriptions of any changes to procedures to assure that flood management projects assess the impacts on the water quality of receiving water bodies;
	4. Summary and assessment of BMPs retrofits implemented at flood control structures, including: (a) List of projects retrofitted; and (b) List and description of structures evaluated for retrofitting; (c) List of structures still needing to be evaluated and the schedule for evaluation.;
	5. Summary of the municipal structural treatment control operations and maintenance activities, including: (a) Number of inspections and types of facilities; and (b) Summary of findings;

Program Component	Reporting Requirement
Municipal	6. Summary of the MS4 and MS4 facilities operations and maintenance activities, including: (a) Number and types of facilities maintained; (b) Amount of material removed; and (c) List of facilities planned for bi-annual inspections and the justification;
	7. Summary of the municipal areas/programs inspection activities, including: (a) Number and date of inspections conducted at each facility; (c) The BMP violations identified during the inspection by facility; (d) Number, date and types of enforcement actions by facility; (e) Summary of inspection findings and follow-up activities for each facility;
	8. Description of activities implemented to address sewage infiltration into the MS4;
	9. Description of BMPs and their implementation for unpaved roads construction and maintenance.
Commercial / Industrial	1. Updated inventory of commercial / industrial sources;
	2. Summary of the inspection program, including the following information: (a) Number and date of inspections conducted at each facility or mobile business;; (c) The BMP violations identified during the inspection by facility; (d) Number, date, and types of enforcement actions by facility or mobile business; (e) Brief description of each high-level enforcement actions at commercial/industrial sites including the effectiveness of the enforcement and follow-up activities for each facility;.
	3. All changes to designated minimum and enhanced BMPs;
	4. A list of industrial sites, including each name, address, and SIC code, that the Copermittee suspects may require coverage under the General Industrial Permit, but has not submitted an NOI;
Residential	1. All updated minimum BMPs required for residential areas and activities;
	2. Quantification and summary of applicable runoff and storm water enforcement actions within residential areas and activities;
	3. Description of efforts to manage runoff and storm water pollution in common interest areas and mobile home parks;
Retrofitting Existing Development	1. Updated inventory and prioritization of existing developments identified as candidates for retrofitting.
	2. Description of efforts to retrofit existing developments during the reporting year.

Program Component	Reporting Requirement
Retrofitting Existing Development	3. Description of efforts taken to encourage private landowners to retrofit existing development.
	4. A list of all retrofit projects that have been implemented, including site location, a description of the retrofit project, pollutants expected to be treated, and the tributary acreage of runoff that will be treated.
	5. Any proposed retrofit or regional mitigation projects and timelines for future implementation.
	6. Any proposed changes to the Copermittee's overall retrofitting program.
Illicit Discharge Detection and Elimination	1. Any changes to the legal authority to implement Illicit Discharge Detection and Elimination activities;
	2. Any Changes to the established investigation procedures;
	3. Any changes to public reporting mechanisms, including phone numbers and web pages;
	4. Summaries of illicit discharges (including spills and water quality data events) and how each significant case was resolved;
	5. A description of instances when field screening and analytical data exceeded action levels, including those instances for which no investigation was conducted;
	6. A description of follow-up and enforcement actions taken in response to investigations of illicit discharges and a description of the outcome of the investigation/enforcement actions;
Workplans	Updated workplans including priorities, strategy, implementation schedule and effectiveness evaluation;

(4) Each JRMP Annual Report must also include the following information regarding non-storm water discharges (see Section B.2. of this Order):

(a) Identification of non-storm water discharge categories identified as a source of pollutants to waters of the U.S;
(b) A description of any updates to ordinances, orders, or similar means to prohibit non-storm water discharge categories identified under section B.2 above ;
(c) Identification of any control measures to be required and implemented for non-storm water discharge categories identified as needing controls by the San Diego Water Board; and
(d) A description of a program to address pollutants from non-emergency fire fighting flows identified by the Copermittee to be significant sources of pollutants.

4. Interim Reporting Requirements

For the reporting periods, prior to submittal of the JRMP, Each JRMP Annual Report must be submitted in accordance with the requirements and deadlines described in Order No. 2004-001.

5. Universal Reporting Requirements

All submittals must include an executive summary, introduction, conclusion, recommendations, and signed certified statement. Each Copermittee must submit a signed certified statement covering its responsibilities for each applicable submittal. The Principal Copermittee must submit a signed certified statement covering its responsibilities for each applicable submittal and the sections of the submittals for which it is responsible.

L. MODIFICATION OF PROGRAMS

Modifications of JRMPs and/or Watershed Workplan may be initiated by the Executive Officer of the San Diego Water Board or by the Copermittees. Requests by Copermittees must be made to the Executive Officer, and must be submitted during the annual review process. Requests for modifications should be incorporated, as appropriate, into the Annual Reports or other deliverables required or allowed under this Order.

1. Minor modifications to JRMPs, and/or Watershed Workplan, may be accepted by the Executive Officer where the Executive Officer finds the proposed modification complies with all discharge prohibitions, receiving water limitations, and other requirements of this Order.

2. Proposed modifications that are not minor require amendment of this Order in accordance with this Order's rules, policies, and procedures.

M. PRINCIPAL COPERMITTEE RESPONSIBILITIES

Within 180 days of adoption of this Order, the Copermittees must designate the Principal Copermittee and notify the San Diego Water Board of the name of the Principal Copermittee. The Principal Copermittee must, at a minimum:

1. Serve as liaison between the Copermittees and the San Diego Water Board on general permit issues, and when necessary and appropriate, represent the Copermittees before the San Diego Water Board.

2. Coordinate permit activities among the Copermittees and facilitate collaboration on the development and implementation of programs required under this Order.

3. Produce and submit documents and reports as required by section K of this Order and Receiving Waters and MS4 Discharge Monitoring and Reporting Program No. R9-2010-0016 in Attachment E of this Order.

N. RECEIVING WATERS AND MS4 DISCHARGE MONITORING AND REPORTING PROGRAM

Pursuant to CWC section 13267, the Copermittees must comply with all the requirements contained in Receiving Waters and MS4 Discharge Monitoring and Reporting Program No. R9-2010-0016 in Attachment E of this Order.

O. STANDARD PROVISIONS, REPORTING REQUIREMENTS, AND NOTIFICATIONS

1. Each Copermittee must comply with Standard Provisions, Reporting Requirements, and Notifications contained in Attachment B of this Order. This includes 24 hour/5 day reporting requirements for any instance of non-compliance with this Order as described in section 5.e of Attachment B.

2. All plans, reports and subsequent amendments submitted in compliance with this Order must be implemented immediately (or as otherwise specified). All submittals by Copermittees must be adequate to implement the requirements of this Order.

I, David W. Gibson, Executive Officer, do hereby certify the foregoing is a full, true, and correct copy of an Order adopted by the California Regional Water Quality Control Board, San Diego Region, on October 13, 2010.

\\TENTATIVE
David W. Gibson
Executive Officer

ATTACHMENT A

BASIN PLAN PROHIBITIONS

California Water Code Section 13243 provides that a Regional Board, in a water quality control plan, may specify certain conditions or areas where the discharge of waste or certain types of waste is not permitted. The following discharge prohibitions are applicable to any person, as defined by Section 13050(c) of the California Water Code, who is a citizen, domiciliary, or political agency or entity of California whose activities in California could affect the quality of waters of the state within the boundaries of the San Diego Region.

1. The discharge of waste to waters of the state in a manner causing, or threatening to cause a condition of pollution, contamination or nuisance as defined in California Water Code Section 13050, is prohibited.

2. The discharge of waste to land, except as authorized by waste discharge requirements or the terms described in California Water Code Section 13264 is prohibited.

3. The discharge of pollutants or dredged or fill material to waters of the United States except as authorized by a NPDES permit or a dredged or fill material permit (subject to the exemption described in California Water Code Section 13376) is prohibited.

4. Discharges of recycled water to lakes or reservoirs used for municipal water supply or to inland surface water tributaries thereto are prohibited, unless this Regional Board issues a NPDES permit authorizing such a discharge; the proposed discharge has been approved by the State Department of Health Services and the operating agency of the impacted reservoir; and the discharger has an approved fail-safe long-term disposal alternative.

5. The discharge of waste to inland surface waters, except in cases where the quality of the discharge complies with applicable receiving water quality objectives, is prohibited. Allowances for dilution may be made at the discretion of the Regional Board. Consideration would include streamflow data, the degree of treatment provided and safety measures to ensure reliability of facility performance. As an example, discharge of secondary effluent would probably be permitted if streamflow provided 100:1 dilution capability.

6. The discharge of waste in a manner causing flow, ponding, or surfacing on lands not owned or under the control of the discharger is prohibited, unless the discharge is authorized by the Regional Board.

7. The dumping, deposition, or discharge of waste directly into waters of the state, or adjacent to such waters in any manner which may permit its being transported into the waters, is prohibited unless authorized by the Regional Board.

8. Any discharge to a storm water conveyance system that is not composed entirely of "storm water" is prohibited unless authorized by the Regional Board. [The federal regulations, 40 CFR 122.26(b)(13), define storm water as storm water

runoff, snow melt runoff, and surface runoff and drainage. 40 CFR 122.26(b)(2) defines an illicit discharge as any discharge to a storm water conveyance system that is not composed entirely of storm water except discharges pursuant to a NPDES permit and discharges resulting from fire fighting activities. [§122.26 amended at 56 FR 56553, November 5, 1991; 57 FR 11412, April 2, 1992].

9. The unauthorized discharge of treated or untreated sewage to waters of the state or to a storm water conveyance system is prohibited.

10. The discharge of industrial wastes to conventional septic tank/subsurface disposal systems, except as authorized by the terms described in California Water Code Section 13264, is prohibited.

11. The discharge of radioactive wastes amenable to alternative methods of disposal into the waters of the state is prohibited.

12. The discharge of any radiological, chemical, or biological warfare agent into waters of the state is prohibited.

13. The discharge of waste into a natural or excavated site below historic water levels is prohibited unless the discharge is authorized by the Regional Board.

14. The discharge of sand, silt, clay, or other earthen materials from any activity, including land grading and construction, in quantities which cause deleterious bottom deposits, turbidity or discoloration in waters of the state or which unreasonably affect, or threaten to affect, beneficial uses of such waters is prohibited.

15. The discharge of treated or untreated sewage from vessels to Mission Bay, Oceanside Harbor, Dana Point Harbor, or other small boat harbors is prohibited.

ATTACHMENT B

STANDARD PROVISIONS, REPORTING REQUIREMENTS, AND NOTIFICATIONS

1. STANDARD PROVISIONS – PERMIT COMPLIANCE [40 CFR 122.41]

(a) *Duty to comply* [40 CFR 122.41(a)].

(1) The Copermittee must comply with all of the conditions of this Order. Any noncompliance constitutes a violation of the Clean Water Act (CWA) and the California Water Code (CWC) and is grounds for enforcement action, for permit termination, revocation and reissuance, or modification; or denial of a permit renewal application.

(2) The Copermittee shall comply with effluent standards or prohibitions established under section 307(a) of the CWA toxic pollutants and with standards for sewage sludge use or disposal established under section 405(d) of the CWA within the time provided in the regulations that establish these standards or prohibitions or standards for sewage sludge use or disposal, even if the Order has not yet been modified to incorporate the requirement.

(b) *Need to halt or reduce activity not a defense* [40 CFR 122.41(c)]. It shall not be a defense for the Copermittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this Order.

(c) *Duty to mitigate* [40 CFR 122.41(d)]. The Copermittee shall take all reasonable steps to minimize or prevent any discharge or prevent any discharge or sludge use or disposal in violation of this Order that has a reasonable likelihood of adversely affecting human health or the environment.

(d) *Proper operation and maintenance* [40 CFR 122.41(e)]. The Copermittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the Copermittee to achieve compliance with the conditions of this Order. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures. This provision requires the operation of back-up or auxiliary facilities or similar systems that are installed by the Copermittee only when necessary to achieve compliance with the conditions of this Order.

(e) *Property rights* [40 CFR 122.41(g)].

(1) This Order does not convey any property rights of any sort or any exclusive privilege.
(2) The issuance of this Order does not authorize any injury to persons or property or invasion of other private rights, or any infringement of State or local law or regulations.

(f) *Inspection and entry* [40 CFR 122.41(i)]. The Copermittee shall allow the Regional Water Quality Control Board, San Diego Region (Regional Board), State Water Resources Control Board (SWRCB), United States Environmental Protection Agency

(USEPA), and/or their authorized representatives (including an authorized contractor acting as their representative), upon presentation of credentials and other documents as may be required by law, to:

(1) Enter upon the Copermittee's premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of this Order;
(2) Have access to and copy, at reasonable times, any records that must be kept under the conditions of this Order;
(3) Inspect and photograph, at reasonable times, any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this Order; and
(4) Sample or monitor, at reasonable times, for the purpose of assuring Order compliance or as otherwise authorized by the CWA or the CWC, any substances or parameters at any location.

(g) *Bypass* [40 CFR 122.41(m)]

(1) Definitions:

i) "Bypass" means the intentional diversion of waste streams from any portion of a treatment facility.
ii) "Severe property damage" means substantial physical damage to property, damage to the treatment facilities, which causes them to become inoperable, or substantial and permanent loss of natural resources that can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production.

(2) Bypass not exceeding limitations - The Copermittee may allow any bypass to occur which does not cause exceedances of effluent limitations, but only if it also is for essential maintenance to assure efficient operation. These bypasses are not subject to the provisions listed in Standard Provisions – Permit Compliance (g)(3), (g)(4) and (g)(5) below.

(3) Prohibition of Bypass - Bypass is prohibited, and the Regional Board may take enforcement action against a Copermittee for bypass, unless:

i) Bypass was unavoidable to prevent loss of life, personal injury, or severe property damage;
ii) There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate back-up equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass which occurred during normal periods of equipment downtime or preventive maintenance; and
iii) The Copermittee submitted notice as required under Standard Provisions – Permit Compliance (g)(3) above.

(4) Notice

i) Anticipated bypass. If the Copermittee knows in advance of the need for a

bypass, it shall submit a notice, if possible at least ten days before the date of the bypass.

ii) Unanticipated bypass. The Copermittee shall submit notice of an unanticipated bypass as required in Standard Provisions 5(e) below (24-hour notice).

(h) *Upset* [40 CFR 122.41(n)] Upset means an exceptional incident in which there is unintentional and temporary noncompliance with technology based effluent limitations because of factors beyond the reasonable control of the Copermittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation.

(1) Effect of an upset. An upset constitutes an affirmative defense to an action brought for noncompliance with such technology based permit effluent limitations if the requirements of Standard Provisions – Permit Compliance (h)(2) below are met. No determination made during administrative review of claims that noncompliance was caused by upset, and before an action for noncompliance, is final administrative action subject to judicial review.

(2) Conditions necessary for a demonstration of upset. A Copermittee who wishes to establish the affirmative defense of upset shall demonstrate, through properly signed, contemporaneous operating logs, or other relevant evidence that:

i) An upset occurred and that the Copermittee can identify the cause(s) of the upset;
ii) The permitted facility was at the time being properly operated;
iii) The Copermittee submitted notice of the upset as required in Standard Provisions – Permit Compliance (5)(e)(ii)(B) below (24-hour notice); and
iv) The Copermittee complied with any remedial measures required under Standard Provisions – Permit Compliance 1(c) above.

(3) Burden of Proof. In any enforcement proceeding, the Copermittee seeking to establish the occurrence of an upset has the burden of proof.

2. STANDARD PROVISIONS – PERMIT ACTION

(a) *General* [40 CFR 122.41(f)] This Order may be modified, revoked and reissued, or terminated for cause. The filing of a request by the Copermittee for modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance does not stay any Order condition.

(b) *Duty to reapply* [40 CFR 122.41(b)]. If the Copermittee wishes to continue an activity regulated by this Order after the expiration date of this Order, the Copermittee must apply for and obtain new permit.

(c) *Transfers*. This Order is not transferable to any person except after notice to the Regional Board. The Regional Board may require modification or revocation and reissuance of the Order to change the name of the Copermittee and incorporate such other requirements as may be necessary under the CWA and the CWC.

3. STANDARD PROVISIONS – MONITORING

(a) Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity. [40 CFR Section 122.41 (j) (1)]

(b) Monitoring results must be conducted according to test procedures under 40 CFR Part 136, or in the case of sludge use or disposal, approved under 40 CFR Part 136 unless otherwise specified in 40 CFR Part 503 unless other test procedures have been specified in this Order [40 CFR Section 122.41(j)(4)][40 CFR Section 122.44(i)(1)(iv)].

4. STANDARD PROVISIONS – RECORDS

(a) Except for records of monitoring information required by this Order related to the Copermittee's sewage sludge use and disposal activities, which shall be retained for a period of at least five years (or longer as required by 40 CFR Part 503), the Copermittee shall retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this Order, and records of all data used to complete the application for this Order, for a period of at least three (3) years from the date of the sample, measurement, report or application, This period may be extended by request of the Regional Water Board Executive Officer at any rime [40 CFR Section 122.41(j)(2)].

(b) *Records of monitoring information* [40 CFR 122.41(j) (3)] shall include:

(1) The date, exact place, and time of sampling or measurements;
(2) The individual(s) who performed the sampling or measurements;
(3) The date(s) analyses were performed;
(4) The individual(s) who performed the analyses;
(5) The analytical techniques or methods used; and
(6) The results of such analyses.

(c) *Claims of confidentiality* [40 CFR Section 122.7(b)] of the following information will be denied:

(1) The name and address of any permit applicant or Copermittee; and
(2) Permit applications and attachments, permits and effluent data.

5. STANDARD PROVISIONS – REPORTING

(a) *Duty to provide information* [40 CFR 122.41(h)]. The Copermittee shall furnish to the Regional Board, SWRCB, or USEPA within a reasonable time, any information which the Regional Board, SWRCB, or USPEA may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this Order or to determine compliance with this Order. Upon request, the Copermittee shall also furnish to the Regional Board, SWRCB, or USEPA, copies of records required to be kept by this Order.

(b) *Signatory and Certification Requirements* [40 CFR 122.41(k)]

(1) All applications, reports, or information submitted to the Regional Board, SWRCB, or USEPA shall be signed and certified in accordance with Standard Provisions – Reporting 5(b)ii), 5(b)iii), 5(b)iv), and 5(b) (see 40 CFR 122.22)

(2) *Applications* [40 CFR 122.22(a)(3)] All permit applications shall be signed by either a principal executive officer or ranking elected official.

(3) *Reports* [40 CFR 122.22(b)]. All reports required by this Order, and other information requested by the Regional Board, SWRCB, or USEPA shall be signed by a person described in Standard Provisions – Reporting 5(b)(2) above, or by a duly authorized representative of that person. A person is a duly authorized representative only if:

i) The authorization is made in writing by a person described in Standard Provisions-Reporting 5(b)(2) above;

ii) The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity, such as the position of plant manager, operator of a well or a well field, superintendent, position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters for the company. (A duly authorized representative may thus be either a named individual or any individual occupying a named position.); and,

iii) The written authorization is submitted to the Regional Water Board and State Water Board.

(4) *Changes to authorization* [40 CFR Section 122.22(c)] If an authorization under Standard Provisions – Reporting 5(b)(3)of this reporting requirement is no longer accurate because a different individual or position has responsibility for the overall operation of the facility, a new authorization satisfying the requirements of Standard Provisions – Reporting 5(b)(3) above must be submitted to the Regional Water Board and State Water Board prior to or together with any reports, information, or applications to be signed by an authorized representative.

(5) *Certification* [40 CFR Section 122.22(d)] Any person signing a document under Standard Provisions – Reporting 5(b)(2), or 5(b)(3) above shall make the following certification:

”I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.”

(c) *Monitoring reports*. [40 CFR 122.41(l)(4)]

(1) Monitoring results shall be reported at the intervals specified in the Receiving Waters and Runoff Monitoring and Reporting Program No. R9-2009-0002.

(2) Monitoring results must be reported on a Discharge Monitoring Report (DMR) form or forms provided or specified by the Regional Board or SWRCB for reporting results of mentoring of sludge use or disposal practices.

(3) If the Copermittee monitors any pollutant more frequently than required by this Order using test procedures approved under 40 CFR Part 136 or, in the case of sludge use or disposal, approved under 40 CFR Part 136 unless otherwise specified in 40 CFR Part 503, or as specified in this Order, the results of this monitoring shall be included in the calculation and reporting of the data submitted in the DMR or sludge reporting form specified by the Regional Board.

(4) Calculations for all limitations, which require averaging of measurements, shall utilize an arithmetic mean unless otherwise specified in this Order.

(d) *Compliance schedules*. [40 CFR Section 122.41(l)(5)] Reports of compliance or noncompliance with, or any progress reports on, interim and final requirements contained in any compliance schedule of this Order shall be submitted no later than 14 days following each schedule date.

(e) *Twenty-four hour reporting* [40 CFR Section 122.41(l)(6)]

(1) The Copermittee shall report any noncompliance that may endanger health or the environment. Any information shall be provided orally within 24 hours from the time the Copermittee becomes aware of the circumstances. A written submission shall also be provided within five (5) days of the time the Copermittee becomes aware of the circumstances. The written submission shall contain a description of the noncompliance and its cause; the period of noncompliance, including exact dates and times, and if the noncompliance has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance.

(2) The following shall be included as information, which must be reported within 24 hours under this paragraph:

i) Any unanticipated bypass that exceeds any effluent limitation in the Order (See 40 CFR 122.41(g)).
ii) Any upset which exceeds any effluent limitation in this Order.

(3) The Regional Board may waive the above-required written report under this provision on a case-by-case basis if the oral report has been received within 24 hours.

(f) *Planned changes*. [40 CFR Section 122.41(l)(1)] The Copermittee shall give notice to the Regional Board as soon as possible of any planned physical alterations or additions to the permitted facility. Notice is required under this provision only when:

(1) The alteration or addition to a permitted facility may meet one of the criteria for

determining whether a facility is a new source in 40 CFR 122.29(b); or

(2) The alteration or addition could significantly change the nature or increase the quantity of pollutants discharged. This notification applies to pollutants, which are not subject to effluent limitations in this Order.

(3) The alteration or addition results in a significant change in the Copermittee's sludge use or disposal practices, and such alteration, addition, or change may justify the application of permit conditions that are different from or absent in the existing Order, including notification of additional use or disposal sites not reported during the permit application process or not reported pursuant to an approved land application plan.

(g) *Anticipated noncompliance*. [40 CFR Section 122.41(l)(7)] The Copermittee shall give advance notice to the Regional Board or SWRCB of any planned changes in the permitted facility or activity, which may result in noncompliance with Order requirements.

(h) *Other noncompliance* [40 CFR Section 122.41(l) 7)] The Copermittee shall report all instances of noncompliance not reported under Standard Provisions 5(c), 5(d), and 5(e) above, at the time monitoring reports are submitted. The reports shall contain the information listed in Standard Provision – Reporting 5(e) above.

(i) *Other information* [40 CFR Section 122.41(l)(8)] When the Copermittee becomes aware that it failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application or in any report to the Regional Board, SWRCB, or USEPA, the Copermittee shall promptly submit such facts or information.

6. STANDARD PROVISIONS – ENFORCEMENT

(a) The Regional Board is authorized to enforce the terms of this permit under several provisions of the CWC, including, but not limited to, Sections 13385, 13386, and 13387.

7. ADDITIONAL STANDARD PROVISIONS

(a) *Municipal separate storm sewer systems* [40 CFR 122.42(c)]. The operator of a large or medium municipal separate storm sewer system or a municipal separate storm sewer that has been designated by the Director under 40 CFR 122.26(a)(1)(v) must submit an annual report by the anniversary of the date of the issuance of the permit for such system. The report shall include:

(1) The status of implementing the components of the storm water management program that are established as permit conditions;

(2) Proposed changes to the storm water management programs that are established as permit conditions. Such proposed changes shall be consistent with 40 CFR 122.26(d)(2)(iii); and

(3) Revisions, if necessary, to the assessment of controls and the fiscal analysis

reported in the permit application under 40 CFR 122.26(d)(2)(iv) and 40 CFR 122.26(d)(2)(v);

(4) A summary of data, including monitoring data, that is accumulated throughout the reporting year;

(5) Annual expenditures and budget for year following each annual report;

(6) A summary describing the number and nature of enforcement actions, inspections, and public education programs; and

(7) Identification of water quality improvements or degradation.

(b) *Storm water discharges* [40 CFR 122.42(d)]. The initial permits for discharges composed entirely of storm water issued pursuant to 40 CFR 122.26(e)(7) shall require compliance with the conditions of the permit as expeditiously as practicable, but in no event later than three years after the date of issuance of the permit.

(c) *Other Effluent Limitations and Standards* [40 CFR 122.44(b)(1)]. If any toxic effluent standard or prohibition (including any schedule of compliance specified in such effluent standard or prohibition) is promulgated under Section 307(a) of the CWA for a toxic pollutant which is present in the discharge and that standard or prohibition is more stringent than any limitation on the pollutant in this Order, the Regional Board may institute proceedings under these regulations to modify or revoke and reissue the Order to conform to the toxic effluent standard or prohibition.

(d) *Discharge is a privilege* [CWC section 13263(g)]. No discharge of waste into the waters of the State, whether or not such discharge is made pursuant to waste discharge requirements, shall create a vested right to continue such discharge. All discharges of waste into waters of the State are privileges, not rights.

(e) *Review and revision of Order* [CWC section 13263(e)]. Upon application by any affected person, or on its own motion, the Regional Board may review and revise this permit.

(f) *Termination or modification of Order* [CWC section13381]. This permit may be terminated or modified for causes, including, but not limited to, all of the following:

(1) Violation of any condition contained in this Order.
(2) Obtaining this Order by misrepresentation, or failure to disclose fully all relevant facts.
(3) A change in any condition that requires either a temporary or permanent reduction or elimination of the permitted discharge.

(g) *Transfers*. When this Order is transferred to a new owner or operator, such requirements as may be necessary under the CWC may be incorporated into this Order.

(h) *Conditions not stayed*. The filing of a request by the Copermittee for modification, revocation and reissuance, or termination of this Order, or a notification of planned change in or anticipated noncompliance with this Order does not stay any condition of this Order.

(i) *Availability*. A copy of this Order shall be kept at a readily accessible location and shall be available to on-site personnel at all times.

(j) *Duty to minimize or correct adverse impacts*. The Copermittees shall take all reasonable steps to minimize or correct any adverse impact on the environment resulting from noncompliance with this Order, including such accelerated or additional monitoring as may be necessary to determine the nature and impact of the noncompliance.

(k) *Interim Effluent Limitations.* The Copermittee shall comply with any interim effluent limitations as established by addendum, enforcement action, or revised waste discharge requirements which have been, or may be, adopted by this Regional Board.

(l) *Responsibilities, liabilities, legal action, penalties* [CWC sections 13385 and 13387]. The Porter-Cologne Water Quality Control Act provides for civil and criminal penalties comparable to, and in some cases greater than, those provided for under the CWA.

Nothing in this Order shall be construed to protect the Copermittee from its liabilities under federal, state, or local laws.

Except as provided for in 40CFR 122.41(m) and (n), nothing in this Order shall be construed to relieve the Copermittee from civil or criminal penalties for noncompliance.

Nothing in this Order shall be construed to preclude the institution of any legal action or relieve the Copermittee from any responsibilities, liabilities, or penalties to which the Copermittee is or may be subject to under Section 311 of the CWA.

Nothing in this Order shall be construed to preclude institution of any legal action or relieve the Copermittee from any responsibilities, liabilities, or penalties established pursuant to any applicable state law or regulation under authoring preserved by Section 510 of the CWA.

(m) *Noncompliance*. Any noncompliance with this Order constitutes violation of the CWC and is grounds for denial of an application for modification of the Order (also see 40 CFR 122.41(a).

(n) *Director*. For purposes of this Order, the term “Director” used in parts of 40 CFR incorporated into this Order by reference and/or applicable to this Order shall have the same meaning as the term “Regional Board” used elsewhere in this Order, except that in 40 CFR 122.41(h) and (I), “Director” shall mean “Regional Board, SWRCB, and USEPA.”

(o) The Regional Board has, in prior years, issued a limited number of individual NPDES permits for non-storm water discharges to MS4s. The Regional Board or SWRCB may in the future, upon prior notice to the Copermittee(s), issue an NPDES permit for any non-storm water discharge (or class of non-storm water discharges) to a MS4. Copermittees may prohibit any non-storm water discharge (or class of non-storm water discharges) to a MS4 that is authorized under such separate NPDES permits.

(p) *Effective date*. This Order shall become effective on the date of its adoption provided the USEPA has no objection. If the USEPA objects to its issuance, this Order shall not become effective until such objection is withdrawn. This Order supersedes Order No. 2001-01 upon the effective date of this Order.

(q) *Expiration*. This Order expires five years after adoption.

(r) *Continuation of expired order* [23 CCR 2235.4]. After this Order expires, the terms and conditions of this Order are automatically continued pending issuance of a new permit if all requirements of the federal NPDES regulations on the continuation of expired permits (40 CFR 122.6) are complied with.

(s) *Applications*. Any application submitted by a Copermittee for reissuance or modification of this Order shall satisfy all applicable requirements specified in federal regulations as well as any additional requirements for submittal of a Report of Waste Discharge specified in the CWC and the California Code of Regulations.

(t) *Confidentiality*. Except as provided for in 40 CFR 122.7, no information or documents submitted in accordance with or in application for this Order will be considered confidential, and all such information and documents shall be available for review by the public at the Regional Board office.

(u) *Severability*. The provisions of this Order are severable, and if any provision of this Order, or the application of any provisions of this Order to any circumstance, is held invalid, the application of such provision to other circumstances and the remainder of this Order shall not be affected thereby.

(v) R*eport submittal*. The Copermittee shall submit reports and provide notifications as required by this Order to the following:

NORTHERN WATERSHED UNIT
CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN DIEGO REGION
9174 SKY PARK COURT, SUITE 100
SAN DIEGO CA 92123-4340
Telephone: (858) 467-2952 Fax: (858) 571-6972

EUGENE BROMLEY
US ENVIRONMENTAL PROTECTION AGENCY
REGION IX
PERMITS ISSUANCE SECTION (W-5-1)
75 HAWTHORNE STREET
SAN FRANCISCO CA 94105

Unless otherwise directed, the Copermittee shall submit one hard copy for the official record and one electronic copy of each report required under this Order to the Regional Board and one electronic copy to the EPA.

DRAFT

ATTACHMENT C

ACRONYMS AND ABBREVIATIONS

ADT	Average Daily Traffic
AMAL	Average Monthly Action Level
ASBS	Area of Special Biological Significance
AST	Active/Passive Sediment Treatment
BMP	Best Management Practice
Basin Plan	Water Quality Control Plan for the San Diego Basin
BU	Beneficial Use
CASQA	California Stormwater Quality Association
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
CWA	Clean Water Act
CWC	California Water Code
CZARA	Coastal Zone Act Reauthorization Amendments of 1990
DAMP	Drainage Area Management Plan
DNQ	Detected, but not Quantified
EIA	Effective Impervious Area
ESAs	Environmentally Sensitive Areas
GIS	Geographic Information System
HMP	Hydromodification Management Plan
IBI	Index of Biotic Integrity
JRMP	Jurisdictional Runoff Management Plan
LID	Low Impact Development
MDAL	Maximum Daily Action Level
MEP	Maximum Extent Practicable
ML	Minimum Level
MS4	Municipal Separate Storm Sewer System
NOI	Notice of Intent
NPDES	National Pollutant Discharge Elimination System
Copermittees	County of Riverside, the 4 incorporated cities within the County of Riverside in the San Diego Region, and the Riverside County Flood Control District
RGOs	Retail Gasoline Outlets
ROWD	Riverside County Copermittees' Report of Waste Discharge (application for NPDES reissuance)
RWLs	Receiving Water Limitations
SAL	Storm Water Action Level
San Diego Water Board	California Regional Water Quality Control Board, San Diego Region
SIC	Standard Industrial Classification Code
SSMP	Standard Urban Storm Water Mitigation Plan
State Board	State Water Resources Control Board
SWQPA	State Water Quality Protected Area
TMDL	Total Maximum Daily Load

USEPA	United States Environmental Protection Agency
WLA	Waste Load Allocation
WQMP	Water Quality Management Plan
WRMP	Watershed Runoff Management Plan

DEFINITIONS

Active/Passive Sediment Treatment - Using mechanical, electrical or chemical means to flocculate or coagulate suspended sediment for removal from runoff from construction sites prior to discharge.

Anthropogenic Litter – Trash generated from human activities, not including sediment.

Average Monthly Action Level – the highest allowable average of daily discharges over a calendar month, calculated as the sum of all daily discharges measured during a calendar month divided by the number of daily discharges measured during that month.

Basin Plan – Water Quality Control Plan, San Diego Basin, Region 9, and amendments, developed by the Regional Board.

Beneficial Uses - The uses of water necessary for the survival or well being of man, plants, and wildlife. These uses of water serve to promote tangible and intangible economic, social, and environmental goals. "Beneficial Uses" of the waters of the State that may be protected include, but are not limited to, domestic, municipal, agricultural and industrial supply; power generation; recreation; aesthetic enjoyment; navigation; and preservation and enhancement of fish, wildlife, and other aquatic resources or preserves. Existing beneficial uses are uses that were attained in the surface or ground water on or after November 28, 1975; and potential beneficial uses are uses that would probably develop in future years through the implementation of various control measures. "Beneficial Uses" are equivalent to "Designated Uses" under federal law. [California Water Code Section 13050(f)].

Best Management Practices (BMPs) - Defined in 40 CFR 122.2 as schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the pollution of waters of the United States. BMPs also include treatment requirements, operating procedures and practices to control plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage. In the case of municipal storm water permits, BMPs are typically used in place of numeric effluent limits.

Bioassessment - The use of biological community information to evaluate the biological integrity of a water body and its watershed. With respect to aquatic ecosystems, bioassessment is the collection and analysis of samples of the benthic macroinvertebrate community together with physical/habitat quality measurements associated with the sampling site and the watershed to evaluate the biological condition (i.e. biological integrity) of a water body.

Biocriteria - Under the CWA, numerical values or narrative expressions that define a desired biological condition for a water body that are legally enforceable. The USEPA

defines biocriteria as: "numerical values or narrative expressions that describe the reference biological integrity of aquatic communities inhabiting waters of a given designated aquatic life use… (that)…describe the characteristics of water body segments least impaired by human activities."

Biofiltration - refers to practices that use vegetation and amended soils to detain and treat runoff from impervious areas. Treatment is through filtration, infiltration, adsorption, ion exchange, and biological uptake of pollutants.

Biological Integrity - Defined in Karr J.R. and D.R. Dudley. 1981. Ecological perspective on water quality goals. Environmental Management 5:55-68 as: "A balanced, integrated, adaptive community of organisms having a species composition, diversity, and functional organization comparable to that of natural habitat of the region." Also referred to as ecosystem health.

Clean Water Act Section 402(p) [33 USC 1342(p)] - The federal statute requiring municipal and industrial dischargers to obtain NPDES permits for their discharges of storm water.

Clean Water Act Section 303(d) Water Body - An impaired water body in which water quality does not meet applicable water quality standards and/or is not expected to meet water quality standards, even after the application of technology based pollution controls required by the CWA. The discharge of runoff to these water bodies by the Copermittees is significant because these discharges can cause or contribute to violations of applicable water quality standards.

Construction Site – Any project, including projects requiring coverage under the General Construction Permit, that involves soil disturbing activities including, but not limited to, clearing, grading, disturbances to ground such as stockpiling, and excavation.

Contamination - As defined in the Porter-Cologne Water Quality Control Act, contamination is "an impairment of the quality of waters of the State by waste to a degree which creates a hazard to the public health through poisoning or through the spread of disease. 'Contamination' includes any equivalent effect resulting from the disposal of waste whether or not waters of the State are affected."

Critical Channel Flow (Qc) – The channel flow that produces the critical shear stress that initiates bed movement or that erodes the toe of channel banks. When measuring Qc, it should be based on the weakest boundary material – either bed or bank.

CWA – Federal Clean Water Act

CWC – California Water Code

Daily Discharge – Daily Discharge is defined as either: (1) the total mass of the constituent discharged over the calendar day or any 24 hour period that reasonably represents a calendar day for purposes of sampling (as specified in the permit), for a constituent with limitations expressed in units of mass or; (2) the unweighted arithmetic mean measurement of the constituent over the day for a constituent with limitations expressed in other units of measurement (e.g. concentration.)

The Daily Discharge may be determined by the analytical results of a composite sample taken over the course of one day (a calendar day, or other 24 hour period other than a day), or by the arithmetic mean of analytical results from one or more grab samples taken over the course of a day.

Detected, but not Quantified – those sample results less than the reporting level, but greater than or equal to the laboratory's Method of Detection Limit (MDL.)

Development Projects - Construction, rehabilitation, redevelopment, or reconstruction of any public or private residential project, industrial, commercial, or any other projects.

Dilution Credit – the amount of dilution granted to a discharger in the calculation of a WQBEL, based on the allowance of a specific mixing zone. It is calculated from the dilution ratio, or determined through conducting of a mixing zone study, or modeling of the discharge and receiving water.

Dry Season – May 1 through September 30 of each year.

Dry Weather – weather is considered dry if the preceding 72 hours has been without precipitation.

Effectiveness Assessment Outcome Level 1 - Compliance with Activity-based Permit Requirements – Level 1 outcomes are those directly related to the implementation of specific activities prescribed by this Order or established pursuant to it.

Effectiveness Assessment Outcome Level 2 - Changes in Attitudes, Knowledge, and Awareness – Level 2 outcomes are measured as increases in knowledge and awareness among target audiences such as residents, businesses, and municipal employees.

Effectiveness Assessment Outcome Level 3 - Behavioral Change and BMP Implementation – Level 3 outcomes measure the effectiveness of activities in affecting behavioral change and BMP implementation.

Effectiveness Assessment Outcome Level 4 - Load Reductions – Level 4 outcomes measure load reductions which quantify changes in the amounts of pollutants associated with specific sources before and after a BMP or other control measure is employed.

Effectiveness Assessment Outcome Level 5 - Changes in Runoff and Discharge Quality – Level 5 outcomes are measured as changes in one or more specific constituents or stressors in discharges into or from MS4s.

Effectiveness Assessment Outcome Level 6 - Changes in Receiving Water Quality – Level 6 outcomes measure changes to receiving water quality resulting from discharges into and from MS4s, and may be expressed through a variety of means such as compliance with water quality objectives or other regulatory benchmarks, protection of biological integrity, or beneficial use attainment.

Enclosed Bays – Enclosed bays are indentations along the coast that enclose an area of oceanic water within distinct headlands or harbor works. Enclosed bays include all

bays where the narrowest distance between the headlands or outermost bay works is less than 75 percent of the greatest dimension of the enclosed portion of the bay. Enclosed bays do not include inland surface waters or ocean waters.

Erosion – When land is diminished or worn away due to wind, water, or glacial ice. Often the eroded debris (silt or sediment) becomes a pollutant via storm water runoff. Erosion occurs naturally but can be intensified by land clearing activities such as farming, development, road building, and timber harvesting.

Environmentally Sensitive Areas (ESAs) - Areas that include but are not limited to all Clean Water Act Section 303(d) impaired water bodies; areas designated as Areas of Special Biological Significance by the State Water Resources Control Board (Water Quality Control Plan for the San Diego Basin (1994) and amendments); State Water Quality Protected Areas; water bodies designated with the RARE beneficial use by the State Water Resources Control Board (Water Quality Control Plan for the San Diego Basin (1994) and amendments); areas designated as preserves or their equivalent under the Natural Communities Conservation Program within the Cities and County of Orange; and any other equivalent environmentally sensitive areas which have been identified by the Copermittees.

Estuaries – waters, including coastal lagoons, located at the mouth of streams that serve as areas of mixing fresh and ocean waters. Coastal lagoons and mouths of streams that are temporarily separated from the ocean by sandbars shall be considered estuaries. Estuarine waters shall be considered to extend from a bay or the open ocean to a point upstream where there is no significant mixing of fresh water and ocean water. Estuaries do not include inland surface waters or ocean waters.

Feasibility Analysis – Detailed description of the selection process for the treatment control BMPs for a Priority Development Project, including justification of why one BMP is selected over another. For a Priority Development Project where a treatment control BMP with a low removal efficiency ranking (as identified by the Model SUSMP) is proposed, the analysis shall include a detailed and adequate justification exhibiting the reasons implementation of a treatment control BMP with a higher removal efficiency is infeasible for the Priority Development Project or portion of the Priority Development Project.

Flow Duration – The long-term period of time that flows occur above a threshold that causes significant sediment transport and may cause excessive erosion damage to creeks and streams (not a single storm event duration). The simplest way to visualize this is to consider a histogram of pre- and post-project flows using long-term records of hourly data. To maintain pre-project flow duration means that the total number of hours (counts) within each range of flows in a flow-duration histogram cannot increase between the pre- and post-project condition. Flow duration within the range of geomorphologically significant flows is important for managing erosion.

GIS – Geographic Information System

Grading - The cutting and/or filling of the land surface to a desired slope or elevation.

Hazardous Material – Any substance that poses a threat to human health or the environment due to its toxicity, corrosiveness, ignitability, explosive nature or chemical

reactivity. These also include materials named by the USEPA in 40 CFR 116 to be reported if a designated quantity of the material is spilled into the waters of the U.S. or emitted into the environment.

Hazardous Waste - Hazardous waste is defined as "any waste which, under Section 600 of Title 22 of this code, is required to be managed according to Chapter 30 of Division 4.5 of Title 22 of this code" [CCR Title 22, Division 4.5, Chapter 11, Article 1].

Household Hazardous Waste – Paints, cleaning products, and other wastes generated during home improvement or maintenance activities.

Hydromodification – The change in the natural watershed hydrologic processes and runoff characteristics (i.e., interception, infiltration, overland flow, interflow and groundwater flow) caused by urbanization or other land use changes that result in increased stream flows and sediment transport. In addition, alteration of stream and river channels, such as stream channelization, concrete lining, installation of dams and water impoundments, and excessive streambank and shoreline erosion are also considered hydromodification, due to their disruption of natural watershed hydrologic processes.

Illicit Connection – Any connection to the MS4 that conveys an illicit discharge.

Illicit Discharge - Any discharge to the MS4 that is not composed entirely of storm water except discharges pursuant to a NPDES permit and discharges resulting from fire fighting activities [40 CFR 122.26(b)(2)].

Implementation Assessment – Assessment conducted to determine the effectiveness of Copermittee programs and activities in achieving measurable targeted outcomes, and in determining whether priority sources of water quality problems are being effectively addressed.

Inactive Slopes – Slopes on which no grading or other soil disturbing activities are conducted for 10 or more days.

Inland Surface Waters – all surface waters of the State that do not include the ocean, enclosed bays, or estuaries.

Integrated Assessment – Assessment to be conducted to evaluate whether program implementation is properly targeted to and resulting in the protection and improvement of water quality.

Jurisdictional Runoff Management Plan (JRMP) – A written description of the specific jurisdictional runoff management measures and programs that each Copermittee will implement to comply with this Order and ensure that storm water pollutant discharges in runoff are reduced to the MEP and do not cause or contribute to a violation of water quality standards.

Low Impact Development (LID) – A storm water management and land development strategy that emphasizes conservation and the use of on-site natural features integrated with engineered, small-scale hydrologic controls to more closely reflect pre-development hydrologic functions.

Maximum Daily Action Level (MDAL) – is the highest allowable daily discharge of a pollutant, over a calendar day (or 24 hour period). For pollutants with action levels expressed in units of mass, the daily discharge is calculated as the total mass of the pollutant discharged over the day. For pollutants with action levels expressed in other units of measurement, the daily discharge is calculated as the arithmetic mean measurement of the pollutant over the day.

Maximum Extent Practicable (MEP) – The technology-based standard established by Congress in CWA section 402(p)(3)(B)(iii) for storm water that operators of MS4s must meet. Technology-based standards establish the level of pollutant reductions that dischargers must achieve, typically by treatment or by a combination of source control and treatment control BMPs. MEP generally emphasizes pollution prevention and source control BMPs primarily (as the first line of defense) in combination with treatment methods serving as a backup (additional line of defense). MEP considers economics and is generally, but not necessarily, less stringent than BAT. A definition for MEP is not provided either in the statute or in the regulations. Instead the definition of MEP is dynamic and will be defined by the following process over time: municipalities propose their definition of MEP by way of their runoff management programs. Their total collective and individual activities conducted pursuant to the runoff management programs becomes their proposal for MEP as it applies both to their overall effort, as well as to specific activities (e.g., MEP for street sweeping, or MEP for MS4 maintenance). In the absence of a proposal acceptable to the Regional Board, the Regional Board defines MEP.

In a memo dated February 11, 1993, entitled "Definition of Maximum Extent Practicable," Elizabeth Jennings, Senior Staff Counsel, SWRCB addressed the achievement of the MEP standard as follows:

> "*To achieve the MEP standard, municipalities must employ whatever Best Management Practices (BMPs) are technically feasible (i.e., are likely to be effective) and are not cost prohibitive. The major emphasis is on technical feasibility. Reducing pollutants to the MEP means choosing effective BMPs, and rejecting applicable BMPs only where other effective BMPs will serve the same purpose, or the BMPs would not be technically feasible, or the cost would be prohibitive. In selecting BMPs to achieve the MEP standard, the following factors may be useful to consider:*
>
> *a. Effectiveness: Will the BMPs address a pollutant (or pollutant source) of concern?*
> *b. Regulatory Compliance: Is the BMP in compliance with storm water regulations as well as other environmental regulations?*
> *c. Public Acceptance: Does the BMP have public support?*
> *d. Cost: Will the cost of implementing the BMP have a reasonable relationship to the pollution control benefits to be achieved?*
> *e. Technical Feasibility: Is the BMP technically feasible considering soils, geography, water resources, etc?*
>
> *The final determination regarding whether a municipality has reduced pollutants to the maximum extent practicable can only be made by the Regional or State Water Boards, and not by the municipal discharger. If a municipality reviews a*

lengthy menu of BMPs and chooses to select only a few of the least expensive, it is likely that MEP has not been met. On the other hand, if a municipal discharger employs all applicable BMPs except those where it can show that they are not technically feasible in the locality, or whose cost would exceed any benefit derived, it would have met the standard. Where a choice may be made between two BMPs that should provide generally comparable effectiveness, the discharger may choose the least expensive alternative and exclude the more expensive BMP. However, it would not be acceptable either to reject all BMPs that would address a pollutant source, or to pick a BMP base solely on cost, which would be clearly less effective. In selecting BMPs the municipality must make a serious attempt to comply and practical solutions may not be lightly rejected. In any case, the burden would be on the municipal discharger to show compliance with its permit. After selecting a menu of BMPs, it is the responsibility of the discharger to ensure that all BMPs are implemented."

Minimum Level – the concentration at which the entire analytical system must give a recognizable signal and acceptable calibration point. The ML is the concentration in a sample that is equivalent to the concentration of the lowest calibration standard analyzed by a specific analytical procedure, assuming that all the method sample weights, volumes and processing steps have been followed.

Monitoring Year – the monitoring year includes a full wet season and dry season, beginning annually on October 1st and ending on September 30th.

Municipal Separate Storm Sewer System (MS4) – A conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, or storm drains): (i) Owned or operated by a State, city, town, borough, county, parish, district, association, or other public body (created by or pursuant to State law) having jurisdiction over disposal of sewage, industrial wastes, storm water, or other wastes, including special districts under State law such as a sewer district, flood control district or drainage district, or similar entity, or an Indian tribe or an authorized Indian tribal organization, or designated and approved management agency under section 208 of the CWA that discharges to waters of the United States; (ii) Designated or used for collecting or conveying storm water; (iii) Which is not a combined sewer; (iv) Which is not part of the Publicly Owned Treatment Works (POTW) as defined at 40 CFR 122.26.

National Pollutant Discharge Elimination System (NPDES) - The national program for issuing, modifying, revoking and reissuing, terminating, monitoring and enforcing permits, and imposing and enforcing pretreatment requirements, under Sections 307, 318, 402, and 405 of the CWA.

NOI – Notice of Intent

Non-Storm Water - All discharges to and from a MS4 that do not originate from precipitation events (i.e., all discharges from a MS4 other than storm water). Non-storm water includes illicit discharges, non-prohibited discharges, and NPDES permitted discharges.

Nuisance - As defined in the Porter-Cologne Water Quality Control Act a nuisance is "anything which meets all of the following requirements: 1) Is injurious to health, or is

indecent, or offensive to the senses, or an obstruction to the free use of property, so as to interfere with the comfortable enjoyment of life or property. 2) Affects at the same time an entire community or neighborhood, or any considerable number of persons, although the extent of the annoyance or damage inflicted upon individuals may be unequal. 3) Occurs during, or as a result of, the treatment or disposal of wastes."

Ocean Waters – the territorial marine waters of the State as defined by California law to the extent these waters are outside of enclosed bays, estuaries, and coastal lagoons. Discharges to ocean waters are regulated in accordance with the State Board's California Ocean Plan.

Order – Order No. R9-2009-0002 (NPDES No. CAS0108740)

Person - A person is defined as an individual, association, partnership, corporation, municipality, State or Federal agency, or an agent or employee thereof [40 CFR 122.2].

Point Source - Any discernible, confined, and discrete conveyance, including, but not limited to, any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operations, landfill leachate collection systems, vessel, or other floating craft from which pollutants are or may be discharged. This term does not include return flows from irrigated agriculture or agricultural storm water runoff.

Pollutant - Any agent that may cause or contribute to the degradation of water quality such that a condition of pollution or contamination is created or aggravated.

Pollution - As defined in the Porter-Cologne Water Quality Control Act: "the alteration of the quality of the waters of the State by waste, to a degree that unreasonably affects the either of the following: 1) The waters for beneficial uses; or 2) Facilities that serve these beneficial uses." Pollution may include contamination.

Pollutants of Concern – Pollutants for which water bodies are listed as impaired under CWA section 303(d), pollutants associated with the land use type of a development, and/or pollutants commonly associated with runoff. Pollutants commonly associated with runoff include total suspended solids; sediment; pathogens (e.g., bacteria, viruses, protozoa); heavy metals (e.g., copper, lead, zinc, and cadmium); petroleum products and polynuclear aromatic hydrocarbons; synthetic organics (e.g., pesticides, herbicides, and PCBs); nutrients (e.g., nitrogen and phosphorus fertilizers); oxygen-demanding substances (decaying vegetation, animal waste, and anthropogenic litter).

Pollution Prevention - Pollution prevention is defined as practices and processes that reduce or eliminate the generation of pollutants, in contrast to source control BMPs, treatment control BMPs, or disposal.

Post-Construction BMPs - A subset of BMPs including structural and non-structural controls which detain, retain, filter, or educate to prevent the release of pollutants to surface waters during the final functional life of developments.

Pre-Project or Pre-Development Runoff Conditions (Discharge Rates, Durations, Etc.) – Runoff conditions that exist onsite immediately before the planned development activities occur. This definition is not intended to be interpreted as that period before any

human-induced land activities occurred. This definition pertains to redevelopment as well as initial development.

Principal Copermittee – County of Orange

Priority Development Projects - New development and redevelopment project categories listed in Section F.1.d(2) of Order No. R9-2009-0002.

Rainy Season – (aka Wet Season) is the period of time from October 1 forward to April 30 when the San Diego region experiences the most rainfall.

Receiving Waters – Waters of the United States.

Receiving Water Limitations (RWLs) - Waste discharge requirements issued by the Regional Board typically include both: (1) "Effluent Limitations" (or "Discharge Limitations") that specify the technology-based or water-quality-based effluent limitations; and (2) "Receiving Water Limitations" that specify the water quality objectives in the Basin Plan as well as any other limitations necessary to attain those objectives. In summary, the "Receiving Water Limitations" provision is the provision used to implement the requirement of CWA section 301(b)(1)(C) that NPDES permits must include any more stringent limitations necessary to meet water quality standards.

Redevelopment - The creation, addition, and or replacement of impervious surface on an already developed site. Examples include the expansion of a building footprint, road widening, the addition to or replacement of a structure, and creation or addition of impervious surfaces. Replacement of impervious surfaces includes any activity that is not part of a routine maintenance activity where impervious material(s) are removed, exposing underlying soil during construction. Redevelopment does not include trenching and resurfacing associated with utility work; resurfacing existing roadways; new sidewalk construction, pedestrian ramps, or bikelane on existing roads; and routine replacement of damaged pavement, such as pothole repair.

Retain – to keep or hold in a particular place, condition, or position without discharge to surface waters.

Runoff - All flows in a storm water conveyance system that consists of the following components: (1) storm water (wet weather flows) and (2) non-storm water including dry weather flows.

San Diego Water Board – As used in this document the term "San Diego Water Board" is synonymous with the term "Regional Board" as defined in Water Code section 13050(b) and is intended to refer to the California Regional Water Quality Control Board for the San Diego Region as specified in Water Code Section 13200.

Sediment - Soil, sand, and minerals washed from land into water. Sediment resulting from anthropogenic sources (i.e. human induced land disturbance activities) is considered a pollutant. This Order regulates only the discharges of sediment from anthropogenic sources and does not regulate naturally occurring sources of sediment. Sediment can destroy fish-nesting areas, clog animal habitats, and cloud waters so that sunlight does not reach aquatic plants.

Shared Treatment Control BMP - BMPs used by multiple developments to infiltrate, filter, or treat the required volume or flow prior to discharge to a receiving water. This could include, for example, a treatment BMP at the end of an enclosed storm drain that collects runoff from several commercial developments.

Source Control BMP – Land use or site planning practices, or structural or nonstructural measures that aim to prevent runoff pollution by reducing the potential for contamination at the source of pollution. Source control BMPs minimize the contact between pollutants and runoff.

State Water Quality Protection Area – A nonterrestrial marine or estuarine area designated to protect marine species or biological communities from an undesirable alteration in natural water quality, including, but not limited to, areas of special biological significance that have been designated by the State Water Resources Control Board through its water quality control planning process. Areas of special biological significance are a subset of State Water Quality Protection Areas, and require special protection as determined by the State Water Resources Control Board pursuant to the California Ocean Plan adopted and reviewed pursuant to Article 4 (commencing with Section 13160) of Chapter 3 of Division 7 of the California Water Code and pursuant to the Water Quality Control Plan for Control of Temperature in the Coastal and Interstate Waters and Enclosed Bays and Estuaries of California (California Thermal Plan) adopted by the state board.

Storm Water – Per 40 CFR 122.26(b)(13), means storm water runoff, snowmelt runoff and surface runoff and drainage. Surface runoff and drainage pertains to runoff and drainage resulting from precipitation events.

Standard Storm Water Mitigation Plan (SSMP) – A plan developed to mitigate the impacts of runoff from Priority Development Projects.

Third Party Inspectors - Industrial and commercial facility inspectors who are not contracted or employed by a regulatory agency or group of regulatory agencies, such as the Regional Board or Copermittees. The third party inspector is not a regular facility employee self-inspecting their own facility. The third party inspector could be a contractor or consultant employed by a facility or group of businesses to conduct inspections.

Total Maximum Daily Load (TMDL) - The maximum amount of a pollutant that can be discharged into a water body from all sources (point and non-point) and still maintain water quality standards. Under CWA section 303(d), TMDLs must be developed for all water bodies that do not meet water quality standards after application of technology-based controls.

Toxicity - Adverse responses of organisms to chemicals or physical agents ranging from mortality to physiological responses such as impaired reproduction or growth anomalies). The water quality objectives for toxicity provided in the Water Quality Control Plan, San Diego Basin, Region 9, (Basin Plan), state in part…"All waters shall be free of toxic substances in concentrations that are toxic to, or that produce detrimental physiological responses in human, plant, animal, or aquatic life….The survival of aquatic life in surface waters subjected to a waste discharge or other controllable water quality factors, shall not be less than that for the same water body in areas unaffected by the waste discharge".

Treatment Control BMP – Any engineered system designed to remove pollutants by simple gravity settling of particulate pollutants, filtration, biological uptake, media absorption or any other physical, biological, or chemical process.

Unpaved Road – is a long, narrow stretch without pavement used for traveling by motor passenger vehicle between two or more points. Unpaved roads are generally constructed of dirt, gravel, aggregate or macadam and may be improved or unimproved.

Waste - As defined in CWC Section 13050(d), "waste includes sewage and any and all other waste substances, liquid, solid, gaseous, or radioactive, associated with human habitation, or of human or animal origin, or from any producing, manufacturing, or processing operation, including waste placed within containers of whatever nature prior to, and for purposes of, disposal."

Article 2 of CCR Title 23, Chapter 15 (Chapter 15) contains a waste classification system that applies to solid and semi-solid waste, which cannot be discharged directly or indirectly to water of the state and which therefore must be discharged to land for treatment, storage, or disposal in accordance with Chapter 15. There are four classifications of waste (listed in order of highest to lowest threat to water quality): hazardous waste, designated waste, non-hazardous solid waste, and inert waste.

Water Quality Assessment – Assessment conducted to evaluate the condition of non-storm water and storm water discharges, and the water bodies which receive these discharges.

Water Quality Objective - Numerical or narrative limits on constituents or characteristics of water designated to protect designated beneficial uses of the water. [California Water Code Section 13050 (h)]. California's water quality objectives are established by the State and Regional Water Boards in the Water Quality Control Plans. Numeric or narrative limits for pollutants or characteristics of water designed to protect the beneficial uses of the water. In other words, a water quality objective is the maximum concentration of a pollutant that can exist in a receiving water and still generally ensure that the beneficial uses of the receiving water remain protected (i.e., not impaired). Since water quality objectives are designed specifically to protect the beneficial uses, when the objectives are violated the beneficial uses are, by definition, no longer protected and become impaired. This is a fundamental concept under the Porter Cologne Act. Equally fundamental is Porter Cologne's definition of pollution. A condition of pollution exists when the water quality needed to support designated beneficial uses has become unreasonably affected or impaired; in other words, when the water quality objectives have been violated. These underlying definitions (regarding beneficial use protection) are the reason why all waste discharge requirements implementing the federal NPDES regulations require compliance with water quality objectives. (Water quality objectives are also called water quality criteria in the CWA.)

Water Quality Standards - The beneficial uses (e.g., swimming, fishing, municipal drinking water supply, etc.,) of water and the water quality objectives necessary to protect those uses.

Waters of the State - Any water, surface or underground, including saline waters within the boundaries of the State [CWC section 13050 (e)]. The definition of the Waters of the

State is broader than that for the Waters of the United States in that all water in the State is considered to be a Waters of the State regardless of circumstances or condition. Under this definition, a MS4 is always considered to be a Waters of the State.

Waters of the United States - As defined in the 40 CFR 122.2, the Waters of the U.S. are defined as: "(a) All waters, which are currently used, were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide; (b) All interstate waters, including interstate "wetlands;" (c) All other waters such as intrastate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, "wetlands," sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds the use, degradation or destruction of which would affect or could affect interstate or foreign commerce including any such waters: (1) Which are or could be used by interstate or foreign travelers for recreational or other purposes; (2) From which fish or shellfish are or could be taken and sold in interstate or foreign commerce; or (3) Which are used or could be used for industrial purposes by industries in interstate commerce; (d) All impoundments of waters otherwise defined as waters of the United States under this definition: (e) Tributaries of waters identified in paragraphs (a) through (d) of this definition; (f) The territorial seas; and (g) "Wetlands" adjacent to waters (other than waters that are themselves wetlands) identified in paragraphs (a) through (f) of this definition. Waters of the United States do not include prior converted cropland. Notwithstanding the determination of an area's status as prior converted cropland by any other federal agency, for the purposes of the Clean Water Act, the final authority regarding Clean Water Act jurisdiction remains with the EPA."

Watershed - That geographical area which drains to a specified point on a water course, usually a confluence of streams or rivers (also known as drainage area, catchment, or river basin).

Watershed Runoff Management Plan (WRMP) – A written description of the specific watershed runoff management measures and programs that each watershed group of Copermittees will implement to comply with this Order and ensure that storm water pollutant discharges in runoff are reduced to the MEP and do not cause or contribute to a violation of water quality standards.

WDRs – Waste Discharge Requirements

DRAFT

ATTACHMENT D

SCHEDULED SUBMITTALS SUMMARY AND REPORTING CHECKLIST

Submittal	Permit Section	Completion Date	Frequency
Prohibitions on dry-weather discharges not listed in Section B.2	B.2	July 1, 2012, then in JRMP Annual Report	Annual
Submit Certified Statement of Adequate Legal Authority	E.2	June 30, 2012	One time
Updated SSMP	F.1.d, K.2.a	June 30, 2012	One time
Identify and remove barriers to LID implementation	F.1.d.(4)(a)(v)	With JRMP Annual Report	Annual
Hydromodification Management Plan	F.1.h.(5), K.2.b	June 30, 2013	One Time for Draft
Flood Control Structure BMP Inventory and Evaluation	F.3.a.(4)	With JRMP Annual Report	Annual
Retrofitting Program	F.3.d.(3)	With JRMP Annual Report	Annual
Updated Watershed Workplans	G.1 K.1.b	June 30, 2012	One time
Fiscal Analysis	H.3	With JRMP Annual Report	Annual
Updated Jurisdictional Runoff Management Plans	K.1.a	June 30, 2012	One time
Report of Waste Discharge	K.2.c	At least 180 days prior to expiration of this Order	One time
Principal Copermittee submits JRMP Annual Reports to Regional Board	K.3.a.(2)	October 31, 2013 and annually thereafter	Annual
Principal Copermittee submits Notification of Principal Copermittee	M	180 days after adoption of the Order	One Time

Jurisdictional Runoff Management Program Annual Report Checklist

In the JRMP Annual Report each Copermittee shall provide an Annual Report Checklist. The Annual Report Checklist must be no longer than 2 pages, be current as of the 1st day of the rainy season of that year, and include a signed certification statement. The Annual Report Summary Checklist must provide the following information:

Order Requirements
Were All Requirements of this Order Met?

Construction
Number of Active Sites
Number of Inactive Sites
Number of Sites Inspected
Number of Inspections
Number of Violations
Number of Construction Enforcement Actions Taken

New Development
Number of Development Plan Reviews
Number of Grading Permits Issued
Number of Projects Exempted from Interim/Final Hydromodification Requirements

Post Construction Development
Number of Priority Development Projects
Number of SUSMP Required Post-Construction BMP Inspections
Number of SUSMP Required Post-Construction BMP Violations
Number of SUSMP Required Post-Construction BMP Enforcement Actions Taken

Illicit Discharges and Connections
Number of IC/ID Inspections
Number of IC/ID Detections by Staff
Number of IC/ID Detections from the Public
Number of IC/ID Eliminations
Number of IC/ID Violations
Number of IC/ID Enforcement Actions Taken

MS4 Maintenance
Number of Inspections Conducted
Amount of Waste Removed
Total Miles of MS4 Inspected

Municipal/Commercial/Industrial
Number of Facilities
Number of Inspections Conducted
Number of Facilities Inspected
Number of Violations
Number of Enforcement Actions Taken

Attachment E

RECEIVING WATERS AND MS4 DISCHARGE MONITORING AND REPORTING PROGRAM NO. R9-2010-0016

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I. PURPOSE

A. This Receiving Waters and MS4 Discharge Monitoring and Reporting Program (MRP) is intended to meet the following goals:
   1. Assess compliance with Order No. R9-2010-0016;
   2. Measure and improve the effectiveness of the Copermittees' runoff management programs;
   3. Assess the chemical, physical, and biological impacts to receiving waters resulting from MS4 discharges;
   4. Characterize storm water discharges;
   5. Identify sources of specific pollutants;
   6. Prioritize drainage and sub-drainage areas that need management actions;
   7. Detect and eliminate illicit discharges and illicit connections to the MS4;
   8. Assess the overall health of receiving waters; and
   9. Provide information to implement required BMP improvements.

B. This Receiving Waters and MS4 Discharges Monitoring and Reporting Program is designed to answer the following core management questions[1]:
   1. Are conditions in receiving waters protective, or likely to be protective, of beneficial uses?
   2. What is the extent and magnitude of the current or potential receiving water problems?
   3. What is the relative MS4 discharge contribution to the receiving water problem(s)?
   4. What are the sources of MS4 discharge that contribute to receiving water problem(s)?
   5. Are conditions in receiving waters getting better or worse?

II. MONITORING PROGRAM

The Monitoring Program is designed to assess the condition of receiving waters, monitor pollutants in storm and non-storm water effluent from the MS4, and conduct Special Studies to address conditions of concern. Where feasible, the Monitoring Program is designed to allow the Copermittees to combine required monitoring elements or efforts that are not mutually exclusive while still meeting the requirements of the Order.

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[1] Core management questions from "*Model Monitoring Program for Municipal Separate Storm Sewer Systems in Southern California: A report from the Stormwater Monitoring Coalition's Model Monitoring Technical Committee.*" Technical Report No. 419. August 2004.

A. Receiving Waters Monitoring Program

Each Copermittee must collaborate with the other Copermittees to develop, conduct, and report on a year-round watershed based Receiving Waters Monitoring Program. The monitoring program design, implementation, analysis, assessment, and reporting must be conducted on a watershed basis for the Santa Margarita Hydrologic Unit (HU) and must be designed to meet the goals and answer the questions listed in section I above. The monitoring program must include the following components:

1. MASS LOADING STATION (MLS) MONITORING

a. Locations: The following existing mass loading stations must continue to be monitored: Lower Temecula Creek, Lower Murrieta Creek at the USGS Weir, and a permanent reference station.[2] Copermittees may propose, for San Diego Water Board review and approval, changing the location of a mass loading station.

b. Frequency: Each mass loading station must be monitored each year three times during wet weather events and twice during dry weather flow conditions.

c. Timing: Each mass loading station must be monitored for the first wet weather event of the season which meets USEPA's criteria described in 40 CFR 122.21(g)(7). Monitoring of the third wet weather event must be conducted after February 1. Dry weather mass loading monitoring events must be sampled at least three months apart between May and October. If flows are not evident for the second event, then sampling must be conducted during non-rain events in the following wet weather season.

d. Protocols: Protocols for mass loading sampling and analysis including analytical methods, target reporting limits, and data reporting formats must be compatible with the State Water Resources Control Board's (State Water Board's) State Surface Water Ambient Monitoring Program (SWAMP). If the mass loading sampling and analysis are determined to be impracticable with the SWAMP standards, the Copermittees must provide a written explanation and discussion in the submittal of the Planned Monitoring Program. Wet weather samples must be time-weighted composites, collected for the duration of the entire runoff event. Where such monitoring is not practical, such as for large watersheds with significant groundwater recharge flows, composites must be collected at a minimum during the first 3 hours of

[2] A map depicting mass loading stations can be found in the Fact Sheet for Order R9-2010-0016.

flow. Dry weather event sampling must be time-weighted composites composed of 24 discrete hourly samples, whereby the mass loads of pollutants are calculated as the product of the composite sample concentration and the total volume of water discharged past the monitoring point during the time of sample collection.

(1) Automatic samplers must be used to collect samples from mass loading stations.

(2) Grab samples must be analyzed for temperature, pH, specific conductance, biochemical oxygen demand, oil and grease, E. coli , fecal coliform, enterococcus and for total petroleum hydrocarbons whenever a sheen is observed.

e. Copermittees must measure or estimate flow rates and volumes for each mass loading station sampling event to determine mass loadings of pollutants. Data from nearby USGS gauging stations may be utilized, or flow rates may be estimated in accordance with the USEPA Storm Water Sampling Guidance Document (EPA-833-B-92-001), Section 3.2.1.

f. In the event that the required number of sampling events are not conducted during one monitoring year at any given station, the Copermittees must provide a written explanation for the reduced number of sampling events in the subsequent Receiving Waters Monitoring Annual Report. The explanation must include, at a minimum, streamflow data from the nearest USGS gauging station, a full description of any equipment failures and subsequent remedies if applicable, efforts made to resample a future event, and any quality assurance or quality control issues encountered. The explanation must also include a description of steps taken to prevent further sampling failures.

g. The following constituents must be analyzed for each monitoring event at each station:

Table 1. Analytical Testing for Mass Loading (II.A.1) and Stream Assessment (II.A.2)

Conventionals, Nutrients, Hydrocarbons	Pesticides	Metals (Total and Dissolved)	Bacteriological (mass loading)
• Total Dissolved Solids • Total Suspended Solids • Turbidity • Total Hardness • pH • Specific Conductance • Temperature • Dissolved Oxygen • Total Phosphorus • Dissolved Phosphorus • Nitrite ˚ • Nitrate ˚ • Total Kjeldahl Nitrogen • Ammonia • Biological Oxygen Demand, 5-day • Chemical Oxygen Demand • Total Organic Carbon • Dissolved Organic Carbon • Methylene Blue Active Substances • Oil and Grease • Sulfate	• Diazinon • Chlorpyrifos • Malathion • Carbamates • Pyrethroids	• Arsenic • Cadmium • Total Chromium • Hexavalent Chromium • Copper • Lead • Iron • Manganese • Nickel • Selenium • Zinc • Mercury • Silver • Thallium	• E. coli • Fecal Coliform • Enterococcus
˚ Nitrate and nitrate may be combined and reported as nitrate + nitrite.			

h. Toxicity testing must be conducted for each monitoring event at each station according to the following Table 2:

Table 2. Toxicity Testing for Mass Loading (II.A.1) and Stream Assessment (II.A.2)

Program Component	***Dry Weather Flows***	***Storm Water Flows***
	Freshwater Organisms	**Freshwater Organisms**
Mass Loading	3 chronic* 3 acute*	3 acute*
Bioassessment**	3 chronic* 3 acute*	n/a
Sediment Toxicity Special Study	1 chronic 1 acute	n/a

Table Notes
* Toxicity testing must include use of *Pimephales promelas* (fathead minnow), *Hyalella azteca* and *Pseudokirchneriella subcapitata (*formerly *Selenastrum capricornutum,* unicellular algae).
** Duplicative toxicity testing is not required for Stream Assessment Monitoring stations co-located at mass loading stations since Stream Assessment Monitoring must be conducted in conjunction with dry weather mass loading.

Species Notes:
1. Acute toxicity may be determined during the course of chronic toxicity monitoring per U.S. EPA protocols.

i. The presence of acute toxicity must be determined in accordance with USEPA protocol (EPA-821-R-02-012). The presence of chronic freshwater toxicity must be determined in accordance with USEPA protocol (EPA-821-R-02-013).

2. Stream Assessment Monitoring

Copermittees must conduct Stream Assessment Monitoring using multiple lines of evidence to assess the condition of biological communities in freshwater receiving waters. Stream assessment must include the collection and reporting of the following specified instream biological, chemical, and physical (including habitat) data.

a. Locations: At a minimum, the program must consist of station identification, sampling, monitoring, and analysis of data for six stream assessment stations in order to determine the biological, chemical and physical integrity of streams within the County of Riverside. The two existing mass loading stations at Murrieta and Temecula Creeks must continue to be monitored. Two reference stream assessment stations, including the existing Adobe Creek station, must be identified, sampled, monitored, and analyzed. Locations of reference stations

must be identified according to protocols outlined in "A Quantitative Tool for Assessing the Integrity of Southern Coastal California Streams," by Ode, et al. 2005.[3]

b. Frequency: Stream assessment stations must be monitored in May or June (to represent the influence of wet weather on the communities) and September or October (to represent the influence of dry weather flows on the communities). The timing of monitoring of stream assessment stations located at mass loading stations must coincide with dry weather monitoring of those mass loading stations.

c. Parameters / Methods: Stream assessment monitoring must include bioassessment, aquatic chemistry, and aqueous toxicity.

(1) Aquatic chemistry and aqueous toxicity must be conducted as outlined in Tables 1 and 2 using the same parameters and methods as the mass loading station monitoring.

(2) Bioassessment analysis procedures must include calculation of the Index of Biotic Integrity (IBI) for benthic macroinvertebrates for all bioassessment stations, as outlined in "A Quantitative Tool for Assessing the Integrity of Southern Coastal California Streams," by Ode, et al. 2005.

(3) Monitoring of stream assessment stations must be conducted according to bioassessment Standard Operating Procedures (SOP) developed by the Surface Water Ambient Monitoring Program (SWAMP), as amended.[4] In collecting macroinvertebrate samples, the discharger must use the "Reachwide Benthos (Multihabitat) Procedure." The discharger must conduct, concurrently with all required macroinvertebrate collections, the "full" suite of physical/habitat characterization measurements specified in the SWAMP Bioassessment SOP, and as summarized in the *SWAMP Stream Habitat Characterization Form — Full Version*. [5]

(4) Monitoring of stream assessment stations must incorporate assessment of algae using SWAMP's SOP for Collecting Stream

[3] Ode, et al. 2005. "A Quantitative Tool for Assessing the Integrity of Southern Coastal California Streams." Environmental Management. Vol. 35, No. 1, pp. 1-13.
[4] Ode, P.R.. 2007. Standard operating procedures for collecting macroinvertebrate samples and associated physical and chemical data for ambient bioassessments in California. California State Water Resources Control Board Surface Water Ambient Monitoring Program (SWAMP) Bioassessment SOP 001.
[5] Available at:
http://www.waterboards.ca.gov/water_issues/programs/swamp/docs/reports/fieldforms_fullversion052908.pdf

Algae Samples.[6] Assessment of freshwater algae must include algal taxonomic composition (diatoms and soft algae) and algal biomass. Future bioassessment must incorporate algal IBI scores, when developed.

d. A qualified professional environmental laboratory must perform all sampling, laboratory, quality assurance, and analytical procedures in accordance with the Southern California Regional Watershed Monitoring Program Bioassessment Quality Assurance Project Plan.[7] The Copermittees must utilize future Quality Assurance Project Plans as developed by SWAMP.

(1) The Copermittees must have and follow a quality assurance (QA) plan that covers the required stream assessment monitoring. External QA checks must be funded by the Copermittees, and performed by the California Department of Fish and Game's Aquatic Bioassessment Laboratory. An alternate laboratory with equivalent expertise and performance may be used if approved in advance in writing by San Diego Water Board.

(2) Identified organisms must be archived (i.e., retained) by the Copermittee(s) for a period of not less than three years from the date that all QA steps are completed. The identified organisms must be relinquished to the San Diego Water Board upon request by the San Diego Water Board.

(3) The macroinvertebrate results (i.e., taxonomic identifications consistent with the specified SAFIT STEs, and number of organisms within each taxa) must be submitted to the San Diego Water Board in electronic format. SWAMP is currently developing standardized formats for reporting bioassessment data. All bioassessment data collected after those formats become available must be submitted using the SWAMP formats. Until those formats are available, the biological data must be submitted in MS-Excel[8] (or equivalent) format.

The physical/habitat data must be reported using the standard format titled *SWAMP Stream Habitat Characterization Form — Full Version*.

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[6] Fetcher et al. 2009. Standard Operating Procedures for Collecting Stream Algae Samples and Associated Physical Habitat and Chemical Data for Ambient Bioassessments in California.
[7] Version 1.0 of the Southern California Regional Watershed Monitoring Program Bioassessment Quality Assurance Program Plan was released on June 25, 2009.
[8] Any version of Excel, 2000 or later, may be used.

3. FOLLOW-UP ANALYSIS AND ACTIONS (TIE AND TRE TRIAD APPROACH)

When results from the required monitoring indicate adverse water quality effects at a mass loading station or stream assessment station as defined in Table 3, Copermittees within the watershed(s) that discharge to that location must evaluate the extent and causes of MS4 discharge pollution to the adverse effects in receiving waters and prioritize and implement management actions to eliminate non-storm water discharges and/or reduce storm water sources from the MS4 as described in Table 3. Toxicity Identification Evaluations (TIEs) must be conducted to determine the cause of toxicity as outlined in Table 3 below. Other follow-up activities, which must be conducted by the Copermittees, are also identified in Table 3. Once the cause of toxicity has been identified by a TIE, the Copermittees must perform source identification projects as needed and implement the measures necessary to reduce or eliminate the pollutant discharges and abate the sources causing the toxicity.

Table 3. Triad Approach to Determining Follow-Up Actions[9]

	Chemistry	Toxicity	Benthic Alteration	Example Conclusions	Possible Actions or Decisions
1.	Exceedance of water quality objectives	Evidence of toxicity	Indications of alteration	Strong evidence of pollution-induced degradation	Use TIE to identify contaminants of concern, based on TIE metric Initiate upstream source identification as a high priority
2.	No persistent exceedances of water quality objectives	No evidence of toxicity	No indications of alteration	No evidence of current pollution-induced degradation Potentially harmful pollutants not yet concentrated enough to cause visible impact	No immediate action necessary Conduct periodic broad scans for new and/or potentially harmful pollutants
3.	Exceedance of water quality objectives	No evidence of toxicity	No indications of alteration	Contaminants are not bioavailable Test organisms not sensitive to problem pollutants	TIE would not provide useful information with no evidence of toxicity Continue monitoring for toxic and benthic impacts Initiate upstream source identification as a low priority Consider whether different or additional test organisms should be evaluated
4.	No persistent exceedances of water quality objectives	Evidence of toxicity	No indications of alteration	Unmeasured contaminant(s) or conditions have the potential to cause degradation Pollutant causing toxicity at very low levels	Recheck chemical analyses; verify toxicity test results Consider additional advanced chemical analyses Use TIE to identify contaminants of concern, based on TIE metric Initiate upstream source identification as a medium priority
5.	No persistent exceedances of water quality objectives	No evidence of toxicity	Indications of alteration	Alteration may not be due to toxic contamination Test organisms not sensitive to problem pollutants	No action necessary due to toxic chemicals Initiate upstream source identification (for physical sources) as a high priority Consider whether different or additional test organisms should be evaluated
6.	Exceedance of water quality objectives	Evidence of toxicity	No indications of alteration	Toxic contaminants are bioavailable, but in situ effects are not demonstrable Benthic analysis not sensitive enough to detect impact Potentially harmful pollutants not yet concentrated enough to change community	Determine if chemical and toxicity tests indicate persistent degradation Recheck benthic analyses; consider additional data analyses If recheck indicates benthic alteration, perform TIE to identify contaminants of concern, based on TIE metric Initiate upstream source identification as a high priority If recheck shows no effect, use TIE to identify contaminants of concern, based on TIE metric Initiate upstream source identification as a medium priority
7.	No persistent exceedances of water quality objectives	Evidence of toxicity	Indications of alteration	Unmeasured toxic contaminants are causing degradation Pollutant causing toxicity at very low levels Benthic impact due to habitat disturbance, not toxicity	Recheck chemical analyses and consider additional advanced analyses Use TIE to identify contaminants of concern, based on TIE metric Initiate upstream source identification as a high priority Consider potential role of physical habitat disturbance
8.	Exceedance of water quality objectives	No evidence of toxicity	Indications of alteration	Test organisms not sensitive to problem pollutants Benthic impact due to habitat disturbance, not toxicity	TIE would not provide useful information with no evidence of toxicity Initiate upstream source identification as a high priority Consider whether different or additional test organisms should be evaluated Consider potential role of physical habitat disturbance

4. REGIONAL MONITORING PROGRAMS

The San Diego Water Board recognizes the importance and advantages of participation by Copermittees in Regional Monitoring Programs. As such, the Copermittees may propose participation in additional regional monitoring programs to supplement and/or replace monitoring required under this Order. The regional monitoring plan must be submitted to the San Diego Water Board[10] for review and approval. Documentation of

[9] Model Monitoring Program for Municipal Separate Storm Sewer Systems in Southern California. Stormwater Monitoring Coalition August 2004. See Table 5-4 for definitions.

[10] For the purposes of Receiving Waters and MS4 Discharge Monitoring and Reporting Program No. R9-2010-0016, review and approval by the San Diego Water Board of draft monitoring plans, proposals or protocols shall be conducted by the San Diego Water Board Executive Officer.

participation and monitoring must be included in the annual report(s).

B. Wet Weather MS4 Discharge Monitoring

Each Copermittee must collaborate with the other Copermittees to develop, conduct, and report on a year-round, watershed-based, Wet Weather MS4 Discharge Monitoring Program. The monitoring program design, implementation, analysis, assessment, and reporting must be conducted on a watershed basis for each of the hydrologic subareas within the Santa Margarita HU under jurisdiction of the Copermittees. The monitoring program must be designed to meet the goals, and answer the questions, listed in Section I above, as well as to implement required Storm Water Action Levels (SALs) in the Order. The monitoring program must include the following components;

1. MS4 OUTFALL MONITORING

The Copermittees must collaborate to develop and implement a monitoring program to characterize pollutant discharges from MS4 outfalls in each watershed during wet weather. The program must include the rationale and criteria for selection of outfalls to be monitored. The program must, at a minimum, include collection of samples for pollutants listed in Table 4 (below). This monitoring program must be designed to sample a representative percentage[11] of the major outfalls within each hydrologic subarea and must begin no later than the 2012-2013 monitoring year.

a. The program must comply with Section D of this Order for Storm Water Action Levels (SALs). Samples must be collected during the first 24 hours of the storm water discharge or for the entire storm water discharge if it is less than 24 hours.

(1) Grab samples may be utilized only for pH, indicator bacteria, DO, temperature and hardness.

(2) All other constituents must be sampled using 24-hour composite samples or for the entire storm water discharge if the storm event is less than 24 hours.

b. Sampling to compare MS4 outfall discharges with total metal SALs must include a measurement of receiving water hardness at each

[11] A representative percentage determination must consider hydrologic conditions, total drainage area of the site, population density of the site, traffic density, age of the structures or buildings in the area, and land use types (commercial, residential and industrial).

outfall. If a total metal concentration exceeds a SAL in Section D of the Order, that concentration must be compared to the California Toxic Rule criteria and the USEPA 1-hour maximum concentration for the detected level of receiving water hardness associated with that sample. If it is determined that the sample's total metal concentration for that specific pollutant exceeds the SAL but does not exceed the applicable 1-hour criteria for the measured level of hardness, then the SAL shall be considered not exceeded for that measurement.

Table 4. Analytical Testing for Wet Weather MS4 Discharges

Conventionals, Nutrients, Hydrocarbons	Pesticides	Metals (Total and Dissolved)	Bacteriological
• Total Dissolved Solids • Total Suspended Solids • Turbidity★ • Total Hardness • pH • Specific Conductance • Temperature • Dissolved Oxygen • Total Phosphorus★ • Dissolved Phosphorus • Nitrite °★ • Nitrate °★ • Total Kjeldahl Nitrogen • Ammonia • Biological Oxygen Demand, 5-day • Chemical Oxygen Demand • Total Organic Carbon • Dissolved Organic Carbon • Oil and Grease • Sulfate	• Diazinon • Chlorpyrifos • Pyrethroids	• Arsenic • Cadmium★ • Chromium • Copper★ • Lead★ • Nickel • Selenium • Zinc★ • Mercury • Silver • Thallium • Iron • Manganese	• Fecal Coliform • Enterococcus • E. coli

° Nitrate and nitrate may be combined and reported as nitrate + nitrite.
★Pollutant for which there is a Storm Water Action Level

2. SOURCE IDENTIFICATION MONITORING

The Copermittees must collaborate to develop and implement a monitoring program to identify sources of pollutants causing the priority water quality problems within each hydrologic subarea. The monitoring program must include focused monitoring which moves upstream into each watershed as necessary to identify sources. This monitoring program must be implemented within each hydrologic subarea and must begin no later than the 2012-2013 monitoring year.

3. COMMENCEMENT OF MS4 OUTFALL AND SOURCE IDENTIFICATION MONITORING

The Principal Copermittee must submit to the San Diego Water Board for review and approval, a detailed draft of the wet weather MS4 discharge monitoring program to be implemented. The description must identify and provide the rationale for all constituents monitored, locations of monitoring, frequency of monitoring, and analyses to be conducted with the data generated. The draft must be submitted with the proposed monitoring program (Section III.A.1).

C. Non-Storm Water Dry Weather Action Levels and Illicit Discharge Detection and Elimination

Each Copermittee must collaborate with the other Copermittees to conduct, and report on a year-round watershed based Dry Weather Non-storm Water MS4 Discharge Monitoring Program. The monitoring program's implementation, analysis, assessment, and reporting must be conducted to assess compliance with section B and C of this Order, meet the goals of the MRP, and conduct Illicit Discharge Detection and Elimination Activities under Section F.4 of this Order. The monitoring program must also be designed to assess the contribution of dry weather flows to Clean Water Act Section 303(d) listed impairments. The monitoring program must include the following components:

1. MS4 OUTFALL MONITORING

Each Copermittee's program must be designed to determine levels of pollutants in effluent discharges from the MS4 into receiving waters. Each Copermittee must conduct the following dry weather field screening and analytical monitoring tasks:

a. Dry Weather Non-storm Water Effluent Analytical Monitoring Station Identification

(1) Sampling Stations must be located at major outfalls pursuant to section C of this Order. Other outfall sampling points (or any other point of access such as manholes) identified by the Copermittees as potential high risk sources of polluted effluent or as identified under Section C.4 of the Order must be sampled.

(2) Each Copermittee must clearly identify each dry weather effluent analytical monitoring station on its MS4 Map as either a separate GIS layer or a map overlay hereinafter referred to as a Dry Weather

Non-storm Water Effluent Analytical Stations Map.

b. Develop Dry Weather Non-storm Water Effluent Analytical Monitoring Procedures

Each Copermittee must develop and/or update written procedures for effluent analytical monitoring including field observations, monitoring, and analyses to be conducted. These procedures must be consistent with 40 CFR part 136. At a minimum, the procedures must meet the following guidelines and criteria:

(1) Determining Sampling Frequency: Effluent analytical monitoring must be conducted at major outfalls and identified stations. The Copermittees must sample a representative number of major outfalls and identified stations within each hydrologic subarea.[12] The sampling must be done to assess compliance with dry weather non-storm water action levels pursuant to section C of this Order. All monitoring conducted must be preceded by a minimum of 72 hours of dry weather.

(2) Sampling of non-storm water discharges may be done utilizing grab samples. If a ponded MS4 discharge is observed at a monitoring station, the Copermittee(s) must record the observation and collect at least one (1) grab sample. If flow is evident, a 1-hour composite sample may be taken. The Copermittee(s) must estimate the flow by measuring the width of water surface, approximate depth of water, and approximate flow velocity.

(3) Effluent samples must undergo analytical laboratory analysis for (a) all constituents described in *Table 1. Analytical Testing for Mass Loading and Stream Assessment* of this Order; (b) Constituents with assigned non-storm water action levels under Section C of this Order; and (c) Total Residual Chlorine.

(4) If the station is dry (i.e. no flowing or ponded MS4 discharge is observed), the Copermittee(s) must make and record all applicable observations on the MS4 outfall and receiving waters, including any evidence of past non-storm water flows and the presence of trash.

[12] A representative percentage determination must consider hydrologic conditions, total drainage area of the site, population density of the site, traffic density, age of the structures or buildings in the area, and land use types (commercial, residential and industrial).

2. SOURCE IDENTIFICATION MONITORING

The Copermittees must collaborate to develop and implement a monitoring program to identify sources of pollutants in non-storm water discharges in accordance with Sections C and F.4 of this Order. The source identification portion of the monitoring program must include: the following components:

a. Development and/or update of response criteria for dry weather non-storm water effluent analytical monitoring results:

(1) Response criteria must include action levels described in Section C of this Order.

(2) Response criteria must include evaluation of LC_{50} levels for toxicity to appropriate test organisms.

b. Develop and/or update Illicit Discharge Detection and Elimination response procedures for source identification follow up investigations and elimination in the event of exceedance of dry weather non-storm water effluent analytical monitoring response criteria (see above). These procedures must be consistent with procedures required in section C, F.4.d, and F.4.e. of this Order.

3. COMMENCEMENT OF MS4 OUTFALL AND SOURCE IDENTIFICATION MONITORING

The Copermittees must commence implementation of dry weather effluent analytical monitoring under the requirements of this Order no later than **July 1, 2012**. If monitoring indicates an illicit connection or illegal discharge, the Copermittee(s) must conduct the follow-up investigation and elimination activities described in sections C, F.4.d and F.4.e of this Order. In the interim period until the dry weather non-storm water effluent analytical monitoring program of this Order is implemented, each Copermittee must continue to implement dry weather field screening and analytical monitoring as it was most recently implemented pursuant to Order No. 2004-001.

D. High Priority Inland Aquatic Habitat Monitoring

The Copermittees must develop and submit to the San Diego Water Board by April 01, 2012, an inland aquatic habitat monitoring program for areas supporting high priority aquatic and/or riparian species. The goal of the monitoring program is to assess if MS4 storm water and non-storm water discharges are affecting high priority inland aquatic habitat. The monitoring

will assist the Copermittees in preventing the degradation of high quality waters within the jurisdiction of this Order that support high priority species by identifying discharges from MS4s which may cause or have the potential to cause impairment of beneficial uses within these areas.[13] High priority species include those federally and/or state listed as endangered, threatened, or as a species of concern. The design and goal of the monitoring program must be consistent with the criteria listed in Section I.B of this Monitoring Program, including evaluation of the protection of high priority species in receiving waters. The Copermittees must implement the program unless otherwise directed in writing by the San Diego Water Board.

The monitoring program must include the following components:

1. OUTFALL AND RECEIVING WATER MONITORING

   The program must be designed to determine levels of pollutants in storm water and non-storm water effluent discharges from the MS4 discharged into high priority inland aquatic habitat(s) and the level of those pollutants found in ambient receiving waters subject to the discharge. The Copermittees must conduct the following field screening and analytical monitoring tasks:

   a. MS4 and Receiving Waters Monitoring Station Identification

      (1) MS4 discharge stations must be major outfalls that directly discharge into high priority inland aquatic habitat. MS4 discharge stations may be selected in conjunction with monitoring required under Section II.B and II.C of the Receiving Waters and MS4 Discharge Monitoring Program.

      (2) Receiving water station(s) must be located upstream and downstream of the discharge within the high priority inland aquatic habitat. Receiving water stations must be located to prevent any significant co-mingling of receiving water flows with other sources.

   b. Develop Analytical Monitoring Procedures

      Each Copermittee must develop procedures for analytical monitoring (these procedures must be consistent with 40 CFR part 136), including field observations, pollutants to be monitored, analyses to be conducted, and quality assurance/control. At a minimum, the procedures must meet the following guidelines and criteria:

[13] In accordance with requirements of State Water Resources Control Board Resolution No. 68-16, Statement of Policy with Respect to Maintaining High Quality Waters in California.

(1) Determining Sampling Frequency: The Copermittees must sample a representative number of major outfalls and receiving waters that are considered high priority inland aquatic habitat. Sampling of the discharge and receiving waters must be paired and occur during both storm and non-storm conditions.

(2) Sampling in receiving waters may be done utilizing grab samples, though composite samples are encouraged. Sampling of storm and non-storm water discharges from the MS4 must be done in accordance with Section II.B and II.C. If ponded receiving waters is/are observed at a monitoring station, the Copermittees must make written observations and collect at least one (1) grab sample. The Copermittee(s) must estimate the flow by measuring the width of water surface, approximate depth of water, and approximate flow velocity

(3) The proposed constituents for which samples will undergo analytical laboratory analysis.

(4) Procedures for recording applicable observations when monitoring stations are dry (i.e. no flowing water or ponded conditions).

3. ASSESSMENT OF MONITORING RESULTS

The program must include a discussion of monitoring results within the monitoring annual report. The discussion must include an evaluation of the contribution of MS4 discharges to ambient water conditions within high priority inland aquatic habitats, as well as any actions taken to prevent and/or reduce sources of those pollutants.

4. SOURCE IDENTIFICATION MONITORING

The Copermittees must collaborate to conduct source identification monitoring in accordance with Section II.B and II.C of the Monitoring and Reporting Program of this Order.

E. Special Studies

1. The Copermittees must conduct special studies, including any monitoring and/or modeling required for TMDL development and implementation, as directed by the San Diego Water Board.

2. Sediment Toxicity Study

The Copermittees must develop and submit to the San Diego Water Board by April 01, 2012, a special study workplan to investigate the toxicity of sediment in streams and potential impact on benthic macroinvertebrate IBI scores. The Sediment Toxicity Special Study must be implemented in conjunction with the Stream Assessment Monitoring in II.A.2. The Copermittees must implement the special study unless otherwise directed in writing by the San Diego Water Board.

The Sediment Toxicity Special Study must include the following elements:

a. Sampling Locations: At least 4 stream assessment locations must be sampled, including 1 reference site and 1 mass loading site. Selection of sites must be done with consideration of subjectivity of receiving waters to discharges from residential and agricultural land uses.

b. Frequency: At a minimum, sampling must occur once per year at each site for at least 2 years. Sampling must be done in conjunction with the stream assessment sampling required under Section II.A.2 of the Monitoring and Reporting Program of this Order.

c. Parameters/Methods: At a minimum, sediment toxicity analysis must include the measurement of metals, pyrethroids and organochlorine pesticides. The analysis must include estimates of bioavailability based upon sediment grain size, organic carbon and receiving water temperature at the sampling site. Acute and chronic toxicity testing must be done using *Hyalella azteca* in accordance with Table 2.

d. Results: Results and a Discussion must be included in the Monitoring Annual Report (see III.A). The Discussion must include an assessment of the relationship between observed IBI scores under Section II.A.2 and all variables measured.

3. Trash and Litter Investigation

The Copermittees must develop and submit to the San Diego Water Board by September 01, 2012, a special study workplan to assess trash (including litter) as a pollutant within receiving waters on a watershed based scale. Litter is defined in California Government Code 68055.1g as "…improperly discarded waste material, including, but not limited to, convenience food, beverage, and other product packages or container constructed of steel, aluminum, glass, paper, plastic and other natural and synthetic, materials, thrown or deposited on lands and waters of the state,

but not including the properly discarded waste of the primary processing of agriculture, mining, logging, sawmilling, or manufacturing." A lead Copermittee must be selected for the Santa Margarita HU for the purposes of this Special Study. The Copermittees must implement the special study unless otherwise directed in writing by the San Diego Water Board

The Trash and Litter Investigation must include the following elements:

a. Locations: The lead Copermittee must identify suitable sampling locations within the Santa Margarita HU.

b. Frequency: Trash at each location must be monitored a minimum of twice during the wet season following a qualified monitoring storm event (minimum of 0.1 inches preceded by 72 hours of dry weather) and twice during the dry season.

c. Protocol: The lead Copermittee for the Santa Margarita HU must use the "Final Monitoring Workplan for the Assessment of Trash in San Diego County Watersheds" and "A Rapid Trash Assessment Method Applied to Waters of the San Francisco Bay Region" to develop a monitoring protocol for the Santa Margarita HU.

d. Results and Discussion from the Trash and Litter Study must be included in the Monitoring Annual Report. The Results and Discussion must, at a minimum, include source identification, an evaluation of BMPs for trash reduction and prevention, and a description of any BMPs implemented in response to study results.

4. Agricultural, Federal and Tribal Input Study

The Copermittees must develop and submit to the San Diego Water Board by September 01, 2012, a special study workplan to investigate the water quality of agricultural, federal and tribal runoff that is discharged into their MS4 (see Finding D.3.c of the Order). The Copermittees must implement the special study unless otherwise directed in writing by the San Diego Water Board.

The Agricultural, Federal and Tribal Input Special Study must include the following elements:

a. Locations: The Copermittees must identify a representative number of sampling stations within their MS4 that receive discharges of agricultural, federal, and tribal runoff that has not co-mingled with any

other source. At least one station from each category must be identified.

b. Frequency: One storm event must be monitored at each sampling location each year for at least 2 years.

c. Parameters/Methods: At a minimum, analysis must include those constituents listed in Table 1 of the MRP (see II.A.1). Grab samples may be utilized, though composite samples are preferred. Copermittees must also measure or estimate flow rates and volumes of discharges into the MS4.

d. Results: Results and Discussion from the Agricultural, Federal and Tribal Input Study must be included in the Monitoring Annual Report.

5. MS4 and Receiving Water Maintenance Study

The Copermittees must develop and submit to the San Diego Water Board by April 01, 2012, a special study workplan to investigate receiving waters that are also considered part of the MS4 (see Finding D.3.c of the Order) and which are subject to continual vegetative clearance activities (e.g. mowing). The study must be designed to assess the effects of vegetation removal activities and water quality, including, but not limited to, modification of biogeochemical functions, in-stream temperatures, receiving water bed and bank erosion potential and sediment transport. The Copermittees must implement the special study unless otherwise directed in writing by the San Diego Water Board.

The MS4 and Receiving Water Maintenance Special Study must include the following elements:

a. Locations: The Copermittees must identify suitable sampling locations, including at least one reference system that is not subject to maintenance activities.

b. Parameters/Methods: At a minimum, the Copermittees must monitor pre and post maintenance activities for indicator bacteria, turbidity (NTU), temperature, dissolved oxygen and nutrients (Nitrite, Nitrate, Total Kjeldahl Nitrogen, Ammonia and Total Phosphorous). Copermittees must also measure or estimate flow rates and volumes.

c. Results and Discussion from the MS4 and Receiving Water Maintenance Study must be included in the Annual Monitoring Report. The Discussion must include relevance of findings to CWA Section

303(d) listed impaired waters.

6. Intermittent and Ephemeral Stream Perennial Conversion Study

The Copermittees must develop and submit to the San Diego Water Board by April 01, 2013, a special study workplan to investigate the extent of any impacts to beneficial uses from the conversion of historically ephemeral or intermittent receiving waters to perennially flowing waters due to the continued discharge of currently exempted non-storm water from the MS4 and/or discharges into MS4s covered under a separate NPDES permit into receiving waters. The goal of the study is to assess if any impacts to beneficial uses, including, but not limited to, WILD, WARM, COLD or RARE, have occurred due to continuous discharge of currently exempted non-storm water discharges, and if the discharges should no longer be exempt. The Copermittees must implement the special study unless otherwise directed in writing by the San Diego Water Board.

The Intermittent and Ephemeral Stream Perennial Conversion Special Study must include the following elements:

a. Locations: The Copermittees must investigate their MS4 and adjacent downstream receiving waters to identify portions that have historically been ephemeral or intermittent but currently exhibit perennial flow due to exempted non-storm water discharges. Investigation must include historic habitat assessments, USGS gauging information, and historic aerial photography. Sampling must occur at a minimum of 2 identified perennially converted locations. Should the Copermittees be unable to locate any converted waters, a full description of the investigation must be documented in the annual report.

b. Parameters/Methods: The Copermittees must conduct water quality monitoring of the non-storm water discharge in accordance with Section C of this Order. In addition, the Copermittees must select a minimum of 2 downstream sampling points within the receiving waters subject the discharge and conduct the following:

(1) Grab samples must be taken and analyzed for indicator bacteria, nutrients (Nitrite, Nitrate, Total Kjeldahl Nitrogen, Ammonia and Total Phosphorous), turbidity (NTU), temperature, dissolved oxygen, total hardness, pH and 303(d) listed pollutants for all receiving waters at or downstream of the sampling site. The Copermittees must measure or estimate flow rates and volumes at each sampling point.

(2) Sampling at each site must include a quantitative and qualitative evaluation of beneficial uses. At a minimum, sampling must include observation estimation of active bed and bank erosion and erosion potential, invasive/non-native plant cover, aquatic non-native species, and potential vector control requirements.

c. Results and Discussion from the Intermittent and Ephemeral Stream Perennial Conversion Study must be included in the Annual Monitoring Report.

F. Monitoring Provisions

All monitoring activities must meet the following requirements:

1. Where procedures are not otherwise specified in this Receiving Waters Monitoring and Reporting Program, sampling, analysis and quality assurance/quality control must be conducted in accordance with the Quality Assurance Management Plan (QAMP) for the State of California's Surface Water Ambient Monitoring Program (SWAMP), adopted by the State Water Resources Control Board (SWRCB).

2. Samples and measurements taken for the purpose of monitoring must be representative of the monitored activity [40 CFR 122.41(j)(1)].

3. The Copermittees must retain records of all monitoring information, including all calibration and maintenance of monitoring instrumentation, copies of all reports required by this Order, and records of all data used to complete the Report of Waste Discharge and application for this Order, for a period of at least five (5) years from the date of the sample, measurement, report, or application. This period may be extended by request of the San Diego Water Board or USEPA at any time and must be extended during the course of any unresolved litigation regarding this discharge. [40 CFR 122.41(j)(2), CWC section 13383(a)]

4. Records of monitoring information must include [40 CFR 122.41(j)(3)]:

   a. The date, exact place, and time of sampling or measurements;
   b. The individual(s) who performed the sampling or measurements;
   c. The date(s) analyses were performed;
   d. The individual(s) who performed the analyses;
   e. The analytical techniques or methods used; and
   f. The results of such analyses.

5. All sampling, sample preservation, and analyses must be conducted according to test procedures approved under 40 CFR part 136, unless other test procedures have been specified in this Receiving Waters Monitoring and Reporting Program or approved by the San Diego Water Board [40 CFR 122.41(j)(4)].

6. The CWA provides that any person who falsifies, tampers with, or knowingly renders inaccurate any monitoring device or method required to be maintained under this Order must, upon conviction, be punished by a fine of not more than $10,000, or by imprisonment for not more than two years, or both. If a conviction of a person is for a violation committed after a first conviction of such person under this paragraph, punishment is a fine of not more than $20,000 per day of violation, or by imprisonment of not more than four years, or both. [40 CFR 122.41(j)(5)]

7. Calculations for all limitations which require averaging of measurements must utilize an arithmetic mean unless otherwise specified in this Receiving Waters Monitoring and Reporting Program. [40 CFR 122.41(l)(4)(iii)]

8. All chemical, bacteriological, and toxicity analyses must be conducted at a laboratory certified for such analyses by the California Department of Health Services or a laboratory approved by the San Diego Water Board.

9. For priority toxic pollutants that are identified in the California Toxics Rule (CTR) (65 Fed. Reg. 31682), the Copermittees must instruct their laboratories to establish calibration standards that are equivalent to or lower than the Minimum Levels (MLs) published in Appendix 4 of the Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California (SIP). If a Copermittee can demonstrate that a particular ML is not attainable, in accordance with procedures set forth in 40 CFR 136, the lowest quantifiable concentration of the lowest calibration standard analyzed by a specific analytical procedure (assuming that all the method specified sample weights, volumes, and processing steps have been followed) may be used instead of the ML listed in Appendix 4 of the SIP. The Copermittee must submit documentation from the laboratory to the San Diego Water Board for approval prior to raising the ML for any priority toxic pollutant.

10. The San Diego Water Board may make revisions to this Receiving Waters and MS4 Discharge Monitoring and Reporting Program at any time during the term of Order No. R9-2010-0016 and may include a reduction or increase in the number of parameters to be monitored, locations monitored, the frequency of monitoring, or the number and size of

samples collected.

11. The Clean Water Act provides that any person who knowingly makes any false statement, representation, or certification in any record or other document submitted or required to be maintained under this permit, including monitoring reports or reports of compliance or non-compliance must, upon conviction, be punished by a fine of not more than $10,000 per violation, or by imprisonment for not more than six months per violation, or by both. [40 CFR 122.41(k)(2)]

12. Monitoring must be conducted according the USEPA test procedures approved under 40 CFR 136, "Guidelines Establishing Test Procedures for Analysis of Pollutants under the Clean Water Act" as amended, unless other test procedures have been specified in this Receiving Waters and MS4 Discharge Monitoring and Reporting Program, in Order No. R9-2010-0016, or by the San Diego Water Board.

13. If a Copermittee(s) monitors any pollutant more frequently than required by the permit using test procedures approved under 40 CFR part 136, unless otherwise specified in the Order, the results of this monitoring must be included in the calculation and reporting of the data submitted in the reports requested by the San Diego Water Board. [40 CFR 122.41(l)(4)(ii)]

III. REPORTING PROGRAM

A. Monitoring Reporting

1. Planned Monitoring Program: The Principal Copermittee must submit to the San Diego Water Board by **June 1, 2012,** a proposed workplan describing the Receiving Waters and MS4 Discharge Monitoring Program to be implemented. Any updates to the planned monitoring program workplan proposed by the Copermittees shall be submitted with each Monitoring Annual Report. The Copermittees shall implement the proposed workplan unless otherwise directed in writing by the San Diego Water Board.

2. Monitoring Annual Report: The Principal Copermittee must submit the Receiving Waters and MS4 Discharge Monitoring Annual Report to the San Diego Water Board on October 1 of each year, beginning on **October 1, 2013**. Receiving Waters and MS4 Discharge Monitoring Annual Reports must meet the following requirements:

a. Annual monitoring reports must include the data/results, methods of evaluating the data, graphical summaries of the data, and an explanation/discussion of the data for each monitoring program component.

b. Annual monitoring reports must include a watershed-based analysis of the findings of each monitoring program component (mass loading, bioassessment, etc…). Each watershed-based analysis must include:

   (1) Identification and prioritization of water quality problems within each watershed.
   (2) Identification and description of the nature and magnitude of potential sources of the water quality problems within each watershed.
   (3) Evaluation and presentation of pollutant load and concentration increases or decreases at each mass loading station over time.
   (4) Evaluation of pollutant loads and concentrations measured at mass loading stations with respect to land use, population, sources, and other characteristics of watersheds using tools such as multiple linear regression, factor analysis, and cluster analysis.
   (5) Identification of links between source activities/conditions and observed receiving water impacts.
   (6) Identification of recommended future monitoring to identify and address sources of water quality problems.
   (7) Results and discussion of any TIE conducted, together with actions that will be implemented to reduce the discharge of pollutants in storm water, eliminate any discharge of pollutants in non-storm water, and abate the sources causing the toxicity.

c. Annual monitoring reports must include an analysis and interpretation of the data for each watershed with respect to the management questions listed in section I.B of this Receiving Waters Monitoring and Reporting Program.

d. Annual monitoring reports must include a discussion describing how each of the goals listed in section I.A of this MRP is addressed by the Copermittees' monitoring program for the monitoring year covered by the report.

e. Annual monitoring reports must include identification and analysis of any long-term trends in storm water or receiving water quality. Trend analysis must use nonparametric approaches, such as the Mann-Kendall test, including exogenous variables in a multiple regression model, and/or using a seasonal nonparametric trend model, where

applicable.

f. Annual monitoring reports must provide an estimation of total pollutant loads (wet weather loads plus dry weather loads) due to MS4 Discharge for each of the hydrologic subareas, including for 303(d) pollutants specified in Table 2 of the Order.

g. Annual monitoring reports must, for each monitoring program component listed above, include an assessment of compliance with applicable water quality standards.

h. Annual monitoring reports must describe monitoring station locations by latitude and longitude coordinates, frequency of sampling, quality assurance/quality control procedures, and sampling and analysis protocols.

i. Annual monitoring reports must use a standard report format and include the following elements:

(1) A stand alone comprehensive executive summary addressing all sections of the monitoring report;
(2) Comprehensive interpretations and conclusions; and
(3) Recommendations for future actions.

j. All monitoring reports submitted to the Principal Copermittee or the San Diego Water Board must contain the certified perjury statement described in Attachment B of this Order No. R9-2010-0016.

k. Annual monitoring reports must be reviewed prior to submittal to the San Diego Water Board by a committee of the Copermittees (consisting of no less than three different Copermittee members).

l. Annual monitoring reports must be submitted in both electronic and paper formats. Electronic formats must be CEDEN or SWAMP-uploadable.[14]

3. Monitoring programs and reports must comply with section II.F of Receiving Waters and MS4 Discharge Monitoring and Reporting Program No. R9-2010-0016 and Attachment B of this Order.

4. Following completion of an annual cycle of monitoring in October, the Copermittees must make the monitoring data and results available to the San Diego Water Board at the San Diego Water Board's request.

[14] For updates to the SWAMP templates and formats, see http://www.waterboards.ca.gov/swamp.

B. Interim Reporting Requirements

For the October 2010 to October 2012 monitoring period, the Principal Copermittee must submit the Receiving Waters Monitoring Annual Report as required under Order No. 2004-0001. The Receiving Waters Monitoring Annual Report must address the monitoring conducted to comply with the requirements of Order No. 2004-0001.

C. Reporting Dates

Table 5. Table of Required MRP Reporting Dates and Frequencies.

Submittal	Section	Completion Date	Frequency
Description of Proposed Monitoring Program	III.A.1	June 1, 2012	One Time
Receiving Waters and MS4 Discharge Monitoring Annual Reports, Including Proposed Updates to the Monitoring Program	III.A.2	Starting October 1, 2013	Annual
Copermittees submit Interim Monitoring Program Annual Report	III.B	As required under Order No. 2004-001	One Time
Draft Wet Weather MS4 Discharge Monitoring Program	II.B	June 01, 2012	One Time
Draft High Priority Inland Aquatic Habitat Monitoring	II.D	April 01, 2012	One Time
Draft Sediment Toxicity Special Study	II.E.2	April 01, 2012	One Time
Draft Trash and Litter Impairment Special Study	II.E.3	September 01, 2012	One Time
Draft Agricultural, Federal and Tribal Input Study	II.E.4	September 01, 2012	One Time
Draft MS4 and Receiving Water Maintenance Study	II.E.5	April 01, 2012	One Time
Draft Intermittent and Ephemeral Stream Perennial Conversion Study	II.E.6	April 01, 2013	One Time

Attachment F

SOURCE DATA

I. STORM WATER ACTION LEVELS DATABASE.....2

II. NUMERIC ACTION LEVELS EVALUATION DATA[1] 9

[1] Represented data from monitoring conducted by the Copermittees and provided in the 2008-09 Annual Monitoring Report.

I. STORM WATER ACTION LEVELS DATABASE

N02+NO3 (mg/l)	Phosphorous Total (mg/l)	Cadmium Total (ug/l)	Copper Total (ug/l)	Lead Total (ug/l)	Zinc Total (ug/l)	Turbidity (NTU)
4.70	7.90	9.80	800.00	660.00	22500.00	10
4.20	7.19	6.00	340.00	620.00	18000.00	15
3.90	4.96	6.00	320.00	540.00	11000.00	15
3.90	4.50	6.00	270.00	520.00	9970.00	16
3.60	4.40	6.00	244.00	460.00	9100.00	22
3.60	4.24	6.00	230.00	450.00	8800.00	23
3.60	2.59	5.30	220.00	450.00	6500.00	23
3.50	2.59	5.00	220.00	440.00	5500.00	24
3.30	2.50	4.10	210.00	430.00	5000.00	24
3.30	2.50	4.00	210.00	400.00	4900.00	30
3.10	2.50	4.00	209.00	380.00	4600.00	31
3.00	2.27	4.00	209.00	360.00	4300.00	33
2.96	2.00	4.00	200.00	350.00	3800.00	36
2.90	2.00	4.00	200.00	330.00	3800.00	36
2.70	2.00	4.00	200.00	320.00	3400.00	39
2.70	2.00	3.90	200.00	320.00	3390.00	40
2.60	1.90	3.80	200.00	320.00	3100.00	45
2.60	1.90	3.40	180.00	310.00	2500.00	50
2.60	1.80	3.40	180.00	310.00	2200.00	50
2.50	1.80	3.20	166.00	310.00	2100.00	60
2.50	1.70	3.10	163.00	310.00	1829.00	61
2.32	1.70	3.00	160.00	300.00	1700.00	62
2.30	1.70	3.00	150.00	290.00	1500.00	65
2.20	1.60	3.00	140.00	280.00	1400.00	65
2.20	1.60	3.00	140.00	270.00	1300.00	66
2.10	1.60	3.00	140.00	270.00	1300.00	69
2.10	1.53	3.00	140.00	270.00	1285.00	70
2.10	1.50	3.00	140.00	270.00	1200.00	72
2.10	1.50	3.00	130.00	260.00	1100.00	80
2.00	1.47	3.00	130.00	260.00	1054.00	84
2.00	1.46	3.00	128.00	250.00	1000.00	97
2.00	1.40	3.00	120.00	250.00	980.00	111
2.00	1.40	3.00	120.00	250.00	960.00	140
1.90	1.40	3.00	120.00	245.00	850.00	151
1.90	1.30	2.90	120.00	230.00	850.00	157
1.90	1.30	2.80	120.00	230.00	850.00	590
1.90	1.30	2.70	111.00	225.00	850.00	
1.90	1.30	2.60	111.00	220.00	840.00	
1.80	1.30	2.50	110.00	220.00	780.00	
1.80	1.30	2.40	110.00	210.00	768.00	
1.70	1.24	2.40	110.00	210.00	760.00	

1.70	1.20	2.30	110.00	200.00	750.00	
1.70	1.20	2.20	110.00	200.00	740.00	
1.70	1.20	2.10	110.00	190.00	740.00	
1.70	1.20	2.00	100.00	190.00	730.00	
1.70	1.10	2.00	100.00	190.00	720.00	
1.70	1.10	2.00	100.00	190.00	710.00	
1.60	1.10	2.00	100.00	170.00	710.00	
1.60	1.10	2.00	100.00	170.00	700.00	
1.60	1.06	2.00	100.00	170.00	700.00	
1.60	1.00	2.00	99.00	160.00	690.00	
1.60	0.96	2.00	94.00	160.00	690.00	
1.60	0.96	2.00	91.00	150.00	680.00	
1.60	0.94	2.00	91.00	150.00	680.00	
1.53	0.94	2.00	90.00	150.00	670.00	
1.50	0.92	2.00	90.00	150.00	660.00	
1.50	0.91	2.00	89.00	150.00	660.00	
1.50	0.85	2.00	87.00	140.00	660.00	
1.50	0.85	2.00	87.00	140.00	650.00	
1.50	0.85	2.00	84.00	140.00	630.00	
1.50	0.83	2.00	83.00	130.00	610.00	
1.40	0.83	2.00	82.00	130.00	610.00	
1.40	0.83	2.00	81.00	130.00	597.00	
1.40	0.81	2.00	81.00	130.00	590.00	
1.40	0.81	2.00	77.00	130.00	590.00	
1.40	0.81	2.00	77.00	123.00	576.00	
1.40	0.80	2.00	76.00	120.00	570.00	
1.40	0.80	2.00	74.00	120.00	570.00	
1.32	0.78	2.00	72.00	120.00	560.00	
1.30	0.78	1.90	72.00	120.00	560.00	
1.30	0.77	1.90	72.00	120.00	540.00	
1.30	0.77	1.90	72.00	115.00	540.00	
1.30	0.76	1.80	72.00	110.00	520.00	
1.30	0.76	1.80	71.00	110.00	520.00	
1.30	0.75	1.80	70.00	110.00	520.00	
1.30	0.75	1.70	70.00	110.00	510.00	
1.29	0.75	1.60	67.00	102.00	500.00	
1.20	0.74	1.60	66.00	100.00	500.00	
1.20	0.73	1.60	66.00	100.00	490.00	
1.20	0.72	1.60	66.00	100.00	480.00	
1.20	0.72	1.60	65.00	100.00	475.00	
1.20	0.72	1.60	65.00	100.00	470.00	
1.20	0.71	1.50	63.00	99.00	470.00	
1.20	0.71	1.50	63.00	97.00	462.00	
1.20	0.69	1.40	62.00	97.00	460.00	
1.20	0.68	1.30	62.00	97.00	460.00	
1.20	0.68	1.30	60.00	95.00	450.00	
1.20	0.68	1.20	60.00	91.00	440.00	

1.10	0.68	1.20	59.00	90.00	440.00	
1.10	0.68	1.20	56.59	90.00	440.00	
1.10	0.67	1.20	55.00	87.00	430.00	
1.10	0.66	1.10	55.00	86.00	430.00	
1.10	0.66	1.10	54.00	86.00	430.00	
1.10	0.65	1.10	54.00	84.00	420.00	
1.10	0.65	1.10	54.00	82.00	420.00	
1.10	0.65	1.10	53.00	82.00	410.00	
1.10	0.65	1.00	53.00	81.00	409.00	
1.00	0.63	1.00	52.00	78.00	400.00	
1.00	0.62	1.00	51.00	78.00	400.00	
1.00	0.61	1.00	50.00	78.00	400.00	
1.00	0.60	1.00	50.00	77.00	390.00	
1.00	0.60	1.00	50.00	76.00	390.00	
1.00	0.59	1.00	50.00	76.00	390.00	
0.99	0.57	1.00	50.00	69.00	390.00	
0.99	0.57	1.00	50.00	69.00	390.00	
0.98	0.56	1.00	50.00	67.00	370.00	
0.97	0.56	1.00	50.00	66.00	370.00	
0.96	0.55	1.00	49.00	66.00	370.00	
0.96	0.55	1.00	49.00	66.00	360.00	
0.95	0.55	1.00	49.00	65.00	360.00	
0.95	0.53	1.00	48.00	64.00	360.00	
0.93	0.53	1.00	48.00	61.00	360.00	
0.93	0.53	1.00	47.00	57.00	350.00	
0.93	0.52	1.00	46.08	57.00	350.00	
0.93	0.52	1.00	46.00	56.00	350.00	
0.92	0.52	1.00	46.00	56.00	340.00	
0.90	0.52	1.00	44.25	53.00	340.00	
0.88	0.51	1.00	44.00	53.00	340.00	
0.87	0.51	1.00	44.00	52.60	340.00	
0.86	0.50	1.00	44.00	52.00	340.00	
0.85	0.49	1.00	44.00	51.00	340.00	
0.84	0.49	1.00	43.00	51.00	334.00	
0.83	0.48	1.00	43.00	50.00	330.00	
0.81	0.48	1.00	43.00	50.00	330.00	
0.81	0.48	1.00	42.00	50.00	330.00	
0.80	0.47	1.00	42.00	50.00	330.00	
0.80	0.47	1.00	42.00	50.00	330.00	
0.78	0.47	1.00	41.00	50.00	330.00	
0.78	0.46	1.00	40.00	50.00	330.00	
0.77	0.46	1.00	40.00	50.00	320.00	
0.77	0.46	1.00	40.00	50.00	320.00	
0.77	0.45	1.00	40.00	50.00	320.00	
0.74	0.45	1.00	40.00	50.00	320.00	
0.73	0.44	1.00	39.00	49.00	310.00	
0.72	0.44	1.00	39.00	47.00	310.00	

0.69	0.44	1.00	39.00	46.00	310.00	
0.69	0.44	1.00	39.00	46.00	308.00	
0.69	0.44	1.00	39.00	44.00	300.00	
0.67	0.44	1.00	39.00	44.00	300.00	
0.67	0.44	1.00	37.00	43.00	300.00	
0.66	0.43	1.00	37.00	42.00	300.00	
0.66	0.42	1.00	37.00	41.00	290.00	
0.65	0.42	1.00	37.00	41.00	285.00	
0.63	0.41	1.00	37.00	41.00	280.00	
0.62	0.41	1.00	36.00	41.00	280.00	
0.62	0.41	1.00	36.00	41.00	280.00	
0.62	0.40	1.00	36.00	40.10	280.00	
0.60	0.40	1.00	36.00	40.00	280.00	
0.59	0.40	1.00	35.00	39.30	280.00	
0.59	0.40	1.00	35.00	39.00	280.00	
0.58	0.40	1.00	34.00	39.00	280.00	
0.57	0.40	1.00	34.00	39.00	280.00	
0.57	0.40	1.00	33.40	38.00	270.00	
0.55	0.40	1.00	33.00	38.00	270.00	
0.52	0.40	1.00	33.00	38.00	270.00	
0.50	0.40	1.00	33.00	37.00	270.00	
0.50	0.39	1.00	33.00	36.00	270.00	
0.46	0.39	1.00	33.00	36.00	270.00	
0.42	0.39	1.00	32.26	36.00	260.00	
0.42	0.38	1.00	32.01	36.00	260.00	
0.35	0.38	1.00	32.00	35.00	260.00	
0.10	0.38	1.00	32.00	34.00	260.00	
0.06	0.37	1.00	32.00	34.00	260.00	
	0.36	1.00	32.00	33.00	250.00	
	0.36	1.00	32.00	33.00	250.00	
	0.36	1.00	32.00	33.00	250.00	
	0.36	1.00	31.00	33.00	250.00	
	0.35	1.00	31.00	32.00	247.00	
	0.35	1.00	31.00	32.00	242.13	
	0.35	1.00	31.00	31.94	240.00	
	0.35	1.00	30.00	30.00	240.00	
	0.34	1.00	30.00	30.00	240.00	
	0.34	1.00	30.00	30.00	240.00	
	0.34	1.00	30.00	30.00	240.00	
	0.34	1.00	30.00	30.00	230.00	
	0.34	1.00	29.00	30.00	230.00	
	0.34	1.00	29.00	30.00	220.00	
	0.33	1.00	28.00	29.00	220.00	
	0.33	1.00	28.00	29.00	220.00	
	0.33	0.98	28.00	29.00	210.00	
	0.33	0.94	28.00	29.00	210.00	
	0.33	0.94	27.19	28.00	210.00	

	0.33	0.92	27.00	28.00	210.00	
	0.32	0.90	27.00	28.00	210.00	
	0.32	0.90	27.00	27.00	210.00	
	0.32	0.86	26.00	27.00	210.00	
	0.32	0.80	26.00	26.31	205.00	
	0.32	0.80	26.00	26.00	202.79	
	0.31	0.71	25.00	26.00	202.00	
	0.31	0.70	25.00	25.00	200.00	
	0.30	0.70	25.00	25.00	200.00	
	0.30	0.60	24.00	25.00	200.00	
	0.30	0.60	24.00	24.60	200.00	
	0.30	0.59	23.00	24.00	200.00	
	0.30	0.59	23.00	24.00	200.00	
	0.30	0.52	23.00	24.00	200.00	
	0.30	0.50	23.00	24.00	194.49	
	0.29	0.50	23.00	23.00	190.00	
	0.29	0.50	22.00	23.00	190.00	
	0.29	0.50	22.00	23.00	190.00	
	0.29	0.50	21.00	23.00	190.00	
	0.29	0.50	21.00	23.00	184.13	
	0.29	0.50	21.00	23.00	180.00	
	0.28	0.50	21.00	22.20	180.00	
	0.28	0.50	20.36	22.00	180.00	
	0.28	0.50	20.00	22.00	180.00	
	0.27	0.50	20.00	22.00	180.00	
	0.27	0.50	20.00	22.00	180.00	
	0.27	0.50	20.00	21.20	180.00	
	0.26	0.50	20.00	21.10	170.00	
	0.26	0.40	19.00	21.00	170.00	
	0.26	0.40	19.00	20.00	170.00	
	0.26	0.40	18.00	19.10	170.00	
	0.25	0.30	18.00	19.00	160.00	
	0.25	0.30	18.00	19.00	160.00	
	0.25	0.30	18.00	19.00	160.00	
	0.25	0.30	18.00	19.00	160.00	
	0.25	0.30	17.00	18.50	160.00	
	0.25	0.30	17.00	18.00	160.00	
	0.24	0.20	17.00	18.00	160.00	
	0.24	0.20	17.00	18.00	160.00	
	0.24	0.20	17.00	18.00	160.00	
	0.23	0.04	17.00	17.00	160.00	
	0.23		17.00	17.00	150.00	
	0.23		17.00	17.00	150.00	
	0.23		17.00	17.00	150.00	
	0.22		16.00	17.00	150.00	
	0.22		16.00	17.00	150.00	
	0.22		16.00	17.00	146.00	

	0.22		16.00	17.00	145.00	
	0.22		16.00	17.00	140.00	
	0.22		15.00	16.90	140.00	
	0.22		15.00	16.00	140.00	
	0.21		15.00	15.00	140.00	
	0.21		15.00	15.00	140.00	
	0.21		15.00	15.00	140.00	
	0.21		14.50	15.00	140.00	
	0.21		14.00	15.00	140.00	
	0.21		14.00	14.00	140.00	
	0.20		14.00	14.00	140.00	
	0.20		14.00	14.00	136.55	
	0.20		14.00	13.00	135.60	
	0.20		14.00	13.00	130.00	
	0.20		13.00	13.00	130.00	
	0.20		13.00	13.00	130.00	
	0.20		13.00	13.00	130.00	
	0.20		13.00	12.00	130.00	
	0.20		13.00	12.00	130.00	
	0.19		13.00	12.00	130.00	
	0.19		12.00	12.00	127.00	
	0.19		12.00	12.00	124.00	
	0.19		12.00	12.00	122.05	
	0.19		12.00	11.00	120.00	
	0.19		11.00	11.00	120.00	
	0.19		11.00	11.00	120.00	
	0.18		10.00	10.00	120.00	
	0.18		10.00	10.00	112.11	
	0.18		10.00	10.00	110.00	
	0.18		10.00	10.00	110.00	
	0.18		9.60	10.00	110.00	
	0.18		9.60	10.00	110.00	
	0.17		9.10	10.00	110.00	
	0.17		9.10	10.00	110.00	
	0.17		9.00	10.00	110.00	
	0.17		8.30	9.60	110.00	
	0.17		8.20	9.40	110.00	
	0.16		8.00	9.10	108.00	
	0.15		8.00	9.00	100.00	
	0.15		7.70	9.00	100.00	
	0.15		7.70	9.00	100.00	
	0.15		7.00	9.00	100.00	
	0.15		7.00	8.00	100.00	
	0.15		6.80	8.00	100.00	
	0.14		6.80	8.00	99.00	
	0.14		6.80	8.00	98.00	
	0.14		6.50	8.00	97.00	

	0.14		6.50	8.00	93.40	
	0.14		6.30	8.00	92.00	
	0.14		6.30	7.60	92.00	
	0.14		6.10	7.50	90.00	
	0.13		5.60	7.00	90.00	
	0.13		5.40	7.00	90.00	
	0.13		5.20	6.00	86.00	
	0.13		5.00	6.00	83.00	
	0.13		4.90	6.00	81.00	
	0.12		4.50	5.90	81.00	
	0.12		4.10	5.80	80.00	
	0.12		4.10	5.40	80.00	
	0.11		3.90	5.00	80.00	
	0.11		3.40	5.00	80.00	
	0.11		2.60	5.00	80.00	
	0.11		2.60	5.00	79.00	
	0.10		2.60	5.00	73.00	
	0.10		2.30	5.00	72.00	
	0.10		2.00	4.80	70.00	
	0.10		2.00	4.80	70.00	
	0.09		1.70	4.70	70.00	
	0.08		1.50	4.60	70.00	
	0.06		1.50	4.00	64.00	
	0.03		1.50	4.00	63.00	
			1.40	3.80	61.00	
			1.40	3.00	60.00	
				3.00	56.00	
				2.30	44.00	
				2.00	40.00	
				1.60	37.00	
					35.00	
					30.00	
					26.00	
					24.00	
					20.00	
					10.00	
					5.00	

II. NUMERIC ACTION LEVELS EVALUATION DATA

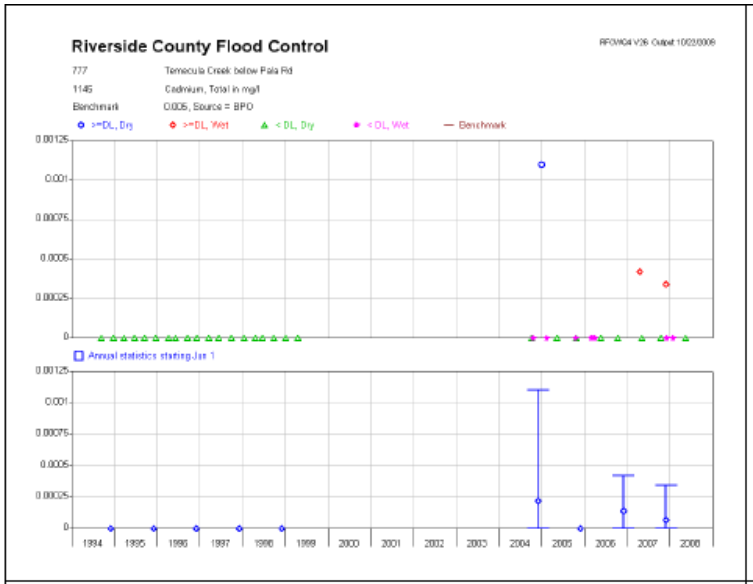

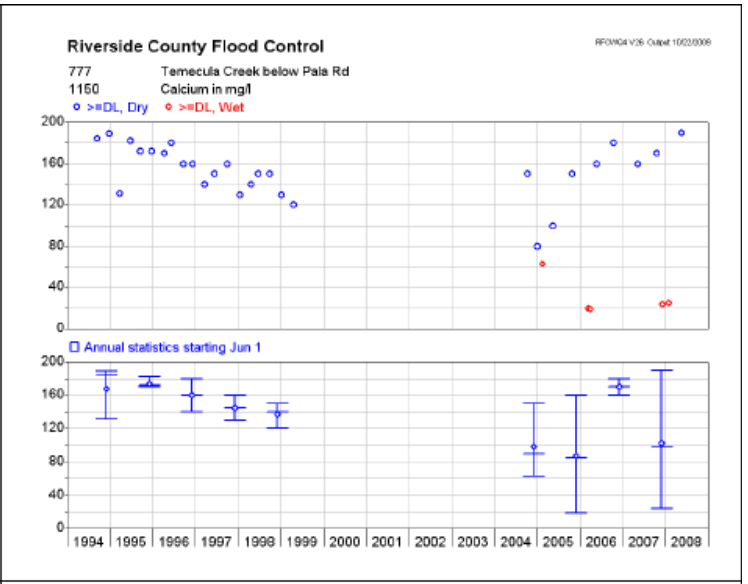

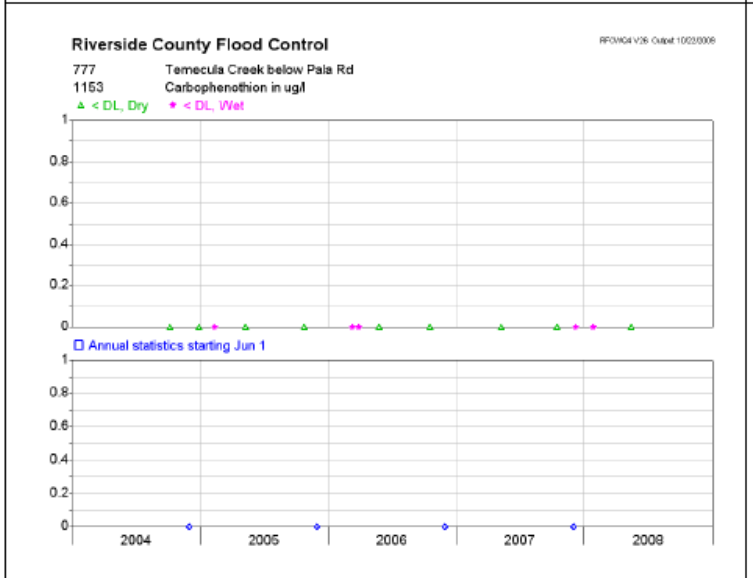

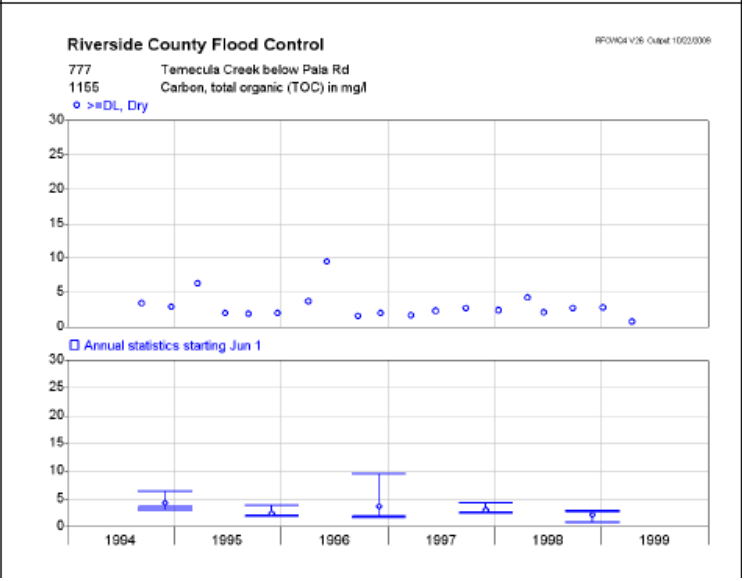

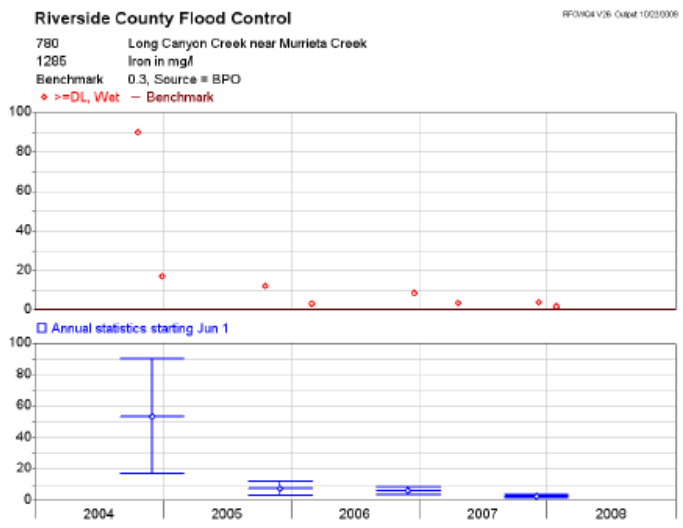
Riverside County Flood Control
780 Long Canyon Creek near Murrieta Creek
1285 Iron in mg/l
Benchmark 0.3, Source = BPO
>=DL, Wet
Benchmark
Annual statistics starting Jun 1
2004
2005
2006
2007
2008

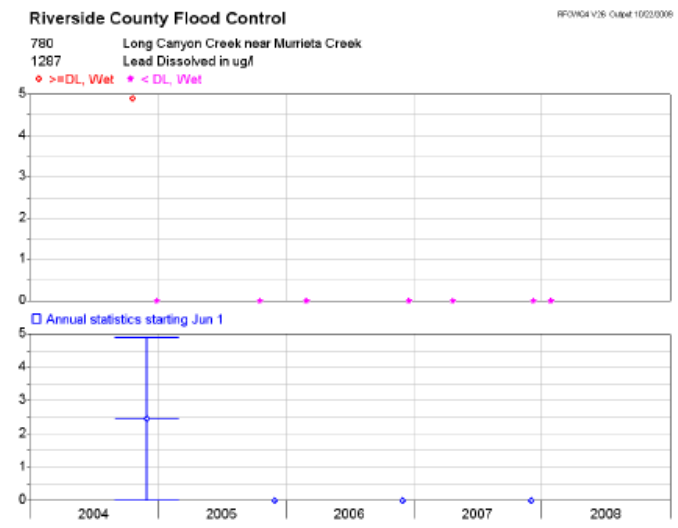
Riverside County Flood Control
780 Long Canyon Creek near Murrieta Creek
1287 Lead Dissolved in ug/l
>=DL, Wet
< DL, Wet
Annual statistics starting Jun 1
2004
2005
2006
2007
2008

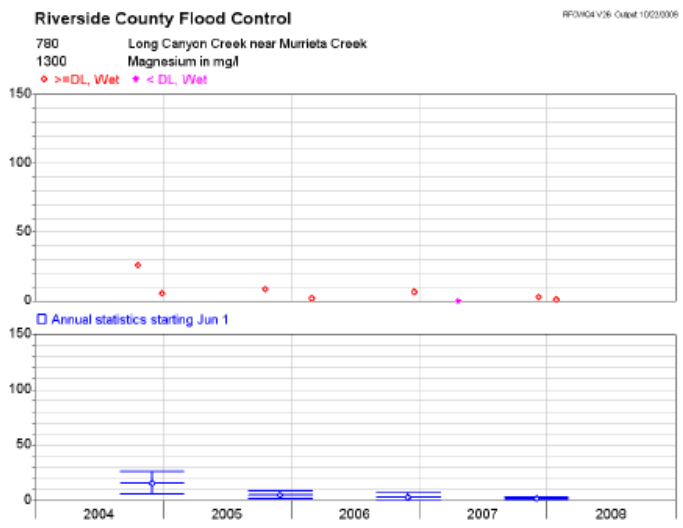
Riverside County Flood Control
780 Long Canyon Creek near Murrieta Creek
1300 Magnesium in mg/l
>=DL, Wet
< DL, Wet
Annual statistics starting Jun 1
2004
2005
2006
2007
2008

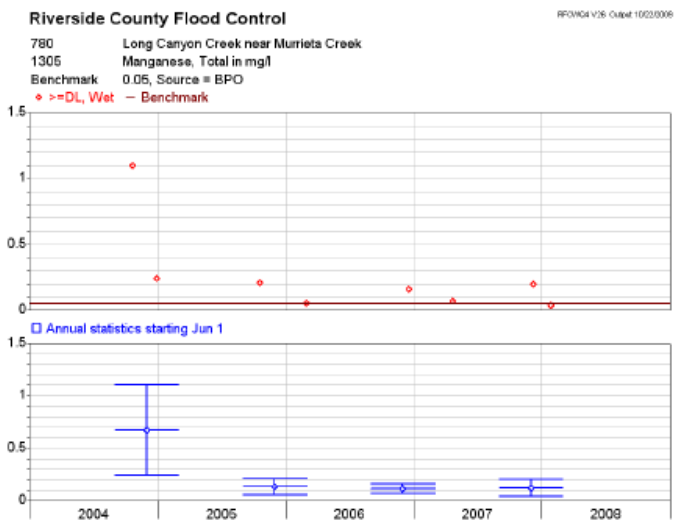
Riverside County Flood Control
780 Long Canyon Creek near Murrieta Creek
1305 Manganese, Total in mg/l
Benchmark 0.05, Source = BPO
>=DL, Wet
Benchmark
Annual statistics starting Jun 1
2004
2005
2006
2007
2008

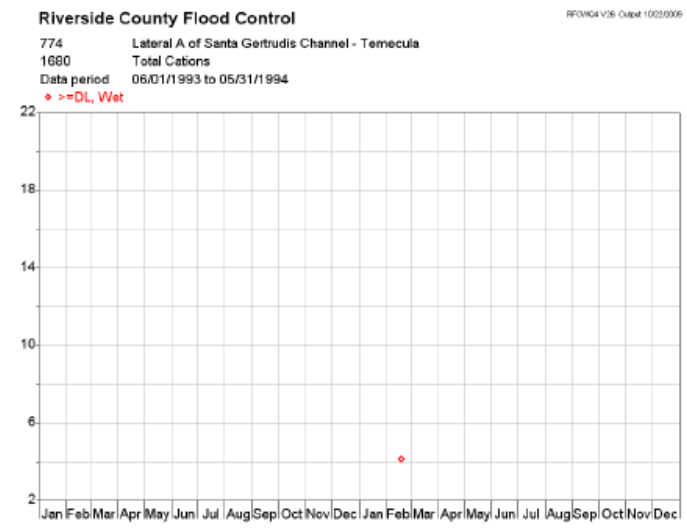
Riverside County Flood Control
774 Lateral A of Santa Gertrudis Channel - Temecula
1680 Total Cations
Data period 06/01/1993 to 05/31/1994
>=DL, Wet
22
18
14
10
6
2
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

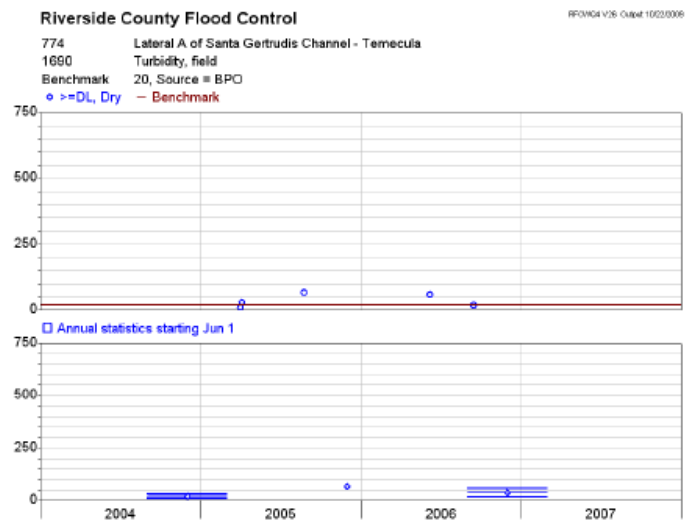
Riverside County Flood Control
774 Lateral A of Santa Gertrudis Channel - Temecula
1690 Turbidity, field
Benchmark 20, Source = BPO
>=DL, Dry
Benchmark
750
500
250
0
Annual statistics starting Jun 1
750
500
250
0
2004
2005
2006
2007

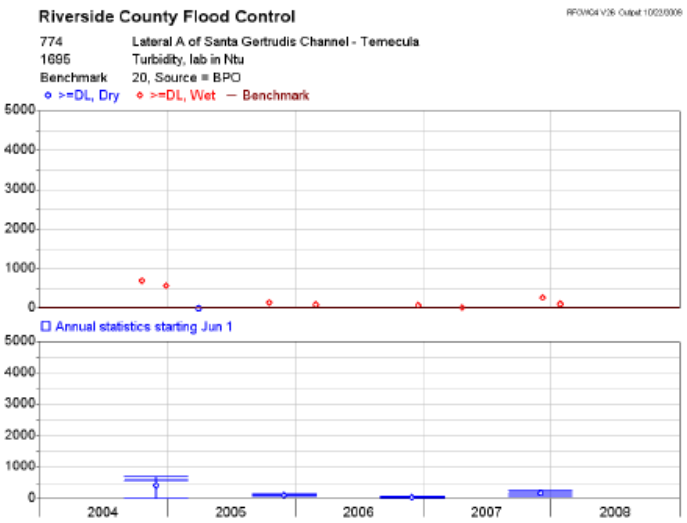
Riverside County Flood Control
774 Lateral A of Santa Gertrudis Channel - Temecula
1695 Turbidity, lab in Ntu
Benchmark 20, Source = BPO
>=DL, Dry
>=DL, Wet
Benchmark
5000
4000
3000
2000
1000
0
Annual statistics starting Jun 1
5000
4000
3000
2000
1000
0
2004
2005
2006
2007
2008

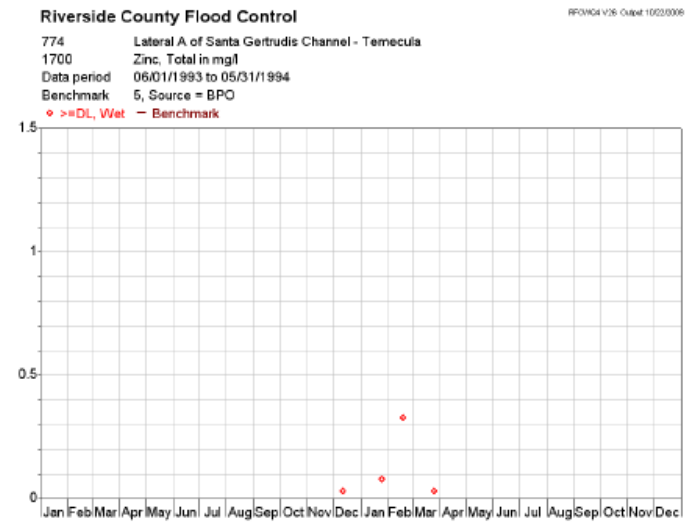
Riverside County Flood Control
774 Lateral A of Santa Gertrudis Channel - Temecula
1700 Zinc, Total in mg/l
Data period 06/01/1993 to 05/31/1994
Benchmark 5, Source = BPO
>=DL, Wet
Benchmark
1.5
1
0.5
0
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

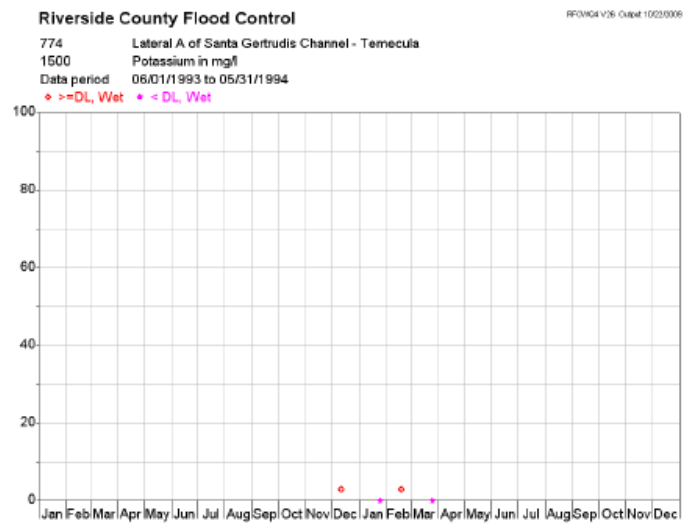
Riverside County Flood Control
774 Lateral A of Santa Gertrudis Channel - Temecula
1500 Potassium in mg/l
Data period 06/01/1993 to 05/31/1994
>=DL, Wet
< DL, Wet
100
80
60
40
20
0
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

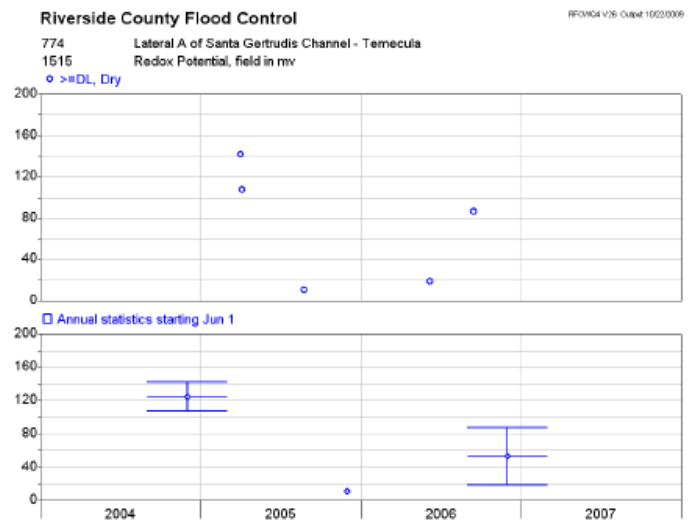
Riverside County Flood Control
774 Lateral A of Santa Gertrudis Channel - Temecula
1515 Redox Potential, field in mv
>=DL, Dry
200
160
120
80
40
0
Annual statistics starting Jun 1
2004
2005
2006
2007

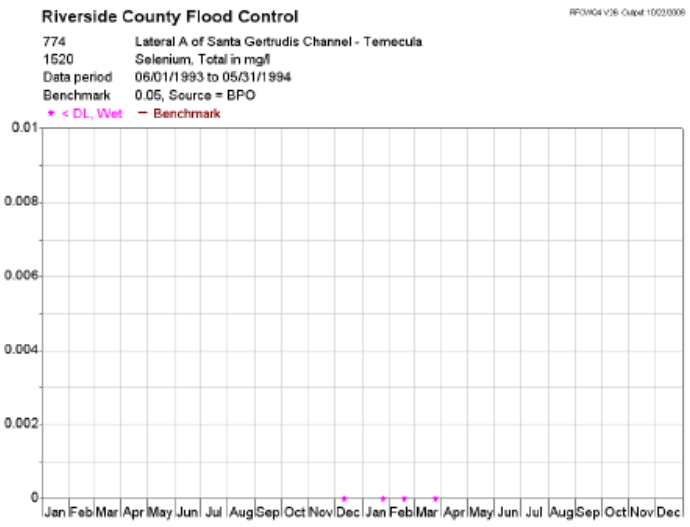
Riverside County Flood Control
774 Lateral A of Santa Gertrudis Channel - Temecula
1520 Selenium, Total in mg/l
Data period 06/01/1993 to 05/31/1994
Benchmark 0.05, Source = BPO
< DL, Wet
Benchmark
0.01
0.008
0.006
0.004
0.002
0
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

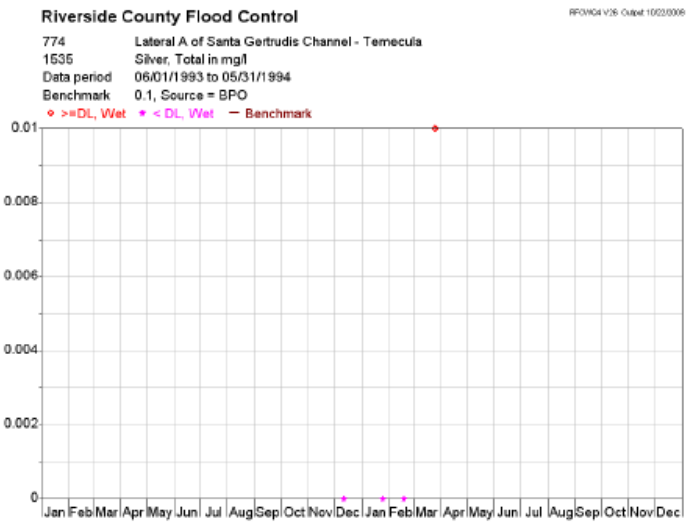
Riverside County Flood Control
774 Lateral A of Santa Gertrudis Channel - Temecula
1535 Silver, Total in mg/l
Data period 06/01/1993 to 05/31/1994
Benchmark 0.1, Source = BPO
>=DL, Wet
< DL, Wet
Benchmark
0.01
0.008
0.006
0.004
0.002
0
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

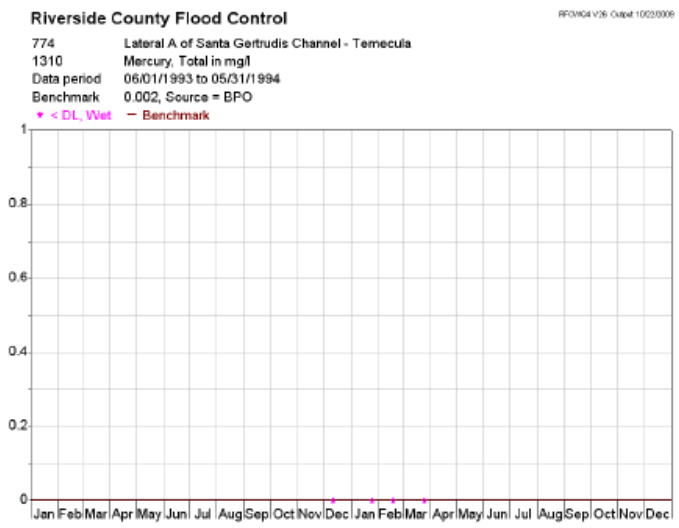
Riverside County Flood Control
774 Lateral A of Santa Gertrudis Channel - Temecula
1310 Mercury, Total in mg/l
Data period 06/01/1993 to 05/31/1994
Benchmark 0.002, Source = BPO
< DL, Wet
Benchmark
1
0.8
0.6
0.4
0.2
0
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

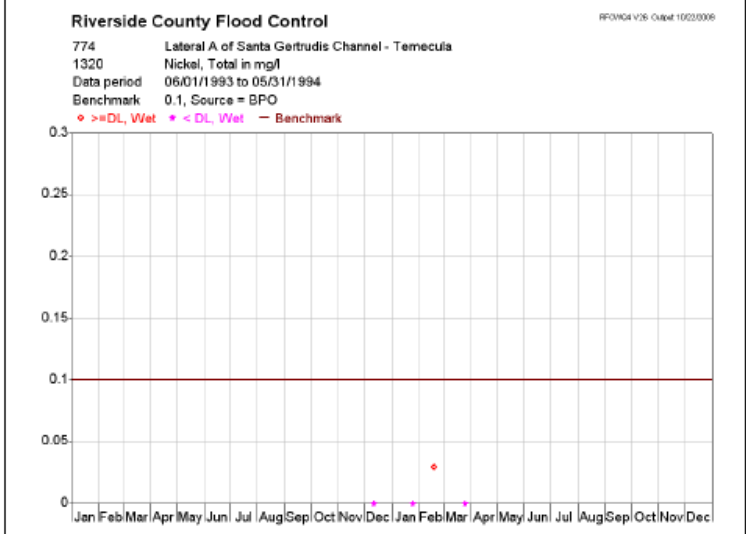
Riverside County Flood Control
774 Lateral A of Santa Gertrudis Channel - Temecula
1320 Nickel, Total in mg/l
Data period 06/01/1993 to 05/31/1994
Benchmark 0.1, Source = BPO
>=DL, Wet
< DL, Wet
Benchmark
0.3
0.25
0.2
0.15
0.1
0.05
0
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

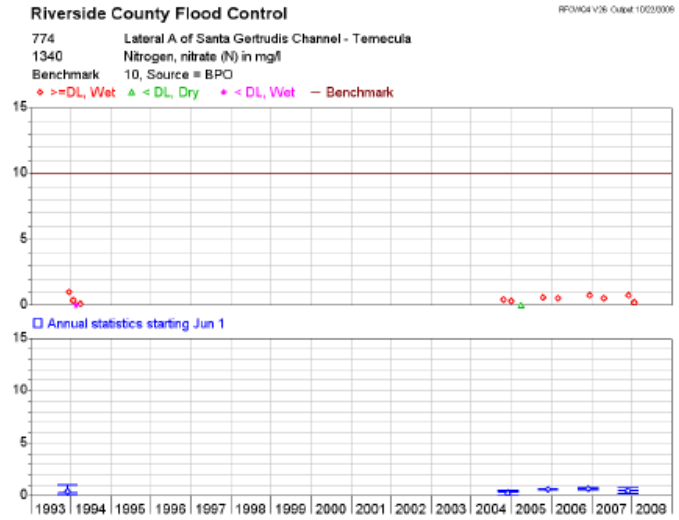
Riverside County Flood Control
774 Lateral A of Santa Gertrudis Channel - Temecula
1340 Nitrogen, nitrate (N) in mg/l
Benchmark 10, Source = BPO
>=DL, Wet
< DL, Dry
< DL, Wet
Benchmark
15
10
5
0
Annual statistics starting Jun 1
1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008

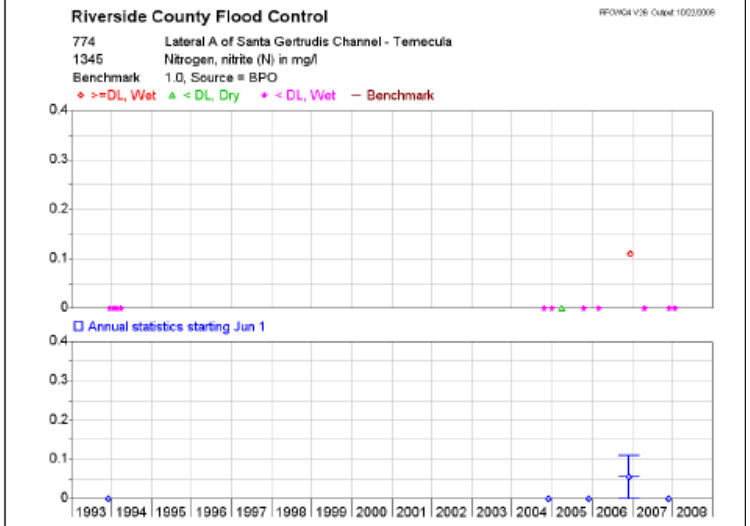
Riverside County Flood Control
774 Lateral A of Santa Gertrudis Channel - Temecula
1345 Nitrogen, nitrite (N) in mg/l
Benchmark 1.0, Source = BPO
>=DL, Wet
< DL, Dry
< DL, Wet
Benchmark
0.4
0.3
0.2
0.1
0
Annual statistics starting Jun 1
1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008

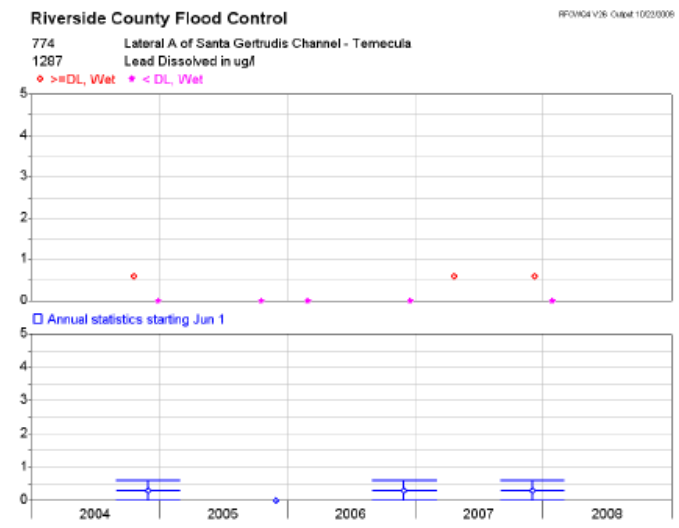
Riverside County Flood Control
774 Lateral A of Santa Gertrudis Channel - Temecula
1287 Lead Dissolved in ug/l
>=DL, Wet
< DL, Wet
Annual statistics starting Jun 1
2004
2005
2006
2007
2008

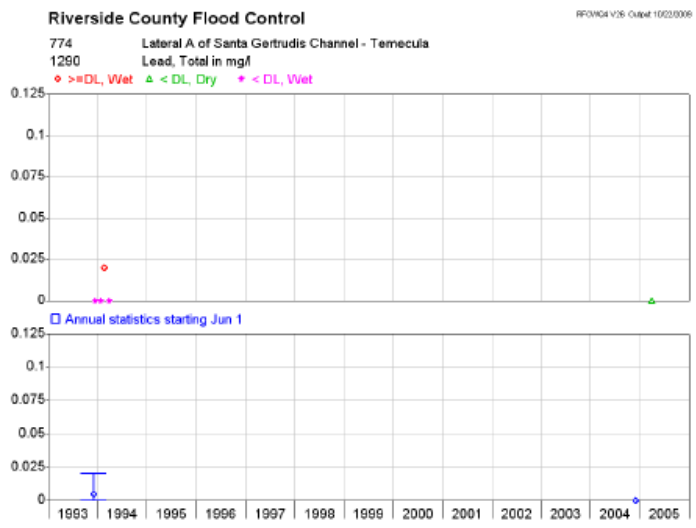
Riverside County Flood Control
774 Lateral A of Santa Gertrudis Channel - Temecula
1290 Lead, Total in mg/l
>=DL, Wet
< DL, Dry
< DL, Wet
Annual statistics starting Jun 1
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005

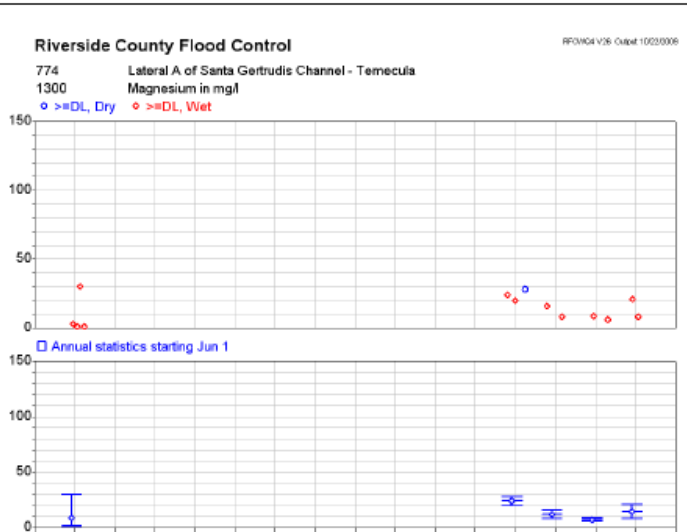
Riverside County Flood Control
774 Lateral A of Santa Gertrudis Channel - Temecula
1300 Magnesium in mg/l
>=DL, Dry
>=DL, Wet
Annual statistics starting Jun 1
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008

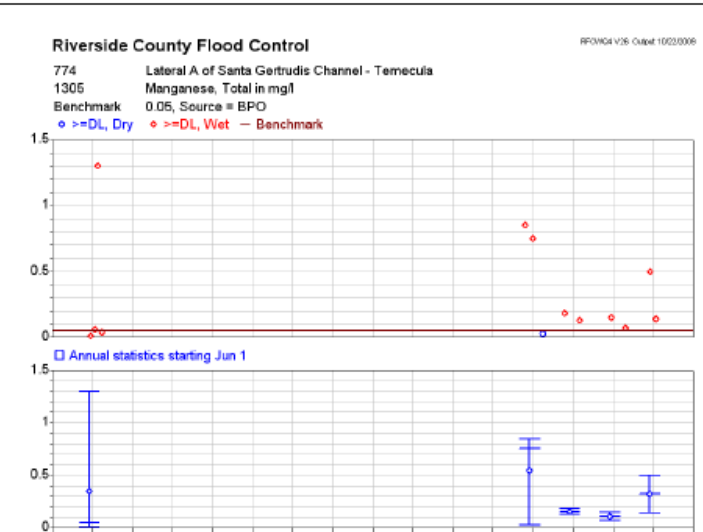
Riverside County Flood Control
774 Lateral A of Santa Gertrudis Channel - Temecula
1305 Manganese, Total in mg/l
Benchmark 0.05, Source = BPO
>=DL, Dry
>=DL, Wet
Benchmark
Annual statistics starting Jun 1
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008

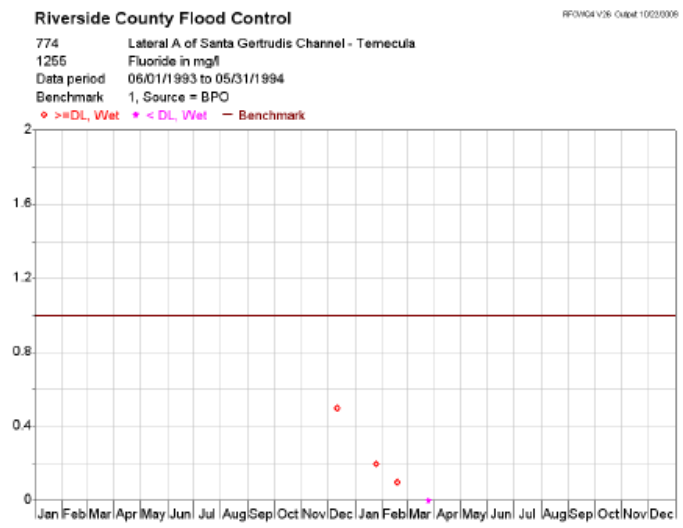
Riverside County Flood Control
774 Lateral A of Santa Gertrudis Channel - Temecula
1255 Fluoride in mg/l
Data period 06/01/1993 to 05/31/1994
Benchmark 1, Source = BPO
>=DL, Wet
< DL, Wet
Benchmark
2
1.6
1.2
0.8
0.4
0
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

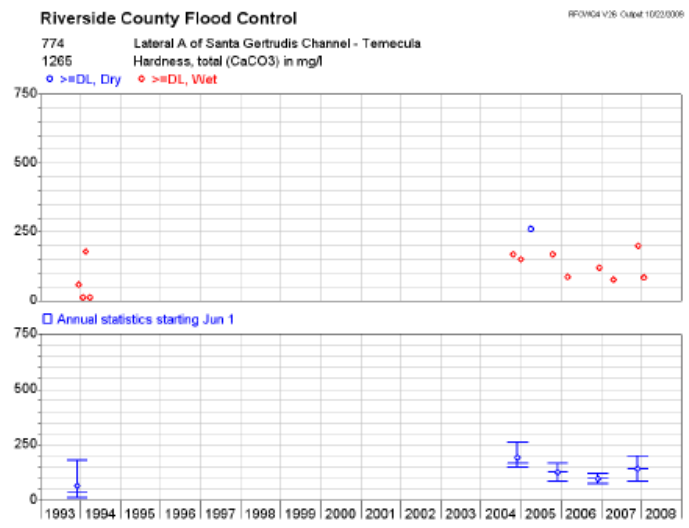
Riverside County Flood Control
774 Lateral A of Santa Gertrudis Channel - Temecula
1265 Hardness, total (CaCO3) in mg/l
>=DL, Dry
>=DL, Wet
750
500
250
0
Annual statistics starting Jun 1
1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008

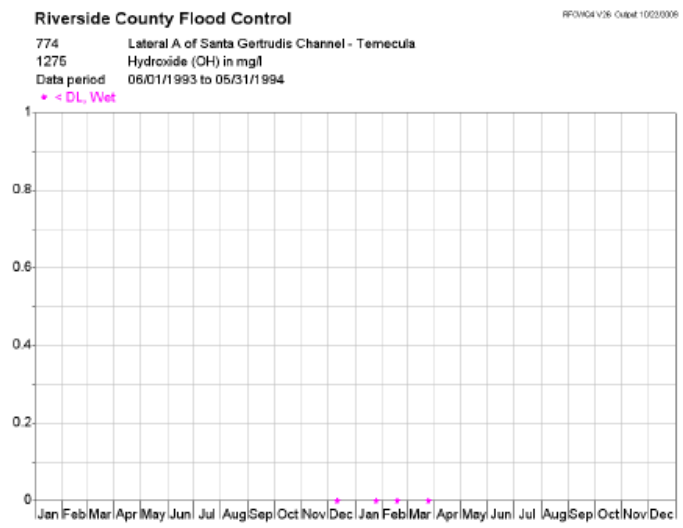
Riverside County Flood Control
774 Lateral A of Santa Gertrudis Channel - Temecula
1275 Hydroxide (OH) in mg/l
Data period 06/01/1993 to 05/31/1994
< DL, Wet
1
0.8
0.6
0.4
0.2
0
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

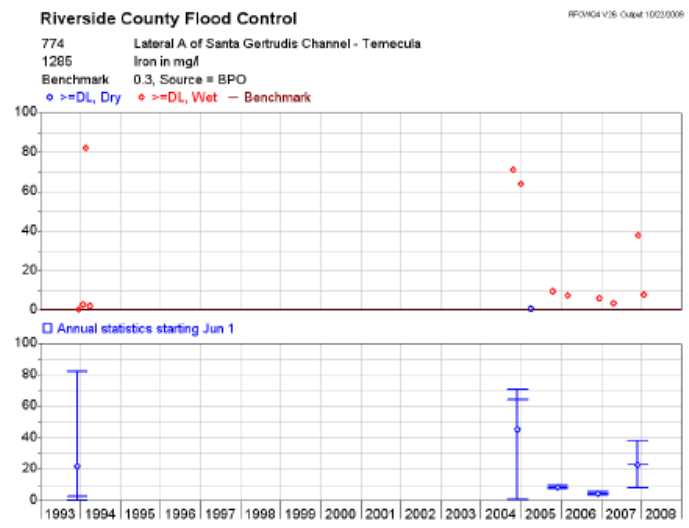
Riverside County Flood Control
774 Lateral A of Santa Gertrudis Channel - Temecula
1285 Iron in mg/l
Benchmark 0.3, Source = BPO
>=DL, Dry
>=DL, Wet
Benchmark
100
80
60
40
20
0
Annual statistics starting Jun 1
1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008

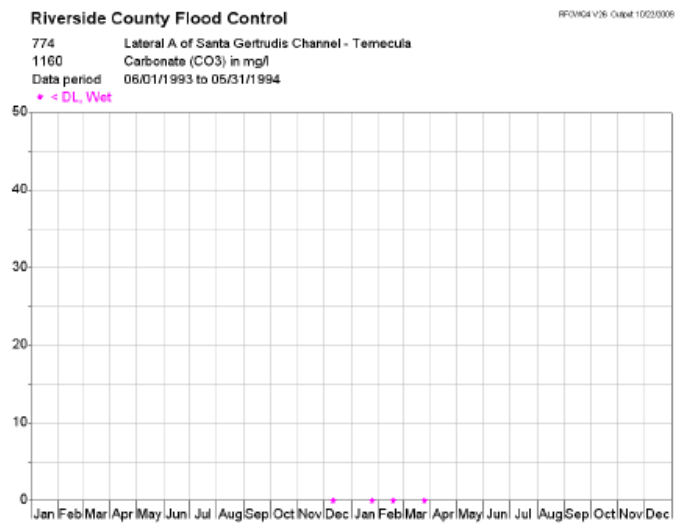
Riverside County Flood Control
774 Lateral A of Santa Gertrudis Channel - Temecula
1160 Carbonate (CO3) in mg/l
Data period 06/01/1993 to 05/31/1994
< DL, Wet
50
40
30
20
10
0
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

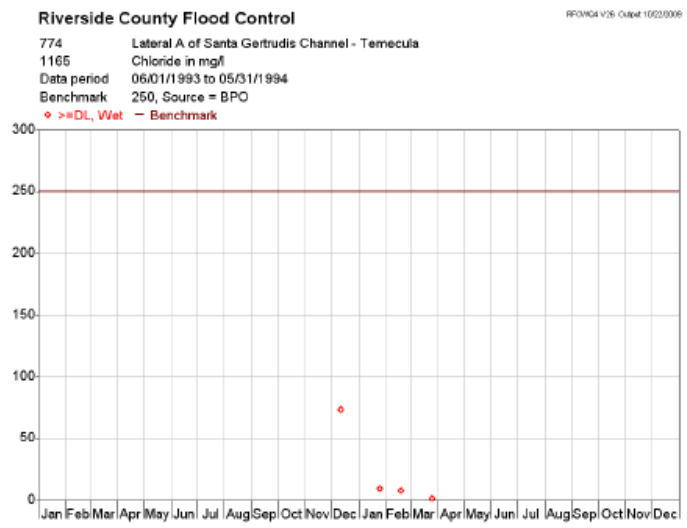
Riverside County Flood Control
774 Lateral A of Santa Gertrudis Channel - Temecula
1165 Chloride in mg/l
Data period 06/01/1993 to 05/31/1994
Benchmark 250, Source = BPO
>=DL, Wet
Benchmark
300
250
200
150
100
50
0
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

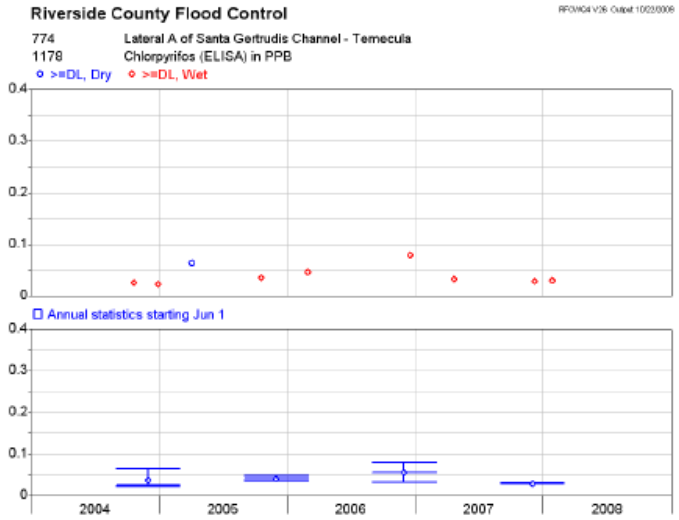
Riverside County Flood Control
774 Lateral A of Santa Gertrudis Channel - Temecula
1178 Chlorpyrifos (ELISA) in PPB
>=DL, Dry
>=DL, Wet
0.4
0.3
0.2
0.1
0
Annual statistics starting Jun 1
0.4
0.3
0.2
0.1
0
2004
2005
2006
2007
2008

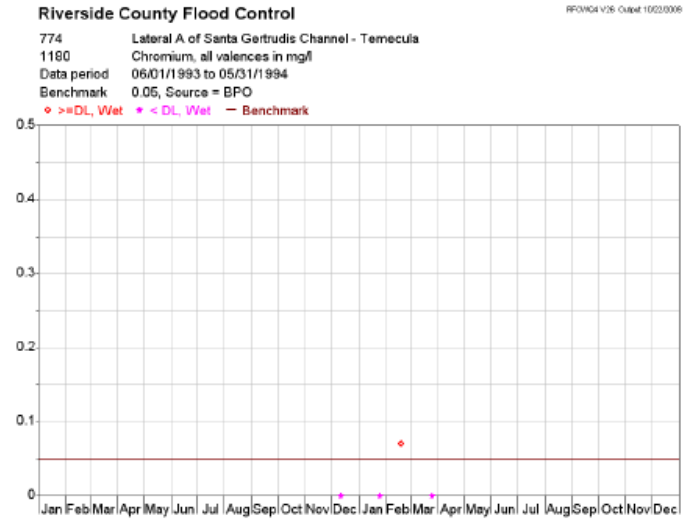
Riverside County Flood Control
774 Lateral A of Santa Gertrudis Channel - Temecula
1180 Chromium, all valences in mg/l
Data period 06/01/1993 to 05/31/1994
Benchmark 0.05, Source = BPO
>=DL, Wet
< DL, Wet
Benchmark
0.5
0.4
0.3
0.2
0.1
0
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

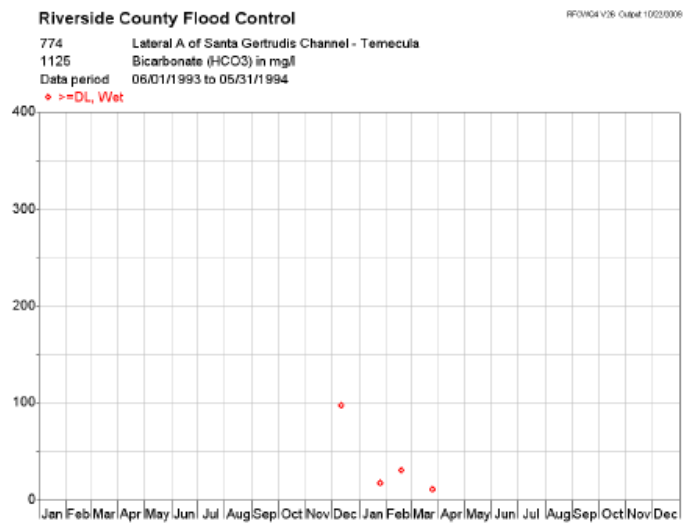
Riverside County Flood Control
774 Lateral A of Santa Gertrudis Channel - Temecula
1125 Bicarbonate (HCO3) in mg/l
Data period 06/01/1993 to 05/31/1994
>=DL, Wet
400
300
200
100
0
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

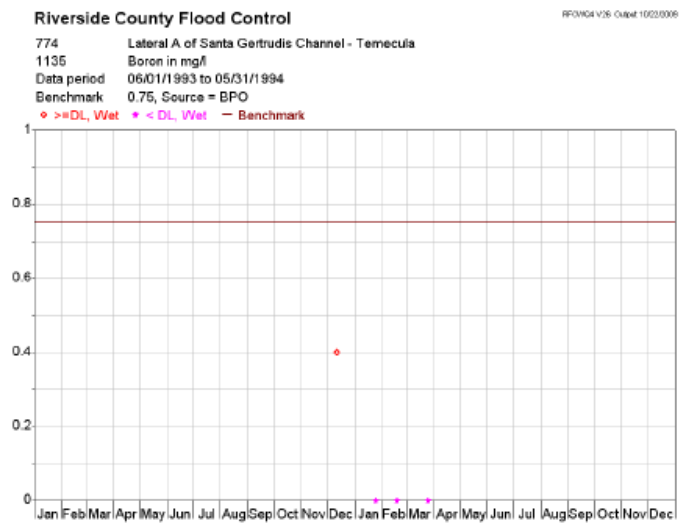
Riverside County Flood Control
774 Lateral A of Santa Gertrudis Channel - Temecula
1135 Boron in mg/l
Data period 06/01/1993 to 05/31/1994
Benchmark 0.75, Source = BPO
>=DL, Wet
< DL, Wet
Benchmark
1
0.8
0.6
0.4
0.2
0
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

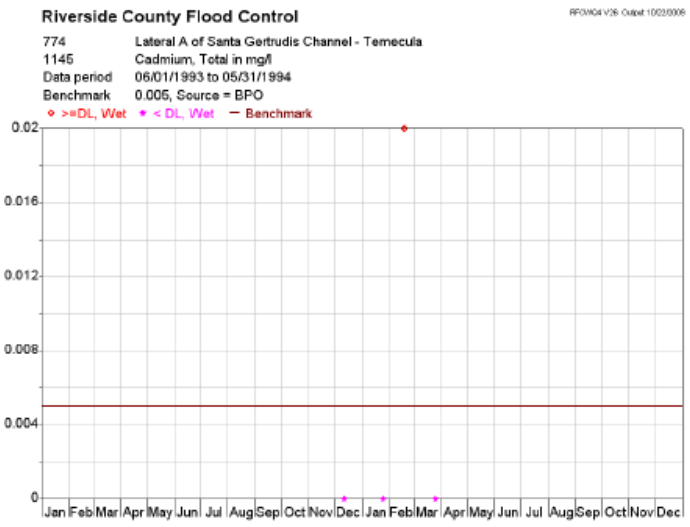
Riverside County Flood Control
774 Lateral A of Santa Gertrudis Channel - Temecula
1145 Cadmium, Total in mg/l
Data period 06/01/1993 to 05/31/1994
Benchmark 0.005, Source = BPO
>=DL, Wet
< DL, Wet
Benchmark
0.02
0.016
0.012
0.008
0.004
0
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

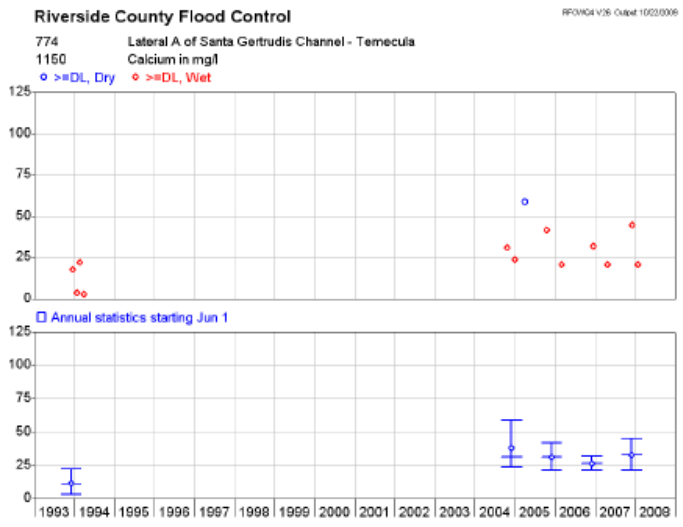
Riverside County Flood Control
774 Lateral A of Santa Gertrudis Channel - Temecula
1150 Calcium in mg/l
>=DL, Dry
>=DL, Wet
125
100
75
50
25
0
Annual statistics starting Jun 1
125
100
75
50
25
0
1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008

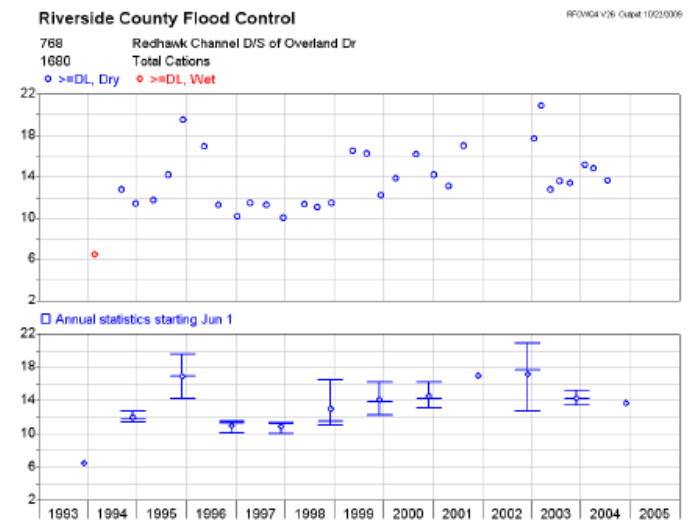
Riverside County Flood Control
768 Redhawk Channel D/S of Overland Dr
1680 Total Cations
>=DL, Dry
>=DL, Wet
Annual statistics starting Jun 1

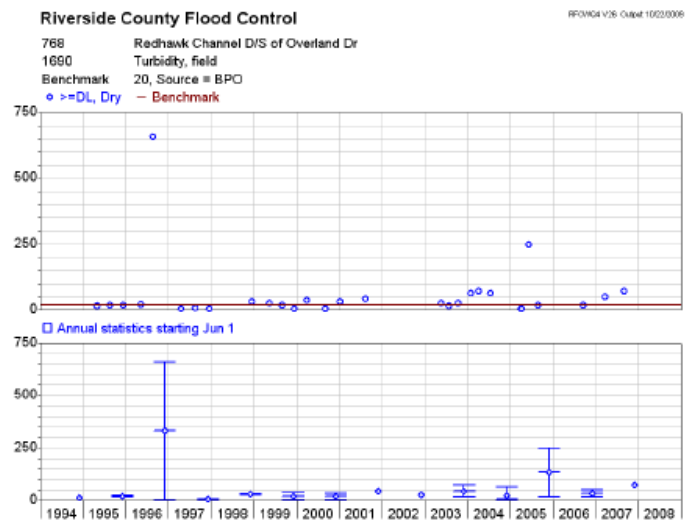
Riverside County Flood Control
768 Redhawk Channel D/S of Overland Dr
1690 Turbidity, field
Benchmark 20, Source = BPO
>=DL, Dry
Benchmark
Annual statistics starting Jun 1

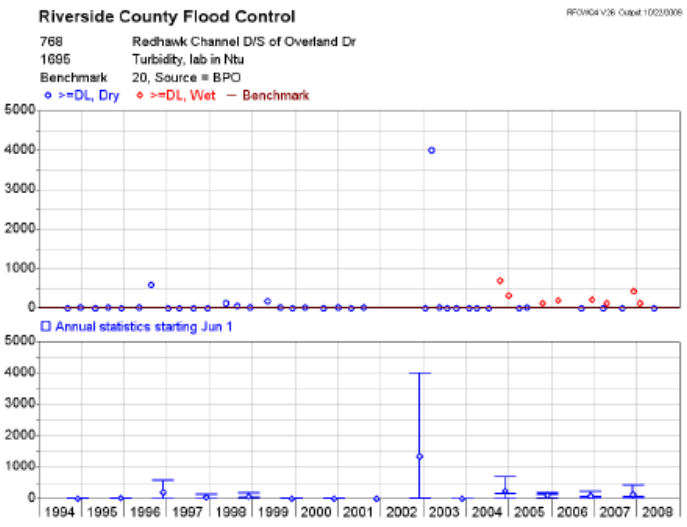
Riverside County Flood Control
768 Redhawk Channel D/S of Overland Dr
1695 Turbidity, lab in Ntu
Benchmark 20, Source = BPO
>=DL, Dry
>=DL, Wet
Benchmark
Annual statistics starting Jun 1

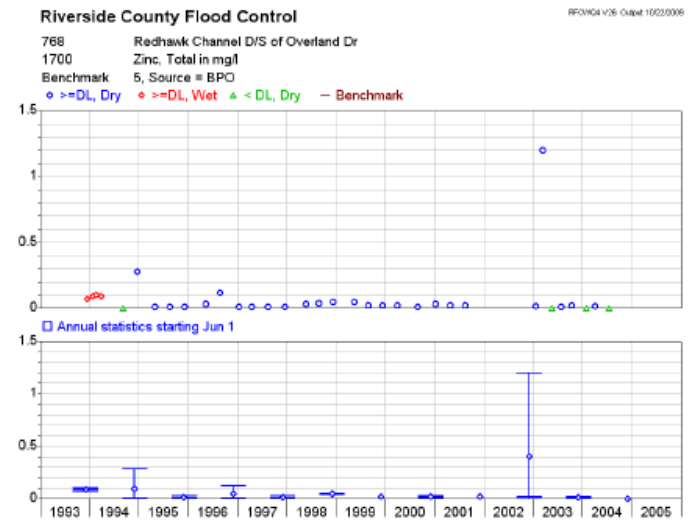
Riverside County Flood Control
768 Redhawk Channel D/S of Overland Dr
1700 Zinc, Total in mg/l
Benchmark 5, Source = BPO
>=DL, Dry
>=DL, Wet
< DL, Dry
Benchmark
Annual statistics starting Jun 1

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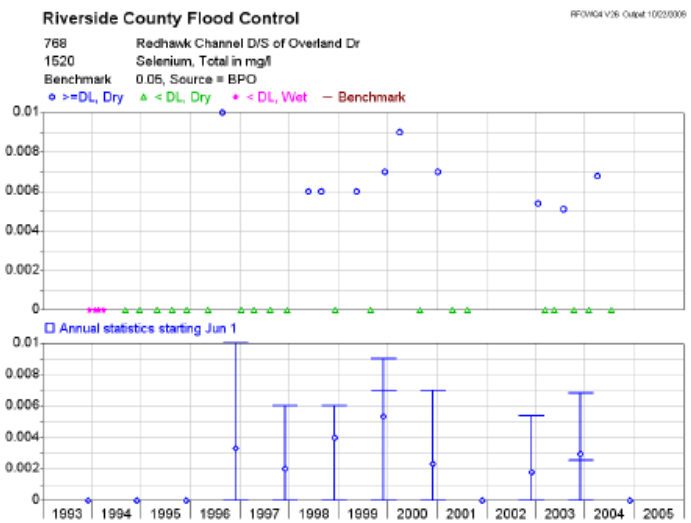
Riverside County Flood Control
768 Redhawk Channel D/S of Overland Dr
1520 Selenium, Total in mg/l
Benchmark 0.05, Source = BPO
>=DL, Dry
< DL, Dry
< DL, Wet
Benchmark
Annual statistics starting Jun 1
0.01
0.008
0.006
0.004
0.002
0
1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005

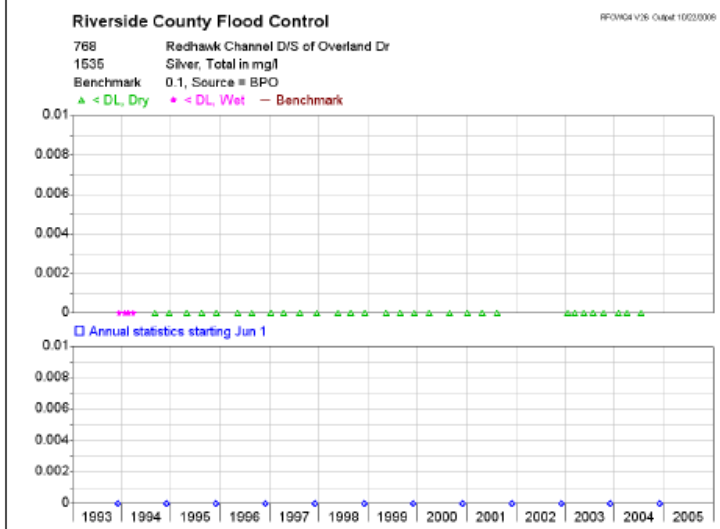
Riverside County Flood Control
768 Redhawk Channel D/S of Overland Dr
1535 Silver, Total in mg/l
Benchmark 0.1, Source = BPO
< DL, Dry
< DL, Wet
Benchmark
Annual statistics starting Jun 1
0.01
0.008
0.006
0.004
0.002
0
1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005

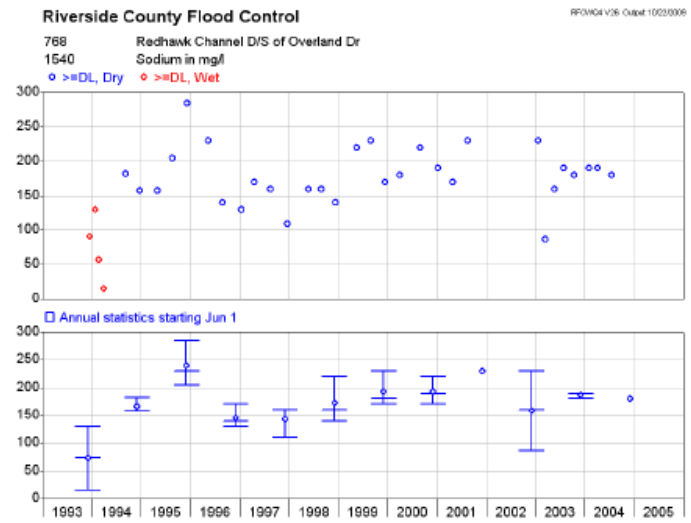
Riverside County Flood Control
768 Redhawk Channel D/S of Overland Dr
1540 Sodium in mg/l
>=DL, Dry
>=DL, Wet
Annual statistics starting Jun 1
300
250
200
150
100
50
0
1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005

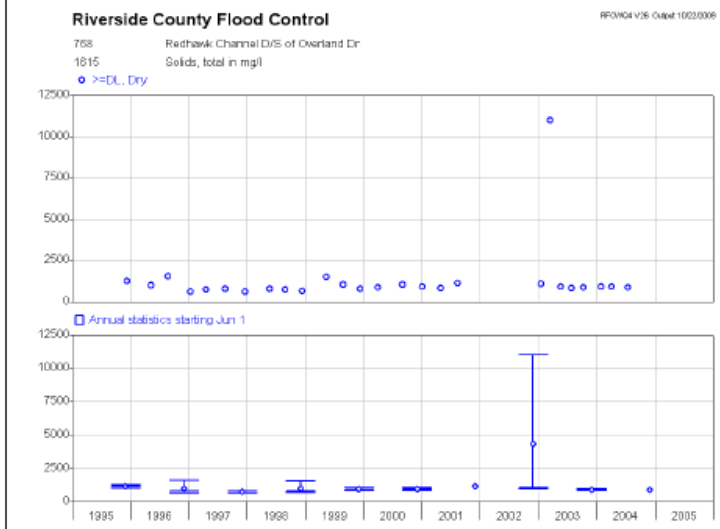
Riverside County Flood Control
768 Redhawk Channel D/S of Overland Dr
1615 Solids, total in mg/l
>=DL, Dry
Annual statistics starting Jun 1
12500
10000
7500
5000
2500
0
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005

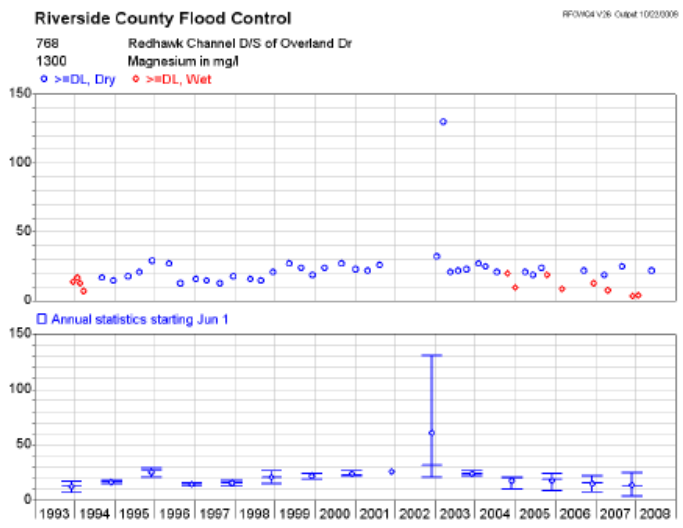
Riverside County Flood Control
768 Redhawk Channel D/S of Overland Dr
1300 Magnesium in mg/l
>=DL, Dry
>=DL, Wet
Annual statistics starting Jun 1
1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008

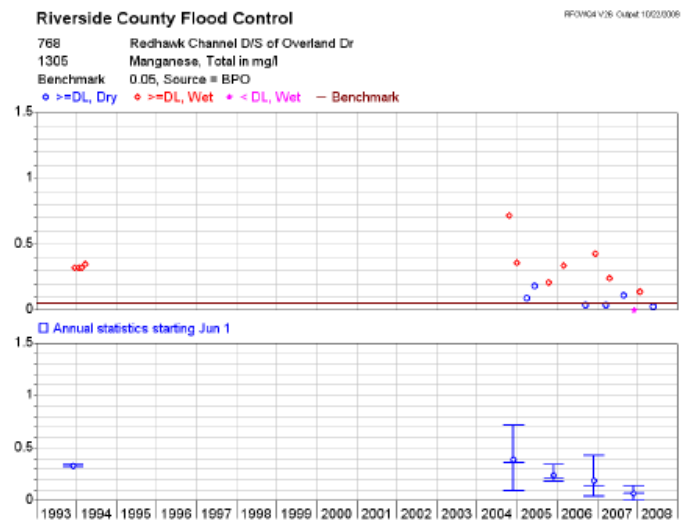
Riverside County Flood Control
768 Redhawk Channel D/S of Overland Dr
1305 Manganese, Total in mg/l
Benchmark 0.05, Source = BPO
>=DL, Dry
>=DL, Wet
< DL, Wet
Benchmark
Annual statistics starting Jun 1
1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008

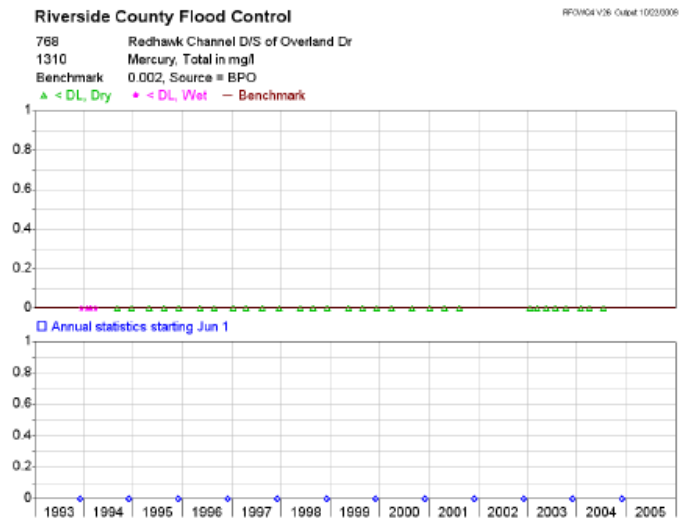
Riverside County Flood Control
768 Redhawk Channel D/S of Overland Dr
1310 Mercury, Total in mg/l
Benchmark 0.002, Source = BPO
< DL, Dry
< DL, Wet
Benchmark
Annual statistics starting Jun 1
1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005

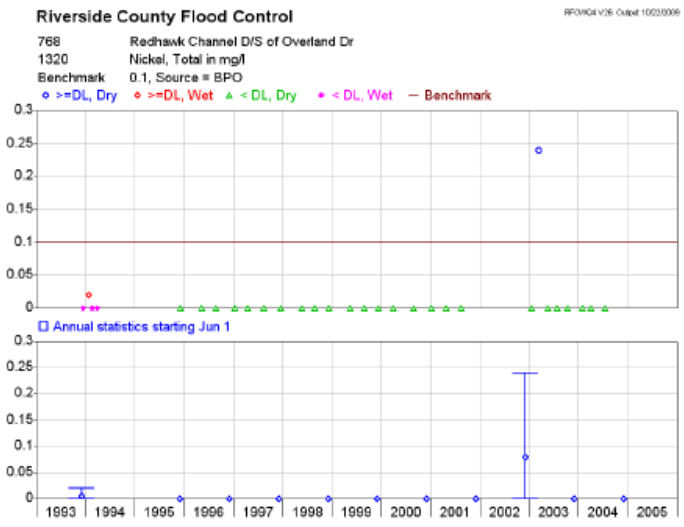
Riverside County Flood Control
768 Redhawk Channel D/S of Overland Dr
1320 Nickel, Total in mg/l
Benchmark 0.1, Source = BPO
>=DL, Dry
>=DL, Wet
< DL, Dry
< DL, Wet
Benchmark
Annual statistics starting Jun 1
1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005

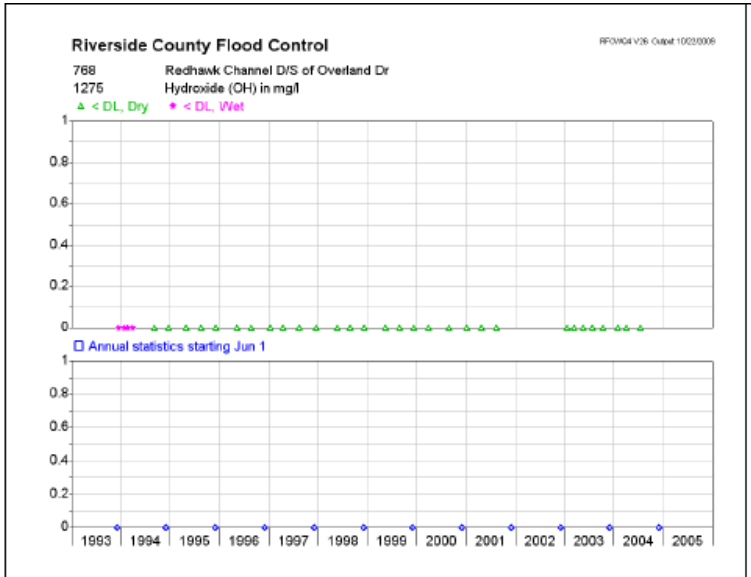
Riverside County Flood Control
768 Redhawk Channel D/S of Overland Dr
1275 Hydroxide (OH) in mg/l
< DL, Dry
< DL, Wet
Annual statistics starting Jun 1
1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005

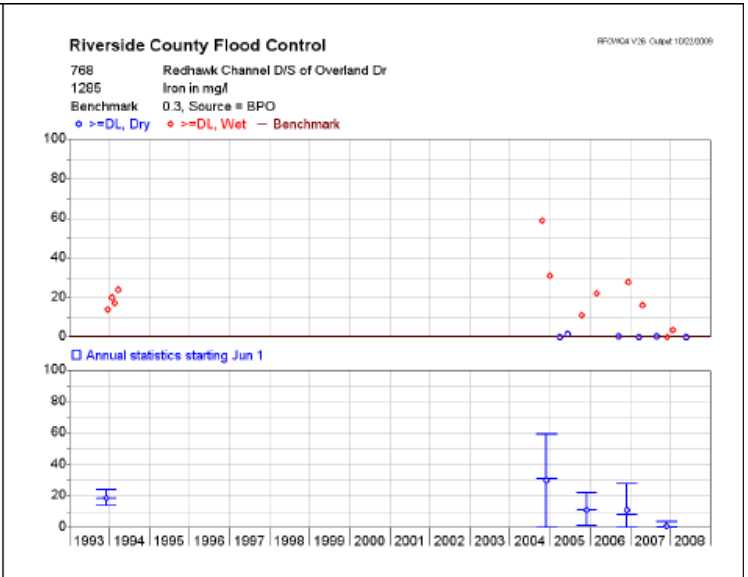
Riverside County Flood Control
768 Redhawk Channel D/S of Overland Dr
1285 Iron in mg/l
Benchmark 0.3, Source = BPO
>=DL, Dry
>=DL, Wet
Benchmark
Annual statistics starting Jun 1
1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008

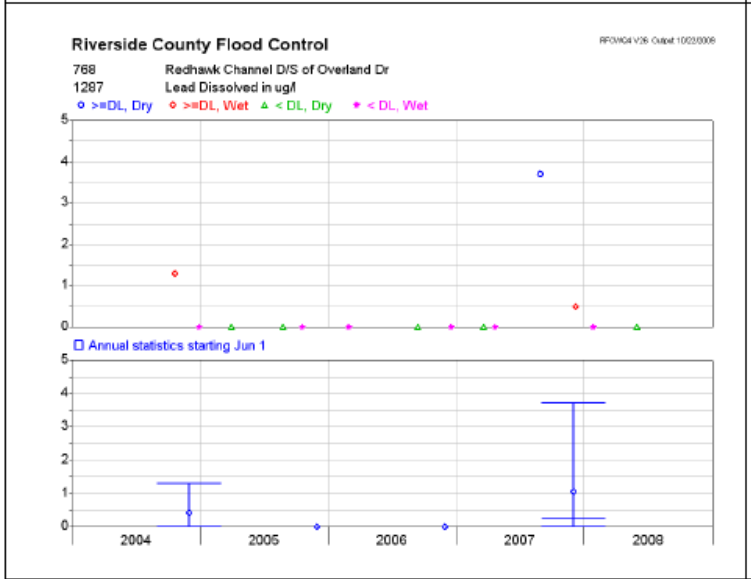
Riverside County Flood Control
768 Redhawk Channel D/S of Overland Dr
1287 Lead Dissolved in ug/l
>=DL, Dry
>=DL, Wet
< DL, Dry
< DL, Wet
Annual statistics starting Jun 1
2004 2005 2006 2007 2008

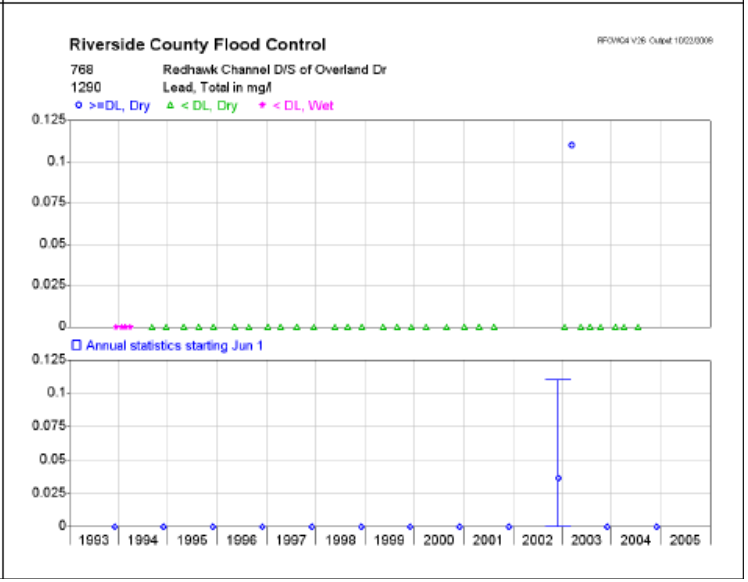
Riverside County Flood Control
768 Redhawk Channel D/S of Overland Dr
1290 Lead, Total in mg/l
>=DL, Dry
< DL, Dry
< DL, Wet
Annual statistics starting Jun 1
1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005

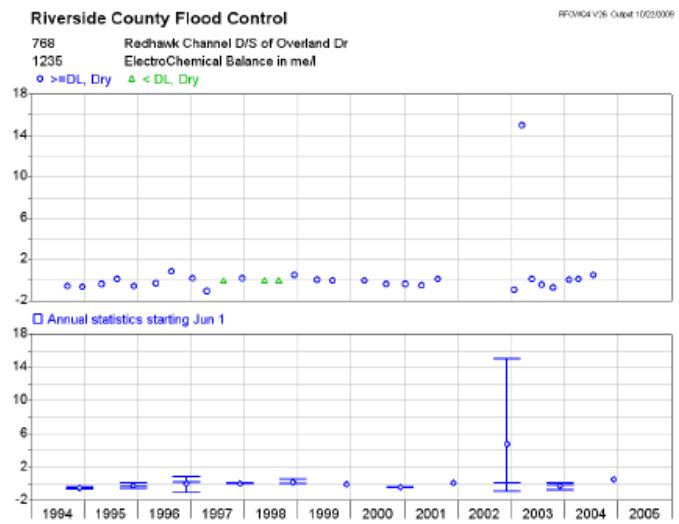
Riverside County Flood Control
768 Redhawk Channel D/S of Overland Dr
1235 ElectroChemical Balance in me/l
>=DL, Dry
< DL, Dry
Annual statistics starting Jun 1

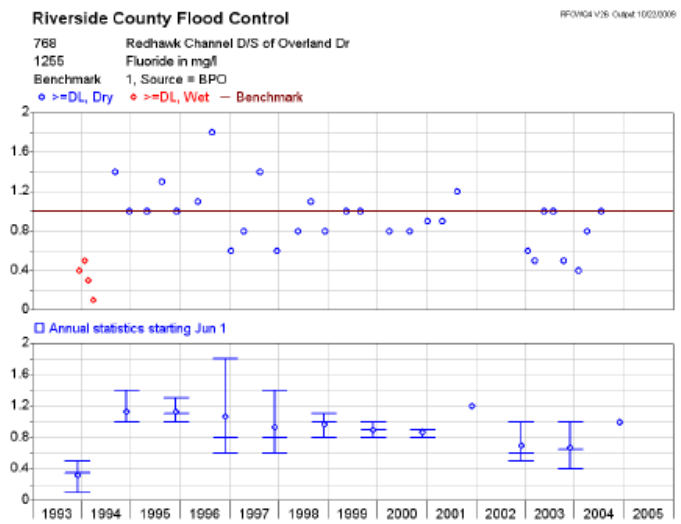
Riverside County Flood Control
768 Redhawk Channel D/S of Overland Dr
1255 Fluoride in mg/l
Benchmark 1, Source = BPO
>=DL, Dry
>=DL, Wet
Benchmark
Annual statistics starting Jun 1

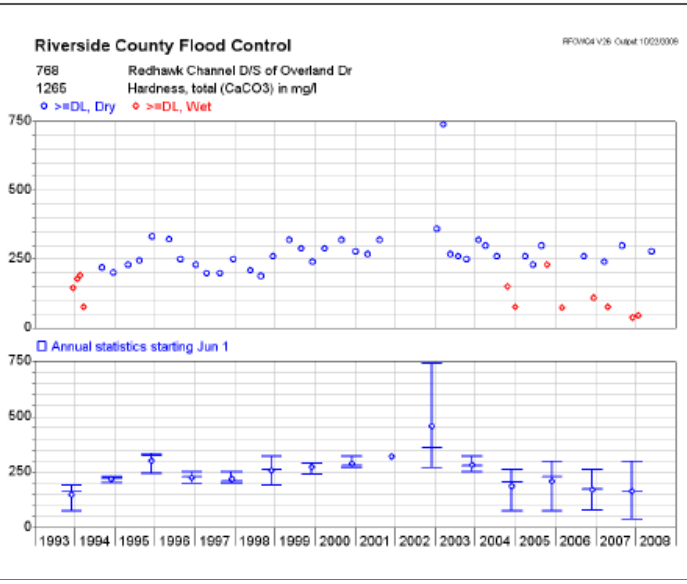
Riverside County Flood Control
768 Redhawk Channel D/S of Overland Dr
1265 Hardness, total (CaCO3) in mg/l
>=DL, Dry
>=DL, Wet
Annual statistics starting Jun 1

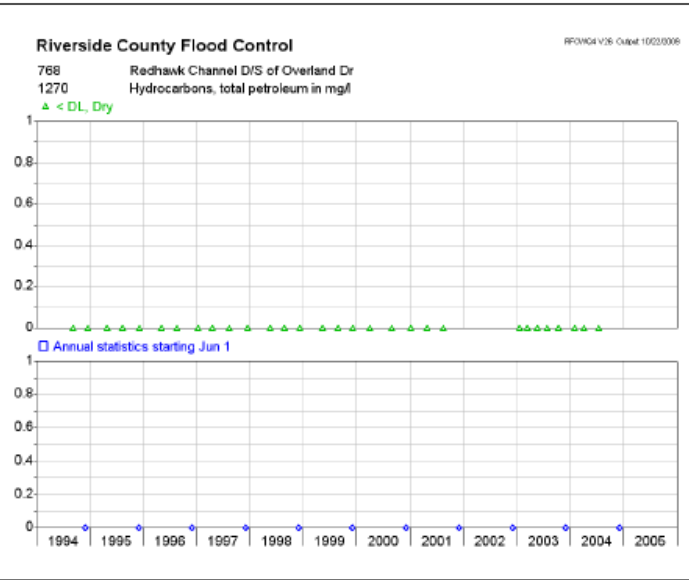
Riverside County Flood Control
768 Redhawk Channel D/S of Overland Dr
1270 Hydrocarbons, total petroleum in mg/l
< DL, Dry
Annual statistics starting Jun 1

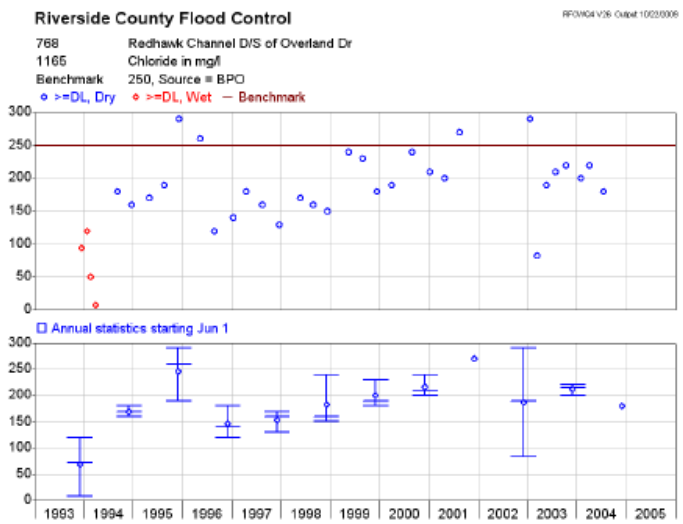
Riverside County Flood Control
768 Redhawk Channel D/S of Overland Dr
1165 Chloride in mg/l
Benchmark 250, Source = BPO
>=DL, Dry
>=DL, Wet
Benchmark
Annual statistics starting Jun 1
1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005

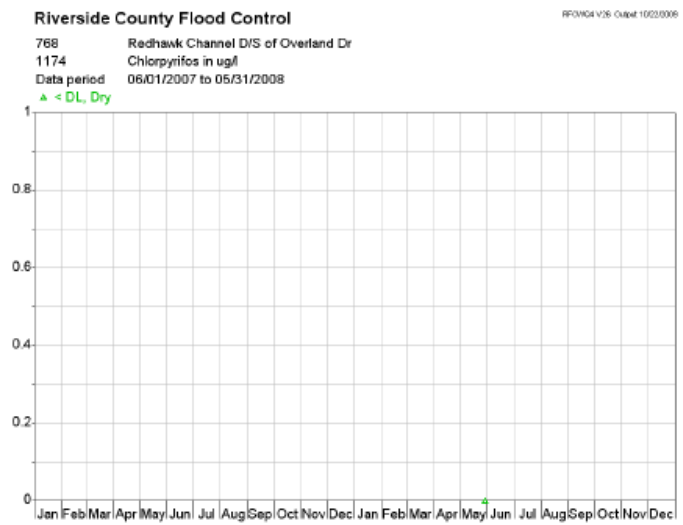
Riverside County Flood Control
768 Redhawk Channel D/S of Overland Dr
1174 Chlorpyrifos in ug/l
Data period 06/01/2007 to 05/31/2008
< DL, Dry
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

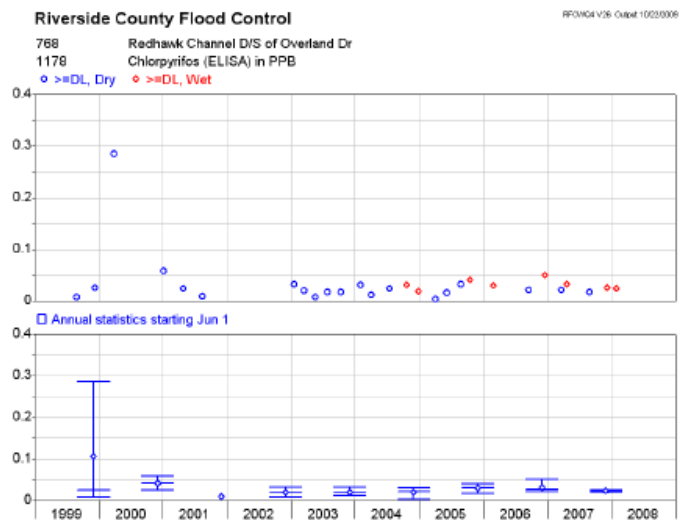
Riverside County Flood Control
768 Redhawk Channel D/S of Overland Dr
1178 Chlorpyrifos (ELISA) in PPB
>=DL, Dry
>=DL, Wet
Annual statistics starting Jun 1
1999 2000 2001 2002 2003 2004 2005 2006 2007 2008

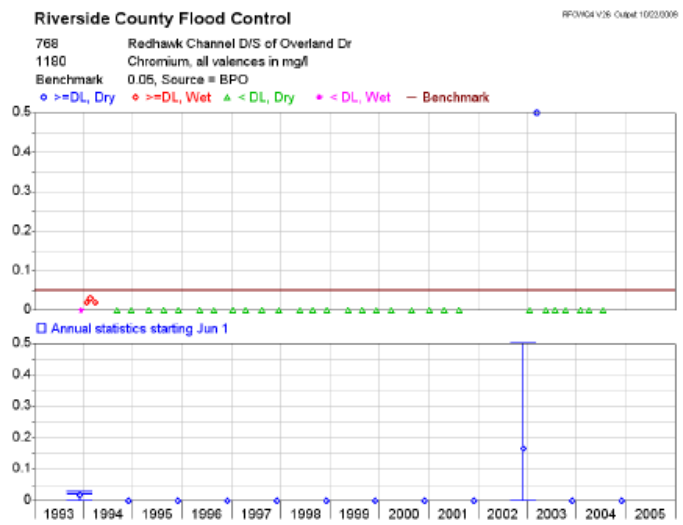
Riverside County Flood Control
768 Redhawk Channel D/S of Overland Dr
1180 Chromium, all valences in mg/l
Benchmark 0.05, Source = BPO
>=DL, Dry
>=DL, Wet
< DL, Dry
< DL, Wet
Benchmark
Annual statistics starting Jun 1
1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005

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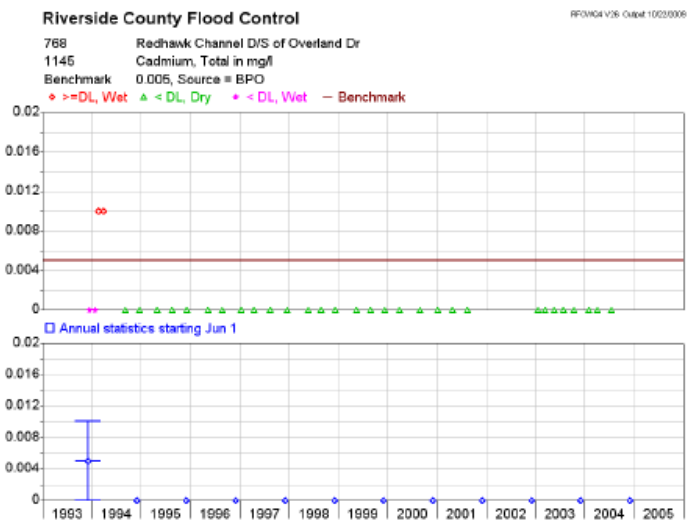
Riverside County Flood Control
768 Redhawk Channel D/S of Overland Dr
1145 Cadmium, Total in mg/l
Benchmark 0.005, Source = BPO
>=DL, Wet
< DL, Dry
< DL, Wet
Benchmark
Annual statistics starting Jun 1

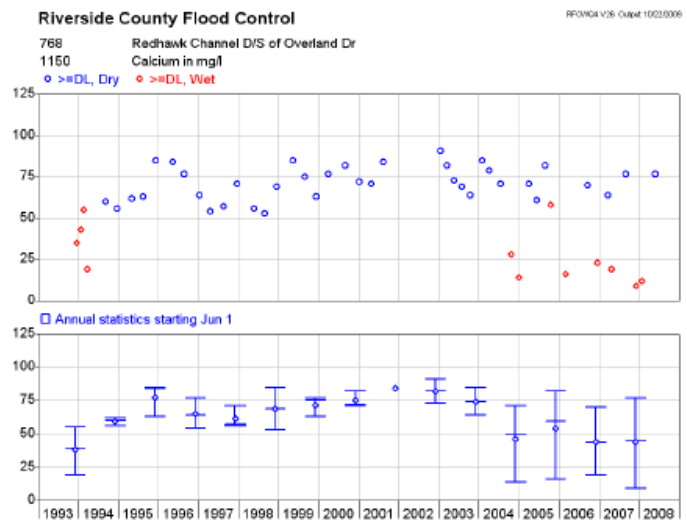
Riverside County Flood Control
768 Redhawk Channel D/S of Overland Dr
1150 Calcium in mg/l
>=DL, Dry
>=DL, Wet
Annual statistics starting Jun 1

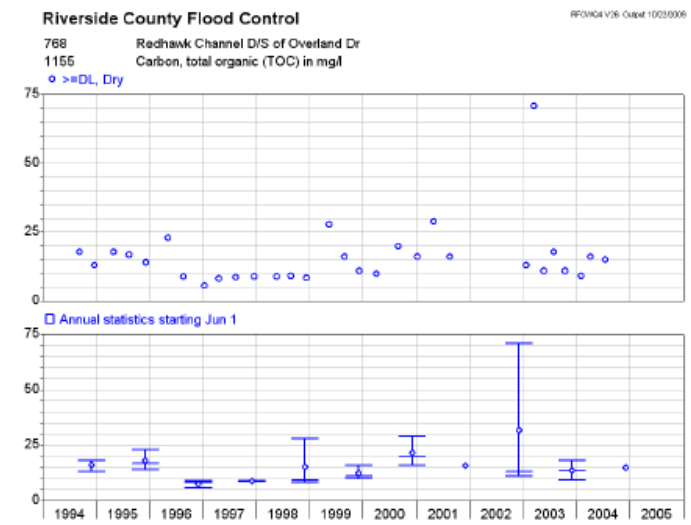
Riverside County Flood Control
768 Redhawk Channel D/S of Overland Dr
1155 Carbon, total organic (TOC) in mg/l
>=DL, Dry
Annual statistics starting Jun 1

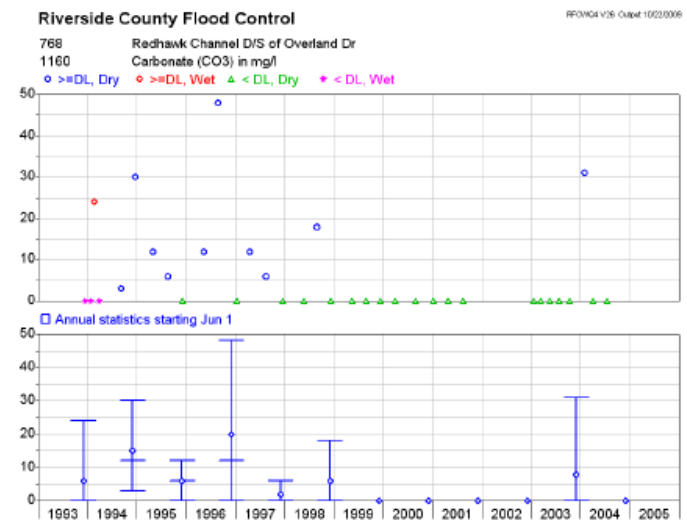
Riverside County Flood Control
768 Redhawk Channel D/S of Overland Dr
1160 Carbonate (CO3) in mg/l
>=DL, Dry
>=DL, Wet
< DL, Dry
< DL, Wet
Annual statistics starting Jun 1

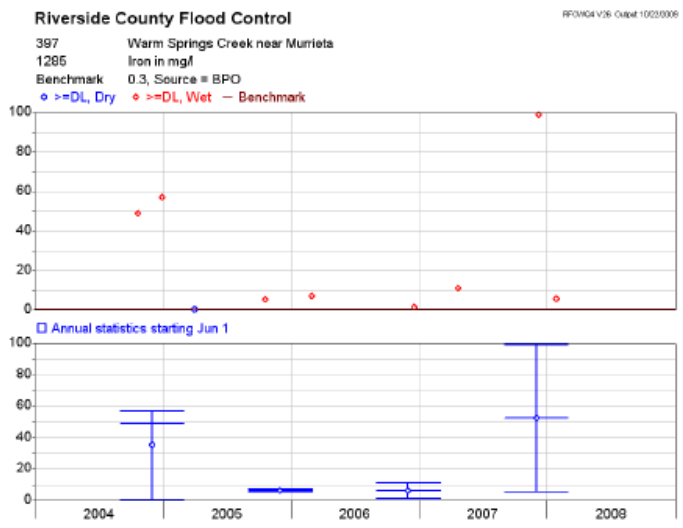
Riverside County Flood Control
397 Warm Springs Creek near Murrieta
1285 Iron in mg/l
Benchmark 0.3, Source = BPO
>=DL, Dry
>=DL, Wet
Benchmark
Annual statistics starting Jun 1
2004
2005
2006
2007
2008

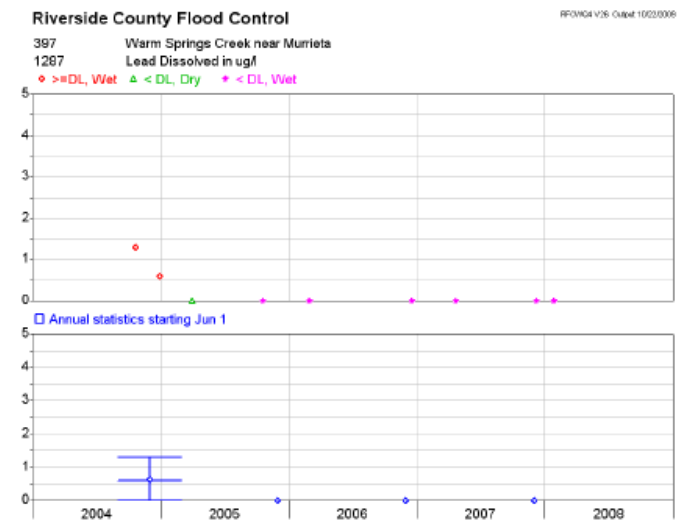
Riverside County Flood Control
397 Warm Springs Creek near Murrieta
1287 Lead Dissolved in ug/l
>=DL, Wet
< DL, Dry
< DL, Wet
Annual statistics starting Jun 1
2004
2005
2006
2007
2008

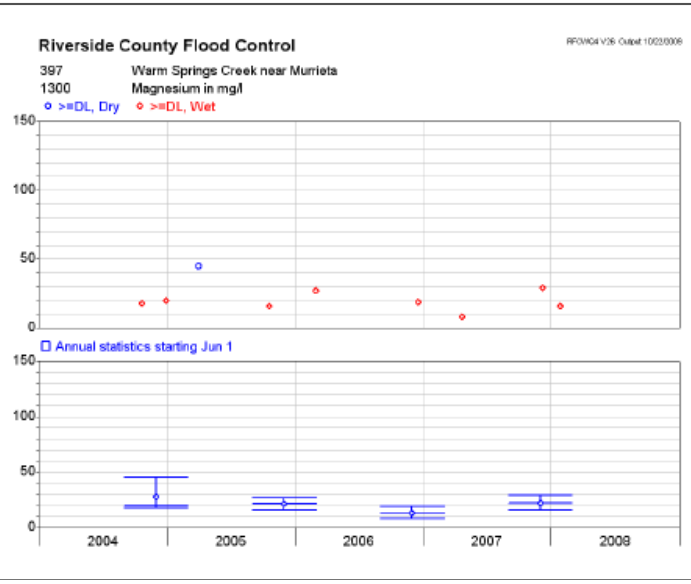
Riverside County Flood Control
397 Warm Springs Creek near Murrieta
1300 Magnesium in mg/l
>=DL, Dry
>=DL, Wet
Annual statistics starting Jun 1
2004
2005
2006
2007
2008

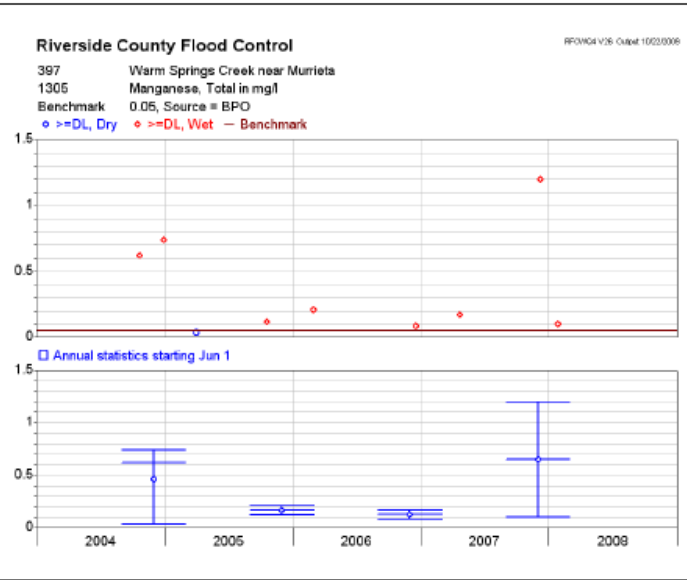
Riverside County Flood Control
397 Warm Springs Creek near Murrieta
1305 Manganese, Total in mg/l
Benchmark 0.05, Source = BPO
>=DL, Dry
>=DL, Wet
Benchmark
Annual statistics starting Jun 1
2004
2005
2006
2007
2008

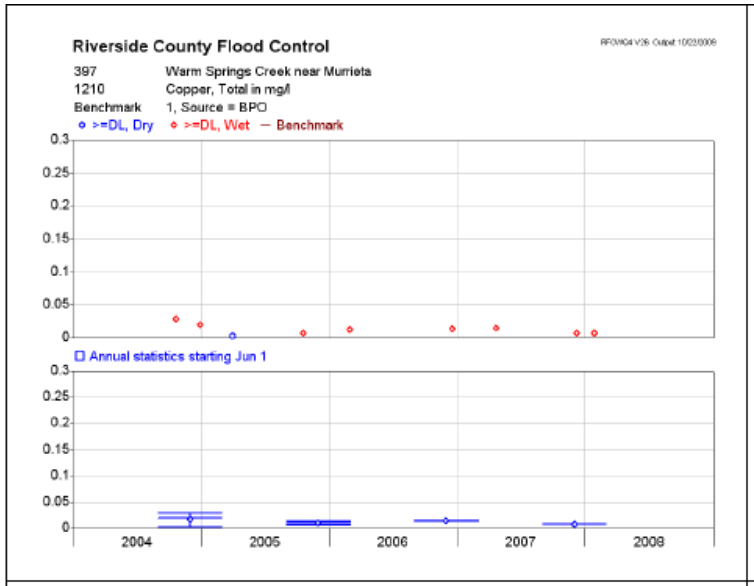
Riverside County Flood Control
397 Warm Springs Creek near Murrieta
1210 Copper, Total in mg/l
Benchmark 1, Source = BPO
>=DL, Dry
>=DL, Wet
Benchmark
Annual statistics starting Jun 1
2004
2005
2006
2007
2008

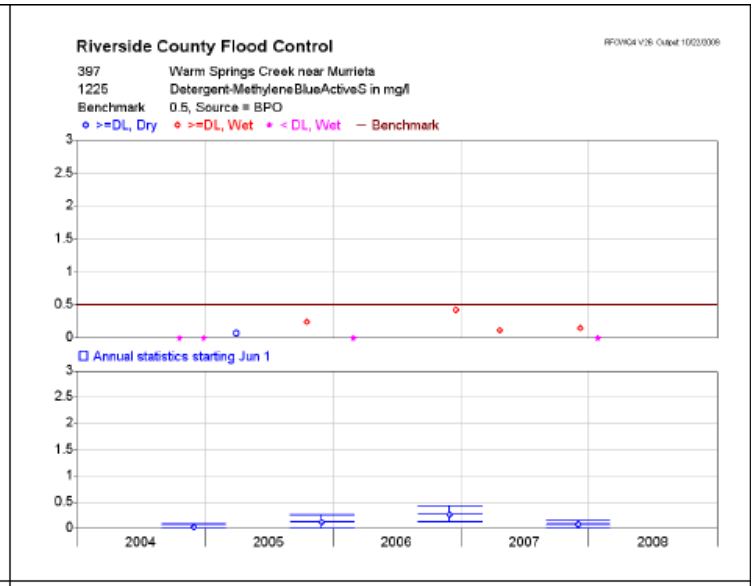
Riverside County Flood Control
397 Warm Springs Creek near Murrieta
1225 Detergent-MethyleneBlueActiveS in mg/l
Benchmark 0.5, Source = BPO
>=DL, Dry
>=DL, Wet
< DL, Wet
Benchmark
Annual statistics starting Jun 1
2004
2005
2006
2007
2008

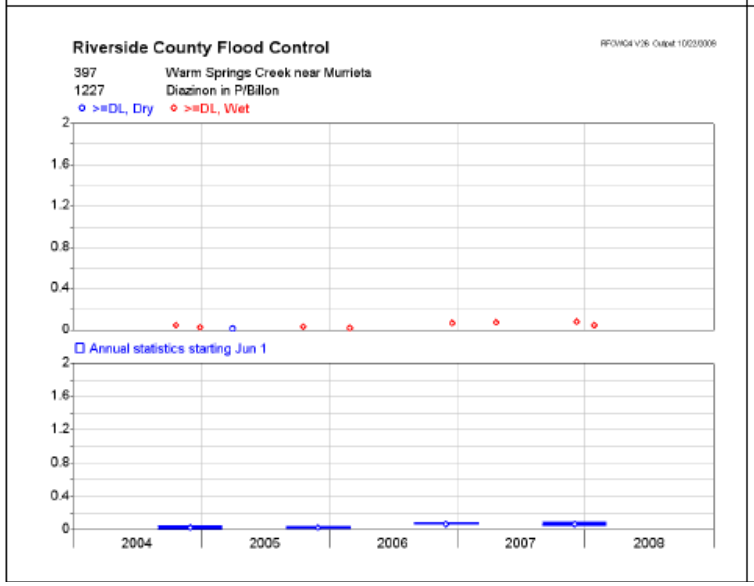
Riverside County Flood Control
397 Warm Springs Creek near Murrieta
1227 Diazinon in P/Bilon
>=DL, Dry
>=DL, Wet
Annual statistics starting Jun 1
2004
2005
2006
2007
2008

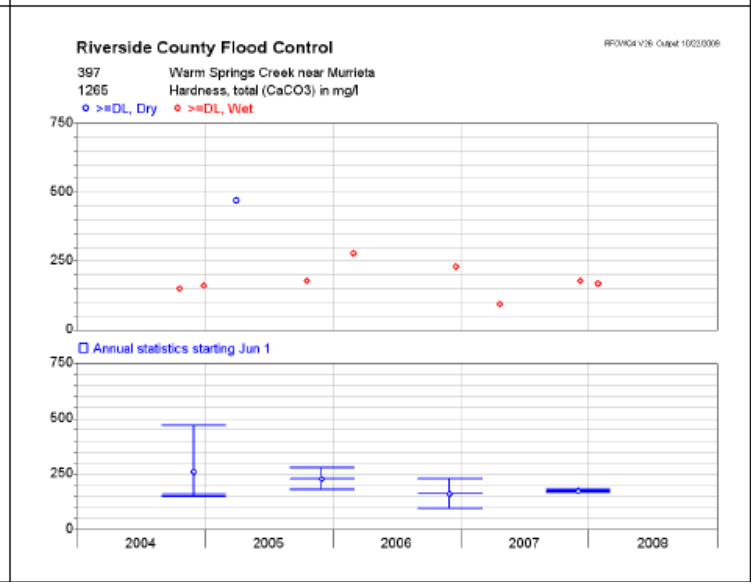
Riverside County Flood Control
397 Warm Springs Creek near Murrieta
1265 Hardness, total (CaCO3) in mg/l
>=DL, Dry
>=DL, Wet
Annual statistics starting Jun 1
2004
2005
2006
2007
2008

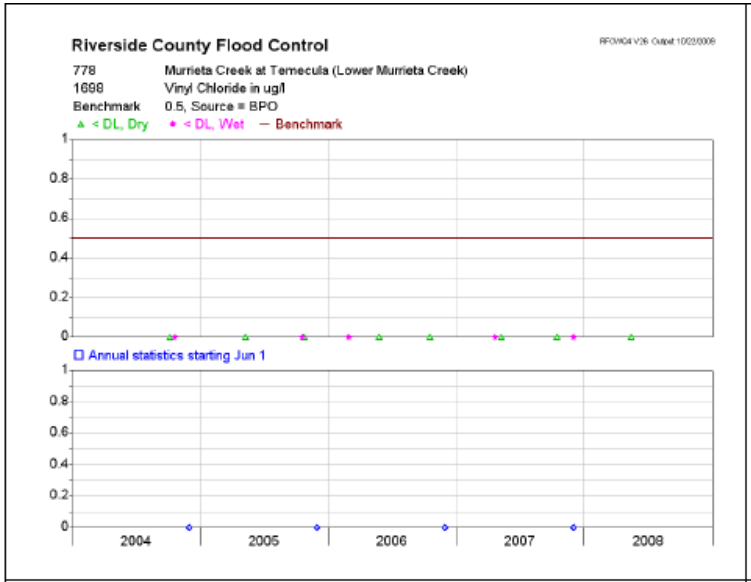
Riverside County Flood Control
778 Murrieta Creek at Temecula (Lower Murrieta Creek)
1698 Vinyl Chloride in ug/l
Benchmark 0.5, Source = BPO
< DL, Dry
< DL, Wet
Benchmark
Annual statistics starting Jun 1
2004
2005
2006
2007
2008

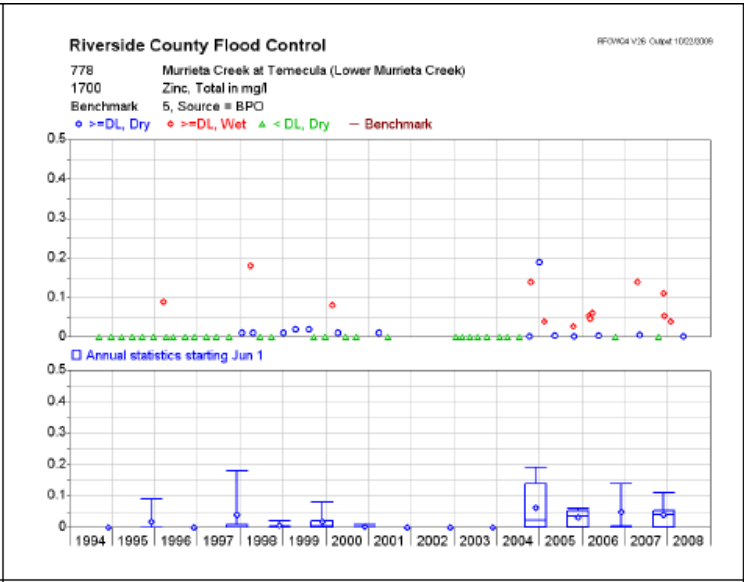
Riverside County Flood Control
778 Murrieta Creek at Temecula (Lower Murrieta Creek)
1700 Zinc, Total in mg/l
Benchmark 5, Source = BPO
>=DL, Dry
>=DL, Wet
< DL, Dry
Benchmark
Annual statistics starting Jun 1
1994
1995
1996
1997
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2002
2003
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2005
2006
2007
2008

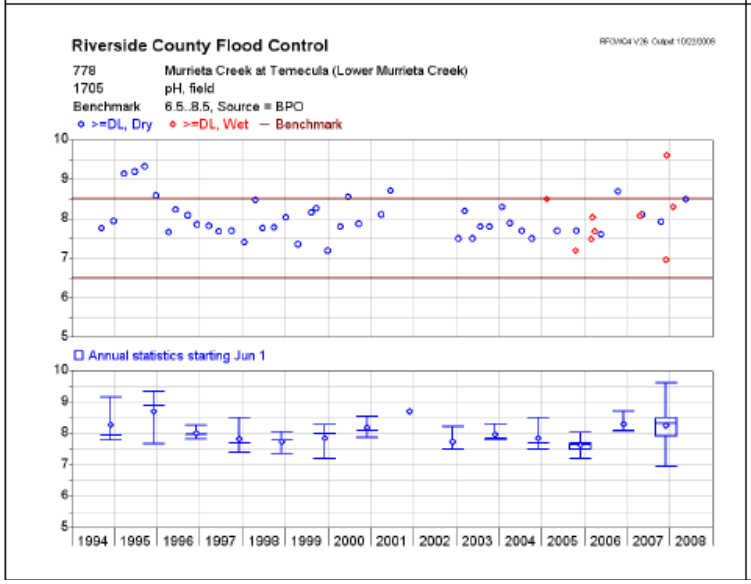
Riverside County Flood Control
778 Murrieta Creek at Temecula (Lower Murrieta Creek)
1705 pH, field
Benchmark 6.5..8.5, Source = BPO
>=DL, Dry
>=DL, Wet
Benchmark
Annual statistics starting Jun 1
1994
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2007
2008

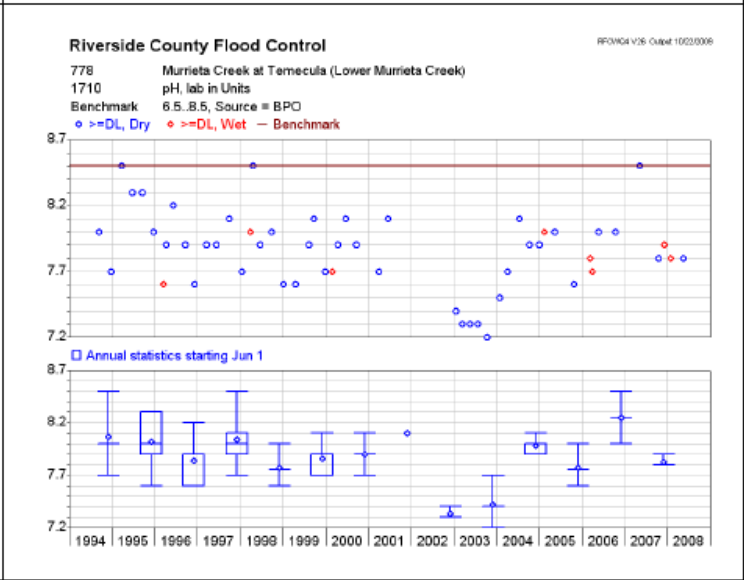
Riverside County Flood Control
778 Murrieta Creek at Temecula (Lower Murrieta Creek)
1710 pH, lab in Units
Benchmark 6.5..8.5, Source = BPO
>=DL, Dry
>=DL, Wet
Benchmark
Annual statistics starting Jun 1
1994
1995
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2001
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2007
2008

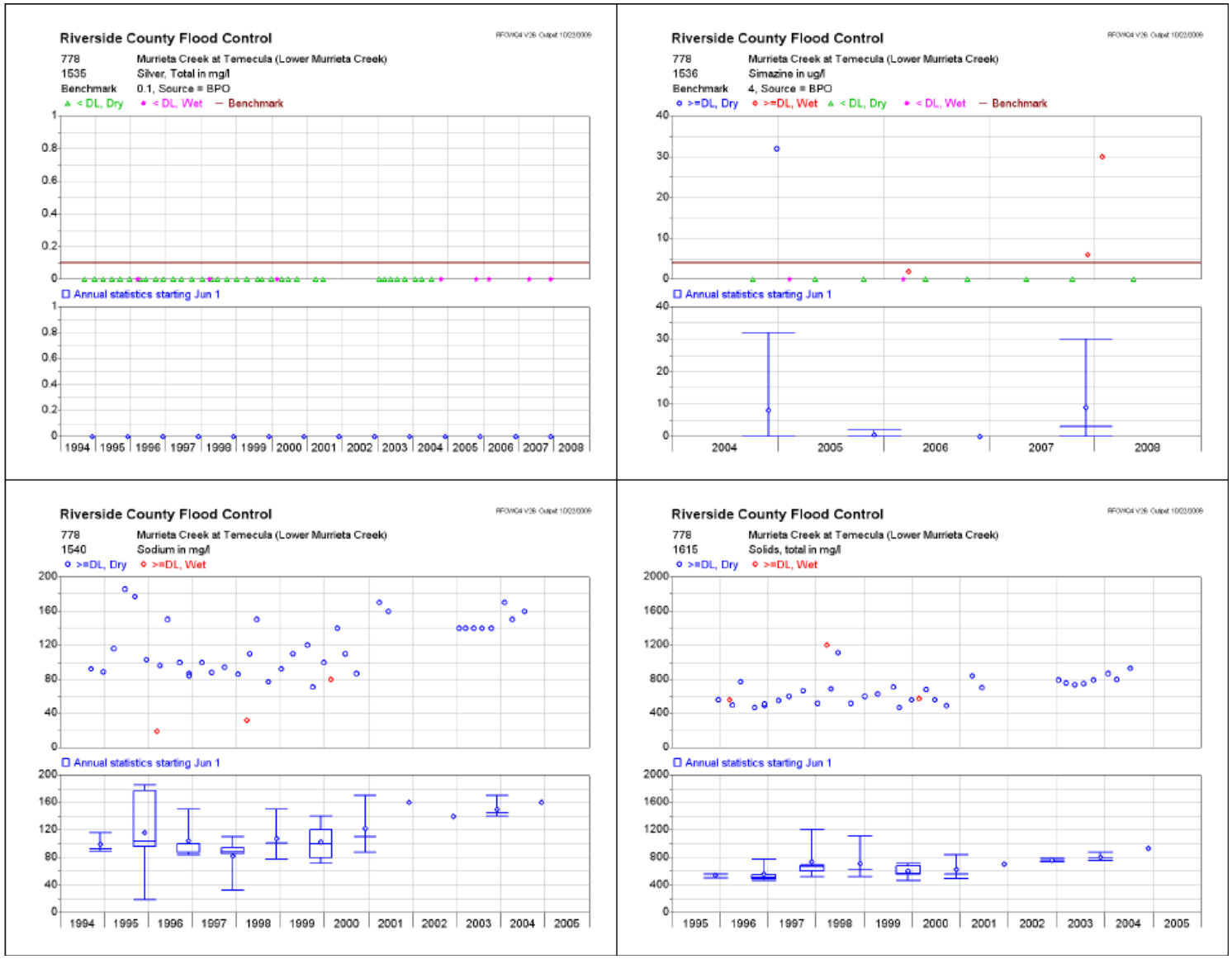
Riverside County Flood Control
778 Murrieta Creek at Temecula (Lower Murrieta Creek)
1535 Silver, Total in mg/l
Benchmark 0.1, Source = BPO
< DL, Dry
< DL, Wet
Benchmark
Annual statistics starting Jun 1
Riverside County Flood Control
778 Murrieta Creek at Temecula (Lower Murrieta Creek)
1536 Simazine in ug/l
Benchmark 4, Source = BPO
>=DL, Dry
>=DL, Wet
< DL, Dry
< DL, Wet
Benchmark
Annual statistics starting Jun 1
Riverside County Flood Control
778 Murrieta Creek at Temecula (Lower Murrieta Creek)
1540 Sodium in mg/l
>=DL, Dry
>=DL, Wet
Annual statistics starting Jun 1
Riverside County Flood Control
778 Murrieta Creek at Temecula (Lower Murrieta Creek)
1615 Solids, total in mg/l
>=DL, Dry
>=DL, Wet
Annual statistics starting Jun 1

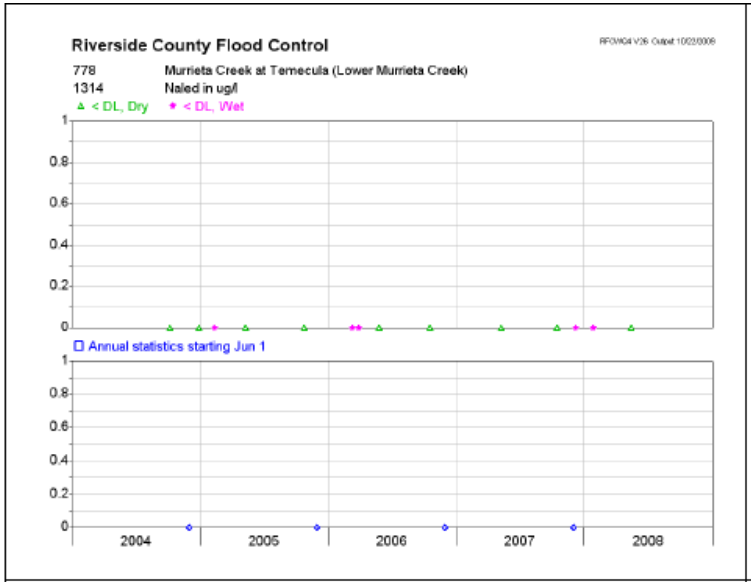
Riverside County Flood Control
778 Murrieta Creek at Temecula (Lower Murrieta Creek)
1314 Naled in ug/l
< DL, Dry
< DL, Wet
Annual statistics starting Jun 1
2004
2005
2006
2007
2008

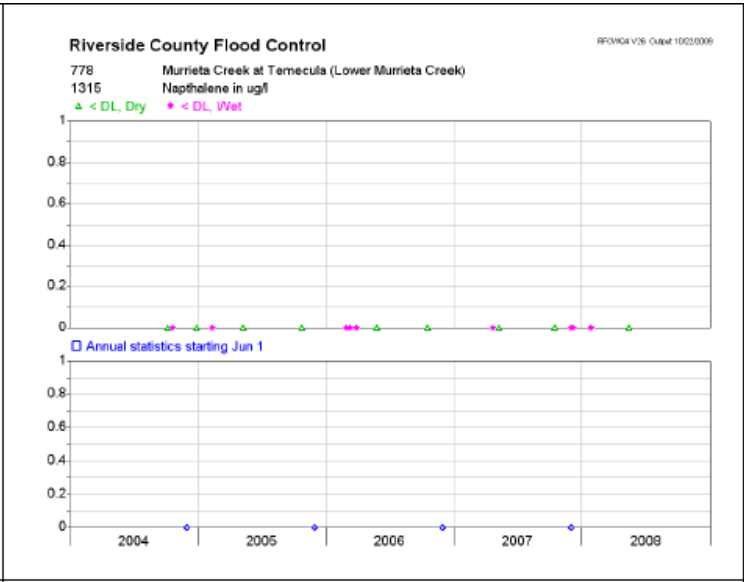
Riverside County Flood Control
778 Murrieta Creek at Temecula (Lower Murrieta Creek)
1315 Napthalene in ug/l
< DL, Dry
< DL, Wet
Annual statistics starting Jun 1
2004
2005
2006
2007
2008

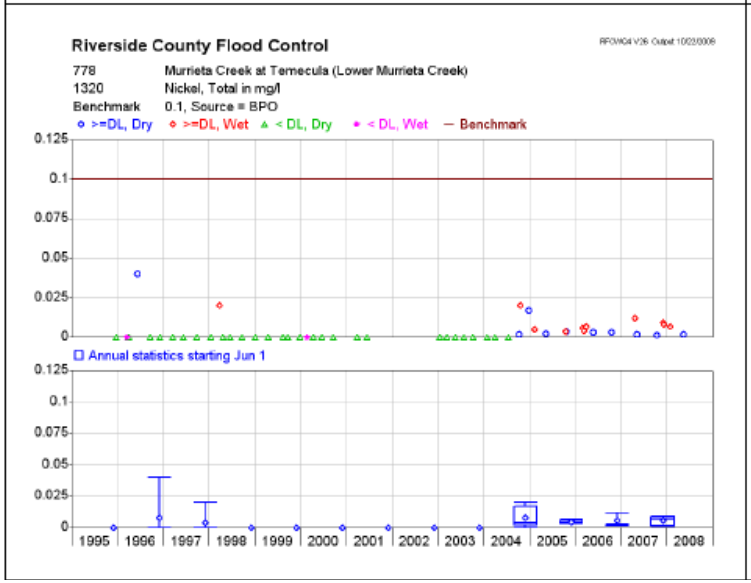
Riverside County Flood Control
778 Murrieta Creek at Temecula (Lower Murrieta Creek)
1320 Nickel, Total in mg/l
Benchmark 0.1, Source = BPO
>=DL, Dry
>=DL, Wet
< DL, Dry
< DL, Wet
Benchmark
Annual statistics starting Jun 1
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008

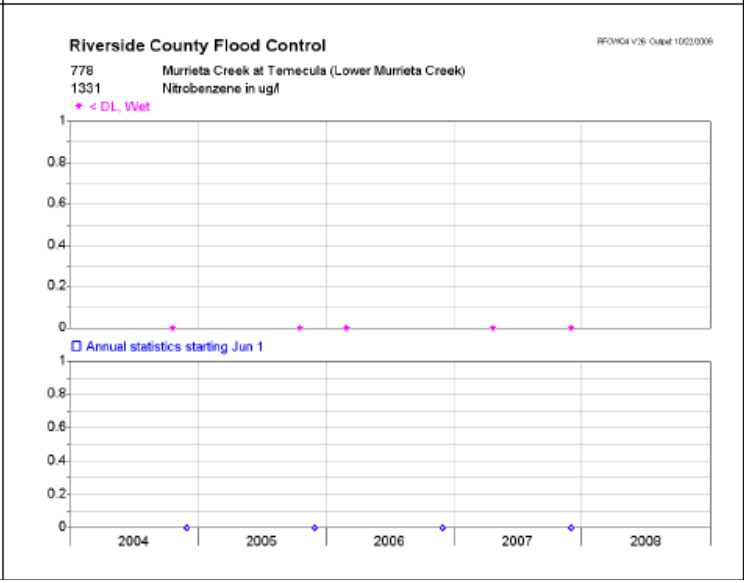
Riverside County Flood Control
778 Murrieta Creek at Temecula (Lower Murrieta Creek)
1331 Nitrobenzene in ug/l
< DL, Wet
Annual statistics starting Jun 1
2004
2005
2006
2007
2008

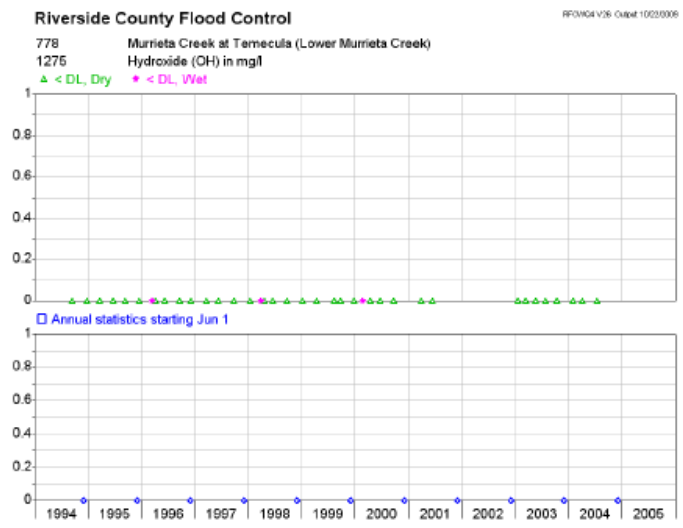
Riverside County Flood Control
778 Murrieta Creek at Temecula (Lower Murrieta Creek)
1275 Hydroxide (OH) in mg/l
< DL, Dry
< DL, Wet
Annual statistics starting Jun 1
1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005

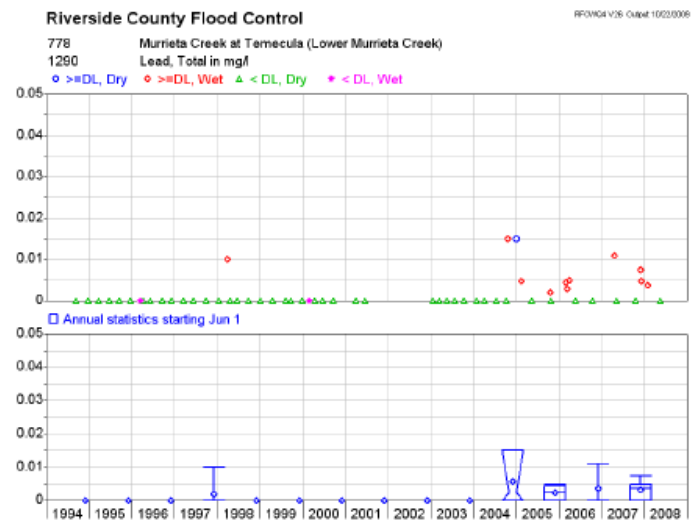
Riverside County Flood Control
778 Murrieta Creek at Temecula (Lower Murrieta Creek)
1290 Lead, Total in mg/l
>=DL, Dry
>=DL, Wet
< DL, Dry
< DL, Wet
Annual statistics starting Jun 1
1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008

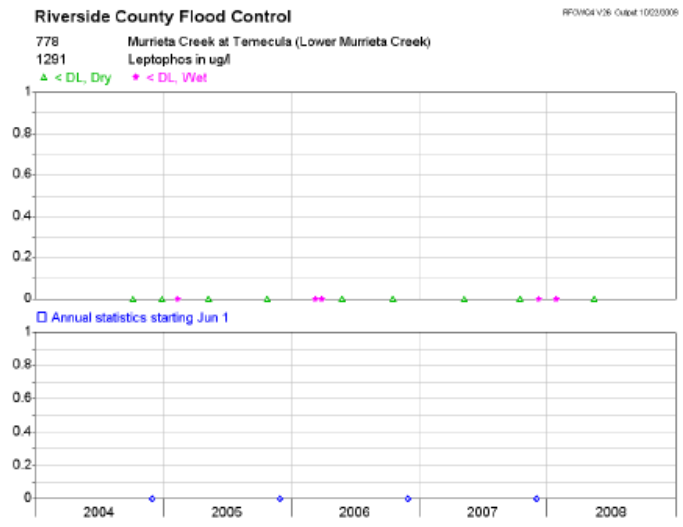
Riverside County Flood Control
778 Murrieta Creek at Temecula (Lower Murrieta Creek)
1291 Leptophos in ug/l
< DL, Dry
< DL, Wet
Annual statistics starting Jun 1
2004 2005 2006 2007 2008

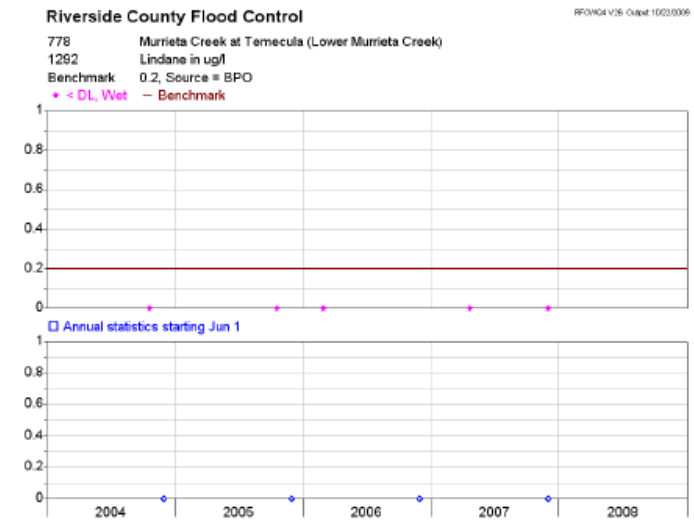
Riverside County Flood Control
778 Murrieta Creek at Temecula (Lower Murrieta Creek)
1292 Lindane in ug/l
Benchmark 0.2, Source = BPO
< DL, Wet
Benchmark
Annual statistics starting Jun 1
2004 2005 2006 2007 2008

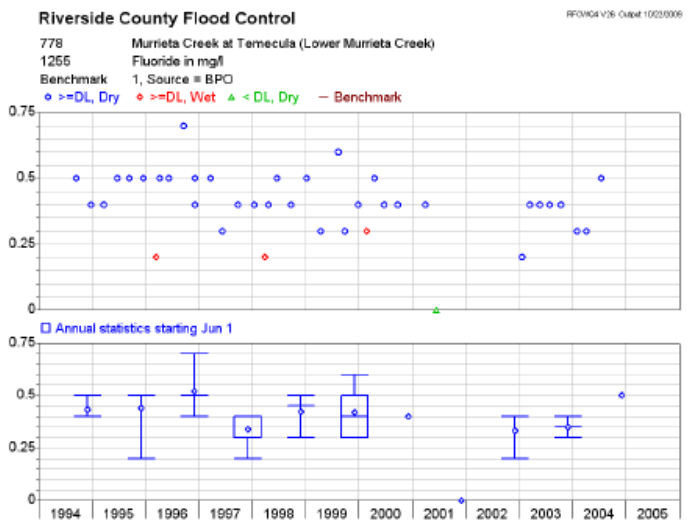
Riverside County Flood Control
778 Murrieta Creek at Temecula (Lower Murrieta Creek)
1255 Fluoride in mg/l
Benchmark 1, Source = BPO
>=DL, Dry
>=DL, Wet
< DL, Dry
Benchmark
Annual statistics starting Jun 1
0.75
0.5
0.25
0
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005

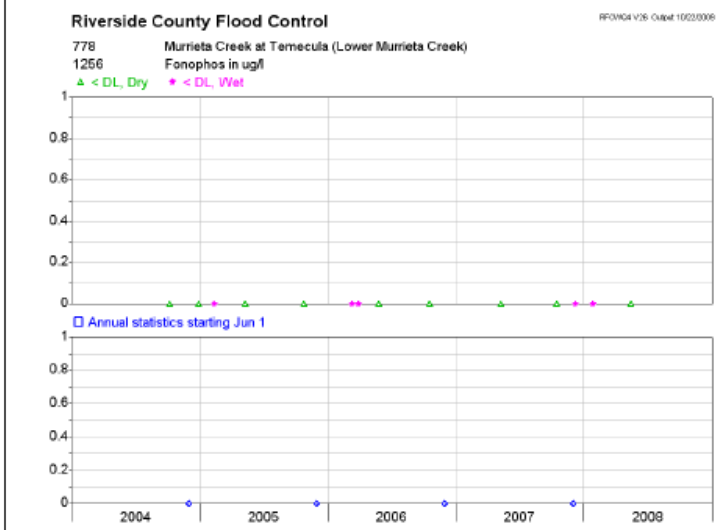
Riverside County Flood Control
778 Murrieta Creek at Temecula (Lower Murrieta Creek)
1256 Fonophos in ug/l
< DL, Dry
< DL, Wet
Annual statistics starting Jun 1
1
0.8
0.6
0.4
0.2
0
2004
2005
2006
2007
2008

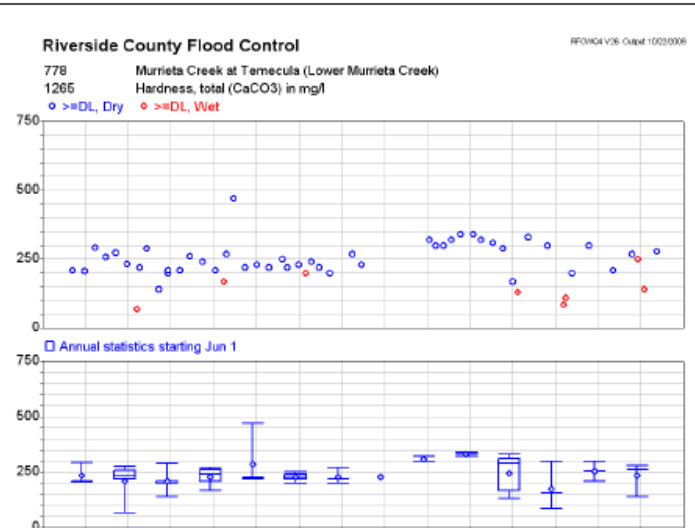
Riverside County Flood Control
778 Murrieta Creek at Temecula (Lower Murrieta Creek)
1265 Hardness, total (CaCO3) in mg/l
>=DL, Dry
>=DL, Wet
Annual statistics starting Jun 1
750
500
250
0
1994
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2005
2006
2007
2008

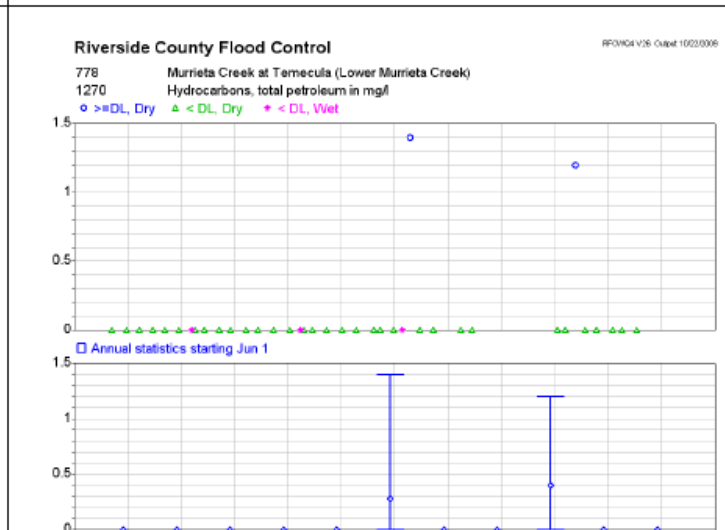
Riverside County Flood Control
778 Murrieta Creek at Temecula (Lower Murrieta Creek)
1270 Hydrocarbons, total petroleum in mg/l
>=DL, Dry
< DL, Dry
< DL, Wet
Annual statistics starting Jun 1
1.5
1
0.5
0
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005

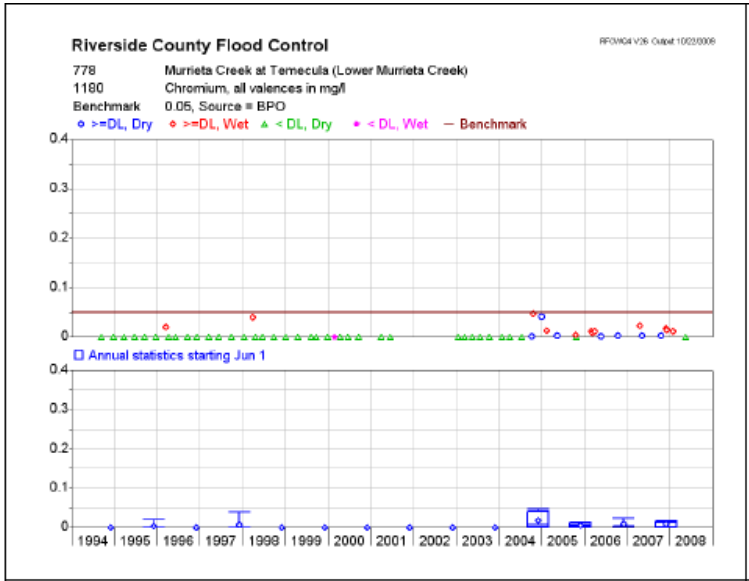
Riverside County Flood Control
778 Murrieta Creek at Temecula (Lower Murrieta Creek)
1180 Chromium, all valences in mg/l
Benchmark 0.05, Source = BPO
>=DL, Dry
>=DL, Wet
< DL, Dry
< DL, Wet
Benchmark
Annual statistics starting Jun 1
1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008

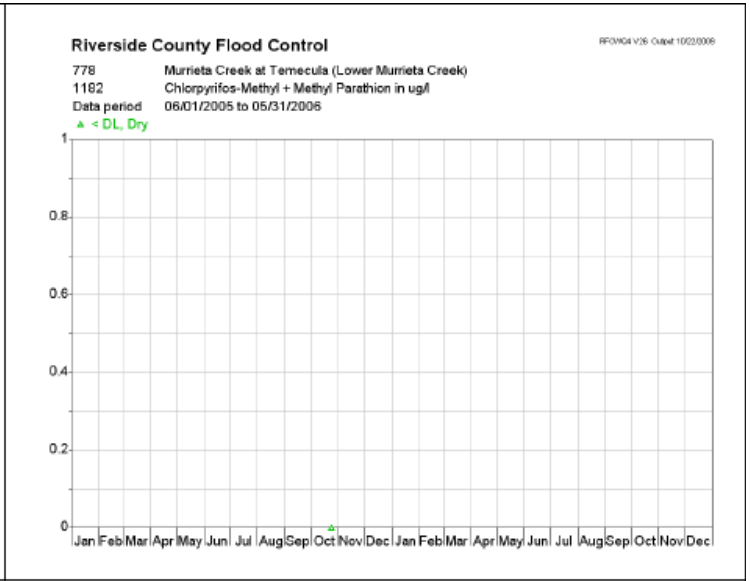
Riverside County Flood Control
778 Murrieta Creek at Temecula (Lower Murrieta Creek)
1182 Chlorpyrifos-Methyl + Methyl Parathion in ug/l
Data period 06/01/2005 to 05/31/2006
< DL, Dry
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

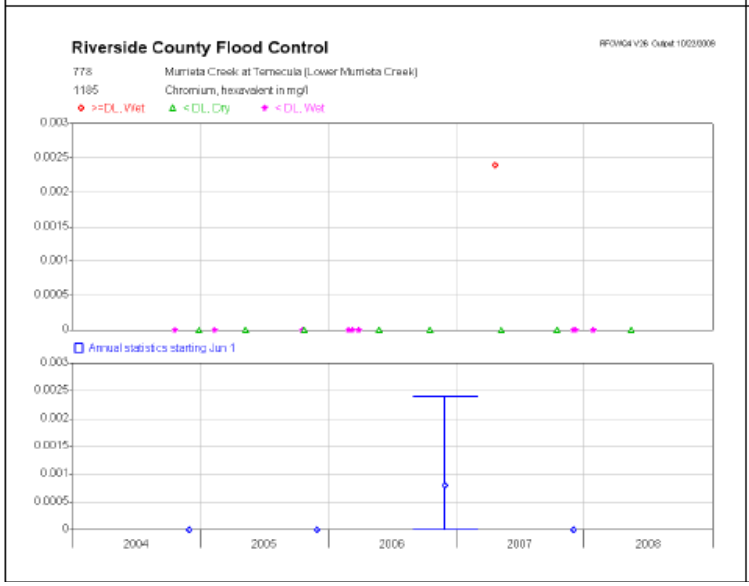
Riverside County Flood Control
778 Murrieta Creek at Temecula (Lower Murrieta Creek)
1185 Chromium, hexavalent in mg/l
>=DL, Wet
< DL, Dry
< DL, Wet
Annual statistics starting Jun 1
2004 2005 2006 2007 2008

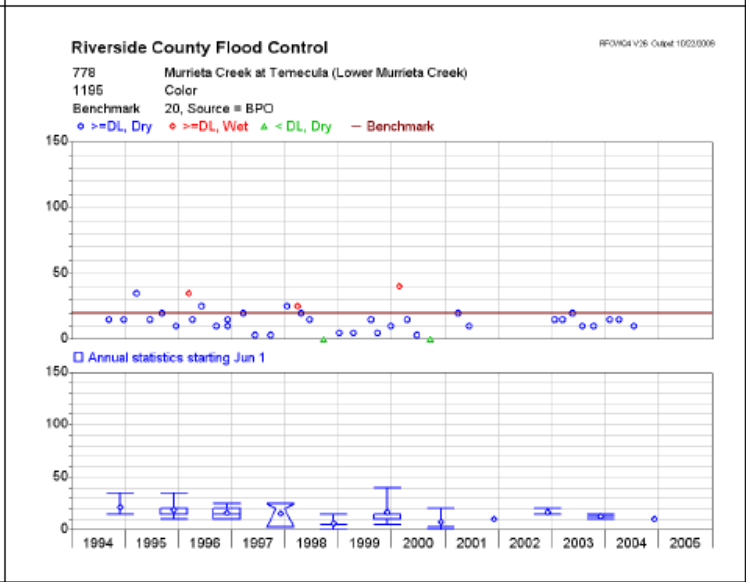
Riverside County Flood Control
778 Murrieta Creek at Temecula (Lower Murrieta Creek)
1195 Color
Benchmark 20, Source = BPO
>=DL, Dry
>=DL, Wet
< DL, Dry
Benchmark
Annual statistics starting Jun 1
1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005

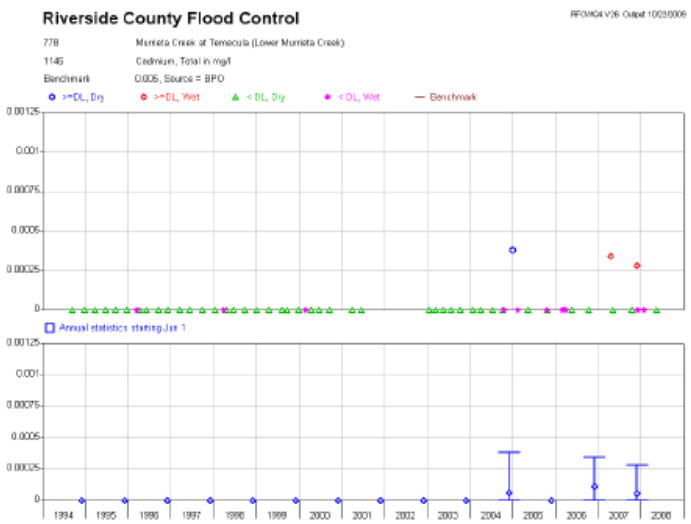
Riverside County Flood Control
778 Murrieta Creek at Temecula (Lower Murrieta Creek)
1145 Cadmium, Total in mg/l
Benchmark 0.005, Source = BPO
>=DL, Dry
>=DL, Wet
< DL, Dry
< DL, Wet
Benchmark
Annual statistics starting Jun 1

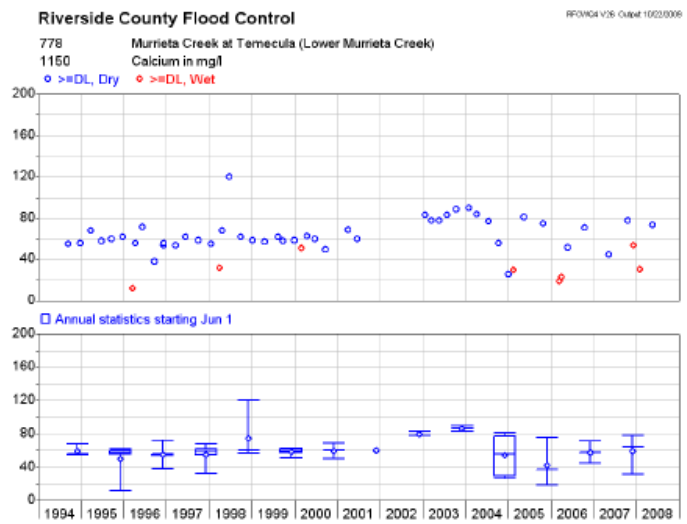
Riverside County Flood Control
778 Murrieta Creek at Temecula (Lower Murrieta Creek)
1150 Calcium in mg/l
>=DL, Dry
>=DL, Wet
Annual statistics starting Jun 1
1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008

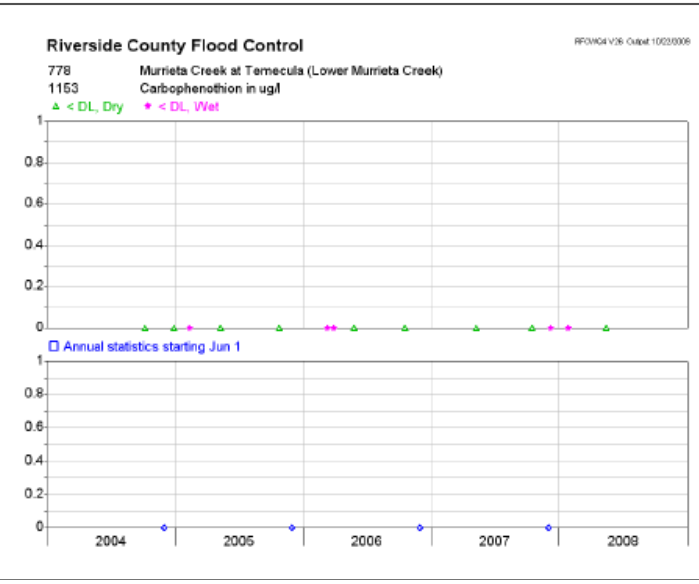
Riverside County Flood Control
778 Murrieta Creek at Temecula (Lower Murrieta Creek)
1153 Carbophenothion in ug/l
< DL, Dry
< DL, Wet
Annual statistics starting Jun 1
2004 2005 2006 2007 2008

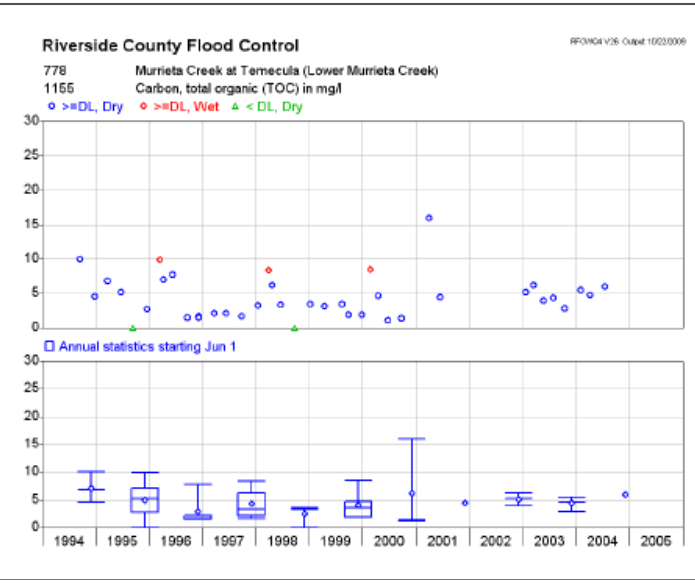
Riverside County Flood Control
778 Murrieta Creek at Temecula (Lower Murrieta Creek)
1155 Carbon, total organic (TOC) in mg/l
>=DL, Dry
>=DL, Wet
< DL, Dry
Annual statistics starting Jun 1
1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005

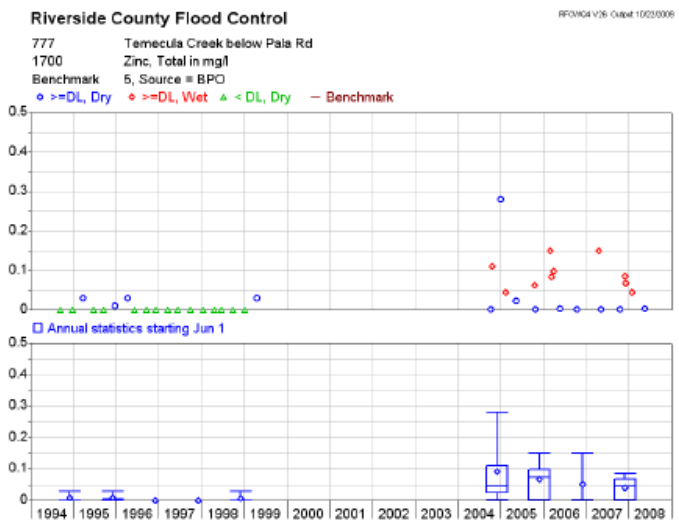
Riverside County Flood Control
777 Temecula Creek below Pala Rd
1700 Zinc, Total in mg/l
Benchmark 5, Source = BPO
>=DL, Dry
>=DL, Wet
< DL, Dry
Benchmark
Annual statistics starting Jun 1
1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008

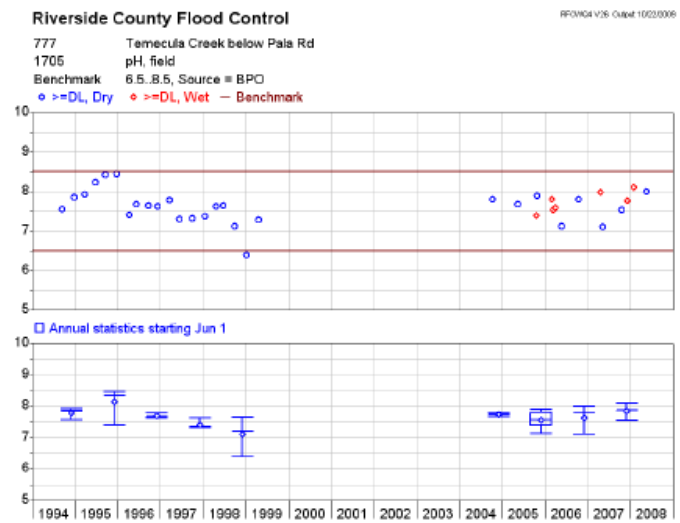
Riverside County Flood Control
777 Temecula Creek below Pala Rd
1705 pH, field
Benchmark 6.5..8.5, Source = BPO
>=DL, Dry
>=DL, Wet
Benchmark
Annual statistics starting Jun 1
1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008

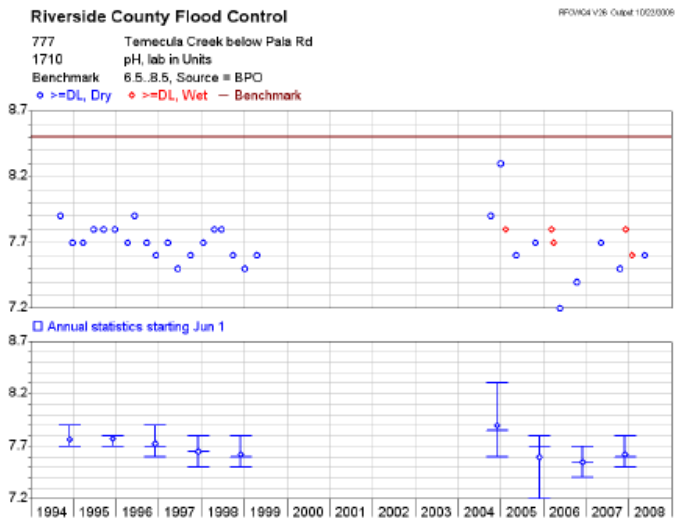
Riverside County Flood Control
777 Temecula Creek below Pala Rd
1710 pH, lab in Units
Benchmark 6.5..8.5, Source = BPO
>=DL, Dry
>=DL, Wet
Benchmark
Annual statistics starting Jun 1
1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008

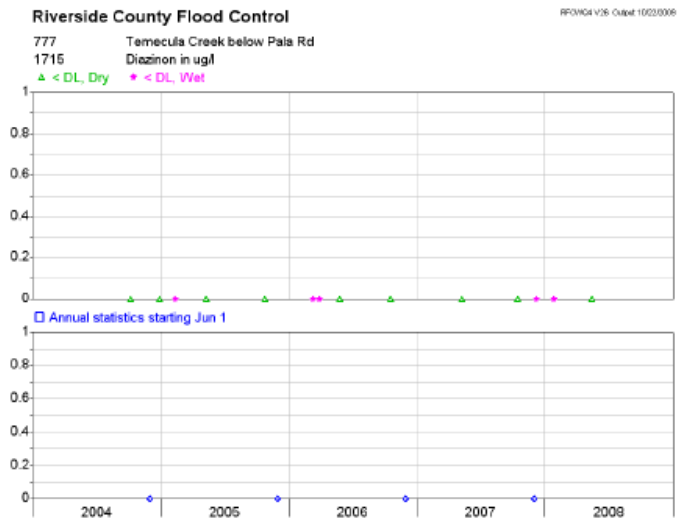
Riverside County Flood Control
777 Temecula Creek below Pala Rd
1715 Diazinon in ug/l
< DL, Dry
< DL, Wet
Annual statistics starting Jun 1
2004 2005 2006 2007 2008

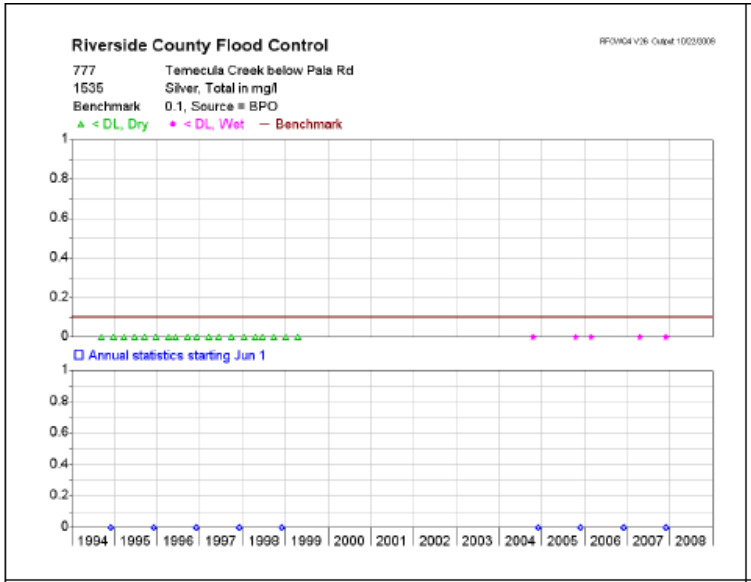
Riverside County Flood Control
777 Temecula Creek below Pala Rd
1535 Silver, Total in mg/l
Benchmark 0.1, Source = BPO
< DL, Dry
< DL, Wet
Benchmark
Annual statistics starting Jun 1
1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008

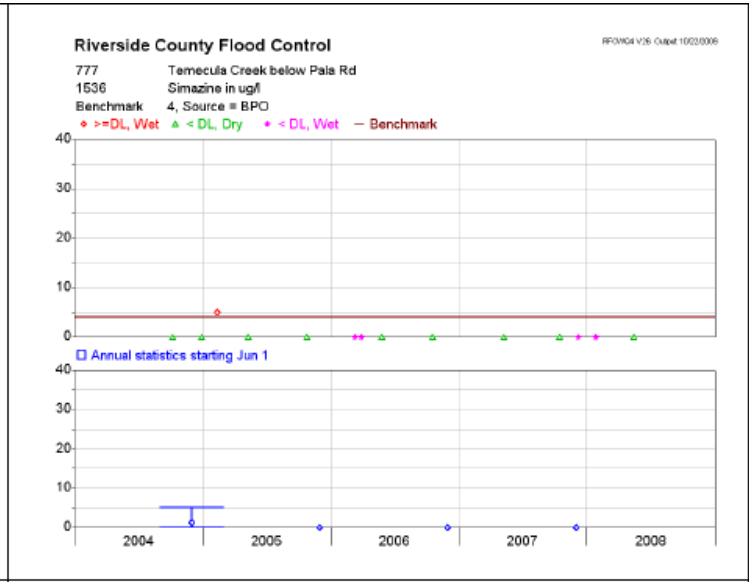
Riverside County Flood Control
777 Temecula Creek below Pala Rd
1536 Simazine in ug/l
Benchmark 4, Source = BPO
>=DL, Wet
< DL, Dry
< DL, Wet
Benchmark
Annual statistics starting Jun 1
2004 2005 2006 2007 2008

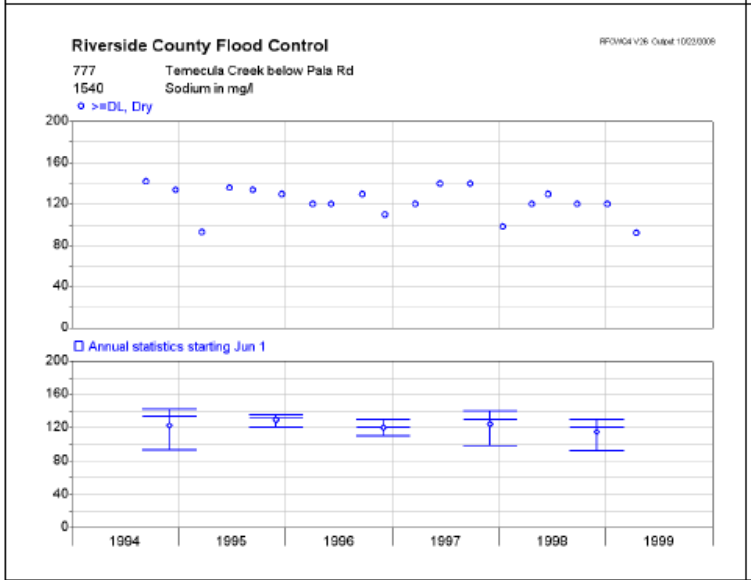
Riverside County Flood Control
777 Temecula Creek below Pala Rd
1540 Sodium in mg/l
>=DL, Dry
Annual statistics starting Jun 1
1994 1995 1996 1997 1998 1999

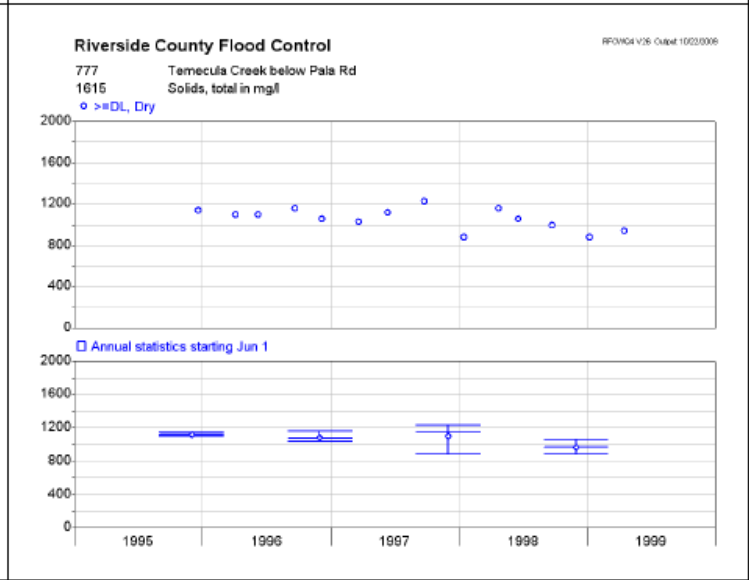
Riverside County Flood Control
777 Temecula Creek below Pala Rd
1615 Solids, total in mg/l
>=DL, Dry
Annual statistics starting Jun 1
1995 1996 1997 1998 1999

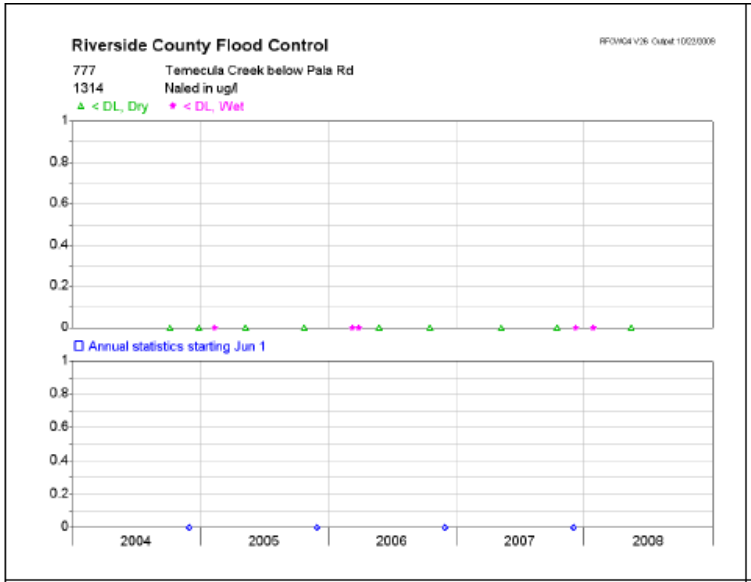
Riverside County Flood Control
777 Temecula Creek below Pala Rd
1314 Naled in ug/l
< DL, Dry
< DL, Wet
Annual statistics starting Jun 1
2004
2005
2006
2007
2008

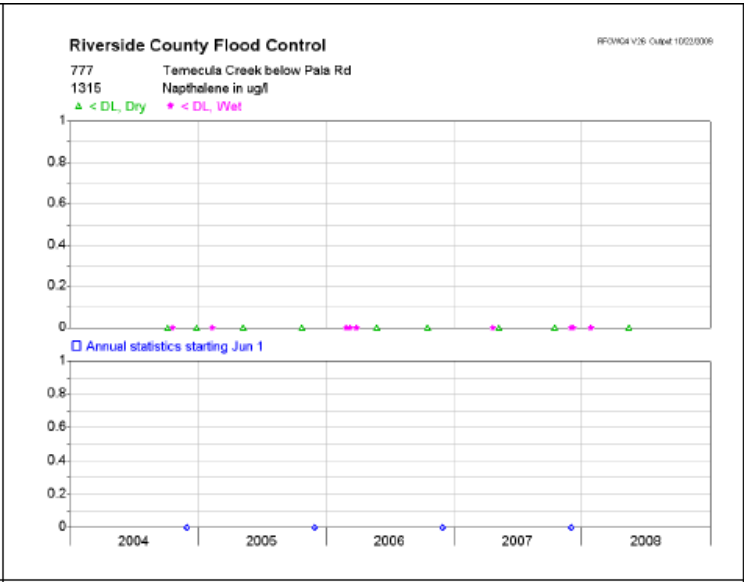
Riverside County Flood Control
777 Temecula Creek below Pala Rd
1315 Napthalene in ug/l
< DL, Dry
< DL, Wet
Annual statistics starting Jun 1
2004
2005
2006
2007
2008

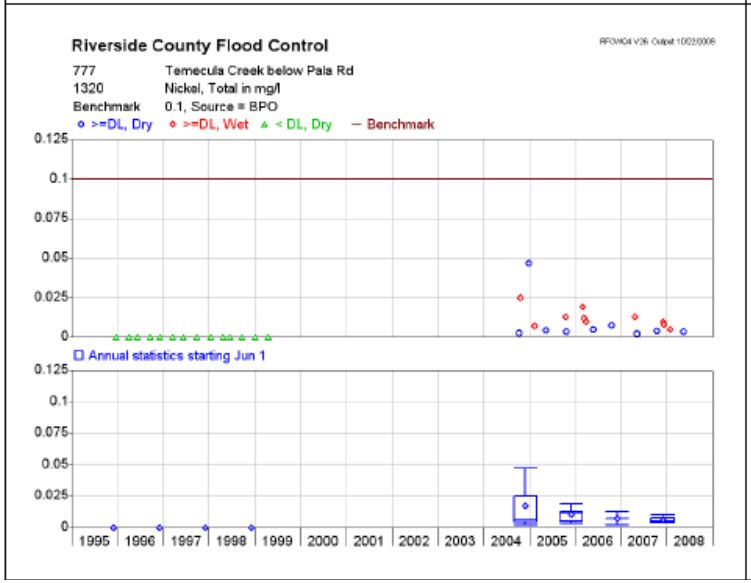
Riverside County Flood Control
777 Temecula Creek below Pala Rd
1320 Nickel, Total in mg/l
Benchmark 0.1, Source = BPO
>=DL, Dry
>=DL, Wet
< DL, Dry
Benchmark
Annual statistics starting Jun 1
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008

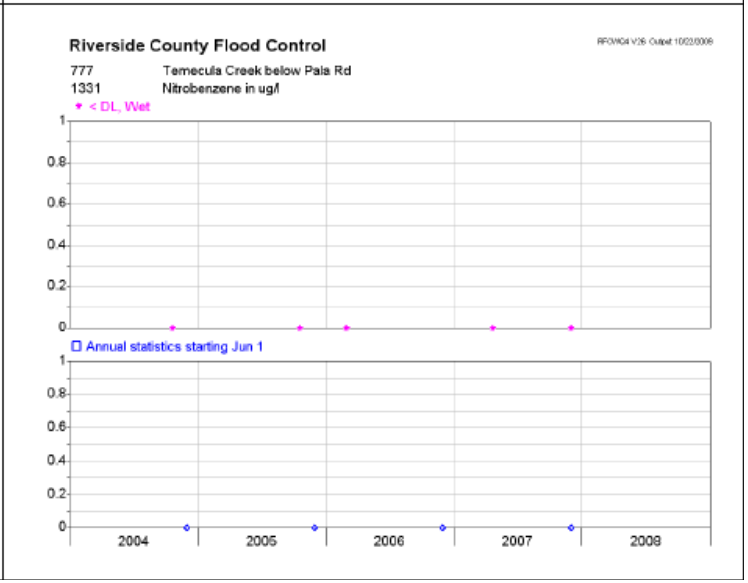
Riverside County Flood Control
777 Temecula Creek below Pala Rd
1331 Nitrobenzene in ug/l
< DL, Wet
Annual statistics starting Jun 1
2004
2005
2006
2007
2008

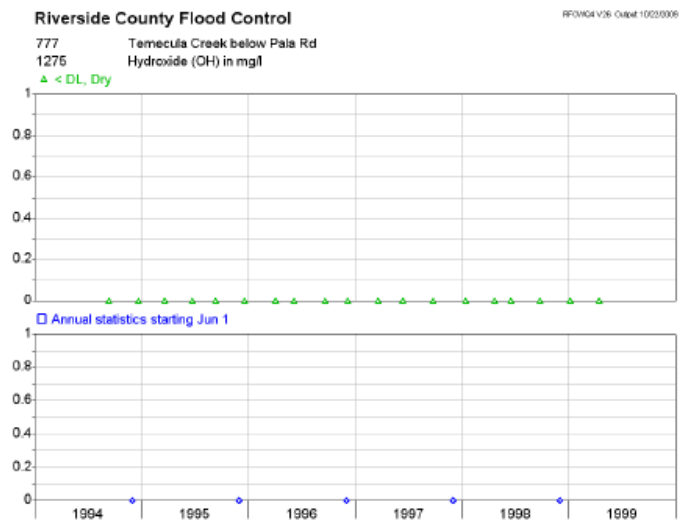
Riverside County Flood Control
777 Temecula Creek below Pala Rd
1275 Hydroxide (OH) in mg/l
< DL, Dry
Annual statistics starting Jun 1
1994
1995
1996
1997
1998
1999

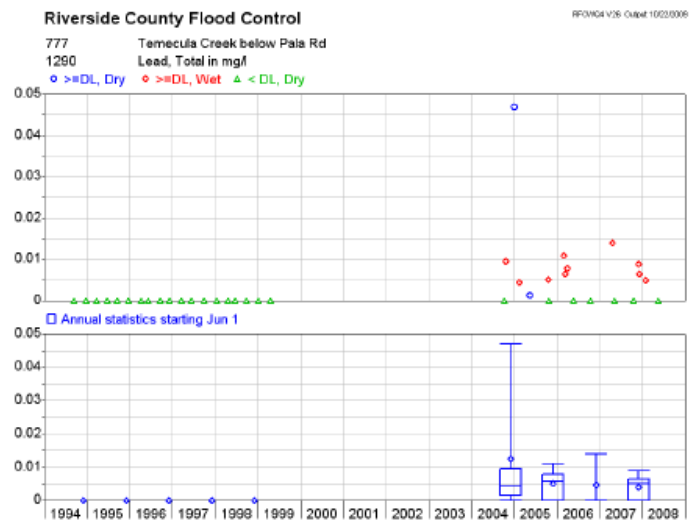
Riverside County Flood Control
777 Temecula Creek below Pala Rd
1290 Lead, Total in mg/l
>=DL, Dry
>=DL, Wet
< DL, Dry
Annual statistics starting Jun 1
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008

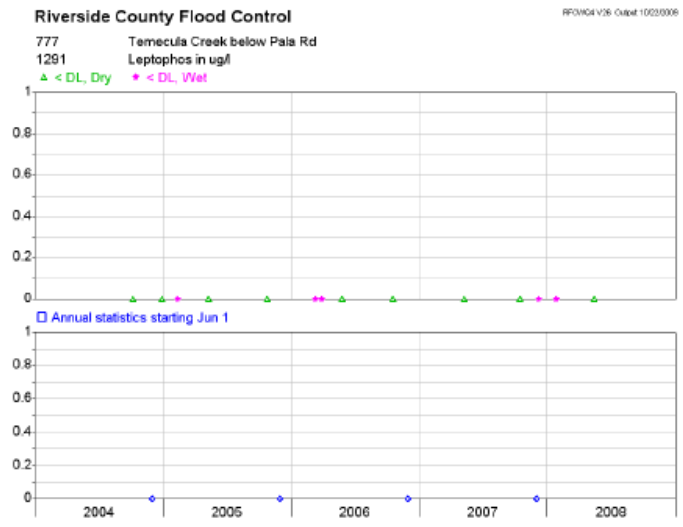
Riverside County Flood Control
777 Temecula Creek below Pala Rd
1291 Leptophos in ug/l
< DL, Dry
< DL, Wet
Annual statistics starting Jun 1
2004
2005
2006
2007
2008

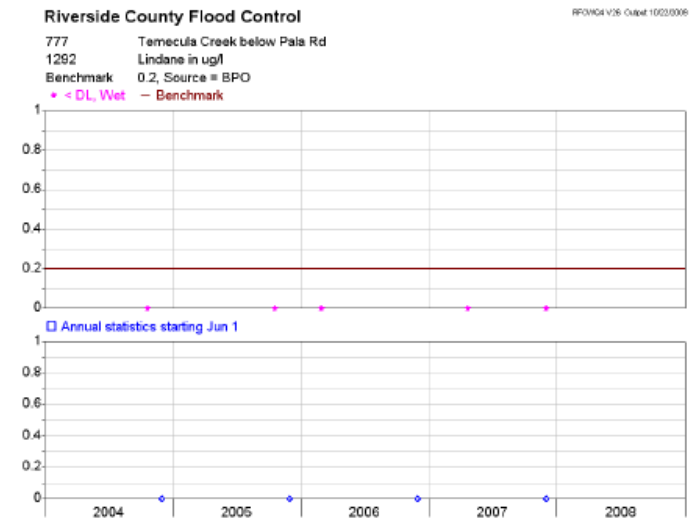
Riverside County Flood Control
777 Temecula Creek below Pala Rd
1292 Lindane in ug/l
Benchmark 0.2, Source = BPO
< DL, Wet
Benchmark
Annual statistics starting Jun 1
2004
2005
2006
2007
2008

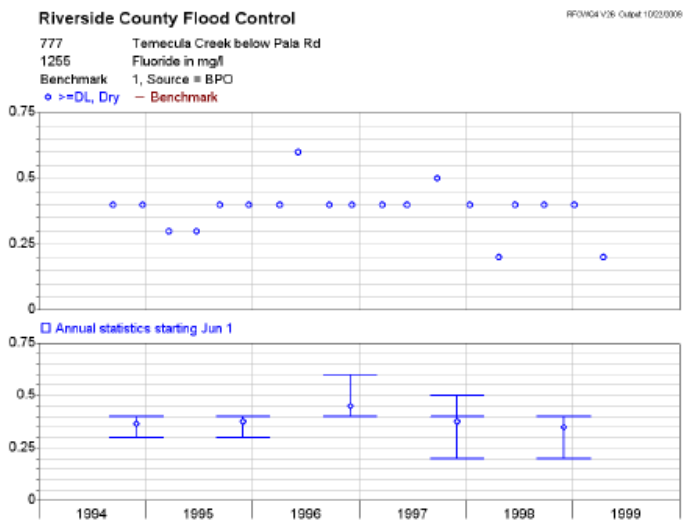
Riverside County Flood Control
777 Temecula Creek below Pala Rd
1255 Fluoride in mg/l
Benchmark 1, Source = BPO
>=DL, Dry
Benchmark
Annual statistics starting Jun 1
0.75
0.5
0.25
0
1994
1995
1996
1997
1998
1999

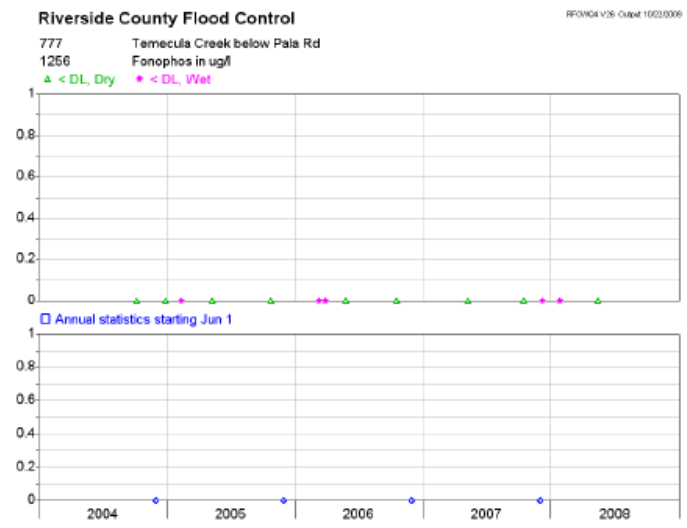
Riverside County Flood Control
777 Temecula Creek below Pala Rd
1256 Fonophos in ug/l
< DL, Dry
< DL, Wet
Annual statistics starting Jun 1
1
0.8
0.6
0.4
0.2
0
2004
2005
2006
2007
2008

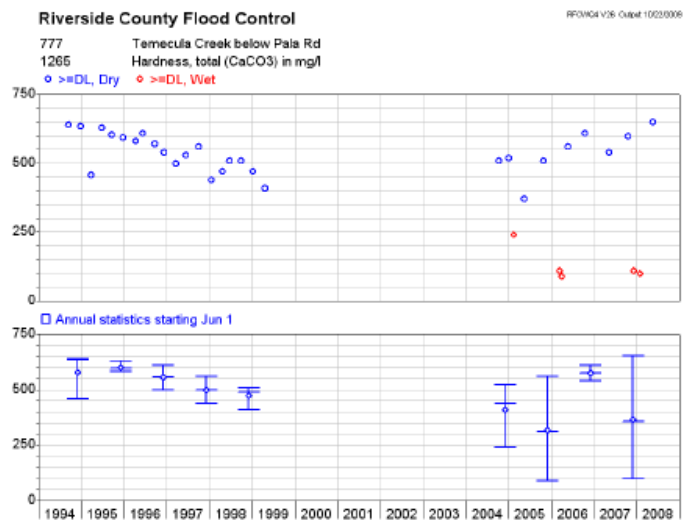
Riverside County Flood Control
777 Temecula Creek below Pala Rd
1265 Hardness, total (CaCO3) in mg/l
>=DL, Dry
>=DL, Wet
Annual statistics starting Jun 1
750
500
250
0
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008

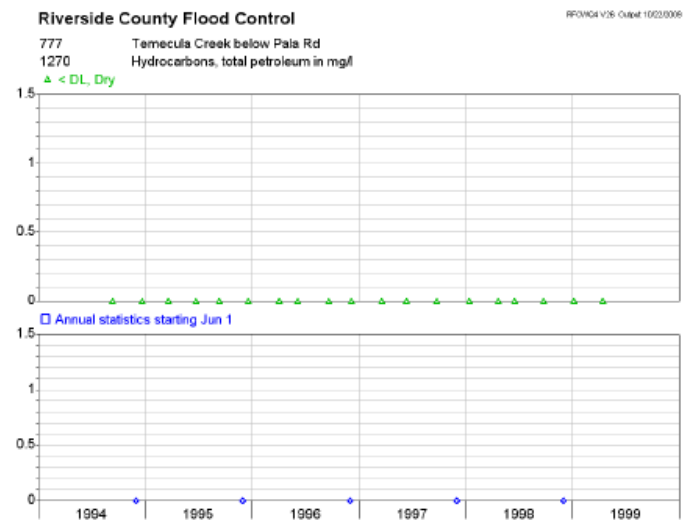
Riverside County Flood Control
777 Temecula Creek below Pala Rd
1270 Hydrocarbons, total petroleum in mg/l
< DL, Dry
Annual statistics starting Jun 1
1.5
1
0.5
0
1994
1995
1996
1997
1998
1999

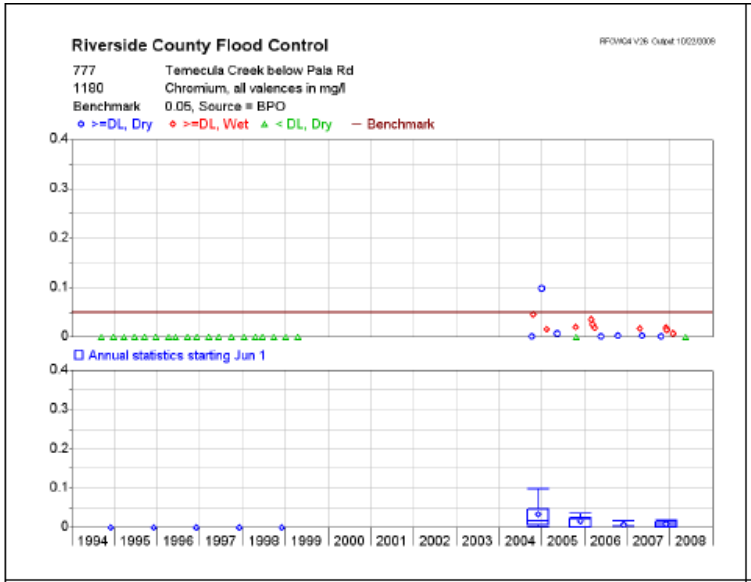
Riverside County Flood Control
777 Temecula Creek below Pala Rd
1180 Chromium, all valences in mg/l
Benchmark 0.05, Source = BPO
>=DL, Dry
>=DL, Wet
< DL, Dry
Benchmark
Annual statistics starting Jun 1
1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008

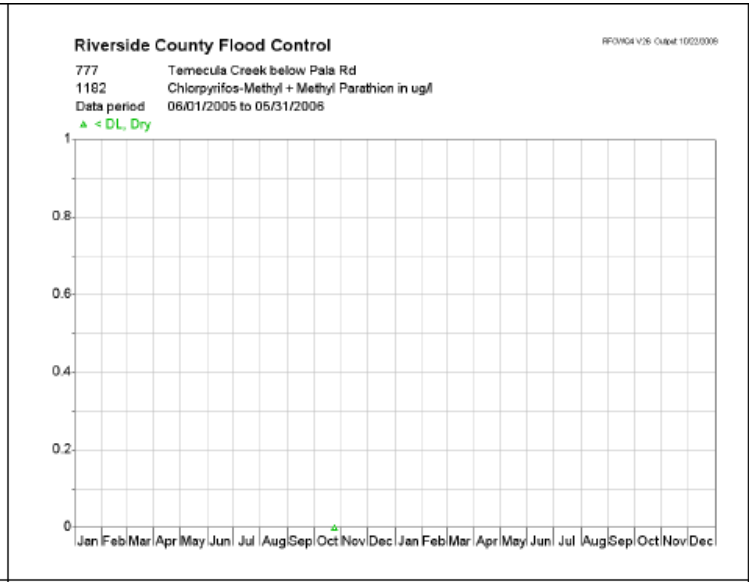
Riverside County Flood Control
777 Temecula Creek below Pala Rd
1182 Chlorpyrifos-Methyl + Methyl Parathion in ug/l
Data period 06/01/2005 to 05/31/2006
< DL, Dry
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

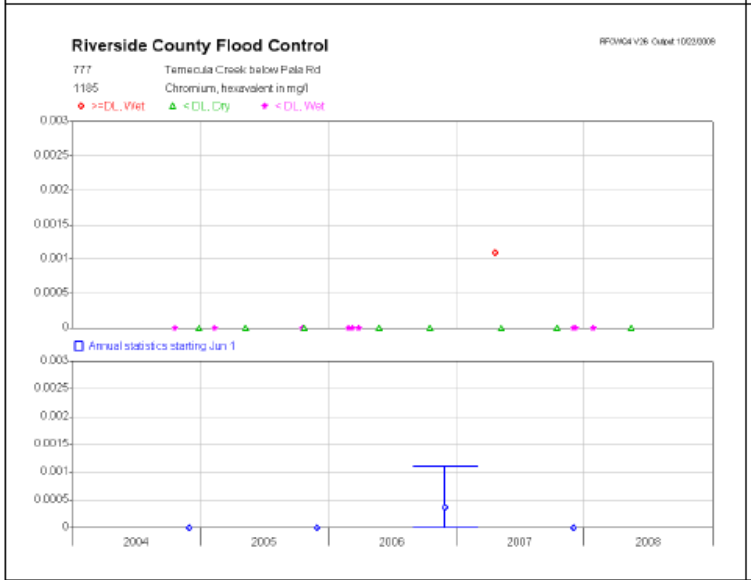
Riverside County Flood Control
777 Temecula Creek below Pala Rd
1185 Chromium, hexavalent in mg/l
>=DL, Wet
< DL, Dry
< DL, Wet
Annual statistics starting Jun 1
2004 2005 2006 2007 2008

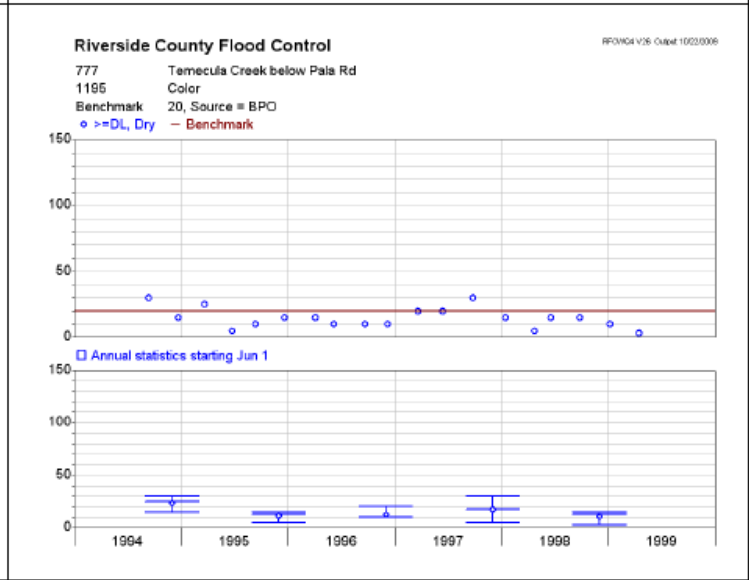
Riverside County Flood Control
777 Temecula Creek below Pala Rd
1195 Color
Benchmark 20, Source = BPO
>=DL, Dry
Benchmark
Annual statistics starting Jun 1
1994 1995 1996 1997 1998 1999

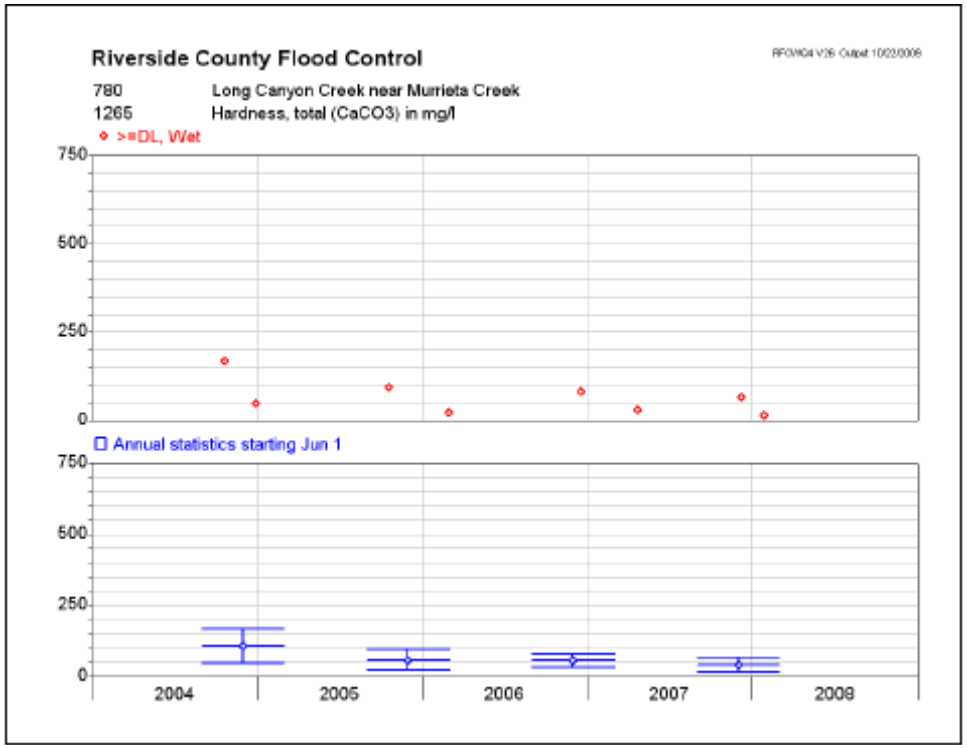
Riverside County Flood Control
780 Long Canyon Creek near Murrieta Creek
1265 Hardness, total (CaCO3) in mg/l
>=DL, Wet
750
500
250
0
Annual statistics starting Jun 1
750
500
250
0
2004
2005
2006
2007
2008

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN DIEGO REGION

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FACT SHEET / TECHNICAL REPORT

FOR

ORDER NO. R9-2010-0016
NPDES NO. CAS0108766

WASTE DISCHARGE REQUIREMENTS

FOR

DISCHARGES FROM THE
MUNICIPAL SEPARATE STORM SEWER SYSTEMS (MS4s)
DRAINING THE COUNTY OF RIVERSIDE,
THE INCORPORATED CITIES OF RIVERSIDE COUNTY,
AND THE RIVERSIDE COUNTY FLOOD CONTROL
AND WATER CONSERVATION DISTRICT
WITHIN THE SAN DIEGO REGION

OCTOBER 13, 2010

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LIST OF ACRONYMS AND ABBREVIATIONS

ADT	Average Daily Traffic
AMAL	Average Monthly Action Level
AST	Active/Passive Sediment Treatment
BAT	Best Available Technology
BIA	Building Industry Association
BMP	Best Management Practice
Basin Plan	Water Quality Control Plan for the San Diego Basin
CASQA	California Stormwater Quality Association
CCC	California Coastal Commission
CC&Rs	Covenants, Conditions and Restrictions
CDFG	California Department of Fish and Game
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
Colorado River Water Board	California Regional Water Quality Control Board, Colorado River Region
Copermittees	County of Riverside, the 4 incorporated cities within the County of Riverside in the San Diego Region, and the Riverside County Flood Control and Water Conservation District
CWA	Clean Water Act
CWC	California Water Code
CZARA	Coastal Zone Act Reauthorization Amendments of 1990
DAMP	Drainage Area Management Plan
DNQ	Did Not Quantify
ESAs	Environmentally Sensitive Areas
FR	Federal Register
GIS	Geographic Information System
HMP	Hydromodification Management Plan
HU	Hydrologic Unit
IBI	Index of Biotic Integrity
IC/ID	Illicit Connections and Illicit Discharges
JRMP	Jurisdictional Runoff Management Plan
Los Angeles Water Board	California Regional Water Quality Control Board, Los Angeles Region
LID	Low Impact Development
MDAL	Maximum Daily Action Level
MEP	Maximum Extent Practicable
MRP	Receiving Waters Monitoring and Reporting Program
MS4	Municipal Separate Storm Sewer System

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LIST OF ACRONYMS AND ABBREVIATIONS (Cont'd)

NAL	Non-storm Water Action Levels
ND	Not Detected
NPDES	National Pollutant Discharge Elimination System
NRDC	Natural Resources Defense Council
NURP	Nationwide Urban Runoff Program
OAL	Office of Administrative Law
RCFCD	Riverside County Flood Control and Water Conservation District
Regional Water Board	California Regional Water Quality Control Board
RGOs	Retail Gasoline Outlets
ROWD	Riverside County Copermittees' Report of Waste Discharge (application for NPDES reissuance)
RWL	Receiving Water Limitations
SAL	Storm Water Action Level
Santa Ana Water Board	California Regional Water Quality Control Board, Santa Ana Region
San Diego Water Board	California Regional Water Quality Control Board, San Diego Region
San Francisco Bay Water Board	California Regional Water Quality Control Board, San Francisco Bay Region
SIC	Standard Industrial Classification Code
SIP	State Implementation Plan
SSMP	Standard Storm Water Mitigation Plan
State Water Board	State Water Resources Control Board
SWMP	Storm Water Management Plan
TAC	State Water Resources Control Board Urban Runoff Technical Advisory Committee
TIE	Toxicity Identification Evaluation
TMDL	Total Maximum Daily Load
USEPA	United States Environmental Protection Agency
WDRs	Waste Discharge Requirements
WLA	Waste Load Allocation
WQO	Water Quality Objective
WQBEL	Water Quality Based Effluent Limitations
WQMP	Water Quality Management Plan
WQS	Water Quality Standard
WRMP	Watershed Runoff Management Plan

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I. FACT SHEET FORMAT

This Fact Sheet briefly sets forth the principle facts and the significant factual, legal, methodological, and policy questions that the California Regional Water Quality Control Board, San Diego Region (San Diego Water Board) considered in preparing Order No. R9-2010-0016. In accordance with the Code of Federal Regulations (CFR) title 40 parts 124.8 and 124.56 (40 CFR 124.8 and 124.56), this Fact Sheet includes, but is not limited to, the following information:

A. Contact information
B. Public process and notification procedures
C. Background information
D. Permitting approach
E. Economic issues
F. Legal authority
G. Findings
H. Directives

Tentative Order No. R9-2010-0016 was distributed for public review on July 23, 2010. The San Diego Water Board accepted written comments on the Tentative Order until September 7, 2010. A public hearing was subsequently held on October 13, 2010 to receive oral comments from interested persons.

The San Diego Water Board's files applicable to the issuance of Order No. R9-2010-0016 are incorporated into the administrative record in support of the findings and requirements of Order No. R9-2010-0016.

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II. CONTACT INFORMATION

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The Order and other related documents can be downloaded from the San Diego Water Board website at http://www.waterboards.ca.gov/sandiego/water_issues/programs/stormwater/rsd_stormwater.shtml

All documents referenced in this Fact Sheet and in Order No. R9-2010-0016 are available for public review at the San Diego Water Board office, located at the address listed above. Public records are available for inspection during regular business hours, from 8:00 am to 5:00 pm Monday through Friday. To schedule an appointment to inspect public records, contact the San Diego Water Board Records Management Officer at 858-467-2952.

Copermittees

1. City of Murrieta	4. County of Riverside
2. City of Temecula	5. Riverside County Flood Control and Water Conservation District
3. City of Wildomar	
6. City of Menifee[1]	

[1] Until an agreement to transfer the regulatory oversight of the City of Menifee's MS4 to the California Regional Water Quality Control Board, Santa Ana Region under Order No. R8-2010-0033 is finalized, the City of Menifee is included as a Copermittee under Order No. R9-2010-0016.

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III. PUBLIC PROCESS AND NOTIFICATION PROCEDURES

The San Diego Water Board followed the schedule listed below for the preparation of Order No. R9-2010-0016:

A. In December 2008, the San Diego Water Board met with the Copermittees to discuss the Report of Waste Discharge (ROWD) required by Order No. R9-2004-001.
B. On January 15, 2009, the San Diego Water Board received the ROWD for the permit renewal.
C. On October 29, 2009, the San Diego Water Board received the 2008-09 annual reports from the Copermittees for the existing permit.
D. On February 8, 2010, the San Diego Water Board notified all known interested parties that an electronic email listserv had been established to provide information and notices on the reissuance of the municipal storm water NPDES permit for southern Riverside County.
E. On February 18, 2010 the San Diego Water Board provided written comments on the ROWD to the Copermittees.
F. On March 22, 2010, the San Diego Water Board met with the Copermittees to discuss the potential changes to the permit based on the ROWD and annual reports.
G. Between April 22 and July 23, 2010, the San Diego Water Board met with the Copermittees on a weekly basis to discuss the Copermittees' concerns with the provisions of the Tentative Order.
H. On July 23, 2010, the San Diego Water Board released the Tentative Order for public review and comment.
I. Written comments were accepted until September 7, 2010.
J. A public hearing of the Tentative Order was conducted on October 13, 2010.

IV. BACKGROUND

Order No. R9-R9-2010-0016 is the fourth iteration of the storm water permit for the municipal separate storm sewer systems (MS4s) in the Riverside County portion of the San Diego Region. The first permit was adopted in 1990. The San Diego Water Board adopted the second iteration of the permit in 1998. The U.S. Environmental Protection Agency (USEPA) objected to the 1998 permit and reissued the permit in 1999. In 2000, the San Diego Water Board issued an addendum to the 1998 permit and incorporated the USEPA's permit by reference. The San Diego Water Board reissued the third iteration of the permit in 2004.

Municipal Storm Water Permits are required by the Federal Clean Water Act 1987 Amendments. The federal Clean Water Act (CWA) was amended in 1987 to address storm water runoff from municipal and industrial dischargers. One requirement of the amendment was that many municipalities throughout the United States were obligated for the first time to obtain National Pollutant Discharge Elimination System (NPDES) permits for discharges of storm water runoff from their MS4s. In response to the CWA amendment (and the pending federal NPDES regulations which would implement the amendment), the San Diego Water Board issued a municipal storm water permit, Order No. 90-46, in July 1990 to the Copermittees for their municipal separate storm sewer system (MS4) discharges.[2]

The First and Second Term Permits, Order Nos. 90-46 and 98-02, provided maximum flexibility. San Diego Water Board Order No. 90-46 contained the "essentials" of the 1990 regulations, but the requirements were written in very broad, generic terms. This was done in order to provide the maximum amount of flexibility to the Copermittees in implementing the new requirements (flexibility was, in fact, the stated reason for issuing the permit in advance of the final regulations). From staff's perspective however, "flexibility" in the form of lack of specificity, combined with the Copermittees' lack of funding and political will, also provided the Copermittees with ample reasons to take few substantive steps towards achieving water quality standards. The situation was exacerbated by the San Diego Water Board's own lack of storm water resources for oversight.

The Third-Term Permit introduced specific requirements. The regulatory approach incorporated into Order No. R9-2004-001 was a significant departure from the regulatory approach of the First and Second-Term Permits. Where San Diego Water Board Order Nos. 90-46 and 98-02 included broad, nonspecific requirements in order to provide the Copermittees with the maximum amount of flexibility in developing their programs, Order No. R9-2004-001 used detailed, specific requirements which outlined the minimum level of implementation required for the Copermittees' programs. In order to provide the Copermittees with the minimum requirements to meet the

[2] The 1990 permit was issued to the County of Riverside, the Orange County Flood Control and Water Conservation District, and the City of Temecula. Additional municipalities have been added to the MS4 NPDES permit as they have incorporated.

maximum extent practicable (MEP) standard for storm water of the San Diego Water Board, Order No. R9-2004-001 included more detail to emphasize the strong jurisdictional level programs developed by the Copermittees during the First and Second-Term Permits, as well as including the watershed-level program. The shift in permitting approaches resulted from the San Diego Water Board's conclusion that the lack of specificity in earlier Orders resulted in frequently unenforceable permit requirements, which in turn allowed some Copermittees to only make limited progress in implementing their programs.

The Third-Term Permit followed the San Diego County and Orange County permit templates. The shift in regulatory approaches for MS4 permits was first manifested in the 2001 MS4 permit to the owners and operators of San Diego County MS4s (Order No. 2001-01) and subsequently incorporated into the 2002 MS4 permit to the owners and operators of the Orange County MS4s (Order No. R9-2002-0001). The Third-Term Riverside County Permit included similar requirements as the 2001 San Diego County Permit and the 2002 Orange County Permit. Both the San Diego and Orange County Permits were appealed to the State Water Resources Control Board (State Water Board).[3] Minor modifications of each were made by the State Water Board, but the vast majority of the requirements were upheld. The San Diego County permit was also challenged in the Superior Court of the State of California and the Court of Appeal, Fourth Appellate District. Further litigation on the Orange County permit was held pending the precedential decisions on the San Diego Permit. The San Diego Permit was largely upheld in the Superior and Appellate Courts. The State of California Supreme Court declined to hear a final appeal from the Building Industry Association in March 2005. Thus, the Third-Term Riverside County permit requirements remained as slightly modified by the State Water Board.

The Third-Term Permit was adopted following substantial public participation. Public participation was extensive during the adoption process of the Third-Term Permit. The draft permit was released for public review and comment on December 15, 2003. Because the proposed requirements for Riverside County were similar to those that had recently been adopted and contested in San Diego County, much of the public participation dialogue echoed the discussions held during the San Diego renewal. A public workshop was held at the Temecula City Hall on January 23, 2004 to answer questions about the Tentative Order for the Third-Term Riverside County permit. A public hearing was held on February 11, 2004 to receive testimony. The public comment period was closed on March 10, 2004. Approximately 165 written and verbal comments were received and responded to during the public workshop, the public hearing, and the written comment period on the Tentative Order for the Third-Term Riverside County permit. Following the extensive public participation process, the San Diego Water Board adopted Order No. R9-2004-001 on July 14, 2004.

[3] Seven petitions were filed with the State Water Board over the Third-Term Orange County Permit. Six were placed in abeyance. Three of the petitioners sought stays. One stay request was dismissed and one was withdrawn. The active petition and stays were addressed by the State Water Board in Order WQO 2002-0014. That Order stayed provision F.5.f regarding sewage spills and modified Finding No. 26 regarding chronic toxicity.

Storm water programs have improved under the Third-Term Permit. Since adoption of Order No. R9-2004-001, the Copermittees' storm water programs have expanded. Audits of the Copermittees' programs and reviews of annual reports exhibit that the Copermittees' jurisdictional programs are largely in compliance with the Order. Some of the efforts currently being conducted on a regular basis by the Copermittees that were not conducted on a widespread basis prior to adoption of Order No. R9-2004-001, include: construction site storm water inspections, industrial and commercial facility storm water inspections, municipal facility storm water inspections, management of storm water quality from new development, development of best management practice (BMP) requirements for existing development, interdepartmental coordination, comprehensive water quality monitoring, and assessment of storm water program effectiveness.

Significant challenges remain. When viewed relative to the magnitude of the storm water runoff problem, enormous challenges remain, particularly regarding the management of storm water runoff on a watershed scale. Today, storm and non-storm water discharges from the MS4 continue to be the leading cause of water quality impairment in the San Diego Region.[4] Since 1998, the number of impaired water bodies in the Riverside County portion of the San Diego Region on the CWA section 303(d) List of Water Quality Impaired Segments (303(d) List) has increased with each new list (i.e. new impaired water bodies listed on the 2002, 2006, and 2008 303(d) Lists). The Copermittees' monitoring data exhibits persistent exceedances of water quality objectives in the Santa Margarita watershed.[5] The Santa Margarita watershed also has conditions that are frequently toxic to aquatic life. Bioassessment data from the watersheds further reflects these conditions, finding that macroinvertebrate communities in creeks have widespread Poor to Very Poor Index of Biotic Integrity (IBI) ratings.

[4] The potential sources of impairments are identified on the CWA section 303(d) list of impaired water bodies for the San Diego Region.
[5] Data is provided in annual reports to the San Diego Water Board. A summary of data collected during the Third-Term Permit is provided in the Riverside County Copermittees' application for permit reissuance. That summary is available on-line at:
http://www.waterboards.ca.gov/sandiego/water_issues/programs/stormwater/rsd_stormwater.shtml

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V. PERMITTING APPROACH (PROGRAM INTEGRATION, FLEXIBILITY, AND DETAIL)

The Order contains an increased emphasis on storm water discharge management on a watershed basis. This shift towards increased watershed management is consistent with planning efforts conducted by the San Diego Water Board regarding reissuance of the San Diego Permit (Order No. R9-2007-0001) and Orange County Permit (Order No. R9-2009-0002). This shift reflects recognition of the maturity of the storm water programs since they began implementing the Third-Term Permit. Addressing storm water discharge management on a watershed basis is only possible if effective jurisdictional programs have been established, and maintaining effective jurisdictional programs is crucial to the success of watershed-focused management.

There are several reasons for this shift in emphasis. An emphasis on watersheds is necessary to shift the focus of the Copermittees from program development and implementation to water quality results. After over 20 years of Copermittee program implementation, it is critical that the Copermittees link their efforts with positive impacts on water quality. Addressing storm water on a watershed scale focuses on water quality results by emphasizing the receiving waters within the watershed. The conditions of the receiving waters drive management actions, which in turn focus on the water quality problems in each watershed.

Focusing on watershed implementation does not mean that the Copermittees must expend funds outside of their jurisdictions. Rather, the Copermittees within each watershed are expected to collaborate to develop a watershed strategy to address the high priority water quality problems within each watershed. They have the option of implementing the strategy in the manner they find to be most effective. Each Copermittee can implement the strategy individually within its jurisdiction, or the Copermittees can group together to implement the strategy throughout the watershed.

While the Order includes a new emphasis on addressing storm water discharges on a watershed basis, the Order includes recognition of the importance of continued program implementation on jurisdictional and countywide levels. The Order also acknowledges that jurisdictional, watershed, and countywide efforts are not always mutually exclusive. For this reason, an attempt has been made to allow for the Copermittees' jurisdictional, watershed, and countywide programs to integrate.

In the Order, the watershed requirements serve as the mechanism for this program integration. Since jurisdictional and countywide activities can also serve watershed purposes, such activities can be integrated into the Copermittees' watershed programs, provided the activities meet certain criteria. In this manner, the Copermittees' activities do not always need to distinguish between jurisdictional, watershed, and countywide levels of implementation. Instead, they can be integrated on multiple levels.

Such opportunities for program integration inherently provide flexibility to the Copermittees in implementing their programs. Program integration can be expanded or minimized as the Copermittees see fit. For example, there is flexibility provided in determining the activities to be integrated and implemented in the watershed programs – watershed-based efforts, countywide efforts, enhanced jurisdictional efforts, or a mixture of the three. Significant flexibility is also provided throughout other portions of the Order.

Copermittees can choose the best management practices (BMPs) to be implemented, or required to be implemented, for development, construction, and existing development areas. Flexibility to determine which industrial or commercial sites are to be inspected is also provided to the Copermittees. Educational approaches are also to be determined by the Copermittees under the Order. Implementation of certain efforts on a countywide basis is largely optional for the Copermittees as well. Significant leeway is also provided to the Copermittees in using methods to assess the effectiveness of their various runoff management programs. This flexibility is further extended to the monitoring program requirements, which allow the Copermittees to develop monitoring approaches to several aspects of the monitoring program.

The challenge in drafting the Order is to provide the flexibility described above while ensuring that the Order is still enforceable. To achieve this, the Order frequently prescribes minimum measurable outcomes, while providing the Copermittees with flexibility in the approaches they use to meet those outcomes. Enforceability has been found to be a critical aspect of the Order. For example, the watershed requirements of Order No. R9-2004-001 were some of the Order's most flexible requirements. This lack of specificity in the watershed requirements resulted in inefficient watershed compliance efforts. This situation reflects a common outcome of flexible permit language. Such language can be unclear and unenforceable, and it can lead to implementation of inadequate programs.

To avoid these types of situations, a balance between flexibility and enforceability has been crafted into the Order. Minimum measurable outcomes are utilized to ensure the Order is enforceable, while the Copermittees are provided flexibility in deciding how they will implement their programs to meet the minimum measurable outcomes.

VI. ECONOMIC ISSUES

Economic discussions of storm and non-storm water management programs tend to focus on the significant costs incurred by municipalities in developing and implementing the programs. However, when considering the cost of implementing the programs, it is also important to consider the alternative costs incurred by not fully implementing the programs, as well as the benefits which result from program implementation.

The financial crisis and current economic environment has amplified the concerns about the costs incurred by the municipalities in implementing their programs. It is frequently cited by many of the Copermittees as a justification for reducing or modifying the requirements that must be met by their programs. While the current economic environment is a cause for concern in the short term, it also provides an opportunity for these programs to find and implement improvements and efficiencies before the next period of growth and development.

It is very difficult to ascertain the true cost of implementation of the Copermittees' management programs because of inconsistencies in reporting by the Copermittees. Reported costs of compliance for the same program element can vary widely from city to city, often by a very wide margin that is not easily explained.[6] Despite these problems, efforts have been made to identify management program costs, which can be helpful in understanding the costs of program implementation.

Estimates of Phase I Storm Water Program Costs

The USEPA, the California Regional Water Quality Control Boards (Regional Water Boards), and the State Water Board have attempted to evaluate the costs of implementing municipal storm water programs. The assessments demonstrate that true costs are difficult to ascertain and reported costs vary widely. Nonetheless, they provide a useful context for considering the costs of requirements within Order No. R9-2010-0016. In addition, reported fiscal analyses tend to neglect the costs incurred to municipalities when storm water runoff is not effectively managed. Such costs result from pollution, contamination, nuisance, and damage to ecosystems, property, and human health.

In 1999 USEPA reported on multiple studies it conducted to determine the cost of management programs. A study of Phase II municipalities determined that the annual cost of the Phase II program was expected to be $9.16 per household. USEPA also studied 35 Phase I municipalities, finding costs to be $9.08 per household annually, similar to those anticipated for Phase II municipalities.[7]

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[6] LARWQCB, 2003. Review and Analysis of Budget Data Submitted by the Permittees for Fiscal Years 2000-2003. P. 2.
[7] Federal Register / Vol. 64, No. 235 / Wednesday, December 8, 1999 / Rules and Regulations. P. 68791-68792.

A study on Phase I MS4 program cost was also conducted by the California Regional Water Quality Control Board, Los Angeles Region (Los Angeles Water Board), where program costs reported in the municipalities' annual reports were assessed. The Los Angeles Water Board estimated that average per household cost to implement the MS4 program in Los Angeles County was $12.50.[8] Since the Los Angeles County permit is very similar to Order No. R9-2004-001, this estimate is also useful in assessing general program costs in Riverside County.

The State Water Board also commissioned a study by the California State University, Sacramento to assess costs of the Phase I MS4 program. This study includes an assessment of costs incurred by Phase I MS4s throughout the State to implement their programs. Annual cost per household in the study ranged from $18-46, with the Fresno-Clovis Metropolitan Area (FCMA) representing the lower end of the range, and the City of Encinitas (in San Diego County) representing the upper end of the range.[9] Included in the study is the City of Corona, which is in Riverside County under the jurisdiction of the California Regional Water Quality Control Board, Santa Ana Region (Santa Ana Water Board).

The annual cost per household for the City of Corona's program was estimated to be $32, which should be similar to the costs to implement the MS4 programs in the Riverside County portion of the San Diego Region. In contrast, the cost of the City of Encinitas' program, with an annual cost per household estimated to be $46, may represent the upper range of Riverside County MS4 programs. However, the City of Encinitas's program cost can be considered as the high end of the spectrum for management program costs because the City has a consent decree with environmental groups regarding its program, and City of Encinitas has received recognition for implementing a superior program.

The annual costs for the City of Corona and City of Encinitas were estimated from data collected in 2003-2004. Between 2003 and 2008, the number of households in both cities has increased by approximately 3 percent and 7 percent, respectively.[10] In contrast, between 2003 and 2008 the number of households in the City of Temecula has increased from 23,199 to 31,135 (34 percent)[11] and the City of Murrieta has increased from 22,020 to 32,664 (48 percent).[12] This significant increase in number of households indicates a significant increase in the tax base (sales and property tax) available to fund the implementation of the MS4 programs for the City of Temecula and City of Murrieta, as well as for the County of Riverside and recently incorporated cities.

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[8] Los Angeles Water Board, 2003. Review and Analysis of Budget Data Submitted by the Permittees for Fiscal Years 2000-2003. P. 2.
[9] State Water Board, 2005. NPDES Stormwater Cost Survey. P. ii.
[10] Southern California Association of Governments, Profile of the City of Corona, dated May 2009; and City of Encinitas, Comprehensive Financial Annual Report, dated June 30, 2009.
[11] Southern California Association of Governments, Profile of the City of Temecula, dated May 2009.
[12] Southern California Association of Governments, Profile of the City of Murrieta, dated May 2009.

The average amount spent per household in the Cities of Temecula and Murrieta, however, does not correspond with the increase in the number of households or the amount spent in municipalities in other regions. The table below compares the reported expenditures for the MS4 programs from 2006-07 to 2008-09 compared to number of households in the Cities of Encinitas, Corona, Temecula, and Murrieta.[13]

	2006-07			2007-08			2008-09		
City	$ Spent	House-holds	$/House-hold	$ Spent	House-holds	$/House-hold	$ Spent	House-holds	$/House-hold
Encinitas	$1,192,174	23,798	$50.10	$2,052,671	23,871	$85.99	$1,729,962	24,100	$71.78
Corona	$988,547	43,000	$22.99	$1,151,779	43,482	$26.49	$1,162,928*	43,827	$26.53
Temecula	$566,952	28,890	$19.62	$748,267	30,222	$24.76	$534,492	31,135	$17.17
Murrieta	$186,377	30,237	$6.16	$258,247	31,758	$8.13	$541,180*	32,664	$16.56

It is important to note that the program costs reported above may not include costs incurred by other departments or programs that may support the MS4 permit programs. The costs only represent the funds spent by each municipality as reported in their jurisdictional program annual reports. In any case, the figures in the table above illustrate the disparity in the amounts reportedly budgeted and spent for the programs in the Riverside County portion of the San Diego Region in comparison to the amounts budgeted and spent in the Santa Ana Region and in the San Diego County portion of the San Diego Region.

It is also important to note that reported program costs are not all attributable to compliance with MS4 permits. Many program components, and their associated costs, existed before any MS4 permits were ever issued. For example, street sweeping and trash collection costs cannot be solely or even principally attributable to MS4 permit compliance, since these practices have long been expected from and implemented by municipalities.

Therefore, true program cost resulting from MS4 permit requirements is some fraction of reported costs. The California State University, Sacramento study found that only 38 percent of program costs are new costs fully attributable to MS4 permits. The remainder of the program costs was either pre-existing or resulted from enhancement of pre-existing programs.[14] In 2000, the County of Orange found that even lesser amounts of program costs are solely attributable to MS4 permit compliance, reporting that the amount attributable to implement the County or Orange Drainage Area

[13] Amount ($) Spent figures are the actual expenditures reported in the 2006-07, 2007-08, and/or 2008/09 Annual Reports for the jurisdictional programs for each municipality (figures with * are estimated/budgeted expenditures). Number of households derived from SCAG 2009 profiles of Corona, Temecula, and Murrieta, and from City of Encinitas 2009 Financial Annual Report.
[14] State Water Board, 2005. NPDES Stormwater Cost Survey. P. 58.

Management Plan (DAMP), was less than 20 percent of the total budget. The remaining 80 percent was attributable to pre-existing programs.[15]

Estimating Costs of Reissued Storm Water Permits

The vast majority of costs that will be incurred as a result of implementing Order No. R9-2010-0016 is not new. Storm water management programs have been in place in Riverside County for over 15 years. As shown in the discussion above, the amount spent for MS4 Permit compliance per household in the municipalities in the Riverside County portion of the San Diego Region is already low compared to other regions. Any increase in cost to the Copermittees, however, is still expected to be incremental in nature. Since Order No. R9-2010-0016 "fine tunes" the requirements of Order No. R9-2004-001, these cost increases are expected to be modest.

Where there may be additional elements that will incur new costs, the Riverside County Copermittees are given the time to develop the budgets and funding mechanisms to phase those elements into their programs. Additionally, development of these additional elements by the Riverside County Copermittees will have the benefit of the experiences and work already done by the San Diego County and Orange County Copermittees.

The anticipated costs of program changes are difficult to estimate because of the flexibility inherent within the Permit and the recognition that program modifications will vary among the municipalities in response to the specific needs of the local and watershed programs. In other words, the Permit is intended to allow each Copermittee to de-emphasize some program components and strengthen others based on the experience of the jurisdictional programs.

The changes in Order No. R9-2010-0016 reflect the iterative process of BMP implementation and the necessarily adaptive nature of storm water management that is expected by the USEPA. In 1996, USEPA recognized that changes to MS4 programs would occur during the reapplication period based on new information on the relative magnitude of a problem, new data on water quality impacts of the storm water discharges, and experience gained under the prior permit.[16] Some changes have been proposed by the Copermittees in the permit reapplication package, and others have been included because the San Diego Water Board considers those measures necessary and feasible to protect water quality from the effects of MS4 discharges.

[15] County of Orange, 2000. A NPDES Annual Progress Report. P. 60. More current data from the County of Orange is not used in this discussion because the County of Orange no longer reports such information.
[16] Federal Register / Vol. 61, No. 155 / Friday, August 9, 1996 / Rules and Regulations. Interpretive policy memorandum on reapplication requirements for MS4s.

Other Economic Considerations

Economic considerations of management programs cannot be limited only to program costs. Evaluation of programs requires information on the implementation costs and information on the benefits derived from environmental protection and improvement.[17] Attention is often focused on program costs, but the programs must also be viewed in terms of their value to the public.

For example, household willingness to pay for improvements in fresh water quality for fishing and boating has been estimated by USEPA to be $158-210.[18] This estimate can be considered conservative, since it does not include important considerations such as marine waters benefits, wildlife benefits, or flood control benefits. The California State University, Sacramento study reports that the annual household willingness to pay for statewide clean water is approximately $180.[19] When viewed in comparison to household costs for existing management programs, household willingness to pay estimates exhibit that per household costs incurred by the Riverside County Copermittees to implement their management programs are very low.

Placing a value on good water quality in receiving waters is very difficult. The Santa Margarita River is one of the few remaining natural gorge rivers in southern California, with approximately 70 species of special concern (rare, threatened, or endangered) regularly inhabiting the watershed, including 30 that are currently protected under the Federal Endangered Species Act.[20] The Upper Santa Margarita Watershed provides significant habitat and recreation opportunities. In addition, residents and businesses in the Upper Santa Margarita Watershed rely heavily of local water for drinking, agriculture, and industrial supply.

Often the value of receiving waters with good water quality manifests in other forms, such as tourism, recreational opportunities, and increased property values. When surface waters are degraded, thereby degrading the habitat, the public loses the aesthetic value and benefit of being able to use the area in and around the water. Surface waters that are able to support the beneficial uses designated in the Water Quality Control Plan for the San Diego Basin (Basin Plan) can sustain plants and wildlife that can attract visitors and residents, providing aesthetic, recreational, as well as monetary value to the public. At this time, however, there have been no studies for the Riverside County portion of the San Diego Region to quantify the added value that surface waters with healthy water quality can provide.

It is also important to consider the benefits of management programs in conjunction with their costs. A study conducted by the University of Southern California and

[17] Ribaudo M.O. and D. Heelerstein. 1992, *Estimating Water Quality Benefits: Theoretical and Methodological Issues.* U.S. Department of Agriculture. Technical Bulletin No. 1808.
[18] Federal Register / Vol. 64, No. 235 / Wednesday, December 8, 1999 / Rules and Regulations. P. 68793.
[19] State Water Board, 2005. NPDES Stormwater Cost Survey. P. iv.
[20] Stein, E. and Ambrose, R. 1998. Cumulative Impacts of Section 404 Clean Water Act Permitting on the Riparian Habitat of the Santa Margarita, California Watershed. Wetlands, Vol. 18, No. 3.

University of California, Los Angeles assessed the costs and benefits of implementing various approaches for achieving compliance with the MS4 permits in the Los Angeles Region. The study found that non-structural systems would cost $2.8 billion but provide $5.6 billion in benefit. If structural systems were determined to be needed, the study found that total costs would be $5.7 to $7.4 billion, while benefits could reach $18 billion.[21] Costs are anticipated to be borne over many years – probably ten years at least. As can be seen, the benefits of the programs are expected to considerably exceed their costs. Such findings are corroborated by USEPA, which found that the benefits of implementation of its Phase II storm water rule would also outweigh the costs.[22]

[21] Los Angeles Water Board, 2004. Alternative Approaches to Stormwater Control.
[22] Federal Register / Vol. 64, No. 235 / Wednesday, December 8, 1999 / Rules and Regulations. P. 68791.

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VII. LEGAL AUTHORITY

The following statutes, regulations, and Water Quality Control Plans provide the basis for the requirements of Order No. R9-2010-0016: Clean Water Act (CWA), California Water Code (CWC), Title 40 of the Code of Federal Regulations (40 CFR) Parts 122, 123, 124 (National Pollutant Discharge Elimination System Permit Application Regulations for Storm Water Discharges, Final Rule), Part II of 40 CFR Parts 9, 122, 123, and 124 (National Pollutant Discharge Elimination System – Regulations for Revision of the Water Pollution Control Program Addressing Storm Water Discharges; Final Rule), Water Quality Control Plan – Ocean Waters of California (California Ocean Plan), Water Quality Control Plan for the San Diego Basin (Basin Plan), 40 CFR 131 Water Quality Standards; Establishment of Numeric Criteria for Priority Toxic Pollutants for the State of California; Rule (California Toxics Rule), and the California Toxics Rule Implementation Plan.

The legal authority citations below generally apply to directives in Order No. R9-2010-0016, and provide the San Diego Water Board with ample underlying authority to require each of the directives of Order No. R9-2010-0016. Legal authority citations are also provided with each permit section discussion in section IX of this Fact Sheet/Technical Report.

CWA 402(p)(3)(B)(ii) – The CWA requires in section 402(p)(3)(B)(ii) that permits for discharges from municipal storm sewers "shall include a requirement to effectively prohibit non-storm water discharges into the storm sewers."

CWA 402(p)(3)(B)(iii) – The CWA requires in section 402(p)(3)(B)(iii) that permits for discharges from municipal storm sewers "shall require controls to reduce the discharge of pollutants to the maximum extent practicable, including management practices, control techniques and system, design and engineering methods, and such other provisions as the Administrator or the State determines appropriate for the control of such pollutants."

40 CFR 122.26(d)(2)(i)(B,C,E, and F) – Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B,C,E, and F) provide that each Copermittee's permit application "shall consist of: (i) Adequate legal authority. A demonstration that the applicant can operate pursuant to legal authority established by statute, ordinance or series of contracts which authorizes or enables the applicant at a minimum to: […] (B) Prohibit through ordinance, order or similar means, illicit discharges to the municipal separate storm sewer; (C) Control through ordinance, order or similar means the discharge to a municipal separate storm sewer of spills, dumping or disposal of materials other than storm water; […] (E) Require compliance with condition in ordinances, permits, contracts or orders; and (F) Carry out all inspection, surveillance and monitoring procedures necessary to determine compliance and noncompliance with permit conditions including the prohibition on illicit discharges to the municipal separate storm sewer."

40 CFR 122.26(d)(2)(iv) – Federal NPDES regulation 40 CFR 122.26(d)(2)(iv) provides that the Copermittee shall develop and implement a proposed management program which "shall include a comprehensive planning process which involves public participation and where necessary intergovernmental coordination, to reduce the discharge of pollutants to the maximum extent practicable using management practices, control techniques and system, design and engineering methods, and such other provisions which are appropriate. The program shall also include a description of staff and equipment available to implement the program. […] Proposed programs may impose controls on a system wide basis, a watershed basis, a jurisdiction basis, or on individual outfalls. […] Proposed management programs shall describe priorities for implementing controls."

40 CFR 122.26(d)(2)(iv)(A - D) – Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(A - D) require municipalities to implement controls to reduce pollutants in storm water runoff from new development and significant redevelopment, construction, and commercial, residential, industrial, and municipal land uses or activities. Prevention of illicit discharges is also required.

CWC 13377 – CWC section 13377 provides that "Notwithstanding any other provision of this division, the State Water Board or the Regional Water Boards shall, as required or authorized by the CWA, as amended, issue waste discharge requirements and dredged or fill material permits which apply and ensure compliance with all applicable provisions of the act and acts amendatory thereof or supplementary, thereto, together with anymore stringent effluent standards or limitation necessary to implement water quality control plans, or for the protection of beneficial uses, or to prevent nuisance."

Order No. R9-2010-0016 is an essential mechanism for achieving the water quality objectives that have been established for protecting the beneficial uses of the water resources in the San Diego Water Board's portion of Riverside County. Federal NPDES regulation 40 CFR 122.44(d)(1) requires MS4 permits to include any requirements necessary to "achieve water quality standards established under CWA section 303, including State narrative criteria for water quality." The term "water quality standards" in this context refers to a water body's beneficial uses and the water quality objectives necessary to protect those beneficial uses as established in the Basin Plan and antidegradation policies.

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VIII. FINDINGS

The findings of the Order have been modified to reduce repetition in their discussions and address new requirements. Each finding of the Order is provided and discussed below. Additional discussion relative to the findings can be found in section IX of the Fact Sheet, which provides discussions of the Order's directives.

A. Basis For the Order

Finding A.1. This Order is based on the federal Clean Water Act (CWA), the Porter-Cologne Water Quality Control Act (Division 7 of the Water Code, commencing with Section 13000), applicable State and federal regulations, all applicable provisions of statewide Water Quality Control Plans and Policies adopted by the State Water Resources Control Board (State Water Board), the Water Quality Control Plan for the San Diego Basin adopted by the San Diego Water Board (Basin Plan), the California Toxics Rule, and the California Toxics Rule Implementation Plan.

Discussion of Finding A.1. In 1987, Congress established CWA Amendments to create requirements for storm water discharges under the NPDES program, which provides for permit systems to regulate the discharge of pollutants. Under the Porter-Cologne Water Quality Control Act, the State Water Board and the nine Regional Water Boards have primary responsibility for the coordination and control of water quality, including the authority to implement the CWA. Porter-Cologne (section 13240) directs the Regional Water Boards to set water quality objectives via adoption of Water Quality Control Plans (Basin Plans) that conform to all State policies for water quality control.

As a means for achieving those water quality objectives, Porter-Cologne (section 13243) further authorizes the Regional Water Boards to establish waste discharge requirements (WDRs) to prohibit waste discharges in certain conditions or areas. Since 1990, the San Diego Water Board has issued area-wide MS4 NPDES permits. The Order will renew Order No. R9-2004-001 to comply with the CWA and attain water quality objectives in the Basin Plan by including numeric storm water action levels to limit the contributions of pollutants conveyed by storm water, and by including numeric non-storm water action levels for dry weather non-storm water discharges designed to ensure that the Copermittees comply with the requirement to effectively prohibit all types of unauthorized non-storm water discharges into their MS4. Further discussions of the legal authority associated with the prohibitions and directives of the Order are provided in section VII this document.

Finding A.2. This Order reissues National Pollutant Discharge Elimination System (NPDES) Permit No. CAS0108766, which was first adopted by the San Diego Water Board on July 16, 1990 (Order No. 90-38), and then reissued on May 13, 1998 (Order No. 98-02). On May 26, 1998, the United States Environmental Protection Agency

(USEPA), Region IX, objected to Order No. 98-02 due to concerns regarding Receiving Water Limitations (RWL) language. The USEPA concluded that the RWL language in the permit did not comply with the CWA and its implementing regulations. On April 27, 1999, the USEPA reissued the MS4 permit, which the San Diego Water Board adopted as Addendum No. 1 to Order No. 98-02 on November 8, 2000. On July 14, 2004, the San Diego Water Board adopted the third term MS4 permit, Order No. R9-2004-001. On January 15, 2009, the Riverside County Flood Control and Water Conservation District (RCFCD), as the Principal Copermittee, submitted a Report of Waste Discharge (ROWD) for reissuance of the municipal separate storm sewer system (MS4) Permit.

Discussion of Finding A.2. This Order renews National Pollutant Discharge Elimination System (NPDES) Permit No. CAS0108766, which was first issued on July 16, 1990 (Order No. 90-38), and then renewed on May 13, 1998 (Order No. 98-02). The USEPA determined that Order No. 98-02 the Receiving Water Limitations (RWL) language in the permit did not comply with the CWA and its implementing regulations. The USEPA assumed responsibility and reissued the Riverside County MS4 permit on April 27, 1999. Subsequently, the San Diego Water Board adopted Addendum No. 1 to Order No. 98-02 on November 8, 2000, which incorporated the USEPA's permit by reference. On July 14, 2004, the San Diego Water Board adopted the third term MS4 permit, Order No. R9-2004-001. On January 15, 2009, in accordance with Order No. R9-2004-001, the Riverside County Flood Control and Water Conservation District (District), as the Principal Copermittee, submitted a Report of Waste Discharge (ROWD) for reissuance of the municipal separate storm sewer system (MS4) Permit. Supporting information discussing the topic of this finding can be found in section V of this document.

Finding A.3. This Order is consistent with the following precedential Orders adopted by the State Water Board addressing MS4 NPDES Permits: Order WQ 99-05, Order WQ 2000-11, Order WQ 2001-15, Order WQO 2002-0014, and Order WQ 2009-0008 (*SWRCB/OCC FILE A-1780)*.

Discussion of Finding A.3. In recent years the State Water Board has considered several appeals of MS4 permits issued by the Regional Water Boards. In State Water Board Order WQ 99-05, the State Water Board established Receiving Water Limitation Language for MS4 permits. In State Water Board Order WQ 2000-11, the State Water Board addressed design standards for Standard Urban Storm Water Mitigation Plan (SUSMP) requirements. In State Water Board Order WQ 2001-15, the State Water Board addressed Petitions of the San Diego County MS4 Permit issued by the San Diego Water Board in 2001 (San Diego Water Board Order No. 2001-001). In State Water Board Order WQO 2002-0014, the State Water Board addresses Petitions of the Orange County MS4 Permit issued by the San Diego Water Board in 2002 (San Diego Water Board Order No. R9-2002-0001). In State Water Board Order WQ 2009-0008, the State Water Board addresses Petitions of the Los Angeles County MS4

Permit issued by the Los Angeles Water Board in 2006 (Los Angeles Water Board Order No. R4-2006-0074).

Finding A.4. The Fact Sheet / Technical Report for the Order No. R9-2010-0016, NPDES No. CAS0108766, Waste Discharge Requirements for Discharges from the MS4s Draining the County of Riverside, the Incorporated Cities of Riverside County, and the Riverside County Flood Control and Water Conservation District within the San Diego Region, includes cited regulatory and legal references and additional explanatory information and data in support of the requirements of this Order. This information, including any supplements thereto, and any response to comments on the Tentative Orders, is hereby incorporated by reference into these findings.

Discussion of Finding A.4. This Fact Sheet briefly sets forth the principle facts and the significant factual, legal, methodological, and policy questions that the San Diego Water Board considered in preparing Order No. R9-2010-0016, in accordance with the Code of Federal Regulations (CFR) title 40 parts 124.8 and 124.56 (40 CFR 124.8 and 124.56). This Fact Sheet includes general information regarding the watershed and the Copermittees' discharges from their MS4 systems. The discussions in the Fact Sheet include references to applicable statutes and regulations, as well as other supporting documents. The discussions in the Fact Sheet also can clarify the permit writer's intent for requirements that may appear vague or open to multiple interpretations.

B. Regulated Parties

Finding B.1. Each of the persons in Table 1 below, hereinafter called Copermittees or dischargers, owns or operates an MS4, through which it discharges storm water and non-storm water into waters of the United States (U.S.) within the San Diego Region. These MS4s fall into one or more of the following categories: (1) a medium or large MS4 that services a population of greater than 100,000 or 250,000 respectively; or (2) a small MS4 that is "interrelated" to a medium or large MS4; or (3) an MS4 which contributes to a violation of a water quality standard; or (4) an MS4 which is a significant contributor of pollutants to waters of the U.S.

The Cities of Murietta, Menifee and Wildomar also discharge into waters of the U.S. in the California Regional Water Quality Control Board, Santa Ana Region (Santa Ana Water Board), so are located partially within both the San Diego and Santa Ana Water Board boundaries. As allowed by California Water Code (CWC) §13228, these Cities submitted written requests to be regulated for MS4 purposes under a permit adopted by only one Water Board. As authorized by CWC § 13228 and pursuant to a written agreement between the San Diego Water Board and the Santa Ana Water Board, the Cities of Murrieta and Wildomar are wholly regulated by the San Diego Water Board under this Order, including those portions of the Cities jurisdiction not within the San Diego Water Board's region. Similarly, the City of Menifee is wholly regulated by the Santa Ana Water Board under Order No. R8-2010-0033, including those portions of the City of Menifee within the San Diego Water Board's region.

Discussion of Finding B.1. Section 402 of the CWA prohibits the discharge of any pollutant to waters of the United States from a point source, unless that discharge is authorized by a NPDES permit. Though storm water and non-storm water may come from a diffuse source, it is discharged through MS4s, which are point sources under the CWA. Federal NPDES regulation 40 CFR 122.26(a) (iii) and (iv) provide that discharges from MS4s, which service medium or large populations greater than 100,000 or 250,000 respectively, shall be required to obtain a NPDES permit. Federal NPDES regulation 40 CFR 122.26(a)(v) also provides that a NPDES permit is required for "A [storm water] discharge which the Director, or in states with approved NPDES programs, either the Director or the USEPA Regional Administrator, determines to contribute to a violation of a water quality standard or is a significant contributor of pollutants to waters of the United States." Such sources are then designated into the program.

Included in Table 1 of the Order are the Cities of Menifee, Murrieta, Temecula, and Wildomar, the County of Riverside, and the Riverside County Flood Control and Water Conservation District. The Cities of Wildomar and Menifee are newly incorporated cities. Both Cities were previously a part of the County of Riverside's jurisdiction and have an MS4 interrelated to other Copermittee MS4s in the San Diego Region. The boundaries of the Cities of Menifee, Murrieta, and Wildomar fall within the jurisdiction of both the San Diego Water Board and the Santa Ana Water Board.

As requested by the Cities of Menifee, Murrieta, and Wildomar, and pursuant to an agreement between the San Diego and Santa Ana Water Boards as authorized by CWC section 13228, the MS4s of the Cities of Murrieta and Wildomar are to be wholly regulated by the San Diego Water Board under this Order, and the MS4 of the City of Menifee is to be wholly regulated by the Santa Ana Water Board under Order No. R8-2010-0033. The agreement between the San Diego and Santa Ana Water Board to regulate the Cities of Menifee, Murrieta, and Wildomar will be subject to change with each permit renewal. Until the an agreement between the San Diego Water Board and Santa Ana Water Board is finalized to allow the City of Menifee to be wholly regulated by the Santa Ana Water Board under Order No. R8-2010-0033, the City of Menifee will remain as a Copermittee under this Order.

Other small MS4s also exist within the portion of Riverside County in the San Diego Region. While these small MS4s are not subject to this Order, they are subject to the Phase II NPDES storm water regulations. Over time, these small MS4s will be designated for coverage under the State Water Board's statewide general storm water permit for small MS4s.

C. Discharge Characteristics

Finding C.1. Discharges from the MS4 contain waste, as defined in the CWC, and pollutants that adversely affect the quality of the waters of the State. The discharge from an MS4 is a "discharge of pollutants from a point source" into waters of the U.S. as defined in the CWA.

Discussion of Finding C.1. Section 13050(d) of the CWC defines "waste" as "sewage and any and all other waste substances, liquid, solid, gaseous, or radioactive, associated with human habitation, or of human or animal origin, or from any producing, manufacturing, or processing operation, including waste placed within containers of whatever nature prior to, and for purposes of, disposal." 40 CFR 122.2 defines "point source" as "any discernable, confined, and discrete conveyance, including but not limited to, any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, landfill leachate collection system, vessel or other floating craft from which pollutants are or may be discharged. This term does not include return flows from irrigated agriculture or agricultural storm water runoff." 40 CFR 122.2 defines "discharge of a pollutant" as "Any addition of any pollutant or combination of pollutants to waters of the U.S. from any point source." Also, the justification for control of pollution into waters of the state can be found at CWC section 13260(a)(1). State Water Board Order No. WQ 2001-15 verifies that discharges from the MS4 contain waste.[23]

The term "urban runoff" has been removed throughout Order No. R9-2010-0016 and replaced with storm water (wet weather) or non-storm water (dry weather) runoff. This clarification is necessary to prevent the misunderstanding that regulation under this permit is subject only to urbanized areas. The term "urban runoff" is not defined in the Code of Federal Regulations or Federal Register in the regulation of Phase I MS4 discharges.

In the Copermittees' ROWD, a distinction is made between urban land use areas and non-urban land use areas. Urban land use areas include commercial, industrial, *urban residential (less than 1 acre)*, parks and recreation facilities, and streets and roads land use categories. Non-urban land use areas include preserves and open space, agriculture, federal/state/tribal lands/non-County jurisdiction, and *rural residential (greater than 1 acre)*. The ROWD implies that only discharges from the urban land use areas are subject to the requirements of the MS4 Permit, thus rural residential (greater than 1 acre) land use areas would not be subject to the requirements of the MS4 Permit. Rural residential land use areas, however, are subject to the requirements of the MS4 Permit. The removal of the term urban runoff will further clarify the application of the requirements of the MS4 Permit.

[23] State Water Board, 2001. Order WQ 2001-15. In the Matter of Petitions of Building Industry Association of San Diego County and Western States Petroleum Association: For Review of Waster Discharge Requirements Order No. 2001-01 for Urban Runoff from San Diego County [NPDES No. CAS0108758] Issued by the Regional Board.

The discharge of runoff from an MS4 is a "discharge of pollutants from a point source" into waters of the U.S. as defined in the CWA. The Permit defines runoff as all flows in a storm water conveyance system (MS4 defined below) and consists of the following components:

(1) storm water (wet weather flows) and
(2) non-storm water discharges (dry weather flows).

The Permit defines an MS4 as a conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, or storm drains):

(i) Owned or operated by a State, city, town, borough, county, parish, district, association, or other public body (created by or pursuant to State law) having jurisdiction over disposal of sewage, industrial wastes, storm water, or other wastes, including special districts under State law such as a sewer district, flood control district or drainage district, or similar entity, or an Indian tribe or an authorized Indian tribal organization, or designated and approved management agency under section 208 of the CWA that discharges to waters of the United States;

(ii) Designated or used for collecting or conveying storm water;

(iii) Which is not a combined sewer;

(iv) Which is not part of the Publicly Owned Treatment Works (POTW) as defined at 40 CFR 122.26.

Permit finding D.3.c. includes natural streams that convey runoff as part of the MS4. The presence of an MS4 system is not limited to areas considered to be "urban" in nature. Though the term urban is often referred to specifically as pertaining to cities, runoff means all flows in a storm water conveyance system, regardless of the location of the conveyance system. A conveyance system owned or operated by a State, city, town, borough, county, parish, district, association, or other public body (created by or pursuant to State law), may be located in a setting (e.g. unincorporated area, low density residential) that is not considered by the public to be "urban" in nature. These areas are contributing pollutants to the MS4 system that must be addressed. The term runoff applies to all flows in an MS4 system, no matter where the MS4 may be located in regards to incorporated or unincorporated property. Storm water and non-storm water discharges from the rural residential (greater than 1 acre) land use category, characterized as non-urban, that enter into any part of the MS4 system (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, or storm drains), are also subject to the requirements of the MS4 Permit.

The Code of Federal Regulations (CFR) at 40 CFR 122.26 requires that large and medium MS4s obtain a permit for all discharges from their systems. Appendix I to 40 CFR 122 designates Riverside County as having a large and medium MS4 requiring a permit. The regulations do not differentiate discharges from urban or rural MS4 systems. Rather, the regulations require the permit for all discharges from their systems. In the Final Rule establishing the Phase 1 storm water regulations, the USEPA clarified that all discharges are subject to a permit. On page 48041 of the Final Rule, the USEPA states:

> "EPA recognizes that some of the counties addressed by today's rule have, in addition to areas with high unincorporated urbanized populations, areas that are essentially rural or uninhabited and may not be the subject of planned development. While permits issued for these municipal systems ***will cover*** *(emphasis added) municipal systems discharges in unincorporated portions of the county* (emphasis added), it is the intent of EPA that management plans and other components of the programs focus on the urbanized and developing areas of the county."

So, while the Permit covers all MS4 discharges regardless if that discharge is in an urban or unincorporated area; the Copermittees management program should focus on urbanized areas. Due to the Permit's requirements, the Copermittees management programs will naturally focus on urbanized areas. Urbanized areas have more industry, construction, pollution and MS4s that require more inspection, maintenance, monitoring, enforcement and complaint follow-up.

USEPA further clarified on page 48041 that all MS4 discharges require permit coverage when addressing highway MS4 systems:

> "[The regulations] will result in discharges from separate storm sewer systems serving State highways and other highways through storm sewers … in unincorporated portions of specified counties being included as part of the large or medium municipal separate storm sewer systems, since all municipal separate storm sewers within the boundaries of these political entities are included."

In their summary on page 48043, the USEPA states:

> "The definition [of MS4] provides that all systems within a geographical area including highways and flood controls will be covered, thereby avoiding fragmented and ill-coordinated programs;"

Neither the State Water Board's storm water permit for Caltrans (State Water Board Order No. 99-06-DWQ) nor the Los Angeles Water Board's MS4 permit for Ventura County include the term "urban runoff" in a significant regulatory capacity. The Caltrans permit has one reference to "urban runoff" where the term is used

interchangeably with “storm water.” The draft Ventura permit uses the term “urban runoff” when referring to titles of reference documents, previously adopted management plans and municipal ordinances that may contain the phrase.

The Copermittees have expressed concern regarding the regulation of pollutants from natural, undeveloped areas that enter the MS4 in an unincorporated area. Runoff and pollutants from any source entering the MS4, however, become the responsibility of the Copermittees upon entering the MS4. The assimilation of pollutants from natural, undeveloped areas is different under natural conditions compared to when they are transported through the MS4. The MS4 collection could change a natural sheet flow discharge to a concentrated point discharge. The MS4 does not provide natural infiltration or other pollutant remediation that these flows would receive in an otherwise natural drainage system. The MS4 may concentrate these natural pollutants and flows. In some cases, the MS4 may ultimately discharge the elevated concentrations of natural pollutants and flow rates to waters of the US far from the natural pollutant and flow source, causing a condition of pollution or a violation of water quality standards.

Finding C.2. MS4 storm water and non-storm water discharges are likely to contain pollutants that cause or threaten to cause a violation of surface water quality standards, as outlined in the Basin Plan. Storm water and non-storm water discharges from the MS4 are subject to the conditions and requirements established in the Basin Plan for point source discharges.

Discussion of Finding C.2. This finding is a clarification regarding the potential for discharges of storm water and non-storm water to impact the Beneficial Uses as described in the Basin Plan. As such these point source discharges require Waste Discharge Requirements (WDRs) to ensure that water quality standards are met. Furthermore, since point source discharges require WDRs, the discharges are subject to the prohibitions, conditions and requirements of the Basin Plan.

In addition, municipal discharges have been split into storm water and non-storm water discharges to represent the differing regulations applicable to storm water and non-storm water, though both types of discharges are likely to contain pollutants.

Finding C.3. The most common categories of pollutants in runoff include total suspended solids, sediment, pathogens (e.g., bacteria, viruses, protozoa), heavy metals (e.g., copper, lead, zinc and cadmium), petroleum products and polynuclear aromatic hydrocarbons, synthetic organics (e.g., pesticides, herbicides, and PCBs), nutrients (e.g., nitrogen and phosphorus fertilizers), oxygen-demanding substances (decaying vegetation, animal waste), detergents, and trash.

Discussion of Finding C.3. The National Urban Runoff Program (NURP) study showed that heavy metals, organics, coliform bacteria, nutrients, oxygen demanding substances (e.g., decaying vegetation), and total suspended solids are found at

relatively high levels in storm water and non-storm water discharges.[24] It also found that MS4 discharges draining residential, commercial, and light industrial areas contain significant loadings of total suspended solids and other pollutants. The Basin Plan goes on to identify runoff pollutants to include lawn and garden chemicals, household and automotive care products dumped or drained on streets, and sediment that erodes from construction sites.[25] In addition, the State Water Board Urban Runoff Technical Advisory Committee (TAC) finds that urban runoff pollutants include sediments, nutrients, oxygen-demanding substances, heavy metals, petroleum hydrocarbons, pathogenic bacteria, viruses, and pesticides.[26] Runoff that flows over streets, parking lots, construction sites, and industrial, commercial, residential, and municipal areas carries these untreated pollutants through storm drain networks directly to the receiving waters of the San Diego Region.

Finding C.4. The discharge of pollutants and/or increased flows from MS4s may cause or threaten to cause the concentration of pollutants to exceed applicable receiving water quality objectives and impair or threaten to impair designated beneficial uses resulting in a condition of pollution (i.e. unreasonable impairment of water quality for designated beneficial uses), contamination, or nuisance.

Discussion of Finding C.4. The 1992, 1994, and 1996 National Water Quality Inventory Reports to Congress prepared by USEPA showed a trend of impairment in the nation's waters from contaminated storm and non-storm water runoff.[27] The 1998 National Water Quality Inventory Report showed that runoff discharges affect 11 percent of rivers, 12 percent of lakes, and 28 percent of estuaries. Primary sources of impairment to rivers and streams included sediment, bacteria, nutrients, oxygen-depleting substances, metals, and pesticides. The report notes that runoff discharges are the leading source of pollution and the main factor in the degradation of surface water quality in California's coastal waters, rivers, and streams. Furthermore, the NURP study found that pollutant levels from illicit non-storm water discharges were high enough to significantly degrade receiving water quality, and threaten aquatic life, wildlife, and human health.[28]

In addition, the Region's CWA section 303(d) list, which identifies water bodies with impaired beneficial uses within the region, also indicates that the impacts of storm water and non-storm water runoff on receiving waters are significant. Many of the impaired water bodies on the 303(d) list are impaired by constituents that have been found at high levels within storm water and non-storm water runoff by the Riverside

[24] Ibid.
[25] San Diego Water Board, 1994. Water Quality Control Plan, San Diego Basin, Region 9. San Diego.
[26] State Water Board, 1994. Urban Runoff Technical Advisory Committee Report and Recommendations. Nonpoint Source Management Program.
[27] USEPA, 2000. Quality of Our Nation's Waters: Summary of the National Water Quality Inventory 1998 Report to Congress – USEPA 841-S-00-001; Water Quality Conditions in the United States: Profile from the 1998 National Water Quality Inventory Report to Congress – USEPA 841-F-00-006.
[28] USEPA, 1993. Results of the Nationwide Urban Runoff Program, Volume 1 – Final Report.

County storm water monitoring program.[29] Examples of constituents frequently responsible for beneficial use impairment include indicator fecal bacteria, heavy metals, toxicity, pesticides, dissolved solids, turbidity, and nutrients. These constituents have been found at high levels in runoff both regionally and nationwide.[30,31] In addition, impairments may be caused by synergistic effects of multiple contaminants or by pollutants not currently monitored by storm water programs.

Finding C.5. Pollutants in runoff can threaten and adversely affect human health. Human illnesses have been clearly linked to recreating near storm drains flowing to receiving waters. Also, runoff pollutants in receiving waters can bioaccumulate in the tissues of invertebrates and fish, which may be eventually consumed by humans.

Discussion of Finding C.5. Human illnesses have been clearly linked to recreating near storm drains flowing to coastal waters. A landmark study, conducted by the Santa Monica Bay Restoration Project, found that there was an increased occurrence of illness in people that swam in proximity to a flowing storm drain.[32] A study of south Huntington Beach and north Newport Beach (both located in northern Orange County) found that an illness rate of about 0.8 percent among bathers at those beaches resulted in about $3 million annually in health-related expenses.[33] Although the Upper Santa Margarita Watershed is inland, the watershed drains to the Pacific Ocean, and pollutants generated in the area may impact coastal waters. For example, the Santa Margarita River system provides the main source of beach sand for the beaches in northern San Diego County.[34] In addition, residents from the Upper Santa Margarita Watershed, who recreate at southern California beaches, benefit from clean water.

Residents and businesses in the Upper Santa Margarita Watershed also rely heavily on local water for drinking, agriculture and industrial supply. Over 40 percent of the water used in the watershed is locally produced.[35] In addition, surface and ground water from the Upper Santa Margarita Watershed flow to Fallbrook in San Diego County and the U.S. Marine Corps Base Camp Pendleton where it is used as part of the municipal and domestic water supply.

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[29] County of Riverside, 2009. Riverside County Municipal Copermittees 2008-09 Annual Storm Water Program Report, Section 11.
[30] Ibid.
[31] USEPA, 1983. Results of the Nationwide Urban Runoff Program, Volume 1 – Final Report.
[32] Haile, R.W., et al., 1996. An Epidemiological Study of Possible Adverse Health Effects of Swimming in Santa Monica Bay. Santa Monica Bay Restoration Project.
[33] Dwight, R.H., et al., 2005. Estimating the Economic Burden From Illnesses Associated With Recreational Coastal Water Pollution – A Case Study in Orange County, California. Journal of Enviro. Management Vol.76. No.2 p.95-103. Also reported in: Los Angeles Times, May 2, 2005. Here's What Ocean Germs Cost You: A UC Irvine Study Tallies the Cost of Treatment and Lost Wages for Beachgoers Who Get Sick.
[34] Shapiro. 1991. Refuge in an urbanized land, the Santa Margarita River: cultural and natural resource value. Santa Margarita Research Foundation, Fallbrook, CA.
[35] Jenks, .J. 2002. Santa Margarita River Watershed Annual Watermaster Report: Water Year 2000-2001.

According to the USEPA, spilled fuel, solvents, waste oil, paints, and other maintenance fluids pose a risk to the environment, but may be especially harmful if they enter someone's drinking water supply.[36] Discharges of runoff from urban areas were identified by the California Department of Health Services as one of the most prevalent possible contaminating activities for drinking water sources.[37] This issue of potential source water contamination is of fundamental importance, because of the dependence on local water for domestic use in the Santa Margarita Watershed.

Furthermore, runoff pollutants in receiving waters can bioaccumulate in the tissues of invertebrates and fish, which may eventually be consumed by humans. Pollutants such as heavy metals and pesticides, which are commonly found in MS4 runoff, have been found to bioaccumulate and biomagnify in long-lived organisms at the higher trophic levels.[38] Since many aquatic species are utilized for human consumption, toxic substances accumulated in species' tissues can pose a significant threat to public health. USEPA supports this finding when it states, "As runoff flows over areas altered by development, it picks up harmful sediment and chemicals such as oil and grease, pesticides, heavy metals, and nutrients (e.g., nitrogen and phosphorus). These pollutants often become suspended in runoff and are carried to receiving waters, such and lakes, ponds, and streams. Once deposited, these pollutants can enter the food chain through small aquatic life, eventually entering the tissues of fish and humans."[39]

Finding C.6. Runoff discharges from MS4s often contain pollutants that cause toxicity to aquatic organisms (i.e. adverse responses of organisms to chemicals or physical agents ranging from mortality to physiological responses such as impaired reproduction or growth anomalies). Toxic pollutants impact the overall quality of aquatic systems and beneficial uses of receiving waters.

Discussion of Finding C.6. The Copermittees' monitoring data exhibits frequent toxic conditions in runoff during storm events and dry weather. Toxicity varies significantly within and among sites and over time. The cause of toxicity may vary between locations, dates, and indicator organisms. The actual cause may be influenced by various factors such as development, land uses, runoff management, habitat modification, hydromodification, and native aquatic environment. Some toxicity identification evaluations (TIEs) have identified pyrethroids as a cause of toxicity in the receiving waters.[40]

Finding C.7. The Copermittees discharge runoff into lakes, drinking water reservoirs, rivers, streams, creeks, bays, estuaries, coastal lagoons, the Pacific Ocean, and tributaries thereto within one of the eleven hydrologic units (Santa Margarita Hydrologic Unit) comprising the San Diego Region as shown in Table 2. Some of the

[36] USEPA. 2004. Municipal Storm Water and Ground Water Discharge Regulations in California. F-909-04-004.
[37] Ibid.
[38] Abel, P.D, 1996. Water Pollution Biology.
[39] USEPA, 2000. Storm Water Phase II Compliance Assistance Guide. Washington D.C. EPA 833-R-00-002.
[40] County of Riverside, 2009. Riverside County Municipal Copermittees 2008-09 Annual Storm Water Program Report, Section 11.

receiving water bodies have been designated as impaired by the San Diego Water Board in 2009 pursuant to CWA section 303(d).

Discussion of Finding C.7. This finding identifies the major receiving water bodies in the Riverside County portion of the Santa Margarita Hydrologic Unit that are listed as impaired on the CWA section 303(d) List of Impaired Waters (303(d) List). The 2006 303(d) List has been approved by the San Diego Water Board, State Water Board, and USEPA.[41] The 2008 303(d) List was approved by the San Diego Water Board on December 18, 2009 and is awaiting State Water Board and USEPA approval.[42] The 303(d) list identifies waters that do not meet water quality standards after applying certain required technology-based effluent limits ("impaired" water bodies). As part of this listing process, states are required to prioritize waters/watersheds for future development of Total Maximum Daily Loads (TMDLs). The listed 303(d) pollutant(s) of concern do not necessarily reflect impairment of the entire corresponding major surface water bodies. The specific impaired portions of each water body are listed in the 2006 and 2008 303(d) Lists.

Since 2002, the number of water bodies and water body – pollutant combinations included on the 303(d) List, located in the Riverside County portion of the San Diego Region, has increased. A comparison of the 2002, 2006, and 2008 303(d) listings are summarized in the following table.

[41] The approved 2006 Clean Water Act Section 303(d) List of Water Quality Limited Segments is on-line at: http://www.waterboards.ca.gov/tmdl/303d_lists2006.html
[42] The 2008 Clean Water Act Section 303(d) List of Water Quality Limited Segments, approved by the San Diego Water Board, is available on-line at http://www.swrcb.ca.gov/rwqcb9/water_issues/programs/303d_list/index.shtml

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Comparison of Riverside County 303(d) Listings

Watershed[1]	2002 303(d) List		2006 303(d) List		2008 303(d) List[2]	
	Listed Water Body	Impairing Pollutants	Listed Water Body	Impairing Pollutants	Listed Water Body	Impairing Pollutants
De Luz Creek HSA (902.21)	NO LISTINGS	NOT APPLICABLE	De Luz Creek	Iron Manganese	De Luz Creek	Iron Manganese Nitrogen Sulfates
Gavilan HSA (902.22)	Sandia Creek	TDS	Sandia Creek	Iron Manganese Nitrogen Sulfates TDS	Sandia Creek	Iron Sulfates TDS
	Santa Margarita River (Upper)	Phosphorus	Santa Margarita River (Upper)	Phosphorus	Santa Margarita River (Upper)	Phosphorus Toxicity
Murrieta HSA (902.32)	NO LISTINGS	NOT APPLICABLE	Long Canyon Creek	TDS	Long Canyon Creek	Chlorpyrifos E. Coli Fecal Coliform Iron Manganese
French HSA (902.33)	NO LISTINGS	NOT APPLICABLE	NO LISTINGS	NOT APPLICABLE	Warm Springs Creek	Chlorpyrifos E. Coli Fecal Coliform Iron Manganese Phosphorus Total Nitrogen as N

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Comparison of Riverside County 303(d) Listings (Cont'd)

Watershed[1]	2002 303(d) List		2006 303(d) List		2008 303(d) List[2]	
	Listed Water Body	Impairing Pollutants	Listed Water Body	Impairing Pollutants	Listed Water Body	Impairing Pollutants
Gertrudis HSA (902.42)	NO LISTINGS	NOT APPLICABLE	NO LISTINGS	NOT APPLICABLE	Santa Gertrudis Creek	Chlorpyrifos Copper E. Coli Fecal Coliform Iron Phosphorus
Pauba HSA (902.51)	NO LISTINGS	NOT APPLICABLE	Temecula Creek	TDS Phosphorus Nitrogen	Temecula Creek	Chlorpyrifos Copper Phosphorus TDS Toxicity
	NO LISTINGS	NOT APPLICABLE	NO LISTINGS	NOT APPLICABLE	Redhawk Channel	Chlorpyrifos Copper Diazinon E. Coli Fecal Coliform Iron Manganese Nitrogen Phosphorus TDS
Wolf HSA (902.52)	Murrieta Creek	Phosphorus	Murrieta Creek	Phosphorus	Murrieta Creek	Chlorpyrifos Copper Iron Manganese Nitrogen Phosphorus Toxicity

Notes:
1. Hydrologic subarea (HSA) within the Santa Margarita Hydrologic Unit (HU), located in the Riverside County portion of the San Diego Basin.
2. Water bodies and pollutants on the 2008 303(d) List was approved by the San Diego Water Board on December 18, 2009, and is awaiting final approval by the State Water Board and USEPA.

Finding C.8. Trash is a persistent pollutant which can enter receiving waters from the MS4, accumulate and be transported downstream into receiving waters over time. Trash poses a serious threat to the beneficial uses of the receiving waters, including, but not limited to, human health, rare and endangered species, navigation and human recreation.

Discussion of Finding C.8. The Copermittees to date have documented high volumes of trash coming from the MS4 system and in receiving waters.[43]

The Basin Plan specifies the following narrative Water Quality Objective (WQO) for Floating Material:

> *"Waters shall not contain floating material, including solids, liquids, foams, and scum in concentrations which cause nuisance or adversely affect beneficial uses."*

The Basin Plan specifies the following narrative WQO for Suspended and Settleable Solids: Material:

> *"Waters shall not contain suspended and settleable solids in concentrations of solids that cause nuisance or adversely affect beneficial uses."*

Additionally, high density urban areas in Southern California have been shown to be responsible for up to 60 percent of the trash that enters receiving waters from the MS4.[44] The retrofitting of existing MS4 systems, such as catch basins, in targeted high trash areas can result in significant reductions in the amount of trash entering receiving waters from the MS4.

Trash, as litter in both solid and liquid form, is consistently found on and adjacent to roadways. A California Department of Transportation Litter Management Pilot Study found that of roadway trash, plastics and Styrofoam accounted for 33 percent of trash by weight, and 43 percent by volume. Further, the study found that approximately 80 percent of the litter associated with roadways was floatable, indicating that, without capture, this litter would enter Waters of the State after a storm event, resulting in the impairment of Beneficial Uses.[45] The study, however, relied upon a mesh capture size of 0.25 inches (6.35 millimeters). This size is too large to effectively capture plastic pre-production pellets (a.k.a. "nurdles"), which are roughly 3 mm in size, and likely underestimated the total contribution of plastics. Furthermore, pre-production plastic pellets, which are small enough to be easily digested, have been found to carry

[43] Fiscal Year 2008-2009 Santa Margarita Watershed Annual Report
[44] The City of Los Angeles Meets Trash TMDLs Compliance with CB Inserts and Opening Covers. August 06, 2008.
[45] California Department of Transportation District 7 Litter Management Pilot Study. June 26, 2000.

persistent organic pollutants, including PCBs and DDT.[46]

Finding C.9. The Copermittees' water quality monitoring data submitted to date documents persistent violations of Basin Plan water quality objectives for various runoff-related pollutants (indicator bacteria, dissolved solids, turbidity, metals, pesticides, etc.) at various watershed monitoring stations. Persistent toxicity has also been observed at some watershed monitoring stations. In addition, bioassessment data indicate that the majority of the monitored receiving waters have Poor to Very Poor IBI ratings. In sum, the above findings indicate that runoff discharges are causing or contributing to water quality impairments, and are a leading cause of such impairments in Riverside County.

Discussion of Finding C.9. The Copermittees have produced data that demonstrates water quality objectives are frequently not met during dry and wet weather. The 2009 Report of Waste Discharge and the 2008-2009 Annual Reports document that receiving water monitoring stations often fail to meet water quality objectives established in the Basin Plan.

Water quality in receiving waters downstream of MS4 discharges fail to meet California Toxics Rule standards[47] and Basin Plan objectives. Data submitted in the MS4 Annual Reports indicate that at various times chemical, bacteria, pesticide, and metal concentrations may exceed water quality objectives in receiving waters in both wet and dry weather conditions.

There are no other significant NPDES permitted discharges to the creeks. For instance, there are no live-stream discharges of treated waste water in the Riverside County area of the Santa Margarita watershed. The few NPDES permits in the watershed are mainly for recycled water which only discharges occasionally during the rainy season. Because the water quality monitoring indicates exceedances of water quality standards and MS4 discharges are the main source of pollutants in the watersheds, it can be inferred that the MS4 discharges are causing or contributing to water quality impairments, and are a leading cause of such impairments in Riverside County.

Finding C.10. When natural vegetated pervious ground cover is converted to impervious surfaces such as paved highways, streets, rooftops, and parking lots, the natural absorption and infiltration abilities of the land are lost. Therefore, runoff leaving a developed area is significantly greater in runoff volume, velocity, and peak flow rate than pre-development runoff from the same area. Runoff durations can also increase as a result of flood control and other efforts to control peak flow rates. Increased volume, velocity, rate, and duration of runoff greatly accelerate the erosion of

[46] Rios, L.M., Moore, C. and Patrick R. Jones. 2007. Persistent organic pollutants carried by synthetic polymers in the ocean environment. *Marine Pollution Bulletin.* Vol. 54.
[47] The California Toxics Rule criteria promulgated by the USEPA are directly applicable water quality standards for certain priority toxic pollutants in inland surface waters and enclosed bays and estuaries in California.

downstream natural channels. Significant declines in the biological integrity and physical habitat of streams and other receiving waters have been found to occur with as little as a 3-5 percent conversion from natural to impervious surfaces. The increased runoff characteristics from new development must be controlled to protect against increased erosion of channel beds and banks, sediment pollutant generation, or other impacts to beneficial uses and stream habitat due to increased erosive force.

Finding C.11. Development creates new pollution sources as human population density increases and brings with it proportionately higher levels of car emissions, car maintenance wastes, municipal sewage, pesticides, household hazardous wastes, pet wastes, trash, etc. which can either be washed or directly dumped into the MS4. As a result, the runoff leaving the developed area is significantly greater in pollutant load than the pre-development runoff from the same area. These increased pollutant loads must be controlled to protect downstream receiving water quality.

Discussion of Findings C.10 and C.11. The Natural Resources Defense Council (NRDC) 1999 Report, "*Stormwater Strategies, Community Responses to Runoff Pollution*" identifies two main causes of the storm water pollution problem in developed areas. Both causes are directly related to development:

1. Increased volume and velocity of surface runoff. There are three types of human-made impervious covers that increase the volume and velocity of runoff: (i) rooftop, (ii) transportation imperviousness, and (iii) non-porous (impervious) surfaces. As these impervious surfaces increase, infiltration will decrease, forcing more water to run off the surface, picking up speed and pollutants.

2. The concentration of pollutants in the runoff. Certain industrial, commercial, residential and construction activities are large contributors of pollutant concentrations in storm water runoff. As human population density increases, it brings with it proportionately higher levels of car emissions, car maintenance wastes, municipal sewage, pesticides, household hazardous wastes, pet wastes, trash, etc.

As a result of these two causes, runoff leaving developed areas is significantly greater in volume, velocity, and pollutant load than pre-development runoff from the same area.

By accommodating the traditional approach to storm water management, development has also altered the flow regime (rate, magnitude, frequency, timing, and flashiness of runoff) that supports aquatic and riparian habitats. These hydrologic changes are driven by the loss of water storage capacity in the watersheds,[48] and exacerbated by

[48] Konrad, Christopher P. and Derek K. Booth, 2005. *Hydrologic Changes in Urban Streams and Their Ecological Significance.* American Fisheries Society Symposium Vol.47 pp.157-177.

physical alterations of the stream channel network.[49] This relationship between development and stream channel integrity has been documented nationally and in southern California. The Copermittees support these findings in their 1993 DAMP,[50] which states:

> "Many storm water runoff problems are primarily a consequence of urbanization. Water that previously soaked into the ground, removing pollutants by filtering through soil, and eventually replenishing groundwater supplies, now must flow overland and therefore enters local streams more rapidly. The rapid transport of water increases the erosion of stream banks and hillsides and does not permit filtering pollutants. Sediment carried by storm water runoff can build up in streambeds, harming fish and aquatic habitat. The sediment acts as a transport mechanism for pollutants which adhere to soil particles. Typical urban runoff pollutants found in surface waters include heavy metals, nutrients, petroleum products, sediment, bacteria, chemicals, and litter."

Hydrologic changes from development also directly and indirectly adversely affect wetlands. Natural wetlands support many beneficial uses and provide important water-quality related ecological services, including pollutant removal, flood attenuation, and groundwater recharge.[51] The Center for Watershed Protection recently provided USEPA with a synthesis of more than 100 scientific studies on the direct and indirect impacts of development, particularly urbanization, on wetlands and the role wetlands play in watershed quality. The report found that the three changes from land development with the most potential to impact wetlands include: Increased storm water runoff; decreased groundwater recharge; and flow constriction.[52] Each of these changes can often be avoided or minimized by implementing low impact development (LID) and hydromodification BMPs.

When Order No. R9-2004-001 was adopted, studies had shown that the level of imperviousness in an area strongly correlates with the quality of nearby receiving waters.[53] One comprehensive study, which looked at numerous areas, variables, and methods, revealed that stream degradation occurs at levels of imperviousness as low as 10 – 20 percent.[54] Stream degradation is a decline in the biological integrity and physical habitat conditions that are necessary to support natural biological diversity. For instance, few urban streams can support diverse benthic communities with imperviousness greater than or equal to 25 percent.[55] To provide some perspective, a

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[49] Poff. N.L. et al. 1997. The Natural Flow Regime: A paradigm for river conservation and restoration. Bioscience Vol. 47, No. 11, pp.769-784.
[50] Riverside County Copermittees. 1993. Santa Margarita Regional Drainage Area Management Plan.
[51] Wright, Tiffany, et al. 2006. "Direct and Indirect Impacts of Urbanization on Wetland Quality." Prepared by the Center for Watershed Protection. Available at: http://www.cwp.org. 81p.
[52] Ibid p.26
[53] USEPA, 1999. Part II. 40 CFR Parts 9, 122, 123, and 124. National Pollutant Discharge Elimination System – Regulations for Revision of the Water Pollution Control Program Addressing Storm Water Discharges; Final Rule. Federal Register.
[54] Ibid.
[55] Ibid.

medium density, single-family home area can be from 25 percent to 60 percent impervious (variation due to street and parking design).[56]

More recently, a report on the effects of impervious in southern California streams found that local ephemeral and intermittent streams are more sensitive to such effects than streams in other parts of the country. This study, by the Southern California Coastal Water Research Program, estimated a threshold of response at a two to three percent change in percent of impervious cover in a watershed. [57] This threshold is lower than the previously reported estimates by the USEPA that were cited in the Fact Sheet for Order No. R9-2004-001.

To demonstrate the principle of increased volume and velocity of runoff from urbanization, the figure below shows the flow rate of an urban vs. a natural stream. What the figure demonstrates is that urban stream flows have greater peaks and volumes, as well as shorter retention times than natural stream flows. The greater peak flows and volumes result in stream degradation through increased erosion of stream banks and damage to aquatic habitat. The shorter retention times result in less time for sediments and other pollutants to settle before being carried out to the ocean. This sediment, and the associated pollutants it carries, can be a significant cause of water quality degradation.

Flow Rate of Urban and Natural Streams[58]

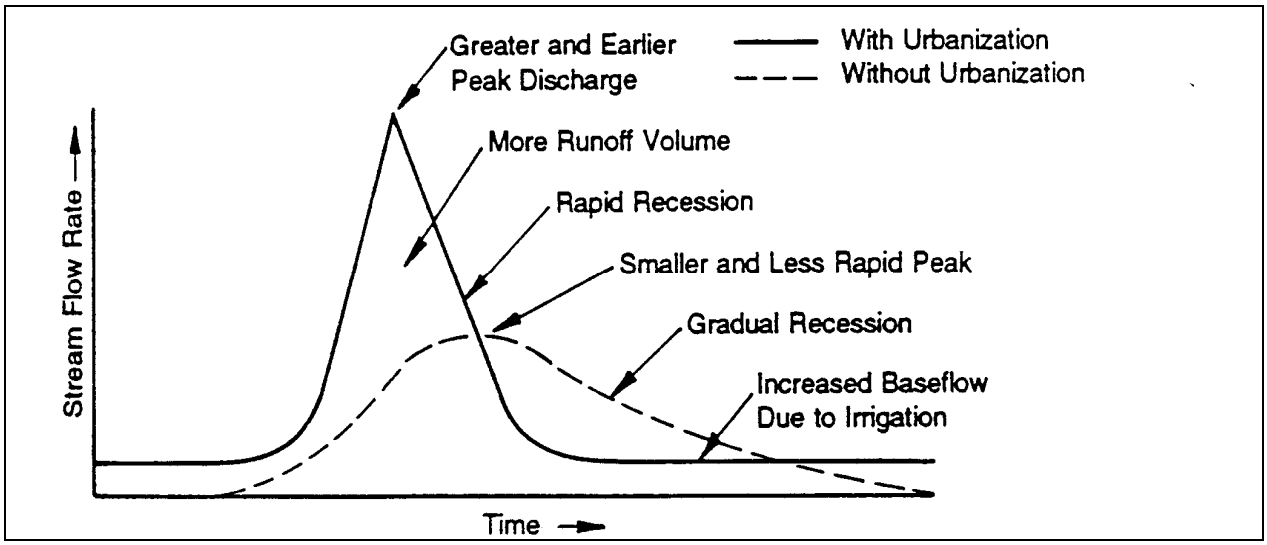

[56] Schueler, T.R., 1994. The Importance of Imperviousness. Watershed Protection Techniques. As cited in 64 FR 68725.
[57] Coleman, Derrick, et al. 2005. *Effect of Increases in Peak Flows and Imperviousness on the Morphology of Southern California Streams.* Technical Report No. 450 of the Southern California Coastal Water Research Project.
[58] Adapted from Schueler, T.R., 1987. Controlling Urban Runoff: A Practical Manual for Planning and Designing Urban BMPs. Metropolitan Washington Council of Governments.

Increased volume and velocity of runoff adversely impacts receiving waters and their beneficial uses in many ways. According to the Urban Runoff TAC report,[59] increases in population density and imperviousness result in changes to stream hydrology including:

1. Increased peak discharges compared to pre-development levels;
2. Increased volume of storm water runoff with each storm compared to pre-development levels;
3. Decreased travel time to reach receiving water; increased frequency and severity of floods;
4. Reduced stream flow during prolonged periods of dry weather due to reduced levels of infiltration;
5. Increased runoff velocity during storms due to a combination of effects of higher discharge peaks, rapid time of concentration, and smoother hydraulic surfaces from channelization; and
6. Decreased infiltration and diminished ground water recharge.

Even though the rainfall depths in arid watersheds are lower, watershed development can greatly increase peak discharge rates during rare flood events.[60] A study conducted in arid watersheds around Riverside, CA showed that, over two decades, impervious cover increased from 9 percent to 22 percent, which resulted in an increase of more than 100 percent in the peak flow rate for the two-year storm event. The study also showed that the average annual storm water runoff volume had increased by 115 percent to 130 percent over the same time span.[61]

Flooding caused by the increased volume and velocity of runoff from urbanization in the upper Santa Margarita watershed are clear examples of the effects described above. Disastrous flooding has occurred more frequently in recent years. In the last century, flood events occurred in 1938, 1969, 1980, 1993, 1995, and 1998.[62] In the 1993 flood event, the Cities of Murrieta and Temecula sustained $12 million dollars in damage, and Camp Pendleton sustained $88 million in damage. Future flooding is expected to occur more frequently because of continued urban development within the watershed, and flood damages are expected to continue accruing at an estimated annual rate of $1,780,300.

Prior hydromodification studies in California have shown that the increase in impervious cover, and thus change in runoff volume, velocity, rate, and duration, results in a shift in the range of storms that produce geomorphically significant flows within receiving waters (see above discussion). Additionally, studies in California have determined that ninety percent of the geomorphic “work” done within channels

[59] State Water Board, 1994. Urban Runoff Technical Advisory Committee Report and Recommendations. Nonpoint Source Management Program.
[60] Schueler and Holland, 2000. Storm Water Strategies for Arid and Semi-Arid Watersheds (Article 66). The Practice of Watershed Protection. P. 695-706.
[61] Ibid.
[62] U.S. Army Corps of Engineers, 2000. Final EIS/EIR, Murrieta Creek Flood Control Project.

receiving flows from developed areas now occurs from flows below the 10 year peak flow event.[63]

This increased volume, velocity, rate, and duration of runoff greatly accelerates the erosion of the beds and banks within downstream receiving waters. Additionally, storm water flows which runoff directly from impervious surfaces into the MS4 and thus receiving waters prevent the associated runoff of natural sediments which would occur in pre-project conditions. This combined alteration of the physical condition of storm water runoff results in accelerated downstream erosion of receiving water bed and banks. The excessive erosion of stream beds and banks releases pollutants found in soils into receiving waters, degrades macroinvertebrate habitat (see D.2.c), eliminates spawning habitat, reduces associated wetland and riparian habitat, and threatens existing infrastructure adjacent to receiving waters. Bank sloughing within creeks and streams increases the pollutant loading to those receiving waters, particularly for turbidity and phosphorous.[64] In arid environments, accelerated channel erosion has been shown to have synergistic impacts within watersheds. Increased channel erosion within Las Vegas wash has resulted in the loss of over 1,000 acres of wetland and riparian habitat, released additional pollutants into downstream receiving waters, and eliminated in-stream habitat and water quality conditions required for existing threatened and endangered species.[65]

Regarding the impact of development on storm water runoff pollutant loads, the San Diego Water Board's Basin Plan states:

> *Nonpoint source pollution is primarily the result of man's uses of land such as urbanization, roads and highways, vehicles, agriculture, construction, industry, mineral extraction, physical habitat alteration (dredging/filling), hydromodification (diversion, impoundment, channelization), silviculture (logging), and other activities which disturb land.[66] As a result, when rain falls on and drains through urban freeways, industries, construction sites, and neighborhoods it picks up a multitude of pollutants. The pollutants can be dissolved in the runoff and quickly transported by gravity flow through a vast network of concrete channels and underground pipes referred to as storm water conveyance systems. Such systems ultimately discharge the polluted runoff, without treatment, into the nation's creeks, rivers, estuaries, bays, and oceans.[67]*

According to the Center for Watershed Protection, urbanization strongly shapes the quality of both surface and ground water in arid and semi-arid regions of the

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[63] Santa Clara Valley Hydromodification Management Plan. April 21, 2005.
[64] Sekely, A.C., Mulla, D.J. and D.W. Bauer. 2002. Streambank slumping and its contribution to the phosphorus and suspended sediment loads of the Blue Earth River, Minnesota. *Journal of Soil and Water Conservation.* September 2002 vol. 57 no. 5 243-250.
[65] Tuttle, P.L.. and E..L.. Orsak. 2002. Las Vegas Wash Water Quality and Implications to Fish and Wildlife. U.S. Fish and Wildlife Service.
[66] San Diego Water Board, 1994. Water Quality Control Plan for the San Diego Basin. P. 4-66.
[67] Ibid. P. 4-69 - 4-70.

southwest. Since rain events are so rare, pollutants have more time to build up on impervious surfaces compared to humid regions. Therefore, the pollutant concentrations of storm water runoff from arid watersheds tend to be higher than that of humid watersheds.[68] The effect of antecedent rainfall events is demonstrated in a report from the California Department of Transportation (Caltrans) that found the concept of a seasonal first flush is applicable to the southern California climate.[69]

Finding C.12. Development and urbanization especially threaten environmentally sensitive areas (ESAs), such as water bodies designated as supporting a RARE beneficial use (supporting rare, threatened or endangered species) and CWA 303(d)-impaired water bodies. Such areas have a much lower capacity to withstand pollutant loads than other, more sensitive areas. In essence, development that is ordinarily insignificant in its impact on the environment may become significant in a particularly sensitive environment. Therefore, additional controls to reduce storm water pollutants from new and existing development may be necessary for areas adjacent to or discharging directly to an ESA.

Discussion of Finding C.12. ESAs are defined in the Order as "Areas that include but are not limited to all CWA section 303(d) impaired water bodies; areas designated as Areas of Special Biological Significance by the Basin Plan; water bodies designated with the RARE beneficial use by the Basin Plan; areas designated as preserves or their equivalent under the Natural Communities Conservation Program within the Cities and County of Riverside; and any other equivalent environmentally sensitive areas which have been identified by the Copermittees."

Areas that meet this definition are inherently sensitive habitats containing unique, rare, threatened, or endangered species, or are not achieving their designated beneficial uses. As discussed above, runoff is known to contain a wide range of pollutants and has demonstrated toxicity to plants and animals. Therefore, it is necessary to apply additional storm water controls for developments within, adjacent to, or directly discharging to ESAs. This need for additional storm water controls is addressed within each component of the Order. USEPA supports the requirement for additional storm water controls, stating "For construction sites that discharge to receiving waters that do not support their designated use or other waters of special concern, additional construction site controls are probably warranted and should be strongly considered."[70] Further support for requiring additional controls to reduce pollutants in storm water

[68] Schueler and Holland, 2000. Storm Water Strategies for Arid and Semi-Arid Watersheds (Article 66). The Practice of Watershed Protection. P. 695-706.
[69] Stenstrom, Michael and Masoud Kayhanian, 2005. *First Flush Phenomenon Characterization.* Prepared for Caltrans. Report No. CTSW-RT-05-73-02.6 Study jointly performed by UCLA and UCD. Most of the data presented was collected from three highly urbanized highway sites in west Los Angeles. Much effort went into developing a quantitative way of defining the mass first flush. Other aspects include: variability of water quality during storm events, litter characteristics, correlation among constituents, first flush of organics and particle size distribution, new methods for measuring oil and grease, and grab and composite sampling strategies. The report is available on-line at: http://www.dot.ca.gov/hq/env/stormwater/special/newsetup/
[70] USEPA, 1992. Guidance Manual for the Preparation of Part II of the NPDES Permit Applications for Discharges from Municipal Separate Storm Sewer Systems. Washington D.C. EPA/833-B-92-002.

discharges to ESAs can be found in *Mitigation of Storm Water Impacts From New Developments in Environmentally Sensitive Areas*, a technical report written by the Los Angeles Water Board.[71]

Finding C.13. Although dependent on several factors, the risks typically associated with properly managed infiltration of runoff (especially from residential land use areas) are not significant. The risks associated with infiltration can be managed by many techniques, including (1) designing landscape drainage features that promote infiltration of runoff, but do not "inject" runoff (injection bypasses the natural processes of filtering and transformation that occur in the soil); (2) taking reasonable steps to prevent the illegal disposal of wastes; (3) protecting footings and foundations; (4) ensuring that each drainage feature is adequately maintained in perpetuity; and (5) pretreatment.

Discussion of Finding C.13. Infiltration is an effective means for managing runoff. However, measures must be taken to protect groundwater quality when infiltration of runoff is implemented. USEPA supports runoff infiltration and provides guidance for protection of groundwater: "With a reasonable degree of site-specific design considerations to compensate for soil characteristics, infiltration may be very effective in controlling both urban runoff quality and quantity problems. This strategy encourages infiltration of urban runoff to replace the natural infiltration capacity lost through urbanization and to use the natural filtering and sorption capacity of soils to remove pollutants; however, the potential for some types of urban runoff to contaminate groundwater through infiltration requires some restrictions."[72] The restrictions placed on runoff infiltration in this Order are based on recommendations provided by the USEPA Risk Reduction Engineering Laboratory. The State Water Board found in Order WQ 2000-11 on the appeal of the Los Angeles Water Board's Standard Urban Storm Water Mitigation Plan (SUSMP) requirements that the guidance provided in the above referenced document by the USEPA Risk Reduction Engineering Laboratory is sufficient for the protection of groundwater quality from runoff infiltration. To further protect groundwater quality, the Order also includes guidance from the Los Angeles Water Board,[73] the State of Washington,[74] and the State of Maryland.[75] Subsequently, the California Storm Water Quality Association (CASQA) has produced technical guidance for post-construction treatment BMPs to protect ground water quality[76].

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[71] Los Angeles Water Board, 2001. Mitigation of Storm Water Impacts From New Developments In Environmentally Sensitive Areas.
[72] USEPA, 1994. Potential Groundwater Contamination from Intentional and Nonintentional Stormwater Infiltration. EPA 600 SR-94 051.
[73] Los Angeles Water Board, 2000. Standard Urban Storm Water Mitigation Plan for Los Angeles County and Cities in Los Angeles County.
[74] Washington State Department of Ecology, 1999. Draft Stormwater Management in Washington State. Volume V – Runoff Treatment BMPs. Pub. No. 99-15.
[75] Maryland Department of the Environment, 1999. 2000 Maryland Stormwater Design Manual. Volume I.
[76] CASQA. The New Development and Redevelopment Handbook, 2003. Available on-line at http://www.cabmphandbooks.org/Development.asp

Finding C.14. Non-storm water (dry weather) discharge from the MS4 is not considered a storm water (wet weather) discharge and therefore is not subject to regulation under the Maximum Extent Practicable (MEP) standard from CWA 402(p)(3)(B)(iii), which is explicitly for "Municipal … *Stormwater Discharges* (emphasis added)" from the MS4. Rather, non-storm water discharges into the storm sewers, per CWA 402(p)(3)(B)(ii), are to be effectively prohibited. Such dry weather non-storm water discharges have been shown to contribute significant levels of pollutants and flow in arid, developed Southern California watersheds and are to be effectively prohibited under the CWA.

Discussion of Finding C.14.

Permitting Framework

The CWA prohibits the discharge of any pollutant from a point source into waters of the United States unless the discharger of the pollutant(s) obtains a NPDES permit pursuant to CWA section 402. The discharge of storm water and/or non-storm water from an MS4 system is considered a discharge from a point source. As discussed below, however, the CWA regulates storm water and non-storm water discharges under different standards.

In 1987 the CWA was amended to include provisions that specifically concerned NPDES permitting requirements for storm water discharges from MS4 systems. Section 402(p) of the CWA regulates the discharge of storm water from a point source, the municipal separate storm sewers. Such discharges of storm water are subject to the maximum extent practicable (MEP) storm water standard and the related iterative process. The MEP standard for storm water discharges reflects Congress' recognition that the variability of flow and intensity of storm events render difficult strict compliance with water quality standards by MS4s. However, this standard was not considered applicable to non-storm water discharges, which under 402(p) are required to be effectively prohibited from entering the MS4. Clearly, if non-storm water discharges must be effectively prohibited from entering the MS4, the very next requirement (402(p)(3)(B)(iii)) requiring discharges from the MS4 be reduced to the MEP intends that the discharge of pollutants be limited to storm water. Unless exempt or authorized under a separate NPDES permit, non-storm water discharges are not authorized to enter the MS4 in the first instance and are considered to be illicit discharges.

The Federal Register further clarifies that such discharges through an MS4 are not authorized under the CWA (55 Federal Register (FR) 47995):

> "Today's rule defines the term "illicit discharge" to describe any discharge through a municipal separate storm sewer system that is not composed entirely of storm water and that is not covered by an NPDES permit. Such illicit discharges are not authorized under the Clean Water Act. Section 402(p(3)(B) requires that permits for discharges from municipal separate storm sewers require the municipality to "effectively prohibit" non-storm water discharges from

> the municipal separate storm sewer…Ultimately, such non-storm water discharges through a municipal separate storm sewer must either be removed from the system or become subject to an NPDES permit."

The federal regulations (40 CFR 122.26(d)(vi)(2)(B)) require that the municipal separate storm sewer discharger prohibit "through ordinance, order or similar means, illicit discharges to the municipal separate storm sewer." As owners and operators of the MS4, Copermittees cannot passively receive discharges from third parties (Federal Register 68766) and thus are responsible for the discharge of any non-storm water from their MS4.

The State Water Board's recent precedential order (Order WQ 2009-0008) affirming a Los Angeles County MS4 permit modification, consistent with USEPA's prior interpretations, recognizes that "[n]either the Clean Water Act nor the federal storm water regulations define 'non-storm water.' 'Illicit discharge' is defined as any discharge to an MS4 'not composed entirely of storm water.' Thus, 'illicit discharge' is the most nearly applicable definition of 'non-storm water' found in federal law and is often used interchangeably with that term."[77]

Storm Water and Non-storm Water Definitions

By definition non-storm water is not precipitation related. 40 CFR 122.26(b)(13) states that: "Storm water means storm water runoff, snowmelt runoff, and surface runoff and drainage." While "surface runoff and drainage" is not defined in federal law, it is related to precipitation events such as rain and/or snowmelt (see 55 FR 47995-96). The term "surface runoff and drainage" does not include all incidental flows in the MS4 system, but consists of flows relating to precipitation events as clarified by the Federal Register, USEPA's documents and permitting, and other Regional Water Board Orders.

The Federal Register (55 FR 47995-47996) provides clarification on the distinction between storm water and non-storm water discharges, including their regulation:

> "In response to the comments which requested EPA to define the term storm water broadly to include a number of classes of discharges **which are not in any way related to precipitation events, EPA believes that this rulemaking is not an appropriate forum for addressing the appropriate regulation of such non-storm water discharges**, even though some classes of non-storm water discharges may typically contain only minimal amounts of pollutants. Congress did not intend that the term storm water be used to describe any discharge that has a de minimis amount of pollutants, not did it intend for section 402(p) to be used to provide a moratorium from permitting other non-storm water discharges."

[77] State Water Board Order WQ-2009-0008 (*In the Matter of the Petition of County of Los Angeles and Los Angeles County Flood Control District*, adopted August 4, 2009), p. 4.

As recently recognized by the State Water Board in a precedential decision upholding an MS4 permit modification adopted by the Los Angeles Water Board, "U.S. EPA has previously rejected the notion that 'storm water,' as defined at 40 Code of Federal Regulations section 122.26(b)(13), includes dry weather flows. In U.S. EPA's preamble to the storm water regulations, U.S. EPA rejected an attempt to define storm water to include categories of discharges 'not in any way related to precipitation events.'[78] Thus, USEPA has made it clear that it deems discharges unrelated to precipitation events to be non-storm water discharges. 40 CFR 122.26(d)(iv)(B) itself provides specific examples of non-storm water discharges:

> "…the following category of non-storm water discharges or flows shall only be addressed where such discharges are identified by the municipality as sources of pollutants to the United States: water line flushing, landscape irrigation, diverted stream flows, rising ground waters, uncontaminated groundwater infiltration (as defined at 40 CFR 35.2005(20) to separate storm sewers, uncontaminated pumped groundwater,…"

USEPA also removed street wash waters from the definition of storm water, as USEPA specifically identified this discharge as being non-storm water (55 FR page 47996). Additionally, section 1.2.2.2 of USEPA's Multi-Sector General Permit for Industrial Activities (MSGP-2000) considers fire hydrant flushings, irrigation drainage, landscape watering, and foundation or footing drains to be non-storm water discharges. USEPA's September 1999 Storm Water Management Fact Sheet for Non-Storm Water Discharges to Storm Sewers states that non-storm water discharges can include discharges of process water, air conditioning condensate, non-contact cooling water, vehicle wash water, or sanitary wastes.

While these types of non-storm water discharges (or illicit discharges) may be regulated under storm water permits because as a practical matter they can enter and be discharged from the MS4 systems, they are not regulated as storm water discharges under the CWA because they are unrelated to precipitation events. As indicated above, the State Water Board's recent discussion of this issue supports the conclusion that non-storm water discharges are unrelated to precipitation events. In its Order affirming amendments to the Los Angeles County MS4 permit to implement a TMDL to control bacteria in dry weather flows, the State Water Board rejected petitioners County of Los Angeles and the Los Angeles County Flood Control District implied assertion that the definition of "storm water" contained in the federal regulations (defined as "surface run-off and drainage") includes the run-off and drainage from non-storm events. The State Water Board notes that the challenged permit provisions do not apply to storm water flows in that they apply only during dry weather conditions as defined in the permit. In upholding the challenged order, the State Water Board notes that the Los Angeles Water Board's permit language followed

[78] State Water Board Order WQ-2009-0008 (*In the Matter of the Petition of County of Los Angeles and Los Angeles County Flood Control District*, adopted August 4, 2009), p. 7.

USEPA's approach, referring to USEPA's rejection of attempts to define storm water to include categories of discharges "not in any way related to precipitation events."[79]

Lastly, the San Diego Water Board and State Water Board have issued multiple, separate NPDES permits for non-storm water discharges, including, but not limited to, San Diego Water Board Order No. R9-2008-0002 (extracted groundwater), San Diego Water Board Order No. R9-2002-0020 (hydrostatic discharge), and State Water Board Order No. 2006-0008-DWQ (utility vaults), pursuant to section 402 of the CWA.

Permitting Non-storm Water Discharges

Non-storm water discharges may contain pollutants which result from various activities that occur within areas draining into the MS4. This includes, but is not limited to, illicit discharges and connections, exempted categories of discharge not a source of pollutants (40 CFR 122.26(d)), and discharges into the MS4 covered under a separate NPDES permit. As such, existing and proposed discharges of non-storm water from MS4s:

a) Result from similar activities through the MS4 system;
b) Are the same type of water;
c) Require similar action levels for the protection of the Beneficial Uses of the receiving waters;
d) Require similar monitoring;
e) Are under the passive control of the owner and operator of the MS4 system; and
f) Are more appropriately regulated under a general permit than individual permits.

The U.S. EPA's approach (and the San Diego Water Board's under its approved program) for non-storm water discharges from MS4s is to regulate these discharges under the existing 402 NPDES framework (FR 47995 and 48037 see below) for discharges to surface waters. The NPDES program (40 CFR 122.44(d)) utilizes discharge prohibitions and effluent limitations as regulatory mechanisms to regulate non-storm water discharges, including the use of technology and water quality-based effluent limitations. Non-numerical effluent limitations, such as BMPs for non-storm water discharges may only be authorized where numerical effluent limits are infeasible or where the practices are reasonably necessary to achieve effluent limitations and standards or to carry out the purposes and intent of the CWA (40 CFR 122.44(k) see below).

[79] State Water Board Order WQ-2009-0008 (*In the Matter of the Petition of County of Los Angeles and Los Angeles County Flood Control District*, adopted August 4, 2009), p. 7 (quoting 55 FR 47990. 47995).

The Federal Register (55, page 48037) provides clarification that non-storm water discharges from the MS4 are to be regulated under section 402, not 402(p):

> "Conveyances which continue to accept other "non-storm water" discharges (e.g. discharges without an NPDES permit) with the exceptions noted above (*exempted discharges that are not a source of pollutants*) do not meet the definition of municipal separate storm sewer and are not subject to 402(p)(3)(B) of the CWA unless such discharges are issued separate NPDES permits. Instead, conveyances which continue to accept non-storm water discharges which have not been issued separate NPDES permits are subject to sections 301 and 402 of the CWA."

This regulatory approach is consistent with the approach recently upheld by the State Water Board in a precedential order adopted on August 4, 2009. In this Order, the State Water Board rejected a challenge to amendments to the Los Angeles County MS4 permit that require compliance with receiving water limitations and discharge prohibitions for dry weather, non-storm water discharges. Petitioners there argued that the receiving water limits and discharge prohibitions for dry weather dischargers were inappropriate and that the Los Angeles Water Board should instead have regulated the discharges with the maximum extent practicable standard, through an iterative process. The State Water Board concludes that dry weather discharges, as defined in the permit and in the underlying TMDL, "are more appropriately regarded as non-storm water discharges, which the Clean Water Act requires to be effectively prohibited."[80]

As stated above, for NPDES permits under 402 of the CWA, the Code of Federal Regulations (122.44(k)) clarify that a discharger may utilize BMPs to control or abate the discharge of pollutants when:

> "(1) Authorized under section 304(e) of the CWA for the control of toxic pollutants and hazardous substances from ancillary industrial activities;
> (2) Authorized under section 402(p) of the CWA for the control of storm water discharges;
> (3) Numeric limits are infeasible; or
> (4) The practices are reasonably necessary to achieve effluent limitations and standards or to carry out the purposes and intent of the CWA."

For the last 20 years, Riverside County NPDES permits for discharges of storm water have regulated non-storm water discharges from the MS4. These permits required Copermittees (dischargers) to prohibit non-storm water discharges into (thus through and from) their MS4 systems, implement a program to prevent illicit discharges, and monitor to identify illicit discharges and exempted discharges that are a source of pollution. These measures are considered Best Management Practices (BMPs), are

[80] State Water Board Order WQ-2009-0008 (*In the Matter of the Petition of County of Los Angeles and Los Angeles County Flood Control District*, adopted August 4, 2009), p. 8

required to be included in NPDES permits issued under section 402(p) of the CWA, and are considered by USEPA to be an interim approach to permitting non-storm water discharges from the MS4 in accordance with section 402 of the CWA and CFR 122.44(k).

As explained in the discussion of Finding C.15., below, the Copermittees' reliance on BMPs for the past 20 years has not resulted in compliance with applicable water quality standards. The San Diego Water Board has evaluated (in accordance with 40 CFR 122.44(d)(1)) past and existing controls (BMPs), non-storm water monitoring results, the sensitivity of the species in receiving waters (e.g. endangered species), and the potential for effluent dilution, and has determined that existing BMPs to control pollutants in storm water discharges are not sufficient to protect water quality standards in receiving waters and the existing requirement that Copermittees effectively prohibit all types of unauthorized non-storm water discharges into the MS4 historically results in the discharge of pollutants to the receiving waters. Thus, numeric action levels for non-storm water, dry weather, discharges from the MS4 and required actions following observed exceedances of numeric action levels have been established. For further discussion regarding the development of action levels please see Finding E.10 and discussion.

Dry weather action levels are applicable to non-storm water discharges of effluent from the MS4 system. Non-storm water effluent discharges from the MS4 are those which occur during dry weather conditions. These action levels are not applied to storm water discharges, as defined within the Order. Storm water discharges regulated by the Order are required to meet the MEP standard and related iterative process and have separate action levels.

Dry weather action levels are applicable to non-storm water discharges from the MS4 system into receiving waters. Non-storm water discharges are already required to be prohibited unless specifically exempted or covered under a separate NPDES permit. Dry weather action levels apply to non-storm water discharges of effluent from a point source into receiving waters. The MS4 is not a receiving water. Should a discharger wish to discharge a non-exempt category to the MS4 system, such discharges require a separate NPDES permit pursuant to sections 402 and 301 of the CWA. It is also infeasible to monitor and sample every discharge into the MS4, as such discharges are diffuse by nature and may vary spatially and temporally.

Finding C.15. Non-storm water discharges to the MS4 granted an influent exception [i.e. which are exempt from the effective prohibition requirement set forth in CWA section 402(p)(3)(B)(ii)] under 40 CFR 122. 26 are included within this Order. Any exempted discharges identified by Copermittees as a source of pollutants are subsequently required to be *addressed* (emphasis added) as illicit discharges through prohibition and incorporation into existing IC/ID programs. Furthermore, the USEPA contemplates that permitting agencies such as the San Diego Water Board may also identify exempted discharges as a source of pollutants required to be addressed as illicit

discharges (See Vol. 55 FR 48037). The San Diego Water Board and the Copermittees have identified landscape irrigation, irrigation water and lawn water, previously exempted discharges, as a source of pollutants and conveyance of pollutants to waters of the U.S.

Discussion of Finding C.15. The FR (Vol. 55, page 48037) and 40 CFR 122.26(d)(iv)(B) clarify that certain components and categories of non-storm water discharges into the MS4 are not required to be prohibited. The Code of Federal Regulations requires the discharger have:

> "…a program, including inspections, to implement through ordinance, orders or similar means to prevent illicit discharges to the municipal separate storm sewer system; this program shall address all types of illicit discharges, however, the following category of non-storm water discharges or flows shall only be addressed where such discharges are identified by the municipality as sources of pollutants to waters of the United States: water line flushing, landscape irrigation, diverted stream flows, rising ground waters, uncontaminated groundwater infiltration (as defined at 40 CFR 35.2005(20) to separate storm sewers, uncontaminated pumped groundwater,…"

The categories of non-storm water discharges into the MS4, as listed under 40 CFR 122.26(d)(iv)(B), are not required to be prohibited unless identified by the Copermittees as sources of pollutants to waters of the United States. The FR (Vol. 55, page 48037), however, goes on to clarify that:

> "However, the Director may include permit conditions that either require municipalities to prohibit or otherwise control any of these types of discharge where appropriate."

Thus, the Copermittees or the San Diego Water Board may identify any of these categories of non-storm water discharges as a source of pollutants. As such, the identification of any of these categories as a source of pollutants requires them to be addressed as illicit discharges, which are not authorized under the CWA, and are required to be "effectively prohibited" as illicit discharges via ordinance, order or similar means. The prohibition of previously exempted discharges of non-storm water to waters of the United States from entering, and necessarily being discharged from an MS4, conforms with CWA requirements for standards and enforcement for effluent limitations necessary to meet water quality standards (33 U.S.C. 1311(b)(1)(C)).

To date the San Diego Water Board and the Copermittees have identified overspray and drainage from potable and reclaimed water landscape irrigation as a substantial source and conveyance mechanism for pollutants into waters of the United States. Several municipalities throughout the San Diego Region (e.g., cities and counties of Orange County and San Diego County) have reported and/or identified runoff originating from landscape irrigation as potential sources of dry weather flows conveying pollutants into

their MS4s. This is also supported by legislation (Assembly Bill 1881) recently enacted by the State of California, which has identified runoff resulting from over irrigation not only as a waste of water resources, but also as a source of pollutants to the state's waterways.

Irrigation runoff into the MS4, as identified by the San Diego Water Board and the Copermittees, is a source of pollutants to waters of the United States, and is required to be *addressed* (emphasis added) as an illicit discharge per 40 CFR 122.26(d)(2)(iv)(B)(1) by prohibition through implementing and enforcing an ordinance, order or similar means. The San Diego Water Board and the Copermittees have identified irrigation water as a source of pollutants and conveyance of pollutants to waters of the United States, when applied improperly in excess and thereafter entering the MS4, in the following documents:

- The Cities and County of Riverside "Only Rain in the Storm Drain" Pollution Prevention Program identifies runoff from irrigation as a source of pollutants to waters of the United States in the following documents:

    1) The Landscape and Garden public education brochure states:

    "Soil, yard wastes, over-watering [emphasis added] *and garden chemicals become part of the urban runoff mix that winds it way through streets, gutters and storm drains before entering lakes, rivers, streams, etc."*

    2) In a survey distributed at public outreach events,[81] the answer to the question about where lawn irrigation water goes states:

    "Water that leaves your lawn from irrigation…can pick up motor oil and grease from vehicles, excess fertilizer from your lawn, bacteria from pet waste, and excess pesticides from your yard. These pollutants can be carried down streets and storm drains directly to our streams, lakes and rivers without treatment!"

- In 2006, the State Water Board allocated Grant funding to the **SmartTimer/Edgescape Evaluation Program (SEEP)**. The project targets irrigation runoff by retrofitting existing development and documenting the conservation and runoff improvements. The Grant Application states that:

    "*Irrigation runoff contributes flow & pollutant loads to creeks and beaches that are 303(d) listed for bacteria indicators.*"

[81] A copy of the survey was provided in the Riverside County Copermittees' Report of Waste Discharge, dated January 15, 2009, page 39.

Furthermore, the grant application states:

> "*Regional program managers agree that the reduction and/or elimination of irrigation-related urban flows and associated pollutant loads may be key to successful attainment of water quality and beneficial use goals as outlined in the San Diego Basin Plan and Bacteria TMDL over the long term.*"

This is reinforced in the project descriptions and objectives:

> "*Elevated dry-weather storm drain flows, composed primarily … of landscape irrigation water wasted as runoff, carry pollutants that impair recreational use and aquatic habitats all along Southern California's urbanized coastline. Storm drain systems carry the wasted water, along with landscape derived pollutants such as bacteria, nutrients and pesticides, to local creeks and the ocean. Given the local Mediterranean climate, excessive perennial dry season stream flows are an unnatural hydrologic pattern, causing species shifts in local riparian communities and warm, unseasonal contaminated freshwater plumes in the near-shore marine environment*".

The basis of this grant project is that over-irrigation (landscape irrigation, irrigation water and lawn watering) into the MS4 is a source and conveyance of pollutants. In addition, they indicate that this alteration of natural flows is impacting the Beneficial Uses of Waters of the State and U.S. The results of this study can be applied broadly to any area where over-irrigation takes place, including Riverside County. Preliminary results from the study indicate that that over-irrigation (landscape irrigation, irrigation water and lawn watering) into the MS4 *is* a source and conveyance of pollutants.

- Several municipalities in the San Diego Region have identified runoff from irrigation as a source of pollutants to waters of the United States in the following documents:

  1) The **Watershed Action Plan Annual Report**(s) for the 2006-2007 reporting period was submitted by the County of Orange, Orange County Flood Control District and Copermittees within the San Juan Creek, Laguna Coastal Streams, Aliso Creek, and Dana Point Coastal Streams Watersheds. San Juan Creek, Laguna Coastal Streams, Aliso Creek and Dana Point Coastal Streams are all currently 303(d) listed as impaired for Indicator Bacteria within their watersheds and/or in the Pacific Ocean at the discharge points of their watersheds. The Orange County Copermittees, within their Watershed Action Strategy Table for Fecal Indicator Bacteria:

"*Support programs to reduce or eliminate the discharge of anthropogenic dry weather nuisance flow throughout the […] watershed. Dry weather flow is the transport medium for bacteria and other 303(d) constituents of concern*". Additionally, they state that "*conditions in the MS4 contribute to high seasonal bacteria propagation in-pipe during warm weather. Landscape irrigation is a major contributor to dry weather flow, both as surface runoff due to over-irrigation and overspray onto pavements; and as subsurface seepage that finds its way into the MS4*."

2) The **Carlsbad Watershed Urban Runoff Management Program (WURMP) Fiscal Year 2008 Annual Report** was submitted by the Carlsbad Watershed Copermittees (Cities of Carlsbad, Encinitas, Escondido, Oceanside, San Marcos, Solana Beach, and Vista, and the County of San Diego). In the WUMRP Annual Report, the Carlsbad Watershed Copermittees stated the following:

   "The Carlsbad Watershed Management Area (WMA) collective watershed strategy identifies bacteria, sediment, and nutrients as high priority water quality pollutants in the Agua Hedionda (904.3 – bacteria and sediment), Buena Vista (904.2 – bacteria), and San Marcos Creek (904.5 – nutrients) Hydrologic Areas. Bacteria, sediment, and nutrients have been identified as potential discharges from over-irrigation."

3) The **San Diego Bay Watershed Urban Runoff Management Program (WURMP) 2007-2008 Annual Report** was submitted by the San Diego Bay Watershed Copermittees (Cities of Chula Vista, Coronado, Imperial Beach, La Mesa, Lemon Grove, National City, and San Diego, the County of San Diego, the Port of San Diego, and the San Diego County Airport Authority). In Appendix D of the WUMRP Annual Report, titled Likely Sources of Pollutants, the San Diego Bay Watershed Copermittees identified over-irrigation of lawns as a pollutant generating activity from business and/or residential land uses for bacteria, pesticides, and sediment.

Within the reports above, municipalities throughout San Diego and Orange counties have acknowledged that runoff from over-irrigation is a potential or likely source of several types of pollutants to waters of the United States. Because there are landscaped areas in Riverside County that receive irrigation similar to San Diego and Orange counties, runoff from over-irrigation is also a likely source of pollutants to waters of the United States in Riverside County.

- There is statewide recognition of the pollution caused by over-irrigation, and current legislation already requires cities and counties to prohibit over-irrigation. On September 28, 2006 Governor Arnold Schwarzenegger approved Assembly Bill 1881, The Water Conservation in Landscaping Act (AB 1881, Laird). The

act requires cities, counties, and charter cities and charter counties, to adopt landscape water conservation ordinances by January 1, 2010. Additionally, the law required the Department of Water Resources (DWR) to prepare a Model Water Efficient Landscape Ordinance for use by local agencies. The Water Efficient Landscape Ordinance was approved by the Office of Administrative Law on September 10, 2009. All local agencies were required to adopt a water efficient landscape ordinance by January 1, 2010. Local agencies could adopt the Water Efficient Landscape Ordinance developed by DWR, or an ordinance considered at least as effective as the Model Ordinance. The Water Efficient Landscape Ordinance includes a requirement that local agencies prohibit runoff from irrigation (§ 493.2):

> *"(a) Local agencies shall prevent water waste resulting from inefficient landscape irrigation by* prohibiting runoff *[emphasis added] from leaving the target landscape due to low head drainage, overspray, or other similar conditions where water flows onto adjacent property, non-irrigated areas, walks, roadways, parking lots, or structures. Penalties for violation of these prohibitions shall be established locally."*

- On October 08, 2009, the State of California Department of Water Resources issued a letter to all cities and counties within the State of California giving reminder of required adoption of the Water Efficient Landscape Ordinance. The letter states that:

  > *"Other benefits include reduced irrigation runoff, reduced pollution of waterways, drought resistance, and less green waste."*

- On December 18, 2009, the San Diego Water Board adopted Order No. R9-2009-0002, the fourth-term Orange County permit, which found that over-irrigation (landscape irrigation, irrigation water and lawn watering) into the MS4 is a source and conveyance of pollutants. Landscape irrigation, irrigation water, and lawn watering were categories removed from the list of non-storm water discharges not prohibited to be discharged into the MS4.

D. Runoff Management Programs

Finding D.1.a. This Order specifies requirements necessary for the Copermittees to reduce the discharge of pollutants in storm water to the MEP. However, since MEP is a dynamic performance standard, which evolves over time as runoff management knowledge increases, the Copermittees' runoff management programs must continually be assessed and modified to incorporate improved programs, control measures, best management practices (BMPs), etc. in order to achieve the evolving MEP standard. Absent evidence to the contrary, this continual assessment, revision, and improvement of runoff management program implementation is expected to ultimately achieve compliance with water quality standards in the Region.

Discussion of Finding D.1.a. Under CWA section 402(p), municipalities are required to reduce the discharge of storm water pollutants from their MS4s to the maximum extent practicable (MEP). MEP is the critical technology-based performance standard that municipalities must attain. The MEP standard is an ever-evolving, flexible, and advancing concept, which considers technical and economic feasibility. As knowledge about controlling storm water runoff continues to evolve, so does that which constitutes MEP. Reducing the discharge of storm water pollutants to the MEP requires Copermittees to assess each program component and revise activities, control measures, best management practices (BMPs), and measurable goals, as necessary to meet MEP.

To achieve the MEP standard, municipalities must employ whatever BMPs are technically feasible (i.e. are likely to be effective) and are not cost prohibitive. The major emphasis is on technical feasibility. Reducing storm water pollutants to the MEP means choosing effective BMPs, and rejecting applicable BMPs only where other effective BMPs will serve the same purpose, or the BMPs would not be technically feasible, or the cost would be prohibitive. In selecting BMPs to achieve the MEP standard, the following factors may be useful to consider:

1. Effectiveness: Will the BMPs address a pollutant (or pollutant source) of concern?
2. Regulatory Compliance: Is the BMP in compliance with storm water regulations as well as other environmental regulations?
3. Public Acceptance: Does the BMP have public support?
4. Cost: Will the cost of implementing the BMP have a reasonable relationship to the pollution control benefits to be achieved?
5. Technical Feasibility: Is the BMP technically feasible considering soils, geography, water resources, etc?

If a municipality reviews a lengthy menu of BMPs and chooses to select only a few of the least expensive BMPs, it is likely that MEP has not been met. On the other hand, if a municipal discharger employs all applicable BMPs except those where it can show

that they are not technically feasible in the locality, or whose cost is prohibitive, it would have met the standard. Where a choice may be made between two BMPs that should provide generally comparable effectiveness, the discharger may choose the least expensive alternative and exclude the more expensive BMP. However, it would not be acceptable either to reject all BMPs that would address a pollutant source, or to pick a BMP based solely on cost, which would be clearly less effective. In selecting BMPs the municipality must make a serious attempt to comply and practical solutions may not be easily dismissed. In any case, the burden is on the municipal discharger to comply with its permit. After selecting BMPs, it is the responsibility of the discharger to ensure that all BMPs are implemented.[82]

A definition of MEP is not provided in either the federal statute or in the federal regulations. The final determination regarding whether a municipality has reduced storm water pollutants to the MEP can only be made by the San Diego Water Board or the State Water Board, and not by the municipal discharger. While the San Diego Water Board or the State Water Board ultimately define MEP, it is the responsibility of the Copermittees to initially propose actions that implement BMPs to reduce storm water pollution to the MEP. In other words, the Copermittees' runoff management programs to be developed under the Order are the Copermittees' proposals of MEP. Their total collective and individual activities conducted pursuant to their runoff management programs become their proposal for MEP as it applies both to their overall effort, as well as to specific activities. The Order provides a minimum framework to guide the Copermittees in meeting the MEP standard for storm water.

It is the San Diego Water Board's responsibility to evaluate the proposed programs and specific BMPs to determine what constitutes MEP, using the above guidance and the court's 1994 decision in NRDC v. California Department of Transportation, Federal District Court, Central District of California. The federal court stated that a Copermittee must evaluate and implement BMPs except where (1) other effective BMPs will achieve greater or substantially similar pollution control benefits; (2) the BMP is not technically feasible; or (3) the cost of BMP implementation greatly outweighs the pollution control benefits. In the absence of a proposal acceptable to the San Diego Water Board, the San Diego Water Board will define MEP by requiring implementation of additional measures by the Copermittees.

The Copermittees' continual evolution in meeting the MEP standard is expected to achieve compliance with water quality standards. USEPA has consistently supported this expectation. In its Interim Permitting Approach for Water Quality-Based Effluent Limitations (WQBELs) in Storm Water Permits, USEPA states "the interim permitting approach uses best management practices (BMPs) in first-round storm water permits, and expanded or better-tailored BMPs in subsequent permits, where necessary, to provide for attainment of water quality standards."[83] USEPA reiterated its position in 1999, when it stated regarding the Phase II municipal storm water regulations that

[82] State Water Board, 1993. Memo Entitled Definition of Maximum Extent Practicable.
[83] Federal Register / Vol. 61, No. 166 / August 26, 1996 / P. 43761.

"successive iterations of the mix of BMPs and measurable goals will be driven by the objective of assuring maintenance of water quality standards" and "EPA anticipates that a permit for a regulated small MS4 operator implementing BMPs to satisfy the six minimum control measures will be sufficiently stringent to protect water quality, including water quality standards […]."[84]

The requirements of the Order are expected to achieve compliance with receiving water quality standards. The approach to be used is the continual assessment, revision, and improvement of Copermittee best management practice implementation. This approach is consistent with the CWA and State Water Board guidance. In Defenders of Wildlife v. Browner (1999, 197 F. 3d 1035), the United States Court of Appeals for the Ninth Circuit states: "Under 33 U.S.C. section 1342 (p)(3)(B)(iii), the EPA's choice to include either management practices or numeric limitations in the permits was within its discretion." In addition, the approach is consistent with State Water Board Order WQ 99-05, which outlines an iterative approach for achieving compliance with water quality standards.

Finding D.1.b. The Copermittees have generally been implementing the Jurisdictional Runoff Management Programs (JRMPs) required pursuant to Order No. R9-2004-001 since July 14, 2005. Prior to that, the Copermittees were regulated by Order No. 98-02 since May 13, 1998. MS4 discharges, however, continue to cause or contribute to violations of water quality standards as evidenced by the Copermittees' monitoring results.[85]

Discussion of Finding D.1.b. In response to Order No. R9-2004-001, the Copermittees have developed their runoff management programs. In order to implement the plans, the Copermittees have, among other things, developed BMP requirements, improved inter- and intra-governmental coordination, improved training programs, improved illicit discharge detection procedures, and improved their monitoring efforts. Although the programmatic improvements have led to better implementation of BMPs, the Copermittees' monitoring data demonstrate that additional or revised BMPs are necessary to prevent discharges from MS4s from causing and contributing to violations of water quality standards. A discussion of data collected by the Copermittees is included in the discussion for Finding C.9.

Finding D.1.c. This Order contains new or modified requirements that are necessary to improve Copermittees' efforts to reduce the discharge of pollutants in storm water runoff to the MEP and achieve water quality standards. Some of the new or modified requirements, such as the revised Watershed Water Quality Workplan (Watershed Workplan) section, are designed to specifically address these high priority water quality problems. Other requirements, such as for unpaved roads, are a result of San Diego Water Board's identification of water quality problems through investigations

[84] Federal Register / Vol. 64, No. 235 / Wednesday, December 8, 1999 / Rules and Regulations. P. 68753-68754.
[85] County of Riverside, 2009. Riverside County Municipal Copermittees 2008-09 Annual Storm Water Program Report, Section 11..

and complaints during the previous permit period. Other new or modified requirements address program deficiencies that have been noted during audits, report reviews, and other San Diego Water Board compliance assessment activities. Additional changes in the monitoring program provide consistency with the Code of Federal Regulations, USEPA guidance, State Water Board guidance, and the Southern California Monitoring Coalition recommendations.

Discussion of Finding D.1.c. The Copermittees are required to update and expand their runoff management programs on jurisdictional and watershed levels in order to improve their efforts to reduce the contribution of storm water pollutants in runoff to the MEP and meet water quality standards. Changes to Order No. R9-2004-001's requirements have been made to help ensure these two standards are achieved by the Copermittees.

The Orders' jurisdictional requirements have changed based on findings by the San Diego Water Board during typical compliance assurance activities, audits, or receipt of complaints.[86] Where the audits found common implementation problems, requirements have been altered to better ensure compliance. In addition, the San Diego Water Board conducted reviews of the jurisdictional annual reports submitted by the Copermittees. Updates to the requirements for the Copermittees' programs are also based in part on information found in the Copermittees' ROWD,[87] requirements that were included in the San Diego and Orange County MS4 permits, and discussions with the Riverside County Copermittees.

To better focus on attainment of water quality standards, the Order's jurisdictional and watershed requirements have been improved. The conditions of the receiving waters now drive management actions, which in turn focus diminishing resources on the highest priority water quality problems within the receiving waters in the watershed. Improvements to jurisdictional and watershed requirements were also made to facilitate a mutually clear understanding of the requirements between the San Diego Water Board and Copermittees.

During the previous permit period, the San Diego Water Board identified, through investigations and complaints, sediment discharges from unpaved roads as a significant source of water quality problems in the Riverside County portion of the San Diego Region. Enforcement and inspection activities conducted by the San Diego Water Board during the previous permit term have found a lack of source control for many unpaved roads within the jurisdiction of the Copermittees. Unpaved roads are a source of sediment that can be discharged in runoff to receiving waters, especially during storm events. Erosion of unpaved roadways occurs when soil particles are loosened and carried away from the roadway base, ditch, or road bank by water, wind,

[86] Audit reports, report reviews, and inspection reports are available for review at the San Diego Water Board office.
[87] All significant changes made to the Order's requirements are described and explained in detail in Fact Sheet section IX.

traffic, or other transport means. Exposed soils, high runoff velocities and volumes, sandy or silty soil types, and poor compaction increase the potential for erosion.

Road construction, culvert installation, and other maintenance activities can disturb the soil and drainage patterns to streams in undeveloped areas, causing excess runoff and thereby erosion and the release of sediment. Poorly designed roads can act as preferential drainage pathways that carry runoff and sediment into natural streams, impacting water quality. In addition, other public works activities along unpaved roads have the potential to significantly affect sediment discharge and transport within streams and other waterways, which can degrade the beneficial uses of those waterways.

USEPA also recognizes that discharges from unpaved roads are a threat to water quality. USEPA guidance[88] emphasizes the threat of unpaved roads to water quality:

> "*Dirt and gravel roads are a major potential source of these pollutants [sediment] and pollutants that bind to sediment such as oils, nutrients, pesticides, herbicides, and other toxic substances]. Many roads have unstable surfaces and bases. Roads act like dams, concentrating flows that accelerate erosion of road materials and roadsides. Both unstable surfaces and accelerated erosion then lead to sediment and dust.*"

There are several guidance documents, developed by the USEPA,[89] the US Forest Service,[90] the University of California,[91] and others, that include design and construction specifications and BMPs that are readily available for implementation by private and public entities. Implementing design and other source control BMPs for unpaved roads in the region is necessary to reduce and minimize the impacts of sediment discharged during storm events from unpaved roads to the MS4s and receiving waters.

Finding D.1.d. Updated individual Drainage Area Management Plans (individual DAMPs) and Watershed Stormwater Management Plans (watershed SWMPs), which describe the Copermittees' runoff management programs in their entirety, are needed to guide the Copermittees' runoff management efforts and aid the Copermittees in tracking runoff management program implementation. Hereinafter, the individual DAMP is referred to as the JRMPs and the Watershed SWMP is referred to as the Watershed Workplan. It is practicable for the Copermittees to update the JRMPs and Watershed Workplans within the timeframe specified in this Order, since significant efforts to develop these programs have already occurred.

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[88] USEPA 2006 "Environmentally Sensitive Maintenance for Dirt and Gravel Roads." Gesford and Anderson, USEPA-PA-2005.
[89] Ibid.
[90] US Forest Service, 1996. Forest Service Specifications for Construction of Roads & Bridges. EM-7720-100. Revised August 1996.
[91] University of California Division of Agriculture and Natural Resources, 2007. Rural Roads: A Construction and Maintenance Guide of California Landowners. Publication 8262.

Discussion of Finding D.1.d. Development of runoff management plans is a crucial runoff management measure and should be considered a BMP. The plans help organize and focus the Copermittees' programs and guide their implementation. In its statewide assessment report to USEPA Region IX and the State Water Board, Tetra Tech, Inc. concluded that the lack of a master storm water planning document must be considered a serious program deficiency[92]. When submitted to the San Diego Water Board, the plans provide useful correspondence between the Copermittees and the San Diego Water Board. The Plans also become available for review by the public, and thus facilitate public participation in runoff management decisions. Finally, while development and submittal of runoff management plans are not necessary to ensure compliance of the Copermittees' runoff management programs with the Order, the San Diego Water Board is provided with a means to track Copermittee implementation.

The focus of the Order is on development and implementation of storm water programs which meet MEP, rather than creation of Copermittee plans which exhibit MEP. While the Order does not rely upon the plans to ensure MEP and other standards are achieved, the plans still serve a useful purpose. As stated above, the plans serve to organize the Copermittees' efforts to address runoff. As a practical matter, any program of the size required by the Order should be documented in writing. This serves to guide implementation of the program by the numerous individuals responsible for program implementation.

Runoff management plans are not necessary for ensuring compliance with the Order because the Order itself contains sufficient detailed requirements to ensure that compliance with discharge prohibitions, receiving water limitations, and the narrative standard of MEP for storm water are achieved. Implementation by the Copermittees of programs in compliance with the Order's requirements, prohibitions, and receiving water limitations is the pertinent compliance standard to be used under the Order, as opposed to assessing compliance by reviewing the Copermittees' implementation of their plans alone. The San Diego Water Board ensures compliance with the Order by reviewing annual reports, conducting inspections, performing audits, and through other general program oversight.

Runoff management plans are particularly important and useful for municipalities when program implementation is spread across several departments and/or when municipalities experience staff turnover.[93] Each Copermittee relies on multiple employees or contractors for program implementation, but the spread of responsibility varies among Copermittees.[94] Written jurisdictional plans ensure appropriate coordination within each municipality.

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[92] Tetra Tech, Inc. 2006. *Assessment Report on Tetra Tech's Support of California's MS4 Stormwater Program.* Produced for USEPA Region IX and the California State and Regional Water Quality Control Boards.
[93] Tetra Tech, Inc. 2005. Program Evaluation Report. Orange County Storm Water Program: Cities of Laguna Beach, Laguna Hills, Lake Forest, and Rancho Santa Margarita.
[94] Responsible departments and employees are described in the 2005-06 Annual Reports for the MS4 programs.

Copermittees' runoff management plans are simply descriptions of their runoff management programs required under the Order. These plans serve as procedural correspondence which guides program implementation and aids the Copermittees and San Diego Water Board in tracking implementation of the programs. In this manner, the plans are not functional equivalents of the Order. For these reasons, the Copermittees' runoff management plans need not be an enforceable part of the Order.

The Copermittees' plans and programs can be updated on or before June 30, 2012 because much of their plans and programs are already in existence. In fact, many parts of their plans and programs have been in place for 15 years. Moreover, the adoption of Order No. R9-2004-001 required a larger scale reorganization of the Copermittees' programs than Order No. R9-2010-0016, but also only allowed one year for program updates. The Copermittees were generally able to meet the time schedule required under Order No. R9-2004-001. After discussions with the Copermittees, based on the timing of the adoption of the Order and the Copermittee's fiscal planning cycles, in conjunction with consideration for the current economic conditions, the San Diego Water Board agreed that additional time to update the Copermittees' plans and programs may be warranted. Thus, the Copermittees must update their plans and programs on or before June 30, 2012, which provides the Copermittees over 18 months, instead of 1 year, to update their plans and programs.

Finding D.1.e. Pollutants can be effectively reduced in storm water runoff by the application of a combination of pollution prevention, source control, and treatment control BMPs. Pollution prevention is the reduction or elimination of pollutant generation at its source and is the best "first line of defense". Source control BMPs (both structural and non-structural) minimize the contact between pollutants and flows (e.g., rerouting run-on around pollutant sources or keeping pollutants on-site and out of receiving waters). Treatment control BMPs remove pollutants that have been mobilized by wet-weather or dry-weather flows.

Discussion of Finding D.1.e. The State Water Board finds in its Order WQ 98-01 that BMPs are effective in reducing pollutants in storm water runoff, stating that "implementation of BMPs [is] generally the most appropriate form of effluent limitations when designed to satisfy technology requirements, including reduction of pollutants to the maximum extent practicable." A State Water Board TAC further supports this finding by recommending "that nonpoint source pollution control can be accomplished most effectively by giving priority to [BMPs] in the following order:

1. Pollution Prevention – implementation of practices that use or promote pollution free alternatives;
2. Source Control – implementation of control measures that focus on preventing or minimizing urban runoff from contacting pollution sources;

3. Treatment Control – implementation of practices that require treatment of polluted runoff either onsite or offsite."[95]

Pollution prevention, the reduction or elimination of pollutant generation at its source, is an essential aspect of BMP implementation. Fewer pollutants are available to be washed from developed areas when the generation of pollutants by activities is limited. Thus, pollutant loads in storm water discharges are reduced from these areas. In addition, there is no need to control or treat pollutants that are never generated. Furthermore, pollution prevention BMPs are generally more cost effective than removal of pollutants by treatment facilities or cleanup of contaminated media.[96,97]

In the Pollution Prevention Act of 1990, Congress established a national policy that emphasizes pollution prevention over control and treatment. CWC section 13263.3(a) also supports pollution prevention, stating "The Legislature finds and declares that pollution prevention should be the first step in a hierarchy for reducing pollution and managing wastes, and to achieve environmental stewardship for society. The Legislature also finds and declares that pollution prevention is necessary to support the federal goal of zero discharge of pollutants into navigable waters." Finally, the Basin Plan also supports this finding by stating "To eliminate pollutants in storm water, one can either clean it up by removing pollutants or prevent it from becoming polluted in the first place. Because of the overwhelming volume of storm water and the enormous costs associated with pollutant removal, pollution prevention is the only approach that makes sense."[98]

USEPA also supports the utilization of a combination of BMPs to address pollutants in runoff. For example, USEPA has found there has been success in addressing illicit discharge related problems through BMP initiatives like storm drain stenciling and recycling programs, including household hazardous waste special collection days.[99] Structural BMP performance data has also been compiled and summarized by USEPA.[100]

The summary provides the performance ranges of various types of structural BMPs for removing suspended solids, nutrients, pathogens, and metals from storm water flows. These pollutants are generally a concern in storm water in the San Diego Region and

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[95] State Water Board, 1994. Urban Runoff Technical Advisory Committee Report and Recommendations. Nonpoint Source Management Program.
[96] Devinny, J.S. et al. 2004. *Alternative Approaches to Stormwater Quality Control.* Prepared for the Los Angeles Regional Water Quality Control Board. Found as Appendix H to *NPDES Stormwater Cost Survey.* Prepared for the California State Water Resources Control Board by the Office of Water Programs California State University, Sacramento. Available on-line at: http://www.owp.csus.edu/research/npdes/
[97] Schueler, T.R.., 2000. Center for Watershed Protection. Assessing the Potential for Urban Watershed Restoration, Article 142.
[98] San Diego Water Board, 1994. Water Quality Control Plan, San Diego Basin, Region 9.
[99] USEPA, 1999. 40 CFR Parts 9, 122, 123, and 124 National Pollutant Discharge Elimination System-Regulations for Revision of the Water Pollution Control Program Addressing Storm Water Discharges. 64 FR 68728.
[100] USEPA, 1999. Preliminary Data Summary of Urban Storm Water Best Management Practices. EPA 821-R-99-012.

Riverside County. For suspended solids, the least effective structural BMP type was found to remove 30-65 percent of the pollutant load, while the most effective was found to remove 65-100 percent of the pollutant load. For nutrients, the least effective structural BMP type was found to remove 15-45 percent of the pollutant load, while the most effective was found to remove 65-100 percent of the pollutant load. For pathogens, the least effective structural BMP type was found to remove <30 percent of the pollutant load, while the most effective was found to remove 65-100 percent of the pollutant load. For metals, the least effective structural BMP type was found to remove 15-45 percent of the pollutant load, while the most effective was found to remove 65-100 percent of the pollutant load.

It is important to note that the CWA and NPDES federal regulations clearly require control of discharges into the MS4. CWA section 402(p)(3)(B)(ii) states that MS4 permits must "prohibit non-storm water discharges into the storm sewers." 40 CFR 122.26(d)(2)(iv)(B) requires Copermittees to "detect and remove […] illicit discharges and improper disposal into the storm sewer." See Finding C.14 and Discussion.

The Order's approach to regulating discharges into and from the MS4 is in accordance with State Water Board Order WQ 2001-15. In that order, the State Water Board reviewed the San Diego County permit (Order No. 2001-01) requirements and made one change to one prohibition.[101] The Order upheld all other requirements of the current permit. Order No. R9-2010-0016 incorporates the one change made by the State Water Board, and continues the approach of Order No. 2001-01 (the basis for the current permit), as it was upheld by the State Water Board in Order WQ 2001-15. State Water Board Order WQ 2001-15 supports such requirements, stating: "It is important to emphasize that dischargers into MS4s continue to be required to implement a full range of BMPs, including source control."

The Court of Appeals, Fourth Appellate District, found that the current permit's approach to regulation of discharges into the MS4 was appropriate. Since the Order utilizes the same approach, the court decision supports the Order's requirements.

Finding D.1.f. Runoff needs to be addressed during the three major phases of urban development (planning, construction, and use) in order to reduce the discharge of storm water pollutants to the MEP, effectively prohibit non-storm water discharges and protect receiving waters. Development which is not guided by water quality planning policies and principles can unnecessarily result in increased pollutant load discharges, flow rates, and flow durations which can negatively impact receiving water beneficial uses. Construction sites without adequate BMP implementation result in sediment runoff rates which greatly exceed natural erosion rates of undisturbed lands, causing

[101] The State Water Board removed the prohibition of discharges *into* the MS4 that cause or contribute to exceedances of water quality objectives. The revision allows for treatment of storm water flows once the pollutants have entered the MS4. It does not affect the effective prohibition on certain dry-weather flows into the MS4 that is required by the Clean Water Act.

siltation and impairment of receiving waters. Existing development generates substantial pollutant loads which are discharged in runoff to receiving waters.

Discussion of Finding D.1.f. MS4 permits are issued to municipalities because of their land use authority. The ultimate responsibility for the pollutant discharges, increased runoff, and inevitable long-term water quality degradation that results from development lies with local governments. This responsibility is based on the fact that it is the local governments that have authorized the development (i.e. conversion of natural pervious ground cover to impervious surfaces) and the land uses that generate the pollutants and runoff. Furthermore, the MS4 through which the pollutants and increased flows are conveyed, and ultimately discharged into natural receiving waters, are owned and operated by the same local governments. In summary, the Copermittees under the Order are responsible for discharges into and out of their MS4s because (1) they own and operate the MS4; and (2) they have the legal authority that authorizes the very development and land uses with generate the pollutants and increased flows in the first place.

For example, since grading cannot commence prior to the issuance of a local grading permit, the Copermittees have a built-in mechanism to ensure that all grading activities are protective of receiving water quality. The Copermittee has the authority to withhold issuance of the grading permit until the project proponent has demonstrated to the satisfaction of the Copermittee that the project will not violate their ordinances or cause the Copermittee to be in violation of its MS4 permit. Since the Copermittee will ultimately be held responsible for any discharges from the grading project by the San Diego Water Board, the Copermittee will want to use its own permitting authority to ensure that whatever measures the Copermittee deems necessary to protect discharges into its MS4 are in fact taken by the project proponent.

The Order holds the local government accountable for this direct link between its land use decisions and water quality degradation. The Order recognizes that each of the three major stages in the development process (development planning, construction, and the use or operational stage) are controlled by and must be authorized by the local government. Accordingly, this permit requires the local government to implement, or require others to implement, appropriate best management practices to reduce storm water pollutant discharges and increased flow during each of the three stages of development.

Including plans for BMP implementation during the design phase of new development and redevelopment offers the most cost effective strategy to reduce storm water runoff pollutant loads to surface waters.[102] The Phase II regulations for small municipalities reflect the necessity of addressing runoff during the early planning phase. Due to the greater water quality concerns generally experienced by larger municipalities, Phase II requirements for small municipalities are also applicable to larger municipalities such as

[102] USEPA, 2000. Storm Water Phase II Compliance Assistance Guide. EPA 833-R-00-002.

the Copermittees. The Phase II regulations direct municipalities to develop, implement, and enforce a program to address storm water runoff from new development and redevelopment projects that disturb greater than or equal to one acre, including projects less than one acre that are part of a larger common plan of development or sale. The program must ensure that controls are in place that would prevent or minimize water quality impacts. This includes developing and implementing strategies which include a combination of structural and/or non-structural BMPs appropriate to the locality. The program must also ensure the adequate long-term operation and maintenance of BMPs.[103] USEPA expands on the Phase II regulations for urban development when it recommends that Copermittees:

> "Adopt a planning process that identifies the municipality's program goals (e.g., minimize water quality impacts resulting from post-construction runoff from new development and redevelopment), implementation strategies (e.g., adopt a combination of structural and/or non-structural BMPs), operation and maintenance policies and procedures, and enforcement procedures. In developing your program, you should consider assessing existing ordinances, policies, programs and studies that address storm water runoff quality."

Management of storm water runoff during the construction phase is also essential. USEPA explains in the preamble to the Phase II regulations that storm water discharges generated during construction activities can cause an array of physical, chemical, and biological water quality impacts. Specifically, the biological, chemical and physical integrity of the waters may become severely compromised due to runoff from construction sites. Fine sediment from construction sites can adversely affect aquatic ecosystems by reducing light penetration, impeding sight-feeding, smothering benthic organisms, abrading gills and other sensitive structures, reducing habitat by clogging interstitial spaces within the streambed, and reducing intergravel dissolved oxygen by reducing the permeability of the bed material. Water quality impairment also results, in part, because a number of pollutants are preferentially absorbed onto mineral or organic particles found in fine sediment. The interconnected process of erosion (detachment of the soil particles), sediment transport, and delivery is the primary pathway for introducing key pollutants, such as nutrients, metals, and organic compounds into aquatic systems.[104]

Finally, storm water and non-storm water runoff from existing development must be addressed. The Copermittees' monitoring data exhibits that significant water quality problems exist in receiving waters which receive runoff from areas with extensive existing development, such as Aliso Creek. Source identification, BMP requirements, inspections, and enforcement are all important measures which can be implemented to address runoff from existing development. USEPA supports inspections and enforcement by municipalities when it states "Effective inspection and enforcement

[103] USEPA, 1999. 40 CFR Parts 9, 122, 123, and 124 National Pollutant Discharge Elimination System-Regulations for Revision of the Water Pollution Control Program Addressing Storm Water Discharges; Final Rule. 64 FR 68845.
[104] Ibid., 64 FR 68728.

requires […] penalties to deter infractions and intervention by the municipal authority to correct violations. Enforcement mechanisms […] also must be described."[105]

Finding D.1.g. Annual reporting requirements included in this Order are necessary to meet federal requirements and to evaluate the effectiveness and compliance of the Copermittees' programs.

Discussion of Finding D.1.g. The annual reporting requirements are consistent with federal NPDES regulation 40 CFR 122.41, which states:

> "The operator of a large or medium municipal separate storm sewer system of a municipal separate storm sewer system that has been designated by the Director under section 122.26(a)(1)(v) of this part must submit an annual report by the anniversary of the date of the issuance of the permit for such a system. The report shall include: (1) The status of implementing the components of the storm water management program that are established as permit conditions; (2) Proposed changes to the storm water management program that are established as permit condition, Such proposed changes shall be consistent with § 122.26(d)(2)iii) of this part; (3) Revisions, if necessary, to the assessment of controls and the fiscal analysis reported in the permit application under § 122.26(d)(2)iv) and (d)(2)(v) of this part; (4) A summary of data, including monitoring data, that is accumulated throughout the reporting year; (5) Annual expenditures and budget for year following each annual report; (6) A summary describing the number and nature of enforcement actions, inspections, and public education programs; and (7) Identification of water quality improvements or degradation."

CWC section 13267 provides that "the regional board may require that any person who has discharged […] shall furnish, under penalty of perjury, technical or monitoring reports which the regional board requires."

The San Diego Water Board must assess the reports to ensure that the Copermittees' programs are adequate to assess and address water quality. The reporting requirements can also be useful tools for the Copermittees to review, update, or revise their programs. Areas or issues which have received insufficient efforts can also be identified and improved.

Finding D.1.h. This Order establishes Storm Water Action Levels (SALs) for selected pollutants based on USEPA Rain Zone 6 (arid southwest) Phase I MS4 monitoring data for pollutants in storm water. The SALs were computed as the 90th percentile of the data set, utilizing the statistical based population approach, one of three approaches recommended by the State Water Board's Storm Water Panel in its report, 'The Feasibility of Numerical Effluent Limits Applicable to Discharges of Storm Water

[105] USEPA, 1992. Guidance Manual for the Preparation of Part II of the NPDES Permit Applications for Discharges from Municipal Separate Storm Sewer Systems. EPA 833-B-92-002.

Associated with Municipal, Industrial and Construction Activities (June 2006). SALs are identified in section D of this Order. Copermittees must implement a timely, comprehensive, cost-effective storm water pollution control program to reduce the discharge of pollutants in storm water from the permitted areas so as not to exceed the SALs. Exceedance of SALs may indicate inadequacy of programmatic measures and BMPs required in this Order.

Discussion of Finding D.1.h. Section 402(p) of the CWA states MS4 permits for storm water shall require controls to reduce the discharge of pollutants to the maximum extent practicable, including management practices, control techniques and system, design and engineering methods, and such other provisions as the Administrator or the State determines appropriate for the control of such pollutants. This includes requiring numeric effluent limitations for storm water.

SALs are not numeric effluent limitations, which is reflected in language which clarifies an excursion above a SAL does not create a presumption that MEP is not being met. Instead, a SAL exceedance is to be used by the Copermittee as an indication that the MS4 storm water discharge point is a definitive "bad actor," and the result from the monitoring needs to be considered as part of the iterative process for reducing pollutants in storm water to the MEP.

The CWA defines effluent limitations as:

> “Any restriction imposed by the Director on quantities, discharge rates, and concentrations of pollutants which are “discharged” from “point sources” into “waters of the United States”…” A SAL is not a restriction on a quantity, rate or concentration, but is a level at which actions that further reduce pollutants from that discharge point need to be evaluated in order to reduce storm water pollutants to the MEP. Thus, SALs are not effluent limitations as defined by the CWC or CWA.

The approach of using "action levels" is consistent with recommendations made by USEPA in their Interim Permitting Approach for Water Quality-Based Effluent Limitations in Storm Water Permits, dated August 26, 1996:

> "Under the Clean Water Act (CWA) and NPDES regulations, permitting authorities may employ a variety of conditions and limitations in storm water permits, including best management practices, performance objectives, narrative conditions, monitoring triggers, action levels (e.g., monitoring benchmarks, toxicity reduction evaluation action levels), etc., as the necessary water-quality based limitations, where numeric water quality based effluent limitations are determined to be unnecessary or infeasible". As such, these action levels are not considered numeric water quality-based effluent limitations.

It should be noted that a purpose of monitoring, required under this and previous Orders, is to aid in the evaluation of implemented programs and BMPs in reducing pollutants in storm water discharges to the MEP. The Monitoring and Reporting Program states:

> This Receiving Waters Monitoring and Reporting Program is intended to meet the following goals:
>
> 2. Measure and improve the effectiveness of the Copermittees' runoff management programs;
> 3. Assess the chemical, physical, and biological impacts to receiving waters resulting from MS4 discharges;
> 4. Characterize storm water discharges;
> 5. Identify sources of specific pollutants;
> 6. Prioritize drainage and sub-drainage areas that need management actions; and
> 9. Provide information to implement required BMP improvements.

Since the first permit (adopted 20 years ago), Copermittees have utilized non-numerical limitations (BMPs) to control and abate the discharge of any pollutants in storm water discharges to the MEP. Copermittees have been accorded 20 years to research, develop, and deploy BMPs that are capable of reducing storm water discharges from the MS4 to levels represented in SALs. Storm Water Action Levels are set at such a level that any exceedance of a SAL will clearly indicate BMPs being implemented are insufficient to protect the Beneficial Uses of waters of the State. Copermittee shall utilize the exceedance information as a high priority consideration when adjusting and executing annual work plans, as required by this Permit. Failure to appropriately consider and react to SAL exceedances in an iterative manner creates a presumption that the Copermittee(s) have not complied to the MEP.

SALs have been developed utilizing Phase I storm water effluent data (updated February 2008, http://rpitt.eng.ua.edu/Research/ms4/mainms4.shtml) from the arid west region (USEPA Rain Zone 6). USEPA Rainfall Zone 6, which includes MS4 effluent data from Orange, San Diego, Los Angeles, Ventura and San Bernadino County. The approach taken to derive SALs is a straightforward percentile approach, with the SAL being set as the 90th percentile of the dataset for each constituent. This approach is consistent with the 2006 State Water Board Panel Report:

> "The statistically based population approach would once again rely on the average distribution of measured water quality values developed from many water quality samples taken for many events at many locations. In this case, however, the Action Level would be defined by the central tendency and variance estimates from the population data. For example, the Action Level could be set as two standard deviations above the mean, i.e. if measured concentrations are consistently higher than two standard deviations above the mean, an Action Level would be triggered. Other population based measures

> of central tendency could be used (i.e. geometric mean, median, etc.) or estimates of variance (i.e. prediction intervals, etc.). Regardless of which population based estimators are used (or percentile from above), the idea would be to identify the [statistically derived] point at which managers feel concentrations are significantly beyond the norm."

SALs are measurable criteria which quantify the performance of BMPs for a particular watershed or subwatershed that discharges storm water MS4 effluent from that particular discharge point. Thus, Copermittees can utilize SAL results to determine the effectiveness BMPs on the effluent from a particular area of the MS4.

SALs represent the lowest 10 percent of pollutant reduction for USEPA Rain Zone 6 MS4 Phase I programs discharging to waters of the United States. For the past 20 years, Copermittees have utilized non-numerical limitations (BMPs) to control and abate the discharge of any pollutants in storm water discharges to the MEP. Copermittees have been accorded 20 years to research, develop, and deploy BMPs that are capable of reducing storm water discharges from the MS4 to levels represented in SALs. Storm Water Action Levels are set at such a level that any exceedance of a SAL will indicate to the Copermittee(s) that the discharge is within the lowest 10% of monitored outfalls. Therefore, an exceedance of a SAL warrants priority consideration within the Copermittee iterative process.

Finding D.2.a. The Standard Storm Water Mitigation Plan (SSMP) requirements contained in this Order are consistent with Order WQ 2000-11 adopted by the State Water Board on October 5, 2000. In the precedential order, the State Water Board found that the design standards, which essentially require that runoff generated by 85 percent of storm events from specific development categories be infiltrated or treated, reflect the MEP standard. The order also found that the SSMP requirements are appropriately applied to the majority of the Priority Development Project categories that are also contained in section F.1 of this Order. The State Water Board also gave California Regional Water Quality Control Boards (Regional Water Boards) the needed discretion to include additional categories and locations, such as retail gasoline outlets (RGOs), in SSMPs.

Discussion of Finding D.2.a. The post-construction requirements and design standards contained in the SSMP section of Order No. R9-2010-0016 constitute MEP consistent with State Water Board guidance, court decisions, and San Diego Water Board requirements. The State Water Board and San Diego Water Board have made several recent decisions in regards to inclusion of SSMP requirements in MS4 permits. In a precedential decision, State Water Board Order WQ 2000-11, the State Water Board found that the SSMP provisions constitute MEP for addressing storm water pollutant discharges resulting from Priority Development Projects. The provisions of the SSMP section of the Order are also consistent with those previously issued by the San Diego Water Board for Riverside County (Order No. R9-2004-001), Southern Orange County (Order Nos. R9-2002-0001 and R9-2009-0002) and San Diego County

(Order Nos. R9-2001-01 and R9-2007-0001), as well as requirements in the Los Angeles County MS4 permit (Order No. R4-2001-182). In State Water Board Order WQ 2001-15, the State Water Board reaffirmed that SSMP requirements constitute MEP. Moreover, the SSMP requirements of the San Diego County MS4 permit (Order No. R9-2001-01) were upheld when the California State Supreme Court declined to hear the matter on appeal.

Finding D.2.b. Controlling runoff pollution by using a combination of onsite source control and site design BMPs augmented with treatment control BMPs before the runoff enters the MS4 is important for the following reasons: (1) Many end-of-pipe BMPs (such as diversion to the sanitary sewer) are typically ineffective during significant storm events; (2) Whereas, onsite source control BMPs can be applied during all runoff conditions end-of-pipe BMPs are often incapable of capturing and treating the wide range of pollutants which can be generated on a sub-watershed scale; (3) End-of-pipe BMPs are more effective when used as polishing BMPs, rather than the sole BMP to be implemented; (4) End-of-pipe BMPs do not protect the quality or beneficial uses of receiving waters between the pollutant source and the BMP; and (5) Offsite end-of-pipe BMPs do not aid in the effort to educate the public regarding sources of pollution and their prevention.

Discussion of Finding D.2.b. Many end-of-pipe BMPs are designed for low flow conditions because their end-of-pipe location prevents them from being designed for large storm events. This results in the end-of-pipe BMPs being overwhelmed, bypassed, or ineffective during larger storm events more frequently than onsite BMPs designed for larger storms. BMPs are also frequently most effective for a particular type of pollutant (such as sediment). Such BMPs may be appropriate for small sites with a limited suite of pollutants generated; however, end-of-pipe BMPs must typically be able to address a wide range of pollutants generated by a sub-watershed, limiting their effectiveness and/or increasing costs. Moreover, the location of some end-of-pipe BMPs allow for untreated pollutants to be discharged to and degrade receiving waters prior to their reaching the BMPs. This fails to protect receiving waters, which is the purpose of BMP implementation. In addition, opportunities to educate the public regarding runoff pollution can be lost when end-of-pipe BMPs are located away from pollutant sources and out of sight. Onsite BMPs can lead to a better public understanding of runoff issues since their presence can provide a visible and/or tangible lesson in pollution prevention.

Finding D.2.c. Use of Low-Impact Development (LID) site design BMPs at new development, redevelopment and retrofit projects can be an effective means for minimizing the impact of storm water runoff discharges from the development projects on receiving waters. LID is a site design strategy with a goal of maintaining or replicating the pre-development hydrologic regime through the use of design techniques. LID site design BMPs help preserve and restore the natural hydrologic cycle of the site, allowing for filtration and infiltration which can greatly reduce the volume, peak flow rate, velocity, and pollutant loads of storm water runoff. Current

runoff management, knowledge, practices and technology have resulted in the use of LID BMPs as an acceptable means of meeting the storm water MEP standard.

Discussion of Finding D.2.c. The CWA is the cornerstone of surface water quality protection in the United States. (The Act does not deal directly with ground water or with water quantity issues.) The statute employs a variety of regulatory and nonregulatory tools to sharply reduce direct pollutant discharges into waterways, and manage polluted runoff. These tools are employed to achieve the broader goal of restoring and maintaining the chemical, physical, and biological integrity of the nation's waters so that they can support the protection and propagation of fish, shellfish, wildlife and recreation in and on the water.

Increasing the volume, velocity, frequency and discharge duration of storm water runoff from developed areas will eventually greatly accelerate downstream erosion, impair stream habitat in natural drainages, and negatively impact beneficial uses. Development and urbanization increase pollutant loads and volume while simultaneously increasing impervious area. Impervious surfaces can neither absorb water nor remove pollutants and thus lose the purification and infiltration provided by naturally vegetated soil. Furthermore, impervious surfaces tend to concentrate pollutants on the top of the surface that are then washed off into the MS4 and waters of the State in a concentrated manner. The use of LID site design BMPs can be an effective means of minimizing the impact of runoff discharges on receiving waters. By reducing water pollution, reducing runoff and increasing groundwater recharge, LID helps to improve the quality of receiving surface waters, stabilize the flow rates of receiving waters (preventing downstream hydromodification), reduce downstream flooding and protect and enhance water supply sources. Current runoff management, knowledge, practice and technology has resulted in the use of LID BMPs as an acceptable means of meeting the MEP standard for storm water treatment.

Current municipal codes may oppose or hinder the design, use and implementation of specific elements of LID. These codes include, but are not limited to, emergency services access requirements, building landscape ordinances, building height limits and parking space requirements. It is essential for Copermittees to work with other responsible agencies and/or update codes that have the potential to impact the use of LID.

The Local Government Commission, a non-profit organization working to build livable communities, developed a set of principles known as the *Ahwahnee Water Principles for Resource-Efficient Land Use*[106] that provide the opportunity to reduce costs and improve the reliability and quality of our water resources. Implementation of LID incorporates several of the Ahwahnee principles such as:

[106] Local Government Commission, "The Ahwahnee Water Principles – A Blueprint for Regional Sustainability", http://water.lgc.org/Members/tony/docs/lgc_water_guide.pdf

1. "Community Design should be compact, mixed use, walkable and transit-oriented so that urban runoff pollutants are minimized and the open lands that absorb water are preserved to the maximum extent possible."
3. "Water holding areas such as creek beds, recessed athletic fields, ponds, cisterns, and other features that serve to recharge groundwater, reduce runoff, improve water quality and decrease flooding should be incorporated into the urban landscape."
4. "All aspects of landscaping from the selection of plants to soil preparation and the installation of irrigation systems should be designed to reduce water demand, retain runoff, decrease flooding, and recharge groundwater."
5. "Permeable surfaces should be used for hardscape. Impervious surfaces such as driveways, streets, and parking lots should be minimized so that land is available to absorb storm water, reduce polluted urban runoff, recharge groundwater and reduce flooding."

The use of LID site design BMPs helps reduce the amount of impervious area associated with development and allows storm water to infiltrate into the soil. Natural vegetation and soil filters storm water runoff and reduces the volume and pollutant loads of storm water. Studies have revealed that the level of imperviousness resulting from development and urbanization is strongly correlated with the water quality impairment of nearby receiving waters.[107] In many cases, the impacts on receiving waters due to changes in hydrology can be more significant than those attributable to the contaminants found in storm water discharges.[108] These impacts include stream bank erosion (increased sediment load and subsequent deposition), benthic habitat degradation, and decreased diversity of macroinvertebrates. Although conventional BMPs do reduce storm water pollutant loads, they may not effectively control adverse effects from changes in the discharge hydrologic conditions.[109]

The Order includes requirements for developments to include site design BMPs that mimic or replicate the natural hydrologic cycle. Open space designs which maximize pervious surfaces and retention of "natural" drainages have been found to reduce both the costs of development and pollutant export.[110] Moreover, USEPA finds including plans for a "natural" site design and BMP implementation during the design phase of new development and redevelopment offers the most cost effective strategy to reduce storm water pollutant loads to surface waters.[111] In addition, a recent U.S. Department of Housing and Urban Development guidance document on low-impact development notes that the use of LID-based storm water management design allows land to be

[107] USEPA, 1999. 40 CFR Parts 9, 122, 123, and 124 National Pollutant Discharge Elimination System – Regulations for Revision of the Water Pollution Control Program Addressing Storm Water Discharges; Final Rule.
[108] Ibid.
[109] USEPA, 2000. Low-Impact Development: A literature review. EPA-841-B-00-005. 35p.
[110] Center for Watershed Protection, 2000. "The Benefits of Better Site Design in Residential Subdivisions." Watershed Protection Techniques. Vol. 3. No. 2.
[111] USEPA, 1999. 40 CFR Parts 9, 122, 123, and 124 National Pollutant Discharge Elimination System – Regulations for Revision of the Water Pollution Control Program Addressing Storm Water Discharges; Final Rule.

developed, but in a cost-effective manner that helps mitigate potential environmental impacts.[112]

Finding D.2.d. RGOs are significant sources of pollutants in storm water runoff. RGOs are points of convergence for motor vehicles for automotive related services such as repair, refueling, tire inflation, and radiator fill-up and consequently produce significantly higher loadings of hydrocarbons and trace metals (including copper and zinc) than other developed areas.

Discussion of Finding D.2.d. RGOs are included in the Order as a Priority Development Project category because RGOs produce significantly greater loadings of hydrocarbons and trace metals (including copper and zinc) than other developed areas. To meet the storm water MEP standard, source control and structural treatment BMPs are needed at RGOs that meet the following criteria: (a) 5,000 square feet or more or (b) an average daily traffic (ADT) of 100 or more vehicles per day. These are appropriate thresholds since vehicular development size and volume of traffic are good indicators of potential impacts of storm water runoff from RGOs on receiving waters.

This finding has been added to satisfy State Water Board Order WQ 2000-11's requirements for including RGOs as a Priority Development Category. State Water Board Order WQ 2000-11 acknowledged that a threshold (size, average daily traffic, etc.) appropriate to trigger SSMP requirements should be developed for RGOs and that specific findings regarding RGOs should be included in MS4 permits to justify the requirement.[113]

Finding D.2.e. Industrial sites are significant sources of pollutants in runoff. Pollutant concentrations and loads in runoff from industrial sites are similar or exceed pollutant concentrations and loads in runoff from other land uses, such as commercial or residential land uses. As with other land uses, LID site design, source control, and treatment control BMPs are needed at industrial sites in order to meet the MEP standard. These BMPs are necessary where the industrial site is larger than 10,000 square feet. The 10,000 square feet threshold is appropriate, since it is consistent with requirements in other Phase I NPDES storm water regulations throughout California.

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[112] U.S. Department of Housing and Urban Development, Office of Policy Development and Research, 2003. "The Practice of Low Impact Development." Prepared by: NAHB Research Center, Inc. Upper Marlboro, Maryland. Contract No. H-21314CA. 131p.

[113] State Water Board, 2000. Order WQ 2000-11. In the Matter of the Petitions of The Cities Of Bellflower, Et Al., The City Of Arcadia, And Western States Petroleum Association Review of January 26, 2000 Action of the Regional Board And Actions and Failures to Act by both the California Regional Water Quality Control Board, Los Angeles Region and Its Executive Officer Pursuant to Order No. 96-054, Permit for Municipal Storm Water and Urban Run-Off Discharges Within Los Angeles County [NPDES NO. CAS614001] SWRCB/OCC FILES A-1280, A-1280(a) and A-1280(b)

Discussion of Finding D.2.e. Industrial sites can be a significant source of pollutants in storm water runoff. In an extensive review of storm water literature, the Los Angeles Water Board found widespread support for the finding that "industrial and commercial activities can also be considered hot spots as sources of pollutants." It also found that "industrial and commercial areas were likely to be the most significant pollutant source areas" of heavy metals.[114] Likewise, storm water runoff from heavy industry in the Santa Clara Valley has been found to be extremely toxic.[115] These findings are corroborated by USEPA, which states in the preamble to the 1990 Phase I NPDES storm water regulations that "Because storm water from industrial facilities may be a major contributor of pollutants to municipal separate storm sewer systems, municipalities are obligated to develop controls for storm water discharges associated with industrial activity through their system in their storm water management program." Since heavy industrial sites can be a significant source of pollutants in runoff in a manner similar to other SSMP project categories such as commercial development or automotive repair shops, it is appropriate to include heavy industrial sites as a SSMP category in the Order.

The Phase I NPDES storm water regulations require the Copermittees to "control through ordinance, permit, contract, order, or similar means, the contribution of pollutants to the municipal storm sewer by storm water discharges associated with industrial activity and the quality of storm water discharged from sites of industrial activity" (40 CFR 122.26(d)(2)(i)). In addition, it has been established that the MEP standard for the control of storm water runoff from new development projects includes incorporation of the SSMP requirements. Since the Copermittees must both control storm water pollutants from industrial sites and meet the storm water MEP standard for new development, it is appropriate to apply the SSMP requirements to heavy industrial sites.

The State Water Board's Order WQ 2000-11 indicates that it is appropriate to apply SSMP requirements to categories of development where evidence shows the category of development can be a significant source of pollutants. As evidenced above, heavy industrial sites can be a significant source of pollutants. Therefore, the Order includes heavy industrial sites as a SSMP Priority Development Project category.

Finding D.2.f. If not properly designed or maintained, certain BMPs implemented or required by municipalities for runoff management may create a habitat for vectors (e.g. mosquitoes and rodents). Proper BMP design and maintenance to avoid standing water, however, can prevent the creation of vector habitat. Nuisances and public health impacts resulting from vector breeding can be prevented with close collaboration and cooperative effort between municipalities, local vector control agencies, and the California Department of Public Health during the development and implementation of runoff management programs.

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[114] Los Angeles Water Board. 2001.
[115] Schueler and Holland, 2000. Storm Water Strategies for Arid and Semi-Arid Watersheds (Article 66). The Practice of Watershed Protection.

Discussion of Finding D.2.f. The implementation of certain structural BMPs or other runoff treatment systems can result in significant vector problems in the form of increased breeding or harborage habitat for mosquitoes, rodents or other potentially disease transmitting organisms. The implementation of BMPs that retain water may provide breeding habitat for a variety of mosquito species, some of which have the potential to transmit diseases such as Western Equine Encephalitis, St. Louis Encephalomyelitis, and malaria. Recent BMP implementation studies by Caltrans[116] in District 7 and District 11 have demonstrated mosquito breeding associated with some types of BMPs. The Caltrans BMP Retrofit Pilot study cited lack of maintenance and improper design as factors contributing to mosquito production. However, a Watershed Protection Techniques article describes management techniques for selecting, designing, and maintaining structural treatment BMPs to minimize mosquito production.[117] State and local runoff management programs that include structural BMPs with the potential to retain water have been implemented in Florida and the Chesapeake Bay region without resulting in significant public health threats from mosquitoes or other vectors.[118]

Finding D.2.g. The increased volume, velocity, frequency and discharge duration of storm water runoff from developed areas has the potential to greatly accelerate downstream erosion, impair stream habitat in natural drainages, and negatively impact beneficial uses. Development and urbanization increase pollutant loads in storm water runoff and the volume of storm water runoff. Impervious surfaces can neither absorb water nor remove pollutants and thus lose the purification and infiltration provided by natural vegetated soil. Hydromodification measures for discharges to hardened channels allow for the future restoration of the hardened channels to their natural state, thereby restoring the chemical, physical, and biological integrity and beneficial uses of local receiving waters.

Discussion of Finding D.2.g. Increasing the volume, velocity, frequency and discharge duration of storm water runoff from developed areas will eventually greatly accelerate downstream erosion, impair stream habitat in natural drainages, and negatively impact beneficial uses. Development and urbanization increase pollutant loads and volume while simultaneously increasing impervious area. Impervious surfaces can neither absorb water nor remove pollutants and thus lose the purification and infiltration provided by naturally vegetated soil.

Historic hydromodification impacts, such as concrete lining and channelization, have impacted the natural physical habitat of urban streams resulting in low IBI scores. The Copermittee's monitoring to date indicates decreased IBI scores in the developed

[116] Caltrans, 2000. BMP Retrofit Pilot Studies: A Preliminary Assessment of Vector Production.
[117] Watershed Protection Techniques, 1995. Mosquitoes in Constructed Wetlands: A Management Bugaboo? 1(4):203-207.
[118] Shaver, E. and R. Baldwin , 1995. Sand Filter Design for Water Quality Treatment in Herricks, E., Ed. Stormwater Runoff and Receiving Systems: Impact, Monitoring, and Assessment, CRC Lewis Publishers, New York, NY.

watersheds when compared to reference sites, with developed sites consistently having poor or very poor IBI scores. While habitat scores remained stable over the last reporting period, with scores of marginal to sub-optimal, the Copermittees have consistently monitored high levels of fine sediment in habitat assessments and often changing vegetative cover. However, the impact of persistent toxicity at the bioassessment stations in conjunction with physical habitat scores is unknown.[119]

Hydromodification impacts result in poor physical habitat conditions through streambed scour, erosion, vegetation displacement, sediment deposition, channelization, and channel modifications. Increased sediment loads from hydromodification causes other impacts to physical habitats including increased turbidity which then may cause increased temperatures. In addition, an increased sediment load may have an increased biological content thereby increasing the sediment oxygen demand and lowering the dissolved oxygen available for aquatic life.[120]

The objective of the CWA is "to restore and maintain the chemical, *physical,* and biological integrity of the Nation's waters (emphasis added)." Stream restoration by removing concrete and other unnatural materials is a major step toward achieving that objective. The success of future stream restoration and stabilization is, however, dependent on preventing and reducing physical impacts from activities upstream. Therefore, hydromodification management measures are necessary upstream of modified (e.g. concrete, rip rap, etc.) channels in addition to non-modified channels.

Please see discussion of Findings C.10 and C.11 for additional information about impacts due to increasing volume, velocity, frequency and discharge duration of storm water runoff from developed areas.

Finding D.3.a. In accordance with federal NPDES regulations and to ensure the most effective oversight of industrial and construction site discharges, discharges of runoff from industrial and construction sites are subject to dual (State and local) storm water regulation. Under this dual system, each Copermittee is responsible for enforcing its local permits, plans, and ordinances, and the San Diego Water Board is responsible for enforcing the General Construction Activities Storm Water Permit, State Water Board Order 2009-0009-DWQ, NPDES No. CAS000002 (General Construction Permit) and the General Industrial Activities Storm Water Permit, State Water Board Order97-03-DWQ, NPDES No. CAS000001 (General Industrial Permit). NPDES municipal regulations require that municipalities develop and implement measures to address runoff from industrial and construction activities. Those measures may include the implementation of other BMPs in addition to those BMPs that are required under the statewide general permits for activities subject to both State and local regulation.

[119] Riverside County Copermittees, 2008-2009 Santa Margarita Watershed Annual Report.
[120] USEPA, National Management Measures to Control Nonpoint Source Pollution from Hydromodification, EPA 841-B-07-002, July 2007.

Discussion of Finding D.3.a. USEPA finds the control of pollutant discharges from industry and construction so important to receiving water quality that it has established a double system of regulation over industrial and construction sites. This double system of regulation consists of two parallel regulatory systems with the same common objective: to keep pollutants from industrial and construction sites out of the MS4. In this double system of regulation for runoff from industrial and construction sites, local governments must enforce their legal authorities (i.e. local ordinances and permits) while the San Diego Water Board must enforce its legal authority (i.e. statewide general industrial and construction storm water permits). These two regulatory systems are designed to complement and support each other. Municipalities are not required to enforce San Diego Water Board and State Water Board permits. They are required, however, to enforce their ordinances and permits. The Federal regulations are clear that municipalities have responsibility to prevent non-storm water and address storm water runoff from industrial and construction sites which enters their MS4s.

Municipalities have this responsibility because they have the authority to issue land use and development permits. Since municipalities are the lead permitting authority for industrial land use and construction activities, they are also the lead for enforcement regarding runoff discharges from these sites. For sites where the municipality is the lead permitting authority, the San Diego Water Board will work with the municipality and provide support where needed. The San Diego Water Board will assist municipalities in enforcement against non-compliant sites after the municipality has exhibited a good faith effort to bring the site into compliance.

According to USEPA, the storm water regulations envision that NPDES permitting authorities and municipal operators will cooperate to develop programs to monitor and control pollutants in storm water discharges from industrial facilities.[121] USEPA discusses the "dual regulation" of construction sites in its Storm Water Phase II Compliance Assistance Guide, which states "Even though all construction sites that disturb more than one acre are covered nationally by an NPDES storm water permit, the construction site runoff control minimum measure […] is needed to induce more localized site regulation and enforcement efforts, and to enable operators […] to more effectively control construction site discharges into their MS4s."[122] While the Storm Water Phase II Compliance Assistance Guide applies to small municipalities, it is applicable to the Copermittees, because they are similar in size and have the potential to discharge similar pollutant types as Phase II municipalities.

Finding D.3.b. Identification of sources of pollutants in runoff (such as municipal areas and activities, industrial and commercial sites/sources, construction sites, and residential areas), development and implementation of BMPs to address those

[121] USEPA, 1992. Guidance Manual for the Preparation of Part II of the NPDES Permit Applications for Discharges from Municipal Separate Storm Sewer Systems. EPA 833-B-92-002.
[122] USEPA, 2000. Storm Water Phase II Compliance Assistance Guide. EPA 833-R-00-002.

sources, and updating ordinances and approval processes are necessary for the Copermittees to ensure that discharges of pollutants from its MS4 in storm water are reduced to the MEP and that non-storm water discharges are not occurring. Inspections and other compliance verification methods are needed to ensure minimum BMPs are implemented. Inspections are especially important at areas that are at high risk for pollutant discharges.

Discussion of Finding D.3.b. Source identification is necessary to characterize the nature and extent of pollutants in discharges and to develop appropriate BMPs. It is the first step in a targeted approach to runoff management. Source identification helps identify the location of potential sources of pollutants in runoff. Pollutants found to be present in receiving waters can then be traced to the sites which frequently generate such pollutants. In this manner source inventories can help to target inspections, monitoring, and potential enforcement. This allows for limited inspection, monitoring, and enforcement time to be most effective. USEPA supports source identification as a concept when it recommends construction, municipal, and industrial source identification in guidance and the federal regulations.[123,124]

The development of BMPs for identified sources will help ensure that appropriate, consistent controls are implemented at all types of development and areas. Copermittees must reduce the discharge of pollutants in storm water runoff to the maximum extent practicable. To achieve this level of pollutant reduction, BMPs must be implemented. Designation of minimum BMPs helps ensure that appropriate BMPs are implemented for various sources. These minimum BMPs also serve as guidance as to the level of water quality protection required. USEPA requires development and implementation of BMPs for construction, municipal, commercial, industrial, and residential sources at 40 CFR 122.26(d)(2)(iv)(A-D).

Updating ordinances and approval processes is necessary in order for the Copermittees to control discharges to their MS4s. USEPA supports updating ordinances and approval processes when it states "A crucial requirement of the NPDES storm water regulation is that a municipality must demonstrate that it has adequate legal authority to control the contribution of pollutants in storm water discharged to its MS4. […] In order to have an effective municipal storm water management program, a municipality must have adequate legal authority to control the contribution of pollutants to the MS4. […] 'Control,' in this context, means not only to require disclosure of information, but also to limit, discourage, or terminate a storm water discharge to the MS4."[125]

[123] USEPA, 1992. Guidance Manual for the Preparation of Part II of the NPDES Permit Applications for Discharges from Municipal Separate Storm Sewer Systems. EPA 833-B-92-002.
[124] 40 CFR 122.26(d)(2)(ii)
[125] USEPA, 1992. Guidance Manual for the Preparation of Part II of the NPDES Permit Applications for Discharges from Municipal Separate Storm Sewer Systems. EPA 833-B-92-002.

Inspections provide a necessary means for the Copermittees to evaluate compliance of pollutant sources with their municipal ordinances and minimum BMP requirements. USEPA supports inspections when it recommends inspections of construction, municipal, and industrial sources.[126] Inspection of high risk sources are especially important because of the ability of frequent inspections to help ensure compliance, thereby reducing the risk associated with such sources. USEPA suggests that inspections can improve compliance when it states "Effective inspection and enforcement requires […] penalties to deter infractions and intervention by the municipal authority to correct violations."[127]

Finding D.3.c. Historic and current development makes use of natural drainage patterns and features as conveyances for runoff. Urban streams used in this manner are part of the municipalities MS4s regardless of whether they are natural, anthropogenic, or partially modified features. In these cases, the urban stream is both an MS4 and receiving water.

Discussion of Finding D.3.c. An MS4 is defined in the federal regulations as a conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, or storm drains), owned or operated by a Copermittee, and designed or used for collecting or conveying runoff.[128] Natural drainage patterns and urban streams are frequently used by municipalities to collect and convey runoff away from development within their jurisdiction. Therefore, the San Diego Water Board considers natural drainages that are used for conveyances of runoff, regardless of whether or not they've been altered by the municipality, as both part of the MS4s and as receiving waters. To clarify, an unaltered natural drainage, which receives runoff from a point source (channeled by a Copermittee to drain an area within their jurisdiction), which then conveys the runoff to an altered natural drainage or a man-made MS4, is both an MS4 and a receiving water.[129]

Finding D.3.d. As operators of the MS4s, the Copermittees cannot passively receive and discharge pollutants from third parties. By providing free and open access to an MS4 that conveys discharges to waters of the U.S., the operator essentially accepts responsibility for discharges into the MS4 that it does not prohibit or otherwise control. These discharges may cause or contribute to a condition of contamination or a violation of water quality standards.

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[126] Ibid.
[127] USEPA, 1992. Guidance Manual for the Preparation of Part II of the NPDES Permit Applications for Discharges from Municipal Separate Storm Sewer Systems. EPA 833-B-92-002.
[128] USEPA, 2000. EPA Administered Permit Programs: The National Pollutant Discharge Elimination System. Code of Federal Regulations, Vol. 40, Part 122.
[129] San Diego Water Board, 2001. Response in Opposition to Petitions for Review of California Regional Water Quality Control Board San Diego Region Order No. 2001-01 – NPDES Permit No. CAS0108758 (San Diego Municipal Storm Water Permit).

Discussion of Finding D.3.d. CWA section 402(p) requires operators of MS4s to prohibit non-storm water discharges into their MS4s. This is necessary because pollutants which enter the MS4 generally are conveyed through the MS4 to be eventually discharged into receiving waters. If a municipality does not prohibit non-storm water discharges, it is providing the pathway (its MS4) which enables pollutants to reach receiving waters. Since the municipality's storm water management service can result in pollutant discharges to receiving waters, the municipality must accept responsibility for the water quality consequences resulting from this service. Furthermore, third party discharges can cause a municipality to be out of compliance with its permit. Since pollutants from third parties which enter the MS4 will eventually be discharged from the MS4 to receiving waters, the third party discharges can result in a situation of municipality non-compliance if the discharges lead to an exceedance of water quality standards. For these reasons, each Copermittee must prohibit and/or control discharges from third parties to its MS4. USEPA supports this concept when it states "the operators of regulated small MS4s cannot passively receive and discharge pollutants from third parties" and "the operator of a small MS4 that does not prohibit and/or control discharges into its system essentially accepts 'title' for those discharges. At a minimum, by providing free and open access to the MS4s that convey discharges to the waters of the United States, the municipal storm sewer system enables water quality impairment by third parties."[130]

In a recent decision issued for *United States v. Washington State Department of Transportation (WSDOT)*,[131] the court found that WSDOT, by allowing runoff from its MS4 to a receiving water that is part of a Superfund site, is an "arranger" of "disposal or treatment of hazardous substances" as defined under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) by "designing, constructing, and operating drainage systems whose sole function was to collect highway runoff and dispose of it into nearby water-bodies." The court went on to state that "WSDOT did design the drainage system and…has the ability to redirect, contain or treat its contaminated runoff."

Finding D.3.e. Waste and pollutants which are deposited and accumulate in MS4 drainage structures will be discharged from these structures to waters of the U.S. unless they are removed. These discharges may cause or contribute to, or threaten to cause or contribute to, a condition of pollution in receiving waters. For this reason, pollutant discharges from storm water into MS4s must be reduced using a combination of management measures, including source control and an effective MS4 maintenance program implemented by each Copermittee.

Discussion of Finding D.3.e. When rain falls and drains freeways, industries, construction sites, and neighborhoods, it picks up a multitude of pollutants. Gravity flow transports the pollutants to the MS4. Illicit discharges and connections also can

[130] Federal Register / Vol. 64, No. 235 / Wednesday, December 8, 1999 / Rules and Regulations. P. 68765-68766.
[131] United State District Court, Western District of Washington at Tacoma, Case No. C08-5722RJB, Order on Motions for Partial Summary Judgment, dated June 7, 2010.

contribute a significant amount of pollutants to MS4s. MS4s are commonly designed to convey their contents as quickly as possible. Due to the resulting typically high flow rates within the concrete conveyance systems of MS4s, pollutants which enter or are deposited in the MS4 and not removed are generally flushed unimpeded through the MS4 to waters of the United States. Since treatment generally does not occur within the MS4, in such cases reduction of storm water pollutants to the MEP must occur prior to discharges entering the MS4.

The importance of this concept is supported by the tons of wastes/pollutants that have been removed from the Copermittees' MS4s as reported in their ROWD.[132] Moreover, these pollutants will be discharged into receiving waters unless an effective MS4 and structural treatment BMP maintenance program is implemented by the Copermittees. The requirement for Copermittees to conduct a MS4 maintenance program is specifically directed in both the Phase I and Phase II storm water regulations. Regarding MS4 cleaning, USEPA states "The removal of sediment, decaying debris, and highly polluted water from catch basins has aesthetic and water quality benefits, including reducing foul odors, reducing suspended solids, and reducing the load of oxygen-demanding substances that reach receiving waters."[133] It goes on to say, "Catch basin cleaning is an efficient and cost-effective method for preventing the transport of sediment and pollutants to receiving water bodies." USEPA also finds that "Lack of maintenance often limits the effectiveness of storm water structural controls such as detention/retention basins and infiltration devices. […] The proposed program should provide for maintenance logs and identify specific maintenance activities for each class of control, such as removing sediment from retention ponds every five years, cleaning catch basins annually, and removing litter from channels twice a year."[134]

Finding D.3.f. Enforcement of local runoff related ordinances, permits, and plans is an essential component of every runoff management program and is specifically required in the federal storm water regulations and this Order. Each Copermittee is individually responsible for adoption and enforcement of ordinances and/or policies, implementation of identified control measures/BMPs needed to prevent or reduce pollutants in storm water runoff, and for the allocation of funds for the capital, operation and maintenance, administrative, and enforcement expenditures necessary to implement and enforce such control measures/BMPs under its jurisdiction. Education is an important aspect of every effective runoff management program and the basis for changes in behavior at a societal level. Education of municipal planning, inspection, and maintenance department staffs is especially critical to ensure that in-house staffs understand how their activities impact water quality, how to accomplish their jobs while protecting water quality, and understand their specific roles and responsibilities for compliance with this Order. Public education, designed to target various urban land

[132] Riverside County Copermittees. 2009. Report of Waste Discharge (San Diego Region).
[133] USEPA, 1999. Storm Water O&M Fact Sheet, Catch Basin Cleaning. EPA 832-F-99-011.
[134] USEPA, 1992. Guidance Manual for the Preparation of Part II of the NPDES Permit Applications for Discharges from Municipal Separate Storm Sewer Systems. EPA 833-B-92-002.

users and other audiences, is also essential to inform the public of how individual actions affect receiving water quality and how adverse effects can be minimized.

Discussion of Finding D.3.f. The Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(A – D) are clear in placing responsibility on municipalities for control of runoff from third party activities and land uses to their MS4.[135] In order for municipalities to assume this responsibility, they must implement ordinances, permits, and plans addressing runoff from third parties. Assessments for compliance with their ordinances, permits, and plans are essential for a municipality to ensure that third parties are not causing the municipality to be in violation of its municipal storm water permit. When conditions of non-compliance are determined, enforcement is necessary to ensure that violations of municipality ordinances and permits are corrected. When the Copermittees determine a violation of its storm water ordinance, it must pursue correction of the violation. Without enforcement, third parties do not have incentive to correct violations. USEPA supports enforcement by municipalities when it states "Effective inspection and enforcement requires […] penalties to deter infractions and intervention by the municipal authority to correct violations. Enforcement mechanisms […] also must be described."[136]

Education is a critical BMP and an important aspect of runoff management programs. USEPA finds that "An informed and knowledgeable community is critical to the success of a storm water management program since it helps ensure the following: Greater support for the program as the public gains a greater understanding of the reasons why it is necessary and important, [and] greater compliance with the program as the public becomes aware of the personal responsibilities expected of them and others in the community, including the individual actions they can take to protect or improve the quality of area waters."[137]

Regarding target audiences, USEPA also states "The public education program should use a mix of appropriate local strategies to address the viewpoints and concerns of a variety of audiences and communities, including minority and disadvantaged communities, as well as children."

Finding D.3.g. Public participation during the development of runoff management programs is necessary to ensure that all stakeholder interests and a variety of creative solutions are considered.

Discussion of Finding D.3.g. This finding is supported by the Phase II Storm Water Regulations, which state "early and frequent public involvement can shorten implementation schedules and broaden public support for a program." USEPA goes

[135] USEPA, 2000. EPA Administered Permit Programs: The National Pollutant Discharge Elimination System. Code of Federal Regulations, Vol. 40, Part 122.
[136] USEPA, 1992. Guidance Manual for the Preparation of Part II of the NPDES Permit Applications for Discharges from Municipal Separate Storm Sewer Systems. EPA/833-B-92-002.
[137] USEPA, 2000. Storm Water Phase II Compliance Assistance Guide. EPA 833-R-00-002.

on to explain, "Public participation is likely to ensure a more successful storm water program by providing valuable expertise and a conduit to other programs and governments."[138]

Finding D.3.h. Retrofitting existing development with storm water treatment controls, including LID, is necessary to address storm water discharges from existing development that may cause or contribute to a condition of pollution or a violation of water quality standards. Although SSMP BMPs are required for redevelopment, the current rate of redevelopment will not address water quality problems in a timely manner. Cooperation with private landowners is necessary to effectively identify, implement, and maintain retrofit projects for the preservation, restoration, and enhancement of water quality.

Discussion of Finding D.3.h. Existing BMPs are not sufficient to protect the Beneficial Uses of receiving waters from storm water MS4 discharges, as evidenced by 303(d) listings and exceedances of Water Quality Objectives from the Copermittees' monitoring reports. As recognized in USEPA guidance, waters in the region cannot be protected without also addressing degradation caused by storm water discharges from existing development. This requires more than just a new development and redeveloped sites program, which at best can only hold the line. For this reason USEPA recommends that storm water programs include a retrofit plan or program for retrofitting existing development.[139]

Implementing more advanced BMPs, including the retrofitting of existing development with LID BMPs, is part of the iterative process. Based on the current rate of redevelopment compared to existing BMPs, the use of LID only on new and redevelopment will not adequately address current water quality problems, including downstream hydromodification. Retrofitting existing development is practicable for a municipality through a systematic evaluation, prioritization and implementation plan focused on impaired water bodies, pollutants of concern, areas of downstream hydromodification, feasibility and effective communication and cooperation with private property owners.

To actually improve the quality of receiving waters, discharges from existing developed sites need to be mitigated, which generally means implementation of measures to retrofit existing development sites with storm water control measures that can retain and/or treat storm water on site. Retrofitting existing development is possible and reasonable to significantly improve water quality in receiving waters.

Successful retrofitting programs have been implemented in such diverse locations as Seattle, Washington[140]; Portland, Oregon[141], Santa Monica, California[142]; Kansas City,

[138] Federal Register / Vol. 64, No. 235 / Wednesday, December 8, 1999 / Rules and Regulations. P. 68755.
[139] USEPA, 2010. MS4 Permit Improvement Guide. EPA 833-R-10-001.
[140] SEA Street, http://www.seattle.gov/dpd/Planning/CityDesign/What_We_Do/Outreach/Folio/DPDS_008014.asp
[141] Clean River Rewards, http://www.portlandonline.com/BES/index.cfm?c=edeef

Kansas[143]; and Montgomery County, MD[144]. When appropriately applied as in this Order, retrofitting existing development meets MEP.

Finding D.4.a. Since runoff within a watershed can flow from and through multiple land uses and political jurisdictions, watershed-based runoff management can greatly enhance the protection of receiving waters. Such management provides a means to focus on the most important water quality problems in each watershed. By focusing on the most important water quality problems, watershed efforts can maximize protection of beneficial use in an efficient manner. Effective watershed-based runoff management actively reduces pollutant discharges and abates pollutant sources causing or contributing to watershed water quality problems. Watershed-based runoff management that does not actively reduce pollutant discharges and abate pollutant sources causing or contributing to watershed water quality problems can necessitate implementation of the iterative process outlined in section A.3 of the this Order. Watershed management of runoff does not require Copermittees to expend resources outside of their jurisdictions. In some cases, however, this added flexibility provides more, and possibly more effective, alternatives for minimizing waste discharges. Watershed management requires the Copermittees within a watershed to develop a watershed-based management strategy, which can then be implemented on a jurisdictional basis.

Discussion of Finding D.4.a. In recent years, addressing water quality issues from a watershed perspective has increasingly gained attention. Regarding watershed-based permitting, the USEPA *Watershed-Based NPDES Permitting Policy Statement* issued on Jan. 7, 2004 states the following:

> USEPA continues to support a holistic watershed approach to water quality management. The process for developing and issuing NPDES permits on a watershed basis is an important tool in water quality management. USEPA believes that developing and issuing NPDES permits on a watershed basis can benefit all watershed stakeholders, from the NPDES permitting authority to local community members. A watershed-based approach to point source permitting under the NPDES program may serve as one innovative tool for achieving new efficiencies and environmental results. USEPA believes that watershed-based permitting can:
>
> - Lead to more environmentally effective results;
> - Emphasize measuring the effectiveness of targeted actions on improvements in water quality;
> - Provide greater opportunities for trading and other market based approaches;

[142] City of Santa Monica, Urban Runoff program, http://www.smgov.net/Departments/OSE/categories/content.aspx?id=4007
[143] 10,000 Rain Gardens, http://www.rainkc.com/
[144] Rainscapes, http://www.montgomerycountymd.gov/Content/DEP/Rainscapes/home.html

- Reduce the cost of improving the quality of the nation's waters;
- Foster more effective implementation of watershed plans, including total maximum daily loads (TMDLs); and
- Realize other ancillary benefits beyond those that have been achieved under the CWA (e.g., facilitate program integration including integration of Clean Water Act and Safe Drinking Water Act programs).

Watershed-based permitting is a process that ultimately produces NPDES permits that are issued to point sources on a geographic or watershed basis. In establishing point source controls in a watershed-based permit, the permitting authority may focus on watershed goals, and consider multiple pollutant sources and stressors, including the level of nonpoint source control that is practicable. In general, there are numerous permitting mechanisms that may be used to develop and issue permits within a watershed approach.

This USEPA guidance is in line with State Water Board and San Diego Water Board watershed management goals. For example, the State Water Board's TAC recommends watershed-based water quality protection, stating "Municipal permits should have watershed specific components." The TAC further recommends that "All NPDES permits and Waste Discharge Requirements should be considered for reissuance on a watershed basis."

In addition, the Basin Plan states that "public agencies and private organizations concerned with water resources have come to recognize that a comprehensive evaluation of pollutant contributions on a watershed scale is the only way to realistically assess cumulative impacts and formulate workable strategies to truly protect our water resources. Both water pollution and habitat degradation problems can best be solved by following a basin-wide approach."

In light of USEPA's policy statement and the State Water Board's and San Diego Water Board's watershed management goals, the San Diego Water Board seeks to expand watershed management in the regulation of runoff from the MS4. Watershed-based MS4 permits can provide for more effective receiving water quality protection by focusing on specific water quality problems. The entire watershed for the receiving water can be assessed, allowing for critical areas and practices to be targeted for corrective actions. Known sources of pollutants of concern can be investigated for potential water quality impacts. Problem areas can then be addressed, leading to eventual improvements in receiving water quality. Management of runoff on a watershed basis allows for specific water quality problems to be targeted so that efforts result in maximized water quality improvements.[145]

[145] San Diego Water Board, 2004. San Diego County Municipal Storm Water Permit Reissuance Analysis Summary. P. 1.

Finding D.4.b. Some runoff issues, such as general education and training, can be effectively addressed on a regional basis. Regional approaches to runoff management can improve program consistency and promote sharing of resources, which can result in implementation of more efficient programs.

Discussion of Finding D.4.b. Copermittees in Riverside County participate in several runoff-related activities whose scope extends beyond the area subject to this Order. These include countywide activities (e.g., portions of Riverside County fall under the jurisdictions of the Santa Ana Water Board and California Regional Water Quality Control Board, Colorado River Region (Colorado River Water Board)), southern California, and statewide activities. Copermittees' participation in these regional activities is generally directed at improving management capability, preventing redundancy and taking advantage of economies of scale. For instance, Copermittees seek to develop consistency between watershed and/or jurisdictional programs (e.g., through standards development), and to collaborate on certain program activities such as education, training, and monitoring.

Finding D.4.c. It is important for the Copermittees to coordinate their water quality protection and land use planning activities to achieve the greatest protection of receiving water bodies. Copermittee coordination with other watershed stakeholders, especially the State of California Department of Transportation, the U.S. federal government, sovereign American Indian tribes, and water and sewer districts, is also important.

Discussion of Finding D.4.c. Conventional planning and zoning can be limited in their ability to protect the environmental quality of creeks, rivers, and other water bodies. Watershed-based planning is often ignored, despite the fact that receiving waters unite land by collecting runoff from throughout the watershed. Since watersheds unite land, they can be used as an effective basis for planning. Watershed-based planning enables local and regional areas to realize economic, social, and other benefits associated with growth, while conserving the resources needed to sustain such growth, including water quality.

This type of planning can involve four steps: (1) Identify the watersheds shared by the participating jurisdictions; (2) Identify, assess, and prioritize the natural, social, and other resources in the watersheds; (3) Prioritize areas for growth, protection, and conservation, based on prioritized resources; and (4) Develop plans and regulations to guide growth and protect resources. Local governments have started with simple, yet effective, steps toward watershed planning, such as adopting a watershed-based planning approach, articulating the basic strategy in their General Plans, and beginning to pursue the basic strategy in collaboration with neighboring local governments who share the watersheds. Examples of new mechanisms created to facilitate watershed-based planning and zoning include the San Francisquito Creek

Watershed Coordinated Resource Management Process and the Santa Clara Basin Watershed Management Initiative.[146]

[146] Bay Area Stormwater Management Agencies Association., 1999. Start at the Source. Forbes Custom Publishing. Available on-line at: http://www.scvurppp-w2k.com/basmaa_satsm.htm

E. Statute and Regulatory Considerations

Finding E.1. The RWL language specified in this Order is consistent with language recommended by the USEPA and established in State Water Board Order WQ-99-05, *Own Motion Review of the Petition of Environmental Health Coalition to Review Waste Discharge Requirements Order No. 96-03, NPDES Permit No. CAS0108740*, adopted by the State Water Board on June 17, 1999. The RWL language in this Order requires compliance with water quality standards, which for storm water discharges is to be achieved through an iterative approach requiring the implementation of improved and better-tailored BMPs over time. Compliance with receiving water limitations based on applicable water quality standards is necessary to ensure that MS4 discharges will not cause or contribute to violations of water quality standards and the creation of conditions of pollution, contamination, or nuisance.

Discussion of Finding E.1. The RWL language in the Order requires storm water compliance with water quality standards through an iterative approach for implementing improved and better-tailored BMPs over time. The iterative BMP process requires the implementation of increasingly stringent BMPs until receiving water quality standards are achieved. This is necessary because implementation of BMPs alone cannot ensure attainment of receiving water quality standards. For example, a BMP that is effective in one situation may not be applicable in another. An iterative process of BMP development, implementation, and assessment is needed to promote consistent compliance with receiving water quality objectives. If assessment of a given BMP confirms that the BMP is ineffective, the iterative process should be restarted, with redevelopment of a new BMP that is anticipated to result in compliance with receiving water quality objectives.

The issue of whether storm water discharges from MS4s must meet water quality standards has been intensely debated in past years. The argument arises because CWA section 402(p) fails to clearly state that municipal dischargers of storm water must meet water quality standards. On the issue of industrial discharges of storm water, the statute clearly indicates that industrial dischargers must meet both (1) the technology-based standard of “best available technology economically achievable (BAT)” and (2) applicable water quality standards. On the issue of municipal discharges however, the statute states that municipal dischargers must meet (1) the technology-based standard of MEP” and (2) “such other provisions that the Administrator or the State determines appropriate for the control of such pollutants.” The statute fails, however, to specifically state that municipal dischargers must meet water quality standards.

As a result, the municipal storm water dischargers have argued that they do not have to meet water quality standards; and that they only are required to meet MEP for storm water. Environmental interest groups maintain that not only do MS4 discharges have to meet water quality standards, but that MS4 permits must also comply with numeric effluent limitations for the purpose of meeting water quality standards. On the issue of

water quality standards, USEPA, the State Water Board, and the San Diego Water Board have consistently maintained that MS4s must indeed comply with water quality standards. On the issue of whether water quality standards must be met by numeric effluent limitations, USEPA, the State Water Board (in Orders WQ 91-03 and WQ 91-04), and the San Diego Water Board have maintained that MS4 permits can contain narrative requirements for the implementation of BMPs in place of numeric effluent limitations for storm water discharges.[147]

In addition to relying on USEPA's legal opinion concluding that MS4s must meet MEP for storm water and water quality standards, the State Water Board also relied on the CWA's explicit authority for States to require "such other provisions that the Administrator or the State determines appropriate for the control of such pollutants" in addition to the technology-based standard of MEP for storm water discharges. To further support its conclusions that MS4 permit dischargers must meet water quality standards, the State Water Board relied on provisions of the CWC that specify that all waste discharge requirements must implement applicable Basin Plans and take into consideration the appropriate water quality objectives for the protection of beneficial uses.

The State Water Board first formally concluded that permits for MS4s must contain effluent limitations based on water quality standards in its Order WQ 91-03. In that Order, the State Water Board also concluded that it was appropriate for Regional Water Boards to achieve this result by requiring best management practices, rather than by inserting numeric effluent limitations into MS4 permits. Later, in Order WQ 98-01, the State Water Board prescribed specific precedent setting Receiving Water Limitations language to be included in all future MS4 permits. This language specifically requires that MS4 dischargers meet water quality standards and allows for the use of narrative BMPs (increasing in stringency and implemented in an iterative process) as the mechanism by which water quality standards can be met for storm water discharges.

In Order WQ 99-05, the State Water Board modified its receiving water limitations language in Order WQ 98-01 to meet specific objections by USEPA (the modifications resulted in stricter compliance with water quality standards). State Water Board Order WQ 99-05 states:

> "In Order WQ 98-01, the State Board ordered that certain receiving water limitation language be included in future municipal storm water permits. Following inclusion of that language in permits issued by the San Francisco Bay and San Diego Water Boards for Vallejo and Riverside respectively, the USEPA objected to the permits. The USEPA objection was based on the receiving

[147] For the most recent assessment, see Storm Water Panel Recommendations to the California State Water Resources Control Board, 2006. *The Feasibility of Numeric Effluent Limits Applicable to Discharges of Storm Water Associated with Municipal, Industrial, and Construction Activities.*

> water limitation language. The USEPA has now issued those permits itself and has included receiving water limitation language it deems appropriate.
>
> In light of USEPA's objection to the receiving water limitation language in Order WQ 98-01 and its adoption of alternative language, the State Board is revising its instructions regarding receiving water limitation language for municipal storm water permits. It is hereby ordered that Order WQ 98-01 will be amended to remove the receiving water limitation language contained therein and to substitute the USEPA language. Based on the reasons stated here, and as a precedent decision, the following receiving water limitation language shall be included in future municipal storm water permits."

In the 1999 case involving MS4 permits issued by USEPA to several Arizona cities (*Defenders of Wildlife v. Browner*, 1999, 197 F. 3d 1035), the United States Court of Appeals for the Ninth Circuit upheld USEPA's requirement for MS4 dischargers to meet water quality standards, but it did so on the basis of USEPA's discretion rather than on the basis of strict compliance with the CWA. In other words, while holding that the CWA does not require all MS4 discharges to comply strictly with state water quality standards, the Court also held that USEPA has the authority to determine that ensuring strict compliance with state water quality standards is necessary to control pollutants. On the question of whether MS4 permits must contain numeric effluent limitations, the court upheld USEPA's use of iterative BMPs in place of numeric effluent limitations for storm water discharges.

On October 14, 1999, the State Water Board issued a legal opinion on the federal appellate decision and provided advice to the Regional Water Boards on how to proceed in the future. In the memorandum, the State Water Board concludes that the recent Ninth Circuit opinion upholds the discretion of USEPA and the State to (continue to) issue storm water permits to MS4s that require compliance with water quality standards through iterative BMPs. Moreover, the memorandum states that "[…] because most MS4 discharges enter impaired water bodies, there is a real need for permits to include stringent requirements to protect those water bodies. As TMDLs are developed, it is likely that MS4s will have to participate in pollutant load reductions, and the MS4 permits are the most effective vehicles for those reductions." In summary, the State Water Board found that the Regional Water Boards should continue to include the RWL established in State Water Board Order WQ 99-05 in all future permits.

The issue of the RWLs language was also central to the Building Industry Association's (BIA's) (and others') appeal of San Diego Water Board Order No. 2001-01 (San Diego MS4 permit), which was used as a template for San Diego Water Board Order No. R9-2002-0001 (Orange County MS4 permit). BIA contended that the storm water MEP standard was a ceiling on what could be required of the Copermittees in implementing their runoff management programs, and that Order No. 2001-01's receiving water limitations requirements exceeded that ceiling. In other words, BIA

argued that the Copermittees could not be required to comply with receiving water limitations if they necessitated efforts which went beyond the MEP standard. Again, the courts upheld the San Diego Water Board's discretion to require compliance with water quality standards in municipal storm water permits, without limitation. The Court of Appeal, Fourth Appellate District found that the San Diego Water Board has "the authority to include a permit provision requiring compliance with water quality standards."[148] On further appeal by BIA, the California State Supreme Court declined to hear the matter.

While implementation of the iterative BMP process is a means to achieve compliance with water quality objectives for storm water MS4 discharges, it does not shield the discharger from enforcement actions for continued non-compliance with water quality standards. Consistent with USEPA guidance,[149] regardless of whether or not an iterative process is being implemented, discharges that cause or contribute to a violation of water quality standards are in violation of Order No. R9-2010-0016.

Finding E.2. The Basin Plan, identifies the following existing and potential beneficial uses for surface waters in Riverside County: Municipal and Domestic Supply (MUN), Agricultural Supply (AGR), Industrial Process Supply (PROC), Hydropower Generation (POW), Industrial Service Supply (IND), Ground Water Recharge (GWR), Contact Water Recreation (REC1), Non-contact Water Recreation (REC2), Warm Freshwater Habitat (WARM), Cold Freshwater Habitat (COLD), Wildlife Habitat (WILD), Rare, Threatened, or Endangered Species (RARE), Spawning, Reproduction and/or Early Development (SPWN) and Preservation of Biological Habitats of Special Significance (BIOL).

Discussion of Finding E.2. The southwestern portion of Riverside County is within the San Diego Region. The Riverside County portion of the San Diego Region falls within Santa Margarita Hydrologic Unit. The major streams within the Riverside County portion of the Santa Margarita Hydrologic Unit are the Santa Margarita River, Temecula Creek, and Murrieta Creek. Other surface water bodies include De Luz Creek, Sandia Canyon Creek, Warm Springs Creek, San Gertrudis Creek, and Wilson Creek. Major inland water bodies include Lake Skinner and Vail Lake.

The Riverside County portion of the Santa Margarita Hydrologic Unit includes unincorporated portions of Riverside County, the Cities of Menifee, Murrieta, Temecula, and Wildomar..

Based on the 2000 census, approximately 150,000 people resided within the permitted area. Since the 2000 census, however, several new developments, especially in the Cities of Temecula and Murrieta have increased the housing stock of the area, and the population is now significantly higher. As of January 1, 2009, approximately 250,000

[148] Building Industry Association et al., v. State Water Resources Control Board, et al. 2004.
[149] USEPA, 1998. Jan. 21, 1998 correspondence, "State Board/OCC File A-1041 for Orange County," from Alexis Strauss to Walt Petit, and March 17, 1998 correspondence from Alexis Strauss to Walt Petit.

people reside in the permitted area, with approximately 30,000 people living in the unincorporated area of Riverside County (31,163) and approximately 220,000 living in the Cities of Menifee (613), Murrieta (99,574), Temecula (102,604), and Wildomar (22,240).[150]

Finding E.3. This Order is in conformance with State Water Board Resolution No. 68-16, *Statement of Policy with Respect to Maintaining High Quality Waters in California*, and the federal Antidegradation Policy described in 40 CFR 131.12.

Discussion of Finding E.3. Runoff management programs are required to be designed to reduce pollutants in storm water MS4 discharges to the maximum extent practicable and achieve compliance with water quality standards. Therefore, implementation of runoff management programs, which satisfy the requirements of Order No. R9-2010-0016, will prevent violations of receiving water quality standards. The Basin Plan states that "Water quality objectives must […] conform to US EPA regulations covering antidegradation (40 CFR 131.12) and State Water Board Resolution No. 68-16, Statement of Policy with Respect to Maintaining High Quality of Waters in California." As a result, when water quality standards are met, USEPA and State Water Board antidegradation policy requirements are also met.

Finding E.4. Section 6217(g) of the Coastal Zone Act Reauthorization Amendments of 1990 (CZARA) requires coastal states with approved coastal zone management programs to address non-point pollution impacting or threatening coastal water quality. CZARA addresses five sources of non-point pollution: agriculture, silviculture, urban, marinas, and hydromodification. This NPDES permit addresses the management measures required for the urban category, with the exception of septic systems. The adoption and implementation of this NPDES permit relieves the Copermittee from developing a non-point source plan, for the urban category, under CZARA. The San Diego Water Board addresses septic systems through the administration of other programs.

Discussion of Finding E.4. Coastal states are required to develop programs to protect coastal waters from nonpoint source pollution, as mandated by the federal CZARA. CZARA section 6217 identifies polluted runoff as a significant factor in coastal water degradation, and requires implementation of management measures and enforceable policies to restore and protect coastal waters. In lieu of developing a separate NPS program for the coastal zone, California's NPS Pollution Control Program was updated in 2000 to address the requirements of both the CWA section 319 and the CZARA section 6217 on a statewide basis. The California Coastal Commission (CCC), the State Water Board, and the nine Regional Water Boards are the lead State agencies for upgrading the program, although 20 other State agencies also participate. Pursuant to the CZARA (section 6217(g)) Guidance Document the development of runoff management programs pursuant to this NPDES permit fulfills

[150] Fiscal Year 2008-2009 Santa Margarita Watershed Annual Progress Report

the need for cities within watersheds that discharge to the coastal zone to develop an runoff non-point source plan identified in the State's Non-point Source Program Strategy and Implementation Plan.[151]

Finding E.5. Section 303(d)(1)(A) of the CWA requires that "Each state shall identify those waters within its boundaries for which the effluent limitations…are not stringent enough to implement any water quality standard (WQS) applicable to such waters." The CWA also requires states to establish a priority ranking of impaired waterbodies known as Water Quality Limited Segments and to establish Total Maximum Daily Loads (TMDLs) for such waters. This priority list of impaired waterbodies is called the Section 303(d) List. The 2006 303(d) List was approved by the State Water Board on October 25, 2006. On June 28, 2007 the 2006 303(d) List for California was given final approval by the USEPA. The 303(d) List was recently updated, and on December 16, 2009 the 2008 303(d) List was approved by the San Diego Water Board. The 2008 303(d) List is awaiting State Water Board and USEPA approval.

Discussion of Finding E.5. Section 303(d) of the federal CWA (CWA, 33 USC 1250, et seq., at 1313(d)), requires States to identify waters that do not meet water quality standards after applying certain required technology-based effluent limits ("impaired" water bodies). States are required to compile this information in a list and submit the list to USEPA for review and approval. This list is known as the Section 303(d) list of impaired waters, or 303(d) List. As part of this listing process, States are required to prioritize waters/watersheds for future development of TMDLs. The State Water Board and Regional Water Boards have ongoing efforts to monitor and assess water quality, to prepare the 303(d) List, to prioritize waters/watersheds for TMDL development, and to subsequently develop TMDLs. TMDLs developed and adopted by the San Diego Water Board are incorporated into the Basin Plan via a Basin Plan Amendment as authorized under CWC section 13240.

The 2006 California 303(d) List identifies impaired receiving water bodies and their watersheds within the State of California.[152] The San Diego Water Board recently updated the 303(d) List for the San Diego Region and adopted the 2008 303(d) List on December 16, 2009.[153] The number of water bodies listed as impaired in the Riverside County portion of the Santa Margarita Hydrologic Unit increased from 6 water bodies (13 water body / impairing pollutant combinations) on the 2006 303(d) List to 9 water bodies (49 water body / impairing pollutant combinations) on the 2008 303(d) List, indicating the receiving water quality has been degraded further (see Table 2). Storm water and non-storm water runoff that is discharged from the Copermittees' MS4s is a leading cause of receiving water quality impairment in the San Diego Region.

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[151] State Water Board/CCC, 2000. Nonpoint Source Program Strategy and Implementation Plan, 1998-2013 (PROSIP).
[152] The approved 2006 Clean Water Act Section 303(d) List of Water Quality Limited Segments is on-line at: http://www.waterboards.ca.gov/tmdl/303d_lists2006.html.
[153] The 2008 Clean Water Act Section 303(d) List of Water Quality Limited Segments, approved by the San Diego Water Board, is available on-line at http://www.swrcb.ca.gov/rwqcb9/water_issues/programs/303d_list/index.shtml

Finding E.6. This Order does not constitute an unfunded local government mandate subject to subvention under Article XIIIB, Section (6) of the California Constitution for several reasons, including, but not limited to, the following. First, this Order implements federally mandated requirements under CWA § 402. (33 U.S.C. § 1342(p)(3)(B).) Second, the local agency Copermittees' obligations under this Order are similar to, and in many respects less stringent than, the obligations of non-governmental and new dischargers who are issued NPDES permits for storm water and non-storm water discharges. Third, the local agency Copermittees have the authority to levy service charges, fees, or assessments sufficient to pay for compliance with this Order. Fourth, the Copermittees have requested permit coverage in lieu of compliance with the complete prohibition against the discharge of pollutants contained in CWA § 301, subdivision (a) (33 U.S.C. § 1311(a)) and in lieu of numeric restrictions on their MS4 discharges (i.e. effluent limitations). Fifth, the local agencies' responsibility for preventing discharges of waste that can create conditions of pollution or nuisance from conveyances that are within their ownership or control under State law predates the enactment of Article XIIIB, Section (6) of the California Constitution. Likewise, the provisions of this Order to implement TMDLs are federal mandates. The CWA requires TMDLs to be developed for water bodies that do not meet federal water quality standards. (33 U.S.C. sec. 1313(d).) Once the UUSEPA or a state develops a TMDL, federal law requires that permits must contain effluent limitations consistent with the assumptions of any applicable wasteload allocation. (40 C.F.R. sec. 122.44(d)(1)(vii)(B).)

Discussion of Finding E.6. This Order does not constitute an unfunded local government mandate subject to subvention under Article XIIIB, Section (6) of the California Constitution for several reasons, including, but not limited to, the following. First, this Order implements federally mandated requirements under CWA section 402, subdivision (p)(3)(B). (33 U.S.C. § 1342(p)(3)(B).) This includes federal requirements to effectively prohibit non-storm water discharges, to reduce the discharge of pollutants in storm water to the maximum extent practicable, and to include such other provisions as the Administrator or the State determines appropriate for the control of such pollutants. Federal cases have held these provisions require the development of permits and permit provisions on a case-by-case basis to satisfy federal requirements. (Natural Resources Defense Council, Inc. v. U.S. E.P.A. (9th Cir. 1992) 966 F.2d 1292, 1308, fn. 17.)

The authority exercised under this Order is not reserved state authority under the CWA's savings clause (cf. Burbank v. State Water Resources Control Bd. (2005) 35 Cal.4th 613, 627-628 [relying on 33 U.S.C. § 1370, which allows a state to develop requirements which are not "less stringent" than federal requirements]), but instead, is part of a federal mandate to develop pollutant reduction requirements for municipal separate storm sewer systems. To this extent, it is entirely federal authority that forms the legal basis to establish the permit provisions. (See, City of Rancho Cucamonga v. Regional Water Quality Control Bd.-Santa Ana Region (2006) 135 Cal.App.4th 1377,

1389; Building Industry Ass'n of San Diego County v. State Water Resources Control Bd. (2004) 124 Cal.App.4th 866, 882-883.)

Second, the local agency Copermittees' obligations under this Order are similar to, and in many respects less stringent than, the obligations of non-governmental dischargers who are issued NPDES permits for storm water discharges. With a few inapplicable exceptions, the CWA regulates the discharge of pollutants from point sources (33 U.S.C. § 1342) and the Porter-Cologne regulates the discharge of waste (CWC § 13263), both without regard to the source of the pollutant or waste. As a result, the "costs incurred by local agencies" to protect water quality reflect an overarching regulatory scheme that places similar requirements on governmental and nongovernmental dischargers. (See County of Los Angeles v. State of California (1987) 43 Cal.3d 46, 57-58 [finding comprehensive workers compensation scheme did not create a cost for local agencies that was subject to state subvention].)

The CWA and the Porter-Cologne Water Quality Control Act largely regulate storm water with an even hand, but to the extent there is any relaxation of this even-handed regulation, it is in favor of the local agencies. Except for municipal separate storm sewer systems, the CWA requires point source dischargers, including discharges of storm water associated with industrial or construction activity, to comply strictly with water quality standards. (33 U.S.C. § 1311(b)(1)(C), Defenders of Wildlife v. Browner (1999) 191 F.3d 1159, 1164-1165 [noting that industrial storm water discharges must strictly comply with water quality standards].) As discussed in prior State Water Board decisions, this Order does not require strict compliance with water quality standards. (State Water Board Order WQ 2001-15, p. 7.) The Order, therefore, regulates the discharge of waste in municipal storm water more leniently than the discharge of waste from non-governmental sources.

Third, the local agency Copermittees have the authority to levy service charges, fees, or assessments sufficient to pay for compliance with this Order. The fact sheet demonstrates that numerous activities contribute to the pollutant loading in the municipal separate storm sewer system. Local agencies can levy service charges, fees, or assessments on these activities, independent of real property ownership. (See, e.g., Apartment Ass'n of Los Angeles County, Inc. v. City of Los Angeles (2001) 24 Cal.4th 830, 842 [upholding inspection fees associated with renting property].) The ability of a local agency to defray the cost of a program without raising taxes indicates that a program does not entail a cost subject to subvention. (County of Fresno v. State of California (1991) 53 Cal.3d 482, 487-488.)

Fourth, the Copermittees have requested permit coverage in lieu of compliance with the complete prohibition against the discharge of pollutants contained in CWA section 301, subdivision (a) (33 U.S.C. § 1311(a)) and in lieu of numeric effluent limitations on their storm water discharges. To the extent, the local agencies have voluntarily availed themselves of the permit, the program is not a state mandate. (Accord County of San Diego v. State of California (1997) 15 Cal.4th 68, 107-108.) Likewise, the

Copermittees have voluntarily sought a program-based municipal storm water permit in lieu of a numeric limitations approach on their storm water discharge. (See City of Abilene v. U.S. E.P.A. (5th Cir. 2003) 325 F.3d 657, 662-663 [noting that municipalities can choose between a management permit or a permit with numeric limitations].) The local agencies' voluntary decision to file a report of waste discharge proposing a program-based permit is a voluntary decision not subject to subvention. (See Environmental Defense Center v. USEPA (9th Cir. 2003) 344 F.3d 832, 845-848.)

Fifth, the local agencies' responsibility for preventing discharges of waste that can create conditions of pollution or nuisance from conveyances that are within their ownership or control under state law predates the enactment of Article XIIIB, Section (6) of the California Constitution.

Finding E.7. Runoff treatment and/or mitigation must occur prior to the discharge of runoff into receiving waters. Treatment BMPs must not be constructed in waters of the U.S. or State unless the runoff flows are sufficiently pretreated to protect the values and functions of the water body. Federal regulations at 40 CFR 131.10(a) state that in no case shall a state adopt waste transport or waste assimilation as a designated use for any waters of the U.S. Authorizing the construction of a runoff treatment facility within a water of the U.S., or using the water body itself as a treatment system or for conveyance to a treatment system, would be tantamount to accepting waste assimilation as an appropriate use for that water body. Furthermore, the construction, operation, and maintenance of a pollution control facility in a water body can negatively impact the physical, chemical, and biological integrity, as well as the beneficial uses, of the water body. Without federal authorization (e.g., pursuant to CWA § 404), waters of the U.S. may not be converted into, or used as, waste treatment or conveyance facilities. Similarly, waste discharge requirements pursuant to CWC §13260 are required for the conversion or use of waters of the State as waste treatment or conveyance facilities. Diversion from waters of the U.S./State to treatment facilities and subsequent return to waters of the U.S. is allowable, provided that the effluent complies with applicable NPDES requirements.

Discussion of Finding E.7. Runoff treatment and/or mitigation in accordance with any of the requirements in the Order must occur prior to the discharge of storm water into receiving waters. Allowing storm water polluted runoff to enter receiving waters prior to treatment to the MEP will result in degradation of the water body and potential exceedances of water quality standards, from the discharge point to the point of dissipation, infiltration, or treatment. Furthermore, the construction, operation, and maintenance of a pollution control facility in a water body can negatively impact the physical, chemical, and biological integrity, as well as the beneficial uses, of the water body. This requirement is supported by federal regulation 40 CFR 131.10(a) and USEPA guidance. According to USEPA,[154] "To the extent possible, municipalities should avoid locating structural controls in natural wetlands. Before considering siting

[154] USEPA, 1992. Guidance Manual for the Preparation of Part II of the NPDES Permit Applications for Discharges from Municipal Separate Storm Sewer Systems. EPA 833-B-92-002.

of controls in a natural wetland, the municipality should demonstrate that it is not possible or practicable to construct them in sites that do not contain natural wetlands. Practices should be used that settle solids, regulate flow, and remove contaminants prior to discharging storm water into a wetland."

Additional Federal guidance discusses the implementation of wetlands to treat municipal storm water discharges (USEPA, 2000. *Guiding Principles for Constructed Treatment Wetlands: Providing for Water Quality and Wildlife Habitat*). It states:

> *"..treatment wetlands should not be constructed in a waters of the U.S. unless you can sufficiently pretreat the stormwater flows to protect the values and functions of the waters of the U.S. Because storm water is an unpredictable effluent source and can contain high levels of toxic substances, nutrients, and pathogens, we strongly encourage that you construct the treatment wetland in uplands and use best management practices in these projects."*[155]

Consistent with USEPA guidance, the conversion or use of waters of the U.S./State into runoff treatment facilities or conveyance facilities for untreated storm water discharges must be appropriately reviewed by both Federal and State resource agencies. Such projects may be subject to federal permitting pursuant to CWA section 404 if discharges of dredged or fill material is involved.

The placement of hydromodification controls within waters of the U.S./State may also be subject to federal and/or state permitting, but would not necessarily be considered a pollutant treatment BMP. Provided that grade control structures are designed to re-establish a natural channel gradient and correct excessive changes to the sediment transport regime caused by urbanization, rather than to create a series of artificial hydrological impoundments for the purpose of treating pollution, this type of project is not considered an in-stream treatment BMP.

Finding E.8. The issuance of waste discharge requirements and an NPDES permit for the discharge of runoff from MS4s to waters of the U.S. is exempt from the requirement for preparation of environmental documents under the California Environmental Quality Act (CEQA) (Public Resources Code, Division 13, Chapter 3, section 21000 et seq.) in accordance with the CWC section 13389.

Discussion of Finding E.8. CWC section 13389 exempts the adoption of waste discharge requirements (such as NPDES permits) from CEQA requirements: "Neither the State Water Board nor the Regional Water Boards shall be required to comply with the provisions of Chapter 3 (commencing with section 21100) of Division 13 of the Public Resources Code prior to the adoption of any waste discharge requirement, except requirements for new sources as defined in the Federal Water Pollution Control Act or acts amendatory thereof or supplementary thereto."

[155] USEPA, 2000. Guiding Principles for Constructed Treatment Wetlands: Providing for Water Quality and Wildlife Habitat, (EPA 843-B-00-003).

This CEQA exemption was challenged during BIA's (and others') appeal of Order No. 2001-01. BIA contended that the CEQA exemption did not apply to permit requirements where the San Diego Water Board utilized its discretion to craft permit requirements which were more prescriptive than required by federal law. The Court of Appeal, Fourth Appellate District disagreed with this argument, stating "we also reject Building Industry's argument to the extent it contends the statutory CEQA exemption in CWC section 13389 is inapplicable to a particular NPDES permit provision that is discretionary, rather than mandatory, under the CWA."[156] On further appeal by BIA, the California State Supreme Court declined to hear the matter.

In a recent decision, the Court of Appeal of the State of California, Second Appellate District, upheld the CEQA exemption for municipal storm water NPDES permits (County of Los Angeles, et al. v. California State Water Resources Control Board, et al.).[157]

Finding E.9. Storm water discharges from developed and developing areas in Riverside County are significant sources of certain pollutants that cause, may be causing, threatening to cause or contributing to water quality impairment in the waters of Riverside County. Furthermore, as delineated in the CWA section 303(d) list in Table 2, the San Diego Water Board has found that there is a reasonable potential that municipal storm water and non-storm water discharges from MS4s cause or may cause or contribute to an excursion above water quality standards for the following pollutants: Indicator Bacteria, Copper, Manganese, Iron, Chlorpyrifos, Sulfates, Phosphorous, Nitrogen, Toxicity, and Turbidity. In accordance with CWA section 303(d), the San Diego Water Board is required to establish TMDLs for these pollutants to these waters to eliminate impairment and attain water quality standards. Therefore, certain early pollutant control actions and further pollutant impact assessments by the Copermittees are warranted and required pursuant to this Order.

Discussion of Finding E.9. CWA section 303(d)(1)(A) requires that:

> "*Each state must identify those waters within its boundaries for which the effluent limitations…are not stringent enough to implement any water quality standard (WQS) applicable to such waters.*"

The CWA also requires states to establish a priority ranking of impaired water bodies known as Water Quality Limited Segments and to establish Total Maximum Daily Loads (TMDLs) for such waters. This priority list of impaired water bodies is called the 303(d) List. The current 303(d) List was approved by the State Water Board on October 25, 2006. On June 28, 2007 the 2006 303(d) List for California was given final approval by USEPA. Every two years the State of California is required by CWA section 303(d) and 40 CFR(130.7) to develop and submit to the USEPA for approval

[156] Building Industry Association et al., v. State Water Resources Control Board, et al. 2004.
[157] Los Angeles County Super. Ct. No. BS080792. Partial publication dated November 6, 2006.

an updated 303(d) list of impaired water bodies. The San Diego Water Board recently updated the 303(d) List and adopted the 2008 303(d) List on December 16, 2009.[158] The 2008 303(d) List is awaiting approval by the State Water Board and USEPA. The number of water bodies listed as impaired in the Riverside County portion of the Santa Margarita Hydrologic Unit increased from 6 water bodies (13 water body / pollutant combinations) on the 2006 303(d) List to 9 water bodies (49 water body / pollutant combinations) on the 2008 303(d) List, indicating the receiving water quality has been degraded further (see Table 2).

Multiple water bodies in Riverside County have been identified as impaired and placed on the 303(d) List. The 303(d) listing of a water body and subsequent TMDL development is required when regulations under current permits, such as Technology Based Effluent Limitations (TBELs), are not stringent enough to meet Water Quality Standards and protect the Beneficial Uses of Waters of the State.

Storm water discharges from developed and developing areas in Riverside County are a significant source of certain pollutants that cause, may be causing, threatening to cause, or contributing to water quality impairment in the waters of Riverside County. Furthermore, the CWA section 303(d) list indicates that there is a reasonable potential that municipal storm water and dry weather discharges from MS4s cause, or may cause, or contribute to an excursion above water quality standards for the following pollutants: Indicator Bacteria, Copper, Manganese, Iron, Chlorpyrifos, Sulfates, Phosphorous, Nitrogen, Total Dissolved Solids, Toxicity and Turbidity (see Table 2). In accordance with CWA section 303(d), the San Diego Water Board is required to establish TMDLs for these pollutants in these waters to eliminate impairment and attain water quality standards. Per 40 CFR(130.7), WLAs are required for all point sources, including storm water and non-storm water discharges from MS4s. Therefore, focused pollutant control actions and further pollutant impact assessments by the Copermittees are warranted and required pursuant to this Order.

MS4 Permits address only those TMDL WLAs that have been adopted by the San Diego Water Board and have been approved by the State Water Board, Office of Administrative Law (OAL) and USEPA. WLAs are portions of a receiving water's loading capacity that is allocated to one of its existing or future point sources of pollution. To date, no TMDLs and WLAs have been adopted to address impaired water bodies in the Riverside County portion of the Santa Margarita Hydrologic Unit. When TMDLs and WLAs are adopted and approved, they will be incorporated into the MS4 permit. The TMDL WLAs in MS4 Permits can be addressed using water quality-based numeric effluent limitations (WQBELs) calculated at end-of-pipe. WQBELs must be consistent with the assumptions and requirements of the WLAs.[159]

[158] The 2008 Clean Water Act Section 303(d) List of Water Quality Limited Segments, approved by the San Diego Water Board, is available on-line at http://www.swrcb.ca.gov/rwqcb9/water_issues/programs/303d_list/index.shtml
[159] Per 40 CFR 122.44(d)(1)(vii)(B)

Finding E.10. This Order requires each Copermittee to effectively prohibit all types of unauthorized discharges of non-storm water into its MS4. However, historically pollutants have been identified as present in dry weather non-storm water discharges from the MS4s through 303(d) listings, monitoring conducted by the Copermittees under Order No. R9-2004-001, and there are others expected to be present in dry weather non-storm water discharges because of the nature of these discharges. This Order includes action levels for pollutants in non-storm water, dry weather discharges from the MS4. The non-storm water action levels are designed to ensure that the Order's requirement to effectively prohibit all types of unauthorized discharges of non-storm water into the MS4 is being complied with. Non-storm water action levels in the Order are based upon numeric or narrative water quality objectives and criteria as outlined in the Basin Plan, the State Water Board's Water Quality Control Plan for Ocean Waters of California (Ocean Plan), and State Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California (State Implementation Policy or SIP). An exceedance of an action level requires specified responsive action by the Copermittees. This Order describes what actions the Copermittees must take when an exceedance of an action level is observed. Exceedances of non-storm water action levels do not alone constitute a violation of this Order but could indicate non-compliance with the requirement to effectively prohibit all types of unauthorized non-storm water discharges into the MS4 or other prohibitions established in this Order. Failure to undertake required source investigation and elimination action following an exceedance of a non-storm water action level (NAL or action level) is a violation of this Order. The San Diego Water Board recognizes that use of action levels will not necessarily result in detection of all unauthorized sources of non-storm water discharges because there may be some discharges in which pollutants do not exceed established action levels. However, establishing NALs at levels appropriate to protect water quality standards is expected to lead to the identification of significant sources of pollutants in dry weather non-storm water discharges.

Discussion of Finding E.10. This Order includes the existing requirement that Copermittees effectively prohibit all types of unauthorized non-storm water discharges in the MS4s. It also includes the following prohibition set forth in the Basin Plan: "The discharge of waste to waters of the state in a manner causing, or threatening to cause a condition of pollution, contamination or nuisance as defined in CWC section 13050 is prohibited." (Prohibition A.1.) As discussed in the Order's Findings on discharge characteristics, e.g., C.2., C.4., C.6., C.7., C.9., C.14., and C.15., the Copermittees' reliance on BMPs for the past 20 years has not resulted in compliance with applicable water quality standards or compliance with the requirement to effectively prohibit all types of unauthorized discharges of non-storm water in the MS4. The San Diego Water Board has evaluated (in accordance with 40 CFR 122.44(d)(1)) past and existing control BMPs, non-storm water effluent monitoring results, the sensitivity of the species in receiving waters (e.g. endangered species), and the potential for effluent dilution, and has determined that existing BMPs to control pollutants in storm water discharges are not sufficient to protect water quality standards in receiving

waters, and the existing requirement that Copermittees effectively prohibit all types of unauthorized non-storm water discharges into the MS4, historically results in the discharge of pollutants to the receiving waters.

Therefore it is appropriate to establish dry weather non-storm water action levels based upon established water quality standards to measure pollutants levels in the discharge of dry weather non-storm water that could indicate non-compliance with the requirement to effectively prohibit all types of unauthorized non-storm water discharges into the MS4 and/or that these discharges are causing, or threatening to cause, a condition of pollution, contamination or nuisance in the receiving waters. NALs are not numeric effluent limitations. While not alone a violation of this Order, an exceedance of an NAL requires the Copermittees to initiate a series of source investigation and elimination actions to address the exceedance. Results from the NAL monitoring are to be used in developing the Copermittees annual work plans. Failure to undertake required source investigation and elimination action following an exceedance of an NAL is a violation of this Order. Also refer to further discussion in the Directives section C of the Fact Sheet.

A purpose of monitoring, required under this and previous Orders, as stated in the Monitoring and Reporting Program is to “detect and eliminate illicit discharges and illicit connections to the MS4” and to answer the following core management questions:

1. Are conditions in receiving waters protective, or likely to be protective, of beneficial uses?
2. What is the extent and magnitude of the current or potential receiving water problems?
3. What is the relative MS4 discharge contribution to the receiving water problem(s)?
4. What are the sources of MS4 discharge that contribute to receiving water problem(s)?
5. Are conditions in receiving waters getting better or worse?

For the past 20 years, Copermittees have utilized their illicit connection / illicit discharge (IC/ID) program to identify and eliminate non-storm water discharges that are sources of pollutants to the MS4. The Copermittees are also subject to the requirement to effectively prohibit all types of unauthorized discharges of non-storm water into the MS4s. Historically, discharges of unauthorized non-storm water do occur, resulting in the discharge of pollutants to the receiving water. NALs have been included in this Order to ensure that the Copermittees comply with the requirement to effectively prohibit all types of unauthorized non-storm water discharges that are a source of pollutants in the receiving waters.

Finding E.12. With this Order, the San Diego Water Board has completed the re-issuance of the fourth iteration of the Phase I MS4 NPDES Permits for the Copermittees in the portions of San Diego County, Orange County, and Riverside County within the San Diego Region. The NPDES Permit requirements issued to the Copermittees in each county have substantially the same core requirements such as discharge prohibitions, receiving water limitations, jurisdictional components, and monitoring. In addition, the Copermittees cooperate regionally to develop monitoring with the Southern California Stormwater Monitoring Coalition and to develop program effectiveness with the California Stormwater Quality Association. Regional programs could improve the Copermittees' compliance with other permit components such as development of the Hydromodification Management Plans and Retrofitting Existing Development with more consistent implementation and cost sharing. Re-issuing the NPDES Permit requirements within five years for three counties under three different permits requires the San Diego Water Board to expend significant time and resources for issuance of the permits through three separate public proceedings, thereby greatly reducing the time and resources available to oversee compliance. Multiple permits also create confusion for determining compliance among regulated entities, especially the land development community. The San Diego Water Board recognizes that issuing a single MS4 permit for all Phase I entities in the San Diego Region will provide consistent implementation, improve communication among agencies within watersheds crossing multiple jurisdictions, and minimize staff resources spent with each permit renewal. The San Diego Water Board plans to develop a single regional MS4 permit prior to the expiration of this Order that will transfer the Copermittees' enrollment to the regional permit upon expiration of this Order.

Discussion of Finding E.12. With the advances in storm water science and regulation in the last decade, the additional complexity has resulted in a more significant amount of San Diego Water Board staff time and resources required to complete each Phase I MS4 Permit renewal. On average, the renewal of the fourth iteration of the Phase I MS4 Permits for each county has taken approximately 2 years and multiple staff to complete. The time and resources required to complete each renewal has diverted staff time and resources away from the San Diego Water Board's ability to oversee and ensure compliance with the permit provisions and requirements.

With the adoption of this Order, all the Phase I MS4s in the San Diego Region (i.e. Copermittees of Orange County, Riverside County and San Diego County) will essentially be subject to the same set of core requirements. Because there are now more similarities than differences among the permit provisions and requirements, developing and issuing a single regionwide permit to the Phase I MS4 entities may be appropriate with the next (i.e. fifth) iteration of the Phase I MS4 Permits.

This approach would provide a consistent set of regulatory requirements throughout the San Diego Region, thereby reducing the confusion that is created with different sets of requirements between areas in close proximity to each other. A regional set of

requirements for the discharge prohibitions, receiving water limitations, jurisdictional program components (i.e., new development, construction, existing development, retrofitting), hydromodification management plans, low impact development design requirements, and monitoring would also make it easier for the programs in the three counties to share and transfer information and program efficiencies, and cooperate on a regionwide basis. Regionwide consistency would be especially beneficial where there are multiple counties involved in implementing permit requirements, such as the Santa Margarita watershed with parts of San Diego County and Riverside County, regional TMDLs (e.g., beaches and creeks bacteria TMDLs), or regional monitoring efforts or studies (e.g., Southern California Stormwater Monitoring Coalition, Bight '08).

An additional benefit would be the reduction of staff time and resources that will be required to renew future Phase I MS4 Permits, which would only be required once every 5 years for a single regionwide permit instead of once every 1 to 3 years for three separate permits. Because of these benefits, the San Diego Water Board plans to develop a single regional Phase I MS4 Permit with the next iteration of the San Diego County MS4 Permit, which will incorporate the Orange County and Riverside County Phase I MS4 entities upon the expiration of their respective permits, or sooner.

F. Public Process

Finding F.1. The San Diego Water Board has notified the Copermittees, all known interested parties, and the public of its intent to consider adoption of an Order prescribing waste discharge requirements that would serve to renew an NPDES permit for the existing MS4 discharges of pollutants to waters of the U.S.

Discussion of Finding F.1. Public notification of development of a draft permit is required under Federal regulation 40 CFR 124.10(a)(1)(ii). This regulation states "(a) Scope. (1) The Director shall give public notice that the following actions have occurred: (ii) A draft permit has been prepared under Sec. 124.6(d)." Public notifications "shall allow at least 30 days for public comment," as required under Federal regulation 40 CFR 124.10(b)(1).

Finding F.2. The San Diego Water Board has held a public hearing on October 13, 2010 and heard and considered all comments pertaining to the terms and conditions of this Order.

Discussion of Finding F.2. Public hearings are required under CWC section 13378, which states "Waste discharge requirements and dredged or fill material permits shall be adopted only after notice and any necessary hearing." Federal regulation 40 CFR 124.12(a)(1) also requires public hearings for draft permits, stating "The Director shall hold a public hearing whenever he or she finds, on the basis or requests, a significant degree of public interest in a draft permit(s)." Regarding public notice of a public hearing, Federal regulation 40 CFR 124.10(b)(2) states that "Public notice of a public hearing shall be given at least 30 days before the hearing."

IX. DIRECTIVES

This section discusses significant changes which have been made to the requirements of the Order from the requirements which were previously included in Order No. R9-2004-001. For each section of the Order than has been changed there is a discussion which describes the change that was made and provides the rationale for the change. In addition, comments on the Copermittees' ROWD recommendations, as they pertain to each changed requirement of the Order, are provided.

Requirements of the Order that are not discussed in this section have not been significantly changed from those requirements previously included in Order No. R9-2004-001. For such requirements, discussions and rationale for the requirements can be found in section VIII of the Fact Sheet/Technical Report for San Diego Water Board Order No. R9-2004-001, dated July 14, 2004. Section VIII also provides additional background information for those requirements that have undergone significant change which are described in detail in this report. The Fact Sheet/Technical Report is available for download at:

http://www.waterboards.ca.gov/sandiego/water_issues/programs/stormwater/rsd_stormwater.shtml

Legal authority citations are provided for each major section of the Order. These citations apply to all applicable requirements within the section for which they are provided.

A. Prohibitions and Receiving Water Limitations

The following legal authority applies to section A:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: The Water Quality Control Plan for the San Diego Basin (Basin Plan) contains the following waste discharge prohibition: "The discharge of waste to waters of the state in a manner causing, or threatening to cause a condition of pollution, contamination, or nuisance as defined in CWC section 13050, is prohibited."

CWC section 13050(l) states "(1) 'Pollution' means an alteration of the quality of waters of the state by waste to a degree which unreasonably affects either of the following: (A) The water for beneficial uses. (B) Facilities which serve beneficial uses. (2) 'Pollution' may include "contamination."

CWC section 13050(k) states "Contamination' means an impairment of the quality of waters of the state by waste to a degree which creates a hazard to public health through poisoning or through the spread of disease. 'Contamination' includes any equivalent effect resulting from the disposal of waste, whether or not waters of the state are affected."

CWC section 13050(m) states "Nuisance' means anything which meets all of the following requirements: (1) Is injurious to health, or is indecent or offensive to the senses, or an obstruction to the free use of property, so as to interfere with the comfortable enjoyment of life or property. (2) Affects at the same time an entire community or neighborhood, or any considerable number of persons, although the extent of the annoyance or damage inflicted upon individuals may be unequal. (3) Occurs during, or as a result of, the treatment or disposal of wastes."

CWC section 13241 requires each Regional Water Board to "establish such water quality objectives in water quality control plans as in its judgment will ensure the reasonable protection of beneficial uses and the prevention of nuisance […]."

CWC section 13243 provides that "A regional board, in a water quality control plan or in waste discharge requirements, may specify certain conditions or areas where the discharge of waste, or certain types of waste, will not be permitted."

CWC section 13263(a) provides that waste discharge requirements prescribed by the San Diego Water Board implement the Basin Plan.

Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(A - D) require municipalities to implement controls to reduce pollutants in storm water runoff from commercial, residential, industrial, and construction land uses or activities.

Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(A - D) require municipalities to have legal authority to control various discharges to their MS4.

Federal NPDES regulation 40 CFR 122.44(d)(1) requires municipal storm water permits to include any requirements necessary to "[a]cheive water quality standards established under section 303 of the CWA, including State narrative criteria for water quality."

Federal NPDES regulation 40 CFR 122.44(d)(1)(i) requires NPDES permits to include limitations to "control all pollutants or pollutant parameters (either conventional, nonconventional, or toxic pollutants) which the Director determines are or may be discharged at a level which will cause, have reasonable potential to cause, or contribute to an excursion above any State water quality standard, including State narrative criteria for water quality."

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Section A of the Order combines two previously distinct requirement sections – Prohibitions and Receiving Water Limitations. These sections have been combined into one section for organization purposes and to reduce redundancy, since both sections address the same issue. These changes have no net effect on the implementation and enforcement of the Order.

Section A.3 describes the “iterative process.” The Copermittees must reduce the discharge of storm water pollutants to the MEP and ensure that their MS4 discharges do not cause or contribute to violations of water quality standards. If the Copermittees have reduced storm water pollutant discharges to the MEP, but their discharges are still causing or contributing to violations of water quality standards, the Order provides a clear and detailed process for the Copermittees to follow. This process is often referred to as the "iterative process" and can be found at section A.3. The language of section A.3 is prescribed by the State Water Board and is included in MS4 permits statewide. Section A.3 essentially requires additional BMPs to be implemented until MS4 storm water discharges no longer cause or contribute to a violation of water quality standards.

The State Policy with respect to maintaining high quality waters has been added to clarify that discharges from the MS4 that cause or contribute to a violation of the Policy for high quality waters is prohibited.

The Copermittee must notify the San Diego Water Board of storm water discharges that are causing or contributing to an exceedance of applicable water quality standards. This notification can be in the form of an email or letter, with a summary of the pollutants in the storm water discharge that are exceeding the applicable water quality standards, and where and when the exceedances occurred. After notification is provided to the San Diego Water Board, the Copermittee must submit a report that describes the BMPs that are currently being implemented and the additional BMPs that will be implemented by the Copermittee to prevent or reduce the pollutants in the storm water discharge from causing or contributing to the exceedances of the applicable water quality standards. The report is separate from the notification and may be submitted with the Annual Report, unless the San Diego Water Board requests an earlier submittal of the report.

B. Non-Storm Water Discharges

The following legal authority applies to section B:

Broad Legal Authority: CWA sections 402, 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F), 40 CFR 122.26(d)(2)(iv) and 40 CFR 122.44.

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B) requires MS4 operators "to detect and remove (or require the discharger to the municipal separate storm sewer to obtain a separate NPDES permit for) illicit discharges and improper disposal into the storm sewer."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B)(1) provides that the Copermittees shall prevent all types of illicit discharges into the MS4 except for certain non-storm water discharges.

Section B of the Order has been reworded to simplify and clarify the requirements for addressing non-storm water discharges that are not prohibited. This rewording has no net effect on the implementation and enforcement of the Order.

Section B.2 identifies categories of non-storm water discharges that do not have to be addressed as illicit discharges unless identified by a Copermittee or the San Diego Water Board as a category that is a source of pollutants to waters of the U.S. If a Copermittee or the San Diego Water Board identifies a category of non-storm water discharges as a source of pollutants to waters of the U.S., the category must be addressed through a program, including inspections, to implement and enforce an ordinance, orders, or other similar means to prevent illicit discharges to the MS4.[160]

The program includes enforcement of an ordinance, orders, or other legal authority that prohibits the category of non-storm water discharges from entering the MS4. Implementation of the program is through the IC/ID program, described in Directive F.4, which includes requirements for investigating/inspecting illicit discharges and enforcing the ordinance, orders, or other legal authority that prohibits the category of non-storm water discharges from entering the MS4.

The federal regulations list several categories of non-storm water discharges or flows that do not have to be addressed by the program unless a Copermittee or the San Diego Water Board identifies a category as a source of pollutants to waters of the U.S. These categories are often referred to as "exempt" discharges that are "allowed" to be discharged into the MS4. There are two types of categories of non-storm water discharges or flows that are considered "exempt": 1) anthropogenic (e.g., water line

[160] Code of Federal Regulations Title 40 section 122.26(d)(2)(iv)(B)(1)

flushing, air conditioner condensate), and 2) non-anthropogenic (e.g., springs, rising ground water).

For "exempt" anthropogenic categories of non-storm water discharges or flows that are identified as sources of pollutants to waters of the U.S., those categories become illicit discharges and are no longer "allowed" to be discharged to the MS4. The IC/ID program addresses those discharges (i.e. investigation of illicit discharges and enforcement of ordinances prohibiting illicit discharges to the MS4).

For "exempt" non-anthropogenic discharges or flows that are identified as sources of pollutants to waters of the U.S., the IC/ID program cannot be fully implemented with enforcement. Categories of non-storm water discharges or flows that originate due to a natural source (e.g., springs or rising ground water) can be investigated and identified, but it would be difficult to enforce ordinances prohibiting these discharges to the MS4. In these cases, the Copermittee may need to implement other control measures to prevent the illicit discharges from non-anthropogenic sources from entering the MS4 (e.g., sealing the storm drains to prevent infiltration).

The IC/ID program also identifies categories of "exempt" non-storm water discharges that are sources of pollutants to waters of the U.S. If an individual discharge within a category of "exempt" non-storm water discharges is found to be an isolated incidence or source of pollutants and not representative of the category as a whole, the entire category does not need to be removed from the list of "exempt" categories of non-storm water discharges. If, however, the Copermittees or the San Diego Water Board find that a pattern of isolated incidents or sources are consistently discharging pollutants to waters of the U.S. over a period of time, or throughout the region, the category must be identified as a source of pollutants to waters of the U.S. warranting removal from the list of "exempt" categories of non-storm water discharges.

The San Diego Water Board and several municipalities throughout the San Diego Region (e.g., cities and counties of Orange County and San Diego County) have reported and/or identified runoff originating from landscape irrigation as likely sources of dry weather flows conveying pollutants into their MS4s. This is also supported by legislation (Assembly Bill 1881) recently enacted by the State of California, which has identified runoff resulting from over irrigation not only as a waste of water resources, but also as a source of pollutants to the state's waterways. Discharges from landscape irrigation have been identified by the San Diego Water Board and the Copermittees as a source of pollutants and conveyance of pollutants to waters of the United States in the following:

- In educational materials developed by The Cities and County of Riverside "Only Rain in the Storm Drain" Pollution Prevention Program, the Landscape and Garden brochure states: "Soil, yard wastes, *over-watering* [emphasis added] and garden chemicals become part of the urban runoff mix that winds it way through streets, gutters and storm drains before entering lakes, rivers, streams, etc."

- In an educational survey developed by The Cities and County of Riverside "Only Rain in the Storm Drain" Pollution Prevention Program distributed at Public Outreach events, the answer to the question about where lawn irrigation water goes states: *"Water that leaves your lawn from irrigation…can pick up motor oil and grease from vehicles, excess fertilizer from your lawn, bacteria from pet waste, and excess pesticides from your yard. These pollutants can be carried down streets and storm drains directly to our streams, lakes and rivers without treatment!"*

- In 2006, the State Water Board allocated Grant funding to the Smarttimer/Edgescape Evaluation Program (SEEP). The project targets irrigation runoff by retrofitting existing development and documenting the conservation and runoff improvements. The Grant Application states that "Irrigation runoff contributes flow & pollutant loads to creeks and beaches that are 303(d) listed for bacteria indicators". Furthermore, the grant application states that "Regional program managers agree that the reduction and/or elimination of irrigation-related urban flows and associated pollutant loads may be key to successful attainment of water quality and beneficial use goals as outlined in the Basin Plan and Bacteria TMDL over the long term". This is reinforced in the project descriptions and objectives: "Elevated dry-weather storm drain flows, composed primarily … of landscape irrigation water wasted as runoff, carry pollutants that impair recreational use and aquatic habitats all along Southern California's urbanized coastline. Storm drain systems carry the wasted water, along with landscape derived pollutants such as bacteria, nutrients and pesticides, to local creeks and the ocean. Given the local Mediterranean climate, excessive perennial dry season stream flows are an unnatural hydrologic pattern, causing species shifts in local riparian communities and warm, unseasonal contaminated freshwater plumes in the near-shore marine environment". The basis of this grant project is that over-irrigation (landscape irrigation, irrigation water and lawn watering) into the MS4 is a source and conveyance of pollutants. In addition, they indicate that the alteration of natural flows is impacting the Beneficial Uses of waters of the State. The results of this study can be applied broadly to any area where over-irrigation takes place, including Riverside County. Preliminary results from the study indicate that that over-irrigation (landscape irrigation, irrigation water and lawn watering) into the MS4 *is* a source and conveyance of pollutants.

- In the Watershed Action Plan Annual Report(s) for the 2006-2007 reporting period, submitted by the County of Orange, Orange County Flood Control District and Copermittees within the San Juan Creek, Laguna Coastal Streams, Aliso Creek, and Dana Point Coastal Streams Watersheds, the Orange County Copermittees, within their Watershed Action Strategy Table for Fecal Indicator Bacteria state that "*Support programs to reduce or eliminate the discharge of anthropogenic dry weather nuisance flow throughout the […] watershed. Dry weather flow is the transport medium for bacteria and other 303(d) constituents of concern*".

Additionally, they state that "*conditions in the MS4 contribute to high seasonal bacteria propagation in-pipe during warm weather. Landscape irrigation is a major contributor to dry weather flow, both as surface runoff due to over-irrigation and overspray onto pavements; and as subsurface seepage that finds its way into the MS4*."

- In the Carlsbad Watershed Urban Runoff Management Program (WURMP) Fiscal Year 2008 Annual Report, submitted by the Carlsbad Watershed Copermittees (Cities of Carlsbad, Encinitas, Escondido, Oceanside, San Marcos, Solana Beach, and Vista, and the County of San Diego), the Carlsbad Watershed Copermittees state *"The Carlsbad Watershed Management Area (WMA) collective watershed strategy identifies bacteria, sediment, and nutrients as high priority water quality pollutants in the Agua Hedionda (904.3 – bacteria and sediment), Buena Vista (904.2 – bacteria), and San Marcos Creek (904.5 – nutrients) Hydrologic Areas. Bacteria, sediment, and nutrients have been identified as potential discharges from over-irrigation."*

- In Appendix D of the San Diego Bay WURMP 2007-2008 Annual Report, submitted by the San Diego Bay Watershed Copermittees (Cities of Chula Vista, Coronado, Imperial Beach, La Mesa, Lemon Grove, National City, and San Diego, the County of San Diego, the Port of San Diego, and the San Diego County Airport Authority), the San Diego Bay Watershed Copermittees identified *over-irrigation of lawns* from business and/or residential land uses as a likely pollutant source for bacteria, pesticides, and sediment.

- On September 28, 2006 Governor Arnold Schwarzenegger approved Assembly Bill 1881, The Water Conservation in Landscaping Act (AB 1881, Laird). The act requires cities, counties, and charter cities and charter counties, to adopt landscape water conservation ordinances by January 1, 2010. Additionally, the law required the Department of Water Resources (DWR) to prepare a Model Water Efficient Landscape Ordinance for use by local agencies. The Water Efficient Landscape Ordinance was approved by the Office of Administrative Law on September 10, 2009. All local agencies were required to adopt a water efficient landscape ordinance by January 1, 2010. Local agencies could adopt the Water Efficient Landscape Ordinance developed by DWR, or an ordinance considered at least as effective as the Model Ordinance. The Water Efficient Landscape Ordinance includes a requirement that local agencies prohibit runoff from irrigation (§ 493.2): "*Local agencies shall prevent water waste resulting from inefficient landscape irrigation by* prohibiting runoff from leaving the target landscape *[emphasis added] due to low head drainage, overspray, or other similar conditions where water flows onto adjacent property, non-irrigated areas, walks, roadways, parking lots, or structures. Penalties for violation of these prohibitions shall be established locally.*"

- On October 08, 2009, the State of California Department of Water Resources issued a letter to all cities and counties within the State of California giving reminder of required adoption of the Water Efficient Landscape Ordinance. The letter states that: "*Other benefits include reduced irrigation runoff,* reduced pollution of waterways *[emphasis added], drought resistance, and less green waste*."

- On December 18, 2009, the San Diego Water Board adopted Order. No. R9-2009-0002, the fourth-term Orange County permit, which found that over-irrigation (landscape irrigation, irrigation water and lawn watering) into the MS4 is a source and conveyance of pollutants. Landscape irrigation, irrigation water, and lawn watering were categories removed from the list of non-storm water discharges not prohibited to be discharged into the MS4.

- The San Diego Water Board has responded to complaints about and observed runoff from over-irrigation entering the MS4s in the Riverside County portion of the San Diego Region.

Several significant changes have been made to the list of categories of non-storm water discharges that do not have to be addressed as illicit discharges. A footnote has been added to dechlorinated swimming pool discharges on the list to specify that this category does not include saline swimming pool discharges. The list has been modified to remove the landscape irrigation, irrigation water and lawn watering "exempt" discharge categories (i.e. no longer "allowed" to enter the MS4). Language has been also added to the section to clarify differences in the federal regulations under 40 CFR 122.26(d)(iv)(B) and for the authority of the Director (i.e. San Diego Water Board) in regards to identifying exempted discharges.

Because the landscape irrigation, irrigation water and lawn watering "exempt" discharge categories have been removed from section B, per identification as a source and conveyance of pollutants to waters of the United States when discharged from the MS4, these illicit discharges must be addressed per 40 CFR 122.26(d)(iv)(B). The San Diego Water Board is requiring these discharges be addressed as illicit discharges by the Copermittees. This is consistent with the Federal Regulations (55 FR 48037). Thus, the discharges are to be prohibited via ordinance, order, or similar means and incorporated as part of the Copermittees IC/ID program.

Section B.3 has been clarified by the recognition of building fire suppression system maintenance (e.g. fire sprinklers) as an illicit discharge. The San Diego Water Board has found that such discharges contain waste, and as such the San Diego Water Board is requiring these discharges be addressed as illicit discharges by the Copermittees. This is consistent with the Federal Regulations (55 FR 48037). Thus, the discharges are to be prohibited via ordinance, order or similar means and incorporated as part of the Copermittees IC/ID program.

C. Non Storm Water Dry Weather Action Levels

The following legal authority applies to section C:

Broad Legal Authority: CWA section 402, 402(p)(3)(B)(ii), CWC §13377. 40 CFR 122.26(d)(2)(i)(B, C, E, and F), and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority:
CWA section 402(p)(3)(B)(ii) provides that MS4 permits "shall include a requirement to effectively prohibit non-storm water discharges into the storm sewers."

Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(B) provides that the proposed management program "shall be based on a description of a program including a schedule, to detect and remove (or require the discharger to the municipal storm sewer to obtain a separate NPDES permit for) illicit discharges and improper disposal into the storm sewer."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B)(1) provides that the Copermittee include in its proposed management program "a program, including inspections, to implement and enforce an ordinance, orders or similar means to prevent illicit discharges to the municipal storm sewer system; this program description shall address all types of illicit discharges, however the [listed exempt] category of non-storm water discharges or flows shall be addressed where such discharges are identified by the municipality as sources of pollutants to waters of the United States."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B)(2) provides that the Copermittee include in its proposed management program "a description of procedures to conduct on-going field screening activities during the life of the permit, including areas or locations that will be evaluated by such field screens."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B)(3) provides that the Copermittee include in its proposed management program "procedures to be followed to investigate portions of the separate storm sewer system that, based on the results of the field screen, or other appropriate information, indicate a reasonable potential of containing illicit discharges or other sources of non-storm water."

Section C establishes non-storm water dry weather action levels (see also Finding C.14, Finding E.10, and the Discussion for those sections).

Non-exempted, non-storm water discharges are to be effectively prohibited from entering the MS4 or become subject to another NPDES permit (see Federal Register, Vol. 55, No. 222, pg. 47995). Conveyances which continue to accept non-exempt, non-storm water discharges do not meet the definition of MS4 and are not subject to section 402(p)(3)(B) of the CWA unless the discharges are issued separate NPDES

permits. Instead, conveyances that continue to accept non-exempt, non-storm water discharges that do not have a separate NPDES permit are subject to sections 301 and 402 of the CWA (see Federal Register, Vol. 55, No. 222, pg. 48037).

The Order requires the sampling of a representative percentage of major outfalls and other identified stations within each hydrologic subarea. While it is important to assess all major outfall discharges from the MS4 into receiving waters, to date the Copermittees have implemented a dry-weather monitoring program that has consisted of 4 water quality parameters collected in receiving waters, not major outfalls. In the ROWD the Copermittees have proposed relocating IC/ID (non-storm water) monitoring sites to major outfalls and increasing the level of monitoring. It is expected that the Copermittees will need to utilize current 303(d) listings, land use, the history of IC/ID complaints and the sensitivity of receiving waters in the selection and annual sampling of a representative percentage of major outfalls in accordance with the requirements under section C.4. It is expected the selection of major outfalls will be done in conjunction with the Copermittees' required updates to the MS4 map in section F.4.b of the Order.

The Order requires an increase in the number and type of pollutants sampled in non-storm water from major outfalls. To date, Copermittees have not sampled major outfalls, only receiving waters, and sampling was limited to total dissolved solids, dissolved oxygen, pH, turbidity and specific conductance. Additional sampling was generally, though not always, conducted by Copermittees if initial sampling exceeded a Copermittee threshold. With the exception of dissolved oxygen, the current thresholds do not represent water quality objectives, as sampling may not trigger a threshold, but may still be exceeding a water quality objective. This Order requires non-storm water discharges to be sampled for additional pollutants including indicator bacteria, nutrients (nitrate and phosphorous), Methylene Blue Active Substances (MBAS), pesticides and metals. These pollutants are expected to be present in non-storm water discharges, are pollutants for which receiving waters are 303(d) listed as impaired or have been identified as present through receiving water monitoring.

Background and Rationale for Requirements

The San Diego Water Board developed the requirements for dry weather, non-storm water action levels based upon an evaluation of existing controls, monitoring and reporting programs (effluent and receiving water), special studies, and based upon Findings C.1 C.3, C.4, C.6, C.7 and C.14. In addition, the Copermittees' ROWD supports the establishment of action levels which can be used in the effectiveness assessment program to ensure a minimum level of program implementation and identify shortcomings in their MS4 programs.[161]

[161] Riverside County Copermittees. 2009. Report of Waste Discharge (San Diego Region).

Water Quality Control Plan

CWA section 303(c) requires the state to establish Water Quality Standards (WQS). WQS define the water quality goals of a water body, or part thereof, by designating their use or uses to be made of the water and by setting criteria necessary to protect those uses.

The San Diego Water Board's Water Quality Control Plan for the San Diego Basin (Basin Plan) designates beneficial uses, establishes water quality objectives, and contains implementation programs and policies to achieve those objectives for all waters addressed through the Basin Plan. The Basin Plan was adopted by the San Diego Water Board on September 8, 1994, and was subsequently approved by the State Water Board on December 13, 1994. Subsequent revisions to the Basin Plan have also been adopted by the San Diego Water Board and State Water Board.

National Toxics Rule (NTR) and California Toxics Rule (CTR)

The USEPA adopted the NTR on December 22, 1992, which was amended on May 4, 1995, and November 9, 1999. The CTR was adopted by USEPA on May 18, 2000,[162] and amended on February 13, 2001.[163] These rules include water quality criteria for priority pollutants and are applicable to non-storm water discharges from the MS4. Criteria for 126 priority pollutants are established by the CTR. USEPA promulgated this rule to fill a gap in California water quality standards that was created in 1994 when a California court overturned the State's water quality control plans containing criteria for priority toxic pollutants. The federal criteria are legally applicable in the State of California for inland surface waters, enclosed bays and estuaries for all purposes and programs under the CWA.

Antidegradation Policy

Section 131.12 of 40 CFR requires that the State water quality standards include an antidegradation policy consistent with the federal policy. The State Water Board established California's antidegradation policy in State Water Board Resolution No. 68-16. Resolution No. 68-16 incorporates the federal antidegradation policy where the federal policy applies under federal law. Resolution No. 68-16 requires that existing quality of waters be maintained unless degradation is justified based on specific findings. The Regional Water Boards' Basin Plans implement, and incorporate by reference, both the State and federal antidegradation policies. Permitted non-storm water discharges from the MS4 are consistent with the antidegradation provision of 40 CFR section 131.12 and State Water Board Resolution No. 68-16.

[162] Federal Register / Vol. 65, No. 97 / May 18, 2000 / Rules and Regulation P. 31861-31719; Code of Federal Regulations Title 40 Part 131

[163] Federal Register / Vol. 66, No. 30 / February 13, 2001 / Rules and Regulation P. 9960-9962; Code of Federal Regulations Title 40 Part 131

Sources of Drinking Water Policy
State Water Board Resolution No. 88-63 establishes state policy that all waters, with certain exceptions, should be considered suitable or potentially suitable for municipal and domestic supplies. Requirements of this Order include action levels, where appropriate, reflecting municipal and domestic supply use as all waters within the County of Riverside under this Order are specifically assigned municipal and domestic supply as a Beneficial Use.

Monitoring and Reporting
40 CFR section 122.48 requires that all NPDES permits specify requirements for recording and reporting monitoring results. Sections 13267 and 13383 of CWC authorize the Regional Water Boards to require technical and monitoring reports. The Monitoring and Reporting Program establishes monitoring and reporting requirements to implement state and federal regulations. The Monitoring and Reporting Program can be found as Attachment E of the Order.

Dilution or Mixing Zones
In order to protect the Beneficial Uses of receiving waters from pollutants as a result of non-storm water MS4 discharges, this Order does not provide for a mixing zone or a zone of initial dilution except when the discharge is to the surf zone.

The San Diego Region has predominantly intermittent and ephemeral rivers and streams (Inland Surface Waters) which vary in flow volume and duration at spatial and temporal scales. Therefore, it is assumed that any non-storm water discharge from the MS4 into the receiving water is likely to be of a quantity and duration that does not allow for dilution or mixing. For ephemeral systems, non-storm water discharges from the MS4 are likely to be the only surface flows present within the receiving water during the dry season. Additionally, all surface waters within the jurisdiction of this Order have been designated in the Basin Plan with municipal supply (MUN) as a beneficial use.

It is appropriate to base numeric action levels for dry weather non-storm water discharges on these considerations.

Establishment of Action Levels
Action levels in the Order are based upon numeric or narrative water quality objectives and criteria as defined in the Basin Plan and the State Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California (State Implementation Policy or SIP). The San Diego Water Board recognizes that use of action levels will not necessarily result in detection of all unauthorized sources of non-storm water discharges because there may be some discharges in which pollutants do not exceed established action levels.

In June of 2006, the State Water Board's Blue Ribbon Storm Water Panel released its report titled 'The Feasibility of Numerical Effluent Limits Applicable to Discharges of

Storm Water Associated with Municipal, Industrial and Construction Activities.' The report only examined numerical limits as applied to storm water and not non-storm water. In the recommendations, the Blue Ribbon panel proposed storm water action levels which are computed using statistical based population approaches. For example, section D of the Permit uses a recommended statistical approach to develop storm water action levels. The Blue Ribbon panel did not examine the efficacy of action levels or recommendations for development of action levels for non-storm water discharges.

For discharges to inland surface waters, action levels are based on the USEPA water quality criteria for the protection of aquatic species, the USEPA water quality criteria for the protection of human health, water quality criteria and objectives in the applicable State plans, effluent concentration available using best available technology, and 40 CFR 131.38. Since the assumed initial dilution factor for the discharge is zero and a mixing zone is not allowed, a non-storm water discharge from the MS4 could not cause an excursion from numeric receiving water quality objectives if the discharge is in compliance with the action levels contained in the Order.

Dry weather monitoring of non-storm water conducted in receiving waters under the previous Order (Order No. R9-2004-001), which relies on BMPs as controls to protect water quality standards, has identified the presence of pollutants commonly found in non-storm water discharges. Monitoring of Indicator Bacteria, pH, Dissolved Oxygen, Phosphorus, Nitrate, Turbidity, Methylene Blue Active Substances (MBAS), and metals in receiving waters has shown concentrations that exceed state water quality criteria. It is appropriate to establish numeric action levels for these pollutants to ensure that the Copermittees are complying with the requirement to effectively prohibit all types of unauthorized non-storm water discharges into the MS4s.

Water Quality Limited Segments on the current 303(d) list (2008) within the jurisdiction of this Order have been identified due to exceedances of Sulfate and Total Dissolved Solids criteria from a source which is currently unknown (see Table 2). These pollutants are not monitored for in non-storm water effluent under the current non-storm water MS4 monitoring program. While this Order does not establish a numeric action level for these constituents at this time, this Order now requires non-storm water MS4 discharge monitoring to include monitoring for Sulfates, Total Dissolved Solids, and Chlorides.

Priority pollutants analyzed included Cadmium, Copper, Chromium, Lead, Nickel, Silver and Zinc. These priority pollutants are likely to be present in non-storm water MS4 discharges (see Finding C.3) though dissolved metal effluent monitoring was not conducted under the previous Order. The most stringent applicable water quality criteria have been identified for these seven metals and, excluding Chromium (VI), and all are dependent on receiving water hardness. The conversion factors for Cadmium and Lead are also water hardness dependent (40 CFR 131.38(b)(2)). These levels are established as the action levels for these constituents.

While effluent monitoring is not available from the previous Order, the monitoring that was done for metal concentrations in receiving waters often lacked a measurement of receiving water hardness. Due to the multiple point source discharges of non-storm water from the MS4, a discharge may enter a receiving water whose hardness will vary temporally. In addition, hardness may vary spatially within and among receiving waters.

However, other information is available to determine the appropriateness of an action level. Existing monitoring concentrations absent of receiving water data, no dilution credit or mixing zone allowance, current 303(d) listings of receiving waters for other pollutants, receiving water monitoring data, and the classification of waters as critical habitat for endangered and species of concern, provide evidence that NALs are appropriate for these priority pollutants at this time in order to ensure that the Copermittees comply with the requirement to effectively prohibit all types of unauthorized non-storm water discharges into the MS4s.

Existing receiving water pollutant concentration data (see attachment F) provides evidence that it is appropriate to include NAL based comparisons to water quality criteria given observed hardness levels, assumption of a conservative hardness level when data is absent, or designation of receiving waters as having MUN as a beneficial use. Although dry weather receiving water data is limited (see attachment F), data has been collected that documents exceedances of CTR criteria for Lead, Nickel, and Copper given the measured hardness for the receiving water. Absent receiving water hardness, Zinc has been detected in receiving waters at concentrations which may be in exceedance of CTR criteria depending on receiving water hardness. Additionally, Cadmium and Chromium were detected at elevated levels, though the concentrations were within CTR criteria given the observed receiving water hardness. However, these detections typically coincided with detections of other exceedances of water quality standards for other pollutants, including metals. Chromium and Nickel were also detected at levels that did not exceed CTR, but did exceed Maximum Contaminant Levels (MCLs) for receiving waters.

As discussed, inland surface waters have conservatively been allotted a mixing zone and dilution credit of zero. As such, any discharge of these priority pollutants is likely to impact the receiving water, regardless of the quantity or rate of discharge.

As discussed in Finding C.7 and discussion, multiple receiving waters within the County of Riverside are 303(d) listed for a number of pollutants, including toxicity. The 303(d) listing of a water body as impaired provides evidence that the receiving water(s) are already experiencing negative impacts. These water quality limited segments are more susceptible to degradation from the synergistic addition of more pollutants, even from upstream discharges. It is therefore appropriate to include NALs designed to ensure that the Copermittees are complying with the requirement to

effectively prohibit all types of unauthorized discharges of non-storm water into the MS4s.

Copermittees have monitored the receiving waters for MS4 discharges pursuant to requirements under Order No. R9-2004-001. Dry weather receiving water data indicates poor conditions within waters receiving non-storm water MS4 discharges. Bioassessment conducted under the Order (2004-present) has documented all non-reference sites as consistently having poor or very poor IBI scores, likely due in part to receiving water chemistry and toxicity[164].

Receiving waters and downstream receiving waters within the jurisdiction of this Order contain species and/or are classified as critical habitat (or are exempted pursuant to Integrated National Resource Management Plans) for endangered, threatened, and state species of special concern including, but not limited to, *E. newberryi, A. marmorata pallida*, and *G. orcutti.*

Furthermore, the Santa Margarita River has been designated with the RARE beneficial use.

Dry Weather Non-Storm Water Action Levels Calculations for Discharges to Inland Surface Waters

On the basis of the foregoing discussion, the NALs were calculated with the following considerations and assumptions:

> No dilution credit is considered for the discharge. Therefore, the discharge must comply with the Water Quality Objective at the point of discharge.
>
> For NALs based on CTR, implementation was done using the procedure list as outlined in the State Implementation Plan (SIP) (see below example).

NAL CTR/SIP Calculation – Chromium VI Example:

Criteria for Priority Toxic Pollutants in the State of California is described in the CTR table listed in 40 CFR 131.38.

[164] Riverside County Copermittees 2007-08 and 2008-09 Annual Progress Reports.

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A		B Freshwater		C Saltwater		D Human Health (10^{-6} risk for carcinogens) For consumption of:	
# Compound	CAS Number	Criterion Maximum Conc. [d] B1	Criterion Continuous Conc. [d] B2	Criterion Maximum Conc. [d] C1	Criterion Continuous Conc. [d] C2	Water & Organisms (μg/L) D1	Organisms Only (μg/L) D2
1. Antimony	7440360					14 a,s	4300 a,t
2. Arsenic [b]	7440382	340 i,m,w	150 i,m,w	69 i,m	36 i,m		
3. Beryllium	7440417					n	n
4. Cadmium [b]	7440439	4.3 e,i,m,w,x	2.2 e,i,m,w	42 i,m	9.3 i,m	n	n
5a. Chromium (III)	16065831	550 e,i,m,o	180 e,i,m,o			n	n
5b. Chromium (VI) [b]	18540299	16 i,m,w	11 i,m,w	1100 i,m	50 i,m	n	n
6. Copper [b]	7440508	13 e,i,m,w,x	9.0 e,i,m,w	4.8 i,m	3.1 i,m	1300	
7. Lead [b]	7439921	65 e,i,m	2.5 e,i,m	210 i,m	8.1 i,m	n	n
8. Mercury [b]	7439976	[Reserved]	[Reserved]	[Reserved]	[Reserved]	0.050 a	0.051 a
9. Nickel [b]	7440020	470 e,i,m,w	52 e,i,m,w	74 i,m	8.2 i,m	610 a	4600 a
10. Selenium [b]	7782492	[Reserved] p	5.0 q	290 i,m	71 i,m	n	n
11. Silver [b]	7440224	3.4 e,i,m		1.9 i,m			
12. Thallium	7440280					1.7 a,s	6.3 a,t
13. Zinc [b]	7440666	120 e,i,m,w,x	120 e,i,m,w	90 i,m	81 i,m		

Freshwater criterion maximum concentration (CMC) = 16 ug/L
Freshwater criterion continuous concentration (CCC) = 11 ug/L

These criteria are expressed in terms of the dissolved fraction of the metal in the water column. [See footnote “m” to Table in paragraph (b)(1) of 40 CFR 131.38].

40 CFR 122.45(c) requires that this Order include effluent limitations as total recoverable concentration; therefore it is appropriate to include action levels also as total recoverable concentration.

The SIP requires that if it is necessary to express a dissolved metal value as a total recoverable and a site-specific translator has not yet been developed, the San Diego Water Board shall use the applicable conversion factor from 40 CFR 131.38.

The term “Conversion Factor” (CF) represents the recommended conversion factor for converting a metal criterion expressed as the total recoverable fraction in the water column to a criterion expressed as the dissolved fraction in the water column.

Total recoverable concentration * CF = Dissolved concentration criterion

or

Total recoverable concentration = Dissolved concentration criterion/ CF

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§ 131.38 40 CFR Ch. I (7–1–08 Edition)

Metal	Conversion factor (CF) for freshwater acute criteria	CF for freshwater chronic criteria	CF for saltwater acute criteria	CF[a] for saltwater chronic criteria
Antimony	([d])	([d])	([d])	([d])
Arsenic	1.000	1.000	1.000	1.000
Beryllium	([d])	([d])	([d])	([d])
Cadmium	[b]0.944	[b]0.909	0.994	0.994
Chromium (III)	0.316	0.860	([d])	([d])
Chromium (VI)	0.982	0.962	0.993	0.993
Copper	0.960	0.960	0.83	0.83
Lead	[b]0.791	[b]0.791	0.951	0.951
Mercury				
Nickel	0.998	0.997	0.990	0.990
Selenium		([c])	0.998	0.998

CF for Chromium VI = .982 and .962, so the total recoverable concentrations for chromium VI:
16 ug/L dissolved (CMC)/ 0.982 (CF) = 16.3 ug/L total recoverable CMC
11 ug/L dissolved (CCC) / 0.962 (CF) = 11.4 ug/L total recoverable CCC

Effluent Variability multiplier and Coefficient of Variation (CV)
For each concentration based on an aquatic life criterion, the long-term average (LTA) is calculated by multiplying the concentration with a factor that adjusts for effluent variability. The multiplier can be found in Table 1 of the SIP. Since this Order does not have existing data to properly conduct a variability analysis in accordance with the SIP, the CV has been set equal to 0.6 per SIP requirements. The current effluent data is limited due to the small number of representative outfalls sampled, the lack of outfalls discharging to representative water bodies within the Region, and the targeted nature of the sampling design.

Based upon a CV of 0.6, Table 1 of the SIP requires an effluent variability as follows:
Acute Multiplier = 0.321
Chronic Multiplier = 0.527

The long-term average (LTA) is calculated by multiplying the total recoverable concentrations for zinc with the acute and chronic multipliers:
LTA Acute = 16.3 ug/L * 0.321 = 5.23
LTA Chronic = 86 11.4 ug/L * 0.527 = 6.01

The maximum daily action level (MDAL) and average monthly action level (AMAL) will be based on the most limiting of the acute and chronic LTA, in the case for copper the most limiting LTA is the acute of 5.23 ug/L

NALs are calculated by multiplying the most limiting LTA with a multiplier that adjusts for the averaging periods and exceedance frequencies of the criteria and the effluent limitations. The multiplier can be found in Table 2 of the SIP. Since this Order has

insufficient data, the CV has been set to 0.6 and since sampling frequency is four times a month or less, n has been set equal to 4 per the SIP.

Table 2. Long-Term Average (LTA) Multipliers for Calculating Effluent Limitations

Coefficient of Variation	MDEL Multiplier	AMEL Multiplier			MDEL/AMEL Multiplier		
	99th Percentile Occurrence Probability	95th Percentile Occurrence Probability			MDEL = 99th Percentile AMEL = 95th Percentile Occurrence Probability		
(CV)		n = 4	n = 8	n = 30	n = 4	n = 8	n = 30
0.1	1.25	1.08	1.06	1.03	1.16	1.18	1.22
0.2	1.55	1.17	1.12	1.06	1.33	1.39	1.46
0.3	1.90	1.26	1.18	1.09	1.50	1.60	1.74
0.4	2.27	1.36	1.25	1.12	1.67	1.82	2.02
0.5	2.68	1.45	1.31	1.16	1.84	2.04	2.32
0.6	3.11	1.55	1.38	1.19	2.01	2.25	2.62

Therefore, from Table 2 of the SIP, the LTA multipliers will be as follows:
MDAL Multiplier = 3.11
AMAL Multiplier = 1.55

The MDAL and AMAL limits are calculated by multiplying the LTA with an LTA multiplier for each limit:
MDAL = 5.23 ug/L * 3.11 = 16 ug/L
AMAL = 5.23 ug/L * 1.55 = 8.1 ug/L

Whole Effluent Toxicity (WET) Testing Requirements
A WET limit is required if a discharge causes, has a reasonable potential to cause, or contributes to an exceedance of applicable water quality standards, including numeric and narrative. Since these types of discharges are prohibited under this Order, WET limits are not applicable.

Discussion of AMALs, MDALs and Instantaneous Maximums
Where practical, action levels in this Order have been expressed as both AMALs and MDALs. Certain action levels may not practicably be expressed as AMALs and MDALs due to specific Basin Plan water quality objective language, sampling requirements and/or a lack of Criteria. Based upon the likely sampling frequency of the Copermittees, the frequency of sampling will occur such that grab samples are taken once per sampling day. This single sample would then be subject to MDALs and

Instantaneous Maximum levels. In this case, the more conservative action level would apply. In addition, it is expected that some effluent monitoring will occur less than or equal to once per month. In this scenario, the MDAL, AMAL and Instantaneous Maximum levels would need to be met based upon one sample (unless sampling did not occur). For some Basin Plan water quality objectives, AMALs have been excluded and only MDALs/Instantaneous Maximums set to prevent redundancy in action levels.

Compliance with Action Levels (Priority Pollutants)
Compliance with action levels shall be determined as follows:

Dischargers shall be deemed out of compliance with this Order if the Copermittee failed to take the prescribed action in response to a concentration of the priority pollutant in the monitoring sample that is greater than the action level and greater than or equal to the reported Minimum Level (exceedance of an action level). Regardless of the Copermittee's actions in response to an exceedance, they are still subject to the prohibitions found in sections A and B of the Order.

When determining to take an action in response to the AMALs and more than one sample result is available in a month, the discharger shall compute the arithmetic mean unless the data set contains one or more reported determinations of "did not quantify" (DNQ) or "not detected" (ND). In those cases, the discharger shall compute the median in place of the arithmetic mean in accordance with the following procedure:

(1) The data set shall be ranked from low to high, reported ND determinations lowest, DNQ determinations next, followed by quantified values (if any). The order of the individual ND or DNQ determinations is unimportant.

(2) The median value of the data set shall be determined. If the data set has an odd number of data points then the median is the middle value. If the data set has an even number of data points, then the median is the average of the two values around the middle unless one or both of those points are ND or DNQ, in which case the median value shall be the lower of the two data points where DNQ is lower than a value and ND is lower than DNQ.

D. Storm Water Action Levels

The following legal authority applies to section D:

Broad Legal Authority: CWA §402, §402(p)(3)(B)(iii), CWC §13377, 40 CFR §122.44, 40 CFR §122.26(d)(1)(iv), 40 CFR §122.26(d)(2)(i)(E and F), and 40 CFR §122.26(d)(2)(iii and iv).

Specific Legal Authority:
CWA section 402(p)(3)(B)(iii) provides that MS4 permits "shall require controls to reduce the discharge of pollutants to the maximum extent practicable, including management practices, control techniques and system, design and engineering methods and such other provisions as the Administrator or the State determines appropriate for the control of such pollutants."

Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(E and F) provides that the Copermittee "Require compliance with conditions in ordinances, permits, contracts or orders;" and "Carry out all inspection, surveillance and monitoring procedures necessary to determine compliance and noncompliance with permit conditions …"

Copermittees must conduct a comprehensive monitoring program as required under Federal NPDES regulations 40 CFR 122.26(d)(2)(iii), including the collection of quantitative MS4 storm water effluent data from outfalls.

Federal NPDES regulations 40 CFR 122.44 (d) provide that NPDES permits include any requirements necessary to "Achieve water quality standards,… including State narrative criteria for water quality."

Section D has been added to establish storm water action levels (see also Finding D.1.h and Discussion).

<u>Introduction</u>
The Copermittees' ROWD supports the establishment of action levels which can be used in the effectiveness assessment program to ensure a minimum level of program implementation and identify shortcomings in their MS4 programs.[165] Storm Water Action Level (SAL) concentrations, standards and constituents have been developed and incorporated into the monitoring requirements for wet weather.

[165] Riverside County Copermittees. 2009. Report of Waste Discharge (San Diego Region).

SAL Concentration/Standards

SAL pollutant levels were developed from a regional subset of nationwide Phase I MS4 data by using USEPA Climate Zone 6 (arid west) data.[166] Utilizing data from USEPA Climate Zone 6 resulted in SALs which closely reflect the environmental conditions experienced in Riverside County. The localized subset of data includes sampling events from multiple Southern California locations including Orange, San Diego, Riverside, Los Angeles, and San Bernardino Counties. The dataset includes samples taken from highly built-out impervious areas and from storm events representative of Southern California conditions.

Additionally, utilization of regional data is appropriate due to the addition of data into the nationwide Phase I MS4 monitoring dataset in February 2008. This additional data increased the number of USEPA Climate Zone 6 samples to more than 400, and included additional monitoring events within Southern California (see figure below).

Sample Sizes Used to Calculate Storm Water Action Levels

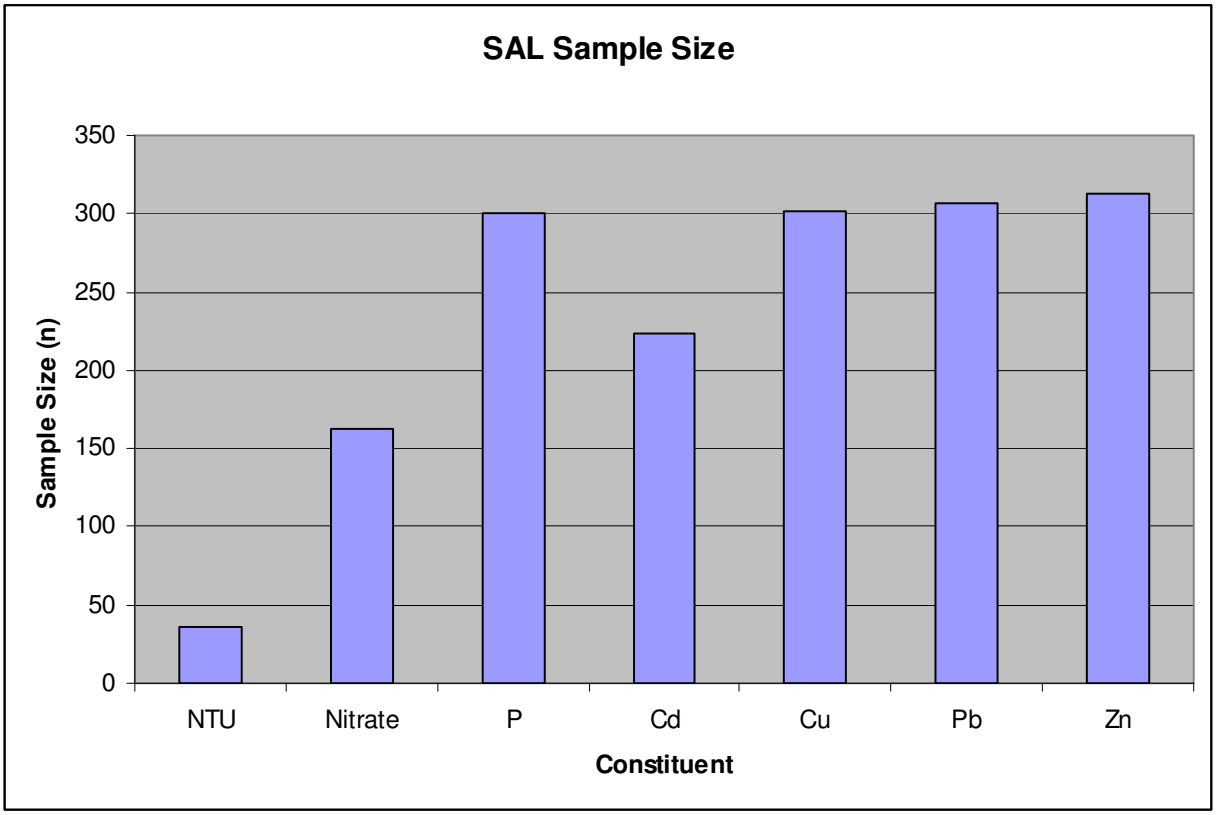

In addition, the SALs reflect the water quality standards in the Basin Plan for the San Diego Region, the California Toxic Rule and USEPA Water Quality Criteria. Since it is the goal of the SALs, through the iterative and MEP process, to have outfall storm

[166] Data used to develop SAL are provided in Attachment F to Order No. R9-2010-0016, and obtained from http://rpitt.eng.ua.edu/Research/ms4/mainms4.shtml

water discharges meet all applicable water quality objectives, the list of constituents to be tested and protocol for testing has been developed to provide a reference point to evaluate the iterative MEP process.

SALs were developed based upon receiving water monitoring results and CWA section 303(d) impaired waters listings. Nitrogen, Copper and Phosphorous are all pollutants for which receiving waters are 303(d) listed as impaired and for which sufficient data was available to develop SALs. Additionally, receiving water monitoring, including from storm events monitored by the Copermittees, has demonstrated excursions and/or potential excursions, often absent receiving water hardness, above water quality criteria for turbidity (NTU), Cadmium, Lead, and Zinc. SALs were not developed for some pollutants for which receiving waters are 303(d) listed as impaired due to a lack of representative data available. These pollutants are required to be monitored but are not subject to a SAL under the Order.

Monitoring

The SALs require the measurement of hardness and to provide more specificity in the assessment of samples with SALs for total metal concentrations. While USEPA Climate Region 6 data includes a large sample size for concentrations of total metals, the impact the concentration will have on receiving waters will vary with receiving water hardness. Since it is the goal of the SALs, through the iterative and MEP process, to have MS4 storm water discharges meet all applicable water quality objectives, the hardness of the receiving water should be used when assessing the total metal concentration of a sample. Thus, when an exceedance of a SAL concentration is detected for a metal, the Copermittee must determine if that exceedance is above the existing applicable water quality limitation based upon the hardness of the receiving water. The water quality limitations Copermittees must use to assess total metal SAL exceedances are the California Toxic Rule (CTR) and USEPA National Recommended Water Quality Criteria for Freshwater Aquatic Life 1 hour maximum concentrations. The 1 hour maximum concentration is to be used for comparison since it is expected to most replicate the impacts to waters of the State from the first flush following a precipitation event.

E. Legal Authority

The following legal authority applies to section E:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.26(d)(2)(i)(A) provides that the Copermittees shall develop and implement legal authority to "Control through ordinance, order or similar means, the contribution of pollutants to the municipal storm sewer by storm water discharges associated with industrial activity and the quality of storm water discharged from sites of industrial activity."

Federal NPDES regulation 40 CFR 122.26(d)(2)(i)(D) provides that the Copermittees shall develop and implement legal authority to "Control through interagency agreements among coapplicants the contribution of pollutants from one portion of the municipal system to another portion of the municipal system."

Illicit discharge is defined under Federal NPDES regulation 40 CFR 122.26(b)(2) as "any discharge to a municipal separate storm sewer system that is not composed entirely of storm water except discharges pursuant to a NPDES permit (other than the NPDES permit for discharges from the municipal separate storm sewer) and discharges resulting from fire fighting activities."

Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(A - D) require municipalities to implement controls to reduce pollutants in storm water runoff from commercial, residential, industrial, and construction land uses or activities.

Federal NPDES regulation 40 CFR 122.26(d)(1)(ii) requires from the Copermittee "A description of existing legal authority to control discharges to the municipal separate storm sewer system."

Section E.1.b requires the Copermittees to prohibit all identified illicit discharges not otherwise allowed pursuant to section B.2 including but not limited to:

(1) Sewage;
(2) Discharges of wash water resulting from the hosing or cleaning of gas stations, auto repair garages, or other types of automotive services facilities;
(3) Discharges resulting from the cleaning, repair, or maintenance of any type of equipment, machinery, or facility including motor vehicles, cement-related equipment, and port-a-potty servicing, etc.;
(4) Discharges of wash water from mobile operations such as mobile automobile washing, steam cleaning, power washing, and carpet cleaning, etc.;

(5) Discharges of wash water from the cleaning or hosing of impervious surfaces in municipal, industrial, commercial, and residential areas including parking lots, streets, sidewalks, driveways, patios, plazas, work yards and outdoor eating or drinking areas, etc.;
(6) Discharges of runoff from material storage areas containing chemicals, fuels, grease, oil, or other hazardous materials;
(7) Discharges of pool or fountain water containing chlorine, biocides, toxic amounts of salt, or other chemicals; discharges of pool or fountain filter backwash water;
(8) Discharges of sediment, pet waste, vegetation clippings, or other landscape or construction-related wastes; and
(9) Discharges of food-related wastes (e.g., grease, fish processing, and restaurant kitchen mat and trash bin wash water, etc.).

Section E.1.j has been added to the Order to ensure that BMPs implemented by third parties are effective. Since the Copermittees cannot passively receive and discharge pollutants from third parties, the Copermittees must ensure discharges of storm water pollutants to the MS4 are reduced to the MEP. In order to achieve this, the Copermittees must be able to ensure that effective BMPs are being implemented by requiring the third parties to document BMP effectiveness. Regarding the Copermittees' ability to require documentation and reporting from third parties, USEPA states "municipalities should provide documentation of their authority to enter, sample, inspect, review, and copy records, etc., as well as demonstrate their authority to require regular reports."[167]

[167] USEPA, 1992. Guidance Manual for the Preparation of Part 2 of the NPDES Permit Applications for Discharges from Municipal Separate Storm Sewer Systems. EPA 833-B-92-002.

F. Jurisdictional Runoff Management Program

F.1. Development Planning Component

The following legal authority applies to section F.1:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWA section 402(a), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F), 40 CFR 131.12, and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A)(2) provides that Copermittees develop and implement a management program which is to include "A description of planning procedures including a comprehensive master plan to develop, implement and enforce controls to reduce the discharge of pollutants from municipal separate storm sewers which receive discharges from areas of new development and significant redevelopment. Such plans shall address controls to reduce pollutants in discharges from municipal separate storm sewers after construction is completed."

Federal NPDES regulation 40 CFR 122.44(d)(1) requires municipal storm water permits to include any requirements necessary to "[a]cheive water quality standards established under section 303 of the CWA, including State narrative criteria for water quality."

Sections F.1.a and F.1.b (General Plan and Environmental Review Process) require the Copermittees to update and revise their General Plan (or equivalent plan) and environmental review processes to ensure water quality and watershed protection principles are included. The Copermittees are required to detail any changes to the General Plan or environmental review process in their Jurisdictional Runoff Management Program Annual Reports. The General Plan must be updated to include water quality and watershed protection principles for all new development and redevelopment projects.

The change made to these sections requires updating the General Plan and Environmental Review Process on an as-needed basis. Each Copermittee has either updated, is in the process of updating, or has assessed its General Plan to ensure the General Plans include the required principles and are in compliance with Order No. R9-2004-001.

Section F.1.c (Approval Process Criteria and Requirements) requires that all development projects (regardless of size) implement BMPs to reduce storm water pollutant discharges to the MEP. Source control and site design BMP requirements were not clearly described in this section of Order No. R9-2004-001. Additional detail has been added to this section to better describe the source control and site design

BMPs needed for implementation. This additional detail is consistent with the requirements of the SSMP, also known in Riverside County as the Water Quality Management Plan (WQMP). However, only source control and site design BMPs that apply to all types of development projects are required (e.g., properly designed trash storage areas).

The requirements are consistent with Order No. R9-2004-001. However, some elements are not contained in the current DAMP[168] (e.g., buffer zones). One exception is that Order No. R9-2004-001's requirement that applicants must provide evidence of coverage under the General Industrial Permit has been removed, since industrial tenants for a development project are usually not known during the planning stage.

The section has also been modified to reflect the prohibition of over-irrigation runoff to the MS4, as well as LID requirements. Additionally, this section requires the use of native and/or low water use plants for landscaping, and rainwater harvesting, where feasible.

Sections F.1.d and F.1.d.(1) (Standard Storm Water Mitigation Plans and Definition of Priority Development Project) require the Copermittees to review and update their SSMPs (also known in Riverside County as Water Quality Management Plans – WQMPs) for compliance with the Order. The sections also require all Priority Development Projects falling under certain categories to meet SSMP requirements. The update is necessary to ensure that the Copermittees' SSMPs are consistent with the changes that have been made to the Order's SSMP requirements. The requirement for the development/adoption of a Model SSMP has been removed since a model was completed and adopted in 2005.

The SSMP section of the Order has been reformatted for clarity. There are also some significant changes. Changes have been made in response to USEPA program evaluations, recent BMP development and effectiveness studies, recent reports on the magnitude of problems caused by hydromodification, and reviews of annual reports and the ROWD submitted by the Copermittees.

In addition, the Order requires that a one-acre threshold be phased in over two years for the priority development category. This one-acre threshold was selected to be consistent with the State Water Board's Phase II NPDES requirements for small municipalities (Order No. 2003-0005-DWQ). The one-acre threshold is also included to be consistent with the State Water Board's Construction General Permit (Order No. 2009-0009-WQO), to ensure all Development Projects subject to the post-construction BMP requirements of the Construction General Permit will implement SSMP post-construction BMP requirements. The one-acre determination applies to the amount of

[168] Riverside County Copermittees. *Drainage Area Management Plan (DAMP)2006.* July 21, 2006.

ground area disturbed, not the total size of the parcel or project. Each Copermittee may also lower this threshold if desired.

Section F.1.d.(2) (Priority Development Project Categories) includes several changes to improve, simplify, and clarify the Priority Development Project categories.

One of the most significant changes is that where a new Development Project feature, such as a parking lot, falls into a Priority Development Project Category, the entire project footprint is subject to SSMP requirements. This criterion was not included in Order No. R9-2004-001. It is included, however, in the Model San Diego SSMP that was approved by the San Diego Water Board in 2002. It is included in this Order because existing development inspections by Riverside County municipalities show that facilities included in the Priority Development Project Categories routinely pose threats to water quality. This permit requirement will improve water quality and program efficiency by preventing future problems associated with partly treated storm water runoff from redevelopment sites. This approach to improving storm water runoff from existing developments is practicable because municipalities have a better ability to regulate new developments than existing developments.

Another significant change is a new category for any new development projects that create 10,000 square feet or more of impervious surfaces (collectively over the entire project site). This category applies to commercial, industrial, residential, mixed use, and public projects on private or public land.

Section F.1.d.(2)(g) was modified to allow the Copermittees to develop a standard roadway design and post-construction BMP guidance document that could be used by the Copermittees in lieu of a project specific SSMP for each public works road construction project. The guidance document must comply with the SSMP requirements, including the LID and hydromodification BMP requirements. The roadway design and post-construction BMP guidance must be included in the updated SSMP, and may be utilized after the San Diego Water Board has determined that the updated SSMP is acceptable.

Development of new industrial sites was not included as a category in the Priority Development Projects in Order No. R9-2004-001 because industrial NPDES requirements already establish storm water criteria. Industrial sites are now included in the new development category of the Order to be consistent with Phase II rules and to close loopholes.

Section F.1.d.(3) (Pollutants of Concern) requires Copermittees to update their procedures for identifying pollutants of concern for each Priority Development Project. This is important to do periodically because of changing water quality conditions and designations of impairments or areas of concern. Furthermore Copermittees continually learn more about pollutant-generating activities as they conduct inspections and investigations, and that information must be incorporated into the SSMP process.

Section F.1.d.(4) (Low Impact Development BMP Requirements) requires the Copermittees to require each Priority Development Project to implement low impact development (LID) BMPs to reduce the amount of polluted storm water runoff from those sites. The Copermittees' ROWD proposes to revise the Riverside County Storm Water Quality BMP Design Handbook to incorporate LID design concepts.[169] The primary approach in LID site design BMPs is to limit the permanent loss of existing infiltration capacity because loss of infiltration is a major contributor to wet weather pollution discharges. General means to accomplish that goal include retaining natural infiltration areas of a site and limiting the amount of impervious surfaces. The Order does not require a specific or relative amount of pervious surfaces be added to a project. The Order seeks to retain on-site capture of the 85th percentile storm.

The Copermittees must require LID BMPs to be implemented for each Priority Development Project, unless found to be technically infeasible. LID BMPs must be formally considered during the plan review process for Priority Development Projects. The LID review process for each Priority Development Project is expected to include an assessment of LID BMP techniques to infiltrate, filter, store, evaporate, and/or retain runoff close to the source of the runoff. The review process is also expected to include an assessment of the potential collection of storm water for on site and off site reuse opportunities. In cases where LID BMPs are found to be technically infeasible, the Copermittees may grant a waiver to the Priority Development Project for all or a portion of the LID BMP requirements.

The Order directs the Copermittees to require new development projects to employ certain classes of LID site design BMPs. The required LID site design BMPs take advantage of features that are incorporated into the Priority Development Project, such as landscaping or walkways. It also requires that projects seek to maintain natural water drainage features rather than instinctively convey water in buried pipes and engineered ditches that eliminate natural water quality treatment functions. These types of site design BMPs are both effective and achievable.

LID BMPs must be sized and designed to ensure onsite retention without runoff, of the volume of runoff produced from a 24-hour 85th percentile storm event ("design capture volume"). This is consistent with other municipal storm water NPDES permits recently adopted by the Los Angeles and Santa Ana Water Boards, as well as the permit recently adopted by the San Diego Water Board for Orange County. The requirement for a numerical BMP design standard is well established for treatment control BMPs and is required in permits throughout the nation such as in Pennsylvania, West Virginia, Georgia, and Washington D.C. Since the 85th percentile storm event has previously been used as the numeric design standard for treatment control BMPs; the same size storm event can be applied as the numeric design standard for LID BMPs.

[169] Riverside County Copermittees. 2009. Report of Waste Discharge (San Diego Region).

The average 24-hour, 85th percentile rainfall for the Riverside County portion of the San Diego Region was calculated to be approximately 0.6 inches of rain.[170]

The retention and restoration of natural drainage features, such as ephemeral streams, wetlands, and depressions, can be particularly important because small tributaries are essential to the maintenance of the chemical, biological, and physical integrity of larger water bodies.[171] The loss and modification of such natural water resources to accommodate post-development storm water management leads to direct and indirect adverse effects on water quality that are felt both on the project site and off the site within the watershed.[172,173,174] Effects to aquatic beneficial uses from altered drainage features can occur downstream and upstream. The length of upstream or downstream effect of channel modifications is dependant on the specific structure type and channel slope.[175] For instance, road culverts can act as partial barriers to upstream distribution of native aquatic macroinvertebrates in urban streams, while bridges can provide adequate passage.[176] As a result of the adverse effects to water quality and beneficial uses, the State of California nonpoint source pollution program management measures for urban areas includes limiting the destruction of natural drainage features and natural conveyance areas.[177] Additionally, any project proposing to discharge dredge and/or fill material to waters of the United States and/or State is required to obtain a CWA section 401 Water Quality Certification and/or Waste Discharge Requirements from the San Diego Water Board or State Water Board.

LID site design BMP options do not need to be costly.[178] Some design options, such as concave vegetated surfaces or routing rooftop or walkway runoff to landscaped areas, are cost neutral.[179] Other LID site design BMPs, such as minimizing parking stall widths or use of efficient irrigation devices, are oftentimes already required. In addition, use of LID site design BMPs reduces storm water runoff quantity, allowing for

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[170] San Diego Water Board, 2004. Fact Sheet/Technical report for Order No. R9-2004-001, dated July 14, 2004.
[171] Aquatic scientists comment letter (April 10, 2003) on the Advanced Notice of Proposed Rulemaking (ANPRM) on the Clean Water Act Regulatory Definition of "Waters of the United States." (Docket ID No. OW-2002-0050). This letter is a synthesis of scientific information regarding ephemeral, intermittent, and headwater streams. It was written to USEPA by 85 leading aquatic scientists.
[172] Wright, Tiffany, et al. 2006. *Direct and Indirect Impacts of Urbanization on Wetland Quality.* Prepared by the Center for Watershed Protection for the USEPA Office of Wetlands, Oceans, an Watersheds. 81p. Available on-line at http://www.cwp.org
[173] Konrad, Christopher P. and Derek K. Booth, 2005. *Hydrologic Changes in Urban Streams and Their Ecological Significance.* American Fisheries Society Symposium. Vol. 45 pp.157-177.
[174] Coleman, Derrick, et al. 2005. *Effect of Increases in Peak Flows and Imperviousness on the Morphology of Southern California Streams*. Technical Report No. 450 of the Southern California Coastal Water Research Project.
[175] Fischenich, J.C. 2001. "*Impacts of stabilization measures*," EMRRP Technical Notes Collection (ERDC TNEMRRP- SR-32), U.S. Army Engineer Research and Development Center, Vicksburg, MS. http://www.wes.army.mil/el/emrrp
[176] Blakely, Tanya J., et al. 2006. *Barriers To The Recovery Of Aquatic Insect Communities In Urban Streams* Freshwater Biology Vol. 51(9), 1634–1645.
[177] California Nonpoint Source Encyclopedia, Management Measure 3.1.b. Runoff from Developing Areas, Site Development and Management Measure 3.3.a. Runoff from Existing Development, Existing Development.
[178] USEPA, 2000. Low-Impact Development: A literature review. EPA-841-B-00-005. 35p.
[179] Bay Area Stormwater Management Agencies Association., 1999. Start at the Source. Forbes Custom Publishing. Available on-line at: http://www.scvurppp-w2k.com/basmaa_satsm.htm. pp. 149.

treatment control BMPs and other storm water infrastructure on site to be smaller, therefore savings costs for both developers and municipalities.[180,181]

Because of the potential economic and environmental benefits of using LID site design, the U.S. Department of Housing and Urban Development, Office of Policy Development and Research, developed "*The Practice of Low Impact Development (LID)*" to assist the housing industry during the land development process. [182] This document focuses specifically on technologies that affect both the cost impacts and environmental issues associated with land development. Much of the report focuses on storm water management because LID storm water management systems can save capital costs for developers and maintenance costs for municipalities.[183] The executive summary of the HUD report notes:

> *This approach to land development, called Low Impact Development (LID), uses various land planning and design practices and technologies to simultaneously conserve and protect natural resource systems and reduce infrastructure costs. LID still allows land to be developed, but in a cost-effective manner that helps mitigate potential environmental impacts. LID is best suited for new, suburban development.*

Developers can use site and structure designs that reduce building footprints, decrease the amount of paved infrastructure, and provide for dispersed drainage and infiltration of runoff from impervious surfaces to reduce the effective impervious surface.[184] The concept of effective impervious surface is important, because when runoff from these surfaces is directed to pervious areas rather to an impervious drainage system (i.e. curbs, gutters, street surfaces, storm drain pipes), it can infiltrate, evaporate, or be taken up by vegetation, thereby reducing the total volume of storm water runoff leaving a site.

In addition to all the benefits discussed above, LID BMPs have several other advantages over conventional treatment control BMPs. As previously discussed, implementing LID BMPs can save on maintenance costs for municipalities and property owners. LID BMPs are typically easier to operate and maintain compared to conventional mechanical treatment control BMP technologies. Because LID BMPs are easier to operate and maintain, they are also more reliable compared to conventional mechanical treatment control BMP technologies, thus more sustainable over the long term.

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[180] National Association of Home Builders Research Center. *Builders Guide to Low Impact Development.* Available on-line at http://www.toolbase.org
[181] National Association of Home Builders Research Center. *Municipal Guide to Low Impact Development.* Available on-line at http://www.toolbase.org
[182] U.S. Department of Housing and Urban Development, Office of Policy Development and Research, 2003. *The Practice of Low Impact Development."* Prepared by: NAHB Research Center, Inc. Upper Marlboro, Maryland. Contract No. H-21314CA.
[183] Ibid. Executive Summary, p.x.
[184] Bay Area Stormwater Management Agencies Association. 2003. *Using Site Design Techniques to Meet Development Standards for Stormwater Quality*. Available on-line at: http://www.basmaa.org/

Through its process of conditioning development projects under the CWA section 401 Water Quality Certification program, the San Diego Water Board finds that the level of LID site design BMP implementation in the Order is feasible for all projects. The LID BMP requirements will help ensure that LID site design BMPs are implemented for new development projects. LID site design BMPs are a critical component of storm water runoff management at new development projects, since the LID BMPs provide multiple benefits including preservation of hydrologic conditions, reduction of pollutant discharges, cost effectiveness, and green space.

The Order provides the Copermittees with flexibility in implementing the LID site design BMP requirements by providing a LID BMP waiver program. For Priority Development Projects where infiltration LID BMPs are not technically feasible for retaining all or part of the design capture volume on site without runoff, a waiver may be granted for the remaining portion of the design capture volume to be treated with other LID BMPs. The Riverside County Copermittees plan on allowing the implementation of the LID BMPs contained in the Riverside County LID Design Manual if infiltration LID BMPs are found to be technically infeasible to retain all of the design capture volume. Other LID BMP design and guidance manuals that are acceptable to the Copermittees and/or San Diego Water Board may also be considered.

If infiltration LID BMPs and/or other LID BMPs are technically infeasible to retain and/or treat all or part of the design capture volume for a Priority Development Project, a waiver may be granted for the remaining portion of the design capture volume. The waiver would allow the remaining portion of the design capture volume to be treated with conventional treatment control BMPs and some form of mitigation.

The use of conventional treatment control BMPs for Priority Development Projects is expected to be allowed by the Copermittees on a very limited basis, and only when a Copermittee finds that LID BMPs are technically infeasible for retaining and/or treating the full design capture volume. In such cases, the Copermittee may issue a waiver for the Priority Development Project from all or a portion of the LID BMP requirements. The LID BMP waiver program that must be developed and implemented by the Copermittee(s) is discussed below under section F.1.d.(7). The criteria that the Copermittee(s) may use to make a finding of technical infeasibility for implementing LID BMPs are also discussed under section F.1.d.(7).

Section F.1.d.(5) (Source Control BMP Requirements) requires that Priority Development Projects implement a minimum set of source control BMPs to protect the water quality of receiving waters from discharges of runoff from these projects. This section has been added to provide more detail and clarify the Order's requirements for source control BMPs. The minimum source control BMPs listed as required by this section must be implemented by each Priority Development Project. In cases where one or more of the minimum source control BMPs are not warranted as part of the site

design for the Priority Development Project (e.g., no outdoor material storage and/or work areas), those source control BMPs are not expected to be implemented.

Section F.1.d.(6) (Treatment Control BMP Requirements) includes several design requirements for any treatment control BMPs that are allowed to be implemented (i.e. granted a waiver for all or part of the LID BMP requirements) on Priority Development Projects. These requirements are generally consistent with Order No. R9-2004-001, with two exceptions. First, the Order limits the selections of methods used to determine the appropriate volume of storm water runoff to be treated. The modification ensures that priority development project proponents utilize the most accurate information to determine the volume or flow of runoff which must be treated.

Second, the Order requires that treatment control BMPs selected for implementation at Priority Development Projects have a removal efficiency rating that is ranked with high or medium pollutant removal frequency for the project's most significant pollutants of concern. The requirement allows exceptions for those projects that, with a feasibility analysis, can justify the use of a treatment control BMP with a low removal efficiency for a Priority Development Project. This requirement is needed because to date, the Copermittees have generally approved low removal efficiency treatment control BMPs without justification or evidence that use of higher efficiency treatment BMPs was considered and found to be infeasible. Specifically, it has been found during audits of the Copermittees' SSMP programs that many SSMP reports do not adequately describe the selection of treatment control BMPs.[185] Moreover, USEPA's contractor Tetra Tech, Inc. recommends that "project proponents should begin with the treatment control that is most effective at removing the pollutants of concern […] and provide justification if that treatment control BMP is not selected."[186]

In addition, treatment control BMPs must be designed and implemented with measures to avoid the creation of nuisance or pollution associated with vectors, such as mosquitoes, rodents, and flies. Related guidelines are identified in guidance from CASQA.[187] Additional considerations are outlined in publications from the California Department of Health Services and University of California Division of Agriculture and Natural Resources.[188]

Section F.1.d.(7) (Low-Impact Development BMP Waiver Program) requires the Copermittees to develop, collectively or individually, a LID BMP waiver program. For some Priority Development Project sites, it may be technically infeasible to implement the required LID BMPs to retain and/or treat the design capture volume due to the site

[185] PG Environmental, 2008. Riverside County Flood Control and Water Conservation District and County of Riverside MS4 Inspection Report.
[186] Tetra Tech, Inc., 2005. Program Evaluation Report –San Diego Standard Urban Storm Water Mitigation Plan (SUSMP) Evaluation. P. 5.
[187] For example, see the California Stormwater BMP Handbook guidelines for Extended Detention Basins (TC-22) at http://www.cabmphandbooks.org.
[188] Marco Metzger. "Managing Mosquitoes in Stormwater Treatment Devices." University of California Division of Agriculture and Natural Resources Publication No. 8125. Available at http://anrcatalog.ucdavis.edu.

constraints. For this reason, the San Diego Water Board has added to the Order a requirement for the Copermittees to develop such a program. The LID BMP waiver program would provide the opportunity for development projects to avoid partial or full LID BMP implementation in exchange for implementation of conventional treatment control BMPs and mitigation. The program would maintain equal water quality benefits as properly implemented LID BMPs when partial LID BMPs are coupled with some form of mitigation.

LID BMPs are not limited to infiltration BMPs, and may also include storage, evaporation, evapotranspiration, filtration, and/or on site reuse BMPs. Thus, the San Diego Water Board expects that every site will be able to implement some form of LID BMPs to some extent. The LID BMP waiver program is expected to be used by the Copermittees on a limited basis, and only when a Copermittee finds that LID BMPs are technically infeasible for retaining and/or treating the full design capture volume. The Order provides several conditions under which a Copermittee may find that the implementation of LID BMPs to retain and/or treat the design capture volume is technically infeasible [see section F.1.d.(7)(b)(i)-(iii)]. The Copermittees are not limited to the conditions listed in the Order, and may identify other conditions in the SSMP that would allow a finding of technical infeasibility.

Making a finding of technical infeasibility for the implementation of the LID BMP requirements on any Priority Development Project is at the discretion of each Copermittee through their SSMP plan review process. For any project proponent that would like to receive a waiver for all or part of the LID BMP requirements, the Copermittees may require and/or use any information to make a finding of technical infeasibility.

A separate technical report developed by the project proponent or the Copermittee to support a finding of technical infeasibility may not always be necessary to meet the requirements of this Order. In most cases, it is expected that the information that is provided in the project proponent's SSMP plan review documents (e.g., geotechnical reports, site design plans) will allow the Copermittees to determine whether or not it is technically feasible for LID BMPs to be implemented to retain and/or treat all or part of the design capture volume. The reason(s) for a Copermittee making a finding a technical infeasibility and granting a LID BMP waiver for any project must be provided in the Annual Report.

For Priority Development Projects that are granted a waiver for all or a portion of the LID BMP requirements, mitigation will be required to achieve water quality benefits that will be lost without the LID BMP retention and/or treatment. Any LID BMP waiver program which allows development projects to forgo all or part of the LID BMP implementation requirements must include mitigation provisions which will achieve similar water quality benefits. To ensure that this is the case for the LID BMP waiver program, minimum mitigation provisions for the program have been added to the Order.

Mitigation can be achieved on site or off site. On site mitigation may include additional sizing multipliers for conventional treatment control BMPs implemented on the site to treat a larger range of storm events to achieve the same or greater pollutant load removal expected from retention of the design capture volume. Off site mitigation may include other pollutant treatment projects that are not located on the site that will achieve the same or greater pollutant removal expected from on site LID BMPs for the design capture volume. For example, off site mitigation projects may include green streets projects, existing development retrofit projects, retrofit incentive programs, regional BMPs and/or riparian restoration projects. Off site mitigation projects may also satisfy the Order's retrofitting requirements in section F.3.d.

In addition to these mitigation options, the Order allows the Copermittees to develop and propose additional forms of mitigation (e.g., pollutant credit system, mitigation fund) that could be implemented as part of the LID BMP waiver program by the Copermittee(s). Any additional forms of mitigation proposed by the Copermittees would be subject to approval by the San Diego Water Board Executive Officer prior to implementation.

Section F.1.d.(8) (LID and Treatment Control BMP Standards) addresses a need for the Copermittees to develop and apply consistent criteria for the design and maintenance of structural treatment BMPs. Correct BMP design is critical to ensure that BMPs are effective and perform as intended. Without design criteria, there is no assurance that this will occur, since there is no standard for design or review. As an example, Ventura County has developed a BMP manual that includes standard design procedure forms for BMPs. Ventura County's *Technical Guidance Manual for Storm Water Quality Control Measures* is available at http://www.vcstormwater.org/publications.htm."[189] CASQA also confirms the necessity of design criteria when it includes such criteria in its New Development and Redevelopment BMP Handbook.[190] This issue is noted in the ROWD, and the Copermittees propose to develop standard design checklist/plans/details for selected source control and treatment BMPs.[191]

Section F.1.d.(9) (Implementation Process) requires the Copermittee to implement a process to verify compliance with SSMP requirements. The process must identify at what point in the planning process that projects must meet SSMP requirements and what are roles/responsibilities of municipal departments. The intent of this requirement is to provide consistency in the application of the SSMP between the Copermittees. This requirement was included in previous Order No. R9-2004-001.

[189] Ibid.
[190] California Stormwater Quality Association, 2003. Stormwater Best Management Practice Handbook – New Development and Redevelopment.
[191] Riverside County Copermittees. 2009. Report of Waste Discharge (San Diego Region).

Section F.1.d.(10) (Post-construction BMP Review) requires the Copermittees to keep their SSMP up to date with BMP effectiveness studies for low-impact design and treatment control BMPs. This requirement will ensure that two important types of information be included in those efforts: Site design BMPs and treatment BMPs that are assessed as part of contracts with the State Water Board and San Diego Water Board. Projects funded with such state grants must include effectiveness assessments using a quality assurance plan. As a result, such studies generally provide reliable sources of local data and should be included in the SSMP.

Sections F.1.e (BMP Construction Verification)requires the Copermittees to verify that the BMPs are being constructed for each Priority Development Project subject to SSMP requirements (SSMP project). SSMP projects that improperly construct or fail to construct site design, source control, and treatment control BMPs can pose a significant threat to water quality. Section F.1.e is included in response to recommendations from USEPA.[192]

In some cases SSMP projects may wish to allow occupancy and/or use of a portion of the site prior to full completion of the project. Section F.1.e is not intended to require a project to be fully (i.e. all phases and areas) completed before the occupancy and/or intended use of a portion of the site is allowed. A Copermittee, however, must verify that the BMPs designed to treat and control pollutants from the completed portion of the project are properly constructed before the occupancy and/or intended use of the completed portion is allowed. The BMPs must be specifically designed to control pollutants from the completed portion of the site that will be occupied and/or used prior to the full completion of the SSMP project.

Section F.1.f (BMP Maintenance Tracking) is included in the Order to ensure the continued effectiveness of the post-construction BMP requirements. BMPs need to be properly constructed and adequately maintained to ensure that they are operating correctly and remain effective in removing pollutants from a project site's runoff prior to discharging to receiving waters.

To facilitate the tracking of BMP maintenance, each Copermittee must develop and maintain a database of Priority Development Projects subject to SSMP requirements (SSMP projects) and the post-construction BMPs implemented for each SSMP project. The inventory is not expected or required to include LID BMPs that are implemented on a lot by lot basis in low density residential areas. The inventory, however, must include the post-construction BMPs for all other development or redevelopment SSMP project sites.

The Order requires BMPs at all high priority SSMP project sites as well as all Copermittee project sites with BMPs to be inspected by the Copermittees annually.

[192] Federal Register / Vol. 64, No. 235 / Wednesday, December 8, 1999 / Rules and Regulations. P. 68845. USEPA recommends such practices in the Phase II storm water regulations, promoting "inspections during construction to verify BMPs are built as designed."

Other measures, verification methods, and inspection frequencies may be used for BMPs at lower priority SSMP project sites. SSMP project sites with the highest potential for causing or contributing to a threat to water quality or an existing impairment of water quality are required to be inspected by the Copermittees on an annual basis.

Twenty percent of all SSMP projects are required to be inspected by the Copermittees annually. If the number of high priority SSMP project sites is 20 percent or more of the total number of SSMP projects in the Copermittee's inventory, this requirement will be met. If, however, the number of high priority SSMP project sites is less than 20 percent of the total number of SSMP projects in the Copermittee's inventory, additional lower priority SSMP project sites must be inspected to make up the difference. Selection of the additional lower priority SSMP project sites will be at the discretion of the Copermittee, but are selected based on each site's potential threat to water quality.

The prioritization of the SSMP project sites requiring inspections by the Copermittees will be developed by the Copermittees and reported in the updated JRMP. The prioritization of SSMP project sites may be revised on an annual basis based on inspection findings, and the Copermittees must report changes in prioritization, and justification for each change, in the Annual Report.

The Order includes several criteria that must be considered by the Copermittees in determining the priority of a SSMP project site's threat to water quality. Receiving waters that are listed as impaired by pollutants and/or with discharges exceeding action levels are water bodies most at risk for impairment of beneficial uses. Thus, at a minimum, high priority SSMP projects must include sites that are known or suspected to generate pollutants in an area that is tributary (i.e. upstream within the same Hydrologic Subarea) to a receiving water body listed as impaired for those pollutants; and/or, a receiving water body where exceedances of action levels for those pollutants are observed; and/or, a receiving water body where exceedances of NALs for those pollutants are observed and the Copermittee has not been able to identify the source.

Section F.1.h (Hydromodification) expands and clarifies current requirements for control of MS4 discharges to limit hydromodification effects caused by changes in runoff resulting from development and urbanization. The requirements are based on findings and recommendations of the Riverside County Storm Water Program,[193] the Stormwater Monitoring Coalition (SMC),[194,195] and the Storm Water Panel on Numeric

[193] Riverside County Copermittees. 2009. Report of Waste Discharge (San Diego Region).
[194] Coleman, Derrick, et al. 2005. *Effect of Increases in Peak Flows and Imperviousness on the Morphology of Southern California Streams.* Technical Report No. 450 of the Southern California Coastal Water Research Project.
[195] Stein, Eric and Susan Zaleski. 2005. Managing Runoff to Protect Natural Streams: The Latest Developments on Investigation and Management of Hydromodification in California. Proceedings of a special technical workshop co-sponsored by California Stormwater Quality Association (CASQA), Stormwater Monitoring Coalition (SMC), and University of Southern California Sea Grant (USC Sea Grant). Technical Report No. 475 of the Southern California Coastal Water Research Project.

Effluent Limits (Numeric Effluent Panel).[196] Added specificity is needed due to the current lack of a clear standard for controlling hydromodification resulting from development. More specific requirements are also warranted because hydromodification is increasingly recognized as a major factor affecting water quality and beneficial uses.

Hydromodification is the change in a watershed's runoff characteristics resulting from development, together with associated morphological changes to channels receiving the runoff. As the total area of impervious surfaces increases, infiltration of rainfall decreases, causing more water to run off the surface and at a higher velocity than natural conditions. While erosion in channels is a naturally occurring process, increased runoff rates, volumes, and velocities from developed areas can produce erosive flows in channels under rainfall conditions which are unnatural and were not previously problematic. Moreover, runoff from developed areas increases the duration of time that channels are exposed to erosive flows. The increase in the volume of runoff and the length of time that erosive flows occur ultimately intensify the amount and potential of channel erosion, subsequently causing changes in sediment transport characteristics and the hydraulic geometry (width, depth, and slope) of channels.[197]

These types of changes have been documented in southern California. It has been reported that researchers studying flood frequencies in Riverside County have found that increases in watershed imperviousness of only 9-22 percent can result in increases in peak flow rates for the two-year storm event of up to 100 percent.[198] Such changes in runoff have significant impacts on channel morphology. It has recently been found that ephemeral/intermittent channels in southern California appear to be more sensitive to changes in imperviousness than channels in other areas. Morphology of small channels in southern California was found to change with only 2-3 percent watershed imperviousness, as opposed to 7-10 percent watershed imperviousness in other parts of the nation.[199]

Sediment that would normally be eroded from the developed areas (i.e. naturally eroded if the area remained undeveloped) is typically coarser grained and deposited closer to the source. Coarser grained sediments that are deposited also provide or contribute to habitat that is more hospitable to aquatic flora and fauna.

Developed areas and increased impervious surface change the types and quality of sediment that are discharged in runoff to the channels under rainfall conditions, which

[196] Storm Water Panel Recommendations to the California State Water Resources Control Board. 2006. The Feasibility of Numeric Effluent Limits Applicable to Discharges of Storm Water Associated with Municipal, Industrial, and Construction Activities.
[197] Santa Clara Valley Urban Runoff Pollution Prevention Program, 2005. Hydromodification Management Plan. P. 1-1.
[198] Schueler and Holland, 2000. Storm Water Strategies for Arid and Semi-Arid Watersheds (Article 66). The Practice of Watershed Protection.
[199] Coleman, et. al., 2005. Effect of Increases in Peak Flows and Imperviousness on the Morphology of Southern California Streams. P. iv.

can have any adverse impact on downstream habitats. Sediment in runoff from developed areas and impervious surfaces are typically finer grained, which remains suspended for longer periods of time and can affect aquatic flora (e.g., reduce photosynthesis by limiting transmittance of light) and fauna (e.g., interfere with respiration). Several types of pollutants generated on developed areas (e.g., pesticides, nutrients, bacteria, metals, hydrocarbons) also tend to adsorb on to finer grained sediments. In addition, finer grained sediments get deposited further away from the source or point of discharge. These changes in the characteristics and quality of the sediment in the runoff from developed areas also contribute to the hydromodification effects on downstream channels.

Effects of hydromodification are evident in Riverside County and recognized by the Copermittees. Analyses of bioassessment data within the San Diego Region has indicated that physical changes to stream channels caused by hydromodification are likely responsible, in part, for the low bioassessment scores in urbanized settings.[200] This pattern is consistent under Order No. R9-2004-001, although non-reference bioassessment monitoring was limited to two sites located at mass loading stations. These sites consistently exhibited poor or very poor IBI scores and sub-optimal or marginal habitat. In addition to poor habitat, water chemistry and toxicity impacts were documented at mass and tributary loading stations, likely exacerbating the observed low IBI scores.[201] It is important to recognize that the physical changes in stream channels are a direct result of MS4 discharges, but that two separate mechanisms are involved in bringing about those changes. First, is a change in the flow regime caused by the increase in impervious surfaces and loss of natural conveyance systems. Discharges to receiving waters from the MS4 outfalls do not mimic the natural discharges from former tributaries to that receiving water, and the change results in erosion. Second, the physical stream habitat in many places has been severely modified in order to efficiently convey those increased storm water discharges to the ocean. Where streams are hardened and/or buried to convey storm water, they cannot provide adequate water quality and other necessary conditions to support beneficial uses. Both of these issues are addressed in the Order.

The Copermittees' recognize the need to improve management of hydromodification. The ROWD proposes to revise the SSMP to incorporate additional information from ongoing hydromodification studies conducted by the SMC. The Order allows the Copermittees to adopt criteria consistent with future SMC findings in the development of their Hydromodification Management Plan.

Section F.1.h. requires the Copermittees to submit a draft Hydromodification Management Plan (HMP) on or before June 30, 2013. This will provide the Copermittees over 2 years to develop the draft HMP.

Section F.1.h (1) describes several elements that must be included in the HMP. For

[200] See San Diego Water Board Order No. R9-2009-002 Fact Sheet.
[201] Riverside County Copermittees Fiscal Year 2008-2009 Santa Margarita Watershed Annual Progress Report.

example, the HMP must identify a method for assessing susceptibility of channel segments which receive runoff discharges from Priority Development Projects, and include a channel standard to ensure that the stability of the channel is not compromised as a result of discharges from the Priority Development Projects. The HMP must also identify a range of flows where Priority Development Projects could cause hydromodification effects and subsequent stream instability.

Maintaining the pre-development flows and durations from a Priority Development Project will significantly reduce the potential for increased erosion caused by development. Loss of natural sediment that will be removed because of otherwise pervious areas covered by the impervious development and removal of pollutants in runoff from Priority Development Projects, however, can still increase the potential for increased erosion. Runoff that is discharged from a project that lacks sediment becomes “sediment hungry” and can result in increased erosion upstream and downstream from the point of discharge. Thus, the HMP must also identify a method and compensate for the loss of sediment supply that is expected due to development and include a performance and/or design standard that will be able to mitigate for that expected loss of sediment supply.

The HMP must require Priority Development Projects to implement control measures (such as LID or detention basins) to prevent hydromodification and resultant degradation of stream conditions upstream and/or downstream of project sites. To compare post-project flow rates and durations to pre-project flow rates and durations, the HMP must specify that the pre-development (naturally occurring) flow rates and durations shall be used when assessing pre-project conditions, so that the naturally occurring hydrology throughout the watershed is eventually restored.

In cases where a stream has been armored with concrete, rip rap, or other man-made materials, the HMP shall require the assessment of a comparable soft-bottom channel as the channel standard, as opposed to using the characteristics of the hardened channel as the channel standard. This is to ensure that hydromodification management measures are already in place should any portion of the hardened channel be returned to its natural state, thereby restoring the physical integrity of the creek and its Beneficial Uses. The only exceptions are for projects that discharge storm water runoff into underground storm drains or conveyance channels with bed and banks that have been concrete lined all the way to water storage reservoirs or lakes, where effects from hydromodification are not expected. Other exceptions that are acceptable to the San Diego Water Board may be identified in the final HMP.

The HMP must also include metrics for assessing impacts to downstream watercourses from Priority Development Projects, as well as assessing improvements to these watercourses. The metrics must be able to assess changes to the channels as Priority Development Projects are developed and constructed in the watershed. Monitoring and evaluating changes to the physical conditions of the channels receiving runoff discharges from Priority Development Projects will provide the Copermittees

data that can be used to determine whether or not the HMP is effective at reducing the increased erosive forces caused by development and impervious surfaces over time.

In addition to metrics to assess changes to the physical conditions of the channels, the Copermittees must monitor and evaluate the biological conditions (e.g., habitat quality, benthic flora and fauna, IBI scores) of the channels. This is because historic hydromodification impacts, such as concrete lining and channelization, are suspected to have impacted the natural physical habitat of urban streams resulting in low IBI scores. The Copermittee's 2008-2009 monitoring report indicated decreased IBI scores at mass loading stations below urbanized watersheds, in part due to marginal or suboptimal habitat. The Monitoring and Reporting Program in the Order includes new requirements for monitoring of habitat for bioassessment, with the "Full" suite of physical/habitat characterization measurements found in the SWAMP Bioassessment Standard Operating Procedures being required with each bioassessment sample. Additional bioassessment sites are also required at locations higher in the watershed, which is expected to more closely reflect localized impacts. Therefore, the IBI scores required by the Monitoring and Reporting Program will be a useful metric in terms of assessing both impacts to streams from Priority Development Projects and improvements due to implementation of the HMP management measures. The Copermittees may also develop or utilize other metrics and identify other monitoring locations that can be used to assess the effectiveness of the HMP on the physical and biological conditions of the channels.

In addition to the control measures that must be included in the HMP to prevent or minimize hydromodification effects from Priority Development Projects, section F.1.h.(2) requires the HMP to include additional management measures to be used on Priority Development Projects based on a prioritized consideration of the following elements in this order: 1) site-design control measures, 2) on-site management measures, 3) the use of regional control measures upstream of receiving waters, and lastly, 4) in-stream management and control measures (not to include reinforcement with non-naturally occurring materials). The suite of management measures must also include stream restoration as a viable option to achieve the channel standard and subsequently restore Beneficial Uses. In-stream controls are expected to be in the form of stream restoration or rehabilitation. The use of stream restoration is expected to be an option that is used in conjunction with other on site management measures and not by itself as the only management measure. Stream restoration or rehabilitation projects that are considered in-stream controls for the purpose of preventing or minimizing hydromodification effects do not include projects that use non-naturally occurring materials (e.g., concrete, rip-rap, or gabions, etc.), but may include projects that use natural materials and/or create stable and sustainable channel configurations.

The San Diego Water Board recognizes that fully achieving post-project runoff flow rates and durations that do not exceed pre-development (naturally occurring) runoff flow rates and durations on redevelopment projects with existing impervious surfaces

may be challenging. Thus, section F.1.h.(3) has been included to allow the Copermittees to propose, as part of the HMP, a waiver program specifically for Priority Development Projects that are redevelopment projects, as defined by section F.1.d.(1)(b). Because redevelopment projects may not be able to achieve post-project runoff flow rates and durations that do not exceed pre-development (naturally occurring) runoff flow rates and durations through onsite management and control measures, offsite mitigation measures may be required. Redevelopment projects, however, must be able to achieve post-project runoff flow rates and durations that are less than or equal to pre-project and down to pre-development runoff flow rates and durations to be eligible to receive a waiver under the program. If a project is granted a waiver, the incremental hydromodification impacts from not achieving the pre-development (naturally occurring) runoff flow rates and durations for the project site must be fully mitigated with offsite mitigation. Offsite mitigation measures may include utilizing regional hydrologic control measures (e.g., regional detention or infiltration basins) or rehabilitation of stream channels to achieve sustainable channel configurations.

Section F.1.h (6) describes interim hydromodification criteria that must be implemented by the Copermittees until the final HMP is found to be adequate by the San Diego Water Board Executive Officer. The Copermittees currently have hydromodification requirements in the SSMP (section 4.4 of the Riverside County WQMP). Until the final HMP is required to be implemented, the Copermittees must continue implementing their existing hydromodification requirements. The existing hydromodification requirements[202] allow exemptions for Priority Development Projects if they meet one of three conditions. One of those conditions is if a project discharges directly to a publicly-owned, operated and maintained MS4. This condition has been too broadly applied and has resulted in many projects being exempt from the hydromodification requirements in the past.

Therefore, the Order modifies the conditions that may exempt Priority Development Projects from implementing the interim hydromodification criteria. The modifications to the conditions are minor and can be implemented in the interim until the final HMP is approved. This allows the Copermittees to focus their resources on development of the final HMP.

Finally, the requirements included in section F.1.h do not supersede the LID BMP requirements in section F.1.d. (4). In certain situations, the requirements to incorporate LID BMPs will satisfy the requirements for hydromodification management. Using LID is a viable option for both accomplishing hydromodification management and pollutant load reductions.

[202] Riverside County Copermittees, 2006 (updated in 2009). Riverside County Water Quality Management Plan (WQMP), Section 4.4.

Section F.1.i (Unpaved Roads Development) specifically requires the Copermittees to implement or require implementation of BMPs for erosion and sediment control after construction of all new unpaved roads. As discussed for Finding D.1c, design and source control BMPs for unpaved roads are needed to minimize the discharge of sediment to the MS4s and receiving waters, especially during storm events. There are several guidance documents available (see Discussion for Finding D.1.c) that include design and source control BMPs that can be readily implemented by the Copermittees for the development of new unpaved roads.

F.2. Construction Component

The following legal authority applies to section F.2:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(D) provides that the proposed management program include "A description of a program to implement and maintain structural and non-structural best management practices to reduce pollutants in storm water runoff from construction sites to the municipal storm sewer system."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(D)(1) provides that the proposed management program include "A description of procedures for site planning which incorporate consideration of potential water quality impacts."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(D)(2) provides that the proposed management program include "A description of requirements for nonstructural and structural best management practices."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(D)(3) provides that the proposed management program include "A description of procedures for identifying priorities for inspecting sites and enforcing control measures which consider the nature of the construction activity, topography, and the characteristics of soils and receiving water quality."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(D)(4) provides that the proposed management program include "A description of appropriate educational and training measures for construction site operators."

Federal NPDES regulation 40 CFR 122.26(d)(2)(i)(A) provides that each Copermittee must demonstrate that it can control "through ordinance, permit, contract, order or similar means, the contribution of pollutants to the municipal storm sewer by storm

water discharges associated with industrial activity and the quality of storm water discharged from site of industrial activity."

Federal NPDES regulation 40 CFR 122.26(b)(14) provides that "The following categories of facilities are considered to be engaging in 'industrial activity' for the purposes of this subsection: […] (x) Construction activity including cleaning, grading and excavation activities […]."

Federal NPDES regulation 40 CFR 122.44(d)(1)(i) requires NPDES permits to include limitations to "control all pollutants or pollutant parameters (either conventional, nonconventional, or toxic pollutants) which the Director determines are or may be discharged at a level which will cause, have reasonable potential to cause, or contribute to an excursion above any State water quality standard, including State narrative criteria for water quality."

Section F.2 has additions to ensure the protection of threatened and endangered species and requires the consideration of potential impacts from the use of Active/Passive Sediment Treatment (AST) at sites determined by the Copermittees to be exceptional threats to water quality. These requirements were added to ensure additional protection of the Beneficial Uses of waters of the State.

Section F.2.a (Ordinance Update) requires each Copermittee to review and update its grading and storm water ordinances as necessary to comply with the MS4 permit. By updating the grading and storm water ordinances, the Copermittees will have the necessary legal authority to require construction sites to implement effective BMPs that will reduce pollutant discharges to the maximum extent practicable. The Order allows the Copermittees 365 days to review and update their ordinances. The 365 days should be adequate to allow for the relatively minor changes that might be needed since their ordinances were last updated under Order No. R9-2004-001.

Section F.2.b (Source Identification) requires the Copermittees to develop and update a watershed based inventory of all construction sites regardless of size or ownership. This section has been modified to require the inventory be updated regularly, rather than annually because constructions sites tend to change often within the course of a year. More frequent updates will ensure the Copermittees have a more accurate inventory of construction sites within their jurisdiction. A regularly updated inventory of active construction sites will assist the Copermittees in ensuring that all sites are inspected per Order requirements. The Order does not specify the frequency of updates, and instead relies on each Copermittee to develop updates appropriate to local construction activity. Failure to maintain a useful inventory would be a violation of the Order.

Section F.2.c (Site Planning and Project Approval Process) requires Copermittees to incorporate consideration of potential water quality impacts prior to approval and issuance of construction and grading permits.

This section now requires the Copermittees to review project proponents' runoff management plans for compliance with local regulations, policies, and procedures. USEPA recommends that it is often easier and more effective to incorporate storm water quality controls during the site plan review process or earlier.[203] In the Phase I storm water regulations, USEPA states that a primary control technique is good site planning.[204] USEPA goes on to say that the most efficient controls result when a comprehensive storm water management system is in place.[205] To determine if a construction site is in compliance with construction and grading ordinances and permits, USEPA states that the "MS4 operator should review the site plans submitted by the construction site operator before ground is broken."[206] Site plan review aids in compliance and enforcement efforts since it alerts the "MS4 operator early in the process to the planned use or non-use of proper BMPs and provides a way to track new construction activities."[207]

The Copermittees have the discretion to determine the depth and detail of the review, as well as the method by which the review will be conducted. The Copermittees review must at least verify that the project proponent's runoff management plan complies with the Copermittee's construction, storm water, and grading ordinances and permits prior to issuing the permit.

Section F.2.d (BMP Implementation) includes modifications to the requirements for each Copermittee to designate and ensure implementation of a set of minimum BMPs at construction sites. These modifications are based on San Diego Water Board findings and experience during implementation of Order No. R9-2004-001.

As a result, the Order requires a minimum set of BMPs to be designated for all sites. In addition to the minimum set of BMPs, enhanced BMPs must be designated and implemented for sites tributary to (i.e. upstream within the same Hydrologic Subarea of) a 303(d) listed water body, or within, directly adjacent to, or discharging directly to ESAs. Enhanced BMPs are control actions and measures specifically targeted to the pollutant or condition of concern and of higher quality and effectiveness than the minimum control measures otherwise required. Enhanced BMPs are expected to be better and more effective for pollutant removal than the minimum set of BMPs.

For sites that are identified as exceptional threat to water quality, active/passive sediment treatment (AST) is required to be implemented in addition to the minimum set and/or enhanced sediment control BMPs. AST is required at construction sites that are identified by the Copermittee as an exceptional threat to water quality due to high turbidity or suspended sediment levels in the site's effluent even when other

[203] USEPA, 1992. Guidance 833-8-92-002. Section 6.3.2.1.
[204] Federal Register / Vol. 55, No. 222 / Friday, November 16, 1990 / Rules and Regulations. P. 48034.
[205] Ibid.
[206] USEPA, 2000. Guidance 833-R-00-002. Section 4.6.2.4, P. 4-30.
[207] Ibid., P. 4-31.

sediment control BMPs have been implemented. In cases where the Copermittee's designated minimum set of BMPs and/or enhanced BMPs are not able or expected to be able to reduce turbidity or suspended sediment levels to a level that will be protective of water quality, AST is necessary and is considered MEP for the discharges from these sites.

AST has been effectively implemented extensively in the other states and in the Central Valley Region of California.[208] In addition, the San Diego Water Board's inspectors have observed AST being effectively implemented at large sites greater than 100 acres and at small, less than 5 acre, in-fill sites. AST is often necessary for Copermittees to ensure that discharges from construction sites are not causing or contributing to a violation of water quality standards. For example, the Basin Plan lists the water quality objective for turbidity as 20 NTU for all hydrologic areas and subareas except for the Coronado HA (10.10) and the Tijuana Valley (11.10). For certain construction sites with high clay content soils, large slopes and exposed areas, the only technology that is likely to meet 20 NTU is AST combined with erosion and sediment controls. To ensure the MEP standard and water quality standards are met, the requirement for implementation of AST at exceptional threat construction sites has been added to the Order, while still providing sufficient flexibility for each Copermittee's unique program.

The Copermittees may define types of construction sites, and/or at any time identify any construction sites after inspections, that are considered exceptional threats to water quality warranting AST. AST may include any sediment control technologies that are capable of reducing turbidity or suspended sediment levels in a construction site's discharge to meet water quality standards in receiving waters.

The Order does not include seasonal restrictions on grading. Seasonal restrictions on grading for storm water are difficult to implement due to the conflict between seasonal grading restrictions, avian breeding and nesting seasons and the seasonal passage of endangered salmonids; therefore the seasonal grading restrictions have not been included with the other BMPs in the Order. For example, the Least Bell's Vireo and the Coastal California Gnatcatcher, found in southern California, are listed as federally endangered and threatened, respectively.[209] Permits issued by the California Department of Fish and Game (CDFG) restrict grading during these birds' breeding seasons, which is from April 10 to August 31 for the Least Bell's Vireo[210] and from February 15 to August 31 for the Coastal California Gnatcatcher.[211] Ideally storm water restrictions on grading would be during the rainy season from October 1 through April 30.[212] Combined, these restrictions would limit construction grading to be during

[208] State Water Board, 2004. Conference on Advanced Treatment at Construction Sites.
[209] State of California, Department of Fish and Game, 2010. State and Federally Listed Endangered and Threatened Animals of California.
[210] United States Department of the Interior, Fish and Wildlife Service, 2001. Least Bell's Vireo Survey Guidelines.
[211] United States Department of the Interior, Fish and Wildlife Service, 1997. Coastal California Gnatcatcher (*Polioptila californica californica)* Presence/Absence Survey Guidelines.
[212] San Diego Water Board, 2001. Order No. 2001-01, San Diego County MS4 Permit. Directive F.2.g.(2).

the month of September, which is infeasible. Section D.2.d of the Order still requires project proponents to minimize grading during the rainy season and coincide grading with seasonal dry weather periods to the extent feasible.

Section F.2.e (Inspections) establishes criteria for inspections based on risk factors including size, season, and location of the construction site. Modifications have been made to requirements of Order No. R9-2004-001 based on the experience of the Copermittees and San Diego Water Board construction programs.

The types of construction sites that must be inspected every two weeks during the rainy season have been changed from Order No. R9-2004-001. In general, because large construction sites (i.e. greater than 50 acres) have been closely scrutinized during the last permit period, they tend to be adequately implementing BMPs. Smaller construction sites (i.e. site with less than 50 acres), however, were not inspected as frequently and can pose a significant threat to water quality. The final rule recently promulgated by USEPA for construction sites[213] identified construction sites with 20 or more acres of land disturbed at one time as posing a significant threat to water quality during the rainy season. Thus, the San Diego Water Board recognized that smaller construction sites needed to be inspected more frequently. As with the construction inspection requirements that were recently adopted for the Orange County Phase I MS4s, this Order requires sites in active grading during the rainy season that are over 30 acres, rather than sites over 50 acres, be inspected every two weeks.

The Order also lowers the size of construction sites adjacent to or discharging directly to ESAs that receive scrutiny. Order No. R9-2004-001 requires such sites five acres and more to be inspected every two weeks during the rainy season. This Order requires such sites one acre and above and tributary to (i.e. with the same Hydrologic Subarea of) a CWA section 303(d) water body segment impaired for sediment; or within, directly adjacent to, or discharging directly to a receiving water within an ESA to be inspected every two weeks during the rainy season and once during August or September. The lower size threshold is consistent with Phase II storm water permits and the Construction General Permit, State Water Board Order No. 2009-0009-DWQ.

The Copermittees also have the discretion to define or identify other construction sites that are significant threats to water quality that must be inspected every two weeks. Several factors are provided that must be considered by each Copermittee in evaluating threat to water quality.

Finally, types of construction sites that must be inspected at least monthly during the rainy season have been changed from Order No. R9-2004-001. All construction sites with one acre or more of soil disturbance must be inspected monthly during the rainy season instead of just 3 times during the rainy season. This level of inspection is

necessary by the Copermittees to ensure adequate compliance with their grading, building, storm water or other water quality related orders and provisions.

This section also requires the Copermittees to track the number of inspections for each inventoried construction site. This requirement has been added to ensure that the Copermittees can demonstrate that construction sites are inspected at the minimum frequencies.

Section F.2.g requires the Copermittees to notify the San Diego Water Board when high level enforcement has been issued to a construction site as a result of storm water violations. The Copermittees will define the types of high level enforcement that will warrant a notification of the San Diego Water Board in their JRMPs. Copermittees are also required to annually notify the San Diego Water Board of construction sites that have alleged violations. This section was added to enhance San Diego Water Board and Copermittee communication and coordination in regulating construction sites.

F.3 Existing Development Component

F.3.a. Municipal
The following legal authority applies to section D.3.a:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A)(1) provides that the proposed management program include "A description of maintenance activities and a maintenance schedule for structural controls to reduce pollutants (including floatables) in discharges from municipal separate storm sewers."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A)(3) provides that the proposed management program include "A description for operating and maintaining public streets, roads and highways and procedures for reducing the impact on receiving waters of discharges from municipal storm sewer systems, including pollutants discharged as a result of de-icing activities."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A)(4) provides that the proposed management program include "A description of procedures to assure that flood management projects assess the impacts on the water quality of receiving water bodies and that existing structural flood control devices have been evaluated to determine if retrofitting the device to provide additional pollutant removal from storm water is feasible."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A)(5) provides that the proposed management program include "A description of a program to monitor pollutants in runoff from operating or closed municipal landfills or other treatment, storage or disposal facilities for municipal waste, which shall identify priorities and procedures for inspections and establishing and implementing control measures for such discharges."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A)(6) provides that the proposed management program include "A description of a program to reduce to the maximum extent practicable, pollutants in discharges from municipal separate storm sewers associated with the application of pesticides, herbicides, and fertilizer which will include, as appropriate, controls such as educational activities, permits, certifications, and other measures for commercial applicators and distributors, and controls for application in public right-of-ways and at municipal facilities."

Federal NPDES regulation 40 CFR 122.44(d)(1)(i) requires NPDES permits to include limitations to "control all pollutants or pollutant parameters (either conventional, nonconventional, or toxic pollutants) which the Director determines are or may be discharged at a level which will cause, have reasonable potential to cause, or contribute to an excursion above any State water quality standard, including State narrative criteria for water quality."

Section F.3.a.(2) (General BMP Implementation) requires the Copermittees to designate minimum BMPs for general municipal areas and activities, regardless of their threat to water quality. BMPs must also be designated for special events. The designated minimum BMPs required to be implemented at a site can be based on the sources or activities present at the site. Threat to water quality is used to determine inspection frequencies in section F.3.a.(8).

Section F.3.a.(3), F.3.a.(4), and F.3.a.(5) (BMP Implementation for Specific Categories) establishes requirements for specific categories of activities and areas. These are selected based on the CWA and findings of the Copermittees in annual reports and ROWD that identify these activities as warranting special attention.

Pesticides, Herbicides, and Fertilizers. 40 CFR 122.26(d)(2)(iv)(A)(6) requires a description of a storm water program for pesticides, herbicides, and fertilizers. In addition, water quality data demonstrates widespread presence of such pollutants in receiving waters and MS4 discharges. In response to similar requirements of Order No. R9-2004-001, the Copermittees have developed a specific Integrated Pest Management, Pesticides, and Fertilizer guidelines.

Flood Control Structures. In order to more closely meet the intent of the federal regulations and guidance, the requirement has been modified. 40 CFR 122.26(d)(2)(iv)(A)(4) requires "A description of procedures to assure that flood management projects assess the impacts on the water quality of receiving water bodies and that existing structural flood control devices have been evaluated to

determine if retrofitting the device to provide additional pollutant removal from storm water is feasible." Retrofitting flood control devices can reduce storm water pollutants and improve water quality.

USEPA expands on the federal provision with the following information: "Storm water management devices and structures that focus solely on water quantity are usually not designed to remove pollutants, and may sometimes harm aquatic habitat and aesthetic values".[214] As flood control structures and other elements of the MS4 age and retrofitting becomes necessary, opportunities for water quality improvements arise.

Conveyance systems which take water quality consideration into account (such as grassed swales, vegetated detention ponds, etc.) can often cost less to construct than traditional concrete systems. Evaluation of the applicability of such systems during retrofitting must occur to ensure that pollutants in storm water runoff are reduced to the maximum extent practicable. USEPA supports utilizing BMPs for pollution reduction in flood management projects, stating that "The proposed management program must demonstrate that flood management projects take into account the effects on the water quality of receiving water bodies. […] Opportunities for pollutant reduction should be considered".[215]

There are generally two types of retrofits for flood control structures. The first type involves adding an engineered device to an existing structure in order to treat or divert runoff. Examples include catch basin inlet filters/screens, ultraviolet disinfection facilities, hydrodynamic separators, and diversions to the sanitary sewer. The second type involves re-installing pervious or natural treatment features to facilities. Examples include removing concrete portions of conveyances to create pervious conveyances; and creating treatment wetlands within flood detention facilities. The later type of retrofit is preferred by the San Diego Water Board. They are likely more sustainable over the long-term because they may require less rigorous operation and maintenance than the former. They may also provide the additional benefit of providing significant or incidental opportunities for beneficial uses (e.g., recreation, wildlife, water supply).[216,217]

<u>Sweeping of Municipal Areas.</u> Sweeping municipal areas would likely be done in the absence of the Order. However, in certain cases it is an important component of a jurisdictional runoff management program. The Order contains requirements to

[214] USEPA, 1992. Guidance Manual for the Preparation of Part II of the NPDES Permit Applications for Discharges from Municipal Separate Storm Sewer Systems. Washington D.C. EPA/833-B-92-002.
[215] Ibid.
[216] Burton, Carmen et al. 2005. Assessing Water Source and Channel Type as Factors Affecting Benthic Macroinvertebrate and Periphyton Assemblages in the Highly Urbanized Santa Ana River Basin, California. American Fisheries Society Symposium. Vol.47 pp.239-262.
[217] Stromberg, Juliet C. 2001. Restoration of Riparian Vegetation in the South-Western United States: the importance of flow regimes and fluvial dynamism. Journal of Arid Environments. Vol49, pp.17-34.

ensure that the use of street sweeping is optimized for runoff applications if it is to be used and reported as a BMP.

Section F.3.a.(6) (Operation and Maintenance of MS4 and Treatment Controls) requires the Copermittees to inspect and remove waste from their MS4s prior to the rainy season.

Maintenance is critical to the successful implementation of every storm water runoff management program. USEPA finds that "Lack of maintenance often limits the effectiveness of storm water structural controls such as detention/retention basins and infiltration devices. […] The proposed program should provide for maintenance logs of, and identify specific maintenance activities for, each class of control, such as removing sediment from retention ponds every five years, cleaning catch basins annually, and removing litter from channels twice a year.

If maintenance activities are scheduled infrequently, inspections must be scheduled to ensure that the control is operating adequately. In cases where scheduled maintenance is not appropriate, maintenance should be based on inspections of the control structure or frequency of storm events. If maintenance depends on the results of inspections or if it occurs infrequently, the applicant must provide an inspection schedule. The applicant should also identify the municipal department(s) responsible for the maintenance program".[218] The MS4 maintenance requirements are based on the above USEPA recommendations. This maintenance will help ensure that structural controls are in adequate condition to be effective year round, but especially at the beginning of and throughout the rainy season.

Two requirements have been added to the Order that were not within Order No. R9-2004-001. Subsection (iii) allows a decreased inspection frequency for facilities that are routinely clean, and subsection (iv) requires trash to be removed from open channels and detention basins in a timely manner. Typically, Copermittees have reported annual or semi-annual creek cleanups as significant BMPs. The large volumes of trash reported to be removed during these events demonstrates the significant amount of trash that accumulates in the channels. In order to reduce the effect of the trash, the Order requires that trash be removed more frequently.

Section F.3.a.(7) (Infiltration from Sanitary Sewer to MS4) requires the Copermittees to implement controls and measures to prevent and eliminate sewage infiltration or seepage from municipal sanitary sewers to MS4s through thorough, routine preventive maintenance of the MS4.

[218] USEPA, 1992. Guidance Manual for the Preparation of Part II of the NPDES Permit Applications for Discharges from Municipal Separate Storm Sewer Systems. Washington D.C. EPA/833-B-92-002.

Sections F.3.a.(8) and F.3.a.(9) (Inspections and Enforcement) establishes a minimum set of municipal areas and activities for oversight and inspection by the Copermittees and requires that Copermittees properly enforce runoff requirements at municipal areas and activities.

Section F.3.a.(10) (Unpaved Roads Maintenance) requires the Copermittees to implement or require implementation of BMPs for erosion and sediment control during and after maintenance activities on unpaved roads, particularly in or adjacent to stream channels or wetlands. As discussed for Finding D.1c, source control BMPs for unpaved roads are needed to minimize the discharge of sediment to the MS4s and receiving waters. There are several guidance documents available (see Discussion for Finding D.1.c) that include BMPs that can be readily implemented by the Copermittees for the development of new unpaved roads. This requirement is necessary to ensure the Copermittees minimize the discharge of sediment from their unpaved roads used for their maintenance activities.

F.3.b. Commercial / Industrial
The following legal authority applies to section F.3.b:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(C) provides that the proposed management program include "A description of a program to monitor and control pollutants in storm water discharges to municipal systems from municipal landfills, hazardous waste treatment, disposal and recovery facilities, industrial facilities that are subject to section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA), and industrial facilities that the municipal permit applicant determines are contributing a substantial pollutant loading to the municipal storm sewer system."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(C)(1) provides that the Copermittee must "identify priorities and procedures for inspections and establishing and implementing control measures for such discharges."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(C)(2) provides that the proposed management program shall "Describe a monitoring program for storm water discharges associated with the industrial facilities identified in paragraph (d)(2)(iv)(C) of this section, to be implemented during the term of the permit, including the submission of quantitative data on the following constituents: any pollutants limited in effluent guidelines subcategories, where applicable; any pollutant listed in an existing NPDES permit for a facility; oil and grease, COD, pH, BOD_5 , TSS, total phosphorus, total Kjeldhal nitrogen, nitrate plus nitrite nitrogen, and any information on discharges required under 40 CFR 122.21(g)(7)(iii) and (iv)."

Federal NPDES regulation 40 CFR 122.26(d)(2)(ii) provides that the Copermittee "Provide an inventory, organized by watershed of the name and address, and a description (such as Standard Industrial Classification [SIC] codes) which best reflects the principal products or services provided by each facility which may discharge, to the municipal separate storm sewer, storm water associated with industrial activity."

Federal NPDES regulation 40 CFR 122.44(d)(1)(i) requires NPDES permits to include limitations to "control all pollutants or pollutant parameters (either conventional, nonconventional, or toxic pollutants) which the Director determines are or may be discharged at a level which will cause, have reasonable potential to cause, or contribute to an excursion above any State water quality standard, including State narrative criteria for water quality."

Federal NPDES regulation 40 CFR 122.26(d)(2)(i)(A) provides that each Copermittee must demonstrate that it can control "through ordinance, permit, contract, order or similar means, the contribution of pollutants to the municipal storm sewer by storm water discharges associated with industrial activity and the quality of storm water discharged from site of industrial activity."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A) provides that the Copermittee develop a proposed management program which includes "A description of structural and source control measures to reduce pollutants from runoff from commercial and residential areas that are discharged from the municipal storm sewer system that are to be implemented during the life of the permit, accompanied with an estimate of the expected reduction of pollutant loads and a proposed schedule for implementing such controls."

Section F.3.b.(1) (Source Identification) requires that botanical and zoological gardens and exhibits, building material retailers and storage, animal boarding facilities and kennels, mobile pet services, plumbing services, and power washing services be included in the Copermittees' inventory of commercial sites/sources. These commercial or industrial sites and sources have been identified by the Copermittees and/or the San Diego Water Board as facilities that may contribute a significant pollutant load to the MS4. In cases where a particular type of facility is not present or known to operate within a Copermittee's jurisdiction, there is no expectation that there would be any such facilities included in the inventory. If, however, that type of facility does become established or begins operating within a Copermittee's jurisdiction during the period of this Order, the Copermittees are expected to identify those sites or sources and include them in their inventory of commercial or industrial facilities. This is not a significant change because Order No. R9-2004-001 requires that any commercial or industrial site or source determined by a Copermittee to contribute a significant pollutant load to the MS4 be added to its inventory of commercial or industrial sites.

The inventory of commercial and industrial facilities is expected to be reviewed and, if necessary, updated at least annually and included in the Annual Report. The inventory is expected to include the prioritization of each facility to ensure the facility is inspected at the correct frequency. If changes are made to the prioritization for any facilities, justification for the changes is expected to be reported in the Annual Report. The inventory is the foundation for the tracking of BMP implementation, number and date(s) of inspections performed, inspection findings, violations, and enforcement actions for each commercial or industrial facility, all of which are expected to be included in the Annual Report.

Section F.3.b.(3) (Mobile Businesses Program) requires each Copermittee to develop and implement a program to reduce the discharge of storm water pollutants from mobile businesses to the MEP and to prevent the discharge of non-storm water. Mobile businesses are service industries that travel to the customer to perform the service rather than the customer traveling to the business to receive the service. Examples of mobile businesses are power washing, mobile vehicle washers, carpet cleaners, port-a-potty servicing, pool and fountain cleaning, mobile pet groomers, plumbers, and landscapers. These mobile services produce waste streams that could potentially impact water quality if appropriate BMPs are not implemented.

Order No. R9-2004-001 also requires BMP implementation for certain mobile businesses (e.g., mobile vehicle washing and mobile carpet cleaning). These storm water requirements of Order No. R9-2004-001 are not significantly different from the existing requirements. The Order specifies the Copermittees must prevent non storm water dry weather flows from entering the MS4 (see section C.2.b). Special attention is required for mobile businesses because of the difficultly of controlling discharges from mobile businesses with existing programs.

Mobile businesses present a unique difficulty in storm water regulation. Due to the transient nature of the business, the regular, effective practice of unannounced inspections is difficult to implement. Also, tracking these mobile businesses is difficult because they are often not permitted or licensed and their services cross Copermittee jurisdictions. Mobile businesses that operate within a municipality may be based in another municipality or even outside the Region.

The Order takes into account the difficulties in regulating mobile businesses. The Copermittees may choose to cooperate in developing and implementing their programs for mobile businesses, including sharing of mobile business inventories, BMP requirements, enforcement action information, and education. Sharing information will allow the Copermittees to better identify and track mobile businesses operating in their jurisdictions.

Because BMPs have been developed already, but communication with mobile businesses may be difficult, the Order provides broad flexibility to the Copermittees for developing a targeted program within the Commercial portion of each JRMP.

Section F.3.b.(4) (Inspection of Industrial and Commercial Sites/Sources) includes requirements for inspections of industrial and commercial sites/sources. The Order is similar to the Order No. R9-2004-001 in requiring that inspections check for coverage under the General Industrial Permit; assessment of compliance with Copermittee ordinances and permits related to storm water and non-storm water runoff; assessment of BMP implementation, maintenance, and effectiveness; visual observations for non-storm water discharges, potential illicit connections, and potential discharge of pollutants in storm water runoff; and education and outreach on storm water pollution prevention.

The Order also requires that inspections include review of BMP implementation plans if the site uses or is required to use such a plan, and the review of facility monitoring data if the site monitors its runoff. If a facility is not required to have a BMP implementation plan or required to collect monitoring data, the inspection does not need to include a review of this information. BMP implementation plans and monitoring data are expected to be available for any facility that is covered under the General Industrial Permit. The BMP implementation plans and monitoring data can provide the inspector pertinent information that can be used during the visual inspection of the facility (e.g., BMPs implemented, maintenance records for BMPs, pollutants in storm water runoff). The Copermittees' inspectors have the discretion to determine the depth and detail of the review and use of the information in conducting the inspection.

Changes in the Order's requirements for inspection procedures mimic USEPA's guidance: "Site inspections should include (1) an evaluation of the pollution prevention plan and any other pertinent documents, and (2) an onsite visual inspection of the facility to evaluate the potential for discharges of contaminated storm water from the site and to assess the effectiveness of the pollution prevention plan."[219] In 1999, USEPA "recognized visual inspection as a baseline BMP for over 10 years," and "visual inspections are an effective way to identify a variety of problems. Correcting these problems can improve the water quality of the receiving water."[220]

Inspection frequencies in the Order have been modified from Order No. R9-2004-001. Order No. R9-2004-001 specifies frequencies for inspecting commercial/industrial sites based on threat to water quality and requires high priority sites to be inspected annually. For sites not identified as high priority, each site must be inspected at least once within a 5 year period.

An additional notification to the San Diego Water Board regarding industrial sites has been added. Copermittees are required to annually notify the San Diego Water Board of industrial sites that have suspected violations. This was added to enhance San Diego Water Board and Copermittee communication and coordination in regulating

[219] USEPA, 1992. Guidance 833-8-92-002, section 6.3.3.4 "Inspection and Monitoring".
[220] USEPA, 1999. 832-F-99-046, "Storm Water Management Fact Sheet – Visual Inspection".

industrial sites. Information may be provided as part of the JRMP annual report if submitted prior to the rainy season.

Also, the option for implementing a third party certification program is included. To the extent that third party certifications are conducted to fulfill the inspection requirements for this section of this Order, the Copermittee will be responsible for conducting and documenting quality assurance and quality control of the third-party certifications. The Copermittees may propose a third party certification program that must receive approval from the San Diego Water Board Executive Officer prior to implementation. The Order includes several requirements that must be included in the third party certification program in order for it to be considered for approval by the San Diego Water Board.

F.3.c. Residential
The following legal authority applies to section F.3.c:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A) provides that the Copermittee develop a proposed management program which includes "A description of structural and source control measures to reduce pollutants from runoff from commercial and residential areas that are discharged from the municipal storm sewer system that are to be implemented during the life of the permit, accompanied with an estimate of the expected reduction of pollutant loads and a proposed schedule for implementing such controls."

Federal NPDES regulation 40 CFR 122.44(d)(1)(i) requires NPDES permits to include limitations to "control all pollutants or pollutant parameters (either conventional, nonconventional, or toxic pollutants) which the Director determines are or may be discharged at a level which will cause, have reasonable potential to cause, or contribute to an excursion above any State water quality standard, including State narrative criteria for water quality."

Section F.3.c.(4) (Common Interest Areas / Home Owner Association Areas / Mobile Home Parks) includes requirements for common interest areas / homeowners' associations and mobile home parks. Many residential neighborhoods and some commercial areas within the jurisdiction of the Copermittees are within common interest developments and are, therefore, subject to management of common areas by associations. The Declaration of the Covenants, Conditions and Restrictions (CC&Rs) contains the ground rules for the operation of such an association. CC&Rs are an appropriate method for protecting the common plan of developments and to provide for a mechanism for financial support for the upkeep of common areas including roads, storm drains, and other components of storm water conveyance systems.

This Order interprets common interest areas as property subject to the codes and ordinance and enforcement mechanisms of the city or county in which it resides and, therefore, holds the local government responsible for the discharge of wastes from storm water conveyance systems located within these areas.

Section F.3.c.(5) (Privately Owned Unpaved Roads Maintenance) includes requirements for privately owned unpaved roads. The Copermittees must require implementation of BMPs for erosion and sediment control during maintenance activities on privately owned unpaved roads, particularly roads that are in or adjacent to receiving waters. As discussed for Finding D.1.c, BMPs for unpaved roads are needed to minimize the discharge of sediment to the MS4s and receiving waters. There are several guidance documents available (see Discussion for Finding D.1.c) that include design and source control BMPs that can the Copermittees can readily require to be implemented.

In addition, where the Copermittees identify illegal construction and maintenance grading activities on privately owned unpaved roads, the Copermittees must enforce their ordinances to prevent illicit discharges of sediment and other pollutants from privately owned unpaved roads to their MS4s and receiving waters.

Section F.3.d. Retrofitting Existing Development
The following legal authority applies to section F.3.d:

Legal Authority: The legal authority for retrofitting existing development is the same legal authority as that identified for municipal, industrial, commercial and residential development sections (See fact sheet discussion on those sections, F.3.a – c). In particular, CWA sections 402(p)(3)(B)(ii-iii), and CWC section 13377 give the Regional Water Board the legal authority to require retrofitting of existing development.

Section F.3.d has been added to require a plan for the retrofit of existing development (see Finding D.3.h and Discussion). This section contains specific requirements for a program to retrofit existing development. When appropriately applied as in this Order, retrofitting existing development meets MEP standards.

Existing BMPs are not sufficient, as evidenced by 303(d) listings and exceedances of Water Quality Objectives from the Copermittees monitoring reports. More advanced BMPs, including the retrofitting of existing development with LID, are part of the iterative process. Previous permits limited the requirement of treatment control BMPs to new development and redevelopment. Based on the current rate of redevelopment compared to existing BMPs, the use of LID only on new and redevelopment will not adequately address current water quality pollution and problems, including downstream hydromodification. Retrofitting existing development is practicable for a municipality through a systematic evaluation, prioritization and implementation plan focused on impaired water bodies, pollutants of concern, areas of downstream

hydromodification, feasibility and effective communication and cooperation with private property owners. The retrofitting requirements are based largely on guidance from the USEPA[221] and the Center for Watershed Protection.[222]

Section F.3.d.(1) requires the Copermittees to identify and inventory areas of existing development within their jurisdiction as candidates for retrofitting projects. The Copermittees are expected to examine the inventories that they are maintaining as required under sections F.3.a-c, inspection findings, and any other forms of data and information to identify the candidates for retrofitting projects. Several areas of existing development that must be identified as candidates for retrofitting projects are listed. Based in part on guidance developed by the Center for Watershed Protection, these areas of existing development are expected to provide the most immediate improvements for water quality through retrofitting. This list of areas that must be considered does not limit the Copermittees from identifying other areas within their jurisdiction that may be evaluated for retrofitting projects.

Section F.3.d.(2) requires each Copermittee to evaluate the candidates identified under section F.3.d.(1) and rank them based on several criteria. One or more types of retrofit source control or treatment control BMPs may be evaluated for each candidate. Landowner cooperation is among the criteria to evaluate and prioritize retrofitting. For example, retrofitting projects on publicly owned properties are likely and expected to be feasible with sufficient funding secured.

Section F.3.d.(4) requires each Copermittee to cooperate with private property owners to encourage the implementation of site specific retrofitting projects. Because the Copermittees have limited authority to directly require retrofitting projects on private property, the Copermittees must encourage private property owners to implement retrofitting projects through indirect programs and incentives. Several programs and incentives that have been successful in other areas are provided in the Order for the Copermittees consideration in developing their practices to encourage private property owners to retrofit their sites. This list, however, does not limit the Copermittees from identifying and considering other practices that may be effective in encouraging private property owners to implement retrofitting projects on their sites.

Section F.3.d.(5) requires retrofit BMPs that are implemented to be tracked in accordance with section F.1.f. The retrofit BMPs must also be inspected. Retrofit BMPs on publicly owned properties must be inspected per section F.1.f. Privately owned retrofit BMPs must be inspected as needed to ensure proper operation and maintenance. Tracking and inspecting retrofit BMPs is necessary for the Copermittee to ensure that the retrofit BMPs are not removed and are maintained to remain effective. Inspections can also provide the Copermittee useful information on the effectiveness of individual retrofit BMPs. For retrofit BMPs on publicly owned

[221] USEPA , MS4 Permit Improvement Guide, EPA 833-R-10-001, April, 2010.
[222] USEPA , MS4 Permit Improvement Guide, EPA 833-R-10-001, April, 2010.

properties, tracking and inspection will correct any problems with the BMPs as soon as a problem arises and will ensure proper maintenance.

For retrofit BMPs on privately owned properties, retrofit BMPs are expected to be implemented and maintained by the property owner on a voluntary basis. The retrofit BMPs must be tracked by the Copermittees, but their inspections are required less frequently due to access issues (i.e. on an as-needed basis). Voluntary retrofitting projects do not warrant frequent Copermittee inspections due to the property owner's willingness to retrofit. Periodic inspections may be performed to ensure the site owner has not removed the retrofit BMPs. Periodic inspections would also ensure that the retrofit BMPs remain effective by providing an opportunity for the inspector to educate the original and subsequent site owner(s) if the retrofit BMP is not operating effectively and requires some maintenance.

F.4. Illicit Discharge Detection and Elimination

The following legal authority applies to section F.4:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(B) provides that the proposed management program "shall be based on a description of a program, including a schedule, to detect and remove (or require the discharger to the municipal storm sewer to obtain a separate NPDES permit for) illicit discharges and improper disposal into the storm sewer."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B)(1) provides that the Copermittee include in its proposed management program "a program, including inspections, to implement and enforce an ordinance, orders or similar means to prevent illicit discharges to the municipal storm sewer system."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B)(2) provides that the Copermittee include in its proposed management program "a description of procedures to conduct on-going field screening activities during the life of the permit, including areas or locations that will be evaluated by such field screens."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B)(3) provides that the Copermittee include in its proposed management program "procedures to be followed to investigate portions of the separate storm sewer system that, based on the results of the field screen, or other appropriate information, indicate a reasonable potential of containing illicit discharges or other sources of non-storm water."

Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(B)(4) provides that the Copermittee include in its proposed management program "a description of procedures to prevent, contain, and respond to spills that may discharge into the municipal separate storm sewer."

Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(B)(5) provides that the Copermittee include in its proposed management program "a description of a program to promote, publicize, and facilitate public reporting of the presence of illicit discharges or water quality impacts associated with discharges from municipal separate storm sewers."

Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(B)(6) provides that the Copermittee include in its proposed management program "a description of educational activities, public information activities, and other appropriate activities to facilitate the proper management and disposal of used oil and toxic materials."

Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(B)(7) provides that the Copermittee include in its proposed management program "a description of controls to limit infiltration of seepage from municipal sanitary sewers to municipal separate storm sewer systems where necessary."

Section F.4.a (Prevent and Detect Illicit Discharges and Connections) requires the Copermittees to implement a program to actively seek and eliminate IC/IDs. Additional wording has been added to this section to clarify and ensure that all appropriate municipal personnel (i.e. field personnel) are utilized in the program to observe and report these illicit discharges and connections.

Section F.4.b (Maintain MS4 Map) requires each Copermittee to maintain an updated map of its entire MS4 and the corresponding drainage areas within its jurisdiction. The Order specifies that the map must include the segments of the storm sewer system owned, operated, and maintained by the Copermittee, and include locations of all known inlets, access points (i.e. manholes), connections with other MS4s, and outfalls to the Copermittee's MS4. Knowing where their inlets, access points, connections with other MS4s, and outfalls are located will allow the Copermittees to better track, identify, and eliminate IC/IDs. The use of a geographic information system (GIS) by the Copermittees is strongly encouraged for the MS4 map. The Riverside County Flood Control and Water Conservation District (RCFCD) currently maintains a GIS layer that is a compilation of all the Copermittee MS4 maps. Although an individual Copermittee may not have GIS capabilities, each Copermittee has agreements with RCFCD for providing updated MS4 maps to the RCFCD to update this GIS layer and subsequent submittal to the San Diego Water Board.

Section F.4.e (Investigation / Inspection and Follow-Up) requires the Copermittees to conduct follow up investigations and inspect portions of the MS4 for illicit discharges and connections, based on dry weather effluent analytical monitoring results. The

section also requires the Copermittees to establish criteria for triggering follow up investigations. Additional language has been added to this section to clarify the minimum level of effort and timeframes for follow up investigations when dry weather limitations are exceeded. This section requires the Copermittees to include and evaluate the specified action levels in their response criteria and to develop response criteria for pollutants without action levels.

Timely investigation and follow up of exceedances is necessary to identify sources of illicit discharges, especially since many of the discharges are transitory. The requirements for immediate response to obvious illicit discharges and a 2 business day minimum response time when field screening action levels are exceeded is necessary to ensure timely response by the Copermittees. When analytical data indicate an exceedance of action levels, the Copermittee(s) have 5 business days to confirm the need to initiate an investigation to identify the source of the exceedance. The Copermittees are expected to investigate for potential sources of the pollutant(s) that may have caused the exceedance of action levels upstream of the collection point and collect additional analytical and field data as necessary. If the quality of the data is confirmed to be unreliable or inaccurate and the investigation indicates there were no sources of the pollutant that could have caused an exceedance of the applicable action level, then further investigation is no longer warranted and should be documented in the Annual Report.

Section F.4.f (Elimination of Illicit Discharges and Connections) requires the Copermittee(s) to take immediate action to initiate steps necessary to eliminate illicit discharges, illicit discharge sources, and illicit connections that have been detected as a result of the investigations required under section F.4.e. The steps necessary to eliminate the illicit discharge or connection are typically initiated with identifying and contacting the person responsible for the illicit discharge or connection. The Copermittee(s) are expected to eliminate the detected illicit discharges and connections as soon as possible after they are able to contact the person responsible for the illicit discharge or connection. The steps expected and/or necessary to eliminate illicit discharges and connections under different scenarios and for different sources should be developed and implemented by the Copermittee(s). These steps may be outlined by the Copermittee(s) in their JRMPs.

In some cases, the Copermittee(s) may determine that one of the necessary steps is to contact the San Diego Water Board to assist in resolving and eliminating illicit discharges and connections. The Copermittee(s), however, are expected to exhaust all of their available administrative and enforcement authorities and mechanisms for addressing and eliminating illicit discharges and connections before contacting the San Diego Water Board for assistance.

Section F.4.h (Prevent and Response to Sewage Spills and Other Spills) requires each Copermittee to implement measures to prevent and respond to spills into its MS4. These requirements are consistent with Order No. R9-2004-001 and based on

federal regulations at 40 CFR 122.26(d)(2)(iv)(B)(4). Those federal NPDES regulations clearly require that owners and operators of MS4s have procedures to prevent, contain, and respond to spills that may discharge into the municipal separate storm sewer.

The Order includes sewage and non-sewage spills in the requirement for spill prevention and response. Federal regulations clearly define sewage as an illicit discharge that must be addressed by municipalities (see Phase II Final Rule, p.68758). Sewage is an illicit discharge to the MS4 that threatens public health. As such, the Copermittees must implement measures to prevent sewage from entering the MS4 system and must respond to illicit discharges that have entered the system. This section has been revised to clarify that management measures and procedures must be implemented to prevent, respond to, and cleanup spills. In addition to the management measures and procedures, a mechanism for the Copermittees to be notified of spills is necessary in order for those management measures and procedures to be implemented as soon as possible after a spill has occurred. The facilitation of public reporting of illicit discharges required by section F.4.c, in addition to regular and open communication with other agencies (e.g., sanitary sewer districts), may also serve as a mechanism for notifying the Copermittees of spills within their jurisdiction.

Section F.3.a.(7) of the Order includes requirements for measures that must be taken to prevent sewage spills. Examples of measures being implemented by Copermittees include inspections of fats, oils, and grease management at restaurants. Other preventative measures can be implemented during routine planning efforts for new development and redevelopment projects. Similarly, building permit inspections should be used to verify the integrity of the sanitary and storm sewer infrastructure and ensure that cross-connections between the two are avoided.

F.5. Public Participation Component

The following legal authority applies to section F.5:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv).

No significant changes from Order No. R9-2004-001 have been made to this section of the Order.

F.6. Education Component

The following legal authority applies to section F.6:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A)(6) provides that the proposed management program include "A description of a program to reduce to the maximum extent practicable, pollutants in discharges from municipal separate storm sewers associated with the application of pesticides, herbicides, and fertilizer which will include, as appropriate, controls such as *educational activities*, permits, certifications, and other measures for commercial applicators and distributors, and controls for application in public right-of-ways and at municipal facilities."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B)(6) provides that the proposed management program include "A description of educational activities, public information activities, and other appropriate activities to facilitate the proper management and disposal of used oil and toxic materials."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(D)(4) provides that the proposed management program include "A description of appropriate educational and training measures for construction site operators."

Section F.6 (Education Component) includes an introductory paragraph that is the same as in Order No. R9-2004-001, except for the addition of New Development / Redevelopment Project Applicants, Developers, Contractors, Property Owners, and other Responsible Parties to the list of target communities.

Section F.6.a (General Requirements) includes education topics that are required for the education programs developed and implemented for the target communities. The Copermittees can choose how and to what degree to address these topics. Some topics may be more important for certain target communities.

The requirement for educational activities, public information activities, and other appropriate activities to facilitate the proper management and disposal of used oil and toxic materials has been moved to this section from the Illicit Discharge Detection and Elimination section.

Section F.6.b (Specific Requirements) includes requirements for specific target communities, which are in addition to the general requirements. The education and training requirements previously included in other sections of Order No. R9-2004-001 (i.e. Development Planning, Construction, Existing Development) have been removed and consolidated under this section. Specific education requirements are included for:

1) the Copermittees' departments and personnel (i.e. staff and contractors, and Planning Boards and Elected Officials, if applicable), 2) new development / redevelopment and construction sites, 3) commercial and industrial sites/sources, and 4) residential and general public communities.

Section F.6.b.(1) (Copermittee Departments and Personnel) requires the Copermittees to implement an education program for their staff and contractors. Education is required at all levels of municipal staff and contractors. Education is especially important for the staff responsible for planning and development review, oversight, inspection and enforcement of construction activities, selecting and implementing BMPs for Copermittee areas, inspection and enforcement of industrial and commercial facilities, and other Copermittee activities which might result in discharges of pollutants if proper BMPs are not used.

Education of Copermittee departments and personnel may be conducted with joint and/or individual training programs (i.e. on a regional and/or jurisdictional scale), and may include both formal and informal training. The Copermittees may choose the scale and methods for educating their departments and personnel.

The annual training required for construction, building, code enforcement, grading review staffs, inspectors, and other responsible construction staff requires the training to occur annually, prior to the rainy season.

Section F.6.b.(2) (New Development / Redevelopment and Construction Sites) requires the Copermittees to educate parties responsible for a project (i.e. project applicants, developers, contractors, property owners, community planning groups, and other responsible parties) about storm water issues and BMPs. Different levels of training will be needed for planning groups, owners, developers, contractors, and construction workers, but all should get a general education of storm water requirements. Education of all construction workers can prevent unintentional discharges, such as discharges by workers who are not aware that they are not allowed to wash things down the storm drains. Training for BMP installation workers is imperative because the BMPs will fail if not properly installed and maintained. Training for field level workers can be formal or informal tail-gate format.

Section F.6.b.(3) (Commercial and Industrial Sites / Sources) requires the Copermittees to notify the owner/operator of each of their inventoried commercial and industrial sites/sources of the BMP requirements applicable to the site/source at least twice during the five-year period of the Order. Notification of BMP requirements may be fulfilled during the business license application/renewal process and/or during site inspections. Notifying commercial and industrial sites/sources of the BMP requirements will ensure the business owners are aware of the appropriate BMPs to implement that prevent discharges of pollutants from these sites/sources.

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Section F.6.b.(4) (Residential and General Public) requires the target audiences for residential and general public communities to include underserved target audiences (e.g., disadvantaged communities), residents and managers of Common Interest Areas / Homeowner Associations, and owners and residents of mobile home parks. These communities are frequently neglected or underserved by most water quality education programs, but can be significant sources of pollutants. Thus, it is important for the residential and general public education programs to reach out to and educate these communities on their potential impacts to water quality.

G. Watershed Water Quality Workplan

The following legal authority applies to section G:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.26(a)(3)(ii) states: "The Director may […] issue distinct permits for appropriate categories of discharges […] including, but not limited to […] all discharges within a system that discharge to the same watershed […]"

Federal NPDES regulations 40 CFR 122.26(a)(3)(v) states: "Permits for all or a portion of all discharges from large or medium municipal separate storm sewer systems that are issued on a system-wide, jurisdiction-wide, watershed, or other basis may specify different conditions relating to different discharges covered by the permit, including different management programs for different drainage areas [watersheds] which contribute storm water to the system."

Federal NPDES regulation 40 CFR 122.26(a)(5) states: "The Director may issue permits for municipal separate storm sewers that are designated under paragraph (a)91)(v) of this section on a system-wide basis, a jurisdiction-wide basis, watershed basis, or other appropriate basis."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv) states: "Proposed programs may impose controls on a system-wide basis, a watershed basis, a jurisdiction basis, or on individual outfalls."

Section G requires Copermittees to continue implementation of their watershed runoff management program (WRMP), however the implementation approach has changed. Order No. R9-2004-001 required a Watershed SWMP that included a collaborative strategy to abate the sources and reduce the discharges causing high priority water quality problems. This strategy was to guide each watershed Copermittee's selection and implementation of Watershed Activities, so that the activities selected and implemented would remove that pollutant contribution responsible for the identified high priority water quality problem. Outcomes of these requirements were not able to demonstrate improvements to water quality.

Revised language in Order No. R9-2010-0016 attempts to focus each watershed Copermittee's efforts and resources on addressing the highest water quality problems in the watershed by focusing attention on the health of the receiving water body and the most efficient use of the watershed Copermittee's time and resources. Order No. R9-2010-0016 requires the watershed Copermittees to develop and follow a workplan

approach towards assessing receiving water body conditions, prioritizing the highest priority water quality problems, implementing effective BMPs, and measuring water quality improvement in the receiving water.

Section G.1. (Watershed Workplan Components) requires the watershed Copermittees to develop a workplan that will implement a collective watershed strategy to assess and prioritize the water quality problems, and identify, address, and mitigate the highest priority water quality issues/pollutants within the Upper Santa Margarita watershed's receiving waters. This section specifies the minimum components that must be included in the Watershed Workplan. Development of a workplan rather than watershed activities will allow the Copermittees flexibility to iteratively modify their watershed strategy over the course of future planning years as priorities change.

Section G.2 (Watershed Workplan Implementation) requires the Copermittee's to begin implementing the Watershed Workplan within 90 days of submittal unless otherwise directed by the San Diego Water Board. The Watershed Workplan must meet the requirements of the Order. The San Diego Water Board expects that implementing the Watershed Workplan, which will coordinate the Copermittees' efforts in the watershed, will result in water quality improvements sooner than later. If there are deficiencies in the Watershed Workplan, the San Diego Water Board will provide guidance to remedy those deficiencies as appropriate.

Section G.3 (Copermittee Collaboration) requires the Copermittees to collaborate to develop and implement the Watershed Workplan. Watershed Copermittee collaboration must include frequent regularly scheduled meetings. Because there are several other agencies with MS4s in the Upper Santa Margarita watershed that the Copermittees have indicated in the ROWD are a source of pollutants that may discharge into the MS4 systems of the Copermittees, the Copermittees are also required to pursue interagency agreements, or similar cooperative efforts, with non-Copermittee owners of the MS4 (such as Caltrans, Native American tribes, and school districts) to control the contribution of pollutants from one portion of the shared MS4 to another portion of the shared MS4. In addition, the Copermittees are required, as appropriate, to participate in watershed management efforts to address water quality issues within the entire Santa Margarita Watershed (such as the County of San Diego and United States Marine Corps Camp Pendleton).

Section G.4 (Public Participation) requires the Copermittees to implement a watershed-specific public participation mechanism within each watershed. A required component of the watershed-specific public participation mechanism must be a minimum 30-day public review of the Watershed Workplan. Opportunity for the public to review and comment on the Watershed Workplan must occur before the workplan is implemented.

Section G.5 (Watershed Workplan Review and Updates) requires the Copermittees to review and update the Watershed Workplan annually to identify needed changes to the prioritized water quality problem(s) listed in the workplan. This section requires the Copermittees to review and update their workplan each year to incorporate changing priorities and evolving watershed strategies.

Section G.6 (Pyrethroid Toxicity Reduction Evaluation) requires the Copermittees to incorporate the pyrethroid pollutant reduction program into the Watershed Workplan, as described in the ROWD.

H. Fiscal Analysis

The following legal authority applies to section H:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.26(d)(2)(vi) provides that "[The Copermittee must submit] for each fiscal year to be covered by the permit, a fiscal analysis of the necessary capital and operation and maintenance expenditures necessary to accomplish the activities of the programs under paragraphs (d)(2)(iii) and (iv) of this section. Such analysis shall include a description of the source of funds that are proposed to meet the necessary expenditures, including legal restrictions on the use of such funds."

Section H has been expanded in order to develop more useful and meaningful fiscal reporting. A revamped fiscal reporting strategy will provide the San Diego Water Board and the Copermittees with better capability to manage performance of the programs.

The Copermittees' effort is expected to provide standardization of reporting so that figures between Copermittees are comparable, which is one of many types of information which can be used by the San Diego Water Board to better understand Copermittee program implementation. Standardization and comparison of fiscal analysis reporting is supported by the State Water Board funded NPDES Stormwater Cost Survey, which finds that "standards for reporting costs and storm water activities are needed to allow accurate cost comparisons to be made between storm water activities."[223] This document also provides guidance regarding categorization of expenditures for tracking and reporting.

The Order establishes a criterion for when Copermittees must add narrative evaluations to the tables. This will address some of the variability in reporting and will provide the public and San Diego Water Board with improved understanding of how resources are shifted in response to annual assessments. This will also help ensure that projected annual costs adequately reflect planned program modifications described in the annual reports.

The San Diego Water Board has chosen not to require a description of fiscal benefits realized from implementation of the storm water protection program. This is a recommendation from the National Association of Flood and Stormwater Management

[223] Currier, et al., 2005. *NPDES Storm Water Cost Survey Final Report*. Prepared for California State Water Resources Control Board by Office of Water Programs, California State University, Sacramento. P. 63.

Agencies.[224] For instance, the current fiscal assessment does not address city-wide fiscal benefits of protection (e.g., public health, tourism, property values, economic activity, beneficial uses, etc.), even though many costs currently reported to the San Diego Water Board are for related activities. This type of assessment may help Copermittees improve the allocation of resources and it may help the Copermittees secure adequate funding for the program. Finally, it will provide a clearer picture of the storm water and non-storm water runoff program to the public and San Diego Water Board. However, qualitative assessments could be overly subjective and most Copermittees likely lack the ability to provide accurate quantitative assessments. The San Diego Water Board encourages Copermittees to consider means for conducting assessments of fiscal benefits derived from the programs. Such assessments could be conducted on a regional scale similar to studies of program costs conducted by the State Water Board.[225]

Currently, each Riverside County municipality's annual report includes a table based on a template developed by the principal Copermittee. The template was meant to facilitate reporting consistency among the Copermittees. The annual report table contains estimates of spending during the reported period and estimates of the next year's spending.

Review of the fiscal analysis tables included in the annual reports has not been as straightforward as expected, and the value of the information is moderate. The reviews indicate that cities do not use consistent methods to fill in the tables because they use different accounting and budgeting processes, and certain storm water program expenditures are not easily categorized into the table formats. Furthermore, storm water permit-related activities involve several departments, which makes it difficult for the storm water manager to gather and decipher actual costs.

These issues also make it difficult for the Copermittees to accurately compartmentalize expenditures within the format. As a result, the current financial reporting provides estimates at best and cannot be reliably used to compare program implementation among most municipalities.

[224] National Association of Flood and Stormwater Management Agencies. 2006. *Guidance for Municipal Stormwater Funding.* Prepared under a grant provided by the USEPA.
[225] State Water Board, 2005. NPDES Stormwater Cost Survey.

I. Total Maximum Daily Loads

The following legal authority applies to section I:

Broad Legal Authority: CWA section 303(d)(1)(A) and (C), and Federal regulations 40 CFR 130.2(i), 40 CFR 130.7(b)(1) and 40 CFR 122.44(d)(1)(vii)(B).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.44(d)(1)(vii)(B) requires that NPDES permit requirements incorporate water quality based effluent limitations that must be consistent with the requirements and assumptions of wasteload allocations (WLAs) assigned to the MS4 as part of the calculated TMDLs.

Section I.1. is a placeholder for the requirements and WLAs assigned to the Copermittees' MS4 discharges of any future TMDLs that are adopted by the San Diego Water Board.

Section I.2 includes, by reference to Santa Ana Water Board Order No. R8-2010-0033 (and subsequent revisions), the requirements and WLAs assigned to the MS4s for the Lake Elsinore/Canyon Lake (San Jacinto Watershed) Nutrient TMDLs that are being implemented for the Santa Ana Water Board. Because the San Jacinto Watershed is within the boundaries of the Santa Ana Water Board's region, the Lake Elsinore/Canyon Lake Nutrient TMDLs and its requirements must be implemented by the Cities of Murrieta and Wildomar for the areas within their jurisdictions located in the Santa Ana Region (Region 8).

J. Program Effectiveness Component

The following legal authority applies to section J:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.26(d)(2)(v) provides that the Copermittees must include "Estimated reductions in loadings of pollutants from discharges of municipal storm sewer constituents from municipal storm sewer systems expected as the result of the municipal storm water quality management program. The assessment shall also identify known impacts of storm water controls on ground water." Under Federal NPDES regulation 40 CFR 122.42(c) applicants must provide annual reports on the progress of their storm water management programs.

Section J.1 (Program Effectiveness Assessments) of the Order requires the Copermittees to assess the effectiveness of the implementation of their jurisdictional, watershed, and monitoring programs and activities. The Riverside County Storm Water Program is supportive of the CASQA effort, and use of CASQA assessment techniques is consistent with the methodology proposed in the ROWD.[226,227]

This section requires the Copermittees to establish assessment measures or methods for each of the six outcome levels described by CASQA that will be used to assess the effectiveness of the Jurisdictional Runoff Management Program (JRMP) and Watershed Workplan implementation at (1) reducing the discharge of storm water pollutants from its MS4 to the MEP; (2) prohibit non-storm water discharges; and (3) preventing runoff discharges from the MS4 from causing or contributing to a violation of water quality standards.

The effectiveness assessment measures or methods must be established and included as part of the updated JRMPs and Watershed Workplan that are due on or before June 30, 2012. Beginning with the Annual Report due in 2013, the Copermittees are required to annually perform the assessments using the established assessment measures or methods.

Section J.2 (Respond to Assessments) of the Order requires the Copermittees to improve jurisdictional and watershed activities or BMPs when they are found to be ineffective or when water quality impairments are continuing. This requirement fulfills the purpose of conducting effectiveness assessments – to improve and refine the

[226] The Riverside County Copermittees proposed an assessment strategy based on the CASQA Municipal Stormwater Program Effectiveness Assessment Guidance in section 6.1.2.1 of the ROWD.
[227] CASQA 2007. Municipal Stormwater Program Effectiveness Assessment Guidance.

Copermittees' programs. The requirement is consistent with USEPA's Phase II regulations, which state: "If the permittee determines that its original combination of BMPs are not adequate to achieve the objectives of the municipal program, the MS4 should revise its program to implement BMPs that are adequate […]."[228]

Each Copermittee must update the effectiveness assessment work plan and schedule to address any program modifications and improvements in response to the findings of their assessment. The updates to the work plan and schedule must be incorporated into the applicable Annual Report.

Section J.3 (Assessment and Response Reporting) of the Order describes the information required to be submitted in the Annual Report pertaining to program effectiveness assessments, review, and response. A summary of the effectiveness assessments, responses to the effectiveness assessments, and any steps implemented to improve the Copermittee's ability to assess program effectiveness must be included with the Annual Report. The reporting will demonstrate whether Copermittees have appropriately responded to the effectiveness assessments.

[228] Federal Register / Vol. 64, No. 235 / Wednesday, December 8, 1999 / Rules and Regulations. P. 68762.

K. Reporting

The following legal authority applies to section K:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.42(c) requires that "The operator of a large or medium municipal separate storm sewer system or a municipal separate storm sewer system that has been designated by the director under § 122.26(a)(1)(v) of this part must submit an annual report by the anniversary of the date of the issuance of the permit for such system. The report shall include: (1) The status of implementing the components of the storm water management program that are established as permit conditions; (2) Proposed changes to the storm water management program that are established as permit condition. Such proposed changes shall be consistent with § 122.26(d)(2)(iii) of this part; (3) Revisions, if necessary, to the assessment of controls and the fiscal analysis reported in the permit application under § 122.26(d)(2)(iv) and (d)(2)(v) of this part; (4) A summary of data, including monitoring data, that is accumulated throughout the reporting year; (5) Annual expenditures and budget for year following each annual report; (6) A summary describing the number and nature of enforcement actions, inspections, and public education programs; (7) Identification of water quality improvements or degradation."

CWC section 13267 provides that "the Regional Board may require than any person who has discharged […] shall furnish, under penalty of perjury, technical or monitoring reports which the regional board requires."

Section K.1 (Runoff Management Plans) outlines the process and due dates for submitting JRMPs and Watershed Workplan. The information to be included in the Jurisdictional and Watershed plans must be sufficient to demonstrate the capacity to implement the requirements of section F and G, respectively, of the Order.

In many cases, the requirements of the Order should not necessitate a complete rewrite of the plans, as was basically done in 2005. Only sections of the Order which are new or have been significantly changed should warrant rewriting of plans' sections. The San Diego Water Board plans to work with the Copermittees and provide guidance regarding where JRMPs and Watershed Workplan must be updated in accordance with the Order. This will help ensure that rewriting, reporting, and review efforts are minimized.

Section K.2 (Other Required Reports and Plans) include requirements for information to be included in the SSMP update, the HMP, and the Report of Waste Discharge (ROWD) for the next permit reissuance. The Order requires submittal of an updated

SSMP on or before June 30, 2012; a draft HMP on or before June 30, 2013; and a ROWD 180 days in advance of the expiration of this Order. The section also identifies the minimum information to be included in the ROWD, based on USEPA's May 17, 1996 guidance "Interpretive Policy Memorandum on Reapplication Requirements for Municipal Separate Storm Sewer Systems."

Section K.3 (Annual Reports) outlines the process and roles of the Copermittees for developing and submitting the JRMP Annual Report. Information to be included in the Annual Reports is described in section K.3.a.(3).

Each Copermittee is required to maintain records demonstrating that Permit activity requirements have been met, which allows the San Diego Water Board to confirm compliance as needed, such as via inspections, program audits, or requests for information per CWC sections 13225 and 13267.

Reporting requirements in the Order focus on results and responses to the effectiveness assessments conducted by the Copermittees. This will allow the San Diego Water Board to determine how appropriately municipalities adapt and tailor their programs to findings from activities and monitoring results. Assessment of progress toward meeting the objectives is possible because the data collected by the Copermittees under Order No. R9-2004-001 can be used to establish baseline conditions. Compared to activity-based reporting, this will greatly enhance the ability of the San Diego Water Board, Copermittees, and the public to determine whether the programs are successful.

The Order reduces the amount of program activity-based reporting from Order No. R9-2004-001. Under the CASQA assessment model, activity-based reporting includes primarily outcomes that document compliance with permit requirements (Level 1 outcomes), rather than being indicators of the impact of activity implementation.[229] This approach is consistent with guidance from the USEPA, which notes that annual reports should highlight program effectiveness as well as describing activities.[230] This emphasis is also consistent with recommendations from the National Academy of Public Administration in its report to USEPA on Evaluating Environmental Progress, which suggest that reviewing activities data provides limited value when evaluating the effectiveness of programs and resulting environmental conditions.[231]

The Order maintains some reporting requirements for certain activity-based outcomes. These are mostly focused on activities that establish or revise municipal processes related to storm water runoff and management. The processes required by the Order

[229] Level 1 outcomes under the CASQA guidance include documentation that required activities have been implemented.
[230] USEPA 2007. *MS4 Program Evaluation Guidance.* USEPA Office of Wastewater Management EPA-833-R-07-003. January 2007 field test version.
[231] National Academy of Public Adminstration 2001. Evaluating Environmental Progress: How EPA and the States Can Improve the Quality of Enforcement and Compliance Information (June 2001). http://www.napawash.org

are especially important in situations where sustaining water quality improvements may require activities that extend beyond the five-year period of the NPDES permit.

In addition, the Order maintains many activity-based reporting requirements related to enforcement of local requirements, with an emphasis on the results from such activities. This is intended to facilitate review of the contributions that inspection and enforcement activities have made toward meeting the goals of the Order. Reporting of these types of activities is supported by recommendations from the National Academy of Public Administration in its report to the USEPA: *Evaluating Environmental Progress: How EPA and the States Can Improve the Quality of Enforcement and Compliance Information* (June 2001).[232] Other activity-based reporting has been reduced to selected items based on consideration of program priorities.

Another source of prioritization for activity-based reporting is the *Storm Water Panel Recommendations to the California State Water Resources Control Board The Feasibility of Numeric Effluent Limits Applicable to Discharges of Storm Water Associated with Municipal, Industrial and Construction Activities* (June 19, 2006). In particular, the panel highlighted needs to improve the design, maintenance, and inspections of best management practices.

Section K.4 (Interim Reporting Requirements) specifies that the JRMP Annual Reports must be submitted in accordance with the requirements of Order No. R9-2004-001 prior to submittal of the JRMPs required under section K.1a.

[232] The National Academy of Public Administration report is available on-line at http://www.napawash.org

L. Modification of Programs

The following legal authority applies to section L:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv).

Section L of the Order provides a process for the Copermittees to modify their runoff management programs. This process will be useful so that the Copermittees can continue to refine and improve their programs based on the findings of their annual program effectiveness assessments. The process allows for minor modifications to the Copermittees' programs where the Copermittees can exhibit that the modifications meet or exceed existing legal requirements under the Order. Such a process avoids lengthy and time consuming formal approvals of proposed modifications before the San Diego Water Board, while still ensuring compliance with applicable legal standards and the Order. The process included in the Order is based on a process utilized by the California Regional Water Quality Control Board, San Francisco Bay Region (San Francisco Bay Water Board) in their MS4 permit for Alameda County.[233]

[233] San Francisco Bay Water Board, 2003. Order No. R2-2003-0021. P. 45.

M. Principal Permittee Responsibilities

The following legal authority applies to section M:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.26(a)(3)(iii)(C) provides that "A regional authority may be responsible for submitting a permit application."

Federal NPDES regulation 40 CFR 122.26(d)(2)(i)(D) provides that "[The Copermittee must demonstrate that it can control] through interagency agreements among coapplicants the contribution of pollutants from one portion of the municipal system to another portion of the municipal system."

No significant changes were made to this section.

N. Receiving Waters and MS4 Discharge Monitoring and Reporting Program

The following legal authority applies to section N:

Broad Legal Authority: CWA sections 402, 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulations 40 CFR 122.26(d)(2)(iii) and 122.44 require the Copermittees to conduct a comprehensive monitoring program.

See section T of this Fact Sheet/Technical Report for a discussion of changes to the Receiving Waters Monitoring and Reporting Program.

O. Standard Provisions, Reporting Requirements, And Notifications

The following legal authority applies to section O:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Standard provisions, reporting requirements, and notifications are consistent to all NPDES permits and are generally found in Federal NPDES regulation 40 CFR 122.41.

Section O.2 of the Order has been changed to remove the statement that all plans and reports submitted in compliance with the Order are an enforceable part of the Order. This statement has been removed because it is unnecessary. The Order itself contains sufficient detailed requirements to ensure that compliance with discharge prohibitions, receiving water limitations, non-storm water action levels and the narrative standard of MEP for storm water are achieved. Implementation by the Copermittees of programs in compliance with the Order's requirements, prohibitions, and receiving water limitations is the pertinent compliance standard to be used under the Order, as opposed to assessing compliance by reviewing the Copermittees' implementation of their plans alone.

Rather than being substantive components of the Order itself, the Copermittees' management plans are simply descriptions of their runoff management programs required under the Order. These plans serve as procedural correspondence which guides program implementation and aids the Copermittees and San Diego Water Board in tracking implementation of the programs. In this manner, the plans are not functional equivalents of the Order. For these reasons, the Copermittees' runoff management plans need not be an enforceable part of the Order.

P. Attachment A – Basin Plan Prohibitions

The following legal authority applies to Attachment A:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: CWC section 13243 provides that "A regional board, in a water quality control plan or in waste discharge requirements, may specify certain conditions or areas where the discharge of waste, or certain types of waste, will not be permitted."

CWC section 13263(a) provides that waste discharge requirements prescribed by the San Diego Water Board implement the Basin Plan.

No significant changes were made to this attachment.

Q. Attachment B – Standard Provisions

The following legal authority applies to Attachment B:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Standard provisions, reporting requirements, and notifications are consistent to all NPDES permits and are generally found in Federal NPDES regulation 40 CFR 122.41.

Attachment B includes Standard Provisions which have been developed by the State Water Board. These Standard Provisions ensure that NPDES permits are consistent and compatible with USEPA's federal regulations. Some Standard Provisions sections specific to publicly owned sewage treatment works are not included in Attachment B.

R. Attachment C – Definitions

The following legal authority applies to Attachment C:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv).

Attachment C contains definitions for terms found in the Order. In addition, definitions for terms previously defined in Order No. R9-2004-001 Attachment C, but which are not found in the current Order, have been deleted.

An additional section which includes acronyms and abbreviations has been added. This is to ensure clarity and prevent confusion of terms. Definitions have been added for new terms used in the permit to provide a clear understanding of their meaning and use.

S. Attachment D – Summary of Submittals

The following legal authority applies to Attachment D:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, 13383, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv) and 122.44(i).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.42(c) requires that "The operator of a large or medium municipal separate storm sewer system or a municipal separate storm sewer system that has been designated by the director under § 122.26(a)(1)(v) of this part must submit an annual report by the anniversary of the date of the issuance of the permit for such system. The report shall include: (1) The status of implementing the components of the storm water management program that are established as permit conditions; (2) Proposed changes to the storm water management program that are established as permit condition. Such proposed changes shall be consistent with § 122.26(d)(2)(iii) of this part; (3) Revisions, if necessary, to the assessment of controls and the fiscal analysis reported in the permit application under § 122.26(d)(2)(iv) and (d)(2)(v) of this part; (4) A summary of data, including monitoring data, that is accumulated throughout the reporting year; (5) Annual expenditures and budget for year following each annual report; (6) A summary describing the number and nature of enforcement actions, inspections, and public education programs; (7) Identification of water quality improvements or degradation."

CWC section 13267 provides that "the regional board may require than any person who has discharged […] shall furnish, under penalty of perjury, technical or monitoring reports which the regional board requires."

Attachment D to the Order provides a table summary of scheduled submittals required by the Order. Unscheduled submittals are no longer added to the table, since there is no proper due date for such submittals. A task summary has not been created for the Order, since the previous task summary was found to be redundant, repeating information found in the submittal summary and elsewhere in the Order.

A Jurisdictional Runoff Management Program (JRMP) Annual Report Checklist has been added to the reporting requirements. This addition is to determine and ensure that all requirements of the permit are being met. A Jurisdictional Runoff Management Program (JRMP) Annual Report Checklist has been added to the reporting requirements. This addition is to determine and ensure that all requirements of the permit are being met.

T. Attachment E - Receiving Waters and MS4 Discharge Monitoring and Reporting Program

The following legal authority applies to the Receiving Waters and MS4 Discharge Monitoring and Reporting Program:

Broad Legal Authority: CWA sections 402, 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv), 122.44 and 122.45.

Specific Legal Authority: Federal NPDES regulations 40 CFR 122.26(d)(2)(iii) requires the Copermittees to conduct a comprehensive monitoring program.

Federal NPDES regulation 40 CFR 122.42(c) requires that "The operator of a large or medium municipal separate storm sewer system or a municipal separate storm sewer system that has been designated by the director under § 122.26(a)(1)(v) of this part must submit an annual report by the anniversary of the date of the issuance of the permit for such system. The report shall include: (1) The status of implementing the components of the storm water management program that are established as permit conditions; (2) Proposed changes to the storm water management program that are established as permit condition. Such proposed changes shall be consistent with § 122.26(d)(2)(iii) of this part; (3) Revisions, if necessary, to the assessment of controls and the fiscal analysis reported in the permit application under § 122.26(d)(2)(iv) and (d)(2)(v) of this part; (4) A summary of data, including monitoring data, that is accumulated throughout the reporting year; (5) Annual expenditures and budget for year following each annual report; (6) A summary describing the number and nature of enforcement actions, inspections, and public education programs; (7) Identification of water quality improvements or degradation."

CWC section 13267 provides that "the regional board may require than any person who has discharged […] shall furnish, under penalty of perjury, technical or monitoring reports which the regional board requires."

I. Purpose

According to USEPA, the benefits of sampling data include, but are not limited to:

1. Providing a means for evaluating the environmental risk of storm water discharges by identifying types and amounts of pollutants present;
2. Determining the relative potential for storm water discharges to contribute to water quality impacts or water quality standard violations;
3. Identifying potential sources of pollutants; and

4. Eliminating or controlling identified sources more specifically through permit conditions.[234]

Equally important, monitoring programs are an essential link in the improvement of storm water management efforts. Data collected from monitoring programs can be assessed to determine the effectiveness of management programs and practices, which is vital for the success of the iterative approach used to meet the MEP standard for storm water. When water quality data indicate that water quality standards or objectives are being exceeded, particular pollutants, sources, and drainage areas can be identified and targeted for specific management efforts. When data indicate that a particular BMP or program component is not effective, improved efforts can be selected and implemented.

Considering the benefits described above, the Receiving Waters Monitoring and Reporting Program (MRP) has been designed to determine impacts to receiving water quality and beneficial uses from storm water runoff and to use the results to refine the Copermittees' storm water runoff management programs for the reduction of storm water pollutant loadings to the MEP. For non-storm water discharges, monitoring has been designed to identify and eliminate prohibited illicit discharges and to determine appropriate actions to take in response to dry weather non-storm water action levels. Additionally, the results from dry weather non-storm water monitoring can be used to evaluate exempted non-storm water discharges as a source or conveyance of pollutants. The primary goals of the MRP include:

1. Assess compliance with Order No. R9-2010-0016;
2. Measure and improve the effectiveness of the Copermittees' runoff management programs;
3. Assess the chemical, physical, and biological impacts of receiving waters from MS4 discharges;
4. Characterize storm water runoff discharges;
5. Identify sources of specific pollutants;
6. Prioritize drainage and sub-drainage areas that need management actions;
7. Detect and eliminate illicit discharges and illicit connections to the MS4;
8. Assess the overall health of receiving waters; and
9. Provide information to implement required BMP improvements

Each of the components of the MRP is necessary to meet the objectives listed above. In addition, the MRP has been designed in accordance with the guidance provided by the Southern California Stormwater Monitoring Coalition's Model Monitoring Technical Committee in its August 2004 "Model Monitoring Program for Municipal Separate Storm Sewer Systems in Southern California." This guidance document was developed in response to Senate Bill 72 (Kuehl), which addressed the standardization of sampling and analysis protocols in municipal storm water monitoring programs. The

[234] USEPA, 1992. NPDES Storm Water Sampling Guidance Document. EPA/833-B-92-001.

technical committee which developed the guidance included representatives from Southern California Regional Water Boards (including the San Diego Water Board), municipal storm water Copermittees (including Riverside County Flood Control District), Heal the Bay, and the Southern California Coastal Water Research Project.

As its title suggests, the guidance essentially developed a model municipal storm water monitoring program for use in Southern California. The model program is structured around five fundamental management questions, outlined below. The MRP is designed as an iterative step towards ensuring that the Copermittees' monitoring program can fully answer each of the five management questions.

1. Are conditions in receiving waters protective, or likely to be protective, of beneficial uses?
2. What is the extent and magnitude of the current or potential receiving water problems?
3. What is the relative storm water runoff contribution to the receiving water problem(s)?
4. What are the sources of storm water runoff that contribute to receiving water problem(s)?
5. Are conditions in receiving waters getting better or worse?

The three MS4 NPDES permits within San Diego Water Board jurisdiction each have very similar core monitoring requirements that include receiving water monitoring, effluent monitoring, and special studies (see Finding E.12 and Discussion). The justifications for each component of the monitoring program are discussed below.

II. Monitoring Program

The Monitoring Program has been organized into distinct sections and includes receiving water monitoring, MS4 effluent monitoring, a monitoring program in high priority inland aquatic habitat, and special studies. Each monitoring program is expected to answer specific questions and achieve goals outlined in section I. Some of these questions require the linkage of both receiving water monitoring and MS4 discharge monitoring that is required in the Order. As such, the Monitoring Program has been written to allow the Copermittees to utilize the same data and/or sampling effort where monitoring requirements overlap. For example, the Copermittees may elect to develop a Trash Special Study where the sampling is done at the same location and time as stream assessment monitoring. The Copermittees may evaluate the goals and questions of the Monitoring Program when evaluating how required monitoring programs may overlap.

Section II.A.1 (Mass Loading Station Monitoring) of the MRP requires mass loading and toxicity monitoring at monitoring stations located at the bottom of the Riverside County portion of the Santa Margarita watershed (see figure below).

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Locations of Mass Loading Stations (MLS) under Order No. R9-2004-0001

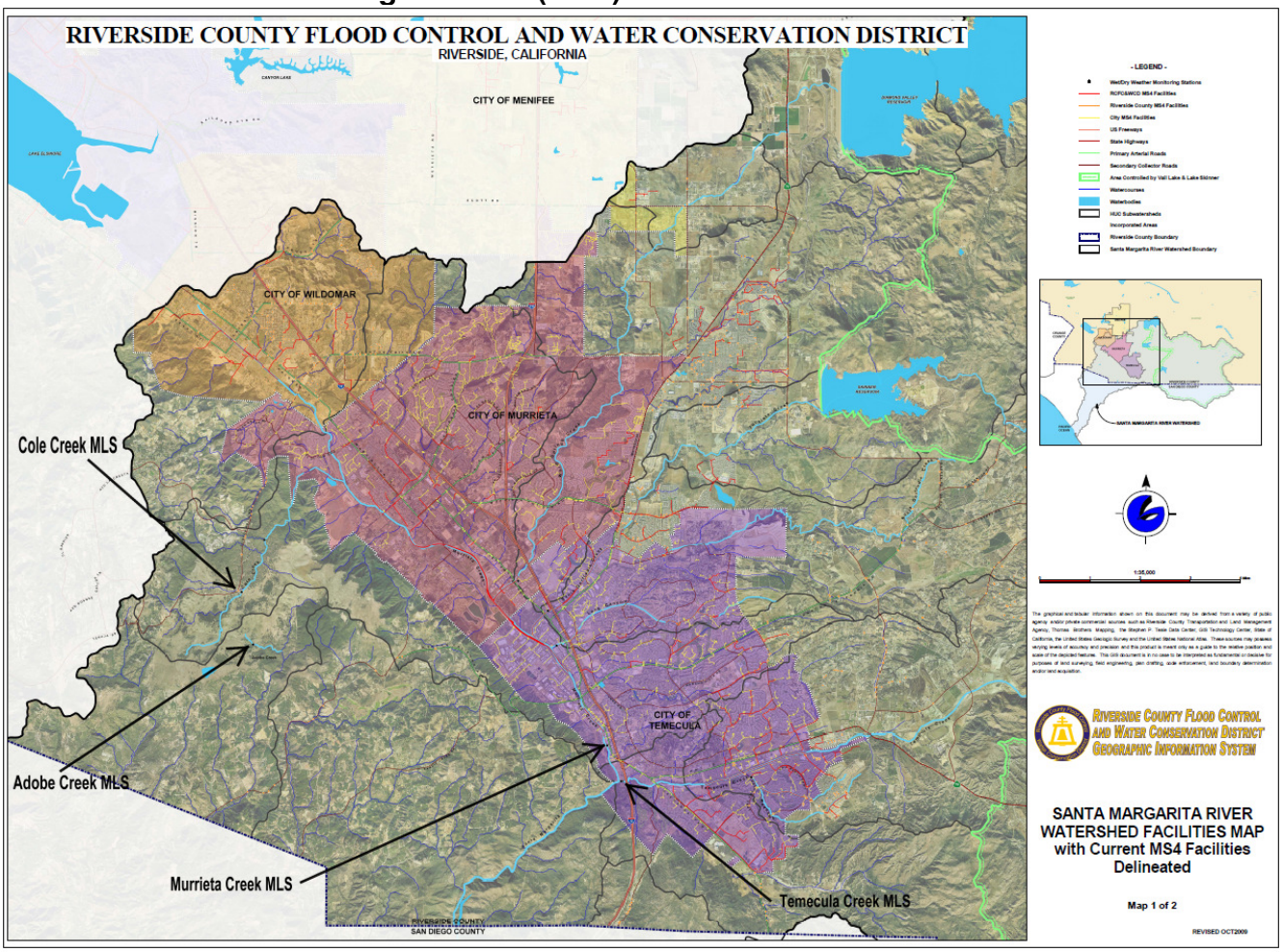

The intent of current mass loading monitoring as conducted by the Copermittees under Order No. R9-2004-001 is to use water chemistry data from storm events and dry weather flows to calculate pollutant loads and to assess water quality with respect to applicable acute and chronic toxicity criteria from the California Toxics Rule (CTR) and bioassessment as part of the triad monitoring approach.[235] The mass loading monitoring that is required by the Order will provide data representing event mean concentrations of pollutants, total pollutant loadings, and toxicity conditions from specific drainage areas. Mass loading monitoring stations are recommended by the Model Monitoring Technical Committee in order to answer management questions 1, 2, and 5.[236] The stations are also expected to contribute towards meeting MRP goals 1, 2, 3, 4, 6, and 8. The locations of the mass loading monitoring stations are not changed from Order No. R9-2004-001. The MRP, however, retains flexibility to allow the Copermittees to propose changing the location of a mass loading station. The

[235] Riverside County Copermittees. 2009. Report of Waste Discharge, section 6.4 .
[236] Model Monitoring Technical Committee, 2004. Model Monitoring Program for Municipal Separate Storm Sewer Systems in Southern California. Chapter 5.

Copermittees may also propose additional mass loading stations should they determine more are needed. The Copermittees will identify a permanent mass loading reference station for the permit term.

Some revisions to the required list of constituents to be monitored at mass loading stations have been made. The changes are made to be compatible with the federal NPDES regulations and in response to data collected during the current permit term. Audits of the Copermittees' monitoring program and reviews of annual reports during the last permit term have found consistent shortcomings in the Copermittees' monitoring programs. As a result, some changes have been made to the monitoring requirements. The changes include:

1. All events must now include: Biological Oxygen Demand, 5-day Chemical Oxygen Demand, Total Organic Carbon, Dissolved Organic Carbon. These are specifically required by 40 CFR 122.26(d)(2)(iii)(B), but were omitted from collection and reporting required by Order No. R9-2004-001.

2. Carbamate and Pyrethroid pesticides must be monitored. Pyrethroid pesticides were identified from TIEs conducted in response to toxicity observed during sampling as part of the triad approach at Temecula and Murrieta Creek. Long term monitoring of pesticide presence is critical to evaluate Copermittees BMP efforts and program effectiveness. Carbamate pesticides are utilized in residential, agricultural and commercial applications, and have been shown to have negative direct and indirect impacts on aquatic invertebrates and vertebrates, as well as associated riparian species.[237] In addition, the National Marine Fisheries Service (NMFS) issued a Biological Opinion in 2009 that concluded pesticide products containing carbaryl and carbofuran are likely to jeopardize 22 listed salmonids, including Southern California Steelhead.[238]

3. Impaired water body pollutants. Specific pollutants have been added in response to the U.S. Environmental Protection Agency approval of California's 2004-2006 and the San Diego Water Board approval of the 2008 303(d) List.

4. A requirement to collect a grab sample for total petroleum hydrocarbons whenever a sheen is observed has been added based upon results from IC/ID programs in existing southern California NPDES MS4 permits.

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[237] See:
Boone and James. 2003. Interactions of an insecticide, herbicide, and natural stressors in amphibian community mesocosms. *Ecological Applications*: 13(3) pp. 829-841.
Hanazato. 2001. Pesticide effects on freshwater zooplankton: an ecological perspective. *Environmental Pollution*: 112 pp. 1-10.
USGS. 1999. Field Manual of Wildlife Diseases: General Field Procedures and Diseases of Birds. Chapter 39.
California Department of Pesticide Regulation. 2010. Urban Pesticide Monitoring in Northern and Southern California. http://www.cdpr.ca.gov/docs/emon/surfwtr/presentations.htm

[238] NMFS. 2009. Endangered Species Act Section 7 Consultation Biological Opinion: Environmental Protection Agency Registration of Pesticides Containing Carbaryl, Carbofuran, and Methomyl.

5. The required organisms for toxicity testing have changed from the previous order to be consistent with USEPA guidance.[239] *Ceriodaphnia dubia* (water flea) has been replaced with *Pimephales promelas* (fathead minnow) to provide at least three test species from different phyla. *Hyalella azteca* has been retained as a test organism due to sensitivity to pyrethroid pesticides.

6. A constituent-specific table has been added to provide clarity to the list of pollutants that are required to be monitored as part of the triad approach.

7. More presecriptive reporting requirements have been added in the event the Copermittees fail to monitor the required number of mass loading events.

Section II.A.2 (Stream Assessment Monitoring) of the MRP requires the Copermittees to conduct bioassessment monitoring using a multiple lines of evidence approach which includes collection of benthic macroinvertebrates and algae, a full physical habitat assessment, water chemistry sampling, and toxicity testing. Bioassessment monitoring is a cost-effective tool that measures the effects of water quality over time.[240] It is an important indicator of stream health and impacts from storm water and non-storm water runoff. It can detect impacts that chemical and toxicity monitoring alone cannot. USEPA encourages permitting authorities to consider requiring biological monitoring methods in conjunction with chemical and toxicity testing to fully characterize the nature and extent of impacts from runoff.[241] Therefore, the San Diego Water Board commonly requires bioassessment monitoring in MS4 and other types of discharge permits.

Bioassessment is the direct measurement of the biological, chemical, and physical condition, and attainment of beneficial uses of receiving waters (typically using benthic macroinvertebrates, periphyton, and fish). Bioassessment monitoring integrates the effects of both water chemistry (including toxicity) and physical habitat impacts (e.g., sedimentation or erosion) of various discharges on the biological community native to the receiving waters. Moreover, bioassessment is a direct measurement of the impact of cumulative, sub-lethal doses of pollutants that may be below reasonable water chemistry detection limits, but that still have biological affects.

Because bioassessment focuses on communities of living organisms as integrators of cumulative impacts resulting from water quality or habitat degradation, it defines the ecological risks resulting from storm water and non-storm water MS4 runoff. Bioassessment not only identifies that an impact has occurred, but also measures the effect of the impact and tracks recovery when control or restoration measures have been taken. These features make bioassessment a powerful tool to assess

[239] USEPA, 1991. Technical Support Document for Water Quality Based Toxics Control. EPA 505-2-90-001.
[240] California Department of Fish and Game, 2002. California Regional Water Quality Control Board, San Diego Region 2002 Biological Assessment Report: Results of May 2001 Reference Site Study and Preliminary Index of Biotic Integrity.
[241] USEPA, 1999. Rapid Bioassessment Protocols for Use in Wadeable Streams and Rivers. EPA 841-B-99-002. P. 2-5.

compliance, evaluate the effectiveness of BMPs, and to track both short and long-term trends (MRP goals 1, 2, 3, and 8). Bioassessment can also help answer management questions 1, 2, and 5.

The Order also identifies the most current established protocol to be used in identifying bioassessment reference stations. The protocol referenced in the Order is specified because it provides a qualitative and repeatable method for identifying reference sites. Moreover, the protocol is well established, since it has been peer reviewed and published.

The Order includes four significant modifications to the bioassessment monitoring required under Order No. R9-2004-001. These changes include:

1. Bioassessment monitoring must be consistent with the State Water Board's Surface Water Ambient Monitoring Program (SWAMP) Standard Operating Procedures (SOP) as amended.[242]

2. Bioassessment monitoring is to include an assessment of periphyton (algae).[243] Advantages of bioassessment using periphyton include: (1) they have rapid reproduction rates and very short life cycles, making them valuable indicators of short-term impacts; (2) as primary producers, they are most directly affected by physical and chemical factors; (3) sampling is easy and inexpensive; and (4) algal assemblages are sensitive to some pollutants which may not visibly affect other aquatic assemblages.[244] Future bioassessment must use algal IBI scores, when developed.

3. The number of bioassessment stations has been increased from three to six. The Copermittees currently conduct bioassessment monitoring at one reference station and at the two mass loading stations at Temecula and Murrieta Creek. The increase in required sampling is needed to evaluate more localized impacts higher in the Santa Margarita Hydrologic Unit (HU) in conjunction with SAL and NAL monitoring, as well as to evaluate any impacts that occur from hydromodification. The additional required reference station will aid in detecting any differences in bioassessment scores over time that may be independent of MS4 discharges.

4. The bioassessment section title has been changed to Stream Assessment Monitoring. This was done to prevent confusion by the Copermittees in understanding sampling differences between mass loading stations and bioassessment sites. Under Order No. 2004-0001 all bioassessment sites were

[242] SWAMP February 2007 (amended September 2008). Standard Operating Procedures for Collecting Benthic Macroinvertebrate Samples and Associated Physical and Chemical Data for Ambient Bioassessments in California
[243] SWAMP June 2009. Standard Operating Procedures for Collecting Stream Algae Samples and Associated Physical Habitat and Chemical Data for Ambient Bioassessments in Califorinia.
[244] USEPA, 1999. Rapid Bioassessment Protocols for Use in Wadeable Streams and Rivers. EPA 841-B-99-002. P. 3-3.

co-located with mass loading stations. Thus, the collection of water chemistry and toxicity data was done simultaneously for mass loading and bioassessment purposes, which prevented duplicative water chemistry and toxicity testing. For new "Stream Assessment Monitoring" sites not located at mass loading stations, the nomenclature for monitoring has been changed to prevent possible misinterpretation of the term "bioassessment" to mean only the collection of benthic macroinvertebrates and physical habitat data.

Section II.A.3 (Follow-up Analysis and Actions) of the MRP requires the Copermittees to use the results of the receiving water monitoring to determine if impacts from MS4 discharges are occurring and when follow-up actions are necessary. The triad approach allows a wide range of measurements to be combined to more efficiently identify pollutants, their sources, and appropriate follow-up actions. Results from the three types of monitoring must be assessed to evaluate the extent and causes of pollution in receiving waters and to prioritize management actions to eliminate or reduce the sources. The framework provided is to be used to determine conclusions from the data and appropriate follow-up actions. The framework is proposed by the Copermittees and derived from the Model Monitoring Program for Municipal Separate Storm Sewer Systems in Southern California.[245] These follow-up actions are expected to primarily help answer management questions 2 and 4, as well as address MRP goals 2, 4, 5, 6 and 7.

When, based on the framework in Table 3 of the MRP, data indicates the presence of toxic pollutants in runoff, the Copermittees are required to conduct a Toxicity Identification Evaluation (TIE). A TIE is a set of procedures used to identify the specific chemical(s) responsible for toxicity to aquatic organisms. When discharges are toxic to a test organism, a TIE must be conducted to confirm potential constituents of concern and rule out others, therefore allowing Copermittees to determine and prioritize appropriate management actions. If a sample is toxic to more than one species, it is necessary to determine the toxicant(s) affecting each species. If the type and source of pollutants can be identified based on the data alone and an analysis of potential sources in the drainage area, a TIE is not necessary.

When a TIE identifies a pollutant associated with MS4 discharge as a cause of toxicity, it is then necessary to conduct follow-up actions to identify the causative agents of toxicity, isolate the sources of toxicity, evaluate the effectiveness of toxicity control options, and then confirm the reduction in toxicity. Follow-up actions should analyze all potential source(s) causing toxicity, potential BMPs to eliminate or reduce the pollutants causing toxicity, and suggested monitoring to demonstrate that toxicity has been removed.

Section II.A.4 (Regional Monitoring Programs) of the MRP identifies that the San Diego Water Board recognizes the importance of regional monitoring efforts to answer

[245] Model Monitoring Technical Committee, 2004. Model Monitoring Program for Municipal Separate Storm Sewer Systems in Southern California. P. 5-61.

monitoring questions and/or address problems that may not be specific to only the Santa Margarita hydrologic unit (see Finding E.12 and Discussion). Additionally, the Copermittees' jurisdiction does not encompass the entire Santa Margarita hydrologic unit, as portions of the hydrologic unit include, but are not limited to, San Diego County, tribal lands, the Cleveland National Forest, and Marine Corps Base at Camp Pendleton.

Section II.B (Wet Weather MS4 Discharge Monitoring) of the MRP requires the Copermittees to develop and implement a program, in accordance with 40 CFR 122.26(d)(2)(iii), to monitor and characterize pollutants in discharges of storm water effluent from major MS4 outfalls. Currently the Copermittees do not monitor the discharge of storm water from the MS4 outfalls. As a result, a substantial amount of information regarding the quality of MS4 effluent is unknown, and in-stream stations monitored under R9-2004-001 have not accurately characterized MS4 effluent data during the permit term.[246] The collection of wet-weather MS4 effluent data will enable the Copermittees to assess the effectiveness of existing storm water BMP measures, estimate cumulative annual pollutant loads from MS4 storm water discharges, and estimate seasonal pollutant loads from individual major outfalls. This data can be used to more effectively target storm water management program efforts. The MRP also requires compliance with section D of the Order for Storm Water Action Levels.

The monitoring of outfalls is expected to be used to identify storm drains that are discharging pollutants in concentrations that may pose a threat to receiving waters. Source investigations are expected to be conducted as a response to the data. The Copermittees are required to monitor for those pollutants in 40CFR 122.26(d)(2)(iii)(B); for 303(d) listed pollutants for the Santa Margarita Hydrologic Unit; and for pollutants with Storm Water Action Levels.

The MRP provides the Copermittees great flexibility in assigning stations and sampling frequency for wet-weather monitoring. Copermittees are to propose the number and frequency of monitoring stations, thus proposing the overall cost of their program. The San Diego Water Board will review the proposed program to ensure it will comply with Federal regulations and section D of the Order for Storm Water Action Levels.

The monitoring requirements also include a requirement to measure receiving water hardness when comparing storm water MS4 discharge data to Storm Water Action Levels for priority pollutants (e.g. metals). The effect of these constituents upon receiving waters will vary depending upon the hardness of receiving waters.

Section II.B.2 (Source Identification Monitoring) requires the Copermittees to develop and implement a program to identify sources of discharges of pollutants causing the high priority water quality problems within each hydrologic subarea. The current source identification monitoring program conducted by the Copermittees has not been

[246] Riverside County Copermittees. 2009. Report of Waste Discharge, section 5.1.

demonstrated to be effective due to the continued receiving water monitoring that documents persistent exceedances of water quality objectives for 303(d) listed pollutants, as well as the listing of new water bodies and pollutants (see Finding C.7). Furthermore, all monitoring conducted under Order R9-2004-001 focused on receiving water conditions rather than MS4 effluent discharges. Outside of required toxicity identification and reduction evaluations, little to no source identification was conducted for observed exceedances of water quality standards in receiving waters.

Identification of sources causing high priority water quality problems is a central purpose of storm water runoff management programs. Monitoring which enables the Copermittees to identify sources of water quality problems aids the Copermittees in focusing their management efforts, improving their programs and choosing additional and/or better BMPs. In turn, the Copermittees' programs can abate identified sources, which will improve the quality of storm water runoff discharges and receiving waters. This monitoring is needed to address management questions 3 and 4, in addition to ensuring that pollutants in storm water discharges from the MS4 are reduced to the MEP. Moreover, in its review of the San Diego County Copermittees' monitoring proposal, Tetra Tech, Inc. finds that "after some years of assessment monitoring, it is time to look more systematically at determining the relative urban contributions and the sources of urban runoff that contribute to identified receiving water problems."[247]

Section II.C (Non-Storm Water Dry Weather Action Levels) of the MRP describes the monitoring to be conducted by the Copermittees to determine compliance with dry weather, non-storm water action levels.

The section for Dry Weather Non-Storm Water Action Level Monitoring has taken the place of Illicit Discharge Detection and Elimination Monitoring under the previous Order. This change is required to assess compliance with action levels for non-storm water discharges from the MS4 into receiving waters while the Copermittees simultaneously conduct Illicit Discharge Detection and Elimination activities. The prior Order did not require the testing of non-storm water MS4 effluent prior to discharge into receiving waters, and thus Illicit Discharge Detection and Elimination Monitoring was conducted in receiving waters that were technically considered part of the MS4 but did not necessarily contain solely MS4 effluent. Discussions between the San Diego Water Board and Copermittees identified this shortcoming, which is reflected in the Copermittees Annual Reports (2007-08 and 2008-09), and the Copermittees have requested the point of monitoring for non-storm water be changed to sample MS4 effluent.[248] The required sampling frequency has great flexibility and allows Copermittees to sample a representative number of discharge points while the sampling methodology continues to be grab sampling. Additionally, the selection of representative outfalls or other identified stations has been clarified to ensure that those selected are consistent with federal requirements under 40 CFR 122.26(d) and section C of the Order.

[247] Tetra Tech Inc., 2006. Review of San Diego County MS4 Monitoring Program.
[248] Riverside County Copermittees ROWD, January 2009. Section 7.8.2.

Section II.C.2 (Source Identification Monitoring) requires the Copermittees to develop and implement a program to identify the sources of pollutants in non-storm water discharges. The section provides clarification that the program must utilize action levels pursuant to section C of the Order as a source identification response criteria. The source identification monitoring program is required under sections C, F.4.d, and F.4.e of the Order and to comply with 40 CFR 122.26(d)(2)(iv)(B), which requires the Copermittees have a program to detect and remove illicit discharges into the MS4.

Section II.D (High Priority Inland Aquatic Habitat) of the MRP describes required monitoring to be done in order to assess if MS4 storm water and/or non-storm water discharges are affecting high priority aquatic and/or riparian species. The existing monitoring program does almost all monitoring at or near mass loading stations, which are located at and below the confluence of multiple major hydrologic subareas. While this approach may estimate cumulative loadings and impacts from entire hydrologic areas, it provides little information regarding localized impacts to receiving waters subject to MS4 discharges, especially for high priority habitats. This approach is also recommended by the Southern California Stormwater Monitoring Coalition's Model Monitoring Technical Committee as an integral part of a storm water monitoring program. The Model Monitoring Technical Committee, which includes a member from RCFCD, recommends the use of "site-specific stations focused on the status of high-priority inland habitats of concern, with monitoring based primarily on the Triad approach for dry weather sampling and on chemistry and toxicity for wet weather."[249]

The monitoring of MS4 discharges into high-priority inland habitats is of special importance to the species which rely on the habitat subject to the discharge. The Santa Margarita River, and its tributaries, has been designated with BIOL, WARM, COLD, RARE and WILD beneficial uses, in part due to the presence of threatened and endangered species.[250] Portions of the Santa Margarita HU also include areas designated as critical habitat by state and Federal agencies. Federal and State threatened and endangered species are particularly susceptible to negative direct and indirect effects of MS4 discharges because the habitat available to them has already been reduced, restricted, and/or degraded, and their populations have already been reduced to low levels.[251] Therefore, short-term or chronic degradation of habitat or exposure to pollutants caused by MS4 discharges results in a proportionally high level of negative impact to already impacted beneficial uses. Threatened or endangered species with reduced habitat availability may be restricted from avoiding pollutants associated with MS4 discharges,[252] and any reproductive impacts from pollutants would likely have significant negative effects on already low population sizes.

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[249] Model Monitoring Technical Committee, 2004. Model Monitoring Program for Municipal Separate Storm Sewer Systems in Southern California.
[250] See Federal Register 50 CFR 71.11 and the California Code of Regulations, Title 14 Section 670.5.
[251] Carroll, R., Augspurger, C., Dobson, A., Franklin, J., Orians, G., Reid, W., Tracy, R., Wilcove, D. and J. Wilson. 1996. Strengthening the use of science in achieving the goals of the Endangered Species Act: An Assessment by the Ecological Society of America. *Ecological Applications*. 6(1) pp. 1-11.
[252] For example, see National Marine Fisheries Service Draft Southern Steelhead Recovery Plan, July 2009.

Information regarding the extent of environmentally-sensitive habitats is available from sources familiar to the Copermittees.[253] Examples include the Western Riverside Multiple Species Habitat Conservation Plan, Santa Margarita HU assessments conducted by the U.S. Army Corps of Engineers, and California Department of Fish and Game Ecological Reserves. Therefore, a relatively small level of effort will be required to collect information to determine high priority inland aquatic habitats. In addition, the Copermittees already are required to have updated inventories of inland MS4 outfall locations. As a result, a monitoring plan can be developed within 36 months to address the new requirement.

Section II.E.2 (Sediment Toxicity Study) includes a requirement that the Copermittees conduct a sediment toxicity special study. This study has been added to the Monitoring and Reporting requirements to assess the quality of stream sediments and possible contamination due to runoff from the MS4. Toxicity tests focusing on aqueous toxicity may not account for the full toxicity of receiving waters if constituents, such as heavy metals or pesticides, are bound to sediments. Southern California studies have shown that stream sediments can exhibit significant levels of toxic metals and pesticides, including pyrethroids.[254,255] Additionally, the Copermittees have identified the presence of aqueous toxicity at both mass loading stations due to pyrethroid pesticides, but their presence in sediments is unknown.

Section II.E.3 (Trash and Litter Investigation) includes a requirement that the Copermittees conduct a Trash and Litter Investigation (see Finding C.8 and Discussion). The objective of the study is to evaluate the quantity, type, and source(s) of trash and litter in receiving waters (see Finding E.12 and Discussion regarding regional efforts). Although trash can impair beneficial uses, the amount and type of trash discharged into receiving waters from the Copermittee(s) MS4 is unknown. Thus, the Copermittees have largely been unable to assess the effectiveness of their BMPs that target trash as a pollutant. The special study requires the Copermittees to utilize previously developed protocols to determine the source of trash and litter in receiving waters, assess BMP effectiveness, and implement additional BMPs if needed according to the requirements of the Order. Qualitative and quantitative protocols for trash assessment have already been developed for San Diego County and the San Francisco Bay Region. These protocols are required to be used in the development of the special study, are expected to reduce Copermittee costs, and promote regional consistency in trash and litter assessments.

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[253] See Riverside County Copermittees ROWD, January 2009. Section 4.3.3.

[254] Holmes, R.W., Anderson, B.S., Phillips, B.M., Hunt, J.W., Crane, D.B., Mekebri, A. and V. Connor. 2008. Statewide Investigation of the Role of Pyrethroid Pesticides in Sediment Toxicity in California's Urban Waterways. *Environmental Science Technology* 42: 7003-7009..

[255] Crane, D.B. and C. Younghans-Haug. 1992. Oxadiazon residue concentrations in sediment, fish, and shellfish from a combined residential/agricultural area in Southern California. *Bulletin of Environmental Contamination and Toxicology.* Volume 48, no. 4.

Section II.E.4 (Agricultural, Federal and Tribal Input Study) includes a requirement for the Copermittees to draft and subsequently conduct a special study to determine the water quality of storm water flows which are entering their MS4 from agricultural, federal and tribal areas. The objective of the study is to determine the type, quantity and estimated loading of pollutants in these discharges. In the ROWD, the Copermittees specifically state their concern regarding the quality of storm water which is discharged into their MS4 from such areas, and state that these discharges may affect overall water quality, primarily in the Murrieta and Temecula Creek watersheds.[256] However, no data, information, or analyses were presented or identified on the level of pollutants in such flows into their MS4. The special study has been designed with sampling frequency and parameter requirements that lend flexibility to the Copermittees. The minimum requirements are limited to grab samples for pollutants expected to be present in storm water discharges and at a number of representative sites chosen be the Copermittees. The special study requires testing to be source specific (e.g. only sampling discharge into from one of the three sources) and does not allow for sampling to be done on co-mingled flows within the MS4. Additionally, the Copermittees may elect to conduct composite sampling, toxicity testing, more targeted sites, or a combination thereof.

Section II.E.5 (MS4 and Receiving Water Maintenance Study) includes a requirement that the Copermittees investigate impacts to Beneficial Uses from routine removal of vegetation from portions of the MS4 that are also receiving waters (see Finding D.3.c and Discussion). The objective of the study is to determine if there are short-term or long-term in-stream water quality impacts from maintenance activities and to assess if the activities exacerbate the impairment of receiving waters 303(d) listed as impaired wholly or partially from MS4 discharges. Receiving waters within the Copermittees jurisdiction have been routinely cleared of vegetation by the Copermittees as part of their MS4 maintenance programs without mitigation efforts. The in-stream modification of vegetation may result in changes in water quality and Beneficial Uses from changes in nutrient cycling, the storage of organic matter, infiltration, flow attenuation, temperature and erosion potential.[257,258,259] The relative contribution, if any, of maintenance activities to CWA 303(d) water quality impairments in unknown. The program is also expected to work in conjunction with other permit requirements of the Order. For example, the Copermittees may choose to utilize study results when implementing the HMP, LID, and retrofitting programs.

Section II.E.6 (Intermittent and Ephemeral Stream Perennial Conversion Study) includes a study to assess specifically exempted non-storm water discharges[260] into

[256] Riverside County Copermittees ROWD, January 2009. Sections 3.2 and 3.3.
[257] Fischenich, J.C. and R.R. Copeland. 2001. Environmental Considerations for Vegetation in Flood Control Channels. US Army Corps of Engineers.
[258] Shade et al. 2005. Hydrologic exchange and N uptake by riparian vegetation in an arid-land stream. *Journal of North American Benthological Society*. 24(1):19–28.
[259] Warner, R.E. and K.M. Hendrix. 1984. California Riparian Systems: Ecology, Conservation, and Productive Management. *pp. 160-189*. University of California Press.
[260] See Finding C.15 of the Order for discussion of exempted non-storm water discharges.

surface waters and discharges into MS4s covered under a separate NPDES permit in order to determine if the exempted discharges and/or separate NPDES discharges to the MS4 are causing or contributing to a condition of pollution, contamination or nuisance. For ephemeral and intermittent inland surface waters, modification of flows may impact beneficial uses through modification of in-stream ecology including, but not limited to, sediment transport, biogeochemical functioning, water temperature, non-native species presence and exclusion of native species.[261,262] The objective of the study is to determine if the alteration of natural in-stream hydrologic regimes from intermittent or ephemeral to perennial due to exempted non-storm water discharges has modified the beneficial uses of the receiving water. The evaluation includes both qualitative and quantitative measurements of parameters which will help the Copermittees determine if exempted discharges and/or separate NPDES discharges into the MS4 are causing a condition of pollution, contamination, or nuisance. Such a determination would potentially require an action to be taken by the Copermittee(s) (i.e. prohibition of an exempted discharge), permit modification for a separate NPDES permit, and/or an action by the San Diego Water Board.

Section II.F (Monitoring Provisions) of the MRP includes monitoring provisions which are standard requirements for all municipal storm water permits.

III. Reporting Program

Section III of the MRP discusses submittal of the Planned Monitoring Program, the Receiving Waters and MS4 Discharge Monitoring Annual Reports, and Interim Reporting Requirements. For the purposes of Receiving Waters and MS4 Discharge Monitoring and Reporting Program, required reviews and approvals by the San Diego Water Board of draft monitoring plans, proposals or protocols shall be conducted by the San Diego Water Board Executive Officer.

Section III.C (Table of Reporting Requirements) has been added to the MRP to provide a quick reference for all required reporting dates found in the MRP

[261] Naiman, R.J., Bunn, S.E., Nilsson, C., Petts, G.E., Pinay, G., and L.C. Thompson. 2002. Legitimizing Fluvial Ecosystems as Users of Water: An Overview. *Environmental Management*: 30(4) pp. 455-467.
[262] Marchetti, M.P., Light, T., Moyle, P.B. and J.H. Viers. 2004. Fish Invasions in California Watersheds: Testing Hypotheses Using Landscape Patterns. *Ecological Applications*. 14(5) pp. 1507-1525.

U. Attachment F - Source Data

Attachment F contains data utilized for the development of Storm Water Action Levels and Non-storm Water Action Levels.

California Regional Water Quality Control Board
San Diego Region

DRAFT UPDATES & ERRATA

to the

July 23, 2010 PUBLIC RELEASE DRAFT

of the

Waste Discharge Requirements for Discharges from the Municipal Separate Storm Sewer Systems (MS4s) Draining the Watershed of the County of Riverside, the Incorporated Cities of Riverside County, and the Riverside County Flood Control and Water Conservation District within the San Diego Region

Tentative Order No. R9-2010-0016
NPDES NO. CAS0108766

ERRATA & UPDATES AS OF
September 29, 2010

This document represents tentative updates and errata to the July 23, 2010 release of Tentative Order No. R9-2010-0016. The errata represent minor clarifications and reference mistakes identified by Staff and/or in the response to comments on the public release of Tentative Order. The updates include changes made as a result of oral and written comments received on the July 23, 2010 public release of the Tentative Order.

Permit Errata

Title Page - NPDES NO. CAS010876640~~0~~

Page # 2, Finding B.1 - Each of the persons in Table 1 below, hereinafter called Copermittees or dischargers, owns or operates an MS4, through which it discharges into waters of the United States (U.S.) within the San Diego Region. These MS4s fall into one or more of the following categories: (1) a medium or large MS4 that services a population of greater than 100,000 or 250,000 respectively; or (2) a small MS4 that is "interrelated" to a medium or large MS4; or (3) an MS4 that contributes to a violation of a water quality standard; or (4) an MS4 which is a significant contributor of pollutants to waters of the U.S.

Table 1. Municipal Copermittees

1. City of Murrieta	4. County of Riverside
2. City of Temecula	5. Riverside County Flood Control and Water Conservation District
3. City of Wildomar	
~~6. City of Menifee~~[1]	

The Cities of Murietta, Menifee and Wildomar also discharge into the waters of the U.S. in the California Regional Water Quality Control Board, Santa Ana Region (Santa Ana Water Board), so are located partially within both the San Diego and Santa Ana Water Board boundaries. As allowed by California Water Code (CWC) §13228, these Cities submitted written requests to be regulated for MS4 purposes under a permit adopted by only one Water Board. As authorized by CWC §13228 and pursuant to ~~a~~ written agreements dated September 28, 2010 between the San Diego Water Board and the Santa Ana Water Board, the Cities of Murrieta and Wildomar are wholly regulated by the San Diego Water Board under this Order, including those portions of the Cities jurisdiction not within the San Diego Water Board's region. Similarly, the City of Menifee is wholly regulated by the Santa Ana Water Board under Order No. R8-2010-0033, including those portions of the City of Menifee within the San Diego Water Board's region[1].

Page # 7, Finding D.1.d - Updated individual ~~Drainage Area~~ Storm Water Management Plans (Individual ~~DA~~SWMP or JRMP), and Watershed Stormwater Management Plans (watershed SWMPs or Watershed Worklplans), which, together with references in the DAMP, describe the Copermittees' runoff management programs in their entirety, are needed to guide the Copermittees' runoff management efforts and aid the Copermittees in tracking runoff management program implementation. Hereinafter, the individual

[1] ~~Until an agreement is finalized, the City of Menifee is included as a Copermittee in this Order.~~

~~DA~~SWMP is referred to as the JRMPs and the Watershed SWMP is referred to as the Watershed Workplan. It is practicable for the Copermittees to update the JRMPs and Watershed Workplans within the timeframe specified in this Order, since significant efforts to develop these programs have already occurred.

Page # 15, Finding E.9 - Storm water discharges from developed and developing areas in Riverside County are significant sources of certain pollutants that can cause, may be causing, threatening to cause or contributing to water quality impairment in the waters of Riverside County. Furthermore, as delineated in the CWA section 303(d) list in Table 2, the San Diego Water Board has found that there is a reasonable potential that municipal storm water and non-storm water discharges from MS4s cause or may cause or contribute to an excursion above water quality standards for the following pollutants: Indicator Bacteria (including Fecal Coliform and E. Coli), Copper, Manganese, Iron, Chlorpyrifos, Diazinon, Sulfates, Phosphorous, Nitrogen, Total Dissolved Solids (TDS), and Toxicity~~, and Turbidity~~. In accordance with CWA section 303(d), the San Diego Water Board is required to establish TMDLs for these pollutants to these waters to eliminate impairment and attain water quality standards. Therefore, certain early pollutant control actions and further pollutant impact assessments by the Copermittees are warranted and required pursuant to this Order.

Page # 20, Section C.2 – In response to an exceedance of an NAL, the Copermittee(s) having jurisdiction must investigate and seek to identify the source of the exceedance in a timely manner.

Page # 23, Section D.2 – The end-of-pipe assessment points for the determination of SAL compliance are ~~all~~ major outfalls, as defined in 40 CFR 122.26(b)(5) and (b)(6) and Attachment E of this Order.

Page # 24, Section E.1 - Each Copermittee must establish, maintain, and enforce adequate legal authority within its jurisdiction to control pollutant discharges into and from its MS4 through ordinance, statute, permit, contract or similar means.

Page # 25, Section E.2 - Each Copermittee must submit on or before June 30, 2012, a statement certified by its chief legal counsel that the Copermittee has taken the necessary steps to obtain and maintain full legal authority within its jurisdiction to implement and enforce each of the requirements contained in 40 CFR 122.26(d)(2)(i)(A-F) and this Order.

Page # 33, Section F.1.d.(4)(b)(i), Footnote 12 - Priority Development Projects proposing to dredge or fill materials in waters of the U.S. must obtain a CWA Section 401 Water Quality Certification. ~~and/or~~ Priority Development Projects proposing to discharge waste in waters of the State must obtain ~~a CWA §401 Water Quality Certification and/or~~ Waste Discharge Requirements.

Page # 39, Section F.1.f.(2)(a) - At a minimum, high priority projects include those projects that generate pollutants (prior to treatment) within the tributary area of and within the same hydrologic subarea as a 303(d) listed waterbody impaired for that pollutant; or those projects generating pollutants within the tributary area for and within the same hydrologic subarea as an observed action level exceedance of that pollutant.

Page # 43, Section F.1.h.(2) - In addition to the control measures that must be

implemented by Priority Development Projects per section F.1.h.(1)(d), the HMP must include a suite of management measures ~~to~~ that can be used on Priority Development Projects to mitigate hydromodification impacts, protect and restore downstream beneficial uses and prevent or further prevent adverse physical changes to downstream channels. The measures must be based on a prioritized consideration of the following elements in this order:

Page # 43, Section F.1.h.(3) - As part of the HMP, the Copermittees may develop a waiver program that allows a redevelopment Priority Development Project, as defined in Section F.1.d.(1)(b), to implement offsite mitigation measures. A waiver may be granted if onsite management and control measures are technically infeasible to fully achieve post-project runoff flow rates and durations that do not exceed the pre-development (naturally occurring) runoff flow rates and durations. Redevelopment projects that are granted a waiver under the program must not have post-project runoff flow rates and durations that exceed the pre-project runoff flow rates and durations. The estimated incremental hydromodification impacts from not achieving the pre-development (naturally occurring) runoff flow rates and durations for the project site must be fully mitigated. The offsite mitigation must be within the same stream channel system to which the project discharges. Mitigation projects not within the same stream channel system but within the same hydrologic unit may be approved provided that the project proponent demonstrates that mitigation within the same stream channel is infeasible and that the mitigation project will address similar impacts as expected from the project.

Page # 45, Section F.1.i - The Copermittees must develop, where they do not already exist, and implement or require implementation of erosion and sediment control BMPs after construction of new unpaved roads. At a minimum, the BMPs must include the following, or alternative BMPs that are equally effective:

Page # 51, Section F.3.a.(1) - Each Copermittee must maintain an updated watershed-based inventory of all its municipal areas and those activities that have the potential to generate pollutants. The inventory must include the name, address (if applicable), and a description of the area/activity; which pollutants are potentially generated by the area/activity; whether the area/activity is adjacent to an ESA; and identification of whether the area/activity is tributary to and within the same hydrologic subarea as a CWA section 303(d) water body segment and generates pollutants for which the water body segment is impaired. Linear facilities, such as roads, streets, and highways, do not need to be individually inventoried. The use of an automated database system, such as Geographical Information Systems (GIS) is highly recommended.

Page # 52, Section F.3.a.(2)(d) - Designate BMPs for ESAs and 303(d) Impairments: Each Copermittee must designate enhanced measures for its municipal areas and activities tributary to and within the same hydrologic subarea as CWA section 303(d) impaired water body segments when an area or those activities have the potential to generate pollutants for which the water body segment is impaired. Each Copermittee must also designate additional controls for its municipal areas and activities within or directly adjacent to or discharging directly to receiving waters within environmentally sensitive areas (as defined in Attachment C of this Order).

Page # 52, Section F.3.a.(8)(a)(iii) - Areas and activities tributary to and within the same hydrologic subarea as a CWA section 303(d) impaired water body segment, where an area or activity generates pollutants for which the water body segment is impaired.

Page # 56, Section F.3.a.(10) – Copermittee Maintained Unpaved Roads Maintenance

(a) The Copermittees must develop, where they do not already exist, and implement or require implementation of BMPs for erosion and sediment control measures during their maintenance activities on Copermittee maintained unpaved roads, particularly in or adjacent to receiving waters.

(b) The Copermittees must develop and implement or require implementation of appropriate BMPs to minimize impacts on streams and wetlands during their unpaved road maintenance activities.

(c) The Copermittees must ~~regularly~~ maintain as necessary their unpaved roads adjacent to streams and riparian habitat to reduce erosion and sediment transport;

(d) Re-grading of unpaved roads during maintenance must be sloped outward where consistent with road engineering safety standards or alternative equally effective BMPs must be implemented to minimize erosion and sedimentation from unpaved roads;

(e) Through their ~~regular~~ maintenance of unpaved roads, the Copermittees must examine the feasibility of replacing existing culverts or design of new culverts or bridge crossings to reduce erosion and maintain natural stream geomorphology.

Page # 58, Section F.3.b.(1)(a)(iii) - ESAs and 303(d) Listed Waterbodies: All other commercial or industrial sites/sources tributary to and within the same hydrologic subarea as a CWA Section 303(d) impaired water body segment, where the site/source generates pollutants for which the water body segment is impaired. All other commercial or industrial sites/sources within or directly adjacent to or discharging directly to receiving waters within environmentally sensitive areas (as defined in Attachment C of this Order) or that generate pollutants tributary to and within the same hydrologic subarea as an observed exceedance of an action level.

Page # 58, Section F.3.b.(2)(b) - Designate / Update Minimum BMPs: Each Copermittee must designate a minimum set of BMPs for all inventoried industrial and commercial sites/sources. Where BMPs have already been designated, each Copermittee must review and update its existing BMPs for adequacy ~~within one year of permit adoption~~ no later than with the submittal of the JRMP. Copermittees may continue to regularly review and update their designated BMPs for adequacy and subsequently submit any updates in their Annual Report. The designated minimum BMPs must be specific to facility types and pollutant-generating activities, as appropriate.

Page # 58-59, Section F.3.b.(2)(c) - Designate Enhanced BMPs for ESAs and 303(d) Impairments: Each Copermittee must designate enhanced measures for inventoried industrial and commercial sites/sources tributary to and within the same hydrologic subarea as CWA section 303(d) impaired water body segments (where a site/source generates pollutants for which the water body segment is impaired). Each Copermittee must also designate additional controls for industrial and commercial sites/sources within or directly adjacent to or discharging directly to coastal lagoons, the ocean, or other receiving waters within environmentally sensitive areas (as defined in Attachment C of this Order). Copermittees may continue to regularly review and update their designated enhanced BMPs for adequacy and subsequently submit any updates in their next Annual Report.

Page # 60, Section F.3.b.(4)(a)(i) - Review of BMP implementation plans not including SSMPs required pursuant to section F.1.d, if the site uses or is required to use such a plan;

Page # 60, Section F.3.b.(4)(b) – Delete the section:

~~(b) Each Copermittee must annually notify the San Diego Water Board, prior to the commencement of the rainy season, of all Industrial Sites and Industrial Facilities subject to the General Industrial Permit or other individual NPDES permit with alleged violations of the Copermittees ordinances, that pose a significant threat to water quality.~~

Page # 62, Section F.3.b.(6) – Add the section:

(6) Reporting of Non-Compliant Sites

Each Copermittee must annually notify the San Diego Water Board, prior to the commencement of the wet season, of any unresolved high level enforcement action (as defined in the Copermittees' JRMP) that poses a significant threat to water quality in its jurisdiction as a result of violations of their storm water ordinances.

Page # 62, Section F.3.c.(1)(e) - Any residential areas tributary to and within the same hydrologic subarea as a CWA section 303(d) impaired water body, where the residence generates pollutants for which the water body is impaired; and

Page # 64, Section F.3.d – Each Copermittee must develop and implement a retrofitting program that meets the requirements of this section. The goals of the existing development retrofitting program are to address the impacts of existing development through retrofit projects that reduce impacts from hydromodification, promote LID, support riparian and aquatic habitat restoration, reduce the discharges of storm water pollutants from the MS4 to the MEP, and prevent discharges from the MS4 from causing or contributing to a violation of water quality standards. Where feasible, at the discretion of the Copermittee, the existing development retrofitting program may be coordinated with flood control projects and other infrastructure improvement programs.

Page # 65, Section F.3.d.(5) – The known completed retrofit BMPs must be tracked in accordance with Section F.1.f. Retrofit BMPs on publicly owned properties must be inspected per section F.1.f . Privately owned retrofit BMPs must be inspected as needed ~~to ensure proper operation and maintenance~~.

Page # 69, Section F.4.h - Each Copermittee must implement management measures and procedures (including a notification mechanism) to prevent, respond to, contain and clean up all sewage (see below) and other spills that may discharge into its MS4 from any source (including private laterals and failing septic systems). Copermittees must coordinate with spill response teams to prevent entry of spills into the MS4 and contamination of surface water, ground water and soil. Each Copermittee must coordinate spill prevention, containment and response activities throughout all appropriate Copermittee departments, programs and agencies so that maximum water quality protection is available at all times.

Page # 69-70, Section F.6.a.(1) - At a minimum, the Copermittee education programs must educate each target community on the following topics, as appropriate to the target community's potential storm water and non-storm water discharges to the MS4:

(a) Applicable water quality laws, regulations, permits, and requirements;
(b) Best management practices;
(c) General runoff concepts;
(d) Existing water quality, including local water quality conditions, impaired waterbodies and environmentally sensitive areas; and
(e) Other topics, as determined by the Copermittee(s), such as public reporting mechanisms, water conservation, low-impact development techniques, and public health and vector issues associated with runoff.

Page # 72, Section G.1.d - Develop a watershed BMP implementation strategy to attain receiving water quality objectives in the identified highest priority water quality problem(s) and locations. The BMP implementation strategy must include a schedule for implementation of the BMPs ~~projects~~ to abate specific receiving water quality problems and a list of criteria to be used to evaluate BMP effectiveness. Identified watershed water quality problems may be the result of jurisdictional discharges that will need to be addressed with BMPs applied in a specific jurisdiction in order to generate a benefit to the watershed. This implementation strategy must include a map of any implemented and/or proposed BMPs.

Page # 74, Section I.2 - The Cities of Wildomar and Murrieta must comply with the requirements and WLAs assigned to the discharges from their MS4s contributing to the Lake Elsinore/Canyon Lake (San Jacinto Watershed) Nutrient TMDLs as specified in Section VI.D.2 of the Santa Ana Water Board's Order R8-2010-0033, including relevant sections of the fact sheet and findings, and subsequent revisions thereto.

Page # 77, Section K.2.a.(2) - Within 180 days of determination that the SSMP is in compliance with this Order's provisions, each Copermittee must amend its ordinances consistent with the SSMP and implement the updated SSMP. Any amended or new ordinances must be submitted to the San Diego Water Board within ~~30 days of adoption~~ the applicable Annual Report.

Page # 84, Section M.3 - ~~Produce and submit~~ Coordinate the submittal of the documents and reports as required by section K of this Order and Receiving Waters and MS4 Discharge Monitoring and Reporting Program No. R9-2010-0016 in Attachment E of this Order.

Attachments Errata

Page # B-9, Section Att. B.7.(m) - *Noncompliance*. Any noncompliance with this Order constitutes violation of the CWA~~C~~ and is grounds for denial of an application ~~f~~or modification of the Order (also see 40 CFR 122.41(a)).

Page # E-3, Section II.A.1.d - Protocols: Protocols for mass loading sampling and analysis including analytical methods, target reporting limits, and data reporting formats must be compatible with the State Water Resources Control Board's (State Water Board's) State Surface Water Ambient Monitoring Program (SWAMP). If the mass loading sampling and analysis are determined to be impracticable with the SWAMP standards, the Copermittees must provide a written explanation and discussion in the submittal of the Planned Monitoring Program. Wet weather samples must be ~~time~~flow-weighted composites, collected for the duration of the entire runoff event. Where such monitoring is not practical, such as for large watersheds with significant groundwater recharge flows, composites must be collected at a minimum during the first 3 hours of flow. Dry weather event sampling must be time-weighted composites composed of 24 discrete hourly samples, whereby the mass loads of pollutants are calculated as the product of the composite sample concentration and the total volume of water discharged past the monitoring point during the time of sample collection.

Page # E-7, Section II.A.2.c.(3) - Monitoring of stream assessment stations must be conducted according to the most current bioassessment Standard Operating Procedures (SOP) developed by the Surface Water Ambient Monitoring Program (SWAMP), and amendments, as ~~amended~~applicable. In collecting macroinvertebrate samples, the discharger must use the "Reachwide Benthos (Multihabitat) Procedure." The discharger must conduct, concurrently with all required macroinvertebrate collections, the "full" suite of physical/habitat characterization measurements specified in the SWAMP Bioassessment SOP, and as summarized in the *SWAMP Stream Habitat Characterization Form — Full Version* ~~.~~and must collect the water chemistry as listed in Table 1 of the bioassessment SOP developed by SWAMP.

Page # E-7, Section II.C.1.b.(1) - Determining Sampling Frequency: Effluent analytical monitoring must be conducted at major outfalls and identified stations. The Copermittees must sample a representative ~~number~~ percentage of major outfalls and identified stations within each hydrologic subarea. The sampling must be done to assess compliance with dry weather non-storm water action levels pursuant to section C of this Order. All monitoring conducted must be preceded by a minimum of 72 hours of dry weather.

Page # E-14, Section II.C.1.b.(2) - Sampling of non-storm water discharges may be done utilizing grab samples. If a ponded MS4 discharge is observed at a monitoring station, the Copermittee(s) must record the observation and collect at least one (1) grab sample. If flow is evident, a 1-hour composite sample may be taken. The Copermittee(s) must estimate the discharge flow by measuring the width of water surface, approximate depth of water, and approximate flow velocity. A flow meter may also be utilized.

Page # E-27, Section III.B. - For the October 2010 to October 2012 monitoring period, the Principal Copermittee must submit the Receiving Waters Monitoring Annual Report as required under Order No. 2004-~~0~~001. The Receiving Waters Monitoring Annual

Report must address the monitoring conducted to comply with the requirements of Order No. 2004-~~0~~001.

Page # E-27, Section III.C. – Table 5. Table of Required MRP Reporting Dates and Frequencies. … Draft Trash and Litter ~~Impairment~~ Special Study …

Fact Sheet Errata

Page # 23-24, Discussion of Finding B.1 - Included in Table 1 of the Order are the Cities of ~~Menifee,~~ Murrieta, Temecula, and Wildomar, the County of Riverside, and the Riverside County Flood Control and Water Conservation District. The Cities of Wildomar and Menifee are newly incorporated cities. Both Cities were previously a part of the County of Riverside's jurisdiction and have an MS4 interrelated to other Copermittee MS4s in the San Diego Region. The boundaries of the Cities of Menifee, Murrieta, and Wildomar fall within the jurisdiction of both the San Diego Water Board and the Santa Ana Water Board.

As requested by the Cities of Menifee, Murrieta, and Wildomar, and pursuant to an agreement between the San Diego and Santa Ana Water Boards as authorized by CWC section 13228, the MS4s of the Cities of Murrieta and Wildomar are to be wholly regulated by the San Diego Water Board under this Order, and the MS4 of the City of Menifee is to be wholly regulated by the Santa Ana Water Board under Order No. R8-2010-0033. The agreement between the San Diego and Santa Ana Water Board to regulate the Cities of Menifee, Murrieta, and Wildomar will be subject to change with ~~each permit renewal~~sufficient notice, and for good cause. ~~Until the an agreement between the San Diego Water Board and Santa Ana Water Board is finalized to allow the City of Menifee to be wholly regulated by the Santa Ana Water Board under Order No. R8-2010-0033, the City of Menifee will remain as a Copermittee under this Order.~~

Page # 59, Finding D.1.d - Updated individual ~~Drainage Area~~ Storm Water Management Plans (Individual ~~DA~~SWMP or JRMP), and Watershed Stormwater Management Plans (watershed SWMPs or Watershed Workplans), which, together with references in the DAMP, describe the Copermittees' runoff management programs in their entirety, are needed to guide the Copermittees' runoff management efforts and aid the Copermittees in tracking runoff management program implementation. Hereinafter, the individual ~~DA~~SWMP is referred to as the JRMPs and the Watershed SWMP is referred to as the Watershed Workplan. It is practicable for the Copermittees to update the JRMPs and Watershed Workplans within the timeframe specified in this Order, since significant efforts to develop these programs have already occurred.

Page # 98, Finding E.9 - Storm water discharges from developed and developing areas in Riverside County are significant sources of certain pollutants that can cause, may be causing, threatening to cause or contributing to water quality impairment in the waters of Riverside County. Furthermore, as delineated in the CWA section 303(d) list in Table 2, the San Diego Water Board has found that there is a reasonable potential that municipal storm water and non-storm water discharges from MS4s cause or may cause or contribute to an excursion above water quality standards for the following pollutants: Indicator Bacteria (including Fecal Coliform and E. Coli), Copper, Manganese, Iron, Chlorpyrifos, Diazinon, Sulfates, Phosphorous, Nitrogen, Total Dissolved Solids (TDS), and Toxicity~~, and Turbidity~~. In accordance with CWA section 303(d), the San Diego Water Board is required to establish TMDLs for these pollutants to these waters to eliminate impairment and attain water quality standards. Therefore, certain early pollutant control actions and further pollutant impact assessments by the Copermittees are warranted and required pursuant to this Order.

Page # 121, Section C - The maximum daily action level (MDAL) and average monthly action level (AMAL) will be based on the most limiting of the acute and chronic LTA, in

the case for ~~copper~~ chromium VI the most limiting LTA is the acute of 5.23 ug/L.

Page # 144, Section F.1.h – In addition to the control measures that must be included in the HMP to prevent or minimize hydromodification effects from Priority Development Projects, section F.1.h.(2) requires the HMP to include additional management measures ~~to~~ that can be used on Priority Development Projects based on a prioritized consideration of the following elements in this order:

Page # 144-145, Section F.1.h – The San Diego Water Board recognizes that fully achieving post-project runoff flow rates and durations that do not exceed pre-development (naturally occurring) runoff flow rates and durations on redevelopment projects with existing impervious surfaces may be challenging. Thus, section F.1.h.(3) has been included to allow the Copermittees to propose, as part of the HMP, a waiver program specifically for Priority Development Projects that are redevelopment projects, as defined by section F.1.d.(1)(b). Because redevelopment projects may not be able to achieve post-project runoff flow rates and durations that do not exceed pre-development (naturally occurring) runoff flow rates and durations through onsite management and control measures, offsite mitigation measures may be required. Redevelopment projects~~, however,~~ must ~~be able to~~ achieve post-project runoff flow rates and durations that are less than or equal to pre-project and down to pre-development runoff flow rates and durations to be eligible to receive a waiver under the program. For a redevelopment project, the pre-project runoff flow rates and durations are those currently being discharged by the existing development prior to the redevelopment project being built. Meeting pre-project runoff flow rates and durations is usually a less stringent performance criteria than meeting the pre-development runoff flow rates and durations. Implementing BMPs to meet the pre-project flow rates and durations is significantly easier and cheaper for a redevelopment project compared to meeting pre-development flow rates and durations. If a project is granted a waiver, the estimated incremental hydromodification impacts from not achieving the pre-development (naturally occurring) runoff flow rates and durations for the project site must be fully mitigated with offsite mitigation. Offsite mitigation measures may include utilizing regional hydrologic control measures (e.g., regional detention or infiltration basins) or rehabilitation of stream channels to achieve sustainable channel configurations.

Page # 155, Section F.3.a.(10) - (Copermittee Maintained Unpaved Roads Maintenance) requires the Copermittees to implement or require implementation of BMPs for erosion and sediment control during and after maintenance activities on the unpaved roads that the Copermittees are responsible for maintaining, particularly in or adjacent to stream channels or wetlands. As discussed for Finding D.1c, source control BMPs for unpaved roads are needed to minimize the discharge of sediment to the MS4s and receiving waters. There are several guidance documents available (see Discussion for Finding D.1.c) that include BMPs that can be readily implemented by the Copermittees for the development of new unpaved roads. This requirement is necessary to ensure the Copermittees minimize the discharge of sediment from their unpaved roads used for their maintenance activities.

Page # 158, Section F.3.b.(4) - The Order also requires that inspections include review of BMP implementation plans if the site uses or is required to use such a plan, and the review of facility monitoring data if the site monitors its runoff. BMP implementation plans do not include SSMPs required pursuant to section F.1.d. If a facility is not required to have a BMP implementation plan or required to collect monitoring data, the inspection

does not need to include a review of this information. BMP implementation plans and monitoring data are expected to be available for any facility that is covered under the General Industrial Permit. The BMP implementation plans and monitoring data can provide the inspector pertinent information that can be used during the visual inspection of the facility (e.g., BMPs implemented, maintenance records for BMPs, pollutants in storm water runoff). The Copermittees' inspectors have the discretion to determine the depth and detail of the review and use of the information in conducting the inspection.

Page # 158-159, Section F.3.b.(4) – Delete the following paragraph:
~~An additional notification to the San Diego Water Board regarding industrial sites has been added. Copermittees are required to annually notify the San Diego Water Board of industrial sites that have suspected violations. This was added to enhance San Diego Water Board and Copermittee communication and coordination in regulating industrial sites. Information may be provided as part of the JRMP annual report if submitted prior to the rainy season.~~

Page # 159, Section F.3.b.(6) – Add the following section after the end of Section F.3.b.(4):
Section F.3.b.(6) (Reporting of Non-Compliant Sites) has been added as additional notification to the San Diego Water Board regarding commercial and industrial sites. Copermittees are required to annually notify, prior to the rainy season, the San Diego Water Board of commercial and industrial sites that have any unresolved high level enforcement actions. This was added to enhance San Diego Water Board and Copermittee communication. Information may be provided as part of the JRMP annual report if submitted prior to the rainy season.

Page # 174, Section I.2 – includes, by reference to Santa Ana Water Board Order No. R8-2010-0033, including the relevant sections of the fact sheet and findings (and subsequent revisions), the requirements and WLAs assigned to the MS4s for the Lake Elsinore/Canyon Lake (San Jacinto Watershed) Nutrient TMDLs that are being implemented for the Santa Ana Water Board. Because the San Jacinto Watershed is within the boundaries of the Santa Ana Water Board's region, the Lake Elsinore/Canyon Lake Nutrient TMDLs and its requirements must be implemented by the Cities of Murrieta and Wildomar for the areas within their jurisdictions located in the Santa Ana Region (Region 8).

Page # 192, Section II.A.1 – 1. All events must now include: Biological Oxygen Demand, 5-day Chemical Oxygen Demand, Total Organic Carbon, Dissolved Organic Carbon. These are specifically required by 40 CFR 122.26(d)(2)(iii)(A) and (B), but were omitted from collection and reporting required by Order No. R9-2004-001.

Permit Updates

Page # 1, Finding A.3 – Insert "and following "Order WQ 2001-15," and delete "~~and Order WQ 2009-0008 (SWRCB/OCC File A-1780).~~" Add the following footnote to the end of the finding:
In July 2010, the court in Los Angeles County v. State Water Resources Control Board remanded the Los Angeles Water Board's MS4 permit underlying Order WQ 2008-0009 for procedural reasons occurring during the permit adoption process. The court did not evaluate or rule upon the substantive findings and reasoningn set forth in Order WQ 2009-0008. While the San Diego Water Board may no longer cite Order WQ 2009-0008 as a precedential State Water Board order, the San Diego Water Board agrees with the reasoning expressed by the State Water Board.

Page # 1, Finding A.4 - The Fact Sheet / Technical Report for the Order No. R9-2010-0016, NPDES No. CAS0108766, Waste Discharge Requirements for Discharges from the MS4s Draining the County of Riverside, the Incorporated Cities of Riverside County, and the Riverside County Flood Control and Water Conservation District within the San Diego Region, includes cited regulatory and legal references and additional explanatory information and data in support of the requirements of this Order. This information, including any supplements thereto, ~~and any response to comments on the Tentative Orders,~~ is hereby incorporated by reference into these findings.

Page #28, Section F.1.c.(6) – Infiltration and Groundwater Protection
To protect groundwater quality, each Copermittee must apply restrictions to the use of treatment control BMPs that are designed to primarily function as large, centralized infiltration devices (such as large infiltration trenches and infiltration basins). Such restrictions must be designed so that the use of such infiltration treatment control BMPs does not cause or contribute to an exceedance of groundwater quality objectives and must be fully protective of downstream water rights. At a minimum, each treatment control BMP designed to primarily function as a centralized infiltration device must meet the restrictions below, unless the Developemnt~~n~~ Project demonstrates to the Copermittee that a restriction is not necessary to protect groundwater quality. The Copermittees may collectively or individually develop alternative restrictions on the use of treatment control BMPs which are designed to primarily function as centralized infiltration devices. Alternative restrictions developed by the Copermittees can partially or wholly replace the restrictions listed below. The restrictions do not apply to small infiltration systems dispersed throughout a development project.

Page # 29, Section F.1.c.(8) - Rain water harvesting and water reuse, where feasible, must be ~~implemented~~ encouraged as part of the site design and construction to reduce pollutants in storm water discharges to the MEP~~, and to supplement offsite beneficial uses~~.

Page # 33, Section F.1.d.(4)(b)(iii) - Projects with low traffic areas and appropriate soil conditions must be constructed ~~walkways, trails, overflow parking lots, alleys, or other low-traffic areas~~ with permeable surfaces~~, such as pervious concrete, porous asphalt, unit pavers, and granular materials~~.

Page # 33-34 Section F.1.d.(4)(c)(ii) - If onsite retention ~~infiltration~~ LID BMPs are technically infeasible per section F.1.d.(7)(b), other LID BMPs may treat any volume that is not retained onsite provided that the other LID BMPs are sized ~~to hold the design~~

~~storm volume that is not infiltrated~~ to achieve equivalent storm water volume and pollutant load reduction as if the entire design capture volume were retained onsite. The LID BMPs must be designed for an appropriate surface loading rate to prevent erosion, scour and channeling within the BMP.

Page # 36, Section F.1.d.(7)(a) - Prior to implementation, the LID waiver program must clearly exhibit that it will not allow Priority Development Projects to result in a net impact (after consideration of any mitigation) from pollutant loadings over and above the impact caused by projects meeting the onsite LID retention requirements;

Page # 38-39, Section F.1.f.(1) - Inventory of SSMP projects: Each Copermittee must develop and maintain a watershed-based database to track and inventory all projects constructed within their jurisdiction, that have a final approved SSMP (SSMP projects), and its structural post-construction BMPs ~~within its jurisdiction~~ implemented therein since July, 2005. LID BMPs implemented on a lot by lot basis ~~in low density residential areas~~ at single family residential houses, such as rain barrels, are not required to be tracked or inventoried.

Page # 39, Section F.1.f.(2)(b)(iv) – Delete the section:
~~(iv) At least 20 percent of all approved and inventoried SSMP projects must be inspected by the Copermittee annually;~~

Page # 64, Section F.3.c.(5) – Delete the section:
~~(5) Privately Owned Unpaved Roads Maintenance~~

~~(a) The Copermittees must require implementation of BMPs for erosion and sediment control during maintenance activities on privately owned unpaved roads, particularly in or adjacent to stream channels or wetlands.~~

~~(b) The Copermittees must enforce their ordinances against illegal construction and maintenance grading activities on privately owned unpaved roads, so as to prevent impacts to water quality.~~

Page # 66-67, Section F.4.b - Each Copermittee must maintain an updated map of its entire MS4 and the corresponding drainage areas within its jurisdiction. The use of GIS is strongly encouraged. The MS4 map must include all segments of the storm sewer system owned, operated, and maintained by the Copermittee, as well as all known locations of inlets that discharge and/or collect runoff into the Copermittee's MS4~~, all known locations of access points (i.e. manholes) to the Copermittee's MS4~~, all known locations of connections with other MS4s (e.g. Caltrans), and all known locations of all the outfalls that discharge runoff from the Copermittee's MS4. The accuracy of the MS4 map must be confirmed during dry weather field screening and analytical monitoring and must be updated at least annually. The MS4 map including any GIS layers must be submitted with the updated JRMP.

Page # 69, Section F.6 - Each Copermittee must implement education programs to (1) measurably increase the knowledge regarding MS4s, impacts of runoff on receiving waters, and potential BMP solutions for the target audience; and (2) to measurably change the behavior of target communities and thereby reduce pollutants in storm water discharges and eliminate prohibited non-storm water discharges to MS4s and the

environment. At a minimum, the education programs must meet the requirements of this section and address the following target communities:

- Copermittee Departments and Personnel
- New Development / Redevelopment Project Applicants, Developers, Contractors, Property Owners, and other Responsible Parties
- Construction Site Owners and Operators
- Commercial Owners and Operators
- Industrial Owners and Operators
- Residential Community and General Public
- ~~Quasi-Governmental Agencies / Districts (i.e., educational institutions, water districts, sanitation districts, etc.)~~

Attachment Updates

Page # C-7 - Add the following definition:
Low Impact Development Best Management Practices (LID BMPs) - LID BMPs include schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the pollution of waters of the United States through storm water management and land development strategies that emphasize conservation and the use of on-site natural features integrated with engineered, small-scale hydrologic controls to more closely reflect pre-development hydrologic functions. LID BMPs include retention practices that do not allow runoff such as infiltration, rain water harvesting and reuse, and evapotranspiration. LID BMPs also include flow-through practices such as biofiltration that may have some discharge of storm water following treatment.

Page # E-5, Section II.A.1, Table 1 -
Table 1. Analytical Testing for Mass Loading (II.A.1) and Stream Assessment (II.A.2)

Conventionals, Nutrients, Hydrocarbons	Pesticides	Metals (Total and Dissolved)	Bacteriological (mass loading)
• Total Dissolved Solids • Total Suspended Solids • Turbidity • Total Hardness • pH • Specific Conductance • Temperature • Dissolved Oxygen • Total Phosphorus • Dissolved Phosphorus • Nitrite* • Nitrate* • Total Kjeldahl Nitrogen • Ammonia • Biological Oxygen Demand, 5-day • Chemical Oxygen Demand • Total Organic Carbon • Dissolved Organic Carbon • Methylene Blue Active Substances • Oil and Grease • Sulfate	• Diazinon • Chlorpyrifos • Malathion • Carbamates • Pyrethroids	• Arsenic • Cadmium • Total Chromium • Hexavalent Chromium** • Copper • Lead • Iron • Manganese • Nickel • Selenium • Zinc • Mercury • Silver • Thallium	• E. coli • Fecal Coliform • Enterococcus

* Nitrate and ~~nitrate~~ nitrite may be combined and reported as nitrate + nitrite.
** Hexavalent Chromium sampling must occur only for mass loading stations for the 1st wet weather event and 1 dry weather event.

Page # E-6, Section II.A.2.a – … The two existing mass loading stations at Murrieta and Temecula Creeks must continue to be monitored. Copermittees may propose, for San Diego Water Board review and approval, changing the location of stream assessment monitoring stations where the mass loading stations location has changed pursuant to section II.A.1.a. Two reference stream assessment stations, including the existing Adobe Creek station, must be identified, sampled, monitored, and analyzed.

Page # E-7, Section II.A.2.b - Frequency: Stream assessment stations must be monitored in May or June (to represent the influence of wet weather on the communities) ~~and September or October (to represent the influence of dry weather flows on the communities)~~. The timing of monitoring of stream assessment stations located at mass loading stations must coincide with dry weather monitoring of those mass loading stations.

Page # E-22, Section II.E -
Add the following special study to the end of Section II.E:

7. Stormwater Monitoring Coalition (SMC) Regional Monitoring of Southern California Coastal Watersheds:

   The Copermittees must implement the monitoring program developed by the SMC for Regional Monitoring of the southern California coastal watersheds within the Santa Margarita Hydrologic Unit. Each Copermittee must evaluate the results of the monitoring program within and downstream of their jurisdiction and integrate the results into program assessments and modifications.

Page # E-25, Section III.A.2 - Monitoring Annual Report: The Principal Copermittee must submit the Receiving Waters and MS4 Discharge Monitoring Annual Report to the San Diego Water Board on October 1 of each year, beginning on **October 1, 2013**. Receiving Waters and MS4 Discharge Monitoring Annual Reports must include monitoring conducted under the previous fiscal year, and must meet the following requirements:

Page # E-27, Section III.A.4 - Following completion of an annual cycle of monitoring in October, the Copermittees must make the monitoring data and results available to the San Diego Water Board at the San Diego Water Board's request. Following completion of the annual cycle of monitoring, the Copermittees must upload monitoring data and results into the California Environmental Data Exchange Network (CEDEN)[15].

Footnote 15: http://www.ceden.org/

Fact Sheet Updates

Page # 5, Section II - Copermittees

1. City of Murrieta	4. County of Riverside
2. City of Temecula	5. Riverside County Flood Control and Water Conservation District
3. City of Wildomar	
~~6. City of Menifee~~[1]	

Page # 22, Finding A.4 - The Fact Sheet / Technical Report for the Order No. R9-2010-0016, NPDES No. CAS0108766, Waste Discharge Requirements for Discharges from the MS4s Draining the County of Riverside, the Incorporated Cities of Riverside County, and the Riverside County Flood Control and Water Conservation District within the San Diego Region, includes cited regulatory and legal references and additional explanatory information and data in support of the requirements of this Order. This information, including any supplements thereto, ~~and any response to comments on the Tentative Orders,~~ is hereby incorporated by reference into these findings.

Page # 45, Discussion of Finding C.14 - The State Water Board~~'s~~ recently recognized ~~precedential~~ in order (Order WQ 2009-0008) ~~affirming a Los Angeles County MS4 permit modification, consistent with USEPA's prior interpretations, recognizes~~ that "[n]either the Clean Water Act nor the federal storm water regulations define 'non-storm water.' 'Illicit discharge' is defined as any discharge to an MS4 'not composed entirely of storm water.' Thus, 'illicit discharge' is the most nearly applicable definition of 'non-storm water' found in federal law and is often used interchangeably with that term." In July 2010, the court in Los Angeles County v. State Water Resources Control Board remanded the Los Angeles Water Board's MS4 permit underlying Order WQ 2009-0008 for procedural reasons occurring during the permit adoption process. The court did not evaluate or rule upon the substantive findings and reasoning set forth in Order WQ 2009-0008. While the San Diego Water Board may no longer cite Order WQ 2009-0008 as a precedential State Water Board order, the San Diego Water Board agrees with the reasoning expressed by the State Water Board.

Page # 96, Finding E.6 – Add the following paragraph at the end of the discussion of Finding E.6:

The San Diego Water Board recognizes that the Commission on State Mandates recently found that certain provisions within two municipal storm water permits constituted reimbursable state mandates within the meaning of the California Constitution. The Commission did not reimburse the claimants for the costs of implementing those provisions. The decisions directly affect only the municipal storm water permits identified in the two test claims. That is, the effect of the decisions is limited to the provisions of Los Angeles Water Board Order 01-182 and San Diego Order R9-2007-0001 identified by the Commission as reimbursable state mandates. No other municipal storm water permits or provisions therein are directly affected by the decisions and the San Diego Water Board is not precluded from adopting similar or identical provisions in the Tentative Order. Subsequent proceedings before the Commission to

[1] ~~Until an agreement to transfer the regulatory oversight of the City of Menifee's MS4 to the California Regional Water Quality Control Board, Santa Ana Region under Order No. R8-2010-0033 is finalized, the City of Menifee is included as a Copermittee under Order No. R9-2010-0016.~~

determine the local governments entitled to reimbursement and the amount of reimbursement are underway before the Commission. Separately, the State Water Board and San Diego and Los Angeles Water Boards have challenged these decisions in court.

Page # 139, Section F.1.f - To facilitate the tracking of BMP maintenance, each Copermittee must develop and maintain a database of Priority Development Projects subject to SSMP requirements (SSMP projects) and the post-construction BMPs implemented for each SSMP project. The inventory is not expected or required to include LID BMPs that are implemented on a lot by lot basis ~~in low density residential areas~~ at single family residential houses. The inventory, however, must include the post-construction BMPs for all other development or redevelopment SSMP project sites.

Page # 140, Section F.1.f – Delete the following paragraph:
~~Twenty percent of all SSMP projects are required to be inspected by the Copermittees annually. If the number of high priority SSMP project sites is 20 percent or more of the total number of SSMP projects in the Copermittee's inventory, this requirement will be met. If, however, the number of high priority SSMP project sites is less than 20 percent of the total number of SSMP projects in the Copermittee's inventory, additional lower priority SSMP project sites must be inspected to make up the difference. Selection of the additional lower priority SSMP project sites will be at the discretion of the Copermittee, but are selected based on each site's potential threat to water quality.~~

Page # 160, Section F.3.c.(5) – Delete the section:
~~**Section F.3.c.(5)** (Privately Owned Unpaved Roads Maintenance) includes requirements for privately owned unpaved roads. The Copermittees must require implementation of BMPs for erosion and sediment control during maintenance activities on privately owned unpaved roads, particularly roads that are in or adjacent to receiving waters. As discussed for Finding D.1.c, BMPs for unpaved roads are needed to minimize the discharge of sediment to the MS4s and receiving waters. There are several guidance documents available (see Discussion for Finding D.1.c) that include design and source control BMPs that can the Copermittees can readily require to be implemented.~~

~~In addition, where the Copermittees identify illegal construction and maintenance grading activities on privately owned unpaved roads, the Copermittees must enforce their ordinances to prevent illicit discharges of sediment and other pollutants from privately owned unpaved roads to their MS4s and receiving waters.~~

Page # 163, Section F.4.b - requires each Copermittee to maintain an updated map of its entire MS4 and the corresponding drainage areas within its jurisdiction. The Order specifies that the map must include the segments of the storm sewer system owned, operated, and maintained by the Copermittee, and include locations of all known inlets, ~~access points (i.e. manholes),~~ connections with other MS4s, and outfalls to the Copermittee's MS4. Knowing where their inlets, access points, connections with other MS4s, and outfalls are located will allow the Copermittees to better track, identify, and eliminate IC/IDs. The use of a geographic information system (GIS) by the Copermittees is strongly encouraged for the MS4 map. The Riverside County Flood Control and Water Conservation District (RCFCD) currently maintains a GIS layer that is a compilation of all the Copermittee MS4 maps. Although an individual Copermittee may not have GIS capabilities, each Copermittee has agreements with RCFCD for providing updated MS4

maps to the RCFCD to update this GIS layer and subsequent submittal to the San Diego Water Board.

Supporting Document No. 4
Item No. 5
October 13, 2010

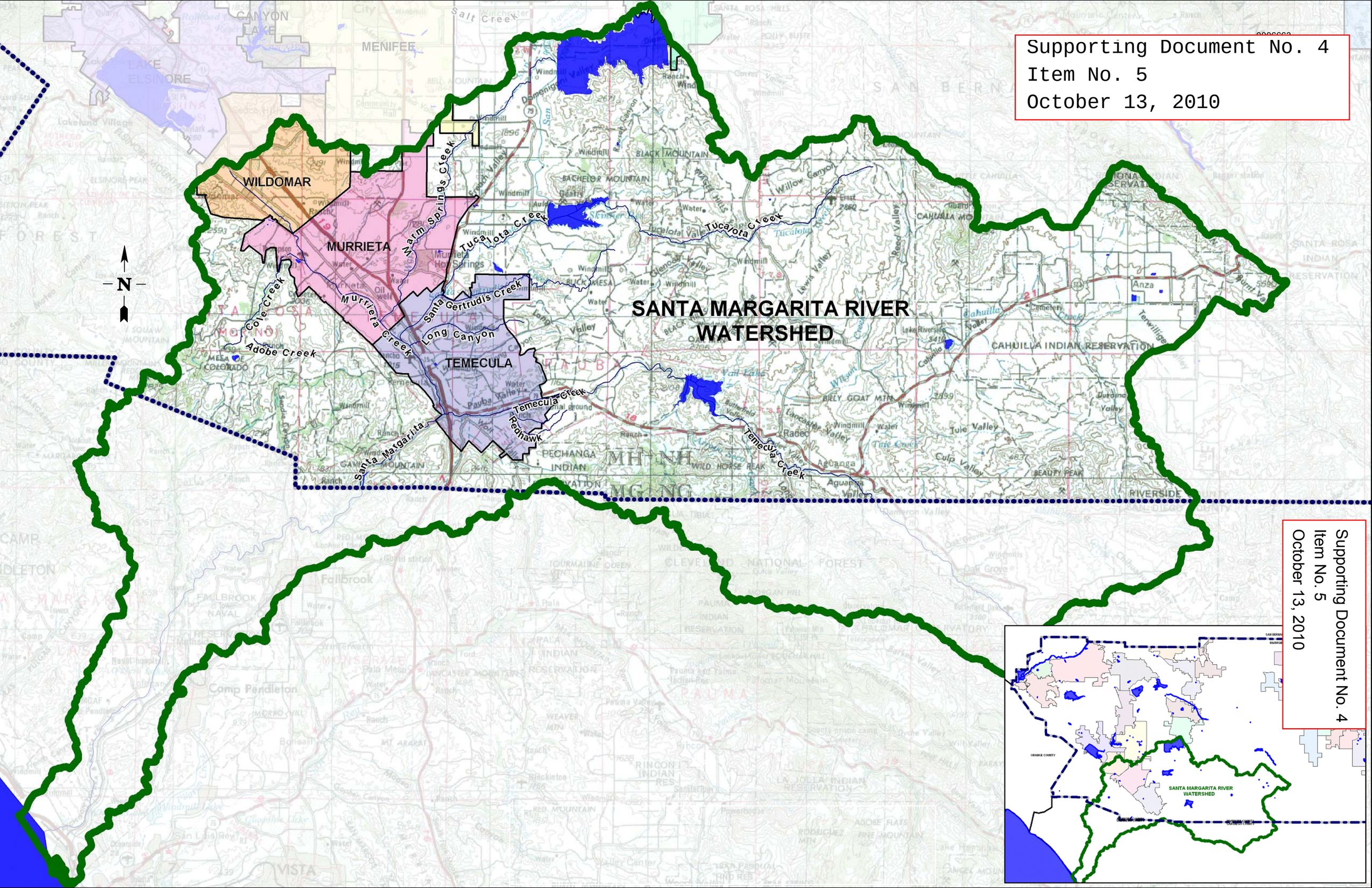

Supporting Document No. 4
Item No. 5
October 13, 2010

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD,
SAN DIEGO REGION

October 13, 2010

Event Timeline for Tentative Order No. R9-2010-0016

September 8, 2008	Meeting regarding ROWD submittal
January 15, 2009	Report of Waste Discharge submitted
July 14, 2009	Current Permit, R9-2004-0001, expired
February 18, 2010	San Diego Water Board Comments sent on the ROWD
17 Meetings:	Meeting Topic:
February 24, 2010	Initial meeting with Executive Officer (EO)
March 22, 2010	Staff & Copermittees meeting with EO and Assistant Executive Officer (AEO)
April 22, 2010	Initial draft permit presented to Copermittees
April 28, 2010	Staff & Copermittee meeting to discuss public participation, residential, and municipal
May 6, 2010	Staff & Copermittee meeting to discuss MS4 Map, illicit discharge detection and elimination, education, and action levels
May 13, 2010	Staff & Copermittee meeting to discuss discharge prohibitions, receiving waters limitations, over-irrigation, new development, BMP verification, and retrofit
May 20, 2010	Staff & Copermittee meeting to discuss BMP verification & maintenance tracking, enforcement, and retrofit
May 26, 2010	Staff & Copermittee meeting to discuss construction, retrofit, post-construction, commercial, industrial, and low impact development (LID)
June 3, 2010	Staff & Copermittee meeting to discuss commercial, industrial, and new development
June 10, 2010	Staff & Copermittee meeting to discuss post-construction, LID, and hydromodification
June 15, 2010	Staff & Copermittee teleconference to discuss monitoring
June 17, 2010	Staff & Copermittee meeting to discuss jurisdictional exchange, LID, and hydromodification
June 23, 2010	Staff & Copermittee meeting to discuss jurisdictional exchange, LID, hydromodification, watershed plan, fiscal analysis, Total Maximum Daily Load, effectiveness, and

	reporting
July 1, 2010	Staff & Copermittee meeting to discuss legal authority, effectiveness, and reporting
July 8, 2010	Staff & Copermittee meeting to discuss monitoring, and unpaved roads
July 15, 2010	Staff & Copermittee meeting to discuss monitoring, costs, and unpaved roads
July 19, 2010	Staff & Copermittee meeting to discuss hydromodification, and unpaved roads
July 23, 2010	Public release of Tentative Order
<u>2 additional meetings:</u>	
August 18, 2010	Staff & Copermittee meeting to discuss unpaved roads, minor errata, costs, overirrigation
August 25, 2010	Copermittee meeting with EO and staff to discuss outstanding concerns, monitoring, overirrigation, costs, and unpaved roads
September 7, 2010	Written comments due
September 29, 2010	Draft responses to comments released
October 13, 2010	San Diego Water Board hearing and adoption

California Regional Water Quality Control Board

San Diego Region

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http:// www.waterboards.ca.gov/sandiego

Supporting Document No. 6
Item No. 5
October 13, 2010

September 28, 2010

Patrick A. Thomas
Director of Public Works
City of Murrieta
1 Town Square
24601 Jefferson Avenue
Murrieta, CA 92562

Frank Oviedo
City Manager
City of Wildomar
23873 Clinton Keith Road, Suite 201
Wildomar, CA 92595

Donald Allison, P.E.
City Engineer/Public Works Director
City of Menifee
29714 Haun Road
Menifee, CA 92586

Dear Messrs. Thomas, Oviedo and Allison:

SUBJECT: DESIGNATIONS OF SAN DIEGO WATER BOARD AND SANTA ANA WATER BOARD FOR PURPOSES OF REGULATION OF MUNICIPAL SEPARATE STORM SEWER SYSTEMS - CITIES OF MENIFEE, MURRIETA AND WILDOMAR, RIVERSIDE COUNTY

This letter constitutes the California Regional Water Quality Control Board, San Diego Region's (San Diego Water Board, San Diego Regional Board, or Region 9) written agreement pursuant to Water Code section 13228, subdivision (a) to designate the Santa Ana Regional Water Quality Control Board (Santa Ana Water Board or Region 8) as the regulator of the City of Menifee within Region 9's geographic jurisdiction for municipal separate storm sewer system (MS4) permit purposes[1], and further constitutes the San Diego Water Board's written agreement to accept designation from the Santa Ana Water Board to regulate the Cities of Murrieta and Wildomar, including those portions of each city that fall within Region 8's geographic jurisdiction, for MS4 permit purposes.[2] As discussed below, this agreement is subject to several important limitations recognized by the Cities.

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[1] The San Diego Water Board intends to consider the adoption of a new MS4 permit (Tentative Order No. R9-2010-0016) that would regulate the relevant portions of Murrieta and Wildomar on October 13, 2010.

[2] Until the new San Diego Water Board MS4 permit is adopted, including regulation of the Cities of Murrieta and Wildomar for MS4 purposes regardless of geographic boundaries, portions of Murrieta and Wildomar remain regulated in part by Order No. R8-2010-0033. Murrieta and Wildomar would become regulated by the San Diego Water Board, with certain limitations described below, when the San Diego Water Board adopts tentative Order No. R9-2010-0016, scheduled for consideration on October 13, 2010.

Background

The Cities each lay partially within both the San Diego and Santa Ana Water Boards' geographic jurisdictional boundaries. Portions of the Cities are currently regulated by the Santa Ana Water Board under Order No. R8-2010-0033 for MS4 discharges. Because the Cities of Wildomar and Menifee were incorporated after 2004, the San Diego Water Board's existing MS4 permit, Order No. R9-2004-001, regulates portions of Murrieta, but does not regulate Wildomar or Menifee. On July 20, 21 and 22, 2010, Murrieta, Wildomar and Menifee, respectively, submitted letters addressed jointly to the Executive Officers of the San Diego Water Board and the Santa Ana Water Board requesting that they each be regulated by one MS4 permit, pursuant to Water Code section 13228. (The Cities' letters, which include maps provided by the Cities depicting their respective geographic locations, are attached to this letter as Exhibits 1-3.) Murrieta and Wildomar requested that the Santa Ana Water Board designate the San Diego Water Board as the regulator for all portions of their respective cities, including those portions within Region 8's geographic boundary, for their MS4-related discharges. Likewise, the City of Menifee requested that the San Diego Water Board designate the Santa Ana Water Board as the regulator for all portions of Menifee, including those portions of the city that fall within Region 9's jurisdictional boundary, for matters pertaining to MS4 discharges. As the basis for their requests, the Cities cite the desire to reduce the complexities associated with being regulated by two separate MS4 permits and a desire to increase effectiveness and efficiencies in using city resources to benefit water quality. As described below, each city recognizes appropriate and important limitations to this agreement.

Limitations on San Diego Water Board Designation Agreement

As explained in their respective letters, each city recognizes the following common limitations to this agreement: (1) the requested designation applies only to MS4 permitting so that each city is subject to a single MS4 permit; (2) the Cities of Murrieta and Wildomar recognize that other waste discharge requirements (WDRs) or orders issued and/or enforced by the San Diego Water Board remain wholly under the San Diego Water Board's jurisdiction; likewise, the City of Menifee recognizes that WDRs and/or other orders issued or enforced by the Santa Ana Water Board remain wholly under the Santa Ana Water Board's jurisdiction; and (3) each Water Board retains the authority to enforce provisions of the MS4 permit issued to each city[3] but compliance

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The Santa Ana Water Board may amend its order to remove Murrieta and Wildomar after the San Diego Water Board's adoption of Tentative Order No. R9-2010-0016, but this designation becomes effective upon the San Diego water Board's action.

[3] Primary enforcement responsibility lies with the permitting Water Board.

will be determined based upon the MS4 permit in which a particular city is regulated as a co-permittee (see Wat. Code § 13228, subd. (b)).

The Cities also expressly acknowledged the following reciprocal limitation concerning Total Maximum Daily Loads (TMDLs). Murrieta and Wildomar understand and agree that "[a]ny TMDLs and associated MS4 permit requirements issued by the Santa Ana Regional Board, which include [Murrieta and Wildomar] as responsible part[ies], will be incorporated into the MS4 permit issued by the San Diego Regional Board by reference, including reference to any associated provisions, findings or elements of the fact sheet." (City of Murrieta, Letter to Kurt Berchtold and David Gibson, July 20, 2010, p. 2; City of Wildomar, Letter to Kurt Berchtold and David Gibson, July 21, 2010, p. 2.) Similarly, the City of Menifee understands that "[a]ny TMDLs and associated MS4 permit requirements issued by the San Diego Regional Board, which include the City of Menifee as a responsible party, will be incorporated into the MS4 permit issued by the Santa Ana Regional Board by reference, including reference to any associated provisions, findings or elements of the fact sheet." (City of Menifee, Letter to Kurt Berchtold and David Gibson, July 22, 2010, p. 2.)

The Cities further recognize they will be subject to different processes for submitting Permit Registration Documents (PRDs) for municipal construction projects subject to the State Water Resources Control Board's (State Water Board's) Construction General Storm Water Permit. Under the Santa Ana Water Board's MS4 permit, Order No. R8-2010-0033, PRDs for municipal construction projects are submitted to the State Water Board through the Stormwater Multi-Application Reporting and Tracking System (SMARTS) without the filing fee. The City of Menifee will follow the process set forth by the Santa Ana Water Board under Order No. R8-2010-0033 for construction PRDs for all municipal construction projects within the City of Menifee. In contrast, the San Diego Water Board's existing (R9-2004-0001) and proposed (R9-2010-0016) MS4 permits include no similar process. Therefore, the Cities of Murrieta and Wildomar will submit PRDs[4] in accordance with the manner prescribed in State Water Board's Construction General Storm Water Permit, including appropriate fees.

Similarly, Region 8 MS4 requirements do not require separate coverage under the General Industrial Storm Water Permit (97-03-DWQ) for municipal yards. As such, the City of Menifee need not get coverage under the State Water Board's General Industrial Storm Water Permit for its corporate yards. Murrieta and Wildomar shall get coverage under the General Industrial Storm Water Permit for <u>all</u> their corporate yards.

Complaints received for discharges flowing from municipal, construction, industrial, and commercial sites to MS4s within the Cities of Murrieta and Wildomar will be forwarded to the San Diego Water Board for review. Complaints regarding discharges from

[4] In the form of a Notice of Intent (NOI).

municipal, construction, industrial, and commercial sites to MS4s within the City of Menifee will be referred to the Santa Ana Water Board for review.

Each Water Board remains responsible for overseeing construction and industrial sites under the statewide General Permits for Construction and Industrial Activities (State Water Board Orders No. 2009-0009 DWQ and No. 97-03 DWQ, respectively) based on the Water Board's geographic jurisdictional boundary. The Santa Ana Water Board shall notify the San Diego Water Board of any non-compliance found during routine inspections of sites within the Santa Ana Water Board boundary that discharge into the MS4s for the Cities of Murrieta and Wildomar. The San Diego Water Board shall notify the Santa Ana Water Board of any non-compliance found during routine inspections of sites within the San Diego Water Board boundary that discharge into the City of Menifee's MS4.

For de minimus types of discharges listed in the Region 8 MS4 Permit, the City of Menifee does not have to get separate coverage under Region 8's General De Minimus Permit (R8-2009-0003). De minimus types of discharges to Region 8's jurisdiction from the Cities of Wildomar and Murrieta shall be regulated under Region 8's General De Minimus Permit, R8-2009-0003.

Finally, the City of Murrieta notes that its annual report under the San Diego MS4 permit will include the 375 acres currently within the Santa Ana watershed. While not noted by the Cities of Wildomar and Menifee, the San Diego Water Board expects that the annual report filed by each city would be a single report covering the entire geographic area of the city, regardless of geographic jurisdiction, using the format prescribed in its respective permit and submitted to the appropriate regulating board.

For the reasons outlined above, the San Diego Water Board agrees to the Cities' regulatory designation requests and notes that tentative Order No. R9-2010-0016 will be revised to reflect this agreement. This agreement shall become effective with the adoption of tentative Order No. R9-2010-0016. The San Diego Water Board does not anticipate the need, but reserves the right, to modify or terminate this agreement in the future, upon sufficient notice, and for good cause.

Respectfully,

DAVID W. GIBSON
Executive Officer

Enclosure

cc: Kurt Berchtold, Executive Officer, Santa Ana Water Board

California Regional Water Quality Control Board
Santa Ana Region

Linda S. Adams
Secretary for Environmental Protection

3737 Main Street, Suite 500, Riverside, California 92501-3348
Phone (951) 782-4130 • FAX (951) 781-6288
www.waterboards.ca.gov/santaana

Arnold Schwarzenegger
Governor

September 28, 2010

Patrick A. Thomas
Director of Public Works
City of Murrieta
1 Town Square
24601 Jefferson Avenue
Murrieta, CA 92562

Frank Oviedo
City Manager
City of Wildomar
23873 Clinton Keith Road, Suite 201
Wildomar, CA 92595

Donald Allison, P.E.
City Engineer/Public Works Director
City of Menifee
29714 Haun Road
Menifee, CA 92586

Dear Messrs. Thomas, Oviedo and Allison:

DESIGNATIONS OF SAN DIEGO REGIONAL WATER QUALITY CONTROL BOARD AND SANTA ANA REGIONAL WATER QUALITY CONTROL BOARD FOR PURPOSES OF REGULATION OF MUNICIPAL SEPARATE STORM SEWER SYSTEMS - CITIES OF MENIFEE, MURRIETA AND WILDOMAR, RIVERSIDE COUNTY

This letter constitutes the Santa Ana Regional Water Quality Control Board's (Santa Ana Water Board's or Region 8's) written agreement pursuant to Water Code section 13228, subdivision (a), to designate the San Diego Regional Water Quality Control Board (San Diego Water Board or Region 9) as the regulator of the Cities of Murrieta and Wildomar, including those portions of each city that fall within Region 8's geographic jurisdiction, for municipal separate storm sewer system (MS4) permit purposes[1], and further constitutes the Santa Ana Water Board's written agreement to accept designation from the San Diego Water Board to regulate the City of Menifee within Region 9's geographic jurisdiction for MS4 permit purposes under Order No. R8-2010-0033.[2]

[1] At the time this letter was signed, the San Diego Water Board intended to consider the adoption of a new MS4 permit (Tentative Order No. R9-2010-0016) that would regulate the relevant portions of Murrieta and Wildomar.

[2] Until the new San Diego Water Board MS4 permit is adopted, including regulation of the Cities of Murrieta and Wildomar for MS4 purposes regardless of geographic boundaries, portions of Murrieta and Wildomar remain regulated in part by Order No. R8-2010-0033. Murrieta and Wildomar would become regulated by the San Diego Water Board, with certain limitations described below, when the San Diego Water Board adopts tentative Order No. R9-2010-0016, scheduled for consideration on October 13, 2010.

As discussed below, this agreement is subject to several important limitations recognized by the Cities of Menifee, Wildomar, and Murrieta (collectively, the Cities).

Background

The Cities each lay partially within both the San Diego and Santa Ana Water Boards' geographic jurisdictional boundaries. Portions of the Cities are currently regulated by the Santa Ana Water Board under Order No. R8-2010-0033 for MS4 discharges. Because the Cities of Wildomar and Menifee were incorporated after 2004, the San Diego Water Board's existing MS4 permit, Order No. R9-2004-0001, only regulates portions of Murrieta. On July 20, 21 and 22, 2010, Murrieta, Wildomar and Menifee, respectively, submitted letters addressed jointly to the Executive Officers of the San Diego Water Board and the Santa Ana Water Board requesting that they each be regulated by one MS4 permit, pursuant to Water Code section 13228. (The Cities' letters, which include maps provided by the Cities depicting their respective geographic locations, are attached to this letter as Exhibits 1-3.) Murrieta and Wildomar requested that the Santa Ana Water Board designate the San Diego Water Board as the regulator for all portions of their respective cities, including those portions within Region 8's geographic boundary, for their MS4-related discharges. Likewise, the City of Menifee requested that the San Diego Water Board designate the Santa Ana Water Board as the regulator for all portions of Menifee, including those portions of the city that fall within Region 9's jurisdictional boundary, for matters pertaining to MS4 discharges. As the basis for their requests, the Cities cite the desire to reduce the complexities associated with being regulated by two separate MS4 permits and a desire to increase effectiveness and efficiencies in using city resources to benefit water quality. As described below, each city recognizes appropriate and important limitations to this agreement.

Limitations on the Santa Ana Water Board Designation Agreement

As explained in their respective letters, each city recognizes the following common limitations to this agreement: (1) the requested designation applies only to MS4 permitting so that each city is subject to a single MS4 permit; (2) the Cities of Murrieta and Wildomar recognize that other waste discharge requirements (WDRs) or orders issued and/or enforced by the San Diego Water Board remain wholly under the San Diego Water Board's jurisdiction; likewise, the City of Menifee recognizes that WDRs and/or other orders issued or enforced by the Santa Ana Water Board remain wholly under the Santa Ana Water Board's jurisdiction; and (3) each Water Board retains the authority to enforce provisions of the MS4 permit issued to each city but compliance will

---

The Santa Ana Water Board intends to amend Order No. R8-2010-033 to remove Murrieta and Wildomar after the San Diego Water Board's adoption of Tentative Order No. R9-2010-0016. This designation becomes effective upon the San Diego Water Board's action.

be determined based upon the MS4 permit in which a particular city is a named as a co-permittee (see Wat. Code § 13228, subd. (b)).

The Cities also expressly acknowledged the following reciprocal limitation concerning Total Maximum Daily Loads (TMDLs). Murrieta and Wildomar understand and agree that "[a]ny TMDLs and associated MS4 permit requirements issued by the Santa Ana Regional Board, which include [Murrieta and Wildomar] as responsible part[ies], will be incorporated into the MS4 permit issued by the San Diego Regional Board by reference, including reference to any associated provisions, findings or elements of the fact sheet." (City of Murrieta, Letter to Kurt Berchtold and David Gibson, July 20, 2010, p. 2; City of Wildomar, Letter to Kurt Berchtold and David Gibson, July 21, 2010, p. 2.) Similarly, the City of Menifee understands that "[a]ny TMDLs and associated MS4 permit requirements issued by the San Diego Regional Board, which include the City of Menifee as a responsible party, will be incorporated into the MS4 permit issued by the Santa Ana Regional Board by reference, including reference to any associated provisions, findings or elements of the fact sheet." (City of Menifee, Letter to Kurt Berchtold and David Gibson, July 22, 2010, p. 2.)

The Cities further recognize they will be subject to different processes for submitting Permit Registration Documents (PRDs) for municipal construction projects subject to the State Water Resources Control Board's (State Water Board's) Construction General Storm Water Permit. Under the Santa Ana Water Board's MS4 permit, Order No. R8-2010-0033, PRDs for municipal construction projects are submitted to the State Water Board through the Stormwater Multi-Application Reporting and Tracking System (SMARTS) without the filing fee. The City of Menifee will follow the process set forth by the Santa Ana Water Board under Order No. R8-2010-0033 for construction PRDs for all municipal construction projects within the City of Menifee. In contrast, the San Diego Water Board's existing (R9-2004-0001) and proposed (R9-2010-0016) MS4 permits include no similar process. Therefore, the Cities of Murrieta and Wildomar will submit PRDs[3] in accordance with the manner prescribed in State Water Board's Construction General Storm Water Permit, including appropriate fees.

Similarly, Region 8 MS4 requirements do not require separate coverage under the General Industrial Storm Water Permit (97-03-DWQ) for corporate yards. As such, the City of Menifee need not obtain coverage under the State Water Board's General Industrial Storm Water Permit for its corporate yards. Murrieta and Wildomar shall get coverage under the General Industrial Storm Water Permit for <u>all</u> their corporate yards.

Complaints received for discharges flowing from municipal, construction, industrial, and commercial sites to MS4s within the Cities of Murrieta and Wildomar will be forwarded to the San Diego Water Board for review. Complaints regarding discharges from municipal, construction, industrial, and commercial sites to MS4s within the City of

[3] The PRDs include a Notice of Intent (NOI).

Menifee will be referred to the Santa Ana Water Board for review. Each Water Board remains responsible for overseeing construction and industrial sites under the statewide General Permits for Construction and Industrial Activities (State Water Board Orders No. 2009-0009 DWQ and No. 97-03 DWQ, respectively) based on the Water Board's geographic jurisdictional boundary. The Santa Ana Water Board shall notify the San Diego Water Board of any non-compliance found during routine inspections of sites within the Santa Ana Water Board boundary that discharge into the MS4s for the Cities of Murrieta and Wildomar. The San Diego Water Board shall notify the Santa Ana Water Board of any non-compliance found during routine inspections of sites within the San Diego Water Board boundary that discharge into the City of Menifee's MS4.

For de minimus types of discharges listed in the Region 8 MS4 Permit, the City of Menifee does not have to obtain separate coverage under Region 8's General De Minimus Permit (R8-2009-0003). De minimus types of discharges to Region 8's jurisdiction from the Cities of Wildomar and Murrieta shall be regulated under Region 8's General De Minimus Permit, R8-2009-0003.

Finally, the City of Murrieta notes that its annual report under the San Diego MS4 permit will include the 375 acres currently within the Santa Ana watershed. While not noted by the Cities of Wildomar and Menifee, the Santa Ana Water Board expects that the annual report filed by each city would be a single report covering the entire geographic area of the city, regardless of geographic jurisdiction, using the format prescribed in its respective permit and submitted to the appropriate regulating board.

For the reasons outlined above, the Santa Ana Water Board agrees to the Cities' regulatory designation requests and notes that Order No. R8-2010-0033 will be revised to reflect this agreement. This agreement shall become effective with the adoption of tentative Order No. R9-2010-0016.

The Santa Ana Water Board does not anticipate the need, but reserves the right, to modify or terminate this agreement in the future, upon sufficient notice, and for good cause.

Respectfully,

Kurt V. Berchtold
Executive Officer

Enclosure

cc: David Gibson, Executive Officer, San Diego Regional Water Quality Control Board
Jason Uhley, Riverside County Flood Control and Water Conservation District

July 22, 2010

SAN DIEGO REGIONAL
WATER QUALITY
CONTROL BOARD

2010 JUL 23 A 9:4

Mr. Kurt Berchtold
Executive Officer
California Regional Water Quality
Control Board - Santa Ana Region
3737 Main Street, Suite 500
Riverside, CA 92501-3339

Mr. David W. Gibson
Executive Officer
California Regional Water Quality
Control Board – San Diego Region
9174 Sky Park Court, Suite 100
San Diego, CA 92123-4340

Re: **Request for Designating the Santa Ana Regional Board as Regulating Discharges from MS4 within the City of Menifee**

Dear Messrs. Berchtold and Gibson:

The City of Menifee is located within southwestern Riverside County, and covers an area of approximately 60 square miles. While the city is located primarily within the Santa Ana Watershed and therefore is under the jurisdiction of the Santa Ana Regional Board, approximately 800 acres (or 3%) of the city extends into the Santa Margarita Watershed which is under the jurisdiction of the San Diego Regional Board. The land use in this area is rural residential and residential. Attached for your reference is a map of the city, overlaid with the jurisdictional boundary between the two Regional Boards. As a result of this situation, the city is subject to two Municipal Separate Storm Sewer System (MS4) Permits issued by the respective Regional Boards.

Pursuant to discussions with staff at both Regional Boards, and consistent with California Water Code section 13228, the City of Menifee hereby requests that the San Diego Regional Board designate the Santa Ana Regional Board for regulation of all portions of the city, regardless of Regional Board jurisdictional boundaries, for matters pertaining to MS4 permitting.

The remainder of this letter contains a discussion of the basis for this request; a description of the understood limitations of this designation; and any other associated requests.

Basis for the request

The City is currently a named permittee on order R8-2010-0033 issued by the Santa Ana Regional Board (Santa Ana Permit), and submitted a Notice of Intent as part of the Report of Waste Discharge to participate in the upcoming permit issued by the San Diego Regional Board. While having the same goal of reducing the discharge of pollutants from the MS4 system, these two orders include requirements that accomplish that goal in different ways. As a result, programs designed to be in compliance with the Santa Ana Permit are similar, but necessarily different than programs designed

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for compliance with the San Diego Permit. When this situation is applied within a single city, such as the City of Menifee, having two differing programs creates significant confusion among both city staff and the public, which can lead to inefficient and inconsistent implementation of the programs and less effective protection of water quality. Additionally, and no less significant, there is a duplicative administrative and financial burden that is inherent in complying with two MS4 permits: two sets of programs have to be developed; staff have to be trained to two sets of requirements, and at differing frequencies; business inspections must inspect for and track different information, at differing frequencies; two sets of annual reports have to be created, with each report being required to include different information; etc.

The purpose of the City's request is to reduce the aforementioned complexity to allow for the more effective and focused utilization of the City's resources to the benefit of water quality.

Understood Limitations

This request by the City of Menifee is made with the understanding that:

- For the purposes of MS4 permitting only, the Santa Ana Regional Board would regulate the entirety of the City of Menifee. As a result, the City of Menifee would be subject to a single MS4 permit, which would be issued by the Santa Ana Regional Board.
- Construction NOIs for all municipal construction projects within the City of Menifee will be submitted in accordance with the process identified by the Santa Ana Regional Board.
- Enforcement of any provisions of the MS4 permit issued to the City of Menifee can be performed by either the San Diego Regional Board or the Santa Ana Regional Board however compliance will be based on the permit issued by the Santa Ana Regional Board.
- Any TMDLs and associated MS4 permit requirements issued by the San Diego Regional Board, which include the City of Menifee as a responsible party, will be incorporated into the MS4 permit issued by the Santa Ana Regional Board by reference, including reference to any associated provisions, findings or elements of the fact sheet.
- Other Waste Discharge Requirements, or other Orders issued or enforced by the San Diego Regional Board would remain wholly under the jurisdiction of the San Diego Regional Board.

Other Requests:

Understanding that the requested designation applies to the MS4 permit requirements, the Santa Ana Permit incorporates a simplified process in section XIV.G.1. for applying for coverage under the General Construction Permit (Order 2009-0009-DWQ) for municipal projects. This process includes submission of the NOI or Permit Registration Documents (PRDs) directly to the Executive Officer, and waived application fees. To avoid unnecessary confusion among staff, and potential for

Mr. Kurt Berchtold
Santa Ana Regional Water Quality Control Board
Mr. David W. Gibson
San Diego Regional Water Quality Control Board
Re: Request for Designating Santa Ana Board as Regulator of MS4 Permits within the City of Menifee

inadvertent non-compliance, the City of Menifee specifically requests that this portion of the MS4 permit would be applicable within the entire City, including those portions of the city within the jurisdiction of the San Diego Regional Board.

In conclusion, the requested designation of regulatory authority to the Santa Ana Regional Board will not only reduce the complexity and administrative burden upon the City of Menifee, but will allow the City to better focus and effectively utilize their available resources to the best benefit to water quality. The City of Menifee is focused on protecting the receiving waters (Canyon Lake) immediately adjacent to the City. The City is taking specific actions and pursuing funding requests to insure future compliance. The City has accepted responsibility for a 105 acre preserve immediately upstream of Canyon Lake under permits by ACOE and CAF&G. We appreciate the San Diego Regional Board's flexibility in allowing the City of Menifee to remain focused on these important responsibilities in District 8 and not having to address separate permit issues.

If you have any questions regarding this request, please contact Don Allison at 951-672-6777.

Very truly yours,

Donald Allison

Mr. Donald Allison, P.E.
City Engineer/Public Works Director
City of Menifee

Attachment:

Map of the City of Menifee with Redesignation Area

cc: Steve Harding, City Manager, City of Menifee
Karen Feld, City Attorney, City of Menifee
Jason Uhley, Riverside County Flood Control

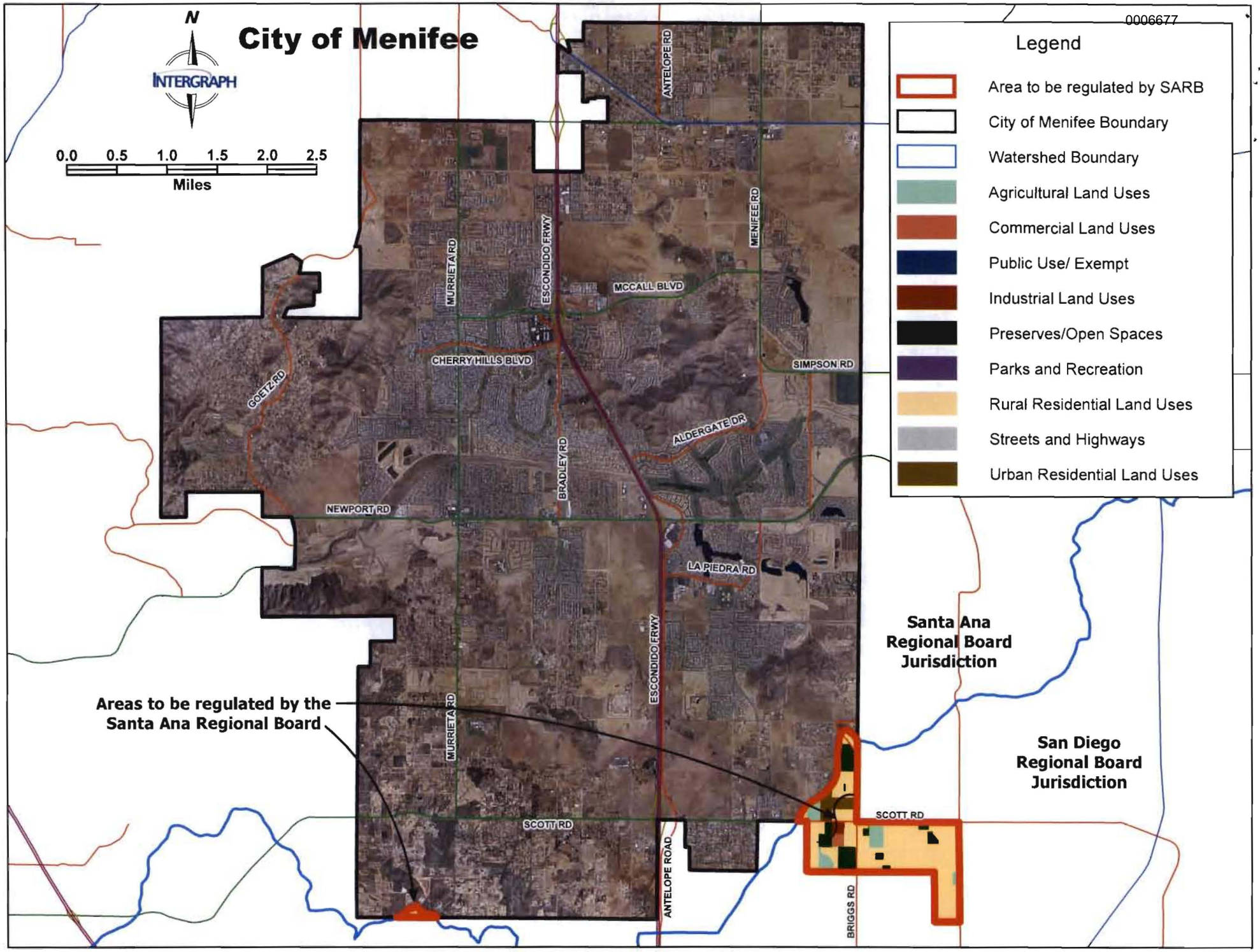
City of Menifee
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Miles
Legend
Area to be regulated by SARB
City of Menifee Boundary
Watershed Boundary
Agricultural Land Uses
Commercial Land Uses
Public Use/ Exempt
Industrial Land Uses
Preserves/Open Spaces
Parks and Recreation
Rural Residential Land Uses
Streets and Highways
Urban Residential Land Uses
ANTELOPE RD
MENIFEE RD
MURRIETA RD
ESCONDIDO FRWY
MCCALL BLVD
CHERRY HILLS BLVD
SIMPSON RD
GOETZ RD
ALDERGATE DR
BRADLEY RD
NEWPORT RD
LA PIEDRA RD
Santa Ana Regional Board Jurisdiction
San Diego Regional Board Jurisdiction
Areas to be regulated by the Santa Ana Regional Board
SCOTT RD
ANTELOPE ROAD
BRIGGS RD

0006678

Bridgette Moore, Mayor
Marsha Swanson, Mayor Pro Tem
Sheryl Ade, Council Member
Bob Cashman, Council Member
Scott Farnam, Council Member

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July 21, 2010

Mr. Kurt Berchtold
Executive Officer
California Regional Water Quality
Control Board - Santa Ana Region
3737 Main Street, Suite 500
Riverside, CA 92501-3339

Mr. David W. Gibson
Executive Officer
California Regional Water Quality
Control Board – San Diego Region
9174 Sky Park Court, Suite 100
San Diego, CA 92123-4340

Dear Messrs Berchtold and Gibson:

Re: Request for Designating the San Diego Regional Board as Regulating Discharges from MS4 owned by the City of Wildomar

The City of Wildomar is located within southwestern Riverside County, and covers an area of approximately 23.7 square miles. While the city is located primarily within the Santa Margarita Watershed and therefore is under the jurisdiction of the San Diego Regional Board, approximately 4,768 acres (or 31.4 %) of the city extends into the Santa Ana Watershed which is under the jurisdiction of the Santa Ana Regional Board. Attached for your reference is a map of the city, overlaid with the jurisdictional boundary between the two Regional Boards. As a result of this situation, the city is subject to two Municipal Separate Storm Sewer System (MS4) Permits issued by the respective Regional Boards.

Pursuant to discussions with staff at both Regional Boards, and consistent with California Water Code section 13228, the City of Wildomar hereby requests that the Santa Ana Regional Board designate the San Diego Regional Board for regulation of all portions of the city, regardless of Regional Board jurisdictional boundaries, for matters pertaining to MS4 permitting.

The remainder of this letter contains a discussion of the basis for this request; a description of the understood limitations of this designation; a description of the additional portion of the city that, pursuant to this designation, would be regulated by the San Diego Regional Board, and any other associated requests.

Basis for the request

The City is currently a named permittee on order R8-2010-0033 issued by the Santa Ana Regional Board (Santa Ana Permit), and submitted a Notice of Intent as part of the Report of Waste Discharge to participate in the upcoming permit issued by the San Diego Regional Board. While having the same goal of reducing the discharge of pollutants from the MS4 system, these two orders include requirements that accomplish that goal in different ways. As a result, programs designed to be in compliance with the Santa Ana Permit are similar, but necessarily different than programs designed for compliance with the San Diego Permit. When this situation is applied within a single city, such as the City of Wildomar, having two differing programs creates significant confusion among both city staff and the public, which can lead to inefficient and inconsistent implementation of the programs and less effective protection of water quality. Additionally, and no less significant, there is a duplicative administrative and financial burden that is inherent in complying with two MS4 permits: two sets of programs have to be developed; staff have to be trained to two sets of requirements, and at differing frequencies; business inspections must inspect for and track different information, at differing frequencies; two sets of annual reports have to be created, with each report being required to include different information; etc.

The purpose of the City's request is to reduce the aforementioned complexity to allow for the more effective and focused utilization of the City's resources to the benefit of water quality.

Understood Limitations

This request by the City of Wildomar is made with the understanding that:

- For the purposes of MS4 permitting only, the San Diego Regional Board would regulate the entirety of the City of Wildomar. As a result, the City of Wildomar would be subject to a single MS4 permit, which would be issued by the San Diego Regional Board.
- Enforcement of any provisions of the MS4 permit issued to the City of Wildomar can be performed by either San Diego Regional Board or Santa Ana Regional Board however compliance will be based on the permit issued by the San Diego Regional Board.
- Any TMDLs and associated MS4 permit requirements issued by the Santa Ana Regional Board, which include the City of Wildomar as a responsible party, will be incorporated into the MS4 permit issued by the San Diego Regional Board by reference, including reference to any associated provisions, findings or elements of the fact sheet.
- Other Waste Discharge Requirements, or other Orders issued or enforced by the Santa Ana Regional Board would remain wholly under the jurisdiction of the Santa Ana Regional Board.

Description of the area of the City subject to the designation:

Some facts about the City of Wildomar and the portion within the jurisdiction of the Santa Ana Regional Board are described below. Also enclosed with this letter is a map of the City with the subject area highlighted.

- Total Area of the City of Wildomar is 23.7 square miles.
- Area within the Santa Ana Watershed is 4,768 acres or 7.45 square miles.
- Percent of the City of Wildomar in the Santa Ana Watershed is 31.4%.
- Top three land uses within the portion of the City of Wildomar in the Santa Ana Watershed are residential (58.5%), Preserve/Open Space (25.6%) and Agriculture (6.7 %) (as % of area within Santa Ana Watershed)

In conclusion, the requested designation of regulatory authority to the San Diego Regional Board will not only reduce the complexity and administrative burden upon the City of Wildomar, but will allow the City to better focus and effectively utilize their available resources to the best benefit to water quality.

If you have any questions regarding this request, please contact Tim D'Zmura at 951-677-7751.

Very truly yours,

Frank Oviedo, City Manager
City of Wildomar

Attachments:
Map of the City of Wildomar

ec:

Tim D'Zmura, City of Wildomar
Jason Uhley, Riverside County Flood Control

City of Wildomar

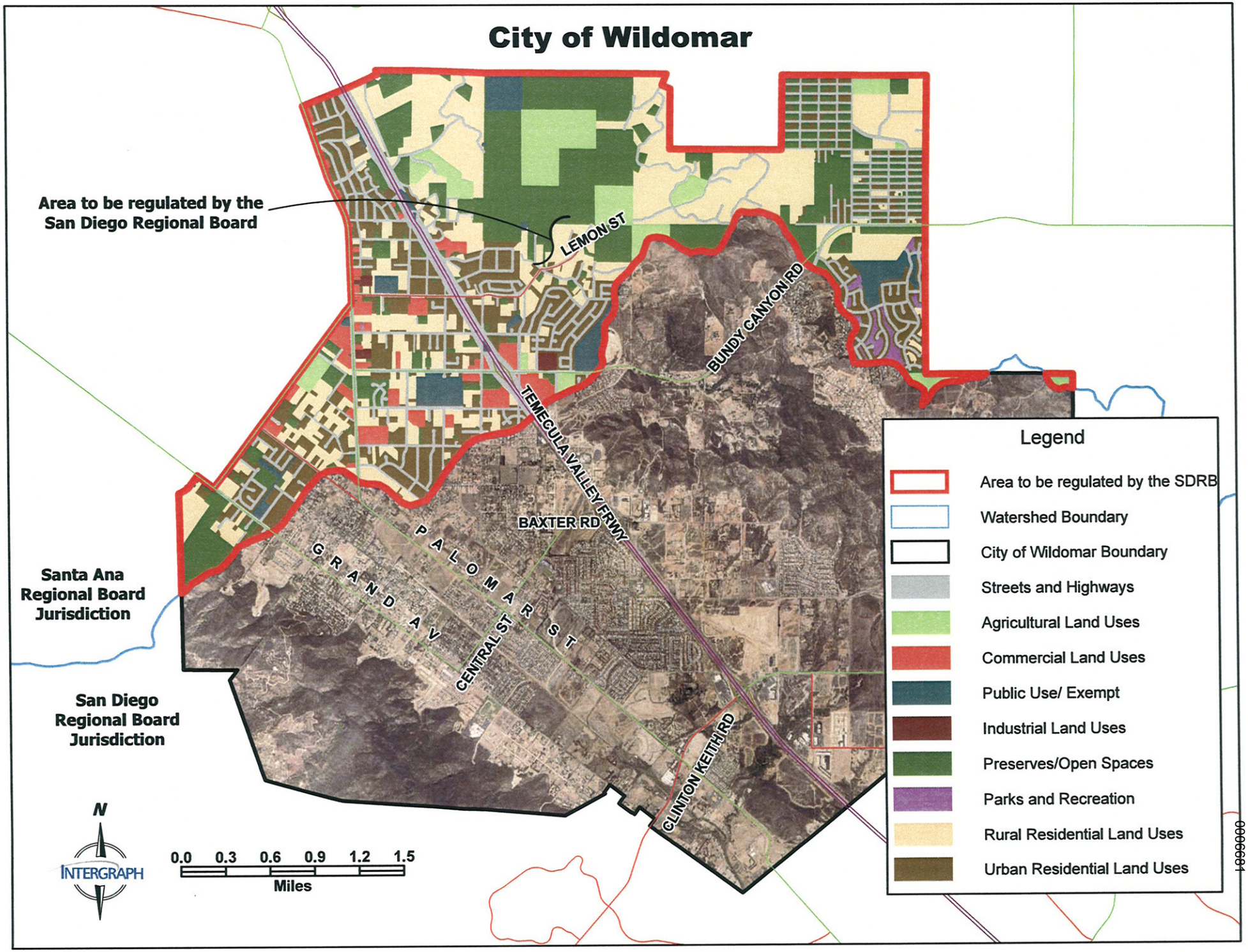

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CITY OF MURRIETA

July 20, 2010

Mr. Kurt Berchtold
Executive Officer
California Regional Water Quality
Control Board - Santa Ana Region
3737 Main Street, Suite 500
Riverside, CA 92501-3339

Mr. David W. Gibson
Executive Officer
California Regional Water Quality
Control Board – San Diego Region
9174 Sky Park Court, Suite 100
San Diego, CA 92123-4340

Dear Messrs. Berchtold and Gibson:

Re: Request for Designating the San Diego Regional Board as Regulating Discharges from MS4 owned by the City of Murrieta

The City of Murrieta is located within southwestern Riverside County, and covers an area of approximately 21,503 square miles. While the city is located primarily within the Santa Margarita Watershed and therefore is under the jurisdiction of the San Diego Regional Board, approximately 375 acres (or 1.7%) of the city extends into the Santa Ana Watershed which is under the jurisdiction of the Santa Ana Regional Board. Attached for your reference is a map of the city, overlaid with the jurisdictional boundary between the two Regional Boards. As a result of this situation, the city is subject to two Municipal Separate Storm Sewer System (MS4) Permits issued by the respective Regional Boards.

Pursuant to discussions with staff at both Regional Boards, and consistent with California Water Code section 13228, the City of Murrieta hereby requests that the Santa Ana Regional Board designate the San Diego Regional Board for regulation of all portions of the city, regardless of Regional Board jurisdictional boundaries, for matters pertaining to MS4 permitting.

The remainder of this letter contains a discussion of the basis for this request; a description of the understood limitations of this designation; a description of the additional portion of the city that, pursuant to this designation, would be regulated by the San Diego Regional Board, and any other associated requests.

1 Town Square, 24601 Jefferson Avenue • Murrieta, California 92562
phone: 951.304.CITY (2489) • fax: 951.698.4509 • web: murrieta.org

Mr. Kurt Berchtold
Santa Ana Regional Water Quality Control Board
Mr. David W. Gibson
San Diego Regional Water Quality Control Board
Re: Request for Area Exchange

Basis for the request

The City is currently a named permittee on order R8-2010-0033 issued by the Santa Ana Regional Board (Santa Ana Permit), and order R9-2004-001 with the San Diego Regional Board (San Diego Permit) - which is currently up for renewal. While having the same goal of reducing the discharge of pollutants from the MS4 system, these two orders include requirements that accomplish that goal in different ways. As a result, programs designed to be in compliance with the Santa Ana Permit are similar, but necessarily different than programs designed for compliance with the San Diego Permit. When this situation is applied within a single city, such as the City of Murrieta, having two differing programs creates significant confusion among both city staff and the public, which can lead to inefficient and inconsistent implementation of the programs and less effective protection of water quality. Additionally, and no less significant, there is a duplicative administrative and financial burden that is inherent in complying with two MS4 permits: two sets of programs have to be developed; staff have to be trained to two sets of requirements, and at differing frequencies; business inspections must inspect for and track different information, at differing frequencies; two sets of annual reports have to be created, with each report being required to include different information; etc.

The purpose of the City's request is to reduce the aforementioned complexity to allow for the more effective and focused utilization of the City's resources to the benefit of water quality.

Understood Limitations

This request by the City of Murrieta is made with the understanding that:

- For the purposes of MS4 permitting only, the San Diego Regional Board would regulate the entirety of the City of Murrieta. As a result, the City of Murrieta would be subject to a single MS4 permit, which would be issued by the San Diego Regional Board.
- Enforcement of any provisions of the MS4 permit issued to the City of Murrieta can be performed by either San Diego Regional Board or Santa Ana Regional Board however compliance will be based on the permit issued by the San Diego Regional Board.
- Any TMDLs and associated MS4 permit requirements issued by the Santa Ana Regional Board, which include the City of Murrieta as a responsible party, will be incorporated into the MS4 permit issued by the San Diego Regional Board by reference, including reference to any associated provisions, findings or elements of the fact sheet.
- Other Waste Discharge Requirements, or other Orders issued or enforced by the Santa Ana Regional Board would remain wholly under the jurisdiction of the Santa Ana Regional Board.
- One Annual Report will be prepared in accordance to the San Diego MS4 permit that includes the 375 acres that is currently in the Santa Ana watershed.

Mr. Kurt Berchtold
Santa Ana Regional Water Quality Control Board
Mr. David W. Gibson
San Diego Regional Water Quality Control Board
Re: Request for Area Exchange

Description of the area of the City subject to the designation:

Some facts about the City of Murrieta and the portion within the jurisdiction of the Santa Ana Regional Board are described below. Also enclosed with this letter is a map of the City with the subject area highlighted.

- Total Area of the City of Murrieta is 21,503 square miles.
- Area within the Santa Ana Watershed is 375 acres or 0.6 square miles.
- Percent of City of Murrieta in the Santa Ana Watershed is 1.7%.
- Top three land uses within the portion of the City of Murrieta in the Santa Ana Watershed are residential (65%), business park office (23%), and commercial (6%) (as % of area within Santa Ana Watershed)

In conclusion, the requested designation of regulatory authority to the San Diego Regional Board will not only reduce the complexity and administrative burden upon the City of Murrieta, but will allow the City to better focus and effectively utilize their available resources to the best benefit to water quality.

If you have any questions regarding this request, please contact me at 951.461.6078.

Very truly yours,

Patrick A. Thomas
Director of Public Works
City of Murrieta

Attachments: Map of the City of Murrieta

CC:
Bill Woolsey, City of Murrieta
Jason Uhley, Riverside County Flood Control

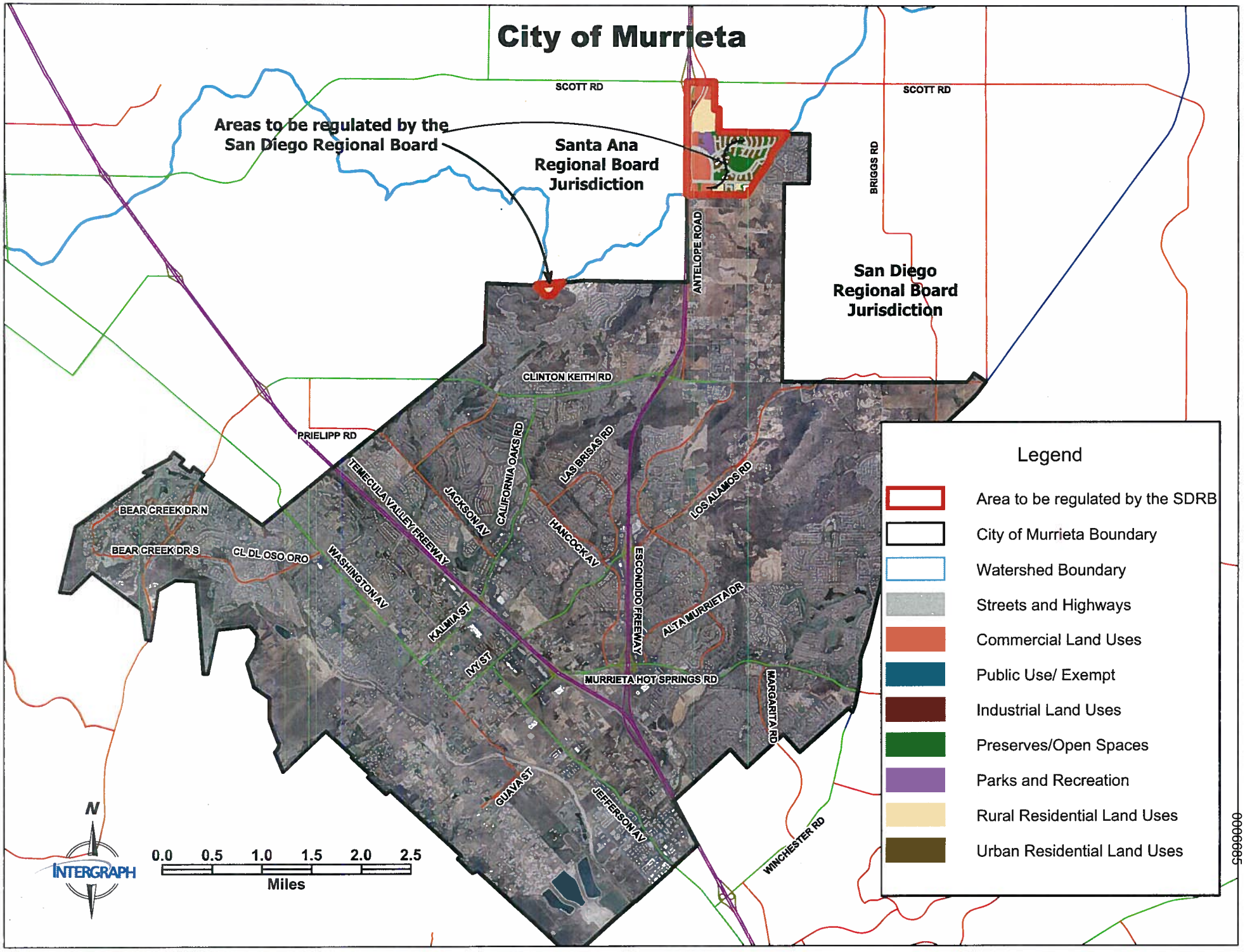
City of Murrieta
Areas to be regulated by the San Diego Regional Board
Santa Ana Regional Board Jurisdiction
San Diego Regional Board Jurisdiction
SCOTT RD
SCOTT RD
BRIGGS RD
ANTELOPE ROAD
CLINTON KEITH RD
PRIELIPP RD
TEMECULA VALLEY FREEWAY
JACKSON AV
CALIFORNIA OAKS RD
LAS BRISAS RD
HANCOCK AV
LOS ALAMOS RD
ESCONDIDO FREEWAY
ALTA MURRIETA DR
MURRIETA HOT SPRINGS RD
MARGARITA RD
WINCHESTER RD
BEAR CREEK DR N
BEAR CREEK DR S
CL DL OSO ORO
WASHINGTON AV
KALMIA ST
IVY ST
GUAVA ST
JEFFERSON AV
Legend
Area to be regulated by the SDRB
City of Murrieta Boundary
Watershed Boundary
Streets and Highways
Commercial Land Uses
Public Use/ Exempt
Industrial Land Uses
Preserves/Open Spaces
Parks and Recreation
Rural Residential Land Uses
Urban Residential Land Uses
N
INTERGRAPH
0.0 0.5 1.0 1.5 2.0 2.5
Miles

00006885

NOTICE OF PUBLIC MEETING

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN DIEGO REGION

TENTATIVE ORDER R9-2010-0016
Riverside County Municipal Storm Water Permit

The California Regional Water Quality Control Board, San Diego Region (San Diego Water Board) hereby notifies the public of its intent to consider adoption of Tentative Order No. R9-2010-0016, the Riverside County Municipal Storm Water Permit, at a public meeting scheduled for the following time and location[1]:

October 13, 2010 at 9:00 am
Rancho California Water District
District Board Room
42135 Winchester Road
Temecula, California

Tentative Order No. R9-2010-0016 (Tentative Order) will replace the current Riverside County Municipal Storm Water Permit, R9-2004-0001. The Tentative Order regulates the discharge of storm water pollutants from the municipal separate storm sewer system. Additional information may be found on the San Diego Water Board website at: http://www.waterboards.ca.gov/sandiego. As indicated in the July 23, 2010 Notice of Written Comment Period, written comments on the Tentative Order received by 5 p.m. on September 7, 2010, will be provided to the San Diego Water Board members for their consideration prior to the public hearing. Written comments received after the deadline will not be accepted and will not be incorporated into the administrative record if doing so would jeopardize any party. Interested persons are invited to attend the public hearing to provide oral comments on the Tentative Order. Written comments will not be accepted at the public hearing, but can be orally summarized.

Please contact Mr. Ben Neill at (858) 467-2952 or via e-mail at bneill@waterboards.ca.gov for information regarding the meeting or Tentative Order No. R9-2010-0016.

All documents, comments received, and other information related to the above-mentioned item are on file and may be reviewed at the San Diego Water Board office, 9174 Sky Park Court, Suite 100, San Diego, CA 92123, telephone (858) 467-2952, FAX (858) 571-6972. Review of information and files may be conducted Monday through Friday from 8 am to 5 pm. To insure that space is available we suggest that you contact our office to schedule an appointment. Or send an e-mail to File_Review@waterboards.ca.gov. Please bring the foregoing to the attention of any person known to you who would be interested in these matters.

DAVID W. GIBSON
Executive Officer

[1] If it is necessary to modify the meeting date or location, a further public notice will be issued.

Supporting Document No. 7
Item No. 5
October 13, 2010

0006687
This space is for the County Clerk's Filing Stamp

PROOF OF PUBLICATION
(2010 & 2011 C.C.P.)

STATE OF CALIFORNIA
County of San Diego

I am a citizen of the United States and a resident of the County aforesaid: I am over the age of eighteen years and not a party to or interested in the above-entitled matter. I am the principal clerk of the printer of

North County Times

Formerly known as the Blade-Citizen and The Times-Advocate and which newspapers have been adjudicated newspapers of general circulation by the Superior Court of the County of San Diego, State of California, for the City of Oceanside and the City of Escondido, Court Decree number 171349, for the County of San Diego, that the notice of which the annexed is a printed copy (set in type not smaller than nonpariel), has been published in each regular and entire issue of said newspaper and not in any supplement thereof on the following dates, to-wit:

September 09th, 2010

I certify (or declare) under penalty of perjury that the foregoing is true and correct.

Dated at **Escondido,** California

This 09th, day of September, 2010

Jane Allshouse
NORTH COUNTY TIMES
Legal Advertising

* A 0 0 0 0 0 1 8 4 8 0 4 1 *

NOTICE OF PUBLIC MEETING

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD - SAN DIEGO REGION

TENTATIVE ORDER R9-2010-0016 Riverside County Municipal Storm Water Permit

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Please contact Mr. Ben Neill at 858-467-2952 or via e-mail at bneill@waterboards.ca.gov for information regarding the meeting or Tentative Order No. R9-2010-0016.

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DAVID W. GIBSON
Executive Officer

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9/9/10
CNS-1940374#
NORTH COUNTY TIMES 2269888

Supporting Document No. 7
Item No. 5
October 13, 2010

0006688

This space for filing stamp only

THE REGISTER

625 N GRAND AVE, SANTA ANA, CA 92701
Telephone (714) 796-7000 / Fax (714) 796-6059

PROOF OF PUBLICATION

(2015.5 C.C.P.)

State of California)
County of ORANGE) ss

Notice Type: HRG - NOTICE OF HEARING

Ad Description: Riverside MS4 hearing

I am a citizen of the United States and a resident of the State of California; I am over the age of eighteen years, and not a party to or interested in the above entitled matter. I am the principal clerk of the printer and publisher of the THE REGISTER, a newspaper published in the English language in the city of SANTA ANA, county of ORANGE, and adjudged a newspaper of general circulation as defined by the laws of the State of California by the Superior Court of the County of ORANGE, State of California, under date 11/19/1905, Case No. A21046. That the notice, of which the annexed is a printed copy, has been published in each regular and entire issue of said newspaper and not in any supplement thereof on the following dates, to-wit:

09/10/2010

Executed on: 09/10/2010
At SANTA ANA, California

I certify (or declare) under penalty of perjury that the foregoing is true and correct.

Julie Trammell
Signature

* A 0 0 0 0 0 1 8 3 3 8 0 3 *

CNS#: 1940377

NOTICE OF PUBLIC MEETING

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD - SAN DIEGO REGION

TENTATIVE ORDER R9-2010-0016 Riverside County Municipal Storm Water Permit

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DAVID W. GIBSON
Executive Officer

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9/10/10
CNS-1940377#
THE REGISTER

The San Diego Union-Tribune. SIGN ON SAN DIEGO enlace. Classifieds

P.O. Box 120191, San Diego, CA 92112-0191

AFFIDAVIT OF PUBLICATION

CALIFORNIA NEWSPAPER SERVICE
P.O. BOX 60460
LOS ANGELES, CA 90060

STATE OF CALIFORNIA} ss.
County of San Diego}

The Undersigned, declares under penalty of perjury under the laws of the State of California: That she is a resident of the County of San Diego. That she is and at all times herein mentioned was a citizen of the United States, over the age of twenty-one years, and that she is not a party to, nor interested in the above entitled matter; that she is Chief Clerk for the publisher of

SignonMobile/The San Diego Union-Tribune

a newspaper of general circulation , printed and published daily in the City of San Diego, County of San Diego, and which newspaper is published for the dissemination of local news and intelligence of a general character, and which newspaper at all the times herein mentioned had and still has a bona fide subscription list of paying subscribers, and which newspaper has been established, printed and published at regular intervals in the said City of San Diego, County of San Diego, for a period exceeding one year next preceding the date of publication of the notice hereinafter referred to, and which newspaper is not devoted to nor published for the interests, entertainment or instruction of a particular class, profession, trade, calling, race, or denomination, or any number of same; that the notice of which the annexed is a printed copy, has been published in said newspaper in accordance with the instructions of the person(s) requesting publication, and not in any supplement thereof on the following dates, to wit:

Sep 8, 2010

Emily Flenn

Chief Clerk for the Publisher

9/13/10

Date

Affidavit of Publication of

Legal Advertisement
Ad # 0010427787
ORDERED BY: IRENE AND JACKY

* A 0 0 0 0 0 1 8 5 7 5 0 8 *

NOTICE OF PUBLIC MEETING

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD - SAN DIEGO REGION

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DAVID W. GIBSON
Executive Officer

(1) If it is necessary to modify the meeting date or location, a further public notice will be issued.
9/8/10
CNS-1940376#

Supporting Document No. 7
Item No. 5
October 13, 2010

0006690

THE PRESS-ENTERPRISE

3450 Fourteenth Street
Riverside CA 92501-3878
951-684-1200
951-368-9018 FAX

PROOF OF PUBLICATION
(2010, 2015.5 C.C.P.)

Press-Enterprise

PROOF OF PUBLICATION OF

Ad Desc.: PUBLIC MEETING / 1940375

I am a citizen of the United States. I am over the age of eighteen years and not a party to or interested in the above entitled matter. I am an authorized representative of THE PRESS-ENTERPRISE, a newspaper of general circulation, printed and published daily in the County of Riverside, and which newspaper has been adjudicated a newspaper of general circulation by the Superior Court of the County of Riverside, State of California, under date of April 25, 1952, Case Number 54446, under date of March 29, 1957, Case Number 65673 and under date of August 25, 1995, Case Number 267864; that the notice, of which the annexed is a printed copy, has been published in said newspaper in accordance with the instructions of the person(s) requesting publication, and not in any supplement thereof on the following dates, to wit:

09-08-10

I Certify (or declare) under penalty of perjury that the foregoing is true and correct.

Date: Sep. 8, 2010
At: Riverside, California

Natalie Mea

CALIF NEWSPAPER SERV BUREAU

PO BOX 60460
LOS ANGELES CA 90060

Ad #: 10387721

PO #: 1940375

Agency #: _____

Ad Copy:

NOTICE OF PUBLIC MEETING
CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD - SAN DIEGO REGION
TENTATIVE ORDER R9-2010-0016
Riverside County Municipal Storm Water Permit

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DAVID W. GIBSON
Executive Officer

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9/8/10
CNS-1940375#
THE PRESS ENTERPRISE

A000001848001

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD, SAN DIEGO REGION

Draft Response to Comments

On Tentative Order No. R9-2010-0016
October 13, 2010

A. Background

This document provides responses to the written comments received on the draft permit for reissuance of NPDES Waste Discharge Requirements for Discharges from the Municipal Separate Storm Sewer Systems (MS4s) draining the County of Riverside, the Incorporated Cities of Riverside County, and the Riverside County Flood Control and Water Conservation District within the San Diego Region (Tentative Order No. R9-2010-0016, NPDES Permit No. CAS0108766).

The Tentative Order was distributed on July 23, 2010. This document summarizes and responds to written comments received between July 23, 2010 and September 7, 2010 on the Tentative Order. Interested parties had a full 45-days to review the Tentative Order prior to the deadline for submission of written comments that would be responded to in writing prior to the October Hearing on the Tentative Order.

B. Contents of This Document

Thirteen interested parties submitted comments on the Tentative Order. This resulted in the submission of over 350 comments. Comments came from the public, MS4 Copermittees, governmental and non-governmental organizations, United States Marine Corps Camp Pendleton and one business coalition. The San Diego Water Board reviewed and considered every written comment received. Responses to specific comments are provided within this document. Each specific comment has been assigned a comment number, and comments are generally grouped by commenter. A legend for commenters can be found in Table 1(below). For the reader's information, Table 2 provides an accounting of the comments by subject.

Comments received were concerned with a variety of topics in the Tentative Order. Consideration of written comments has resulted in proposed revisions to the requirements in the Tentative Order and can be found in the Draft Updates and Errata Sheet. In this response to comments, the comments have not been summarized or paraphrased. When comments received from one commenter were similar to other comments received, the California Regional Water Quality Control Board, San Diego Region's (San Diego Water Board) response usually references back to a previous comment number in order to minimize redundancy. Please note that due to limitations of the comment database system employed to handle these numerous comments, some formatting from the original comment has been lost and typographical errors may be present due to optical character recognition transfer. Readers are recommended to review the comments as submitted in their original format to fully appreciate the commenter's sentiments. The original comment letters can be found as Supporting Document 8.

C. Order Adoption

The San Diego Water Board is scheduled to consider adoption of the Tentative Order on October 13, 2010.

Table 1. Commenter Legend.

Commenter	Commenter Number	# of Comments
Tressa Coco, Riverside County resident	1	1
Natural Resources Defense Counsel	2	6
City of Murrieta	3	2
Riverside County Flood Control & Water Conservation District	4	244
City of Temecula	5	17
United States Army Corps of Engineers	6	1
United States Environmental Protection Agency	7	10
City of Wildomar	8	7
City of San Diego	9	43
San Diego Bay Council	10	15
United States Marine Corps Base Camp Pendleton	11	2
Construction Industry Coalition on Water Quality	12	2
County of Riverside Transportation Department	13	4

Table 2. Comment Subjects

Comment Subject	Number of Comments
Action Levels	27
Commercial / Industrial	9
Construction	8
Discharge Prohibitions	5
Economic	24
Finding	15
General	32
Hydromodification	14
IDDE	9
Legal	50
Low Impact Development	19
Monitoring	49
Municipal	13
New Development	16
Overirrigation	17
Reporting	3
Retrofit	12
Total Maximum Daily Load	1
Unpaved Roads	29
Watershed Workplan	3

Draft Response to Comments on R9-2010-0016
As of September 29, 2010

Comment # 1 **Commentor** 1 **Comment Subject** Unpaved Roads

Specific Comment

I have now found that the new requirements for Copermittees include a draft for "Unpaved Roads Construction and Maintenance" that spells out "sediment control measures during construction and maintenance activities on unpaved roads, including developing and implementing appropriate training and technical assistance resources". This has given me new hope that these hills have a chance of being returned to the once beautiful land that I loved so many years ago. Is it possible that this new order can require help from the County to solve the erosion problems in Rancho Glenoaks, as well as others in the same situation as I? I truly hope it can happen. The County and environmental agencies need to take responsibility.

Comment Response

Through several investigations and complaints during the previous permit period, unpaved roads were identified as significant sources of water quality pollutants, namely sediment, within Riverside County. The proposed Tentative Order can help solve erosion problems from unpaved roads throughout the watershed. The Tentative Order's provisions address the unpaved roads as a source of pollution during design, construction and ongoing maintenance phases. Rancho Glenoaks, however, is a private road, and as a result of comments received from the Copermittees, the Tentative Order has been revised to remove requirements for private roads. Please see the errata sheet for exact language changes.

Comment # 2 **Commentor** 2 **Comment Subject** LID

Specific Comment

First, this section erroneously states that where infiltration BMPs alone are technically infeasible, other LID BMPs may be employed to treat the volume of runoff not retained onsite. This language improperly excludes any requirement that a site first use all LID practices that retain water onsite—including those other than infiltration such as evapotranspiration or capture and onsite reuse—to meet the design capture requirement where feasible, even where infiltration may not be. A Priority Development Project should not be permitted to participate in the Permit's offsite mitigation program or to employ other means of addressing the design capture volume where LID based options for the onsite retention of stormwater are available. The Permit's language in section F.1.d.(4)(c) must therefore reflect that a finding of infeasibility may only be made where use of any and all LID practices that retain water onsite, including evapotranspiration and capture, is infeasible.

Comment Response

The San Diego Water Board agrees with the comment and has made the suggested changes in the errata to the Tentative Order. With the changes, the Tentative Order is consistent with the adopted South Orange County MS4 permit and the Ventura County MS4 permit.

Comment # 3 **Commentor** 2 **Comment Subject** LID

Specific Comment

Second, this section would allow for measures that do not retain water onsite, described by the Permit as "other LID BMPs," to count toward the design capture requirement. Practices that allow for the discharge of any volume of stormwater to receiving waters would have to be 100% effective at removing pollutants—a condition almost certain not to be attained—in order to provide the equivalent water quality benefit derived from retaining the same volume of stormwater onsite. The Permit should be revised such that it clearly states that only water retained onsite may count towards the design capture requirement and that a site using BMPs that allow for offsite discharge must participate in the LID Waiver Program to address the volume not retained onsite.

Comment Response

Please see the response to comment 12. Other LID BMPs that allow for the discharge of any volume of the design storm event must achieve equivalent volume and pollutant load reduction.

Comment # 4 **Commentor** 2 **Comment Subject** LID

Specific Comment

Of particular concern in this regard is that the Permit does not define the term "LID BMPs." As a result, the Permit would allow virtually any practice, potentially including conventional stormwater management techniques, which have been demonstrated to be far less effective at removing pollutants than LID-based retention practices, to count toward meeting the Permit's design capture requirement. While we argue here that practices that do not retain stormwater onsite, such as biofiltration, should not count towards the onsite retention standard at all, should the Board determine to allow the use of such practices, it should clearly define the term "LID BMPs," or more appropriately, delete the phrase and explicitly state which practices may be used. The Board should additionally ensure that conventional or structural treatment practices that are not LID based may not count toward the Permit's LID requirements.

Comment Response

Comment noted. A definition of LID BMPs has been provided in the errata for Attachment C.

Comment # 5 **Commentor** 2 **Comment Subject** LID

Specific Comment

Further troubling is that, in allowing "LID BMPs" to count toward the design capture requirement, the Permit includes no performance requirements or metrics, and requires only that "other LID BMPs [shall be] sized to hold the design storm volume that is not infiltrated," or that "LID BMPs must be designed for an appropriate surface loading rate to prevent erosion, scour and channeling within the BMP." Permit at ¶ F.1.d.(4)(c)(ii). The Permit should be revised to require that, in addition to the above standard, any practices that allow for the discharge of stormwater in-lieu of onsite retention must, at a minimum, reduce the pollutant load in such discharge to equivalent levels as would be achieved through use of onsite retention. The Board should further ensure that discharges resulting from other BMPs not contribute to erosion or other volume based impacts to receiving waters, as opposed to impacts only within the BMP. Given that practices that do not incorporate onsite retention have been shown to be less effective at reducing pollution in stormwater runoff, we suggest that biofiltration or other practices allowing for discharge of runoff may be allowed, if at all, only if accompanied by a "multiplier" or "mitigation factor," requiring treatment of between 1.5 to 2.0 times the volume required to be treated through onsite retention.

Comment Response

Please see the response to comment 12. The Tentative Order does not include a multiplier or mitigation for LID BMPs that do not incorporate onsite retention due to the requirement that such practices must achieve equivalent pollutant load reduction as retention BMPs.

Comment # 6 **Commentor** 2 **Comment Subject** LID

Specific Comment

The Permit requires that the "LID waiver program must clearly exhibit that it will not allow Priority Development Projects to result in a net impact (after consideration of any mitigation) from pollutant loadings over and above the impact caused by projects meeting LID requirements." Permit at ¶ F.1.d.(7)(a). While we support the use of a performance requirement for waiver projects in general, we note that as currently drafted, the Permit allows for its "LID Requirements" to be met through use of unspecified "LID BMPs" with no express performance requirement or standard. We suggest, in order to ensure that any alternative or in-lieu program adequately protects surface waters in Riverside County, that the Permit language be changed to state that Priority Development Projects shall not result in a net impact "from pollutant loadings over and above the impact caused by projects meeting the onsite LID retention requirements." This requirement would tie use of alternative or in-lieu programs specifically to achieving equivalent benefits to onsite retention, and remove any confusion over what standard of performance is required under this provision of the Permit.

Comment Response

Comment noted, meeting the onsite LID retention requirement is the San Diego Water Board's intent. Clarifying language has been included in the errata. Please also see the responses to comments 76 and 78.

Comment # 7 **Commentor** 2 **Comment Subject** LID

Specific Comment

Further, the Permit's inclusion of a provision allowing for a LID waiver program to authorize implementation of either "an off-site mitigation project," or "other mitigation developed by the Copermittees" should be clarified to require that any such project or mitigation measure must incorporate practices that result in the onsite retention of stormwater runoff equivalent to the volume not retained onsite by the Priority Development Project.

Such a move could help to ensure compliance with the Clean Water Act, would protect Riverside County's aquatic resources, and would further serve important policy goals of the State. Given our current state of drought, Governor Schwarzenegger has issued a proclamation calling on water agencies to take additional actions to protect and enhance water supplies. By requiring offsite mitigation through practices that retain stormwater runoff, captured or infiltrated water could be used to increase water supplies through onsite use or recharging groundwater, in furtherance of this goal. In contrast, the draft Permit would currently allow most or all of that water to be discharged through use of biofiltration or "other LID BMPs," without any volume retained to increase water supplies.

Comment Response

The San Diego Water Board disagrees with the proposed change. Limiting the LID waiver program to projects that provide equivalent retention of runoff only would limit the potential for other equally environmentally beneficial mitigation projects such as creek restoration or stream daylighting.

Comment # 8	**Commentor** 3	**Comment Subject** Economic

Specific Comment

RWQCB staff has expressed their opinion that the Cities are able to create new fees or tax assessments to pay for the requirements they have placed in the proposed MS4 permit. We strongly disagree with this assertion. Fees can only be collected from new development if there is a nexus to offset impacts created by development. There is simply no mechanism to impose a new fee or assessment on existing development to fund the storm water program. Furthermore, due to Proposition 218, any tax or fee increase must be approved by the voters.

Comment Response

The San Diego Water Board is aware of the challenges with developing new fees and/or tax assessments to fund storm water programs. These challenges are not limited to the City of Murrieta or the other Riverside County Copermittees. The Copermittees appear to be relying primarily on sales and property tax revenues and developer fees to fund their storm water programs. These sources of funding, unfortunately, can fluctuate significantly from year to year.

If the Copermittees choose to fund their storm water programs solely through revenues generated by sales and property taxes and developer fees, then they must be able to plan and prepare for times when those revenues decrease by setting aside funds when there are significant increases in revenue, such as during the intense and significant growth period experienced by the area between 2003 and 2008. Unfortunately, the Copermittees did not do the planning and preparation for this eventuality.

The Copermittees appear to dismiss the possibility of developing fees to fund their storm water program before attempting to do so, and the City only cites a case of failure rather than looking for and trying to emulate cases of success. While “imposing” new fees by edict may not be possible, developing and informing the residents that new fees for water quality protection are necessary is possible and probable. Several municipalities throughout California have been successful in developing new fees that are dedicated for funding their storm water programs, which are associated with sources that can cause and/or convey pollutants to and from the MS4. For example, the City of Poway assesses a storm water fee as part of their trash collection service, because trash generation can be a good indication of potential for storm water pollution. The City of Brea was successful in developing an “urban run-off” fee rate that is based on the type of development and associated with maintaining their storm sewer system. The City of San Diego includes a storm drain fee as part of their water and sanitary sewer services to pay for the cleaning, repair, and maintenance of the City's storm drain system. These types of fees are typically more sustainable than relying on general funds from sales and property tax revenue, which can fluctuate significantly from year to year. The San Diego Water Board encourages the Copermittees to explore other sources of revenue to fund their storm water programs instead of relying on property and sales taxes and developer fees.

In addition, several guidances are available for municipalities to assist in developing sustainable funding sources for their storm water programs such as USEPA's "Funding Stormwater Programs" (EPA 833-F-07-012), the National Association of Flood and Stormwater Management Agencies "Guidance for Municipal Stormwater Funding," Natural Resources Defense Council "Stormwater Strategies: Community Responses to Runoff Pollution, Chapter 4: Funding and Gaining Support for Stormwater Programs," and USEPA Watershed Academy "Catalog of Federal Funding Sources for Watershed Protection." These guidances describe storm water funding alternatives to property taxes, sales tax and general fund revenues such as service fees, stormwater utilities, special assessment districts, system development charges, grants, low-interest loans, and environmental tax shifting.

Comment # 9 **Commentor** 3 **Comment Subject** Economic

Specific Comment

Due to the historic decrease in property tax and sales tax revenues, the primary funding mechanism for the City to implement programs, it is unlikely we would be able to comply with the proposed MS4 permit. In order to do so, the City would have to make budget cuts to other programs. Considering we have already considerably cut our budget two years in a row, implemented layoffs and furloughs, and put other cost savings measures into practice, a further decrease to critical city services to fund the additional requirements is impractical. Of greatest concern to the City is that the proposed MS4 permit does not take the current economic climate into consideration, and yet has more costly and stringent requirements than other permits throughout the region that are more suitable to fund such programs. In our opinion, this seems inequitable and unfair.

The City of Murrieta joins the vast majority of Californians in supporting a balanced, cost-effective strategy to guarantee clean water. However, we remain concerned that the MS4 permit will impose additional costs on the City that we cannot afford at this time. Additionally, it seems the new regulations are inequitable compared to other regions. Therefore, the City is opposed to the proposed permit in its current form. Increasing the cost to the public on a region that is one of the hardest hit during this economic crisis seems excessive. Instead, the City would be more supportive of efforts that would phase in requirements once revenue levels can support the additional costs. Moreover, we request that the Board direct their staff to prioritize what permit requirements are necessary to address the most critical issues that will give the most efficient use of available funds. This will allow the City to allocate the funds they have for these programs while not increasing current expenditures.

Comment Response

The San Diego Water Board considers protection of water quality to be a "critical city service," especially when this water provides a potable drinking water source to USMC Camp Pendleton. The San Diego Water Board has taken the current economic climate into consideration along with the economic information provided by the Copermittees. We disagree that Tentative Order is more costly and stringent than other permits in the region.

As discussed in the response to comment 8, if the Copermittees choose to fund their storm water programs solely through revenues generated by sales and property taxes and developer fees, then they must be able to plan and prepare for times when those revenues decrease by setting aside funds when there are significant increases in revenue.

Between 2000 and 2008, the population of the portion of Riverside County in the San Diego Region grew from approximately 150,000 to over 250,000, at least a 65 percent increase. During that time, there was a significant growth in sales and property tax revenue and developer fees generated. That time period also was an opportune time for the Copermittees to develop, propose, and implement new and sustainable fees to fund their storm water programs, which municipalities in other parts of the region were successfully able to achieve.

The Copermittees have been well aware of the new and enhanced MS4 Permit requirements that were adopted for San Diego County in 2007, which were being developed in 2006, and similar requirements that were adopted for Orange County in 2009, which were being developed between 2007 and 2009. The Riverside County Copermittees had approximately 4 years to plan and prepare for the requirements that are now in the Tentative Order. Unfortunately, rather than planning and preparing for the new requirements that were likely to be included in the new Riverside County MS4 Permit, the Copermittees chose to continue doing the minimum that was required in their current permit, and less than what was required in some situations. The Copermittees also chose to continue funding their storm water programs primarily through sales and property tax revenues and developer fees, rather than trying to develop dedicated and more sustainable storm water fees.

The San Diego Water Board, however, has been sensitive to the current economic hardships that are being experienced by the Riverside County Copermittees. Between March and July 2010, we met with the Copermittees over a dozen times and modified the permit requirements and schedules for implementation to phase in the requirements with these economic concerns in mind. Many of the modifications were made because the Copermittees requested the changes. Many of the modifications to the implementation schedule that were agreed upon during those meetings between the Copermittees and the San Diego Water Board were also based on prioritizing the permit requirements to address the most critical issues. The Tentative Order provides the Riverside County Copermittees more time than the San Diego County and Orange County Copermittees to develop and implement several elements of the permit, as well as reducing the potential development costs for those elements.

Comment # 10 **Commentor** 6 **Comment Subject** General

Specific Comment

Thank you for the opportunity to comment on the San Diego Region - Riverside County Storm Water Permit. As you are aware, the U.S. Army Corps of Engineers has been developing a Special Area Management Plan (SAMP) for the San Jacinto and Santa Margarita Watersheds. There is direct overlap between the Santa Margarita portion of the SAMP and the San Diego Region - Riverside County Storm Water Permit.

The language proposed in the permit and the actions and studies proposed would complement the work being done for the SAMP. Ideally, the regulatory processing and permitting for the State and Federal agencies would be aligned and streamlined for the cities and County within this area. We remain committed to working with the Regional Water Quality Control Board (Board) and the jurisdictions to bring this idea to fruition.

Within the permit itself, the Watershed Water Quality work plan and the Jurisdictional Runoff Management Program are of particular interest. Unfortunately due to time constraints, we are not able to do a thorough review and comparison of the language at this time, but would like to work with the Board and the affected jurisdictions to streamline permitting and improved the water quality in the watershed.

The studies mentioned in the permit appear to have great value, and we would encourage the jurisdictions to complete them and applaud the Board for including them in the permit. Although all the studies mentioned in the permit are worthwhile, we draw particular interest to and support the inclusion of the MS4 and Receiving Water Maintenance Study and the Intermittent and the Ephemeral Stream Perennial Conversion Study in the final permit.

There are many additional comments that could be made regarding the permit; however, due to staffing and time limitations, these comments are abbreviated and limited. We would like to dedicate time in the near future to work with your staff and the jurisdictions in supporting actions to comply with the Clean Water Act and provide clean water to all of our communities.

Comment Response

Comment noted.

Comment # 11 **Commentor** 7 **Comment Subject** LID

Specific Comment

As you know, Region 9 has been working with Regional Boards throughout the State over the last several years in an effort to develop clear, measurable and enforceable requirements for MS4 permits. We have focused most of our attention on requirements related to low impact development (LID) and TMDL implementation, given the potential environmental benefits to be derived from these particular components of the stormwater permit program. Since there are no approved wasteload allocations applicable to the Riverside County MS4 discharges at this time, the following comments focus on LID requirements, but also address several other issues as well. However, with regards to TMDLs, section I of the draft permit would incorporate applicable requirements of future TMDLs when fully approved, and we support this provision.

Comment Response

Comment noted.

Comment # 12 **Commentor** 7 **Comment Subject** LID

Specific Comment

We recommend section F.1.d.(4)(c)(ii) ofthe draft permit (page 33) be revised as follows:

"If onsite [infiltration] retention LID BMPs are technically infeasible per section F .1.d.(7)(b), other LID BMPs may treat any volume that is not retained onsite provided that the other LID BMPs are sized to achieve equivalent stormwater volume and pollutant load reduction as if the entire design capture volume were retained onsite [to hold the design storm volume that is not infiltrated]."

The proposed language in the draft Riverside County MS4 permit (which only mentions infiltration as an LID BMP) is inconsistent with the analogous section in the adopted South Orange County MS4 permit, and would not require a consideration of LID measures such as evapotranspiration, or capture and reuse of stormwater in determining the feasibility of the permit's onsite retention requirement in section F.l.d.(7)(a). The revised approach we've suggested here is derived from the requirements of the Ventura County MS4 permit (section E.III.l.b) adopted by the Los Angeles Regional Board in July 2010, and we believe it is more consistent with the intent of LID for stormwater, i.e., retention of storm water onsite, and section F.l.d.(7)(a) of the draft permit.

Comment Response

The San Diego Water Board agrees with the comment and has made the suggested changes in the errata to the Tentative Order. With the changes, the Tentative Order is consistent with the adopted South Orange County MS4 permit and the Ventura County MS4 permit. The consistent requirements will be easier for the regulated building industry to comply with and understand.

Comment # 13 **Commentor** 7 **Comment Subject** LID

Specific Comment

Further, although the draft permit includes a rough definition of "LID" in Attachment C-2, the permit is still not entirely clear concerning what is intended by the term "LID BMPs." We suggest additional descriptive information such as the following (also derived from the Ventura County MS4 permit) be added to Finding 2.c (page 9) or the definitions section of the draft Riverside County permit:

"LID site design BMPs, utilizing infiltration, storage for reuse, evapotranspiration, or biofiltration/bioretention help preserve and restore the natural hydrologic cycle of the site, [allovving for filtration and infiltration] which can greatly reduce the volume, peak flow rate, velocity, and pollutant loads of storm water runoff."

Comment Response

The San Diego Water Board agrees with the comment and has made changes in the errata to Attachment C of Tentative Order. A definition of LID BMPs has been added to the errata for Attachment C of the Tentative Order. LID BMPs may be retention or flow through. The Tentative Order allows for both types, but emphasizes retention.

Comment # 14 **Commentor** 7 **Comment Subject** Action Levels

Specific Comment

We understand that concerns have been raised regarding the proposed numeric action levels for non-stormwater dry weather discharges (section C of the draft Riverside County MS4 permit). However, we would point out that these requirements are consistent with requirements adopted by the SDRB in December 2009 for the MS4 permit for South Orange County. Such requirements are also consistent with our efforts
to ensure MS4 permit requirements are more measurable and enforceable, and we would encourage the SDRB to retain the proposed requirements in the final Riverside County MS4 permit.

Comment Response

Comment noted.

Comment # 15 **Commentor** 7 **Comment Subject** Overirrigation

Specific Comment

We also understand that concerns have been raised regarding the deletion of landscape irrigation, irrigation water, and lawn watering from the list of non-stormwater discharges which are not necessarily prohibited by the permit (section B.2). We previously supported this same revision in a letter to the SDRB dated June 18, 2009 commenting on the draft South Orange County MS4 permit; we support the revision in the Riverside County MS4 permit as well. In our previous letter, we noted that the fact sheet for the Orange County MS4 permit had identified these categories of discharges as significant sources of pollutants, and as such, it would be appropriate for the SDRB to remove these discharges from the list of non-prohibited non-stormwater discharges in the Orange County MS4 permit. The fact sheet for the draft Riverside County MS4 permit includes similar information on the discharges, and we believe removal of the discharges from the list of non-prohibited discharges would be appropriate in both counties.

Comment Response

Comment noted.

Comment # 16 **Commentor** 7 **Comment Subject** Action Levels

Specific Comment

In a previous letter to the SDRB dated September 28,2009, we supported the SALs proposed for the South Orange County MS4 permit; we noted the proposed requirements would help clarify the term "maximum extent practicable" (MEP), and would be consistent with our goal of including more measurable and enforceable requirements in MS4 permits. The proposed SAL requirements in the Riverside County MS4 permit are consistent with requirements for South Orange County, and for the same reasons noted in the case of South Orange County, we would also support the proposed requirements for the Riverside County MS4 permit.

Comment Response

Comment noted.

Comment # 17 **Commentor** 7 **Comment Subject** Retrofit

Specific Comment

As you know, EPA is considering requirements for retrofitting BMPs into existing developments as one of the key components of national stormwater rulemaking currently underway to improve the stormwater program (74 FR 68621, December 28,2009). We note that the proposed retrofitting requirements for Riverside County are very similar to the requirements of the MS4 permit adopted by the SDRB in December 2009 for South Orange County. Given the potential environmental benefits of retrofitting in reducing pollutant discharges in stormwater runoff, we strongly encourage the SDRB to retain the proposed requirements in the final Riverside County MS4 permit.

Comment Response

Comment noted.

Comment # 18 **Commentor** 7 **Comment Subject** Hydromod

Specific Comment

We have reviewed the proposed requirements related to hydromodification in the draft Riverside County MS4 permit (section F.1.h), and we would encourage the SDRB to retain these requirements in the final permit. The proposed requirements in the Riverside County permit are similar to requirements in other recently-adopted Southern California MS4 permits, and the requirements will further the objectives of the LID provisions in the permit.

Comment Response

Comment noted.

Comment # 19 **Commentor** 7 **Comment Subject** Unpaved Roads

Specific Comment

We understand that concerns have been raised regarding the new requirements in the draft Riverside County MS4 permit to implement additional controls for stormwater discharges from unpaved roads (sections F.Li, F.3.a.l and F.3.c.5 of the permit). We believe the new requirements are fully supported by the fact sheet and the Findings for the permit (Finding D.1.c), which identify the discharges as a significant source of pollutants. As such, we urge the SDRD to retain the proposed requirements in the final permit. Lastly, we would note the proposed requirements are similar to requirements in the Municipal Regional Permit for MS4s in the San Francisco Bay Area adopted in 2009 by the San Franc.isco Bay Regional Board.

Comment Response

Comment noted. The Copermittees have brought up concerns addressing the regulation of privately owned and maintained unpaved roads; therefore those regulations have been removed. Please see the errata sheet for exact language changes.

Comment # 20 **Commentor** 7 **Comment Subject** Monitoring

Specific Comment

We understand that concerns have been raised about the monitoring requirements of the draft Riverside County MS4 permit (Attachment E to the permit). However, the proposed requirements are consistent with the requirements of other recent MS4 permits adopted by the SDRB such as the 2009 South Orange County MS4 permit. We strongly encourage the SDRB to retain the requirements in the final permit. Measuring the effectiveness of the stormwater program continues to be a challenge and thus, is an important priority for EPA; we believe the proposed monitoring details and requirements will improve permittee and Regional Board's ability to measure program effectiveness.

Comment Response

Comment noted.

Comment # 21 **Commentor** 9 **Comment Subject** Finding

Specific Comment

Make findings consistent with JRMP.

Provide separate sections for Construction vs. Existing Development.

Comment Response

The recommendation is appreciated, but not necessary. No changes were made based on this comment.

Comment # 22 **Commentor** 9 **Comment Subject** Finding

Specific Comment

Definition of "urban stream" contradicts 40CFR 122.

Provide clearer definition as to what an "urban stream" is.

Comment Response

The San Diego Water Board disagrees that the definition of "urban stream" contradicts 40CFR 122. An MS4 is defined in the federal regulations as a conveyance or system of conveyances owned or operated by a Copermittee, and designed or used for collecting or conveying runoff. Therefore, the San Diego Water Board considers natural drainages that are used by the Copermittees as conveyances of runoff, as both part of the MS4 and as receiving waters. Please see the Fact Sheet discussion on Finding D.3.c.

The State Water Board supports this approach. In reviewing a Petition on Order No. R9-2001-0001, the State Water Board stated "We also agree with the Regional Water Board's concern, as stated in its response, that there may be instances where MS4s use 'waters of the United States as part of their sewer system […]" State Water Resources Control Board Order WQ 2001-15.

The Rapanos decision further supports the conclusion that urban streams can be both receiving waters and MS4s by confirming that ephemeral and intermittent streams can be waters of the U.S. subject to regulation under CWA Section 404 and also be considered point sources of pollution discharges regulated under CWA Section 402. (See discussion in Section V of the Opinion of Justice Scalia and Section A (p.14) of the Concurring Opinion of Justice Kennedy.) No changes were made based on this comment.

Comment # 23 **Commentor** 9 **Comment Subject** Discharge Prohibitions

Specific Comment

Discharge category found to be a source of pollutants requires implementation of appropriate control measures to prevent the discharge of pollutants to the MS4.

Should state: Implement appropriate control measures to reduce the discharge of pollutants to the MEP.

Comment Response

The commenter cited the text incorrectly. Section B.2 states, "For a discharge category determined to be a source of pollutants, the Copermittee, under direction of the San Diego Water Board, must either prohibit the discharge category or develop and implement appropriate control measures for non-anthropogenic sources to prevent the discharge of pollutants to the MS4 ..."

MEP does not apply to non-storm water discharges. The Clean Water Act specifically makes a clear distinction between the regulation of storm water and non-storm water discharges by effectively prohibiting non-storm water discharges from entering the MS4. Since non-storm water discharges are to be effectively prohibited, then clearly the very next requirement (402(p)(3)(B)(iii) that requires polluant discharges from the MS4 be reduced to the MEP) intends that the discharge of pollutants only apply to storm water. Please see the Fact Sheet discussion for Finding C.14 for further clarification. No changes were made based on this comment.

Comment # 24 **Commentor** 9 **Comment Subject** Discharge Prohibitions

Specific Comment

Discharges into MS4 require authorization from owner and operator of the MS4 system, specifically for uncontaminated pumped ground water, foundation drains, and water from crawl space pumps

Support change, and recommend that dischargers are required to obtain authorization prior to the commencement of the discharge.

Comment Response

The San Diego Water Board appreciates the support of the commenter. The commenter incorrectly cites the footnote as Footnote 8. The correct footnote, Footnote 5, clearly states "Discharges into the MS4 require authorization from the owner and operator of the MS4 system." Please note this is a requirement for enrollees under the referenced NPDES permit (R9-2008-0002)

Comment # 25 **Commentor** 9 **Comment Subject** Discharge Prohibitions

Specific Comment

States that building fire suppression system maintenance discharges contain waste and must be prohibited.

Not clear what waste the discharges contain and the basis for prohibiting it.

Comment Response

The San Diego Water Board is concerned with non-storm water discharges associated with building fire suppression system maintenance and testing. The San Diego Water Board has found that such activities do not qualify as fire fighting flows as the activities are strictly maintenance in purpose. While building fire suppression systems lines may be filled with potable water, the systems are not utilized until: a) a fire occurs and triggers the system, or b) the system undergoes required maintenance. The San Diego Water Board has found that water within the lines may contain metals that that may be a significant source of pollutants upon discharge. Furthermore, many of these discharges occur to MS4s, which discharge to receiving waters 303(d) listed for toxicity under the 2008 CWA Section 303(d) List. As such, these non-storm water discharges are no longer exempted from prohibition. The exemption from prohibition for water line flushing does not apply to building fire suppression system maintenance.

Comment # 26 **Commentor** 9 **Comment Subject** Discharge Prohibitions

Specific Comment

Must identify and control any non-prohibited discharge that creates water quality problems.

Should define what is meant by control the discharge.

Comment Response

The commenter cited the text incorrectly. Section B.4 states, "Follow-up investigations must be conducted to identify and control, pursuant to section B.2, any non-prohibited discharge category(ies) listed above." Please see the response to comment 23 or section B.2 of the Tentative Order for what is meant by "control." No changes were made based on this comment.

Comment # 27	**Commentor** 9	**Comment Subject** Action Levels

Specific Comment

This requires the Copermittee to determine whether a discharge type should be exempt.

This is the responsibility of the Regional Board.

Comment Response

This is the responsibility of both the San Diego Water Board and/or the discharger. Either the San Diego Water Board or the discharger may identify categories that should not be exempt.

The Code of Federal Regulations states at 40 CFR 122.26 (d)(2)(iv)(B)(1) explicitly states:

"… this program description shall address all types of illicit discharges, however the following category of non-storm water discharges or flows shall be addressed where such discharges are identified by the municipality as source of pollutants to water of the United States…"

Furthermore, in addition to the regulations under 40 CFR 122.26(d), the Federal Register (55 Fed Reg 48037) clearly states that "the Director [i.e. San Diego Water Board] may include permit conditions that either require municipalities to prohibit or otherwise control any of these types of discharges where appropriate."

Comment # 28	**Commentor** 9	**Comment Subject** Action Levels

Specific Comment

Copermittees must develop monitoring plans to sample a representative percentage of major outfalls and identified stations within each hydrologic subarea.

Make consistent with 40CFR.

Comment Response

The San Diego Water Board finds it difficult to respond to the comment without a more specific reference to 40 CFR. In all actions, the San Diego Water Board seeks to be consistent with State and Federal regulations.

The NPDES regulations do not specify the exact location to be used for monitoring, and the Copermittee is ultimately responsible for providing a safe and accessible sampling point that is representative of the discharge (40 CFR 122.41(j)). The San Diego Water Board has prescribed the monitoring requirements in an effort to be consistent with the current monitoring done by the Copermitttees under the existing Order.

Comment # 29 **Commentor** 9 **Comment Subject** Action Levels

Specific Comment

The NELs as defined are receiving water standards. This would apply receiving water standards to the water within the MS4. Some of the NELs are not appropriately applied. (Fecal Coliform 400 for AMEL, this is a single sample standard not an average standard).

There needs to be a way to account for receiving water quality.

Comment Response

The Tentative Order does not have numeric effluent limitations, but does include numeric action levels. The establishment of the dry weather non-storm water action levels considers the discharge under critical conditions, including flow. As such, no mixing zone is allowed for discharges under the Tentative Order. For further information please see the Tentative Order Fact Sheet.

Water "within" the MS4, where also not considered receiving waters, are not required to meet receiving water standards (see Comment Response No. 22). Under the Tentative Order, the "discharge" of non-storm water from the MS4 must be effectively prohibited.

In regards to the referenced fecal coliform standard, the clarification was made in the Orange County MS4 Permit, Order No. R9-2009-0002. The standard has been included in the AMAL because it is based on a 30-day period.

Comment # 30 **Commentor** 9 **Comment Subject** Action Levels

Specific Comment

Non-storm water discharges from MS4 to inland surface waters

What about when an MS4 flow discharges to dry sediment and not to actual water?

Comment Response

The described situation would be considered critical conditions for flow. The consideration of critical flow conditions is required under 40 CFR 122.44(d). A discussion regarding flow is also found in the Fact Sheet:

"The San Diego Region has predominately intermittent and ephemeral rivers and streams (Inland Surface Waters) which vary in flow volume and duration at spatial and temporal scales. Therefore, it is assumed that any non-storm water discharge from the MS4 into the receiving water is likely to be of a quantity and duration that does not allow for dilution or mixing. For ephemeral systems, non-storm water discharges from the MS4 are likely to be the only surface flows present within the receiving water during the dry season."

Comment # 31 **Commentor** 9 **Comment Subject** Action Levels

Specific Comment

Need to define WARM & COLD water for DO effluent limitations.

Should use> < with specific temperatures.

Comment Response

Table 3.a.1 does define WARM and COLD waters for DO effluent limitations.

While the suggested use of >< for DO in the table is appreciated, this change has not been made as the language used in the table is directly from the Basin Plan for the San Diego Region.

Comment # 32	**Commentor** 9	**Comment Subject** Action Levels

Specific Comment

Fecal coliform AMELs are inappropriate for multiple reasons.

Imposes AB411 standards for Rec 1 waters on non-storm water, non-recreational flows. If it must be applied then B should move to Instantaneous Maximum column.

Comment Response

The Tentative Order includes non-storm water action levels that are protective of receiving waters, including those downstream of the discharge. The non-storm water action levels are based on the REC-1 water quality objectives in the Basin Plan, not AB411 standards. Please note that all the receiving waters in the Upper Santa Margarita Watershed are designated as having an existing or potential REC-1 beneficial use.

Comment # 33	**Commentor** 9	**Comment Subject** Action Levels

Specific Comment

Enterococcus inappropriately set to Ocean Plan Designated beach area standards.

This is non-storm water, non-recreational flow. Why is it being held to beach standards when 5+ years of paired sampling data do not indicate strong links between even higher levels of bacteria than being allowed, and detected AB411 exceedances.

Comment Response

Please see the response to comment 32.

Comment # 34	**Commentor** 9	**Comment Subject** Action Levels

Specific Comment

MDEL limits.

Where are MDELs defined in 40CFR?

Comment Response

The Tentative Order does not have numeric effluent limitations, but does include numeric action levels. Although the Tentative Order does not have effluent limitations, please see 40 CFR 122.2 and 122.45. A definition for MDAL, consistent with 40 CFR 122.2 and existing State and Regional Water Board NPDES permits and resolutions is provided in Attachment C for further clarification.

Comment # 35	**Commentor** 9	**Comment Subject** Action Levels

Specific Comment

Table 4.a.1 does not list an instantaneous maximum for Fecal Coliform.

Should list a maximum if less than 5 samples collected in 30-day period.

Comment Response

Please see the response to comment 29.

Comment # 36 **Commentor** 9 **Comment Subject** Action Levels

Specific Comment

Table 4.a.1 subject storm drain flows to the very stringent AB-411Rec-1 Criteria standards.

The maximums should be adjusted to attainable limits.

Comment Response

Please see the response to comment 32.

Comment # 37 **Commentor** 9 **Comment Subject** Action Levels

Specific Comment

Turbidity

What is the justification for turbidity limitations in Region 9 being so much lower than other regions in the state?

Comment Response

The water quality objectives for turbidity are provided in the Basin Plan for the San Diego Region. The water quality objectives in the Basin Plan have been established to protect the beneficial uses of waters within the San Diego Region. The water quality objectives in the San Diego Basin Plan were appropriately used in the development of water quality-based action levels for non-storm water discharges. Please note that issues pertaining to any proposed modifications of the water quality objectives in the Basin Plan are to be addressed under the Triennial Review process. More information may be found at: http://www.waterboards.ca.gov/sandiego/water_issues/programs/basin_plan/tri_review.shtml

Comment # 38 **Commentor** 9 **Comment Subject** Action Levels

Specific Comment

.. freshwater criteria are based on site-specific water quality data (receiving water hardness).

Should be changed to effluent water hardness.

Comment Response

Site-specific water quality data (receiving water hardness) is required under State Water Board Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California. No changes were made based on this comment.

Comment # 39 **Commentor** 9 **Comment Subject** Action Levels

Specific Comment

pH

6.5-8.5 for freshwater 6-9 for saline waters - based on?

Comment Response

As cited in Table 3.a.1, pH is based upon water quality objectives found within the Basin Plan for the San Diego Region.

Comment # 40 **Commentor** 9 **Comment Subject** Action Levels

Specific Comment

This requires "implementation of all necessary storm water controls and measures to reduce ... " when there is no evidence of a receiving water exceedance. The assessment point is "end-of-pipe" and SALs do not have any justification for applicability.

This seems to require an action when there is no evidence of a receiving water violation.

Comment Response

SALs are applicable as a tool to be used by the Copermittee(s) to determine the level of effectiveness of BMPs utilized within the drainage area discharging at the SAL outfall. This is part of the iterative process to reduce the discharge of pollutants in storm water from the MS4 to the MEP.

Comment # 41 **Commentor** 9 **Comment Subject** Action Levels

Specific Comment

Metals SALs are in direct contradiction with statement on "table 3.a.2: Priority Pollutants" page 22

Contradiction between NEL section and SAL in terms of metals values.

Comment Response

Storm Water Action Levels (SALs) are for discharges of storm water from the MS4. Section C is for non-storm water discharges. The SALs were computed utilizing USEPA nationwide MS4 discharge data (Arid West Region), and SALs for metals have been set as the 90th percentile for this dataset. Additionally, the SALs for metals incorporate synoptic water hardness measurements. Please see Attachment E Section II.B.1.b.

Comment # 42 **Commentor** 9 **Comment Subject** Action Levels

Specific Comment

" .. . assessment points for determination of SAL compliance are all major outfalls .. .. " Seems to contradict the following sentence
" ... monitoring plans to sample a representative percent of the outfalls .... "

Sentences seem to contradict each other.

Comment Response

Section D of the Order has been clarified in response to the comment. The word "all" has been removed, as the Copermittees are to sample a representative percent of major outfalls within each hydrologic subarea, not all major outfalls.

Comment # 43 **Commentor** 9 **Comment Subject** Action Levels

Specific Comment

" ... to have outfall storm water discharges meet all applicable water quality standards."

This applies receiving water standards to the storm drain.

Comment Response

The comment references the cited text out of context. The full text of the provision clarifies "that through the iterative and MEP process, outfall storm water discharges will meet all applicable water quality standards." This is consistent with section A.3 and State Water Board Order WQ 99-05.

Comment # 44 **Commentor** 9 **Comment Subject** LID

Specific Comment

It is not clear what is intended to be included in this category. A steep hillside development with known erosion soil conditions would need to address erosion. Treatment control and hydromodification requirements are not justified.

Remove this from the Priority Development Project Categories, and define elsewhere in Section F.1 how these projects would need to include measures that protect slopes from erosion.

Comment Response

This requirement is identical to that in the current Riverside County MS4 Permit (Order No. R9-2004-001), the San Diego MS4 Permit (Order No. R9-2007-0001), and the Santa Ana Water Board Riverside County MS4 Permit (Order No. R8-2010-0033). These provisions are based on the Los Angeles Water Board's SUSMP upheld by the precedential State Water Board Order WQ-2000-11. The State Water Board's order found that hillside residences can be a significant source of pollutants and/or runoff following development and it is appropriate that the design standards apply so that BMPs for these categories of development result in the infiltration or treatment of a significant amount of the runoff.

Treatment control and hydromodification requirements are even more necessary for hillside developments. Hillside developments that include impervious surfaces will have surface runoff discharging at much higher volumes and velocities than developments with flatter and more gradual slopes. The treatment control and hydromodification requirements will reduce the pollutants and increased erosive forces in runoff discharging from these developments. No changes were made in response to this comment.

Comment # 45 **Commentor** 9 **Comment Subject** LID

Specific Comment

Retention of the 85th percentile storm event does not mimic the natural hydrology. The amount of runoff under natural conditions is dependent on soil type and other factors.

Retention requirements should be revised with intent of matching hydrology under natural conditions.

Comment Response

Retention of the 85th percentile storm event provides for a high level of pollutant removal to protect water quality. This design storm does not necessarily result in zero discharge. The design storm is approximately 0.6 inches of rainfall for most of the developed area of the Riverside County portion of the San Diego Region. Larger storms will produce runoff to receiving waters. Also, retention of the design storm will begin to compensate for decades of previous, unchecked development creating impervious surfaces that have resulted in the increased runoff volumes and flow rates discharged to receiving waters. Retention of the storm value will also provide groundwater recharge that, where hydrologically connected, can create surface flows downstream.

Comment # 46 **Commentor** 9 **Comment Subject** LID

Specific Comment

It may be unrealistic for municipalities to implement the various processes required under this section within the amount of time allowed.

Provide a feasible time schedule for municipalities to put such a program in place.

Comment Response

The San Diego Water Board disagrees that it is unrealistic to implement a LID BMP waiver program within the amount of time allowed. No changes were made in resposne to this comment.

Comment # 47 **Commentor** 9 **Comment Subject** Construction

Specific Comment

It is neither wise nor necessary to mandate use of a particular technology for managing sediment from construction sites. The Construction General Permit has adequate and more appropriate measures for ensuring sediment discharges will not create a pollution problem.

Remove the requirement that Copermittees mandate use of AST. Allow Copermittees to rely on the Risk based approach that was developed for the Construction General Permit, which does not mandate a particular technology.

Comment Response

The San Diego Water Board disagrees with the recommended change. The Tentative Order does not mandate the use of a particular technology for managing sediment from construction sites. The Tentative Order defines Active/Passive Sediment Treatment (AST) variously as using mechanical or chemical means to flocculate and remove suspended sediment from runoff at construction sites prior to discharge. Examples of coagulants include chitosan, modified starches, alum, electro-coagulation, carbonic acid, ferric chloride, and polyacrylamides. Examples of sedimentation devices include settling basins, ponds, baker tanks, weir tanks, tube settlers, and centrifuges. Examples of polishing filter types include sand, engineered media, membrane and hydrocarbon. For certain construction sites, with specific soil types that are difficult to settle, AST is likely the only method to meet the 20 NTU water quality objective specified in the Basin Plan. The requirements provide sufficient flexibility to the Copermittees to mandate the specific method of compliance and to determine which sites are required to implement AST. No changes were made based on this comment.

Comment # 48 **Commentor** 9 **Comment Subject** Construction

Specific Comment

This section requires inspection of construction sites of 1 acre or more at least monthly.

Propose language that is definitive and require construction site inspections monthly for sites of 1 acre or more.

Comment Response

Section F.2.e.(3) requires the Copermittees to inspect at least monthly, all sites with one acre or more of soil disturbance. This language requires a minimum frequency. The Copermittees may choose to inspect these types of construction sites at a higher frequency, if warranted. No changes were made based on this comment.

Comment # 49 **Commentor** 9 **Comment Subject** Municipal

Specific Comment

Reduction of pesticides, herbicides, and fertilizers into the storm water to the MS4 and receiving waters.

Support inclusion of "storm water" and "and receiving waters" in the opening paragraph.

Comment Response

The San Diego Water Board appreciates the commenter's support for the inclusion of "storm water" and "receiving waters" in the opening paragraph to section F.3.a.(3). "Storm water" and "receiving waters" will remain included in the opening paragraph of section F.3.a.(3).

Comment # 50	**Commentor** 9	**Comment Subject** Municipal

Specific Comment

Inspecting and cleaning all MS4 facilities between May 1 and September 30 is infeasible for those Copermittees that have tens of thousands of structures.

Inspection and removal of accumulated waste at least once a year between May 1 and September 30 of each year for (all) MS4 facilities [that receive or collect high volumes of trash and debris.]

Comment Response

The Tentative Order provides in section F.3.a.(6)(iii) that, "Following two years of inspections, any MS4 facility that requires inspection and cleaning less than annually may be inspected as needed, but not less than every other year." This requirement provides the Copermittees the ability to prioritize their MS4 maintenance activities following a sufficient data collection period.

Comment # 51	**Commentor** 9	**Comment Subject** Municipal

Specific Comment

Sections (a) and (b) are redundant.

Delete Section (b) as the implementation of the provisions in Section (a) would maximize pollutant reductions by providing greater flexibility to Copermittees to manage their programs.

Comment Response

Section F.3.a.(7)(b) has been retained within the Tentative Order. Please note that as an illicit discharge into the MS4, sewage infiltration is to be eliminated, not reduced. Federal regulation (40 CFR 122.26(d)) require that Copermittees use controls, as necessary, to limit the infiltration of sewage into the MS4 system. As an illicit discharge, it is expected that these controls will prevent and eliminate infiltration and seepage from the sanitary sewer. The controls listed under section F.3.a.(7)(b) are BMP measures that currently should be a part of the Copermittees' IC/ID program to prevent and eliminate illicit discharges. It is unclear how removal of this section would provide greater flexibility, as Copermittees are already required to implement these BMPs. No changes were made based on this comment.

Comment # 52 **Commentor** 5 **Comment Subject** Economic

Specific Comment

While the City shares the Regional Board's goal of protecting the quality of water in our local creeks, it is not fiscally responsible to adopt a new Model Permit that does not accurately reflect the needs of the local watershed. The Regional Board must allow the City to prioritize and balance finite public resources in order to provide numerous vital public services. The City's responsibilities also include providing for public safety (police and fire services), installing and maintaining infrastructure (roads, drainage facilities, etc.), public facilities (parks, libraries, community centers, etc.), providing recreational programs, conserving land (MSHCP), promoting habitat conservation, etc. All of these needs are equally important, but public funding mechanisms do not allow anyone of them to be funded without consideration to competing needs, priorities, and expected outcomes. New requirements must carefully weigh the benefits achieved against their real costs to implement. From a public agency perspective, all expenditures must be justified and supported by the general public.

Comment Response

The San Diego Water Board is aware of the many and competing needs that the municipalities are responsible for. The mission of the San Diego Water Board, however, is to preserve, enhance, and restore the quality of the waters in the region. Our responsibility is to protect the beneficial uses of the waters of the state. The Tentative Order does reflect the water quality needs of the local watershed with requirements such as the regulation of unpaved roads and watershed specific action levels.

The Copermittees' programs have already been found to be deficient. USEPA audits conducted in January 2008 (USEPA Region IX MS4 Inspection Report Riverside County Flood Control and Water Conservation District and County of Riverside, dated 03/31/2008), and subsequent enforcement action by the San Diego Water Board (Notice of Violation No. R9-2008-0053 and No. R9-2010-0074) documented significant short-comings in the Copermittees' programs.

While we try to take other needs into consideration when developing the requirements included in the Tentative Order, the requirements must be able to fulfill our mission and responsibilities. The Copermittees must be able to meet the requirements of the Tentative Order for the protection of water quality. We understand that the provisions in the Tentative Order may require the Copermitttees to modify, reduce, or find additional efficiencies in their operations, but the Copermittees are still allowed to prioritize and balance their finite public resources. As the Copermittees' regulatory and administrative requirements and responsibilities expand and increase with their population and growth, which are not limited and related to only managing the MS4 system, the Copermittees will also need to identify ways to expand and increase their resources for those ever increasing and/or changing needs.

Please see the responses to comments 8 and 9 for a discussion about the Copermittees' revenue sources for funding their storm water programs.

Comment # 53 **Commentor** 9 **Comment Subject** IDDE

Specific Comment

Paragraph makes a reference to attachment E, which does not in fact contain a description of this particular program.

Include a description of the Dry Weather Field Screening and Analytical Monitoring Program in Attachment E.

Comment Response

The commenter is incorrect that Attachment E does not contain a description of this program. Section II.C of the MRP (Attachment E) includes a description of the dry weather field screening and analytical monitoring of MS4 detect illicit discharges and connections.

Comment # 54 **Commentor** 9 **Comment Subject** IDDE

Specific Comment

... based on results of field screening …

Field screening is not included as a component of any monitoring programs and should be removed from this sentence.

Comment Response

The San Diego Water Board disagrees, as field screening is the quantitative and/or qualitative monitoring of MS4 outfalls for non-storm water discharges and associated observations regarding a discharge. For example, if a field screening of an MS4 major outfall detects a high turbidity from sediment in a non-storm water discharge, Section F.4.e directs that this screening should be used for investigating and inspecting that portion of the MS4. According to Section II.C.1.b of the MRP (Attachment E), "Each Copermittee must develop and/or update written procedures for effluent analytical monitoring including field observations, monitoring, and analyses to be conducted." "[F]ield observations, monitoring and analyses" all can be performed by sampling personnel in the field, with visual observations and with portable monitoring and water quality analysis equipment (e.g. YSI meter, turbidity meter, pH strips). These components of the monitoring program would be part of the "field screening". No changes were made based on this comment.

Comment # 55 **Commentor** 9 **Comment Subject** IDDE

Specific Comment

References a monitoring effort that does not exist anywhere else in the permit (field screening)

The inconsistency in the permit for the different programs and the referenced sections need to be straightened out. Add description of referenced program to Attachment E.

Comment Response

Please see the response to comment 54.

Comment # 56 **Commentor** 9 **Comment Subject** IDDE

Specific Comment

Contradictory paragraph. Numeric action levels must be developed, but "the criteria must consider numeric effluent limitation (see Section C)".

The NELs from Section C or develop numeric action levels? Recommend selecting one criteria.

Comment Response

The commenter cited the text incorrectly. Section F.4.e.(1) clearly states, "The criteria must include required non-storm water action levels (see Section C) and a consideration of 303(d)-listed waterbodies and environmentally sensitive areas (ESAs) as defined in Attachment C."

Comment # 57 **Commentor** 9 **Comment Subject** Watershed Workplan

Specific Comment

The workplan is for development of a BMP strategy and implementatlon of BMPs to improve urban runoff water quality contributions to the receiving water. Calling it a "Water Quality" workplan is misleading because the regulated parties under this permit are not responsible for every contribution to every water body in the entire watershed.

The requirements should focus on urban runoff contributions to the receiving waters for which the regulated parties are responsible.

Revise the section to state: The Watershed Workplan shall describe the Permittees' development and implementation of a collective watershed strategy to assess and prioritize the water quality problems due to runoff discharging to the wathershed's receiving waters, identify and/or model sources of the highest priority water quality problem(s), develop a watershed-wide BMP implementation strategy to abate highest priority water quality problems and the relative contribution from runoff discharges, and a monitoring strategy to evaluate BMP effectiveness and changing water quality prioritzation in the WMA.

Comment Response

The Tentative Order is for the discharges from the Copermittees' MS4s. Pollutant contributions that are not discharged from the Copermittees' MS4s are not addressed by this permit or required to be addressed by the Watershed Workplan section. No changes were made based on this comment.

Comment # 58 **Commentor** 9 **Comment Subject** Watershed Workplan

Specific Comment

The use of the word "proper" for installation of BMPs is subjective and not defined by this permit. There may be many different ways to "properly" design and install a BMP, and the regulated parties may or may not choose to test different ways for each BMP to determine which works best.

Revise to state: Develop a strategy to model and/or monitor improvements in runoff discharge quality resulting from implementation of the BMPs described in the Watershed Workplan. The modeling and/or monitoring strategy shall generate the necessary data to report on the measured pollutant reduction that results from BMP implementation.

Comment Response

The term "proper" for describing BMP implementation is purposely left undefined in the Tentative Order. The Copermittees must determine what is the proper BMP implementation through manufacturer suggestions or BMP guidance manuals (e.g. CASQA). In some cases, "proper" BMP design and implementation may later be found to be faulty. The Tentative Order provides the Copermittee the flexibility to adjust and maintain BMPs to improve pollutant removal effectiveness. No changes were made based on this comment.

Comment # 59 **Commentor** 9 **Comment Subject** General

Specific Comment

The reference to a watershed workplan should use a consistent naming convention. It is referred to as a "Watershed Workplan" in Section K.1.b., and a "Watershed Water Quality Workplan" in Section G.2.

The reference to a watershed workplan should use a consistent naming convention.

Comment Response

Section G is for the "Watershed Water Quality Workplan (Watershed Workplan)." Therefore, the "Watershed Water Quality Workplan" is subsequently referred to as the "Watershed Workplan" throughout the remainder of the Tentative Order. After the term "Watershed Water Quality Workplan" is defined as “Watershed Workplan”, the term “Watershed Water Quality Workplan” in no longer used in Section G, nor Section K. No changes were made based on this comment.

Comment # 60	**Commentor** 9	**Comment Subject** Monitoring

Specific Comment

Typo at the base of the table: "Nitrate and nitrate may be combined…"

Change to" "Nitrite and nitrate may be combined…"

Comment Response

The correction made been made to the text as shown in the errata.

Comment # 61	**Commentor** 9	**Comment Subject** Monitoring

Specific Comment

Comparing Metals SALs with CTR values

Question is if you can use the "1 hour maximum concentration" criteria in this way?

Comment Response

Although the SALs have been set at a conservative level, it is possible that a SAL for metals may be exceeded but, given the hardness of the receiving water, applicable CTR water quality criteria may not be exceeded. The 1 hour CTR criteria was chosen for storm events as this CTR criteria represents the highest concentration of pollutant which aquatic life can be exposed to for a short time without deleterious effects. The continuous CTR criteria is less representative of pollutants in storm water as the continuous criteria represents the maximum concentration over an extended time period (4 days).

Comment # 62	**Commentor** 9	**Comment Subject** Monitoring

Specific Comment

"Stations must be all major outfalls" plus "other outfall points…"

This far exceeds CWA 500 point maximum for dry weather monitoring.

Comment Response

The section referenced by the commentor does not read “stations must be all major outfalls.” It reads: “Sampling Stations must be located at major outfalls pursuant to section C of this Order.”

Comment # 63	**Commentor** 9	**Comment Subject** Monitoring

Specific Comment

If flow is evident a 1 hour composite sample may be taken.

Should elaborate on sampling procedures for flowing outfalls.

Comment Response

This section does not require the collection of a 1-hour composite sample, but suggests that one may be taken. This lends the Copermittee(s) maximum flexibility in evaluating if a composite is required to address IC/ID investigations on a case-by-case basis. If a composite sample is taken, it also is up to the Copermittee(s) to determine if a time or flow-based composite should be taken.

Comment # 64	**Commentor** 9	**Comment Subject** Monitoring

Specific Comment

"if flow is evident a 1 hour composite sample may be taken"

There is not definition of what comprises a composite sample. This would significantly increase this program.

Comment Response

Please see the response to comment 63.

Comment # 65	**Commentor** 5	**Comment Subject** Economic

Specific Comment

Although the Order has been slightly modified from the previous version issued to the South Orange County permittees, it continues to retain numerous provisions that do not apply to this region and are unnecessarily costly and administratively burdensome to the City and, ultimately, to our citizens.

Comment Response

The San Diego Water Board disagrees that there are provisions in the Tentative Order that do not apply to the portion of Riverside County in the San Diego Region and the commentor does not explain which provisions are allegedly unnecessary and costly. All of the provisions in the Tentative Order are applicable and can be applied in this part of the San Diego Region, as well as all other parts of the region. The San Diego Water Board has also modified the Tentative Order in several ways, in response to recommendations by the Riverside County Copermittees, to align it more with regional needs and to minimize or reduce the incremental increase in costs that will be necessary to improve their programs to meet the new and enhanced requirements. These modifications are discussed in the response to comment 9.

Comment # 66 **Commentor** 5 **Comment Subject** General

Specific Comment

It is important to note that the federal regulations regulating MS4 discharges have not changed since 1987. There is no policy basis for the significant changes proposed by this Tentative Order. The majority of the changes proposed to this Tentative Order are to accommodate Regional Board staff wishes to move to a model MS4 Permit that treats Riverside, Orange and San Diego County's equally. These changes were not specifically designed to address the local needs of this watershed.

Comment Response

The San Diego Water Board agrees that the federal regulations regulating MS4 discharges have not changed since 1987. There are two main reasons for the changes that have been made. The first and foremost reason is to correct deficiencies in the requirements to be more protective of receiving waters, which is more consistent with the federal regulations. The second reason is to make the requirements for the three counties in the San Diego Region more consistent among each other. In addition, although the federal regulations for MS4 discharges have not changed since 1987, the water quality in the Upper Santa Margarita watershed has continued to deteriorate along with a subsequent increase in urban development within the watershed during the same time period. The receiving waters within the Upper Santa Margarita watershed continue to not meet water quality standards as evidenced by increased number of CWA section 303(d) listed waterbodies.

As the City is aware, the San Diego Water Board met with the Riverside County Copermittees on more than a dozen occasions between March and July 2010 to modify the requirements to be more specific to the needs of the Upper Santa Margarita watershed. While we acknowledge that the requirements are now more consistent with the San Diego County and Orange County MS4 Permits, many of the changes were specifically designed to address the local needs of the Upper Santa Margarita watershed.

The increased complexity in a fourth round MS4 permit is consistent with federal regulations and guidance; and appropriate where numeric effluent limitations are not required as explained in the USEPA's Interim Permitting Approach for Water Quality-Based Effluent Limitations in Storm Water Permits, "The interim permitting approach uses best management pracitces (BMPs) in first-round permits, and expanded or better-tailored BMPs in subsequent permits, where necessary, to provide for the attainment of water quality standards."

Comment # 67 **Commentor** 10 **Comment Subject** General

Specific Comment

The Bay Council appreciates and welcomes the opportunity to comment on the Regional Water Quality Control Board's ("Regional Board") draft Municipal Storm Water Permit ("Permit") for Riverside County. As with the recently adopted Orange County permit (Order No. R9-2009-0002), this draft Permit represents a significant improvement to past storm water permits in not only the San Diego region, but the entire state. The Bay Council applauds the Regional Board for its leadership in advancing municipal storm water permits to reflect the iterative approach of the maximum extent practicable ("MEP") standard mandated by the Clean Water Act.

Comment Response

Comment noted.

Comment # 68 **Commentor** 10 **Comment Subject** Hydromod

Specific Comment

Bay Council member San Diego Coastkeeper was part of the Technical Advisory Committee for the San Diego region Hydromodification Management Plan (HMP) development. Many of Coastkeeper's concerns, as well as committee member NRDC's, focused on the standard set in the San Diego HMP. The hydromodification susceptibility and the resulting BMP sizing tools were set to meet predevelopment standards, not the naturally occurring condition. It was ultimately the San Diego MS4 Permit language—which defines predevelopment as the condition onsite immediately before the planned development—that constrained the development of the HMP. (Order No. R9-2007-0001, C-7). This Permit, however, is in line with Coastkeeper and NRDC's view that predevelopment and preproject are the naturally occurring condition—as opposed to simply the condition immediately preceding the new development. This definition will create a more robust and effective HMP for the Riverside area, protecting natural stream hydrology as opposed to merely preventing further degradation. (Permit, F.1.h). Further, the required prioritization of BMPs will ensure the most effective BMPs are evaluated first, instead of the least expensive or easiest to implement BMPs. (Permit, F.1.g.(2).

Comment Response

Comment noted.

Comment # 69 **Commentor** 10 **Comment Subject** Unpaved Roads

Specific Comment

A new addition to this Permit is the regulation of unpaved roads, which now require implementation of BMPs. (F.1.i.; F.3.a.(10); F.3.c.(5)). Not only will these new permit provisions help alleviate sediment and erosion problems; they will also promote smart maintenance and planning. For
example, the permit requirement that BMPs include "[u]npaved roads and culvert designs that do not impact creek functions and where applicable, that maintain migratory fish passage" will help maintain natural water courses. (F.1.i). The following requirement will also serve to promote long-term maintenance and planning to protect water quality and geomorphology:

"Through their regular maintenance of unpaved roads, the Copermittees must examine the feasibility of replacing existing culverts or design of new culverts or bridge crossings to reduce erosion and maintain natural stream geomorphology."

(F.3.a.(10)(e)). These types of Permit conditions will incentivize municipalities to plan ahead, and will prevent the perpetuation of the currently fragmented maintenance activities.

Comment Response

Comment noted. The Copermittees have brought up concerns addressing the regulation of privately owned and maintained unpaved roads; therefore those regulations have been removed. Please see the errata sheet for exact language changes.

Comment # 70 **Commentor** 10 **Comment Subject** General

Specific Comment

In addition, municipal flood control structure BMP implementation will also serve to benefit Copermittees in maintaining their storm water systems. (F.3.a.(4)(a)-(c)). The requirement that Copermittees assess flood management project impacts on water quality, evaluate existing flood
control structures as part of ongoing maintenance, and inventory such activities in the JRMP Annual Report is particularly important to avoid poor planning such as evidenced in the City of San Diego's Master Storm Water System Maintenance Program. (Id.)

Comment Response

Comment noted.

Comment # 71	**Commentor** 10	**Comment Subject** Retrofit

Specific Comment

Largely ignored in the past, the retrofit requirements in the Permit will help Copermittees tackle the storm water issues that cannot be solved through new construction and development standards alone. Many water quality issues are historical, due to poor planning and the proliferation of impervious surfaces. Permit-required assessment of retrofit opportunities, and permissive language with regard to implementation of retrofits will spur Copermittees to action, but allow them flexibility to choose the most effective projects. (F.3.d.). The novel idea of using retrofits as an enforcement or mitigation measure will also likely prove more appealing than simple monetary penalties.

Comment Response

Comment noted.

Comment # 72 **Commentor** 5 **Comment Subject** Legal

Specific Comment

1. THE TENTATIVE ORDER ATTEMPTS TO REDEFINE WHAT CONSTITUTES A WATER OF THE UNITED STATES

Section 3.C of the Findings section on page 11 of the Tentative Order states:

"Historic and current development makes use of natural drainage patterns and features as conveyances for urban runoff. Urban streams used in this manner are part of the municipalities MS4 regardless of whether they are natural, man-made, or partially modified features. In these cases, the urban stream is both an MS4 and a receiving water."

The City does not believe that such a finding is warranted or lawful under either the clear statutory provisions of the Clean Water Act or recent judicial interpretations of the Act. The language in the Tentative Order could be construed as seeking to regulate all discharges into MS4s, changing the very nature of MS4s so as to constitute a receiving water.

This is contrary to the plain language of section 402(P)(3)(B) of the Clean Water Act, which requires: "Permits for discharges from municipal storm sewers ... " 33 U.S.C. § 1342(P)(3)(B) (emphasis added.). Based on this assertion, the Regional Board does not have the authority to regulate water entering into MS4s as receiving waters of the United States.

Furthermore, even if the statutory language indicated that Permits were required for discharges into MS4s, recent holdings from the United States Supreme Court conclusively show such structures would not constitute a water of the United States. According to the plurality decision in Rapanos v. United States (2006) 126 S. Ct. 2208, 2225:

"In sum, on its only plausible interpretation, the phrase 'the waters of the United States' includes only those relatively permanent, standing or continuously flowing bodies of water 'forming geographic features' that are described in ordinary parlance as 'streams[,] ... oceans, rivers, [and] lakes.' See Webster's Second 2882. The phrase does not include channels through which water flows intermittently or ephemerally, or channels that periodically provide drainage for rainfall. The Corps' expansive interpretation of the 'the waters of the United States' is thus not 'based on a permissible construction of the statute."

(Emphasis added.). The MS4 systems and urban streams that the Regional Board is seeking to regulate as receiving waters are intermittent, ephemeral, and used only periodically as drainage for rainfall. As such, these systems and streams wonld not constitute a water of the United States. Because the Clean Water Act extends solely to waters of the United States, the Regional Board has no authority to regulate MS4s or urban streams as defined in its Permit.

Even under Justice Kennedy's more lenient interpretation of what constitutes a water of the United States, the Regional Board has still not adequately met the requirements for establishing that an MS4 or urban stream is subject to regulation as a Water of the United States. According to Justice Kennedy, the Regional Board must establish that the MS4 system and urban streams bear a significant nexus to the other regulated waters so as to qualify forregulation as a water of the United States. Rapanos, 126 S. Ct. at 2249. Such a determination must be made on a case-by-case basis, and must contain some measure of the significance of the connection for downstream water quality. Id. at 2250-2251. In other words, the Regional Board must conduct an analysis of the "quantity and regularity of flow" in the relevant MS4s and urban streams prior to holding that these structures merit regulation under the Clean Water Act. ld. at 2251. Absent conclusive findings, the Regional Board is without authority to regulate MS4s and urban streams as receiving waters under the Clean Water Act.

The City requests that the Board members direct staff to modify the language in the Tentative Order to ensure regulations of only those systems and streams discharging directly into waters of the United States as defined according to the Supreme Court's holding in Rapanos in order to avoid random interpretations of the CWA.

Comment Response

The Tentative Order does not attempt to redefine what constitutes waters of the United States (waters of the U.S.). Section D.3.c of the Findings defines what constitutes the MS4. In some cases, waters of the U.S. and waters of the state may be considered part of the MS4.

The San Diego Water Board is authorized to regulate storm water discharges from the MS4, which are considered point sources under the Clean Water Act, to waters of the U.S. Discharges from the MS4 that are not composed entirely of storm water (i.e. non-storm water discharges) are prohibited. Pollutants that are deposited in the MS4 that can be conveyed by

storm water cannot cause of contribute to a condition of nuisance, pollution, or contamination in waters of the U.S. Thus, discharges into the MS4 that are not composed entirely of storm water (i.e. pollutants in storm water and non-storm water) and can be a significant source of pollutants are prohibited.

The definition of the MS4 and waters of the U.S. are consistent with the Clean Water Act and NPDES regulations in the Tentative Order. Please also see the response to comment 22.

Comment # 73	**Commentor**	10	**Comment Subject**	Overirrigation

Specific Comment

Bay Council has been collectively, and through its individual organizations, advocating for conservation and smart water use for years. Every drop of water that remains at its source is a drop that has not contributed to urban runoff. Nonetheless, many municipalities have been reluctant to enforce over-irrigation as either a water supply or water quality issue, citing the previous permit exemption as authority for such practice. Now, with the removal of this exemption, municipalities will not only be required to enforce over-irrigation runoff, but will be able to use the revised Permit as authority for urging residents, developments, and commercial and industrial facilities to conserve water.

Comment Response

Comment noted.

Comment # 74 **Commentor** 5 **Comment Subject** New Development

Specific Comment

2. THE TENTATIVE ORDER UNLAWFULLY PURPORTS TO RESTRICT THE LOCATION OF TREATMENT OPTIONS

Section F.1.d.(6)(d) on page 35 of the Tentative Order states:

"All treatment control BMPs for Priority Development Projects must, at a minimum, be implemented close to pollutant sources (where shared BMPs are not proposed), and prior to discharging into waters of the U.S."

The implementation of this provision presents a number of potentially serious problems. First, this provision of the Tentative Order violates Water Code section 13360. According to Water Code section 13360(a):

"No waste discharge requirement or other order of a regional board or the state board or decree of a court issued under this division shall specify the design, location, type of construction, or particular manner in which compliance may be had with that requirement, order, or decree, and the person so ordered shall be permitted to comply with the order in any lawful manner."

(Emphasis added.) As noted above, the Regional Board is already attempting to define MS4s and urban streams as waters of the United States. Supra, p. II. The proposed regulation would therefore effectively limit the ability for Permittees to implement any BMPs in any area except at the exact location of the source generating pollutants and would exclude Permittees from choosing to implement what may be less-costly, more effective BMPs in other areas, but Water Code section 13360(a) expressly prohibits this type of regulation.

Second, the comparison to wetlands regulation misconstrues USEPA guidance on this issue. The USEP A guidance document referenced by the Regional Board does not preclude Permittees from locating structural controls within a natural wetland. Rather, the guidelines simply state:

"To the extent possible, municipalities should avoid locating structural controls in natural wetlands. Before considering siting of controls in a natural wetland, the municipality should demonstrate that it is not possible or practicable to construct them in sites that do not contain natural wetlands .... "

(Fact Sheet, p. 96, fu. 154, citing USEPA, 1992. Guidance Manual for the Preparation of Part II of the NPDES Permit Applications for Discharges from Municipal Separate Stonn Sewer Systems. EPA 833-B-92-002. (Emphasis added.) While the Permittees may agree that they should generally avoid in stream treatment to the extent possible, outright prohibition of an option would be counterproductive.

The City requests that the Board members direct staff to modify the language in the Tentative Order to allow permittees to make the determination of the exact placement location of BMPs.

Comment Response

The Tentative Order is consistent with the California Water Code. The Tentative Order does not specify the exact placement location of BMPs. The Tentative Order does, however, include some limitations for the placement location of BMPs to minimize or eliminate the discharge of pollutants to waters of the U.S. Additionally, treatment BMPs must not be constructed in waters of the U.S. or state unless the runoff flows are sufficiently pretreated to protect the values and functions of the water body. Federal regulations at 40 CFR 131.10(a) state that in no case shall a state adopt waste transport or waste assimilation as a designated use for any waters of the U.S. The limitations for the placement location of BMPs are appropriate. No changes were made based on this comment.

Comment # 75	**Commentor** 10	**Comment Subject** Action Levels

Specific Comment

As with the Orange County permit, this Permit is a great leap forward in achieving the MEP standard. With the Orange County permit paving the way, the Regional Board has created a mechanism to evaluate BMP effectiveness and ensure the iterative approach is truly progressive. As Bay Council members have previously commented on the Orange County permit, the Regional Board has broad authority to impose numeric effluent limits.1 The Bay Council fully supports the Regional Board in requiring both non-storm water dry weather action levels (“NALs”) and storm water action levels (“SALs”). (Permit, C. and D.).

Comment Response

Comment noted.

Comment # 76 **Commentor** 5 **Comment Subject** Legal

Specific Comment

3. THE TENTATIVE ORDER IMPROPERLY INTRUDES UPON THE CITY'S LAND USE AUTHORITY IN VIOLATION OF THE TENTH AMENDMENT OF THE U.S. CONSTITUTION

To the extent that this Tentative Order relies on federal authority under the Clean Water Act to impose land use regulations and dictate specific methods of compliance, it violates the Tenth Amendment of the U.S. Constitution. Furthermore, to the extent the Tentative Order requires a Municipal Permittee to modify its city ordinances in a specific manner; it also violates the Tenth Amendment.

According to the Tenth Amendment:

"The powers not delegated to the United States by the Constitution, nor prohibited by it to the States, are reserved to the States respectively, or to the people."

Article XI, section 7 of the California Constitution, California guarantees municipalities the right to "make and enforce within [their] limits all local police, sanitary and other ordinances and regulations not in conflict with general laws." The United States Supreme Court has held that the ability to enact land use regulations is delegated to municipalities as part of their inherent police powers to protect the public health, safety, and welfare of its residents. See Berman v. Parker (1954) 348 U.S. 26, 32- 33. Because it is a constitutionally conferred power, land use powers cannot be overridden by State or federal statutes.

From the City's perspective, under the guise of federal law, the Regional Board is attempting to dictate the precise manner in which cities must exercise their police powers. The City does not believe that such a requirement is consistent with the Tenth Amendment.

The City requests that the Board members direct staff to modify the language in the Tentative Order to ensure consistency with the Tenth Amendment, rather than applying random interpretations of it, with regard to issuing requirements which dictate the precise method of compliance.

Comment Response

The San Diego Water Board disagrees that the Tentative Order intrudes upon the City's land use authority. The Tentative Order requires the City to be protective of water quality in the City's land use decisions. The requirements of the Tentative Order provide the Copermittees with sufficient flexibility to choose how they will achieve compliance. The requirements provide the Copermittees with numerous compliance options. As such, the requirements do not specify design, location, type of construction, or particular manner in which compliance may be had.

Where the Tentative Order includes detailed requirements, it is to be in compliance with CWA section 402(p)(3)(B)(iii), which mandates that MS4 permits "shall require controls to reduce the discharge of pollutants to the maximum extent practicable, including management practices, control techniques and system, design and engineering methods, and such other provisions as the Administrator or the State determines appropriate for the control of such pollutants." Clearly, the CWA provides the San Diego Water Board with the discretion to include specific requirements in the Tentative Order. This discretion is supported in the preamble to the Phase I NPDES storm water regulations, which states "this rule sets out permit application requirements that are sufficiently flexible to allow the development of site-specific permit conditions" (FR 48038). USEPA has issued regulations and guidance documents that discuss the types of BMPs, for example, that must be included in storm water permits in order to reduce the dicharge of pollutants in storm water to the maximum extent practicable. Thus, federal law mandates that permits issued to MS4s must require management practices that will result in the reduction of pollutants to the maximum extent practicable. The state is required, by federal law, to select the BMPs. See NRDC v USEPA (9th Cir. 1992) 966 F .2d 1292; Environmental Defense Center v USEPA (9th Cir. 2002) 344 F .3d 832, 855; City of Rancho Cucamonga v Regional Water Quality Control Bd., Santa Ana Region (2006) 135 Cal.App.4th 1377, 1389.

The Copermittees are able to implement effective runoff management programs because they possess land use authority. Municipal NPDES requirements compel Copermittees to exercise that authority in a manner that protects water quality from adverse effects of MS4 discharges.The Tentative Order therefore does not conflict with the Tenth Amendment of the U.S. Constitution. Copermittees are responsible for accepting flows into their MS4. For each Copermittee that accepts flows into their MS4, federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B,C,E, and F) provide that each Copermittee's permit

application "shall consist of: (i) Adequate legal authority. A demonstration that the applicant can operate pursuant to legal authority established by statute, ordinance or series of contracts which authorizes or enables the applicant at a minimum to: […] (B) Prohibit through ordinance, order or similar means, illicit discharges to the municipal separate storm sewer; (C) Control through ordinance, order or similar means the discharge to a municipal separate storm sewer of spills, dumping or disposal of materials other than storm water; […] (E) Require compliance with condition in ordinances, permits, contracts or orders; and (F) Carry out all inspection, surveillance and monitoring procedures necessary to determine compliance and noncompliance with permit conditions including the prohibition on illicit discharges to the municipal separate storm sewer."

The Tentative Order includes the requirements of the federal regulations and does not conflict with the Tenth Amendment of the U.S. Constitution. Nor do its requirements infringe on municipalities' police power rights under Article XI, section 7 of the California Constitution. Failure of a municipal discharger to develop and implement appropriate and effective runoff management programs that comply with the NPDES requirements for MS4s would subject the municipal discharger to enforcement by the San Diego Water Board, and potentially by its citizens. The burden of proving the deficiency of the runoff management programs would be defined by the provisions describing the necessary elements of the program, and by the extent to which the program reduces pollutants in the MS4.

Comment # 77 **Commentor** 5 **Comment Subject** Legal

Specific Comment

4. THE TENTATIVE ORDER CONSTITUTES AN UNFUNDED STATE MANDATE

The Regional Board seeks to impose new provisions that require a higher level of service of existing programs that are not required or mandated under the Clean Water Act or any federal regulations thereunder. Yet, according to the Fiscal Analysis provided in Section H.1. of the Tentative Order:

"Each Copermittee must exercise its full authority to secure the resources necessary to meet all requirements of this Order."

(Tentative Order, p. 74.) To the extent the Tentative Order imposes additional programs on the Permittees without providing additional funds, they are unfunded mandates. The Commission on State Mandates recently held that both the Los Angeles County MS4 Permit and the San Diego County MS4 Permit contained provisions that constituted unfunded state mandates. In re Test Claim on Los Angeles Regional Quality Control Board Order No. 01-182 (July 31,2009); In re Test Claim on San Diego Regional Water Quality Control Board Order No. R9-2007-0001 (March 26, 2010). As such, the Regional Board cannot merely dismiss the suggestion that the Tentative Order does contain provisions that constitute unfunded state mandates.

The imposition of unfunded programs and mandates in the Tentative Order is inconsistent with the provisions of the California Constitution, specifically Article XIII.B, Section 6, which requires a state agency mandating a new program or a higher level of service to provide a "subvention" of funds to reimburse local governments for the costs of the program or increased level of service.

Article XIII.B, Section 6 of the Constitution prevents the state from shifting the cost of government from itself to local agencies without providing a "subvention of funds to reimburse that local government for the costs of the program or increased level of service ... " State agencies are not free to shift state costs to local agencies without providing funding merely because those costs were imposed upon the state by the federal government. If the state freely chooses to impose additional costs upon a local agency as a means of implementing its policy, then those costs should be reimbursed by the state agency. See Hayes v. Commission on State Mandates (1992) 11 Cal. App. 4th 1564, 1593-1594. If the state refuses to appropriate money to reimburse a city, the enforcement of the state mandate can potentially be enjoined by a court. See Lucia Mar Unified School District v ..Honig (1988) 44 Cal. 3d 830, 833-834.

The Tentative Order will require a substantial capital investment, which individual cities will have to fund, despite the fact that no funding mechanism, nor any assistance, financial or otherwise, from the Regional Board is provided to the Permittees. To our knowledge, the Regional Board has made no provision to provide any level of financial relief to the permittees for any of the provisions proposed in the Tentative Order.

The Tentative Order explicitly provides that the Tentative Order does not constitute an unfunded state mandate for four reasons in paragraph 6 of page 14 of the Tentative Order. The City disagrees with all four stated reasons. To the extent the Tentative Order imposes additional programs on the City and its co-pennittees without providing additional funds, they are unfunded mandates.

Comment Response

The San Diego Water Board disagrees that the Tentative Order constitutes an unfunded mandate. The San Diego Water Board disagrees that the provisions in the Tentative Order are not required or mandated under the Clean Water Act. We acknowledge that several of the elements of the Tentative Order have been improved upon by including more specific requirements. The additional specificity which will likely require modifications to the Copermittees' existing programs, however, does not mean that there are now unfunded state mandates.

We also acknowledge that the Commission on State Mandates (Commission) recently held that the San Diego County MS4 Permit contained provisions that constituted unfunded state mandates and so partially approved the San Diego County MS4 claimants' Test Claim. First, the Commission did not determine the validity of those permit provisions; it only addressed funding and determined that the State must reimburse the claimants for the costs of complying with them. Second, the Commission's decisions only affect those Orders (MS4 permits) directly identified by the Commission. No other permits are affected, even if those permits have similar provisions. Third, the San Diego Water Board is not precluded from adopting similar or identical provisions in the Riverside County MS4 permit and the State is not required to provide funding for any permit provisions unless and until the Commission, through a Test Claim proceeding, makes a determination that

one or more provisions in the Riverside County MS4 permit are unfunded state mandates requiring reimbursement. Finally, the State Water Board and San Diego Water Board have challenged the Commission's determination in Sacramento Superior Court on grounds including that the affected permit provisions are in fact federal, and not state, mandates. The San Diego Water Board maintains at this time that the provisions of the Tentative Order are not unfunded state mandates and will continue to include appropriate provisions in the MS4 Permits to protect the water quality and beneficial uses of the waters of the region.

Comment # 78 **Commentor** 5 **Comment Subject** Legal

Specific Comment

A. The Tentative Order Imposes Requirements that Go Beyond Federal Law

To the extent the Tentative Order imposes requirements that go beyond what is required by federal law, the Regional Board is required to consider and address among other things the constitutional prohibition on unfunded state mandates. In fact, there are many specific obligations in the Tentative Order that are not federally mandated.

For example, Section E, on page 24 of the Tentative Order, requires that each permittee submit a certification statement, signed by its chief legal counsel, that the permittee has taken the steps necessary to obtain and maintain full legal authority to implement and enforce each of the requirements in 40 CFR 122.26(d)(2)(i)(A-F) and the Tentative Order. The Clean Water Act does not require the certification statement mandated by the Regional Board. 40 CFR 122.26(d)(2)(i) only requires "[a] demonstration that the applicant can operate pursuant to legal authority established by statute, ordinance or series of contracts .... " Arguably, the City can demonstrate its legal authority by submitting copies of ordinances, resolution or contracts certified by the City Clerk. The Clean Water Act does not require permittees to submit a certification statement.

Furthermore, the Tentative Order goes beyond federal law in that it is at least twice as long, and in some cases, three times as long as other MS4 Permits developed by other Regional Boards in the State of California such as the Lahonten Regional Board and the Central Valley Regional Board. This means that either some Regional Boards are failing to impose federally mandated requirements pursuant to the Clean Water Act, or the San Diego Regional Board is imposing requirements that go beyond federal law.

Comment Response

The Tentative Order is consistent with federal requirements and does not go beyond federal law. The provisions of the Tentative Order represent the MEP with specific requirements that are necessary to protect water quality.

MS4 Permits from different regions cannot be compared without looking at the different issues facing each region. The length of a permit is not indicative of consistency with the Clean Water Act. The discharges that the Lahontan and Central Valley Regions are most concerned with are typically nonpoint source discharges that cannot be regulated under NPDES requirements (e.g., agriculture and silviculture). There are, however, examples of MS4 Permits with similar provisions and lengths in the Los Angeles and San Francisco Bay Regions. Each region implements the requirements of the Clean Water Act by including provisions in the MS4 Permits with the specificity that is necessary to protect water quality and beneficial uses for the waters in that region.

The requirements in the Tentative Order include the specificity that has been demonstrated to be necessary to direct the programs of the Copermittees to be protective of water quality. Without the additional specificity, which would make the language subject to greater interpretation and less enforceable, the Copermittees often assert that they have “met the minimum requirements of the permit” and do not attempt to go any further to try and improve water quality. Thus, additional specificity to the provisions of the MS4 Permit are warranted to direct the Copermittees to implement requirements that will be more protective of water quality, consistent with the Clean Water Act, and do not constitute an unfunded mandate.

Finally, a municipality's legal counsel appears to be the most appropriate official to interpret the municipality's legal authorities and to make the demonstration, that based upon his or her legal evaluation, that the municipality's legal authorities are adequate to carry out the federal requirements. Simply providing copies of ordincances, resolutions or statues is insufficient to make the necessary demonstration that the municipality has and will maintain ful legal authorities.

Please also see the response to comment 77.

Comment # 79	**Commentor** 5	**Comment Subject** Legal

Specific Comment

B. The Fact that Industrial Dischargers are More Strictly Regulated than Municipal Dischargers is Irrelevant to the Unfunded Mandate Issue

The Tentative Order asserts that the Order does not constitute an unfunded mandate because the Order regulates discharges of waste from municipal sources more leniently than they could regulate discharges from non-governmental dischargers. See paragraph 6 on page 14 of Tentative Order. The City fails to see how this statutory distinction between the regulation of municipal dischargers and industrial dischargers affects whether the Order imposes requirements on co-permittees that go beyond federal law. Municipalities are not industrial sites. Municipal discharges are not industrial discharges.

Comment Response

The San Diego Water Board disagrees that the fact that industrial dischargers are more strictly regulated that municipal dischargers is irrelevant to the unfunded mandate issue. The fact that the obligations of non-governmental and new dischargers who are issued NPDES permits for storm water and non-storm water discharges are more stringent is very pertinent. The NPDES requirements for non-governmental dischargers typically include numeric effluent limitations for a discharge so it will not cause or contribute to a condition of pollution in the receiving waters. Any excursion above these numeric effluent limitations in the discharge is a violation of the permit. Compliance is achieved when the numeric effluent limitations are met.

The NPDES requirements in the MS4 Permit do not include such effluent limitations, but allows compliance through iterative implementation of BMPs and improving storm water management programs, which is less stringent. Compliance means improving BMPs and storm water and non-storm water management programs when water quality is not adequately protected.

To date, the Copermittees have been unable to adequately protect water quality in the receiving waters, as demonstrated by the increasing number of Clean Water Action section 303(d) listed impaired water bodies. The Copermittees often state that they have "met the minimum requirements of the permit" and do not attempt to go any further to try and improve their programs to protect water quality. In the absence of numeric effluent limitation, the provisions of the MS4 Permit must include the level of specificity to direct the Copermittees to improve their storm water and non-storm water management programs to be more protective of water quality. The additional specificity does not go beyond federal law.

In addition, one of the statutory bases for establishing that a permit provision amounts to an unfunded state mandate requiring reimbursement is for the municipality to show that the requirements are unique to local government and do not apply generally to all residents and entities in the state. The federal mandate in the Clean Water Act applies to many dischargers, both public and private, and is not unique to local government. In addition , CalTrans, for example, is a state, not local, govermental entity and is subject to MS4 permits throughout the state. Industrial dischargers are also subject to storm water regulation, albeit more stringent than is typically applied to municiapl dischargers. Thus, it appears that the commenter misunderstands at least one of the bases for establishing the existence of an unfunded state mandate when it states that it fails to see how this statutory distinction affects whether the Order imposes requriements that exceed federal law.

Comment # 80 **Commentor** 5 **Comment Subject** Legal

Specific Comment

C. The City Does Not Have the Authority to Randomly Levy Fees at Will to Pay For Compliance With the Order

The Tentative Order also alleges that the Order does not constitute an unfunded mandate because copermittees have the authority to levy service fees to pay for compliance with the Order. See paragraph 6 on page 14 of Tentative Order. Pursuant to Government Code Section 17556(d), if a local agency can levy service fees to pay for a State mandate, the State is not required to provide funding for the mandate.

The City does not have the authority to levy service fees to pay for the State mandate. The Tentative Order presumes, but makes no specific findings that co-permittees have the authority to levy such service fees. In fact, to the extent such service fees are "property-related," copermittees can only levy them once approved by the affected property owners or electorate. See California Constitution, Article XllID, Section 6(c); Howard Jarvis Taxpayers Ass'n, v. City of Salinas, 98 Cal. App. 4th 1351 (2002). The City of Salinas case dealt precisely with this issue. The City of Salinas established a fee to recover costs related to compliance with its MS4 Permit. The fee was based largely on the amount of impervious area on a developed parcel. The Court held that this fee was property-related and, thus, subject to voter-approval requirements. Salinas, 98 Cal. App. 4th at 1356. Only if the fee was a use-based charge, directly based on use of city services (such as the metered use of water), could the fee avoid the voter-approval requirements of Article XllID. The City of Salinas's method to allocate the fee based on the amount of impervious area so as to assure that the fee charged would be proportional to the burden being placed on the City's storm drain system was not sufficiently direct to qualify as a use-based fee exempt from the requirements of Article XIIlD. ld. at 1355.

Because storm water running off of real property and into the MS4 is not a precise measurement, it would be impossible to meet the direct usage requirements of the City of Salinas. Accordingly, without voter approval, which would be almost impossible to successfully obtain during the current economic crisis, the City of Temecula does not have the authority to levy service fees to pay for compliance with the Order.

Comment Response

Please see the responses to comments 8, 9 and 77. In addition, the San Diego Water Board disagrees with the Commission on State Mandates that San Diego County MS4 Test Claimants lacked appropriate authority to levy fees sufficient to pay for some unfunded state mandates if adoption of the fee is contingent on the outcome of an election and believes that those claimants have sufficient fee authority within the meaning of Government Code section 17556, subdivision (d). Section 6 of article XIII B of the California Constitution requires subvention only when the costs in question can be recovered solely from tax revenues. When local agencies have the legal authority to levy charges, fees or assessments, they do not have to spend tax proceeds to fund activities and no subvention is therefore required. The San Diego Water Board notes that this issue is one of first impression for the court and has not been finally adjudicated. In any event, even if the Commission were ultimately to determine that provisions in this Tentative Order require reimbursement and that Copermittees lack fee authority under Government Code section 17556, subdivision (d), the San Diego Water Board is not precluded from adopting provisions in the Tentative Order in the first place and is not required to first provide a funding source before or upon adoption of the Tentative Order. There is a process in place for establishing what are appropriate amounts for reimbursement to carry out particular permit provisions that the Commission has determined requires subvention by the State.

Comment # 81	**Commentor** 5	**Comment Subject** Legal

Specific Comment

D. The City Does Not Have a Real Choice in Requesting Permit Coverage

The fourth reason provided in the Tentative Order for why the Order does not constitute an unfunded mandate is that co-permittees requested permit coverage under the Order. Thus, according to the Tentative Order, co-permittees have not been mandated to do anything.

The City adamantly disagrees. It is disingenuous for Regional Board staff to suggest that copermittees have voluntarily chosen coverage under the Order and that the Order cannot be considered a State mandate.

The City requests that the Board members direct staff to modify the language in the Tentative Order to include State-sponsored relief for the permittees to carry out the requirements in the Order. To the extent that these requirements will require additional funds, the Board should direct staff to assist the permittees in securing such funds.

Comment Response

The Copermittees do have a choice. The Copermittees may request coverage under the MS4 Permit or comply with the complete prohibition against the discharge of pollutants contained in Clean Water Action section 301, subdivision (a) (33 U.S.C. § 1311(a)). These choices are provided by the federal Clean Water Act, not state laws. Thus, meeting the requirements of the MS4 Permit is a federal mandate, and not an unfunded state mandate. Please see the responses to comments 77 and 80.

Comment # 82 **Commentor** 5 **Comment Subject** IDDE

Specific Comment

5. THE TENTATIVE ORDER IMPROPERLY ATTEMPTS TO HOLD THE CITY RESPONSIBLE FOR SEWAGE SPILLS WHEN THIS RESPONSIBILITY HAS BEEN CLEARLY ASSIGNED TO LOCAL WATER DISTRICTS

Section F.4.h. of the Tentative Order states:

"Each Copermittee must implement management measures and procedures (including a notification mechanism) to prevent, respond to, contain and clean up all sewage (see below) and other spills that may discharge into its MS4 from any source (including private laterals and failing septic systems.) Copermittees must coordinate with spill response teams to prevent entry of spills into the MS4 and contamination of surface water, ground water and soil. Each Copermittee must coordinate spill prevention, containment and response activities throughout all appropriate departments, programs and agencies so that maximum water quality protection is available at all times."

(Tentative Order, p. 69).

For many cities, implementation of this provision is simply not feasible. The City of Temecula does not own or operate its own sewage system. All of the sewer systems in the City's jurisdiction are owned, operated, and maintained by water districts, specifically the Rancho California Water District and Eastern Municipal Water District. These water districts have their own separate Regional Board Orders/NPDES permits. The City does not have the equipment or expertise to manage a sewage spill of any size, and its staff is not adequately trained to respond to potential spills. All of the water districts in the City's jurisdiction already respond to sewer spills (including sewer spills from private laterals). Furthermore, this provision is duplicative because the Regional Board is seeking to make the City responsible for a task already delegated to the water districts. By making the City responsible for sewer spills, there is a high risk of creating confusion in determining who (water districts or the City) will respond to a spill and who is responsible for associated costs and reporting requirements. Such an act would result in a tremendous waste of scarce public resources.

The State Water Resources Control Board has previously issued a stay on this exact issue. After extensive hearings and briefing on the matter, the State Board issued Order WQO 2002-0014 on August 15, 2002, granting a stay as to this provision. In that Order, the State Board held:

"The record shows that three separate water districts operate these sewers within Mission Viejo, and are regulated by a sanitary sewer NPDES permit issued by the Regional Board. Mission Viejo alleged that the duplication of effort that would ensue by having Mission Viejo also be responsible for preventing and responding to sanitary sewage spills could lead to delayed responses as agencies try to determine jurisdiction and primary responsibility. Orange County's cost table for the upcoming year estimated total copermittee costs at $56,512 to implement this requirement. While these costs, by themselves do not constitute substantial harm, we find that the duplicative nature of the costs, combined with potential response delay and confusion, do."

(State Board Order WQO 2002-0014, p. 6).

In deciding to grant a stay as to this provision, the State Board concluded:

"The regulation of sanitary sewer overflows by municipal storm water entities, while other public entities are already charged with that responsibility in separate NPDES permits, may result in significant confusion and unnecessary control activities. For example, the Permit appears to assign primary spill prevention and response coordination authority to the co-permittees. While the federal regulations clearly assign some spill prevention and response duties to the copermittees, we find that the extent of these duties is a substantial question of law and fact."

(State Board Order WQO 2002-0014, p. 8. (Emphasis added).

Given the previous findings of the State Board on this same issue, the City requests that the Board members direct staff to modify the language in the Tentative Order to reduce duplicity of effort and the implementation of unnecessary control activities.

Comment Response

The Tentative Order does not hold the Copermittees responsible for sewage spills. Section F.4.h of the Tentative Order requires each Copermittee to "prevent, respond to, contain and clean up" spills that may discharge into its MS4. The Tentative Order holds the Copermittees responsible for preventing sewage spills from entering and/or responding to spills that have entered their MS4. Preventing sewage from entering the MS4 may be done in coordination with the sanitary sewer agencies, who are responsible for responding to sewage spills, but ultimately each Copermittee is responsible for whatever enters its MS4. This is consistent with State Water Board Order WQO 2002-0014.

When the State Water Board stayed the sewage provision from San Diego Water Board Order No. R9-2002-01, it found that the costs of the requirement did not constitute harm, but agreed that harm could ensue from potential response delay and confusion (State Water Board Order WQO 2002-0014). Subsequently, the Copermittees and the local sewer agencies have developed mature relationships regarding sewage spill response. As a result, the concerns expressed by the State Water Board are no longer warranted. For instance, the Copermittees have developed and implemented procedures for spill response and sewage spill response. Regardless of where the spill originates, if the spill has entered or may enter the storm drain system, the Copermittees must respond to assist with the cleanup and remediation of the area.

Comment # 83 **Commentor** 5 **Comment Subject** Overirrigation

Specific Comment

6. THE TENTATIVE ORDER IMPROPERLY DELETES CATEGORIES OF EXEMPT NONSTORMWATER DISCHARGES

Federal law requires that MS4 permits include a requirement that the Permittees effectively prohibit the discharge of non-stormwater into the MS4. 33 U.S.C. 1342(p)(3)(B)(ii). Federal regulations exempt certain discharge categories from this effective prohibition requirement. 40 C.F.R. 122.26(d)(2)(iv)(B)(l). A Permittee must address a discharge in one of these exempt categories only when a Permittee identifies the discharge as a source of pollutants to waters of the United States. ld.

The Tentative Order impermissibly deletes three of the non-stormwater discharge categories - landscape irrigation, irrigation water, and lawn watering (collectively, "irrigation"). (See subparagraphs a-n on page 19 of Tentative Order.) The federal regulations require that permittees address discharges within an exempt category when they identify a discharge as a source of pollutants to waters of the United States. Neither the regulations nor EPA's guidance allow the Regional Board to delete entire categories of exempt non-stormwater discharges then the Permittees identify a discharge within one of the categories as a source of pollutants.

Accordingly, since the permittees have not identified irrigation runoff as a source of pollutants, the City requests that the Board members direct staff to restore the irrigation categories of exempt nonstormwater discharges in the Tentative Order.

Comment Response

The San Diego Water Board may also identify a discharge as a source of pollutants to waters of the United States. Please see the response to comment 27.

In this case, the San Diego Water Board has identified non-storm water runoff from landscape irrigation, irrigation water, and lawn watering (collectively, "irrigation") as a significant source of pollutants discharging to the MS4. We have cited a number of documents, from the state and all three counties of the San Diego Region, in the Fact Sheet (see Discussion of Finding C.15) to justify the removal of these categories from the list of categories of non-storm water discharges into the MS4 not required to be prohibited.

Comment # 84	**Commentor** 5	**Comment Subject** Retrofit

Specific Comment

7. THE TENTATIVE ORDER'S RETROFITTING REQUIREMENT IMPOSES POTENTIALLY SIGNIFICANT COSTS WITHOUT ANY CORRESPONDING GAINS IN WATER QUALITY

The Tentative Order requires the Permittees to develop and implement a program to retrofit existing development with additional structural measures to control runoff. (See Section F.3.d (Retrofitting Existing Development) on page 64 of the Tentative Order). This new provision is in addition to the New Development/Redevelopment provisions in the Tentative Order. However, the City does not have the ability under existing statutes and under the California and the United States Constitutions to force private landowners to retrofit existing developments to improve water quality when these landowners didn't have any plans to retrofit their properties in the first place. As such, the expense entailed in developing and implementing a retrofitting program will not be matched by any gains in water quality. Federal law does not require retrofitting of existing development. In fact, EPA's regulations acknowledge that MS4 regulation would have to be limited largely to undeveloped sites and sites being developed/redeveloped. Accordingly, the City requests that the Board members direct staff to either remove this provision in its entirety from the Tentative Order, or modify the language to exclude private property.

Comment Response

The San Diego Water Board disagrees that the retrofitting requirements impose significant costs without any corresponding gains in water quality. As recognized in USEPA guidance, waters in the region cannot be protected without also addressing degradation caused by storm water discharges from existing development. The USEPA recommends that storm water programs include a retrofit plan or program for retrofitting existing development. To actually improve the quality of receiving waters, discharges from existing developed sites need to be mitigated, which generally means implementation of measures to retrofit existing development sites with storm water control measures that can retain and/or treat storm water on site. Retrofitting existing development is possible and reasonable to significantly improve water quality in receiving waters.

The retrofitting requirements in the Tentative Order do not, as the commenter asserts, require the Copermittees “to force” private landowners to retrofit existing development. Implementing retrofitting projects is not actually required by the Tentative Order. The retrofitting requirements do, however, require the Copermittees to identify areas of existing development where retrofitting projects are feasible and to find ways to cooperate with and encourage private land owners to implement retrofitting projects.

Comment # 85 **Commentor** 5 **Comment Subject** Legal

Specific Comment

8. THE TENTATIVE ORDER LACKS FLEXIBILITY IN IMPLEMENTING LOW IMPACT DEVELOPMENT AND HYDROMODIFICATION REQUIREMENTS

The Tentative Order requires that development projects include prescriptive Low Impact Development ("LID") requirements. (See, e.g., Section F.1 of the Tentative Order). The Tentative Order also requires the Permittees to develop and implement a Hydromodification Management Plan ("HMP") for the same development projects. (Section F.1.h. of the Tentative Order) However, the LID and HMP provisions are not required by federal law and violate state law in that, among other things, they prescribe how the Permittees are to comply with the MEP standard. See Water Code §13360(a). Moreover, the LID and HMP provisions in this Tentative Order are overbroad and will not necessarily result in any improvement to the quality of water entering Waters of the U.S.. For example, HMP requirements for hardened channels will not have any water quality benefits. Finally, to the extent the LID requirements would interfere with downstream or upstream water rights holders, compliance with the requirements potentially expose the Permittees to common law liability.

In addition, the Regional Board's imposition of a highly prescriptive Low Impact Development strategy may have an unintended consequence-potential lawsuits from downstream users of the surface water that the City is now purportedly "diverting for reuse or infiltration." As one attorney expert in the field of water law has put it:

"First, to the extent that one can obtain a right to capture diffuse surface waters ... any capture of diffuse surface waters without a permit from the State Water Resources Control Board could well be a trespass against the State of California. Second, even if one cannot obtain a 'right' to diffuse surface waters, though, the capture of such waters in a manner that interferes with the diversion of the same water once it reaches a watercourse constitutes injury to legal users of water that rely on such diffuse surface water contributing to the water that they are able to divert."

D. Aladjem, "Who Owns the Water? The Looming Conflict Between Low hnpact Development and the Water Rights System" at p.5 (paper presented at American Bar Association 17th Enviromnental Law Fall Section Meeting, Sept. 24, 2009).

The City believes that the law in this area, particularly with respect to ownership of diffuse surface waters, is quite uncertain. The City also believes that, to the extent that the Regional Board imposes these additional obligations upon the City pursuant to the Permit, then the Regional Board should insert sufficient findings and authorization for the capture of surface water through LID systems to protect the City against claims of either a trespass against the State or claims of unlawful diversion of stormwater that would otherwise flow into watercourses that might be the subject of claims of diversion rights by downstream users.

Because the LID and HMP provisions are not required by federal law and violate state law, the City requests that the Board members direct staff to insert sufficient findings and authorization for the capture of surface water through LID systems to protect the City against claims of either a trespass against the State or claims of unlawful diversion of stormwater. In addition, the City also requests that the Board members direct staff to modify the language in the Tentative Order to provide the Permittees with required flexibility in implementing the LID and HMP requirements.

Comment Response

The Tentative Order provides flexibility to implement the LID and HMP requirements. We fail to understand how the commenter can assert that the LID and HMP provisions are too prescriptive (implying too little flexibility), and then assert that the same provisions allow too much flexibility. The LID and HMP provisions provide flexibility that is consistent with both federal and state laws.

The Tentative Order includes design and performance standards for the LID requirements. The Tentative Order requires the Copermittees to develop an HMP which must include design and performance standards. The Tentative Order does not specify the methods for implementation of those design and performance standards. The method of compliance is left to the discretion of the Copermittees. The Tentative Order also allows a waiver of design and performance standards providing more flexibility to Copermittees and project proponents. The Tentative Order does not mandate method of compliance and is consistent with state laws.

The LID and HMP provisions have been included to provide more specificity, in the form of design and performance criteria, to direct the Copermittees to improve their storm water and non-storm water management programs to be more

protective of water quality. The additional specificity is consistent with federal law.

In regards to the potential water rights issues, the San Diego Water Board does not perceive a conflict and the commenter has not established that implementation of LID and HMP requirements in fact has the potential to impair existing water rights or that the San Diego Water Board is precluded from adoption water quality provisions that may potentially impair existing water rights. The concept of LID is to infiltrate and retain as much of the water on site. The concept for the HMP is to mimic the natural infiltration, runoff and drainage patterns as much as possible. In both situations, the expected and desired result is more groundwater recharge and more natural in-stream flow conditions. More groundwater and higher groundwater levels would provide more water supply to water purveyors in the watershed, and would also likely result in more downstream flow when the groundwater re-surfaces in the lower parts of the watershed. The LID and HMP provisions also provide higher quality water in downstream flows.

Comment # 86 **Commentor** 5 **Comment Subject** Legal

Specific Comment

9. THE TENTATIVE ORDER DOES NOT CONSIDER COSTS TO IMPLEMENT THE STORMWATER AND NON-STORMWATER ACTION LEVELS AS REQUIRED BY FEDERAL LAW, AND THE WATER QUALITY BENEFITS ACHIEVED BY THESE REQUIREMENTS HAVE NOT BEEN ADEQUATELY CONSIDERED BY THE REGIONAL BOARD

Federal law requires that permittees effectively prohibit the discharge of pollutants in nonstormwater into the MS4 and to reduce the discharge of pollutants in stormwater from the MS4 to the maximum extent practicable. To assist the Permittees in meeting these two standards, the Tentative Order imposes action levels on pollutants in the discharge of stormwater (SALs) and nonstormwater (NALs) from the MS4. (Sections C and D on pages 20 and 23, respectively, of the Tentative Order.). Ideally, action levels would be a tool that would help the City focus resources on more significant water quality problems. However, the City is concerned that, depending on how the provisions are interpreted, the cost to implement the action levels may far outweigh any benefit to water quality. Moreover, rather than a tool to help the Permittees, the action levels may be used against the Permittees.

As an initial matter, the City objects to the distinction made in the Tentative Order between the discharge of stormwater from the MS4 and the discharge of non-stormwater from the MS4. Federal law does not support this distinction. Under federal law, permittees must control the discharge of pollutants from the MS4 to the maximum extent practicable, regardless of whether the pollutants are in storm water or non-stormwater. Permittee's obligation with respect to non-stormwater is to effectively prohibit the discharge of pollutants in non-stormwater into the MS4. To the extent the Permit imposes separate requirements on the discharge of pollutants in non-stormwater from the MS4, such requirements must be supported by state law.

Because neither the SALs or NALs are required by federal law, the Regional Board must comply with state law in imposing these requirements. For example, in issuing waste discharge requirements under State law, the Regional Board must consider certain factors, including the water quality conditions that could be reasonably achieved and economic considerations. Water Code §§ 13263(a) and 13241. The City is hopeful that the Tentative Order's SAL and NAL provisions will provide the City with flexibility to prioritize its response to any actual exceedances. However, if the City is required to respond to and address all exceedances without reasonable prioritization, the cost will be significant. Because some exceedances will not be indicative of impacts to water quality, the cost to implement the SALs and NALs may have little if any commensurate environmental benefit. There is nothing in the record that suggests that the Regional Board has considered these water quality and economic factors.

Accordingly, the City requests that the Board members direct staff to provide the analysis required under state law to ensure that economic factors are considered and that the water quality goals are reasonably achievable through implementation of the SALs and NALs.

Comment Response

The provisions of the MS4 Permit are based on and fully supported by federal requirements, as demonstrated by the broad and specific legal authority cited in the Fact Sheet . The San Diego Water Board considered economic information in developing the Tentative Order, but federal NPDES regulations do not require that the San Diego Water Board conduct a cost-benefit analysis. The San Diego Water Board did, however, modify the requirements in the Tentative Order based on the economic considerations provided by the Copermittees. Please see the response to comment 9 for additional discussion about modifications made to the Tentative Order based on the economic considerations.

The Clean Water Act makes a clear distinction between the regulation of stormwater and non-stormwater discharges by requiring that MS4 Copermittees effectively prohibit non-stormwater discharges from entering the MS4. Since non-stormwater discharges are to be effectively prohibited, then clearly the very next requirement (402(p)(3)(B)(iii) that requires polluant discharges from the MS4 be reduced to the MEP) intends that the discharge of pollutants be limited to storm water. Please see the Fact Sheet discussion for Finding C.14 for further clarification.

Comment # 87	**Commentor** 5	**Comment Subject** TMDL

Specific Comment

10. THE TENTATIVE ORDER IMPROPERLY INCORPORATES TOTAL MAXIMUM DAILY LOAD W ASTELOAD ALLOCATIONS

The Tentative Order includes limitations based on wasteload allocations ("WLAs") developed in fully approved and adopted Total Maximum Daily Loads ("TMDLs"). (Section I of the Tentative Order.) The Tentative Order characterizes the limitations as Water Quality Based Effluent Limitations. However, the WLAs are to be achieved in the receiving water. Accordingly, the City considers the limitations to be receiving water limitations. See, e.g., State Board Order WQ 2009-0008. The Permittees are to comply with the limitations by implementing best management practices ("BMPs").

Federal and state policy provide that an iterative BMP approach is appropriate in MS4 permits for achieving receiving water limitations. See, e.g., State Board Order WQ 99-05. Where existing BMPs are not sufficient to meet the receiving water limitations, permittees are to implement more effective BMPs. This approach is consistent with the MEP standard governing the discharge of all pollutants from the MS4. The City submits that to be consistent with federal and state policy, the Permit must be clarified to provide for compliance with WLAs through an iterative BMP approach. To the extent the Regional Board can rely on state law to support the TMDL provisions, the City submits that the Regional Board has not complied with relevant requirements (e.g., Water Code§§ 13000, 13263(a), 13241, etc.). Accordingly, the City requests that the Board members direct staff to revise the Tentative Order's TMDL provisions to be consistent with federal and state law and policy.

Comment Response

The Tentative Order properly characterizes wasteload allocations (WLAs) assigned to MS4s for fully approved and adopted Total Maximum Daily Loads (TMDLs) as water quality based effluent limitations (WQBELs). Federal regulations (40 CFR 122.44(d)(1)(vii)(B)) require that NPDES requirements incorporate WQBELs that must be consistent with the requirements and assumptions of any available WLAs. In accordance with 40 CFR 122.44(k)(2)&(3), WQBELs may be expressed as numeric effluent limitations, when feasible, and/or as a BMP program of expanded or better-tailored BMPs. Currently, no TMDLs have been developed for the Upper Santa Margarita Watershed. When a TMDL is developed, it will be included in Section I of the Order. Depending on how the TMDL is developed, and the requirements and assumptions included in the TMDL to assign the WLA to the MS4 discharges, the WQBELs included in the MS4 Permit may be in the form of numeric effluent limitations, receiving water limitations, an expanded or better-tailored BMP program, or a combination of them.

Comment # 88 **Commentor** 10 **Comment Subject** Economic

Specific Comment

Though the Permit, as other past permits, requires a Fiscal Analysis, the Copermittees are surely to view this component of the Permit as another draconian measure that requires them to "check the box" as opposed to viewing this Permit condition as a tool. Copermittees should rather use the Fiscal Analysis requirement to plan ahead, financing necessary projects and measures not only for Permit compliance, but to achieve actual water quality improvements. (H.1.).

The current practice with respect to the Fiscal Analysis component of storm water permits is exemplified in the City of San Diego's 2009 Annual Report. This Report provides a "Future Projection" analysis consisting of two paragraphs which simply reiterate funds are generated from general fund and non-general fund sources, and costs will continue to rise. Earlier in the same section, the City provides an explanation of how funds are generally used, but provides no insight into the amount of money applicable to each funding source.

Such cursory fiscal analysis is common in Annual Reports, while municipalities refuse to face the real problem. They continuously fail to adequately pass on the true costs of compliance. Time and again, environmental groups and the Regional Board are faced with the same excuse: protecting water quality and restoring beneficial uses is too expensive. From Permit approval to Permit implementation, the same excuse persists. Nonetheless, the reluctance of the Copermittees to adequately fund their respective storm water programs is not the result of a lack of desire to improve water quality by municipal staff or managers, but rather poor decisionmaking and lack of political will. Decisionmakers at the city and county level must pass their costs on to those reaping the benefits. Recent news articles highlight the City's reluctance to increase storm water fees, requiring 95 cents per month per residence across the board, while to recoup its costs, the City should be charging $3 per month.

Now is the time for the Regional Board to clearly articulate in the Permit: noncompliance due to cost will not be tolerated. The Permit is a tool underutilized by Copermittees to obtain necessary funds and plan for the future. If the Copermittees once again fail to use Permit section H., they risk enforcement action. We urge the Regional Board to make clear that noncompliance due to cost is not an excuse. After almost three decades, Copermittees should no longer be allowed to claim poverty as an excuse for post-approval weakening of permits and the requirements therein.

Comment Response

The San Diego Water Board does not consider the ability of a Copermittee to fund a program in determining compliance with the provisions of the MS4 Permit. We agree that the Copermittees are responsible for securing the resources necessary for meeting the requirements of the Tentative Order. Please see the responses to comments 8 and 9. In addition, the "Need to halt or reduce activity is not a defense" per the standard provisions in Attachment B.1(b) and 40 CFR 122.41(c). Also, at Attachment B.(7)(m) and 40 CFR 122.41.(a) states that "ANY noncompliance with this Order constitutes violation of the CWA and is grounds for denial of an application or modification of the Order."

Comment # 89 **Commentor** 10 **Comment Subject** General

Specific Comment

Individual residential car washing is currently listed as exempt from the prohibition against nonstormwater discharge. However, this allowance contradicts other permit sections that evidence the negative water quality impact residential car washing poses. Indeed, car washing is specifically listed as a threat to water quality in the residential permit section. (F.6.b.(3)). It is also provided as an example topic for discussion in the education component for residential and general public outreach. (F.6.b.(4)). Clearly a threat to water quality, and a water supply issue, residential car washing should not be made exempt simply because it requires a change in public behavior. Just as over-irrigation should not be exempt non-storm water, neither should this source of urban runoff.

Comment Response

Neither the San Diego Water Board nor the Copermittees have yet identified residential car washing as a significant source of pollutants that must be prohibited. We invite the commentor to provide the San Diego Water Board with data and studies to satisfy their request in future permits. Please see the response to comment 27.

Comment # 90 **Commentor** 10 **Comment Subject** Action Levels

Specific Comment

As mentioned above, the Bay Council is extremely supportive of the inclusion of NALs and SALs in this Permit. However, the vague Permit language leaves much to be desired. The Permit requires investigation and source identification for a NAL exceedance in a "timely manner". (Permit C.2. and C.3.). It is entirely unclear what constitutes a "timely manner". Further, because the NALs are an illicit discharge identification and elimination tool, time is of the essence. (C.2.b.). In many instances, a NAL exceedance must be investigated contemporaneously with the return of monitoring results, or the source will evade detection. Therefore, the Regional Board should impose a strict numeric deadline for "timely action". We suggest the Copermittee begin investigation of the source of the exceedance the business day following receipt of the monitoring results. The investigation should be expedited, and should not take more than two weeks.

Comment Response

The San Diego Water Board chose the phrase "timely manner" to allow Copermittees flexibility to prioritize investigations and source identification when a multitude of action level exceedances are identified. Also, the phrase "timely manner" allows for the differing return times of field data and lab data. Certainly, field analysis indicating an exceedance should be immediately responded to whereas lab analysis may take weeks to return data which then would initiate an investigation. It is unacceptable to wait for a lengthy QA/QC analysis prior to initiating an investigation; nor is it acceptable to solely rely on subsequent monitoring actions to address the cause of an exceedance.

Comment # 91 **Commentor** 10 **Comment Subject** Monitoring

Specific Comment

In addition, development of the monitoring plan for dry weather is largely left to the Copermittees. (Permit, Attachment E, C.1.b.). Sampling frequency must simply be "representative" of major outfalls and identified stations within each hydrologic subarea. (Id.). The actual frequency of sampling is not mentioned at all. As with most plans developed by Copermittees, this monitoring plan will surely be greatly and artificially constrained by costs. Therefore, we urge the Regional Board to set a minimum monitoring frequency that is scientifically sound, as opposed to a cost-driven frequency.

Comment Response

The referenced section has been written to provide flexibility to the Copermittees when selecting the number and frequency of monitoring major outfalls and identified stations that are a "representative percentage." Thus, the San Diego Water Board expects that the Copermittees will utilize current 303(d) listings, land use, the history of IC/ID complaints and the sensitivity of receiving waters in the selection and sampling of outfalls in order to, at a minimum, obtain a representative percentage over the permit term. The Copermittees have also identified in their ROWD that their current monitoring approach is not consistent with IC/ID requirements. It should be noted that the Copermittees, by being extended a chance to propose the program, have an opportunity to examine other MS4 non-storm water IC/ID programs in the region. Finally, the San Diego Water Board requires the Copermittees to submit their proposed monitoring plan for review prior to implementation.

Comment # 92 **Commentor** 8 **Comment Subject** Monitoring

Specific Comment

Prior to the submittal of the ROWD, the Copermittees met with Board staff to propose changes to the Monitoring and Reporting Program (MRP). In these discussions, Board staff identified two areas for needed improvement:

• Relocation of Illicit Connection I Illicit Discharge (IC/ID) monitoring stations to MS4 outfalls, and
• Incorporation of Action Levels

In more recent discussions, Board staff noted that the MRP needed significant modification to reflect the South Orange County MRP, but would be scaled to be appropriate to the smaller Santa Margarita Region.

[Per Capita Monitoring Cost Comparison Table]

Unfortunately, the final MRP requirements have been expanded well beyond the South Orange County MRP requirements, resulting in a program that is completely out of proportion with the needs and resources of the Santa Margarita Region. In fact, the proposed MRP requirements will result in a 500% increase in monitoring program costs, costing our residents over two and a half times the per capita costs for South Orange County.

The Copermittees recognize that monitoring and data collection is necessary. However, the MRP requirements exceed what is necessary to address management questions related to water quality, are beyond requirements dictated in the South Orange County MRP, and are beyond the Copermittees' ability to fund. Not only are the level of requirements inappropriate for the Santa Margarita Region, but they disregard the economic realities faced by the Copermittees. As such, the MRP fa lls far short of meeting the Executive Officer's stated goals of affordability.

In the interest of finding ways to offer Board staff a comparable program in a more cost effective and appropriate manner, the Copermittees have identified nine adjustments to the MRP that will save approximately seven hundred and eighty thousand dollars ($780,000) annually and bring per capita monitoring costs more in line with the South Orange County MRP, while maintaining the core components of the MRP. Table I summarizes the key changes and the respective cost savings. It is important to note that any change highlighted in RED reflects bringing the program in line with the South Orange County MRP. Figure I below shows graphically the comparative costs for the draft MRP with and without the requested adjustments. Please note that the 100% baseline in Figure 2 reflects the current cost of the Copermittees' current MRP.

[Table 1 - Cost Savings resulting from proposed MRP changes]
[Figure 1 - graph comparing draft permit costs with Requested Changes]
[Cost comparison table with Proposed Changes]

Although the requested adjustments to the MRP will not eliminate cost increases, and will result in an MRP which is more expensive, on a per capita basis, than the South Orange County MRP, they provide a more manageable program for the Copermittees.

The City requests that the Board make the adjustments identified above before Permit adoption.

Comment Response

The two areas discussed during the ROWD meetings were identified because they were proposed by the Copermittees in the ROWD. San Diego Water Board Staff also have made it clear through the process that water quality monitoring requirements under the Tentative Order were expected to be relatively consistent with San Diego and Orange County, as well as the 2004 SMC Report.

San Diego Water Board staff contend that the monitoring required in the Tentative Order has not been expanded “well beyond the South Orange County MRP requirements.” The MRP in the Tentative Order has actually been scaled back where appropriate, and many elements of the San Diego and Orange County MRPs are absent from the Riverside MRP. Furthermore, San Diego and Orange County MRPs in 2007 and 2009, respectively, had reduced monitoring requirements based upon the level of data collection during the previous permit terms. USEPA audits conducted in January 2008 (USEPA Region IX MS4 Inspection Report Riverside County Flood Control and Water Conservation District and County of Riverside, dated 03/31/2008), and subsequent enforcement action by the San Diego Water Board (Notice of Violation No. R9-2008-0053 and No. R9-2010-0074) documented significant short-comings in the Copermittees MRP. Thus,

reductions similar to those for Orange and San Diego County are not warranted.

The San Diego Water Board agrees that monitoring and data collection is necessary, and would go farther to state that water quality monitoring is a critical component of MS4 permits. The San Diego Water Board is attempting to make monitoring requirements for MS4 permits relatively consistent for Copermittees throughout the San Diego Region (see Finding E.12 and Discussion in the Fact Sheet). This is also consistent with Senate Bill 72 (Kuehl), which addressed the standardization of sampling and analysis protocols in municipal stormwater monitoring programs. In response to Senate Bill 72, the Stormwater Monitoring Coalition's Model Monitoring Technical Committee developed a Model Monitoring Program for Municipal Separate Storm Sewer Systems in Southern California in 2004. The San Diego Water Board, as well as Riverside County Copermittees, were represented during the development of the model monitoring program. The monitoring program under the current order (R9-2004-0001) includes some, but not all, recommended monitoring program elements in the 2004 report. In contrast, the San Diego and Orange County MS4 permits contain monitoring programs whose structure and requirements are built upon the 2004 report.

The MRP in the draft tentative order is built upon the 2004 report, and program elements mirror those in the San Diego and Orange County MRPs. Similar to the San Diego and Orange County MRPs, flexibility has been included to aid the Copermittees in determining some level of cost, as well as monitoring direction and focus. It is important to note that the MRP in the current Order does not meet the level of water quality monitoring required in San Diego and Orange County, as well as that prescribed in the 2004 report. Thus, it is expected that additional resources will be required for the Copermitttees to develop a MRP that will sufficiently characterize water quality while meeting the goals and objectives in the 2004 report. As noted above, during the term of the current Order, the Copermittees MRP were audited for permit compliance. These audits found significant deficiencies in the Copermittees MRP. In response, the Copermittees have stated that funds have been spent to meet monitoring requirements under the current Order. It is unknown if the increase in monitoring costs stated by the Copermittees is based upon levels of spending before or after money was allocated in the Copermittees' attempts to bring monitoring into compliance with the current MRP.

Furthermore, USEPA (61 Fed Reg 43761) has addressed the question regarding the quantity of storm water monitoring required for MS4 NPDES permits: "The amount and types of monitoring necessary will vary depending on the individual circumstances of each storm water discharge. EPA encourages dischargers and permitting authorities to carefully evaluate monitoring needs and storm water program objectives so as to select useful and cost-effective monitoring approaches. For most dischargers, storm water monitoring can be conducted for two basic reasons: 1) to identify if problems are present, either in receiving water or in the discharge, and to characterize the cause(s) of such problems; and 2) to assess the effectiveness of storm water controls in reducing contaminants and making improvements to water quality." Again, 2008 USEPA audits found that the monitoring in the current MRP to be insufficient. For example:

"it is unclear how the District is using its monitoring programs to measure the effectiveness of the BMPs it has implemented and to accordingly identify modifications and improvements needed to its SWMP (or DAMP as it is referred to by the permittee)."

And:

"The number and location of illicit discharge monitoring stations did not appear to be effective or sufficient to represent the MS4 and detect illicit discharges that may occur throughout the system."

It is also important to note that while the San Diego Water Board is attempting to make MRP requirements relatively consistent, there are differences in the Riverside MRP when compared to Orange and San Diego County. First, although the Copermittees permit area includes Santa Margarita HU and the San Mateo HA, which drains to portions of San Diego County, the MRP within the Tentative Order does not require any monitoring of downstream receiving waters outside of Riverside County. This is despite the fact that these areas are subject to the discharge from MS4s in Riverside County. While Orange and San Diego County MRPs include monitoring requirements for bays, estuaries, lagoons, and the ocean, the Riverside MRP does not. MRP requirements under the draft Tentative Order are limited to inland surface waters.

Comment # 93	**Commentor** 8	**Comment Subject** Unpaved Roads

Specific Comment

The requirements for unpaved roads are particularly cumbersome, onerous and unreasonable. In summary, the proposed unpaved road requirements may result in substantial and unnecessary additional Copermittee costs that are not justified by the facts in the Santa Margarita Region. The Copermittees believe that the existing MS4 Permit requirements for new development, construction, maintenance and
IC/ID adequately address regulation of unpaved roads that threaten water quality. If the Regional Board believes that unpaved roads require further regulation, the Copermittees believe that the appropriate regulatory mechanism is a general permit (Waste Discharge Requirements or NPDES permit) that would apply to all unpaved roads in the San Diego Region, rather than only those that are under the jurisdiction of the Copermittees.

The City requests that Sections F.1.i, F.3.a.(11) and F.3.c.(5) regulating unpaved roads be deleted from the draft MS4 Permit.

However, should the Water Board insist on retaining unpaved road requirements in this Permit, the Copermittees request the following revisions. These revisions are needed to ensure that all parties have a clear understanding of the requirements. In summary, the Copermittees request:

• Clarification that these requirements apply to those unpaved roads that the Copennittees maintain in their road system.
  - This should be commonly understood, but the clarification is important to include due to complex legal limitations and rights associated with access, ownership, and maintenance of unpaved roads.
• Removal of language that specifies specific BMPs that must be implemented.
  - Specifying the method ofcompliance is prohibited pursuant to CWC section 13360, and inappropriately forces the Copermittees to adopt paliicular solutions that may not best fit the situation.
• Removal of requirement for BMPs for private unpaved roads.
  - The proposed requirements would require the creation of an additional and unnecessary program element addressing privately owned unpaved roads. The Copermittees believe that a focused public outreach program should be implemented to educate property owners and associations about the need to properly maintain unpaved roads. This education program combined with existing IC/ID enforcement capabilities seems a more reasoned and responsible response to addressing this issue.

Should Sections F.1.i, F.3.a.(1l) and F.3.c.(5) regulating unpaved roads not be removed from the Permit, the City requests they be modified as noted above.

Comment Response

Please see the responses to comments 101, and 138-141.

Comment # 94	**Commentor** 8	**Comment Subject** New Development

Specific Comment

Section F.I.f of the draft MS4 Permit includes new requirements for the Copermittees to verify that Post-Construction BMPs are being appropriately maintained. The new requirements appropriately develop a risk-based approach to inspections, defining eight factors that the Copermittees must consider in determining 'high-priority' projects.

However, language in Section F.1.f.(2)(a) removes that discretion by stating:

'At a minimum, high priority projects include those projects that generate pollutants (prior to treatment) within the tributary area of a 303(d) listed waterbody impaired for that pollutant; or those projects generating pollutants within the tributary area for an observed action level exceedance of that pollutant.'

This language is excessively broad, and will require virtually all sites in the watershed to be designated as ' high priority' and therefore subject to annual in spections. This language is inconsistent with the goals of a socia lly responsible and affordable permit and should be modified for several reasons:

• Inspections frequencies should be based on risk of discharge. Annual inspections are not needed for all sites that generate a specific pollutant. For example, if a site generates a pollutant associated with 303(d) listing, but the site retains runoff onsite or stores those pollutants indoors,
annual inspections would be unnecessary. However, sites that store 303(d) listed pollutants outdoors or otherwise have a high risk of discharge should be inspected more frequently.

• The language dilutes Copermittee resources by requiring annual inspections of low-risk sites, preventing the Copermittees from appropriately concentrat ing resources on problematic sites/sources. This is because when an action level is exceeded then all parties in the watershed
are assumed guilty until proven innocent.

While the Copermittees are not opposed to implementing a program to verify that these BMPs are being maintained, it is critica lly important that they be provided the flexibility to determine which sites warrant annual inspections. Specifically, the City requests that the language in F.1.f.(2)(a) be amended as follows prior to adoption of the Permit:

'At a minimum, high priority projects include those projects that have been determined to be the source of an observed action level exceedance.' [final proposed text - proposed amended language in underline/strikeout text not shown]

Comment Response

The San Diego Water Board recognizes that the language in F.1.f.(2)(a) may be too broad and may result in identifying many SSMP projects as high priority projects. Thus, we have revised the language to provide more specificity, which will limit the number of SSMP project sites that will need to be inspected.

Comment # 95 **Commentor** 10 **Comment Subject** Reporting

Specific Comment

Most Copermittees expend tremendous resources on preparing and submitting their Annual Reports, but view this requirement as overly burdensome and largely an exercise in futility. After reading numerous and varied municipality Annual Reports, we tend to agree. Annual Reports are massive documents with surface-level detail, no depth, and very little substance. Copermittees are loath to point out any failures or inadequacies in their storm water programs, and virtually never highlight deficiencies. Instead, systemic issues such as lack of enforcement and funding, evident during field visits, remain unmentioned in Annual Reports.

Therefore, the Bay Council suggests a more appropriate tool for public involvement, reporting, and monitoring progress would be real-time or quarterly electronic reporting. The State Water Resources Control Board has moved into the digital age, making a variety of documents and reports publicly available via the internet. We encourage the Regional Board to work with Copermittees, utilizing the permissive Permit language to explore such a possibility. Neither the Regional Board, nor the individual Copermittee, is served by rigid reporting requirements that result in largely unread or useless documents. (Permit, K.)

Specifically, the dry and wet weather monitoring results should be available publicly online as soon as the results are received. NAL and SAL exceedance real-time reporting would benefit Copermittees as the public could aid in investigations or prove an otherwise valuable source of
information. Such real-time reporting might also prove a successful deterrent to illicit discharges. The Copermittees should further report inspections, BMP maintenance tracking, and SSMP project inventories quarterly. Construction site, municipal, industrial, and commercial inspections should also be reported quarterly. This type of information is invaluable to the public and the Regional Board, but is largely unavailable to either as Annual Reports are an attempt to summarize such information compiled over long periods of time. Smaller doses would prove more useful and easily digestible.

Comment Response

The San Diego Water Board agrees with the comment regarding the importance of making information, especially water quality monitoring results, available to the public for review. Although real-time data reporting is an admirable goal, the feasibility of real-time uploading is unknown. The San Diego Water Board does not want to include permit requirements where real-time uploading somehow limits IDDE monitoring and response which may be time-sensitive.

The MRP (Attachment E to the Tentative Order) requires the data collected to be SWAMP compatible, and other Regional Water Boards have already required Copermittees to upload data into on-line databases. Thus, the MRP section has been modified to require the Copermittees to upload water quality data into the California Environmental Data Exchange Network (CEDEN, http://www.ceden.org/) to facilitate the exchange of data between resource agencies, Copermittees, research institutions, and the public.

Comment # 96	**Commentor** 8	**Comment Subject** Commercial/Industrial

Specific Comment

Sections F.3.b.(1)(a)(i) and (ii) identify forty-two (42) categories of businesses that must be inventoried and inspected based on risk of pollutant discharge. However, Section FJ .b.(I)(a)(iii) adds virtually any business in the Permit area, independent of pollutant discharge risk:

'All other commercial or industrial sites/sources within or directly adjacent to or discharging directly to receiving waters within environmentally sensitive areas (as defined in Attachment C of this Order) or that generate pollutants tributary to an observed exceedance of an action level.'

[n effect, section F.3.b.(I)(a)(iii) adds the following additional businesses:

• EVERY business that is adjacent to (or within) an Environmentally Sensitive Area (ESA), regardless of whether the business generates or discharges any pollutants, and

• EVERY business that 'generates' pollutants which happens to be upstream of an action level exceedance, regardless of whether the site has ever discharged any pollutants.

This language expands the list of sites far beyond the current requirements, and well beyond those sites that actually pose a threat to water quality. This is clearly unnecessary and should be removed for several reasons:

• It inappropriately separates 'risk' from the 'response' , by requiring the Copermittees to inspect businesses irrespective of the risk that the business poses to water quality. For example, this language would require the Copermittees to expend resources and time inspecting hair salons, office buildings and other activities that happen to be adjacent to an ESA. This inappropriate broad-brush approach to permitting actually works to discredit the Copermittees NPDES programs and dilute resources, rather than enhancing protection of water quality.

• It will further remove the flexibility that the Copermittees need to be able to re-allocate resources to inspecting and following up with sites/sources that are problematic.

Therefore, the City requests that the language in F.3.b.(1)(a)(iii) be amended as follows prior to adoption of the Permit:

'All other commercial or industrial sites/sources that have been determined to be the source of an observed exceedance of an action level.'
[final proposed text - proposed amended language in underline/strikeout text not shown]

Comment Response

The San Diego Water Board recognizes that the language in F.3.b.(1)(a)(iii) may be too broad and may result in including too many commercial/industrial sites in the inspection requirements. Thus, we have revised the language to provide more specificity, which will limit the number of commercial/industrial sites that will need to be inspected.

Comment # 97	**Commentor** 10	**Comment Subject** Hydromod

Specific Comment

As with the San Diego HMP, the exemption for conveyance channels whose bed and bank are concrete lined all the way from the point of discharge to water storage reservoirs and lakes will prevent rehabilitation of these areas, especially in light of the retrofit requirements elsewhere in the Permit. (Permit, F.1.h.(4)(b)). Moreover, this exemption encourages continued channelization efforts. We urge the Regional Board to remove this exemption.

Comment Response

The San Diego Water Board does not agree that this exemption encourages continued channelization efforts. The exemption may only be used if the concrete lined channels already exist and does not prevent future retrofitting or rehabilitation. Also, the exemption cannot be used as justification to install additional concrete lined channels if they do not already exist. We also do not expect there to be many existing concrete lined channels that can be utilized for the exemption. Removal of this exemption may be considered in future iterations of the MS4 Permit.

Comment # 98	**Commentor** 8	**Comment Subject** Commercial/Industrial

Specific Comment

Section F.3.b.(4)(a) specifies what the Copermittees must review when performing an inspection. The new requirements in sub sections (i) and (ii) to review BMP implementation plans, and review facility monitoring data, respectively, are an unnecessary new mandate. They should be removed for several reasons:

• The requirements burden the Copermittees with reviewing information that is required under General Permits and is the responsibility of the Regional Board to enforce.

• The requirements would significantly increase the inspection time for sites with General Permits and endanger an existing collaborative inspection program (Compliance/ Assistance Program (CAP)) that leverages the time that highly trained Environmental Health Inspectors spend onsite for Certified Unified Program Agencies (CUPA) and Food Services inspections to also conduct NPDES inspections. The CAP program not only utilizes highly trained Environmental Health inspectors, but also regionalizes the inspections and therefore provides multiple benefits including uniformity, reduction in total number of inspections and higher-quality inspections. The Environmental Health HazMat inspection program administrators have indicated that they cannot accommodate the additional time required to implement the new requirements, as they would unduly cut into their ability to meet their own state-mandated inspection frequencies.

• By virtue of eliminating the CAP program, the requirements would effectively mandate a more fractured and disconnected set of inspections for the businesses, contrary to CAL EPA mandates for consolidated inspections, and in turn diluting the effectiveness of the program.

The City requests that the language in F.3.b.(1)(a)(iii) be amended as follows prior to adoption of the Permit:

(a) Inspection Procedures: Inspections must include but not be limited to:
(i) [Delete]
(ii) [Delete]
(iii) Check for coverage under the General Industrial Permit (Notice of Intent (NOI) and/or Waste Discharge Identification Number), if applicable;
(iv) Assessment of compliance with Copermittee ordinances and Copermittee issued permits related to runoff;
(v) Assessment of the implementation, maintenance and effectiveness of the designated minimum and/or enhanced BMPs;

Comment Response

The San Diego Water Board disagrees with the proposed changes. The San Diego Water Board disagrees that including a review of the BMP management plans and monitoring data, if available, would significantly increase inspection times and endanger the Copermittees' CAP program. Availability of BMP management plans and monitoring data are expected to be limited to few industrial sites not otherwise inspected by the CAP.

Inspectors can obtain valuable information for conducting their site inspections if a BMP management plan (.e.g., SWPPP or SPCC) is available for review, and if the site has collected monitoring data. Reviewing a BMP management plan can actually reduce inspection time by providing the inspector information about where BMPs and storm drain inlets are implemented and/or located. Reviewing monitoring data can inform the inspector of the types of pollutants that may be generated at a site and compliance with local ordinances, and will only take a few minutes to review. HazMat inspectors should already be inspecting these types of information. CAP inspectors can easily be trained to review these types of information. The Tentative Order does not prohibit the Copermittees continued coordination with CAP to conduct inspections and compliance oversight.

The Copermittees expressed some concern that BMP implementation plans may be interpreted as the SSMP that is developed for the site. The Tentative Order has been modified to clarify that BMP management plans do not include SSMPs (or WQMPs) that are developed for the development of the site. As such, clarifying language has been included in the errata for the Tentative Order.

Comment # 99 **Commentor** 8 **Comment Subject** Retrofit

Specific Comment

Section F.3.d, proposes a program to develop an inventory of existing developments that may be candidates for future water quality retrofits, The requirement goes on to encourage the Copermittees to collaborate with local property owners to promote urban retrofit in an effort to accelerate reductions in pollutant loading from existing urban areas.

Although laudable, this requirement has two significant problems:

1) The program is self-defeating as it contains no "carrots" to lure private property owners into participating in the program, Any property owner that is interested in volunteering in this effort would be required to fully comply with all provisions of the draft MS4 Permit. This includes preparation of compliance documents such as SSMPs, LID and hydromodification studies, subjecting themselves to additional regulatory scrutiny through business and BMP inspection programs required by the MS4 Permit, and otherwise incurring a myriad of costs and requirements. These costs and requirements would provide a strong disincentive to participate in a retrofit program, This program will only work if it is modified to remove these disincentives.

2) Current and projected economic conditions will limit the interest and participation of private property owners, Long-term economic predictions for Riverside County indicate that assessed valuations and property values wi ll likely remain stagnant for the term of this Permit. Similarly, sales tax and unemployment are not expected to significantly improve either.

Without Co-Permittee resources to supplement private retrofit projects, the current economic disincentives for private redevelopment that are built into the program and the current impact of the economy on private property owners, there is no real value to the program.

PREFERRED POLICY CHOICE: The City strongly requests that this program be deleted for the aforementioned reasons.

Alternatively, and at minimum, the Copermittees request that the schedule for completion of the retrofitting program be revised to provide for development during the term of the Permit and submittal of the proposed program with the next ROWD. This will allow the Copermittees to defer expenditures related to development of the program until later in the Permit term when it is hoped that economic conditions and local revenues will improve. The Copermittees expect few opportunities for retrofit until the economy improves. Due to the Copermittee's limited ability to require retrofit on private property, our best opportunities for retrofit may be associated with approvals of proposed modifications of existing developments.

ALTERNATE POLICY CHOICE: If the Retrofit requirements are not removed, the City requests that the Regional Board modify Section F.3.d. as follows:

Each Copermittee must develop and implement a retrofitting program that meets the requirements of this section upon submittal of the ROWD.

Comment Response

The San Diego Water Board disagrees with the commenter's concerns. First, the San Diego Water Board disagrees that all retrofit projects on privately owned properties will be or must be subject to SSMP redvelopment requirements. Most retrofit projects will easily be less than 1 acre in size and not create, add, or replace 5,000 square feet of impervious surface. Thus, those projects would not be subject to the SSMP, LID, and HMP requirements.

Second, the San Diego Water Board disagrees with the assumption that the current economic conditions will limit interest from private property owners. Retrofit interest already exist through the CWA Section 401 certification program, Supplemental Environmental Projects (SEPs), and grant programs. Retrofits do not have to be expensive. Retrofits could be as simple as redirecting downspouts from roofs to pervious or landscaped areas instead of to hardscaped areas discharging directly to the MS4. Private property owners will show interest if they become educated about the benefits of retrofits, especially if they are inexpensive and easy to implement.

The San Diego Water Board disagrees with the commenter's request to remove or delay the retrofitting requirements from the Tentative Order. Discharges from existing development sites need to be mitigated, which generally means implementation of measures to retrofit existing development sites with storm water control measures that can retain and/or treat storm water on site. Retrofitting existing development is possible and reasonable to significantly improve water

quality in receiving waters. The USEPA supports including the retrofitting existing development requirements in the Tentative Order (see comment 17).

Finally, the San Diego Water Board has already reduced the scope of this effort, and delayed submittal requirements as a result of discussions with the Copermittees prior to release of the Tentative Order. Any further reduction or delay would result in significant missed opportunities for implementing feasible retrofitting projects. The Copermittees must begin the planning and preparation sooner rather than later to identify opportunities for implementing retrofit projects to protect water quality from discharges of pollutants from existing development. No changes were made based on this comment.

Comment # 100 **Commentor** 8 **Comment Subject** Overirrigation

Specific Comment

The Draft MS4 Permit categorically prohibits the discharge of landscape irrigation; irrigation water; lawn watering; (collectively 'irrigation runoff) and non-emergency fire fighting flow runoff to the MS4. The basis for this requirement comes from the current Orange County storm water permit within the San Diego Region (NPDES No. CASOI08740), which prohibits such discharges.

Although irrigation runoff may have been shown to be a problem in South Orange County, it has not been shown to be causing problems in receiving waters in the Santa Margarita Region. Attachment 6 summarizes the unique conditions and other facts that warrant the restoration of irrigation runoffas a nonprohibited non-storm water discharge category. lt is important to reiterate the three key points made in
Attachment 6

• Unlike the watersheds in South Orange County, the Santa Margarita Region is an ephemeral watershed;

• Unlike South Orange County, the Copermittees have not identified landscape irrigation, irrigation water or lawn water as an actual source of pollutants or conveyance of pollutants to waters of the U.S.;

• The draft MS4 Permit requires Copermittees to eliminate irrigation runoff TO THE MS4, which by definition, requires elimination of discharges to streets, curbs and gutters.

As noted above, the prohibition appears to hold the Copermittees responsible for any amount of irrigation runoff discharged to the curb and gutter, regardless of whether or not the discharge ever reaches receiving waters or causes or contributes to the exceedance of a water quality standard. This fact, combined with the fact that irrigation runoff has not been shown to be causing impairments in the local receiving waters, will make enforcement difficult to justify with residents and will likely result in community outrage over bans on irrigation. Further the Copermittees are not water purveyors, and as such, have little control over residential irrigation runoff outside of sending code enforcement officers out to look for incidents of excessive irrigation runoff. This is a very inefficient use of resources. In any event, the provisions as written will do little for water quality but potentially much for community outrage against water quality programs. The Copermittees do not believe this is the intent of the Board. It is further worth noting that the Permit already contains an investigation and remediation process via Non-Storm water Action Levels (NALs) by which the Copermittees will identify the source of problematic non-storm water discharges. Should the source be found to be a conditionally exempt nonstorm water discharge, the permit requires the Copennittees to address that discharge or the entire category of discharges as appropriate. By allowing the NAL process to determine when and where conditionally exempt discharges need to be prohibited, the Copermittees are better positioned to justify any enforeement actions.

PREFERRED POLICY CHOICE: The City requests that the Regional Board restore the conditional exemption for landscape irrigation, irrigation water and lawn watering.

Alternatively, if the Regional Board nevertheless insists on prohibiting Irrigation Runoff, the Copermittees request that the draft MS4 Permit be revised to allow for irrigation runoff to be managed as a JRMP program, rather than as a prohibited discharge to the MS4. This alternative request is eonsistent with how the Permit currently deals with non-emergency fire fighting discharges, which was also removed from the list of non-prohibited non-storm water discharges. The Executive Officer stated that he would be open to consideration of a program for irrigation runoff that would address discharges from the MS4. This alternative approach allows the Copennittees to develop a program that focuses on irrigation runoff problem areas, as opposed to holding the Copermittees responsible for eliminating any instant case of over-irrigation to a street independent of threat to receiving water quality.

ALTERNATIVE POLICY CHOICE: The City requests that the Regional Board clarify that irrigation runoff is only prohibited where it is discharged/rom an MS4 (into receiving waters) by adding the following language:

B.4. As part ofthe JRMP, the Copermittees must develop and implement a program to address pollutants from landscape irrigation, irrigation water and lawn watering identified as significant sources of pollutants to waters ofthe United States.

Comment Response

The San Diego Water Board agrees, in part, that the basis for prohibiting the discharge of overirrigation runoff and non-emergency fire fighting flow runoff into the MS4 is the Orange County MS4 Permit. The San Diego Water Board has also cited several other sources to justify the prohibition in the Fact Sheet. The San Diego Water Board does not agree with the commenter's recommendation to restore the overirrgation runoff categories as non-prohibited non-storm water categories. Please see the responses to comment 25, 27, 83, and 175.

The San Diego Water Board disagrees that the prohibition will make enforcement difficult to justify with residents and will likely result in community outrage over bans on irrigation. This is not a ban on irrigation; rather, overirrigation discharging to the MS4. The prohibition is consistent with the Water Conservation in Landscaping Act (AB1881), which already required cities and counties to adopted landscape water conservation ordinances prohibiting runoff from inefficient landscape irrigation by Janaury 1, 2010. The cities and counties are required to adopt ordinances that prohibit runoff from "the target landscape" to "adjacent property, non-irrigated areas, walks, roadways, parking lots, or structures." The Copermittees are already required to enforce these ordinances.

The San Diego Water Board disagrees with the the commenter's "Preferred Policy Choice". The change proposed by the commenter's "Alternative Policy Chioce" is not necessary. In the event that overirrigation runoff is identifed as an illicit discharge to "adjacent property, non-irrigated areas, walks, roadways, parking lots, or structures", which includes the Copermittees' MS4s, the Copermittees are expected to address the illicit discharge through their IC/ID programs. No changes were made based on this comment.

Comment # 101 **Commentor** 13 **Comment Subject** Unpaved Roads

Specific Comment

There are many different categories of unpaved roads within the unincorporated County area. These include County-Maintained unpaved roads, dedicated and accepted public roads (which are not County maintained), roads dedicated but not accepted, private roads, utility access roads, roads through tribal lands, and others. These roads are maintained by numerous entities besides the County, such as Homeowners Associations, quasi-public entities like County Service Areas, Community Service Districts, public and private utilities, Tribes, and in many cases, individual property owners. The County in fact is prohibited by law from spending general gas tax dollars (our main funding source) for maintenance of roads not in the County Maintained Road System, and is not financially able to take on new unpaved roads into the County Maintained System until they are improved to County Standards.

The proposed permit requirements would therefore impose an undue and substantial regulatory burden on the County and would create a class of potential unwitting "violators" that are not familiar with these requirements, including hundreds if not thousands of property owners that have been maintaining unpaved roads for many decades as needed to access their property. The special requirements for development and maintenance of unpaved roads were proposed by Regional Board staff for inclusion in the draft MS4 Permit very late in the process, after a number of weeks of discussions on the overall permit language and just prior to release for the Santa Margarita Region for public comment. During those discussions, unpaved roads were not raised by Regional Board staff as a source requiring additional regulatory attention.

Given the complexity of these jurisdictional issues, and the number of stakeholders that would be impacted, we respectfully request that the regulation of unpaved roads be removed from this permit. Alternatively, unpaved roads could be considered as part of a separate general permit to allow for proper stakeholder involvement and vetting, at the least within those areas of the permit (see below) that have to do with maintenance
provIsions. Given the complexity of this issue and the impact on thousands of properties, another option is to achieve a water quality benefit through education programs, not using limited resources on regulation and enforcement. We also note that unpaved road regulation was not included in the recent Orange County permit. Orange County receives approximately 8 times the amount of funding on a per mile
basis towards their County-Maintained roads as does Riverside County, so imposing additional requirements on the Riverside County permit magnifies the undue regulatory and financial burden.

Comment Response

The Tenative Order's requirements for the maintanence of unpaved roads does not require the County to maintain any roads that are not within the County's Maintained Road System. Rather, if a road is not maintained by the County, the Tenative Order requires the County to ensure the party(ies) responsible for maintaining the road conduct road maintenance for the protection of water quality. As such, the commenter's concern about spending general gas tax dollars or taking on new unpaved roads into the County Maintained System is unfounded.

Contrary to the commentor's assertion, the unpaved roads requirements were not proposed "very late" in the process. It was proposed and discussed proir to the release of the Tentattive Order, and modifications were made as a result of these discussions (also prior to the release of the Tentative Order). The County Department of Transportation had the same public comment period timeframe to review and comment on the Tentative Order's provision as any other public or private agency or individual, if not more. Furthermore, any concerns about process does not diminish or negate the water quality impacts currently caused by unpaved roads. Please also see the response to comment 104.

Within south Orange County, unpaved roads were not identified as a source or potential source of water quality pollution; therefore the requirements were not included in the Orange County MS4 Permit (Order No. R9-2009-0002). South Orange County is mostly in a built-out condition and has very few unpaved roads in comparison to Riverside County. In addition, the San Diego Water Board has not received the same level of complaints or investigations for unpaved roads in Orange County.

Nevertheless, the San Diego Water Board is sensitive to the Copermittee's perceived difficulties with protecting water quality from runoff from privately maintained unpaved roads and has removed the regulation of unpaved roads maintained by private parties, section F.3.c.(5). The San Diego Water Board reserves the right to include provisions for unpaved roads that protect water quality in future MS4 permits, WDRs or individual/general NPDES permits.

Comment # 102	**Commentor** 13	**Comment Subject** Unpaved Roads

Specific Comment

Requirements for the development of unpaved road projects are addressed in section F.1.i. on page 45 of the Draft MS4 Permit. This requirement states:

i. Unpaved Roads Development
The Copermittees must develop, where they do not already exist, and implement or require implementation of erosion and sediment control BMPs after construction of new unpaved roads. At a minimum, the BMPs must include:
(1) Practices to minimize road related erosion and sediment transport;
(2) Grading of unpaved roads to slope outward where consistent with road engineering safety standards;
(3) Installation of water bars as appropriate;
(4) Unpaved roads and culvert designs that do not impact creek functions and where applicable, that maintain migratory fish passage;

It is our contention that construction of new unpaved roads is already adequately regulated through development regulations. New unpaved roads built through development fall under the definition of a "project", and as such are already required to develop and implement project-specific SUSMPs, which include identification of BMPs in the same manner as required of other development projects. Unpaved road projects
are also required to comply with the General Permit-Construction which requires preparation of a SWPPP. These requirements are implemented by the Permittees during the development review process and in issuance of grading permits. We also note that the development process already achieves a gradual "retirement" of unpaved roads, as the County requires in many cases that new development replace unpaved access roads with paved access.

Additional separate requirements for development of unpaved roads are redundant to these requirements and may only complicate compliance. However, if the Board wishes to include permit language to further clarify what is already required through these permits, we would be pleased to work with the Board to help craft appropriate language.

Comment Response

The definition of a new development Priority Development Project requiring a SSMP only addresses roads with impervious surfaces or ones that are greater than one acre. Further, the Construction Stormwater Permit (Order 2009-0009-DWQ) and associated SWPPP, do not address post-construction BMPs in areas that are already regulated by a Phase I MS4 permit.

The requirements are not redundant but rather specific to the unique water quality impacts caused by unpaved roads development. To whatever extent there exists overlap with the existing SSMP and grading permit approval processes, this should result in minimal additional efforts for the Copermittees to implement.

Comment # 103	**Commentor** 13	**Comment Subject** Unpaved Roads

Specific Comment

This is our primary issue of major concern, particularly since the proposed language would appear to impose regulatory requirements on roads that are not part of the County Maintained Road System that we operate.

Requirements for the maintenance of unpaved road projects are addressed in section F.3.a.(10) on page 56 of the Draft MS4 Permit. This requirement states:

(10) Unpaved Roads Maintenance
(a) The Copermittees must develop, where they do not already exist, and implement or require implementation of BMPs for erosion and sediment control measures during maintenance activities on unpaved roads, particularly in or adjacent to receiving waters.
(b) The Copermittees must develop and implement or require implementation of appropriate BMPs to minimize impacts on streams and wetlands during unpaved road maintenance activities.
(c) The Copermittees must regularly maintain their unpaved roads adjacent to streams and riparian habitat to reduce erosion and sediment transport;
(d) Re-grading of unpaved roads during maintenance must be sloped outward where consistent with road engineering safety standards;
(e) Through their regular maintenance of unpaved roads, the Copermittees must examine the feasibility of replacing existing culverts or design of new culverts or bridge crossings to reduce erosion and maintain natural stream geomorphology.

As we have stated, this issue should be addressed through a broad general permit or an education program. However, if the Board finds it necessary to impose additional permit requirements on maintenance activities, which go well beyond the Board's previous definitions of a "project", we respectfully request that this language be rewritten to make it clear that it applies to those roads within the County (or City) Maintained Road System.

Comment Response

The Copermittees are encouraged to include unpaved roads as part of their education program. The San Diego Water Board reserves the right to issue a broad general permit regulating the discharges from unpaved roads. Uuntil such time, it is appropriate to regulate unpaved roads through the MS4 permit per 40 CFR 122.26 (d)(iv)(A)(3) which does not distinguish between paved or unpaved roads. This is supported by the San Francisco Bay Area MS4 permit adopted in 2009. Please also see the response to comment 101.

Comment # 104 **Commentor** 13 **Comment Subject** Finding

Specific Comment

Findings D.l.C, pg 57-59, states:

"During the previous permit period, the San Diego Water Board identified, through investigations and complaints, sediment discharges from unpaved roads as a significant source of water quality problems in the Riverside County portion of the San Diego Region. Enforcement and inspection activities conducted by the San Diego Water Board during the previous permit term have found a lack of source control for many unpaved roads within the jurisdiction of the Copermittees".

The Department supports the continued application of development and construction requirements and maintenance of temporary post-maintenance erosion a[1d sediment control BMPs as specified in existing permits. However, we do not believe that sufficient justification has been presented to support the identification of unpaved roads as a Significant source of water quality problems in the Santa Margarita Region. In these days of uncertain state funding and dwindling local funding sources, every dollar spent on additional regulatory requirements needs to be weighed against the benefit of otherwise using funding on basic public health-and-safety needs such as road maintenance and safety improvements.

The discussion of Finding D.1.c. states that the inclusion of unpaved road requirements were based on findings by the San Diego Regional Board during typical compliance assurance activities, audits, or receipt of complaints. However no feedback from these activities were reported to the Permittees at the MS4 Permit discussions prior to the proposal of the unpaved road requirements just before the draft permit was released.

The Department has reviewed the documents cited by Regional Board staff in the discussion of Finding D.1.e. and the conditions in the Santa Margarita River are vastly different from those in Pennsylvania and Northern California cited in those documents. Nevertheless, these documents do not suggest that unpaved roads are a significant source requiring special attention in MS4 permits. Further, neither the Permittee's monitoring data nor our observations support a conclusion that unpaved roads are a significant source of pollutants warranting special regulatory attention and we request that this finding be deleted unless significant data specific to the Santa Margarita Region can be produced. In particular, the Department requests a copy of the investigations and complaints along with the data that supports a significant source of water quality problems on unpaved roads, including a listing of roadways where water quality problems have been identified.

Comment Response

The San Diego Water Board disagrees with the commenter about the events leading to the inclusion of the unpaved road requirements in the Tentative Order. While the inclusion may not have been discussed at the beginning of the more than a dozen meetings that took place before the Tentative Order was released to the public, it was discussed multiple times before the release. The need to include the unpaved road provisions was identified after an early meeting with the Copermittees about the municipal program component of the Tentative Order. The Copermittees were provided the draft unpaved roads provisions as soon as they were drafted. After the Copermittees reviewed the draft language, it was discussed during at least two subsequent meetings. After the discussions with the Copermittees, the language was modified significantly based on the comments and recommendations of the Copermittees. Please also see the response to comment 101.

The San Diego Water Board has received several complaints about and observed several instances where sediment from unpaved roads has discharged into waters of the U.S. and/or State, causing a condition of pollution and/or nuisance. The commenter is welcome to review the documentation and records regarding these complaints and investigations, which are available to the public at the San Diego Water Board. Please also see the response to comment 138.

The San Diego Water Board took into consideration the Copermittees' concerns in the development of the unpaved roads requirements. The San Diego Water Board worked with the Copermittees in the development of the unpaved roads requirements and made changes where appropriate (in addition, see the responses to comments 101 and 139-141). The San Diego Water Board maintains that the Tentative Order should include provisions that specifically address pollutants from unpaved roads.

Comment # 105 **Commentor** 12 **Comment Subject** LID

Specific Comment

The exclusion of economic feasibility in provisions F.1.d.(4)(a), F.1.d.(4)(c), and F.1.d.(7)(b) is readily apparent (only technical feasibility is mentioned) and we urge correction and explicit recognition of conducting both technical and economic feasibility analysis when evaluating the appropriate combination of LID controls that meet the Permit's performance sizing criteria as defined in F.1.d.(4)(c). In particular, the Tentative Order requires in F.1.d.(4)(a) that "each copermittee must require LID BMPs or make a finding of technical infeasibility for each priority development project" and in F.1.d.(4)(c) that "if onsite infiltration LID BMPs are technically infeasible per section F.1.d(7)(b), other LID BMPs may be allowed for use to treat stormwater onsite provided that other LID BMPs are sized to hold the design storm volume that is not infiltrated." In both instances, economic feasibility is excluded and this omission must be corrected given the importance of balancing technical and economic feasibility. In fact, the San Diego Regional Board recognized the importance of economic feasibility in the South Orange County MS4 permit and included the following language in the adopted permit (R9—2009-0002, Section F.(7)(b)):

"For each PDP participating, a technical feasibility analysis must be included demonstrating that it is technically infeasible to implement LID BMPs that comply with the requirements of Section F.1.(d)(4). The Copermittee(s) must develop criteria for the technical feasibility analysis including a cost benefit analysis, examination of LID BMPs considered and alternatives chosen."

We ask that the Board make the south Riverside County permit language at least consistent with that included in the adopted south Orange County MS4 permit and explicitly allow economic feasibility to be considered when evaluating appropriate LID BMPs to meet the onsite performance standard.

Comment Response

The San Diego Water Board found the addition of an economic feasibility analysis on a project proponent could be unnecessarily burdensome. A cost benefit analysis for LID BMPs is unnecessary because USEPA studies have demonstrated that LID is both fiscally and environmentally beneficial (USEPA, "Reducing Stormwater Costs through Low Impact Development (LID) Startegies and Practices, December 2007, EPA 841-F-07-006). In the vast majority of cases, significant savings were realized due to reduced costs for site grading and preparation, stormwater infrastructure, site paving, and landscaping.

Comment # 107 **Commentor** 12 **Comment Subject** LID

Specific Comment

We appreciate the Board's recognition in the Fact Sheet that properly engineered LID filtration BMPs are available to a project developer to meet the LID performance standard. However, we are troubled by the pervasive use of the terms "without runoff" and "hold the design storm volume that is not infiltrated" in the Tentative Order. These terms continue to propagate the incorrect application of LID in that stormwater that has undergone filtration and/or treatment cannot be of equal or better quality than that retained on site given the performance criteria specified in F.1.d.(4)(c). We again urge the Regional Board to eliminate these terms and expressly allow biofiltration and biotreatment LID practices to meet the onsite performance standard without having to perform an exhaustive technical and economic feasibility analysis and to not relegate these controls to a lesser status.

Comment Response

Comment noted. The errata in the Tentative Order clarifies that LID filtration BMPs that provide equal or better quality than that retained on site may be used and are preferred to conventional post-construction storm water treatment BMPs.

Comment # 108	**Commentor** 11	**Comment Subject** LID

Specific Comment

The Office of Water Resources Supports Low Impact Development (LID) in Concept:

The Office of Water Resources (OWR) supports the concept of LID from a water quality perspective. Cleaner water coming onto Camp Pendleton not only sustains healthy ecosystems, but also ensures water in Camp Pendleton's aquifers is safe and suitable for potable use. Although, implementation of LID is expected to improve the quality of water that reaches Camp Pendleton via the Santa Margarita River (SMR), if improperly structured, LID has the potential to reduce the volume of high quality water that would otherwise arrive downstream to support beneficial uses on Camp Pendleton. Beneficial uses on Camp Pendleton, which are supported by historic baseflows in the SMR, include-but are not limited to--providing seventy percent of Camp Pendleton's water supply and sustaining populations of threatened and endangered species.

Comment Response

Comment noted.

Comment # 109 **Commentor** 11 **Comment Subject** Legal

Specific Comment

The Proposed Tentative Order Remains Problematic From a Water Supply Perspective:

OWR appreciates that the Regional Board has already included provisions in the Proposed Tentative Order that appear oriented towards protecting downstream water users from encroachment of historical flows. However OWR remains concerned that some provisions in the Proposed Tentative Order could be read to incentivize removal of native SMR water from the watershed in a manner that has the potential to reduce SMR baseflows. We have suggested revisions to the Proposed Tentative Order at the end of this memorandum that we believe will further reduce the risk to our water supply.

Treatment of Runoff Before Discharge into Receiving Waters:

Finding E.7 on (page 14) raises a potential dilemma for MS4 operators that could facilitate large scale impoundment and export of stormflows for "runoff treatment" to the detriment of downstream water right holders. Specifically, Finding E.7 states that"[t]reatment and/or mitigation must occur prior to the discharge of runoff into receiving waters." Because achieving water quality standards may require extensive treatment-particularly to achieve the existing nutrient standards in the Basin Plan, there is real risk that developers of large scale development/retrofit projects will impound large amounts of water onsite in lined facilities or export the water to a watershed with less stringent water quality objectives where the water can be discharged (or reclaimed for consumptive use) at significant savings to the MS4 or project developer.

To address this concern, the Regional Board should consider adding a section to the Findings in the Proposed Tentative Order which clarifies that impoundment or export of storrnwater/rainwater for the purpose of avoiding pertinent discharge standards and/or basin plan objectives is not a proper use of stormwater absent demonstration of compliance with California Water Code Sections 1200-1225.

Along these lines, and to reduce risk that storrnwater capture will reduce historic baseflows or otherwise diminish the water rights of downstream water users, we recommend the following additional revisions to the Proposed Tentative Order:

1. Revise Section F.lc.8 (page 29) to read as follows:

Rain water harvesting, where feasible andfully protective ofdownstream water rights, must be implemented as part of the site design and construction, and to supplement offsite beneficial uses.

2. Amend Section F.3.d.2 to add an additional criterion, along the lines below for prioritizing retrofit of existing development:

(k) the extent such projects are fully protective of downstream waterrights
[footnote to F.3.d.(2)(k): This recommended amendment will promote consistency with Section F.3.d.6(d) and ensure that the prioritization of retrofit projects properly considers the ramifications of retrofit on downstream baseflows.]

Comment Response

The San Diego Water Board believes that significant export of stormwater flows outside of the watershed will require waste discharge requirements. Section F.1.c.(8), Infiltration and Groudnwater Protection, has been modified to include language that is intended to be protective of downstream water rights.

Section F.1.c.(8) has been modified to clarify that the requirement is for the reduction of pollutants in storm water discharges to the MEP. The San Diego Water Board does not have the water rights expertise to evaluate the full scope and legal implications of the commenter's water rights. The San Diego Water Board's understanding is that through current agreements Camp Pendleton is guaranteed base flows from the upstream water districts regardless of the amount of runoff. The Tentative Order clarifies under section E.1 that nothing within the Tentative Order authorizes an action that reasonably anticipated harm downstream water rights holders.

Comment # 110 **Commentor** 10 **Comment Subject** Hydromod

Specific Comment

With the HMP and with all other plans required by the Permit, such as monitoring, it is imperative that the Regional Board play the lead role. Bay Council understands, given budget constraints and furlough restrictions, the Regional Board has fewer resources and more work to do. Nonetheless, as permit requirements are delegated to Copermittees for development and planning, water quality suffers and NGOs and the public are left out of the process.

As with the San Diego HMP, this Permit requires Copermittee-driven HMP development. However, the San Diego process serves to shed light on the likely result: an artificially cost-constrained plan with frequent exercise of exemptions. Therefore, it is critical that the Regional Board play a lead role in the development of the HMP and all other plans.

If the current practice remains, Copermittees will expend large sums of money in developing a plan made publicly available (and indeed reviewed by the Regional Board) at the end of the process. Often the Regional Board and public are faced with two equally unappealing options: force the
Copermittees to start anew and delay implementation; or accept an inadequate plan. The final product in this type of planning further represents a financial commitment by Copermittees. Because of this financial investment, Copermittees that may have been able to proceed in a different direction at the beginning stages of development, are unable to afford (or unwilling to pay for) repeating the process after the plan is fully developed.

A possible remedy is a cost-share plan, or outside consultant who is employed by the Regional Board, reports to the Regional Board, but is paid via Copermittee funds. In order to foster a truly public process, and scientifically driven compliance (as opposed to cost-constrained), the Regional Board must remain the ultimate decisionmaker, with staff developing plans—not Copermittees. Therefore, we urge the Regional Board to commit to heavy oversight if not a cost-share mechanism to take charge of the development of these plans in order to ensure timely completion and true advancement of water quality.

Comment Response

The San Diego Water Board understands and appreciates the concern expressed by the commenter. While we appreciate the recommendations provided, they are not necessary at this time. Because of their current economic issues, the Riverside County Copermittees have expressed, on many occasions, their desire to borrow heavily from the HMPs already developed (e.g., San Diego County, Santa Clara County, Contra Costa County) or are in development (e.g., Orange County), and work already performed by SCCWRP. The Tentative Order allows this. The San Diego Water Board remains the ultimate decision maker for approving the elements included in the Riverside County HMP, and as such, will ensure that the requirements of the Tentative Order are met for the development of the Riverside County HMP.

Comment # 111 **Commentor** 10 **Comment Subject** Watershed Workplan

Specific Comment

The Permit requires identification of sources causing the highest water quality problems within the Upper Santa Margarita Watershed. (Permit, G.1.c.). A relatively easy aid to identification of such sources is expanded public outreach. We urge the Copermittees to survey the public and NGOs in the area in ranking water quality problems. In addition, Copermittees should provide bilingual public notice of annual watershed workplan meetings by sending such notices directly to area residents or holding special semi-annual workshops, especially in underserved communities. Copermittees might find the public particularly useful in source identification and BMP implementation strategies. This could further serve as an effective tool to meet the education and public participation Permit requirements. (Permit, G.4.). Lastly, we urge the Copermittees in Riverside County to reach out to Copermittees in the lower portion of the Watershed to coordinate source identification and monitoring activities.

Comment Response

Comment noted.

Comment # 112	**Commentor** 4	**Comment Subject** General

Specific Comment

This document highlights the agreed upon revisions resulting from detailed discussions between Water Board Staff and the Copermittees on program implementation. The intent of these revisions is to ensure that requirements in the Draft MS4 Permit continue to be protective of water quality while allowing the Copermittees flexibility in resource allocation and cost efficiencies. This collaborative process enhanced a mutual understanding of these goals and, consequently, many of the Permit's requirements are streamlined, clearer, implementable and protective. This document highlights specifically the Low Impact Development (LID) and the Interim Hydromodification requirements that have been revised from the Orange County NPDES MS4 Permit in order to recognize the Copermittees' advanced efforts.

Comment Response

Comment noted.

Comment # 113 **Commentor** 4 **Comment Subject** General

Specific Comment

[From Attachment 1 to RCFC&WCD comment letter]

Summary of Proactive Efforts to Manage Stormwater

Introduction

Murrieta and Temecula Creeks and their tributaries are an important economic, environmental and social resource for the Santa Margarita Region. As an example, Murrieta Creek serves as the backdrop for Old Town Temecula, an important local tourist attraction. Several ecological preserves that are utilized by local residents and tourists are also located within the Santa Margarita Region. The Permittees are cognizant of these resources and their benefits and have implemented or initiated proactive programs beyond the requirements of the NPDES MS4 Permits to ensure that these resources remain viable and are protected for future generations.

Integrated Planning
-Upper Santa Margarita River Integrated Water Management (IRWM) Plan
-Santa Margarita River Executive Management Team
-Murrieta Creek Flood Control, Environmental Restoration and Recreation Project

Management of New Development
-LID BMP Design Manual
-Public BMP Maintenance Mechanism

Management of New Development
-LID BMP Testing and Demonstration Facility
-Southern California Stormwater Monitoring Coalition

Statewide Stormwater Leadership
-Pesticide Regulation
-California Stormwater Quality Association (CASQA)

Habitat and Aquatic Resource Conservation
-Western Riverside County Multiple Species Habitat Conservation Plan (MSHCP)
-Special Area Management Plan (SAMP)

Comment Response

The San Diego Water Board is aware of the Copermittees' efforts to manage storm water as listed in Attachment 1. The Copermittees characterize these efforts as "proactive" because they were not specifically required in Order No. R9-2004-001. In many cases, these efforts were in response to findings during the implemention of Order No. R9-2004-001, in response to the requirements of the recently adopted Santa Ana Water Board Order No. R8-2010-0033, in response to efforts initiated by the Orange County and/or San Diego County Copermittees, in response to USEPA contracted audits and/or in anticipation of the requirements expected to be in the Tentative Order. We expect that the efforts of the Riverside County Copermittees listed in Attachment 1 will facilitate the implementation of several elements of the Tentative Order, but we also expect the Copermittees to continue identifying efforts and opportunities that will improve their storm water management programs to improve water quality in the Upper Santa Margarita Watershed.

Comment # 114 **Commentor** 4 **Comment Subject** Economic

Specific Comment

[From Attachment 2 to the RCFC&WCD comment letter]

Due to their reduced revenues, the Copermittees budgets and staffing have been significantly reduced for virtually all services and programs operated by the Copermittees, including police, fire, and paramedic services. Funding has been focused on essential public safety and existing state and federally mandated programs. Increases in funding for the water quality mandates contained in the draft Permit can only come from reduced funding for these basic priorities. Therefore, the expanded compliance requirements proposed in the draft Permit are economically infeasible.

Comment Response

Please see the response to comment 9.

Comment # 115 **Commentor** 4 **Comment Subject** Economic

Specific Comment

[From Attachment 2 to the RCFC&WCD comment letter]

POPULATION

Riverside County, which is subject to three NPDES MS4 permits, has a total population of 2,153,186. However, only 289,765 persons (approximately 13 percent) reside within the Santa Margarita Region. Population and housing projections for the Santa Margarita Region are summarized in Table 1. MS4 discharges in Riverside County are regulated by separate NPDES stormwater permits issued by the Colorado River, Santa Ana, and San Diego Regional Water Quality Control Boards. Although these three MS4 permits address the same federal regulatory requirements, the provisions in the draft Permit are often not well aligned with the requirements of the other two MS4 permits. As such, the cost for complying with those requirements is borne entirely by the 289,765 residents within the Santa Margarita Region.

Comment Response

The San Diego Water Board is aware that Riverside County is subject to regulation by three MS4 Permits from three separate Regional Water Boards. The San Diego Water Board agrees that the costs for complying with the requirements of the Tentative Order should be borne primarily by the residents in the Upper Santa Margarita Watershed, but we do not agree the provisions of the permit are not well aligned with the requirements of the other MS4 Permits.

As the RCFC&WCD is aware, the San Diego Water Board met with the Riverside County Copermittees on more than a dozen occasions between March and July 2010. The San Diego Water Board modified the Tentative Order in several ways, in response to recommendations by the Riverside County Copermittees during those meetings, to make it more aligned and compatible with Santa Ana Water Board Order No. R8-2010-0033.

The commenter cites figures for the population of the Upper Santa Margarita Watershed compared to all of Riverside County. The commenter, however, fails to acknowledge that the population growth in this part of Riverside County has also grown substantially since 2000. According to the 2000 census, the population in the Upper Santa Margarita Watershed was approximately 150,000. As reported by the Copermittees in their 2008-2009 Annual Report, the population in the Upper Santa Margarita Watershed was over 250,000 as of January 1, 2009, an increase of at least 65 percent since 2000. According to the commenter, the projected population for the Upper Santa Margarita Watershed is approximately 290,000 in 2010, an additional increase of approximately 15 percent since January 1, 2009. The population has almost doubled in the last 10 years. Such a significant increase in population also means a significant increase in development and need for expanded storm water and non-storm water management programs.

Because many of the provisions of the Tentative Order have been modified to be more aligned with the requirements of Santa Ana Water Board Order No. R8-2010-0033, the Riverside County Copermittees will be able to benefit from efforts that are being implemented for the Santa Ana Region, which will provide some cost efficiencies for complying with the requirements for both regions.

Comment # 116	**Commentor** 4	**Comment Subject** Economic

Specific Comment

[From Attachment 2 to the RCFC&WCD comment letter]

CURRENT ECONOMIC CONDITIONS

Unemployment
Higher unemployment directly impacts the revenue streams available to the County and the Cities for funding programs and services. As illustrated in Figure 1, the unemployment rate in Riverside County is currently 15.3 percent, which is 42 percent higher than the unemployment rate in San Diego County (9.8 percent) and 56 percent higher than the unemployment rate in Orange County (9.8 percent).

Comment Response

The San Diego Water Board recognizes that Riverside County is currently experiencing economic difficulties and high unemployment. The unemployment figure cited from Figure 1 may be true for Riverside County as a whole, but does not necessarily provide an accurate representation of the unemployment rate in the Upper Santa Margarita Watershed. The Upper Santa Margarita Watershed area is located between San Diego and Orange Counties, with lower than average unemployment rates for the state, which could have a localized influence on the unemployment rate in the Upper Santa Margarita Watershed. Unemployment in Riverside County, as a whole, is also heavily influenced by agriculture, and seasonal agricultural workers that are not currently employed affects the overall unemployment rate.

Also, as noted in the response to comment 115, the population in the Upper Santa Margarita Watershed is projected to grow approximately 15 percent in 2010 compared to January 1, 2009. This growth may indicate that there will soon be additional economic activity and unemployment will decrease in the near future.

Please see the responses to comments 8 and 9 for a discussion about the Copermittees' revenue sources for funding their storm water programs.

Comment # 117 **Commentor** 4 **Comment Subject** LID

Specific Comment

The Copermittees strongly support the language in the draft Permit with regard to Low Impact Development (LID) BMPs (Section F.1.d.(4)). Through discussions with staff, the Copermittees have presented their commitment and vision for LID, emphasizing that their programs' goals are in line with the intent of the LID language found in the Orange County permit. The District and the County, with input from the Copermittees, have invested five years into developing a well thought through LID program including: The design of a detailed and thoroughly researched LID BMP Manual, An implementation policy focused on a tiered approach to BMP selection, Incorporation of a public maintenance mechanism, and Construction of a $3,000,000 LID BMP retrofit, demonstration and testing facility.

These various features are already in effect in the unincorporated County, or in the process of being finalized, for broader use.

Regional Board Staff has recognized the efforts, thoughtfulness, and funding that the County has invested in their LID BMP approach, and have, in coordination with the Copermittees, developed a prioritization process that supports the Copermittees' investment in a plan for LID, while ensuring that an appropriate prioritization for the most effective BMPs is implemented. As such, infiltration BMPs must be used for all sites unless it is technically infeasible to infiltrate. Technical infeasibility will be based on criteria that will be developed by the Copermittees and approved by the Regional Board. Only when infiltration is deemed infeasible through the approved analysis can other LID BMPs be used in place of infiltration. These LID BMPs must be consistent with the Copermittees design manual or other regional LID manuals, which have been developed to ensure these LID BMPs are designed to have the greatest pollutant removal over the life of a project. If LID BMPs are found to be technically infeasible due to poor site or other conditions, then conventional BMPS must be implemented and the project must participate in the LID waiver/mitigation program that will ensure pollutant removal effectiveness consistent with the preferred LID BMPs.

Comment Response

The San Diego Water Board appreciates the support of the commenter. Based on several comments received during the public comment period, minor changes were made to the provisions in section F.1.d.(4) of the Tentative Order without affecting the overall intent of the language or the Copermittee's existing programs. Please see the errata sheet for the specific changes made.

Comment # 118 **Commentor** 4 **Comment Subject** LID

Specific Comment

One other important consideration for new development and LID requirements in MS4 permits is the ability for the project proponent (developer) to understand and easily comply with the requirements, such that they can easily be incorporated into projects. Recently adopted MS4 permits, such as the south Orange County MS4 Permit, have very complicated new development and LID requirements. The result of such requirements is a WQMP guidance document that can be confusing, and may be difficult to implement consistently and in a way that will provide consistent protection of water quality. The Copermittees and Regional Board staff, working together, have crafted new development LID requirements that are easily understood, and will ensure the highest likelihood of integration of LID features consistently into projects.

Comment Response

Comment noted. Through several meetings with the Copermittees, the requirements for LID implementation were clarified and streamlined to reduce confusion and easily understand. To that end, the requirements are similar to the South Orange County MS4 Permit to consistently apply LID requirements throughout the San Diego Region.

Comment # 119 **Commentor** 4 **Comment Subject** Hydromod

Specific Comment

Pursuant to discussions between the Copermittees and Water Board staff, the proposed interim hydromodification criteria is aligned with the Copermittees' existing hydromodification program. This agreed language ensures that adequate hydromodification protection measures continue to be in place, while allowing the Copermittees to focus resources and funds on developing the Final Hydromodification Management Program and avoid diversion of scarce resources to developing new interim criteria that will only be in effect for a short duration. In addition, this approach will save the development community from confusion as to which requirements are in effect.

The Copermittees' current hydromodification mitigation program is described in the WQMP, but has been slightly modified as presented in the draft MS4 Permit. Although the Copermittees request the minimal changes to the language shown in the attached redlines, the Copermittees otherwise support the currently drafted interim hydromodification requirements. Under the proposed interim requirements, project applicants must either demonstrate numerically that the project will not adversely impact downstream alluvial channels, or, they must mitigate both the two-year and 10-year recurrence interval storms to pre-project levels in the post-project condition. All analysis must be performed by a registered civil engineer specializing in water resources. Mitigation of both the two-year and the 10-year storms to pre-project levels has been demonstrated to be consistent with the range of flows that are the primary determinants of the stream geomorphology in the southern California area. By maintaining these storm events at pre-project levels, impacts to the downstream alluvial channel should be mitigated to a level of less than significant. Additionally, the Copermittees believe that the onsite LID requirements will further reduce the need for on-site hydromodification controls that would otherwise be required with conventional treatment BMPs. The final comprehensive hydromodification mitigation program will further develop more detailed analysis methods, as well as establish a monitoring program to help verify the effectiveness of the HMP requirements.

Comment Response

The San Diego Water Board agrees that the interim hydromodification criteria in the Tentative Order are aligned with the Copermittees' existing hydromodification program. The minor proposed modifications to Tentative Order sections F.1.h.(2) and F.1.h.(3) as shown on Attachment 3 to the RCFC&WCD's comment letter are acceptable. The San Diego Water Board does not agree to the proposed modifications to Tentative Order section F.1.h.(6)(a) as shown on Attachment 9 to the RCFC&WCD's comment letter.

Also, the commenter states that "project applicants must either demonstrate numerically that the project will not adversely impact downstream alluvial channels, or, they must mitigate both the two-year and 10-year recurrence interval storms to pre-project levels in the post-project condition." This is an incorrect statement. To clarify, projects subject to the interim hydromodication criteria must mitigate to "pre-development" levels, not "pre-project" levels. The use of the term "pre-development" is used in section 4.4 of the Riverside County Copermittees WQMP, and is assumed to mean the same as "pre-development" as used in the Tentative Order.

Comment # 120 **Commentor** 4 **Comment Subject** General

Specific Comment

Revisions tentatively agreed to with Board Staff
Per discussions between the Water Board Staff and Copermittees the following revisions were agreed upon.

See table in Riverside County Flood Control Comment Letter Attachment 3, page 4.

Comment Response

Comment noted. Please see the errata sheet for changes that the San Diego Water Board agreed to make to the Tentative Order.

Comment # 121	**Commentor** 4	**Comment Subject** General

Specific Comment

The process needed to be cut short as the Board expected the draft MS4 Permit to be heard in October. Copermittee staff requested that the hearing be delayed to allow the process to complete several times, but these requests were denied;

Comment Response

The San Diego Water Board disagrees that the process was cut short. The existing Order was scheduled for renewal in 2009. The San Diego Water Board originally intended to release the Tentative Order for public comment in March 2010 and hold a public hearing in June 2010. At the request of the Riverside County Copermittees, the San Diego Water Board agreed to delay the release to allow the Riverside County Copermittees to meet with the San Diego Water Board to discuss issues they were concerned about. The San Diego Water Board met with the Copermittees over a dozen times between March and July 2010, on a weekly basis. During those meetings, practically every provision contained in the directives in the Tentative Order, as well as in the Monitoring and Reporting Program in Attachment E, was discussed. The Copermittees were given great latitude in choosing the topic and length of discussions at those meetings. Additional meetings were held with the Copermittees in August following the public release of the Tentative Order to further discuss the Copermittees' concerns. During many of the later meetings the Copermittees were repeating several of their concerns without new information and recommending the same changes to the Tentative Order that the San Diego Water Board would not agree to.

The San Diego Water Board has spent a significant amount of time and resources meeting with the Copermittees. The process was long enough for the San Diego Water Board to listen to and consider all of the concerns expressed by the Copermittees prior to releasing the Tentative Order.

Comment # 122 **Commentor** 4 **Comment Subject** Economic

Specific Comment

[From Attachment 2 to the RCFC&WCD comment letter]

SOURCES OF LOCAL REVENUE

The Copermittee's primary revenue sources for implementation of programs and services are property taxes, sales taxes, and development/construction permit fees. Each of these sources has declined substantially since the beginning of the recession in FY 2006/2007. The 2009 per capita income in Riverside County ($29,177) is 31% lower than the per capita income in San Diego County ($42,094) and 32% lower than the per capita income in Orange County ($46,898). The population of the Santa Margarita Region (289,765) is 48% lower than the population of South Orange County (553,1615) and 91% lower than the population of San Diego County. As a less affluent area with relatively small population, the Santa Margarita Region has far less revenue than South Orange County and San Diego County to fund local programs and services, and MS4 permit compliance costs.

Comment Response

The San Diego Water Board recognizes that the per capita income of the different counties vary. The per capita income cited may be true for Riverside County as a whole, but does not necessarily provide an accurate representation of the per capita income in the Upper Santa Margarita Watershed. The Upper Santa Margarita Watershed area is located between San Diego and Orange Counties, which could have a localized influence on the per capita income in the Upper Santa Margarita Watershed as a commuter community. Riverside County, as a whole, is heavily influenced by agriculture, and agricultural workers typically receive low wages, which may affect the per capita income for Riverside County as a whole.

As noted in the response to comment 115, the commenter fails to acknowledge that the population growth in the Upper Santa Margarita Watershed has also grown substantially since 2000. The population has almost doubled in the last 10 years. The population of South Orange County has grown at a significantly lower rate. Such a significant increase in population also means a significant increase in property and sales tax revenues. If the Copermittees choose to fund their storm water programs solely through revenues generated by sales and property taxes and developer fees, then they must be able to plan and prepare for times when those revenues decrease by setting aside funds when there are significant increases in revenue.

Please see the responses to comments 8 and 9 for a discussion about the Copermittees' revenue sources for funding their storm water programs.

Comment # 123 **Commentor** 4 **Comment Subject** General

Specific Comment

Regional Board staff indicated that the Board had adopted the South Orange County MS4 Permit as a model permit and, therefore, the Board would have to approve any major revisions to the provisions established in that MS4 Permit; and

Comment Response

The San Diego Water Board must approve and adopt all MS4 NPDES permits regardless if the revisions or changes are major or minor.

Comment # 124	**Commentor** 4	**Comment Subject** General

Specific Comment

Regional Board staff indicated that the Board would have to resolve our issues with several new provisions of the draft MS4 Permit addressing unpaved roads, inspection programs and monitoring requirements, all requirements that exceed the provisions of the Orange County MS4 Permit.

Comment Response

To the extent that the Copermittees disagree with the San Diego Water Board regarding the Tentative Order's provisions, the Copermittees have the right to submit both written and oral comments directly to the San Diego Water Board at the adoption hearing.

Comment # 125	**Commentor** 4	**Comment Subject** Legal

Specific Comment

The Copermittees note that despite being directed to take several important issues to the Board, we have not been provided an opportunity for a formal or informal workshop before the Board. By contrast, the South Orange County MS4 Copermittees had at least three workshops and five formal hearings prior to adoption of that permit. Although we do not want to duplicate the Orange County renewal process, it is common practice to allow at least one workshop on significant permit issues before holding an adoption hearing. Given the issues outlined in this letter and in the attachments, there are numerous issues worthy of at least one workshop.

Comment Response

The decision whether or not to hold a workshop is discretionary and the decision not to hold a workshop in the matter was due to the general lack of public interest in the permit, the similarity between the Tentative Order and the recently adopted South Orange County MS4 Permit and the several weeks of meetings with the Copermittees between March and July of 2010. San Diego Water Board members generally do not attend public workshops. When they do attend, they listen to discussion but do not provide feedback. No San Diego Water Board members were present at any of the Orange County workshops. The Orange County workshops were held because of the broad public interest and were held in tandem with meetings with those Copermittees. All issues important to the Copermittees and addressed in the comment letter were discussed with San Diego Water Board staff during the many, frequent meetings held prior to public release of the Tentative Order.

Comment # 126 **Commentor** 4 **Comment Subject** Economic

Specific Comment

[From Attachment 2 to the RCFC&WCD comment letter]

Home Values/Property Tax Revenue

Property tax revenue, which is a major source of funding for the County and Cities, is a direct function of the total inventory of real estate and the assessed values of the real estate. With a small population relative to South Orange County and San Diego County and a limited amount of commercial and industrial property, the Santa Margarita Region is supported by a much smaller inventory of real estate from which to obtain property tax revenue. The high rate of foreclosures in Riverside County has also resulted in significant declines in real estate values and, consequently, property tax revenue. The Riverside County Auditor-Controller projects that property values will fall over 10 percent in FY 2009-10 and could fall further in FY 2010/2011. Figure 3 illustrates the decline in median home values in the Santa Margarita Region and South Orange County. Although home values in both areas have declined, home values in the Santa Margarita Region have declined at a greater rate and the difference in home values between the two areas has grown with the recession.

The Inland Empire (Riverside and San Bernardino Counties) registered more defaults and foreclosures than any other area of Southern California.9 The Inland Empire was ranked No. 5 in nationwide foreclosure activity during the first half of 2010, with almost 4.5 percent of households in default. A total 63,717 mortgage default notices, auction sale notices, and bank repossessions were recorded in the Riverside-San Bernardino-Ontario metropolitan area between January and June 2010, according to RealtyTrac. Accordingly, one in 23 households were in some stage of foreclosure during this six-month period. Additionally, almost 45 percent of homeowners with a mortgage in Riverside and San Bernardino Counties owe more on their homes than the homes are worth. As illustrated in Figure 3, Orange County and San Diego County have not been impacted by "upside-down mortgages" to the same extent as has Riverside County.

One expert, Professor Mason Gaffney of the UC Riverside Economics Department believes that the housing market is in a vicious cycle simply because there are too many homes. According to Professor Gaffney, because demand is down, prices will go down, and more people will go "upside-down" on their mortgage, and then go into foreclosure. Professor Gaffney estimates that the bottom of the housing market will not be seen for another three years, due to the previous overbuilding in Riverside County.10

Although the recession has impacted property values throughout Southern California, Riverside County remains at a distinct disadvantage relative to Orange and San Diego Counties. The average home value in Riverside County is $207, 900, which is 58% less than the average home value in South Orange County ($499,500) and 45% less than the average home value in San Diego County ($378,800).11 As a result, property tax revenues per home in Riverside County are 58% less than in Orange County and 45% less than in San Diego County. The larger populations and number of homes in Orange and San Diego Counties multiply this disparity in property tax revenue that can be used to help fund NPDES compliance programs. Based on population and average home value, South Orange County generates over four times the property tax revenue generated in the Santa Margarita Region, and San Diego County generates 20 times the property tax revenue of the Santa Margarita Region. Clearly, the Copermittees in the Santa Margarita Region receive significantly less property tax revenue than either Orange or San Diego Counties and are less able to fund additional MS4 permit compliance costs.

Comment Response

The San Diego Water Board recognizes that Riverside County is currently experiencing economic difficulties. If, however, the Copermittees choose to fund their storm water programs primarily through revenues generated by sales and property taxes and developer fees, then they must be able to plan and prepare for times when those revenues decrease by setting aside funds when there are significant increases in revenue. The Upper Santa Margarita Watershed had a substantial increase in the total inventory of taxable properties during the past housing boom of the early 2000s. Even while assessed values have decreased, the valuation has not dropped below 2004 levels and the inventory continues to increase.

Please see the responses to comments 8 and 9 for a discussion about the Copermittees' revenue sources for funding their storm water programs.

Comment # 127 **Commentor** 4 **Comment Subject** Economic

Specific Comment

[From Attachment 2 to the RCFC&WCD comment letter]

Sales Tax Revenue
The next most significant revenue source for program funding is sales tax. Sales tax revenue is a function of population and relative income. As described, the Santa Margarita Region has a less affluent and smaller population than South Orange County and San Diego County on which to generate sales tax revenue.

The high levels of unemployment in Riverside County have reduced disposable income which has further depressed sales tax revenues. Retail sales in Riverside County fell by nearly 27% in 2008 and 2009.12 Statewide sales and use tax revenues for the second quarter of 2010 declined approximately 10.4 percent. Additionally, taxable sales for the first quarter of 2010 remained flat compared to a year earlier. Although data specific to the Santa Margarita Region is not available, it is anticipated that taxable sales have been impacted more significantly than in Orange and San Diego Counties due to the higher unemployment rate in Riverside County.

Taxable sales are directly proportional to sales tax revenue. Based on data presented in the Los Angeles Economic Development Corporation's July 2010 Economic Forecast, South Orange County generates 2.6 times the taxable sales generated in the Santa Margarita Region and San Diego County generates 13.3 times the taxable sales of the Santa Margarita Region. Clearly, the Copermittees in the Santa Margarita Region receive significantly less sales tax revenue than either Orange or San Diego Counties and are less able to fund additional MS4 permit compliance costs.

Comment Response

The San Diego Water Board recognizes that Riverside County is currently experiencing economic difficulties. If, however, the Copermittees choose to fund their storm water programs primarily through revenues generated by sales and property taxes and developer fees, then they must be able to plan and prepare for times when those revenues decrease by setting aside funds when there are significant increases in revenue.

Please see the responses to comments 8 and 9 for a discussion about the Copermittees' revenue sources for funding their storm water programs.

Comment # 128 **Commentor** 4 **Comment Subject** Economic

Specific Comment

[From Attachment 2 to the RCFC&WCD comment letter]

New Fees or Taxes
Another potential source of funding would be the establishment of a new fee or tax. Such revenues would be subject to the requirements of Proposition 218. Recent efforts to pass supplemental fees have been mixed and given the current economic conditions, this option appears infeasible. For example, on the March 2006 ballot, an attempt by the City of Encinitas to pass a Clean Water Fee was defeated by the voters. It is notable that this rejection of a Clean Water Fee occurred prior to the recession in a relatively affluent coastal city.

Comment Response

Please see the response to comment 8.

Comment # 129	**Commentor** 4	**Comment Subject** Economic

Specific Comment

[From Attachment 2 to the RCFC&WCD comment letter]

Economic Forecasts

The Riverside County Executive Office assessed Riverside County's economy in a report to the Board of Supervisors submitted with the FY 2010/2011 Recommended Budget. In this assessment, it was noted that the economy is still staggering and that economic news has been mixed. Although a slightly rising stock market and other nationwide measures could be interpreted to signal improvement, persistently high unemployment and personal and national debt call for caution, and a double-dip recession is possible. Locally, while some experts project revenues will shrink again in FY 2011/2012, Riverside County's economic consultants foresee a long and gradual muted recovery and the County will be managing with drastically reduced budgets for an extended period. Budget reductions of approximately $21 million are projected for FY 2011/2012. The County projects that it will see a balanced but significantly reduced budget in FY 2012/2013, with a total budget of $670 million (compared to $736 in 2007). Based on this assessment and reports in the media, it appears that the economy in Riverside County will stabilize at a reduced level and may not recover during the term of the SMR MS4 Permit.

Comment Response

Please see the response to comment 9.

Comment # 130 **Commentor** 4 **Comment Subject** Economic

Specific Comment

[From Attachment 2 to the RCFC&WCD comment letter]

Projected Increases in Compliance Costs
The draft Permit proposes a significant expansion of compliance requirements that would significantly increase the Copermittee compliance costs. The draft Permit was developed by starting with the MS4 Permit for South Orange County. The requirements proposed in the draft Permit that would significantly increase compliance costs include:

Regional Compliance Requirements
-Monitoring and special studies (See Attachment 4)
-Hyrdomodification Management Plan (including monitoring)
-Retrofit study
-Other general program updates (JRMP)

Individual Copermittee Compliance Requirements
-Enforcement of Irrigation runoff prohibition (See Attachment 6)
-Significantly Increased business and BMP inspections
-BMP retrofit requirements
-Regulation of unpaved roads (See attachment #5)
-Hydromodification requirements
-Monitoring Source Identifications
-Expanded IC/ID requirements

Estimates for implementation of the regional compliance requirements have been prepared and Figure 4 illustrates the disparity between projected Copermittee revenues and costs for implementation of the proposed regional programs. Due to the fact that calculating costs for implementing entirely new programs is excessively difficult, cost estimates for the implementation of individual Copermittee compliance requirements have not been completed, although it is expected that their individual costs will parallel the regional costs presented in Figure 4.

Comment Response

The San Diego Water Board has been sensitive to the current economic hardships that are being experienced by the Riverside County Copermittees. Between March and July 2010, we met with the Copermittees over a dozen times and modified the requirements and schedules for implementation to phase in the requirements with these economic concerns in mind. Many of the modifications were made because the Copermittees requested the changes. Many of the modifications to the implementation schedule that were agreed upon during those meetings between the Copermittees and the San Diego Water Board were also based on prioritizing the permit requirements to address the most critical issues. The Tentative Order now provides the Riverside County Copermittees more time than the San Diego County and Orange County Copermittees to develop and implement several elements of the permit, as well as reducing the potential development costs for those elements.

The San Diego Water Board recognizes there will be increases in costs to improve the Copermittees' storm water management programs. The improvements are necessary, especially given the intense growth and development that has occurred in the Upper Santa Margarita Watershed during the third-term of the MS4 Permit. We do not agree that the increases in costs will be as projected in Figure 4 since the Copermittees have already begun developing several of the program elements (as listed in Attachment 1 to the RCFC&WCD comment letter), and will be able to benefit from the experiences and the work already completed by the San Diego County and Orange County Copermittees.

Comment # 131 **Commentor** 4 **Comment Subject** General

Specific Comment

The Copermittees also have significant concern with the use of the South Orange County MS4 Permit as a model for our MS4 Permit area. As outlined in more detail throughout this letter and the attachments, the South Orange County and Santa Margarita Region MS4 Permit areas vary widely with regard to the water resources to be protected and available tax revenue to fund local programs and services, including compliance with MS4 permit requirements. Orange County has substantial coastal water resources with active recreational use, twice the population, and significantly higher tax revenues. The per capita cost for the residents within the Santa Margarita Region to comply with the requirements of the draft MS4 Permit is significantly greater than the per capita cost faced in South Orange County, with each dollar spent effectively hitting our residents three to four times harder. The expansion of regional program elements (e.g., coordination, monitoring, reporting, program development, effectiveness assessment) will result in an annual doubling of these costs, with a peak increase of nearly 300% for these programs alone. The Copermittees simply cannot economically support, nor does the Santa Margarita Region warrant, the same level of programs as South Orange County to protect our local receiving waters.

Comment Response

The federal requirements regulating MS4 discharges from Orange County and Riverside County are the same, providing flexibility for regional differences in implementation. To that extent, the Tentative Order has significant differences from the adopted South Orange County MS4 Permit to address Riverside County. These differences were identified by the San Diego Water Board or requested by the Copermittees. These changes include requirements addressing unpaved roads, watershed specific non-storm water dry weather action levels, specific monitoring provisions, special studies, street sweeping provisions, streamlined LID requirements, Hydromodification Management Plan changes, a lengthened implementation timeline, more specific action level response language, specific education requirements, standard roadway designs, specific LID waiver provisions, a HMP waiver provision, specific interim hydromodification criteria, requirement of Passive Sediment Treatment Systems, specific reporting requirements, retrofitting examination of areas of development, and unique program effectiveness assessment requirements. To some extent, the discharges, programs and land use from the Copermittees' MS4s are similar and thus have similar requirements.

Comment # 132 **Commentor** 4 **Comment Subject** General

Specific Comment

In summary, the meetings between Regional Board staff and Copermittee staff were honest, good faith and productive efforts to bridge the gaps between the requirements of the Orange County MS4 Permit and the specific needs of, and resources available to, the Upper Santa Margarita Watershed (the draft MS4 Permit area). However, given the constraints identified herein, the differing impacts on beneficial uses and current economic realities, the current draft MS4 Permit cannot be supported by the Copermittees.

The Copermittees, therefore, request that the Board direct staff to work with the Copermittees to resolve the issues identified in this letter prior to considering adoption of the Permit.

Comment Response

Please see the response to comment 121.

Comment # 133	**Commentor** 4	**Comment Subject** General

Specific Comment

Unlike several of the watersheds in South Orange County, which exhibit perennial flow, the Santa Margarita Region is an ephemeral watershed. The only areas of perennial flow in the Santa Margarita Region are located at the formation of the Santa Margarita River right at the County line and in mountain areas outside of the urbanized areas serviced by the MS4s. The creeks in the urbanized areas of the watershed serviced by the MS4s are ephemeral and flows are only observed during and immediately after significant storm events. Any non-stormwater flows quickly disappear by seepage into the alluvial sands. Additionally, rising groundwater has been observed in Murrieta and Temecula Creeks for a short distance at various locations upstream of the confluence with the Santa Margarita River; however such conditions existed prior to urbanization.

Comment Response

Please see the response to comment 175.

Comment # 134 **Commentor** 4 **Comment Subject** Economic

Specific Comment

[From Attachment 2 to the RCFC&WCD comment letter]

ECONOMIC SUMMARY

As all sources of revenues have been reduced significantly, the Copermittees have been required to reduce staffing through layoffs, attrition and furlough; reduce funding across the board for public services and programs, and, in some cases, completely eliminate public services and programs. For example, it is estimated that County of Riverside staffing has been reduced by 2,500 since FY 2006/2007 mostly in the form of early retirement and layoffs. It is estimated that an additional 500-700 staff positions will be eliminated by the County in FY 2011/2012.

Due to the loss of revenue, virtually all Copermittee programs or services have been reduced, including fire and police. As an example, the Riverside County FY 2010/2011 Recommended Budget for Riverside County proposes:

-Public safety department cuts of 3 – 5 percent
-Other department cuts averaging 19 percent
-Continued staff reductions

After three years of modest cuts culminating in a 25% decrease, the Board of Supervisors approved an additional 19% cut in the general fund and a 4% cut to public safety for FY 2010/2011. These additional cuts will decrease spending by an additional $71 million. The remaining budget gap will be filled from general fund reserves set aside for economic uncertainty. Since FY 2006/2007 Riverside County general fund reserves have declined from over $300 million to $30 million. The County cannot decrease the reserve fund any further without affecting the County's ability to obtain credit. According to the Associated Press Economic Stress Index, of counties with populations of at least 25,000, Riverside County was identified as the eleventh most economically stressed county in the nation based on its June 2010 stress scores.

All County departments have been directed to only provide those core services that the County is mandated to provide. At this point, the Copermittees are struggling to maintain the existing compliance programs required by the 2004 MS4 Permit with available staff and funding. Implementation of expanded or new Permit compliance requirements would require the Copermittees to either further reduce implementation of other mandated programs or reduce the level of implementation of MS4 Permit compliance programs - at risk of receiving an NOV and ACL. In other words, the Copermittees cannot increase MS4 Permit compliance expenditures without directly impacting compliance with other state or federally-mandated programs.

Comment Response

The San Diego Water Board is aware of the many and competing needs that the municipalities are responsible for. The mission of the San Diego Water Board, however, is to preserve, enhance, and restore the quality of the waters in the region. Our responsibility is to protect the beneficial uses of the waters of the state.

While we try to take other needs into consideration when developing the requirements included in the Tentative Order, the requirements must be able fulfill our mission and responsibilities. We understand that the provisions in the Tentative Order may require the Copermitttees to modify, reduce, or find additional efficiencies in their operations, but the Copermittees are still responsible for implementing and improving their storm water and non-storm water programs to protect water quality.

The San Diego Water Board has been sensitive to the current economic hardships that are being experienced by the Riverside County Copermittees. Between March and July 2010, we met with the Copermittees over a dozen times and modified the permit requirements and schedules for implementation to phase in the requirements with these economic concerns in mind. Through this process and series of meetings, the San Diego Water Board has tried to accommodate the needs of the Riverside County Copermittees as much as possible.

Comment # 135	**Commentor** 4	**Comment Subject** General

Specific Comment

Since the initial MS4 permit was issued in 1990, the Copermittees have been actively and successfully implementing programs to manage their MS4 discharges. As described in the 2009 report of waste discharge (ROWD) submitted by the Copermittees, there have been no statistically significant increases in pollutant concentrations since issuance of the initial MS4 permit in 1990, despite the fact that the Santa Margarita Region has experienced over 300% population growth over the same time period. Further, although staff points out several recent 303(d) listings as basis for the need to enhance regulations, these listings were based on data that mostly predates our existing management programs implemented under the 2004 NPDES MS4 Permit. Further, the Permittees have submitted additional data for the current round of listings that should result in the removal of some of these additional listings based on more recent data. Additionally, the likely sources of these impairments include natural background concentrations in soils and groundwater (iron and manganese), natural and/or agricultural source loads (nutrients, total dissolved solids, sulfates and bacteria), and/or federally authorized uses of products (pesticides and copper). Although all of these sources can have urban components, it is also clear that these sources are mostly non-point in nature and not solely urban sourced, as implied in the Fact Sheet and Findings.

Comment Response

The San Diego Water Board disagrees that the Copermittees' programs have been successfully implemented. The San Diego Water Board disagrees that there have been no statistically significant increases in pollutant concenrtrations. The Copermittees' ROWD states that not enough data has been collected to date by the current and past MRPs to statistically detect any change or trend in water quality. If not enough data has been collected, how can any statistically significant increases in pollutant concentrations be detected?

Enough data, however, have been collected to see a statistically significant increase in 303(d) listings for the waters in the Upper Santa Margarita Watershed. On the 2002 303(d) List there were 3 water body/pollutant combinations listed. On the 2008 303(d) List there were over 50 water body/pollutant combinations listed. This signicant increase in 303(d) listings indicates that water quality has degraded, not improved.

The San Diego Water Board would be pleased if the data provided by the Copermittees supports the removal of some of these listings. Even if some listings are removed, there would be a significant number of listings that would still need to be addressed. In any case, the Copermittees must continue to improve their programs to prevent discharges of pollutants from their MS4s and protect the water quality of the receiving waters of the Upper Santa Margarita Watershed.

Comment # 136 **Commentor** 4 **Comment Subject** Economic

Specific Comment

[From Attachment 2 to the RCFC&WCD comment letter]

CONCLUSION

The draft Permit was developed by starting with the MS4 Permit for South Orange County. This represented a significant expansion of compliance requirements and compliance costs relative to the 2004 Permit issued to the Copermittees in the Santa Margarita Region, and by no means are the costs incremental in nature. South Orange County is a permit area with twice the population, 2.6 times the sales tax revenue, and over four times the property tax revenue of the Santa Margarita Region. The draft Permit was then expanded to include additional compliance and monitoring requirements, further increasing compliance costs. Plainly, it is unrealistic to impose greater, or even the same Permit requirements on the Santa Margarita Region, as have been imposed on South Orange County.

In addition to having a lower property tax revenue based on lower property tax base and lower per capita retail sales, the Santa Margarita Region has also been hit harder by the recession, which has further diminished funding resources. It is projected that revenues will continue at a reduced level for an extended period with recovery not expected within the term of the Permit term. Therefore, the available resources to fund public safety, existing state and federal mandates, and expanded water quality permit requirements are much less than San Diego and Orange Counties.

The economy has resulted in reductions of reserves to minimum levels and virtually all local services and programs have been reduced or eliminated. As increases in funding for the water quality mandates contained in the draft Permit can only come from reduced funding for public safety, existing state and federal mandates, the expanded compliance requirements proposed in the draft Permit are economically infeasible.

Comment Response

The San Diego Water Board recognizes that there are differences in the economic characteristics between the counties in the San Diego Region, but we do not agree that those differences should affect the provisions included in the Tentative Order to protect water quality. If anything, because of the signicant growth and development experienced by the Upper Santa Margarita Watershed within the last 10 years, the new and enhanced requirements are more necessary than ever. Significant changes in the Tentative Order's schedules and compliance requirements have been made to accommodate the Copermittees and the watersheds unique status.

The population of the Upper Santa Margarita Watershed has almost doubled in the last 10 years. The significant increase in population has resulted in a significant increase in development in the area. On the 2002 303(d) List, there were 3 water body/pollutant combinations listed for the waters in the Upper Santa Margarita Watershed. On the 2008 303(d) List, there are over 50 water body/pollutant combinations listed for the waters in the Upper Santa Margarita Watershed.

We understand that the current economic situation is challenging for the Copermittees. While the current economic environment is a cause for concern in the short term, it also provides the Copermittees an opportunity to find and implement improvements and efficiencies to their storm water programs before the next period of growth and development. In any case, the Copermittees must improve their storm water programs to be more protective of water quality.

Comment # 137 **Commentor** 4 **Comment Subject** Economic

Specific Comment

As the draft MS4 Permit for the Santa Margarita Region of Riverside County was modeled on the MS4 Permit developed for South Orange County, it is important to carefully contrast the economic resources available to the Counties:

The population of the Santa Margarita Region (289,765) is 48% less than the population of South Orange County (553,161).

The 2009 per capita income in Riverside County ($29,177) is 38% less than the per capita income in Orange County ($46,898).

The current unemployment rate in Riverside County is 15.3 percent, which is 56% higher than the unemployment rate in Orange County (9.8 percent).

Property and sales tax revenues are the primary sources of funding for local programs and services, including compliance with MS4 Permit requirements. Based on population and average home value, South Orange County generates over four times the property tax revenue generated in the Santa Margarita Region. Based on data presented in the Los Angeles Economic Development Corporation's July 2010 Economic Forecast, South Orange County generates 2.6 times the taxable sales generated in the Santa Margarita Region. As a less affluent area with a relatively small population, the Copermittees in the Santa Margarita Region receive significantly less property and sales tax revenue than municipalities in South Orange County and are less able to fund additional MS4 Permit compliance costs. These issues are discussed in detail in Attachment 2.

The recession also has impacted the economy in the Santa Margarita Region more than in South Orange County and it is projected that tax revenues will continue at a reduced level for an extended period, with recovery not expected within the Permit term. The poor economy has resulted in reductions of reserves to minimum levels and cuts or eliminations in virtually all local services and programs in the Santa Margarita Region. As a result any increases in funding for the water quality mandates contained in the draft MS4 Permit can come only by reducing funding for public safety or other existing state and federal mandates.

Modeling the draft MS4 Permit on the South Orange County permit represented a significant expansion of compliance requirements and compliance costs relative to the existing MS4 Permit issued to the Santa Margarita Region Copermittees. The requirements in the draft MS4 Permit have been expanded to include additional compliance and monitoring requirements beyond the South Orange County permit, further increasing compliance costs. We would submit that such an approach is fundamentally unfair and could be viewed as arbitrary.

Comment Response

Please see the responses to comments 8, 9, 115, 116, 122, 126, 127, 130, 134, and 136. The commenter is not consistent in the scope of statistical comparison of the two regions. For example, the population comparison is only for the Upper Santa Margarita Watershed while the economic indicators are compared for the whole of Riverside County. Factors within Riverside County yet outside of the Upper Santa Margarita Watershed may influence the statistics, e.g. agriculture in the Coachella Valley.

Comment # 138 **Commentor** 4 **Comment Subject** Unpaved Roads

Specific Comment

The requirements for unpaved roads are particularly cumbersome, onerous and unreasonable. Our detailed analysis of these requirements is provided in Attachment 5. In summary, the proposed unpaved road requirements may result in substantial and unnecessary additional Copermittee costs that are not justified by the facts in the Santa Margarita Region. The Copermittees believe that the existing MS4 Permit requirements for new development, construction, maintenance and IC/ID adequately address regulation of unpaved roads that threaten water quality. If the Regional Board believes that unpaved roads require further regulation, the Copermittees believe that the appropriate regulatory mechanism is a general permit (Waste Discharge Requirements or NPDES permit) that would apply to all unpaved roads in the San Diego Region, rather than only those that are under the jurisdiction of the Copermittees

The Copermittees request that Sections F.1.i, F.3.a.(11) and F.3.c.(5) regulating unpaved roads be deleted from the draft MS4 Permit.

Comment Response

The commenter does not provide any substantial data or reasoning to support their assertion that the requirements are "cumbersome, onerous and unreasonable." Despite the Copermittees' belief that existing MS4 Permit requirements adequately address pollution from unpaved roads, the San Diego Water Board has discovered numerous cases of unpaved roads creating or causing water quality impacts. Examples of unpaved roads causing water quality problems within the past year include Fairway Hills Estates, Rancho Glen Oaks, Santiago Road, and Lake Village Association. The San Diego Water Board reserves the right to issue a general permit to regulate unpaved roads; but until such time the unpaved roads are addressed through the MS4 permit. Please see the responses to comments 103 and 104.

Comment # 139 **Commentor** 4 **Comment Subject** Unpaved Roads

Specific Comment

Clarification that these requirements apply to those unpaved roads that the Copermittees maintain in their road system.

This should be commonly understood, but the clarification is important to include due to complex legal limitations and rights associated with access, ownership, and maintenance of unpaved roads.

Comment Response

Comment noted. Appropriate changes addressing the comment have been included in the errata.

Comment # 140 **Commentor** 4 **Comment Subject** Unpaved Roads

Specific Comment

Removal of language that specifies specific BMPs that must be implemented.

Specifying the method of compliance is prohibited pursuant to CWC Section 13360, and inappropriately forces the Copermittees to adopt particular solutions that may not best fit the situation.

Comment Response

Comment noted. Clarifying language has been included in the errata.

Comment # 141 **Commentor** 4 **Comment Subject** Unpaved Roads

Specific Comment

Removal of requirement for BMPs for private unpaved roads.

The proposed requirements would require the creation of an additional and unnecessary program element addressing privately owned unpaved roads. The Copermittees believe that a focused public outreach program should be implemented to educate property owners and associations about the need to properly maintain unpaved roads. This education program combined with existing IC/ID enforcement capabilities seems a more reasoned and responsible response to addressing this issue.

Comment Response

The San Diego Water Board is sensitive to the Copermittees' concerns. Upon considering various factors, we have removed the requirements for privately owned unpaved roads in the errata. The San Diego Water Board reserves the right to include this provision in future MS4 permits or general permits. The San Diego Water Board still expects the Copermittees to address illicit discharges from privately owned unpaved roads to their MS4 systems through their IC/ID programs.

Comment # 142 **Commentor** 4 **Comment Subject** Monitoring

Specific Comment

Since the initial MS4 permit was issued in 1990, the Copermittees have been actively and successfully implementing programs to manage their MS4 discharges. As described in the 2009 report of waste discharge (ROWD) submitted by the Copermittees, there have been no statistically significant increases in pollutant concentrations since issuance of the initial MS4 permit in 1990, despite the fact that the Santa Margarita Region has experienced over 300% population growth over the same time period. Further, although staff points out several recent 303(d) listings as basis for the need to enhance regulations, these listings were based on data that mostly predates our existing management programs implemented under the 2004 NPDES MS4 Permit. Further, the Permittees have submitted additional data for the current round of listings that should result in the removal of some of these additional listings based on more recent data. Additionally, the likely sources of these impairments include natural background concentrations in soils and groundwater (iron and manganese), natural and/or agricultural source loads (nutrients, total dissolved solids, sulfates and bacteria), and/or federally authorized uses of products (pesticides and copper). Although all of these sources can have urban components, it is also clear that these sources are mostly non-point in nature and not solely urban sourced, as implied in the Fact Sheet and Findings.

Comment Response

The San Diego Water Board finds the comment to be confusing and misleading on multiple accounts. First, the ROWD states that not enough data has been collected to date by the current and past MRPs to statistically detect any change or trend in water quality. Thus, if not enough data has been collected, how can any statistically significant increases in pollutant concentrations be detected? Secondly, the recent 303(d) listings referenced in the comment refer to the 2008 303(d) list, which relies on data collected up to that listing, including data collected under the current Order. New listings and re-listings for the 2008 list relied on data collected from 2004-2006. The list is required to be updated every 2 years, so it is unclear how new listings are based primarily on data prior to 2004. Lastly, it should be noted that speculation regarding likely sources of pollutants for 303(d) listed receiving waters should not take the place of active source identification, which been largely absent under the current Order.

Comment # 143	**Commentor** 4	**Comment Subject** Monitoring

Specific Comment

Monitoring and Reporting Program (Attachment 4)
Prior to the submittal of the ROWD, the Copermittees met with Board staff to propose changes to the Monitoring and Reporting Program (MRP). In these discussions, Board staff identified two areas for needed improvement:

• Relocation of Illicit Connection I Illicit Discharge (IC/ID) monitoring stations to MS4 outfalls, and
• Incorporation of Action Levels

In more recent discussions, Board staff noted that the MRP needed significant modification to reflect the South Orange County MRP, but would be scaled to be appropriate to the smaller Santa Margarita Region.

Unfortunately, the final MRP requirements have been expanded well beyond the South Orange County MRP requirements, resulting in a program that is completely out of proportion with the needs and resources of the Santa Margarita Region. In fact, the proposed MRP requirements will result in a 500% increase in monitoring program costs, costing our residents over two and a half times the per capita costs for South Orange County.

[Per Capita Monitoring Cost Comparison Table]

The Copermittees recognize that monitoring and data collection is necessary. However, the MRP requirements exceed what is necessary to address management questions related to water quality, are beyond requirements dictated in the South Orange County MRP, and are beyond the Copermittees' ability to fund. Not only are the level of requirements inappropriate for the Santa Margarita Region, but they disregard the economic realities faced by the Copermittees. As such, the MRP falls far short of meeting the Executive Officer's stated goals of affordability.

In the interest of finding ways to offer Board staff a comparable program in a more cost effective and appropriate manner, the Copermittees have identified nine adjustments to the MRP that will save approximately seven hundred and eighty thousand dollars ($780,000) allllually and bring per capita monitoring costs more in line with the South Orange County MRP, whi le maintaining the core components of the MRP. Table I summarizes the key changes and the respective cost savings. It is important to note that any change highlighted in RED reflects bringing the program in line with the South Orange County MRP. Figure I below shows graphically the comparative costs for the draft MRP with and without the requested adjustments. Please note that the 100% baseline in Figure 2 reflects the current cost of the Copermittees' current MRP.

[Table 1 - Cost Savings resulting from proposed MRP changes]
[Figure 1 - graph comparing draft permit costs with Requested Changes]
[Cost comparison table with Proposed Changes]

Although the requested adjustments to the MRP will not eliminate cost increases, and will result in an MRP which is more expensive, on a per capita basis, than the South Orange County MRP, they provide a more manageable program for the Copermittees.

The Copermittees requests that the Board make the adjustments identified in Attachment 4 before Permit adoption.

Comment Response

See the response to comment 92.

Comment # 144	**Commentor** 4	**Comment Subject** Monitoring

Specific Comment

[From Attachment 4 to the RCFC&WCD comment letter]

Prior to the release of the first draft of the MRP requirements to the Copermittees, Water Board staff indicated the program would be similar to the South Orange County MS4 Permit (OC Permit) yet scaled appropriately to the Santa Margarita Region. The first draft of the MRP was not released until three weeks prior to the public release draft MRP. To our surprise, instead of being appropriately scaled, the draft MRP actually exceeded the scope and costs of the OC Permit MRP. Due to limited time, Water Board staff recommended the discussions regarding MRP requirements be brought before the Regional Board at the appointed October 13, 2010 Board Hearing. This was particularly frustrating as it was not consistent with our mutual goal to resolve technical issues at the staff level and bring only necessary policy issues to the Regional Board.

Comment Response

Please see the response to comment 92. For clarification, San Diego Water Board allowed the Copermittees to select and prioritize topics for discussion at these meetings. Dedicated discussions regarding the MRP occurred at multiple meetings, including prior to public release of the Tentative Order. Some modifications and agreements were made regarding the MRP, but many issues came to an impasse at the staff level. Where impasse was met, staff provided a recommendation that the discussions be brought to the Board following review of public comments.

Comment # 145 **Commentor** 4 **Comment Subject** New Development

Specific Comment

Section F.1.f of the draft MS4 Permit includes new requirements for the Copermittees to verify that Post-Construction BMPs are being appropriately maintained. The new requirements appropriately develop a risk-based approach to inspections, defining eight factors that the Copermittees must
consider in determining 'high-priority' projects.

However, language in Section F.1.f.(2)(a) removes that discretion by stating:
'At a minimum, high priority projects include those projects that generate pollutants (prior to treatment) within the tributary area of a 303(d) listed waterbody impaired for that pollutant; or those projects generating pollutants within the tributary area for an observed action level exceedance of that pollutant.'

This language is excessively broad, and will require virtually all sites in the watershed to be designated as 'high priority' and, therefore, subject to annual inspections. This language is inconsistent with the goals of a socially responsible and affordable permit and should be modified for
several reasons:

Inspections frequencies should be based on risk of discharge. Annual inspections are not needed for all sites that generate a specific pollutant. For example, if a site generates a pollutant associated with 303(d) listing, but the site retains runoff onsite or stores those pollutants indoors, annual inspections would be unnecessary. However, sites that store 303(d) listed pollutants outdoors or otherwise have a high risk of discharge should be inspected more frequently.

The language dilutes Copermittee resources by requiring annual inspections of low-risk sites, preventing the Copermittees from appropriately concentrating resources on problematic sites/sources. This is because when an action level is exceeded then all parties in the watershed are assumed guilty until proven innocent.

While the Copermittees are not opposed to implementing a program to verify that these BMPs are being maintained, it is critically important that they be provided the flexibility to determine which sites warrant annual inspections. Specifically, the Permittees request that the language in
F.1.f.(2)(a) be amended as follows prior to adoption of the Permit:

At a minimum, high priority projects include those projects that have been determined to be the source of an observed action level exceedance.

Comment Response

Please see the response to comment 94.

Comment # 146 **Commentor** 4 **Comment Subject** Commercial/Industrial

Specific Comment

Section F.3.b. of the draft Permit includes requirements to inventory and inspect Commercial and Industrial businesses. The draft Permit expands upon existing inventory and inspection requirements in two problematic ways:

It requires significantly more businesses to be inspected, and

It includes new requirements specifying what the Copermittees are required to inspect when they are onsite.

Comment Response

Please see the response to comments 96 and 98.

Comment # 147	**Commentor** 4	**Comment Subject** Commercial/Industrial

Specific Comment

Sections F.3.b.(1)(a)(i) and (ii) identify 42 categories of businesses that must be inventoried and inspected based on risk of pollutant discharge. However, Section F.3.b.(1)(a)(iii) adds virtually any business in the Permit area, independent of pollutant discharge risk:

'All other commercial or industrial sites/sources within or directly adjacent to or discharging directly to receiving waters within environmentally sensitive areas (as defined in Attachment C of this Order) or that generate pollutants tributary to an observed exceedance of an action level.' (Bold emphasis added)

In effect, section F.3.b.(1)(a)(iii) adds the following additional businesses:

EVERY business that is adjacent to (or within) an Environmentally Sensitive Area (ESA), regardless of whether the business generates or discharges any pollutants, and

EVERY business that 'generates' pollutants which happens to be upstream of an action level exceedance, regardless of whether the site has ever discharged any pollutants.

This language expands the list of sites far beyond the current requirements, and well beyond those sites that actually pose a threat to water quality. This is clearly unnecessary and should be removed for several reasons:

It inappropriately separates 'risk' from the 'response', by requiring the Copermittees to inspect businesses irrespective of the risk that the business poses to water quality. For example, this language would require the Copermittees to expend resources and time inspecting hair salons, office buildings and other activities that happen to be adjacent to an ESA. This inappropriate broad-brush approach to permitting actually works to discredit the Copermittees' NPDES programs and dilute resources, rather than enhancing protection of water quality.

It will further remove the flexibility that the Copermittees need to be able to re-allocate resources to inspecting and following up with sites/sources that are problematic.

Therefore, the Copermittees request that the language in F.3.b.(1)(a)(iii) be amended as follows prior to adoption of the Permit:

All other commercial or industrial sites/sources that have been determined to be the source of an observed exceedance of an action level.

Comment Response

Please see the response to comment 96.

Comment # 148	**Commentor** 4	**Comment Subject** Commercial/Industrial

Specific Comment

Additional items to review during inspections:

Section F.3.b.(4)(a) specifies what the Copermittees must review when performing an inspection. The new requirements in subsections (i) and (ii) to review BMP implementation plans, and review facility monitoring data, respectively, are an unnecessary new mandate. They should be removed for several reasons:

The requirements burden the Copermittees with reviewing information that is required under General Permits and is the responsibility of the Regional Board to enforce.

The requirements would significantly increase the inspection time for sites with General Permits and endanger an existing collaborative inspection program (Complaince/Assistance Program (CAP)) that leverages the time highly trained Environmental Health Inspectors spend onsite for Certified Unified Program Agencies (CUPA) and Food Services inspections to also conduct NPDES inspections. The CAP program not only utilizes highly trained Environmental Health inspectors, but also regionalizes the inspections and, therefore, provides multiple benefits including uniformity, reduction in total number of inspections and higher-quality inspections. The Environmental Health HazMat inspection program administrators have indicated that they cannot accommodate the additional time required to implement the new requirements, as they would unduly cut into their ability to meet their own state-mandated inspection frequencies.

By virtue of eliminating the CAP program, the requirements would effectively mandate a more fractured and disconnected set of inspections for the businesses, contrary to CAL EPA mandates for consolidated inspections, and in turn diluting the effectiveness of the program.

The Copermittees request that the language in F.3.b.(1)(a)(iii) be amended as follows prior to adoption of the Permit:

(a) Inspection Procedures: Inspections must include but not be limited to:

(iii) Check for coverage under the General Industrial Permit (Notice of Intent (NOI) and/or Waste Discharge Identification Number), if applicable;
(iv) Assessment of compliance with Copermittee ordinances and Copermittee issued permits related to runoff;
(v) Assessment of the implementation, maintenance and effectiveness of the designated minimum and/or enhanced BMPs;

Comment Response

Please see the response to comment 98.

Comment # 149	**Commentor** 4	**Comment Subject** Retrofit

Specific Comment

Section F.3.d. proposes a program to develop an inventory of existing developments that may be candidates for future water quality retrofits. The requirement goes on to encourage the Copermittees to collaborate with local property owners to promote urban retrofit in an effort to accelerate reductions in pollutant loading from existing urban areas.

Although laudable, this requirement has two significant problems:

1) The program is self-defeating as it contains no "carrots" to lure private property owners into participating in the program. Any property owner that is interested in volunteering in this effort would be required to fully comply with all provisions of the draft MS4 Permit. This includes preparation of compliance documents such as SSMPs, LID and hydromodification studies, subjecting themselves to additional regulatory scrutiny through business and BMP inspection programs required by the MS4 Permit, and otherwise incurring a myriad of costs and requirements. These costs and requirements would provide a strong disincentive to participate in a retrofit program. This program will only work if it is modified to remove these disincentives.

2) Current and projected economic conditions will limit the interest and participation of private property owners. Long-term economic predictions for Riverside County indicate that assessed valuations and property values will likely remain stagnant for the term of this Permit. Similarly, sales tax and unemployment are not expected to significantly improve either.

Without Co-Permittee resources to supplement private retrofit projects, the current economic disincentives for private redevelopment that are built into the program and the current impact of the economy on private property owners, there is no real value to the program.

PREFERRED POLICY CHOICE: The Permittees strongly request that this program be deleted for the aforementioned reasons.

Alternatively, and at minimum, the Copermittees request that the schedule for completion of the retrofitting program be revised to provide for development during the term of the Permit and submittal of the proposed program with the next ROWD. This will allow the Copermittees to defer expenditures related to development of the program until later in the Permit term when it is hoped that economic conditions and local revenues will improve. The Copermittees expect few opportunities for retrofit until the economy improves. Due to the Copermittees' limited ability to require retrofit on private property, our best opportunities for retrofit may be associated with approvals of proposed modifications of existing developments.

ALTERNATE POLICY CHOICE: If the Retrofit requirements are not removed, the Copermittees request that the Regional Board modify Section F.3.d. as follows:

Each Copermittee must develop and implement a retrofitting program that meets the requirements of this section upon submittal of the ROWD.

Comment Response

Please see the response to comment 99.

Comment # 150 **Commentor** 4 **Comment Subject** Monitoring

Specific Comment

[From Attachment 4 to the RCFC&WCD comment letter]

One of the most significant issues with the MRP is that the Copermittees proposed several new special studies in the ROWD. The Copermittees moved forward on these studies in good faith, including a $3,000,000 LID Demonstration and Testing Facility at the District headquarters in Riverside. The final MRP does not recognize any of these efforts, and instead mandates six new special studies and a habitat monitoring program. Initially, Board staff indicated that these six studies were for discussion and that it was not their intent to include all of the studies, however, later Board staff changed their position and mandated all of the studies. Further, the habitat monitoring program was actually removed from the Orange County MS4 Permit due to the addition of the NAL/SAL monitoring which was expected to effectively address the underlying habitat monitoring questions. These unnecessary additions put the Copermittees in the precarious position of having to abandon special studies that were already deemed by local stakeholders to be of critical value to managing stormwater within our region.

Comment Response

San Diego Water Board staff did review the proposed special studies within the ROWD. Staff have made changes to the Special Studies to include the SMC Bioassessment study while concurrently removing the requirement for twice-annual bioassessment monitoring, and removed an additional special study on unpaved roads prior to public release of the MRP. In the 2004 SMC report, special studies are recommended when preliminary source identification work identifies a receiving water problem and/or to answer receiving water questions related to MS4 discharges not addressed by core monitoring programs. In addition, many of the special studies are regional issues, and the MRP allows Copermittees to propose participation in regional efforts to supplement and/or replace MRP requirements. San Diego Water Board staff did not include the Copermittees request to include a site-design LID special study in the MRP because it does not qualify as a MRP special study and the proposed study is outside of our jurisdictional region. Given the purpose of including special studies in the MRP, the proposed LID special study has no relation to a receiving water problem, question, or evaluation (including source identification monitoring). While the San Diego Water Board does not want in any way to discount the importance of LID demonstration and BMP testing, the study would only have an indirect relationship to the MRP.

In regards to the High Priority Inland Aquatic Habitat Monitoring ("habitat monitoring program"), this requirement was included as an important core MRP element per recommendations by the 2004 SMC report, of which the Copermittees took part. The High Priority Inland Aquatic Habitat Monitoring requirements were constructed to allow the Copermittees a maximum level of flexibility when proposing their monitoring program. For example, the Copermittees could choose to select some SAL/NAL monitoring outfalls and stream assessment monitoring at a site they deem to be High Priority Inland Aquatic Habitat. Furthermore, unlike Orange and San Diego County, the Copermittees' monitoring is limited only to inland surface waters. In regards to the removal of the High Priority Inland Aquatic Habitat requirement from Orange County, the removal was made under the Board's direction to attempt to make Orange County's MRP as "cost-neutral" as possible while prioritizing focus areas for monitoring. This direction was made due to the performance of the Orange County monitoring program during the previous permit term. The removal of the requirement was not a "trade" for NAL/SAL monitoring. MS4 effluent monitoring was already an existing MRP element prior to inclusion of NALs and SALs.

Comment # 151	**Commentor** 4	**Comment Subject** Monitoring

Specific Comment

[From Attachment 4 to the RCFC&WCD comment letter]

The proposed draft MRP includes additional stations, constituents, data analysis and multiple special studies that exceed other programs such as South Orange County's or established standards of practice. These elements will not add substantively to the understanding of MS4 water quality impacts within the Santa Margarita Region and vastly exceed the ability of the Copermittees to pay and staff. Table 1 summarizes the Copermittees' requested revisions to the draft MRP and the costs savings from each revision.

These changes are also critical as the draft MRP proposes a program that exceeds available monitoring staffing and equipment resources. The District is currently in the process of recruiting for budgeted positions that were based on the monitoring program contained in our ROWD. However, review of the MRP has determined that our estimations were woefully inadequate. The MRP special studies and other requirements require scientists and other staff with specialized training and backgrounds that are not readily available. The District will likely have to find staff with generalized knowledge in related fields and spend significant resources training them to be knowledgeable in the science of stormwater management. Even if we were to consult out most of the work, we would still need specialized staff to scope, manage and review the consultants' work. It is not feasible to find, recruit and train the necessary staff and also deploy the proposed MRP in the time allotted. The Copermittees' proposed revisions scale requirements to a more financially attainable and manageable level. Detailed justifications for each revision are described below.

Comment Response

Please see the response to comment 92.

Comment # 152	**Commentor** 4	**Comment Subject** Monitoring

Specific Comment

[From Attachment 4 to the RCFC&WCD comment letter]

Revision: Request wet weather monitoring to be required twice a year instead of three times a year.

Justification: (1) The Water Board Staff has referenced the SMC guidance and indicated not enough data has been collected to warrant a requirement change from three wet weather samples to two. However this guidance states once three wet weather samples have been collected for three years, sampling for two wet weather events is acceptable. This data has been collected by the Copermittees. The Copermittees successfully collected three wet weather events for three reporting periods; in addition, the Copermittees have over 10 years of data to form the basis of future analyses. Although the methods of collection have changed, our statistical analysis indicates that there is no statistically significant difference between data sets collected during prior terms and the current term. (2) The current OC and SD Permits require only two wet weather samples. (3) The Santa Margarita Region is semi arid with ephemeral flows, sampling for a third storm event has proven, and will continue to prove difficult and may result in non compliance due to climate (lack of storm events). (4) The cost to Copermittees to fund a third wet weather monitoring event during this permit term is significant.

Comment Response

The referenced SMC guidance recommends 3 storm events for at least 3 years, after which a power analysis should be conducted to determine what, if any, changes should be made. The ROWD provided an analysis that stated not enough data was available statistically detect any trends. Furthermore, two issues remain regarding the mass loading data collected to date:

1) Much of the mass loading monitoring had deficiencies that were documented in the 2008 USEPA audits. For example, the audits found the Copermittees collected grab in lieu of manual composite samples. These deficiencies make answering MRPs core management questions, as well as meeting the goals, very difficult. Composite sampling enables a better calculation of the extent and magnitude of impacts on receiving waters (i.e. loading, first flush, event mean concentrations, etc...)

2) The required list of pollutants have not been monitored at mass loading stations under the current Order.

The current Orange and San Diego County MRPs have a reduced frequency because they have collected a large number of samples from representative storms, have done composite sampling, and have sampled the first storm event of the rainy season. The statement regarding inability to sample storms in the Santa Margarita HU is addressed in the 2008 USEPA Audit Inspection Report.

Lastly, the draft MRP is consistent with the Santa Ana MRP (Order No. R8-2010-0033), which requires mass loading sampling for 3 storm events annually.

Comment # 153	**Commentor** 4	**Comment Subject** Monitoring

Specific Comment

[From Attachment 4 to the RCFC&WCD comment letter]

Revision: Request dry weather sampling method to be changed from composite sampling to grab samples.

Justification: (1) The Copermittees currently conduct dry weather sampling using an instantaneous grab sample. The MRP proposes 24-hour composite sampling, which represents a significant cost increase due to the need to construct infrastructure at the sampling sites to secure and facilitate portable automatic sampling equipment. (2) Composite samples will mask illicit discharges which is one of the primary reasons for dry weather monitoring. (3) Due to dry weather flows' steady nature, the flows can be accurately characterized using a grab sample. (4) The SMC Regional Bioassessment Program, which effectively defines the standard of practice for receiving waters monitoring, has found that chemistry samples must be collected at the most downstream transect (Transect A) to be representative of the flow through the assessed reach. This program therefore uses Grab samples collected immediately prior to benthomacroinvertebrate (BMI) and periphyton sampling. If composite sampling was required, it similarly must be done at the downstream transect; however, the composites would not be representative as they would pick up sediment, nutrients and other pollutants that had been unnaturally introduced by the BMI and periphyton collection activities. This would create an unrepresentative sample and the sampling equipment would be at risk of failure due to the suspension of sediment.

Comment Response

The purpose of dry weather mass loading is to determine concentrations and mass loads of pollutants within receiving waters during dry weather conditions. This is critical in order to meet the goals and answer the core management questions of the MRP. A 24-hour composite is required because flows may not have a steady nature during the course of 24 hours. The Copermittees are expected to utilize the concentration and loading information from the composite sampling to identify pollutants of concern that should be closely monitored for in their IC/ID monitoring. It is doubtful that 2 dry weather grab samples per year at a mass loading station will be representative of illicit discharges occurring upstream. It should also be noted that the SMC bioassessment monitoring does not include mass loading monitoring as part of receiving water monitoring. For bioassessment (stream assessment) conducted at mass loading stations, composite sampling is required to coincide with bioassessment monitoring in accordance with water chemistry sampling protocol in the bioassessment SOP. A statement to that effect has been added to the draft MRP.

Comment # 154	**Commentor** 4	**Comment Subject** Monitoring

Specific Comment

[From Attachment 4 to the RCFC&WCD comment letter]

Revision: Request change in toxicity testing from three organisms to two organisms.

Justification: (1) The MRP specified in the OC Permit requires toxicity testing of two organisms and this permit should not go beyond requirements found within the OC Permit due to limited funding and resources. This is an example of a simple change where cost-savings can be realized. (2) The USEPA only has chronic toxicity protocols for Pseudokirchneriella subcapitata (formerly, Selenastrum capricornutum). Therefore there are no established protocols for the other two species, and data collection results will be difficult to compare to other regions.

Comment Response

The toxicity testing required within the Orange County MRP is inappropriate for comparison to the Riverside County draft MRP, as the Orange County MRP includes toxicity testing for inland surfaces waters (2 organisms) as well as estuarine and marine organisms (1-2 organisms). Thus, Orange County actually includes the same number or additional organisms for toxicity testing at mass loading stations.

Furthermore, the testing of 3 organisms is recommended by USEPA and is discussed in the fact sheet. For clarification purposes, USEPA has published chronic toxicity protocols (see EPA-821-R-02-013) for
1) the fathead minnow, Pimephales promelas
2) the cladoceran, Ceriodaphnia dubia
3) the alga, Selenastrum capriconutum

In this respect, the draft MRP is consistent with the Santa Ana MRP (Order No. R8-2010-0033), which requires toxicity testing for 3 organisms of different phyla at mass loading stations.

Comment # 155 **Commentor** 4 **Comment Subject** Monitoring

Specific Comment

[From Attachment 4 to the RCFC&WCD comment letter]

Revision: Request that three stream assessment stations be monitored instead of six stations.

Justification: (1) The existing MS4 Permit requires three stream assessment stations annually. These stations are our mass loading stations. It should be noted that this is an ephemeral watershed. The current stations were selected because they were the only stations that had flowing water during the bioassessment sampling periods, not because they were necessary representative of urban runoff (although they are downstream of the entire MS4 system). Specifically, during dry weather, none of the current receiving waters stations receive runoff from the MS4 due to the ephemeral nature of the watershed. Similarly, efforts to find flowing water for the Regional Bioassessment Program have been challenging. For example, in 2009, the first year of the program, 35 random sites were evaluated before one perennial site could be identified. In 2010, 39 random sites were evaluated. The final sites that were selected were actually our CURRENT mass loading stations as they were the first randomly selected sites that had flow. This lack of flow was recognized by SCCWRP in establishing the distribution of Regional Bioassessment Stations in southern California. This is why southwest Riverside County is only assigned one Bioassessment station. (2) As is demonstrated above, the Copermittees are not likely to find three additional flowing stations that are indicative of impacts from MS4 discharges. The Permit requirement therefore puts the Copermittees in unavoidable non-compliance with the Permit. (3) The cost of monitoring the additional three stations is substantial, and given the relative size of the MS4 system and population of RC to OC, the additional stations are not appropriate on an environmental, economic or social justice scale.

Comment Response

The San Diego Water Board understands that there are areas within the Santa Margarita HU that have largely ephemeral and intermittent flows.

In response to the comment:

1) The existing Order requires three stream assessment stations monitored twice per year, not annually as the commentor states. Thus, 6 sampling events are currently required. Based upon discussions with the Copermttees, the draft MRP has been modified from requiring 6 stations twice per year to 6 stations once per year. Thus, the frequency of monitoring will remain unchanged from the current Order, and the Copermittees and required to sampling in the spring following storm flows.

2) For the Regional Bioassessment Monitoring Program, it is important to note the station selection criteria for inclusion in the program. For example, stations selected must be representative of certain land use criteria, as well as have sufficient flows during September. The draft MRP requires the Copermittees to select 3 additional stations for monitoring. The Copermittees already have selected 1 additional station to monitor as part of the Regional Bioassessment Monitoring Program. Thus, 2 additional stations, which are not required to be monitored in the fall, will need to be selected. The San Diego Water Board does not agree that this will put the Copermittees in unavoidable non-compliance.

3) As stated above, the frequency of monitoring will remain the same as in the current Order. In regards to the relative frequency of monitoring when compared to Orange County, the initial Orange County draft had 12 stations monitored twice per year. Following discussions with the Orange County Copermittees, this was reduced to 9 stations annually. Orange County also participates in the Regional Bioassessment Monitoring Program.

Comment # 156	**Commentor** 4	**Comment Subject** Monitoring

Specific Comment

[From Attachment 4 to the RCFC&WCD comment letter]

Revision: Request frequency be changed from twice per year to once per year for stream assessment monitoring.

Justification: (1) The Water Board Staff and Executive Officer agreed to make this change as a trade for the Copermittees participation in the SMC Regional Bioassment special study. The change was based on findings by the Southern California Coastal Watershed Research Project (SCCWRP) scientiests indicating that there is no seasonally signficant difference in bioassesment scores. The Copermittees volunteered to implement th Regional Bioassessment Program ahead of the necessary changes to the NPDES MS4 Permit program to reduce the ioassessment sampling events in a good faith effort. (2) To determine if two sampling events are in fact necessary, the Copermittees evaluated the difference in biological community scores between Spring and Fall for data collected at Lower Murrieta, Lower Temecula and Adobe Creeks during May and October from 2007 through 2009. Utilizing a Two-Way Analysis of Variance of Southern California Index of Biological Integrity (IBI) scores, with season (Spring/Fall) and year (2007 through 2009) as variables, results indicated no statistical difference between years for any of the Permittee's three sites. No seasonal statistical difference in IBI scores ($p \geq 0.19$) was noted within any of the three stations, indicating that the IBI scores were consistent across seasons, regardless of the year. This data confirmed SCCWRP findings that there is not a change in the biological communities between the Spring and Fall seasons. (3) Further, the MRP within the OC Permit states that stations with year-round flow conditions may be monitored in May/June or September/October. Current assessment stations at Murrieta Creek, Temecula Creek, and Adobe Creek are perennial stations. Consistency across programs would denote assessments of these creeks once per year.

Comment Response

Pursuant to discussions with the Copermittees, the frequency has been changed to 6 sites once per year. The monitoring will be required to be conducted in the spring.

Comment # 157 **Commentor** 4 **Comment Subject** Monitoring

Specific Comment

[From Attachment 4 to the RCFC&WCD comment letter]

Revision: Request "a representative percentage of the major outfalls within each hydrologic subarea" (II.B.1) and "a representative number of major outfalls within each hydrologic subarea" (II.C.1.b.(1)) be changed to "representative major outfalls" as shown in the redlines attached to this comment letter.

Justification: (1) The draft MRP requires sampling of a representative number or representative percentage of major outfalls. This is a problematic compliance target as it focuses the program on a particular and open-ended "number" or "percent" of outfalls. By revising the language to require monitoring of "representative major outfalls", the burden is on the Copermittees to come up with a program that is truly representative, without requirements to meet an arbitrary number or percent of outfalls. The Copermittees are concerned about subareas that have many outfalls, which could require sampling of more sites than are economically feasible. These costs could escalate beyond the initial sampling event because if a NAL or SAL exceedance is recorded, source assessments studies are triggered that require additional staff time and resources. If this requirement is not revised, costs will quickly rise beyond the Copermittees' ability to sustain the MS4 compliance program.

Comment Response

The language in the draft MRP is consistent with requirements under 40 CFR 122.26 for non-storm water field screening (122.26(d)(1)) and storm water characterization (122.26(d)(2)) requirements. The language “a representative percentage of the major outfalls within each hydrologic subarea” leaves it up to the Copermittees to determine what number would be a representative percentage. The comment speculates that areas with many outfalls would require sampling of more sites than economically feasible. The San Diego Water Board does not expect the Copermittees to propose a program with a frequency that is not economically feasible nor statistically defensible. In regards to rising costs, the SAL/NAL requirements in the Order have specific language which allows for prioritization of source identification if a situation arises where the number of exceedances of action levels exceeds the ability to adequately respond. Additionally, in discussions with the Copermittees, the Copermittees were unable to provide an accurate numerical count of MS4 outfalls within the permit coverage area. Lastly, the Copermittees to date have not characterized their storm and non-storm water MS4 effluent, as monitoring is currently conducted in the receiving waters. Effluent monitoring is a critical component of MS4 programs, and as a permanent MRP element, the San Diego Water Board expects that the Copermittees will be able to collect data over the permit term that provides a representative percentage or number of MS4 outfalls that discharge for differing watershed conditions in each hydrologic subarea. The lack of representative stations was also documented in the 2008 USEPA audits. Thus, no change has been made to the draft MRP.

Comment # 158	**Commentor** 4	**Comment Subject** Monitoring

Specific Comment

[From Attachment 4 to the RCFC&WCD comment letter]

Revision: Request the following text revisions in footnote:

"A representative determination must consider hydrologic conditions, total drainage area of the site, land use types (commercial, residential and industrial) , costs and other considerations as appropriate."

Justification: (1) The Copermittees originally asked for clarification on what factors would be considered for "representative percentage" and Water Board staff agreed to cost being included. The failure to include cost as a factor results in a program that reduces resources and diminishes funds quickly. The revision of the above allows for cost to be included through "other considerations as appropriate". (2) Deletion of percentage is consistent with previous comments. (3) Hydrologic conditions, population density of the site, traffic density and age of the structures or building in the area are all proposed "A representative percentage determination must consider hydrologic conditions, total drainage area of the site, population density of the site, traffic density, age of the structures or buildings in the area, and land use types (commercial, residential and industrial) , costs and other considerations as appropriate." deletions because each subarea may not be sensitive to these factors and if one of this factors is applicable it will be included under the addition "other considerations as appropriate".

Comment Response

Please see section VI of the Fact Sheet for a discussion regarding cost considerations in NPDES storm water permits. To clarify, the San Diego Water Board did not agree to include cost as a specific criteria for determining a “representative percentage” of sampling points. The San Diego Water Board agreed to clarify what factors (consistent with 40 CFR 122.26) to consider when evaluating representativeness under the MRP in order to meet the goals and answer the questions of the MRP. The existing language provides sufficient flexibility for the Copermittees to consider their program cost-efficiencies when evaluating factors in the draft MRP for proposing water quality monitoring. It is unclear how the “failure to include cost as a factor results in a program that reduces resources and diminishes funds quickly.” It is expected that sufficient water quality monitoring will require resources and funds. No changes were made based on this comment.

Comment # 159	**Commentor** 4	**Comment Subject** Monitoring

Specific Comment

[From Attachment 4 to the RCFC&WCD comment letter]

Revision: Request samples for Storm Water Action Levels (SALs) to be changed from 24-hour composite to grab.

Justification: (1) Composite sampling would result in significant increased cost due to the cost of purchasing additional automatic sampling equipment and constructing the necessary infrastructure to support its use. (2) Grab samples are likely more conservative. The Copermittees propose that grab samples be collected first and then, if a problem is indicated, the Copermittees would specify needed follow-up monitoring in the Source Assessment Monitoring Plan. (3) Freed resources can be dedicated to other key components of the program, such as follow-up source assessment studies.

Comment Response

The request to modify SALs to composites is not warranted on multiple accounts:

1) The draft MRP has flexibility that allows the Copermittees to select a representative percentage of sites, and frequency of sampling.

2) Grab samples may or may not be more conservative depending upon the time of sampling. Composite samples are what the SALs were calculated from, are what is required under 40CFR 122.21(g)(7), and composites provide additional information crucial to storm water programs (see the responses to comments 152 and 153, for example see 40 CFR 122.26(d)(2)(iii)(B)).

3) If grab samples are not representative of the discharge, it may actually waste resources on unnecessary follow-up source monitoring.

Comment # 160 **Commentor** 4 **Comment Subject** Overirrigation

Specific Comment

The draft MS4 Permit categorically prohibits the discharge of landscape irrigation; irrigation water; lawn watering; (collectively 'irrigation runoff') and non-emergency fire fighting flow runoff to the MS4. The basis for this requirement comes from the current Orange County stormwater permit within the San Diego Region (NPDES No. CAS0108740), which prohibits such discharges.

Although irrigation runoff may have been shown to be a problem in South Orange County, it has not been shown to be causing problems in receiving waters in the Santa Margarita Region. Attachment 6 summarizes the unique conditions and other facts that warrant the restoration of irrigation runoff as a non-prohibited non-stormwater discharge category. It is important to reiterate the three key points
made in Attachment 6:

Unlike the watersheds in South Orange County, the Santa Margarita Region is an ephemeral watershed;

Unlike South Orange County, the Copermittees have not identified landscape irrigation, irrigation water or lawn water as an actual source of pollutants or conveyance of pollutants to waters of the U.S.;

The draft MS4 Permit requires Copermittees to eliminate irrigation runoff TO THE MS4, which by definition, requires elimination of discharges to streets, curbs and gutters.

As noted above, the prohibition appears to hold the Copermittees responsible for any amount of irrigation runoff discharged to the curb and gutter, regardless of whether or not the discharge ever reaches receiving waters or causes or contributes to the exceedance of a water quality standard. This fact, combined with the fact that irrigation runoff has not been shown to be causing impairments in the local receiving waters, will make enforcement difficult to justify with residents and will likely result in community outrage over bans on irrigation. Further the Copermittees are not water purveyors, and as such, have little control over residential irrigation runoff outside of sending code enforcement officers out to look for incidents of excessive irrigation runoff. This is a very inefficient use of resources. In any event, the provisions as written will do little for water quality but potentially much for community outrage against water quality programs. The Copermittees do not believe this is the intent of the Board.

It is further worth noting that the Permit already contains an investigation and remediation process via Non-Stormwater Action Levels (NALs) by which the Copermittees will identify the source of problematic non-stormwater discharges. Should the source be found to be a conditionally exempt non-stormwater discharge, the permit requires the Copermittees to address that discharge or the entire category of discharges as appropriate. By allowing the NAL process to determine when and where conditionally exempt discharges need to be prohibited, the Copermittees are better positioned to justify any enforcement actions.

PREFERRED POLICY CHOICE: the Copermittees request that the Regional Board restore the conditional exemption for landscape irrigation, irrigation water and lawn watering as outlined in Attachments 6 and 7.

Alternatively, if the Regional Board nevertheless insists on prohibiting Irrigation Runoff, the Copermittees request that the draft MS4 Permit be revised to allow for irrigation runoff to be managed as a JRMP program, rather than as a prohibited discharge to the MS4. This alternative request is consistent with how the Permit currently deals with non-emergency fire fighting discharges, which was also removed from the list of non-prohibited non-storm water discharges. The Executive Officer stated that he would be open to consideration of a program for irrigation runoff that
would address discharges from the MS4. This alternative approach allows the Copermittees to develop a program that focuses on irrigation runoff problem areas, as opposed to holding the Copermittees responsible for eliminating any instant case of over-irrigation to a street independent of threat to receiving water quality.

ALTERNATIVE POLICY CHOICE: The Copermittees request that the Regional Board clarify that irrigation runoff is only prohibited where it is discharged from an MS4 (into receiving waters) by adding the following language:

B.4. As part of the JRMP, the Copermittees must develop and implement a program to address pollutants from landscape irrigation, irrigation water and lawn watering identified as significant sources of pollutants to waters of the United States.

Comment Response

Please see the response to comment 100.

Comment # 161 **Commentor** 4 **Comment Subject** Monitoring

Specific Comment

[From Attachment 4 to the RCFC&WCD comment letter]

Revision: Request removal of the High Priority Inland Aquatic Habitat Monitoring requirements.

Justification: (1) This is an entirely new monitoring program. This monitoring program was initially proposed in the Orange County NPDES MS4 Permit, but later deleted when the NAL/SAL monitoring requirement was added. This trade was made as it was expected that the outfall monitoring data from the NAL and SAL program would effectively answer the underlying management question – "are MS4s impairing beneficial uses in priority aquatic habitat areas?" The underlying logic for removing the requirement in Orange County similarly applies here. Given the current economic conditions and the fact that this was considered and deleted from the OC Permit; the Copermittees respectfully request that this requirement similarly be deleted from the Riverside County MRP.

Comment Response

Please see the response to comment 150.

Comment # 162 **Commentor** 4 **Comment Subject** Economic

Specific Comment

It is fundamental that the MS4 Permit be economically, technically, and legally feasible. To be credible, and to pass legal muster, MS4 Permit requirements must demonstrable a nexus to water quality improvements. Instead the current requirements, although well intended but not always well developed, will put the Copermittees in non-compliance since we cannot afford to implement all the requirements and consequently this will not lead to water quality improvement.

The present economic crisis has made daily headlines over the past three years and Riverside County has been identified as the 11th most impacted county in the nation. In the ROWD and throughout the development of the draft MS4 Permit, the Copermittees have provided abundant publicly available information regarding the impact of this crisis on their revenues, staffing, and programs. Virtually every program and service, including public safety services, has been impacted, and others have been eliminated. Contingency reserves have been depleted to the lowest levels allowable to maintain operations. At this point, the Copermittees cannot increase water quality compliance spending without real risks to reducing spending on existing state and federal mandates or other much-needed local programs and services. As proposed, the draft MS4 Permit is economically infeasible.

Comment Response

Please see the responses to comments 8, 9, 52, 134, and 136. The Tentative Order is economically, technically, and legally feasible as evidenced in the supporting Fact Sheet.

Comment # 163	**Commentor** 4	**Comment Subject** General

Specific Comment

In an effort to promote a viable 4th-term MS4 Permit, the Copermittees proactively engaged Regional Board staff in a collaborative dialogue with the intent of developing an economically feasible MS4 Permit that was protective of receiving water quality in the Santa Margarita Region. However, the following constraints have limited the benefits of the process:

1. The discussions were curtailed because the Board expected the draft MS4 Permit to be heard in October;

2. The Board had adopted the South Orange County MS4 Permit as a "model" permit, and, therefore, would have to approve any major revisions to the provisions of that Permit; and

3. The inclusion of several new provisions of the draft MS4 Permit addressing unpaved roads, inspection programs and monitoring requirements go well beyond the Orange County Permit.

Comment Response

Please see the responses to comments 121 and 131. The commentor presents a paradoxical argument of on the one hand complaining that the San Diego Water Board uses the South Orange County MS4 permit as a model permit and on the other hand complaining about uniques provisions in the Tentative Order that are not in the South Orange County MS4 permit.

Comment # 164	**Commentor** 4	**Comment Subject** Economic

Specific Comment

As noted in the Executive Summary, the MS4 Permit adopted for South Orange County was ultimately developed for a region with substantial coastal resources and perennial streams, twice the population, significantly higher property tax revenues, and more affluent tax payers.

Comment Response

Please see the responses to comments 8, 9, 115, 116, 122, 126, 127, 130, 134, and 136.

Comment # 165 **Commentor** 4 **Comment Subject** Monitoring

Specific Comment

[From Attachment 4 to the RCFC&WCD comment letter]

Revision: Request alteration of Special Study Program.

Justification: The Draft Permit requires six special studies to be conducted (TMDL Development and Implementation, Sediment Toxicity, Trash and Litter Investigation, Agricultural, Federal and Tribal Input Study, MS4 and Receiving Water Maintenance Study and Intermittent and Ephemeral Stream Perennial Conversion Study). This is in excess of the four special studies required by the OC MRP. Given the larger MS4 Permit Area, population and resources available to South Orange County, the additional studies proposed on Riverside County are inappropriate from a social, economic and environmental justice standpoint. (1) Water Board staff acknowledged multiple studies were added to the draft MRP with the intention that would be eliminated. (2) The issues addressed by these studies are not all specific to the Santa Margarita Region and would be more appropriate to be evaluated as part of a broader regional study, such as the Sediment Toxicity study. (3) The Agricultural, Federal, and Tribal Input Study is specifically inappropriate as it requires the Copermittees to monitor the discharges of other entities subject to separate NPDES regulations. (4) The Intermittent and Ephemeral Stream Perennial Conversion Study is specifically inappropriate as it incorrectly presumes that such ephemeral streams are actually being converted to perennial systems within the permit area due to MS4 discharges.

Comment Response

Please see the responses to comments 92 and 150. San Diego Water Board staff included special studies for issues of concern to the San Diego Water Board specific to the Santa Margarita Watershed, based upon our corrent knoledge of the watershed, including complaints and enforcement within the region, to answer specific questions outside the scope of the core MRP requirements, and as a result of issues raised in the ROWD. Based upon discussion with the Copermittees, one of the Special Studies was removed from the draft MRP prior to public release. For those remaining, San Diego Water Board staff included studies thought to be of importance from a water quality standpoint, and their removal or inclusion is appropriately considered by the Board.

Additionally, Copermittees are correct that some studies have a regional context and are of regional importance. Thus, as in the Orange County MRP, the Copermittees can propose to participate in a regional monitoring approach to supplement and/or replace MRP requirements. This is subject to Executive Officer approval.

Please see the response to comment 167 in regards to the Sediment Toxicity Study.

Please see the response to comment 168 in regards to the Agricultural, Federal, and Tribal Input Study.

Please see the response to comment 172 in regards to the Intermittent and Ephemeral Stream Perennial Conversion Study.

Comment # 166 **Commentor** 4 **Comment Subject** General

Specific Comment

By contrast, the ephemeral conditions found in the Santa Margarita Region result in stream channels that are dry during dry weather conditions and receive less rain during wet season conditions. The stream flow conditions in the Santa Margarita Region are entirely unlike the significant perennial flow conditions found in South Orange County. The proposed changes contained herein address these realities. The proposed changes also address necessary changes to ensure that the Copermittees can continue to afford implementation of the draft MS4 Permit given the significant economic disadvantages faced by the Santa Margarita Region, disadvantages that have been exacerbated by the impacts of the recession.

Comment Response

Please see the response to comment 175

Comment # 167 **Commentor** 4 **Comment Subject** Monitoring

Specific Comment

[From Attachment 4 to the RCFC&WCD comment letter]

Sediment Toxicity – In the waterbodies found in the Santa Margarita watershed (which are intermittent at best and dry most of the time) the idea of investigating sediment toxicity and its impacts on benthic macroinvertebrates seems a reach. Current sediment toxicity monitoring in the State is focused on year round streams and estuaries (e.g. the Delta). Furthermore the current state of sediment toxicity monitoring is at best in its infancy as is the State's policy regarding Sediment Quality Objectives. It would seem that a more reasonable approach associate with sediment toxicity is to allow the science to catch up with the policy and for the Copermittees to learn from these other statewide efforts.

Comment Response

As discussed in the Fact Sheet, Pyrethroid pesticides were identified from TIEs conducted in response to toxicity observed during sampling as part of the triad approach at Temecula and Murrieta Creek. This monitoring was water chemistry specific and did not include sediment monitoring for pesticides. Additionally, Temecula Creek, Murrieta Creek and the Santa Margarita River were 303(d) listed for toxicity for the 2008 list. In regards to current sediment toxicity monitoring, southern California specific monitoring has shown sediments to contain pyrethroids, specifically following storm events from residential areas. Thus, irrespective of watershed hydrology (i.e. intermittent streams), pyrethroids can have a large impact on the benthos during periods of flow both during and following storm events, which may be reflected in the observed low IBI scores.

The commentor also includes some discussion regarding the science behind sediment toxicity monitoring and the status of sediment quality objectives policy at a statewide level. It is important to note that the science is well-established as documented in peer-reviewed studies, and the rate of development of state policy does not provide a sufficient basis for removal of the special study. It is unclear how the science needs to "catch up with the policy," and how this warrants not evaluating the receiving waters for a pollutant already documented to be present in toxic amounts.

Comment # 168 **Commentor** 4 **Comment Subject** Monitoring

Specific Comment

[From Attachment 4 to the RCFC&WCD comment letter]

Agricultural, Federal, and Tribal Input Study - Ongoing monitoring efforts in the Central Valley and the Los Angeles Regions for the Agriculture Waiver Program are more robust and statistically valid to make any efforts by Riverside County to be pale in comparison and likely insignificant. Likewise, monitoring in watersheds (e.g. Lake Tahoe, and the northwest part of the State) where water bodies are impaired by sediment and where Federal and Tribal land uses have inputs to the impaired water bodies is significant and should take precedent over any efforts in Riverside County. As previously noted, it is inappropriate to require the Copermittees to not only monitor their own discharges, but also expend resources monitoring the discharges of others. The Regional Board has authorities to require these sources to collect their own data and should exercise that authority appropriately if such studies are required.

Comment Response

This special study was included based upon information provided in the Copermittees' ROWD, as the Copermittees stated their concern regarding the quality of storm water being discharged into their MS4s from Agricultural, Federal and Tribal areas without sufficient supporting data. The Copermittees are responsible for flows into, through and from their MS4s, and they cannot passively accept discharges from third parties (see Finding D.3.d and Discussion in the Fact Sheet). This special study is intended to identify those flows and determine the level of pollutants being discharged into their MS4s.

The information from this study will be useful in determining whether pollutant contributions from agricultural, federal, and tribal areas are actually a significant source of pollutants entering the Copermittees' MS4 systems, as they assert. This study can also be done in conjunction with the monitoring that will be performed by the irrigated agriculture community for Conditional Waiver No. 4.

Comment # 169 **Commentor** 4 **Comment Subject** Monitoring

Specific Comment

[From Attachment 4 to the RCFC&WCD comment letter]

MS4 and Receiving Water Maintenance Study - It is likely that every flood control district in the State and Caltrans would be impacted by the MS4 and Receiving Water Maintenance Study; therefore it would be imperative to have a well thought out, comprehensive, and regional study to answer the questions being posed in the MRP. Requiring the Copermittees to take on this responsibility is misleading and will not be sufficient to answer the broad questions being posed in the MRP. A more reasonable approach would be to model a regional program similar to the current SCCWRP efforts to assess hydromodification requirements for southern California.

Comment Response

Although MS4/receiving water maintenance activities are conducted throughout the region, they are not conducted in the same manner and magnitude as is the practice in Riverside County. This special study was included with the intention that the study would serve as a pilot study to assist in the San Diego Water Board's determination if further investigation is warranted. The special study requirements are flexible and require, at a minimum, 2 sites (1 reference and 1 maintained) with pre and post monitoring for 9 pollutants. There is no specific requirement for sampling frequencies, durations or specific locations. However, the Copermittees are encouraged to propose a regional approach or program, which is allowed under the draft MRP, with EO approval.

Comment # 170 **Commentor** 4 **Comment Subject** Economic

Specific Comment

The requirements in the Permit must protect beneficial uses in a cost effective manner. It is always a balance to protect water quality and avoid unnecessary increases in program compliance costs. Balancing local water quality needs and funding limitations should be paramount in the current economic climate. Proposed program expansions must be carefully weighed against economic realities and be justified by conditions actually found in the Santa Margarita Region. As described, unpaved roads and business inspections have been effectively addressed by existing programs, yet the draft MS4 Permit proposes requirements that can only be met by establishment of new compliance programs and, in the case of the business inspect ions, elimination of the highly effective CAP.

Comment Response

Please see the responses to comments 52, 130, and 134. Through meeting with the Copermittees over a dozen times spanning several months, the Tentative Order was modified to address cost effectiveness.

Comment # 171 **Commentor** 4 **Comment Subject** General

Specific Comment

The legislature created Regional Boards to protect our beneficial uses while carefully considering the technical and economical feasibility of such protection. Even in the best of economic times, state and local government must carefully manage public revenues. A policy-level decision by the Regional Board is necessary to direct staff to work with the Copermittees to address the comments contained herein . The Copermittees request your support in our effort to develop an economically, technically, and legally feasible MS4 Permit that is appropriate to the Santa Margarita Region. As noted in the opening Executive Summary of this comment letter we specifically request that you direct Regional Board provide staff with direction to resolve the issues identified in this letter and attachments.

Comment Response

Please see the responses to comments 8, 9, 52, 121, 134, 136, 162, and 170.

Comment # 172	**Commentor** 4	**Comment Subject** Monitoring

Specific Comment

[From Attachment 4 to the RCFC&WCD comment letter]

Intermittent and Ephemeral Stream Perennial Conversion Study – Finally, review of historical water resource data by the Copermittees (as indicated in the ROWD), USGS and state and federal courts have all found that the construction of Vale and Skinner dams has significantly increased the ephemeral nature of local watersheds, resulting in much drier conditions than naturally occurred. This is why Rancho California Water District is required to discharge raw water down the Santa Margarita River at the County Line. Requiring a study to study the impacts of ephemeral conversion demonstrates a clear lack of understanding of historical and current receiving water conditions. Further, similar to our comment above regarding the MS4 and Receiving Water Maintenance Study, this study is better addressed at a regional or statewide level. It is not possible to develop a sufficient local database to statistically validate any impacts from non-stormwater discharges within any reasonable timeframe. Furthermore any minimal monitoring effort that could be provide by the Copermittees would not comprehensively address the questions being proposed in the MRP and would be a waste of resources. Again a regional approach, whether it be SCCWRP or other combination of stormwater Copermittees, would be a more logical and constructive approach to address this issue.

Comment Response

The San Diego Water Board does not disagree with the impact of impoundments upon downstream hydrology, including historical conditions within the Santa Margarita HU. However, the commentor misunderstands the context of the special study. The purpose of the investigation is to assess if exempted non-storm water discharges from the MS4 are negatively impacting beneficial uses through the conversion of waters that historically were ephemeral or intermittent into perennial systems. For ephemeral systems, any discharge of effluent becomes the receiving water, and as such, can alter beneficial uses due to pollutants, flow, invasives species, etc… which would otherwise not be present. As described, this special study is meant to coincide with non-storm water discharge monitoring and provide a qualitative and quantitative evaluation of beneficial uses for receiving waters subject to the non-storm water discharges. This is expected to aid the Copermittees IC/ID efforts to determine if the discharges are causing a condition of pollution, contamination, or nuisance due to the non-storm water flows. The San Diego Water Board contends this is not a waste of resources.

The special study has been written with a great deal of flexibility and does not require the development of a database for statistical validation of results as the commentor states. Additionally, it is unclear what questions are proposed in the special study that could not be comprehensively addressed.

Again, the Copermittees may propose a regional approach under the draft MRP to supplement and/or replace monitoring requirements. While a regional approach may be warranted, the study's intent is to provide site-specific non-storm water evaluations within the Santa Margarita HU.

Comment # 173	**Commentor** 4	**Comment Subject** Monitoring

Specific Comment

[From Attachment 4 to the RCFC&WCD comment letter]

The Copermittees have proposed maintaining two of the special studies (TMDL Development and Trash Assessment), while replacing the other four with locally preferred special studies already in place (Regional Bioasessment Program and LID BMP design, maintenance, and effectiveness study). The Copermittees believe the alternate proposal provides information that is directly relevant and beneficial to the Santa Margarita Region. This would result in an annual cost savings of $314,000 per year. This would maintain parity with the OC Permit, which only has four special studies, three of which are identical to the studies proposed below (TMDL Development, Regional Bioassessment, Trash and Litter investigation). Specific language to incorporate the new studies is included in the redline markup of the MRP.

The Copermittees propose the following studies, the write-up for which can be found in Attachment 9 to the comment letter:

1. TMDL Development and Implementation

2. LID BMP design, maintenance and effectiveness study and demonstration
This study will be valuable in ensuring BMPs that are required are effective and the benefit and integration of LID BMPs into a site is understood. This proposed study would directly affect the Copermittees ability to ensure effective LID BMPs are being implemented.

3. Regional Bioassessment study
All the Southern California counties have committed to participate in this study, with the understanding that it would be written into the MS4 permits as a special study for which they would get credit. The Copermittees have been proactively implementing this study without a MS4 Permit requirement, and want to be able to continue to support these regional studies.

4. Trash and Litter Investigation

Comment Response

The San Diego Water Board is amenable to the addition of the Regional Bioassessment as a special study, and has modified the Stream Assessment Montioring Frequency to once annually, in exchange. The draft MRP has been modified accordingly. The San Diego Water Board disagrees with including the LID special study (see the response to comment 150).

Comment # 174 **Commentor** 4 **Comment Subject** Unpaved Roads

Specific Comment

[From Attachment 5 to the RCFC&WCD comment letter]

The Draft Municipal Separate Storm Sewer System Permit (Draft Tentative Order No. R9-2010-0016; NPDES No. CAS0108740) for the Santa Margarita Region of Riverside County (Draft MS4 Permit) includes proposed findings and requirements for development and maintenance of unpaved roads that are redundant to existing regulatory requirements. The proposed requirements for maintenance of unpaved roads may lead to the unintended consequence of discouraging maintenance of the majority of the unpaved roads in the Santa Margarita Region, which may increase the potential for erosion and sediment discharge from such roads. Statements in the Fact Sheet and Findings, monitoring data, and Permittee observations and experience do not support identification of unpaved roads as a significant source of pollutants to receiving waters in the Santa Margarita Region, thereby warranting additional regulation of unpaved roads.

The Copermittees request that the proposed requirements for development and maintenance of unpaved roads be removed from the Draft MS4 Permit. The Copermittees believe that enhancement of existing programs by identifying Best Management Practices (BMPs) specific to maintenance of unpaved roads and providing public education to owners and contractors providing maintenance of privately maintained unpaved roads will be as effective as the program in the draft Permit at substantially less cost. If the San Diego Regional Board determines that unpaved roads within their jurisdiction require further regulation, the Permittees believe that the appropriate regulatory mechanism is a General Permit (Waste Discharge Requirements or NPDES Permit) since the Draft MS4 Permit addresses only a fraction of unpaved roads within the jurisdiction of the San Diego Regional Board.

Comment Response

San Diego Water Board disagrees with the conclusion that these requirements are redundant to existing regulatory requirements.

Also, the comment fails to explain the reasoning or logic behind their assertion why requiring maintenance of unpaved roads will discourage the maintenance of the majority of unpaved roads. If indeed a reduction in maintenance does occur, to whatever extent that reduction results in water quality impacts, it must be addressed through the requirements proposed.

The San Diego Water Board has identified unpaved roads as a significant source of pollutants; please see the response to comment 138 for recent examples. The requirement to regulate unpaved roads has not been removed from the Tentative Order. Certain changes have been made to the exact language as requested by the Copermittees. The San Diego Water Board strongly encourages the Copermittees to educate the public on proper maintenance of unpaved roads. The San Diego Water Board reserves the right to issue a general permit regulating unpaved roads.

Comment # 175 **Commentor** 4 **Comment Subject** General

Specific Comment

[From Attachment 5 to the RCFC&WCD comment letter]

The stream system in the Santa Margarita Region is ephemeral, with only small isolated segments exhibiting natural perennial flow due to rising groundwater. Such a stream system does not support fish migration. Runoff from the Santa Margarita Region naturally exhibits high sediment loads due to precipitation patterns, limited vegetative cover, soil types and steep topography.

Comment Response

The San Diego Water Board disagrees with the comment as an over generalization of the stream conditions within the Santa Margarita watershed. The Santa Margarita River has historic fish migration and historic perennial flows. Groundwater harvesting has drawn down the water table and reduced surface flow availability. In addition, urbanization has created localized perennial flows and wetlands in historically ephemeral areas, much like other areas throughout the region.

Comment # 176 **Commentor** 4 **Comment Subject** Unpaved Roads

Specific Comment

[From Attachment 5 to the RCFC&WCD comment letter]

Most existing unpaved roads in the Santa Margarita Region are private roads on private property that have not been engineered and have evolved through use. Such unpaved roads consist of earthen materials that have been compacted by vehicular use and do not include improved drainage, engineered grading or surface improvement. However, proposed unpaved road projects are subject to the development requirements of the MS4 Permit and the Construction General Permit and would be engineered.

In contrast to paved roads, unpaved roads are predominantly lightly traveled and found in rural areas serving economically disadvantaged residents. Many of these roads remain unpaved for economic reasons. Moreover, some residents do not want paved roads as they desire to preserve the rural/rustic nature of their communities.

Comment Response

San Diego Water Board staff disagree that proposed unpaved road projects are already subject to the development requirements of the MS4 Permit and the Construction General Permit (see the response to comment 102)

The status of ownership may increase an unpaved roads' threat to water quality due to a private owner being less likely to be informed on the threat to water quality or have the ability to maintain the unpaved road. The frequency of travel may also correlate to a threat to water quality. Less frequently used roads are also less likely to be maintained, thereby being an increased threat to water quality. If residents choose to have unpaved roads as their preferred access for aesthetic reasons, those roads must have BMPs and be maintained to not cause a water quality impairment.

Comment # 177 **Commentor** 4 **Comment Subject** Monitoring

Specific Comment

[From Attachment 4 to the RCFC&WCD comment letter]

Revision: Request "Carbamates" be removed as a constituent for analytical testing in Table 1.

Justification: The testing of carbamates should be dictated by the completion of toxicity identification evaluations (TIEs). The use of carbaryl in urban areas throughout California dropped approximately 80% between 2004 and 2008. This drop is also matched by an 80% reduction in the number of USEPA registered carbaryl products between 2004 and 2008. A downward trend since 2006 likely reflects a long-term reduction in the availability of carbaryl products due to USEPA regulatory requirements. Further, once the USEPA completes its regulatory process for the full implementation of new carbayl restrictions3, urban carbaryl use is likely to continue to decline.

Comment Response

The Copermittees have not monitored for carbamates, and thus no evidence of their presence in the discharge is available. While the reduction in registration and projected use likely limits the possibility of the presence of carbamates in the future, it does not warrant removal of carbamates from the required monitoring list. Should toxicity be detected, the inclusion of carbamates will assist with conducting TIEs. It is also important to note that other pesticides required to be monitored regularly (chlorpyrifos) and through TIEs (pyrethroids) have been detected. Thus, it is probable carbamates are present. No change has been made to the draft MRP.

Comment # 178 **Commentor** 4 **Comment Subject** Unpaved Roads

Specific Comment

[From Attachment 5 to the RCFC&WCD comment letter]

Maintenance of unpaved roads in the Santa Margarita Region is generally limited to smoothing washboard depressions that have been created by vehicle use and to improve drainage by properly sloping the surface. The smoothed road surface is compacted by the grading equipment and, subsequently, by regular traffic use. This routine maintenance activity is intended to maintain original lines and grade, and the original purpose of the unpaved road. Repair of landslides and washouts, and replacement of culverts is also performed as needed, in some instances on an emergency basis. Landslide and washout repairs may require the implementation and maintenance of temporary erosion and sediment control BMPs until the disturbed area is stabilized.

The Permittees voluntarily provide limited maintenance of Copermittee maintained, dedicated and accepted unpaved roads for public access. This voluntary maintenance is provided for public safety, including emergency vehicle access, and to maintain utility of the public easement. There is no requirement that the Permittees provide this maintenance.

Comment Response

Unpaved roads should be maintained to prevent landslide and washouts that subsequently cause a water quality impairment. Regardless of ownership, the Copermittee can, through their storm water ordinances, require private owners of unpaved roads to maintain the road to prevent erosion and sedimententation downstream in receiving waters. The San Diego Water Board, however, is sensitive to the Copermittees' concerns. The unpaved roads requirements have been revised. Please see the responses to comments 101 and 139-141.

Comment # 179 **Commentor** 4 **Comment Subject** Unpaved Roads

Specific Comment

[From Attachment 5 to the RCFC&WCD comment letter]

Most unpaved roads in the Santa Margarita Region are not maintained by the Permittees, but instead are private roads located on private property. Permittee staff is only allowed to enter private property if a crime or illegal activity is observed. The County of Riverside has not accepted maintenance of unpaved roads since the late 1940s and now only accepts paved roads that have been designed and constructed to County standards. Murrieta and Temecula will only approve new subdivisions with paved roadways constructed to their standards. In some instances, the Permittees maintain unpaved roads under contract to Home Owners' Associations or through Community Service Areas. However, the Permittees are prohibited by law from using Gas Tax funds for maintenance of unpaved roads on private property.

Other entities that are not under the legal authority of the Permittees also own unpaved roads in the Santa Margarita Region. These entities include: Agricultural Operators, Eastern Municipal Water District, Federal Lands, Metropolitan Water District of Southern California, Nature Conservancy, Railroads, Rancho California Water District, Southern California Edison, State of California, Tribal Lands

Comment Response

The Tentative Order only regulates those unpaved roads within the Copermittee's jurisdiction. Outside of their jurisdicion, other regulatory mechanisms will be required to address pollution from unpaved roads.

Comment # 180 **Commentor** 4 **Comment Subject** Monitoring

Specific Comment

[From Attachment 4 to the RCFC&WCD comment letter]

Revision: Request "Hexavalent Chromium" be removed as a constituent for analytical testing in Table 1.

Justification: Since 2004, monitoring in the Santa Margarita Region has reflected that out of 62 total samples, there were 60 non-detected levels of Hexavalent chromium. The 2 detected levels of Hexavalent chromium occurred in April 2007 in wet weather samples. It may be notes that 2007 was the driest year on record for the region and analyzed samples reflect an extended period between wet weather events. Table 1 has been modified to reflect this change.

Comment Response

Based upon data collected to date, the requirement to monitor Hexavalent Chromium has been reduced to the 1st storm event of the season and 1 dry weather event at mass loading stations. Following results collected during the term of the Tentative Order, the inclusion of Hexavalent Chromium will be evaluated for continued monitoring. Table 1 has been modified to include this clarification.

Comment # 181 **Commentor** 4 **Comment Subject** Monitoring

Specific Comment

[From Attachment 4 to the RCFC&WCD comment letter]

Revision: Request "Biological Oxygen Demand, 5day" and "Chemical Oxygen Demand" be removed as constituents for analytical testing in Table 1.

Justification: The reference in the Fact Sheet supporting the inclusion of these constituents is to the initial Phase 1 application requirements. It should be noted that the initial constituent list is not required of future permits. Further, these constituents are costly to analyze and do not provide new information that is relevant to the management of the NPDES MS4 Program.

Comment Response

Biological and Chemical Oxygen Demand (BOD/COD) provide an indication of pollution from excess sources of organic waste (biologically available and inert) such as sewage, animal waste, and plant over-production due to nutrient enrichment. The initial NPDES application requires the collection of a minimum number of constituents, including a list of constituents that are used to characterize storm water discharges. The comment does not provide any supporting evidence or documentation that warrants removal of these constituents. No changes were made based on this comment.

Comment # 182 **Commentor** 4 **Comment Subject** Unpaved Roads

Specific Comment

[From Attachment 5 to the RCFC&WCD comment letter]

The evidence cited in the Finding, water quality monitoring data, and Permittee observations and experience since establishment of the MS4 Permit in 1990 do not identify unpaved roads as a significant source of pollutants resulting in water quality impairments. The Copermittees support the continued application of development and construction requirements and maintenance of temporary erosion and sediment control BMPs as specified in existing permits.

The requirements for development and maintenance of unpaved roads were proposed by Regional Board staff for inclusion in the Draft MS4 Permit just prior to its release for public comment. Prior to that time, and dating from the original establishment of the MS4 Permit requirements in 1990, unpaved roads had not once been mentioned by Regional Board staff as a significant source of water quality impairment requiring additional regulatory.

The discussion of Finding D.1.c. states that the inclusion of unpaved road requirements was based on "investigations and complaints" reviewed by the San Diego Regional Board. However, Regional Board staff identified only one recent case regarding an unpaved road in the Santa Margarita Region as a problem. The Copermittee in question has investigated this case and it is being addressed as an enforcement action. Although the Copermittees have not had the opportunity to review the investigations and complaints cited by Regional Board staff, no feedback from these investigations was reported to the Copermittees at the MS4 Permit discussions prior to the proposal of the unpaved road requirements. This indicates to the Copermittees that unpaved roads do not in fact present a significant water quality concern.

The Copermittees have reviewed the documents cited by Regional Board staff in the discussion of Finding D.1.c. and the conditions in the Santa Margarita Region are vastly different from those in Pennsylvania and Northern California cited in those documents. These areas receive regular precipitation, have significant vegetative cover, and perennial streams, some of which may support migrating fish. Nothing in these documents suggests that unpaved roads are a significant source requiring special attention in the Santa Margarita Region. Further, no data collected during Copermittee monitoring nor their observations support a conclusion that unpaved roads are a significant source of pollutants warranting special regulatory attention.

The lack of evidentiary support for the unpaved roads provisions makes their inclusion in the Draft MS4 Permit arbitrary and capricious. The Copermittees therefore request deletion of Finding D.1.C.

Comment Response

Contrary to the comment, the San Diego Water Board has identified several unpaved roads potentially causing water quality problems. Therefore, "continued application of development and construction requirements and maintenance of temporary erosion and sediment control BMPs" is clearly insufficient, and, to some extent inappropriate, since unpaved roads are not temporary.

The BMPs cited in USEPA and State of California can be equally effective at addressing sediment and erosion on unpaved roads in the Santa Margarita Watershed. In no way does a BMP manual infer similar geology, climate or habitat. The fact that the watershed has less vegetative cover and flashy flows undesrcores the need for proper BMPs in the watershed.

Finally, the statement that ," no data collected during Copermittee monitoring nor their observations support a conclusion that unpaved roads are a significant source of pollutants warranting special regulatory attention" is not surprising since no such data was collected. This was the basis for the San Diego Water Board proposing a Special Study on unpaved roads in earier drafts (prior to public release).

Please see the responses to comments 101, 103, and 138.

Comment # 183 **Commentor** 4 **Comment Subject** Monitoring

Specific Comment

[From Attachment 4 to the RCFC&WCD comment letter]

Revision: Request "Total Organic Carbon" and "Dissolved Organic Carbon" be removed as constituents for analytical testing in Table 1.

Justification: The reference within the Fact Sheet does not require these constituents and there is a significant cost in analyzing the constituents. It is not clear what additional information these constituents provide that would be useful in managing the MS4 program that is not already addressed through the collection of other constituents.

Comment Response

The reference in the Fact Sheet has been updated to reflect the reference for monitoring of organic carbon. Please also see the response to comment 181.

Comment # 184 **Commentor** 4 **Comment Subject** Unpaved Roads

Specific Comment

[From Attachment 5 to the RCFC&WCD comment letter]

For the reasons set forth above, there is no evidence that unpaved roads require special regulatory attention in the MS4 Permit. Moreover, proposed requirements specific to unpaved roads are redundant to existing requirements in both the existing Permit and the draft MS4 Permit, the state General Construction Permit, and the Copermittees' Stormwater ordinances. To the extent that unpaved roads are of concern to Regional Board staff, those concerns can be effectively addressed by minor adjustments to these existing compliance programs. In a time of tight regulatory budgets, adding these additional requirements, especially where there is no demonstrated need for them, is arbitrary and capricious. The Copermittees request deletion of requirements specific to unpaved roads (see discussion below) as well as these statements in the Fact Sheet.

Comment Response

Please see the response to comment 138 and 182. The Copermittees' existing permit requirements have failed to adequately address pollution coming from unpaved roads.

Comment # 185 **Commentor** 4 **Comment Subject** Unpaved Roads

Specific Comment

[From Attachment 5 to the RCFC&WCD comment letter]

Virtually all unpaved road development activities would be greater than one acre and/or be part of a priority development project of one acre or more. Such development projects are required to prepare and implement project-specific Standard Urban Stormwater Mitigation Plans (SUSMPs) under Section F of both the existing MS4 Permit and the Draft MS4 Permit. The SUSMPs identify post-construction BMPs that will be implemented for all elements of the project, including the unpaved road elements of the project. Unpaved road projects are also required to comply with the state General Construction Permit, which requires preparation of a SWPPP that identifies construction-phase BMPs and post-construction BMPs. These development and construction phase requirements are applicable to unpaved roads and are imposed by the Copermittees during the development review process, during the issuance of grading permits and during construction inspections. Either the general requirements for development projects in the existing or Draft MS4 Permit and/or the General Construction Permit already require identification and implementation of post-construction BMPs, including erosion and sediment control BMPs, when developing new unpaved roads. Therefore, additional requirements for development of unpaved roads are redundant and the Copermittees request that these redundant requirements be removed from the Draft MS4 Permit.

Comment Response

The San Diego Water Board disagrees with the comment's over generalization that virtually all unpaved road development activity would be greater than one acre. In particular, small roads crossing ephemeral stream can cause significant impacts through improperly engineered, designed and maintained culvert systems. Please see the response to comment 102.

Comment # 186 **Commentor** 4 **Comment Subject** Unpaved Roads

Specific Comment

[From Attachment 5 to the RCFC&WCD comment letter]

The documents cited in Finding D.1.c discuss shaping of the surface of unpaved roads during smoothing, and maintenance of temporary sediment and erosion control BMPs associated with maintenance activities, such as repair of landslides and wash outs. The temporary erosion and sediment control BMPs identified include straw bales and silt fencing. The documents do not describe conditions in the Santa Margarita Region, but rather in Pennsylvania and Northern California.

The conditions in the Santa Margarita Region are vastly different from the conditions found in Pennsylvania and Northern California. Nevertheless, the Copermittees conduct surface grading and maintain temporary erosion and sediment control BMPs as appropriate following completion of maintenance on unpaved roads. These BMPs associated with the routine maintenance of unpaved roads will be documented and procedures formalized in the Riverside County Drainage Area Management Plan (DAMP).

Comment Response

Finding D.1.c in the Tentative Order does not include any document citations. The Fact Sheet discussion for Finding D.1.c. does include some examples of existing BMP manuals that the Copermittees may draw upon as a cost -saving resource in designating BMPs for unpaved roads maintenance. The BMP manuals are in no way used to describe the geology, habitat and climate of the Santa Margarita Region. The manuals do include useful information regarding the impacts of unpaved roads reardless of location. See comment 182 response.

Comment # 187 **Commentor** 4 **Comment Subject** Unpaved Roads

Specific Comment

[From Attachment 5 to the RCFC&WCD comment letter]

As previously described, the vast majority of unpaved roads within the jurisdiction of the Copermittees are not maintained by the Copermittees, but are maintained by others, typically private property owners. As these are public easements over private property, however, the underlying property owner is under no legal obligation to provide maintenance. To provide reasonable access, maintenance of such unpaved roads is voluntarily provided by property owners and, in some cases, home owners' associations. State law prohibits the use of Gas Tax funds by the Copermittees for the maintenance of unpaved roads on private property. Requirements for implementation and maintenance of temporary erosion and sediment control BMPs in areas under the legal jurisdiction of the Copermittees are addressed by the general requirements of the Copermittees' stormwater ordinances and, where grading activities are significant, through the Copermittees' grading ordinances. As maintenance of unpaved roads on private property is voluntary, more aggressive regulation of such private roads may in fact discourage routine maintenance of unpaved roads, likely resulting in an increase in erosion and sediment discharge from such roads.

As an alternative, maintenance of unpaved roads can be effectively addressed by enhancing existing programs. There is no need to create a new compliance program requirement specific to unpaved roads, especially where such programs cannot in any event be implemented by the Copermittees on private property. The Copermittees believe that a better approach is to provide public education to property owners and grading contractors in areas served by unpaved roads, focusing on the proper methods of shaping unpaved road surfaces and the benefits of implementing and maintaining temporary erosion and sediment controls.

The Copermittees request that these proposed provisions be removed from the Draft MS4 Permit.

Comment Response

Please see the responses to comments 101, 102, 176, and 182.

Comment # 188 **Commentor** 4 **Comment Subject** Unpaved Roads

Specific Comment

[From Attachment 5 to the RCFC&WCD comment letter]

There is nothing unique about potential discharges from unpaved roads under the legal jurisdiction of the Copermittees such that they would require special regulation. As discussed above, there is significant mileage of unpaved roads in the Santa Margarita Region that are not under the legal jurisdiction of the Copermittees. If there is concern about the impact of unpaved roads on water quality (a concern that, for the reasons already stated, is not supported by the evidence), there is no reason to believe that unpaved roads not under the legal jurisdiction of the Copermittees do not present the same potential to affect receiving water quality.

If it is determined that development and maintenance of unpaved roads requires special additional regulation, then such regulation should apply equally and on the same schedule to all unpaved roads under the jurisdiction of the San Diego Regional Board, not just those under the legal authority of the Copermittees. The Copermittees request that, if staff continues to maintain that unpaved roads require additional regulation, those requirements be addressed through a general permit for unpaved roads, and not in the Draft MS4 Permit.

Comment Response

Because unpaved roads are a significant concern to water quality, the San Diego Water Board will regulate discharges from them under the appropriate mechanism. Please see the responses to comments 101 and 179.

Comment # 189	**Commentor** 4	**Comment Subject** Unpaved Roads

Specific Comment

[From Attachment 5 to the RCFC&WCD comment letter]

No evidence, whether statements in the Fact Sheet and Findings, monitoring data, or Copermittee observations and experience, supports identification of unpaved roads as a significant source of pollutants to receiving waters in the Santa Margarita Region warranting additional regulation. The proposed unpaved road requirements are redundant to requirements of existing permits, including the state General Construction Permit, as well as existing Copermittee ordinances and programs. To the extent that unpaved roads may be a source of pollutants to the MS4 and thence to receiving waters, the Copermittees believe that enhancement of existing programs by documenting BMPs specific to maintenance of unpaved roads and providing public education to owners and contractors who provide maintenance of privately maintained unpaved roads will be as effective in reducing such pollutants, at a much reduced cost.

If the Regional Board determines that unpaved roads within its jurisdiction require further regulation, the appropriate method for addressing those roads is through a General Permit (Waste Discharge Requirements or NPDES Permit) rather than the Draft MS4 Permit, since a General Permit would address all unpaved roads in the San Diego Region, not just the subset of unpaved roads under the legal jurisdiction of the Copermittees.

Comment Response

Please see the responses to comments 101 and 138.

Comment # 190 **Commentor** 4 **Comment Subject** General

Specific Comment

[From Attachment 6 to the RCFC&WCD comment letter]

Unlike the watersheds in South Orange County, the Santa Margarita Region is an ephemeral watershed that includes Murrieta and Temecula Creeks which are perennial interrupted streams, i.e., they include some reaches in which the flow is continuous and others where flow is ephemeral. However, the areas of perennial flow in the Santa Margarita Region are located in mountain area tributaries outside of the urbanized areas serviced by the MS4s. These perennial flows quickly disappear by seepage into the sands and gravels and resurface upstream of the confluence of Murrieta and Temecula Creeks. The creeks in the urbanized areas of the watershed, located primarily in the valley, are ephemeral and flows are only observed during and immediately following significant storm events.

Rising groundwater is currently observed in Murrieta Creek below its confluence with the Santa Gertrudis Channel, an observation consistent with the observations made by the State of California in 1956. Rising groundwater is also observed in Temecula Creek approximately one quarter mile upstream of the Interstate 15 Bridge. In 1956, the State observed more extensive rising groundwater conditions occurring as far upstream as the Highway 79 Bridge. Based on the virtual absence of non-stormwater flows and the rising groundwater conditions observed in lower Murrieta and Temecula Creeks prior to development of the watershed, there is no evidence that the rising groundwater currently observed is due to Urban Runoff nor that Urban Runoff has affected the quality of rising groundwater.

Comment Response

The San Diego Water Board recognizes that many of the streams should be ephemeral in the Upper Santa Margarita Watershed. The San Diego Water Board disagrees that the perennial flows in the upper parts of the watershed are all natural. This is the reason the Intermittent and Ephemeral Stream Perennial Conversion special study was included in the MRP. The San Diego Water Board recognizes that rising groundwater is likely to contribute to flows that are observed in some reaches. The San Diego Water Board does not contend that rising groundwater is necessarily due to non-storm water discharges. The San Diego Water Board does not agree that non-storm water discharges are not affecting groundwater quality. Much of the available groundwater monitoring data in the region indicate that there are elevated levels of nitrates and other forms of nutrients, as well as other pollutants that can likely be attributed to non-storm water discharges that infiltrate to groundwater.

The commenter misrepresents the State of California's 1956 report on the Santa Margarita Watershed. The report cites that flows in the watershed are highly "seasonal" not "ephemeral". In addition, the report demonstrates the seasonality with flow data in a table that shows diminished flows in the summer, but not an absence of flows, at the river gauge.

Also see the response to comment 175.

Comment # 191 **Commentor** 4 **Comment Subject** Monitoring

Specific Comment

[From Attachment 4 to the RCFC&WCD comment letter]

Revision: Request "Biological Oxygen Demand, 5day" and "Chemical Oxygen Demand" be removed as constituents for analytical testing in Table 4.

Justification: The reference in the Fact Sheet supporting the inclusion of these constituents is to the initial Phase 1 application requirements. It should be noted that the initial constituent list is not required of future permits. Further, these constituents are costly to analyze and do not provide new information that is relevant to the management of the NPDES MS4 Program.

Comment Response

Please see the response to comment 181. It is important to note that no data has been collected to date to characterize discharges of storm water effluent from the Copermittees' MS4s. No changes were made based on this comment.

Comment # 192 **Commentor** 4 **Comment Subject** Monitoring

Specific Comment

[From Attachment 4 to the RCFC&WCD comment letter]

Revision: Request "Total Organic Carbon" and "Dissolved Organic Carbon" be removed as constituents for analytical testing in Table 4.

Justification: The reference within the Fact Sheet does not require these constituents and there is a significant cost in analyzing the constituents. It is not clear what additional information these constituents provide that would be useful in managing the MS4 program that is not already addressed through the collection of other constituents.

Comment Response

Please see the responses to comments 181 and 183. It is important to note that no data has been collected to date to characterize discharges of storm water effluent from the Copermittees' MS4s. No changes were made based on this comment.

Comment # 193 **Commentor** 4 **Comment Subject** Monitoring

Specific Comment

[From Attachment 4 to the RCFC&WCD comment letter]

Revision: Request the following text revisions:

"The Copermittees must collaborate to develop and implement a program to identify sources of pollutants causing the priority water
quality problems within each hydrologic subarea. The program must include focused monitoring as necessary to identify source areas, or other methods to identify the societal sources of pollutants, as appropriate. This program must begin no later than the 2012-2013 monitoring year."

Justification: As drafted, the permit requires source identifications to start at the end point of the watershed and move upstream. The requested revisions are intended to provide flexibility to allocate resources appropriately based on field judgements. The second part of the revision is to acknowledge some pollutant contributions to the MS4 are in-fact, non-point source, and cannot be pinpointed through focused source ID Monitoring.

Comment Response

A key component of receiving water and effluent monitoring is to conduct source identification monitoring to identify specific sources and/or areas for pollutants causing priority water quality problems. This is done in conjunction with source identification as required under the Tentative Order on a watershed basis, moving upstream to identify specific sources and contributing areas. As stated in the fact sheet, all monitoring conducted under Order No. R9-2004-001 focused on receiving water conditions rather than MS4 effluent discharges. Outside of required toxicity identification and reduction evaluations, no source identification effluent monitoring was conducted for observed exceedances of water quality standards in receiving waters. The utilization of "other methods to identify the societal sources of pollutants," is not considered water quality monitoring, and thus does not fall under the MRP but rather the Tentative Order (i.e. construction site locations). See the Fact Sheet for further discussion. No changes were made based on this comment.

Comment # 194 **Commentor** 4 **Comment Subject** Monitoring

Specific Comment

[From Attachment 4 to the RCFC&WCD comment letter]

Revision: Request text additions:

"Sampling of non-storm water discharges may be done utilizing grab samples. If a ponded MS4 discharge is observed at a monitoring station, the Copermittee(s) must record the observation and collect at least one (1) grab sample, however ponded water samples will not be used in determining action level exceedances. If flow is evident, a 1-hour composite sample may be taken. The Copermittee(s) must estimate the flow using techniques such as by measuring the width of water surface, approximate depth of water, and approximate flow velocity."

Justification: The first text addition is to avoid triggering action levels due to increased concentrations caused by evaporation of ponded water. Evaporation of ponded water will result in increased concentrations of any constituents contained in the water. NALs are based on Water Quality Objectives that are based on stable, flowing stream conditions. The second text addition is to allow flexibility in measuring stream flows. In some cases, flow gauges or flow meters may be available to estimate flow.

Comment Response

In response to the comment regarding ponded MS4 discharge and concerns over higher concentrations, there are multiple factors to consider. Non-storm water discharge sampling requires sampling of the effluent discharged from the MS4 into receiving waters. First, if an MS4 discharge is ponded within the receiving water due to the receiving water's natural hydrology, then an increased concentration due to receiving water conditions (i.e. evaporation) is not a sufficient rationale for causing a condition of pollution, contamination, or nuisance as a result of the discharge. This is also reflected within the action level calculations, specifically in consideration of the appropriateness of granting dilution credits. Second, if an MS4 discharge is ponded within the MS4 prior to the discharge point, then action levels would also still apply, as there is visible evidence of a non-storm water discharge into the MS4 system which may be an illicit discharge. The ponding does not warrant foregoing proper IC/ID investigations.

In regards to the flow estimation language, edits have been made to ensure there is flexibility in measuring the flow of the effluent. For clarification, the commentor requests "flexibility in measuring stream flows", and the referenced flow estimation is for effluent discharge. The draft MRP has been modified to include this clarification.

Comment # 195 **Commentor** 4 **Comment Subject** Monitoring

Specific Comment

[From Attachment 4 to the RCFC&WCD comment letter]

Revision: Request text additions:

Monitoring Annual Report: The Principal Copermittee must submit the Receiving Waters and MS4 Discharge Monitoring Annual Report to the San Diego Water Board on October 1 of each year, beginning on October 1, 2013. Receiving Waters and MS4 Discharge Monitoring Annual Reports must cover the monitoring activities and results from the previous fiscal year, and must meet the following requirements:

Justification: All of the Copermittees' activities are tracked and reported on a Fiscal Year basis. This facilitates clearer data and cost tracking, and results that can be more effectively integrated into the JRMP reports in a clear and understandable manner, since the reporting periods are aligned. This change is important, so as to allow for a simpler transition from the existing monitoring and data tracking methods, to those that will be developed for compliance with the permit.

Comment Response

The San Diego Water Board finds this to be a reasonable request and has modified the draft MRP language.

Comment # 196 **Commentor** 4 **Comment Subject** Monitoring

Specific Comment

[From Attachment 4 to the RCFC&WCD comment letter]

Revision: Request the following text revisions:

"The 4th year monitoring report must include identification and analysis of any long-term trends in the Copermittees' MS4 storm water discharges or receiving water quality. Appropriate statistical methods shall be used to evaluate the water quality data."

Justification: The first edit is to require the long term statistical analyses be performed on a time schedule consistent with submission of the ROWD. Requiring long-term statistical trend analyses on an annual basis is unnecessary and inappropriately increases analysis and reporting costs and complexity. The second edit recognizes a multitude of different statistical methods could be used and others may be more appropriate to the dataset than those identified in the draft MRP.

Comment Response

The first proposed edit to reduce trend analysis to the 4th year monitoring report for submission with the ROWD is not appropriate for multiple reasons. This does not meet the goals of the MRP (I.A). For example, goal number 2 is to "Measure and improve the effectiveness of the Copermittees' runoff management programs." Trend analysis should be utilized as a tool to meet this goal, which arguably should not be done on a permit re-issuance basis. The proposed edit would also not answer the core management questions the MRP is designed to answer (I.B). For example, question 5 asks "are conditions in receiving waters getting better or worse?" Again, this should not be answered only on a permit re-issuance basis.

In regards to the second proposed edit, the commentor misconstrues the MRP language. The MRP language only requires a trend analysis to include a non-parametric approach, and provides some examples ("Trend analysis must use nonparametric approaches, such as"). A non-parametric approach is required to be included because stormwater data in southern California are not normally distributed, and comparison of statistical calculations on transformed data with a non-parametric approach aids in evaluating conducted trend analysis. No changes were made based on this comment.

Comment # 197 **Commentor** 4 **Comment Subject** Monitoring

Specific Comment

[From Attachment 4 to the RCFC&WCD comment letter]

Revision: Request elimination of requirement for annual monitoring reports to include total pollutant loads (wet weather loads plus dry weather loads) due to MS4 Discharge for each of the hydrologic subareas.

Justification: Many assumptions go into the calculations of total loads, making their use in statistical analyses questionable at best. The Copermittees have continued to provide this data, but do not see that it has any value.

Comment Response

The San Diego Water Board recognizes that multiple assumptions are integrated into the estimation of total pollutant loading from MS4 discharges. However, this does not warrant the removal of the calculation requirement, as load calculations play an important role in estimating the impact of MS4 discharges on receiving waters. Importantly, estimation of pollutant loading should be utilized by the Copermittees to meet the goals and answers the questions under I.A and I.B. Furthermore, the Copermittees have not conducted MS4 effluent monitoring under previous or the current Order, so it is expected that pollutant loading estimations under the draft MRP, which requires storm and non-storm water effluent monitoring, will be more accurate.

It is also important to note that the collection of MS4 effluent and receiving waters data and subsequent MS4 load estimation will assist in the evaluation of 303(d) listings and TMDL development. No changes were made based on this comment.

Comment # 199	**Commentor** 4	**Comment Subject** Overirrigation

Specific Comment

[From Attachment 6 to the RCFC&WCD comment letter]

The last sentence of this Finding [C.15] does not accurately reflect the facts. Unlike Orange County, and despite Board staff's contentions in the fact sheet the Copermittees have not identified landscape irrigation, irrigation water or lawn water as a source of pollutants or conveyance of pollutants to waters of the U.S. Rather, this statement is based on the efforts in Orange County where that County found that the significant perennial flows throughout the urbanized areas were caused by irrigation runoff. Not only has irrigation runoff not been found to be a source of pollutants to waters of the U.S. in the Santa Margarita Region as a category, no individual discharges of irrigation runoff in the region have been found to be a source of pollutants. As described in the Stream Flow Characteristics section above, during dry weather there is no perennial flow in the waters of the U.S. in the urbanized area until rising groundwater occurs just before the confluence of Murrieta and Temecula Creeks. This is unlike streams in South Orange County, that it was found that the significant perennial flows throughout the urbanized areas were caused by irrigation runoff. In the Santa Margarita Region, any weather runoff that does reach receiving waters quickly seeps into the alluvial soils.

Comment Response

Please see the responses to comments 27, 83, 175 and 233.

Comment # 200	**Commentor** 4	**Comment Subject** Overirrigation

Specific Comment

[From Attachment 6 to the RCFC&WCD comment letter]

Second, the Discussion of Finding C.15 in the Fact Sheet fails to demonstrate the need for a prohibition of this irrigation runoff as a non-stormwater runoff category. The discussion references conditions outside of and unlike those found in the Santa Margarita Region and misconstrues statements in public education materials that encourage runoff management as justification for the proposed prohibitions. Finally, no justification is provided in this discussion or elsewhere to support the prohibition of the non-emergency fire fighting flows runoff as a category.

Comment Response

Please see the responses to comments 25, 27, and 83.

Comment # 201	**Commentor** 4	**Comment Subject** Overirrigation

Specific Comment

[From Attachment 6 to the RCFC&WCD comment letter]

A prohibition of irrigation runoff will result in significant costs to the public and the Copermittees as the prohibition is TO THE MS4, which is defined to include streets, curbs and gutters. As the MS4 Permit has eliminated the MEP protections for dry weather non-stormwater discharges (see also legal comments in Attachment 7 to the comment letter), this makes the Copermittees responsible for every incidence of over-irrigation, regardless of whether such discharges ever affect receiving waters. As such, the cost to eliminate these discharges is not commensurate with any measurable environmental benefit. The Copermittees cannot impose fees to recover the costs of enforcing this new requirement and, as described in the Economics White Paper (Attachment 2 to the comment letter), the Copermittees have even fewer resources to carry out the requirements of the current MS4 Permit than in past years, much less carry out the additional requirements set forth in the draft Permit, including the development and implementation of a new program to prohibit irrigation runoff.

As this prohibition would also apply to Copermittees' facilities, retrofit of existing facilities would likely be immediately required to ensure compliance. The City of Murrieta, for example, has estimated that retrofit of their sprinklers to a drip system to avoid irrigation runoff from their facilities alone would cost $250,000.

Comment Response

Please see the response to comment 23. The San Diego Water Board disagrees that including the prohibition of irrigation runoff in the Tentative Order will result in significant costs to the public and Copermittees. The prohibition is consistent with the Water Conservation in Landscaping Act (AB1881), which already required cities and counties to adopted landscape water conservation ordinances prohibiting runoff from inefficient landscape irrigation by Janaury 1, 2010. The cities and counties are required to adopt ordinances that prohibit runoff from "the target landscape" to "adjacent property, non-irrigated areas, walks, roadways, parking lots, or structures." The Copermittees are already required to enforce these ordinances.

In the event that overirrigation runoff is identifed as an illicit discharge to "adjacent property, non-irrigated areas, walks, roadways, parking lots, or structures", which includes the Copermittees' MS4s, the Copermittees are expected to address the illicit discharge through their IC/ID programs. In addition, the San Diego Water Board encourages the Copermittees to identify and implement retrofit projects and education programs that can help to minimize or eliminate the potential for illicit discharges of overirrigation runoff into their MS4s.

Comment # 202 **Commentor** 4 **Comment Subject** Overirrigation

Specific Comment

[From Attachment 6 to the RCFC&WCD comment letter]

Management of irrigation runoff is currently addressed by existing requirements and programs and the additional requirements proposed in the draft Permit are unnecessary. The use of reclaimed water is regulated under Waste Discharge Requirements (WDRs) issued by the Regional Board.

The draft Permit also provides other mechanisms to address irrigation runoff. First, if a discharge of irrigation runoff was determined to be a source of stormwater pollutants, the Copermittees already have the legal authority to take appropriate enforcement action to control the discharge as an illegal discharge, under their existing storm water ordinances. Second, the non-stormwater action level monitoring required by this draft Permit will identify any potentially problematic non-stormwater discharges and identify the source of those discharges. Should the source be determined to be irrigation runoff, it will require the Copermittees to address that discharge. Both mechanisms are better suited (financially and legally) to deal with irrigation runoff than a complete prohibition provision in the absence of local data showing it as a problem.

Finally, local water purveyors are better equipped and able to address irrigation runoff. As an example, Rancho California Water District and Eastern Municipal Water District actively promote water conservation programs, which are supported by the Metropolitan Water District of Southern California. The County and the cities have adopted water conservation ordinances as required by the Water Conservation in Landscaping Act (AB 1881, Laird). Given these facts, there is even less justification for an extensive and expensive program to address an irrigation runoff issue that is not, in fact, a source of pollutants causing or contributing to a violation of water quality standards in the Santa Margarita Region.

Comment Response

The San Diego Water Board disagrees that the requirements in the Tentative Order are unnecessary. The San Diego Water Board has identified runoff from overirrigation as a significant source and conveyance of pollutants to the MS4 and receiving waters. This justifies the requirements of the Tentative Order. Please see the responses to comments 27 and 83.

In addition, the prohibition is consistent with the Water Conservation in Landscaping Act (AB1881), which already required cities and counties to adopted landscape water conservation ordinances prohibiting runoff from inefficient landscape irrigation by Janaury 1, 2010. The cities and counties are required to adopt ordinances that prohibit runoff from "the target landscape" to "adjacent property, non-irrigated areas, walks, roadways, parking lots, or structures." The Copermittees are already required to enforce these ordinances.

The San Diego Water Board agrees that NALs may idenify illicit discharges from overirrigation. In the event that an individual irrigation runoff discharge is identifed as an illicit discharge to the MS4, whether or not an NAL exceedance has been observed, the Copermittees are expected to address the illicit discharge through their IC/ID programs.

Comment # 203	**Commentor** 4	**Comment Subject** Overirrigation

Specific Comment

[From Attachment 6 to the RCFC&WCD comment letter]

Specifically, the Permittees request that the language in the Permit be amended as follows prior to adoption of the Permit:

Delete Finding C.15

As the last sentence of this Finding is not supported by fact, the Permittees request that it be deleted as noted in the following text and the entirety of the Discussion of Finding C.15 in the Fact Sheet be deleted.

Non-storm water discharges to the MS4 granted an influent exception [i.e., which are exempt from the effective prohibition requirement set forth in CWA section 402(p)(3)(B)(ii)] under 40 CFR 122.26 are included within this Order. Any exempted discharges identified by Copermittees as a source of pollutants are subsequently required to be addressed (emphasis added) as illicit discharges through prohibition and incorporation into existing IC/ID programs. Furthermore, the USEPA contemplates that permitting agencies such as the San Diego Water Board may also identify exempted discharges as a source of pollutants required to be addressed as illicit discharges (See VOl. 55 Fed. Reg. 48037).

Comment Response

Please see the responses to comments 27 and 83. No changes were made based on this comment.

Comment # 204	**Commentor** 4	**Comment Subject** Overirrigation

Specific Comment

[From Attachment 6 to the RCFC&WCD comment letter]

The Permittees request that the landscape irrigation; irrigation water; lawn watering; and non-emergency fire fighting flows runoff categories be restored to the list of non-prohibited, non-stormwater discharges identified in B.2 of the draft SMR MS4 Permit as noted below. In the event that an individual irrigation runoff discharge is determined to be a source of pollutants as identified by the non-stormwater dry weather action level (NAL) process, appropriate action can be taken by the Permittees to control that source.

B.2. Non-Stormwater Discharges
This item includes a listing of discharges that are not prohibited unless a discharge is determined to be a source of pollutants to waters of the U.S. Landscape irrigation, irrigation water, lawn watering and non-emergency fire fighting flows were deleted from this list as noted:
a. Diverted stream flows;
b. Rising groundwaters;
c. Uncontaminated groundwater infiltration [as defined at 40 CFR 35.2005(20)] to MS4s;
d. Uncontaminated pumped groundwater3;
e. Foundation drains3;
f. Springs;
g. Water from crawl space pumps3;
h. Footing drains3;
i. Air conditioning condensation;
j. Flows from riparian habitats and wetlands;
k. Water line flushing4,5;
l. Landscape irrigation;
m. Discharges from potable water sources not subject to NPDES Permit No. CAG679001, other than water main breaks;
n. Irrigation water;
o. Lawn watering;
p. Individual residential car washing;
q. Non-emergency fire fighting flows; and
r. Dechlorinated swimming pool discharges

Comment Response

Please see the responses to comments 27 and 83. In the event that an individual irrigation runoff discharge is identifed as an illicit discharge to the MS4, which may be after an NAL exceedance has been observed, the Copermittees are expected to address the illicit discharge through their IC/ID programs. No changes were made based on this comment.

Comment # 205	**Commentor** 4	**Comment Subject** Overirrigation

Specific Comment

[From Attachment 6 to the RCFC&WCD comment letter]

It is not practicable for the Copermittees to prevent or eliminate irrigation runoff. The Permittees request that the following requirements be revised as noted to provide achievable compliance requirements:

F.1.c.(1) Approval Process Criteria and Requirements for All Development Projects states:

Performance Criteria: Discharges from each approved development project must be subject to the following management measures:

(1) Source control BMPs that reduce stormwater pollutants of concern in runoff;prevent reduce the potential for illicit discharges into the MS4; prevent reduce the potential for irrigation runoff; storm drain system stenciling or signage; properly design outdoor material storage areas; properly design outdoor work areas; and properly design trash storage areas.

F.1.d.(5) Source Control BMP Requirements states:

Each Copermittee must require each Priority Development Project to implement applicable source control BMPs. The source control BMPs to be required must:

(a) Prevent illicit discharges into the MS4;
(b) Minimize storm water pollutants of concern in runoff;
(c) Eliminate Reduce the potential for irrigation runoff;
(d) Include storm drain system stenciling or signage;
(e) Include properly designed outdoor material storage areas;
(f) Include properly designed outdoor work areas;
(g) Include properly designed trash storage areas;
(h) Include water quality protection requirements applicable to individual priority project categories.

Comment Response

The San Diego Water Board disagrees with the proposed changes. The San Diego Water Board disagrees that it is not practicable for the Copermittees to prevent or eliminate irrigation runoff from entering their MS4 systems. The Copermittees are required by AB 1811 to prohibit overirrigation runoff. Please see the responses to comments 27, 83, and 201. The Copermittees are expected to implement their jursidictional programs, especially their IC/ID programs, to prevent or eliminate irrigation runoff from entering their MS4 systems. No changes were made based on this comment.

Comment # 206	**Commentor** 4	**Comment Subject** Overirrigation

Specific Comment

[From Attachment 6 to the RCFC&WCD comment letter]

Regulate irrigation runoff discharges from the MS4, rather than as prohibited discharge to the MS4:

If the Regional Board nevertheless insists on prohibiting irrigation runoff, the Copermittees request that the draft MS4 Permit be revised to allow for irrigation runoff to be managed as a Jurisdiction Runoff Management Plan (JRMP) program, rather than as a prohibited discharge to the MS4. This alternative request is consistent with how the Permit currently deals with non-emergency fire fighting discharges, which was also removed from the list of non-prohibited non-stormwater discharges. The Executive Officer stated that he would be open to consideration of a program for irrigation runoff that would address discharges from the MS4. This alternative approach allows the Copermittees to develop a program that focuses on irrigation runoff problem areas, as opposed to holding the Copermittees responsible for eliminating any instant case of over-irrigation independent of threat to receiving water quality.

As the alternative to restoring the conditional exemption, the Copermittees request the Board to ADD Provision B.4 as follows:

B.4. As part of the JRMP, the Copermittees must develop and implement a program to address pollutants from landscape irrigation, irrigation water and lawn watering identified as significant sources of pollutants to waters of the United States.

Comment Response

The San Diego Water Board disagrees with the requested change. The Copermittees are expected to implement their jursidictional programs, especially their IC/ID programs, to prevent or eliminate irrigation runoff from entering their MS4 systems. No changes were made based on this comment. Please see response to comment 201.

Comment # 207 **Commentor** 4 **Comment Subject** Legal

Specific Comment

[From Attachment 7 to the RCFC&WCD comment letter]

Throughout Part F. of the Tentative Order relating to the Jurisdictional Runoff Management Program, the language requires not only that the Copermittees adopt programs intended to achieve control of pollutants but also requires such programs to achieve certain ends. See, for example, Part F.1., where each Copermittee must implement a development planning program which meets the requirements of Section F of the Tentative Order and which requires such a program to (1) reduce development project discharges from the MS4 to the MEP, (2) prevent such discharges "from causing or contributing to a violation of water quality standards", (3) prevents illicit discharges to the MS4, and (4) manages increases in runoff discharge rates. A similar requirement is set forth in other provisions, including Part F.3, relating to existing development, Part F.3.b., relating to commercial/industrial programs, Part F.3.c., relating to residential programs and Part F.6, relating to the education component where, in each case, the Copermittees are required to develop programs and ensure their performance.

This dual requirement, to develop a program and then to ensure that it achieves the intended ends, is unlawful, as it goes beyond the requirements of the MS4 regulations and requires the Copermittees to guarantee the results of activities that will often be in the control of third parties. The MS4 regulations require that the MS4 permittees develop the required programs. See, for example, 40 CFR § 122.26(d)(2)(iv(A)((2), which requires the Copermittees to, among other things, develop and implement a management program including a "description of planning
procedures including a comprehensive master plan to develop, implement and enforce controls to reduce the discharge of pollutants from municipal separate storm sewers which receive discharges from areas of new development and significant redevelopment". The Copermittees certainly could be liable under the permit if they failed to adequately "develop, implement and enforce controls". However, the MS4 regulations do not require that the Copermittees guarantee, under threat of being found in violation of the permit, that such controls achieve the desired ends of the management programs. It should be also noted that in many other parts of the Order, the Copermittees are directed to develop programs "designed" to achieve water quality goals.

Further, the iterative BMP approach required by the State Water Resources Control Board ("State Board") in precedential State Board Order WQ 99-05 and subsequent rulings would be made meaningless if the Copermittees were strictly liable for ensuring in their programs that discharges did not cause or contribute to a violation of a water quality standard. It is appropriate for the Board to set forth in these sections the "elements needed in the Copermittees' program to fulfill the goals of [the] directive", as set forth in staff's Response to Comment 297 on the Orange County MS4 permit, Order No. R9-2009-0002. However, the Board has no authority to require the Copermittees to guarantee that such goals will be fulfilled, as the current language appears to require.

In addition to the portions of the Order cited, the Copermittees also request changes to similar provisions found at Sections F.1.d, F.1.d.5, F.2, F.3.a, F.4, and G. The attached redline identifies those and any additional parts.

Comment Response

40 CFR 122.44(d)(1) requires municipal storm water permits to include any requirements necessary to "[a]chieve water quality standards established under section 303 of the CWA, including State narrative criteria for water quality." 40 CFR 122.44(d)(1)(i) requires NPDES permits to include limitations to "control all pollutants or pollutant parameters (either conventional, nonconventional, or toxic pollutants) which the Director determines are or may be discharged at a level which will cause, have reasonable potential to cause, or contribute to an excursion above any State water quality standard, including State narrative criteria for water quality." Please also see the response to comment 76.

The Tentative Order's requirements are wholly lawful in accordance with the Clean Water Act, the Code of Federal Regulations and the California Water Code. The dual requirements are not in conflict, but work in harmony. The requirements set forth minimum programmatic actions that are expected to result in MS4 discharges meeting water quality standards. Where the Copermittees have implemented the minimum programmatic actions yet their discharges continue to violate water quality standards, the Copermittees must modify their programs and implement additional actions that are not specified within the Tentative Order to achieve water quality standards. The Tentative Order does not require strict compliance with water quality standards. See Defenders of Wildlife v Browner (9th Cir. 1999) 191 F.3d 1159, 1167-1168.

Comment # 208 **Commentor** 4 **Comment Subject** Legal

Specific Comment

[From Attachment 7 to the RCFC&WCD comment letter]

A number of requirements in the Tentative Order exceed the requirements of federal law. The Board may have discretion to impose such requirements under state law (Defenders of Wildlife v. Browner, 191 F.3d 1159 (9th Cir. 1999), however, the California Supreme Court has determined that to the extent such state law requirements are included in an NPDES permit, the Board must consider the factors set forth in Water Code § 13263(a) and § 13241, including the water quality that could reasonably be achieved by the requirements and economic considerations. City of Burbank v. State Water Resources Control Board (2005) 35 Cal. 4th 613. See also Water Code §13000, setting forth that the activities and factors which may affect the quality of the waters of the state "shall be regulated to attain the highest water quality which is reasonable, considering all demands being made on those waters and the total values involved, beneficial and detrimental, economic and social, tangible and intangible".

The Fact Sheet and findings for the Tentative Order do not establish that staff has considered such factors or, to the limited extent the factors were considered, staff used out-of-date and incomplete information. In particular, the economic analysis contained in Section VI of the Fact Sheet uses out-of-date information on the economic viability of the cities in the Santa Margarita Region, ignoring the impact of the national recession, which has hit the Region with particular force and which has caused a major reduction in property tax and sale tax revenues available to fund water quality activities under the Order. For a more complete economic analysis, please see Attachment 2 to the comment letter.

Comment Response

The federal statute provides that, in adopting MS4 permits, the permit "shall require . . . such other provisions as the Administrator or the State determines appropriate for the control of such pollutants." (See Defenders of Wildlife v Browner (9th Cir. 1999) 191 F.3d 1159) U.S. EPA and states have authority under federal law to go beyond the MEP standard and require strict compliance with water quality standards. (Building Industry Association of San Diego County v. State Water Resources Control Board, et al. (2004) 124 Cal.App 4th 866. The BIA court was persuaded that USEPA or the states have authority to require strict compliance with water quality standards under the "such other provisions as the Administrator . . . Determines appropriate for the control of such pollutants" language in CWA section 402(p)(3)(B)(iii). (Building Industry, 124 Cal.App 4th at 882-884.) In other words, even if the Permit somehow exceeded the federal minimum requirements of MEP, any discretion to exceed MEP originate in federal law, which requires the San Diego Water Board to include such other permit provisions as it deems appropriate.

However, in the Tentative Order, the San Diego Water Board has chosen not to exercise its discretion to go beyond MEP and require strict compliance with water quality standards. Thus, the Tentative Order's provisions clearly fall within the federal mandated requirements. The San Diego Water Board disagrees with the commenter's assertion that requirements in the Tentative Order exceed the requirements of federal law thus needing to consider the cited factors. However, where provided and available, staff has considered economic information in crafting the Tentative Order. Please see the responses to comments 8, 9, 77-79, and 86.

The economic analysis contained in section VI of the Fact Sheet is from up to date information, as reported by the Copermittees' Annual Reports, with information as of January 1, 2009. While we recognize that Riverside County is experiencing a period of economic hardship, the Copermittees do not provide an completely accurate characterization of the economic conditions. Please see the responses to comments 115, 116, 122, and 126-130.

Comment # 209 **Commentor** 4 **Comment Subject** Finding

Specific Comment

[From Attachment 8 to the RCFC&WCD comment letter]

Need for New Finding B.2: Section B in the findings describes the regulated parties. The District requests a new finding B.2, which provides as follows:

The Riverside County Flood Control and Water Conservation District (District) is not a municipality but rather operates various elements of the MS4 system within the San Diego Region in the form of flood control structures, including channels. Such channels and other flood control structures have been constructed and are operated by the District in accordance with its statutory obligations established by the Legislature in California Water Code App. § 48-9, to "control the flood and storm waters of said district" and to save and conserve in any manner all or any of such waters and protect from damage from such flood or storm waters the watercourses, watersheds, public highways, life and property in said district." Water Code App. § 48-9(8). As a creature of state law, and not a municipal corporation, the District does not exercise jurisdiction over land areas within the San Diego Region and the activities carried out on those land areas outside of its limited rights-of-way. Please see redline.

Comment Response

The San Diego Water Board disagrees with the requested change. As stated in the comment, the RCFC&WCD constructs and maintains channels and flood control structures, which are considered part of the MS4. The RCFC&WCD has jurisdiction within its right-of-way. The RCFC&WCD is responsible for implementing the requirements of the Tentative Order within its jurisdiction as is any other Copermittee. No changes were made based on this comment.

Comment # 210 **Commentor** 4 **Comment Subject** Legal

Specific Comment

[From Attachment 7 to the RCFC&WCD comment letter]

Finding A.4: This finding states that responses to comments on the Order would be "incorporated by reference" into the findings supporting the Order.

Comment: Incorporating responses to comments as to which interested parties have no chance to comment prior to the hearing on the Order raises a due process concern.

Comment Response

Finding A.4 has been modified to remove responses to comments as "incorporated by reference" into the findings of the Tentative Order. Although not part of the findings, the responses to comments remains part of the record and have been considered by the San Diego Water Board in adopting the Tentatie Order.

Comment # 211 **Commentor** 4 **Comment Subject** Finding

Specific Comment

[From Attachment 8 to the RCFC&WCD comment letter]

Findings, Section D.3: This section of the Findings referring to "Construction and Existing Development" is of limited applicability to the District, since the only construction projects that would be overseen by the District are of or within its own facilities. The redline sets forth a change to clarify this limited applicability.

Comment Response

The San Diego Water Board disagrees that the Findings referring to "Construction and Existing Development" are of limited applicability to the RCFC&WCD. Please see the response to comment 209. No changes were made based on this comment.

Comment # 212 **Commentor** 4 **Comment Subject** New Development

Specific Comment

[From Attachment 8 to the RCFC&WCD comment letter]

Section F.1.a: The District, as a non-municipality, does not prepare a General Plan or equivalent because it does not govern development within a geographical area. Thus, the requirements of this section of the Order are not applicable to it. Please see redline.

Comment Response

The requested changes are not necessary. The language also says "or equivalent plan". The RCFCD&WCD has Master Drainage Plans and Area Drainage Plans that must include watershd protection principles. No changes were made based on this comment.

Comment # 213 **Commentor** 4 **Comment Subject** New Development

Specific Comment

[From Attachment 8 to the RCFC&WCD comment letter]

Section F.1.d.(4)(a)(iii): Since the District, as a non-municipality, does not have land use codes, policies and ordinances, this provision, relating to the removal of "barriers to LID implementation," is not applicable to it. Please see redline.

Comment Response

The requested changes are not necessary. The RCFC&WCD has standard contract and bid specifications, encroachment permits and internal policies and procedures that all apply to this requirement. No changes were made based on this comment.

Comment # 214 **Commentor** 4 **Comment Subject** New Development

Specific Comment

[From Attachment 8 to the RCFC&WCD comment letter]

Section F.1.d.(9): The only Priority Development Projects (PDP) relevant to the District would be the District's owned non-flood control channel projects, since it has no authority to permit private or non-District facilities and exercises jurisdiction over no private land areas within the watershed, and because the construction of flood control channels is subject to the jurisdiction of the U.S. Army Corps of Engineers through the Clean Water Act Section 404 permit program, not the NPDES permit program under Section 402 of the Clean Water Act. Thus, this directive, which requires the verification of compliance by third parties with Standard Stormwater Mitigation Plan (SSMP) requirements, is not applicable to the District. Please see redline.

Comment Response

The requested changes are not necessary. The RCFC&WCD is required to verify compliance with SSMP requirements and track post-construction BMPs for its own projects. No changes were made based on this comment.

Comment # 215	**Commentor** 4	**Comment Subject** New Development

Specific Comment

[From Attachment 8 to the RCFC&WCD comment letter]

Section F.1.e: As noted above, the only PDPs over which the District would have authority are its own projects. Thus, this directive, which requires inspection of BMPs at PDPs constructed by third parties, is not applicable to the District. Please see redline.

Comment Response

The requested changes are not necessary. The RCFC&WCD is required to verify the construction of BMPs for its own projects. No changes were made based on this comment.

Comment # 216 **Commentor** 4 **Comment Subject** Legal

Specific Comment

[From Attachment 7 to the RCFC&WCD comment letter]

Finding C.14: This finding states, in relevant part, that "[n]on-storm water (dry weather) discharge from the MS4 is not considered a storm water (wet weather) discharge and therefore is not subject to regulation under the Maximum Extent Practicable (MEP) standard . . . .". The finding further asserts that such discharges are to be "effectively prohibited" from discharge into the MS4.

Comment: The rationale for this finding, as set forth in the Fact Sheet, relies on a State Board precedential decision, Order No. WQ 2009-0008. This order has been vacated by order of the Los Angeles County Superior Court in County of Los Angeles v. State Water Resources Control Board, Case No. BS 122724 (July 16, 2010). Thus, the order has no further effect and cannot be cited or relied upon by the Board in support of this finding or any other finding or directive in the Order.

Moreover, the finding incorrectly states that discharges of non-stormwater from the MS4 are not subject to the MEP standard. This parsing of "stormwater" and "non- stormwater" is not found in the Clean Water Act, which states only that the MS4 permit "shall require controls to reduce the discharge of pollutants to the maximum extent practicable . . . .". 33 U.S.C. 1342(p)(3)(B)(iii) (emphasis supplied). The preamble to the MS4 regulations promulgated by U.S. EPA moreover also acknowledges that "MEP control measures" would be implemented to address not only pollutants in "stormwater" but also from "non-stormwater discharges."

As the preamble states:

[Copermittees are required] to develop management programs for four types of pollutant sources which discharge to large and medium municipal storm sewer systems. Discharges from [such systems] are usually expected to be composed primarily of: (1) Runoff from commercial and residential areas; (2) storm water runoff from industrial areas; (3) runoff from construction sites; and (4) non-storm water discharges. Part 2 of the permit application has been designed to allow [permittees] the opportunity to propose MEP control measures for each of these components of the discharge". 55 Fed. Reg. at 48052 (emphasis supplied).

This language sets forth EPA's understanding of the plain language of the Act: "pollutants" must be controlled to the MEP from the MS4 "discharge", not merely stormwater. While State Board Order No. WQ 2009-0008 improperly attempted to ignore this distinction and liken non-stormwater discharges to prohibited "illicit discharges", that order has been vacated and cannot be cited by the Board.

Moreover, the interpretation that the Clean Water Act requires controls of dry weather discharges from the MS4 in the same manner as if such discharges were from an industrial wastewater source ignores the factual complexity of the MS4 discharge. For example, some of that discharge will be composed of exempt discharges, such as car washing runoff, swimming pool drainage, rising groundwater, foundation drains and other such sources. As to these types of discharges, U.S. EPA stated that "it is unlikely Congress intended to require municipalities to effectively prohibit . . . seemingly innocent flows that are characteristic of human existence in urban environments and which discharge to municipal separate storm sewers". 55 Fed. Reg. at 48037 (emphasis added). Other parts of that discharge will be comprised of industrial discharges separately permitted by the Board, such as well development discharges. These discharges cannot be distinguished from possible illicit discharges, yet they must still be treated to the MEP. There is no requirement in the Clean Water Act, or in the implementing regulations, to ensure that these mixed dry weather discharges must be "effectively prohibited" in the same way that an industrial plant would be required to control its discharges.

Comment Response

Please see the responses to comments 86 and 223.

Comment # 217 **Commentor** 4 **Comment Subject** New Development

Specific Comment

[From Attachment 8 to the RCFC&WCD comment letter]

Section F.1.g: Since the District is not a municipality, and does not permit third parties to build development projects, this provision is not applicable to it. (It should be noted that this directive also has been objected to by the District on behalf of itself and the other Copermittees.)

Comment Response

The requested changes are not necessary. The RCFC&WCD is required to enforce its storm water requirements and ensure compliance with the requirements of the Tentative Order for its own development projects. No changes were made based on this comment.

Comment # 218 **Commentor** 4 **Comment Subject** Construction

Specific Comment

[From Attachment 8 to the RCFC&WCD comment letter]

Sections F.2, F.2.a and F.2.f.: These directives require each Copermittee to comply with each of the requirements of the section, to review and update its grading and other ordinances, and implement an enforcement process for Construction sites. These requirements are not applicable to the District in the same manner as the other Copermittees, as the District is not a municipality and does not issue grading or other permits for private land use activities. Please see redline.

Comment Response

The San Diego Water Board disagrees that these requirements are not applicable to the RCFC&WCD in the same manner as the other Copermittees. The RCFC&WCD can review and update its grading and other requirements for construction projects implemented by the RCFC&WCD. The RCFC&WCD must enforce those requirements to ensure they are in compliance with the requirements of the Tentative Order. No changes were made based on this comment.

Comment # 219 **Commentor** 4 **Comment Subject** Commercial/Industrial

Specific Comment

[From Attachment 8 to the RCFC&WCD comment letter]

Sections F.3.b-c: These directives, which require the development of commercial/industrial and residential programs, are applicable to a municipality but not to the District, which does not have land area occupied by either commercial/industrial or residential developments. Such requirements may be applicable to the municipal Copermittees, but not to the District, which only operates MS4 within the Permit area. The District's rights-of-way are limited to that which is necessary to properly operate flood control infrastructure. Please see redline.

Comment Response

The San Diego Water Board disagrees that the proposed changes are necessary to make a distinction for the RCFC&WCD. If the RCFC&WCD does not have any commercial/industrial and residential land uses within their jurisdiction, they can report it in their Annual Report. The San Diego Water Board would not expect the RCFC&WCD to implement these programs if these land uses are not within their jurisdiction. No changes were made based on this comment.

Comment # 220 **Commentor** 4 **Comment Subject** Retrofit

Specific Comment

[From Attachment 8 to the RCFC&WCD comment letter]

Section F.3.d: This directive requires development of a retrofitting program for "municipal, industrial, commercial and residential" areas of development. The District only maintains MS4 facilities within the Santa Margarita Region, and does not have jurisdiction over other areas of development. The Order should make clear that any retrofitting requirements (which are the subject of separate comments by the District on behalf of other Copermittees) apply only to development with the jurisdiction of the Copermittee. Clarifying changes are set forth in the redline.

Comment Response

The San Diego Water Board disagrees with the requested changes. As stated in the comment, the RCFC&WCD maintains MS4 facilities within the Santa Margarita Region. MS4 facilities are considered municipal. There are potential retrofit opportunities for RCFC&WCD maintained MS4 facilities. Where there may be private property owners within other jurisdictions that could impact the RCFC&WCD MS4 facilities, the RCFC&WCD could work with those jurisdictions to identify ways to cooperate and encourage those private property owners to implement retrofit BMPs. No changes were made based on this comment.

Comment # 221 **Commentor** 4 **Comment Subject** General

Specific Comment

[From Attachment 8 to the RCFC&WCD comment letter]

Section F.6: This directive contains requirements for education of various target communities, including commercial and industrial owners and operators and residential communities, most of which are not within the jurisdiction of the District. The Order should make clear that such educational programs must be consistent with the jurisdiction of the Copermittees. Clarifying changes are set forth in the redline.

Comment Response

Through meetings with the Copermittees, modifications to the education section were made to accommodate the concern raised by the RCFC&WCD. Section F.6 requires each Copermittee to implement education programs. The Tentative Order is silent on how those education programs are implemented (i.e. for each jurisdiction, or regional). On several occasions, the RCFC&WCD has indicated that the Copermittees have a regional education program. As such, the RCFC&WCD is participating in educating and reaching out to the target communities in all the municipalities. No additional clarification is necessary.

Comment # 222 **Commentor** 4 **Comment Subject** General

Specific Comment

Attachment 9: Santa Margarita Region MS4 Copermittee Comments on Tentative Order R9-2010-0016 and Attachment E.

This attachment provides an underline strikeout text of Copermittee requested changes to the Tentative Order and Attachment E.

Comment Response

Where specific comments were provided in the underline-strikeout text, the San Diego Water Board has responded to those comments under a separate comment ID. Where comments were not provided in the text or where the comments were not otherwise addressed in other attachments of their comment letter, the San Diego Water Board has considered the change and either accepted the change as shown in the Errata or did not agree with the proposed change.

Comment # 223 **Commentor** 4 **Comment Subject** Legal

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

This order [WQ-2009-0008] has been vacated and can no longer be referenced

Comment Response

The San Diego Water Board disagrees with the commenter that discharges of non-storm water from the MS4 are subject only to the MEP standard. Non-storm water discharges into the MS4 are required to be effectively prohibited by the Copermittees. The San Diego Water Board acknowledges that State Water Board Order WQ-2009-0008 is no longer a precedential order by which the San Diego Water Board is bound, the court's opinion in County of Los Angeles v State Water Resources Control Board (Case No. BS 122724 (July 16, 2010)) does not address the substantive analysis and conclusions reached by the State Water Board in Order WQ-2009-0008. Rather, it vacates the permit issued by the Los Angeles Water Board that underlies Order WQ-2009-0008 on procedural grounds. The San Diego Water Board continues to agree with the State Water Board's findings and rationale as expressed in the Order. Findings in the Tentative Order will be revised to reflect that although Order WQ 2009-0008 is no longer a precedential order, the San Diego Water Board independently agrees with its findings and rationale.

Comment # 224 **Commentor** 4 **Comment Subject** Legal

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

This is inappropriate. The information in the fact sheet is/are not 'findings', they are explanations. Further a finding cannot be created through a response to comments.

Comment Response

Please see the response to comment 210. While the San Diego Water Board has modified the finding stating that responses to comments are incorporated as findings, it is appropriate to incorporate by reference the Fact Sheet into the Tentative Order.

Comment # 225 **Commentor** 4 **Comment Subject** Finding

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

No link has been demonstrated within this watershed. (Partially due to lack of recreation in receiving waters)

The findings should be accurate for reflective of the specific area the permit is regulating.

Comment Response

The San Diego Water Board contends that the finding is accurate for the specific area the permit is regulating. A landmark study, conducted by the Santa Monica Bay Restoration Project, found that there was an increased occurrence of illness in people that swam in proximity to a flowing storm drain. Although the Upper Santa Margarita Watershed is inland, the watershed drains to the Pacific Ocean, and pollutants generated in the area may impact coastal waters. For example, the Santa Margarita River system provides the main source of beach sand for the beaches in northern San Diego County. In addition, residents from the Upper Santa Margarita Watershed, who recreate at southern California beaches, benefit from clean water. Also, the waters in the Upper Santa Margarita Watershed are designated with water contact recreation (REC-1) beneficial use, and waders may come in direct contact with storm drain discharges. No changes were made based on this comment

Comment # 226 **Commentor** 4 **Comment Subject** Legal

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

[Copermittees request the word "violations" be replaced with the word "exceedances" in the Finding C.9 that states (in summary) that water quality monitoring data documents persistent violations of Basin Plan water quality objectives.]

It is only a violation if the pollutant has not been reduced to the MEP in accordance with a Permit.

Comment Response

Section A.2 of the current Riverside County MS4 Permit (Order No. R9-2004-001) prohibits [storm water and non-storm water] discharges from MS4s that cause or contribute to exceedances of water quality objectives for surface water or groundwater. Thus, the San Diego Water Board characterizes exceedances of the water quality objectives in the Basin Plan as violations of water quality objectives, especially if discharges from the MS4 is causing or contributing to those exceedances. This prohibition remains in the Tentative Order (see section A.3), but now also includes response requirements (see sections A.3.a-c).

Section A.3 of Order No. R9-2004-001 prohibits [storm water] discharges from MS4s containing pollutants which have not been reduced to the MEP. MEP only applies to storm water discharges. Please see response to comment 23. If pollutants in storm water discharges are not reduced to the MEP, the discharges would also be in violation of this prohibition. This prohibition remains in the Tentative Order (see section A.2). No changes were made based on this comment.

Comment # 227 **Commentor** 4 **Comment Subject** Finding

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

See legal comments in Attachment 7 Discharges of pollutants from the MS4, of whatever source, are subject to the MEP standard. The MEP standard applies to municipal discharges, not to only municipal storm water discharges.

Comment Response

Please see the response to comment 86.

Comment # 228 **Commentor** 4 **Comment Subject** Overirrigation

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

This is a false statement – the Copermittees have not made this determination (or 'identification') See also comments within the letter and attachments thereto.

Comment Response

Please see the responses to comments 27 and 83.

Comment # 229	**Commentor** 4	**Comment Subject** Finding

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

[Copermittees request the terms "Drainage Area Management Plan" be replaced with "Storm Water Management Plans" and that Storm Water Management Plans together with the DAMP describe the Copermittee's runoff management programs.]

Terminology in this paragraph was not correct for the Santa Margarita Region

Comment Response

Comment noted, the recommended changes have been made to the Tentative Order and reflected in the errata.

Comment # 230 **Commentor** 4 **Comment Subject** Legal

Specific Comment

[From Attachment 7 to the RCFC&WCD comment letter]

Finding C.15: This finding states, in relevant part, that the Board and the Copermittees have identified "landscape irrigation, irrigation water and lawn water, previously exempted discharges, as a source of pollutants and conveyance of pollutants to waters of the U.S." The finding further asserts that such non-exempt discharges are required to be "addressed" as "illicit discharges" and effectively prohibited from entry into the MS4.

Comment: The rationale for this prohibition lacks both a factual and legal basis. The factual issues are discussed in the District's technical comments on this issue. With regard to legal issues, the justification for removing the preexisting exemption for these discharges (referred to hereafter as "irrigation water") is completely lacking. First, given that the justification is based on State Board Order WQ 2009-0008, which likens dry weather discharges to "illicit discharges" required to be "effectively prohibited" from entry into the MS4, the vacation of this order by the Los Angeles County Superior court eliminates this Order as a justification for the prohibition.

Second, EPA, in the preamble to the federal MS4 regulations, required that a permittee must make a finding that the "irrigation water" discharges must be a "source of pollutants to waters of the United States . . . .". 55 Fed. Reg. 48037. Moreover, such discharges must represent a "significant" source of pollutants to waters of the United States "under certain conditions". U.S. EPA Guidance Manual for the Preparation of Part 2 of the NPDES Permit Application for Discharges from Municipal Separate Storm Sewer Systems, November 1992 ("EPA Part 2 Guidance Manual"), at p. 6-33. These conditions require a focus not on an entire category of discharges, but rather a discharger-by-discharger examination.

In the MS4 regulatory preamble, EPA stated that "[i]n general, municipalities will not be held responsible for prohibiting some specific components of discharges or flows listed below through their [MS4], even though such components may be considered non-storm water discharges, unless such discharges are specifically identified on a case-by-case basis as needing to be addressed". 55 Fed. Reg. 47995 (emphasis supplied). In the Guidance Manual, EPA states:

If an applicant knows . . . that landscape irrigation water from a particular site flows through and picks up pesticides or excess nutrients from fertilizer applications, there may be a reasonable potential for a storm water discharge to result in a water quality impact. In such an event, the applicant should contact the NPDES permitting authority to request that the authority order the discharger . . . to obtain a separate NPDES permit (or in this case, the discharge could be controlled through the storm water management program of the MS4).

EPA Part 2 Guidance Manual, p. 6-33 (emphasis added).

Third, the finding asserts that the Board has the authority to "identify exempted discharges as a source of pollutants" and that it has identified the irrigation discharges "as a source of pollutants and conveyance of pollutants to waters of the U.S." Read in the context of the previously cited language, however, the Board has no power greater than a municipality and must identify specific discharges, and not entire categories of discharges. See 55 Fed. Reg. 48037. And, as noted in the white paper on irrigation runoff, the Copermittees have not, in fact, identified irrigation discharges as a source of pollutants or a "conveyance of pollutants" to waters of the United States.

Comment Response

Please see the responses to comments 27, 83 and 223. The Fact Sheet describes that overirrigation discharges are a significant source of pollutants into and from the MS4 to water of the US.

The San Diego Water Board disagrees with the comment that: "These conditions require a focus not on an entire category of discharges, but rather a discharger-by-discharger examination." The Federal Register (as referenced in the above comment), in discussion of exempted categories of non-storm discharges states: "in general, municipalities will not be held responsible for prohibiting some specific components of discharges or flows listed below through their municipal separate storm sewer system, even though such components may be considered non-storm water discharges, unless such discharges are specifically identified on a case-by-case basis as needing to be addressed." (Vol. 55 Fed Reg 47995). The San Diego Water Board maintains that 40 CFR 122.26(d)(2)(iv)(B)(1) and the discussion in the Federal Register are clear in discussion of "components" and "categories" of non-storm water discharges, and that the exempted components and categories of non-storm water discharges are required to be addressed through prohibition on a category by category basis, not on a discharger by discharger basis, when identified as a source of pollutants.

The discussion in the Federal Register further clarifies that once a category of exempted non-storm water discharges has been identified and prohibited, "operators of such non-storm water discharges need to obtain NPDES permits for these discharges under the present framework of the CWA..." as "such illicit discharges are not authorized under the CWA" (55 Fed Reg 47995). This is consistent with existing NPDES permits applicable to categories of discharges.

Furthermore, in addition to the regulations under 40 CFR 122.26(d), the discussion in the Federal Register (55 Fed Reg 48037) clearly states that "the Director may include permit conditions that either require municipalities to prohibit or otherwise control any of these types of discharges where appropriate."

Comment # 231 **Commentor** 4 **Comment Subject** Legal

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

Not all non-storm water discharges need to be prohibited.

Comment Response

The Clean Water Act requires all non-storm water discharges to the MS4 be effectively prohibited. Section 402(p)(3)(B)(ii) reads "Municipal Discharge -- Permits for discharges from municipal storm sewers … shall include a requirement to effectively prohibit non-stormwater discharges into the storm sewers;"

Comment # 232 **Commentor** 4 **Comment Subject** Legal

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

The MS4 can never be comprised of natural waterbodies. See definition in federal MS4 regulations and legal comments in Attachment 7.

Comment Response

Please see the response to comment 22.

Comment # 233 **Commentor** 4 **Comment Subject** Finding

Specific Comment

[From Attachment 7 to the RCFC&WCD comment letter]

Finding D.1.b.: This finding states that "MS4 discharges, however, continue to cause or contribute to violations of water quality standards as evidenced by the Copermittees' monitoring results". (Emphasis added)

Comment: With respect to discharges that "contribute to" violations of water quality standards, it should be noted that for concentration-based water quality standards, an MS4 discharge at concentrations below the water quality standard cannot, as a matter of simple scientific fact, contribute to a violation of such a water quality standard. If the discharge is below the standard in question, that discharge will never exceed the water quality standard, no matter the volume of the discharge.

Comment Response

The Copermittees' water quality monitoring data submitted to date documents persistent violations of Basin Plan water quality objectives for various runoff-related pollutants (indicator bacteria, dissolved solids, turbidity, metals, pesticides, etc.) at various watershed monitoring stations. Additionally, available monitoring data submitted to the San Diego Water Board have resulted in a significant increase in 303(d) listings for the waters in the Upper Santa Margarita Watershed. On the 2002 303(d) List there were 3 water body/pollutant combinations listed. On the 2008 303(d) List there were over 50 water body/pollutant combinations listed. The 303(d) impaired water body listings are based on violations of water quality standards in the Basin Plan.

The commenter does not consider other ways that discharges to and from the MS4 can contribute to violations of water quality standards. Pollutants in discharges to the MS4 may be deposited within the MS4 and accumulate over time. Those accumulated pollutants could contribute to a violation of water quality standards when the next storm event washes those pollutants from the MS4 to the receiving waters.

Non-storm water discharges from the MS4 during dry weather may discharge at concentrations below the water quality standards, but can still contribute to a violation of water quality standards. Non-storm water discharges to the receiving waters, which may be dry at the time, could pool and concentrate the pollutants within the receiving water body as the water evaporates. The concentrated pollutants in the receiving water body could contribute to violations of water quality standards with the next storm event.

No changes were made based on this comment.

Comment # 234 **Commentor** 4 **Comment Subject** Legal

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

The MS4 operators are obligated to take storm water under state law, and therefore must "passively" receive such waters, whether or not they contain pollutants. Moreover, a number of separately permitted sources discharge into the MS4 through rights granted under the NPDES program. Control over such permitted sources is the responsibility of the owner of that permitted discharge in question.

Comment Response

Please see the response to comment 81. The Copermittees are responsible for flows into, through and from their MS4s, and they cannot passively accept discharges from third parties (see Finding D.3.d and Discussion in the Fact Sheet). If the Copermittees identify sources regulated under separate NPDES permits that are discharging pollutants into their MS4 systems and causing exceedances of water quality standards in the receiving waters, the Copermittees should identify those sources, with supporting data and documentation, to the San Diego Water Board so the NPDES requirements for those sources can be enforced and/or revised.

Comment # 235 **Commentor** 4 **Comment Subject** Finding

Specific Comment

[From Attachment 7 to the RCFC&WCD comment letter]

Finding D.2.g: This finding, which concerns the effects of urbanization on the characteristics of stormwater flow, states in part that "[h]ydromodification measures for discharges to hardened channels are needed for the future restoration of the hardened channels to their natural state . . . ."

Comment: Hardened flood control channels are in place in the Santa Margarita Region due to the need to protect the lives and property of Riverside County residents from floodwaters. Such channels, and other flood control structures, have been established by the District in accordance with its statutory obligations set down by the Legislature in California Water Code App. § 48-9. In particular, we draw the Board's attention to that section of the Water Code setting forth the power of the District to "control the flood and storm waters of said district" and to save and conserve in any manner all or any of such waters and protect from damage from such flood or storm waters the watercourses, watersheds, public highways, life and property in said district." Water Code App. § 48-9(8).

The Board has no statutory jurisdiction under the MS4 program to alter any flood control structures or channels of the District or to some jurisdiction over the construction or location of such structures or channels. Any such alteration or construction must be done with the cooperation and agreement of the District and in accord with the District's statutory mandate to protect the citizens of Riverside County. Please see changes in redline.

Comment Response

The Tentative Order does not require the alteration of any existing flood control structures or channels. Implementing hydromodification measures for discharges from development projects to hardened channels will allow those hardened channels to be restored to a more natural (i.e. non-hardened) state some day in the future. If those hydromodification measures are not implemented, there is not the possibility that those hardened channels could be restored to a more natural state.

Nor does the RCFC&WCD have a statutory obligation to degrade or destroy water quality and beneficial uses to control flood waters. Rather the opposite; per the federal Clean Water Act Section 101(a), the RCFC&WCD is required to "[r]estore and maintain the chemical, physical, and biological integrity of the Nation's waters." Controlling flood waters while protecting water quality are not mutually exclusive and can be done synergistically to provide economic, environmental and societal benefits. No changes were made based on this comment.

Comment # 236 **Commentor** 4 **Comment Subject** Legal

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

This finding is inaccurate and inappropriate, as the Commission on State Mandates, and not the Regional Board, has exclusive jurisdiction in determining whether a requirement is an unfunded state mandate. See legal comment white paper.

Comment Response

Please see the response to comment 77.

Comment # 237 **Commentor** 4 **Comment Subject** Finding

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

The federal regulations (that do not allow waste assimilation), do not apply to waters of the state.

Comment Response

The San Diego Water Board disagrees with the proposed change. Waste assimilation is not considered a beneficial use of waters of the U.S. or waters of the state. No changes were made based on this comment.

Comment # 238 **Commentor** 4 **Comment Subject** Finding

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

[Copermittees requested deletion of ", and Turbidity" from Finding E.9.]

This is not on the 303(d) list.

Comment Response

The commenter is correct that turbidity is not on the 303(d) list. Finding E.9 has been modified to accurately list the pollutants causing impairments as shown in the 2008 303(d) List.

Comment # 239 **Commentor** 4 **Comment Subject** Legal

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

See legal comment white paper. The scope of this Order is the discharge from MS4s. Moreover, MS4s are not receiving waters.

Comment Response

Please see the responses to comments 22, 233, and 290.

Comment # 240 **Commentor** 4 **Comment Subject** Legal

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

[Copermittees requested adding "Subject to the requirements of section A..3.a" to the opening sentence of section A.3.]

This change clarifies that the iterative process reflected in Part A.3 applies to the entire provision.

Comment Response

The requested changes are not necessary as it simply references the immediately following subsection. No changes were made based on this comment.

Comment # 241 **Commentor** 4 **Comment Subject** Legal

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

[Copermittees request adding "but the Copermittees shall not be liable for violation of section A.3 provided that they are in compliance with the requirements of this section" to the end of the sentence for section A.3.c.]

This change reiterates that the iterative process is in effect so long as the Copermittees remain in compliance with the process set forth in section A.3.

Comment Response

The San Diego Water Board disagrees with the proposed changes. The requested change makes the referenced provision entirely unenforceable and therefore, likely not complied with. The Copermittees must implement the iterative process. The San Diego Water Board reserves the enforcement authority to determine liability for a permit violation. The Tentative Order does not provide any "safe harbor" provisions for violations of water quality standards. No changes were made based on this comment.

Comment # 242 **Commentor** 4 **Comment Subject** Discharge Prohibitions

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

As noted in the comment letter and Attachment 6, irrigation runoff has not been shown to be an actual source of pollutants to the receiving waters in this watershed.

As such the comment letter requests that THE CONDTIONAL EXEMPTION BE RESTORED as shown in the redlines above.

Should the Board decide to prohibit the discharge anyway, the Copermittees request that at a minimum that the category of discharges be managed through a JRMP program similar to non-emergency fire fighting flows, as shown in these redlines.

Comment Response

Please see the response to comment 83. Irrigation runoff has been shown to be a source and conveyance of pollutants to receiving waters. The San Diego Water Board disagrees with the proposed changes. The Copermittees are expected to prevent discharges from overirrigation into the MS4 and eliminate those discharges through their IC/ID programs. No changes were made based on this comment.

Comment # 243 **Commentor** 4 **Comment Subject** Legal

Specific Comment

[From Attachment 7 to the RCFC&WCD comment letter]

Finding D.3.c: This finding states in part that "urban streams", whether natural, anthropogenic or partially modified, are considered part of the "MS4" if they are used as a conveyance for runoff.

Comment: The definition of "MS4" does not include any natural watercourse. This is evident both from the definition of "MS4" in the federal Clean Water Act regulations and from EPA's comments in the preamble to those regulations. First, the definition of "MS4", in relevant part, states that it consists of "a conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, manmade channels or storm drains" "owned or operated by" a municipality "having jurisdiction over disposal of . . . storm water" that is "designed or used for collecting or conveying storm water". 40 CFR § 122.26(b)(8). Nothing in that definition even suggests that natural watercourses are part of the MS4, only improved watercourses.

Second, U.S. EPA, in the preamble to the original MS4 regulations, stated unequivocally that "[t]he Agency also wants to clarify that streams, wetlands and other water bodies that are waters of the United States are not storm sewers for the purpose of this rule". 53 Fed Reg. 49442 (December 7, 1988).1

Moreover, none of the Copermittees "own" or "operate" a natural stream. Such streams are waters of the State and are "owned" by the people of California.

The authority cited in the Fact Sheet for this finding, a response filed with the State Board in opposition to a petition challenging an MS4 permit issued by the Board to San Diego County, contradicts the federal definition and, under the Supremacy Clause, cannot be employed. Please see changes in redline.

Comment Response

Please see the response to comment 22.

Comment # 244 **Commentor** 4 **Comment Subject** Action Levels

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

‘lack of compliance’ is in contradiction with the second sentence. The proposed language is more appropriate.

Comment Response

The San Diego Water Board disagrees that the two sentences are in contradiction. The second sentence has the clarifying phrase "does not alone" constitute a violation. In addition, the third sentence does not state that an NAL exceedance is unequivocally a lack of compliance; but only that an NAL exceedance "may indicate" a lack of compliance. The requested change has not been made.

Comment # 245 **Commentor** 4 **Comment Subject** Legal

Specific Comment

[From Attachment 7 to the RCFC&WCD comment letter]

Finding E.1: This finding states that the RWL language in the Tentative Order "requires compliance with water quality standards, which for stormwater discharges compliance is to be achieved through an iterative approach requiring the implementation of improved and better-tailored BMPs over time".

Comment: The District has two comments regarding this finding, one relating to the language of the finding and one relating to the Fact Sheet discussion of the finding. First, the language of State Board Order WQ 99-05, which establishes the RWL language required to be placed in MS4 permits statewide, is not limited to "stormwater" discharges, but rather to all discharges into receiving waters. See State Board Order WQ 99-05. This is consistent also with the requirement that "discharges" from the MS4, not merely stormwater discharges, must be controlled to the MEP and are not required to meet numeric effluent limitations. 33 U.S.C. § 1342(p)(3)(B)(iii). Second, while the language of the finding correctly states that compliance with water quality standards "is to be achieved through an iterative approach", language in the Fact Sheet improperly contradicts this finding by asserting that compliance with the iterative BMP process "does not shield the discharger from enforcement actions for continued non-compliance with water quality standards". Fact Sheet, page 91.

Such an interpretation contradicts the plain language of Order WQ 99-05 and appears to represent an "end-run" around the entire iterative process and the concept of MEP, which is a flexible concept, intended to allow the development of site-specific permit conditions based on the judgment of the permit writer. See, e.g., 55 Fed. Reg. 48038. The interpretation is, therefore, not consonant with the requirements of the State Board precedential order and the MS4 regulations and should be deleted from the Fact Sheet.

Comment Response

Please see the responses to comments 23, 207 and 290. The Tentative Order and Fact Sheet are consistent with Order WQ 99-05 as well as Order WQ-2001-015 (In the Matter of the Petitions of Building Industry Association of San Diego County and Western States Petroleum Association).

Comment # 246 **Commentor** 4 **Comment Subject** Action Levels

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

The previous sentence requires outfalls to be selected consistent with Attachment E. This sentence is not needed and is duplicative of Attachment E.

At a minimum, this language will need to be modified to be consistent with changes being requested in the Attachment 4 to the Comment Letter, including any footnotes.

Comment Response

The sentence simply reiterates the San Diego Water Board's requirement that a representative percentage of major outfalls are sampled. The requested change has not been made.

Comment # 247	**Commentor** 4	**Comment Subject** Action Levels

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

This value was incorrectly referencing the criteria for beach areas and needs to be updated to reflect the shown values for infrequently used areas.

Comment Response

The value is correct. For the application of Enterococcus REC-1 water quality objectives, unless otherwise specified in the Basin Plan, all waterbodies in the San Diego Region designated with REC-1 beneficial use are assumed to have a "designated beach" usage frequency. Until a lower usage frequency is designated in the Basin Plan for one or more water bodies in the Upper Santa Margarita Watershed, the water quality objective based on the "designated beach" usage frequency is the appropriate and correct value to be included in the action levels.

Comment # 248	**Commentor** 4	**Comment Subject** Action Levels

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

Conflicts with attachment E, which states to select 'representative' outfalls.

Comment Response

Comment noted. The requested change has been made in the errata.

Comment # 249	**Commentor** 4	**Comment Subject** Action Levels

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

[The Copermittees request addition of language that end-of-pipe assessment points for SAL complaince are major outfalls as also defined by Attachment E of the Tentative Order.]

Consistent with NALs section

Comment Response

Comment noted. This is a reasonable request and the change has been made in the errata document.

Comment # 250 **Commentor** 4 **Comment Subject** Legal

Specific Comment

[From Attachment 7 to the RCFC&WCD comment letter]

Finding E.6: This finding purports to determine that the Tentative Order "does not constitute an unfunded local government mandate subject to subvention under Article XIIIB, Section(6) of the California Constitution".

Comment: This finding has no place in the Tentative Order. The exclusive jurisdiction over a determination as to whether a mandate constitutes an unfunded state mandate lies with the Commission on State Mandates. The Commission has exclusive authority to determine, in the first instance, whether a requirement constitutes an unfunded state mandate. Government Code §§ 17751 and 17552; Lucia Mar Unified School District v. Honig (1988) 44 Cal.3d 830, 837; Hayes v. Commission on State Mandates (1992) 11 Cal.App.4th 1546, 1596-97. The findings of an agency that has no jurisdiction to make those findings are entitled to no weight.

Second, the finding is erroneous on several grounds. It is erroneous in its assertion that the Tentative Order "implements federally mandated requirements under CWA §402". While true, the Order also contains separate state-mandated requirements. As the California Supreme Court has held, NPDES permits (like the Tentative Order) can contain both federal and state requirements. See City of Burbank, supra, 35 Cal. 4th at 618, 628. Where those non-federal requirements constitute a new program or higher level of service ordered by the state or exceed federal requirements, those requirements can qualify as a state mandate requiring a subvention of funds. See Long Beach Unified School District v State of California (1990) 225 Cal.App.3d 155, 172-73. Even if the requirement derives from federal law, the requirement can still constitute an unfunded state mandate if the state agency has a choice as to whether to impose the requirement on the permittees, e.g., Hayes, 11 Cal.App.4th at 1593-94.

Recently, the Commission on State Mandates held that both the Los Angeles County MS4 Permit and the San Diego County MS4 Permit contained requirements that constituted an unfunded state mandate, not required by federal law. In re Test Claim on Los Angeles Regional Quality Control Board Order No. 01-182, July 31, 2009; In re Test Claim on San Diego Regional Water Quality Control Board Order No. R9-2007-0001, March 26, 2010.

The finding further asserts that the obligations to be imposed on the Copermittees are "similar to, and in many respects less stringent than" obligations on non-governmental discharges. A similar argument was considered and rejected by the Commission in the Los Angeles and San Diego MS4 Permit Test Claims. The District disagrees with this assertion, as there are numerous requirements in the Tentative Order that are uniquely applicable to governmental entities. This is, however, a question that would be addressed by the Commission on State Mandates were a test claim to be filed, the only procedure for the determination of this issue.

The finding further asserts that Copermittees "have the authority to levy service charges, fees, or assessments to pay for compliance with this Order". This finding is both erroneous on the facts and without any basis in the record. The question of how a state mandate is to be funded is beyond the scope of the Board's expertise and, again, is exclusively within the jurisdiction of the Commission on State Mandates. The finding also asserts that the "Copermittees requested permit coverage in lieu of compliance with the complete prohibition against the discharge of pollutants contained in CWA §301, subdivision (a)". A similar argument was made and rejected in the Los Angeles and San Diego MS4 Permit Test Claims. The finding further asserts that prohibitions against conditions of pollution or nuisance predate the enactment of Article XIIIB Section 6 of the California Constitution. The requirements of the Tentative Order far exceed such requirements. And, in any event, whether such requirements predate Article XIIIB Section 6 is an issue for the Commission on State Mandates.

The finding is not supported by evidence in the record and is in fact contradicted by controlling legal precedent. Even were it to be included in the Tentative Order, it is entitled to no weight since the Board lacks jurisdiction to make such a finding. For these reasons, the finding and any associated discussion in the Fact Sheet should be deleted. Please see changes in redline.

Comment Response

This comment contradicts comments made by other commenters that insist that the San Diego Water Board must recognize that certain Tentative Order provisions constitute unfunded state mandates and may not properly be adopted unless the State first provides funding to the Copermittees to carry out those provisions. The San Diego Water Board agrees that the Commission on State Mandates ultimately has jurisdiction to determine that a provision in an executive order constitutes an unfunded state mandate requiring state subvention. Finding E.6 is nonetheless appropriate and necessary to express the San

Diego Water Board's opinion that the Tentative Order is the result of a federal and not a state mandate. Please also see the responses to comments 8 and 77-81.

Comment # 251 **Commentor** 4 **Comment Subject** Action Levels

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

The previous sentence requires outfalls to be selected consistent with Attachment E. This sentence is not needed and is duplicative of Attachment E.

At a minimum, this language will need to be modified to be consistent with changes being requested in the Attachment 4 to this comment letter, including any footnotes.

Comment Response

Please see the response to comment 246.

Comment # 252 **Commentor** 4 **Comment Subject** Legal

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

See legal comments in Attachment 7. The Copermittees' responsibility under the Clean Water Act is to reduce the discharge of pollutants from the MS4 to the MEP. Therefore, the purpose of the BMP is to reduce pollutants in such discharges

Comment Response

Please see the response to comment 23. No changes were made based on this comment.

Comment # 253 **Commentor** 4 **Comment Subject** Legal

Specific Comment

[From Attachment 7 to the RCFC&WCD comment letter]

Section A.1: This directive mandates, among other things, that discharges "into" MS4s that would cause or threaten to cause a condition of "pollution, contamination, or nuisance" in receiving waters of the state are prohibited.

Comment: While the Board in this Order has jurisdiction to prohibit discharges "from" the MS4, it cannot regulate conditions within the MS4, since these are not in fact "receiving waters of the state". In any event, the language is superfluous, since regulation of a discharge from the MS4, which is subject matter of the Tentative Order, accomplishes the same end. Please see the accompanying redline.

Comment Response

Please see the responses to comments 23, 72, 233 and 290. No changes were made based on this comment.

Comment # 254 **Commentor** 4 **Comment Subject** Legal

Specific Comment

[From Attachment 7 to the RCFC&WCD comment letter]

Section A.3: This directive both recites the prohibition against discharges that cause or contribute to the violation of water quality standards and introduces the iterative process required by the State Board for MS4 permittees.

Comment: To clarify that the iterative process specifically applies to the Copermittees' compliance requirements in Section A.3, language has been added in the redline.

Comment Response

The proposed change is not necessary. Please see response to comment 23, 207 and 290. No changes were made based on this comment.

Comment # 255 **Commentor** 4 **Comment Subject** Legal

Specific Comment

[From Attachment 7 to the RCFC&WCD comment letter]

Section A.3.b: This directive relates to the requirement that the Copermittees repeat the iterative process to comply with receiving water limitations for continuing or recurring exceedances of the limitations.

Comment: Clarifying language changes are requested in the redline.

Comment Response

The proposed change is not necessary. Please see response to comment 23, 207 and 290. No changes were made based on this comment.

Comment # 256 **Commentor** 4 **Comment Subject** Legal

Specific Comment

[From Attachment 7 to the RCFC&WCD comment letter]

Section A.3.c: This directive indicates that nothing prevents the Board from enforcing any provision of the Order while the Copermittees are preparing and implementing the receiving water limitation report.

Comment: Clarifying language changes are included in the redline to make clear that so long as the Copermittees are in compliance with the requirements of Section A.3, they are not in violation of the section.

Comment Response

The San Diego Water Board disagrees with the proposed change. Please see response to comment 241. No changes were made based on this comment.

Comment # 257 **Commentor** 4 **Comment Subject** Legal

Specific Comment

[From Attachment 7 to the RCFC&WCD comment letter]

Section B.2: This section categorizes the types of non-stormwater discharges that are not prohibited from discharge into the MS4, and thus not subject to the "effectively prohibit" requirement in Section B.1. However, this section improperly omits several categories of non-stormwater discharges, landscape irrigation, irrigation water, lawn watering and non-emergency fire fighting flows. In addition, this section states that the Water Board may require controls for "non-anthropogenic sources".

Comment: As discussed above in the District's comment concerning Findings C.14 and C.15, the Board lacks authority to delete an entire category of discharge from the non-stormwater designation. Such authority must be exercised primarily by the Copermittees, based on their evaluation of source-specific facts. And, the ability of the RWQCB to liken such flows to "illicit discharges", apparently authorized by State Board Order No. WQ 2009-0008, is no longer in effect, as that Order has been vacated. Moreover, there is no requirement in the MS4 regulations for controls on "non-anthropogenic sources". Such natural sources are not within the control of the MS4 Copermittees. Moreover, controlling such natural sources as rising groundwater or springs by sealing the MS4 could raise concerns about interference with water rights. Given the natural source of such springs, the incidental presence of pollutants in the waters would have occurred whether an MS4 was in existence or not. Please see the accompanying redline as well as the District's technical comments on this directive.

Comment Response

Please see the responses to comments 27 and 83 in regards to the removal of landscape irrigation, irrigation water, lawn watering from the list of discharge categories that do not have to be prohibited from entering the MS4. The requirement to implement appropriate control measures for non-anthropogenic sources identified as sources of pollutants discharging into or from the MS4 is consistent with the federal regulations. To date, neither the Copermittees nor the San Diego Water Board has identified non-anthropogenic sources as significant sources of pollutants discharging into or from the MS4. No changes were based on this comment. Please also see the response to comment 223 concerning Order No. WQ-2009-0008.

Comment # 258 **Commentor** 4 **Comment Subject** Legal

Specific Comment

[From Attachment 7 to the RCFC&WCD comment letter]

Section C: This section establishes "non-stormwater dry weather action levels" ("NAL") monitoring and the requirements to be followed when NALs exceedances are identified.

Comment: In addition to the District's technical comments on this part, the District has the following concerns regarding legal aspects of this directive. The District wishes to incorporate its comments on Findings C.14 and C.15, which discuss the requirements applicable to any discharge from an MS4, which is that the Copermittees control pollutants in such discharges to the MEP. Such a requirement applies not only to discharges of stormwater, but also dry weather discharges, which may (as discussed above) include not only non-exempted non-stormwater discharges but also discharges from exempted non-stormwater sources (those identified in Section B.2 of the Order) as well as discharges from sources holding separate NPDES permits. We note that Section C.2.d. requires prompt notice to the RWQCB of a source that may require a separate NPDES permit. The Board must be prepared to address such sources and not require further investigation by the Copermittees. As also noted above, in the preamble to the MS4 regulations, U.S. EPA indicated that the MEP control requirement would apply to all discharges from MS4s, including "non-stormwater discharges". 55 Fed. Reg. 48052.

Comment Response

Please see the response to comment 23, 86 and 290.

Comment # 259 **Commentor** 4 **Comment Subject** General

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

[The Copermittees requested adding "to the extent of their legal authority established under the California Constitution and any enabling acts" to first sentence of section E.1.]

To address limitations of the District

Comment Response

The proposed change is not necessary. The Code of Federal Regulations requires the Copermittees including RCFC&WCD to have adequate legal authority to comply with the Tentative Order. No changes were made based on this comment.

Comment # 260 **Commentor** 4 **Comment Subject** Legal

Specific Comment

[From Attachment 7 to the RCFC&WCD comment letter]

Section E.1.a: This directive requires the Copermittees to have legal authority to, among other things, "control the quality of runoff from industrial and construction sites", including sites that have coverage under the general industrial and construction stormwater permits.

Comment: As separate NPDES permits, the general construction and general industrial stormwater permits allow discharge into the MS4 so long as those permits are being complied with. Copermittees do not have authority to contradict the requirements of the general permits. This requirement is vague and ambiguous, and goes beyond the requirements of the MS4 regulations, which require that Copermittees demonstrate that they have legal authority to control discharges into their MS4 systems.

Comment Response

The Copermittees must enforce their ordinances to prevent or eliminate discharges to their MS4s that can cause or contribute to a condition of pollution in receiving waters. Please see the response to comment 76. If construction or industrial sites are discharging pollutants that are causing a condition of pollution in receiving waters, they are likely in violation of their NPDES requirements. The Copermittees have the authority to enforce their ordinances. The Copermittees can report these violations to the San Diego Water Board, and the San Diego Water Board can also enforce the the NPDES requirements.

40 CFR 122.26 (d)(2)(i)(A) specifically requires the Copermitees to "Control through ordinance, permit, contract, order or similar means, the contribution of pollutants to the muniucipal storm sewer by storm water dischagres associated with industrial acitivity and the quality of storm water discharged form sites of industrial activity;" Construction activity is a subset of industrial activity. The USEPA in the Code of Federal Regulations purposefully required a dual permitting system, MS4 and individual, for industrial activites due to their heightened threat to water quality. The Copermitees' ordinances and requirements do not contradict the general industrial stormwater permits; rather the Copermittees can apply more stringent controls than those that are required under general permits.

Comment # 261 **Commentor** 4 **Comment Subject** LID

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

[The Copermittees requested deletion of "of storm water pollutants from the MS4 will be reduced to the MEP, will not cause or contribute to a violation of water quality standards, and" from first sentence of section F.1.c.]

This is duplicative of section A and is not needed. Further, the end of this sentence specifically requires compliance with this order.

Comment Response

The San Diego Water Board disagrees with the proposed change. The text was included to reiterate the requirements of section A and no changes were made in response to this comment.

Comment # 262 **Commentor** 4 **Comment Subject** Legal

Specific Comment

[From Attachment 7 to the RCFC&WCD comment letter]

Sections E.1.j and k: These directives require the Copermittees to have legal authority to require the use of BMPs to prevent or reduce the discharge of pollutants into MS4s from stormwater to the MEP and to require documentation on such BMPs.

Comment: The Copermittees are required under the Clean Water Act to control discharge of pollutants from their MS4 to the MEP standard. 33 U.S.C. § 1342(p)(3). There is no requirement that discharges into the MS4 meet this standard, though the Copermittees are free to impose such a standard voluntarily. These provisions are not required and should either be removed or made optional for the Copermittees. The requirements of these directives are also duplicative of Section E.1.i., which already requires the Copermittees to have the legal authority to require reports from dischargers to the MS4.

Comment Response

Please see the responses to comments 22, 23, 233, and 290.

Comment # 263 **Commentor** 4 **Comment Subject** New Development

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

Important not to penalize proactive efforts to retrofit existing development.

Comment Response

The San Diego Water Board disagrees with the proposed change. Please see the response to comment 353. No changes were made based on this comment.

Comment # 264 **Commentor** 4 **Comment Subject** New Development

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

[The Copermittees requested deletion of section F.1.d.(1)(c), which defines new Development Projects that disturb one or more acres of land as a Priority Development Project.]

Request deletion as disturbance threshold inappropriately captures non-development related activity (maintenance, agricultural, etc.) Further, the one acre threshold is not appropriately supported in the Fact Sheet.

Comment Response

The San Diego Water Board disagrees with the proposed change. Please see the response to comment 331. No changes were made based on this comment.

Comment # 265 **Commentor** 4 **Comment Subject** Legal

Specific Comment

[From Attachment 7 to the RCFC&WCD comment letter]

Section F.1.h(h): This directive requires that where Priority Development Projects are adjacent to or will modify stream channels, the use of hardscape and other materials is forbidden.

Comment: As noted above, the District has a statutory mandate to protect the lives and property of the citizens of Riverside County from floodwaters. If, in the professional judgment of the District's engineers, hardscape or other engineering improvements are required in a stream channel affected by this directive due to flood control concerns, the District must be allowed to make that judgment. The Board does not have the hydrologic/hydraulic expertise, nor is it authorized by the Legislature to make flood control judgments and presumably would not wish to be a defendant in a lawsuit brought by flood victims whose lives or property was affected by the inability of the District to make necessary flood control decisions.

In making this comment, the District wants to be clear that it is not unwilling to accommodate potential future channel rehabilitation efforts where flood control will not be affected. Please see the accompanying redline for suggested language to address these concerns.

Comment Response

Section F.1.h.(h) requires to Copermittees, as part of the HMP, to identify areas within the Santa Margarita Hydrologic Unit for potential opportunities to restore or rehabilitate stream channels with historic hydromodication of receiving waters that are tributary to documented low or very low IBI scores.

The hydromodication requirements do not allow the use of non-naturally occuring hardscape materials for stream restoration if the purpose of the stream restoration is to mitigate erosion impacts expected from potential hydromodication caused by the Priority Development Project. The hydromodification requirements do not necessarily apply if the stream restoration project is not part of a Priority Development Project.

The requirements within the Tentative Order do not limit the RCFC&WCD's authority to provide flood control to protect public safety. The RCFC&WCD's mandate for flood control does not allow the degradation and destruction of water quality or beneficial uses to fulfill that mandate. As public stewards, the RCFC&WCD must protect water quality and beneficial uses while providing flood control to protect the lives and property of the citizens of Riverside County. Existing projects and studies have demonstrated the hydraulic, economic and societal benefits to providing increased flood control through natural systems that also protect water quality. No changes were made based on this comment. Please also see the response to comment 233.

Comment # 266	**Commentor** 4	**Comment Subject** New Development

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

This requirement is clearly specifying the method of compliance in contradiction with state law (CWC 13360).

Comment Response

The San Diego Water Board has made appropriate changes in the errata to address the commentor's concern.

Comment # 267	**Commentor** 4	**Comment Subject** LID

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

This had been agreed to in discussions with RB staff, but was omitted from the draft.

Comment Response

The San Diego Water Board did not agree to make this change during the discussions with the Copermittees. Please see the response to comment 105. No changes were made in response to this comment.

Comment # 268	**Commentor** 4	**Comment Subject** New Development

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

Logistical issue for populating a database with BMPs that have as of- yet not been individually tracked, and potential legal issues for verifications of those BMPs that were built without requirements for such verifications.

Comment Response

The San Diego Water Board is concerned that apparently the Copermittees are unaware of whether or not post-construction BMPs were implemented as designed during the current permit term. This comment only reinforces the San Diego Water Board's position that the post-construction BMP verification and maintenance tracking requirements are necessary. This also reinforces the need for the Copermittees to review their records, identify these projects and BMPs, and verify and track the maintenance of those BMPs. The San Diego Water Board disagrees with the proposed change. No changes were made based on this comment.

Comment # 269	**Commentor** 4	**Comment Subject** Hydromod

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

It is not appropriate to require a single property owner to mitigate the effects caused by previous owners of that land. The current property owners can only be held responsible for their own actions.

Comment Response

The San Diego Water Board disagrees with the proposed change and the basis for the proposed change. If a project is a Priority Development Project (PDP) subject to the HMP requirements, then it is entirely appropriate for the owner, whether new or current, to be responsible for restoring the runoff from the site to a pre-development, more natural condition. If PDPs in undeveloped areas are expected to implement HMP requirements, there is no reason there should be a disparity for the application of the HMP requirements for PDPs in already developed areas. In fact, implementing the HMP requirements is even more necessary in already developed areas because of the ongoing hydromodication and water quality impacts caused by those existing developments. This is also consistent with, and can work in conjunction with, the retrofitting requirements in section F.3.d.

The San Diego Water Board recognizes that there may be some conditions in already developed areas that could limit the full implementation of the HMP requirements on site. Therefore, as recommended by the Riverside County Copermittees, we have included a provision in the Tentative Order that allows the Copermittees to develop a waiver program for re-development PDPs (see section F.1.h.(3)). No changes were made based on this comment.

Comment # 270	**Commentor** 4	**Comment Subject** Hydromod

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

This is not a necessary component of the HMP and unnecessarily increases costs.

Comment Response

The San Diego Water Board disagrees with the commenter that this is not a necessary component. Without having this knowledge, the Copermittees will not be able to plan and prepare for implementing the HMP requirements in the Upper Santa Margarita Watershed in a way that can coherently and efficiently restore or rehabilitate stream channels with historic hydromodification of receiving waters when those opportunities present themselves. No changes were made based on this comment.

Comment # 271 **Commentor** 4 **Comment Subject** Hydromod

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

Per discussions with Board staff on 8/18

Additionally, "wherever feasible" is an appropriate addition to this language for three reasons:

1) Based on the prioritization already identified in this section, instream controls will be a 'last resort'

2) If a project were to need to mitigate in-stream, preventing any man made materials would unnecessarily eliminate potentially viable solutions, even to the extent of eliminating options that would rehabilitate stream functions and uses.

3) The Water Board will still have oversight of the final in-stream plans through the 401 certifications, which will allow the Board to additionally ensure that such instream controls to not adversely affect the stream.

Comment Response

The San Diego Water Board disagrees with the proposed changes. The San Diego Water Board did not agree to make the proposed changes during the meeting with the Copermittees on August 18, 2010, as implied by the commenter. Please see the response to comment 265. No changes were made based on this comment.

Comment # 272 **Commentor** 4 **Comment Subject** Hydromod

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

This is not needed and makes the language confusing. The HMP must be approved by the board anyway. See legal comment white paper.

Comment Response

The San Diego Water Board disagrees that the language is confusing. The language is to clarify that it is not fully at the discretion of the Copermittees to identify these types of areas. No changes were made based on this comment.

Comment # 273 **Commentor** 4 **Comment Subject** Hydromod

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

As seen in the San Diego HMP process, things can change after submitting it to the Board for approval. This requirement will create problems where a project implements the early measures, and such early measures may conflict with the final requirements, thereby forcing the project to redesign.

Comment Response

The San Diego Water Board disagrees with the proposed change. Presumably, the HMP that is developed by the Riverside County Copermittees will include requirements that are more stringent than the interim hydromodification criteria. Many of those requirements are likely to be agreed upon prior to the acceptance of the final HMP. Where there is relative certainty that the HMP requirements will be accepted by the San Diego Water Board, the Copermittees should encourage the implementation of those expected requirements as early as possible. No changes were made based on this comment.

Comment # 274 **Commentor** 4 **Comment Subject** Hydromod

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

All the way to the ocean is unreasonable and unnecessary. In the interim, very few projects are expected within the watershed, and the cumulative effects of such few projects is negligible.

Comment Response

Please see the response to comment 119. The inclusion of "ocean, bay, lagoon" is simply to list all potential types of water bodies that could be included as part of the exemption. In the interim, any projects that do not quailfy for the exemptions provided in Section F.1.h.(6)(a)-(c) must meet the interim hydromodification criteria. We expect there to be very few projects that will be able to qualify for the exemptions.

Comment # 275 **Commentor** 4 **Comment Subject** Legal

Specific Comment

[From Attachment 7 to the RCFC&WCD comment letter]

Section F.2.a: This directive requires the Copermittees to update their grading and other ordinances as necessary to comply with the Order and including requirements for implementing all designated BMPs and other measures.

Comment: The drafting and enforcement of ordinances by a municipality is a municipal function that cannot be directed by the Regional Board. Article XI, section 7 of the Constitution guarantees municipalities the right to "make and enforce within [their] limits all local police, sanitary and other ordinances and regulations not in conflict with general laws". Thus, specific requirements as to the content of ordinances cannot be directed by the Board. The redline requests deletion of this directive.

Comment Response

Please see the response to comment 76.

Comment # 276 **Commentor** 4 **Comment Subject** Unpaved Roads

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

Pursuant to the comment letter:

THE COPERMITTEES REQUEST THIS SECTION BE DELETED IN ITS ENTIRETY.

See the comment letter, attachment 5, for further discussion of the issues and justification for this request.

Should the board decide to include such requirements despite the request and justifications provided in the comment letter, the edits shown below are the minimum changes that should be made.

Comment Response

The San Diego Water Board disagrees with the request to delete the section in its entirety. The San Diego Water Board has made appropriate changes in the errata to address the commentor's concern.

Comment # 277 **Commentor** 4 **Comment Subject** Legal

Specific Comment

[From Attachment 7 to the RCFC&WCD comment letter]

Section F.3.b.(5): This directive requires that the Copermittee stormwater ordinances must contain certain enforcement components.

Comment: The drafting and enforcement of ordinances by a municipality is a municipal function that cannot be directed by the Regional Board. Article XI, section 7 of the Constitution guarantees municipalities the right to "make and enforce within [their] limits all local police, sanitary and other ordinances and regulations not in conflict with general laws". Thus, specific requirements as to the content of ordinances cannot be directed by the Board. The redline requests deletion of this requirement.

Comment Response

Please see the response to comment 76.

Comment # 278 **Commentor** 4 **Comment Subject** Unpaved Roads

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

[The Copermittees requested deletion of sections F.1.i.(2) and F.1.i.(3) as required BMPs for unpaved roads development.]

These are specifying the method of compliance.

Comment Response

Comment noted. Clarifying language has been included in the errata.

Comment # 279 **Commentor** 4 **Comment Subject** Construction

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

[Copermittees request deletion of requirement that Copermittes must review a project proponent's runoff management plan to verify compliance.]

Specifying method of compliance.

Comment Response

The San Diego Water Board disagrees that the requirement for a project proponent's runoff management plan to be "reviewed to verify compliance" with local grading ordinance is specifying method of compliance. The requirement directs the Copermittees to do the review, but does not specify how the review is to be performed. The requirement includes a performance standard, that the plan complies with "local grading ordinance". No changes were made based on this comment.

Comment # 280 **Commentor** 4 **Comment Subject** Legal

Specific Comment

[From Attachment 7 to the RCFC&WCD comment letter]

Section F.3.c.(4): This directive requires that each Copermittee "must ensure that effective measures exist and are implement or required to be implemented to ensure that runoff within and from common interest developments, including areas managed by associations and mobile home parks, and meets the objectives of this section and Order".

Comment: The Fact Sheet inappropriately states that the Tentative Order "interprets common interest areas as property subject to the codes and ordinance and enforcement mechanisms of the city or county in which it resides and, therefore, holds the local government responsible for the discharge of wastes from storm water conveyance systems located within these areas".

The Tentative Order regulates discharges from the MS4. Drainage systems and the runoff handled within a private development or common interest area generally are not part of the Copermittees' MS4, as the Copermittees (unless they actually maintain their MS4 within such areas) have no right to maintain or regulate such internal systems, beyond the enforcement of local ordinances regulating discharges into the Copermittees' MS4 or through the requirement to install and maintain BMPs. Discharges from such systems are thus no different than discharges from any other private property within the Copermittees' jurisdiction. The first full paragraph in this section should be deleted because it is merely prefatory language to the specific requirements set forth in the remainder of the section.

Comment Response

The comment fails to address the San Diego Water Board's contention that common interest areas are subject to the codes and ordinance and enforcement mechanisms of the city or county. The comment has not provided any data or documentation to the contrary. Municipalities consistently enforce their ordinances and regulations within common interest areas. In fact, nothing within the law limits the municipality from taking enforcement within a common interest area. As such, the San Diego Water Board disagrees with the commenter's claim that the Copermittees have no rights to regulate common interest areas including their MS4s. On the contrary, the Copermittees have a public duty to do such to protect public and environmental health and safety.

The Copermittees are responsible for flows into, through and from their MS4s, and they cannot passively accept discharges from third parties (see Finding D.3.d and Discussion in the Fact Sheet), including from common interest areas.

Comment # 281 **Commentor** 4 **Comment Subject** Construction

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

[The Copermittees requested deletion of "Development and" from beginning of section F.2.d.(1)(a)(ii).]

Conflicts with the ‘off-the-shelf’ approach that may be appropriate for some sites. This issue was discussed with staff.

Comment Response

The San Diego Water Board disagrees with the proposed change. The “development” of a runoff management plan as a management measure for construction sites does not conflict with an “off-the-shelf” approach that may be appropriate for some sites. A runoff management plan may be developed for an “off-the-shelf” approach. No changes were made based on this comment.

Comment # 282 **Commentor** 4 **Comment Subject** Legal

Specific Comment

[From Attachment 7 to the RCFC&WCD comment letter]

Section F.3.c.(5): This directive requires the Copermittees to enforce their ordinances with respect to grading activities on privately owned unpaved roads "so as to prevent impacts to water quality".

Comment: In addition to the general objection to the requirement to regulate unpaved roads, found in a separate white paper and in the general comment letter, this specific directive violates the constitutional requirement that the drafting and enforcement of ordinances by a municipality is a municipal function that cannot be directed by the Regional Board. Article XI, section 7 of the Constitution guarantees municipalities the right to "make and enforce within [their] limits all local police, sanitary and other ordinances and regulations not in conflict with general laws". Thus, specific requirements as to the content of ordinances cannot be directed by the Board. Moreover, the scope of the Order is to address discharges from the MS4, not discharges from non-point or non-MS4 sources that may affect "water quality". The redline requests deletion of this requirement.

Comment Response

The commenter is incorrect in their interpretation of the cited section of the constitution. The Code of Federal Regulations that governs the issuance of municipal storm water NPDES permits specifically requires at section 40 CFR 122.26 (d)(2)(i) that the Copermittees have adequate legal authority established by statute, ordinance or series of contracts." Please see the Fact Sheet discussion on the broad and specific legal authority to require section E. LEGAL AUTHORITY. Also, please see the response to comment 76.

Comment # 283 **Commentor** 4 **Comment Subject** Construction

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

[The Copermittees requested deletion of section F.2.d.(3), to remove the Active/Passive Sediment Treatment requirements in their entirety.]

Specifying method of compliance, in violation of CWC 13360.

Comment Response

Please see the response to comment 47. The San Diego Water Board disagrees that section F.2.d.(3) specifies method of compliance. Section F.2.d.(3) directs the Copermittees to require implementation of Active/Passive Sediment Treatment (AST) at construction site if the Copermittee determines it to be an “exceptional” threat to water quality. The Tentative Order does not specify what AST technologies are required to be implemented. Furthermore, the Tentative Order provides flexibility for the Copermittees to determine which construction sites are “exceptional” threats to water quality. No changes were made based on this comment.

Comment # 284 **Commentor** 4 **Comment Subject** Construction

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

This section is setting the minimum frequencies, and as such should provide flexibility to inspect more frequently those sites that warrant additional focus / followup. The changes shown to F.2.e.(1) and (2) are to provide such flexibility. Additionally these frequencies are consistent with Riverside County's Santa Ana MS4 permit – which promotes consistency within the areas
serviced by the County.

Comment Response

The San Diego Water Board disagrees with the proposed changes. The inspection frequencies in the Tentative Order are consistent with the inspection frequencies for San Diego and Orange Counties. These inspection frequencies are necessary because the San Diego Water Board has found that these types of construction sites can pose a significant threat to water quality and require more scrutiny during the wet season. No changes were made based on this comment.

Comment # 285 **Commentor** 4 **Comment Subject** Legal

Specific Comment

[From Attachment 7 to the RCFC&WCD comment letter]

Section F.6: This directive includes a description of the purposes of the education program with respect to stormwater and non-stormwater discharges.

Comment: The redline includes revisions that correctly state the requirements of the Clean Water Act.

Comment Response

The proposed change is not necessary. Please see responses to comments 22, 23, and 290. No changes were made based on this comment.

Comment # 286 **Commentor** 4 **Comment Subject** Construction

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

This is a new and inappropriate requirement. Monitoring data is only required under the Statewide General Construction Permit, which is the Regional Board's responsibility to inspect and review. Copermittee review of data which falls under the regional board's responsibility should be optional.

Comment Response

The San Diego Water Board disagrees with the proposed change. If monitoring data are available, the inspector should review the data. Monitoring data can provide valuable information to an inspector and may help to identify any potential issues that may be on a construction site. No changes were made based on this comment.

Comment # 287 **Commentor** 4 **Comment Subject** Legal

Specific Comment

[From Attachment 7 to the RCFC&WCD comment letter]

Section H.1: This directive requires that each "Copermittees must exercise its full authority to secure the resources necessary to meet all requirements of this Order".

Comment: There is no statutory or regulatory authority for this requirement. The MS4 regulations require only that the Copermittees submit a "fiscal analysis" of the resources required to accomplish permit program activities, including a description of the sources of funds. 40 CFR § 122.26(d)(2)(vi). Moreover, this requirement is inherently vague and ambiguous and is, therefore, especially troublesome given the economic conditions now faced by the County and the Cities within the Santa Margarita region. This directive should be deleted, or at minimum, revised as shown in the redlines.

Comment Response

Please see the responses to comments 8, 9, 88, and 321. Without securing the resources necessary to meet all requirements of the Order, the Copermittee would be unable to meet the intended outcome of 40 CFR § 122.26(d)(2)(i) (i.e. carry out all inspection, surveillance and monitoring procedures necessary to determine compliance and noncompliance with permit conditions).

Comment # 288 **Commentor** 4 **Comment Subject** Municipal

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

Sites that do not have the potential to discharge pollutants, cannot affect discharges from the MS4.

Comment Response

The San Diego Water Board disagrees with the proposed change. Sites that do not have the potential to discharge pollutants are only through the implementation and maintenance of BMPs. Through inventorying their sites and conducting appropriate inspection and enforcement, the Copermittees can ensure that the sites continue to not have the potential to discharge pollutants. No changes were made based on this comment.

Comment # 289 **Commentor** 4 **Comment Subject** Legal

Specific Comment

[From Attachment 7 to the RCFC&WCD comment letter]

In the Standard Provisions, it is stated that the Order "may be modified, revoked and reissued, or terminated for cause", citing 40 CFR § 122.41(f). However, the Standard Provisions do not cite 40 CFR § 122.62 or provide that any such modification, revocation or reissuance may only be carried out upon prior notice and hearing. See Water Code § 13263 (regional board, "after any necessary hearing", may prescribe requirements for waste discharges). The Standard Provisions should make clear that any modification, revocation or reissuance of the Order can only be accomplished at a noticed public hearing, with opportunity for comment.

Comment Response

The requested change is unnecessary. In any matter, the San Diego Water Board is obligated to comply with existing federal and state regulations regarding revocation, reissuance or termination of the Tentative Order. No change made based on this comment.

Comment # 290 **Commentor** 4 **Comment Subject** Legal

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

The Copermittees are required to reduce pollutants in discharges from the MS4. See legal comments in Attachment 7

Comment Response

Please see response to comments 22, 23, 72, and 233. The Order's approach to regulating discharges into and from the MS4 is in accordance with State Water Board Order WQ 2001-15. In that order, the State Water Board reviewed the San Diego County MS4 Permit (Order No. 2001-01) requirements and made one change to one prohibition. The Order upheld all other requirements of the current permit. Order No. R9-2010-0016 incorporates the one change made by the State Water Board, and continues the approach of Order No. 2001-01 (the basis for the current permit), as it was upheld by the State Water Board in Order WQ 2001-15. State Water Board Order WQ 2001-15 supports such requirements, stating: "It is important to emphasize that dischargers into MS4s continue to be required to implement a full range of BMPs, including source control."

Oftentimes, the MS4 does not include structural BMPs at the outfalls to reduce pollutants of concern to the MEP from the MS4. Therefore, the municipalities must require and/or implement a full range of best management practices including source controls on discharges into the MS4 to comply with the MEP standard for discharges from the MS4. The requirements addressing "into and from" do not preclude the use of BMPs, structural or non-structural either within the MS4 or at the outfall, that reduce the discharge of pollutants from the MS4 to the MEP.

Comment # 291 **Commentor** 4 **Comment Subject** Municipal

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

There are cases where pesticides may be necessary due to health concerns (rodent infestations, etc) The concept of IPM does not preclude the use of chemical solutions where such solutions are needed or appropriate.

Comment Response

The Tentative Order does not preclude the use of chemical solutions for the management of pesticides, herbicides, and fertilizers where absolutely necessary. Non-chemical solutions are preferred and should be utilized first. In any case, the use of chemical solutions must comply with the requirements of the Tentative Order.

Comment # 292 **Commentor** 4 **Comment Subject** Municipal

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

[The Copermittees requested deletion of section F.3.a.(3)(c), requiring the use of native vegetation as a BMP.]

This is clearly overly specifying method of compliance, and is illegal pursuant to CWC 13360.

Comment Response

The San Diego Water Board disagrees that section F.3.a.(3)(c) is specifying method of compliance. The requirement provides a limitation as to which types of plants may be used, but does not specify which plants must be used; nor specifically where such plants should be used. The designation of the BMPs is up to the Copermittees to determine the circumstances when the use of such BMP is appropriate. No changes were made based on this comment.

Comment # 293	**Commentor** 4	**Comment Subject** Municipal

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

[The Copermittees highlighted section F.3.a.(4)(c), requiring the Copermittees to evaluate its existing flood control structures as part of ongoing routine maintenance.]

This is not required by the federal regulations as an ongoing permit requirement.

Accordingly, the Copermittees, request deletion of the section.

Should the board decide not to remove the section, at a minimum, the language should be restored to not require anything more than the
O.C. Permit.

Comment Response

This change was made at the Copermittees request during several months of meetings. According to the Copermittees, they preferred to evaluate their existing flood control structures as part of ongoing routine maintenance. No changes were made based on this comment.

Comment # 294	**Commentor** 4	**Comment Subject** Municipal

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

[The Copermittees requested deletion of section F.3.a.(5), rwhich includes requirements for sweeping of municipal areas.]

These are new requirements that are not necessary, and were not included in the draft OC Permit.

Further it is overly specific in forcing the Copermittees to identify high/moderate/ and low (trash) volume streets. Such specificity is not necessary.

Comment Response

The commenter is incorrect. Similar requirements were included in the Orange County MS4 Permit (Order No. R9-2009-0002). The Orange County Copermittees have shown they are proactively implementing street sweeping, thus less specificity was included in their requirements. The Riverside County Copermittees have not demonstrated that they are proactively implementing their programs, thus more specificity was included. These requirements are the same as in the San Diego County MS4 Permit (Order No. R9-2007-0001). No changes were made based on this comment.

Comment # 295	**Commentor** 4	**Comment Subject** Municipal

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

The term ‘facilities’ is confusing and unnecessary.

Request use of the language from the 2004 MS4 permit as shown in these redlines (though (b)(ii)). This is much clearer and simple to comply with.

Comment Response

The proposed change is not necessary. The San Diego Water Board prefers the term 'facilities' as more encompassing of devices needing cleaning. No changes were made based on this comment.

Comment # 296	**Commentor** 4	**Comment Subject** Municipal

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

Although the shown redlines will be much clearer, should board staff reject such changes, at a minimum the word 'detention basins' should be removed as it would otherwise conflict with subpart (iii)below.

Comment Response

The proposed change is not necessary. Section F.3.a.(6)(b)(iv) only addresses the cleaning of anthropogenic litter and does not address other sediment or debris cleaning activities that the Copermittees should do. Therefore, no conflict exists. No changes were made based on this comment.

Comment # 297	**Commentor** 4	**Comment Subject** Municipal

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

The MS4 Copermittees that do not own nor operate a sewer system cannot prevent seepage by maintaining their MS4.

Comment Response

The San Diego Water Board disagrees that the Copermittees cannot prevent sewage seeping into their MS4s by maintaining their MS4s. Through routine maintenance of their MS4, the Copermittees may identify sanitary sewer seepage and then take appropriate actions to temporarily divert the sewage, contact the responsible party for the sewage seepage to stop the seepage, or jacket the storm drain to prevent the sewage seepage. No changes were made based on this comment.

Comment # 298	**Commentor** 4	**Comment Subject** Municipal

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

See footnote explaining this change. The idea is that if a project has LID or Treatment Control BMPs in place – it should no longer be a mandatory high-priority site for municipal inspection purposes. It would then be subject to the requirements of Section F.1.f.

Comment Response

The San Diego Water Board disagrees with the proposed change. See the response to comment 288. No changes were made based on this comment.

Comment # 299 **Commentor** 4 **Comment Subject** Unpaved Roads

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

Pursuant to the comment letter:

THE COPERMITTEES REQUEST THIS SECTION BE DELETED IN ITS ENTIRETY.

See the comment letter, attachment 5, for further discussion of the issues and justification for this request.

Should the board decide to include such requirements despite the request and justifications provided in the comment letter, the edits shown below are the minimum changes that should be made.

Comment Response

Please see the response to comment 276.

Comment # 300 **Commentor** 4 **Comment Subject** Unpaved Roads

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

Regular maintenance of unpaved roads may have unintended negative effects by virtue of further loosening soil to maintain the roads. This requirement should be removed, or revised to only be required where necessary to resolve significant problems impacting streams and riparian habitat.

Comment Response

The requirement has been edited to require maintenance of unpaved roads "as necessary" to protect water quality.

Comment # 301 **Commentor** 4 **Comment Subject** Unpaved Roads

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

[The Copermittees requested deletion of section F.3.a.(11)(d), regarding re-grading of Copermittee maintained unpaved roads.]

Specifying method of compliance.

Comment Response

Comment noted. Clarifying language has been included in the errata.

Comment # 302	**Commentor** 4	**Comment Subject** Commercial/Industrial

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

[Copermittees request deletion of "marinas" from the list of commercial sites/sources required to be included in their inventory.]

Clearly not applicable within this permit area.

Comment Response

The requested change raises serious concerns that apparently the Copermittees are unaware that marinas are currently or have historically been in business at Lake Skinner, Vail Lake, and Diamond Valley Lake. As such, the Copermittees may be in violation of existing permit requirements under Order No. R9-2004-001. If it is not currently applicable, the Copermittees' inventory should not include such facilities. If, however, such a facility exists or does become established in the future, the Copermittees must include it in their inventory. No changes were made based on this comment.

Comment # 303	**Commentor** 4	**Comment Subject** Legal

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

This change reflects the purpose of the Order, which is to reduce pollutants discharged from the MS4.

Comment Response

The San Diego Water Board disagrees with the proposed change. Please see the responses to comments 22, 23, and 290. No changes were made based on this comment.

Comment # 304	**Commentor** 4	**Comment Subject** Commercial/Industrial

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

[Copermittees request language changed in the Mobile Business Program to read: Each Copermittee must keep as part of its commercial source inventory a listing of mobile business know to [delete: "operate" and replace with: "have bases of operation"] within tits jurisdiction that conduct services etc.]

This is an appropriate change, as it sets clear responsibility among the Copermittees.

Comment Response

The San Diego Water Board disagrees with the proposed change. The proposed change is already required under section F.3.b.(1)(a) and would make section F3.b.(3) unnecessary. No changes were made based on this comment.

Comment # 305 **Commentor** 4 **Comment Subject** General

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

[The Copermittees requested changes to section F.3.c.(1)(e), regarding the criterion to prioritize residential areas tributary to 303(d) listed water bodies as high priority.]

These requirements should be focused on discharges of pollutants

Comment Response

The San Diego Water Board disagrees with the proposed change. This requirement is focused on areas that can generate pollutants which may contribute to a 303(d) listed impairment. No changes were made based on this comment.

Comment # 306 **Commentor** 4 **Comment Subject** General

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

[The Copermittees requested deletion of section F.3.c.(1)(f), regarding the criterion to prioritize residential areas within or directly adjacent to or discharging directly to an ESA as high priority.]

This inappropriately separates the risk (pollutant discharge potential) from the action (regulation, minimum BMPs, etc), and should not be a mandated component of this permit.

Comment Response

The San Diego Water Board disagrees with the proposed change. This requirement is focused on areas that can generate pollutants which may impact an enironmentally sensitive area. No changes were made based on this comment.

Comment # 307 **Commentor** 4 **Comment Subject** Unpaved Roads

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

Pursuant to the comment letter:

THE COPERMITTEES REQUEST THIS SECTION BE DELETED IN ITS ENTIRETY.

See further discussion on this issue in Attachment 5 to this comment letter

Comment Response

Please see the response to comment 276.

Comment # 308	**Commentor** 4	**Comment Subject** Retrofit

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

[The Copermittees requested adding "Environmental Constraints (such as regulatory permits)" as a criterion for evaluating areas of existing development for retrofitting.]

There may be external constraints by other regulatory agencies that may affect the ranking of a particular candidate.

Comment Response

The San Diego Water Board disagrees with the requested change. Section F.3.d.(2) states that the evaluation criteria "is not limited to" the criteria included in the Tentative Order. The Copermittees may identify other criteria during their evaluation. The requested change is not necessary. No changes were made based on this comment.

Comment # 309	**Commentor** 4	**Comment Subject** Retrofit

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

A particular retrofit opportunity may have both positive and/or negative effects on public health and safety, and both should be considered.

Comment Response

Please see response to comment 308.

Comment # 310	**Commentor** 4	**Comment Subject** General

Specific Comment

[From Attachment 10 to the RCFC&WCD comment letter]

Fact Sheet Text, Page 7:
"The First and Second Term Permits, Order Nos. 90-46 and 98-02, provided maximum flexibility. San Diego Water Board Order No. 90-46 contained the "essentials" of the 1990 regulations, but the requirements were written in very broad, generic terms. This was done in order to provide the maximum amount of flexibility to the Copermittees in implementing the new requirements (flexibility was, in fact, the stated reason for issuing the permit in advance of the final regulations). From staff's perspective however, "flexibility" in the form of lack of specificity, combined with the Copermittees' lack of funding and political will, also provided the Copermittees with ample reasons to take few substantive steps towards achieving water quality standards. The situation was exacerbated by the San Diego Water Board's own lack of storm water resources for oversight."

Problem with Text:
The statement regarding a 'lack of funding and political will' is unsupported and inflammatory, and provides no benefit in a public document.

Suggestion:
Delete this statement.

Comment Response

The San Diego Water Board disagrees with the assertion that the statement is unsupported and inflammatory. During a time of increased economic activity, the Copermittees chose to do the minimum that is required in the current Order No. R9-2004-001 instead of identifying ways to improve upon those requirements and secure funding sources. The Copermittees chose to rely on funding sources that are not sustainable. The Copermittees chose not to actively pursue dedicated resources to support their storm water and non-storm water management programs. Now, with the current economic environment, the Copermittees use the reduction in the sources for their general funds as an excuse for not being able to support and expand their programs. Please see the responses to comments 8 and 9. No changes were made based on this comment.

Comment # 311 **Commentor** 4 **Comment Subject** Economic

Specific Comment

[From Attachment 10 to the RCFC&WCD comment letter]

Fact Sheet Text, Page 12 and 13:
"It is very difficult to ascertain the true cost of implementation of the Copermittees' management programs because of inconsistencies in reporting by the Copermittees. Reported costs of compliance for the same program element can vary widely from city to city, often by a very wide margin that is not easily explained. Despite these problems, efforts have been made to identify management program costs, which can be helpful in understanding the costs of program implementation….

A study on Phase I MS4 program cost was also conducted by the California Regional Water Quality Control Board, Los Angeles Region (Los Angeles Water Board), where program costs reported in the municipalities' annual reports were assessed. The Los Angeles Water Board estimated that average per household cost to implement the MS4 program in Los Angeles County was $12.50. 8 Since the Los Angeles County permit is very similar to Order No. R9-2004-001, this estimate is also useful in assessing general program costs in Riverside County.

The State Water Board also commissioned a study by the California State University, Sacramento to assess costs of the Phase I MS4 program. This study includes an assessment of costs incurred by Phase I MS4s throughout the State to implement their programs. Annual cost per household in the study ranged from $18-46, with the Fresno-Clovis Metropolitan Area (FCMA) representing the lower end of the range, and the City of Encinitas (in San Diego County) representing the upper end of the range.9 Included in the study is the City of Corona, which is in Riverside County under the jurisdiction of the California Regional Water Quality Control Board, Santa Ana Region (Santa Ana Water Board).

The annual cost per household for the City of Corona's program was estimated to be $32, which should be similar to the costs to implement the MS4 programs in the Riverside County portion of the San Diego Region. In contrast, the cost of the City of Encinitas' program, with an annual cost per household estimated to be $46, may represent the upper range of Riverside County MS4 programs. However, the City of Encinitas's program cost can be considered as the high end of the spectrum for management program costs because the City has a consent decree with environmental groups regarding its program, and City of Encinitas has received recognition for implementing a superior program.

The annual costs for the City of Corona and City of Encinitas were estimated from data collected in 2003-2004. Between 2003 and 2008, the number of households in both cities has increased by approximately 3 percent and 7 percent, respectively.10 In contrast, between 2003 and 2008 the number of households in the City of Temecula has increased from 23,199 to 31,135 (34 percent) and the City of Murrieta has increased from 22,020 to 32,664 (48 percent). This significant increase in number of households indicates a significant increase in the tax base (sales and property tax) available to fund the implementation of the MS4 programs for the City of Temecula and City of Murrieta, as well as for the County of Riverside and recently incorporated cities."

Problem with Text:
The text notes that it is difficult to compare costs between Cities for stormwater program implementation since the cost accounting varies widely, and the specific issues also vary widely. Despite this fact, the fact sheet goes on to make just such comparisons and further implies that the Santa Margarita Region Cities are underfunding their programs by comparison. For example, the City of Encinitas is cited as an example of a city that is spending on the upper end for a stormwater program. The City of Encinitas varies significantly from the cities in the Santa Margarita area in that it must address a major outfall (Cottonwood Creek) at its primary beach (Moonlight Beach). Cottonwood Creek has perennial dry weather flow from urban sources and exceeds REC-1 and REC-2 water quality standards. Since Cottonwood Creek discharges at Moonlight Beach, frequent sanitary standard exceedences were noted on a year–round basis. The City of Encinitas constructed a dry weather flow treatment plant near Moonlight Beach to treat Cottonwood Creek to correct this problem. No such compliance problems exist for the Copermittees. The comparisons in this part of the fact sheet are not valid.

In addition, the Fact Sheet leaves the inaccurate impression that the Copermittees have ample financial resources to fund MS4 programs by completely ignoring the effects of the current national recession. (See Attachment 2). As pointed out in Attachment 2 (Economic Assessment), declines in home values and tax receipts have crippled the ability of the Copermittees to finance such programs. The Fact Sheet selectively examines the period 2003-2008, when there was significant growth, but ignores the period 2008-2010, when that growth ended and the economy declined precipitously, affecting property and sale tax receipts as well as other sources of revenue.

Suggestion: Delete the text on Page 13 and 14 of the Fact Sheet.

Comment Response

Please see the responses to comments 9, 115, 116, 122, 126-130, and 208.

In addition to the City of Encinitas, the comparison in the Fact Sheet also includes the City of Corona, which is in Riverside County. The City of Encinitas was included in the comparison to provide a contrast in the varying amounts expended by different municipalities. The City of Corona was included in the comparison to provide a more region specific cost comparison. The comparison showed that the Cities of Murrieta and Temecula expended significantly less for their storm water management program, on a per household basis, compared to to the City of Corona, all of which are in the same county. According to the information provided in their FY 2008-2009 Annual Reports, the City of Corona reportedly spent approximately 50-60 percent more per household than the Cities of Murrieta and Temecula. The information was provided by the Cities. The comparison is accurate and valid. No changes were made based on this comment.

Comment # 312 **Commentor** 4 **Comment Subject** Legal

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

[The Copermittees requested deletion of section F.4.a.(1), requiring each Copermittee to retain legal authority to prevent and eliminate illicit discharges and connections to the MS4.]

This measure is already covered in Part E of the Order.

Comment Response

This level of specificity provides clarity to the Copermittee's to ensure their compliance with the Tentative Order's provisions. The proposed change is not necessary. No changes were made based on this comment.

Comment # 313 **Commentor** 4 **Comment Subject** IDDE

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

[The Copermittees requested deletion of "all known locations of access points (i.e. manholes) to the Copermittee's MS4, all known
locations of connections with other MS4s (e.g. Caltrans)" from section F.4.b.]

These are not required under the federal regulations, and are not necessary for the Copermittees' programs.

Comment Response

Section F.4.b of the Tentative Order and the corresponding text in the Fact Sheet have been modified to remove the requirement to include access points (i.e. manholes) in the MS4 Map.

Comment # 314 **Commentor** 4 **Comment Subject** IDDE

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

[The Copermittees requested deletion of section F.4.g, requiring each Copermittee to implement and enforce its ordinances, orders, or other legal authority.]

This requirement is already covered in Part E.1 of the Order.

Comment Response

This level of specificity provides clarity to the Copermittee's to ensure their compliance with the Tentative Order's provisions. The proposed change is not necessary. No changes were made based on this comment.

Comment # 315 **Commentor** 4 **Comment Subject** IDDE

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

The Copermittees do not own nor operate such systems, and as such cannot 'prevent' such spills from occurring.

Comment Response

Section F.4.g does not require the prevention of the spills from occurring, but the prevention of the spills from entering the MS4. Please see the response to comment 82. No changes were made based on this comment.

Comment # 316 **Commentor** 4 **Comment Subject** General

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

These entities are subject to individual NPDES regulations, and the Copermittees should not be required to educate them on the general requirements below.

Comment Response

Section F.6 has been modified as recommended.

Comment # 317 **Commentor** 4 **Comment Subject** General

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

The language should be clear that the minimum topics should be tailored as appropriate to the target audience.

Comment Response

Section F.6.a.(1) has been modified to clarify that the Copermittees' education programs must educate as appropriate to the target community's potential storm water and non-storm water discharges.

Comment # 318 **Commentor** 4 **Comment Subject** General

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

[The Copermittees requested deletion of "and review of monitoring data" from section F.6.b.(1)(a)(vii).]

As discussed in the comment letter, this is a requirement for other NPDES permits, and it is inappropriate to mandate upon the Copermittees.

Comment Response

The San Diego Water Board disagrees with the proposed change. Copermittee personnel (e.g., inspectors) should be educated on how to review monitoring data, especially if monitoring data are available for review at a site that is being inspected. Monitoring data provide valuable information to an inspector. No changes have been made based on this comment.

Comment # 319 **Commentor** 4 **Comment Subject** General

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

The requirement to educate the residential and general public communities will necessarily include these underserved audiences.

Comment Response

The San Diego Water Board agrees that the requirement will necessarily include these underserved audiences. Removing the text as proposed is not necessary. No changes were made based on this comment.

Comment # 320 **Commentor** 4 **Comment Subject** General

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

Goal is to pursue these agreements where we determine it is needed. Otherwise this requirement is diverting our time and resources from other more important efforts.

Comment Response

The Tentative Order describes that interagency agreements are necessary to control the contribution of pollutants from one portion of the shared MS4 to another portion of the shared MS4. If the agencies do not share portions of the MS4, then such agreements are not necessary.

Comment # 321 **Commentor** 4 **Comment Subject** Economic

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

This clarifies that the Copermittees have the option to request modification of the order for reasons such as inability to obtain the requisite funding for the programs.

Comment Response

The San Diego Water Board does not agree with the proposed change. The Copermittees are responsible for securing the resources necessary to meet the requirements of the Order. Please see the responses to comments 8 and 9. The Copermittees are free to request modification to the Order at any time. Until those modification are made, the Copermittees' storm water and non-storm water programs must be able to be protective of water quality and meet the requirements of the Order. In addition, the "Need to halt or reduce activity is not a defense" per the standard provisions in Attachment B.1(b) and 40 CFR 122.41(c). No changes were made based on this comment.

Comment # 322 **Commentor** 4 **Comment Subject** General

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

Although the Copermittees prefer to not be required to develop another compliance document, the edits below are intended to focus such a document on information that is relevant to the Copermittes' response.

Comment Response

The requested information is vital to formulating and implementing an appropriate workplan that addresses water quality. The level of detail is specific to provide the Copermittees more certainty on the status of their compliance. The suggested language is vague and open to multiple interpretations that would create confusion and uncertainty on the status of compliance.

Comment # 323 **Commentor** 4 **Comment Subject** Reporting

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

As drafted (without the changes shown) the requirements will be a significant and lengthy reporting exercise.

Request keeping this as a 'summary' report on compliance with the inspection frequencies, and identifying any follow-up actions (as shown via
the markup)

Comment Response

The San Diego Water Board disagrees with the requested changes and feels the reporting requirements are similar in breadth as current reporting requirements. No changes were made based on this comment.

Comment # 324	**Commentor** 4	**Comment Subject** Reporting

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

As drafted (without the changes shown) the requirements will be a significant and lengthy reporting exercise.

Request keeping this as a 'summary' report on compliance with the inspection frequencies, and identifying the high-level enforcement actions
(as shown via the markup).

Comment Response

The San Diego Water Board disagrees with the requested changes and feels the reporting requirements are similar in breadth as current reporting requirements. No changes were made based on this comment.

Comment # 325 **Commentor** 4 **Comment Subject** Economic

Specific Comment

[From Attachment 10 to the RCFC&WCD comment letter]

Fact Sheet Text Page 15:
"The vast majority of costs that will be incurred as a result of implementing Order No. R9-2010-0016 is not new. Storm water management programs have been in place in Riverside County for over 15 years. As shown in the discussion above, the amount spent for MS4 Permit compliance per household in the municipalities in the Riverside County portion of the San Diego Region is already low compared to other regions. Any increase in cost to the Copermittees, however, is still expected to be incremental in nature. Since Order No. R9-2010-0016 "fine tunes" the requirements of Order No. R9-2004-001, these cost increases are expected to be modest.

Where there may be additional elements that will incur new costs, the Riverside County Copermittees are given the time to develop the budgets and funding mechanisms to phase those elements into their programs. Additionally, development of these additional elements by the Riverside County Copermittees will have the benefit of the experiences and work already done by the San Diego County and Orange County Copermittees."

Problem with Text:
The Fact Sheet states that the vast majority of costs for implementing the Tentative Order are 'not new'. This is not correct. Almost every program in the Tentative Order has been amended and require new resources. Specific programs include, but are not limited to, the monitoring program (over fivefold increase in costs), hydromodification management programs, new development programs, inspection programs, irrigation runoff prohibitions, retrofit studies and MS4 maintenance programs. The very prescriptive and detailed requirements of the Tentative Order impose new requirements on the Copermittees at a time when funding sources are drying up. The Copermittees estimate that implementation of the regional components of the new Order (as written) will cost approximately $11,500,000 (e.g. the costs to write the new compliance documents, develop the retrofit, hydromodification programs and develop and implement the new monitoring program). These costs are on top of the current expenditures to implement the existing regional monitoring program (approximately $5,000,000 for the five-year permit term). These costs are further amplified by the direct cost of implementation that will be incurred by the individual Permittees (e.g. the cost to implement the new compliance documents and hydromodification programs). The text further indicates that the Tentative Order provides time for the Permittees to 'develop…funding mechanisms'. This statement assumes that the Copermittees have the ability to collect additional funds from taxpayers to support the stormwater program implementation. This is false, since any such funds, outside of inspection or plan review fees, would be required to be submitted to a vote of the people pursuant to Propostion 218. In the current economic and political climate, a successful vote to increase taxes is extremely remote. The Copermittees further note that in the City of Encinitas in Orange County, cited by the staff as an example of proactive MS4 regulation, a minimal stormwater proposition recently was voted down.

Suggestion: Delete the text noted above in the Fact Sheet and add a discussion on the difficulties of funding expansions to the Copermittees' stormwater programs due to Proposition 218.

Comment Response

Please see the responses to comments 8 and 9. No changes were made based on this comment.

Comment # 326	**Commentor** 4	**Comment Subject** Economic

Specific Comment

[From Attachment 10 to the RCFC&WCD comment letter]

Fact Sheet Text Page 16:
"For example, household willingness to pay for improvements in fresh water quality for fishing and boating has been estimated by USEPA to be $158-210. This estimate can be considered conservative, since it does not include important considerations such as marine waters benefits, wildlife benefits, or flood control benefits. The California State University, Sacramento study reports that the annual household willingness to pay for statewide clean water is approximately $180. When viewed in comparison to household costs for existing management programs, household willingness to pay estimates exhibit that per household costs incurred by the Riverside County Copermittees to implement their management programs are very low."

Problem with Text:
The discussion in the referenced text is not represented correctly. The figure cited in the California State University, Sacramento study includes the cost of wastewater treatment. The author of the study notes:

'The survey question was for restoring water quality for all waters throughout the state from all impairment, not just within a city or region and not just for impairment from stormwater pollution.' The current cost for sewer fees exceed $200 per year, Thus, the vast majority of the "household willingness" figure relates to sanitary sewer costs, and not to the costs of addressing stormwater.

Suggestion: Delete this text in the fact sheet and note that the cost consumers are currently paying for clean water in the Permit area exceeds that which studies cited have found they are willing to pay.

Comment Response

The commenter is correct that the figure cited in the California State University, Sacramento study is for "for restoring water quality for all waters throughout the state from all impairment, not just within a city or region and not just for impairment from stormwater pollution." The survey was about restoring water quality for all waters throughout the state, and does not state, as the commenter asserts, that the cited figure includes the cost of wastewater treatment. Thus, the figure indicates that the household willingness to pay for statewide clean water is higher than what the households in the Upper Santa Margarita Watershed are paying toward the Copermittees' storm water programs. No changes were made based on this comment.

Comment # 327 **Commentor** 4 **Comment Subject** Economic

Specific Comment

[From Attachment 10 to the RCFC&WCD comment letter]

Fact Sheet Text Page 17:
"University of California, Los Angeles assessed the costs and benefits of implementing various approaches for achieving compliance with the MS4 permits in the Los Angeles Region. The study found that non-structural systems would cost $2.8 billion but provide $5.6 billion in benefit. If structural systems were determined to be needed, the study found that total costs would be $5.7 to $7.4 billion, while benefits could reach $18 billion. Costs are anticipated to be borne over many years – probably ten years at least. As can be seen, the benefits of the programs are expected to considerably exceed their costs. Such findings are corroborated by USEPA, which found that the benefits of implementation of its Phase II storm water rule would also outweigh the costs."

Problem with Text:
It is a basic principle that public spending should have a positive cost-benefit. The Fact Sheet implies that since spending on stormwater has a positive cost-benefit, such spending should be increased. The reality is that there are also other public spending priorities such as police, fire, ambulance, and public utilities competing for the same funding, all of which have positive cost-benefit ratios. Moreover, the UCLA study specifically focused on the benefit of improving beach water quality, which is a very significant economic factor in terms of tourism in coastal Los Angeles County. No beaches exist in the Santa Margarita Region, and given the ephemeral nature of many of the Region's waterways, attempting to extrapolate the UCLA study is not appropriate. In the absence of a similar cost-benefit study being undertaken in the Santa Margarita Region, the studies cited by staff do not provide any basis for the conclusions reached in the Fact Sheet.

Suggestion:
As the fundamental basis for this comment is flawed, in the absence of any local data for inland waterbodies in semi-arid climates, the text should be deleted.

Comment Response

The San Diego Water Board disagrees with the commenter's assertion that the basis for the text in the Fact Sheet is flawed. The waters in the Upper Santa Margarita Watershed are designated with water contact recreation (REC-1) and rare, threatened, and endanged species (RARE) beneficial uses. The Upper Santa Margarita Watershed also has valuable resources that are worth protecting and provide value and benefits to the community. In general, the study shows that the costs of implementing programs to restore and protect water quality would provide benefits that exceed and outweigh the costs of implementing those programs. No changes were made based on this comment.

Comment # 328	**Commentor** 4	**Comment Subject** Finding

Specific Comment

[From Attachment 10 to the RCFC&WCD comment letter]

Fact Sheet Text Page 35:
"Trash, as litter in both solid and liquid form, is consistently found on and adjacent to roadways. A California Department of Transportation Litter Management Pilot Study found that of roadway trash, plastics and Styrofoam accounted for 33 percent of trash by weight, and 43 percent by volume. Further, the study found that approximately 80 percent of the litter associated with roadways was floatable, indicating that, without capture, this litter would enter Waters of the State after a storm event, resulting in the impairment of Beneficial Uses. The study, however, relied upon a mesh capture size of 0.25 inches (6.35 millimeters). This size is too large to effectively capture plastic pre-production pellets (a.k.a. "nurdles"), which are roughly 3 mm in size, and likely underestimated the total contribution of plastics. Furthermore, pre-production plastic pellets, which are small enough to be easily digested, have been found to carry persistent organic pollutants, including PCBs and DDT."

Problem with Text:
While the Fact Sheet suggests that there is a compelling argument to address trash along Caltrans highways, such a problem is not found on municipal streets. The Caltrans studies found that a substantial portion of the litter load comes from uncovered loads on commercial and private vehicles. The low speed roadways operated by the Copermittees do not create similar conditions or handle similar traffic. Further, the text discusses pre-production plastics (nurdles), yet fails to acknowledge that there are no industries within the Copermittees' jurisdiction that manufacture or use this material. The Fact Sheet's citation of studies that have no bearing on actual conditions within the Santa Margarita Region cannot be used to justify programs in the Tentative Order addressing such non-existent conditions. The ROWD has a more informed discussion of trash issues based on actual conditions in the Santa Margarita Region.

Suggestion:
Revise the fact sheet text to discuss the current findings relative to trash in the Permit region based on the ROWD.

Comment Response

The San Diego Water Board disagrees that the Fact Sheet requires revisions regarding trash. The discussion in the Fact Sheet includes information specific to high density urban areas in Southern California as well. The Caltrans study referenced in the Fact Sheet was provided as additional information about the amount and types of trash that can be found along Caltrans maintained roadways which can be discharged from the Caltrans MS4 system to the Copermittees' MS4 systems. No changes were made based on this comment.

Comment # 329	**Commentor** 4	**Comment Subject** Overirrigation

Specific Comment

[From Attachment 10 to the RCFC&WCD comment letter]

Fact Sheet Text Page 50 and 51
Pg. 50 - "To date the San Diego Water Board and the Copermittees have identified overspray and drainage from potable and reclaimed water landscape irrigation as a substantial source and conveyance mechanism for pollutants into waters of the United States."
Pg. 51 – "The San Diego Water Board and the Copermittees have identified irrigation water as a source of pollutants and conveyance of pollutants to waters of the United States, when applied improperly in excess and thereafter entering the MS4, in the following documents:"

Problem with Text:
The documents cited in the Fact Sheet do not support the conclusion that irrigation water is a source of pollutants or conveyance of pollutants in the Santa Margarita Region. First, the comments in the public education document cited in the Fact Sheet were borrowed from an Orange County publication, and do not represent any official conclusion by the Copermittees that irrigation water represents a water quality threat. Plainly over-irrigation is to be discouraged, as even if the water is clean, it adds to the Copermittees' costs of addressing such waters. Second, this public education document is the only document from a Santa Margarita Region source. The other documents cited by staff are studies conducted in other areas, with different hydrology and climate. For a more comprehensive assessment of the irrigation runoff issues, please see Attachment 6 (Prohibition of Irrigation Runoff).

Suggestion:
Delete the referenced text and the quotes referencing Permittee education materials. Also remove the improperly supported irrigation runoff prohibition.

Revise the text to accurately reflect the lack of any connection between irrigation runoff and impairments of receiving waters in the Santa Margarita Region.

Comment Response

Please see the reponse to comment 83. Also, there are two public education documents used by the Riverside County Copermittees cited, one of which is a survey developed by the Copermittees. These documents exhibit an explicit concern with pollutants contained in and conveyed by irrigation runoff. These documents may have been "borrowed", but the fact that they are being distributed by the Copermittees as part of their public participation program does make them an "official" publication. No changes were made based on this comment.

Comment # 330	**Commentor** 4	**Comment Subject** Unpaved Roads

Specific Comment

[From Attachment 10 to the RCFC&WCD comment letter]

Fact Sheet Text Page 58:
"Enforcement and inspection activities conducted by the San Diego Water Board during the previous permit term have found a lack of source control for many unpaved roads within the jurisdiction of the Copermittees."

Problem with Text:
The Copermittees submit that there is no evidence reflecting any substantial water quality problem relating to MS4 discharges affected by unpaved roads. Moreover, the mileage of unpaved roads in the jurisdiction of the Copermittees is a small percentage of the total mileage of unpaved roads in the Santa Margarita Region, given that many of these roads are operated by such jurisdictions as the U.S. Forest Service. Please see Attachment 5 (Unpaved Roads). Further, the Fact Sheet notes on page 27 that Permits "will cover municipal systems discharges in unincorporated portions of the county, it is the intent of EPA that management plans and other components of the program focus on the urbanized and developing area of the County". Dedicating resources to unpaved roads diverts already limited resources from the urbanized areas intended to be addressed by USEPA regulations.

Suggestion:
The references and associated program requirements should be removed from the Permit and addressed through a separate general permit for unpaved roads, if in fact unpaved roads are a significant source of pollutants.

Comment Response

Please see the responses to comments 101, 138, and 179. Although the USEPA intends the regulations to "focus" on urban areas, the regulations are not limited to urban areas. As necessary in the rural areas, the Copermittees must enforce their ordinances to maintain compliance with the Tentative Order thereby protecting water quality.

Comment # 331 **Commentor** 4 **Comment Subject** New Development

Specific Comment

[From Attachment 10 to the RCFC&WCD comment letter]

Fact Sheet Text Page 69:
"The order also found that the SSMP requirements are appropriately applied to the majority of the Priority Development Project categories that are also contained in section F.1 of this Order. The State Water Board also gave California Regional Water Quality Control Boards (Regional Water Boards) the needed discretion to include additional categories and locations, such as retail gasoline outlets(RGOs), in SSMPs "

"The provisions of the SSMP section of the Order are also consistent with those previously issued by the San Diego Water Board for Riverside County (Order No. R9-2004-001), Southern Orange County (Order Nos. R9-2002-0001 and R9-2009-0002) and San Diego County."

Problem with Text:
Several PDP categories or thresholds are not supported by Order WQ 2000-11 such as the 10,000 square feet requirement for residential areas nor the 1-acre threshold for all development projects. Further the Order ignores other applicable portions of Order WQ 2000-11. Specifically, the memo from State Board Chief Counsel Craig S. Wilson transmitted WQ Order 2000-11 to the Regional Board executive officers states that with regard to discretion that:

"3. The Order allows broader discretion by the Regional Water Boards to decide whether to include additional types of development in future SUSMPs. These areas for potential future inclusion in SUSMPs include retail gasoline outlets, ministerial projects (only discretionary projects are included in the approved SUSMPs), and projects in environmentally sensitive areas. If Boards include these types of developments in future permits, the Order explains the types of evidence and findings that are necessary."

Order 2000-11 requires that revisions to regulatory thresholds be justified economically. The Copermittees have expressed their concern with requirement F.1.d.(2)(a) regulating residential developments of 10,000 sq. ft. or more and requirement F.1.d.(1)(c) regulating any project 1-acre or more. These thresholds, and their relative impact on project proponents, have not been adequately justified. The Permittees have noted that these regulations will negatively impact the construction of custom homes (individual lot developments). The relative economic impact of meeting the SSMP requirements for individual homeowners has not been justified in the fact sheet.

Suggestion:
As shown in the redline markup (Attachment 9); The 1-acre SSMP threshold (F.1.d.(1)(c)) should be deleted and the 10,000 square feet threshold for residential areas (F.1.d.(2)(a)) should be made the same as the requirement contained in the Riverside County Santa Ana NPDES MS4 Permit.

Comment Response

The 10,000 square feet threshold is appropriate, since it is consistent with requirements in other Phase I NPDES storm water regulations throughout California. The 10,000 square feet threshold is also included in the Santa Ana Water Board Riverside County MS4 Permit (Order No. R8-2010-0033), but section F.1.d.(2)(a) of the Tentative Order does not differentiate residential new development projects.

This one-acre threshold is appropriate, since it was selected to be consistent with the State Water Board's Phase II NPDES requirements for small municipalities (Order No. 2003-0005-DWQ). The one-acre threshold is consistent with the San Diego County MS4 Permit (Order No. R9-2007-0001) and Orange County MS4 Permit (Order No. R9-2009-0002). The one-acre threshold is also included to be consistent with the State Water Board's Construction General Permit (Order No. 2009-0009-WQO), to ensure all Development Projects subject to the post-construction BMP requirements of the Construction General Permit will implement SSMP post-construction BMP requirements.

No changes were made based on this comment.

Comment # 332 **Commentor** 4 **Comment Subject** Hydromod

Specific Comment

[From Attachment 10 to the RCFC&WCD comment letter]

Fact Sheet Text Page76:
"The success of future stream restoration and stabilization is, however, dependent on preventing and reducing physical impacts from activities upstream. Therefore, hydromodification management measures are necessary upstream of modified (e.g. concrete, rip rap, etc.) channels in addition to non-modified channels."

Problem with Text:
In some areas, hardened channels may be needed for flood control and public safety. In those areas, channel restoration may not be feasible and onsite controls are not warranted. The protection of public safety from flooding is a statutorily required duty of the District. See Water Code App. Section 48-9. Any provisions of the Tentative Order that would presume to challenge this duty must be deleted. The District assumes that the Regional Board and staff are not placing themselves in the position of making flood control judgments, as the agency is neither charged by the Legislature with such obligation nor is the agency equipped to do so.

Suggestion:
Revise the text to add "except where hardened channels are required for the protection of public safety"

Comment Response

Please see the responses to comments 235 and 265. No changes were made based on this comment.

Comment # 333 **Commentor** 4 **Comment Subject** Commercial/Industrial

Specific Comment

[From Attachment 10 to the RCFC&WCD comment letter]

Fact Sheet Text Page 77:
"Since municipalities are the lead permitting authority for industrial land use and construction activities, they are also the lead for enforcement regarding runoff discharges from these sites."

Problem with Text:
This is a leap of logic we should probably not let pass. The Copermittees can greatly influence the design and construction, but the Industrial Permit is focused on the operation of the facility, and that is where the authority of the Board lies - and is arguably the most important aspect of runoff quality from the site.

Suggestion:
Delete the sentence.

Comment Response

The San Diego Water Board maintains that it is logical for the municipalities to be the lead for enforcement regarding runoff discharges from these sites into their MS4. The Copermittees are responsible for enforcing their ordinances within their jurisdiction regarding discharges to their MS4 systems. The Copermittees have land use permitting authority for industrial land use and construction activities and can require implementation of BMPs to reduce or eliminate runoff discharges into their MS4 systems. No changes were made based on this comment.

Comment # 334	**Commentor** 4	**Comment Subject** Legal

Specific Comment

[From Attachment 10 to the RCFC&WCD comment letter]

Fact Sheet Text Page 79:
"To clarify, an unaltered natural drainage, which receives runoff from a point source (channeled by a Copermittee to drain an area within their jurisdiction), which then conveys the runoff to an altered natural drainage or a man-made MS4, is both an MS4 and a receiving water."

Problem with Text:
As noted in Attachment 7 (General Legal Comments) regarding Finding D.3.c., a natural drainage, whether or not it conveys point source runoff to a man-made MS4, is not itself part of the MS4.

Suggestion:
Delete text.

Comment Response

Please see the response to comment 22.

Comment # 335 **Commentor** 4 **Comment Subject** Legal

Specific Comment

[From Attachment 10 to the RCFC&WCD comment letter]

Fact Sheet Text Page 79:
"As operators of the MS4s, the Copermittees cannot passively receive and discharge pollutants from third parties. By providing free and open access to an MS4 that conveys discharges to waters of the U.S., the operator essentially accepts responsibility for discharges into the MS4 that it does not prohibit or otherwise control. These discharges may cause or contribute to a condition of contamination or a violation of water quality standards."

Problem with Text:
First, the Copermittees, as operators of the MS4, are required to address storm drainage. During storm conditions in particular, the District is required to handle flood waters so as to protect the lives and property of residents of Riverside County. The failure to do so is a violation of state law. See Water Code App. Section 48-9. Thus, the Copermittees must "passively receive and discharge" waters from third parties, which waters may contain pollutants. Moreover, the operator of the MS4 is NOT accepting responsibility for discharges from other MS4 systems. There is no provision for joint liability under the federal Clean Water Act or the California Water Code. The former directs its prohibitions against a "discharger," and no others. 33 U.S.C. §§ 1319 and 1342. A party is responsible only for its own discharges or those over which it has control. Jones v. E.R. Snell Contractor, Inc., 333 F.Supp.2d 1344, 1348 (N.D. Ga. 2004); United States v. Sargent County Water Dist., 876 F.Supp. 1081, 1088 (D.N.D. 1992).

The Clean Water Act MS4 regulations, moreover, specifically provide that Copermittees under an MS4 Permit are required to "comply with permit conditions relating to discharges from the municipal separate storm sewers for which they are operators." 40 C.F.R. § 122.26(a)(3)(vi) (emphasis supplied). Moreover, the Regional Board, as the permitting agency for stormwater and Industrial Permits, and the State Board as the overall agency responsible for compliance with the Clean Water Act in California, are responsible for ensuring that the discharges from such permitted facilities, whether or not they enter the MS4, are in compliance with the requirements of those permits. Finally, many sources of pollutants are beyond the control of the MS4 operators but are within the control of other agencies, if those agencies elect to exercise their authority. A major example is the discharge of metals from motor vehicle brake pads, which contributes to exceedances of copper, zinc and potentially other metals in stormwater. The MS4 operators cannot control the composition of brake pads, nor can the MS4 operators control air emissions from domestic and foreign sources that discharge pollutants onto the surface area of the region, which can then wash into the MS4 systems.

Suggestion:
Delete cited text.

Comment Response

The text cited from the Fact Sheet is a Finding that is included as part of the Findings of the Tentative Order. The San Diego Water Board disagrees with the recommendation to delete the finding from the Fact Sheet or the Tentative Order. Please see the responses to comments 81, 233-235, 260, and 265.

Comment # 336 **Commentor** 4 **Comment Subject** Legal

Specific Comment

[From Attachment 10 to the RCFC&WCD comment letter]

Fact Sheet Text Page 81:
"Since treatment generally does not occur within the MS4, in such cases reduction of storm water pollutants to the MEP must occur prior to discharges entering the MS4."

Problem with Text:
Nothing in the MS4 regulations prohibits use of the MS4 for treatment. Frankly, some of the most effective treatment facilities for pollutants may be located in the MS4 as part of regional treatment systems. An example are catch basins, which collect trash and other debris and detention and retention basins that can be used to capture, treat and infiltrate runoff.

Suggestion:
Delete cited text.

Comment Response

The San Diego Water Board agrees that nothing in the MS4 regulations prohibits use of treatment devices within the MS4 to treat pollutants prior to discharge into receiving waters, subject to appropriate NPDES requirements. Although more often than not, structural treatment controls within the MS4 are costly and maintenance intensive, and therefore not implemented by the Copermittees. The text clarifies the most common case; that treatment controls for priority pollutants do not exist within the MS4 and the most cost efficient and effective controls are at the source of the pollutants prior to entering the MS4. Please see the response to comment 290. No changes were made based on this comment.

Comment # 337 **Commentor** 4 **Comment Subject** Retrofit

Specific Comment

[From Attachment 10 to the RCFC&WCD comment letter]

Fact Sheet Text Page 84:
"When appropriately applied as in this Order, retrofitting existing development meets MEP."

Problem with Text:
Only retrofits that are applied with the requirements of the Order meet MEP, which is not the case.

Suggestion:
Delete the text.

Comment Response

If retrofits are applied appropriately, in compliance with the requirements of the Tentative Order, the San Diego Water Board considers that as controlling pollutants in storm water discharges from existing development to the MEP. No changes were made based on this comment.

Comment # 338	**Commentor** 4	**Comment Subject** Monitoring

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

[Copermittees requested deletion of "Where such monitoring is not practical, such as for large watersheds with significant groundwater recharge flows, composites must be" from Attachment E, section II.A.1.d.]

As discussed in our meeting, this is a large watershed with significant GW recharge flows.

Comment Response

This requirement is referring to the watershed area for the specific monitoring stations and not for the Santa Margarita Watershed as a whole. The practicality of collecting a sample for the duration of the event is based on the availablilty of flows during that storm event which may be impacted by the condition of the watershed depending on the size of the storm event, i.e. small storm events in a large watershed with significant groundwater recharge may not have flows during the duration of the entire runoff event.

Comment # 339	**Commentor** 4	**Comment Subject** Monitoring

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

Language from MLS section. This is to allow for changes in MLS locations, and then allow the stream assessment stations to follow.

Comment Response

The San Diego Water Board agrees with this request with the caveat that the bioassessment stations location remains with the mass loading station. The following language has been added "Copermittees may propose, for San Diego Water Board review and approval, changing the location of stream assessment monitoring stations where the mass loading stations location has changed pursuant to section II.A.1.a."

Comment # 340	**Commentor** 4	**Comment Subject** Monitoring

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

Only the Bioassessment component of stream assessment monitoring must be conducted according to the SOP.

Comment Response

Section II.A.2.c.(3) requires that the monitoring at the stream assessment stations be conducted according to the most current applicable SOPs developed by SWAMP, and includes a footnote with current SOPs. These SOPs are also applicable to the following water chemistry constituents: Temperature, pH, Dissolved Oxygen, Specific Conductance, and Alkalinity. The Tentative Order has been revised to clarify this.

Comment # 341 **Commentor** 4 **Comment Subject** Legal

Specific Comment

[From Attachment 10 to the RCFC&WCD comment letter]

Fact Sheet Text Page 88:
"The RWL language in the Order requires storm water compliance with water quality standards through an iterative approach for implementing improved and better-tailored BMPs over time. The iterative BMP process requires the implementation of increasingly stringent BMPs until receiving water quality standards are achieved. This is necessary because implementation of BMPs alone cannot ensure attainment of receiving water quality standards."

Problem with Text:
61 Federal Register 57425 (1996), Interim Permitting Approach for Water Quality-Based Effluent Limitations in Storm Water Permits states "expanded or better-tailored BMPs in subsequent permits, where necessary, to provide for the attainment of water quality standards."

Suggestion:
The second sentence should be revised to reflect the actual text from federal regulations (specifically "in subsequent permits"). Further the last sentence does not make sense and is contrary to the proceeding text and should be deleted.

Comment Response

The cited guidance is for NPDES storm water permit writing and not for storm water program management. The implementation of improved and better-tailored BMPs does not have to wait for subsequent permit iterations. A proactive storm water program will continuously review and improve their BMPs for the attainment of water quality standards. The last sentence has not been changed because it refers to the iterative process and not BMPs alone. No changes were made based on this comment.

Comment # 342 **Commentor** 4 **Comment Subject** Monitoring

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

This section is referring to the Bioassessment component of stream assessment monitoring.

Comment Response

This section is referring to the stream assessment monitoring. See response to comment No. 340.

Comment # 343	**Commentor** 4	**Comment Subject** Overirrigation

Specific Comment

[From Attachment 10 to the RCFC&WCD comment letter]

Fact Sheet Text Page 112:
"The San Diego Water Board has responded to complaints about and observed runoff from over-irrigation entering the MS4s in the Riverside County portion of the San Diego Region."

Problem with Text:
There is no evidence in the fact sheet supporting this statement.

Suggestion:
Provide evidence or delete statement.

Comment Response

This finding states the fact that the San Diego Wate Board has received and responded to complaints about and observed runoff from overirrigation entering the MS4s in the Riverside County portion of the San Diego Region. The documentation is available in the records available to the public at the San Diego Water Board. No changes were made based on this comment.

Comment # 344	**Commentor** 4	**Comment Subject** Monitoring

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

This presumes we are starting at the 'bottom of the watershed'. We may approach this differently, but would come up with something to help identify source areas.

Comment Response

Please see the response to comment 193.

Comment # 345	**Commentor** 4	**Comment Subject** Monitoring

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

This is necessary because some pollutants have broad societal sources that cannot be pinpointed through focused source ID 'Monitoring'.

Comment Response

Please see the response to comment 193.

Comment # 346	**Commentor** 4	**Comment Subject** Monitoring

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

Table 4 is more appropriate – consistency for all MS4 outfall stations.

Comment Response

The San Diego Water Board does not agree with the proposed change. Table 1 is appropriate. No changes were made based on this comment.

Comment # 347 **Commentor** 4 **Comment Subject** LID

Specific Comment

[From Attachment 10 to the RCFC&WCD comment letter]

Fact Sheet Text Page 130:
"This section requires the use of native and/or low water use plants for landscaping."

Problem with Text:
There was an agreement that this would be suggested but not a requirement. This requirement also mandates the means of compliance, in violation of Water Code section 13360.

Suggestion:
Change the text:
"Section suggests the use of native and/or low water use plants for landscaping,"

Comment Response

No change is needed in response to the comment. The full text of the the fact sheet accurately reflects the language in the Tentative Order which requires the use of native and/or low water use plants for landscaping where feasible.

Comment # 348 **Commentor** 4 **Comment Subject** Monitoring

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

The existing monitoring program is reported on a fiscal year basis. Need to align the monitoring report with the fiscal year and the JRMP annual report. Also consistent with the change requested in III.A.2.

Comment Response

Please see the response to comment 195.

Comment # 349 **Commentor** 4 **Comment Subject** New Development

Specific Comment

[From Attachment 10 to the RCFC&WCD comment letter]

Fact Sheet Text Page 136:
"This requirement is needed because to date, the Copermittees have generally approved low removal efficiency treatment control BMPs without justification or evidence that use of higher efficiency treatment BMPs was considered and found to be infeasible."

Problem with Text:
The Copermittees challenge the accuracy of this Statement. Riverside County has been requiring landscaped based low impact development BMPs since 2005. The District has also spent a substantial sum of money and time developing BMP manuals with specific criteria to ensure the effectiveness of BMPs.

Suggestion:
Delete the unsupported and offensive statement.

Comment Response

The statement is accurate. The Fact Sheet references a Program Evaluation Report from 2008, in which an audit of the Copermittees' SSMP programs found that many SSMP reports do not describe the selection of treatment control BMPs. Where treatment control BMPs were implemented for a SSMP project, no justification or evidence was provided for the selection of those treatment control BMPs. The pollutant removal efficiency of those treatment control BMPs was not known or evaluated in the SSMP report. The requirement is necessary to ensure that the Copermittees ensure the use of treatment control BMPs with the highest feasible pollutant removal efficiency. No changes were made based on this comment.

Comment # 350 **Commentor** 4 **Comment Subject** Hydromod

Specific Comment

[From Attachment 10 to the RCFC&WCD comment letter]

Fact Sheet Text Page 142:
"Where streams are hardened and/or buried to convey storm water, they cannot provide adequate water quality."

Problem with Text:
Unsupported and incorrect. Hardened channels can be designed to provide both flood protection and natural stream function. For example, hardened levees can be designed to be set back and backfilled with native material, effectively providing a natural substrate for stream function. Similarly, porous channel materials such as gabions can provide both flood protection and substrate for native habitat. Finally, even underground systems can be connected to regional treatment systems that provide requisite water quality benefits where appropriate.

Suggestion:
Delete.

Comment Response

The San Diego Water Board disagrees with the commenter. We fail to see how a channel that is lined with hardscape materials or an underground pipe would be able to support habitat necessary to support rare, threatened, or endangered species (i.e. RARE beneficial use). The Finding in the Fact Sheet is correct to state that hardened stream channels (i.e. lined with hardcape materials) and underground systems (i.e. pipes) cannot provide water quality and other necessary conditions to support beneficial uses. No changes were made based on this comment.

Comment # 351	**Commentor** 4	**Comment Subject** Hydromod

Specific Comment

[From Attachment 10 to the RCFC&WCD comment letter]

Fact Sheet Text Page 145:
"Redevelopment projects, however, must be able to achieve post-project runoff flow rates and durations that are less than or equal to pre-project and down to pre-development runoff flow rates and durations to be eligible to receive a waiver under the program."

Problem with Text:
This requirement is self-defeating. By placing regulatory obligations on redevelopments that make the cost of redevelopment greater than the cost of developing on virgin land, the Permit effectively promotes inner-city blight as existing structures are abandoned and suburban development is promoted due to economic factors. The Permit should include accommodations for redevelopment to ensure that existing developed areas are economically preferable for new development and to prevent the onset of unnecessary additional impervious area.

Suggestion:
The Permit and fact sheet should be revised to offer exemptions for hydromodification requirements for redevelopments where such improvements are infeasible.

Comment Response

The San Diego Water Board disagrees that the requirement is self-defeating. Language has been added to the fact sheet clarifying the difference between pre-project and pre-development. The waiver provides the appropriate level of accomodations to redevelopment projects while protecting water quality. In addition, the San Diego Water Boad believes the commentor over estimates the extent to which development may be preffered on pristine land over redevelopment with the current landuse zoning and dedicated open space requirements. Please see the response to comment 269. No changes were made based on this comment.

Comment # 352	**Commentor** 4	**Comment Subject** Retrofit

Specific Comment

[From Attachment 10 to the RCFC&WCD comment letter]

Fact Sheet Text Page 160:
"Retrofitting existing development is practicable for a municipality through a systematic evaluation, prioritization and implementation plan focused on impaired water bodies, pollutants of concern, areas of downstream [hydromodification, feasibility and effective communication and cooperation with private property owners]."

Problem with Text:
Although the current requirement simply calls for a study, it is expected that future permits will require implementation of said study. This study exceeds the requirements for Copermittees to evaluate opportunities for retrofit of the MS4 contained in the federal regulations and federal Clean Water Act. There are no revenues to promote such a program.

Suggestion:
The Board should recognize in the fact sheet that without funding provided by the state, there is no revenue for such a program.

Comment Response

The San Diego Water Board disagrees that funding must be provided by the State for the Copermittees to implement a retrofitting program. Retrofitting is anticipated to be most feasible and implementable at publicly owned properties and areas. Retrofit opportunities at publicly owned properties and areas can be implemented whenever maintenance or upgrades are necessary, which should already be included in the Copermittee's budget. If private owners choose to retrofit their properties, the cost may be borne by the property owner and may not require additional resources from the Copermittees. Also, retrofit opportunities may be funded by the CWA Section 401 certification project proponents, Supplemental Environmental Project (SEP) proponents, and grant programs.

The requirement to implement retrofits is fully supported by the federal regulations to reduce storm water pollutants to the MEP. 40 CFR 122.26 (d)(2)(iv) provides that the Copermittees storm water program shall include control techniques and engineering methods. Retrofitting BMPs are such control techniques and engineering methods for discharges from existing developments. 40 CFR 122.26(d)(2)(iv)(A) specifies that the Copermittee's program must include "a description of structural and source control measures to reduce pollutants from runoff from commercial and residential areas". Retrofitting BMPs are both structural and source control measures to reduce pollutants. 40 CFR 122.44(d)(1) requires municipal storm water permits to include any requirements necessary to "[a]chieve water quality standards established under section 303 of the CWA, including State narrative criteria for water quality." To date, the receiving waters with the Copermittees' jurisdiction are not meeting water quality standards as evidenced by the San Diego Region Clean Water Act Section 303(d) List of Water Quality Limited Segments. Experience has shown that retrofitting existing development is necessary to meet water quality standards.

Retrofits do not have to be expensive. Retrofits could be as simple as redirecting downspouts from roofs to pervious or landscaped areas instead of to hardscaped areas discharging directly to the MS4. The San Diego Water Board encourages the Copermittees to identify simple, low-cost retrofit opportunities that can be easily implemented, in addition to other more expensive retrofit opportunities, as part of their retrofitting program.

Comment # 353	**Commentor** 4	**Comment Subject** Retrofit

Specific Comment

[From Attachment 10 to the RCFC&WCD comment letter]

Fact Sheet Text Page 161:
"Section F.3.d.(4) requires each Copermittee to cooperate with private property owners to encourage the implementation of site specific retrofitting projects. Because the Copermittees have limited authority to directly require retrofitting projects on private property, the Copermittees must encourage private property owners to implement retrofitting projects through indirect programs and incentives."

Problem with Text:
If the Board wishes to promote urban retrofit, then they also need to incentivize the program. Currently, property owners wishing to volunteer for urban retrofit projects are required to comply with the SSMP, including hydromodification and LID requirements, opt into BMP inspection programs and subject themselves to ongoing scrutiny through business inspection programs required by the Permit. The permit places an ECONOMIC DISINCENTIVE in the way of promoting a general good for the watershed. The purpose of this requirement is to promote acceleration of water quality benefits from existing urban areas. The requirements, as written, promote a program that is doomed to failure.

Suggestion:
The Board should clearly exempt urban retrofit projects from the new development requirements of the Permit if they wish to accelerate water quality improvements from existing urban areas.

Comment Response

The San Diego Water board disagrees that urban retrofit project should be exempt from the new development requirements. The San Diego Water Board disagrees with the commenter than all retrofit projects on privately owned properties will be or must be subject to SSMP requirements (See response to Comment #99).

Many retrofit projects could easily be less than 1 acre in size. For example, as described in the response to comment 352, a retrofit project could be a simple as redirecting downspouts from roofs to pervious or landscaped areas instead of hardscaped areas discharging directly to the MS4. To take such a project one step further, the owner of the property may wish add a planter box that can receive roof runoff, which can retain, filter, and evapotranspire the runoff, as well as provide aesthetic value. Or, the property owner could direct the roof runoff to a series of rain barrels that allow the overflow to discharge to a landscaped area or pervious surface. These types of retrofits are unlikely be subject to SSMP requirements.

On the other hand, if a private owner is planning to implement a project that is subject to SSMP requirements, that would essentially mean the project is a redevelopment Priority Development Project (PDP). Such projects would be adding, creating, or replacing at least 5,000 square feet of impervious surface. It is necessary for these redevelopment PDPs to implement the LID and HMP requirements to protect water quality from the runoff that is generated from the impervious surface. If, however, the project were to redevelop the site and replace at least 5,000 square feet of impervious surface with pervious surface, and not add or create at least 5,000 square feet of impervious surface, that project may no longer meet the definition of a PDP. Section F.3.d.(4) provides several practices to encourage retrofit projects to be implemented by private property owners. The San Diego Water Board encourage the Copermittees to implement these practices and identify other practices that may be effective in incentivizing retrofit projects for private property owners. In the unlikely event that a retrofit project triggers the redevelopment PDP criteria, then that project would most likely be self mitigating.

Comment # 354 **Commentor** 4 **Comment Subject** Retrofit

Specific Comment

[From Attachment 10 to the RCFC&WCD comment letter]

Fact Sheet Text Page 162:
"Periodic inspections may be performed to ensure the site owner has not removed the retrofit BMPs."

Problem with Text:
Similar to the prior comment, this creates a disincentive to retrofit BMPs.

Suggestion:
Delete.

Comment Response

The San Diego Water Board disagrees that this creates a disincentive to retrofit BMPs. The Tentative Order only requires retrofit BMPs implemented by private property owners to be inspected as needed. An inspection does not have to be intrusive. The inspection could be as simple as driving by and verifying that the retrofit BMP is still there.

The water quality benefit of a retrofit BMP is only realized though continued proper operation of that BMP. Knowing where there are retrofit BMPs and that those BMPs are being maintained properly is important information for the Copermittees to reduce storm water pollutants to the MEP. Knowing if the retrofit BMP has been removed is also important information for the Copermittees. No changes were made based on this comment.

Comment # 355 **Commentor** 4 **Comment Subject** IDDE

Specific Comment

[From Attachment 10 to the RCFC&WCD comment letter]

Fact Sheet Text Page 163:
"Section F.4.b …access points (i.e. manholes), connections…"

Problem with Text:
The text from the Phase I rule implementing the NPDES regulations and the requirement of the storm drain system map is:

(from Federal Register, Vol 55, No 222, Friday Nov 18, 1990):

"[submit] a USGS 7.5 minute topographic map...[showing] The location of known municipal storm sewer system outfalls discharging to waters of the United States...the location of major structural controls for storm water discharge (retention basins etc) and the identification of publicly owned parks, recreation areas and other open lands."

The proposed requirements exceed the federal regulatory requirements for MS4 mapping. Further, the mapping of manholes is a significant economic burden that would have no benefit for our staff. Manholes are typically placed at regular intervals (300 – 500 feet) on underground storm drain systems. Once a map providing the location of the MS4 system is available, manholes are quickly located through visual inspection in the field. Further, storm drain plans that are available to Permittee staff can be used to locate specific manholes where absolutely necessary. The economic costs of mapping potentially thousands of manholes is not offset by any known benefit.

Suggestion:
Delete requirement to map manholes.

Comment Response

Please see response to comment 313.

Comment # 356	**Commentor** 4	**Comment Subject** Monitoring

Specific Comment

[From Attachment 10 to the RCFC&WCD comment letter]

Fact Sheet Text Page 198:
"Section II.D (High Priority Inland Aquatic Habitat) of the MRP describes required monitoring to be done in order to assess if MS4 storm water and/or non-storm water discharges are affecting high priority aquatic and/or riparian species."

Problem with Text:
This requirement was deleted from the Orange County NPDES MS4 Permit when the provision to assess outfalls using NALs and SALs was added. It is not clear why such an accommodation would not also be provided to the Riverside County NPDES MS4 Program. This region has significantly less economic resources than south Orange County or San Diego County to implement monitoring programs. The Permittees specifically request this be deleted as impacts to aquatic habitat will be detected through the NAL/SAL program.

Suggestion:
This requirement should be deleted.

Comment Response

Please see the response to comment 150.

July 26, 2010

San Diego Water Quality Board
Re: Tentative Order No. R9-2010-0016

Dear Board:

I have been involved in trying to find a solution to the erosion problems in the unincorporated hills of Temecula for almost three years.

I live in Rancho Glenoaks, a community of about 8 miles of dirt roads within approximately 640 acres. These roads were dedicated to the County of Riverside in 1982 by the developer. The unprofessional continuous grading of these roads by our HOA road committee has caused silt and sediment to flow through blue line tributaries to San Gertrudis Creek, down to DePortola and into the Santa Margarita watershed.

I was alerted to this problem when my own blue line creek bed habitat was destroyed by sand and silt. The road adjoining my property eroded into the creek and debris and vegetation clogged the undersized, poorly installed culvert created under the road by the original developer.

In my quest for a solution to the damage that was being done to my oaks, native habitat and environment, I contacted the County of Riverside. I believe I spoke to more than one person in every department of the County. I was told to contact Fish & Game, Flood Control, RCD, etc., etc. – always reaching a dead-end. (I even contacted the EPA and every environmental agency I could find!) I was told not to contact water quality as the County would be fined for allowing this erosion to continue. Every agency continually told me there was nothing they could do – even as I contacted them again and again. I still can not understand what any of these state and federal agencies are about. They seem to be just words and ordinances that mean nothing.

Finally, last year, Code Enforcement contacted the board of directors of our homeowner's association and tried to educate them on the importance of BMPs; however, oaks are still dying and sediment from grading of the roads is still being pushed into our many watersheds as the road committee continues to grade as they always do - not even recognizing the pollution they are causing to our stream channels. Our tributaries flow to a 100-year flood zone that is continuing to be destroyed. This watercourse/flood zone is on private property. Inhabitants of this community drive through this watercourse, crossing a creek bed, having no concern for the destruction they are continuing to cause.

I contacted an agency called Pacific Watershed Associates, who are hydrologists that specialize in assessing, redesigning and repairing road-related erosion problems, and offer environmental services, with funding being administered by state and federal grants. PWA states: "These programs can cover the costs of both the assessment and implementation"; however, I have been unable to convince the BOD of our HOA that we

need professional help. They have told me that I cannot represent this HOA, and it is my understanding that I cannot apply for grants as an individual.

I have now found that the new requirements for Copermittees include a draft for "Unpaved Roads Construction and Maintenance" that spells out "sediment control measures during construction and maintenance activities on unpaved roads, including developing and implementing appropriate training and technical assistance resources".

This has given me new hope that these hills have a chance of being returned to the once beautiful land that I loved so many years ago. Is it possible that this new order can require help from the County to solve the erosion problems in Rancho Glenoaks, as well as others in the same situation as I? I truly hope it can happen. The County and environmental agencies need to take responsibility.

Tressa Coco
39740 Via Carmelo
Temecula, CA 92592

951-302-0421

NATURAL RESOURCES DEFENSE COUNCIL

August 13, 2010

Via electronic mail

Executive Officer David Gibson and Members of the Board
California Regional Water Quality Control Board, San Diego Region
9174 Sky Park Court, Suite 100
San Diego, CA 92123

Re: Comments on Tentative Order R9-2010-0016.

Dear Mr. Gibson and Members of the Board:

We write on behalf of the Natural Resources Defense Council ("NRDC"). We have reviewed the July 23, 2010 draft of Tentative Order No. R9-2010-0016, NPDES No. CAS0108740 ("Permit"), the latest draft of the Municipal Separate Storm Sewer System NPDES Permit for Riverside County, and appreciate the opportunity to submit the following comments. Overall, we support the draft Permit's inclusion of Low Impact Development ("LID") based onsite retention requirements for new development and significant redevelopment. However, we are concerned that as written, the Permit fails to fully implement provisions present in other MS4 permits throughout California, thereby failing to meet the Clean Water Act's "maximum extent practicable" standard (*see* 33 U.S.C. 1342(p)(3)(b)(iii)), and is in critical aspects vague or otherwise requires clarification to ensure that its terms are enforceable.

In particular, we focus our comments here on the Permit's Development Planning Component, which is crucial to addressing the root causes of stormwater pollution. As the U.S. EPA has noted:

> Most stormwater runoff is the result of the man-made hydrologic modifications that normally accompany development. The addition of impervious surfaces, soil compaction, and tree and vegetation removal result in alterations to the movement of water through the environment. As interception, evapotranspiration, and infiltration are reduced and precipitation is converted to overland flow, these modifications affect not only the characteristics of the developed site but also the watershed in which the development is located. Stormwater has been identified as one of the leading sources of pollution for all waterbody types in the United

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> States. Furthermore, the impacts of stormwater pollution are not static; they usually increase with more development and urbanization.[1]

In order to address this source of pollution, the U.S. EPA has stated that "permit[s] must include clear, measurable, enforceable provisions for implementation of LID. . . ."[2]

1. The Permit Should Ensure that Only Water Retained Onsite Counts Toward the Design Capture Volume

Section F.1.d mandates that "[e]ach Copermittee must require LID BMPs or make a finding of technical infeasibility for each Priority Development Project in accordance with the LID waiver program in section F.1.d.(7)." LID BMPs then "must be sized and designed to ensure onsite retention without runoff, of the volume of runoff produced from a 24-hour 85th percentile storm event (design capture volume)." Permit at ¶ F.1.d.(4)(c)(i). However, the Permit also allows that "[i]f onsite infiltration LID BMPs are technically infeasible per section F.1.d.(7)(b), other LID BMPs may treat any volume that is not retained onsite provided that the other LID BMPs are sized to hold the design storm volume that is not infiltrated." Permit at ¶ F.1.d.(4)(c)(ii). This language is problematic for several reasons, outlined below.

First, this section erroneously states that where infiltration BMPs alone are technically infeasible, other LID BMPs may be employed to treat the volume of runoff *not retained* onsite. This language improperly excludes any requirement that a site first use all LID practices that *retain* water onsite—including those other than infiltration such as evapotranspiration or capture and onsite reuse—to meet the design capture requirement where feasible, even where infiltration may not be. A Priority Development Project should not be permitted to participate in the Permit's offsite mitigation program or to employ other means of addressing the design capture volume where LID based options for the onsite retention of stormwater are available. The Permit's language in section F.1.d.(4)(c) must therefore reflect that a finding of infeasibility may only be made where use of any and all LID practices that retain water onsite, including evapotranspiration and capture, is infeasible.

Second, this section would allow for measures that do not retain water onsite, described by the Permit as "other LID BMPs," to count toward the design capture requirement. Practices that allow for the discharge of any volume of stormwater to receiving waters would have to be 100% effective at removing pollutants—a condition almost certain not to be attained—in order to provide the equivalent water quality benefit derived from retaining the same volume of stormwater onsite. The Permit should be revised such that it clearly states that only water

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[1] U.S. Environmental Protection Agency (December 2007) *Reducing Stormwater Costs through Low Impact Development (LID) Strategies and Practices*, at v.

[2] Letter from Douglas E. Eberhardt, EPA, to Michael Adackapara, Santa Ana Regional Water Quality Control Board (February 13, 2009), at 2-3.

retained onsite may count towards the design capture requirement and that a site using BMPs that allow for offsite discharge must participate in the LID Waiver Program to address the volume not retained onsite.[3]

Of particular concern in this regard is that the Permit does not define the term "LID BMPs." As a result, the Permit would allow virtually any practice, potentially including conventional stormwater management techniques, which have been demonstrated to be far less effective at removing pollutants than LID-based retention practices,[4] to count toward meeting the Permit's design capture requirement. While we argue here that practices that do not retain stormwater onsite, such as biofiltration, should not count towards the onsite retention standard at all, should the Board determine to allow the use of such practices, it should clearly define the term "LID BMPs," or more appropriately, delete the phrase and explicitly state which practices may be used. The Board should additionally ensure that conventional or structural treatment practices that are not LID based may not count toward the Permit's LID requirements.

Further troubling is that, in allowing "LID BMPs" to count toward the design capture requirement, the Permit includes no performance requirements or metrics, and requires only that "other LID BMPs [shall be] sized to hold the design storm volume that is not infiltrated," or that "LID BMPs must be designed for an appropriate surface loading rate to prevent erosion, scour and channeling within the BMP." Permit at ¶ F.1.d.(4)(c)(ii). The Permit should be revised to require that, in addition to the above standard, any practices that allow for the discharge of stormwater in-lieu of onsite retention must, at a minimum, reduce the pollutant load in such discharge to equivalent levels as would be achieved through use of onsite retention. The Board should further ensure that discharges resulting from other BMPs not contribute to erosion or other volume based impacts to receiving waters, as opposed to impacts only within the BMP.[5] Given that practices that do not incorporate onsite retention have been shown to be less effective at reducing pollution in stormwater runoff, we suggest that biofiltration or other practices allowing for discharge of runoff may be allowed, if at all, only if accompanied by a "multiplier"

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[3] We do not oppose the use of, for example, biofiltration as a means of addressing stormwater runoff when onsite retention of the design storm is demonstrated to be technically infeasible, however, when biofiltration is used it should trigger a requirement to provide alternative or in-lieu compliance under Section F.1.d.(7) and should not be a means of satisfying these requirements.

[4] R. Horner, *Investigation of the Feasibility and Benefits of Low-Impact Site Design Practices ("LID") for Ventura County* (February 2007); R. Horner, *Investigation of Low-Impact Site Design Practices for the San Diego Region* (2008).

[5] This approach was recently adopted by the Los Angeles Regional Board in Order No. R4-2010-0108, the Ventura County MS4 Permit, which requires that use of biofiltration practices that discharge a portion of the design capture volume must achieve equivalent environmental benefits as would onsite retention practices. Los Angeles Regional Water Quality Control Board, Order No. R4-2010-0108, at E.III.1.(b).

or "mitigation factor," requiring treatment of between 1.5 to 2.0 times the volume required to be treated through onsite retention.[6]

2. The Low Impact Development Waiver Program Should Require Use of Practices that Retain Water Onsite

The Permit requires that the "LID waiver program must clearly exhibit that it will not allow Priority Development Projects to result in a net impact (after consideration of any mitigation) from pollutant loadings over and above the impact caused by projects meeting LID requirements." Permit at ¶ F.1.d.(7)(a). While we support the use of a performance requirement for waiver projects in general, we note that as currently drafted, the Permit allows for its "LID Requirements" to be met through use of unspecified "LID BMPs" with no express performance requirement or standard. We suggest, in order to ensure that any alternative or in-lieu program adequately protects surface waters in Riverside County, that the Permit language be changed to state that Priority Development Projects shall not result in a net impact "from pollutant loadings over and above the impact caused by projects meeting the onsite LID retention requirements." This requirement would tie use of alternative or in-lieu programs specifically to achieving equivalent benefits to onsite retention, and remove any confusion over what standard of performance is required under this provision of the Permit.

Further, the Permit's inclusion of a provision allowing for a LID waiver program to authorize implementation of either "an off-site mitigation project," or "other mitigation developed by the Copermittees" should be clarified to require that any such project or mitigation measure must incorporate practices that result in the onsite retention of stormwater runoff equivalent to the volume not retained onsite by the Priority Development Project.

Such a move could help to ensure compliance with the Clean Water Act, would protect Riverside County's aquatic resources, and would further serve important policy goals of the State. Given our current state of drought, Governor Schwarzenegger has issued a proclamation calling on water agencies to take additional actions to protect and enhance water supplies.[7] By requiring offsite mitigation through practices that retain stormwater runoff, captured or infiltrated water could be used to increase water supplies through onsite use or recharging groundwater, in furtherance of this goal. In contrast, the draft Permit would currently allow most or all of that water to be discharged through use of biofiltration or "other LID BMPs," without any volume retained to increase water supplies.

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[6] *Id*. See Also, State of West Virginia (June 22, 2009) Department of Environmental Protection, Division of Water and Waste Management, General National Pollution Discharge Elimination System Water Pollution Control Permit, NPDES Permit No. WV0116025 at 15.

[7] Gov. Arnold Schwarzenegger, Proclamation, State of Emergency: Water Shortage, Feb. 27, 2009, available at http://gov.ca.gov/proclamation/11557.

Conclusion

We appreciate the efforts made to date to implement sound LID standards in the Permit, and would be pleased to respond to any questions you may have about our comments. We believe the above suggested changes will significantly improve the effectiveness of the permit, and we urge that the Board implement these modifications before it is adopted.

Sincerely,

Noah Garrison
Natural Resources Defense Council

CITY OF MURRIETA

September 2, 2010

Mr. David King, Chairman
California Regional Water Quality Control Board
San Diego Region
9174 Sky Park Court, Suite 100
San Diego, CA 92123-4353

RE: COMMENTS TO PROPOSED TENTATIVE ORDER NO. R9-2010-0016, REISSUANCE OF RIVERSIDE COUNTY MS4 NPDES PERMIT

Dear Honorable Board Members:

The City of Murrieta is pleased to have this opportunity to comment on the draft of the Riverside County Municipal Separate Storm Sewer System (MS4) Permit, Tentative Order R9-2010-0016. City staff has reviewed the MS4 permit and has serious concerns about the financial implications on our region. Based on our research, the new requirements will significantly increase the City's program cost, and it is doubtful the City will be able to comply with the MS4 permit as drafted.

The City is committed to effectively utilizing public funds for the various services our citizens require, including the protection of our natural resources such as our water quality. The proposed MS4 permit, however, would require the City to expend significant additional resources, while the current and forecasted economic conditions have constrained our ability to meet the basic needs of our citizens. The City has been forced to make significant budget reductions due to reductions in sales tax and property tax revenue. The proposed MS4 permit will drastically increase our program cost, likely by twice the current budget.

On several occasions, Regional Water Quality Control Board (RWQCB) staff has stated their desire is to have similar requirements in all three MS4 permits issued by the Board, yet scaled or focused as appropriate to each region. Yet the proposed MS4 permit seems to contradict that goal. Recently, RWQCB issued Order R9-2009-001 to the south Orange County MS4 permittees. R9-2009-001, by our analysis, is less stringent. This despite the fact that Orange County has double the population of Riverside County with much higher property tax revenues to be able to budget for the necessary programs to comply with the permit. These metrics (population and tax revenues) often determine the strength of such programs. Unfortunately, these metrics do not appear to be considered in the proposed MS4 permit for Riverside County.

RWQCB staff has expressed their opinion that the cities are able to create new fees or tax assessments to pay for the requirements they have placed in the proposed MS4 permit. We strongly disagree with this assertion. Fees can only be collected from new development if there is a nexus to offset impacts created by development. There is simply no mechanism to impose a new fee or assessment on existing development to fund the stormwater program. Furthermore, due to Proposition 218, any tax or fee increase must be approved by the voters. California history has not

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been sympathetic to those cities that have attempted to increase clean water fees. For example, the City of Encinitas, a relatively prosperous coastal city, attempted to pass a clean water fee in 2006, and it was defeated by 61 percent of the voters at a time when the economy was doing well. It does not bode well to think that voters in Riverside County would approve a fee increase during one of the worst economies in the history of our nation.

Due to the historic decrease in property tax and sales tax revenues, the primary funding mechanism for the City to implement programs, it is unlikely we would be able to comply with the proposed MS4 permit. In order to do so, the City would have to make budget cuts to other programs. Considering we have already considerably cut our budget two years in a row, implemented layoffs and furloughs, and put other cost savings measures into practice, a further decrease to critical city services to fund the additional requirements is impractical. Of greatest concern to the City is that the proposed MS4 permit does not take the current economic climate into consideration, and yet has more costly and stringent requirements than other permits throughout the region that are more suitable to fund such programs. In our opinion, this seems inequitable and unfair.

The City of Murrieta joins the vast majority of Californians in supporting a balanced, cost-effective strategy to guarantee clean water. However, we remain concerned that the MS4 permit will impose additional costs on the City that we cannot afford at this time. Additionally, it seems the new regulations are inequitable compared to other regions. Therefore, the City is opposed to the proposed permit in its current form. Increasing the cost to the public on a region that is one of the hardest hit during this economic crisis seems excessive. Instead, the City would be more supportive of efforts that would phase in requirements once revenue levels can support the additional costs. Moreover, we request that the Board direct their staff to prioritize what permit requirements are necessary to address the most critical issues that will give the most efficient use of available funds. This will allow the City to allocate the funds they have for these programs while not increasing current expenditures.

Thank you again for the opportunity to comment on the MS4 proposal. The City of Murrieta looks forward to working towards a solution with the Regional Water Quality Control Board on this issue. If I can be of any assistance, please do not hesitate to contact me at (951) 461-6015.

Respectfully,

Kelly A. Bennett

Kelly A. Bennett, Esq.
Mayor

Cc: City Council
Dave Gibson, Dave Barker, Chiara Clemente, Ben Neil, Chad Loften, and Wayne Chiu: San Diego Regional Board Staff
Rick Dudley, City Manager
Jim Holston, Assistant City Manager
Patrick Thomas, Director of Public Works
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City of Temecula

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September 7th, 2010

Mr. David King
Chairman
San Diego Regional Water Quality Control Board
9174 Sky Park Court, Suite 100
San Diego, California 92123-4353

Chairman King,

The City of Temecula (City) is one of five permittees within Riverside County that would be regulated under the Santa Margarita River (SMR) Municipal Separate Storm Sewer System (MS4) Order (Tentative Order R9-2010-0016). The City has reviewed Tentative Order No. R9-2010-0016, including its findings, attachments, and accompanying Fact Sheet, and submits the following comments for your consideration. There are several extensive new and expanded requirements proposed throughout the Order. These requirements are based on a model permit adopted in Orange County and are in excess of what is necessary to protect receiving waters within the Permit Area. As currently written, these requirements extend far beyond our financial ability to effectively implement them. The City expresses its concern that this Order will pit the limited funds currently available for critical services against unnecessarily stringent requirements mandated throughout this Order.

While the City shares the Regional Board's goal of protecting the quality of water in our local creeks, it is not fiscally responsible to adopt a new Model Permit that does not accurately reflect the needs of the local watershed. The Regional Board must allow the City to prioritize and balance finite public resources in order to provide numerous vital public services. The City's responsibilities also include providing for public safety (police and fire services), installing and maintaining infrastructure (roads, drainage facilities, etc.), public facilities (parks, libraries, community centers, etc.), providing recreational programs, conserving land (MSHCP), promoting habitat conservation, etc. All of these needs are equally important, but public funding mechanisms do not allow any one of them to be funded without consideration to competing needs, priorities, and expected outcomes. New requirements must carefully weigh the benefits achieved against their real costs to implement. From a public agency perspective, all expenditures must be justified and supported by the general public.

Although the Order has been slightly modified from the previous version issued to the South Orange

County permittees, it continues to retain numerous provisions that do not apply to this region and are unnecessarily costly and administratively burdensome to the City and, ultimately, to our citizens. To this end, the City agrees with, and supports, the comments provided by the Riverside County Flood Control and Water Conservation District on behalf of the SMR permitees, and also submits the following information to explain why the requirements in the Order will be difficult to fund and cause unavoidable non-compliance.

Economic conditions have forced significant workforce reductions since 2007. Three rounds of staff reductions have occurred due to the City's severe budget cuts. To date, 75 project-employees and 48 full-time employees were cut from the City budget. In addition, two contract fire-prevention positions had to be cut as well. The City's workforce has been reduced, thus far, by 25%. Consequently, no new positions are being proposed and the City unfunded thirteen previously authorized positions, adding to the 26 existing unfunded positions from last year. In total 39 positions are no longer funded. Furthermore, positions that become vacant from hereon will no longer be refilled.

Historic and ongoing revenue reductions are causing significant cuts in the number and level of service to all other City programs. The City has experienced tremendous losses as a result of the nationwide recession. Preliminary year-end revenues for fiscal year 09-10 are projected to be $50.5M; compared to a $67.7M annual revenue just three years ago. That equates to general fund revenues decreasing nearly 26%. Despite falling revenues, the costs to maintain remaining city services, particularly public safety, continue to rise. Annual expenditures to maintain current levels of service are expected to rise to $59M by the end of the Permit term. If revenues do not increase, or even flat-line as currently projected, the City will not be able to maintain the current level of service for other programs including public safety. Despite this well recognized trend, Tentative Order R9-2010-0016 proposes significant increases in level of service for this program.

One of the harder hit areas is development driven revenue streams. The Planning Department user fee revenue fell by 42%, while that of the Building and Safety Department fell by as much as 49%. The City's Land Development division revenue dropped significantly from $1.8M in fiscal year 06-07 down to $484K in fiscal year 09-10, a 73% decrease due to the drastic reduction in development activity within the City. In like manner, Development Impact Fees (DIF) tumbled from $6.5M to $1.1M, an 83% drop, in that same period. These examples show the true impacts to the City that are crippling our ability to continue providing even the most minimum level of services required by law and expected of the public.

The City's Capital Improvement Program (CIP) budget has been decimated. The majority of the projects in the City's CIP are funded with either one-time outside funding sources, DIF or Capital Project Reserves (General funds). The City's ability to supplement or provide matching dollars for this program has been severely impacted. In fiscal year 06-07 the General Fund contributed $11.2M toward the CIP, that figure is down to $2.4M in fiscal year 09-10, a 79% decrease. At this point, only projects with outside funding sources or the most significant traffic circulation projects are moving forward, while many other projects are being postponed indefinitely.

Many of the most significant and inappropriate cost ramifications of the Order are as a result of new requirements that exceed the current "model" Orange County NPDES MS4 Permit. Specifically, there were significant changes to the Monitoring and Reporting Program (MRP) as well as the addition of a series of new special studies requiring special expertise. The City estimates that

the annual cost to support the changes to the regional component of the Order will increase our current cost by 3 times. In addition, there will also be additional annual costs associated with implementing the required changes to the City's NON-regional components. These components have been projected to increase the City's existing annual costs by no less than 1.5 times.

There are no new revenue sources available to fund these program expansions. Revenue reductions are occurring in almost all revenue categories. Although the City's largest single revenue source, Sales Tax, is projected to increase slightly in the coming year, Sales Tax revenues are still over $8.0M below the FY06-07 value of $30.1M. Some of the more significant decreases from last fiscal year alone include: $283K in Property Tax revenue, $232K in Motor Vehicle in Lieu revenue, $499K reduction in Investment Interest revenue, $182K in Development fees, $212K in Franchise Fees, $332K in reimbursement revenues, and $280K in other existing miscellaneous revenue sources. Other potential sources of funding, including taxes, fee increases, surcharges, establishment of utilities, etc., have all been evaluated and determined not to be feasible or realistically available to the City. Further, with the high unemployment and foreclosure rates within Riverside County, the voters are not willing to support new taxes or bonds in the current economic climate.

This information leads to the inevitable conclusion that implementation costs of the new Order will exceed our currently available resources and cause additional impacts to other City departments, which will then begin affecting the number and level of services the City currently provides. **It is important to note that the federal regulations regulating MS4 discharges have not changed since 1987. There is no policy basis for the significant changes proposed by this Tentative Order. The majority of the changes proposed to this Tentative Order are to accommodate Regional Board staff wishes to move to a model MS4 Permit that treats Riverside, Orange and San Diego County's equally. These changes were not specifically designed to address the local needs of this watershed**. Further, the Permit does not reflect the relative resources available to each Permit area. The area regulated by this Tentative Order has only half the taxpaying population of the Orange County NPDES MS4 Permit and 1/10th the taxpaying population of the San Diego County NPDES MS4 Permit. These relative economic discrepancies create not only a social injustice, but impacts that will be exacerbated by the State's reduced funding of other state mandated City services.

There are numerous legal concerns that need to be considered. As such, the following provides ten categorical points for consideration. However, these ten points do not represent all of the legal inconsistencies that exist in the Order. To this end, the City agrees with, and supports, the legal comments provided by the Riverside County Flood Control and Water Conservation District on behalf of the SMR permitees.

The City has serious concerns regarding the legality of the provisions contained in this Tentative Order. The prescriptive nature of this Order will ensure that any resident or business challenging these conditions would not only sue the municipality charged with implementing these requirements, but would also bring suit against the Regional Board itself to obtain the requested relief. The City does not believe this was the intent of the Regional Board.

1. THE TENTATIVE ORDER ATTEMPTS TO REDEFINE WHAT CONSTITUTES A WATER OF THE UNITED STATES

Section 3.C of the Findings section on page 11 of the Tentative Order states:

> "Historic and current development makes use of natural drainage patterns and features as conveyances for urban runoff. Urban streams used in this manner are part of the municipalities MS4 regardless of whether they are natural, man-made, or partially modified features. In these cases, the urban stream is both an MS4 and a receiving water."

The City does not believe that such a finding is warranted or lawful under either the clear statutory provisions of the Clean Water Act or recent judicial interpretations of the Act. The language in the Tentative Order could be construed as seeking to regulate all discharges into MS4s, changing the very nature of MS4s so as to constitute a receiving water.

This is contrary to the plain language of section 402(p)(3)(B) of the Clean Water Act, which requires: "Permits for discharges from municipal storm sewers . . ." 33 U.S.C. § 1342(p)(3)(B) (emphasis added.). Based on this assertion, the Regional Board does not have the authority to regulate water entering into MS4s as receiving waters of the United States.

Furthermore, even if the statutory language indicated that Permits were required for discharges into MS4s, recent holdings from the United States Supreme Court conclusively show such structures would not constitute a water of the United States. According to the plurality decision in *Rapanos v. United States* (2006) 126 S. Ct. 2208, 2225:

> "In sum, on its only plausible interpretation, the phrase 'the waters of the United States' includes only those relatively permanent, standing or continuously flowing bodies of water 'forming geographic features' that are described in ordinary parlance as 'streams[,] ... oceans, rivers, [and] lakes.' *See* Webster's Second 2882. ***The phrase does not include channels through which water flows intermittently or ephemerally, or channels that periodically provide drainage for rainfall.*** The Corps' expansive interpretation of the 'the waters of the United States' is thus not 'based on a permissible construction of the statute."

(Emphasis added.). The MS4 systems and urban streams that the Regional Board is seeking to regulate as receiving waters are intermittent, ephemeral, and used only periodically as drainage for rainfall. As such, these systems and streams would not constitute a water of the United States. Because the Clean Water Act extends solely to waters of the United States, the Regional Board has no authority to regulate MS4s or urban streams as defined in its Permit.

Even under Justice Kennedy's more lenient interpretation of what constitutes a water of the United States, the Regional Board has still not adequately met the requirements for establishing that an MS4 or urban stream is subject to regulation as a Water of the United States. According to Justice Kennedy, the Regional Board must establish that the MS4 system and urban streams bear a significant nexus to the other regulated waters so as to qualify for regulation as a water of the United States. *Rapanos,* 126 S. Ct. at 2249. Such a determination must be made on a case-by-case basis, and must contain some measure of the significance of the connection for downstream water quality. *Id.* at 2250-2251. In other words, the Regional Board must conduct an analysis of the "quantity and regularity of flow" in the relevant MS4s and urban streams prior to holding that these structures merit regulation under the Clean Water Act. *Id.* at 2251. Absent conclusive findings, the Regional Board is without authority to regulate MS4s and urban streams as receiving waters under the Clean Water Act.

The City requests that the Board members direct staff to modify the language in the Tentative Order to ensure regulations of only those systems and streams discharging directly into waters of the United States as defined according to the Supreme Court's holding in *Rapanos* in order to avoid random interpretations of the CWA.

2. THE TENTATIVE ORDER UNLAWFULLY PURPORTS TO RESTRICT THE LOCATION OF TREATMENT OPTIONS

Section F.1.d.(6)(d) on page 35 of the Tentative Order states:

> "All treatment control BMPs for Priority Development Projects must, at a minimum, be implemented close to pollutant sources (where shared BMPs are not proposed), and prior to discharging into waters of the U.S."

The implementation of this provision presents a number of potentially serious problems.

First, this provision of the Tentative Order violates Water Code section 13360. According to Water Code section 13360(a):

> "No waste discharge requirement or other order of a regional board or the state board or decree of a court issued under this division shall specify the design, ***location***, type of construction, or particular manner in which compliance may be had with that requirement, order, or decree, and the person so ordered shall be permitted to comply with the order in any lawful manner."

(Emphasis added.) As noted above, the Regional Board is already attempting to define MS4s and urban streams as waters of the United States. *Supra*, p. 11. The proposed regulation would therefore effectively limit the ability for Permittees to implement any BMPs in any area except at the exact location of the source generating pollutants and would exclude Permittees from choosing to implement what may be less-costly, more effective BMPs in other areas. But Water Code section 13360(a) expressly prohibits this type of regulation.

Second, the comparison to wetlands regulation misconstrues USEPA guidance on this issue. The USEPA guidance document referenced by the Regional Board does not preclude Permittees from locating structural controls within a natural wetland. Rather, the guidelines simply state:

> "***To the extent possible***, municipalities should avoid locating structural controls in natural wetlands. Before considering siting of controls in a natural wetland, the municipality should demonstrate that it is not possible or practicable to construct them in sites that do not contain natural wetlands...."

(Fact Sheet, p. 96, fn. 154, *citing* USEPA, 1992. Guidance Manual for the Preparation of Part II of the NPDES Permit Applications for Discharges from Municipal Separate Storm Sewer Systems. EPA 833-B-92-002. (Emphasis added.)) While the Permittees may agree that they should generally avoid in stream treatment to the extent possible, outright prohibition of an option would be counterproductive.

The City requests that the Board members direct staff to modify the language in the Tentative Order to allow permittees to make the determination of the exact placement location of BMPs.

3. THE TENTATIVE ORDER IMPROPERLY INTRUDES UPON THE CITY'S LAND USE AUTHORITY IN VIOLATION OF THE TENTH AMENDMENT OF THE U.S. CONSTITUTION

To the extent that this Tentative Order relies on federal authority under the Clean Water Act to impose land use regulations and dictate specific methods of compliance, it violates the Tenth Amendment of the U.S. Constitution. Furthermore, to the extent the Tentative Order **requires** a Municipal Permittee to modify its city ordinances in a specific manner; it also violates the Tenth Amendment.

According to the Tenth Amendment:

> "The powers not delegated to the United States by the Constitution, nor prohibited by it to the States, are reserved to the States respectively, or to the people."

Article XI, section 7 of the California Constitution, California guarantees municipalities the right to "make and enforce within [their] limits all local police, sanitary and other ordinances and regulations not in conflict with general laws." The United States Supreme Court has held that the ability to enact land use regulations is delegated to municipalities as part of their inherent police powers to protect the public health, safety, and welfare of its residents. *See **Berman v. Parker*** (1954) 348 U.S. 26, 32-33. Because it is a constitutionally conferred power, land use powers cannot be overridden by State or federal statutes.

From the City's perspective, under the guise of federal law, the Regional Board is attempting to dictate the precise manner in which cities must exercise their police powers. The City does not believe that such a requirement is consistent with the Tenth Amendment.

The City requests that the Board members direct staff to modify the language in the Tentative Order to ensure consistency with the Tenth Amendment, rather than applying random interpretations of it, with regard to issuing requirements which dictate the precise method of compliance.

4. THE TENTATIVE ORDER CONSTITUTES AN UNFUNDED STATE MANDATE

The Regional Board seeks to impose new provisions that require a higher level of service of existing programs that are not required or mandated under the Clean Water Act or any federal regulations thereunder. Yet, according to the Fiscal Analysis provided in Section H.1. of the Tentative Order:

> "Each Copermittee must exercise its full authority to secure the resources necessary to meet all requirements of this Order."

(Tentative Order, p. 74.) To the extent the Tentative Order imposes additional programs on the Permittees without providing additional funds, they are unfunded mandates.

The Commission on State Mandates recently held that both the Los Angeles County MS4 Permit and the San Diego County MS4 Permit contained provisions that constituted unfunded state mandates. *In re Test Claim on Los Angeles Regional Quality Control Board Order No. 01-182* (July 31, 2009); *In re Test Claim on San Diego Regional Water Quality Control Board Order No. R9-2007-0001* (March 26, 2010). As such, the Regional Board cannot merely dismiss the suggestion that the Tentative Order does contain provisions that constitute unfunded state mandates.

The imposition of unfunded programs and mandates in the Tentative Order is inconsistent with the provisions of the California Constitution, specifically Article XIII B, Section 6, which requires a state agency mandating a new program or a higher level of service to provide a "subvention" of funds to reimburse local governments for the costs of the program or increased level of service.

Article XIII B, Section 6 of the Constitution prevents the state from shifting the cost of government from itself to local agencies without providing a "subvention of funds to reimburse that local government for the costs of the program or increased level of service . . ." State agencies are not free to shift state costs to local agencies without providing funding merely because those costs were imposed upon the state by the federal government. If the state freely chooses to impose additional costs upon a local agency as a means of implementing its policy, then those costs should be reimbursed by the state agency. *See Hayes v. Commission on State Mandates* (1992) 11 Cal. App. 4th 1564, 1593-1594. If the state refuses to appropriate money to reimburse a city, the enforcement of the state mandate can potentially be enjoined by a court. *See Lucia Mar Unified School District v. Honig* (1988) 44 Cal. 3d 830, 833-834.

The Tentative Order will require a substantial capital investment, which individual cities will have to fund, despite the fact that no funding mechanism, nor any assistance, financial or otherwise, from the Regional Board is provided to the Permittees. To our knowledge, the Regional Board has made no provision to provide any level of financial relief to the permittees for any of the provisions proposed in the Tentative Order.

The Tentative Order explicitly provides that the Tentative Order does not constitute an unfunded state mandate for four reasons in paragraph 6 of page 14 of the Tentative Order. The City disagrees with all four stated reasons. . To the extent the Tentative Order imposes additional programs on the City and its co-permittees without providing additional funds, they are unfunded mandates.

A. The Tentative Order Imposes Requirements that Go Beyond Federal Law

To the extent the Tentative Order imposes requirements that go beyond what is required by federal law, the Regional Board is required to consider and address among other things the constitutional prohibition on unfunded state mandates. In fact, there are many specific obligations in the Tentative Order that are not federally mandated.

For example, Section E, on page 24 of the Tentative Order, requires that each permittee submit a certification statement, signed by its chief legal counsel, that the permittee has taken the steps necessary to obtain and maintain full legal authority to implement and enforce each of the requirements in 40 CFR 122.26(d)(2)(i)(A-F) and the Tentative Order. The Clean Water Act does not require the certification statement mandated by the Regional Board. 40 CFR 122.26(d)(2)(i) only requires "[a] demonstration that the applicant can operate pursuant to legal authority established by statute, ordinance or series of contracts...." Arguably, the City can demonstrate its legal authority by submitting copies of ordinances, resolution or contracts certified by the City Clerk. The Clean Water Act does not require permittees to submit a certification statement.

Furthermore, the Tentative Order goes beyond federal law in that it is at least twice as long, and in some cases, three times as long as other MS4 Permits developed by other Regional Boards in the State of California such as the Lahonten Regional Board and the Central Valley Regional Board. This means that either some Regional Boards are failing to impose federally mandated requirements pursuant to the Clean Water Act, or the San Diego Regional Board is imposing requirements that go

beyond federal law.

B. The Fact that Industrial Dischargers are More Strictly Regulated than Municipal Dischargers is Irrelevant to the Unfunded Mandate Issue

The Tentative Order asserts that the Order does not constitute an unfunded mandate because the Order regulates discharges of waste from municipal sources more leniently than they could regulate discharges from non-governmental dischargers. *See* paragraph 6 on page 14 of Tentative Order. The City fails to see how this statutory distinction between the regulation of municipal dischargers and industrial dischargers affects whether the Order imposes requirements on co-permittees that go beyond federal law. Municipalities are not industrial sites. Municipal discharges are not industrial discharges.

C. The City Does Not Have the Authority to Randomly Levy Fees at Will to Pay For Compliance With the Order

The Tentative Order also alleges that the Order does not constitute an unfunded mandate because co-permittees have the authority to levy service fees to pay for compliance with the Order. *See* paragraph 6 on page 14 of Tentative Order. Pursuant to Government Code Section 17556(d), if a local agency can levy service fees to pay for a State mandate, the State is not required to provide funding for the mandate.

The City does not have the authority to levy service fees to pay for the State mandate. The Tentative Order presumes, but makes no specific findings that co-permittees have the authority to levy such service fees. In fact, to the extent such service fees are "property-related," co-permittees can only levy them once approved by the affected property owners or electorate. *See* California Constitution, Article XIIID, Section 6(c); *Howard Jarvis Taxpayers Ass'n, v. City of Salinas*, 98 Cal. App. 4th 1351 (2002). The *City of Salinas* case dealt precisely with this issue. The City of Salinas established a fee to recover costs related to compliance with its MS4 Permit. The fee was based largely on the amount of impervious area on a developed parcel. The Court held that this fee was property-related and, thus, subject to voter-approval requirements. *Salinas*, 98 Cal. App. 4th at 1356. Only if the fee was a use-based charge, directly based on use of city services (such as the metered use of water), could the fee avoid the voter-approval requirements of Article XIIID. The City of Salinas's method to allocate the fee based on the amount of impervious area so as to assure that the fee charged would be proportional to the burden being placed on the City's storm drain system was not sufficiently direct to qualify as a use-based fee exempt from the requirements of Article XIIID. *Id.* at 1355.

Because storm water running off of real property and into the MS4 is not a precise measurement, it would be impossible to meet the direct usage requirements of the *City of Salinas*. Accordingly, without voter approval, which would be almost impossible to successfully obtain during the current economic crisis, the City of Temecula does not have the authority to levy service fees to pay for compliance with the Order.

D. The City Does Not Have a Real Choice in Requesting Permit Coverage

The fourth reason provided in the Tentative Order for why the Order does not constitute an unfunded mandate is that co-permittees requested permit coverage under the Order. Thus, according to the

Tentative Order, co-permittees have not been mandated to do anything.

The City adamantly disagrees. It is disingenuous for Regional Board staff to suggest that co-permittees have voluntarily chosen coverage under the Order and that the Order cannot be considered a State mandate.

The City requests that the Board members direct staff to modify the language in the Tentative Order to include State-sponsored relief for the permittees to carry out the requirements in the Order. To the extent that these requirements will require additional funds, the Board should direct staff to assist the permittees in securing such funds.

5. THE TENTATIVE ORDER IMPROPERLY ATTEMPTS TO HOLD THE CITY RESPONSIBLE FOR SEWAGE SPILLS WHEN THIS RESPONSIBILITY HAS BEEN CLEARLY ASSIGNED TO LOCAL WATER DISTRICTS

Section F.4.h. of the Tentative Order states:

> "Each Copermittee must implement management measures and procedures (including a notification mechanism) to prevent, respond to, contain and clean up all sewage (see below) and other spills that may discharge into its MS4 from any source (including private laterals and failing septic systems.) Copermittees must coordinate with spill response teams to prevent entry of spills into the MS4 and contamination of surface water, ground water and soil. Each Copermittee must coordinate spill prevention, containment and response activities throughout all appropriate departments, programs and agencies so that maximum water quality protection is available at all times."

(Tentative Order, p. 69).

For many cities, implementation of this provision is simply not feasible. The City of Temecula does not own or operate its own sewage system. All of the sewer systems in the City's jurisdiction are owned, operated, and maintained by water districts, specifically the Rancho California Water District and Eastern Municipal Water District. These water districts have their own separate Regional Board Orders/NPDES permits. The City does not have the equipment or expertise to manage a sewage spill of any size, and its staff is not adequately trained to respond to potential spills. All of the water districts in the City's jurisdiction already respond to sewer spills (including sewer spills from private laterals). Furthermore, this provision is duplicative because the Regional Board is seeking to make the City responsible for a task already delegated to the water districts. By making the City responsible for sewer spills, there is a high risk of creating confusion in determining who (water districts or the City) will respond to a spill and who is responsible for associated costs and reporting requirements. Such an act would result in a tremendous waste of scarce public resources.

The State Water Resources Control Board has previously issued a stay on this exact issue. After extensive hearings and briefing on the matter, the State Board issued Order WQO 2002-0014 on August 15, 2002, granting a stay as to this provision. In that Order, the State Board held:

> "The record shows that three separate water districts operate these sewers within Mission Viejo, and are regulated by a sanitary sewer NPDES permit issued by the Regional Board. Mission Viejo alleged that the duplication of effort that would

> ensue by having Mission Viejo also be responsible for preventing and responding to sanitary sewage spills could lead to delayed responses as agencies try to determine jurisdiction and primary responsibility. Orange County's cost table for the upcoming year estimated total copermittee costs at $56,512 to implement this requirement. While these costs, by themselves do not constitute substantial harm, we find that the duplicative nature of the costs, combined with potential response delay and confusion, do."

(State Board Order WQO 2002-0014, p. 6).

In deciding to grant a stay as to this provision, the State Board concluded:

> "**The regulation of sanitary sewer overflows by municipal storm water entities, while other public entities are already charged with that responsibility in separate NPDES permits, may result in significant confusion and unnecessary control activities.** For example, the Permit appears to assign primary spill prevention and response coordination authority to the co-permittees. While the federal regulations clearly assign some spill prevention and response duties to the co-permittees, we find that the extent of these duties is a substantial question of law and fact."

(State Board Order WQO 2002-0014, p. 8. (Emphasis added)).

Given the previous findings of the State Board on this same issue, the City requests that the Board members direct staff to modify the language in the Tentative Order to reduce duplicity of effort and the implementation of unnecessary control activities.

6. THE TENTATIVE ORDER IMPROPERLY DELETES CATEGORIES OF EXEMPT NON-STORMWATER DISCHARGES

Federal law requires that MS4 permits include a requirement that the Permittees effectively prohibit the discharge of non-stormwater into the MS4. 33 U.S.C. 1342(p)(3)(B)(ii). Federal regulations exempt certain discharge categories from this effective prohibition requirement. 40 C.F.R. 122.26(d)(2)(iv)(B)(1). A Permittee must address a discharge in one of these exempt categories only when a Permittee identifies the discharge as a source of pollutants to waters of the United States. *Id.*

The Tentative Order impermissibly deletes three of the non-stormwater discharge categories – landscape irrigation, irrigation water, and lawn watering (collectively, "irrigation"). (See subparagraphs a-n on page 19 of Tentative Order.) The federal regulations require that permittees address discharges within an exempt category when they identify a discharge as a source of pollutants to waters of the United States. Neither the regulations nor EPA's guidance allow the Regional Board to delete entire categories of exempt non-stormwater discharges when the Permittees identify a discharge within one of the categories as a source of pollutants.

Accordingly, since the permittees have not identified irrigation runoff as a source of pollutants, the City requests that the Board members direct staff to restore the irrigation categories of exempt non-stormwater discharges in the Tentative Order.

7. THE TENTATIVE ORDER'S RETROFITTING REQUIREMENT IMPOSES POTENTIALLY SIGNIFICANT COSTS WITHOUT ANY CORRESPONDING GAINS IN WATER QUALITY

The Tentative Order requires the Permittees to develop and implement a program to retrofit existing development with additional structural measures to control runoff. (See Section F.3.d (Retrofitting Existing Development) on page 64 of the Tentative Order). This new provision is in addition to the New Development/Redevelopment provisions in the Tentative Order. However, the City does not have the ability under existing statutes and under the California and the United States Constitutions to force private landowners to retrofit existing developments to improve water quality when these landowners didn't have any plans to retrofit their properties in the first place. As such, the expense entailed in developing and implementing a retrofitting program will not be matched by any gains in water quality. Federal law does not require retrofitting of existing development. In fact, EPA's regulations acknowledge that MS4 regulation would have to be limited largely to undeveloped sites and sites being developed/redeveloped. Accordingly, the City requests that the Board members direct staff to either remove this provision in its entirety from the Tentative Order, or modify the language to exclude private property.

8. THE TENTATIVE ORDER LACKS FLEXIBILITY IN IMPLEMENTING LOW IMPACT DEVELOPMENT AND HYDROMODIFICATION REQUIREMENTS

The Tentative Order requires that development projects include prescriptive Low Impact Development ("LID") requirements. (*See, e.g.*, Section F.1 of the Tentative Order). The Tentative Order also requires the Permittees to develop and implement a Hydromodification Management Plan ("HMP") for the same development projects. (Section F.1.h. of the Tentative Order) However, the LID and HMP provisions are not required by federal law and violate state law in that, among other things, they prescribe how the Permittees are to comply with the MEP standard. *See* Water Code § 13360(a). Moreover, the LID and HMP provisions in this Tentative Order are overbroad and will not necessarily result in any improvement to the quality of water entering Waters of the U.S.. For example, HMP requirements for hardened channels will not have any water quality benefits. Finally, to the extent the LID requirements would interfere with downstream or upstream water rights holders, compliance with the requirements potentially expose the Permittees to common law liability.

In addition, the Regional Board's imposition of a highly prescriptive Low Impact Development strategy may have an unintended consequence—potential lawsuits from downstream users of the surface water that the City is now purportedly "diverting for reuse or infiltration." As one attorney expert in the field of water law has put it:

> "First, to the extent that one can obtain a right to capture diffuse surface waters . . . any capture of diffuse surface waters without a permit from the State Water Resources Control Board could well be a trespass against the State of California. Second, even if one cannot obtain a 'right' to diffuse surface waters, though, the capture of such waters in a manner that interferes with the diversion of the same water once it reaches a watercourse constitutes injury to legal users of water that rely on such diffuse surface water contributing to the water that they are able to divert."

D. Aladjem, "Who Owns the Water? The Looming Conflict Between Low Impact Development and the Water Rights System" at p.5 (Paper presented at American Bar Association 17th Environmental Law Fall Section Meeting, Sept. 24, 2009).

The City believes that the law in this area, particularly with respect to ownership of diffuse surface waters, is quite uncertain. The City also believes that, to the extent that the Regional Board imposes these additional obligations upon the City pursuant to the Permit, then the Regional Board should insert sufficient findings and authorization for the capture of surface water through LID systems to protect the City against claims of either a trespass against the State or claims of unlawful diversion of stormwater that would otherwise flow into watercourses that might be the subject of claims of diversion rights by downstream users.

Because the LID and HMP provisions are not required by federal law and violate state law, the City requests that the Board members direct staff to insert sufficient findings and authorization for the capture of surface water through LID systems to protect the City against claims of either a trespass against the State or claims of unlawful diversion of stormwater. In addition, the City also requests that the Board members direct staff to modify the language in the Tentative Order to provide the Permittees with required flexibility in implementing the LID and HMP requirements.

9. THE TENTATIVE ORDER DOES NOT CONSIDER COSTS TO IMPLEMENT THE STORMWATER AND NON-STORMWATER ACTION LEVELS AS REQUIRED BY FEDERAL LAW, AND THE WATER QUALITY BENEFITS ACHIEVED BY THESE REQUIREMENTS HAVE NOT BEEN ADEQUATELY CONSIDERED BY THE REGIONAL BOARD

Federal law requires that permittees effectively prohibit the discharge of pollutants in non-stormwater into the MS4 and to reduce the discharge of pollutants in stormwater from the MS4 to the maximum extent practicable. To assist the Permittees in meeting these two standards, the Tentative Order imposes action levels on pollutants in the discharge of stormwater (SALs) and non-stormwater (NALs) from the MS4. (Sections C and D on pages 20 and 23, respectively, of the Tentative Order.). Ideally, action levels would be a tool that would help the City focus resources on more significant water quality problems. However, the City is concerned that, depending on how the provisions are interpreted, the cost to implement the action levels may far outweigh any benefit to water quality. Moreover, rather than a tool to help the Permittees, the action levels may be used against the Permittees.

As an initial matter, the City objects to the distinction made in the Tentative Order between the discharge of stormwater from the MS4 and the discharge of non-stormwater from the MS4. Federal law does not support this distinction. Under federal law, permittees must control the discharge of ***pollutants*** from the MS4 to the maximum extent practicable, regardless of whether the pollutants are in ***stormwater*** or ***non-stormwater***. Permittee's obligation with respect to non-stormwater is to effectively prohibit the discharge of pollutants in non-stormwater into the MS4. To the extent the Permit imposes separate requirements on the discharge of pollutants in non-stormwater from the MS4, such requirements must be supported by state law.

Because neither the SALs or NALs are required by federal law, the Regional Board must comply with state law in imposing these requirements. For example, in issuing waste discharge requirements under State law, the Regional Board must consider certain factors, including the water quality conditions that could be reasonably achieved and economic considerations. Water Code §§ 13263(a) and 13241. The City is hopeful that the Tentative Order's SAL and NAL provisions will provide the City with flexibility to prioritize its response to any actual exceedances. However, if the City is required to respond to and address all exceedances without reasonable prioritization, the cost will be significant. Because some exceedances will not be indicative of impacts to water quality, the cost to implement the SALs and NALs may have little if any commensurate environmental benefit. There is

nothing in the record that suggests that the Regional Board has considered these water quality and economic factors.

Accordingly, the City requests that the Board members direct staff to provide the analysis required under state law to ensure that economic factors are considered and that the water quality goals are reasonably achievable through implementation of the SALs and NALs.

10. THE TENTATIVE ORDER IMPROPERLY INCORPORATES TOTAL MAXIMUM DAILY LOAD WASTELOAD ALLOCATIONS

The Tentative Order includes limitations based on wasteload allocations ("WLAs") developed in fully approved and adopted Total Maximum Daily Loads ("TMDLs"). (Section I of the Tentative Order.) The Tentative Order characterizes the limitations as Water Quality Based Effluent Limitations. However, the WLAs are to be achieved in the receiving water. Accordingly, the City considers the limitations to be receiving water limitations. *See, e.g.*, State Board Order WQ 2009-0008. The Permittees are to comply with the limitations by implementing best management practices ("BMPs").

Federal and state policy provide that an iterative BMP approach is appropriate in MS4 permits for achieving receiving water limitations. *See, e.g.*, State Board Order WQ 99-05. Where existing BMPs are not sufficient to meet the receiving water limitations, permittees are to implement more effective BMPs. This approach is consistent with the MEP standard governing the discharge of all pollutants from the MS4. The City submits that to be consistent with federal and state policy, the Permit must be clarified to provide for compliance with WLAs through an iterative BMP approach. To the extent the Regional Board can rely on state law to support the TMDL provisions, the City submits that the Regional Board has not complied with relevant requirements (*e.g.*, Water Code §§ 13000, 13263(a), 13241, etc.). Accordingly, the City requests that the Board members direct staff to revise the Tentative Order's TMDL provisions to be consistent with federal and state law and policy.

As a public agency, we have the obligation to carry out our duties in a responsible, realistic, and reasoned manner. Requirements that tether public agencies to impractical positions are counterproductive and violate our sacred charge as representatives of the people. It must be emphasized that the City is very committed to water quality protection, but in a manner that balances this goal with the resources, needs, and expected results of the community. In submitting these comments, the City hopes it has provided a better perspective, from a local level, of the impacts that the current state of the economy has had on the City, the additional hardships that will be incurred to fund and implement the Order at this time, and the magnitude of legal liability it will expose both of our agencies to.

The City recommends that the Permit be remanded to staff with direction to address the unnecessary economic impacts imposed by the Permit. The monitoring program, unfunded roads mandates, retrofitting, and changes to the various existing inspection programs must, at minimum, be addressed. We request that the Board members direct staff to continue meeting with the permittees prior to adopting the permit and to work through these concerns, or at least defer the costly provisions until the permittees can adequately fund the requirements rather than fall into unavoidable non-compliance. The 2007 ROWD prepared by the Permittees addressed necessary changes to Water Quality Protection programs by building on existing programs and leveraging other available local resources. The programs in the 2007 ROWD should be carefully reconsidered in lieu of the model program elements proposed by Board staff. Thank you.

If you have any questions regarding this information, please contact Aldo Licitra, our Associate Engineer for NPDES, at 951-308-6387.

Sincerely,

Greg Butler
Director of Public Works/City Engineer

Cc: Shawn Nelson, City Manager
City Council

DEPARTMENT OF THE ARMY
6010 Hidden Valley Road Suite 105
Carlsbad, CA 92011

September 7, 2010

REPLY TO
ATTENTION OF:
Office of the Chief
Regulatory Division

ATTN: **NWU:749045:bneili**

David Gibson, Executive Officer
Regional Water Quality Control Board
9174 Sky Park Court, Suite 100,
San Diego, California 92123-4353

Dear Mr. Gibson:

Thank you for the opportunity to comment on the San Diego Region – Riverside County Storm Water Permit. As you are aware, the U.S. Army Corps of Engineers has been developing a Special Area Management Plan (SAMP) for the San Jacinto and Santa Margarita Watersheds. There is direct overlap between the Santa Margarita portion of the SAMP and the San Diego Region – Riverside County Storm Water Permit.

The language proposed in the permit and the actions and studies proposed would complement the work being done for the SAMP. Ideally, the regulatory processing and permitting for the State and Federal agencies would be aligned and streamlined for the cities and County within this area. We remain committed to working with the Regional Water Quality Control Board (Board) and the jurisdictions to bring this idea to fruition.

Within the permit itself, the Watershed Water Quality work plan and the Jurisdictional Runoff Management Program are of particular interest. Unfortunately due to time constraints, we are not able to do a thorough review and comparison of the language at this time, but would like to work with the Board and the affected jurisdictions to streamline permitting and improved the water quality in the watershed.

The studies mentioned in the permit appear to have great value, and we would encourage the jurisdictions to complete them and applaud the Board for including them in the permit. Although all the studies mentioned in the permit are worthwhile, we draw particular interest to and support the inclusion of the MS4 and Receiving Water Maintenance Study and the Intermittent and the Ephemeral Stream Perennial Conversion Study in the final permit.

There are many additional comments that could be made regarding the permit; however,

due to staffing and time limitations, these comments are abbreviated and limited. We would like to dedicate time in the near future to work with your staff and the jurisdictions in supporting actions to comply with the Clean Water Act and provide clean water to all of our communities.

Thank you for receiving our comments, should you have any questions, please contact me at 760.602.4830 or via e-mail at therese.orourke@usace.army.mil. Please refer to this letter and SPL-2010-00860-TOR in your reply.

Sincerely,

Therese O'Rourke Bradford
Chief, South Coast Branch
Regulatory Division

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105-3901

SEP 07 2010

Mr. Ben Neill
Northern Watersheds Protection Unit
San Diego Regional Water Quality Control Board
9174 Sky Park Court, Suite 100
San Diego, CA 92123

Re: Draft MS4 Permit for Riverside County

Dear Mr. Neill:

The following are EPA Region 9's comments on the draft NPDES permit for the municipal separate storm sewer system (MS4) serving the portion of Riverside County within the jurisdiction of the San Diego Regional Board (SDRB), which was public noticed on July 23, 2010. We would first like to point out there appears to be an error in the NPDES permit number for the draft permit (page i). Permit No. CAS0108740 proposed for the Riverside County MS4 permit, is also the number used for the SDRB's MS4 permit for South Orange County. We suggest the SDRB retain the permit number used for the previous permit for Riverside County, which is CAS0108766.

As you know, Region 9 has been working with Regional Boards throughout the State over the last several years in an effort to develop clear, measurable and enforceable requirements for MS4 permits. We have focused most of our attention on requirements related to low impact development (LID) and TMDL implementation, given the potential environmental benefits to be derived from these particular components of the stormwater permit program. Since there are no approved wasteload allocations applicable to the Riverside County MS4 discharges at this time, the following comments focus on LID requirements, but also address several other issues as well. However, with regards to TMDLs, section I of the draft permit would incorporate applicable requirements of future TMDLs when fully approved, and we support this provision.

A. LID Requirements

We recommend section F.1.d.(4)(c)(ii) of the draft permit (page 33) be revised as follows:

> "If onsite ~~infiltration~~ retention LID BMPs are technically infeasible per section F.1.d.(7)(b), other LID BMPs may treat any volume that is not retained onsite provided that the other LID BMPs are sized to achieve equivalent stormwater volume and pollutant load reduction as if the entire design capture volume were retained onsite ~~to hold the design storm volume that is not infiltrated~~."

The proposed language in the draft Riverside County MS4 permit (which only mentions infiltration as an LID BMP) is inconsistent with the analogous section in the adopted South Orange County MS4 permit, and would not require a consideration of LID measures such as evapotranspiration, or capture and reuse of stormwater in determining the feasibility of the permit's onsite retention requirement in section F.1.d.(7)(a). The revised approach we've suggested here is derived from the requirements of the Ventura County MS4 permit (section E.III.1.b) adopted by the Los Angeles Regional Board in July 2010, and we believe it is more consistent with the intent of LID for stormwater, i.e., retention of stormwater onsite, and section F.1.d.(7)(a) of the draft permit. Further, although the draft permit includes a rough definition of "LID" in Attachment C-2, the permit is still not entirely clear concerning what is intended by the term "LID BMPs." We suggest additional descriptive information such as the following (also derived from the Ventura County MS4 permit) be added to Finding 2.c (page 9) or the definitions section of the draft Riverside County permit:

> "LID site design BMPs, utilizing infiltration, storage for reuse, evapotranspiration, or biofiltration/bioretention help preserve and restore the natural hydrologic cycle of the site~~, allowing for filtration and infiltration~~ which can greatly reduce the volume, peak flow rate, velocity, and pollutant loads of storm water runoff."

B. Comments on Other Issues

1. Issues Related to Non-Stormwater Discharges

We understand that concerns have been raised regarding the proposed numeric action levels for non-stormwater dry weather discharges (section C of the draft Riverside County MS4 permit). However, we would point out that these requirements are consistent with requirements adopted by the SDRB in December 2009 for the MS4 permit for South Orange County. Such requirements are also consistent with our efforts to ensure MS4 permit requirements are more measurable and enforceable, and we would encourage the SDRB to retain the proposed requirements in the final Riverside County MS4 permit.

We also understand that concerns have been raised regarding the deletion of landscape irrigation, irrigation water, and lawn watering from the list of non-stormwater discharges which are not necessarily prohibited by the permit (section B.2). We previously supported this same revision in a letter to the SDRB dated June 18, 2009 commenting on the draft South Orange County MS4 permit; we support the revision in the Riverside County MS4 permit as well. In our previous letter, we noted that the fact sheet for the Orange County MS4 permit had identified these categories of discharges as significant sources of pollutants, and as such, it would be appropriate for the SDRB to remove these discharges from the list of non-prohibited non-stormwater discharges in the Orange County MS4 permit. The fact sheet for the draft Riverside County MS4 permit

includes similar information on the discharges, and we believe removal of the discharges from the list of non-prohibited discharges would be appropriate in both counties.

2. Stormwater Action Levels (SALs)

In a previous letter to the SDRB dated September 28, 2009, we supported the SALs proposed for the South Orange County MS4 permit; we noted the proposed requirements would help clarify the term "maximum extent practicable" (MEP), and would be consistent with our goal of including more measurable and enforceable requirements in MS4 permits. The proposed SAL requirements in the Riverside County MS4 permit are consistent with requirements for South Orange County, and for the same reasons noted in the case of South Orange County, we would also support the proposed requirements for the Riverside County MS4 permit.

3. Retrofitting Requirements for Existing Development

As you know, EPA is considering requirements for retrofitting BMPs into existing developments as one of the key components of national stormwater rulemaking currently underway to improve the stormwater program (74 FR 68621, December 28, 2009). We note that the proposed retrofitting requirements for Riverside County are very similar to the requirements of the MS4 permit adopted by the SDRB in December 2009 for South Orange County. Given the potential environmental benefits of retrofitting in reducing pollutant discharges in stormwater runoff, we strongly encourage the SDRB to retain the proposed requirements in the final Riverside County MS4 permit.

4. Hydromodification Requirements

We have reviewed the proposed requirements related to hydromodification in the draft Riverside County MS4 permit (section F.1.h), and we would encourage the SDRB to retain these requirements in the final permit. The proposed requirements in the Riverside County permit are similar to requirements in other recently-adopted Southern California MS4 permits, and the requirements will further the objectives of the LID provisions in the permit.

5. Requirements for Unpaved Roads

We understand that concerns have been raised regarding the new requirements in the draft Riverside County MS4 permit to implement additional controls for stormwater discharges from unpaved roads (sections F.1.i, F.3.a.10 and F.3.c.5 of the permit). We believe the new requirements are fully supported by the fact sheet and the Findings for the permit (Finding D.1.c), which identify the discharges as a significant source of pollutants. As such, we urge the SDRD to retain the proposed requirements in the final permit. Lastly, we would note the proposed requirements are similar to requirements in

the Municipal Regional Permit for MS4s in the San Francisco Bay Area adopted in 2009 by the San Francisco Bay Regional Board.

6. Monitoring Requirements

We understand that concerns have been raised about the monitoring requirements of the draft Riverside County MS4 permit (Attachment E to the permit). However, the proposed requirements are consistent with the requirements of other recent MS4 permits adopted by the SDRB such as the 2009 South Orange County MS4 permit. We strongly encourage the SDRB to retain the requirements in the final permit. Measuring the effectiveness of the stormwater program continues to be a challenge and thus, is an important priority for EPA; we believe the proposed monitoring details and requirements will improve permittee and Regional Board's ability to measure program effectiveness.

We appreciate the opportunity to provide comments on the draft permit. If you would like to discuss this matter further, please contact Eugene Bromley of the NPDES Permits Office at (415) 972-3510.

Sincerely,

David Smith, Manager
NPDES Permits Office (WTR-5)

Bridgette Moore, Mayor
Marsha Swanson, Mayor Pro Tem
Sheryl Ade, Council Member
Bob Cashman, Council Member
Scott Farnam, Council Member

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September 7th, 2010

Mr. David King
Chairman
San Diego Regional Water Quality Control Board
9174 Sky Park Court, Suite 100
San Diego, California 92123-4353

Re: Tentative Order R9-2010-0016, NPDES No. CAS0108740, Riverside County Municipal Separate Storm Sewer System Permit Reissuance *NWU:749045:bneill*

Chairman King:

The City of Wildomar is providing these comments on the above listed Tentative Order, and appreciates the Board's consideration of the issues described herein. Tentative Order R9-2010-0016 (draft Permit) has been drafted by Board staff to serve as the reissuance of Order R9-2004-0001 (existing Permit) which was originally issued to the County of Riverside, the Riverside County Flood Control and Water Conservation District (District), and the cities of Temecula and Murrieta. Additionally the draft Permit adds the recently incorporated City of Wildomar.

The City would like to thank the Board and the Executive Officer for committing their staff's time for a number of meetings with the City and fellow Copermittees in the development of the draft Permit. This collaborative approach to permit development is crucial to developing effective programs, and the City strongly believes that only through such effective communication and collaboration will our mutual goals of protecting water quality be realized. As a result of the meetings, the Permittees and Regional Board staff worked collaboratively to develop language for consideration in the Tentative Order.

We are most appreciative of the Board staff's consideration of allowing Wildomar to be regulated by one region with respect to the MS4 permit requirements. Although the City will still be mandated to participate in the Lake Elsinore/Canyon Lake TMDL as part of Region 8, the option of having the entire City regulated by one region will greatly help with the implementation of the permit requirements.

While the collaborative discussions have been fruitful and have resulted in a draft permit that is substantively improved over the initial draft, we unfortunately cannot support the tentative order as currently drafted due to (1) the projected cost exceeding our available resources and (2) shortcomings in the permit language itself.

The City therefore requests that the Board direct staff to work with the Copermittees to resolve the issues identified in this and the Riverside County Flood Control letter, including attachments, prior to considering adoption of the Permit.

This letter provides additional background, information and perspective specific to the City of Wildomar for the Board's consideration.

Background

City of Wildomar

Wildomar is one of the newest cities in the state having officially become a city on July 1, 2008. It is home to approximately 25,000 residents and encompasses about 24 square miles between the cities of Murrieta and Lake Elsinore in south western Riverside County. Wildomar is a community of old and new, mature homes and property with horses and other animals mixed with modern housing tracts. The name Wildomar was coined from the names of its three original founders – the "WIL" from William Collier, the "DO" from Donald Graham and the "MAR" from Margaret Collier Graham.

Economic Conditions

The adopted 2010-11 city **budget reflects the harsh reality of the City having <u>only 64% of the revenue</u> shown in the Comprehensive Fiscal Analysis (CFA) that was used for incorporation**. An examination of the major sources of revenue in the City reveals a grim picture:

Revenue Source	Estimate in Comprehensive Fiscal Analysis (CFA)	Revised Estimate for 2010-11 Budget	Difference
Taxes *(sales, property, franchise, etc.)*	$7.9 million	$5.1 million	**35% ↓**
Permits, Licenses, Fees	$2.5 million	$0.9 million	**25% ↓**
Total General Fund	$14.1 million	$9 million	**36% ↓**

The City is somewhat fortunate in that it can adjust to the demands of services and available funding because of its contract service arrangements for police and fire services provided to the community. However, the **City currently has only three authorized positions**: City Manager, Assistant City Manager/Finance Director and City Clerk. All other services are provided by contract services. The equivalent staff for city hall operations is approximately 13 staff members.

While it is difficult to estimate the exact cost of the permit, based on available budget estimates and assumptions made on the level of effort needed to implement and administer the permit as currently

drafted, the City's cost will be in the range of $250,000 – $350,000 in the first two years and $150,000-$250,000 in years three through five. **This cost was simply not contemplated in the Comprehensive Fiscal Analysis (CFA) that was used for incorporation**. While the collaborative process has resulted in successes that should not be overlooked, the shortcomings have resulted in a permit that cannot meet its core purpose of protecting water quality, by virtue of not being economically feasible for the City to implement.

Shortcomings:

Despite the noteworthy and important improvements in the permit, the publically released draft remains **far beyond the economic reach of the City**. Further in as much as the requirements are unattainable, and the public's resources are spread too thin, the Permit cannot, and **will not be effective at protecting water quality**. There are several fundamental issues that have caused or contributed to the shortcomings of the collaborative process:

- The baseline OC permit was designed for a region with significantly more resources than Riverside County
- New programs were added which go well beyond the OC permit requirements
- Several major programmatic changes were introduced at the end of the process
- The continuing recession

Priority Issues and Solutions

The Copermittees have identified specific and focused changes to the Permit that will allow the Copermittees to address staff's primary water quality concerns, while reducing compliance costs in a manner that is appropriate for the local watersheds. The City of Wildomar supports these changes. As previously noted, Board staff has directed the Copermittees to bring these changes directly to the Board for consideration, although we are hopeful that by summarizing them in writing that they may be addressed ahead of the scheduled October 13 hearing.

Monitoring and Reporting Program

Prior to the submittal of the ROWD, the Copermittees met with Board staff to propose changes to the Monitoring and Reporting Program (MRP). In these discussions, Board staff identified two areas for needed improvement:

- Relocation of Illicit Connection / Illicit Discharge (IC/ID) monitoring stations to MS4 outfalls, and
- Incorporation of Action Levels

In more recent discussions, Board staff noted that the MRP needed significant modification to reflect the South Orange County MRP, but would be scaled to be appropriate to the smaller Santa Margarita Region.

Unfortunately, the final MRP requirements have been expanded well beyond the South Orange County MRP requirements, resulting in a program that is completely out of proportion with the needs and resources of the Santa Margarita Region. In fact, the proposed MRP requirements will result in a **500% increase in monitoring program costs**, costing our residents **over two and a half times the per capita costs for South Orange County**.

Per Capita Monitoring Cost Comparison

Draft Permit	OC Permit
$5.13 per capita	~$2.00 per capita

The Copermittees recognize that monitoring and data collection is necessary. However, the MRP requirements exceed what is necessary to address management questions related to water quality, are beyond requirements dictated in the South Orange County MRP, and are beyond the Copermittees' ability to fund. Not only are the level of requirements inappropriate for the Santa Margarita Region, but they disregard the economic realities faced by the Copermittees. As such, the MRP falls far short of meeting the Executive Officer's stated goals of affordability.

In the interest of finding ways to offer Board staff a comparable program in a more cost effective and appropriate manner, the Copermittees have identified nine adjustments to the MRP that will **save approximately seven hundred and eighty thousand dollars ($780,000)** ***annually*** and bring per capita monitoring costs more in line with the South Orange County MRP, while maintaining the core components of the MRP. Table 1 summarizes the key changes and the respective cost savings. It is important to note that any change highlighted in RED reflects bringing the program in line with the South Orange County MRP. Figure 1 below shows graphically the comparative costs for the draft MRP with and without the requested adjustments. Please note that the 100% baseline in Figure 2 reflects the current cost of the Copermittees' current MRP.

Table 1 - Cost Savings resulting from proposed MRP changes[1]

Component	Requested Change	Cost reduction
Mass Loading Stations	1) Wet Weather - 3 wet -> 2 wet	**~$79,000**
	2) Dry Weather - Composite -> Grab	**~$66,000**
Toxicity Testing (MLS and Bioassessment)	3) 3 organisms -> 2 organisms	**~$14,000**
Bioassessment	4) 6 stations -> 3 stations	**~$158,000**
	5) 2X each -> 1X each	**~$95,000**
Action Levels	6) 'Representative Number/Percent' -> Representative - and remove 'within each sub area'	**~$241,000**
	7) SAL Composites -> Grab	**~$165,000**
Inland Aquatic Habitat Monitoring	8) Eliminate requirement	**~$140,000**
Special Studies	9) 6 special studies -> 4 studies, and Replace with more locally appropriate	**~$220,000/year**

	studies	
TOTAL ESTIMATED SAVINGS	Net savings of all recommended changes (annualized)	***~780,000/year***

Note: Red text refers to requirements currently in the South Orange County MRP.

Figure 1

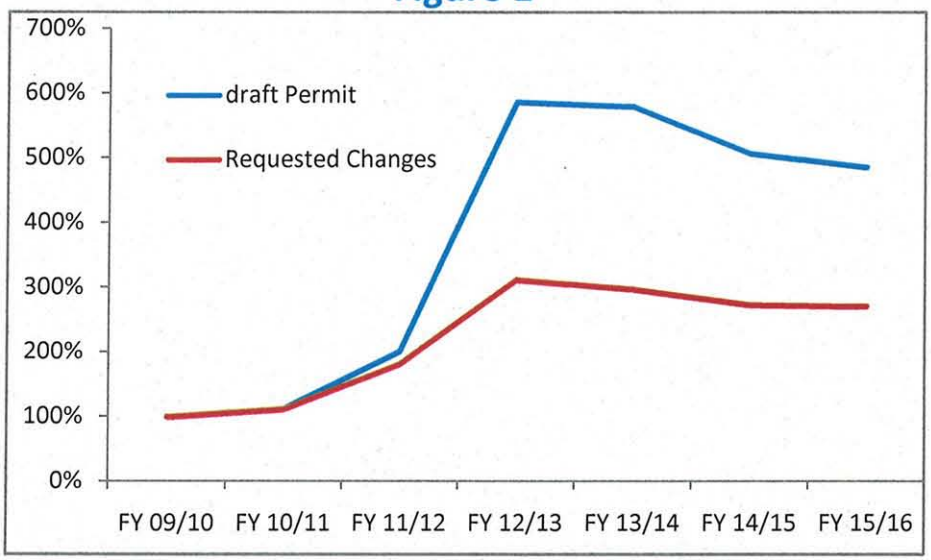

Draft Permit	OC Permit	Proposed Changes
~~$5.13/ per capita~~	~$2.00/per capita	**$2.54/per capita**

Although the requested adjustments to the MRP will not eliminate cost increases, and will result in an MRP which is more expensive, on a per capita basis, than the South Orange County MRP, they provide a more manageable program for the Copermittees.

The City requests that the Board make the adjustments identified above before Permit adoption.

Unpaved Roads Requirements (Sections F.1.i, F.3.a.(11), F.3.c.(5))

The requirements for unpaved roads are particularly cumbersome, onerous and unreasonable. In summary, the proposed unpaved road requirements may result in substantial and unnecessary additional Copermittee costs that are not justified by the facts in the Santa Margarita Region. The Copermittees believe that the existing MS4 Permit requirements for new development, construction, maintenance and IC/ID adequately address regulation of unpaved roads that threaten water quality. If the Regional Board believes that unpaved roads require further regulation, the Copermittees believe that the appropriate regulatory mechanism is a general permit (Waste Discharge Requirements or NPDES permit) that would

apply to *all* unpaved roads in the San Diego Region, rather than only those that are under the jurisdiction of the Copermittees.

The City requests that Sections F.1.i, F.3.a.(11) and F.3.c.(5) regulating unpaved roads be deleted from the draft MS4 Permit.

However, should the Water Board insist on retaining unpaved road requirements in this Permit, the Copermittees request the following revisions. These revisions are needed to ensure that all parties have a clear understanding of the requirements. In summary, the Copermittees request:

- Clarification that these requirements apply to those unpaved roads that the Copermittees maintain in their road system.
    - This should be commonly understood, but the clarification is important to include due to complex legal limitations and rights associated with access, ownership, and maintenance of unpaved roads.
- Removal of language that specifies specific BMPs that must be implemented.
    - Specifying the method of compliance is prohibited pursuant to CWC section 13360, and inappropriately forces the Copermittees to adopt particular solutions that may not best fit the situation.
- Removal of requirement for BMPs for private unpaved roads.
    - The proposed requirements would require the creation of an additional and unnecessary program element addressing privately owned unpaved roads. The Copermittees believe that a focused public outreach program should be implemented to educate property owners and associations about the need to properly maintain unpaved roads. This education program combined with existing IC/ID enforcement capabilities seems a more reasoned and responsible response to addressing this issue.

Should Sections F.1.i, F.3.a.(11) and F.3.c.(5) regulating unpaved roads not be removed from the Permit, the City requests they be modified as noted above.

Post-Construction BMP Inspections

Section F.1.f of the draft MS4 Permit includes new requirements for the Copermittees to verify that Post-Construction BMPs are being appropriately maintained. The new requirements appropriately develop a risk-based approach to inspections, defining eight factors that the Copermittees must consider in determining 'high-priority' projects.

However, language in Section F.1.f.(2)(a) removes that discretion by stating:

> *'At a minimum, high priority projects include those projects that generate pollutants (prior to treatment) within the tributary area of a 303(d) listed waterbody impaired for that pollutant; or those projects generating pollutants within the tributary area*

for an observed action level exceedance of that pollutant.'

This language is excessively broad, and will require virtually all sites in the watershed to be designated as 'high priority' and therefore subject to annual inspections. This language is inconsistent with the goals of a socially responsible and affordable permit and should be modified for several reasons:

- Inspections frequencies should be based on risk of discharge. Annual inspections are not needed for all sites that *generate* a specific pollutant. For example, if a site generates a pollutant associated with 303(d) listing, but the site retains runoff onsite or stores those pollutants indoors, annual inspections would be unnecessary. However, sites that store 303(d) listed pollutants outdoors or otherwise have a high risk of discharge should be inspected more frequently.

- The language dilutes Copermittee resources by requiring annual inspections of low-risk sites, preventing the Copermittees from appropriately concentrating resources on problematic sites/sources. This is because when an action level is exceeded then all parties in the watershed are assumed guilty until proven innocent.

While the Copermittees are not opposed to implementing a program to verify that these BMPs are being maintained, it is critically important that they be provided the flexibility to determine which sites warrant annual inspections. **Specifically, the City requests that the language in F.1.f.(2)(a) be amended as follows prior to adoption of the Permit:**

> *At a **minimum**, high priority projects include those projects that ~~generate pollutants (prior to treatment) within the tributary area of a 303(d) listed waterbody impaired for that pollutant; or those projects generating pollutants within the tributary area for~~ have been determined to be the source of an observed action level exceedance. ~~of that pollutant.~~*

Commercial and Industrial Inspections

Section F.3.b. of the draft Permit includes requirements to inventory and inspect Commercial and Industrial businesses. The draft Permit expands upon existing inventory and inspection requirements in two problematic ways:

- It requires *significantly* more businesses to be inspected, and

- It includes new requirements specifying what the Copermittees are required to inspect when they are onsite.

More inspections

Sections F.3.b.(1)(a)(i) and (ii) identify forty-two (42) categories of businesses that must be inventoried and inspected based on risk of pollutant discharge. However, Section F.3.b.(1)(a)(iii) adds virtually any business in the Permit area, independent of pollutant discharge risk:

> *'**All** other commercial or industrial sites/sources **within or directly adjacent to or discharging directly to receiving waters within environmentally sensitive areas** (as defined in Attachment C of this Order) or **that generate** pollutants tributary to an observed exceedance of an action level.' (Bold emphasis added)*

In effect, section F.3.b.(1)(a)(iii) adds the following additional businesses:

- EVERY business that is adjacent to (or within) an Environmentally Sensitive Area (ESA), regardless of whether the business generates or discharges *any* pollutants, and
- EVERY business that '*generates*' pollutants which happens to be upstream of an action level exceedance, *regardless* of whether the site has ever *discharged any* pollutants.

This language expands the list of sites far beyond the current requirements, and well beyond those sites that actually pose a threat to water quality. This is clearly unnecessary and should be removed for several reasons:

- It inappropriately separates 'risk' from the 'response', by requiring the Copermittees to inspect businesses irrespective of the risk that the business poses to water quality. For example, this language would require the Copermittees to expend resources and time inspecting hair salons, office buildings and other activities that happen to be adjacent to an ESA. This inappropriate broad-brush approach to permitting actually works to discredit the Copermittees NPDES programs and dilute resources, rather than enhancing protection of water quality.
- It will further remove the flexibility that the Copermittees need to be able to re-allocate resources to inspecting and following up with sites/sources that are problematic.

Therefore, the City requests that the language in F.3.b.(1)(a)(iii) be amended as follows prior to adoption of the Permit:

> *All other commercial or industrial sites/sources ~~within or directly adjacent to or discharging directly to receiving waters within environmentally sensitive areas (as defined in Attachment C of this Order) or that generate pollutants tributary to~~ that have been determined to be the source of an observed exceedance of an action level.*

Additional items to review during inspections

Section F.3.b.(4)(a) specifies what the Copermittees must review when performing an inspection. The new requirements in sub sections (i) and (ii) to review BMP implementation plans, and review facility monitoring data, respectively, are an unnecessary new mandate. They should be removed for several reasons:

- The requirements burden the Copermittees with reviewing information that is required under General Permits and is the responsibility of the Regional Board to enforce.
- The requirements would significantly increase the inspection time for sites with General Permits and endanger an existing collaborative inspection program (Complaince/Assistance Program (CAP)) that leverages the time highly trained Environmental Health Inspectors spend onsite for Certified Unified Program Agencies (CUPA) and Food Services inspections to also conduct NPDES inspections. The CAP program not only utilizes highly trained Environmental Health inspectors, but also regionalizes the inspections and therefore provides multiple benefits including uniformity, reduction in total number of inspections and higher-quality inspections. The

Environmental Health HazMat inspection program administrators have indicated that they cannot accommodate the additional time required to implement the new requirements, as they would unduly cut into their ability to meet their own state-mandated inspection frequencies.

- By virtue of eliminating the CAP program, the requirements would effectively mandate a more fractured and disconnected set of inspections for the businesses, contrary to CAL EPA mandates for consolidated inspections, and in turn diluting the effectiveness of the program.

The City requests that the language in F.3.b.(1)(a)(iii) be amended as follows prior to adoption of the Permit:

(a) Inspection Procedures: Inspections must include but not be limited to:

(i) ~~*Review of BMP implementation plans, if the site uses or is required to use such a plan*~~*;*

(ii) ~~*Review of facility monitoring data, if the site monitors its runoff*~~*;*

(iii) Check for coverage under the General Industrial Permit (Notice of Intent (NOI) and/or Waste Discharge Identification Number), if applicable;

(iv) Assessment of compliance with Copermittee ordinances and Copermittee issued permits related to runoff;

(v) Assessment of the implementation, maintenance and effectiveness of the designated minimum and/or enhanced BMPs;

Retrofit

Section F.3.d. proposes a program to develop an inventory of existing developments that may be candidates for future water quality retrofits. The requirement goes on to encourage the Copermittees to collaborate with local property owners to promote urban retrofit in an effort to accelerate reductions in pollutant loading from existing urban areas.

Although laudable, this requirement has two significant problems:

1) The program is self-defeating as it contains no "carrots" to lure private property owners into participating in the program. Any property owner that is interested in volunteering in this effort would be required to fully comply with all provisions of the draft MS4 Permit. This includes preparation of compliance documents such as SSMPs, LID and hydromodification studies, subjecting themselves to additional regulatory scrutiny through business and BMP inspection programs required by the MS4 Permit, and otherwise incurring a myriad of costs and requirements. These costs and requirements would provide a strong disincentive to participate in a retrofit program. This program will only work if it is modified to remove these disincentives.

2) Current and projected economic conditions will limit the interest and participation of private property owners. Long-term economic predictions for Riverside County indicate that assessed valuations and property values will likely remain stagnant for the term of this Permit. Similarly, sales tax and unemployment are not expected to significantly improve either.

Without Co-Permittee resources to supplement private retrofit projects, the current economic dis-incentives for private redevelopment that are built into the program and the current impact of the economy on private property owners, there is no real value to the program.

PREFERRED POLICY CHOICE: The City strongly requests that this program be deleted for the aforementioned reasons.

Alternatively, and at minimum, the Copermittees request that the schedule for completion of the retrofitting program be revised to provide for development during the term of the Permit and submittal of the proposed program with the next ROWD. This will allow the Copermittees to defer expenditures related to development of the program until later in the Permit term when it is hoped that economic conditions and local revenues will improve. The Copermittees expect few opportunities for retrofit until the economy improves. Due to the Copermittee's limited ability to require retrofit on private property, our best opportunities for retrofit may be associated with approvals of proposed modifications of existing developments.

ALTERNATE POLICY CHOICE: If the Retrofit requirements are not removed, the City requests that the Regional Board modify Section F.3.d. as follows:

> *Each Copermittee must develop and implement a retrofitting program that meets the requirements of this section upon submittal of the ROWD.*

Irrigation Runoff

The Draft MS4 Permit categorically prohibits the discharge of landscape irrigation; irrigation water; lawn watering; (collectively 'irrigation runoff') and non-emergency fire fighting flow runoff to the MS4. The basis for this requirement comes from the current Orange County storm water permit within the San Diego Region (NPDES No. CAS0108740), which prohibits such discharges.

Although irrigation runoff may have been shown to be a problem in South Orange County, it has **not** been shown to be causing problems in receiving waters in the Santa Margarita Region. Attachment 6 summarizes the unique conditions and other facts that warrant the restoration of irrigation runoff as a non-prohibited non-storm water discharge category. It is important to reiterate the three key points made in Attachment 6

- Unlike the watersheds in South Orange County, the Santa Margarita Region is an ephemeral watershed;
- Unlike South Orange County, the Copermittees have **not** identified landscape irrigation, irrigation water or lawn water as an actual source of pollutants or conveyance of pollutants to waters of the U.S.;
- The draft MS4 Permit requires Copermittees to eliminate irrigation runoff ***TO THE MS4,*** which by definition, requires elimination of discharges to streets, curbs and gutters.

As noted above, the prohibition appears to hold the Copermittees responsible for any amount of irrigation runoff discharged to the curb and gutter, *regardless* of whether or not the discharge ever reaches receiving waters or causes or contributes to the exceedance of a water quality standard. This fact, combined with the fact that irrigation runoff has not been shown to be causing impairments in the local receiving waters, will make enforcement difficult to justify with residents and will likely result in community outrage over bans on irrigation. Further the Copermittees are not water purveyors, and as such, have little control over residential irrigation runoff outside of sending code enforcement officers out to look for incidents of

excessive irrigation runoff. This is a very inefficient use of resources. In any event, the provisions as written will do little for water quality but potentially much for community outrage against water quality programs. The Copermittees do not believe this is the intent of the Board.

It is further worth noting that the Permit already contains an investigation and remediation process via Non-Storm water Action Levels (NALs) by which the Copermittees will identify the source of problematic non-storm water discharges. . Should the source be found to be a conditionally exempt non-storm water discharge, the permit requires the Copermittees to address that discharge or the entire category of discharges as appropriate. By allowing the NAL process to determine when and where conditionally exempt discharges need to be prohibited, the Copermittees are better positioned to justify any enforcement actions.

PREFERRED POLICY CHOICE: The City requests that the Regional Board restore the conditional exemption for landscape irrigation, irrigation water and lawn watering.

Alternatively, if the Regional Board nevertheless insists on prohibiting Irrigation Runoff, the Copermittees request that the draft MS4 Permit be revised to allow for irrigation runoff to be managed as a JRMP program, rather than as a prohibited discharge to the MS4. This alternative request is consistent with how the Permit currently deals with non-emergency fire fighting discharges, which was also removed from the list of non-prohibited non-storm water discharges. The Executive Officer stated that he would be open to consideration of a program for irrigation runoff that would address discharges from the MS4. This alternative approach allows the Copermittees to develop a program that focuses on irrigation runoff problem areas, as opposed to holding the Copermittees responsible for eliminating any instant case of over-irrigation to a street independent of threat to receiving water quality.

ALTERNATIVE POLICY CHOICE: The City requests that the Regional Board clarify that irrigation runoff is only prohibited where it is discharged *from* an MS4 (into receiving waters) by adding the following language:

B.4. *As part of the JRMP, the Copermittees must develop and implement a program to address pollutants from landscape irrigation, irrigation water and lawn watering identified as significant sources of pollutants to waters of the United States.*

Legal Issues

The Copermittees have identified legal issues that raise fundamental questions regarding several of the key elements of the Tentative Order.

The City requests review of the legal issues raised in the RCFC comment letter and revision of the Tentative Order prior to adoption.

Conclusion

The City of Wildomar is very appreciative of the process and consideration given thus far to our concerns related to the draft permit. With very few exceptions, your staff has done an excellent job in communicating and explaining the proposed requirements. As a result of the discussions with your staff, we believe that sections of the permit have been refined in a manner that will benefit both the board and the city.

We understand that the federal regulations require that municipalities obtain a permit and renew it every 5 years. We understand that each city must develop a storm water management program designed to control the discharge of pollutants into and from the MS4 (or from being dumped directly into the MS4). We also understand that the purpose of the permit is to protect local waterbodies since storm drains typically dump their water into streams, bays, and/or the ocean without being treated.

However, at this time, we need the Board's help in meeting these requirements. **Specifically, we need time: time to fully flesh out new permit language (some that has never appeared in an MS4 permit before!) and time to allow the city (and the economy!) to recover from the devastating impacts of the recession – we simply can't afford the permit as currently drafted.**

Thank you in advance for your consideration of the issues raised in this comment letter. We look forward to the opportunity to continue working with you, your Executive Director and your staff on the refinement and implementation of this important permit.

Sincerely,

Frank Oviedo
City Manager

THE CITY OF SAN DIEGO

September 7, 2010

Electronic Submission to: bneill@waterboards.ca.gov

Mr. David Gibson, Executive Director
San Diego Regional Water Quality Control Board
9174 Sky Park Court, Suite 100
San Diego, CA 92123

Ben Neill, WRC Engineer
San Diego Regional Water Quality Control Board
9174 Sky Park Court, Suite 100
San Diego, CA 92123

Dear Sirs:

Subject: City of San Diego Comments on the Tentative Municipal Storm Water Permit for Riverside County (NWU:749045:bneill)

The City of San Diego wishes to provide the Regional Water Quality Control Board with comments regarding the tentative Riverside County Municipal Storm Water Permit. We understand the need to continue moving forward with water quality improvements and want to work with you on permit revisions to maximize our water quality efforts in a cost effective and efficient manner.

If you have any questions or require more information, please don't hesitate to contact me at (858) 541-4328.

Sincerely,

Ruth Kolb
Program Manager

Enclosure: City of San Diego Comments on Draft Riverside County Municipal Permit (Tentative Order No. R9-2010-0016)

cc: Tony Heinrichs
Kris McFadden
Drew Kleis
Chron File

CITY OF SAN DIEGO COMMENTS ON DRAFT RIVERSIDE COUNTY MUNICIPAL PERMIT (TENTATIVE ORDER NO. R9-2010-0016)				
Permit Section	**Permit Page**	**Section Title/Topic**	**Reason for Proposed Changes/Comments**	**Comments/Proposed Changes**
FINDINGS				
D.3.	10	Construction & Existing Development	Make findings consistent with JRMP.	Provide separate sections for Construction vs. Existing Development.
D.3.c.	11	Construction & Existing Development	Definition of "urban stream" contradicts 40CFR 122.	Provide clearer definition as to what an "urban stream" is.
DISCHARGE AND LEGAL PROVISIONS				
B.2.	18	Non-Storm Water Discharges	Discharge category found to be a source of pollutants requires implementation of appropriate control measures to **prevent** the discharge of pollutants to the MS4.	Should state: Implement appropriate control measures to **reduce** the discharge of pollutants to the **MEP**.
B.2.foot note 8	19	Non-Storm Water Discharges	Discharges into MS4 require authorization from owner and operator of the MS4 system, specifically for uncontaminated pumped ground water, foundation drains, and water from crawl space pumps.	Support change, and recommend that dischargers are required to obtain authorization prior to the commencement of the discharge.
B.3.a.	19	Non-Storm Water Discharges	States that building fire suppression system maintenance discharges contain **waste** and must be prohibited.	Not clear what **waste** the discharges contain and the basis for prohibiting it.
B.4.	19	Non-Storm Water Discharges	Must identify and **control** any non-prohibited discharge that creates water quality problems.	Should define what is meant by **control** the discharge.
C.2.c.	20	Non-Storm Water dry weather Numeric effluent limitations	This requires the Copermittee to determine whether a discharge type should be exempt.	This is the responsibility of the Regional Board.
C.4.	21	Non-storm water dry weather numeric effluent limitation	Copermittees must develop monitoring plans to sample a representative percentage of major outfalls and identified stations within each hydrologic subarea.	Make consistent with 40CFR.
C.5 Tables 3a.1, 3.a.2	22	Non-Storm Water dry weather Numeric effluent limitations	The NELs as defined are receiving water standards. This would apply receiving water standards to the water within the MS4. Some of the NELs are not appropriately applied. (Fecal Coliform 400 for AMEL, this is a single sample standard not an average standard).	There needs to be a way to account for receiving water quality.

CITY OF SAN DIEGO COMMENTS ON DRAFT RIVERSIDE COUNTY MUNICIPAL PERMIT (TENTATIVE ORDER NO. R9-2010-0016)				
Permit Section	**Permit Page**	**Section Title/Topic**	**Reason for Proposed Changes/Comments**	**Comments/Proposed Changes**
C.5.a.	22	Discharges to inland surface waters	Non-storm water discharges from MS4 to inland surface waters	What about when an MS4 flow discharges to dry sediment and not to actual water?
C.5.	22	Table 3.a.1	Need to define WARM & COLD water for DO effluent limitations.	Should use > < with specific temperatures.
C.5.a.	22	Table 3.a.1	Fecal coliform AMELs are inappropriate for multiple reasons.	Imposes AB411 standards for Rec 1 waters on non-storm water, non-recreational flows. If it must be applied then B should move to Instantaneous Maximum column.
C.5.a.	22	Table 3.a.1	Enterococcus inappropriately set to Ocean Plan Designated beach area standards.	This is non-storm water, non-recreational flow. Why is it being held to beach standards when 5+ years of paired sampling data do not indicate strong links between even higher levels of bacteria than being allowed, and detected AB411 exceedances.
C.5.a.	22	Table 3.a.1	MDEL limits.	Where are MDELs defined in 40CFR?
C.5.a.	22	Table 3.a.1	Table 4.a.1 does not list an instantaneous maximum for Fecal Coliform .	Should list a maximum if less than 5 samples collected in 30-day period.
C.5.a.	22	Table 3.a.1	Table 4.a.1 subject storm drain flows to the very stringent AB-411 Rec-1 Criteria standards.	The maximums should be adjusted to attainable limits.
C.5.a.	22	Table 3.a.1	Turbidity.	What is the justification for turbidity limitations in Region 9 being so much lower than other regions in the state?
C.5.a.	22	Non-Storm Water Dry Weather Numeric Effluent Limitations	..freshwater criteria are based on site-specific water quality data (**receiving** water hardness).	Should be changed to **effluent** water hardness.
C.5.a	22	Table 3.a.1	pH.	6.5-8.5 for freshwater 6-9 for saline waters – based on?
D.1.	23	Storm water Action Levels	This requires "implementation of all necessary storm water controls and measures to reduce…" when there is no evidence of a receiving water exceedance. The assessment point is "end-of-pipe" and SALs do not have any justification for applicability.	This seems to require an action when there is no evidence of a receiving water violation.
D.Table 4	23	Storm water Action Levels	Metals SALs are in direct contradiction with statement on "table 3.a.2: Priority Pollutants" page 22	Contradiction between NEL section and SAL in terms of metals values.

CITY OF SAN DIEGO COMMENTS ON DRAFT RIVERSIDE COUNTY MUNICIPAL PERMIT (TENTATIVE ORDER NO. R9-2010-0016)				
Permit Section	**Permit Page**	**Section Title/Topic**	**Reason for Proposed Changes/Comments**	**Comments/Proposed Changes**
D.2.	23	Storm Water Action Levels	"...assessment points for determination of SAL compliance are all major outfalls...." Seems to contradict the following sentence "...monitoring plans to sample a representative percent of the outfalls...."	Sentences seem to contradict each other.
D.5.	25	Storm Water Action Levels	"...to have outfall storm water discharges meet all applicable water quality standards."	This applies receiving water standards to the storm drain.
F.1 – DEVELOPMENT PLANNING				
d(2)(d).	31	Hillside development category	It is not clear what is intended to be included this category. A steep hillside development with known erosion soil conditions would need to address erosion. Treatment control and hydromodification requirements are not justified.	Remove this from the Priority Development Project Categories, and define elsewhere in Section F.1 how these projects would need to include measures that protect slopes from erosion.
d(4)(c)(i).	33	Retention of 85th percentile storm event	Retention of the 85th percentile storm event does not mimic the natural hydrology. The amount of runoff under natural conditions is dependent on soil type and other factors.	Retention requirements should be revised with intent of matching hydrology under natural conditions.
d(7).	37	LID waiver program	It may be unrealistic for municipalities to implement the various processes required under this section within the amount of time allowed.	Provide a feasible time schedule for municipalities to put such a program in place.
F.2 – CONSTRUCTION				
d(1)(c)(i).	50	AST mandate	It is neither wise nor necessary to mandate use of a particular technology for managing sediment from construction sites. The Construction General Permit has adequate and more appropriate measures for ensuring sediment discharges will not create a pollution problem.	Remove the requirement that Copermittees mandate use of AST. Allow Copermittees to rely on the Risk based approach that was developed for the Construction General Permit, which does not mandate a particular technology.
e(2).	49	Inspection of Construction Sites	This section requires inspection of construction sites of 1 acre or more at least monthly	Propose language that is definitive and require construction site inspections monthly for sites of 1 acre or more
F.3.a – EXISTING DEVELOPMENT: MUNICIPAL ACTIVITIES				
(3).	55	BMP Implementation for Management of Pesticides, Herbicides and Fertilizers	Reduction of pesticides, herbicides, and fertilizers into the storm water to the MS4 and receiving waters.	Support inclusion of "storm water" and "and receiving waters" in the opening paragraph.

CITY OF SAN DIEGO COMMENTS ON DRAFT RIVERSIDE COUNTY MUNICIPAL PERMIT (TENTATIVE ORDER NO. R9-2010-0016)				
Permit Section	**Permit Page**	**Section Title/Topic**	**Reason for Proposed Changes/Comments**	**Comments/Proposed Changes**
(6)(b)(i).	56	Operation and Maintenance of Municipal Separate Storm Sewer System and Structural Controls	Inspecting and cleaning all MS4 facilities between May 1 and September 30 is infeasible for those Copermittees that have tens of thousands of structures.	Inspection and removal of accumulated waste at least once a year between May 1 and September 30 of each year for ~~all~~ MS4 facilities that receive or collect high volumes of trash and debris.
(7).	54	Infiltration From Sanitary Sewer to MS4/Provide Preventative Maintenance of Both	Sections (a) and (b) are redundant.	Delete Section (b) as the implementation of the provisions in Section (a) would maximize pollutant reductions by providing greater flexibility to Copermittees to manage their programs.
F.3.b – Existing Development: Commercial/Industrial				
F.3.c – EXISTING DEVELOPMENT: RESIDENTIAL				
F.3.d – RETROFITTING EXISTING DEVELOPMENT				
F.4 – ILLICIT DISCHARGE DETECTION AND ELIMINATION				
d.	67	Dry Weather Field Screening and Analytical Monitoring	Paragraph makes a reference to attachment E, which does not in fact contain a description of this particular program.	Include a description of the Dry Weather Field Screening and Analytical Monitoring Program in Attachment E.
e.	67	Investigation/Inspection and follow-up	...based on results of **field screening**...	Field screening is not included as a component of any monitoring programs and should be removed from this sentence.
e.	67	Investigation / Inspection and Follow Up	References a monitoring effort that does not exist anywhere else in the permit (field screening)	The inconsistency in the permit for the different programs and the referenced sections need to be straightened out. Add description of referenced program to Attachment E.
e(1).	72	Develop response criteria for data	Contradictory paragraph. Numeric action levels must be developed, but "the criteria must consider numeric effluent limitation (see Section C)".	The NELs from Section C or develop numeric action levels? Recommend selecting one criteria.
F.5 – PUBLIC PARTICIPATION				

CITY OF SAN DIEGO COMMENTS ON DRAFT RIVERSIDE COUNTY MUNICIPAL PERMIT (TENTATIVE ORDER NO. R9-2010-0016)				
Permit Section	**Permit Page**	**Section Title/Topic**	**Reason for Proposed Changes/Comments**	**Comments/Proposed Changes**
G. – WATERSHED RUNOFF MANAGEMENT PLAN				
G.2.	73	Watershed Water Quality Workplan	The workplan is for development of a BMP strategy and implementation of BMPs to improve urban runoff water quality contributions to the receiving water. Calling it a "Water Quality" workplan is misleading because the regulated parties under this permit are not responsible for every contribution to every water body in the entire watershed. The requirements should focus on urban runoff contributions to the receiving waters for which the regulated parties are responsible.	Revise the section to state: The Watershed Workplan shall describe the Permittees' development and implementation of a collective watershed strategy to assess and prioritize the water quality problems due to runoff discharging to the watershed's receiving waters, identify and/or model sources of the highest priority water quality problem(s), develop a watershed-wide BMP implementation strategy to abate highest priority water quality problems and the relative contribution from runoff discharges, and a monitoring strategy to evaluate BMP effectiveness and changing water quality prioritization in the WMA.
1.e.	72	Develop strategy to model and monitor improvements	The use of the word "proper" for installation of BMPs is subjective and not defined by this permit. There may be many different ways to "properly" design and install a BMP, and the regulated parties may or may not choose to test different ways for each BMP to determine which works best.	Revise to state: Develop a strategy to model and/or monitor improvements in runoff discharge quality resulting from implementation of the BMPs described in the Watershed Workplan. The modeling and/or monitoring strategy shall generate the necessary data to report on the measured pollutant reduction that results from BMP implementation.
H. – Fiscal Analysis				
I. – Total Maximum Daily Loads				
J. – Program Effectiveness Assessment				
K. – Reporting				
1.b.	77	Watershed Workplans	The reference to a watershed workplan should use a consistent naming convention. It is referred to as a "Watershed Workplan" in Section K.1.b., and a "Watershed Water Quality Workplan" in Section G.2.	The reference to a watershed workplan should use a consistent naming convention.
L. – MODIFICATION OF PROGRAMS				

CITY OF SAN DIEGO COMMENTS ON DRAFT RIVERSIDE COUNTY MUNICIPAL PERMIT (TENTATIVE ORDER NO. R9-2010-0016)				
Permit Section	**Permit Page**	**Section Title/Topic**	**Reason for Proposed Changes/Comments**	**Comments/Proposed Changes**
M. – PRINCIPAL COPERMITTEE RESPONSIBILITIES				
N. – RECEIVING WATERS MONITORING AND REPORTING PROGRAM				
O. – STANDARD PROVISIONS, REPORTING REQUIREMENTS, AND NOTIFICATIONS				
Attachments (A Through E)				
E. II. A.1.g, Table 1	5	Mass Loading Station Monitoring	Typo at the base of the table: "Nitrate and nitrate may be combined…"	Change to: "Nitrite and nitrate may be combined…"
E.II.B.1.b.	12	MS4 Outfall Monitoring	Comparing Metals SALs with CTR values	Question is if you can use the "1 hour maximum concentration" criteria in this way?
E.II.C.a. (1).	13	Dry weather non-storm water effluent analytical monitoring stations	"Stations must be all major outfalls" plus "other outfall points…"	This far exceeds CWA 500 point maximum for dry weather monitoring.
E.II.C. b.2.	13	Dry weather non-storm water effluent analytical monitoring stations	If flow is evident a 1 hour composite sample may be taken.	Should elaborate on sampling procedures for flowing outfalls.
E.II.C.b. (2).	13	Dry weather non-storm water effluent analytical monitoring stations	"if flow is evident a 1 hour composite sample may be taken"	There is no definition of what comprises a composite sample. This would significantly increase this program.

San Diego Bay Council

A coalition of San Diego environmental organizations dedicated to protection and restoration of San Diego's Coastal water resources

September 7, 2010

via Electronic Mail to:
Ben Neill: *bneill@waterboards.ca.gov*
Chiara Clemente: *cclemente@waterboards.ca.gov*

RE: Riverside County Municipal Storm Water Permit Reissuance
Tentative Order No. R9-2010-0016

Dear Mr. Gibson:

Please accept these comments on behalf of the San Diego Bay Council ("Bay Council"), a coalition of environmental organizations dedicated to the protection and restoration of regional coastal waters in San Diego. Member organizations, representing 22,000 San Diegans, act through community involvement, regulatory participation, and legal action to ensure the protection restoration of San Diego Bay, Mission Bay, and the region's coastal waters.

The Bay Council appreciates and welcomes the opportunity to comment on the Regional Water Quality Control Board's ("Regional Board") draft Municipal Storm Water Permit ("Permit") for Riverside County. As with the recently adopted Orange County permit (Order No. R9-2009-0002), this draft Permit represents a significant improvement to past storm water permits in not only the San Diego region, but the entire state. The Bay Council applauds the Regional Board for its leadership in advancing municipal storm water permits to reflect the iterative approach of the maximum extent practicable ("MEP") standard mandated by the Clean Water Act.

I. Permit Improvement Highlights

Although the Bay Council is composed of local San Diego organizations, it nonetheless has great interest in the Permit, as it will pave the way for the forthcoming San Diego County municipal storm water permit and perhaps the regionwide permit. (Permit Findings. E.12.). Moreover, the Santa Margarita Watershed links Riverside and San Diego Counties. Therefore, the Bay Council is pleased to see the Regional Board continue its progress in developing storm water permits that will result in greater protections for water quality throughout the region. These areas warrant specific mention.

A. Hydromodification Requirements Are More Protective

Bay Council member San Diego Coastkeeper was part of the Technical Advisory Committee for the San Diego region Hydromodification Management Plan (HMP) development. Many of Coastkeeper's concerns, as well as committee member NRDC's, focused on the standard set in the San Diego HMP. The hydromodification susceptibility and the resulting BMP sizing tools were set to meet predevelopment standards, not the naturally occurring condition. It was ultimately the San Diego MS4 Permit language—which defines predevelopment as the condition onsite immediately before the

planned development—that constrained the development of the HMP. (Order No. R9-2007-0001, C-7). This Permit, however, is in line with Coastkeeper and NRDC's view that predevelopment and pre-project are the naturally occurring condition—as opposed to simply the condition immediately preceding the new development. This definition will create a more robust and effective HMP for the Riverside area, protecting natural stream hydrology as opposed to merely preventing further degradation. (Permit, F.1.h). Further, the required prioritization of BMPs will ensure the most effective BMPs are evaluated first, instead of the least expensive or easiest to implement BMPs. (Permit, F.1.g.(2).

B. Unpaved Road BMPs and Flood Control Maintenance Requirements Are a Welcome New Addition

A new addition to this Permit is the regulation of unpaved roads, which now require implementation of BMPs. (F.1.i.; F.3.a.(10); F.3.c.(5)). Not only will these new permit provisions help alleviate sediment and erosion problems; they will also promote smart maintenance and planning. For example, the permit requirement that BMPs include "[u]npaved roads and culvert designs that do not impact creek functions and where applicable, that maintain migratory fish passage" will help maintain natural water courses. (F.1.i). The following requirement will also serve to promote long-term maintenance and planning to protect water quality and geomorphology:

> Through their regular maintenance of unpaved roads, the Copermittees must examine the feasibility of replacing existing culverts or design of new culverts or bridge crossings to reduce erosion and maintain natural stream geomorphology.

(F.3.a.(10)(e)). These types of Permit conditions will incentivize municipalities to plan ahead, and will prevent the perpetuation of the currently fragmented maintenance activities.

In addition, municipal flood control structure BMP implementation will also serve to benefit Copermittees in maintaining their storm water systems. (F.3.a.(4)(a)-(c)). The requirement that Copermittees assess flood management project impacts on water quality, evaluate existing flood control structures as part of ongoing maintenance, and inventory such activities in the JRMP Annual Report is particularly important to avoid poor planning such as evidenced in the City of San Diego's Master Storm Water System Maintenance Program. (Id.)

C. Retrofit Requirements Will Expedite the Water Quality Improvement Process

Largely ignored in the past, the retrofit requirements in the Permit will help Copermittees tackle the storm water issues that cannot be solved through new construction and development standards alone. Many water quality issues are historical, due to poor planning and the proliferation of impervious surfaces. Permit-required assessment of retrofit opportunities, and permissive language with regard to implementation of retrofits will spur Copermittees to action, but allow them flexibility to choose the most effective projects. (F.3.d.). The novel idea of using retrofits as an enforcement or mitigation measure will also likely prove more appealing than simple monetary penalties.

D. The Removal of Over-Irrigation as an Exempt Non-Stormwater Discharge Addresses Both Water Quality and Water Supply Issues

Bay Council has been collectively, and through its individual organizations, advocating for conservation and smart water use for years. Every drop of water that remains at its source is a drop that has not contributed to urban runoff. Nonetheless, many municipalities have been reluctant to enforce over-irrigation as either a water supply or water quality issue, citing the previous permit

exemption as authority for such practice. Now, with the removal of this exemption, municipalities will not only be required to enforce over-irrigation runoff, but will be able to use the revised Permit as authority for urging residents, developments, and commercial and industrial facilities to conserve water.

E. Numeric Limits Will Help Assess Water Quality Improvements and BMP Effectiveness

As with the Orange County permit, this Permit is a great leap forward in achieving the MEP standard. With the Orange County permit paving the way, the Regional Board has created a mechanism to evaluate BMP effectiveness and ensure the iterative approach is truly progressive. As Bay Council members have previously commented on the Orange County permit, the Regional Board has broad authority to impose numeric effluent limits.[1] The Bay Council fully supports the Regional Board in requiring both non-storm water dry weather action levels ("NALs") and storm water action levels ("SALs"). (Permit, C. and D.).

II. Copermittees Must Stop Using Cost as An Excuse For Non-compliance

Though the Permit, as other past permits, requires a Fiscal Analysis, the Copermittees are surely to view this component of the Permit as another draconian measure that requires them to "check the box" as opposed to viewing this Permit condition as a tool. Copermittees should rather use the Fiscal Analysis requirement to plan ahead, financing necessary projects and measures not only for Permit compliance, but to achieve actual water quality improvements. (H.1.).

The current practice with respect to the Fiscal Analysis component of storm water permits is exemplified in the City of San Diego's 2009 Annual Report. This Report provides a "Future Projection" analysis consisting of two paragraphs which simply reiterate funds are generated from general fund and non-general fund sources, and costs will continue to rise.[2] Earlier in the same section, the City provides an explanation of how funds are generally used, but provides no insight into the amount of money applicable to each funding source.

Such cursory fiscal analysis is common in Annual Reports, while municipalities refuse to face the real problem. They continuously fail to adequately pass on the true costs of compliance. Time and again, environmental groups and the Regional Board are faced with the same excuse: protecting water quality and restoring beneficial uses is too expensive. From Permit approval to Permit implementation, the same excuse persists. Nonetheless, the reluctance of the Copermittees to adequately fund their respective storm water programs is not the result of a lack of desire to improve water quality by municipal staff or managers, but rather poor decisionmaking and lack of political will. Decisionmakers at the city and county level must pass their costs on to those reaping the benefits. Recent news articles highlight the City's reluctance to increase storm water fees, requiring 95 cents per month per residence across the board, while to recoup its costs, the City should be charging $3 per month.[3]

Now is the time for the Regional Board to clearly articulate in the Permit: noncompliance due to cost will not be tolerated. The Permit is a tool underutilized by Copermittees to obtain necessary funds

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[1] *Defenders of Wildlife v. Browner* (9th Cir. 1999) 191 F.3d. 1159; 1166-67("Under 33 U.S.C. § 1342(p)(3)(B)(iii), the EPA's choice to include either management practices or numeric limitations in the permits was within its discretion." citing *Natural Resources Defense Council*, *Inc. v. United States EPA*, (9th Cir. 1992) 966 F.2d 1292, 1308); *see also*, *City of Abilene v. United States EPA*, (5th Cir. 2003) 325 F.3d 657, 661.
[2] http://www.sandiego.gov/stormwater/pdf/urmp09ar.pdf (p. 10-4).
[3] http://www.voiceofsandiego.org/government/article_f4be2cbd-c631-51fc-a428-a7e64773eac4.html; http://www.voiceofsandiego.org/government/thehall/article_4531d4ce-95ba-11df-8ab8-001cc4c03286.html; http://www.sdcitybeat.com/sandiego/article-8041-show-us-the-money.html

and plan for the future. If the Copermittees once again fail to use Permit section H., they risk enforcement action. We urge the Regional Board to make clear that noncompliance due to cost is not an excuse. After almost three decades, Copermittees should no longer be allowed to claim poverty as an excuse for post-approval weakening of permits and the requirements therein.

III. Specific Permit Areas Require Further Improvement

Notwithstanding the many advances in the current permit, a few aspects of the permit remain incomplete. Our specific comments and suggestions with respect to these topics are below.

A. Residential Carwashing Should Not Be an Allowed Non-Stormwater Discharge

Individual residential car washing is currently listed as exempt from the prohibition against non-stormwater discharge. However, this allowance contradicts other permit sections that evidence the negative water quality impact residential car washing poses. Indeed, car washing is specifically listed as a threat to water quality in the residential permit section. (F.6.b.(3)). It is also provided as an example topic for discussion in the education component for residential and general public outreach. (F.6.b.(4)). Clearly a threat to water quality, and a water supply issue, residential car washing should not be made exempt simply because it requires a change in public behavior. Just as over-irrigation should not be exempt non-storm water, neither should this source of urban runoff.

B. NAL Requirements Are Too Lax

As mentioned above, the Bay Council is extremely supportive of the inclusion of NALs and SALs in this Permit. However, the vague Permit language leaves much to be desired. The Permit requires investigation and source identification for a NAL exceedance in a “timely manner”. (Permit C.2. and C.3.). It is entirely unclear what constitutes a “timely manner”. Further, because the NALs are an illicit discharge identification and elimination tool, time is of the essence. (C.2.b.). In many instances, a NAL exceedance must be investigated contemporaneously with the return of monitoring results, or the source will evade detection. Therefore, the Regional Board should impose a strict numeric deadline for “timely action”. We suggest the Copermittee begin investigation of the source of the exceedance the business day following receipt of the monitoring results. The investigation should be expedited, and should not take more than two weeks.

In addition, development of the monitoring plan for dry weather is largely left to the Copermittees. (Permit, Attachment E, C.1.b.). Sampling frequency must simply be “representative” of major outfalls and identified stations within each hydrologic subarea. (Id.). The actual frequency of sampling is not mentioned at all. As with most plans developed by Copermittees, this monitoring plan will surely be greatly and artificially constrained by costs. Therefore, we urge the Regional Board to set a minimum monitoring frequency that is scientifically sound, as opposed to a cost-driven frequency.

C. Publicly and Electronically Available Documents and Monitoring Will Help Inform the Public and Regional Board, and Reduce Annual Report Burdens

Most Copermittees expend tremendous resources on preparing and submitting their Annual Reports, but view this requirement as overly burdensome and largely an exercise in futility. After reading numerous and varied municipality Annual Reports, we tend to agree. Annual Reports are massive documents with surface-level detail, no depth, and very little substance. Copermittees are loath to point out any failures or inadequacies in their storm water programs, and virtually never

highlight deficiencies. Instead, systemic issues such as lack of enforcement and funding, evident during field visits, remain unmentioned in Annual Reports.

Therefore, the Bay Council suggests a more appropriate tool for public involvement, reporting, and monitoring progress would be real-time or quarterly electronic reporting. The State Water Resources Control Board has moved into the digital age, making a variety of documents and reports publicly available via the internet.[4] We encourage the Regional Board to work with Copermittees, utilizing the permissive Permit language to explore such a possibility. Neither the Regional Board, nor the individual Copermittee, is served by rigid reporting requirements that result in largely unread or useless documents. (Permit, K.)

Specifically, the dry and wet weather monitoring results should be available publicly online as soon as the results are received. NAL and SAL exceedance real-time reporting would benefit Copermittees as the public could aid in investigations or prove an otherwise valuable source of information. Such real-time reporting might also prove a successful deterrent to illicit discharges. The Copermittees should further report inspections, BMP maintenance tracking, and SSMP project inventories quarterly. Construction site, municipal, industrial, and commercial inspections should also be reported quarterly. This type of information is invaluable to the public and the Regional Board, but is largely unavailable to either as Annual Reports are an attempt to summarize such information compiled over long periods of time. Smaller doses would prove more useful and easily digestible.

D. HMP Exemptions Will Prevent Rehabilitation of Channelized Streams

As with the San Diego HMP, the exemption for conveyance channels whose bed and bank are concrete lined all the way from the point of discharge to water storage reservoirs and lakes will prevent rehabilitation of these areas, especially in light of the retrofit requirements elsewhere in the Permit. (Permit, F.1.h.(4)(b)). Moreover, this exemption encourages continued channelization efforts. We urge the Regional Board to remove this exemption.

E. The Regional Board Should Develop Plans – Rather Than Copermittees

With the HMP and with all other plans required by the Permit, such as monitoring, it is imperative that the Regional Board play the lead role. Bay Council understands, given budget constraints and furlough restrictions, the Regional Board has fewer resources and more work to do. Nonetheless, as permit requirements are delegated to Copermittees for development and planning, water quality suffers and NGOs and the public are left out of the process.

As with the San Diego HMP, this Permit requires Copermittee-driven HMP development. However, the San Diego process serves to shed light on the likely result: an artificially cost-constrained plan with frequent exercise of exemptions. Therefore, it is critical that the Regional Board play a lead role in the development of the HMP and all other plans.

If the current practice remains, Copermittees will expend large sums of money in developing a plan made publicly available (and indeed reviewed by the Regional Board) at the end of the process. Often the Regional Board and public are faced with two equally unappealing options: force the Copermittees to start anew and delay implementation; or accept an inadequate plan. The final product in this type of planning further represents a financial commitment by Copermittees. Because of this financial investment, Copermittees that may have been able to proceed in a different direction at the

[4] Geotracker, DMR, CIWQS, and ESI.

beginning stages of development, are unable to afford (or unwilling to pay for) repeating the process after the plan is fully developed.

A possible remedy is a cost-share plan, or outside consultant who is employed by the Regional Board, reports to the Regional Board, but is paid via Copermittee funds. In order to foster a truly public process, and scientifically driven compliance (as opposed to cost-constrained), the Regional Board must remain the ultimate decisionmaker, with staff developing plans—not Copermittees.

Therefore, we urge the Regional Board to commit to heavy oversight if not a cost-share mechanism to take charge of the development of these plans in order to ensure timely completion and true advancement of water quality.

F. The Watershed Water Quality Workplan Presents A Unique Opportunity for Public Involvement

The Permit requires identification of sources causing the highest water quality problems within the Upper Santa Margarita Watershed. (Permit, G.1.c.). A relatively easy aid to identification of such sources is expanded public outreach. We urge the Copermittees to survey the public and NGOs in the area in ranking water quality problems. In addition, Copermittees should provide bilingual public notice of annual watershed workplan meetings by sending such notices directly to area residents or holding special semi-annual workshops, especially in underserved communities. Copermittees might find the public particularly useful in source identification and BMP implementation strategies. This could further serve as an effective tool to meet the education and public participation Permit requirements. (Permit, G.4.). Lastly, we urge the Copermittees in Riverside County to reach out to Copermittees in the lower portion of the Watershed to coordinate source identification and monitoring activities.

IV. Conclusion

The San Diego Bay Council applauds the Regional Board for many of the Permit measures, while offering suggestions for needed improvements. We look forward to continued participation in the review process and approval hearing. Thank you for your consideration of these comments.

Sincerely,

Bruce Reznik
Executive Director
San Diego Coastkeeper

Marco Gonzalez
Legal Director
Coastal Environmental Rights Foundation

Joe Geever
CA Policy Coordinator
Surfrider Foundation

James A. Peugh,
Conservation Chair
San Diego Audubon Society

UNITED STATES MARINE CORPS
MARINE CORPS BASE
BOX 555008
CAMP PENDLETON, CALIFORNIA 92055-5008

In Reply Refer to:
5090.7B
ENVSEC/426
September 7, 2010

Executive Officer
Attention: Mr. Ben Neill
California Regional Water Quality Control Board
San Diego Region
9174 Sky Park Court, Suite 100
San Diego, CA 92123

Subj: San Diego Regional Water Quality Control Board, Order No. R9-2010-0016, NPDES No. CAS0108740, County of Riverside, the Incorporated Cities of Riverside County, and the Riverside County Flood Control Water Conservation District

Marine Corps Base Camp Pendleton supports the Regional Water Quality Control Board's efforts to promote water quality and low impact development and appreciates the opportunity to review and comment upon the subject draft permit. Camp Pendleton's Director of Water Resources has expressed concerns over potential unintended consequences to water rights and water supply that could result from requirements contained in the draft permit. Please consider the enclosed comments.

If you have any questions, please contact Ms. Gabrielle Skipper at (760) 725-9760. Thank you.

Sincerely,

A. C. ENTINGH
Head, Environmental Compliance Department
Assistant Chief of Staff, Environmental Security
By direction of the Commanding Officer

Enclosures: Director of Office of Water Resources Letter

UNITED STATES MARINE CORPS
OFFICE OF WATER RESOURCES
MARINE CORPS BASE
BOX 555013
CAMP PENDLETON, CALIFORNIA 92055-5013

07 Sept 10

MEMORANDUM

From: Director, Office of Water Resources, AC/S Facilities, Camp Pendleton
To: Compliance Department Head, AC/S Environmental Security, Camp Pendleton

Subj: San Diego Regional Water Quality Control Board ("Regional Board"), Order No. R9-2010-0016, NPDES No. CAS0108740, County of Riverside, the Incorporated Cities of Riverside County, and the Riverside County Flood Control Water District Conservation

The Office of Water Resources (OWR) respectfully requests that the below comments regarding the Proposed Tentative Order be forwarded to Regional Board for consideration. Submitting such comments will help ensure that the national defense priorities of Camp Pendleton, particularly as they pertain to water supply and water rights, are not frustrated by the potential unintended consequences of the Proposed Tentative Order.

The Office of Water Resources Supports Low Impact Development (LID) in Concept:

The Office of Water Resources (OWR) supports the concept of LID from a water quality perspective. Cleaner water coming onto Camp Pendleton not only sustains healthy ecosystems, but also ensures water in Camp Pendleton's aquifers is safe and suitable for potable use. Although, implementation of LID is expected to improve the quality of water that reaches Camp Pendleton via the Santa Margarita River (SMR), if improperly structured, LID has the potential to reduce the volume of high quality water that would otherwise arrive downstream to support beneficial uses on Camp Pendleton. Beneficial uses on Camp Pendleton, which are supported by historic baseflows in the SMR, include—but are not limited to--providing seventy percent of Camp Pendleton's water supply and sustaining populations of threatened and endangered species.

The Proposed Tentative Order Remains Problematic From a Water Supply Perspective:

OWR appreciates that the Regional Board has already included provisions in the Proposed Tentative Order that appear oriented towards protecting downstream water users from encroachment of historical flows. However OWR remains concerned that some provisions in the Proposed Tentative Order could be read to incentivize removal of native SMR water from the watershed in a manner that has the potential to reduce SMR baseflows. We have suggested revisions to the Proposed Tentative Order at the end of this memorandum that we believe will further reduce the risk to our water supply.

Treatment of Runoff Before Discharge into Receiving Waters:

Finding E.7 on (page 14) raises a potential dilemma for MS4 operators that could facilitate large scale impoundment and export of stormflows for "runoff treatment" to the detriment of downstream water right holders. Specifically, Finding E.7 states that"[t]reatment and/or mitigation must occur prior to the discharge of runoff into receiving waters." Because achieving water quality standards may require extensive treatment—particularly to achieve the existing nutrient standards in the Basin

Plan, there is real risk that developers of large scale development/retrofit projects will impound large amounts of water onsite in lined facilities or export the water to a watershed with less stringent water quality objectives where the water can be discharged (or reclaimed for consumptive use) at significant savings to the MS4 or project developer.

To address this concern, the Regional Board should consider adding a section to the Findings in the Proposed Tentative Order which clarifies that impoundment or export of stormwater/rainwater for the purpose of avoiding pertinent discharge standards and/or basin plan objectives is not a proper use of stormwater absent demonstration of compliance with California Water Code Sections 1200-1225.

Along these lines, and to reduce risk that stormwater capture will reduce historic baseflows or otherwise diminish the water rights of downstream water users, we recommend the following additional revisions to the Proposed Tentative Order:

1. Revise Section F.1c.8 (page 29) to read as follows:

   Rain water harvesting, where feasible *and fully protective of downstream water rights*, must be implemented as part of the site design and construction, and to supplement offsite beneficial uses.

2. Amend Section F.3.d.2 to add an additional criterion, along the lines below for prioritizing retrofit of existing development:

   (k) the extent such projects are fully protective of downstream water rights[1]

J.N. JUNGREIS

[1] This recommended amendment will promote consistency with Section F.3.d.6(d) and ensure that the prioritization of retrofit projects properly considers the ramifications of retrofit on downstream baseflows.

Construction Industry Coalition on Water Quality

September 7, 2010

David Barker, Supervising Water Resources Control Engineer
San Diego Regional Water Quality Control Board
9174 Sky Park Court, Suite 100
San Diego, CA 92123

Public Comments Regarding Tentative Order R9-2010-0016, Waste Discharge Requirements for Discharges from the Municipal Separate Storm Sewer System (MS4); the National Pollutant Discharge Elimination System (NPDES) MS4 Permit No. CAS0108740, to the County of Riverside, the Riverside County Flood Control and Water Conservation District, and the Cities of Murrieta, Wildomar, and Temecula

Dear Mr. Barker:

On behalf of the more than 3,000 member companies of the Construction Industry Coalition on Water Quality (CICWQ), we would like to thank the San Diego Regional Water Quality Control Board (Regional Board) for the opportunity to offer this public comment on the revised tentative order (Tentative Order or Permit) No. R9-2010-0016. This letter provides brief constructive suggestions that we have for the Tentative Order and is in support of those comments (written and oral) that we have made to the Regional Board previously on several occasions during the South Orange County MS4 permit adoption process (permit adopted in December 2009).

We have concerns with the Tentative Order relating to the implementation of Low Impact Development (LID) best management practices as described in Program Provisions, F.1.d.(4). Of these concerns, the principal issues that we raise here are: i) the exclusion of economic feasibility when a project proponent is required to evaluate and install LID best practices and; ii) the requirement for onsite retention of stormwater with no discharge.

Exclusion of Economic Feasibility in Considering Appropriate LID BMPs

The exclusion of economic feasibility in provisions F.1.d.(4)(a), F.1.d.(4)(c), and F.1.d.(7)(b) is readily apparent (only technical feasibility is mentioned) and we urge correction and explicit recognition of conducting both technical and economic feasibility analysis when evaluating the appropriate combination of LID controls that meet the Permit's performance sizing criteria as defined in F.1.d.(4)(c). In particular, the Tentative Order requires in F.1.d.(4)(a) that "each copermittee must require LID BMPs or make a finding of technical infeasibility for each priority development project" and in F.1.d.(4)(c) that "if onsite infiltration LID BMPs are technically infeasible per section F.1.d(7)(b), other LID BMPs may be allowed for use to treat stormwater onsite provided that other LID BMPs are sized to hold the design storm volume that

is not infiltrated." In both instances, economic feasibility is excluded and this omission must be corrected given the importance of balancing technical and economic feasibility. In fact, the San Diego Regional Board recognized the importance of economic feasibility in the South Orange County MS4 permit and included the following language in the adopted permit (R9—2009-0002, Section F.(7)(b)):

"For each PDP participating, a technical feasibility analysis must be included demonstrating that it is technically infeasible to implement LID BMPs that comply with the requirements of Section F.1.(d)(4). ***The Copermittee(s) must develop criteria for the technical feasibility analysis including a cost benefit analysis, examination of LID BMPs considered and alternatives chosen****." (Emphasis added).*

We ask that the Board make the south Riverside County permit language at least consistent with that included in the adopted south Orange County MS4 permit and explicitly allow economic feasibility to be considered when evaluating appropriate LID BMPs to meet the onsite performance standard.

Onsite Retention of Stormwater with No Discharge

We appreciate the Board's recognition in the Fact Sheet that properly engineered LID filtration BMPs are available to a project developer to meet the LID performance standard. However, we are troubled by the pervasive use of the terms "without runoff" and "hold the design storm volume that is not infiltrated" in the Tentative Order. These terms continue to propagate the incorrect application of LID in that stormwater that has undergone filtration and/or treatment cannot be of equal or better quality than that retained on site given the performance criteria specified in F.1.d.(4)(c). We again urge the Regional Board to eliminate these terms and expressly allow biofiltration and biotreatment LID practices to meet the onsite performance standard without having to perform an exhaustive technical and economic feasibility analysis and to not relegate these controls to a lesser status.

If you have any questions or want to discuss the content of our comment letter, please feel free to contact me at (909) 525-0623, or mgrey@biasc.org.

Respectfully,

Mark Grey, Ph.D.
Technical Director
Construction Industry Coalition on Water Quality

COUNTY OF RIVERSIDE
TRANSPORTATION AND LAND MANAGEMENT AGENCY
Transportation Department

0006956

Juan C. Perez, P.E., T.E.
Director of Transportation

September 7, 2010

Chairman David King and Members of the Board
San Diego Regional Water Quality Control Board
Attn: Executive Director Gibson
9174 Sky Park Court, Suite 100
San Diego CA 92123-4353

RE: Draft Tentative Order No. R9-2010-0016 (NPDES No. CAS0108740) - Proposed Unpaved Road Requirements

Dear Mr. Gibson:

The Riverside County Transportation Department has reviewed the proposed requirements applicable to unpaved roads presented in the Draft Municipal Separate Storm Sewer System Permit (Draft Tentative Order No. R9-2010-0016 (NPDES No. CAS0108740) for the Santa Margarita Region of Riverside County (Draft MS4 Permit) and has identified several major concerns. We appreciated the opportunity to meet recently with you and staff to discuss our concerns. Primarily, they have to do with requirements being imposed through this permit that go well above-and-beyond what is required in the Orange County permit to regulate the operation and maintenance of unpaved roads.

SUMMARY

There are many different categories of unpaved roads within the unincorporated County area. These include County-Maintained unpaved roads, dedicated and accepted public roads (which are not County maintained), roads dedicated but not accepted, private roads, utility access roads, roads through tribal lands, and others. These roads are maintained by numerous entities besides the County, such as Homeowners Associations, Quasi-public entities like County Service Areas, Community Service Districts, public and private utilities, Tribes, and in many cases, individual property owners. The County in fact is prohibited by law from spending general gas tax dollars (our main funding source) for maintenance of roads not in the County Maintained Road System, and is not financially able to take on new unpaved roads into the County Maintained System until they are improved to County Standards.

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The proposed permit requirements would therefore impose an undue and substantial regulatory burden on the County and would create a class of potential unwitting "violators" that are not familiar with these requirements, including hundreds if not thousands of property owners that have been maintaining unpaved roads for many decades as needed to access their property. The special requirements for development and maintenance of unpaved roads were proposed by Regional Board staff for inclusion in the draft MS4 Permit very late in the process, after a number of weeks of discussions on the overall permit language and just prior to release for the Santa Margarita Region for public comment. During those discussions, unpaved roads were not raised by Regional Board staff as a source requiring additional regulatory attention.

Given the complexity of these jurisdictional issues, and the number of stakeholders that would be impacted, we respectfully request that the regulation of unpaved roads be removed from this permit. Alternatively, unpaved roads could be considered as part of a separate general permit to allow for proper stakeholder involvement and vetting, at the least within those areas of the permit (see below) that have to do with maintenance provisions. Given the complexity of this issue and the impact on thousands of properties, another option is to achieve a water quality benefit through education programs, not using limited resources on regulation and enforcement. We also note that unpaved road regulation was not included in the recent Orange County permit. Orange County receives approximately 8 times the amount of funding on a per mile basis towards their County-Maintained roads as does Riverside County, so imposing additional requirements on the Riverside County permit magnifies the undue regulatory and financial burden.

The Draft MS4 Permit includes requirements for unpaved roads that are either redundant to existing regulatory requirements or that impose new regulation requirements at a time that the County can ill afford to start new programs. The language proposed needs clarification to avoid potential misinterpretations that may result in operational disruptions to the transportation system and/or compliance costs way out of proportion to the potential impact on receiving water quality. Although the Department supports implementation of erosion and sediment control best management practices (BMPs) as appropriate for development of new unpaved roads, it does not agree that the statements in the Fact Sheet and Findings support identification of unpaved roads as a significant source of pollutants warranting special regulation. The following summarizes the Department's specific concerns and perspectives.

UNPAVED ROAD DEVELOPMENT REQUIREMENTS

Requirements for the development of unpaved road projects are addressed in section F.1.i. on page 45 of the Draft MS4 Permit. This requirement states:

i. Unpaved Roads Development

> The Copermittees must develop, where they do not already exist, and implement or require implementation of erosion and sediment control BMPs after construction of new unpaved roads. At a minimum, the BMPs must include:
>
> (1) Practices to minimize road related erosion and sediment transport;
> (2) Grading of unpaved roads to slope outward where consistent with road engineering safety standards;
> (3) Installation of water bars as appropriate;
> (4) Unpaved roads and culvert designs that do not impact creek functions and where applicable, that maintain migratory fish passage;

It is our contention that construction of new unpaved roads is already adequately regulated through development regulations. New unpaved roads built through development fall under the definition of a "project", and as such are already required to develop and implement project-specific SUSMPs, which include identification of BMPs in the same manner as required of other development projects. Unpaved road projects are also required to comply with the General Permit-Construction which requires preparation of a SWPPP. These requirements are implemented by the Permittees during the development review process and in issuance of grading permits. We also note that the development process already achieves a gradual "retirement" of unpaved roads, as the County requires in many cases that new development replace unpaved access roads with paved access.

Additional separate requirements for development of unpaved roads are redundant to these requirements and may only complicate compliance. However, if the Board wishes to include permit language to further clarify what is already required through these permits, we would be pleased to work with the Board to help craft appropriate language.

UNPAVED ROAD MAINTENANCE

This is our primary issue of major concern, particularly since the proposed language would appear to impose regulatory requirements on roads that are not part of the County Maintained Road System that we operate.

Requirements for the maintenance of unpaved road projects are addressed in section F.3.a.(10) on page 56 of the Draft MS4 Permit. This requirement states:

> (10) Unpaved Roads Maintenance
>
> (a) The Copermittees must develop, where they do not already exist, and implement or require implementation of BMPs for erosion and sediment control

measures during maintenance activities on unpaved roads, particularly in or adjacent to receiving waters.
(b) The Copermittees must develop and implement or require implementation of appropriate BMPs to minimize impacts on streams and wetlands during unpaved road maintenance activities.
(c) The Copermittees must regularly maintain their unpaved roads adjacent to streams and riparian habitat to reduce erosion and sediment transport;
(d) Re-grading of unpaved roads during maintenance must be sloped outward where consistent with road engineering safety standards;
(e) Through their regular maintenance of unpaved roads, the Copermittees must examine the feasibility of replacing existing culverts or design of new culverts or bridge crossings to reduce erosion and maintain natural stream geomorphology.

As we have stated, this issue should be addressed through a broad general permit or an education program. However, if the Board finds it necessary to impose additional permit requirements on maintenance activities, which go well beyond the Board's previous definitions of a "project", we respectfully request that this language be re-written to make it clear that it applies to those roads within the County (or City) Maintained Road System.

UNPAVED ROADS ARE NOT A SIGNIFICANT SOURCE OF WATER QUALITY IMPAIRMENT

Findings D.1.C, pg 57-59, states:

> "During the previous permit period, the San Diego Water Board identified, through investigations and complaints, sediment discharges from unpaved roads as a significant source of water quality problems in the Riverside County portion of the San Diego Region. Enforcement and inspection activities conducted by the San Diego Water Board during the previous permit term have found a lack of source control for many unpaved roads within the jurisdiction of the Copermittees".

The Department supports the continued application of development and construction requirements and maintenance of temporary post-maintenance erosion and sediment control BMPs as specified in existing permits. However, we do not believe that sufficient justification has been presented to support the identification of unpaved roads as a significant source of water quality problems in the Santa Margarita Region. In these days of uncertain state funding and dwindling local funding sources, every dollar spent on additional regulatory requirements needs to be weighed against the benefit of otherwise using funding on basic public health-and-safety needs such as road maintenance and safety improvements.

The discussion of Finding D.1.c. states that the inclusion of unpaved road requirements were based on findings by the San Diego Regional Board during typical compliance assurance activities, audits, or receipt of complaints. However no feedback from these activities were reported to the Permittees at the MS4 Permit discussions prior to the proposal of the unpaved road requirements just before the draft permit was released.

The Department has reviewed the documents cited by Regional Board staff in the discussion of Finding D.1.c. and the conditions in the Santa Margarita River are vastly different from those in Pennsylvania and Northern California cited in those documents. Nevertheless, these documents do not suggest that unpaved roads are a significant source requiring special attention in MS4 permits. Further, neither the Permittee's monitoring data nor our observations support a conclusion that unpaved roads are a significant source of pollutants warranting special regulatory attention and we request that this finding be deleted unless significant data specific to the Santa Margarita Region can be produced. In particular, the Department requests a copy of the investigations and complaints along with the data that supports a significant source of water quality problems on unpaved roads, including a listing of roadways where water quality problems have been identified.

Thank you for the opportunity to review and comment on the Draft MS4 Permit. The County of Riverside Transportation Department is committed to managing the roads and highways within our County Maintained Road System in a manner that protects water quality. Our goal is to work constructively with the Regional Board staff to improve the effectiveness with which we address water quality issues, and put limited public and private dollars into those programs that provide the best return. We would be pleased to meet with you to discuss regulation of unpaved roads further and to explain our unpaved road development, construction, and maintenance practices.

Please feel free to contact me or Ward Maxwell at 951-955-6740 if you have any questions regarding our comments on the proposed unpaved road requirements or our requests for modification of the draft Santa Margarita Region MS4 Permit.

Sincerely,

Juan C. Perez
Director of Transportation

CC: George A. Johnson, TLMA Director
Mike Shelter, Executive Office
Patty Romo, Deputy Director of Transportation
Ward Maxwell, Engineering Project Manager
Jason Uhley, Flood Control

WARREN D. WILLIAMS
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RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

September 7, 2010

Chairman David King and Members of the Board
San Diego Regional Water Quality Control Board
9174 Sky Park Court, Suite 100
San Diego, California 92123-4353

Dear Chairman King:

Re: Tentative Order R9-2010-0016, NPDES No. CAS0108740, Riverside County Municipal Separate Storm Sewer System Permit Reissuance *NWU:749045:bneill*

The Riverside County Flood Control and Water Conservation District (District) is submitting this comment letter on the above listed Tentative Order, on behalf of the Riverside County MS4 Permittees within the San Diego Region (Copermittees). Tentative Order R9-2010-0016 (draft MS4 Permit) was drafted by Board staff to serve as the reissuance of Order R9-2004-0001 (existing MS4 Permit) which covers the Santa Margarita Region of Riverside County. This letter was developed in consultation with the Copermittees and reflects our most critical concerns. The Board's careful consideration of these critical concerns will be appreciated.

This comment letter is organized as follows:

Executive Summary 2
Background 4
- Receiving Waters and Water quality Conditions 4
- Proactive Permittee Programs to Protect Local Resources 5
- Economic Conditions 6
- Approach to the Permit Renewal 7
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- Monitoring and Reporting Program (Attachment 4) 8
- Unpaved Roads Requirements (Sections F.1.i., F.3.a.(11), F.3.c.(5)) 10
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Conclusion 17

In addition, the following attachments provide support for our priority issues and solutions, provide additional legal comments and/or summarize additional technical changes recommended to the draft MS4 Permit. Attachment 9 is a full redline markup of the draft MS4 Permit incorporating all of our recommended edits. Attachment 9 also includes additional minor edits not found elsewhere in this letter or its attachments.

Attachment 1 – Summary of Proactive Efforts to Manage Stormwater
Attachment 2 – Economic Assessment
Attachment 3 – Language Changes Supported by Board Staff and Copermittees
Attachment 4– Monitoring and Reporting Program Requirements
Attachment 5 – Proposed Unpaved Road Requirements of the Draft 2010 Santa Margarita Region MS4 Permit
Attachment 6 – Prohibition of Irrigation Runoff
Attachment 7 – General Legal Comments
Attachment 8 – District Specific Comments
Attachment 9 – Redline Comments of MS4 Permit and Attachments
Attachment 10 - Fact Sheet Comments

EXECUTIVE SUMMARY

It is the goal of the Copermittees to obtain an MS4 permit that is both protective of the beneficial uses of the receiving waters in the Santa Margarita Region and respectful of the unprecedented economic conditions impacting the Copermittees. Further, the Copermittees have no interest in repeating the three-year Orange County MS4 Permit adoption process. In an effort to achieve our goal and head off a renewal process similar to Orange County's, the Copermittees approached David Gibson, Regional Board Executive Officer, in February 2010 regarding implementing a win-win process for developing the draft MS4 Permit.

In response, the Executive Officer authorized Board staff to meet with the Copermittees to foster communication and understanding. The Copermittees appreciate the Executive Officer's decision to dedicate staff time to meetings regarding the individual requirements of the South Orange County MS4 Permit and the appropriateness of those individual requirements to the Santa Margarita Region. The meetings provided an opportunity to foster a mutual understanding of the goals and objectives of Board staff and the capabilities and limitations of the Copermittees. As a result, the Permittees and Regional Board staff worked collaboratively to develop language for consideration in the Tentative Order.

However, the process did not resolve several significant issues due to the following constraints:

1. The process needed to be cut short as the Board expected the draft MS4 Permit to be heard in October. Copermittee staff requested that the hearing be delayed to allow the process to complete several times, but these requests were denied;

2. Regional Board staff indicated that the Board had adopted the South Orange County MS4 Permit as a model permit and, therefore, the Board would have to approve any major revisions to the provisions established in that MS4 Permit; and

3. Regional Board staff indicated that the Board would have to resolve our issues with several new provisions of the draft MS4 Permit addressing unpaved roads, inspection programs and monitoring requirements, all requirements that exceed the provisions of the Orange County MS4 Permit.

Although the collaborative process has improved the draft MS4 Permit with respect to several provisions of the Orange County MS4 Permit, Board staff also introduced several costly compliance and monitoring requirements, many of these requirements were introduced during the very latter part of the collaborative process. As described within this letter and its attachments, **the remaining issues and these new requirements result in a Permit that is economically infeasible** and has no substantiated nexus to demonstrated impairments of beneficial uses within the Santa Margarita Region caused by MS4 discharges. **At a minimum, the Priority issues outlined below must be addressed before the Copermittees can support the draft MS4 Permit.**

The Copermittees note that despite being directed to take several important issues to the Board, we have not been provided an opportunity for a formal or informal workshop before the Board. By contrast, the South Orange County MS4 Copermittees had at least three workshops and five formal hearings prior to adoption of that permit. Although we do not want to duplicate the Orange County renewal process, it is common practice to allow at least one workshop on significant permit issues before holding an adoption hearing. Given the issues outlined in this letter and in the attachments, there are numerous issues worthy of at least one workshop.

The Copermittees also have significant concern with the use of the South Orange County MS4 Permit as a model for our MS4 Permit area. As outlined in more detail throughout this letter and the attachments, the South Orange County and Santa Margarita Region MS4 Permit areas vary widely with regard to the water resources to be protected and available tax revenue to fund local programs and services, including compliance with MS4 permit requirements. Orange County has substantial coastal water resources with active recreational use, twice the population, and significantly higher tax revenues. The per capita cost for the residents within the Santa Margarita Region to comply with the requirements of the draft MS4 Permit is significantly greater than the per capita cost faced in South Orange County, with each dollar spent effectively hitting our residents three to four times harder. The expansion of regional program elements (e.g., coordination, monitoring, reporting, program development, effectiveness assessment) will result in an annual doubling of these costs, with a peak increase of nearly 300% for these programs alone. The Copermittees simply cannot economically support, nor does the Santa Margarita Region warrant, the same level of programs as South Orange County to protect our local receiving waters.

In summary, the meetings between Regional Board staff and Copermittee staff were honest, good faith and productive efforts to bridge the gaps between the requirements of the Orange County MS4 Permit and the specific needs of, and resources available to, the Upper Santa Margarita Watershed (the draft MS4 Permit area). However, given the constraints identified herein, the differing impacts on beneficial uses and current economic realities, the current draft MS4 Permit cannot be supported by the Copermittees.

> ***The Copermittees, therefore, request that the Board direct staff to work with the Copermittees to resolve the issues identified in this letter prior to considering adoption of the Permit.***

In the interest of developing economically feasible requirements for Board consideration, the balance of this letter and its attachments propose and justify changes to the draft MS4 Permit that will reduce costs to an achievable level, while continuing to raise the bar, where appropriate, to effectively protect the beneficial uses of receiving waters in the Santa Margarita Region. Please note that the Copermittees have many other concerns in addition to those identified in this letter with provisions in the draft MS4 Permit. These concerns are discussed in the Attachments to this letter, the redline of the Permit and the letters drafted by individual Copermittees.

BACKGROUND

Receiving Waters and Water Quality Conditions

This draft Permit proposes to regulate discharges from the MS4 owned by the Copermittees within the Santa Margarita Region of Riverside County. The MS4 in the Santa Margarita Region primarily discharges into Murrieta and Temecula Creeks and immediate tributaries thereto.

Unlike several of the watersheds in South Orange County, which exhibit perennial flow, the Santa Margarita Region is an ephemeral watershed. The only areas of perennial flow in the Santa Margarita Region are located at the formation of the Santa Margarita River right at the County line and in mountain areas outside of the urbanized areas serviced by the MS4s. The creeks in the urbanized areas of the watershed serviced by the MS4s are ephemeral and flows are only observed during and immediately after significant storm events. Any non-stormwater flows quickly disappear by seepage into the alluvial sands. Additionally, rising groundwater has been observed in Murrieta and Temecula Creeks for a short distance at various locations upstream of the confluence with the Santa Margarita River; however such conditions existed prior to urbanization.[1]

Since the initial MS4 permit was issued in 1990, the Copermittees have been actively and successfully implementing programs to manage their MS4 discharges. As described in the 2009 report of waste discharge (ROWD) submitted by the Copermittees, there have been no statistically

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[1] [1] State of California Department of Public Works Division of Water Resources, Bulletin No. 57, "Santa Margarita River Investigation," Volume I, June 1956, p. 48.

significant increases in pollutant concentrations since issuance of the initial MS4 permit in 1990, despite the fact that the Santa Margarita Region has experienced over 300% population growth over the same time period. Further, although staff points out several recent 303(d) listings as basis for the need to enhance regulations, these listings were based on data that mostly predates our existing management programs implemented under the 2004 NPDES MS4 Permit. Further, the Permittees have submitted additional data for the current round of listings that should result in the removal of some of these additional listings based on more recent data. Additionally, the likely sources of these impairments include natural background concentrations in soils and groundwater (iron and manganese), natural and/or agricultural source loads (nutrients, total dissolved solids, sulfates and bacteria), and/or federally authorized uses of products (pesticides and copper). Although all of these sources can have urban components, it is also clear that these sources are mostly non-point in nature and not solely urban sourced, as implied in the Fact Sheet and Findings.

Proactive Permittee Programs to Protect Local Resources

Murrieta and Temecula Creeks and their tributaries are an important economic, environmental and social resource for the Santa Margarita Region. The Copermittees are cognizant of these benefits and have implemented or initiated proactive programs beyond the requirements of the current and previous MS4 permits to ensure that these resources remain viable and are protected for future generations. These programs are described in Attachment 1 and include:

- Integrated Planning, including the development of an Integrated Regional Water Management Plan that is actively coordinated with San Diego and Orange Counties.

- Management of New Development, including a progressive LID BMP implementation program five years in the making. The program includes a comprehensive LID BMP design manual, proposed public maintenance mechanism and a $3,000,000 LID BMP Testing and Demonstration Facility.

- Water Quality Monitoring and Assessment, including active participation in the Southern California Stormwater Monitoring Coalition, California Stormwater Quality Association (CASQA) and Santa Margarita Region Executive Management Team, and including funding of several special studies designed to improve the science of stormwater management.

- Statewide Stormwater Leadership, including active leadership in promoting changes in the regulations of pesticides at the state and federal level and strong leadership and representation within the CASQA organization.

- Habitat and Aquatic Resource Conservation, including development of the largest and most comprehensive Multiple Species Habitat Conservation Plan in California.

Economic Conditions

As the draft MS4 Permit for the Santa Margarita Region of Riverside County was modeled on the MS4 Permit developed for South Orange County, it is important to carefully contrast the economic resources available to the Counties:

- The population of the Santa Margarita Region (289,765) is 48% less than the population of South Orange County (553,161).[2]

- The 2009 per capita income in Riverside County ($29,177) is 38% less than the per capita income in Orange County ($46,898).[3]

- The current unemployment rate in Riverside County is 15.3 percent, which is 56% higher than the unemployment rate in Orange County (9.8 percent).[4]

Property and sales tax revenues are the primary sources of funding for local programs and services, including compliance with MS4 Permit requirements. Based on population and average home value, South Orange County generates over <u>four times</u> the property tax revenue generated in the Santa Margarita Region. Based on data presented in the Los Angeles Economic Development Corporation's July 2010 Economic Forecast, South Orange County generates <u>2.6 times</u> the taxable sales generated in the Santa Margarita Region. As a less affluent area with a relatively small population, the Copermittees in the Santa Margarita Region receive significantly less property and sales tax revenue than municipalities in South Orange County and are less able to fund additional MS4 Permit compliance costs. These issues are discussed in detail in Attachment 2.

The recession also has impacted the economy in the Santa Margarita Region more than in South Orange County and it is projected that tax revenues will continue at a reduced level for an extended period, with **recovery not expected within the Permit term**. The poor economy has resulted in reductions of reserves to minimum levels and cuts or eliminations in virtually all local services and programs in the Santa Margarita Region. As a result any increases in funding for the water quality mandates contained in the draft MS4 Permit can come only by reducing funding for public safety or other existing state and federal mandates.

Modeling the draft MS4 Permit on the South Orange County permit represented a significant expansion of compliance requirements and compliance costs relative to the existing MS4 Permit issued to the Santa Margarita Region Copermittees. The requirements in the draft MS4 Permit have been expanded to include additional compliance and monitoring requirements beyond the South

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[2] Richard Boon, County of Orange, personal communication, September 1, 2010.
[3] Economic Forecast, Los Angeles Economic Development Corporation, July 2010.
[4] Monthly Labor Force Data for Counties, July 2010 – Preliminary, Labor Market Information Division, Employment Development Department, August 20, 2010. http://www.calmis.ca.gov/file/lfmonth/countyur-400c.pdf

Orange County permit, further increasing compliance costs. We would submit that such an approach is fundamentally unfair and could be viewed as arbitrary.

Approach to the Permit Renewal

As noted above, the Copermittees share the Board's goal of continually improving both the effectiveness and the efficiency of the MS4 compliance program. To that end, the Copermittees proposed program revisions in the ROWD that were designed to effectively manage/address the discharge of pollutants from their MS4, while making effective and responsible use of sharply reduced and further declining public funds. The ROWD recognized the Copermittees' proactive efforts and integrated those efforts into our recommendations for enhancing the MS4 Permit program. Further, the Copermittees met with Regional Board staff prior to the submittal of the ROWD in January 2009 to ensure that we had identified and addressed all of staff's concerns.

In March 2010, the Copermittees met with the Regional Board staff to discuss a collaborative process for renewing the draft Permit. At that time, the Executive Officer identified that the Board's fundamental goals for the renewal would be to develop a permit that is:

- Socially responsible;
- Environmentally responsible;
- Affordable; and
- Protective of water quality.

The Copermittees proposed initiating the discussions by focusing on the existing MS4 Permit and identifying what provisions needed to be changed to address local water quality conditions, the approach outlined in the ROWD. Regional Board staff preferred to start with the South Orange County permit and require the Copermittees to justify why programs in the Santa Margarita Region should be different than those proposed for Orange County. Regional Board staff also noted that none of the major provisions of the South Orange County permit could likely be altered, as that permit was now a model for the San Diego Region. In the interest of moving the process forward in light of the current economy, the Copermittees agreed to proceed based on the Board staff's terms.

Outcome of Discussions with Board Staff

The discussions resulted in several improvements to the draft Permit including:

- Streamlined and more useful reporting and effectiveness assessment requirements.
- Greatly improved Development Planning / Low Impact Development (LID) requirements (further discussed in Attachment 3).

- Language clarifications to more clearly state the intent of various requirements and to eliminate ambiguity.

- Enhanced understanding of the permit requirements and intent.

However, the addition of several new requirements not originally in the Orange County MS4 Permit as well as the constraints of working from within the boundaries of the existing Orange County MS4 Permit, resulted in an economically infeasible draft MS4 Permit that exceeds the water resource protection needs of the Santa Margarita Region and is too expensive for implementation by the Copermittees. Unless the permit requirements are revised to address specific local needs and resources, the Copermittees will not be able to implement the Permit requirements in a manner that is protective of water quality.

PRIORITY ISSUES AND SOLUTIONS

The Copermittees have identified specific and focused changes to the Permit that will allow the Copermittees to address staff's primary water quality concerns, while reducing compliance costs in a manner that is appropriate for the local watersheds. As previously noted, Board staff has directed the Copermittees to bring these changes directly to the Board for consideration, although we are hopeful that by summarizing them in writing that they may be addressed ahead of the scheduled October 13th hearing.

Monitoring and Reporting Program (Attachment 4)
Prior to the submittal of the ROWD, the Copermittees met with Board staff to propose changes to the Monitoring and Reporting Program (MRP). In these discussions, Board staff identified two areas for needed improvement:

- Relocation of Illicit Connection / Illicit Discharge (IC/ID) monitoring stations to MS4 outfalls, and

- Incorporation of Action Levels

In more recent discussions, Board staff noted that the MRP needed significant modification to reflect the South Orange County MRP, but would be scaled to be appropriate to the smaller Santa Margarita Region.

Unfortunately, the final MRP requirements have been expanded well beyond the South Orange County MRP requirements, resulting in a program that is completely out of proportion with the needs and resources of the Santa Margarita Region. In fact, the proposed MRP requirements will result in a **500% increase in monitoring program costs**, costing our residents **over two and a half times the per capita costs for South Orange County**.

Per Capita Monitoring Cost Comparison

Draft Permit	OC Permit
$5.13 per capita	~$2.00 per capita

The Copermittees recognize that monitoring and data collection is necessary. However, the MRP requirements exceed what is necessary to address management questions related to water quality, are beyond requirements dictated in the South Orange County MRP, and are beyond the Copermittees' ability to fund. Not only are the level of requirements inappropriate for the Santa Margarita Region, but they disregard the economic realities faced by the Copermittees. As such, the MRP falls far short of meeting the Executive Officer's stated goals of affordability.

In the interest of finding ways to offer Board staff a comparable program in a more cost effective and appropriate manner, the Copermittees have identified nine adjustments to the MRP that will **save approximately seven hundred and eighty thousand dollars ($780,000)** ***annually*** and bring per capita monitoring costs more in line with the South Orange County MRP, while maintaining the core components of the MRP. Table 1 summarizes the key changes and the respective cost savings. It is important to note that any change highlighted in RED reflects bringing the program in line with the South Orange County MRP. Figure 1 below shows graphically the comparative costs for the draft MRP with and without the requested adjustments. Please note that the 100% baseline in Figure 2 reflects the current cost of the Copermittees' current MRP.

Table 1 - Cost Savings resulting from proposed MRP changes[1]

Component	Requested Change	Cost reduction
Mass Loading Stations	1) Wet Weather - 3 wet -> 2 wet	**~$79,000**
	2) Dry Weather - Composite -> Grab	**~$66,000**
Toxicity Testing (MLS and Bioassessment)	3) 3 organisms -> 2 organisms	**~$14,000**
Bioassessment	4) 6 stations -> 3 stations	**~$158,000**
	5) 2X each -> 1X each	**~$95,000**
Action Levels	6) 'Representative Number/Percent' -> Representative - and remove 'within each sub area'	**~$241,000**
	7) SAL Composites -> Grab	**~$165,000**
Inland Aquatic Habitat Monitoring	8) Eliminate requirement	**~$140,000**
Special Studies	9) 6 special studies -> 4 studies, and Replace with more locally appropriate studies	**~$220,000/year**
TOTAL ESTIMATED SAVINGS	Net savings of all recommended changes (annualized)	***~780,000/year***

Note: Red text refers to requirements currently in the South Orange County MRP.

1. See Attachment 4 for detail descriptions of requested changes.

Figure 1

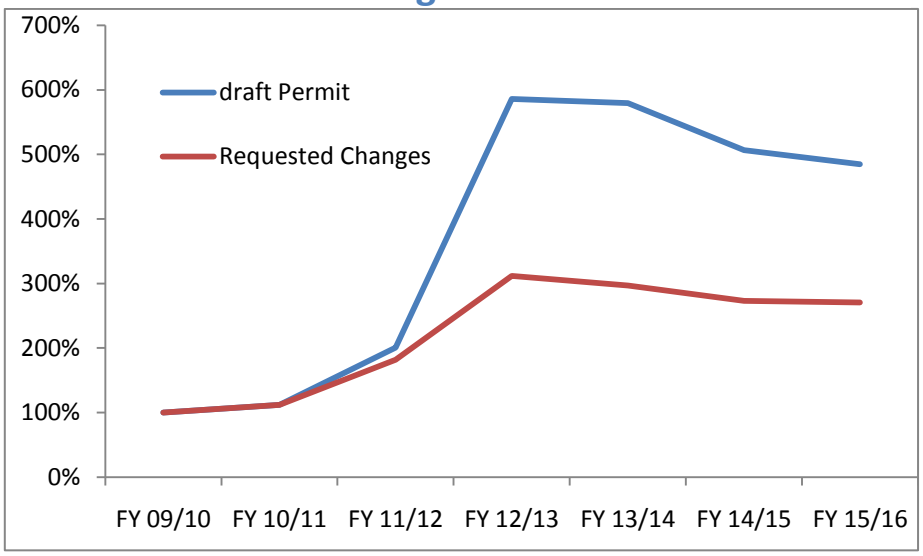

Draft Permit	OC Permit	Proposed Changes
~~$5.13/ per capita~~	~$2.00/per capita	**$2.54/per capita**

Although the requested adjustments to the MRP will not eliminate cost increases, and will result in an MRP which is more expensive, on a per capita basis, than the South Orange County MRP, they provide a more manageable program for the Copermittees.

The Copermittees request that the Board make the adjustments identified in Attachment 4 above before Permit adoption.

Each of these requested adjustments and justifications for each is further discussed in Attachment 4 to this letter.

Unpaved Roads Requirements (Sections F.1.i, F.3.a.(11), F.3.c.(5))
The requirements for unpaved roads are particularly cumbersome, onerous and unreasonable. Our detailed analysis of these requirements is provided in Attachment 5. In summary, the proposed unpaved road requirements may result in substantial and unnecessary additional Copermittee costs that are not justified by the facts in the Santa Margarita Region. The Copermittees believe that the existing MS4 Permit requirements for new development, construction, maintenance and IC/ID adequately address regulation of unpaved roads that threaten water quality. If the Regional Board believes that unpaved roads require further regulation, the Copermittees believe that the appropriate regulatory mechanism is a general permit (Waste Discharge Requirements or NPDES permit) that would apply to *all* unpaved roads in the San Diego Region, rather than only those that are under the jurisdiction of the Copermittees.

The Copermittees request that Sections F.1.i, F.3.a.(11) and F.3.c.(5) regulating unpaved roads be deleted from the draft MS4 Permit.

However, should the Water Board insist on retaining unpaved road requirements in this Permit, the Copermittees request the following revisions. These revisions are needed to ensure that all parties have a clear understanding of the requirements as clarified in Attachment 9. In summary, the Copermittees request:

- Clarification that these requirements apply to those unpaved roads that the Copermittees maintain in their road system.
    - This should be commonly understood, but the clarification is important to include due to complex legal limitations and rights associated with access, ownership, and maintenance of unpaved roads.
- Removal of language that specifies specific BMPs that must be implemented.
    - Specifying the method of compliance is prohibited pursuant to CWC Section 13360, and inappropriately forces the Copermittees to adopt particular solutions that may not best fit the situation.
- Removal of requirement for BMPs for private unpaved roads.
    - The proposed requirements would require the creation of an additional and unnecessary program element addressing privately owned unpaved roads. The Copermittees believe that a focused public outreach program should be implemented to educate property owners and associations about the need to properly maintain unpaved roads. This education program combined with existing IC/ID enforcement capabilities seems a more reasoned and responsible response to addressing this issue.

Should Sections F.1.i, F.3.a.(11) and F.3.c.(5) regulating unpaved roads not be removed from the Permit, the Copermittees request they be modified as noted above. Specific redline edits to address the requested changes are contained in Attachment 9.

Post-Construction BMP Inspections

Section F.1.f of the draft MS4 Permit includes new requirements for the Copermittees to verify that Post-Construction BMPs are being appropriately maintained. The new requirements appropriately develop a risk-based approach to inspections, defining eight factors that the Copermittees must consider in determining 'high-priority' projects.

However, language in Section F.1.f.(2)(a) removes that discretion by stating:

> *'At a minimum, high priority projects include those projects that generate pollutants (prior to treatment) within the tributary area of a 303(d) listed waterbody impaired for that pollutant; or those projects generating pollutants within the tributary area for an observed action level exceedance of that pollutant.'*

This language is excessively broad, and will require virtually all sites in the watershed to be designated as 'high priority' and, therefore, subject to annual inspections. This language is inconsistent with the goals of a socially responsible and affordable permit and should be modified for several reasons:

- Inspections frequencies should be based on risk of discharge. Annual inspections are not needed for all sites that *generate* a specific pollutant. For example, if a site generates a pollutant associated with 303(d) listing, but the site retains runoff onsite or stores those pollutants indoors, annual inspections would be unnecessary. However, sites that store 303(d) listed pollutants outdoors or otherwise have a high risk of discharge should be inspected more frequently.

- The language dilutes Copermittee resources by requiring annual inspections of low-risk sites, preventing the Copermittees from appropriately concentrating resources on problematic sites/sources. This is because when an action level is exceeded then all parties in the watershed are assumed guilty until proven innocent.

While the Copermittees are not opposed to implementing a program to verify that these BMPs are being maintained, it is critically important that they be provided the flexibility to determine which sites warrant annual inspections. **Specifically, the Permittees request that the language in F.1.f.(2)(a) be amended as follows prior to adoption of the Permit:**

> *At a **minimum**, high priority projects include those projects that ~~generate pollutants (prior to treatment) within the tributary area of a 303(d) listed waterbody impaired for that pollutant; or those projects generating pollutants within the tributary area for~~ have been determined to be the source of an observed action level exceedance. ~~of that pollutant.~~*

Commercial and Industrial Inspections

Section F.3.b. of the draft Permit includes requirements to inventory and inspect Commercial and Industrial businesses. The draft Permit expands upon existing inventory and inspection requirements in two problematic ways:

- It requires significantly more businesses to be inspected, and

- It includes new requirements specifying what the Copermittees are required to inspect when they are onsite.

More inspections

Sections F.3.b.(1)(a)(i) and (ii) identify 42 categories of businesses that must be inventoried and inspected based on risk of pollutant discharge. However, Section F.3.b.(1)(a)(iii) adds virtually any business in the Permit area, independent of pollutant discharge risk:

> *'**All** other commercial or industrial sites/sources **within or directly adjacent to or discharging directly to receiving waters within environmentally sensitive areas** (as defined in Attachment C of this Order) or **that generate** pollutants tributary to an observed exceedance of an action level.' (Bold emphasis added)*

In effect, section F.3.b.(1)(a)(iii) adds the following additional businesses:

- EVERY business that is adjacent to (or within) an Environmentally Sensitive Area (ESA), regardless of whether the business generates or discharges any pollutants, and

- EVERY business that 'generates' pollutants which happens to be upstream of an action level exceedance, *regardless* of whether the site has ever *discharged any* pollutants.

This language expands the list of sites far beyond the current requirements, and well beyond those sites that actually pose a threat to water quality. This is clearly unnecessary and should be removed for several reasons:

- It inappropriately separates 'risk' from the 'response', by requiring the Copermittees to inspect businesses irrespective of the risk that the business poses to water quality. For example, this language would require the Copermittees to expend resources and time inspecting hair salons, office buildings and other activities that happen to be adjacent to an ESA. This inappropriate broad-brush approach to permitting actually works to discredit the Copermittees' NPDES programs and dilute resources, rather than enhancing protection of water quality.

- It will further remove the flexibility that the Copermittees need to be able to re-allocate resources to inspecting and following up with sites/sources that are problematic.

Therefore, the Copermittees request that the language in F.3.b.(1)(a)(iii) be amended as follows prior to adoption of the Permit:

> *All other commercial or industrial sites/sources ~~within or directly adjacent to or discharging directly to receiving waters within environmentally sensitive areas (as~~*

~~defined in Attachment C of this Order) or that generate pollutants tributary to~~ that have been determined to be the source of an observed exceedance of an action level.

Additional items to review during inspections

Section F.3.b.(4)(a) specifies what the Copermittees must review when performing an inspection. The new requirements in subsections (i) and (ii) to review BMP implementation plans, and review facility monitoring data, respectively, are an unnecessary new mandate. They should be removed for several reasons:

- The requirements burden the Copermittees with reviewing information that is required under General Permits and is the responsibility of the Regional Board to enforce.

- The requirements would significantly increase the inspection time for sites with General Permits and endanger an existing collaborative inspection program (Complaince/Assistance Program (CAP)) that leverages the time highly trained Environmental Health Inspectors spend onsite for Certified Unified Program Agencies (CUPA) and Food Services inspections to also conduct NPDES inspections. The CAP program not only utilizes highly trained Environmental Health inspectors, but also regionalizes the inspections and, therefore, provides multiple benefits including uniformity, reduction in total number of inspections and higher-quality inspections. The Environmental Health HazMat inspection program administrators have indicated that they cannot accommodate the additional time required to implement the new requirements, as they would unduly cut into their ability to meet their own state-mandated inspection frequencies.

- By virtue of eliminating the CAP program, the requirements would effectively mandate a more fractured and disconnected set of inspections for the businesses, contrary to CAL EPA mandates for consolidated inspections, and in turn diluting the effectiveness of the program.

The Copermittees request that the language in F.3.b.(1)(a)(iii) be amended as follows prior to adoption of the Permit:

(a) Inspection Procedures: Inspections must include but not be limited to:
- *(i) ~~Review of BMP implementation plans, if the site uses or is required to use such a plan~~;*
- *(ii) ~~Review of facility monitoring data, if the site monitors its runoff~~;*
- *(iii) Check for coverage under the General Industrial Permit (Notice of Intent (NOI) and/or Waste Discharge Identification Number), if applicable;*
- *(iv) Assessment of compliance with Copermittee ordinances and Copermittee issued permits related to runoff;*
- *(v) Assessment of the implementation, maintenance and effectiveness of the designated minimum and/or enhanced BMPs;*

Retrofit

Section F.3.d. proposes a program to develop an inventory of existing developments that may be candidates for future water quality retrofits. The requirement goes on to encourage the Copermittees to collaborate with local property owners to promote urban retrofit in an effort to accelerate reductions in pollutant loading from existing urban areas.

Although laudable, this requirement has two significant problems:

1) The program is self-defeating as it contains no "carrots" to lure private property owners into participating in the program. Any property owner that is interested in volunteering in this effort would be required to fully comply with all provisions of the draft MS4 Permit. This includes preparation of compliance documents such as SSMPs, LID and hydromodification studies, subjecting themselves to additional regulatory scrutiny through business and BMP inspection programs required by the MS4 Permit, and otherwise incurring a myriad of costs and requirements. These costs and requirements would provide a strong disincentive to participate in a retrofit program. This program will only work if it is modified to remove these disincentives.

2) Current and projected economic conditions will limit the interest and participation of private property owners. Long-term economic predictions for Riverside County indicate that assessed valuations and property values will likely remain stagnant for the term of this Permit. Similarly, sales tax and unemployment are not expected to significantly improve either.

Without Co-Permittee resources to supplement private retrofit projects, the current economic dis-incentives for private redevelopment that are built into the program and the current impact of the economy on private property owners, there is no real value to the program.

PREFERRED POLICY CHOICE: The Permittees strongly request that this program be deleted for the aforementioned reasons.

Alternatively, and at minimum, the Copermittees request that the schedule for completion of the retrofitting program be revised to provide for development during the term of the Permit and submittal of the proposed program with the next ROWD. This will allow the Copermittees to defer expenditures related to development of the program until later in the Permit term when it is hoped that economic conditions and local revenues will improve. The Copermittees expect few opportunities for retrofit until the economy improves. Due to the Copermittees' limited ability to require retrofit on private property, our best opportunities for retrofit may be associated with approvals of proposed modifications of existing developments.

ALTERNATE POLICY CHOICE: If the Retrofit requirements are not removed, the Copermittees request that the Regional Board modify Section <u>F.3.d. as follows:</u>

Each Copermittee must develop and implement a retrofitting program that meets the requirements of this section upon submittal of the ROWD.

Irrigation Runoff

The draft MS4 Permit categorically prohibits the discharge of landscape irrigation; irrigation water; lawn watering; (collectively 'irrigation runoff') and non-emergency fire fighting flow runoff to the MS4. The basis for this requirement comes from the current Orange County stormwater permit within the San Diego Region (NPDES No. CAS0108740), which prohibits such discharges.

Although irrigation runoff may have been shown to be a problem in South Orange County, it has **not** been shown to be causing problems in receiving waters in the Santa Margarita Region. Attachment 6 summarizes the unique conditions and other facts that warrant the restoration of irrigation runoff as a non-prohibited non-stormwater discharge category. It is important to reiterate the three key points made in Attachment 6:

- Unlike the watersheds in South Orange County, the Santa Margarita Region is an ephemeral watershed;

- Unlike South Orange County, the Copermittees have **not** identified landscape irrigation, irrigation water or lawn water as an actual source of pollutants or conveyance of pollutants to waters of the U.S.;

- The draft MS4 Permit requires Copermittees to eliminate irrigation runoff ***TO THE MS4,*** which by definition, requires elimination of discharges to streets, curbs and gutters.

As noted above, the prohibition appears to hold the Copermittees responsible for any amount of irrigation runoff discharged to the curb and gutter, *regardless* of whether or not the discharge ever reaches receiving waters or causes or contributes to the exceedance of a water quality standard. This fact, combined with the fact that irrigation runoff has not been shown to be causing impairments in the local receiving waters, will make enforcement difficult to justify with residents and will likely result in community outrage over bans on irrigation. Further the Copermittees are not water purveyors, and as such, have little control over residential irrigation runoff outside of sending code enforcement officers out to look for incidents of excessive irrigation runoff. This is a very inefficient use of resources. In any event, the provisions as written will do little for water quality but potentially much for community outrage against water quality programs. The Copermittees do not believe this is the intent of the Board.

It is further worth noting that the Permit already contains an investigation and remediation process via Non-Stormwater Action Levels (NALs) by which the Copermittees will identify the source of problematic non-stormwater discharges. Should the source be found to be a conditionally exempt non-stormwater discharge, the permit requires the Copermittees to address that discharge or the entire category of discharges as appropriate. By allowing the NAL process to determine when and where

conditionally exempt discharges need to be prohibited, the Copermittees are better positioned to justify any enforcement actions.

PREFERRED POLICY CHOICE: the Copermittees request that the Regional Board restore the conditional exemption for landscape irrigation, irrigation water and lawn watering as outlined in Attachments 6 and 7.

Alternatively, if the Regional Board nevertheless insists on prohibiting Irrigation Runoff, the Copermittees request that the draft MS4 Permit be revised to allow for irrigation runoff to be managed as a JRMP program, rather than as a prohibited discharge to the MS4. This alternative request is consistent with how the Permit currently deals with non-emergency fire fighting discharges, which was also removed from the list of non-prohibited non-storm water discharges. The Executive Officer stated that he would be open to consideration of a program for irrigation runoff that would address discharges from the MS4. This alternative approach allows the Copermittees to develop a program that focuses on irrigation runoff problem areas, as opposed to holding the Copermittees responsible for eliminating any instant case of over-irrigation to a street independent of threat to receiving water quality.

ALTERNATIVE POLICY CHOICE: The Copermittees request that the Regional Board clarify that irrigation runoff is only prohibited where it is discharged *from* an MS4 (into receiving waters) by adding the following language:

B.4. *As part of the JRMP, the Copermittees must develop and implement a program to address pollutants from landscape irrigation, irrigation water and lawn watering identified as significant sources of pollutants to waters of the United States.*

Legal Issues
The Copermittees have identified legal issues that raise fundamental questions regarding several of the key elements of the Tentative Order.

The Copermittees request review of the legal issues and revision of the Tentative Order prior to adoption.

Each of the legal issues and requested adjustments and justifications for each requested revision is further discussed in Attachments 7 and 8 to this letter.

CONCLUSION

It is fundamental that the MS4 Permit be economically, technically, and legally feasible. To be credible, and to pass legal muster, MS4 Permit requirements must demonstrable a nexus to water quality improvements. Instead the current requirements, although well intended but not always well

developed, will put the Copermittees in non-compliance since we cannot afford to implement all the requirements and consequently this will not lead to water quality improvement.

The present economic crisis has made daily headlines over the past three years and Riverside County has been identified as the 11th most impacted county in the nation. In the ROWD and throughout the development of the draft MS4 Permit, the Copermittees have provided abundant publicly available information regarding the impact of this crisis on their revenues, staffing, and programs. Virtually every program and service, including public safety services, has been impacted, and others have been eliminated. Contingency reserves have been depleted to the lowest levels allowable to maintain operations. At this point, the Copermittees cannot increase water quality compliance spending without real risks to reducing spending on existing state and federal mandates or other much-needed local programs and services. As proposed, the draft MS4 Permit is economically infeasible.

In an effort to promote a viable 4th-term MS4 Permit, the Copermittees proactively engaged Regional Board staff in a collaborative dialogue with the intent of developing an economically feasible MS4 Permit that was protective of receiving water quality in the Santa Margarita Region. However, the following constraints have limited the benefits of the process:

1. The discussions were curtailed because the Board expected the draft MS4 Permit to be heard in October;

2. The Board had adopted the South Orange County MS4 Permit as a "model" permit, and, therefore, would have to approve any major revisions to the provisions of that Permit; and

3. The inclusion of several new provisions of the draft MS4 Permit addressing unpaved roads, inspection programs and monitoring requirements go well beyond the Orange County Permit.

As noted in the Executive Summary, the MS4 Permit adopted for South Orange County was ultimately developed for a region with substantial coastal resources and perennial streams, twice the population, significantly higher property tax revenues, and more affluent tax payers.

By contrast, the ephemeral conditions found in the Santa Margarita Region result in stream channels that are dry during dry weather conditions and receive less rain during wet season conditions. The stream flow conditions in the Santa Margarita Region are entirely unlike the significant perennial flow conditions found in South Orange County. The proposed changes contained herein address these realities. The proposed changes also address necessary changes to ensure that the Copermittees can continue to afford implementation of the draft MS4 Permit given the significant economic disadvantages faced by the Santa Margarita Region, disadvantages that have been exacerbated by the impacts of the recession.

The requirements in the Permit must protect beneficial uses in a cost effective manner. It is always a balance to protect water quality and avoid unnecessary increases in program compliance costs. Balancing local water quality needs and funding limitations should be paramount in the current economic climate. Proposed program expansions must be carefully weighed against economic realities and be justified by conditions actually found in the Santa Margarita Region. As described, unpaved roads and business inspections have been effectively addressed by existing programs, yet the draft MS4 Permit proposes requirements that can only be met by establishment of new compliance programs and, in the case of the business inspections, elimination of the highly effective CAP.

The legislature created Regional Boards to protect our beneficial uses while carefully considering the technical and economical feasibility of such protection. Even in the best of economic times, state and local government must carefully manage public revenues. A policy-level decision by the Regional Board is necessary to direct staff to work with the Copermittees to address the comments contained herein. The Copermittees request your support in our effort to develop an economically, technically, and legally feasible MS4 Permit that is appropriate to the Santa Margarita Region. As noted in the opening Executive Summary of this comment letter we specifically request that you direct Regional Board provide staff with direction to resolve the issues identified in this letter and attachments.

Thank you for your time and consideration. We look forward to discussing this issue further at the October 13th hearing.

Very truly yours,

JASON E. UHLEY
Chief of the Watershed Protection Division

JEU:bjp

Attachment 1: Summary of Proactive Efforts to Manage Stormwater

Introduction

Murrieta and Temecula Creeks and their tributaries are an important economic, environmental and social resource for the Santa Margarita Region. As an example, Murrieta Creek serves as the backdrop for Old Town Temecula, an important local tourist attraction. Several ecological preserves that are utilized by local residents and tourists are also located within the Santa Margarita Region. The Permittees are cognizant of these resources and their benefits and have implemented or initiated proactive programs beyond the requirements of the NPDES MS4 Permits to ensure that these resources remain viable and are protected for future generations.

Integrated Planning

Upper Santa Margarita River Integrated Water Management (IRWM) Plan
The County of Riverside, Riverside County Flood Control and Water Conservation District (District) and Rancho California Water District proactively entered into an agreement to form this program to manage the Upper Santa Margarita River Watershed. These three agencies have proactively engaged tribes, local stakeholders, and other local, state and federal agencies in an effort to develop a comprehensive plan to manage the watershed. Further, we have also built bridges to the San Diego County and Orange County IRWM programs to ensure proactive inter-regional planning of cross-jurisdiction watersheds such as the Santa Margarita River Watershed. The three-party agreement reached by the IRWM programs within the San Diego Region is the only one of its kind in California.

Santa Margarita River Executive Management Team
The Permittees also coordinate more technical issues with San Diego County, the U.S. Bureau of Reclamation, Camp Pendleton, and other stakeholders to address coordination of monitoring and analysis of monitoring data within the region.

Murrieta Creek Flood Control, Environmental Restoration and Recreation Project
Murrieta Creek poses a severe flood threat to the cities of Murrieta and Temecula. Overflow flooding from the undersized creek has periodically wreaked havoc on the communities – most recently in 1993 when nearly $20 million in damages was incurred by the public and private sectors.

In 1997, at the request of District, the U.S. Army Corps of Engineers initiated studies on the Creek. The outcome of this endeavor was Congressional authorization in 2000 of a $90 million, multi-faceted project known as the Murrieta Creek Flood Control, Environmental Restoration and Recreation Project. What was once viewed only as a needed local flood control project was now a federally cost shared, community endorsed corridor project that would not only safeguard the two cities from the ravages of uncontrolled flooding, but would celebrate the unique character of the communities by restoring and enhancing the environmental distinctiveness of the Creek bottom, utilizing the top of the river banks for hiking, biking and equestrian trails, and developing a 240-acre flow attenuation basin that would encompass 160 acres of new environmental habitat and a 50 acre sports park. The project is currently undergoing design of Phase II.

Attachment 1: Summary of Proactive Efforts to Manage Stormwater

Management of New Development

LID BMP Design Manual

The County, with input from the Permittees has spent the last five years developing and field testing a manual promoting Low Impact Development (LID). The manual is due to be published by December 31, 2010. The development of the manual was informed by meetings with authors of key LID manuals from throughout the nation, field visits to existing LID BMP sites to evaluate design and maintenance characteristics, and years of research into design methodologies and water quality effectiveness data. The manual includes detailed design criteria, standard drawings, maintenance requirements and other key information that will ensure that LID BMPs deployed in the Santa Margarita Region will provide long-term water quality benefits.

Public BMP Maintenance Mechanism

The District has also been developing a plan for public maintenance of post-construction BMPs that meet specified requirements. This mechanism will go hand-in-hand with the release of the LID BMP Design Manual. Development projects that design their BMPs to the criteria in the manual and place the BMPs consistent with our guidelines will be able to opt into a public maintenance mechanism that will provide for consistent and ongoing maintenance of post-construction BMPs throughout the region.

Management of New Development

LID BMP Testing and Demonstration Facility

The LID BMPs incorporated into our LID BMP Design Manual are being incorporated into a $3,000,000 retrofit of the District's headquarters in the City of Riverside. The project will provide a regional center for LID BMP training and demonstration, include a five-year study to collect water quality and field data on the effectiveness of the BMP designs and maintenance programs, and facilitate a cycle of continuous improvement for LID BMP techniques.

Southern California Stormwater Monitoring Coalition

The Permittees voluntarily participate in a collaborative effort with the other Counties in southern California to conduct special studies to advance the science of stormwater management. These studies include regional bioassessment programs, inter-lab calibration programs, hydromodification management studies, programs to develop the scientific methods used to monitor for toxics, biological indicators and chemistry, and more.

Statewide Stormwater Leadership

Pesticide Regulation

The Permittees have proactively met with management of California Department of Pesticide Regulation and USEPA staff regarding negative receiving water impacts of authorized pesticides use in California. District staff have also submitted multiple comments and provided testimony at applicable state and federal listening sessions regarding the need to change the regulatory framework to better protect receiving waters.

Attachment 1: Summary of Proactive Efforts to Manage Stormwater

California Stormwater Quality Association (CASQA)

The District proactively participates in the activities of this pre-eminent organization addressing stormwater issues in California. District staff serves on the Board of Directors, as the Chairs for the Legislative Committee and Conference and on several committees including Monitoring, Pesticides, and Policy and Permitting. This organization and these committees are developing the programs and science that are driving the management of stormwater programs forward.

Habitat and Aquatic Resource Conservation

Western Riverside County Multiple Species Habitat Conservation Plan (MSHCP)

The Permittees have established the MSHCP to identify and proactively protect critical habitat for threatened and endangered species in Riverside County. The MSHCP establishes several key linkage corridors along existing streams and creeks to ensure protection of the habitat and safe paths of migration for species. The MSHCP will ultimately conserve over 40% of the lands within the Santa Margarita Region of Riverside County. Further, the plan proposes to purchase and preserve several of the remaining natural stream systems in the region for use as habitat conservation and species corridors.

Special Area Management Plan (SAMP)

The Permittees have also entered into ongoing negotiations with the San Diego Regional Water Quality Control Board and United States Army Corps of Engineers staff regarding a SAMP to proactively identify and protect the most important aquatic resources in the Santa Margarita Region of Riverside County.

Economic Assessment
Draft 2010 Santa Margarita Region MS4 Permit
September 2, 2010

The Draft Municipal Separate Storm Sewer System Permit (Draft Tentative Order No. R9-2010-0016; NPDES No. CAS0108740) for the Santa Margarita Region of Riverside County (draft Permit) proposes new and expanded compliance requirements that would significantly increase the Copermittee compliance costs. Further, the draft Permit expands the compliance requirements and compliance costs beyond those required by the recently adopted MS4 Permit for South Orange County, a more populous and affluent area with significantly greater tax revenues to support the compliance programs. These additional requirements and costs are proposed at a time when the Copermittees have been severely impacted by the most significant economic downturn since the Great Depression. These impacts include high levels of unemployment and homes in default, sharply reduced Copermittee revenues and increased demands on public services. Moreover, these impacts have fallen disproportionately on communities in Riverside County relative to South Orange County and San Diego County, due in large part to the crash of the housing market.

Due to their reduced revenues, the Copermittees budgets and staffing have been significantly reduced for virtually all services and programs operated by the Copermittees, including police, fire, and paramedic services. Funding has been focused on essential public safety and existing state and federally mandated programs. Increases in funding for the water quality mandates contained in the draft Permit can only come from reduced funding for these basic priorities. Therefore, the expanded compliance requirements proposed in the draft Permit are economically infeasible. This paper describes the general economic conditions in the Santa Margarita Region, the Copermittees' current budget and budget projections, their assessment of projected increases in compliance costs, and economic forecasts provided by other parties.

POPULATION

Riverside County, which is subject to three NPDES MS4 permits, has a total population of 2,153,186. However, only 289,765 persons (approximately 13 percent) reside within the Santa Margarita Region.[1] Population and housing projections for the Santa Margarita Region are summarized in Table 1. MS4 discharges in Riverside County are regulated by separate NPDES stormwater permits issued by the Colorado River, Santa Ana, and San Diego Regional Water Quality Control Boards. Although these three MS4 permits address the same federal regulatory requirements, the provisions in the draft Permit are often not well aligned with the requirements of the other two MS4 permits. As such, the cost for complying with those requirements is borne entirely by the 289,765 residents within the Santa Margarita Region.

[1] Riverside County Projections 2010 (RCP-10), Transportation and Land Management Agency, Administrative Services, Center for Demographic Research, June 23, 2010.

Attachment 2: Economic Assessment

Table 1: Santa Margarita Region Population & Housing Projections 2010[2]

	Population / Housing Units		
Jurisdiction	**2010**	**2015**	**2020**
Murrieta	101,680/34,812	105,513/36,162	109,343/37,512
Temecula	102,727/33,194	109,136/35,270	112,242/36,321
Wildomar	32,720/11,123	37,289/12,722	42,475/14,537
Unincorporated	52,638/17,546	54,584/18,195	59,878/19,959
Total	**289,765/96,675**	**306,522/102,349**	**323,938/108,329**

CURRENT ECONOMIC CONDITIONS

Unemployment

Higher unemployment directly impacts the revenue streams available to the County and the Cities for funding programs and services. As illustrated in Figure 1, the unemployment rate in Riverside County is currently 15.3 percent, which is 42 percent higher than the unemployment rate in San Diego County (9.8 percent) and 56 percent higher than the unemployment rate in Orange County (9.8 percent).[3]

SOURCES OF LOCAL REVENUE

The Copermittee's primary revenue sources for implementation of programs and services are property taxes, sales taxes, and development/construction permit fees. Each of these sources has declined substantially since the beginning of the recession in FY 2006/2007. The 2009 per capita income in Riverside County ($29,177) is 31% lower than the per capita income in San Diego County ($42,094) and 32% lower than the per capita income in Orange County ($46,898).[4] The population of the Santa Margarita Region (289,765) is 48% lower than the population of South Orange County (553,161[5]) and 91% lower than the population of San Diego County. As a less affluent area with relatively small

[2] Riverside County Projections 2010 (RCP-10), Transportation and Land Management Agency, Administrative Services, Center for Demographic Research, June 23, 2010.

[3] Monthly Labor Force Data for Counties, July 2010 – Preliminary, Labor Market Information Division, Employment Development Department, August 20, 2010. http://www.calmis.ca.gov/file/lfmonth/countyur-400c.pdf

population, the Santa Margarita Region has far less revenue than South Orange County and San Diego County to fund local programs and services, and MS4 permit compliance costs.

Per Capita Income[6]

	Riverside County	Orange County	San Diego County
2006	29,148	49,098	42,110
2007	29,950	49,790	43,816
2008	30,088	49,650	44,438
2009	29,177	46,898	42,094
2010 (forecast)	28,117	47,435	42,651

Figure 1. Unemployment Rates of California Counties (title for figure on next page)

[4] Economic Forecast, Los Angeles Economic Development Corporation, July 2010.
[5] Richard Boon, County of Orange, personal communication, September 1, 2010.
[6] Economic Forecast, Los Angeles Economic Development Corporation, July 2010.

Attachment 2: Economic Assessment

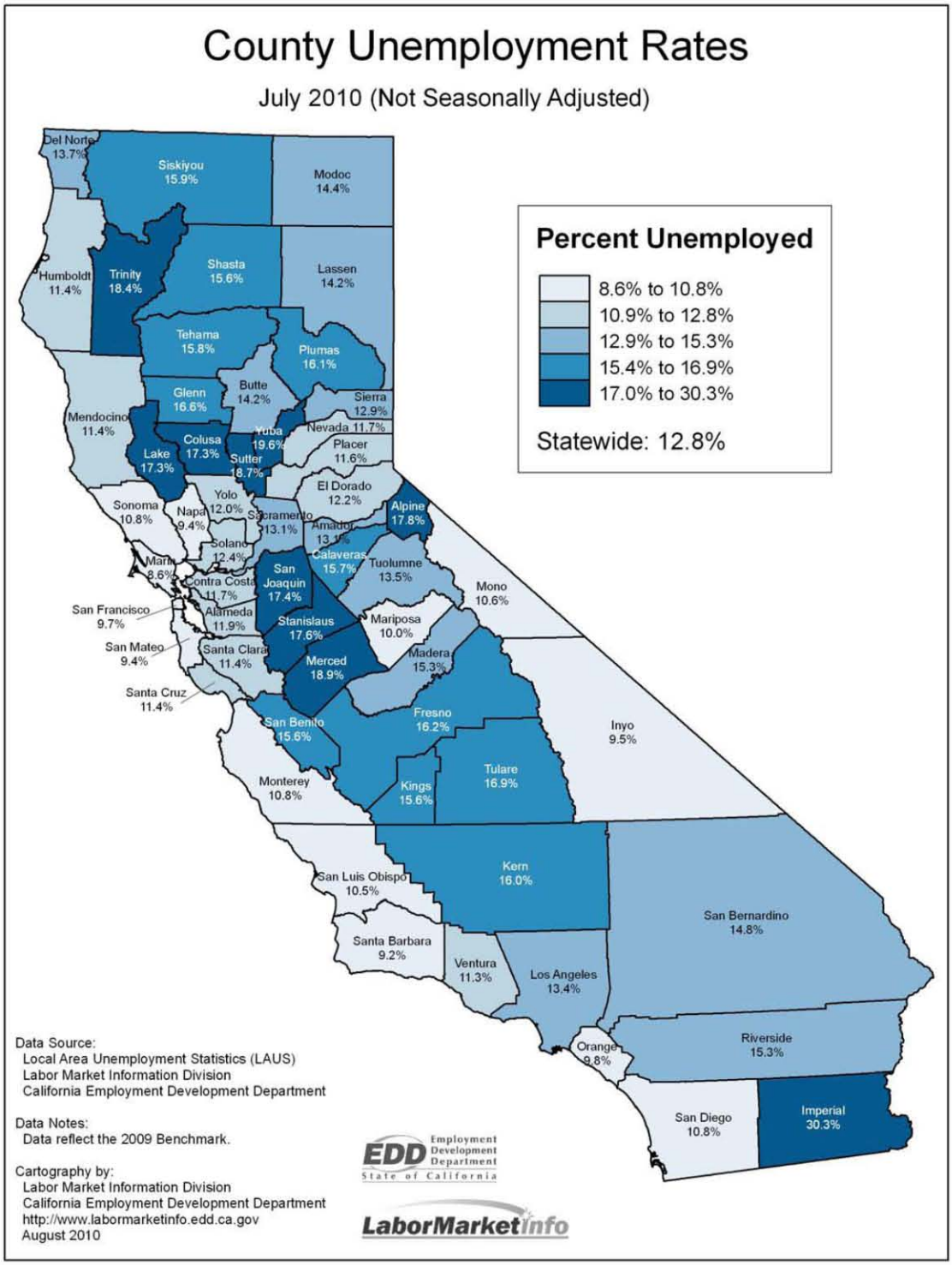

Home Values/Property Tax Revenue

Property tax revenue, which is a major source of funding for the County and Cities, is a direct function of the total inventory of real estate and the assessed values of the real estate. With a small population relative to South Orange County and San Diego County and a limited amount of commercial and industrial property, the Santa Margarita Region is supported by a much smaller inventory of real estate from which to obtain property tax revenue. The high rate of foreclosures in Riverside County has also resulted in significant declines in real estate values and, consequently, property tax revenue. The Riverside County Auditor-Controller projects that property values will fall over 10 percent in FY 2009-10 and could fall further in FY 2010/2011.[7] Figure 3 illustrates the decline in median home values in the Santa Margarita Region and South Orange County. Although home values in both areas have declined, home values in the Santa Margarita Region have declined at a greater rate and the difference in home values between the two areas has grown with the recession.

Figure 3. Median Home Values[8]

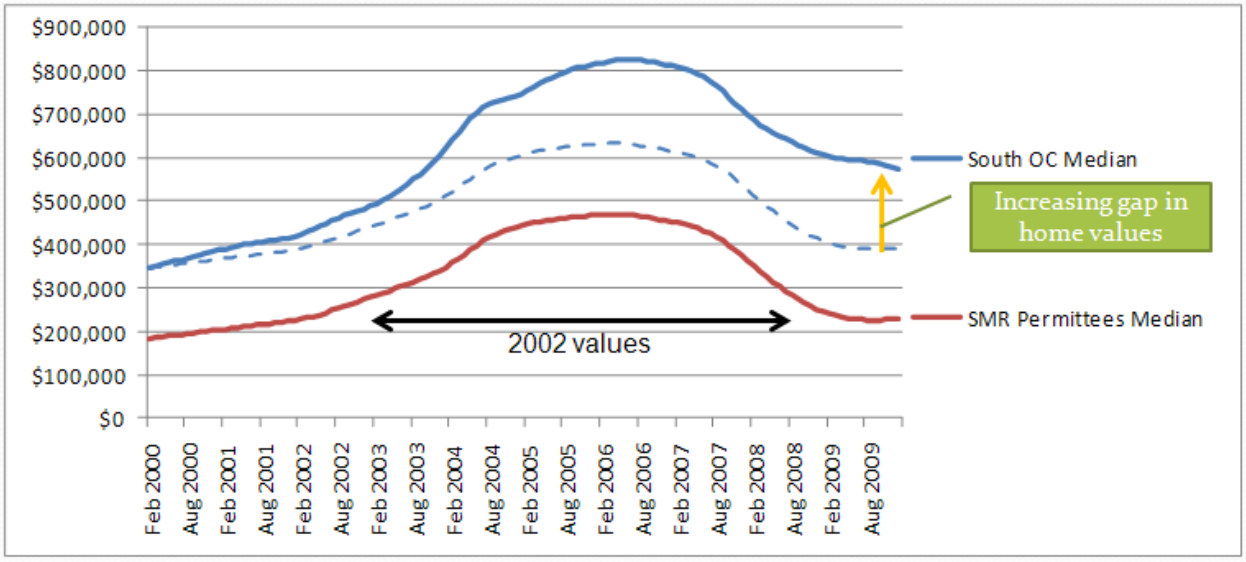

The Inland Empire (Riverside and San Bernardino Counties) registered more defaults and foreclosures than any other area of Southern California.[9] The Inland Empire was ranked No. 5 in nationwide foreclosure activity during the first half of 2010, with almost 4.5 percent of households in default. A total 63,717 mortgage default notices, auction sale notices, and bank repossessions were recorded in the Riverside-San Bernardino-Ontario metropolitan area between January and June 2010, according to RealtyTrac. Accordingly, one in 23 households were in some stage of foreclosure during this six-month period. Additionally, almost 45 percent of homeowners with a mortgage in Riverside and San Bernardino Counties owe more on their homes than the homes are worth. As illustrated in Figure 3, Orange County

[7] Comprehensive Annual Financial Report of the County of Riverside for the Fiscal Year Ended June 30, 2009, Robert E. Byrd, Riverside County Auditor-Controller, December 9, 2009. P. vii. http://www.auditorcontroller.org/opencms/publications/FinancialPub/cafr/CAFR_2009/Introductory.pdf
[8] Source: www.zillow.com
[9] Economic Forecast, Los Angeles Economic Development Corporation, July 2010, p. 50.

and San Diego County have not been impacted by "upside-down mortgages" to the same extent as has Riverside County.

Figure 3. "Upside-Down Mortgages"

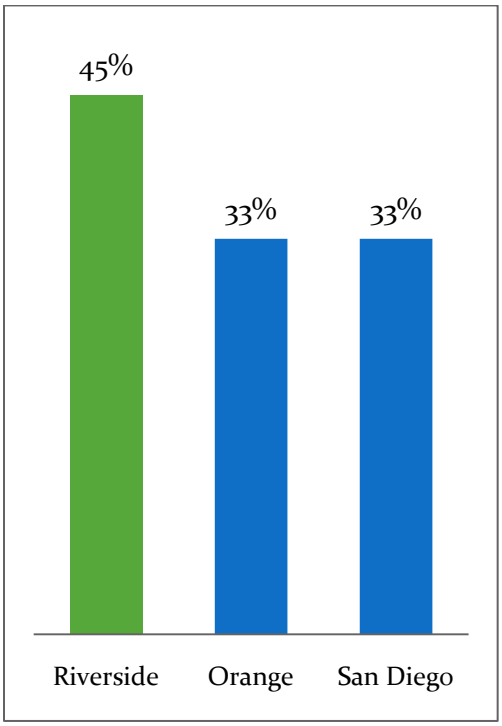

One expert, Professor Mason Gaffney of the UC Riverside Economics Department believes that the housing market is in a vicious cycle simply because there are too many homes. According to Professor Gaffney, because demand is down, prices will go down, and more people will go "upside-down" on their mortgage, and then go into foreclosure. Professor Gaffney estimates that the bottom of the housing market will not be seen for another three years, due to the previous overbuilding in Riverside County.[10]

Although the recession has impacted property values throughout Southern California, Riverside County remains at a distinct disadvantage relative to Orange and San Diego Counties. The average home value in Riverside County is $207, 900, which is 58% less than the average home value in South Orange County ($499,500) and 45% less than the average home value in San Diego County ($378,800).[11] As a result, property tax revenues per home in Riverside County are 58% less than in Orange County and 45% less than in San Diego County. The larger populations and number of homes in Orange and San Diego Counties multiply this disparity in property tax revenue that can be used to help fund NPDES compliance programs. Based on population and average home value, South Orange County generates over <u>four times</u> the property tax revenue generated in the Santa Margarita Region, and San Diego County generates <u>20 times</u> the property tax revenue of the Santa Margarita Region. Clearly, the Copermittees in the Santa Margarita Region receive significantly less property tax revenue than either Orange or San Diego Counties and are less able to fund additional MS4 permit compliance costs.

[10] Ibid.
[11] Zillow Home Value Index – Riverside County, Zillow.com. August 10, 2010.

Attachment 2: Economic Assessment

Sales Tax Revenue

The next most significant revenue source for program funding is sales tax. Sales tax revenue is a function of population and relative income. As described, the Santa Margarita Region has a less affluent and smaller population than South Orange County and San Diego County on which to generate sales tax revenue.

The high levels of unemployment in Riverside County have reduced disposable income which has further depressed sales tax revenues. Retail sales in Riverside County fell by nearly 27% in 2008 and 2009.[12] Statewide sales and use tax revenues for the second quarter of 2010 declined approximately 10.4 percent. Additionally, taxable sales for the first quarter of 2010 remained flat compared to a year earlier.[13] Although data specific to the Santa Margarita Region is not available, it is anticipated that taxable sales have been impacted more significantly than in Orange and San Diego Counties due to the higher unemployment rate in Riverside County.

Taxable sales are directly proportional to sales tax revenue. Based on data presented in the Los Angeles Economic Development Corporation's July 2010 Economic Forecast, South Orange County generates 2.6 times the taxable sales generated in the Santa Margarita Region and San Diego County generates 13.3 times the taxable sales of the Santa Margarita Region. Clearly, the Copermittees in the Santa Margarita Region receive significantly less sales tax revenue than either Orange or San Diego Counties and are less able to fund additional MS4 permit compliance costs.

Development and Construction Permit Fees

Prior to the recession, development and construction permit fees funded a variety of compliance activities related to review, approval, inspection and enforcement associated with development and construction activities. Since the recession, revenues from these fees have been virtually eliminated. As a result, Copermittee inspection and enforcement of development and construction activities, including abandoned projects, has been funded by the Copermittees' general funds. General fund budgets are in turn supported by sales and property tax revenues which, as described, have declined significantly.

New Fees or Taxes

Another potential source of funding would be the establishment of a new fee or tax. Such revenues would be subject to the requirements of Proposition 218. Recent efforts to pass supplemental fees have been mixed and given the current economic conditions, this option appears infeasible. For example, on the March 2006 ballot, an attempt by the City of Encinitas to pass a Clean Water Fee was defeated by the voters.[14] It is notable that this rejection of a Clean Water Fee occurred prior to the recession in a relatively affluent coastal city.

Economic Forecasts

The Riverside County Executive Office assessed Riverside County's economy in a report to the Board of Supervisors submitted with the FY 2010/2011 Recommended Budget. In this assessment, it was noted that the economy is still staggering and that economic news has been mixed. Although a slightly rising

[12] Economic Forecast, Los Angeles Economic Development Corporation, July 2010, p. 51.
[13] News release "Local Sales Tax Allocations Reduced in Many Areas of the State," California Board of Equalization, August 27, 2010. http://www.boe.ca.gov/news/2010/92-10-G.pdf
[14] FY 2008-2009 JURMP Annual Report, City of Encinitas, p. 10-3.

stock market and other nationwide measures could be interpreted to signal improvement, persistently high unemployment and personal and national debt call for caution, and a double-dip recession is possible. Locally, while some experts project revenues will shrink again in FY 2011/2012, Riverside County's economic consultants foresee a long and gradual muted recovery and the County will be managing with drastically reduced budgets for an extended period. Budget reductions of approximately $21 million are projected for FY 2011/2012. The County projects that it will see a balanced but significantly reduced budget in FY 2012/2013, with a total budget of $670 million (compared to $736 in 2007). Based on this assessment and reports in the media, it appears that the economy in Riverside County will stabilize at a reduced level and may not recover during the term of the SMR MS4 Permit.

Projected Increases in Compliance Costs

The draft Permit proposes a significant expansion of compliance requirements that would significantly increase the Copermittee compliance costs. The draft Permit was developed by starting with the MS4 Permit for South Orange County. The requirements proposed in the draft Permit that would significantly increase compliance costs include:

Regional Compliance Requirements

- Monitoring and special studies (See Attachment 4)
- Hyrdomodification Management Plan (including monitoring)
- Retrofit study
- Other general program updates (JRMP)

Individual Copermittee Compliance Requirements

- Enforcement of Irrigation runoff prohibition (See Attachment 6)
- Significantly Increased business and BMP inspections
- BMP retrofit requirements
- Regulation of unpaved roads (See attachment #5)
- Hydromodification requirements
- Monitoring Source Identifications
- Expanded IC/ID requirements

Estimates for implementation of the regional compliance requirements have been prepared and Figure 4 illustrates the disparity between projected Copermittee revenues and costs for implementation of the proposed regional programs. Due to the fact that calculating costs for implementing entirely new programs is excessively difficult, cost estimates for the implementation of individual Copermittee compliance requirements have not been completed, although it is expected that their individual costs will parallel the regional costs presented in Figure 4.

Figure 3. Projected Revenues vs MS4 Permit Compliance Costs

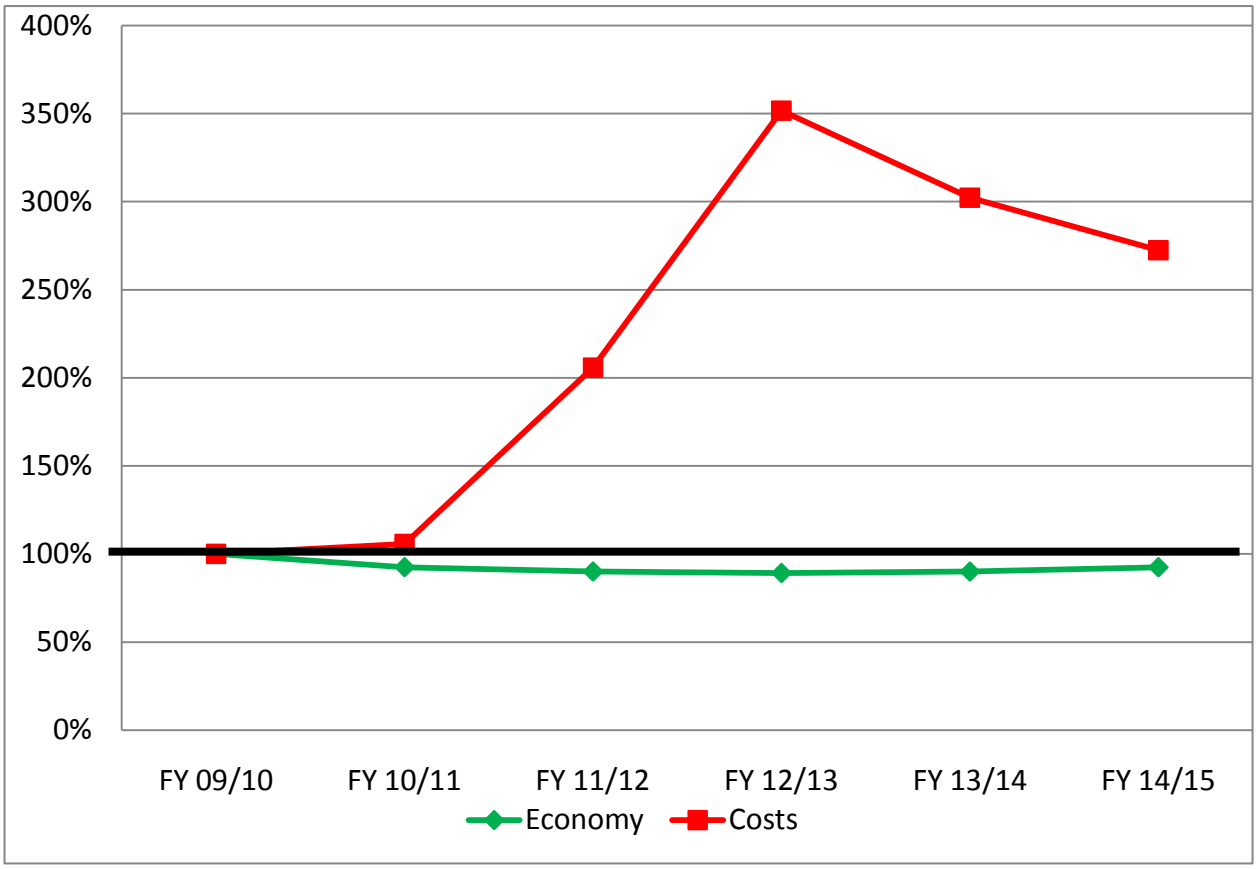

ECONOMIC SUMMARY

As all sources of revenues have been reduced significantly, the Copermittees have been required to reduce staffing through layoffs, attrition and furlough; reduce funding across the board for public services and programs, and, in some cases, completely eliminate public services and programs. For example, it is estimated that County of Riverside staffing has been reduced by 2,500 since FY 2006/2007 mostly in the form of early retirement and layoffs. It is estimated that an additional 500-700 staff positions will be eliminated by the County in FY 2011/2012.

Due to the loss of revenue, virtually all Copermittee programs or services have been reduced, including fire and police. As an example, the Riverside County FY 2010/2011 Recommended Budget for Riverside County proposes:

- Public safety department cuts of 3 – 5 percent
- Other department cuts averaging 19 percent
- Continued staff reductions

Attachment 2: Economic Assessment

After three years of modest cuts culminating in a 25% decrease, the Board of Supervisors approved an additional 19% cut in the general fund and a 4% cut to public safety for FY 2010/2011. These additional cuts will decrease spending by an additional $71 million. The remaining budget gap will be filled from general fund reserves set aside for economic uncertainty. Since FY 2006/2007 Riverside County general fund reserves have declined from over $300 million to $30 million. The County cannot decrease the reserve fund any further without affecting the County's ability to obtain credit. According to the Associated Press Economic Stress Index, of counties with populations of at least 25,000, Riverside County was identified as the eleventh most economically stressed county in the nation based on its June 2010 stress scores.[15]

All County departments have been directed to only provide those core services that the County is mandated to provide. At this point, the Copermittees are struggling to maintain the existing compliance programs required by the 2004 MS4 Permit with available staff and funding. Implementation of expanded or new Permit compliance requirements would require the Copermittees to either further reduce implementation of other mandated programs or reduce the level of implementation of MS4 Permit compliance programs - at risk of receiving an NOV and ACL. In other words, the Copermittees cannot increase MS4 Permit compliance expenditures without directly impacting compliance with other state or federally-mandated programs.

CONCLUSION

The draft Permit was developed by starting with the MS4 Permit for South Orange County. This represented a significant expansion of compliance requirements and compliance costs relative to the 2004 Permit issued to the Copermittees in the Santa Margarita Region, and by no means are the costs incremental in nature. South Orange County is a permit area with twice the population, 2.6 times the sales tax revenue, and over four times the property tax revenue of the Santa Margarita Region. The draft Permit was then expanded to include additional compliance and monitoring requirements, further increasing compliance costs. Plainly, it is unrealistic to impose greater, or even the same Permit requirements on the Santa Margarita Region, as have been imposed on South Orange County.

In addition to having a lower property tax revenue based on lower property tax base and lower per capita retail sales, the Santa Margarita Region has also been hit harder by the recession, which has further diminished funding resources. It is projected that revenues will continue at a reduced level for an extended period with recovery not expected within the term of the Permit term. Therefore, the available resources to fund public safety, existing state and federal mandates, and expanded water quality permit requirements are much less than San Diego and Orange Counties.

The economy has resulted in reductions of reserves to minimum levels and virtually all local services and programs have been reduced or eliminated. As increases in funding for the water quality mandates contained in the draft Permit can only come from reduced funding for public safety, existing state and federal mandates, the expanded compliance requirements proposed in the draft Permit are economically infeasible.

[15] "20 Most Stressed, 20 Least Stressed Counties, The Associated Press, August 2, 2010.

Attachment 3: Language Changes Supported by Board Staff and Copermittees

Introduction

This document highlights the agreed upon revisions resulting from detailed discussions between Water Board Staff and the Copermittees on program implementation. The intent of these revisions is to ensure that requirements in the Draft MS4 Permit continue to be protective of water quality while allowing the Copermittees flexibility in resource allocation and cost efficiencies. This collaborative process enhanced a mutual understanding of these goals and, consequently, many of the Permit's requirements are streamlined, clearer, implementable and protective. This document highlights specifically the Low Impact Development (LID) and the Interim Hydromodification requirements that have been revised from the Orange County NPDES MS4 Permit in order to recognize the Copermittees' advanced efforts.

Important Program Revisions

Low Impact Development (LID)

The Copermittees strongly support the language in the draft Permit with regard to Low Impact Development (LID) BMPs (Section F.1.d.(4)). Through discussions with staff, the Copermittees have presented their commitment and vision for LID, emphasizing that their programs' goals are in line with the intent of the LID language found in the Orange County permit. The District and the County, with input from the Copermittees, have invested five years into developing a well thought through LID program including:

- The design of a detailed and thoroughly researched LID BMP Manual,
- An implementation policy focused on a tiered approach to BMP selection,
- Incorporation of a public maintenance mechanism, and
- Construction of a $3,000,000 LID BMP retrofit, demonstration and testing facility.

These various features are already in effect in the unincorporated County, or in the process of being finalized, for broader use.

The LID BMP manual provides the development community guidance for designing LID BMPs that will be effective at reducing pollutants from the site to the MEP. While the current program is based on a tiered approach that encourages landscaped LID BMPs first, above detention BMPs, and those above proprietary/mechanical BMPs, this tiered approach will be further revised to support Staff's goal for more onsite BMPs to infiltrate runoff, although some Copermittees are still concerned with the infiltration mandate. Specifically, this tiered approach will prioritize BMPs for new development and redevelopment that:

- Provide for the harvest and reuse of stormwater through safe infiltration of site runoff, similar to natural conditions where such runoff can then help replenish the groundwater table,
- Treat site stormwater runoff on a project scale, generally providing a more robust system as compared to individual lot features,

Attachment 3: Language Changes Supported by Board Staff and Copermittees

- Are the most protective of surface water resources, providing 100% 'removal' of pollutants for the water quality volume infiltrated,
- Even for runoff that is biotreated, provide substantial benefit by ensuring that BMP designs maximize the opportunities for incidental infiltration and runoff capture,
- Focus on passive/landscape BMPs that do not require extensive or special maintenance, or that rely on external factors to function for water quality purposes,
- Provide hydromodification mitigation by more closely mimicking pre-development hydrology,
- Ensure that all sites will have runoff water quality that is consistent.

Not only are the Copermittees committed to implementing effective BMPs, they are also committed to effective maintenance. The District's proposed public maintenance mechanism will bolster BMP maintenance for areas where private BMP maintenance has historically been found to be lacking, thus ensuring a higher level of protection for receiving waters. Lastly, the retrofit, demonstration and testing facility will be used to confirm the effectiveness of BMPs included within the BMP manual, provide Copermittees data to review and enhance the program, and provide a demonstration of BMPs for the Copermittees, developers, and the general public.

The Copermittees also believe the passive-treatment BMPs, as opposed to capture and re-use BMPs, are the most reliable for the ongoing protection of water quality. For example, properly designed infiltration BMPs provide benefit during and between storms, without intervention from site owners, operators or occupants, and only require occasional and relatively simple landscape contractor maintenance on an annual basis. This concept has been integrated into the LID BMP Manual through conservative designs that provide a significant margin of safety against failure, and have design features that facilitate proactive maintenance (e.g., integrated landscape features). For the purposes of requiring BMPs that will be most protective of water quality, the Copermittees have de-emphasized the use of BMPs that harvest stormwater for on-site use, since the BMP will not operate passively, and if the BMP 'use' or maintenance should not occur, the BMP will bypass 100% of runoff without treatment. The Copermittees believe that the draft Permit appropriately encourages such water conservation technologies, while not mandating their use.

Regional Board Staff has recognized the efforts, thoughtfulness, and funding that the County has invested in their LID BMP approach, and have, in coordination with the Copermittees, developed a prioritization process that supports the Copermittees' investment in a plan for LID, while ensuring that an appropriate prioritization for the most effective BMPs is implemented. As such, infiltration BMPs must be used for all sites unless it is technically infeasible to infiltrate. Technical infeasibility will be based on criteria that will be developed by the Copermittees and approved by the Regional Board. Only when infiltration is deemed infeasible through the approved analysis can other LID BMPs be used in place of infiltration. These LID BMPs must be consistent with the Copermittees design manual or other regional LID manuals, which have been developed to ensure these LID BMPs are designed to have the greatest pollutant removal

over the life of a project. If LID BMPs are found to be technically infeasible due to poor site or other conditions, then conventional BMPS must be implemented and the project must participate in the LID waiver/mitigation program that will ensure pollutant removal effectiveness consistent with the preferred LID BMPs.

One other important consideration for new development and LID requirements in MS4 permits is the ability for the project proponent (developer) to understand and easily comply with the requirements, such that they can easily be incorporated into projects. Recently adopted MS4 permits, such as the south Orange County MS4 Permit, have very complicated new development and LID requirements. The result of such requirements is a WQMP guidance document that can be confusing, and may be difficult to implement consistently and in a way that will provide consistent protection of water quality. The Copermittees and Regional Board staff, working together, have crafted new development LID requirements that are easily understood, and will ensure the highest likelihood of integration of LID features consistently into projects.

Interim Hydromodification Criteria

Pursuant to discussions between the Copermittees and Water Board staff, the proposed interim hydromodification criteria is aligned with the Copermittees' existing hydromodification program. This agreed language ensures that adequate hydromodification protection measures continue to be in place, while allowing the Copermittees to focus resources and funds on developing the Final Hydromodification Management Program and avoid diversion of scarce resources to developing new interim criteria that will only be in effect for a short duration. In addition, this approach will save the development community from confusion as to which requirements are in effect.

The Copermittees' current hydromodification mitigation program is described in the WQMP, but has been slightly modified as presented in the draft MS4 Permit. Although the Copermittees request the minimal changes to the language shown in the attached redlines, the Copermittees otherwise support the currently drafted interim hydromodification requirements. Under the proposed interim requirements, project applicants must either demonstrate numerically that the project will not adversely impact downstream alluvial channels, or, they must mitigate both the two-year and 10-year recurrence interval storms to pre-project levels in the post-project condition. All analysis must be performed by a registered civil engineer specializing in water resources. Mitigation of both the two-year and the 10-year storms to pre-project levels has been demonstrated to be consistent with the range of flows that are the primary determinants of the stream geomorphology in the southern California area. By maintaining these storm events at pre-project levels, impacts to the downstream alluvial channel should be mitigated to a level of less than significant. Additionally, the Copermittees believe that the onsite LID requirements will further reduce the need for on-site hydromodification controls that would otherwise be required with conventional treatment BMPs. The final comprehensive hydromodification mitigation program will further develop more detailed analysis methods, as well as establish a monitoring program to help verify the effectiveness of the HMP requirements.

Attachment 3: Language Changes Supported by Board Staff and Copermittees

Revisions tentatively agreed to with Board Staff

Per discussions between the Water Board Staff and Copermittees the following revisions were agreed upon.

Section	Alternate Permit Language	Page in T.O.
Non-Stormwater Dry Weather Action Levels (NALs)		
C.2	In response to an exceedance of an NAL, the Copermittee(s) having jurisdiction must investigate and seek to identify the source of the exceedance in a timely manner.	20
Legal Authority		
E.1	Each Copermittee must establish, maintain, and enforce adequate legal authority within their jurisdiction to control pollutant discharges into and from its MS4 through ordinance, statute, permit, contract or similar means.	24
E.2	Each Copermittee must submit on or before June 30, 2012, a statement certified by its chief legal counsel that the Copermittee has taken the necessary steps to obtain and maintain full legal authority within their jurisdiction to implement and enforce each of the requirements contained in 40 CFR 122.26(d)(2)(i)(A-F) and this Order.	25
Jurisdictional Runoff Management Program - JRMP (Development Planning)		
F.1.c.(8)	Rain water harvesting, where feasible, ~~must~~ shall be ~~implemented~~ encouraged as part of the site design and construction~~, and to supplement offsite beneficial uses.~~	29
F.1.d.(4)(b)(i) Footnote	Maintain or restore natural storage reservoirs and drainage corridors (including depressions, areas of permeable soils, swales, and ephemeral and intermittent streams) to the extent feasible[12]. [12] Priority Development Projects proposing to dredge or fill materials in waters of the U.S. must obtain a CWA §401 Water Quality Certification .~~and/or~~Priority Development Projects proposing to dredge or fill materials in waters of the State must obtain ~~a CWA §401 Water Quality Certification and/or~~ Waste Discharge Requirements.	34

Attachment 3: Language Changes Supported by Board Staff and Copermittees

Section	**Alternate Permit Language**	**Page in T.O.**
F.1.f.(1)	Inventory of SSMP projects: Each Copermittee must develop and maintain a watershed-based database to track and inventory all projects within their jurisdiction, that have a final approved SSMP (SSMP projects), and its structural post-construction BMPs implemented therein ~~within its jurisdiction~~ since July, 2005. LID BMPs implemented on a lot by lot basis ~~in low density residential areasfor~~ at single family residential homes, such as rain barrels, are not required to be tracked or inventoried.	38-39
F.1.f.(2)(b)(iv)	~~At least 20 percent of all approved and inventoried SSMP projects must be inspected by the Copermittee annually;~~	39
F.1.h.(2)	In addition to the control measures that must be implemented by Priority Development Projects per section F.1.h.(1)(d), the HMP must include a suite of management measures ~~to~~ that can be used on Priority Development Projects to mitigate hydromodification impacts, protect and restore downstream beneficial uses and prevent or further prevent adverse physical changes to downstream channels.	43
F.1.h.(3)	As part of the HMP, the Copermittees may develop a waiver program that allows a redevelopment Priority Development Project, as defined in Section F.1.d.(1)(b), to implement offsite mitigation measures. A waiver may be granted if onsite management and control measures are technically infeasible to fully achieve post-project runoff flow rates and durations that do not exceed the pre-development (naturally occurring) runoff flow rates and durations. Redevelopment projects that are granted a waiver under the program must not have post-project runoff flow rates and durations that exceed the pre-project runoff flow rates and durations. The estimated incremental hydromodification impacts from not achieving the pre-development (naturally occurring) runoff flow rates and durations for the project site must be fully mitigated.	43
Commercial / Industrial		
F.3.b.(2)(b)	Designate / Update Minimum BMPs: Each Copermittee must designate a minimum set of BMPs for all inventoried industrial and commercial sites/sources. Where BMPs have already been designated, each Copermittee must review and update its existing BMPs for adequacy ~~within one year of permit adoption~~by no later than the submittal of the JRMP. Copermittees may continue to regularly review and update their designated BMPs for adequacy and subsequently submit any updates in their Annual Report.	58

Attachment 3: Language Changes Supported by Board Staff and Copermittees

Section	Alternate Permit Language	Page in T.O.
F.3.b.(4)(b) And **NEW** F.3.b.(6)(a)	F.3.b.(4)(b) ~~Each Copermittee must annually notify the San Diego Water Board, prior to the commencement of the rainy season, of all Industrial Sites and Industrial Facilities subject to the General Industrial Permit or other individual NPDES permit with alleged violations of the Copermittees ordinances, that pose a significant threat to water quality~~. F.3.b.(6)(a) – New (6) Reporting of Non-Compliant Sites (a) Each Copermittee must annually notify the San Diego Water Board, prior to the commencement of the wet season, of any unresolved high level enforcement action (as defined in the Copermittees' JRMP) that poses a significant threat to water quality in its jurisdiction as a result of violations of their stormwater ordinances.	60-62
Retrofit		
F.3.d.	Each Copermittee must develop and implement a retrofitting program that meets the requirements of this section. The goals of the existing development retrofitting program are to provide a means to the Copermittees to address the impacts of existing development through retrofit projects that reduce impacts from hydromodification, promote LID, support riparian and aquatic habitat restoration, reduce the discharges of stormwater pollutants from the MS4 to the MEP, and prevent discharges from the MS4 from causing or contributing to a violation of water quality standards.	64
F.3.d.(5)	The completed retrofit BMPs must be tracked in accordance with Section F.1.f. Retrofit BMPs on publicly owned properties must be inspected per section F.1.f. Privately owned retrofit BMPs must be inspected as needed ~~to ensure proper operation and maintenance~~.	65
IDDE		
F.4.b	Remove the following language: ~~all known locations of access points (i.e. manholes) to the Copermittee's MS4~~	67

Attachment 3: Language Changes Supported by Board Staff and Copermittees

Section	**Alternate Permit Language**	**Page in T.O.**
Education		
F.6.	~~Quasi-Governmental Agencies / Districts (i.e., educational institutions, water districts, sanitation districts, etc.)~~	
Watershed Workplan		
G.1.d.	Develop a watershed BMP implementation strategy to attain receiving water quality objectives in the identified highest priority water quality problem(s) and locations. The BMP implementation strategy must include a schedule for implementation of the BMP ~~project~~s to abate specific receiving water quality problems and a list of criteria to be used to evaluate BMP effectiveness. Identified watershed water quality problems may be the result of jurisdictional discharges that will need to be addressed with BMPs applied in a specific jurisdiction in order to generate a benefit to the watershed. This implementation strategy must include a map of any implemented and/or proposed structural BMPs.	72
Principal Copermittee Responsibilities		
M.3.	~~Produce and submit~~Coordinate the submittal of the documents and reports as required by section K of this Order and Receiving Waters and MS4 Discharge Monitoring and Reporting Program No. R9-2010-0016 in Attachment E of this Order.	84

Attachment 4: Monitoring and Reporting Program Requirements

Introduction

Tentative Order R9-2010-0016 (draft MS4 Permit) includes proposed requirements within Attachment E Monitoring and Reporting Program (draft MRP) that are not necessary to address management questions related to water quality, beyond requirements dictated to Orange County and beyond the Copermittees' ability to fund. Due to the expansion of monitoring requirements proposed by Regional Board staff, costs for monitoring program compliance are two and half times more expensive for Santa Margarita Region residents than to South Orange County residents. The Copermittees recognize monitoring and data collection are necessary to assist with program effectiveness assessment and address stormwater management questions within the Santa Margarita Region. However, the proposed revisions provided within this paper allow these assessments and questions to be answered in a more cost effective manner while retaining all major components of the draft MRP. The proposed revisions prune requirements that are not necessary to answer key management questions for this MS4 program, eliminate elements that may be of general interest and therefore should be handled at a more regional, state or federal level and/or correct provisions that are contrary to, or not aligned with, methods of practice established by the Southern California Stormwater Monitoring Coalition or other MS4 Permits approved by your Board. The changes proposed herein result in annual savings of approximately $780,000 while maintaining the integrity of the MRP. Even with these proposed revisions, this MRP is significantly more expensive than the Copermittees' current program.

Table 1 - Cost Savings resulting from proposed MRP changes

Section	Component	Requested Change	Cost reduction
A	**Mass Loading Stations**	1) Wet Weather - 3 wet -> 2 wet	**~$79,000**
		2) Dry Weather - Composite -> Grab	**~$66,000**
B	**Toxicity Testing (MLS and Bioassessment)**	3) 3 organisms -> 2 organisms	**~$14,000**
C	**Bioassessment**	4) 6 stations -> 3 stations	**~$158,000**
		5) 2X each -> 1X each	**~$95,000**
D	**Action Levels**	6) 'Representative Number/Percent' -> Representative - and remove 'within each sub area'	**~$241,000**
		7) SAL Composites -> Grab	**~$165,000**
E	**Inland Aquatic Habitat Monitoring**	8) Eliminate requirement	**~$140,000**
F	**Special Studies**	9) 6 special studies -> 4 studies, and Replace with more locally appropriate studies	**~$220,000/year**
	TOTAL ESTIMATED SAVINGS	Net savings of all recommended changes (annualized)	***~780,000/year***

Note: Red text refers to the requirements that are beyond the MRP requirements in the OC permit.

Attachment 4: Monitoring and Reporting Program Requirements

Draft Monitoring and Reporting Program Requirements

Background

Prior to the release of the first draft of the MRP requirements to the Copermittees, Water Board staff indicated the program would be similar to the South Orange County MS4 Permit (OC Permit) yet scaled appropriately to the Santa Margarita Region. The first draft of the MRP was not released until three weeks prior to the public release draft MRP. To our surprise, instead of being appropriately scaled, the draft MRP actually exceeded the scope and costs of the OC Permit MRP. Due to limited time, Water Board staff recommended the discussions regarding MRP requirements be brought before the Regional Board at the appointed October 13, 2010 Board Hearing. This was particularly frustrating as it was not consistent with our mutual goal to resolve technical issues at the staff level and bring only necessary policy issues to the Regional Board.

One of the most significant issues with the MRP is that the Copermittees proposed several new special studies in the ROWD. The Copermittees moved forward on these studies in good faith, including a $3,000,000 LID Demonstration and Testing Facility at the District headquarters in Riverside. The final MRP does not recognize any of these efforts, and instead mandates six new special studies and a habitat monitoring program. Initially, Board staff indicated that these six studies were for discussion and that it was not their intent to include all of the studies, however, later Board staff changed their position and mandated all of the studies. Further, the habitat monitoring program was actually removed from the Orange County MS4 Permit due to the addition of the NAL/SAL monitoring which was expected to effectively address the underlying habitat monitoring questions. These unnecessary additions put the Copermittees in the precarious position of having to abandon special studies that were already deemed by local stakeholders to be of critical value to managing stormwater within our region.

Cost Saving Requirement Revisions – Overview

The proposed draft MRP includes additional stations, constituents, data analysis and multiple special studies that exceed other programs such as South Orange County's or established standards of practice. These elements will not add substantively to the understanding of MS4 water quality impacts within the Santa Margarita Region and vastly exceed the ability of the Copermittees ability to pay and staff. Table 1 summarizes the Copermittees' requested revisions to the draft MRP and the costs savings from each revision.

These changes are also critical as the draft MRP proposes a program that exceeds available monitoring staffing and equipment resources. The District is currently in the process of recruiting for budgeted positions that were based on the monitoring program contained in our ROWD. However, review of the MRP has determined that our estimations were woefully inadequate. The MRP special studies and other requirements require scientists and other staff with specialized training and backgrounds that are not readily available. The District will likely have to find staff with generalized knowledge in related fields and spend significant resources training them to be knowledgeable in the science of stormwater management. Even if we were to consult out most of the work, we would still need specialized staff to scope, manage and review the consultants' work. It is not feasible to find, recruit and train the necessary staff and also deploy the proposed MRP in the time allotted. The Copermittees' proposed revisions scale

requirements to a more financially attainable and manageable level. Detailed justifications for each revision are described below.

Cost Saving Requirement Revisions – Section A

Mass Loading Station Monitoring - Attachment E: II.A.1.b & II.A.1.c

Revision: Request wet weather monitoring to be required twice a year instead of three times a year.

Justification: (1) The Water Board Staff has referenced the SMC guidance and indicated not enough data has been collected to warrant a requirement change from three wet weather samples to two. However this guidance states once three wet weather samples have been collected for three years, sampling for two wet weather events is acceptable. This data has been collected by the Copermittees. The Copermittees successfully collected three wet weather events for three reporting periods; in addition, the Copermittees have over 10 years of data to form the basis of future analyses. Although the methods of collection have changed, our statistical analysis indicates that there is no statistically significant difference between data sets collected during prior terms and the current term. (2) The current OC and SD Permits require only two wet weather samples. (3) The Santa Margarita Region is semi arid with ephemeral flows, sampling for a third storm event has proven, and will continue to prove difficult and may result in non compliance due to climate (lack of storm events). (4) The cost to Copermittees to fund a third wet weather monitoring event during this permit term is significant.

Mass Loading Station Monitoring - Attachment E: II.A.1.d

Revision: Request dry weather sampling method to be changed from composite sampling to grab samples.

Justification: (1) The Copermittees currently conduct dry weather sampling using an instantaneous grab sample. The MRP proposes 24-hour composite sampling, which represents a significant cost increase due to the need to construct infrastructure at the sampling sites to secure and facilitate portable automatic sampling equipment. (2) Composite samples will mask illicit discharges which is one of the primary reasons for dry weather monitoring. (3) Due to dry weather flows' steady nature, the flows can be accurately characterized using a grab sample. (4) The SMC Regional Bioassessment Program, which effectively defines the standard of practice for receiving waters monitoring, has found that chemistry samples must be collected at the most downstream transect (Transect A) to be representative of the flow through the assessed reach. This program therefore uses Grab samples collected immediately prior to benthomacroinvertebrate (BMI) and periphyton sampling. If composite sampling was required, it similarly must be done at the downstream transect; however, the composites would not be representative as they would pick up sediment, nutrients and other pollutants that had been unnaturally introduced by the BMI and periphyton collection activities. This would create an unrepresentative sample and the sampling equipment would be at risk of failure due to the suspension of sediment.

Cost Saving Requirement Revisions – Section B

Toxicity Testing - Attachment E: II.A.1.h

Revision: Request change in toxicity testing from three organisms to two organisms.

Justification: (1) The MRP specified in the OC Permit requires toxicity testing of two organisms and this permit should not go beyond requirements found within the OC Permit due to limited funding and resources. This is an example of a simple change where cost-savings can be realized. (2) The USEPA only has chronic toxicity protocols for *Pseudokirchneriella. Subcapitata* (formerly, *Selenastrum capricornutum*). Therefore there are no established protocols for the other two species, and data collection results will be difficult to compare to other regions.

Cost Saving Requirement Revisions – Section C

Stream Assessment Monitoring - Attachment E: II.A.2.a

Revision: Request that three stream assessment stations be monitored instead of six stations.

Justification: (1) The existing MS4 Permit requires three stream assessment stations annually. These stations are our mass loading stations. It should be noted that this is an ephemeral watershed. The current stations were selected because they were the only stations that had flowing water during the bioassessment sampling periods, not because they were necessary representative of urban runoff (although they are downstream of the entire MS4 system). Specifically, during dry weather, none of the current receiving waters stations receive runoff from the MS4 due to the ephemeral nature of the watershed. Similarly, efforts to find flowing water for the Regional Bioassessment Program have been challenging. For example, in 2009, the first year of the program, 35 random sites were evaluated before one perennial site could be identified. In 2010, 39 random sites were evaluated. The final sites that were selected were actually our CURRENT mass loading stations as they were the first randomly selected sites that had flow. This lack of flow was recognized by SCCWRP in establishing the distribution of Regional Bioassessment Stations in southern California. This is why southwest Riverside County is only assigned one Bioassessment station. (2) As is demonstrated above, the Copermittees are not likely to find three additional flowing stations that are indicative of impacts from MS4 discharges. The Permit requirement therefore puts the Copermittees in unavoidable non-compliance with the Permit. (3) The cost of monitoring the additional three stations is substantial, and given the relative size of the MS4 system and population of RC to OC, the additional stations are not appropriate on an environmental, economic or social justice scale.

Stream Assessment Monitoring - Attachment E: II.A.2.b

Revision: Request frequency be changed from twice per year to once per year for stream assessment monitoring.

Justification: (1) The Water Board Staff and Executive Officer agreed to make this change as a trade for the Copermittees participation in the SMC Regional Bioassment special study. The change was based on findings by the Southern California Coastal Watershed Research Project (SCCWRP) scientiests indicating that there is no seasonally signficant difference in bioassesment scores. The Copermittees volunteered to implement th Regional Bioassessment Program ahead of the necessary changes to the NPDES MS4 Permit program to reduce the bioassessment sampling events in a good faith effort. (2) To determine if two sampling events are in fact necessary, the Copermittees evaluated the difference in biological community scores between Spring and Fall for data collected at Lower Murrieta, Lower Temecula and

Adobe Creeks during May and October from 2007 through 2009. Utilizing a Two-Way Analysis of Variance of Southern California Index of Biological Integrity (IBI) scores, with season (Spring/Fall) and year (2007 through 2009) as variables, results indicated no statistical difference between years for any of the Permittee's three sites. No seasonal statistical difference in IBI scores ($p \geq 0.19$) was noted within any of the three stations, indicating that the IBI scores were consistent across seasons, regardless of the year. This data confirmed SCCWRP findings that there is not a change in the biological communities between the Spring and Fall seasons. (3) Further, the MRP within the OC Permit states that stations with year-round flow conditions may be monitored in May/June or September/October. Current assessment stations at Murrieta Creek, Temecula Creek, and Adobe Creek are perennial stations. Consistency across programs would denote assessments of these creeks once per year.

Cost Saving Requirement Revisions – Section D

MS4 Outfall Monitoring - Action Levels - Attachment E: II.B.1 and II.C.1.b.(1)

Revision: Request "a representative percentage of the major outfalls within each hydrologic subarea" (**II.B.1)** and "a representative number of major outfalls within each hydrologic subarea" (**II.C.1.b.(1)**) be changed to "representative major outfalls" as shown in the redlines attached to this comment letter.

Justification: (1) The draft MRP requires sampling of a representative number or representative percentage of major outfalls. This is a problematic compliance target as it focuses the program on a particular and open-ended "number" or "percent" of outfalls. By revising the language to require monitoring of "representative major outfalls", the burden is on the Copermittees to come up with a program that is truly representative, without requirements to meet an arbitrary number or percent of outfalls. The Copermittees are concerned about subareas that have many outfalls, which could require sampling of more sites than are economically feasible. These costs could escalate beyond the initial sampling event because if a NAL or SAL exceedance is recorded, source assessments studies are triggered that require additional staff time and resources. If this requirement is not revised, costs will quickly rise beyond the Copermittees' ability to sustain the MS4 compliance program.

MS4 Outfall Monitoring - Action Levels - Attachment E: II.B.1 and II.C.1.b.(1)

Revision: Request the following text revisions in footnote:

> "A representative ~~percentage~~ determination must consider hydrologic conditions, total drainage area of the site, ~~population density of the site, traffic density, age of the structures or buildings in the area, and~~ land use types (commercial, residential and industrial) , costs and other considerations as appropriate."

Justification: (1) The Copermittees originally asked for clarification on what factors would be considered for "representative percentage" and Water Board staff agreed to cost being included. The failure to include cost as a factor results in a program that reduces resources and diminishes funds quickly. The revision of the above allows for cost to be included through "other considerations as appropriate". (2) Deletion of percentage is consistent with previous comments. (3) Hydrologic conditions, population density of the site, traffic density and age of the structures or building in the area are all proposed

deletions because each subarea may not be sensitive to these factors and if one of this factors is applicable it will be included under the addition "other considerations as appropriate".

MS4 Outfall Monitoring - Action Levels - Attachment E: II.B.1.a

Revision: Request samples for Storm Water Action Levels (SALs) to be changed from 24-hour composite to grab.

Justification: (1) Composite sampling would result in significant increased cost due to the cost of purchasing additional automatic sampling equipment and constructing the necessary infrastructure to support its use. (2) Grab samples are likely more conservative. The Copermittees propose that grab samples be collected first and then, if a problem is indicated, the Copermittees would specify needed follow-up monitoring in the Source Assessment Monitoring Plan. (3) Freed resources can be dedicated to other key components of the program, such as follow-up source assessment studies.

Cost Saving Requirement Revisions – Section E

High Priority Inland Aquatic Habitat Monitoring - Attachment E: II.D

Revision: Request removal of the High Priority Inland Aquatic Habitat Monitoring requirements.

Justification: (1) This is an entirely new monitoring program. This monitoring program was initially proposed in the Orange County NPDES MS4 Permit, but later deleted when the NAL/SAL monitoring requirement was added. This trade was made as it was expected that the outfall monitoring data from the NAL and SAL program would effectively answer the underlying management question – "are MS4s impairing beneficial uses in priority aquatic habitat areas?" The underlying logic for removing the requirement in Orange County similarly applies here. Given the current economic conditions and the fact that this was considered and deleted from the OC Permit; the Copermittees respectfully request that this requirement similarly be deleted from the Riverside County MRP.

Cost Saving Requirement Revisions – Section F

Special Studies - Attachment E: II.E

Revision: Request alteration of Special Study Program.

Justification: The Draft Permit requires six special studies to be conducted (TMDL Development and Implementation, Sediment Toxicity, Trash and Litter Investigation, Agricultural, Federal and Tribal Input Study, MS4 and Receiving Water Maintenance Study and Intermittent and Ephemeral Stream Perennial Conversion Study). *This is in excess of the four special studies required by the OC MRP*. Given the larger MS4 Permit Area, population and resources available to South Orange County, the additional studies proposed on Riverside County are inappropriate from a social, economic and environmental justice standpoint. (1) Water Board staff acknowledged multiple studies were added to the draft MRP with the intention of that would be eliminated. (2) The issues addressed by these studies are not all specific to the Santa Margarita Region and would be more appropriate to be evaluated as part of a broader regional study, such as the Sediment Toxicity study. (3) The Agricultural, Federal, and Tribal Input Study is specifically inappropriate as it requires the Copermittees to monitor the discharges of other entities subject to separate NPDES regulations. (4) The Intermittent and Ephemeral Stream Perennial

Attachment 4: Monitoring and Reporting Program Requirements

Conversion Study is specifically inappropriate as it incorrectly presumes that such ephemeral streams are actually being converted to perennial systems within the permit area due to MS4 discharges. Some additional specific points include:

- Sediment Toxicity – In the waterbodies found in the Santa Margarita watershed (which are intermittent at best and dry most of the time) the idea of investigating sediment toxicity and its impacts on benthic macroinvertebrates seems a reach. Current sediment toxicity monitoring in the State is focused on year round streams and estuaries (e.g. the Delta). Furthermore the current state of sediment toxicity monitoring is at best in its infancy as is the State's policy regarding Sediment Quality Objectives. It would seem that a more reasonable approach associate with sediment toxicity is to allow the science to catch up with the policy and for the Copermittees to learn from these other statewide efforts.

- Agricultural, Federal, and Tribal Input Study - Ongoing monitoring efforts in the Central Valley and the Los Angeles Regions for the Agriculture Waiver Program are more robust and statistically valid to make any efforts by Riverside County to be pale in comparison and likely insignificant. Likewise, monitoring in watersheds (e.g. Lake Tahoe, and the northwest part of the State) where water bodies are impaired by sediment and where Federal and Tribal land uses have inputs to the impaired water bodies is significant and should take precedent over any efforts in Riverside County. As previously noted, it is inappropriate to require the Copermittees to not only monitor their own discharges, but also expend resources monitoring the discharges of others. The Regional Board has authorities to require these sources to collect their own data and should exercise that authority appropriately if such studies are required.

- MS4 and Receiving Water Maintenance Study - It is likely that every flood control district in the State and Caltrans would be impacted by the MS4 and Receiving Water Maintenance Study; therefore it would be imperative to have a well thought out, comprehensive, and regional study to answer the questions being posed in the MRP. Requiring the Copermittees to take on this responsibility is misleading and will not be sufficient to answer the broad questions being posed in the MRP. A more reasonable approach would be to model a regional program similar to the current SCCWRP efforts to assess hydromodification requirements for southern California.

- Intermittent and Ephemeral Stream Perennial Conversion Study – Finally, review of historical water resource data by the Copermittees (as indicated in the ROWD), USGS and state and federal courts have all found that the construction of Vale and Skinner dams has significantly increased the ephemeral nature of local watersheds, resulting in much drier conditions than naturally occurred. This is why Rancho California Water District is required to discharge raw water down the Santa Margarita River at the County Line. Requiring a study to study the impacts of ephemeral conversion demonstrates a clear lack of understanding of historical and current receiving water conditions. Further, similar to our comment above regarding the MS4 and Receiving Water Maintenance Study, this study is better addressed at a regional or statewide level. It is not possible to develop a sufficient local database to statistically validate any impacts from non-stormwater discharges within any reasonable timeframe. Furthermore any minimal

monitoring effort that could be provide by the Copermittees would not comprehensively address the questions being proposed in the MRP and would be a waste of resources. Again a regional approach, whether it be SCCWRP or other combination of stormwater Copermittees, would be a more logical and constructive approach to address this issue. The Copermittees have proposed maintaining two of the special studies (TMDL Development and Trash Assessment), while replacing the other four with locally preferred special studies already in place (Regional Bioasessment Program and LID BMP design, maintenance, and effectiveness study). The Copermittees believe the alternate proposal provides information that is directly relevant and beneficial to the Santa Margarita Region. This would result in an annual cost savings of $314,000 per year. This would maintain parity with the OC Permit, which only has four special studies, three of which are identical to the studies proposed below (TMDL Development, Regional Bioassessment, Trash and Litter investigation). Specific language to incorporate the new studies is included in the redline markup of the MRP.

The Copermittees propose the following studies, the write-up for which can be found in Attachment 9 to the comment letter:

1. TMDL Development and Implementation

2. **LID BMP design, maintenance and effectiveness study and demonstration**

   This study will be valuable in ensuring BMPs that are required are effective and the benefit and integration of LID BMPs into a site is understood. This proposed study would directly affect the Copermittees ability to ensure effective LID BMPs are being implemented.

3. **Regional Bioassessment study**

   All the Southern California counties have committed to participate in this study, with the understanding that it would be written into the MS4 permits as a special study for which they would get credit. The Copermittees have been proactively implementing this study without a MS4 Permit requirement, and want to be able to continue to support these regional studies.

4. Trash and Litter Investigation

Other Changes

Table 1: Analytical Testing for Mass Load (A.1) and Bioassessment (A.2)

Revision: Request "Carbamates" be removed as a constituent for analytical testing in Table 1.

Justification: The testing of carbamates should be dictated by the completion of toxicity identification evaluations (TIEs). The use of carbaryl in urban areas throughout California dropped approximately 80% between 2004 and 2008[1]. This drop is also matched by an 80% reduction in the number of USEPA-registered carbaryl products between 2004 and 2008. A downward trend since 2006 likely reflects a long-

[1] TDC Environmental, LLC (2010). *Annual Urban Pesticide Use Data Report 2010.* Prepared for the Urban Pesticide Pollution Prevention Project (UP3 Project) and the San Francisco Estuary Partnership (SFEP) through grant agreement from the State Water Resources Control Board (Agreement 09-305-550-1). June.

term reduction in the availability of carbaryl products due to USEPA regulatory requirements.[2] Further, once the USEPA completes its regulatory process for the full implementation of new carbayl restrictions[3], urban carbaryl use is likely to continue to decline.

Revision: Request "Hexavalent Chromium" be removed as a constituent for analytical testing in Table 1.

Justification: Since 2004, monitoring in the Santa Margarita Region has reflected that out of 62 total samples, there were 60 non-detected levels of Hexavalent chromium. The 2 detected levels of Hexavalent chromium occurred in April 2007 in wet weather samples. It may be notes that 2007 was the driest year on record for the region and analyzed samples reflect an extended period between wet weather events.

Revision: Request "Biological Oxygen Demand, 5day" and "Chemical Oxygen Demand" be removed as constituents for analytical testing in Table 1.

Justification: The reference in the Fact Sheet supporting the inclusion of these constituents is to the initial Phase 1 application requirements. It should be noted that the initial constituent list is not required of future permits. Further, these constituents are costly to analyze and do not provide new information that is relevant to the management of the NPDES MS4 Program.

Revision: Request "Total Organic Carbon" and "Dissolved Organic Carbon" be removed as constituents for analytical testing in Table 1.

Justification: The reference within the Fact Sheet does not require these constituents and there is a significant cost in analyzing the constituents. It is not clear what additional information these constituents provide that would be useful in managing the MS4 program that is not already addressed through the collection of other constituents.

Table 4: Analytical Testing for Wet Weather MS4 Discharges

Revision: Request "Biological Oxygen Demand, 5day" and "Chemical Oxygen Demand" be removed as constituents for analytical testing in Table 4.

Justification: The reference in the Fact Sheet supporting the inclusion of these constituents is to the initial Phase 1 application requirements. It should be noted that the initial constituent list is not required of future permits. Further, these constituents are costly to analyze and do not provide new information that is relevant to the management of the NPDES MS4 Program.

Revision: Request "Total Organic Carbon" and "Dissolved Organic Carbon" be removed as constituents for analytical testing in Table 4.

Justification: The reference within the Fact Sheet does not require these constituents and there is a significant cost in analyzing the constituents. It is not clear what additional information these constituents

[2] USEPA (2008). Amended Reregistration Eligibility Decision (RED) for Carbaryl. EPA-738-R-08-010. August.
[3] USEPA (2007). Reregistration Eligibility Decision (RED) for Carbaryl. EPA-738-R-07-018. September.

provide that would be useful in managing the MS4 program that is not already addressed through the collection of other constituents.

Attachment E: II.B.2

Revision: Request the following text revisions:

> "The Copermittees must collaborate to develop and implement a ~~monitoring~~program to identify sources of pollutants causing the priority water quality problems within each hydrologic subarea. The ~~monitoring~~ program must include focused monitoring ~~which moves upstream into each watershed~~ as necessary to identify source areas, or other methods to identify the societal sources of pollutants, as appropriate. This ~~monitoring~~ program must ~~be implemented within each hydrologic subarea and must begin~~ no later than the 2012-2013 monitoring year."

Justification: As drafted, the permit requires source identifications to start at the end point of the watershed and move upstream. The requested revisions are intended to provide flexibility to allocate resources appropriately based on field judgements. The second part of the revision is to acknowledge some pollutant contributions to the MS4 are in-fact, non-point source, and cannot be pinpointed through focused source ID Monitoring.

Attachment E: II.C.1.b.(2)

Revision: Request text additions:

> "Sampling of non-storm water discharges may be done utilizing grab samples. If a ponded MS4 discharge is observed at a monitoring station, the Copermittee(s) must record the observation and collect at least one (1) grab sample, however ponded water samples will not be used in determining action level exceedances. If flow is evident, a 1-hour composite sample may be taken. The Copermittee(s) must estimate the flow using techniques such as by measuring the width of water surface, approximate depth of water, and approximate flow velocity."

Justification: The first text addition is to avoid triggering action levels due to increased concentrations caused by evaporation of ponded water. Evaporation of ponded water will result in increased concentrations of any constituents contained in the water. NALs are based on Water Quality Objectives that are based on stable, flowing stream conditions. The second text addition is to allow flexibility in measuring stream flows. In some cases, flow gauges or flow meters may be available to estimate flow.

Attachment E: III.A.2.

Revision: Request text additions:

Attachment 4: Monitoring and Reporting Program Requirements

> Monitoring Annual Report: The Principal Copermittee must submit the Receiving Waters and MS4 Discharge Monitoring Annual Report to the San Diego Water Board on October 1 of each year, beginning on **October 1, 2013**. Receiving Waters and MS4 Discharge Monitoring Annual Reports must cover the monitoring activities and results from the previous fiscal year, and must meet the following requirements:

Justification: All of the Copermittees' activities are tracked and reported on a Fiscal Year basis. This facilitates clearer data and cost tracking, and results that can be more effectively integrated into the JRMP reports in a clear and understandable manner, since the reporting periods are aligned. This change is important, so as to allow for a simpler transition from the existing monitoring and data tracking methods, to those that will be developed for compliance with the permit.

Attachment E: III.A.2.e

Revision: Request the following text revisions:

> "~~Annual~~ The 4th year monitoring report must include identification and analysis of any long-term trends in the Copermittees' MS4 storm water discharges or receiving water quality. Appropriate statistical methods shall be used to evaluate the water quality data. ~~Trend analysis must use nonparametric approaches, such as the Mann-Kendall test, including exogenous variables in a multiple regression model, and/or using a seasonal nonparametric trend model, where applicable~~"

Justification: The first edit is to require the long term statistical analyses be performed on a time schedule consistent with submission of the ROWD. Requiring long-term statistical trend analyses on an annual basis is unnecessary and inappropriately increases analysis and reporting costs and complexity. The second edit recognizes a multitude of different statistical methods could be used and others may be more appropriate to the dataset than those identified in the draft MRP.

Attachment E: III.A.2.f

Revision: Request elimination of requirement for annual monitoring reports to include total pollutant loads (wet weather loads plus dry weather loads) due to MS4 Discharge for each of the hydrologic subareas.

Justification: Many assumptions go into the calculations of total loads, making their use in statistical analyses questionable at best. The Copermittees have continued to provide this data, but do not see that it has any value.

Note: Other redlines noted but not included in this paper are for clarification purposes and to make sure permit language is consistent with requested changes throughout Attachment E.

Attachment 5: Proposed Unpaved Road Requirements of the Draft 2010 Santa Margarita Region MS4 Permit

Executive Summary

The Draft Municipal Separate Storm Sewer System Permit (Draft Tentative Order No. R9-2010-0016; NPDES No. CAS0108740) for the Santa Margarita Region of Riverside County (Draft MS4 Permit) includes proposed findings and requirements for development and maintenance of unpaved roads that are redundant to existing regulatory requirements. The proposed requirements for maintenance of unpaved roads may lead to the unintended consequence of discouraging maintenance of the majority of the unpaved roads in the Santa Margarita Region, which may increase the potential for erosion and sediment discharge from such roads. Statements in the Fact Sheet and Findings, monitoring data, and Permittee observations and experience do not support identification of unpaved roads as a significant source of pollutants to receiving waters in the Santa Margarita Region, thereby warranting additional regulation of unpaved roads.

The Copermittees request that the proposed requirements for development and maintenance of unpaved roads be removed from the Draft MS4 Permit. The Copermittees believe that enhancement of existing programs by identifying Best Management Practices (BMPs) specific to maintenance of unpaved roads and providing public education to owners and contractors providing maintenance of privately maintained unpaved roads will be as effective as the program in the draft Permit at substantially less cost. If the San Diego Regional Board determines that unpaved roads within their jurisdiction require further regulation, the Permittees believe that the appropriate regulatory mechanism is a General Permit (Waste Discharge Requirements or NPDES Permit) since the Draft MS4 Permit addresses only a fraction of unpaved roads within the jurisdiction of the San Diego Regional Board.

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1.0 Background

The stream system in the Santa Margarita Region is ephemeral, with only small isolated segments exhibiting natural perennial flow due to rising groundwater. Such a stream system does not support fish migration. Runoff from the Santa Margarita Region naturally exhibits high sediment loads due to precipitation patterns, limited vegetative cover, soil types and steep topography.

Most existing unpaved roads in the Santa Margarita Region are private roads on private property that have not been engineered and have evolved through use. Such unpaved roads consist of earthen materials that have been compacted by vehicular use and do not include improved drainage, engineered grading or surface improvement. However, proposed unpaved road projects are subject to the development requirements of the MS4 Permit and the Construction General Permit and would be engineered.

In contrast to paved roads, unpaved roads are predominantly lightly traveled and found in rural areas serving economically disadvantaged residents. Many of these roads remain unpaved for economic reasons. Moreover, some residents do not want paved roads as they desire to preserve the rural/rustic nature of their communities.

Maintenance of unpaved roads in the Santa Margarita Region is generally limited to smoothing washboard depressions that have been created by vehicle use and to improve drainage by properly sloping the surface. The smoothed road surface is compacted by the grading equipment and, subsequently, by regular traffic use. This routine maintenance activity is intended to maintain original lines and grade, and the original purpose of the unpaved road. Repair of landslides and washouts, and replacement of culverts is also performed as needed, in some instances on an emergency basis. Landslide and washout repairs may require the implementation and maintenance of temporary erosion and sediment control BMPs until the disturbed area is stabilized.

The Permittees voluntarily provide limited maintenance of Copermittee maintained, dedicated and accepted unpaved roads for public access. This voluntary maintenance is provided for public safety, including emergency vehicle access, and to maintain utility of the public easement. There is no requirement that the Permittees provide this maintenance.

Most unpaved roads in the Santa Margarita Region are not maintained by the Permittees, but instead are private roads located on private property. Permittee staff is only allowed to enter private property if a crime or illegal activity is observed. The County of Riverside has not accepted maintenance of unpaved roads since the late 1940s and now only accepts paved roads that have been designed and constructed to County standards. Murrieta and Temecula will only approve new subdivisions with paved roadways constructed to their standards. In some instances, the Permittees maintain unpaved roads under contract to Home Owners' Associations or through Community Service Areas. However, the Permittees are prohibited by law from using Gas Tax funds for maintenance of unpaved roads on private property.

Other entities that are not under the legal authority of the Permittees also own unpaved roads in the Santa Margarita Region. These entities include:

- Agricultural Operators
- Eastern Municipal Water District
- Federal Lands
- Metropolitan Water District of Southern California
- Nature Conservancy
- Railroads
- Rancho California Water District
- Southern California Edison
- State of California
- Tribal Lands

2.0 Findings Addressing Proposed Requirements for Unpaved Roads

Finding D.1.c of the Draft MS4 Permit states:

> This Order contains new or modified requirements that are necessary to improve Copermittees' efforts to reduce the discharge of pollutants in storm water runoff to the MEP and achieve water quality standards. Some of the new or modified requirements, such as the revised Watershed Water Quality Workplan (Watershed Workplan) section, are designed to specifically address these high priority water quality problems. Other requirements, such as for unpaved roads, are a result of San Diego Water Board's identification of water quality problems through investigations and complaints during the previous permit period. Other new or modified requirements address program deficiencies that have been noted during audits, report reviews, and other San Diego Water Board compliance assessment activities. Additional changes in the monitoring program provide consistency with the Code of Federal Regulations, USEPA guidance, State Water Board guidance, and the Southern California Monitoring Coalition recommendations.

The discussion of Finding D.1.c states:

> The Copermittees are required to update and expand their runoff management programs on jurisdictional and watershed levels in order to improve their efforts to reduce the contribution of storm water pollutants in runoff to the MEP and meet water quality standards. Changes to Order No. R9-2004-001's requirements have been made to help ensure these two standards are achieved by the Copermittees.
>
> The Orders' jurisdictional requirements have changed based on findings by the San Diego Water Board during typical compliance assurance activities, audits, or receipt of complaints. Where the audits found common implementation problems, requirements have been altered to better ensure compliance. In addition, the San Diego Water Board conducted reviews of the jurisdictional annual reports submitted by the Copermittees. Updates to the requirements for the Copermittees' programs are also based in part on

information found in the Copermittees' ROWD requirements that were included in the San Diego and Orange County MS4 permits, and discussions with the Riverside County Copermittees.

To better focus on attainment of water quality standards, the Order's jurisdictional and watershed requirements have been improved. The conditions of the receiving waters now drive management actions, which in turn focus diminishing resources on the highest priority water quality problems within the receiving waters in the watershed. Improvements to jurisdictional and watershed requirements were also made to facilitate a mutually clear understanding of the requirements between the San Diego Water Board and Copermittees.

During the previous permit period, the San Diego Water Board identified, through investigations and complaints, sediment discharges from unpaved roads as a significant source of water quality problems in the Riverside County portion of the San Diego Region. Enforcement and inspection activities conducted by the San Diego Water Board during the previous permit term have found a lack of source control for many unpaved roads within the jurisdiction of the Copermittees. Unpaved roads are a source of sediment that can be discharged in runoff to receiving waters, especially during storm events. Erosion of unpaved roadways occurs when soil particles are loosened and carried away from the roadway base, ditch, or road bank by water, wind, traffic, or other transport means. Exposed soils, high runoff velocities and volumes, sandy or silty soil types, and poor compaction increase the potential for erosion. Road construction, culvert installation, and other maintenance activities can disturb the soil and drainage patterns to streams in undeveloped areas, causing excess runoff and thereby erosion and the release of sediment. Poorly designed roads can act as preferential drainage pathways that carry runoff and sediment into natural streams, impacting water quality. In addition, other public works activities along unpaved roads have the potential to significantly affect sediment discharge and transport within streams and other waterways, which can degrade the beneficial uses of those waterways.

USEPA also recognizes that discharges from unpaved roads are a threat to water quality. USEPA guidance emphasizes the threat of unpaved roads to water quality:

"Dirt and gravel roads are a major potential source of these pollutants [sediment] and pollutants that bind to sediment such as oils, nutrients, pesticides, herbicides, and other toxic substances]. Many roads have unstable surfaces and bases. Roads act like dams, concentrating flows that accelerate erosion of road materials and roadsides. Both unstable surfaces and accelerated erosion then lead to sediment and dust."

There are several guidance documents, developed by the USEPA, the US Forest Service, the University of California, and others, that include design and construction specifications and BMPs that are readily available for implementation by private and

> public entities. Implementing design and other source control BMPs for unpaved roads in the region is necessary to reduce and minimize the impacts of sediment discharged during storm events from unpaved roads to the MS4s and receiving waters.

Comment: The evidence cited in the Finding, water quality monitoring data, and Permittee observations and experience since establishment of the MS4 Permit in 1990 do not identify unpaved roads as a significant source of pollutants resulting in water quality impairments. The Copermittees support the continued application of development and construction requirements and maintenance of temporary erosion and sediment control BMPs as specified in existing permits.

The requirements for development and maintenance of unpaved roads were proposed by Regional Board staff for inclusion in the Draft MS4 Permit just prior to its release for public comment. Prior to that time, and dating from the original establishment of the MS4 Permit requirements in 1990, unpaved roads had not once been mentioned by Regional Board staff as a significant source of water quality impairment requiring additional regulatory.

The discussion of Finding D.1.c. states that the inclusion of unpaved road requirements was based on "investigations and complaints" reviewed by the San Diego Regional Board. However, Regional Board staff identified only one recent case regarding an unpaved road in the Santa Margarita Region as a problem. The Copermittee in question has investigated this case and it is being addressed as an enforcement action. Although the Copermittees have not had the opportunity to review the investigations and complaints cited by Regional Board staff, no feedback from these investigations was reported to the Copermittees at the MS4 Permit discussions prior to the proposal of the unpaved road requirements. This indicates to the Copermittees that unpaved roads do not in fact present a significant water quality concern.

The Copermittees have reviewed the documents cited by Regional Board staff in the discussion of Finding D.1.c. and the conditions in the Santa Margarita Region are vastly different from those in Pennsylvania and Northern California cited in those documents. These areas receive regular precipitation, have significant vegetative cover, and perennial streams, some of which may support migrating fish. Nothing in these documents suggests that unpaved roads are a significant source requiring special attention in the Santa Margarita Region. Further, no data collected during Copermittee monitoring nor their observations support a conclusion that unpaved roads are a significant source of pollutants warranting special regulatory attention.

The lack of evidentiary support for the unpaved roads provisions makes their inclusion in the Draft MS4 Permit arbitrary and capricious. The Copermittees therefore request deletion of Finding D.1.C.

3.0 Fact Sheet Addressing Proposed Requirements for Unpaved Roads

Page 146 of the Fact Sheet states:

> **Section F.1.i** (Unpaved Roads Development) specifically requires the Copermittees to implement or require implementation of BMPs for erosion and sediment control after construction of all new unpaved roads. As discussed for Finding D.1c, design and source control BMPs for unpaved roads are needed to minimize the discharge of sediment to the MS4s and receiving waters,

especially during storm events. There are several guidance documents available (see Discussion for Finding D.1.c) that include design and source control BMPs that can be readily implemented by the Copermittees for the development of new unpaved roads.

Page 155 of the Fact Sheet states:

> **Section F.3.a.(10)** (Unpaved Roads Maintenance) requires the Copermittees to implement or require implementation of BMPs for erosion and sediment control during and after maintenance activities on unpaved roads, particularly in or adjacent to stream channels or wetlands. As discussed for Finding D.1c, source control BMPs for unpaved roads are needed to minimize the discharge of sediment to the MS4s and receiving waters. There are several guidance documents available (see Discussion for Finding D.1.c) that include BMPs that can be readily implemented by the Copermittees for the development of new unpaved roads. This requirement is necessary to ensure the Copermittees minimize the discharge of sediment from their unpaved roads used for their maintenance activities.

Page 160 of the Fact Sheet states:

> **Section F.3.c.(5)** (Privately Owned Unpaved Roads Maintenance) includes requirements for privately owned unpaved roads. The Copermittees must require implementation of BMPs for erosion and sediment control during maintenance activities on privately owned unpaved roads, particularly roads that are in or adjacent to receiving waters. As discussed for Finding D.1.c, BMPs for unpaved roads are needed to minimize the discharge of sediment to the MS4s and receiving waters. There are several guidance documents available (see Discussion for Finding D.1.c) that include design and source control BMPs that can the Copermittees can readily require to be implemented.
>
> In addition, where the Copermittees identify illegal construction and maintenance grading activities on privately owned unpaved roads, the Copermittees must enforce their ordinances to prevent illicit discharges of sediment and other pollutants from privately owned unpaved roads to their MS4s and receiving waters.

Comment: For the reasons set forth above, there is no evidence that unpaved roads require special regulatory attention in the MS4 Permit. Moreover, proposed requirements specific to unpaved roads are redundant to existing requirements in both the existing Permit and the draft MS4 Permit, the state General Construction Permit, and the Copermittees' Stormwater ordinances. To the extent that unpaved roads are of concern to Regional Board staff, those concerns can be effectively addressed by minor adjustments to these existing compliance programs. In a time of tight regulatory budgets, adding these additional requirements, especially where there is no demonstrated need for them, is arbitrary and capricious. The Copermittees request deletion of requirements specific to unpaved roads (see discussion below) as well as these statements in the Fact Sheet.

Attachment 5: Proposed Unpaved Road Requirements of the Draft 2010 Santa Margarita Region MS4 Permit

4.0 Draft MS4 Permit Requirements for Unpaved Roads

4.1 Unpaved Road Development Requirements

Proposed requirements for the development of unpaved road projects appear on page 45 in section F.1.i of the Draft MS4 Permit. The proposed requirements state:

> **i. Unpaved Roads Development**
>
> The Copermittees must develop, where they do not already exist, and implement or require implementation of erosion and sediment control BMPs after construction of new unpaved roads. At a minimum, the BMPs must include:
>
> (1) Practices to minimize road related erosion and sediment transport;
>
> (2) Grading of unpaved roads to slope outward where consistent with road engineering safety standards;
>
> (3) Installation of water bars as appropriate;
>
> (4) Unpaved roads and culvert designs that do not impact creek functions and where applicable, that maintain migratory fish passage.

Virtually all unpaved road development activities would be greater than one acre and/or be part of a priority development project of one acre or more. Such development projects are required to prepare and implement project-specific Standard Urban Stormwater Mitigation Plans (SUSMPs) under Section F of both the existing MS4 Permit and the Draft MS4 Permit. The SUSMPs identify post-construction BMPs that will be implemented for all elements of the project, including the unpaved road elements of the project. Unpaved road projects are also required to comply with the state General Construction Permit, which requires preparation of a SWPPP that identifies construction-phase BMPs and post-construction BMPs. These development and construction phase requirements are applicable to unpaved roads and are imposed by the Copermittees during the development review process, during the issuance of grading permits and during construction inspections. Either the general requirements for development projects in the existing or Draft MS4 Permit and/or the General Construction Permit already require identification and implementation of post-construction BMPs, including erosion and sediment control BMPs, when developing new unpaved roads. Therefore, additional requirements for development of unpaved roads are redundant and the Copermittees request that these redundant requirements be removed from the Draft MS4 Permit.

4.2 Unpaved Road Maintenance Requirements

Proposed requirements for the maintenance of unpaved roads appear on page 56 in Section F.3.a(10) and on page 64 in Section F.3.c.(5) of the Draft MS4 Permit. The proposed requirements state:

> **F.3.a. (10) <u>Unpaved Roads Maintenance</u>**

(a) The Copermittees must develop, where they do not already exist, and implement or require implementation of BMPs for erosion and sediment control measures during such maintenance activities on unpaved roads, particularly in or adjacent to receiving waters.

(b) The Copermittees must develop and implement or require implementation of appropriate BMPs to minimize impacts on streams and wetlands during unpaved road maintenance activities.

(c) The Copermittees must regularly maintain their unpaved roads adjacent to streams and riparian habitat to reduce erosion and sediment transport;

(d) Re-grading of unpaved roads during maintenance must be sloped outward where consistent with road engineering safety standards;

(e) Through their regular maintenance of unpaved roads, the Copermittees must examine the feasibility of replacing existing culverts or design of new culverts or bridge crossings to reduce erosion and maintain natural stream geomorphology.

F.3.c. (5) <u>Privately Owned Unpaved Roads Maintenance</u>

(a) The Copermittees must require implementation of BMPs for erosion and sediment control during maintenance activities on privately owned unpaved roads, particularly in or adjacent to stream channels or wetlands.

(b) The Copermittees must enforce their ordinances against illegal construction and maintenance grading activities on privately owned unpaved roads, so as to prevent impacts to water quality.

The documents.[1,2,3] cited in Finding D.1.c discuss shaping of the surface of unpaved roads during smoothing, and maintenance of temporary sediment and erosion control BMPs associated with maintenance activities, such as repair of landslides and wash outs. The temporary erosion and sediment control BMPs identified include straw bales and silt fencing. The documents do not describe conditions in the Santa Margarita Region, but rather in Pennsylvania and Northern California.

Unpaved Roads Maintained by Copermittees

The conditions in the Santa Margarita Region are vastly different from the conditions found in Pennsylvania and Northern California. Nevertheless, the Copermittees conduct surface grading and maintain temporary erosion and sediment control BMPs as appropriate following completion of maintenance on unpaved roads. These BMPs associated with the routine maintenance of unpaved roads

[1] USEPA 2006 "Environmentally Sensitive Maintenance for Dirt and Gravel Roads." Gesford and Anderson,USEPA-PA-2005.

[2] US Forest Service, 1996. Forest Service Specifications for Construction of Roads & Bridges. EM-7720-100. Revised August 1996.

[3] University of California Division of Agriculture and Natural Resources, 2007. Rural Roads: A Construction and Maintenance Guide of California Landowners. Publication 8262.

will be documented and procedures formalized in the Riverside County Drainage Area Management Plan (DAMP).

Unpaved Roads Maintained by Others

As previously described, the vast majority of unpaved roads within the jurisdiction of the Copermittees are not maintained by the Copermittees, but are maintained by others, typically private property owners. As these are public easements over private property, however, the underlying property owner is under no legal obligation to provide maintenance. To provide reasonable access, maintenance of such unpaved roads is voluntarily provided by property owners and, in some cases, home owners' associations. State law prohibits the use of Gas Tax funds by the Copermittees for the maintenance of unpaved roads on private property. Requirements for implementation and maintenance of temporary erosion and sediment control BMPs in areas under the legal jurisdiction of the Copermittees are addressed by the general requirements of the Copermittees' stormwater ordinances and, where grading activities are significant, through the Copermittees' grading ordinances. As maintenance of unpaved roads on private property is voluntary, more aggressive regulation of such private roads may in fact discourage routine maintenance of unpaved roads, likely resulting in an increase in erosion and sediment discharge from such roads.

As an alternative, maintenance of unpaved roads can be effectively addressed by enhancing existing programs. There is no need to create a new compliance program requirement specific to unpaved roads, especially where such programs cannot in any event be implemented by the Copermittees on private property. The Copermittees believe that a better approach is to provide public education to property owners and grading contractors in areas served by unpaved roads, focusing on the proper methods of shaping unpaved road surfaces and the benefits of implementing and maintaining temporary erosion and sediment controls.

The Copermittees request that these proposed provisions be removed from the Draft MS4 Permit.

5.0 Alternative Regulation of Unpaved Roads

There is nothing unique about potential discharges from unpaved roads under the legal jurisdiction of the Copermittees such that they would require special regulation. As discussed above, there is significant mileage of unpaved roads in the Santa Margarita Region that are not under the legal jurisdiction of the Copermittees. If there is concern about the impact of unpaved roads on water quality (a concern that, for the reasons already stated, is not supported by the evidence), there is no reason to believe that unpaved roads not under the legal jurisdiction of the Copermittees do not present the same potential to affect receiving water quality.

If it is determined that development and maintenance of unpaved roads requires special additional regulation, then such regulation should apply equally and on the same schedule to all unpaved roads under the jurisdiction of the San Diego Regional Board, not just those under the legal authority of the Copermittees. The Copermittees request that, if staff continues to maintain that unpaved roads require additional regulation, those requirements be addressed through a general permit for unpaved roads, and not in the Draft MS4 Permit.

6.0 Conclusion

No evidence, whether statements in the Fact Sheet and Findings, monitoring data, or Copermittee observations and experience, supports identification of unpaved roads as a significant source of pollutants to receiving waters in the Santa Margarita Region warranting additional regulation. The proposed unpaved road requirements are redundant to requirements of existing permits, including the state General Construction Permit, as well as existing Copermittee ordinances and programs. To the extent that unpaved roads may be a source of pollutants to the MS4 and thence to receiving waters, the Copermittees believe that enhancement of existing programs by documenting BMPs specific to maintenance of unpaved roads and providing public education to owners and contractors who provide maintenance of privately maintained unpaved roads will be as effective in reducing such pollutants, at a much reduced cost.

If the Regional Board determines that unpaved roads within its jurisdiction require further regulation, the appropriate method for addressing those roads is through a General Permit (Waste Discharge Requirements or NPDES Permit) rather than the Draft MS4 Permit, since a General Permit would address all unpaved roads in the San Diego Region, not just the subset of unpaved roads under the legal jurisdiction of the Copermittees.

Attachment 6: Prohibition of Irrigation Runoff

Introduction

The Draft Municipal Separate Storm Sewer System Permit (Draft Tentative Order No. R9-2010-0016 (NPDES No. CAS0108740) for the Santa Margarita Region of Riverside County (Draft SMR MS4 Permit) categorically prohibits the discharge of landscape irrigation; irrigation water; lawn watering; (collectively 'irrigation runoff') and non-emergency fire fighting flows runoff to the MS4. The basis for this requirement comes from the current Orange County Stormwater Permit within the San Diego Region (NPDES No. CAS0108740), which prohibits such discharges.

Context of Requested Changes

Stream and Watershed Characteristics

Unlike the watersheds in South Orange County, the Santa Margarita Region is an ephemeral watershed that includes Murrieta and Temecula Creeks which are perennial interrupted streams, i.e., they include some reaches in which the flow is continuous and others where flow is ephemeral. However, the areas of perennial flow in the Santa Margarita Region are located in mountain area tributaries outside of the urbanized areas serviced by the MS4s. These perennial flows quickly disappear by seepage into the sands and gravels and resurface upstream of the confluence of Murrieta and Temecula Creeks. The creeks in the urbanized areas of the watershed, located primarily in the valley, are ephemeral and flows are only observed during and immediately following significant storm events[1].

Rising groundwater is currently observed in Murrieta Creek below its confluence with the Santa Gertrudis Channel, an observation consistent with the observations made by the State of California in 1956.[2] Rising groundwater is also observed in Temecula Creek approximately one quarter mile upstream of the Interstate 15 Bridge. In 1956, the State observed more extensive rising groundwater conditions occurring as far upstream as the Highway 79 Bridge. Based on the virtual absence of non-stormwater flows and the rising groundwater conditions observed in lower Murrieta and Temecula Creeks prior to development of the watershed, there is no evidence that the rising groundwater currently observed is due to Urban Runoff nor that Urban Runoff has affected the quality of rising groundwater.

Irrigation Runoff is Not a Source of Pollutants

Finding C.15 states:

> *Non-storm water discharges to the MS4 granted an influent exception [i.e., which are exempt from the effective prohibition requirement set forth in CWA section 402(p)(3)(B)(ii)] under 40 CFR 122.26 are included within this Order. Any exempted discharges identified by Copermittees as a source of pollutants are subsequently required to be addressed (emphasis added) as illicit discharges through prohibition and incorporation into existing IC/ID programs. Furthermore, the USEPA contemplates that permitting agencies such as the San Diego Water Board may also identify exempted discharges as a source of pollutants required to be addressed as illicit discharges (See VOl.*

[1] Riverside Flood Control and Water Conservation District, "Hydrologic Data for 1975-76 Season," March 1982, p. 49.

[2] State of California Department of Public Works Division of Water Resources, Bulletin No. 57, "Santa Margarita River Investigation," Volume I, June 1956, p. 48.

> *55 Fed. Reg. 48037). The San Diego Water Board and the Copermittees have identified landscape irrigation, irrigation water and lawn water, previously exempted discharges, as a source of pollutants and conveyance of pollutants to waters of the U.S. Of course, rising groundwater is exempt from regulation under 40 CFR 122.26 as a non-prohibited non-storm water discharge.*

The last sentence of this Finding does not accurately reflect the facts. Unlike Orange County, and despite Board staff's contentions in the fact sheet the Copermittees have **not** identified landscape irrigation, irrigation water or lawn water as a source of pollutants or conveyance of pollutants to waters of the U.S. Rather, this statement is based on the efforts in Orange County where that County found that the significant perennial flows throughout the urbanized areas were caused by irrigation runoff. Not only has irrigation runoff not been found to be a source of pollutants to waters of the U.S. in the Santa Margarita Region as a category, no individual discharges of irrigation runoff in the region have been found to be a source of pollutants. As described in the Stream Flow Characteristics section above, during dry weather there is no perennial flow in the waters of the U.S. in the urbanized area until rising groundwater occurs just before the confluence of Murrieta and Temecula Creeks. This is unlike streams in South Orange County, that it was found that the significant perennial flows throughout the urbanized areas were caused by irrigation runoff. In the Santa Margarita Region, any weather runoff that does reach receiving waters quickly seeps into the alluvial soils.

Second, the Discussion of Finding C.15 in the Fact Sheet fails to demonstrate the need for a prohibition of this irrigation runoff as a non-stormwater runoff *category*. The discussion references conditions outside of and unlike those found in the Santa Margarita Region and misconstrues statements in public education materials that encourage runoff management as justification for the proposed prohibitions. Finally, no justification is provided in this discussion or elsewhere to support the prohibition of the non-emergency fire fighting flows runoff as a category.

Prohibition Not Economically Justifiable

A prohibition of irrigation runoff will result in significant costs to the public and the Copermittees as the prohibition is ***TO THE MS4***, which is defined to include streets, curbs and gutters. As the MS4 Permit has eliminated the MEP protections for dry weather non-stormwater discharges (see also legal comments in Attachment 7 to the comment letter), this makes the Copermittees responsible for every incidence of over-irrigation, regardless of whether such discharges ever affect receiving waters. As such, the cost to eliminate these discharges is not commensurate with any measurable environmental benefit. The Copermittees cannot impose fees to recover the costs of enforcing this new requirement and, as described in the Economics White Paper (Attachment 2 to the comment letter), the Copermittees have even fewer resources to carry out the requirements of the current MS4 Permit than in past years, much less carry out the additional requirements set forth in the draft Permit, including the development and implementation of a new program to prohibit irrigation runoff.

As this prohibition would also apply to Copermittees' facilities, retrofit of existing facilities would likely be immediately required to ensure compliance. The City of Murrieta, for example, has estimated that retrofit of their sprinklers to a drip system to avoid irrigation runoff from their facilities alone would cost $250,000.

Attachment 6: Prohibition of Irrigation Runoff

Irrigation Runoff Addressed by Existing Requirements and Programs

Management of irrigation runoff is currently addressed by existing requirements and programs and the additional requirements proposed in the draft Permit are unnecessary. The use of reclaimed water is regulated under Waste Discharge Requirements (WDRs) issued by the Regional Board.

The draft Permit also provides other mechanisms to address irrigation runoff. **First**, if a discharge of irrigation runoff was determined to be a source of stormwater pollutants, the Copermittees already have the legal authority to take appropriate enforcement action to control the discharge as an illegal discharge, under their existing storm water ordinances. **Second**, the non-stormwater action level monitoring required by this draft Permit will identify any potentially problematic non-stormwater discharges and identify the source of those discharges. Should the source be determined to be irrigation runoff, it will require the Copermittees to address that discharge. Both mechanisms are better suited (financially and legally) to deal with irrigation runoff than a complete prohibition provision in the absence of local data showing it as a problem.

Finally, local water purveyors are better equipped and able to address irrigation runoff. As an example, Rancho California Water District and Eastern Municipal Water District actively promote water conservation programs, which are supported by the Metropolitan Water District of Southern California. The County and the cities have adopted water conservation ordinances as required by the Water Conservation in Landscaping Act (AB 1881, Laird). Given these facts, there is even less justification for an extensive and expensive program to address an irrigation runoff issue that is not, in fact, a source of pollutants causing or contributing to a violation of water quality standards in the Santa Margarita Region.

Preferred Requested Permit Revisions

Specifically, the Permittees request that the language in the Permit be amended as follows prior to adoption of the Permit:

Delete Finding C.15

As the last sentence of this Finding is not supported by fact, the Permittees request that it be deleted as noted in the following text and the entirety of the Discussion of Finding C.15 in the Fact Sheet be deleted.

> *Non-storm water discharges to the MS4 granted an influent exception [i.e., which are exempt from the effective prohibition requirement set forth in CWA section 402(p)(3)(B)(ii)] under 40 CFR 122.26 are included within this Order. Any exempted discharges identified by Copermittees as a source of pollutants are subsequently required to be addressed (emphasis added) as illicit discharges through prohibition and incorporation into existing IC/ID programs. Furthermore, the USEPA contemplates that permitting agencies such as the San Diego Water Board may also identify exempted discharges as a source of pollutants required to be addressed as illicit discharges (See VOl. 55 Fed. Reg. 48037). ~~The San Diego Water Board and the Copermittees have identified landscape irrigation, irrigation water and lawn water, previously exempted discharges, as a source of pollutants and conveyance of pollutants to waters of the U.S.~~*

Attachment 6: Prohibition of Irrigation Runoff

Restore Conditional Exemption

The Permittees request that the landscape irrigation; irrigation water; lawn watering; and non-emergency fire fighting flows runoff categories be restored to the list of non-prohibited, non-stormwater discharges identified in B.2 of the draft SMR MS4 Permit as noted below. In the event that an individual irrigation runoff discharge is determined to be a source of pollutants as identified by the non-stormwater dry weather action level (NAL) process, appropriate action can be taken by the Permittees to control that source.

B.2. Non-Stormwater Discharges

> This item includes a listing of discharges that are not prohibited unless a discharge is determined to be a source of pollutants to waters of the U.S. Landscape irrigation, irrigation water, lawn watering and non-emergency fire fighting flows were deleted from this list as noted:

a. Diverted stream flows;
b. Rising groundwaters;
c. Uncontaminated groundwater infiltration [as defined at 40 CFR 35.2005(20)] to MS4s;
d. Uncontaminated pumped groundwater[3];
e. Foundation drains[3];
f. Springs;
g. Water from crawl space pumps[3];
h. Footing drains[3];
i. Air conditioning condensation;
j. Flows from riparian habitats and wetlands;
k. Water line flushing[4,5;]
l. <u>Landscape irrigation;</u>
m. Discharges from potable water sources not subject to NPDES Permit No. CAG679001, other than water main breaks;
n. <u>Irrigation water;</u>
o. <u>Lawn watering;</u>
p. Individual residential car washing;
q. <u>Non-emergency fire fighting flows; and</u>
r. Dechlorinated swimming pool discharges

Additional Clarifications

It is not practicable for the Copermittees to <u>prevent or eliminate</u> irrigation runoff. The Permittees request that the following requirements be revised as noted to provide achievable compliance requirements:
F.1.c.(1) Approval Process Criteria and Requirements for All Development Projects states:

[3] Requires enrollment under Order R9-2008-002. Discharges into the MS4 require authorization from the owner and operator of the MS4 system.
[4] This exemption does not include fire suppression sprinkler system maintenance and testing discharges. Those discharges may be regulated under Section B.3.
[5] Requires enrollment under Order R9-2002-0020.

Performance Criteria: Discharges from each approved development project must be subject to the following management measures:

(1) Source control BMPs that reduce stormwater pollutants of concern in runoff;~~prevent~~ reduce the potential for illicit discharges into the MS4; ~~prevent~~ reduce the potential for irrigation runoff; storm drain system stenciling or signage; properly design outdoor material storage areas; properly design outdoor work areas; and properly design trash storage areas.

F.1.d.(5) Source Control BMP Requirements states:

Each Copermittee must require each Priority Development Project to implement applicable source control BMPs. The source control BMPs to be required must:

(a) Prevent illicit discharges into the MS4;
(b) Minimize storm water pollutants of concern in runoff;
(c) ~~Eliminate~~ Reduce the potential for irrigation runoff;
(d) Include storm drain system stenciling or signage;
(e) Include properly designed outdoor material storage areas;
(f) Include properly designed outdoor work areas;
(g) Include properly designed trash storage areas;
(h) Include water quality protection requirements applicable to individual priority project categories.

Alternative Requested Permit Revisions

Regulate irrigation runoff discharges from the MS4, rather than as prohibited discharge to the MS4

If the Regional Board nevertheless insists on prohibiting irrigation runoff, the Copermittees request that the draft MS4 Permit be revised to allow for irrigation runoff to be managed as a Jurisdiction Runoff Management Plan (JRMP) program, rather than as a prohibited discharge to the MS4. This alternative request is consistent with how the Permit currently deals with non-emergency fire fighting discharges, which was also removed from the list of non-prohibited non-stormwater discharges. The Executive Officer stated that he would be open to consideration of a program for irrigation runoff that would address discharges from the MS4. This alternative approach allows the Copermittees to develop a program that focuses on irrigation runoff problem areas, as opposed to holding the Copermittees responsible for eliminating any instant case of over-irrigation independent of threat to receiving water quality.

As the alternative to restoring the conditional exemption, the Copermittees request the Board to ADD Provision B.4 as follows:

B.4. *As part of the JRMP, the Copermittees must develop and implement a program to address pollutants from landscape irrigation, irrigation water and lawn watering identified as significant sources of pollutants to waters of the United States.*

Attachment 7: General Legal Comments

LEGAL COMMENTS OF THE RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT ON TENTATIVE ORDER NO. R9-2010-0016, WASTE DISCHARGE REQUIREMENTS FOR DISCHARGES FROM THE MUNICIPAL SEPARATE STORM SEWER SYSTEMS (MS4s) DRAINING THE COUNTY OF RIVERSIDE, THE INCORPORATED CITIES OF RIVERSIDE COUNTY, AND THE RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT WITHIN THE SAN DIEGO REGION

The following comments are made by the Riverside County Flood Control and Water Conservation District (District) with respect to legal issues raised by the above-referenced Tentative Order (Order). These comments are being made on behalf of the District and, with respect to issues common to the other Copermittees, also on behalf of the County of Riverside and the Cities of Menifee (to the extent that this City will remain as a Co-Permittee under the Order), Murrieta, Temecula and Wildomar. We also understand that the County and the individual Cities will be filing comments on the Order under separate cover. The comments contained in this document are intended to complement, but not supersede, the individual comments of the County and the City. Also, the District will be filing separate comments concerning issues specific to it.

The District reserves the right to make additional legal comments on the Order prior to the close of the public hearing to adopt the order. In addition, legal comments may also be included in the Technical Comments separately filed herewith by the District.

The redlined version of the Order submitted with the District's comment letter also addresses the following and additional comments, along with requested changes in the text of the Order.

General Comments:

1. *Dual Requirement to Adopt Programs and Guarantee Results*

Throughout Part F. of the Tentative Order relating to the Jurisdictional Runoff Management Program, the language requires not only that the Copermittees adopt programs intended to achieve control of pollutants but also requires such programs to achieve certain ends. See, for example, Part F.1., where each Copermittee must implement a development planning program which meets the requirements of Section F of the Tentative Order *and* which requires such a program to (1) reduce development project discharges from the MS4 to the MEP, (2) prevent such discharges "from causing or contributing to a violation of water quality standards", (3) prevents illicit discharges to the MS4, and (4) manages increases in runoff discharge rates. A similar requirement is set forth in other provisions, including Part F.3, relating to existing development, Part F.3.b., relating to commercial/industrial programs, Part F.3.c., relating to residential programs and Part F.6, relating to the education component where, in each case, the Copermittees are required to develop programs <u>and ensure their performance</u>.

This dual requirement, to develop a program and then to ensure that it achieves the intended ends, is unlawful, as it goes beyond the requirements of the MS4 regulations and requires the Copermittees to guarantee the results of activities that will often be in the control of third parties.

Attachment 7: General Legal Comments

The MS4 regulations require that the MS4 permittees develop the required programs. See, for example, 40 CFR § 122.26(d)(2)(iv(A)((2), which requires the Copermittees to, among other things, develop and implement a management program including a "description of planning procedures including a comprehensive master plan to develop, implement and enforce controls to reduce the discharge of pollutants from municipal separate storm sewers which receive discharges from areas of new development and significant redevelopment". The Copermittees certainly could be liable under the permit if they failed to adequately "develop, implement and enforce controls". However, the MS4 regulations do not require that the Copermittees guarantee, under threat of being found in violation of the permit, that such controls achieve the desired ends of the management programs. It should be also noted that in many other parts of the Order, the Copermittees are directed to develop programs "designed" to achieve water quality goals.

Further, the iterative BMP approach required by the State Water Resources Control Board ("State Board") in precedential State Board Order WQ 99-05 and subsequent rulings would be made meaningless if the Copermittees were strictly liable for ensuring in their programs that discharges did not cause or contribute to a violation of a water quality standard. It is appropriate for the Board to set forth in these sections the "elements needed in the Copermittees' program to fulfill the goals of [the] directive", as set forth in staff's Response to Comment 297 on the Orange County MS4 permit, Order No. R9-2009-0002. However, the Board has no authority to require the Copermittees to guarantee that such goals will be fulfilled, as the current language appears to require.

In addition to the portions of the Order cited, the Copermittees also request changes to similar provisions found at Sections F.1.d, F.1.d.5, F.2, F.3.a, F.4, and G. The attached redline identifies those and any additional parts.

2. *Requirement to Follow State Law on Requirements Not Required by Federal Law*

A number of requirements in the Tentative Order exceed the requirements of federal law. The Board may have discretion to impose such requirements under state law (*Defenders of Wildlife v. Browner*, 191 F.3d 1159 (9th Cir. 1999), however, the California Supreme Court has determined that to the extent such state law requirements are included in an NPDES permit, the Board must consider the factors set forth in Water Code § 13263(a) and § 13241, including the water quality that could reasonably be achieved by the requirements and economic considerations. *City of Burbank v. State Water Resources Control Board* (2005) 35 Cal. 4th 613. See also Water Code § 13000, setting forth that the activities and factors which may affect the quality of the waters of the state "shall be regulated to attain the highest water quality which is reasonable, considering all demands being made on those waters and the total values involved, beneficial and detrimental, economic and social, tangible and intangible".

The Fact Sheet and findings for the Tentative Order do not establish that staff has considered such factors or, to the limited extent the factors were considered, staff used out-of-date and incomplete information. In particular, the economic analysis contained in Section VI of the Fact Sheet uses out-of-date information on the economic viability of the cities in the Santa Margarita Region, ignoring the impact of the national recession, which has hit the Region with particular force and which has caused a major reduction in property tax and sale tax revenues available to

fund water quality activities under the Order. For a more complete economic analysis, please see Attachment 2 to the comment letter.

Findings in Tentative Order:

Finding A.4: This finding states that responses to comments on the Order would be "incorporated by reference" into the findings supporting the Order.

Comment: Incorporating responses to comments as to which interested parties have no chance to comment prior to the hearing on the Order raises a due process concern.

Finding C.14: This finding states, in relevant part, that "[n]on-storm water (dry weather) discharge from the MS4 is not considered a storm water (wet weather) discharge and therefore is not subject to regulation under the Maximum Extent Practicable (MEP) standard . . . .". The finding further asserts that such discharges are to be "effectively prohibited" from discharge into the MS4.

Comment: The rationale for this finding, as set forth in the Fact Sheet, relies on a State Board precedential decision, Order No. WQ 2009-0008. This order has been vacated by order of the Los Angeles County Superior Court in *County of Los Angeles v. State Water Resources Control Board*, Case No. BS 122724 (July 16, 2010). Thus, the order has no further effect and cannot be cited or relied upon by the Board in support of this finding or any other finding or directive in the Order.

Moreover, the finding incorrectly states that discharges of non-stormwater from the MS4 are not subject to the MEP standard. This parsing of "stormwater" and "non- stormwater" is not found in the Clean Water Act, which states only that the MS4 permit "shall require controls to reduce the discharge of *pollutants* to the maximum extent practicable . . . .". 33 U.S.C. 1342(p)(3)(B)(iii) (emphasis supplied). The preamble to the MS4 regulations promulgated by U.S. EPA moreover also acknowledges that "MEP control measures" would be implemented to address not only pollutants in "stormwater" but also from "non-stormwater discharges."

> As the preamble states:
>
> [Copermittees are required] to develop management programs for four types of pollutant sources which discharge to large and medium municipal storm sewer systems. Discharges from [such systems] are usually expected to be composed primarily of: (1) Runoff from commercial and residential areas; (2) storm water runoff from industrial areas; (3) runoff from construction sites; and (4) *non-storm water discharges*. Part 2 of the permit application has been designed to allow [permittees] the opportunity to propose *MEP control measures for each of these components of the discharge"*. 55 Fed. Reg. at 48052 (emphasis supplied).

This language sets forth EPA's understanding of the plain language of the Act: "pollutants" must be controlled to the MEP from the MS4 "discharge", not merely stormwater. While State Board Order No. WQ 2009-0008 improperly attempted to ignore this distinction and liken non-stormwater discharges to prohibited "illicit discharges", that order has been vacated and cannot be cited by the Board.

Moreover, the interpretation that the Clean Water Act requires controls of dry weather discharges from the MS4 in the same manner as if such discharges were from an industrial wastewater source ignores the factual complexity of the MS4 discharge. For example, some of that discharge will be composed of exempt discharges, such as car washing runoff, swimming pool drainage, rising groundwater, foundation drains and other such sources. As to these types of discharges, U.S. EPA stated that "it is unlikely Congress intended to require municipalities to effectively prohibit . . . *seemingly innocent flows that are characteristic of human existence in urban environments and which discharge to municipal separate storm sewers"*. 55 Fed. Reg. at 48037 (emphasis added). Other parts of that discharge will be comprised of industrial discharges separately permitted by the Board, such as well development discharges. These discharges cannot be distinguished from possible illicit discharges, yet they must still be treated to the MEP. There is no requirement in the Clean Water Act, or in the implementing regulations, to ensure that these mixed dry weather discharges must be "effectively prohibited" in the same way that an industrial plant would be required to control its discharges.

Finding C.15: This finding states, in relevant part, that the Board and the Copermittees have identified "landscape irrigation, irrigation water and lawn water, previously exempted discharges, as a source of pollutants and conveyance of pollutants to waters of the U.S." The finding further asserts that such non-exempt discharges are required to be "addressed" as "illicit discharges" and effectively prohibited from entry into the MS4.

Comment: The rationale for this prohibition lacks both a factual and legal basis. The factual issues are discussed in the District's technical comments on this issue. With regard to legal issues, the justification for removing the preexisting exemption for these discharges (referred to hereafter as "irrigation water") is completely lacking. First, given that the justification is based on State Board Order WQ 2009-0008, which likens dry weather discharges to "illicit discharges" required to be "effectively prohibited" from entry into the MS4, the vacation of this order by the Los Angeles County Superior court eliminates this Order as a justification for the prohibition.

Second, EPA, in the preamble to the federal MS4 regulations, required that a *permittee* must make a finding that the "irrigation water" discharges must be a "source of pollutants to waters of the United States . . . .". 55 Fed. Reg. 48037. Moreover, such discharges must represent a "significant" source of pollutants to waters of the United States "under certain conditions". U.S. EPA *Guidance Manual for the Preparation of Part 2 of the NPDES Permit Application for Discharges from Municipal Separate Storm Sewer Systems,* November 1992 ("EPA Part 2 Guidance Manual"), at p. 6-33. These conditions require a focus not on an entire category of discharges, but rather a discharger-by-discharger examination.

In the MS4 regulatory preamble, EPA stated that "[i]n general, municipalities will not be held responsible for prohibiting some specific components of discharges or flows listed below through their [MS4], even though such components may be considered non-storm water discharges, unless such discharges *are specifically identified on a case-by-case basis as needing to be addressed"*. 55 Fed. Reg. 47995 (emphasis supplied). In the Guidance Manual, EPA states:

> If an applicant knows . . . that landscape irrigation water from a ***particular site*** flows through and picks up pesticides **or *excess*** nutrients from fertilizer applications, there may

> be a reasonable potential for a storm water discharge to result in a water quality impact. In such an event, the applicant should contact the NPDES permitting authority to request that the authority order ***the discharger*** . . . to obtain a separate NPDES permit (or in this case, the discharge could be controlled through the storm water management program of the MS4).
>
> EPA Part 2 Guidance Manual, p. 6-33 (emphasis added).

Third, the finding asserts that the Board has the authority to "identify exempted discharges as a source of pollutants" and that it has identified the irrigation discharges "as a source of pollutants and conveyance of pollutants to waters of the U.S." Read in the context of the previously cited language, however, the Board has no power greater than a municipality and must identify specific discharges, and not entire categories of discharges. See 55 Fed. Reg. 48037. And, as noted in the white paper on irrigation runoff, the Copermittees have not, in fact, identified irrigation discharges as a source of pollutants or a "conveyance of pollutants" to waters of the United States.

Finding D.1.b.: This finding states that "MS4 discharges, however, continue to cause *or contribute to* violations of water quality standards as evidenced by the Copermittees' monitoring results". (Emphasis added)

Comment: With respect to discharges that "contribute to" violations of water quality standards, it should be noted that for concentration-based water quality standards, an MS4 discharge at concentrations *below* the water quality standard cannot, as a matter of simple scientific fact, *contribute to* a violation of such a water quality standard. If the discharge is below the standard in question, that discharge will never exceed the water quality standard, no matter the volume of the discharge.

Finding D.2.g: This finding, which concerns the effects of urbanization on the characteristics of stormwater flow, states in part that "[h]ydromodification measures for discharges to hardened channels are needed for the future restoration of the hardened channels to their natural state . . . ."

Comment: Hardened flood control channels are in place in the Santa Margarita Region due to the need to protect the lives and property of Riverside County residents from floodwaters. Such channels, and other flood control structures, have been established by the District in accordance with its statutory obligations set down by the Legislature in California Water Code App. § 48-9. In particular, we draw the Board's attention to that section of the Water Code setting forth the power of the District to "control the flood and storm waters of said district" and to save and conserve in any manner all or any of such waters and protect from damage from such flood or storm waters the watercourses, watersheds, public highways, life and property in said district." Water Code App. § 48-9(8).

The Board has no statutory jurisdiction under the MS4 program to alter any flood control structures or channels of the District or to some jurisdiction over the construction or location of such structures or channels. Any such alteration or construction must be done with the cooperation and agreement of the District and in accord with the District's statutory mandate to protect the citizens of Riverside County. Please see changes in redline.

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Finding D.3.c: This finding states in part that "urban streams", whether natural, anthropogenic or partially modified, are considered part of the "MS4" if they are used as a conveyance for runoff.

Comment: The definition of "MS4" does *not* include any natural watercourse. This is evident both from the definition of "MS4" in the federal Clean Water Act regulations and from EPA's comments in the preamble to those regulations. First, the definition of "MS4", in relevant part, states that it consists of "a conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, manmade channels or storm drains" "owned or operated by" a municipality "having jurisdiction over disposal of . . . storm water" that is "designed or used for collecting or conveying storm water". 40 CFR § 122.26(b)(8). Nothing in that definition even suggests that natural watercourses are part of the MS4, only improved watercourses.

Second, U.S. EPA, in the preamble to the original MS4 regulations, stated unequivocally that "[t]he Agency also wants to clarify that streams, wetlands and other water bodies that are waters of the United States are not storm sewers for the purpose of this rule". 53 Fed Reg. 49442 (December 7, 1988).[1]

Moreover, none of the Copermittees "own" or "operate" a natural stream. Such streams are waters of the State and are "owned" by the people of California.

The authority cited in the Fact Sheet for this finding, a response filed with the State Board in opposition to a petition challenging an MS4 permit issued by the Board to San Diego County, contradicts the federal definition and, under the Supremacy Clause, cannot be employed. Please see changes in redline.

Finding E.1: This finding states that the RWL language in the Tentative Order "requires compliance with water quality standards, which for stormwater discharges compliance is to be achieved through an iterative approach requiring the implementation of improved and better-tailored BMPs over time".

Comment: The District has two comments regarding this finding, one relating to the language of the finding and one relating to the Fact Sheet discussion of the finding. First, the language of State Board Order WQ 99-05, which establishes the RWL language required to be placed in MS4 permits statewide, is not limited to "stormwater" discharges, but rather to all discharges into receiving waters. See State Board Order WQ 99-05. This is consistent also with the requirement that "discharges" from the MS4, not merely stormwater discharges, must be controlled to the MEP and are not required to meet numeric effluent limitations. 33 U.S.C. § 1342(p)(3)(B)(iii). Second, while the language of the finding correctly states that compliance with water quality standards "is to be achieved through an iterative approach", language in the Fact Sheet improperly contradicts this finding by asserting that compliance with the iterative BMP process

[1] EPA saw no need to further clarify this point in the final rulemaking for the MS4 regulations. The absence of any discussion of this point in the final rulemaking does not, contrary to comments made by Board staff in responses to comments on the South Orange County MS4 Permit, Order No. R9-2009-0002, indicate that EPA abandoned this reading of the Act.

"does not shield the discharger from enforcement actions for continued non-compliance with water quality standards". Fact Sheet, page 91.

Such an interpretation contradicts the plain language of Order WQ 99-05 and appears to represent an "end-run" around the entire iterative process and the concept of MEP, which is a flexible concept, intended to allow the development of site-specific permit conditions based on the judgment of the permit writer. See, e.g., 55 Fed. Reg. 48038. The interpretation is, therefore, not consonant with the requirements of the State Board precedential order and the MS4 regulations and should be deleted from the Fact Sheet.

Finding E.6: This finding purports to determine that the Tentative Order "does not constitute an unfunded local government mandate subject to subvention under Article XIIIB, Section(6) of the California Constitution".

Comment: This finding has no place in the Tentative Order. The exclusive jurisdiction over a determination as to whether a mandate constitutes an unfunded state mandate lies with the Commission on State Mandates. The Commission has exclusive authority to determine, in the first instance, whether a requirement constitutes an unfunded state mandate. Government Code §§ 17751 and 17552; *Lucia Mar Unified School District v. Honig* (1988) 44 Cal.3d 830, 837; *Hayes v. Commission on State Mandates* (1992) 11 Cal.App.4th 1546, 1596-97. The findings of an agency that has no jurisdiction to make those findings are entitled to no weight.

Second, the finding is erroneous on several grounds. It is erroneous in its assertion that the Tentative Order "implements federally mandated requirements under CWA §402". While true, the Order also contains separate state-mandated requirements. As the California Supreme Court has held, NPDES permits (like the Tentative Order) can contain both federal and state requirements. See *City of Burbank, supra,* 35 Cal. 4th at 618, 628. Where those non-federal requirements constitute a new program or higher level of service ordered by the state or exceed federal requirements, those requirements can qualify as a state mandate requiring a subvention of funds. See *Long Beach Unified School District v State of California* (1990) 225 Cal.App.3d 155, 172-73. Even if the requirement derives from federal law, the requirement can still constitute an unfunded state mandate if the state agency has a choice as to whether to impose the requirement on the permittees, e.g., *Hayes,* 11 Cal.App.4th at 1593-94.

Recently, the Commission on State Mandates held that both the Los Angeles County MS4 Permit and the San Diego County MS4 Permit contained requirements that constituted an unfunded state mandate, not required by federal law. *In re Test Claim on Los Angeles Regional Quality Control Board Order No. 01-182,* July 31, 2009; *In re Test Claim on San Diego Regional Water Quality Control Board Order No. R9-2007-0001,* March 26, 2010.

The finding further asserts that the obligations to be imposed on the Copermittees are "similar to, and in many respects less stringent than" obligations on non-governmental discharges. A similar argument was considered and rejected by the Commission in the Los Angeles and San Diego MS4 Permit Test Claims. The District disagrees with this assertion, as there are numerous requirements in the Tentative Order that are uniquely applicable to governmental entities. This is, however, a question that would be addressed by the Commission on State Mandates were a test claim to be filed, the only procedure for the determination of this issue.

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The finding further asserts that Copermittees "have the authority to levy service charges, fees, or assessments to pay for compliance with this Order". This finding is both erroneous on the facts and without any basis in the record. The question of how a state mandate is to be funded is beyond the scope of the Board's expertise and, again, is exclusively within the jurisdiction of the Commission on State Mandates. The finding also asserts that the "Copermittees requested permit coverage in lieu of compliance with the complete prohibition against the discharge of pollutants contained in CWA §301, subdivision (a)". A similar argument was made and rejected in the Los Angeles and San Diego MS4 Permit Test Claims. The finding further asserts that prohibitions against conditions of pollution or nuisance predate the enactment of Article XIIIB Section 6 of the California Constitution. The requirements of the Tentative Order far exceed such requirements. And, in any event, whether such requirements predate Article XIIIB Section 6 is an issue for the Commission on State Mandates.

The finding is not supported by evidence in the record and is in fact contradicted by controlling legal precedent. Even were it to be included in the Tentative Order, it is entitled to no weight since the Board lacks jurisdiction to make such a finding. For these reasons, the finding and any associated discussion in the Fact Sheet should be deleted. Please see changes in redline.

Directives in Tentative Order:

Section A.1: This directive mandates, among other things, that discharges "into" MS4s that would cause or threaten to cause a condition of "pollution, contamination, or nuisance" in receiving waters of the state are prohibited.

Comment: While the Board in this Order has jurisdiction to prohibit discharges "from" the MS4, it cannot regulate conditions within the MS4, since these are not in fact "receiving waters of the state". In any event, the language is superfluous, since regulation of a discharge from the MS4, which is subject matter of the Tentative Order, accomplishes the same end. Please see the accompanying redline.

Section A.3: This directive both recites the prohibition against discharges that cause or contribute to the violation of water quality standards and introduces the iterative process required by the State Board for MS4 permittees.

Comment: To clarify that the iterative process specifically applies to the Copermittees' compliance requirements in Section A.3, language has been added in the redline.

Section A.3.b: This directive relates to the requirement that the Copermittees repeat the iterative process to comply with receiving water limitations for continuing or recurring exceedances of the limitations.

Comment: Clarifying language changes are requested in the redline.

Section A.3.c: This directive indicates that nothing prevents the Board from enforcing any provision of the Order while the Copermittees are preparing and implementing the receiving water limitation report.

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Comment: Clarifying language changes are included in the redline to make clear that so long as the Copermittees are in compliance with the requirements of Section A.3, they are not in violation of the section.

Section B.2: This section categorizes the types of non-stormwater discharges that are not prohibited from discharge into the MS4, and thus not subject to the "effectively prohibit" requirement in Section B.1. However, this section improperly omits several categories of non-stormwater discharges, landscape irrigation, irrigation water, lawn watering and non-emergency fire fighting flows. In addition, this section states that the Water Board may require controls for "non-anthropogenic sources".

Comment: As discussed above in the District's comment concerning Findings C.14 and C.15, the Board lacks authority to delete an entire category of discharge from the non-stormwater designation. Such authority must be exercised primarily by the Copermittees, based on their evaluation of source-specific facts. And, the ability of the RWQCB to liken such flows to "illicit discharges", apparently authorized by State Board Order No. WQ 2009-0008, is no longer in effect, as that Order has been vacated. Moreover, there is no requirement in the MS4 regulations for controls on "non-anthropogenic sources". Such natural sources are not within the control of the MS4 Copermittees. Moreover, controlling such natural sources as rising groundwater or springs by sealing the MS4 could raise concerns about interference with water rights. Given the natural source of such springs, the incidental presence of pollutants in the waters would have occurred whether an MS4 was in existence or not. Please see the accompanying redline as well as the District's technical comments on this directive.

Section C: This section establishes "non-stormwater dry weather action levels" ("NAL") monitoring and the requirements to be followed when NALs exceedances are identified.

Comment: In addition to the District's technical comments on this part, the District has the following concerns regarding legal aspects of this directive. The District wishes to incorporate its comments on Findings C.14 and C.15, which discuss the requirements applicable to any discharge from an MS4, which is that the Copermittees control pollutants in such discharges to the MEP. Such a requirement applies not only to discharges of stormwater, but also dry weather discharges, which may (as discussed above) include not only non-exempted non-stormwater discharges but also discharges from exempted non-stormwater sources (those identified in Section B.2 of the Order) as well as discharges from sources holding separate NPDES permits. We note that Section C.2.d. requires prompt notice to the RWQCB of a source that may require a separate NPDES permit. The Board must be prepared to address such sources and not require further investigation by the Copermittees.

As also noted above, in the preamble to the MS4 regulations, U.S. EPA indicated that the MEP control requirement would apply to all discharges from MS4s, including "non-stormwater discharges". 55 Fed. Reg. 48052.

Section E.1.a: This directive requires the Copermittees to have legal authority to, among other things, "control the quality of runoff from industrial and construction sites", including sites that have coverage under the general industrial and construction stormwater permits.

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Comment: As separate NPDES permits, the general construction and general industrial stormwater permits allow discharge into the MS4 so long as those permits are being complied with. Copermittees do not have authority to contradict the requirements of the general permits. This requirement is vague and ambiguous, and goes beyond the requirements of the MS4 regulations, which require that Copermittees demonstrate that they have legal authority to control discharges into their MS4 systems.

Sections E.1.j and k: These directives require the Copermittees to have legal authority to require the use of BMPs to prevent or reduce the discharge of pollutants into MS4s from stormwater to the MEP and to require documentation on such BMPs.

Comment*:* The Copermittees are required under the Clean Water Act to control discharge of pollutants *from* their MS4 to the MEP standard. 33 U.S.C. § 1342(p)(3). There is no requirement that discharges *into* the MS4 meet this standard, though the Copermittees are free to impose such a standard voluntarily. These provisions are not required and should either be removed or made optional for the Copermittees. The requirements of these directives are also duplicative of Section E.1.i., which already requires the Copermittees to have the legal authority to require reports from dischargers to the MS4.

Section F.1.h(h): This directive requires that where Priority Development Projects are adjacent to or will modify stream channels, the use of hardscape and other materials is forbidden.

Comment: As noted above, the District has a statutory mandate to protect the lives and property of the citizens of Riverside County from floodwaters. If, in the professional judgment of the District's engineers, hardscape or other engineering improvements are required in a stream channel affected by this directive due to flood control concerns, the District must be allowed to make that judgment. The Board does not have the hydrologic/hydraulic expertise, nor is it authorized by the Legislature to make flood control judgments and presumably would not wish to be a defendant in a lawsuit brought by flood victims whose lives or property was affected by the inability of the District to make necessary flood control decisions.

In making this comment, the District wants to be clear that it is not unwilling to accommodate potential future channel rehabilitation efforts where flood control will not be affected. Please see the accompanying redline for suggested language to address these concerns.

Section F.2.a: This directive requires the Copermittees to update their grading and other ordinances as necessary to comply with the Order and including requirements for implementing all designated BMPs and other measures.

Comment: The drafting and enforcement of ordinances by a municipality is a municipal function that cannot be directed by the Regional Board. Article XI, section 7 of the Constitution guarantees municipalities the right to "make and enforce within [their] limits all local police, sanitary and other ordinances and regulations not in conflict with general laws". Thus, specific requirements as to the content of ordinances cannot be directed by the Board. The redline requests deletion of this directive.

Section F.3.b.(5): This directive requires that the Copermittee stormwater ordinances must contain certain enforcement components.

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Comment: The drafting and enforcement of ordinances by a municipality is a municipal function that cannot be directed by the Regional Board. Article XI, section 7 of the Constitution guarantees municipalities the right to "make and enforce within [their] limits all local police, sanitary and other ordinances and regulations not in conflict with general laws". Thus, specific requirements as to the content of ordinances cannot be directed by the Board. The redline requests deletion of this requirement.

Section F.3.c.(4): This directive requires that each Copermittee "must ensure that effective measures exist and are implement or required to be implemented to ensure that runoff within and from common interest developments, including areas managed by associations and mobile home parks, and meets the objectives of this section and Order".

Comment: The Fact Sheet inappropriately states that the Tentative Order "interprets common interest areas as property subject to the codes and ordinance and enforcement mechanisms of the city or county in which it resides and, therefore, holds the local government responsible for the discharge of wastes from storm water conveyance systems located within these areas".

The Tentative Order regulates discharges from the MS4. Drainage systems and the runoff handled *within* a private development or common interest area generally are not part of the Copermittees' MS4, as the Copermittees (unless they actually maintain their MS4 within such areas) have no right to maintain or regulate such internal systems, beyond the enforcement of local ordinances regulating discharges *into* the Copermittees' MS4 or through the requirement to install and maintain BMPs. Discharges from such systems are thus no different than discharges from any other private property within the Copermittees' jurisdiction. The first full paragraph in this section should be deleted because it is merely prefatory language to the specific requirements set forth in the remainder of the section.

Section F.3.c.(5): This directive requires the Copermittees to enforce their ordinances with respect to grading activities on privately owned unpaved roads "so as to prevent impacts to water quality".

Comment: In addition to the general objection to the requirement to regulate unpaved roads, found in a separate white paper and in the general comment letter, this specific directive violates the constitutional requirement that the drafting and enforcement of ordinances by a municipality is a municipal function that cannot be directed by the Regional Board. Article XI, section 7 of the Constitution guarantees municipalities the right to "make and enforce within [their] limits all local police, sanitary and other ordinances and regulations not in conflict with general laws". Thus, specific requirements as to the content of ordinances cannot be directed by the Board. Moreover, the scope of the Order is to address discharges from the MS4, not discharges from non-point or non-MS4 sources that may affect "water quality". The redline requests deletion of this requirement.

Section F.6: This directive includes a description of the purposes of the education program with respect to stormwater and non-stormwater discharges.

Comment: The redline includes revisions that correctly state the requirements of the Clean Water Act.

Attachment 7: General Legal Comments

Section H.1: This directive requires that each "Copermittees must exercise its full authority to secure the resources necessary to meet all requirements of this Order".

Comment: There is no statutory or regulatory authority for this requirement. The MS4 regulations require *only* that the Copermittees submit a "fiscal analysis" of the resources required to accomplish permit program activities, including a description of the sources of funds. 40 CFR § 122.26(d)(2)(vi). Moreover, this requirement is inherently vague and ambiguous and is, therefore, especially troublesome given the economic conditions now faced by the County and the Cities within the Santa Margarita region. This directive should be deleted, or at minimum, revised as shown in the redlines.

Standard Provisions, Attachment B:

In the Standard Provisions, it is stated that the Order "may be modified, revoked and reissued, or terminated for cause", citing 40 CFR § 122.41(f). However, the Standard Provisions do not cite 40 CFR § 122.62 or provide that any such modification, revocation or reissuance may only be carried out upon prior notice and hearing. See Water Code § 13263 (regional board, "after any necessary hearing", may prescribe requirements for waste discharges). The Standard Provisions should make clear that any modification, revocation or reissuance of the Order can only be accomplished at a noticed public hearing, with opportunity for comment.

Attachment 8: District-Specific Comments

DISTRICT-SPECIFIC COMMENTS OF THE RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT ON TENTATIVE ORDER NO. R9-2010-0016, WASTE DISCHARGE REQUIREMENTS FOR DISCHARGES FROM THE MUNICIPAL SEPARATE STORM SEWER SYSTEMS (MS4s) DRAINING THE COUNTY OF RIVERSIDE

The following comments are made by the Riverside County Flood Control and Water Conservation District (District) with respect to District-specific issues raised by the above referenced Tentative Order (Order) as the Order pertains to the District. These comments are in addition to the comments made by the District and on behalf of the other Copermittees, the County of Riverside and the Cities of Menifee (to the extent that this City will remain as a Copermittee under the Order), Murrieta, Temecula and Wildomar. We also understand that the County and the individual Cities will be filing comments on the Order under separate cover. These comments are intended to supplement those comments filed by the District on behalf of itself and the other Copermittees.

The District reserves the right to make additional comments on the Order prior to the close of the public hearing to adopt the Order.

The focus of these comments is to apprise Regional Board staff of the limited jurisdiction of the District within the Santa Margarita Region and to suggest language clarifying the requirements of the Order to reflect the District's limited jurisdiction. While aspects of the Order clearly apply to the District as an owner and operator of the Municipal Separate Storm Sewer System (MS4) serving the watershed, because of the limited nature of the District's jurisdiction over land areas within the watershed, many cannot. For example, the District, unlike other Copermittees, does not control activities on land not directly owned by the District, nor does it have ordinances or issue permits governing the use of such land. The District simply does not have statutory authority to govern the activities of the residents within a municipal area, unlike the other Copermittees.

Thus, a number of the provisions in the Order are not applicable to the District in the same manner and some are entirely not applicable. This letter highlights those provisions. The comments noted below also are reflected in the redline of the Order submitted with these and other comment white papers.

Comments on Findings

1. Need for New Finding B.2: Section B in the findings describes the regulated parties. The District requests a new finding B.2, which provides as follows:

> The Riverside County Flood Control and Water Conservation District (District) is not a municipality but rather operates various elements of the MS4 system within the San Diego Region in the form of flood control structures, including channels. Such channels and other flood control structures have been constructed and are operated by the District in accordance with its statutory obligations established by the Legislature in California Water Code App. § 48-9, to "control the flood and storm waters of said district" and to save and conserve in any manner all or any of such waters and protect from damage from such flood or storm waters the watercourses, watersheds, public highways, life and property in said district." Water Code App. § 48-9(8). As

a creature of state law, and not a municipal corporation, the District does not exercise jurisdiction over land areas within the San Diego Region and the activities carried out on those land areas outside of its limited rights-of-way. Please see redline.

2. Findings, Section D.3: This section of the Findings referring to "Construction and Existing Development" is of limited applicability to the District, since the only construction projects that would be overseen by the District are of or within its own facilities. The redline sets forth a change to clarify this limited applicability.

COMMENTS ON DIRECTIVES

1. Section F.1.a: The District, as a non-municipality, does not prepare a General Plan or equivalent because it does not govern development within a geographical area. Thus, the requirements of this section of the Order are not applicable to it. Please see redline.

2. Section F.1.d.(4)(a)(iii): Since the District, as a non-municipality, does not have land use codes, policies and ordinances, this provision, relating to the removal of "barriers to LID implementation," is not applicable to it. Please see redline.

3. Section F.1.d.(9): The only Priority Development Projects (PDP) relevant to the District would be the District's owned non-flood control channel projects, since it has no authority to permit private or non-District facilities and exercises jurisdiction over no private land areas within the watershed, and because the construction of flood control channels is subject to the jurisdiction of the U.S. Army Corps of Engineers through the Clean Water Act Section 404 permit program, not the NPDES permit program under Section 402 of the Clean Water Act. Thus, this directive, which requires the verification of compliance by third parties with Standard Stormwater Mitigation Plan (SSMP) requirements, is not applicable to the District. Please see redline.

4. Section F.1.e: As noted above, the only PDPs over which the District would have authority are its own projects. Thus, this directive, which requires inspection of BMPs at PDPs constructed by third parties, is not applicable to the District. Please see redline.

5. Section F.1.g: Since the District is not a municipality, and does not permit third parties to build development projects, this provision is not applicable to it. (It should be noted that this directive also has been objected to by the District on behalf of itself and the other Copermittees.)

6. Sections F.2, F.2.a and F.2.f.: These directives require each Copermittee to comply with each of the requirements of the section, to review and update its grading and other ordinances, and implement an enforcement process for Construction sites. These requirements are not applicable to the District in the same manner as the other Copermittees, as the District is not a municipality and does not issue grading or other permits for private land use activities. Please see redline.

7. Sections F.3.b-c: These directives, which require the development of commercial/industrial and residential programs, are applicable to a municipality but not to the District, which does not have land area occupied by either commercial/industrial or residential developments. Such requirements may be applicable to the municipal Copermittees, but not to the District, which only operates MS4 within the

Permit area. The District's rights-of-way are limited to that which is necessary to properly operate flood control infrastructure. Please see redline.

8. Section F.3.d: This directive requires development of a retrofitting program for "municipal, industrial, commercial and residential" areas of development. The District only maintains MS4 facilities within the Santa Margarita Region, and does not have jurisdiction over other areas of development. The Order should make clear that any retrofitting requirements (which are the subject of separate comments by the District on behalf of other Copermittees) apply only to development with the jurisdiction of the Copermittee. Clarifying changes are set forth in the redline.

9. Section F.6: This directive contains requirements for education of various target communities, including commercial and industrial owners and operators and residential communities, most of which are not within the jurisdiction of the District. The Order should make clear that such educational programs must be consistent with the jurisdiction of the Copermittees. Clarifying changes are set forth in the redline.

Attachment 9: Santa Margarita Region MS4 Copermittees Comments on Tentative Order R9-2010-0016 and Attachment E

California Regional Water Quality Control Board
San Diego Region

Waste Discharge Requirements for Discharges from the Municipal Separate Storm Sewer Systems (MS4s) Draining the County of Riverside, the Incorporated Cities of Riverside County, and the Riverside County Flood Control and Water Conservation District within the San Diego Region

Tentative Order No. R9-2010-0016
NPDES NO. CAS0108740

October 13, 2010

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
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To request copies of the Riverside County Municipal Storm Water Permit, please contact Ben Neill, Water Resources Control Engineer at (858) 467 – 2983, bneill@waterboards.ca.gov

Documents also are available at: http://www.waterboards.ca.gov/sandiego

Waste Discharge Requirements for Discharges from the Municipal Separate Storm Sewer Systems (MS4s) Draining the County of Riverside, the Incorporated Cities of Riverside County, and the Riverside County Flood Control and Water Conservation District within the San Diego Region

Adopted by the
California Regional Water Quality Control Board
San Diego Region
on October 13, 2010

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California Regional Water Quality Control Board
San Diego Region

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Eric Anderson	Irrigated Agriculture
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DRAFT

The California Regional Water Quality Control Board, San Diego Region (hereinafter San Diego Water Board), finds that:

A. BASIS FOR THE ORDER

1. This Order is based on the federal Clean Water Act (CWA), the Porter-Cologne Water Quality Control Act (Division 7 of the Water Code, commencing with Section 13000), applicable State and federal regulations, all applicable provisions of statewide Water Quality Control Plans and Policies adopted by the State Water Resources Control Board (State Water Board), the Water Quality Control Plan for the San Diego Basin adopted by the San Diego Water Board (Basin Plan), the California Toxics Rule, and the California Toxics Rule Implementation Plan.

2. This Order reissues National Pollutant Discharge Elimination System (NPDES) Permit No. CAS0108766, which was first adopted by the San Diego Water Board on July 16, 1990 (Order No. 90-38), and then reissued on May 13, 1998 (Order No. 98-02). On May 26, 1998, the United States Environmental Protection Agency (USEPA), Region IX, objected to Order No. 98-02 due to concerns regarding Receiving Water Limitations (RWL) language. The USEPA concluded that the RWL language in the permit did not comply with the CWA and its implementing regulations. On April 27, 1999, the USEPA reissued the MS4 permit, which the San Diego Water Board adopted as Addendum No. 1 to Order No. 98-02 on November 8, 2000. On July 14, 2004, the San Diego Water Board adopted the third term MS4 permit, Order No. R9-2004-001. On January 15, 2009, the Riverside County Flood Control and Water Conservation District (RCFCD), as the Principal Copermittee, submitted a Report of Waste Discharge (ROWD) for reissuance of the municipal separate storm sewer system (MS4) Permit.

3. This Order is consistent with the following precedential Orders adopted by the State Water Board addressing MS4 NPDES Permits: Order 99-05, Order WQ-2000-11, Order WQ 2001-15, Order WQO 2002-0014, and ~~Order WQ 2009-0008~~ (*SWRCB/OCC FILE A-1780).*

4. The Fact Sheet / Technical Report for the Order No. R9-2010-0016, NPDES No. CAS0108766, Waste Discharge Requirements for Discharges from the MS4s Draining the County of Riverside, the Incorporated Cities of Riverside County, and the Riverside County Flood Control and Water Conservation District within the San Diego Region, includes cited regulatory and legal references and additional explanatory information and data in support of the requirements of this Order. ~~This information, including any supplements thereto, and any response to comments on the Tentative Orders, is hereby incorporated by reference into these findings.~~

Comment [CP1]: This order has been vacated and can no longer be referenced

Comment [CP2]: This is inappropriate. The information in the fact sheet is/are not 'findings', they are explanations. Further a finding cannot be created through a response to comments.

B. REGULATED PARTIES

1. Each of the persons in Table 1 below, hereinafter called Copermittees or dischargers, owns or operates an MS4, through which it discharges into waters of the United States (U.S.) within the San Diego Region. These MS4s fall into one or more of the following categories: (1) a medium or large MS4 that services a population of greater than 100,000 or 250,000 respectively; or (2) a small MS4 that is "interrelated" to a medium or large MS4; or (3) an MS4 that contributes to a violation of a water quality standard; or (4) an MS4 which is a significant contributor of pollutants to waters of the U.S.

Table 1. Municipal Copermittees

1. City of Murrieta	4. County of Riverside
2. City of Temecula	5. Riverside County Flood Control and Water Conservation District
3. City of Wildomar	
6. City of Menifee[1]	

The Cities of Murrieta, Menifee and Wildomar also discharge into the waters of the U.S. in the California Regional Water Quality Control Board, Santa Ana Region (Santa Ana Water Board), so are located partially within both the San Diego and Santa Ana Water Board boundaries. As allowed by California Water Code (CWC) §13228, these Cities submitted written requests to be regulated for MS4 purposes under a permit adopted by only one Water Board. As authorized by CWC §13228 and pursuant to a written agreement between the San Diego Water Board and the Santa Ana Water Board, the Cities of Murrieta and Wildomar are wholly regulated by the San Diego Water Board under this Order, including those portions of the Cities jurisdiction not within the San Diego Water Board's region. Similarly, the City of Menifee is wholly regulated by the Santa Ana Water Board under Order No. R8-2010-0033, including those portions of the City of Menifee within the San Diego Water Board's region.[1]

2. The Riverside County Flood Control and Water Conservation District (District) is not a municipality but rather operates various elements of the MS4 system within the San Diego Region in the form of flood control structures, including channels. Such channels and other flood control structures have been constructed and are operated by the District in accordance with its statutory obligations established by the Legislature in California Water Code App. § 48-9, to "control the flood and storm waters of said district" and to save and conserve in any manner all or any of such waters and protect from damage from such flood or storm waters the watercourses, watersheds, public highways, life and property in said district." Water Code App. § 48-9(8). As a creature of state law, and not a municipal corporation, the District

[1] Until an agreement is finalized, the City of Menifee is included as a Copermittee in this Order.

does not exercise jurisdiction over land areas within the San Diego Region and the activities carried out on those land areas.

Comment [DB3]: See legal comments in Attachment 8

C. DISCHARGE CHARACTERISTICS

1. Discharges from the MS4 may contain waste, as defined in the CWC, and pollutants that adversely affect the quality of the waters of the State. The discharge of pollutants from an MS4 is a "discharge of pollutants from a point source" into waters of the U.S. as defined in the CWA.

2. MS4 storm water and non-storm water discharges are likely to contain pollutants that cause or threaten to cause a violation of water quality standards, as outlined in the Basin Plan. Storm water and non-storm water discharges from the MS4 are subject to the conditions and requirements established in the Basin Plan for point source discharges.

3. The most common categories of pollutants in runoff include total suspended solids, sediment, pathogens (e.g., bacteria, viruses, protozoa), heavy metals (e.g., copper, lead, zinc and cadmium), petroleum products and polynuclear aromatic hydrocarbons, synthetic organics (e.g., pesticides, herbicides, and PCBs), nutrients (e.g., nitrogen and phosphorus fertilizers), oxygen-demanding substances (decaying vegetation, animal waste), detergents, and trash.

4. The discharge of pollutants and/or increased flows from MS4s may cause or threaten to cause the concentration of pollutants to exceed applicable receiving water quality objectives and/or impair or threaten to impair designated beneficial uses resulting in a condition of pollution (i.e., unreasonable impairment of water quality for designated beneficial uses), contamination, or nuisance.

5. Pollutants in runoff can threaten and adversely affect human health. Human illnesses ~~have been clearly linked to~~ can be caused by recreating near storm drains flowing to receiving waters. Also, runoff pollutants in receiving waters can bioaccumulate in the tissues of invertebrates and fish, which may be eventually consumed by humans.

Comment [CP4]: No link has been demonstrated within this watershed. (Partially due to lack of recreation in receiving waters)

The findings should be accurate for reflective of the specific area the permit is regulating.

6. Runoff discharges from MS4s often contain pollutants that cause toxicity to aquatic organisms (i.e., adverse responses of organisms to chemicals or physical agents ranging from mortality to physiological responses such as impaired reproduction or growth anomalies). Toxic pollutants impact the overall quality of aquatic systems and beneficial uses of receiving waters.

7. The Copermittees' MS4 discharges runoff into lakes, drinking water reservoirs, rivers, streams, creeks, bays, estuaries, coastal lagoons, the Pacific Ocean, and tributaries thereto within one of the eleven hydrologic units (Santa Margarita Hydrologic Unit) comprising the San Diego Region as shown in Table 2. Some of

the receiving water bodies have been designated as impaired by the San Diego Water Board in 2009 pursuant to CWA section 303(d).

Table 2. Common Watersheds and CWA Section 303(d) Impaired Waters in the San Diego Region.

Hydrologic Area (HA) or Hydrologic Subarea (HSA) of the Santa Margarita Hydrologic Unit	**Major Receiving Water Bodies**	**303(d) Pollutant(s)/stressor or Water Quality Effect[2]**
DeLuz Creek HSA (902.21)	De Luz Creek	Iron, Manganese, Nitrogen, Sulfates
Murrieta HSA (902.32)	Long Canyon Creek (tributary to Murrieta Creek	Chlorpyrifos, E. Coli, Fecal Coliform, Iron, Manganese
Wolf HSA (902.52)	Murrieta Creek	Chlorpyrifos, Copper, Iron, Manganese, Nitrogen, Toxicity
Pauba HSA (902.51)	Redhawk Channel	Chlorpyrifos, Copper, Diazinon, E. Coli, Fecal Coliform, Iron, Manganese, Nitrogen, Phosphorus, Total Dissolved Solids
Gavilan HSA (902.22)	Sandia Creek	Iron, Sulfates
Gertrudis HSA (902.42)	Santa Gertrudis Creek	Chlorpyrifos, Copper, E. Coli, Fecal Coliform, Iron, Phosphorous
Lower Ysidora HSA (902.11)	Santa Margarita Lagoon	Eutrophic
Lower Ysidora HSA (902.11)	Santa Margarita River (Lower)	Enterococcus, Fecal Coliform, Phosphorus, Total Nitrogen as N
Gavilan HSA	Santa Margarita River (Upper)	Toxicity

[2] The listed 303(d) pollutant(s) do not necessarily reflect impairment of the entire corresponding WMA or all corresponding major surface water bodies. The specific impaired portions of each WMA are listed in the State Water Resources Control Board's 2008 Section 303(d) List of Water Quality Limited Segments.

Table 2. Common Watersheds and CWA Section 303(d) Impaired Waters in the San Diego Region.

Hydrologic Area (HA) or Hydrologic Subarea (HSA) of the Santa Margarita Hydrologic Unit	**Major Receiving Water Bodies**	**303(d) Pollutant(s)/stressor or Water Quality Effect[2]**
(902.22)		
Pauba HSA (902.51)	Temecula Creek	Chlorpyrifos, Copper, Phosphorus, Total Dissolved Solids, Toxicity
French HSA (902.33)	Warm Springs Creek (Riverside County)	Chlorpyrifos, E. Coli, Fecal Coliform, Iron, Manganese, Phosphorus, Total Nitrogen as N

8. Trash is a ~~persistent~~ pollutant that can enter receiving waters from the MS4, accumulate, and be transported downstream into receiving waters over time. Trash poses a serious threat to the beneficial uses of the receiving waters, including, but not limited to, human health, rare and endangered species, navigation and human recreation.

9. The Copermittees' water quality monitoring data submitted to date documents persistent ~~violations~~ exceedances of Basin Plan water quality objectives for various runoff-related pollutants (indicator bacteria, dissolved solids, turbidity, metals, pesticides, etc.) at various watershed monitoring stations. Persistent toxicity has also been observed at some watershed monitoring stations. In addition, bioassessment data indicate that the majority of the monitored receiving waters have Poor to Very Poor Index of Biotic Integrity ratings. In sum, the above findings indicate that runoff discharges are causing or contributing to water quality impairments, and are a leading cause of such impairments in Riverside County.

Comment [CP5]: It is only a violation if the pollutant has not been reduced to the MEP in accordance with a Permit.

10. When natural vegetated pervious ground cover is converted to impervious surfaces such as paved highways, streets, rooftops, and parking lots, the natural absorption and infiltration abilities of the land are lost. Therefore, runoff leaving a developed area ~~is~~ can be significantly greater in runoff volume, velocity, and peak flow rate than pre-development runoff from the same area. Runoff durations can also increase as a result of flood control and other efforts to control peak flow rates. Increased volume, velocity, rate, and duration of runoff, and decreased natural clean sediment loads, greatly accelerate the erosion of downstream natural channels. Significant declines in the biological integrity and physical habitat of streams and other receiving waters have been found to occur with as little as a 3-5 percent conversion from

natural to impervious surfaces. The increased runoff characteristics from new development must be controlled to protect against increased erosion of channel beds and banks, sediment pollutant generation, or other impacts to beneficial uses and stream habitat due to increased erosive force.

11. Development creates new pollution sources as human population density increases and brings with it proportionately higher levels of car emissions, car maintenance wastes, municipal sewage, pesticides, household hazardous wastes, pet wastes, trash, etc. which can either be washed or directly dumped into the MS4. As a result, the runoff leaving the developed urban area is typically significantly greater in pollutant load than the pre-development runoff from the same area. These increased pollutant loads must be controlled to protect downstream receiving water quality.

12. Development and urbanization especially threaten environmentally sensitive areas (ESAs), such as water bodies designated as supporting a RARE beneficial use (supporting rare, threatened or endangered species) and CWA 303(d)-impaired water bodies. Such areas have a much lower capacity to withstand pollutant loads than other, more sensitive areas. In essence, development that is ordinarily insignificant in its impact on the environment may become significant in a particularly sensitive environment. Therefore, additional controls to reduce storm water pollutants from new and existing development may be necessary for areas adjacent to or discharging directly to an ESA.

13. Although dependent on several factors, the risks typically associated with properly managed infiltration of runoff (especially from residential land use areas) are not significant. The risks associated with infiltration can be managed by many techniques, including (1) designing landscape drainage features that promote infiltration of runoff, but do not "inject" runoff (injection bypasses the natural processes of filtering and transformation that occur in the soil); (2) taking reasonable steps to prevent the illegal disposal of wastes; (3) protecting footings and foundations; (4) ensuring that each drainage feature is adequately maintained in perpetuity; and (5) pretreatment.

~~14. Non-storm water (dry weather) discharge from the MS4 is not considered a storm water (wet weather) discharge and therefore is not subject to regulation under the Maximum Extent Practicable (MEP) standard from CWA 402(p)(3)(B)(iii), which is explicitly for "Municipal … *Stormwater Discharges* (emphasis added)" from the MS4. Rather, non-storm water discharges into the storm sewers, per CWA 402(p)(3)(B)(ii), are to be effectively prohibited. Such dry weather non-storm water discharges have been shown to contribute significant levels of pollutants and flow in arid, developed Southern California watersheds and are to be effectively prohibited under the CWA.~~

Comment [DB6]: See legal comments in Attachment 7 Discharges of pollutants from the MS4, of whatever source, are subject to the MEP standard. The MEP standard applies to municipal discharges, not to only municipal storm water discharges.

~~15.~~ Non-storm water discharges to the MS4 granted an influent exception [i.e., which are exempt from the effective prohibition requirement set forth in CWA section 402(p)(3)(B)(ii)] under 40 CFR 122.26 are included within this Order. Any exempted

discharges identified by Copermittees as a source of pollutants are subsequently required to be *addressed* (emphasis added) as illicit discharges through prohibition and incorporation into existing IC/ID programs. Furthermore, the USEPA contemplates that permitting agencies such as the San Diego Water Board may also identify exempted discharges as a source of pollutants required to be addressed as illicit discharges (See VOl. 55 Fed. Reg. 48037). ~~The San Diego Water Board and the Copermittees havehas identified landscape irrigation, irrigation water and lawn water, previously exempted discharges, as a source of pollutants and conveyance of pollutants to waters of the U.S.~~

Comment [CP7]: This is a false statement – the Copermittees have not made this determination (or 'identification') See also comments within the letter and attachments thereto

~~16.~~14.

D. RUNOFF MANAGEMENT PROGRAMS

1. General

a. This Order specifies requirements necessary for the Copermittees to reduce the discharge of pollutants in storm water to the MEP. However, since MEP is a dynamic performance standard, which evolves over time as runoff management knowledge increases, the Copermittees' runoff management programs m*ust contin*ually be assessed and modified to incorporate improved programs, control measures, best management practices (BMPs), etc. in order to achieve the evolving MEP standard. Absent evidence to the contrary, this continual assessment, revision, and improvement of runoff management program implementation is expected to ultimately achieve compliance with water quality standards in the Region. However, it is recognized that there are other sources of pollutants into the receiving waters other than the Copermittees' MS4, and there are certain activities and sources that generate pollutants present in MS4 discharges may be beyond the ability of Copermittees to prevent or eliminate. Examples of these activities and sources include, but are not limited to: emissions from internal combustion engines, brake pad wear and tear, atmospheric deposition, bacteria and wildlife and leaching of naturally occurring nutrients and minerals from local soils. This Order is not intended to address these background or naturally occurring pollutants or flows.

b. The Copermittees have generally been implementing the jurisdictional runoff management programs (JRMPs) required pursuant to Order No. R9-2004-001 since July 14, 2005. Prior to that, the Copermittees were regulated by Order No. 98-02, since May 13, 1998. MS4 discharges, however, continue to cause or contribute to violations of water quality standards as evidenced by the Copermittees' monitoring results.

c. This Order contains new or modified requirements that are necessary to improve Copermittees' efforts to reduce the discharge of pollutants in storm water runoff to the MEP and achieve water quality standards. Some of the new or modified requirements, such as the revised Watershed Water Quality Workplan (Watershed Workplan) section, are designed to specifically address high priority

water quality problems. Other requirements, such as for unpaved roads, are a result of San Diego Water Board's identification of water quality problems through investigations and complaints during the previous permit period. Other new or modified requirements address program deficiencies that have been noted during audits, report reviews, and other San Diego Water Board compliance assessment activities. Additional changes in the monitoring program provide consistency with the Code of Federal Regulations, USEPA guidance, State Water Board guidance, and the Southern California Monitoring Coalition recommendations.

d. Updated individual ~~Drainage Area~~Storm Water Management Plans (~~DAMP~~Individual SWMP), and Watershed Stormwater Management Plans (watershed SWMPs), which, together with the DAMP describe the Copermittees' runoff management programs in their entirety, are needed to guide the Copermittees' runoff management efforts and aid the Copermittees in tracking runoff management program implementation. Hereinafter, the individual ~~DAMP~~ SWMP is referred to as the JRMPs and the Watershed SWMP is referred to as the Watershed Workplan. It is practicable for the Copermittees to update the JRMPs and Watershed Workplans within the timeframe specified in this Order, since significant efforts to develop these programs have already occurred.

Comment [CP8]: Terminology in this paragraph was not correct for the Santa Margarita Region

e. Pollutants can be effectively reduced in storm water runoff by the application of a combination of pollution prevention, source control, and treatment control BMPs. Pollution prevention is the reduction or elimination of pollutant generation at its source and is the best "first line of defense." Source control BMPs (both structural and non-structural) minimize the contact between pollutants and flows (e.g., rerouting run-on around pollutant sources or keeping pollutants on-site and out of receiving waters). Treatment control BMPs remove pollutants that have been mobilized by wet-weather or dry-weather flows.

f. Runoff needs to be addressed during the three major phases of urban development (planning, construction, and use) in order to reduce the discharge of pollutants from storm water to the MEP, effectively prohibit non-storm water discharges and protect receiving waters. Development which is not guided by water quality planning policies and principles can unnecessarily result in increased pollutant load discharges, flow rates, and flow durations which can negatively impact receiving water beneficial uses. Construction sites without adequate BMP implementation can result in sediment runoff rates which greatly exceed natural erosion rates of undisturbed lands, causing siltation and impairment of receiving waters. Existing development can generates substantial pollutant loads which are can be discharged in runoff to receiving waters.

g. Annual reporting requirements included in this Order are necessary to meet federal requirements and to evaluate the effectiveness and compliance of the Copermittees' programs.

h. This Order establishes Storm Water Action Levels (SALs) for selected pollutants based on USEPA Rain Zone 6 (arid southwest) Phase I MS4 monitoring data for pollutants in storm water. The SALs were computed as the 90th percentile of the data set, utilizing the statistical based population approach, one of three approaches recommended by the State Water Board's Storm Water Panel in its report, 'The Feasibility of Numerical Effluent Limits Applicable to Discharges of Storm Water Associated with Municipal, Industrial and Construction Activities (June 2006). SALs are identified in Section D of this Order. Copermittees must implement a timely, comprehensive, cost-effective storm water pollution control program to reduce the discharge of pollutants in storm water from the permitted areas so as not to exceed the SALs to the MEP. Exceedance of SALs may indicate inadequacy of programmatic measures and BMPs required in this Order.

2. **Development Planning**

a. The Standard Storm Water Mitigation Plan (SSMP) requirements contained in this Order are consistent with Order WQ-2000-11 adopted by the State Water Board on October 5, 2000. In the precedential order, the State Water Board found that the design standards, which essentially require that runoff generated by 85 percent of storm events from specific development categories be infiltrated or treated, reflect the MEP standard. The order also found that the SSMP requirements are appropriately applied to the majority of the Priority Development Project categories that are also contained in Section F.1 of this Order. The State Water Board also gave California Regional Water Quality Control Boards (Regional Water Boards) the needed discretion to include additional categories and locations, such as retail gasoline outlets (RGOs), in SSMPs.

b. Controlling runoff pollution by using a combination of onsite source control and site design BMPs augmented with treatment control BMPs before the runoff enters the MS4 is important for the following reasons: (1) Many end-of-pipe BMPs (such as diversion to the sanitary sewer) are typically ineffective during significant storm events. (2) Whereas, onsite source control BMPs can be applied during all runoff conditions end-of-pipe BMPs are often incapable of capturing and treating the wide range of pollutants which can be generated on a sub-watershed scale; (3) End-of-pipe BMPs are more effective when used as polishing BMPs, rather than the sole BMP to be implemented; (4) End-of-pipe BMPs do not protect the quality or beneficial uses of receiving waters between the pollutant source and the BMP; and (5) Offsite end-of-pipe BMPs do not aid in the effort to educate the public regarding sources of pollution and their prevention.

c. Use of Low-Impact Development (LID) site design BMPs at new development, redevelopment and retrofit projects can be an effective means for minimizing the

impact of storm water runoff discharges from the development projects on receiving waters. LID is a site design strategy with a goal of maintaining or replicating the pre-development hydrologic regime through the use of design techniques. LID site design BMPs help preserve and restore the natural hydrologic cycle of the site, allowing for filtration and infiltration which can greatly reduce the volume, peak flow rate, velocity, and pollutant loads of storm water runoff. Current runoff management, knowledge, practices and technology have resulted in the use of LID BMPs as an acceptable means of meeting the storm water MEP standard.

d. RGOs ~~are~~ can be significant sources of pollutants in storm water runoff. RGOs are points of convergence for motor vehicles for automotive related services such as repair, refueling, tire inflation, and radiator fill-up and consequently produce significantly higher loadings of hydrocarbons and trace metals (including copper and zinc) than other developed areas.

e. Industrial sites ~~are~~ can be significant sources of pollutants in runoff. Pollutant concentrations and loads in runoff from industrial sites are similar or exceed pollutant concentrations and loads in runoff from other land uses, such as commercial or residential land uses. As with other land uses, LID site design, source control, and treatment control BMPs are needed at industrial sites in order to meet the MEP standard. These BMPs are necessary where the industrial site is larger than 10,000 square feet. The 10,000 square feet threshold is appropriate, since it is consistent with requirements in other Phase I NPDES storm water regulations throughout California.

f. If not properly designed or maintained, certain BMPs implemented or required by municipalities for runoff management may create a habitat for vectors (e.g. mosquitoes and rodents). Proper BMP design and maintenance to avoid standing water, however, can prevent the creation of vector habitat. Nuisances and public health impacts resulting from vector breeding can be prevented with close collaboration and cooperative effort between municipalities, local vector control agencies, and the California Department of Public Health during the development and implementation of runoff management programs.

g. The increased volume, velocity, frequency and discharge duration of storm water runoff from developed areas has the potential to greatly accelerate downstream erosion, impair stream habitat in natural drainages, and negatively impact beneficial uses. Development and urbanization increase pollutant loads in storm water runoff and the volume of storm water runoff. Impervious surfaces can neither absorb water nor remove pollutants and thus lose the purification and infiltration provided by natural vegetated soil. Hydromodification measures for discharges to hardened channels ~~are~~ may be needed ~~for the~~so as to not prevent potential future ~~restoration~~ rehabilitation of the hardened channels ~~to their natural state~~, thereby restoring the chemical, physical, and biological integrity and beneficial uses of local receiving waters. Any rehabilitation of hardened channels

must take into account flood control considerations, which are within the jurisdiction of the Riverside County Flood Control and Water Conservation District, under Water Code App. Section 48.

Comment [DB9]: See legal comments in Attachment 7

3. **Construction and Existing Development**

   a. In accordance with federal NPDES regulations and to ensure the most effective oversight of industrial and construction site discharges, discharges of runoff from industrial and construction sites are subject to dual (State and local) storm water regulation. Under this dual system, each Copermittee, consistent with its jurisdiction, is responsible for enforcing its local permits, plans, and ordinances, and the San Diego Water Board is responsible for enforcing the General Construction Activities Storm Water Permit, State Water Board Order 2009-0009-DWQ, NPDES No. CAS000002 (General Construction Permit) and the General Industrial Activities Storm Water Permit, State Water Board Order 97-03 DWQ, NPDES No. CAS000001 (General Industrial Permit) and any reissuance of these permits. NPDES municipal regulations require that municipalities develop and implement measures to address runoff from industrial and construction activities. Those measures may include the implementation of other BMPs in addition to those BMPs that are required under the statewide general permits for activities subject to both State and local regulation.

   b. Identification of sources of pollutants in runoff (such as municipal areas and activities, industrial and commercial sites/sources, construction sites, and residential areas), development and implementation of BMPs to address those sources, and updating ordinances and approval processes are necessary for the Copermittees to ensure that discharges of pollutants from its MS4 in storm water are reduced to the MEP and that illegal non-storm water discharges are not occurring. Inspections and other compliance verification methods are needed to ensure minimum BMPs are implemented. Inspections are especially important at areas that are at high risk for pollutant discharges.

Comment [CP10]: Not all non-storm water discharges need to be prohibited.

   c. Historic and current development ~~sometime~~may makes use of natural drainage patterns and features as conveyances for runoff. ~~Urban streams owned or operated by the Copermittees that are used in this manner are part of the municipalities' MS4s regardless of whether they are natural, anthropogenic, or partially modified features. In these cases, the urban stream is both an MS4 and receiving water.~~

Comment [DB11]: The MS4 can never be comprised of natural waterbodies. See definition in federal MS4 regulations and legal comments in Attachment 7

   ~~d. As operators of the MS4s, the Copermittees cannot passively receive and discharge pollutants from third parties. By providing free and open access to an MS4 that conveys discharges to waters of the U.S., the operator essentially accepts responsibility for discharges into the MS4 that it does not prohibit or otherwise control. These discharges may cause or contribute to a condition of~~

~~contamination or a violation of water quality standards.~~

~~e.~~d. Waste and pollutants which are deposited and accumulate in MS4 drainage structures will be discharged from these structures to waters of the U.S. unless they are removed. These discharges may cause or contribute to, or threaten to cause or contribute to, a condition of pollution in receiving waters. For this reason, pollutant discharges from storm water into MS4s must be reduced using a combination of management measures, including source control and an effective MS4 maintenance program implemented by each Copermittee.

~~f.~~e. Enforcement of local runoff related ordinances, permits, and plans is an essential component of every runoff management program and is specifically required in the federal storm water regulations and this Order. Each Copermittee is, to the extent of its legal authority, individually responsible for adoption and enforcement of ordinances and/or policies, implementation of identified control measures/BMPs needed to prevent or reduce pollutants in storm water runoff, and for the allocation of funds for the capital, operation and maintenance, administrative, and enforcement expenditures necessary to implement and enforce such control measures/BMPs under its jurisdiction. Education is an important aspect of every effective runoff management program and the basis for changes in behavior at a societal level. Education of municipal planning, inspection, and maintenance department staffs is especially critical to ensure that in-house staffs understand how their activities impact water quality, how to accomplish their jobs while protecting water quality, and understand their specific roles and responsibilities for compliance with this Order. Public education, designed to target various urban land users and other audiences, is also essential to inform the public of how individual actions affect receiving water quality and how adverse effects can be minimized.

~~g.~~f. Public participation during the development of runoff management programs is necessary to ensure that all stakeholder interests and a variety of creative solutions are considered.

g. Retrofitting existing development with storm water treatment controls, including LID, ~~is~~ may be necessary to address storm water discharges from existing development that may cause or contribute to a condition of pollution or a violation of water quality standards. Although SSMP BMPs are required for redevelopment, the current rate of redevelopment will not address water quality problems in a timely manner. Cooperation with private landowners is necessary to effectively identify, implement and maintain retrofit projects for the preservation, restoration, and enhancement of water quality.

h. Emergency Copermittee public works projects required to protect public health and safety are exempted from these requirements until the emergency ends, at which time they need to comply with the requirements.

Comment [DB12]: The MS4 operators are obligated to take storm water under state law, and therefore must "passively" receive such waters, whether or not they contain pollutants. Moreover, a number of separately permitted sources discharge into the MS4 through rights granted under the NPDES program. Control over such permitted sources is the responsibility of the owner of that permitted discharge in question, .

4. **Watershed Runoff Management**

a. Since runoff within a watershed can flow from and through multiple land uses and political jurisdictions, watershed-based runoff management can greatly enhance the protection of receiving waters. Such management provides a means to focus on the most important water quality problems in each watershed. By focusing on the most important water quality problems, watershed efforts can maximize protection of beneficial use in an efficient manner. Effective watershed-based runoff management actively reduces pollutant discharges and abates pollutant sources causing or contributing to watershed water quality problems. Watershed-based runoff management that does not actively reduce pollutant discharges and abate pollutant sources causing or contributing to watershed water quality problems can necessitate implementation of the iterative process outlined in section A.3 of this Order. Watershed management of runoff does not require Copermittees to expend resources outside of their jurisdictions. In some cases, however, this added flexibility provides more, and possibly more effective, alternatives for minimizing waste discharges. Watershed management requires the Copermittees within a watershed to develop a watershed-based management strategy, which can then be implemented on a jurisdictional basis.

~~a.~~b. The Copermittees have jointly pursued several watershed based management programs including the Upper Santa Margarita River Integrated Regional Watershed Management Plan (USMR IRWM). The USMR IRWM management team, which includes the County of Riverside and the Riverside County Flood Control and Water Conservation District, has also formed cooperative agreements with the San Diego and Orange County IRWM programs to integrate watershed planning efforts of the three counties. These efforts have identified and prioritized key watershed management issues related to the protection and restoration of beneficial uses in the Permit Area. The Board encourages the Copermittees to use these forums to prioritize actions and support the allocation of resources to protect water quality.

~~b.~~c. Some runoff issues, such as general education, monitoring, and training, can be effectively addressed on a regional basis. Regional approaches to runoff management can improve program consistency and promote sharing of resources, which can result in implementation of more efficient programs.

~~c.~~d. It is important for the Copermittees to coordinate their water quality protection and land use planning activities to achieve the greatest protection of receiving water bodies. Copermittee coordination with other watershed stakeholders, especially the State of California Department of Transportation, the U.S. federal government, sovereign American Indian tribes, and water and sewer districts, is also important.

E. STATUTE AND REGULATORY CONSIDERATIONS

1. The RWL language specified in this Order is consistent with language recommended by the USEPA and established in State Water Board Order WQ-99-05, *Own Motion Review of the Petition of Environmental Health Coalition to Review Waste Discharge Requirements Order No. 96-03, NPDES Permit No. CAS0108740*, adopted by the State Water Board on June 17, 1999. The RWL language in this Order requires compliance with water quality standards, which for ~~storm water~~MS4 discharges is to be achieved through an iterative approach requiring the implementation of improved and better-tailored BMPs over time. Compliance with receiving water limits based on applicable water quality standards is necessary to ensure that MS4 discharges will not cause or contribute to violations of water quality standards and the creation of conditions of pollution, contamination, or nuisance.

Comment [DB13]: See legal comments in Attachment 7

2. The Basin Plan, identifies the following existing and potential beneficial uses for surface waters in Riverside County: Municipal and Domestic Supply (MUN), Agricultural Supply (AGR), Industrial Process Supply (PROC), Hydropower Generation (POW), Industrial Service Supply (IND), Ground Water Recharge (GWR), Contact Water Recreation (REC1), Non-contact Water Recreation (REC2), Warm Freshwater Habitat (WARM), Cold Freshwater Habitat (COLD), Wildlife Habitat (WILD), Rare, Threatened, or Endangered Species (RARE), Spawning, Reproduction and/or Early Development (SPWN) and Preservation of Biological Habitats of Special Significance (BIOL).

3. This Order is in conformance with State Water Board Resolution No. 68-16, *Statement of Policy with Respect to Maintaining High Quality Waters in California*, and the federal Antidegradation Policy described in 40 CFR 131.12.

4. Section 6217(g) of the Coastal Zone Act Reauthorization Amendments of 1990 (CZARA) requires coastal states with approved coastal zone management programs to address non-point pollution impacting or threatening coastal water quality. CZARA addresses five sources of non-point pollution: agriculture, silviculture, urban, marinas, and hydromodification. This NPDES permit addresses the management measures required for the urban category, with the exception of septic systems. The adoption and implementation of this NPDES permit relieves the Copermittee from developing a non-point source plan, for the urban category, under CZARA. The San Diego Water Board addresses septic systems through the administration of other programs.

5. Section 303(d)(1)(A) of the CWA requires that "Each state shall identify those waters within its boundaries for which the effluent limitations…are not stringent enough to implement any water quality standard (WQS) applicable to such waters." The CWA also requires states to establish a priority ranking of impaired water bodies known as Water Quality Limited Segments and to establish Total Maximum Daily Loads

(TMDLs) for such waters. This priority list of impaired water bodies is called the Section 303(d) List. The 2006 Section 303(d) List was approved by the State Water Board on October 25, 2006. On June 28, 2007, the 2006 303(d) list for California was given final approval by the USEPA. The 303(d) List was recently updated, and on December 16, 2009, the 2008 303(d) List was approved by the San Diego Water Board. The 2008 List is awaiting State Water Board and USEPA approval.

6. ~~This Order does not constitute an unfunded local government mandate subject to subvention under Article XIIIB, Section (6) of the California Constitution for several reasons, including, but not limited to, the following. First, this Order implements federally mandated requirements under CWA §402. (33 U.S.C. § 1342(p)(3)(B).) Second, the local agency Copermittees' obligations under this Order are similar to, and in many respects less stringent than, the obligations of non-governmental and new dischargers who are issued NPDES permits for storm water and non-storm water discharges. Third, the local agency Copermittees have the authority to levy service charges, fees, or assessments sufficient to pay for compliance with this Order. Fourth, the Copermittees have requested permit coverage in lieu of compliance with the complete prohibition against the discharge of pollutants contained in CWA §301, subdivision (a) (33 U.S.C. § 1311(a)) and in lieu of numeric restrictions on their MS4 discharges (i.e. effluent limitations). Fifth, the local agencies' responsibility for preventing discharges of waste that can create conditions of pollution or nuisance from conveyances that are within their ownership or control under State law predates the enactment of Article XIIIB, Section (6) of the California Constitution. Likewise, the provisions of this Order to implement TMDLs are federal mandates. The CWA requires TMDLs to be developed for water bodies that do not meet federal water quality standards. (33 U.S.C. sec. 1313(d).) Once the USEPA or a state develops a TMDL, federal law requires that permits must contain effluent limitations consistent with the assumptions of any applicable wasteload allocation. (40 C.F.R. sec. 122.44(d)(1)(vii)(B).)~~

7. Runoff treatment and/or mitigation must occur prior to the discharge of runoff into receiving waters. Treatment BMPs must not be constructed in waters of the U.S. ~~or State~~ unless the runoff flows are sufficiently pretreated to protect the values and functions of the water body. Federal regulations at 40 CFR 131.10(a) state that in no case shall a state adopt waste transport or waste assimilation as a designated use for any waters of the U.S. Authorizing the construction of an runoff treatment facility within a water of the U.S., or using the water body itself as a treatment system or for conveyance to a treatment system, would be tantamount to accepting waste assimilation as an appropriate use for that water body. Furthermore, the construction, operation, and maintenance of a pollution control facility in a water body can negatively impact the physical, chemical, and biological integrity, as well as the beneficial uses, of the water body. Without federal authorization (e.g., pursuant to CWA § 404), waters of the U.S. may not be converted into, or used as, waste treatment or conveyance facilities. Similarly, waste discharge requirements pursuant to CWC §13260 are required for the conversion or use of waters of the

Comment [DB14]: This finding is inaccurate and inappropriate, as the Commission on State Mandates, and not the Regional Board, has exclusive jurisdiction in determining whether a requirement is an unfunded state mandate. See legal comment white paper.

Comment [CP15]: The federal regulations (that do not allow waste assimilation), do not apply to waters of the state.

State as waste treatment or conveyance facilities. Diversion from waters of the U.S./State to treatment facilities and subsequent return to waters of the U.S. is allowable, provided that the effluent complies with applicable NPDES requirements.

8. The issuance of waste discharge requirements and an NPDES permit for the discharge of runoff from MS4s to waters of the U.S. is exempt from the requirement for preparation of environmental documents under the California Environmental Quality Act (CEQA) (Public Resources Code, Division 13, Chapter 3, section 21000 et seq.) in accordance with the CWC section 13389.

9. Storm water discharges from developed and developing areas in Riverside County are ~~significant~~ potential sources of certain pollutants that can cause, may be causing, threatening to cause or contributing to water quality impairment in the waters of Riverside County. Furthermore, as delineated in the CWA section 303(d) list in Table 2, the San Diego Water Board has found that there is a reasonable potential that municipal storm water and non-storm water discharges from MS4s cause or may cause or contribute to an excursion above water quality standards for the following pollutants: Indicator Bacteria, Copper, Manganese, Iron, Chlorpyrifos, Sulfates, Phosphorous, Nitrogen, Toxicity~~, and Turbidity~~. In accordance with CWA section 303(d), the San Diego Water Board is required to establish TMDLs for these pollutants to these waters to eliminate impairment and attain water quality standards. Therefore, certain early pollutant control actions and further pollutant impact assessments by the Copermittees are warranted and required pursuant to this Order.

Comment [CP16]: This is not on the 303(d) list.

10. This Order requires each Copermittee to effectively prohibit all types of unauthorized discharges of non-storm water into its MS4. However, historically pollutants have been identified as present in dry weather ~~non-storm water discharges from the MS4s~~ conditions within the receiving waters through 303(d) listings, monitoring conducted by the Copermittees under Order No. R9-2004-0001, and there are others expected to be present in dry weather non-storm water discharges because of the nature of these discharges. These pollutants in the receiving waters may be associated with activities that may or may not be under the authority of the Copermittees to address. This Order includes action levels for pollutants in non-storm water, dry weather discharges from the MS4. The non-storm water action levels are designed to ensure that the Order's requirement to effectively prohibit all types of unauthorized discharges of non-storm water into the MS4 from areas under the authority of the Copermittees is being complied with. Non-storm water action levels in the Order are based upon numeric or narrative water quality objectives and criteria as defined in the Basin Plan, the State Water Board's Water Quality Control Plan for Ocean Waters of California (Ocean Plan), and the State Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California

(State Implementation Policy or SIP). An exceedance of an action level requires specified responsive action by the Copermittees. This Order describes what actions the Copermittees must take when an exceedance of an action level is observed. Exceedances of non-storm water action levels do not alone constitute a violation of this Order but could indicate non-compliance with the requirement to effectively prohibit all types of unauthorized non-storm water discharges into the MS4 or other prohibitions established in this Order. Failure to undertake required source investigation and elimination action following an exceedance of a non-storm water action level (NAL or action level) is a violation of this Order. The San Diego Water Board recognizes that use of action levels will not necessarily result in detection of all unauthorized sources of non-storm water discharges because there may be some discharges in which pollutants do not exceed established action levels. However, establishing NALs at levels appropriate to protect water quality standards is expected to lead to the identification of significant sources of pollutants in dry weather non-storm water discharges.

11. In addition to federal regulations cited in the Fact Sheet / Technical Report for the Order No. R9-2010-0016, monitoring and reporting required under Order No. R9-2010-0016 is required pursuant to authority under CWC section 13383.

12. With this Order, the San Diego Water Board has completed the re-issuance of the fourth iteration of the Phase I MS4 NPDES Permits for the Copermittees in the portions of San Diego County, Orange County, and Riverside County within the San Diego Region. The NPDES Permit requirements issued to the Copermittees in each county have substantially the same core requirements such as discharge prohibitions, receiving water limitations, jurisdictional components, and monitoring. In addition, the Copermittees cooperate regionally to develop monitoring with the Southern California Stormwater Monitoring Coalition and to develop program effectiveness with the California Stormwater Quality Association. Regional programs could improve the Copermittees' compliance with other permit components such as development of the Hydromodification Management Plans and Retrofitting Existing Development with more consistent implementation and cost sharing. Re-issuing the NPDES Permit requirements within five years for three counties under three different permits requires the San Diego Water Board to expend significant time and resources for issuance of the permits through three separate public proceedings, thereby greatly reducing the time and resources available to oversee compliance. Multiple permits also create confusion for determining compliance among regulated entities, especially the land development community. The San Diego Water Board recognizes that issuing a single MS4 permit for all Phase I entities in the San Diego Region will provide consistent implementation, improve communication among agencies within watersheds crossing multiple jurisdictions, and minimize staff resources spent with each permit renewal. The San Diego Water Board plans to develop a single regional MS4 permit prior to the expiration of this Order that will transfer the Copermittees' enrollment to the regional permit upon expiration of this Order.

F. PUBLIC PROCESS

1. The San Diego Water Board has notified the Copermittees, all known interested parties, and the public of its intent to consider adoption of an Order prescribing waste discharge requirements that would serve to renew an NPDES permit for the existing MS4 discharges of pollutants in waters of the U.S.

2. The San Diego Water Board has held a public hearing on October 13, 2010 and heard and considered all comments pertaining to the terms and conditions of this Order.

IT IS HEREBY ORDERED that the Copermittees, in order to meet the provisions contained in Division 7 of the CWC and regulations adopted thereunder, and the provisions of the CWA and regulations adopted thereunder, must each comply with the following to the extent of their legal authority~~ies~~ established under the California Constitution and any~~their~~ enabling acts:

A. PROHIBITIONS AND RECEIVING WATER LIMITATIONS

1. Discharges ~~into and~~ from MS4s in a manner causing, or threatening to cause, a condition of pollution, contamination, or nuisance (as defined in CWC section 13050), in receiving waters of the state are prohibited.[3]

Comment [DB17]: See legal comment white paper. The scope of this Order is the discharge from MS4s. Moreover, MS4s are not receiving waters.

2. Storm water discharges from MS4s containing pollutants which have not been reduced to the MEP are prohibited.[3]

3. Subject to the requirements of section A.3.a., d~~D~~ischarges from MS4s that cause or contribute to the violation of water quality standards (designated beneficial uses, water quality objectives developed to protect beneficial uses, and the State policy with respect to maintaining high quality waters) are prohibited.

Comment [DB18]: This change clarifies that the iterative process reflected in Part A.3 applies to the entire provision.

a. Each Copermittee must comply with section A.3 and section A.4 as it applies to Prohibition 5 in Attachment A of this Order through timely implementation of control measures and other actions to reduce pollutants in storm water discharges in accordance with this Order, including any modifications. If exceedance(s) of water quality standards persist notwithstanding implementation of this Order, the Copermittee must assure compliance with section A.3 and section A.4 as it applies to Prohibition 5 in Attachment A of this Order by complying with the following procedure:

(1) Upon a determination by either the Copermittee or the San Diego Water Board that storm water MS4 discharges are causing or contributing to an exceedance of an applicable water quality standard, the Copermittee must notify the San Diego Water Board within 30 days and thereafter submit a report to the San Diego Water Board that describes best management practices (BMPs) that are currently being implemented and additional BMPs that will be implemented to prevent or reduce any pollutants that are causing or contributing to the exceedance of water quality standards. The report may be incorporated in the Annual Report unless the San Diego Water

[3] This prohibition does not apply to MS4 discharges which receive subsequent treatment to reduce pollutants in storm water discharges to the MEP prior to entering receiving waters (e.g., low flow diversions to the sanitary sewer). Runoff treatment and/or mitigation must occur prior to the discharge of runoff into receiving waters per finding E.7.

Board[4] directs an earlier submittal. The report must include an implementation schedule. The San Diego Water Board may require modifications to the report

(2) Submit any modifications to the report required by the San Diego Water Board within 30 days of notification;

(3) Within 30 days following acceptance of the report described above by the San Diego Water Board, the Copermittee must revise its JRMP and monitoring program to incorporate the approved modified BMPs that have been and will be implemented, the implementation schedule, and any additional monitoring required; and

(4) Implement the revised JRMP and monitoring program in accordance with the approved schedule.

b. The Copermittee must repeat the procedure set forth above to comply with the receiving water limitations for continuing or recurring exceedances of the same water quality standard(s) that occur following ~~implementation~~ completion of scheduled actions unless directed to do otherwise by the San Diego Water Board's Executive Officer.

c. Nothing in section A.3 prevents the San Diego Water Board from enforcing any provision of this Order while the Copermittee prepares and implements the above report but the Copermittees shall not be liable for violation of section A.3 provided that they are in compliance with the requirements of this section.

Comment [DB19]: This change reiterates that the iterative process is in effect so long as the Copermittees remain in compliance with the process set forth in section A.3.

4. In addition to the above prohibitions, discharges from MS4s are subject to all Basin Plan prohibitions cited in Attachment A to this Order.

B. NON-STORM WATER DISCHARGES

1. Each Copermittee must effectively prohibit all types of non-storm water discharges into its MS4 unless such discharges are either authorized by a separate NPDES permit; or not prohibited in accordance with sections B.2, ~~and~~ B.3, and B.4 below.

Comment [CP20]: Change consistent with the addition of B.4. below, and the comments thereto.

2. The following categories of non-storm water discharges are not prohibited unless a Copermittee or the San Diego Water Board identifies the discharge category as a source of pollutants to waters of the U.S. Where the Copermittee(s) have identified a category as a source of pollutants, the category must be addressed as an illicit discharge and prohibited through ordinance, order or similar means. The San Diego

[4] The San Diego Water Board by prior resolution has delegated all matters that may legally be delegated to its Executive Officer to act on its behalf pursuant to CWC §13223. Therefore, the Executive Officer is authorized to act on the San Diego Water Board's behalf on any matter within this Order unless such delegation is unlawful under CWC §13223 or this Order explicitly states otherwise.

Water Board may identify categories of discharge that either require prohibition, or other controls ~~for non-anthropogenic sources~~. For a discharge category determined to be a source of pollutants, the Copermittee, under direction of the San Diego Water Board, must either prohibit the discharge category or develop and implement appropriate control measures ~~for non-anthropogenic sources~~ to prevent the discharge of pollutants to the MS4 and report to the San Diego Water Board pursuant to Section K.1 and K.3 of this Order. The discharge categories are:

a. Diverted stream flows;
b. Rising ground waters;
c. Uncontaminated ground water infiltration [as defined at 40 CFR 35.2005(20)] to MS4s;
d. Uncontaminated pumped ground water[5];
e. Foundation drains[5];
f. Springs;
g. Water from crawl space pumps[5];
h. Footing drains[5];
i. Air conditioning condensation;
j. Flows from riparian habitats and wetlands;
k. Water line flushing[6,7];
l. Landscape irrigation;
m. Discharges from potable water sources not subject to NPDES Permit No. CAG679001, other than water main breaks;
n. Irrigation water;
o. Lawn watering;
p. Individual residential car washing; and
q. Dechlorinated swimming pool discharges[8].

3. Emergency fire fighting flows (i.e., flows necessary for the protection of life or property) do not require BMPs and need not be prohibited.

a. As part of the JRMP, each Copermittee must develop and implement a program to address pollutants from non-emergency fire fighting flows (i.e., flows from controlled or practice blazes and maintenance activities) identified as significant sources of pollutants to waters of the U.S.
b. Building fire suppression system maintenance discharges (e.g. sprinkler line flushing) may contain waste. Therefore, such discharges are to be prohibited by the Copermittees as illicit discharges through ordinance, order, or similar means.

4. As part of the JRMP, the Copermittees must develop and implement a program to

[5] Requires enrollment under Order R9-2008-002. Discharges into the MS4 require authorization from the owner and operator of the MS4 system.
[6] This exemption does not include fire suppression sprinkler system maintenance and testing discharges. Those discharges may be regulated under Section B.3.
[7] Requires enrollment under Order R9-2002-0020.
[8] Excluding saline swimming pool discharges.

Comment [DB21]: See legal comments in Attachment 7

Comment [DB22]: See legal comments white paper.

Comment [CP23]: See discussion in the comment letter, and Attachment 6

Comment [CP24]: As noted in the comment letter and Attachment 6, irrigation runoff has not been shown to be an actual source of pollutants to the receiving waters in this watershed.

As such the comment letter requests that THE CONDTIONAL EXEMPTION BE RESTORED as shown in the redlines above.

Should the Board decide to prohibit the discharge anyway, the Copermittees request that at a minimum that the category of discharges be managed through a JRMP program similar to non-emergency fire fighting flows, as shown in these redlines

address pollutants from landscape irrigation, irrigation water and lawn watering identified as significant sources of pollutants to waters of the United States.

4.5. Each Copermittee must examine all dry weather effluent analytical monitoring results collected in accordance with section F.4 of this Order and Receiving Waters and MS4 Discharge Monitoring and Reporting Program No. R9-2010-0016 to identify water quality problems which may be the result of any non-prohibited discharge category(ies) identified above in section B.2. Follow-up investigations must be conducted to identify and control, pursuant to section B.2, any non-prohibited discharge category(ies) listed above.

C. NON-STORM WATER DRY WEATHER ACTION LEVELS

1. Each Copermittee, beginning no later than July 1, 2012, must implement the non-storm water dry weather action level (NAL) monitoring as described in Attachment E of this Order.

2. In response to an exceedance of an NAL, the Copermittee(s) having jurisdiction must investigate and seek to identify the source of the exceedance in a timely manner. However, if any Copermittee identifies a number of NAL exceedances that prevents it from adequately conducting source investigations at all sites in a timely manner, then that Copermittee may submit a prioritization plan and timeline that identifies the timeframe and planned actions to investigate and report its findings on all of the exceedances. Depending on the source of the pollutant exceedance, the Copermittee(s) having jurisdiction must take action as follows:

Comment [CP25]: Per discussions with Board staff on 8/18

a. If the Copermittee identifies the source of the exceedance as natural (non-anthropogenically influenced) in origin and in conveyance into the MS4; then the Copermittee must report its findings and documentation of its source investigation to the San Diego Water Board in its Annual Report.

b. If the Copermittee identifies the source of the exceedance as an illicit discharge or connection, then the Copermittee must eliminate the discharge to its MS4 pursuant to Section F.4.f and report the findings, including any enforcement action(s) taken, and documentation of the source investigation to the San Diego Water Board in the Annual Report. If the Copermittee is unable to eliminate the source of discharge prior to the Annual Report submittal, then the Copermittee must submit, as part of its Annual Report, its plan and timeframe to eliminate the source of the exceedance. Those dischargers seeking to continue such a discharge must become subject to a separate NPDES permit prior to continuing any such discharge.

c. If the Copermittee identifies the source of the exceedance as an exempted category of non-storm water discharge, then the Copermittees must determine if this is an isolated circumstance or if the category of discharges must be

addressed through the prevention or prohibition of that category of discharge as an illicit discharge. The Copermittee must submit its findings including a description of the steps taken to address the discharge and the category of discharge, to the San Diego Water Board for review in its Annual Report. Such description must include relevant updates to or new ordinances, orders, or other legal means of addressing the category of discharge, and the anticipated schedule for doing so. The Copermittees must also submit a summary of its findings with the Report of Waste Discharge.

d. If the Copermittee identifies the source of the exceedance as a non-storm water discharge in violation or potential violation of an existing separate NPDES permit (e.g. the groundwater dewatering permit), then the Copermittee must report, within three business days, the findings to the San Diego Water Board including all pertinent information regarding the discharger and discharge characteristics.

e. If the Copermittee is unable to identify the source of the exceedance after taking and documenting reasonable steps to do so, then the Copermittee must perform additional focused sampling. If the results of the additional sampling indicate a recurring exceedance of NALs with an unidentified source, then the Copermittee must update its programs within a year to address the common contributing sources that may be causing such an exceedance. The Copermittee's annual report must include these updates to its programs including, where applicable, updates to their watershed workplans (Section G.2), retrofitting consideration (Section F.3.d) and program effectiveness work plans (Section J.4).

f. The Copermittees or any interested party, may evaluate existing NALs and propose revised NALs for future Board consideration.

3. NALs can help provide an assessment of the effectiveness of the prohibition of non-storm water discharges and of the appropriateness of exempted non-storm water discharges. An exceedance of an NAL does not alone constitute a violation of the provisions of this Order. An exceedance of an NAL may indicate a ~~lack of compliance with the requirement that~~ need to enhance the Copermittees efforts to effectively prohibit all types of unauthorized non-storm water discharges into the MS4 or other prohibitions set forth in Sections A and B of this Order. Failure to timely implement required actions specified in this Order following an exceedance of an NAL constitutes a violation of this Order. Neither the absence of exceedances of NALs nor compliance with required actions following observed exceedances, excuses any non-compliance with the requirement to effectively prohibit all types of unauthorized non-storm water discharges into the MS4s or any non-compliance with the prohibitions in Sections A and B of this Order. During any annual reporting period in which one or more exceedances of NALs have been documented the Copermittee must report in response to Section C.2 above, a description of whether and how the observed exceedances did or did not result in a discharge from the MS4 that caused, or threatened to cause or contribute to a condition of pollution, contamination, or nuisance in the receiving waters.

Comment [CP26]: 'lack of compliance' is in contradiction with the second sentence. The proposed language is more appropriate.

4. Monitoring of effluent will occur at the end-of-pipe prior to discharge into the receiving waters, with a focus on Major Outfalls, as defined in 40 CFR 122.26(B 5-6) and Attachment E of this Order. ~~The Copermittees must develop their monitoring plans to sample a representative percentage of major outfalls and identified stations within each hydrologic subarea.~~ At a minimum, outfalls that exceed any NALs once during any year must be monitored in the subsequent year. Any station that does not exceed an NAL, or only has exceedances that are identified as natural in origin and conveyance into the MS4 pursuant to Section C.2.a, for 3 successive years may be replaced with a different station.

Comment [CP27]: The previous sentence requires outfalls to be selected consistent with Attachment E. This sentence is not needed and is duplicative of Attachment E.

At a minimum, this language will need to be modified to be consistent with changes being requested in the Attachment 4 to the Comment Letter, including any footnotes.

5. Each Copermittee must monitor for the non-storm water dry weather action levels, which are incorporated into this Order as follows:

   a. Action levels for discharges to inland surface waters:

Table 3.a.1: General Constituents

Parameter	Units	AMAL	MDAL	Instantaneous Maximum	Basis
Fecal Coliform	MPN/ 100 ml	200[A] 400[B]	-		BPO
Enterococci	MPN/ 100 ml	33	-	~~61[C]~~ 151[C]	BPO
Turbidity	NTU	-	20		BPO
pH	Units	Within limit of 6.5 to 8.5 at all times			BPO
Dissolved Oxygen	mg/L	Not less than 5.0 in WARM waters and not less than 6.0 in COLD waters			BPO
Total Nitrogen	mg/L	-	1.0	See MDAL	BPO
Total Phosphorus	mg/L	-	0.1	See MDAL	BPO
Methylene Blue Active Substances	mg/L	-	0.5	See MDAL	BPO
Iron	mg/L	-	0.3	See MDAL	BPO
Manganese	mg/L	-	0.05	See MDAL	BPO

A – Based on a minimum of not less than five samples for any 30-day period
B – No more than 10 percent of total samples may exceed 400 per 100 ml during any 30 day period
C – This Value has been set to Basin Plan Criteria for ~~Designated Beach~~infrequently used Areas
BPO – Basin Plan Objective
MDAL – Maximum Daily Action Level AMAL – Average Monthly Action Level

Comment [CP28]: This value was incorrectly referencing the criteria for beach areas and needs to be updated to reflect the shown values for infrequently used areas.

Table 3.a.2: Priority Pollutants

		Freshwater (CTR)	
Parameter	Units	MDAL	AMAL
Cadmium	ug/L	**	**
Copper	ug/L	*	*
Chromium III	ug/L	**	**
Chromium VI (hexavalent)	ug/L	16	8.1
Lead	ug/L	*	*
Nickel	ug/L	**	**

Silver	ug/L	*	*
Zinc	ug/L	*	*

CTR – California Toxic Rule
*- Action Levels developed on a case-by-case basis (see below)
**- Action Levels developed on a case-by-case basis (see below), but calculated criteria are not to exceed Maximum Contaminant Levels under the California Code of Regulations[9]

The NALs for Cadmium, Copper, Chromium (III), Lead, Nickel, Silver and Zinc will be developed on a case-by-case basis because the freshwater criteria are based on site-specific water quality data (receiving water hardness). For these priority pollutants, the following equations (40 CFR 131.38.b.2) will be required:

Cadmium (Total Recoverable) = exp(0.7852[ln(hardness)] -2.715)
Chromium III (Total Recoverable) = exp(0.8190[ln(hardness)] + .6848)
Copper (Total Recoverable) = exp(0.8545[ln(hardness)] - 1.702)
Lead (Total Recoverable) = exp(1.273[ln(hardness)] - 4.705)
Nickel (Total Recoverable) = exp(.8460[ln(hardness)] + 0.0584)
Silver (Total Recoverable) = exp(1.72[ln(hardness)] - 6.52)
Zinc (Total Recoverable) = exp(0.8473[ln(hardness)] + 0.884)

D. STORM WATER ACTION LEVELS

1. The Copermittees must implement the Wet Weather MS4 Discharge Monitoring as described in Attachment E of this Order, and beginning three years after the Order adoption date, the Copermittees must annually evaluate their data compared to the Stormwater Action Levels (SALs). At each monitoring station, a running average of twenty percent or greater of exceedances of any discharge of storm water from the MS4 to waters of the U.S. that exceed the SALs for each of the pollutants listed in Table 4 (below) requires the Copermittee(s) having jurisdiction to affirmatively augment and implement all necessary storm water controls and measures to reduce the discharge of the associated class of pollutants(s) to the MEP. The Copermittees must utilize the exceedance information when adjusting and executing annual work plans, as required by this Order. Copermittees must take the magnitude, frequency, and number of constituents exceeding the SAL(s), in addition to receiving water quality data and other information, into consideration when prioritizing and reacting to SAL exceedances in an iterative manner. Failure to appropriately consider and react to SAL exceedances in an iterative manner creates a presumption that the Copermittee(s) have not reduced pollutants in storm water discharges to the MEP.

Table 4. Storm Water Action Levels

Pollutant	Action Level
Turbidity (NTU)	126
Nitrate & Nitrite total (mg/L)	2.6
P total (mg/L)	1.46

[9] California Code of Regulations, Title 22, Division 4, Chapter 15, Article 4, Section 64431.

Cd total (µg/L)	3.0
Cu total (µg/L)	127
Pb total (µg/L)	250
Zn total (µg/L)	976

2. The end-of-pipe assessment points for the determination of SAL compliance are ~~all~~ major outfalls, as defined in 40 CFR 122.26(b)(5) and (b)(6) and Attachment E of this Order. ~~The Copermittees must develop their monitoring plans to sample a representative percentage of the major outfalls within each hydrologic subarea.~~ At a minimum, outfalls that exceed SALs must be monitored in the subsequent year. Any station that does not exceed an SAL for 3 successive years may be replaced with a different station. SAL samples must be 24 hour time-weighted composites.

3. The absence of SAL exceedances does not relieve the Copermittees from implementing all other required elements of this Order.

4. This Order does not regulate natural sources and conveyances into the MS4 of constituents listed in Table 5. To be relieved of the requirements to take action as described in D.1 above, the Copermittee must demonstrate that the likely and expected cause of the SAL exceedance is not anthropogenic in nature. This demonstration does not need to be repeated for subsequent exceedances of the same SAL at the same monitoring station.

5. The SALs will be reviewed and updated at the end of every permit cycle. The data collected pursuant to D.2 above and Attachment E can be used to create SALs based upon local data. The purpose of establishing the SALs is that through the iterative and MEP process, outfall storm water discharges will meet all applicable water quality standards.

Comment [CP29]: Conflicts with attachment E, which states to select 'representative' outfalls.

Comment [CP30]: Consistent with NALs section

Comment [CP31]: The previous sentence requires outfalls to be selected consistent with Attachment E. This sentence is not needed and is duplicative of Attachment E.

At a minimum, this language will need to be modified to be consistent with changes being requested in the Attachment 4 to this comment letter, including any footnotes.

E. LEGAL AUTHORITY

1. Each Copermittee must, to the extent of their legal authority established under the California Constitution and any enabling acts, establish, maintain, and enforce adequate legal authority within their legal authority to control pollutant discharges into and from its MS4 through ordinance, statute, permit, contract or similar means. Nothing herein shall authorize a Copermittee or other discharger regulated under the terms of this order to divert, store or otherwise impound water if such action is reasonably anticipated to harm downstream water rights holders in the exercise of their water rights. This legal authority must, at a minimum, authorize the Copermittee to:

   a. Control the contribution of pollutants in discharges of runoff associated with industrial and construction activity to its MS4 and control the quality of runoff from industrial and construction sites. This requirement applies both to industrial and construction sites which have coverage under the statewide general industrial or

construction storm water permits, as well as to those sites which do not. Grading ordinances must be updated and enforced as necessary to comply with this Order;

b. Prohibit all identified illicit discharges not otherwise allowed pursuant to section B.2;

c. Prohibit and eliminate illicit connections to the MS4;

d. Control the discharge of spills, dumping, or disposal of materials other than storm water to its MS4;

e. Require compliance with conditions in Copermittee ordinances, permits, contracts or orders (i.e., hold dischargers to its MS4 accountable for their contributions of pollutants and flows);

f. Utilize enforcement mechanisms to require compliance with Copermittee storm water ordinances, permits, contracts, or orders;

g. Control the contribution of pollutants from one portion of the shared MS4 to another portion of the MS4 through interagency agreements among Copermittees.

h. Control of the contribution of pollutants from one portion of the shared MS4 to another portion of the MS4 through interagency agreements with other owners of the MS4 such as the State of California Department of Transportation, the U.S. federal government, or sovereign Native American Tribes is encouraged;

i. Carry out all inspections, surveillance, and monitoring necessary to determine compliance and noncompliance with local ordinances and permits and with this Order, including the prohibition on illicit discharges to the MS4. This means the Copermittee must have authority to enter, monitor, inspect, take measurements, review and copy records, and require regular reports from industrial facilities discharging into its MS4, including construction sites;

j. Require the use of BMPs to prevent or reduce the discharge of pollutants ~~into~~ fromMS4s ~~from storm water~~ to the MEP; and

k. Require documentation on the effectiveness of BMPs implemented to reduce the discharge of ~~storm water~~ pollutants from~~to~~ the MS4 to the MEP.

2. Each Copermittee must submit on or before June 30, 2012, a statement certified by its chief legal counsel that the Copermittee has taken the necessary steps to obtain and maintain full legal authority within their jurisdiction to implement and enforce each of the requirements contained in 40 CFR 122.26(d)(2)(i)(A-F) and this Order. As applicable to each Copermittee, ~~T~~these statements must include:

a. Citation of runoff related ordinances and the reasons they are enforceable;

b. Identification of the local administrative and legal procedures available to mandate compliance with runoff related ordinances and therefore with the conditions of this Order, and a statement as to whether enforcement actions can be completed administratively or whether they must be commenced and completed in the judicial system; and

c. A brief description of how runoff related ordinances are adopted and the process by which they may be challenged.

Comment [DB32]: See legal comments in Attachment 7. The Copermittees' responsibility under the Clean Water Act is to reduce the discharge of pollutants from the MS4 to the MEP. Therefore, the purpose of the BMP is to reduce pollutants in such discharges.

Comment [CP33]: To address limitations of the District

F. JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM (JRMP)

Each Copermittee must implement all requirements of section F of this Order no later than July 1, 2012, unless otherwise specified. Upon adoption of this Order and until an updated JRMP is developed and implemented or July 1, 2012, whichever occurs first,, each Copermittee must at a minimum implement its ~~JRMP~~ Individual SWMP document, as the document was developed and amended to comply with the requirements of Order No. R9-2004-001.

Each Copermittee must develop and implement an updated JRMP for its jurisdiction no later than July 1, 2012. Each updated JRMP must meet the requirements of section F of this Order, reduce the discharge of storm water pollutants from the MS4 to the MEP, effectively prohibit non-storm water discharges, and prevent runoff discharges from the MS4 from causing or contributing to a violation of water quality standards. In addition, each Copermittee's JRMP must identify all departments and positions within its jurisdiction that conduct runoff related activities, and their roles and responsibilities under this Order. This identification must include an up to date organizational chart specifying these departments and key personnel.

1. DEVELOPMENT PLANNING COMPONENT

Each Copermittee must implement a program which meets the requirements of this section as applicable to their authority, that ~~and~~ is designed to (1) reduce~~s~~ Development Project discharges of storm water pollutants from the MS4 to the MEP; (2) prevent~~s~~ Development Project discharges from the MS4 from causing or contributing to a violation of water quality standards; (3) prevent~~s~~ illicit discharges into the MS4; and (4) manage~~s~~ increases in runoff discharge rates and durations from Development Projects that are likely to cause increased erosion of stream beds and banks, silt pollutant generation, or other impacts to beneficial uses and stream habitat due to increased erosive force.

Comment [DB34]: See legal comments in Attachment 8

Comment [DB35]: See general comment 1 in Attachment 7

a. GENERAL PLAN

Each Copermittee (except the District) must revise as needed its General Plan or equivalent plan (e.g., Comprehensive, Master, or Community Plan) to include water quality and watershed protection principles and policies that direct land-use decisions and require implementation of consistent water quality protection measures for all development, redevelopment, and retrofit projects. Examples of water quality and watershed protection principles and policies to be considered include the following:

Comment [CP36]: See legal comments in Attachment 8

(1) Minimize the amount of impervious surfaces and directly connected impervious surfaces in areas of new development and redevelopment and where feasible slow runoff and maximize on-site infiltration of runoff.

(2) Implement pollution prevention methods supplemented by pollutant source controls and treatment BMPs. Use small collection strategies located at, or as close as possible to, the source (i.e., the point where water initially meets the ground) to minimize the transport of urban runoff and pollutants offsite and into an MS4.

(3) Preserve, and where possible, create, or restore areas that provide important water quality benefits, such as riparian corridors, wetlands, and buffer zones. Encourage land acquisition of such areas.

(4) Limit disturbances of natural water bodies and natural drainage systems caused by development including roads, highways, and bridges.

(5) Prior to making land use decisions, utilize methods available to estimate increases in pollutant loads and flows resulting from projected future development. Require incorporation of BMPs to mitigate the projected increases in pollutant loads and flows.

(6) Avoid development of areas that are particularly susceptible to erosion and sediment loss; or establish development guidance that identifies these areas and protects them from erosion and sediment loss.

(7) Reduce pollutants associated with vehicles and increasing traffic resulting from development.

(8) Post-development runoff from a site must not contain pollutant loads that cause or contribute to an exceedance of receiving water quality objectives and which have not been reduced to the MEP.

b. ENVIRONMENTAL REVIEW PROCESS

Each Copermittee must revise as needed its current environmental review processes to accurately evaluate water quality impacts and cumulative impacts and identify appropriate measures to avoid, minimize, and mitigate those impacts for all Development Projects.

c. APPROVAL PROCESS CRITERIA AND REQUIREMENTS FOR ALL DEVELOPMENT PROJECTS

For all proposed Development Projects, each Copermittee, during the planning process, and prior to project approval and issuance of local permits, must prescribe the necessary requirements so that Development Project discharges ~~of storm water pollutants from the MS4 will be reduced to the MEP, will not cause or contribute to a violation of water quality standards, and~~ will comply with the Copermittee's ordinances, permits, plans, and requirements, and with this Order.

Comment [CP37]: This is duplicative of section A and is not needed. Further, the end of this sentence specifically requires compliance with this order.

Performance Criteria: Discharges from each approved development project must be subject to the following management measures:

(1) Source control BMPs that reduce storm water pollutants of concern in runoff; prevent illicit discharges into the MS4; ~~prevent~~ minimize irrigation runoff; storm drain system stenciling or signage; properly design outdoor material storage areas; properly design outdoor work areas; and properly design trash storage areas.

(2) The following LID BMPs listed below must be implemented at all Development Projects where applicable and feasible.

(a) Conserve natural areas, including existing trees, other vegetation, and soils,
(b) Construct streets, sidewalks, or parking lot aisles to the minimum widths necessary, provided that public safety is not compromised,
(c) Minimize the impervious footprint of the project,
(d) Minimize soil compaction to landscaped areas,
(e) Minimize disturbances to natural drainages (e.g., natural swales, topographic depressions, etc.), and
(f) Disconnect impervious surfaces through distributed pervious areas.

(3) Buffer zones for natural water bodies, where technically feasible. Where buffer zones are technically infeasible, require project proponent to implement other buffers such as trees, access restrictions, etc;

(4) Other measures necessary so that grading or other construction activities meet the provisions specified in section F.2 of this Order.

(5) Submittal of documentation of a mechanism under which ongoing long-term maintenance of all structural post-construction BMPs will be conducted.

(6) Infiltration and Groundwater Protection

To protect groundwater quality, each Copermittee must apply restrictions to the use of treatment control BMPs that are designed to primarily function as large, centralized infiltration devices (such as large infiltration trenches and infiltration basins). Such restrictions must be designed so that the use of such infiltration treatment control BMPs does not cause or contribute to an exceedance of groundwater quality objectives. At a minimum, each treatment control BMP designed to primarily function as a centralized infiltration device must meet the restrictions below, unless the Development Project demonstrates to the Copermittee that a restriction is not necessary to protect groundwater quality. The Copermittees may collectively or individually develop alternative restrictions on the use of treatment control BMPs which

are designed to primarily function as centralized infiltration devices. Alternative restrictions developed by the Copermittees can partially or wholly replace the restrictions listed below. The restrictions do not apply to small infiltration systems dispersed throughout a development project.

(a) Runoff must undergo pretreatment such as sedimentation or filtration prior to infiltration;

(b) All dry weather flows containing significant pollutant loads must be diverted from infiltration devices and treated through other BMPs;

(c) Pollution prevention and source control BMPs must be implemented at a level appropriate to protect groundwater quality at sites where infiltration treatment control BMPs are to be used;

(d) Infiltration treatment control BMPs must be adequately maintained so that they remove storm water pollutants to the MEP;

(e) The vertical distance from the base of any infiltration treatment control BMP to the seasonal high groundwater mark must be at least 10 feet. Where groundwater basins do not support beneficial uses, this vertical distance criteria may be reduced, provided groundwater quality is maintained;

(f) The soil through which infiltration is to occur must have physical and chemical characteristics (such as appropriate cation exchange capacity, organic content, clay content, and infiltration rate) which are adequate for proper infiltration durations and treatment of runoff for the protection of groundwater beneficial uses;

(g) Infiltration treatment control BMPs must not be used for areas of industrial or light industrial activity; and other high threat to water quality land uses and activities as designated by each Copermittee unless first treated or filtered to remove pollutants prior to infiltration; and

(h) Infiltration treatment control BMPs must be located a minimum of 100 feet horizontally from any water supply wells.

(7) Where feasible, landscaping with native or low water species shall be preferred in areas that drain to the MS4 or to waters of the U.S.

(8) Rain water harvesting, where feasible~~, must be implemented~~ shall be encouraged as part of the site design and construction,~~ and to supplement offsite beneficial uses~~.

d. STANDARD STORM WATER MITIGATION PLANS (SSMPS) – APPROVAL PROCESS

CRITERIA AND REQUIREMENTS FOR PRIORITY DEVELOPMENT PROJECTS

On or before June 30, 2012, the Copermittees must submit an updated SSMP, to the San Diego Water Board's Executive Officer for a 30 day public review and comment period. The San Diego Water Board's Executive Officer has the discretion to determine whether to hold a public hearing or to limit public input to written comments. Within 180 days of determination that the SSMP is in compliance with this Order's provisions, each Copermittee must amend its local ordinances consistent with the updated SSMP, and begin implementing the updated SSMP. Any updated local ordinances must be submitted to the San Diego Water Board with the applicable Annual Report . The SSMP must meet the requirements of section F.1.d of this Order to (1) be designed to reduce Priority Development Project discharges of storm water pollutants from the MS4 to the MEP, and (2) be designed to prevent Priority Development Project runoff discharges from the MS4 from causing or contributing to a violation of water quality standards.[10]

Comment [CP38]: Per discussions with Board staff on 8/18

Comment [DB39]: See general comment 1 in Attachment 7.

Comment [DB40]: See general comment 1 in Attachment 7.

(1) Definition of Priority Development Project:

Priority Development Projects are:

(a) All new Development Projects that fall under the project categories or locations listed in section F.1.d.(2), and

(b) Those redevelopment projects that create, add, or replace at least 5,000 square feet of impervious surfaces on an already developed site and the existing development and/or the redevelopment project falls under the project categories or locations listed in section F.1.d.(2). Where redevelopment results in an increase of less than fifty percent of the impervious surfaces of a previously existing development, and the existing development was not subject to SSMP requirements, the numeric sizing criteria discussed in section F.1.d.(6) applies only to the addition or replacement, and not to the entire development. Where redevelopment results in an increase of more than fifty percent of the impervious surfaces

[10] Updated SSMP and hydromodification requirements must apply to all priority projects or phases of priority projects which have not yet begun grading or construction activities at the time any updated SSMP or hydromodification requirement commences. If lawful prior approval of a project exists, whereby application of an updated SSMP or hydromodification requirement to the project is illegal, the updated SSMP or hydromodification requirement need not apply to the project. Updated Development Planning requirements set forth in Sections F.1. (a) through (h) of this Order must apply to all projects or phases of projects, unless, at the time any updated Development Planning requirement commences, the projects or project phases meet any one of the following conditions: (i) the project or phase has begun grading or construction activities; or (ii) a Copermittee determines that lawful prior approval rights for a project or project phase exist, whereby application of the Updated Development Planning requirement to the project is legally infeasible. Where feasible, the Permittees must utilize the SSMP and hydromodification update periods to ensure that projects undergoing approval processes include application of the updated SSMP and hydromodification requirements in its plans.

of a previously existing development, the numeric sizing criteria applies to the entire development.

(c) Redevelopment also does not include projects that are implemented solely pursuant to section F.3.d of this order.

~~(b)~~(d) PDPs do not include Emergency projects required to protect public health and safety, consistent with CEQA § 15269.

~~(c) One acre threshold: In addition to the Priority Development Project Categories identified in section F.1.d.(2), Priority Development Projects must also include all other post-construction pollutant-generating new Development Projects that result in the disturbance of one acre or more of land by July 1, 2012.[11]~~

Comment [CP41]: Important not to penalize proactive efforts to retrofit existing development.

Comment [amm42]: Request deletion as disturbance threshold inappropriately captures non-development related activity (maintenance, agricultural, etc.) Further, the one acre threshold is not appropriately supported in the Fact Sheet.

(2) Priority Development Project Categories

Where a new Development Project feature, such as a parking lot, falls into a Priority Development Project Category, the entire project footprint is subject to SSMP requirements.

(a) New development projects that create 10,000 square feet or more of impervious surfaces (collectively over the entire project site) including commercial, industrial, residential (excluding individual single family home projects not part of a larger common plan of development), mixed-use, and public projects. This category includes development projects on public or private land which fall under the planning and building authority of the Copermittees.

(b) Automotive repair shops. This category is defined as a facility that is categorized in any one of the following Standard Industrial Classification (SIC) codes: 5013, 5014, 5541, 7532-7534, or 7536-7539.

(c) Restaurants. This category is defined as a facility that sells prepared foods and drinks for consumption, including stationary lunch counters and refreshment stands selling prepared foods and drinks for immediate consumption (SIC code 5812), where the land area for development is greater than 5,000 square feet. Restaurants where land development is less than 5,000 square feet must meet all SSMP requirements except for

~~[11] Pollutant generating Development Projects are those projects that generate pollutants at levels greater than natural background levels.~~

LID and structural treatment BMP and numeric sizing criteria requirement F.1.d.(4) and F.1.d.(6) and hydromodification requirement F.1.h.

(d) All hillside development greater than 5,000 square feet. This category is defined as any development which creates 5,000 square feet of impervious surface which is located in an area with known erosive soil conditions, where the development will grade on any natural slope that is twenty-five percent or greater.

(e) Environmentally Sensitive Areas (ESAs). All development located within, or directly adjacent to, or discharging directly to an ESA (where discharges from the development or redevelopment will enter receiving waters within the ESA), which either creates 2,500 square feet of impervious surface on a proposed project site or increases the area of imperviousness of a proposed project site to 10 percent or more of its naturally occurring condition. "Directly adjacent" means situated within 200 feet of the ESA. "Discharging directly to" means outflow from a drainage conveyance system that is composed entirely of flows from the subject development or redevelopment site, and not commingled with flows from adjacent lands.

(f) Impervious parking lots 5,000 square feet or more and potentially exposed to runoff. Parking lot is defined as a land area or facility for the temporary parking or storage of motor vehicles used personally, for business, or for commerce.

(g) Street, roads, highways, and freeways. This category includes any paved impervious surface that is 5,000 square feet or greater used for the transportation of automobiles, trucks, motorcycles, and other vehicles. To the extent that the Copermittees develop revised standard roadway design and post-construction BMP guidance that comply with the provisions of Section F.1 of the Order, then public works projects that implement the ~~revised standard roadway sections~~designs/guidance do not have to develop a project specific SSMP. The standard roadway design and post-construction BMP guidance must be submitted with the Copermittee's updated SSMP.

(h) Retail Gasoline Outlets (RGOs). This category includes RGOs that meet the following criteria: (a) 5,000 square feet or more or (b) a projected Average Daily Traffic (ADT) of 100 or more vehicles per day.

(3) Pollutants of Concern

As part of its local SSMP, each Copermittee must implement an updated procedure for identifying pollutants of concern for each Priority Development Project. The procedure must address, at a minimum: (1) Receiving water quality (including pollutants for which receiving waters are listed as impaired under CWA section 303(d)); (2) Land-use type of the Development Project and pollutants associated with that land use type; and (3) Pollutants expected to be present on site.

(4) Low Impact Development BMP Requirements

Each Copermittee must require each Priority Development Project to implement LID BMPs which will collectively minimize directly connected impervious areas, limit loss of existing infiltration capacity, and protect areas that provide important water quality benefits necessary to maintain riparian and aquatic biota, and/or are particularly susceptible to erosion and sediment loss.

(a) The Copermittees must take the following measures to ensure that LID BMPs are implemented at Priority Development Projects:

(i) Each Copermittee must require LID BMPs or make a finding of technical infeasibility for each Priority Development Project in accordance with the LID waiver program in Section F.1.d.(7);

(ii) Each Copermittee must incorporate formalized consideration, such as thorough checklists, ordinances, and/or other means, of LID BMPs into the plan review process for Priority Development Projects;

(iii) On or before July 1, 2012, each Copermittee, to the extent of its jurisdiction, must review its local codes, policies, and ordinances and identify barriers therein to implementation of LID BMPs. Following the identification of these barriers to LID implementation, where feasible, the Copermittee must take, by the end of the permit cycle, appropriate actions to remove such barriers. The Copermittees must include this review with the updated JRMP.

Comment [DB43]: See legal comments in Attachment 8.

(b) The following LID BMPs must be implemented at each Priority Development Project:

(i) Maintain or restore natural storage reservoirs and drainage corridors (including depressions, areas of permeable soils, swales, and ephemeral and intermittent streams) to the extent feasible[12].

(ii) Projects with landscaped or other pervious areas must, where feasible, properly design and construct the pervious areas to

Comment [CP44]: Footnote edits per discussions with Board staff on 8/18

[12] Priority Development Projects proposing to dredge or fill materials in waters of the U.S. must obtain a CWA §401 Water Quality Certification. Discharges of dredge or fill materials in ~~and/or~~ waters of the State must obtain ~~a CWA §401 Water Quality Certification and/or~~ Waste Discharge Requirements.

effectively receive and infiltrate, retain and/or treat runoff from impervious areas, prior to discharge to the MS4. Soil compaction for these areas must be minimized. The amount of the impervious areas that are to drain to pervious areas must be based upon the total size, soil conditions, slope, and other pertinent factors.

(iii) ~~Projects with low traffic areas and appropriate soil conditions must construct walkways, trails, overflow parking lots, alleys, or other low-traffic areas with permeable surfaces, such as pervious concrete, porous asphalt, unit pavers, and granular materials~~.

Comment [CP45]: This requirement is clearly specifying the method of compliance in contradiction with state law (CWC 13360).

(c) LID BMPs sizing criteria:

(i) LID BMPs must be sized and designed to ensure onsite retention without runoff, of the volume of runoff produced from a 24-hour 85th percentile storm event[13] ("design capture volume");

(ii) If onsite infiltration LID BMPs are technically infeasible per section F.1.d.(7)(b), other LID BMPs may treat any volume that is not retained onsite provided that the other LID BMPs are sized to hold the design storm volume that is not infiltrated. The LID BMPs must be designed for an appropriate surface loading rate to prevent erosion, scour and channeling within the BMP.

(d) If it is shown to be technically infeasible per Section F.1.d.(7)(b) to retain and/or treat the remaining volume up to and including the design capture volume using LID BMPs, then the project must implement conventional treatment control BMPs in accordance with Section F.1.d.(6) below and must participate in the LID waiver program in Section F.1.d.(7).

(e) All LID BMPs must be designed and implemented with measures to avoid the creation of nuisance or pollution associated with vectors, such as mosquitoes, rodents, and flies.

(5) Source Control BMP Requirements

Each Copermittee must require each Priority Development Project to implement applicable source control BMPs. The source control BMPs to be required must be designed to:

Comment [DB46]: See general comment 1 in Attachment 7 .

[13] This volume is not a single volume to be applied to all of Riverside County. The size of the 85th percentile storm event is different for various parts of the County. The Copermittees are encouraged to calculate the 85th percentile storm event for each of its jurisdictions using local rain data pertinent to its particular jurisdiction (0.6 inch standard is a rough average for the County and should only be used where appropriate rain data is not available). In addition, isopluvial maps may be used to extrapolate rainfall data to areas where insufficient data exists in order to determine the volume of the local 85th percentile storm event in such areas. Where the Copermittees will use isopluvial maps to determine the 85th percentile storm event in areas lacking rain data, the Copermittees must describe their method for using isopluvial maps in its SSMPs.

(a) Prevent illicit discharges into the MS4;
(b) Minimize storm water pollutants of concern in runoff;
(c) ~~Eliminate~~ Minimize irrigation runoff;
(d) Include storm drain system stenciling or signage;
(e) Include properly designed outdoor material storage areas;
(f) Include properly designed outdoor work areas;
(g) Include properly designed trash storage areas;
(h) Include water quality protection requirements applicable to individual priority project categories.

(6) Treatment Control BMP Requirements

Each Copermittee must require each Priority Development Project that meets the Copermittee's technical infeasibility criteria in Section F.1.d(7) below, to implement conventional treatment control BMPs to treat the portion of the "design capture volume" that was not treated by LID BMPs per Section F.1.d(4) above. Conventional treatment control BMPs must meet the following requirements:

(a) All treatment control BMPs for a single Priority Development Project must collectively be sized to comply with the following numeric sizing criteria:

(i) Volume-based treatment control BMPs must be designed to mitigate (infiltrate, filter, or treat) the remaining portion of the design capture volume that was not retained and/or treated with LID BMPs; or

(ii) Flow-based treatment control BMPs must be designed to mitigate (filter, or treat) either: a) the maximum flow rate of runoff produced from a rainfall intensity of 0.2 inch of rainfall per hour, for each hour of a storm event; or b) the maximum flow rate of runoff produced by the 85th percentile hourly rainfall intensity (for each hour of a storm event), as determined from the local historical rainfall record, multiplied by a factor of two.

(b) All treatment control BMPs for Priority Development Projects must, at a minimum:

(i) Be ranked with high or medium pollutant removal efficiency for the project's most significant pollutants of concern, as the pollutant removal efficiencies are identified in the Copermittees' SSMP. Treatment control BMPs with a low removal efficiency ranking must only be approved by a Copermittee when a feasibility analysis has been conducted which exhibits that implementation of treatment control BMPs with high or medium removal efficiency rankings are infeasible for a Priority Development Project or portion of a Priority

Development Project.

(ii) Be correctly sized and designed so as to remove storm water pollutants to the MEP.

(c) Target removal of pollutants of concern from runoff.

(d) Be implemented close to pollutant sources, and prior to discharging into waters of the U.S.

(e) Include proof of a mechanism under which ongoing long-term maintenance will be conducted to ensure proper maintenance for the life of the project. The mechanisms may be provided by the project proponent or Copermittee.

(f) Be designed and implemented with measures to avoid the creation of nuisance or pollution associated with vectors, such as mosquitoes, rodents, and flies.

(7) Low Impact Development (LID) BMP Waiver Program

The Copermittees must develop, collectively or individually, a LID waiver program for incorporation into the SSMP, which would allow a Priority Development Project to substitute implementation of all or a portion of required LID BMPs in Section F.1.d(4) with implementation of treatment control BMPs and either 1) on-site mitigation, 2) an off-site mitigation project, and/or 3) other mitigation developed by the Copermittees. The Copermittees must submit the LID waiver program as part of their updated SSMP. At a minimum, the program must meet the requirements below:

(a) Prior to implementation, the LID waiver program must clearly exhibit that it will not allow Priority Development Projects to result in a net impact (after consideration of any mitigation) from pollutant loadings over and above the impact caused by projects meeting LID requirements;

(b) For each Priority Development Project participating, the Copermittee must find that it is technically infeasible to implement LID BMPs that comply with the requirements of Section F.1.(d)(4). The Copermittee(s) must develop criteria to determine the technical feasibility of implementing LID BMPs . Each Priority Development Project participating must demonstrate that LID BMPs were implemented as much as feasible given the site's unique conditions. Technical infeasibility may result from conditions including, but not limited to:

(i) Locations that cannot meet the infiltration and groundwater protection requirements in section F.1.c.(6) for large, centralized infiltration BMPs. Where infiltration is technically infeasible, the

project must still examine the feasibility of other onsite LID BMPs;

(ii) Insufficient demand for storm water reuse;

(iii) Smart growth and infill or redevelopment locations where the density and/or nature of the project would create significant difficulty for compliance with the LID BMP requirements;

~~(iii)~~(iv) Results of a Cost-Benefit Analysis; and

~~(iv)~~(v) Other site, geologic, soil, or implementation constraints identified in the Copermittees updated SSMP document.

Comment [CP47]: This had been agreed to in discussions with RB staff, but was omitted from the draft.

(c) Each Priority Development Project that participates in the LID waiver program must mitigate for the pollutant loads expected to be discharged due to not implementing the LID retention BMPs in section F.1.d.(4). The pollutant loading must be estimated for each project participating in the LID waiver program. The estimated impacts from not implementing the required LID retention BMPs in section F.1.d.(4) must be fully mitigated. Mitigation projects must be implemented within the same hydrologic unit as the Priority Development Project. Mitigation projects outside of the hydrologic subarea but within the same hydrologic unit may be approved provided that the project proponent demonstrates that mitigation projects within the same hydrologic subarea are infeasible and that the mitigation project will address similar beneficial use impacts as expected from the Priority Development Projects pollutant load. Onsite mitigation may include increasing the conventional treatment sizing factors to achieve pollutant load removal equal to or greater than the pollutant load removal expected from implementing onsite retention of the design capture volume. Offsite mitigation projects may include green streets projects, existing development retrofit projects, retrofit incentive programs, regional BMPs and/or riparian restoration projects. Project applicants seeking to utilize these alternative compliance provisions may propose other offsite mitigation projects, which the Copermittees may approve if they meet the requirements of this subpart.

(d) A Copermittee may choose to implement additional mitigation programs (e.g., pollutant credit system, mitigation fund) as part of the LID waiver program provided that the mitigation program clearly exhibits that it will not allow Priority Development Projects to result in a net impact from pollutant loadings over and above the impact caused by projects meeting LID requirements. Any additional mitigation programs that a Copermittee chooses to implement must be submitted to the San Diego Water Board Executive Officer for review and acceptance prior to implementation.

(8) LID and Treatment Control BMP Standards

(a) As part of the SSMP, each Copermittee must develop and require Priority Development Projects to implement siting, design, and maintenance criteria for each LID and treatment control BMP listed in the SSMP to

determine feasibility and applicability and so that implemented LID and treatment control BMPs are constructed correctly and are effective at pollutant removal, runoff control, and vector minimization. Development of BMP design worksheets which can be used by project proponents is encouraged.

(b) LID and treatment control BMPs implemented at any Priority Development Projects must mitigate (treat through infiltration, settling, filtration or other unit processes) the required volume or flow of runoff from all developed portions of the project, including landscaped areas.

(c) All LID and treatment control BMPs must be located so as to remove pollutants from runoff prior to its discharge to any receiving waters. Multiple Priority Development Projects may use shared post-construction BMPs as long as construction of any shared BMP is completed prior to the use or occupation of any Priority Development Project from which the BMP will receive runoff. Post construction BMPs must not be constructed within a waters of the U.S. or waters of the State.

(9) Implementation Process

(a) As part of its local SSMP, each Copermittee, to the extent of its jurisdiction, must implement a process to verify compliance with SSMP requirements. The process must identify at what point in the planning process Priority Development Projects will be required to meet SSMP requirements and at a minimum, the Priority Development Project must implement the required post-construction BMPs prior to occupancy and/or the intended use of any portion of that project. The process must also include identification of the roles and responsibilities of various municipal departments in implementing the SSMP requirements, as well as any other measures necessary for the implementation of SSMP requirements.

Comment [DB48]:

(b) Each Copermittee, to the extent of its jurisdiction, must establish a mechanism not only to track post-construction BMPs, but also to ensure that appropriate easements and ownerships are properly recorded in public records and the information is conveyed to all appropriate parties when there is a change in project or site ownership.

Comment [DB49]:

(10) Post-construction BMP Review

(a) The Copermittees must review and update the BMPs that are listed in their SSMP as options for treatment control. At a minimum, the update must include removal of obsolete or ineffective BMPs and addition of LID BMPs that can be used for treatment, such as bioretention cells, bioretention swales, etc. The update must also add appropriate LID BMPs to any tables or discussions in the local SSMPs addressing pollutant

removal efficiencies of treatment control BMPs. In addition, the update must include review and revision where necessary of treatment control BMP pollutant removal efficiencies.

(b) The update must incorporate findings from BMP effectiveness studies conducted by the Copermittees for projects funded wholly or in part by the State Water Board or Regional Water Boards.

(c) Each Copermittee must implement a mechanism for annually incorporating findings from local treatment BMP effectiveness studies (e.g., ones conducted by, or on-behalf of, public agencies in Riverside County) into SSMP project reviews and permitting

e. BMP CONSTRUCTION VERIFICATION

Prior to occupancy and/or intended use of any portion of the Priority Development Project subject to SSMP requirements, each Copermittee, to the extent of its jurisdiction, must inspect the constructed site design, source control, and treatment control BMPs applicable to the constructed portion of the project to verify that they have been constructed and are operating in compliance with all specifications, plans, permits, ordinances, and this Order.

Comment [DB50]: See District-specific comments in Attachment 8.

f. BMP MAINTENANCE TRACKING

(1) Inventory of SSMP projects: Each Copermittee must develop and maintain a watershed-based database to track and inventory all projects ~~constructed~~ within their jurisdiction, that have a final approved SSMP (SSMP projects), and its structural post-construction BMPs, ~~within its jurisdiction since July, 2005~~. LID BMPs implemented on a lot by lot basis ~~in low density residential areas~~ at single family residential homes~~,~~ such as rain barrels, are not required to be tracked or inventoried. At a minimum, the database must include information on BMP type(s), location, watershed, date of construction, party responsible for maintenance, dates and findings of maintenance verifications, and corrective actions, including whether the site was referred to the local vector control agency or department.

Comment [CP51]: Per discussions with Board staff on 8/18

Comment [CP52]: Logistical issue for populating a database with BMPs that have as-of-yet not been individually tracked, and a potential legal issues for verifications of those BMPs that were built without requirements for such verifications.

Comment [CP53]: Per discussions with Board staff on 8/18

(2) Each Copermittee must verify that approved post-construction BMPs are operating effectively and have been adequately maintained by implementing the following measures:

(a) The designation of high priority SSMP Projects must consider the following:

(i) BMP size,
(ii) Recommended maintenance frequency,
(iii) Likelihood of operational and maintenance issues,

(iv) Location,
(v) Receiving water quality,
(vi) Compliance record,
(vii) Land use,
(viii) and other pertinent factors;

At a minimum, high priority projects include those projects that ~~generate pollutants (prior to treatment) within the tributary area of a 303(d) listed waterbody impaired for that pollutant; or those projects generating pollutants within the tributary area for~~have been determined to be the source of an observed action level exceedance~~ of that pollutant~~.

Comment [CP54]: See discussion in comment letter

(b) Beginning on July 1, 2012, each Copermittee must implement a program to verify that the required structural post-construction BMPs on the inventoried SSMP projects have been implemented, are maintained, and operating effectively through inspections, self-certifications, surveys, or other equally effective approaches with the following conditions:

(i) The implementation, operation, and maintenance of all (100 percent) approved and inventoried final project public and private SSMPs (a.k.a. WQMPs) must be verified every five years;

(ii) All (100 percent) projects with BMPs that are high priority must be inspected by the Copermittee annually prior to each rainy season;
(iii) All (100 percent) Copermittee projects with BMPs must be inspected by the Copermittee annually;
~~(iv) At least 20 percent of all approved and inventoried SSMP projects must be inspected by the Copermittee annually;~~
~~(v)~~(iv) At the discretion of the Copermittee, its inspections may be coordinated with the facility inspections implemented pursuant to section F.3. of this Order;
~~(vi)~~(v) For verifications performed through a means other than direct Copermittee inspection, adequate documentation must be submitted to the Copermittee to provide assurance that the required maintenance has been completed;
~~(vii)~~(vi) Appropriate follow-up measures (including re-inspections, enforcement, maintenance, etc.) must be conducted to ensure the treatment BMPs continue to reduce storm water pollutants as originally designed; and
~~(viii)~~(vii) Inspections must note observations of vector conditions, such as mosquitoes. Where conditions are identified as contributing to mosquito production, the Copermittee must notify its local vector control agency.

Comment [CP55]: Per discussions with Board staff on 8/18

g. ENFORCEMENT OF DEVELOPMENT SITES

Each Copermittee must, to the extent of its jurisdiction, enforce its storm water ordinance for all development projects as necessary to maintain compliance with this Order. Copermittee ordinances or other regulatory mechanisms must include appropriate sanctions to achieve compliance. Sanctions must include the following tools or their equivalent: Non-monetary penalties, fines, bonding requirements, liens, and/or permit or occupancy denials for non-compliance.

Comment [CP56]: See District-specific comments in Attachment 8

h. HYDROMODIFICATION – LIMITATIONS ON INCREASES OF RUNOFF DISCHARGE RATES AND DURATIONS[14]

Each Copermittee shall collaborate with the other Copermittees to develop and implement a Hydromodification Management Plan (HMP) to manage increases in runoff discharge rates and durations from all Priority Development Projects. The HMP must be incorporated into the SSMP and implemented by each Copermittee so that estimated post-project runoff discharge rates and durations must not exceed pre-development discharge rates and durations. Where the proposed project is located on an already developed site, the pre-project discharge rate and duration must be that of the pre-~~developed, naturally occurring~~project condition. The draft HMP must be submitted to the San Diego Water Board on or before June 30, ~~2013~~2014. The HMP will be made available for public review and comment and the San Diego Water Board Executive Officer will determine whether to hold a public hearing before the full San Diego Water Board or whether public input will be through written comments to the Executive Officer only.

Comment [CP57]: It is not appropriate to require a single property owner to mitigate the effects caused by previous owners of that land. The current property owners can only be held responsible for their own actions.

(1) The HMP must:

(a) Identify a method for assessing susceptibility and geomorphic stability of channel segments which receive runoff discharges from Priority Development Projects. A performance standard must be established that ensures that the geomorphic stability within the channel will not be compromised as a result of receiving runoff discharges from Priority Development Projects.

(b) Identify a range of runoff flows[15] based on continuous simulation of the entire rainfall record (or other analytical method proposed by the

[14] Updated SSMP and hydromodification requirements must apply to all Priority Development Projects or phases of Priority Development Projects which have not yet begun grading or construction activities at the time any updated SSMP or hydromodification requirement commences. If a Copermittee determines that lawful prior approval of a project exists, whereby application of an updated SSMP or hydromodification requirement to the project is legally infeasible, the updated SSMP or hydromodification requirement need not apply to the project. The Copermittees must utilize the SSMP and hydromodification update periods to ensure that projects undergoing approval processes include application of the updated SSMP and hydromodification requirements in its plans.

[15] The identified range of run off flows to be controlled should be expressed in terms of peak flow rates of rainfall events, such as "10% of the pre-development 2-year runoff event up to the pre-development 10-year runoff event."

Copermittees and deemed acceptable by the San Diego Water Board) for which Priority Development Project post-project runoff flow rates and durations must not exceed pre-development ~~(naturally occurring)~~ runoff flow rates and durations by more than 10 percent, where the increased flow rates and durations will result in increased potential for erosion or other significant adverse impacts to beneficial uses. The lower boundary of the range of runoff flows identified must correspond with the critical channel flow that produces the critical shear stress that initiates channel bed movement or that erodes the toe of channel banks. The identified range of runoff flows may be different for specific watersheds, channels, or channel reaches. In the case of an artificially hardened (concrete lined, rip rap, etc.) channel, the lower boundary of the range of runoff flows identified must correspond with the critical channel flow that produces the critical shear stress that initiates channel bed movement or that erodes the toe of channel banks of a comparable natural channel (i.e. non-hardened, pre-development).

(c) Identify a method to assess and compensate for the loss of sediment supply to streams due to development. A performance and/or design standard must be created and required to be met by Priority Development Projects to ensure that the loss of sediment supply due to development does not cause or contribute to increased erosion within channel segments downstream of Priority Development Project discharge points.

(d) Designate and require Priority Development Projects to implement control measures so that (1) post-project runoff flow rates and durations do not exceed pre-development ~~(naturally occurring)~~ runoff flow rates and durations by more than 10 percent for the range of runoff flows identified under section F.1.h.(1)(b), where the increased flow rates and durations will result in increased potential for erosion or other significant adverse impacts to beneficial uses; (2) post-project runoff flow rates and durations do not result in channel conditions which do not meet the channel standard developed under section F.1.h.(1)(a) for channel segments downstream of Priority Development Project discharge points; and (3) the design of the project and/or control measures ~~compensate for~~minimize the loss of sediment supply due to development.

(e) Include a protocol to evaluate potential hydrograph change impacts to downstream watercourses from Priority Development Projects to meet the range of runoff flows identified under Section F.1.h.(1)(b).

(f) Include other performance criteria (numeric or otherwise) for Priority Development Projects as necessary to prevent runoff from the projects from increasing and/or continuing unnatural rates of erosion of channel beds and banks, silt pollutants generation, or other impacts to beneficial uses and stream habitat due to increased erosive force.

(g) Include a review of pertinent literature.

~~(h) Identify areas within the Santa Margarita Hydrologic Unit for potential opportunities to restore or rehabilitate stream channels with historic hydromodification of receiving waters that are tributary to documented low or very low Index of Biotic Integrity (IBI) scores.~~

Comment [CP58]: This is not a necessary component of the HMP and unnecessarily increases costs.

~~(i)~~(h) Include a description of how the Copermittees will incorporate the HMP requirements into their local approval processes.

~~(j)~~(i) Include criteria on selection and design of management practices and measures (such as detention, retention, and infiltration) to control flow rates and durations and address potential hydromodification impacts.

~~(k)~~(j) Include technical information, including references, supporting any standards and criteria proposed.

~~(l)~~(k) Include a description of inspections and maintenance to be conducted for management practices and measures to control flow rates and durations and address potential hydromodification impacts.

~~(m)~~(l) Include a description of monitoring and other program evaluations to be conducted to assess the effectiveness of implementation of the HMP. Monitoring and other program evaluations must include an evaluation of changes to physical (e.g., cross-section, slope, discharge rate, vegetation, pervious/impervious area) and biological (e.g., habitat quality, benthic flora and fauna, IBI scores) conditions of receiving water channels as areas with Priority Development Projects are constructed (i.e. pre- and post-project), as appropriate.

~~(n)~~(m) Include mechanisms for assessing and addressing cumulative impacts of Priority Development Projects within a watershed on channel morphology.

(2) In addition to the control measures that must be implemented by Priority Development Projects per section F.1.h.(1)(d), the HMP must include a suite of management measures ~~to~~ that can be be used on Priority Development Projects to mitigate hydromodification impacts, protect and restore downstream beneficial uses and prevent or further prevent adverse physical changes to downstream channels. The measures must be based on a prioritized consideration of the following elements in this order:

Comment [CP59]: Per discussions with Board staff on 8/18

(a) Site design control measures;
(b) On-site management measures;
(c) Regional control measures located upstream of receiving waters; and

(d) In-stream management and control measures.

Where stream channels are adjacent to, or are to be modified as part of a Priority Development Project, management measures must include buffer zones and setbacks. The suite of management measures must also include stream restoration as a viable option to achieve the channel standard in section F.1.h.(1)(a). Whenever feasible, In-stream controls that are implemented by a PDP to mitigate that project's impact on hydromodification ~~used as management measures to protect and restore downstream beneficial uses and for preventing or minimizing further adverse physical changes~~ must not include the use of non-naturally occurring hardscape materials such as concrete, riprap, gabions, etc. to reinforce stream channels.

(3) As part of the HMP, the Copermittees may develop a waiver program that allows a redevelopment Priority Development Project, as defined in Section F.1.d.(1)(b), to implement offsite mitigation measures. A waiver may be granted if onsite management and control measures are technically infeasible to fully achieve post-project runoff flow rates and durations that do not exceed the pre-development (naturally occurring) runoff flow rates and durations. Redevelopment projects that are granted a waiver under the program must not have post-project runoff flow rates and durations that exceed the pre-project runoff flow rates and durations. The estimated incremental hydromodification impacts from not achieving the pre-development (naturally occurring) runoff flow rates and durations for the project site must be fully mitigated. The offsite mitigation must be within the same stream channel system to which the project discharges. Mitigation projects not within the same stream channel system but within the same hydrologic unit may be approved provided that the project proponent demonstrates that mitigation within the same stream channel is infeasible and that the mitigation project will address similar impacts as expected from the project.

(4) Each individual Copermittee has the discretion to not require Section F.1.h. at Priority Development Projects where the project:

(a) Discharges storm water runoff into underground storm drains discharging directly to water storage reservoirs and lakes;
(b) Discharges storm water runoff into conveyance channels whose bed and bank are concrete lined all the way from the point of discharge to water storage reservoirs and lakes; or
(c) Discharges storm water runoff into other areas identified in the HMP as acceptable to not need to meet the requirements of Section F.1.h ~~by the San Diego Water Board Executive Officer~~.

(5) HMP Reporting and Implementation

Comment [CP60]: Per discussions with Board staff on 8/18

Additionally, "wherever feasible" is an appropriate addition to this language for three reasons:

1)Based on the prioritization already identified in this section, instream controls will be a 'last resort'
2)If a project were to need to mitigate in-stream, preventing any man made materials would unnecessarily eliminate potentially viable solutions, even to the extent of eliminating options that would rehabilitate stream functions and uses.
3)The Water Board will still have oversight of the final in-stream plans through the 401 certifications, which will allow the Board to additionally ensure that such instream controls to not adversely affect the stream.

Comment [CP61]: Per discussions with Board staff on 8/18

Comment [CP62]: This is not needed and makes the language confusing. The HMP must be approved by the board anyway. See legal comment white paper.

(a) On or before June 30 , 2013, the Copermittees must submit to the San Diego Water Board a draft HMP that has been reviewed by the public, including the identification of the appropriate limiting range of flow rates per section F.1.h.(1)(b).

(b) Within 180 days of receiving San Diego Water Board comments on the draft HMP, the Copermittees must submit a final HMP that addressed the San Diego Water Board's comments.

(c) Within 90 days of receiving a determination of adequacy from the San Diego Water Board issued at a noticed public hearing, each Copermittee must incorporate and implement the HMP for all Priority Development Projects.

~~(d) Prior to acceptance of the HMP by the San Diego Water Board, the early implementation measures likely to be included in the HMP must be encouraged by the Copermittees.~~

Comment [CP63]: As seen in the San Diego HMP process, things can change after submitting it to the Board for approval. This requirement will create problems where a project implements the early measures, and such early measures may conflict with the final requirements, thereby forcing the project to re-design.

(6) Interim Hydromodification Criteria

Immediately following adoption of this Order and until the final HMP required by this Order has been determined by the San Diego Water Board to be adequate, each Copermittee must ensure that all Priority Development Projects are implementing the hydromodification (aka Hydrologic Condition of Concern) requirements found in Section 4.4 of the 2006 Riverside County WQMP (updated in 2009) unless one of the following conditions in lieu of those specified in the WQMP are met:

(a) Runoff from the Priority Development Project discharges (1) directly to a conveyance channel or storm drain that is concrete lined all the way from the point of discharge to the ocean, bay, lagoon, water storage reservoir or ~~lake~~Murrieta or Temecula creeks; and (2) the discharge is in full compliance with Copermittee requirements for connections and discharges to the MS4 (including both quality and quantity requirements); and (3) the discharge will not cause increased upstream or downstream erosion or adversely impact downstream habitat; and (4) the discharge is authorized by the Copermittee.

Comment [CP64]: All the way to the ocean is unreasonable and unnecessary. In the interim, very few projects are expected within the watershed, and the cumulative effects of such few projects is negligible.

(b) The Priority Development Project disturbs less than one acre. The Copermittee has the discretion to require a project specific WQMP to address hydrologic condition concerns on projects less than one acre on a case by case basis. The disturbed area calculation should include all disturbances associated with larger common plans of development.

(c) The runoff flow rate, volume, velocity, and duration for the post-

development condition of the Priority Development Project do not exceed the pre-development (i.e. naturally occurring) condition for the 2-year, 24-hour and 10-year, 24-hour rainfall events. This condition must be substantiated by hydrologic modeling acceptable to the Copermittee.

Once a final HMP is determined to be adequate and is required to be implemented, compliance with the final HMP is required by this Order and compliance with the 2004 WQMP (updated in 2009) or the in-lieu interim hydromodification criteria set forth above no longer satisfies the requirements of this Order.

(7) No part of section F.1.h eliminates the Copermittees' responsibilities for implementing the Low Impact Development requirements under section F.1.d.(4).

i. UNPAVED ROADS DEVELOPMENT

The Copermittees must develop, where they do not already exist, and implement or require implementation of erosion and sediment control BMPs after construction of new unpaved roads that are within their legal authority to regulate. At a minimum, the BMPs must include:

(1) Practices to minimize road related erosion and sediment transport;
~~(2) Grading of unpaved roads to slope outward where consistent with road engineering safety standards;~~
~~(3) Installation of water bars as appropriate;~~
~~(4)~~(2)Unpaved roads and culvert designs that ~~do not~~minimize impacts to creek functions and where applicable, that maintain migratory fish passage;

2. CONSTRUCTION COMPONENT

Each Copermittee must implement a construction program as applicable to its jurisdiction, which meets the requirements of this section, and is designed to prevent~~s~~ illicit discharges into the MS4, implement~~s~~ and maintain~~s~~ structural and non-structural BMPs to reduce pollutants in storm water runoff from construction sites to the MS4, reduce~~s~~ construction site discharges of storm water pollutants from the MS4 to the MEP, and prevent~~s~~ construction site discharges from the MS4 from causing or contributing to a violation of water quality standards.

a. ORDINANCE UPDATE

By July 1, 2012, each Copermittee (except the District) must review and update its grading ordinances and other ordinances as necessary to comply with the

Comment [CP65]: Pursuant to the comment letter:

THE COPERMITTEES REQUEST THIS SECTION BE DELETED IN ITS ENTIRETY.

See the comment letter, attachment 5, for further discussion of the issues and justification for this request.

Should the board decide to include such requirements despite the request and justifications provided in the comment letter, the edits shown below are the minimum changes that should be made.

Comment [CP66]: These are specifying the method of compliance.

Comment [DB67]: See general comment 1 in Attachment 7

Comment [CP68]: See District Legal Comments in Attachment 8

requirements of ~~achieve full compliance with~~ this Order~~, including requirements for the implementation of all designated BMPs and other measures.~~

Comment [DB69]: See legal comments in Attachment 7

b. SOURCE IDENTIFICATION

Each Copermittee must maintain an updated watershed-based inventory of all construction sites within its jurisdiction. The use of an automated database system, such as Geographical Information Systems (GIS) is strongly encouraged.

c. SITE PLANNING AND PROJECT APPROVAL PROCESS

Each Copermittee must incorporate consideration of potential water quality impacts prior to approval and issuance of construction and grading permits.

(1) Each construction and grading permit must require proposed construction sites to implement designated BMPs and other measures so that illicit discharges into the MS4 are prevented, storm water pollutants discharged from the site will be reduced to the MEP, and construction discharges from the MS4 are prevented from causing or contributing to a violation of water quality standards.

(2) Prior to permit issuance, the project proponent's runoff management plan (or equivalent construction BMP plan) must be required to comply~~, and reviewed to verify compliance~~ with the local grading ordinance, other applicable local ordinances, and this Order.

Comment [CP70]: Specifying method of compliance

(3) Prior to permit issuance, each Copermittee must verify that project proponents subject to California's statewide General NPDES Permit for Storm Water Discharges Associated With Construction Activities, (hereinafter General Construction Permit), have existing coverage under the General Construction Permit.

d. BMP IMPLEMENTATION

(1) Designate BMPs: Each Copermittee must designate a minimum set of BMPs and other measures to be implemented at all construction sites within their jurisdiction. The designated minimum set of BMPs must include:

(a) Management Measures:

(i) Pollution prevention, where appropriate;

(ii) ~~Development and~~ implementation of a runoff management plan;

(iii) Minimization of areas that are cleared and graded to only the portion of the site that is necessary for construction;

(iv) Minimization of exposure time of disturbed soil areas;

(v) Minimization of grading during the rainy season and correlation of grading with seasonal dry weather periods to the extent feasible;

(vi) Limitation of grading to a maximum disturbed area as determined by each Copermittee before either temporary or permanent erosion controls are implemented to prevent storm water pollution. The Copermittee has the option of temporarily increasing the size of disturbed soil areas by a set amount beyond the maximum, if the individual site is in compliance with applicable storm water regulations and the site has adequate control practices implemented to prevent storm water pollution;

(vii) Temporary stabilization and reseeding of disturbed soil areas as rapidly as feasible;

(viii) Wind erosion controls;

(ix) Tracking controls;

(x) Non-stormwater management measures to prevent illicit discharges and control storm water pollution sources;

(xi) Waste management measures;

(xii) Preservation of natural hydrologic features where feasible;

(xiii) Preservation of riparian buffers and corridors where feasible;

(xiv) Evaluation and maintenance of all BMPs, until removed; and

(xv) Retention, reduction, and proper management of all storm water pollutant discharges on site to the MEP standard.

(b) Erosion and Sediment Controls:

(i) Erosion prevention. Erosion prevention is to be used as the most important measure for keeping sediment on site during construction;

(ii) Sediment controls. Sediment controls are to be used as a supplement to erosion prevention for keeping sediment on-site during construction;

(iii) Slope stabilization must be used on all active slopes during rain events regardless of the season and on all inactive slopes during the rainy season and during rain events in the dry season;

(iv) Permanent revegetation or landscaping as early as feasible; and

(v) Erosion and sediment controls must be required during the construction of unpaved roads.

(2) Each Copermittee must implement, or require implementation of,

Comment [CP71]: Conflicts with the 'off-the-shelf' approach that may be appropriate for some sites. This issue was discussed with staff.

enhanced[16] measures to address the threat to water quality posed by all construction sites tributary to CWA section 303(d) water body segments impaired for sediment or turbidity. Each Copermittee must also implement, or require implementation of, enhanced, measures for construction sites within, or adjacent to, or discharging directly to receiving waters within environmentally sensitive areas (as defined in Attachment C of this Order).

~~(3) Active/Passive Sediment Treatment (AST): Each Copermittee must require implementation of AST for sediment at construction sites (or portions thereof) that are determined by the Copermittee to be an exceptional threat to water quality. In evaluating the threat to water quality, the following factors must be considered by the Copermittee:~~

Comment [CP72]: Specifying method of compliance, in violation of CWC 13360.

~~(a) Soil erosion potential or soil type;~~
~~(b) The site's slopes;~~
~~(c) Project size and type;~~
~~(d) Sensitivity of receiving water bodies;~~
~~(e) Proximity to receiving water bodies;~~
~~(f) Non-storm water discharges;~~
~~(g) Ineffectiveness of other BMPs;~~
~~(h) Proximity and sensitivity of aquatic threatened and endangered species of concern;~~
~~(i) Known effects of AST chemicals; and~~
~~(j) Any other relevant factors.~~

~~(4)~~(3) Implement BMPs: Each Copermittee must implement, or require the implementation of, the designated minimum BMPs and any additional measures necessary to comply with this Order at each construction site within its jurisdiction year round. BMP implementation requirements, however, can vary based on wet and dry seasons. Dry season BMP implementation must plan for and address unseasonal rain events that may occur during the dry season (May 1 through September 30).

e. Inspection of Construction Sites

Each Copermittee must conduct construction site inspections for compliance with its ordinances (grading, storm water, etc.), permits (construction, grading, etc.), and this Order. Priorities for inspecting sites must consider the nature and size of the construction activity, topography, and the characteristics of soils and receiving water quality.

[16] Enhanced BMPs are control actions specifically targeted to the pollutant or condition of concern and should be of higher quality and effectiveness than the minimum control measures otherwise required. ~~Enhanced in this Order means better, not simply more, BMPs.~~

(1) During the rainy season, each Copermittee must inspect at least ~~every two weeks~~monthly, all construction sites within its jurisdiction meeting any of the following criteria:

(a) All sites ~~30~~ 50 acres or more in size with rough grading or with active, unstabilized slopes occurring during the rainy season;

(b) All sites one acre or more, and within the same hydrologic subarea and tributary to a CWA section 303(d) water body segment impaired for sediment; or within, directly adjacent to, or discharging directly to a receiving water within an ESA; and

(c) Other sites determined by the Copermittees or the San Diego Water Board as a significant threat to water quality. In evaluating threat to water quality, the following factors must be considered: (1) soil erosion potential; (2) site slope; (3) project size and type; (4) sensitivity of receiving water bodies; (5) proximity to receiving water bodies; (6) non-storm water discharges; (7) known past record of non-compliance by the operators of the construction site; and (8) any other relevant factors.

(2) During the rainy season, each Copermittee must inspect at least ~~monthly~~twice during the wet season, all construction sites with one acre or more of soil disturbance not meeting the criteria specified above in section F.2.e.(1).

(3) During the rainy season, each Copermittee must inspect construction sites less than one acre in size as needed to ensure compliance with its ordinances and this Order.

(4) Each Copermittee must inspect all construction sites as needed during the dry season. Sites meeting the criteria in section F.2.e.(1) must be inspected at least once in August or September each year.

(5) Re-inspections: Based upon site inspection findings, each Copermittee must implement all follow-up actions (i.e., re-inspection, enforcement) necessary to comply with this Order. Reinspection frequencies must be determined by each Copermittee based upon the severity of deficiencies, the nature of the construction activity, and the characteristics of soils and receiving water quality.

(6) Inspections of construction sites must include, but not be limited to:

(a) Check for coverage under the General Construction Permit (Notice of Intent (NOI) and/or Waste Discharge Identification No.) during initial

Comment [CP73]: This section is setting the minimum frequencies, and as such should provide flexibility to inspect more frequently those sites that warrant additional focus / follow-up. The changes shown to F.2.e.(1) and (2) are to provide such flexibility.
Additionally these frequencies are consistent with Riverside County's Santa Ana MS4 permit – which promotes consistency within the areas serviced by the County.

Comment [CP74]: See comment above

inspections;

(b) Assessment of compliance with Copermittee ordinances and permits related to runoff, including the implementation and maintenance of designated minimum BMPs;

(c) Assessment of BMP effectiveness;

(d) Visual observations for non-storm water discharges, potential illicit connections, and potential discharge of pollutants in storm water runoff;

(e) ~~Review of site monitoring data results, if the site monitors its runoff~~

(f) Education and outreach on storm water pollution prevention, as needed; and

(g) Creation of a written or electronic inspection report.

Comment [CP75]: This is a new and inappropriate requirement. Monitoring data is only required under the Statewide General Construction Permit, which is the Regional Board's responsibility to inspect and review.

Copermittee review of data which falls under the regional board's responsibility should be optional.

(7) The Copermittees must track the number of inspections for each inventoried construction site throughout the reporting period to verify that each site is inspected at the minimum frequencies required.

f. ENFORCEMENT OF CONSTRUCTION SITES

(1) Each Copermittee must develop and implement an escalating enforcement process that achieves prompt corrective actions at construction sites within their jurisdiction, for violations of the Copermittee's water quality protection permits, requirements, and ordinances. This enforcement process must include authorizing the Copermittee's construction site inspectors to take immediate enforcement actions when appropriate and necessary. The enforcement process must include appropriate sanctions such as stop work orders, non-monetary penalties, fines, bonding requirements, and/or permit denials for non-compliance.

(2) Each Copermittee must be able to respond to construction complaints received from third-parties and to ensure the San Diego Water Board that corrective actions have been implemented, if warranted.

g. REPORTING OF NON-COMPLIANT SITES

(1) In addition to the notification requirements in Attachment B, each Copermittee must notify the San Diego Water Board when the Copermittee issues high level enforcement (as defined in the Copermittee's JRMP) to a construction site that poses a significant threat to water quality in its jurisdiction as a result of violations of its storm water ordinances.

(2) Each Copermittee must annually notify the San Diego Water Board, prior to the commencement of the rainy season, of all construction sites with alleged

violations that pose a significant threat to water quality. Information may be provided as part of the JRMP annual report if submitted prior to the rainy season. Information provided must include, but not be limited to, the following:

(a) WDID number if enrolled under the General Construction Permit
(b) Site Location, including address
(c) Current violations or suspected violations

3. EXISTING DEVELOPMENT COMPONENT

a. MUNICIPAL

Each Copermittee must implement a municipal program for the Copermittee's areas and activities that meets the requirements of this section, and is designed to prevent~~s~~ illicit discharges into the MS4, reduce~~s~~ municipal discharges of storm water pollutants from the MS4 to the MEP, and prevent~~s~~ municipal discharges from the MS4 from causing or contributing to a violation of water quality standards.

Comment [DB76]: See general comment 1 in Attachment 7

(1) Source Identification / Inventory

Each Copermittee must maintain an updated watershed-based inventory of all its municipal areas and those activities that have the potential to generate and discharge pollutants. The inventory must include the name, address (if applicable), and a description of the area/activity; which pollutants are potentially generated by the area/activity; whether the area/activity is adjacent to an ESA; and identification of whether the area/activity is tributary to and within the same hydrologic sub area as a CWA section 303(d) water body segment and generates pollutants for which the water body segment is impaired. Linear facilities, such as roads, streets, and highways, do not need to be individually inventoried. The use of an automated database system, such as Geographical Information Systems (GIS) is highly recommended.

Comment [CP77]: Sites that do not have the potential to discharge pollutants, cannot affect discharges from the MS4.

Comment [CP78]: Per discussions with Board staff on 8/18

(2) General BMP Implementation

(a) Pollution Prevention: Each Copermittee must implement pollution prevention methods in its municipal program and must require their use by appropriate departments, personnel, and contractors.

(b) Designate Minimum BMPs: Each Copermittee must designate a minimum set of BMPs for all municipal areas and those activities that have the potential to generate and discharge pollutants. The designated minimum

Comment [CP79]: See comment above

BMPs for municipal areas and activities must be area or activity specific as appropriate.

(c) Each Copermittee must designate BMPs for special events that are expected to generate significant trash and litter. Controls to consider must include:

(i) Temporary screens on catch basins and storm drain inlets;
(ii) Temporary fencing to prevent windblown trash from entering adjacent water bodies and MS4 channels;
(iii) Proper management of trash and litter;
(iv) Catch basin cleaning following the special event and prior to an anticipated rain event;
(v) Street sweeping of roads, streets, highways and parking facilities following the special event; and
(vi) Other equivalent controls.

(d) Designate BMPs for ESAs and 303(d) Impairments: Each Copermittee must designate enhanced measures for its municipal areas and activities tributary to and within the same hydrologic sub area as a CWA section 303(d) impaired water body segments when an area or those activities have the potential to generate pollutants for which the water body segment is impaired. Each Copermittee must also designate additional controls for its municipal areas and activities within or directly adjacent to or discharging directly to receiving waters within environmentally sensitive areas (as defined in Attachment C of this Order).

Comment [CP80]: Per discussions with Board staff on 8/18

(e) Implement BMPs: Each Copermittee must implement, or require the implementation of, the designated minimum and enhanced BMPs and any additional measures necessary based on its inventory to comply with this Order for each of its municipal area and those activities that have the potential to discharge pollution.

(3) BMP Implementation for Management of Pesticides, Herbicides, and Fertilizers

Each Copermittee must implement BMPs to reduce the contribution of storm water pollutants to the MEP associated with the application, storage, and disposal of pesticides, herbicides and fertilizers from its municipal areas and activities from its MS4~~to MS4s and receiving waters~~. Such BMPs must include, at a minimum:

Comment [DB81]: The Copermittees are required to reduce pollutants in discharges from the MS4. See legal comments in Attachment 7

(a) Educational activities, permits, certifications and other measures for municipal applicators and distributors;
(b) Integrated Pest Management (IPM) measures that ~~rely on~~ emphasize non-chemical solutions;

Comment [CP82]: There are cases where pesticides may be necessary due to health concerns (rodent infestations, etc) The concept of IPM does not preclude the use of chemical solutions where such solutions are needed or appropriate.

(c) ~~The use of native vegetation~~;
(d) Schedules for irrigation and chemical application; and
(e) The collection and proper disposal of unused pesticides, herbicides, and fertilizers.

(4) BMP implementation for Flood Control Structures

(a) Each Copermittee must implement procedures to assure that flood management projects assess the impacts on the water quality of receiving water bodies.
(b) Each Copermittee must include water quality protection measures, where feasible, when retrofitting existing flood control structural devices.
(c) Each Copermittee must evaluate its existing flood control structures ~~as part of ongoing routine maintenance~~, identify structures causing or contributing to a condition of pollution, ~~implement~~identify measures to reduce or eliminate the structure's effect on pollution, and evaluate the feasibility of retrofitting the structural flood control device. The inventory and evaluation must be completed by and submitted to the San Diego Water Board in ~~each~~ the 2nd year (i.e. FY 2012/2013) JRMP Annual Report.

(5) ~~BMP Implementation for Sweeping of Municipal Areas~~

~~Where municipal area sweeping is implemented as an MS4 BMP for municipal roads, streets, highways, and parking facilities, each Copermittee must design and implement the program based on the following criteria:~~

~~(a) Roads, streets, highways, and parking facilities identified as consistently generating the highest volumes of trash and/or debris must be swept at least two times per month.~~

~~(b) Roads, streets, highways, and parking facilities identified as consistently generating moderate volumes of trash and/or debris must be swept at least monthly.~~

~~(c) Roads, streets, highways, and parking facilities identified as generating low volumes of trash and/or debris must be swept as necessary, but no less than once per year.~~

(6) Operation and Maintenance of Municipal Separate Storm Sewer System (MS4) and Treatment Controls

(a) Treatment Controls: Each Copermittee must implement a schedule of inspection and maintenance activities to verify proper operation of all its municipal structural treatment controls designed to reduce storm water pollutant discharges to or from its MS4s and related drainage structures.

Comment [CP83]: This is clearly overly specifying method of compliance, and is illegal pursuant to CWC 13360.

Comment [CP84]: This is not required by the federal regulations as an ongoing permit requirement.

Accordingly, the Copermittees, request deletion of the section.

Should the board decide not to remove the section, at a minimum, the language should be restored to not require anything more than the O.C. Permit.

Comment [CP85]: These are new requirements that are not necessary, and were not included in the draft OC Permit.

Further it is overly specific in forcing the Copermittees to identify high/moderate/ and low (trash) volume streets. Such specificity is not necessary.

(b) MS4 ~~and Facilities~~: Each Copermittee must implement a schedule of maintenance activities for its MS4 ~~and facilities (including but not limited to catch basins, storm drain inlets, detention basins, etc).~~ . The maintenance activities must, at a minimum, include:

(i) Inspection and removal of accumulated waste at least once a year between May 1 and September 30 of each year for all ~~MS4 facilities~~catch basins and storm drain inlets, with~~;~~ Additional ~~facilities~~ cleaning as necessary between October 1 and April 30 of each year;
(ii) Following two years of inspections, any MS4 ~~facility~~ that requires inspection and cleaning less than annually may be inspected as needed, but not less than every other year;
(iii) Open channels and basins must be cleaned of observed anthropogenic litter in a timely manner;
(iv) Maintenance activities within open channels must not adversely impact beneficial uses within those channels;
(v) Record keeping of the maintenance and cleaning activities including the overall quantity of waste removed;
(vi) Proper disposal of waste removed pursuant to applicable laws; and
(vii) Measures to eliminate waste discharges during MS4 maintenance and cleaning activities.

(7) Infiltration From Sanitary Sewer to MS4/ Provide ~~Preventive~~ Maintenance

(8) Each Copermittee must implement controls and measures to prevent and eliminate infiltration of seepage from sanitary sewers to MS4s ~~through thorough, routine preventive maintenance of the MS4~~. Each Copermittee that operates both a municipal sanitary sewer system and a MS4 must implement controls and measures to prevent and eliminate infiltration of seepage from the sanitary sewers to the MS4s that must include overall sanitary sewer and MS4 surveys and thorough, routine preventive maintenance of both.

(a) Each Copermittee must implement controls to limit infiltration of seepage from sanitary sewers to municipal separate storm sewer systems where necessary. Such controls must include:

(i) Adequate plan checking for construction and new development;
(ii) Incident response training for its municipal employees that identify sanitary sewer spills;
(iii) Code enforcement inspections;
(iv) MS4 maintenance and inspections;
(v) Interagency coordination with sewer agencies; and

Comment [CP86]: The term 'facilities' is confusing and unnecessary.

Request use of the language from the 2004 MS4 permit as shown in these redlines (though (b)(ii)). This is much clearer and simple to comply with.

Comment [CP87]: Although the shown redlines will be much clearer, should board staff reject such changes, at a minimum the word 'detention basins' should be removed as it would otherwise conflict with subpart (iii)below.

Comment [CP88]: The MS4 Copermittees that do not own nor operate a sewer system cannot prevent seepage by maintaining their MS4.

(vi) Proper education of its municipal staff and contractors conducting field operations on the MS4 or its municipal sanitary sewer (if applicable).

(9) Inspection of Municipal Areas and Activities

(a) At a minimum, each Copermittee must inspect their following high priority municipal areas and activities annually:

(i) Roads, Streets, Highways, and Parking Facilities;
(ii) Flood Management Projects and Flood Control Devices not otherwise inspected per Section F.3.a.(6)(b);
(iii) Areas and activities tributary to and within the same hydrologic sub area as a CWA section 303(d) impaired water body segment, where an area or activity ~~generates~~ has the potential to discharge pollutants[17] for which the water body segment is impaired.
(iv) Areas and activities within or adjacent to or discharging directly to receiving waters within environmentally sensitive areas (as defined in Attachment C of this Order);
(v) Municipal Facilities:
[a] Active or closed municipal landfills;
[b] Publicly owned treatment works (including water and wastewater treatment plants) and sanitary sewage collection systems;
[c] Solid waste transfer facilities;
[d] Land application sites;
[e] Corporate yards including maintenance and storage yards for materials, waste, equipment and vehicles; and
[f] Household hazardous waste collection facilities.
(vi) Municipal airfields;
(vii) Parks and recreation facilities;
(viii) Special event venues following special events (festivals, sporting events, etc.);
(ix) Power washing activities; and
(x) Other municipal areas and activities that the Copermittee determines may contribute a significant pollutant load to the MS4.

(b) Other municipal areas and activities must be inspected as needed and in response to water quality data, valid public complaints, and findings from municipal or contract staff.

(c) Based upon site inspection findings, each Copermittee must implement all follow-up actions necessary to comply with this Order.

[17] A project is considered to have the potential to discharge a pollutant if it does not have LID or treatment controls BMPs in place that treat the design capture volume for the areas of the site generating that pollutant.

Comment [CP89]: Per discussions with Board staff on 8/18

Comment [CP90]: See footnote explaining this change. The idea is that if a project has LID or Treatment Control BMPs in place – it should no longer be a mandatory high-priority site for municipal inspection purposes. It would then be subject to the requirements of Section F.1.f.

(10) Enforcement of Municipal Areas and Activities

Each Copermittee must enforce its storm water ordinance for all its municipal areas and activities as necessary to maintain compliance with this Order.

(11) Copermittee Maintained Unpaved Roads Maintenance

(a) The Copermittees must develop, where they do not already exist, and implement or require implementation of BMPs for erosion and sediment control measures during their maintenance activities on unpaved roads, ~~particularly~~ in or adjacent to receiving waters.

(b) The Copermittees must develop and implement or require implementation of appropriate BMPs to minimize impacts on streams and wetlands during their unpaved road maintenance activities.

(c) ~~The Copermittees must regularly maintain their unpaved roads adjacent to streams and riparian habitat to reduce erosion and sediment transport~~;

(d) ~~Re-grading of unpaved roads during maintenance must be sloped outward where consistent with road engineering safety standards~~;

(e) Through their ~~regular~~ maintenance of unpaved roads, the Copermittees must examine the feasibility of replacing existing culverts or design of new culverts or bridge crossings to reduce erosion and maintain natural stream geomorphology.

Comment [CP91]: Pursuant to the comment letter:

THE COPERMITTEES REQUEST THIS SECTION BE DELETED IN ITS ENTIRETY.

See the comment letter, attachment 5, for further discussion of the issues and justification for this request.

Should the board decide to include such requirements despite the request and justifications provided in the comment letter, the edits shown below are the minimum changes that should be made.

Comment [CP92]: Regular maintenance of unpaved roads may have unintended negative effects by virtue of further loosening soil to maintain the roads. This requirement should be removed, or revised to only be required where necessary to resolve significant problems impacting streams and riparian habitat.

Comment [CP93]: Specifying method of compliance

b. COMMERCIAL / INDUSTRIAL

Each Copermittee (except the District) must implement a commercial / industrial program that meets the requirements of this section for facilities whose operation is under its jurisdiction, and is designed to prevent~~s~~ illicit discharges into the MS4, reduce~~s~~ commercial / industrial discharges of storm water pollutants from the MS4 to the MEP, and prevent~~s~~ commercial / industrial discharges from the MS4 from causing or contributing to a violation of water quality standards.

Comment [CP94]: See District-specific Legal comments

Comment [DB95]: See general comment 1 in Attachment 7

(1) Source Identification

(a) Each Copermittee must maintain an updated watershed-based inventory of all industrial and commercial sites/sources within its jurisdiction (regardless of ownership) that could contribute a significant pollutant load to the MS4. The inventory must include the following minimum information for each industrial and commercial site/source: name; address; pollutants potentially generated by the site/source; and

identification of whether the site/source is tributary to a CWA §303(d) water body segment and generates pollutants for which the water body segment is impaired; and a narrative description including SIC codes which best reflects the principal products or services provided by each facility.

At a minimum, the following sites/sources must be included in the inventory:

(i) Commercial Sites/Sources:

[a] Automobile repair, maintenance, fueling, or cleaning;
[b] Airplane repair, maintenance, fueling, or cleaning;
[c] Boat repair, maintenance, fueling, or cleaning;
[d] Equipment repair, maintenance, fueling, or cleaning;
[e] Automobile and other vehicle body repair or painting;
[f] Mobile automobile or other vehicle washing;
[g] Automobile (or other vehicle) parking lots and storage facilities;
[h] Retail or wholesale fueling;
[i] Pest control services;
[j] Eating or drinking establishments, including such retail establishments with food markets;
[k] Mobile carpet, drape or furniture cleaning;
[l] Cement mixing or cutting;
[m] Masonry;
[n] Painting and coating;
[o] Botanical or zoological gardens and exhibits;
[p] Landscaping;
[q] Nurseries and greenhouses;
[r] Golf courses, parks and other recreational areas/facilities;
[s] Cemeteries;
[t] Pool and fountain cleaning;
[u] ~~Marinas~~;
[v] Portable sanitary services;
[w] Building material retailers and storage;
[x] Animal boarding facilities and kennels;
[y] Mobile pet services;
[z] Power washing services;
[aa] Plumbing services; and
[bb] Other sites and sources with a history of un-authorized discharges to the MS4.

Comment [CP96]: Clearly not applicable within this permit area.

(ii) Industrial Sites/Sources:

[a] Industrial Facilities, as defined at 40 CFR § 122.26(b)(14), including those subject to the General Industrial Permit or other individual NPDES permit;
[b] Operating and closed landfills;
[c] Facilities subject to SARA Title III; and
[d] Hazardous waste treatment, disposal, storage and recovery facilities.

(iii) ~~ESAs and~~ 303(d) Listed Waterbodies: All other commercial or industrial sites/sources tributary to and within the same hydrologic sub area as a CWA Section 303(d) impaired water body segment, where the site/source generates pollutants for which the water body segment is impaired. All other commercial or industrial sites/sources ~~within or directly adjacent to or discharging directly to receiving waters within environmentally sensitive areas (as defined in Attachment C of this Order) or that generate pollutants tributary to~~ determined to be the source of an observed exceedance of an action level.

(iv) All other commercial or industrial sites/sources that the Copermittee determines may contribute a significant pollutant load to the MS4.

(2) General BMP Implementation

(a) Pollution Prevention: Each Copermittee must require the use of pollution prevention methods by the inventoried industrial and commercial sites/sources, where appropriate.

(b) Designate / Update Minimum BMPs: Each Copermittee must designate a minimum set of BMPs for all inventoried industrial and commercial sites/sources. Where BMPs have already been designated, each Copermittee must review and update its existing BMPs for adequacy ~~within one year of permit adoption~~by no later than the submittal of the JRMP. Copermittees may continue to regularly review and update their designated BMPs for adequacy and subsequently submit any updates in their Annual Report. The designated minimum BMPs must be specific to facility types and pollutant-generating activities, as appropriate.

(c) Designate Enhanced BMPs for ESAs and 303(d) Impairments: Each Copermittee must designate enhanced measures for inventoried industrial and commercial sites/sources tributary to and within the same hydrologic subarea as a CWA section 303(d) impaired water body segments (where a site/source generates pollutants for which the water body segment is impaired). Each Copermittee must also designate additional controls for industrial and commercial sites/sources within or directly adjacent to or discharging directly to coastal lagoons, the ocean, or other receiving

Comment [CP97]: See discussion in the comment letter.

Comment [CP98]: Per discussions with Board staff on 8/18

Comment [CP99]: See discussion in the comment letter.

Comment [c100]: From 2004 permit

Comment [CP101]: Per discussions with Board staff on 8/18

Comment [CP102]: Per discussions with Board staff on 8/18

waters within environmentally sensitive areas (as defined in Attachment C of this Order). Copermittees may continue to regularly review and update their designated enhanced BMPs for adequacy and subsequently submit any updates in their next Annual Report.

(d) Implement BMPs: Each Copermittee must implement, or require the implementation of, the designated minimum and enhanced BMPs and any additional measures necessary based on inspections, incident responses, and water quality data to comply with this Order at each industrial and commercial site/source within its jurisdiction.

(3) Mobile Businesses Program

(a) Each Copermittee must develop and implement a program designed to reduce the discharge of storm water pollutants from the MS4 attributable to ~~from~~ mobile businesses to the MEP ~~and to prohibit non-storm water discharges pursuant to Section B of this Order~~. Each Copermittee must keep as part of its commercial source inventory a listing of mobile businesses known to ~~operate~~ have bases of operation within its jurisdiction that conduct services listed above in section F.3.b.(1)(a). The program must include:

(i) Development and implementation of minimum standards and BMPs to be required for each of the various types of mobile businesses;
(ii) Development and implementation of an enforcement strategy which specifically addresses the unique characteristics of mobile businesses;
(iii) Notification of those mobile businesses known to ~~operate~~ have bases of operation within the Copermittee's jurisdiction of the minimum standards and BMP requirements;
(iv) Development and implementation of an outreach and education strategy; and
(v) Inspection of mobile businesses as needed to implement the program.

(b) If they choose to, the Copermittees may cooperate in developing and implementing their programs for mobile businesses, including sharing of mobile business inventories, BMP requirements, enforcement action information, and education.

(4) Inspection of Industrial and Commercial Sites/Sources

Each Copermittee must conduct industrial and commercial site inspections for compliance with its ordinances, permits, and this Order. Mobile businesses must be inspected as needed pursuant to section F.3.b.(3).

(a) Inspection Procedures: Inspections must include but not be limited to:

Comment [DB103]: See general comment 1 Attachment 7 to the comment letter

Comment [DB104]: This change reflects the purpose of the Order, which is to reduce pollutants discharged from the MS4.

Comment [CP105]: This is an appropriate change, as it sets clear responsibility among the Copermittees.

(i) ~~Review of BMP implementation plans, if the site uses or is required to use such a plan~~;
(ii) ~~Review of facility monitoring data, if the site monitors its runoff~~;
(iii) Check for coverage under the General Industrial Permit (Notice of Intent (NOI) and/or Waste Discharge Identification Number), if applicable;
(iv) Assessment of compliance with Copermittee ordinances and Copermittee issued permits related to runoff;
(v) Assessment of the implementation, maintenance and effectiveness of the designated minimum and/or enhanced BMPs;
(vi) Visual observations for non-storm water discharges, potential illicit connections, and potential discharge of pollutants in storm water runoff; and
(vii) Education and training on storm water pollution prevention, as conditions warrant.

Comment [CP106]: See discussion in comment letter.

~~(b) Each Copermittee must annually notify the San Diego Water Board, prior to the commencement of the rainy season, of all Industrial Sites and Industrial Facilities subject to the General Industrial Permit or other individual NPDES permit with alleged violations of the Copermittees ordinances, that pose a significant threat to water quality.~~

Comment [CP107]: Per discussions with Board staff on 8/18. (comparable language added to F.3.b.(5)(b))

~~(c)~~(b) Frequencies: At a minimum all sites determined to pose a high threat to water quality must be inspected each year. All inventoried sites must be inspected at least once during a five year period. In evaluating threat to water quality, each Copermittee must consider, at a minimum, the following:

(i) Type of activity (SIC code);
(ii) Materials used at the facility;
(iii) Wastes generated;
(iv) Pollutant discharge potential, including whether the facility generates a pollutant that exceeds an action level;
(v) Non-storm water discharges;
(vi) Size of facility;
(vii) Proximity to receiving water bodies;
(viii) Sensitivity of receiving water bodies;
(ix) Whether the facility is subject to the General Industrial Permit or an individual NPDES permit;
(x) Whether the facility has filed a No Exposure Certification/Notice of Non-Applicability;
(xi) Facility design;
(xii) Total area of the site, portion of the site where industrial or commercial activities occur, and area of the site exposed to rainfall and runoff;
(xiii) The facility's compliance history; and

(xiv) Any other relevant factors.

~~(d)~~(c) Third-Party Certifications: Each Copermittee may propose to develop and implement a third party certification program subject to San Diego Water Board Executive Officer acceptance. This program would verify industrial and commercial site/source compliance with the Copermittees' ordinances, permits, and this Order. To the extent that third party certifications are conducted to fulfill the requirements of Section F.3.b.(4) above, the Copermittee retains responsibility for compliance with this Order and will be responsible for conducting and documenting quality assurance and quality control of the third-party certifications.

(i) The Copermittee's proposed third party certification program must include the following:

[a] A description of the procedures and measures for quality assurance and quality control;
[b] A listing of sites/sources that may and may not participate in the program;
[c] The representative percentage of certifications that would qualify to satisfy the inspection requirements in section F.3.b(4)(c) above;
[d] Photo documentation of potential storm water violations identified during the third party inspection;
[e] Reporting to the Copermittee of identified significant potential violations, including imminent or observed illegal discharges, within 24 hours of the third party inspection;
[f] Reporting to the Copermittee of all findings within one week of the inspection being conducted; and
[g] Copermittee follow-up and/or enforcement actions for identified potential storm water violations within two business days of the potential violation report receipt.

~~(e)~~(d) Based upon site inspection findings, each Copermittee must implement all follow-up actions and enforcement necessary to comply with this Order.

~~(f)~~(e) To the extent that the San Diego Water Board has conducted an inspection of an industrial site during a particular year, the requirement for the responsible Copermittee to inspect this facility during the same year is deemed satisfied.

~~(g)~~(f) The Copermittees must track the number of inspections for the inventoried industrial and commercial sites/sources throughout the reporting period to verify that the sites/sources are inspected at the minimum frequencies listed in this Order.

(5) Enforcement of Industrial and Commercial Sites/Sources

Each Copermittee must enforce its storm water ordinance for all industrial and commercial sites/sources as necessary to maintain compliance with this Order. ~~Copermittee ordinances or other regulatory mechanisms must include appropriate sanctions to achieve compliance. Sanctions must include the following tools or their equivalent: Non-monetary penalties, fines, bonding requirements, liens and/or permit denials for non-compliance.~~

(a) Each Copermittee shall annually notify the San Diego Water Board, prior to the commencement of the wet season, of any unresolved high level enforcement action (as defined in the Copermittee's JRMP) that poses a significant threat to water quality in its jurisdiction as a result of violations of their storm water ordinances.

Comment [DB108]: See legal comments in Attachment 7

Comment [CP109]: Per discussions with Board staff on 8/18, language such as this would serve as an alternative to F.3.b.(4)(b) above.This proposed language is more consistent with the requirements in the Construction section.

c. RESIDENTIAL

Each Copermittee (except the District) must implement a residential program that meets the requirements of this section, and is designed to prevent~~s~~ illicit discharges into the MS4, reduce~~s~~ residential discharges of storm water pollutants from the MS4 to the MEP, and prevent~~s~~ residential discharges from the MS4 from causing or contributing to a violation of water quality standards.

Comment [DB110]: See legal comments in Attachment 8

Comment [DB111]: See general comment 1 in Attachment 7

(1) Threat to Water Quality Prioritization

Each Copermittee must, within its jurisdiction, identify residential areas and activities that pose a high threat to water quality. At a minimum, these must include:

(a) Automobile repair, maintenance, washing, and parking;
(b) Home and garden care activities and product use (pesticides, herbicides, and fertilizers);
(c) Disposal of trash, pet waste, green waste, and household hazardous waste (e.g., paints, cleaning products);
(d) Any other residential source that the Copermittee determines may contribute a significant pollutant load to the MS4;
(e) Any residential areas tributary to and within the same hydrologic sub area as a CWA section 303(d) impaired water body, where the residential area ~~ce generates~~ discharges pollutants for which the water body is impaired; and
(f) ~~Any residential areas within or directly adjacent to or discharging directly to receiving waters within an environmentally sensitive area (as defined in~~

Comment [CP112]: Per discussions with Board staff on 8/18

Comment [CP113]: These requirements should be focused on discharges of pollutants

Comment [CP114]: This inappropriately separates the risk (pollutant discharge potential) from the action (regulation, minimum BMPs, etc), and should not be a mandated component of this permit.

~~Attachment C of this Order)~~.

(2) BMP Implementation

(a) Pollution Prevention: Each Copermittee must actively encourage the use of pollution prevention methods by residents.

(b) Designate BMPs: Each Copermittee must designate minimum BMPs for high-threat-to-water quality residential areas and activities. The designated minimum BMPs for high-threat-to-water quality residential areas and activities must be area or activity specific.

(c) Hazardous Waste BMPs: Each Copermittee must facilitate the proper management and disposal of used oil, toxic materials, and other household hazardous wastes. Such facilitation must include educational activities, public information activities, and establishment of collection sites operated individually and/or jointly by the Copermittee(s) or a private entity. Curbside collection of household hazardous wastes is encouraged.

(d) Implement BMPs: Each Copermittee must implement, or require implementation of, the designated minimum BMPs and any additional measures necessary to comply with Sections A and B of this Order.

(e) Each Copermittee must implement, or require implementation of, BMPs for residential areas and activities that have not been designated a high threat to water quality, as necessary.

(3) Enforcement of Residential Areas and Activities

Each Copermittee must enforce its storm water ordinance for all residential areas and activities as necessary to maintain compliance with this Order.

(4) Common Interest Areas (CIA) / Home Owner Association (HOA) Areas, and Mobile Home Parks

Each Copermittee must ensure that effective measures exist and are implemented or required to be implemented to ensure that runoff within and from common interest developments, including areas managed by associations and mobile home parks, and meets the objectives of this section and Order.

(a) BMP Implementation: Each Copermittee must implement or require implementation of management measures based on ~~a review of~~ pertinent factors, including:

(i) Maintenance duties and procedures typically used by CIA/HOA

maintenance associations within its jurisdiction;

(ii) Whether streets and storm drains are publicly or privately owned within the CIA/HOA or mobile home park;

(iii) Whether the CIA/HOA area or mobile home park has been identified as a high priority residential area based on ~~an evaluation of~~ the site potential to generate pollutants contributing to a 303(d) listed waterbody or an observed action level exceedance;

(iv) Other activities conducted or authorized by the HOA that may pose a significant risk to inland receiving waters.

(b) Legal Authority and Enforcement: By July 1, 2012, each Copermittee must review, and if necessary update, its Municipal Code to verify that they have the legal authority to implement and enforce its ordinances within CIA/HOA areas and mobile home parks.

(5) Privately Owned Unpaved Roads Maintenance

~~(a) The Copermittees must require implementation of BMPs for erosion and sediment control during maintenance activities on privately owned unpaved roads, particularly in or adjacent to stream channels or wetlands.~~

~~(b) The Copermittees must enforce their ordinances against illegal construction and maintenance grading activities on privately owned unpaved roads, so as to prevent impacts to water quality.~~

Comment [CP115]: Pursuant to the comment letter:

THE COPERMITTEES REQUEST THIS SECTION BE DELETED IN ITS ENTIRETY.

See further discussion on this issue in Attachment 5 to this comment letter

d. Retrofitting Existing Development

Each Copermittee must develop and implement a retrofitting program that meets the requirements of this section upon submittal of the ROWD. The goals of the existing development retrofitting program are to provide an means to the Copermittees to address the impacts of existing development through retrofit projects that reduce impacts from hydromodification, promote LID, support riparian and aquatic habitat restoration, reduce the discharges of storm water pollutants from the MS4 to the MEP, and prevent discharges from the MS4 from causing or contributing to a violation of water quality standards. Where feasible, at the discretion of the Copermittee, the existing development retrofitting program may be coordinated with flood control projects and other infrastructure improvement programs.

Comment [CP116]: Clarifying edit Per discussions with Board staff on 8/18

(1) The Copermittee(s) must identify and inventory existing areas of development (i.e. municipal, industrial, commercial, residential) within their jurisdiction as candidates for retrofitting. Potential retrofitting candidates must include but are not limited to:

Comment [CP117]: See District-specific comment white paper. (Attachment 8)

(a) Areas of development that generate pollutants of concern to a TMDL or an ESA;
(b) Receiving waters that are channelized or otherwise hardened;
(c) Areas of development tributary to receiving waters that are channelized or otherwise hardened;
(d) Areas of development tributary to receiving waters that are significantly eroded;
(e) Areas of development tributary to an ASBS or SWQPA; and

(2) Each Copermittee must evaluate and rank their inventoried areas of existing developments to prioritize retrofitting. Criteria for evaluation must include but is not limited to:

(a) Feasibility;
(b) Cost effectiveness;
(c) Pollutant removal effectiveness, including reducing pollutants exceeding action level;
(d) Tributary area potentially treated;
(e) Maintenance requirements;
(f) Landowner cooperation;
(g) Neighborhood acceptance;
(h) Aesthetic qualities;
~~(h)~~(i) Environmental Constraints (such as regulatory permits)
~~(i)~~(j) Efficacy at addressing concern; and
~~(j)~~(k) Potential ~~improvements~~ effects on public health and safety

(3) Each Copermittee must consider the results of the evaluation in prioritizing work plans for the following year in accordance with Sections G.1 and J. Highly feasible projects expected to benefit water quality should be given a high priority to implement source control and treatment control BMPs. Where feasible, the retrofit projects may be designed in accordance with the SSMP requirements within sections F.1.d.(3) through F.1.d.(8) and the Hydromodification requirements in Section F.1.h.

(4) The Copermittees (except the District) must cooperate with private landowners to encourage site specific retrofitting projects. The Copermittee must consider the following practices in cooperating and encouraging private landowners to retrofit their existing development:

(a) Demonstration retrofit projects;
(b) Retrofits on public land and easements that treat runoff from private developments;
(c) Education and outreach;
(d) Subsidies for retrofit projects;
(e) Requiring retrofit projects as enforcement, mitigation or ordinance compliance;

Comment [CP118]: See District-specific comment white paper, Attachment 8.

Comment [CP119]: There may be external constraints by other regulatory agencies that may affect the ranking of a particular candidate.

Comment [CP120]: A particular retrofit opportunity may have both positive and/or negative effects on public health and safety, and both should be considered.

Comment [CP121]: See District-specific comment white paper. (Attachment 8)

(f) Public and private partnerships; and
(g) Fees for existing discharges to the MS4 and reduction of fees for retrofit implementation.

(5) The known completed retrofit BMPs must be tracked in accordance with Section F.1.f. Retrofit BMPs on publicly owned properties must be inspected per section F.1.f . Privately owned retrofit BMPs must be inspected as needed ~~to ensure proper operation and maintenance~~.

Comment [CP122]: Per discussions with Board staff on 8/18

Comment [CP123]: Per discussions with Board staff on 8/18

(6) Where constraints on retrofitting preclude effective BMP deployment on existing developments at locations critical to protect receiving waters (as identified in section F.3.d.(1)), a Copermittee may propose a regional mitigation project to improve water quality. Such regional projects may include but are not limited to:

(a) Regional water quality treatment BMPs;
(b) Urban creek or wetlands restoration and preservation;
(c) Daylighting and restoring underground creeks;
(d) Localized rainfall storage and reuse to the extent such projects are fully protective of downstream water rights;
(e) Hydromodification project; and
(f) Removal of invasive plant species.

(7) A retrofit project or regional mitigation project may qualify as a Watershed Water Quality Activity provided it meets the requirements in section G. Watershed Workplan.

4. ILLICIT DISCHARGE DETECTION AND ELIMINATION

Each Copermittee must implement a program that meets the requirements of this section and is designed to actively detect and eliminate illicit discharges and disposal into the MS4. The program must address all types of illicit discharges and connections excluding those non-storm water discharges not prohibited by the Copermittee in accordance with section B of this Order.

Comment [DB124]: See general comment 1 in Attachment 7

a. PREVENT AND DETECT ILLICIT DISCHARGES AND CONNECTIONS

Each Copermittee must implement measures to prevent and detect illicit discharges to the MS4.

~~(1) Legal Authority: Each Copermittee must retain legal authority to prevent and eliminate illicit discharges and connections to the MS4.~~

Comment [DB125]: This measure is already covered in Part E of the Order.

~~(2)~~(1)Inspections: Each Copermittee must include use of appropriate

Copermittee personnel and contractors to assist in identifying illicit discharges and connections during their daily activities.

(a) Visual inspections for illegal discharges and connections must be conducted during routine maintenance of all MS4 facilities.

(b) Copermittee staff and contractors conducting non-MS4 field operations must be trained to report suspected illegal discharges and connections to proper Copermittee staff.

b. MAINTAIN MS4 MAP

Each Copermittee must maintain an updated map of its entire MS4 and the corresponding drainage areas within its jurisdiction. The use of GIS is strongly encouraged. The MS4 map must include all segments of the storm sewer system owned, operated, and maintained by the Copermittee, as well as all known locations of inlets that discharge and/or collect runoff into the Copermittee's MS4~~, all known locations of access points (i.e. manholes) to the Copermittee's MS4, all known locations of connections with other MS4s (e.g. Caltrans),~~ and all known locations of all the outfalls that discharge runoff from the Copermittee's MS4. The accuracy of the MS4 map must be confirmed during dry weather field screening and analytical monitoring and must be updated at least annually. The MS4 map including any GIS layers must be submitted with the updated JRMP.

Comment [CP126]: These are not required under the federal regulations, and are not necessary for the Copermittees' programs.

c. FACILITATE PUBLIC REPORTING OF ILLICIT DISCHARGES AND CONNECTIONS - PUBLIC HOTLINE

Each Copermittee must promote, publicize and facilitate public reporting of illicit discharges or water quality impacts associated with discharges into or from MS4s. Each Copermittee must facilitate public reporting through development and operation of a public hotline. Public hotlines can be Copermittee-specific or shared by Copermittees. All storm water hotlines must be capable of receiving reports in both English and Spanish 24 hours per day and seven days per week. All reported incidents, and how each was resolved, must be summarized in each Copermittee's Annual Report.

d. DRY WEATHER FIELD SCREENING AND ANALYTICAL MONITORING

Each Copermittee must conduct dry weather field screening and analytical monitoring of MS4 outfalls and other portions of its MS4 within its jurisdiction to detect illicit discharges and connections in accordance with Receiving Waters and MS4 Discharge Monitoring and Reporting Program No. R9-2010-0016 in Attachment E of this Order.

e. INVESTIGATION / INSPECTION AND FOLLOW-UP

Each Copermittee must implement procedures to investigate and inspect portions of its MS4 that, based on the results of field screening, analytical monitoring, or other appropriate information, indicate a reasonable potential of containing illicit discharges, illicit connections, or other sources of pollutants in non-storm water.

(1) Develop response criteria for data: Each Copermittee must develop, update, and use numeric criteria action levels (or other actions level criteria where appropriate) to determine when follow-up investigations will be performed in response to water quality monitoring. The criteria must include required non-storm water action levels (see Section C) and a consideration of 303(d)-listed waterbodies and environmentally sensitive areas (ESAs) as defined in Attachment C.

(2) Respond to data: Each Copermittee must investigate portions of the MS4 for which water quality data or conditions indicates a potential illegal discharge or connection.

(a) Obvious illicit discharges (i.e. color, odor, or significant exceedances of action levels) must be investigated immediately.

(b) Field screen data: Within two business days of receiving dry weather field screening results that exceed action levels, the Copermittee(s) having jurisdiction must either initiate an investigation to identify the source of the discharge or document the rationale for why the discharge does not pose a threat to water quality and does not need further investigation. This documentation must be included in the Annual Report.

(c) Analytical data: Within five business days of receiving analytical laboratory results that exceed action levels, the Copermittee(s) having jurisdiction must either initiate an investigation to identify the source of the discharge or document the rationale for why the discharge does not pose a threat to water quality and does not need further investigation. This documentation must be included in the Annual Report.

(3) Respond to notifications: Each Copermittee must respond to and resolve each reported incident (e.g., public hotline, staff notification, etc.) made to the Copermittee in a timely manner. Criteria may be developed to assess the validity of, and prioritize the response to, each report.

f. ELIMINATION OF ILLICIT DISCHARGES AND CONNECTIONS

Each Copermittee must take immediate action to initiate steps necessary to eliminate all detected illicit discharges, illicit discharge sources, and illicit connections after detection within its jurisdiction. Elimination measures may include an escalating series of enforcement actions for those illicit discharges

that are not a serious threat to public health or the environment. Illicit discharges that pose a serious threat to the public's health or the environment must be eliminated immediately.

~~g. ENFORCE ORDINANCES~~

~~Each Copermittee must implement and enforce its ordinances, orders, or other legal authority to prevent illicit discharges and connections to its MS4 and to eliminate detected illicit discharges and connections to its MS4.~~

Comment [DB127]: This requirement is already covered in Part E.1 of the Order.

~~h.~~g. PREVENT AND RESPOND TO SEWAGE SPILLS (INCLUDING FROM PRIVATE LATERALS AND FAILING SEPTIC SYSTEMS) AND OTHER SPILLS

Each Copermittee must implement management measures and procedures (including a notification mechanism) to ~~prevent,~~ respond to, contain and clean up all sewage (see below) and other spills that may discharge into its MS4 from any source (including private laterals and failing septic systems). Copermittees must coordinate with spill response teams to prevent entry of spills into the MS4 and contamination of surface water, ground water and soil. Each Copermittee must coordinate spill prevention, containment and response activities throughout all appropriate Copermittee departments, programs and agencies so that maximum water quality protection is available at all times.

Comment [CP128]: The Copermittees do not own nor operate such systems, and as such cannot 'prevent' such spills from occurring.

Comment [CP129]: Per discussions with Board staff on 8/18

5. PUBLIC PARTICIPATION COMPONENT

Each Copermittee must incorporate a mechanism for public participation in the updating, development, and implementation of the JRMP.

6. EDUCATION COMPONENT

Each Copermittee must implement education programs designed to (1) measurably increase the knowledge regarding MS4s, impacts of runoff on receiving waters, and potential BMP solutions for the target audience; and (2) to measurably change the behavior of target communities and thereby reduce pollutants in ~~storm water~~ discharges from MS4s to the MEP~~and eliminate prohibited non-storm water discharges to MS4s and the environment~~. At a minimum, the education programs must meet the requirements of this section and address the following target communities within their jurisdiction:

Comment [DB130]: See general comment 1 in Attachment 7 to the comment letter .

Comment [DB131]: See legal comments white paper in Attachment 8 to the comment letter .

Comment [DB132]: See District-specific comment white paper in Attachment 8 to the comment letter .

- Copermittee Departments and Personnel

- New Development / Redevelopment Project Applicants, Developers, Contractors, Property Owners, and other Responsible Parties
- Construction Site Owners and Operators
- Commercial Facility Owners and Operators
- Industrial Facility Owners and Operators
- Residential Community and General Public
- ~~Quasi-Governmental Agencies / Districts (i.e., educational institutions, water districts, sanitation districts, etc.)~~

Comment [CP133]: These entities are subject to individual NPDES regulations, and the Copermittees should not be required to educate them on the general requirements below.

a. General Requirements

(1) At a minimum, the Copermittee education programs must implement educational programs for ~~educate~~ each target community on the following topics as appropriate to the community's activities and their impact discharges from the MS4 :

Comment [CP134]: The language should be clear that the minimum topics should be tailored as appropriate to the target audience.

(a) Applicable water quality laws, regulations, permits, and/or other requirements;
(b) Best management practices;
(c) General runoff concepts;
(d) Existing water quality, including local water quality conditions, impaired waterbodies and environmentally sensitive areas; and
(e) Other topics as determined by the Copermittee, such as public reporting mechanisms, water conservation, low-impact development techniques, and public health and vector issues associated with runoff.

(2) Each Copermittee must implement educational activities, public information activities, and other appropriate activities to facilitate the proper management and disposal of used oil and toxic materials.

b. Specific Requirements

(1) Copermittee Departments and Personnel

(a) Each Copermittee must implement an education program so its staff and contractors (and Planning Boards and Elected Officials, if applicable) responsible for implementing the requirements of this Order have an understanding of the following topics, as applicable to their responsibilities:

(i) Applicable water quality laws and regulations;
(ii) The potential effects and impacts that Copermittee departments and personnel activities related to their job duties can have on water quality);

(iii) Plan review policies and procedures to verify consistent application;
(iv) Methods of minimizing impacts to receiving water quality resulting from development, construction, and other potential pollutant generating activities;
(v) Proper implementation of erosion and sediment control, source control, treatment control, and other BMPs to minimize the impacts to receiving water quality resulting from development, construction, and other potential pollutant generating activities;
(vi) Applicable recordkeeping and tracking mechanisms;
(vii) Inspection and enforcement procedures and~~,~~ BMP implementation, ~~and review of monitoring data~~.

Comment [CP135]: As discussed in the comment letter, this is a requirement for other NPDES permits, and it is inappropriate to mandate upon the Copermittees.

(b) Each Copermittee must train its staff responsible for oversight and conducting storm water compliance inspections and enforcement of construction activities (e.g. construction, building, code enforcement, grading review staffs, inspectors, and other responsible construction staff) annually prior to the rainy season.

(c) Each Copermittee must train its staff responsible for conducting storm water compliance inspections and enforcement of industrial and commercial facilities at least once a year.

(2) New Development / Redevelopment and Construction Sites

As early in the planning and development process as possible and all through the permitting and construction process, each Copermittee must notify parties responsible for the project about the importance of educating all construction workers in the field about storm water issues and BMPs, in addition to the topics under Section F.6.a.(1).

(3) Commercial and Industrial Sites / Sources

At least once during the five-year period of this Order, each Copermittee must notify the owner/operator of each of its inventoried commercial and industrial site/source of the BMP requirements applicable to the site/source.

(4) Residential and General Public

Each Copermittee shall collaboratively conduct or participate in development and implementation of a program to educate residential and general public target communities. The Copermittee residential and general public education programs must address potential pollutant generating activities (e.g., car washing, mobile operations, yard maintenance) and pollutant generating products (e.g., pesticides, fertilizers, household chemicals). ~~The target audiences of the residential and general public education programs must include underserved target audiences (e.g., disadvantaged~~

~~communities), residents and managers of CIA/HOA areas, and owners and residents of mobile home parks.~~

Comment [DB136]: The requirement to educate the residential and general public communities will necessarily include these underserved audiences.

G. WATERSHED WATER QUALITY WORKPLAN

Each Copermittee must collaborate with other Copermittees to develop and implement a Watershed Water Quality Workplan (Watershed Workplan) designed to identify, prioritize, address, and mitigate the highest priority water quality issues/pollutants in the Upper Santa Margarita Watershed relating to discharges from the MS4.

Comment [DB137]: See general comment 1 in Attachment 7 to the comment letter .

1. Watershed Workplan Components:

The work plan must, at a minimum:

a. Characterize the receiving water quality in the watershed. Characterization must include assessment and analysis of regularly collected water quality data, reports, monitoring and analysis generated in accordance with the requirements of the Receiving Waters Monitoring and Reporting Program, as well as applicable information available from other public and private organizations. This characterization must include an updated watershed map.

b. Identify and prioritize water quality problem(s) in terms of constituents by location, in the watershed's receiving waters. In identifying water quality problem(s), the Copermittees must, at a minimum, give consideration to TMDLs, receiving waters listed on the CWA section 303(d) list, waters with persistent violations of water quality standards, toxicity, or other impacts to beneficial uses, and other pertinent conditions.

c. Identify the likely sources, pollutant discharges and/or other factors causing the highest water quality problem(s) within the watershed resulting from discharges from the MS4. Efforts to determine such sources must include, but not be limited to: use of information from the construction, industrial/commercial, municipal, and residential source identification programs required within the JRMP of this Order; water quality monitoring data collected as part of the Receiving Water Monitoring and Reporting Program required by this Order, and additional focused water quality monitoring to identify specific sources within the watershed.

d. Develop a watershed BMP implementation strategy to attain receiving water quality objectives in the identified highest priority water quality problem(s) and locations. The BMP implementation strategy must include a schedule for implementation of the BMP ~~project~~s to abate specific receiving water quality problems and a list of criteria to be used to evaluate BMP effectiveness. Identified watershed water quality problems may be the result of jurisdictional discharges that will need to be addressed with BMPs applied in a specific jurisdiction in order to generate a benefit to the watershed. This implementation

Comment [CP138]: Changes in this section are requested pursuant to discussions with Board staff on 8/18

strategy must include a map of any implemented and/or proposed structural BMPs.

e. Develop a strategy to monitor improvements in receiving water quality directly resulting from implementation of the BMPs described in the Watershed Workplan. The monitoring strategy must review the necessary data to report on the measured pollutant reduction that results from proper BMP implementation. Monitoring must, at a minimum, be conducted in the receiving water to demonstrate reduction in pollutant concentrations and progression towards attainment of receiving water quality objectives.

f. Establish a schedule for development and implementation of the Watershed strategy outlined in the Workplan. The schedule must, at a minimum, include forecasted dates of planned actions to address Provisions E.2(a) through E.2(e) and dates for watershed review meetings through the remaining portion of this Permit cycle. Annual watershed workplan review meetings must be open to the public and appropriately publically noticed such that interested parties may come and provide comments on the watershed program.

2. **Watershed Workplan Implementation –** Watershed Copermittee's must implement the Watershed Workplan within 90 days of submittal unless otherwise directed by the San Diego Water Board.

3. **Copermittee Collaboration** – Watershed Copermittees must collaborate to develop and implement the accepted Watershed Workplan. Watershed Copermittee collaboration must include frequent regularly scheduled meetings. The Copermittees must pursue ~~efforts to obtain any~~ interagency agreements, or other coordination efforts, with non-Copermittee owners of the MS4 (such as Caltrans, Native American tribes, and school districts) where determined by the Copermittee as necessary to control the contribution of pollutants from one portion of the shared MS4 to another portion of the shared MS4. The Copermittees must, as appropriate, participate in watershed management efforts to address water quality issues within the entire Santa Margarita Watershed (such as the County of San Diego and U.S. Marine Corps Camp Pendleton).

Comment [CP139]: Goal is to pursue these agreements where we determine it is needed. Otherwise this requirement is diverting our time and resources from other more important efforts.

4. **Public Participation –** Watershed Copermittees must implement a watershed-specific public participation mechanism within each watershed. A required component of the watershed-specific public participation mechanism must be a minimum 30-day public review of and opportunity to comment on the Watershed Workplan prior to submittal to the San Diego Water Board. The Workplan must include a description of the public participation mechanisms to be used and identification of the persons or entities anticipated to be involved during the development and implementation of the Watershed Workplan.

5. **Watershed Workplan Review and Updates –** Watershed Copermittees must review and update the Watershed Workplan annually to identify needed changes to

the prioritized water quality problem(s) listed in the workplan. All updates to the Watershed Workplan must be presented during an Annual Watershed Review Meeting. Annual Watershed Review Meetings must occur once every calendar year and be conducted by the Watershed Copermittees. Annual Watershed Review Meetings must be open to the public and adequately noticed. Individual Watershed Copermittees must also review and modify their jurisdictional programs and JRMP Annual Reports, as necessary, so that they are consistent with the updated Watershed Workplan.

6. **Pyrethroid Toxicity Reduction Evaluation –** The Watershed Copermittees must incorporate the pyrethroid pollutant reduction program[18] into the Watershed Workplan. The pyrethroid pollutant reduction program must include the following elements:

   a. Pursue state and federal regulatory change.
   b. Implement a set of source controls targeted specifically at urban pyrethroid use,
   c. Through the annual reporting process, monitor the implementation of those controls, assess effectiveness, and identify sources or areas where additional effort is needed,
   d. Implement additional controls as needed,
   e. Continue to monitor implementation, as well as conditions within the target receiving waters, assess effectiveness, and re-evaluate control programs.

H. FISCAL ANALYSIS

1. Secure Resources: Each Copermittee must ~~exercise its full authority to~~ secure the resources necessary to meet all requirements of this Order. If the Copermittees are unable to secure the funding necessary to implement the requirements of this order, the Copermittees may request modification of the Order consistent with the MEP standard.

Comment [CP140]: This clarifies that the Copermittees have the option to request modification of the order for reasons such as inability to obtain the requisite funding for the programs.

2. Annual Analysis: Each Copermittee must conduct an annual fiscal analysis of the necessary capital and operation and maintenance expenditures necessary to accomplish the activities of the programs required by this Order. The analysis must include estimated expenditures for the current reporting period, the preceding period, and the next reporting period.

   a. Each analysis must include a description of the source of funds that are proposed to meet the necessary expenditures.
   b. Each analysis must include a narrative description of circumstances resulting in a 25 percent or greater annual change for any budget line items.

[18] The pyrethroid pollutant reduction program is described in the "Riverside County – Santa Margarita Region Pyrethroid Source Identification Toxicity Reduction Evaluation, Final Phase II Report", January 2009 by MACTEC.

3. Annual Reporting: Each Copermittee must submit its annual fiscal analysis with the annual JRMP report.

I. TOTAL MAXIMUM DAILY LOADS

1. The waste load allocations (WLAs) of fully approved and adopted TMDLs are incorporated as Water Quality Based Effluent Limitations on a pollutant by pollutant, watershed by watershed basis. Early TMDL requirements, including monitoring, may be required and inserted into this Order pursuant to Finding E.10.

2. The Cities of Wildomar and Murrieta must comply with the requirements and WLAs assigned to the discharges from their MS4s contributing to the Lake Elsinore/Canyon Lake (San Jacinto Watershed) Nutrient TMDLs as specified in Section VI.D.2 of the Santa Ana Water Board's Order R8-2010-0033, -including the relevant sections of the fact sheet and findings, and subsequent revisions thereto.

J. PROGRAM EFFECTIVENESS ASSESSMENT AND REPORTING

Beginning with the Annual Report due in 2013, each Copermittee must annually assess and report upon the effectiveness of its JRMP and Watershed Workplan implementation to (1) reduce the discharge of storm water pollutants from its MS4 to the MEP; (2) prohibit non-stormwater discharges; and (3) prevent runoff discharges from the MS4 from causing or contributing to a violation of water quality standards.

1. Program Effectiveness Assessments

a. IDENTIFY EFFECTIVENESS ASSESSMENTS

With the JRMP and Watershed Workplan submittal, each Copermittee must establish assessment measures or methods for each of the six outcome levels described by CASQA[19], using data from each JRMP program component as appropriate, the MRP, and the Watershed Workplan.

(1) Assessment interval: For each established assessment measure or method, an assessment interval must be established as appropriate to the measure or method.

(2) Projected Timeframe: For each established assessment measure or method, each Copermittee must identify the projected timeframe within which the associated outcome level can adequately assess change.

[19] Effectiveness assessment outcome levels as defined by CASQA are defined in Attachment C of this Order. See "*Municipal Stormwater Program Effectiveness Assessment Guidance"* (CASQA, May 2007) for guidance for assessing program activities at the various outcome levels.

b. PERFORM ASSESSMENTS

(1) Annually: Each year, the Copermittee must perform each applicable assessment based on the associated assessment interval, and determine whether the desired outcome has been met;

(2) With the submittal of the Report of Waste Discharge, the Copermittees must determine whether their program implementation is resulting in the protection and/or improvement of water quality through an Integrated Assessment;

2. Respond to Assessments

a. Where the assessments indicate that the desired outcome level has not been achieved at the end of the projected timeframe, the Copermittee must review its applicable activities and BMPs to identify any modifications and improvements needed to maximize effectiveness, as necessary to comply with this Order. If the Copermittee determines that the existing activities/BMPs are adequate, or that the projected timeframe should be extended, justification and an updated timeframe for attainment of the outcome level must be provided in the Annual Report.

b. Each Copermittee must develop and implement a work plan and schedule to address any program modifications and improvements in response to the findings of its assessment. The work plan and schedule must be provided and updated with the applicable Annual Report. The work plan must include, at a minimum, the following:

(1) A description of the program modifications / improvements that will be implemented to achieve the intended outcome level.
(2) A schedule for development and implementation of the program modifications / improvements, including any significant milestones.
(3) Establishment of appropriate assessment measure(s) or method(s), assessment interval(s), and projected timeframe(s) in accordance with Section J.1.a. for the program modifications / improvements.
~~(1) The problems and priorities identified during the assessment;~~
~~(2) A list of priority pollutants and known or suspected sources;~~
~~(3) A brief description of the strategy employed to reduce, eliminate or mitigate the negative impacts;~~
~~(4) A description and schedule for new and/or modified BMPs. The schedule is to include dates for significant milestones;~~
~~(5) A description of how the selected activities will address an identified high priority problem. This will include a description of the expected effectiveness and benefits of the new and/or modified BMPs;~~
~~(6) A description of implementation effectiveness metrics;~~
~~(7) A description of how efficacy results will be used to modify priorities and~~

Comment [CP141]: Although the Copermittees prefer to not be required to develop another compliance document, the edits below are intended to focus such a document on information that is relevant to the Copermittes' response.

~~implementation; and~~

~~(8) A review of past activities implemented, progress in meeting water quality standards, and planned program adjustments.~~

3. Assessment and Response Reporting

Each Copermittee must include a summary of its effectiveness assessments within each Annual Report. Beginning with the FY 2012-2013 Annual Report, the Program Effectiveness reporting must include:

a. The results of each of the effectiveness assessments performed pursuant to J.1.b, including the demonstrated CASQA effectiveness level(s);

b. Responses to effectiveness assessments; A description of any program modifications planned in accordance with section J.2, including the work plan and identified schedule for implementation. The description must include the basis for determining that each modified activity and/or BMP represents an improvement expected to result in improved water quality;

c. A description of any steps to be implemented to improve the Copermittee's ability to assess program effectiveness.

K. REPORTING

The Copermittees may propose alternate reporting criteria and schedules, as part of their updated JRMP, for the Executive Officer's acceptance.

1. Runoff Management Plans

a. JURISDICTIONAL RUNOFF MANAGEMENT PLANS

(1) The written account of the overall program to be conducted by each Copermittee to meet the jurisdictional requirements of section F of this Order is referred to as the Jurisdictional Runoff Management Plan (JRMP). Each Copermittee must revise and update its existing JRMP so that it describes all activities the Copermittee will undertake to implement the requirements of this Order. Each Copermittee must submit its updated and revised JRMP to the San Diego Water Board <u>no later than June 30, 2012</u>.

(2) At a minimum, each Copermittee's JRMP must be updated and revised to

demonstrate compliance with each applicable section of this Order.

b. WATERSHED WORKPLANS

Copermittees must update and revise the Watershed Workplan to describe any changes in water quality problems or priorities, and any necessary change to actions Copermittees will take to implement jurisdictional or watershed BMPs to address those identified. The Copermittees must assemble and submit the Watershed Workplan to the San Diego Water Board no later than June 30, 2012, and must implement the Workplan within 90 days unless otherwise directed by the San Diego Water Board.

2. Other Required Reports and Plans

a. SSMP UPDATES

(1) Copermittees must submit their updated SSMP in accordance with the applicable requirements of section F.1 with the JRMP by June 30, 2012.
(2) Within 180 days of determination that the SSMP is in compliance with this Order's provisions, each Copermittee must amend its ordinances consistent with the SSMP and implement the updated SSMP. Any amended or new ordinances must be submitted to the San Diego Water Board within ~~30 days of adoption~~the applicable annual report.

Comment [CP142]: Per discussions with Board staff on 8/18

b. HMP

(1) By June 30, 2013, the Copermittees must submit to the San Diego Water Board Executive Officer a draft HMP that has been reviewed by the public, including identification of the appropriate limiting range of flow rates in accordance with the applicable requirements of section F.1.h.

(2) Within 180 of receiving San Diego Water Board comments on the draft HMP, the Copermittees must submit a final HMP that addressed the San Diego Water Board's comments.

(3) Within 90 days of receiving a finding of adequacy from the Executive Officer each Copermittee must incorporate and implement the HMP for all Priority Development Projects.

(4) Prior to acceptance of the HMP by the San Diego Water Board, the early implementation measures likely to be included in the HMP shall be

encouraged by the Copermittees.

c. REPORT OF WASTE DISCHARGE

The Copermittees must submit to the San Diego Water Board, no later than 180 days in advance of the expiration date of this Order, a Report of Waste Discharge (ROWD) as an application for issuance of new waste discharge requirements. The fourth annual report for this Order ~~may supplement~~serve as the ROWD, provided ~~the ROWD~~it contains the minimum information below.

At a minimum, the ROWD must include the following: (1) Proposed changes to the Copermittees' runoff management programs; (2) Proposed changes to monitoring programs; (3) Justification for proposed changes; (4) Name and mailing addresses of the Copermittees; (5) Names and titles of primary contacts of the Copermittees; (6) Any other information necessary for the reissuance of this Order and (7) Any other information required by federal regulations for permit reapplications.

3. Annual Reports

a. JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM (JRMP) ANNUAL REPORTS

(1) Each Copermittee must generate individual JRMP Annual Reports that cover implementation of its jurisdictional activities during the past annual reporting period. Each Annual Report must verify and document compliance with this Order as directed in this section. Each Copermittee must retain records in accordance with the Standard Provisions in Attachment B of this Order, available for review, that document compliance with each requirement of this Order. The reporting period for these annual reports must be the previous fiscal year.

(2) Each Copermittee must submit its JRMP Annual Reports to the San Diego Water Board by October 31of each year, beginning on October 31, 2013.

(3) Each JRMP Annual Report must contain, at a minimum, the following information, as applicable to the Copermittee:

(a) Information required to be reported annually in Section H (Fiscal Analysis) of this Order;
(b) Information required to be reported annually in Section J (Program Effectiveness) of this Order;
(c) The completed Reporting Checklist found in Attachment D, and
(d) Information for each program component as described in the following Table 9:

Table 9. Annual Reporting Requirements

Program Component	Reporting Requirement
New Development	1. All updated relevant sections of the General Plan and environmental review process and a description of any planned updates within the next annual reporting period, if applicable
	2. All revisions to the SSMP, including where applicable: (a) Identification and summary of where the SSMP fails to meet the requirements of this Order; (b) Updated procedures for identifying pollutants of concern for each Priority Development Project; (c) Updated treatment BMP ranking matrix; and (d) Updated site design and treatment control BMP design standards;
	3. Number of Priority Development Projects reviewed and approved during the reporting period. Brief description of BMPs required at approved Priority Development Projects. Verification that site design, source control, and treatment BMPs were required on all applicable Priority Development Projects;
	4. Name (or other identifier) and location of all Priority Development Projects that were granted a waiver from implementing LID BMPs pursuant to section F.1.d.(4) during the reporting period;
	5. Updated watershed-based BMP maintenance tracking database of approved treatment control BMPs and treatment control BMP maintenance within its jurisdiction, including updates to the list of high-priority Priority Development Projects; and verification that the requirements of this Order were met during the reporting period.
New Development	6. Name and brief description of all approved Priority Development Projects ~~required to~~exempted from implementing hydrologic control measures in compliance with section F.1.h ~~including a brief description of the management measures planned to protect downstream beneficial uses and prevent adverse physical changes to downstream stream channels;~~
	7. Number and description of all enforcement activities applicable to the new development and redevelopment component and a summary of the effectiveness of those activities;
Construction	1. All updated relevant ordinances and description of planned ordinance updates within the next annual reporting period, if applicable;
	2. A description of any changes to procedures used for identifying priorities for inspecting sites and enforcing control measures ~~that consider the nature of the construction activity, topography, and the characteristics of soils and receiving water quality~~;
	3. Any changes to the designated minimum and enhanced BMPs;

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Program Component	Reporting Requirement
	4. Summary of the inspection program, including the following information: (a) Total number and date of inspections conducted at each facility; ~~(b) Number, date, and types of enforcement actions by facility~~; (c) Brief description of each high-level enforcement actions at construction sites including the ~~effectiveness~~ outcome of the enforcement. Supporting paper (or electronic) files must be maintained by the Copermittees and made available upon San Diego Water Board request. Supporting files must include a record of inspection dates, the results of each inspection , photographs (if any), and a summary of any enforcement actions taken.
Municipal	1. Updated source inventory;
	2.All changes to the designated municipal BMPs;
	3. Descriptions of any changes to procedures to assure that flood management projects assess the impacts on the water quality of receiving water bodies;
	4. Summary and assessment of BMPs retrofits implemented at flood control structures, including: (a) List of projects retrofitted; and (b) List and description of structures evaluated for retrofitting; (c) List of structures still needing to be evaluated and the schedule for evaluation.;
	5. Summary of the municipal structural treatment control operations and maintenance activities, including: (a) Number of inspections and types of facilities; and (b) Summary of findings;
Municipal	6. Summary of the MS4 and MS4 facilities operations and maintenance activities, including: (a) Number and types of facilities maintained; (b) Amount of material removed; and (c) Updates to the List of facilities planned for bi-annual inspections and the justification;
	7. Summary of the municipal areas/programs inspection activities, including: (a) Number and date of inspections conducted at each facility; ~~(c) The BMP violations identified during the inspection by facility;~~ ~~(d) Number, date and types of enforcement actions by facility~~; (e) Summary of inspection findings and follow-up activities for each facility;
	8. Description of activities implemented to address sewage infiltration into the MS4;
	~~9. Description of BMPs and their implementation for unpaved roads construction and maintenance.~~

Comment [CP143]: As drafted (without the changes shown) the requirements will be a significant and lengthy reporting exercise. Request keeping this as a 'summary' report on compliance with the inspection frequencies, and identifying any follow-up actions (as shown via the markup).

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Program Component	Reporting Requirement
Commercial / Industrial	1. Updated inventory of commercial / industrial sources;
	2. Summary of the inspection program, including the following information: (a) Number and date of inspections conducted at each facility or mobile business;; ~~(c) The BMP violations identified during the inspection by facility;~~ (d) Number, date, and types of high-level enforcement actions by facility or mobile business, and the outcome of each; ~~(e) Brief description of each high-level enforcement actions at commercial/industrial sites including the effectiveness of the enforcement and follow-up activities for each facility;.~~
	3. All changes to designated minimum and enhanced BMPs;
	4. A list of industrial sites, including each name, address, and SIC code, that the Copermittee suspects may require coverage under the General Industrial Permit, but has not submitted an NOI;
Residential	1. All updated minimum BMPs required for residential areas and activities;
	2. Quantification and summary of applicable runoff and storm water enforcement actions within residential areas and activities;
	3. Description of efforts to manage runoff and storm water pollution in common interest areas and mobile home parks;
Retrofitting Existing Development	1. Updated inventory and prioritization of existing developments identified as candidates for retrofitting.
	2. Description of efforts to retrofit existing developments during the reporting year.
Retrofitting Existing Development	3. Description of efforts taken to encourage private landowners to retrofit existing development.
	4. A list of all known retrofit projects that have been implemented within the reporting period, including site location, a description of the retrofit project, pollutants expected to be treated, and the tributary acreage of runoff that will be treated.
	5. Any proposed retrofit or regional mitigation projects and timelines for future implementation.
	6. Any proposed changes to the Copermittee's overall retrofitting program.
Illicit Discharge Detection and Elimination	1. Any changes to the legal authority to implement Illicit Discharge Detection and Elimination activities;
	2. Any Changes to the established investigation procedures;
	3. Any changes to public reporting mechanisms, including phone numbers and web pages;
	4. Summaries of illicit discharges (including spills and water quality data events) and how each significant case was resolved;
	5. A description of instances when field screening and analytical data exceeded action levels, including those instances for which no investigation was conducted;

Comment [CP144]: As drafted (without the changes shown) the requirements will be a significant and lengthy reporting exercise. Request keeping this as a 'summary' report on compliance with the inspection frequencies, and identifying the high-level enforcement actions (as shown via the markup).

Program Component	Reporting Requirement
	6. A description of follow-up and enforcement actions taken in response to investigations of illicit discharges and a description of the outcome of the investigation/enforcement actions;
Workplans	Updated workplans including priorities, strategy, implementation schedule and effectiveness evaluation;

(4) Each JRMP Annual Report must also include the following information regarding non-storm water discharges (see Section B.2. of this Order):

(a) Identification of non-storm water discharge categories identified as a source of pollutants to waters of the U.S;
(b) A description of any updates to ordinances, orders, or similar means to prohibit non-storm water discharge categories identified under section B.2 above ;
(c) Identification of any control measures to be required and implemented for non-storm water discharge categories identified as needing controls by the San Diego Water Board; and
(d) A description of a program to address pollutants from non-emergency fire fighting flows identified by the Copermittee to be significant sources of pollutants.

4. Interim Reporting Requirements

For the reporting periods, prior to submittal of the JRMP, Each JRMP Annual Report must be submitted in accordance with the requirements and deadlines described in Order No. 2004-001.

5. Universal Reporting Requirements

All submittals must include an executive summary, ~~introduction, conclusion, recommendations,~~ and signed certified statement. Each Copermittee must submit a signed certified statement covering its responsibilities for each applicable submittal. The Principal Copermittee must submit a signed certified statement covering its responsibilities for each applicable submittal and the sections of the submittals for which it is responsible.

Comment [CP145]: Per discussions with Board staff on 8/18

L. MODIFICATION OF PROGRAMS

Modifications of JRMPs and/or Watershed Workplan may be initiated by the Executive Officer of the San Diego Water Board or by the Copermittees. Requests by Copermittees must be made to the Executive Officer, and must be submitted during the annual review process. Requests for modifications should be incorporated, as appropriate, into the Annual Reports or other deliverables required or allowed under this Order.

1. Minor modifications to JRMPs, and/or Watershed Workplan, may be accepted by the Executive Officer where the Executive Officer finds the proposed modification complies with all discharge prohibitions, receiving water limitations, and other requirements of this Order.

2. Proposed modifications that are not minor require amendment of this Order in accordance with this Order's rules, policies, and procedures.

M. PRINCIPAL COPERMITTEE RESPONSIBILITIES

Within 180 days of adoption of this Order, the Copermittees must designate the Principal Copermittee and notify the San Diego Water Board of the name of the Principal Copermittee. The Principal Copermittee must, at a minimum:

1. Serve as liaison between the Copermittees and the San Diego Water Board on general permit issues, and when necessary and appropriate, represent the Copermittees before the San Diego Water Board.

2. Coordinate permit activities among the Copermittees and facilitate collaboration on the development and implementation of programs required under this Order.

3. ~~Produce and submit~~Coordinate the submittal of the documents and reports as required by section K of this Order and Receiving Waters and MS4 Discharge Monitoring and Reporting Program No. R9-2010-0016 in Attachment E of this Order.

Comment [CP146]: Per discussions with Board staff on 8/18

N. RECEIVING WATERS AND MS4 DISCHARGE MONITORING AND REPORTING PROGRAM

Pursuant to CWC section 13267, the Copermittees must comply with all the requirements contained in Receiving Waters and MS4 Discharge Monitoring and Reporting Program No. R9-2010-0016 in Attachment E of this Order.

O. STANDARD PROVISIONS, REPORTING REQUIREMENTS, AND NOTIFICATIONS

1. Each Copermittee must comply with Standard Provisions, Reporting Requirements,

and Notifications contained in Attachment B of this Order. This includes 24 hour/5 day reporting requirements for any instance of non-compliance with this Order as described in section 5.e of Attachment B.

2. All plans, reports and subsequent amendments submitted in compliance with this Order must be implemented immediately (or as otherwise specified). All submittals by Copermittees must be adequate to implement the requirements of this Order.

I, David W. Gibson, Executive Officer, do hereby certify the foregoing is a full, true, and correct copy of an Order adopted by the California Regional Water Quality Control Board, San Diego Region, on October 13, 2010.

\\TENTATIVE
David W. Gibson
Executive Officer

I. PURPOSE

A. This Receiving Waters and MS4 Discharge Monitoring and Reporting Program (MRP) is intended to meet the following goals as they relate to discharges from the Copermittees' MS4:
   1. Assess compliance with Order No. R9-2010-0016;
   2. Measure and improve the effectiveness of the Copermittees' runoff management programs;
   3. Assess the chemical, physical, and biological impacts to receiving waters resulting from MS4 discharges;
   4. Characterize storm water discharges;
   5. Identify sources of specific pollutants;
   6. Prioritize drainage and sub-drainage areas that need management actions;
   7. Detect and eliminate illicit discharges and illicit connections to the MS4;
   8. Assess the overall health of receiving waters; and
   9. Provide information to implement required BMP improvements.

B. This Receiving Waters and MS4 Discharges Monitoring and Reporting Program is designed to answer the following core management questions[1]:
   1. Are conditions in receiving waters protective, or likely to be protective, of beneficial uses?
   2. What is the extent and magnitude of the current or potential receiving water problems?
   3. What is the relative MS4 discharge contribution to the receiving water problem(s)?
   4. What are the sources of pollutants in MS4 discharges that contribute to receiving water problem(s)?
   5. Are conditions in receiving waters getting better or worse?

II. MONITORING PROGRAM

The Monitoring Program is designed to assess the condition of receiving waters, monitor pollutants in storm and non-storm water effluent from the MS4, and conduct Special Studies to address conditions of concern. Where feasible, the Monitoring Program is designed to allow the Copermittees to

[1] Core management questions from "*Model Monitoring Program for Municipal Separate Storm Sewer Systems in Southern California: A report from the Stormwater Monitoring Coalition's Model Monitoring Technical Committee.*" Technical Report No. 419. August 2004.

combine required monitoring elements or efforts that are not mutually exclusive while still meeting the requirements of the Order.

A. Receiving Waters Monitoring Program

Each Copermittee must collaborate with the other Copermittees to develop, conduct, and report on a year-round watershed based Receiving Waters Monitoring Program. The monitoring program design, implementation, analysis, assessment, and reporting must be conducted on a watershed basis for the Santa Margarita Hydrologic Unit (HU) and must be designed to meet the goals and answer the questions listed in section I above. The monitoring program must include the following components:

1. MASS LOADING STATION (MLS) MONITORING

a. Locations: The following existing mass loading stations must continue to be monitored: Lower Temecula Creek, Lower Murrieta Creek at the USGS Weir, and a permanent reference station.[2] Copermittees may propose, for San Diego Water Board review and approval, changing the location of a mass loading station.

b. Frequency: Each mass loading station must be monitored each year ~~three~~ two times during wet weather events and twice during dry weather flow conditions.

Comment [CP1]: See discussion in Attachment 4 to the Comment Letter

c. Timing: Each mass loading station must be monitored for the first wet weather event of the season which meets USEPA's criteria described in 40 CFR 122.21(g)(7). Monitoring of the ~~third~~ second wet weather event must be conducted after February 1. Dry weather mass loading monitoring events must be sampled at least three months apart between May and October. If flows are not evident for the second event, then sampling must be conducted during non-rain events in the following wet weather season.

Comment [CP2]: Consistent with above

d. Protocols: Protocols for mass loading sampling and analysis including analytical methods, target reporting limits, and data reporting formats must be compatible with the State Water Resources Control Board's (State Water Board's) State Surface Water Ambient Monitoring Program (SWAMP). If the mass loading sampling and analysis are determined to be impracticable with the SWAMP standards, the Copermittees must provide a written explanation and discussion in the submittal of the Planned

[2] A map depicting mass loading stations can be found in the Fact Sheet for Order R9-2010-0016.

Monitoring Program. Wet weather samples must be time-weighted composites, ~~collected for the duration of the entire runoff event. Where such monitoring is not practical, such as for large watersheds with significant groundwater recharge flows, composites must be~~ collected at a minimum during the first 3 hours of flow or for the duration of the entire runoff event if it is less than three hours. Grab samples are acceptable for Dry weather event sampling ~~must be time-weighted composites composed of 24 discrete hourly samples, whereby the mass loads of pollutants are calculated as the product of the composite sample concentration and the total volume of water discharged past the monitoring point during the time of sample collection~~.

Comment [CP3]: As discussed in our meeting, this is a large watershed with significant GW recharge flows

Comment [CP4]: See discussion in Attachment 4 to the Comment Letter

(1) Automatic samplers must be used to collect wet weather samples from mass loading stations.

(2) Grab samples must be analyzed for temperature, pH, specific conductance, biochemical oxygen demand, oil and grease, total coliform, fecal coliform, enterococcus and for total petroleum hydrocarbons whenever a sheen is observed.

e. Copermittees must measure or estimate flow rates and volumes for each mass loading station sampling event to determine mass loadings of pollutants. Data from nearby USGS gauging stations may be utilized, or flow rates may be estimated in accordance with the USEPA Storm Water Sampling Guidance Document (EPA-833-B-92-001), Section 3.2.1.

f. In the event that the required number of sampling events are not conducted during one monitoring year at any given station, the Copermittees must provide a written explanation for the reduced number of sampling events in the subsequent Receiving Waters Monitoring Annual Report. The explanation must include, at a minimum, streamflow data from the nearest USGS gauging station, a full description of any equipment failures and subsequent remedies, efforts made to resample a future event, and any quality assurance or quality control issues encountered. The explanation must also include a description of steps taken to prevent further sampling failures.

g. The following constituents must be analyzed for each monitoring event at each station:

Table 1. Analytical Testing for Mass Loading (A.1) and Bioassessment (A.2)

Comment [CP5]: See discussion in Attachment 4 to the Comment Letter

Conventionals, Nutrients, Hydrocarbons	Pesticides	Metals (Total and Dissolved)	Bacteriological (mass loading)
• Total Dissolved Solids • Total Suspended Solids • Turbidity • Total Hardness • pH • Specific Conductance • Temperature • Dissolved Oxygen • Total Phosphorus • Dissolved Phosphorus • Nitrite ◌̊ • Nitrate ◌̊ • Total Kjeldahl Nitrogen • Ammonia • ~~Biological Oxygen Demand, 5-day~~ • ~~Chemical Oxygen Demand~~ • ~~Total Organic Carbon~~ • ~~Dissolved Organic Carbon~~ • Methylene Blue Active Substances • Oil and Grease • Sulfate	• Diazinon • Chlorpyrifos • Malathion • ~~Carbamates~~ • Pyrethroids	• Arsenic • Cadmium • Total Chromium • ~~Hexavalent Chromium~~ • Copper • Lead • Iron • Manganese • Nickel • Selenium • Zinc • Mercury • Silver • Thallium	• Total Coliform • Fecal Coliform • Enterococcus

◌̊ Nitrate and nitrate may be combined and reported as nitrate + nitrite.

h. Toxicity testing must be conducted for each monitoring event at each station according to the following Table 2:

Table 2. Toxicity Testing for Mass Loading (A.1) and Bioassessment (A.2)

Program Component	*Dry Weather Flows*	*Storm Water Flows*
	Freshwater Organisms	**Freshwater Organisms**
Mass Loading	~~3~~ 2 chronic* ~~3~~ 2 acute*	~~3~~ 2 acute*
Bioassessment**	~~3~~ 2 chronic* ~~3~~ 2 acute*	n/a
Sediment Toxicity Special Study	1 chronic 1 acute	n/a

Table Notes
* Toxicity testing must include use of *Pimephales promelas* (fathead minnow), *Hyalella azteca* ~~and *Pseudokirchneriella subcapitata (formerly Selenastrum capricornutum, unicellular algae*~~).
** Duplicative toxicity testing is not required for bioassessment stations located at mass loading stations as bioassessment must be conducted in conjunction with dry weather mass loading

Species Notes:
1. Acute toxicity may be determined during the course of chronic toxicity monitoring per U.S. EPA protocols.

Comment [CP6]: See discussion in Attachment 4 to the Comment Letter

Comment [CP7]: Consistent with the changes discussed in the comment letter

i. The presence of acute toxicity must be determined in accordance with USEPA protocol (EPA-821-R-02-012). The presence of chronic freshwater toxicity must be determined in accordance with USEPA protocol (EPA-821-R-02-013).

2. Stream Assessment Monitoring

Copermittees must conduct Stream Assessment Monitoring using multiple lines of evidence to assess the condition of biological communities in freshwater receiving waters. Stream assessment must include the collection and reporting of the following specified instream biological, chemical, physical (including habitat) data.

a. Locations: At a minimum, the program must consist of station identification, sampling, monitoring, and analysis of data for ~~six~~ three stream assessment stations in order to determine the biological and physical integrity of streams within the County of Riverside. The two existing mass loading stations at Murrieta and Temecula Creeks ~~must continue to be monitored. Two reference stream bioassessment stations, including~~and the existing Adobe Creek reference station, must continue to be monitored.~~be~~

Comment [CP8]: See discussion in Attachment 4 to the Comment Letter

~~identified, sampled, monitored, and analyzed~~. Copermittees may propose, for San Diego Water Board review and approval, changing the location of a Bioassessment station. Locations of alternate reference stations must be identified according to protocols outlined in "A Quantitative Tool for Assessing the Integrity of Southern Coastal California Streams," by Ode, et al. 2005.[3]

Comment [CP9]: Language from MLS section. This is to allow for changes in MLS locations, and then allow the stream assessment stations to follow.

b. Frequency: Stream assessment stations must be monitored in May or June (to represent the influence of wet weather on the communities) ~~and~~ or September or October (to represent the influence of dry weather flows on the communities). The timing of monitoring of stream assessment stations must coincide with dry weather monitoring of mass loading stations.

Comment [CP10]: See discussion in Attachment 4 to the Comment Letter

c. Parameters / Methods: Stream assessment monitoring must include bioassessment, aquatic chemistry, and aqueous toxicity.

(1) Aquatic chemistry and aqueous toxicity must be conducted as outlined in Tables 1 and 2 using the same parameters and methods as the mass loading station monitoring.

(2) Bioassessment analysis procedures must include calculation of the Index of Biotic Integrity (IBI) for benthic macroinvertebrates for all bioassessment stations, as outlined in "A Quantitative Tool for Assessing the Integrity of Southern Coastal California Streams," by Ode, et al. 2005.

(3) ~~Monitoring of stream bioassessment stations~~Bioassessment must be conducted according to bioassessment Standard Operating Procedures (SOP) developed by the Surface Water Ambient Monitoring Program (SWAMP), as amended.[4] In collecting macroinvertebrate samples, the discharger must use the "Reachwide Benthos (Multihabitat) Procedure." The discharger must conduct, concurrently with all required macroinvertebrate collections, the "full" suite of physical/habitat characterization measurements specified in the SWAMP Bioassessment SOP, and as summarized in the *SWAMP*

Comment [CP11]: Only the Bioassessment component of stream assessment monitoring must be conducted according to the SOP.

[3] Ode, et al. 2005. "A Quantitative Tool for Assessing the Integrity of Southern Coastal California Streams." Environmental Management. Vol. 35, No. 1, pp. 1-13.
[4] Ode, P.R.. 2007. Standard operating procedures for collecting macroinvertebrate samples and associated physical and chemical data for ambient bioassessments in California. California State Water Resources Control Board Surface Water Ambient Monitoring Program (SWAMP) Bioassessment SOP 001.

Stream Habitat Characterization Form — Full Version. [5]

(4) Monitoring of stream assessment stations must incorporate assessment of algae using SWAMP's SOP for Collecting Stream Algae Samples.[6] Assessment of freshwater algae must include algal taxonomic composition (diatoms and/or soft algae) and algal biomass. Future bioassessment must incorporate algal IBI scores, when developed.

d. A qualified professional environmental laboratory must perform all Bioassessment sampling, laboratory, quality assurance, and analytical procedures in accordance with the Southern California Regional Watershed Monitoring Program Bioassessment Quality Assurance Project Plan.[7] The Copermittees must utilize future Quality Assurance Project Plans as developed by SWAMP.

Comment [CP12]: This section is referring to the Bioassessment component of stream assessment monitoring

(1) The Copermittees must have and follow a quality assurance (QA) plan that covers the required stream assessment monitoring. External QA check must be funded by the Copermittees, and performed by the California Department of Fish and Game's Aquatic Bioassessment Laboratory. An alternate laboratory with equivalent expertise and performance may be used if approved in advance in writing by San Diego Water Board.

(2) Identified organisms must be archived (i.e., retained) by the Copermittee(s) for a period of not less than three years from the date that all QA steps are completed. The identified organisms must be relinquished to the San Diego Water board upon request by the San Diego Board.

(3) The macroinvertebrate results (i.e., taxonomic identifications consistent with the specified SAFIT STEs, and number of organisms within each taxa) must be submitted to the San Diego Water Board in electronic format. SWAMP is currently developing standardized formats for reporting bioassessment data. All bioassessment data collected after those formats become available must be submitted using the SWAMP

[5] Available at: http://www.waterboards.ca.gov/water_issues/programs/swamp/docs/reports/fieldforms_fullversion052908.pdf

[6] Fetcher et al. 2009. Standard Operating Procedures for Collecting Stream Algae Samples and Associated Physical Habitat and Chemical Data for Ambient Bioassessments in California.

formats. Until those formats are available, the biological data must be submitted in MS-Excel[87] (or equivalent) format.

~~(4)~~ The physical/habitat data must be reported using the standard format titled *SWAMP Stream Habitat Characterization Form — Full Version*.

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3. Follow-up Analysis and Actions (TIE and TRE Triad Approach)

When results from the required monitoring indicate water quality impacts at a mass loading station or stream assessment station as defined in Table 3, Copermittees within the watershed(s) that discharge to that location must evaluate the extent and causes of MS4 discharge pollution in receiving waters and prioritize and implement management actions to eliminate or reduce sources of pollutants from the MS4 as described in Table 3. Toxicity Identification Evaluations (TIEs) must be conducted to determine the cause of toxicity as outlined in Table 3 below. Other follow-up activities, which must be conducted by the Copermittees, are also identified in Table 3. Once the cause of toxicity has been identified by a TIE, the Copermittees must perform source identification projects as needed and implement the measures necessary to reduce or eliminate the pollutant discharges and abate the sources causing the toxicity.

[8] Any version of Excel, 2000 or later, may be used.

approval. Documentation of participation and monitoring must be included in the annual report(s).

B. Wet Weather MS4 Discharge Monitoring

Each Copermittee must collaborate with the other Copermittees to develop, conduct, and report on a year-round, watershed-based, Wet Weather MS4 Discharge Monitoring Program. The monitoring program design, implementation, analysis, assessment, and reporting must be conducted on a watershed basis for each of the hydrologic subareas within the Santa Margarita HU under jurisdiction of the Copermittees. The monitoring program must be designed to meet the goals, and answer the questions, listed in Section I above, as well as to implement required Storm Water Action Levels (SALs) in the Order. The monitoring program must include the following components;

1. MS4 OUTFALL MONITORING

The Copermittees must collaborate to develop and implement a monitoring program to characterize pollutant discharges from MS4 outfalls in each watershed during wet weather. The program must include the rationale and criteria for selection of outfalls to be monitored. The program must, at a minimum, include collection of samples for pollutants listed in Table 4 (below). This monitoring program must be designed to sample ~~a~~ representative ~~percentage~~[11] ~~of the~~ major outfalls ~~within each hydrologic subarea~~ and must begin no later than the 2012-2013 monitoring year.

a. The program must comply with Section D of this Order for Storm Water Action Levels (SALs). ~~Samples must be collected during the first 24 hours of the storm water discharge or for the entire storm water discharge if it is less than 24 hours~~.

(1) Sampling may be done utilizing grab samples, though composite samples are encouraged. ~~Grab samples may be utilized only for pH, indicator bacteria, DO, temperature and hardness.~~

~~(2) All other constituents must be sampled using 24-hour composite samples or for the entire storm water discharge if the storm event is less than 24 hours.~~

b. Sampling to compare MS4 outfall discharges with total metal SALs must include a measurement of receiving water hardness at each

[11] A representative ~~percentage~~ determination must consider ~~hydrologic conditions,~~ total drainage area of the site, ~~population density of the site, traffic density, age of the structures or buildings in the area, and~~ land use

Comment [CP13]: See discussion in Attachment 4 to the Comment Letter, including footnote

Comment [CP14]: See discussion in Attachment 4 to the Comment Letter

Language from the Inland Aquatic Habitat Monitoring section.

types (commercial, residential and industrial), and other considerations as appropriate.

outfall. If a total metal concentration exceeds a SAL in Section D of the Order, that concentration must be compared to the California Toxic Rule criteria and the USEPA 1-hour maximum concentration for the detected level of receiving water hardness associated with that sample. If it is determined that the sample's total metal concentration for that specific pollutant exceeds the SAL but does not exceed the applicable 1-hour criteria for the measured level of hardness, then the SAL shall be considered not exceeded for that measurement.

Table 4. Analytical Testing for Wet Weather MS4 Discharges

Conventionals, Nutrients, Hydrocarbons	Pesticides	Metals (Total and Dissolved)	Bacteriological
• Total Dissolved Solids • Total Suspended Solids • Turbidity★ • Total Hardness • pH • Specific Conductance • Temperature • Dissolved Oxygen • Total Phosphorus★ • Dissolved Phosphorus • Nitrite ♢★ • Nitrate ♢★ • Total Kjeldahl Nitrogen • Ammonia • ~~Biological Oxygen Demand, 5-day~~ • ~~Chemical Oxygen Demand~~ • ~~Total Organic Carbon~~ • ~~Dissolved Organic Carbon~~ • Oil and Grease • Sulfate	• Diazinon • Chlorpyrifos • Pyrethroids	• Arsenic • Cadmium★ • Chromium • Copper★ • Lead★ • Nickel • Selenium • Zinc★ • Mercury • Silver • Thallium • Iron • Manganese	• Fecal Coliform • Enterococcus • E. coli
♢ Nitrate and nitrate may be combined and reported as nitrate + nitrite. ★Pollutant for which there is a Storm Water Action Level			

Comment [CP15]: See discussion in Attachment 4 to the Comment Letter

2. SOURCE IDENTIFICATION ~~MONITORING~~

Comment [CP16]: Source identifications for wet weather may or may not include "monitoring".

See discussion in Attachment 4 to the Comment Letter

The Copermittees must collaborate to develop and implement a ~~monitoring~~ program to identify sources of pollutants causing the priority water quality problems within each hydrologic subarea. The ~~monitoring~~ program must include focused monitoring ~~which moves upstream into each watershed~~ as necessary to identify source areas,

Comment [CP17]: This presumes we are starting at the 'bottom of the watershed'. We may approach this differently, but would come up with something to help identify source areas.

or other methods to identify the societal sources of pollutants, as appropriate. This ~~monitoring~~ program must ~~be implemented within each hydrologic subarea and must~~ begin no later than the 2012-2013 monitoring year.

Comment [CP18]: This is necessary because some pollutants have broad societal sources that cannot be pinpointed through focused source ID 'Monitoring'.

3. COMMENCEMENT OF MS4 OUTFALL AND SOURCE IDENTIFICATION MONITORING

The Principal Copermittee must submit to the San Diego Water Board for review and approval, a detailed draft of the wet weather MS4 discharge monitoring program to be implemented. The description must identify and provide the rationale for all constituents monitored, locations of monitoring, frequency of monitoring, and analyses to be conducted with the data generated. The draft must be submitted With the proposed monitoring program (Secion III.A.1).

C. Non-Storm Water Dry Weather Action Levels and Illicit Discharge Detection and Elimination

Each Copermittee must collaborate with the other Copermittees to conduct, and report on a year-round watershed based Dry Weather Non-storm Water MS4 Discharge Monitoring Program. The monitoring program's implementation, analysis, assessment, and reporting must be conducted to assess compliance with section B and C of this Order, meet the goals of the MRP, and conduct Illicit Discharge Detection and Elimination Activities under Section F.4 of this Order. The monitoring program must also be designed to assess the contribution of dry weather flows to Clean Water Act Section 303(d) listed impairments. The monitoring program must include the following components:

1. MS4 OUTFALL MONITORING

Each Copermittee's program must be designed to determine levels of pollutants in effluent discharges from the MS4 into receiving waters. Each Copermittee must conduct the following dry weather field screening and analytical monitoring tasks:

a. Dry Weather Non-storm Water Effluent Analytical Monitoring Station Identification

(1) Sampling Stations must be located at major outfalls pursuant to section C of this Order. Other outfall sampling points (or any other point of access such as manholes) identified by the

Copermittees as potential high risk sources of polluted effluent or as identified under Section C.4 of the Order must be sampled.

(2) Each Copermittee must clearly identify each dry weather effluent analytical monitoring station on its MS4 Map as either a separate GIS layer or a map overlay hereinafter referred to as a Dry Weather Non-storm Water Effluent Analytical Stations Map.

b. Develop Dry Weather Non-storm Water Effluent Analytical Monitoring Procedures

Each Copermittee must develop and/or update written procedures for effluent analytical monitoring including field observations, monitoring, and analyses to be conducted. These procedures must be consistent with 40 CFR part 136. At a minimum, the procedures must meet the following guidelines and criteria:

(1) Determining Sampling Frequency: Effluent analytical monitoring must be conducted at major outfalls and identified stations. The Copermittees must sample ~~a~~ representative ~~number of~~ major outfalls and identified stations ~~within each hydrologic subarea~~.[12] The sampling must be done to assess compliance with dry weather non-storm water action levels pursuant to section C of this Order. All monitoring conducted must be preceded by a minimum of 72 hours of dry weather.

Comment [CP19]: See discussion in Attachment 4 to the Comment Letter, including footnote

(2) Sampling of non-storm water discharges may be done utilizing grab samples. If a ponded MS4 discharge is observed at a monitoring station, the Copermittee(s) must record the observation and collect at least one (1) grab sample See discussion in Attachment 4 to the Comment Letter. ~~.~~ If flow is evident, a 1-hour composite sample may be taken. The Copermittee(s) must estimate the flow using techniques such as by measuring the width of water surface, approximate depth of water, and approximate flow velocity.

(3) Effluent samples must undergo analytical laboratory analysis for (a) all constituents described in *Table 4. Analytical Testing for Wet Weather MS4 Discharges* ~~*Table 1. Analytical Testing for Mass Loading and Bioassessment*~~ of this Order; (b) Constituents with assigned non-storm water action levels under Section C of this Order; and (c) Total Residual Chlorine.

Comment [CP20]: Table 4 is more appropriate – consistency for all MS4 outfall stations.

[12] A representative ~~percentage~~ determination must consider ~~hydrologic conditions~~, total drainage area of the site, ~~population density of the site, traffic density, age of the structures or buildings in the area~~, and land use

types (commercial, residential and industrial) , and other considerations as appropriate.

(4) If the station is dry (i.e. no flowing or ponded MS4 discharge is observed), the Copermittee(s) must make and record all applicable observations on the ~~MS4 outfall and receiving waters~~monitoring site, including any evidence of past non-storm water flows and the presence of trash.

2. SOURCE IDENTIFICATION MONITORING

The Copermittees must collaborate to develop and implement a monitoring program to identify sources of pollutants in non-storm water discharges in accordance with Sections C and F.4 of this Order. The source identification portion of the monitoring program must include: the following components:

a. Development and/or update of response criteria for dry weather non-storm water effluent analytical monitoring results:

(1) Response Criteria must include action levels described in Section C of this Order.

(2) Response Criteria must include evaluation of LC_{50} levels for toxicity to appropriate test organisms.

b. Develop and/or update Illicit Discharge Detection and Elimination response procedures for source identification follow up investigations and elimination in the event of exceedance of dry weather non-storm water effluent analytical monitoring result criteria (see above). These procedures must be consistent with procedures required in section C, F.4.d, and F.4.e. of this Order.

3. COMMENCEMENT OF MS4 OUTFALL AND SOURCE IDENTIFICATION MONITORING

The Copermittees must commence implementation of dry weather effluent analytical monitoring under the requirements of this Order no later than **July 1, 2012**. If monitoring indicates an illicit connection or illegal discharge, the Copermittee(s) must conduct the follow-up investigation and elimination activities described in sections C, F.4.d and F.4.e of this Order. In the interim period until the dry weather non-storm water effluent analytical monitoring program of this Order is implemented, each Copermittee must continue to implement dry weather field screening and analytical monitoring as it was most recently implemented pursuant to Order No. 2004-001.

D. ~~**High Priority Inland Aquatic Habitat Monitoring**~~

Comment [CP21]: See discussion in Attachment 4 to the Comment Letter

The Copermittees must develop and submit for approval to the San Diego Water Board by April 01, 2012, an inland aquatic habitat monitoring program for areas supporting high priority aquatic and/or riparian species. The goal of the monitoring program is to assess if MS4 storm water and non-storm water discharges are affecting high priority inland aquatic habitat. The monitoring will assist the Copermittees in preventing the degradation of high quality waters within the jurisdiction of this Order that support high priority species by identifying discharges from MS4s which may cause or have the potential to cause impairment of beneficial uses within these areas.[1310] High priority species include those federally and/or state listed as endangered, threatened, or as a species of concern. The design and goal of the monitoring program must be consistent with the criteria listed in Section I.B of this Monitoring Program, including evaluation of the protection of high priority species in receiving waters. The Copermittees must implement the program unless otherwise directed in writing by the San Diego Water Board.

The monitoring program must include the following components:

1. OUTFALL AND RECEIVING WATER MONITORING

   The program must be designed to determine levels of pollutants in storm water and non-storm water effluent discharges from the MS4 discharged into high priority inland aquatic habitat(s) and the level of those pollutants found in ambient receiving waters subject to the discharge. The Copermittees must conduct the following field screening and analytical monitoring tasks:

   a. MS4 and Receiving Waters Monitoring Station Identification

      (1) MS4 Discharge Stations must be major outfalls that directly discharge into high priority inland aquatic habitat. MS4 Discharge Stations may be selected in conjunction with monitoring required under Section II.B and II.C of the Receiving Waters and MS4 Discharge Monitoring Program.

      (2) Receiving water station(s) must be located upstream and downstream of the discharge within the high priority inland aquatic habitat. Receiving water stations must be located to prevent any significant co-mingling of receiving water flows with

[10] [13]In accordance with requirements of State Water Resources Control Board Resolution No. 68-16, Statement of Policy with Respect to Maintaining High Quality Waters in California.

other sources.

b. Develop Analytical Monitoring Procedures

Each Copermittee must develop procedures for analytical monitoring (these procedures must be consistent with 40 CFR part 136), including field observations, pollutants to be monitored, analyses to be conducted, and quality assurance/control. At a minimum, the procedures must meet the following guidelines and criteria:

(1) Determining Sampling Frequency: The Copermittees must sample ~~a~~ representative ~~number of~~ major outfalls and receiving waters that are considered high priority inland aquatic habitat. Sampling of the discharge and receiving waters must be paired and occur during both storm and non-storm conditions.

(2) Sampling may be done utilizing grab samples, though composite samples are encouraged. ~~Sampling of storm and non-storm water discharges from the MS4 must be done in accordance with Section II.B and II.C.~~ If ponded discharge or receiving waters is/are observed at a monitoring station, the Copermittees must make written observations and collect at least one (1) grab sample. The Copermittee(s) must estimate the flow using techniques such as by measuring the width of water surface, approximate depth of water, and approximate flow velocity

(3) The proposed constituents for which samples will undergo analytical laboratory analysis.

(4) Procedures for recording applicable observations when monitoring stations are dry (i.e. no flowing water or ponded conditions).

3. ASSESSMENT OF MONITORING RESULTS

The program must include a discussion of monitoring results within the monitoring annual report. The discussion must include an evaluation of the contribution of MS4 discharges to ambient water conditions within high priority inland aquatic habitats, as well as any actions taken to prevent and/or reduce sources of those pollutants.

4. SOURCE IDENTIFICATION MONITORING

The Copermittees must collaborate to conduct source identification monitoring in accordance with Section II.B and II.C of the Monitoring and Reporting Program of this Order.

E. Special Studies

1. The Copermittees must conduct special studies, including any monitoring required for TMDL development and implementation, as directed by the San Diego Water Board.

2. Stormwater Monitoring Coalition Regional Monitoring of Southern California's Coastal Watersheds:

   The Copermittees must implement the monitoring program developed by the Bioassessment Workgroup of the Stormwater Monitoring Coalition, for Regional Monitoring of the Southern California's Coastal Watersheds within the San Juan Hydrologic Unit. Each Copermittee must evaluate the results of the monitoring program within and downstream of its jurisdiction and integrate the results into program assessments and modifications.

3. Low Impact Development Integrated Management Practices, testing and demonstration facility

   The Southern California Stormwater Monitoring Coalition (SMC) is conducting a study to measure the effectiveness of various LID BMPs. The Copermittees must participate in that study through implementation of their plan to construct an LID IMP Testing and Demonstration Facility at the District's headquarters. The project shall monitor effectiveness of the tested BMPs at pollutant reduction. The results of this study shall be summarized in the fourth year annual report and utilized in future revisions to the County's LID BMP manual.

~~2.~~4. ~~Sediment Toxicity Study~~

The Copermittees must develop and submit for approval to the San Diego Water Board by April 01, 2012, a special study workplan to investigate the toxicity of sediment in streams and potential impact on benthic macroinvertebrate IBI scores. The Sediment Toxicity Special Study must be implemented in conjunction with the Stream Assessment Monitoring in II.A.2.. The Copermittees must implement the special study unless otherwise directed in writing by the San Diego Water Board.

Comment [CP22]: See discussion in Attachment 4 to the Comment Letter

Comment [CP23]: See discussion in Attachment 4 to the Comment Letter

Comment [CP24]: Request remove **See discussion in Attachment 4 to the Comment Letter**

The Sediment Toxicity Special Study must include the following elements:

a. Sampling Locations: At ~~least 4~~the bioassessment locations identified pursuant to II.A.2. must be sampled, including 1 reference site and 1 mass loading site. Selection of sites must be done with consideration of subjectivity of receiving waters to discharges from residential and agricultural land uses.

b. Frequency: At a minimum, sampling must occur once per year at each site for at least 2 years. Sampling must be done in conjunction with the bioassessment sampling required under Section II.A.2 of the Monitoring and Reporting Program of this Order.

c. Parameters/Methods: At a minimum, sediment toxicity analysis must include the measurement of metals, pyrethroids and organochlorine pesticides. The analysis must include estimates of bioavailability based upon sediment grain size, organic carbon and receiving water temperature at the sampling site. Acute and chronic toxicity testing must be done using *Hyalella azteca* in accordance with Table 2.

d. Results: Results and a Discussion must be included in the Monitoring Annual Report (see III.A). The Discussion must include an assessment of the relationship between observed IBI scores under Section II.A.2 and all variables measured.

~~3.~~5. Trash and Litter Investigation

The Copermittees must develop and submit for approval to the San Diego Water Board by September 01, 2012, a special study workplan to assess trash (including litter) as a pollutant within receiving waters on a watershed based scale. Litter is defined in California Government Code 68055.1g as "…improperly discarded waste material, including, but not limited to, convenience food, beverage, and other product packages or container constructed of steel, aluminum, glass, paper, plastic and other natural and synthetic, materials, thrown or deposited on lands and waters of the state, but not including the properly discarded waste of the primary processing of agriculture, mining, logging, sawmilling, or manufacturing." A lead Copermittee must be selected for the Santa Margarita HU for the purposes of this Special Study. The Copermittees must implement the special study unless

otherwise directed in writing by the San Diego Water Board

The Trash and Litter Investigation must include the following elements:

a. Locations: The lead Copermittee must identify suitable sampling locations within the Santa Margarita HU.

b. Frequency: Trash at each location must be monitored a minimum of twice during the wet season following a qualified monitoring storm event (minimum of 0.1 inches preceded by 72 hours of dry weather) and twice during the dry season.

c. Protocol: The lead Copermittee for the watershed must use the "Final Monitoring Workplan for the Assessment of Trash in San Diego County Watersheds" and "A Rapid Trash Assessment Method Applied to Waters of the San Francisco Bay Region" to develop a monitoring protocol for the Santa Margarita HU.

d. Results and Discussion from the Trash and Litter Impairment Study must be included in the Monitoring Annual Report. The Results and Discussion must, at a minimum, include source identification, an evaluation of BMPs for trash reduction and prevention, and a description of any BMPs implemented in response to study results.

4.6. ~~Agricultural, Federal and Tribal Input Study~~

Comment [CP25]: Request remove
See discussion in Attachment 4 to the Comment Letter

The Copermittees must develop and submit for approval to the San Diego Water Board by September 01, 2012, a special study workplan to investigate the water quality of agricultural, federal and tribal runoff that is discharged into their MS4 (see Finding D.3.c of the Order). The Copermittees must implement the special study unless otherwise directed in writing by the San Diego Water Board.

The Agricultural, Federal and Tribal Input Special Study must include the following elements:

a. Locations: The Copermittees must identify a representative number of sampling stations within their MS4 that receive discharges of agricultural, federal, and tribal runoff that has not co-mingled with any other source. At least one station from each category must be identified.

b. Frequency: One storm event must be monitored at each sampling location each year for at least 2 years.

c. Parameters/Methods: At a minimum, analysis must include those constituents listed in Table 1 of the MRP (see II.A.1). Grab samples may be utilized, though composite samples are preferred. Copermittees must also measure or estimate flow rates and volumes of discharges into the MS4.

d. Results: Results and Discussion from the Agricultural, Federal and Tribal Input Study must be included in the Monitoring Annual Report.

~~5. MS4 and Receiving Water Maintenance Study~~

Comment [CP26]: Request remove
See discussion in Attachment 4 to the Comment Letter

The Copermittees must develop and submit for approval to the San Diego Water Board by April 01, 2012, a special study workplan to investigate receiving waters that are also considered part of the MS4 (see Finding D.3.c of the Order) and which are subject to continual vegetative clearance activities (e.g. mowing). The study must be designed to assess the effects of vegetation removal activities and water quality, including, but not limited to, modification of biogeochemical functions, in-stream temperatures, receiving water bed and bank erosion potential and sediment transport. The Copermittees must implement the special study unless otherwise directed in writing by the San Diego Water Board.

The MS4 and Receiving Water Maintenance Special Study must include the following elements:

~~a.~~e. Locations: The Copermittees must identify suitable sampling locations, including at least one reference system that is not subject to maintenance activities.

~~b.~~f. Parameters/Methods: At a minimum, the Copermittees must monitor pre and post maintenance activities for indicator bacteria, turbidity (NTU), temperature, dissolved oxygen and nutrients (Nitrite, Nitrate, Total Kjeldahl Nitrogen, Ammonia and Total Phosphorous). Copermittees must also measure or estimate flow rates and volumes.

~~c.~~g. Results and Discussion from the MS4 and Receiving Water Maintenance Study must be included in the Annual Monitoring Report. The Discussion must include relevance of findings to CWA

Section 303(d) listed impaired waters.

6.7. ~~Intermittent and Ephemeral Stream Perennial Conversion Study~~

Comment [CP27]: Request remove
See discussion in Attachment 4 to the Comment Letter

The Copermittees must develop and submit for approval to the San Diego Water Board by April 01, 2013, a special study workplan to investigate the extent of any impacts to beneficial uses from the conversion of historically ephemeral or intermittent receiving waters to perennially flowing waters due to the continued discharge of currently exempted non-storm water from the MS4 and/or discharges into MS4s covered under a separate NPDES permit into receiving waters. The goal of the study is to assess if any impacts to beneficial uses, including, but not limited to, WILD, WARM, COLD or RARE, have occurred due to continuous discharge of currently exempted non-storm water discharges, and if the discharges should no longer be exempt. The Copermittees must implement the special study unless otherwise directed in writing by the San Diego Water Board.

The Intermittent and Ephermeral Stream Perennial Conversion Special Study must include the following elements:

a. Locations: The Copermittees must investigate their MS4 and adjacent downstream receiving waters to identify portions that have historically been ephemeral or intermittent but currently exhibit perennial flow due to exempted non-storm water discharges. Investigation must include historic habitat assessments, USGS gauging information, and historic aerial photography. Sampling must occur at a minimum of 2 identified perennially converted locations. Should the Copermittees be unable to locate any converted waters, a full description of the investigation must be documented in the annual report.

b. Parameters/Methods: The Copermittees must conduct water quality monitoring of the non-storm water discharge in accordance with Section C of this Order. In addition, the Copermittees must select a minimum of 2 downstream sampling points within the receiving waters subject the discharge and conduct the following:

(1) Grab samples must be taken and analyzed for indicator bacteria, nutrients (Nitrite, Nitrate, Total Kjeldahl Nitrogen, Ammonia and Total Phosphorous), turbidity (NTU), temperature, dissolved oxygen, total hardness, pH and 303(d) listed pollutants for all receiving waters at or downstream of the sampling site. The Copermittees must measure or estimate flow

2. Monitoring Annual Report: The Principal Copermittee must submit the Receiving Waters and MS4 Discharge Monitoring Annual Report to the San Diego Water Board on October 1 of each year, beginning on **October 1, 2013**. Receiving Waters and MS4 Discharge Monitoring Annual Reports must cover the monitoring activities and results from the previous fiscal year, and must meet the following requirements:

Comment [CP28]: See discussion in Attachment 4 to the Comment Letter

   a. Annual monitoring reports must include the data/results, methods of evaluating the data, graphical summaries of the data, and an explanation/discussion of the data for each monitoring program component.

   b. Annual monitoring reports must include a watershed-based analysis of the findings of each monitoring program component (mass loading, bioassessment, etc…). Each watershed-based analysis must include:

      (1) Identification and prioritization of water quality problems within each watershed.
      (2) Identification and description of the nature and magnitude of potential sources of the water quality problems within each watershed.
      (3) Evaluation and presentation of pollutant load and concentration increases or decreases at each mass loading station over time.
      (4) Evaluation of pollutant loads and concentrations measured at mass loading stations with respect to land use, population, sources, and other characteristics of watersheds using tools such as multiple linear regression, factor analysis, and cluster analysis.
      (5) Identification of links between source activities/conditions and observed receiving water impacts.
      (6) Identification of recommended future monitoring to identify and address sources of water quality problems.
      (7) Results and discussion of any TIE conducted, together with actions that will be implemented to reduce the discharge of pollutants in storm water MS4 discharges, eliminate any discharge of pollutants in non-storm water MS4 discharges, and abate the sources causing the toxicity.

   c. Annual monitoring reports must include an analysis and interpretation of the data for each watershed with respect to the management questions listed in section I.B of this Receiving Waters Monitoring and Reporting Program.

d. Annual monitoring reports must include a discussion describing how each of the goals listed in section I.A of this MRP is addressed by the Copermittees' monitoring program for the monitoring year covered by the report.

e. ~~Annual~~ The 4th year monitoring report~~s~~ must include identification and analysis of any long-term trends in the Copermittees' MS4 storm water discharges or receiving water quality. Appropriate statistical methods shall be used to evaluate the water quality data. ~~Trend analysis must use nonparametric approaches, such as the Mann-Kendall test, including exogenous variables in a multiple regression model, and/or using a seasonal nonparametric trend model, where applicable.~~

f. ~~Annual monitoring reports must provide an estimation of total pollutant loads (wet weather loads plus dry weather loads) due to MS4 Discharge for each of the hydrologic subareas, including for 303(d) pollutants specified in Table 2 of the Order~~.

g. Annual monitoring reports must, for each monitoring program component listed above, include an assessment of compliance with applicable water quality standards.

h. Annual monitoring reports must describe monitoring station locations by latitude and longitude coordinates, frequency of sampling, quality assurance/quality control procedures, and sampling and analysis protocols.

i. Annual monitoring reports must use a standard report format and include the following elements:

(1) A stand alone comprehensive executive summary addressing all sections of the monitoring report;
(2) Comprehensive interpretations and conclusions; and
(3) Recommendations for future actions.

j. All monitoring reports submitted to the Principal Copermittee or the San Diego Water Board must contain the certified perjury statement described in Attachment B of this Order No. R9-2010-0016.

k. Annual monitoring reports must be reviewed prior to submittal to the San Diego Water Board by a committee of the Copermittees (consisting of no less than three different Copermittee members).

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Comment [CP29]: See discussion in Attachment 4 to the Comment Letter

Comment [CP30]: See discussion in Attachment 4 to the Comment Letter

l. Annual monitoring reports must be submitted in both electronic and paper formats. Electronic formats must be CEDEN or SWAMP-uploadable.[1411]

3. Monitoring programs and reports must comply with section II.F of Receiving Waters and MS4 Discharge Monitoring and Reporting Program No. R9-2010-0016 and Attachment B of this Order.

4. Following completion of an annual cycle of monitoring in October, the Copermittees must make the monitoring data and results available to the San Diego Water Board at the San Diego Water Board's request.

B. Interim Reporting Requirements

Prior to July 1, 2012 ~~For the October 2010 to October 2012 monitoring period,~~ the Principal Copermittee must submit the Receiving Waters Monitoring Annual Report as required under Order No. 2004-0001. The Receiving Waters Monitoring Annual Report must address the monitoring conducted to comply with the requirements of Order No. 2004-0001.

Comment [CP31]: The existing monitoring program is reported on a fiscal year basis. Need to align the monitoring report with the fiscal year and the JRMP annual report.

Also consistent with the change requested in III.A.2.

C. Reporting Dates

Table 5. Table of Required MRP Reporting Dates and Frequencies.

Comment [CP32]: See discussion in Attachment 4 to the Comment Letter related to the special studies changes.

Submittal	Section	Completion Date	Frequency
Description of Proposed Monitoring Program	III.A.1	June 1, 2012	One Time
Receiving Waters and MS4 Discharge Monitoring Annual Reports, Including Proposed Updates to the Monitoring Program	III.A.2	Starting October 1, 2013	Annual
Copermittees submit Interim Monitoring Program Annual Report	III.B	As required under Order No. 2004-001	One Time
Draft Wet Weather MS4 Discharge Monitoring Program	II.B	July 01, 2012	One Time
~~Draft High Priority Inland Aquatic Habitat Monitoring~~	~~II.D~~	~~April 01, 2012~~	~~One Time~~
~~Draft Sediment Toxicity Special Study~~	~~II.E.2~~	~~April 01, 2012~~	~~One Time~~
Draft Trash and Litter Impairment Special Study	II.E.3	September 01, 2012	One Time

[11] [14] For updates to the SWAMP templates and formats, see http://www.waterboards.ca.gov/swamp.

Submittal	Section	Completion Date	Frequency
~~Draft Agricultural, Federal and Tribal Input Study~~	~~II.E.4~~	~~September 01, 2012~~	~~One Time~~
~~Draft MS4 and Receiving Water Maintenance Study~~	~~II.E.5~~	~~April 01, 2012~~	~~One Time~~
~~Draft Intermittent and Ephemeral Stream Perennial Conversion Study~~	~~II.E.6~~	~~April 01, 2013~~	~~One Time~~

Attachment 10: Fact Sheet Comments

Introduction

These comments on the Fact Sheet should be read in conjunction with the other white papers submitted as part of the comments on the Tentative Order.

Fact Sheet Text, Page 7:

> "The First and Second Term Permits, Order Nos. 90-46 and 98-02, provided maximum flexibility**.** San Diego Water Board Order No. 90-46 contained the "essentials" of the 1990 regulations, but the requirements were written in very broad, generic terms. This was done in order to provide the maximum amount of flexibility to the Copermittees in implementing the new requirements (flexibility was, in fact, the stated reason for issuing the permit in advance of the final regulations). From staff's perspective however, "flexibility" in the form of lack of specificity, combined with the Copermittees' *lack of funding and political will,* also provided the Copermittees with ample reasons to take few substantive steps towards achieving water quality standards. The situation was exacerbated by the San Diego Water Board's own lack of storm water resources for oversight."

<u>Problem with Text</u>:
The statement regarding a 'lack of funding and political will' is unsupported and inflammatory, and provides no benefit in a public document.

<u>Suggestion:</u>
Delete this statement.

Fact Sheet Text, Page 12 and 13:

> "It is very difficult to ascertain the true cost of implementation of the Copermittees' management programs because of inconsistencies in reporting by the Copermittees. Reported costs of compliance for the same program element can vary widely from city to city, often by a very wide margin that is not easily explained.[6] Despite these problems, efforts have been made to identify management program costs, which can be helpful in understanding the costs of program implementation….
>
> A study on Phase I MS4 program cost was also conducted by the California Regional Water Quality Control Board, Los Angeles Region (Los Angeles Water Board), where program costs reported in the municipalities' annual reports were assessed. The Los Angeles Water Board estimated that average per household cost to implement the MS4 program in Los Angeles County was $12.50. 8 Since the Los Angeles County permit is very similar to Order No. R9-2004-001, this estimate is also useful in assessing general program costs in Riverside County.
>
> The State Water Board also commissioned a study by the California State University, Sacramento to assess costs of the Phase I MS4 program. This study includes an assessment of costs incurred by Phase I MS4s throughout the State to implement their programs. Annual cost per household in the study ranged from $18-46, with the Fresno-Clovis Metropolitan Area (FCMA) representing the lower end of the range, and the City of Encinitas (in San Diego County) representing the upper end of the range.9 Included in the study is the City of Corona, which is in Riverside County

> under the jurisdiction of the California Regional Water Quality Control Board, Santa Ana Region (Santa Ana Water Board).
>
> The annual cost per household for the City of Corona's program was estimated to be $32, which should be similar to the costs to implement the MS4 programs in the Riverside County portion of the San Diego Region. In contrast, the cost of the City of Encinitas' program, with an annual cost per household estimated to be $46, may represent the upper range of Riverside County MS4 programs. However, the City of Encinitas's program cost can be considered as the high end of the spectrum for management program costs because the City has a consent decree with environmental groups regarding its program, and City of Encinitas has received recognition for implementing a superior program.
>
> The annual costs for the City of Corona and City of Encinitas were estimated from data collected in 2003-2004. Between 2003 and 2008, the number of households in both cities has increased by approximately 3 percent and 7 percent, respectively.10 In contrast, between 2003 and 2008 the number of households in the City of Temecula has increased from 23,199 to 31,135 (34 percent)11 and the City of Murrieta has increased from 22,020 to 32,664 (48 percent).12 This significant increase in number of households indicates a significant increase in the tax base (sales and property tax) available to fund the implementation of the MS4 programs for the City of Temecula and City of Murrieta, as well as for the County of Riverside and recently incorporated cities."

<u>Problem with Text:</u>
The text notes that it is difficult to compare costs between Cities for stormwater program implementation since the cost accounting varies widely, and the specific issues also vary widely. Despite this fact, the fact sheet goes on to make just such comparisons and further implies that the Santa Margarita Region Cities are underfunding their programs by comparison. For example, the City of Encinitas is cited as an example of a city that is spending on the upper end for a stormwater program. The City of Encinitas varies significantly from the cities in the Santa Margarita area in that it must address a major outfall (Cottonwood Creek) at its primary beach (Moonlight Beach). Cottonwood Creek has perennial dry weather flow from urban sources and exceeds REC-1 and REC-2 water quality standards. Since Cottonwood Creek discharges at Moonlight Beach, frequent sanitary standard exceedences were noted on a year–round basis. The City of Encinitas constructed a dry weather flow treatment plant near Moonlight Beach to treat Cottonwood Creek to correct this problem. No such compliance problems exist for the Copermittees. The comparisons in this part of the fact sheet are not valid.

In addition, the Fact Sheet leaves the inaccurate impression that the Copermittees have ample financial resources to fund MS4 programs by completely ignoring the effects of the current national recession. (See Attachment 2). As pointed out in Attachment 2 (Economic Assessment), declines in home values and tax receipts have crippled the ability of the Copermittees to finance such programs. The Fact Sheet selectively examines the period 2003-2008, when there was significant growth, but ignores the period 2008-2010, when that growth ended and the economy declined precipitously, affecting property and sale tax receipts as well as other sources of revenue.

Attachment 10: Fact Sheet Comments

Suggestion:
Delete the text on Page 13 and 14 of the Fact Sheet.

Fact Sheet Text Page 15:

> "The vast majority of costs that will be incurred as a result of implementing OrderNo. R9-2010-0016 is not new. Storm water management programs have been in place in Riverside County for over 15 years. As shown in the discussion above, the amount spent for MS4 Permit compliance per household in the municipalities in the Riverside County portion of the San Diego Region is already low compared to other regions. Any increase in cost to the Copermittees, however, is still expected to be incremental in nature. Since Order No. R9-2010-0016 "fine tunes" the requirements of Order No. R9-2004-001, these cost increases are expected to be modest.
>
> Where there may be additional elements that will incur new costs, the Riverside County Copermittees are given the time to develop the budgets and funding mechanisms to phase those elements into their programs. Additionally, development of these additional elements by the Riverside County Copermittees will have the benefit of the experiences and work already done by the San Diego County and Orange County Copermittees."

Problem with Text:
The Fact Sheet states that the vast majority of costs for implementing the Tentative Order are 'not new'. This is not correct. Almost every program in the Tentative Order has been amended and require new resources. Specific programs include, but are not limited to, the monitoring program (over fivefold increase in costs), hydromodification management programs, new development programs, inspection programs, irrigation runoff prohibitions, retrofit studies and MS4 maintenance programs. The very prescriptive and detailed requirements of the Tentative Order impose new requirements on the Copermittees at a time when funding sources are drying up. The Copermittees estimate that implementation of the regional components of the new Order (as written) will cost approximately $11,500,000 (e.g. the costs to write the new compliance documents, develop the retrofit, hydromodification programs and develop and implement the new monitoring program). These costs are on top of the current expenditures to implement the existing regional monitoring program (approximately $5,000,000 for the five-year permit term). These costs are further amplified by the direct cost of implementation that will be incurred by the individual Permittees (e.g. the cost to implement the new compliance documents and hydromodification programs). The text further indicates that the Tentative Order provides time for the Permittees to 'develop…funding mechanisms'. This statement assumes that the Copermittees have the ability to collect additional funds from taxpayers to support the stormwater program implementation. This is false, since any such funds, outside of inspection or plan review fees, would be required to be submitted to a vote of the people pursuant to Propostion 218. In the current economic and political climate, a successful vote to increase taxes is extremely remote. The Copermittees further note that in the City of Encinitas in Orange County, cited by the staff as an example of proactive MS4 regulation, a minimal stormwater proposition recently was voted down.

Suggestion:
Delete the text noted above in the Fact Sheet and add a discussion on the difficulties of funding expansions to the Copermittees' stormwater programs due to Proposition 218.

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Fact Sheet Text Page 16:

> "For example, household willingness to pay for improvements in fresh water quality for fishing and boating has been estimated by USEPA to be $158-210.18. This estimate can be considered conservative, since it does not include important considerations such as marine waters benefits, wildlife benefits, or flood control benefits. The California State University, Sacramento study reports that the annual household willingness to pay for statewide clean water is approximately $180.19. When viewed in comparison to household costs for existing management programs, household willingness to pay estimates exhibit that per household costs incurred by the Riverside County Copermittees to implement their management programs are very low."

Problem with Text:

The discussion in the referenced text is not represented correctly. The figure cited in the California State University, Sacramento study includes the cost of wastewater treatment. The author of the study notes:

'The survey question was for restoring water quality for all waters throughout the state from all impairment, not just within a city or region and not just for impairment from stormwater pollution.' The current cost for sewer fees exceed $200 per year, Thus, the vast majority of the "household willingness" figure relates to sanitary sewer costs, and not to the costs of addressing stormwater.

Suggestion:

Delete this text in the fact sheet and note that the cost consumers are currently paying for clean water in the Permit area exceeds that which studies cited have found they are willing to pay.

Fact Sheet Text Page 17:

> "University of California, Los Angeles assessed the costs and benefits of implementing various approaches for achieving compliance with the MS4 permits in the Los Angeles Region. The study found that non-structural systems would cost $2.8 billion but provide $5.6 billion in benefit. If structural systems were determined to be needed, the study found that total costs would be $5.7 to $7.4 billion, while benefits could reach $18 billion.[21] Costs are anticipated to be borne over many years – probably ten years at least. As can be seen, the benefits of the programs are expected to considerably exceed their costs. Such findings are corroborated by USEPA, which found that the benefits of implementation of its Phase II storm water rule would also outweigh the costs."

Problem with Text:

It is a basic principle that public spending should have a positive cost-benefit. The Fact Sheet implies that since spending on stormwater has a positive cost-benefit, such spending should be increased. The reality is that there are also other public spending priorities such as police, fire, ambulance, and public utilities competing for the same funding, all of which have positive cost-benefit ratios. Moreover, the UCLA study specifically focused on the benefit of improving beach water quality, which is a very significant economic factor in terms of tourism in coastal Los Angeles County. No beaches exist in the Santa Margarita Region, and given the ephemeral nature of many of the Region's waterways, attempting to extrapolate the UCLA study is not appropriate. In the absence of a similar cost-benefit study being undertaken in the Santa Margarita Region, the studies cited by staff do not provide any basis for the conclusions reached in the Fact Sheet.

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Suggestion:
As the fundamental basis for this comment is flawed, in the absence of any local data for inland waterbodies in semi-arid climates, the text should be deleted.

Fact Sheet Text Page 35:

> "Trash, as litter in both solid and liquid form, is consistently found on and adjacent to roadways. A California Department of Transportation Litter Management Pilot Study found that of roadway trash, plastics and Styrofoam accounted for 33 percent of trash by weight, and 43 percent by volume. Further, the study found that approximately 80 percent of the litter associated with roadways was floatable, indicating that, without capture, this litter would enter Waters of the State after a storm event, resulting in the impairment of Beneficial Uses.[45] The study, however, relied upon a mesh capture size of 0.25 inches (6.35 millimeters). This size is too large to effectively capture plastic pre-production pellets (a.k.a. "nurdles"), which are roughly 3 mm in size, and likely underestimated the total contribution of plastics. Furthermore, pre-production plastic pellets, which are small enough to be easily digested, have been found to carry persistent organic pollutants, including PCBs and DDT."

Problem with Text:
While the Fact Sheet suggests that there is a compelling argument to address trash along Caltrans highways, such a problem is not found on municipal streets. The Caltrans studies found that a substantial portion of the litter load comes from uncovered loads on commercial and private vehicles. The low speed roadways operated by the Copermittees do not create similar conditions or handle similar traffic. Further, the text discusses pre-production plastics (nurdles), yet fails to acknowledge that there are no industries within the Copermittees' jurisdiction that manufacture or use this material. The Fact Sheet's citation of studies that have no bearing on actual conditions within the Santa Margarita Region cannot be used to justify programs in the Tentative Order addressing such non-existent conditions. The ROWD has a more informed discussion of trash issues based on actual conditions in the Santa Margarita Region.

Suggestion:
Revise the fact sheet text to discuss the current findings relative to trash in the Permit region based on the ROWD.

Fact Sheet Text Page 50 and 51

> Pg. 50 - "To date the San Diego Water Board and the Copermittees have identified overspray and drainage from potable and reclaimed water landscape irrigation as a substantial source and conveyance mechanism for pollutants into waters of the United States."
>
> Pg. 51 – "The San Diego Water Board and the Copermittees have identified irrigation water as a source of pollutants and conveyance of pollutants to waters of the United States, when applied improperly in excess and thereafter entering the MS4, in the following documents:"

Problem with Text:
The documents cited in the Fact Sheet do not support the conclusion that irrigation water is a source of pollutants or conveyance of pollutants in the *Santa Margarita Region*. First, the comments in the public education document cited in the Fact Sheet were borrowed from an Orange County publication, and do not represent any official conclusion by the Copermittees that irrigation water represents a water quality

threat. Plainly over-irrigation is to be discouraged, as even if the water is clean, it adds to the Copermittees' costs of addressing such waters. Second, this public education document is the *only* document from a Santa Margarita Region source. The other documents cited by staff are studies conducted in other areas, with different hydrology and climate. For a more comprehensive assessment of the irrigation runoff issues, please see Attachment 6 (Prohibition of Irrigation Runoff).

Suggestion:
Delete the referenced text and the quotes referencing Permittee education materials. Also remove the improperly supported irrigation runoff prohibition.

Revise the text to accurately reflect the lack of any connection between irrigation runoff and impairments of receiving waters in the Santa Margarita Region.

Fact Sheet Text Page 58:

> "Enforcement and inspection activities conducted by the San Diego Water Board during the previous permit term have found a lack of source control for many unpaved roads within the jurisdiction of the Copermittees."

Problem with Text:
The Copermittees submit that there is no evidence reflecting any substantial water quality problem relating to MS4 discharges affected by unpaved roads. Moreover, the mileage of unpaved roads in the jurisdiction of the Copermittees is a small percentage of the total mileage of unpaved roads in the Santa Margarita Region, given that many of these roads are operated by such jurisdictions as the U.S. Forest Service. Please see Attachment 5 (Unpaved Roads). Further, the Fact Sheet notes on page 27 that Permits "will cover municipal systems discharges in unincorporated portions of the county, it is the intent of EPA that management plans and other components of the program focus on the urbanized and developing area of the County". Dedicating resources to unpaved roads diverts already limited resources from the urbanized areas intended to be addressed by USEPA regulations.

Suggestion:
The references and associated program requirements should be removed from the Permit and addressed through a separate general permit for unpaved roads, if in fact unpaved roads are a significant source of pollutants.

Fact Sheet Text Page 69:

> "The order also found that the SSMP requirements are appropriately applied to the majority of the Priority Development Project categories that are also contained in section F.1 of this Order. The State Water Board also gave California Regional Water Quality Control Boards (Regional Water Boards) the needed discretion to include additional categories and locations, such as retail gasoline outlets(RGOs), in SSMPs "
>
> "The provisions of the SSMP section of the Order are also consistent with those previously issued by the San Diego Water Board for Riverside County (Order No. R9-2004-001), Southern Orange County (Order Nos. R9-2002-0001 and R9-2009-0002) and San Diego County."

Attachment 10: Fact Sheet Comments

Problem with Text:
Several PDP categories or thresholds are not supported by Order WQ 2000-11 such as the 10,000 square feet requirement for residential areas nor the 1-acre threshold for all development projects. Further the Order ignores other applicable portions of Order WQ 2000-11. Specifically, the memo from State Board Chief Counsel Craig S. Wilson transmitted WQ Order 2000-11 to the Regional Board executive officers states that with regard to discretion that:

> "3. The Order allows broader discretion by the Regional Water Boards to decide whether to include additional types of development in future SUSMPs. These areas for potential future inclusion in SUSMPs include retail gasoline outlets, ministerial projects (only discretionary projects are included in the approved SUSMPs), and projects in environmentally sensitive areas. **If Boards include these types of developments in future permits, the Order explains the types of evidence and findings that are necessary."**

Order 2000-11 requires that revisions to regulatory thresholds be justified economically. The Copermittees have expressed their concern with requirement F.1.d.(2)(a) regulating residential developments of 10,000 sq. ft. or more and requirement F.1.d.(1)(c) regulating any project 1-acre or more. These thresholds, and their relative impact on project proponents, have not been adequately justified. The Permittees have noted that these regulations will negatively impact the construction of custom homes (individual lot developments). The relative economic impact of meeting the SSMP requirements for individual homeowners has not been justified in the fact sheet.

Suggestion:
As shown in the redline markup (Attachment 9); The 1-acre SSMP threshold (F.1.d.(1)(c)) should be deleted and the 10,000 square feet threshold for residential areas (F.1.d.(2)(a)) should be made the same as the requirement contained in the Riverside County Santa Ana NPDES MS4 Permit.

Fact Sheet Text Page76:

> "The success of future stream restoration and stabilization is, however, dependent on preventing and reducing physical impacts from activities upstream. Therefore, hydromodification management measures are necessary upstream of modified (e.g. concrete, rip rap, etc.) channels in addition to non-modified channels."

Problem with Text:
In some areas, hardened channels may be needed for flood control and public safety. In those areas, channel restoration may not be feasible and onsite controls are not warranted. The protection of public safety from flooding is a statutorily required duty of the District. See Water Code App. Section 48-9. Any provisions of the Tentative Order that would presume to challenge this duty must be deleted. The District assumes that the Regional Board and staff are not placing themselves in the position of making flood control judgments, as the agency is neither charged by the Legislature with such obligation nor is the agency equipped to do so.

Suggestion:
Revise the text to add "except where hardened channels are required for the protection of public safety"

Attachment 10: Fact Sheet Comments

Fact Sheet Text Page 77:

> "Since municipalities are the lead permitting authority for industrial land use and construction activities, they are also the lead for enforcement regarding runoff discharges from these sites."

Problem with Text:
This is a leap of logic we should probably not let pass. The Copermittees can greatly influence the design and construction, but the Industrial Permit is focused on the operation of the facility, and that is where the authority of the Board lies - and is arguably the most important aspect of runoff quality from the site.

Suggestion:
Delete the sentence.

Fact Sheet Text Page 79:

> "To clarify, an unaltered natural drainage, which receives runoff from a point source (channeled by a Copermittee to drain an area within their jurisdiction), which then conveys the runoff to an altered natural drainage or a man-made MS4, is both an MS4 and a receiving water."

Problem with Text:
As noted in Attachment 7 (General Legal Comments) regarding Finding D.3.c., a natural drainage, whether or not it conveys point source runoff to a man-made MS4, is not itself part of the MS4.

Suggestion:
Delete text.

Fact Sheet Text Page 79:

> "As operators of the MS4s, the Copermittees cannot passively receive and discharge pollutants from third parties. By providing free and open access to an MS4 that conveys discharges to waters of the U.S., the operator essentially accepts responsibility for discharges into the MS4 that it does not prohibit or otherwise control. These discharges may cause or contribute to a condition of contamination or a violation of water quality standards."

Problem with Text:
First, the Copermittees, as operators of the MS4, are required to address storm drainage. During storm conditions in particular, the District is required to handle flood waters so as to protect the lives and property of residents of Riverside County. The failure to do so is a violation of state law. See Water Code App. Section 48-9. Thus, the Copermittees must "passively receive and discharge" waters from third parties, which waters may contain pollutants. Moreover, the operator of the MS4 is NOT accepting responsibility for discharges from other MS4 systems. There is no provision for joint liability under the federal Clean Water Act or the California Water Code. The former directs its prohibitions against a "discharger," and no others. 33 U.S.C. §§ 1319 and 1342. A party is responsible only for its own discharges or those over which it has control. *Jones v. E.R. Snell Contractor, Inc.*, 333 F.Supp.2d 1344, 1348 (N.D. Ga. 2004); *United States v. Sargent County Water Dist.*, 876 F.Supp. 1081, 1088 (D.N.D. 1992).

The Clean Water Act MS4 regulations, moreover, specifically provide that Copermittees under an MS4 Permit are required to "comply with permit conditions relating to discharges from the municipal separate storm sewers for which they are operators." 40 C.F.R. § 122.26(a)(3)(vi) (emphasis supplied). Moreover,

the Regional Board, as the permitting agency for stormwater and Industrial Permits, and the State Board as the overall agency responsible for compliance with the Clean Water Act in California, are responsible for ensuring that the discharges from such permitted facilities, whether or not they enter the MS4, are in compliance with the requirements of those permits. Finally, many sources of pollutants are beyond the control of the MS4 operators but are within the control of other agencies, if those agencies elect to exercise their authority. A major example is the discharge of metals from motor vehicle brake pads, which contributes to exceedances of copper, zinc and potentially other metals in stormwater. The MS4 operators cannot control the composition of brake pads, nor can the MS4 operators control air emissions from domestic and foreign sources that discharge pollutants onto the surface area of the region, which can then wash into the MS4 systems.

Suggestion:
Delete cited text.

Fact Sheet Text Page 81:

> "Since treatment generally does not occur within the MS4, in such cases reduction of storm water pollutants to the MEP must occur prior to discharges entering the MS4."

Problem with Text:
Nothing in the MS4 regulations prohibits use of the MS4 for treatment. Frankly, some of the most effective treatment facilities for pollutants may be located in the MS4 as part of regional treatment systems. An example are catch basins, which collect trash and other debris and detention and retention basins that can be used to capture, treat and infiltrate runoff.

Suggestion:
Delete cited text.

Fact Sheet Text Page 84:

> "When appropriately applied as in this Order, retrofitting existing development meets MEP."

Problem with Text:
Only retrofits that are applied with the requirements of the Order meet MEP, which is not the case.

Suggestion:
Delete the text.

Fact Sheet Text Page 88:

> "The RWL language in the Order requires storm water compliance with water quality standards through an iterative approach for implementing improved and better-tailored BMPs over time. The iterative BMP process requires the implementation of increasingly stringent BMPs until receiving water quality standards are achieved. This is necessary because implementation of BMPs alone cannot ensure attainment of receiving water quality standards."

Problem with Text:
61 Federal Register 57425 (1996), Interim Permitting Approach for Water Quality-Based Effluent Limitations in Storm Water Permits states "expanded or better-tailored BMPs in subsequent permits, where necessary, to provide for the attainment of water quality standards."

Attachment 10: Fact Sheet Comments

Suggestion:
The second sentence should be revised to reflect the actual text from federal regulations (specifically "in subsequent permits"). Further the last sentence does not make sense and is contrary to the proceeding text and should be deleted.

Fact Sheet Text Page 112:

> "The San Diego Water Board has responded to complaints about and observed runoff from over-irrigation entering the MS4s in the Riverside County portion of the San Diego Region."

Problem with Text:
There is no evidence in the fact sheet supporting this statement.

Suggestion:
Provide evidence or delete statement.

Fact Sheet Text Page 130:

> "This section requires the use of native and/or low water use plants for landscaping."

Problem with Text:
There was an agreement that this would be suggested but not a requirement. This requirement also mandates the means of compliance, in violation of Water Code section 13360.

Suggestion:
Change the text:

> "Section ~~requires~~ suggests the use of native and/or low water use plants for landscaping,"

Fact Sheet Text Page 136:

> "This requirement is needed because to date, the Copermittees have generally approved low removal efficiency treatment control BMPs without justification or evidence that use of higher efficiency treatment BMPs was considered and found to be infeasible."

Problem with Text:
The Copermittees challenge the accuracy of this Statement. Riverside County has been requiring landscaped based low impact development BMPs since 2005. The District has also spent a substantial sum of money and time developing BMP manuals with specific criteria to ensure the effectiveness of BMPs.

Suggestion:
Delete the unsupported and offensive statement.

Fact Sheet Text Page 142:

> "Where streams are hardened and/or buried to convey storm water, they cannot provide adequate water quality."

Problem with Text:
Unsupported and incorrect. Hardened channels can be designed to provide both flood protection and natural stream function. For example, hardened levees can be designed to be set back and backfilled with native material, effectively providing a natural substrate for stream function. Similarly, porous channel materials such as gabions can provide both flood protection and substrate for native habitat. Finally,

even underground systems can be connected to regional treatment systems that provide requisite water quality benefits where appropriate.

Suggestion:
Delete.

Fact Sheet Text Page 145:

> "Redevelopment projects, however, must be able to achieve post-project runoff flow rates and durations that are less than or equal to pre-project and down to pre-development runoff flow rates and durations to be eligible to receive a waiver under the program."

Problem with Text:
This requirement is self-defeating. By placing regulatory obligations on redevelopments that make the cost of redevelopment greater than the cost of developing on virgin land, the Permit effectively promotes inner-city blight as existing structures are abandoned and suburban development is promoted due to economic factors. The Permit should include accommodations for redevelopment to ensure that existing developed areas are economically preferable for new development and to prevent the onset of unnecessary additional impervious area.

Suggestion:
The Permit and fact sheet should be revised to offer exemptions for hydromodification requirements for redevelopments where such improvements are infeasible.

Fact Sheet Text Page 160:

> "Retrofitting existing development is practicable for a municipality through a systematic evaluation, prioritization and implementation plan focused on impaired water bodies, pollutants of concern, areas of downstream."

Problem with Text:
Although the current requirement simply calls for a study, it is expected that future permits will require implementation of said study. This study exceeds the requirements for Copermittees to evaluate opportunities for retrofit of the MS4 contained in the federal regulations and federal Clean Water Act. There are no revenues to promote such a program.

Suggestion:
The Board should recognize in the fact sheet that without funding provided by the state, there is no revenue for such a program.

Fact Sheet Text Page 161:

> **"Section F.3.d.(4)** requires each Copermittee to cooperate with private property owners to encourage the implementation of site specific retrofitting projects. Because the Copermittees have limited authority to directly require retrofitting projects on private property, the Copermittees must encourage private property owners to implement retrofitting projects through indirect programs and incentives."

Problem with Text:
If the Board wishes to promote urban retrofit, then they also need to incentivize the program. Currently, property owners wishing to volunteer for urban retrofit projects are required to comply with the SSMP,

including hydromodification and LID requirements, opt into BMP inspection programs and subject themselves to ongoing scrutiny through business inspection programs required by the Permit. The permit places an ECONOMIC DISINCENTIVE in the way of promoting a general good for the watershed. The purpose of this requirement is to promote acceleration of water quality benefits from existing urban areas. The requirements, as written, promote a program that is doomed to failure.

Suggestion:
The Board should clearly exempt urban retrofit projects from the new development requirements of the Permit if they wish to accelerate water quality improvements from existing urban areas.

Fact Sheet Text Page 162:

> "Periodic inspections may be performed to ensure the site owner has not removed the retrofit BMPs."

Problem with Text:
Similar to the prior comment, this creates a disincentive to retrofit BMPs.

Suggestion:
Delete.

Fact Sheet Text Page 163:

> **"Section F.4.b** …access points (i.e. manholes), connections…"

Problem with Text:
The text from the Phase I rule implementing the NPDES regulations and the requirement of the storm drain system map is:

(from Federal Register, Vol 55, No 222, Friday Nov 18, 1990):

> "[submit] a USGS 7.5 minute topographic map...[showing] The location of known municipal storm sewer system outfalls discharging to waters of the United States...the location of major structural controls for storm water discharge (retention basins etc) and the identification of publicly owned parks, recreation areas and other open lands."

The proposed requirements exceed the federal regulatory requirements for MS4 mapping. Further, the mapping of manholes is a significant economic burden that would have no benefit for our staff. Manholes are typically placed at regular intervals (300 – 500 feet) on underground storm drain systems. Once a map providing the location of the MS4 system is available, manholes are quickly located through visual inspection in the field. Further, storm drain plans that are available to Permittee staff can be used to locate specific manholes where absolutely necessary. The economic costs of mapping potentially thousands of manholes is not offset by any known benefit.

Suggestion:
Delete requirement to map manholes.

Attachment 10: Fact Sheet Comments

Fact Sheet Text Page 198:

> "**Section II.D** (High Priority Inland Aquatic Habitat) of the MRP describes required monitoring to be done in order to assess if MS4 storm water and/or non-storm water discharges are affecting high priority aquatic and/or riparian species."

Problem with Text:
This requirement was deleted from the Orange County NPDES MS4 Permit when the provision to assess outfalls using NALs and SALs was added. It is not clear why such an accommodation would not also be provided to the Riverside County NPDES MS4 Program. This region has significantly less economic resources than south Orange County or San Diego County to implement monitoring programs. The Permittees specifically request this be deleted as impacts to aquatic habitat will be detected through the NAL/SAL program.

Suggestion:
This requirement should be deleted.

NOTICE OF PUBLIC MEETING

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN DIEGO REGION

TENTATIVE ORDER R9-2010-0016
Riverside County Municipal Storm Water Permit

The California Regional Water Quality Control Board, San Diego Region (San Diego Water Board) hereby notifies the public of its intent to consider adoption of Tentative Order No. R9-2010-0016, the Riverside County Municipal Storm Water Permit, at a public meeting scheduled for the following time and location[1]:

October 13, 2010 at 9:00 am
Rancho California Water District
District Board Room
42135 Winchester Road
Temecula, California

Tentative Order No. R9-2010-0016 (Tentative Order) will replace the current Riverside County Municipal Storm Water Permit, R9-2004-0001. The Tentative Order regulates the discharge of storm water pollutants from the municipal separate storm sewer system. Additional information may be found on the San Diego Water Board website at: http://www.waterboards.ca.gov/sandiego. As indicated in the July 23, 2010 Notice of Written Comment Period, written comments on the Tentative Order received by 5 p.m. on September 7, 2010, will be provided to the San Diego Water Board members for their consideration prior to the public hearing. Written comments received after the deadline will not be accepted and will not be incorporated into the administrative record if doing so would jeopardize any party. Interested persons are invited to attend the public hearing to provide oral comments on the Tentative Order. Written comments will not be accepted at the public hearing, but can be orally summarized.

Please contact Mr. Ben Neill at (858) 467-2952 or via e-mail at bneill@waterboards.ca.gov for information regarding the meeting or Tentative Order No. R9-2010-0016.

All documents, comments received, and other information related to the above-mentioned item are on file and may be reviewed at the San Diego Water Board office, 9174 Sky Park Court, Suite 100, San Diego, CA 92123, telephone (858) 467-2952, FAX (858) 571-6972. Review of information and files may be conducted Monday through Friday from 8 am to 5 pm. To insure that space is available we suggest that you contact our office to schedule an appointment. Or send an e-mail to File_Review@waterboards.ca.gov. Please bring the foregoing to the attention of any person known to you who would be interested in these matters.

DAVID W. GIBSON
Executive Officer

[1] If it is necessary to modify the meeting date or location, a further public notice will be issued.

0007174

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(2010 & 2011 C.C.P.)

STATE OF CALIFORNIA
County of San Diego

I am a citizen of the United States and a resident of the County aforesaid: I am over the age of eighteen years and not a party to or interested in the above-entitled matter. I am the principal clerk of the printer of

North County Times

Formerly known as the Blade-Citizen and The Times-Advocate and which newspapers have been adjudicated newspapers of general circulation by the Superior Court of the County of San Diego, State of California, for the City of Oceanside and the City of Escondido, Court Decree number 171349, for the County of San Diego, that the notice of which the annexed is a printed copy (set in type not smaller than nonpariel), has been published in each regular and entire issue of said newspaper and not in any supplement thereof on the following dates, to-wit:

September 09th, 2010

I certify (or declare) under penalty of perjury that the foregoing is true and correct.

Dated at **Escondido,** California

This 09th, day of September, 2010

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NORTH COUNTY TIMES
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NOTICE OF PUBLIC MEETING

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD - SAN DIEGO REGION

TENTATIVE ORDER R9-2010-0016
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DAVID W. GIBSON
Executive Officer

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NORTH COUNTY TIMES 2269888

0007175

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(2015.5 C.C.P.)

State of California)
County of ORANGE) ss

Notice Type: HRG - NOTICE OF HEARING

Ad Description: Riverside MS4 hearing

I am a citizen of the United States and a resident of the State of California; I am over the age of eighteen years, and not a party to or interested in the above entitled matter. I am the principal clerk of the printer and publisher of the THE REGISTER, a newspaper published in the English language in the city of SANTA ANA, county of ORANGE, and adjudged a newspaper of general circulation as defined by the laws of the State of California by the Superior Court of the County of ORANGE, State of California, under date 11/19/1905, Case No. A21046. That the notice, of which the annexed is a printed copy, has been published in each regular and entire issue of said newspaper and not in any supplement thereof on the following dates, to-wit:

09/10/2010

Executed on: 09/10/2010
At SANTA ANA, California

I certify (or declare) under penalty of perjury that the foregoing is true and correct.

Julie Trammell
Signature

* A 0 0 0 0 0 1 8 3 3 8 0 3 *

CNS#: 1940377

NOTICE OF PUBLIC MEETING

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD - SAN DIEGO REGION

TENTATIVE ORDER R9-2010-0016 Riverside County Municipal Storm Water Permit

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DAVID W. GIBSON
Executive Officer

[1] If it is necessary to modify the meeting date or location, a further public notice will be issued.
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THE REGISTER

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STATE OF CALIFORNIA} ss.
County of San Diego}

The Undersigned, declares under penalty of perjury under the laws of the State of California: That she is a resident of the County of San Diego. That she is and at all times herein mentioned was a citizen of the United States, over the age of twenty-one years, and that she is not a party to, nor interested in the above entitled matter; that she is Chief Clerk for the publisher of

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a newspaper of general circulation , printed and published daily in the City of San Diego, County of San Diego, and which newspaper is published for the dissemination of local news and intelligence of a general character, and which newspaper at all the times herein mentioned had and still has a bona fide subscription list of paying subscribers, and which newspaper has been established, printed and published at regular intervals in the said City of San Diego, County of San Diego, for a period exceeding one year next preceding the date of publication of the notice hereinafter referred to, and which newspaper is not devoted to nor published for the interests, entertainment or instruction of a particular class, profession, trade, calling, race, or denomination, or any number of same; that the notice of which the annexed is a printed copy, has been published in said newspaper in accordance with the instructions of the person(s) requesting publication, and not in any supplement thereof on the following dates, to wit:

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NOTICE OF PUBLIC MEETING

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD - SAN DIEGO REGION

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DAVID W. GIBSON
Executive Officer

(1) If it is necessary to modify the meeting date or location, a further public notice will be issued.
9/8/10
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Riverside CA 92501-3878
951-684-1200
951-368-9018 FAX

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(2010, 2015.5 C.C.P.)

Press-Enterprise

PROOF OF PUBLICATION OF

Ad Desc.: PUBLIC MEETING / 1940375

I am a citizen of the United States. I am over the age of eighteen years and not a party to or interested in the above entitled matter. I am an authorized representative of THE PRESS-ENTERPRISE, a newspaper of general circulation, printed and published daily in the County of Riverside, and which newspaper has been adjudicated a newspaper of general circulation by the Superior Court of the County of Riverside, State of California, under date of April 25, 1952, Case Number 54446, under date of March 29, 1957, Case Number 65673 and under date of August 25, 1995, Case Number 267864; that the notice, of which the annexed is a printed copy, has been published in said newspaper in accordance with the instructions of the person(s) requesting publication, and not in any supplement thereof on the following dates, to wit:

09-08-10

I Certify (or declare) under penalty of perjury that the foregoing is true and correct.

Date: Sep. 8, 2010
At: Riverside, California

Natalie Mea

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PO #: 1940375

Agency #: _____

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NOTICE OF PUBLIC MEETING
CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD - SAN DIEGO REGION
TENTATIVE ORDER R9-2010-0016
Riverside County Municipal Storm Water Permit

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District Board Room
42135 Winchester Road
Temecula, California

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DAVID W. GIBSON
Executive Officer

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9/8/10
CNS-1940375#
THE PRESS ENTERPRISE

A000001848001

NOTICE OF PUBLIC MEETING

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN DIEGO REGION

TENTATIVE ORDER R9-2010-0016
Riverside County Municipal Storm Water Permit

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November 10, 2010 at 9:00 am
City of Temecula
Council Chambers
43200 Business Park Drive
Temecula, CA 92590

This matter was originally noticed for consideration at the October 13, 2010 San Diego Water Board Meeting. The October 13, 2010 San Diego Water Board meeting was cancelled due to lack of a quorum. Therefore this serves as a notice of public hearing for the rescheduled date.

Tentative Order No. R9-2010-0016 (Tentative Order) will replace the current Riverside County Municipal Storm Water Permit, R9-2004-0001. The Tentative Order regulates the discharge of storm water pollutants from the municipal separate storm sewer system. Additional information may be found on the San Diego Water Board website at: http://www.waterboards.ca.gov/sandiego.

As indicated in the July 23, 2010 Notice of Written Comment Period, written comments on the Tentative Order were due to the San Diego Water Board by 5 p.m. on September 7, 2010. Rescheduling of this hearing does not require a new comment period, and none has been established. Written comments received after the deadline will not be accepted and will not be incorporated into the administrative record if doing so would jeopardize any party. Interested persons are invited to attend the public hearing to provide oral comments on the Tentative Order. Written comments will not be accepted at the public hearing, but can be orally summarized.

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DAVID W. GIBSON
Executive Officer

State of California
Regional Water Quality Control Board
San Diego Region

EXECUTIVE OFFICER SUMMARY REPORT
November 10, 2010

ITEM: 6

SUBJECT: PUBLIC HEARING: Reissuance of NPDES Waste Discharge Requirements for Discharges from the Municipal Separate Storm Sewer Systems (MS4s) draining the County of Riverside, the Incorporated Cities of Riverside County, and the Riverside County Flood Control and Water Conservation District, within the San Diego Region. (Tentative Order No. R9-2010-0016, (NPDES Permit No. CAS0108766) *(Chad Loflen, Ben Neill, Wayne Chiu)*

PURPOSE: Today's public hearing provides the San Diego Water Board the opportunity to hear public testimony on, and consider adoption of the Tentative Order No. R9-2010-0016.

PUBLIC NOTICE: The public review and comment period for the Tentative Order began on July 23, 2010. Interested persons and the public have been notified in accordance with California Water Code Section 13167.5, the State Water Resources Control Board Administrative Procedures Manual (Chapter 1), and Code of Federal Regulations Title 40 CFR Part 25 (Supporting Document No. 7).

- A notice of this item was distributed to all known interested persons and posted on the San Diego Water Board web site on July 23, 2010;
- The original notice of the October 13, 2010 meeting was posted for the general public in the Orange County Register on September 10, 2010; in the Riverside Press-Enterprise on September 8, 2010; in the San Diego North County Times on September 9, 2010; and in the San Diego Union Tribune on September 8, 2010;
- A notice of the rescheduled November 10, 2010 meeting date was sent electronically to all interested parties on October 11, 2010, and subsequently posted for the general public in the Orange County Register, the Riverside Press-Enterprise, the San

Diego North County Times, and the San Diego Union Tribune.

- In addition, notice was included on the November 10, 2010 San Diego Water Board meeting agenda.

DISCUSSION: Tentative Order No. R9-2010-0016 is the proposed reissuance of the Municipal Storm Water Permit (Order No. R9-2004-0001) for portions of Riverside County within the San Diego Region. The Tentative Order serves as both Waste Discharge Requirements and as a federal National Pollutant Discharge Elimination System permit.

The Tentative Order would, if adopted, require the County of Riverside, the incorporated cities of Riverside County, and the Riverside County Flood Control and Water Conservation District (Copermittees), within the San Diego Region to continue to prohibit the discharge of non-storm water from their separate storm sewer systems (MS4s) and to reduce the discharge of pollutants in storm water from their MS4 to the maximum extent practicable (MEP). These requirements are mandated by Clean Water Act Section 402(p).

In lieu of numeric effluent limitations, pollutant discharge reduction is accomplished through the Copermittees' implementation of comprehensive runoff management programs. These runoff management programs are to be implemented on jurisdictional and watershed levels, depending upon the scale of the water quality issues being addressed.

Background and Permitting Approach Summary

The Tentative Order (No. R9-2010-0016) with the Fact Sheet (Supporting Document Nos. 1 & 2) builds upon the current Riverside County MS4 Permit, R9-2004-001, while tailoring similar requirements from the South Orange County MS4 permit (R9-2009-0002), to meet the unique needs of the Copermittees and the conditions of the Santa Margarita Watershed (Supporting Document 4). The Tentative Order includes changes made in response to (1) the Report of Waste Discharge (ROWD); (2) new information; and (3) knowledge and experience gained by the Copermittees and the San Diego Water Board during the current permit cycle.

To draft a permit that is sufficiently protective of water quality and enforceable (i.e. all parties are easily able to assess

compliance in the same manner), the Tentative Order addresses issues known to exist in Riverside County (e.g. unpaved roads, insufficient monitoring, etc.) and brings the MS4 requirements in this Tentative Order to the current standard set forth in other southern California MS4 permits (e.g. for Low Impact Development, retrofit, hydromodification, etc.). This consistency in the San Diego Water Board's approach to MS4 regulation is not only beneficial to developing a regional permit; but more importantly, it is essential in meeting the maximum extent practicable standard.

Prior to the issuance of the Tentative Order, San Diego Water Board staff met with the Copermittees seventeen (17) separate times over six months to discuss at length the conditions to be included in the Tentative Order (Please see the timeline in Supporting Document No. 5). The Tentative Order being considered today was then distributed to the public for review and comment on July 23, 2010. Following the issuance of the Tentative Order, San Diego Water Board staff held six more meetings with the Copermittees and/or interested parties to discuss the proposed requirements.

Staff is sensitive to the cost considerations raised by the Copermittees. To the extent that the Copermittee recommendations did not conflict with the goals of the Clean Water Act and the mission of the San Diego Water Board, the requested changes were made. Many of the changes were made prior to public release and/or as a result of discussions with the Copermittees.

Examples of these include:

1. Finalizing an agreement with the Santa Ana Water Board, Region 8, at the request of the Cities of Murrieta, Wildomar, and Menifee in order to streamline regulation, that allows the Cities of Murrieta and Wildomar to be wholly regulated under this Tentative Order, and the City of Menifee to be wholly regulated with the Region 8 MS4 permit, pursuant to CWC Section 13228. (Supporting Document No. 6)
2. Staggering and delaying reporting deadlines as much as practicable, while still obtaining the necessary information during the term of the Tentative Order, to make informed decisions.

3. Decreasing monitoring frequency for Stream Assessment Stations (from twice annually to once annually) in return for Copermittee participation in Stormwater Monitoring Coalition monitoring efforts.
4. Consolidating and streamlining permitting language in the Low Impact Development, Education and Effectiveness Assessment sections.
5. Allowing the development of a standard roadway design/section in lieu of a post-construction storm water mitigation plan.
6. Reducing the scope and magnitude of the required retrofit program.
7. Removing a special study on unpaved roads.
8. Revising requirements on hydromodification to (a) match interim criteria with existing efforts, (b) allow utilization of data prepared by San Diego and Orange Counties, and (c) provide a waiver for redevelopment projects.
9. Removing requirements to use Geographical Information Systems in mapping.
10. Removing requirements to individually inventory roads, streets, or highways.
11. Providing allowances for either Active or Passive Sediment Treatment systems at construction sites.
12. Providing greater flexibility in utilizing third-party inspections of commercial and industrial sites.
13. Reducing inventory and inspection requirements, as related to 303(d) listed water bodies.
14. Revising inspection requirements for private retrofit projects to occur as necessary.
15. Removing language requiring the oversight and enforcement of unpaved private roads maintenance.

Comments on the Revised Tentative Order

The San Diego Water Board has received fourteen letters containing written comments and responded in writing to over 350 comments, which includes 244 comments from the Riverside County Flood Control and Water Conservation District. Written comments received by September 7, 2010 are included as Supporting Document No. 9. The San Diego Water Board's response to these comments is included as Supporting Document No. 8.

Revisions to Tentative Order No. R9-2010-0016

Minor revisions to Tentative Order No. R9-2010-0016 and its Fact Sheet are included as Supporting Document No. 3. The changes are made either in response to comments received and/or to correct typographical errors.

Procedures for Today's Meeting

The purpose of today's item is to consider comments and adoption on Tentative Order No. R9-2010-0016, as modified. Oral comments will be accepted as part of the hearing. Staff will provide verbal responses to significant public comments raised on revisions to the Tentative Order. Time allotted for oral comments may be limited at the discretion of the San Diego Water Board.

On September 28, 2010 the Copermittees submitted a letter requesting unspecified alternative hearing procedures and the opportunity to meet and discuss these procedures with staff. On October 5, 2010, staff met with the Copermittees to discuss the responses to comments and hearing procedures. The Copermittees refined their request to include testimony by elected officials (3-5 minutes, each), a joint Copermittee technical presentation (1 hour), and closing remarks (15 minutes) (Supporting Document No. 11).

KEY ISSUES:

Based upon review of written comments, the following issues are of significant concern.

1. Economic Considerations – The Copermittees expressed concerns that the new requirements in the Tentative Order are cost prohibitive to implement. The San Diego Water Board staff has considered the economic information provided by the Copermittees and made appropriate changes in the Tentative Order's requirements. Please see the discussion above; the Fact Sheet Section VI pages 12 to 17 and discussion about Finding E.6 on pages 94 to 96; and responses to comments Nos. 8, 9, 52, 77, 78, 86, 88, 115, 122, 126, 130, 134, and 208.

2. Over irrigation prohibition – The Copermittees are opposed to removal of the current exemption of the prohibition against over-irrigation discharges. The Tentative Order appropriately removed the exemption of over-irrigation discharged according to federal

regulations. USEPA and non-governmental environmental organizations support removal of the exemption. Please see the Fact Sheet discussion about Finding C.15 on pages 50 to 54 and about Section B.2 on pages 108 to 112; and also responses to comments Nos. 15, 27, 73, 83, 100, 201, 202, 230 and 257.

3. Monitoring Requirements – The Copermittees believe that the monitoring requirements are excessive and unwarranted and have proposed alternatives to scale down associated costs. The monitoring proposed (with proposed changes) is appropriate in consideration of the Copermittee's record of noncompliance and limited monitoring data available for the watershed. USEPA supports the currently proposed requirements and finds them "consistent with requirements of other recent MS4 permits adopted." Please see Attachment E; the Fact Sheet discussion on pages 188 to 201; and responses to comments Nos. 20, 90, 92, 95, 142, 144, 150, 152-159, 165, 167-169, 172, 173, 177, 180, 181, 193-197, 338, 339, and 340.

4. Unpaved roads requirement – The Copermittees believe that regulation of unpaved roads should be removed and vetted through a separate general order. The Tentative Order includes requirements to minimize pollution discharges from unpaved roads that are based on similar requirements in the San Franciso Bay Water Board, Region 2, Multi-region MS4 Permit. Where appropriate, the requirements have been modified to address the Copermittees' concerns. USEPA, non-governmental environmental organizations, and a local resident have written in support of the originally proposed language. Please see the Fact Sheet discussion about Finding D.1.c on pages 58 and 59, Section F.1.i on page 146, Section F.3.a.(10) on page 155, and Section F.3.c.(5) on page 160; and also please see response to comments Nos. 1, 19, 69, 101-104, 138-141, 174, 176, 178, 182, 185, 186, 282, and 300.

5. Low-Impact Development – The USEPA and the Natural Resources Defense Council recommended that requirements pertaining to low-impact development (LID) be more consistent with those in other Southern California MS4 permits. To accommodate these comments, minor modifications have been proposed that

give preference to onsite retention and allow equivalent biofiltration practices. Please see the Fact Sheet discussion about Finding D.2.c on pages 71 to 73, Section F.1.d.(4) on pages 132 to 135, and Section F.1.d.(7) on pages 136 to 138. Please also see response to comments Nos. 7, 12, 13, 85, 105, 107, 108, 112, 117, and 118.

LEGAL CONCERNS: None.

SUPPORTING DOCUMENTS:

1. Tentative Order No. R9-2010-0016, with attachments
2. Fact Sheet / Technical Report for Tentative Order No. R9-2010-0016
3. Draft Updates and Errata for the revised Tentative Order
4. Map of Riverside County within the San Diego Region
5. Timeline of Events
6. Letters of Agreement from Santa Ana Water Board and San Diego Water Board Executive Officers
7. Notice of Public Hearing
8. Draft Responses to written comments on Tentative Order No. R9-2010-0016 received between July 23, 2010 and September 7, 2010
9. Written Comment letters received between July 23, 2010 and September 7, 2010 on the Tentative Order
10. Table of Deliverable Due Dates
11. Copermittee letters requesting alternative hearing procedures, dated September 28, 2010 and October 4, 2010.
12. Memo from Catherine George Hagan, Senior Staff Counsel to the San Diego Water Board.

Supporting Document Nos. 1-4, 6, 8, 9, and 11 remain unchanged from the October 13, 2010 Agenda materials

mailed out (Item 5). Therefore, these documents are being provided only on CD. Supporting Document Nos. 5, 7, 10, and 12 contain minor modifications. The updated versions of these documents have been provided in hard copy.

RECOMMENDATION: It is recommended that the Board receive public testimony at today's hearing, close the public comment period, and adopt the Tentative Order (with updates and errata).

Supporting Document No. 1
Item No. 6
0007188
November 10, 2010

California Regional Water Quality Control Board
San Diego Region

Waste Discharge Requirements for Discharges from the Municipal Separate Storm Sewer Systems (MS4s) Draining the County of Riverside, the Incorporated Cities of Riverside County, and the Riverside County Flood Control and Water Conservation District within the San Diego Region

Tentative Order No. R9-2010-0016
NPDES NO. CAS0108740

October 13, 2010

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
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To request copies of the Riverside County Municipal Storm Water Permit, please contact Ben Neill, Water Resources Control Engineer at (858) 467 – 2983, bneill@waterboards.ca.gov

Documents also are available at: http://www.waterboards.ca.gov/sandiego

Waste Discharge Requirements for Discharges from the Municipal Separate Storm Sewer Systems (MS4s) Draining the County of Riverside, the Incorporated Cities of Riverside County, and the Riverside County Flood Control and Water Conservation District within the San Diego Region

Adopted by the
California Regional Water Quality Control Board
San Diego Region
on October 13, 2010

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California Regional Water Quality Control Board
San Diego Region

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Grant Destache *Vice Chair*	Industrial Water Use
Eric Anderson	Irrigated Agriculture
Wayne Rayfield	Water Quality
George Loveland	Water Supply
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The California Regional Water Quality Control Board, San Diego Region (hereinafter San Diego Water Board), finds that:

A. BASIS FOR THE ORDER

1. This Order is based on the federal Clean Water Act (CWA), the Porter-Cologne Water Quality Control Act (Division 7 of the Water Code, commencing with Section 13000), applicable State and federal regulations, all applicable provisions of statewide Water Quality Control Plans and Policies adopted by the State Water Resources Control Board (State Water Board), the Water Quality Control Plan for the San Diego Basin adopted by the San Diego Water Board (Basin Plan), the California Toxics Rule, and the California Toxics Rule Implementation Plan.

2. This Order reissues National Pollutant Discharge Elimination System (NPDES) Permit No. CAS0108766, which was first adopted by the San Diego Water Board on July 16, 1990 (Order No. 90-38), and then reissued on May 13, 1998 (Order No. 98-02). On May 26, 1998, the United States Environmental Protection Agency (USEPA), Region IX, objected to Order No. 98-02 due to concerns regarding Receiving Water Limitations (RWL) language. The USEPA concluded that the RWL language in the permit did not comply with the CWA and its implementing regulations. On April 27, 1999, the USEPA reissued the MS4 permit, which the San Diego Water Board adopted as Addendum No. 1 to Order No. 98-02 on November 8, 2000. On July 14, 2004, the San Diego Water Board adopted the third term MS4 permit, Order No. R9-2004-001. On January 15, 2009, the Riverside County Flood Control and Water Conservation District (RCFCD), as the Principal Copermittee, submitted a Report of Waste Discharge (ROWD) for reissuance of the municipal separate storm sewer system (MS4) Permit.

3. This Order is consistent with the following precedential Orders adopted by the State Water Board addressing MS4 NPDES Permits: Order 99-05, Order WQ-2000-11, Order WQ 2001-15, Order WQO 2002-0014, and Order WQ-2009-0008 (*SWRCB/OCC FILE A-1780).*

4. The Fact Sheet / Technical Report for the Order No. R9-2010-0016, NPDES No. CAS0108766, Waste Discharge Requirements for Discharges from the MS4s Draining the County of Riverside, the Incorporated Cities of Riverside County, and the Riverside County Flood Control and Water Conservation District within the San Diego Region, includes cited regulatory and legal references and additional explanatory information and data in support of the requirements of this Order. This information, including any supplements thereto, and any response to comments on the Tentative Orders, is hereby incorporated by reference into these findings.

B. REGULATED PARTIES

1. Each of the persons in Table 1 below, hereinafter called Copermittees or dischargers, owns or operates an MS4, through which it discharges into waters of the United States (U.S.) within the San Diego Region. These MS4s fall into one or more of the following categories: (1) a medium or large MS4 that services a population of greater than 100,000 or 250,000 respectively; or (2) a small MS4 that is "interrelated" to a medium or large MS4; or (3) an MS4 that contributes to a violation of a water quality standard; or (4) an MS4 which is a significant contributor of pollutants to waters of the U.S.

Table 1. Municipal Copermittees

1. City of Murrieta	4. County of Riverside
2. City of Temecula	5. Riverside County Flood Control and Water Conservation District
3. City of Wildomar	
6. City of Menifee[1]	

The Cities of Murrieta, Menifee and Wildomar also discharge into the waters of the U.S. in the California Regional Water Quality Control Board, Santa Ana Region (Santa Ana Water Board), so are located partially within both the San Diego and Santa Ana Water Board boundaries. As allowed by California Water Code (CWC) §13228, these Cities submitted written requests to be regulated for MS4 purposes under a permit adopted by only one Water Board. As authorized by CWC §13228 and pursuant to a written agreement between the San Diego Water Board and the Santa Ana Water Board, the Cities of Murrieta and Wildomar are wholly regulated by the San Diego Water Board under this Order, including those portions of the Cities jurisdiction not within the San Diego Water Board's region. Similarly, the City of Menifee is wholly regulated by the Santa Ana Water Board under Order No. R8-2010-0033, including those portions of the City of Menifee within the San Diego Water Board's region.[1]

C. DISCHARGE CHARACTERISTICS

1. Discharges from the MS4 contain waste, as defined in the CWC, and pollutants that adversely affect the quality of the waters of the State. The discharge from an MS4 is a "discharge of pollutants from a point source" into waters of the U.S. as defined in the CWA.

2. MS4 storm water and non-storm water discharges are likely to contain pollutants that cause or threaten to cause a violation of water quality standards, as outlined in the Basin Plan. Storm water and non-storm water discharges from the MS4 are subject

[1] Until an agreement is finalized, the City of Menifee is included as a Copermittee in this Order.

to the conditions and requirements established in the Basin Plan for point source discharges.

3. The most common categories of pollutants in runoff include total suspended solids, sediment, pathogens (e.g., bacteria, viruses, protozoa), heavy metals (e.g., copper, lead, zinc and cadmium), petroleum products and polynuclear aromatic hydrocarbons, synthetic organics (e.g., pesticides, herbicides, and PCBs), nutrients (e.g., nitrogen and phosphorus fertilizers), oxygen-demanding substances (decaying vegetation, animal waste), detergents, and trash.

4. The discharge of pollutants and/or increased flows from MS4s may cause or threaten to cause the concentration of pollutants to exceed applicable receiving water quality objectives and/or impair or threaten to impair designated beneficial uses resulting in a condition of pollution (i.e., unreasonable impairment of water quality for designated beneficial uses), contamination, or nuisance.

5. Pollutants in runoff can threaten and adversely affect human health. Human illnesses have been clearly linked to recreating near storm drains flowing to receiving waters. Also, runoff pollutants in receiving waters can bioaccumulate in the tissues of invertebrates and fish, which may be eventually consumed by humans.

6. Runoff discharges from MS4s often contain pollutants that cause toxicity to aquatic organisms (i.e., adverse responses of organisms to chemicals or physical agents ranging from mortality to physiological responses such as impaired reproduction or growth anomalies). Toxic pollutants impact the overall quality of aquatic systems and beneficial uses of receiving waters.

7. The Copermittees discharge runoff into lakes, drinking water reservoirs, rivers, streams, creeks, bays, estuaries, coastal lagoons, the Pacific Ocean, and tributaries thereto within one of the eleven hydrologic units (Santa Margarita Hydrologic Unit) comprising the San Diego Region as shown in Table 2. Some of the receiving water bodies have been designated as impaired by the San Diego Water Board in 2009 pursuant to CWA section 303(d).

Table 2. Common Watersheds and CWA Section 303(d) Impaired Waters in the San Diego Region.

Hydrologic Area (HA) or Hydrologic Subarea (HSA) of the Santa Margarita Hydrologic Unit	**Major Receiving Water Bodies**	**303(d) Pollutant(s)/stressor or Water Quality Effect[2]**
DeLuz Creek HSA (902.21)	De Luz Creek	Iron, Manganese, Nitrogen, Sulfates
Murrieta HSA (902.32)	Long Canyon Creek (tributary to Murrieta Creek	Chlorpyrifos, E. Coli, Fecal Coliform, Iron, Manganese
Wolf HSA (902.52)	Murrieta Creek	Chlorpyrifos, Copper, Iron, Manganese, Nitrogen, Toxicity
Pauba HSA (902.51)	Redhawk Channel	Chlorpyrifos, Copper, Diazinon, E. Coli, Fecal Coliform, Iron, Manganese, Nitrogen, Phosphorus, Total Dissolved Solids
Gavilan HSA (902.22)	Sandia Creek	Iron, Sulfates
Gertrudis HSA (902.42)	Santa Gertrudis Creek	Chlorpyrifos, Copper, E. Coli, Fecal Coliform, Iron, Phosphorous
Lower Ysidora HSA (902.11)	Santa Margarita Lagoon	Eutrophic
Lower Ysidora HSA (902.11)	Santa Margarita River (Lower)	Enterococcus, Fecal Coliform, Phosphorus, Total Nitrogen as N
Gavilan HSA (902.22)	Santa Margarita River (Upper)	Toxicity
Pauba HSA (902.51)	Temecula Creek	Chlorpyrifos, Copper, Phosphorus, Total Dissolved Solids, Toxicity
French HSA (902.33)	Warm Springs Creek (Riverside County)	Chlorpyrifos, E. Coli, Fecal Coliform, Iron, Manganese, Phosphorus, Total Nitrogen as N

[2] The listed 303(d) pollutant(s) do not necessarily reflect impairment of the entire corresponding WMA or all corresponding major surface water bodies. The specific impaired portions of each WMA are listed in the State Water Resources Control Board's 2008 Section 303(d) List of Water Quality Limited Segments.

8. Trash is a persistent pollutant that can enter receiving waters from the MS4, accumulate, and be transported downstream into receiving waters over time. Trash poses a serious threat to the beneficial uses of the receiving waters, including, but not limited to, human health, rare and endangered species, navigation and human recreation.

9. The Copermittees' water quality monitoring data submitted to date documents persistent violations of Basin Plan water quality objectives for various runoff-related pollutants (indicator bacteria, dissolved solids, turbidity, metals, pesticides, etc.) at various watershed monitoring stations. Persistent toxicity has also been observed at some watershed monitoring stations. In addition, bioassessment data indicate that the majority of the monitored receiving waters have Poor to Very Poor Index of Biotic Integrity ratings. In sum, the above findings indicate that runoff discharges are causing or contributing to water quality impairments, and are a leading cause of such impairments in Riverside County.

10. When natural vegetated pervious ground cover is converted to impervious surfaces such as paved highways, streets, rooftops, and parking lots, the natural absorption and infiltration abilities of the land are lost. Therefore, runoff leaving a developed area is significantly greater in runoff volume, velocity, and peak flow rate than pre-development runoff from the same area. Runoff durations can also increase as a result of flood control and other efforts to control peak flow rates. Increased volume, velocity, rate, and duration of runoff, and decreased natural clean sediment loads, greatly accelerate the erosion of downstream natural channels. Significant declines in the biological integrity and physical habitat of streams and other receiving waters have been found to occur with as little as a 3-5 percent conversion from natural to impervious surfaces. The increased runoff characteristics from new development must be controlled to protect against increased erosion of channel beds and banks, sediment pollutant generation, or other impacts to beneficial uses and stream habitat due to increased erosive force.

11. Development creates new pollution sources as human population density increases and brings with it proportionately higher levels of car emissions, car maintenance wastes, municipal sewage, pesticides, household hazardous wastes, pet wastes, trash, etc. which can either be washed or directly dumped into the MS4. As a result, the runoff leaving the developed urban area is significantly greater in pollutant load than the pre-development runoff from the same area. These increased pollutant loads must be controlled to protect downstream receiving water quality.

12. Development and urbanization especially threaten environmentally sensitive areas (ESAs), such as water bodies designated as supporting a RARE beneficial use (supporting rare, threatened or endangered species) and CWA 303(d)-impaired water bodies. Such areas have a much lower capacity to withstand pollutant loads than other, more sensitive areas. In essence, development that is ordinarily insignificant in its impact on the environment may become significant in a particularly sensitive environment. Therefore, additional controls to reduce storm water

pollutants from new and existing development may be necessary for areas adjacent to or discharging directly to an ESA.

13. Although dependent on several factors, the risks typically associated with properly managed infiltration of runoff (especially from residential land use areas) are not significant. The risks associated with infiltration can be managed by many techniques, including (1) designing landscape drainage features that promote infiltration of runoff, but do not "inject" runoff (injection bypasses the natural processes of filtering and transformation that occur in the soil); (2) taking reasonable steps to prevent the illegal disposal of wastes; (3) protecting footings and foundations; (4) ensuring that each drainage feature is adequately maintained in perpetuity; and (5) pretreatment.

14. Non-storm water (dry weather) discharge from the MS4 is not considered a storm water (wet weather) discharge and therefore is not subject to regulation under the Maximum Extent Practicable (MEP) standard from CWA 402(p)(3)(B)(iii), which is explicitly for "Municipal … *Stormwater Discharges* (emphasis added)" from the MS4. Rather, non-storm water discharges into the storm sewers, per CWA 402(p)(3)(B)(ii), are to be effectively prohibited. Such dry weather non-storm water discharges have been shown to contribute significant levels of pollutants and flow in arid, developed Southern California watersheds and are to be effectively prohibited under the CWA.

15. Non-storm water discharges to the MS4 granted an influent exception [i.e., which are exempt from the effective prohibition requirement set forth in CWA section 402(p)(3)(B)(ii)] under 40 CFR 122.26 are included within this Order. Any exempted discharges identified by Copermittees as a source of pollutants are subsequently required to be *addressed* (emphasis added) as illicit discharges through prohibition and incorporation into existing IC/ID programs. Furthermore, the USEPA contemplates that permitting agencies such as the San Diego Water Board may also identify exempted discharges as a source of pollutants required to be addressed as illicit discharges (See VOl. 55 Fed. Reg. 48037). The San Diego Water Board and the Copermittees have identified landscape irrigation, irrigation water and lawn water, previously exempted discharges, as a source of pollutants and conveyance of pollutants to waters of the U.S.

D. RUNOFF MANAGEMENT PROGRAMS

1. General

a. This Order specifies requirements necessary for the Copermittees to reduce the discharge of pollutants in storm water to the MEP. However, since MEP is a dynamic performance standard, which evolves over time as runoff management knowledge increases, the Copermittees' runoff management programs must continually be assessed and modified to incorporate improved programs, control measures, best management practices (BMPs), etc. in order to achieve the

evolving MEP standard. Absent evidence to the contrary, this continual assessment, revision, and improvement of runoff management program implementation is expected to ultimately achieve compliance with water quality standards in the Region.

b. The Copermittees have generally been implementing the jurisdictional runoff management programs (JRMPs) required pursuant to Order No. R9-2004-001 since July 14, 2005. Prior to that, the Copermittees were regulated by Order No. 98-02, since May 13, 1998. MS4 discharges, however, continue to cause or contribute to violations of water quality standards as evidenced by the Copermittees' monitoring results.

c. This Order contains new or modified requirements that are necessary to improve Copermittees' efforts to reduce the discharge of pollutants in storm water runoff to the MEP and achieve water quality standards. Some of the new or modified requirements, such as the revised Watershed Water Quality Workplan (Watershed Workplan) section, are designed to specifically address high priority water quality problems. Other requirements, such as for unpaved roads, are a result of San Diego Water Board's identification of water quality problems through investigations and complaints during the previous permit period. Other new or modified requirements address program deficiencies that have been noted during audits, report reviews, and other San Diego Water Board compliance assessment activities. Additional changes in the monitoring program provide consistency with the Code of Federal Regulations, USEPA guidance, State Water Board guidance, and the Southern California Monitoring Coalition recommendations.

d. Updated individual Drainage Area Management Plans (DAMP), and Watershed Stormwater Management Plans (watershed SWMPs), which describe the Copermittees' runoff management programs in their entirety, are needed to guide the Copermittees' runoff management efforts and aid the Copermittees in tracking runoff management program implementation. Hereinafter, the individual DAMP is referred to as the JRMPs and the Watershed SWMP is referred to as the Watershed Workplan. It is practicable for the Copermittees to update the JRMPs and Watershed Workplans within the timeframe specified in this Order, since significant efforts to develop these programs have already occurred.

e. Pollutants can be effectively reduced in storm water runoff by the application of a combination of pollution prevention, source control, and treatment control BMPs. Pollution prevention is the reduction or elimination of pollutant generation at its source and is the best "first line of defense." Source control BMPs (both structural and non-structural) minimize the contact between pollutants and flows (e.g., rerouting run-on around pollutant sources or keeping pollutants on-site and out of receiving waters). Treatment control BMPs remove pollutants that have been mobilized by wet-weather or dry-weather flows.

f. Runoff needs to be addressed during the three major phases of urban development (planning, construction, and use) in order to reduce the discharge of pollutants from storm water to the MEP, effectively prohibit non-storm water discharges and protect receiving waters. Development which is not guided by water quality planning policies and principles can unnecessarily result in increased pollutant load discharges, flow rates, and flow durations which can negatively impact receiving water beneficial uses. Construction sites without adequate BMP implementation result in sediment runoff rates which greatly exceed natural erosion rates of undisturbed lands, causing siltation and impairment of receiving waters. Existing development generates substantial pollutant loads which are discharged in runoff to receiving waters.

g. Annual reporting requirements included in this Order are necessary to meet federal requirements and to evaluate the effectiveness and compliance of the Copermittees' programs.

h. This Order establishes Storm Water Action Levels (SALs) for selected pollutants based on USEPA Rain Zone 6 (arid southwest) Phase I MS4 monitoring data for pollutants in storm water. The SALs were computed as the 90th percentile of the data set, utilizing the statistical based population approach, one of three approaches recommended by the State Water Board's Storm Water Panel in its report, 'The Feasibility of Numerical Effluent Limits Applicable to Discharges of Storm Water Associated with Municipal, Industrial and Construction Activities (June 2006). SALs are identified in Section D of this Order. Copermittees must implement a timely, comprehensive, cost-effective storm water pollution control program to reduce the discharge of pollutants in storm water from the permitted areas so as not to exceed the SALs. Exceedance of SALs may indicate inadequacy of programmatic measures and BMPs required in this Order.

2. **Development Planning**

a. The Standard Storm Water Mitigation Plan (SSMP) requirements contained in this Order are consistent with Order WQ-2000-11 adopted by the State Water Board on October 5, 2000. In the precedential order, the State Water Board found that the design standards, which essentially require that runoff generated by 85 percent of storm events from specific development categories be infiltrated or treated, reflect the MEP standard. The order also found that the SSMP requirements are appropriately applied to the majority of the Priority Development Project categories that are also contained in Section F.1 of this Order. The State Water Board also gave California Regional Water Quality Control Boards (Regional Water Boards) the needed discretion to include additional categories and locations, such as retail gasoline outlets (RGOs), in SSMPs.

b. Controlling runoff pollution by using a combination of onsite source control and site design BMPs augmented with treatment control BMPs before the runoff enters the MS4 is important for the following reasons: (1) Many end-of-pipe BMPs (such as diversion to the sanitary sewer) are typically ineffective during significant storm events. (2) Whereas, onsite source control BMPs can be applied during all runoff conditions end-of-pipe BMPs are often incapable of capturing and treating the wide range of pollutants which can be generated on a sub-watershed scale; (3) End-of-pipe BMPs are more effective when used as polishing BMPs, rather than the sole BMP to be implemented; (4) End-of-pipe BMPs do not protect the quality or beneficial uses of receiving waters between the pollutant source and the BMP; and (5) Offsite end-of-pipe BMPs do not aid in the effort to educate the public regarding sources of pollution and their prevention.

c. Use of Low-Impact Development (LID) site design BMPs at new development, redevelopment and retrofit projects can be an effective means for minimizing the impact of storm water runoff discharges from the development projects on receiving waters. LID is a site design strategy with a goal of maintaining or replicating the pre-development hydrologic regime through the use of design techniques. LID site design BMPs help preserve and restore the natural hydrologic cycle of the site, allowing for filtration and infiltration which can greatly reduce the volume, peak flow rate, velocity, and pollutant loads of storm water runoff. Current runoff management, knowledge, practices and technology have resulted in the use of LID BMPs as an acceptable means of meeting the storm water MEP standard.

d. RGOs are significant sources of pollutants in storm water runoff. RGOs are points of convergence for motor vehicles for automotive related services such as repair, refueling, tire inflation, and radiator fill-up and consequently produce significantly higher loadings of hydrocarbons and trace metals (including copper and zinc) than other developed areas.

e. Industrial sites are significant sources of pollutants in runoff. Pollutant concentrations and loads in runoff from industrial sites are similar or exceed pollutant concentrations and loads in runoff from other land uses, such as commercial or residential land uses. As with other land uses, LID site design, source control, and treatment control BMPs are needed at industrial sites in order to meet the MEP standard. These BMPs are necessary where the industrial site is larger than 10,000 square feet. The 10,000 square feet threshold is appropriate, since it is consistent with requirements in other Phase I NPDES storm water regulations throughout California.

f. If not properly designed or maintained, certain BMPs implemented or required by municipalities for runoff management may create a habitat for vectors (e.g. mosquitoes and rodents). Proper BMP design and maintenance to avoid standing water, however, can prevent the creation of vector habitat. Nuisances

and public health impacts resulting from vector breeding can be prevented with close collaboration and cooperative effort between municipalities, local vector control agencies, and the California Department of Public Health during the development and implementation of runoff management programs.

g. The increased volume, velocity, frequency and discharge duration of storm water runoff from developed areas has the potential to greatly accelerate downstream erosion, impair stream habitat in natural drainages, and negatively impact beneficial uses. Development and urbanization increase pollutant loads in storm water runoff and the volume of storm water runoff. Impervious surfaces can neither absorb water nor remove pollutants and thus lose the purification and infiltration provided by natural vegetated soil. Hydromodification measures for discharges to hardened channels are needed for the future restoration of the hardened channels to their natural state, thereby restoring the chemical, physical, and biological integrity and beneficial uses of local receiving waters.

3. **Construction and Existing Development**

a. In accordance with federal NPDES regulations and to ensure the most effective oversight of industrial and construction site discharges, discharges of runoff from industrial and construction sites are subject to dual (State and local) storm water regulation. Under this dual system, each Copermittee is responsible for enforcing its local permits, plans, and ordinances, and the San Diego Water Board is responsible for enforcing the General Construction Activities Storm Water Permit, State Water Board Order 2009-0009-DWQ, NPDES No. CAS000002 (General Construction Permit) and the General Industrial Activities Storm Water Permit, State Water Board Order 97-03 DWQ, NPDES No. CAS000001 (General Industrial Permit) and any reissuance of these permits. NPDES municipal regulations require that municipalities develop and implement measures to address runoff from industrial and construction activities. Those measures may include the implementation of other BMPs in addition to those BMPs that are required under the statewide general permits for activities subject to both State and local regulation.

b. Identification of sources of pollutants in runoff (such as municipal areas and activities, industrial and commercial sites/sources, construction sites, and residential areas), development and implementation of BMPs to address those sources, and updating ordinances and approval processes are necessary for the Copermittees to ensure that discharges of pollutants from its MS4 in storm water are reduced to the MEP and that non-storm water discharges are not occurring. Inspections and other compliance verification methods are needed to ensure minimum BMPs are implemented. Inspections are especially important at areas that are at high risk for pollutant discharges.

c. Historic and current development makes use of natural drainage patterns and features as conveyances for runoff. Urban streams used in this manner are part of the municipalities' MS4s regardless of whether they are natural, anthropogenic, or partially modified features. In these cases, the urban stream is both an MS4 and receiving water.

d. As operators of the MS4s, the Copermittees cannot passively receive and discharge pollutants from third parties. By providing free and open access to an MS4 that conveys discharges to waters of the U.S., the operator essentially accepts responsibility for discharges into the MS4 that it does not prohibit or otherwise control. These discharges may cause or contribute to a condition of contamination or a violation of water quality standards.

e. Waste and pollutants which are deposited and accumulate in MS4 drainage structures will be discharged from these structures to waters of the U.S. unless they are removed. These discharges may cause or contribute to, or threaten to cause or contribute to, a condition of pollution in receiving waters. For this reason, pollutant discharges from storm water into MS4s must be reduced using a combination of management measures, including source control and an effective MS4 maintenance program implemented by each Copermittee.

f. Enforcement of local runoff related ordinances, permits, and plans is an essential component of every runoff management program and is specifically required in the federal storm water regulations and this Order. Each Copermittee is individually responsible for adoption and enforcement of ordinances and/or policies, implementation of identified control measures/BMPs needed to prevent or reduce pollutants in storm water runoff, and for the allocation of funds for the capital, operation and maintenance, administrative, and enforcement expenditures necessary to implement and enforce such control measures/BMPs under its jurisdiction. Education is an important aspect of every effective runoff management program and the basis for changes in behavior at a societal level. Education of municipal planning, inspection, and maintenance department staffs is especially critical to ensure that in-house staffs understand how their activities impact water quality, how to accomplish their jobs while protecting water quality, and understand their specific roles and responsibilities for compliance with this Order. Public education, designed to target various urban land users and other audiences, is also essential to inform the public of how individual actions affect receiving water quality and how adverse effects can be minimized.

g. Public participation during the development of runoff management programs is necessary to ensure that all stakeholder interests and a variety of creative solutions are considered.

h. Retrofitting existing development with storm water treatment controls, including LID, is necessary to address storm water discharges from existing development that may cause or contribute to a condition of pollution or a violation of water

quality standards. Although SSMP BMPs are required for redevelopment, the current rate of redevelopment will not address water quality problems in a timely manner. Cooperation with private landowners is necessary to effectively identify, implement and maintain retrofit projects for the preservation, restoration, and enhancement of water quality.

4. **Watershed Runoff Management**

   a. Since runoff within a watershed can flow from and through multiple land uses and political jurisdictions, watershed-based runoff management can greatly enhance the protection of receiving waters. Such management provides a means to focus on the most important water quality problems in each watershed. By focusing on the most important water quality problems, watershed efforts can maximize protection of beneficial use in an efficient manner. Effective watershed-based runoff management actively reduces pollutant discharges and abates pollutant sources causing or contributing to watershed water quality problems. Watershed-based runoff management that does not actively reduce pollutant discharges and abate pollutant sources causing or contributing to watershed water quality problems can necessitate implementation of the iterative process outlined in section A.3 of this Order. Watershed management of runoff does not require Copermittees to expend resources outside of their jurisdictions. In some cases, however, this added flexibility provides more, and possibly more effective, alternatives for minimizing waste discharges. Watershed management requires the Copermittees within a watershed to develop a watershed-based management strategy, which can then be implemented on a jurisdictional basis.

   b. Some runoff issues, such as general education and training, can be effectively addressed on a regional basis. Regional approaches to runoff management can improve program consistency and promote sharing of resources, which can result in implementation of more efficient programs.

   c. It is important for the Copermittees to coordinate their water quality protection and land use planning activities to achieve the greatest protection of receiving water bodies. Copermittee coordination with other watershed stakeholders, especially the State of California Department of Transportation, the U.S. federal government, sovereign American Indian tribes, and water and sewer districts, is also important.

E. STATUTE AND REGULATORY CONSIDERATIONS

1. The RWL language specified in this Order is consistent with language recommended by the USEPA and established in State Water Board Order WQ-99-05, *Own Motion Review of the Petition of Environmental Health Coalition to Review Waste Discharge Requirements Order No. 96-03, NPDES Permit No. CAS0108740*, adopted by the

State Water Board on June 17, 1999. The RWL language in this Order requires compliance with water quality standards, which for storm water discharges is to be achieved through an iterative approach requiring the implementation of improved and better-tailored BMPs over time. Compliance with receiving water limits based on applicable water quality standards is necessary to ensure that MS4 discharges will not cause or contribute to violations of water quality standards and the creation of conditions of pollution, contamination, or nuisance.

2. The Basin Plan, identifies the following existing and potential beneficial uses for surface waters in Riverside County: Municipal and Domestic Supply (MUN), Agricultural Supply (AGR), Industrial Process Supply (PROC), Hydropower Generation (POW), Industrial Service Supply (IND), Ground Water Recharge (GWR), Contact Water Recreation (REC1), Non-contact Water Recreation (REC2), Warm Freshwater Habitat (WARM), Cold Freshwater Habitat (COLD), Wildlife Habitat (WILD), Rare, Threatened, or Endangered Species (RARE), Spawning, Reproduction and/or Early Development (SPWN) and Preservation of Biological Habitats of Special Significance (BIOL).

3. This Order is in conformance with State Water Board Resolution No. 68-16, *Statement of Policy with Respect to Maintaining High Quality Waters in California*, and the federal Antidegradation Policy described in 40 CFR 131.12.

4. Section 6217(g) of the Coastal Zone Act Reauthorization Amendments of 1990 (CZARA) requires coastal states with approved coastal zone management programs to address non-point pollution impacting or threatening coastal water quality. CZARA addresses five sources of non-point pollution: agriculture, silviculture, urban, marinas, and hydromodification. This NPDES permit addresses the management measures required for the urban category, with the exception of septic systems. The adoption and implementation of this NPDES permit relieves the Copermittee from developing a non-point source plan, for the urban category, under CZARA. The San Diego Water Board addresses septic systems through the administration of other programs.

5. Section 303(d)(1)(A) of the CWA requires that "Each state shall identify those waters within its boundaries for which the effluent limitations…are not stringent enough to implement any water quality standard (WQS) applicable to such waters." The CWA also requires states to establish a priority ranking of impaired water bodies known as Water Quality Limited Segments and to establish Total Maximum Daily Loads (TMDLs) for such waters. This priority list of impaired water bodies is called the Section 303(d) List. The 2006 Section 303(d) List was approved by the State Water Board on October 25, 2006. On June 28, 2007, the 2006 303(d) list for California was given final approval by the USEPA. The 303(d) List was recently updated, and on December 16, 2009, the 2008 303(d) List was approved by the San Diego Water Board. The 2008 List is awaiting State Water Board and USEPA approval.

6. This Order does not constitute an unfunded local government mandate subject to subvention under Article XIIIB, Section (6) of the California Constitution for several reasons, including, but not limited to, the following. First, this Order implements federally mandated requirements under CWA §402. (33 U.S.C. § 1342(p)(3)(B).) Second, the local agency Copermittees' obligations under this Order are similar to, and in many respects less stringent than, the obligations of non-governmental and new dischargers who are issued NPDES permits for storm water and non-storm water discharges. Third, the local agency Copermittees have the authority to levy service charges, fees, or assessments sufficient to pay for compliance with this Order. Fourth, the Copermittees have requested permit coverage in lieu of compliance with the complete prohibition against the discharge of pollutants contained in CWA §301, subdivision (a) (33 U.S.C. § 1311(a)) and in lieu of numeric restrictions on their MS4 discharges (i.e. effluent limitations). Fifth, the local agencies' responsibility for preventing discharges of waste that can create conditions of pollution or nuisance from conveyances that are within their ownership or control under State law predates the enactment of Article XIIIB, Section (6) of the California Constitution. Likewise, the provisions of this Order to implement TMDLs are federal mandates. The CWA requires TMDLs to be developed for water bodies that do not meet federal water quality standards. (33 U.S.C. sec. 1313(d).) Once the USEPA or a state develops a TMDL, federal law requires that permits must contain effluent limitations consistent with the assumptions of any applicable wasteload allocation. (40 C.F.R. sec. 122.44(d)(1)(vii)(B).)

7. Runoff treatment and/or mitigation must occur prior to the discharge of runoff into receiving waters. Treatment BMPs must not be constructed in waters of the U.S. or State unless the runoff flows are sufficiently pretreated to protect the values and functions of the water body. Federal regulations at 40 CFR 131.10(a) state that in no case shall a state adopt waste transport or waste assimilation as a designated use for any waters of the U.S. Authorizing the construction of an runoff treatment facility within a water of the U.S., or using the water body itself as a treatment system or for conveyance to a treatment system, would be tantamount to accepting waste assimilation as an appropriate use for that water body. Furthermore, the construction, operation, and maintenance of a pollution control facility in a water body can negatively impact the physical, chemical, and biological integrity, as well as the beneficial uses, of the water body. Without federal authorization (e.g., pursuant to CWA § 404), waters of the U.S. may not be converted into, or used as, waste treatment or conveyance facilities. Similarly, waste discharge requirements pursuant to CWC §13260 are required for the conversion or use of waters of the State as waste treatment or conveyance facilities. Diversion from waters of the U.S./State to treatment facilities and subsequent return to waters of the U.S. is allowable, provided that the effluent complies with applicable NPDES requirements.

8. The issuance of waste discharge requirements and an NPDES permit for the discharge of runoff from MS4s to waters of the U.S. is exempt from the requirement for preparation of environmental documents under the California Environmental Quality Act (CEQA) (Public Resources Code, Division 13, Chapter 3, section 21000 et seq.) in accordance with the CWC section 13389.

9. Storm water discharges from developed and developing areas in Riverside County are significant sources of certain pollutants that cause, may be causing, threatening to cause or contributing to water quality impairment in the waters of Riverside County. Furthermore, as delineated in the CWA section 303(d) list in Table 2, the San Diego Water Board has found that there is a reasonable potential that municipal storm water and non-storm water discharges from MS4s cause or may cause or contribute to an excursion above water quality standards for the following pollutants: Indicator Bacteria, Copper, Manganese, Iron, Chlorpyrifos, Sulfates, Phosphorous, Nitrogen, Toxicity, and Turbidity. In accordance with CWA section 303(d), the San Diego Water Board is required to establish TMDLs for these pollutants to these waters to eliminate impairment and attain water quality standards. Therefore, certain early pollutant control actions and further pollutant impact assessments by the Copermittees are warranted and required pursuant to this Order.

10. This Order requires each Copermittee to effectively prohibit all types of unauthorized discharges of non-storm water into its MS4. However, historically pollutants have been identified as present in dry weather non-storm water discharges from the MS4s through 303(d) listings, monitoring conducted by the Copermittees under Order No. R9-2004-0001, and there are others expected to be present in dry weather non-storm water discharges because of the nature of these discharges. This Order includes action levels for pollutants in non-storm water, dry weather discharges from the MS4. The non-storm water action levels are designed to ensure that the Order's requirement to effectively prohibit all types of unauthorized discharges of non-storm water into the MS4 is being complied with. Non-storm water action levels in the Order are based upon numeric or narrative water quality objectives and criteria as defined in the Basin Plan, the State Water Board's Water Quality Control Plan for Ocean Waters of California (Ocean Plan), and the State Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California (State Implementation Policy or SIP). An exceedance of an action level requires specified responsive action by the Copermittees. This Order describes what actions the Copermittees must take when an exceedance of an action level is observed. Exceedances of non-storm water action levels do not alone constitute a violation of this Order but could indicate non-compliance with the requirement to effectively prohibit all types of unauthorized non-storm water discharges into the MS4 or other prohibitions established in this Order. Failure to undertake required source investigation and elimination action following an exceedance of a non-storm water action level (NAL or action level) is a violation of this Order. The San Diego Water Board recognizes that use of action levels will not necessarily result in detection of all unauthorized sources of non-storm water discharges because there may be some discharges in which pollutants do not exceed established action

levels. However, establishing NALs at levels appropriate to protect water quality standards is expected to lead to the identification of significant sources of pollutants in dry weather non-storm water discharges.

11. In addition to federal regulations cited in the Fact Sheet / Technical Report for the Order No. R9-2010-0016, monitoring and reporting required under Order No. R9-2010-0016 is required pursuant to authority under CWC section 13383.

12. With this Order, the San Diego Water Board has completed the re-issuance of the fourth iteration of the Phase I MS4 NPDES Permits for the Copermittees in the portions of San Diego County, Orange County, and Riverside County within the San Diego Region. The NPDES Permit requirements issued to the Copermittees in each county have substantially the same core requirements such as discharge prohibitions, receiving water limitations, jurisdictional components, and monitoring. In addition, the Copermittees cooperate regionally to develop monitoring with the Southern California Stormwater Monitoring Coalition and to develop program effectiveness with the California Stormwater Quality Association. Regional programs could improve the Copermittees' compliance with other permit components such as development of the Hydromodification Management Plans and Retrofitting Existing Development with more consistent implementation and cost sharing. Re-issuing the NPDES Permit requirements within five years for three counties under three different permits requires the San Diego Water Board to expend significant time and resources for issuance of the permits through three separate public proceedings, thereby greatly reducing the time and resources available to oversee compliance. Multiple permits also create confusion for determining compliance among regulated entities, especially the land development community. The San Diego Water Board recognizes that issuing a single MS4 permit for all Phase I entities in the San Diego Region will provide consistent implementation, improve communication among agencies within watersheds crossing multiple jurisdictions, and minimize staff resources spent with each permit renewal. The San Diego Water Board plans to develop a single regional MS4 permit prior to the expiration of this Order that will transfer the Copermittees' enrollment to the regional permit upon expiration of this Order.

F. PUBLIC PROCESS

1. The San Diego Water Board has notified the Copermittees, all known interested parties, and the public of its intent to consider adoption of an Order prescribing waste discharge requirements that would serve to renew an NPDES permit for the existing MS4 discharges of pollutants in waters of the U.S.

2. The San Diego Water Board has held a public hearing on October 13, 2010 and heard and considered all comments pertaining to the terms and conditions of this Order.

IT IS HEREBY ORDERED that the Copermittees, in order to meet the provisions contained in Division 7 of the CWC and regulations adopted thereunder, and the provisions of the CWA and regulations adopted thereunder, must each comply with the following:

A. PROHIBITIONS AND RECEIVING WATER LIMITATIONS

1. Discharges into and from MS4s in a manner causing, or threatening to cause, a condition of pollution, contamination, or nuisance (as defined in CWC section 13050), in receiving waters of the state are prohibited.[3]

2. Storm water discharges from MS4s containing pollutants which have not been reduced to the MEP are prohibited.[3]

3. Discharges from MS4s that cause or contribute to the violation of water quality standards (designated beneficial uses, water quality objectives developed to protect beneficial uses, and the State policy with respect to maintaining high quality waters) are prohibited.

a. Each Copermittee must comply with section A.3 and section A.4 as it applies to Prohibition 5 in Attachment A of this Order through timely implementation of control measures and other actions to reduce pollutants in storm water discharges in accordance with this Order, including any modifications. If exceedance(s) of water quality standards persist notwithstanding implementation of this Order, the Copermittee must assure compliance with section A.3 and section A.4 as it applies to Prohibition 5 in Attachment A of this Order by complying with the following procedure:

(1) Upon a determination by either the Copermittee or the San Diego Water Board that storm water MS4 discharges are causing or contributing to an exceedance of an applicable water quality standard, the Copermittee must notify the San Diego Water Board within 30 days and thereafter submit a report to the San Diego Water Board that describes best management practices (BMPs) that are currently being implemented and additional BMPs that will be implemented to prevent or reduce any pollutants that are causing or contributing to the exceedance of water quality standards. The report may be incorporated in the Annual Report unless the San Diego Water Board[4] directs an earlier submittal. The report must include an

[3] This prohibition does not apply to MS4 discharges which receive subsequent treatment to reduce pollutants in storm water discharges to the MEP prior to entering receiving waters (e.g., low flow diversions to the sanitary sewer). Runoff treatment and/or mitigation must occur prior to the discharge of runoff into receiving waters per finding E.7.

[4] The San Diego Water Board by prior resolution has delegated all matters that may legally be delegated to its Executive Officer to act on its behalf pursuant to CWC §13223. Therefore, the Executive Officer is

implementation schedule. The San Diego Water Board may require modifications to the report

(2) Submit any modifications to the report required by the San Diego Water Board within 30 days of notification;

(3) Within 30 days following acceptance of the report described above by the San Diego Water Board, the Copermittee must revise its JRMP and monitoring program to incorporate the approved modified BMPs that have been and will be implemented, the implementation schedule, and any additional monitoring required; and

(4) Implement the revised JRMP and monitoring program in accordance with the approved schedule.

b. The Copermittee must repeat the procedure set forth above to comply with the receiving water limitations for continuing or recurring exceedances of the same water quality standard(s) following implementation of scheduled actions unless directed to do otherwise by the San Diego Water Board's Executive Officer.

c. Nothing in section A.3 prevents the San Diego Water Board from enforcing any provision of this Order while the Copermittee prepares and implements the above report.

4. In addition to the above prohibitions, discharges from MS4s are subject to all Basin Plan prohibitions cited in Attachment A to this Order.

B. NON-STORM WATER DISCHARGES

1. Each Copermittee must effectively prohibit all types of non-storm water discharges into its MS4 unless such discharges are either authorized by a separate NPDES permit; or not prohibited in accordance with sections B.2 and B.3 below.

2. The following categories of non-storm water discharges are not prohibited unless a Copermittee or the San Diego Water Board identifies the discharge category as a source of pollutants to waters of the U.S. Where the Copermittee(s) have identified a category as a source of pollutants, the category must be addressed as an illicit discharge and prohibited through ordinance, order or similar means. The San Diego Water Board may identify categories of discharge that either require prohibition, or other controls for non-anthropogenic sources. For a discharge category determined to be a source of pollutants, the Copermittee, under direction of the San Diego Water Board, must either prohibit the discharge category or develop and implement

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authorized to act on the San Diego Water Board's behalf on any matter within this Order unless such delegation is unlawful under CWC §13223 or this Order explicitly states otherwise.

appropriate control measures for non-anthropogenic sources to prevent the discharge of pollutants to the MS4 and report to the San Diego Water Board pursuant to Section K.1 and K.3 of this Order. The discharge categories are:

a. Diverted stream flows;
b. Rising ground waters;
c. Uncontaminated ground water infiltration [as defined at 40 CFR 35.2005(20)] to MS4s;
d. Uncontaminated pumped ground water[5];
e. Foundation drains[5];
f. Springs;
g. Water from crawl space pumps[5];
h. Footing drains[5];
i. Air conditioning condensation;
j. Flows from riparian habitats and wetlands;
k. Water line flushing[6,7];
l. Discharges from potable water sources not subject to NPDES Permit No. CAG679001, other than water main breaks;
m. Individual residential car washing; and
n. Dechlorinated swimming pool discharges[8].

3. Emergency fire fighting flows (i.e., flows necessary for the protection of life or property) do not require BMPs and need not be prohibited.

a. As part of the JRMP, each Copermittee must develop and implement a program to address pollutants from non-emergency fire fighting flows (i.e., flows from controlled or practice blazes and maintenance activities) identified as significant sources of pollutants to waters of the U.S.
b. Building fire suppression system maintenance discharges (e.g. sprinkler line flushing) contain waste. Therefore, such discharges are to be prohibited by the Copermittees as illicit discharges through ordinance, order, or similar means.

4. Each Copermittee must examine all dry weather effluent analytical monitoring results collected in accordance with section F.4 of this Order and Receiving Waters and MS4 Discharge Monitoring and Reporting Program No. R9-2010-0016 to identify water quality problems which may be the result of any non-prohibited discharge category(ies) identified above in section B.2. Follow-up investigations must be conducted to identify and control, pursuant to section B.2, any non-prohibited discharge category(ies) listed above.

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[5] Requires enrollment under Order R9-2008-002. Discharges into the MS4 require authorization from the owner and operator of the MS4 system.
[6] This exemption does not include fire suppression sprinkler system maintenance and testing discharges. Those discharges may be regulated under Section B.3.
[7] Requires enrollment under Order R9-2002-0020.
[8] Excluding saline swimming pool discharges.

C. NON-STORM WATER DRY WEATHER ACTION LEVELS

1. Each Copermittee, beginning no later than July 1, 2012, must implement the non-storm water dry weather action level (NAL) monitoring as described in Attachment E of this Order.

2. In response to an exceedance of an NAL, the Copermittee(s) having jurisdiction must investigate and identify the source of the exceedance in a timely manner. However, if any Copermittee identifies a number of NAL exceedances that prevents it from adequately conducting source investigations at all sites in a timely manner, then that Copermittee may submit a prioritization plan and timeline that identifies the timeframe and planned actions to investigate and report its findings on all of the exceedances. Depending on the source of the pollutant exceedance, the Copermittee(s) having jurisdiction must take action as follows:

a. If the Copermittee identifies the source of the exceedance as natural (non-anthropogenically influenced) in origin and in conveyance into the MS4; then the Copermittee must report its findings and documentation of its source investigation to the San Diego Water Board in its Annual Report.

b. If the Copermittee identifies the source of the exceedance as an illicit discharge or connection, then the Copermittee must eliminate the discharge to its MS4 pursuant to Section F.4.f and report the findings, including any enforcement action(s) taken, and documentation of the source investigation to the San Diego Water Board in the Annual Report. If the Copermittee is unable to eliminate the source of discharge prior to the Annual Report submittal, then the Copermittee must submit, as part of its Annual Report, its plan and timeframe to eliminate the source of the exceedance. Those dischargers seeking to continue such a discharge must become subject to a separate NPDES permit prior to continuing any such discharge.

c. If the Copermittee identifies the source of the exceedance as an exempted category of non-storm water discharge, then the Copermittees must determine if this is an isolated circumstance or if the category of discharges must be addressed through the prevention or prohibition of that category of discharge as an illicit discharge. The Copermittee must submit its findings including a description of the steps taken to address the discharge and the category of discharge, to the San Diego Water Board for review in its Annual Report. Such description must include relevant updates to or new ordinances, orders, or other legal means of addressing the category of discharge, and the anticipated schedule for doing so. The Copermittees must also submit a summary of its findings with the Report of Waste Discharge.

d. If the Copermittee identifies the source of the exceedance as a non-storm water discharge in violation or potential violation of an existing separate NPDES permit

(e.g. the groundwater dewatering permit), then the Copermittee must report, within three business days, the findings to the San Diego Water Board including all pertinent information regarding the discharger and discharge characteristics.

e. If the Copermittee is unable to identify the source of the exceedance after taking and documenting reasonable steps to do so, then the Copermittee must perform additional focused sampling. If the results of the additional sampling indicate a recurring exceedance of NALs with an unidentified source, then the Copermittee must update its programs within a year to address the common contributing sources that may be causing such an exceedance. The Copermittee's annual report must include these updates to its programs including, where applicable, updates to their watershed workplans (Section G.2), retrofitting consideration (Section F.3.d) and program effectiveness work plans (Section J.4).

f. The Copermittees or any interested party, may evaluate existing NALs and propose revised NALs for future Board consideration.

3. NALs can help provide an assessment of the effectiveness of the prohibition of non-storm water discharges and of the appropriateness of exempted non-storm water discharges. An exceedance of an NAL does not alone constitute a violation of the provisions of this Order. An exceedance of an NAL may indicate a lack of compliance with the requirement that Copermittees effectively prohibit all types of unauthorized non-storm water discharges into the MS4 or other prohibitions set forth in Sections A and B of this Order. Failure to timely implement required actions specified in this Order following an exceedance of an NAL constitutes a violation of this Order. Neither the absence of exceedances of NALs nor compliance with required actions following observed exceedances, excuses any non-compliance with the requirement to effectively prohibit all types of unauthorized non-storm water discharges into the MS4s or any non-compliance with the prohibitions in Sections A and B of this Order. During any annual reporting period in which one or more exceedances of NALs have been documented the Copermittee must report in response to Section C.2 above, a description of whether and how the observed exceedances did or did not result in a discharge from the MS4 that caused, or threatened to cause or contribute to a condition of pollution, contamination, or nuisance in the receiving waters.

4. Monitoring of effluent will occur at the end-of-pipe prior to discharge into the receiving waters, with a focus on Major Outfalls, as defined in 40 CFR 122.26(B 5-6) and Attachment E of this Order. The Copermittees must develop their monitoring plans to sample a representative percentage of major outfalls and identified stations within each hydrologic subarea. At a minimum, outfalls that exceed any NALs once during any year must be monitored in the subsequent year. Any station that does not exceed an NAL, or only has exceedances that are identified as natural in origin and conveyance into the MS4 pursuant to Section C.2.a, for 3 successive years may be replaced with a different station.

5. Each Copermittee must monitor for the non-storm water dry weather action levels, which are incorporated into this Order as follows:

a. Action levels for discharges to inland surface waters:

Table 3.a.1: General Constituents

Parameter	Units	AMAL	MDAL	Instantaneous Maximum	Basis
Fecal Coliform	MPN/ 100 ml	200[A] 400[B]	-		BPO
Enterococci	MPN/ 100 ml	33	-	61[C]	BPO
Turbidity	NTU	-	20		BPO
pH	Units	Within limit of 6.5 to 8.5 at all times			BPO
Dissolved Oxygen	mg/L	Not less than 5.0 in WARM waters and not less than 6.0 in COLD waters			BPO
Total Nitrogen	mg/L	-	1.0	See MDAL	BPO
Total Phosphorus	mg/L	-	0.1	See MDAL	BPO
Methylene Blue Active Substances	mg/L	-	0.5	See MDAL	BPO
Iron	mg/L	-	0.3	See MDAL	BPO
Manganese	mg/L	-	0.05	See MDAL	BPO

A – Based on a minimum of not less than five samples for any 30-day period
B – No more than 10 percent of total samples may exceed 400 per 100 ml during any 30 day period
C – This Value has been set to Basin Plan Criteria for Designated Beach Areas
BPO – Basin Plan Objective
MDAL – Maximum Daily Action Level AMAL – Average Monthly Action Level

Table 3.a.2: Priority Pollutants

		Freshwater (CTR)	
Parameter	Units	MDAL	AMAL
Cadmium	ug/L	**	**
Copper	ug/L	*	*
Chromium III	ug/L	**	**
Chromium VI (hexavalent)	ug/L	16	8.1
Lead	ug/L	*	*
Nickel	ug/L	**	**
Silver	ug/L	*	*
Zinc	ug/L	*	*

CTR – California Toxic Rule
*- Action Levels developed on a case-by-case basis (see below)
**- Action Levels developed on a case-by-case basis (see below), but calculated criteria are not to exceed Maximum Contaminant Levels under the California Code of Regulations[9]

The NALs for Cadmium, Copper, Chromium (III), Lead, Nickel, Silver and Zinc will be developed on a case-by-case basis because the freshwater criteria are based on

[9] California Code of Regulations, Title 22, Division 4, Chapter 15, Article 4, Section 64431.

site-specific water quality data (receiving water hardness). For these priority pollutants, the following equations (40 CFR 131.38.b.2) will be required:

Cadmium (Total Recoverable)	= exp(0.7852[ln(hardness)] -2.715)
Chromium III (Total Recoverable)	= exp(0.8190[ln(hardness)] + .6848)
Copper (Total Recoverable)	= exp(0.8545[ln(hardness)] - 1.702)
Lead (Total Recoverable)	= exp(1.273[ln(hardness)] - 4.705)
Nickel (Total Recoverable)	= exp(.8460[ln(hardness)] + 0.0584)
Silver (Total Recoverable)	= exp(1.72[ln(hardness)] - 6.52)
Zinc (Total Recoverable)	= exp(0.8473[ln(hardness)] + 0.884)

D. STORM WATER ACTION LEVELS

1. The Copermittees must implement the Wet Weather MS4 Discharge Monitoring as described in Attachment E of this Order, and beginning three years after the Order adoption date, the Copermittees must annually evaluate their data compared to the Stormwater Action Levels (SALs). At each monitoring station, a running average of twenty percent or greater of exceedances of any discharge of storm water from the MS4 to waters of the U.S. that exceed the SALs for each of the pollutants listed in Table 4 (below) requires the Copermittee(s) having jurisdiction to affirmatively augment and implement all necessary storm water controls and measures to reduce the discharge of the associated class of pollutants(s) to the MEP. The Copermittees must utilize the exceedance information when adjusting and executing annual work plans, as required by this Order. Copermittees must take the magnitude, frequency, and number of constituents exceeding the SAL(s), in addition to receiving water quality data and other information, into consideration when prioritizing and reacting to SAL exceedances in an iterative manner. Failure to appropriately consider and react to SAL exceedances in an iterative manner creates a presumption that the Copermittee(s) have not reduced pollutants in storm water discharges to the MEP.

Table 4. Storm Water Action Levels

Pollutant	Action Level
Turbidity (NTU)	126
Nitrate & Nitrite total (mg/L)	2.6
P total (mg/L)	1.46
Cd total (µg/L)	3.0
Cu total (µg/L)	127
Pb total (µg/L)	250
Zn total (µg/L)	976

2. The end-of-pipe assessment points for the determination of SAL compliance are all major outfalls, as defined in 40 CFR 122.26(b)(5) and (b)(6). The Copermittees must develop their monitoring plans to sample a representative percentage of the major outfalls within each hydrologic subarea. At a minimum, outfalls that exceed SALs must be monitored in the subsequent year. Any station that does not exceed

an SAL for 3 successive years may be replaced with a different station. SAL samples must be 24 hour time-weighted composites.

3. The absence of SAL exceedances does not relieve the Copermittees from implementing all other required elements of this Order.

4. This Order does not regulate natural sources and conveyances into the MS4 of constituents listed in Table 5. To be relieved of the requirements to take action as described in D.1 above, the Copermittee must demonstrate that the likely and expected cause of the SAL exceedance is not anthropogenic in nature. This demonstration does not need to be repeated for subsequent exceedances of the same SAL at the same monitoring station.

5. The SALs will be reviewed and updated at the end of every permit cycle. The data collected pursuant to D.2 above and Attachment E can be used to create SALs based upon local data. The purpose of establishing the SALs is that through the iterative and MEP process, outfall storm water discharges will meet all applicable water quality standards.

E. LEGAL AUTHORITY

1. Each Copermittee must establish, maintain, and enforce adequate legal authority to control pollutant discharges into and from its MS4 through ordinance, statute, permit, contract or similar means. Nothing herein shall authorize a Copermittee or other discharger regulated under the terms of this order to divert, store or otherwise impound water if such action is reasonably anticipated to harm downstream water rights holders in the exercise of their water rights. This legal authority must, at a minimum, authorize the Copermittee to:

a. Control the contribution of pollutants in discharges of runoff associated with industrial and construction activity to its MS4 and control the quality of runoff from industrial and construction sites. This requirement applies both to industrial and construction sites which have coverage under the statewide general industrial or construction storm water permits, as well as to those sites which do not. Grading ordinances must be updated and enforced as necessary to comply with this Order;

b. Prohibit all identified illicit discharges not otherwise allowed pursuant to section B.2;

c. Prohibit and eliminate illicit connections to the MS4;

d. Control the discharge of spills, dumping, or disposal of materials other than storm water to its MS4;

e. Require compliance with conditions in Copermittee ordinances, permits, contracts or orders (i.e., hold dischargers to its MS4 accountable for their contributions of pollutants and flows);

f. Utilize enforcement mechanisms to require compliance with Copermittee storm

water ordinances, permits, contracts, or orders;

g. Control the contribution of pollutants from one portion of the shared MS4 to another portion of the MS4 through interagency agreements among Copermittees.

h. Control of the contribution of pollutants from one portion of the shared MS4 to another portion of the MS4 through interagency agreements with other owners of the MS4 such as the State of California Department of Transportation, the U.S. federal government, or sovereign Native American Tribes is encouraged;

i. Carry out all inspections, surveillance, and monitoring necessary to determine compliance and noncompliance with local ordinances and permits and with this Order, including the prohibition on illicit discharges to the MS4. This means the Copermittee must have authority to enter, monitor, inspect, take measurements, review and copy records, and require regular reports from industrial facilities discharging into its MS4, including construction sites;

j. Require the use of BMPs to prevent or reduce the discharge of pollutants into MS4s from storm water to the MEP; and

k. Require documentation on the effectiveness of BMPs implemented to reduce the discharge of storm water pollutants to the MS4 to the MEP.

2. Each Copermittee must submit on or before June 30, 2012, a statement certified by its chief legal counsel that the Copermittee has taken the necessary steps to obtain and maintain full legal authority to implement and enforce each of the requirements contained in 40 CFR 122.26(d)(2)(i)(A-F) and this Order. These statements must include:

a. Citation of runoff related ordinances and the reasons they are enforceable;

b. Identification of the local administrative and legal procedures available to mandate compliance with runoff related ordinances and therefore with the conditions of this Order, and a statement as to whether enforcement actions can be completed administratively or whether they must be commenced and completed in the judicial system; and

c. A brief description of how runoff related ordinances are adopted and the process by which they may be challenged.

F. JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM (JRMP)

Each Copermittee must implement all requirements of section F of this Order no later than July 1, 2012, unless otherwise specified. Upon adoption of this Order and until an updated JRMP is developed and implemented or July 1, 2012, whichever occurs first,, each Copermittee must at a minimum implement its JRMP document, as the document was developed and amended to comply with the requirements of Order No. R9-2004-001.

Each Copermittee must develop and implement an updated JRMP for its jurisdiction no later than July 1, 2012. Each updated JRMP must meet the requirements of section F

of this Order, reduce the discharge of storm water pollutants from the MS4 to the MEP, effectively prohibit non-storm water discharges, and prevent runoff discharges from the MS4 from causing or contributing to a violation of water quality standards. In addition, each Copermittee's JRMP must identify all departments and positions within its jurisdiction that conduct runoff related activities, and their roles and responsibilities under this Order. This identification must include an up to date organizational chart specifying these departments and key personnel.

1. DEVELOPMENT PLANNING COMPONENT

Each Copermittee must implement a program which meets the requirements of this section and (1) reduces Development Project discharges of storm water pollutants from the MS4 to the MEP; (2) prevents Development Project discharges from the MS4 from causing or contributing to a violation of water quality standards; (3) prevents illicit discharges into the MS4; and (4) manages increases in runoff discharge rates and durations from Development Projects that are likely to cause increased erosion of stream beds and banks, silt pollutant generation, or other impacts to beneficial uses and stream habitat due to increased erosive force.

a. GENERAL PLAN

Each Copermittee must revise as needed its General Plan or equivalent plan (e.g., Comprehensive, Master, or Community Plan) to include water quality and watershed protection principles and policies that direct land-use decisions and require implementation of consistent water quality protection measures for all development, redevelopment, and retrofit projects. Examples of water quality and watershed protection principles and policies to be considered include the following:

(1) Minimize the amount of impervious surfaces and directly connected impervious surfaces in areas of new development and redevelopment and where feasible slow runoff and maximize on-site infiltration of runoff.

(2) Implement pollution prevention methods supplemented by pollutant source controls and treatment BMPs. Use small collection strategies located at, or as close as possible to, the source (i.e., the point where water initially meets the ground) to minimize the transport of urban runoff and pollutants offsite and into an MS4.

(3) Preserve, and where possible, create, or restore areas that provide important water quality benefits, such as riparian corridors, wetlands, and buffer zones. Encourage land acquisition of such areas.

(4) Limit disturbances of natural water bodies and natural drainage systems caused by development including roads, highways, and bridges.

(5) Prior to making land use decisions, utilize methods available to estimate increases in pollutant loads and flows resulting from projected future development. Require incorporation of BMPs to mitigate the projected increases in pollutant loads and flows.

(6) Avoid development of areas that are particularly susceptible to erosion and sediment loss; or establish development guidance that identifies these areas and protects them from erosion and sediment loss.

(7) Reduce pollutants associated with vehicles and increasing traffic resulting from development.

(8) Post-development runoff from a site must not contain pollutant loads that cause or contribute to an exceedance of receiving water quality objectives and which have not been reduced to the MEP.

b. ENVIRONMENTAL REVIEW PROCESS

Each Copermittee must revise as needed its current environmental review processes to accurately evaluate water quality impacts and cumulative impacts and identify appropriate measures to avoid, minimize, and mitigate those impacts for all Development Projects.

c. APPROVAL PROCESS CRITERIA AND REQUIREMENTS FOR ALL DEVELOPMENT PROJECTS

For all proposed Development Projects, each Copermittee, during the planning process, and prior to project approval and issuance of local permits, must prescribe the necessary requirements so that Development Project discharges of storm water pollutants from the MS4 will be reduced to the MEP, will not cause or contribute to a violation of water quality standards, and will comply with the Copermittee's ordinances, permits, plans, and requirements, and with this Order.

Performance Criteria: Discharges from each approved development project must be subject to the following management measures:

(1) Source control BMPs that reduce storm water pollutants of concern in runoff; prevent illicit discharges into the MS4; prevent irrigation runoff; storm drain system stenciling or signage; properly design outdoor material storage areas; properly design outdoor work areas; and properly design trash storage areas.

(2) The following LID BMPs listed below must be implemented at all Development Projects where applicable and feasible.

(a) Conserve natural areas, including existing trees, other vegetation, and soils,
(b) Construct streets, sidewalks, or parking lot aisles to the minimum widths necessary, provided that public safety is not compromised,
(c) Minimize the impervious footprint of the project,
(d) Minimize soil compaction to landscaped areas,
(e) Minimize disturbances to natural drainages (e.g., natural swales, topographic depressions, etc.), and
(f) Disconnect impervious surfaces through distributed pervious areas.

(3) Buffer zones for natural water bodies, where technically feasible. Where buffer zones are technically infeasible, require project proponent to implement other buffers such as trees, access restrictions, etc;

(4) Other measures necessary so that grading or other construction activities meet the provisions specified in section F.2 of this Order.

(5) Submittal of documentation of a mechanism under which ongoing long-term maintenance of all structural post-construction BMPs will be conducted.

(6) Infiltration and Groundwater Protection

To protect groundwater quality, each Copermittee must apply restrictions to the use of treatment control BMPs that are designed to primarily function as large, centralized infiltration devices (such as large infiltration trenches and infiltration basins). Such restrictions must be designed so that the use of such infiltration treatment control BMPs does not cause or contribute to an exceedance of groundwater quality objectives. At a minimum, each treatment control BMP designed to primarily function as a centralized infiltration device must meet the restrictions below, unless the Development Project demonstrates to the Copermittee that a restriction is not necessary to protect groundwater quality. The Copermittees may collectively or individually develop alternative restrictions on the use of treatment control BMPs which are designed to primarily function as centralized infiltration devices. Alternative restrictions developed by the Copermittees can partially or wholly replace the restrictions listed below. The restrictions do not apply to small infiltration systems dispersed throughout a development project.

(a) Runoff must undergo pretreatment such as sedimentation or filtration prior to infiltration;

(b) All dry weather flows containing significant pollutant loads must be diverted from infiltration devices and treated through other BMPs;

(c) Pollution prevention and source control BMPs must be implemented at a level appropriate to protect groundwater quality at sites where infiltration

treatment control BMPs are to be used;

(d) Infiltration treatment control BMPs must be adequately maintained so that they remove storm water pollutants to the MEP;

(e) The vertical distance from the base of any infiltration treatment control BMP to the seasonal high groundwater mark must be at least 10 feet. Where groundwater basins do not support beneficial uses, this vertical distance criteria may be reduced, provided groundwater quality is maintained;

(f) The soil through which infiltration is to occur must have physical and chemical characteristics (such as appropriate cation exchange capacity, organic content, clay content, and infiltration rate) which are adequate for proper infiltration durations and treatment of runoff for the protection of groundwater beneficial uses;

(g) Infiltration treatment control BMPs must not be used for areas of industrial or light industrial activity; and other high threat to water quality land uses and activities as designated by each Copermittee unless first treated or filtered to remove pollutants prior to infiltration; and

(h) Infiltration treatment control BMPs must be located a minimum of 100 feet horizontally from any water supply wells.

(7) Where feasible, landscaping with native or low water species shall be preferred in areas that drain to the MS4 or to waters of the U.S.

(8) Rain water harvesting, where feasible, must be implemented as part of the site design and construction, and to supplement offsite beneficial uses.

d. STANDARD STORM WATER MITIGATION PLANS (SSMPS) – APPROVAL PROCESS CRITERIA AND REQUIREMENTS FOR PRIORITY DEVELOPMENT PROJECTS

On or before June 30, 2012, the Copermittees must submit an updated SSMP, to the San Diego Water Board's Executive Officer for a 30 day public review and comment period. The San Diego Water Board's Executive Officer has the discretion to determine whether to hold a public hearing or to limit public input to written comments. Within 180 days of determination that the SSMP is in compliance with this Order's provisions, each Copermittee must amend its local ordinances consistent with the updated SSMP, and begin implementing the updated SSMP. Any updated local ordinances must be submitted to the San Diego Water Board with the Annual Report. The SSMP must meet the requirements of section F.1.d of this Order to (1) reduce Priority Development Project discharges of storm water pollutants from the MS4 to the MEP, and (2)

prevent Priority Development Project runoff discharges from the MS4 from causing or contributing to a violation of water quality standards.[10]

(1) Definition of Priority Development Project:

Priority Development Projects are:

(a) All new Development Projects that fall under the project categories or locations listed in section F.1.d.(2), and

(b) Those redevelopment projects that create, add, or replace at least 5,000 square feet of impervious surfaces on an already developed site and the existing development and/or the redevelopment project falls under the project categories or locations listed in section F.1.d.(2). Where redevelopment results in an increase of less than fifty percent of the impervious surfaces of a previously existing development, and the existing development was not subject to SSMP requirements, the numeric sizing criteria discussed in section F.1.d.(6) applies only to the addition or replacement, and not to the entire development. Where redevelopment results in an increase of more than fifty percent of the impervious surfaces of a previously existing development, the numeric sizing criteria applies to the entire development.

(c) One acre threshold: In addition to the Priority Development Project Categories identified in section F.1.d.(2), Priority Development Projects must also include all other post-construction pollutant-generating new Development Projects that result in the disturbance of one acre or more of land by July 1, 2012.[11]

[10] Updated SSMP and hydromodification requirements must apply to all priority projects or phases of priority projects which have not yet begun grading or construction activities at the time any updated SSMP or hydromodification requirement commences. If lawful prior approval of a project exists, whereby application of an updated SSMP or hydromodification requirement to the project is illegal, the updated SSMP or hydromodification requirement need not apply to the project. Updated Development Planning requirements set forth in Sections F.1. (a) through (h) of this Order must apply to all projects or phases of projects, unless, at the time any updated Development Planning requirement commences, the projects or project phases meet any one of the following conditions: (i) the project or phase has begun grading or construction activities; or (ii) a Copermittee determines that lawful prior approval rights for a project or project phase exist, whereby application of the Updated Development Planning requirement to the project is legally infeasible. Where feasible, the Permittees must utilize the SSMP and hydromodification update periods to ensure that projects undergoing approval processes include application of the updated SSMP and hydromodification requirements in its plans.

[11] Pollutant generating Development Projects are those projects that generate pollutants at levels greater than natural background levels.

(2) Priority Development Project Categories

Where a new Development Project feature, such as a parking lot, falls into a Priority Development Project Category, the entire project footprint is subject to SSMP requirements.

(a) New development projects that create 10,000 square feet or more of impervious surfaces (collectively over the entire project site) including commercial, industrial, residential, mixed-use, and public projects. This category includes development projects on public or private land which fall under the planning and building authority of the Copermittees.

(b) Automotive repair shops. This category is defined as a facility that is categorized in any one of the following Standard Industrial Classification (SIC) codes: 5013, 5014, 5541, 7532-7534, or 7536-7539.

(c) Restaurants. This category is defined as a facility that sells prepared foods and drinks for consumption, including stationary lunch counters and refreshment stands selling prepared foods and drinks for immediate consumption (SIC code 5812), where the land area for development is greater than 5,000 square feet. Restaurants where land development is less than 5,000 square feet must meet all SSMP requirements except for structural treatment BMP and numeric sizing criteria requirement F.1.d.(6) and hydromodification requirement F.1.h.

(d) All hillside development greater than 5,000 square feet. This category is defined as any development which creates 5,000 square feet of impervious surface which is located in an area with known erosive soil conditions, where the development will grade on any natural slope that is twenty-five percent or greater.

(e) Environmentally Sensitive Areas (ESAs). All development located within, or directly adjacent to, or discharging directly to an ESA (where discharges from the development or redevelopment will enter receiving waters within the ESA), which either creates 2,500 square feet of impervious surface on a proposed project site or increases the area of imperviousness of a proposed project site to 10 percent or more of its naturally occurring condition. “Directly adjacent” means situated within 200 feet of the ESA. “Discharging directly to” means outflow from a drainage conveyance system that is composed entirely of flows from the subject development or redevelopment site, and not commingled with flows from adjacent lands.

(f) Impervious parking lots 5,000 square feet or more and potentially exposed to runoff. Parking lot is defined as a land area or facility for the temporary parking or storage of motor vehicles used personally, for business, or for commerce.

(g) Street, roads, highways, and freeways. This category includes any paved impervious surface that is 5,000 square feet or greater used for the transportation of automobiles, trucks, motorcycles, and other vehicles. To the extent that the Copermittees develop revised standard roadway design and post-construction BMP guidance that comply with the provisions of Section F.1 of the Order, then public works projects that implement the revised standard roadway sections do not have to develop a project specific SSMP. The standard roadway design and post-construction BMP guidance must be submitted with the Copermittee's updated SSMP.

(h) Retail Gasoline Outlets (RGOs). This category includes RGOs that meet the following criteria: (a) 5,000 square feet or more or (b) a projected Average Daily Traffic (ADT) of 100 or more vehicles per day.

(3) Pollutants of Concern

As part of its local SSMP, each Copermittee must implement an updated procedure for identifying pollutants of concern for each Priority Development Project. The procedure must address, at a minimum: (1) Receiving water quality (including pollutants for which receiving waters are listed as impaired under CWA section 303(d)); (2) Land-use type of the Development Project and pollutants associated with that land use type; and (3) Pollutants expected to be present on site.

(4) Low Impact Development BMP Requirements

Each Copermittee must require each Priority Development Project to implement LID BMPs which will collectively minimize directly connected impervious areas, limit loss of existing infiltration capacity, and protect areas that provide important water quality benefits necessary to maintain riparian and aquatic biota, and/or are particularly susceptible to erosion and sediment loss.

(a) The Copermittees must take the following measures to ensure that LID BMPs are implemented at Priority Development Projects:

(i) Each Copermittee must require LID BMPs or make a finding of technical infeasibility for each Priority Development Project in accordance with the LID waiver program in Section F.1.d.(7);

(ii) Each Copermittee must incorporate formalized consideration, such as thorough checklists, ordinances, and/or other means, of LID

BMPs into the plan review process for Priority Development Projects;

(iii) On or before July 1, 2012, each Copermittee must review its local codes, policies, and ordinances and identify barriers therein to implementation of LID BMPs. Following the identification of these barriers to LID implementation, where feasible, the Copermittee must take, by the end of the permit cycle, appropriate actions to remove such barriers. The Copermittees must include this review with the updated JRMP.

(b) The following LID BMPs must be implemented at each Priority Development Project:

(i) Maintain or restore natural storage reservoirs and drainage corridors (including depressions, areas of permeable soils, swales, and ephemeral and intermittent streams) to the extent feasible[12].

(ii) Projects with landscaped or other pervious areas must, where feasible, properly design and construct the pervious areas to effectively receive and infiltrate, retain and/or treat runoff from impervious areas, prior to discharge to the MS4. Soil compaction for these areas must be minimized. The amount of the impervious areas that are to drain to pervious areas must be based upon the total size, soil conditions, slope, and other pertinent factors.

(iii) Projects with low traffic areas and appropriate soil conditions must construct walkways, trails, overflow parking lots, alleys, or other low-traffic areas with permeable surfaces, such as pervious concrete, porous asphalt, unit pavers, and granular materials.

(c) LID BMPs sizing criteria:

(i) LID BMPs must be sized and designed to ensure onsite retention without runoff, of the volume of runoff produced from a 24-hour 85th percentile storm event[13] ("design capture volume");

(ii) If onsite infiltration LID BMPs are technically infeasible per section F.1.d.(7)(b), other LID BMPs may treat any volume that is not retained onsite provided that the other LID BMPs are sized to hold

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[12] Priority Development Projects proposing to dredge or fill materials in waters of the U.S. and/or waters of the State must obtain a CWA §401 Water Quality Certification and/or Waste Discharge Requirements.

[13] This volume is not a single volume to be applied to all of Riverside County. The size of the 85th percentile storm event is different for various parts of the County. The Copermittees are encouraged to calculate the 85th percentile storm event for each of its jurisdictions using local rain data pertinent to its particular jurisdiction (0.6 inch standard is a rough average for the County and should only be used where appropriate rain data is not available). In addition, isopluvial maps may be used to extrapolate rainfall data to areas where insufficient data exists in order to determine the volume of the local 85th percentile storm event in such areas. Where the Copermittees will use isopluvial maps to determine the 85th percentile storm event in areas lacking rain data, the Copermittees must describe their method for using isopluvial maps in its SSMPs.

the design storm volume that is not infiltrated. The LID BMPs must be designed for an appropriate surface loading rate to prevent erosion, scour and channeling within the BMP.

(d) If it is shown to be technically infeasible per Section F.1.d.(7)(b) to retain and/or treat the remaining volume up to and including the design capture volume using LID BMPs, then the project must implement conventional treatment control BMPs in accordance with Section F.1.d.(6) below and must participate in the LID waiver program in Section F.1.d.(7).

(e) All LID BMPs must be designed and implemented with measures to avoid the creation of nuisance or pollution associated with vectors, such as mosquitoes, rodents, and flies.

(5) Source Control BMP Requirements

Each Copermittee must require each Priority Development Project to implement applicable source control BMPs. The source control BMPs to be required must:

(a) Prevent illicit discharges into the MS4;
(b) Minimize storm water pollutants of concern in runoff;
(c) Eliminate irrigation runoff;
(d) Include storm drain system stenciling or signage;
(e) Include properly designed outdoor material storage areas;
(f) Include properly designed outdoor work areas;
(g) Include properly designed trash storage areas;
(h) Include water quality protection requirements applicable to individual priority project categories.

(6) Treatment Control BMP Requirements

Each Copermittee must require each Priority Development Project that meets the Copermittee's technical infeasibility criteria in Section F.1.d(7) below, to implement conventional treatment control BMPs to treat the portion of the "design capture volume" that was not treated by LID BMPs per Section F.1.d(4) above. Conventional treatment control BMPs must meet the following requirements:

(a) All treatment control BMPs for a single Priority Development Project must collectively be sized to comply with the following numeric sizing criteria:

(i) Volume-based treatment control BMPs must be designed to mitigate (infiltrate, filter, or treat) the remaining portion of the design capture volume that was not retained and/or treated with LID BMPs; or

(ii) Flow-based treatment control BMPs must be designed to mitigate (filter, or treat) either: a) the maximum flow rate of runoff produced from a rainfall intensity of 0.2 inch of rainfall per hour, for each hour of a storm event; or b) the maximum flow rate of runoff produced by the 85th percentile hourly rainfall intensity (for each hour of a storm event), as determined from the local historical rainfall record, multiplied by a factor of two.

(b) All treatment control BMPs for Priority Development Projects must, at a minimum:

(i) Be ranked with high or medium pollutant removal efficiency for the project's most significant pollutants of concern, as the pollutant removal efficiencies are identified in the Copermittees' SSMP. Treatment control BMPs with a low removal efficiency ranking must only be approved by a Copermittee when a feasibility analysis has been conducted which exhibits that implementation of treatment control BMPs with high or medium removal efficiency rankings are infeasible for a Priority Development Project or portion of a Priority Development Project.

(ii) Be correctly sized and designed so as to remove storm water pollutants to the MEP.

(c) Target removal of pollutants of concern from runoff.

(d) Be implemented close to pollutant sources, and prior to discharging into waters of the U.S.

(e) Include proof of a mechanism under which ongoing long-term maintenance will be conducted to ensure proper maintenance for the life of the project. The mechanisms may be provided by the project proponent or Copermittee.

(f) Be designed and implemented with measures to avoid the creation of nuisance or pollution associated with vectors, such as mosquitoes, rodents, and flies.

(7) Low Impact Development (LID) BMP Waiver Program

The Copermittees must develop, collectively or individually, a LID waiver program for incorporation into the SSMP, which would allow a Priority Development Project to substitute implementation of all or a portion of required LID BMPs in Section F.1.d(4) with implementation of treatment control BMPs and either 1) on-site mitigation, 2) an off-site mitigation project, and/or 3) other mitigation developed by the Copermittees. The Copermittees

must submit the LID waiver program as part of their updated SSMP. At a minimum, the program must meet the requirements below:

(a) Prior to implementation, the LID waiver program must clearly exhibit that it will not allow Priority Development Projects to result in a net impact (after consideration of any mitigation) from pollutant loadings over and above the impact caused by projects meeting LID requirements;

(b) For each Priority Development Project participating, the Copermittee must find that it is technically infeasible to implement LID BMPs that comply with the requirements of Section F.1.(d)(4). The Copermittee(s) must develop criteria to determine the technical feasibility of implementing LID BMPs . Each Priority Development Project participating must demonstrate that LID BMPs were implemented as much as feasible given the site's unique conditions. Technical infeasibility may result from conditions including, but not limited to:

(i) Locations that cannot meet the infiltration and groundwater protection requirements in section F.1.c.(6) for large, centralized infiltration BMPs. Where infiltration is technically infeasible, the project must still examine the feasibility of other onsite LID BMPs;
(ii) Insufficient demand for storm water reuse;
(iii) Smart growth and infill or redevelopment locations where the density and/or nature of the project would create significant difficulty for compliance with the LID BMP requirements; and
(iv) Other site, geologic, soil, or implementation constraints identified in the Copermittees updated SSMP document.

(c) Each Priority Development Project that participates in the LID waiver program must mitigate for the pollutant loads expected to be discharged due to not implementing the LID retention BMPs in section F.1.d.(4). The pollutant loading must be estimated for each project participating in the LID waiver program. The estimated impacts from not implementing the required LID retention BMPs in section F.1.d.(4) must be fully mitigated. Mitigation projects must be implemented within the same hydrologic unit as the Priority Development Project. Mitigation projects outside of the hydrologic subarea but within the same hydrologic unit may be approved provided that the project proponent demonstrates that mitigation projects within the same hydrologic subarea are infeasible and that the mitigation project will address similar beneficial use impacts as expected from the Priority Development Projects pollutant load. Onsite mitigation may include increasing the conventional treatment sizing factors to achieve pollutant load removal equal to or greater than the pollutant load removal expected from implementing onsite retention of the design capture volume. Offsite mitigation projects may include green streets projects, existing development retrofit projects, retrofit incentive programs, regional

BMPs and/or riparian restoration projects. Project applicants seeking to utilize these alternative compliance provisions may propose other offsite mitigation projects, which the Copermittees may approve if they meet the requirements of this subpart.

(d) A Copermittee may choose to implement additional mitigation programs (e.g., pollutant credit system, mitigation fund) as part of the LID waiver program provided that the mitigation program clearly exhibits that it will not allow Priority Development Projects to result in a net impact from pollutant loadings over and above the impact caused by projects meeting LID requirements. Any additional mitigation programs that a Copermittee chooses to implement must be submitted to the San Diego Water Board Executive Officer for review and acceptance prior to implementation.

(8) LID and Treatment Control BMP Standards

(a) As part of the SSMP, each Copermittee must develop and require Priority Development Projects to implement siting, design, and maintenance criteria for each LID and treatment control BMP listed in the SSMP to determine feasibility and applicability and so that implemented LID and treatment control BMPs are constructed correctly and are effective at pollutant removal, runoff control, and vector minimization. Development of BMP design worksheets which can be used by project proponents is encouraged.

(b) LID and treatment control BMPs implemented at any Priority Development Projects must mitigate (treat through infiltration, settling, filtration or other unit processes) the required volume or flow of runoff from all developed portions of the project, including landscaped areas.

(c) All LID and treatment control BMPs must be located so as to remove pollutants from runoff prior to its discharge to any receiving waters. Multiple Priority Development Projects may use shared post-construction BMPs as long as construction of any shared BMP is completed prior to the use or occupation of any Priority Development Project from which the BMP will receive runoff. Post construction BMPs must not be constructed within a waters of the U.S. or waters of the State.

(9) Implementation Process

(a) As part of its local SSMP, each Copermittee must implement a process to verify compliance with SSMP requirements. The process must identify at what point in the planning process Priority Development Projects will be required to meet SSMP requirements and at a minimum, the Priority Development Project must implement the required post-construction BMPs prior to occupancy and/or the intended use of any portion of that

project. The process must also include identification of the roles and responsibilities of various municipal departments in implementing the SSMP requirements, as well as any other measures necessary for the implementation of SSMP requirements.

(b) Each Copermittee must establish a mechanism not only to track post-construction BMPs, but also to ensure that appropriate easements and ownerships are properly recorded in public records and the information is conveyed to all appropriate parties when there is a change in project or site ownership.

(10) Post-construction BMP Review

(a) The Copermittees must review and update the BMPs that are listed in their SSMP as options for treatment control. At a minimum, the update must include removal of obsolete or ineffective BMPs and addition of LID BMPs that can be used for treatment, such as bioretention cells, bioretention swales, etc. The update must also add appropriate LID BMPs to any tables or discussions in the local SSMPs addressing pollutant removal efficiencies of treatment control BMPs. In addition, the update must include review and revision where necessary of treatment control BMP pollutant removal efficiencies.

(b) The update must incorporate findings from BMP effectiveness studies conducted by the Copermittees for projects funded wholly or in part by the State Water Board or Regional Water Boards.

(c) Each Copermittee must implement a mechanism for annually incorporating findings from local treatment BMP effectiveness studies (e.g., ones conducted by, or on-behalf of, public agencies in Riverside County) into SSMP project reviews and permitting

e. BMP CONSTRUCTION VERIFICATION

Prior to occupancy and/or intended use of any portion of the Priority Development Project subject to SSMP requirements, each Copermittee must inspect the constructed site design, source control, and treatment control BMPs applicable to the constructed portion of the project to verify that they have been constructed and are operating in compliance with all specifications, plans, permits, ordinances, and this Order.

f. BMP MAINTENANCE TRACKING

(1) Inventory of SSMP projects: Each Copermittee must develop and maintain a watershed-based database to track and inventory all projects constructed, that have a final approved SSMP (SSMP projects), and its structural post-

construction BMPs within its jurisdiction since July, 2005. LID BMPs implemented on a lot by lot basis in low density residential areas, such as rain barrels, are not required to be tracked or inventoried. At a minimum, the database must include information on BMP type(s), location, watershed, date of construction, party responsible for maintenance, dates and findings of maintenance verifications, and corrective actions, including whether the site was referred to the local vector control agency or department.

(2) Each Copermittee must verify that approved post-construction BMPs are operating effectively and have been adequately maintained by implementing the following measures:

(a) The designation of high priority SSMP Projects must consider the following:

(i) BMP size,
(ii) Recommended maintenance frequency,
(iii) Likelihood of operational and maintenance issues,
(iv) Location,
(v) Receiving water quality,
(vi) Compliance record,
(vii) Land use,
(viii) and other pertinent factors;

At a minimum, high priority projects include those projects that generate pollutants (prior to treatment) within the tributary area of a 303(d) listed waterbody impaired for that pollutant; or those projects generating pollutants within the tributary area for an observed action level exceedance of that pollutant.

(b) Beginning on July 1, 2012, each Copermittee must verify that the required structural post-construction BMPs on the inventoried SSMP projects have been implemented, are maintained, and operating effectively through inspections, self-certifications, surveys, or other equally effective approaches with the following conditions:

(i) The implementation, operation, and maintenance of all (100 percent) approved and inventoried final project public and private SSMPs (a.k.a. WQMPs) must be verified every five years;

(ii) All (100 percent) projects with BMPs that are high priority must be inspected by the Copermittee annually prior to each rainy season;
(iii) All (100 percent) Copermittee projects with BMPs must be inspected by the Copermittee annually;
(iv) At least 20 percent of all approved and inventoried SSMP projects must be inspected by the Copermittee annually;

(v) At the discretion of the Copermittee, its inspections may be coordinated with the facility inspections implemented pursuant to section F.3. of this Order;
(vi) For verifications performed through a means other than direct Copermittee inspection, adequate documentation must be submitted to the Copermittee to provide assurance that the required maintenance has been completed;
(vii) Appropriate follow-up measures (including re-inspections, enforcement, maintenance, etc.) must be conducted to ensure the treatment BMPs continue to reduce storm water pollutants as originally designed; and
(viii) Inspections must note observations of vector conditions, such as mosquitoes. Where conditions are identified as contributing to mosquito production, the Copermittee must notify its local vector control agency.

g. ENFORCEMENT OF DEVELOPMENT SITES

Each Copermittee must enforce its storm water ordinance for all development projects as necessary to maintain compliance with this Order. Copermittee ordinances or other regulatory mechanisms must include appropriate sanctions to achieve compliance. Sanctions must include the following tools or their equivalent: Non-monetary penalties, fines, bonding requirements, liens, and/or permit or occupancy denials for non-compliance.

h. HYDROMODIFICATION – LIMITATIONS ON INCREASES OF RUNOFF DISCHARGE RATES AND DURATIONS[14]

Each Copermittee shall collaborate with the other Copermittees to develop and implement a Hydromodification Management Plan (HMP) to manage increases in runoff discharge rates and durations from all Priority Development Projects. The HMP must be incorporated into the SSMP and implemented by each Copermittee so that estimated post-project runoff discharge rates and durations must not exceed pre-development discharge rates and durations. Where the proposed project is located on an already developed site, the pre-project discharge rate and duration must be that of the pre-developed, naturally occurring condition. The draft HMP must be submitted to the San Diego Water Board on or before June 30, 2013. The HMP will be made available for public

[14] Updated SSMP and hydromodification requirements must apply to all Priority Development Projects or phases of Priority Development Projects which have not yet begun grading or construction activities at the time any updated SSMP or hydromodification requirement commences. If a Copermittee determines that lawful prior approval of a project exists, whereby application of an updated SSMP or hydromodification requirement to the project is legally infeasible, the updated SSMP or hydromodification requirement need not apply to the project. The Copermittees must utilize the SSMP and hydromodification update periods to ensure that projects undergoing approval processes include application of the updated SSMP and hydromodification requirements in its plans.

review and comment and the San Diego Water Board Executive Officer will determine whether to hold a public hearing before the full San Diego Water Board or whether public input will be through written comments to the Executive Officer only.

(1) The HMP must:

(a) Identify a method for assessing susceptibility and geomorphic stability of channel segments which receive runoff discharges from Priority Development Projects. A performance standard must be established that ensures that the geomorphic stability within the channel will not be compromised as a result of receiving runoff discharges from Priority Development Projects.

(b) Identify a range of runoff flows[15] based on continuous simulation of the entire rainfall record (or other analytical method proposed by the Copermittees and deemed acceptable by the San Diego Water Board) for which Priority Development Project post-project runoff flow rates and durations must not exceed pre-development (naturally occurring) runoff flow rates and durations by more than 10 percent, where the increased flow rates and durations will result in increased potential for erosion or other significant adverse impacts to beneficial uses. The lower boundary of the range of runoff flows identified must correspond with the critical channel flow that produces the critical shear stress that initiates channel bed movement or that erodes the toe of channel banks. The identified range of runoff flows may be different for specific watersheds, channels, or channel reaches. In the case of an artificially hardened (concrete lined, rip rap, etc.) channel, the lower boundary of the range of runoff flows identified must correspond with the critical channel flow that produces the critical shear stress that initiates channel bed movement or that erodes the toe of channel banks of a comparable natural channel (i.e. non-hardened, pre-development).

(c) Identify a method to assess and compensate for the loss of sediment supply to streams due to development. A performance and/or design standard must be created and required to be met by Priority Development Projects to ensure that the loss of sediment supply due to development does not cause or contribute to increased erosion within channel segments downstream of Priority Development Project discharge points.

(d) Designate and require Priority Development Projects to implement control measures so that (1) post-project runoff flow rates and durations do not exceed pre-development (naturally occurring) runoff flow rates and

[15] The identified range of run off flows to be controlled should be expressed in terms of peak flow rates of rainfall events, such as "10% of the pre-development 2-year runoff event up to the pre-development 10-year runoff event."

durations by more than 10 percent for the range of runoff flows identified under section F.1.h.(1)(b), where the increased flow rates and durations will result in increased potential for erosion or other significant adverse impacts to beneficial uses; (2) post-project runoff flow rates and durations do not result in channel conditions which do not meet the channel standard developed under section F.1.h.(1)(a) for channel segments downstream of Priority Development Project discharge points; and (3) the design of the project and/or control measures compensate for the loss of sediment supply due to development.

(e) Include a protocol to evaluate potential hydrograph change impacts to downstream watercourses from Priority Development Projects to meet the range of runoff flows identified under Section F.1.h.(1)(b).

(f) Include other performance criteria (numeric or otherwise) for Priority Development Projects as necessary to prevent runoff from the projects from increasing and/or continuing unnatural rates of erosion of channel beds and banks, silt pollutants generation, or other impacts to beneficial uses and stream habitat due to increased erosive force.

(g) Include a review of pertinent literature.

(h) Identify areas within the Santa Margarita Hydrologic Unit for potential opportunities to restore or rehabilitate stream channels with historic hydromodification of receiving waters that are tributary to documented low or very low Index of Biotic Integrity (IBI) scores.

(i) Include a description of how the Copermittees will incorporate the HMP requirements into their local approval processes.

(j) Include criteria on selection and design of management practices and measures (such as detention, retention, and infiltration) to control flow rates and durations and address potential hydromodification impacts.

(k) Include technical information, including references, supporting any standards and criteria proposed.

(l) Include a description of inspections and maintenance to be conducted for management practices and measures to control flow rates and durations and address potential hydromodification impacts.

(m) Include a description of monitoring and other program evaluations to be conducted to assess the effectiveness of implementation of the HMP. Monitoring and other program evaluations must include an evaluation of changes to physical (e.g., cross-section, slope, discharge rate, vegetation, pervious/impervious area) and biological (e.g., habitat quality, benthic flora

and fauna, IBI scores) conditions of receiving water channels as areas with Priority Development Projects are constructed (i.e. pre- and post-project), as appropriate.

(n) Include mechanisms for assessing and addressing cumulative impacts of Priority Development Projects within a watershed on channel morphology.

(2) In addition to the control measures that must be implemented by Priority Development Projects per section F.1.h.(1)(d), the HMP must include a suite of management measures to be used on Priority Development Projects to mitigate hydromodification impacts, protect and restore downstream beneficial uses and prevent or further prevent adverse physical changes to downstream channels. The measures must be based on a prioritized consideration of the following elements in this order:

(a) Site design control measures;
(b) On-site management measures;
(c) Regional control measures located upstream of receiving waters; and
(d) In-stream management and control measures.

Where stream channels are adjacent to, or are to be modified as part of a Priority Development Project, management measures must include buffer zones and setbacks. The suite of management measures must also include stream restoration as a viable option to achieve the channel standard in section F.1.h.(1)(a). In-stream controls used as management measures to protect and restore downstream beneficial uses and for preventing or minimizing further adverse physical changes must not include the use of non-naturally occurring hardscape materials such as concrete, riprap, gabions, etc. to reinforce stream channels.

(3) As part of the HMP, the Copermittees may develop a waiver program that allows a redevelopment Priority Development Project, as defined in Section F.1.d.(1)(b), to implement offsite mitigation measures. A waiver may be granted if onsite management and control measures are technically infeasible to fully achieve post-project runoff flow rates and durations that do not exceed the pre-development (naturally occurring) runoff flow rates and durations. Redevelopment projects that are granted a waiver under the program must not have post-project runoff flow rates and durations that exceed the pre-project runoff flow rates and durations. The incremental hydromodification impacts from not achieving the pre-development (naturally occurring) runoff flow rates and durations for the project site must be fully mitigated. The offsite mitigation must be within the same stream channel system to which the project discharges. Mitigation projects not within the same stream channel system but within the same hydrologic unit may be approved provided that the project proponent demonstrates that mitigation

within the same stream channel is infeasible and that the mitigation project will address similar impacts as expected from the project.

(4) Each individual Copermittee has the discretion to not require Section F.1.h. at Priority Development Projects where the project:

(a) Discharges storm water runoff into underground storm drains discharging directly to water storage reservoirs and lakes;
(b) Discharges storm water runoff into conveyance channels whose bed and bank are concrete lined all the way from the point of discharge to water storage reservoirs and lakes; or
(c) Discharges storm water runoff into other areas identified in the HMP as acceptable to not need to meet the requirements of Section F.1.h by the San Diego Water Board Executive Officer.

(5) <u>HMP Reporting and Implementation</u>

(a) On or before June 30 , 2013, the Copermittees must submit to the San Diego Water Board a draft HMP that has been reviewed by the public, including the identification of the appropriate limiting range of flow rates per section F.1.h.(1)(b).

(b) Within 180 days of receiving San Diego Water Board comments on the draft HMP, the Copermittees must submit a final HMP that addressed the San Diego Water Board's comments.

(c) Within 90 days of receiving a determination of adequacy from the San Diego Water Board, each Copermittee must incorporate and implement the HMP for all Priority Development Projects.

(d) Prior to acceptance of the HMP by the San Diego Water Board, the early implementation measures likely to be included in the HMP must be encouraged by the Copermittees.

(6) <u>Interim Hydromodification Criteria</u>

Immediately following adoption of this Order and until the final HMP required by this Order has been determined by the San Diego Water Board to be adequate, each Copermittee must ensure that all Priority Development Projects are implementing the hydromodification (aka Hydrologic Condition of Concern) requirements found in Section 4.4 of the 2006 Riverside County WQMP (updated in 2009) unless one of the following conditions in lieu of those specified in the WQMP are met:

(a) Runoff from the Priority Development Project discharges (1) directly to a conveyance channel or storm drain that is concrete lined all the way from

the point of discharge to the ocean, bay, lagoon, water storage reservoir or lake; and (2) the discharge is in full compliance with Copermittee requirements for connections and discharges to the MS4 (including both quality and quantity requirements); and (3) the discharge will not cause increased upstream or downstream erosion or adversely impact downstream habitat; and (4) the discharge is authorized by the Copermittee.

(b) The Priority Development Project disturbs less than one acre. The Copermittee has the discretion to require a project specific WQMP to address hydrologic condition concerns on projects less than one acre on a case by case basis. The disturbed area calculation should include all disturbances associated with larger common plans of development.

(c) The runoff flow rate, volume, velocity, and duration for the post-development condition of the Priority Development Project do not exceed the pre-development (i.e. naturally occurring) condition for the 2-year, 24-hour and 10-year, 24-hour rainfall events. This condition must be substantiated by hydrologic modeling acceptable to the Copermittee.

Once a final HMP is determined to be adequate and is required to be implemented, compliance with the final HMP is required by this Order and compliance with the 2004 WQMP (updated in 2009) or the in-lieu interim hydromodification criteria set forth above no longer satisfies the requirements of this Order.

(7) No part of section F.1.h eliminates the Copermittees' responsibilities for implementing the Low Impact Development requirements under section F.1.d.(4).

i. UNPAVED ROADS DEVELOPMENT

The Copermittees must develop, where they do not already exist, and implement or require implementation of erosion and sediment control BMPs after construction of new unpaved roads. At a minimum, the BMPs must include:

(1) Practices to minimize road related erosion and sediment transport;
(2) Grading of unpaved roads to slope outward where consistent with road engineering safety standards;
(3) Installation of water bars as appropriate;
(4) Unpaved roads and culvert designs that do not impact creek functions and where applicable, that maintain migratory fish passage;

2. CONSTRUCTION COMPONENT

Each Copermittee must implement a construction program which meets the requirements of this section, prevents illicit discharges into the MS4, implements and maintains structural and non-structural BMPs to reduce pollutants in storm water runoff from construction sites to the MS4, reduces construction site discharges of storm water pollutants from the MS4 to the MEP, and prevents construction site discharges from the MS4 from causing or contributing to a violation of water quality standards.

a. ORDINANCE UPDATE

By July 1, 2012, each Copermittee must review and update its grading ordinances and other ordinances as necessary to achieve full compliance with this Order, including requirements for the implementation of all designated BMPs and other measures.

b. SOURCE IDENTIFICATION

Each Copermittee must maintain an updated watershed-based inventory of all construction sites within its jurisdiction. The use of an automated database system, such as Geographical Information Systems (GIS) is strongly encouraged.

c. SITE PLANNING AND PROJECT APPROVAL PROCESS

Each Copermittee must incorporate consideration of potential water quality impacts prior to approval and issuance of construction and grading permits.

(1) Each construction and grading permit must require proposed construction sites to implement designated BMPs and other measures so that illicit discharges into the MS4 are prevented, storm water pollutants discharged from the site will be reduced to the MEP, and construction discharges from the MS4 are prevented from causing or contributing to a violation of water quality standards.

(2) Prior to permit issuance, the project proponent's runoff management plan (or equivalent construction BMP plan) must be required to comply, and reviewed to verify compliance with the local grading ordinance, other applicable local ordinances, and this Order.

(3) Prior to permit issuance, each Copermittee must verify that project

proponents subject to California's statewide General NPDES Permit for Storm Water Discharges Associated With Construction Activities, (hereinafter General Construction Permit), have existing coverage under the General Construction Permit.

d. BMP IMPLEMENTATION

(1) Designate BMPs: Each Copermittee must designate a minimum set of BMPs and other measures to be implemented at all construction sites. The designated minimum set of BMPs must include:

(a) Management Measures:

(i) Pollution prevention, where appropriate;
(ii) Development and implementation of a runoff management plan;
(iii) Minimization of areas that are cleared and graded to only the portion of the site that is necessary for construction;
(iv) Minimization of exposure time of disturbed soil areas;
(v) Minimization of grading during the rainy season and correlation of grading with seasonal dry weather periods to the extent feasible;
(vi) Limitation of grading to a maximum disturbed area as determined by each Copermittee before either temporary or permanent erosion controls are implemented to prevent storm water pollution. The Copermittee has the option of temporarily increasing the size of disturbed soil areas by a set amount beyond the maximum, if the individual site is in compliance with applicable storm water regulations and the site has adequate control practices implemented to prevent storm water pollution;
(vii) Temporary stabilization and reseeding of disturbed soil areas as rapidly as feasible;
(viii) Wind erosion controls;
(ix) Tracking controls;
(x) Non-stormwater management measures to prevent illicit discharges and control storm water pollution sources;
(xi) Waste management measures;
(xii) Preservation of natural hydrologic features where feasible;
(xiii) Preservation of riparian buffers and corridors where feasible;
(xiv) Evaluation and maintenance of all BMPs, until removed; and
(xv) Retention, reduction, and proper management of all storm water pollutant discharges on site to the MEP standard.

(b) Erosion and Sediment Controls:

(i) Erosion prevention. Erosion prevention is to be used as the most important measure for keeping sediment on site during

construction;

(ii) Sediment controls. Sediment controls are to be used as a supplement to erosion prevention for keeping sediment on-site during construction;

(iii) Slope stabilization must be used on all active slopes during rain events regardless of the season and on all inactive slopes during the rainy season and during rain events in the dry season;

(iv) Permanent revegetation or landscaping as early as feasible; and

(v) Erosion and sediment controls must be required during the construction of unpaved roads.

(2) Each Copermittee must implement, or require implementation of, enhanced[16] measures to address the threat to water quality posed by all construction sites tributary to CWA section 303(d) water body segments impaired for sediment or turbidity. Each Copermittee must also implement, or require implementation of, enhanced, measures for construction sites within, or adjacent to, or discharging directly to receiving waters within environmentally sensitive areas (as defined in Attachment C of this Order).

(3) Active/Passive Sediment Treatment (AST): Each Copermittee must require implementation of AST for sediment at construction sites (or portions thereof) that are determined by the Copermittee to be an exceptional threat to water quality. In evaluating the threat to water quality, the following factors must be considered by the Copermittee:

(a) Soil erosion potential or soil type;
(b) The site's slopes;
(c) Project size and type;
(d) Sensitivity of receiving water bodies;
(e) Proximity to receiving water bodies;
(f) Non-storm water discharges;
(g) Ineffectiveness of other BMPs;
(h) Proximity and sensitivity of aquatic threatened and endangered species of concern;
(i) Known effects of AST chemicals; and
(j) Any other relevant factors.

(4) Implement BMPs: Each Copermittee must implement, or require the implementation of, the designated minimum BMPs and any additional measures necessary to comply with this Order at each construction site within its jurisdiction year round. BMP implementation requirements,

[16] Enhanced BMPs are control actions specifically targeted to the pollutant or condition of concern and of higher quality and effectiveness than the minimum control measures otherwise required. Enhanced in this Order means better, not simply more, BMPs.

however, can vary based on wet and dry seasons. Dry season BMP implementation must plan for and address unseasonal rain events that may occur during the dry season (May 1 through September 30).

e. INSPECTION OF CONSTRUCTION SITES

Each Copermittee must conduct construction site inspections for compliance with its ordinances (grading, storm water, etc.), permits (construction, grading, etc.), and this Order. Priorities for inspecting sites must consider the nature and size of the construction activity, topography, and the characteristics of soils and receiving water quality.

(1) During the rainy season, each Copermittee must inspect at least every two weeks, all construction sites within its jurisdiction meeting any of the following criteria:

(a) All sites 30 acres or more in size with rough grading or with active, unstabilized slopes occurring during the rainy season;

(b) All sites one acre or more, and within the same hydrologic subarea and tributary to a CWA section 303(d) water body segment impaired for sediment; or within, directly adjacent to, or discharging directly to a receiving water within an ESA; and

(c) Other sites determined by the Copermittees or the San Diego Water Board as a significant threat to water quality. In evaluating threat to water quality, the following factors must be considered: (1) soil erosion potential; (2) site slope; (3) project size and type; (4) sensitivity of receiving water bodies; (5) proximity to receiving water bodies; (6) non-storm water discharges; (7) known past record of non-compliance by the operators of the construction site; and (8) any other relevant factors.

(2) During the rainy season, each Copermittee must inspect at least monthly, all construction sites with one acre or more of soil disturbance not meeting the criteria specified above in section F.2.e.(1).

(3) During the rainy season, each Copermittee must inspect construction sites less than one acre in size as needed to ensure compliance with its ordinances and this Order.

(4) Each Copermittee must inspect all construction sites as needed during the dry season. Sites meeting the criteria in section F.2.e.(1) must be inspected at least once in August or September each year.

(5) Re-inspections: Based upon site inspection findings, each Copermittee must implement all follow-up actions (i.e., re-inspection, enforcement) necessary to comply with this Order. Reinspection frequencies must be determined by each Copermittee based upon the severity of deficiencies, the nature of the construction activity, and the characteristics of soils and receiving water quality.

(6) Inspections of construction sites must include, but not be limited to:

(a) Check for coverage under the General Construction Permit (Notice of Intent (NOI) and/or Waste Discharge Identification No.) during initial inspections;
(b) Assessment of compliance with Copermittee ordinances and permits related to runoff, including the implementation and maintenance of designated minimum BMPs;
(c) Assessment of BMP effectiveness;
(d) Visual observations for non-storm water discharges, potential illicit connections, and potential discharge of pollutants in storm water runoff;
(e) Review of site monitoring data results, if the site monitors its runoff
(f) Education and outreach on storm water pollution prevention, as needed; and
(g) Creation of a written or electronic inspection report.

(7) The Copermittees must track the number of inspections for each inventoried construction site throughout the reporting period to verify that each site is inspected at the minimum frequencies required.

f. ENFORCEMENT OF CONSTRUCTION SITES

(1) Each Copermittee must develop and implement an escalating enforcement process that achieves prompt corrective actions at construction sites for violations of the Copermittee's water quality protection permits, requirements, and ordinances. This enforcement process must include authorizing the Copermittee's construction site inspectors to take immediate enforcement actions when appropriate and necessary. The enforcement process must include appropriate sanctions such as stop work orders, non-monetary penalties, fines, bonding requirements, and/or permit denials for non-compliance.

(2) Each Copermittee must be able to respond to construction complaints received from third-parties and to ensure the San Diego Water Board that corrective actions have been implemented, if warranted.

g. REPORTING OF NON-COMPLIANT SITES

(1) In addition to the notification requirements in Attachment B, each Copermittee must notify the San Diego Water Board when the Copermittee issues high level enforcement (as defined in the Copermittee's JRMP) to a construction site that poses a significant threat to water quality in its jurisdiction as a result of violations of its storm water ordinances.

(2) Each Copermittee must annually notify the San Diego Water Board, prior to the commencement of the rainy season, of all construction sites with alleged violations that pose a significant threat to water quality. Information may be provided as part of the JRMP annual report if submitted prior to the rainy season. Information provided must include, but not be limited to, the following:

(a) WDID number if enrolled under the General Construction Permit
(b) Site Location, including address
(c) Current violations or suspected violations

3. EXISTING DEVELOPMENT COMPONENT

a. MUNICIPAL

Each Copermittee must implement a municipal program for the Copermittee's areas and activities that meets the requirements of this section, prevents illicit discharges into the MS4, reduces municipal discharges of storm water pollutants from the MS4 to the MEP, and prevents municipal discharges from the MS4 from causing or contributing to a violation of water quality standards.

(1) Source Identification / Inventory

Each Copermittee must maintain an updated watershed-based inventory of all its municipal areas and those activities that have the potential to generate pollutants. The inventory must include the name, address (if applicable), and a description of the area/activity; which pollutants are potentially generated by the area/activity; whether the area/activity is adjacent to an ESA; and identification of whether the area/activity is tributary to a CWA section 303(d) water body segment and generates pollutants for which the water body segment is impaired. Linear facilities, such as roads, streets, and highways, do not need to be individually inventoried. The use of an automated database system, such as Geographical Information Systems (GIS) is highly recommended.

(2) General BMP Implementation

(a) Pollution Prevention: Each Copermittee must implement pollution prevention methods in its municipal program and must require their use by appropriate departments, personnel, and contractors.

(b) Designate Minimum BMPs: Each Copermittee must designate a minimum set of BMPs for all municipal areas and those activities that have the potential to generate pollutants. The designated minimum BMPs for municipal areas and activities must be area or activity specific as appropriate.

(c) Each Copermittee must designate BMPs for special events that are expected to generate significant trash and litter. Controls to consider must include:

(i) Temporary screens on catch basins and storm drain inlets;
(ii) Temporary fencing to prevent windblown trash from entering adjacent water bodies and MS4 channels;
(iii) Proper management of trash and litter;
(iv) Catch basin cleaning following the special event and prior to an anticipated rain event;
(v) Street sweeping of roads, streets, highways and parking facilities following the special event; and
(vi) Other equivalent controls.

(d) Designate BMPs for ESAs and 303(d) Impairments: Each Copermittee must designate enhanced measures for its municipal areas and activities tributary to CWA section 303(d) impaired water body segments when an area or those activities have the potential to generate pollutants for which the water body segment is impaired. Each Copermittee must also designate additional controls for its municipal areas and activities within or directly adjacent to or discharging directly to receiving waters within environmentally sensitive areas (as defined in Attachment C of this Order).

(e) Implement BMPs: Each Copermittee must implement, or require the implementation of, the designated minimum and enhanced BMPs and any additional measures necessary based on its inventory to comply with this Order for each of its municipal area and those activities that have the potential to discharge pollution.

(3) BMP Implementation for Management of Pesticides, Herbicides, and Fertilizers

Each Copermittee must implement BMPs to reduce the contribution of storm water pollutants to the MEP associated with the application, storage, and

disposal of pesticides, herbicides and fertilizers from its municipal areas and activities to MS4s and receiving waters. Such BMPs must include, at a minimum:

(a) Educational activities, permits, certifications and other measures for municipal applicators and distributors;
(b) Integrated Pest Management (IPM) measures that rely on non-chemical solutions;
(c) The use of native vegetation;
(d) Schedules for irrigation and chemical application; and
(e) The collection and proper disposal of unused pesticides, herbicides, and fertilizers.

(4) BMP implementation for Flood Control Structures

(a) Each Copermittee must implement procedures to assure that flood management projects assess the impacts on the water quality of receiving water bodies.
(b) Each Copermittee must include water quality protection measures, where feasible, when retrofitting existing flood control structural devices.
(c) Each Copermittee must evaluate its existing flood control structures as part of ongoing routine maintenance, identify structures causing or contributing to a condition of pollution, implement measures to reduce or eliminate the structure's effect on pollution, and evaluate the feasibility of retrofitting the structural flood control device. The inventory and evaluation must be completed by and submitted to the San Diego Water Board in each JRMP Annual Report.

(5) BMP Implementation for Sweeping of Municipal Areas

Where municipal area sweeping is implemented as an MS4 BMP for municipal roads, streets, highways, and parking facilities, each Copermittee must design and implement the program based on the following criteria:

(a) Roads, streets, highways, and parking facilities identified as consistently generating the highest volumes of trash and/or debris must be swept at least two times per month.

(b) Roads, streets, highways, and parking facilities identified as consistently generating moderate volumes of trash and/or debris must be swept at least monthly.

(c) Roads, streets, highways, and parking facilities identified as generating low volumes of trash and/or debris must be swept as necessary, but no less than once per year.

(6) Operation and Maintenance of Municipal Separate Storm Sewer System (MS4) and Treatment Controls

(a) Treatment Controls: Each Copermittee must implement a schedule of inspection and maintenance activities to verify proper operation of all its municipal structural treatment controls designed to reduce storm water pollutant discharges to or from its MS4s and related drainage structures.

(b) MS4 and Facilities: Each Copermittee must implement a schedule of maintenance activities for its MS4 and facilities (including but not limited to catch basins, storm drain inlets, detention basins, etc). The maintenance activities must, at a minimum, include:

(i) Inspection and removal of accumulated waste at least once a year between May 1 and September 30 of each year for all MS4 facilities;
(ii) Additional facilities cleaning as necessary between October 1 and April 30 of each year;
(iii) Following two years of inspections, any MS4 facility that requires inspection and cleaning less than annually may be inspected as needed, but not less than every other year;
(iv) Open channels and basins must be cleaned of observed anthropogenic litter in a timely manner;
(v) Maintenance activities within open channels must not adversely impact beneficial uses;
(vi) Record keeping of the maintenance and cleaning activities including the overall quantity of waste removed;
(vii) Proper disposal of waste removed pursuant to applicable laws; and
(viii) Measures to eliminate waste discharges during MS4 maintenance and cleaning activities.

(7) Infiltration From Sanitary Sewer to MS4/Provide Preventive Maintenance

(a) Each Copermittee must implement controls and measures to prevent and eliminate infiltration of seepage from sanitary sewers to MS4s through thorough, routine preventive maintenance of the MS4. Each Copermittee that operates both a municipal sanitary sewer system and a MS4 must implement controls and measures to prevent and eliminate infiltration of seepage from the sanitary sewers to the MS4s that must include overall sanitary sewer and MS4 surveys and thorough, routine preventive maintenance of both.

(b) Each Copermittee must implement controls to limit infiltration of seepage from sanitary sewers to municipal separate storm sewer systems where necessary. Such controls must include:

(i) Adequate plan checking for construction and new development;
(ii) Incident response training for its municipal employees that identify sanitary sewer spills;
(iii) Code enforcement inspections;
(iv) MS4 maintenance and inspections;
(v) Interagency coordination with sewer agencies; and
(vi) Proper education of its municipal staff and contractors conducting field operations on the MS4 or its municipal sanitary sewer (if applicable).

(8) Inspection of Municipal Areas and Activities

(a) At a minimum, each Copermittee must inspect the following high priority municipal areas and activities annually:

(i) Roads, Streets, Highways, and Parking Facilities;
(ii) Flood Management Projects and Flood Control Devices not otherwise inspected per Section F.3.a.(6)(b);
(iii) Areas and activities tributary to a CWA section 303(d) impaired water body segment, where an area or activity generates pollutants for which the water body segment is impaired.
(iv) Areas and activities within or adjacent to or discharging directly to receiving waters within environmentally sensitive areas (as defined in Attachment C of this Order);
(v) Municipal Facilities:
[a] Active or closed municipal landfills;
[b] Publicly owned treatment works (including water and wastewater treatment plants) and sanitary sewage collection systems;
[c] Solid waste transfer facilities;
[d] Land application sites;
[e] Corporate yards including maintenance and storage yards for materials, waste, equipment and vehicles; and
[f] Household hazardous waste collection facilities.
(vi) Municipal airfields;
(vii) Parks and recreation facilities;
(viii) Special event venues following special events (festivals, sporting events, etc.);
(ix) Power washing activities; and
(x) Other municipal areas and activities that the Copermittee determines may contribute a significant pollutant load to the MS4.

(b) Other municipal areas and activities must be inspected as needed and in response to water quality data, valid public complaints, and findings from municipal or contract staff.

(c) Based upon site inspection findings, each Copermittee must implement all follow-up actions necessary to comply with this Order.

(9) Enforcement of Municipal Areas and Activities

Each Copermittee must enforce its storm water ordinance for all its municipal areas and activities as necessary to maintain compliance with this Order.

(10) Unpaved Roads Maintenance

(a) The Copermittees must develop, where they do not already exist, and implement or require implementation of BMPs for erosion and sediment control measures during maintenance activities on unpaved roads, particularly in or adjacent to receiving waters.

(b) The Copermittees must develop and implement or require implementation of appropriate BMPs to minimize impacts on streams and wetlands during unpaved road maintenance activities.

(c) The Copermittees must regularly maintain their unpaved roads adjacent to streams and riparian habitat to reduce erosion and sediment transport;

(d) Re-grading of unpaved roads during maintenance must be sloped outward where consistent with road engineering safety standards;

(e) Through their regular maintenance of unpaved roads, the Copermittees must examine the feasibility of replacing existing culverts or design of new culverts or bridge crossings to reduce erosion and maintain natural stream geomorphology.

b. COMMERCIAL / INDUSTRIAL

Each Copermittee must implement a commercial / industrial program that meets the requirements of this section, prevents illicit discharges into the MS4, reduces commercial / industrial discharges of storm water pollutants from the MS4 to the MEP, and prevents commercial / industrial discharges from the MS4 from causing or contributing to a violation of water quality standards.

(1) Source Identification

(a) Each Copermittee must maintain an updated watershed-based inventory of all industrial and commercial sites/sources within its jurisdiction (regardless of ownership) that could contribute a significant pollutant load to the MS4. The inventory must include the following minimum information for each industrial and commercial site/source: name;

address; pollutants potentially generated by the site/source; and identification of whether the site/source is tributary to a CWA §303(d) water body segment and generates pollutants for which the water body segment is impaired; and a narrative description including SIC codes which best reflects the principal products or services provided by each facility.

At a minimum, the following sites/sources must be included in the inventory:

(i) Commercial Sites/Sources:

[a] Automobile repair, maintenance, fueling, or cleaning;
[b] Airplane repair, maintenance, fueling, or cleaning;
[c] Boat repair, maintenance, fueling, or cleaning;
[d] Equipment repair, maintenance, fueling, or cleaning;
[e] Automobile and other vehicle body repair or painting;
[f] Mobile automobile or other vehicle washing;
[g] Automobile (or other vehicle) parking lots and storage facilities;
[h] Retail or wholesale fueling;
[i] Pest control services;
[j] Eating or drinking establishments, including such retail establishments with food markets;
[k] Mobile carpet, drape or furniture cleaning;
[l] Cement mixing or cutting;
[m] Masonry;
[n] Painting and coating;
[o] Botanical or zoological gardens and exhibits;
[p] Landscaping;
[q] Nurseries and greenhouses;
[r] Golf courses, parks and other recreational areas/facilities;
[s] Cemeteries;
[t] Pool and fountain cleaning;
[u] Marinas;
[v] Portable sanitary services;
[w] Building material retailers and storage;
[x] Animal boarding facilities and kennels;
[y] Mobile pet services;
[z] Power washing services;
[aa] Plumbing services; and
[bb] Other sites and sources with a history of un-authorized discharges to the MS4.

(ii) Industrial Sites/Sources:

[a] Industrial Facilities, as defined at 40 CFR § 122.26(b)(14), including those subject to the General Industrial Permit or other individual NPDES permit;
[b] Operating and closed landfills;
[c] Facilities subject to SARA Title III; and
[d] Hazardous waste treatment, disposal, storage and recovery facilities.

(iii) ESAs and 303(d) Listed Waterbodies: All other commercial or industrial sites/sources tributary to a CWA Section 303(d) impaired water body segment, where the site/source generates pollutants for which the water body segment is impaired. All other commercial or industrial sites/sources within or directly adjacent to or discharging directly to receiving waters within environmentally sensitive areas (as defined in Attachment C of this Order) or that generate pollutants tributary to an observed exceedance of an action level.

(iv) All other commercial or industrial sites/sources that the Copermittee determines may contribute a significant pollutant load to the MS4.

(2) General BMP Implementation

(a) Pollution Prevention: Each Copermittee must require the use of pollution prevention methods by the inventoried industrial and commercial sites/sources.

(b) Designate / Update Minimum BMPs: Each Copermittee must designate a minimum set of BMPs for all inventoried industrial and commercial sites/sources. Where BMPs have already been designated, each Copermittee must review and update its existing BMPs for adequacy within one year of permit adoption. Copermittees may continue to regularly review and update their designated BMPs for adequacy and subsequently submit any updates in their Annual Report. The designated minimum BMPs must be specific to facility types and pollutant-generating activities, as appropriate.

(c) Designate Enhanced BMPs for ESAs and 303(d) Impairments: Each Copermittee must designate enhanced measures for inventoried industrial and commercial sites/sources tributary to CWA section 303(d) impaired water body segments (where a site/source generates pollutants for which the water body segment is impaired). Each Copermittee must also designate additional controls for industrial and commercial sites/sources within or directly adjacent to or discharging directly to coastal lagoons, the ocean, or other receiving waters within environmentally sensitive areas (as

defined in Attachment C of this Order). Copermittees may continue to regularly review and update their designated enhanced BMPs for adequacy and subsequently submit any updates in their next Annual Report.

(d) Implement BMPs: Each Copermittee must implement, or require the implementation of, the designated minimum and enhanced BMPs and any additional measures necessary based on inspections, incident responses, and water quality data to comply with this Order at each industrial and commercial site/source within its jurisdiction.

(3) Mobile Businesses Program

(a) Each Copermittee must develop and implement a program to reduce the discharge of storm water pollutants from mobile businesses to the MEP and to prohibit non-storm water discharges pursuant to Section B of this Order. Each Copermittee must keep as part of its commercial source inventory a listing of mobile businesses known to operate within its jurisdiction that conduct services listed above in section F.3.b.(1)(a). The program must include:

(i) Development and implementation of minimum standards and BMPs to be required for each of the various types of mobile businesses;
(ii) Development and implementation of an enforcement strategy which specifically addresses the unique characteristics of mobile businesses;
(iii) Notification of those mobile businesses known to operate within the Copermittee's jurisdiction of the minimum standards and BMP requirements;
(iv) Development and implementation of an outreach and education strategy; and
(v) Inspection of mobile businesses as needed to implement the program.

(b) If they choose to, the Copermittees may cooperate in developing and implementing their programs for mobile businesses, including sharing of mobile business inventories, BMP requirements, enforcement action information, and education.

(4) Inspection of Industrial and Commercial Sites/Sources

Each Copermittee must conduct industrial and commercial site inspections for compliance with its ordinances, permits, and this Order. Mobile businesses must be inspected as needed pursuant to section F.3.b.(3).

(a) Inspection Procedures: Inspections must include but not be limited to:

(i) Review of BMP implementation plans, if the site uses or is required to use such a plan;
(ii) Review of facility monitoring data, if the site monitors its runoff;
(iii) Check for coverage under the General Industrial Permit (Notice of Intent (NOI) and/or Waste Discharge Identification Number), if applicable;
(iv) Assessment of compliance with Copermittee ordinances and Copermittee issued permits related to runoff;
(v) Assessment of the implementation, maintenance and effectiveness of the designated minimum and/or enhanced BMPs;
(vi) Visual observations for non-storm water discharges, potential illicit connections, and potential discharge of pollutants in storm water runoff; and
(vii) Education and training on storm water pollution prevention, as conditions warrant.

(b) Each Copermittee must annually notify the San Diego Water Board, prior to the commencement of the rainy season, of all Industrial Sites and Industrial Facilities subject to the General Industrial Permit or other individual NPDES permit with alleged violations of the Copermittees ordinances, that pose a significant threat to water quality.

(c) Frequencies: At a minimum all sites determined to pose a high threat to water quality must be inspected each year. All inventoried sites must be inspected at least once during a five year period. In evaluating threat to water quality, each Copermittee must consider, at a minimum, the following:

(i) Type of activity (SIC code);
(ii) Materials used at the facility;
(iii) Wastes generated;
(iv) Pollutant discharge potential, including whether the facility generates a pollutant that exceeds an action level;
(v) Non-storm water discharges;
(vi) Size of facility;
(vii) Proximity to receiving water bodies;
(viii) Sensitivity of receiving water bodies;
(ix) Whether the facility is subject to the General Industrial Permit or an individual NPDES permit;
(x) Whether the facility has filed a No Exposure Certification/Notice of Non-Applicability;
(xi) Facility design;
(xii) Total area of the site, portion of the site where industrial or commercial activities occur, and area of the site exposed to rainfall and runoff;
(xiii) The facility's compliance history; and
(xiv) Any other relevant factors.

(d) Third-Party Certifications: Each Copermittee may propose to develop and implement a third party certification program subject to San Diego Water Board Executive Officer acceptance. This program would verify industrial and commercial site/source compliance with the Copermittees' ordinances, permits, and this Order. To the extent that third party certifications are conducted to fulfill the requirements of Section F.3.b.(4) above, the Copermittee retains responsibility for compliance with this Order and will be responsible for conducting and documenting quality assurance and quality control of the third-party certifications.

(i) The Copermittee's proposed third party certification program must include the following:

[a] A description of the procedures and measures for quality assurance and quality control;
[b] A listing of sites/sources that may and may not participate in the program;
[c] The representative percentage of certifications that would qualify to satisfy the inspection requirements in section F.3.b(4)(c) above;
[d] Photo documentation of potential storm water violations identified during the third party inspection;
[e] Reporting to the Copermittee of identified significant potential violations, including imminent or observed illegal discharges, within 24 hours of the third party inspection;
[f] Reporting to the Copermittee of all findings within one week of the inspection being conducted; and
[g] Copermittee follow-up and/or enforcement actions for identified potential storm water violations within two business days of the potential violation report receipt.

(e) Based upon site inspection findings, each Copermittee must implement all follow-up actions and enforcement necessary to comply with this Order.

(f) To the extent that the San Diego Water Board has conducted an inspection of an industrial site during a particular year, the requirement for the responsible Copermittee to inspect this facility during the same year is deemed satisfied.

(g) The Copermittees must track the number of inspections for the inventoried industrial and commercial sites/sources throughout the reporting period to verify that the sites/sources are inspected at the minimum frequencies listed in this Order.

(5) Enforcement of Industrial and Commercial Sites/Sources

Each Copermittee must enforce its storm water ordinance for all industrial and commercial sites/sources as necessary to maintain compliance with this Order. Copermittee ordinances or other regulatory mechanisms must include appropriate sanctions to achieve compliance. Sanctions must include the following tools or their equivalent: Non-monetary penalties, fines, bonding requirements, liens and/or permit denials for non-compliance.

C. RESIDENTIAL

Each Copermittee must implement a residential program that meets the requirements of this section, prevents illicit discharges into the MS4, reduces residential discharges of storm water pollutants from the MS4 to the MEP, and prevents residential discharges from the MS4 from causing or contributing to a violation of water quality standards.

(1) Threat to Water Quality Prioritization

Each Copermittee must identify residential areas and activities that pose a high threat to water quality. At a minimum, these must include:

(a) Automobile repair, maintenance, washing, and parking;
(b) Home and garden care activities and product use (pesticides, herbicides, and fertilizers);
(c) Disposal of trash, pet waste, green waste, and household hazardous waste (e.g., paints, cleaning products);
(d) Any other residential source that the Copermittee determines may contribute a significant pollutant load to the MS4;
(e) Any residential areas tributary to a CWA section 303(d) impaired water body, where the residence generates pollutants for which the water body is impaired; and
(f) Any residential areas within or directly adjacent to or discharging directly to receiving waters within an environmentally sensitive area (as defined in Attachment C of this Order).

(2) BMP Implementation

(a) Pollution Prevention: Each Copermittee must actively encourage the use of pollution prevention methods by residents.

(b) Designate BMPs: Each Copermittee must designate minimum BMPs for high-threat-to-water quality residential areas and activities. The designated minimum BMPs for high-threat-to-water quality residential areas and activities must be area or activity specific.

(c) Hazardous Waste BMPs: Each Copermittee must facilitate the proper management and disposal of used oil, toxic materials, and other household hazardous wastes. Such facilitation must include educational activities, public information activities, and establishment of collection sites operated individually and/or jointly by the Copermittee(s) or a private entity. Curbside collection of household hazardous wastes is encouraged.

(d) Implement BMPs: Each Copermittee must implement, or require implementation of, the designated minimum BMPs and any additional measures necessary to comply with Sections A and B of this Order.

(e) Each Copermittee must implement, or require implementation of, BMPs for residential areas and activities that have not been designated a high threat to water quality, as necessary.

(3) Enforcement of Residential Areas and Activities

Each Copermittee must enforce its storm water ordinance for all residential areas and activities as necessary to maintain compliance with this Order.

(4) Common Interest Areas (CIA) / Home Owner Association (HOA) Areas, and Mobile Home Parks

Each Copermittee must ensure that effective measures exist and are implemented or required to be implemented to ensure that runoff within and from common interest developments, including areas managed by associations and mobile home parks, and meets the objectives of this section and Order.

(a) BMP Implementation: Each Copermittee must implement or require implementation of management measures based on a review of pertinent factors, including:

(i) Maintenance duties and procedures typically used by CIA/HOA maintenance associations within its jurisdiction;
(ii) Whether streets and storm drains are publicly or privately owned within the CIA/HOA or mobile home park;
(iii) Whether the CIA/HOA area or mobile home park has been identified as a high priority residential area based on an evaluation of the site potential to generate pollutants contributing to a 303(d) listed waterbody or an observed action level exceedance;
(iv) Other activities conducted or authorized by the HOA that may pose a significant risk to inland receiving waters.

(b) Legal Authority and Enforcement: By July 1, 2012, each Copermittee must review, and if necessary update, its Municipal Code to verify that they have the legal authority to implement and enforce its ordinances within CIA/HOA areas and mobile home parks.

(5) Privately Owned Unpaved Roads Maintenance

(a) The Copermittees must require implementation of BMPs for erosion and sediment control during maintenance activities on privately owned unpaved roads, particularly in or adjacent to stream channels or wetlands.

(b) The Copermittees must enforce their ordinances against illegal construction and maintenance grading activities on privately owned unpaved roads, so as to prevent impacts to water quality.

d. RETROFITTING EXISTING DEVELOPMENT

Each Copermittee must develop and implement a retrofitting program that meets the requirements of this section. The goals of the existing development retrofitting program are to reduce impacts from hydromodification, promote LID, support riparian and aquatic habitat restoration, reduce the discharges of storm water pollutants from the MS4 to the MEP, and prevent discharges from the MS4 from causing or contributing to a violation of water quality standards. Where feasible, at the discretion of the Copermittee, the existing development retrofitting program may be coordinated with flood control projects and other infrastructure improvement programs.

(1) The Copermittee(s) must identify and inventory existing areas of development (i.e. municipal, industrial, commercial, residential) as candidates for retrofitting. Potential retrofitting candidates must include but are not limited to:

(a) Areas of development that generate pollutants of concern to a TMDL or an ESA;
(b) Receiving waters that are channelized or otherwise hardened;
(c) Areas of development tributary to receiving waters that are channelized or otherwise hardened;
(d) Areas of development tributary to receiving waters that are significantly eroded;
(e) Areas of development tributary to an ASBS or SWQPA; and

(2) Each Copermittee must evaluate and rank the inventoried areas of existing developments to prioritize retrofitting. Criteria for evaluation must include but is not limited to:

(a) Feasibility;
(b) Cost effectiveness;
(c) Pollutant removal effectiveness, including reducing pollutants exceeding action level;
(d) Tributary area potentially treated;
(e) Maintenance requirements;
(f) Landowner cooperation;
(g) Neighborhood acceptance;
(h) Aesthetic qualities;
(i) Efficacy at addressing concern; and
(j) Potential improvements on public health and safety

(3) Each Copermittee must consider the results of the evaluation in prioritizing work plans for the following year in accordance with Sections G.1 and J. Highly feasible projects expected to benefit water quality should be given a high priority to implement source control and treatment control BMPs. Where feasible, the retrofit projects may be designed in accordance with the SSMP requirements within sections F.1.d.(3) through F.1.d.(8) and the Hydromodification requirements in Section F.1.h.

(4) The Copermittees must cooperate with private landowners to encourage site specific retrofitting projects. The Copermittee must consider the following practices in cooperating and encouraging private landowners to retrofit their existing development:

(a) Demonstration retrofit projects;
(b) Retrofits on public land and easements that treat runoff from private developments;
(c) Education and outreach;
(d) Subsidies for retrofit projects;
(e) Requiring retrofit projects as enforcement, mitigation or ordinance compliance;
(f) Public and private partnerships; and
(g) Fees for existing discharges to the MS4 and reduction of fees for retrofit implementation.

(5) The completed retrofit BMPs must be tracked in accordance with Section F.1.f. Retrofit BMPs on publicly owned properties must be inspected per section F.1.f . Privately owned retrofit BMPs must be inspected as needed to ensure proper operation and maintenance.

(6) Where constraints on retrofitting preclude effective BMP deployment on existing developments at locations critical to protect receiving waters (as identified in section F.3.d.(1)), a Copermittee may propose a regional mitigation project to improve water quality. Such regional projects may include but are not limited to:

(a) Regional water quality treatment BMPs;
(b) Urban creek or wetlands restoration and preservation;
(c) Daylighting and restoring underground creeks;
(d) Localized rainfall storage and reuse to the extent such projects are fully protective of downstream water rights;
(e) Hydromodification project; and
(f) Removal of invasive plant species.

(7) A retrofit project or regional mitigation project may qualify as a Watershed Water Quality Activity provided it meets the requirements in section G. Watershed Workplan.

4. ILLICIT DISCHARGE DETECTION AND ELIMINATION

Each Copermittee must implement a program that meets the requirements of this section to actively detect and eliminate illicit discharges and disposal into the MS4. The program must address all types of illicit discharges and connections excluding those non-storm water discharges not prohibited by the Copermittee in accordance with section B of this Order.

a. PREVENT AND DETECT ILLICIT DISCHARGES AND CONNECTIONS

Each Copermittee must implement measures to prevent and detect illicit discharges to the MS4.

(1) Legal Authority: Each Copermittee must retain legal authority to prevent and eliminate illicit discharges and connections to the MS4.

(2) Inspections: Each Copermittee must include use of appropriate Copermittee personnel and contractors to assist in identifying illicit discharges and connections during their daily activities.

(a) Visual inspections for illegal discharges and connections must be conducted during routine maintenance of all MS4 facilities.

(b) Copermittee staff and contractors conducting non-MS4 field operations must be trained to report suspected illegal discharges and connections to proper Copermittee staff.

b. MAINTAIN MS4 MAP

Each Copermittee must maintain an updated map of its entire MS4 and the corresponding drainage areas within its jurisdiction. The use of GIS is strongly

encouraged. The MS4 map must include all segments of the storm sewer system owned, operated, and maintained by the Copermittee, as well as all known locations of inlets that discharge and/or collect runoff into the Copermittee's MS4, all known locations of access points (i.e. manholes) to the Copermittee's MS4, all known locations of connections with other MS4s (e.g. Caltrans), and all known locations of all the outfalls that discharge runoff from the Copermittee's MS4. The accuracy of the MS4 map must be confirmed during dry weather field screening and analytical monitoring and must be updated at least annually. The MS4 map including any GIS layers must be submitted with the updated JRMP.

c. Facilitate Public Reporting Of Illicit Discharges And Connections - Public Hotline

Each Copermittee must promote, publicize and facilitate public reporting of illicit discharges or water quality impacts associated with discharges into or from MS4s. Each Copermittee must facilitate public reporting through development and operation of a public hotline. Public hotlines can be Copermittee-specific or shared by Copermittees. All storm water hotlines must be capable of receiving reports in both English and Spanish 24 hours per day and seven days per week. All reported incidents, and how each was resolved, must be summarized in each Copermittee's Annual Report.

d. Dry Weather Field Screening And Analytical Monitoring

Each Copermittee must conduct dry weather field screening and analytical monitoring of MS4 outfalls and other portions of its MS4 within its jurisdiction to detect illicit discharges and connections in accordance with Receiving Waters and MS4 Discharge Monitoring and Reporting Program No. R9-2010-0016 in Attachment E of this Order.

e. Investigation / Inspection And Follow-Up

Each Copermittee must implement procedures to investigate and inspect portions of its MS4 that, based on the results of field screening, analytical monitoring, or other appropriate information, indicate a reasonable potential of containing illicit discharges, illicit connections, or other sources of pollutants in non-storm water.

(1) Develop response criteria for data: Each Copermittee must develop, update, and use numeric criteria action levels (or other actions level criteria where appropriate) to determine when follow-up investigations will be performed in response to water quality monitoring. The criteria must include required non-storm water action levels (see Section C) and a consideration of 303(d)-listed waterbodies and environmentally sensitive areas (ESAs) as defined in Attachment C.

(2) Respond to data: Each Copermittee must investigate portions of the MS4 for which water quality data or conditions indicates a potential illegal discharge or connection.

(a) Obvious illicit discharges (i.e. color, odor, or significant exceedances of action levels) must be investigated immediately.

(b) Field screen data: Within two business days of receiving dry weather field screening results that exceed action levels, the Copermittee(s) having jurisdiction must either initiate an investigation to identify the source of the discharge or document the rationale for why the discharge does not pose a threat to water quality and does not need further investigation. This documentation must be included in the Annual Report.

(c) Analytical data: Within five business days of receiving analytical laboratory results that exceed action levels, the Copermittee(s) having jurisdiction must either initiate an investigation to identify the source of the discharge or document the rationale for why the discharge does not pose a threat to water quality and does not need further investigation. This documentation must be included in the Annual Report.

(3) Respond to notifications: Each Copermittee must respond to and resolve each reported incident (e.g., public hotline, staff notification, etc.) made to the Copermittee in a timely manner. Criteria may be developed to assess the validity of, and prioritize the response to, each report.

f. ELIMINATION OF ILLICIT DISCHARGES AND CONNECTIONS

Each Copermittee must take immediate action to initiate steps necessary to eliminate all detected illicit discharges, illicit discharge sources, and illicit connections after detection within its jurisdiction. Elimination measures may include an escalating series of enforcement actions for those illicit discharges that are not a serious threat to public health or the environment. Illicit discharges that pose a serious threat to the public's health or the environment must be eliminated immediately.

g. ENFORCE ORDINANCES

Each Copermittee must implement and enforce its ordinances, orders, or other legal authority to prevent illicit discharges and connections to its MS4 and to eliminate detected illicit discharges and connections to its MS4.

h. Prevent And Respond To Sewage Spills (Including From Private Laterals And Failing Septic Systems) And Other Spills

Each Copermittee must implement management measures and procedures (including a notification mechanism) to prevent, respond to, contain and clean up all sewage (see below) and other spills that may discharge into its MS4 from any source (including private laterals and failing septic systems). Copermittees must coordinate with spill response teams to prevent entry of spills into the MS4 and contamination of surface water, ground water and soil. Each Copermittee must coordinate spill prevention, containment and response activities throughout all appropriate departments, programs and agencies so that maximum water quality protection is available at all times.

5. PUBLIC PARTICIPATION COMPONENT

Each Copermittee must incorporate a mechanism for public participation in the updating, development, and implementation of the JRMP.

6. EDUCATION COMPONENT

Each Copermittee must implement education programs to (1) measurably increase the knowledge regarding MS4s, impacts of runoff on receiving waters, and potential BMP solutions for the target audience; and (2) to measurably change the behavior of target communities and thereby reduce pollutants in storm water discharges and eliminate prohibited non-storm water discharges to MS4s and the environment. At a minimum, the education programs must meet the requirements of this section and address the following target communities:

- Copermittee Departments and Personnel
- New Development / Redevelopment Project Applicants, Developers, Contractors, Property Owners, and other Responsible Parties
- Construction Site Owners and Operators
- Commercial Owners and Operators
- Industrial Owners and Operators
- Residential Community and General Public
- Quasi-Governmental Agencies / Districts (i.e., educational institutions, water districts, sanitation districts, etc.)

a. General Requirements

(1) At a minimum, the Copermittee education programs must educate each target community on the following topics:

(a) Applicable water quality laws, regulations, permits, and requirements;
(b) Best management practices;
(c) General runoff concepts;
(d) Existing water quality, including local water quality conditions, impaired waterbodies and environmentally sensitive areas; and
(e) Other topics, such as public reporting mechanisms, water conservation, low-impact development techniques, and public health and vector issues associated with runoff.

(2) Each Copermittee must implement educational activities, public information activities, and other appropriate activities to facilitate the proper management and disposal of used oil and toxic materials.

b. Specific Requirements

(1) Copermittee Departments and Personnel

(a) Each Copermittee must implement an education program so its staff and contractors (and Planning Boards and Elected Officials, if applicable) responsible for implementing the requirements of this Order have an understanding of the following topics as applicable to their responsibilities:

(i) Applicable water quality laws and regulations;
(ii) The potential effects and impacts that Copermittee departments and personnel activities related to their job duties can have on water quality);
(iii) Plan review policies and procedures to verify consistent application;
(iv) Methods of minimizing impacts to receiving water quality resulting from development, construction, and other potential pollutant generating activities;
(v) Proper implementation of erosion and sediment control, source control, treatment control, and other BMPs to minimize the impacts to receiving water quality resulting from development, construction, and other potential pollutant generating activities;
(vi) Applicable recordkeeping and tracking mechanisms;
(vii) Inspection and enforcement procedures, BMP implementation, and review of monitoring data.

(b) Each Copermittee must train its staff responsible for oversight and conducting storm water compliance inspections and enforcement of construction activities (e.g. construction, building, code enforcement, grading review staffs, inspectors, and other responsible construction staff) annually prior to the rainy season.

(c) Each Copermittee must train its staff responsible for conducting storm water compliance inspections and enforcement of industrial and commercial facilities at least once a year.

(2) New Development / Redevelopment and Construction Sites

As early in the planning and development process as possible and all through the permitting and construction process, each Copermittee must notify parties responsible for the project about the importance of educating all construction workers in the field about storm water issues and BMPs, in addition to the topics under Section F.6.a.(1).

(3) Commercial and Industrial Sites / Sources

At least once during the five-year period of this Order, each Copermittee must notify the owner/operator of each of its inventoried commercial and industrial site/source of the BMP requirements applicable to the site/source.

(4) Residential and General Public

Each Copermittee shall collaboratively conduct or participate in development and implementation of a program to educate residential and general public target communities. The Copermittee residential and general public education programs must address potential pollutant generating activities (e.g., car washing, mobile operations, yard maintenance) and pollutant generating products (e.g., pesticides, fertilizers, household chemicals). The target audiences of the residential and general public education programs must include underserved target audiences (e.g., disadvantaged communities), residents and managers of CIA/HOA areas, and owners and residents of mobile home parks.

G. WATERSHED WATER QUALITY WORKPLAN

Each Copermittee must collaborate with other Copermittees to develop and implement a Watershed Water Quality Workplan (Watershed Workplan) to identify, prioritize, address, and mitigate the highest priority water quality issues/pollutants in the Upper Santa Margarita Watershed.

1. Watershed Workplan Components:

The work plan must, at a minimum:

a. Characterize the receiving water quality in the watershed. Characterization must include assessment and analysis of regularly collected water quality data, reports, monitoring and analysis generated in accordance with the requirements

of the Receiving Waters Monitoring and Reporting Program, as well as applicable information available from other public and private organizations. This characterization must include an updated watershed map.

b. Identify and prioritize water quality problem(s) in terms of constituents by location, in the watershed's receiving waters. In identifying water quality problem(s), the Copermittees must, at a minimum, give consideration to TMDLs, receiving waters listed on the CWA section 303(d) list, waters with persistent violations of water quality standards, toxicity, or other impacts to beneficial uses, and other pertinent conditions.

c. Identify the likely sources, pollutant discharges and/or other factors causing the highest water quality problem(s) within the watershed. Efforts to determine such sources must include, but not be limited to: use of information from the construction, industrial/commercial, municipal, and residential source identification programs required within the JRMP of this Order; water quality monitoring data collected as part of the Receiving Water Monitoring and Reporting Program required by this Order, and additional focused water quality monitoring to identify specific sources within the watershed.

d. Develop a watershed BMP implementation strategy to attain receiving water quality objectives in the identified highest priority water quality problem(s) and locations. The BMP implementation strategy must include a schedule for implementation of the BMP projects to abate specific receiving water quality problems and a list of criteria to be used to evaluate BMP effectiveness. Identified watershed water quality problems may be the result of jurisdictional discharges that will need to be addressed with BMPs applied in a specific jurisdiction in order to generate a benefit to the watershed. This implementation strategy must include a map of implemented and proposed BMPs.

e. Develop a strategy to monitor improvements in receiving water quality directly resulting from implementation of the BMPs described in the Watershed Workplan. The monitoring strategy must review the necessary data to report on the measured pollutant reduction that results from proper BMP implementation. Monitoring must, at a minimum, be conducted in the receiving water to demonstrate reduction in pollutant concentrations and progression towards attainment of receiving water quality objectives.

f. Establish a schedule for development and implementation of the Watershed strategy outlined in the Workplan. The schedule must, at a minimum, include forecasted dates of planned actions to address Provisions E.2(a) through E.2(e) and dates for watershed review meetings through the remaining portion of this Permit cycle. Annual watershed workplan review meetings must be open to the public and appropriately publically noticed such that interested parties may come and provide comments on the watershed program.

2. **Watershed Workplan Implementation –** Watershed Copermittee's must implement the Watershed Workplan within 90 days of submittal unless otherwise directed by the San Diego Water Board.

3. **Copermittee Collaboration** – Watershed Copermittees must collaborate to develop and implement the accepted Watershed Workplan. Watershed Copermittee collaboration must include frequent regularly scheduled meetings. The Copermittees must pursue efforts to obtain any interagency agreements, or other coordination efforts, with non-Copermittee owners of the MS4 (such as Caltrans, Native American tribes, and school districts) to control the contribution of pollutants from one portion of the shared MS4 to another portion of the shared MS4. The Copermittees must, as appropriate, participate in watershed management efforts to address water quality issues within the entire Santa Margarita Watershed (such as the County of San Diego and U.S. Marine Corps Camp Pendleton).

4. **Public Participation –** Watershed Copermittees must implement a watershed-specific public participation mechanism within each watershed. A required component of the watershed-specific public participation mechanism must be a minimum 30-day public review of and opportunity to comment on the Watershed Workplan prior to submittal to the San Diego Water Board. The Workplan must include a description of the public participation mechanisms to be used and identification of the persons or entities anticipated to be involved during the development and implementation of the Watershed Workplan.

5. **Watershed Workplan Review and Updates –** Watershed Copermittees must review and update the Watershed Workplan annually to identify needed changes to the prioritized water quality problem(s) listed in the workplan. All updates to the Watershed Workplan must be presented during an Annual Watershed Review Meeting. Annual Watershed Review Meetings must occur once every calendar year and be conducted by the Watershed Copermittees. Annual Watershed Review Meetings must be open to the public and adequately noticed. Individual Watershed Copermittees must also review and modify their jurisdictional programs and JRMP Annual Reports, as necessary, so that they are consistent with the updated Watershed Workplan.

6. **Pyrethroid Toxicity Reduction Evaluation –** The Watershed Copermittees must incorporate the pyrethroid pollutant reduction program[17] into the Watershed Workplan. The pyrethroid pollutant reduction program must include the following elements:

   a. Pursue state and federal regulatory change.
   b. Implement a set of source controls targeted specifically at urban pyrethroid use,
   c. Through the annual reporting process, monitor the implementation of those

[17] The pyrethroid pollutant reduction program is described in the "Riverside County – Santa Margarita Region Pyrethroid Source Identification Toxicity Reduction Evaluation, Final Phase II Report", January 2009 by MACTEC.

controls, assess effectiveness, and identify sources or areas where additional effort is needed,

d. Implement additional controls as needed,

e. Continue to monitor implementation, as well as conditions within the target receiving waters, assess effectiveness, and re-evaluate control programs.

H. FISCAL ANALYSIS

1. Secure Resources: Each Copermittee must exercise its full authority to secure the resources necessary to meet all requirements of this Order.

2. Annual Analysis: Each Copermittee must conduct an annual fiscal analysis of the necessary capital and operation and maintenance expenditures necessary to accomplish the activities of the programs required by this Order. The analysis must include estimated expenditures for the current reporting period, the preceding period, and the next reporting period.

a. Each analysis must include a description of the source of funds that are proposed to meet the necessary expenditures.

b. Each analysis must include a narrative description of circumstances resulting in a 25 percent or greater annual change for any budget line items.

3. Annual Reporting: Each Copermittee must submit its annual fiscal analysis with the annual JRMP report.

I. TOTAL MAXIMUM DAILY LOADS

1. The waste load allocations (WLAs) of fully approved and adopted TMDLs are incorporated as Water Quality Based Effluent Limitations on a pollutant by pollutant, watershed by watershed basis. Early TMDL requirements, including monitoring, may be required and inserted into this Order pursuant to Finding E.10.

2. The Cities of Wildomar and Murrieta must comply with the requirements and WLAs assigned to the discharges from their MS4s contributing to the Lake Elsinore/Canyon Lake (San Jacinto Watershed) Nutrient TMDLs as specified in Section VI.D.2 of the Santa Ana Water Board's Order R8-2010-0033 and subsequent revisions thereto.

J. PROGRAM EFFECTIVENESS ASSESSMENT AND REPORTING

Beginning with the Annual Report due in 2013, each Copermittee must annually assess and report upon the effectiveness of its JRMP and Watershed Workplan implementation to (1) reduce the discharge of storm water pollutants from its MS4 to

the MEP; (2) prohibit non-stormwater discharges; and (3) prevent runoff discharges from the MS4 from causing or contributing to a violation of water quality standards.

1. Program Effectiveness Assessments

a. IDENTIFY EFFECTIVENESS ASSESSMENTS

With the JRMP and Watershed Workplan submittal, each Copermittee must establish assessment measures or methods for each of the six outcome levels described by CASQA[18], using data from each JRMP program component, the MRP, and the Watershed Workplan.

(1) Assessment interval: For each established assessment measure or method, an assessment interval must be established as appropriate to the measure or method.

(2) Projected Timeframe: For each established assessment measure or method, each Copermittee must identify the projected timeframe within which the associated outcome level can adequately assess change.

b. PERFORM ASSESSMENTS

(1) Annually: Each year, the Copermittee must perform each applicable assessment based on the associated assessment interval, and determine whether the desired outcome has been met;

(2) With the submittal of the Report of Waste Discharge, the Copermittees must determine whether their program implementation is resulting in the protection and/or improvement of water quality through an Integrated Assessment;

2. Respond to Assessments

a. Where the assessments indicate that the desired outcome level has not been achieved at the end of the projected timeframe, the Copermittee must review its applicable activities and BMPs to identify any modifications and improvements needed to maximize effectiveness, as necessary to comply with this Order. If the Copermittee determines that the existing activities/BMPs are adequate, or that the projected timeframe should be extended, justification and an updated timeframe for attainment of the outcome level must be provided in the Annual Report.

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[18] Effectiveness assessment outcome levels as defined by CASQA are defined in Attachment C of this Order. See "*Municipal Stormwater Program Effectiveness Assessment Guidance"* (CASQA, May 2007) for guidance for assessing program activities at the various outcome levels.

b. Each Copermittee must develop and implement a work plan and schedule to address any program modifications and improvements in response to the findings of its assessment. The work plan and schedule must be provided and updated with the applicable Annual Report. The work plan must include, at a minimum, the following:

(1) The problems and priorities identified during the assessment;
(2) A list of priority pollutants and known or suspected sources;
(3) A brief description of the strategy employed to reduce, eliminate or mitigate the negative impacts;
(4) A description and schedule for new and/or modified BMPs. The schedule is to include dates for significant milestones;
(5) A description of how the selected activities will address an identified high priority problem. This will include a description of the expected effectiveness and benefits of the new and/or modified BMPs;
(6) A description of implementation effectiveness metrics;
(7) A description of how efficacy results will be used to modify priorities and implementation; and
(8) A review of past activities implemented, progress in meeting water quality standards, and planned program adjustments.

3. Assessment and Response Reporting

Each Copermittee must include a summary of its effectiveness assessments within each Annual Report. Beginning with the FY 2012-2013 Annual Report, the Program Effectiveness reporting must include:

a. The results of each of the effectiveness assessments performed pursuant to J.1.b, including the demonstrated CASQA effectiveness level(s);

b. Responses to effectiveness assessments; A description of any program modifications planned in accordance with section J.2, including the work plan and identified schedule for implementation. The description must include the basis for determining that each modified activity and/or BMP represents an improvement expected to result in improved water quality;

c. A description of any steps to be implemented to improve the Copermittee's ability to assess program effectiveness.

K. REPORTING

The Copermittees may propose alternate reporting criteria and schedules, as part of their updated JRMP, for the Executive Officer's acceptance.

1. Runoff Management Plans

a. JURISDICTIONAL RUNOFF MANAGEMENT PLANS

(1) The written account of the overall program to be conducted by each Copermittee to meet the jurisdictional requirements of section F of this Order is referred to as the Jurisdictional Runoff Management Plan (JRMP). Each Copermittee must revise and update its existing JRMP so that it describes all activities the Copermittee will undertake to implement the requirements of this Order. Each Copermittee must submit its updated and revised JRMP to the San Diego Water Board no later than June 30, 2012.

(2) At a minimum, each Copermittee's JRMP must be updated and revised to demonstrate compliance with each applicable section of this Order.

b. WATERSHED WORKPLANS

Copermittees must update and revise the Watershed Workplan to describe any changes in water quality problems or priorities, and any necessary change to actions Copermittees will take to implement jurisdictional or watershed BMPs to address those identified. The Copermittees must assemble and submit the Watershed Workplan to the San Diego Water Board no later than June 30, 2012, and must implement the Workplan within 90 days unless otherwise directed by the San Diego Water Board.

2. Other Required Reports and Plans

a. SSMP UPDATES

(1) Copermittees must submit their updated SSMP in accordance with the applicable requirements of section F.1 with the JRMP by June 30, 2012.
(2) Within 180 days of determination that the SSMP is in compliance with this Order's provisions, each Copermittee must amend its ordinances consistent with the SSMP and implement the updated SSMP. Any amended or new ordinances must be submitted to the San Diego Water Board within 30 days of adoption.

b. HMP

(1) By June 30, 2013, the Copermittees must submit to the San Diego Water Board Executive Officer a draft HMP that has been reviewed by the public, including identification of the appropriate limiting range of flow rates in accordance with the applicable requirements of section F.1.h.

(2) Within 180 of receiving San Diego Water Board comments on the draft HMP, the Copermittees must submit a final HMP that addressed the San Diego Water Board's comments.

(3) Within 90 days of receiving a finding of adequacy from the Executive Officer each Copermittee must incorporate and implement the HMP for all Priority Development Projects.

(4) Prior to acceptance of the HMP by the San Diego Water Board, the early implementation measures likely to be included in the HMP shall be encouraged by the Copermittees.

c. REPORT OF WASTE DISCHARGE

The Copermittees must submit to the San Diego Water Board, no later than 180 days in advance of the expiration date of this Order, a Report of Waste Discharge (ROWD) as an application for issuance of new waste discharge requirements. The fourth annual report for this Order may supplement the ROWD, provided the ROWD contains the minimum information below.

At a minimum, the ROWD must include the following: (1) Proposed changes to the Copermittees' runoff management programs; (2) Proposed changes to monitoring programs; (3) Justification for proposed changes; (4) Name and mailing addresses of the Copermittees; (5) Names and titles of primary contacts of the Copermittees; (6) Any other information necessary for the reissuance of this Order and (7) Any other information required by federal regulations for permit reapplications.

3. Annual Reports

a. JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM (JRMP) ANNUAL REPORTS

(1) Each Copermittee must generate individual JRMP Annual Reports that cover implementation of its jurisdictional activities during the past annual reporting period. Each Annual Report must verify and document compliance with this Order as directed in this section. Each Copermittee must retain records in accordance with the Standard Provisions in Attachment B of this Order,

available for review, that document compliance with each requirement of this Order. The reporting period for these annual reports must be the previous fiscal year.

(2) Each Copermittee must submit its JRMP Annual Reports to the San Diego Water Board by October 31of each year, beginning on October 31, 2013.

(3) Each JRMP Annual Report must contain, at a minimum, the following information, as applicable to the Copermittee:

(a) Information required to be reported annually in Section H (Fiscal Analysis) of this Order;
(b) Information required to be reported annually in Section J (Program Effectiveness) of this Order;
(c) The completed Reporting Checklist found in Attachment D, and
(d) Information for each program component as described in the following Table 9:

Table 9. Annual Reporting Requirements

Program Component	Reporting Requirement
New Development	1. All updated relevant sections of the General Plan and environmental review process and a description of any planned updates within the next annual reporting period, if applicable
	2. All revisions to the SSMP, including where applicable: (a) Identification and summary of where the SSMP fails to meet the requirements of this Order; (b) Updated procedures for identifying pollutants of concern for each Priority Development Project; (c) Updated treatment BMP ranking matrix; and (d) Updated site design and treatment control BMP design standards;
	3. Number of Priority Development Projects reviewed and approved during the reporting period. Brief description of BMPs required at approved Priority Development Projects. Verification that site design, source control, and treatment BMPs were required on all applicable Priority Development Projects;
	4. Name and location of all Priority Development Projects that were granted a waiver from implementing LID BMPs pursuant to section F.1.d.(4) during the reporting period;
	5. Updated watershed-based BMP maintenance tracking database of approved treatment control BMPs and treatment control BMP maintenance within its jurisdiction, including updates to the list of high-priority Priority Development Projects; and verification that the requirements of this Order were met during the reporting period.

Program Component	Reporting Requirement
New Development	6. Name and brief description of all approved Priority Development Projects required to implement hydrologic control measures in compliance with section F.1.h including a brief description of the management measures planned to protect downstream beneficial uses and prevent adverse physical changes to downstream stream channels;
	7. Number and description of all enforcement activities applicable to the new development and redevelopment component and a summary of the effectiveness of those activities;
Construction	1. All updated relevant ordinances and description of planned ordinance updates within the next annual reporting period, if applicable;
	2. A description of any changes to procedures used for identifying priorities for inspecting sites and enforcing control measures that consider the nature of the construction activity, topography, and the characteristics of soils and receiving water quality;
	3. Any changes to the designated minimum and enhanced BMPs;
	4. Summary of the inspection program, including the following information: (a) Total number and date of inspections conducted at each facility; (b) Number, date, and types of enforcement actions by facility; (c) Brief description of each high-level enforcement actions at construction sites including the effectiveness of the enforcement. Supporting paper (or electronic) files must be maintained by the Copermittees and made available upon San Diego Water Board request. Supporting files must include a record of inspection dates, the results of each inspection , photographs (if any), and a summary of any enforcement actions taken.
Municipal	1. Updated source inventory;
	2.All changes to the designated municipal BMPs;
	3. Descriptions of any changes to procedures to assure that flood management projects assess the impacts on the water quality of receiving water bodies;
	4. Summary and assessment of BMPs retrofits implemented at flood control structures, including: (a) List of projects retrofitted; and (b) List and description of structures evaluated for retrofitting; (c) List of structures still needing to be evaluated and the schedule for evaluation.;
	5. Summary of the municipal structural treatment control operations and maintenance activities, including: (a) Number of inspections and types of facilities; and (b) Summary of findings;

Program Component	Reporting Requirement
Municipal	6. Summary of the MS4 and MS4 facilities operations and maintenance activities, including: (a) Number and types of facilities maintained; (b) Amount of material removed; and (c) List of facilities planned for bi-annual inspections and the justification;
	7. Summary of the municipal areas/programs inspection activities, including: (a) Number and date of inspections conducted at each facility; (c) The BMP violations identified during the inspection by facility; (d) Number, date and types of enforcement actions by facility; (e) Summary of inspection findings and follow-up activities for each facility;
	8. Description of activities implemented to address sewage infiltration into the MS4;
	9. Description of BMPs and their implementation for unpaved roads construction and maintenance.
Commercial / Industrial	1. Updated inventory of commercial / industrial sources;
	2. Summary of the inspection program, including the following information: (a) Number and date of inspections conducted at each facility or mobile business;; (c) The BMP violations identified during the inspection by facility; (d) Number, date, and types of enforcement actions by facility or mobile business; (e) Brief description of each high-level enforcement actions at commercial/industrial sites including the effectiveness of the enforcement and follow-up activities for each facility;.
	3. All changes to designated minimum and enhanced BMPs;
	4. A list of industrial sites, including each name, address, and SIC code, that the Copermittee suspects may require coverage under the General Industrial Permit, but has not submitted an NOI;
Residential	1. All updated minimum BMPs required for residential areas and activities;
	2. Quantification and summary of applicable runoff and storm water enforcement actions within residential areas and activities;
	3. Description of efforts to manage runoff and storm water pollution in common interest areas and mobile home parks;
Retrofitting Existing Development	1. Updated inventory and prioritization of existing developments identified as candidates for retrofitting.
	2. Description of efforts to retrofit existing developments during the reporting year.

Program Component	Reporting Requirement
Retrofitting Existing Development	3. Description of efforts taken to encourage private landowners to retrofit existing development.
	4. A list of all retrofit projects that have been implemented, including site location, a description of the retrofit project, pollutants expected to be treated, and the tributary acreage of runoff that will be treated.
	5. Any proposed retrofit or regional mitigation projects and timelines for future implementation.
	6. Any proposed changes to the Copermittee's overall retrofitting program.
Illicit Discharge Detection and Elimination	1. Any changes to the legal authority to implement Illicit Discharge Detection and Elimination activities;
	2. Any Changes to the established investigation procedures;
	3. Any changes to public reporting mechanisms, including phone numbers and web pages;
	4. Summaries of illicit discharges (including spills and water quality data events) and how each significant case was resolved;
	5. A description of instances when field screening and analytical data exceeded action levels, including those instances for which no investigation was conducted;
	6. A description of follow-up and enforcement actions taken in response to investigations of illicit discharges and a description of the outcome of the investigation/enforcement actions;
Workplans	Updated workplans including priorities, strategy, implementation schedule and effectiveness evaluation;

(4) Each JRMP Annual Report must also include the following information regarding non-storm water discharges (see Section B.2. of this Order):

(a) Identification of non-storm water discharge categories identified as a source of pollutants to waters of the U.S;
(b) A description of any updates to ordinances, orders, or similar means to prohibit non-storm water discharge categories identified under section B.2 above ;
(c) Identification of any control measures to be required and implemented for non-storm water discharge categories identified as needing controls by the San Diego Water Board; and
(d) A description of a program to address pollutants from non-emergency fire fighting flows identified by the Copermittee to be significant sources of pollutants.

4. Interim Reporting Requirements

For the reporting periods, prior to submittal of the JRMP, Each JRMP Annual Report must be submitted in accordance with the requirements and deadlines described in Order No. 2004-001.

5. Universal Reporting Requirements

All submittals must include an executive summary, introduction, conclusion, recommendations, and signed certified statement. Each Copermittee must submit a signed certified statement covering its responsibilities for each applicable submittal. The Principal Copermittee must submit a signed certified statement covering its responsibilities for each applicable submittal and the sections of the submittals for which it is responsible.

L. MODIFICATION OF PROGRAMS

Modifications of JRMPs and/or Watershed Workplan may be initiated by the Executive Officer of the San Diego Water Board or by the Copermittees. Requests by Copermittees must be made to the Executive Officer, and must be submitted during the annual review process. Requests for modifications should be incorporated, as appropriate, into the Annual Reports or other deliverables required or allowed under this Order.

1. Minor modifications to JRMPs, and/or Watershed Workplan, may be accepted by the Executive Officer where the Executive Officer finds the proposed modification complies with all discharge prohibitions, receiving water limitations, and other requirements of this Order.

2. Proposed modifications that are not minor require amendment of this Order in accordance with this Order's rules, policies, and procedures.

M. PRINCIPAL COPERMITTEE RESPONSIBILITIES

Within 180 days of adoption of this Order, the Copermittees must designate the Principal Copermittee and notify the San Diego Water Board of the name of the Principal Copermittee. The Principal Copermittee must, at a minimum:

1. Serve as liaison between the Copermittees and the San Diego Water Board on general permit issues, and when necessary and appropriate, represent the Copermittees before the San Diego Water Board.

2. Coordinate permit activities among the Copermittees and facilitate collaboration on the development and implementation of programs required under this Order.

3. Produce and submit documents and reports as required by section K of this Order and Receiving Waters and MS4 Discharge Monitoring and Reporting Program No. R9-2010-0016 in Attachment E of this Order.

N. RECEIVING WATERS AND MS4 DISCHARGE MONITORING AND REPORTING PROGRAM

Pursuant to CWC section 13267, the Copermittees must comply with all the requirements contained in Receiving Waters and MS4 Discharge Monitoring and Reporting Program No. R9-2010-0016 in Attachment E of this Order.

O. STANDARD PROVISIONS, REPORTING REQUIREMENTS, AND NOTIFICATIONS

1. Each Copermittee must comply with Standard Provisions, Reporting Requirements, and Notifications contained in Attachment B of this Order. This includes 24 hour/5 day reporting requirements for any instance of non-compliance with this Order as described in section 5.e of Attachment B.

2. All plans, reports and subsequent amendments submitted in compliance with this Order must be implemented immediately (or as otherwise specified). All submittals by Copermittees must be adequate to implement the requirements of this Order.

I, David W. Gibson, Executive Officer, do hereby certify the foregoing is a full, true, and correct copy of an Order adopted by the California Regional Water Quality Control Board, San Diego Region, on October 13, 2010.

\\TENTATIVE
David W. Gibson
Executive Officer

ATTACHMENT A

BASIN PLAN PROHIBITIONS

California Water Code Section 13243 provides that a Regional Board, in a water quality control plan, may specify certain conditions or areas where the discharge of waste or certain types of waste is not permitted. The following discharge prohibitions are applicable to any person, as defined by Section 13050(c) of the California Water Code, who is a citizen, domiciliary, or political agency or entity of California whose activities in California could affect the quality of waters of the state within the boundaries of the San Diego Region.

1. The discharge of waste to waters of the state in a manner causing, or threatening to cause a condition of pollution, contamination or nuisance as defined in California Water Code Section 13050, is prohibited.

2. The discharge of waste to land, except as authorized by waste discharge requirements or the terms described in California Water Code Section 13264 is prohibited.

3. The discharge of pollutants or dredged or fill material to waters of the United States except as authorized by a NPDES permit or a dredged or fill material permit (subject to the exemption described in California Water Code Section 13376) is prohibited.

4. Discharges of recycled water to lakes or reservoirs used for municipal water supply or to inland surface water tributaries thereto are prohibited, unless this Regional Board issues a NPDES permit authorizing such a discharge; the proposed discharge has been approved by the State Department of Health Services and the operating agency of the impacted reservoir; and the discharger has an approved fail-safe long-term disposal alternative.

5. The discharge of waste to inland surface waters, except in cases where the quality of the discharge complies with applicable receiving water quality objectives, is prohibited. Allowances for dilution may be made at the discretion of the Regional Board. Consideration would include streamflow data, the degree of treatment provided and safety measures to ensure reliability of facility performance. As an example, discharge of secondary effluent would probably be permitted if streamflow provided 100:1 dilution capability.

6. The discharge of waste in a manner causing flow, ponding, or surfacing on lands not owned or under the control of the discharger is prohibited, unless the discharge is authorized by the Regional Board.

7. The dumping, deposition, or discharge of waste directly into waters of the state, or adjacent to such waters in any manner which may permit its being transported into the waters, is prohibited unless authorized by the Regional Board.

8. Any discharge to a storm water conveyance system that is not composed entirely of "storm water" is prohibited unless authorized by the Regional Board. [The federal regulations, 40 CFR 122.26(b)(13), define storm water as storm water

runoff, snow melt runoff, and surface runoff and drainage. 40 CFR 122.26(b)(2) defines an illicit discharge as any discharge to a storm water conveyance system that is not composed entirely of storm water except discharges pursuant to a NPDES permit and discharges resulting from fire fighting activities. [§122.26 amended at 56 FR 56553, November 5, 1991; 57 FR 11412, April 2, 1992].

9. The unauthorized discharge of treated or untreated sewage to waters of the state or to a storm water conveyance system is prohibited.

10. The discharge of industrial wastes to conventional septic tank/subsurface disposal systems, except as authorized by the terms described in California Water Code Section 13264, is prohibited.

11. The discharge of radioactive wastes amenable to alternative methods of disposal into the waters of the state is prohibited.

12. The discharge of any radiological, chemical, or biological warfare agent into waters of the state is prohibited.

13. The discharge of waste into a natural or excavated site below historic water levels is prohibited unless the discharge is authorized by the Regional Board.

14. The discharge of sand, silt, clay, or other earthen materials from any activity, including land grading and construction, in quantities which cause deleterious bottom deposits, turbidity or discoloration in waters of the state or which unreasonably affect, or threaten to affect, beneficial uses of such waters is prohibited.

15. The discharge of treated or untreated sewage from vessels to Mission Bay, Oceanside Harbor, Dana Point Harbor, or other small boat harbors is prohibited.

ATTACHMENT B

STANDARD PROVISIONS, REPORTING REQUIREMENTS, AND NOTIFICATIONS

1. STANDARD PROVISIONS – PERMIT COMPLIANCE [40 CFR 122.41]

(a) *Duty to comply* [40 CFR 122.41(a)].

(1) The Copermittee must comply with all of the conditions of this Order. Any noncompliance constitutes a violation of the Clean Water Act (CWA) and the California Water Code (CWC) and is grounds for enforcement action, for permit termination, revocation and reissuance, or modification; or denial of a permit renewal application.

(2) The Copermittee shall comply with effluent standards or prohibitions established under section 307(a) of the CWA toxic pollutants and with standards for sewage sludge use or disposal established under section 405(d) of the CWA within the time provided in the regulations that establish these standards or prohibitions or standards for sewage sludge use or disposal, even if the Order has not yet been modified to incorporate the requirement.

(b) *Need to halt or reduce activity not a defense* [40 CFR 122.41(c)]. It shall not be a defense for the Copermittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this Order.

(c) *Duty to mitigate* [40 CFR 122.41(d)]. The Copermittee shall take all reasonable steps to minimize or prevent any discharge or prevent any discharge or sludge use or disposal in violation of this Order that has a reasonable likelihood of adversely affecting human health or the environment.

(d) *Proper operation and maintenance* [40 CFR 122.41(e)]. The Copermittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the Copermittee to achieve compliance with the conditions of this Order. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures. This provision requires the operation of back-up or auxiliary facilities or similar systems that are installed by the Copermittee only when necessary to achieve compliance with the conditions of this Order.

(e) *Property rights* [40 CFR 122.41(g)].

(1) This Order does not convey any property rights of any sort or any exclusive privilege.
(2) The issuance of this Order does not authorize any injury to persons or property or invasion of other private rights, or any infringement of State or local law or regulations.

(f) *Inspection and entry* [40 CFR 122.41(i)]. The Copermittee shall allow the Regional Water Quality Control Board, San Diego Region (Regional Board), State Water Resources Control Board (SWRCB), United States Environmental Protection Agency

(USEPA), and/or their authorized representatives (including an authorized contractor acting as their representative), upon presentation of credentials and other documents as may be required by law, to:

(1) Enter upon the Copermittee's premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of this Order;
(2) Have access to and copy, at reasonable times, any records that must be kept under the conditions of this Order;
(3) Inspect and photograph, at reasonable times, any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this Order; and
(4) Sample or monitor, at reasonable times, for the purpose of assuring Order compliance or as otherwise authorized by the CWA or the CWC, any substances or parameters at any location.

(g) *Bypass* [40 CFR 122.41(m)]

(1) Definitions:

i) "Bypass" means the intentional diversion of waste streams from any portion of a treatment facility.
ii) "Severe property damage" means substantial physical damage to property, damage to the treatment facilities, which causes them to become inoperable, or substantial and permanent loss of natural resources that can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production.

(2) Bypass not exceeding limitations - The Copermittee may allow any bypass to occur which does not cause exceedances of effluent limitations, but only if it also is for essential maintenance to assure efficient operation. These bypasses are not subject to the provisions listed in Standard Provisions – Permit Compliance (g)(3), (g)(4) and (g)(5) below.

(3) Prohibition of Bypass - Bypass is prohibited, and the Regional Board may take enforcement action against a Copermittee for bypass, unless:

i) Bypass was unavoidable to prevent loss of life, personal injury, or severe property damage;
ii) There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate back-up equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass which occurred during normal periods of equipment downtime or preventive maintenance; and
iii) The Copermittee submitted notice as required under Standard Provisions – Permit Compliance (g)(3) above.

(4) Notice

i) Anticipated bypass. If the Copermittee knows in advance of the need for a

bypass, it shall submit a notice, if possible at least ten days before the date of the bypass.

ii) Unanticipated bypass. The Copermittee shall submit notice of an unanticipated bypass as required in Standard Provisions 5(e) below (24-hour notice).

(h) *Upset* [40 CFR 122.41(n)] Upset means an exceptional incident in which there is unintentional and temporary noncompliance with technology based effluent limitations because of factors beyond the reasonable control of the Copermittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation.

(1) Effect of an upset. An upset constitutes an affirmative defense to an action brought for noncompliance with such technology based permit effluent limitations if the requirements of Standard Provisions – Permit Compliance (h)(2) below are met. No determination made during administrative review of claims that noncompliance was caused by upset, and before an action for noncompliance, is final administrative action subject to judicial review.

(2) Conditions necessary for a demonstration of upset. A Copermittee who wishes to establish the affirmative defense of upset shall demonstrate, through properly signed, contemporaneous operating logs, or other relevant evidence that:

i) An upset occurred and that the Copermittee can identify the cause(s) of the upset;
ii) The permitted facility was at the time being properly operated;
iii) The Copermittee submitted notice of the upset as required in Standard Provisions – Permit Compliance (5)(e)(ii)(B) below (24-hour notice); and
iv) The Copermittee complied with any remedial measures required under Standard Provisions – Permit Compliance 1(c) above.

(3) Burden of Proof. In any enforcement proceeding, the Copermittee seeking to establish the occurrence of an upset has the burden of proof.

2. STANDARD PROVISIONS – PERMIT ACTION

(a) *General* [40 CFR 122.41(f)] This Order may be modified, revoked and reissued, or terminated for cause. The filing of a request by the Copermittee for modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance does not stay any Order condition.

(b) *Duty to reapply* [40 CFR 122.41(b)]. If the Copermittee wishes to continue an activity regulated by this Order after the expiration date of this Order, the Copermittee must apply for and obtain new permit.

(c) *Transfers*. This Order is not transferable to any person except after notice to the Regional Board. The Regional Board may require modification or revocation and reissuance of the Order to change the name of the Copermittee and incorporate such other requirements as may be necessary under the CWA and the CWC.

3. STANDARD PROVISIONS – MONITORING

(a) Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity. [40 CFR Section 122.41 (j) (1)]

(b) Monitoring results must be conducted according to test procedures under 40 CFR Part 136, or in the case of sludge use or disposal, approved under 40 CFR Part 136 unless otherwise specified in 40 CFR Part 503 unless other test procedures have been specified in this Order [40 CFR Section 122.41(j)(4)][40 CFR Section 122.44(i)(1)(iv)].

4. STANDARD PROVISIONS – RECORDS

(a) Except for records of monitoring information required by this Order related to the Copermittee's sewage sludge use and disposal activities, which shall be retained for a period of at least five years (or longer as required by 40 CFR Part 503), the Copermittee shall retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this Order, and records of all data used to complete the application for this Order, for a period of at least three (3) years from the date of the sample, measurement, report or application, This period may be extended by request of the Regional Water Board Executive Officer at any rime [40 CFR Section 122.41(j)(2)].

(b) *Records of monitoring information* [40 CFR 122.41(j) (3)] shall include:

(1) The date, exact place, and time of sampling or measurements;
(2) The individual(s) who performed the sampling or measurements;
(3) The date(s) analyses were performed;
(4) The individual(s) who performed the analyses;
(5) The analytical techniques or methods used; and
(6) The results of such analyses.

(c) *Claims of confidentiality* [40 CFR Section 122.7(b)] of the following information will be denied:

(1) The name and address of any permit applicant or Copermittee; and
(2) Permit applications and attachments, permits and effluent data.

5. STANDARD PROVISIONS – REPORTING

(a) *Duty to provide information* [40 CFR 122.41(h)]. The Copermittee shall furnish to the Regional Board, SWRCB, or USEPA within a reasonable time, any information which the Regional Board, SWRCB, or USPEA may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this Order or to determine compliance with this Order. Upon request, the Copermittee shall also furnish to the Regional Board, SWRCB, or USEPA, copies of records required to be kept by this Order.

(b) *Signatory and Certification Requirements* [40 CFR 122.41(k)]

(1) All applications, reports, or information submitted to the Regional Board, SWRCB, or USEPA shall be signed and certified in accordance with Standard Provisions – Reporting 5(b)ii), 5(b)iii), 5(b)iv), and 5(b) (see 40 CFR 122.22)

(2) *Applications* [40 CFR 122.22(a)(3)] All permit applications shall be signed by either a principal executive officer or ranking elected official.

(3) *Reports* [40 CFR 122.22(b)]. All reports required by this Order, and other information requested by the Regional Board, SWRCB, or USEPA shall be signed by a person described in Standard Provisions – Reporting 5(b)(2) above, or by a duly authorized representative of that person. A person is a duly authorized representative only if:

i) The authorization is made in writing by a person described in Standard Provisions-Reporting 5(b)(2) above;

ii) The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity, such as the position of plant manager, operator of a well or a well field, superintendent, position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters for the company. (A duly authorized representative may thus be either a named individual or any individual occupying a named position.); and,

iii) The written authorization is submitted to the Regional Water Board and State Water Board.

(4) *Changes to authorization* [40 CFR Section 122.22(c)] If an authorization under Standard Provisions – Reporting 5(b)(3)of this reporting requirement is no longer accurate because a different individual or position has responsibility for the overall operation of the facility, a new authorization satisfying the requirements of Standard Provisions – Reporting 5(b)(3) above must be submitted to the Regional Water Board and State Water Board prior to or together with any reports, information, or applications to be signed by an authorized representative.

(5) *Certification* [40 CFR Section 122.22(d)] Any person signing a document under Standard Provisions – Reporting 5(b)(2), or 5(b)(3) above shall make the following certification:

”I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.”

(c) *Monitoring reports*. [40 CFR 122.41(l)(4)]

(1) Monitoring results shall be reported at the intervals specified in the Receiving Waters and Runoff Monitoring and Reporting Program No. R9-2009-0002.

(2) Monitoring results must be reported on a Discharge Monitoring Report (DMR) form or forms provided or specified by the Regional Board or SWRCB for reporting results of mentoring of sludge use or disposal practices.

(3) If the Copermittee monitors any pollutant more frequently than required by this Order using test procedures approved under 40 CFR Part 136 or, in the case of sludge use or disposal, approved under 40 CFR Part 136 unless otherwise specified in 40 CFR Part 503, or as specified in this Order, the results of this monitoring shall be included in the calculation and reporting of the data submitted in the DMR or sludge reporting form specified by the Regional Board.

(4) Calculations for all limitations, which require averaging of measurements, shall utilize an arithmetic mean unless otherwise specified in this Order.

(d) *Compliance schedules*. [40 CFR Section 122.41(l)(5)] Reports of compliance or noncompliance with, or any progress reports on, interim and final requirements contained in any compliance schedule of this Order shall be submitted no later than 14 days following each schedule date.

(e) *Twenty-four hour reporting* [40 CFR Section 122.41(l)(6)]

(1) The Copermittee shall report any noncompliance that may endanger health or the environment. Any information shall be provided orally within 24 hours from the time the Copermittee becomes aware of the circumstances. A written submission shall also be provided within five (5) days of the time the Copermittee becomes aware of the circumstances. The written submission shall contain a description of the noncompliance and its cause; the period of noncompliance, including exact dates and times, and if the noncompliance has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance.

(2) The following shall be included as information, which must be reported within 24 hours under this paragraph:

i) Any unanticipated bypass that exceeds any effluent limitation in the Order (See 40 CFR 122.41(g)).
ii) Any upset which exceeds any effluent limitation in this Order.

(3) The Regional Board may waive the above-required written report under this provision on a case-by-case basis if the oral report has been received within 24 hours.

(f) *Planned changes*. [40 CFR Section 122.41(l)(1)] The Copermittee shall give notice to the Regional Board as soon as possible of any planned physical alterations or additions to the permitted facility. Notice is required under this provision only when:

(1) The alteration or addition to a permitted facility may meet one of the criteria for

determining whether a facility is a new source in 40 CFR 122.29(b); or

(2) The alteration or addition could significantly change the nature or increase the quantity of pollutants discharged. This notification applies to pollutants, which are not subject to effluent limitations in this Order.

(3) The alteration or addition results in a significant change in the Copermittee's sludge use or disposal practices, and such alteration, addition, or change may justify the application of permit conditions that are different from or absent in the existing Order, including notification of additional use or disposal sites not reported during the permit application process or not reported pursuant to an approved land application plan.

(g) *Anticipated noncompliance*. [40 CFR Section 122.41(l)(7)] The Copermittee shall give advance notice to the Regional Board or SWRCB of any planned changes in the permitted facility or activity, which may result in noncompliance with Order requirements.

(h) *Other noncompliance* [40 CFR Section 122.41(l) 7)] The Copermittee shall report all instances of noncompliance not reported under Standard Provisions 5(c), 5(d), and 5(e) above, at the time monitoring reports are submitted. The reports shall contain the information listed in Standard Provision – Reporting 5(e) above.

(i) *Other information* [40 CFR Section 122.41(l)(8)] When the Copermittee becomes aware that it failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application or in any report to the Regional Board, SWRCB, or USEPA, the Copermittee shall promptly submit such facts or information.

6. STANDARD PROVISIONS – ENFORCEMENT

(a) The Regional Board is authorized to enforce the terms of this permit under several provisions of the CWC, including, but not limited to, Sections 13385, 13386, and 13387.

7. ADDITIONAL STANDARD PROVISIONS

(a) *Municipal separate storm sewer systems* [40 CFR 122.42(c)]. The operator of a large or medium municipal separate storm sewer system or a municipal separate storm sewer that has been designated by the Director under 40 CFR 122.26(a)(1)(v) must submit an annual report by the anniversary of the date of the issuance of the permit for such system. The report shall include:

(1) The status of implementing the components of the storm water management program that are established as permit conditions;

(2) Proposed changes to the storm water management programs that are established as permit conditions. Such proposed changes shall be consistent with 40 CFR 122.26(d)(2)(iii); and

(3) Revisions, if necessary, to the assessment of controls and the fiscal analysis

reported in the permit application under 40 CFR 122.26(d)(2)(iv) and 40 CFR 122.26(d)(2)(v);

(4) A summary of data, including monitoring data, that is accumulated throughout the reporting year;

(5) Annual expenditures and budget for year following each annual report;

(6) A summary describing the number and nature of enforcement actions, inspections, and public education programs; and

(7) Identification of water quality improvements or degradation.

(b) *Storm water discharges* [40 CFR 122.42(d)]. The initial permits for discharges composed entirely of storm water issued pursuant to 40 CFR 122.26(e)(7) shall require compliance with the conditions of the permit as expeditiously as practicable, but in no event later than three years after the date of issuance of the permit.

(c) *Other Effluent Limitations and Standards* [40 CFR 122.44(b)(1)]. If any toxic effluent standard or prohibition (including any schedule of compliance specified in such effluent standard or prohibition) is promulgated under Section 307(a) of the CWA for a toxic pollutant which is present in the discharge and that standard or prohibition is more stringent than any limitation on the pollutant in this Order, the Regional Board may institute proceedings under these regulations to modify or revoke and reissue the Order to conform to the toxic effluent standard or prohibition.

(d) *Discharge is a privilege* [CWC section 13263(g)]. No discharge of waste into the waters of the State, whether or not such discharge is made pursuant to waste discharge requirements, shall create a vested right to continue such discharge. All discharges of waste into waters of the State are privileges, not rights.

(e) *Review and revision of Order* [CWC section 13263(e)]. Upon application by any affected person, or on its own motion, the Regional Board may review and revise this permit.

(f) *Termination or modification of Order* [CWC section13381]. This permit may be terminated or modified for causes, including, but not limited to, all of the following:

(1) Violation of any condition contained in this Order.
(2) Obtaining this Order by misrepresentation, or failure to disclose fully all relevant facts.
(3) A change in any condition that requires either a temporary or permanent reduction or elimination of the permitted discharge.

(g) *Transfers*. When this Order is transferred to a new owner or operator, such requirements as may be necessary under the CWC may be incorporated into this Order.

(h) *Conditions not stayed*. The filing of a request by the Copermittee for modification, revocation and reissuance, or termination of this Order, or a notification of planned change in or anticipated noncompliance with this Order does not stay any condition of this Order.

(i) *Availability*. A copy of this Order shall be kept at a readily accessible location and shall be available to on-site personnel at all times.

(j) *Duty to minimize or correct adverse impacts*. The Copermittees shall take all reasonable steps to minimize or correct any adverse impact on the environment resulting from noncompliance with this Order, including such accelerated or additional monitoring as may be necessary to determine the nature and impact of the noncompliance.

(k) *Interim Effluent Limitations.* The Copermittee shall comply with any interim effluent limitations as established by addendum, enforcement action, or revised waste discharge requirements which have been, or may be, adopted by this Regional Board.

(l) *Responsibilities, liabilities, legal action, penalties* [CWC sections 13385 and 13387]. The Porter-Cologne Water Quality Control Act provides for civil and criminal penalties comparable to, and in some cases greater than, those provided for under the CWA.

Nothing in this Order shall be construed to protect the Copermittee from its liabilities under federal, state, or local laws.

Except as provided for in 40CFR 122.41(m) and (n), nothing in this Order shall be construed to relieve the Copermittee from civil or criminal penalties for noncompliance.

Nothing in this Order shall be construed to preclude the institution of any legal action or relieve the Copermittee from any responsibilities, liabilities, or penalties to which the Copermittee is or may be subject to under Section 311 of the CWA.

Nothing in this Order shall be construed to preclude institution of any legal action or relieve the Copermittee from any responsibilities, liabilities, or penalties established pursuant to any applicable state law or regulation under authoring preserved by Section 510 of the CWA.

(m) *Noncompliance*. Any noncompliance with this Order constitutes violation of the CWC and is grounds for denial of an application for modification of the Order (also see 40 CFR 122.41(a).

(n) *Director*. For purposes of this Order, the term “Director” used in parts of 40 CFR incorporated into this Order by reference and/or applicable to this Order shall have the same meaning as the term “Regional Board” used elsewhere in this Order, except that in 40 CFR 122.41(h) and (l), “Director” shall mean “Regional Board, SWRCB, and USEPA.”

(o) The Regional Board has, in prior years, issued a limited number of individual NPDES permits for non-storm water discharges to MS4s. The Regional Board or SWRCB may in the future, upon prior notice to the Copermittee(s), issue an NPDES permit for any non-storm water discharge (or class of non-storm water discharges) to a MS4. Copermittees may prohibit any non-storm water discharge (or class of non-storm water discharges) to a MS4 that is authorized under such separate NPDES permits.

(p) *Effective date*. This Order shall become effective on the date of its adoption provided the USEPA has no objection. If the USEPA objects to its issuance, this Order shall not become effective until such objection is withdrawn. This Order supersedes Order No. 2001-01 upon the effective date of this Order.

(q) *Expiration*. This Order expires five years after adoption.

(r) *Continuation of expired order* [23 CCR 2235.4]. After this Order expires, the terms and conditions of this Order are automatically continued pending issuance of a new permit if all requirements of the federal NPDES regulations on the continuation of expired permits (40 CFR 122.6) are complied with.

(s) *Applications*. Any application submitted by a Copermittee for reissuance or modification of this Order shall satisfy all applicable requirements specified in federal regulations as well as any additional requirements for submittal of a Report of Waste Discharge specified in the CWC and the California Code of Regulations.

(t) *Confidentiality*. Except as provided for in 40 CFR 122.7, no information or documents submitted in accordance with or in application for this Order will be considered confidential, and all such information and documents shall be available for review by the public at the Regional Board office.

(u) *Severability*. The provisions of this Order are severable, and if any provision of this Order, or the application of any provisions of this Order to any circumstance, is held invalid, the application of such provision to other circumstances and the remainder of this Order shall not be affected thereby.

(v) R*eport submittal*. The Copermittee shall submit reports and provide notifications as required by this Order to the following:

NORTHERN WATERSHED UNIT
CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN DIEGO REGION
9174 SKY PARK COURT, SUITE 100
SAN DIEGO CA 92123-4340
Telephone: (858) 467-2952 Fax: (858) 571-6972

EUGENE BROMLEY
US ENVIRONMENTAL PROTECTION AGENCY
REGION IX
PERMITS ISSUANCE SECTION (W-5-1)
75 HAWTHORNE STREET
SAN FRANCISCO CA 94105

Unless otherwise directed, the Copermittee shall submit one hard copy for the official record and one electronic copy of each report required under this Order to the Regional Board and one electronic copy to the EPA.

DRAFT

ATTACHMENT C

ACRONYMS AND ABBREVIATIONS

ADT	Average Daily Traffic
AMAL	Average Monthly Action Level
ASBS	Area of Special Biological Significance
AST	Active/Passive Sediment Treatment
BMP	Best Management Practice
Basin Plan	Water Quality Control Plan for the San Diego Basin
BU	Beneficial Use
CASQA	California Stormwater Quality Association
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
CWA	Clean Water Act
CWC	California Water Code
CZARA	Coastal Zone Act Reauthorization Amendments of 1990
DAMP	Drainage Area Management Plan
DNQ	Detected, but not Quantified
EIA	Effective Impervious Area
ESAs	Environmentally Sensitive Areas
GIS	Geographic Information System
HMP	Hydromodification Management Plan
IBI	Index of Biotic Integrity
JRMP	Jurisdictional Runoff Management Plan
LID	Low Impact Development
MDAL	Maximum Daily Action Level
MEP	Maximum Extent Practicable
ML	Minimum Level
MS4	Municipal Separate Storm Sewer System
NOI	Notice of Intent
NPDES	National Pollutant Discharge Elimination System
Copermittees	County of Riverside, the 4 incorporated cities within the County of Riverside in the San Diego Region, and the Riverside County Flood Control District
RGOs	Retail Gasoline Outlets
ROWD	Riverside County Copermittees' Report of Waste Discharge (application for NPDES reissuance)
RWLs	Receiving Water Limitations
SAL	Storm Water Action Level
San Diego Water Board	California Regional Water Quality Control Board, San Diego Region
SIC	Standard Industrial Classification Code
SSMP	Standard Urban Storm Water Mitigation Plan
State Board	State Water Resources Control Board
SWQPA	State Water Quality Protected Area
TMDL	Total Maximum Daily Load

USEPA	United States Environmental Protection Agency
WLA	Waste Load Allocation
WQMP	Water Quality Management Plan
WRMP	Watershed Runoff Management Plan

DEFINITIONS

Active/Passive Sediment Treatment - Using mechanical, electrical or chemical means to flocculate or coagulate suspended sediment for removal from runoff from construction sites prior to discharge.

Anthropogenic Litter – Trash generated from human activities, not including sediment.

Average Monthly Action Level – the highest allowable average of daily discharges over a calendar month, calculated as the sum of all daily discharges measured during a calendar month divided by the number of daily discharges measured during that month.

Basin Plan – Water Quality Control Plan, San Diego Basin, Region 9, and amendments, developed by the Regional Board.

Beneficial Uses - The uses of water necessary for the survival or well being of man, plants, and wildlife. These uses of water serve to promote tangible and intangible economic, social, and environmental goals. "Beneficial Uses" of the waters of the State that may be protected include, but are not limited to, domestic, municipal, agricultural and industrial supply; power generation; recreation; aesthetic enjoyment; navigation; and preservation and enhancement of fish, wildlife, and other aquatic resources or preserves. Existing beneficial uses are uses that were attained in the surface or ground water on or after November 28, 1975; and potential beneficial uses are uses that would probably develop in future years through the implementation of various control measures. "Beneficial Uses" are equivalent to "Designated Uses" under federal law. [California Water Code Section 13050(f)].

Best Management Practices (BMPs) - Defined in 40 CFR 122.2 as schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the pollution of waters of the United States. BMPs also include treatment requirements, operating procedures and practices to control plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage. In the case of municipal storm water permits, BMPs are typically used in place of numeric effluent limits.

Bioassessment - The use of biological community information to evaluate the biological integrity of a water body and its watershed. With respect to aquatic ecosystems, bioassessment is the collection and analysis of samples of the benthic macroinvertebrate community together with physical/habitat quality measurements associated with the sampling site and the watershed to evaluate the biological condition (i.e. biological integrity) of a water body.

Biocriteria - Under the CWA, numerical values or narrative expressions that define a desired biological condition for a water body that are legally enforceable. The USEPA

defines biocriteria as: "numerical values or narrative expressions that describe the reference biological integrity of aquatic communities inhabiting waters of a given designated aquatic life use… (that)…describe the characteristics of water body segments least impaired by human activities."

Biofiltration - refers to practices that use vegetation and amended soils to detain and treat runoff from impervious areas. Treatment is through filtration, infiltration, adsorption, ion exchange, and biological uptake of pollutants.

Biological Integrity - Defined in Karr J.R. and D.R. Dudley. 1981. Ecological perspective on water quality goals. Environmental Management 5:55-68 as: "A balanced, integrated, adaptive community of organisms having a species composition, diversity, and functional organization comparable to that of natural habitat of the region." Also referred to as ecosystem health.

Clean Water Act Section 402(p) [33 USC 1342(p)] - The federal statute requiring municipal and industrial dischargers to obtain NPDES permits for their discharges of storm water.

Clean Water Act Section 303(d) Water Body - An impaired water body in which water quality does not meet applicable water quality standards and/or is not expected to meet water quality standards, even after the application of technology based pollution controls required by the CWA. The discharge of runoff to these water bodies by the Copermittees is significant because these discharges can cause or contribute to violations of applicable water quality standards.

Construction Site – Any project, including projects requiring coverage under the General Construction Permit, that involves soil disturbing activities including, but not limited to, clearing, grading, disturbances to ground such as stockpiling, and excavation.

Contamination - As defined in the Porter-Cologne Water Quality Control Act, contamination is "an impairment of the quality of waters of the State by waste to a degree which creates a hazard to the public health through poisoning or through the spread of disease. 'Contamination' includes any equivalent effect resulting from the disposal of waste whether or not waters of the State are affected."

Critical Channel Flow (Qc) – The channel flow that produces the critical shear stress that initiates bed movement or that erodes the toe of channel banks. When measuring Qc, it should be based on the weakest boundary material – either bed or bank.

CWA – Federal Clean Water Act

CWC – California Water Code

Daily Discharge – Daily Discharge is defined as either: (1) the total mass of the constituent discharged over the calendar day or any 24 hour period that reasonably represents a calendar day for purposes of sampling (as specified in the permit), for a constituent with limitations expressed in units of mass or; (2) the unweighted arithmetic mean measurement of the constituent over the day for a constituent with limitations expressed in other units of measurement (e.g. concentration.)

The Daily Discharge may be determined by the analytical results of a composite sample taken over the course of one day (a calendar day, or other 24 hour period other than a day), or by the arithmetic mean of analytical results from one or more grab samples taken over the course of a day.

Detected, but not Quantified – those sample results less than the reporting level, but greater than or equal to the laboratory's Method of Detection Limit (MDL.)

Development Projects - Construction, rehabilitation, redevelopment, or reconstruction of any public or private residential project, industrial, commercial, or any other projects.

Dilution Credit – the amount of dilution granted to a discharger in the calculation of a WQBEL, based on the allowance of a specific mixing zone. It is calculated from the dilution ratio, or determined through conducting of a mixing zone study, or modeling of the discharge and receiving water.

Dry Season – May 1 through September 30 of each year.

Dry Weather – weather is considered dry if the preceding 72 hours has been without precipitation.

Effectiveness Assessment Outcome Level 1 - Compliance with Activity-based Permit Requirements – Level 1 outcomes are those directly related to the implementation of specific activities prescribed by this Order or established pursuant to it.

Effectiveness Assessment Outcome Level 2 - Changes in Attitudes, Knowledge, and Awareness – Level 2 outcomes are measured as increases in knowledge and awareness among target audiences such as residents, businesses, and municipal employees.

Effectiveness Assessment Outcome Level 3 - Behavioral Change and BMP Implementation – Level 3 outcomes measure the effectiveness of activities in affecting behavioral change and BMP implementation.

Effectiveness Assessment Outcome Level 4 - Load Reductions – Level 4 outcomes measure load reductions which quantify changes in the amounts of pollutants associated with specific sources before and after a BMP or other control measure is employed.

Effectiveness Assessment Outcome Level 5 - Changes in Runoff and Discharge Quality – Level 5 outcomes are measured as changes in one or more specific constituents or stressors in discharges into or from MS4s.

Effectiveness Assessment Outcome Level 6 - Changes in Receiving Water Quality – Level 6 outcomes measure changes to receiving water quality resulting from discharges into and from MS4s, and may be expressed through a variety of means such as compliance with water quality objectives or other regulatory benchmarks, protection of biological integrity, or beneficial use attainment.

Enclosed Bays – Enclosed bays are indentations along the coast that enclose an area of oceanic water within distinct headlands or harbor works. Enclosed bays include all

bays where the narrowest distance between the headlands or outermost bay works is less than 75 percent of the greatest dimension of the enclosed portion of the bay. Enclosed bays do not include inland surface waters or ocean waters.

Erosion – When land is diminished or worn away due to wind, water, or glacial ice. Often the eroded debris (silt or sediment) becomes a pollutant via storm water runoff. Erosion occurs naturally but can be intensified by land clearing activities such as farming, development, road building, and timber harvesting.

Environmentally Sensitive Areas (ESAs) - Areas that include but are not limited to all Clean Water Act Section 303(d) impaired water bodies; areas designated as Areas of Special Biological Significance by the State Water Resources Control Board (Water Quality Control Plan for the San Diego Basin (1994) and amendments); State Water Quality Protected Areas; water bodies designated with the RARE beneficial use by the State Water Resources Control Board (Water Quality Control Plan for the San Diego Basin (1994) and amendments); areas designated as preserves or their equivalent under the Natural Communities Conservation Program within the Cities and County of Orange; and any other equivalent environmentally sensitive areas which have been identified by the Copermittees.

Estuaries – waters, including coastal lagoons, located at the mouth of streams that serve as areas of mixing fresh and ocean waters. Coastal lagoons and mouths of streams that are temporarily separated from the ocean by sandbars shall be considered estuaries. Estuarine waters shall be considered to extend from a bay or the open ocean to a point upstream where there is no significant mixing of fresh water and ocean water. Estuaries do not include inland surface waters or ocean waters.

Feasibility Analysis – Detailed description of the selection process for the treatment control BMPs for a Priority Development Project, including justification of why one BMP is selected over another. For a Priority Development Project where a treatment control BMP with a low removal efficiency ranking (as identified by the Model SUSMP) is proposed, the analysis shall include a detailed and adequate justification exhibiting the reasons implementation of a treatment control BMP with a higher removal efficiency is infeasible for the Priority Development Project or portion of the Priority Development Project.

Flow Duration – The long-term period of time that flows occur above a threshold that causes significant sediment transport and may cause excessive erosion damage to creeks and streams (not a single storm event duration). The simplest way to visualize this is to consider a histogram of pre- and post-project flows using long-term records of hourly data. To maintain pre-project flow duration means that the total number of hours (counts) within each range of flows in a flow-duration histogram cannot increase between the pre- and post-project condition. Flow duration within the range of geomorphologically significant flows is important for managing erosion.

GIS – Geographic Information System

Grading - The cutting and/or filling of the land surface to a desired slope or elevation.

Hazardous Material – Any substance that poses a threat to human health or the environment due to its toxicity, corrosiveness, ignitability, explosive nature or chemical

reactivity. These also include materials named by the USEPA in 40 CFR 116 to be reported if a designated quantity of the material is spilled into the waters of the U.S. or emitted into the environment.

Hazardous Waste - Hazardous waste is defined as "any waste which, under Section 600 of Title 22 of this code, is required to be managed according to Chapter 30 of Division 4.5 of Title 22 of this code" [CCR Title 22, Division 4.5, Chapter 11, Article 1].

Household Hazardous Waste – Paints, cleaning products, and other wastes generated during home improvement or maintenance activities.

Hydromodification – The change in the natural watershed hydrologic processes and runoff characteristics (i.e., interception, infiltration, overland flow, interflow and groundwater flow) caused by urbanization or other land use changes that result in increased stream flows and sediment transport. In addition, alteration of stream and river channels, such as stream channelization, concrete lining, installation of dams and water impoundments, and excessive streambank and shoreline erosion are also considered hydromodification, due to their disruption of natural watershed hydrologic processes.

Illicit Connection – Any connection to the MS4 that conveys an illicit discharge.

Illicit Discharge - Any discharge to the MS4 that is not composed entirely of storm water except discharges pursuant to a NPDES permit and discharges resulting from fire fighting activities [40 CFR 122.26(b)(2)].

Implementation Assessment – Assessment conducted to determine the effectiveness of Copermittee programs and activities in achieving measurable targeted outcomes, and in determining whether priority sources of water quality problems are being effectively addressed.

Inactive Slopes – Slopes on which no grading or other soil disturbing activities are conducted for 10 or more days.

Inland Surface Waters – all surface waters of the State that do not include the ocean, enclosed bays, or estuaries.

Integrated Assessment – Assessment to be conducted to evaluate whether program implementation is properly targeted to and resulting in the protection and improvement of water quality.

Jurisdictional Runoff Management Plan (JRMP) – A written description of the specific jurisdictional runoff management measures and programs that each Copermittee will implement to comply with this Order and ensure that storm water pollutant discharges in runoff are reduced to the MEP and do not cause or contribute to a violation of water quality standards.

Low Impact Development (LID) – A storm water management and land development strategy that emphasizes conservation and the use of on-site natural features integrated with engineered, small-scale hydrologic controls to more closely reflect pre-development hydrologic functions.

Maximum Daily Action Level (MDAL) – is the highest allowable daily discharge of a pollutant, over a calendar day (or 24 hour period). For pollutants with action levels expressed in units of mass, the daily discharge is calculated as the total mass of the pollutant discharged over the day. For pollutants with action levels expressed in other units of measurement, the daily discharge is calculated as the arithmetic mean measurement of the pollutant over the day.

Maximum Extent Practicable (MEP) – The technology-based standard established by Congress in CWA section 402(p)(3)(B)(iii) for storm water that operators of MS4s must meet. Technology-based standards establish the level of pollutant reductions that dischargers must achieve, typically by treatment or by a combination of source control and treatment control BMPs. MEP generally emphasizes pollution prevention and source control BMPs primarily (as the first line of defense) in combination with treatment methods serving as a backup (additional line of defense). MEP considers economics and is generally, but not necessarily, less stringent than BAT. A definition for MEP is not provided either in the statute or in the regulations. Instead the definition of MEP is dynamic and will be defined by the following process over time: municipalities propose their definition of MEP by way of their runoff management programs. Their total collective and individual activities conducted pursuant to the runoff management programs becomes their proposal for MEP as it applies both to their overall effort, as well as to specific activities (e.g., MEP for street sweeping, or MEP for MS4 maintenance). In the absence of a proposal acceptable to the Regional Board, the Regional Board defines MEP.

In a memo dated February 11, 1993, entitled "Definition of Maximum Extent Practicable," Elizabeth Jennings, Senior Staff Counsel, SWRCB addressed the achievement of the MEP standard as follows:

> "*To achieve the MEP standard, municipalities must employ whatever Best Management Practices (BMPs) are technically feasible (i.e., are likely to be effective) and are not cost prohibitive. The major emphasis is on technical feasibility. Reducing pollutants to the MEP means choosing effective BMPs, and rejecting applicable BMPs only where other effective BMPs will serve the same purpose, or the BMPs would not be technically feasible, or the cost would be prohibitive. In selecting BMPs to achieve the MEP standard, the following factors may be useful to consider:*
>
> *a. Effectiveness: Will the BMPs address a pollutant (or pollutant source) of concern?*
> *b. Regulatory Compliance: Is the BMP in compliance with storm water regulations as well as other environmental regulations?*
> *c. Public Acceptance: Does the BMP have public support?*
> *d. Cost: Will the cost of implementing the BMP have a reasonable relationship to the pollution control benefits to be achieved?*
> *e. Technical Feasibility: Is the BMP technically feasible considering soils, geography, water resources, etc?*
>
> *The final determination regarding whether a municipality has reduced pollutants to the maximum extent practicable can only be made by the Regional or State Water Boards, and not by the municipal discharger. If a municipality reviews a*

lengthy menu of BMPs and chooses to select only a few of the least expensive, it is likely that MEP has not been met. On the other hand, if a municipal discharger employs all applicable BMPs except those where it can show that they are not technically feasible in the locality, or whose cost would exceed any benefit derived, it would have met the standard. Where a choice may be made between two BMPs that should provide generally comparable effectiveness, the discharger may choose the least expensive alternative and exclude the more expensive BMP. However, it would not be acceptable either to reject all BMPs that would address a pollutant source, or to pick a BMP base solely on cost, which would be clearly less effective. In selecting BMPs the municipality must make a serious attempt to comply and practical solutions may not be lightly rejected. In any case, the burden would be on the municipal discharger to show compliance with its permit. After selecting a menu of BMPs, it is the responsibility of the discharger to ensure that all BMPs are implemented."

Minimum Level – the concentration at which the entire analytical system must give a recognizable signal and acceptable calibration point. The ML is the concentration in a sample that is equivalent to the concentration of the lowest calibration standard analyzed by a specific analytical procedure, assuming that all the method sample weights, volumes and processing steps have been followed.

Monitoring Year – the monitoring year includes a full wet season and dry season, beginning annually on October 1st and ending on September 30th.

Municipal Separate Storm Sewer System (MS4) – A conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, or storm drains): (i) Owned or operated by a State, city, town, borough, county, parish, district, association, or other public body (created by or pursuant to State law) having jurisdiction over disposal of sewage, industrial wastes, storm water, or other wastes, including special districts under State law such as a sewer district, flood control district or drainage district, or similar entity, or an Indian tribe or an authorized Indian tribal organization, or designated and approved management agency under section 208 of the CWA that discharges to waters of the United States; (ii) Designated or used for collecting or conveying storm water; (iii) Which is not a combined sewer; (iv) Which is not part of the Publicly Owned Treatment Works (POTW) as defined at 40 CFR 122.26.

National Pollutant Discharge Elimination System (NPDES) - The national program for issuing, modifying, revoking and reissuing, terminating, monitoring and enforcing permits, and imposing and enforcing pretreatment requirements, under Sections 307, 318, 402, and 405 of the CWA.

NOI – Notice of Intent

Non-Storm Water - All discharges to and from a MS4 that do not originate from precipitation events (i.e., all discharges from a MS4 other than storm water). Non-storm water includes illicit discharges, non-prohibited discharges, and NPDES permitted discharges.

Nuisance - As defined in the Porter-Cologne Water Quality Control Act a nuisance is "anything which meets all of the following requirements: 1) Is injurious to health, or is

indecent, or offensive to the senses, or an obstruction to the free use of property, so as to interfere with the comfortable enjoyment of life or property. 2) Affects at the same time an entire community or neighborhood, or any considerable number of persons, although the extent of the annoyance or damage inflicted upon individuals may be unequal. 3) Occurs during, or as a result of, the treatment or disposal of wastes."

Ocean Waters – the territorial marine waters of the State as defined by California law to the extent these waters are outside of enclosed bays, estuaries, and coastal lagoons. Discharges to ocean waters are regulated in accordance with the State Board's California Ocean Plan.

Order – Order No. R9-2009-0002 (NPDES No. CAS0108740)

Person - A person is defined as an individual, association, partnership, corporation, municipality, State or Federal agency, or an agent or employee thereof [40 CFR 122.2].

Point Source - Any discernible, confined, and discrete conveyance, including, but not limited to, any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operations, landfill leachate collection systems, vessel, or other floating craft from which pollutants are or may be discharged. This term does not include return flows from irrigated agriculture or agricultural storm water runoff.

Pollutant - Any agent that may cause or contribute to the degradation of water quality such that a condition of pollution or contamination is created or aggravated.

Pollution - As defined in the Porter-Cologne Water Quality Control Act: "the alteration of the quality of the waters of the State by waste, to a degree that unreasonably affects the either of the following: 1) The waters for beneficial uses; or 2) Facilities that serve these beneficial uses." Pollution may include contamination.

Pollutants of Concern – Pollutants for which water bodies are listed as impaired under CWA section 303(d), pollutants associated with the land use type of a development, and/or pollutants commonly associated with runoff. Pollutants commonly associated with runoff include total suspended solids; sediment; pathogens (e.g., bacteria, viruses, protozoa); heavy metals (e.g., copper, lead, zinc, and cadmium); petroleum products and polynuclear aromatic hydrocarbons; synthetic organics (e.g., pesticides, herbicides, and PCBs); nutrients (e.g., nitrogen and phosphorus fertilizers); oxygen-demanding substances (decaying vegetation, animal waste, and anthropogenic litter).

Pollution Prevention - Pollution prevention is defined as practices and processes that reduce or eliminate the generation of pollutants, in contrast to source control BMPs, treatment control BMPs, or disposal.

Post-Construction BMPs - A subset of BMPs including structural and non-structural controls which detain, retain, filter, or educate to prevent the release of pollutants to surface waters during the final functional life of developments.

Pre-Project or Pre-Development Runoff Conditions (Discharge Rates, Durations, Etc.) – Runoff conditions that exist onsite immediately before the planned development activities occur. This definition is not intended to be interpreted as that period before any

human-induced land activities occurred. This definition pertains to redevelopment as well as initial development.

Principal Copermittee – County of Orange

Priority Development Projects - New development and redevelopment project categories listed in Section F.1.d(2) of Order No. R9-2009-0002.

Rainy Season – (aka Wet Season) is the period of time from October 1 forward to April 30 when the San Diego region experiences the most rainfall.

Receiving Waters – Waters of the United States.

Receiving Water Limitations (RWLs) - Waste discharge requirements issued by the Regional Board typically include both: (1) "Effluent Limitations" (or "Discharge Limitations") that specify the technology-based or water-quality-based effluent limitations; and (2) "Receiving Water Limitations" that specify the water quality objectives in the Basin Plan as well as any other limitations necessary to attain those objectives. In summary, the "Receiving Water Limitations" provision is the provision used to implement the requirement of CWA section 301(b)(1)(C) that NPDES permits must include any more stringent limitations necessary to meet water quality standards.

Redevelopment - The creation, addition, and or replacement of impervious surface on an already developed site. Examples include the expansion of a building footprint, road widening, the addition to or replacement of a structure, and creation or addition of impervious surfaces. Replacement of impervious surfaces includes any activity that is not part of a routine maintenance activity where impervious material(s) are removed, exposing underlying soil during construction. Redevelopment does not include trenching and resurfacing associated with utility work; resurfacing existing roadways; new sidewalk construction, pedestrian ramps, or bikelane on existing roads; and routine replacement of damaged pavement, such as pothole repair.

Retain – to keep or hold in a particular place, condition, or position without discharge to surface waters.

Runoff - All flows in a storm water conveyance system that consists of the following components: (1) storm water (wet weather flows) and (2) non-storm water including dry weather flows.

San Diego Water Board – As used in this document the term "San Diego Water Board" is synonymous with the term "Regional Board" as defined in Water Code section 13050(b) and is intended to refer to the California Regional Water Quality Control Board for the San Diego Region as specified in Water Code Section 13200.

Sediment - Soil, sand, and minerals washed from land into water. Sediment resulting from anthropogenic sources (i.e. human induced land disturbance activities) is considered a pollutant. This Order regulates only the discharges of sediment from anthropogenic sources and does not regulate naturally occurring sources of sediment. Sediment can destroy fish-nesting areas, clog animal habitats, and cloud waters so that sunlight does not reach aquatic plants.

Shared Treatment Control BMP - BMPs used by multiple developments to infiltrate, filter, or treat the required volume or flow prior to discharge to a receiving water. This could include, for example, a treatment BMP at the end of an enclosed storm drain that collects runoff from several commercial developments.

Source Control BMP – Land use or site planning practices, or structural or nonstructural measures that aim to prevent runoff pollution by reducing the potential for contamination at the source of pollution. Source control BMPs minimize the contact between pollutants and runoff.

State Water Quality Protection Area – A nonterrestrial marine or estuarine area designated to protect marine species or biological communities from an undesirable alteration in natural water quality, including, but not limited to, areas of special biological significance that have been designated by the State Water Resources Control Board through its water quality control planning process. Areas of special biological significance are a subset of State Water Quality Protection Areas, and require special protection as determined by the State Water Resources Control Board pursuant to the California Ocean Plan adopted and reviewed pursuant to Article 4 (commencing with Section 13160) of Chapter 3 of Division 7 of the California Water Code and pursuant to the Water Quality Control Plan for Control of Temperature in the Coastal and Interstate Waters and Enclosed Bays and Estuaries of California (California Thermal Plan) adopted by the state board.

Storm Water – Per 40 CFR 122.26(b)(13), means storm water runoff, snowmelt runoff and surface runoff and drainage. Surface runoff and drainage pertains to runoff and drainage resulting from precipitation events.

Standard Storm Water Mitigation Plan (SSMP) – A plan developed to mitigate the impacts of runoff from Priority Development Projects.

Third Party Inspectors - Industrial and commercial facility inspectors who are not contracted or employed by a regulatory agency or group of regulatory agencies, such as the Regional Board or Copermittees. The third party inspector is not a regular facility employee self-inspecting their own facility. The third party inspector could be a contractor or consultant employed by a facility or group of businesses to conduct inspections.

Total Maximum Daily Load (TMDL) - The maximum amount of a pollutant that can be discharged into a water body from all sources (point and non-point) and still maintain water quality standards. Under CWA section 303(d), TMDLs must be developed for all water bodies that do not meet water quality standards after application of technology-based controls.

Toxicity - Adverse responses of organisms to chemicals or physical agents ranging from mortality to physiological responses such as impaired reproduction or growth anomalies). The water quality objectives for toxicity provided in the Water Quality Control Plan, San Diego Basin, Region 9, (Basin Plan), state in part…"All waters shall be free of toxic substances in concentrations that are toxic to, or that produce detrimental physiological responses in human, plant, animal, or aquatic life….The survival of aquatic life in surface waters subjected to a waste discharge or other controllable water quality factors, shall not be less than that for the same water body in areas unaffected by the waste discharge".

Treatment Control BMP – Any engineered system designed to remove pollutants by simple gravity settling of particulate pollutants, filtration, biological uptake, media absorption or any other physical, biological, or chemical process.

Unpaved Road – is a long, narrow stretch without pavement used for traveling by motor passenger vehicle between two or more points. Unpaved roads are generally constructed of dirt, gravel, aggregate or macadam and may be improved or unimproved.

Waste - As defined in CWC Section 13050(d), "waste includes sewage and any and all other waste substances, liquid, solid, gaseous, or radioactive, associated with human habitation, or of human or animal origin, or from any producing, manufacturing, or processing operation, including waste placed within containers of whatever nature prior to, and for purposes of, disposal."

Article 2 of CCR Title 23, Chapter 15 (Chapter 15) contains a waste classification system that applies to solid and semi-solid waste, which cannot be discharged directly or indirectly to water of the state and which therefore must be discharged to land for treatment, storage, or disposal in accordance with Chapter 15. There are four classifications of waste (listed in order of highest to lowest threat to water quality): hazardous waste, designated waste, non-hazardous solid waste, and inert waste.

Water Quality Assessment – Assessment conducted to evaluate the condition of non-storm water and storm water discharges, and the water bodies which receive these discharges.

Water Quality Objective - Numerical or narrative limits on constituents or characteristics of water designated to protect designated beneficial uses of the water. [California Water Code Section 13050 (h)]. California's water quality objectives are established by the State and Regional Water Boards in the Water Quality Control Plans. Numeric or narrative limits for pollutants or characteristics of water designed to protect the beneficial uses of the water. In other words, a water quality objective is the maximum concentration of a pollutant that can exist in a receiving water and still generally ensure that the beneficial uses of the receiving water remain protected (i.e., not impaired). Since water quality objectives are designed specifically to protect the beneficial uses, when the objectives are violated the beneficial uses are, by definition, no longer protected and become impaired. This is a fundamental concept under the Porter Cologne Act. Equally fundamental is Porter Cologne's definition of pollution. A condition of pollution exists when the water quality needed to support designated beneficial uses has become unreasonably affected or impaired; in other words, when the water quality objectives have been violated. These underlying definitions (regarding beneficial use protection) are the reason why all waste discharge requirements implementing the federal NPDES regulations require compliance with water quality objectives. (Water quality objectives are also called water quality criteria in the CWA.)

Water Quality Standards - The beneficial uses (e.g., swimming, fishing, municipal drinking water supply, etc.,) of water and the water quality objectives necessary to protect those uses.

Waters of the State - Any water, surface or underground, including saline waters within the boundaries of the State [CWC section 13050 (e)]. The definition of the Waters of the

State is broader than that for the Waters of the United States in that all water in the State is considered to be a Waters of the State regardless of circumstances or condition. Under this definition, a MS4 is always considered to be a Waters of the State.

Waters of the United States - As defined in the 40 CFR 122.2, the Waters of the U.S. are defined as: "(a) All waters, which are currently used, were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide; (b) All interstate waters, including interstate "wetlands;" (c) All other waters such as intrastate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, "wetlands," sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds the use, degradation or destruction of which would affect or could affect interstate or foreign commerce including any such waters: (1) Which are or could be used by interstate or foreign travelers for recreational or other purposes; (2) From which fish or shellfish are or could be taken and sold in interstate or foreign commerce; or (3) Which are used or could be used for industrial purposes by industries in interstate commerce; (d) All impoundments of waters otherwise defined as waters of the United States under this definition: (e) Tributaries of waters identified in paragraphs (a) through (d) of this definition; (f) The territorial seas; and (g) "Wetlands" adjacent to waters (other than waters that are themselves wetlands) identified in paragraphs (a) through (f) of this definition. Waters of the United States do not include prior converted cropland. Notwithstanding the determination of an area's status as prior converted cropland by any other federal agency, for the purposes of the Clean Water Act, the final authority regarding Clean Water Act jurisdiction remains with the EPA."

Watershed - That geographical area which drains to a specified point on a water course, usually a confluence of streams or rivers (also known as drainage area, catchment, or river basin).

Watershed Runoff Management Plan (WRMP) – A written description of the specific watershed runoff management measures and programs that each watershed group of Copermittees will implement to comply with this Order and ensure that storm water pollutant discharges in runoff are reduced to the MEP and do not cause or contribute to a violation of water quality standards.

WDRs – Waste Discharge Requirements

DRAFT

ATTACHMENT D

SCHEDULED SUBMITTALS SUMMARY AND REPORTING CHECKLIST

Submittal	Permit Section	Completion Date	Frequency
Prohibitions on dry-weather discharges not listed in Section B.2	B.2	July 1, 2012, then in JRMP Annual Report	Annual
Submit Certified Statement of Adequate Legal Authority	E.2	June 30, 2012	One time
Updated SSMP	F.1.d, K.2.a	June 30, 2012	One time
Identify and remove barriers to LID implementation	F.1.d.(4)(a)(v)	With JRMP Annual Report	Annual
Hydromodification Management Plan	F.1.h.(5), K.2.b	June 30, 2013	One Time for Draft
Flood Control Structure BMP Inventory and Evaluation	F.3.a.(4)	With JRMP Annual Report	Annual
Retrofitting Program	F.3.d.(3)	With JRMP Annual Report	Annual
Updated Watershed Workplans	G.1 K.1.b	June 30, 2012	One time
Fiscal Analysis	H.3	With JRMP Annual Report	Annual
Updated Jurisdictional Runoff Management Plans	K.1.a	June 30, 2012	One time
Report of Waste Discharge	K.2.c	At least 180 days prior to expiration of this Order	One time
Principal Copermittee submits JRMP Annual Reports to Regional Board	K.3.a.(2)	October 31, 2013 and annually thereafter	Annual
Principal Copermittee submits Notification of Principal Copermittee	M	180 days after adoption of the Order	One Time

Jurisdictional Runoff Management Program Annual Report Checklist

In the JRMP Annual Report each Copermittee shall provide an Annual Report Checklist. The Annual Report Checklist must be no longer than 2 pages, be current as of the 1st day of the rainy season of that year, and include a signed certification statement. The Annual Report Summary Checklist must provide the following information:

Order Requirements
Were All Requirements of this Order Met?

Construction
Number of Active Sites
Number of Inactive Sites
Number of Sites Inspected
Number of Inspections
Number of Violations
Number of Construction Enforcement Actions Taken

New Development
Number of Development Plan Reviews
Number of Grading Permits Issued
Number of Projects Exempted from Interim/Final Hydromodification Requirements

Post Construction Development
Number of Priority Development Projects
Number of SUSMP Required Post-Construction BMP Inspections
Number of SUSMP Required Post-Construction BMP Violations
Number of SUSMP Required Post-Construction BMP Enforcement Actions Taken

Illicit Discharges and Connections
Number of IC/ID Inspections
Number of IC/ID Detections by Staff
Number of IC/ID Detections from the Public
Number of IC/ID Eliminations
Number of IC/ID Violations
Number of IC/ID Enforcement Actions Taken

MS4 Maintenance
Number of Inspections Conducted
Amount of Waste Removed
Total Miles of MS4 Inspected

Municipal/Commercial/Industrial
Number of Facilities
Number of Inspections Conducted
Number of Facilities Inspected
Number of Violations
Number of Enforcement Actions Taken

Attachment E

RECEIVING WATERS AND MS4 DISCHARGE MONITORING AND REPORTING PROGRAM NO. R9-2010-0016

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I. PURPOSE

A. This Receiving Waters and MS4 Discharge Monitoring and Reporting Program (MRP) is intended to meet the following goals:
   1. Assess compliance with Order No. R9-2010-0016;
   2. Measure and improve the effectiveness of the Copermittees' runoff management programs;
   3. Assess the chemical, physical, and biological impacts to receiving waters resulting from MS4 discharges;
   4. Characterize storm water discharges;
   5. Identify sources of specific pollutants;
   6. Prioritize drainage and sub-drainage areas that need management actions;
   7. Detect and eliminate illicit discharges and illicit connections to the MS4;
   8. Assess the overall health of receiving waters; and
   9. Provide information to implement required BMP improvements.

B. This Receiving Waters and MS4 Discharges Monitoring and Reporting Program is designed to answer the following core management questions[1]:
   1. Are conditions in receiving waters protective, or likely to be protective, of beneficial uses?
   2. What is the extent and magnitude of the current or potential receiving water problems?
   3. What is the relative MS4 discharge contribution to the receiving water problem(s)?
   4. What are the sources of MS4 discharge that contribute to receiving water problem(s)?
   5. Are conditions in receiving waters getting better or worse?

II. MONITORING PROGRAM

The Monitoring Program is designed to assess the condition of receiving waters, monitor pollutants in storm and non-storm water effluent from the MS4, and conduct Special Studies to address conditions of concern. Where feasible, the Monitoring Program is designed to allow the Copermittees to combine required monitoring elements or efforts that are not mutually exclusive while still meeting the requirements of the Order.

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[1] Core management questions from "*Model Monitoring Program for Municipal Separate Storm Sewer Systems in Southern California: A report from the Stormwater Monitoring Coalition's Model Monitoring Technical Committee.*" Technical Report No. 419. August 2004.

A. Receiving Waters Monitoring Program

Each Copermittee must collaborate with the other Copermittees to develop, conduct, and report on a year-round watershed based Receiving Waters Monitoring Program. The monitoring program design, implementation, analysis, assessment, and reporting must be conducted on a watershed basis for the Santa Margarita Hydrologic Unit (HU) and must be designed to meet the goals and answer the questions listed in section I above. The monitoring program must include the following components:

1. MASS LOADING STATION (MLS) MONITORING

a. Locations: The following existing mass loading stations must continue to be monitored: Lower Temecula Creek, Lower Murrieta Creek at the USGS Weir, and a permanent reference station.[2] Copermittees may propose, for San Diego Water Board review and approval, changing the location of a mass loading station.

b. Frequency: Each mass loading station must be monitored each year three times during wet weather events and twice during dry weather flow conditions.

c. Timing: Each mass loading station must be monitored for the first wet weather event of the season which meets USEPA's criteria described in 40 CFR 122.21(g)(7). Monitoring of the third wet weather event must be conducted after February 1. Dry weather mass loading monitoring events must be sampled at least three months apart between May and October. If flows are not evident for the second event, then sampling must be conducted during non-rain events in the following wet weather season.

d. Protocols: Protocols for mass loading sampling and analysis including analytical methods, target reporting limits, and data reporting formats must be compatible with the State Water Resources Control Board's (State Water Board's) State Surface Water Ambient Monitoring Program (SWAMP). If the mass loading sampling and analysis are determined to be impracticable with the SWAMP standards, the Copermittees must provide a written explanation and discussion in the submittal of the Planned Monitoring Program. Wet weather samples must be time-weighted composites, collected for the duration of the entire runoff event. Where such monitoring is not practical, such as for large watersheds with significant groundwater recharge flows, composites must be collected at a minimum during the first 3 hours of

[2] A map depicting mass loading stations can be found in the Fact Sheet for Order R9-2010-0016.

flow. Dry weather event sampling must be time-weighted composites composed of 24 discrete hourly samples, whereby the mass loads of pollutants are calculated as the product of the composite sample concentration and the total volume of water discharged past the monitoring point during the time of sample collection.

(1) Automatic samplers must be used to collect samples from mass loading stations.

(2) Grab samples must be analyzed for temperature, pH, specific conductance, biochemical oxygen demand, oil and grease, E. coli , fecal coliform, enterococcus and for total petroleum hydrocarbons whenever a sheen is observed.

e. Copermittees must measure or estimate flow rates and volumes for each mass loading station sampling event to determine mass loadings of pollutants. Data from nearby USGS gauging stations may be utilized, or flow rates may be estimated in accordance with the USEPA Storm Water Sampling Guidance Document (EPA-833-B-92-001), Section 3.2.1.

f. In the event that the required number of sampling events are not conducted during one monitoring year at any given station, the Copermittees must provide a written explanation for the reduced number of sampling events in the subsequent Receiving Waters Monitoring Annual Report. The explanation must include, at a minimum, streamflow data from the nearest USGS gauging station, a full description of any equipment failures and subsequent remedies if applicable, efforts made to resample a future event, and any quality assurance or quality control issues encountered. The explanation must also include a description of steps taken to prevent further sampling failures.

g. The following constituents must be analyzed for each monitoring event at each station:

Table 1. Analytical Testing for Mass Loading (II.A.1) and Stream Assessment (II.A.2)

Conventionals, Nutrients, Hydrocarbons	Pesticides	Metals (Total and Dissolved)	Bacteriological (mass loading)
• Total Dissolved Solids • Total Suspended Solids • Turbidity • Total Hardness • pH • Specific Conductance • Temperature • Dissolved Oxygen • Total Phosphorus • Dissolved Phosphorus • Nitrite ˚ • Nitrate ˚ • Total Kjeldahl Nitrogen • Ammonia • Biological Oxygen Demand, 5-day • Chemical Oxygen Demand • Total Organic Carbon • Dissolved Organic Carbon • Methylene Blue Active Substances • Oil and Grease • Sulfate	• Diazinon • Chlorpyrifos • Malathion • Carbamates • Pyrethroids	• Arsenic • Cadmium • Total Chromium • Hexavalent Chromium • Copper • Lead • Iron • Manganese • Nickel • Selenium • Zinc • Mercury • Silver • Thallium	• E. coli • Fecal Coliform • Enterococcus
˚ Nitrate and nitrate may be combined and reported as nitrate + nitrite.			

h. Toxicity testing must be conducted for each monitoring event at each station according to the following Table 2:

Table 2. Toxicity Testing for Mass Loading (II.A.1) and Stream Assessment (II.A.2)

Program Component	***Dry Weather Flows***	***Storm Water Flows***
	Freshwater Organisms	**Freshwater Organisms**
Mass Loading	3 chronic* 3 acute*	3 acute*
Bioassessment**	3 chronic* 3 acute*	n/a
Sediment Toxicity Special Study	1 chronic 1 acute	n/a

Table Notes
* Toxicity testing must include use of *Pimephales promelas* (fathead minnow), *Hyalella azteca* and *Pseudokirchneriella subcapitata (*formerly *Selenastrum capricornutum,* unicellular algae).
** Duplicative toxicity testing is not required for Stream Assessment Monitoring stations co-located at mass loading stations since Stream Assessment Monitoring must be conducted in conjunction with dry weather mass loading.

Species Notes:
1. Acute toxicity may be determined during the course of chronic toxicity monitoring per U.S. EPA protocols.

i. The presence of acute toxicity must be determined in accordance with USEPA protocol (EPA-821-R-02-012). The presence of chronic freshwater toxicity must be determined in accordance with USEPA protocol (EPA-821-R-02-013).

2. Stream Assessment Monitoring

Copermittees must conduct Stream Assessment Monitoring using multiple lines of evidence to assess the condition of biological communities in freshwater receiving waters. Stream assessment must include the collection and reporting of the following specified instream biological, chemical, and physical (including habitat) data.

a. Locations: At a minimum, the program must consist of station identification, sampling, monitoring, and analysis of data for six stream assessment stations in order to determine the biological, chemical and physical integrity of streams within the County of Riverside. The two existing mass loading stations at Murrieta and Temecula Creeks must continue to be monitored. Two reference stream assessment stations, including the existing Adobe Creek station, must be identified, sampled, monitored, and analyzed. Locations of reference stations

must be identified according to protocols outlined in "A Quantitative Tool for Assessing the Integrity of Southern Coastal California Streams," by Ode, et al. 2005.[3]

b. Frequency: Stream assessment stations must be monitored in May or June (to represent the influence of wet weather on the communities) and September or October (to represent the influence of dry weather flows on the communities). The timing of monitoring of stream assessment stations located at mass loading stations must coincide with dry weather monitoring of those mass loading stations.

c. Parameters / Methods: Stream assessment monitoring must include bioassessment, aquatic chemistry, and aqueous toxicity.

(1) Aquatic chemistry and aqueous toxicity must be conducted as outlined in Tables 1 and 2 using the same parameters and methods as the mass loading station monitoring.

(2) Bioassessment analysis procedures must include calculation of the Index of Biotic Integrity (IBI) for benthic macroinvertebrates for all bioassessment stations, as outlined in "A Quantitative Tool for Assessing the Integrity of Southern Coastal California Streams," by Ode, et al. 2005.

(3) Monitoring of stream assessment stations must be conducted according to bioassessment Standard Operating Procedures (SOP) developed by the Surface Water Ambient Monitoring Program (SWAMP), as amended.[4] In collecting macroinvertebrate samples, the discharger must use the "Reachwide Benthos (Multihabitat) Procedure." The discharger must conduct, concurrently with all required macroinvertebrate collections, the "full" suite of physical/habitat characterization measurements specified in the SWAMP Bioassessment SOP, and as summarized in the *SWAMP Stream Habitat Characterization Form — Full Version*. [5]

(4) Monitoring of stream assessment stations must incorporate assessment of algae using SWAMP's SOP for Collecting Stream

[3] Ode, et al. 2005. "A Quantitative Tool for Assessing the Integrity of Southern Coastal California Streams." Environmental Management. Vol. 35, No. 1, pp. 1-13.
[4] Ode, P.R.. 2007. Standard operating procedures for collecting macroinvertebrate samples and associated physical and chemical data for ambient bioassessments in California. California State Water Resources Control Board Surface Water Ambient Monitoring Program (SWAMP) Bioassessment SOP 001.
[5] Available at: http://www.waterboards.ca.gov/water_issues/programs/swamp/docs/reports/fieldforms_fullversion052908.pdf

Algae Samples.[6] Assessment of freshwater algae must include algal taxonomic composition (diatoms and soft algae) and algal biomass. Future bioassessment must incorporate algal IBI scores, when developed.

d. A qualified professional environmental laboratory must perform all sampling, laboratory, quality assurance, and analytical procedures in accordance with the Southern California Regional Watershed Monitoring Program Bioassessment Quality Assurance Project Plan.[7] The Copermittees must utilize future Quality Assurance Project Plans as developed by SWAMP.

(1) The Copermittees must have and follow a quality assurance (QA) plan that covers the required stream assessment monitoring. External QA checks must be funded by the Copermittees, and performed by the California Department of Fish and Game's Aquatic Bioassessment Laboratory. An alternate laboratory with equivalent expertise and performance may be used if approved in advance in writing by San Diego Water Board.

(2) Identified organisms must be archived (i.e., retained) by the Copermittee(s) for a period of not less than three years from the date that all QA steps are completed. The identified organisms must be relinquished to the San Diego Water Board upon request by the San Diego Water Board.

(3) The macroinvertebrate results (i.e., taxonomic identifications consistent with the specified SAFIT STEs, and number of organisms within each taxa) must be submitted to the San Diego Water Board in electronic format. SWAMP is currently developing standardized formats for reporting bioassessment data. All bioassessment data collected after those formats become available must be submitted using the SWAMP formats. Until those formats are available, the biological data must be submitted in MS-Excel[8] (or equivalent) format.

The physical/habitat data must be reported using the standard format titled *SWAMP Stream Habitat Characterization Form — Full Version*.

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[6] Fetcher et al. 2009. Standard Operating Procedures for Collecting Stream Algae Samples and Associated Physical Habitat and Chemical Data for Ambient Bioassessments in California.
[7] Version 1.0 of the Southern California Regional Watershed Monitoring Program Bioassessment Quality Assurance Program Plan was released on June 25, 2009.
[8] Any version of Excel, 2000 or later, may be used.

3. FOLLOW-UP ANALYSIS AND ACTIONS (TIE AND TRE TRIAD APPROACH)

When results from the required monitoring indicate adverse water quality effects at a mass loading station or stream assessment station as defined in Table 3, Copermittees within the watershed(s) that discharge to that location must evaluate the extent and causes of MS4 discharge pollution to the adverse effects in receiving waters and prioritize and implement management actions to eliminate non-storm water discharges and/or reduce storm water sources from the MS4 as described in Table 3. Toxicity Identification Evaluations (TIEs) must be conducted to determine the cause of toxicity as outlined in Table 3 below. Other follow-up activities, which must be conducted by the Copermittees, are also identified in Table 3. Once the cause of toxicity has been identified by a TIE, the Copermittees must perform source identification projects as needed and implement the measures necessary to reduce or eliminate the pollutant discharges and abate the sources causing the toxicity.

Table 3. Triad Approach to Determining Follow-Up Actions[9]

	Chemistry	Toxicity	Benthic Alteration	Example Conclusions	Possible Actions or Decisions
1.	Exceedance of water quality objectives	Evidence of toxicity	Indications of alteration	Strong evidence of pollution-induced degradation	Use TIE to identify contaminants of concern, based on TIE metric Initiate upstream source identification as a high priority
2.	No persistent exceedances of water quality objectives	No evidence of toxicity	No indications of alteration	No evidence of current pollution-induced degradation Potentially harmful pollutants not yet concentrated enough to cause visible impact	No immediate action necessary Conduct periodic broad scans for new and/or potentially harmful pollutants
3.	Exceedance of water quality objectives	No evidence of toxicity	No indications of alteration	Contaminants are not bioavailable Test organisms not sensitive to problem pollutants	TIE would not provide useful information with no evidence of toxicity Continue monitoring for toxic and benthic impacts Initiate upstream source identification as a low priority Consider whether different or additional test organisms should be evaluated
4.	No persistent exceedances of water quality objectives	Evidence of toxicity	No indications of alteration	Unmeasured contaminant(s) or conditions have the potential to cause degradation Pollutant causing toxicity at very low levels	Recheck chemical analyses; verify toxicity test results Consider additional advanced chemical analyses Use TIE to identify contaminants of concern, based on TIE metric Initiate upstream source identification as a medium priority
5.	No persistent exceedances of water quality objectives	No evidence of toxicity	Indications of alteration	Alteration may not be due to toxic contamination Test organisms not sensitive to problem pollutants	No action necessary due to toxic chemicals Initiate upstream source identification (for physical sources) as a high priority Consider whether different or additional test organisms should be evaluated
6.	Exceedance of water quality objectives	Evidence of toxicity	No indications of alteration	Toxic contaminants are bioavailable, but in situ effects are not demonstrable Benthic analysis not sensitive enough to detect impact Potentially harmful pollutants not yet concentrated enough to change community	Determine if chemical and toxicity tests indicate persistent degradation Recheck benthic analyses; consider additional data analyses If recheck indicates benthic alteration, perform TIE to identify contaminants of concern, based on TIE metric Initiate upstream source identification as a high priority If recheck shows no effect, use TIE to identify contaminants of concern, based on TIE metric Initiate upstream source identification as a medium priority
7.	No persistent exceedances of water quality objectives	Evidence of toxicity	Indications of alteration	Unmeasured toxic contaminants are causing degradation Pollutant causing toxicity at very low levels Benthic impact due to habitat disturbance, not toxicity	Recheck chemical analyses and consider additional advanced analyses Use TIE to identify contaminants of concern, based on TIE metric Initiate upstream source identification as a high priority Consider potential role of physical habitat disturbance
8.	Exceedance of water quality objectives	No evidence of toxicity	Indications of alteration	Test organisms not sensitive to problem pollutants Benthic impact due to habitat disturbance, not toxicity	TIE would not provide useful information with no evidence of toxicity Initiate upstream source identification as a high priority Consider whether different or additional test organisms should be evaluated Consider potential role of physical habitat disturbance

4. REGIONAL MONITORING PROGRAMS

The San Diego Water Board recognizes the importance and advantages of participation by Copermittees in Regional Monitoring Programs. As such, the Copermittees may propose participation in additional regional monitoring programs to supplement and/or replace monitoring required under this Order. The regional monitoring plan must be submitted to the San Diego Water Board[10] for review and approval. Documentation of

[9] Model Monitoring Program for Municipal Separate Storm Sewer Systems in Southern California. Stormwater Monitoring Coalition August 2004. See Table 5-4 for definitions.

[10] For the purposes of Receiving Waters and MS4 Discharge Monitoring and Reporting Program No. R9-2010-0016, review and approval by the San Diego Water Board of draft monitoring plans, proposals or protocols shall be conducted by the San Diego Water Board Executive Officer.

participation and monitoring must be included in the annual report(s).

B. Wet Weather MS4 Discharge Monitoring

Each Copermittee must collaborate with the other Copermittees to develop, conduct, and report on a year-round, watershed-based, Wet Weather MS4 Discharge Monitoring Program. The monitoring program design, implementation, analysis, assessment, and reporting must be conducted on a watershed basis for each of the hydrologic subareas within the Santa Margarita HU under jurisdiction of the Copermittees. The monitoring program must be designed to meet the goals, and answer the questions, listed in Section I above, as well as to implement required Storm Water Action Levels (SALs) in the Order. The monitoring program must include the following components;

1. MS4 OUTFALL MONITORING

The Copermittees must collaborate to develop and implement a monitoring program to characterize pollutant discharges from MS4 outfalls in each watershed during wet weather. The program must include the rationale and criteria for selection of outfalls to be monitored. The program must, at a minimum, include collection of samples for pollutants listed in Table 4 (below). This monitoring program must be designed to sample a representative percentage[11] of the major outfalls within each hydrologic subarea and must begin no later than the 2012-2013 monitoring year.

a. The program must comply with Section D of this Order for Storm Water Action Levels (SALs). Samples must be collected during the first 24 hours of the storm water discharge or for the entire storm water discharge if it is less than 24 hours.

(1) Grab samples may be utilized only for pH, indicator bacteria, DO, temperature and hardness.

(2) All other constituents must be sampled using 24-hour composite samples or for the entire storm water discharge if the storm event is less than 24 hours.

b. Sampling to compare MS4 outfall discharges with total metal SALs must include a measurement of receiving water hardness at each

[11] A representative percentage determination must consider hydrologic conditions, total drainage area of the site, population density of the site, traffic density, age of the structures or buildings in the area, and land use types (commercial, residential and industrial).

outfall. If a total metal concentration exceeds a SAL in Section D of the Order, that concentration must be compared to the California Toxic Rule criteria and the USEPA 1-hour maximum concentration for the detected level of receiving water hardness associated with that sample. If it is determined that the sample's total metal concentration for that specific pollutant exceeds the SAL but does not exceed the applicable 1-hour criteria for the measured level of hardness, then the SAL shall be considered not exceeded for that measurement.

Table 4. Analytical Testing for Wet Weather MS4 Discharges

Conventionals, Nutrients, Hydrocarbons	Pesticides	Metals (Total and Dissolved)	Bacteriological
• Total Dissolved Solids • Total Suspended Solids • Turbidity★ • Total Hardness • pH • Specific Conductance • Temperature • Dissolved Oxygen • Total Phosphorus★ • Dissolved Phosphorus • Nitrite °★ • Nitrate °★ • Total Kjeldahl Nitrogen • Ammonia • Biological Oxygen Demand, 5-day • Chemical Oxygen Demand • Total Organic Carbon • Dissolved Organic Carbon • Oil and Grease • Sulfate	• Diazinon • Chlorpyrifos • Pyrethroids	• Arsenic • Cadmium★ • Chromium • Copper★ • Lead★ • Nickel • Selenium • Zinc★ • Mercury • Silver • Thallium • Iron • Manganese	• Fecal Coliform • Enterococcus • E. coli

° Nitrate and nitrate may be combined and reported as nitrate + nitrite.
★Pollutant for which there is a Storm Water Action Level

2. SOURCE IDENTIFICATION MONITORING

The Copermittees must collaborate to develop and implement a monitoring program to identify sources of pollutants causing the priority water quality problems within each hydrologic subarea. The monitoring program must include focused monitoring which moves upstream into each watershed as necessary to identify sources. This monitoring program must be implemented within each hydrologic subarea and must begin no later than the 2012-2013 monitoring year.

3. COMMENCEMENT OF MS4 OUTFALL AND SOURCE IDENTIFICATION MONITORING

The Principal Copermittee must submit to the San Diego Water Board for review and approval, a detailed draft of the wet weather MS4 discharge monitoring program to be implemented. The description must identify and provide the rationale for all constituents monitored, locations of monitoring, frequency of monitoring, and analyses to be conducted with the data generated. The draft must be submitted with the proposed monitoring program (Section III.A.1).

C. Non-Storm Water Dry Weather Action Levels and Illicit Discharge Detection and Elimination

Each Copermittee must collaborate with the other Copermittees to conduct, and report on a year-round watershed based Dry Weather Non-storm Water MS4 Discharge Monitoring Program. The monitoring program's implementation, analysis, assessment, and reporting must be conducted to assess compliance with section B and C of this Order, meet the goals of the MRP, and conduct Illicit Discharge Detection and Elimination Activities under Section F.4 of this Order. The monitoring program must also be designed to assess the contribution of dry weather flows to Clean Water Act Section 303(d) listed impairments. The monitoring program must include the following components:

1. MS4 OUTFALL MONITORING

Each Copermittee's program must be designed to determine levels of pollutants in effluent discharges from the MS4 into receiving waters. Each Copermittee must conduct the following dry weather field screening and analytical monitoring tasks:

a. Dry Weather Non-storm Water Effluent Analytical Monitoring Station Identification

(1) Sampling Stations must be located at major outfalls pursuant to section C of this Order. Other outfall sampling points (or any other point of access such as manholes) identified by the Copermittees as potential high risk sources of polluted effluent or as identified under Section C.4 of the Order must be sampled.

(2) Each Copermittee must clearly identify each dry weather effluent analytical monitoring station on its MS4 Map as either a separate GIS layer or a map overlay hereinafter referred to as a Dry Weather

Non-storm Water Effluent Analytical Stations Map.

b. Develop Dry Weather Non-storm Water Effluent Analytical Monitoring Procedures

Each Copermittee must develop and/or update written procedures for effluent analytical monitoring including field observations, monitoring, and analyses to be conducted. These procedures must be consistent with 40 CFR part 136. At a minimum, the procedures must meet the following guidelines and criteria:

(1) Determining Sampling Frequency: Effluent analytical monitoring must be conducted at major outfalls and identified stations. The Copermittees must sample a representative number of major outfalls and identified stations within each hydrologic subarea.[12] The sampling must be done to assess compliance with dry weather non-storm water action levels pursuant to section C of this Order. All monitoring conducted must be preceded by a minimum of 72 hours of dry weather.

(2) Sampling of non-storm water discharges may be done utilizing grab samples. If a ponded MS4 discharge is observed at a monitoring station, the Copermittee(s) must record the observation and collect at least one (1) grab sample. If flow is evident, a 1-hour composite sample may be taken. The Copermittee(s) must estimate the flow by measuring the width of water surface, approximate depth of water, and approximate flow velocity.

(3) Effluent samples must undergo analytical laboratory analysis for (a) all constituents described in *Table 1. Analytical Testing for Mass Loading and Stream Assessment* of this Order; (b) Constituents with assigned non-storm water action levels under Section C of this Order; and (c) Total Residual Chlorine.

(4) If the station is dry (i.e. no flowing or ponded MS4 discharge is observed), the Copermittee(s) must make and record all applicable observations on the MS4 outfall and receiving waters, including any evidence of past non-storm water flows and the presence of trash.

[12] A representative percentage determination must consider hydrologic conditions, total drainage area of the site, population density of the site, traffic density, age of the structures or buildings in the area, and land use types (commercial, residential and industrial).

2. SOURCE IDENTIFICATION MONITORING

The Copermittees must collaborate to develop and implement a monitoring program to identify sources of pollutants in non-storm water discharges in accordance with Sections C and F.4 of this Order. The source identification portion of the monitoring program must include: the following components:

a. Development and/or update of response criteria for dry weather non-storm water effluent analytical monitoring results:

(1) Response criteria must include action levels described in Section C of this Order.

(2) Response criteria must include evaluation of LC_{50} levels for toxicity to appropriate test organisms.

b. Develop and/or update Illicit Discharge Detection and Elimination response procedures for source identification follow up investigations and elimination in the event of exceedance of dry weather non-storm water effluent analytical monitoring response criteria (see above). These procedures must be consistent with procedures required in section C, F.4.d, and F.4.e. of this Order.

3. COMMENCEMENT OF MS4 OUTFALL AND SOURCE IDENTIFICATION MONITORING

The Copermittees must commence implementation of dry weather effluent analytical monitoring under the requirements of this Order no later than **July 1, 2012**. If monitoring indicates an illicit connection or illegal discharge, the Copermittee(s) must conduct the follow-up investigation and elimination activities described in sections C, F.4.d and F.4.e of this Order. In the interim period until the dry weather non-storm water effluent analytical monitoring program of this Order is implemented, each Copermittee must continue to implement dry weather field screening and analytical monitoring as it was most recently implemented pursuant to Order No. 2004-001.

D. High Priority Inland Aquatic Habitat Monitoring

The Copermittees must develop and submit to the San Diego Water Board by April 01, 2012, an inland aquatic habitat monitoring program for areas supporting high priority aquatic and/or riparian species. The goal of the monitoring program is to assess if MS4 storm water and non-storm water discharges are affecting high priority inland aquatic habitat. The monitoring

will assist the Copermittees in preventing the degradation of high quality waters within the jurisdiction of this Order that support high priority species by identifying discharges from MS4s which may cause or have the potential to cause impairment of beneficial uses within these areas.[13] High priority species include those federally and/or state listed as endangered, threatened, or as a species of concern. The design and goal of the monitoring program must be consistent with the criteria listed in Section I.B of this Monitoring Program, including evaluation of the protection of high priority species in receiving waters. The Copermittees must implement the program unless otherwise directed in writing by the San Diego Water Board.

The monitoring program must include the following components:

1. OUTFALL AND RECEIVING WATER MONITORING

   The program must be designed to determine levels of pollutants in storm water and non-storm water effluent discharges from the MS4 discharged into high priority inland aquatic habitat(s) and the level of those pollutants found in ambient receiving waters subject to the discharge. The Copermittees must conduct the following field screening and analytical monitoring tasks:

   a. MS4 and Receiving Waters Monitoring Station Identification

      (1) MS4 discharge stations must be major outfalls that directly discharge into high priority inland aquatic habitat. MS4 discharge stations may be selected in conjunction with monitoring required under Section II.B and II.C of the Receiving Waters and MS4 Discharge Monitoring Program.

      (2) Receiving water station(s) must be located upstream and downstream of the discharge within the high priority inland aquatic habitat. Receiving water stations must be located to prevent any significant co-mingling of receiving water flows with other sources.

   b. Develop Analytical Monitoring Procedures

      Each Copermittee must develop procedures for analytical monitoring (these procedures must be consistent with 40 CFR part 136), including field observations, pollutants to be monitored, analyses to be conducted, and quality assurance/control. At a minimum, the procedures must meet the following guidelines and criteria:

[13] In accordance with requirements of State Water Resources Control Board Resolution No. 68-16, Statement of Policy with Respect to Maintaining High Quality Waters in California.

(1) Determining Sampling Frequency: The Copermittees must sample a representative number of major outfalls and receiving waters that are considered high priority inland aquatic habitat. Sampling of the discharge and receiving waters must be paired and occur during both storm and non-storm conditions.

(2) Sampling in receiving waters may be done utilizing grab samples, though composite samples are encouraged. Sampling of storm and non-storm water discharges from the MS4 must be done in accordance with Section II.B and II.C. If ponded receiving waters is/are observed at a monitoring station, the Copermittees must make written observations and collect at least one (1) grab sample. The Copermittee(s) must estimate the flow by measuring the width of water surface, approximate depth of water, and approximate flow velocity

(3) The proposed constituents for which samples will undergo analytical laboratory analysis.

(4) Procedures for recording applicable observations when monitoring stations are dry (i.e. no flowing water or ponded conditions).

3. ASSESSMENT OF MONITORING RESULTS

The program must include a discussion of monitoring results within the monitoring annual report. The discussion must include an evaluation of the contribution of MS4 discharges to ambient water conditions within high priority inland aquatic habitats, as well as any actions taken to prevent and/or reduce sources of those pollutants.

4. SOURCE IDENTIFICATION MONITORING

The Copermittees must collaborate to conduct source identification monitoring in accordance with Section II.B and II.C of the Monitoring and Reporting Program of this Order.

E. Special Studies

1. The Copermittees must conduct special studies, including any monitoring and/or modeling required for TMDL development and implementation, as directed by the San Diego Water Board.

2. Sediment Toxicity Study

The Copermittees must develop and submit to the San Diego Water Board by April 01, 2012, a special study workplan to investigate the toxicity of sediment in streams and potential impact on benthic macroinvertebrate IBI scores. The Sediment Toxicity Special Study must be implemented in conjunction with the Stream Assessment Monitoring in II.A.2. The Copermittees must implement the special study unless otherwise directed in writing by the San Diego Water Board.

The Sediment Toxicity Special Study must include the following elements:

a. Sampling Locations: At least 4 stream assessment locations must be sampled, including 1 reference site and 1 mass loading site. Selection of sites must be done with consideration of subjectivity of receiving waters to discharges from residential and agricultural land uses.

b. Frequency: At a minimum, sampling must occur once per year at each site for at least 2 years. Sampling must be done in conjunction with the stream assessment sampling required under Section II.A.2 of the Monitoring and Reporting Program of this Order.

c. Parameters/Methods: At a minimum, sediment toxicity analysis must include the measurement of metals, pyrethroids and organochlorine pesticides. The analysis must include estimates of bioavailability based upon sediment grain size, organic carbon and receiving water temperature at the sampling site. Acute and chronic toxicity testing must be done using *Hyalella azteca* in accordance with Table 2.

d. Results: Results and a Discussion must be included in the Monitoring Annual Report (see III.A). The Discussion must include an assessment of the relationship between observed IBI scores under Section II.A.2 and all variables measured.

3. Trash and Litter Investigation

The Copermittees must develop and submit to the San Diego Water Board by September 01, 2012, a special study workplan to assess trash (including litter) as a pollutant within receiving waters on a watershed based scale. Litter is defined in California Government Code 68055.1g as "…improperly discarded waste material, including, but not limited to, convenience food, beverage, and other product packages or container constructed of steel, aluminum, glass, paper, plastic and other natural and synthetic, materials, thrown or deposited on lands and waters of the state,

but not including the properly discarded waste of the primary processing of agriculture, mining, logging, sawmilling, or manufacturing." A lead Copermittee must be selected for the Santa Margarita HU for the purposes of this Special Study. The Copermittees must implement the special study unless otherwise directed in writing by the San Diego Water Board

The Trash and Litter Investigation must include the following elements:

a. Locations: The lead Copermittee must identify suitable sampling locations within the Santa Margarita HU.

b. Frequency: Trash at each location must be monitored a minimum of twice during the wet season following a qualified monitoring storm event (minimum of 0.1 inches preceded by 72 hours of dry weather) and twice during the dry season.

c. Protocol: The lead Copermittee for the Santa Margarita HU must use the "Final Monitoring Workplan for the Assessment of Trash in San Diego County Watersheds" and "A Rapid Trash Assessment Method Applied to Waters of the San Francisco Bay Region" to develop a monitoring protocol for the Santa Margarita HU.

d. Results and Discussion from the Trash and Litter Study must be included in the Monitoring Annual Report. The Results and Discussion must, at a minimum, include source identification, an evaluation of BMPs for trash reduction and prevention, and a description of any BMPs implemented in response to study results.

4. Agricultural, Federal and Tribal Input Study

The Copermittees must develop and submit to the San Diego Water Board by September 01, 2012, a special study workplan to investigate the water quality of agricultural, federal and tribal runoff that is discharged into their MS4 (see Finding D.3.c of the Order). The Copermittees must implement the special study unless otherwise directed in writing by the San Diego Water Board.

The Agricultural, Federal and Tribal Input Special Study must include the following elements:

a. Locations: The Copermittees must identify a representative number of sampling stations within their MS4 that receive discharges of agricultural, federal, and tribal runoff that has not co-mingled with any

other source. At least one station from each category must be identified.

b. Frequency: One storm event must be monitored at each sampling location each year for at least 2 years.

c. Parameters/Methods: At a minimum, analysis must include those constituents listed in Table 1 of the MRP (see II.A.1). Grab samples may be utilized, though composite samples are preferred. Copermittees must also measure or estimate flow rates and volumes of discharges into the MS4.

d. Results: Results and Discussion from the Agricultural, Federal and Tribal Input Study must be included in the Monitoring Annual Report.

5. MS4 and Receiving Water Maintenance Study

The Copermittees must develop and submit to the San Diego Water Board by April 01, 2012, a special study workplan to investigate receiving waters that are also considered part of the MS4 (see Finding D.3.c of the Order) and which are subject to continual vegetative clearance activities (e.g. mowing). The study must be designed to assess the effects of vegetation removal activities and water quality, including, but not limited to, modification of biogeochemical functions, in-stream temperatures, receiving water bed and bank erosion potential and sediment transport. The Copermittees must implement the special study unless otherwise directed in writing by the San Diego Water Board.

The MS4 and Receiving Water Maintenance Special Study must include the following elements:

a. Locations: The Copermittees must identify suitable sampling locations, including at least one reference system that is not subject to maintenance activities.

b. Parameters/Methods: At a minimum, the Copermittees must monitor pre and post maintenance activities for indicator bacteria, turbidity (NTU), temperature, dissolved oxygen and nutrients (Nitrite, Nitrate, Total Kjeldahl Nitrogen, Ammonia and Total Phosphorous). Copermittees must also measure or estimate flow rates and volumes.

c. Results and Discussion from the MS4 and Receiving Water Maintenance Study must be included in the Annual Monitoring Report. The Discussion must include relevance of findings to CWA Section

303(d) listed impaired waters.

6. Intermittent and Ephemeral Stream Perennial Conversion Study

The Copermittees must develop and submit to the San Diego Water Board by April 01, 2013, a special study workplan to investigate the extent of any impacts to beneficial uses from the conversion of historically ephemeral or intermittent receiving waters to perennially flowing waters due to the continued discharge of currently exempted non-storm water from the MS4 and/or discharges into MS4s covered under a separate NPDES permit into receiving waters. The goal of the study is to assess if any impacts to beneficial uses, including, but not limited to, WILD, WARM, COLD or RARE, have occurred due to continuous discharge of currently exempted non-storm water discharges, and if the discharges should no longer be exempt. The Copermittees must implement the special study unless otherwise directed in writing by the San Diego Water Board.

The Intermittent and Ephemeral Stream Perennial Conversion Special Study must include the following elements:

a. Locations: The Copermittees must investigate their MS4 and adjacent downstream receiving waters to identify portions that have historically been ephemeral or intermittent but currently exhibit perennial flow due to exempted non-storm water discharges. Investigation must include historic habitat assessments, USGS gauging information, and historic aerial photography. Sampling must occur at a minimum of 2 identified perennially converted locations. Should the Copermittees be unable to locate any converted waters, a full description of the investigation must be documented in the annual report.

b. Parameters/Methods: The Copermittees must conduct water quality monitoring of the non-storm water discharge in accordance with Section C of this Order. In addition, the Copermittees must select a minimum of 2 downstream sampling points within the receiving waters subject the discharge and conduct the following:

(1) Grab samples must be taken and analyzed for indicator bacteria, nutrients (Nitrite, Nitrate, Total Kjeldahl Nitrogen, Ammonia and Total Phosphorous), turbidity (NTU), temperature, dissolved oxygen, total hardness, pH and 303(d) listed pollutants for all receiving waters at or downstream of the sampling site. The Copermittees must measure or estimate flow rates and volumes at each sampling point.

(2) Sampling at each site must include a quantitative and qualitative evaluation of beneficial uses. At a minimum, sampling must include observation estimation of active bed and bank erosion and erosion potential, invasive/non-native plant cover, aquatic non-native species, and potential vector control requirements.

c. Results and Discussion from the Intermittent and Ephemeral Stream Perennial Conversion Study must be included in the Annual Monitoring Report.

F. Monitoring Provisions

All monitoring activities must meet the following requirements:

1. Where procedures are not otherwise specified in this Receiving Waters Monitoring and Reporting Program, sampling, analysis and quality assurance/quality control must be conducted in accordance with the Quality Assurance Management Plan (QAMP) for the State of California's Surface Water Ambient Monitoring Program (SWAMP), adopted by the State Water Resources Control Board (SWRCB).

2. Samples and measurements taken for the purpose of monitoring must be representative of the monitored activity [40 CFR 122.41(j)(1)].

3. The Copermittees must retain records of all monitoring information, including all calibration and maintenance of monitoring instrumentation, copies of all reports required by this Order, and records of all data used to complete the Report of Waste Discharge and application for this Order, for a period of at least five (5) years from the date of the sample, measurement, report, or application. This period may be extended by request of the San Diego Water Board or USEPA at any time and must be extended during the course of any unresolved litigation regarding this discharge. [40 CFR 122.41(j)(2), CWC section 13383(a)]

4. Records of monitoring information must include [40 CFR 122.41(j)(3)]:

   a. The date, exact place, and time of sampling or measurements;
   b. The individual(s) who performed the sampling or measurements;
   c. The date(s) analyses were performed;
   d. The individual(s) who performed the analyses;
   e. The analytical techniques or methods used; and
   f. The results of such analyses.

5. All sampling, sample preservation, and analyses must be conducted according to test procedures approved under 40 CFR part 136, unless other test procedures have been specified in this Receiving Waters Monitoring and Reporting Program or approved by the San Diego Water Board [40 CFR 122.41(j)(4)].

6. The CWA provides that any person who falsifies, tampers with, or knowingly renders inaccurate any monitoring device or method required to be maintained under this Order must, upon conviction, be punished by a fine of not more than $10,000, or by imprisonment for not more than two years, or both. If a conviction of a person is for a violation committed after a first conviction of such person under this paragraph, punishment is a fine of not more than $20,000 per day of violation, or by imprisonment of not more than four years, or both. [40 CFR 122.41(j)(5)]

7. Calculations for all limitations which require averaging of measurements must utilize an arithmetic mean unless otherwise specified in this Receiving Waters Monitoring and Reporting Program. [40 CFR 122.41(l)(4)(iii)]

8. All chemical, bacteriological, and toxicity analyses must be conducted at a laboratory certified for such analyses by the California Department of Health Services or a laboratory approved by the San Diego Water Board.

9. For priority toxic pollutants that are identified in the California Toxics Rule (CTR) (65 Fed. Reg. 31682), the Copermittees must instruct their laboratories to establish calibration standards that are equivalent to or lower than the Minimum Levels (MLs) published in Appendix 4 of the Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California (SIP). If a Copermittee can demonstrate that a particular ML is not attainable, in accordance with procedures set forth in 40 CFR 136, the lowest quantifiable concentration of the lowest calibration standard analyzed by a specific analytical procedure (assuming that all the method specified sample weights, volumes, and processing steps have been followed) may be used instead of the ML listed in Appendix 4 of the SIP. The Copermittee must submit documentation from the laboratory to the San Diego Water Board for approval prior to raising the ML for any priority toxic pollutant.

10. The San Diego Water Board may make revisions to this Receiving Waters and MS4 Discharge Monitoring and Reporting Program at any time during the term of Order No. R9-2010-0016 and may include a reduction or increase in the number of parameters to be monitored, locations monitored, the frequency of monitoring, or the number and size of

samples collected.

11. The Clean Water Act provides that any person who knowingly makes any false statement, representation, or certification in any record or other document submitted or required to be maintained under this permit, including monitoring reports or reports of compliance or non-compliance must, upon conviction, be punished by a fine of not more than $10,000 per violation, or by imprisonment for not more than six months per violation, or by both. [40 CFR 122.41(k)(2)]

12. Monitoring must be conducted according the USEPA test procedures approved under 40 CFR 136, "Guidelines Establishing Test Procedures for Analysis of Pollutants under the Clean Water Act" as amended, unless other test procedures have been specified in this Receiving Waters and MS4 Discharge Monitoring and Reporting Program, in Order No. R9-2010-0016, or by the San Diego Water Board.

13. If a Copermittee(s) monitors any pollutant more frequently than required by the permit using test procedures approved under 40 CFR part 136, unless otherwise specified in the Order, the results of this monitoring must be included in the calculation and reporting of the data submitted in the reports requested by the San Diego Water Board. [40 CFR 122.41(l)(4)(ii)]

III. REPORTING PROGRAM

A. Monitoring Reporting

1. Planned Monitoring Program: The Principal Copermittee must submit to the San Diego Water Board by **June 1, 2012,** a proposed workplan describing the Receiving Waters and MS4 Discharge Monitoring Program to be implemented. Any updates to the planned monitoring program workplan proposed by the Copermittees shall be submitted with each Monitoring Annual Report. The Copermittees shall implement the proposed workplan unless otherwise directed in writing by the San Diego Water Board.

2. Monitoring Annual Report: The Principal Copermittee must submit the Receiving Waters and MS4 Discharge Monitoring Annual Report to the San Diego Water Board on October 1 of each year, beginning on **October 1, 2013**. Receiving Waters and MS4 Discharge Monitoring Annual Reports must meet the following requirements:

a. Annual monitoring reports must include the data/results, methods of evaluating the data, graphical summaries of the data, and an explanation/discussion of the data for each monitoring program component.

b. Annual monitoring reports must include a watershed-based analysis of the findings of each monitoring program component (mass loading, bioassessment, etc…). Each watershed-based analysis must include:

   (1) Identification and prioritization of water quality problems within each watershed.
   (2) Identification and description of the nature and magnitude of potential sources of the water quality problems within each watershed.
   (3) Evaluation and presentation of pollutant load and concentration increases or decreases at each mass loading station over time.
   (4) Evaluation of pollutant loads and concentrations measured at mass loading stations with respect to land use, population, sources, and other characteristics of watersheds using tools such as multiple linear regression, factor analysis, and cluster analysis.
   (5) Identification of links between source activities/conditions and observed receiving water impacts.
   (6) Identification of recommended future monitoring to identify and address sources of water quality problems.
   (7) Results and discussion of any TIE conducted, together with actions that will be implemented to reduce the discharge of pollutants in storm water, eliminate any discharge of pollutants in non-storm water, and abate the sources causing the toxicity.

c. Annual monitoring reports must include an analysis and interpretation of the data for each watershed with respect to the management questions listed in section I.B of this Receiving Waters Monitoring and Reporting Program.

d. Annual monitoring reports must include a discussion describing how each of the goals listed in section I.A of this MRP is addressed by the Copermittees' monitoring program for the monitoring year covered by the report.

e. Annual monitoring reports must include identification and analysis of any long-term trends in storm water or receiving water quality. Trend analysis must use nonparametric approaches, such as the Mann-Kendall test, including exogenous variables in a multiple regression model, and/or using a seasonal nonparametric trend model, where

applicable.

f. Annual monitoring reports must provide an estimation of total pollutant loads (wet weather loads plus dry weather loads) due to MS4 Discharge for each of the hydrologic subareas, including for 303(d) pollutants specified in Table 2 of the Order.

g. Annual monitoring reports must, for each monitoring program component listed above, include an assessment of compliance with applicable water quality standards.

h. Annual monitoring reports must describe monitoring station locations by latitude and longitude coordinates, frequency of sampling, quality assurance/quality control procedures, and sampling and analysis protocols.

i. Annual monitoring reports must use a standard report format and include the following elements:

(1) A stand alone comprehensive executive summary addressing all sections of the monitoring report;
(2) Comprehensive interpretations and conclusions; and
(3) Recommendations for future actions.

j. All monitoring reports submitted to the Principal Copermittee or the San Diego Water Board must contain the certified perjury statement described in Attachment B of this Order No. R9-2010-0016.

k. Annual monitoring reports must be reviewed prior to submittal to the San Diego Water Board by a committee of the Copermittees (consisting of no less than three different Copermittee members).

l. Annual monitoring reports must be submitted in both electronic and paper formats. Electronic formats must be CEDEN or SWAMP-uploadable.[14]

3. Monitoring programs and reports must comply with section II.F of Receiving Waters and MS4 Discharge Monitoring and Reporting Program No. R9-2010-0016 and Attachment B of this Order.

4. Following completion of an annual cycle of monitoring in October, the Copermittees must make the monitoring data and results available to the San Diego Water Board at the San Diego Water Board's request.

[14] For updates to the SWAMP templates and formats, see http://www.waterboards.ca.gov/swamp.

B. Interim Reporting Requirements

For the October 2010 to October 2012 monitoring period, the Principal Copermittee must submit the Receiving Waters Monitoring Annual Report as required under Order No. 2004-0001. The Receiving Waters Monitoring Annual Report must address the monitoring conducted to comply with the requirements of Order No. 2004-0001.

C. Reporting Dates

Table 5. Table of Required MRP Reporting Dates and Frequencies.

Submittal	Section	Completion Date	Frequency
Description of Proposed Monitoring Program	III.A.1	June 1, 2012	One Time
Receiving Waters and MS4 Discharge Monitoring Annual Reports, Including Proposed Updates to the Monitoring Program	III.A.2	Starting October 1, 2013	Annual
Copermittees submit Interim Monitoring Program Annual Report	III.B	As required under Order No. 2004-001	One Time
Draft Wet Weather MS4 Discharge Monitoring Program	II.B	June 01, 2012	One Time
Draft High Priority Inland Aquatic Habitat Monitoring	II.D	April 01, 2012	One Time
Draft Sediment Toxicity Special Study	II.E.2	April 01, 2012	One Time
Draft Trash and Litter Impairment Special Study	II.E.3	September 01, 2012	One Time
Draft Agricultural, Federal and Tribal Input Study	II.E.4	September 01, 2012	One Time
Draft MS4 and Receiving Water Maintenance Study	II.E.5	April 01, 2012	One Time
Draft Intermittent and Ephemeral Stream Perennial Conversion Study	II.E.6	April 01, 2013	One Time

Attachment F

SOURCE DATA

I. STORM WATER ACTION LEVELS DATABASE.....2

II. NUMERIC ACTION LEVELS EVALUATION DATA[1] 9

[1] Represented data from monitoring conducted by the Copermittees and provided in the 2008-09 Annual Monitoring Report.

I. STORM WATER ACTION LEVELS DATABASE

N02+NO3 (mg/l)	Phosphorous Total (mg/l)	Cadmium Total (ug/l)	Copper Total (ug/l)	Lead Total (ug/l)	Zinc Total (ug/l)	Turbidity (NTU)
4.70	7.90	9.80	800.00	660.00	22500.00	10
4.20	7.19	6.00	340.00	620.00	18000.00	15
3.90	4.96	6.00	320.00	540.00	11000.00	15
3.90	4.50	6.00	270.00	520.00	9970.00	16
3.60	4.40	6.00	244.00	460.00	9100.00	22
3.60	4.24	6.00	230.00	450.00	8800.00	23
3.60	2.59	5.30	220.00	450.00	6500.00	23
3.50	2.59	5.00	220.00	440.00	5500.00	24
3.30	2.50	4.10	210.00	430.00	5000.00	24
3.30	2.50	4.00	210.00	400.00	4900.00	30
3.10	2.50	4.00	209.00	380.00	4600.00	31
3.00	2.27	4.00	209.00	360.00	4300.00	33
2.96	2.00	4.00	200.00	350.00	3800.00	36
2.90	2.00	4.00	200.00	330.00	3800.00	36
2.70	2.00	4.00	200.00	320.00	3400.00	39
2.70	2.00	3.90	200.00	320.00	3390.00	40
2.60	1.90	3.80	200.00	320.00	3100.00	45
2.60	1.90	3.40	180.00	310.00	2500.00	50
2.60	1.80	3.40	180.00	310.00	2200.00	50
2.50	1.80	3.20	166.00	310.00	2100.00	60
2.50	1.70	3.10	163.00	310.00	1829.00	61
2.32	1.70	3.00	160.00	300.00	1700.00	62
2.30	1.70	3.00	150.00	290.00	1500.00	65
2.20	1.60	3.00	140.00	280.00	1400.00	65
2.20	1.60	3.00	140.00	270.00	1300.00	66
2.10	1.60	3.00	140.00	270.00	1300.00	69
2.10	1.53	3.00	140.00	270.00	1285.00	70
2.10	1.50	3.00	140.00	270.00	1200.00	72
2.10	1.50	3.00	130.00	260.00	1100.00	80
2.00	1.47	3.00	130.00	260.00	1054.00	84
2.00	1.46	3.00	128.00	250.00	1000.00	97
2.00	1.40	3.00	120.00	250.00	980.00	111
2.00	1.40	3.00	120.00	250.00	960.00	140
1.90	1.40	3.00	120.00	245.00	850.00	151
1.90	1.30	2.90	120.00	230.00	850.00	157
1.90	1.30	2.80	120.00	230.00	850.00	590
1.90	1.30	2.70	111.00	225.00	850.00	
1.90	1.30	2.60	111.00	220.00	840.00	
1.80	1.30	2.50	110.00	220.00	780.00	
1.80	1.30	2.40	110.00	210.00	768.00	
1.70	1.24	2.40	110.00	210.00	760.00	

1.70	1.20	2.30	110.00	200.00	750.00	
1.70	1.20	2.20	110.00	200.00	740.00	
1.70	1.20	2.10	110.00	190.00	740.00	
1.70	1.20	2.00	100.00	190.00	730.00	
1.70	1.10	2.00	100.00	190.00	720.00	
1.70	1.10	2.00	100.00	190.00	710.00	
1.60	1.10	2.00	100.00	170.00	710.00	
1.60	1.10	2.00	100.00	170.00	700.00	
1.60	1.06	2.00	100.00	170.00	700.00	
1.60	1.00	2.00	99.00	160.00	690.00	
1.60	0.96	2.00	94.00	160.00	690.00	
1.60	0.96	2.00	91.00	150.00	680.00	
1.60	0.94	2.00	91.00	150.00	680.00	
1.53	0.94	2.00	90.00	150.00	670.00	
1.50	0.92	2.00	90.00	150.00	660.00	
1.50	0.91	2.00	89.00	150.00	660.00	
1.50	0.85	2.00	87.00	140.00	660.00	
1.50	0.85	2.00	87.00	140.00	650.00	
1.50	0.85	2.00	84.00	140.00	630.00	
1.50	0.83	2.00	83.00	130.00	610.00	
1.40	0.83	2.00	82.00	130.00	610.00	
1.40	0.83	2.00	81.00	130.00	597.00	
1.40	0.81	2.00	81.00	130.00	590.00	
1.40	0.81	2.00	77.00	130.00	590.00	
1.40	0.81	2.00	77.00	123.00	576.00	
1.40	0.80	2.00	76.00	120.00	570.00	
1.40	0.80	2.00	74.00	120.00	570.00	
1.32	0.78	2.00	72.00	120.00	560.00	
1.30	0.78	1.90	72.00	120.00	560.00	
1.30	0.77	1.90	72.00	120.00	540.00	
1.30	0.77	1.90	72.00	115.00	540.00	
1.30	0.76	1.80	72.00	110.00	520.00	
1.30	0.76	1.80	71.00	110.00	520.00	
1.30	0.75	1.80	70.00	110.00	520.00	
1.30	0.75	1.70	70.00	110.00	510.00	
1.29	0.75	1.60	67.00	102.00	500.00	
1.20	0.74	1.60	66.00	100.00	500.00	
1.20	0.73	1.60	66.00	100.00	490.00	
1.20	0.72	1.60	66.00	100.00	480.00	
1.20	0.72	1.60	65.00	100.00	475.00	
1.20	0.72	1.60	65.00	100.00	470.00	
1.20	0.71	1.50	63.00	99.00	470.00	
1.20	0.71	1.50	63.00	97.00	462.00	
1.20	0.69	1.40	62.00	97.00	460.00	
1.20	0.68	1.30	62.00	97.00	460.00	
1.20	0.68	1.30	60.00	95.00	450.00	
1.20	0.68	1.20	60.00	91.00	440.00	

1.10	0.68	1.20	59.00	90.00	440.00	
1.10	0.68	1.20	56.59	90.00	440.00	
1.10	0.67	1.20	55.00	87.00	430.00	
1.10	0.66	1.10	55.00	86.00	430.00	
1.10	0.66	1.10	54.00	86.00	430.00	
1.10	0.65	1.10	54.00	84.00	420.00	
1.10	0.65	1.10	54.00	82.00	420.00	
1.10	0.65	1.10	53.00	82.00	410.00	
1.10	0.65	1.00	53.00	81.00	409.00	
1.00	0.63	1.00	52.00	78.00	400.00	
1.00	0.62	1.00	51.00	78.00	400.00	
1.00	0.61	1.00	50.00	78.00	400.00	
1.00	0.60	1.00	50.00	77.00	390.00	
1.00	0.60	1.00	50.00	76.00	390.00	
1.00	0.59	1.00	50.00	76.00	390.00	
0.99	0.57	1.00	50.00	69.00	390.00	
0.99	0.57	1.00	50.00	69.00	390.00	
0.98	0.56	1.00	50.00	67.00	370.00	
0.97	0.56	1.00	50.00	66.00	370.00	
0.96	0.55	1.00	49.00	66.00	370.00	
0.96	0.55	1.00	49.00	66.00	360.00	
0.95	0.55	1.00	49.00	65.00	360.00	
0.95	0.53	1.00	48.00	64.00	360.00	
0.93	0.53	1.00	48.00	61.00	360.00	
0.93	0.53	1.00	47.00	57.00	350.00	
0.93	0.52	1.00	46.08	57.00	350.00	
0.93	0.52	1.00	46.00	56.00	350.00	
0.92	0.52	1.00	46.00	56.00	340.00	
0.90	0.52	1.00	44.25	53.00	340.00	
0.88	0.51	1.00	44.00	53.00	340.00	
0.87	0.51	1.00	44.00	52.60	340.00	
0.86	0.50	1.00	44.00	52.00	340.00	
0.85	0.49	1.00	44.00	51.00	340.00	
0.84	0.49	1.00	43.00	51.00	334.00	
0.83	0.48	1.00	43.00	50.00	330.00	
0.81	0.48	1.00	43.00	50.00	330.00	
0.81	0.48	1.00	42.00	50.00	330.00	
0.80	0.47	1.00	42.00	50.00	330.00	
0.80	0.47	1.00	42.00	50.00	330.00	
0.78	0.47	1.00	41.00	50.00	330.00	
0.78	0.46	1.00	40.00	50.00	330.00	
0.77	0.46	1.00	40.00	50.00	320.00	
0.77	0.46	1.00	40.00	50.00	320.00	
0.77	0.45	1.00	40.00	50.00	320.00	
0.74	0.45	1.00	40.00	50.00	320.00	
0.73	0.44	1.00	39.00	49.00	310.00	
0.72	0.44	1.00	39.00	47.00	310.00	

0.69	0.44	1.00	39.00	46.00	310.00	
0.69	0.44	1.00	39.00	46.00	308.00	
0.69	0.44	1.00	39.00	44.00	300.00	
0.67	0.44	1.00	39.00	44.00	300.00	
0.67	0.44	1.00	37.00	43.00	300.00	
0.66	0.43	1.00	37.00	42.00	300.00	
0.66	0.42	1.00	37.00	41.00	290.00	
0.65	0.42	1.00	37.00	41.00	285.00	
0.63	0.41	1.00	37.00	41.00	280.00	
0.62	0.41	1.00	36.00	41.00	280.00	
0.62	0.41	1.00	36.00	41.00	280.00	
0.62	0.40	1.00	36.00	40.10	280.00	
0.60	0.40	1.00	36.00	40.00	280.00	
0.59	0.40	1.00	35.00	39.30	280.00	
0.59	0.40	1.00	35.00	39.00	280.00	
0.58	0.40	1.00	34.00	39.00	280.00	
0.57	0.40	1.00	34.00	39.00	280.00	
0.57	0.40	1.00	33.40	38.00	270.00	
0.55	0.40	1.00	33.00	38.00	270.00	
0.52	0.40	1.00	33.00	38.00	270.00	
0.50	0.40	1.00	33.00	37.00	270.00	
0.50	0.39	1.00	33.00	36.00	270.00	
0.46	0.39	1.00	33.00	36.00	270.00	
0.42	0.39	1.00	32.26	36.00	260.00	
0.42	0.38	1.00	32.01	36.00	260.00	
0.35	0.38	1.00	32.00	35.00	260.00	
0.10	0.38	1.00	32.00	34.00	260.00	
0.06	0.37	1.00	32.00	34.00	260.00	
	0.36	1.00	32.00	33.00	250.00	
	0.36	1.00	32.00	33.00	250.00	
	0.36	1.00	32.00	33.00	250.00	
	0.36	1.00	31.00	33.00	250.00	
	0.35	1.00	31.00	32.00	247.00	
	0.35	1.00	31.00	32.00	242.13	
	0.35	1.00	31.00	31.94	240.00	
	0.35	1.00	30.00	30.00	240.00	
	0.34	1.00	30.00	30.00	240.00	
	0.34	1.00	30.00	30.00	240.00	
	0.34	1.00	30.00	30.00	240.00	
	0.34	1.00	30.00	30.00	230.00	
	0.34	1.00	29.00	30.00	230.00	
	0.34	1.00	29.00	30.00	220.00	
	0.33	1.00	28.00	29.00	220.00	
	0.33	1.00	28.00	29.00	220.00	
	0.33	0.98	28.00	29.00	210.00	
	0.33	0.94	28.00	29.00	210.00	
	0.33	0.94	27.19	28.00	210.00	

	0.33	0.92	27.00	28.00	210.00	
	0.32	0.90	27.00	28.00	210.00	
	0.32	0.90	27.00	27.00	210.00	
	0.32	0.86	26.00	27.00	210.00	
	0.32	0.80	26.00	26.31	205.00	
	0.32	0.80	26.00	26.00	202.79	
	0.31	0.71	25.00	26.00	202.00	
	0.31	0.70	25.00	25.00	200.00	
	0.30	0.70	25.00	25.00	200.00	
	0.30	0.60	24.00	25.00	200.00	
	0.30	0.60	24.00	24.60	200.00	
	0.30	0.59	23.00	24.00	200.00	
	0.30	0.59	23.00	24.00	200.00	
	0.30	0.52	23.00	24.00	200.00	
	0.30	0.50	23.00	24.00	194.49	
	0.29	0.50	23.00	23.00	190.00	
	0.29	0.50	22.00	23.00	190.00	
	0.29	0.50	22.00	23.00	190.00	
	0.29	0.50	21.00	23.00	190.00	
	0.29	0.50	21.00	23.00	184.13	
	0.29	0.50	21.00	23.00	180.00	
	0.28	0.50	21.00	22.20	180.00	
	0.28	0.50	20.36	22.00	180.00	
	0.28	0.50	20.00	22.00	180.00	
	0.27	0.50	20.00	22.00	180.00	
	0.27	0.50	20.00	22.00	180.00	
	0.27	0.50	20.00	21.20	180.00	
	0.26	0.50	20.00	21.10	170.00	
	0.26	0.40	19.00	21.00	170.00	
	0.26	0.40	19.00	20.00	170.00	
	0.26	0.40	18.00	19.10	170.00	
	0.25	0.30	18.00	19.00	160.00	
	0.25	0.30	18.00	19.00	160.00	
	0.25	0.30	18.00	19.00	160.00	
	0.25	0.30	18.00	19.00	160.00	
	0.25	0.30	17.00	18.50	160.00	
	0.25	0.30	17.00	18.00	160.00	
	0.24	0.20	17.00	18.00	160.00	
	0.24	0.20	17.00	18.00	160.00	
	0.24	0.20	17.00	18.00	160.00	
	0.23	0.04	17.00	17.00	160.00	
	0.23		17.00	17.00	150.00	
	0.23		17.00	17.00	150.00	
	0.23		17.00	17.00	150.00	
	0.22		16.00	17.00	150.00	
	0.22		16.00	17.00	150.00	
	0.22		16.00	17.00	146.00	

	0.22		16.00	17.00	145.00	
	0.22		16.00	17.00	140.00	
	0.22		15.00	16.90	140.00	
	0.22		15.00	16.00	140.00	
	0.21		15.00	15.00	140.00	
	0.21		15.00	15.00	140.00	
	0.21		15.00	15.00	140.00	
	0.21		14.50	15.00	140.00	
	0.21		14.00	15.00	140.00	
	0.21		14.00	14.00	140.00	
	0.20		14.00	14.00	140.00	
	0.20		14.00	14.00	136.55	
	0.20		14.00	13.00	135.60	
	0.20		14.00	13.00	130.00	
	0.20		13.00	13.00	130.00	
	0.20		13.00	13.00	130.00	
	0.20		13.00	13.00	130.00	
	0.20		13.00	12.00	130.00	
	0.20		13.00	12.00	130.00	
	0.19		13.00	12.00	130.00	
	0.19		12.00	12.00	127.00	
	0.19		12.00	12.00	124.00	
	0.19		12.00	12.00	122.05	
	0.19		12.00	11.00	120.00	
	0.19		11.00	11.00	120.00	
	0.19		11.00	11.00	120.00	
	0.18		10.00	10.00	120.00	
	0.18		10.00	10.00	112.11	
	0.18		10.00	10.00	110.00	
	0.18		10.00	10.00	110.00	
	0.18		9.60	10.00	110.00	
	0.18		9.60	10.00	110.00	
	0.17		9.10	10.00	110.00	
	0.17		9.10	10.00	110.00	
	0.17		9.00	10.00	110.00	
	0.17		8.30	9.60	110.00	
	0.17		8.20	9.40	110.00	
	0.16		8.00	9.10	108.00	
	0.15		8.00	9.00	100.00	
	0.15		7.70	9.00	100.00	
	0.15		7.70	9.00	100.00	
	0.15		7.00	9.00	100.00	
	0.15		7.00	8.00	100.00	
	0.15		6.80	8.00	100.00	
	0.14		6.80	8.00	99.00	
	0.14		6.80	8.00	98.00	
	0.14		6.50	8.00	97.00	

	0.14		6.50	8.00	93.40	
	0.14		6.30	8.00	92.00	
	0.14		6.30	7.60	92.00	
	0.14		6.10	7.50	90.00	
	0.13		5.60	7.00	90.00	
	0.13		5.40	7.00	90.00	
	0.13		5.20	6.00	86.00	
	0.13		5.00	6.00	83.00	
	0.13		4.90	6.00	81.00	
	0.12		4.50	5.90	81.00	
	0.12		4.10	5.80	80.00	
	0.12		4.10	5.40	80.00	
	0.11		3.90	5.00	80.00	
	0.11		3.40	5.00	80.00	
	0.11		2.60	5.00	80.00	
	0.11		2.60	5.00	79.00	
	0.10		2.60	5.00	73.00	
	0.10		2.30	5.00	72.00	
	0.10		2.00	4.80	70.00	
	0.10		2.00	4.80	70.00	
	0.09		1.70	4.70	70.00	
	0.08		1.50	4.60	70.00	
	0.06		1.50	4.00	64.00	
	0.03		1.50	4.00	63.00	
			1.40	3.80	61.00	
			1.40	3.00	60.00	
				3.00	56.00	
				2.30	44.00	
				2.00	40.00	
				1.60	37.00	
					35.00	
					30.00	
					26.00	
					24.00	
					20.00	
					10.00	
					5.00	

II. NUMERIC ACTION LEVELS EVALUATION DATA

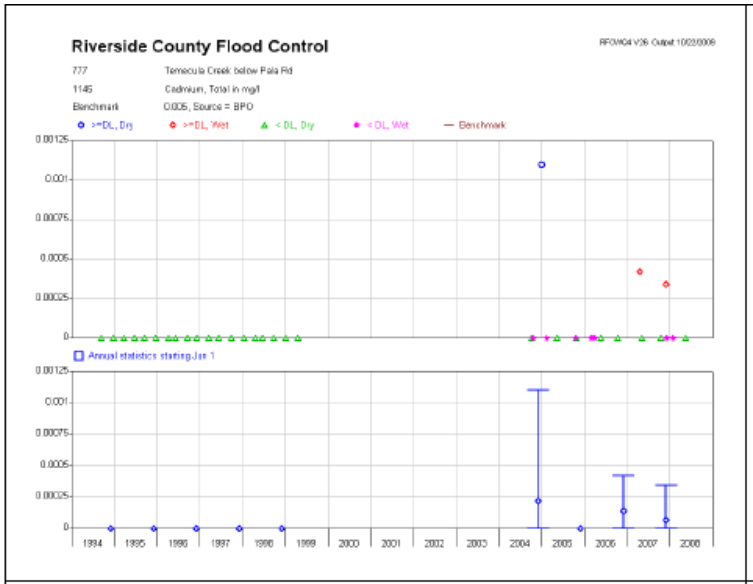

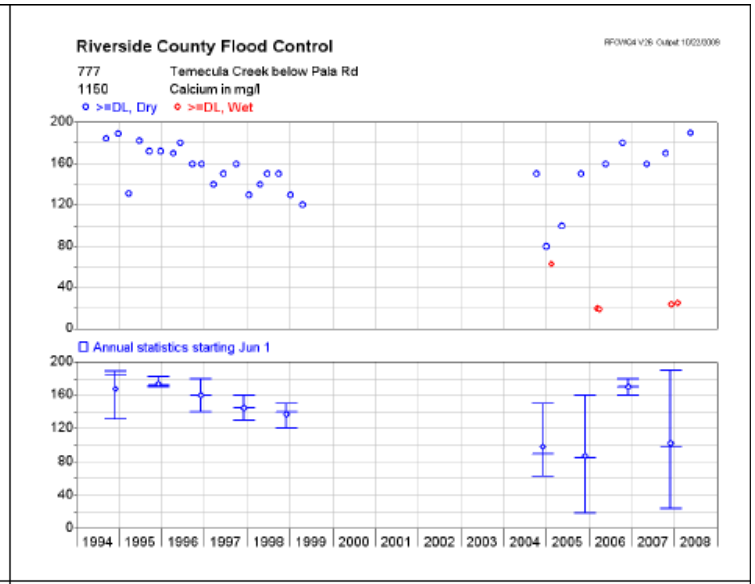

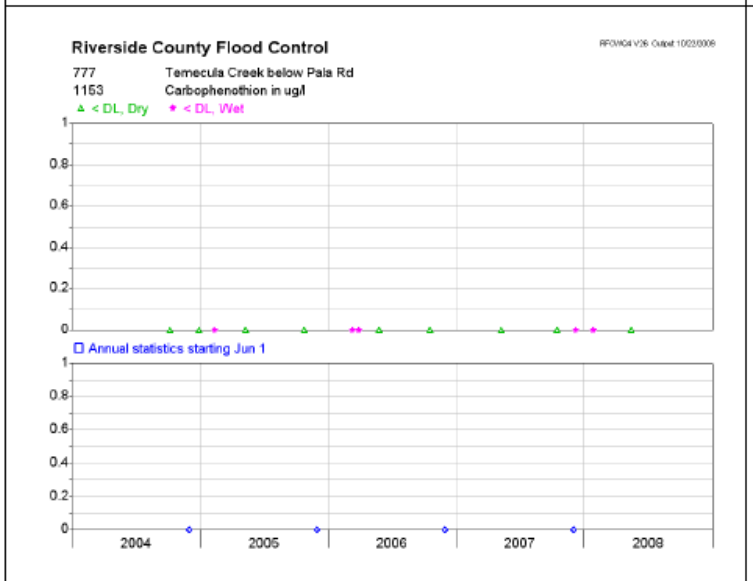

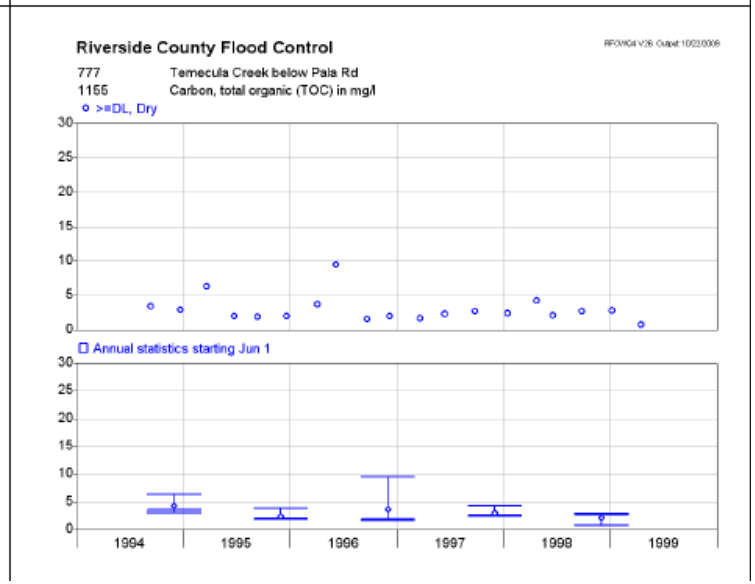

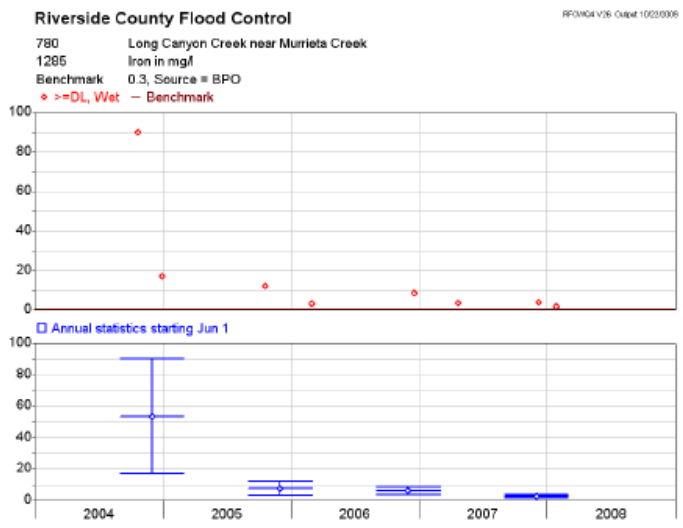
Riverside County Flood Control
780 Long Canyon Creek near Murrieta Creek
1285 Iron in mg/l
Benchmark 0.3, Source = BPO
>=DL, Wet
Benchmark
Annual statistics starting Jun 1
2004
2005
2006
2007
2008

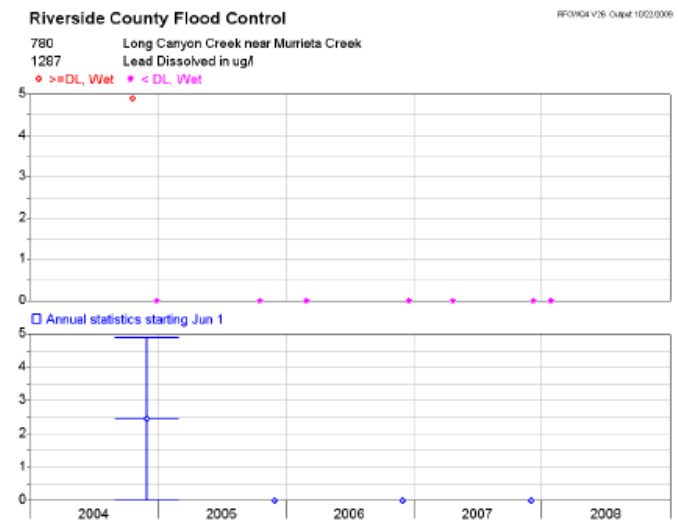
Riverside County Flood Control
780 Long Canyon Creek near Murrieta Creek
1287 Lead Dissolved in ug/l
>=DL, Wet
< DL, Wet
Annual statistics starting Jun 1
2004
2005
2006
2007
2008

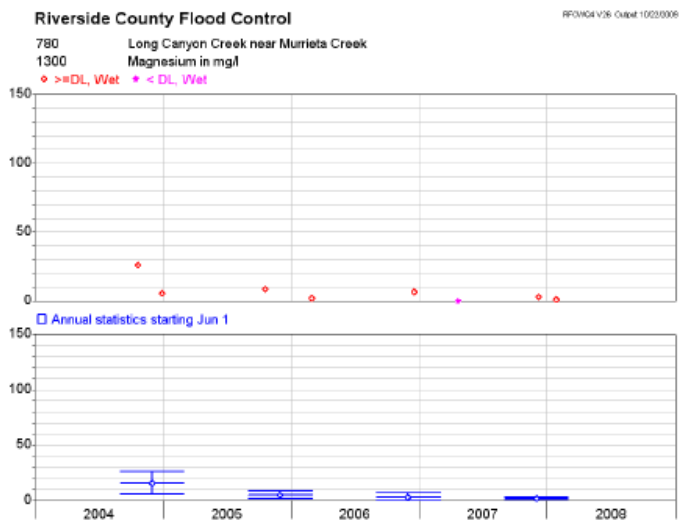
Riverside County Flood Control
780 Long Canyon Creek near Murrieta Creek
1300 Magnesium in mg/l
>=DL, Wet
< DL, Wet
Annual statistics starting Jun 1
2004
2005
2006
2007
2008

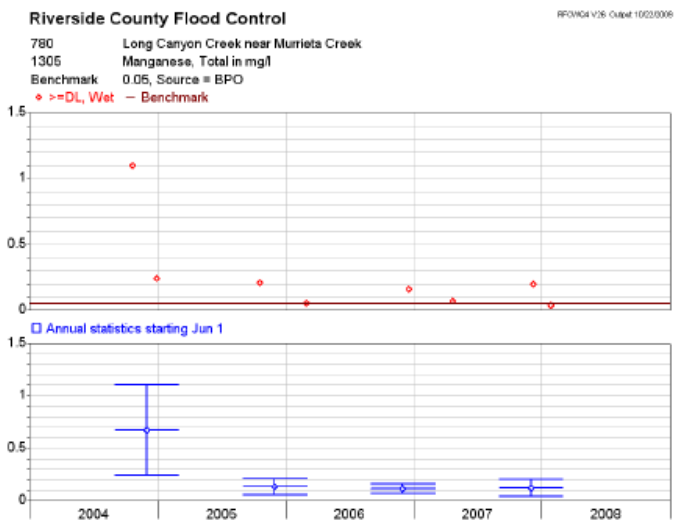
Riverside County Flood Control
780 Long Canyon Creek near Murrieta Creek
1305 Manganese, Total in mg/l
Benchmark 0.05, Source = BPO
>=DL, Wet
Benchmark
Annual statistics starting Jun 1
2004
2005
2006
2007
2008

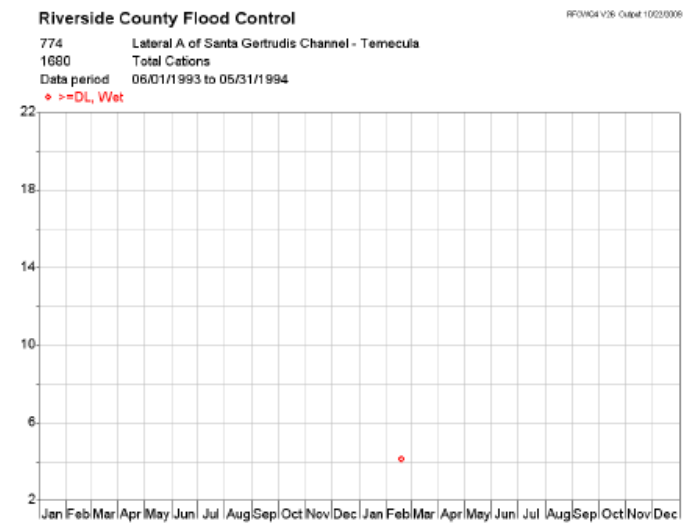
Riverside County Flood Control
774 Lateral A of Santa Gertrudis Channel - Temecula
1680 Total Cations
Data period 06/01/1993 to 05/31/1994
>=DL, Wet
22
18
14
10
6
2
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

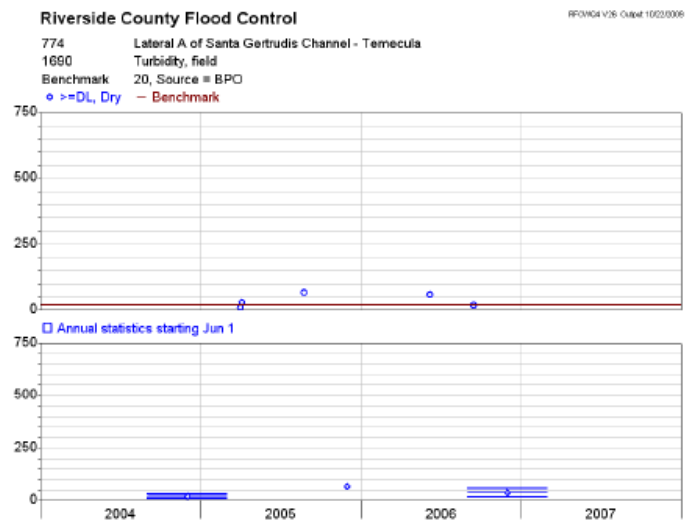
Riverside County Flood Control
774 Lateral A of Santa Gertrudis Channel - Temecula
1690 Turbidity, field
Benchmark 20, Source = BPO
>=DL, Dry
Benchmark
750
500
250
0
Annual statistics starting Jun 1
750
500
250
0
2004
2005
2006
2007

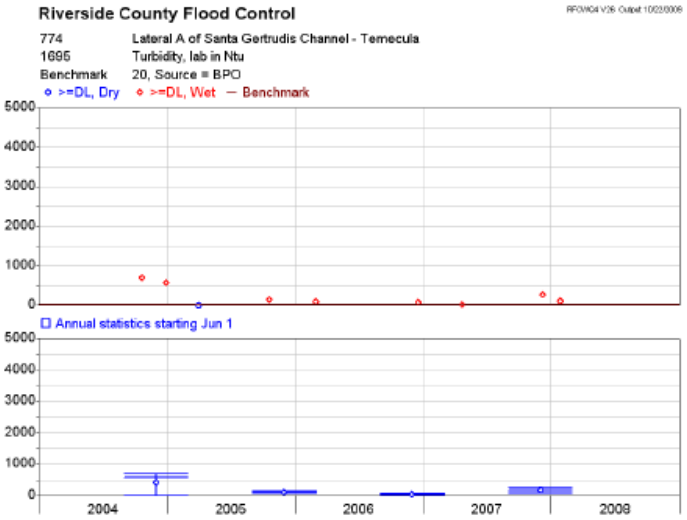
Riverside County Flood Control
774 Lateral A of Santa Gertrudis Channel - Temecula
1695 Turbidity, lab in Ntu
Benchmark 20, Source = BPO
>=DL, Dry
>=DL, Wet
Benchmark
5000
4000
3000
2000
1000
0
Annual statistics starting Jun 1
5000
4000
3000
2000
1000
0
2004
2005
2006
2007
2008

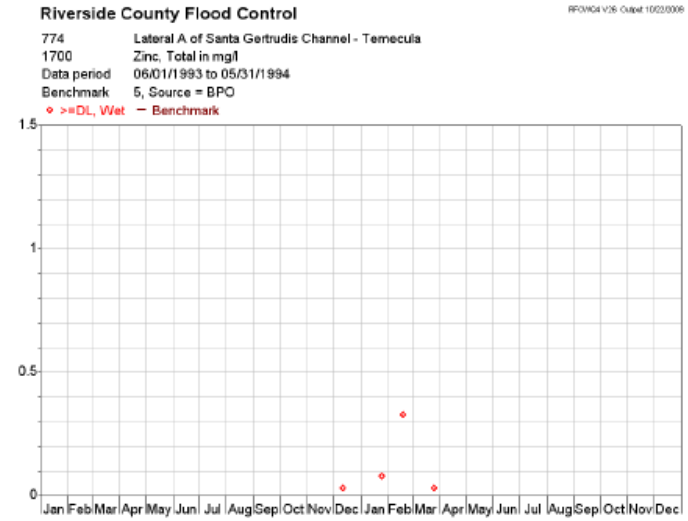
Riverside County Flood Control
774 Lateral A of Santa Gertrudis Channel - Temecula
1700 Zinc, Total in mg/l
Data period 06/01/1993 to 05/31/1994
Benchmark 5, Source = BPO
>=DL, Wet
Benchmark
1.5
1
0.5
0
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

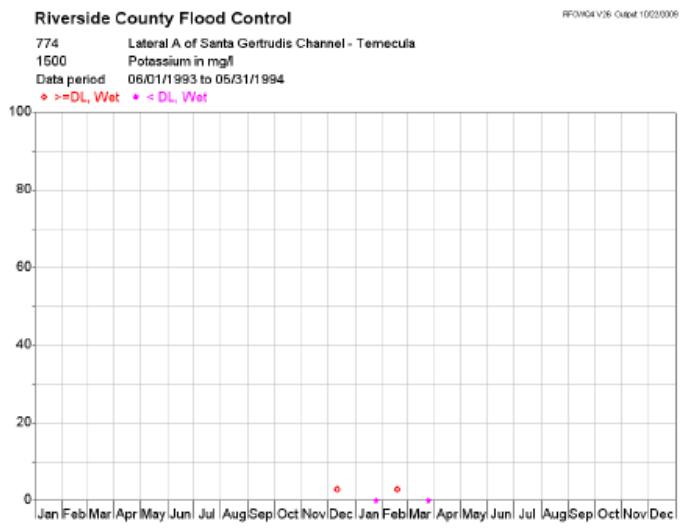
Riverside County Flood Control
774 Lateral A of Santa Gertrudis Channel - Temecula
1500 Potassium in mg/l
Data period 06/01/1993 to 05/31/1994
>=DL, Wet
< DL, Wet
100
80
60
40
20
0
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

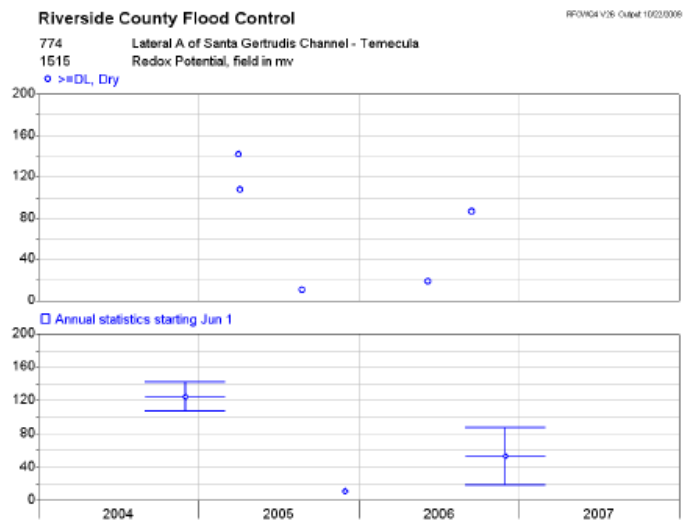
Riverside County Flood Control
774 Lateral A of Santa Gertrudis Channel - Temecula
1515 Redox Potential, field in mv
>=DL, Dry
Annual statistics starting Jun 1
200
160
120
80
40
0
2004
2005
2006
2007

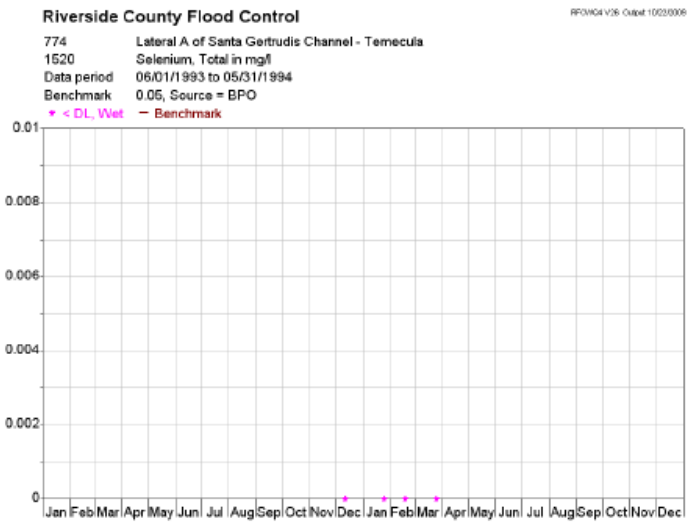
Riverside County Flood Control
774 Lateral A of Santa Gertrudis Channel - Temecula
1520 Selenium, Total in mg/l
Data period 06/01/1993 to 05/31/1994
Benchmark 0.05, Source = BPO
< DL, Wet
Benchmark
0.01
0.008
0.006
0.004
0.002
0
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

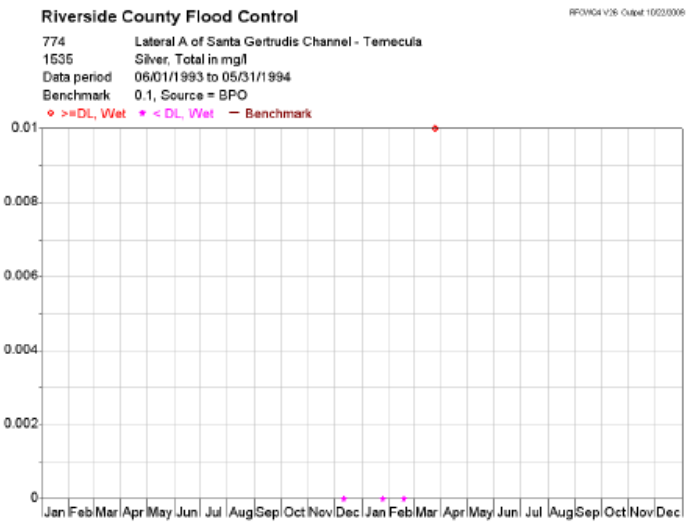
Riverside County Flood Control
774 Lateral A of Santa Gertrudis Channel - Temecula
1535 Silver, Total in mg/l
Data period 06/01/1993 to 05/31/1994
Benchmark 0.1, Source = BPO
>=DL, Wet
< DL, Wet
Benchmark
0.01
0.008
0.006
0.004
0.002
0
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

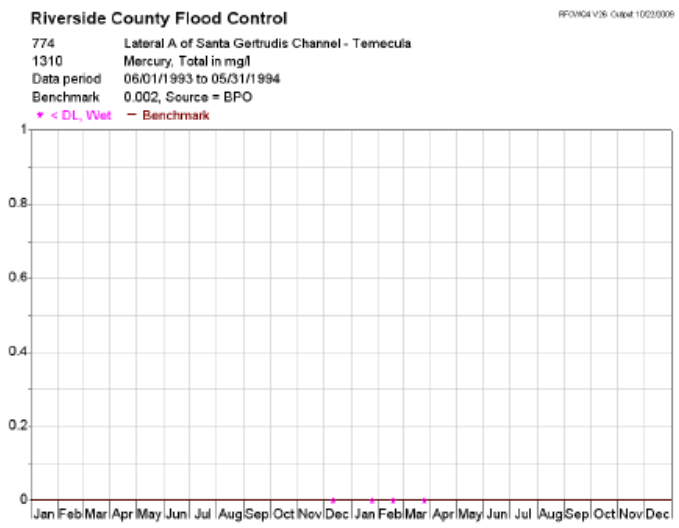
Riverside County Flood Control
774 Lateral A of Santa Gertrudis Channel - Temecula
1310 Mercury, Total in mg/l
Data period 06/01/1993 to 05/31/1994
Benchmark 0.002, Source = BPO
< DL, Wet
Benchmark
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

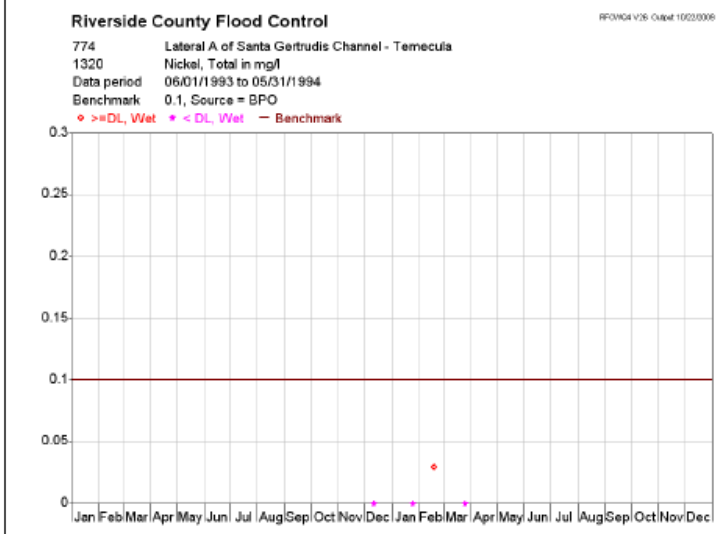
Riverside County Flood Control
774 Lateral A of Santa Gertrudis Channel - Temecula
1320 Nickel, Total in mg/l
Data period 06/01/1993 to 05/31/1994
Benchmark 0.1, Source = BPO
>=DL, Wet
< DL, Wet
Benchmark
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

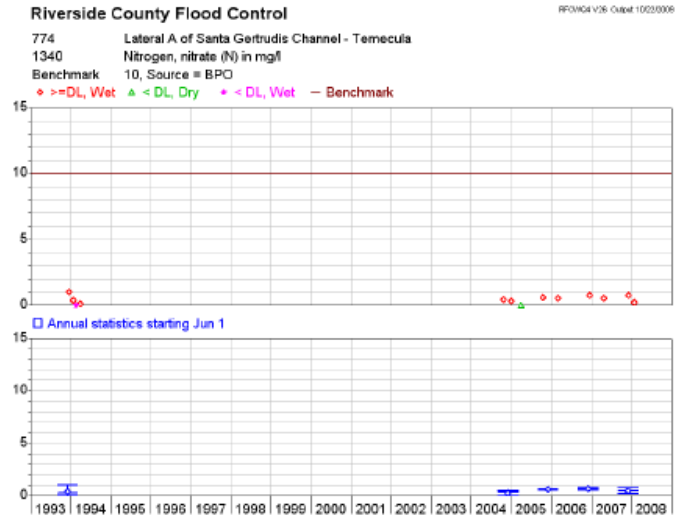
Riverside County Flood Control
774 Lateral A of Santa Gertrudis Channel - Temecula
1340 Nitrogen, nitrate (N) in mg/l
Benchmark 10, Source = BPO
>=DL, Wet
< DL, Dry
< DL, Wet
Benchmark
Annual statistics starting Jun 1
1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008

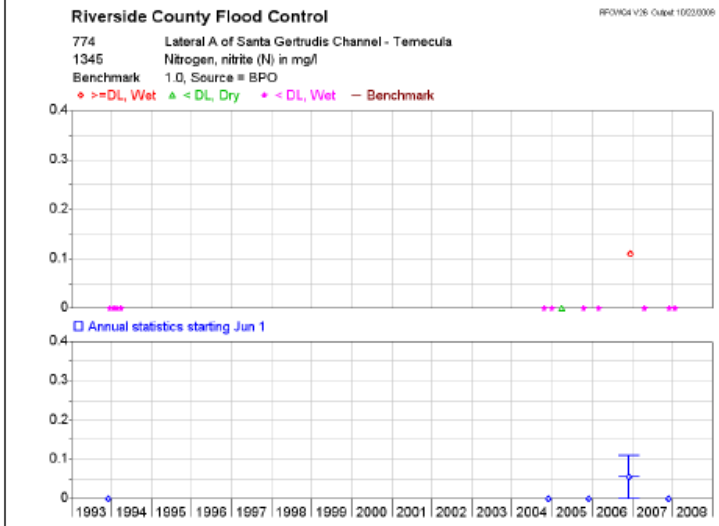
Riverside County Flood Control
774 Lateral A of Santa Gertrudis Channel - Temecula
1345 Nitrogen, nitrite (N) in mg/l
Benchmark 1.0, Source = BPO
>=DL, Wet
< DL, Dry
< DL, Wet
Benchmark
Annual statistics starting Jun 1
1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008

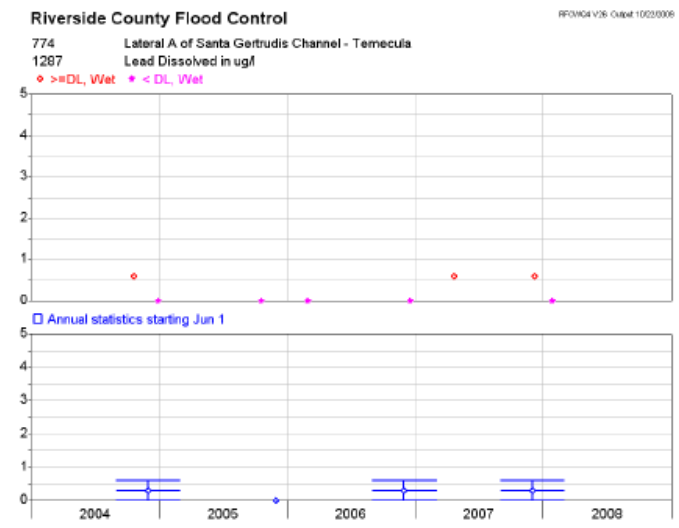
Riverside County Flood Control
774 Lateral A of Santa Gertrudis Channel - Temecula
1287 Lead Dissolved in ug/l
>=DL, Wet
< DL, Wet
Annual statistics starting Jun 1
2004
2005
2006
2007
2008

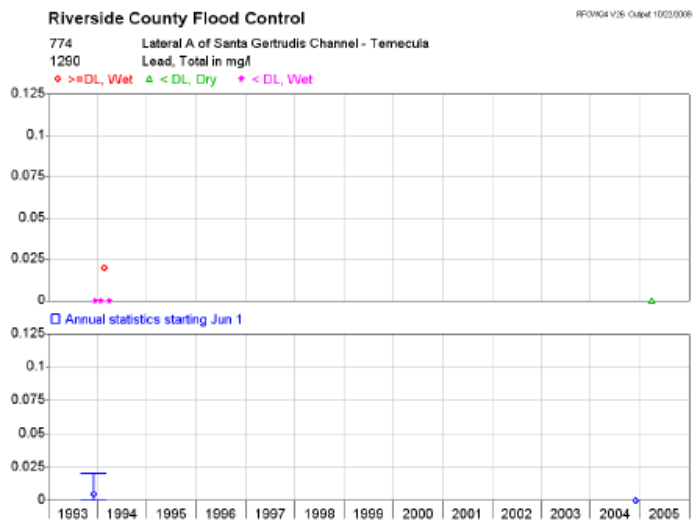
Riverside County Flood Control
774 Lateral A of Santa Gertrudis Channel - Temecula
1290 Lead, Total in mg/l
>=DL, Wet
< DL, Dry
< DL, Wet
Annual statistics starting Jun 1
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005

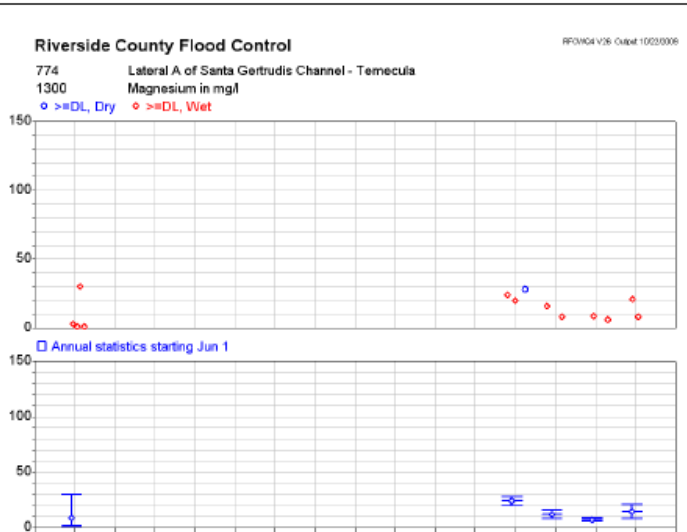
Riverside County Flood Control
774 Lateral A of Santa Gertrudis Channel - Temecula
1300 Magnesium in mg/l
>=DL, Dry
>=DL, Wet
Annual statistics starting Jun 1
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008

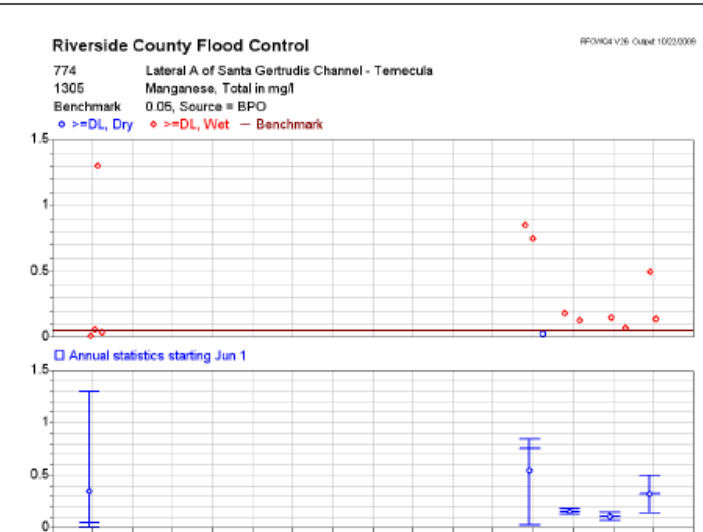
Riverside County Flood Control
774 Lateral A of Santa Gertrudis Channel - Temecula
1305 Manganese, Total in mg/l
Benchmark 0.05, Source = BPO
>=DL, Dry
>=DL, Wet
Benchmark
Annual statistics starting Jun 1
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008

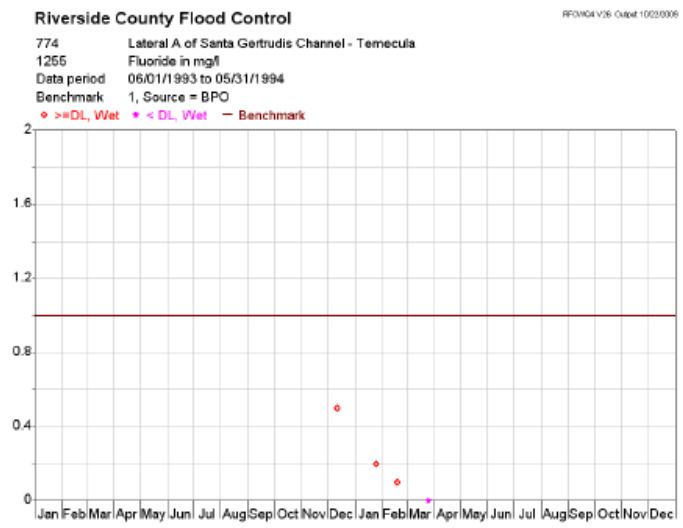
Riverside County Flood Control
774 Lateral A of Santa Gertrudis Channel - Temecula
1255 Fluoride in mg/l
Data period 06/01/1993 to 05/31/1994
Benchmark 1, Source = BPO
>=DL, Wet
< DL, Wet
Benchmark
2
1.6
1.2
0.8
0.4
0
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

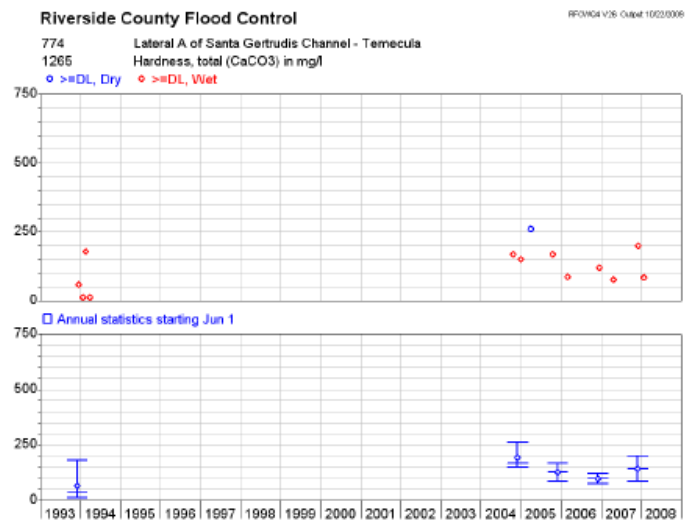
Riverside County Flood Control
774 Lateral A of Santa Gertrudis Channel - Temecula
1265 Hardness, total (CaCO3) in mg/l
>=DL, Dry
>=DL, Wet
750
500
250
0
Annual statistics starting Jun 1
1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008

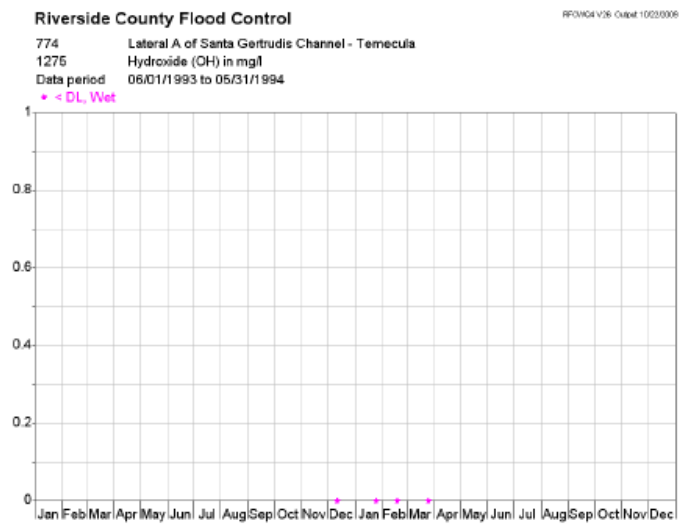
Riverside County Flood Control
774 Lateral A of Santa Gertrudis Channel - Temecula
1275 Hydroxide (OH) in mg/l
Data period 06/01/1993 to 05/31/1994
< DL, Wet
1
0.8
0.6
0.4
0.2
0
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

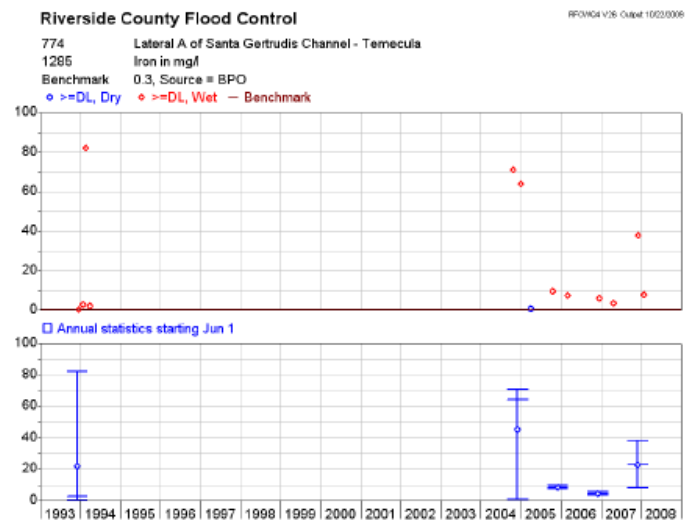
Riverside County Flood Control
774 Lateral A of Santa Gertrudis Channel - Temecula
1285 Iron in mg/l
Benchmark 0.3, Source = BPO
>=DL, Dry
>=DL, Wet
Benchmark
100
80
60
40
20
0
Annual statistics starting Jun 1
1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008

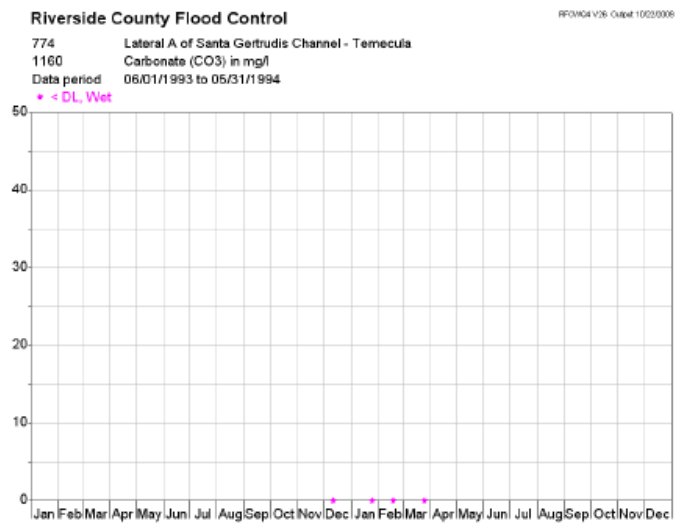
Riverside County Flood Control
774 Lateral A of Santa Gertrudis Channel - Temecula
1160 Carbonate (CO3) in mg/l
Data period 06/01/1993 to 05/31/1994
< DL, Wet
50
40
30
20
10
0
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

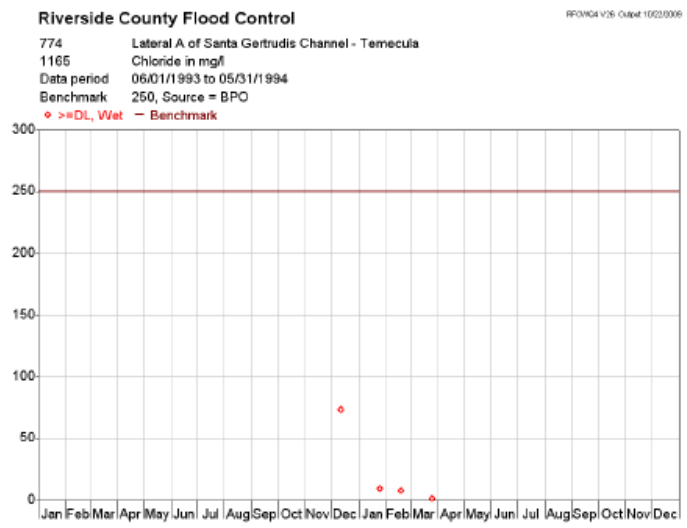
Riverside County Flood Control
774 Lateral A of Santa Gertrudis Channel - Temecula
1165 Chloride in mg/l
Data period 06/01/1993 to 05/31/1994
Benchmark 250, Source = BPO
>=DL, Wet
Benchmark
300
250
200
150
100
50
0
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

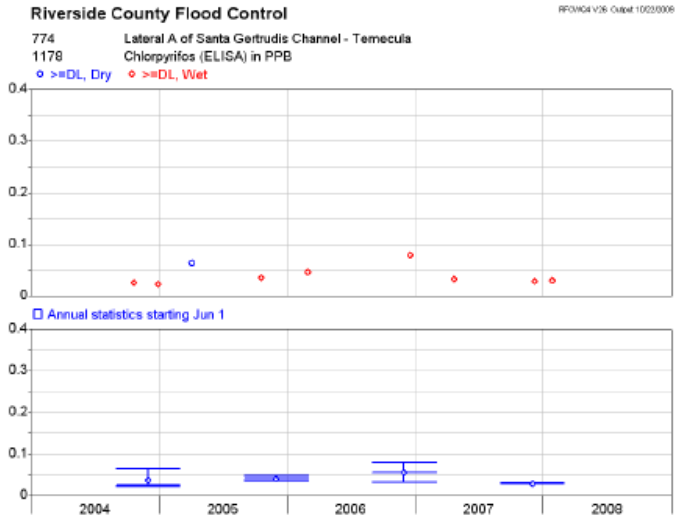
Riverside County Flood Control
774 Lateral A of Santa Gertrudis Channel - Temecula
1178 Chlorpyrifos (ELISA) in PPB
>=DL, Dry
>=DL, Wet
0.4
0.3
0.2
0.1
0
Annual statistics starting Jun 1
0.4
0.3
0.2
0.1
0
2004
2005
2006
2007
2008

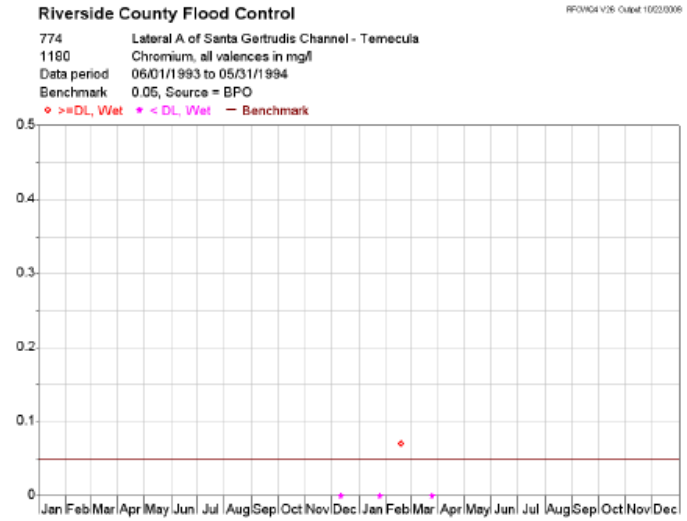
Riverside County Flood Control
774 Lateral A of Santa Gertrudis Channel - Temecula
1180 Chromium, all valences in mg/l
Data period 06/01/1993 to 05/31/1994
Benchmark 0.05, Source = BPO
>=DL, Wet
< DL, Wet
Benchmark
0.5
0.4
0.3
0.2
0.1
0
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

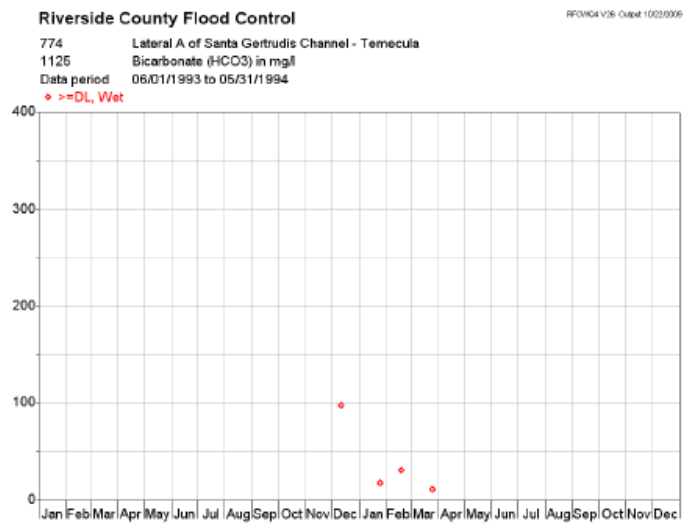
Riverside County Flood Control
774 Lateral A of Santa Gertrudis Channel - Temecula
1125 Bicarbonate (HCO3) in mg/l
Data period 06/01/1993 to 05/31/1994
>=DL, Wet
400
300
200
100
0
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

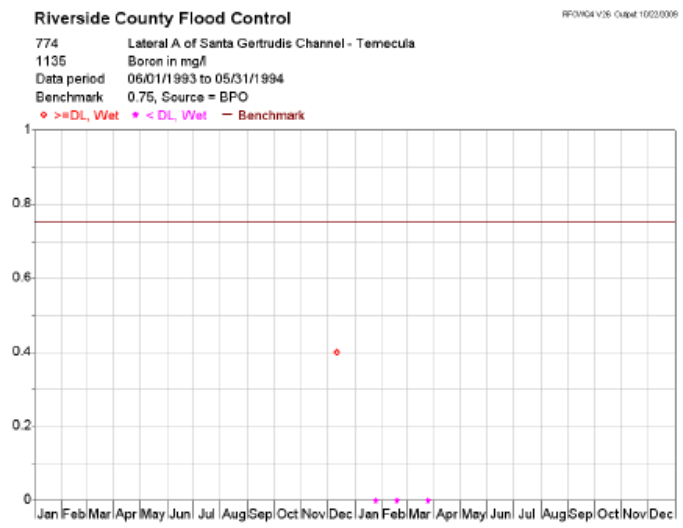
Riverside County Flood Control
774 Lateral A of Santa Gertrudis Channel - Temecula
1135 Boron in mg/l
Data period 06/01/1993 to 05/31/1994
Benchmark 0.75, Source = BPO
>=DL, Wet
< DL, Wet
Benchmark
1
0.8
0.6
0.4
0.2
0
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

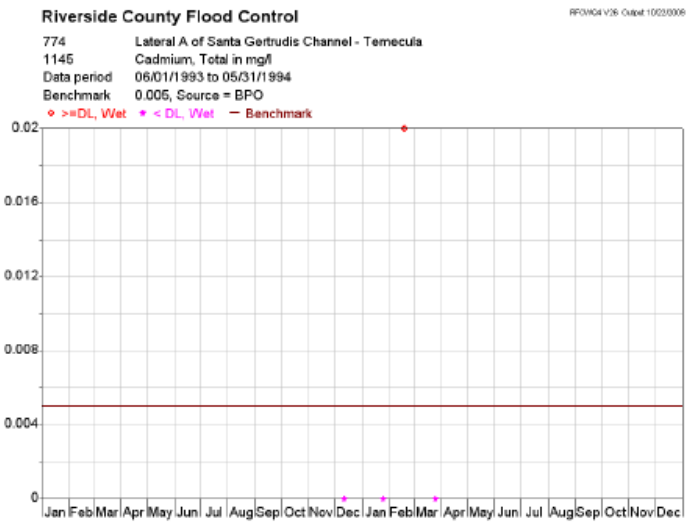
Riverside County Flood Control
774 Lateral A of Santa Gertrudis Channel - Temecula
1145 Cadmium, Total in mg/l
Data period 06/01/1993 to 05/31/1994
Benchmark 0.005, Source = BPO
>=DL, Wet
< DL, Wet
Benchmark
0.02
0.016
0.012
0.008
0.004
0
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

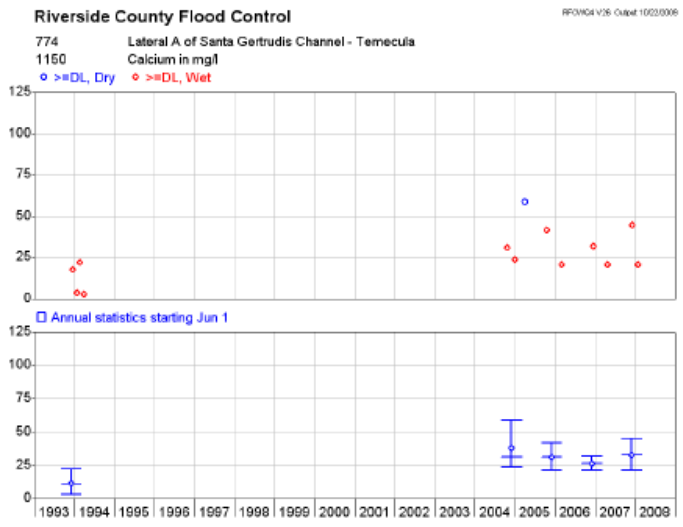
Riverside County Flood Control
774 Lateral A of Santa Gertrudis Channel - Temecula
1150 Calcium in mg/l
>=DL, Dry
>=DL, Wet
125
100
75
50
25
0
Annual statistics starting Jun 1
125
100
75
50
25
0
1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008

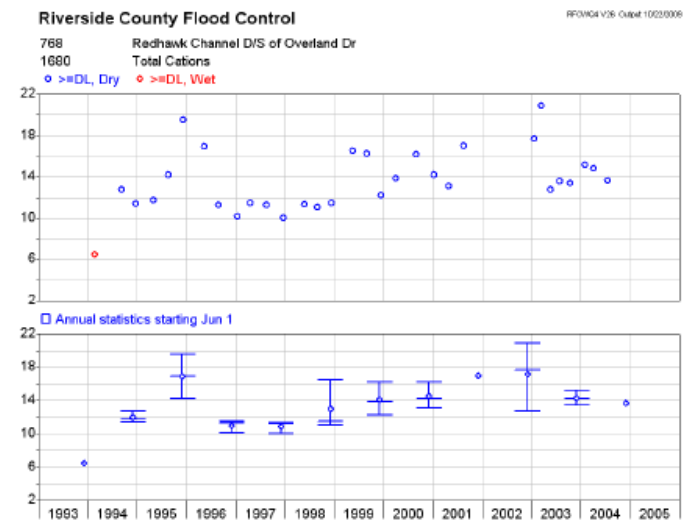
Riverside County Flood Control
768 Redhawk Channel D/S of Overland Dr
1680 Total Cations
>=DL, Dry
>=DL, Wet
Annual statistics starting Jun 1

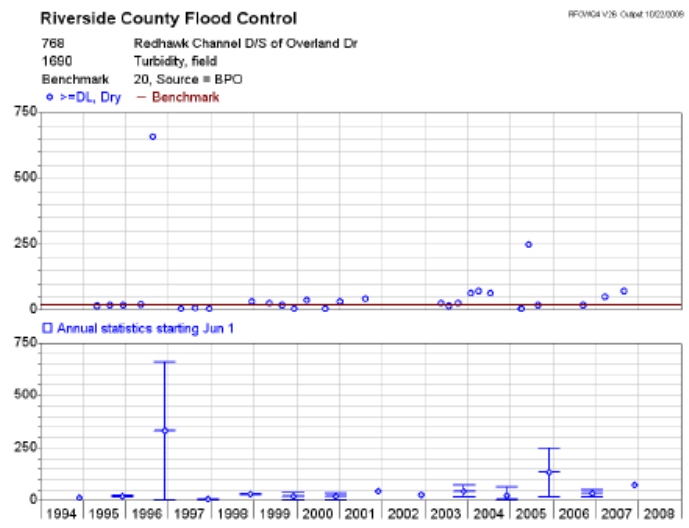
Riverside County Flood Control
768 Redhawk Channel D/S of Overland Dr
1690 Turbidity, field
Benchmark 20, Source = BPO
>=DL, Dry
Benchmark
Annual statistics starting Jun 1

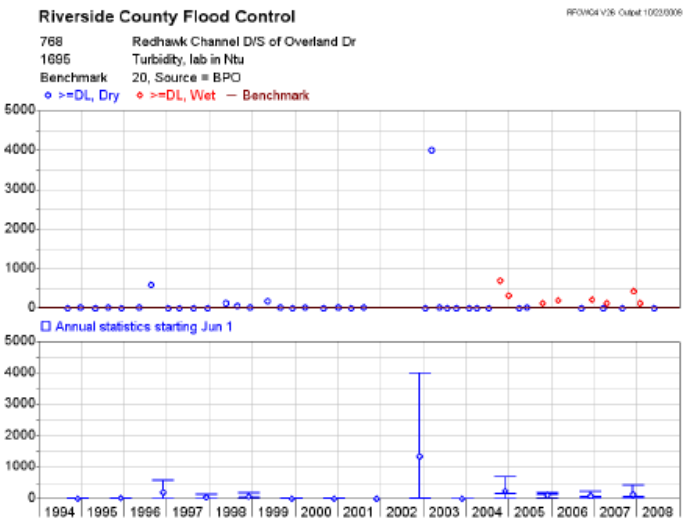
Riverside County Flood Control
768 Redhawk Channel D/S of Overland Dr
1695 Turbidity, lab in Ntu
Benchmark 20, Source = BPO
>=DL, Dry
>=DL, Wet
Benchmark
Annual statistics starting Jun 1

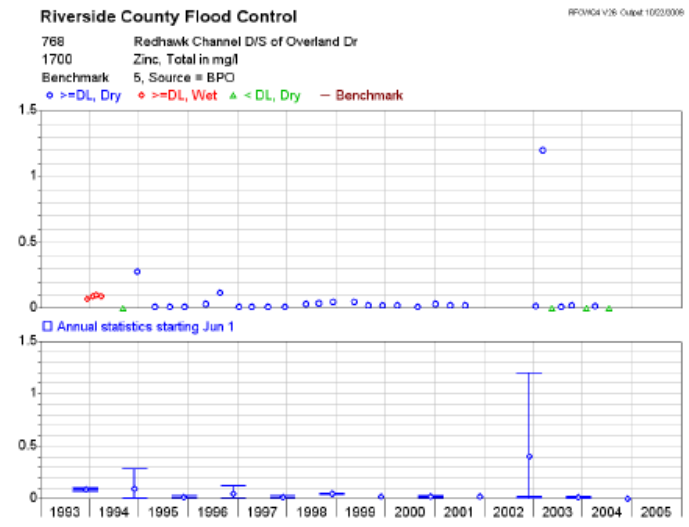
Riverside County Flood Control
768 Redhawk Channel D/S of Overland Dr
1700 Zinc, Total in mg/l
Benchmark 5, Source = BPO
>=DL, Dry
>=DL, Wet
< DL, Dry
Benchmark
Annual statistics starting Jun 1

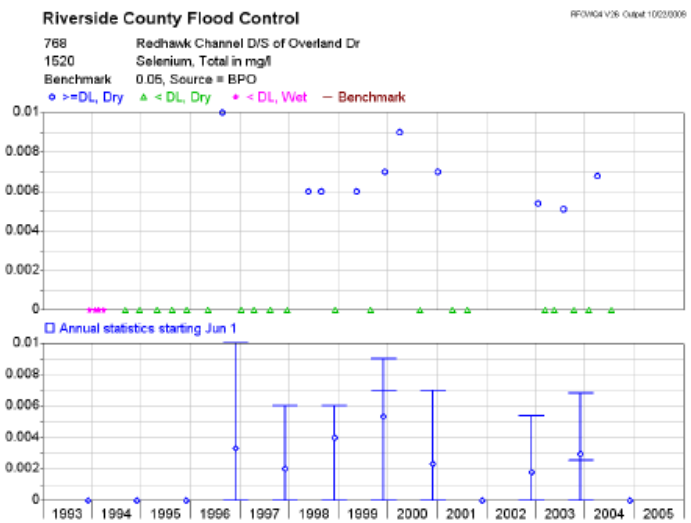
Riverside County Flood Control
768 Redhawk Channel D/S of Overland Dr
1520 Selenium, Total in mg/l
Benchmark 0.05, Source = BPO
>=DL, Dry
< DL, Dry
< DL, Wet
Benchmark
Annual statistics starting Jun 1
0.01
0.008
0.006
0.004
0.002
0
1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005

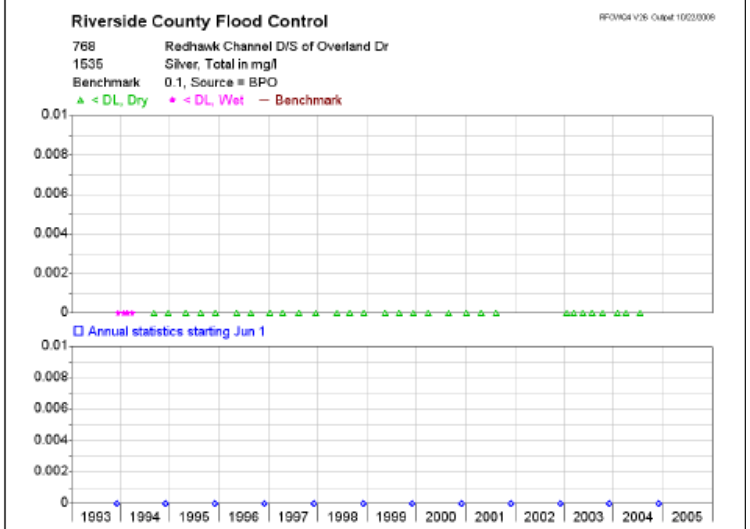
Riverside County Flood Control
768 Redhawk Channel D/S of Overland Dr
1535 Silver, Total in mg/l
Benchmark 0.1, Source = BPO
< DL, Dry
< DL, Wet
Benchmark
Annual statistics starting Jun 1
0.01
0.008
0.006
0.004
0.002
0
1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005

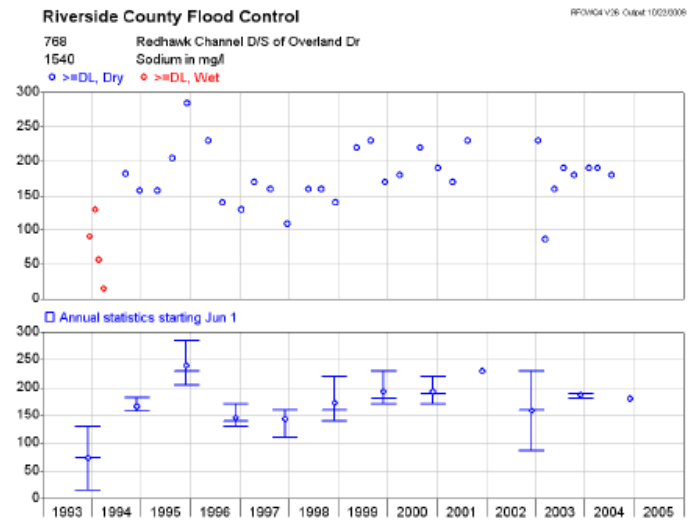
Riverside County Flood Control
768 Redhawk Channel D/S of Overland Dr
1540 Sodium in mg/l
>=DL, Dry
>=DL, Wet
Annual statistics starting Jun 1
300
250
200
150
100
50
0
1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005

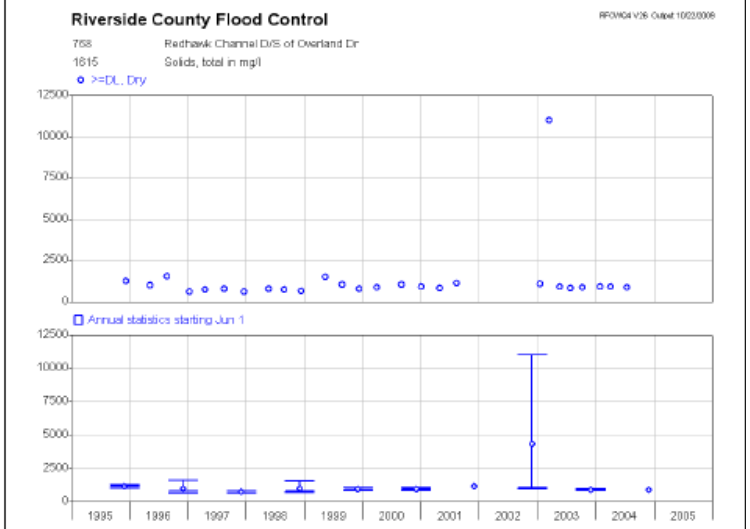
Riverside County Flood Control
768 Redhawk Channel D/S of Overland Dr
1615 Solids, total in mg/l
>=DL, Dry
Annual statistics starting Jun 1
12500
10000
7500
5000
2500
0
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005

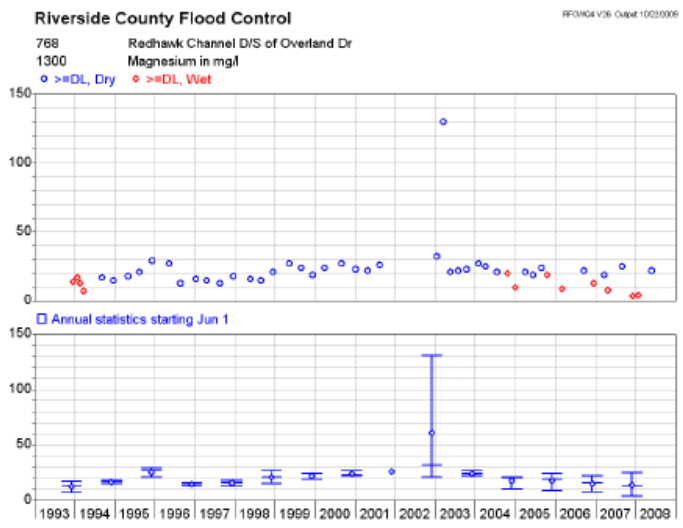
Riverside County Flood Control
768 Redhawk Channel D/S of Overland Dr
1300 Magnesium in mg/l
>=DL, Dry
>=DL, Wet
Annual statistics starting Jun 1
150
100
50
0
1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008

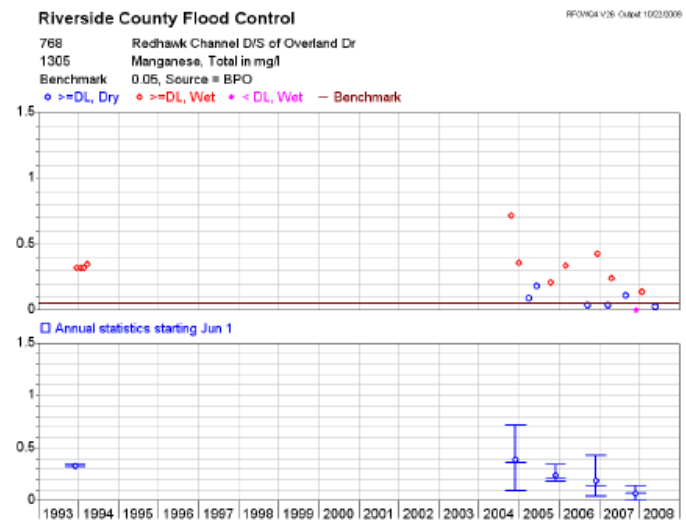
Riverside County Flood Control
768 Redhawk Channel D/S of Overland Dr
1305 Manganese, Total in mg/l
Benchmark 0.05, Source = BPO
>=DL, Dry
>=DL, Wet
< DL, Wet
Benchmark
Annual statistics starting Jun 1
1.5
1
0.5
0
1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008

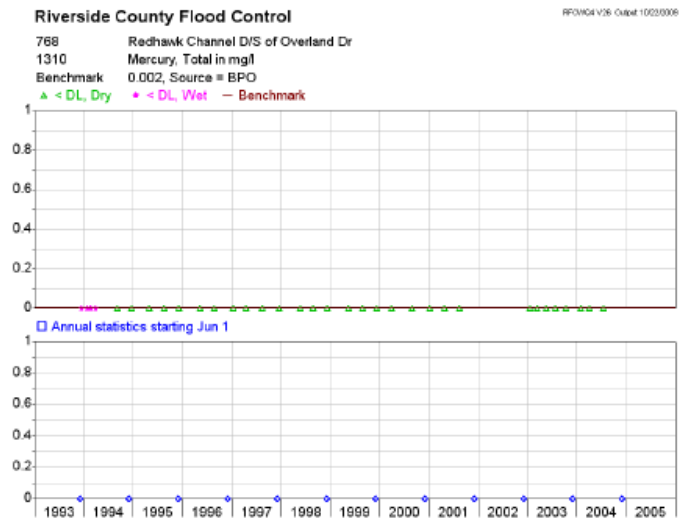
Riverside County Flood Control
768 Redhawk Channel D/S of Overland Dr
1310 Mercury, Total in mg/l
Benchmark 0.002, Source = BPO
< DL, Dry
< DL, Wet
Benchmark
Annual statistics starting Jun 1
1
0.8
0.6
0.4
0.2
0
1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005

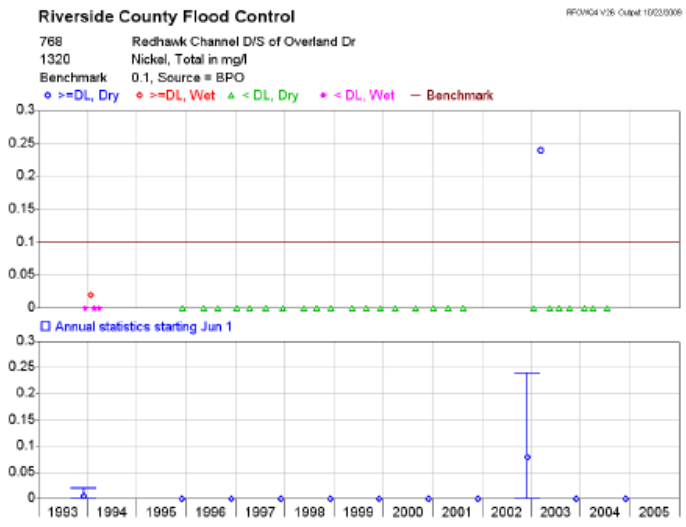
Riverside County Flood Control
768 Redhawk Channel D/S of Overland Dr
1320 Nickel, Total in mg/l
Benchmark 0.1, Source = BPO
>=DL, Dry
>=DL, Wet
< DL, Dry
< DL, Wet
Benchmark
Annual statistics starting Jun 1
0.3
0.25
0.2
0.15
0.1
0.05
0
1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005

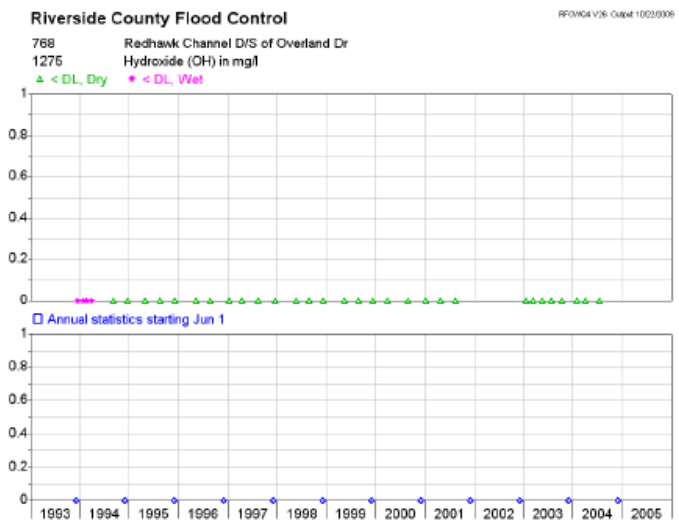
Riverside County Flood Control
768 Redhawk Channel D/S of Overland Dr
1275 Hydroxide (OH) in mg/l
< DL, Dry
< DL, Wet
Annual statistics starting Jun 1
1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005

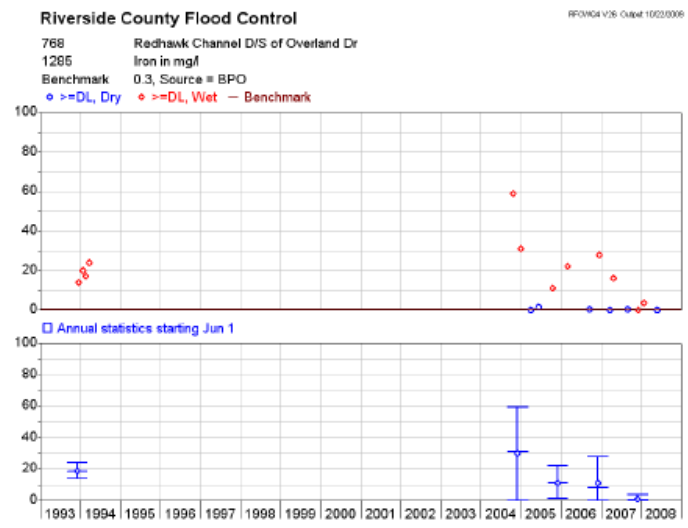
Riverside County Flood Control
768 Redhawk Channel D/S of Overland Dr
1285 Iron in mg/l
Benchmark 0.3, Source = BPO
>=DL, Dry
>=DL, Wet
Benchmark
Annual statistics starting Jun 1
1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008

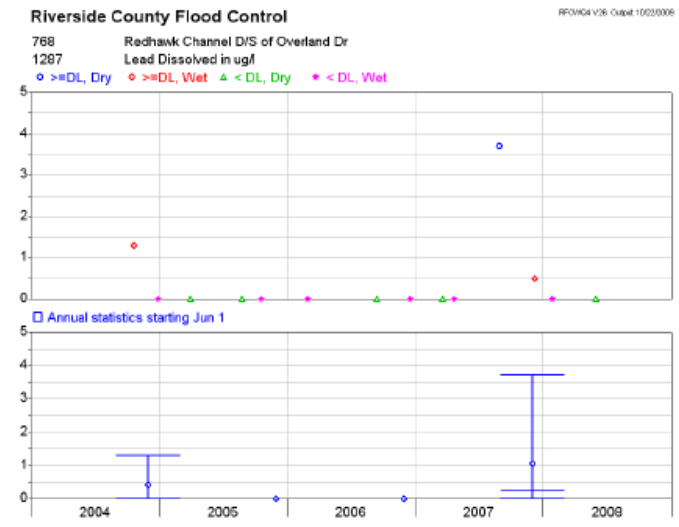
Riverside County Flood Control
768 Redhawk Channel D/S of Overland Dr
1287 Lead Dissolved in ug/l
>=DL, Dry
>=DL, Wet
< DL, Dry
< DL, Wet
Annual statistics starting Jun 1
2004 2005 2006 2007 2008

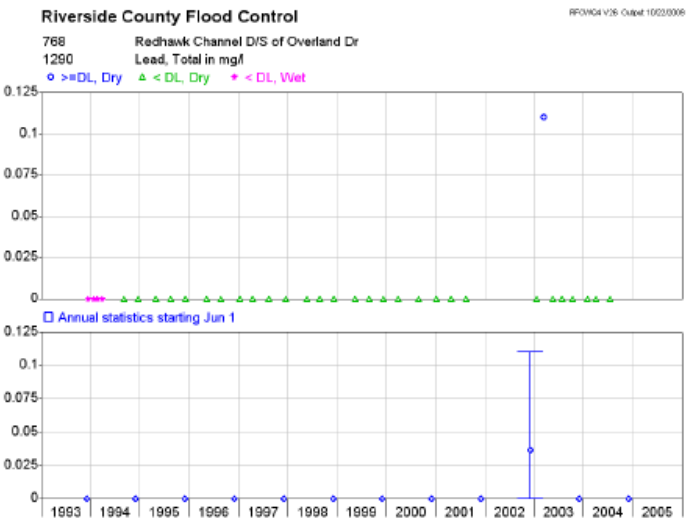
Riverside County Flood Control
768 Redhawk Channel D/S of Overland Dr
1290 Lead, Total in mg/l
>=DL, Dry
< DL, Dry
< DL, Wet
Annual statistics starting Jun 1
1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005

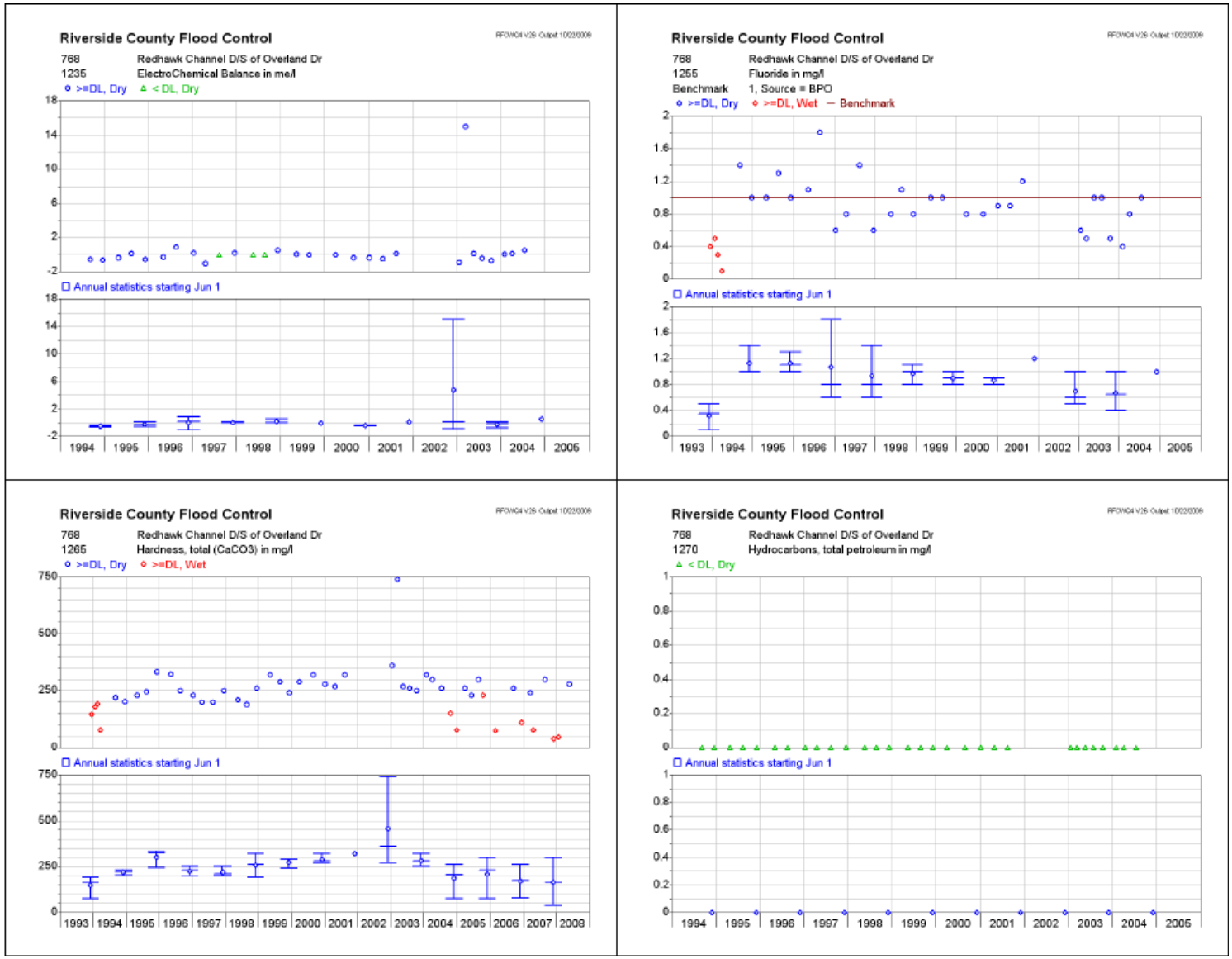
Riverside County Flood Control
768 Redhawk Channel D/S of Overland Dr
1235 ElectroChemical Balance in me/l
>=DL, Dry < DL, Dry
Annual statistics starting Jun 1
Riverside County Flood Control
768 Redhawk Channel D/S of Overland Dr
1255 Fluoride in mg/l
Benchmark 1, Source = BPO
>=DL, Dry >=DL, Wet Benchmark
Annual statistics starting Jun 1
Riverside County Flood Control
768 Redhawk Channel D/S of Overland Dr
1265 Hardness, total (CaCO3) in mg/l
>=DL, Dry >=DL, Wet
Annual statistics starting Jun 1
Riverside County Flood Control
768 Redhawk Channel D/S of Overland Dr
1270 Hydrocarbons, total petroleum in mg/l
< DL, Dry
Annual statistics starting Jun 1

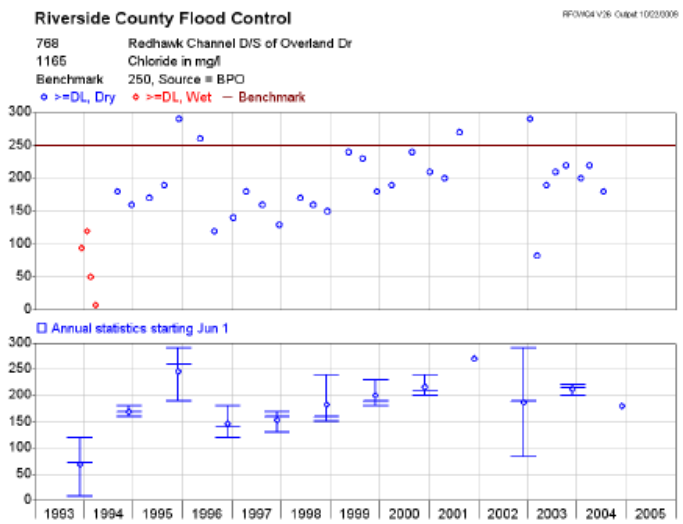
Riverside County Flood Control
768 Redhawk Channel D/S of Overland Dr
1165 Chloride in mg/l
Benchmark 250, Source = BPO
>=DL, Dry
>=DL, Wet
Benchmark
Annual statistics starting Jun 1
1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005

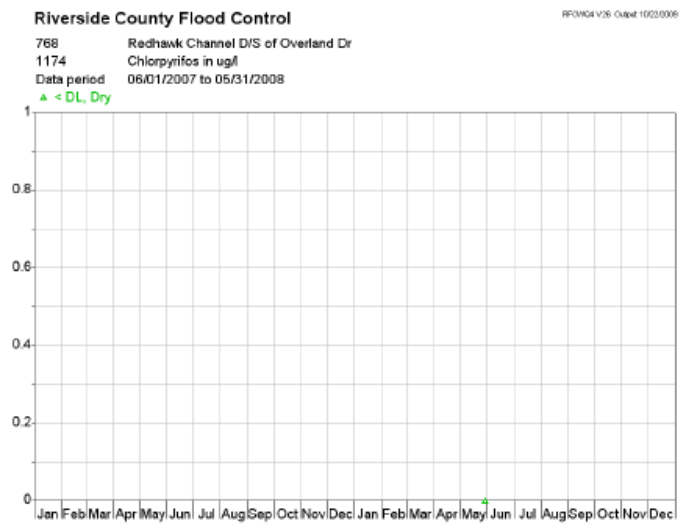
Riverside County Flood Control
768 Redhawk Channel D/S of Overland Dr
1174 Chlorpyrifos in ug/l
Data period 06/01/2007 to 05/31/2008
< DL, Dry
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

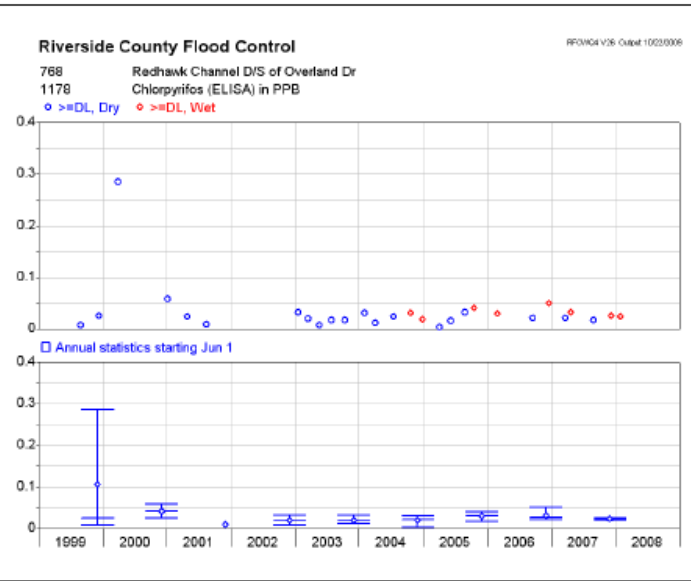
Riverside County Flood Control
768 Redhawk Channel D/S of Overland Dr
1178 Chlorpyrifos (ELISA) in PPB
>=DL, Dry
>=DL, Wet
Annual statistics starting Jun 1
1999 2000 2001 2002 2003 2004 2005 2006 2007 2008

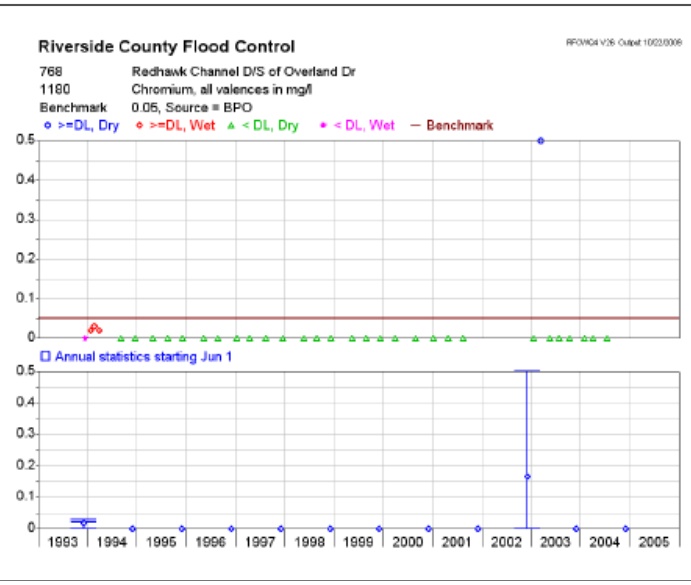
Riverside County Flood Control
768 Redhawk Channel D/S of Overland Dr
1180 Chromium, all valences in mg/l
Benchmark 0.05, Source = BPO
>=DL, Dry
>=DL, Wet
< DL, Dry
< DL, Wet
Benchmark
Annual statistics starting Jun 1
1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005

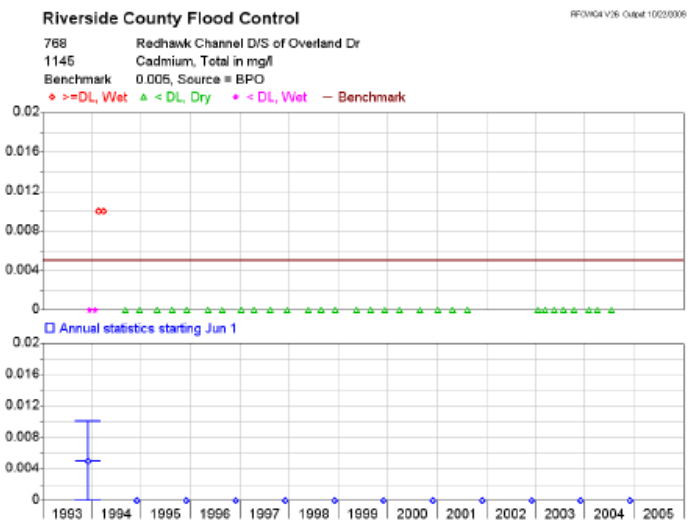
Riverside County Flood Control
768 Redhawk Channel D/S of Overland Dr
1145 Cadmium, Total in mg/l
Benchmark 0.005, Source = BPO
>=DL, Wet
< DL, Dry
< DL, Wet
Benchmark
Annual statistics starting Jun 1

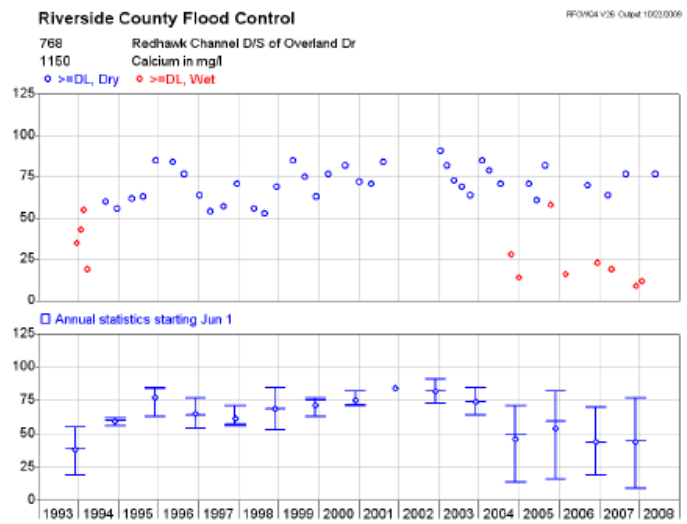
Riverside County Flood Control
768 Redhawk Channel D/S of Overland Dr
1150 Calcium in mg/l
>=DL, Dry
>=DL, Wet
Annual statistics starting Jun 1

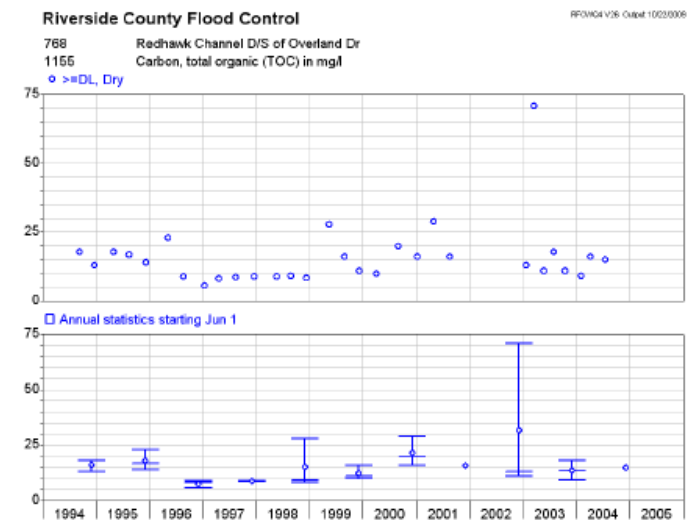
Riverside County Flood Control
768 Redhawk Channel D/S of Overland Dr
1155 Carbon, total organic (TOC) in mg/l
>=DL, Dry
Annual statistics starting Jun 1

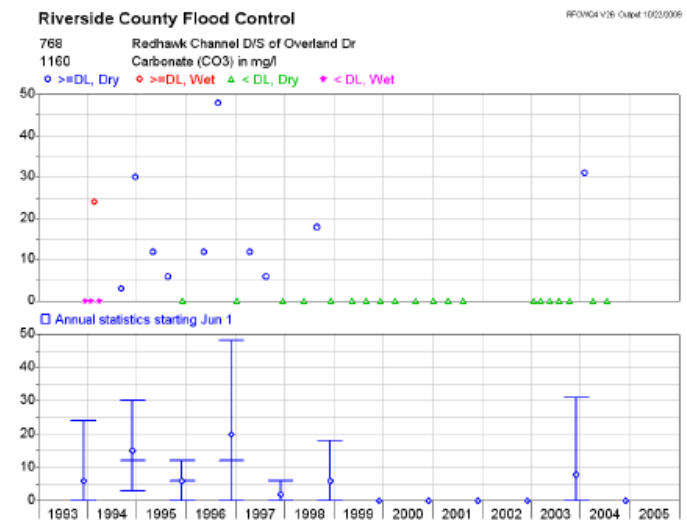
Riverside County Flood Control
768 Redhawk Channel D/S of Overland Dr
1160 Carbonate (CO3) in mg/l
>=DL, Dry
>=DL, Wet
< DL, Dry
< DL, Wet
Annual statistics starting Jun 1

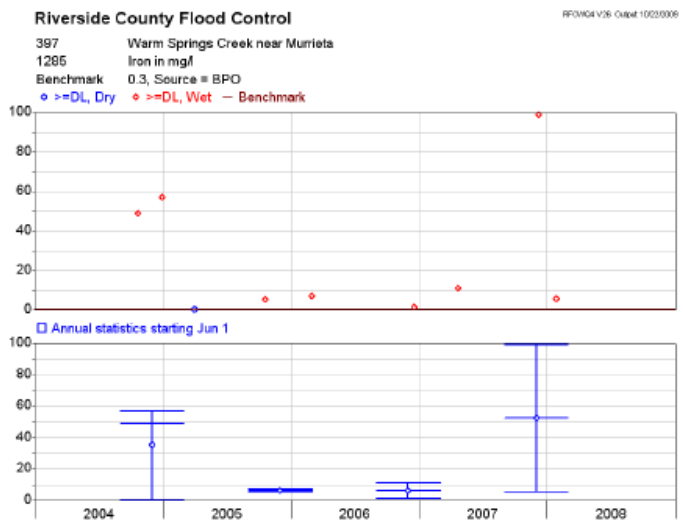
Riverside County Flood Control
397 Warm Springs Creek near Murrieta
1285 Iron in mg/l
Benchmark 0.3, Source = BPO
>=DL, Dry
>=DL, Wet
Benchmark
Annual statistics starting Jun 1
2004
2005
2006
2007
2008

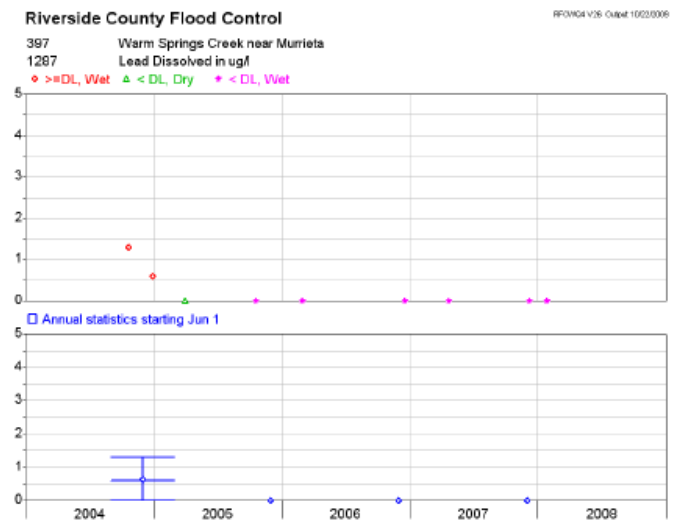
Riverside County Flood Control
397 Warm Springs Creek near Murrieta
1287 Lead Dissolved in ug/l
>=DL, Wet
< DL, Dry
< DL, Wet
Annual statistics starting Jun 1
2004
2005
2006
2007
2008

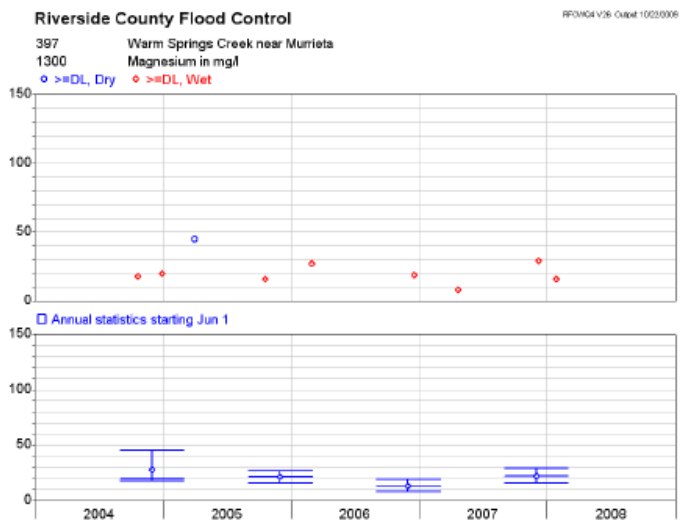
Riverside County Flood Control
397 Warm Springs Creek near Murrieta
1300 Magnesium in mg/l
>=DL, Dry
>=DL, Wet
Annual statistics starting Jun 1
2004
2005
2006
2007
2008

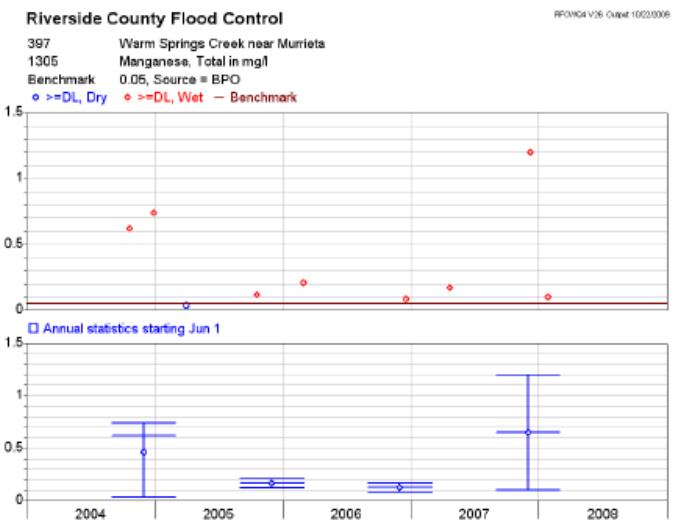
Riverside County Flood Control
397 Warm Springs Creek near Murrieta
1305 Manganese, Total in mg/l
Benchmark 0.05, Source = BPO
>=DL, Dry
>=DL, Wet
Benchmark
Annual statistics starting Jun 1
2004
2005
2006
2007
2008

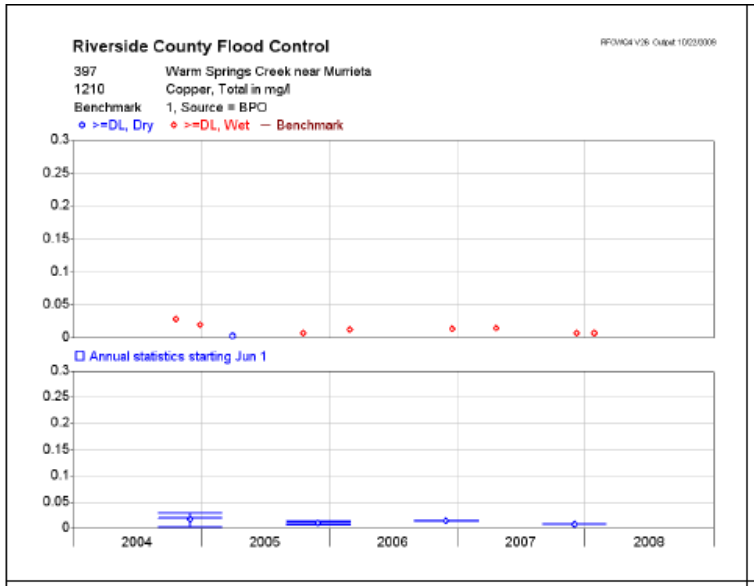
Riverside County Flood Control
397 Warm Springs Creek near Murrieta
1210 Copper, Total in mg/l
Benchmark 1, Source = BPO
>=DL, Dry
>=DL, Wet
Benchmark
Annual statistics starting Jun 1
0.3
0.25
0.2
0.15
0.1
0.05
0
2004
2005
2006
2007
2008

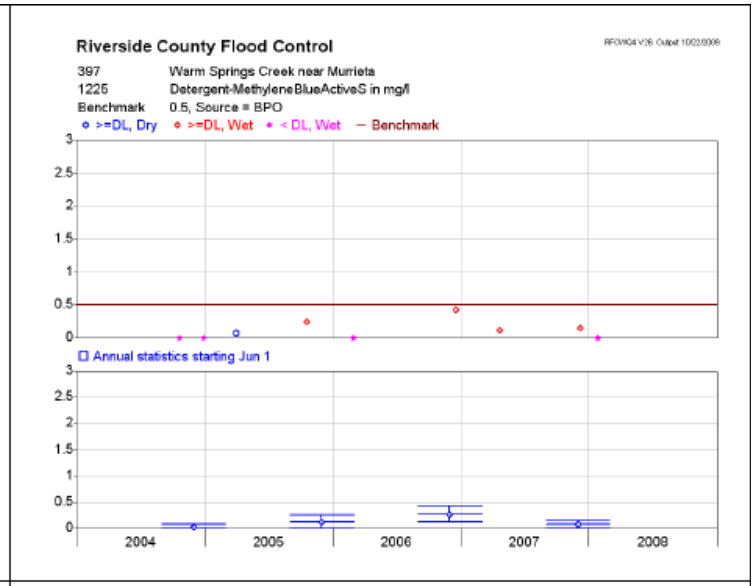
Riverside County Flood Control
397 Warm Springs Creek near Murrieta
1225 Detergent-MethyleneBlueActiveS in mg/l
Benchmark 0.5, Source = BPO
>=DL, Dry
>=DL, Wet
< DL, Wet
Benchmark
Annual statistics starting Jun 1
3
2.5
2
1.5
1
0.5
0
2004
2005
2006
2007
2008

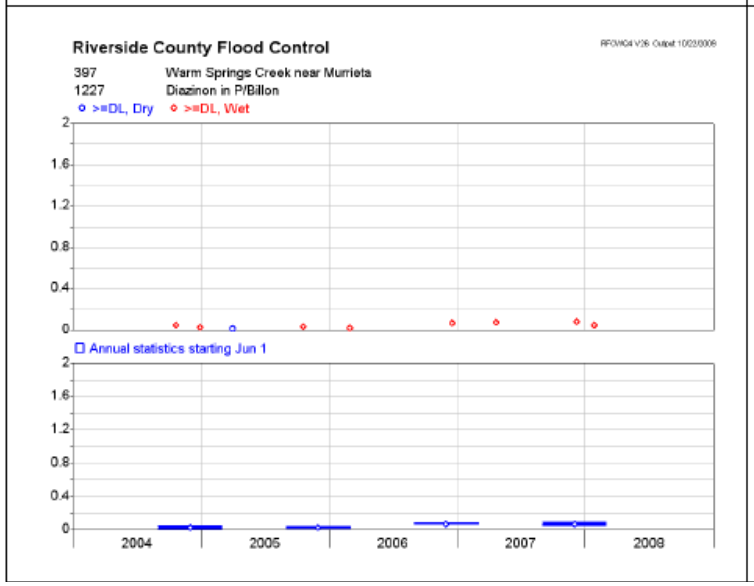
Riverside County Flood Control
397 Warm Springs Creek near Murrieta
1227 Diazinon in P/Billon
>=DL, Dry
>=DL, Wet
Annual statistics starting Jun 1
2
1.6
1.2
0.8
0.4
0
2004
2005
2006
2007
2008

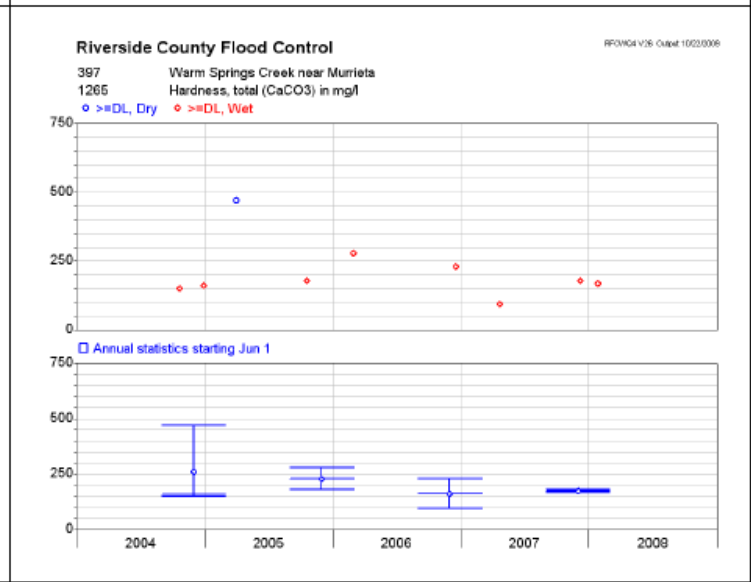
Riverside County Flood Control
397 Warm Springs Creek near Murrieta
1265 Hardness, total (CaCO3) in mg/l
>=DL, Dry
>=DL, Wet
Annual statistics starting Jun 1
750
500
250
0
2004
2005
2006
2007
2008

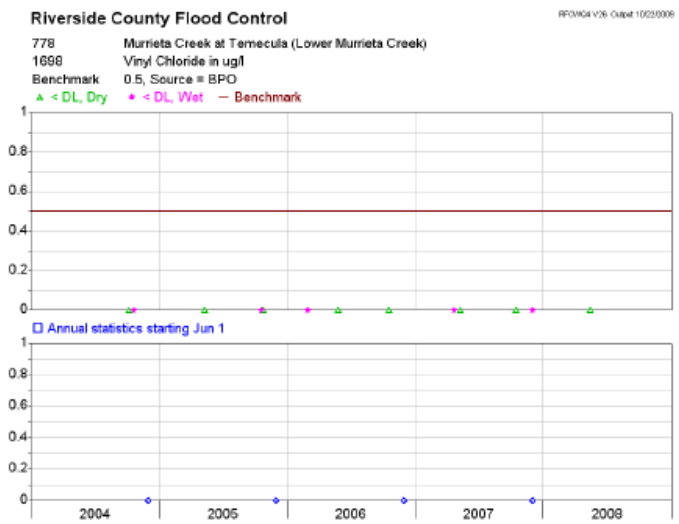
Riverside County Flood Control
778 Murrieta Creek at Temecula (Lower Murrieta Creek)
1698 Vinyl Chloride in ug/l
Benchmark 0.5, Source = BPO
< DL, Dry
< DL, Wet
Benchmark
Annual statistics starting Jun 1
2004
2005
2006
2007
2008

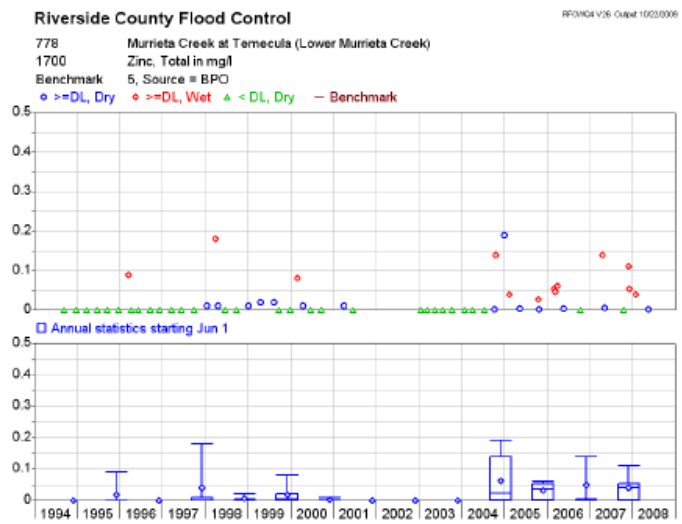
Riverside County Flood Control
778 Murrieta Creek at Temecula (Lower Murrieta Creek)
1700 Zinc, Total in mg/l
Benchmark 5, Source = BPO
>=DL, Dry
>=DL, Wet
< DL, Dry
Benchmark
Annual statistics starting Jun 1
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008

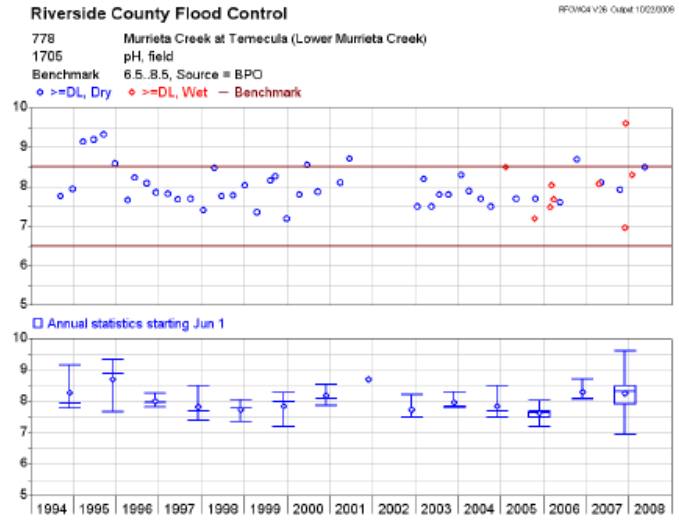
Riverside County Flood Control
778 Murrieta Creek at Temecula (Lower Murrieta Creek)
1705 pH, field
Benchmark 6.5..8.5, Source = BPO
>=DL, Dry
>=DL, Wet
Benchmark
Annual statistics starting Jun 1
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008

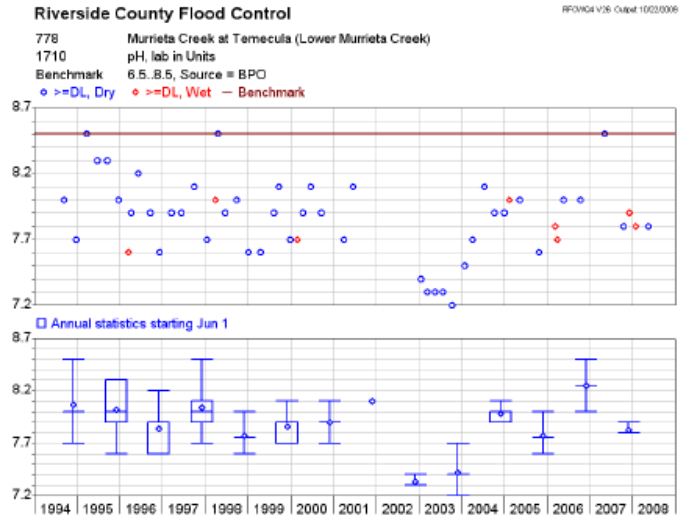
Riverside County Flood Control
778 Murrieta Creek at Temecula (Lower Murrieta Creek)
1710 pH, lab in Units
Benchmark 6.5..8.5, Source = BPO
>=DL, Dry
>=DL, Wet
Benchmark
Annual statistics starting Jun 1
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008

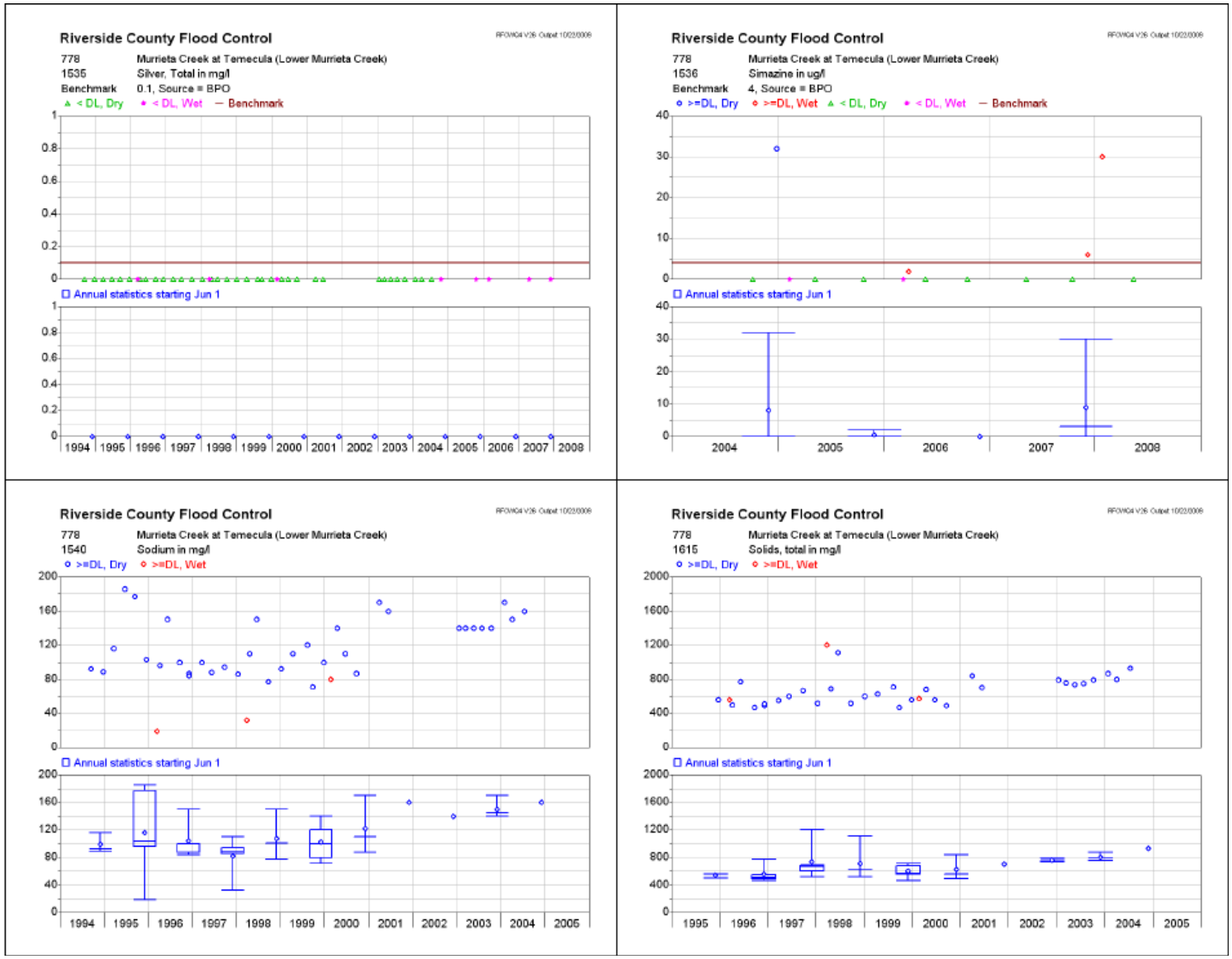
Riverside County Flood Control
778 Murrieta Creek at Temecula (Lower Murrieta Creek)
1535 Silver, Total in mg/l
Benchmark 0.1, Source = BPO
< DL, Dry
< DL, Wet
Benchmark
Annual statistics starting Jun 1
Riverside County Flood Control
778 Murrieta Creek at Temecula (Lower Murrieta Creek)
1536 Simazine in ug/l
Benchmark 4, Source = BPO
>=DL, Dry
>=DL, Wet
< DL, Dry
< DL, Wet
Benchmark
Annual statistics starting Jun 1
Riverside County Flood Control
778 Murrieta Creek at Temecula (Lower Murrieta Creek)
1540 Sodium in mg/l
>=DL, Dry
>=DL, Wet
Annual statistics starting Jun 1
Riverside County Flood Control
778 Murrieta Creek at Temecula (Lower Murrieta Creek)
1615 Solids, total in mg/l
>=DL, Dry
>=DL, Wet
Annual statistics starting Jun 1

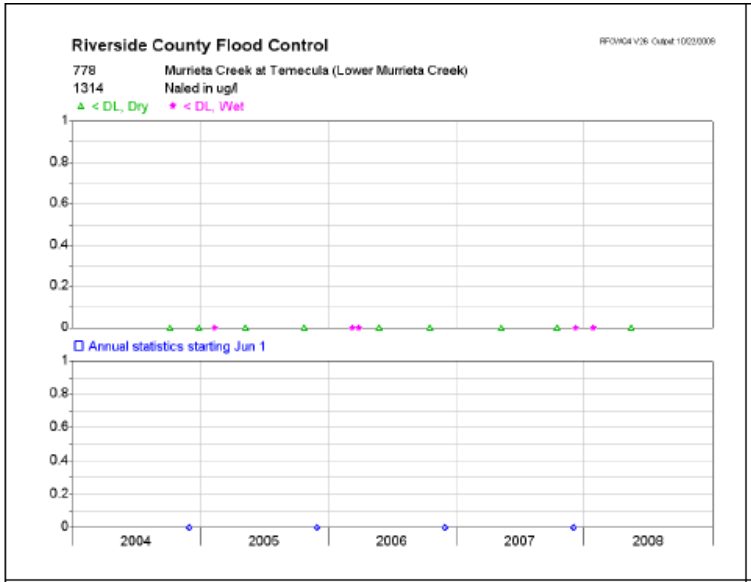
Riverside County Flood Control
778 Murrieta Creek at Temecula (Lower Murrieta Creek)
1314 Naled in ug/l
< DL, Dry
< DL, Wet
Annual statistics starting Jun 1
2004
2005
2006
2007
2008

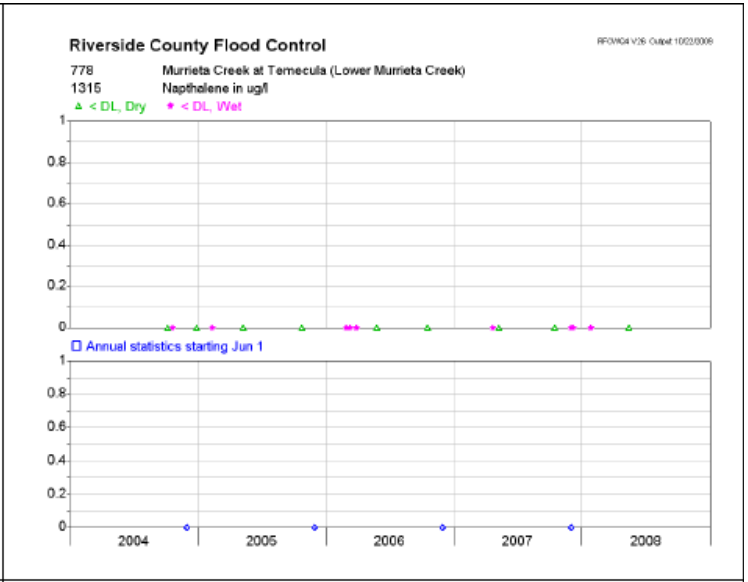
Riverside County Flood Control
778 Murrieta Creek at Temecula (Lower Murrieta Creek)
1315 Napthalene in ug/l
< DL, Dry
< DL, Wet
Annual statistics starting Jun 1
2004
2005
2006
2007
2008

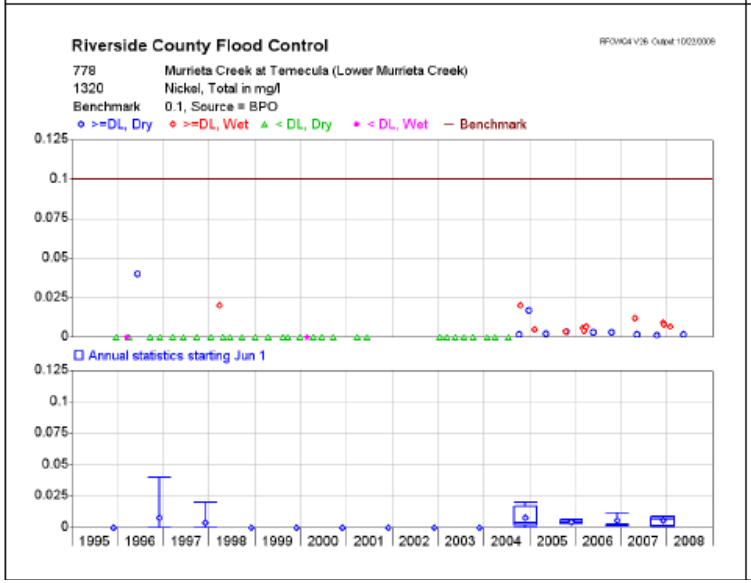
Riverside County Flood Control
778 Murrieta Creek at Temecula (Lower Murrieta Creek)
1320 Nickel, Total in mg/l
Benchmark 0.1, Source = BPO
>=DL, Dry
>=DL, Wet
< DL, Dry
< DL, Wet
Benchmark
Annual statistics starting Jun 1
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008

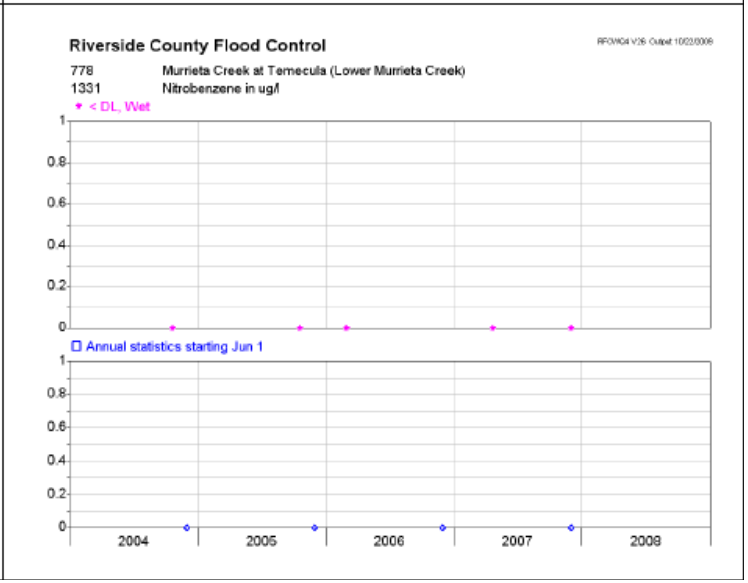
Riverside County Flood Control
778 Murrieta Creek at Temecula (Lower Murrieta Creek)
1331 Nitrobenzene in ug/l
< DL, Wet
Annual statistics starting Jun 1
2004
2005
2006
2007
2008

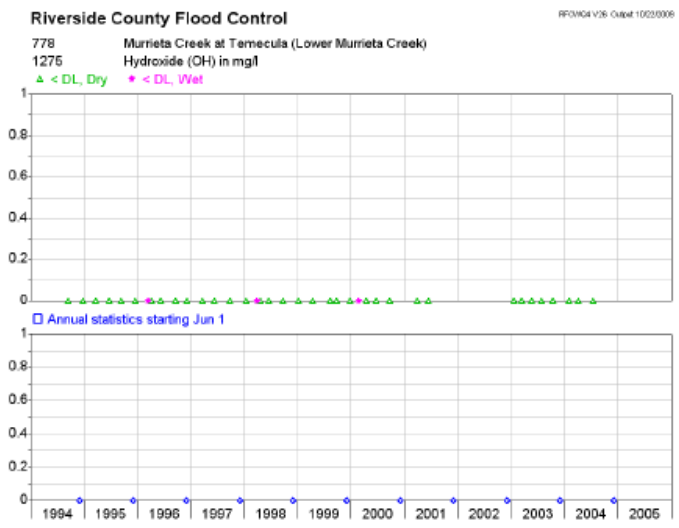
Riverside County Flood Control
778 Murrieta Creek at Temecula (Lower Murrieta Creek)
1275 Hydroxide (OH) in mg/l
< DL, Dry
< DL, Wet
Annual statistics starting Jun 1
1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005

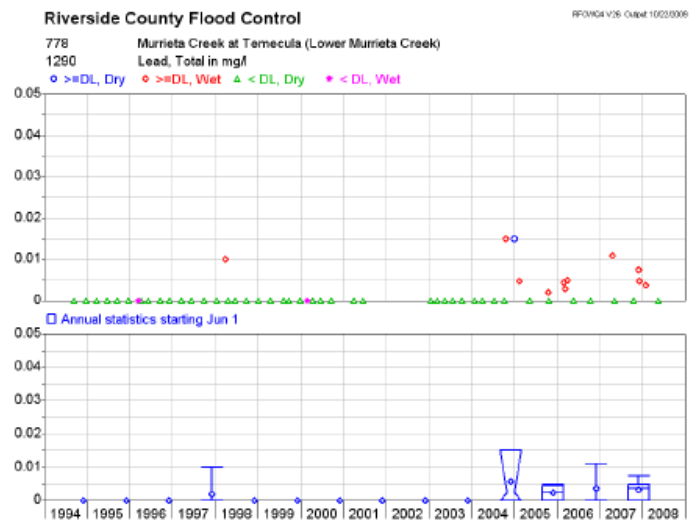
Riverside County Flood Control
778 Murrieta Creek at Temecula (Lower Murrieta Creek)
1290 Lead, Total in mg/l
>=DL, Dry
>=DL, Wet
< DL, Dry
< DL, Wet
Annual statistics starting Jun 1
1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008

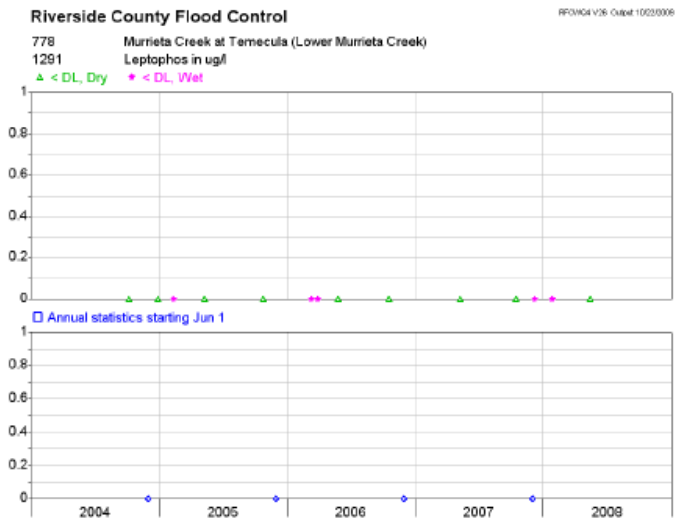
Riverside County Flood Control
778 Murrieta Creek at Temecula (Lower Murrieta Creek)
1291 Leptophos in ug/l
< DL, Dry
< DL, Wet
Annual statistics starting Jun 1
2004 2005 2006 2007 2008

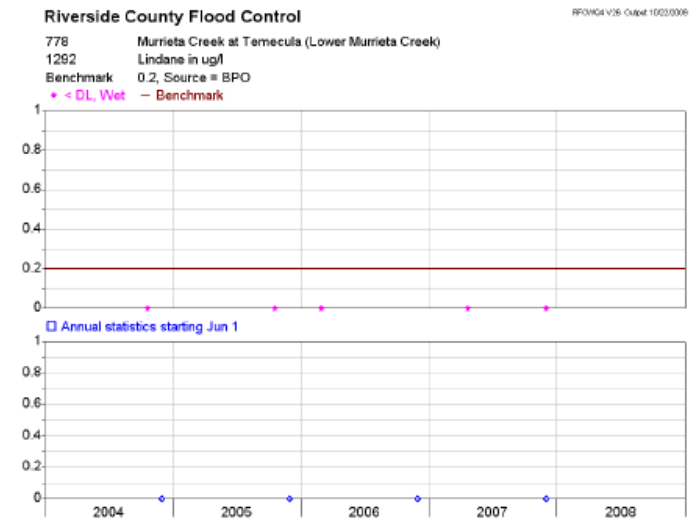
Riverside County Flood Control
778 Murrieta Creek at Temecula (Lower Murrieta Creek)
1292 Lindane in ug/l
Benchmark 0.2, Source = BPO
< DL, Wet
Benchmark
Annual statistics starting Jun 1
2004 2005 2006 2007 2008

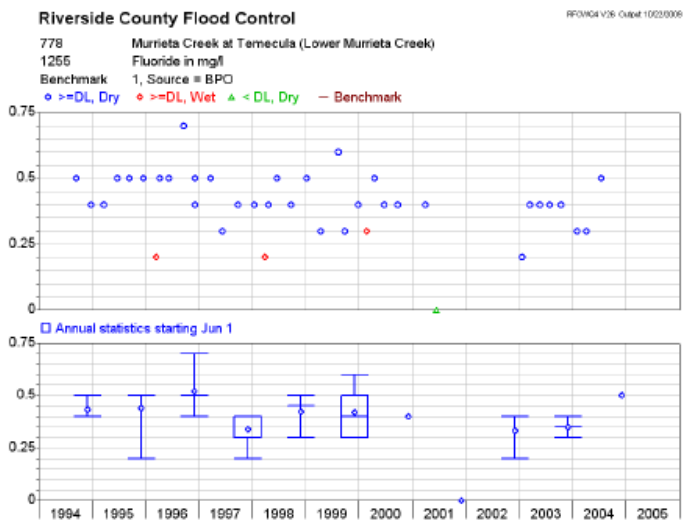
Riverside County Flood Control
778 Murrieta Creek at Temecula (Lower Murrieta Creek)
1255 Fluoride in mg/l
Benchmark 1, Source = BPO
>=DL, Dry
>=DL, Wet
< DL, Dry
Benchmark
Annual statistics starting Jun 1
0.75
0.5
0.25
0
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005

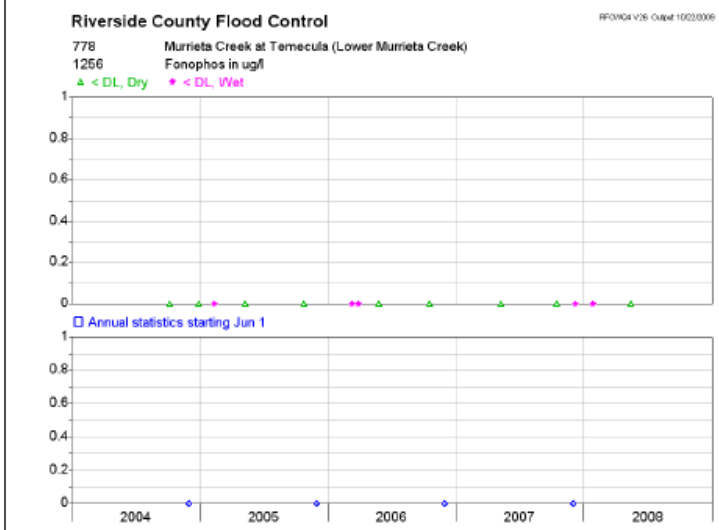
Riverside County Flood Control
778 Murrieta Creek at Temecula (Lower Murrieta Creek)
1256 Fonophos in ug/l
< DL, Dry
< DL, Wet
Annual statistics starting Jun 1
1
0.8
0.6
0.4
0.2
0
2004
2005
2006
2007
2008

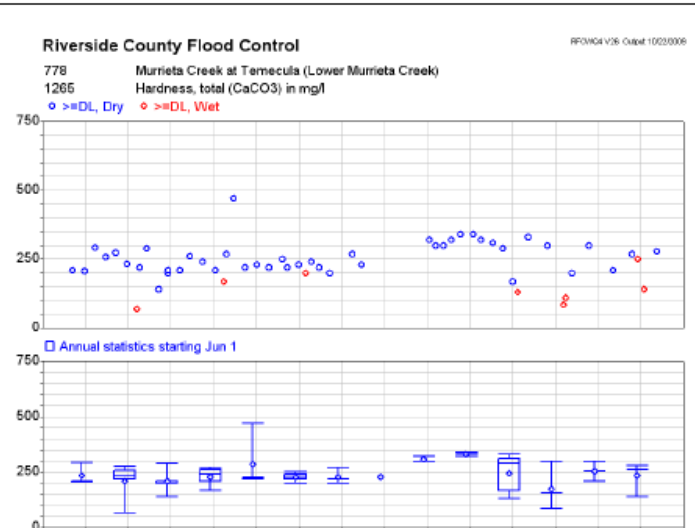
Riverside County Flood Control
778 Murrieta Creek at Temecula (Lower Murrieta Creek)
1265 Hardness, total (CaCO3) in mg/l
>=DL, Dry
>=DL, Wet
Annual statistics starting Jun 1
750
500
250
0
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008

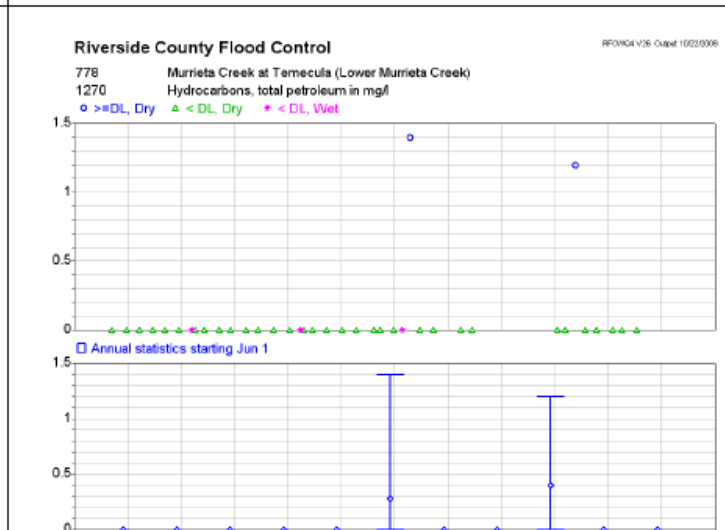
Riverside County Flood Control
778 Murrieta Creek at Temecula (Lower Murrieta Creek)
1270 Hydrocarbons, total petroleum in mg/l
>=DL, Dry
< DL, Dry
< DL, Wet
Annual statistics starting Jun 1
1.5
1
0.5
0
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005

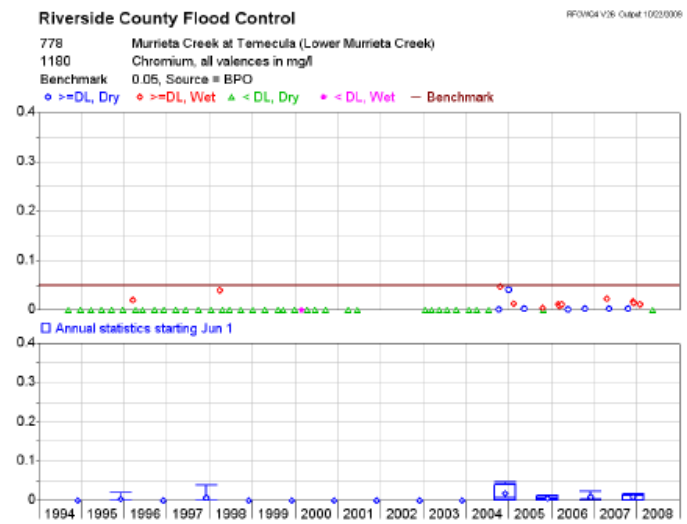
Riverside County Flood Control
778 Murrieta Creek at Temecula (Lower Murrieta Creek)
1180 Chromium, all valences in mg/l
Benchmark 0.05, Source = BPO
>=DL, Dry
>=DL, Wet
< DL, Dry
< DL, Wet
Benchmark
Annual statistics starting Jun 1
1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008

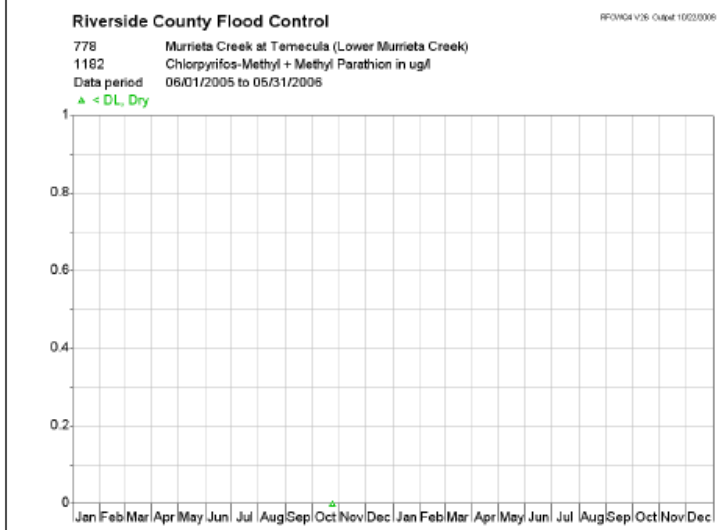
Riverside County Flood Control
778 Murrieta Creek at Temecula (Lower Murrieta Creek)
1182 Chlorpyrifos-Methyl + Methyl Parathion in ug/l
Data period 06/01/2005 to 05/31/2006
< DL, Dry
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

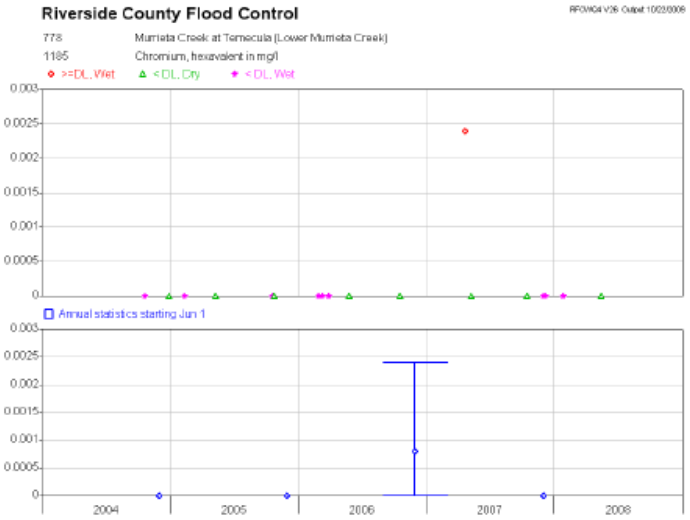
Riverside County Flood Control
778 Murrieta Creek at Temecula (Lower Murrieta Creek)
1185 Chromium, hexavalent in mg/l
>=DL, Wet
< DL, Dry
< DL, Wet
Annual statistics starting Jun 1
2004 2005 2006 2007 2008

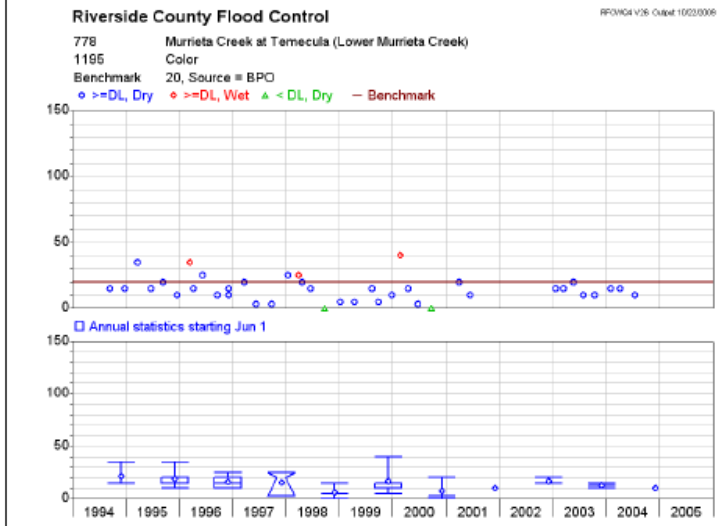
Riverside County Flood Control
778 Murrieta Creek at Temecula (Lower Murrieta Creek)
1195 Color
Benchmark 20, Source = BPO
>=DL, Dry
>=DL, Wet
< DL, Dry
Benchmark
Annual statistics starting Jun 1
1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005

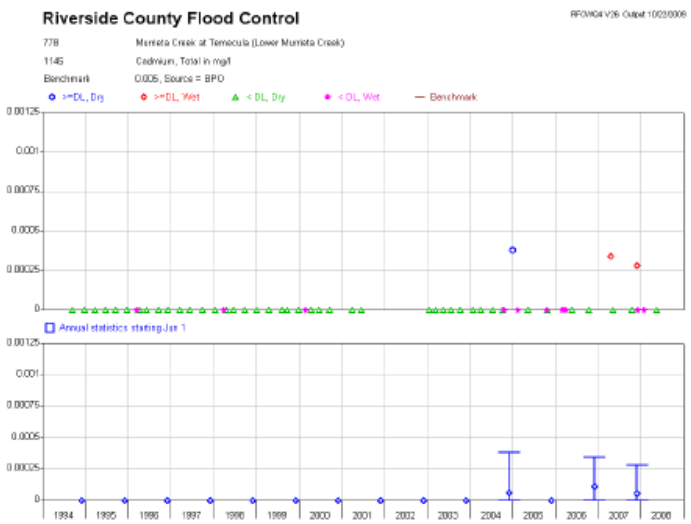
Riverside County Flood Control
778 Murrieta Creek at Temecula (Lower Murrieta Creek)
1145 Cadmium, Total in mg/l
Benchmark 0.005, Source = BPO
>=DL, Dry
>=DL, Wet
< DL, Dry
< DL, Wet
Benchmark
Annual statistics starting Jan 1

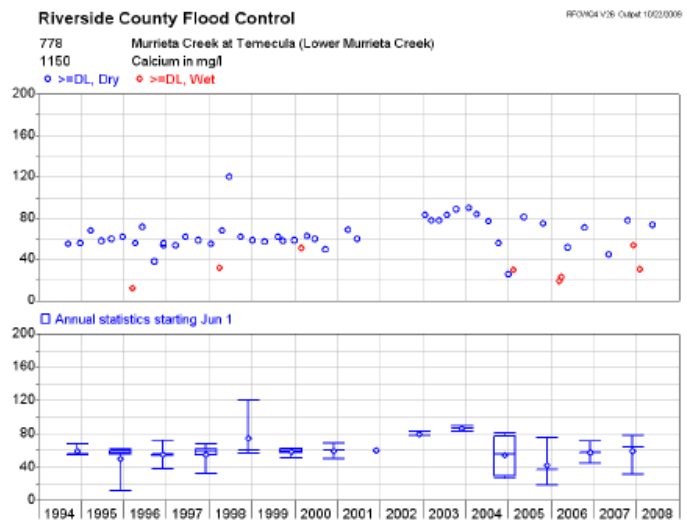
Riverside County Flood Control
778 Murrieta Creek at Temecula (Lower Murrieta Creek)
1150 Calcium in mg/l
>=DL, Dry
>=DL, Wet
Annual statistics starting Jun 1
1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008

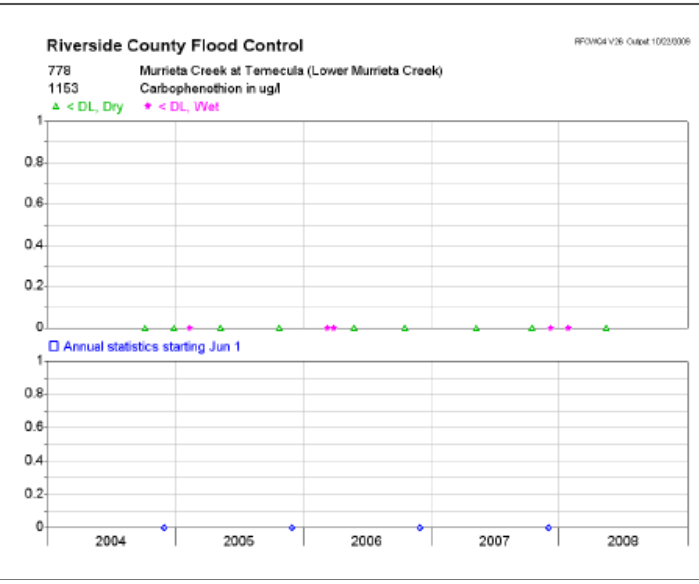
Riverside County Flood Control
778 Murrieta Creek at Temecula (Lower Murrieta Creek)
1153 Carbophenothion in ug/l
< DL, Dry
< DL, Wet
Annual statistics starting Jun 1
2004 2005 2006 2007 2008

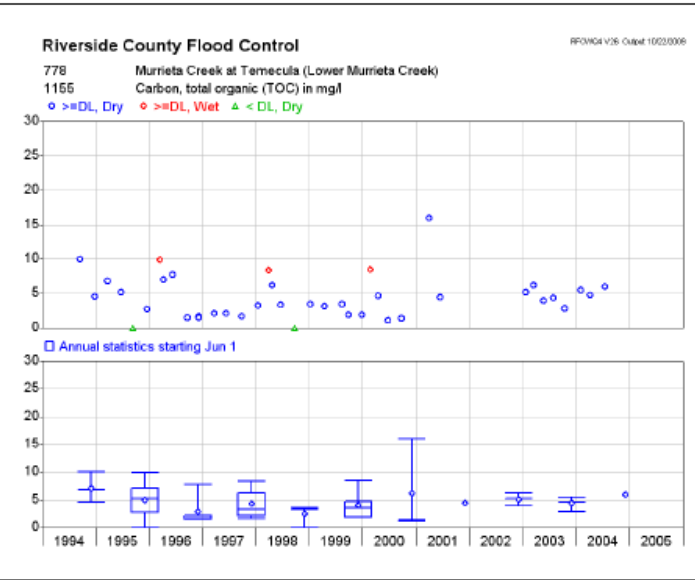
Riverside County Flood Control
778 Murrieta Creek at Temecula (Lower Murrieta Creek)
1155 Carbon, total organic (TOC) in mg/l
>=DL, Dry
>=DL, Wet
< DL, Dry
Annual statistics starting Jun 1
1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005

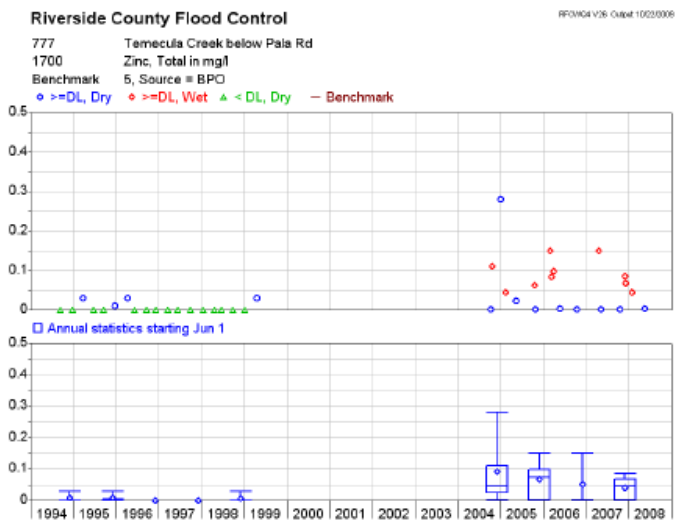
Riverside County Flood Control
777 Temecula Creek below Pala Rd
1700 Zinc, Total in mg/l
Benchmark 5, Source = BPO
>=DL, Dry >=DL, Wet < DL, Dry Benchmark
Annual statistics starting Jun 1
1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008

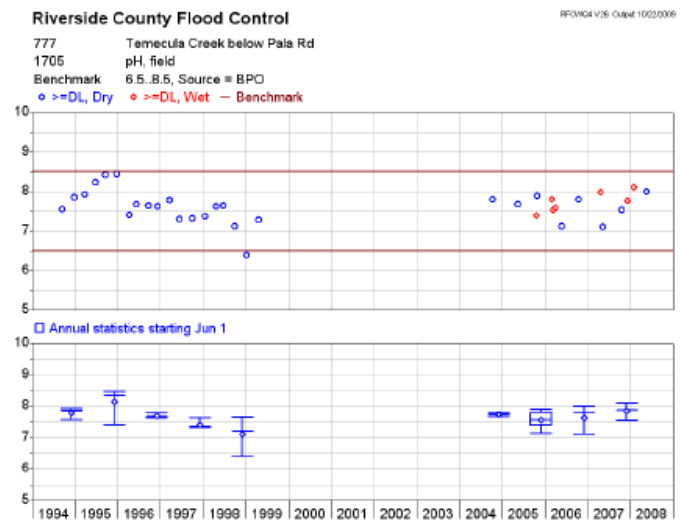
Riverside County Flood Control
777 Temecula Creek below Pala Rd
1705 pH, field
Benchmark 6.5..8.5, Source = BPO
>=DL, Dry >=DL, Wet Benchmark
Annual statistics starting Jun 1
1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008

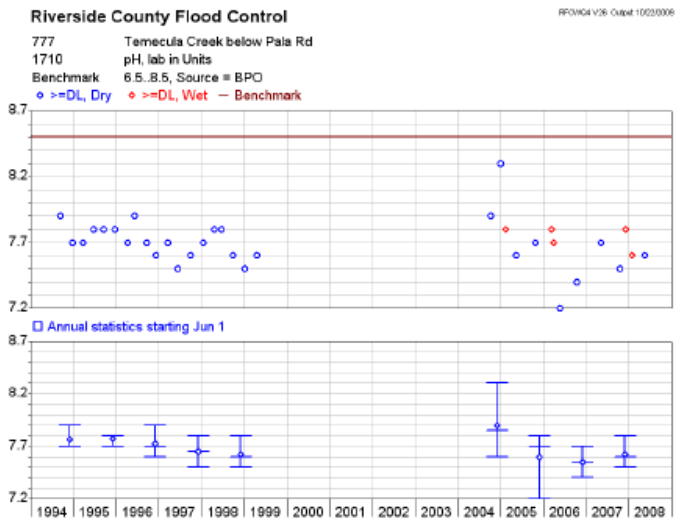
Riverside County Flood Control
777 Temecula Creek below Pala Rd
1710 pH, lab in Units
Benchmark 6.5..8.5, Source = BPO
>=DL, Dry >=DL, Wet Benchmark
Annual statistics starting Jun 1
1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008

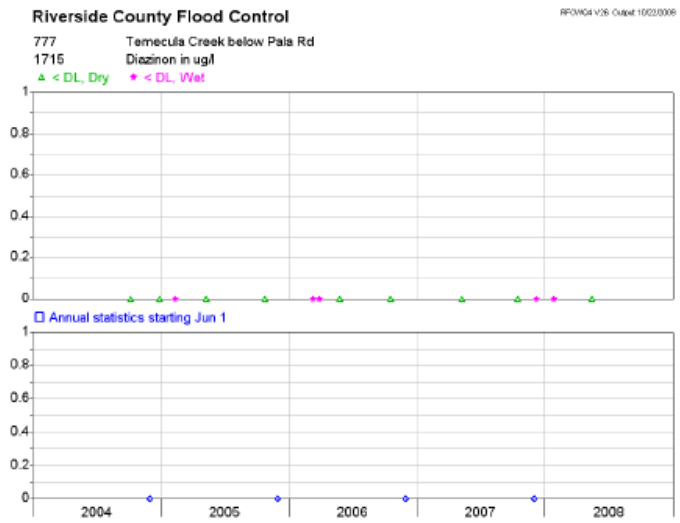
Riverside County Flood Control
777 Temecula Creek below Pala Rd
1715 Diazinon in ug/l
< DL, Dry < DL, Wet
Annual statistics starting Jun 1
2004 2005 2006 2007 2008

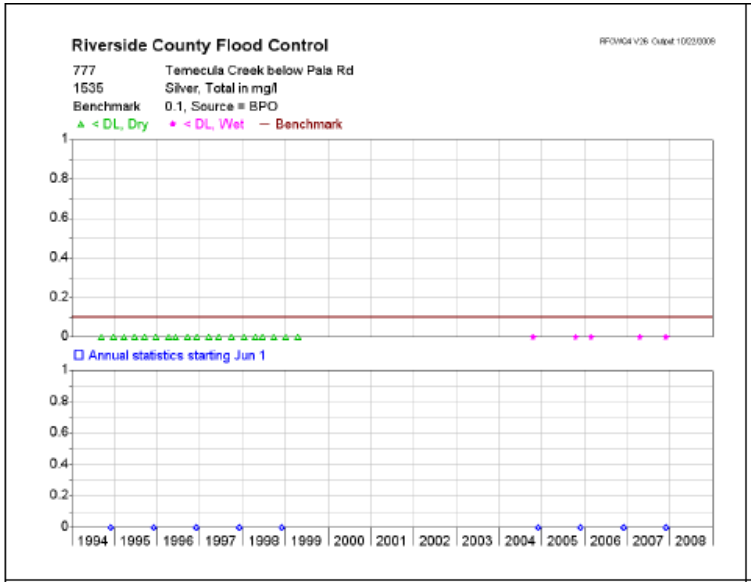
Riverside County Flood Control
777 Temecula Creek below Pala Rd
1535 Silver, Total in mg/l
Benchmark 0.1, Source = BPO
< DL, Dry
< DL, Wet
Benchmark
Annual statistics starting Jun 1
1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008

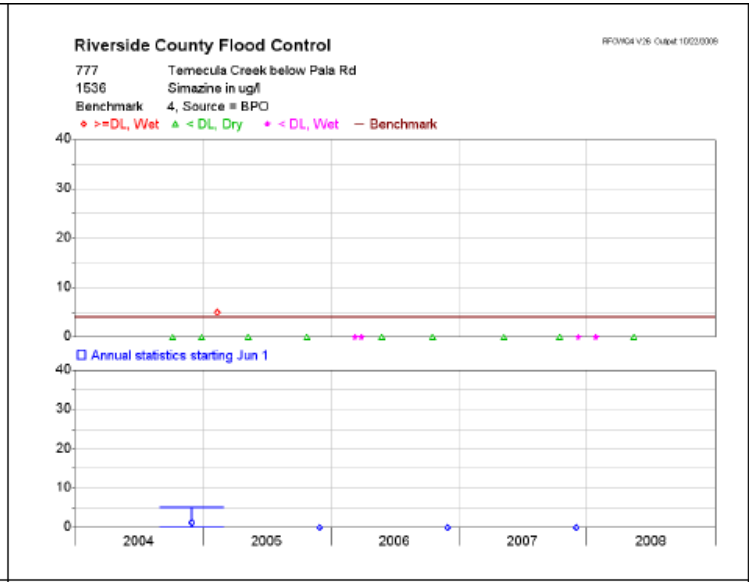
Riverside County Flood Control
777 Temecula Creek below Pala Rd
1536 Simazine in ug/l
Benchmark 4, Source = BPO
>=DL, Wet
< DL, Dry
< DL, Wet
Benchmark
Annual statistics starting Jun 1
2004 2005 2006 2007 2008

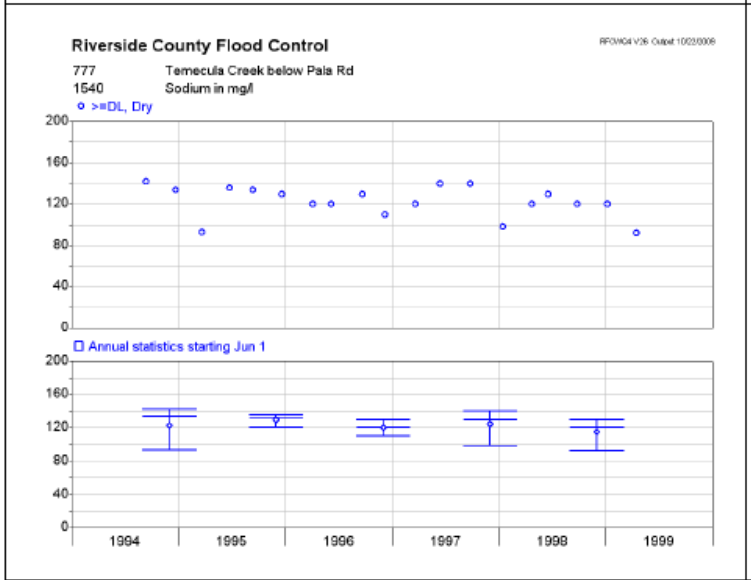
Riverside County Flood Control
777 Temecula Creek below Pala Rd
1540 Sodium in mg/l
>=DL, Dry
Annual statistics starting Jun 1
1994 1995 1996 1997 1998 1999

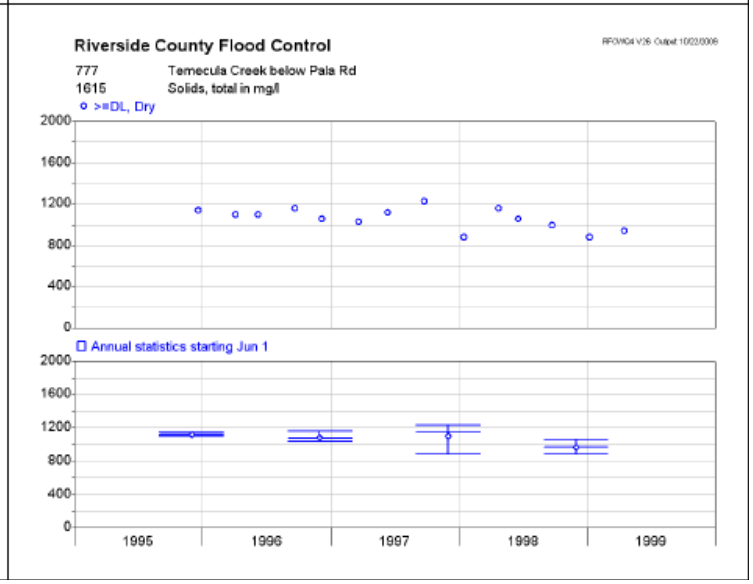
Riverside County Flood Control
777 Temecula Creek below Pala Rd
1615 Solids, total in mg/l
>=DL, Dry
Annual statistics starting Jun 1
1995 1996 1997 1998 1999

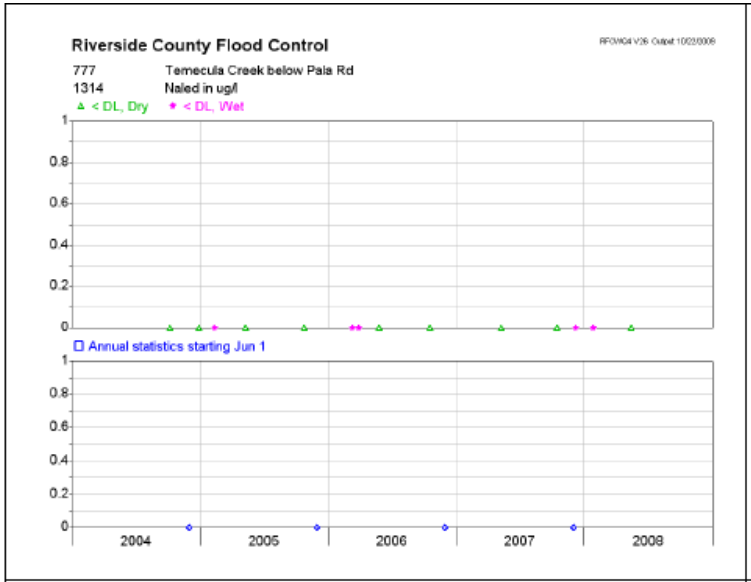
Riverside County Flood Control
777 Temecula Creek below Pala Rd
1314 Naled in ug/l
< DL, Dry
< DL, Wet
Annual statistics starting Jun 1
2004
2005
2006
2007
2008

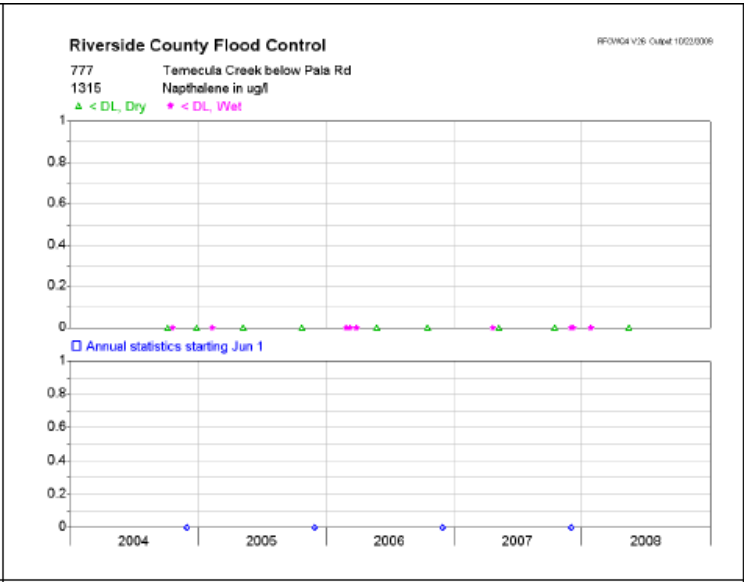
Riverside County Flood Control
777 Temecula Creek below Pala Rd
1315 Napthalene in ug/l
< DL, Dry
< DL, Wet
Annual statistics starting Jun 1
2004
2005
2006
2007
2008

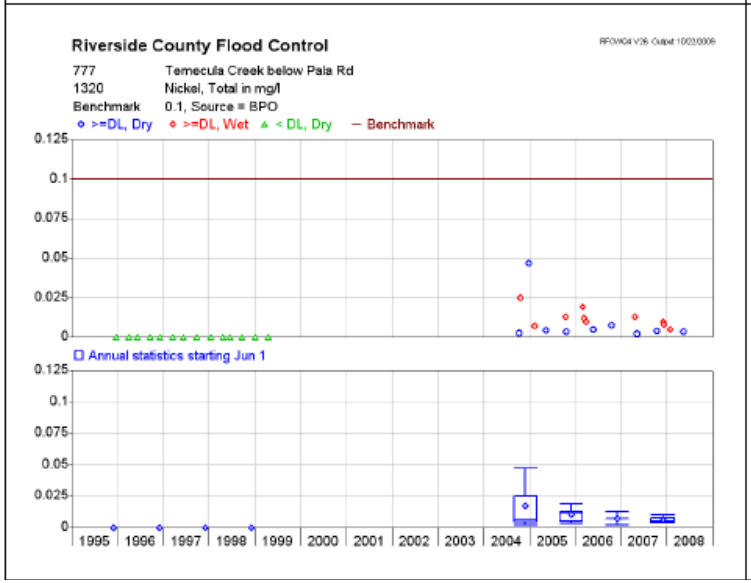
Riverside County Flood Control
777 Temecula Creek below Pala Rd
1320 Nickel, Total in mg/l
Benchmark 0.1, Source = BPO
>=DL, Dry
>=DL, Wet
< DL, Dry
Benchmark
Annual statistics starting Jun 1
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008

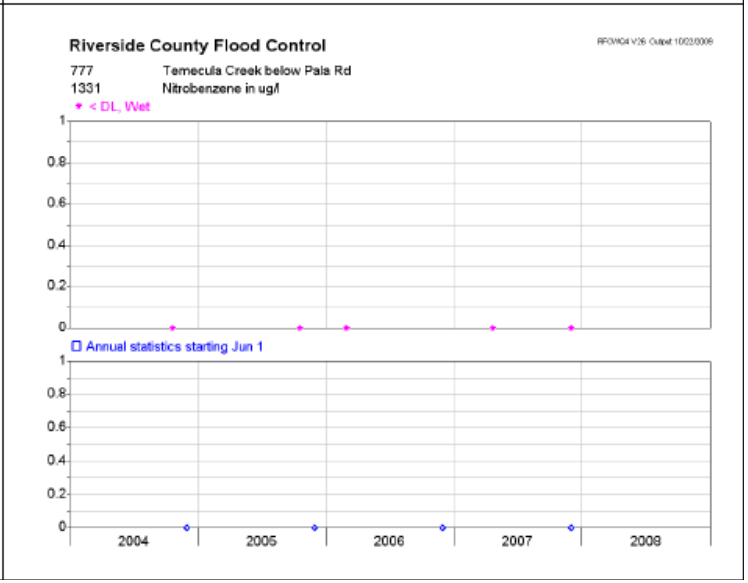
Riverside County Flood Control
777 Temecula Creek below Pala Rd
1331 Nitrobenzene in ug/l
< DL, Wet
Annual statistics starting Jun 1
2004
2005
2006
2007
2008

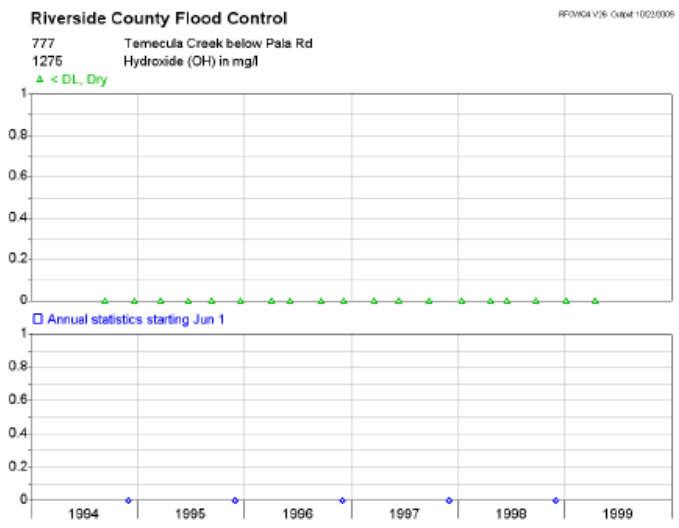
Riverside County Flood Control
777 Temecula Creek below Pala Rd
1275 Hydroxide (OH) in mg/l
< DL, Dry
Annual statistics starting Jun 1
1994
1995
1996
1997
1998
1999

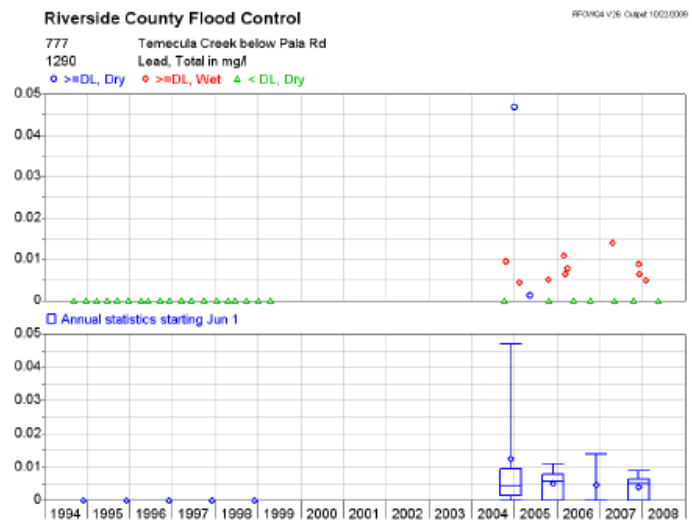
Riverside County Flood Control
777 Temecula Creek below Pala Rd
1290 Lead, Total in mg/l
>=DL, Dry
>=DL, Wet
< DL, Dry
Annual statistics starting Jun 1
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008

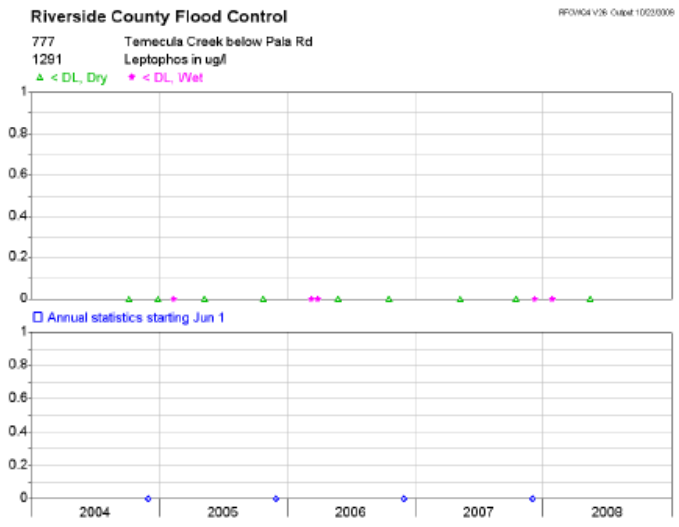
Riverside County Flood Control
777 Temecula Creek below Pala Rd
1291 Leptophos in ug/l
< DL, Dry
< DL, Wet
Annual statistics starting Jun 1
2004
2005
2006
2007
2008

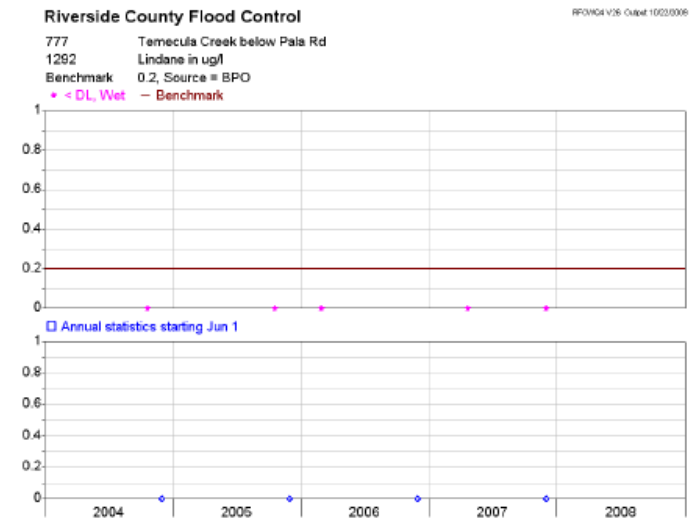
Riverside County Flood Control
777 Temecula Creek below Pala Rd
1292 Lindane in ug/l
Benchmark 0.2, Source = BPO
< DL, Wet
Benchmark
Annual statistics starting Jun 1
2004
2005
2006
2007
2008

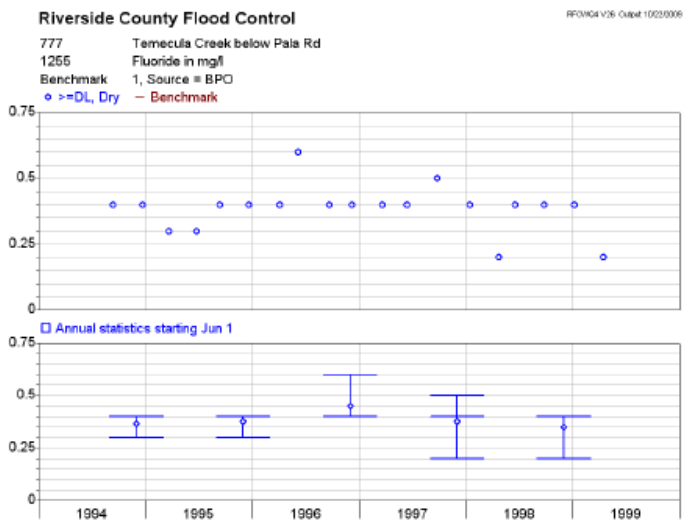
Riverside County Flood Control
777 Temecula Creek below Pala Rd
1255 Fluoride in mg/l
Benchmark 1, Source = BPO
>=DL, Dry
Benchmark
Annual statistics starting Jun 1
0.75
0.5
0.25
0
1994
1995
1996
1997
1998
1999

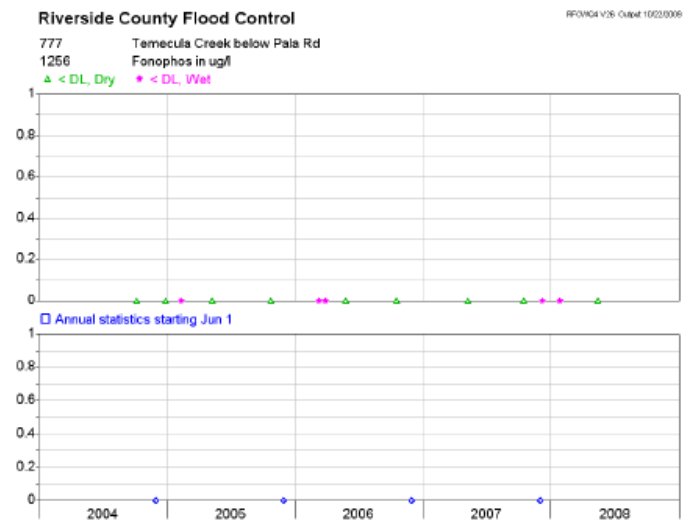
Riverside County Flood Control
777 Temecula Creek below Pala Rd
1256 Fonophos in ug/l
< DL, Dry
< DL, Wet
Annual statistics starting Jun 1
1
0.8
0.6
0.4
0.2
0
2004
2005
2006
2007
2008

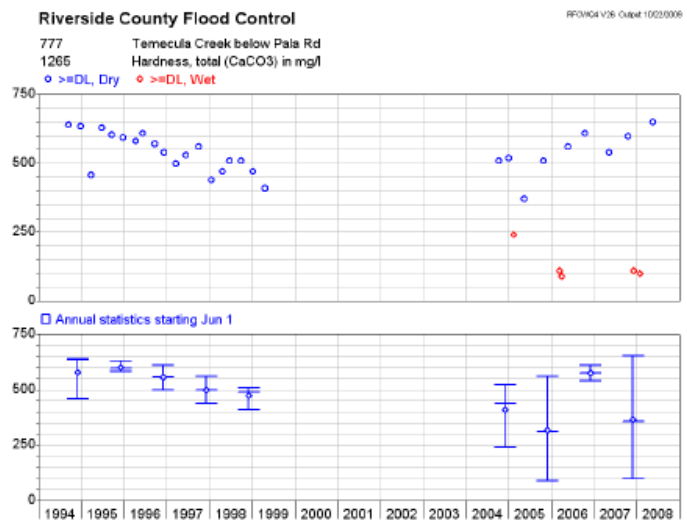
Riverside County Flood Control
777 Temecula Creek below Pala Rd
1265 Hardness, total (CaCO3) in mg/l
>=DL, Dry
>=DL, Wet
Annual statistics starting Jun 1
750
500
250
0
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008

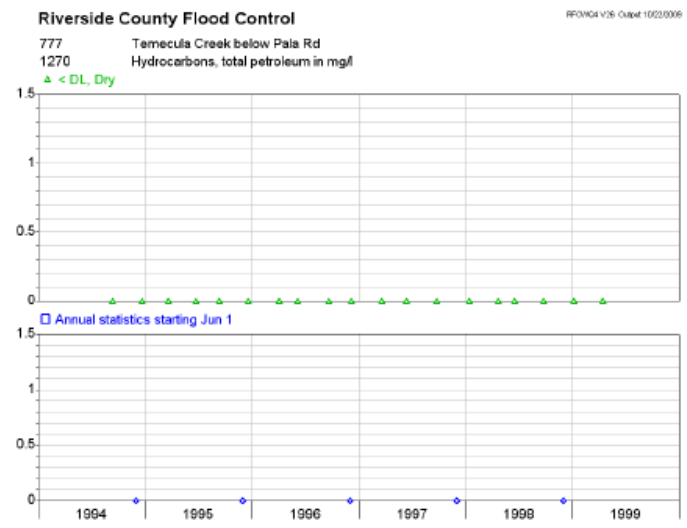
Riverside County Flood Control
777 Temecula Creek below Pala Rd
1270 Hydrocarbons, total petroleum in mg/l
< DL, Dry
Annual statistics starting Jun 1
1.5
1
0.5
0
1994
1995
1996
1997
1998
1999

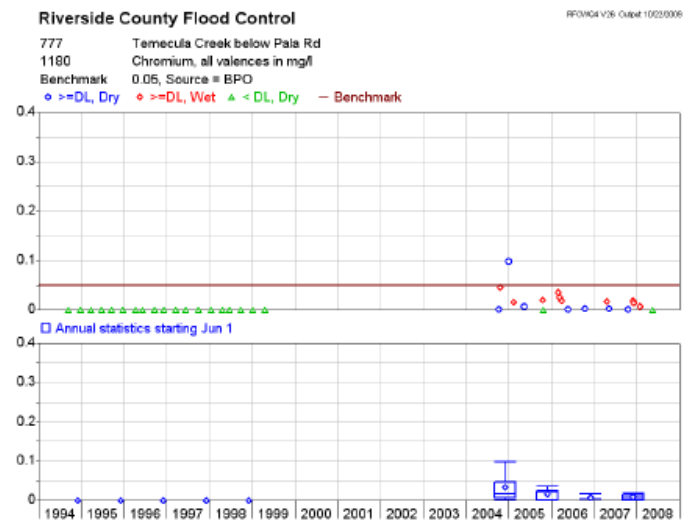
Riverside County Flood Control
777 Temecula Creek below Pala Rd
1180 Chromium, all valences in mg/l
Benchmark 0.05, Source = BPO
>=DL, Dry
>=DL, Wet
< DL, Dry
Benchmark
Annual statistics starting Jun 1
1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008

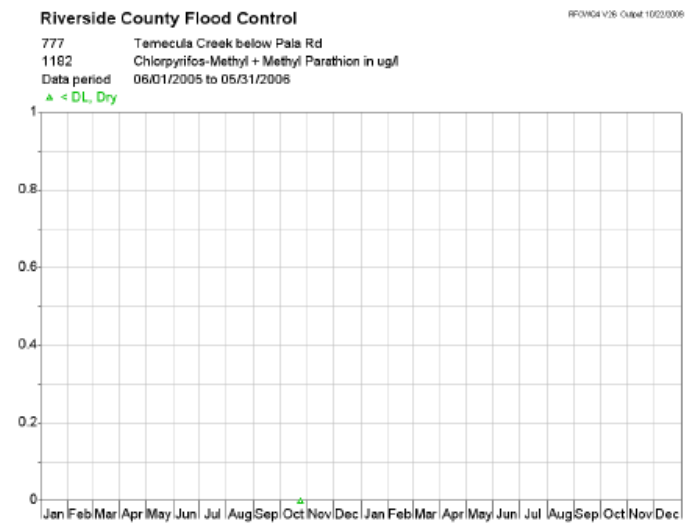
Riverside County Flood Control
777 Temecula Creek below Pala Rd
1182 Chlorpyrifos-Methyl + Methyl Parathion in ug/l
Data period 06/01/2005 to 05/31/2006
< DL, Dry
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

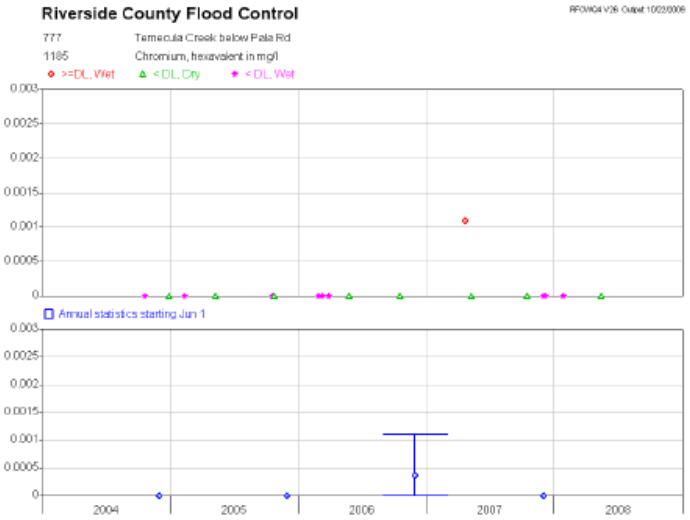
Riverside County Flood Control
777 Temecula Creek below Pala Rd
1185 Chromium, hexavalent in mg/l
>=DL, Wet
< DL, Dry
< DL, Wet
Annual statistics starting Jun 1
2004 2005 2006 2007 2008

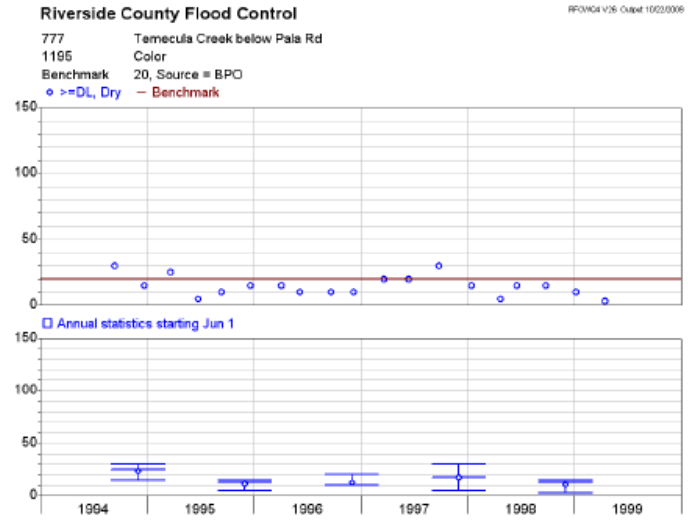
Riverside County Flood Control
777 Temecula Creek below Pala Rd
1195 Color
Benchmark 20, Source = BPO
>=DL, Dry
Benchmark
Annual statistics starting Jun 1
1994 1995 1996 1997 1998 1999

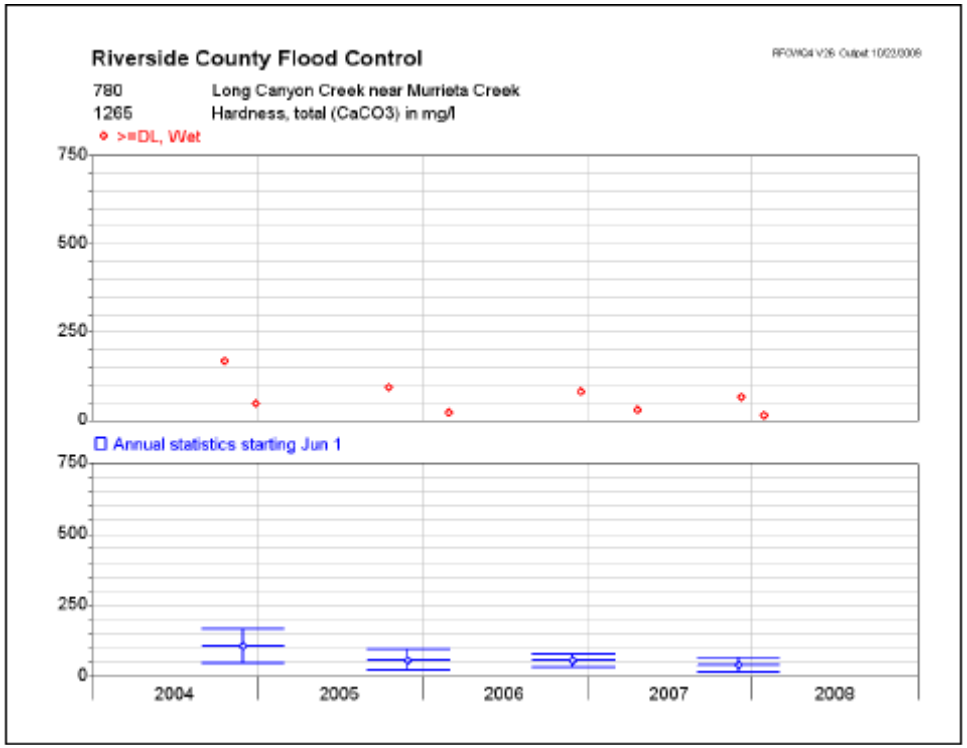
Riverside County Flood Control
780 Long Canyon Creek near Murrieta Creek
1265 Hardness, total (CaCO3) in mg/l
>=DL, Wet
750
500
250
0
Annual statistics starting Jun 1
750
500
250
0
2004
2005
2006
2007
2008

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN DIEGO REGION

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FACT SHEET / TECHNICAL REPORT

FOR

ORDER NO. R9-2010-0016
NPDES NO. CAS0108766

WASTE DISCHARGE REQUIREMENTS

FOR

DISCHARGES FROM THE
MUNICIPAL SEPARATE STORM SEWER SYSTEMS (MS4s)
DRAINING THE COUNTY OF RIVERSIDE,
THE INCORPORATED CITIES OF RIVERSIDE COUNTY,
AND THE RIVERSIDE COUNTY FLOOD CONTROL
AND WATER CONSERVATION DISTRICT
WITHIN THE SAN DIEGO REGION

OCTOBER 13, 2010

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LIST OF ACRONYMS AND ABBREVIATIONS

ADT	Average Daily Traffic
AMAL	Average Monthly Action Level
AST	Active/Passive Sediment Treatment
BAT	Best Available Technology
BIA	Building Industry Association
BMP	Best Management Practice
Basin Plan	Water Quality Control Plan for the San Diego Basin
CASQA	California Stormwater Quality Association
CCC	California Coastal Commission
CC&Rs	Covenants, Conditions and Restrictions
CDFG	California Department of Fish and Game
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
Colorado River Water Board	California Regional Water Quality Control Board, Colorado River Region
Copermittees	County of Riverside, the 4 incorporated cities within the County of Riverside in the San Diego Region, and the Riverside County Flood Control and Water Conservation District
CWA	Clean Water Act
CWC	California Water Code
CZARA	Coastal Zone Act Reauthorization Amendments of 1990
DAMP	Drainage Area Management Plan
DNQ	Did Not Quantify
ESAs	Environmentally Sensitive Areas
FR	Federal Register
GIS	Geographic Information System
HMP	Hydromodification Management Plan
HU	Hydrologic Unit
IBI	Index of Biotic Integrity
IC/ID	Illicit Connections and Illicit Discharges
JRMP	Jurisdictional Runoff Management Plan
Los Angeles Water Board	California Regional Water Quality Control Board, Los Angeles Region
LID	Low Impact Development
MDAL	Maximum Daily Action Level
MEP	Maximum Extent Practicable
MRP	Receiving Waters Monitoring and Reporting Program
MS4	Municipal Separate Storm Sewer System

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LIST OF ACRONYMS AND ABBREVIATIONS (Cont'd)

NAL	Non-storm Water Action Levels
ND	Not Detected
NPDES	National Pollutant Discharge Elimination System
NRDC	Natural Resources Defense Council
NURP	Nationwide Urban Runoff Program
OAL	Office of Administrative Law
RCFCD	Riverside County Flood Control and Water Conservation District
Regional Water Board	California Regional Water Quality Control Board
RGOs	Retail Gasoline Outlets
ROWD	Riverside County Copermittees' Report of Waste Discharge (application for NPDES reissuance)
RWL	Receiving Water Limitations
SAL	Storm Water Action Level
Santa Ana Water Board	California Regional Water Quality Control Board, Santa Ana Region
San Diego Water Board	California Regional Water Quality Control Board, San Diego Region
San Francisco Bay Water Board	California Regional Water Quality Control Board, San Francisco Bay Region
SIC	Standard Industrial Classification Code
SIP	State Implementation Plan
SSMP	Standard Storm Water Mitigation Plan
State Water Board	State Water Resources Control Board
SWMP	Storm Water Management Plan
TAC	State Water Resources Control Board Urban Runoff Technical Advisory Committee
TIE	Toxicity Identification Evaluation
TMDL	Total Maximum Daily Load
USEPA	United States Environmental Protection Agency
WDRs	Waste Discharge Requirements
WLA	Waste Load Allocation
WQO	Water Quality Objective
WQBEL	Water Quality Based Effluent Limitations
WQMP	Water Quality Management Plan
WQS	Water Quality Standard
WRMP	Watershed Runoff Management Plan

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I. FACT SHEET FORMAT

This Fact Sheet briefly sets forth the principle facts and the significant factual, legal, methodological, and policy questions that the California Regional Water Quality Control Board, San Diego Region (San Diego Water Board) considered in preparing Order No. R9-2010-0016. In accordance with the Code of Federal Regulations (CFR) title 40 parts 124.8 and 124.56 (40 CFR 124.8 and 124.56), this Fact Sheet includes, but is not limited to, the following information:

A. Contact information
B. Public process and notification procedures
C. Background information
D. Permitting approach
E. Economic issues
F. Legal authority
G. Findings
H. Directives

Tentative Order No. R9-2010-0016 was distributed for public review on July 23, 2010. The San Diego Water Board accepted written comments on the Tentative Order until September 7, 2010. A public hearing was subsequently held on October 13, 2010 to receive oral comments from interested persons.

The San Diego Water Board's files applicable to the issuance of Order No. R9-2010-0016 are incorporated into the administrative record in support of the findings and requirements of Order No. R9-2010-0016.

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II. CONTACT INFORMATION

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email: wchiu@waterboards.ca.gov

The Order and other related documents can be downloaded from the San Diego Water Board website at http://www.waterboards.ca.gov/sandiego/water_issues/programs/stormwater/rsd_stormwater.shtml

All documents referenced in this Fact Sheet and in Order No. R9-2010-0016 are available for public review at the San Diego Water Board office, located at the address listed above. Public records are available for inspection during regular business hours, from 8:00 am to 5:00 pm Monday through Friday. To schedule an appointment to inspect public records, contact the San Diego Water Board Records Management Officer at 858-467-2952.

Copermittees

1. City of Murrieta	4. County of Riverside
2. City of Temecula	5. Riverside County Flood Control and Water Conservation District
3. City of Wildomar	
6. City of Menifee[1]	

[1] Until an agreement to transfer the regulatory oversight of the City of Menifee's MS4 to the California Regional Water Quality Control Board, Santa Ana Region under Order No. R8-2010-0033 is finalized, the City of Menifee is included as a Copermittee under Order No. R9-2010-0016.

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III. PUBLIC PROCESS AND NOTIFICATION PROCEDURES

The San Diego Water Board followed the schedule listed below for the preparation of Order No. R9-2010-0016:

A. In December 2008, the San Diego Water Board met with the Copermittees to discuss the Report of Waste Discharge (ROWD) required by Order No. R9-2004-001.
B. On January 15, 2009, the San Diego Water Board received the ROWD for the permit renewal.
C. On October 29, 2009, the San Diego Water Board received the 2008-09 annual reports from the Copermittees for the existing permit.
D. On February 8, 2010, the San Diego Water Board notified all known interested parties that an electronic email listserv had been established to provide information and notices on the reissuance of the municipal storm water NPDES permit for southern Riverside County.
E. On February 18, 2010 the San Diego Water Board provided written comments on the ROWD to the Copermittees.
F. On March 22, 2010, the San Diego Water Board met with the Copermittees to discuss the potential changes to the permit based on the ROWD and annual reports.
G. Between April 22 and July 23, 2010, the San Diego Water Board met with the Copermittees on a weekly basis to discuss the Copermittees' concerns with the provisions of the Tentative Order.
H. On July 23, 2010, the San Diego Water Board released the Tentative Order for public review and comment.
I. Written comments were accepted until September 7, 2010.
J. A public hearing of the Tentative Order was conducted on October 13, 2010.

IV. BACKGROUND

Order No. R9-R9-2010-0016 is the fourth iteration of the storm water permit for the municipal separate storm sewer systems (MS4s) in the Riverside County portion of the San Diego Region. The first permit was adopted in 1990. The San Diego Water Board adopted the second iteration of the permit in 1998. The U.S. Environmental Protection Agency (USEPA) objected to the 1998 permit and reissued the permit in 1999. In 2000, the San Diego Water Board issued an addendum to the 1998 permit and incorporated the USEPA's permit by reference. The San Diego Water Board reissued the third iteration of the permit in 2004.

Municipal Storm Water Permits are required by the Federal Clean Water Act 1987 Amendments. The federal Clean Water Act (CWA) was amended in 1987 to address storm water runoff from municipal and industrial dischargers. One requirement of the amendment was that many municipalities throughout the United States were obligated for the first time to obtain National Pollutant Discharge Elimination System (NPDES) permits for discharges of storm water runoff from their MS4s. In response to the CWA amendment (and the pending federal NPDES regulations which would implement the amendment), the San Diego Water Board issued a municipal storm water permit, Order No. 90-46, in July 1990 to the Copermittees for their municipal separate storm sewer system (MS4) discharges.[2]

The First and Second Term Permits, Order Nos. 90-46 and 98-02, provided maximum flexibility. San Diego Water Board Order No. 90-46 contained the "essentials" of the 1990 regulations, but the requirements were written in very broad, generic terms. This was done in order to provide the maximum amount of flexibility to the Copermittees in implementing the new requirements (flexibility was, in fact, the stated reason for issuing the permit in advance of the final regulations). From staff's perspective however, "flexibility" in the form of lack of specificity, combined with the Copermittees' lack of funding and political will, also provided the Copermittees with ample reasons to take few substantive steps towards achieving water quality standards. The situation was exacerbated by the San Diego Water Board's own lack of storm water resources for oversight.

The Third-Term Permit introduced specific requirements. The regulatory approach incorporated into Order No. R9-2004-001 was a significant departure from the regulatory approach of the First and Second-Term Permits. Where San Diego Water Board Order Nos. 90-46 and 98-02 included broad, nonspecific requirements in order to provide the Copermittees with the maximum amount of flexibility in developing their programs, Order No. R9-2004-001 used detailed, specific requirements which outlined the minimum level of implementation required for the Copermittees' programs. In order to provide the Copermittees with the minimum requirements to meet the

[2] The 1990 permit was issued to the County of Riverside, the Orange County Flood Control and Water Conservation District, and the City of Temecula. Additional municipalities have been added to the MS4 NPDES permit as they have incorporated.

maximum extent practicable (MEP) standard for storm water of the San Diego Water Board, Order No. R9-2004-001 included more detail to emphasize the strong jurisdictional level programs developed by the Copermittees during the First and Second-Term Permits, as well as including the watershed-level program. The shift in permitting approaches resulted from the San Diego Water Board's conclusion that the lack of specificity in earlier Orders resulted in frequently unenforceable permit requirements, which in turn allowed some Copermittees to only make limited progress in implementing their programs.

The Third-Term Permit followed the San Diego County and Orange County permit templates. The shift in regulatory approaches for MS4 permits was first manifested in the 2001 MS4 permit to the owners and operators of San Diego County MS4s (Order No. 2001-01) and subsequently incorporated into the 2002 MS4 permit to the owners and operators of the Orange County MS4s (Order No. R9-2002-0001). The Third-Term Riverside County Permit included similar requirements as the 2001 San Diego County Permit and the 2002 Orange County Permit. Both the San Diego and Orange County Permits were appealed to the State Water Resources Control Board (State Water Board).[3] Minor modifications of each were made by the State Water Board, but the vast majority of the requirements were upheld. The San Diego County permit was also challenged in the Superior Court of the State of California and the Court of Appeal, Fourth Appellate District. Further litigation on the Orange County permit was held pending the precedential decisions on the San Diego Permit. The San Diego Permit was largely upheld in the Superior and Appellate Courts. The State of California Supreme Court declined to hear a final appeal from the Building Industry Association in March 2005. Thus, the Third-Term Riverside County permit requirements remained as slightly modified by the State Water Board.

The Third-Term Permit was adopted following substantial public participation. Public participation was extensive during the adoption process of the Third-Term Permit. The draft permit was released for public review and comment on December 15, 2003. Because the proposed requirements for Riverside County were similar to those that had recently been adopted and contested in San Diego County, much of the public participation dialogue echoed the discussions held during the San Diego renewal. A public workshop was held at the Temecula City Hall on January 23, 2004 to answer questions about the Tentative Order for the Third-Term Riverside County permit. A public hearing was held on February 11, 2004 to receive testimony. The public comment period was closed on March 10, 2004. Approximately 165 written and verbal comments were received and responded to during the public workshop, the public hearing, and the written comment period on the Tentative Order for the Third-Term Riverside County permit. Following the extensive public participation process, the San Diego Water Board adopted Order No. R9-2004-001 on July 14, 2004.

[3] Seven petitions were filed with the State Water Board over the Third-Term Orange County Permit. Six were placed in abeyance. Three of the petitioners sought stays. One stay request was dismissed and one was withdrawn. The active petition and stays were addressed by the State Water Board in Order WQO 2002-0014. That Order stayed provision F.5.f regarding sewage spills and modified Finding No. 26 regarding chronic toxicity.

Storm water programs have improved under the Third-Term Permit. Since adoption of Order No. R9-2004-001, the Copermittees' storm water programs have expanded. Audits of the Copermittees' programs and reviews of annual reports exhibit that the Copermittees' jurisdictional programs are largely in compliance with the Order. Some of the efforts currently being conducted on a regular basis by the Copermittees that were not conducted on a widespread basis prior to adoption of Order No. R9-2004-001, include: construction site storm water inspections, industrial and commercial facility storm water inspections, municipal facility storm water inspections, management of storm water quality from new development, development of best management practice (BMP) requirements for existing development, interdepartmental coordination, comprehensive water quality monitoring, and assessment of storm water program effectiveness.

Significant challenges remain. When viewed relative to the magnitude of the storm water runoff problem, enormous challenges remain, particularly regarding the management of storm water runoff on a watershed scale. Today, storm and non-storm water discharges from the MS4 continue to be the leading cause of water quality impairment in the San Diego Region.[4] Since 1998, the number of impaired water bodies in the Riverside County portion of the San Diego Region on the CWA section 303(d) List of Water Quality Impaired Segments (303(d) List) has increased with each new list (i.e. new impaired water bodies listed on the 2002, 2006, and 2008 303(d) Lists). The Copermittees' monitoring data exhibits persistent exceedances of water quality objectives in the Santa Margarita watershed.[5] The Santa Margarita watershed also has conditions that are frequently toxic to aquatic life. Bioassessment data from the watersheds further reflects these conditions, finding that macroinvertebrate communities in creeks have widespread Poor to Very Poor Index of Biotic Integrity (IBI) ratings.

[4] The potential sources of impairments are identified on the CWA section 303(d) list of impaired water bodies for the San Diego Region.
[5] Data is provided in annual reports to the San Diego Water Board. A summary of data collected during the Third-Term Permit is provided in the Riverside County Copermittees' application for permit reissuance. That summary is available on-line at:
http://www.waterboards.ca.gov/sandiego/water_issues/programs/stormwater/rsd_stormwater.shtml

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V. PERMITTING APPROACH (PROGRAM INTEGRATION, FLEXIBILITY, AND DETAIL)

The Order contains an increased emphasis on storm water discharge management on a watershed basis. This shift towards increased watershed management is consistent with planning efforts conducted by the San Diego Water Board regarding reissuance of the San Diego Permit (Order No. R9-2007-0001) and Orange County Permit (Order No. R9-2009-0002). This shift reflects recognition of the maturity of the storm water programs since they began implementing the Third-Term Permit. Addressing storm water discharge management on a watershed basis is only possible if effective jurisdictional programs have been established, and maintaining effective jurisdictional programs is crucial to the success of watershed-focused management.

There are several reasons for this shift in emphasis. An emphasis on watersheds is necessary to shift the focus of the Copermittees from program development and implementation to water quality results. After over 20 years of Copermittee program implementation, it is critical that the Copermittees link their efforts with positive impacts on water quality. Addressing storm water on a watershed scale focuses on water quality results by emphasizing the receiving waters within the watershed. The conditions of the receiving waters drive management actions, which in turn focus on the water quality problems in each watershed.

Focusing on watershed implementation does not mean that the Copermittees must expend funds outside of their jurisdictions. Rather, the Copermittees within each watershed are expected to collaborate to develop a watershed strategy to address the high priority water quality problems within each watershed. They have the option of implementing the strategy in the manner they find to be most effective. Each Copermittee can implement the strategy individually within its jurisdiction, or the Copermittees can group together to implement the strategy throughout the watershed.

While the Order includes a new emphasis on addressing storm water discharges on a watershed basis, the Order includes recognition of the importance of continued program implementation on jurisdictional and countywide levels. The Order also acknowledges that jurisdictional, watershed, and countywide efforts are not always mutually exclusive. For this reason, an attempt has been made to allow for the Copermittees' jurisdictional, watershed, and countywide programs to integrate.

In the Order, the watershed requirements serve as the mechanism for this program integration. Since jurisdictional and countywide activities can also serve watershed purposes, such activities can be integrated into the Copermittees' watershed programs, provided the activities meet certain criteria. In this manner, the Copermittees' activities do not always need to distinguish between jurisdictional, watershed, and countywide levels of implementation. Instead, they can be integrated on multiple levels.

Such opportunities for program integration inherently provide flexibility to the Copermittees in implementing their programs. Program integration can be expanded or minimized as the Copermittees see fit. For example, there is flexibility provided in determining the activities to be integrated and implemented in the watershed programs – watershed-based efforts, countywide efforts, enhanced jurisdictional efforts, or a mixture of the three. Significant flexibility is also provided throughout other portions of the Order.

Copermittees can choose the best management practices (BMPs) to be implemented, or required to be implemented, for development, construction, and existing development areas. Flexibility to determine which industrial or commercial sites are to be inspected is also provided to the Copermittees. Educational approaches are also to be determined by the Copermittees under the Order. Implementation of certain efforts on a countywide basis is largely optional for the Copermittees as well. Significant leeway is also provided to the Copermittees in using methods to assess the effectiveness of their various runoff management programs. This flexibility is further extended to the monitoring program requirements, which allow the Copermittees to develop monitoring approaches to several aspects of the monitoring program.

The challenge in drafting the Order is to provide the flexibility described above while ensuring that the Order is still enforceable. To achieve this, the Order frequently prescribes minimum measurable outcomes, while providing the Copermittees with flexibility in the approaches they use to meet those outcomes. Enforceability has been found to be a critical aspect of the Order. For example, the watershed requirements of Order No. R9-2004-001 were some of the Order's most flexible requirements. This lack of specificity in the watershed requirements resulted in inefficient watershed compliance efforts. This situation reflects a common outcome of flexible permit language. Such language can be unclear and unenforceable, and it can lead to implementation of inadequate programs.

To avoid these types of situations, a balance between flexibility and enforceability has been crafted into the Order. Minimum measurable outcomes are utilized to ensure the Order is enforceable, while the Copermittees are provided flexibility in deciding how they will implement their programs to meet the minimum measurable outcomes.

VI. ECONOMIC ISSUES

Economic discussions of storm and non-storm water management programs tend to focus on the significant costs incurred by municipalities in developing and implementing the programs. However, when considering the cost of implementing the programs, it is also important to consider the alternative costs incurred by not fully implementing the programs, as well as the benefits which result from program implementation.

The financial crisis and current economic environment has amplified the concerns about the costs incurred by the municipalities in implementing their programs. It is frequently cited by many of the Copermittees as a justification for reducing or modifying the requirements that must be met by their programs. While the current economic environment is a cause for concern in the short term, it also provides an opportunity for these programs to find and implement improvements and efficiencies before the next period of growth and development.

It is very difficult to ascertain the true cost of implementation of the Copermittees' management programs because of inconsistencies in reporting by the Copermittees. Reported costs of compliance for the same program element can vary widely from city to city, often by a very wide margin that is not easily explained.[6] Despite these problems, efforts have been made to identify management program costs, which can be helpful in understanding the costs of program implementation.

Estimates of Phase I Storm Water Program Costs

The USEPA, the California Regional Water Quality Control Boards (Regional Water Boards), and the State Water Board have attempted to evaluate the costs of implementing municipal storm water programs. The assessments demonstrate that true costs are difficult to ascertain and reported costs vary widely. Nonetheless, they provide a useful context for considering the costs of requirements within Order No. R9-2010-0016. In addition, reported fiscal analyses tend to neglect the costs incurred to municipalities when storm water runoff is not effectively managed. Such costs result from pollution, contamination, nuisance, and damage to ecosystems, property, and human health.

In 1999 USEPA reported on multiple studies it conducted to determine the cost of management programs. A study of Phase II municipalities determined that the annual cost of the Phase II program was expected to be $9.16 per household. USEPA also studied 35 Phase I municipalities, finding costs to be $9.08 per household annually, similar to those anticipated for Phase II municipalities.[7]

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[6] LARWQCB, 2003. Review and Analysis of Budget Data Submitted by the Permittees for Fiscal Years 2000-2003. P. 2.
[7] Federal Register / Vol. 64, No. 235 / Wednesday, December 8, 1999 / Rules and Regulations. P. 68791-68792.

A study on Phase I MS4 program cost was also conducted by the California Regional Water Quality Control Board, Los Angeles Region (Los Angeles Water Board), where program costs reported in the municipalities' annual reports were assessed. The Los Angeles Water Board estimated that average per household cost to implement the MS4 program in Los Angeles County was $12.50.[8] Since the Los Angeles County permit is very similar to Order No. R9-2004-001, this estimate is also useful in assessing general program costs in Riverside County.

The State Water Board also commissioned a study by the California State University, Sacramento to assess costs of the Phase I MS4 program. This study includes an assessment of costs incurred by Phase I MS4s throughout the State to implement their programs. Annual cost per household in the study ranged from $18-46, with the Fresno-Clovis Metropolitan Area (FCMA) representing the lower end of the range, and the City of Encinitas (in San Diego County) representing the upper end of the range.[9] Included in the study is the City of Corona, which is in Riverside County under the jurisdiction of the California Regional Water Quality Control Board, Santa Ana Region (Santa Ana Water Board).

The annual cost per household for the City of Corona's program was estimated to be $32, which should be similar to the costs to implement the MS4 programs in the Riverside County portion of the San Diego Region. In contrast, the cost of the City of Encinitas' program, with an annual cost per household estimated to be $46, may represent the upper range of Riverside County MS4 programs. However, the City of Encinitas's program cost can be considered as the high end of the spectrum for management program costs because the City has a consent decree with environmental groups regarding its program, and City of Encinitas has received recognition for implementing a superior program.

The annual costs for the City of Corona and City of Encinitas were estimated from data collected in 2003-2004. Between 2003 and 2008, the number of households in both cities has increased by approximately 3 percent and 7 percent, respectively.[10] In contrast, between 2003 and 2008 the number of households in the City of Temecula has increased from 23,199 to 31,135 (34 percent)[11] and the City of Murrieta has increased from 22,020 to 32,664 (48 percent).[12] This significant increase in number of households indicates a significant increase in the tax base (sales and property tax) available to fund the implementation of the MS4 programs for the City of Temecula and City of Murrieta, as well as for the County of Riverside and recently incorporated cities.

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[8] Los Angeles Water Board, 2003. Review and Analysis of Budget Data Submitted by the Permittees for Fiscal Years 2000-2003. P. 2.
[9] State Water Board, 2005. NPDES Stormwater Cost Survey. P. ii.
[10] Southern California Association of Governments, Profile of the City of Corona, dated May 2009; and City of Encinitas, Comprehensive Financial Annual Report, dated June 30, 2009.
[11] Southern California Association of Governments, Profile of the City of Temecula, dated May 2009.
[12] Southern California Association of Governments, Profile of the City of Murrieta, dated May 2009.

The average amount spent per household in the Cities of Temecula and Murrieta, however, does not correspond with the increase in the number of households or the amount spent in municipalities in other regions. The table below compares the reported expenditures for the MS4 programs from 2006-07 to 2008-09 compared to number of households in the Cities of Encinitas, Corona, Temecula, and Murrieta.[13]

	2006-07			2007-08			2008-09		
City	$ Spent	House-holds	$/House-hold	$ Spent	House-holds	$/House-hold	$ Spent	House-holds	$/House-hold
Encinitas	$1,192,174	23,798	$50.10	$2,052,671	23,871	$85.99	$1,729,962	24,100	$71.78
Corona	$988,547	43,000	$22.99	$1,151,779	43,482	$26.49	$1,162,928*	43,827	$26.53
Temecula	$566,952	28,890	$19.62	$748,267	30,222	$24.76	$534,492	31,135	$17.17
Murrieta	$186,377	30,237	$6.16	$258,247	31,758	$8.13	$541,180*	32,664	$16.56

It is important to note that the program costs reported above may not include costs incurred by other departments or programs that may support the MS4 permit programs. The costs only represent the funds spent by each municipality as reported in their jurisdictional program annual reports. In any case, the figures in the table above illustrate the disparity in the amounts reportedly budgeted and spent for the programs in the Riverside County portion of the San Diego Region in comparison to the amounts budgeted and spent in the Santa Ana Region and in the San Diego County portion of the San Diego Region.

It is also important to note that reported program costs are not all attributable to compliance with MS4 permits. Many program components, and their associated costs, existed before any MS4 permits were ever issued. For example, street sweeping and trash collection costs cannot be solely or even principally attributable to MS4 permit compliance, since these practices have long been expected from and implemented by municipalities.

Therefore, true program cost resulting from MS4 permit requirements is some fraction of reported costs. The California State University, Sacramento study found that only 38 percent of program costs are new costs fully attributable to MS4 permits. The remainder of the program costs was either pre-existing or resulted from enhancement of pre-existing programs.[14] In 2000, the County of Orange found that even lesser amounts of program costs are solely attributable to MS4 permit compliance, reporting that the amount attributable to implement the County or Orange Drainage Area

[13] Amount ($) Spent figures are the actual expenditures reported in the 2006-07, 2007-08, and/or 2008/09 Annual Reports for the jurisdictional programs for each municipality (figures with * are estimated/budgeted expenditures). Number of households derived from SCAG 2009 profiles of Corona, Temecula, and Murrieta, and from City of Encinitas 2009 Financial Annual Report.
[14] State Water Board, 2005. NPDES Stormwater Cost Survey. P. 58.

Management Plan (DAMP), was less than 20 percent of the total budget. The remaining 80 percent was attributable to pre-existing programs.[15]

Estimating Costs of Reissued Storm Water Permits

The vast majority of costs that will be incurred as a result of implementing Order No. R9-2010-0016 is not new. Storm water management programs have been in place in Riverside County for over 15 years. As shown in the discussion above, the amount spent for MS4 Permit compliance per household in the municipalities in the Riverside County portion of the San Diego Region is already low compared to other regions. Any increase in cost to the Copermittees, however, is still expected to be incremental in nature. Since Order No. R9-2010-0016 "fine tunes" the requirements of Order No. R9-2004-001, these cost increases are expected to be modest.

Where there may be additional elements that will incur new costs, the Riverside County Copermittees are given the time to develop the budgets and funding mechanisms to phase those elements into their programs. Additionally, development of these additional elements by the Riverside County Copermittees will have the benefit of the experiences and work already done by the San Diego County and Orange County Copermittees.

The anticipated costs of program changes are difficult to estimate because of the flexibility inherent within the Permit and the recognition that program modifications will vary among the municipalities in response to the specific needs of the local and watershed programs. In other words, the Permit is intended to allow each Copermittee to de-emphasize some program components and strengthen others based on the experience of the jurisdictional programs.

The changes in Order No. R9-2010-0016 reflect the iterative process of BMP implementation and the necessarily adaptive nature of storm water management that is expected by the USEPA. In 1996, USEPA recognized that changes to MS4 programs would occur during the reapplication period based on new information on the relative magnitude of a problem, new data on water quality impacts of the storm water discharges, and experience gained under the prior permit.[16] Some changes have been proposed by the Copermittees in the permit reapplication package, and others have been included because the San Diego Water Board considers those measures necessary and feasible to protect water quality from the effects of MS4 discharges.

[15] County of Orange, 2000. A NPDES Annual Progress Report. P. 60. More current data from the County of Orange is not used in this discussion because the County of Orange no longer reports such information.
[16] Federal Register / Vol. 61, No. 155 / Friday, August 9, 1996 / Rules and Regulations. Interpretive policy memorandum on reapplication requirements for MS4s.

Other Economic Considerations

Economic considerations of management programs cannot be limited only to program costs. Evaluation of programs requires information on the implementation costs and information on the benefits derived from environmental protection and improvement.[17] Attention is often focused on program costs, but the programs must also be viewed in terms of their value to the public.

For example, household willingness to pay for improvements in fresh water quality for fishing and boating has been estimated by USEPA to be $158-210.[18] This estimate can be considered conservative, since it does not include important considerations such as marine waters benefits, wildlife benefits, or flood control benefits. The California State University, Sacramento study reports that the annual household willingness to pay for statewide clean water is approximately $180.[19] When viewed in comparison to household costs for existing management programs, household willingness to pay estimates exhibit that per household costs incurred by the Riverside County Copermittees to implement their management programs are very low.

Placing a value on good water quality in receiving waters is very difficult. The Santa Margarita River is one of the few remaining natural gorge rivers in southern California, with approximately 70 species of special concern (rare, threatened, or endangered) regularly inhabiting the watershed, including 30 that are currently protected under the Federal Endangered Species Act.[20] The Upper Santa Margarita Watershed provides significant habitat and recreation opportunities. In addition, residents and businesses in the Upper Santa Margarita Watershed rely heavily of local water for drinking, agriculture, and industrial supply.

Often the value of receiving waters with good water quality manifests in other forms, such as tourism, recreational opportunities, and increased property values. When surface waters are degraded, thereby degrading the habitat, the public loses the aesthetic value and benefit of being able to use the area in and around the water. Surface waters that are able to support the beneficial uses designated in the Water Quality Control Plan for the San Diego Basin (Basin Plan) can sustain plants and wildlife that can attract visitors and residents, providing aesthetic, recreational, as well as monetary value to the public. At this time, however, there have been no studies for the Riverside County portion of the San Diego Region to quantify the added value that surface waters with healthy water quality can provide.

It is also important to consider the benefits of management programs in conjunction with their costs. A study conducted by the University of Southern California and

[17] Ribaudo M.O. and D. Heelerstein. 1992, *Estimating Water Quality Benefits: Theoretical and Methodological Issues.* U.S. Department of Agriculture. Technical Bulletin No. 1808.
[18] Federal Register / Vol. 64, No. 235 / Wednesday, December 8, 1999 / Rules and Regulations. P. 68793.
[19] State Water Board, 2005. NPDES Stormwater Cost Survey. P. iv.
[20] Stein, E. and Ambrose, R. 1998. Cumulative Impacts of Section 404 Clean Water Act Permitting on the Riparian Habitat of the Santa Margarita, California Watershed. Wetlands, Vol. 18, No. 3.

University of California, Los Angeles assessed the costs and benefits of implementing various approaches for achieving compliance with the MS4 permits in the Los Angeles Region. The study found that non-structural systems would cost $2.8 billion but provide $5.6 billion in benefit. If structural systems were determined to be needed, the study found that total costs would be $5.7 to $7.4 billion, while benefits could reach $18 billion.[21] Costs are anticipated to be borne over many years – probably ten years at least. As can be seen, the benefits of the programs are expected to considerably exceed their costs. Such findings are corroborated by USEPA, which found that the benefits of implementation of its Phase II storm water rule would also outweigh the costs.[22]

[21] Los Angeles Water Board, 2004. Alternative Approaches to Stormwater Control.
[22] Federal Register / Vol. 64, No. 235 / Wednesday, December 8, 1999 / Rules and Regulations. P. 68791.

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VII. LEGAL AUTHORITY

The following statutes, regulations, and Water Quality Control Plans provide the basis for the requirements of Order No. R9-2010-0016: Clean Water Act (CWA), California Water Code (CWC), Title 40 of the Code of Federal Regulations (40 CFR) Parts 122, 123, 124 (National Pollutant Discharge Elimination System Permit Application Regulations for Storm Water Discharges, Final Rule), Part II of 40 CFR Parts 9, 122, 123, and 124 (National Pollutant Discharge Elimination System – Regulations for Revision of the Water Pollution Control Program Addressing Storm Water Discharges; Final Rule), Water Quality Control Plan – Ocean Waters of California (California Ocean Plan), Water Quality Control Plan for the San Diego Basin (Basin Plan), 40 CFR 131 Water Quality Standards; Establishment of Numeric Criteria for Priority Toxic Pollutants for the State of California; Rule (California Toxics Rule), and the California Toxics Rule Implementation Plan.

The legal authority citations below generally apply to directives in Order No. R9-2010-0016, and provide the San Diego Water Board with ample underlying authority to require each of the directives of Order No. R9-2010-0016. Legal authority citations are also provided with each permit section discussion in section IX of this Fact Sheet/Technical Report.

CWA 402(p)(3)(B)(ii) – The CWA requires in section 402(p)(3)(B)(ii) that permits for discharges from municipal storm sewers "shall include a requirement to effectively prohibit non-storm water discharges into the storm sewers."

CWA 402(p)(3)(B)(iii) – The CWA requires in section 402(p)(3)(B)(iii) that permits for discharges from municipal storm sewers "shall require controls to reduce the discharge of pollutants to the maximum extent practicable, including management practices, control techniques and system, design and engineering methods, and such other provisions as the Administrator or the State determines appropriate for the control of such pollutants."

40 CFR 122.26(d)(2)(i)(B,C,E, and F) – Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B,C,E, and F) provide that each Copermittee's permit application "shall consist of: (i) Adequate legal authority. A demonstration that the applicant can operate pursuant to legal authority established by statute, ordinance or series of contracts which authorizes or enables the applicant at a minimum to: […] (B) Prohibit through ordinance, order or similar means, illicit discharges to the municipal separate storm sewer; (C) Control through ordinance, order or similar means the discharge to a municipal separate storm sewer of spills, dumping or disposal of materials other than storm water; […] (E) Require compliance with condition in ordinances, permits, contracts or orders; and (F) Carry out all inspection, surveillance and monitoring procedures necessary to determine compliance and noncompliance with permit conditions including the prohibition on illicit discharges to the municipal separate storm sewer."

40 CFR 122.26(d)(2)(iv) – Federal NPDES regulation 40 CFR 122.26(d)(2)(iv) provides that the Copermittee shall develop and implement a proposed management program which "shall include a comprehensive planning process which involves public participation and where necessary intergovernmental coordination, to reduce the discharge of pollutants to the maximum extent practicable using management practices, control techniques and system, design and engineering methods, and such other provisions which are appropriate. The program shall also include a description of staff and equipment available to implement the program. […] Proposed programs may impose controls on a system wide basis, a watershed basis, a jurisdiction basis, or on individual outfalls. […] Proposed management programs shall describe priorities for implementing controls."

40 CFR 122.26(d)(2)(iv)(A - D) – Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(A - D) require municipalities to implement controls to reduce pollutants in storm water runoff from new development and significant redevelopment, construction, and commercial, residential, industrial, and municipal land uses or activities. Prevention of illicit discharges is also required.

CWC 13377 – CWC section 13377 provides that "Notwithstanding any other provision of this division, the State Water Board or the Regional Water Boards shall, as required or authorized by the CWA, as amended, issue waste discharge requirements and dredged or fill material permits which apply and ensure compliance with all applicable provisions of the act and acts amendatory thereof or supplementary, thereto, together with anymore stringent effluent standards or limitation necessary to implement water quality control plans, or for the protection of beneficial uses, or to prevent nuisance."

Order No. R9-2010-0016 is an essential mechanism for achieving the water quality objectives that have been established for protecting the beneficial uses of the water resources in the San Diego Water Board's portion of Riverside County. Federal NPDES regulation 40 CFR 122.44(d)(1) requires MS4 permits to include any requirements necessary to "achieve water quality standards established under CWA section 303, including State narrative criteria for water quality." The term "water quality standards" in this context refers to a water body's beneficial uses and the water quality objectives necessary to protect those beneficial uses as established in the Basin Plan and antidegradation policies.

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VIII. FINDINGS

The findings of the Order have been modified to reduce repetition in their discussions and address new requirements. Each finding of the Order is provided and discussed below. Additional discussion relative to the findings can be found in section IX of the Fact Sheet, which provides discussions of the Order's directives.

A. Basis For the Order

Finding A.1. This Order is based on the federal Clean Water Act (CWA), the Porter-Cologne Water Quality Control Act (Division 7 of the Water Code, commencing with Section 13000), applicable State and federal regulations, all applicable provisions of statewide Water Quality Control Plans and Policies adopted by the State Water Resources Control Board (State Water Board), the Water Quality Control Plan for the San Diego Basin adopted by the San Diego Water Board (Basin Plan), the California Toxics Rule, and the California Toxics Rule Implementation Plan.

Discussion of Finding A.1. In 1987, Congress established CWA Amendments to create requirements for storm water discharges under the NPDES program, which provides for permit systems to regulate the discharge of pollutants. Under the Porter-Cologne Water Quality Control Act, the State Water Board and the nine Regional Water Boards have primary responsibility for the coordination and control of water quality, including the authority to implement the CWA. Porter-Cologne (section 13240) directs the Regional Water Boards to set water quality objectives via adoption of Water Quality Control Plans (Basin Plans) that conform to all State policies for water quality control.

As a means for achieving those water quality objectives, Porter-Cologne (section 13243) further authorizes the Regional Water Boards to establish waste discharge requirements (WDRs) to prohibit waste discharges in certain conditions or areas. Since 1990, the San Diego Water Board has issued area-wide MS4 NPDES permits. The Order will renew Order No. R9-2004-001 to comply with the CWA and attain water quality objectives in the Basin Plan by including numeric storm water action levels to limit the contributions of pollutants conveyed by storm water, and by including numeric non-storm water action levels for dry weather non-storm water discharges designed to ensure that the Copermittees comply with the requirement to effectively prohibit all types of unauthorized non-storm water discharges into their MS4. Further discussions of the legal authority associated with the prohibitions and directives of the Order are provided in section VII this document.

Finding A.2. This Order reissues National Pollutant Discharge Elimination System (NPDES) Permit No. CAS0108766, which was first adopted by the San Diego Water Board on July 16, 1990 (Order No. 90-38), and then reissued on May 13, 1998 (Order No. 98-02). On May 26, 1998, the United States Environmental Protection Agency

(USEPA), Region IX, objected to Order No. 98-02 due to concerns regarding Receiving Water Limitations (RWL) language. The USEPA concluded that the RWL language in the permit did not comply with the CWA and its implementing regulations. On April 27, 1999, the USEPA reissued the MS4 permit, which the San Diego Water Board adopted as Addendum No. 1 to Order No. 98-02 on November 8, 2000. On July 14, 2004, the San Diego Water Board adopted the third term MS4 permit, Order No. R9-2004-001. On January 15, 2009, the Riverside County Flood Control and Water Conservation District (RCFCD), as the Principal Copermittee, submitted a Report of Waste Discharge (ROWD) for reissuance of the municipal separate storm sewer system (MS4) Permit.

Discussion of Finding A.2. This Order renews National Pollutant Discharge Elimination System (NPDES) Permit No. CAS0108766, which was first issued on July 16, 1990 (Order No. 90-38), and then renewed on May 13, 1998 (Order No. 98-02). The USEPA determined that Order No. 98-02 the Receiving Water Limitations (RWL) language in the permit did not comply with the CWA and its implementing regulations. The USEPA assumed responsibility and reissued the Riverside County MS4 permit on April 27, 1999. Subsequently, the San Diego Water Board adopted Addendum No. 1 to Order No. 98-02 on November 8, 2000, which incorporated the USEPA's permit by reference. On July 14, 2004, the San Diego Water Board adopted the third term MS4 permit, Order No. R9-2004-001. On January 15, 2009, in accordance with Order No. R9-2004-001, the Riverside County Flood Control and Water Conservation District (District), as the Principal Copermittee, submitted a Report of Waste Discharge (ROWD) for reissuance of the municipal separate storm sewer system (MS4) Permit. Supporting information discussing the topic of this finding can be found in section V of this document.

Finding A.3. This Order is consistent with the following precedential Orders adopted by the State Water Board addressing MS4 NPDES Permits: Order WQ 99-05, Order WQ 2000-11, Order WQ 2001-15, Order WQO 2002-0014, and Order WQ 2009-0008 (*SWRCB/OCC FILE A-1780)*.

Discussion of Finding A.3. In recent years the State Water Board has considered several appeals of MS4 permits issued by the Regional Water Boards. In State Water Board Order WQ 99-05, the State Water Board established Receiving Water Limitation Language for MS4 permits. In State Water Board Order WQ 2000-11, the State Water Board addressed design standards for Standard Urban Storm Water Mitigation Plan (SUSMP) requirements. In State Water Board Order WQ 2001-15, the State Water Board addressed Petitions of the San Diego County MS4 Permit issued by the San Diego Water Board in 2001 (San Diego Water Board Order No. 2001-001). In State Water Board Order WQO 2002-0014, the State Water Board addresses Petitions of the Orange County MS4 Permit issued by the San Diego Water Board in 2002 (San Diego Water Board Order No. R9-2002-0001). In State Water Board Order WQ 2009-0008, the State Water Board addresses Petitions of the Los Angeles County MS4

Permit issued by the Los Angeles Water Board in 2006 (Los Angeles Water Board Order No. R4-2006-0074).

Finding A.4. The Fact Sheet / Technical Report for the Order No. R9-2010-0016, NPDES No. CAS0108766, Waste Discharge Requirements for Discharges from the MS4s Draining the County of Riverside, the Incorporated Cities of Riverside County, and the Riverside County Flood Control and Water Conservation District within the San Diego Region, includes cited regulatory and legal references and additional explanatory information and data in support of the requirements of this Order. This information, including any supplements thereto, and any response to comments on the Tentative Orders, is hereby incorporated by reference into these findings.

Discussion of Finding A.4. This Fact Sheet briefly sets forth the principle facts and the significant factual, legal, methodological, and policy questions that the San Diego Water Board considered in preparing Order No. R9-2010-0016, in accordance with the Code of Federal Regulations (CFR) title 40 parts 124.8 and 124.56 (40 CFR 124.8 and 124.56). This Fact Sheet includes general information regarding the watershed and the Copermittees' discharges from their MS4 systems. The discussions in the Fact Sheet include references to applicable statutes and regulations, as well as other supporting documents. The discussions in the Fact Sheet also can clarify the permit writer's intent for requirements that may appear vague or open to multiple interpretations.

B. Regulated Parties

Finding B.1. Each of the persons in Table 1 below, hereinafter called Copermittees or dischargers, owns or operates an MS4, through which it discharges storm water and non-storm water into waters of the United States (U.S.) within the San Diego Region. These MS4s fall into one or more of the following categories: (1) a medium or large MS4 that services a population of greater than 100,000 or 250,000 respectively; or (2) a small MS4 that is "interrelated" to a medium or large MS4; or (3) an MS4 which contributes to a violation of a water quality standard; or (4) an MS4 which is a significant contributor of pollutants to waters of the U.S.

The Cities of Murietta, Menifee and Wildomar also discharge into waters of the U.S. in the California Regional Water Quality Control Board, Santa Ana Region (Santa Ana Water Board), so are located partially within both the San Diego and Santa Ana Water Board boundaries. As allowed by California Water Code (CWC) §13228, these Cities submitted written requests to be regulated for MS4 purposes under a permit adopted by only one Water Board. As authorized by CWC § 13228 and pursuant to a written agreement between the San Diego Water Board and the Santa Ana Water Board, the Cities of Murrieta and Wildomar are wholly regulated by the San Diego Water Board under this Order, including those portions of the Cities jurisdiction not within the San Diego Water Board's region. Similarly, the City of Menifee is wholly regulated by the Santa Ana Water Board under Order No. R8-2010-0033, including those portions of the City of Menifee within the San Diego Water Board's region.

Discussion of Finding B.1. Section 402 of the CWA prohibits the discharge of any pollutant to waters of the United States from a point source, unless that discharge is authorized by a NPDES permit. Though storm water and non-storm water may come from a diffuse source, it is discharged through MS4s, which are point sources under the CWA. Federal NPDES regulation 40 CFR 122.26(a) (iii) and (iv) provide that discharges from MS4s, which service medium or large populations greater than 100,000 or 250,000 respectively, shall be required to obtain a NPDES permit. Federal NPDES regulation 40 CFR 122.26(a)(v) also provides that a NPDES permit is required for "A [storm water] discharge which the Director, or in states with approved NPDES programs, either the Director or the USEPA Regional Administrator, determines to contribute to a violation of a water quality standard or is a significant contributor of pollutants to waters of the United States." Such sources are then designated into the program.

Included in Table 1 of the Order are the Cities of Menifee, Murrieta, Temecula, and Wildomar, the County of Riverside, and the Riverside County Flood Control and Water Conservation District. The Cities of Wildomar and Menifee are newly incorporated cities. Both Cities were previously a part of the County of Riverside's jurisdiction and have an MS4 interrelated to other Copermittee MS4s in the San Diego Region. The boundaries of the Cities of Menifee, Murrieta, and Wildomar fall within the jurisdiction of both the San Diego Water Board and the Santa Ana Water Board.

As requested by the Cities of Menifee, Murrieta, and Wildomar, and pursuant to an agreement between the San Diego and Santa Ana Water Boards as authorized by CWC section 13228, the MS4s of the Cities of Murrieta and Wildomar are to be wholly regulated by the San Diego Water Board under this Order, and the MS4 of the City of Menifee is to be wholly regulated by the Santa Ana Water Board under Order No. R8-2010-0033. The agreement between the San Diego and Santa Ana Water Board to regulate the Cities of Menifee, Murrieta, and Wildomar will be subject to change with each permit renewal. Until the an agreement between the San Diego Water Board and Santa Ana Water Board is finalized to allow the City of Menifee to be wholly regulated by the Santa Ana Water Board under Order No. R8-2010-0033, the City of Menifee will remain as a Copermittee under this Order.

Other small MS4s also exist within the portion of Riverside County in the San Diego Region. While these small MS4s are not subject to this Order, they are subject to the Phase II NPDES storm water regulations. Over time, these small MS4s will be designated for coverage under the State Water Board's statewide general storm water permit for small MS4s.

C. Discharge Characteristics

Finding C.1. Discharges from the MS4 contain waste, as defined in the CWC, and pollutants that adversely affect the quality of the waters of the State. The discharge from an MS4 is a "discharge of pollutants from a point source" into waters of the U.S. as defined in the CWA.

Discussion of Finding C.1. Section 13050(d) of the CWC defines "waste" as "sewage and any and all other waste substances, liquid, solid, gaseous, or radioactive, associated with human habitation, or of human or animal origin, or from any producing, manufacturing, or processing operation, including waste placed within containers of whatever nature prior to, and for purposes of, disposal." 40 CFR 122.2 defines "point source" as "any discernable, confined, and discrete conveyance, including but not limited to, any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, landfill leachate collection system, vessel or other floating craft from which pollutants are or may be discharged. This term does not include return flows from irrigated agriculture or agricultural storm water runoff." 40 CFR 122.2 defines "discharge of a pollutant" as "Any addition of any pollutant or combination of pollutants to waters of the U.S. from any point source." Also, the justification for control of pollution into waters of the state can be found at CWC section 13260(a)(1). State Water Board Order No. WQ 2001-15 verifies that discharges from the MS4 contain waste.[23]

The term "urban runoff" has been removed throughout Order No. R9-2010-0016 and replaced with storm water (wet weather) or non-storm water (dry weather) runoff. This clarification is necessary to prevent the misunderstanding that regulation under this permit is subject only to urbanized areas. The term "urban runoff" is not defined in the Code of Federal Regulations or Federal Register in the regulation of Phase I MS4 discharges.

In the Copermittees' ROWD, a distinction is made between urban land use areas and non-urban land use areas. Urban land use areas include commercial, industrial, *urban residential (less than 1 acre)*, parks and recreation facilities, and streets and roads land use categories. Non-urban land use areas include preserves and open space, agriculture, federal/state/tribal lands/non-County jurisdiction, and *rural residential (greater than 1 acre)*. The ROWD implies that only discharges from the urban land use areas are subject to the requirements of the MS4 Permit, thus rural residential (greater than 1 acre) land use areas would not be subject to the requirements of the MS4 Permit. Rural residential land use areas, however, are subject to the requirements of the MS4 Permit. The removal of the term urban runoff will further clarify the application of the requirements of the MS4 Permit.

[23] State Water Board, 2001. Order WQ 2001-15. In the Matter of Petitions of Building Industry Association of San Diego County and Western States Petroleum Association: For Review of Waster Discharge Requirements Order No. 2001-01 for Urban Runoff from San Diego County [NPDES No. CAS0108758] Issued by the Regional Board.

The discharge of runoff from an MS4 is a "discharge of pollutants from a point source" into waters of the U.S. as defined in the CWA. The Permit defines runoff as all flows in a storm water conveyance system (MS4 defined below) and consists of the following components:

(1) storm water (wet weather flows) and
(2) non-storm water discharges (dry weather flows).

The Permit defines an MS4 as a conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, or storm drains):

(i) Owned or operated by a State, city, town, borough, county, parish, district, association, or other public body (created by or pursuant to State law) having jurisdiction over disposal of sewage, industrial wastes, storm water, or other wastes, including special districts under State law such as a sewer district, flood control district or drainage district, or similar entity, or an Indian tribe or an authorized Indian tribal organization, or designated and approved management agency under section 208 of the CWA that discharges to waters of the United States;

(ii) Designated or used for collecting or conveying storm water;

(iii) Which is not a combined sewer;

(iv) Which is not part of the Publicly Owned Treatment Works (POTW) as defined at 40 CFR 122.26.

Permit finding D.3.c. includes natural streams that convey runoff as part of the MS4. The presence of an MS4 system is not limited to areas considered to be "urban" in nature. Though the term urban is often referred to specifically as pertaining to cities, runoff means all flows in a storm water conveyance system, regardless of the location of the conveyance system. A conveyance system owned or operated by a State, city, town, borough, county, parish, district, association, or other public body (created by or pursuant to State law), may be located in a setting (e.g. unincorporated area, low density residential) that is not considered by the public to be "urban" in nature. These areas are contributing pollutants to the MS4 system that must be addressed. The term runoff applies to all flows in an MS4 system, no matter where the MS4 may be located in regards to incorporated or unincorporated property. Storm water and non-storm water discharges from the rural residential (greater than 1 acre) land use category, characterized as non-urban, that enter into any part of the MS4 system (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, or storm drains), are also subject to the requirements of the MS4 Permit.

The Code of Federal Regulations (CFR) at 40 CFR 122.26 requires that large and medium MS4s obtain a permit for all discharges from their systems. Appendix I to 40 CFR 122 designates Riverside County as having a large and medium MS4 requiring a permit. The regulations do not differentiate discharges from urban or rural MS4 systems. Rather, the regulations require the permit for all discharges from their systems. In the Final Rule establishing the Phase 1 storm water regulations, the USEPA clarified that all discharges are subject to a permit. On page 48041 of the Final Rule, the USEPA states:

> "EPA recognizes that some of the counties addressed by today's rule have, in addition to areas with high unincorporated urbanized populations, areas that are essentially rural or uninhabited and may not be the subject of planned development. While permits issued for these municipal systems ***will cover*** *(emphasis added) municipal systems discharges in unincorporated portions of the county* (emphasis added), it is the intent of EPA that management plans and other components of the programs focus on the urbanized and developing areas of the county."

So, while the Permit covers all MS4 discharges regardless if that discharge is in an urban or unincorporated area; the Copermittees management program should focus on urbanized areas. Due to the Permit's requirements, the Copermittees management programs will naturally focus on urbanized areas. Urbanized areas have more industry, construction, pollution and MS4s that require more inspection, maintenance, monitoring, enforcement and complaint follow-up.

USEPA further clarified on page 48041 that all MS4 discharges require permit coverage when addressing highway MS4 systems:

> "[The regulations] will result in discharges from separate storm sewer systems serving State highways and other highways through storm sewers … in unincorporated portions of specified counties being included as part of the large or medium municipal separate storm sewer systems, since all municipal separate storm sewers within the boundaries of these political entities are included."

In their summary on page 48043, the USEPA states:

> "The definition [of MS4] provides that all systems within a geographical area including highways and flood controls will be covered, thereby avoiding fragmented and ill-coordinated programs;"

Neither the State Water Board's storm water permit for Caltrans (State Water Board Order No. 99-06-DWQ) nor the Los Angeles Water Board's MS4 permit for Ventura County include the term "urban runoff" in a significant regulatory capacity. The Caltrans permit has one reference to "urban runoff" where the term is used

interchangeably with “storm water.” The draft Ventura permit uses the term “urban runoff” when referring to titles of reference documents, previously adopted management plans and municipal ordinances that may contain the phrase.

The Copermittees have expressed concern regarding the regulation of pollutants from natural, undeveloped areas that enter the MS4 in an unincorporated area. Runoff and pollutants from any source entering the MS4, however, become the responsibility of the Copermittees upon entering the MS4. The assimilation of pollutants from natural, undeveloped areas is different under natural conditions compared to when they are transported through the MS4. The MS4 collection could change a natural sheet flow discharge to a concentrated point discharge. The MS4 does not provide natural infiltration or other pollutant remediation that these flows would receive in an otherwise natural drainage system. The MS4 may concentrate these natural pollutants and flows. In some cases, the MS4 may ultimately discharge the elevated concentrations of natural pollutants and flow rates to waters of the US far from the natural pollutant and flow source, causing a condition of pollution or a violation of water quality standards.

Finding C.2. MS4 storm water and non-storm water discharges are likely to contain pollutants that cause or threaten to cause a violation of surface water quality standards, as outlined in the Basin Plan. Storm water and non-storm water discharges from the MS4 are subject to the conditions and requirements established in the Basin Plan for point source discharges.

Discussion of Finding C.2. This finding is a clarification regarding the potential for discharges of storm water and non-storm water to impact the Beneficial Uses as described in the Basin Plan. As such these point source discharges require Waste Discharge Requirements (WDRs) to ensure that water quality standards are met. Furthermore, since point source discharges require WDRs, the discharges are subject to the prohibitions, conditions and requirements of the Basin Plan.

In addition, municipal discharges have been split into storm water and non-storm water discharges to represent the differing regulations applicable to storm water and non-storm water, though both types of discharges are likely to contain pollutants.

Finding C.3. The most common categories of pollutants in runoff include total suspended solids, sediment, pathogens (e.g., bacteria, viruses, protozoa), heavy metals (e.g., copper, lead, zinc and cadmium), petroleum products and polynuclear aromatic hydrocarbons, synthetic organics (e.g., pesticides, herbicides, and PCBs), nutrients (e.g., nitrogen and phosphorus fertilizers), oxygen-demanding substances (decaying vegetation, animal waste), detergents, and trash.

Discussion of Finding C.3. The National Urban Runoff Program (NURP) study showed that heavy metals, organics, coliform bacteria, nutrients, oxygen demanding substances (e.g., decaying vegetation), and total suspended solids are found at

relatively high levels in storm water and non-storm water discharges.[24] It also found that MS4 discharges draining residential, commercial, and light industrial areas contain significant loadings of total suspended solids and other pollutants. The Basin Plan goes on to identify runoff pollutants to include lawn and garden chemicals, household and automotive care products dumped or drained on streets, and sediment that erodes from construction sites.[25] In addition, the State Water Board Urban Runoff Technical Advisory Committee (TAC) finds that urban runoff pollutants include sediments, nutrients, oxygen-demanding substances, heavy metals, petroleum hydrocarbons, pathogenic bacteria, viruses, and pesticides.[26] Runoff that flows over streets, parking lots, construction sites, and industrial, commercial, residential, and municipal areas carries these untreated pollutants through storm drain networks directly to the receiving waters of the San Diego Region.

Finding C.4. The discharge of pollutants and/or increased flows from MS4s may cause or threaten to cause the concentration of pollutants to exceed applicable receiving water quality objectives and impair or threaten to impair designated beneficial uses resulting in a condition of pollution (i.e. unreasonable impairment of water quality for designated beneficial uses), contamination, or nuisance.

Discussion of Finding C.4. The 1992, 1994, and 1996 National Water Quality Inventory Reports to Congress prepared by USEPA showed a trend of impairment in the nation's waters from contaminated storm and non-storm water runoff.[27] The 1998 National Water Quality Inventory Report showed that runoff discharges affect 11 percent of rivers, 12 percent of lakes, and 28 percent of estuaries. Primary sources of impairment to rivers and streams included sediment, bacteria, nutrients, oxygen-depleting substances, metals, and pesticides. The report notes that runoff discharges are the leading source of pollution and the main factor in the degradation of surface water quality in California's coastal waters, rivers, and streams. Furthermore, the NURP study found that pollutant levels from illicit non-storm water discharges were high enough to significantly degrade receiving water quality, and threaten aquatic life, wildlife, and human health.[28]

In addition, the Region's CWA section 303(d) list, which identifies water bodies with impaired beneficial uses within the region, also indicates that the impacts of storm water and non-storm water runoff on receiving waters are significant. Many of the impaired water bodies on the 303(d) list are impaired by constituents that have been found at high levels within storm water and non-storm water runoff by the Riverside

[24] Ibid.
[25] San Diego Water Board, 1994. Water Quality Control Plan, San Diego Basin, Region 9. San Diego.
[26] State Water Board, 1994. Urban Runoff Technical Advisory Committee Report and Recommendations. Nonpoint Source Management Program.
[27] USEPA, 2000. Quality of Our Nation's Waters: Summary of the National Water Quality Inventory 1998 Report to Congress – USEPA 841-S-00-001; Water Quality Conditions in the United States: Profile from the 1998 National Water Quality Inventory Report to Congress – USEPA 841-F-00-006.
[28] USEPA, 1993. Results of the Nationwide Urban Runoff Program, Volume 1 – Final Report.

County storm water monitoring program.[29] Examples of constituents frequently responsible for beneficial use impairment include indicator fecal bacteria, heavy metals, toxicity, pesticides, dissolved solids, turbidity, and nutrients. These constituents have been found at high levels in runoff both regionally and nationwide.[30,31] In addition, impairments may be caused by synergistic effects of multiple contaminants or by pollutants not currently monitored by storm water programs.

Finding C.5. Pollutants in runoff can threaten and adversely affect human health. Human illnesses have been clearly linked to recreating near storm drains flowing to receiving waters. Also, runoff pollutants in receiving waters can bioaccumulate in the tissues of invertebrates and fish, which may be eventually consumed by humans.

Discussion of Finding C.5. Human illnesses have been clearly linked to recreating near storm drains flowing to coastal waters. A landmark study, conducted by the Santa Monica Bay Restoration Project, found that there was an increased occurrence of illness in people that swam in proximity to a flowing storm drain.[32] A study of south Huntington Beach and north Newport Beach (both located in northern Orange County) found that an illness rate of about 0.8 percent among bathers at those beaches resulted in about $3 million annually in health-related expenses.[33] Although the Upper Santa Margarita Watershed is inland, the watershed drains to the Pacific Ocean, and pollutants generated in the area may impact coastal waters. For example, the Santa Margarita River system provides the main source of beach sand for the beaches in northern San Diego County.[34] In addition, residents from the Upper Santa Margarita Watershed, who recreate at southern California beaches, benefit from clean water.

Residents and businesses in the Upper Santa Margarita Watershed also rely heavily on local water for drinking, agriculture and industrial supply. Over 40 percent of the water used in the watershed is locally produced.[35] In addition, surface and ground water from the Upper Santa Margarita Watershed flow to Fallbrook in San Diego County and the U.S. Marine Corps Base Camp Pendleton where it is used as part of the municipal and domestic water supply.

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[29] County of Riverside, 2009. Riverside County Municipal Copermittees 2008-09 Annual Storm Water Program Report, Section 11.
[30] Ibid.
[31] USEPA, 1983. Results of the Nationwide Urban Runoff Program, Volume 1 – Final Report.
[32] Haile, R.W., et al., 1996. An Epidemiological Study of Possible Adverse Health Effects of Swimming in Santa Monica Bay. Santa Monica Bay Restoration Project.
[33] Dwight, R.H., et al., 2005. Estimating the Economic Burden From Illnesses Associated With Recreational Coastal Water Pollution – A Case Study in Orange County, California. Journal of Enviro. Management Vol.76. No.2 p.95-103. Also reported in: Los Angeles Times, May 2, 2005. Here's What Ocean Germs Cost You: A UC Irvine Study Tallies the Cost of Treatment and Lost Wages for Beachgoers Who Get Sick.
[34] Shapiro. 1991. Refuge in an urbanized land, the Santa Margarita River: cultural and natural resource value. Santa Margarita Research Foundation, Fallbrook, CA.
[35] Jenks, .J. 2002. Santa Margarita River Watershed Annual Watermaster Report: Water Year 2000-2001.

According to the USEPA, spilled fuel, solvents, waste oil, paints, and other maintenance fluids pose a risk to the environment, but may be especially harmful if they enter someone's drinking water supply.[36] Discharges of runoff from urban areas were identified by the California Department of Health Services as one of the most prevalent possible contaminating activities for drinking water sources.[37] This issue of potential source water contamination is of fundamental importance, because of the dependence on local water for domestic use in the Santa Margarita Watershed.

Furthermore, runoff pollutants in receiving waters can bioaccumulate in the tissues of invertebrates and fish, which may eventually be consumed by humans. Pollutants such as heavy metals and pesticides, which are commonly found in MS4 runoff, have been found to bioaccumulate and biomagnify in long-lived organisms at the higher trophic levels.[38] Since many aquatic species are utilized for human consumption, toxic substances accumulated in species' tissues can pose a significant threat to public health. USEPA supports this finding when it states, "As runoff flows over areas altered by development, it picks up harmful sediment and chemicals such as oil and grease, pesticides, heavy metals, and nutrients (e.g., nitrogen and phosphorus). These pollutants often become suspended in runoff and are carried to receiving waters, such and lakes, ponds, and streams. Once deposited, these pollutants can enter the food chain through small aquatic life, eventually entering the tissues of fish and humans."[39]

Finding C.6. Runoff discharges from MS4s often contain pollutants that cause toxicity to aquatic organisms (i.e. adverse responses of organisms to chemicals or physical agents ranging from mortality to physiological responses such as impaired reproduction or growth anomalies). Toxic pollutants impact the overall quality of aquatic systems and beneficial uses of receiving waters.

Discussion of Finding C.6. The Copermittees' monitoring data exhibits frequent toxic conditions in runoff during storm events and dry weather. Toxicity varies significantly within and among sites and over time. The cause of toxicity may vary between locations, dates, and indicator organisms. The actual cause may be influenced by various factors such as development, land uses, runoff management, habitat modification, hydromodification, and native aquatic environment. Some toxicity identification evaluations (TIEs) have identified pyrethroids as a cause of toxicity in the receiving waters.[40]

Finding C.7. The Copermittees discharge runoff into lakes, drinking water reservoirs, rivers, streams, creeks, bays, estuaries, coastal lagoons, the Pacific Ocean, and tributaries thereto within one of the eleven hydrologic units (Santa Margarita Hydrologic Unit) comprising the San Diego Region as shown in Table 2. Some of the

[36] USEPA. 2004. Municipal Storm Water and Ground Water Discharge Regulations in California. F-909-04-004.
[37] Ibid.
[38] Abel, P.D, 1996. Water Pollution Biology.
[39] USEPA, 2000. Storm Water Phase II Compliance Assistance Guide. Washington D.C. EPA 833-R-00-002.
[40] County of Riverside, 2009. Riverside County Municipal Copermittees 2008-09 Annual Storm Water Program Report, Section 11.

receiving water bodies have been designated as impaired by the San Diego Water Board in 2009 pursuant to CWA section 303(d).

Discussion of Finding C.7. This finding identifies the major receiving water bodies in the Riverside County portion of the Santa Margarita Hydrologic Unit that are listed as impaired on the CWA section 303(d) List of Impaired Waters (303(d) List). The 2006 303(d) List has been approved by the San Diego Water Board, State Water Board, and USEPA.[41] The 2008 303(d) List was approved by the San Diego Water Board on December 18, 2009 and is awaiting State Water Board and USEPA approval.[42] The 303(d) list identifies waters that do not meet water quality standards after applying certain required technology-based effluent limits ("impaired" water bodies). As part of this listing process, states are required to prioritize waters/watersheds for future development of Total Maximum Daily Loads (TMDLs). The listed 303(d) pollutant(s) of concern do not necessarily reflect impairment of the entire corresponding major surface water bodies. The specific impaired portions of each water body are listed in the 2006 and 2008 303(d) Lists.

Since 2002, the number of water bodies and water body – pollutant combinations included on the 303(d) List, located in the Riverside County portion of the San Diego Region, has increased. A comparison of the 2002, 2006, and 2008 303(d) listings are summarized in the following table.

[41] The approved 2006 Clean Water Act Section 303(d) List of Water Quality Limited Segments is on-line at: http://www.waterboards.ca.gov/tmdl/303d_lists2006.html
[42] The 2008 Clean Water Act Section 303(d) List of Water Quality Limited Segments, approved by the San Diego Water Board, is available on-line at http://www.swrcb.ca.gov/rwqcb9/water_issues/programs/303d_list/index.shtml

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Comparison of Riverside County 303(d) Listings

Watershed[1]	2002 303(d) List		2006 303(d) List		2008 303(d) List[2]	
	Listed Water Body	Impairing Pollutants	Listed Water Body	Impairing Pollutants	Listed Water Body	Impairing Pollutants
De Luz Creek HSA (902.21)	NO LISTINGS	NOT APPLICABLE	De Luz Creek	Iron Manganese	De Luz Creek	Iron Manganese Nitrogen Sulfates
Gavilan HSA (902.22)	Sandia Creek	TDS	Sandia Creek	Iron Manganese Nitrogen Sulfates TDS	Sandia Creek	Iron Sulfates TDS
	Santa Margarita River (Upper)	Phosphorus	Santa Margarita River (Upper)	Phosphorus	Santa Margarita River (Upper)	Phosphorus Toxicity
Murrieta HSA (902.32)	NO LISTINGS	NOT APPLICABLE	Long Canyon Creek	TDS	Long Canyon Creek	Chlorpyrifos E. Coli Fecal Coliform Iron Manganese
French HSA (902.33)	NO LISTINGS	NOT APPLICABLE	NO LISTINGS	NOT APPLICABLE	Warm Springs Creek	Chlorpyrifos E. Coli Fecal Coliform Iron Manganese Phosphorus Total Nitrogen as N

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Comparison of Riverside County 303(d) Listings (Cont'd)

Watershed[1]	2002 303(d) List		2006 303(d) List		2008 303(d) List[2]	
	Listed Water Body	Impairing Pollutants	Listed Water Body	Impairing Pollutants	Listed Water Body	Impairing Pollutants
Gertrudis HSA (902.42)	NO LISTINGS	NOT APPLICABLE	NO LISTINGS	NOT APPLICABLE	Santa Gertrudis Creek	Chlorpyrifos Copper E. Coli Fecal Coliform Iron Phosphorus
Pauba HSA (902.51)	NO LISTINGS	NOT APPLICABLE	Temecula Creek	TDS Phosphorus Nitrogen	Temecula Creek	Chlorpyrifos Copper Phosphorus TDS Toxicity
	NO LISTINGS	NOT APPLICABLE	NO LISTINGS	NOT APPLICABLE	Redhawk Channel	Chlorpyrifos Copper Diazinon E. Coli Fecal Coliform Iron Manganese Nitrogen Phosphorus TDS
Wolf HSA (902.52)	Murrieta Creek	Phosphorus	Murrieta Creek	Phosphorus	Murrieta Creek	Chlorpyrifos Copper Iron Manganese Nitrogen Phosphorus Toxicity

Notes:
1. Hydrologic subarea (HSA) within the Santa Margarita Hydrologic Unit (HU), located in the Riverside County portion of the San Diego Basin.
2. Water bodies and pollutants on the 2008 303(d) List was approved by the San Diego Water Board on December 18, 2009, and is awaiting final approval by the State Water Board and USEPA.

Finding C.8. Trash is a persistent pollutant which can enter receiving waters from the MS4, accumulate and be transported downstream into receiving waters over time. Trash poses a serious threat to the beneficial uses of the receiving waters, including, but not limited to, human health, rare and endangered species, navigation and human recreation.

Discussion of Finding C.8. The Copermittees to date have documented high volumes of trash coming from the MS4 system and in receiving waters.[43]

The Basin Plan specifies the following narrative Water Quality Objective (WQO) for Floating Material:

> *"Waters shall not contain floating material, including solids, liquids, foams, and scum in concentrations which cause nuisance or adversely affect beneficial uses."*

The Basin Plan specifies the following narrative WQO for Suspended and Settleable Solids: Material:

> *"Waters shall not contain suspended and settleable solids in concentrations of solids that cause nuisance or adversely affect beneficial uses."*

Additionally, high density urban areas in Southern California have been shown to be responsible for up to 60 percent of the trash that enters receiving waters from the MS4.[44] The retrofitting of existing MS4 systems, such as catch basins, in targeted high trash areas can result in significant reductions in the amount of trash entering receiving waters from the MS4.

Trash, as litter in both solid and liquid form, is consistently found on and adjacent to roadways. A California Department of Transportation Litter Management Pilot Study found that of roadway trash, plastics and Styrofoam accounted for 33 percent of trash by weight, and 43 percent by volume. Further, the study found that approximately 80 percent of the litter associated with roadways was floatable, indicating that, without capture, this litter would enter Waters of the State after a storm event, resulting in the impairment of Beneficial Uses.[45] The study, however, relied upon a mesh capture size of 0.25 inches (6.35 millimeters). This size is too large to effectively capture plastic pre-production pellets (a.k.a. "nurdles"), which are roughly 3 mm in size, and likely underestimated the total contribution of plastics. Furthermore, pre-production plastic pellets, which are small enough to be easily digested, have been found to carry

[43] Fiscal Year 2008-2009 Santa Margarita Watershed Annual Report
[44] The City of Los Angeles Meets Trash TMDLs Compliance with CB Inserts and Opening Covers. August 06, 2008.
[45] California Department of Transportation District 7 Litter Management Pilot Study. June 26, 2000.

persistent organic pollutants, including PCBs and DDT.[46]

Finding C.9. The Copermittees' water quality monitoring data submitted to date documents persistent violations of Basin Plan water quality objectives for various runoff-related pollutants (indicator bacteria, dissolved solids, turbidity, metals, pesticides, etc.) at various watershed monitoring stations. Persistent toxicity has also been observed at some watershed monitoring stations. In addition, bioassessment data indicate that the majority of the monitored receiving waters have Poor to Very Poor IBI ratings. In sum, the above findings indicate that runoff discharges are causing or contributing to water quality impairments, and are a leading cause of such impairments in Riverside County.

Discussion of Finding C.9. The Copermittees have produced data that demonstrates water quality objectives are frequently not met during dry and wet weather. The 2009 Report of Waste Discharge and the 2008-2009 Annual Reports document that receiving water monitoring stations often fail to meet water quality objectives established in the Basin Plan.

Water quality in receiving waters downstream of MS4 discharges fail to meet California Toxics Rule standards[47] and Basin Plan objectives. Data submitted in the MS4 Annual Reports indicate that at various times chemical, bacteria, pesticide, and metal concentrations may exceed water quality objectives in receiving waters in both wet and dry weather conditions.

There are no other significant NPDES permitted discharges to the creeks. For instance, there are no live-stream discharges of treated waste water in the Riverside County area of the Santa Margarita watershed. The few NPDES permits in the watershed are mainly for recycled water which only discharges occasionally during the rainy season. Because the water quality monitoring indicates exceedances of water quality standards and MS4 discharges are the main source of pollutants in the watersheds, it can be inferred that the MS4 discharges are causing or contributing to water quality impairments, and are a leading cause of such impairments in Riverside County.

Finding C.10. When natural vegetated pervious ground cover is converted to impervious surfaces such as paved highways, streets, rooftops, and parking lots, the natural absorption and infiltration abilities of the land are lost. Therefore, runoff leaving a developed area is significantly greater in runoff volume, velocity, and peak flow rate than pre-development runoff from the same area. Runoff durations can also increase as a result of flood control and other efforts to control peak flow rates. Increased volume, velocity, rate, and duration of runoff greatly accelerate the erosion of

[46] Rios, L.M., Moore, C. and Patrick R. Jones. 2007. Persistent organic pollutants carried by synthetic polymers in the ocean environment. *Marine Pollution Bulletin.* Vol. 54.
[47] The California Toxics Rule criteria promulgated by the USEPA are directly applicable water quality standards for certain priority toxic pollutants in inland surface waters and enclosed bays and estuaries in California.

downstream natural channels. Significant declines in the biological integrity and physical habitat of streams and other receiving waters have been found to occur with as little as a 3-5 percent conversion from natural to impervious surfaces. The increased runoff characteristics from new development must be controlled to protect against increased erosion of channel beds and banks, sediment pollutant generation, or other impacts to beneficial uses and stream habitat due to increased erosive force.

Finding C.11. Development creates new pollution sources as human population density increases and brings with it proportionately higher levels of car emissions, car maintenance wastes, municipal sewage, pesticides, household hazardous wastes, pet wastes, trash, etc. which can either be washed or directly dumped into the MS4. As a result, the runoff leaving the developed area is significantly greater in pollutant load than the pre-development runoff from the same area. These increased pollutant loads must be controlled to protect downstream receiving water quality.

Discussion of Findings C.10 and C.11. The Natural Resources Defense Council (NRDC) 1999 Report, "*Stormwater Strategies, Community Responses to Runoff Pollution*" identifies two main causes of the storm water pollution problem in developed areas. Both causes are directly related to development:

1. Increased volume and velocity of surface runoff. There are three types of human-made impervious covers that increase the volume and velocity of runoff: (i) rooftop, (ii) transportation imperviousness, and (iii) non-porous (impervious) surfaces. As these impervious surfaces increase, infiltration will decrease, forcing more water to run off the surface, picking up speed and pollutants.

2. The concentration of pollutants in the runoff. Certain industrial, commercial, residential and construction activities are large contributors of pollutant concentrations in storm water runoff. As human population density increases, it brings with it proportionately higher levels of car emissions, car maintenance wastes, municipal sewage, pesticides, household hazardous wastes, pet wastes, trash, etc.

As a result of these two causes, runoff leaving developed areas is significantly greater in volume, velocity, and pollutant load than pre-development runoff from the same area.

By accommodating the traditional approach to storm water management, development has also altered the flow regime (rate, magnitude, frequency, timing, and flashiness of runoff) that supports aquatic and riparian habitats. These hydrologic changes are driven by the loss of water storage capacity in the watersheds,[48] and exacerbated by

[48] Konrad, Christopher P. and Derek K. Booth, 2005. *Hydrologic Changes in Urban Streams and Their Ecological Significance.* American Fisheries Society Symposium Vol.47 pp.157-177.

physical alterations of the stream channel network.[49] This relationship between development and stream channel integrity has been documented nationally and in southern California. The Copermittees support these findings in their 1993 DAMP,[50] which states:

> "Many storm water runoff problems are primarily a consequence of urbanization. Water that previously soaked into the ground, removing pollutants by filtering through soil, and eventually replenishing groundwater supplies, now must flow overland and therefore enters local streams more rapidly. The rapid transport of water increases the erosion of stream banks and hillsides and does not permit filtering pollutants. Sediment carried by storm water runoff can build up in streambeds, harming fish and aquatic habitat. The sediment acts as a transport mechanism for pollutants which adhere to soil particles. Typical urban runoff pollutants found in surface waters include heavy metals, nutrients, petroleum products, sediment, bacteria, chemicals, and litter."

Hydrologic changes from development also directly and indirectly adversely affect wetlands. Natural wetlands support many beneficial uses and provide important water-quality related ecological services, including pollutant removal, flood attenuation, and groundwater recharge.[51] The Center for Watershed Protection recently provided USEPA with a synthesis of more than 100 scientific studies on the direct and indirect impacts of development, particularly urbanization, on wetlands and the role wetlands play in watershed quality. The report found that the three changes from land development with the most potential to impact wetlands include: Increased storm water runoff; decreased groundwater recharge; and flow constriction.[52] Each of these changes can often be avoided or minimized by implementing low impact development (LID) and hydromodification BMPs.

When Order No. R9-2004-001 was adopted, studies had shown that the level of imperviousness in an area strongly correlates with the quality of nearby receiving waters.[53] One comprehensive study, which looked at numerous areas, variables, and methods, revealed that stream degradation occurs at levels of imperviousness as low as 10 – 20 percent.[54] Stream degradation is a decline in the biological integrity and physical habitat conditions that are necessary to support natural biological diversity. For instance, few urban streams can support diverse benthic communities with imperviousness greater than or equal to 25 percent.[55] To provide some perspective, a

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[49] Poff. N.L. et al. 1997. The Natural Flow Regime: A paradigm for river conservation and restoration. Bioscience Vol. 47, No. 11, pp.769-784.
[50] Riverside County Copermittees. 1993. Santa Margarita Regional Drainage Area Management Plan.
[51] Wright, Tiffany, et al. 2006. "Direct and Indirect Impacts of Urbanization on Wetland Quality." Prepared by the Center for Watershed Protection. Available at: http://www.cwp.org. 81p.
[52] Ibid p.26
[53] USEPA, 1999. Part II. 40 CFR Parts 9, 122, 123, and 124. National Pollutant Discharge Elimination System – Regulations for Revision of the Water Pollution Control Program Addressing Storm Water Discharges; Final Rule. Federal Register.
[54] Ibid.
[55] Ibid.

medium density, single-family home area can be from 25 percent to 60 percent impervious (variation due to street and parking design).[56]

More recently, a report on the effects of impervious in southern California streams found that local ephemeral and intermittent streams are more sensitive to such effects than streams in other parts of the country. This study, by the Southern California Coastal Water Research Program, estimated a threshold of response at a two to three percent change in percent of impervious cover in a watershed. [57] This threshold is lower than the previously reported estimates by the USEPA that were cited in the Fact Sheet for Order No. R9-2004-001.

To demonstrate the principle of increased volume and velocity of runoff from urbanization, the figure below shows the flow rate of an urban vs. a natural stream. What the figure demonstrates is that urban stream flows have greater peaks and volumes, as well as shorter retention times than natural stream flows. The greater peak flows and volumes result in stream degradation through increased erosion of stream banks and damage to aquatic habitat. The shorter retention times result in less time for sediments and other pollutants to settle before being carried out to the ocean. This sediment, and the associated pollutants it carries, can be a significant cause of water quality degradation.

Flow Rate of Urban and Natural Streams[58]

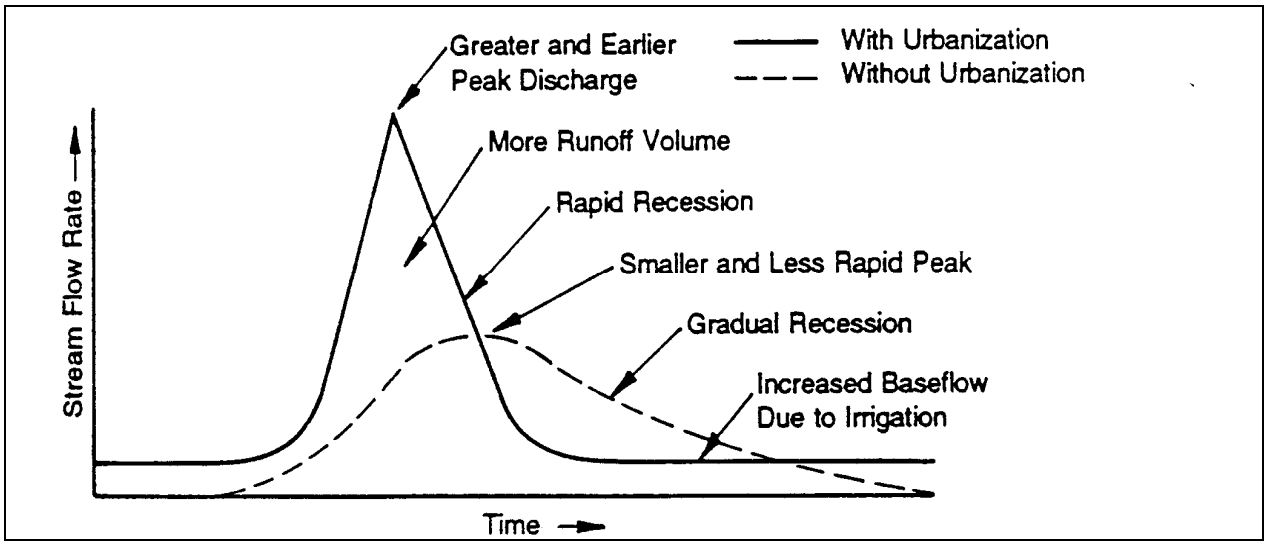

[56] Schueler, T.R., 1994. The Importance of Imperviousness. Watershed Protection Techniques. As cited in 64 FR 68725.
[57] Coleman, Derrick, et al. 2005. *Effect of Increases in Peak Flows and Imperviousness on the Morphology of Southern California Streams.* Technical Report No. 450 of the Southern California Coastal Water Research Project.
[58] Adapted from Schueler, T.R., 1987. Controlling Urban Runoff: A Practical Manual for Planning and Designing Urban BMPs. Metropolitan Washington Council of Governments.

Increased volume and velocity of runoff adversely impacts receiving waters and their beneficial uses in many ways. According to the Urban Runoff TAC report,[59] increases in population density and imperviousness result in changes to stream hydrology including:

1. Increased peak discharges compared to pre-development levels;
2. Increased volume of storm water runoff with each storm compared to pre-development levels;
3. Decreased travel time to reach receiving water; increased frequency and severity of floods;
4. Reduced stream flow during prolonged periods of dry weather due to reduced levels of infiltration;
5. Increased runoff velocity during storms due to a combination of effects of higher discharge peaks, rapid time of concentration, and smoother hydraulic surfaces from channelization; and
6. Decreased infiltration and diminished ground water recharge.

Even though the rainfall depths in arid watersheds are lower, watershed development can greatly increase peak discharge rates during rare flood events.[60] A study conducted in arid watersheds around Riverside, CA showed that, over two decades, impervious cover increased from 9 percent to 22 percent, which resulted in an increase of more than 100 percent in the peak flow rate for the two-year storm event. The study also showed that the average annual storm water runoff volume had increased by 115 percent to 130 percent over the same time span.[61]

Flooding caused by the increased volume and velocity of runoff from urbanization in the upper Santa Margarita watershed are clear examples of the effects described above. Disastrous flooding has occurred more frequently in recent years. In the last century, flood events occurred in 1938, 1969, 1980, 1993, 1995, and 1998.[62] In the 1993 flood event, the Cities of Murrieta and Temecula sustained $12 million dollars in damage, and Camp Pendleton sustained $88 million in damage. Future flooding is expected to occur more frequently because of continued urban development within the watershed, and flood damages are expected to continue accruing at an estimated annual rate of $1,780,300.

Prior hydromodification studies in California have shown that the increase in impervious cover, and thus change in runoff volume, velocity, rate, and duration, results in a shift in the range of storms that produce geomorphically significant flows within receiving waters (see above discussion). Additionally, studies in California have determined that ninety percent of the geomorphic “work” done within channels

[59] State Water Board, 1994. Urban Runoff Technical Advisory Committee Report and Recommendations. Nonpoint Source Management Program.
[60] Schueler and Holland, 2000. Storm Water Strategies for Arid and Semi-Arid Watersheds (Article 66). The Practice of Watershed Protection. P. 695-706.
[61] Ibid.
[62] U.S. Army Corps of Engineers, 2000. Final EIS/EIR, Murrieta Creek Flood Control Project.

receiving flows from developed areas now occurs from flows below the 10 year peak flow event.[63]

This increased volume, velocity, rate, and duration of runoff greatly accelerates the erosion of the beds and banks within downstream receiving waters. Additionally, storm water flows which runoff directly from impervious surfaces into the MS4 and thus receiving waters prevent the associated runoff of natural sediments which would occur in pre-project conditions. This combined alteration of the physical condition of storm water runoff results in accelerated downstream erosion of receiving water bed and banks. The excessive erosion of stream beds and banks releases pollutants found in soils into receiving waters, degrades macroinvertebrate habitat (see D.2.c), eliminates spawning habitat, reduces associated wetland and riparian habitat, and threatens existing infrastructure adjacent to receiving waters. Bank sloughing within creeks and streams increases the pollutant loading to those receiving waters, particularly for turbidity and phosphorous.[64] In arid environments, accelerated channel erosion has been shown to have synergistic impacts within watersheds. Increased channel erosion within Las Vegas wash has resulted in the loss of over 1,000 acres of wetland and riparian habitat, released additional pollutants into downstream receiving waters, and eliminated in-stream habitat and water quality conditions required for existing threatened and endangered species.[65]

Regarding the impact of development on storm water runoff pollutant loads, the San Diego Water Board's Basin Plan states:

> *Nonpoint source pollution is primarily the result of man's uses of land such as urbanization, roads and highways, vehicles, agriculture, construction, industry, mineral extraction, physical habitat alteration (dredging/filling), hydromodification (diversion, impoundment, channelization), silviculture (logging), and other activities which disturb land.[66] As a result, when rain falls on and drains through urban freeways, industries, construction sites, and neighborhoods it picks up a multitude of pollutants. The pollutants can be dissolved in the runoff and quickly transported by gravity flow through a vast network of concrete channels and underground pipes referred to as storm water conveyance systems. Such systems ultimately discharge the polluted runoff, without treatment, into the nation's creeks, rivers, estuaries, bays, and oceans.[67]*

According to the Center for Watershed Protection, urbanization strongly shapes the quality of both surface and ground water in arid and semi-arid regions of the

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[63] Santa Clara Valley Hydromodification Management Plan. April 21, 2005.
[64] Sekely, A.C., Mulla, D.J. and D.W. Bauer. 2002. Streambank slumping and its contribution to the phosphorus and suspended sediment loads of the Blue Earth River, Minnesota. *Journal of Soil and Water Conservation.* September 2002 vol. 57 no. 5 243-250.
[65] Tuttle, P.L.. and E..L.. Orsak. 2002. Las Vegas Wash Water Quality and Implications to Fish and Wildlife. U.S. Fish and Wildlife Service.
[66] San Diego Water Board, 1994. Water Quality Control Plan for the San Diego Basin. P. 4-66.
[67] Ibid. P. 4-69 - 4-70.

southwest. Since rain events are so rare, pollutants have more time to build up on impervious surfaces compared to humid regions. Therefore, the pollutant concentrations of storm water runoff from arid watersheds tend to be higher than that of humid watersheds.[68] The effect of antecedent rainfall events is demonstrated in a report from the California Department of Transportation (Caltrans) that found the concept of a seasonal first flush is applicable to the southern California climate.[69]

Finding C.12. Development and urbanization especially threaten environmentally sensitive areas (ESAs), such as water bodies designated as supporting a RARE beneficial use (supporting rare, threatened or endangered species) and CWA 303(d)-impaired water bodies. Such areas have a much lower capacity to withstand pollutant loads than other, more sensitive areas. In essence, development that is ordinarily insignificant in its impact on the environment may become significant in a particularly sensitive environment. Therefore, additional controls to reduce storm water pollutants from new and existing development may be necessary for areas adjacent to or discharging directly to an ESA.

Discussion of Finding C.12. ESAs are defined in the Order as "Areas that include but are not limited to all CWA section 303(d) impaired water bodies; areas designated as Areas of Special Biological Significance by the Basin Plan; water bodies designated with the RARE beneficial use by the Basin Plan; areas designated as preserves or their equivalent under the Natural Communities Conservation Program within the Cities and County of Riverside; and any other equivalent environmentally sensitive areas which have been identified by the Copermittees."

Areas that meet this definition are inherently sensitive habitats containing unique, rare, threatened, or endangered species, or are not achieving their designated beneficial uses. As discussed above, runoff is known to contain a wide range of pollutants and has demonstrated toxicity to plants and animals. Therefore, it is necessary to apply additional storm water controls for developments within, adjacent to, or directly discharging to ESAs. This need for additional storm water controls is addressed within each component of the Order. USEPA supports the requirement for additional storm water controls, stating "For construction sites that discharge to receiving waters that do not support their designated use or other waters of special concern, additional construction site controls are probably warranted and should be strongly considered."[70] Further support for requiring additional controls to reduce pollutants in storm water

[68] Schueler and Holland, 2000. Storm Water Strategies for Arid and Semi-Arid Watersheds (Article 66). The Practice of Watershed Protection. P. 695-706.
[69] Stenstrom, Michael and Masoud Kayhanian, 2005. *First Flush Phenomenon Characterization.* Prepared for Caltrans. Report No. CTSW-RT-05-73-02.6 Study jointly performed by UCLA and UCD. Most of the data presented was collected from three highly urbanized highway sites in west Los Angeles. Much effort went into developing a quantitative way of defining the mass first flush. Other aspects include: variability of water quality during storm events, litter characteristics, correlation among constituents, first flush of organics and particle size distribution, new methods for measuring oil and grease, and grab and composite sampling strategies. The report is available on-line at: http://www.dot.ca.gov/hq/env/stormwater/special/newsetup/
[70] USEPA, 1992. Guidance Manual for the Preparation of Part II of the NPDES Permit Applications for Discharges from Municipal Separate Storm Sewer Systems. Washington D.C. EPA/833-B-92-002.

discharges to ESAs can be found in *Mitigation of Storm Water Impacts From New Developments in Environmentally Sensitive Areas*, a technical report written by the Los Angeles Water Board.[71]

Finding C.13. Although dependent on several factors, the risks typically associated with properly managed infiltration of runoff (especially from residential land use areas) are not significant. The risks associated with infiltration can be managed by many techniques, including (1) designing landscape drainage features that promote infiltration of runoff, but do not "inject" runoff (injection bypasses the natural processes of filtering and transformation that occur in the soil); (2) taking reasonable steps to prevent the illegal disposal of wastes; (3) protecting footings and foundations; (4) ensuring that each drainage feature is adequately maintained in perpetuity; and (5) pretreatment.

Discussion of Finding C.13. Infiltration is an effective means for managing runoff. However, measures must be taken to protect groundwater quality when infiltration of runoff is implemented. USEPA supports runoff infiltration and provides guidance for protection of groundwater: "With a reasonable degree of site-specific design considerations to compensate for soil characteristics, infiltration may be very effective in controlling both urban runoff quality and quantity problems. This strategy encourages infiltration of urban runoff to replace the natural infiltration capacity lost through urbanization and to use the natural filtering and sorption capacity of soils to remove pollutants; however, the potential for some types of urban runoff to contaminate groundwater through infiltration requires some restrictions."[72] The restrictions placed on runoff infiltration in this Order are based on recommendations provided by the USEPA Risk Reduction Engineering Laboratory. The State Water Board found in Order WQ 2000-11 on the appeal of the Los Angeles Water Board's Standard Urban Storm Water Mitigation Plan (SUSMP) requirements that the guidance provided in the above referenced document by the USEPA Risk Reduction Engineering Laboratory is sufficient for the protection of groundwater quality from runoff infiltration. To further protect groundwater quality, the Order also includes guidance from the Los Angeles Water Board,[73] the State of Washington,[74] and the State of Maryland.[75] Subsequently, the California Storm Water Quality Association (CASQA) has produced technical guidance for post-construction treatment BMPs to protect ground water quality[76].

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[71] Los Angeles Water Board, 2001. Mitigation of Storm Water Impacts From New Developments In Environmentally Sensitive Areas.
[72] USEPA, 1994. Potential Groundwater Contamination from Intentional and Nonintentional Stormwater Infiltration. EPA 600 SR-94 051.
[73] Los Angeles Water Board, 2000. Standard Urban Storm Water Mitigation Plan for Los Angeles County and Cities in Los Angeles County.
[74] Washington State Department of Ecology, 1999. Draft Stormwater Management in Washington State. Volume V – Runoff Treatment BMPs. Pub. No. 99-15.
[75] Maryland Department of the Environment, 1999. 2000 Maryland Stormwater Design Manual. Volume I.
[76] CASQA. The New Development and Redevelopment Handbook, 2003. Available on-line at http://www.cabmphandbooks.org/Development.asp

Finding C.14. Non-storm water (dry weather) discharge from the MS4 is not considered a storm water (wet weather) discharge and therefore is not subject to regulation under the Maximum Extent Practicable (MEP) standard from CWA 402(p)(3)(B)(iii), which is explicitly for "Municipal … *Stormwater Discharges* (emphasis added)" from the MS4. Rather, non-storm water discharges into the storm sewers, per CWA 402(p)(3)(B)(ii), are to be effectively prohibited. Such dry weather non-storm water discharges have been shown to contribute significant levels of pollutants and flow in arid, developed Southern California watersheds and are to be effectively prohibited under the CWA.

Discussion of Finding C.14.

Permitting Framework

The CWA prohibits the discharge of any pollutant from a point source into waters of the United States unless the discharger of the pollutant(s) obtains a NPDES permit pursuant to CWA section 402. The discharge of storm water and/or non-storm water from an MS4 system is considered a discharge from a point source. As discussed below, however, the CWA regulates storm water and non-storm water discharges under different standards.

In 1987 the CWA was amended to include provisions that specifically concerned NPDES permitting requirements for storm water discharges from MS4 systems. Section 402(p) of the CWA regulates the discharge of storm water from a point source, the municipal separate storm sewers. Such discharges of storm water are subject to the maximum extent practicable (MEP) storm water standard and the related iterative process. The MEP standard for storm water discharges reflects Congress' recognition that the variability of flow and intensity of storm events render difficult strict compliance with water quality standards by MS4s. However, this standard was not considered applicable to non-storm water discharges, which under 402(p) are required to be effectively prohibited from entering the MS4. Clearly, if non-storm water discharges must be effectively prohibited from entering the MS4, the very next requirement (402(p)(3)(B)(iii)) requiring discharges from the MS4 be reduced to the MEP intends that the discharge of pollutants be limited to storm water. Unless exempt or authorized under a separate NPDES permit, non-storm water discharges are not authorized to enter the MS4 in the first instance and are considered to be illicit discharges.

The Federal Register further clarifies that such discharges through an MS4 are not authorized under the CWA (55 Federal Register (FR) 47995):

> "Today's rule defines the term "illicit discharge" to describe any discharge through a municipal separate storm sewer system that is not composed entirely of storm water and that is not covered by an NPDES permit. Such illicit discharges are not authorized under the Clean Water Act. Section 402(p(3)(B) requires that permits for discharges from municipal separate storm sewers require the municipality to "effectively prohibit" non-storm water discharges from

> the municipal separate storm sewer…Ultimately, such non-storm water discharges through a municipal separate storm sewer must either be removed from the system or become subject to an NPDES permit."

The federal regulations (40 CFR 122.26(d)(vi)(2)(B)) require that the municipal separate storm sewer discharger prohibit "through ordinance, order or similar means, illicit discharges to the municipal separate storm sewer." As owners and operators of the MS4, Copermittees cannot passively receive discharges from third parties (Federal Register 68766) and thus are responsible for the discharge of any non-storm water from their MS4.

The State Water Board's recent precedential order (Order WQ 2009-0008) affirming a Los Angeles County MS4 permit modification, consistent with USEPA's prior interpretations, recognizes that "[n]either the Clean Water Act nor the federal storm water regulations define 'non-storm water.' 'Illicit discharge' is defined as any discharge to an MS4 'not composed entirely of storm water.' Thus, 'illicit discharge' is the most nearly applicable definition of 'non-storm water' found in federal law and is often used interchangeably with that term."[77]

Storm Water and Non-storm Water Definitions

By definition non-storm water is not precipitation related. 40 CFR 122.26(b)(13) states that: "Storm water means storm water runoff, snowmelt runoff, and surface runoff and drainage." While "surface runoff and drainage" is not defined in federal law, it is related to precipitation events such as rain and/or snowmelt (see 55 FR 47995-96). The term "surface runoff and drainage" does not include all incidental flows in the MS4 system, but consists of flows relating to precipitation events as clarified by the Federal Register, USEPA's documents and permitting, and other Regional Water Board Orders.

The Federal Register (55 FR 47995-47996) provides clarification on the distinction between storm water and non-storm water discharges, including their regulation:

> "In response to the comments which requested EPA to define the term storm water broadly to include a number of classes of discharges **which are not in any way related to precipitation events, EPA believes that this rulemaking is not an appropriate forum for addressing the appropriate regulation of such non-storm water discharges**, even though some classes of non-storm water discharges may typically contain only minimal amounts of pollutants. Congress did not intend that the term storm water be used to describe any discharge that has a de minimis amount of pollutants, not did it intend for section 402(p) to be used to provide a moratorium from permitting other non-storm water discharges."

[77] State Water Board Order WQ-2009-0008 (*In the Matter of the Petition of County of Los Angeles and Los Angeles County Flood Control District*, adopted August 4, 2009), p. 4.

As recently recognized by the State Water Board in a precedential decision upholding an MS4 permit modification adopted by the Los Angeles Water Board, "U.S. EPA has previously rejected the notion that 'storm water,' as defined at 40 Code of Federal Regulations section 122.26(b)(13), includes dry weather flows. In U.S. EPA's preamble to the storm water regulations, U.S. EPA rejected an attempt to define storm water to include categories of discharges 'not in any way related to precipitation events.'[78] Thus, USEPA has made it clear that it deems discharges unrelated to precipitation events to be non-storm water discharges. 40 CFR 122.26(d)(iv)(B) itself provides specific examples of non-storm water discharges:

> "…the following category of non-storm water discharges or flows shall only be addressed where such discharges are identified by the municipality as sources of pollutants to the United States: water line flushing, landscape irrigation, diverted stream flows, rising ground waters, uncontaminated groundwater infiltration (as defined at 40 CFR 35.2005(20) to separate storm sewers, uncontaminated pumped groundwater,…"

USEPA also removed street wash waters from the definition of storm water, as USEPA specifically identified this discharge as being non-storm water (55 FR page 47996). Additionally, section 1.2.2.2 of USEPA's Multi-Sector General Permit for Industrial Activities (MSGP-2000) considers fire hydrant flushings, irrigation drainage, landscape watering, and foundation or footing drains to be non-storm water discharges. USEPA's September 1999 Storm Water Management Fact Sheet for Non-Storm Water Discharges to Storm Sewers states that non-storm water discharges can include discharges of process water, air conditioning condensate, non-contact cooling water, vehicle wash water, or sanitary wastes.

While these types of non-storm water discharges (or illicit discharges) may be regulated under storm water permits because as a practical matter they can enter and be discharged from the MS4 systems, they are not regulated as storm water discharges under the CWA because they are unrelated to precipitation events. As indicated above, the State Water Board's recent discussion of this issue supports the conclusion that non-storm water discharges are unrelated to precipitation events. In its Order affirming amendments to the Los Angeles County MS4 permit to implement a TMDL to control bacteria in dry weather flows, the State Water Board rejected petitioners County of Los Angeles and the Los Angeles County Flood Control District implied assertion that the definition of "storm water" contained in the federal regulations (defined as "surface run-off and drainage") includes the run-off and drainage from non-storm events. The State Water Board notes that the challenged permit provisions do not apply to storm water flows in that they apply only during dry weather conditions as defined in the permit. In upholding the challenged order, the State Water Board notes that the Los Angeles Water Board's permit language followed

[78] State Water Board Order WQ-2009-0008 (*In the Matter of the Petition of County of Los Angeles and Los Angeles County Flood Control District*, adopted August 4, 2009), p. 7.

USEPA's approach, referring to USEPA's rejection of attempts to define storm water to include categories of discharges "not in any way related to precipitation events."[79]

Lastly, the San Diego Water Board and State Water Board have issued multiple, separate NPDES permits for non-storm water discharges, including, but not limited to, San Diego Water Board Order No. R9-2008-0002 (extracted groundwater), San Diego Water Board Order No. R9-2002-0020 (hydrostatic discharge), and State Water Board Order No. 2006-0008-DWQ (utility vaults), pursuant to section 402 of the CWA.

Permitting Non-storm Water Discharges

Non-storm water discharges may contain pollutants which result from various activities that occur within areas draining into the MS4. This includes, but is not limited to, illicit discharges and connections, exempted categories of discharge not a source of pollutants (40 CFR 122.26(d)), and discharges into the MS4 covered under a separate NPDES permit. As such, existing and proposed discharges of non-storm water from MS4s:

a) Result from similar activities through the MS4 system;
b) Are the same type of water;
c) Require similar action levels for the protection of the Beneficial Uses of the receiving waters;
d) Require similar monitoring;
e) Are under the passive control of the owner and operator of the MS4 system; and
f) Are more appropriately regulated under a general permit than individual permits.

The U.S. EPA's approach (and the San Diego Water Board's under its approved program) for non-storm water discharges from MS4s is to regulate these discharges under the existing 402 NPDES framework (FR 47995 and 48037 see below) for discharges to surface waters. The NPDES program (40 CFR 122.44(d)) utilizes discharge prohibitions and effluent limitations as regulatory mechanisms to regulate non-storm water discharges, including the use of technology and water quality-based effluent limitations. Non-numerical effluent limitations, such as BMPs for non-storm water discharges may only be authorized where numerical effluent limits are infeasible or where the practices are reasonably necessary to achieve effluent limitations and standards or to carry out the purposes and intent of the CWA (40 CFR 122.44(k) see below).

[79] State Water Board Order WQ-2009-0008 (*In the Matter of the Petition of County of Los Angeles and Los Angeles County Flood Control District*, adopted August 4, 2009), p. 7 (quoting 55 FR 47990. 47995).

The Federal Register (55, page 48037) provides clarification that non-storm water discharges from the MS4 are to be regulated under section 402, not 402(p):

> "Conveyances which continue to accept other "non-storm water" discharges (e.g. discharges without an NPDES permit) with the exceptions noted above (*exempted discharges that are not a source of pollutants*) do not meet the definition of municipal separate storm sewer and are not subject to 402(p)(3)(B) of the CWA unless such discharges are issued separate NPDES permits. Instead, conveyances which continue to accept non-storm water discharges which have not been issued separate NPDES permits are subject to sections 301 and 402 of the CWA."

This regulatory approach is consistent with the approach recently upheld by the State Water Board in a precedential order adopted on August 4, 2009. In this Order, the State Water Board rejected a challenge to amendments to the Los Angeles County MS4 permit that require compliance with receiving water limitations and discharge prohibitions for dry weather, non-storm water discharges. Petitioners there argued that the receiving water limits and discharge prohibitions for dry weather dischargers were inappropriate and that the Los Angeles Water Board should instead have regulated the discharges with the maximum extent practicable standard, through an iterative process. The State Water Board concludes that dry weather discharges, as defined in the permit and in the underlying TMDL, "are more appropriately regarded as non-storm water discharges, which the Clean Water Act requires to be effectively prohibited."[80]

As stated above, for NPDES permits under 402 of the CWA, the Code of Federal Regulations (122.44(k)) clarify that a discharger may utilize BMPs to control or abate the discharge of pollutants when:

> "(1) Authorized under section 304(e) of the CWA for the control of toxic pollutants and hazardous substances from ancillary industrial activities;
> (2) Authorized under section 402(p) of the CWA for the control of storm water discharges;
> (3) Numeric limits are infeasible; or
> (4) The practices are reasonably necessary to achieve effluent limitations and standards or to carry out the purposes and intent of the CWA."

For the last 20 years, Riverside County NPDES permits for discharges of storm water have regulated non-storm water discharges from the MS4. These permits required Copermittees (dischargers) to prohibit non-storm water discharges into (thus through and from) their MS4 systems, implement a program to prevent illicit discharges, and monitor to identify illicit discharges and exempted discharges that are a source of pollution. These measures are considered Best Management Practices (BMPs), are

[80] State Water Board Order WQ-2009-0008 (*In the Matter of the Petition of County of Los Angeles and Los Angeles County Flood Control District*, adopted August 4, 2009), p. 8

required to be included in NPDES permits issued under section 402(p) of the CWA, and are considered by USEPA to be an interim approach to permitting non-storm water discharges from the MS4 in accordance with section 402 of the CWA and CFR 122.44(k).

As explained in the discussion of Finding C.15., below, the Copermittees' reliance on BMPs for the past 20 years has not resulted in compliance with applicable water quality standards. The San Diego Water Board has evaluated (in accordance with 40 CFR 122.44(d)(1)) past and existing controls (BMPs), non-storm water monitoring results, the sensitivity of the species in receiving waters (e.g. endangered species), and the potential for effluent dilution, and has determined that existing BMPs to control pollutants in storm water discharges are not sufficient to protect water quality standards in receiving waters and the existing requirement that Copermittees effectively prohibit all types of unauthorized non-storm water discharges into the MS4 historically results in the discharge of pollutants to the receiving waters. Thus, numeric action levels for non-storm water, dry weather, discharges from the MS4 and required actions following observed exceedances of numeric action levels have been established. For further discussion regarding the development of action levels please see Finding E.10 and discussion.

Dry weather action levels are applicable to non-storm water discharges of effluent from the MS4 system. Non-storm water effluent discharges from the MS4 are those which occur during dry weather conditions. These action levels are not applied to storm water discharges, as defined within the Order. Storm water discharges regulated by the Order are required to meet the MEP standard and related iterative process and have separate action levels.

Dry weather action levels are applicable to non-storm water discharges from the MS4 system into receiving waters. Non-storm water discharges are already required to be prohibited unless specifically exempted or covered under a separate NPDES permit. Dry weather action levels apply to non-storm water discharges of effluent from a point source into receiving waters. The MS4 is not a receiving water. Should a discharger wish to discharge a non-exempt category to the MS4 system, such discharges require a separate NPDES permit pursuant to sections 402 and 301 of the CWA. It is also infeasible to monitor and sample every discharge into the MS4, as such discharges are diffuse by nature and may vary spatially and temporally.

Finding C.15. Non-storm water discharges to the MS4 granted an influent exception [i.e. which are exempt from the effective prohibition requirement set forth in CWA section 402(p)(3)(B)(ii)] under 40 CFR 122. 26 are included within this Order. Any exempted discharges identified by Copermittees as a source of pollutants are subsequently required to be *addressed* (emphasis added) as illicit discharges through prohibition and incorporation into existing IC/ID programs. Furthermore, the USEPA contemplates that permitting agencies such as the San Diego Water Board may also identify exempted discharges as a source of pollutants required to be addressed as illicit

discharges (See Vol. 55 FR 48037). The San Diego Water Board and the Copermittees have identified landscape irrigation, irrigation water and lawn water, previously exempted discharges, as a source of pollutants and conveyance of pollutants to waters of the U.S.

Discussion of Finding C.15. The FR (Vol. 55, page 48037) and 40 CFR 122.26(d)(iv)(B) clarify that certain components and categories of non-storm water discharges into the MS4 are not required to be prohibited. The Code of Federal Regulations requires the discharger have:

> "…a program, including inspections, to implement through ordinance, orders or similar means to prevent illicit discharges to the municipal separate storm sewer system; this program shall address all types of illicit discharges, however, the following category of non-storm water discharges or flows shall only be addressed where such discharges are identified by the municipality as sources of pollutants to waters of the United States: water line flushing, landscape irrigation, diverted stream flows, rising ground waters, uncontaminated groundwater infiltration (as defined at 40 CFR 35.2005(20) to separate storm sewers, uncontaminated pumped groundwater,…"

The categories of non-storm water discharges into the MS4, as listed under 40 CFR 122.26(d)(iv)(B), are not required to be prohibited unless identified by the Copermittees as sources of pollutants to waters of the United States. The FR (Vol. 55, page 48037), however, goes on to clarify that:

> "However, the Director may include permit conditions that either require municipalities to prohibit or otherwise control any of these types of discharge where appropriate."

Thus, the Copermittees or the San Diego Water Board may identify any of these categories of non-storm water discharges as a source of pollutants. As such, the identification of any of these categories as a source of pollutants requires them to be addressed as illicit discharges, which are not authorized under the CWA, and are required to be "effectively prohibited" as illicit discharges via ordinance, order or similar means. The prohibition of previously exempted discharges of non-storm water to waters of the United States from entering, and necessarily being discharged from an MS4, conforms with CWA requirements for standards and enforcement for effluent limitations necessary to meet water quality standards (33 U.S.C. 1311(b)(1)(C)).

To date the San Diego Water Board and the Copermittees have identified overspray and drainage from potable and reclaimed water landscape irrigation as a substantial source and conveyance mechanism for pollutants into waters of the United States. Several municipalities throughout the San Diego Region (e.g., cities and counties of Orange County and San Diego County) have reported and/or identified runoff originating from landscape irrigation as potential sources of dry weather flows conveying pollutants into

their MS4s. This is also supported by legislation (Assembly Bill 1881) recently enacted by the State of California, which has identified runoff resulting from over irrigation not only as a waste of water resources, but also as a source of pollutants to the state's waterways.

Irrigation runoff into the MS4, as identified by the San Diego Water Board and the Copermittees, is a source of pollutants to waters of the United States, and is required to be *addressed* (emphasis added) as an illicit discharge per 40 CFR 122.26(d)(2)(iv)(B)(1) by prohibition through implementing and enforcing an ordinance, order or similar means. The San Diego Water Board and the Copermittees have identified irrigation water as a source of pollutants and conveyance of pollutants to waters of the United States, when applied improperly in excess and thereafter entering the MS4, in the following documents:

- The Cities and County of Riverside "Only Rain in the Storm Drain" Pollution Prevention Program identifies runoff from irrigation as a source of pollutants to waters of the United States in the following documents:

    1) The Landscape and Garden public education brochure states:

    "Soil, yard wastes, over-watering [emphasis added] *and garden chemicals become part of the urban runoff mix that winds it way through streets, gutters and storm drains before entering lakes, rivers, streams, etc."*

    2) In a survey distributed at public outreach events,[81] the answer to the question about where lawn irrigation water goes states:

    "Water that leaves your lawn from irrigation…can pick up motor oil and grease from vehicles, excess fertilizer from your lawn, bacteria from pet waste, and excess pesticides from your yard. These pollutants can be carried down streets and storm drains directly to our streams, lakes and rivers without treatment!"

- In 2006, the State Water Board allocated Grant funding to the **SmartTimer/Edgescape Evaluation Program (SEEP)**. The project targets irrigation runoff by retrofitting existing development and documenting the conservation and runoff improvements. The Grant Application states that:

    "*Irrigation runoff contributes flow & pollutant loads to creeks and beaches that are 303(d) listed for bacteria indicators.*"

[81] A copy of the survey was provided in the Riverside County Copermittees' Report of Waste Discharge, dated January 15, 2009, page 39.

Furthermore, the grant application states:

> "*Regional program managers agree that the reduction and/or elimination of irrigation-related urban flows and associated pollutant loads may be key to successful attainment of water quality and beneficial use goals as outlined in the San Diego Basin Plan and Bacteria TMDL over the long term.*"

This is reinforced in the project descriptions and objectives:

> "*Elevated dry-weather storm drain flows, composed primarily … of landscape irrigation water wasted as runoff, carry pollutants that impair recreational use and aquatic habitats all along Southern California's urbanized coastline. Storm drain systems carry the wasted water, along with landscape derived pollutants such as bacteria, nutrients and pesticides, to local creeks and the ocean. Given the local Mediterranean climate, excessive perennial dry season stream flows are an unnatural hydrologic pattern, causing species shifts in local riparian communities and warm, unseasonal contaminated freshwater plumes in the near-shore marine environment*".

The basis of this grant project is that over-irrigation (landscape irrigation, irrigation water and lawn watering) into the MS4 is a source and conveyance of pollutants. In addition, they indicate that this alteration of natural flows is impacting the Beneficial Uses of Waters of the State and U.S. The results of this study can be applied broadly to any area where over-irrigation takes place, including Riverside County. Preliminary results from the study indicate that that over-irrigation (landscape irrigation, irrigation water and lawn watering) into the MS4 *is* a source and conveyance of pollutants.

- Several municipalities in the San Diego Region have identified runoff from irrigation as a source of pollutants to waters of the United States in the following documents:

  1) The **Watershed Action Plan Annual Report**(s) for the 2006-2007 reporting period was submitted by the County of Orange, Orange County Flood Control District and Copermittees within the San Juan Creek, Laguna Coastal Streams, Aliso Creek, and Dana Point Coastal Streams Watersheds. San Juan Creek, Laguna Coastal Streams, Aliso Creek and Dana Point Coastal Streams are all currently 303(d) listed as impaired for Indicator Bacteria within their watersheds and/or in the Pacific Ocean at the discharge points of their watersheds. The Orange County Copermittees, within their Watershed Action Strategy Table for Fecal Indicator Bacteria:

"*Support programs to reduce or eliminate the discharge of anthropogenic dry weather nuisance flow throughout the […] watershed. Dry weather flow is the transport medium for bacteria and other 303(d) constituents of concern*". Additionally, they state that "*conditions in the MS4 contribute to high seasonal bacteria propagation in-pipe during warm weather. Landscape irrigation is a major contributor to dry weather flow, both as surface runoff due to over-irrigation and overspray onto pavements; and as subsurface seepage that finds its way into the MS4*."

2) The **Carlsbad Watershed Urban Runoff Management Program (WURMP) Fiscal Year 2008 Annual Report** was submitted by the Carlsbad Watershed Copermittees (Cities of Carlsbad, Encinitas, Escondido, Oceanside, San Marcos, Solana Beach, and Vista, and the County of San Diego). In the WUMRP Annual Report, the Carlsbad Watershed Copermittees stated the following:

   "The Carlsbad Watershed Management Area (WMA) collective watershed strategy identifies bacteria, sediment, and nutrients as high priority water quality pollutants in the Agua Hedionda (904.3 – bacteria and sediment), Buena Vista (904.2 – bacteria), and San Marcos Creek (904.5 – nutrients) Hydrologic Areas. Bacteria, sediment, and nutrients have been identified as potential discharges from over-irrigation."

3) The **San Diego Bay Watershed Urban Runoff Management Program (WURMP) 2007-2008 Annual Report** was submitted by the San Diego Bay Watershed Copermittees (Cities of Chula Vista, Coronado, Imperial Beach, La Mesa, Lemon Grove, National City, and San Diego, the County of San Diego, the Port of San Diego, and the San Diego County Airport Authority). In Appendix D of the WUMRP Annual Report, titled Likely Sources of Pollutants, the San Diego Bay Watershed Copermittees identified over-irrigation of lawns as a pollutant generating activity from business and/or residential land uses for bacteria, pesticides, and sediment.

Within the reports above, municipalities throughout San Diego and Orange counties have acknowledged that runoff from over-irrigation is a potential or likely source of several types of pollutants to waters of the United States. Because there are landscaped areas in Riverside County that receive irrigation similar to San Diego and Orange counties, runoff from over-irrigation is also a likely source of pollutants to waters of the United States in Riverside County.

- There is statewide recognition of the pollution caused by over-irrigation, and current legislation already requires cities and counties to prohibit over-irrigation. On September 28, 2006 Governor Arnold Schwarzenegger approved Assembly Bill 1881, The Water Conservation in Landscaping Act (AB 1881, Laird). The

act requires cities, counties, and charter cities and charter counties, to adopt landscape water conservation ordinances by January 1, 2010. Additionally, the law required the Department of Water Resources (DWR) to prepare a Model Water Efficient Landscape Ordinance for use by local agencies. The Water Efficient Landscape Ordinance was approved by the Office of Administrative Law on September 10, 2009. All local agencies were required to adopt a water efficient landscape ordinance by January 1, 2010. Local agencies could adopt the Water Efficient Landscape Ordinance developed by DWR, or an ordinance considered at least as effective as the Model Ordinance. The Water Efficient Landscape Ordinance includes a requirement that local agencies prohibit runoff from irrigation (§ 493.2):

> *"(a) Local agencies shall prevent water waste resulting from inefficient landscape irrigation by* prohibiting runoff *[emphasis added] from leaving the target landscape due to low head drainage, overspray, or other similar conditions where water flows onto adjacent property, non-irrigated areas, walks, roadways, parking lots, or structures. Penalties for violation of these prohibitions shall be established locally."*

- On October 08, 2009, the State of California Department of Water Resources issued a letter to all cities and counties within the State of California giving reminder of required adoption of the Water Efficient Landscape Ordinance. The letter states that:

  > *"Other benefits include reduced irrigation runoff, reduced pollution of waterways, drought resistance, and less green waste."*

- On December 18, 2009, the San Diego Water Board adopted Order No. R9-2009-0002, the fourth-term Orange County permit, which found that over-irrigation (landscape irrigation, irrigation water and lawn watering) into the MS4 is a source and conveyance of pollutants. Landscape irrigation, irrigation water, and lawn watering were categories removed from the list of non-storm water discharges not prohibited to be discharged into the MS4.

D. Runoff Management Programs

Finding D.1.a. This Order specifies requirements necessary for the Copermittees to reduce the discharge of pollutants in storm water to the MEP. However, since MEP is a dynamic performance standard, which evolves over time as runoff management knowledge increases, the Copermittees' runoff management programs must continually be assessed and modified to incorporate improved programs, control measures, best management practices (BMPs), etc. in order to achieve the evolving MEP standard. Absent evidence to the contrary, this continual assessment, revision, and improvement of runoff management program implementation is expected to ultimately achieve compliance with water quality standards in the Region.

Discussion of Finding D.1.a. Under CWA section 402(p), municipalities are required to reduce the discharge of storm water pollutants from their MS4s to the maximum extent practicable (MEP). MEP is the critical technology-based performance standard that municipalities must attain. The MEP standard is an ever-evolving, flexible, and advancing concept, which considers technical and economic feasibility. As knowledge about controlling storm water runoff continues to evolve, so does that which constitutes MEP. Reducing the discharge of storm water pollutants to the MEP requires Copermittees to assess each program component and revise activities, control measures, best management practices (BMPs), and measurable goals, as necessary to meet MEP.

To achieve the MEP standard, municipalities must employ whatever BMPs are technically feasible (i.e. are likely to be effective) and are not cost prohibitive. The major emphasis is on technical feasibility. Reducing storm water pollutants to the MEP means choosing effective BMPs, and rejecting applicable BMPs only where other effective BMPs will serve the same purpose, or the BMPs would not be technically feasible, or the cost would be prohibitive. In selecting BMPs to achieve the MEP standard, the following factors may be useful to consider:

1. Effectiveness: Will the BMPs address a pollutant (or pollutant source) of concern?
2. Regulatory Compliance: Is the BMP in compliance with storm water regulations as well as other environmental regulations?
3. Public Acceptance: Does the BMP have public support?
4. Cost: Will the cost of implementing the BMP have a reasonable relationship to the pollution control benefits to be achieved?
5. Technical Feasibility: Is the BMP technically feasible considering soils, geography, water resources, etc?

If a municipality reviews a lengthy menu of BMPs and chooses to select only a few of the least expensive BMPs, it is likely that MEP has not been met. On the other hand, if a municipal discharger employs all applicable BMPs except those where it can show

that they are not technically feasible in the locality, or whose cost is prohibitive, it would have met the standard. Where a choice may be made between two BMPs that should provide generally comparable effectiveness, the discharger may choose the least expensive alternative and exclude the more expensive BMP. However, it would not be acceptable either to reject all BMPs that would address a pollutant source, or to pick a BMP based solely on cost, which would be clearly less effective. In selecting BMPs the municipality must make a serious attempt to comply and practical solutions may not be easily dismissed. In any case, the burden is on the municipal discharger to comply with its permit. After selecting BMPs, it is the responsibility of the discharger to ensure that all BMPs are implemented.[82]

A definition of MEP is not provided in either the federal statute or in the federal regulations. The final determination regarding whether a municipality has reduced storm water pollutants to the MEP can only be made by the San Diego Water Board or the State Water Board, and not by the municipal discharger. While the San Diego Water Board or the State Water Board ultimately define MEP, it is the responsibility of the Copermittees to initially propose actions that implement BMPs to reduce storm water pollution to the MEP. In other words, the Copermittees' runoff management programs to be developed under the Order are the Copermittees' proposals of MEP. Their total collective and individual activities conducted pursuant to their runoff management programs become their proposal for MEP as it applies both to their overall effort, as well as to specific activities. The Order provides a minimum framework to guide the Copermittees in meeting the MEP standard for storm water.

It is the San Diego Water Board's responsibility to evaluate the proposed programs and specific BMPs to determine what constitutes MEP, using the above guidance and the court's 1994 decision in NRDC v. California Department of Transportation, Federal District Court, Central District of California. The federal court stated that a Copermittee must evaluate and implement BMPs except where (1) other effective BMPs will achieve greater or substantially similar pollution control benefits; (2) the BMP is not technically feasible; or (3) the cost of BMP implementation greatly outweighs the pollution control benefits. In the absence of a proposal acceptable to the San Diego Water Board, the San Diego Water Board will define MEP by requiring implementation of additional measures by the Copermittees.

The Copermittees' continual evolution in meeting the MEP standard is expected to achieve compliance with water quality standards. USEPA has consistently supported this expectation. In its Interim Permitting Approach for Water Quality-Based Effluent Limitations (WQBELs) in Storm Water Permits, USEPA states "the interim permitting approach uses best management practices (BMPs) in first-round storm water permits, and expanded or better-tailored BMPs in subsequent permits, where necessary, to provide for attainment of water quality standards."[83] USEPA reiterated its position in 1999, when it stated regarding the Phase II municipal storm water regulations that

[82] State Water Board, 1993. Memo Entitled Definition of Maximum Extent Practicable.
[83] Federal Register / Vol. 61, No. 166 / August 26, 1996 / P. 43761.

"successive iterations of the mix of BMPs and measurable goals will be driven by the objective of assuring maintenance of water quality standards" and "EPA anticipates that a permit for a regulated small MS4 operator implementing BMPs to satisfy the six minimum control measures will be sufficiently stringent to protect water quality, including water quality standards […]."[84]

The requirements of the Order are expected to achieve compliance with receiving water quality standards. The approach to be used is the continual assessment, revision, and improvement of Copermittee best management practice implementation. This approach is consistent with the CWA and State Water Board guidance. In Defenders of Wildlife v. Browner (1999, 197 F. 3d 1035), the United States Court of Appeals for the Ninth Circuit states: "Under 33 U.S.C. section 1342 (p)(3)(B)(iii), the EPA's choice to include either management practices or numeric limitations in the permits was within its discretion." In addition, the approach is consistent with State Water Board Order WQ 99-05, which outlines an iterative approach for achieving compliance with water quality standards.

Finding D.1.b. The Copermittees have generally been implementing the Jurisdictional Runoff Management Programs (JRMPs) required pursuant to Order No. R9-2004-001 since July 14, 2005. Prior to that, the Copermittees were regulated by Order No. 98-02 since May 13, 1998. MS4 discharges, however, continue to cause or contribute to violations of water quality standards as evidenced by the Copermittees' monitoring results.[85]

Discussion of Finding D.1.b. In response to Order No. R9-2004-001, the Copermittees have developed their runoff management programs. In order to implement the plans, the Copermittees have, among other things, developed BMP requirements, improved inter- and intra-governmental coordination, improved training programs, improved illicit discharge detection procedures, and improved their monitoring efforts. Although the programmatic improvements have led to better implementation of BMPs, the Copermittees' monitoring data demonstrate that additional or revised BMPs are necessary to prevent discharges from MS4s from causing and contributing to violations of water quality standards. A discussion of data collected by the Copermittees is included in the discussion for Finding C.9.

Finding D.1.c. This Order contains new or modified requirements that are necessary to improve Copermittees' efforts to reduce the discharge of pollutants in storm water runoff to the MEP and achieve water quality standards. Some of the new or modified requirements, such as the revised Watershed Water Quality Workplan (Watershed Workplan) section, are designed to specifically address these high priority water quality problems. Other requirements, such as for unpaved roads, are a result of San Diego Water Board's identification of water quality problems through investigations

[84] Federal Register / Vol. 64, No. 235 / Wednesday, December 8, 1999 / Rules and Regulations. P. 68753-68754.
[85] County of Riverside, 2009. Riverside County Municipal Copermittees 2008-09 Annual Storm Water Program Report, Section 11..

and complaints during the previous permit period. Other new or modified requirements address program deficiencies that have been noted during audits, report reviews, and other San Diego Water Board compliance assessment activities. Additional changes in the monitoring program provide consistency with the Code of Federal Regulations, USEPA guidance, State Water Board guidance, and the Southern California Monitoring Coalition recommendations.

Discussion of Finding D.1.c. The Copermittees are required to update and expand their runoff management programs on jurisdictional and watershed levels in order to improve their efforts to reduce the contribution of storm water pollutants in runoff to the MEP and meet water quality standards. Changes to Order No. R9-2004-001's requirements have been made to help ensure these two standards are achieved by the Copermittees.

The Orders' jurisdictional requirements have changed based on findings by the San Diego Water Board during typical compliance assurance activities, audits, or receipt of complaints.[86] Where the audits found common implementation problems, requirements have been altered to better ensure compliance. In addition, the San Diego Water Board conducted reviews of the jurisdictional annual reports submitted by the Copermittees. Updates to the requirements for the Copermittees' programs are also based in part on information found in the Copermittees' ROWD,[87] requirements that were included in the San Diego and Orange County MS4 permits, and discussions with the Riverside County Copermittees.

To better focus on attainment of water quality standards, the Order's jurisdictional and watershed requirements have been improved. The conditions of the receiving waters now drive management actions, which in turn focus diminishing resources on the highest priority water quality problems within the receiving waters in the watershed. Improvements to jurisdictional and watershed requirements were also made to facilitate a mutually clear understanding of the requirements between the San Diego Water Board and Copermittees.

During the previous permit period, the San Diego Water Board identified, through investigations and complaints, sediment discharges from unpaved roads as a significant source of water quality problems in the Riverside County portion of the San Diego Region. Enforcement and inspection activities conducted by the San Diego Water Board during the previous permit term have found a lack of source control for many unpaved roads within the jurisdiction of the Copermittees. Unpaved roads are a source of sediment that can be discharged in runoff to receiving waters, especially during storm events. Erosion of unpaved roadways occurs when soil particles are loosened and carried away from the roadway base, ditch, or road bank by water, wind,

[86] Audit reports, report reviews, and inspection reports are available for review at the San Diego Water Board office.
[87] All significant changes made to the Order's requirements are described and explained in detail in Fact Sheet section IX.

traffic, or other transport means. Exposed soils, high runoff velocities and volumes, sandy or silty soil types, and poor compaction increase the potential for erosion.

Road construction, culvert installation, and other maintenance activities can disturb the soil and drainage patterns to streams in undeveloped areas, causing excess runoff and thereby erosion and the release of sediment. Poorly designed roads can act as preferential drainage pathways that carry runoff and sediment into natural streams, impacting water quality. In addition, other public works activities along unpaved roads have the potential to significantly affect sediment discharge and transport within streams and other waterways, which can degrade the beneficial uses of those waterways.

USEPA also recognizes that discharges from unpaved roads are a threat to water quality. USEPA guidance[88] emphasizes the threat of unpaved roads to water quality:

> "*Dirt and gravel roads are a major potential source of these pollutants [sediment] and pollutants that bind to sediment such as oils, nutrients, pesticides, herbicides, and other toxic substances]. Many roads have unstable surfaces and bases. Roads act like dams, concentrating flows that accelerate erosion of road materials and roadsides. Both unstable surfaces and accelerated erosion then lead to sediment and dust.*"

There are several guidance documents, developed by the USEPA,[89] the US Forest Service,[90] the University of California,[91] and others, that include design and construction specifications and BMPs that are readily available for implementation by private and public entities. Implementing design and other source control BMPs for unpaved roads in the region is necessary to reduce and minimize the impacts of sediment discharged during storm events from unpaved roads to the MS4s and receiving waters.

Finding D.1.d. Updated individual Drainage Area Management Plans (individual DAMPs) and Watershed Stormwater Management Plans (watershed SWMPs), which describe the Copermittees' runoff management programs in their entirety, are needed to guide the Copermittees' runoff management efforts and aid the Copermittees in tracking runoff management program implementation. Hereinafter, the individual DAMP is referred to as the JRMPs and the Watershed SWMP is referred to as the Watershed Workplan. It is practicable for the Copermittees to update the JRMPs and Watershed Workplans within the timeframe specified in this Order, since significant efforts to develop these programs have already occurred.

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[88] USEPA 2006 "Environmentally Sensitive Maintenance for Dirt and Gravel Roads." Gesford and Anderson, USEPA-PA-2005.
[89] Ibid.
[90] US Forest Service, 1996. Forest Service Specifications for Construction of Roads & Bridges. EM-7720-100. Revised August 1996.
[91] University of California Division of Agriculture and Natural Resources, 2007. Rural Roads: A Construction and Maintenance Guide of California Landowners. Publication 8262.

Discussion of Finding D.1.d. Development of runoff management plans is a crucial runoff management measure and should be considered a BMP. The plans help organize and focus the Copermittees' programs and guide their implementation. In its statewide assessment report to USEPA Region IX and the State Water Board, Tetra Tech, Inc. concluded that the lack of a master storm water planning document must be considered a serious program deficiency[92]. When submitted to the San Diego Water Board, the plans provide useful correspondence between the Copermittees and the San Diego Water Board. The Plans also become available for review by the public, and thus facilitate public participation in runoff management decisions. Finally, while development and submittal of runoff management plans are not necessary to ensure compliance of the Copermittees' runoff management programs with the Order, the San Diego Water Board is provided with a means to track Copermittee implementation.

The focus of the Order is on development and implementation of storm water programs which meet MEP, rather than creation of Copermittee plans which exhibit MEP. While the Order does not rely upon the plans to ensure MEP and other standards are achieved, the plans still serve a useful purpose. As stated above, the plans serve to organize the Copermittees' efforts to address runoff. As a practical matter, any program of the size required by the Order should be documented in writing. This serves to guide implementation of the program by the numerous individuals responsible for program implementation.

Runoff management plans are not necessary for ensuring compliance with the Order because the Order itself contains sufficient detailed requirements to ensure that compliance with discharge prohibitions, receiving water limitations, and the narrative standard of MEP for storm water are achieved. Implementation by the Copermittees of programs in compliance with the Order's requirements, prohibitions, and receiving water limitations is the pertinent compliance standard to be used under the Order, as opposed to assessing compliance by reviewing the Copermittees' implementation of their plans alone. The San Diego Water Board ensures compliance with the Order by reviewing annual reports, conducting inspections, performing audits, and through other general program oversight.

Runoff management plans are particularly important and useful for municipalities when program implementation is spread across several departments and/or when municipalities experience staff turnover.[93] Each Copermittee relies on multiple employees or contractors for program implementation, but the spread of responsibility varies among Copermittees.[94] Written jurisdictional plans ensure appropriate coordination within each municipality.

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[92] Tetra Tech, Inc. 2006. *Assessment Report on Tetra Tech's Support of California's MS4 Stormwater Program.* Produced for USEPA Region IX and the California State and Regional Water Quality Control Boards.
[93] Tetra Tech, Inc. 2005. Program Evaluation Report. Orange County Storm Water Program: Cities of Laguna Beach, Laguna Hills, Lake Forest, and Rancho Santa Margarita.
[94] Responsible departments and employees are described in the 2005-06 Annual Reports for the MS4 programs.

Copermittees' runoff management plans are simply descriptions of their runoff management programs required under the Order. These plans serve as procedural correspondence which guides program implementation and aids the Copermittees and San Diego Water Board in tracking implementation of the programs. In this manner, the plans are not functional equivalents of the Order. For these reasons, the Copermittees' runoff management plans need not be an enforceable part of the Order.

The Copermittees' plans and programs can be updated on or before June 30, 2012 because much of their plans and programs are already in existence. In fact, many parts of their plans and programs have been in place for 15 years. Moreover, the adoption of Order No. R9-2004-001 required a larger scale reorganization of the Copermittees' programs than Order No. R9-2010-0016, but also only allowed one year for program updates. The Copermittees were generally able to meet the time schedule required under Order No. R9-2004-001. After discussions with the Copermittees, based on the timing of the adoption of the Order and the Copermittee's fiscal planning cycles, in conjunction with consideration for the current economic conditions, the San Diego Water Board agreed that additional time to update the Copermittees' plans and programs may be warranted. Thus, the Copermittees must update their plans and programs on or before June 30, 2012, which provides the Copermittees over 18 months, instead of 1 year, to update their plans and programs.

Finding D.1.e. Pollutants can be effectively reduced in storm water runoff by the application of a combination of pollution prevention, source control, and treatment control BMPs. Pollution prevention is the reduction or elimination of pollutant generation at its source and is the best "first line of defense". Source control BMPs (both structural and non-structural) minimize the contact between pollutants and flows (e.g., rerouting run-on around pollutant sources or keeping pollutants on-site and out of receiving waters). Treatment control BMPs remove pollutants that have been mobilized by wet-weather or dry-weather flows.

Discussion of Finding D.1.e. The State Water Board finds in its Order WQ 98-01 that BMPs are effective in reducing pollutants in storm water runoff, stating that "implementation of BMPs [is] generally the most appropriate form of effluent limitations when designed to satisfy technology requirements, including reduction of pollutants to the maximum extent practicable." A State Water Board TAC further supports this finding by recommending "that nonpoint source pollution control can be accomplished most effectively by giving priority to [BMPs] in the following order:

1. Pollution Prevention – implementation of practices that use or promote pollution free alternatives;
2. Source Control – implementation of control measures that focus on preventing or minimizing urban runoff from contacting pollution sources;

3. Treatment Control – implementation of practices that require treatment of polluted runoff either onsite or offsite."[95]

Pollution prevention, the reduction or elimination of pollutant generation at its source, is an essential aspect of BMP implementation. Fewer pollutants are available to be washed from developed areas when the generation of pollutants by activities is limited. Thus, pollutant loads in storm water discharges are reduced from these areas. In addition, there is no need to control or treat pollutants that are never generated. Furthermore, pollution prevention BMPs are generally more cost effective than removal of pollutants by treatment facilities or cleanup of contaminated media.[96,97]

In the Pollution Prevention Act of 1990, Congress established a national policy that emphasizes pollution prevention over control and treatment. CWC section 13263.3(a) also supports pollution prevention, stating "The Legislature finds and declares that pollution prevention should be the first step in a hierarchy for reducing pollution and managing wastes, and to achieve environmental stewardship for society. The Legislature also finds and declares that pollution prevention is necessary to support the federal goal of zero discharge of pollutants into navigable waters." Finally, the Basin Plan also supports this finding by stating "To eliminate pollutants in storm water, one can either clean it up by removing pollutants or prevent it from becoming polluted in the first place. Because of the overwhelming volume of storm water and the enormous costs associated with pollutant removal, pollution prevention is the only approach that makes sense."[98]

USEPA also supports the utilization of a combination of BMPs to address pollutants in runoff. For example, USEPA has found there has been success in addressing illicit discharge related problems through BMP initiatives like storm drain stenciling and recycling programs, including household hazardous waste special collection days.[99] Structural BMP performance data has also been compiled and summarized by USEPA.[100]

The summary provides the performance ranges of various types of structural BMPs for removing suspended solids, nutrients, pathogens, and metals from storm water flows. These pollutants are generally a concern in storm water in the San Diego Region and

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[95] State Water Board, 1994. Urban Runoff Technical Advisory Committee Report and Recommendations. Nonpoint Source Management Program.
[96] Devinny, J.S. et al. 2004. *Alternative Approaches to Stormwater Quality Control.* Prepared for the Los Angeles Regional Water Quality Control Board. Found as Appendix H to *NPDES Stormwater Cost Survey.* Prepared for the California State Water Resources Control Board by the Office of Water Programs California State University, Sacramento. Available on-line at: http://www.owp.csus.edu/research/npdes/
[97] Schueler, T.R.., 2000. Center for Watershed Protection. Assessing the Potential for Urban Watershed Restoration, Article 142.
[98] San Diego Water Board, 1994. Water Quality Control Plan, San Diego Basin, Region 9.
[99] USEPA, 1999. 40 CFR Parts 9, 122, 123, and 124 National Pollutant Discharge Elimination System-Regulations for Revision of the Water Pollution Control Program Addressing Storm Water Discharges. 64 FR 68728.
[100] USEPA, 1999. Preliminary Data Summary of Urban Storm Water Best Management Practices. EPA 821-R-99-012.

Riverside County. For suspended solids, the least effective structural BMP type was found to remove 30-65 percent of the pollutant load, while the most effective was found to remove 65-100 percent of the pollutant load. For nutrients, the least effective structural BMP type was found to remove 15-45 percent of the pollutant load, while the most effective was found to remove 65-100 percent of the pollutant load. For pathogens, the least effective structural BMP type was found to remove <30 percent of the pollutant load, while the most effective was found to remove 65-100 percent of the pollutant load. For metals, the least effective structural BMP type was found to remove 15-45 percent of the pollutant load, while the most effective was found to remove 65-100 percent of the pollutant load.

It is important to note that the CWA and NPDES federal regulations clearly require control of discharges into the MS4. CWA section 402(p)(3)(B)(ii) states that MS4 permits must "prohibit non-storm water discharges into the storm sewers." 40 CFR 122.26(d)(2)(iv)(B) requires Copermittees to "detect and remove […] illicit discharges and improper disposal into the storm sewer." See Finding C.14 and Discussion.

The Order's approach to regulating discharges into and from the MS4 is in accordance with State Water Board Order WQ 2001-15. In that order, the State Water Board reviewed the San Diego County permit (Order No. 2001-01) requirements and made one change to one prohibition.[101] The Order upheld all other requirements of the current permit. Order No. R9-2010-0016 incorporates the one change made by the State Water Board, and continues the approach of Order No. 2001-01 (the basis for the current permit), as it was upheld by the State Water Board in Order WQ 2001-15. State Water Board Order WQ 2001-15 supports such requirements, stating: "It is important to emphasize that dischargers into MS4s continue to be required to implement a full range of BMPs, including source control."

The Court of Appeals, Fourth Appellate District, found that the current permit's approach to regulation of discharges into the MS4 was appropriate. Since the Order utilizes the same approach, the court decision supports the Order's requirements.

Finding D.1.f. Runoff needs to be addressed during the three major phases of urban development (planning, construction, and use) in order to reduce the discharge of storm water pollutants to the MEP, effectively prohibit non-storm water discharges and protect receiving waters. Development which is not guided by water quality planning policies and principles can unnecessarily result in increased pollutant load discharges, flow rates, and flow durations which can negatively impact receiving water beneficial uses. Construction sites without adequate BMP implementation result in sediment runoff rates which greatly exceed natural erosion rates of undisturbed lands, causing

[101] The State Water Board removed the prohibition of discharges *into* the MS4 that cause or contribute to exceedances of water quality objectives. The revision allows for treatment of storm water flows once the pollutants have entered the MS4. It does not affect the effective prohibition on certain dry-weather flows into the MS4 that is required by the Clean Water Act.

siltation and impairment of receiving waters. Existing development generates substantial pollutant loads which are discharged in runoff to receiving waters.

Discussion of Finding D.1.f. MS4 permits are issued to municipalities because of their land use authority. The ultimate responsibility for the pollutant discharges, increased runoff, and inevitable long-term water quality degradation that results from development lies with local governments. This responsibility is based on the fact that it is the local governments that have authorized the development (i.e. conversion of natural pervious ground cover to impervious surfaces) and the land uses that generate the pollutants and runoff. Furthermore, the MS4 through which the pollutants and increased flows are conveyed, and ultimately discharged into natural receiving waters, are owned and operated by the same local governments. In summary, the Copermittees under the Order are responsible for discharges into and out of their MS4s because (1) they own and operate the MS4; and (2) they have the legal authority that authorizes the very development and land uses with generate the pollutants and increased flows in the first place.

For example, since grading cannot commence prior to the issuance of a local grading permit, the Copermittees have a built-in mechanism to ensure that all grading activities are protective of receiving water quality. The Copermittee has the authority to withhold issuance of the grading permit until the project proponent has demonstrated to the satisfaction of the Copermittee that the project will not violate their ordinances or cause the Copermittee to be in violation of its MS4 permit. Since the Copermittee will ultimately be held responsible for any discharges from the grading project by the San Diego Water Board, the Copermittee will want to use its own permitting authority to ensure that whatever measures the Copermittee deems necessary to protect discharges into its MS4 are in fact taken by the project proponent.

The Order holds the local government accountable for this direct link between its land use decisions and water quality degradation. The Order recognizes that each of the three major stages in the development process (development planning, construction, and the use or operational stage) are controlled by and must be authorized by the local government. Accordingly, this permit requires the local government to implement, or require others to implement, appropriate best management practices to reduce storm water pollutant discharges and increased flow during each of the three stages of development.

Including plans for BMP implementation during the design phase of new development and redevelopment offers the most cost effective strategy to reduce storm water runoff pollutant loads to surface waters.[102] The Phase II regulations for small municipalities reflect the necessity of addressing runoff during the early planning phase. Due to the greater water quality concerns generally experienced by larger municipalities, Phase II requirements for small municipalities are also applicable to larger municipalities such as

[102] USEPA, 2000. Storm Water Phase II Compliance Assistance Guide. EPA 833-R-00-002.

the Copermittees. The Phase II regulations direct municipalities to develop, implement, and enforce a program to address storm water runoff from new development and redevelopment projects that disturb greater than or equal to one acre, including projects less than one acre that are part of a larger common plan of development or sale. The program must ensure that controls are in place that would prevent or minimize water quality impacts. This includes developing and implementing strategies which include a combination of structural and/or non-structural BMPs appropriate to the locality. The program must also ensure the adequate long-term operation and maintenance of BMPs.[103] USEPA expands on the Phase II regulations for urban development when it recommends that Copermittees:

> "Adopt a planning process that identifies the municipality's program goals (e.g., minimize water quality impacts resulting from post-construction runoff from new development and redevelopment), implementation strategies (e.g., adopt a combination of structural and/or non-structural BMPs), operation and maintenance policies and procedures, and enforcement procedures. In developing your program, you should consider assessing existing ordinances, policies, programs and studies that address storm water runoff quality."

Management of storm water runoff during the construction phase is also essential. USEPA explains in the preamble to the Phase II regulations that storm water discharges generated during construction activities can cause an array of physical, chemical, and biological water quality impacts. Specifically, the biological, chemical and physical integrity of the waters may become severely compromised due to runoff from construction sites. Fine sediment from construction sites can adversely affect aquatic ecosystems by reducing light penetration, impeding sight-feeding, smothering benthic organisms, abrading gills and other sensitive structures, reducing habitat by clogging interstitial spaces within the streambed, and reducing intergravel dissolved oxygen by reducing the permeability of the bed material. Water quality impairment also results, in part, because a number of pollutants are preferentially absorbed onto mineral or organic particles found in fine sediment. The interconnected process of erosion (detachment of the soil particles), sediment transport, and delivery is the primary pathway for introducing key pollutants, such as nutrients, metals, and organic compounds into aquatic systems.[104]

Finally, storm water and non-storm water runoff from existing development must be addressed. The Copermittees' monitoring data exhibits that significant water quality problems exist in receiving waters which receive runoff from areas with extensive existing development, such as Aliso Creek. Source identification, BMP requirements, inspections, and enforcement are all important measures which can be implemented to address runoff from existing development. USEPA supports inspections and enforcement by municipalities when it states "Effective inspection and enforcement

[103] USEPA, 1999. 40 CFR Parts 9, 122, 123, and 124 National Pollutant Discharge Elimination System-Regulations for Revision of the Water Pollution Control Program Addressing Storm Water Discharges; Final Rule. 64 FR 68845.
[104] Ibid., 64 FR 68728.

requires […] penalties to deter infractions and intervention by the municipal authority to correct violations. Enforcement mechanisms […] also must be described."[105]

Finding D.1.g. Annual reporting requirements included in this Order are necessary to meet federal requirements and to evaluate the effectiveness and compliance of the Copermittees' programs.

Discussion of Finding D.1.g. The annual reporting requirements are consistent with federal NPDES regulation 40 CFR 122.41, which states:

> "The operator of a large or medium municipal separate storm sewer system of a municipal separate storm sewer system that has been designated by the Director under section 122.26(a)(1)(v) of this part must submit an annual report by the anniversary of the date of the issuance of the permit for such a system. The report shall include: (1) The status of implementing the components of the storm water management program that are established as permit conditions; (2) Proposed changes to the storm water management program that are established as permit condition, Such proposed changes shall be consistent with § 122.26(d)(2)iii) of this part; (3) Revisions, if necessary, to the assessment of controls and the fiscal analysis reported in the permit application under § 122.26(d)(2)iv) and (d)(2)(v) of this part; (4) A summary of data, including monitoring data, that is accumulated throughout the reporting year; (5) Annual expenditures and budget for year following each annual report; (6) A summary describing the number and nature of enforcement actions, inspections, and public education programs; and (7) Identification of water quality improvements or degradation."

CWC section 13267 provides that "the regional board may require that any person who has discharged […] shall furnish, under penalty of perjury, technical or monitoring reports which the regional board requires."

The San Diego Water Board must assess the reports to ensure that the Copermittees' programs are adequate to assess and address water quality. The reporting requirements can also be useful tools for the Copermittees to review, update, or revise their programs. Areas or issues which have received insufficient efforts can also be identified and improved.

Finding D.1.h. This Order establishes Storm Water Action Levels (SALs) for selected pollutants based on USEPA Rain Zone 6 (arid southwest) Phase I MS4 monitoring data for pollutants in storm water. The SALs were computed as the 90th percentile of the data set, utilizing the statistical based population approach, one of three approaches recommended by the State Water Board's Storm Water Panel in its report, 'The Feasibility of Numerical Effluent Limits Applicable to Discharges of Storm Water

[105] USEPA, 1992. Guidance Manual for the Preparation of Part II of the NPDES Permit Applications for Discharges from Municipal Separate Storm Sewer Systems. EPA 833-B-92-002.

Associated with Municipal, Industrial and Construction Activities (June 2006). SALs are identified in section D of this Order. Copermittees must implement a timely, comprehensive, cost-effective storm water pollution control program to reduce the discharge of pollutants in storm water from the permitted areas so as not to exceed the SALs. Exceedance of SALs may indicate inadequacy of programmatic measures and BMPs required in this Order.

Discussion of Finding D.1.h. Section 402(p) of the CWA states MS4 permits for storm water shall require controls to reduce the discharge of pollutants to the maximum extent practicable, including management practices, control techniques and system, design and engineering methods, and such other provisions as the Administrator or the State determines appropriate for the control of such pollutants. This includes requiring numeric effluent limitations for storm water.

SALs are not numeric effluent limitations, which is reflected in language which clarifies an excursion above a SAL does not create a presumption that MEP is not being met. Instead, a SAL exceedance is to be used by the Copermittee as an indication that the MS4 storm water discharge point is a definitive "bad actor," and the result from the monitoring needs to be considered as part of the iterative process for reducing pollutants in storm water to the MEP.

The CWA defines effluent limitations as:

> “Any restriction imposed by the Director on quantities, discharge rates, and concentrations of pollutants which are “discharged” from “point sources” into “waters of the United States”…” A SAL is not a restriction on a quantity, rate or concentration, but is a level at which actions that further reduce pollutants from that discharge point need to be evaluated in order to reduce storm water pollutants to the MEP. Thus, SALs are not effluent limitations as defined by the CWC or CWA.

The approach of using "action levels" is consistent with recommendations made by USEPA in their Interim Permitting Approach for Water Quality-Based Effluent Limitations in Storm Water Permits, dated August 26, 1996:

> "Under the Clean Water Act (CWA) and NPDES regulations, permitting authorities may employ a variety of conditions and limitations in storm water permits, including best management practices, performance objectives, narrative conditions, monitoring triggers, action levels (e.g., monitoring benchmarks, toxicity reduction evaluation action levels), etc., as the necessary water-quality based limitations, where numeric water quality based effluent limitations are determined to be unnecessary or infeasible". As such, these action levels are not considered numeric water quality-based effluent limitations.

It should be noted that a purpose of monitoring, required under this and previous Orders, is to aid in the evaluation of implemented programs and BMPs in reducing pollutants in storm water discharges to the MEP. The Monitoring and Reporting Program states:

> This Receiving Waters Monitoring and Reporting Program is intended to meet the following goals:
>
> 2. Measure and improve the effectiveness of the Copermittees' runoff management programs;
> 3. Assess the chemical, physical, and biological impacts to receiving waters resulting from MS4 discharges;
> 4. Characterize storm water discharges;
> 5. Identify sources of specific pollutants;
> 6. Prioritize drainage and sub-drainage areas that need management actions; and
> 9. Provide information to implement required BMP improvements.

Since the first permit (adopted 20 years ago), Copermittees have utilized non-numerical limitations (BMPs) to control and abate the discharge of any pollutants in storm water discharges to the MEP. Copermittees have been accorded 20 years to research, develop, and deploy BMPs that are capable of reducing storm water discharges from the MS4 to levels represented in SALs. Storm Water Action Levels are set at such a level that any exceedance of a SAL will clearly indicate BMPs being implemented are insufficient to protect the Beneficial Uses of waters of the State. Copermittee shall utilize the exceedance information as a high priority consideration when adjusting and executing annual work plans, as required by this Permit. Failure to appropriately consider and react to SAL exceedances in an iterative manner creates a presumption that the Copermittee(s) have not complied to the MEP.

SALs have been developed utilizing Phase I storm water effluent data (updated February 2008, http://rpitt.eng.ua.edu/Research/ms4/mainms4.shtml) from the arid west region (USEPA Rain Zone 6). USEPA Rainfall Zone 6, which includes MS4 effluent data from Orange, San Diego, Los Angeles, Ventura and San Bernadino County. The approach taken to derive SALs is a straightforward percentile approach, with the SAL being set as the 90th percentile of the dataset for each constituent. This approach is consistent with the 2006 State Water Board Panel Report:

> "The statistically based population approach would once again rely on the average distribution of measured water quality values developed from many water quality samples taken for many events at many locations. In this case, however, the Action Level would be defined by the central tendency and variance estimates from the population data. For example, the Action Level could be set as two standard deviations above the mean, i.e. if measured concentrations are consistently higher than two standard deviations above the mean, an Action Level would be triggered. Other population based measures

> of central tendency could be used (i.e. geometric mean, median, etc.) or estimates of variance (i.e. prediction intervals, etc.). Regardless of which population based estimators are used (or percentile from above), the idea would be to identify the [statistically derived] point at which managers feel concentrations are significantly beyond the norm."

SALs are measurable criteria which quantify the performance of BMPs for a particular watershed or subwatershed that discharges storm water MS4 effluent from that particular discharge point. Thus, Copermittees can utilize SAL results to determine the effectiveness BMPs on the effluent from a particular area of the MS4.

SALs represent the lowest 10 percent of pollutant reduction for USEPA Rain Zone 6 MS4 Phase I programs discharging to waters of the United States. For the past 20 years, Copermittees have utilized non-numerical limitations (BMPs) to control and abate the discharge of any pollutants in storm water discharges to the MEP. Copermittees have been accorded 20 years to research, develop, and deploy BMPs that are capable of reducing storm water discharges from the MS4 to levels represented in SALs. Storm Water Action Levels are set at such a level that any exceedance of a SAL will indicate to the Copermittee(s) that the discharge is within the lowest 10% of monitored outfalls. Therefore, an exceedance of a SAL warrants priority consideration within the Copermittee iterative process.

Finding D.2.a. The Standard Storm Water Mitigation Plan (SSMP) requirements contained in this Order are consistent with Order WQ 2000-11 adopted by the State Water Board on October 5, 2000. In the precedential order, the State Water Board found that the design standards, which essentially require that runoff generated by 85 percent of storm events from specific development categories be infiltrated or treated, reflect the MEP standard. The order also found that the SSMP requirements are appropriately applied to the majority of the Priority Development Project categories that are also contained in section F.1 of this Order. The State Water Board also gave California Regional Water Quality Control Boards (Regional Water Boards) the needed discretion to include additional categories and locations, such as retail gasoline outlets (RGOs), in SSMPs.

Discussion of Finding D.2.a. The post-construction requirements and design standards contained in the SSMP section of Order No. R9-2010-0016 constitute MEP consistent with State Water Board guidance, court decisions, and San Diego Water Board requirements. The State Water Board and San Diego Water Board have made several recent decisions in regards to inclusion of SSMP requirements in MS4 permits. In a precedential decision, State Water Board Order WQ 2000-11, the State Water Board found that the SSMP provisions constitute MEP for addressing storm water pollutant discharges resulting from Priority Development Projects. The provisions of the SSMP section of the Order are also consistent with those previously issued by the San Diego Water Board for Riverside County (Order No. R9-2004-001), Southern Orange County (Order Nos. R9-2002-0001 and R9-2009-0002) and San Diego County

(Order Nos. R9-2001-01 and R9-2007-0001), as well as requirements in the Los Angeles County MS4 permit (Order No. R4-2001-182). In State Water Board Order WQ 2001-15, the State Water Board reaffirmed that SSMP requirements constitute MEP. Moreover, the SSMP requirements of the San Diego County MS4 permit (Order No. R9-2001-01) were upheld when the California State Supreme Court declined to hear the matter on appeal.

Finding D.2.b. Controlling runoff pollution by using a combination of onsite source control and site design BMPs augmented with treatment control BMPs before the runoff enters the MS4 is important for the following reasons: (1) Many end-of-pipe BMPs (such as diversion to the sanitary sewer) are typically ineffective during significant storm events; (2) Whereas, onsite source control BMPs can be applied during all runoff conditions end-of-pipe BMPs are often incapable of capturing and treating the wide range of pollutants which can be generated on a sub-watershed scale; (3) End-of-pipe BMPs are more effective when used as polishing BMPs, rather than the sole BMP to be implemented; (4) End-of-pipe BMPs do not protect the quality or beneficial uses of receiving waters between the pollutant source and the BMP; and (5) Offsite end-of-pipe BMPs do not aid in the effort to educate the public regarding sources of pollution and their prevention.

Discussion of Finding D.2.b. Many end-of-pipe BMPs are designed for low flow conditions because their end-of-pipe location prevents them from being designed for large storm events. This results in the end-of-pipe BMPs being overwhelmed, bypassed, or ineffective during larger storm events more frequently than onsite BMPs designed for larger storms. BMPs are also frequently most effective for a particular type of pollutant (such as sediment). Such BMPs may be appropriate for small sites with a limited suite of pollutants generated; however, end-of-pipe BMPs must typically be able to address a wide range of pollutants generated by a sub-watershed, limiting their effectiveness and/or increasing costs. Moreover, the location of some end-of-pipe BMPs allow for untreated pollutants to be discharged to and degrade receiving waters prior to their reaching the BMPs. This fails to protect receiving waters, which is the purpose of BMP implementation. In addition, opportunities to educate the public regarding runoff pollution can be lost when end-of-pipe BMPs are located away from pollutant sources and out of sight. Onsite BMPs can lead to a better public understanding of runoff issues since their presence can provide a visible and/or tangible lesson in pollution prevention.

Finding D.2.c. Use of Low-Impact Development (LID) site design BMPs at new development, redevelopment and retrofit projects can be an effective means for minimizing the impact of storm water runoff discharges from the development projects on receiving waters. LID is a site design strategy with a goal of maintaining or replicating the pre-development hydrologic regime through the use of design techniques. LID site design BMPs help preserve and restore the natural hydrologic cycle of the site, allowing for filtration and infiltration which can greatly reduce the volume, peak flow rate, velocity, and pollutant loads of storm water runoff. Current

runoff management, knowledge, practices and technology have resulted in the use of LID BMPs as an acceptable means of meeting the storm water MEP standard.

Discussion of Finding D.2.c. The CWA is the cornerstone of surface water quality protection in the United States. (The Act does not deal directly with ground water or with water quantity issues.) The statute employs a variety of regulatory and nonregulatory tools to sharply reduce direct pollutant discharges into waterways, and manage polluted runoff. These tools are employed to achieve the broader goal of restoring and maintaining the chemical, physical, and biological integrity of the nation's waters so that they can support the protection and propagation of fish, shellfish, wildlife and recreation in and on the water.

Increasing the volume, velocity, frequency and discharge duration of storm water runoff from developed areas will eventually greatly accelerate downstream erosion, impair stream habitat in natural drainages, and negatively impact beneficial uses. Development and urbanization increase pollutant loads and volume while simultaneously increasing impervious area. Impervious surfaces can neither absorb water nor remove pollutants and thus lose the purification and infiltration provided by naturally vegetated soil. Furthermore, impervious surfaces tend to concentrate pollutants on the top of the surface that are then washed off into the MS4 and waters of the State in a concentrated manner. The use of LID site design BMPs can be an effective means of minimizing the impact of runoff discharges on receiving waters. By reducing water pollution, reducing runoff and increasing groundwater recharge, LID helps to improve the quality of receiving surface waters, stabilize the flow rates of receiving waters (preventing downstream hydromodification), reduce downstream flooding and protect and enhance water supply sources. Current runoff management, knowledge, practice and technology has resulted in the use of LID BMPs as an acceptable means of meeting the MEP standard for storm water treatment.

Current municipal codes may oppose or hinder the design, use and implementation of specific elements of LID. These codes include, but are not limited to, emergency services access requirements, building landscape ordinances, building height limits and parking space requirements. It is essential for Copermittees to work with other responsible agencies and/or update codes that have the potential to impact the use of LID.

The Local Government Commission, a non-profit organization working to build livable communities, developed a set of principles known as the *Ahwahnee Water Principles for Resource-Efficient Land Use*[106] that provide the opportunity to reduce costs and improve the reliability and quality of our water resources. Implementation of LID incorporates several of the Ahwahnee principles such as:

[106] Local Government Commission, "The Ahwahnee Water Principles – A Blueprint for Regional Sustainability", http://water.lgc.org/Members/tony/docs/lgc_water_guide.pdf

1. "Community Design should be compact, mixed use, walkable and transit-oriented so that urban runoff pollutants are minimized and the open lands that absorb water are preserved to the maximum extent possible."
3. "Water holding areas such as creek beds, recessed athletic fields, ponds, cisterns, and other features that serve to recharge groundwater, reduce runoff, improve water quality and decrease flooding should be incorporated into the urban landscape."
4. "All aspects of landscaping from the selection of plants to soil preparation and the installation of irrigation systems should be designed to reduce water demand, retain runoff, decrease flooding, and recharge groundwater."
5. "Permeable surfaces should be used for hardscape. Impervious surfaces such as driveways, streets, and parking lots should be minimized so that land is available to absorb storm water, reduce polluted urban runoff, recharge groundwater and reduce flooding."

The use of LID site design BMPs helps reduce the amount of impervious area associated with development and allows storm water to infiltrate into the soil. Natural vegetation and soil filters storm water runoff and reduces the volume and pollutant loads of storm water. Studies have revealed that the level of imperviousness resulting from development and urbanization is strongly correlated with the water quality impairment of nearby receiving waters.[107] In many cases, the impacts on receiving waters due to changes in hydrology can be more significant than those attributable to the contaminants found in storm water discharges.[108] These impacts include stream bank erosion (increased sediment load and subsequent deposition), benthic habitat degradation, and decreased diversity of macroinvertebrates. Although conventional BMPs do reduce storm water pollutant loads, they may not effectively control adverse effects from changes in the discharge hydrologic conditions.[109]

The Order includes requirements for developments to include site design BMPs that mimic or replicate the natural hydrologic cycle. Open space designs which maximize pervious surfaces and retention of "natural" drainages have been found to reduce both the costs of development and pollutant export.[110] Moreover, USEPA finds including plans for a "natural" site design and BMP implementation during the design phase of new development and redevelopment offers the most cost effective strategy to reduce storm water pollutant loads to surface waters.[111] In addition, a recent U.S. Department of Housing and Urban Development guidance document on low-impact development notes that the use of LID-based storm water management design allows land to be

[107] USEPA, 1999. 40 CFR Parts 9, 122, 123, and 124 National Pollutant Discharge Elimination System – Regulations for Revision of the Water Pollution Control Program Addressing Storm Water Discharges; Final Rule.
[108] Ibid.
[109] USEPA, 2000. Low-Impact Development: A literature review. EPA-841-B-00-005. 35p.
[110] Center for Watershed Protection, 2000. "The Benefits of Better Site Design in Residential Subdivisions." Watershed Protection Techniques. Vol. 3. No. 2.
[111] USEPA, 1999. 40 CFR Parts 9, 122, 123, and 124 National Pollutant Discharge Elimination System – Regulations for Revision of the Water Pollution Control Program Addressing Storm Water Discharges; Final Rule.

developed, but in a cost-effective manner that helps mitigate potential environmental impacts.[112]

Finding D.2.d. RGOs are significant sources of pollutants in storm water runoff. RGOs are points of convergence for motor vehicles for automotive related services such as repair, refueling, tire inflation, and radiator fill-up and consequently produce significantly higher loadings of hydrocarbons and trace metals (including copper and zinc) than other developed areas.

Discussion of Finding D.2.d. RGOs are included in the Order as a Priority Development Project category because RGOs produce significantly greater loadings of hydrocarbons and trace metals (including copper and zinc) than other developed areas. To meet the storm water MEP standard, source control and structural treatment BMPs are needed at RGOs that meet the following criteria: (a) 5,000 square feet or more or (b) an average daily traffic (ADT) of 100 or more vehicles per day. These are appropriate thresholds since vehicular development size and volume of traffic are good indicators of potential impacts of storm water runoff from RGOs on receiving waters.

This finding has been added to satisfy State Water Board Order WQ 2000-11's requirements for including RGOs as a Priority Development Category. State Water Board Order WQ 2000-11 acknowledged that a threshold (size, average daily traffic, etc.) appropriate to trigger SSMP requirements should be developed for RGOs and that specific findings regarding RGOs should be included in MS4 permits to justify the requirement.[113]

Finding D.2.e. Industrial sites are significant sources of pollutants in runoff. Pollutant concentrations and loads in runoff from industrial sites are similar or exceed pollutant concentrations and loads in runoff from other land uses, such as commercial or residential land uses. As with other land uses, LID site design, source control, and treatment control BMPs are needed at industrial sites in order to meet the MEP standard. These BMPs are necessary where the industrial site is larger than 10,000 square feet. The 10,000 square feet threshold is appropriate, since it is consistent with requirements in other Phase I NPDES storm water regulations throughout California.

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[112] U.S. Department of Housing and Urban Development, Office of Policy Development and Research, 2003. "The Practice of Low Impact Development." Prepared by: NAHB Research Center, Inc. Upper Marlboro, Maryland. Contract No. H-21314CA. 131p.

[113] State Water Board, 2000. Order WQ 2000-11. In the Matter of the Petitions of The Cities Of Bellflower, Et Al., The City Of Arcadia, And Western States Petroleum Association Review of January 26, 2000 Action of the Regional Board And Actions and Failures to Act by both the California Regional Water Quality Control Board, Los Angeles Region and Its Executive Officer Pursuant to Order No. 96-054, Permit for Municipal Storm Water and Urban Run-Off Discharges Within Los Angeles County [NPDES NO. CAS614001] SWRCB/OCC FILES A-1280, A-1280(a) and A-1280(b)

Discussion of Finding D.2.e. Industrial sites can be a significant source of pollutants in storm water runoff. In an extensive review of storm water literature, the Los Angeles Water Board found widespread support for the finding that "industrial and commercial activities can also be considered hot spots as sources of pollutants." It also found that "industrial and commercial areas were likely to be the most significant pollutant source areas" of heavy metals.[114] Likewise, storm water runoff from heavy industry in the Santa Clara Valley has been found to be extremely toxic.[115] These findings are corroborated by USEPA, which states in the preamble to the 1990 Phase I NPDES storm water regulations that "Because storm water from industrial facilities may be a major contributor of pollutants to municipal separate storm sewer systems, municipalities are obligated to develop controls for storm water discharges associated with industrial activity through their system in their storm water management program." Since heavy industrial sites can be a significant source of pollutants in runoff in a manner similar to other SSMP project categories such as commercial development or automotive repair shops, it is appropriate to include heavy industrial sites as a SSMP category in the Order.

The Phase I NPDES storm water regulations require the Copermittees to "control through ordinance, permit, contract, order, or similar means, the contribution of pollutants to the municipal storm sewer by storm water discharges associated with industrial activity and the quality of storm water discharged from sites of industrial activity" (40 CFR 122.26(d)(2)(i)). In addition, it has been established that the MEP standard for the control of storm water runoff from new development projects includes incorporation of the SSMP requirements. Since the Copermittees must both control storm water pollutants from industrial sites and meet the storm water MEP standard for new development, it is appropriate to apply the SSMP requirements to heavy industrial sites.

The State Water Board's Order WQ 2000-11 indicates that it is appropriate to apply SSMP requirements to categories of development where evidence shows the category of development can be a significant source of pollutants. As evidenced above, heavy industrial sites can be a significant source of pollutants. Therefore, the Order includes heavy industrial sites as a SSMP Priority Development Project category.

Finding D.2.f. If not properly designed or maintained, certain BMPs implemented or required by municipalities for runoff management may create a habitat for vectors (e.g. mosquitoes and rodents). Proper BMP design and maintenance to avoid standing water, however, can prevent the creation of vector habitat. Nuisances and public health impacts resulting from vector breeding can be prevented with close collaboration and cooperative effort between municipalities, local vector control agencies, and the California Department of Public Health during the development and implementation of runoff management programs.

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[114] Los Angeles Water Board. 2001.
[115] Schueler and Holland, 2000. Storm Water Strategies for Arid and Semi-Arid Watersheds (Article 66). The Practice of Watershed Protection.

Discussion of Finding D.2.f. The implementation of certain structural BMPs or other runoff treatment systems can result in significant vector problems in the form of increased breeding or harborage habitat for mosquitoes, rodents or other potentially disease transmitting organisms. The implementation of BMPs that retain water may provide breeding habitat for a variety of mosquito species, some of which have the potential to transmit diseases such as Western Equine Encephalitis, St. Louis Encephalomyelitis, and malaria. Recent BMP implementation studies by Caltrans[116] in District 7 and District 11 have demonstrated mosquito breeding associated with some types of BMPs. The Caltrans BMP Retrofit Pilot study cited lack of maintenance and improper design as factors contributing to mosquito production. However, a Watershed Protection Techniques article describes management techniques for selecting, designing, and maintaining structural treatment BMPs to minimize mosquito production.[117] State and local runoff management programs that include structural BMPs with the potential to retain water have been implemented in Florida and the Chesapeake Bay region without resulting in significant public health threats from mosquitoes or other vectors.[118]

Finding D.2.g. The increased volume, velocity, frequency and discharge duration of storm water runoff from developed areas has the potential to greatly accelerate downstream erosion, impair stream habitat in natural drainages, and negatively impact beneficial uses. Development and urbanization increase pollutant loads in storm water runoff and the volume of storm water runoff. Impervious surfaces can neither absorb water nor remove pollutants and thus lose the purification and infiltration provided by natural vegetated soil. Hydromodification measures for discharges to hardened channels allow for the future restoration of the hardened channels to their natural state, thereby restoring the chemical, physical, and biological integrity and beneficial uses of local receiving waters.

Discussion of Finding D.2.g. Increasing the volume, velocity, frequency and discharge duration of storm water runoff from developed areas will eventually greatly accelerate downstream erosion, impair stream habitat in natural drainages, and negatively impact beneficial uses. Development and urbanization increase pollutant loads and volume while simultaneously increasing impervious area. Impervious surfaces can neither absorb water nor remove pollutants and thus lose the purification and infiltration provided by naturally vegetated soil.

Historic hydromodification impacts, such as concrete lining and channelization, have impacted the natural physical habitat of urban streams resulting in low IBI scores. The Copermittee's monitoring to date indicates decreased IBI scores in the developed

[116] Caltrans, 2000. BMP Retrofit Pilot Studies: A Preliminary Assessment of Vector Production.
[117] Watershed Protection Techniques, 1995. Mosquitoes in Constructed Wetlands: A Management Bugaboo? 1(4):203-207.
[118] Shaver, E. and R. Baldwin , 1995. Sand Filter Design for Water Quality Treatment in Herricks, E., Ed. Stormwater Runoff and Receiving Systems: Impact, Monitoring, and Assessment, CRC Lewis Publishers, New York, NY.

watersheds when compared to reference sites, with developed sites consistently having poor or very poor IBI scores. While habitat scores remained stable over the last reporting period, with scores of marginal to sub-optimal, the Copermittees have consistently monitored high levels of fine sediment in habitat assessments and often changing vegetative cover. However, the impact of persistent toxicity at the bioassessment stations in conjunction with physical habitat scores is unknown.[119]

Hydromodification impacts result in poor physical habitat conditions through streambed scour, erosion, vegetation displacement, sediment deposition, channelization, and channel modifications. Increased sediment loads from hydromodification causes other impacts to physical habitats including increased turbidity which then may cause increased temperatures. In addition, an increased sediment load may have an increased biological content thereby increasing the sediment oxygen demand and lowering the dissolved oxygen available for aquatic life.[120]

The objective of the CWA is "to restore and maintain the chemical, *physical,* and biological integrity of the Nation's waters (emphasis added)." Stream restoration by removing concrete and other unnatural materials is a major step toward achieving that objective. The success of future stream restoration and stabilization is, however, dependent on preventing and reducing physical impacts from activities upstream. Therefore, hydromodification management measures are necessary upstream of modified (e.g. concrete, rip rap, etc.) channels in addition to non-modified channels.

Please see discussion of Findings C.10 and C.11 for additional information about impacts due to increasing volume, velocity, frequency and discharge duration of storm water runoff from developed areas.

Finding D.3.a. In accordance with federal NPDES regulations and to ensure the most effective oversight of industrial and construction site discharges, discharges of runoff from industrial and construction sites are subject to dual (State and local) storm water regulation. Under this dual system, each Copermittee is responsible for enforcing its local permits, plans, and ordinances, and the San Diego Water Board is responsible for enforcing the General Construction Activities Storm Water Permit, State Water Board Order 2009-0009-DWQ, NPDES No. CAS000002 (General Construction Permit) and the General Industrial Activities Storm Water Permit, State Water Board Order97-03-DWQ, NPDES No. CAS000001 (General Industrial Permit). NPDES municipal regulations require that municipalities develop and implement measures to address runoff from industrial and construction activities. Those measures may include the implementation of other BMPs in addition to those BMPs that are required under the statewide general permits for activities subject to both State and local regulation.

[119] Riverside County Copermittees, 2008-2009 Santa Margarita Watershed Annual Report.
[120] USEPA, National Management Measures to Control Nonpoint Source Pollution from Hydromodification, EPA 841-B-07-002, July 2007.

Discussion of Finding D.3.a. USEPA finds the control of pollutant discharges from industry and construction so important to receiving water quality that it has established a double system of regulation over industrial and construction sites. This double system of regulation consists of two parallel regulatory systems with the same common objective: to keep pollutants from industrial and construction sites out of the MS4. In this double system of regulation for runoff from industrial and construction sites, local governments must enforce their legal authorities (i.e. local ordinances and permits) while the San Diego Water Board must enforce its legal authority (i.e. statewide general industrial and construction storm water permits). These two regulatory systems are designed to complement and support each other. Municipalities are not required to enforce San Diego Water Board and State Water Board permits. They are required, however, to enforce their ordinances and permits. The Federal regulations are clear that municipalities have responsibility to prevent non-storm water and address storm water runoff from industrial and construction sites which enters their MS4s.

Municipalities have this responsibility because they have the authority to issue land use and development permits. Since municipalities are the lead permitting authority for industrial land use and construction activities, they are also the lead for enforcement regarding runoff discharges from these sites. For sites where the municipality is the lead permitting authority, the San Diego Water Board will work with the municipality and provide support where needed. The San Diego Water Board will assist municipalities in enforcement against non-compliant sites after the municipality has exhibited a good faith effort to bring the site into compliance.

According to USEPA, the storm water regulations envision that NPDES permitting authorities and municipal operators will cooperate to develop programs to monitor and control pollutants in storm water discharges from industrial facilities.[121] USEPA discusses the "dual regulation" of construction sites in its Storm Water Phase II Compliance Assistance Guide, which states "Even though all construction sites that disturb more than one acre are covered nationally by an NPDES storm water permit, the construction site runoff control minimum measure […] is needed to induce more localized site regulation and enforcement efforts, and to enable operators […] to more effectively control construction site discharges into their MS4s."[122] While the Storm Water Phase II Compliance Assistance Guide applies to small municipalities, it is applicable to the Copermittees, because they are similar in size and have the potential to discharge similar pollutant types as Phase II municipalities.

Finding D.3.b. Identification of sources of pollutants in runoff (such as municipal areas and activities, industrial and commercial sites/sources, construction sites, and residential areas), development and implementation of BMPs to address those

[121] USEPA, 1992. Guidance Manual for the Preparation of Part II of the NPDES Permit Applications for Discharges from Municipal Separate Storm Sewer Systems. EPA 833-B-92-002.
[122] USEPA, 2000. Storm Water Phase II Compliance Assistance Guide. EPA 833-R-00-002.

sources, and updating ordinances and approval processes are necessary for the Copermittees to ensure that discharges of pollutants from its MS4 in storm water are reduced to the MEP and that non-storm water discharges are not occurring. Inspections and other compliance verification methods are needed to ensure minimum BMPs are implemented. Inspections are especially important at areas that are at high risk for pollutant discharges.

Discussion of Finding D.3.b. Source identification is necessary to characterize the nature and extent of pollutants in discharges and to develop appropriate BMPs. It is the first step in a targeted approach to runoff management. Source identification helps identify the location of potential sources of pollutants in runoff. Pollutants found to be present in receiving waters can then be traced to the sites which frequently generate such pollutants. In this manner source inventories can help to target inspections, monitoring, and potential enforcement. This allows for limited inspection, monitoring, and enforcement time to be most effective. USEPA supports source identification as a concept when it recommends construction, municipal, and industrial source identification in guidance and the federal regulations.[123,124]

The development of BMPs for identified sources will help ensure that appropriate, consistent controls are implemented at all types of development and areas. Copermittees must reduce the discharge of pollutants in storm water runoff to the maximum extent practicable. To achieve this level of pollutant reduction, BMPs must be implemented. Designation of minimum BMPs helps ensure that appropriate BMPs are implemented for various sources. These minimum BMPs also serve as guidance as to the level of water quality protection required. USEPA requires development and implementation of BMPs for construction, municipal, commercial, industrial, and residential sources at 40 CFR 122.26(d)(2)(iv)(A-D).

Updating ordinances and approval processes is necessary in order for the Copermittees to control discharges to their MS4s. USEPA supports updating ordinances and approval processes when it states "A crucial requirement of the NPDES storm water regulation is that a municipality must demonstrate that it has adequate legal authority to control the contribution of pollutants in storm water discharged to its MS4. […] In order to have an effective municipal storm water management program, a municipality must have adequate legal authority to control the contribution of pollutants to the MS4. […] 'Control,' in this context, means not only to require disclosure of information, but also to limit, discourage, or terminate a storm water discharge to the MS4."[125]

[123] USEPA, 1992. Guidance Manual for the Preparation of Part II of the NPDES Permit Applications for Discharges from Municipal Separate Storm Sewer Systems. EPA 833-B-92-002.
[124] 40 CFR 122.26(d)(2)(ii)
[125] USEPA, 1992. Guidance Manual for the Preparation of Part II of the NPDES Permit Applications for Discharges from Municipal Separate Storm Sewer Systems. EPA 833-B-92-002.

Inspections provide a necessary means for the Copermittees to evaluate compliance of pollutant sources with their municipal ordinances and minimum BMP requirements. USEPA supports inspections when it recommends inspections of construction, municipal, and industrial sources.[126] Inspection of high risk sources are especially important because of the ability of frequent inspections to help ensure compliance, thereby reducing the risk associated with such sources. USEPA suggests that inspections can improve compliance when it states "Effective inspection and enforcement requires […] penalties to deter infractions and intervention by the municipal authority to correct violations."[127]

Finding D.3.c. Historic and current development makes use of natural drainage patterns and features as conveyances for runoff. Urban streams used in this manner are part of the municipalities MS4s regardless of whether they are natural, anthropogenic, or partially modified features. In these cases, the urban stream is both an MS4 and receiving water.

Discussion of Finding D.3.c. An MS4 is defined in the federal regulations as a conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, or storm drains), owned or operated by a Copermittee, and designed or used for collecting or conveying runoff.[128] Natural drainage patterns and urban streams are frequently used by municipalities to collect and convey runoff away from development within their jurisdiction. Therefore, the San Diego Water Board considers natural drainages that are used for conveyances of runoff, regardless of whether or not they've been altered by the municipality, as both part of the MS4s and as receiving waters. To clarify, an unaltered natural drainage, which receives runoff from a point source (channeled by a Copermittee to drain an area within their jurisdiction), which then conveys the runoff to an altered natural drainage or a man-made MS4, is both an MS4 and a receiving water.[129]

Finding D.3.d. As operators of the MS4s, the Copermittees cannot passively receive and discharge pollutants from third parties. By providing free and open access to an MS4 that conveys discharges to waters of the U.S., the operator essentially accepts responsibility for discharges into the MS4 that it does not prohibit or otherwise control. These discharges may cause or contribute to a condition of contamination or a violation of water quality standards.

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[126] Ibid.
[127] USEPA, 1992. Guidance Manual for the Preparation of Part II of the NPDES Permit Applications for Discharges from Municipal Separate Storm Sewer Systems. EPA 833-B-92-002.
[128] USEPA, 2000. EPA Administered Permit Programs: The National Pollutant Discharge Elimination System. Code of Federal Regulations, Vol. 40, Part 122.
[129] San Diego Water Board, 2001. Response in Opposition to Petitions for Review of California Regional Water Quality Control Board San Diego Region Order No. 2001-01 – NPDES Permit No. CAS0108758 (San Diego Municipal Storm Water Permit).

Discussion of Finding D.3.d. CWA section 402(p) requires operators of MS4s to prohibit non-storm water discharges into their MS4s. This is necessary because pollutants which enter the MS4 generally are conveyed through the MS4 to be eventually discharged into receiving waters. If a municipality does not prohibit non-storm water discharges, it is providing the pathway (its MS4) which enables pollutants to reach receiving waters. Since the municipality's storm water management service can result in pollutant discharges to receiving waters, the municipality must accept responsibility for the water quality consequences resulting from this service. Furthermore, third party discharges can cause a municipality to be out of compliance with its permit. Since pollutants from third parties which enter the MS4 will eventually be discharged from the MS4 to receiving waters, the third party discharges can result in a situation of municipality non-compliance if the discharges lead to an exceedance of water quality standards. For these reasons, each Copermittee must prohibit and/or control discharges from third parties to its MS4. USEPA supports this concept when it states "the operators of regulated small MS4s cannot passively receive and discharge pollutants from third parties" and "the operator of a small MS4 that does not prohibit and/or control discharges into its system essentially accepts 'title' for those discharges. At a minimum, by providing free and open access to the MS4s that convey discharges to the waters of the United States, the municipal storm sewer system enables water quality impairment by third parties."[130]

In a recent decision issued for *United States v. Washington State Department of Transportation (WSDOT)*,[131] the court found that WSDOT, by allowing runoff from its MS4 to a receiving water that is part of a Superfund site, is an "arranger" of "disposal or treatment of hazardous substances" as defined under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) by "designing, constructing, and operating drainage systems whose sole function was to collect highway runoff and dispose of it into nearby water-bodies." The court went on to state that "WSDOT did design the drainage system and…has the ability to redirect, contain or treat its contaminated runoff."

Finding D.3.e. Waste and pollutants which are deposited and accumulate in MS4 drainage structures will be discharged from these structures to waters of the U.S. unless they are removed. These discharges may cause or contribute to, or threaten to cause or contribute to, a condition of pollution in receiving waters. For this reason, pollutant discharges from storm water into MS4s must be reduced using a combination of management measures, including source control and an effective MS4 maintenance program implemented by each Copermittee.

Discussion of Finding D.3.e. When rain falls and drains freeways, industries, construction sites, and neighborhoods, it picks up a multitude of pollutants. Gravity flow transports the pollutants to the MS4. Illicit discharges and connections also can

[130] Federal Register / Vol. 64, No. 235 / Wednesday, December 8, 1999 / Rules and Regulations. P. 68765-68766.
[131] United State District Court, Western District of Washington at Tacoma, Case No. C08-5722RJB, Order on Motions for Partial Summary Judgment, dated June 7, 2010.

contribute a significant amount of pollutants to MS4s. MS4s are commonly designed to convey their contents as quickly as possible. Due to the resulting typically high flow rates within the concrete conveyance systems of MS4s, pollutants which enter or are deposited in the MS4 and not removed are generally flushed unimpeded through the MS4 to waters of the United States. Since treatment generally does not occur within the MS4, in such cases reduction of storm water pollutants to the MEP must occur prior to discharges entering the MS4.

The importance of this concept is supported by the tons of wastes/pollutants that have been removed from the Copermittees' MS4s as reported in their ROWD.[132] Moreover, these pollutants will be discharged into receiving waters unless an effective MS4 and structural treatment BMP maintenance program is implemented by the Copermittees. The requirement for Copermittees to conduct a MS4 maintenance program is specifically directed in both the Phase I and Phase II storm water regulations. Regarding MS4 cleaning, USEPA states "The removal of sediment, decaying debris, and highly polluted water from catch basins has aesthetic and water quality benefits, including reducing foul odors, reducing suspended solids, and reducing the load of oxygen-demanding substances that reach receiving waters."[133] It goes on to say, "Catch basin cleaning is an efficient and cost-effective method for preventing the transport of sediment and pollutants to receiving water bodies." USEPA also finds that "Lack of maintenance often limits the effectiveness of storm water structural controls such as detention/retention basins and infiltration devices. […] The proposed program should provide for maintenance logs and identify specific maintenance activities for each class of control, such as removing sediment from retention ponds every five years, cleaning catch basins annually, and removing litter from channels twice a year."[134]

Finding D.3.f. Enforcement of local runoff related ordinances, permits, and plans is an essential component of every runoff management program and is specifically required in the federal storm water regulations and this Order. Each Copermittee is individually responsible for adoption and enforcement of ordinances and/or policies, implementation of identified control measures/BMPs needed to prevent or reduce pollutants in storm water runoff, and for the allocation of funds for the capital, operation and maintenance, administrative, and enforcement expenditures necessary to implement and enforce such control measures/BMPs under its jurisdiction. Education is an important aspect of every effective runoff management program and the basis for changes in behavior at a societal level. Education of municipal planning, inspection, and maintenance department staffs is especially critical to ensure that in-house staffs understand how their activities impact water quality, how to accomplish their jobs while protecting water quality, and understand their specific roles and responsibilities for compliance with this Order. Public education, designed to target various urban land

[132] Riverside County Copermittees. 2009. Report of Waste Discharge (San Diego Region).
[133] USEPA, 1999. Storm Water O&M Fact Sheet, Catch Basin Cleaning. EPA 832-F-99-011.
[134] USEPA, 1992. Guidance Manual for the Preparation of Part II of the NPDES Permit Applications for Discharges from Municipal Separate Storm Sewer Systems. EPA 833-B-92-002.

users and other audiences, is also essential to inform the public of how individual actions affect receiving water quality and how adverse effects can be minimized.

Discussion of Finding D.3.f. The Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(A – D) are clear in placing responsibility on municipalities for control of runoff from third party activities and land uses to their MS4.[135] In order for municipalities to assume this responsibility, they must implement ordinances, permits, and plans addressing runoff from third parties. Assessments for compliance with their ordinances, permits, and plans are essential for a municipality to ensure that third parties are not causing the municipality to be in violation of its municipal storm water permit. When conditions of non-compliance are determined, enforcement is necessary to ensure that violations of municipality ordinances and permits are corrected. When the Copermittees determine a violation of its storm water ordinance, it must pursue correction of the violation. Without enforcement, third parties do not have incentive to correct violations. USEPA supports enforcement by municipalities when it states "Effective inspection and enforcement requires […] penalties to deter infractions and intervention by the municipal authority to correct violations. Enforcement mechanisms […] also must be described."[136]

Education is a critical BMP and an important aspect of runoff management programs. USEPA finds that "An informed and knowledgeable community is critical to the success of a storm water management program since it helps ensure the following: Greater support for the program as the public gains a greater understanding of the reasons why it is necessary and important, [and] greater compliance with the program as the public becomes aware of the personal responsibilities expected of them and others in the community, including the individual actions they can take to protect or improve the quality of area waters."[137]

Regarding target audiences, USEPA also states "The public education program should use a mix of appropriate local strategies to address the viewpoints and concerns of a variety of audiences and communities, including minority and disadvantaged communities, as well as children."

Finding D.3.g. Public participation during the development of runoff management programs is necessary to ensure that all stakeholder interests and a variety of creative solutions are considered.

Discussion of Finding D.3.g. This finding is supported by the Phase II Storm Water Regulations, which state "early and frequent public involvement can shorten implementation schedules and broaden public support for a program." USEPA goes

[135] USEPA, 2000. EPA Administered Permit Programs: The National Pollutant Discharge Elimination System. Code of Federal Regulations, Vol. 40, Part 122.
[136] USEPA, 1992. Guidance Manual for the Preparation of Part II of the NPDES Permit Applications for Discharges from Municipal Separate Storm Sewer Systems. EPA/833-B-92-002.
[137] USEPA, 2000. Storm Water Phase II Compliance Assistance Guide. EPA 833-R-00-002.

on to explain, "Public participation is likely to ensure a more successful storm water program by providing valuable expertise and a conduit to other programs and governments."[138]

Finding D.3.h. Retrofitting existing development with storm water treatment controls, including LID, is necessary to address storm water discharges from existing development that may cause or contribute to a condition of pollution or a violation of water quality standards. Although SSMP BMPs are required for redevelopment, the current rate of redevelopment will not address water quality problems in a timely manner. Cooperation with private landowners is necessary to effectively identify, implement, and maintain retrofit projects for the preservation, restoration, and enhancement of water quality.

Discussion of Finding D.3.h. Existing BMPs are not sufficient to protect the Beneficial Uses of receiving waters from storm water MS4 discharges, as evidenced by 303(d) listings and exceedances of Water Quality Objectives from the Copermittees' monitoring reports. As recognized in USEPA guidance, waters in the region cannot be protected without also addressing degradation caused by storm water discharges from existing development. This requires more than just a new development and redeveloped sites program, which at best can only hold the line. For this reason USEPA recommends that storm water programs include a retrofit plan or program for retrofitting existing development.[139]

Implementing more advanced BMPs, including the retrofitting of existing development with LID BMPs, is part of the iterative process. Based on the current rate of redevelopment compared to existing BMPs, the use of LID only on new and redevelopment will not adequately address current water quality problems, including downstream hydromodification. Retrofitting existing development is practicable for a municipality through a systematic evaluation, prioritization and implementation plan focused on impaired water bodies, pollutants of concern, areas of downstream hydromodification, feasibility and effective communication and cooperation with private property owners.

To actually improve the quality of receiving waters, discharges from existing developed sites need to be mitigated, which generally means implementation of measures to retrofit existing development sites with storm water control measures that can retain and/or treat storm water on site. Retrofitting existing development is possible and reasonable to significantly improve water quality in receiving waters.

Successful retrofitting programs have been implemented in such diverse locations as Seattle, Washington[140]; Portland, Oregon[141], Santa Monica, California[142]; Kansas City,

[138] Federal Register / Vol. 64, No. 235 / Wednesday, December 8, 1999 / Rules and Regulations. P. 68755.
[139] USEPA, 2010. MS4 Permit Improvement Guide. EPA 833-R-10-001.
[140] SEA Street, http://www.seattle.gov/dpd/Planning/CityDesign/What_We_Do/Outreach/Folio/DPDS_008014.asp
[141] Clean River Rewards, http://www.portlandonline.com/BES/index.cfm?c=edeef

Kansas[143]; and Montgomery County, MD[144]. When appropriately applied as in this Order, retrofitting existing development meets MEP.

Finding D.4.a. Since runoff within a watershed can flow from and through multiple land uses and political jurisdictions, watershed-based runoff management can greatly enhance the protection of receiving waters. Such management provides a means to focus on the most important water quality problems in each watershed. By focusing on the most important water quality problems, watershed efforts can maximize protection of beneficial use in an efficient manner. Effective watershed-based runoff management actively reduces pollutant discharges and abates pollutant sources causing or contributing to watershed water quality problems. Watershed-based runoff management that does not actively reduce pollutant discharges and abate pollutant sources causing or contributing to watershed water quality problems can necessitate implementation of the iterative process outlined in section A.3 of the this Order. Watershed management of runoff does not require Copermittees to expend resources outside of their jurisdictions. In some cases, however, this added flexibility provides more, and possibly more effective, alternatives for minimizing waste discharges. Watershed management requires the Copermittees within a watershed to develop a watershed-based management strategy, which can then be implemented on a jurisdictional basis.

Discussion of Finding D.4.a. In recent years, addressing water quality issues from a watershed perspective has increasingly gained attention. Regarding watershed-based permitting, the USEPA *Watershed-Based NPDES Permitting Policy Statement* issued on Jan. 7, 2004 states the following:

> USEPA continues to support a holistic watershed approach to water quality management. The process for developing and issuing NPDES permits on a watershed basis is an important tool in water quality management. USEPA believes that developing and issuing NPDES permits on a watershed basis can benefit all watershed stakeholders, from the NPDES permitting authority to local community members. A watershed-based approach to point source permitting under the NPDES program may serve as one innovative tool for achieving new efficiencies and environmental results. USEPA believes that watershed-based permitting can:
>
> - Lead to more environmentally effective results;
> - Emphasize measuring the effectiveness of targeted actions on improvements in water quality;
> - Provide greater opportunities for trading and other market based approaches;

[142] City of Santa Monica, Urban Runoff program, http://www.smgov.net/Departments/OSE/categories/content.aspx?id=4007
[143] 10,000 Rain Gardens, http://www.rainkc.com/
[144] Rainscapes, http://www.montgomerycountymd.gov/Content/DEP/Rainscapes/home.html

- Reduce the cost of improving the quality of the nation's waters;
- Foster more effective implementation of watershed plans, including total maximum daily loads (TMDLs); and
- Realize other ancillary benefits beyond those that have been achieved under the CWA (e.g., facilitate program integration including integration of Clean Water Act and Safe Drinking Water Act programs).

Watershed-based permitting is a process that ultimately produces NPDES permits that are issued to point sources on a geographic or watershed basis. In establishing point source controls in a watershed-based permit, the permitting authority may focus on watershed goals, and consider multiple pollutant sources and stressors, including the level of nonpoint source control that is practicable. In general, there are numerous permitting mechanisms that may be used to develop and issue permits within a watershed approach.

This USEPA guidance is in line with State Water Board and San Diego Water Board watershed management goals. For example, the State Water Board's TAC recommends watershed-based water quality protection, stating "Municipal permits should have watershed specific components." The TAC further recommends that "All NPDES permits and Waste Discharge Requirements should be considered for reissuance on a watershed basis."

In addition, the Basin Plan states that "public agencies and private organizations concerned with water resources have come to recognize that a comprehensive evaluation of pollutant contributions on a watershed scale is the only way to realistically assess cumulative impacts and formulate workable strategies to truly protect our water resources. Both water pollution and habitat degradation problems can best be solved by following a basin-wide approach."

In light of USEPA's policy statement and the State Water Board's and San Diego Water Board's watershed management goals, the San Diego Water Board seeks to expand watershed management in the regulation of runoff from the MS4. Watershed-based MS4 permits can provide for more effective receiving water quality protection by focusing on specific water quality problems. The entire watershed for the receiving water can be assessed, allowing for critical areas and practices to be targeted for corrective actions. Known sources of pollutants of concern can be investigated for potential water quality impacts. Problem areas can then be addressed, leading to eventual improvements in receiving water quality. Management of runoff on a watershed basis allows for specific water quality problems to be targeted so that efforts result in maximized water quality improvements.[145]

[145] San Diego Water Board, 2004. San Diego County Municipal Storm Water Permit Reissuance Analysis Summary. P. 1.

Finding D.4.b. Some runoff issues, such as general education and training, can be effectively addressed on a regional basis. Regional approaches to runoff management can improve program consistency and promote sharing of resources, which can result in implementation of more efficient programs.

Discussion of Finding D.4.b. Copermittees in Riverside County participate in several runoff-related activities whose scope extends beyond the area subject to this Order. These include countywide activities (e.g., portions of Riverside County fall under the jurisdictions of the Santa Ana Water Board and California Regional Water Quality Control Board, Colorado River Region (Colorado River Water Board)), southern California, and statewide activities. Copermittees' participation in these regional activities is generally directed at improving management capability, preventing redundancy and taking advantage of economies of scale. For instance, Copermittees seek to develop consistency between watershed and/or jurisdictional programs (e.g., through standards development), and to collaborate on certain program activities such as education, training, and monitoring.

Finding D.4.c. It is important for the Copermittees to coordinate their water quality protection and land use planning activities to achieve the greatest protection of receiving water bodies. Copermittee coordination with other watershed stakeholders, especially the State of California Department of Transportation, the U.S. federal government, sovereign American Indian tribes, and water and sewer districts, is also important.

Discussion of Finding D.4.c. Conventional planning and zoning can be limited in their ability to protect the environmental quality of creeks, rivers, and other water bodies. Watershed-based planning is often ignored, despite the fact that receiving waters unite land by collecting runoff from throughout the watershed. Since watersheds unite land, they can be used as an effective basis for planning. Watershed-based planning enables local and regional areas to realize economic, social, and other benefits associated with growth, while conserving the resources needed to sustain such growth, including water quality.

This type of planning can involve four steps: (1) Identify the watersheds shared by the participating jurisdictions; (2) Identify, assess, and prioritize the natural, social, and other resources in the watersheds; (3) Prioritize areas for growth, protection, and conservation, based on prioritized resources; and (4) Develop plans and regulations to guide growth and protect resources. Local governments have started with simple, yet effective, steps toward watershed planning, such as adopting a watershed-based planning approach, articulating the basic strategy in their General Plans, and beginning to pursue the basic strategy in collaboration with neighboring local governments who share the watersheds. Examples of new mechanisms created to facilitate watershed-based planning and zoning include the San Francisquito Creek

Watershed Coordinated Resource Management Process and the Santa Clara Basin Watershed Management Initiative.[146]

[146] Bay Area Stormwater Management Agencies Association., 1999. Start at the Source. Forbes Custom Publishing. Available on-line at: http://www.scvurppp-w2k.com/basmaa_satsm.htm

E. Statute and Regulatory Considerations

Finding E.1. The RWL language specified in this Order is consistent with language recommended by the USEPA and established in State Water Board Order WQ-99-05, *Own Motion Review of the Petition of Environmental Health Coalition to Review Waste Discharge Requirements Order No. 96-03, NPDES Permit No. CAS0108740*, adopted by the State Water Board on June 17, 1999. The RWL language in this Order requires compliance with water quality standards, which for storm water discharges is to be achieved through an iterative approach requiring the implementation of improved and better-tailored BMPs over time. Compliance with receiving water limitations based on applicable water quality standards is necessary to ensure that MS4 discharges will not cause or contribute to violations of water quality standards and the creation of conditions of pollution, contamination, or nuisance.

Discussion of Finding E.1. The RWL language in the Order requires storm water compliance with water quality standards through an iterative approach for implementing improved and better-tailored BMPs over time. The iterative BMP process requires the implementation of increasingly stringent BMPs until receiving water quality standards are achieved. This is necessary because implementation of BMPs alone cannot ensure attainment of receiving water quality standards. For example, a BMP that is effective in one situation may not be applicable in another. An iterative process of BMP development, implementation, and assessment is needed to promote consistent compliance with receiving water quality objectives. If assessment of a given BMP confirms that the BMP is ineffective, the iterative process should be restarted, with redevelopment of a new BMP that is anticipated to result in compliance with receiving water quality objectives.

The issue of whether storm water discharges from MS4s must meet water quality standards has been intensely debated in past years. The argument arises because CWA section 402(p) fails to clearly state that municipal dischargers of storm water must meet water quality standards. On the issue of industrial discharges of storm water, the statute clearly indicates that industrial dischargers must meet both (1) the technology-based standard of “best available technology economically achievable (BAT)” and (2) applicable water quality standards. On the issue of municipal discharges however, the statute states that municipal dischargers must meet (1) the technology-based standard of MEP” and (2) “such other provisions that the Administrator or the State determines appropriate for the control of such pollutants.” The statute fails, however, to specifically state that municipal dischargers must meet water quality standards.

As a result, the municipal storm water dischargers have argued that they do not have to meet water quality standards; and that they only are required to meet MEP for storm water. Environmental interest groups maintain that not only do MS4 discharges have to meet water quality standards, but that MS4 permits must also comply with numeric effluent limitations for the purpose of meeting water quality standards. On the issue of

water quality standards, USEPA, the State Water Board, and the San Diego Water Board have consistently maintained that MS4s must indeed comply with water quality standards. On the issue of whether water quality standards must be met by numeric effluent limitations, USEPA, the State Water Board (in Orders WQ 91-03 and WQ 91-04), and the San Diego Water Board have maintained that MS4 permits can contain narrative requirements for the implementation of BMPs in place of numeric effluent limitations for storm water discharges.[147]

In addition to relying on USEPA's legal opinion concluding that MS4s must meet MEP for storm water and water quality standards, the State Water Board also relied on the CWA's explicit authority for States to require "such other provisions that the Administrator or the State determines appropriate for the control of such pollutants" in addition to the technology-based standard of MEP for storm water discharges. To further support its conclusions that MS4 permit dischargers must meet water quality standards, the State Water Board relied on provisions of the CWC that specify that all waste discharge requirements must implement applicable Basin Plans and take into consideration the appropriate water quality objectives for the protection of beneficial uses.

The State Water Board first formally concluded that permits for MS4s must contain effluent limitations based on water quality standards in its Order WQ 91-03. In that Order, the State Water Board also concluded that it was appropriate for Regional Water Boards to achieve this result by requiring best management practices, rather than by inserting numeric effluent limitations into MS4 permits. Later, in Order WQ 98-01, the State Water Board prescribed specific precedent setting Receiving Water Limitations language to be included in all future MS4 permits. This language specifically requires that MS4 dischargers meet water quality standards and allows for the use of narrative BMPs (increasing in stringency and implemented in an iterative process) as the mechanism by which water quality standards can be met for storm water discharges.

In Order WQ 99-05, the State Water Board modified its receiving water limitations language in Order WQ 98-01 to meet specific objections by USEPA (the modifications resulted in stricter compliance with water quality standards). State Water Board Order WQ 99-05 states:

> "In Order WQ 98-01, the State Board ordered that certain receiving water limitation language be included in future municipal storm water permits. Following inclusion of that language in permits issued by the San Francisco Bay and San Diego Water Boards for Vallejo and Riverside respectively, the USEPA objected to the permits. The USEPA objection was based on the receiving

[147] For the most recent assessment, see Storm Water Panel Recommendations to the California State Water Resources Control Board, 2006. *The Feasibility of Numeric Effluent Limits Applicable to Discharges of Storm Water Associated with Municipal, Industrial, and Construction Activities.*

> water limitation language. The USEPA has now issued those permits itself and has included receiving water limitation language it deems appropriate.
>
> In light of USEPA's objection to the receiving water limitation language in Order WQ 98-01 and its adoption of alternative language, the State Board is revising its instructions regarding receiving water limitation language for municipal storm water permits. It is hereby ordered that Order WQ 98-01 will be amended to remove the receiving water limitation language contained therein and to substitute the USEPA language. Based on the reasons stated here, and as a precedent decision, the following receiving water limitation language shall be included in future municipal storm water permits."

In the 1999 case involving MS4 permits issued by USEPA to several Arizona cities (*Defenders of Wildlife v. Browner*, 1999, 197 F. 3d 1035), the United States Court of Appeals for the Ninth Circuit upheld USEPA's requirement for MS4 dischargers to meet water quality standards, but it did so on the basis of USEPA's discretion rather than on the basis of strict compliance with the CWA. In other words, while holding that the CWA does not require all MS4 discharges to comply strictly with state water quality standards, the Court also held that USEPA has the authority to determine that ensuring strict compliance with state water quality standards is necessary to control pollutants. On the question of whether MS4 permits must contain numeric effluent limitations, the court upheld USEPA's use of iterative BMPs in place of numeric effluent limitations for storm water discharges.

On October 14, 1999, the State Water Board issued a legal opinion on the federal appellate decision and provided advice to the Regional Water Boards on how to proceed in the future. In the memorandum, the State Water Board concludes that the recent Ninth Circuit opinion upholds the discretion of USEPA and the State to (continue to) issue storm water permits to MS4s that require compliance with water quality standards through iterative BMPs. Moreover, the memorandum states that "[…] because most MS4 discharges enter impaired water bodies, there is a real need for permits to include stringent requirements to protect those water bodies. As TMDLs are developed, it is likely that MS4s will have to participate in pollutant load reductions, and the MS4 permits are the most effective vehicles for those reductions." In summary, the State Water Board found that the Regional Water Boards should continue to include the RWL established in State Water Board Order WQ 99-05 in all future permits.

The issue of the RWLs language was also central to the Building Industry Association's (BIA's) (and others') appeal of San Diego Water Board Order No. 2001-01 (San Diego MS4 permit), which was used as a template for San Diego Water Board Order No. R9-2002-0001 (Orange County MS4 permit). BIA contended that the storm water MEP standard was a ceiling on what could be required of the Copermittees in implementing their runoff management programs, and that Order No. 2001-01's receiving water limitations requirements exceeded that ceiling. In other words, BIA

argued that the Copermittees could not be required to comply with receiving water limitations if they necessitated efforts which went beyond the MEP standard. Again, the courts upheld the San Diego Water Board's discretion to require compliance with water quality standards in municipal storm water permits, without limitation. The Court of Appeal, Fourth Appellate District found that the San Diego Water Board has "the authority to include a permit provision requiring compliance with water quality standards."[148] On further appeal by BIA, the California State Supreme Court declined to hear the matter.

While implementation of the iterative BMP process is a means to achieve compliance with water quality objectives for storm water MS4 discharges, it does not shield the discharger from enforcement actions for continued non-compliance with water quality standards. Consistent with USEPA guidance,[149] regardless of whether or not an iterative process is being implemented, discharges that cause or contribute to a violation of water quality standards are in violation of Order No. R9-2010-0016.

Finding E.2. The Basin Plan, identifies the following existing and potential beneficial uses for surface waters in Riverside County: Municipal and Domestic Supply (MUN), Agricultural Supply (AGR), Industrial Process Supply (PROC), Hydropower Generation (POW), Industrial Service Supply (IND), Ground Water Recharge (GWR), Contact Water Recreation (REC1), Non-contact Water Recreation (REC2), Warm Freshwater Habitat (WARM), Cold Freshwater Habitat (COLD), Wildlife Habitat (WILD), Rare, Threatened, or Endangered Species (RARE), Spawning, Reproduction and/or Early Development (SPWN) and Preservation of Biological Habitats of Special Significance (BIOL).

Discussion of Finding E.2. The southwestern portion of Riverside County is within the San Diego Region. The Riverside County portion of the San Diego Region falls within Santa Margarita Hydrologic Unit. The major streams within the Riverside County portion of the Santa Margarita Hydrologic Unit are the Santa Margarita River, Temecula Creek, and Murrieta Creek. Other surface water bodies include De Luz Creek, Sandia Canyon Creek, Warm Springs Creek, San Gertrudis Creek, and Wilson Creek. Major inland water bodies include Lake Skinner and Vail Lake.

The Riverside County portion of the Santa Margarita Hydrologic Unit includes unincorporated portions of Riverside County, the Cities of Menifee, Murrieta, Temecula, and Wildomar..

Based on the 2000 census, approximately 150,000 people resided within the permitted area. Since the 2000 census, however, several new developments, especially in the Cities of Temecula and Murrieta have increased the housing stock of the area, and the population is now significantly higher. As of January 1, 2009, approximately 250,000

[148] Building Industry Association et al., v. State Water Resources Control Board, et al. 2004.
[149] USEPA, 1998. Jan. 21, 1998 correspondence, "State Board/OCC File A-1041 for Orange County," from Alexis Strauss to Walt Petit, and March 17, 1998 correspondence from Alexis Strauss to Walt Petit.

people reside in the permitted area, with approximately 30,000 people living in the unincorporated area of Riverside County (31,163) and approximately 220,000 living in the Cities of Menifee (613), Murrieta (99,574), Temecula (102,604), and Wildomar (22,240).[150]

Finding E.3. This Order is in conformance with State Water Board Resolution No. 68-16, *Statement of Policy with Respect to Maintaining High Quality Waters in California*, and the federal Antidegradation Policy described in 40 CFR 131.12.

Discussion of Finding E.3. Runoff management programs are required to be designed to reduce pollutants in storm water MS4 discharges to the maximum extent practicable and achieve compliance with water quality standards. Therefore, implementation of runoff management programs, which satisfy the requirements of Order No. R9-2010-0016, will prevent violations of receiving water quality standards. The Basin Plan states that "Water quality objectives must […] conform to US EPA regulations covering antidegradation (40 CFR 131.12) and State Water Board Resolution No. 68-16, Statement of Policy with Respect to Maintaining High Quality of Waters in California." As a result, when water quality standards are met, USEPA and State Water Board antidegradation policy requirements are also met.

Finding E.4. Section 6217(g) of the Coastal Zone Act Reauthorization Amendments of 1990 (CZARA) requires coastal states with approved coastal zone management programs to address non-point pollution impacting or threatening coastal water quality. CZARA addresses five sources of non-point pollution: agriculture, silviculture, urban, marinas, and hydromodification. This NPDES permit addresses the management measures required for the urban category, with the exception of septic systems. The adoption and implementation of this NPDES permit relieves the Copermittee from developing a non-point source plan, for the urban category, under CZARA. The San Diego Water Board addresses septic systems through the administration of other programs.

Discussion of Finding E.4. Coastal states are required to develop programs to protect coastal waters from nonpoint source pollution, as mandated by the federal CZARA. CZARA section 6217 identifies polluted runoff as a significant factor in coastal water degradation, and requires implementation of management measures and enforceable policies to restore and protect coastal waters. In lieu of developing a separate NPS program for the coastal zone, California's NPS Pollution Control Program was updated in 2000 to address the requirements of both the CWA section 319 and the CZARA section 6217 on a statewide basis. The California Coastal Commission (CCC), the State Water Board, and the nine Regional Water Boards are the lead State agencies for upgrading the program, although 20 other State agencies also participate. Pursuant to the CZARA (section 6217(g)) Guidance Document the development of runoff management programs pursuant to this NPDES permit fulfills

[150] Fiscal Year 2008-2009 Santa Margarita Watershed Annual Progress Report

the need for cities within watersheds that discharge to the coastal zone to develop an runoff non-point source plan identified in the State's Non-point Source Program Strategy and Implementation Plan.[151]

Finding E.5. Section 303(d)(1)(A) of the CWA requires that "Each state shall identify those waters within its boundaries for which the effluent limitations…are not stringent enough to implement any water quality standard (WQS) applicable to such waters." The CWA also requires states to establish a priority ranking of impaired waterbodies known as Water Quality Limited Segments and to establish Total Maximum Daily Loads (TMDLs) for such waters. This priority list of impaired waterbodies is called the Section 303(d) List. The 2006 303(d) List was approved by the State Water Board on October 25, 2006. On June 28, 2007 the 2006 303(d) List for California was given final approval by the USEPA. The 303(d) List was recently updated, and on December 16, 2009 the 2008 303(d) List was approved by the San Diego Water Board. The 2008 303(d) List is awaiting State Water Board and USEPA approval.

Discussion of Finding E.5. Section 303(d) of the federal CWA (CWA, 33 USC 1250, et seq., at 1313(d)), requires States to identify waters that do not meet water quality standards after applying certain required technology-based effluent limits ("impaired" water bodies). States are required to compile this information in a list and submit the list to USEPA for review and approval. This list is known as the Section 303(d) list of impaired waters, or 303(d) List. As part of this listing process, States are required to prioritize waters/watersheds for future development of TMDLs. The State Water Board and Regional Water Boards have ongoing efforts to monitor and assess water quality, to prepare the 303(d) List, to prioritize waters/watersheds for TMDL development, and to subsequently develop TMDLs. TMDLs developed and adopted by the San Diego Water Board are incorporated into the Basin Plan via a Basin Plan Amendment as authorized under CWC section 13240.

The 2006 California 303(d) List identifies impaired receiving water bodies and their watersheds within the State of California.[152] The San Diego Water Board recently updated the 303(d) List for the San Diego Region and adopted the 2008 303(d) List on December 16, 2009.[153] The number of water bodies listed as impaired in the Riverside County portion of the Santa Margarita Hydrologic Unit increased from 6 water bodies (13 water body / impairing pollutant combinations) on the 2006 303(d) List to 9 water bodies (49 water body / impairing pollutant combinations) on the 2008 303(d) List, indicating the receiving water quality has been degraded further (see Table 2). Storm water and non-storm water runoff that is discharged from the Copermittees' MS4s is a leading cause of receiving water quality impairment in the San Diego Region.

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[151] State Water Board/CCC, 2000. Nonpoint Source Program Strategy and Implementation Plan, 1998-2013 (PROSIP).
[152] The approved 2006 Clean Water Act Section 303(d) List of Water Quality Limited Segments is on-line at: http://www.waterboards.ca.gov/tmdl/303d_lists2006.html.
[153] The 2008 Clean Water Act Section 303(d) List of Water Quality Limited Segments, approved by the San Diego Water Board, is available on-line at http://www.swrcb.ca.gov/rwqcb9/water_issues/programs/303d_list/index.shtml

Finding E.6. This Order does not constitute an unfunded local government mandate subject to subvention under Article XIIIB, Section (6) of the California Constitution for several reasons, including, but not limited to, the following. First, this Order implements federally mandated requirements under CWA § 402. (33 U.S.C. § 1342(p)(3)(B).) Second, the local agency Copermittees' obligations under this Order are similar to, and in many respects less stringent than, the obligations of non-governmental and new dischargers who are issued NPDES permits for storm water and non-storm water discharges. Third, the local agency Copermittees have the authority to levy service charges, fees, or assessments sufficient to pay for compliance with this Order. Fourth, the Copermittees have requested permit coverage in lieu of compliance with the complete prohibition against the discharge of pollutants contained in CWA § 301, subdivision (a) (33 U.S.C. § 1311(a)) and in lieu of numeric restrictions on their MS4 discharges (i.e. effluent limitations). Fifth, the local agencies' responsibility for preventing discharges of waste that can create conditions of pollution or nuisance from conveyances that are within their ownership or control under State law predates the enactment of Article XIIIB, Section (6) of the California Constitution. Likewise, the provisions of this Order to implement TMDLs are federal mandates. The CWA requires TMDLs to be developed for water bodies that do not meet federal water quality standards. (33 U.S.C. sec. 1313(d).) Once the UUSEPA or a state develops a TMDL, federal law requires that permits must contain effluent limitations consistent with the assumptions of any applicable wasteload allocation. (40 C.F.R. sec. 122.44(d)(1)(vii)(B).)

Discussion of Finding E.6. This Order does not constitute an unfunded local government mandate subject to subvention under Article XIIIB, Section (6) of the California Constitution for several reasons, including, but not limited to, the following. First, this Order implements federally mandated requirements under CWA section 402, subdivision (p)(3)(B). (33 U.S.C. § 1342(p)(3)(B).) This includes federal requirements to effectively prohibit non-storm water discharges, to reduce the discharge of pollutants in storm water to the maximum extent practicable, and to include such other provisions as the Administrator or the State determines appropriate for the control of such pollutants. Federal cases have held these provisions require the development of permits and permit provisions on a case-by-case basis to satisfy federal requirements. (Natural Resources Defense Council, Inc. v. U.S. E.P.A. (9th Cir. 1992) 966 F.2d 1292, 1308, fn. 17.)

The authority exercised under this Order is not reserved state authority under the CWA's savings clause (cf. Burbank v. State Water Resources Control Bd. (2005) 35 Cal.4th 613, 627-628 [relying on 33 U.S.C. § 1370, which allows a state to develop requirements which are not "less stringent" than federal requirements]), but instead, is part of a federal mandate to develop pollutant reduction requirements for municipal separate storm sewer systems. To this extent, it is entirely federal authority that forms the legal basis to establish the permit provisions. (See, City of Rancho Cucamonga v. Regional Water Quality Control Bd.-Santa Ana Region (2006) 135 Cal.App.4th 1377,

1389; Building Industry Ass'n of San Diego County v. State Water Resources Control Bd. (2004) 124 Cal.App.4th 866, 882-883.)

Second, the local agency Copermittees' obligations under this Order are similar to, and in many respects less stringent than, the obligations of non-governmental dischargers who are issued NPDES permits for storm water discharges. With a few inapplicable exceptions, the CWA regulates the discharge of pollutants from point sources (33 U.S.C. § 1342) and the Porter-Cologne regulates the discharge of waste (CWC § 13263), both without regard to the source of the pollutant or waste. As a result, the "costs incurred by local agencies" to protect water quality reflect an overarching regulatory scheme that places similar requirements on governmental and nongovernmental dischargers. (See County of Los Angeles v. State of California (1987) 43 Cal.3d 46, 57-58 [finding comprehensive workers compensation scheme did not create a cost for local agencies that was subject to state subvention].)

The CWA and the Porter-Cologne Water Quality Control Act largely regulate storm water with an even hand, but to the extent there is any relaxation of this even-handed regulation, it is in favor of the local agencies. Except for municipal separate storm sewer systems, the CWA requires point source dischargers, including discharges of storm water associated with industrial or construction activity, to comply strictly with water quality standards. (33 U.S.C. § 1311(b)(1)(C), Defenders of Wildlife v. Browner (1999) 191 F.3d 1159, 1164-1165 [noting that industrial storm water discharges must strictly comply with water quality standards].) As discussed in prior State Water Board decisions, this Order does not require strict compliance with water quality standards. (State Water Board Order WQ 2001-15, p. 7.) The Order, therefore, regulates the discharge of waste in municipal storm water more leniently than the discharge of waste from non-governmental sources.

Third, the local agency Copermittees have the authority to levy service charges, fees, or assessments sufficient to pay for compliance with this Order. The fact sheet demonstrates that numerous activities contribute to the pollutant loading in the municipal separate storm sewer system. Local agencies can levy service charges, fees, or assessments on these activities, independent of real property ownership. (See, e.g., Apartment Ass'n of Los Angeles County, Inc. v. City of Los Angeles (2001) 24 Cal.4th 830, 842 [upholding inspection fees associated with renting property].) The ability of a local agency to defray the cost of a program without raising taxes indicates that a program does not entail a cost subject to subvention. (County of Fresno v. State of California (1991) 53 Cal.3d 482, 487-488.)

Fourth, the Copermittees have requested permit coverage in lieu of compliance with the complete prohibition against the discharge of pollutants contained in CWA section 301, subdivision (a) (33 U.S.C. § 1311(a)) and in lieu of numeric effluent limitations on their storm water discharges. To the extent, the local agencies have voluntarily availed themselves of the permit, the program is not a state mandate. (Accord County of San Diego v. State of California (1997) 15 Cal.4th 68, 107-108.) Likewise, the

Copermittees have voluntarily sought a program-based municipal storm water permit in lieu of a numeric limitations approach on their storm water discharge. (See City of Abilene v. U.S. E.P.A. (5th Cir. 2003) 325 F.3d 657, 662-663 [noting that municipalities can choose between a management permit or a permit with numeric limitations].) The local agencies' voluntary decision to file a report of waste discharge proposing a program-based permit is a voluntary decision not subject to subvention. (See Environmental Defense Center v. USEPA (9th Cir. 2003) 344 F.3d 832, 845-848.)

Fifth, the local agencies' responsibility for preventing discharges of waste that can create conditions of pollution or nuisance from conveyances that are within their ownership or control under state law predates the enactment of Article XIIIB, Section (6) of the California Constitution.

Finding E.7. Runoff treatment and/or mitigation must occur prior to the discharge of runoff into receiving waters. Treatment BMPs must not be constructed in waters of the U.S. or State unless the runoff flows are sufficiently pretreated to protect the values and functions of the water body. Federal regulations at 40 CFR 131.10(a) state that in no case shall a state adopt waste transport or waste assimilation as a designated use for any waters of the U.S. Authorizing the construction of a runoff treatment facility within a water of the U.S., or using the water body itself as a treatment system or for conveyance to a treatment system, would be tantamount to accepting waste assimilation as an appropriate use for that water body. Furthermore, the construction, operation, and maintenance of a pollution control facility in a water body can negatively impact the physical, chemical, and biological integrity, as well as the beneficial uses, of the water body. Without federal authorization (e.g., pursuant to CWA § 404), waters of the U.S. may not be converted into, or used as, waste treatment or conveyance facilities. Similarly, waste discharge requirements pursuant to CWC §13260 are required for the conversion or use of waters of the State as waste treatment or conveyance facilities. Diversion from waters of the U.S./State to treatment facilities and subsequent return to waters of the U.S. is allowable, provided that the effluent complies with applicable NPDES requirements.

Discussion of Finding E.7. Runoff treatment and/or mitigation in accordance with any of the requirements in the Order must occur prior to the discharge of storm water into receiving waters. Allowing storm water polluted runoff to enter receiving waters prior to treatment to the MEP will result in degradation of the water body and potential exceedances of water quality standards, from the discharge point to the point of dissipation, infiltration, or treatment. Furthermore, the construction, operation, and maintenance of a pollution control facility in a water body can negatively impact the physical, chemical, and biological integrity, as well as the beneficial uses, of the water body. This requirement is supported by federal regulation 40 CFR 131.10(a) and USEPA guidance. According to USEPA,[154] "To the extent possible, municipalities should avoid locating structural controls in natural wetlands. Before considering siting

[154] USEPA, 1992. Guidance Manual for the Preparation of Part II of the NPDES Permit Applications for Discharges from Municipal Separate Storm Sewer Systems. EPA 833-B-92-002.

of controls in a natural wetland, the municipality should demonstrate that it is not possible or practicable to construct them in sites that do not contain natural wetlands. Practices should be used that settle solids, regulate flow, and remove contaminants prior to discharging storm water into a wetland."

Additional Federal guidance discusses the implementation of wetlands to treat municipal storm water discharges (USEPA, 2000. *Guiding Principles for Constructed Treatment Wetlands: Providing for Water Quality and Wildlife Habitat*). It states:

> *"..treatment wetlands should not be constructed in a waters of the U.S. unless you can sufficiently pretreat the stormwater flows to protect the values and functions of the waters of the U.S. Because storm water is an unpredictable effluent source and can contain high levels of toxic substances, nutrients, and pathogens, we strongly encourage that you construct the treatment wetland in uplands and use best management practices in these projects."*[155]

Consistent with USEPA guidance, the conversion or use of waters of the U.S./State into runoff treatment facilities or conveyance facilities for untreated storm water discharges must be appropriately reviewed by both Federal and State resource agencies. Such projects may be subject to federal permitting pursuant to CWA section 404 if discharges of dredged or fill material is involved.

The placement of hydromodification controls within waters of the U.S./State may also be subject to federal and/or state permitting, but would not necessarily be considered a pollutant treatment BMP. Provided that grade control structures are designed to re-establish a natural channel gradient and correct excessive changes to the sediment transport regime caused by urbanization, rather than to create a series of artificial hydrological impoundments for the purpose of treating pollution, this type of project is not considered an in-stream treatment BMP.

Finding E.8. The issuance of waste discharge requirements and an NPDES permit for the discharge of runoff from MS4s to waters of the U.S. is exempt from the requirement for preparation of environmental documents under the California Environmental Quality Act (CEQA) (Public Resources Code, Division 13, Chapter 3, section 21000 et seq.) in accordance with the CWC section 13389.

Discussion of Finding E.8. CWC section 13389 exempts the adoption of waste discharge requirements (such as NPDES permits) from CEQA requirements: "Neither the State Water Board nor the Regional Water Boards shall be required to comply with the provisions of Chapter 3 (commencing with section 21100) of Division 13 of the Public Resources Code prior to the adoption of any waste discharge requirement, except requirements for new sources as defined in the Federal Water Pollution Control Act or acts amendatory thereof or supplementary thereto."

[155] USEPA, 2000. Guiding Principles for Constructed Treatment Wetlands: Providing for Water Quality and Wildlife Habitat, (EPA 843-B-00-003).

This CEQA exemption was challenged during BIA's (and others') appeal of Order No. 2001-01. BIA contended that the CEQA exemption did not apply to permit requirements where the San Diego Water Board utilized its discretion to craft permit requirements which were more prescriptive than required by federal law. The Court of Appeal, Fourth Appellate District disagreed with this argument, stating "we also reject Building Industry's argument to the extent it contends the statutory CEQA exemption in CWC section 13389 is inapplicable to a particular NPDES permit provision that is discretionary, rather than mandatory, under the CWA."[156] On further appeal by BIA, the California State Supreme Court declined to hear the matter.

In a recent decision, the Court of Appeal of the State of California, Second Appellate District, upheld the CEQA exemption for municipal storm water NPDES permits (County of Los Angeles, et al. v. California State Water Resources Control Board, et al.).[157]

Finding E.9. Storm water discharges from developed and developing areas in Riverside County are significant sources of certain pollutants that cause, may be causing, threatening to cause or contributing to water quality impairment in the waters of Riverside County. Furthermore, as delineated in the CWA section 303(d) list in Table 2, the San Diego Water Board has found that there is a reasonable potential that municipal storm water and non-storm water discharges from MS4s cause or may cause or contribute to an excursion above water quality standards for the following pollutants: Indicator Bacteria, Copper, Manganese, Iron, Chlorpyrifos, Sulfates, Phosphorous, Nitrogen, Toxicity, and Turbidity. In accordance with CWA section 303(d), the San Diego Water Board is required to establish TMDLs for these pollutants to these waters to eliminate impairment and attain water quality standards. Therefore, certain early pollutant control actions and further pollutant impact assessments by the Copermittees are warranted and required pursuant to this Order.

Discussion of Finding E.9. CWA section 303(d)(1)(A) requires that:

> "*Each state must identify those waters within its boundaries for which the effluent limitations…are not stringent enough to implement any water quality standard (WQS) applicable to such waters.*"

The CWA also requires states to establish a priority ranking of impaired water bodies known as Water Quality Limited Segments and to establish Total Maximum Daily Loads (TMDLs) for such waters. This priority list of impaired water bodies is called the 303(d) List. The current 303(d) List was approved by the State Water Board on October 25, 2006. On June 28, 2007 the 2006 303(d) List for California was given final approval by USEPA. Every two years the State of California is required by CWA section 303(d) and 40 CFR(130.7) to develop and submit to the USEPA for approval

[156] Building Industry Association et al., v. State Water Resources Control Board, et al. 2004.
[157] Los Angeles County Super. Ct. No. BS080792. Partial publication dated November 6, 2006.

an updated 303(d) list of impaired water bodies. The San Diego Water Board recently updated the 303(d) List and adopted the 2008 303(d) List on December 16, 2009.[158] The 2008 303(d) List is awaiting approval by the State Water Board and USEPA. The number of water bodies listed as impaired in the Riverside County portion of the Santa Margarita Hydrologic Unit increased from 6 water bodies (13 water body / pollutant combinations) on the 2006 303(d) List to 9 water bodies (49 water body / pollutant combinations) on the 2008 303(d) List, indicating the receiving water quality has been degraded further (see Table 2).

Multiple water bodies in Riverside County have been identified as impaired and placed on the 303(d) List. The 303(d) listing of a water body and subsequent TMDL development is required when regulations under current permits, such as Technology Based Effluent Limitations (TBELs), are not stringent enough to meet Water Quality Standards and protect the Beneficial Uses of Waters of the State.

Storm water discharges from developed and developing areas in Riverside County are a significant source of certain pollutants that cause, may be causing, threatening to cause, or contributing to water quality impairment in the waters of Riverside County. Furthermore, the CWA section 303(d) list indicates that there is a reasonable potential that municipal storm water and dry weather discharges from MS4s cause, or may cause, or contribute to an excursion above water quality standards for the following pollutants: Indicator Bacteria, Copper, Manganese, Iron, Chlorpyrifos, Sulfates, Phosphorous, Nitrogen, Total Dissolved Solids, Toxicity and Turbidity (see Table 2). In accordance with CWA section 303(d), the San Diego Water Board is required to establish TMDLs for these pollutants in these waters to eliminate impairment and attain water quality standards. Per 40 CFR(130.7), WLAs are required for all point sources, including storm water and non-storm water discharges from MS4s. Therefore, focused pollutant control actions and further pollutant impact assessments by the Copermittees are warranted and required pursuant to this Order.

MS4 Permits address only those TMDL WLAs that have been adopted by the San Diego Water Board and have been approved by the State Water Board, Office of Administrative Law (OAL) and USEPA. WLAs are portions of a receiving water's loading capacity that is allocated to one of its existing or future point sources of pollution. To date, no TMDLs and WLAs have been adopted to address impaired water bodies in the Riverside County portion of the Santa Margarita Hydrologic Unit. When TMDLs and WLAs are adopted and approved, they will be incorporated into the MS4 permit. The TMDL WLAs in MS4 Permits can be addressed using water quality-based numeric effluent limitations (WQBELs) calculated at end-of-pipe. WQBELs must be consistent with the assumptions and requirements of the WLAs.[159]

[158] The 2008 Clean Water Act Section 303(d) List of Water Quality Limited Segments, approved by the San Diego Water Board, is available on-line at http://www.swrcb.ca.gov/rwqcb9/water_issues/programs/303d_list/index.shtml
[159] Per 40 CFR 122.44(d)(1)(vii)(B)

Finding E.10. This Order requires each Copermittee to effectively prohibit all types of unauthorized discharges of non-storm water into its MS4. However, historically pollutants have been identified as present in dry weather non-storm water discharges from the MS4s through 303(d) listings, monitoring conducted by the Copermittees under Order No. R9-2004-001, and there are others expected to be present in dry weather non-storm water discharges because of the nature of these discharges. This Order includes action levels for pollutants in non-storm water, dry weather discharges from the MS4. The non-storm water action levels are designed to ensure that the Order's requirement to effectively prohibit all types of unauthorized discharges of non-storm water into the MS4 is being complied with. Non-storm water action levels in the Order are based upon numeric or narrative water quality objectives and criteria as outlined in the Basin Plan, the State Water Board's Water Quality Control Plan for Ocean Waters of California (Ocean Plan), and State Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California (State Implementation Policy or SIP). An exceedance of an action level requires specified responsive action by the Copermittees. This Order describes what actions the Copermittees must take when an exceedance of an action level is observed. Exceedances of non-storm water action levels do not alone constitute a violation of this Order but could indicate non-compliance with the requirement to effectively prohibit all types of unauthorized non-storm water discharges into the MS4 or other prohibitions established in this Order. Failure to undertake required source investigation and elimination action following an exceedance of a non-storm water action level (NAL or action level) is a violation of this Order. The San Diego Water Board recognizes that use of action levels will not necessarily result in detection of all unauthorized sources of non-storm water discharges because there may be some discharges in which pollutants do not exceed established action levels. However, establishing NALs at levels appropriate to protect water quality standards is expected to lead to the identification of significant sources of pollutants in dry weather non-storm water discharges.

Discussion of Finding E.10. This Order includes the existing requirement that Copermittees effectively prohibit all types of unauthorized non-storm water discharges in the MS4s. It also includes the following prohibition set forth in the Basin Plan: "The discharge of waste to waters of the state in a manner causing, or threatening to cause a condition of pollution, contamination or nuisance as defined in CWC section 13050 is prohibited." (Prohibition A.1.) As discussed in the Order's Findings on discharge characteristics, e.g., C.2., C.4., C.6., C.7., C.9., C.14., and C.15., the Copermittees' reliance on BMPs for the past 20 years has not resulted in compliance with applicable water quality standards or compliance with the requirement to effectively prohibit all types of unauthorized discharges of non-storm water in the MS4. The San Diego Water Board has evaluated (in accordance with 40 CFR 122.44(d)(1)) past and existing control BMPs, non-storm water effluent monitoring results, the sensitivity of the species in receiving waters (e.g. endangered species), and the potential for effluent dilution, and has determined that existing BMPs to control pollutants in storm water discharges are not sufficient to protect water quality standards in receiving

waters, and the existing requirement that Copermittees effectively prohibit all types of unauthorized non-storm water discharges into the MS4, historically results in the discharge of pollutants to the receiving waters.

Therefore it is appropriate to establish dry weather non-storm water action levels based upon established water quality standards to measure pollutants levels in the discharge of dry weather non-storm water that could indicate non-compliance with the requirement to effectively prohibit all types of unauthorized non-storm water discharges into the MS4 and/or that these discharges are causing, or threatening to cause, a condition of pollution, contamination or nuisance in the receiving waters. NALs are not numeric effluent limitations. While not alone a violation of this Order, an exceedance of an NAL requires the Copermittees to initiate a series of source investigation and elimination actions to address the exceedance. Results from the NAL monitoring are to be used in developing the Copermittees annual work plans. Failure to undertake required source investigation and elimination action following an exceedance of an NAL is a violation of this Order. Also refer to further discussion in the Directives section C of the Fact Sheet.

A purpose of monitoring, required under this and previous Orders, as stated in the Monitoring and Reporting Program is to “detect and eliminate illicit discharges and illicit connections to the MS4” and to answer the following core management questions:

1. Are conditions in receiving waters protective, or likely to be protective, of beneficial uses?
2. What is the extent and magnitude of the current or potential receiving water problems?
3. What is the relative MS4 discharge contribution to the receiving water problem(s)?
4. What are the sources of MS4 discharge that contribute to receiving water problem(s)?
5. Are conditions in receiving waters getting better or worse?

For the past 20 years, Copermittees have utilized their illicit connection / illicit discharge (IC/ID) program to identify and eliminate non-storm water discharges that are sources of pollutants to the MS4. The Copermittees are also subject to the requirement to effectively prohibit all types of unauthorized discharges of non-storm water into the MS4s. Historically, discharges of unauthorized non-storm water do occur, resulting in the discharge of pollutants to the receiving water. NALs have been included in this Order to ensure that the Copermittees comply with the requirement to effectively prohibit all types of unauthorized non-storm water discharges that are a source of pollutants in the receiving waters.

Finding E.12. With this Order, the San Diego Water Board has completed the re-issuance of the fourth iteration of the Phase I MS4 NPDES Permits for the Copermittees in the portions of San Diego County, Orange County, and Riverside County within the San Diego Region. The NPDES Permit requirements issued to the Copermittees in each county have substantially the same core requirements such as discharge prohibitions, receiving water limitations, jurisdictional components, and monitoring. In addition, the Copermittees cooperate regionally to develop monitoring with the Southern California Stormwater Monitoring Coalition and to develop program effectiveness with the California Stormwater Quality Association. Regional programs could improve the Copermittees' compliance with other permit components such as development of the Hydromodification Management Plans and Retrofitting Existing Development with more consistent implementation and cost sharing. Re-issuing the NPDES Permit requirements within five years for three counties under three different permits requires the San Diego Water Board to expend significant time and resources for issuance of the permits through three separate public proceedings, thereby greatly reducing the time and resources available to oversee compliance. Multiple permits also create confusion for determining compliance among regulated entities, especially the land development community. The San Diego Water Board recognizes that issuing a single MS4 permit for all Phase I entities in the San Diego Region will provide consistent implementation, improve communication among agencies within watersheds crossing multiple jurisdictions, and minimize staff resources spent with each permit renewal. The San Diego Water Board plans to develop a single regional MS4 permit prior to the expiration of this Order that will transfer the Copermittees' enrollment to the regional permit upon expiration of this Order.

Discussion of Finding E.12. With the advances in storm water science and regulation in the last decade, the additional complexity has resulted in a more significant amount of San Diego Water Board staff time and resources required to complete each Phase I MS4 Permit renewal. On average, the renewal of the fourth iteration of the Phase I MS4 Permits for each county has taken approximately 2 years and multiple staff to complete. The time and resources required to complete each renewal has diverted staff time and resources away from the San Diego Water Board's ability to oversee and ensure compliance with the permit provisions and requirements.

With the adoption of this Order, all the Phase I MS4s in the San Diego Region (i.e. Copermittees of Orange County, Riverside County and San Diego County) will essentially be subject to the same set of core requirements. Because there are now more similarities than differences among the permit provisions and requirements, developing and issuing a single regionwide permit to the Phase I MS4 entities may be appropriate with the next (i.e. fifth) iteration of the Phase I MS4 Permits.

This approach would provide a consistent set of regulatory requirements throughout the San Diego Region, thereby reducing the confusion that is created with different sets of requirements between areas in close proximity to each other. A regional set of

requirements for the discharge prohibitions, receiving water limitations, jurisdictional program components (i.e., new development, construction, existing development, retrofitting), hydromodification management plans, low impact development design requirements, and monitoring would also make it easier for the programs in the three counties to share and transfer information and program efficiencies, and cooperate on a regionwide basis. Regionwide consistency would be especially beneficial where there are multiple counties involved in implementing permit requirements, such as the Santa Margarita watershed with parts of San Diego County and Riverside County, regional TMDLs (e.g., beaches and creeks bacteria TMDLs), or regional monitoring efforts or studies (e.g., Southern California Stormwater Monitoring Coalition, Bight '08).

An additional benefit would be the reduction of staff time and resources that will be required to renew future Phase I MS4 Permits, which would only be required once every 5 years for a single regionwide permit instead of once every 1 to 3 years for three separate permits. Because of these benefits, the San Diego Water Board plans to develop a single regional Phase I MS4 Permit with the next iteration of the San Diego County MS4 Permit, which will incorporate the Orange County and Riverside County Phase I MS4 entities upon the expiration of their respective permits, or sooner.

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F. Public Process

Finding F.1. The San Diego Water Board has notified the Copermittees, all known interested parties, and the public of its intent to consider adoption of an Order prescribing waste discharge requirements that would serve to renew an NPDES permit for the existing MS4 discharges of pollutants to waters of the U.S.

Discussion of Finding F.1. Public notification of development of a draft permit is required under Federal regulation 40 CFR 124.10(a)(1)(ii). This regulation states "(a) Scope. (1) The Director shall give public notice that the following actions have occurred: (ii) A draft permit has been prepared under Sec. 124.6(d)." Public notifications "shall allow at least 30 days for public comment," as required under Federal regulation 40 CFR 124.10(b)(1).

Finding F.2. The San Diego Water Board has held a public hearing on October 13, 2010 and heard and considered all comments pertaining to the terms and conditions of this Order.

Discussion of Finding F.2. Public hearings are required under CWC section 13378, which states "Waste discharge requirements and dredged or fill material permits shall be adopted only after notice and any necessary hearing." Federal regulation 40 CFR 124.12(a)(1) also requires public hearings for draft permits, stating "The Director shall hold a public hearing whenever he or she finds, on the basis or requests, a significant degree of public interest in a draft permit(s)." Regarding public notice of a public hearing, Federal regulation 40 CFR 124.10(b)(2) states that "Public notice of a public hearing shall be given at least 30 days before the hearing."

IX. DIRECTIVES

This section discusses significant changes which have been made to the requirements of the Order from the requirements which were previously included in Order No. R9-2004-001. For each section of the Order than has been changed there is a discussion which describes the change that was made and provides the rationale for the change. In addition, comments on the Copermittees' ROWD recommendations, as they pertain to each changed requirement of the Order, are provided.

Requirements of the Order that are not discussed in this section have not been significantly changed from those requirements previously included in Order No. R9-2004-001. For such requirements, discussions and rationale for the requirements can be found in section VIII of the Fact Sheet/Technical Report for San Diego Water Board Order No. R9-2004-001, dated July 14, 2004. Section VIII also provides additional background information for those requirements that have undergone significant change which are described in detail in this report. The Fact Sheet/Technical Report is available for download at:

http://www.waterboards.ca.gov/sandiego/water_issues/programs/stormwater/rsd_stormwater.shtml

Legal authority citations are provided for each major section of the Order. These citations apply to all applicable requirements within the section for which they are provided.

A. Prohibitions and Receiving Water Limitations

The following legal authority applies to section A:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: The Water Quality Control Plan for the San Diego Basin (Basin Plan) contains the following waste discharge prohibition: "The discharge of waste to waters of the state in a manner causing, or threatening to cause a condition of pollution, contamination, or nuisance as defined in CWC section 13050, is prohibited."

CWC section 13050(l) states "(1) 'Pollution' means an alteration of the quality of waters of the state by waste to a degree which unreasonably affects either of the following: (A) The water for beneficial uses. (B) Facilities which serve beneficial uses. (2) 'Pollution' may include "contamination."

CWC section 13050(k) states "Contamination' means an impairment of the quality of waters of the state by waste to a degree which creates a hazard to public health through poisoning or through the spread of disease. 'Contamination' includes any equivalent effect resulting from the disposal of waste, whether or not waters of the state are affected."

CWC section 13050(m) states "Nuisance' means anything which meets all of the following requirements: (1) Is injurious to health, or is indecent or offensive to the senses, or an obstruction to the free use of property, so as to interfere with the comfortable enjoyment of life or property. (2) Affects at the same time an entire community or neighborhood, or any considerable number of persons, although the extent of the annoyance or damage inflicted upon individuals may be unequal. (3) Occurs during, or as a result of, the treatment or disposal of wastes."

CWC section 13241 requires each Regional Water Board to "establish such water quality objectives in water quality control plans as in its judgment will ensure the reasonable protection of beneficial uses and the prevention of nuisance […]."

CWC section 13243 provides that "A regional board, in a water quality control plan or in waste discharge requirements, may specify certain conditions or areas where the discharge of waste, or certain types of waste, will not be permitted."

CWC section 13263(a) provides that waste discharge requirements prescribed by the San Diego Water Board implement the Basin Plan.

Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(A - D) require municipalities to implement controls to reduce pollutants in storm water runoff from commercial, residential, industrial, and construction land uses or activities.

Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(A - D) require municipalities to have legal authority to control various discharges to their MS4.

Federal NPDES regulation 40 CFR 122.44(d)(1) requires municipal storm water permits to include any requirements necessary to "[a]cheive water quality standards established under section 303 of the CWA, including State narrative criteria for water quality."

Federal NPDES regulation 40 CFR 122.44(d)(1)(i) requires NPDES permits to include limitations to "control all pollutants or pollutant parameters (either conventional, nonconventional, or toxic pollutants) which the Director determines are or may be discharged at a level which will cause, have reasonable potential to cause, or contribute to an excursion above any State water quality standard, including State narrative criteria for water quality."

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Section A of the Order combines two previously distinct requirement sections – Prohibitions and Receiving Water Limitations. These sections have been combined into one section for organization purposes and to reduce redundancy, since both sections address the same issue. These changes have no net effect on the implementation and enforcement of the Order.

Section A.3 describes the “iterative process.” The Copermittees must reduce the discharge of storm water pollutants to the MEP and ensure that their MS4 discharges do not cause or contribute to violations of water quality standards. If the Copermittees have reduced storm water pollutant discharges to the MEP, but their discharges are still causing or contributing to violations of water quality standards, the Order provides a clear and detailed process for the Copermittees to follow. This process is often referred to as the "iterative process" and can be found at section A.3. The language of section A.3 is prescribed by the State Water Board and is included in MS4 permits statewide. Section A.3 essentially requires additional BMPs to be implemented until MS4 storm water discharges no longer cause or contribute to a violation of water quality standards.

The State Policy with respect to maintaining high quality waters has been added to clarify that discharges from the MS4 that cause or contribute to a violation of the Policy for high quality waters is prohibited.

The Copermittee must notify the San Diego Water Board of storm water discharges that are causing or contributing to an exceedance of applicable water quality standards. This notification can be in the form of an email or letter, with a summary of the pollutants in the storm water discharge that are exceeding the applicable water quality standards, and where and when the exceedances occurred. After notification is provided to the San Diego Water Board, the Copermittee must submit a report that describes the BMPs that are currently being implemented and the additional BMPs that will be implemented by the Copermittee to prevent or reduce the pollutants in the storm water discharge from causing or contributing to the exceedances of the applicable water quality standards. The report is separate from the notification and may be submitted with the Annual Report, unless the San Diego Water Board requests an earlier submittal of the report.

B. Non-Storm Water Discharges

The following legal authority applies to section B:

Broad Legal Authority: CWA sections 402, 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F), 40 CFR 122.26(d)(2)(iv) and 40 CFR 122.44.

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B) requires MS4 operators "to detect and remove (or require the discharger to the municipal separate storm sewer to obtain a separate NPDES permit for) illicit discharges and improper disposal into the storm sewer."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B)(1) provides that the Copermittees shall prevent all types of illicit discharges into the MS4 except for certain non-storm water discharges.

Section B of the Order has been reworded to simplify and clarify the requirements for addressing non-storm water discharges that are not prohibited. This rewording has no net effect on the implementation and enforcement of the Order.

Section B.2 identifies categories of non-storm water discharges that do not have to be addressed as illicit discharges unless identified by a Copermittee or the San Diego Water Board as a category that is a source of pollutants to waters of the U.S. If a Copermittee or the San Diego Water Board identifies a category of non-storm water discharges as a source of pollutants to waters of the U.S., the category must be addressed through a program, including inspections, to implement and enforce an ordinance, orders, or other similar means to prevent illicit discharges to the MS4.[160]

The program includes enforcement of an ordinance, orders, or other legal authority that prohibits the category of non-storm water discharges from entering the MS4. Implementation of the program is through the IC/ID program, described in Directive F.4, which includes requirements for investigating/inspecting illicit discharges and enforcing the ordinance, orders, or other legal authority that prohibits the category of non-storm water discharges from entering the MS4.

The federal regulations list several categories of non-storm water discharges or flows that do not have to be addressed by the program unless a Copermittee or the San Diego Water Board identifies a category as a source of pollutants to waters of the U.S. These categories are often referred to as "exempt" discharges that are "allowed" to be discharged into the MS4. There are two types of categories of non-storm water discharges or flows that are considered "exempt": 1) anthropogenic (e.g., water line

[160] Code of Federal Regulations Title 40 section 122.26(d)(2)(iv)(B)(1)

flushing, air conditioner condensate), and 2) non-anthropogenic (e.g., springs, rising ground water).

For "exempt" anthropogenic categories of non-storm water discharges or flows that are identified as sources of pollutants to waters of the U.S., those categories become illicit discharges and are no longer "allowed" to be discharged to the MS4. The IC/ID program addresses those discharges (i.e. investigation of illicit discharges and enforcement of ordinances prohibiting illicit discharges to the MS4).

For "exempt" non-anthropogenic discharges or flows that are identified as sources of pollutants to waters of the U.S., the IC/ID program cannot be fully implemented with enforcement. Categories of non-storm water discharges or flows that originate due to a natural source (e.g., springs or rising ground water) can be investigated and identified, but it would be difficult to enforce ordinances prohibiting these discharges to the MS4. In these cases, the Copermittee may need to implement other control measures to prevent the illicit discharges from non-anthropogenic sources from entering the MS4 (e.g., sealing the storm drains to prevent infiltration).

The IC/ID program also identifies categories of "exempt" non-storm water discharges that are sources of pollutants to waters of the U.S. If an individual discharge within a category of "exempt" non-storm water discharges is found to be an isolated incidence or source of pollutants and not representative of the category as a whole, the entire category does not need to be removed from the list of "exempt" categories of non-storm water discharges. If, however, the Copermittees or the San Diego Water Board find that a pattern of isolated incidents or sources are consistently discharging pollutants to waters of the U.S. over a period of time, or throughout the region, the category must be identified as a source of pollutants to waters of the U.S. warranting removal from the list of "exempt" categories of non-storm water discharges.

The San Diego Water Board and several municipalities throughout the San Diego Region (e.g., cities and counties of Orange County and San Diego County) have reported and/or identified runoff originating from landscape irrigation as likely sources of dry weather flows conveying pollutants into their MS4s. This is also supported by legislation (Assembly Bill 1881) recently enacted by the State of California, which has identified runoff resulting from over irrigation not only as a waste of water resources, but also as a source of pollutants to the state's waterways. Discharges from landscape irrigation have been identified by the San Diego Water Board and the Copermittees as a source of pollutants and conveyance of pollutants to waters of the United States in the following:

- In educational materials developed by The Cities and County of Riverside "Only Rain in the Storm Drain" Pollution Prevention Program, the Landscape and Garden brochure states: "Soil, yard wastes, *over-watering* [emphasis added] and garden chemicals become part of the urban runoff mix that winds it way through streets, gutters and storm drains before entering lakes, rivers, streams, etc."

- In an educational survey developed by The Cities and County of Riverside "Only Rain in the Storm Drain" Pollution Prevention Program distributed at Public Outreach events, the answer to the question about where lawn irrigation water goes states: *"Water that leaves your lawn from irrigation…can pick up motor oil and grease from vehicles, excess fertilizer from your lawn, bacteria from pet waste, and excess pesticides from your yard. These pollutants can be carried down streets and storm drains directly to our streams, lakes and rivers without treatment!"*

- In 2006, the State Water Board allocated Grant funding to the Smarttimer/Edgescape Evaluation Program (SEEP). The project targets irrigation runoff by retrofitting existing development and documenting the conservation and runoff improvements. The Grant Application states that "Irrigation runoff contributes flow & pollutant loads to creeks and beaches that are 303(d) listed for bacteria indicators". Furthermore, the grant application states that "Regional program managers agree that the reduction and/or elimination of irrigation-related urban flows and associated pollutant loads may be key to successful attainment of water quality and beneficial use goals as outlined in the Basin Plan and Bacteria TMDL over the long term". This is reinforced in the project descriptions and objectives: "Elevated dry-weather storm drain flows, composed primarily … of landscape irrigation water wasted as runoff, carry pollutants that impair recreational use and aquatic habitats all along Southern California's urbanized coastline. Storm drain systems carry the wasted water, along with landscape derived pollutants such as bacteria, nutrients and pesticides, to local creeks and the ocean. Given the local Mediterranean climate, excessive perennial dry season stream flows are an unnatural hydrologic pattern, causing species shifts in local riparian communities and warm, unseasonal contaminated freshwater plumes in the near-shore marine environment". The basis of this grant project is that over-irrigation (landscape irrigation, irrigation water and lawn watering) into the MS4 is a source and conveyance of pollutants. In addition, they indicate that the alteration of natural flows is impacting the Beneficial Uses of waters of the State. The results of this study can be applied broadly to any area where over-irrigation takes place, including Riverside County. Preliminary results from the study indicate that that over-irrigation (landscape irrigation, irrigation water and lawn watering) into the MS4 *is* a source and conveyance of pollutants.

- In the Watershed Action Plan Annual Report(s) for the 2006-2007 reporting period, submitted by the County of Orange, Orange County Flood Control District and Copermittees within the San Juan Creek, Laguna Coastal Streams, Aliso Creek, and Dana Point Coastal Streams Watersheds, the Orange County Copermittees, within their Watershed Action Strategy Table for Fecal Indicator Bacteria state that "*Support programs to reduce or eliminate the discharge of anthropogenic dry weather nuisance flow throughout the […] watershed. Dry weather flow is the transport medium for bacteria and other 303(d) constituents of concern*".

Additionally, they state that "*conditions in the MS4 contribute to high seasonal bacteria propagation in-pipe during warm weather. Landscape irrigation is a major contributor to dry weather flow, both as surface runoff due to over-irrigation and overspray onto pavements; and as subsurface seepage that finds its way into the MS4*."

- In the Carlsbad Watershed Urban Runoff Management Program (WURMP) Fiscal Year 2008 Annual Report, submitted by the Carlsbad Watershed Copermittees (Cities of Carlsbad, Encinitas, Escondido, Oceanside, San Marcos, Solana Beach, and Vista, and the County of San Diego), the Carlsbad Watershed Copermittees state *"The Carlsbad Watershed Management Area (WMA) collective watershed strategy identifies bacteria, sediment, and nutrients as high priority water quality pollutants in the Agua Hedionda (904.3 – bacteria and sediment), Buena Vista (904.2 – bacteria), and San Marcos Creek (904.5 – nutrients) Hydrologic Areas. Bacteria, sediment, and nutrients have been identified as potential discharges from over-irrigation."*

- In Appendix D of the San Diego Bay WURMP 2007-2008 Annual Report, submitted by the San Diego Bay Watershed Copermittees (Cities of Chula Vista, Coronado, Imperial Beach, La Mesa, Lemon Grove, National City, and San Diego, the County of San Diego, the Port of San Diego, and the San Diego County Airport Authority), the San Diego Bay Watershed Copermittees identified *over-irrigation of lawns* from business and/or residential land uses as a likely pollutant source for bacteria, pesticides, and sediment.

- On September 28, 2006 Governor Arnold Schwarzenegger approved Assembly Bill 1881, The Water Conservation in Landscaping Act (AB 1881, Laird). The act requires cities, counties, and charter cities and charter counties, to adopt landscape water conservation ordinances by January 1, 2010. Additionally, the law required the Department of Water Resources (DWR) to prepare a Model Water Efficient Landscape Ordinance for use by local agencies. The Water Efficient Landscape Ordinance was approved by the Office of Administrative Law on September 10, 2009. All local agencies were required to adopt a water efficient landscape ordinance by January 1, 2010. Local agencies could adopt the Water Efficient Landscape Ordinance developed by DWR, or an ordinance considered at least as effective as the Model Ordinance. The Water Efficient Landscape Ordinance includes a requirement that local agencies prohibit runoff from irrigation (§ 493.2): "*Local agencies shall prevent water waste resulting from inefficient landscape irrigation by* prohibiting runoff from leaving the target landscape *[emphasis added] due to low head drainage, overspray, or other similar conditions where water flows onto adjacent property, non-irrigated areas, walks, roadways, parking lots, or structures. Penalties for violation of these prohibitions shall be established locally.*"

- On October 08, 2009, the State of California Department of Water Resources issued a letter to all cities and counties within the State of California giving reminder of required adoption of the Water Efficient Landscape Ordinance. The letter states that: "*Other benefits include reduced irrigation runoff,* reduced pollution of waterways *[emphasis added], drought resistance, and less green waste*."

- On December 18, 2009, the San Diego Water Board adopted Order. No. R9-2009-0002, the fourth-term Orange County permit, which found that over-irrigation (landscape irrigation, irrigation water and lawn watering) into the MS4 is a source and conveyance of pollutants. Landscape irrigation, irrigation water, and lawn watering were categories removed from the list of non-storm water discharges not prohibited to be discharged into the MS4.

- The San Diego Water Board has responded to complaints about and observed runoff from over-irrigation entering the MS4s in the Riverside County portion of the San Diego Region.

Several significant changes have been made to the list of categories of non-storm water discharges that do not have to be addressed as illicit discharges. A footnote has been added to dechlorinated swimming pool discharges on the list to specify that this category does not include saline swimming pool discharges. The list has been modified to remove the landscape irrigation, irrigation water and lawn watering "exempt" discharge categories (i.e. no longer "allowed" to enter the MS4). Language has been also added to the section to clarify differences in the federal regulations under 40 CFR 122.26(d)(iv)(B) and for the authority of the Director (i.e. San Diego Water Board) in regards to identifying exempted discharges.

Because the landscape irrigation, irrigation water and lawn watering "exempt" discharge categories have been removed from section B, per identification as a source and conveyance of pollutants to waters of the United States when discharged from the MS4, these illicit discharges must be addressed per 40 CFR 122.26(d)(iv)(B). The San Diego Water Board is requiring these discharges be addressed as illicit discharges by the Copermittees. This is consistent with the Federal Regulations (55 FR 48037). Thus, the discharges are to be prohibited via ordinance, order, or similar means and incorporated as part of the Copermittees IC/ID program.

Section B.3 has been clarified by the recognition of building fire suppression system maintenance (e.g. fire sprinklers) as an illicit discharge. The San Diego Water Board has found that such discharges contain waste, and as such the San Diego Water Board is requiring these discharges be addressed as illicit discharges by the Copermittees. This is consistent with the Federal Regulations (55 FR 48037). Thus, the discharges are to be prohibited via ordinance, order or similar means and incorporated as part of the Copermittees IC/ID program.

C. Non Storm Water Dry Weather Action Levels

The following legal authority applies to section C:

Broad Legal Authority: CWA section 402, 402(p)(3)(B)(ii), CWC §13377. 40 CFR 122.26(d)(2)(i)(B, C, E, and F), and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority:
CWA section 402(p)(3)(B)(ii) provides that MS4 permits "shall include a requirement to effectively prohibit non-storm water discharges into the storm sewers."

Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(B) provides that the proposed management program "shall be based on a description of a program including a schedule, to detect and remove (or require the discharger to the municipal storm sewer to obtain a separate NPDES permit for) illicit discharges and improper disposal into the storm sewer."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B)(1) provides that the Copermittee include in its proposed management program "a program, including inspections, to implement and enforce an ordinance, orders or similar means to prevent illicit discharges to the municipal storm sewer system; this program description shall address all types of illicit discharges, however the [listed exempt] category of non-storm water discharges or flows shall be addressed where such discharges are identified by the municipality as sources of pollutants to waters of the United States."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B)(2) provides that the Copermittee include in its proposed management program "a description of procedures to conduct on-going field screening activities during the life of the permit, including areas or locations that will be evaluated by such field screens."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B)(3) provides that the Copermittee include in its proposed management program "procedures to be followed to investigate portions of the separate storm sewer system that, based on the results of the field screen, or other appropriate information, indicate a reasonable potential of containing illicit discharges or other sources of non-storm water."

Section C establishes non-storm water dry weather action levels (see also Finding C.14, Finding E.10, and the Discussion for those sections).

Non-exempted, non-storm water discharges are to be effectively prohibited from entering the MS4 or become subject to another NPDES permit (see Federal Register, Vol. 55, No. 222, pg. 47995). Conveyances which continue to accept non-exempt, non-storm water discharges do not meet the definition of MS4 and are not subject to section 402(p)(3)(B) of the CWA unless the discharges are issued separate NPDES

permits. Instead, conveyances that continue to accept non-exempt, non-storm water discharges that do not have a separate NPDES permit are subject to sections 301 and 402 of the CWA (see Federal Register, Vol. 55, No. 222, pg. 48037).

The Order requires the sampling of a representative percentage of major outfalls and other identified stations within each hydrologic subarea. While it is important to assess all major outfall discharges from the MS4 into receiving waters, to date the Copermittees have implemented a dry-weather monitoring program that has consisted of 4 water quality parameters collected in receiving waters, not major outfalls. In the ROWD the Copermittees have proposed relocating IC/ID (non-storm water) monitoring sites to major outfalls and increasing the level of monitoring. It is expected that the Copermittees will need to utilize current 303(d) listings, land use, the history of IC/ID complaints and the sensitivity of receiving waters in the selection and annual sampling of a representative percentage of major outfalls in accordance with the requirements under section C.4. It is expected the selection of major outfalls will be done in conjunction with the Copermittees' required updates to the MS4 map in section F.4.b of the Order.

The Order requires an increase in the number and type of pollutants sampled in non-storm water from major outfalls. To date, Copermittees have not sampled major outfalls, only receiving waters, and sampling was limited to total dissolved solids, dissolved oxygen, pH, turbidity and specific conductance. Additional sampling was generally, though not always, conducted by Copermittees if initial sampling exceeded a Copermittee threshold. With the exception of dissolved oxygen, the current thresholds do not represent water quality objectives, as sampling may not trigger a threshold, but may still be exceeding a water quality objective. This Order requires non-storm water discharges to be sampled for additional pollutants including indicator bacteria, nutrients (nitrate and phosphorous), Methylene Blue Active Substances (MBAS), pesticides and metals. These pollutants are expected to be present in non-storm water discharges, are pollutants for which receiving waters are 303(d) listed as impaired or have been identified as present through receiving water monitoring.

Background and Rationale for Requirements

The San Diego Water Board developed the requirements for dry weather, non-storm water action levels based upon an evaluation of existing controls, monitoring and reporting programs (effluent and receiving water), special studies, and based upon Findings C.1 C.3, C.4, C.6, C.7 and C.14. In addition, the Copermittees' ROWD supports the establishment of action levels which can be used in the effectiveness assessment program to ensure a minimum level of program implementation and identify shortcomings in their MS4 programs.[161]

[161] Riverside County Copermittees. 2009. Report of Waste Discharge (San Diego Region).

Water Quality Control Plan

CWA section 303(c) requires the state to establish Water Quality Standards (WQS). WQS define the water quality goals of a water body, or part thereof, by designating their use or uses to be made of the water and by setting criteria necessary to protect those uses.

The San Diego Water Board's Water Quality Control Plan for the San Diego Basin (Basin Plan) designates beneficial uses, establishes water quality objectives, and contains implementation programs and policies to achieve those objectives for all waters addressed through the Basin Plan. The Basin Plan was adopted by the San Diego Water Board on September 8, 1994, and was subsequently approved by the State Water Board on December 13, 1994. Subsequent revisions to the Basin Plan have also been adopted by the San Diego Water Board and State Water Board.

National Toxics Rule (NTR) and California Toxics Rule (CTR)

The USEPA adopted the NTR on December 22, 1992, which was amended on May 4, 1995, and November 9, 1999. The CTR was adopted by USEPA on May 18, 2000,[162] and amended on February 13, 2001.[163] These rules include water quality criteria for priority pollutants and are applicable to non-storm water discharges from the MS4. Criteria for 126 priority pollutants are established by the CTR. USEPA promulgated this rule to fill a gap in California water quality standards that was created in 1994 when a California court overturned the State's water quality control plans containing criteria for priority toxic pollutants. The federal criteria are legally applicable in the State of California for inland surface waters, enclosed bays and estuaries for all purposes and programs under the CWA.

Antidegradation Policy

Section 131.12 of 40 CFR requires that the State water quality standards include an antidegradation policy consistent with the federal policy. The State Water Board established California's antidegradation policy in State Water Board Resolution No. 68-16. Resolution No. 68-16 incorporates the federal antidegradation policy where the federal policy applies under federal law. Resolution No. 68-16 requires that existing quality of waters be maintained unless degradation is justified based on specific findings. The Regional Water Boards' Basin Plans implement, and incorporate by reference, both the State and federal antidegradation policies. Permitted non-storm water discharges from the MS4 are consistent with the antidegradation provision of 40 CFR section 131.12 and State Water Board Resolution No. 68-16.

[162] Federal Register / Vol. 65, No. 97 / May 18, 2000 / Rules and Regulation P. 31861-31719; Code of Federal Regulations Title 40 Part 131

[163] Federal Register / Vol. 66, No. 30 / February 13, 2001 / Rules and Regulation P. 9960-9962; Code of Federal Regulations Title 40 Part 131

Sources of Drinking Water Policy
State Water Board Resolution No. 88-63 establishes state policy that all waters, with certain exceptions, should be considered suitable or potentially suitable for municipal and domestic supplies. Requirements of this Order include action levels, where appropriate, reflecting municipal and domestic supply use as all waters within the County of Riverside under this Order are specifically assigned municipal and domestic supply as a Beneficial Use.

Monitoring and Reporting
40 CFR section 122.48 requires that all NPDES permits specify requirements for recording and reporting monitoring results. Sections 13267 and 13383 of CWC authorize the Regional Water Boards to require technical and monitoring reports. The Monitoring and Reporting Program establishes monitoring and reporting requirements to implement state and federal regulations. The Monitoring and Reporting Program can be found as Attachment E of the Order.

Dilution or Mixing Zones
In order to protect the Beneficial Uses of receiving waters from pollutants as a result of non-storm water MS4 discharges, this Order does not provide for a mixing zone or a zone of initial dilution except when the discharge is to the surf zone.

The San Diego Region has predominantly intermittent and ephemeral rivers and streams (Inland Surface Waters) which vary in flow volume and duration at spatial and temporal scales. Therefore, it is assumed that any non-storm water discharge from the MS4 into the receiving water is likely to be of a quantity and duration that does not allow for dilution or mixing. For ephemeral systems, non-storm water discharges from the MS4 are likely to be the only surface flows present within the receiving water during the dry season. Additionally, all surface waters within the jurisdiction of this Order have been designated in the Basin Plan with municipal supply (MUN) as a beneficial use.

It is appropriate to base numeric action levels for dry weather non-storm water discharges on these considerations.

Establishment of Action Levels
Action levels in the Order are based upon numeric or narrative water quality objectives and criteria as defined in the Basin Plan and the State Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California (State Implementation Policy or SIP). The San Diego Water Board recognizes that use of action levels will not necessarily result in detection of all unauthorized sources of non-storm water discharges because there may be some discharges in which pollutants do not exceed established action levels.

In June of 2006, the State Water Board's Blue Ribbon Storm Water Panel released its report titled 'The Feasibility of Numerical Effluent Limits Applicable to Discharges of

Storm Water Associated with Municipal, Industrial and Construction Activities.' The report only examined numerical limits as applied to storm water and not non-storm water. In the recommendations, the Blue Ribbon panel proposed storm water action levels which are computed using statistical based population approaches. For example, section D of the Permit uses a recommended statistical approach to develop storm water action levels. The Blue Ribbon panel did not examine the efficacy of action levels or recommendations for development of action levels for non-storm water discharges.

For discharges to inland surface waters, action levels are based on the USEPA water quality criteria for the protection of aquatic species, the USEPA water quality criteria for the protection of human health, water quality criteria and objectives in the applicable State plans, effluent concentration available using best available technology, and 40 CFR 131.38. Since the assumed initial dilution factor for the discharge is zero and a mixing zone is not allowed, a non-storm water discharge from the MS4 could not cause an excursion from numeric receiving water quality objectives if the discharge is in compliance with the action levels contained in the Order.

Dry weather monitoring of non-storm water conducted in receiving waters under the previous Order (Order No. R9-2004-001), which relies on BMPs as controls to protect water quality standards, has identified the presence of pollutants commonly found in non-storm water discharges. Monitoring of Indicator Bacteria, pH, Dissolved Oxygen, Phosphorus, Nitrate, Turbidity, Methylene Blue Active Substances (MBAS), and metals in receiving waters has shown concentrations that exceed state water quality criteria. It is appropriate to establish numeric action levels for these pollutants to ensure that the Copermittees are complying with the requirement to effectively prohibit all types of unauthorized non-storm water discharges into the MS4s.

Water Quality Limited Segments on the current 303(d) list (2008) within the jurisdiction of this Order have been identified due to exceedances of Sulfate and Total Dissolved Solids criteria from a source which is currently unknown (see Table 2). These pollutants are not monitored for in non-storm water effluent under the current non-storm water MS4 monitoring program. While this Order does not establish a numeric action level for these constituents at this time, this Order now requires non-storm water MS4 discharge monitoring to include monitoring for Sulfates, Total Dissolved Solids, and Chlorides.

Priority pollutants analyzed included Cadmium, Copper, Chromium, Lead, Nickel, Silver and Zinc. These priority pollutants are likely to be present in non-storm water MS4 discharges (see Finding C.3) though dissolved metal effluent monitoring was not conducted under the previous Order. The most stringent applicable water quality criteria have been identified for these seven metals and, excluding Chromium (VI), and all are dependent on receiving water hardness. The conversion factors for Cadmium and Lead are also water hardness dependent (40 CFR 131.38(b)(2)). These levels are established as the action levels for these constituents.

While effluent monitoring is not available from the previous Order, the monitoring that was done for metal concentrations in receiving waters often lacked a measurement of receiving water hardness. Due to the multiple point source discharges of non-storm water from the MS4, a discharge may enter a receiving water whose hardness will vary temporally. In addition, hardness may vary spatially within and among receiving waters.

However, other information is available to determine the appropriateness of an action level. Existing monitoring concentrations absent of receiving water data, no dilution credit or mixing zone allowance, current 303(d) listings of receiving waters for other pollutants, receiving water monitoring data, and the classification of waters as critical habitat for endangered and species of concern, provide evidence that NALs are appropriate for these priority pollutants at this time in order to ensure that the Copermittees comply with the requirement to effectively prohibit all types of unauthorized non-storm water discharges into the MS4s.

Existing receiving water pollutant concentration data (see attachment F) provides evidence that it is appropriate to include NAL based comparisons to water quality criteria given observed hardness levels, assumption of a conservative hardness level when data is absent, or designation of receiving waters as having MUN as a beneficial use. Although dry weather receiving water data is limited (see attachment F), data has been collected that documents exceedances of CTR criteria for Lead, Nickel, and Copper given the measured hardness for the receiving water. Absent receiving water hardness, Zinc has been detected in receiving waters at concentrations which may be in exceedance of CTR criteria depending on receiving water hardness. Additionally, Cadmium and Chromium were detected at elevated levels, though the concentrations were within CTR criteria given the observed receiving water hardness. However, these detections typically coincided with detections of other exceedances of water quality standards for other pollutants, including metals. Chromium and Nickel were also detected at levels that did not exceed CTR, but did exceed Maximum Contaminant Levels (MCLs) for receiving waters.

As discussed, inland surface waters have conservatively been allotted a mixing zone and dilution credit of zero. As such, any discharge of these priority pollutants is likely to impact the receiving water, regardless of the quantity or rate of discharge.

As discussed in Finding C.7 and discussion, multiple receiving waters within the County of Riverside are 303(d) listed for a number of pollutants, including toxicity. The 303(d) listing of a water body as impaired provides evidence that the receiving water(s) are already experiencing negative impacts. These water quality limited segments are more susceptible to degradation from the synergistic addition of more pollutants, even from upstream discharges. It is therefore appropriate to include NALs designed to ensure that the Copermittees are complying with the requirement to

effectively prohibit all types of unauthorized discharges of non-storm water into the MS4s.

Copermittees have monitored the receiving waters for MS4 discharges pursuant to requirements under Order No. R9-2004-001. Dry weather receiving water data indicates poor conditions within waters receiving non-storm water MS4 discharges. Bioassessment conducted under the Order (2004-present) has documented all non-reference sites as consistently having poor or very poor IBI scores, likely due in part to receiving water chemistry and toxicity[164].

Receiving waters and downstream receiving waters within the jurisdiction of this Order contain species and/or are classified as critical habitat (or are exempted pursuant to Integrated National Resource Management Plans) for endangered, threatened, and state species of special concern including, but not limited to, *E. newberryi, A. marmorata pallida*, and *G. orcutti.*

Furthermore, the Santa Margarita River has been designated with the RARE beneficial use.

Dry Weather Non-Storm Water Action Levels Calculations for Discharges to Inland Surface Waters

On the basis of the foregoing discussion, the NALs were calculated with the following considerations and assumptions:

> No dilution credit is considered for the discharge. Therefore, the discharge must comply with the Water Quality Objective at the point of discharge.
>
> For NALs based on CTR, implementation was done using the procedure list as outlined in the State Implementation Plan (SIP) (see below example).

NAL CTR/SIP Calculation – Chromium VI Example:

Criteria for Priority Toxic Pollutants in the State of California is described in the CTR table listed in 40 CFR 131.38.

[164] Riverside County Copermittees 2007-08 and 2008-09 Annual Progress Reports.

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A		B Freshwater		C Saltwater		D Human Health (10^{-6} risk for carcinogens) For consumption of:	
# Compound	CAS Number	Criterion Maximum Conc. [d] B1	Criterion Continuous Conc. [d] B2	Criterion Maximum Conc. [d] C1	Criterion Continuous Conc. [d] C2	Water & Organisms (μg/L) D1	Organisms Only (μg/L) D2
1. Antimony	7440360					14 a,s	4300 a,t
2. Arsenic [b]	7440382	340 i,m,w	150 i,m,w	69 i,m	36 i,m		
3. Beryllium	7440417					n	n
4. Cadmium [b]	7440439	4.3 e,i,m,w,x	2.2 e,i,m,w	42 i,m	9.3 i,m	n	n
5a. Chromium (III)	16065831	550 e,i,m,o	180 e,i,m,o			n	n
5b. Chromium (VI) [b]	18540299	16 i,m,w	11 i,m,w	1100 i,m	50 i,m	n	n
6. Copper [b]	7440508	13 e,i,m,w,x	9.0 e,i,m,w	4.8 i,m	3.1 i,m	1300	
7. Lead [b]	7439921	65 e,i,m	2.5 e,i,m	210 i,m	8.1 i,m	n	n
8. Mercury [b]	7439976	[Reserved]	[Reserved]	[Reserved]	[Reserved]	0.050 a	0.051 a
9. Nickel [b]	7440020	470 e,i,m,w	52 e,i,m,w	74 i,m	8.2 i,m	610 a	4600 a
10. Selenium [b]	7782492	[Reserved] p	5.0 q	290 i,m	71 i,m	n	n
11. Silver [b]	7440224	3.4 e,i,m		1.9 i,m			
12. Thallium	7440280					1.7 a,s	6.3 a,t
13. Zinc [b]	7440666	120 e,i,m,w,x	120 e,i,m,w	90 i,m	81 i,m		

Freshwater criterion maximum concentration (CMC) = 16 ug/L
Freshwater criterion continuous concentration (CCC) = 11 ug/L

These criteria are expressed in terms of the dissolved fraction of the metal in the water column. [See footnote “m” to Table in paragraph (b)(1) of 40 CFR 131.38].

40 CFR 122.45(c) requires that this Order include effluent limitations as total recoverable concentration; therefore it is appropriate to include action levels also as total recoverable concentration.

The SIP requires that if it is necessary to express a dissolved metal value as a total recoverable and a site-specific translator has not yet been developed, the San Diego Water Board shall use the applicable conversion factor from 40 CFR 131.38.

The term “Conversion Factor” (CF) represents the recommended conversion factor for converting a metal criterion expressed as the total recoverable fraction in the water column to a criterion expressed as the dissolved fraction in the water column.

Total recoverable concentration * CF = Dissolved concentration criterion

or

Total recoverable concentration = Dissolved concentration criterion/ CF

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§ 131.38 40 CFR Ch. I (7–1–08 Edition)

Metal	Conversion factor (CF) for freshwater acute criteria	CF for freshwater chronic criteria	CF for saltwater acute criteria	CF[a] for saltwater chronic criteria
Antimony	([d])	([d])	([d])	([d])
Arsenic	1.000	1.000	1.000	1.000
Beryllium	([d])	([d])	([d])	([d])
Cadmium	[b]0.944	[b]0.909	0.994	0.994
Chromium (III)	0.316	0.860	([d])	([d])
Chromium (VI)	0.982	0.962	0.993	0.993
Copper	0.960	0.960	0.83	0.83
Lead	[b]0.791	[b]0.791	0.951	0.951
Mercury				
Nickel	0.998	0.997	0.990	0.990
Selenium		([c])	0.998	0.998

CF for Chromium VI = .982 and .962, so the total recoverable concentrations for chromium VI:
16 ug/L dissolved (CMC)/ 0.982 (CF) = 16.3 ug/L total recoverable CMC
11 ug/L dissolved (CCC) / 0.962 (CF) = 11.4 ug/L total recoverable CCC

Effluent Variability multiplier and Coefficient of Variation (CV)
For each concentration based on an aquatic life criterion, the long-term average (LTA) is calculated by multiplying the concentration with a factor that adjusts for effluent variability. The multiplier can be found in Table 1 of the SIP. Since this Order does not have existing data to properly conduct a variability analysis in accordance with the SIP, the CV has been set equal to 0.6 per SIP requirements. The current effluent data is limited due to the small number of representative outfalls sampled, the lack of outfalls discharging to representative water bodies within the Region, and the targeted nature of the sampling design.

Based upon a CV of 0.6, Table 1 of the SIP requires an effluent variability as follows:
Acute Multiplier = 0.321
Chronic Multiplier = 0.527

The long-term average (LTA) is calculated by multiplying the total recoverable concentrations for zinc with the acute and chronic multipliers:
LTA Acute = 16.3 ug/L * 0.321 = 5.23
LTA Chronic = 86 11.4 ug/L * 0.527 = 6.01

The maximum daily action level (MDAL) and average monthly action level (AMAL) will be based on the most limiting of the acute and chronic LTA, in the case for copper the most limiting LTA is the acute of 5.23 ug/L

NALs are calculated by multiplying the most limiting LTA with a multiplier that adjusts for the averaging periods and exceedance frequencies of the criteria and the effluent limitations. The multiplier can be found in Table 2 of the SIP. Since this Order has

insufficient data, the CV has been set to 0.6 and since sampling frequency is four times a month or less, n has been set equal to 4 per the SIP.

Table 2. Long-Term Average (LTA) Multipliers for Calculating Effluent Limitations

Coefficient of Variation	MDEL Multiplier	AMEL Multiplier			MDEL/AMEL Multiplier		
	99th Percentile Occurrence Probability	95th Percentile Occurrence Probability			MDEL = 99th Percentile AMEL = 95th Percentile Occurrence Probability		
(CV)		n = 4	n = 8	n = 30	n = 4	n = 8	n = 30
0.1	1.25	1.08	1.06	1.03	1.16	1.18	1.22
0.2	1.55	1.17	1.12	1.06	1.33	1.39	1.46
0.3	1.90	1.26	1.18	1.09	1.50	1.60	1.74
0.4	2.27	1.36	1.25	1.12	1.67	1.82	2.02
0.5	2.68	1.45	1.31	1.16	1.84	2.04	2.32
0.6	3.11	1.55	1.38	1.19	2.01	2.25	2.62

Therefore, from Table 2 of the SIP, the LTA multipliers will be as follows:
MDAL Multiplier = 3.11
AMAL Multiplier = 1.55

The MDAL and AMAL limits are calculated by multiplying the LTA with an LTA multiplier for each limit:
MDAL = 5.23 ug/L * 3.11 = 16 ug/L
AMAL = 5.23 ug/L * 1.55 = 8.1 ug/L

Whole Effluent Toxicity (WET) Testing Requirements
A WET limit is required if a discharge causes, has a reasonable potential to cause, or contributes to an exceedance of applicable water quality standards, including numeric and narrative. Since these types of discharges are prohibited under this Order, WET limits are not applicable.

Discussion of AMALs, MDALs and Instantaneous Maximums
Where practical, action levels in this Order have been expressed as both AMALs and MDALs. Certain action levels may not practicably be expressed as AMALs and MDALs due to specific Basin Plan water quality objective language, sampling requirements and/or a lack of Criteria. Based upon the likely sampling frequency of the Copermittees, the frequency of sampling will occur such that grab samples are taken once per sampling day. This single sample would then be subject to MDALs and

Instantaneous Maximum levels. In this case, the more conservative action level would apply. In addition, it is expected that some effluent monitoring will occur less than or equal to once per month. In this scenario, the MDAL, AMAL and Instantaneous Maximum levels would need to be met based upon one sample (unless sampling did not occur). For some Basin Plan water quality objectives, AMALs have been excluded and only MDALs/Instantaneous Maximums set to prevent redundancy in action levels.

Compliance with Action Levels (Priority Pollutants)
Compliance with action levels shall be determined as follows:

Dischargers shall be deemed out of compliance with this Order if the Copermittee failed to take the prescribed action in response to a concentration of the priority pollutant in the monitoring sample that is greater than the action level and greater than or equal to the reported Minimum Level (exceedance of an action level). Regardless of the Copermittee's actions in response to an exceedance, they are still subject to the prohibitions found in sections A and B of the Order.

When determining to take an action in response to the AMALs and more than one sample result is available in a month, the discharger shall compute the arithmetic mean unless the data set contains one or more reported determinations of "did not quantify" (DNQ) or "not detected" (ND). In those cases, the discharger shall compute the median in place of the arithmetic mean in accordance with the following procedure:

(1) The data set shall be ranked from low to high, reported ND determinations lowest, DNQ determinations next, followed by quantified values (if any). The order of the individual ND or DNQ determinations is unimportant.

(2) The median value of the data set shall be determined. If the data set has an odd number of data points then the median is the middle value. If the data set has an even number of data points, then the median is the average of the two values around the middle unless one or both of those points are ND or DNQ, in which case the median value shall be the lower of the two data points where DNQ is lower than a value and ND is lower than DNQ.

D. Storm Water Action Levels

The following legal authority applies to section D:

Broad Legal Authority: CWA §402, §402(p)(3)(B)(iii), CWC §13377, 40 CFR §122.44, 40 CFR §122.26(d)(1)(iv), 40 CFR §122.26(d)(2)(i)(E and F), and 40 CFR §122.26(d)(2)(iii and iv).

Specific Legal Authority:
CWA section 402(p)(3)(B)(iii) provides that MS4 permits "shall require controls to reduce the discharge of pollutants to the maximum extent practicable, including management practices, control techniques and system, design and engineering methods and such other provisions as the Administrator or the State determines appropriate for the control of such pollutants."

Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(E and F) provides that the Copermittee "Require compliance with conditions in ordinances, permits, contracts or orders;" and "Carry out all inspection, surveillance and monitoring procedures necessary to determine compliance and noncompliance with permit conditions …"

Copermittees must conduct a comprehensive monitoring program as required under Federal NPDES regulations 40 CFR 122.26(d)(2)(iii), including the collection of quantitative MS4 storm water effluent data from outfalls.

Federal NPDES regulations 40 CFR 122.44 (d) provide that NPDES permits include any requirements necessary to "Achieve water quality standards,… including State narrative criteria for water quality."

Section D has been added to establish storm water action levels (see also Finding D.1.h and Discussion).

<u>Introduction</u>
The Copermittees' ROWD supports the establishment of action levels which can be used in the effectiveness assessment program to ensure a minimum level of program implementation and identify shortcomings in their MS4 programs.[165] Storm Water Action Level (SAL) concentrations, standards and constituents have been developed and incorporated into the monitoring requirements for wet weather.

[165] Riverside County Copermittees. 2009. Report of Waste Discharge (San Diego Region).

SAL Concentration/Standards

SAL pollutant levels were developed from a regional subset of nationwide Phase I MS4 data by using USEPA Climate Zone 6 (arid west) data.[166] Utilizing data from USEPA Climate Zone 6 resulted in SALs which closely reflect the environmental conditions experienced in Riverside County. The localized subset of data includes sampling events from multiple Southern California locations including Orange, San Diego, Riverside, Los Angeles, and San Bernardino Counties. The dataset includes samples taken from highly built-out impervious areas and from storm events representative of Southern California conditions.

Additionally, utilization of regional data is appropriate due to the addition of data into the nationwide Phase I MS4 monitoring dataset in February 2008. This additional data increased the number of USEPA Climate Zone 6 samples to more than 400, and included additional monitoring events within Southern California (see figure below).

Sample Sizes Used to Calculate Storm Water Action Levels

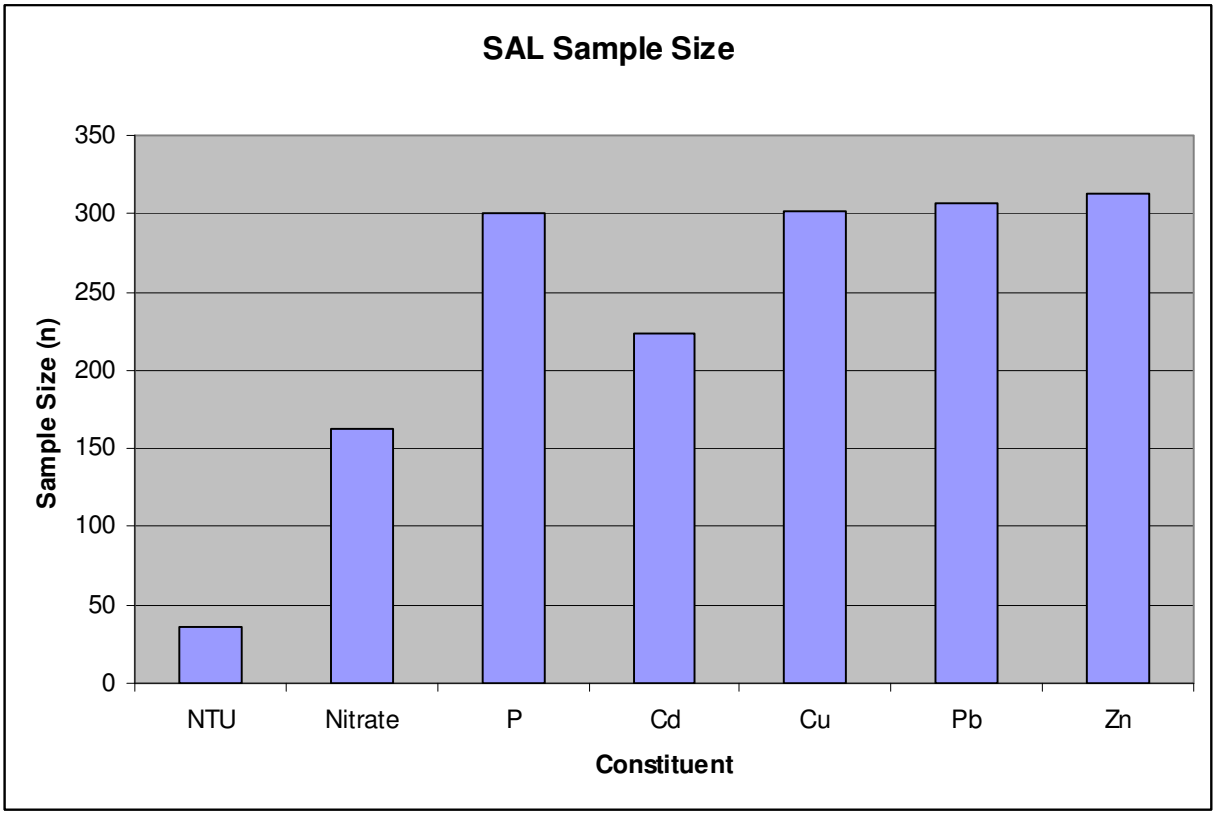

In addition, the SALs reflect the water quality standards in the Basin Plan for the San Diego Region, the California Toxic Rule and USEPA Water Quality Criteria. Since it is the goal of the SALs, through the iterative and MEP process, to have outfall storm

[166] Data used to develop SAL are provided in Attachment F to Order No. R9-2010-0016, and obtained from http://rpitt.eng.ua.edu/Research/ms4/mainms4.shtml

water discharges meet all applicable water quality objectives, the list of constituents to be tested and protocol for testing has been developed to provide a reference point to evaluate the iterative MEP process.

SALs were developed based upon receiving water monitoring results and CWA section 303(d) impaired waters listings. Nitrogen, Copper and Phosphorous are all pollutants for which receiving waters are 303(d) listed as impaired and for which sufficient data was available to develop SALs. Additionally, receiving water monitoring, including from storm events monitored by the Copermittees, has demonstrated excursions and/or potential excursions, often absent receiving water hardness, above water quality criteria for turbidity (NTU), Cadmium, Lead, and Zinc. SALs were not developed for some pollutants for which receiving waters are 303(d) listed as impaired due to a lack of representative data available. These pollutants are required to be monitored but are not subject to a SAL under the Order.

Monitoring

The SALs require the measurement of hardness and to provide more specificity in the assessment of samples with SALs for total metal concentrations. While USEPA Climate Region 6 data includes a large sample size for concentrations of total metals, the impact the concentration will have on receiving waters will vary with receiving water hardness. Since it is the goal of the SALs, through the iterative and MEP process, to have MS4 storm water discharges meet all applicable water quality objectives, the hardness of the receiving water should be used when assessing the total metal concentration of a sample. Thus, when an exceedance of a SAL concentration is detected for a metal, the Copermittee must determine if that exceedance is above the existing applicable water quality limitation based upon the hardness of the receiving water. The water quality limitations Copermittees must use to assess total metal SAL exceedances are the California Toxic Rule (CTR) and USEPA National Recommended Water Quality Criteria for Freshwater Aquatic Life 1 hour maximum concentrations. The 1 hour maximum concentration is to be used for comparison since it is expected to most replicate the impacts to waters of the State from the first flush following a precipitation event.

E. Legal Authority

The following legal authority applies to section E:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.26(d)(2)(i)(A) provides that the Copermittees shall develop and implement legal authority to "Control through ordinance, order or similar means, the contribution of pollutants to the municipal storm sewer by storm water discharges associated with industrial activity and the quality of storm water discharged from sites of industrial activity."

Federal NPDES regulation 40 CFR 122.26(d)(2)(i)(D) provides that the Copermittees shall develop and implement legal authority to "Control through interagency agreements among coapplicants the contribution of pollutants from one portion of the municipal system to another portion of the municipal system."

Illicit discharge is defined under Federal NPDES regulation 40 CFR 122.26(b)(2) as "any discharge to a municipal separate storm sewer system that is not composed entirely of storm water except discharges pursuant to a NPDES permit (other than the NPDES permit for discharges from the municipal separate storm sewer) and discharges resulting from fire fighting activities."

Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(A - D) require municipalities to implement controls to reduce pollutants in storm water runoff from commercial, residential, industrial, and construction land uses or activities.

Federal NPDES regulation 40 CFR 122.26(d)(1)(ii) requires from the Copermittee "A description of existing legal authority to control discharges to the municipal separate storm sewer system."

Section E.1.b requires the Copermittees to prohibit all identified illicit discharges not otherwise allowed pursuant to section B.2 including but not limited to:

(1) Sewage;
(2) Discharges of wash water resulting from the hosing or cleaning of gas stations, auto repair garages, or other types of automotive services facilities;
(3) Discharges resulting from the cleaning, repair, or maintenance of any type of equipment, machinery, or facility including motor vehicles, cement-related equipment, and port-a-potty servicing, etc.;
(4) Discharges of wash water from mobile operations such as mobile automobile washing, steam cleaning, power washing, and carpet cleaning, etc.;

(5) Discharges of wash water from the cleaning or hosing of impervious surfaces in municipal, industrial, commercial, and residential areas including parking lots, streets, sidewalks, driveways, patios, plazas, work yards and outdoor eating or drinking areas, etc.;
(6) Discharges of runoff from material storage areas containing chemicals, fuels, grease, oil, or other hazardous materials;
(7) Discharges of pool or fountain water containing chlorine, biocides, toxic amounts of salt, or other chemicals; discharges of pool or fountain filter backwash water;
(8) Discharges of sediment, pet waste, vegetation clippings, or other landscape or construction-related wastes; and
(9) Discharges of food-related wastes (e.g., grease, fish processing, and restaurant kitchen mat and trash bin wash water, etc.).

Section E.1.j has been added to the Order to ensure that BMPs implemented by third parties are effective. Since the Copermittees cannot passively receive and discharge pollutants from third parties, the Copermittees must ensure discharges of storm water pollutants to the MS4 are reduced to the MEP. In order to achieve this, the Copermittees must be able to ensure that effective BMPs are being implemented by requiring the third parties to document BMP effectiveness. Regarding the Copermittees' ability to require documentation and reporting from third parties, USEPA states "municipalities should provide documentation of their authority to enter, sample, inspect, review, and copy records, etc., as well as demonstrate their authority to require regular reports."[167]

[167] USEPA, 1992. Guidance Manual for the Preparation of Part 2 of the NPDES Permit Applications for Discharges from Municipal Separate Storm Sewer Systems. EPA 833-B-92-002.

F. Jurisdictional Runoff Management Program

F.1. Development Planning Component

The following legal authority applies to section F.1:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWA section 402(a), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F), 40 CFR 131.12, and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A)(2) provides that Copermittees develop and implement a management program which is to include "A description of planning procedures including a comprehensive master plan to develop, implement and enforce controls to reduce the discharge of pollutants from municipal separate storm sewers which receive discharges from areas of new development and significant redevelopment. Such plans shall address controls to reduce pollutants in discharges from municipal separate storm sewers after construction is completed."

Federal NPDES regulation 40 CFR 122.44(d)(1) requires municipal storm water permits to include any requirements necessary to "[a]cheive water quality standards established under section 303 of the CWA, including State narrative criteria for water quality."

Sections F.1.a and F.1.b (General Plan and Environmental Review Process) require the Copermittees to update and revise their General Plan (or equivalent plan) and environmental review processes to ensure water quality and watershed protection principles are included. The Copermittees are required to detail any changes to the General Plan or environmental review process in their Jurisdictional Runoff Management Program Annual Reports. The General Plan must be updated to include water quality and watershed protection principles for all new development and redevelopment projects.

The change made to these sections requires updating the General Plan and Environmental Review Process on an as-needed basis. Each Copermittee has either updated, is in the process of updating, or has assessed its General Plan to ensure the General Plans include the required principles and are in compliance with Order No. R9-2004-001.

Section F.1.c (Approval Process Criteria and Requirements) requires that all development projects (regardless of size) implement BMPs to reduce storm water pollutant discharges to the MEP. Source control and site design BMP requirements were not clearly described in this section of Order No. R9-2004-001. Additional detail has been added to this section to better describe the source control and site design

BMPs needed for implementation. This additional detail is consistent with the requirements of the SSMP, also known in Riverside County as the Water Quality Management Plan (WQMP). However, only source control and site design BMPs that apply to all types of development projects are required (e.g., properly designed trash storage areas).

The requirements are consistent with Order No. R9-2004-001. However, some elements are not contained in the current DAMP[168] (e.g., buffer zones). One exception is that Order No. R9-2004-001's requirement that applicants must provide evidence of coverage under the General Industrial Permit has been removed, since industrial tenants for a development project are usually not known during the planning stage.

The section has also been modified to reflect the prohibition of over-irrigation runoff to the MS4, as well as LID requirements. Additionally, this section requires the use of native and/or low water use plants for landscaping, and rainwater harvesting, where feasible.

Sections F.1.d and F.1.d.(1) (Standard Storm Water Mitigation Plans and Definition of Priority Development Project) require the Copermittees to review and update their SSMPs (also known in Riverside County as Water Quality Management Plans – WQMPs) for compliance with the Order. The sections also require all Priority Development Projects falling under certain categories to meet SSMP requirements. The update is necessary to ensure that the Copermittees' SSMPs are consistent with the changes that have been made to the Order's SSMP requirements. The requirement for the development/adoption of a Model SSMP has been removed since a model was completed and adopted in 2005.

The SSMP section of the Order has been reformatted for clarity. There are also some significant changes. Changes have been made in response to USEPA program evaluations, recent BMP development and effectiveness studies, recent reports on the magnitude of problems caused by hydromodification, and reviews of annual reports and the ROWD submitted by the Copermittees.

In addition, the Order requires that a one-acre threshold be phased in over two years for the priority development category. This one-acre threshold was selected to be consistent with the State Water Board's Phase II NPDES requirements for small municipalities (Order No. 2003-0005-DWQ). The one-acre threshold is also included to be consistent with the State Water Board's Construction General Permit (Order No. 2009-0009-WQO), to ensure all Development Projects subject to the post-construction BMP requirements of the Construction General Permit will implement SSMP post-construction BMP requirements. The one-acre determination applies to the amount of

[168] Riverside County Copermittees. *Drainage Area Management Plan (DAMP)2006.* July 21, 2006.

ground area disturbed, not the total size of the parcel or project. Each Copermittee may also lower this threshold if desired.

Section F.1.d.(2) (Priority Development Project Categories) includes several changes to improve, simplify, and clarify the Priority Development Project categories.

One of the most significant changes is that where a new Development Project feature, such as a parking lot, falls into a Priority Development Project Category, the entire project footprint is subject to SSMP requirements. This criterion was not included in Order No. R9-2004-001. It is included, however, in the Model San Diego SSMP that was approved by the San Diego Water Board in 2002. It is included in this Order because existing development inspections by Riverside County municipalities show that facilities included in the Priority Development Project Categories routinely pose threats to water quality. This permit requirement will improve water quality and program efficiency by preventing future problems associated with partly treated storm water runoff from redevelopment sites. This approach to improving storm water runoff from existing developments is practicable because municipalities have a better ability to regulate new developments than existing developments.

Another significant change is a new category for any new development projects that create 10,000 square feet or more of impervious surfaces (collectively over the entire project site). This category applies to commercial, industrial, residential, mixed use, and public projects on private or public land.

Section F.1.d.(2)(g) was modified to allow the Copermittees to develop a standard roadway design and post-construction BMP guidance document that could be used by the Copermittees in lieu of a project specific SSMP for each public works road construction project. The guidance document must comply with the SSMP requirements, including the LID and hydromodification BMP requirements. The roadway design and post-construction BMP guidance must be included in the updated SSMP, and may be utilized after the San Diego Water Board has determined that the updated SSMP is acceptable.

Development of new industrial sites was not included as a category in the Priority Development Projects in Order No. R9-2004-001 because industrial NPDES requirements already establish storm water criteria. Industrial sites are now included in the new development category of the Order to be consistent with Phase II rules and to close loopholes.

Section F.1.d.(3) (Pollutants of Concern) requires Copermittees to update their procedures for identifying pollutants of concern for each Priority Development Project. This is important to do periodically because of changing water quality conditions and designations of impairments or areas of concern. Furthermore Copermittees continually learn more about pollutant-generating activities as they conduct inspections and investigations, and that information must be incorporated into the SSMP process.

Section F.1.d.(4) (Low Impact Development BMP Requirements) requires the Copermittees to require each Priority Development Project to implement low impact development (LID) BMPs to reduce the amount of polluted storm water runoff from those sites. The Copermittees' ROWD proposes to revise the Riverside County Storm Water Quality BMP Design Handbook to incorporate LID design concepts.[169] The primary approach in LID site design BMPs is to limit the permanent loss of existing infiltration capacity because loss of infiltration is a major contributor to wet weather pollution discharges. General means to accomplish that goal include retaining natural infiltration areas of a site and limiting the amount of impervious surfaces. The Order does not require a specific or relative amount of pervious surfaces be added to a project. The Order seeks to retain on-site capture of the 85th percentile storm.

The Copermittees must require LID BMPs to be implemented for each Priority Development Project, unless found to be technically infeasible. LID BMPs must be formally considered during the plan review process for Priority Development Projects. The LID review process for each Priority Development Project is expected to include an assessment of LID BMP techniques to infiltrate, filter, store, evaporate, and/or retain runoff close to the source of the runoff. The review process is also expected to include an assessment of the potential collection of storm water for on site and off site reuse opportunities. In cases where LID BMPs are found to be technically infeasible, the Copermittees may grant a waiver to the Priority Development Project for all or a portion of the LID BMP requirements.

The Order directs the Copermittees to require new development projects to employ certain classes of LID site design BMPs. The required LID site design BMPs take advantage of features that are incorporated into the Priority Development Project, such as landscaping or walkways. It also requires that projects seek to maintain natural water drainage features rather than instinctively convey water in buried pipes and engineered ditches that eliminate natural water quality treatment functions. These types of site design BMPs are both effective and achievable.

LID BMPs must be sized and designed to ensure onsite retention without runoff, of the volume of runoff produced from a 24-hour 85th percentile storm event ("design capture volume"). This is consistent with other municipal storm water NPDES permits recently adopted by the Los Angeles and Santa Ana Water Boards, as well as the permit recently adopted by the San Diego Water Board for Orange County. The requirement for a numerical BMP design standard is well established for treatment control BMPs and is required in permits throughout the nation such as in Pennsylvania, West Virginia, Georgia, and Washington D.C. Since the 85th percentile storm event has previously been used as the numeric design standard for treatment control BMPs; the same size storm event can be applied as the numeric design standard for LID BMPs.

[169] Riverside County Copermittees. 2009. Report of Waste Discharge (San Diego Region).

The average 24-hour, 85th percentile rainfall for the Riverside County portion of the San Diego Region was calculated to be approximately 0.6 inches of rain.[170]

The retention and restoration of natural drainage features, such as ephemeral streams, wetlands, and depressions, can be particularly important because small tributaries are essential to the maintenance of the chemical, biological, and physical integrity of larger water bodies.[171] The loss and modification of such natural water resources to accommodate post-development storm water management leads to direct and indirect adverse effects on water quality that are felt both on the project site and off the site within the watershed.[172,173,174] Effects to aquatic beneficial uses from altered drainage features can occur downstream and upstream. The length of upstream or downstream effect of channel modifications is dependant on the specific structure type and channel slope.[175] For instance, road culverts can act as partial barriers to upstream distribution of native aquatic macroinvertebrates in urban streams, while bridges can provide adequate passage.[176] As a result of the adverse effects to water quality and beneficial uses, the State of California nonpoint source pollution program management measures for urban areas includes limiting the destruction of natural drainage features and natural conveyance areas.[177] Additionally, any project proposing to discharge dredge and/or fill material to waters of the United States and/or State is required to obtain a CWA section 401 Water Quality Certification and/or Waste Discharge Requirements from the San Diego Water Board or State Water Board.

LID site design BMP options do not need to be costly.[178] Some design options, such as concave vegetated surfaces or routing rooftop or walkway runoff to landscaped areas, are cost neutral.[179] Other LID site design BMPs, such as minimizing parking stall widths or use of efficient irrigation devices, are oftentimes already required. In addition, use of LID site design BMPs reduces storm water runoff quantity, allowing for

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[170] San Diego Water Board, 2004. Fact Sheet/Technical report for Order No. R9-2004-001, dated July 14, 2004.
[171] Aquatic scientists comment letter (April 10, 2003) on the Advanced Notice of Proposed Rulemaking (ANPRM) on the Clean Water Act Regulatory Definition of "Waters of the United States." (Docket ID No. OW-2002-0050). This letter is a synthesis of scientific information regarding ephemeral, intermittent, and headwater streams. It was written to USEPA by 85 leading aquatic scientists.
[172] Wright, Tiffany, et al. 2006. *Direct and Indirect Impacts of Urbanization on Wetland Quality.* Prepared by the Center for Watershed Protection for the USEPA Office of Wetlands, Oceans, an Watersheds. 81p. Available on-line at http://www.cwp.org
[173] Konrad, Christopher P. and Derek K. Booth, 2005. *Hydrologic Changes in Urban Streams and Their Ecological Significance.* American Fisheries Society Symposium. Vol. 45 pp.157-177.
[174] Coleman, Derrick, et al. 2005. *Effect of Increases in Peak Flows and Imperviousness on the Morphology of Southern California Streams*. Technical Report No. 450 of the Southern California Coastal Water Research Project.
[175] Fischenich, J.C. 2001. "*Impacts of stabilization measures*," EMRRP Technical Notes Collection (ERDC TNEMRRP- SR-32), U.S. Army Engineer Research and Development Center, Vicksburg, MS. http://www.wes.army.mil/el/emrrp
[176] Blakely, Tanya J., et al. 2006. *Barriers To The Recovery Of Aquatic Insect Communities In Urban Streams* Freshwater Biology Vol. 51(9), 1634–1645.
[177] California Nonpoint Source Encyclopedia, Management Measure 3.1.b. Runoff from Developing Areas, Site Development and Management Measure 3.3.a. Runoff from Existing Development, Existing Development.
[178] USEPA, 2000. Low-Impact Development: A literature review. EPA-841-B-00-005. 35p.
[179] Bay Area Stormwater Management Agencies Association., 1999. Start at the Source. Forbes Custom Publishing. Available on-line at: http://www.scvurppp-w2k.com/basmaa_satsm.htm. pp. 149.

treatment control BMPs and other storm water infrastructure on site to be smaller, therefore savings costs for both developers and municipalities.[180,181]

Because of the potential economic and environmental benefits of using LID site design, the U.S. Department of Housing and Urban Development, Office of Policy Development and Research, developed "*The Practice of Low Impact Development (LID)*" to assist the housing industry during the land development process. [182] This document focuses specifically on technologies that affect both the cost impacts and environmental issues associated with land development. Much of the report focuses on storm water management because LID storm water management systems can save capital costs for developers and maintenance costs for municipalities.[183] The executive summary of the HUD report notes:

> *This approach to land development, called Low Impact Development (LID), uses various land planning and design practices and technologies to simultaneously conserve and protect natural resource systems and reduce infrastructure costs. LID still allows land to be developed, but in a cost-effective manner that helps mitigate potential environmental impacts. LID is best suited for new, suburban development.*

Developers can use site and structure designs that reduce building footprints, decrease the amount of paved infrastructure, and provide for dispersed drainage and infiltration of runoff from impervious surfaces to reduce the effective impervious surface.[184] The concept of effective impervious surface is important, because when runoff from these surfaces is directed to pervious areas rather to an impervious drainage system (i.e. curbs, gutters, street surfaces, storm drain pipes), it can infiltrate, evaporate, or be taken up by vegetation, thereby reducing the total volume of storm water runoff leaving a site.

In addition to all the benefits discussed above, LID BMPs have several other advantages over conventional treatment control BMPs. As previously discussed, implementing LID BMPs can save on maintenance costs for municipalities and property owners. LID BMPs are typically easier to operate and maintain compared to conventional mechanical treatment control BMP technologies. Because LID BMPs are easier to operate and maintain, they are also more reliable compared to conventional mechanical treatment control BMP technologies, thus more sustainable over the long term.

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[180] National Association of Home Builders Research Center. *Builders Guide to Low Impact Development.* Available on-line at http://www.toolbase.org
[181] National Association of Home Builders Research Center. *Municipal Guide to Low Impact Development.* Available on-line at http://www.toolbase.org
[182] U.S. Department of Housing and Urban Development, Office of Policy Development and Research, 2003. *The Practice of Low Impact Development."* Prepared by: NAHB Research Center, Inc. Upper Marlboro, Maryland. Contract No. H-21314CA.
[183] Ibid. Executive Summary, p.x.
[184] Bay Area Stormwater Management Agencies Association. 2003. *Using Site Design Techniques to Meet Development Standards for Stormwater Quality*. Available on-line at: http://www.basmaa.org/

Through its process of conditioning development projects under the CWA section 401 Water Quality Certification program, the San Diego Water Board finds that the level of LID site design BMP implementation in the Order is feasible for all projects. The LID BMP requirements will help ensure that LID site design BMPs are implemented for new development projects. LID site design BMPs are a critical component of storm water runoff management at new development projects, since the LID BMPs provide multiple benefits including preservation of hydrologic conditions, reduction of pollutant discharges, cost effectiveness, and green space.

The Order provides the Copermittees with flexibility in implementing the LID site design BMP requirements by providing a LID BMP waiver program. For Priority Development Projects where infiltration LID BMPs are not technically feasible for retaining all or part of the design capture volume on site without runoff, a waiver may be granted for the remaining portion of the design capture volume to be treated with other LID BMPs. The Riverside County Copermittees plan on allowing the implementation of the LID BMPs contained in the Riverside County LID Design Manual if infiltration LID BMPs are found to be technically infeasible to retain all of the design capture volume. Other LID BMP design and guidance manuals that are acceptable to the Copermittees and/or San Diego Water Board may also be considered.

If infiltration LID BMPs and/or other LID BMPs are technically infeasible to retain and/or treat all or part of the design capture volume for a Priority Development Project, a waiver may be granted for the remaining portion of the design capture volume. The waiver would allow the remaining portion of the design capture volume to be treated with conventional treatment control BMPs and some form of mitigation.

The use of conventional treatment control BMPs for Priority Development Projects is expected to be allowed by the Copermittees on a very limited basis, and only when a Copermittee finds that LID BMPs are technically infeasible for retaining and/or treating the full design capture volume. In such cases, the Copermittee may issue a waiver for the Priority Development Project from all or a portion of the LID BMP requirements. The LID BMP waiver program that must be developed and implemented by the Copermittee(s) is discussed below under section F.1.d.(7). The criteria that the Copermittee(s) may use to make a finding of technical infeasibility for implementing LID BMPs are also discussed under section F.1.d.(7).

Section F.1.d.(5) (Source Control BMP Requirements) requires that Priority Development Projects implement a minimum set of source control BMPs to protect the water quality of receiving waters from discharges of runoff from these projects. This section has been added to provide more detail and clarify the Order's requirements for source control BMPs. The minimum source control BMPs listed as required by this section must be implemented by each Priority Development Project. In cases where one or more of the minimum source control BMPs are not warranted as part of the site

design for the Priority Development Project (e.g., no outdoor material storage and/or work areas), those source control BMPs are not expected to be implemented.

Section F.1.d.(6) (Treatment Control BMP Requirements) includes several design requirements for any treatment control BMPs that are allowed to be implemented (i.e. granted a waiver for all or part of the LID BMP requirements) on Priority Development Projects. These requirements are generally consistent with Order No. R9-2004-001, with two exceptions. First, the Order limits the selections of methods used to determine the appropriate volume of storm water runoff to be treated. The modification ensures that priority development project proponents utilize the most accurate information to determine the volume or flow of runoff which must be treated.

Second, the Order requires that treatment control BMPs selected for implementation at Priority Development Projects have a removal efficiency rating that is ranked with high or medium pollutant removal frequency for the project's most significant pollutants of concern. The requirement allows exceptions for those projects that, with a feasibility analysis, can justify the use of a treatment control BMP with a low removal efficiency for a Priority Development Project. This requirement is needed because to date, the Copermittees have generally approved low removal efficiency treatment control BMPs without justification or evidence that use of higher efficiency treatment BMPs was considered and found to be infeasible. Specifically, it has been found during audits of the Copermittees' SSMP programs that many SSMP reports do not adequately describe the selection of treatment control BMPs.[185] Moreover, USEPA's contractor Tetra Tech, Inc. recommends that "project proponents should begin with the treatment control that is most effective at removing the pollutants of concern […] and provide justification if that treatment control BMP is not selected."[186]

In addition, treatment control BMPs must be designed and implemented with measures to avoid the creation of nuisance or pollution associated with vectors, such as mosquitoes, rodents, and flies. Related guidelines are identified in guidance from CASQA.[187] Additional considerations are outlined in publications from the California Department of Health Services and University of California Division of Agriculture and Natural Resources.[188]

Section F.1.d.(7) (Low-Impact Development BMP Waiver Program) requires the Copermittees to develop, collectively or individually, a LID BMP waiver program. For some Priority Development Project sites, it may be technically infeasible to implement the required LID BMPs to retain and/or treat the design capture volume due to the site

[185] PG Environmental, 2008. Riverside County Flood Control and Water Conservation District and County of Riverside MS4 Inspection Report.
[186] Tetra Tech, Inc., 2005. Program Evaluation Report –San Diego Standard Urban Storm Water Mitigation Plan (SUSMP) Evaluation. P. 5.
[187] For example, see the California Stormwater BMP Handbook guidelines for Extended Detention Basins (TC-22) at http://www.cabmphandbooks.org.
[188] Marco Metzger. "Managing Mosquitoes in Stormwater Treatment Devices." University of California Division of Agriculture and Natural Resources Publication No. 8125. Available at http://anrcatalog.ucdavis.edu.

constraints. For this reason, the San Diego Water Board has added to the Order a requirement for the Copermittees to develop such a program. The LID BMP waiver program would provide the opportunity for development projects to avoid partial or full LID BMP implementation in exchange for implementation of conventional treatment control BMPs and mitigation. The program would maintain equal water quality benefits as properly implemented LID BMPs when partial LID BMPs are coupled with some form of mitigation.

LID BMPs are not limited to infiltration BMPs, and may also include storage, evaporation, evapotranspiration, filtration, and/or on site reuse BMPs. Thus, the San Diego Water Board expects that every site will be able to implement some form of LID BMPs to some extent. The LID BMP waiver program is expected to be used by the Copermittees on a limited basis, and only when a Copermittee finds that LID BMPs are technically infeasible for retaining and/or treating the full design capture volume. The Order provides several conditions under which a Copermittee may find that the implementation of LID BMPs to retain and/or treat the design capture volume is technically infeasible [see section F.1.d.(7)(b)(i)-(iii)]. The Copermittees are not limited to the conditions listed in the Order, and may identify other conditions in the SSMP that would allow a finding of technical infeasibility.

Making a finding of technical infeasibility for the implementation of the LID BMP requirements on any Priority Development Project is at the discretion of each Copermittee through their SSMP plan review process. For any project proponent that would like to receive a waiver for all or part of the LID BMP requirements, the Copermittees may require and/or use any information to make a finding of technical infeasibility.

A separate technical report developed by the project proponent or the Copermittee to support a finding of technical infeasibility may not always be necessary to meet the requirements of this Order. In most cases, it is expected that the information that is provided in the project proponent's SSMP plan review documents (e.g., geotechnical reports, site design plans) will allow the Copermittees to determine whether or not it is technically feasible for LID BMPs to be implemented to retain and/or treat all or part of the design capture volume. The reason(s) for a Copermittee making a finding a technical infeasibility and granting a LID BMP waiver for any project must be provided in the Annual Report.

For Priority Development Projects that are granted a waiver for all or a portion of the LID BMP requirements, mitigation will be required to achieve water quality benefits that will be lost without the LID BMP retention and/or treatment. Any LID BMP waiver program which allows development projects to forgo all or part of the LID BMP implementation requirements must include mitigation provisions which will achieve similar water quality benefits. To ensure that this is the case for the LID BMP waiver program, minimum mitigation provisions for the program have been added to the Order.

Mitigation can be achieved on site or off site. On site mitigation may include additional sizing multipliers for conventional treatment control BMPs implemented on the site to treat a larger range of storm events to achieve the same or greater pollutant load removal expected from retention of the design capture volume. Off site mitigation may include other pollutant treatment projects that are not located on the site that will achieve the same or greater pollutant removal expected from on site LID BMPs for the design capture volume. For example, off site mitigation projects may include green streets projects, existing development retrofit projects, retrofit incentive programs, regional BMPs and/or riparian restoration projects. Off site mitigation projects may also satisfy the Order's retrofitting requirements in section F.3.d.

In addition to these mitigation options, the Order allows the Copermittees to develop and propose additional forms of mitigation (e.g., pollutant credit system, mitigation fund) that could be implemented as part of the LID BMP waiver program by the Copermittee(s). Any additional forms of mitigation proposed by the Copermittees would be subject to approval by the San Diego Water Board Executive Officer prior to implementation.

Section F.1.d.(8) (LID and Treatment Control BMP Standards) addresses a need for the Copermittees to develop and apply consistent criteria for the design and maintenance of structural treatment BMPs. Correct BMP design is critical to ensure that BMPs are effective and perform as intended. Without design criteria, there is no assurance that this will occur, since there is no standard for design or review. As an example, Ventura County has developed a BMP manual that includes standard design procedure forms for BMPs. Ventura County's *Technical Guidance Manual for Storm Water Quality Control Measures* is available at http://www.vcstormwater.org/publications.htm."[189] CASQA also confirms the necessity of design criteria when it includes such criteria in its New Development and Redevelopment BMP Handbook.[190] This issue is noted in the ROWD, and the Copermittees propose to develop standard design checklist/plans/details for selected source control and treatment BMPs.[191]

Section F.1.d.(9) (Implementation Process) requires the Copermittee to implement a process to verify compliance with SSMP requirements. The process must identify at what point in the planning process that projects must meet SSMP requirements and what are roles/responsibilities of municipal departments. The intent of this requirement is to provide consistency in the application of the SSMP between the Copermittees. This requirement was included in previous Order No. R9-2004-001.

[189] Ibid.
[190] California Stormwater Quality Association, 2003. Stormwater Best Management Practice Handbook – New Development and Redevelopment.
[191] Riverside County Copermittees. 2009. Report of Waste Discharge (San Diego Region).

Section F.1.d.(10) (Post-construction BMP Review) requires the Copermittees to keep their SSMP up to date with BMP effectiveness studies for low-impact design and treatment control BMPs. This requirement will ensure that two important types of information be included in those efforts: Site design BMPs and treatment BMPs that are assessed as part of contracts with the State Water Board and San Diego Water Board. Projects funded with such state grants must include effectiveness assessments using a quality assurance plan. As a result, such studies generally provide reliable sources of local data and should be included in the SSMP.

Sections F.1.e (BMP Construction Verification)requires the Copermittees to verify that the BMPs are being constructed for each Priority Development Project subject to SSMP requirements (SSMP project). SSMP projects that improperly construct or fail to construct site design, source control, and treatment control BMPs can pose a significant threat to water quality. Section F.1.e is included in response to recommendations from USEPA.[192]

In some cases SSMP projects may wish to allow occupancy and/or use of a portion of the site prior to full completion of the project. Section F.1.e is not intended to require a project to be fully (i.e. all phases and areas) completed before the occupancy and/or intended use of a portion of the site is allowed. A Copermittee, however, must verify that the BMPs designed to treat and control pollutants from the completed portion of the project are properly constructed before the occupancy and/or intended use of the completed portion is allowed. The BMPs must be specifically designed to control pollutants from the completed portion of the site that will be occupied and/or used prior to the full completion of the SSMP project.

Section F.1.f (BMP Maintenance Tracking) is included in the Order to ensure the continued effectiveness of the post-construction BMP requirements. BMPs need to be properly constructed and adequately maintained to ensure that they are operating correctly and remain effective in removing pollutants from a project site's runoff prior to discharging to receiving waters.

To facilitate the tracking of BMP maintenance, each Copermittee must develop and maintain a database of Priority Development Projects subject to SSMP requirements (SSMP projects) and the post-construction BMPs implemented for each SSMP project. The inventory is not expected or required to include LID BMPs that are implemented on a lot by lot basis in low density residential areas. The inventory, however, must include the post-construction BMPs for all other development or redevelopment SSMP project sites.

The Order requires BMPs at all high priority SSMP project sites as well as all Copermittee project sites with BMPs to be inspected by the Copermittees annually.

[192] Federal Register / Vol. 64, No. 235 / Wednesday, December 8, 1999 / Rules and Regulations. P. 68845. USEPA recommends such practices in the Phase II storm water regulations, promoting "inspections during construction to verify BMPs are built as designed."

Other measures, verification methods, and inspection frequencies may be used for BMPs at lower priority SSMP project sites. SSMP project sites with the highest potential for causing or contributing to a threat to water quality or an existing impairment of water quality are required to be inspected by the Copermittees on an annual basis.

Twenty percent of all SSMP projects are required to be inspected by the Copermittees annually. If the number of high priority SSMP project sites is 20 percent or more of the total number of SSMP projects in the Copermittee's inventory, this requirement will be met. If, however, the number of high priority SSMP project sites is less than 20 percent of the total number of SSMP projects in the Copermittee's inventory, additional lower priority SSMP project sites must be inspected to make up the difference. Selection of the additional lower priority SSMP project sites will be at the discretion of the Copermittee, but are selected based on each site's potential threat to water quality.

The prioritization of the SSMP project sites requiring inspections by the Copermittees will be developed by the Copermittees and reported in the updated JRMP. The prioritization of SSMP project sites may be revised on an annual basis based on inspection findings, and the Copermittees must report changes in prioritization, and justification for each change, in the Annual Report.

The Order includes several criteria that must be considered by the Copermittees in determining the priority of a SSMP project site's threat to water quality. Receiving waters that are listed as impaired by pollutants and/or with discharges exceeding action levels are water bodies most at risk for impairment of beneficial uses. Thus, at a minimum, high priority SSMP projects must include sites that are known or suspected to generate pollutants in an area that is tributary (i.e. upstream within the same Hydrologic Subarea) to a receiving water body listed as impaired for those pollutants; and/or, a receiving water body where exceedances of action levels for those pollutants are observed; and/or, a receiving water body where exceedances of NALs for those pollutants are observed and the Copermittee has not been able to identify the source.

Section F.1.h (Hydromodification) expands and clarifies current requirements for control of MS4 discharges to limit hydromodification effects caused by changes in runoff resulting from development and urbanization. The requirements are based on findings and recommendations of the Riverside County Storm Water Program,[193] the Stormwater Monitoring Coalition (SMC),[194,195] and the Storm Water Panel on Numeric

[193] Riverside County Copermittees. 2009. Report of Waste Discharge (San Diego Region).
[194] Coleman, Derrick, et al. 2005. *Effect of Increases in Peak Flows and Imperviousness on the Morphology of Southern California Streams.* Technical Report No. 450 of the Southern California Coastal Water Research Project.
[195] Stein, Eric and Susan Zaleski. 2005. Managing Runoff to Protect Natural Streams: The Latest Developments on Investigation and Management of Hydromodification in California. Proceedings of a special technical workshop co-sponsored by California Stormwater Quality Association (CASQA), Stormwater Monitoring Coalition (SMC), and University of Southern California Sea Grant (USC Sea Grant). Technical Report No. 475 of the Southern California Coastal Water Research Project.

Effluent Limits (Numeric Effluent Panel).[196] Added specificity is needed due to the current lack of a clear standard for controlling hydromodification resulting from development. More specific requirements are also warranted because hydromodification is increasingly recognized as a major factor affecting water quality and beneficial uses.

Hydromodification is the change in a watershed's runoff characteristics resulting from development, together with associated morphological changes to channels receiving the runoff. As the total area of impervious surfaces increases, infiltration of rainfall decreases, causing more water to run off the surface and at a higher velocity than natural conditions. While erosion in channels is a naturally occurring process, increased runoff rates, volumes, and velocities from developed areas can produce erosive flows in channels under rainfall conditions which are unnatural and were not previously problematic. Moreover, runoff from developed areas increases the duration of time that channels are exposed to erosive flows. The increase in the volume of runoff and the length of time that erosive flows occur ultimately intensify the amount and potential of channel erosion, subsequently causing changes in sediment transport characteristics and the hydraulic geometry (width, depth, and slope) of channels.[197]

These types of changes have been documented in southern California. It has been reported that researchers studying flood frequencies in Riverside County have found that increases in watershed imperviousness of only 9-22 percent can result in increases in peak flow rates for the two-year storm event of up to 100 percent.[198] Such changes in runoff have significant impacts on channel morphology. It has recently been found that ephemeral/intermittent channels in southern California appear to be more sensitive to changes in imperviousness than channels in other areas. Morphology of small channels in southern California was found to change with only 2-3 percent watershed imperviousness, as opposed to 7-10 percent watershed imperviousness in other parts of the nation.[199]

Sediment that would normally be eroded from the developed areas (i.e. naturally eroded if the area remained undeveloped) is typically coarser grained and deposited closer to the source. Coarser grained sediments that are deposited also provide or contribute to habitat that is more hospitable to aquatic flora and fauna.

Developed areas and increased impervious surface change the types and quality of sediment that are discharged in runoff to the channels under rainfall conditions, which

[196] Storm Water Panel Recommendations to the California State Water Resources Control Board. 2006. The Feasibility of Numeric Effluent Limits Applicable to Discharges of Storm Water Associated with Municipal, Industrial, and Construction Activities.
[197] Santa Clara Valley Urban Runoff Pollution Prevention Program, 2005. Hydromodification Management Plan. P. 1-1.
[198] Schueler and Holland, 2000. Storm Water Strategies for Arid and Semi-Arid Watersheds (Article 66). The Practice of Watershed Protection.
[199] Coleman, et. al., 2005. Effect of Increases in Peak Flows and Imperviousness on the Morphology of Southern California Streams. P. iv.

can have any adverse impact on downstream habitats. Sediment in runoff from developed areas and impervious surfaces are typically finer grained, which remains suspended for longer periods of time and can affect aquatic flora (e.g., reduce photosynthesis by limiting transmittance of light) and fauna (e.g., interfere with respiration). Several types of pollutants generated on developed areas (e.g., pesticides, nutrients, bacteria, metals, hydrocarbons) also tend to adsorb on to finer grained sediments. In addition, finer grained sediments get deposited further away from the source or point of discharge. These changes in the characteristics and quality of the sediment in the runoff from developed areas also contribute to the hydromodification effects on downstream channels.

Effects of hydromodification are evident in Riverside County and recognized by the Copermittees. Analyses of bioassessment data within the San Diego Region has indicated that physical changes to stream channels caused by hydromodification are likely responsible, in part, for the low bioassessment scores in urbanized settings.[200] This pattern is consistent under Order No. R9-2004-001, although non-reference bioassessment monitoring was limited to two sites located at mass loading stations. These sites consistently exhibited poor or very poor IBI scores and sub-optimal or marginal habitat. In addition to poor habitat, water chemistry and toxicity impacts were documented at mass and tributary loading stations, likely exacerbating the observed low IBI scores.[201] It is important to recognize that the physical changes in stream channels are a direct result of MS4 discharges, but that two separate mechanisms are involved in bringing about those changes. First, is a change in the flow regime caused by the increase in impervious surfaces and loss of natural conveyance systems. Discharges to receiving waters from the MS4 outfalls do not mimic the natural discharges from former tributaries to that receiving water, and the change results in erosion. Second, the physical stream habitat in many places has been severely modified in order to efficiently convey those increased storm water discharges to the ocean. Where streams are hardened and/or buried to convey storm water, they cannot provide adequate water quality and other necessary conditions to support beneficial uses. Both of these issues are addressed in the Order.

The Copermittees' recognize the need to improve management of hydromodification. The ROWD proposes to revise the SSMP to incorporate additional information from ongoing hydromodification studies conducted by the SMC. The Order allows the Copermittees to adopt criteria consistent with future SMC findings in the development of their Hydromodification Management Plan.

Section F.1.h. requires the Copermittees to submit a draft Hydromodification Management Plan (HMP) on or before June 30, 2013. This will provide the Copermittees over 2 years to develop the draft HMP.

Section F.1.h (1) describes several elements that must be included in the HMP. For

[200] See San Diego Water Board Order No. R9-2009-002 Fact Sheet.
[201] Riverside County Copermittees Fiscal Year 2008-2009 Santa Margarita Watershed Annual Progress Report.

example, the HMP must identify a method for assessing susceptibility of channel segments which receive runoff discharges from Priority Development Projects, and include a channel standard to ensure that the stability of the channel is not compromised as a result of discharges from the Priority Development Projects. The HMP must also identify a range of flows where Priority Development Projects could cause hydromodification effects and subsequent stream instability.

Maintaining the pre-development flows and durations from a Priority Development Project will significantly reduce the potential for increased erosion caused by development. Loss of natural sediment that will be removed because of otherwise pervious areas covered by the impervious development and removal of pollutants in runoff from Priority Development Projects, however, can still increase the potential for increased erosion. Runoff that is discharged from a project that lacks sediment becomes “sediment hungry” and can result in increased erosion upstream and downstream from the point of discharge. Thus, the HMP must also identify a method and compensate for the loss of sediment supply that is expected due to development and include a performance and/or design standard that will be able to mitigate for that expected loss of sediment supply.

The HMP must require Priority Development Projects to implement control measures (such as LID or detention basins) to prevent hydromodification and resultant degradation of stream conditions upstream and/or downstream of project sites. To compare post-project flow rates and durations to pre-project flow rates and durations, the HMP must specify that the pre-development (naturally occurring) flow rates and durations shall be used when assessing pre-project conditions, so that the naturally occurring hydrology throughout the watershed is eventually restored.

In cases where a stream has been armored with concrete, rip rap, or other man-made materials, the HMP shall require the assessment of a comparable soft-bottom channel as the channel standard, as opposed to using the characteristics of the hardened channel as the channel standard. This is to ensure that hydromodification management measures are already in place should any portion of the hardened channel be returned to its natural state, thereby restoring the physical integrity of the creek and its Beneficial Uses. The only exceptions are for projects that discharge storm water runoff into underground storm drains or conveyance channels with bed and banks that have been concrete lined all the way to water storage reservoirs or lakes, where effects from hydromodification are not expected. Other exceptions that are acceptable to the San Diego Water Board may be identified in the final HMP.

The HMP must also include metrics for assessing impacts to downstream watercourses from Priority Development Projects, as well as assessing improvements to these watercourses. The metrics must be able to assess changes to the channels as Priority Development Projects are developed and constructed in the watershed. Monitoring and evaluating changes to the physical conditions of the channels receiving runoff discharges from Priority Development Projects will provide the Copermittees

data that can be used to determine whether or not the HMP is effective at reducing the increased erosive forces caused by development and impervious surfaces over time.

In addition to metrics to assess changes to the physical conditions of the channels, the Copermittees must monitor and evaluate the biological conditions (e.g., habitat quality, benthic flora and fauna, IBI scores) of the channels. This is because historic hydromodification impacts, such as concrete lining and channelization, are suspected to have impacted the natural physical habitat of urban streams resulting in low IBI scores. The Copermittee's 2008-2009 monitoring report indicated decreased IBI scores at mass loading stations below urbanized watersheds, in part due to marginal or suboptimal habitat. The Monitoring and Reporting Program in the Order includes new requirements for monitoring of habitat for bioassessment, with the "Full" suite of physical/habitat characterization measurements found in the SWAMP Bioassessment Standard Operating Procedures being required with each bioassessment sample. Additional bioassessment sites are also required at locations higher in the watershed, which is expected to more closely reflect localized impacts. Therefore, the IBI scores required by the Monitoring and Reporting Program will be a useful metric in terms of assessing both impacts to streams from Priority Development Projects and improvements due to implementation of the HMP management measures. The Copermittees may also develop or utilize other metrics and identify other monitoring locations that can be used to assess the effectiveness of the HMP on the physical and biological conditions of the channels.

In addition to the control measures that must be included in the HMP to prevent or minimize hydromodification effects from Priority Development Projects, section F.1.h.(2) requires the HMP to include additional management measures to be used on Priority Development Projects based on a prioritized consideration of the following elements in this order: 1) site-design control measures, 2) on-site management measures, 3) the use of regional control measures upstream of receiving waters, and lastly, 4) in-stream management and control measures (not to include reinforcement with non-naturally occurring materials). The suite of management measures must also include stream restoration as a viable option to achieve the channel standard and subsequently restore Beneficial Uses. In-stream controls are expected to be in the form of stream restoration or rehabilitation. The use of stream restoration is expected to be an option that is used in conjunction with other on site management measures and not by itself as the only management measure. Stream restoration or rehabilitation projects that are considered in-stream controls for the purpose of preventing or minimizing hydromodification effects do not include projects that use non-naturally occurring materials (e.g., concrete, rip-rap, or gabions, etc.), but may include projects that use natural materials and/or create stable and sustainable channel configurations.

The San Diego Water Board recognizes that fully achieving post-project runoff flow rates and durations that do not exceed pre-development (naturally occurring) runoff flow rates and durations on redevelopment projects with existing impervious surfaces

may be challenging. Thus, section F.1.h.(3) has been included to allow the Copermittees to propose, as part of the HMP, a waiver program specifically for Priority Development Projects that are redevelopment projects, as defined by section F.1.d.(1)(b). Because redevelopment projects may not be able to achieve post-project runoff flow rates and durations that do not exceed pre-development (naturally occurring) runoff flow rates and durations through onsite management and control measures, offsite mitigation measures may be required. Redevelopment projects, however, must be able to achieve post-project runoff flow rates and durations that are less than or equal to pre-project and down to pre-development runoff flow rates and durations to be eligible to receive a waiver under the program. If a project is granted a waiver, the incremental hydromodification impacts from not achieving the pre-development (naturally occurring) runoff flow rates and durations for the project site must be fully mitigated with offsite mitigation. Offsite mitigation measures may include utilizing regional hydrologic control measures (e.g., regional detention or infiltration basins) or rehabilitation of stream channels to achieve sustainable channel configurations.

Section F.1.h (6) describes interim hydromodification criteria that must be implemented by the Copermittees until the final HMP is found to be adequate by the San Diego Water Board Executive Officer. The Copermittees currently have hydromodification requirements in the SSMP (section 4.4 of the Riverside County WQMP). Until the final HMP is required to be implemented, the Copermittees must continue implementing their existing hydromodification requirements. The existing hydromodification requirements[202] allow exemptions for Priority Development Projects if they meet one of three conditions. One of those conditions is if a project discharges directly to a publicly-owned, operated and maintained MS4. This condition has been too broadly applied and has resulted in many projects being exempt from the hydromodification requirements in the past.

Therefore, the Order modifies the conditions that may exempt Priority Development Projects from implementing the interim hydromodification criteria. The modifications to the conditions are minor and can be implemented in the interim until the final HMP is approved. This allows the Copermittees to focus their resources on development of the final HMP.

Finally, the requirements included in section F.1.h do not supersede the LID BMP requirements in section F.1.d. (4). In certain situations, the requirements to incorporate LID BMPs will satisfy the requirements for hydromodification management. Using LID is a viable option for both accomplishing hydromodification management and pollutant load reductions.

[202] Riverside County Copermittees, 2006 (updated in 2009). Riverside County Water Quality Management Plan (WQMP), Section 4.4.

Section F.1.i (Unpaved Roads Development) specifically requires the Copermittees to implement or require implementation of BMPs for erosion and sediment control after construction of all new unpaved roads. As discussed for Finding D.1c, design and source control BMPs for unpaved roads are needed to minimize the discharge of sediment to the MS4s and receiving waters, especially during storm events. There are several guidance documents available (see Discussion for Finding D.1.c) that include design and source control BMPs that can be readily implemented by the Copermittees for the development of new unpaved roads.

F.2. Construction Component

The following legal authority applies to section F.2:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(D) provides that the proposed management program include "A description of a program to implement and maintain structural and non-structural best management practices to reduce pollutants in storm water runoff from construction sites to the municipal storm sewer system."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(D)(1) provides that the proposed management program include "A description of procedures for site planning which incorporate consideration of potential water quality impacts."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(D)(2) provides that the proposed management program include "A description of requirements for nonstructural and structural best management practices."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(D)(3) provides that the proposed management program include "A description of procedures for identifying priorities for inspecting sites and enforcing control measures which consider the nature of the construction activity, topography, and the characteristics of soils and receiving water quality."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(D)(4) provides that the proposed management program include "A description of appropriate educational and training measures for construction site operators."

Federal NPDES regulation 40 CFR 122.26(d)(2)(i)(A) provides that each Copermittee must demonstrate that it can control "through ordinance, permit, contract, order or similar means, the contribution of pollutants to the municipal storm sewer by storm

water discharges associated with industrial activity and the quality of storm water discharged from site of industrial activity."

Federal NPDES regulation 40 CFR 122.26(b)(14) provides that "The following categories of facilities are considered to be engaging in 'industrial activity' for the purposes of this subsection: […] (x) Construction activity including cleaning, grading and excavation activities […]."

Federal NPDES regulation 40 CFR 122.44(d)(1)(i) requires NPDES permits to include limitations to "control all pollutants or pollutant parameters (either conventional, nonconventional, or toxic pollutants) which the Director determines are or may be discharged at a level which will cause, have reasonable potential to cause, or contribute to an excursion above any State water quality standard, including State narrative criteria for water quality."

Section F.2 has additions to ensure the protection of threatened and endangered species and requires the consideration of potential impacts from the use of Active/Passive Sediment Treatment (AST) at sites determined by the Copermittees to be exceptional threats to water quality. These requirements were added to ensure additional protection of the Beneficial Uses of waters of the State.

Section F.2.a (Ordinance Update) requires each Copermittee to review and update its grading and storm water ordinances as necessary to comply with the MS4 permit. By updating the grading and storm water ordinances, the Copermittees will have the necessary legal authority to require construction sites to implement effective BMPs that will reduce pollutant discharges to the maximum extent practicable. The Order allows the Copermittees 365 days to review and update their ordinances. The 365 days should be adequate to allow for the relatively minor changes that might be needed since their ordinances were last updated under Order No. R9-2004-001.

Section F.2.b (Source Identification) requires the Copermittees to develop and update a watershed based inventory of all construction sites regardless of size or ownership. This section has been modified to require the inventory be updated regularly, rather than annually because constructions sites tend to change often within the course of a year. More frequent updates will ensure the Copermittees have a more accurate inventory of construction sites within their jurisdiction. A regularly updated inventory of active construction sites will assist the Copermittees in ensuring that all sites are inspected per Order requirements. The Order does not specify the frequency of updates, and instead relies on each Copermittee to develop updates appropriate to local construction activity. Failure to maintain a useful inventory would be a violation of the Order.

Section F.2.c (Site Planning and Project Approval Process) requires Copermittees to incorporate consideration of potential water quality impacts prior to approval and issuance of construction and grading permits.

This section now requires the Copermittees to review project proponents' runoff management plans for compliance with local regulations, policies, and procedures. USEPA recommends that it is often easier and more effective to incorporate storm water quality controls during the site plan review process or earlier.[203] In the Phase I storm water regulations, USEPA states that a primary control technique is good site planning.[204] USEPA goes on to say that the most efficient controls result when a comprehensive storm water management system is in place.[205] To determine if a construction site is in compliance with construction and grading ordinances and permits, USEPA states that the "MS4 operator should review the site plans submitted by the construction site operator before ground is broken."[206] Site plan review aids in compliance and enforcement efforts since it alerts the "MS4 operator early in the process to the planned use or non-use of proper BMPs and provides a way to track new construction activities."[207]

The Copermittees have the discretion to determine the depth and detail of the review, as well as the method by which the review will be conducted. The Copermittees review must at least verify that the project proponent's runoff management plan complies with the Copermittee's construction, storm water, and grading ordinances and permits prior to issuing the permit.

Section F.2.d (BMP Implementation) includes modifications to the requirements for each Copermittee to designate and ensure implementation of a set of minimum BMPs at construction sites. These modifications are based on San Diego Water Board findings and experience during implementation of Order No. R9-2004-001.

As a result, the Order requires a minimum set of BMPs to be designated for all sites. In addition to the minimum set of BMPs, enhanced BMPs must be designated and implemented for sites tributary to (i.e. upstream within the same Hydrologic Subarea of) a 303(d) listed water body, or within, directly adjacent to, or discharging directly to ESAs. Enhanced BMPs are control actions and measures specifically targeted to the pollutant or condition of concern and of higher quality and effectiveness than the minimum control measures otherwise required. Enhanced BMPs are expected to be better and more effective for pollutant removal than the minimum set of BMPs.

For sites that are identified as exceptional threat to water quality, active/passive sediment treatment (AST) is required to be implemented in addition to the minimum set and/or enhanced sediment control BMPs. AST is required at construction sites that are identified by the Copermittee as an exceptional threat to water quality due to high turbidity or suspended sediment levels in the site's effluent even when other

[203] USEPA, 1992. Guidance 833-8-92-002. Section 6.3.2.1.
[204] Federal Register / Vol. 55, No. 222 / Friday, November 16, 1990 / Rules and Regulations. P. 48034.
[205] Ibid.
[206] USEPA, 2000. Guidance 833-R-00-002. Section 4.6.2.4, P. 4-30.
[207] Ibid., P. 4-31.

sediment control BMPs have been implemented. In cases where the Copermittee's designated minimum set of BMPs and/or enhanced BMPs are not able or expected to be able to reduce turbidity or suspended sediment levels to a level that will be protective of water quality, AST is necessary and is considered MEP for the discharges from these sites.

AST has been effectively implemented extensively in the other states and in the Central Valley Region of California.[208] In addition, the San Diego Water Board's inspectors have observed AST being effectively implemented at large sites greater than 100 acres and at small, less than 5 acre, in-fill sites. AST is often necessary for Copermittees to ensure that discharges from construction sites are not causing or contributing to a violation of water quality standards. For example, the Basin Plan lists the water quality objective for turbidity as 20 NTU for all hydrologic areas and subareas except for the Coronado HA (10.10) and the Tijuana Valley (11.10). For certain construction sites with high clay content soils, large slopes and exposed areas, the only technology that is likely to meet 20 NTU is AST combined with erosion and sediment controls. To ensure the MEP standard and water quality standards are met, the requirement for implementation of AST at exceptional threat construction sites has been added to the Order, while still providing sufficient flexibility for each Copermittee's unique program.

The Copermittees may define types of construction sites, and/or at any time identify any construction sites after inspections, that are considered exceptional threats to water quality warranting AST. AST may include any sediment control technologies that are capable of reducing turbidity or suspended sediment levels in a construction site's discharge to meet water quality standards in receiving waters.

The Order does not include seasonal restrictions on grading. Seasonal restrictions on grading for storm water are difficult to implement due to the conflict between seasonal grading restrictions, avian breeding and nesting seasons and the seasonal passage of endangered salmonids; therefore the seasonal grading restrictions have not been included with the other BMPs in the Order. For example, the Least Bell's Vireo and the Coastal California Gnatcatcher, found in southern California, are listed as federally endangered and threatened, respectively.[209] Permits issued by the California Department of Fish and Game (CDFG) restrict grading during these birds' breeding seasons, which is from April 10 to August 31 for the Least Bell's Vireo[210] and from February 15 to August 31 for the Coastal California Gnatcatcher.[211] Ideally storm water restrictions on grading would be during the rainy season from October 1 through April 30.[212] Combined, these restrictions would limit construction grading to be during

[208] State Water Board, 2004. Conference on Advanced Treatment at Construction Sites.
[209] State of California, Department of Fish and Game, 2010. State and Federally Listed Endangered and Threatened Animals of California.
[210] United States Department of the Interior, Fish and Wildlife Service, 2001. Least Bell's Vireo Survey Guidelines.
[211] United States Department of the Interior, Fish and Wildlife Service, 1997. Coastal California Gnatcatcher (*Polioptila californica californica)* Presence/Absence Survey Guidelines.
[212] San Diego Water Board, 2001. Order No. 2001-01, San Diego County MS4 Permit. Directive F.2.g.(2).

the month of September, which is infeasible. Section D.2.d of the Order still requires project proponents to minimize grading during the rainy season and coincide grading with seasonal dry weather periods to the extent feasible.

Section F.2.e (Inspections) establishes criteria for inspections based on risk factors including size, season, and location of the construction site. Modifications have been made to requirements of Order No. R9-2004-001 based on the experience of the Copermittees and San Diego Water Board construction programs.

The types of construction sites that must be inspected every two weeks during the rainy season have been changed from Order No. R9-2004-001. In general, because large construction sites (i.e. greater than 50 acres) have been closely scrutinized during the last permit period, they tend to be adequately implementing BMPs. Smaller construction sites (i.e. site with less than 50 acres), however, were not inspected as frequently and can pose a significant threat to water quality. The final rule recently promulgated by USEPA for construction sites[213] identified construction sites with 20 or more acres of land disturbed at one time as posing a significant threat to water quality during the rainy season. Thus, the San Diego Water Board recognized that smaller construction sites needed to be inspected more frequently. As with the construction inspection requirements that were recently adopted for the Orange County Phase I MS4s, this Order requires sites in active grading during the rainy season that are over 30 acres, rather than sites over 50 acres, be inspected every two weeks.

The Order also lowers the size of construction sites adjacent to or discharging directly to ESAs that receive scrutiny. Order No. R9-2004-001 requires such sites five acres and more to be inspected every two weeks during the rainy season. This Order requires such sites one acre and above and tributary to (i.e. with the same Hydrologic Subarea of) a CWA section 303(d) water body segment impaired for sediment; or within, directly adjacent to, or discharging directly to a receiving water within an ESA to be inspected every two weeks during the rainy season and once during August or September. The lower size threshold is consistent with Phase II storm water permits and the Construction General Permit, State Water Board Order No. 2009-0009-DWQ.

The Copermittees also have the discretion to define or identify other construction sites that are significant threats to water quality that must be inspected every two weeks. Several factors are provided that must be considered by each Copermittee in evaluating threat to water quality.

Finally, types of construction sites that must be inspected at least monthly during the rainy season have been changed from Order No. R9-2004-001. All construction sites with one acre or more of soil disturbance must be inspected monthly during the rainy season instead of just 3 times during the rainy season. This level of inspection is

necessary by the Copermittees to ensure adequate compliance with their grading, building, storm water or other water quality related orders and provisions.

This section also requires the Copermittees to track the number of inspections for each inventoried construction site. This requirement has been added to ensure that the Copermittees can demonstrate that construction sites are inspected at the minimum frequencies.

Section F.2.g requires the Copermittees to notify the San Diego Water Board when high level enforcement has been issued to a construction site as a result of storm water violations. The Copermittees will define the types of high level enforcement that will warrant a notification of the San Diego Water Board in their JRMPs. Copermittees are also required to annually notify the San Diego Water Board of construction sites that have alleged violations. This section was added to enhance San Diego Water Board and Copermittee communication and coordination in regulating construction sites.

F.3 Existing Development Component

F.3.a. Municipal
The following legal authority applies to section D.3.a:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A)(1) provides that the proposed management program include "A description of maintenance activities and a maintenance schedule for structural controls to reduce pollutants (including floatables) in discharges from municipal separate storm sewers."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A)(3) provides that the proposed management program include "A description for operating and maintaining public streets, roads and highways and procedures for reducing the impact on receiving waters of discharges from municipal storm sewer systems, including pollutants discharged as a result of de-icing activities."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A)(4) provides that the proposed management program include "A description of procedures to assure that flood management projects assess the impacts on the water quality of receiving water bodies and that existing structural flood control devices have been evaluated to determine if retrofitting the device to provide additional pollutant removal from storm water is feasible."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A)(5) provides that the proposed management program include "A description of a program to monitor pollutants in runoff from operating or closed municipal landfills or other treatment, storage or disposal facilities for municipal waste, which shall identify priorities and procedures for inspections and establishing and implementing control measures for such discharges."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A)(6) provides that the proposed management program include "A description of a program to reduce to the maximum extent practicable, pollutants in discharges from municipal separate storm sewers associated with the application of pesticides, herbicides, and fertilizer which will include, as appropriate, controls such as educational activities, permits, certifications, and other measures for commercial applicators and distributors, and controls for application in public right-of-ways and at municipal facilities."

Federal NPDES regulation 40 CFR 122.44(d)(1)(i) requires NPDES permits to include limitations to "control all pollutants or pollutant parameters (either conventional, nonconventional, or toxic pollutants) which the Director determines are or may be discharged at a level which will cause, have reasonable potential to cause, or contribute to an excursion above any State water quality standard, including State narrative criteria for water quality."

Section F.3.a.(2) (General BMP Implementation) requires the Copermittees to designate minimum BMPs for general municipal areas and activities, regardless of their threat to water quality. BMPs must also be designated for special events. The designated minimum BMPs required to be implemented at a site can be based on the sources or activities present at the site. Threat to water quality is used to determine inspection frequencies in section F.3.a.(8).

Section F.3.a.(3), F.3.a.(4), and F.3.a.(5) (BMP Implementation for Specific Categories) establishes requirements for specific categories of activities and areas. These are selected based on the CWA and findings of the Copermittees in annual reports and ROWD that identify these activities as warranting special attention.

Pesticides, Herbicides, and Fertilizers. 40 CFR 122.26(d)(2)(iv)(A)(6) requires a description of a storm water program for pesticides, herbicides, and fertilizers. In addition, water quality data demonstrates widespread presence of such pollutants in receiving waters and MS4 discharges. In response to similar requirements of Order No. R9-2004-001, the Copermittees have developed a specific Integrated Pest Management, Pesticides, and Fertilizer guidelines.

Flood Control Structures. In order to more closely meet the intent of the federal regulations and guidance, the requirement has been modified. 40 CFR 122.26(d)(2)(iv)(A)(4) requires "A description of procedures to assure that flood management projects assess the impacts on the water quality of receiving water bodies and that existing structural flood control devices have been evaluated to

determine if retrofitting the device to provide additional pollutant removal from storm water is feasible." Retrofitting flood control devices can reduce storm water pollutants and improve water quality.

USEPA expands on the federal provision with the following information: "Storm water management devices and structures that focus solely on water quantity are usually not designed to remove pollutants, and may sometimes harm aquatic habitat and aesthetic values".[214] As flood control structures and other elements of the MS4 age and retrofitting becomes necessary, opportunities for water quality improvements arise.

Conveyance systems which take water quality consideration into account (such as grassed swales, vegetated detention ponds, etc.) can often cost less to construct than traditional concrete systems. Evaluation of the applicability of such systems during retrofitting must occur to ensure that pollutants in storm water runoff are reduced to the maximum extent practicable. USEPA supports utilizing BMPs for pollution reduction in flood management projects, stating that "The proposed management program must demonstrate that flood management projects take into account the effects on the water quality of receiving water bodies. […] Opportunities for pollutant reduction should be considered".[215]

There are generally two types of retrofits for flood control structures. The first type involves adding an engineered device to an existing structure in order to treat or divert runoff. Examples include catch basin inlet filters/screens, ultraviolet disinfection facilities, hydrodynamic separators, and diversions to the sanitary sewer. The second type involves re-installing pervious or natural treatment features to facilities. Examples include removing concrete portions of conveyances to create pervious conveyances; and creating treatment wetlands within flood detention facilities. The later type of retrofit is preferred by the San Diego Water Board. They are likely more sustainable over the long-term because they may require less rigorous operation and maintenance than the former. They may also provide the additional benefit of providing significant or incidental opportunities for beneficial uses (e.g., recreation, wildlife, water supply).[216,217]

<u>Sweeping of Municipal Areas.</u> Sweeping municipal areas would likely be done in the absence of the Order. However, in certain cases it is an important component of a jurisdictional runoff management program. The Order contains requirements to

[214] USEPA, 1992. Guidance Manual for the Preparation of Part II of the NPDES Permit Applications for Discharges from Municipal Separate Storm Sewer Systems. Washington D.C. EPA/833-B-92-002.
[215] Ibid.
[216] Burton, Carmen et al. 2005. Assessing Water Source and Channel Type as Factors Affecting Benthic Macroinvertebrate and Periphyton Assemblages in the Highly Urbanized Santa Ana River Basin, California. American Fisheries Society Symposium. Vol.47 pp.239-262.
[217] Stromberg, Juliet C. 2001. Restoration of Riparian Vegetation in the South-Western United States: the importance of flow regimes and fluvial dynamism. Journal of Arid Environments. Vol49, pp.17-34.

ensure that the use of street sweeping is optimized for runoff applications if it is to be used and reported as a BMP.

Section F.3.a.(6) (Operation and Maintenance of MS4 and Treatment Controls) requires the Copermittees to inspect and remove waste from their MS4s prior to the rainy season.

Maintenance is critical to the successful implementation of every storm water runoff management program. USEPA finds that "Lack of maintenance often limits the effectiveness of storm water structural controls such as detention/retention basins and infiltration devices. […] The proposed program should provide for maintenance logs of, and identify specific maintenance activities for, each class of control, such as removing sediment from retention ponds every five years, cleaning catch basins annually, and removing litter from channels twice a year.

If maintenance activities are scheduled infrequently, inspections must be scheduled to ensure that the control is operating adequately. In cases where scheduled maintenance is not appropriate, maintenance should be based on inspections of the control structure or frequency of storm events. If maintenance depends on the results of inspections or if it occurs infrequently, the applicant must provide an inspection schedule. The applicant should also identify the municipal department(s) responsible for the maintenance program".[218] The MS4 maintenance requirements are based on the above USEPA recommendations. This maintenance will help ensure that structural controls are in adequate condition to be effective year round, but especially at the beginning of and throughout the rainy season.

Two requirements have been added to the Order that were not within Order No. R9-2004-001. Subsection (iii) allows a decreased inspection frequency for facilities that are routinely clean, and subsection (iv) requires trash to be removed from open channels and detention basins in a timely manner. Typically, Copermittees have reported annual or semi-annual creek cleanups as significant BMPs. The large volumes of trash reported to be removed during these events demonstrates the significant amount of trash that accumulates in the channels. In order to reduce the effect of the trash, the Order requires that trash be removed more frequently.

Section F.3.a.(7) (Infiltration from Sanitary Sewer to MS4) requires the Copermittees to implement controls and measures to prevent and eliminate sewage infiltration or seepage from municipal sanitary sewers to MS4s through thorough, routine preventive maintenance of the MS4.

[218] USEPA, 1992. Guidance Manual for the Preparation of Part II of the NPDES Permit Applications for Discharges from Municipal Separate Storm Sewer Systems. Washington D.C. EPA/833-B-92-002.

Sections F.3.a.(8) and F.3.a.(9) (Inspections and Enforcement) establishes a minimum set of municipal areas and activities for oversight and inspection by the Copermittees and requires that Copermittees properly enforce runoff requirements at municipal areas and activities.

Section F.3.a.(10) (Unpaved Roads Maintenance) requires the Copermittees to implement or require implementation of BMPs for erosion and sediment control during and after maintenance activities on unpaved roads, particularly in or adjacent to stream channels or wetlands. As discussed for Finding D.1c, source control BMPs for unpaved roads are needed to minimize the discharge of sediment to the MS4s and receiving waters. There are several guidance documents available (see Discussion for Finding D.1.c) that include BMPs that can be readily implemented by the Copermittees for the development of new unpaved roads. This requirement is necessary to ensure the Copermittees minimize the discharge of sediment from their unpaved roads used for their maintenance activities.

F.3.b. Commercial / Industrial
The following legal authority applies to section F.3.b:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(C) provides that the proposed management program include "A description of a program to monitor and control pollutants in storm water discharges to municipal systems from municipal landfills, hazardous waste treatment, disposal and recovery facilities, industrial facilities that are subject to section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA), and industrial facilities that the municipal permit applicant determines are contributing a substantial pollutant loading to the municipal storm sewer system."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(C)(1) provides that the Copermittee must "identify priorities and procedures for inspections and establishing and implementing control measures for such discharges."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(C)(2) provides that the proposed management program shall "Describe a monitoring program for storm water discharges associated with the industrial facilities identified in paragraph (d)(2)(iv)(C) of this section, to be implemented during the term of the permit, including the submission of quantitative data on the following constituents: any pollutants limited in effluent guidelines subcategories, where applicable; any pollutant listed in an existing NPDES permit for a facility; oil and grease, COD, pH, BOD_5 , TSS, total phosphorus, total Kjeldhal nitrogen, nitrate plus nitrite nitrogen, and any information on discharges required under 40 CFR 122.21(g)(7)(iii) and (iv)."

Federal NPDES regulation 40 CFR 122.26(d)(2)(ii) provides that the Copermittee "Provide an inventory, organized by watershed of the name and address, and a description (such as Standard Industrial Classification [SIC] codes) which best reflects the principal products or services provided by each facility which may discharge, to the municipal separate storm sewer, storm water associated with industrial activity."

Federal NPDES regulation 40 CFR 122.44(d)(1)(i) requires NPDES permits to include limitations to "control all pollutants or pollutant parameters (either conventional, nonconventional, or toxic pollutants) which the Director determines are or may be discharged at a level which will cause, have reasonable potential to cause, or contribute to an excursion above any State water quality standard, including State narrative criteria for water quality."

Federal NPDES regulation 40 CFR 122.26(d)(2)(i)(A) provides that each Copermittee must demonstrate that it can control "through ordinance, permit, contract, order or similar means, the contribution of pollutants to the municipal storm sewer by storm water discharges associated with industrial activity and the quality of storm water discharged from site of industrial activity."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A) provides that the Copermittee develop a proposed management program which includes "A description of structural and source control measures to reduce pollutants from runoff from commercial and residential areas that are discharged from the municipal storm sewer system that are to be implemented during the life of the permit, accompanied with an estimate of the expected reduction of pollutant loads and a proposed schedule for implementing such controls."

Section F.3.b.(1) (Source Identification) requires that botanical and zoological gardens and exhibits, building material retailers and storage, animal boarding facilities and kennels, mobile pet services, plumbing services, and power washing services be included in the Copermittees' inventory of commercial sites/sources. These commercial or industrial sites and sources have been identified by the Copermittees and/or the San Diego Water Board as facilities that may contribute a significant pollutant load to the MS4. In cases where a particular type of facility is not present or known to operate within a Copermittee's jurisdiction, there is no expectation that there would be any such facilities included in the inventory. If, however, that type of facility does become established or begins operating within a Copermittee's jurisdiction during the period of this Order, the Copermittees are expected to identify those sites or sources and include them in their inventory of commercial or industrial facilities. This is not a significant change because Order No. R9-2004-001 requires that any commercial or industrial site or source determined by a Copermittee to contribute a significant pollutant load to the MS4 be added to its inventory of commercial or industrial sites.

The inventory of commercial and industrial facilities is expected to be reviewed and, if necessary, updated at least annually and included in the Annual Report. The inventory is expected to include the prioritization of each facility to ensure the facility is inspected at the correct frequency. If changes are made to the prioritization for any facilities, justification for the changes is expected to be reported in the Annual Report. The inventory is the foundation for the tracking of BMP implementation, number and date(s) of inspections performed, inspection findings, violations, and enforcement actions for each commercial or industrial facility, all of which are expected to be included in the Annual Report.

Section F.3.b.(3) (Mobile Businesses Program) requires each Copermittee to develop and implement a program to reduce the discharge of storm water pollutants from mobile businesses to the MEP and to prevent the discharge of non-storm water. Mobile businesses are service industries that travel to the customer to perform the service rather than the customer traveling to the business to receive the service. Examples of mobile businesses are power washing, mobile vehicle washers, carpet cleaners, port-a-potty servicing, pool and fountain cleaning, mobile pet groomers, plumbers, and landscapers. These mobile services produce waste streams that could potentially impact water quality if appropriate BMPs are not implemented.

Order No. R9-2004-001 also requires BMP implementation for certain mobile businesses (e.g., mobile vehicle washing and mobile carpet cleaning). These storm water requirements of Order No. R9-2004-001 are not significantly different from the existing requirements. The Order specifies the Copermittees must prevent non storm water dry weather flows from entering the MS4 (see section C.2.b). Special attention is required for mobile businesses because of the difficultly of controlling discharges from mobile businesses with existing programs.

Mobile businesses present a unique difficulty in storm water regulation. Due to the transient nature of the business, the regular, effective practice of unannounced inspections is difficult to implement. Also, tracking these mobile businesses is difficult because they are often not permitted or licensed and their services cross Copermittee jurisdictions. Mobile businesses that operate within a municipality may be based in another municipality or even outside the Region.

The Order takes into account the difficulties in regulating mobile businesses. The Copermittees may choose to cooperate in developing and implementing their programs for mobile businesses, including sharing of mobile business inventories, BMP requirements, enforcement action information, and education. Sharing information will allow the Copermittees to better identify and track mobile businesses operating in their jurisdictions.

Because BMPs have been developed already, but communication with mobile businesses may be difficult, the Order provides broad flexibility to the Copermittees for developing a targeted program within the Commercial portion of each JRMP.

Section F.3.b.(4) (Inspection of Industrial and Commercial Sites/Sources) includes requirements for inspections of industrial and commercial sites/sources. The Order is similar to the Order No. R9-2004-001 in requiring that inspections check for coverage under the General Industrial Permit; assessment of compliance with Copermittee ordinances and permits related to storm water and non-storm water runoff; assessment of BMP implementation, maintenance, and effectiveness; visual observations for non-storm water discharges, potential illicit connections, and potential discharge of pollutants in storm water runoff; and education and outreach on storm water pollution prevention.

The Order also requires that inspections include review of BMP implementation plans if the site uses or is required to use such a plan, and the review of facility monitoring data if the site monitors its runoff. If a facility is not required to have a BMP implementation plan or required to collect monitoring data, the inspection does not need to include a review of this information. BMP implementation plans and monitoring data are expected to be available for any facility that is covered under the General Industrial Permit. The BMP implementation plans and monitoring data can provide the inspector pertinent information that can be used during the visual inspection of the facility (e.g., BMPs implemented, maintenance records for BMPs, pollutants in storm water runoff). The Copermittees' inspectors have the discretion to determine the depth and detail of the review and use of the information in conducting the inspection.

Changes in the Order's requirements for inspection procedures mimic USEPA's guidance: "Site inspections should include (1) an evaluation of the pollution prevention plan and any other pertinent documents, and (2) an onsite visual inspection of the facility to evaluate the potential for discharges of contaminated storm water from the site and to assess the effectiveness of the pollution prevention plan."[219] In 1999, USEPA "recognized visual inspection as a baseline BMP for over 10 years," and "visual inspections are an effective way to identify a variety of problems. Correcting these problems can improve the water quality of the receiving water."[220]

Inspection frequencies in the Order have been modified from Order No. R9-2004-001. Order No. R9-2004-001 specifies frequencies for inspecting commercial/industrial sites based on threat to water quality and requires high priority sites to be inspected annually. For sites not identified as high priority, each site must be inspected at least once within a 5 year period.

An additional notification to the San Diego Water Board regarding industrial sites has been added. Copermittees are required to annually notify the San Diego Water Board of industrial sites that have suspected violations. This was added to enhance San Diego Water Board and Copermittee communication and coordination in regulating

[219] USEPA, 1992. Guidance 833-8-92-002, section 6.3.3.4 "Inspection and Monitoring".
[220] USEPA, 1999. 832-F-99-046, "Storm Water Management Fact Sheet – Visual Inspection".

industrial sites. Information may be provided as part of the JRMP annual report if submitted prior to the rainy season.

Also, the option for implementing a third party certification program is included. To the extent that third party certifications are conducted to fulfill the inspection requirements for this section of this Order, the Copermittee will be responsible for conducting and documenting quality assurance and quality control of the third-party certifications. The Copermittees may propose a third party certification program that must receive approval from the San Diego Water Board Executive Officer prior to implementation. The Order includes several requirements that must be included in the third party certification program in order for it to be considered for approval by the San Diego Water Board.

F.3.c. Residential
The following legal authority applies to section F.3.c:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A) provides that the Copermittee develop a proposed management program which includes "A description of structural and source control measures to reduce pollutants from runoff from commercial and residential areas that are discharged from the municipal storm sewer system that are to be implemented during the life of the permit, accompanied with an estimate of the expected reduction of pollutant loads and a proposed schedule for implementing such controls."

Federal NPDES regulation 40 CFR 122.44(d)(1)(i) requires NPDES permits to include limitations to "control all pollutants or pollutant parameters (either conventional, nonconventional, or toxic pollutants) which the Director determines are or may be discharged at a level which will cause, have reasonable potential to cause, or contribute to an excursion above any State water quality standard, including State narrative criteria for water quality."

Section F.3.c.(4) (Common Interest Areas / Home Owner Association Areas / Mobile Home Parks) includes requirements for common interest areas / homeowners' associations and mobile home parks. Many residential neighborhoods and some commercial areas within the jurisdiction of the Copermittees are within common interest developments and are, therefore, subject to management of common areas by associations. The Declaration of the Covenants, Conditions and Restrictions (CC&Rs) contains the ground rules for the operation of such an association. CC&Rs are an appropriate method for protecting the common plan of developments and to provide for a mechanism for financial support for the upkeep of common areas including roads, storm drains, and other components of storm water conveyance systems.

This Order interprets common interest areas as property subject to the codes and ordinance and enforcement mechanisms of the city or county in which it resides and, therefore, holds the local government responsible for the discharge of wastes from storm water conveyance systems located within these areas.

Section F.3.c.(5) (Privately Owned Unpaved Roads Maintenance) includes requirements for privately owned unpaved roads. The Copermittees must require implementation of BMPs for erosion and sediment control during maintenance activities on privately owned unpaved roads, particularly roads that are in or adjacent to receiving waters. As discussed for Finding D.1.c, BMPs for unpaved roads are needed to minimize the discharge of sediment to the MS4s and receiving waters. There are several guidance documents available (see Discussion for Finding D.1.c) that include design and source control BMPs that can the Copermittees can readily require to be implemented.

In addition, where the Copermittees identify illegal construction and maintenance grading activities on privately owned unpaved roads, the Copermittees must enforce their ordinances to prevent illicit discharges of sediment and other pollutants from privately owned unpaved roads to their MS4s and receiving waters.

Section F.3.d. Retrofitting Existing Development
The following legal authority applies to section F.3.d:

Legal Authority: The legal authority for retrofitting existing development is the same legal authority as that identified for municipal, industrial, commercial and residential development sections (See fact sheet discussion on those sections, F.3.a – c). In particular, CWA sections 402(p)(3)(B)(ii-iii), and CWC section 13377 give the Regional Water Board the legal authority to require retrofitting of existing development.

Section F.3.d has been added to require a plan for the retrofit of existing development (see Finding D.3.h and Discussion). This section contains specific requirements for a program to retrofit existing development. When appropriately applied as in this Order, retrofitting existing development meets MEP standards.

Existing BMPs are not sufficient, as evidenced by 303(d) listings and exceedances of Water Quality Objectives from the Copermittees monitoring reports. More advanced BMPs, including the retrofitting of existing development with LID, are part of the iterative process. Previous permits limited the requirement of treatment control BMPs to new development and redevelopment. Based on the current rate of redevelopment compared to existing BMPs, the use of LID only on new and redevelopment will not adequately address current water quality pollution and problems, including downstream hydromodification. Retrofitting existing development is practicable for a municipality through a systematic evaluation, prioritization and implementation plan focused on impaired water bodies, pollutants of concern, areas of downstream

hydromodification, feasibility and effective communication and cooperation with private property owners. The retrofitting requirements are based largely on guidance from the USEPA[221] and the Center for Watershed Protection.[222]

Section F.3.d.(1) requires the Copermittees to identify and inventory areas of existing development within their jurisdiction as candidates for retrofitting projects. The Copermittees are expected to examine the inventories that they are maintaining as required under sections F.3.a-c, inspection findings, and any other forms of data and information to identify the candidates for retrofitting projects. Several areas of existing development that must be identified as candidates for retrofitting projects are listed. Based in part on guidance developed by the Center for Watershed Protection, these areas of existing development are expected to provide the most immediate improvements for water quality through retrofitting. This list of areas that must be considered does not limit the Copermittees from identifying other areas within their jurisdiction that may be evaluated for retrofitting projects.

Section F.3.d.(2) requires each Copermittee to evaluate the candidates identified under section F.3.d.(1) and rank them based on several criteria. One or more types of retrofit source control or treatment control BMPs may be evaluated for each candidate. Landowner cooperation is among the criteria to evaluate and prioritize retrofitting. For example, retrofitting projects on publicly owned properties are likely and expected to be feasible with sufficient funding secured.

Section F.3.d.(4) requires each Copermittee to cooperate with private property owners to encourage the implementation of site specific retrofitting projects. Because the Copermittees have limited authority to directly require retrofitting projects on private property, the Copermittees must encourage private property owners to implement retrofitting projects through indirect programs and incentives. Several programs and incentives that have been successful in other areas are provided in the Order for the Copermittees consideration in developing their practices to encourage private property owners to retrofit their sites. This list, however, does not limit the Copermittees from identifying and considering other practices that may be effective in encouraging private property owners to implement retrofitting projects on their sites.

Section F.3.d.(5) requires retrofit BMPs that are implemented to be tracked in accordance with section F.1.f. The retrofit BMPs must also be inspected. Retrofit BMPs on publicly owned properties must be inspected per section F.1.f. Privately owned retrofit BMPs must be inspected as needed to ensure proper operation and maintenance. Tracking and inspecting retrofit BMPs is necessary for the Copermittee to ensure that the retrofit BMPs are not removed and are maintained to remain effective. Inspections can also provide the Copermittee useful information on the effectiveness of individual retrofit BMPs. For retrofit BMPs on publicly owned

[221] USEPA , MS4 Permit Improvement Guide, EPA 833-R-10-001, April, 2010.
[222] USEPA , MS4 Permit Improvement Guide, EPA 833-R-10-001, April, 2010.

properties, tracking and inspection will correct any problems with the BMPs as soon as a problem arises and will ensure proper maintenance.

For retrofit BMPs on privately owned properties, retrofit BMPs are expected to be implemented and maintained by the property owner on a voluntary basis. The retrofit BMPs must be tracked by the Copermittees, but their inspections are required less frequently due to access issues (i.e. on an as-needed basis). Voluntary retrofitting projects do not warrant frequent Copermittee inspections due to the property owner's willingness to retrofit. Periodic inspections may be performed to ensure the site owner has not removed the retrofit BMPs. Periodic inspections would also ensure that the retrofit BMPs remain effective by providing an opportunity for the inspector to educate the original and subsequent site owner(s) if the retrofit BMP is not operating effectively and requires some maintenance.

F.4. Illicit Discharge Detection and Elimination

The following legal authority applies to section F.4:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(B) provides that the proposed management program "shall be based on a description of a program, including a schedule, to detect and remove (or require the discharger to the municipal storm sewer to obtain a separate NPDES permit for) illicit discharges and improper disposal into the storm sewer."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B)(1) provides that the Copermittee include in its proposed management program "a program, including inspections, to implement and enforce an ordinance, orders or similar means to prevent illicit discharges to the municipal storm sewer system."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B)(2) provides that the Copermittee include in its proposed management program "a description of procedures to conduct on-going field screening activities during the life of the permit, including areas or locations that will be evaluated by such field screens."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B)(3) provides that the Copermittee include in its proposed management program "procedures to be followed to investigate portions of the separate storm sewer system that, based on the results of the field screen, or other appropriate information, indicate a reasonable potential of containing illicit discharges or other sources of non-storm water."

Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(B)(4) provides that the Copermittee include in its proposed management program "a description of procedures to prevent, contain, and respond to spills that may discharge into the municipal separate storm sewer."

Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(B)(5) provides that the Copermittee include in its proposed management program "a description of a program to promote, publicize, and facilitate public reporting of the presence of illicit discharges or water quality impacts associated with discharges from municipal separate storm sewers."

Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(B)(6) provides that the Copermittee include in its proposed management program "a description of educational activities, public information activities, and other appropriate activities to facilitate the proper management and disposal of used oil and toxic materials."

Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(B)(7) provides that the Copermittee include in its proposed management program "a description of controls to limit infiltration of seepage from municipal sanitary sewers to municipal separate storm sewer systems where necessary."

Section F.4.a (Prevent and Detect Illicit Discharges and Connections) requires the Copermittees to implement a program to actively seek and eliminate IC/IDs. Additional wording has been added to this section to clarify and ensure that all appropriate municipal personnel (i.e. field personnel) are utilized in the program to observe and report these illicit discharges and connections.

Section F.4.b (Maintain MS4 Map) requires each Copermittee to maintain an updated map of its entire MS4 and the corresponding drainage areas within its jurisdiction. The Order specifies that the map must include the segments of the storm sewer system owned, operated, and maintained by the Copermittee, and include locations of all known inlets, access points (i.e. manholes), connections with other MS4s, and outfalls to the Copermittee's MS4. Knowing where their inlets, access points, connections with other MS4s, and outfalls are located will allow the Copermittees to better track, identify, and eliminate IC/IDs. The use of a geographic information system (GIS) by the Copermittees is strongly encouraged for the MS4 map. The Riverside County Flood Control and Water Conservation District (RCFCD) currently maintains a GIS layer that is a compilation of all the Copermittee MS4 maps. Although an individual Copermittee may not have GIS capabilities, each Copermittee has agreements with RCFCD for providing updated MS4 maps to the RCFCD to update this GIS layer and subsequent submittal to the San Diego Water Board.

Section F.4.e (Investigation / Inspection and Follow-Up) requires the Copermittees to conduct follow up investigations and inspect portions of the MS4 for illicit discharges and connections, based on dry weather effluent analytical monitoring results. The

section also requires the Copermittees to establish criteria for triggering follow up investigations. Additional language has been added to this section to clarify the minimum level of effort and timeframes for follow up investigations when dry weather limitations are exceeded. This section requires the Copermittees to include and evaluate the specified action levels in their response criteria and to develop response criteria for pollutants without action levels.

Timely investigation and follow up of exceedances is necessary to identify sources of illicit discharges, especially since many of the discharges are transitory. The requirements for immediate response to obvious illicit discharges and a 2 business day minimum response time when field screening action levels are exceeded is necessary to ensure timely response by the Copermittees. When analytical data indicate an exceedance of action levels, the Copermittee(s) have 5 business days to confirm the need to initiate an investigation to identify the source of the exceedance. The Copermittees are expected to investigate for potential sources of the pollutant(s) that may have caused the exceedance of action levels upstream of the collection point and collect additional analytical and field data as necessary. If the quality of the data is confirmed to be unreliable or inaccurate and the investigation indicates there were no sources of the pollutant that could have caused an exceedance of the applicable action level, then further investigation is no longer warranted and should be documented in the Annual Report.

Section F.4.f (Elimination of Illicit Discharges and Connections) requires the Copermittee(s) to take immediate action to initiate steps necessary to eliminate illicit discharges, illicit discharge sources, and illicit connections that have been detected as a result of the investigations required under section F.4.e. The steps necessary to eliminate the illicit discharge or connection are typically initiated with identifying and contacting the person responsible for the illicit discharge or connection. The Copermittee(s) are expected to eliminate the detected illicit discharges and connections as soon as possible after they are able to contact the person responsible for the illicit discharge or connection. The steps expected and/or necessary to eliminate illicit discharges and connections under different scenarios and for different sources should be developed and implemented by the Copermittee(s). These steps may be outlined by the Copermittee(s) in their JRMPs.

In some cases, the Copermittee(s) may determine that one of the necessary steps is to contact the San Diego Water Board to assist in resolving and eliminating illicit discharges and connections. The Copermittee(s), however, are expected to exhaust all of their available administrative and enforcement authorities and mechanisms for addressing and eliminating illicit discharges and connections before contacting the San Diego Water Board for assistance.

Section F.4.h (Prevent and Response to Sewage Spills and Other Spills) requires each Copermittee to implement measures to prevent and respond to spills into its MS4. These requirements are consistent with Order No. R9-2004-001 and based on

federal regulations at 40 CFR 122.26(d)(2)(iv)(B)(4). Those federal NPDES regulations clearly require that owners and operators of MS4s have procedures to prevent, contain, and respond to spills that may discharge into the municipal separate storm sewer.

The Order includes sewage and non-sewage spills in the requirement for spill prevention and response. Federal regulations clearly define sewage as an illicit discharge that must be addressed by municipalities (see Phase II Final Rule, p.68758). Sewage is an illicit discharge to the MS4 that threatens public health. As such, the Copermittees must implement measures to prevent sewage from entering the MS4 system and must respond to illicit discharges that have entered the system. This section has been revised to clarify that management measures and procedures must be implemented to prevent, respond to, and cleanup spills. In addition to the management measures and procedures, a mechanism for the Copermittees to be notified of spills is necessary in order for those management measures and procedures to be implemented as soon as possible after a spill has occurred. The facilitation of public reporting of illicit discharges required by section F.4.c, in addition to regular and open communication with other agencies (e.g., sanitary sewer districts), may also serve as a mechanism for notifying the Copermittees of spills within their jurisdiction.

Section F.3.a.(7) of the Order includes requirements for measures that must be taken to prevent sewage spills. Examples of measures being implemented by Copermittees include inspections of fats, oils, and grease management at restaurants. Other preventative measures can be implemented during routine planning efforts for new development and redevelopment projects. Similarly, building permit inspections should be used to verify the integrity of the sanitary and storm sewer infrastructure and ensure that cross-connections between the two are avoided.

F.5. Public Participation Component

The following legal authority applies to section F.5:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv).

No significant changes from Order No. R9-2004-001 have been made to this section of the Order.

F.6. Education Component

The following legal authority applies to section F.6:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A)(6) provides that the proposed management program include "A description of a program to reduce to the maximum extent practicable, pollutants in discharges from municipal separate storm sewers associated with the application of pesticides, herbicides, and fertilizer which will include, as appropriate, controls such as *educational activities*, permits, certifications, and other measures for commercial applicators and distributors, and controls for application in public right-of-ways and at municipal facilities."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B)(6) provides that the proposed management program include "A description of educational activities, public information activities, and other appropriate activities to facilitate the proper management and disposal of used oil and toxic materials."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(D)(4) provides that the proposed management program include "A description of appropriate educational and training measures for construction site operators."

Section F.6 (Education Component) includes an introductory paragraph that is the same as in Order No. R9-2004-001, except for the addition of New Development / Redevelopment Project Applicants, Developers, Contractors, Property Owners, and other Responsible Parties to the list of target communities.

Section F.6.a (General Requirements) includes education topics that are required for the education programs developed and implemented for the target communities. The Copermittees can choose how and to what degree to address these topics. Some topics may be more important for certain target communities.

The requirement for educational activities, public information activities, and other appropriate activities to facilitate the proper management and disposal of used oil and toxic materials has been moved to this section from the Illicit Discharge Detection and Elimination section.

Section F.6.b (Specific Requirements) includes requirements for specific target communities, which are in addition to the general requirements. The education and training requirements previously included in other sections of Order No. R9-2004-001 (i.e. Development Planning, Construction, Existing Development) have been removed and consolidated under this section. Specific education requirements are included for:

1) the Copermittees' departments and personnel (i.e. staff and contractors, and Planning Boards and Elected Officials, if applicable), 2) new development / redevelopment and construction sites, 3) commercial and industrial sites/sources, and 4) residential and general public communities.

Section F.6.b.(1) (Copermittee Departments and Personnel) requires the Copermittees to implement an education program for their staff and contractors. Education is required at all levels of municipal staff and contractors. Education is especially important for the staff responsible for planning and development review, oversight, inspection and enforcement of construction activities, selecting and implementing BMPs for Copermittee areas, inspection and enforcement of industrial and commercial facilities, and other Copermittee activities which might result in discharges of pollutants if proper BMPs are not used.

Education of Copermittee departments and personnel may be conducted with joint and/or individual training programs (i.e. on a regional and/or jurisdictional scale), and may include both formal and informal training. The Copermittees may choose the scale and methods for educating their departments and personnel.

The annual training required for construction, building, code enforcement, grading review staffs, inspectors, and other responsible construction staff requires the training to occur annually, prior to the rainy season.

Section F.6.b.(2) (New Development / Redevelopment and Construction Sites) requires the Copermittees to educate parties responsible for a project (i.e. project applicants, developers, contractors, property owners, community planning groups, and other responsible parties) about storm water issues and BMPs. Different levels of training will be needed for planning groups, owners, developers, contractors, and construction workers, but all should get a general education of storm water requirements. Education of all construction workers can prevent unintentional discharges, such as discharges by workers who are not aware that they are not allowed to wash things down the storm drains. Training for BMP installation workers is imperative because the BMPs will fail if not properly installed and maintained. Training for field level workers can be formal or informal tail-gate format.

Section F.6.b.(3) (Commercial and Industrial Sites / Sources) requires the Copermittees to notify the owner/operator of each of their inventoried commercial and industrial sites/sources of the BMP requirements applicable to the site/source at least twice during the five-year period of the Order. Notification of BMP requirements may be fulfilled during the business license application/renewal process and/or during site inspections. Notifying commercial and industrial sites/sources of the BMP requirements will ensure the business owners are aware of the appropriate BMPs to implement that prevent discharges of pollutants from these sites/sources.

Section F.6.b.(4) (Residential and General Public) requires the target audiences for residential and general public communities to include underserved target audiences (e.g., disadvantaged communities), residents and managers of Common Interest Areas / Homeowner Associations, and owners and residents of mobile home parks. These communities are frequently neglected or underserved by most water quality education programs, but can be significant sources of pollutants. Thus, it is important for the residential and general public education programs to reach out to and educate these communities on their potential impacts to water quality.

G. Watershed Water Quality Workplan

The following legal authority applies to section G:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.26(a)(3)(ii) states: "The Director may […] issue distinct permits for appropriate categories of discharges […] including, but not limited to […] all discharges within a system that discharge to the same watershed […]"

Federal NPDES regulations 40 CFR 122.26(a)(3)(v) states: "Permits for all or a portion of all discharges from large or medium municipal separate storm sewer systems that are issued on a system-wide, jurisdiction-wide, watershed, or other basis may specify different conditions relating to different discharges covered by the permit, including different management programs for different drainage areas [watersheds] which contribute storm water to the system."

Federal NPDES regulation 40 CFR 122.26(a)(5) states: "The Director may issue permits for municipal separate storm sewers that are designated under paragraph (a)91)(v) of this section on a system-wide basis, a jurisdiction-wide basis, watershed basis, or other appropriate basis."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv) states: "Proposed programs may impose controls on a system-wide basis, a watershed basis, a jurisdiction basis, or on individual outfalls."

Section G requires Copermittees to continue implementation of their watershed runoff management program (WRMP), however the implementation approach has changed. Order No. R9-2004-001 required a Watershed SWMP that included a collaborative strategy to abate the sources and reduce the discharges causing high priority water quality problems. This strategy was to guide each watershed Copermittee's selection and implementation of Watershed Activities, so that the activities selected and implemented would remove that pollutant contribution responsible for the identified high priority water quality problem. Outcomes of these requirements were not able to demonstrate improvements to water quality.

Revised language in Order No. R9-2010-0016 attempts to focus each watershed Copermittee's efforts and resources on addressing the highest water quality problems in the watershed by focusing attention on the health of the receiving water body and the most efficient use of the watershed Copermittee's time and resources. Order No. R9-2010-0016 requires the watershed Copermittees to develop and follow a workplan

approach towards assessing receiving water body conditions, prioritizing the highest priority water quality problems, implementing effective BMPs, and measuring water quality improvement in the receiving water.

Section G.1. (Watershed Workplan Components) requires the watershed Copermittees to develop a workplan that will implement a collective watershed strategy to assess and prioritize the water quality problems, and identify, address, and mitigate the highest priority water quality issues/pollutants within the Upper Santa Margarita watershed's receiving waters. This section specifies the minimum components that must be included in the Watershed Workplan. Development of a workplan rather than watershed activities will allow the Copermittees flexibility to iteratively modify their watershed strategy over the course of future planning years as priorities change.

Section G.2 (Watershed Workplan Implementation) requires the Copermittee's to begin implementing the Watershed Workplan within 90 days of submittal unless otherwise directed by the San Diego Water Board. The Watershed Workplan must meet the requirements of the Order. The San Diego Water Board expects that implementing the Watershed Workplan, which will coordinate the Copermittees' efforts in the watershed, will result in water quality improvements sooner than later. If there are deficiencies in the Watershed Workplan, the San Diego Water Board will provide guidance to remedy those deficiencies as appropriate.

Section G.3 (Copermittee Collaboration) requires the Copermittees to collaborate to develop and implement the Watershed Workplan. Watershed Copermittee collaboration must include frequent regularly scheduled meetings. Because there are several other agencies with MS4s in the Upper Santa Margarita watershed that the Copermittees have indicated in the ROWD are a source of pollutants that may discharge into the MS4 systems of the Copermittees, the Copermittees are also required to pursue interagency agreements, or similar cooperative efforts, with non-Copermittee owners of the MS4 (such as Caltrans, Native American tribes, and school districts) to control the contribution of pollutants from one portion of the shared MS4 to another portion of the shared MS4. In addition, the Copermittees are required, as appropriate, to participate in watershed management efforts to address water quality issues within the entire Santa Margarita Watershed (such as the County of San Diego and United States Marine Corps Camp Pendleton).

Section G.4 (Public Participation) requires the Copermittees to implement a watershed-specific public participation mechanism within each watershed. A required component of the watershed-specific public participation mechanism must be a minimum 30-day public review of the Watershed Workplan. Opportunity for the public to review and comment on the Watershed Workplan must occur before the workplan is implemented.

Section G.5 (Watershed Workplan Review and Updates) requires the Copermittees to review and update the Watershed Workplan annually to identify needed changes to the prioritized water quality problem(s) listed in the workplan. This section requires the Copermittees to review and update their workplan each year to incorporate changing priorities and evolving watershed strategies.

Section G.6 (Pyrethroid Toxicity Reduction Evaluation) requires the Copermittees to incorporate the pyrethroid pollutant reduction program into the Watershed Workplan, as described in the ROWD.

H. Fiscal Analysis

The following legal authority applies to section H:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.26(d)(2)(vi) provides that "[The Copermittee must submit] for each fiscal year to be covered by the permit, a fiscal analysis of the necessary capital and operation and maintenance expenditures necessary to accomplish the activities of the programs under paragraphs (d)(2)(iii) and (iv) of this section. Such analysis shall include a description of the source of funds that are proposed to meet the necessary expenditures, including legal restrictions on the use of such funds."

Section H has been expanded in order to develop more useful and meaningful fiscal reporting. A revamped fiscal reporting strategy will provide the San Diego Water Board and the Copermittees with better capability to manage performance of the programs.

The Copermittees' effort is expected to provide standardization of reporting so that figures between Copermittees are comparable, which is one of many types of information which can be used by the San Diego Water Board to better understand Copermittee program implementation. Standardization and comparison of fiscal analysis reporting is supported by the State Water Board funded NPDES Stormwater Cost Survey, which finds that "standards for reporting costs and storm water activities are needed to allow accurate cost comparisons to be made between storm water activities."[223] This document also provides guidance regarding categorization of expenditures for tracking and reporting.

The Order establishes a criterion for when Copermittees must add narrative evaluations to the tables. This will address some of the variability in reporting and will provide the public and San Diego Water Board with improved understanding of how resources are shifted in response to annual assessments. This will also help ensure that projected annual costs adequately reflect planned program modifications described in the annual reports.

The San Diego Water Board has chosen not to require a description of fiscal benefits realized from implementation of the storm water protection program. This is a recommendation from the National Association of Flood and Stormwater Management

[223] Currier, et al., 2005. *NPDES Storm Water Cost Survey Final Report*. Prepared for California State Water Resources Control Board by Office of Water Programs, California State University, Sacramento. P. 63.

Agencies.[224] For instance, the current fiscal assessment does not address city-wide fiscal benefits of protection (e.g., public health, tourism, property values, economic activity, beneficial uses, etc.), even though many costs currently reported to the San Diego Water Board are for related activities. This type of assessment may help Copermittees improve the allocation of resources and it may help the Copermittees secure adequate funding for the program. Finally, it will provide a clearer picture of the storm water and non-storm water runoff program to the public and San Diego Water Board. However, qualitative assessments could be overly subjective and most Copermittees likely lack the ability to provide accurate quantitative assessments. The San Diego Water Board encourages Copermittees to consider means for conducting assessments of fiscal benefits derived from the programs. Such assessments could be conducted on a regional scale similar to studies of program costs conducted by the State Water Board.[225]

Currently, each Riverside County municipality's annual report includes a table based on a template developed by the principal Copermittee. The template was meant to facilitate reporting consistency among the Copermittees. The annual report table contains estimates of spending during the reported period and estimates of the next year's spending.

Review of the fiscal analysis tables included in the annual reports has not been as straightforward as expected, and the value of the information is moderate. The reviews indicate that cities do not use consistent methods to fill in the tables because they use different accounting and budgeting processes, and certain storm water program expenditures are not easily categorized into the table formats. Furthermore, storm water permit-related activities involve several departments, which makes it difficult for the storm water manager to gather and decipher actual costs.

These issues also make it difficult for the Copermittees to accurately compartmentalize expenditures within the format. As a result, the current financial reporting provides estimates at best and cannot be reliably used to compare program implementation among most municipalities.

[224] National Association of Flood and Stormwater Management Agencies. 2006. *Guidance for Municipal Stormwater Funding.* Prepared under a grant provided by the USEPA.
[225] State Water Board, 2005. NPDES Stormwater Cost Survey.

I. Total Maximum Daily Loads

The following legal authority applies to section I:

Broad Legal Authority: CWA section 303(d)(1)(A) and (C), and Federal regulations 40 CFR 130.2(i), 40 CFR 130.7(b)(1) and 40 CFR 122.44(d)(1)(vii)(B).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.44(d)(1)(vii)(B) requires that NPDES permit requirements incorporate water quality based effluent limitations that must be consistent with the requirements and assumptions of wasteload allocations (WLAs) assigned to the MS4 as part of the calculated TMDLs.

Section I.1. is a placeholder for the requirements and WLAs assigned to the Copermittees' MS4 discharges of any future TMDLs that are adopted by the San Diego Water Board.

Section I.2 includes, by reference to Santa Ana Water Board Order No. R8-2010-0033 (and subsequent revisions), the requirements and WLAs assigned to the MS4s for the Lake Elsinore/Canyon Lake (San Jacinto Watershed) Nutrient TMDLs that are being implemented for the Santa Ana Water Board. Because the San Jacinto Watershed is within the boundaries of the Santa Ana Water Board's region, the Lake Elsinore/Canyon Lake Nutrient TMDLs and its requirements must be implemented by the Cities of Murrieta and Wildomar for the areas within their jurisdictions located in the Santa Ana Region (Region 8).

J. Program Effectiveness Component

The following legal authority applies to section J:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.26(d)(2)(v) provides that the Copermittees must include "Estimated reductions in loadings of pollutants from discharges of municipal storm sewer constituents from municipal storm sewer systems expected as the result of the municipal storm water quality management program. The assessment shall also identify known impacts of storm water controls on ground water." Under Federal NPDES regulation 40 CFR 122.42(c) applicants must provide annual reports on the progress of their storm water management programs.

Section J.1 (Program Effectiveness Assessments) of the Order requires the Copermittees to assess the effectiveness of the implementation of their jurisdictional, watershed, and monitoring programs and activities. The Riverside County Storm Water Program is supportive of the CASQA effort, and use of CASQA assessment techniques is consistent with the methodology proposed in the ROWD.[226,227]

This section requires the Copermittees to establish assessment measures or methods for each of the six outcome levels described by CASQA that will be used to assess the effectiveness of the Jurisdictional Runoff Management Program (JRMP) and Watershed Workplan implementation at (1) reducing the discharge of storm water pollutants from its MS4 to the MEP; (2) prohibit non-storm water discharges; and (3) preventing runoff discharges from the MS4 from causing or contributing to a violation of water quality standards.

The effectiveness assessment measures or methods must be established and included as part of the updated JRMPs and Watershed Workplan that are due on or before June 30, 2012. Beginning with the Annual Report due in 2013, the Copermittees are required to annually perform the assessments using the established assessment measures or methods.

Section J.2 (Respond to Assessments) of the Order requires the Copermittees to improve jurisdictional and watershed activities or BMPs when they are found to be ineffective or when water quality impairments are continuing. This requirement fulfills the purpose of conducting effectiveness assessments – to improve and refine the

[226] The Riverside County Copermittees proposed an assessment strategy based on the CASQA Municipal Stormwater Program Effectiveness Assessment Guidance in section 6.1.2.1 of the ROWD.
[227] CASQA 2007. Municipal Stormwater Program Effectiveness Assessment Guidance.

Copermittees' programs. The requirement is consistent with USEPA's Phase II regulations, which state: "If the permittee determines that its original combination of BMPs are not adequate to achieve the objectives of the municipal program, the MS4 should revise its program to implement BMPs that are adequate […]."[228]

Each Copermittee must update the effectiveness assessment work plan and schedule to address any program modifications and improvements in response to the findings of their assessment. The updates to the work plan and schedule must be incorporated into the applicable Annual Report.

Section J.3 (Assessment and Response Reporting) of the Order describes the information required to be submitted in the Annual Report pertaining to program effectiveness assessments, review, and response. A summary of the effectiveness assessments, responses to the effectiveness assessments, and any steps implemented to improve the Copermittee's ability to assess program effectiveness must be included with the Annual Report. The reporting will demonstrate whether Copermittees have appropriately responded to the effectiveness assessments.

[228] Federal Register / Vol. 64, No. 235 / Wednesday, December 8, 1999 / Rules and Regulations. P. 68762.

K. Reporting

The following legal authority applies to section K:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.42(c) requires that "The operator of a large or medium municipal separate storm sewer system or a municipal separate storm sewer system that has been designated by the director under § 122.26(a)(1)(v) of this part must submit an annual report by the anniversary of the date of the issuance of the permit for such system. The report shall include: (1) The status of implementing the components of the storm water management program that are established as permit conditions; (2) Proposed changes to the storm water management program that are established as permit condition. Such proposed changes shall be consistent with § 122.26(d)(2)(iii) of this part; (3) Revisions, if necessary, to the assessment of controls and the fiscal analysis reported in the permit application under § 122.26(d)(2)(iv) and (d)(2)(v) of this part; (4) A summary of data, including monitoring data, that is accumulated throughout the reporting year; (5) Annual expenditures and budget for year following each annual report; (6) A summary describing the number and nature of enforcement actions, inspections, and public education programs; (7) Identification of water quality improvements or degradation."

CWC section 13267 provides that "the Regional Board may require than any person who has discharged […] shall furnish, under penalty of perjury, technical or monitoring reports which the regional board requires."

Section K.1 (Runoff Management Plans) outlines the process and due dates for submitting JRMPs and Watershed Workplan. The information to be included in the Jurisdictional and Watershed plans must be sufficient to demonstrate the capacity to implement the requirements of section F and G, respectively, of the Order.

In many cases, the requirements of the Order should not necessitate a complete rewrite of the plans, as was basically done in 2005. Only sections of the Order which are new or have been significantly changed should warrant rewriting of plans' sections. The San Diego Water Board plans to work with the Copermittees and provide guidance regarding where JRMPs and Watershed Workplan must be updated in accordance with the Order. This will help ensure that rewriting, reporting, and review efforts are minimized.

Section K.2 (Other Required Reports and Plans) include requirements for information to be included in the SSMP update, the HMP, and the Report of Waste Discharge (ROWD) for the next permit reissuance. The Order requires submittal of an updated

SSMP on or before June 30, 2012; a draft HMP on or before June 30, 2013; and a ROWD 180 days in advance of the expiration of this Order. The section also identifies the minimum information to be included in the ROWD, based on USEPA's May 17, 1996 guidance "Interpretive Policy Memorandum on Reapplication Requirements for Municipal Separate Storm Sewer Systems."

Section K.3 (Annual Reports) outlines the process and roles of the Copermittees for developing and submitting the JRMP Annual Report. Information to be included in the Annual Reports is described in section K.3.a.(3).

Each Copermittee is required to maintain records demonstrating that Permit activity requirements have been met, which allows the San Diego Water Board to confirm compliance as needed, such as via inspections, program audits, or requests for information per CWC sections 13225 and 13267.

Reporting requirements in the Order focus on results and responses to the effectiveness assessments conducted by the Copermittees. This will allow the San Diego Water Board to determine how appropriately municipalities adapt and tailor their programs to findings from activities and monitoring results. Assessment of progress toward meeting the objectives is possible because the data collected by the Copermittees under Order No. R9-2004-001 can be used to establish baseline conditions. Compared to activity-based reporting, this will greatly enhance the ability of the San Diego Water Board, Copermittees, and the public to determine whether the programs are successful.

The Order reduces the amount of program activity-based reporting from Order No. R9-2004-001. Under the CASQA assessment model, activity-based reporting includes primarily outcomes that document compliance with permit requirements (Level 1 outcomes), rather than being indicators of the impact of activity implementation.[229] This approach is consistent with guidance from the USEPA, which notes that annual reports should highlight program effectiveness as well as describing activities.[230] This emphasis is also consistent with recommendations from the National Academy of Public Administration in its report to USEPA on Evaluating Environmental Progress, which suggest that reviewing activities data provides limited value when evaluating the effectiveness of programs and resulting environmental conditions.[231]

The Order maintains some reporting requirements for certain activity-based outcomes. These are mostly focused on activities that establish or revise municipal processes related to storm water runoff and management. The processes required by the Order

[229] Level 1 outcomes under the CASQA guidance include documentation that required activities have been implemented.
[230] USEPA 2007. *MS4 Program Evaluation Guidance.* USEPA Office of Wastewater Management EPA-833-R-07-003. January 2007 field test version.
[231] National Academy of Public Adminstration 2001. Evaluating Environmental Progress: How EPA and the States Can Improve the Quality of Enforcement and Compliance Information (June 2001). http://www.napawash.org

are especially important in situations where sustaining water quality improvements may require activities that extend beyond the five-year period of the NPDES permit.

In addition, the Order maintains many activity-based reporting requirements related to enforcement of local requirements, with an emphasis on the results from such activities. This is intended to facilitate review of the contributions that inspection and enforcement activities have made toward meeting the goals of the Order. Reporting of these types of activities is supported by recommendations from the National Academy of Public Administration in its report to the USEPA: *Evaluating Environmental Progress: How EPA and the States Can Improve the Quality of Enforcement and Compliance Information* (June 2001).[232] Other activity-based reporting has been reduced to selected items based on consideration of program priorities.

Another source of prioritization for activity-based reporting is the *Storm Water Panel Recommendations to the California State Water Resources Control Board The Feasibility of Numeric Effluent Limits Applicable to Discharges of Storm Water Associated with Municipal, Industrial and Construction Activities* (June 19, 2006). In particular, the panel highlighted needs to improve the design, maintenance, and inspections of best management practices.

Section K.4 (Interim Reporting Requirements) specifies that the JRMP Annual Reports must be submitted in accordance with the requirements of Order No. R9-2004-001 prior to submittal of the JRMPs required under section K.1a.

[232] The National Academy of Public Administration report is available on-line at http://www.napawash.org

L. Modification of Programs

The following legal authority applies to section L:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv).

Section L of the Order provides a process for the Copermittees to modify their runoff management programs. This process will be useful so that the Copermittees can continue to refine and improve their programs based on the findings of their annual program effectiveness assessments. The process allows for minor modifications to the Copermittees' programs where the Copermittees can exhibit that the modifications meet or exceed existing legal requirements under the Order. Such a process avoids lengthy and time consuming formal approvals of proposed modifications before the San Diego Water Board, while still ensuring compliance with applicable legal standards and the Order. The process included in the Order is based on a process utilized by the California Regional Water Quality Control Board, San Francisco Bay Region (San Francisco Bay Water Board) in their MS4 permit for Alameda County.[233]

[233] San Francisco Bay Water Board, 2003. Order No. R2-2003-0021. P. 45.

M. Principal Permittee Responsibilities

The following legal authority applies to section M:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.26(a)(3)(iii)(C) provides that "A regional authority may be responsible for submitting a permit application."

Federal NPDES regulation 40 CFR 122.26(d)(2)(i)(D) provides that "[The Copermittee must demonstrate that it can control] through interagency agreements among coapplicants the contribution of pollutants from one portion of the municipal system to another portion of the municipal system."

No significant changes were made to this section.

N. Receiving Waters and MS4 Discharge Monitoring and Reporting Program

The following legal authority applies to section N:

Broad Legal Authority: CWA sections 402, 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulations 40 CFR 122.26(d)(2)(iii) and 122.44 require the Copermittees to conduct a comprehensive monitoring program.

See section T of this Fact Sheet/Technical Report for a discussion of changes to the Receiving Waters Monitoring and Reporting Program.

O. Standard Provisions, Reporting Requirements, And Notifications

The following legal authority applies to section O:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Standard provisions, reporting requirements, and notifications are consistent to all NPDES permits and are generally found in Federal NPDES regulation 40 CFR 122.41.

Section O.2 of the Order has been changed to remove the statement that all plans and reports submitted in compliance with the Order are an enforceable part of the Order. This statement has been removed because it is unnecessary. The Order itself contains sufficient detailed requirements to ensure that compliance with discharge prohibitions, receiving water limitations, non-storm water action levels and the narrative standard of MEP for storm water are achieved. Implementation by the Copermittees of programs in compliance with the Order's requirements, prohibitions, and receiving water limitations is the pertinent compliance standard to be used under the Order, as opposed to assessing compliance by reviewing the Copermittees' implementation of their plans alone.

Rather than being substantive components of the Order itself, the Copermittees' management plans are simply descriptions of their runoff management programs required under the Order. These plans serve as procedural correspondence which guides program implementation and aids the Copermittees and San Diego Water Board in tracking implementation of the programs. In this manner, the plans are not functional equivalents of the Order. For these reasons, the Copermittees' runoff management plans need not be an enforceable part of the Order.

P. Attachment A – Basin Plan Prohibitions

The following legal authority applies to Attachment A:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: CWC section 13243 provides that "A regional board, in a water quality control plan or in waste discharge requirements, may specify certain conditions or areas where the discharge of waste, or certain types of waste, will not be permitted."

CWC section 13263(a) provides that waste discharge requirements prescribed by the San Diego Water Board implement the Basin Plan.

No significant changes were made to this attachment.

Q. Attachment B – Standard Provisions

The following legal authority applies to Attachment B:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Standard provisions, reporting requirements, and notifications are consistent to all NPDES permits and are generally found in Federal NPDES regulation 40 CFR 122.41.

Attachment B includes Standard Provisions which have been developed by the State Water Board. These Standard Provisions ensure that NPDES permits are consistent and compatible with USEPA's federal regulations. Some Standard Provisions sections specific to publicly owned sewage treatment works are not included in Attachment B.

R. Attachment C – Definitions

The following legal authority applies to Attachment C:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv).

Attachment C contains definitions for terms found in the Order. In addition, definitions for terms previously defined in Order No. R9-2004-001 Attachment C, but which are not found in the current Order, have been deleted.

An additional section which includes acronyms and abbreviations has been added. This is to ensure clarity and prevent confusion of terms. Definitions have been added for new terms used in the permit to provide a clear understanding of their meaning and use.

S. Attachment D – Summary of Submittals

The following legal authority applies to Attachment D:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, 13383, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv) and 122.44(i).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.42(c) requires that "The operator of a large or medium municipal separate storm sewer system or a municipal separate storm sewer system that has been designated by the director under § 122.26(a)(1)(v) of this part must submit an annual report by the anniversary of the date of the issuance of the permit for such system. The report shall include: (1) The status of implementing the components of the storm water management program that are established as permit conditions; (2) Proposed changes to the storm water management program that are established as permit condition. Such proposed changes shall be consistent with § 122.26(d)(2)(iii) of this part; (3) Revisions, if necessary, to the assessment of controls and the fiscal analysis reported in the permit application under § 122.26(d)(2)(iv) and (d)(2)(v) of this part; (4) A summary of data, including monitoring data, that is accumulated throughout the reporting year; (5) Annual expenditures and budget for year following each annual report; (6) A summary describing the number and nature of enforcement actions, inspections, and public education programs; (7) Identification of water quality improvements or degradation."

CWC section 13267 provides that "the regional board may require than any person who has discharged […] shall furnish, under penalty of perjury, technical or monitoring reports which the regional board requires."

Attachment D to the Order provides a table summary of scheduled submittals required by the Order. Unscheduled submittals are no longer added to the table, since there is no proper due date for such submittals. A task summary has not been created for the Order, since the previous task summary was found to be redundant, repeating information found in the submittal summary and elsewhere in the Order.

A Jurisdictional Runoff Management Program (JRMP) Annual Report Checklist has been added to the reporting requirements. This addition is to determine and ensure that all requirements of the permit are being met. A Jurisdictional Runoff Management Program (JRMP) Annual Report Checklist has been added to the reporting requirements. This addition is to determine and ensure that all requirements of the permit are being met.

T. Attachment E - Receiving Waters and MS4 Discharge Monitoring and Reporting Program

The following legal authority applies to the Receiving Waters and MS4 Discharge Monitoring and Reporting Program:

Broad Legal Authority: CWA sections 402, 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv), 122.44 and 122.45.

Specific Legal Authority: Federal NPDES regulations 40 CFR 122.26(d)(2)(iii) requires the Copermittees to conduct a comprehensive monitoring program.

Federal NPDES regulation 40 CFR 122.42(c) requires that "The operator of a large or medium municipal separate storm sewer system or a municipal separate storm sewer system that has been designated by the director under § 122.26(a)(1)(v) of this part must submit an annual report by the anniversary of the date of the issuance of the permit for such system. The report shall include: (1) The status of implementing the components of the storm water management program that are established as permit conditions; (2) Proposed changes to the storm water management program that are established as permit condition. Such proposed changes shall be consistent with § 122.26(d)(2)(iii) of this part; (3) Revisions, if necessary, to the assessment of controls and the fiscal analysis reported in the permit application under § 122.26(d)(2)(iv) and (d)(2)(v) of this part; (4) A summary of data, including monitoring data, that is accumulated throughout the reporting year; (5) Annual expenditures and budget for year following each annual report; (6) A summary describing the number and nature of enforcement actions, inspections, and public education programs; (7) Identification of water quality improvements or degradation."

CWC section 13267 provides that "the regional board may require than any person who has discharged […] shall furnish, under penalty of perjury, technical or monitoring reports which the regional board requires."

I. Purpose

According to USEPA, the benefits of sampling data include, but are not limited to:

1. Providing a means for evaluating the environmental risk of storm water discharges by identifying types and amounts of pollutants present;
2. Determining the relative potential for storm water discharges to contribute to water quality impacts or water quality standard violations;
3. Identifying potential sources of pollutants; and

4. Eliminating or controlling identified sources more specifically through permit conditions.[234]

Equally important, monitoring programs are an essential link in the improvement of storm water management efforts. Data collected from monitoring programs can be assessed to determine the effectiveness of management programs and practices, which is vital for the success of the iterative approach used to meet the MEP standard for storm water. When water quality data indicate that water quality standards or objectives are being exceeded, particular pollutants, sources, and drainage areas can be identified and targeted for specific management efforts. When data indicate that a particular BMP or program component is not effective, improved efforts can be selected and implemented.

Considering the benefits described above, the Receiving Waters Monitoring and Reporting Program (MRP) has been designed to determine impacts to receiving water quality and beneficial uses from storm water runoff and to use the results to refine the Copermittees' storm water runoff management programs for the reduction of storm water pollutant loadings to the MEP. For non-storm water discharges, monitoring has been designed to identify and eliminate prohibited illicit discharges and to determine appropriate actions to take in response to dry weather non-storm water action levels. Additionally, the results from dry weather non-storm water monitoring can be used to evaluate exempted non-storm water discharges as a source or conveyance of pollutants. The primary goals of the MRP include:

1. Assess compliance with Order No. R9-2010-0016;
2. Measure and improve the effectiveness of the Copermittees' runoff management programs;
3. Assess the chemical, physical, and biological impacts of receiving waters from MS4 discharges;
4. Characterize storm water runoff discharges;
5. Identify sources of specific pollutants;
6. Prioritize drainage and sub-drainage areas that need management actions;
7. Detect and eliminate illicit discharges and illicit connections to the MS4;
8. Assess the overall health of receiving waters; and
9. Provide information to implement required BMP improvements

Each of the components of the MRP is necessary to meet the objectives listed above. In addition, the MRP has been designed in accordance with the guidance provided by the Southern California Stormwater Monitoring Coalition's Model Monitoring Technical Committee in its August 2004 "Model Monitoring Program for Municipal Separate Storm Sewer Systems in Southern California." This guidance document was developed in response to Senate Bill 72 (Kuehl), which addressed the standardization of sampling and analysis protocols in municipal storm water monitoring programs. The

[234] USEPA, 1992. NPDES Storm Water Sampling Guidance Document. EPA/833-B-92-001.

technical committee which developed the guidance included representatives from Southern California Regional Water Boards (including the San Diego Water Board), municipal storm water Copermittees (including Riverside County Flood Control District), Heal the Bay, and the Southern California Coastal Water Research Project.

As its title suggests, the guidance essentially developed a model municipal storm water monitoring program for use in Southern California. The model program is structured around five fundamental management questions, outlined below. The MRP is designed as an iterative step towards ensuring that the Copermittees' monitoring program can fully answer each of the five management questions.

1. Are conditions in receiving waters protective, or likely to be protective, of beneficial uses?
2. What is the extent and magnitude of the current or potential receiving water problems?
3. What is the relative storm water runoff contribution to the receiving water problem(s)?
4. What are the sources of storm water runoff that contribute to receiving water problem(s)?
5. Are conditions in receiving waters getting better or worse?

The three MS4 NPDES permits within San Diego Water Board jurisdiction each have very similar core monitoring requirements that include receiving water monitoring, effluent monitoring, and special studies (see Finding E.12 and Discussion). The justifications for each component of the monitoring program are discussed below.

II. Monitoring Program

The Monitoring Program has been organized into distinct sections and includes receiving water monitoring, MS4 effluent monitoring, a monitoring program in high priority inland aquatic habitat, and special studies. Each monitoring program is expected to answer specific questions and achieve goals outlined in section I. Some of these questions require the linkage of both receiving water monitoring and MS4 discharge monitoring that is required in the Order. As such, the Monitoring Program has been written to allow the Copermittees to utilize the same data and/or sampling effort where monitoring requirements overlap. For example, the Copermittees may elect to develop a Trash Special Study where the sampling is done at the same location and time as stream assessment monitoring. The Copermittees may evaluate the goals and questions of the Monitoring Program when evaluating how required monitoring programs may overlap.

Section II.A.1 (Mass Loading Station Monitoring) of the MRP requires mass loading and toxicity monitoring at monitoring stations located at the bottom of the Riverside County portion of the Santa Margarita watershed (see figure below).

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Locations of Mass Loading Stations (MLS) under Order No. R9-2004-0001

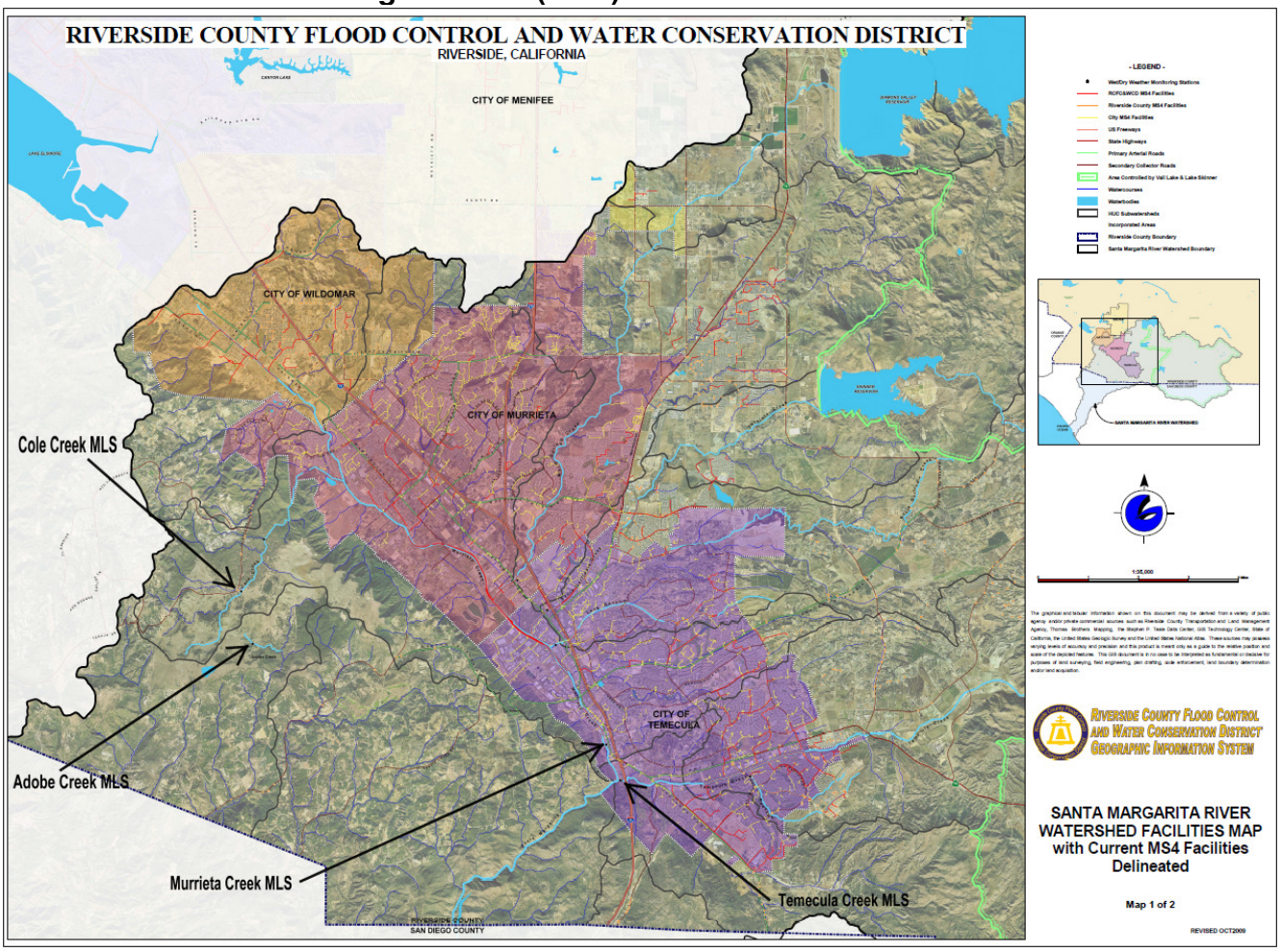

The intent of current mass loading monitoring as conducted by the Copermittees under Order No. R9-2004-001 is to use water chemistry data from storm events and dry weather flows to calculate pollutant loads and to assess water quality with respect to applicable acute and chronic toxicity criteria from the California Toxics Rule (CTR) and bioassessment as part of the triad monitoring approach.[235] The mass loading monitoring that is required by the Order will provide data representing event mean concentrations of pollutants, total pollutant loadings, and toxicity conditions from specific drainage areas. Mass loading monitoring stations are recommended by the Model Monitoring Technical Committee in order to answer management questions 1, 2, and 5.[236] The stations are also expected to contribute towards meeting MRP goals 1, 2, 3, 4, 6, and 8. The locations of the mass loading monitoring stations are not changed from Order No. R9-2004-001. The MRP, however, retains flexibility to allow the Copermittees to propose changing the location of a mass loading station. The

[235] Riverside County Copermittees. 2009. Report of Waste Discharge, section 6.4 .
[236] Model Monitoring Technical Committee, 2004. Model Monitoring Program for Municipal Separate Storm Sewer Systems in Southern California. Chapter 5.

Copermittees may also propose additional mass loading stations should they determine more are needed. The Copermittees will identify a permanent mass loading reference station for the permit term.

Some revisions to the required list of constituents to be monitored at mass loading stations have been made. The changes are made to be compatible with the federal NPDES regulations and in response to data collected during the current permit term. Audits of the Copermittees' monitoring program and reviews of annual reports during the last permit term have found consistent shortcomings in the Copermittees' monitoring programs. As a result, some changes have been made to the monitoring requirements. The changes include:

1. All events must now include: Biological Oxygen Demand, 5-day Chemical Oxygen Demand, Total Organic Carbon, Dissolved Organic Carbon. These are specifically required by 40 CFR 122.26(d)(2)(iii)(B), but were omitted from collection and reporting required by Order No. R9-2004-001.

2. Carbamate and Pyrethroid pesticides must be monitored. Pyrethroid pesticides were identified from TIEs conducted in response to toxicity observed during sampling as part of the triad approach at Temecula and Murrieta Creek. Long term monitoring of pesticide presence is critical to evaluate Copermittees BMP efforts and program effectiveness. Carbamate pesticides are utilized in residential, agricultural and commercial applications, and have been shown to have negative direct and indirect impacts on aquatic invertebrates and vertebrates, as well as associated riparian species.[237] In addition, the National Marine Fisheries Service (NMFS) issued a Biological Opinion in 2009 that concluded pesticide products containing carbaryl and carbofuran are likely to jeopardize 22 listed salmonids, including Southern California Steelhead.[238]

3. Impaired water body pollutants. Specific pollutants have been added in response to the U.S. Environmental Protection Agency approval of California's 2004-2006 and the San Diego Water Board approval of the 2008 303(d) List.

4. A requirement to collect a grab sample for total petroleum hydrocarbons whenever a sheen is observed has been added based upon results from IC/ID programs in existing southern California NPDES MS4 permits.

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[237] See:
Boone and James. 2003. Interactions of an insecticide, herbicide, and natural stressors in amphibian community mesocosms. *Ecological Applications*: 13(3) pp. 829-841.
Hanazato. 2001. Pesticide effects on freshwater zooplankton: an ecological perspective. *Environmental Pollution*: 112 pp. 1-10.
USGS. 1999. Field Manual of Wildlife Diseases: General Field Procedures and Diseases of Birds. Chapter 39.
California Department of Pesticide Regulation. 2010. Urban Pesticide Monitoring in Northern and Southern California. http://www.cdpr.ca.gov/docs/emon/surfwtr/presentations.htm

[238] NMFS. 2009. Endangered Species Act Section 7 Consultation Biological Opinion: Environmental Protection Agency Registration of Pesticides Containing Carbaryl, Carbofuran, and Methomyl.

5. The required organisms for toxicity testing have changed from the previous order to be consistent with USEPA guidance.[239] *Ceriodaphnia dubia* (water flea) has been replaced with *Pimephales promelas* (fathead minnow) to provide at least three test species from different phyla. *Hyalella azteca* has been retained as a test organism due to sensitivity to pyrethroid pesticides.

6. A constituent-specific table has been added to provide clarity to the list of pollutants that are required to be monitored as part of the triad approach.

7. More presecriptive reporting requirements have been added in the event the Copermittees fail to monitor the required number of mass loading events.

Section II.A.2 (Stream Assessment Monitoring) of the MRP requires the Copermittees to conduct bioassessment monitoring using a multiple lines of evidence approach which includes collection of benthic macroinvertebrates and algae, a full physical habitat assessment, water chemistry sampling, and toxicity testing. Bioassessment monitoring is a cost-effective tool that measures the effects of water quality over time.[240] It is an important indicator of stream health and impacts from storm water and non-storm water runoff. It can detect impacts that chemical and toxicity monitoring alone cannot. USEPA encourages permitting authorities to consider requiring biological monitoring methods in conjunction with chemical and toxicity testing to fully characterize the nature and extent of impacts from runoff.[241] Therefore, the San Diego Water Board commonly requires bioassessment monitoring in MS4 and other types of discharge permits.

Bioassessment is the direct measurement of the biological, chemical, and physical condition, and attainment of beneficial uses of receiving waters (typically using benthic macroinvertebrates, periphyton, and fish). Bioassessment monitoring integrates the effects of both water chemistry (including toxicity) and physical habitat impacts (e.g., sedimentation or erosion) of various discharges on the biological community native to the receiving waters. Moreover, bioassessment is a direct measurement of the impact of cumulative, sub-lethal doses of pollutants that may be below reasonable water chemistry detection limits, but that still have biological affects.

Because bioassessment focuses on communities of living organisms as integrators of cumulative impacts resulting from water quality or habitat degradation, it defines the ecological risks resulting from storm water and non-storm water MS4 runoff. Bioassessment not only identifies that an impact has occurred, but also measures the effect of the impact and tracks recovery when control or restoration measures have been taken. These features make bioassessment a powerful tool to assess

[239] USEPA, 1991. Technical Support Document for Water Quality Based Toxics Control. EPA 505-2-90-001.
[240] California Department of Fish and Game, 2002. California Regional Water Quality Control Board, San Diego Region 2002 Biological Assessment Report: Results of May 2001 Reference Site Study and Preliminary Index of Biotic Integrity.
[241] USEPA, 1999. Rapid Bioassessment Protocols for Use in Wadeable Streams and Rivers. EPA 841-B-99-002. P. 2-5.

compliance, evaluate the effectiveness of BMPs, and to track both short and long-term trends (MRP goals 1, 2, 3, and 8). Bioassessment can also help answer management questions 1, 2, and 5.

The Order also identifies the most current established protocol to be used in identifying bioassessment reference stations. The protocol referenced in the Order is specified because it provides a qualitative and repeatable method for identifying reference sites. Moreover, the protocol is well established, since it has been peer reviewed and published.

The Order includes four significant modifications to the bioassessment monitoring required under Order No. R9-2004-001. These changes include:

1. Bioassessment monitoring must be consistent with the State Water Board's Surface Water Ambient Monitoring Program (SWAMP) Standard Operating Procedures (SOP) as amended.[242]

2. Bioassessment monitoring is to include an assessment of periphyton (algae).[243] Advantages of bioassessment using periphyton include: (1) they have rapid reproduction rates and very short life cycles, making them valuable indicators of short-term impacts; (2) as primary producers, they are most directly affected by physical and chemical factors; (3) sampling is easy and inexpensive; and (4) algal assemblages are sensitive to some pollutants which may not visibly affect other aquatic assemblages.[244] Future bioassessment must use algal IBI scores, when developed.

3. The number of bioassessment stations has been increased from three to six. The Copermittees currently conduct bioassessment monitoring at one reference station and at the two mass loading stations at Temecula and Murrieta Creek. The increase in required sampling is needed to evaluate more localized impacts higher in the Santa Margarita Hydrologic Unit (HU) in conjunction with SAL and NAL monitoring, as well as to evaluate any impacts that occur from hydromodification. The additional required reference station will aid in detecting any differences in bioassessment scores over time that may be independent of MS4 discharges.

4. The bioassessment section title has been changed to Stream Assessment Monitoring. This was done to prevent confusion by the Copermittees in understanding sampling differences between mass loading stations and bioassessment sites. Under Order No. 2004-0001 all bioassessment sites were

[242] SWAMP February 2007 (amended September 2008). Standard Operating Procedures for Collecting Benthic Macroinvertebrate Samples and Associated Physical and Chemical Data for Ambient Bioassessments in California
[243] SWAMP June 2009. Standard Operating Procedures for Collecting Stream Algae Samples and Associated Physical Habitat and Chemical Data for Ambient Bioassessments in Califorinia.
[244] USEPA, 1999. Rapid Bioassessment Protocols for Use in Wadeable Streams and Rivers. EPA 841-B-99-002. P. 3-3.

co-located with mass loading stations. Thus, the collection of water chemistry and toxicity data was done simultaneously for mass loading and bioassessment purposes, which prevented duplicative water chemistry and toxicity testing. For new "Stream Assessment Monitoring" sites not located at mass loading stations, the nomenclature for monitoring has been changed to prevent possible misinterpretation of the term "bioassessment" to mean only the collection of benthic macroinvertebrates and physical habitat data.

Section II.A.3 (Follow-up Analysis and Actions) of the MRP requires the Copermittees to use the results of the receiving water monitoring to determine if impacts from MS4 discharges are occurring and when follow-up actions are necessary. The triad approach allows a wide range of measurements to be combined to more efficiently identify pollutants, their sources, and appropriate follow-up actions. Results from the three types of monitoring must be assessed to evaluate the extent and causes of pollution in receiving waters and to prioritize management actions to eliminate or reduce the sources. The framework provided is to be used to determine conclusions from the data and appropriate follow-up actions. The framework is proposed by the Copermittees and derived from the Model Monitoring Program for Municipal Separate Storm Sewer Systems in Southern California.[245] These follow-up actions are expected to primarily help answer management questions 2 and 4, as well as address MRP goals 2, 4, 5, 6 and 7.

When, based on the framework in Table 3 of the MRP, data indicates the presence of toxic pollutants in runoff, the Copermittees are required to conduct a Toxicity Identification Evaluation (TIE). A TIE is a set of procedures used to identify the specific chemical(s) responsible for toxicity to aquatic organisms. When discharges are toxic to a test organism, a TIE must be conducted to confirm potential constituents of concern and rule out others, therefore allowing Copermittees to determine and prioritize appropriate management actions. If a sample is toxic to more than one species, it is necessary to determine the toxicant(s) affecting each species. If the type and source of pollutants can be identified based on the data alone and an analysis of potential sources in the drainage area, a TIE is not necessary.

When a TIE identifies a pollutant associated with MS4 discharge as a cause of toxicity, it is then necessary to conduct follow-up actions to identify the causative agents of toxicity, isolate the sources of toxicity, evaluate the effectiveness of toxicity control options, and then confirm the reduction in toxicity. Follow-up actions should analyze all potential source(s) causing toxicity, potential BMPs to eliminate or reduce the pollutants causing toxicity, and suggested monitoring to demonstrate that toxicity has been removed.

Section II.A.4 (Regional Monitoring Programs) of the MRP identifies that the San Diego Water Board recognizes the importance of regional monitoring efforts to answer

[245] Model Monitoring Technical Committee, 2004. Model Monitoring Program for Municipal Separate Storm Sewer Systems in Southern California. P. 5-61.

monitoring questions and/or address problems that may not be specific to only the Santa Margarita hydrologic unit (see Finding E.12 and Discussion). Additionally, the Copermittees' jurisdiction does not encompass the entire Santa Margarita hydrologic unit, as portions of the hydrologic unit include, but are not limited to, San Diego County, tribal lands, the Cleveland National Forest, and Marine Corps Base at Camp Pendleton.

Section II.B (Wet Weather MS4 Discharge Monitoring) of the MRP requires the Copermittees to develop and implement a program, in accordance with 40 CFR 122.26(d)(2)(iii), to monitor and characterize pollutants in discharges of storm water effluent from major MS4 outfalls. Currently the Copermittees do not monitor the discharge of storm water from the MS4 outfalls. As a result, a substantial amount of information regarding the quality of MS4 effluent is unknown, and in-stream stations monitored under R9-2004-001 have not accurately characterized MS4 effluent data during the permit term.[246] The collection of wet-weather MS4 effluent data will enable the Copermittees to assess the effectiveness of existing storm water BMP measures, estimate cumulative annual pollutant loads from MS4 storm water discharges, and estimate seasonal pollutant loads from individual major outfalls. This data can be used to more effectively target storm water management program efforts. The MRP also requires compliance with section D of the Order for Storm Water Action Levels.

The monitoring of outfalls is expected to be used to identify storm drains that are discharging pollutants in concentrations that may pose a threat to receiving waters. Source investigations are expected to be conducted as a response to the data. The Copermittees are required to monitor for those pollutants in 40CFR 122.26(d)(2)(iii)(B); for 303(d) listed pollutants for the Santa Margarita Hydrologic Unit; and for pollutants with Storm Water Action Levels.

The MRP provides the Copermittees great flexibility in assigning stations and sampling frequency for wet-weather monitoring. Copermittees are to propose the number and frequency of monitoring stations, thus proposing the overall cost of their program. The San Diego Water Board will review the proposed program to ensure it will comply with Federal regulations and section D of the Order for Storm Water Action Levels.

The monitoring requirements also include a requirement to measure receiving water hardness when comparing storm water MS4 discharge data to Storm Water Action Levels for priority pollutants (e.g. metals). The effect of these constituents upon receiving waters will vary depending upon the hardness of receiving waters.

Section II.B.2 (Source Identification Monitoring) requires the Copermittees to develop and implement a program to identify sources of discharges of pollutants causing the high priority water quality problems within each hydrologic subarea. The current source identification monitoring program conducted by the Copermittees has not been

[246] Riverside County Copermittees. 2009. Report of Waste Discharge, section 5.1.

demonstrated to be effective due to the continued receiving water monitoring that documents persistent exceedances of water quality objectives for 303(d) listed pollutants, as well as the listing of new water bodies and pollutants (see Finding C.7). Furthermore, all monitoring conducted under Order R9-2004-001 focused on receiving water conditions rather than MS4 effluent discharges. Outside of required toxicity identification and reduction evaluations, little to no source identification was conducted for observed exceedances of water quality standards in receiving waters.

Identification of sources causing high priority water quality problems is a central purpose of storm water runoff management programs. Monitoring which enables the Copermittees to identify sources of water quality problems aids the Copermittees in focusing their management efforts, improving their programs and choosing additional and/or better BMPs. In turn, the Copermittees' programs can abate identified sources, which will improve the quality of storm water runoff discharges and receiving waters. This monitoring is needed to address management questions 3 and 4, in addition to ensuring that pollutants in storm water discharges from the MS4 are reduced to the MEP. Moreover, in its review of the San Diego County Copermittees' monitoring proposal, Tetra Tech, Inc. finds that "after some years of assessment monitoring, it is time to look more systematically at determining the relative urban contributions and the sources of urban runoff that contribute to identified receiving water problems."[247]

Section II.C (Non-Storm Water Dry Weather Action Levels) of the MRP describes the monitoring to be conducted by the Copermittees to determine compliance with dry weather, non-storm water action levels.

The section for Dry Weather Non-Storm Water Action Level Monitoring has taken the place of Illicit Discharge Detection and Elimination Monitoring under the previous Order. This change is required to assess compliance with action levels for non-storm water discharges from the MS4 into receiving waters while the Copermittees simultaneously conduct Illicit Discharge Detection and Elimination activities. The prior Order did not require the testing of non-storm water MS4 effluent prior to discharge into receiving waters, and thus Illicit Discharge Detection and Elimination Monitoring was conducted in receiving waters that were technically considered part of the MS4 but did not necessarily contain solely MS4 effluent. Discussions between the San Diego Water Board and Copermittees identified this shortcoming, which is reflected in the Copermittees Annual Reports (2007-08 and 2008-09), and the Copermittees have requested the point of monitoring for non-storm water be changed to sample MS4 effluent.[248] The required sampling frequency has great flexibility and allows Copermittees to sample a representative number of discharge points while the sampling methodology continues to be grab sampling. Additionally, the selection of representative outfalls or other identified stations has been clarified to ensure that those selected are consistent with federal requirements under 40 CFR 122.26(d) and section C of the Order.

[247] Tetra Tech Inc., 2006. Review of San Diego County MS4 Monitoring Program.
[248] Riverside County Copermittees ROWD, January 2009. Section 7.8.2.

Section II.C.2 (Source Identification Monitoring) requires the Copermittees to develop and implement a program to identify the sources of pollutants in non-storm water discharges. The section provides clarification that the program must utilize action levels pursuant to section C of the Order as a source identification response criteria. The source identification monitoring program is required under sections C, F.4.d, and F.4.e of the Order and to comply with 40 CFR 122.26(d)(2)(iv)(B), which requires the Copermittees have a program to detect and remove illicit discharges into the MS4.

Section II.D (High Priority Inland Aquatic Habitat) of the MRP describes required monitoring to be done in order to assess if MS4 storm water and/or non-storm water discharges are affecting high priority aquatic and/or riparian species. The existing monitoring program does almost all monitoring at or near mass loading stations, which are located at and below the confluence of multiple major hydrologic subareas. While this approach may estimate cumulative loadings and impacts from entire hydrologic areas, it provides little information regarding localized impacts to receiving waters subject to MS4 discharges, especially for high priority habitats. This approach is also recommended by the Southern California Stormwater Monitoring Coalition's Model Monitoring Technical Committee as an integral part of a storm water monitoring program. The Model Monitoring Technical Committee, which includes a member from RCFCD, recommends the use of "site-specific stations focused on the status of high-priority inland habitats of concern, with monitoring based primarily on the Triad approach for dry weather sampling and on chemistry and toxicity for wet weather."[249]

The monitoring of MS4 discharges into high-priority inland habitats is of special importance to the species which rely on the habitat subject to the discharge. The Santa Margarita River, and its tributaries, has been designated with BIOL, WARM, COLD, RARE and WILD beneficial uses, in part due to the presence of threatened and endangered species.[250] Portions of the Santa Margarita HU also include areas designated as critical habitat by state and Federal agencies. Federal and State threatened and endangered species are particularly susceptible to negative direct and indirect effects of MS4 discharges because the habitat available to them has already been reduced, restricted, and/or degraded, and their populations have already been reduced to low levels.[251] Therefore, short-term or chronic degradation of habitat or exposure to pollutants caused by MS4 discharges results in a proportionally high level of negative impact to already impacted beneficial uses. Threatened or endangered species with reduced habitat availability may be restricted from avoiding pollutants associated with MS4 discharges,[252] and any reproductive impacts from pollutants would likely have significant negative effects on already low population sizes.

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[249] Model Monitoring Technical Committee, 2004. Model Monitoring Program for Municipal Separate Storm Sewer Systems in Southern California.
[250] See Federal Register 50 CFR 71.11 and the California Code of Regulations, Title 14 Section 670.5.
[251] Carroll, R., Augspurger, C., Dobson, A., Franklin, J., Orians, G., Reid, W., Tracy, R., Wilcove, D. and J. Wilson. 1996. Strengthening the use of science in achieving the goals of the Endangered Species Act: An Assessment by the Ecological Society of America. *Ecological Applications*. 6(1) pp. 1-11.
[252] For example, see National Marine Fisheries Service Draft Southern Steelhead Recovery Plan, July 2009.

Information regarding the extent of environmentally-sensitive habitats is available from sources familiar to the Copermittees.[253] Examples include the Western Riverside Multiple Species Habitat Conservation Plan, Santa Margarita HU assessments conducted by the U.S. Army Corps of Engineers, and California Department of Fish and Game Ecological Reserves. Therefore, a relatively small level of effort will be required to collect information to determine high priority inland aquatic habitats. In addition, the Copermittees already are required to have updated inventories of inland MS4 outfall locations. As a result, a monitoring plan can be developed within 36 months to address the new requirement.

Section II.E.2 (Sediment Toxicity Study) includes a requirement that the Copermittees conduct a sediment toxicity special study. This study has been added to the Monitoring and Reporting requirements to assess the quality of stream sediments and possible contamination due to runoff from the MS4. Toxicity tests focusing on aqueous toxicity may not account for the full toxicity of receiving waters if constituents, such as heavy metals or pesticides, are bound to sediments. Southern California studies have shown that stream sediments can exhibit significant levels of toxic metals and pesticides, including pyrethroids.[254,255] Additionally, the Copermittees have identified the presence of aqueous toxicity at both mass loading stations due to pyrethroid pesticides, but their presence in sediments is unknown.

Section II.E.3 (Trash and Litter Investigation) includes a requirement that the Copermittees conduct a Trash and Litter Investigation (see Finding C.8 and Discussion). The objective of the study is to evaluate the quantity, type, and source(s) of trash and litter in receiving waters (see Finding E.12 and Discussion regarding regional efforts). Although trash can impair beneficial uses, the amount and type of trash discharged into receiving waters from the Copermittee(s) MS4 is unknown. Thus, the Copermittees have largely been unable to assess the effectiveness of their BMPs that target trash as a pollutant. The special study requires the Copermittees to utilize previously developed protocols to determine the source of trash and litter in receiving waters, assess BMP effectiveness, and implement additional BMPs if needed according to the requirements of the Order. Qualitative and quantitative protocols for trash assessment have already been developed for San Diego County and the San Francisco Bay Region. These protocols are required to be used in the development of the special study, are expected to reduce Copermittee costs, and promote regional consistency in trash and litter assessments.

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[253] See Riverside County Copermittees ROWD, January 2009. Section 4.3.3.
[254] Holmes, R.W., Anderson, B.S., Phillips, B.M., Hunt, J.W., Crane, D.B., Mekebri, A. and V. Connor. 2008. Statewide Investigation of the Role of Pyrethroid Pesticides in Sediment Toxicity in California's Urban Waterways. *Environmental Science Technology* 42: 7003-7009..
[255] Crane, D.B. and C. Younghans-Haug. 1992. Oxadiazon residue concentrations in sediment, fish, and shellfish from a combined residential/agricultural area in Southern California. *Bulletin of Environmental Contamination and Toxicology.* Volume 48, no. 4.

Section II.E.4 (Agricultural, Federal and Tribal Input Study) includes a requirement for the Copermittees to draft and subsequently conduct a special study to determine the water quality of storm water flows which are entering their MS4 from agricultural, federal and tribal areas. The objective of the study is to determine the type, quantity and estimated loading of pollutants in these discharges. In the ROWD, the Copermittees specifically state their concern regarding the quality of storm water which is discharged into their MS4 from such areas, and state that these discharges may affect overall water quality, primarily in the Murrieta and Temecula Creek watersheds.[256] However, no data, information, or analyses were presented or identified on the level of pollutants in such flows into their MS4. The special study has been designed with sampling frequency and parameter requirements that lend flexibility to the Copermittees. The minimum requirements are limited to grab samples for pollutants expected to be present in storm water discharges and at a number of representative sites chosen be the Copermittees. The special study requires testing to be source specific (e.g. only sampling discharge into from one of the three sources) and does not allow for sampling to be done on co-mingled flows within the MS4. Additionally, the Copermittees may elect to conduct composite sampling, toxicity testing, more targeted sites, or a combination thereof.

Section II.E.5 (MS4 and Receiving Water Maintenance Study) includes a requirement that the Copermittees investigate impacts to Beneficial Uses from routine removal of vegetation from portions of the MS4 that are also receiving waters (see Finding D.3.c and Discussion). The objective of the study is to determine if there are short-term or long-term in-stream water quality impacts from maintenance activities and to assess if the activities exacerbate the impairment of receiving waters 303(d) listed as impaired wholly or partially from MS4 discharges. Receiving waters within the Copermittees jurisdiction have been routinely cleared of vegetation by the Copermittees as part of their MS4 maintenance programs without mitigation efforts. The in-stream modification of vegetation may result in changes in water quality and Beneficial Uses from changes in nutrient cycling, the storage of organic matter, infiltration, flow attenuation, temperature and erosion potential.[257,258,259] The relative contribution, if any, of maintenance activities to CWA 303(d) water quality impairments in unknown. The program is also expected to work in conjunction with other permit requirements of the Order. For example, the Copermittees may choose to utilize study results when implementing the HMP, LID, and retrofitting programs.

Section II.E.6 (Intermittent and Ephemeral Stream Perennial Conversion Study) includes a study to assess specifically exempted non-storm water discharges[260] into

[256] Riverside County Copermittees ROWD, January 2009. Sections 3.2 and 3.3.
[257] Fischenich, J.C. and R.R. Copeland. 2001. Environmental Considerations for Vegetation in Flood Control Channels. US Army Corps of Engineers.
[258] Shade et al. 2005. Hydrologic exchange and N uptake by riparian vegetation in an arid-land stream. *Journal of North American Benthological Society*. 24(1):19–28.
[259] Warner, R.E. and K.M. Hendrix. 1984. California Riparian Systems: Ecology, Conservation, and Productive Management. *pp. 160-189*. University of California Press.
[260] See Finding C.15 of the Order for discussion of exempted non-storm water discharges.

surface waters and discharges into MS4s covered under a separate NPDES permit in order to determine if the exempted discharges and/or separate NPDES discharges to the MS4 are causing or contributing to a condition of pollution, contamination or nuisance. For ephemeral and intermittent inland surface waters, modification of flows may impact beneficial uses through modification of in-stream ecology including, but not limited to, sediment transport, biogeochemical functioning, water temperature, non-native species presence and exclusion of native species.[261,262] The objective of the study is to determine if the alteration of natural in-stream hydrologic regimes from intermittent or ephemeral to perennial due to exempted non-storm water discharges has modified the beneficial uses of the receiving water. The evaluation includes both qualitative and quantitative measurements of parameters which will help the Copermittees determine if exempted discharges and/or separate NPDES discharges into the MS4 are causing a condition of pollution, contamination, or nuisance. Such a determination would potentially require an action to be taken by the Copermittee(s) (i.e. prohibition of an exempted discharge), permit modification for a separate NPDES permit, and/or an action by the San Diego Water Board.

Section II.F (Monitoring Provisions) of the MRP includes monitoring provisions which are standard requirements for all municipal storm water permits.

III. Reporting Program

Section III of the MRP discusses submittal of the Planned Monitoring Program, the Receiving Waters and MS4 Discharge Monitoring Annual Reports, and Interim Reporting Requirements. For the purposes of Receiving Waters and MS4 Discharge Monitoring and Reporting Program, required reviews and approvals by the San Diego Water Board of draft monitoring plans, proposals or protocols shall be conducted by the San Diego Water Board Executive Officer.

Section III.C (Table of Reporting Requirements) has been added to the MRP to provide a quick reference for all required reporting dates found in the MRP

[261] Naiman, R.J., Bunn, S.E., Nilsson, C., Petts, G.E., Pinay, G., and L.C. Thompson. 2002. Legitimizing Fluvial Ecosystems as Users of Water: An Overview. *Environmental Management*: 30(4) pp. 455-467.
[262] Marchetti, M.P., Light, T., Moyle, P.B. and J.H. Viers. 2004. Fish Invasions in California Watersheds: Testing Hypotheses Using Landscape Patterns. *Ecological Applications*. 14(5) pp. 1507-1525.

U. Attachment F - Source Data

Attachment F contains data utilized for the development of Storm Water Action Levels and Non-storm Water Action Levels.

California Regional Water Quality Control Board
San Diego Region

DRAFT UPDATES & ERRATA

to the

July 23, 2010 PUBLIC RELEASE DRAFT

of the

Waste Discharge Requirements for Discharges from the Municipal Separate Storm Sewer Systems (MS4s) Draining the Watershed of the County of Riverside, the Incorporated Cities of Riverside County, and the Riverside County Flood Control and Water Conservation District within the San Diego Region

Tentative Order No. R9-2010-0016
NPDES NO. CAS0108766

ERRATA & UPDATES AS OF
September 29, 2010

This document represents tentative updates and errata to the July 23, 2010 release of Tentative Order No. R9-2010-0016. The errata represent minor clarifications and reference mistakes identified by Staff and/or in the response to comments on the public release of Tentative Order. The updates include changes made as a result of oral and written comments received on the July 23, 2010 public release of the Tentative Order.

Permit Errata

Title Page - NPDES NO. CAS01087664~~0~~

Page # 2, Finding B.1 - Each of the persons in Table 1 below, hereinafter called Copermittees or dischargers, owns or operates an MS4, through which it discharges into waters of the United States (U.S.) within the San Diego Region. These MS4s fall into one or more of the following categories: (1) a medium or large MS4 that services a population of greater than 100,000 or 250,000 respectively; or (2) a small MS4 that is "interrelated" to a medium or large MS4; or (3) an MS4 that contributes to a violation of a water quality standard; or (4) an MS4 which is a significant contributor of pollutants to waters of the U.S.

Table 1. Municipal Copermittees

1. City of Murrieta	4. County of Riverside
2. City of Temecula	5. Riverside County Flood Control and Water Conservation District
3. City of Wildomar	
~~6. City of Menifee~~[1]	

The Cities of Murietta, Menifee and Wildomar also discharge into the waters of the U.S. in the California Regional Water Quality Control Board, Santa Ana Region (Santa Ana Water Board), so are located partially within both the San Diego and Santa Ana Water Board boundaries. As allowed by California Water Code (CWC) §13228, these Cities submitted written requests to be regulated for MS4 purposes under a permit adopted by only one Water Board. As authorized by CWC §13228 and pursuant to ~~a~~ written agreements dated September 28, 2010 between the San Diego Water Board and the Santa Ana Water Board, the Cities of Murrieta and Wildomar are wholly regulated by the San Diego Water Board under this Order, including those portions of the Cities jurisdiction not within the San Diego Water Board's region. Similarly, the City of Menifee is wholly regulated by the Santa Ana Water Board under Order No. R8-2010-0033, including those portions of the City of Menifee within the San Diego Water Board's region[1].

Page # 7, Finding D.1.d - Updated individual ~~Drainage Area~~ Storm Water Management Plans (Individual ~~DA~~SWMP or JRMP), and Watershed Stormwater Management Plans (watershed SWMPs or Watershed Worklplans), which, together with references in the DAMP, describe the Copermittees' runoff management programs in their entirety, are needed to guide the Copermittees' runoff management efforts and aid the Copermittees in tracking runoff management program implementation. Hereinafter, the individual

[1] ~~Until an agreement is finalized, the City of Menifee is included as a Copermittee in this Order.~~

~~DA~~SWMP is referred to as the JRMPs and the Watershed SWMP is referred to as the Watershed Workplan. It is practicable for the Copermittees to update the JRMPs and Watershed Workplans within the timeframe specified in this Order, since significant efforts to develop these programs have already occurred.

Page # 15, Finding E.9 - Storm water discharges from developed and developing areas in Riverside County are significant sources of certain pollutants that can cause, may be causing, threatening to cause or contributing to water quality impairment in the waters of Riverside County. Furthermore, as delineated in the CWA section 303(d) list in Table 2, the San Diego Water Board has found that there is a reasonable potential that municipal storm water and non-storm water discharges from MS4s cause or may cause or contribute to an excursion above water quality standards for the following pollutants: Indicator Bacteria (including Fecal Coliform and E. Coli), Copper, Manganese, Iron, Chlorpyrifos, Diazinon, Sulfates, Phosphorous, Nitrogen, Total Dissolved Solids (TDS), and Toxicity~~, and Turbidity~~. In accordance with CWA section 303(d), the San Diego Water Board is required to establish TMDLs for these pollutants to these waters to eliminate impairment and attain water quality standards. Therefore, certain early pollutant control actions and further pollutant impact assessments by the Copermittees are warranted and required pursuant to this Order.

Page # 20, Section C.2 – In response to an exceedance of an NAL, the Copermittee(s) having jurisdiction must investigate and seek to identify the source of the exceedance in a timely manner.

Page # 23, Section D.2 – The end-of-pipe assessment points for the determination of SAL compliance are ~~all~~ major outfalls, as defined in 40 CFR 122.26(b)(5) and (b)(6) and Attachment E of this Order.

Page # 24, Section E.1 - Each Copermittee must establish, maintain, and enforce adequate legal authority within its jurisdiction to control pollutant discharges into and from its MS4 through ordinance, statute, permit, contract or similar means.

Page # 25, Section E.2 - Each Copermittee must submit on or before June 30, 2012, a statement certified by its chief legal counsel that the Copermittee has taken the necessary steps to obtain and maintain full legal authority within its jurisdiction to implement and enforce each of the requirements contained in 40 CFR 122.26(d)(2)(i)(A-F) and this Order.

Page # 33, Section F.1.d.(4)(b)(i), Footnote 12 - Priority Development Projects proposing to dredge or fill materials in waters of the U.S. must obtain a CWA Section 401 Water Quality Certification. ~~and/or~~ Priority Development Projects proposing to discharge waste in waters of the State must obtain ~~a CWA §401 Water Quality Certification and/or~~ Waste Discharge Requirements.

Page # 39, Section F.1.f.(2)(a) - At a minimum, high priority projects include those projects that generate pollutants (prior to treatment) within the tributary area of and within the same hydrologic subarea as a 303(d) listed waterbody impaired for that pollutant; or those projects generating pollutants within the tributary area for and within the same hydrologic subarea as an observed action level exceedance of that pollutant.

Page # 43, Section F.1.h.(2) - In addition to the control measures that must be

implemented by Priority Development Projects per section F.1.h.(1)(d), the HMP must include a suite of management measures ~~to~~ that can be used on Priority Development Projects to mitigate hydromodification impacts, protect and restore downstream beneficial uses and prevent or further prevent adverse physical changes to downstream channels. The measures must be based on a prioritized consideration of the following elements in this order:

Page # 43, Section F.1.h.(3) - As part of the HMP, the Copermittees may develop a waiver program that allows a redevelopment Priority Development Project, as defined in Section F.1.d.(1)(b), to implement offsite mitigation measures. A waiver may be granted if onsite management and control measures are technically infeasible to fully achieve post-project runoff flow rates and durations that do not exceed the pre-development (naturally occurring) runoff flow rates and durations. Redevelopment projects that are granted a waiver under the program must not have post-project runoff flow rates and durations that exceed the pre-project runoff flow rates and durations. The estimated incremental hydromodification impacts from not achieving the pre-development (naturally occurring) runoff flow rates and durations for the project site must be fully mitigated. The offsite mitigation must be within the same stream channel system to which the project discharges. Mitigation projects not within the same stream channel system but within the same hydrologic unit may be approved provided that the project proponent demonstrates that mitigation within the same stream channel is infeasible and that the mitigation project will address similar impacts as expected from the project.

Page # 45, Section F.1.i - The Copermittees must develop, where they do not already exist, and implement or require implementation of erosion and sediment control BMPs after construction of new unpaved roads. At a minimum, the BMPs must include the following, or alternative BMPs that are equally effective:

Page # 51, Section F.3.a.(1) - Each Copermittee must maintain an updated watershed-based inventory of all its municipal areas and those activities that have the potential to generate pollutants. The inventory must include the name, address (if applicable), and a description of the area/activity; which pollutants are potentially generated by the area/activity; whether the area/activity is adjacent to an ESA; and identification of whether the area/activity is tributary to and within the same hydrologic subarea as a CWA section 303(d) water body segment and generates pollutants for which the water body segment is impaired. Linear facilities, such as roads, streets, and highways, do not need to be individually inventoried. The use of an automated database system, such as Geographical Information Systems (GIS) is highly recommended.

Page # 52, Section F.3.a.(2)(d) - Designate BMPs for ESAs and 303(d) Impairments: Each Copermittee must designate enhanced measures for its municipal areas and activities tributary to and within the same hydrologic subarea as CWA section 303(d) impaired water body segments when an area or those activities have the potential to generate pollutants for which the water body segment is impaired. Each Copermittee must also designate additional controls for its municipal areas and activities within or directly adjacent to or discharging directly to receiving waters within environmentally sensitive areas (as defined in Attachment C of this Order).

Page # 52, Section F.3.a.(8)(a)(iii) - Areas and activities tributary to and within the same hydrologic subarea as a CWA section 303(d) impaired water body segment, where an area or activity generates pollutants for which the water body segment is impaired.

Page # 56, Section F.3.a.(10) – Copermittee Maintained Unpaved Roads Maintenance

(a) The Copermittees must develop, where they do not already exist, and implement or require implementation of BMPs for erosion and sediment control measures during their maintenance activities on Copermittee maintained unpaved roads, particularly in or adjacent to receiving waters.

(b) The Copermittees must develop and implement or require implementation of appropriate BMPs to minimize impacts on streams and wetlands during their unpaved road maintenance activities.

(c) The Copermittees must ~~regularly~~ maintain as necessary their unpaved roads adjacent to streams and riparian habitat to reduce erosion and sediment transport;

(d) Re-grading of unpaved roads during maintenance must be sloped outward where consistent with road engineering safety standards or alternative equally effective BMPs must be implemented to minimize erosion and sedimentation from unpaved roads;

(e) Through their ~~regular~~ maintenance of unpaved roads, the Copermittees must examine the feasibility of replacing existing culverts or design of new culverts or bridge crossings to reduce erosion and maintain natural stream geomorphology.

Page # 58, Section F.3.b.(1)(a)(iii) - ESAs and 303(d) Listed Waterbodies: All other commercial or industrial sites/sources tributary to and within the same hydrologic subarea as a CWA Section 303(d) impaired water body segment, where the site/source generates pollutants for which the water body segment is impaired. All other commercial or industrial sites/sources within or directly adjacent to or discharging directly to receiving waters within environmentally sensitive areas (as defined in Attachment C of this Order) or that generate pollutants tributary to and within the same hydrologic subarea as an observed exceedance of an action level.

Page # 58, Section F.3.b.(2)(b) - Designate / Update Minimum BMPs: Each Copermittee must designate a minimum set of BMPs for all inventoried industrial and commercial sites/sources. Where BMPs have already been designated, each Copermittee must review and update its existing BMPs for adequacy ~~within one year of permit adoption~~ no later than with the submittal of the JRMP. Copermittees may continue to regularly review and update their designated BMPs for adequacy and subsequently submit any updates in their Annual Report. The designated minimum BMPs must be specific to facility types and pollutant-generating activities, as appropriate.

Page # 58-59, Section F.3.b.(2)(c) - Designate Enhanced BMPs for ESAs and 303(d) Impairments: Each Copermittee must designate enhanced measures for inventoried industrial and commercial sites/sources tributary to and within the same hydrologic subarea as CWA section 303(d) impaired water body segments (where a site/source generates pollutants for which the water body segment is impaired). Each Copermittee must also designate additional controls for industrial and commercial sites/sources within or directly adjacent to or discharging directly to coastal lagoons, the ocean, or other receiving waters within environmentally sensitive areas (as defined in Attachment C of this Order). Copermittees may continue to regularly review and update their designated enhanced BMPs for adequacy and subsequently submit any updates in their next Annual Report.

Page # 60, Section F.3.b.(4)(a)(i) - Review of BMP implementation plans not including SSMPs required pursuant to section F.1.d, if the site uses or is required to use such a plan;

Page # 60, Section F.3.b.(4)(b) – Delete the section:

~~(b) Each Copermittee must annually notify the San Diego Water Board, prior to the commencement of the rainy season, of all Industrial Sites and Industrial Facilities subject to the General Industrial Permit or other individual NPDES permit with alleged violations of the Copermittees ordinances, that pose a significant threat to water quality.~~

Page # 62, Section F.3.b.(6) – Add the section:

(6) Reporting of Non-Compliant Sites

Each Copermittee must annually notify the San Diego Water Board, prior to the commencement of the wet season, of any unresolved high level enforcement action (as defined in the Copermittees' JRMP) that poses a significant threat to water quality in its jurisdiction as a result of violations of their storm water ordinances.

Page # 62, Section F.3.c.(1)(e) - Any residential areas tributary to and within the same hydrologic subarea as a CWA section 303(d) impaired water body, where the residence generates pollutants for which the water body is impaired; and

Page # 64, Section F.3.d – Each Copermittee must develop and implement a retrofitting program that meets the requirements of this section. The goals of the existing development retrofitting program are to address the impacts of existing development through retrofit projects that reduce impacts from hydromodification, promote LID, support riparian and aquatic habitat restoration, reduce the discharges of storm water pollutants from the MS4 to the MEP, and prevent discharges from the MS4 from causing or contributing to a violation of water quality standards. Where feasible, at the discretion of the Copermittee, the existing development retrofitting program may be coordinated with flood control projects and other infrastructure improvement programs.

Page # 65, Section F.3.d.(5) – The known completed retrofit BMPs must be tracked in accordance with Section F.1.f. Retrofit BMPs on publicly owned properties must be inspected per section F.1.f . Privately owned retrofit BMPs must be inspected as needed ~~to ensure proper operation and maintenance~~.

Page # 69, Section F.4.h - Each Copermittee must implement management measures and procedures (including a notification mechanism) to prevent, respond to, contain and clean up all sewage (see below) and other spills that may discharge into its MS4 from any source (including private laterals and failing septic systems). Copermittees must coordinate with spill response teams to prevent entry of spills into the MS4 and contamination of surface water, ground water and soil. Each Copermittee must coordinate spill prevention, containment and response activities throughout all appropriate Copermittee departments, programs and agencies so that maximum water quality protection is available at all times.

Page # 69-70, Section F.6.a.(1) - At a minimum, the Copermittee education programs must educate each target community on the following topics, as appropriate to the target community's potential storm water and non-storm water discharges to the MS4:

(a) Applicable water quality laws, regulations, permits, and requirements;
(b) Best management practices;
(c) General runoff concepts;
(d) Existing water quality, including local water quality conditions, impaired waterbodies and environmentally sensitive areas; and
(e) Other topics, as determined by the Copermittee(s), such as public reporting mechanisms, water conservation, low-impact development techniques, and public health and vector issues associated with runoff.

Page # 72, Section G.1.d - Develop a watershed BMP implementation strategy to attain receiving water quality objectives in the identified highest priority water quality problem(s) and locations. The BMP implementation strategy must include a schedule for implementation of the BMPs ~~projects~~ to abate specific receiving water quality problems and a list of criteria to be used to evaluate BMP effectiveness. Identified watershed water quality problems may be the result of jurisdictional discharges that will need to be addressed with BMPs applied in a specific jurisdiction in order to generate a benefit to the watershed. This implementation strategy must include a map of any implemented and/or proposed BMPs.

Page # 74, Section I.2 - The Cities of Wildomar and Murrieta must comply with the requirements and WLAs assigned to the discharges from their MS4s contributing to the Lake Elsinore/Canyon Lake (San Jacinto Watershed) Nutrient TMDLs as specified in Section VI.D.2 of the Santa Ana Water Board's Order R8-2010-0033, including relevant sections of the fact sheet and findings, and subsequent revisions thereto.

Page # 77, Section K.2.a.(2) - Within 180 days of determination that the SSMP is in compliance with this Order's provisions, each Copermittee must amend its ordinances consistent with the SSMP and implement the updated SSMP. Any amended or new ordinances must be submitted to the San Diego Water Board within ~~30 days of adoption~~ the applicable Annual Report.

Page # 84, Section M.3 - ~~Produce and submit~~ Coordinate the submittal of the documents and reports as required by section K of this Order and Receiving Waters and MS4 Discharge Monitoring and Reporting Program No. R9-2010-0016 in Attachment E of this Order.

Attachments Errata

Page # B-9, Section Att. B.7.(m) - *Noncompliance*. Any noncompliance with this Order constitutes violation of the CWA~~C~~ and is grounds for denial of an application ~~f~~or modification of the Order (also see 40 CFR 122.41(a)).

Page # E-3, Section II.A.1.d - Protocols: Protocols for mass loading sampling and analysis including analytical methods, target reporting limits, and data reporting formats must be compatible with the State Water Resources Control Board's (State Water Board's) State Surface Water Ambient Monitoring Program (SWAMP). If the mass loading sampling and analysis are determined to be impracticable with the SWAMP standards, the Copermittees must provide a written explanation and discussion in the submittal of the Planned Monitoring Program. Wet weather samples must be ~~time~~flow-weighted composites, collected for the duration of the entire runoff event. Where such monitoring is not practical, such as for large watersheds with significant groundwater recharge flows, composites must be collected at a minimum during the first 3 hours of flow. Dry weather event sampling must be time-weighted composites composed of 24 discrete hourly samples, whereby the mass loads of pollutants are calculated as the product of the composite sample concentration and the total volume of water discharged past the monitoring point during the time of sample collection.

Page # E-7, Section II.A.2.c.(3) - Monitoring of stream assessment stations must be conducted according to the most current bioassessment Standard Operating Procedures (SOP) developed by the Surface Water Ambient Monitoring Program (SWAMP), and amendments, as ~~amended~~applicable. In collecting macroinvertebrate samples, the discharger must use the "Reachwide Benthos (Multihabitat) Procedure." The discharger must conduct, concurrently with all required macroinvertebrate collections, the "full" suite of physical/habitat characterization measurements specified in the SWAMP Bioassessment SOP, and as summarized in the *SWAMP Stream Habitat Characterization Form — Full Version* ~~.~~and must collect the water chemistry as listed in Table 1 of the bioassessment SOP developed by SWAMP.

Page # E-7, Section II.C.1.b.(1) - Determining Sampling Frequency: Effluent analytical monitoring must be conducted at major outfalls and identified stations. The Copermittees must sample a representative ~~number~~ percentage of major outfalls and identified stations within each hydrologic subarea. The sampling must be done to assess compliance with dry weather non-storm water action levels pursuant to section C of this Order. All monitoring conducted must be preceded by a minimum of 72 hours of dry weather.

Page # E-14, Section II.C.1.b.(2) - Sampling of non-storm water discharges may be done utilizing grab samples. If a ponded MS4 discharge is observed at a monitoring station, the Copermittee(s) must record the observation and collect at least one (1) grab sample. If flow is evident, a 1-hour composite sample may be taken. The Copermittee(s) must estimate the discharge flow by measuring the width of water surface, approximate depth of water, and approximate flow velocity. A flow meter may also be utilized.

Page # E-27, Section III.B. - For the October 2010 to October 2012 monitoring period, the Principal Copermittee must submit the Receiving Waters Monitoring Annual Report as required under Order No. 2004-~~0~~001. The Receiving Waters Monitoring Annual

Report must address the monitoring conducted to comply with the requirements of Order No. 2004-~~0~~001.

Page # E-27, Section III.C. – Table 5. Table of Required MRP Reporting Dates and Frequencies. … Draft Trash and Litter ~~Impairment~~ Special Study …

Fact Sheet Errata

Page # 23-24, Discussion of Finding B.1 - Included in Table 1 of the Order are the Cities of ~~Menifee,~~ Murrieta, Temecula, and Wildomar, the County of Riverside, and the Riverside County Flood Control and Water Conservation District. The Cities of Wildomar and Menifee are newly incorporated cities. Both Cities were previously a part of the County of Riverside's jurisdiction and have an MS4 interrelated to other Copermittee MS4s in the San Diego Region. The boundaries of the Cities of Menifee, Murrieta, and Wildomar fall within the jurisdiction of both the San Diego Water Board and the Santa Ana Water Board.

As requested by the Cities of Menifee, Murrieta, and Wildomar, and pursuant to an agreement between the San Diego and Santa Ana Water Boards as authorized by CWC section 13228, the MS4s of the Cities of Murrieta and Wildomar are to be wholly regulated by the San Diego Water Board under this Order, and the MS4 of the City of Menifee is to be wholly regulated by the Santa Ana Water Board under Order No. R8-2010-0033. The agreement between the San Diego and Santa Ana Water Board to regulate the Cities of Menifee, Murrieta, and Wildomar will be subject to change with ~~each permit renewal~~sufficient notice, and for good cause. ~~Until the an agreement between the San Diego Water Board and Santa Ana Water Board is finalized to allow the City of Menifee to be wholly regulated by the Santa Ana Water Board under Order No. R8-2010-0033, the City of Menifee will remain as a Copermittee under this Order.~~

Page # 59, Finding D.1.d - Updated individual ~~Drainage Area~~ Storm Water Management Plans (Individual ~~DA~~SWMP or JRMP), and Watershed Stormwater Management Plans (watershed SWMPs or Watershed Workplans), which, together with references in the DAMP, describe the Copermittees' runoff management programs in their entirety, are needed to guide the Copermittees' runoff management efforts and aid the Copermittees in tracking runoff management program implementation. Hereinafter, the individual ~~DA~~SWMP is referred to as the JRMPs and the Watershed SWMP is referred to as the Watershed Workplan. It is practicable for the Copermittees to update the JRMPs and Watershed Workplans within the timeframe specified in this Order, since significant efforts to develop these programs have already occurred.

Page # 98, Finding E.9 - Storm water discharges from developed and developing areas in Riverside County are significant sources of certain pollutants that can cause, may be causing, threatening to cause or contributing to water quality impairment in the waters of Riverside County. Furthermore, as delineated in the CWA section 303(d) list in Table 2, the San Diego Water Board has found that there is a reasonable potential that municipal storm water and non-storm water discharges from MS4s cause or may cause or contribute to an excursion above water quality standards for the following pollutants: Indicator Bacteria (including Fecal Coliform and E. Coli), Copper, Manganese, Iron, Chlorpyrifos, Diazinon, Sulfates, Phosphorous, Nitrogen, Total Dissolved Solids (TDS), and Toxicity~~, and Turbidity~~. In accordance with CWA section 303(d), the San Diego Water Board is required to establish TMDLs for these pollutants to these waters to eliminate impairment and attain water quality standards. Therefore, certain early pollutant control actions and further pollutant impact assessments by the Copermittees are warranted and required pursuant to this Order.

Page # 121, Section C - The maximum daily action level (MDAL) and average monthly action level (AMAL) will be based on the most limiting of the acute and chronic LTA, in

the case for ~~copper~~ chromium VI the most limiting LTA is the acute of 5.23 ug/L.

Page # 144, Section F.1.h – In addition to the control measures that must be included in the HMP to prevent or minimize hydromodification effects from Priority Development Projects, section F.1.h.(2) requires the HMP to include additional management measures ~~to~~ that can be used on Priority Development Projects based on a prioritized consideration of the following elements in this order:

Page # 144-145, Section F.1.h – The San Diego Water Board recognizes that fully achieving post-project runoff flow rates and durations that do not exceed pre-development (naturally occurring) runoff flow rates and durations on redevelopment projects with existing impervious surfaces may be challenging. Thus, section F.1.h.(3) has been included to allow the Copermittees to propose, as part of the HMP, a waiver program specifically for Priority Development Projects that are redevelopment projects, as defined by section F.1.d.(1)(b). Because redevelopment projects may not be able to achieve post-project runoff flow rates and durations that do not exceed pre-development (naturally occurring) runoff flow rates and durations through onsite management and control measures, offsite mitigation measures may be required. Redevelopment projects~~, however,~~ must ~~be able to~~ achieve post-project runoff flow rates and durations that are less than or equal to pre-project and down to pre-development runoff flow rates and durations to be eligible to receive a waiver under the program. For a redevelopment project, the pre-project runoff flow rates and durations are those currently being discharged by the existing development prior to the redevelopment project being built. Meeting pre-project runoff flow rates and durations is usually a less stringent performance criteria than meeting the pre-development runoff flow rates and durations. Implementing BMPs to meet the pre-project flow rates and durations is significantly easier and cheaper for a redevelopment project compared to meeting pre-development flow rates and durations. If a project is granted a waiver, the estimated incremental hydromodification impacts from not achieving the pre-development (naturally occurring) runoff flow rates and durations for the project site must be fully mitigated with offsite mitigation. Offsite mitigation measures may include utilizing regional hydrologic control measures (e.g., regional detention or infiltration basins) or rehabilitation of stream channels to achieve sustainable channel configurations.

Page # 155, Section F.3.a.(10) - (Copermittee Maintained Unpaved Roads Maintenance) requires the Copermittees to implement or require implementation of BMPs for erosion and sediment control during and after maintenance activities on the unpaved roads that the Copermittees are responsible for maintaining, particularly in or adjacent to stream channels or wetlands. As discussed for Finding D.1c, source control BMPs for unpaved roads are needed to minimize the discharge of sediment to the MS4s and receiving waters. There are several guidance documents available (see Discussion for Finding D.1.c) that include BMPs that can be readily implemented by the Copermittees for the development of new unpaved roads. This requirement is necessary to ensure the Copermittees minimize the discharge of sediment from their unpaved roads used for their maintenance activities.

Page # 158, Section F.3.b.(4) - The Order also requires that inspections include review of BMP implementation plans if the site uses or is required to use such a plan, and the review of facility monitoring data if the site monitors its runoff. BMP implementation plans do not include SSMPs required pursuant to section F.1.d. If a facility is not required to have a BMP implementation plan or required to collect monitoring data, the inspection

does not need to include a review of this information. BMP implementation plans and monitoring data are expected to be available for any facility that is covered under the General Industrial Permit. The BMP implementation plans and monitoring data can provide the inspector pertinent information that can be used during the visual inspection of the facility (e.g., BMPs implemented, maintenance records for BMPs, pollutants in storm water runoff). The Copermittees' inspectors have the discretion to determine the depth and detail of the review and use of the information in conducting the inspection.

Page # 158-159, Section F.3.b.(4) – Delete the following paragraph:
~~An additional notification to the San Diego Water Board regarding industrial sites has been added. Copermittees are required to annually notify the San Diego Water Board of industrial sites that have suspected violations. This was added to enhance San Diego Water Board and Copermittee communication and coordination in regulating industrial sites. Information may be provided as part of the JRMP annual report if submitted prior to the rainy season.~~

Page # 159, Section F.3.b.(6) – Add the following section after the end of Section F.3.b.(4):
Section F.3.b.(6) (Reporting of Non-Compliant Sites) has been added as additional notification to the San Diego Water Board regarding commercial and industrial sites. Copermittees are required to annually notify, prior to the rainy season, the San Diego Water Board of commercial and industrial sites that have any unresolved high level enforcement actions. This was added to enhance San Diego Water Board and Copermittee communication. Information may be provided as part of the JRMP annual report if submitted prior to the rainy season.

Page # 174, Section I.2 – includes, by reference to Santa Ana Water Board Order No. R8-2010-0033, including the relevant sections of the fact sheet and findings (and subsequent revisions), the requirements and WLAs assigned to the MS4s for the Lake Elsinore/Canyon Lake (San Jacinto Watershed) Nutrient TMDLs that are being implemented for the Santa Ana Water Board. Because the San Jacinto Watershed is within the boundaries of the Santa Ana Water Board's region, the Lake Elsinore/Canyon Lake Nutrient TMDLs and its requirements must be implemented by the Cities of Murrieta and Wildomar for the areas within their jurisdictions located in the Santa Ana Region (Region 8).

Page # 192, Section II.A.1 – 1. All events must now include: Biological Oxygen Demand, 5-day Chemical Oxygen Demand, Total Organic Carbon, Dissolved Organic Carbon. These are specifically required by 40 CFR 122.26(d)(2)(iii)(A) and (B), but were omitted from collection and reporting required by Order No. R9-2004-001.

Permit Updates

Page # 1, Finding A.3 – Insert "and following "Order WQ 2001-15," and delete "~~and Order WQ 2009-0008 (SWRCB/OCC File A-1780).~~" Add the following footnote to the end of the finding:
In July 2010, the court in Los Angeles County v. State Water Resources Control Board remanded the Los Angeles Water Board's MS4 permit underlying Order WQ 2008-0009 for procedural reasons occurring during the permit adoption process. The court did not evaluate or rule upon the substantive findings and reasoningn set forth in Order WQ 2009-0008. While the San Diego Water Board may no longer cite Order WQ 2009-0008 as a precedential State Water Board order, the San Diego Water Board agrees with the reasoning expressed by the State Water Board.

Page # 1, Finding A.4 - The Fact Sheet / Technical Report for the Order No. R9-2010-0016, NPDES No. CAS0108766, Waste Discharge Requirements for Discharges from the MS4s Draining the County of Riverside, the Incorporated Cities of Riverside County, and the Riverside County Flood Control and Water Conservation District within the San Diego Region, includes cited regulatory and legal references and additional explanatory information and data in support of the requirements of this Order. This information, including any supplements thereto, ~~and any response to comments on the Tentative Orders,~~ is hereby incorporated by reference into these findings.

Page #28, Section F.1.c.(6) – Infiltration and Groundwater Protection
To protect groundwater quality, each Copermittee must apply restrictions to the use of treatment control BMPs that are designed to primarily function as large, centralized infiltration devices (such as large infiltration trenches and infiltration basins). Such restrictions must be designed so that the use of such infiltration treatment control BMPs does not cause or contribute to an exceedance of groundwater quality objectives and must be fully protective of downstream water rights. At a minimum, each treatment control BMP designed to primarily function as a centralized infiltration device must meet the restrictions below, unless the Developemnt~~n~~ Project demonstrates to the Copermittee that a restriction is not necessary to protect groundwater quality. The Copermittees may collectively or individually develop alternative restrictions on the use of treatment control BMPs which are designed to primarily function as centralized infiltration devices. Alternative restrictions developed by the Copermittees can partially or wholly replace the restrictions listed below. The restrictions do not apply to small infiltration systems dispersed throughout a development project.

Page # 29, Section F.1.c.(8) - Rain water harvesting and water reuse, where feasible, must be ~~implemented~~ encouraged as part of the site design and construction to reduce pollutants in storm water discharges to the MEP~~, and to supplement offsite beneficial uses~~.

Page # 33, Section F.1.d.(4)(b)(iii) - Projects with low traffic areas and appropriate soil conditions must be constructed ~~walkways, trails, overflow parking lots, alleys, or other low-traffic areas~~ with permeable surfaces~~, such as pervious concrete, porous asphalt, unit pavers, and granular materials~~.

Page # 33-34 Section F.1.d.(4)(c)(ii) - If onsite retention ~~infiltration~~ LID BMPs are technically infeasible per section F.1.d.(7)(b), other LID BMPs may treat any volume that is not retained onsite provided that the other LID BMPs are sized ~~to hold the design~~

~~storm volume that is not infiltrated~~ to achieve equivalent storm water volume and pollutant load reduction as if the entire design capture volume were retained onsite. The LID BMPs must be designed for an appropriate surface loading rate to prevent erosion, scour and channeling within the BMP.

Page # 36, Section F.1.d.(7)(a) - Prior to implementation, the LID waiver program must clearly exhibit that it will not allow Priority Development Projects to result in a net impact (after consideration of any mitigation) from pollutant loadings over and above the impact caused by projects meeting the onsite LID retention requirements;

Page # 38-39, Section F.1.f.(1) - Inventory of SSMP projects: Each Copermittee must develop and maintain a watershed-based database to track and inventory all projects constructed within their jurisdiction, that have a final approved SSMP (SSMP projects), and its structural post-construction BMPs ~~within its jurisdiction~~ implemented therein since July, 2005. LID BMPs implemented on a lot by lot basis ~~in low density residential areas~~ at single family residential houses, such as rain barrels, are not required to be tracked or inventoried.

Page # 39, Section F.1.f.(2)(b)(iv) – Delete the section:
~~(iv) At least 20 percent of all approved and inventoried SSMP projects must be inspected by the Copermittee annually;~~

Page # 64, Section F.3.c.(5) – Delete the section:
~~(5) Privately Owned Unpaved Roads Maintenance~~

~~(a) The Copermittees must require implementation of BMPs for erosion and sediment control during maintenance activities on privately owned unpaved roads, particularly in or adjacent to stream channels or wetlands.~~

~~(b) The Copermittees must enforce their ordinances against illegal construction and maintenance grading activities on privately owned unpaved roads, so as to prevent impacts to water quality.~~

Page # 66-67, Section F.4.b - Each Copermittee must maintain an updated map of its entire MS4 and the corresponding drainage areas within its jurisdiction. The use of GIS is strongly encouraged. The MS4 map must include all segments of the storm sewer system owned, operated, and maintained by the Copermittee, as well as all known locations of inlets that discharge and/or collect runoff into the Copermittee's MS4~~, all known locations of access points (i.e. manholes) to the Copermittee's MS4~~, all known locations of connections with other MS4s (e.g. Caltrans), and all known locations of all the outfalls that discharge runoff from the Copermittee's MS4. The accuracy of the MS4 map must be confirmed during dry weather field screening and analytical monitoring and must be updated at least annually. The MS4 map including any GIS layers must be submitted with the updated JRMP.

Page # 69, Section F.6 - Each Copermittee must implement education programs to (1) measurably increase the knowledge regarding MS4s, impacts of runoff on receiving waters, and potential BMP solutions for the target audience; and (2) to measurably change the behavior of target communities and thereby reduce pollutants in storm water discharges and eliminate prohibited non-storm water discharges to MS4s and the

environment. At a minimum, the education programs must meet the requirements of this section and address the following target communities:

- Copermittee Departments and Personnel
- New Development / Redevelopment Project Applicants, Developers, Contractors, Property Owners, and other Responsible Parties
- Construction Site Owners and Operators
- Commercial Owners and Operators
- Industrial Owners and Operators
- Residential Community and General Public
- ~~Quasi-Governmental Agencies / Districts (i.e., educational institutions, water districts, sanitation districts, etc.)~~

Attachment Updates

Page # C-7 - Add the following definition:
Low Impact Development Best Management Practices (LID BMPs) - LID BMPs include schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the pollution of waters of the United States through storm water management and land development strategies that emphasize conservation and the use of on-site natural features integrated with engineered, small-scale hydrologic controls to more closely reflect pre-development hydrologic functions. LID BMPs include retention practices that do not allow runoff such as infiltration, rain water harvesting and reuse, and evapotranspiration. LID BMPs also include flow-through practices such as biofiltration that may have some discharge of storm water following treatment.

Page # E-5, Section II.A.1, Table 1 -
Table 1. Analytical Testing for Mass Loading (II.A.1) and Stream Assessment (II.A.2)

Conventionals, Nutrients, Hydrocarbons	Pesticides	Metals (Total and Dissolved)	Bacteriological (mass loading)
• Total Dissolved Solids • Total Suspended Solids • Turbidity • Total Hardness • pH • Specific Conductance • Temperature • Dissolved Oxygen • Total Phosphorus • Dissolved Phosphorus • Nitrite* • Nitrate* • Total Kjeldahl Nitrogen • Ammonia • Biological Oxygen Demand, 5-day • Chemical Oxygen Demand • Total Organic Carbon • Dissolved Organic Carbon • Methylene Blue Active Substances • Oil and Grease • Sulfate	• Diazinon • Chlorpyrifos • Malathion • Carbamates • Pyrethroids	• Arsenic • Cadmium • Total Chromium • Hexavalent Chromium** • Copper • Lead • Iron • Manganese • Nickel • Selenium • Zinc • Mercury • Silver • Thallium	• E. coli • Fecal Coliform • Enterococcus

* Nitrate and ~~nitrate~~ nitrite may be combined and reported as nitrate + nitrite.
** Hexavalent Chromium sampling must occur only for mass loading stations for the 1st wet weather event and 1 dry weather event.

Page # E-6, Section II.A.2.a – … The two existing mass loading stations at Murrieta and Temecula Creeks must continue to be monitored. Copermittees may propose, for San Diego Water Board review and approval, changing the location of stream assessment monitoring stations where the mass loading stations location has changed pursuant to section II.A.1.a. Two reference stream assessment stations, including the existing Adobe Creek station, must be identified, sampled, monitored, and analyzed.

Page # E-7, Section II.A.2.b - Frequency: Stream assessment stations must be monitored in May or June (to represent the influence of wet weather on the communities) ~~and September or October (to represent the influence of dry weather flows on the communities)~~. The timing of monitoring of stream assessment stations located at mass loading stations must coincide with dry weather monitoring of those mass loading stations.

Page # E-22, Section II.E -
Add the following special study to the end of Section II.E:

7. Stormwater Monitoring Coalition (SMC) Regional Monitoring of Southern California Coastal Watersheds:

   The Copermittees must implement the monitoring program developed by the SMC for Regional Monitoring of the southern California coastal watersheds within the Santa Margarita Hydrologic Unit. Each Copermittee must evaluate the results of the monitoring program within and downstream of their jurisdiction and integrate the results into program assessments and modifications.

Page # E-25, Section III.A.2 - Monitoring Annual Report: The Principal Copermittee must submit the Receiving Waters and MS4 Discharge Monitoring Annual Report to the San Diego Water Board on October 1 of each year, beginning on **October 1, 2013**. Receiving Waters and MS4 Discharge Monitoring Annual Reports must include monitoring conducted under the previous fiscal year, and must meet the following requirements:

Page # E-27, Section III.A.4 - Following completion of an annual cycle of monitoring in October, the Copermittees must make the monitoring data and results available to the San Diego Water Board at the San Diego Water Board's request. Following completion of the annual cycle of monitoring, the Copermittees must upload monitoring data and results into the California Environmental Data Exchange Network (CEDEN)[15].

Footnote 15: http://www.ceden.org/

Fact Sheet Updates

Page # 5, Section II - Copermittees

1. City of Murrieta	4. County of Riverside
2. City of Temecula	5. Riverside County Flood Control and Water Conservation District
3. City of Wildomar	
~~6. City of Menifee~~[1]	

Page # 22, Finding A.4 - The Fact Sheet / Technical Report for the Order No. R9-2010-0016, NPDES No. CAS0108766, Waste Discharge Requirements for Discharges from the MS4s Draining the County of Riverside, the Incorporated Cities of Riverside County, and the Riverside County Flood Control and Water Conservation District within the San Diego Region, includes cited regulatory and legal references and additional explanatory information and data in support of the requirements of this Order. This information, including any supplements thereto, ~~and any response to comments on the Tentative Orders,~~ is hereby incorporated by reference into these findings.

Page # 45, Discussion of Finding C.14 - The State Water Board~~'s~~ recently recognized ~~precedential~~ in order (Order WQ 2009-0008) ~~affirming a Los Angeles County MS4 permit modification, consistent with USEPA's prior interpretations, recognizes~~ that "[n]either the Clean Water Act nor the federal storm water regulations define 'non-storm water.' 'Illicit discharge' is defined as any discharge to an MS4 'not composed entirely of storm water.' Thus, 'illicit discharge' is the most nearly applicable definition of 'non-storm water' found in federal law and is often used interchangeably with that term." In July 2010, the court in Los Angeles County v. State Water Resources Control Board remanded the Los Angeles Water Board's MS4 permit underlying Order WQ 2009-0008 for procedural reasons occurring during the permit adoption process. The court did not evaluate or rule upon the substantive findings and reasoning set forth in Order WQ 2009-0008. While the San Diego Water Board may no longer cite Order WQ 2009-0008 as a precedential State Water Board order, the San Diego Water Board agrees with the reasoning expressed by the State Water Board.

Page # 96, Finding E.6 – Add the following paragraph at the end of the discussion of Finding E.6:

The San Diego Water Board recognizes that the Commission on State Mandates recently found that certain provisions within two municipal storm water permits constituted reimbursable state mandates within the meaning of the California Constitution. The Commission did not reimburse the claimants for the costs of implementing those provisions. The decisions directly affect only the municipal storm water permits identified in the two test claims. That is, the effect of the decisions is limited to the provisions of Los Angeles Water Board Order 01-182 and San Diego Order R9-2007-0001 identified by the Commission as reimbursable state mandates. No other municipal storm water permits or provisions therein are directly affected by the decisions and the San Diego Water Board is not precluded from adopting similar or identical provisions in the Tentative Order. Subsequent proceedings before the Commission to

[1] ~~Until an agreement to transfer the regulatory oversight of the City of Menifee's MS4 to the California Regional Water Quality Control Board, Santa Ana Region under Order No. R8-2010-0033 is finalized, the City of Menifee is included as a Copermittee under Order No. R9-2010-0016.~~

determine the local governments entitled to reimbursement and the amount of reimbursement are underway before the Commission. Separately, the State Water Board and San Diego and Los Angeles Water Boards have challenged these decisions in court.

Page # 139, Section F.1.f - To facilitate the tracking of BMP maintenance, each Copermittee must develop and maintain a database of Priority Development Projects subject to SSMP requirements (SSMP projects) and the post-construction BMPs implemented for each SSMP project. The inventory is not expected or required to include LID BMPs that are implemented on a lot by lot basis ~~in low density residential areas~~ at single family residential houses. The inventory, however, must include the post-construction BMPs for all other development or redevelopment SSMP project sites.

Page # 140, Section F.1.f – Delete the following paragraph:
~~Twenty percent of all SSMP projects are required to be inspected by the Copermittees annually. If the number of high priority SSMP project sites is 20 percent or more of the total number of SSMP projects in the Copermittee's inventory, this requirement will be met. If, however, the number of high priority SSMP project sites is less than 20 percent of the total number of SSMP projects in the Copermittee's inventory, additional lower priority SSMP project sites must be inspected to make up the difference. Selection of the additional lower priority SSMP project sites will be at the discretion of the Copermittee, but are selected based on each site's potential threat to water quality.~~

Page # 160, Section F.3.c.(5) – Delete the section:
~~**Section F.3.c.(5)** (Privately Owned Unpaved Roads Maintenance) includes requirements for privately owned unpaved roads. The Copermittees must require implementation of BMPs for erosion and sediment control during maintenance activities on privately owned unpaved roads, particularly roads that are in or adjacent to receiving waters. As discussed for Finding D.1.c, BMPs for unpaved roads are needed to minimize the discharge of sediment to the MS4s and receiving waters. There are several guidance documents available (see Discussion for Finding D.1.c) that include design and source control BMPs that can the Copermittees can readily require to be implemented.~~

~~In addition, where the Copermittees identify illegal construction and maintenance grading activities on privately owned unpaved roads, the Copermittees must enforce their ordinances to prevent illicit discharges of sediment and other pollutants from privately owned unpaved roads to their MS4s and receiving waters.~~

Page # 163, Section F.4.b - requires each Copermittee to maintain an updated map of its entire MS4 and the corresponding drainage areas within its jurisdiction. The Order specifies that the map must include the segments of the storm sewer system owned, operated, and maintained by the Copermittee, and include locations of all known inlets, ~~access points (i.e. manholes),~~ connections with other MS4s, and outfalls to the Copermittee's MS4. Knowing where their inlets, access points, connections with other MS4s, and outfalls are located will allow the Copermittees to better track, identify, and eliminate IC/IDs. The use of a geographic information system (GIS) by the Copermittees is strongly encouraged for the MS4 map. The Riverside County Flood Control and Water Conservation District (RCFCD) currently maintains a GIS layer that is a compilation of all the Copermittee MS4 maps. Although an individual Copermittee may not have GIS capabilities, each Copermittee has agreements with RCFCD for providing updated MS4

maps to the RCFCD to update this GIS layer and subsequent submittal to the San Diego Water Board.

Supporting Document No. 4
Item No. 6
November 10, 2010

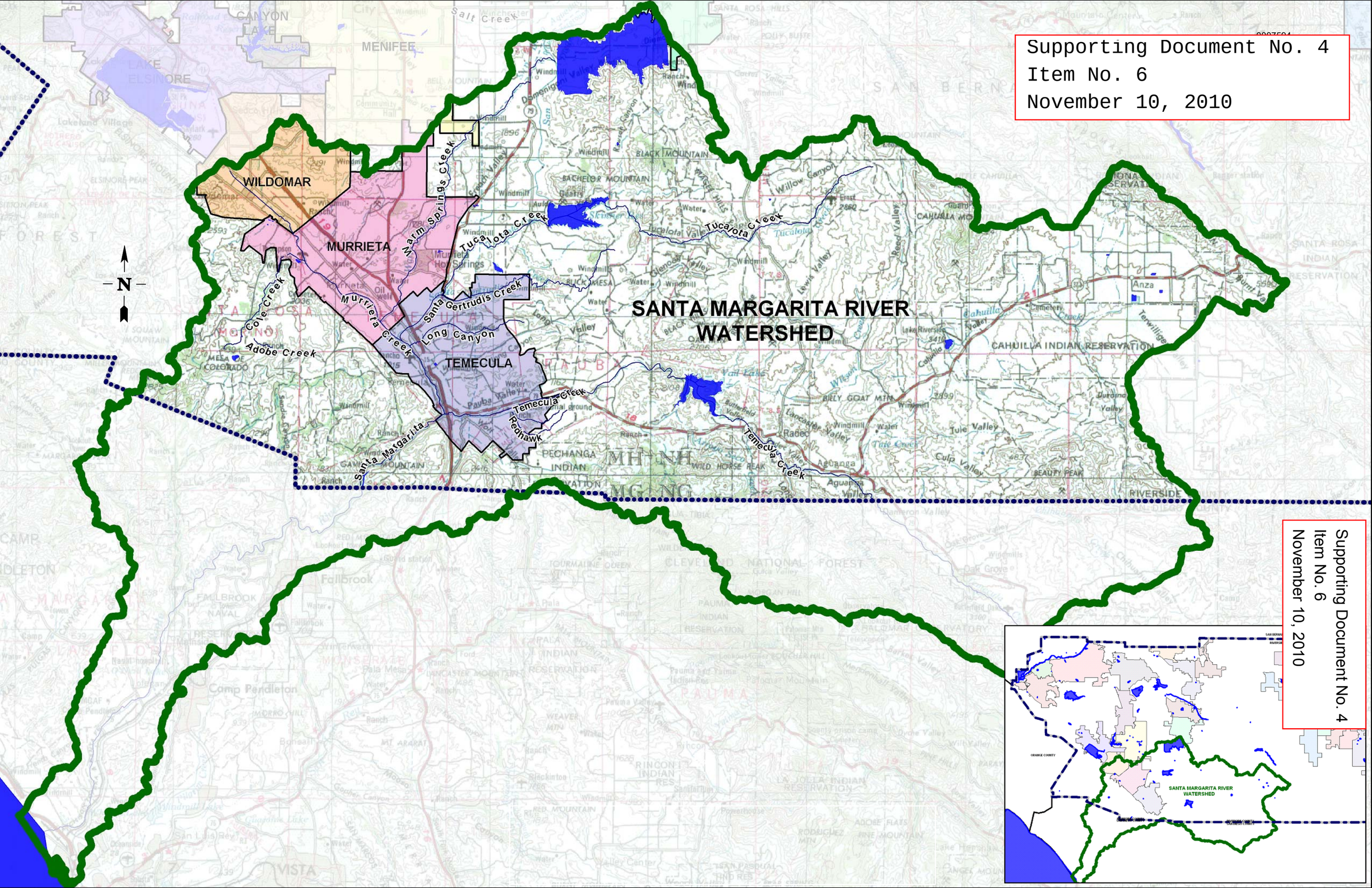

Supporting Document No. 4
Item No. 6
November 10, 2010

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD,
SAN DIEGO REGION

November 10, 2010

Event Timeline for Tentative Order No. R9-2010-0016	
September 8, 2008	Meeting regarding Report of Waste Discharge (ROWD) submittal
January 15, 2009	ROWD submitted
July 14, 2009	Current Permit, Order No. R9-2004-001, expired
February 18, 2010	San Diego Water Board Comments sent on the ROWD
17 Meetings:	Meeting Topic:
February 24, 2010	Initial meeting with Executive Officer (EO)
March 22, 2010	Staff & Copermittees meeting with EO and Assistant Executive Officer (AEO)
April 22, 2010	Initial draft permit presented to Copermittees
April 28, 2010	Staff & Copermittee meeting to discuss public participation, residential, and municipal
May 6, 2010	Staff & Copermittee meeting to discuss MS4 map, illicit discharge detection and elimination, education, and action levels
May 13, 2010	Staff & Copermittee meeting to discuss discharge prohibitions, receiving waters limitations, over-irrigation, new development, BMP verification, and retrofit
May 20, 2010	Staff & Copermittee meeting to discuss BMP verification & maintenance tracking, enforcement, and retrofit
May 26, 2010	Staff & Copermittee meeting to discuss construction, retrofit, post-construction, commercial, industrial, and low impact development (LID)
June 3, 2010	Staff & Copermittee meeting to discuss commercial, industrial, and new development
June 10, 2010	Staff & Copermittee meeting to discuss post-construction, LID, and hydromodification
June 15, 2010	Staff & Copermittee teleconference to discuss monitoring
June 17, 2010	Staff & Copermittee meeting to discuss jurisdictional exchange, LID, and hydromodification

Event Timeline for Tentative Order No. R9-2010-0016	
June 23, 2010	Staff & Copermittee meeting to discuss jurisdictional exchange, LID, hydromodification, watershed workplan, fiscal analysis, Total Maximum Daily Load, effectiveness assessment, and reporting
July 1, 2010	Staff & Copermittee meeting to discuss legal authority, effectiveness assessment, and reporting
July 8, 2010	Staff & Copermittee meeting to discuss monitoring, and unpaved roads
July 15, 2010	Staff & Copermittee meeting to discuss monitoring, costs, and unpaved roads
July 19, 2010	Staff & Copermittee meeting to discuss hydromodification, and unpaved roads
July 23, 2010	Public release of Tentative Order
2 additional meetings:	Meeting Topic:
August 18, 2010	Staff & Copermittee meeting to discuss unpaved roads, minor errata, costs, over-irrigation
August 25, 2010	Copermittee meeting with EO and staff to discuss outstanding concerns, monitoring, over-irrigation, costs, and unpaved roads
September 7, 2010	Written comments due
September 29, 2010	Draft responses to comments released
4 additional meetings:	Meeting Topic:
October 4, 2010	Staff & Camp Pendleton meeting to discuss permit requirements
October 5, 2010	Staff & Copermittees meeting to discuss permit requirements and hearing procedures
October 8, 2010	Staff, Copermittees, & USEPA conference call to discuss LID requirements.
October 13, 2010	Staff, Copermittees, USEPA, NRDC, & Camp Pendleton meeting to discuss LID requirements.
November 10, 2010	San Diego Water Board hearing and adoption

California Regional Water Quality Control Board

San Diego Region

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http:// www.waterboards.ca.gov/sandiego

Supporting Document No. 6
Item No. 6
November 10, 2010

September 28, 2010

Patrick A. Thomas
Director of Public Works
City of Murrieta
1 Town Square
24601 Jefferson Avenue
Murrieta, CA 92562

Frank Oviedo
City Manager
City of Wildomar
23873 Clinton Keith Road, Suite 201
Wildomar, CA 92595

Donald Allison, P.E.
City Engineer/Public Works Director
City of Menifee
29714 Haun Road
Menifee, CA 92586

Dear Messrs. Thomas, Oviedo and Allison:

SUBJECT: DESIGNATIONS OF SAN DIEGO WATER BOARD AND SANTA ANA WATER BOARD FOR PURPOSES OF REGULATION OF MUNICIPAL SEPARATE STORM SEWER SYSTEMS - CITIES OF MENIFEE, MURRIETA AND WILDOMAR, RIVERSIDE COUNTY

This letter constitutes the California Regional Water Quality Control Board, San Diego Region's (San Diego Water Board, San Diego Regional Board, or Region 9) written agreement pursuant to Water Code section 13228, subdivision (a) to designate the Santa Ana Regional Water Quality Control Board (Santa Ana Water Board or Region 8) as the regulator of the City of Menifee within Region 9's geographic jurisdiction for municipal separate storm sewer system (MS4) permit purposes[1], and further constitutes the San Diego Water Board's written agreement to accept designation from the Santa Ana Water Board to regulate the Cities of Murrieta and Wildomar, including those portions of each city that fall within Region 8's geographic jurisdiction, for MS4 permit purposes.[2] As discussed below, this agreement is subject to several important limitations recognized by the Cities.

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[1] The San Diego Water Board intends to consider the adoption of a new MS4 permit (Tentative Order No. R9-2010-0016) that would regulate the relevant portions of Murrieta and Wildomar on October 13, 2010.

[2] Until the new San Diego Water Board MS4 permit is adopted, including regulation of the Cities of Murrieta and Wildomar for MS4 purposes regardless of geographic boundaries, portions of Murrieta and Wildomar remain regulated in part by Order No. R8-2010-0033. Murrieta and Wildomar would become regulated by the San Diego Water Board, with certain limitations described below, when the San Diego Water Board adopts tentative Order No. R9-2010-0016, scheduled for consideration on October 13, 2010.

Background

The Cities each lay partially within both the San Diego and Santa Ana Water Boards' geographic jurisdictional boundaries. Portions of the Cities are currently regulated by the Santa Ana Water Board under Order No. R8-2010-0033 for MS4 discharges. Because the Cities of Wildomar and Menifee were incorporated after 2004, the San Diego Water Board's existing MS4 permit, Order No. R9-2004-001, regulates portions of Murrieta, but does not regulate Wildomar or Menifee. On July 20, 21 and 22, 2010, Murrieta, Wildomar and Menifee, respectively, submitted letters addressed jointly to the Executive Officers of the San Diego Water Board and the Santa Ana Water Board requesting that they each be regulated by one MS4 permit, pursuant to Water Code section 13228. (The Cities' letters, which include maps provided by the Cities depicting their respective geographic locations, are attached to this letter as Exhibits 1-3.) Murrieta and Wildomar requested that the Santa Ana Water Board designate the San Diego Water Board as the regulator for all portions of their respective cities, including those portions within Region 8's geographic boundary, for their MS4-related discharges. Likewise, the City of Menifee requested that the San Diego Water Board designate the Santa Ana Water Board as the regulator for all portions of Menifee, including those portions of the city that fall within Region 9's jurisdictional boundary, for matters pertaining to MS4 discharges. As the basis for their requests, the Cities cite the desire to reduce the complexities associated with being regulated by two separate MS4 permits and a desire to increase effectiveness and efficiencies in using city resources to benefit water quality. As described below, each city recognizes appropriate and important limitations to this agreement.

Limitations on San Diego Water Board Designation Agreement

As explained in their respective letters, each city recognizes the following common limitations to this agreement: (1) the requested designation applies only to MS4 permitting so that each city is subject to a single MS4 permit; (2) the Cities of Murrieta and Wildomar recognize that other waste discharge requirements (WDRs) or orders issued and/or enforced by the San Diego Water Board remain wholly under the San Diego Water Board's jurisdiction; likewise, the City of Menifee recognizes that WDRs and/or other orders issued or enforced by the Santa Ana Water Board remain wholly under the Santa Ana Water Board's jurisdiction; and (3) each Water Board retains the authority to enforce provisions of the MS4 permit issued to each city[3] but compliance

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The Santa Ana Water Board may amend its order to remove Murrieta and Wildomar after the San Diego Water Board's adoption of Tentative Order No. R9-2010-0016, but this designation becomes effective upon the San Diego water Board's action.

[3] Primary enforcement responsibility lies with the permitting Water Board.

will be determined based upon the MS4 permit in which a particular city is regulated as a co-permittee (see Wat. Code § 13228, subd. (b)).

The Cities also expressly acknowledged the following reciprocal limitation concerning Total Maximum Daily Loads (TMDLs). Murrieta and Wildomar understand and agree that "[a]ny TMDLs and associated MS4 permit requirements issued by the Santa Ana Regional Board, which include [Murrieta and Wildomar] as responsible part[ies], will be incorporated into the MS4 permit issued by the San Diego Regional Board by reference, including reference to any associated provisions, findings or elements of the fact sheet." (City of Murrieta, Letter to Kurt Berchtold and David Gibson, July 20, 2010, p. 2; City of Wildomar, Letter to Kurt Berchtold and David Gibson, July 21, 2010, p. 2.) Similarly, the City of Menifee understands that "[a]ny TMDLs and associated MS4 permit requirements issued by the San Diego Regional Board, which include the City of Menifee as a responsible party, will be incorporated into the MS4 permit issued by the Santa Ana Regional Board by reference, including reference to any associated provisions, findings or elements of the fact sheet." (City of Menifee, Letter to Kurt Berchtold and David Gibson, July 22, 2010, p. 2.)

The Cities further recognize they will be subject to different processes for submitting Permit Registration Documents (PRDs) for municipal construction projects subject to the State Water Resources Control Board's (State Water Board's) Construction General Storm Water Permit. Under the Santa Ana Water Board's MS4 permit, Order No. R8-2010-0033, PRDs for municipal construction projects are submitted to the State Water Board through the Stormwater Multi-Application Reporting and Tracking System (SMARTS) without the filing fee. The City of Menifee will follow the process set forth by the Santa Ana Water Board under Order No. R8-2010-0033 for construction PRDs for all municipal construction projects within the City of Menifee. In contrast, the San Diego Water Board's existing (R9-2004-0001) and proposed (R9-2010-0016) MS4 permits include no similar process. Therefore, the Cities of Murrieta and Wildomar will submit PRDs[4] in accordance with the manner prescribed in State Water Board's Construction General Storm Water Permit, including appropriate fees.

Similarly, Region 8 MS4 requirements do not require separate coverage under the General Industrial Storm Water Permit (97-03-DWQ) for municipal yards. As such, the City of Menifee need not get coverage under the State Water Board's General Industrial Storm Water Permit for its corporate yards. Murrieta and Wildomar shall get coverage under the General Industrial Storm Water Permit for <u>all</u> their corporate yards.

Complaints received for discharges flowing from municipal, construction, industrial, and commercial sites to MS4s within the Cities of Murrieta and Wildomar will be forwarded to the San Diego Water Board for review. Complaints regarding discharges from

[4] In the form of a Notice of Intent (NOI).

municipal, construction, industrial, and commercial sites to MS4s within the City of Menifee will be referred to the Santa Ana Water Board for review.

Each Water Board remains responsible for overseeing construction and industrial sites under the statewide General Permits for Construction and Industrial Activities (State Water Board Orders No. 2009-0009 DWQ and No. 97-03 DWQ, respectively) based on the Water Board's geographic jurisdictional boundary. The Santa Ana Water Board shall notify the San Diego Water Board of any non-compliance found during routine inspections of sites within the Santa Ana Water Board boundary that discharge into the MS4s for the Cities of Murrieta and Wildomar. The San Diego Water Board shall notify the Santa Ana Water Board of any non-compliance found during routine inspections of sites within the San Diego Water Board boundary that discharge into the City of Menifee's MS4.

For de minimus types of discharges listed in the Region 8 MS4 Permit, the City of Menifee does not have to get separate coverage under Region 8's General De Minimus Permit (R8-2009-0003). De minimus types of discharges to Region 8's jurisdiction from the Cities of Wildomar and Murrieta shall be regulated under Region 8's General De Minimus Permit, R8-2009-0003.

Finally, the City of Murrieta notes that its annual report under the San Diego MS4 permit will include the 375 acres currently within the Santa Ana watershed. While not noted by the Cities of Wildomar and Menifee, the San Diego Water Board expects that the annual report filed by each city would be a single report covering the entire geographic area of the city, regardless of geographic jurisdiction, using the format prescribed in its respective permit and submitted to the appropriate regulating board.

For the reasons outlined above, the San Diego Water Board agrees to the Cities' regulatory designation requests and notes that tentative Order No. R9-2010-0016 will be revised to reflect this agreement. This agreement shall become effective with the adoption of tentative Order No. R9-2010-0016. The San Diego Water Board does not anticipate the need, but reserves the right, to modify or terminate this agreement in the future, upon sufficient notice, and for good cause.

Respectfully,

DAVID W. GIBSON
Executive Officer

Enclosure

cc: Kurt Berchtold, Executive Officer, Santa Ana Water Board

California Regional Water Quality Control Board
Santa Ana Region

Linda S. Adams
Secretary for Environmental Protection

3737 Main Street, Suite 500, Riverside, California 92501-3348
Phone (951) 782-4130 • FAX (951) 781-6288
www.waterboards.ca.gov/santaana

Arnold Schwarzenegger
Governor

September 28, 2010

Patrick A. Thomas
Director of Public Works
City of Murrieta
1 Town Square
24601 Jefferson Avenue
Murrieta, CA 92562

Frank Oviedo
City Manager
City of Wildomar
23873 Clinton Keith Road, Suite 201
Wildomar, CA 92595

Donald Allison, P.E.
City Engineer/Public Works Director
City of Menifee
29714 Haun Road
Menifee, CA 92586

Dear Messrs. Thomas, Oviedo and Allison:

DESIGNATIONS OF SAN DIEGO REGIONAL WATER QUALITY CONTROL BOARD AND SANTA ANA REGIONAL WATER QUALITY CONTROL BOARD FOR PURPOSES OF REGULATION OF MUNICIPAL SEPARATE STORM SEWER SYSTEMS - CITIES OF MENIFEE, MURRIETA AND WILDOMAR, RIVERSIDE COUNTY

This letter constitutes the Santa Ana Regional Water Quality Control Board's (Santa Ana Water Board's or Region 8's) written agreement pursuant to Water Code section 13228, subdivision (a), to designate the San Diego Regional Water Quality Control Board (San Diego Water Board or Region 9) as the regulator of the Cities of Murrieta and Wildomar, including those portions of each city that fall within Region 8's geographic jurisdiction, for municipal separate storm sewer system (MS4) permit purposes[1], and further constitutes the Santa Ana Water Board's written agreement to accept designation from the San Diego Water Board to regulate the City of Menifee within Region 9's geographic jurisdiction for MS4 permit purposes under Order No. R8-2010-0033.[2]

[1] At the time this letter was signed, the San Diego Water Board intended to consider the adoption of a new MS4 permit (Tentative Order No. R9-2010-0016) that would regulate the relevant portions of Murrieta and Wildomar.

[2] Until the new San Diego Water Board MS4 permit is adopted, including regulation of the Cities of Murrieta and Wildomar for MS4 purposes regardless of geographic boundaries, portions of Murrieta and Wildomar remain regulated in part by Order No. R8-2010-0033. Murrieta and Wildomar would become regulated by the San Diego Water Board, with certain limitations described below, when the San Diego Water Board adopts tentative Order No. R9-2010-0016, scheduled for consideration on October 13, 2010.

As discussed below, this agreement is subject to several important limitations recognized by the Cities of Menifee, Wildomar, and Murrieta (collectively, the Cities).

Background

The Cities each lay partially within both the San Diego and Santa Ana Water Boards' geographic jurisdictional boundaries. Portions of the Cities are currently regulated by the Santa Ana Water Board under Order No. R8-2010-0033 for MS4 discharges. Because the Cities of Wildomar and Menifee were incorporated after 2004, the San Diego Water Board's existing MS4 permit, Order No. R9-2004-0001, only regulates portions of Murrieta. On July 20, 21 and 22, 2010, Murrieta, Wildomar and Menifee, respectively, submitted letters addressed jointly to the Executive Officers of the San Diego Water Board and the Santa Ana Water Board requesting that they each be regulated by one MS4 permit, pursuant to Water Code section 13228. (The Cities' letters, which include maps provided by the Cities depicting their respective geographic locations, are attached to this letter as Exhibits 1-3.) Murrieta and Wildomar requested that the Santa Ana Water Board designate the San Diego Water Board as the regulator for all portions of their respective cities, including those portions within Region 8's geographic boundary, for their MS4-related discharges. Likewise, the City of Menifee requested that the San Diego Water Board designate the Santa Ana Water Board as the regulator for all portions of Menifee, including those portions of the city that fall within Region 9's jurisdictional boundary, for matters pertaining to MS4 discharges. As the basis for their requests, the Cities cite the desire to reduce the complexities associated with being regulated by two separate MS4 permits and a desire to increase effectiveness and efficiencies in using city resources to benefit water quality. As described below, each city recognizes appropriate and important limitations to this agreement.

Limitations on the Santa Ana Water Board Designation Agreement

As explained in their respective letters, each city recognizes the following common limitations to this agreement: (1) the requested designation applies only to MS4 permitting so that each city is subject to a single MS4 permit; (2) the Cities of Murrieta and Wildomar recognize that other waste discharge requirements (WDRs) or orders issued and/or enforced by the San Diego Water Board remain wholly under the San Diego Water Board's jurisdiction; likewise, the City of Menifee recognizes that WDRs and/or other orders issued or enforced by the Santa Ana Water Board remain wholly under the Santa Ana Water Board's jurisdiction; and (3) each Water Board retains the authority to enforce provisions of the MS4 permit issued to each city but compliance will

---

The Santa Ana Water Board intends to amend Order No. R8-2010-033 to remove Murrieta and Wildomar after the San Diego Water Board's adoption of Tentative Order No. R9-2010-0016. This designation becomes effective upon the San Diego Water Board's action.

be determined based upon the MS4 permit in which a particular city is a named as a co-permittee (see Wat. Code § 13228, subd. (b)).

The Cities also expressly acknowledged the following reciprocal limitation concerning Total Maximum Daily Loads (TMDLs). Murrieta and Wildomar understand and agree that "[a]ny TMDLs and associated MS4 permit requirements issued by the Santa Ana Regional Board, which include [Murrieta and Wildomar] as responsible part[ies], will be incorporated into the MS4 permit issued by the San Diego Regional Board by reference, including reference to any associated provisions, findings or elements of the fact sheet." (City of Murrieta, Letter to Kurt Berchtold and David Gibson, July 20, 2010, p. 2; City of Wildomar, Letter to Kurt Berchtold and David Gibson, July 21, 2010, p. 2.) Similarly, the City of Menifee understands that "[a]ny TMDLs and associated MS4 permit requirements issued by the San Diego Regional Board, which include the City of Menifee as a responsible party, will be incorporated into the MS4 permit issued by the Santa Ana Regional Board by reference, including reference to any associated provisions, findings or elements of the fact sheet." (City of Menifee, Letter to Kurt Berchtold and David Gibson, July 22, 2010, p. 2.)

The Cities further recognize they will be subject to different processes for submitting Permit Registration Documents (PRDs) for municipal construction projects subject to the State Water Resources Control Board's (State Water Board's) Construction General Storm Water Permit. Under the Santa Ana Water Board's MS4 permit, Order No. R8-2010-0033, PRDs for municipal construction projects are submitted to the State Water Board through the Stormwater Multi-Application Reporting and Tracking System (SMARTS) without the filing fee. The City of Menifee will follow the process set forth by the Santa Ana Water Board under Order No. R8-2010-0033 for construction PRDs for all municipal construction projects within the City of Menifee. In contrast, the San Diego Water Board's existing (R9-2004-0001) and proposed (R9-2010-0016) MS4 permits include no similar process. Therefore, the Cities of Murrieta and Wildomar will submit PRDs[3] in accordance with the manner prescribed in State Water Board's Construction General Storm Water Permit, including appropriate fees.

Similarly, Region 8 MS4 requirements do not require separate coverage under the General Industrial Storm Water Permit (97-03-DWQ) for corporate yards. As such, the City of Menifee need not obtain coverage under the State Water Board's General Industrial Storm Water Permit for its corporate yards. Murrieta and Wildomar shall get coverage under the General Industrial Storm Water Permit for <u>all</u> their corporate yards.

Complaints received for discharges flowing from municipal, construction, industrial, and commercial sites to MS4s within the Cities of Murrieta and Wildomar will be forwarded to the San Diego Water Board for review. Complaints regarding discharges from municipal, construction, industrial, and commercial sites to MS4s within the City of

[3] The PRDs include a Notice of Intent (NOI).

Menifee will be referred to the Santa Ana Water Board for review. Each Water Board remains responsible for overseeing construction and industrial sites under the statewide General Permits for Construction and Industrial Activities (State Water Board Orders No. 2009-0009 DWQ and No. 97-03 DWQ, respectively) based on the Water Board's geographic jurisdictional boundary. The Santa Ana Water Board shall notify the San Diego Water Board of any non-compliance found during routine inspections of sites within the Santa Ana Water Board boundary that discharge into the MS4s for the Cities of Murrieta and Wildomar. The San Diego Water Board shall notify the Santa Ana Water Board of any non-compliance found during routine inspections of sites within the San Diego Water Board boundary that discharge into the City of Menifee's MS4.

For de minimus types of discharges listed in the Region 8 MS4 Permit, the City of Menifee does not have to obtain separate coverage under Region 8's General De Minimus Permit (R8-2009-0003). De minimus types of discharges to Region 8's jurisdiction from the Cities of Wildomar and Murrieta shall be regulated under Region 8's General De Minimus Permit, R8-2009-0003.

Finally, the City of Murrieta notes that its annual report under the San Diego MS4 permit will include the 375 acres currently within the Santa Ana watershed. While not noted by the Cities of Wildomar and Menifee, the Santa Ana Water Board expects that the annual report filed by each city would be a single report covering the entire geographic area of the city, regardless of geographic jurisdiction, using the format prescribed in its respective permit and submitted to the appropriate regulating board.

For the reasons outlined above, the Santa Ana Water Board agrees to the Cities' regulatory designation requests and notes that Order No. R8-2010-0033 will be revised to reflect this agreement. This agreement shall become effective with the adoption of tentative Order No. R9-2010-0016.

The Santa Ana Water Board does not anticipate the need, but reserves the right, to modify or terminate this agreement in the future, upon sufficient notice, and for good cause.

Respectfully,

Kurt V. Berchtold
Executive Officer

Enclosure

cc: David Gibson, Executive Officer, San Diego Regional Water Quality Control Board
Jason Uhley, Riverside County Flood Control and Water Conservation District

July 22, 2010

SAN DIEGO REGIONAL
WATER QUALITY
CONTROL BOARD

2010 JUL 23 A 9:4

Mr. Kurt Berchtold
Executive Officer
California Regional Water Quality
Control Board - Santa Ana Region
3737 Main Street, Suite 500
Riverside, CA 92501-3339

Mr. David W. Gibson
Executive Officer
California Regional Water Quality
Control Board – San Diego Region
9174 Sky Park Court, Suite 100
San Diego, CA 92123-4340

Re: **Request for Designating the Santa Ana Regional Board as Regulating Discharges from MS4 within the City of Menifee**

Dear Messrs. Berchtold and Gibson:

The City of Menifee is located within southwestern Riverside County, and covers an area of approximately 60 square miles. While the city is located primarily within the Santa Ana Watershed and therefore is under the jurisdiction of the Santa Ana Regional Board, approximately 800 acres (or 3%) of the city extends into the Santa Margarita Watershed which is under the jurisdiction of the San Diego Regional Board. The land use in this area is rural residential and residential. Attached for your reference is a map of the city, overlaid with the jurisdictional boundary between the two Regional Boards. As a result of this situation, the city is subject to two Municipal Separate Storm Sewer System (MS4) Permits issued by the respective Regional Boards.

Pursuant to discussions with staff at both Regional Boards, and consistent with California Water Code section 13228, the City of Menifee hereby requests that the San Diego Regional Board designate the Santa Ana Regional Board for regulation of all portions of the city, regardless of Regional Board jurisdictional boundaries, for matters pertaining to MS4 permitting.

The remainder of this letter contains a discussion of the basis for this request; a description of the understood limitations of this designation; and any other associated requests.

Basis for the request

The City is currently a named permittee on order R8-2010-0033 issued by the Santa Ana Regional Board (Santa Ana Permit), and submitted a Notice of Intent as part of the Report of Waste Discharge to participate in the upcoming permit issued by the San Diego Regional Board. While having the same goal of reducing the discharge of pollutants from the MS4 system, these two orders include requirements that accomplish that goal in different ways. As a result, programs designed to be in compliance with the Santa Ana Permit are similar, but necessarily different than programs designed

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for compliance with the San Diego Permit. When this situation is applied within a single city, such as the City of Menifee, having two differing programs creates significant confusion among both city staff and the public, which can lead to inefficient and inconsistent implementation of the programs and less effective protection of water quality. Additionally, and no less significant, there is a duplicative administrative and financial burden that is inherent in complying with two MS4 permits: two sets of programs have to be developed; staff have to be trained to two sets of requirements, and at differing frequencies; business inspections must inspect for and track different information, at differing frequencies; two sets of annual reports have to be created, with each report being required to include different information; etc.

The purpose of the City's request is to reduce the aforementioned complexity to allow for the more effective and focused utilization of the City's resources to the benefit of water quality.

Understood Limitations

This request by the City of Menifee is made with the understanding that:

- For the purposes of MS4 permitting only, the Santa Ana Regional Board would regulate the entirety of the City of Menifee. As a result, the City of Menifee would be subject to a single MS4 permit, which would be issued by the Santa Ana Regional Board.
- Construction NOIs for all municipal construction projects within the City of Menifee will be submitted in accordance with the process identified by the Santa Ana Regional Board.
- Enforcement of any provisions of the MS4 permit issued to the City of Menifee can be performed by either the San Diego Regional Board or the Santa Ana Regional Board however compliance will be based on the permit issued by the Santa Ana Regional Board.
- Any TMDLs and associated MS4 permit requirements issued by the San Diego Regional Board, which include the City of Menifee as a responsible party, will be incorporated into the MS4 permit issued by the Santa Ana Regional Board by reference, including reference to any associated provisions, findings or elements of the fact sheet.
- Other Waste Discharge Requirements, or other Orders issued or enforced by the San Diego Regional Board would remain wholly under the jurisdiction of the San Diego Regional Board.

Other Requests:

Understanding that the requested designation applies to the MS4 permit requirements, the Santa Ana Permit incorporates a simplified process in section XIV.G.1. for applying for coverage under the General Construction Permit (Order 2009-0009-DWQ) for municipal projects. This process includes submission of the NOI or Permit Registration Documents (PRDs) directly to the Executive Officer, and waived application fees. To avoid unnecessary confusion among staff, and potential for

inadvertent non-compliance, the City of Menifee specifically requests that this portion of the MS4 permit would be applicable within the entire City, including those portions of the city within the jurisdiction of the San Diego Regional Board.

In conclusion, the requested designation of regulatory authority to the Santa Ana Regional Board will not only reduce the complexity and administrative burden upon the City of Menifee, but will allow the City to better focus and effectively utilize their available resources to the best benefit to water quality. The City of Menifee is focused on protecting the receiving waters (Canyon Lake) immediately adjacent to the City. The City is taking specific actions and pursuing funding requests to insure future compliance. The City has accepted responsibility for a 105 acre preserve immediately upstream of Canyon Lake under permits by ACOE and CAF&G. We appreciate the San Diego Regional Board's flexibility in allowing the City of Menifee to remain focused on these important responsibilities in District 8 and not having to address separate permit issues.

If you have any questions regarding this request, please contact Don Allison at 951-672-6777.

Very truly yours,

Donald Allison

Mr. Donald Allison, P.E.
City Engineer/Public Works Director
City of Menifee

Attachment:

Map of the City of Menifee with Redesignation Area

cc: Steve Harding, City Manager, City of Menifee
Karen Feld, City Attorney, City of Menifee
Jason Uhley, Riverside County Flood Control

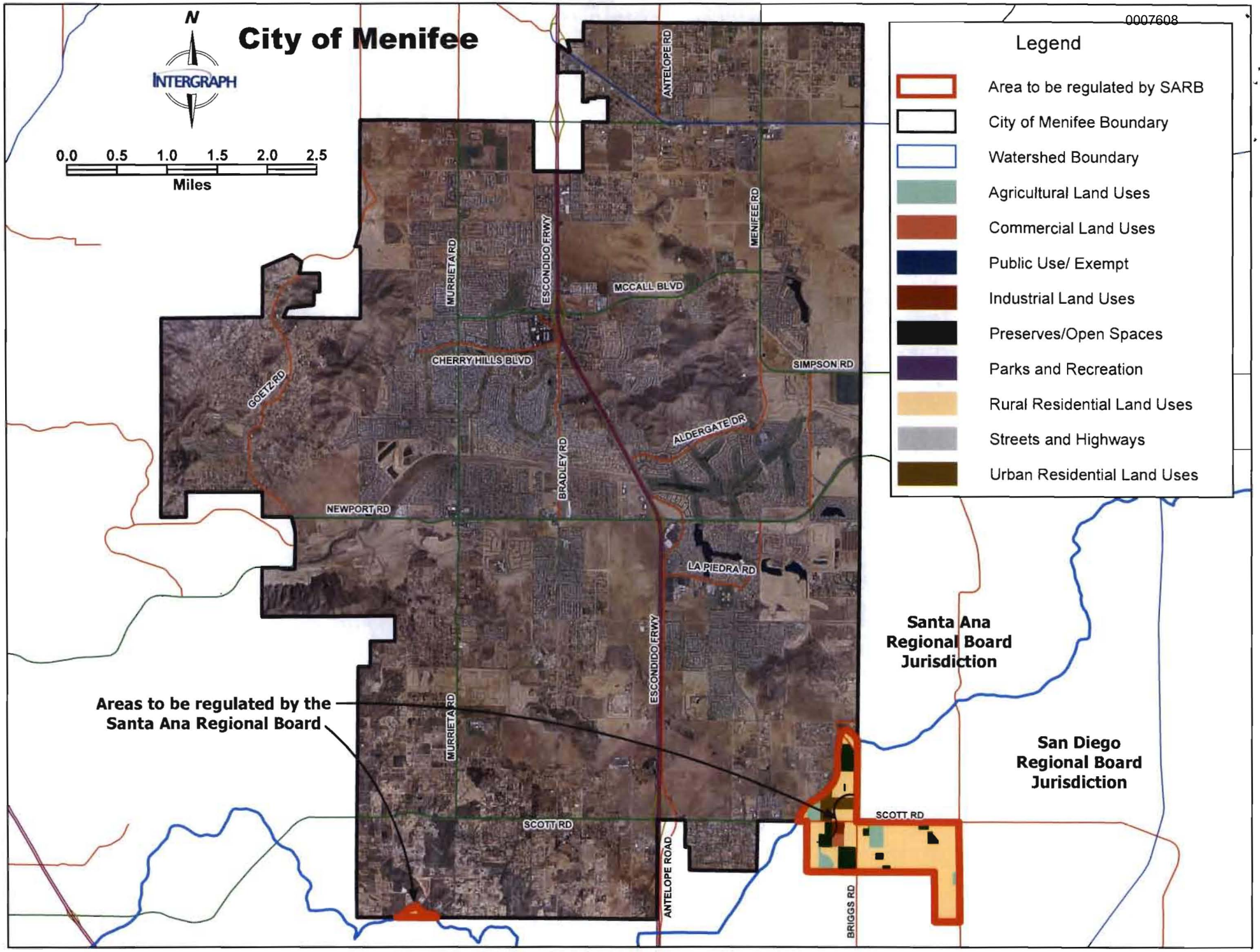
City of Menifee
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INTERGRAPH
0.0 0.5 1.0 1.5 2.0 2.5
Miles
Legend
Area to be regulated by SARB
City of Menifee Boundary
Watershed Boundary
Agricultural Land Uses
Commercial Land Uses
Public Use/ Exempt
Industrial Land Uses
Preserves/Open Spaces
Parks and Recreation
Rural Residential Land Uses
Streets and Highways
Urban Residential Land Uses
ANTELOPE RD
MENIFEE RD
MURRIETA RD
ESCONDIDO FRWY
MCCALL BLVD
CHERRY HILLS BLVD
SIMPSON RD
GOETZ RD
ALDERGATE DR
BRADLEY RD
NEWPORT RD
LA PIEDRA RD
Santa Ana Regional Board Jurisdiction
San Diego Regional Board Jurisdiction
Areas to be regulated by the Santa Ana Regional Board
SCOTT RD
ANTELOPE ROAD
BRIGGS RD

0007609

Bridgette Moore, Mayor
Marsha Swanson, Mayor Pro Tem
Sheryl Ade, Council Member
Bob Cashman, Council Member
Scott Farnam, Council Member

23873 Clinton Keith Road, Suite 201
Wildomar, CA 92595
951.677.7751 Phone
951.698.1463 Fax
www.CityofWildomar.org

July 21, 2010

Mr. Kurt Berchtold
Executive Officer
California Regional Water Quality
Control Board - Santa Ana Region
3737 Main Street, Suite 500
Riverside, CA 92501-3339

Mr. David W. Gibson
Executive Officer
California Regional Water Quality
Control Board – San Diego Region
9174 Sky Park Court, Suite 100
San Diego, CA 92123-4340

Dear Messrs Berchtold and Gibson:

Re: Request for Designating the San Diego Regional Board as Regulating Discharges from MS4 owned by the City of Wildomar

The City of Wildomar is located within southwestern Riverside County, and covers an area of approximately 23.7 square miles. While the city is located primarily within the Santa Margarita Watershed and therefore is under the jurisdiction of the San Diego Regional Board, approximately 4,768 acres (or 31.4 %) of the city extends into the Santa Ana Watershed which is under the jurisdiction of the Santa Ana Regional Board. Attached for your reference is a map of the city, overlaid with the jurisdictional boundary between the two Regional Boards. As a result of this situation, the city is subject to two Municipal Separate Storm Sewer System (MS4) Permits issued by the respective Regional Boards.

Pursuant to discussions with staff at both Regional Boards, and consistent with California Water Code section 13228, the City of Wildomar hereby requests that the Santa Ana Regional Board designate the San Diego Regional Board for regulation of all portions of the city, regardless of Regional Board jurisdictional boundaries, for matters pertaining to MS4 permitting.

The remainder of this letter contains a discussion of the basis for this request; a description of the understood limitations of this designation; a description of the additional portion of the city that, pursuant to this designation, would be regulated by the San Diego Regional Board, and any other associated requests.

Basis for the request

The City is currently a named permittee on order R8-2010-0033 issued by the Santa Ana Regional Board (Santa Ana Permit), and submitted a Notice of Intent as part of the Report of Waste Discharge to participate in the upcoming permit issued by the San Diego Regional Board. While having the same goal of reducing the discharge of pollutants from the MS4 system, these two orders include requirements that accomplish that goal in different ways. As a result, programs designed to be in compliance with the Santa Ana Permit are similar, but necessarily different than programs designed for compliance with the San Diego Permit. When this situation is applied within a single city, such as the City of Wildomar, having two differing programs creates significant confusion among both city staff and the public, which can lead to inefficient and inconsistent implementation of the programs and less effective protection of water quality. Additionally, and no less significant, there is a duplicative administrative and financial burden that is inherent in complying with two MS4 permits: two sets of programs have to be developed; staff have to be trained to two sets of requirements, and at differing frequencies; business inspections must inspect for and track different information, at differing frequencies; two sets of annual reports have to be created, with each report being required to include different information; etc.

The purpose of the City's request is to reduce the aforementioned complexity to allow for the more effective and focused utilization of the City's resources to the benefit of water quality.

Understood Limitations

This request by the City of Wildomar is made with the understanding that:

- For the purposes of MS4 permitting only, the San Diego Regional Board would regulate the entirety of the City of Wildomar. As a result, the City of Wildomar would be subject to a single MS4 permit, which would be issued by the San Diego Regional Board.
- Enforcement of any provisions of the MS4 permit issued to the City of Wildomar can be performed by either San Diego Regional Board or Santa Ana Regional Board however compliance will be based on the permit issued by the San Diego Regional Board.
- Any TMDLs and associated MS4 permit requirements issued by the Santa Ana Regional Board, which include the City of Wildomar as a responsible party, will be incorporated into the MS4 permit issued by the San Diego Regional Board by reference, including reference to any associated provisions, findings or elements of the fact sheet.
- Other Waste Discharge Requirements, or other Orders issued or enforced by the Santa Ana Regional Board would remain wholly under the jurisdiction of the Santa Ana Regional Board.

Description of the area of the City subject to the designation:

Some facts about the City of Wildomar and the portion within the jurisdiction of the Santa Ana Regional Board are described below. Also enclosed with this letter is a map of the City with the subject area highlighted.

- Total Area of the City of Wildomar is 23.7 square miles.
- Area within the Santa Ana Watershed is 4,768 acres or 7.45 square miles.
- Percent of the City of Wildomar in the Santa Ana Watershed is 31.4%.
- Top three land uses within the portion of the City of Wildomar in the Santa Ana Watershed are residential (58.5%), Preserve/Open Space (25.6%) and Agriculture (6.7 %) (as % of area within Santa Ana Watershed)

In conclusion, the requested designation of regulatory authority to the San Diego Regional Board will not only reduce the complexity and administrative burden upon the City of Wildomar, but will allow the City to better focus and effectively utilize their available resources to the best benefit to water quality.

If you have any questions regarding this request, please contact Tim D'Zmura at 951-677-7751.

Very truly yours,

Frank Oviedo, City Manager
City of Wildomar

Attachments:
Map of the City of Wildomar

ec:

Tim D'Zmura, City of Wildomar
Jason Uhley, Riverside County Flood Control

City of Wildomar

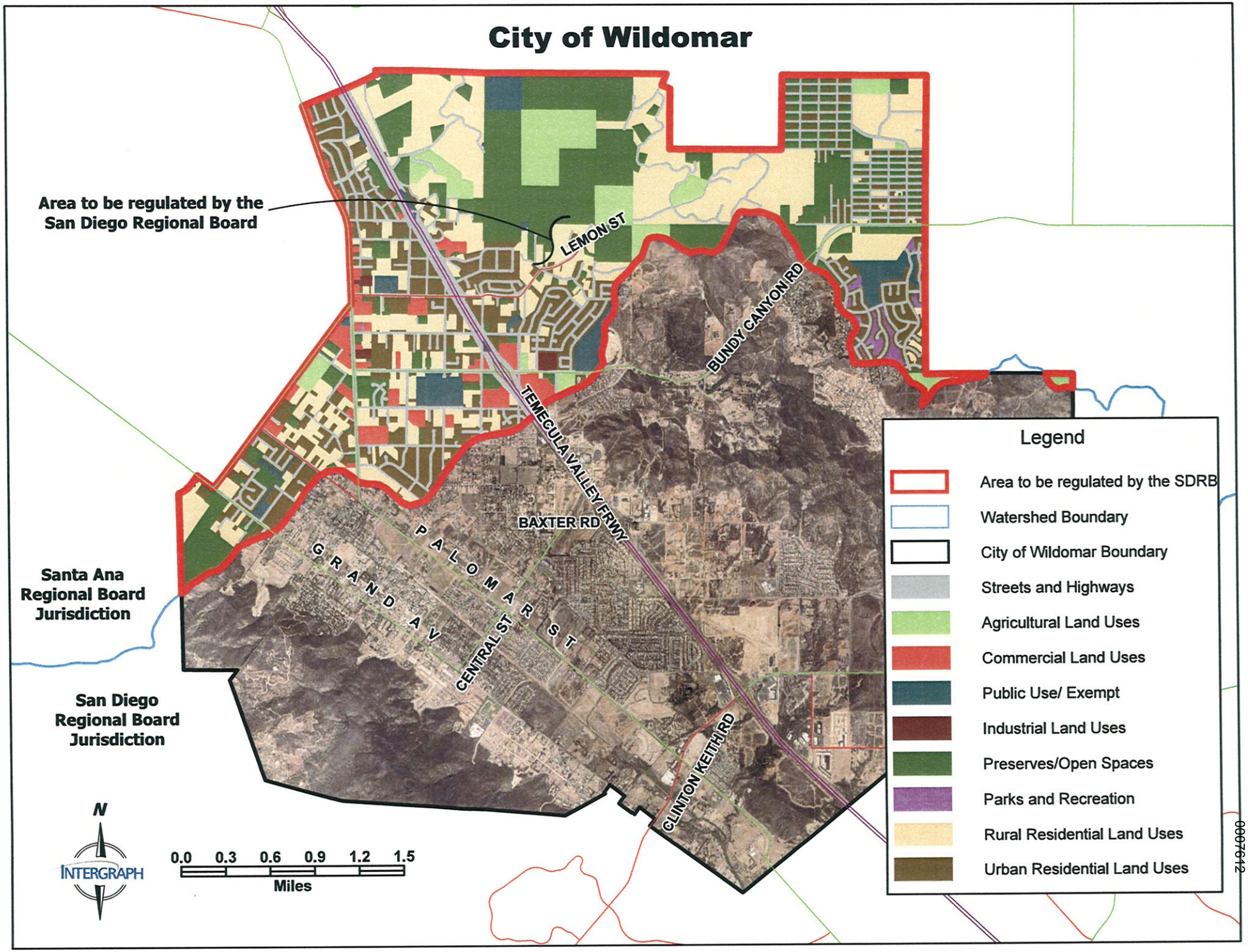

0007612

CITY OF MURRIETA

July 20, 2010

Mr. Kurt Berchtold
Executive Officer
California Regional Water Quality
Control Board - Santa Ana Region
3737 Main Street, Suite 500
Riverside, CA 92501-3339

Mr. David W. Gibson
Executive Officer
California Regional Water Quality
Control Board – San Diego Region
9174 Sky Park Court, Suite 100
San Diego, CA 92123-4340

Dear Messrs. Berchtold and Gibson:

Re: Request for Designating the San Diego Regional Board as Regulating Discharges from MS4 owned by the City of Murrieta

The City of Murrieta is located within southwestern Riverside County, and covers an area of approximately 21,503 square miles. While the city is located primarily within the Santa Margarita Watershed and therefore is under the jurisdiction of the San Diego Regional Board, approximately 375 acres (or 1.7%) of the city extends into the Santa Ana Watershed which is under the jurisdiction of the Santa Ana Regional Board. Attached for your reference is a map of the city, overlaid with the jurisdictional boundary between the two Regional Boards. As a result of this situation, the city is subject to two Municipal Separate Storm Sewer System (MS4) Permits issued by the respective Regional Boards.

Pursuant to discussions with staff at both Regional Boards, and consistent with California Water Code section 13228, the City of Murrieta hereby requests that the Santa Ana Regional Board designate the San Diego Regional Board for regulation of all portions of the city, regardless of Regional Board jurisdictional boundaries, for matters pertaining to MS4 permitting.

The remainder of this letter contains a discussion of the basis for this request; a description of the understood limitations of this designation; a description of the additional portion of the city that, pursuant to this designation, would be regulated by the San Diego Regional Board, and any other associated requests.

1 Town Square, 24601 Jefferson Avenue • Murrieta, California 92562
phone: 951.304.CITY (2489) • fax: 951.698.4509 • web: murrieta.org

Mr. Kurt Berchtold
Santa Ana Regional Water Quality Control Board
Mr. David W. Gibson
San Diego Regional Water Quality Control Board
Re: Request for Area Exchange

Basis for the request

The City is currently a named permittee on order R8-2010-0033 issued by the Santa Ana Regional Board (Santa Ana Permit), and order R9-2004-001 with the San Diego Regional Board (San Diego Permit) - which is currently up for renewal. While having the same goal of reducing the discharge of pollutants from the MS4 system, these two orders include requirements that accomplish that goal in different ways. As a result, programs designed to be in compliance with the Santa Ana Permit are similar, but necessarily different than programs designed for compliance with the San Diego Permit. When this situation is applied within a single city, such as the City of Murrieta, having two differing programs creates significant confusion among both city staff and the public, which can lead to inefficient and inconsistent implementation of the programs and less effective protection of water quality. Additionally, and no less significant, there is a duplicative administrative and financial burden that is inherent in complying with two MS4 permits: two sets of programs have to be developed; staff have to be trained to two sets of requirements, and at differing frequencies; business inspections must inspect for and track different information, at differing frequencies; two sets of annual reports have to be created, with each report being required to include different information; etc.

The purpose of the City's request is to reduce the aforementioned complexity to allow for the more effective and focused utilization of the City's resources to the benefit of water quality.

Understood Limitations

This request by the City of Murrieta is made with the understanding that:

- For the purposes of MS4 permitting only, the San Diego Regional Board would regulate the entirety of the City of Murrieta. As a result, the City of Murrieta would be subject to a single MS4 permit, which would be issued by the San Diego Regional Board.
- Enforcement of any provisions of the MS4 permit issued to the City of Murrieta can be performed by either San Diego Regional Board or Santa Ana Regional Board however compliance will be based on the permit issued by the San Diego Regional Board.
- Any TMDLs and associated MS4 permit requirements issued by the Santa Ana Regional Board, which include the City of Murrieta as a responsible party, will be incorporated into the MS4 permit issued by the San Diego Regional Board by reference, including reference to any associated provisions, findings or elements of the fact sheet.
- Other Waste Discharge Requirements, or other Orders issued or enforced by the Santa Ana Regional Board would remain wholly under the jurisdiction of the Santa Ana Regional Board.
- One Annual Report will be prepared in accordance to the San Diego MS4 permit that includes the 375 acres that is currently in the Santa Ana watershed.

Mr. Kurt Berchtold
Santa Ana Regional Water Quality Control Board
Mr. David W. Gibson
San Diego Regional Water Quality Control Board
Re: Request for Area Exchange

Description of the area of the City subject to the designation:

Some facts about the City of Murrieta and the portion within the jurisdiction of the Santa Ana Regional Board are described below. Also enclosed with this letter is a map of the City with the subject area highlighted.

- Total Area of the City of Murrieta is 21,503 square miles.
- Area within the Santa Ana Watershed is 375 acres or 0.6 square miles.
- Percent of City of Murrieta in the Santa Ana Watershed is 1.7%.
- Top three land uses within the portion of the City of Murrieta in the Santa Ana Watershed are residential (65%), business park office (23%), and commercial (6%) (as % of area within Santa Ana Watershed)

In conclusion, the requested designation of regulatory authority to the San Diego Regional Board will not only reduce the complexity and administrative burden upon the City of Murrieta, but will allow the City to better focus and effectively utilize their available resources to the best benefit to water quality.

If you have any questions regarding this request, please contact me at 951.461.6078.

Very truly yours,

Patrick A. Thomas
Director of Public Works
City of Murrieta

Attachments: Map of the City of Murrieta

CC:
Bill Woolsey, City of Murrieta
Jason Uhley, Riverside County Flood Control

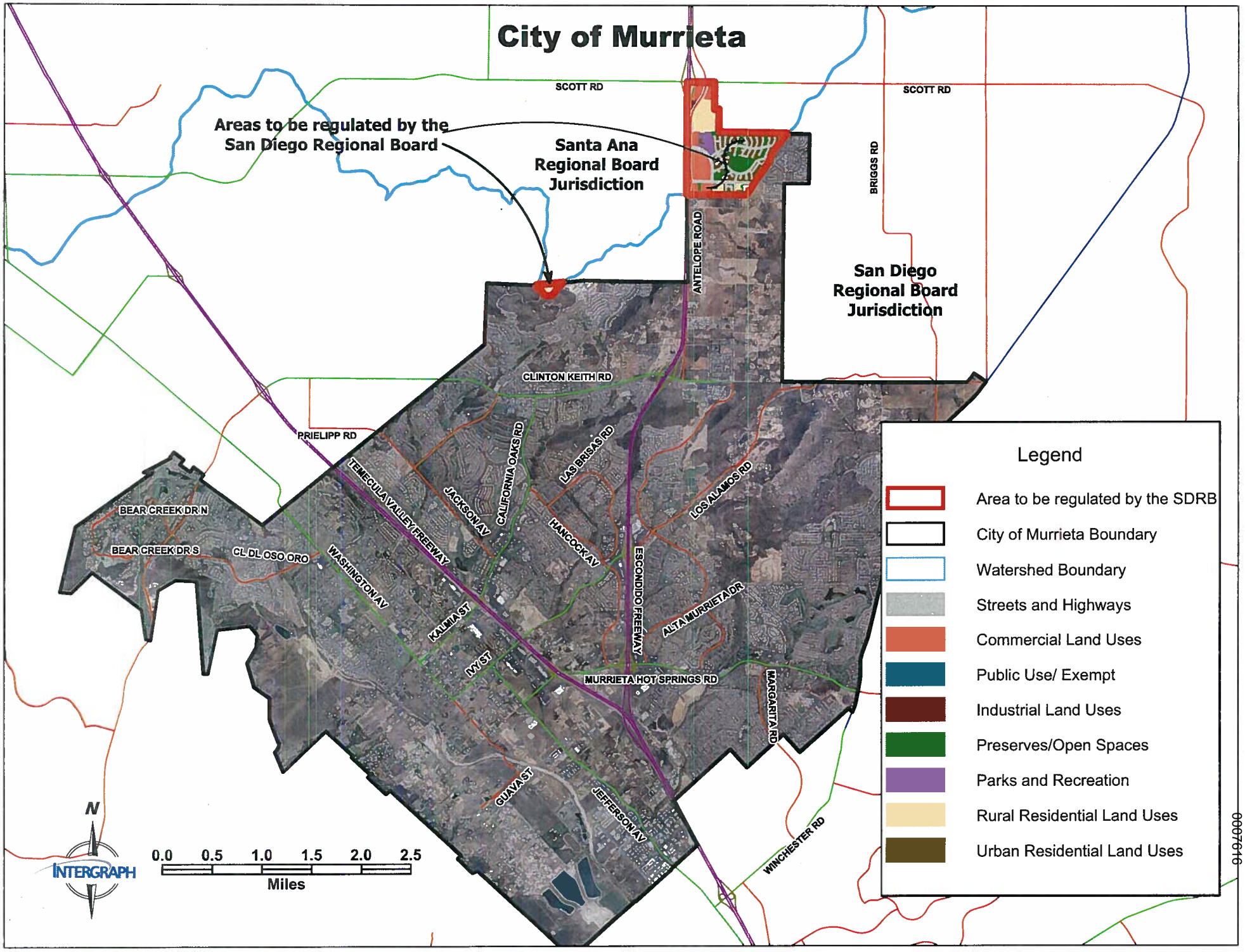
City of Murrieta
Areas to be regulated by the San Diego Regional Board
Santa Ana Regional Board Jurisdiction
San Diego Regional Board Jurisdiction
SCOTT RD
SCOTT RD
BRIGGS RD
ANTELOPE ROAD
CLINTON KEITH RD
PRIELIPP RD
TEMECULA VALLEY FREEWAY
JACKSON AV
CALIFORNIA OAKS RD
LAS BRISAS RD
HANCOCK AV
LOS ALAMOS RD
ESCONDIDO FREEWAY
ALTA MURRIETA DR
MURRIETA HOT SPRINGS RD
MARGARITA RD
WINCHESTER RD
BEAR CREEK DR N
BEAR CREEK DR S
CL DL OSO ORO
WASHINGTON AV
KALMIA ST
IVY ST
GUAVA ST
JEFFERSON AV
N
INTERGRAPH
0.0 0.5 1.0 1.5 2.0 2.5
Miles
Legend
Area to be regulated by the SDRB
City of Murrieta Boundary
Watershed Boundary
Streets and Highways
Commercial Land Uses
Public Use/ Exempt
Industrial Land Uses
Preserves/Open Spaces
Parks and Recreation
Rural Residential Land Uses
Urban Residential Land Uses

0007616

NOTICE OF PUBLIC MEETING

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN DIEGO REGION

TENTATIVE ORDER R9-2010-0016
Riverside County Municipal Storm Water Permit

The California Regional Water Quality Control Board, San Diego Region (San Diego Water Board) hereby notifies the public of its intent to consider adoption of Tentative Order No. R9-2010-0016, the Riverside County Municipal Storm Water Permit, at a public meeting scheduled for the following time and location[1]:

November 10, 2010 at 9:00 am
City of Temecula
Council Chambers
43200 Business Park Drive
Temecula, CA 92590

This matter was originally noticed for consideration at the October 13, 2010 San Diego Water Board Meeting. The October 13, 2010 San Diego Water Board meeting was cancelled due to lack of a quorum. Therefore this serves as a notice of public hearing for the rescheduled date.

Tentative Order No. R9-2010-0016 (Tentative Order) will replace the current Riverside County Municipal Storm Water Permit, R9-2004-0001. The Tentative Order regulates the discharge of storm water pollutants from the municipal separate storm sewer system. Additional information may be found on the San Diego Water Board website at: http://www.waterboards.ca.gov/sandiego.

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Please contact Mr. Ben Neill at (858) 467-2952 or via e-mail at bneill@waterboards.ca.gov for information regarding the meeting or Tentative Order No. R9-2010-0016. All documents, comments received, and other information related to the above-mentioned item are on file and may be reviewed at the San Diego Water Board office, 9174 Sky Park Court, Suite 100, San Diego, CA 92123, telephone (858) 467-2952, FAX (858) 571-6972. Review of information and files may be conducted Monday through Friday from 8 am to 5 pm. To insure that space is available we suggest that you contact our office to schedule an appointment. Or send an e-mail to File_Review@waterboards.ca.gov. Please bring the foregoing to the attention of any person known to you who would be interested in these matters.

DAVID W. GIBSON
Executive Officer

[1] If it is necessary to modify the meeting date or location, a further public notice will be issued.

This space for filing stamp only

THE REGISTER

625 N GRAND AVE, SANTA ANA, CA 92701
Telephone (714) 796-7000 / Fax (714) 796-6059

PROOF OF PUBLICATION

(2015.5 C.C.P.)

State of California)
County of ORANGE) ss

Notice Type: GPN - GOVT PUBLIC NOTICE

Ad Description: Riverside County MS4 NPDES Public Meeting Notice Nov 2010

I am a citizen of the United States and a resident of the State of California; I am over the age of eighteen years, and not a party to or interested in the above entitled matter. I am the principal clerk of the printer and publisher of the THE REGISTER, a newspaper published in the English language in the city of SANTA ANA, county of ORANGE, and adjudged a newspaper of general circulation as defined by the laws of the State of California by the Superior Court of the County of ORANGE, State of California, under date 11/19/1905, Case No. A21046. That the notice, of which the annexed is a printed copy, has been published in each regular and entire issue of said newspaper and not in any supplement thereof on the following dates, to-wit:

10/15/2010

Executed on: 10/15/2010
At SANTA ANA, California

I certify (or declare) under penalty of perjury that the foregoing is true and correct.

Signature

* A 0 0 0 0 0 1 8 8 8 3 4 1 *

CNS#: 1965947

NOTICE OF PUBLIC MEETING

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD SAN DIEGO REGION

TENTATIVE ORDER R9-2010-0016 Riverside County Municipal Storm Water Permit

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DAVID W. GIBSON
Executive Officer

[1] If it is necessary to modify the meeting date or location, a further public notice will be issued.

10/15/10
CNS-1965947#
THE REGISTER

0007619

This space is for the County Clerk's Filing Stamp

PROOF OF PUBLICATION
(2010 & 2011 C.C.P.)

STATE OF CALIFORNIA
County of San Diego

I am a citizen of the United States and a resident of the County aforesaid: I am over the age of eighteen years and not a party to or interested in the above-entitled matter. I am the principal clerk of the printer of

North County Times

Formerly known as the Blade-Citizen and The Times-Advocate and which newspapers have been adjudicated newspapers of general circulation by the Superior Court of the County of San Diego, State of California, for the City of Oceanside and the City of Escondido, Court Decree number 171349, for the County of San Diego, that the notice of which the annexed is a printed copy (set in type not smaller than nonpariel), has been published in each regular and entire issue of said newspaper and not in any supplement thereof on the following dates, to-wit:

October 14th, 2010

I certify (or declare) under penalty of perjury that the foregoing is true and correct.

Dated at **Escondido,** California

On this 14th, day of October, 2010

Jane Allshouse
NORTH COUNTY TIMES

A000001896499

NOTICE OF PUBLIC MEETING

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD SAN DIEGO REGION

TENTATIVE ORDER R9-2010-0016 Riverside County Municipal Storm Water Permit

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DAVID W. GIBSON
Executive Officer

[1] If it is necessary to modify the meeting date or location, a further public notice will be issued.
10/14/10
CNS-1965944#
NORTH COUNTY TIMES 2273168

THE PRESS-ENTERPRISE

3450 Fourteenth Street
Riverside CA 92501-3878
951-684-1200
951-368-9018 FAX

PROOF OF PUBLICATION
(2010, 2015.5 C.C.P.)

Press-Enterprise

PROOF OF PUBLICATION OF

Ad Desc.: PM R9-2010-0016 / 1965945

I am a citizen of the United States. I am over the age of eighteen years and not a party to or interested in the above entitled matter. I am an authorized representative of THE PRESS-ENTERPRISE, a newspaper of general circulation, printed and published daily in the County of Riverside, and which newspaper has been adjudicated a newspaper of general circulation by the Superior Court of the County of Riverside, State of California, under date of April 25, 1952, Case Number 54446, under date of March 29, 1957, Case Number 65673 and under date of August 25, 1995, Case Number 267864; that the notice, of which the annexed is a printed copy, has been published in said newspaper in accordance with the instructions of the person(s) requesting publication, and not in any supplement thereof on the following dates, to wit:

10-14-10

I Certify (or declare) under penalty of perjury that the foregoing is true and correct.

Date: Oct. 14, 2010
At: Riverside, California

Natalie Vela

CALIF NEWSPAPER SERV BUREAU

PO BOX 60460
LOS ANGELES CA 90060

Ad #: 10430133

PO #: 1965945

Agency #: _____

Ad Copy:

NOTICE OF PUBLIC MEETING CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD SAN DIEGO REGION TENTATIVE ORDER R9-2010-0016 Riverside County Municipal Storm Water Permit

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Council Chambers
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DAVID W. GIBSON
Executive Officer

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10/14/10
CNS-1965945#
THE PRESS ENTERPRISE

A0000018962 73

The San Diego Union-Tribune. SIGN ON SAN DIEGO enlace. sifieds

P.O. Box 120191, San Diego, CA 92112-0191

AFFIDAVIT OF PUBLICATION

CALIFORNIA NEWSPAPER SERVICE
P.O. BOX 60460
LOS ANGELES, CA 90060

STATE OF CALIFORNIA} ss.
County of San Diego}

The Undersigned, declares under penalty of perjury under the laws of the State of California: That she is a resident of the County of San Diego. That she is and at all times herein mentioned was a citizen of the United States, over the age of twenty-one years, and that she is not a party to, nor interested in the above entitled matter; that she is Chief Clerk for the publisher of

SignonMobile/The San Diego Union-Tribune

a newspaper of general circulation , printed and published daily in the City of San Diego, County of San Diego, and which newspaper is published for the dissemination of local news and intelligence of a general character, and which newspaper at all the times herein mentioned had and still has a bona fide subscription list of paying subscribers, and which newspaper has been established, printed and published at regular intervals in the said City of San Diego, County of San Diego, for a period exceeding one year next preceding the date of publication of the notice hereinafter referred to, and which newspaper is not devoted to nor published for the interests, entertainment or instruction of a particular class, profession, trade, calling, race, or denomination, or any number of same; that the notice of which the annexed is a printed copy, has been published in said newspaper in accordance with the instructions of the person(s) requesting publication, and not in any supplement thereof on the following dates, to wit:

Oct 14, 2010

Chief Clerk for the Publisher

10-22-10

Date

Affidavit of Publication of

Legal Advertisement
Ad #: 0010442552
ORDERED BY: IRENE AND JACKY

A00000190428 7

NOTICE OF PUBLIC MEETING

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD SAN DIEGO REGION

TENTATIVE ORDER R9-2010-0016 Riverside County Municipal Storm Water Permit

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DAVID W. GIBSON
Executive Officer

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10/14/10
CNS-1945946#

NOTICE OF PUBLIC MEETING

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN DIEGO REGION

TENTATIVE ORDER R9-2010-0016
Riverside County Municipal Storm Water Permit

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October 13, 2010 at 9:00 am
Rancho California Water District
District Board Room
42135 Winchester Road
Temecula, California

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DAVID W. GIBSON
Executive Officer

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0007623

This space is for the County Clerk's Filing Stamp

PROOF OF PUBLICATION
(2010 & 2011 C.C.P.)

STATE OF CALIFORNIA
County of San Diego

I am a citizen of the United States and a resident of the County aforesaid: I am over the age of eighteen years and not a party to or interested in the above-entitled matter. I am the principal clerk of the printer of

North County Times

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September 09th, 2010

I certify (or declare) under penalty of perjury that the foregoing is true and correct.

Dated at **Escondido,** California

This 09th, day of September, 2010

Jane Allshouse
NORTH COUNTY TIMES
Legal Advertising

A000001848041

NOTICE OF PUBLIC MEETING

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD - SAN DIEGO REGION

TENTATIVE ORDER R9-2010-0016
Riverside County Municipal Storm Water Permit

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DAVID W. GIBSON
Executive Officer

[1] If it is necessary to modify the meeting date or location, a further public notice will be issued.
9/9/10
CNS-1940374#
NORTH COUNTY TIMES 2269888

0007624

THE REGISTER

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Telephone (714) 796-7000 / Fax (714) 796-6059

PROOF OF PUBLICATION

(2015.5 C.C.P.)

State of California)
County of ORANGE) ss

Notice Type: HRG - NOTICE OF HEARING

Ad Description: Riverside MS4 hearing

I am a citizen of the United States and a resident of the State of California; I am over the age of eighteen years, and not a party to or interested in the above entitled matter. I am the principal clerk of the printer and publisher of the THE REGISTER, a newspaper published in the English language in the city of SANTA ANA, county of ORANGE, and adjudged a newspaper of general circulation as defined by the laws of the State of California by the Superior Court of the County of ORANGE, State of California, under date 11/19/1905, Case No. A21046. That the notice, of which the annexed is a printed copy, has been published in each regular and entire issue of said newspaper and not in any supplement thereof on the following dates, to-wit:

09/10/2010

Executed on: 09/10/2010
At SANTA ANA, California

I certify (or declare) under penalty of perjury that the foregoing is true and correct.

Julie Trammell
Signature

* A 0 0 0 0 0 1 8 3 3 8 0 3 *

CNS#: 1940377

NOTICE OF PUBLIC MEETING

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD - SAN DIEGO REGION

TENTATIVE ORDER R9-2010-0016 Riverside County Municipal Storm Water Permit

The California Regional Water Quality Control Board, San Diego Region (San Diego Water Board) hereby notifies the public of its intent to consider adoption of Tentative Order No. R9-2010-0016, the Riverside County Municipal Storm Water Permit, at a public meeting scheduled for the following time and location[1]:

October 13, 2010 at 9:00 am
Rancho California Water District
District Board Room
42135 Winchester Road
Temecula, California

Tentative Order No. R9-2010-0016 (Tentative Order) will replace the current Riverside County Municipal Storm Water Permit, R9-2004-0001. The Tentative Order regulates the discharge of storm water pollutants from the municipal separate storm sewer system. Additional information may be found on the San Diego Water Board website at: http://www.waterboards.ca.gov/sandiego. As indicated in the July 23, 2010 Notice of Written Comment Period, written comments on the Tentative Order received by 5 p.m. on September 7, 2010, will be provided to the San Diego Water Board members for their consideration prior to the public hearing. Written comments received after the deadline will not be accepted and will not be incorporated into the administrative record if doing so would jeopardize any party. Interested persons are invited to attend the public hearing to provide oral comments on the Tentative Order. Written comments will not be accepted at the public hearing, but can be orally summarized.

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DAVID W. GIBSON
Executive Officer

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9/10/10
CNS-1940377#
THE REGISTER

The San Diego
Union-Tribune. SIGNON SAN DIEGO enlace. Classifieds

P.O. Box 120191, San Diego, CA 92112-0191

AFFIDAVIT OF PUBLICATION

CALIFORNIA NEWSPAPER SERVICE
P.O. BOX 60460
LOS ANGELES, CA 90060

STATE OF CALIFORNIA} ss.
County of San Diego}

The Undersigned, declares under penalty of perjury under the laws of the State of California: That she is a resident of the County of San Diego. That she is and at all times herein mentioned was a citizen of the United States, over the age of twenty-one years, and that she is not a party to, nor interested in the above entitled matter; that she is Chief Clerk for the publisher of

SignonMobile/The San Diego Union-Tribune

a newspaper of general circulation , printed and published daily in the City of San Diego, County of San Diego, and which newspaper is published for the dissemination of local news and intelligence of a general character, and which newspaper at all the times herein mentioned had and still has a bona fide subscription list of paying subscribers, and which newspaper has been established, printed and published at regular intervals in the said City of San Diego, County of San Diego, for a period exceeding one year next preceding the date of publication of the notice hereinafter referred to, and which newspaper is not devoted to nor published for the interests, entertainment or instruction of a particular class, profession, trade, calling, race, or denomination, or any number of same; that the notice of which the annexed is a printed copy, has been published in said newspaper in accordance with the instructions of the person(s) requesting publication, and not in any supplement thereof on the following dates, to wit:

Sep 8, 2010

Emily Flenn
Chief Clerk for the Publisher

9/13/10
Date

Affidavit of Publication of

Legal Advertisement
Ad # 0010427787
ORDERED BY: IRENE AND JACKY

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NOTICE OF PUBLIC MEETING

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD - SAN DIEGO REGION

TENTATIVE ORDER R9-2010-0016 Riverside County Municipal Storm Water Permit

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DAVID W. GIBSON
Executive Officer

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9/8/10
CNS-1940376#

THE PRESS-ENTERPRISE

3450 Fourteenth Street
Riverside CA 92501-3878
951-684-1200
951-368-9018 FAX

PROOF OF PUBLICATION
(2010, 2015.5 C.C.P.)

Press-Enterprise

PROOF OF PUBLICATION OF

Ad Desc.: PUBLIC MEETING / 1940375

I am a citizen of the United States. I am over the age of eighteen years and not a party to or interested in the above entitled matter. I am an authorized representative of THE PRESS-ENTERPRISE, a newspaper of general circulation, printed and published daily in the County of Riverside, and which newspaper has been adjudicated a newspaper of general circulation by the Superior Court of the County of Riverside, State of California, under date of April 25, 1952, Case Number 54446, under date of March 29, 1957, Case Number 65673 and under date of August 25, 1995, Case Number 267864; that the notice, of which the annexed is a printed copy, has been published in said newspaper in accordance with the instructions of the person(s) requesting publication, and not in any supplement thereof on the following dates, to wit:

09-08-10

I Certify (or declare) under penalty of perjury that the foregoing is true and correct.

Date: Sep. 8, 2010
At: Riverside, California

Natalie Mea

CALIF NEWSPAPER SERV BUREAU

PO BOX 60460
LOS ANGELES CA 90060

Ad #: 10387721

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Agency #: _____

Ad Copy:

NOTICE OF PUBLIC MEETING
CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD - SAN DIEGO REGION
TENTATIVE ORDER R9-2010-0016
Riverside County Municipal Storm Water Permit

The California Regional Water Quality Control Board, San Diego Region (San Diego Water Board) hereby notifies the public of its intent to consider adoption of Tentative Order No. R9-2010-0016, the Riverside County Municipal Storm Water Permit, at a public meeting scheduled for the following time and location[1]:

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DAVID W. GIBSON
Executive Officer

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9/8/10
CNS-1940375#
THE PRESS ENTERPRISE

A000001848001

**CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD,
SAN DIEGO REGION**

Draft Response to Comments

On Tentative Order No. R9-2010-0016
October 13, 2010

A. Background

This document provides responses to the written comments received on the draft permit for reissuance of NPDES Waste Discharge Requirements for Discharges from the Municipal Separate Storm Sewer Systems (MS4s) draining the County of Riverside, the Incorporated Cities of Riverside County, and the Riverside County Flood Control and Water Conservation District within the San Diego Region (Tentative Order No. R9-2010-0016, NPDES Permit No. CAS0108766).

The Tentative Order was distributed on July 23, 2010. This document summarizes and responds to written comments received between July 23, 2010 and September 7, 2010 on the Tentative Order. Interested parties had a full 45-days to review the Tentative Order prior to the deadline for submission of written comments that would be responded to in writing prior to the October Hearing on the Tentative Order.

B. Contents of This Document

Thirteen interested parties submitted comments on the Tentative Order. This resulted in the submission of over 350 comments. Comments came from the public, MS4 Copermittees, governmental and non-governmental organizations, United States Marine Corps Camp Pendleton and one business coalition. The San Diego Water Board reviewed and considered every written comment received. Responses to specific comments are provided within this document. Each specific comment has been assigned a comment number, and comments are generally grouped by commenter. A legend for commenters can be found in Table 1(below). For the reader's information, Table 2 provides an accounting of the comments by subject.

Comments received were concerned with a variety of topics in the Tentative Order. Consideration of written comments has resulted in proposed revisions to the requirements in the Tentative Order and can be found in the Draft Updates and Errata Sheet. In this response to comments, the comments have not been summarized or paraphrased. When comments received from one commenter were similar to other comments received, the California Regional Water Quality Control Board, San Diego Region's (San Diego Water Board) response usually references back to a previous comment number in order to minimize redundancy. Please note that due to limitations of the comment database system employed to handle these numerous comments, some formatting from the original comment has been lost and typographical errors may be present due to optical character recognition transfer. Readers are recommended to review the comments as submitted in their original format to fully appreciate the commenter's sentiments. The original comment letters can be found as Supporting Document 8.

C. Order Adoption

The San Diego Water Board is scheduled to consider adoption of the Tentative Order on October 13, 2010.

Table 1. Commenter Legend.

Commenter	Commenter Number	# of Comments
Tressa Coco, Riverside County resident	1	1
Natural Resources Defense Counsel	2	6
City of Murrieta	3	2
Riverside County Flood Control & Water Conservation District	4	244
City of Temecula	5	17
United States Army Corps of Engineers	6	1
United States Environmental Protection Agency	7	10
City of Wildomar	8	7
City of San Diego	9	43
San Diego Bay Council	10	15
United States Marine Corps Base Camp Pendleton	11	2
Construction Industry Coalition on Water Quality	12	2
County of Riverside Transportation Department	13	4

Table 2. Comment Subjects

Comment Subject	Number of Comments
Action Levels	27
Commercial / Industrial	9
Construction	8
Discharge Prohibitions	5
Economic	24
Finding	15
General	32
Hydromodification	14
IDDE	9
Legal	50
Low Impact Development	19
Monitoring	49
Municipal	13
New Development	16
Overirrigation	17
Reporting	3
Retrofit	12
Total Maximum Daily Load	1
Unpaved Roads	29
Watershed Workplan	3

Draft Response to Comments on R9-2010-0016
As of September 29, 2010

Comment # 1 **Commentor** 1 **Comment Subject** Unpaved Roads

Specific Comment

I have now found that the new requirements for Copermittees include a draft for "Unpaved Roads Construction and Maintenance" that spells out "sediment control measures during construction and maintenance activities on unpaved roads, including developing and implementing appropriate training and technical assistance resources". This has given me new hope that these hills have a chance of being returned to the once beautiful land that I loved so many years ago. Is it possible that this new order can require help from the County to solve the erosion problems in Rancho Glenoaks, as well as others in the same situation as I? I truly hope it can happen. The County and environmental agencies need to take responsibility.

Comment Response

Through several investigations and complaints during the previous permit period, unpaved roads were identified as significant sources of water quality pollutants, namely sediment, within Riverside County. The proposed Tentative Order can help solve erosion problems from unpaved roads throughout the watershed. The Tentative Order's provisions address the unpaved roads as a source of pollution during design, construction and ongoing maintenance phases. Rancho Glenoaks, however, is a private road, and as a result of comments received from the Copermittees, the Tentative Order has been revised to remove requirements for private roads. Please see the errata sheet for exact language changes.

Comment # 2 **Commentor** 2 **Comment Subject** LID

Specific Comment

First, this section erroneously states that where infiltration BMPs alone are technically infeasible, other LID BMPs may be employed to treat the volume of runoff not retained onsite. This language improperly excludes any requirement that a site first use all LID practices that retain water onsite—including those other than infiltration such as evapotranspiration or capture and onsite reuse—to meet the design capture requirement where feasible, even where infiltration may not be. A Priority Development Project should not be permitted to participate in the Permit's offsite mitigation program or to employ other means of addressing the design capture volume where LID based options for the onsite retention of stormwater are available. The Permit's language in section F.1.d.(4)(c) must therefore reflect that a finding of infeasibility may only be made where use of any and all LID practices that retain water onsite, including evapotranspiration and capture, is infeasible.

Comment Response

The San Diego Water Board agrees with the comment and has made the suggested changes in the errata to the Tentative Order. With the changes, the Tentative Order is consistent with the adopted South Orange County MS4 permit and the Ventura County MS4 permit.

Comment # 3 **Commentor** 2 **Comment Subject** LID

Specific Comment

Second, this section would allow for measures that do not retain water onsite, described by the Permit as "other LID BMPs," to count toward the design capture requirement. Practices that allow for the discharge of any volume of stormwater to receiving waters would have to be 100% effective at removing pollutants—a condition almost certain not to be attained—in order to provide the equivalent water quality benefit derived from retaining the same volume of stormwater onsite. The Permit should be revised such that it clearly states that only water retained onsite may count towards the design capture requirement and that a site using BMPs that allow for offsite discharge must participate in the LID Waiver Program to address the volume not retained onsite.

Comment Response

Please see the response to comment 12. Other LID BMPs that allow for the discharge of any volume of the design storm event must achieve equivalent volume and pollutant load reduction.

Comment # 4 **Commentor** 2 **Comment Subject** LID

Specific Comment

Of particular concern in this regard is that the Permit does not define the term "LID BMPs." As a result, the Permit would allow virtually any practice, potentially including conventional stormwater management techniques, which have been demonstrated to be far less effective at removing pollutants than LID-based retention practices, to count toward meeting the Permit's design capture requirement. While we argue here that practices that do not retain stormwater onsite, such as biofiltration, should not count towards the onsite retention standard at all, should the Board determine to allow the use of such practices, it should clearly define the term "LID BMPs," or more appropriately, delete the phrase and explicitly state which practices may be used. The Board should additionally ensure that conventional or structural treatment practices that are not LID based may not count toward the Permit's LID requirements.

Comment Response

Comment noted. A definition of LID BMPs has been provided in the errata for Attachment C.

Comment # 5 **Commentor** 2 **Comment Subject** LID

Specific Comment

Further troubling is that, in allowing "LID BMPs" to count toward the design capture requirement, the Permit includes no performance requirements or metrics, and requires only that "other LID BMPs [shall be] sized to hold the design storm volume that is not infiltrated," or that "LID BMPs must be designed for an appropriate surface loading rate to prevent erosion, scour and channeling within the BMP." Permit at ¶ F.1.d.(4)(c)(ii). The Permit should be revised to require that, in addition to the above standard, any practices that allow for the discharge of stormwater in-lieu of onsite retention must, at a minimum, reduce the pollutant load in such discharge to equivalent levels as would be achieved through use of onsite retention. The Board should further ensure that discharges resulting from other BMPs not contribute to erosion or other volume based impacts to receiving waters, as opposed to impacts only within the BMP. Given that practices that do not incorporate onsite retention have been shown to be less effective at reducing pollution in stormwater runoff, we suggest that biofiltration or other practices allowing for discharge of runoff may be allowed, if at all, only if accompanied by a "multiplier" or "mitigation factor," requiring treatment of between 1.5 to 2.0 times the volume required to be treated through onsite retention.

Comment Response

Please see the response to comment 12. The Tentative Order does not include a multiplier or mitigation for LID BMPs that do not incorporate onsite retention due to the requirement that such practices must achieve equivalent pollutant load reduction as retention BMPs.

Comment # 6 **Commentor** 2 **Comment Subject** LID

Specific Comment

The Permit requires that the "LID waiver program must clearly exhibit that it will not allow Priority Development Projects to result in a net impact (after consideration of any mitigation) from pollutant loadings over and above the impact caused by projects meeting LID requirements." Permit at ¶ F.1.d.(7)(a). While we support the use of a performance requirement for waiver projects in general, we note that as currently drafted, the Permit allows for its "LID Requirements" to be met through use of unspecified "LID BMPs" with no express performance requirement or standard. We suggest, in order to ensure that any alternative or in-lieu program adequately protects surface waters in Riverside County, that the Permit language be changed to state that Priority Development Projects shall not result in a net impact "from pollutant loadings over and above the impact caused by projects meeting the onsite LID retention requirements." This requirement would tie use of alternative or in-lieu programs specifically to achieving equivalent benefits to onsite retention, and remove any confusion over what standard of performance is required under this provision of the Permit.

Comment Response

Comment noted, meeting the onsite LID retention requirement is the San Diego Water Board's intent. Clarifying language has been included in the errata. Please also see the responses to comments 76 and 78.

Comment # 7 **Commentor** 2 **Comment Subject** LID

Specific Comment

Further, the Permit's inclusion of a provision allowing for a LID waiver program to authorize implementation of either "an off-site mitigation project," or "other mitigation developed by the Copermittees" should be clarified to require that any such project or mitigation measure must incorporate practices that result in the onsite retention of stormwater runoff equivalent to the volume not retained onsite by the Priority Development Project.

Such a move could help to ensure compliance with the Clean Water Act, would protect Riverside County's aquatic resources, and would further serve important policy goals of the State. Given our current state of drought, Governor Schwarzenegger has issued a proclamation calling on water agencies to take additional actions to protect and enhance water supplies. By requiring offsite mitigation through practices that retain stormwater runoff, captured or infiltrated water could be used to increase water supplies through onsite use or recharging groundwater, in furtherance of this goal. In contrast, the draft Permit would currently allow most or all of that water to be discharged through use of biofiltration or "other LID BMPs," without any volume retained to increase water supplies.

Comment Response

The San Diego Water Board disagrees with the proposed change. Limiting the LID waiver program to projects that provide equivalent retention of runoff only would limit the potential for other equally environmentally beneficial mitigation projects such as creek restoration or stream daylighting.

Comment # 8	**Commentor** 3	**Comment Subject** Economic

Specific Comment

RWQCB staff has expressed their opinion that the Cities are able to create new fees or tax assessments to pay for the requirements they have placed in the proposed MS4 permit. We strongly disagree with this assertion. Fees can only be collected from new development if there is a nexus to offset impacts created by development. There is simply no mechanism to impose a new fee or assessment on existing development to fund the storm water program. Furthermore, due to Proposition 218, any tax or fee increase must be approved by the voters.

Comment Response

The San Diego Water Board is aware of the challenges with developing new fees and/or tax assessments to fund storm water programs. These challenges are not limited to the City of Murrieta or the other Riverside County Copermittees. The Copermittees appear to be relying primarily on sales and property tax revenues and developer fees to fund their storm water programs. These sources of funding, unfortunately, can fluctuate significantly from year to year.

If the Copermittees choose to fund their storm water programs solely through revenues generated by sales and property taxes and developer fees, then they must be able to plan and prepare for times when those revenues decrease by setting aside funds when there are significant increases in revenue, such as during the intense and significant growth period experienced by the area between 2003 and 2008. Unfortunately, the Copermittees did not do the planning and preparation for this eventuality.

The Copermittees appear to dismiss the possibility of developing fees to fund their storm water program before attempting to do so, and the City only cites a case of failure rather than looking for and trying to emulate cases of success. While “imposing” new fees by edict may not be possible, developing and informing the residents that new fees for water quality protection are necessary is possible and probable. Several municipalities throughout California have been successful in developing new fees that are dedicated for funding their storm water programs, which are associated with sources that can cause and/or convey pollutants to and from the MS4. For example, the City of Poway assesses a storm water fee as part of their trash collection service, because trash generation can be a good indication of potential for storm water pollution. The City of Brea was successful in developing an “urban run-off” fee rate that is based on the type of development and associated with maintaining their storm sewer system. The City of San Diego includes a storm drain fee as part of their water and sanitary sewer services to pay for the cleaning, repair, and maintenance of the City's storm drain system. These types of fees are typically more sustainable than relying on general funds from sales and property tax revenue, which can fluctuate significantly from year to year. The San Diego Water Board encourages the Copermittees to explore other sources of revenue to fund their storm water programs instead of relying on property and sales taxes and developer fees.

In addition, several guidances are available for municipalities to assist in developing sustainable funding sources for their storm water programs such as USEPA's "Funding Stormwater Programs" (EPA 833-F-07-012), the National Association of Flood and Stormwater Management Agencies "Guidance for Municipal Stormwater Funding," Natural Resources Defense Council "Stormwater Strategies: Community Responses to Runoff Pollution, Chapter 4: Funding and Gaining Support for Stormwater Programs," and USEPA Watershed Academy "Catalog of Federal Funding Sources for Watershed Protection." These guidances describe storm water funding alternatives to property taxes, sales tax and general fund revenues such as service fees, stormwater utilities, special assessment districts, system development charges, grants, low-interest loans, and environmental tax shifting.

Comment # 9 **Commentor** 3 **Comment Subject** Economic

Specific Comment

Due to the historic decrease in property tax and sales tax revenues, the primary funding mechanism for the City to implement programs, it is unlikely we would be able to comply with the proposed MS4 permit. In order to do so, the City would have to make budget cuts to other programs. Considering we have already considerably cut our budget two years in a row, implemented layoffs and furloughs, and put other cost savings measures into practice, a further decrease to critical city services to fund the additional requirements is impractical. Of greatest concern to the City is that the proposed MS4 permit does not take the current economic climate into consideration, and yet has more costly and stringent requirements than other permits throughout the region that are more suitable to fund such programs. In our opinion, this seems inequitable and unfair.

The City of Murrieta joins the vast majority of Californians in supporting a balanced, cost-effective strategy to guarantee clean water. However, we remain concerned that the MS4 permit will impose additional costs on the City that we cannot afford at this time. Additionally, it seems the new regulations are inequitable compared to other regions. Therefore, the City is opposed to the proposed permit in its current form. Increasing the cost to the public on a region that is one of the hardest hit during this economic crisis seems excessive. Instead, the City would be more supportive of efforts that would phase in requirements once revenue levels can support the additional costs. Moreover, we request that the Board direct their staff to prioritize what permit requirements are necessary to address the most critical issues that will give the most efficient use of available funds. This will allow the City to allocate the funds they have for these programs while not increasing current expenditures.

Comment Response

The San Diego Water Board considers protection of water quality to be a "critical city service," especially when this water provides a potable drinking water source to USMC Camp Pendleton. The San Diego Water Board has taken the current economic climate into consideration along with the economic information provided by the Copermittees. We disagree that Tentative Order is more costly and stringent than other permits in the region.

As discussed in the response to comment 8, if the Copermittees choose to fund their storm water programs solely through revenues generated by sales and property taxes and developer fees, then they must be able to plan and prepare for times when those revenues decrease by setting aside funds when there are significant increases in revenue.

Between 2000 and 2008, the population of the portion of Riverside County in the San Diego Region grew from approximately 150,000 to over 250,000, at least a 65 percent increase. During that time, there was a significant growth in sales and property tax revenue and developer fees generated. That time period also was an opportune time for the Copermittees to develop, propose, and implement new and sustainable fees to fund their storm water programs, which municipalities in other parts of the region were successfully able to achieve.

The Copermittees have been well aware of the new and enhanced MS4 Permit requirements that were adopted for San Diego County in 2007, which were being developed in 2006, and similar requirements that were adopted for Orange County in 2009, which were being developed between 2007 and 2009. The Riverside County Copermittees had approximately 4 years to plan and prepare for the requirements that are now in the Tentative Order. Unfortunately, rather than planning and preparing for the new requirements that were likely to be included in the new Riverside County MS4 Permit, the Copermittees chose to continue doing the minimum that was required in their current permit, and less than what was required in some situations. The Copermittees also chose to continue funding their storm water programs primarily through sales and property tax revenues and developer fees, rather than trying to develop dedicated and more sustainable storm water fees.

The San Diego Water Board, however, has been sensitive to the current economic hardships that are being experienced by the Riverside County Copermittees. Between March and July 2010, we met with the Copermittees over a dozen times and modified the permit requirements and schedules for implementation to phase in the requirements with these economic concerns in mind. Many of the modifications were made because the Copermittees requested the changes. Many of the modifications to the implementation schedule that were agreed upon during those meetings between the Copermittees and the San Diego Water Board were also based on prioritizing the permit requirements to address the most critical issues. The Tentative Order provides the Riverside County Copermittees more time than the San Diego County and Orange County Copermittees to develop and implement several elements of the permit, as well as reducing the potential development costs for those elements.

Comment # 10 **Commentor** 6 **Comment Subject** General

Specific Comment

Thank you for the opportunity to comment on the San Diego Region - Riverside County Storm Water Permit. As you are aware, the U.S. Army Corps of Engineers has been developing a Special Area Management Plan (SAMP) for the San Jacinto and Santa Margarita Watersheds. There is direct overlap between the Santa Margarita portion of the SAMP and the San Diego Region - Riverside County Storm Water Permit.

The language proposed in the permit and the actions and studies proposed would complement the work being done for the SAMP. Ideally, the regulatory processing and permitting for the State and Federal agencies would be aligned and streamlined for the cities and County within this area. We remain committed to working with the Regional Water Quality Control Board (Board) and the jurisdictions to bring this idea to fruition.

Within the permit itself, the Watershed Water Quality work plan and the Jurisdictional Runoff Management Program are of particular interest. Unfortunately due to time constraints, we are not able to do a thorough review and comparison of the language at this time, but would like to work with the Board and the affected jurisdictions to streamline permitting and improved the water quality in the watershed.

The studies mentioned in the permit appear to have great value, and we would encourage the jurisdictions to complete them and applaud the Board for including them in the permit. Although all the studies mentioned in the permit are worthwhile, we draw particular interest to and support the inclusion of the MS4 and Receiving Water Maintenance Study and the Intermittent and the Ephemeral Stream Perennial Conversion Study in the final permit.

There are many additional comments that could be made regarding the permit; however, due to staffing and time limitations, these comments are abbreviated and limited. We would like to dedicate time in the near future to work with your staff and the jurisdictions in supporting actions to comply with the Clean Water Act and provide clean water to all of our communities.

Comment Response

Comment noted.

Comment # 11 **Commentor** 7 **Comment Subject** LID

Specific Comment

As you know, Region 9 has been working with Regional Boards throughout the State over the last several years in an effort to develop clear, measurable and enforceable requirements for MS4 permits. We have focused most of our attention on requirements related to low impact development (LID) and TMDL implementation, given the potential environmental benefits to be derived from these particular components of the stormwater permit program. Since there are no approved wasteload allocations applicable to the Riverside County MS4 discharges at this time, the following comments focus on LID requirements, but also address several other issues as well. However, with regards to TMDLs, section I of the draft permit would incorporate applicable requirements of future TMDLs when fully approved, and we support this provision.

Comment Response

Comment noted.

Comment # 12 **Commentor** 7 **Comment Subject** LID

Specific Comment

We recommend section F.1.d.(4)(c)(ii) ofthe draft permit (page 33) be revised as follows:

"If onsite [infiltration] retention LID BMPs are technically infeasible per section F .1.d.(7)(b), other LID BMPs may treat any volume that is not retained onsite provided that the other LID BMPs are sized to achieve equivalent stormwater volume and pollutant load reduction as if the entire design capture volume were retained onsite [to hold the design storm volume that is not infiltrated]."

The proposed language in the draft Riverside County MS4 permit (which only mentions infiltration as an LID BMP) is inconsistent with the analogous section in the adopted South Orange County MS4 permit, and would not require a consideration of LID measures such as evapotranspiration, or capture and reuse of stormwater in determining the feasibility of the permit's onsite retention requirement in section F.l.d.(7)(a). The revised approach we've suggested here is derived from the requirements of the Ventura County MS4 permit (section E.III.l.b) adopted by the Los Angeles Regional Board in July 2010, and we believe it is more consistent with the intent of LID for stormwater, i.e., retention of storm water onsite, and section F.l.d.(7)(a) of the draft permit.

Comment Response

The San Diego Water Board agrees with the comment and has made the suggested changes in the errata to the Tentative Order. With the changes, the Tentative Order is consistent with the adopted South Orange County MS4 permit and the Ventura County MS4 permit. The consistent requirements will be easier for the regulated building industry to comply with and understand.

Comment # 13 **Commentor** 7 **Comment Subject** LID

Specific Comment

Further, although the draft permit includes a rough definition of "LID" in Attachment C-2, the permit is still not entirely clear concerning what is intended by the term "LID BMPs." We suggest additional descriptive information such as the following (also derived from the Ventura County MS4 permit) be added to Finding 2.c (page 9) or the definitions section of the draft Riverside County permit:

"LID site design BMPs, utilizing infiltration, storage for reuse, evapotranspiration, or biofiltration/bioretention help preserve and restore the natural hydrologic cycle of the site, [allovving for filtration and infiltration] which can greatly reduce the volume, peak flow rate, velocity, and pollutant loads of storm water runoff."

Comment Response

The San Diego Water Board agrees with the comment and has made changes in the errata to Attachment C of Tentative Order. A definition of LID BMPs has been added to the errata for Attachment C of the Tentative Order. LID BMPs may be retention or flow through. The Tentative Order allows for both types, but emphasizes retention.

Comment # 14 **Commentor** 7 **Comment Subject** Action Levels

Specific Comment

We understand that concerns have been raised regarding the proposed numeric action levels for non-stormwater dry weather discharges (section C of the draft Riverside County MS4 permit). However, we would point out that these requirements are consistent with requirements adopted by the SDRB in December 2009 for the MS4 permit for South Orange County. Such requirements are also consistent with our efforts
to ensure MS4 permit requirements are more measurable and enforceable, and we would encourage the SDRB to retain the proposed requirements in the final Riverside County MS4 permit.

Comment Response

Comment noted.

Comment # 15 **Commentor** 7 **Comment Subject** Overirrigation

Specific Comment

We also understand that concerns have been raised regarding the deletion of landscape irrigation, irrigation water, and lawn watering from the list of non-stormwater discharges which are not necessarily prohibited by the permit (section B.2). We previously supported this same revision in a letter to the SDRB dated June 18, 2009 commenting on the draft South Orange County MS4 permit; we support the revision in the Riverside County MS4 permit as well. In our previous letter, we noted that the fact sheet for the Orange County MS4 permit had identified these categories of discharges as significant sources of pollutants, and as such, it would be appropriate for the SDRB to remove these discharges from the list of non-prohibited non-stormwater discharges in the Orange County MS4 permit. The fact sheet for the draft Riverside County MS4 permit includes similar information on the discharges, and we believe removal of the discharges from the list of non-prohibited discharges would be appropriate in both counties.

Comment Response

Comment noted.

Comment # 16 **Commentor** 7 **Comment Subject** Action Levels

Specific Comment

In a previous letter to the SDRB dated September 28,2009, we supported the SALs proposed for the South Orange County MS4 permit; we noted the proposed requirements would help clarify the term "maximum extent practicable" (MEP), and would be consistent with our goal of including more measurable and enforceable requirements in MS4 permits. The proposed SAL requirements in the Riverside County MS4 permit are consistent with requirements for South Orange County, and for the same reasons noted in the case of South Orange County, we would also support the proposed requirements for the Riverside County MS4 permit.

Comment Response

Comment noted.

Comment # 17 **Commentor** 7 **Comment Subject** Retrofit

Specific Comment

As you know, EPA is considering requirements for retrofitting BMPs into existing developments as one of the key components of national stormwater rulemaking currently underway to improve the stormwater program (74 FR 68621, December 28,2009). We note that the proposed retrofitting requirements for Riverside County are very similar to the requirements of the MS4 permit adopted by the SDRB in December 2009 for South Orange County. Given the potential environmental benefits of retrofitting in reducing pollutant discharges in stormwater runoff, we strongly encourage the SDRB to retain the proposed requirements in the final Riverside County MS4 permit.

Comment Response

Comment noted.

Comment # 18 **Commentor** 7 **Comment Subject** Hydromod

Specific Comment

We have reviewed the proposed requirements related to hydromodification in the draft Riverside County MS4 permit (section F.1.h), and we would encourage the SDRB to retain these requirements in the final permit. The proposed requirements in the Riverside County permit are similar to requirements in other recently-adopted Southern California MS4 permits, and the requirements will further the objectives of the LID provisions in the permit.

Comment Response

Comment noted.

Comment # 19	**Commentor** 7	**Comment Subject** Unpaved Roads

Specific Comment

We understand that concerns have been raised regarding the new requirements in the draft Riverside County MS4 permit to implement additional controls for stormwater discharges from unpaved roads (sections F.Li, F.3.a.l and F.3.c.5 of the permit). We believe the new requirements are fully supported by the fact sheet and the Findings for the permit (Finding D.1.c), which identify the discharges as a significant source of pollutants. As such, we urge the SDRD to retain the proposed requirements in the final permit. Lastly, we would note the proposed requirements are similar to requirements in the Municipal Regional Permit for MS4s in the San Francisco Bay Area adopted in 2009 by the San Franc.isco Bay Regional Board.

Comment Response

Comment noted. The Copermittees have brought up concerns addressing the regulation of privately owned and maintained unpaved roads; therefore those regulations have been removed. Please see the errata sheet for exact language changes.

Comment # 20	**Commentor** 7	**Comment Subject** Monitoring

Specific Comment

We understand that concerns have been raised about the monitoring requirements of the draft Riverside County MS4 permit (Attachment E to the permit). However, the proposed requirements are consistent with the requirements of other recent MS4 permits adopted by the SDRB such as the 2009 South Orange County MS4 permit. We strongly encourage the SDRB to retain the requirements in the final permit. Measuring the effectiveness of the stormwater program continues to be a challenge and thus, is an important priority for EPA; we believe the proposed monitoring details and requirements will improve permittee and Regional Board's ability to measure program effectiveness.

Comment Response

Comment noted.

Comment # 21	**Commentor** 9	**Comment Subject** Finding

Specific Comment

Make findings consistent with JRMP.

Provide separate sections for Construction vs. Existing Development.

Comment Response

The recommendation is appreciated, but not necessary. No changes were made based on this comment.

Comment # 22 **Commentor** 9 **Comment Subject** Finding

Specific Comment

Definition of "urban stream" contradicts 40CFR 122.

Provide clearer definition as to what an "urban stream" is.

Comment Response

The San Diego Water Board disagrees that the definition of "urban stream" contradicts 40CFR 122. An MS4 is defined in the federal regulations as a conveyance or system of conveyances owned or operated by a Copermittee, and designed or used for collecting or conveying runoff. Therefore, the San Diego Water Board considers natural drainages that are used by the Copermittees as conveyances of runoff, as both part of the MS4 and as receiving waters. Please see the Fact Sheet discussion on Finding D.3.c.

The State Water Board supports this approach. In reviewing a Petition on Order No. R9-2001-0001, the State Water Board stated "We also agree with the Regional Water Board's concern, as stated in its response, that there may be instances where MS4s use 'waters of the United States as part of their sewer system […]" State Water Resources Control Board Order WQ 2001-15.

The Rapanos decision further supports the conclusion that urban streams can be both receiving waters and MS4s by confirming that ephemeral and intermittent streams can be waters of the U.S. subject to regulation under CWA Section 404 and also be considered point sources of pollution discharges regulated under CWA Section 402. (See discussion in Section V of the Opinion of Justice Scalia and Section A (p.14) of the Concurring Opinion of Justice Kennedy.) No changes were made based on this comment.

Comment # 23 **Commentor** 9 **Comment Subject** Discharge Prohibitions

Specific Comment

Discharge category found to be a source of pollutants requires implementation of appropriate control measures to prevent the discharge of pollutants to the MS4.

Should state: Implement appropriate control measures to reduce the discharge of pollutants to the MEP.

Comment Response

The commenter cited the text incorrectly. Section B.2 states, "For a discharge category determined to be a source of pollutants, the Copermittee, under direction of the San Diego Water Board, must either prohibit the discharge category or develop and implement appropriate control measures for non-anthropogenic sources to prevent the discharge of pollutants to the MS4 ..."

MEP does not apply to non-storm water discharges. The Clean Water Act specifically makes a clear distinction between the regulation of storm water and non-storm water discharges by effectively prohibiting non-storm water discharges from entering the MS4. Since non-storm water discharges are to be effectively prohibited, then clearly the very next requirement (402(p)(3)(B)(iii) that requires polluant discharges from the MS4 be reduced to the MEP) intends that the discharge of pollutants only apply to storm water. Please see the Fact Sheet discussion for Finding C.14 for further clarification. No changes were made based on this comment.

Comment # 24 **Commentor** 9 **Comment Subject** Discharge Prohibitions

Specific Comment

Discharges into MS4 require authorization from owner and operator of the MS4 system, specifically for uncontaminated pumped ground water, foundation drains, and water from crawl space pumps

Support change, and recommend that dischargers are required to obtain authorization prior to the commencement of the discharge.

Comment Response

The San Diego Water Board appreciates the support of the commenter. The commenter incorrectly cites the footnote as Footnote 8. The correct footnote, Footnote 5, clearly states "Discharges into the MS4 require authorization from the owner and operator of the MS4 system." Please note this is a requirement for enrollees under the referenced NPDES permit (R9-2008-0002)

Comment # 25 **Commentor** 9 **Comment Subject** Discharge Prohibitions

Specific Comment

States that building fire suppression system maintenance discharges contain waste and must be prohibited.

Not clear what waste the discharges contain and the basis for prohibiting it.

Comment Response

The San Diego Water Board is concerned with non-storm water discharges associated with building fire suppression system maintenance and testing. The San Diego Water Board has found that such activities do not qualify as fire fighting flows as the activities are strictly maintenance in purpose. While building fire suppression systems lines may be filled with potable water, the systems are not utilized until: a) a fire occurs and triggers the system, or b) the system undergoes required maintenance. The San Diego Water Board has found that water within the lines may contain metals that that may be a significant source of pollutants upon discharge. Furthermore, many of these discharges occur to MS4s, which discharge to receiving waters 303(d) listed for toxicity under the 2008 CWA Section 303(d) List. As such, these non-storm water discharges are no longer exempted from prohibition. The exemption from prohibition for water line flushing does not apply to building fire suppression system maintenance.

Comment # 26 **Commentor** 9 **Comment Subject** Discharge Prohibitions

Specific Comment

Must identify and control any non-prohibited discharge that creates water quality problems.

Should define what is meant by control the discharge.

Comment Response

The commenter cited the text incorrectly. Section B.4 states, "Follow-up investigations must be conducted to identify and control, pursuant to section B.2, any non-prohibited discharge category(ies) listed above." Please see the response to comment 23 or section B.2 of the Tentative Order for what is meant by "control." No changes were made based on this comment.

Comment # 27	**Commentor** 9	**Comment Subject** Action Levels

Specific Comment

This requires the Copermittee to determine whether a discharge type should be exempt.

This is the responsibility of the Regional Board.

Comment Response

This is the responsibility of both the San Diego Water Board and/or the discharger. Either the San Diego Water Board or the discharger may identify categories that should not be exempt.

The Code of Federal Regulations states at 40 CFR 122.26 (d)(2)(iv)(B)(1) explicitly states:

"… this program description shall address all types of illicit discharges, however the following category of non-storm water discharges or flows shall be addressed where such discharges are identified by the municipality as source of pollutants to water of the United States…"

Furthermore, in addition to the regulations under 40 CFR 122.26(d), the Federal Register (55 Fed Reg 48037) clearly states that "the Director [i.e. San Diego Water Board] may include permit conditions that either require municipalities to prohibit or otherwise control any of these types of discharges where appropriate."

Comment # 28	**Commentor** 9	**Comment Subject** Action Levels

Specific Comment

Copermittees must develop monitoring plans to sample a representative percentage of major outfalls and identified stations within each hydrologic subarea.

Make consistent with 40CFR.

Comment Response

The San Diego Water Board finds it difficult to respond to the comment without a more specific reference to 40 CFR. In all actions, the San Diego Water Board seeks to be consistent with State and Federal regulations.

The NPDES regulations do not specify the exact location to be used for monitoring, and the Copermittee is ultimately responsible for providing a safe and accessible sampling point that is representative of the discharge (40 CFR 122.41(j)). The San Diego Water Board has prescribed the monitoring requirements in an effort to be consistent with the current monitoring done by the Copermitttees under the existing Order.

Comment # 29 **Commentor** 9 **Comment Subject** Action Levels

Specific Comment

The NELs as defined are receiving water standards. This would apply receiving water standards to the water within the MS4. Some of the NELs are not appropriately applied. (Fecal Coliform 400 for AMEL, this is a single sample standard not an average standard).

There needs to be a way to account for receiving water quality.

Comment Response

The Tentative Order does not have numeric effluent limitations, but does include numeric action levels. The establishment of the dry weather non-storm water action levels considers the discharge under critical conditions, including flow. As such, no mixing zone is allowed for discharges under the Tentative Order. For further information please see the Tentative Order Fact Sheet.

Water "within" the MS4, where also not considered receiving waters, are not required to meet receiving water standards (see Comment Response No. 22). Under the Tentative Order, the "discharge" of non-storm water from the MS4 must be effectively prohibited.

In regards to the referenced fecal coliform standard, the clarification was made in the Orange County MS4 Permit, Order No. R9-2009-0002. The standard has been included in the AMAL because it is based on a 30-day period.

Comment # 30 **Commentor** 9 **Comment Subject** Action Levels

Specific Comment

Non-storm water discharges from MS4 to inland surface waters

What about when an MS4 flow discharges to dry sediment and not to actual water?

Comment Response

The described situation would be considered critical conditions for flow. The consideration of critical flow conditions is required under 40 CFR 122.44(d). A discussion regarding flow is also found in the Fact Sheet:

"The San Diego Region has predominately intermittent and ephemeral rivers and streams (Inland Surface Waters) which vary in flow volume and duration at spatial and temporal scales. Therefore, it is assumed that any non-storm water discharge from the MS4 into the receiving water is likely to be of a quantity and duration that does not allow for dilution or mixing. For ephemeral systems, non-storm water discharges from the MS4 are likely to be the only surface flows present within the receiving water during the dry season."

Comment # 31 **Commentor** 9 **Comment Subject** Action Levels

Specific Comment

Need to define WARM & COLD water for DO effluent limitations.

Should use> < with specific temperatures.

Comment Response

Table 3.a.1 does define WARM and COLD waters for DO effluent limitations.

While the suggested use of >< for DO in the table is appreciated, this change has not been made as the language used in the table is directly from the Basin Plan for the San Diego Region.

Comment # 32	**Commentor** 9	**Comment Subject** Action Levels

Specific Comment

Fecal coliform AMELs are inappropriate for multiple reasons.

Imposes AB411 standards for Rec 1 waters on non-storm water, non-recreational flows. If it must be applied then B should move to Instantaneous Maximum column.

Comment Response

The Tentative Order includes non-storm water action levels that are protective of receiving waters, including those downstream of the discharge. The non-storm water action levels are based on the REC-1 water quality objectives in the Basin Plan, not AB411 standards. Please note that all the receiving waters in the Upper Santa Margarita Watershed are designated as having an existing or potential REC-1 beneficial use.

Comment # 33	**Commentor** 9	**Comment Subject** Action Levels

Specific Comment

Enterococcus inappropriately set to Ocean Plan Designated beach area standards.

This is non-storm water, non-recreational flow. Why is it being held to beach standards when 5+ years of paired sampling data do not indicate strong links between even higher levels of bacteria than being allowed, and detected AB411 exceedances.

Comment Response

Please see the response to comment 32.

Comment # 34	**Commentor** 9	**Comment Subject** Action Levels

Specific Comment

MDEL limits.

Where are MDELs defined in 40CFR?

Comment Response

The Tentative Order does not have numeric effluent limitations, but does include numeric action levels. Although the Tentative Order does not have effluent limitations, please see 40 CFR 122.2 and 122.45. A definition for MDAL, consistent with 40 CFR 122.2 and existing State and Regional Water Board NPDES permits and resolutions is provided in Attachment C for further clarification.

Comment # 35	**Commentor** 9	**Comment Subject** Action Levels

Specific Comment

Table 4.a.1 does not list an instantaneous maximum for Fecal Coliform.

Should list a maximum if less than 5 samples collected in 30-day period.

Comment Response

Please see the response to comment 29.

Comment # 36 **Commentor** 9 **Comment Subject** Action Levels

Specific Comment

Table 4.a.1 subject storm drain flows to the very stringent AB-411Rec-1 Criteria standards.

The maximums should be adjusted to attainable limits.

Comment Response

Please see the response to comment 32.

Comment # 37 **Commentor** 9 **Comment Subject** Action Levels

Specific Comment

Turbidity

What is the justification for turbidity limitations in Region 9 being so much lower than other regions in the state?

Comment Response

The water quality objectives for turbidity are provided in the Basin Plan for the San Diego Region. The water quality objectives in the Basin Plan have been established to protect the beneficial uses of waters within the San Diego Region. The water quality objectives in the San Diego Basin Plan were appropriately used in the development of water quality-based action levels for non-storm water discharges. Please note that issues pertaining to any proposed modifications of the water quality objectives in the Basin Plan are to be addressed under the Triennial Review process. More information may be found at: http://www.waterboards.ca.gov/sandiego/water_issues/programs/basin_plan/tri_review.shtml

Comment # 38 **Commentor** 9 **Comment Subject** Action Levels

Specific Comment

.. freshwater criteria are based on site-specific water quality data (receiving water hardness).

Should be changed to effluent water hardness.

Comment Response

Site-specific water quality data (receiving water hardness) is required under State Water Board Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California. No changes were made based on this comment.

Comment # 39 **Commentor** 9 **Comment Subject** Action Levels

Specific Comment

pH

6.5-8.5 for freshwater 6-9 for saline waters - based on?

Comment Response

As cited in Table 3.a.1, pH is based upon water quality objectives found within the Basin Plan for the San Diego Region.

Comment # 40 **Commentor** 9 **Comment Subject** Action Levels

Specific Comment

This requires "implementation of all necessary storm water controls and measures to reduce ... " when there is no evidence of a receiving water exceedance. The assessment point is "end-of-pipe" and SALs do not have any justification for applicability.

This seems to require an action when there is no evidence of a receiving water violation.

Comment Response

SALs are applicable as a tool to be used by the Copermittee(s) to determine the level of effectiveness of BMPs utilized within the drainage area discharging at the SAL outfall. This is part of the iterative process to reduce the discharge of pollutants in storm water from the MS4 to the MEP.

Comment # 41 **Commentor** 9 **Comment Subject** Action Levels

Specific Comment

Metals SALs are in direct contradiction with statement on "table 3.a.2: Priority Pollutants" page 22

Contradiction between NEL section and SAL in terms of metals values.

Comment Response

Storm Water Action Levels (SALs) are for discharges of storm water from the MS4. Section C is for non-storm water discharges. The SALs were computed utilizing USEPA nationwide MS4 discharge data (Arid West Region), and SALs for metals have been set as the 90th percentile for this dataset. Additionally, the SALs for metals incorporate synoptic water hardness measurements. Please see Attachment E Section II.B.1.b.

Comment # 42 **Commentor** 9 **Comment Subject** Action Levels

Specific Comment

" .. . assessment points for determination of SAL compliance are all major outfalls .. .. " Seems to contradict the following sentence
" ... monitoring plans to sample a representative percent of the outfalls .... "

Sentences seem to contradict each other.

Comment Response

Section D of the Order has been clarified in response to the comment. The word "all" has been removed, as the Copermittees are to sample a representative percent of major outfalls within each hydrologic subarea, not all major outfalls.

Comment # 43 **Commentor** 9 **Comment Subject** Action Levels

Specific Comment

" ... to have outfall storm water discharges meet all applicable water quality standards."

This applies receiving water standards to the storm drain.

Comment Response

The comment references the cited text out of context. The full text of the provision clarifies "that through the iterative and MEP process, outfall storm water discharges will meet all applicable water quality standards." This is consistent with section A.3 and State Water Board Order WQ 99-05.

Comment # 44 **Commentor** 9 **Comment Subject** LID

Specific Comment

It is not clear what is intended to be included in this category. A steep hillside development with known erosion soil conditions would need to address erosion. Treatment control and hydromodification requirements are not justified.

Remove this from the Priority Development Project Categories, and define elsewhere in Section F.1 how these projects would need to include measures that protect slopes from erosion.

Comment Response

This requirement is identical to that in the current Riverside County MS4 Permit (Order No. R9-2004-001), the San Diego MS4 Permit (Order No. R9-2007-0001), and the Santa Ana Water Board Riverside County MS4 Permit (Order No. R8-2010-0033). These provisions are based on the Los Angeles Water Board's SUSMP upheld by the precedential State Water Board Order WQ-2000-11. The State Water Board's order found that hillside residences can be a significant source of pollutants and/or runoff following development and it is appropriate that the design standards apply so that BMPs for these categories of development result in the infiltration or treatment of a significant amount of the runoff.

Treatment control and hydromodification requirements are even more necessary for hillside developments. Hillside developments that include impervious surfaces will have surface runoff discharging at much higher volumes and velocities than developments with flatter and more gradual slopes. The treatment control and hydromodification requirements will reduce the pollutants and increased erosive forces in runoff discharging from these developments. No changes were made in response to this comment.

Comment # 45 **Commentor** 9 **Comment Subject** LID

Specific Comment

Retention of the 85th percentile storm event does not mimic the natural hydrology. The amount of runoff under natural conditions is dependent on soil type and other factors.

Retention requirements should be revised with intent of matching hydrology under natural conditions.

Comment Response

Retention of the 85th percentile storm event provides for a high level of pollutant removal to protect water quality. This design storm does not necessarily result in zero discharge. The design storm is approximately 0.6 inches of rainfall for most of the developed area of the Riverside County portion of the San Diego Region. Larger storms will produce runoff to receiving waters. Also, retention of the design storm will begin to compensate for decades of previous, unchecked development creating impervious surfaces that have resulted in the increased runoff volumes and flow rates discharged to receiving waters. Retention of the storm value will also provide groundwater recharge that, where hydrologically connected, can create surface flows downstream.

Comment # 46 **Commentor** 9 **Comment Subject** LID

Specific Comment

It may be unrealistic for municipalities to implement the various processes required under this section within the amount of time allowed.

Provide a feasible time schedule for municipalities to put such a program in place.

Comment Response

The San Diego Water Board disagrees that it is unrealistic to implement a LID BMP waiver program within the amount of time allowed. No changes were made in resposne to this comment.

Comment # 47 **Commentor** 9 **Comment Subject** Construction

Specific Comment

It is neither wise nor necessary to mandate use of a particular technology for managing sediment from construction sites. The Construction General Permit has adequate and more appropriate measures for ensuring sediment discharges will not create a pollution problem.

Remove the requirement that Copermittees mandate use of AST. Allow Copermittees to rely on the Risk based approach that was developed for the Construction General Permit, which does not mandate a particular technology.

Comment Response

The San Diego Water Board disagrees with the recommended change. The Tentative Order does not mandate the use of a particular technology for managing sediment from construction sites. The Tentative Order defines Active/Passive Sediment Treatment (AST) variously as using mechanical or chemical means to flocculate and remove suspended sediment from runoff at construction sites prior to discharge. Examples of coagulants include chitosan, modified starches, alum, electro-coagulation, carbonic acid, ferric chloride, and polyacrylamides. Examples of sedimentation devices include settling basins, ponds, baker tanks, weir tanks, tube settlers, and centrifuges. Examples of polishing filter types include sand, engineered media, membrane and hydrocarbon. For certain construction sites, with specific soil types that are difficult to settle, AST is likely the only method to meet the 20 NTU water quality objective specified in the Basin Plan. The requirements provide sufficient flexibility to the Copermittees to mandate the specific method of compliance and to determine which sites are required to implement AST. No changes were made based on this comment.

Comment # 48 **Commentor** 9 **Comment Subject** Construction

Specific Comment

This section requires inspection of construction sites of 1 acre or more at least monthly.

Propose language that is definitive and require construction site inspections monthly for sites of 1 acre or more.

Comment Response

Section F.2.e.(3) requires the Copermittees to inspect at least monthly, all sites with one acre or more of soil disturbance. This language requires a minimum frequency. The Copermittees may choose to inspect these types of construction sites at a higher frequency, if warranted. No changes were made based on this comment.

Comment # 49 **Commentor** 9 **Comment Subject** Municipal

Specific Comment

Reduction of pesticides, herbicides, and fertilizers into the storm water to the MS4 and receiving waters.

Support inclusion of "storm water" and "and receiving waters" in the opening paragraph.

Comment Response

The San Diego Water Board appreciates the commenter's support for the inclusion of "storm water" and "receiving waters" in the opening paragraph to section F.3.a.(3). "Storm water" and "receiving waters" will remain included in the opening paragraph of section F.3.a.(3).

Comment # 50	**Commentor** 9	**Comment Subject** Municipal

Specific Comment

Inspecting and cleaning all MS4 facilities between May 1 and September 30 is infeasible for those Copermittees that have tens of thousands of structures.

Inspection and removal of accumulated waste at least once a year between May 1 and September 30 of each year for (all) MS4 facilities [that receive or collect high volumes of trash and debris.]

Comment Response

The Tentative Order provides in section F.3.a.(6)(iii) that, "Following two years of inspections, any MS4 facility that requires inspection and cleaning less than annually may be inspected as needed, but not less than every other year." This requirement provides the Copermittees the ability to prioritize their MS4 maintenance activities following a sufficient data collection period.

Comment # 51	**Commentor** 9	**Comment Subject** Municipal

Specific Comment

Sections (a) and (b) are redundant.

Delete Section (b) as the implementation of the provisions in Section (a) would maximize pollutant reductions by providing greater flexibility to Copermittees to manage their programs.

Comment Response

Section F.3.a.(7)(b) has been retained within the Tentative Order. Please note that as an illicit discharge into the MS4, sewage infiltration is to be eliminated, not reduced. Federal regulation (40 CFR 122.26(d)) require that Copermittees use controls, as necessary, to limit the infiltration of sewage into the MS4 system. As an illicit discharge, it is expected that these controls will prevent and eliminate infiltration and seepage from the sanitary sewer. The controls listed under section F.3.a.(7)(b) are BMP measures that currently should be a part of the Copermittees' IC/ID program to prevent and eliminate illicit discharges. It is unclear how removal of this section would provide greater flexibility, as Copermittees are already required to implement these BMPs. No changes were made based on this comment.

Comment # 52 **Commentor** 5 **Comment Subject** Economic

Specific Comment

While the City shares the Regional Board's goal of protecting the quality of water in our local creeks, it is not fiscally responsible to adopt a new Model Permit that does not accurately reflect the needs of the local watershed. The Regional Board must allow the City to prioritize and balance finite public resources in order to provide numerous vital public services. The City's responsibilities also include providing for public safety (police and fire services), installing and maintaining infrastructure (roads, drainage facilities, etc.), public facilities (parks, libraries, community centers, etc.), providing recreational programs, conserving land (MSHCP), promoting habitat conservation, etc. All of these needs are equally important, but public funding mechanisms do not allow anyone of them to be funded without consideration to competing needs, priorities, and expected outcomes. New requirements must carefully weigh the benefits achieved against their real costs to implement. From a public agency perspective, all expenditures must be justified and supported by the general public.

Comment Response

The San Diego Water Board is aware of the many and competing needs that the municipalities are responsible for. The mission of the San Diego Water Board, however, is to preserve, enhance, and restore the quality of the waters in the region. Our responsibility is to protect the beneficial uses of the waters of the state. The Tentative Order does reflect the water quality needs of the local watershed with requirements such as the regulation of unpaved roads and watershed specific action levels.

The Copermittees' programs have already been found to be deficient. USEPA audits conducted in January 2008 (USEPA Region IX MS4 Inspection Report Riverside County Flood Control and Water Conservation District and County of Riverside, dated 03/31/2008), and subsequent enforcement action by the San Diego Water Board (Notice of Violation No. R9-2008-0053 and No. R9-2010-0074) documented significant short-comings in the Copermittees' programs.

While we try to take other needs into consideration when developing the requirements included in the Tentative Order, the requirements must be able to fulfill our mission and responsibilities. The Copermittees must be able to meet the requirements of the Tentative Order for the protection of water quality. We understand that the provisions in the Tentative Order may require the Copermitttees to modify, reduce, or find additional efficiencies in their operations, but the Copermittees are still allowed to prioritize and balance their finite public resources. As the Copermittees' regulatory and administrative requirements and responsibilities expand and increase with their population and growth, which are not limited and related to only managing the MS4 system, the Copermittees will also need to identify ways to expand and increase their resources for those ever increasing and/or changing needs.

Please see the responses to comments 8 and 9 for a discussion about the Copermittees' revenue sources for funding their storm water programs.

Comment # 53 **Commentor** 9 **Comment Subject** IDDE

Specific Comment

Paragraph makes a reference to attachment E, which does not in fact contain a description of this particular program.

Include a description of the Dry Weather Field Screening and Analytical Monitoring Program in Attachment E.

Comment Response

The commenter is incorrect that Attachment E does not contain a description of this program. Section II.C of the MRP (Attachment E) includes a description of the dry weather field screening and analytical monitoring of MS4 detect illicit discharges and connections.

Comment # 54 **Commentor** 9 **Comment Subject** IDDE

Specific Comment

... based on results of field screening …

Field screening is not included as a component of any monitoring programs and should be removed from this sentence.

Comment Response

The San Diego Water Board disagrees, as field screening is the quantitative and/or qualitative monitoring of MS4 outfalls for non-storm water discharges and associated observations regarding a discharge. For example, if a field screening of an MS4 major outfall detects a high turbidity from sediment in a non-storm water discharge, Section F.4.e directs that this screening should be used for investigating and inspecting that portion of the MS4. According to Section II.C.1.b of the MRP (Attachment E), "Each Copermittee must develop and/or update written procedures for effluent analytical monitoring including field observations, monitoring, and analyses to be conducted." "[F]ield observations, monitoring and analyses" all can be performed by sampling personnel in the field, with visual observations and with portable monitoring and water quality analysis equipment (e.g. YSI meter, turbidity meter, pH strips). These components of the monitoring program would be part of the "field screening". No changes were made based on this comment.

Comment # 55 **Commentor** 9 **Comment Subject** IDDE

Specific Comment

References a monitoring effort that does not exist anywhere else in the permit (field screening)

The inconsistency in the permit for the different programs and the referenced sections need to be straightened out. Add description of referenced program to Attachment E.

Comment Response

Please see the response to comment 54.

Comment # 56 **Commentor** 9 **Comment Subject** IDDE

Specific Comment

Contradictory paragraph. Numeric action levels must be developed, but "the criteria must consider numeric effluent limitation (see Section C)".

The NELs from Section C or develop numeric action levels? Recommend selecting one criteria.

Comment Response

The commenter cited the text incorrectly. Section F.4.e.(1) clearly states, "The criteria must include required non-storm water action levels (see Section C) and a consideration of 303(d)-listed waterbodies and environmentally sensitive areas (ESAs) as defined in Attachment C."

Comment # 57 **Commentor** 9 **Comment Subject** Watershed Workplan

Specific Comment

The workplan is for development of a BMP strategy and implementatlon of BMPs to improve urban runoff water quality contributions to the receiving water. Calling it a "Water Quality" workplan is misleading because the regulated parties under this permit are not responsible for every contribution to every water body in the entire watershed.

The requirements should focus on urban runoff contributions to the receiving waters for which the regulated parties are responsible.

Revise the section to state: The Watershed Workplan shall describe the Permittees' development and implementation of a collective watershed strategy to assess and prioritize the water quality problems due to runoff discharging to the wathershed's receiving waters, identify and/or model sources of the highest priority water quality problem(s), develop a watershed-wide BMP implementation strategy to abate highest priority water quality problems and the relative contribution from runoff discharges, and a monitoring strategy to evaluate BMP effectiveness and changing water quality prioritzation in the WMA.

Comment Response

The Tentative Order is for the discharges from the Copermittees' MS4s. Pollutant contributions that are not discharged from the Copermittees' MS4s are not addressed by this permit or required to be addressed by the Watershed Workplan section. No changes were made based on this comment.

Comment # 58 **Commentor** 9 **Comment Subject** Watershed Workplan

Specific Comment

The use of the word "proper" for installation of BMPs is subjective and not defined by this permit. There may be many different ways to "properly" design and install a BMP, and the regulated parties may or may not choose to test different ways for each BMP to determine which works best.

Revise to state: Develop a strategy to model and/or monitor improvements in runoff discharge quality resulting from implementation of the BMPs described in the Watershed Workplan. The modeling and/or monitoring strategy shall generate the necessary data to report on the measured pollutant reduction that results from BMP implementation.

Comment Response

The term "proper" for describing BMP implementation is purposely left undefined in the Tentative Order. The Copermittees must determine what is the proper BMP implementation through manufacturer suggestions or BMP guidance manuals (e.g. CASQA). In some cases, "proper" BMP design and implementation may later be found to be faulty. The Tentative Order provides the Copermittee the flexibility to adjust and maintain BMPs to improve pollutant removal effectiveness. No changes were made based on this comment.

Comment # 59 **Commentor** 9 **Comment Subject** General

Specific Comment

The reference to a watershed workplan should use a consistent naming convention. It is referred to as a "Watershed Workplan" in Section K.1.b., and a "Watershed Water Quality Workplan" in Section G.2.

The reference to a watershed workplan should use a consistent naming convention.

Comment Response

Section G is for the "Watershed Water Quality Workplan (Watershed Workplan)." Therefore, the "Watershed Water Quality Workplan" is subsequently referred to as the "Watershed Workplan" throughout the remainder of the Tentative Order. After the term "Watershed Water Quality Workplan" is defined as “Watershed Workplan”, the term “Watershed Water Quality Workplan” in no longer used in Section G, nor Section K. No changes were made based on this comment.

Comment # 60	**Commentor** 9	**Comment Subject** Monitoring

Specific Comment

Typo at the base of the table: "Nitrate and nitrate may be combined…"

Change to" "Nitrite and nitrate may be combined…"

Comment Response

The correction made been made to the text as shown in the errata.

Comment # 61	**Commentor** 9	**Comment Subject** Monitoring

Specific Comment

Comparing Metals SALs with CTR values

Question is if you can use the "1 hour maximum concentration" criteria in this way?

Comment Response

Although the SALs have been set at a conservative level, it is possible that a SAL for metals may be exceeded but, given the hardness of the receiving water, applicable CTR water quality criteria may not be exceeded. The 1 hour CTR criteria was chosen for storm events as this CTR criteria represents the highest concentration of pollutant which aquatic life can be exposed to for a short time without deleterious effects. The continuous CTR criteria is less representative of pollutants in storm water as the continuous criteria represents the maximum concentration over an extended time period (4 days).

Comment # 62	**Commentor** 9	**Comment Subject** Monitoring

Specific Comment

"Stations must be all major outfalls" plus "other outfall points…"

This far exceeds CWA 500 point maximum for dry weather monitoring.

Comment Response

The section referenced by the commentor does not read “stations must be all major outfalls.” It reads: “Sampling Stations must be located at major outfalls pursuant to section C of this Order.”

Comment # 63	**Commentor** 9	**Comment Subject** Monitoring

Specific Comment

If flow is evident a 1 hour composite sample may be taken.

Should elaborate on sampling procedures for flowing outfalls.

Comment Response

This section does not require the collection of a 1-hour composite sample, but suggests that one may be taken. This lends the Copermittee(s) maximum flexibility in evaluating if a composite is required to address IC/ID investigations on a case-by-case basis. If a composite sample is taken, it also is up to the Copermittee(s) to determine if a time or flow-based composite should be taken.

Comment # 64	**Commentor** 9	**Comment Subject** Monitoring

Specific Comment

"if flow is evident a 1 hour composite sample may be taken"

There is not definition of what comprises a composite sample. This would significantly increase this program.

Comment Response

Please see the response to comment 63.

Comment # 65	**Commentor** 5	**Comment Subject** Economic

Specific Comment

Although the Order has been slightly modified from the previous version issued to the South Orange County permittees, it continues to retain numerous provisions that do not apply to this region and are unnecessarily costly and administratively burdensome to the City and, ultimately, to our citizens.

Comment Response

The San Diego Water Board disagrees that there are provisions in the Tentative Order that do not apply to the portion of Riverside County in the San Diego Region and the commentor does not explain which provisions are allegedly unnecessary and costly. All of the provisions in the Tentative Order are applicable and can be applied in this part of the San Diego Region, as well as all other parts of the region. The San Diego Water Board has also modified the Tentative Order in several ways, in response to recommendations by the Riverside County Copermittees, to align it more with regional needs and to minimize or reduce the incremental increase in costs that will be necessary to improve their programs to meet the new and enhanced requirements. These modifications are discussed in the response to comment 9.

Comment # 66 **Commentor** 5 **Comment Subject** General

Specific Comment

It is important to note that the federal regulations regulating MS4 discharges have not changed since 1987. There is no policy basis for the significant changes proposed by this Tentative Order. The majority of the changes proposed to this Tentative Order are to accommodate Regional Board staff wishes to move to a model MS4 Permit that treats Riverside, Orange and San Diego County's equally. These changes were not specifically designed to address the local needs of this watershed.

Comment Response

The San Diego Water Board agrees that the federal regulations regulating MS4 discharges have not changed since 1987. There are two main reasons for the changes that have been made. The first and foremost reason is to correct deficiencies in the requirements to be more protective of receiving waters, which is more consistent with the federal regulations. The second reason is to make the requirements for the three counties in the San Diego Region more consistent among each other. In addition, although the federal regulations for MS4 discharges have not changed since 1987, the water quality in the Upper Santa Margarita watershed has continued to deteriorate along with a subsequent increase in urban development within the watershed during the same time period. The receiving waters within the Upper Santa Margarita watershed continue to not meet water quality standards as evidenced by increased number of CWA section 303(d) listed waterbodies.

As the City is aware, the San Diego Water Board met with the Riverside County Copermittees on more than a dozen occasions between March and July 2010 to modify the requirements to be more specific to the needs of the Upper Santa Margarita watershed. While we acknowledge that the requirements are now more consistent with the San Diego County and Orange County MS4 Permits, many of the changes were specifically designed to address the local needs of the Upper Santa Margarita watershed.

The increased complexity in a fourth round MS4 permit is consistent with federal regulations and guidance; and appropriate where numeric effluent limitations are not required as explained in the USEPA's Interim Permitting Approach for Water Quality-Based Effluent Limitations in Storm Water Permits, "The interim permitting approach uses best management pracitces (BMPs) in first-round permits, and expanded or better-tailored BMPs in subsequent permits, where necessary, to provide for the attainment of water quality standards."

Comment # 67 **Commentor** 10 **Comment Subject** General

Specific Comment

The Bay Council appreciates and welcomes the opportunity to comment on the Regional Water Quality Control Board's ("Regional Board") draft Municipal Storm Water Permit ("Permit") for Riverside County. As with the recently adopted Orange County permit (Order No. R9-2009-0002), this draft Permit represents a significant improvement to past storm water permits in not only the San Diego region, but the entire state. The Bay Council applauds the Regional Board for its leadership in advancing municipal storm water permits to reflect the iterative approach of the maximum extent practicable ("MEP") standard mandated by the Clean Water Act.

Comment Response

Comment noted.

Comment # 68 **Commentor** 10 **Comment Subject** Hydromod

Specific Comment

Bay Council member San Diego Coastkeeper was part of the Technical Advisory Committee for the San Diego region Hydromodification Management Plan (HMP) development. Many of Coastkeeper's concerns, as well as committee member NRDC's, focused on the standard set in the San Diego HMP. The hydromodification susceptibility and the resulting BMP sizing tools were set to meet predevelopment standards, not the naturally occurring condition. It was ultimately the San Diego MS4 Permit language—which defines predevelopment as the condition onsite immediately before the planned development—that constrained the development of the HMP. (Order No. R9-2007-0001, C-7). This Permit, however, is in line with Coastkeeper and NRDC's view that predevelopment and preproject are the naturally occurring condition—as opposed to simply the condition immediately preceding the new development. This definition will create a more robust and effective HMP for the Riverside area, protecting natural stream hydrology as opposed to merely preventing further degradation. (Permit, F.1.h). Further, the required prioritization of BMPs will ensure the most effective BMPs are evaluated first, instead of the least expensive or easiest to implement BMPs. (Permit, F.1.g.(2).

Comment Response

Comment noted.

Comment # 69 **Commentor** 10 **Comment Subject** Unpaved Roads

Specific Comment

A new addition to this Permit is the regulation of unpaved roads, which now require implementation of BMPs. (F.1.i.; F.3.a.(10); F.3.c.(5)). Not only will these new permit provisions help alleviate sediment and erosion problems; they will also promote smart maintenance and planning. For
example, the permit requirement that BMPs include "[u]npaved roads and culvert designs that do not impact creek functions and where applicable, that maintain migratory fish passage" will help maintain natural water courses. (F.1.i). The following requirement will also serve to promote long-term maintenance and planning to protect water quality and geomorphology:

"Through their regular maintenance of unpaved roads, the Copermittees must examine the feasibility of replacing existing culverts or design of new culverts or bridge crossings to reduce erosion and maintain natural stream geomorphology."

(F.3.a.(10)(e)). These types of Permit conditions will incentivize municipalities to plan ahead, and will prevent the perpetuation of the currently fragmented maintenance activities.

Comment Response

Comment noted. The Copermittees have brought up concerns addressing the regulation of privately owned and maintained unpaved roads; therefore those regulations have been removed. Please see the errata sheet for exact language changes.

Comment # 70 **Commentor** 10 **Comment Subject** General

Specific Comment

In addition, municipal flood control structure BMP implementation will also serve to benefit Copermittees in maintaining their storm water systems. (F.3.a.(4)(a)-(c)). The requirement that Copermittees assess flood management project impacts on water quality, evaluate existing flood
control structures as part of ongoing maintenance, and inventory such activities in the JRMP Annual Report is particularly important to avoid poor planning such as evidenced in the City of San Diego's Master Storm Water System Maintenance Program. (Id.)

Comment Response

Comment noted.

Comment # 71	**Commentor** 10	**Comment Subject** Retrofit

Specific Comment

Largely ignored in the past, the retrofit requirements in the Permit will help Copermittees tackle the storm water issues that cannot be solved through new construction and development standards alone. Many water quality issues are historical, due to poor planning and the proliferation of impervious surfaces. Permit-required assessment of retrofit opportunities, and permissive language with regard to implementation of retrofits will spur Copermittees to action, but allow them flexibility to choose the most effective projects. (F.3.d.). The novel idea of using retrofits as an enforcement or mitigation measure will also likely prove more appealing than simple monetary penalties.

Comment Response

Comment noted.

Comment # 72 **Commentor** 5 **Comment Subject** Legal

Specific Comment

1. THE TENTATIVE ORDER ATTEMPTS TO REDEFINE WHAT CONSTITUTES A WATER OF THE UNITED STATES

Section 3.C of the Findings section on page 11 of the Tentative Order states:

"Historic and current development makes use of natural drainage patterns and features as conveyances for urban runoff. Urban streams used in this manner are part of the municipalities MS4 regardless of whether they are natural, man-made, or partially modified features. In these cases, the urban stream is both an MS4 and a receiving water."

The City does not believe that such a finding is warranted or lawful under either the clear statutory provisions of the Clean Water Act or recent judicial interpretations of the Act. The language in the Tentative Order could be construed as seeking to regulate all discharges into MS4s, changing the very nature of MS4s so as to constitute a receiving water.

This is contrary to the plain language of section 402(P)(3)(B) of the Clean Water Act, which requires: "Permits for discharges from municipal storm sewers ... " 33 U.S.C. § 1342(P)(3)(B) (emphasis added.). Based on this assertion, the Regional Board does not have the authority to regulate water entering into MS4s as receiving waters of the United States.

Furthermore, even if the statutory language indicated that Permits were required for discharges into MS4s, recent holdings from the United States Supreme Court conclusively show such structures would not constitute a water of the United States. According to the plurality decision in Rapanos v. United States (2006) 126 S. Ct. 2208, 2225:

"In sum, on its only plausible interpretation, the phrase 'the waters of the United States' includes only those relatively permanent, standing or continuously flowing bodies of water 'forming geographic features' that are described in ordinary parlance as 'streams[,] ... oceans, rivers, [and] lakes.' See Webster's Second 2882. The phrase does not include channels through which water flows intermittently or ephemerally, or channels that periodically provide drainage for rainfall. The Corps' expansive interpretation of the 'the waters of the United States' is thus not 'based on a permissible construction of the statute."

(Emphasis added.). The MS4 systems and urban streams that the Regional Board is seeking to regulate as receiving waters are intermittent, ephemeral, and used only periodically as drainage for rainfall. As such, these systems and streams wonld not constitute a water of the United States. Because the Clean Water Act extends solely to waters of the United States, the Regional Board has no authority to regulate MS4s or urban streams as defined in its Permit.

Even under Justice Kennedy's more lenient interpretation of what constitutes a water of the United States, the Regional Board has still not adequately met the requirements for establishing that an MS4 or urban stream is subject to regulation as a Water of the United States. According to Justice Kennedy, the Regional Board must establish that the MS4 system and urban streams bear a significant nexus to the other regulated waters so as to qualify forregulation as a water of the United States. Rapanos, 126 S. Ct. at 2249. Such a determination must be made on a case-by-case basis, and must contain some measure of the significance of the connection for downstream water quality. Id. at 2250-2251. In other words, the Regional Board must conduct an analysis of the "quantity and regularity of flow" in the relevant MS4s and urban streams prior to holding that these structures merit regulation under the Clean Water Act. ld. at 2251. Absent conclusive findings, the Regional Board is without authority to regulate MS4s and urban streams as receiving waters under the Clean Water Act.

The City requests that the Board members direct staff to modify the language in the Tentative Order to ensure regulations of only those systems and streams discharging directly into waters of the United States as defined according to the Supreme Court's holding in Rapanos in order to avoid random interpretations of the CWA.

Comment Response

The Tentative Order does not attempt to redefine what constitutes waters of the United States (waters of the U.S.). Section D.3.c of the Findings defines what constitutes the MS4. In some cases, waters of the U.S. and waters of the state may be considered part of the MS4.

The San Diego Water Board is authorized to regulate storm water discharges from the MS4, which are considered point sources under the Clean Water Act, to waters of the U.S. Discharges from the MS4 that are not composed entirely of storm water (i.e. non-storm water discharges) are prohibited. Pollutants that are deposited in the MS4 that can be conveyed by

storm water cannot cause of contribute to a condition of nuisance, pollution, or contamination in waters of the U.S. Thus, discharges into the MS4 that are not composed entirely of storm water (i.e. pollutants in storm water and non-storm water) and can be a significant source of pollutants are prohibited.

The definition of the MS4 and waters of the U.S. are consistent with the Clean Water Act and NPDES regulations in the Tentative Order. Please also see the response to comment 22.

Comment # 73	**Commentor** 10	**Comment Subject** Overirrigation

Specific Comment

Bay Council has been collectively, and through its individual organizations, advocating for conservation and smart water use for years. Every drop of water that remains at its source is a drop that has not contributed to urban runoff. Nonetheless, many municipalities have been reluctant to enforce over-irrigation as either a water supply or water quality issue, citing the previous permit exemption as authority for such practice. Now, with the removal of this exemption, municipalities will not only be required to enforce over-irrigation runoff, but will be able to use the revised Permit as authority for urging residents, developments, and commercial and industrial facilities to conserve water.

Comment Response

Comment noted.

Comment # 74 **Commentor** 5 **Comment Subject** New Development

Specific Comment

2. THE TENTATIVE ORDER UNLAWFULLY PURPORTS TO RESTRICT THE LOCATION OF TREATMENT OPTIONS

Section F.1.d.(6)(d) on page 35 of the Tentative Order states:

"All treatment control BMPs for Priority Development Projects must, at a minimum, be implemented close to pollutant sources (where shared BMPs are not proposed), and prior to discharging into waters of the U.S."

The implementation of this provision presents a number of potentially serious problems. First, this provision of the Tentative Order violates Water Code section 13360. According to Water Code section 13360(a):

"No waste discharge requirement or other order of a regional board or the state board or decree of a court issued under this division shall specify the design, location, type of construction, or particular manner in which compliance may be had with that requirement, order, or decree, and the person so ordered shall be permitted to comply with the order in any lawful manner."

(Emphasis added.) As noted above, the Regional Board is already attempting to define MS4s and urban streams as waters of the United States. Supra, p. II. The proposed regulation would therefore effectively limit the ability for Permittees to implement any BMPs in any area except at the exact location of the source generating pollutants and would exclude Permittees from choosing to implement what may be less-costly, more effective BMPs in other areas, but Water Code section 13360(a) expressly prohibits this type of regulation.

Second, the comparison to wetlands regulation misconstrues USEPA guidance on this issue. The USEP A guidance document referenced by the Regional Board does not preclude Permittees from locating structural controls within a natural wetland. Rather, the guidelines simply state:

"To the extent possible, municipalities should avoid locating structural controls in natural wetlands. Before considering siting of controls in a natural wetland, the municipality should demonstrate that it is not possible or practicable to construct them in sites that do not contain natural wetlands .... "

(Fact Sheet, p. 96, fu. 154, citing USEPA, 1992. Guidance Manual for the Preparation of Part II of the NPDES Permit Applications for Discharges from Municipal Separate Stonn Sewer Systems. EPA 833-B-92-002. (Emphasis added.) While the Permittees may agree that they should generally avoid in stream treatment to the extent possible, outright prohibition of an option would be counterproductive.

The City requests that the Board members direct staff to modify the language in the Tentative Order to allow permittees to make the determination of the exact placement location of BMPs.

Comment Response

The Tentative Order is consistent with the California Water Code. The Tentative Order does not specify the exact placement location of BMPs. The Tentative Order does, however, include some limitations for the placement location of BMPs to minimize or eliminate the discharge of pollutants to waters of the U.S. Additionally, treatment BMPs must not be constructed in waters of the U.S. or state unless the runoff flows are sufficiently pretreated to protect the values and functions of the water body. Federal regulations at 40 CFR 131.10(a) state that in no case shall a state adopt waste transport or waste assimilation as a designated use for any waters of the U.S. The limitations for the placement location of BMPs are appropriate. No changes were made based on this comment.

Comment # 75	**Commentor** 10	**Comment Subject** Action Levels

Specific Comment

As with the Orange County permit, this Permit is a great leap forward in achieving the MEP standard. With the Orange County permit paving the way, the Regional Board has created a mechanism to evaluate BMP effectiveness and ensure the iterative approach is truly progressive. As Bay Council members have previously commented on the Orange County permit, the Regional Board has broad authority to impose numeric effluent limits.1 The Bay Council fully supports the Regional Board in requiring both non-storm water dry weather action levels (“NALs”) and storm water action levels (“SALs”). (Permit, C. and D.).

Comment Response

Comment noted.

Comment # 76 **Commentor** 5 **Comment Subject** Legal

Specific Comment

3. THE TENTATIVE ORDER IMPROPERLY INTRUDES UPON THE CITY'S LAND USE AUTHORITY IN VIOLATION OF THE TENTH AMENDMENT OF THE U.S. CONSTITUTION

To the extent that this Tentative Order relies on federal authority under the Clean Water Act to impose land use regulations and dictate specific methods of compliance, it violates the Tenth Amendment of the U.S. Constitution. Furthermore, to the extent the Tentative Order requires a Municipal Permittee to modify its city ordinances in a specific manner; it also violates the Tenth Amendment.

According to the Tenth Amendment:

"The powers not delegated to the United States by the Constitution, nor prohibited by it to the States, are reserved to the States respectively, or to the people."

Article XI, section 7 of the California Constitution, California guarantees municipalities the right to "make and enforce within [their] limits all local police, sanitary and other ordinances and regulations not in conflict with general laws." The United States Supreme Court has held that the ability to enact land use regulations is delegated to municipalities as part of their inherent police powers to protect the public health, safety, and welfare of its residents. See Berman v. Parker (1954) 348 U.S. 26, 32- 33. Because it is a constitutionally conferred power, land use powers cannot be overridden by State or federal statutes.

From the City's perspective, under the guise of federal law, the Regional Board is attempting to dictate the precise manner in which cities must exercise their police powers. The City does not believe that such a requirement is consistent with the Tenth Amendment.

The City requests that the Board members direct staff to modify the language in the Tentative Order to ensure consistency with the Tenth Amendment, rather than applying random interpretations of it, with regard to issuing requirements which dictate the precise method of compliance.

Comment Response

The San Diego Water Board disagrees that the Tentative Order intrudes upon the City's land use authority. The Tentative Order requires the City to be protective of water quality in the City's land use decisions. The requirements of the Tentative Order provide the Copermittees with sufficient flexibility to choose how they will achieve compliance. The requirements provide the Copermittees with numerous compliance options. As such, the requirements do not specify design, location, type of construction, or particular manner in which compliance may be had.

Where the Tentative Order includes detailed requirements, it is to be in compliance with CWA section 402(p)(3)(B)(iii), which mandates that MS4 permits "shall require controls to reduce the discharge of pollutants to the maximum extent practicable, including management practices, control techniques and system, design and engineering methods, and such other provisions as the Administrator or the State determines appropriate for the control of such pollutants." Clearly, the CWA provides the San Diego Water Board with the discretion to include specific requirements in the Tentative Order. This discretion is supported in the preamble to the Phase I NPDES storm water regulations, which states "this rule sets out permit application requirements that are sufficiently flexible to allow the development of site-specific permit conditions" (FR 48038). USEPA has issued regulations and guidance documents that discuss the types of BMPs, for example, that must be included in storm water permits in order to reduce the dicharge of pollutants in storm water to the maximum extent practicable. Thus, federal law mandates that permits issued to MS4s must require management practices that will result in the reduction of pollutants to the maximum extent practicable. The state is required, by federal law, to select the BMPs. See NRDC v USEPA (9th Cir. 1992) 966 F .2d 1292; Environmental Defense Center v USEPA (9th Cir. 2002) 344 F .3d 832, 855; City of Rancho Cucamonga v Regional Water Quality Control Bd., Santa Ana Region (2006) 135 Cal.App.4th 1377, 1389.

The Copermittees are able to implement effective runoff management programs because they possess land use authority. Municipal NPDES requirements compel Copermittees to exercise that authority in a manner that protects water quality from adverse effects of MS4 discharges.The Tentative Order therefore does not conflict with the Tenth Amendment of the U.S. Constitution. Copermittees are responsible for accepting flows into their MS4. For each Copermittee that accepts flows into their MS4, federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B,C,E, and F) provide that each Copermittee's permit

application "shall consist of: (i) Adequate legal authority. A demonstration that the applicant can operate pursuant to legal authority established by statute, ordinance or series of contracts which authorizes or enables the applicant at a minimum to: […] (B) Prohibit through ordinance, order or similar means, illicit discharges to the municipal separate storm sewer; (C) Control through ordinance, order or similar means the discharge to a municipal separate storm sewer of spills, dumping or disposal of materials other than storm water; […] (E) Require compliance with condition in ordinances, permits, contracts or orders; and (F) Carry out all inspection, surveillance and monitoring procedures necessary to determine compliance and noncompliance with permit conditions including the prohibition on illicit discharges to the municipal separate storm sewer."

The Tentative Order includes the requirements of the federal regulations and does not conflict with the Tenth Amendment of the U.S. Constitution. Nor do its requirements infringe on municipalities' police power rights under Article XI, section 7 of the California Constitution. Failure of a municipal discharger to develop and implement appropriate and effective runoff management programs that comply with the NPDES requirements for MS4s would subject the municipal discharger to enforcement by the San Diego Water Board, and potentially by its citizens. The burden of proving the deficiency of the runoff management programs would be defined by the provisions describing the necessary elements of the program, and by the extent to which the program reduces pollutants in the MS4.

Comment # 77 **Commentor** 5 **Comment Subject** Legal

Specific Comment

4. THE TENTATIVE ORDER CONSTITUTES AN UNFUNDED STATE MANDATE

The Regional Board seeks to impose new provisions that require a higher level of service of existing programs that are not required or mandated under the Clean Water Act or any federal regulations thereunder. Yet, according to the Fiscal Analysis provided in Section H.1. of the Tentative Order:

"Each Copermittee must exercise its full authority to secure the resources necessary to meet all requirements of this Order."

(Tentative Order, p. 74.) To the extent the Tentative Order imposes additional programs on the Permittees without providing additional funds, they are unfunded mandates. The Commission on State Mandates recently held that both the Los Angeles County MS4 Permit and the San Diego County MS4 Permit contained provisions that constituted unfunded state mandates. In re Test Claim on Los Angeles Regional Quality Control Board Order No. 01-182 (July 31,2009); In re Test Claim on San Diego Regional Water Quality Control Board Order No. R9-2007-0001 (March 26, 2010). As such, the Regional Board cannot merely dismiss the suggestion that the Tentative Order does contain provisions that constitute unfunded state mandates.

The imposition of unfunded programs and mandates in the Tentative Order is inconsistent with the provisions of the California Constitution, specifically Article XIII.B, Section 6, which requires a state agency mandating a new program or a higher level of service to provide a "subvention" of funds to reimburse local governments for the costs of the program or increased level of service.

Article XIII.B, Section 6 of the Constitution prevents the state from shifting the cost of government from itself to local agencies without providing a "subvention of funds to reimburse that local government for the costs of the program or increased level of service ... " State agencies are not free to shift state costs to local agencies without providing funding merely because those costs were imposed upon the state by the federal government. If the state freely chooses to impose additional costs upon a local agency as a means of implementing its policy, then those costs should be reimbursed by the state agency. See Hayes v. Commission on State Mandates (1992) 11 Cal. App. 4th 1564, 1593-1594. If the state refuses to appropriate money to reimburse a city, the enforcement of the state mandate can potentially be enjoined by a court. See Lucia Mar Unified School District v ..Honig (1988) 44 Cal. 3d 830, 833-834.

The Tentative Order will require a substantial capital investment, which individual cities will have to fund, despite the fact that no funding mechanism, nor any assistance, financial or otherwise, from the Regional Board is provided to the Permittees. To our knowledge, the Regional Board has made no provision to provide any level of financial relief to the permittees for any of the provisions proposed in the Tentative Order.

The Tentative Order explicitly provides that the Tentative Order does not constitute an unfunded state mandate for four reasons in paragraph 6 of page 14 of the Tentative Order. The City disagrees with all four stated reasons. To the extent the Tentative Order imposes additional programs on the City and its co-pennittees without providing additional funds, they are unfunded mandates.

Comment Response

The San Diego Water Board disagrees that the Tentative Order constitutes an unfunded mandate. The San Diego Water Board disagrees that the provisions in the Tentative Order are not required or mandated under the Clean Water Act. We acknowledge that several of the elements of the Tentative Order have been improved upon by including more specific requirements. The additional specificity which will likely require modifications to the Copermittees' existing programs, however, does not mean that there are now unfunded state mandates.

We also acknowledge that the Commission on State Mandates (Commission) recently held that the San Diego County MS4 Permit contained provisions that constituted unfunded state mandates and so partially approved the San Diego County MS4 claimants' Test Claim. First, the Commission did not determine the validity of those permit provisions; it only addressed funding and determined that the State must reimburse the claimants for the costs of complying with them. Second, the Commission's decisions only affect those Orders (MS4 permits) directly identified by the Commission. No other permits are affected, even if those permits have similar provisions. Third, the San Diego Water Board is not precluded from adopting similar or identical provisions in the Riverside County MS4 permit and the State is not required to provide funding for any permit provisions unless and until the Commission, through a Test Claim proceeding, makes a determination that

one or more provisions in the Riverside County MS4 permit are unfunded state mandates requiring reimbursement. Finally, the State Water Board and San Diego Water Board have challenged the Commission's determination in Sacramento Superior Court on grounds including that the affected permit provisions are in fact federal, and not state, mandates. The San Diego Water Board maintains at this time that the provisions of the Tentative Order are not unfunded state mandates and will continue to include appropriate provisions in the MS4 Permits to protect the water quality and beneficial uses of the waters of the region.

Comment # 78 **Commentor** 5 **Comment Subject** Legal

Specific Comment

A. The Tentative Order Imposes Requirements that Go Beyond Federal Law

To the extent the Tentative Order imposes requirements that go beyond what is required by federal law, the Regional Board is required to consider and address among other things the constitutional prohibition on unfunded state mandates. In fact, there are many specific obligations in the Tentative Order that are not federally mandated.

For example, Section E, on page 24 of the Tentative Order, requires that each permittee submit a certification statement, signed by its chief legal counsel, that the permittee has taken the steps necessary to obtain and maintain full legal authority to implement and enforce each of the requirements in 40 CFR 122.26(d)(2)(i)(A-F) and the Tentative Order. The Clean Water Act does not require the certification statement mandated by the Regional Board. 40 CFR 122.26(d)(2)(i) only requires "[a] demonstration that the applicant can operate pursuant to legal authority established by statute, ordinance or series of contracts .... " Arguably, the City can demonstrate its legal authority by submitting copies of ordinances, resolution or contracts certified by the City Clerk. The Clean Water Act does not require permittees to submit a certification statement.

Furthermore, the Tentative Order goes beyond federal law in that it is at least twice as long, and in some cases, three times as long as other MS4 Permits developed by other Regional Boards in the State of California such as the Lahonten Regional Board and the Central Valley Regional Board. This means that either some Regional Boards are failing to impose federally mandated requirements pursuant to the Clean Water Act, or the San Diego Regional Board is imposing requirements that go beyond federal law.

Comment Response

The Tentative Order is consistent with federal requirements and does not go beyond federal law. The provisions of the Tentative Order represent the MEP with specific requirements that are necessary to protect water quality.

MS4 Permits from different regions cannot be compared without looking at the different issues facing each region. The length of a permit is not indicative of consistency with the Clean Water Act. The discharges that the Lahontan and Central Valley Regions are most concerned with are typically nonpoint source discharges that cannot be regulated under NPDES requirements (e.g., agriculture and silviculture). There are, however, examples of MS4 Permits with similar provisions and lengths in the Los Angeles and San Francisco Bay Regions. Each region implements the requirements of the Clean Water Act by including provisions in the MS4 Permits with the specificity that is necessary to protect water quality and beneficial uses for the waters in that region.

The requirements in the Tentative Order include the specificity that has been demonstrated to be necessary to direct the programs of the Copermittees to be protective of water quality. Without the additional specificity, which would make the language subject to greater interpretation and less enforceable, the Copermittees often assert that they have “met the minimum requirements of the permit” and do not attempt to go any further to try and improve water quality. Thus, additional specificity to the provisions of the MS4 Permit are warranted to direct the Copermittees to implement requirements that will be more protective of water quality, consistent with the Clean Water Act, and do not constitute an unfunded mandate.

Finally, a municipality's legal counsel appears to be the most appropriate official to interpret the municipality's legal authorities and to make the demonstration, that based upon his or her legal evaluation, that the municipality's legal authorities are adequate to carry out the federal requirements. Simply providing copies of ordincances, resolutions or statues is insufficient to make the necessary demonstration that the municipality has and will maintain ful legal authorities.

Please also see the response to comment 77.

Comment # 79	**Commentor** 5	**Comment Subject** Legal

Specific Comment

B. The Fact that Industrial Dischargers are More Strictly Regulated than Municipal Dischargers is Irrelevant to the Unfunded Mandate Issue

The Tentative Order asserts that the Order does not constitute an unfunded mandate because the Order regulates discharges of waste from municipal sources more leniently than they could regulate discharges from non-governmental dischargers. See paragraph 6 on page 14 of Tentative Order. The City fails to see how this statutory distinction between the regulation of municipal dischargers and industrial dischargers affects whether the Order imposes requirements on co-permittees that go beyond federal law. Municipalities are not industrial sites. Municipal discharges are not industrial discharges.

Comment Response

The San Diego Water Board disagrees that the fact that industrial dischargers are more strictly regulated that municipal dischargers is irrelevant to the unfunded mandate issue. The fact that the obligations of non-governmental and new dischargers who are issued NPDES permits for storm water and non-storm water discharges are more stringent is very pertinent. The NPDES requirements for non-governmental dischargers typically include numeric effluent limitations for a discharge so it will not cause or contribute to a condition of pollution in the receiving waters. Any excursion above these numeric effluent limitations in the discharge is a violation of the permit. Compliance is achieved when the numeric effluent limitations are met.

The NPDES requirements in the MS4 Permit do not include such effluent limitations, but allows compliance through iterative implementation of BMPs and improving storm water management programs, which is less stringent. Compliance means improving BMPs and storm water and non-storm water management programs when water quality is not adequately protected.

To date, the Copermittees have been unable to adequately protect water quality in the receiving waters, as demonstrated by the increasing number of Clean Water Action section 303(d) listed impaired water bodies. The Copermittees often state that they have "met the minimum requirements of the permit" and do not attempt to go any further to try and improve their programs to protect water quality. In the absence of numeric effluent limitation, the provisions of the MS4 Permit must include the level of specificity to direct the Copermittees to improve their storm water and non-storm water management programs to be more protective of water quality. The additional specificity does not go beyond federal law.

In addition, one of the statutory bases for establishing that a permit provision amounts to an unfunded state mandate requiring reimbursement is for the municipality to show that the requirements are unique to local government and do not apply generally to all residents and entities in the state. The federal mandate in the Clean Water Act applies to many dischargers, both public and private, and is not unique to local government. In addition , CalTrans, for example, is a state, not local, govermental entity and is subject to MS4 permits throughout the state. Industrial dischargers are also subject to storm water regulation, albeit more stringent than is typically applied to municiapl dischargers. Thus, it appears that the commenter misunderstands at least one of the bases for establishing the existence of an unfunded state mandate when it states that it fails to see how this statutory distinction affects whether the Order imposes requriements that exceed federal law.

Comment # 80 **Commentor** 5 **Comment Subject** Legal

Specific Comment

C. The City Does Not Have the Authority to Randomly Levy Fees at Will to Pay For Compliance With the Order

The Tentative Order also alleges that the Order does not constitute an unfunded mandate because copermittees have the authority to levy service fees to pay for compliance with the Order. See paragraph 6 on page 14 of Tentative Order. Pursuant to Government Code Section 17556(d), if a local agency can levy service fees to pay for a State mandate, the State is not required to provide funding for the mandate.

The City does not have the authority to levy service fees to pay for the State mandate. The Tentative Order presumes, but makes no specific findings that co-permittees have the authority to levy such service fees. In fact, to the extent such service fees are "property-related," copermittees can only levy them once approved by the affected property owners or electorate. See California Constitution, Article XllID, Section 6(c); Howard Jarvis Taxpayers Ass'n, v. City of Salinas, 98 Cal. App. 4th 1351 (2002). The City of Salinas case dealt precisely with this issue. The City of Salinas established a fee to recover costs related to compliance with its MS4 Permit. The fee was based largely on the amount of impervious area on a developed parcel. The Court held that this fee was property-related and, thus, subject to voter-approval requirements. Salinas, 98 Cal. App. 4th at 1356. Only if the fee was a use-based charge, directly based on use of city services (such as the metered use of water), could the fee avoid the voter-approval requirements of Article XllID. The City of Salinas's method to allocate the fee based on the amount of impervious area so as to assure that the fee charged would be proportional to the burden being placed on the City's storm drain system was not sufficiently direct to qualify as a use-based fee exempt from the requirements of Article XIIlD. ld. at 1355.

Because storm water running off of real property and into the MS4 is not a precise measurement, it would be impossible to meet the direct usage requirements of the City of Salinas. Accordingly, without voter approval, which would be almost impossible to successfully obtain during the current economic crisis, the City of Temecula does not have the authority to levy service fees to pay for compliance with the Order.

Comment Response

Please see the responses to comments 8, 9 and 77. In addition, the San Diego Water Board disagrees with the Commission on State Mandates that San Diego County MS4 Test Claimants lacked appropriate authority to levy fees sufficient to pay for some unfunded state mandates if adoption of the fee is contingent on the outcome of an election and believes that those claimants have sufficient fee authority within the meaning of Government Code section 17556, subdivision (d). Section 6 of article XIII B of the California Constitution requires subvention only when the costs in question can be recovered solely from tax revenues. When local agencies have the legal authority to levy charges, fees or assessments, they do not have to spend tax proceeds to fund activities and no subvention is therefore required. The San Diego Water Board notes that this issue is one of first impression for the court and has not been finally adjudicated. In any event, even if the Commission were ultimately to determine that provisions in this Tentative Order require reimbursement and that Copermittees lack fee authority under Government Code section 17556, subdivision (d), the San Diego Water Board is not precluded from adopting provisions in the Tentative Order in the first place and is not required to first provide a funding source before or upon adoption of the Tentative Order. There is a process in place for establishing what are appropriate amounts for reimbursement to carry out particular permit provisions that the Commission has determined requires subvention by the State.

Comment # 81	**Commentor** 5	**Comment Subject** Legal

Specific Comment

D. The City Does Not Have a Real Choice in Requesting Permit Coverage

The fourth reason provided in the Tentative Order for why the Order does not constitute an unfunded mandate is that co-permittees requested permit coverage under the Order. Thus, according to the Tentative Order, co-permittees have not been mandated to do anything.

The City adamantly disagrees. It is disingenuous for Regional Board staff to suggest that copermittees have voluntarily chosen coverage under the Order and that the Order cannot be considered a State mandate.

The City requests that the Board members direct staff to modify the language in the Tentative Order to include State-sponsored relief for the permittees to carry out the requirements in the Order. To the extent that these requirements will require additional funds, the Board should direct staff to assist the permittees in securing such funds.

Comment Response

The Copermittees do have a choice. The Copermittees may request coverage under the MS4 Permit or comply with the complete prohibition against the discharge of pollutants contained in Clean Water Action section 301, subdivision (a) (33 U.S.C. § 1311(a)). These choices are provided by the federal Clean Water Act, not state laws. Thus, meeting the requirements of the MS4 Permit is a federal mandate, and not an unfunded state mandate. Please see the responses to comments 77 and 80.

Comment # 82 **Commentor** 5 **Comment Subject** IDDE

Specific Comment

5. THE TENTATIVE ORDER IMPROPERLY ATTEMPTS TO HOLD THE CITY RESPONSIBLE FOR SEWAGE SPILLS WHEN THIS RESPONSIBILITY HAS BEEN CLEARLY ASSIGNED TO LOCAL WATER DISTRICTS

Section F.4.h. of the Tentative Order states:

"Each Copermittee must implement management measures and procedures (including a notification mechanism) to prevent, respond to, contain and clean up all sewage (see below) and other spills that may discharge into its MS4 from any source (including private laterals and failing septic systems.) Copermittees must coordinate with spill response teams to prevent entry of spills into the MS4 and contamination of surface water, ground water and soil. Each Copermittee must coordinate spill prevention, containment and response activities throughout all appropriate departments, programs and agencies so that maximum water quality protection is available at all times."

(Tentative Order, p. 69).

For many cities, implementation of this provision is simply not feasible. The City of Temecula does not own or operate its own sewage system. All of the sewer systems in the City's jurisdiction are owned, operated, and maintained by water districts, specifically the Rancho California Water District and Eastern Municipal Water District. These water districts have their own separate Regional Board Orders/NPDES permits. The City does not have the equipment or expertise to manage a sewage spill of any size, and its staff is not adequately trained to respond to potential spills. All of the water districts in the City's jurisdiction already respond to sewer spills (including sewer spills from private laterals). Furthermore, this provision is duplicative because the Regional Board is seeking to make the City responsible for a task already delegated to the water districts. By making the City responsible for sewer spills, there is a high risk of creating confusion in determining who (water districts or the City) will respond to a spill and who is responsible for associated costs and reporting requirements. Such an act would result in a tremendous waste of scarce public resources.

The State Water Resources Control Board has previously issued a stay on this exact issue. After extensive hearings and briefing on the matter, the State Board issued Order WQO 2002-0014 on August 15, 2002, granting a stay as to this provision. In that Order, the State Board held:

"The record shows that three separate water districts operate these sewers within Mission Viejo, and are regulated by a sanitary sewer NPDES permit issued by the Regional Board. Mission Viejo alleged that the duplication of effort that would ensue by having Mission Viejo also be responsible for preventing and responding to sanitary sewage spills could lead to delayed responses as agencies try to determine jurisdiction and primary responsibility. Orange County's cost table for the upcoming year estimated total copermittee costs at $56,512 to implement this requirement. While these costs, by themselves do not constitute substantial harm, we find that the duplicative nature of the costs, combined with potential response delay and confusion, do."

(State Board Order WQO 2002-0014, p. 6).

In deciding to grant a stay as to this provision, the State Board concluded:

"The regulation of sanitary sewer overflows by municipal storm water entities, while other public entities are already charged with that responsibility in separate NPDES permits, may result in significant confusion and unnecessary control activities. For example, the Permit appears to assign primary spill prevention and response coordination authority to the co-permittees. While the federal regulations clearly assign some spill prevention and response duties to the copermittees, we find that the extent of these duties is a substantial question of law and fact."

(State Board Order WQO 2002-0014, p. 8. (Emphasis added).

Given the previous findings of the State Board on this same issue, the City requests that the Board members direct staff to modify the language in the Tentative Order to reduce duplicity of effort and the implementation of unnecessary control activities.

Comment Response

The Tentative Order does not hold the Copermittees responsible for sewage spills. Section F.4.h of the Tentative Order requires each Copermittee to "prevent, respond to, contain and clean up" spills that may discharge into its MS4. The Tentative Order holds the Copermittees responsible for preventing sewage spills from entering and/or responding to spills that have entered their MS4. Preventing sewage from entering the MS4 may be done in coordination with the sanitary sewer agencies, who are responsible for responding to sewage spills, but ultimately each Copermittee is responsible for whatever enters its MS4. This is consistent with State Water Board Order WQO 2002-0014.

When the State Water Board stayed the sewage provision from San Diego Water Board Order No. R9-2002-01, it found that the costs of the requirement did not constitute harm, but agreed that harm could ensue from potential response delay and confusion (State Water Board Order WQO 2002-0014). Subsequently, the Copermittees and the local sewer agencies have developed mature relationships regarding sewage spill response. As a result, the concerns expressed by the State Water Board are no longer warranted. For instance, the Copermittees have developed and implemented procedures for spill response and sewage spill response. Regardless of where the spill originates, if the spill has entered or may enter the storm drain system, the Copermittees must respond to assist with the cleanup and remediation of the area.

Comment # 83 **Commentor** 5 **Comment Subject** Overirrigation

Specific Comment

6. THE TENTATIVE ORDER IMPROPERLY DELETES CATEGORIES OF EXEMPT NONSTORMWATER DISCHARGES

Federal law requires that MS4 permits include a requirement that the Permittees effectively prohibit the discharge of non-stormwater into the MS4. 33 U.S.C. 1342(p)(3)(B)(ii). Federal regulations exempt certain discharge categories from this effective prohibition requirement. 40 C.F.R. 122.26(d)(2)(iv)(B)(l). A Permittee must address a discharge in one of these exempt categories only when a Permittee identifies the discharge as a source of pollutants to waters of the United States. ld.

The Tentative Order impermissibly deletes three of the non-stormwater discharge categories - landscape irrigation, irrigation water, and lawn watering (collectively, "irrigation"). (See subparagraphs a-n on page 19 of Tentative Order.) The federal regulations require that permittees address discharges within an exempt category when they identify a discharge as a source of pollutants to waters of the United States. Neither the regulations nor EPA's guidance allow the Regional Board to delete entire categories of exempt non-stormwater discharges then the Permittees identify a discharge within one of the categories as a source of pollutants.

Accordingly, since the permittees have not identified irrigation runoff as a source of pollutants, the City requests that the Board members direct staff to restore the irrigation categories of exempt nonstormwater discharges in the Tentative Order.

Comment Response

The San Diego Water Board may also identify a discharge as a source of pollutants to waters of the United States. Please see the response to comment 27.

In this case, the San Diego Water Board has identified non-storm water runoff from landscape irrigation, irrigation water, and lawn watering (collectively, "irrigation") as a significant source of pollutants discharging to the MS4. We have cited a number of documents, from the state and all three counties of the San Diego Region, in the Fact Sheet (see Discussion of Finding C.15) to justify the removal of these categories from the list of categories of non-storm water discharges into the MS4 not required to be prohibited.

Comment # 84	**Commentor** 5	**Comment Subject** Retrofit

Specific Comment

7. THE TENTATIVE ORDER'S RETROFITTING REQUIREMENT IMPOSES POTENTIALLY SIGNIFICANT COSTS WITHOUT ANY CORRESPONDING GAINS IN WATER QUALITY

The Tentative Order requires the Permittees to develop and implement a program to retrofit existing development with additional structural measures to control runoff. (See Section F.3.d (Retrofitting Existing Development) on page 64 of the Tentative Order). This new provision is in addition to the New Development/Redevelopment provisions in the Tentative Order. However, the City does not have the ability under existing statutes and under the California and the United States Constitutions to force private landowners to retrofit existing developments to improve water quality when these landowners didn't have any plans to retrofit their properties in the first place. As such, the expense entailed in developing and implementing a retrofitting program will not be matched by any gains in water quality. Federal law does not require retrofitting of existing development. In fact, EPA's regulations acknowledge that MS4 regulation would have to be limited largely to undeveloped sites and sites being developed/redeveloped. Accordingly, the City requests that the Board members direct staff to either remove this provision in its entirety from the Tentative Order, or modify the language to exclude private property.

Comment Response

The San Diego Water Board disagrees that the retrofitting requirements impose significant costs without any corresponding gains in water quality. As recognized in USEPA guidance, waters in the region cannot be protected without also addressing degradation caused by storm water discharges from existing development. The USEPA recommends that storm water programs include a retrofit plan or program for retrofitting existing development. To actually improve the quality of receiving waters, discharges from existing developed sites need to be mitigated, which generally means implementation of measures to retrofit existing development sites with storm water control measures that can retain and/or treat storm water on site. Retrofitting existing development is possible and reasonable to significantly improve water quality in receiving waters.

The retrofitting requirements in the Tentative Order do not, as the commenter asserts, require the Copermittees “to force” private landowners to retrofit existing development. Implementing retrofitting projects is not actually required by the Tentative Order. The retrofitting requirements do, however, require the Copermittees to identify areas of existing development where retrofitting projects are feasible and to find ways to cooperate with and encourage private land owners to implement retrofitting projects.

Comment # 85 **Commentor** 5 **Comment Subject** Legal

Specific Comment

8. THE TENTATIVE ORDER LACKS FLEXIBILITY IN IMPLEMENTING LOW IMPACT DEVELOPMENT AND HYDROMODIFICATION REQUIREMENTS

The Tentative Order requires that development projects include prescriptive Low Impact Development ("LID") requirements. (See, e.g., Section F.1 of the Tentative Order). The Tentative Order also requires the Permittees to develop and implement a Hydromodification Management Plan ("HMP") for the same development projects. (Section F.1.h. of the Tentative Order) However, the LID and HMP provisions are not required by federal law and violate state law in that, among other things, they prescribe how the Permittees are to comply with the MEP standard. See Water Code §13360(a). Moreover, the LID and HMP provisions in this Tentative Order are overbroad and will not necessarily result in any improvement to the quality of water entering Waters of the U.S.. For example, HMP requirements for hardened channels will not have any water quality benefits. Finally, to the extent the LID requirements would interfere with downstream or upstream water rights holders, compliance with the requirements potentially expose the Permittees to common law liability.

In addition, the Regional Board's imposition of a highly prescriptive Low Impact Development strategy may have an unintended consequence-potential lawsuits from downstream users of the surface water that the City is now purportedly "diverting for reuse or infiltration." As one attorney expert in the field of water law has put it:

"First, to the extent that one can obtain a right to capture diffuse surface waters ... any capture of diffuse surface waters without a permit from the State Water Resources Control Board could well be a trespass against the State of California. Second, even if one cannot obtain a 'right' to diffuse surface waters, though, the capture of such waters in a manner that interferes with the diversion of the same water once it reaches a watercourse constitutes injury to legal users of water that rely on such diffuse surface water contributing to the water that they are able to divert."

D. Aladjem, "Who Owns the Water? The Looming Conflict Between Low hnpact Development and the Water Rights System" at p.5 (paper presented at American Bar Association 17th Enviromnental Law Fall Section Meeting, Sept. 24, 2009).

The City believes that the law in this area, particularly with respect to ownership of diffuse surface waters, is quite uncertain. The City also believes that, to the extent that the Regional Board imposes these additional obligations upon the City pursuant to the Permit, then the Regional Board should insert sufficient findings and authorization for the capture of surface water through LID systems to protect the City against claims of either a trespass against the State or claims of unlawful diversion of stormwater that would otherwise flow into watercourses that might be the subject of claims of diversion rights by downstream users.

Because the LID and HMP provisions are not required by federal law and violate state law, the City requests that the Board members direct staff to insert sufficient findings and authorization for the capture of surface water through LID systems to protect the City against claims of either a trespass against the State or claims of unlawful diversion of stormwater. In addition, the City also requests that the Board members direct staff to modify the language in the Tentative Order to provide the Permittees with required flexibility in implementing the LID and HMP requirements.

Comment Response

The Tentative Order provides flexibility to implement the LID and HMP requirements. We fail to understand how the commenter can assert that the LID and HMP provisions are too prescriptive (implying too little flexibility), and then assert that the same provisions allow too much flexibility. The LID and HMP provisions provide flexibility that is consistent with both federal and state laws.

The Tentative Order includes design and performance standards for the LID requirements. The Tentative Order requires the Copermittees to develop an HMP which must include design and performance standards. The Tentative Order does not specify the methods for implementation of those design and performance standards. The method of compliance is left to the discretion of the Copermittees. The Tentative Order also allows a waiver of design and performance standards providing more flexibility to Copermittees and project proponents. The Tentative Order does not mandate method of compliance and is consistent with state laws.

The LID and HMP provisions have been included to provide more specificity, in the form of design and performance criteria, to direct the Copermittees to improve their storm water and non-storm water management programs to be more

protective of water quality. The additional specificity is consistent with federal law.

In regards to the potential water rights issues, the San Diego Water Board does not perceive a conflict and the commenter has not established that implementation of LID and HMP requirements in fact has the potential to impair existing water rights or that the San Diego Water Board is precluded from adoption water quality provisions that may potentially impair existing water rights. The concept of LID is to infiltrate and retain as much of the water on site. The concept for the HMP is to mimic the natural infiltration, runoff and drainage patterns as much as possible. In both situations, the expected and desired result is more groundwater recharge and more natural in-stream flow conditions. More groundwater and higher groundwater levels would provide more water supply to water purveyors in the watershed, and would also likely result in more downstream flow when the groundwater re-surfaces in the lower parts of the watershed. The LID and HMP provisions also provide higher quality water in downstream flows.

Comment # 86 **Commentor** 5 **Comment Subject** Legal

Specific Comment

9. THE TENTATIVE ORDER DOES NOT CONSIDER COSTS TO IMPLEMENT THE STORMWATER AND NON-STORMWATER ACTION LEVELS AS REQUIRED BY FEDERAL LAW, AND THE WATER QUALITY BENEFITS ACHIEVED BY THESE REQUIREMENTS HAVE NOT BEEN ADEQUATELY CONSIDERED BY THE REGIONAL BOARD

Federal law requires that permittees effectively prohibit the discharge of pollutants in nonstormwater into the MS4 and to reduce the discharge of pollutants in stormwater from the MS4 to the maximum extent practicable. To assist the Permittees in meeting these two standards, the Tentative Order imposes action levels on pollutants in the discharge of stormwater (SALs) and nonstormwater (NALs) from the MS4. (Sections C and D on pages 20 and 23, respectively, of the Tentative Order.). Ideally, action levels would be a tool that would help the City focus resources on more significant water quality problems. However, the City is concerned that, depending on how the provisions are interpreted, the cost to implement the action levels may far outweigh any benefit to water quality. Moreover, rather than a tool to help the Permittees, the action levels may be used against the Permittees.

As an initial matter, the City objects to the distinction made in the Tentative Order between the discharge of stormwater from the MS4 and the discharge of non-stormwater from the MS4. Federal law does not support this distinction. Under federal law, permittees must control the discharge of pollutants from the MS4 to the maximum extent practicable, regardless of whether the pollutants are in storm water or non-stormwater. Permittee's obligation with respect to non-stormwater is to effectively prohibit the discharge of pollutants in non-stormwater into the MS4. To the extent the Permit imposes separate requirements on the discharge of pollutants in non-stormwater from the MS4, such requirements must be supported by state law.

Because neither the SALs or NALs are required by federal law, the Regional Board must comply with state law in imposing these requirements. For example, in issuing waste discharge requirements under State law, the Regional Board must consider certain factors, including the water quality conditions that could be reasonably achieved and economic considerations. Water Code §§ 13263(a) and 13241. The City is hopeful that the Tentative Order's SAL and NAL provisions will provide the City with flexibility to prioritize its response to any actual exceedances. However, if the City is required to respond to and address all exceedances without reasonable prioritization, the cost will be significant. Because some exceedances will not be indicative of impacts to water quality, the cost to implement the SALs and NALs may have little if any commensurate environmental benefit. There is nothing in the record that suggests that the Regional Board has considered these water quality and economic factors.

Accordingly, the City requests that the Board members direct staff to provide the analysis required under state law to ensure that economic factors are considered and that the water quality goals are reasonably achievable through implementation of the SALs and NALs.

Comment Response

The provisions of the MS4 Permit are based on and fully supported by federal requirements, as demonstrated by the broad and specific legal authority cited in the Fact Sheet . The San Diego Water Board considered economic information in developing the Tentative Order, but federal NPDES regulations do not require that the San Diego Water Board conduct a cost-benefit analysis. The San Diego Water Board did, however, modify the requirements in the Tentative Order based on the economic considerations provided by the Copermittees. Please see the response to comment 9 for additional discussion about modifications made to the Tentative Order based on the economic considerations.

The Clean Water Act makes a clear distinction between the regulation of stormwater and non-stormwater discharges by requiring that MS4 Copermittees effectively prohibit non-stormwater discharges from entering the MS4. Since non-stormwater discharges are to be effectively prohibited, then clearly the very next requirement (402(p)(3)(B)(iii) that requires polluant discharges from the MS4 be reduced to the MEP) intends that the discharge of pollutants be limited to storm water. Please see the Fact Sheet discussion for Finding C.14 for further clarification.

Comment # 87	**Commentor** 5	**Comment Subject** TMDL

Specific Comment

10. THE TENTATIVE ORDER IMPROPERLY INCORPORATES TOTAL MAXIMUM DAILY LOAD W ASTELOAD ALLOCATIONS

The Tentative Order includes limitations based on wasteload allocations ("WLAs") developed in fully approved and adopted Total Maximum Daily Loads ("TMDLs"). (Section I of the Tentative Order.) The Tentative Order characterizes the limitations as Water Quality Based Effluent Limitations. However, the WLAs are to be achieved in the receiving water. Accordingly, the City considers the limitations to be receiving water limitations. See, e.g., State Board Order WQ 2009-0008. The Permittees are to comply with the limitations by implementing best management practices ("BMPs").

Federal and state policy provide that an iterative BMP approach is appropriate in MS4 permits for achieving receiving water limitations. See, e.g., State Board Order WQ 99-05. Where existing BMPs are not sufficient to meet the receiving water limitations, permittees are to implement more effective BMPs. This approach is consistent with the MEP standard governing the discharge of all pollutants from the MS4. The City submits that to be consistent with federal and state policy, the Permit must be clarified to provide for compliance with WLAs through an iterative BMP approach. To the extent the Regional Board can rely on state law to support the TMDL provisions, the City submits that the Regional Board has not complied with relevant requirements (e.g., Water Code§§ 13000, 13263(a), 13241, etc.). Accordingly, the City requests that the Board members direct staff to revise the Tentative Order's TMDL provisions to be consistent with federal and state law and policy.

Comment Response

The Tentative Order properly characterizes wasteload allocations (WLAs) assigned to MS4s for fully approved and adopted Total Maximum Daily Loads (TMDLs) as water quality based effluent limitations (WQBELs). Federal regulations (40 CFR 122.44(d)(1)(vii)(B)) require that NPDES requirements incorporate WQBELs that must be consistent with the requirements and assumptions of any available WLAs. In accordance with 40 CFR 122.44(k)(2)&(3), WQBELs may be expressed as numeric effluent limitations, when feasible, and/or as a BMP program of expanded or better-tailored BMPs. Currently, no TMDLs have been developed for the Upper Santa Margarita Watershed. When a TMDL is developed, it will be included in Section I of the Order. Depending on how the TMDL is developed, and the requirements and assumptions included in the TMDL to assign the WLA to the MS4 discharges, the WQBELs included in the MS4 Permit may be in the form of numeric effluent limitations, receiving water limitations, an expanded or better-tailored BMP program, or a combination of them.

Comment # 88 **Commentor** 10 **Comment Subject** Economic

Specific Comment

Though the Permit, as other past permits, requires a Fiscal Analysis, the Copermittees are surely to view this component of the Permit as another draconian measure that requires them to "check the box" as opposed to viewing this Permit condition as a tool. Copermittees should rather use the Fiscal Analysis requirement to plan ahead, financing necessary projects and measures not only for Permit compliance, but to achieve actual water quality improvements. (H.1.).

The current practice with respect to the Fiscal Analysis component of storm water permits is exemplified in the City of San Diego's 2009 Annual Report. This Report provides a "Future Projection" analysis consisting of two paragraphs which simply reiterate funds are generated from general fund and non-general fund sources, and costs will continue to rise. Earlier in the same section, the City provides an explanation of how funds are generally used, but provides no insight into the amount of money applicable to each funding source.

Such cursory fiscal analysis is common in Annual Reports, while municipalities refuse to face the real problem. They continuously fail to adequately pass on the true costs of compliance. Time and again, environmental groups and the Regional Board are faced with the same excuse: protecting water quality and restoring beneficial uses is too expensive. From Permit approval to Permit implementation, the same excuse persists. Nonetheless, the reluctance of the Copermittees to adequately fund their respective storm water programs is not the result of a lack of desire to improve water quality by municipal staff or managers, but rather poor decisionmaking and lack of political will. Decisionmakers at the city and county level must pass their costs on to those reaping the benefits. Recent news articles highlight the City's reluctance to increase storm water fees, requiring 95 cents per month per residence across the board, while to recoup its costs, the City should be charging $3 per month.

Now is the time for the Regional Board to clearly articulate in the Permit: noncompliance due to cost will not be tolerated. The Permit is a tool underutilized by Copermittees to obtain necessary funds and plan for the future. If the Copermittees once again fail to use Permit section H., they risk enforcement action. We urge the Regional Board to make clear that noncompliance due to cost is not an excuse. After almost three decades, Copermittees should no longer be allowed to claim poverty as an excuse for post-approval weakening of permits and the requirements therein.

Comment Response

The San Diego Water Board does not consider the ability of a Copermittee to fund a program in determining compliance with the provisions of the MS4 Permit. We agree that the Copermittees are responsible for securing the resources necessary for meeting the requirements of the Tentative Order. Please see the responses to comments 8 and 9. In addition, the "Need to halt or reduce activity is not a defense" per the standard provisions in Attachment B.1(b) and 40 CFR 122.41(c). Also, at Attachment B.(7)(m) and 40 CFR 122.41.(a) states that "ANY noncompliance with this Order constitutes violation of the CWA and is grounds for denial of an application or modification of the Order."

Comment # 89 **Commentor** 10 **Comment Subject** General

Specific Comment

Individual residential car washing is currently listed as exempt from the prohibition against nonstormwater discharge. However, this allowance contradicts other permit sections that evidence the negative water quality impact residential car washing poses. Indeed, car washing is specifically listed as a threat to water quality in the residential permit section. (F.6.b.(3)). It is also provided as an example topic for discussion in the education component for residential and general public outreach. (F.6.b.(4)). Clearly a threat to water quality, and a water supply issue, residential car washing should not be made exempt simply because it requires a change in public behavior. Just as over-irrigation should not be exempt non-storm water, neither should this source of urban runoff.

Comment Response

Neither the San Diego Water Board nor the Copermittees have yet identified residential car washing as a significant source of pollutants that must be prohibited. We invite the commentor to provide the San Diego Water Board with data and studies to satisfy their request in future permits. Please see the response to comment 27.

Comment # 90 **Commentor** 10 **Comment Subject** Action Levels

Specific Comment

As mentioned above, the Bay Council is extremely supportive of the inclusion of NALs and SALs in this Permit. However, the vague Permit language leaves much to be desired. The Permit requires investigation and source identification for a NAL exceedance in a "timely manner". (Permit C.2. and C.3.). It is entirely unclear what constitutes a "timely manner". Further, because the NALs are an illicit discharge identification and elimination tool, time is of the essence. (C.2.b.). In many instances, a NAL exceedance must be investigated contemporaneously with the return of monitoring results, or the source will evade detection. Therefore, the Regional Board should impose a strict numeric deadline for "timely action". We suggest the Copermittee begin investigation of the source of the exceedance the business day following receipt of the monitoring results. The investigation should be expedited, and should not take more than two weeks.

Comment Response

The San Diego Water Board chose the phrase "timely manner" to allow Copermittees flexibility to prioritize investigations and source identification when a multitude of action level exceedances are identified. Also, the phrase "timely manner" allows for the differing return times of field data and lab data. Certainly, field analysis indicating an exceedance should be immediately responded to whereas lab analysis may take weeks to return data which then would initiate an investigation. It is unacceptable to wait for a lengthy QA/QC analysis prior to initiating an investigation; nor is it acceptable to solely rely on subsequent monitoring actions to address the cause of an exceedance.

Comment # 91 **Commentor** 10 **Comment Subject** Monitoring

Specific Comment

In addition, development of the monitoring plan for dry weather is largely left to the Copermittees. (Permit, Attachment E, C.1.b.). Sampling frequency must simply be "representative" of major outfalls and identified stations within each hydrologic subarea. (Id.). The actual frequency of sampling is not mentioned at all. As with most plans developed by Copermittees, this monitoring plan will surely be greatly and artificially constrained by costs. Therefore, we urge the Regional Board to set a minimum monitoring frequency that is scientifically sound, as opposed to a cost-driven frequency.

Comment Response

The referenced section has been written to provide flexibility to the Copermittees when selecting the number and frequency of monitoring major outfalls and identified stations that are a "representative percentage." Thus, the San Diego Water Board expects that the Copermittees will utilize current 303(d) listings, land use, the history of IC/ID complaints and the sensitivity of receiving waters in the selection and sampling of outfalls in order to, at a minimum, obtain a representative percentage over the permit term. The Copermittees have also identified in their ROWD that their current monitoring approach is not consistent with IC/ID requirements. It should be noted that the Copermittees, by being extended a chance to propose the program, have an opportunity to examine other MS4 non-storm water IC/ID programs in the region. Finally, the San Diego Water Board requires the Copermittees to submit their proposed monitoring plan for review prior to implementation.

Comment # 92 **Commentor** 8 **Comment Subject** Monitoring

Specific Comment

Prior to the submittal of the ROWD, the Copermittees met with Board staff to propose changes to the Monitoring and Reporting Program (MRP). In these discussions, Board staff identified two areas for needed improvement:

• Relocation of Illicit Connection I Illicit Discharge (IC/ID) monitoring stations to MS4 outfalls, and
• Incorporation of Action Levels

In more recent discussions, Board staff noted that the MRP needed significant modification to reflect the South Orange County MRP, but would be scaled to be appropriate to the smaller Santa Margarita Region.

[Per Capita Monitoring Cost Comparison Table]

Unfortunately, the final MRP requirements have been expanded well beyond the South Orange County MRP requirements, resulting in a program that is completely out of proportion with the needs and resources of the Santa Margarita Region. In fact, the proposed MRP requirements will result in a 500% increase in monitoring program costs, costing our residents over two and a half times the per capita costs for South Orange County.

The Copermittees recognize that monitoring and data collection is necessary. However, the MRP requirements exceed what is necessary to address management questions related to water quality, are beyond requirements dictated in the South Orange County MRP, and are beyond the Copermittees' ability to fund. Not only are the level of requirements inappropriate for the Santa Margarita Region, but they disregard the economic realities faced by the Copermittees. As such, the MRP fa lls far short of meeting the Executive Officer's stated goals of affordability.

In the interest of finding ways to offer Board staff a comparable program in a more cost effective and appropriate manner, the Copermittees have identified nine adjustments to the MRP that will save approximately seven hundred and eighty thousand dollars ($780,000) annually and bring per capita monitoring costs more in line with the South Orange County MRP, while maintaining the core components of the MRP. Table I summarizes the key changes and the respective cost savings. It is important to note that any change highlighted in RED reflects bringing the program in line with the South Orange County MRP. Figure I below shows graphically the comparative costs for the draft MRP with and without the requested adjustments. Please note that the 100% baseline in Figure 2 reflects the current cost of the Copermittees' current MRP.

[Table 1 - Cost Savings resulting from proposed MRP changes]
[Figure 1 - graph comparing draft permit costs with Requested Changes]
[Cost comparison table with Proposed Changes]

Although the requested adjustments to the MRP will not eliminate cost increases, and will result in an MRP which is more expensive, on a per capita basis, than the South Orange County MRP, they provide a more manageable program for the Copermittees.

The City requests that the Board make the adjustments identified above before Permit adoption.

Comment Response

The two areas discussed during the ROWD meetings were identified because they were proposed by the Copermittees in the ROWD. San Diego Water Board Staff also have made it clear through the process that water quality monitoring requirements under the Tentative Order were expected to be relatively consistent with San Diego and Orange County, as well as the 2004 SMC Report.

San Diego Water Board staff contend that the monitoring required in the Tentative Order has not been expanded “well beyond the South Orange County MRP requirements.” The MRP in the Tentative Order has actually been scaled back where appropriate, and many elements of the San Diego and Orange County MRPs are absent from the Riverside MRP. Furthermore, San Diego and Orange County MRPs in 2007 and 2009, respectively, had reduced monitoring requirements based upon the level of data collection during the previous permit terms. USEPA audits conducted in January 2008 (USEPA Region IX MS4 Inspection Report Riverside County Flood Control and Water Conservation District and County of Riverside, dated 03/31/2008), and subsequent enforcement action by the San Diego Water Board (Notice of Violation No. R9-2008-0053 and No. R9-2010-0074) documented significant short-comings in the Copermittees MRP. Thus,

reductions similar to those for Orange and San Diego County are not warranted.

The San Diego Water Board agrees that monitoring and data collection is necessary, and would go farther to state that water quality monitoring is a critical component of MS4 permits. The San Diego Water Board is attempting to make monitoring requirements for MS4 permits relatively consistent for Copermittees throughout the San Diego Region (see Finding E.12 and Discussion in the Fact Sheet). This is also consistent with Senate Bill 72 (Kuehl), which addressed the standardization of sampling and analysis protocols in municipal stormwater monitoring programs. In response to Senate Bill 72, the Stormwater Monitoring Coalition's Model Monitoring Technical Committee developed a Model Monitoring Program for Municipal Separate Storm Sewer Systems in Southern California in 2004. The San Diego Water Board, as well as Riverside County Copermittees, were represented during the development of the model monitoring program. The monitoring program under the current order (R9-2004-0001) includes some, but not all, recommended monitoring program elements in the 2004 report. In contrast, the San Diego and Orange County MS4 permits contain monitoring programs whose structure and requirements are built upon the 2004 report.

The MRP in the draft tentative order is built upon the 2004 report, and program elements mirror those in the San Diego and Orange County MRPs. Similar to the San Diego and Orange County MRPs, flexibility has been included to aid the Copermittees in determining some level of cost, as well as monitoring direction and focus. It is important to note that the MRP in the current Order does not meet the level of water quality monitoring required in San Diego and Orange County, as well as that prescribed in the 2004 report. Thus, it is expected that additional resources will be required for the Copermitttees to develop a MRP that will sufficiently characterize water quality while meeting the goals and objectives in the 2004 report. As noted above, during the term of the current Order, the Copermittees MRP were audited for permit compliance. These audits found significant deficiencies in the Copermittees MRP. In response, the Copermittees have stated that funds have been spent to meet monitoring requirements under the current Order. It is unknown if the increase in monitoring costs stated by the Copermittees is based upon levels of spending before or after money was allocated in the Copermittees' attempts to bring monitoring into compliance with the current MRP.

Furthermore, USEPA (61 Fed Reg 43761) has addressed the question regarding the quantity of storm water monitoring required for MS4 NPDES permits: "The amount and types of monitoring necessary will vary depending on the individual circumstances of each storm water discharge. EPA encourages dischargers and permitting authorities to carefully evaluate monitoring needs and storm water program objectives so as to select useful and cost-effective monitoring approaches. For most dischargers, storm water monitoring can be conducted for two basic reasons: 1) to identify if problems are present, either in receiving water or in the discharge, and to characterize the cause(s) of such problems; and 2) to assess the effectiveness of storm water controls in reducing contaminants and making improvements to water quality." Again, 2008 USEPA audits found that the monitoring in the current MRP to be insufficient. For example:

"it is unclear how the District is using its monitoring programs to measure the effectiveness of the BMPs it has implemented and to accordingly identify modifications and improvements needed to its SWMP (or DAMP as it is referred to by the permittee)."

And:

"The number and location of illicit discharge monitoring stations did not appear to be effective or sufficient to represent the MS4 and detect illicit discharges that may occur throughout the system."

It is also important to note that while the San Diego Water Board is attempting to make MRP requirements relatively consistent, there are differences in the Riverside MRP when compared to Orange and San Diego County. First, although the Copermittees permit area includes Santa Margarita HU and the San Mateo HA, which drains to portions of San Diego County, the MRP within the Tentative Order does not require any monitoring of downstream receiving waters outside of Riverside County. This is despite the fact that these areas are subject to the discharge from MS4s in Riverside County. While Orange and San Diego County MRPs include monitoring requirements for bays, estuaries, lagoons, and the ocean, the Riverside MRP does not. MRP requirements under the draft Tentative Order are limited to inland surface waters.

Comment # 93	**Commentor** 8	**Comment Subject** Unpaved Roads

Specific Comment

The requirements for unpaved roads are particularly cumbersome, onerous and unreasonable. In summary, the proposed unpaved road requirements may result in substantial and unnecessary additional Copermittee costs that are not justified by the facts in the Santa Margarita Region. The Copermittees believe that the existing MS4 Permit requirements for new development, construction, maintenance and
IC/ID adequately address regulation of unpaved roads that threaten water quality. If the Regional Board believes that unpaved roads require further regulation, the Copermittees believe that the appropriate regulatory mechanism is a general permit (Waste Discharge Requirements or NPDES permit) that would apply to all unpaved roads in the San Diego Region, rather than only those that are under the jurisdiction of the Copermittees.

The City requests that Sections F.1.i, F.3.a.(11) and F.3.c.(5) regulating unpaved roads be deleted from the draft MS4 Permit.

However, should the Water Board insist on retaining unpaved road requirements in this Permit, the Copermittees request the following revisions. These revisions are needed to ensure that all parties have a clear understanding of the requirements. In summary, the Copermittees request:

• Clarification that these requirements apply to those unpaved roads that the Copennittees maintain in their road system.
  - This should be commonly understood, but the clarification is important to include due to complex legal limitations and rights associated with access, ownership, and maintenance of unpaved roads.
• Removal of language that specifies specific BMPs that must be implemented.
  - Specifying the method ofcompliance is prohibited pursuant to CWC section 13360, and inappropriately forces the Copermittees to adopt paliicular solutions that may not best fit the situation.
• Removal of requirement for BMPs for private unpaved roads.
  - The proposed requirements would require the creation of an additional and unnecessary program element addressing privately owned unpaved roads. The Copermittees believe that a focused public outreach program should be implemented to educate property owners and associations about the need to properly maintain unpaved roads. This education program combined with existing IC/ID enforcement capabilities seems a more reasoned and responsible response to addressing this issue.

Should Sections F.1.i, F.3.a.(1l) and F.3.c.(5) regulating unpaved roads not be removed from the Permit, the City requests they be modified as noted above.

Comment Response

Please see the responses to comments 101, and 138-141.

Comment # 94	**Commentor** 8	**Comment Subject** New Development

Specific Comment

Section F.I.f of the draft MS4 Permit includes new requirements for the Copermittees to verify that Post-Construction BMPs are being appropriately maintained. The new requirements appropriately develop a risk-based approach to inspections, defining eight factors that the Copermittees must consider in determining 'high-priority' projects.

However, language in Section F.1.f.(2)(a) removes that discretion by stating:

'At a minimum, high priority projects include those projects that generate pollutants (prior to treatment) within the tributary area of a 303(d) listed waterbody impaired for that pollutant; or those projects generating pollutants within the tributary area for an observed action level exceedance of that pollutant.'

This language is excessively broad, and will require virtually all sites in the watershed to be designated as ' high priority' and therefore subject to annual in spections. This language is inconsistent with the goals of a socia lly responsible and affordable permit and should be modified for several reasons:

• Inspections frequencies should be based on risk of discharge. Annual inspections are not needed for all sites that generate a specific pollutant. For example, if a site generates a pollutant associated with 303(d) listing, but the site retains runoff onsite or stores those pollutants indoors,
annual inspections would be unnecessary. However, sites that store 303(d) listed pollutants outdoors or otherwise have a high risk of discharge should be inspected more frequently.

• The language dilutes Copermittee resources by requiring annual inspections of low-risk sites, preventing the Copermittees from appropriately concentrat ing resources on problematic sites/sources. This is because when an action level is exceeded then all parties in the watershed
are assumed guilty until proven innocent.

While the Copermittees are not opposed to implementing a program to verify that these BMPs are being maintained, it is critica lly important that they be provided the flexibility to determine which sites warrant annual inspections. Specifically, the City requests that the language in F.1.f.(2)(a) be amended as follows prior to adoption of the Permit:

'At a minimum, high priority projects include those projects that have been determined to be the source of an observed action level exceedance.' [final proposed text - proposed amended language in underline/strikeout text not shown]

Comment Response

The San Diego Water Board recognizes that the language in F.1.f.(2)(a) may be too broad and may result in identifying many SSMP projects as high priority projects. Thus, we have revised the language to provide more specificity, which will limit the number of SSMP project sites that will need to be inspected.

Comment # 95 **Commentor** 10 **Comment Subject** Reporting

Specific Comment

Most Copermittees expend tremendous resources on preparing and submitting their Annual Reports, but view this requirement as overly burdensome and largely an exercise in futility. After reading numerous and varied municipality Annual Reports, we tend to agree. Annual Reports are massive documents with surface-level detail, no depth, and very little substance. Copermittees are loath to point out any failures or inadequacies in their storm water programs, and virtually never highlight deficiencies. Instead, systemic issues such as lack of enforcement and funding, evident during field visits, remain unmentioned in Annual Reports.

Therefore, the Bay Council suggests a more appropriate tool for public involvement, reporting, and monitoring progress would be real-time or quarterly electronic reporting. The State Water Resources Control Board has moved into the digital age, making a variety of documents and reports publicly available via the internet. We encourage the Regional Board to work with Copermittees, utilizing the permissive Permit language to explore such a possibility. Neither the Regional Board, nor the individual Copermittee, is served by rigid reporting requirements that result in largely unread or useless documents. (Permit, K.)

Specifically, the dry and wet weather monitoring results should be available publicly online as soon as the results are received. NAL and SAL exceedance real-time reporting would benefit Copermittees as the public could aid in investigations or prove an otherwise valuable source of
information. Such real-time reporting might also prove a successful deterrent to illicit discharges. The Copermittees should further report inspections, BMP maintenance tracking, and SSMP project inventories quarterly. Construction site, municipal, industrial, and commercial inspections should also be reported quarterly. This type of information is invaluable to the public and the Regional Board, but is largely unavailable to either as Annual Reports are an attempt to summarize such information compiled over long periods of time. Smaller doses would prove more useful and easily digestible.

Comment Response

The San Diego Water Board agrees with the comment regarding the importance of making information, especially water quality monitoring results, available to the public for review. Although real-time data reporting is an admirable goal, the feasibility of real-time uploading is unknown. The San Diego Water Board does not want to include permit requirements where real-time uploading somehow limits IDDE monitoring and response which may be time-sensitive.

The MRP (Attachment E to the Tentative Order) requires the data collected to be SWAMP compatible, and other Regional Water Boards have already required Copermittees to upload data into on-line databases. Thus, the MRP section has been modified to require the Copermittees to upload water quality data into the California Environmental Data Exchange Network (CEDEN, http://www.ceden.org/) to facilitate the exchange of data between resource agencies, Copermittees, research institutions, and the public.

Comment # 96	**Commentor** 8	**Comment Subject** Commercial/Industrial

Specific Comment

Sections F.3.b.(1)(a)(i) and (ii) identify forty-two (42) categories of businesses that must be inventoried and inspected based on risk of pollutant discharge. However, Section FJ .b.(I)(a)(iii) adds virtually any business in the Permit area, independent of pollutant discharge risk:

'All other commercial or industrial sites/sources within or directly adjacent to or discharging directly to receiving waters within environmentally sensitive areas (as defined in Attachment C of this Order) or that generate pollutants tributary to an observed exceedance of an action level.'

[n effect, section F.3.b.(I)(a)(iii) adds the following additional businesses:

• EVERY business that is adjacent to (or within) an Environmentally Sensitive Area (ESA), regardless of whether the business generates or discharges any pollutants, and

• EVERY business that 'generates' pollutants which happens to be upstream of an action level exceedance, regardless of whether the site has ever discharged any pollutants.

This language expands the list of sites far beyond the current requirements, and well beyond those sites that actually pose a threat to water quality. This is clearly unnecessary and should be removed for several reasons:

• It inappropriately separates 'risk' from the 'response' , by requiring the Copermittees to inspect businesses irrespective of the risk that the business poses to water quality. For example, this language would require the Copermittees to expend resources and time inspecting hair salons, office buildings and other activities that happen to be adjacent to an ESA. This inappropriate broad-brush approach to permitting actually works to discredit the Copermittees NPDES programs and dilute resources, rather than enhancing protection of water quality.

• It will further remove the flexibility that the Copermittees need to be able to re-allocate resources to inspecting and following up with sites/sources that are problematic.

Therefore, the City requests that the language in F.3.b.(1)(a)(iii) be amended as follows prior to adoption of the Permit:

'All other commercial or industrial sites/sources that have been determined to be the source of an observed exceedance of an action level.'
[final proposed text - proposed amended language in underline/strikeout text not shown]

Comment Response

The San Diego Water Board recognizes that the language in F.3.b.(1)(a)(iii) may be too broad and may result in including too many commercial/industrial sites in the inspection requirements. Thus, we have revised the language to provide more specificity, which will limit the number of commercial/industrial sites that will need to be inspected.

Comment # 97	**Commentor** 10	**Comment Subject** Hydromod

Specific Comment

As with the San Diego HMP, the exemption for conveyance channels whose bed and bank are concrete lined all the way from the point of discharge to water storage reservoirs and lakes will prevent rehabilitation of these areas, especially in light of the retrofit requirements elsewhere in the Permit. (Permit, F.1.h.(4)(b)). Moreover, this exemption encourages continued channelization efforts. We urge the Regional Board to remove this exemption.

Comment Response

The San Diego Water Board does not agree that this exemption encourages continued channelization efforts. The exemption may only be used if the concrete lined channels already exist and does not prevent future retrofitting or rehabilitation. Also, the exemption cannot be used as justification to install additional concrete lined channels if they do not already exist. We also do not expect there to be many existing concrete lined channels that can be utilized for the exemption. Removal of this exemption may be considered in future iterations of the MS4 Permit.

Comment # 98	**Commentor** 8	**Comment Subject** Commercial/Industrial

Specific Comment

Section F.3.b.(4)(a) specifies what the Copermittees must review when performing an inspection. The new requirements in sub sections (i) and (ii) to review BMP implementation plans, and review facility monitoring data, respectively, are an unnecessary new mandate. They should be removed for several reasons:

• The requirements burden the Copermittees with reviewing information that is required under General Permits and is the responsibility of the Regional Board to enforce.

• The requirements would significantly increase the inspection time for sites with General Permits and endanger an existing collaborative inspection program (Compliance/ Assistance Program (CAP)) that leverages the time that highly trained Environmental Health Inspectors spend onsite for Certified Unified Program Agencies (CUPA) and Food Services inspections to also conduct NPDES inspections. The CAP program not only utilizes highly trained Environmental Health inspectors, but also regionalizes the inspections and therefore provides multiple benefits including uniformity, reduction in total number of inspections and higher-quality inspections. The Environmental Health HazMat inspection program administrators have indicated that they cannot accommodate the additional time required to implement the new requirements, as they would unduly cut into their ability to meet their own state-mandated inspection frequencies.

• By virtue of eliminating the CAP program, the requirements would effectively mandate a more fractured and disconnected set of inspections for the businesses, contrary to CAL EPA mandates for consolidated inspections, and in turn diluting the effectiveness of the program.

The City requests that the language in F.3.b.(1)(a)(iii) be amended as follows prior to adoption of the Permit:

(a) Inspection Procedures: Inspections must include but not be limited to:
(i) [Delete]
(ii) [Delete]
(iii) Check for coverage under the General Industrial Permit (Notice of Intent (NOI) and/or Waste Discharge Identification Number), if applicable;
(iv) Assessment of compliance with Copermittee ordinances and Copermittee issued permits related to runoff;
(v) Assessment of the implementation, maintenance and effectiveness of the designated minimum and/or enhanced BMPs;

Comment Response

The San Diego Water Board disagrees with the proposed changes. The San Diego Water Board disagrees that including a review of the BMP management plans and monitoring data, if available, would significantly increase inspection times and endanger the Copermittees' CAP program. Availability of BMP management plans and monitoring data are expected to be limited to few industrial sites not otherwise inspected by the CAP.

Inspectors can obtain valuable information for conducting their site inspections if a BMP management plan (.e.g., SWPPP or SPCC) is available for review, and if the site has collected monitoring data. Reviewing a BMP management plan can actually reduce inspection time by providing the inspector information about where BMPs and storm drain inlets are implemented and/or located. Reviewing monitoring data can inform the inspector of the types of pollutants that may be generated at a site and compliance with local ordinances, and will only take a few minutes to review. HazMat inspectors should already be inspecting these types of information. CAP inspectors can easily be trained to review these types of information. The Tentative Order does not prohibit the Copermittees continued coordination with CAP to conduct inspections and compliance oversight.

The Copermittees expressed some concern that BMP implementation plans may be interpreted as the SSMP that is developed for the site. The Tentative Order has been modified to clarify that BMP management plans do not include SSMPs (or WQMPs) that are developed for the development of the site. As such, clarifying language has been included in the errata for the Tentative Order.

Comment # 99 **Commentor** 8 **Comment Subject** Retrofit

Specific Comment

Section F.3.d, proposes a program to develop an inventory of existing developments that may be candidates for future water quality retrofits, The requirement goes on to encourage the Copermittees to collaborate with local property owners to promote urban retrofit in an effort to accelerate reductions in pollutant loading from existing urban areas.

Although laudable, this requirement has two significant problems:

1) The program is self-defeating as it contains no "carrots" to lure private property owners into participating in the program, Any property owner that is interested in volunteering in this effort would be required to fully comply with all provisions of the draft MS4 Permit. This includes preparation of compliance documents such as SSMPs, LID and hydromodification studies, subjecting themselves to additional regulatory scrutiny through business and BMP inspection programs required by the MS4 Permit, and otherwise incurring a myriad of costs and requirements. These costs and requirements would provide a strong disincentive to participate in a retrofit program, This program will only work if it is modified to remove these disincentives.

2) Current and projected economic conditions will limit the interest and participation of private property owners, Long-term economic predictions for Riverside County indicate that assessed valuations and property values wi ll likely remain stagnant for the term of this Permit. Similarly, sales tax and unemployment are not expected to significantly improve either.

Without Co-Permittee resources to supplement private retrofit projects, the current economic disincentives for private redevelopment that are built into the program and the current impact of the economy on private property owners, there is no real value to the program.

PREFERRED POLICY CHOICE: The City strongly requests that this program be deleted for the aforementioned reasons.

Alternatively, and at minimum, the Copermittees request that the schedule for completion of the retrofitting program be revised to provide for development during the term of the Permit and submittal of the proposed program with the next ROWD. This will allow the Copermittees to defer expenditures related to development of the program until later in the Permit term when it is hoped that economic conditions and local revenues will improve. The Copermittees expect few opportunities for retrofit until the economy improves. Due to the Copermittee's limited ability to require retrofit on private property, our best opportunities for retrofit may be associated with approvals of proposed modifications of existing developments.

ALTERNATE POLICY CHOICE: If the Retrofit requirements are not removed, the City requests that the Regional Board modify Section F.3.d. as follows:

Each Copermittee must develop and implement a retrofitting program that meets the requirements of this section upon submittal of the ROWD.

Comment Response

The San Diego Water Board disagrees with the commenter's concerns. First, the San Diego Water Board disagrees that all retrofit projects on privately owned properties will be or must be subject to SSMP redvelopment requirements. Most retrofit projects will easily be less than 1 acre in size and not create, add, or replace 5,000 square feet of impervious surface. Thus, those projects would not be subject to the SSMP, LID, and HMP requirements.

Second, the San Diego Water Board disagrees with the assumption that the current economic conditions will limit interest from private property owners. Retrofit interest already exist through the CWA Section 401 certification program, Supplemental Environmental Projects (SEPs), and grant programs. Retrofits do not have to be expensive. Retrofits could be as simple as redirecting downspouts from roofs to pervious or landscaped areas instead of to hardscaped areas discharging directly to the MS4. Private property owners will show interest if they become educated about the benefits of retrofits, especially if they are inexpensive and easy to implement.

The San Diego Water Board disagrees with the commenter's request to remove or delay the retrofitting requirements from the Tentative Order. Discharges from existing development sites need to be mitigated, which generally means implementation of measures to retrofit existing development sites with storm water control measures that can retain and/or treat storm water on site. Retrofitting existing development is possible and reasonable to significantly improve water

quality in receiving waters. The USEPA supports including the retrofitting existing development requirements in the Tentative Order (see comment 17).

Finally, the San Diego Water Board has already reduced the scope of this effort, and delayed submittal requirements as a result of discussions with the Copermittees prior to release of the Tentative Order. Any further reduction or delay would result in significant missed opportunities for implementing feasible retrofitting projects. The Copermittees must begin the planning and preparation sooner rather than later to identify opportunities for implementing retrofit projects to protect water quality from discharges of pollutants from existing development. No changes were made based on this comment.

Comment # 100 **Commentor** 8 **Comment Subject** Overirrigation

Specific Comment

The Draft MS4 Permit categorically prohibits the discharge of landscape irrigation; irrigation water; lawn watering; (collectively 'irrigation runoff) and non-emergency fire fighting flow runoff to the MS4. The basis for this requirement comes from the current Orange County storm water permit within the San Diego Region (NPDES No. CASOI08740), which prohibits such discharges.

Although irrigation runoff may have been shown to be a problem in South Orange County, it has not been shown to be causing problems in receiving waters in the Santa Margarita Region. Attachment 6 summarizes the unique conditions and other facts that warrant the restoration of irrigation runoffas a nonprohibited non-storm water discharge category. lt is important to reiterate the three key points made in
Attachment 6

• Unlike the watersheds in South Orange County, the Santa Margarita Region is an ephemeral watershed;

• Unlike South Orange County, the Copermittees have not identified landscape irrigation, irrigation water or lawn water as an actual source of pollutants or conveyance of pollutants to waters of the U.S.;

• The draft MS4 Permit requires Copermittees to eliminate irrigation runoff TO THE MS4, which by definition, requires elimination of discharges to streets, curbs and gutters.

As noted above, the prohibition appears to hold the Copermittees responsible for any amount of irrigation runoff discharged to the curb and gutter, regardless of whether or not the discharge ever reaches receiving waters or causes or contributes to the exceedance of a water quality standard. This fact, combined with the fact that irrigation runoff has not been shown to be causing impairments in the local receiving waters, will make enforcement difficult to justify with residents and will likely result in community outrage over bans on irrigation. Further the Copermittees are not water purveyors, and as such, have little control over residential irrigation runoff outside of sending code enforcement officers out to look for incidents of excessive irrigation runoff. This is a very inefficient use of resources. In any event, the provisions as written will do little for water quality but potentially much for community outrage against water quality programs. The Copermittees do not believe this is the intent of the Board. It is further worth noting that the Permit already contains an investigation and remediation process via Non-Storm water Action Levels (NALs) by which the Copermittees will identify the source of problematic non-storm water discharges. Should the source be found to be a conditionally exempt nonstorm water discharge, the permit requires the Copennittees to address that discharge or the entire category of discharges as appropriate. By allowing the NAL process to determine when and where conditionally exempt discharges need to be prohibited, the Copermittees are better positioned to justify any enforeement actions.

PREFERRED POLICY CHOICE: The City requests that the Regional Board restore the conditional exemption for landscape irrigation, irrigation water and lawn watering.

Alternatively, if the Regional Board nevertheless insists on prohibiting Irrigation Runoff, the Copermittees request that the draft MS4 Permit be revised to allow for irrigation runoff to be managed as a JRMP program, rather than as a prohibited discharge to the MS4. This alternative request is eonsistent with how the Permit currently deals with non-emergency fire fighting discharges, which was also removed from the list of non-prohibited non-storm water discharges. The Executive Officer stated that he would be open to consideration of a program for irrigation runoff that would address discharges from the MS4. This alternative approach allows the Copennittees to develop a program that focuses on irrigation runoff problem areas, as opposed to holding the Copermittees responsible for eliminating any instant case of over-irrigation to a street independent of threat to receiving water quality.

ALTERNATIVE POLICY CHOICE: The City requests that the Regional Board clarify that irrigation runoff is only prohibited where it is discharged/rom an MS4 (into receiving waters) by adding the following language:

B.4. As part ofthe JRMP, the Copermittees must develop and implement a program to address pollutants from landscape irrigation, irrigation water and lawn watering identified as significant sources of pollutants to waters ofthe United States.

Comment Response

The San Diego Water Board agrees, in part, that the basis for prohibiting the discharge of overirrigation runoff and non-emergency fire fighting flow runoff into the MS4 is the Orange County MS4 Permit. The San Diego Water Board has also cited several other sources to justify the prohibition in the Fact Sheet. The San Diego Water Board does not agree with the commenter's recommendation to restore the overirrgation runoff categories as non-prohibited non-storm water categories. Please see the responses to comment 25, 27, 83, and 175.

The San Diego Water Board disagrees that the prohibition will make enforcement difficult to justify with residents and will likely result in community outrage over bans on irrigation. This is not a ban on irrigation; rather, overirrigation discharging to the MS4. The prohibition is consistent with the Water Conservation in Landscaping Act (AB1881), which already required cities and counties to adopted landscape water conservation ordinances prohibiting runoff from inefficient landscape irrigation by Janaury 1, 2010. The cities and counties are required to adopt ordinances that prohibit runoff from "the target landscape" to "adjacent property, non-irrigated areas, walks, roadways, parking lots, or structures." The Copermittees are already required to enforce these ordinances.

The San Diego Water Board disagrees with the the commenter's "Preferred Policy Choice". The change proposed by the commenter's "Alternative Policy Chioce" is not necessary. In the event that overirrigation runoff is identifed as an illicit discharge to "adjacent property, non-irrigated areas, walks, roadways, parking lots, or structures", which includes the Copermittees' MS4s, the Copermittees are expected to address the illicit discharge through their IC/ID programs. No changes were made based on this comment.

Comment # 101 **Commentor** 13 **Comment Subject** Unpaved Roads

Specific Comment

There are many different categories of unpaved roads within the unincorporated County area. These include County-Maintained unpaved roads, dedicated and accepted public roads (which are not County maintained), roads dedicated but not accepted, private roads, utility access roads, roads through tribal lands, and others. These roads are maintained by numerous entities besides the County, such as Homeowners Associations, quasi-public entities like County Service Areas, Community Service Districts, public and private utilities, Tribes, and in many cases, individual property owners. The County in fact is prohibited by law from spending general gas tax dollars (our main funding source) for maintenance of roads not in the County Maintained Road System, and is not financially able to take on new unpaved roads into the County Maintained System until they are improved to County Standards.

The proposed permit requirements would therefore impose an undue and substantial regulatory burden on the County and would create a class of potential unwitting "violators" that are not familiar with these requirements, including hundreds if not thousands of property owners that have been maintaining unpaved roads for many decades as needed to access their property. The special requirements for development and maintenance of unpaved roads were proposed by Regional Board staff for inclusion in the draft MS4 Permit very late in the process, after a number of weeks of discussions on the overall permit language and just prior to release for the Santa Margarita Region for public comment. During those discussions, unpaved roads were not raised by Regional Board staff as a source requiring additional regulatory attention.

Given the complexity of these jurisdictional issues, and the number of stakeholders that would be impacted, we respectfully request that the regulation of unpaved roads be removed from this permit. Alternatively, unpaved roads could be considered as part of a separate general permit to allow for proper stakeholder involvement and vetting, at the least within those areas of the permit (see below) that have to do with maintenance
provIsions. Given the complexity of this issue and the impact on thousands of properties, another option is to achieve a water quality benefit through education programs, not using limited resources on regulation and enforcement. We also note that unpaved road regulation was not included in the recent Orange County permit. Orange County receives approximately 8 times the amount of funding on a per mile
basis towards their County-Maintained roads as does Riverside County, so imposing additional requirements on the Riverside County permit magnifies the undue regulatory and financial burden.

Comment Response

The Tenative Order's requirements for the maintanence of unpaved roads does not require the County to maintain any roads that are not within the County's Maintained Road System. Rather, if a road is not maintained by the County, the Tenative Order requires the County to ensure the party(ies) responsible for maintaining the road conduct road maintenance for the protection of water quality. As such, the commenter's concern about spending general gas tax dollars or taking on new unpaved roads into the County Maintained System is unfounded.

Contrary to the commentor's assertion, the unpaved roads requirements were not proposed "very late" in the process. It was proposed and discussed proir to the release of the Tentattive Order, and modifications were made as a result of these discussions (also prior to the release of the Tentative Order). The County Department of Transportation had the same public comment period timeframe to review and comment on the Tentative Order's provision as any other public or private agency or individual, if not more. Furthermore, any concerns about process does not diminish or negate the water quality impacts currently caused by unpaved roads. Please also see the response to comment 104.

Within south Orange County, unpaved roads were not identified as a source or potential source of water quality pollution; therefore the requirements were not included in the Orange County MS4 Permit (Order No. R9-2009-0002). South Orange County is mostly in a built-out condition and has very few unpaved roads in comparison to Riverside County. In addition, the San Diego Water Board has not received the same level of complaints or investigations for unpaved roads in Orange County.

Nevertheless, the San Diego Water Board is sensitive to the Copermittee's perceived difficulties with protecting water quality from runoff from privately maintained unpaved roads and has removed the regulation of unpaved roads maintained by private parties, section F.3.c.(5). The San Diego Water Board reserves the right to include provisions for unpaved roads that protect water quality in future MS4 permits, WDRs or individual/general NPDES permits.

Comment # 102	**Commentor** 13	**Comment Subject** Unpaved Roads

Specific Comment

Requirements for the development of unpaved road projects are addressed in section F.1.i. on page 45 of the Draft MS4 Permit. This requirement states:

i. Unpaved Roads Development
The Copermittees must develop, where they do not already exist, and implement or require implementation of erosion and sediment control BMPs after construction of new unpaved roads. At a minimum, the BMPs must include:
(1) Practices to minimize road related erosion and sediment transport;
(2) Grading of unpaved roads to slope outward where consistent with road engineering safety standards;
(3) Installation of water bars as appropriate;
(4) Unpaved roads and culvert designs that do not impact creek functions and where applicable, that maintain migratory fish passage;

It is our contention that construction of new unpaved roads is already adequately regulated through development regulations. New unpaved roads built through development fall under the definition of a "project", and as such are already required to develop and implement project-specific SUSMPs, which include identification of BMPs in the same manner as required of other development projects. Unpaved road projects
are also required to comply with the General Permit-Construction which requires preparation of a SWPPP. These requirements are implemented by the Permittees during the development review process and in issuance of grading permits. We also note that the development process already achieves a gradual "retirement" of unpaved roads, as the County requires in many cases that new development replace unpaved access roads with paved access.

Additional separate requirements for development of unpaved roads are redundant to these requirements and may only complicate compliance. However, if the Board wishes to include permit language to further clarify what is already required through these permits, we would be pleased to work with the Board to help craft appropriate language.

Comment Response

The definition of a new development Priority Development Project requiring a SSMP only addresses roads with impervious surfaces or ones that are greater than one acre. Further, the Construction Stormwater Permit (Order 2009-0009-DWQ) and associated SWPPP, do not address post-construction BMPs in areas that are already regulated by a Phase I MS4 permit.

The requirements are not redundant but rather specific to the unique water quality impacts caused by unpaved roads development. To whatever extent there exists overlap with the existing SSMP and grading permit approval processes, this should result in minimal additional efforts for the Copermittees to implement.

Comment # 103	**Commentor** 13	**Comment Subject** Unpaved Roads

Specific Comment

This is our primary issue of major concern, particularly since the proposed language would appear to impose regulatory requirements on roads that are not part of the County Maintained Road System that we operate.

Requirements for the maintenance of unpaved road projects are addressed in section F.3.a.(10) on page 56 of the Draft MS4 Permit. This requirement states:

(10) Unpaved Roads Maintenance
(a) The Copermittees must develop, where they do not already exist, and implement or require implementation of BMPs for erosion and sediment control measures during maintenance activities on unpaved roads, particularly in or adjacent to receiving waters.
(b) The Copermittees must develop and implement or require implementation of appropriate BMPs to minimize impacts on streams and wetlands during unpaved road maintenance activities.
(c) The Copermittees must regularly maintain their unpaved roads adjacent to streams and riparian habitat to reduce erosion and sediment transport;
(d) Re-grading of unpaved roads during maintenance must be sloped outward where consistent with road engineering safety standards;
(e) Through their regular maintenance of unpaved roads, the Copermittees must examine the feasibility of replacing existing culverts or design of new culverts or bridge crossings to reduce erosion and maintain natural stream geomorphology.

As we have stated, this issue should be addressed through a broad general permit or an education program. However, if the Board finds it necessary to impose additional permit requirements on maintenance activities, which go well beyond the Board's previous definitions of a "project", we respectfully request that this language be rewritten to make it clear that it applies to those roads within the County (or City) Maintained Road System.

Comment Response

The Copermittees are encouraged to include unpaved roads as part of their education program. The San Diego Water Board reserves the right to issue a broad general permit regulating the discharges from unpaved roads. Uuntil such time, it is appropriate to regulate unpaved roads through the MS4 permit per 40 CFR 122.26 (d)(iv)(A)(3) which does not distinguish between paved or unpaved roads. This is supported by the San Francisco Bay Area MS4 permit adopted in 2009. Please also see the response to comment 101.

Comment # 104 **Commentor** 13 **Comment Subject** Finding

Specific Comment

Findings D.l.C, pg 57-59, states:

"During the previous permit period, the San Diego Water Board identified, through investigations and complaints, sediment discharges from unpaved roads as a significant source of water quality problems in the Riverside County portion of the San Diego Region. Enforcement and inspection activities conducted by the San Diego Water Board during the previous permit term have found a lack of source control for many unpaved roads within the jurisdiction of the Copermittees".

The Department supports the continued application of development and construction requirements and maintenance of temporary post-maintenance erosion a[1d sediment control BMPs as specified in existing permits. However, we do not believe that sufficient justification has been presented to support the identification of unpaved roads as a Significant source of water quality problems in the Santa Margarita Region. In these days of uncertain state funding and dwindling local funding sources, every dollar spent on additional regulatory requirements needs to be weighed against the benefit of otherwise using funding on basic public health-and-safety needs such as road maintenance and safety improvements.

The discussion of Finding D.1.c. states that the inclusion of unpaved road requirements were based on findings by the San Diego Regional Board during typical compliance assurance activities, audits, or receipt of complaints. However no feedback from these activities were reported to the Permittees at the MS4 Permit discussions prior to the proposal of the unpaved road requirements just before the draft permit was released.

The Department has reviewed the documents cited by Regional Board staff in the discussion of Finding D.1.e. and the conditions in the Santa Margarita River are vastly different from those in Pennsylvania and Northern California cited in those documents. Nevertheless, these documents do not suggest that unpaved roads are a significant source requiring special attention in MS4 permits. Further, neither the Permittee's monitoring data nor our observations support a conclusion that unpaved roads are a significant source of pollutants warranting special regulatory attention and we request that this finding be deleted unless significant data specific to the Santa Margarita Region can be produced. In particular, the Department requests a copy of the investigations and complaints along with the data that supports a significant source of water quality problems on unpaved roads, including a listing of roadways where water quality problems have been identified.

Comment Response

The San Diego Water Board disagrees with the commenter about the events leading to the inclusion of the unpaved road requirements in the Tentative Order. While the inclusion may not have been discussed at the beginning of the more than a dozen meetings that took place before the Tentative Order was released to the public, it was discussed multiple times before the release. The need to include the unpaved road provisions was identified after an early meeting with the Copermittees about the municipal program component of the Tentative Order. The Copermittees were provided the draft unpaved roads provisions as soon as they were drafted. After the Copermittees reviewed the draft language, it was discussed during at least two subsequent meetings. After the discussions with the Copermittees, the language was modified significantly based on the comments and recommendations of the Copermittees. Please also see the response to comment 101.

The San Diego Water Board has received several complaints about and observed several instances where sediment from unpaved roads has discharged into waters of the U.S. and/or State, causing a condition of pollution and/or nuisance. The commenter is welcome to review the documentation and records regarding these complaints and investigations, which are available to the public at the San Diego Water Board. Please also see the response to comment 138.

The San Diego Water Board took into consideration the Copermittees' concerns in the development of the unpaved roads requirements. The San Diego Water Board worked with the Copermittees in the development of the unpaved roads requirements and made changes where appropriate (in addition, see the responses to comments 101 and 139-141). The San Diego Water Board maintains that the Tentative Order should include provisions that specifically address pollutants from unpaved roads.

Comment # 105 **Commentor** 12 **Comment Subject** LID

Specific Comment

The exclusion of economic feasibility in provisions F.1.d.(4)(a), F.1.d.(4)(c), and F.1.d.(7)(b) is readily apparent (only technical feasibility is mentioned) and we urge correction and explicit recognition of conducting both technical and economic feasibility analysis when evaluating the appropriate combination of LID controls that meet the Permit's performance sizing criteria as defined in F.1.d.(4)(c). In particular, the Tentative Order requires in F.1.d.(4)(a) that "each copermittee must require LID BMPs or make a finding of technical infeasibility for each priority development project" and in F.1.d.(4)(c) that "if onsite infiltration LID BMPs are technically infeasible per section F.1.d(7)(b), other LID BMPs may be allowed for use to treat stormwater onsite provided that other LID BMPs are sized to hold the design storm volume that is not infiltrated." In both instances, economic feasibility is excluded and this omission must be corrected given the importance of balancing technical and economic feasibility. In fact, the San Diego Regional Board recognized the importance of economic feasibility in the South Orange County MS4 permit and included the following language in the adopted permit (R9—2009-0002, Section F.(7)(b)):

"For each PDP participating, a technical feasibility analysis must be included demonstrating that it is technically infeasible to implement LID BMPs that comply with the requirements of Section F.1.(d)(4). The Copermittee(s) must develop criteria for the technical feasibility analysis including a cost benefit analysis, examination of LID BMPs considered and alternatives chosen."

We ask that the Board make the south Riverside County permit language at least consistent with that included in the adopted south Orange County MS4 permit and explicitly allow economic feasibility to be considered when evaluating appropriate LID BMPs to meet the onsite performance standard.

Comment Response

The San Diego Water Board found the addition of an economic feasibility analysis on a project proponent could be unnecessarily burdensome. A cost benefit analysis for LID BMPs is unnecessary because USEPA studies have demonstrated that LID is both fiscally and environmentally beneficial (USEPA, "Reducing Stormwater Costs through Low Impact Development (LID) Startegies and Practices, December 2007, EPA 841-F-07-006). In the vast majority of cases, significant savings were realized due to reduced costs for site grading and preparation, stormwater infrastructure, site paving, and landscaping.

Comment # 107 **Commentor** 12 **Comment Subject** LID

Specific Comment

We appreciate the Board's recognition in the Fact Sheet that properly engineered LID filtration BMPs are available to a project developer to meet the LID performance standard. However, we are troubled by the pervasive use of the terms "without runoff" and "hold the design storm volume that is not infiltrated" in the Tentative Order. These terms continue to propagate the incorrect application of LID in that stormwater that has undergone filtration and/or treatment cannot be of equal or better quality than that retained on site given the performance criteria specified in F.1.d.(4)(c). We again urge the Regional Board to eliminate these terms and expressly allow biofiltration and biotreatment LID practices to meet the onsite performance standard without having to perform an exhaustive technical and economic feasibility analysis and to not relegate these controls to a lesser status.

Comment Response

Comment noted. The errata in the Tentative Order clarifies that LID filtration BMPs that provide equal or better quality than that retained on site may be used and are preferred to conventional post-construction storm water treatment BMPs.

Comment # 108	**Commentor** 11	**Comment Subject** LID

Specific Comment

The Office of Water Resources Supports Low Impact Development (LID) in Concept:

The Office of Water Resources (OWR) supports the concept of LID from a water quality perspective. Cleaner water coming onto Camp Pendleton not only sustains healthy ecosystems, but also ensures water in Camp Pendleton's aquifers is safe and suitable for potable use. Although, implementation of LID is expected to improve the quality of water that reaches Camp Pendleton via the Santa Margarita River (SMR), if improperly structured, LID has the potential to reduce the volume of high quality water that would otherwise arrive downstream to support beneficial uses on Camp Pendleton. Beneficial uses on Camp Pendleton, which are supported by historic baseflows in the SMR, include-but are not limited to--providing seventy percent of Camp Pendleton's water supply and sustaining populations of threatened and endangered species.

Comment Response

Comment noted.

Comment # 109 **Commentor** 11 **Comment Subject** Legal

Specific Comment

The Proposed Tentative Order Remains Problematic From a Water Supply Perspective:

OWR appreciates that the Regional Board has already included provisions in the Proposed Tentative Order that appear oriented towards protecting downstream water users from encroachment of historical flows. However OWR remains concerned that some provisions in the Proposed Tentative Order could be read to incentivize removal of native SMR water from the watershed in a manner that has the potential to reduce SMR baseflows. We have suggested revisions to the Proposed Tentative Order at the end of this memorandum that we believe will further reduce the risk to our water supply.

Treatment of Runoff Before Discharge into Receiving Waters:

Finding E.7 on (page 14) raises a potential dilemma for MS4 operators that could facilitate large scale impoundment and export of stormflows for "runoff treatment" to the detriment of downstream water right holders. Specifically, Finding E.7 states that"[t]reatment and/or mitigation must occur prior to the discharge of runoff into receiving waters." Because achieving water quality standards may require extensive treatment-particularly to achieve the existing nutrient standards in the Basin Plan, there is real risk that developers of large scale development/retrofit projects will impound large amounts of water onsite in lined facilities or export the water to a watershed with less stringent water quality objectives where the water can be discharged (or reclaimed for consumptive use) at significant savings to the MS4 or project developer.

To address this concern, the Regional Board should consider adding a section to the Findings in the Proposed Tentative Order which clarifies that impoundment or export of storrnwater/rainwater for the purpose of avoiding pertinent discharge standards and/or basin plan objectives is not a proper use of stormwater absent demonstration of compliance with California Water Code Sections 1200-1225.

Along these lines, and to reduce risk that storrnwater capture will reduce historic baseflows or otherwise diminish the water rights of downstream water users, we recommend the following additional revisions to the Proposed Tentative Order:

1. Revise Section F.lc.8 (page 29) to read as follows:

Rain water harvesting, where feasible andfully protective ofdownstream water rights, must be implemented as part of the site design and construction, and to supplement offsite beneficial uses.

2. Amend Section F.3.d.2 to add an additional criterion, along the lines below for prioritizing retrofit of existing development:

(k) the extent such projects are fully protective of downstream waterrights
[footnote to F.3.d.(2)(k): This recommended amendment will promote consistency with Section F.3.d.6(d) and ensure that the prioritization of retrofit projects properly considers the ramifications of retrofit on downstream baseflows.]

Comment Response

The San Diego Water Board believes that significant export of stormwater flows outside of the watershed will require waste discharge requirements. Section F.1.c.(8), Infiltration and Groudnwater Protection, has been modified to include language that is intended to be protective of downstream water rights.

Section F.1.c.(8) has been modified to clarify that the requirement is for the reduction of pollutants in storm water discharges to the MEP. The San Diego Water Board does not have the water rights expertise to evaluate the full scope and legal implications of the commenter's water rights. The San Diego Water Board's understanding is that through current agreements Camp Pendleton is guaranteed base flows from the upstream water districts regardless of the amount of runoff. The Tentative Order clarifies under section E.1 that nothing within the Tentative Order authorizes an action that reasonably anticipated harm downstream water rights holders.

Comment # 110 **Commentor** 10 **Comment Subject** Hydromod

Specific Comment

With the HMP and with all other plans required by the Permit, such as monitoring, it is imperative that the Regional Board play the lead role. Bay Council understands, given budget constraints and furlough restrictions, the Regional Board has fewer resources and more work to do. Nonetheless, as permit requirements are delegated to Copermittees for development and planning, water quality suffers and NGOs and the public are left out of the process.

As with the San Diego HMP, this Permit requires Copermittee-driven HMP development. However, the San Diego process serves to shed light on the likely result: an artificially cost-constrained plan with frequent exercise of exemptions. Therefore, it is critical that the Regional Board play a lead role in the development of the HMP and all other plans.

If the current practice remains, Copermittees will expend large sums of money in developing a plan made publicly available (and indeed reviewed by the Regional Board) at the end of the process. Often the Regional Board and public are faced with two equally unappealing options: force the
Copermittees to start anew and delay implementation; or accept an inadequate plan. The final product in this type of planning further represents a financial commitment by Copermittees. Because of this financial investment, Copermittees that may have been able to proceed in a different direction at the beginning stages of development, are unable to afford (or unwilling to pay for) repeating the process after the plan is fully developed.

A possible remedy is a cost-share plan, or outside consultant who is employed by the Regional Board, reports to the Regional Board, but is paid via Copermittee funds. In order to foster a truly public process, and scientifically driven compliance (as opposed to cost-constrained), the Regional Board must remain the ultimate decisionmaker, with staff developing plans—not Copermittees. Therefore, we urge the Regional Board to commit to heavy oversight if not a cost-share mechanism to take charge of the development of these plans in order to ensure timely completion and true advancement of water quality.

Comment Response

The San Diego Water Board understands and appreciates the concern expressed by the commenter. While we appreciate the recommendations provided, they are not necessary at this time. Because of their current economic issues, the Riverside County Copermittees have expressed, on many occasions, their desire to borrow heavily from the HMPs already developed (e.g., San Diego County, Santa Clara County, Contra Costa County) or are in development (e.g., Orange County), and work already performed by SCCWRP. The Tentative Order allows this. The San Diego Water Board remains the ultimate decision maker for approving the elements included in the Riverside County HMP, and as such, will ensure that the requirements of the Tentative Order are met for the development of the Riverside County HMP.

Comment # 111 **Commentor** 10 **Comment Subject** Watershed Workplan

Specific Comment

The Permit requires identification of sources causing the highest water quality problems within the Upper Santa Margarita Watershed. (Permit, G.1.c.). A relatively easy aid to identification of such sources is expanded public outreach. We urge the Copermittees to survey the public and NGOs in the area in ranking water quality problems. In addition, Copermittees should provide bilingual public notice of annual watershed workplan meetings by sending such notices directly to area residents or holding special semi-annual workshops, especially in underserved communities. Copermittees might find the public particularly useful in source identification and BMP implementation strategies. This could further serve as an effective tool to meet the education and public participation Permit requirements. (Permit, G.4.). Lastly, we urge the Copermittees in Riverside County to reach out to Copermittees in the lower portion of the Watershed to coordinate source identification and monitoring activities.

Comment Response

Comment noted.

Comment # 112	**Commentor** 4	**Comment Subject** General

Specific Comment

This document highlights the agreed upon revisions resulting from detailed discussions between Water Board Staff and the Copermittees on program implementation. The intent of these revisions is to ensure that requirements in the Draft MS4 Permit continue to be protective of water quality while allowing the Copermittees flexibility in resource allocation and cost efficiencies. This collaborative process enhanced a mutual understanding of these goals and, consequently, many of the Permit's requirements are streamlined, clearer, implementable and protective. This document highlights specifically the Low Impact Development (LID) and the Interim Hydromodification requirements that have been revised from the Orange County NPDES MS4 Permit in order to recognize the Copermittees' advanced efforts.

Comment Response

Comment noted.

Comment # 113 **Commentor** 4 **Comment Subject** General

Specific Comment

[From Attachment 1 to RCFC&WCD comment letter]

Summary of Proactive Efforts to Manage Stormwater

Introduction

Murrieta and Temecula Creeks and their tributaries are an important economic, environmental and social resource for the Santa Margarita Region. As an example, Murrieta Creek serves as the backdrop for Old Town Temecula, an important local tourist attraction. Several ecological preserves that are utilized by local residents and tourists are also located within the Santa Margarita Region. The Permittees are cognizant of these resources and their benefits and have implemented or initiated proactive programs beyond the requirements of the NPDES MS4 Permits to ensure that these resources remain viable and are protected for future generations.

Integrated Planning
-Upper Santa Margarita River Integrated Water Management (IRWM) Plan
-Santa Margarita River Executive Management Team
-Murrieta Creek Flood Control, Environmental Restoration and Recreation Project

Management of New Development
-LID BMP Design Manual
-Public BMP Maintenance Mechanism

Management of New Development
-LID BMP Testing and Demonstration Facility
-Southern California Stormwater Monitoring Coalition

Statewide Stormwater Leadership
-Pesticide Regulation
-California Stormwater Quality Association (CASQA)

Habitat and Aquatic Resource Conservation
-Western Riverside County Multiple Species Habitat Conservation Plan (MSHCP)
-Special Area Management Plan (SAMP)

Comment Response

The San Diego Water Board is aware of the Copermittees' efforts to manage storm water as listed in Attachment 1. The Copermittees characterize these efforts as "proactive" because they were not specifically required in Order No. R9-2004-001. In many cases, these efforts were in response to findings during the implemention of Order No. R9-2004-001, in response to the requirements of the recently adopted Santa Ana Water Board Order No. R8-2010-0033, in response to efforts initiated by the Orange County and/or San Diego County Copermittees, in response to USEPA contracted audits and/or in anticipation of the requirements expected to be in the Tentative Order. We expect that the efforts of the Riverside County Copermittees listed in Attachment 1 will facilitate the implementation of several elements of the Tentative Order, but we also expect the Copermittees to continue identifying efforts and opportunities that will improve their storm water management programs to improve water quality in the Upper Santa Margarita Watershed.

Comment # 114 **Commentor** 4 **Comment Subject** Economic

Specific Comment

[From Attachment 2 to the RCFC&WCD comment letter]

Due to their reduced revenues, the Copermittees budgets and staffing have been significantly reduced for virtually all services and programs operated by the Copermittees, including police, fire, and paramedic services. Funding has been focused on essential public safety and existing state and federally mandated programs. Increases in funding for the water quality mandates contained in the draft Permit can only come from reduced funding for these basic priorities. Therefore, the expanded compliance requirements proposed in the draft Permit are economically infeasible.

Comment Response

Please see the response to comment 9.

Comment # 115 **Commentor** 4 **Comment Subject** Economic

Specific Comment

[From Attachment 2 to the RCFC&WCD comment letter]

POPULATION

Riverside County, which is subject to three NPDES MS4 permits, has a total population of 2,153,186. However, only 289,765 persons (approximately 13 percent) reside within the Santa Margarita Region. Population and housing projections for the Santa Margarita Region are summarized in Table 1. MS4 discharges in Riverside County are regulated by separate NPDES stormwater permits issued by the Colorado River, Santa Ana, and San Diego Regional Water Quality Control Boards. Although these three MS4 permits address the same federal regulatory requirements, the provisions in the draft Permit are often not well aligned with the requirements of the other two MS4 permits. As such, the cost for complying with those requirements is borne entirely by the 289,765 residents within the Santa Margarita Region.

Comment Response

The San Diego Water Board is aware that Riverside County is subject to regulation by three MS4 Permits from three separate Regional Water Boards. The San Diego Water Board agrees that the costs for complying with the requirements of the Tentative Order should be borne primarily by the residents in the Upper Santa Margarita Watershed, but we do not agree the provisions of the permit are not well aligned with the requirements of the other MS4 Permits.

As the RCFC&WCD is aware, the San Diego Water Board met with the Riverside County Copermittees on more than a dozen occasions between March and July 2010. The San Diego Water Board modified the Tentative Order in several ways, in response to recommendations by the Riverside County Copermittees during those meetings, to make it more aligned and compatible with Santa Ana Water Board Order No. R8-2010-0033.

The commenter cites figures for the population of the Upper Santa Margarita Watershed compared to all of Riverside County. The commenter, however, fails to acknowledge that the population growth in this part of Riverside County has also grown substantially since 2000. According to the 2000 census, the population in the Upper Santa Margarita Watershed was approximately 150,000. As reported by the Copermittees in their 2008-2009 Annual Report, the population in the Upper Santa Margarita Watershed was over 250,000 as of January 1, 2009, an increase of at least 65 percent since 2000. According to the commenter, the projected population for the Upper Santa Margarita Watershed is approximately 290,000 in 2010, an additional increase of approximately 15 percent since January 1, 2009. The population has almost doubled in the last 10 years. Such a significant increase in population also means a significant increase in development and need for expanded storm water and non-storm water management programs.

Because many of the provisions of the Tentative Order have been modified to be more aligned with the requirements of Santa Ana Water Board Order No. R8-2010-0033, the Riverside County Copermittees will be able to benefit from efforts that are being implemented for the Santa Ana Region, which will provide some cost efficiencies for complying with the requirements for both regions.

Comment # 116	**Commentor** 4	**Comment Subject** Economic

Specific Comment

[From Attachment 2 to the RCFC&WCD comment letter]

CURRENT ECONOMIC CONDITIONS

Unemployment
Higher unemployment directly impacts the revenue streams available to the County and the Cities for funding programs and services. As illustrated in Figure 1, the unemployment rate in Riverside County is currently 15.3 percent, which is 42 percent higher than the unemployment rate in San Diego County (9.8 percent) and 56 percent higher than the unemployment rate in Orange County (9.8 percent).

Comment Response

The San Diego Water Board recognizes that Riverside County is currently experiencing economic difficulties and high unemployment. The unemployment figure cited from Figure 1 may be true for Riverside County as a whole, but does not necessarily provide an accurate representation of the unemployment rate in the Upper Santa Margarita Watershed. The Upper Santa Margarita Watershed area is located between San Diego and Orange Counties, with lower than average unemployment rates for the state, which could have a localized influence on the unemployment rate in the Upper Santa Margarita Watershed. Unemployment in Riverside County, as a whole, is also heavily influenced by agriculture, and seasonal agricultural workers that are not currently employed affects the overall unemployment rate.

Also, as noted in the response to comment 115, the population in the Upper Santa Margarita Watershed is projected to grow approximately 15 percent in 2010 compared to January 1, 2009. This growth may indicate that there will soon be additional economic activity and unemployment will decrease in the near future.

Please see the responses to comments 8 and 9 for a discussion about the Copermittees' revenue sources for funding their storm water programs.

Comment # 117 **Commentor** 4 **Comment Subject** LID

Specific Comment

The Copermittees strongly support the language in the draft Permit with regard to Low Impact Development (LID) BMPs (Section F.1.d.(4)). Through discussions with staff, the Copermittees have presented their commitment and vision for LID, emphasizing that their programs' goals are in line with the intent of the LID language found in the Orange County permit. The District and the County, with input from the Copermittees, have invested five years into developing a well thought through LID program including: The design of a detailed and thoroughly researched LID BMP Manual, An implementation policy focused on a tiered approach to BMP selection, Incorporation of a public maintenance mechanism, and Construction of a $3,000,000 LID BMP retrofit, demonstration and testing facility.

These various features are already in effect in the unincorporated County, or in the process of being finalized, for broader use.

Regional Board Staff has recognized the efforts, thoughtfulness, and funding that the County has invested in their LID BMP approach, and have, in coordination with the Copermittees, developed a prioritization process that supports the Copermittees' investment in a plan for LID, while ensuring that an appropriate prioritization for the most effective BMPs is implemented. As such, infiltration BMPs must be used for all sites unless it is technically infeasible to infiltrate. Technical infeasibility will be based on criteria that will be developed by the Copermittees and approved by the Regional Board. Only when infiltration is deemed infeasible through the approved analysis can other LID BMPs be used in place of infiltration. These LID BMPs must be consistent with the Copermittees design manual or other regional LID manuals, which have been developed to ensure these LID BMPs are designed to have the greatest pollutant removal over the life of a project. If LID BMPs are found to be technically infeasible due to poor site or other conditions, then conventional BMPS must be implemented and the project must participate in the LID waiver/mitigation program that will ensure pollutant removal effectiveness consistent with the preferred LID BMPs.

Comment Response

The San Diego Water Board appreciates the support of the commenter. Based on several comments received during the public comment period, minor changes were made to the provisions in section F.1.d.(4) of the Tentative Order without affecting the overall intent of the language or the Copermittee's existing programs. Please see the errata sheet for the specific changes made.

Comment # 118 **Commentor** 4 **Comment Subject** LID

Specific Comment

One other important consideration for new development and LID requirements in MS4 permits is the ability for the project proponent (developer) to understand and easily comply with the requirements, such that they can easily be incorporated into projects. Recently adopted MS4 permits, such as the south Orange County MS4 Permit, have very complicated new development and LID requirements. The result of such requirements is a WQMP guidance document that can be confusing, and may be difficult to implement consistently and in a way that will provide consistent protection of water quality. The Copermittees and Regional Board staff, working together, have crafted new development LID requirements that are easily understood, and will ensure the highest likelihood of integration of LID features consistently into projects.

Comment Response

Comment noted. Through several meetings with the Copermittees, the requirements for LID implementation were clarified and streamlined to reduce confusion and easily understand. To that end, the requirements are similar to the South Orange County MS4 Permit to consistently apply LID requirements throughout the San Diego Region.

Comment # 119 **Commentor** 4 **Comment Subject** Hydromod

Specific Comment

Pursuant to discussions between the Copermittees and Water Board staff, the proposed interim hydromodification criteria is aligned with the Copermittees' existing hydromodification program. This agreed language ensures that adequate hydromodification protection measures continue to be in place, while allowing the Copermittees to focus resources and funds on developing the Final Hydromodification Management Program and avoid diversion of scarce resources to developing new interim criteria that will only be in effect for a short duration. In addition, this approach will save the development community from confusion as to which requirements are in effect.

The Copermittees' current hydromodification mitigation program is described in the WQMP, but has been slightly modified as presented in the draft MS4 Permit. Although the Copermittees request the minimal changes to the language shown in the attached redlines, the Copermittees otherwise support the currently drafted interim hydromodification requirements. Under the proposed interim requirements, project applicants must either demonstrate numerically that the project will not adversely impact downstream alluvial channels, or, they must mitigate both the two-year and 10-year recurrence interval storms to pre-project levels in the post-project condition. All analysis must be performed by a registered civil engineer specializing in water resources. Mitigation of both the two-year and the 10-year storms to pre-project levels has been demonstrated to be consistent with the range of flows that are the primary determinants of the stream geomorphology in the southern California area. By maintaining these storm events at pre-project levels, impacts to the downstream alluvial channel should be mitigated to a level of less than significant. Additionally, the Copermittees believe that the onsite LID requirements will further reduce the need for on-site hydromodification controls that would otherwise be required with conventional treatment BMPs. The final comprehensive hydromodification mitigation program will further develop more detailed analysis methods, as well as establish a monitoring program to help verify the effectiveness of the HMP requirements.

Comment Response

The San Diego Water Board agrees that the interim hydromodification criteria in the Tentative Order are aligned with the Copermittees' existing hydromodification program. The minor proposed modifications to Tentative Order sections F.1.h.(2) and F.1.h.(3) as shown on Attachment 3 to the RCFC&WCD's comment letter are acceptable. The San Diego Water Board does not agree to the proposed modifications to Tentative Order section F.1.h.(6)(a) as shown on Attachment 9 to the RCFC&WCD's comment letter.

Also, the commenter states that "project applicants must either demonstrate numerically that the project will not adversely impact downstream alluvial channels, or, they must mitigate both the two-year and 10-year recurrence interval storms to pre-project levels in the post-project condition." This is an incorrect statement. To clarify, projects subject to the interim hydromodication criteria must mitigate to "pre-development" levels, not "pre-project" levels. The use of the term "pre-development" is used in section 4.4 of the Riverside County Copermittees WQMP, and is assumed to mean the same as "pre-development" as used in the Tentative Order.

Comment # 120 **Commentor** 4 **Comment Subject** General

Specific Comment

Revisions tentatively agreed to with Board Staff
Per discussions between the Water Board Staff and Copermittees the following revisions were agreed upon.

See table in Riverside County Flood Control Comment Letter Attachment 3, page 4.

Comment Response

Comment noted. Please see the errata sheet for changes that the San Diego Water Board agreed to make to the Tentative Order.

Comment # 121	**Commentor** 4	**Comment Subject** General

Specific Comment

The process needed to be cut short as the Board expected the draft MS4 Permit to be heard in October. Copermittee staff requested that the hearing be delayed to allow the process to complete several times, but these requests were denied;

Comment Response

The San Diego Water Board disagrees that the process was cut short. The existing Order was scheduled for renewal in 2009. The San Diego Water Board originally intended to release the Tentative Order for public comment in March 2010 and hold a public hearing in June 2010. At the request of the Riverside County Copermittees, the San Diego Water Board agreed to delay the release to allow the Riverside County Copermittees to meet with the San Diego Water Board to discuss issues they were concerned about. The San Diego Water Board met with the Copermittees over a dozen times between March and July 2010, on a weekly basis. During those meetings, practically every provision contained in the directives in the Tentative Order, as well as in the Monitoring and Reporting Program in Attachment E, was discussed. The Copermittees were given great latitude in choosing the topic and length of discussions at those meetings. Additional meetings were held with the Copermittees in August following the public release of the Tentative Order to further discuss the Copermittees' concerns. During many of the later meetings the Copermittees were repeating several of their concerns without new information and recommending the same changes to the Tentative Order that the San Diego Water Board would not agree to.

The San Diego Water Board has spent a significant amount of time and resources meeting with the Copermittees. The process was long enough for the San Diego Water Board to listen to and consider all of the concerns expressed by the Copermittees prior to releasing the Tentative Order.

Comment # 122 **Commentor** 4 **Comment Subject** Economic

Specific Comment

[From Attachment 2 to the RCFC&WCD comment letter]

SOURCES OF LOCAL REVENUE

The Copermittee's primary revenue sources for implementation of programs and services are property taxes, sales taxes, and development/construction permit fees. Each of these sources has declined substantially since the beginning of the recession in FY 2006/2007. The 2009 per capita income in Riverside County ($29,177) is 31% lower than the per capita income in San Diego County ($42,094) and 32% lower than the per capita income in Orange County ($46,898). The population of the Santa Margarita Region (289,765) is 48% lower than the population of South Orange County (553,1615) and 91% lower than the population of San Diego County. As a less affluent area with relatively small population, the Santa Margarita Region has far less revenue than South Orange County and San Diego County to fund local programs and services, and MS4 permit compliance costs.

Comment Response

The San Diego Water Board recognizes that the per capita income of the different counties vary. The per capita income cited may be true for Riverside County as a whole, but does not necessarily provide an accurate representation of the per capita income in the Upper Santa Margarita Watershed. The Upper Santa Margarita Watershed area is located between San Diego and Orange Counties, which could have a localized influence on the per capita income in the Upper Santa Margarita Watershed as a commuter community. Riverside County, as a whole, is heavily influenced by agriculture, and agricultural workers typically receive low wages, which may affect the per capita income for Riverside County as a whole.

As noted in the response to comment 115, the commenter fails to acknowledge that the population growth in the Upper Santa Margarita Watershed has also grown substantially since 2000. The population has almost doubled in the last 10 years. The population of South Orange County has grown at a significantly lower rate. Such a significant increase in population also means a significant increase in property and sales tax revenues. If the Copermittees choose to fund their storm water programs solely through revenues generated by sales and property taxes and developer fees, then they must be able to plan and prepare for times when those revenues decrease by setting aside funds when there are significant increases in revenue.

Please see the responses to comments 8 and 9 for a discussion about the Copermittees' revenue sources for funding their storm water programs.

Comment # 123 **Commentor** 4 **Comment Subject** General

Specific Comment

Regional Board staff indicated that the Board had adopted the South Orange County MS4 Permit as a model permit and, therefore, the Board would have to approve any major revisions to the provisions established in that MS4 Permit; and

Comment Response

The San Diego Water Board must approve and adopt all MS4 NPDES permits regardless if the revisions or changes are major or minor.

Comment # 124	**Commentor** 4	**Comment Subject** General

Specific Comment

Regional Board staff indicated that the Board would have to resolve our issues with several new provisions of the draft MS4 Permit addressing unpaved roads, inspection programs and monitoring requirements, all requirements that exceed the provisions of the Orange County MS4 Permit.

Comment Response

To the extent that the Copermittees disagree with the San Diego Water Board regarding the Tentative Order's provisions, the Copermittees have the right to submit both written and oral comments directly to the San Diego Water Board at the adoption hearing.

Comment # 125	**Commentor** 4	**Comment Subject** Legal

Specific Comment

The Copermittees note that despite being directed to take several important issues to the Board, we have not been provided an opportunity for a formal or informal workshop before the Board. By contrast, the South Orange County MS4 Copermittees had at least three workshops and five formal hearings prior to adoption of that permit. Although we do not want to duplicate the Orange County renewal process, it is common practice to allow at least one workshop on significant permit issues before holding an adoption hearing. Given the issues outlined in this letter and in the attachments, there are numerous issues worthy of at least one workshop.

Comment Response

The decision whether or not to hold a workshop is discretionary and the decision not to hold a workshop in the matter was due to the general lack of public interest in the permit, the similarity between the Tentative Order and the recently adopted South Orange County MS4 Permit and the several weeks of meetings with the Copermittees between March and July of 2010. San Diego Water Board members generally do not attend public workshops. When they do attend, they listen to discussion but do not provide feedback. No San Diego Water Board members were present at any of the Orange County workshops. The Orange County workshops were held because of the broad public interest and were held in tandem with meetings with those Copermittees. All issues important to the Copermittees and addressed in the comment letter were discussed with San Diego Water Board staff during the many, frequent meetings held prior to public release of the Tentative Order.

Comment # 126 **Commentor** 4 **Comment Subject** Economic

Specific Comment

[From Attachment 2 to the RCFC&WCD comment letter]

Home Values/Property Tax Revenue

Property tax revenue, which is a major source of funding for the County and Cities, is a direct function of the total inventory of real estate and the assessed values of the real estate. With a small population relative to South Orange County and San Diego County and a limited amount of commercial and industrial property, the Santa Margarita Region is supported by a much smaller inventory of real estate from which to obtain property tax revenue. The high rate of foreclosures in Riverside County has also resulted in significant declines in real estate values and, consequently, property tax revenue. The Riverside County Auditor-Controller projects that property values will fall over 10 percent in FY 2009-10 and could fall further in FY 2010/2011. Figure 3 illustrates the decline in median home values in the Santa Margarita Region and South Orange County. Although home values in both areas have declined, home values in the Santa Margarita Region have declined at a greater rate and the difference in home values between the two areas has grown with the recession.

The Inland Empire (Riverside and San Bernardino Counties) registered more defaults and foreclosures than any other area of Southern California.9 The Inland Empire was ranked No. 5 in nationwide foreclosure activity during the first half of 2010, with almost 4.5 percent of households in default. A total 63,717 mortgage default notices, auction sale notices, and bank repossessions were recorded in the Riverside-San Bernardino-Ontario metropolitan area between January and June 2010, according to RealtyTrac. Accordingly, one in 23 households were in some stage of foreclosure during this six-month period. Additionally, almost 45 percent of homeowners with a mortgage in Riverside and San Bernardino Counties owe more on their homes than the homes are worth. As illustrated in Figure 3, Orange County and San Diego County have not been impacted by "upside-down mortgages" to the same extent as has Riverside County.

One expert, Professor Mason Gaffney of the UC Riverside Economics Department believes that the housing market is in a vicious cycle simply because there are too many homes. According to Professor Gaffney, because demand is down, prices will go down, and more people will go "upside-down" on their mortgage, and then go into foreclosure. Professor Gaffney estimates that the bottom of the housing market will not be seen for another three years, due to the previous overbuilding in Riverside County.10

Although the recession has impacted property values throughout Southern California, Riverside County remains at a distinct disadvantage relative to Orange and San Diego Counties. The average home value in Riverside County is $207, 900, which is 58% less than the average home value in South Orange County ($499,500) and 45% less than the average home value in San Diego County ($378,800).11 As a result, property tax revenues per home in Riverside County are 58% less than in Orange County and 45% less than in San Diego County. The larger populations and number of homes in Orange and San Diego Counties multiply this disparity in property tax revenue that can be used to help fund NPDES compliance programs. Based on population and average home value, South Orange County generates over four times the property tax revenue generated in the Santa Margarita Region, and San Diego County generates 20 times the property tax revenue of the Santa Margarita Region. Clearly, the Copermittees in the Santa Margarita Region receive significantly less property tax revenue than either Orange or San Diego Counties and are less able to fund additional MS4 permit compliance costs.

Comment Response

The San Diego Water Board recognizes that Riverside County is currently experiencing economic difficulties. If, however, the Copermittees choose to fund their storm water programs primarily through revenues generated by sales and property taxes and developer fees, then they must be able to plan and prepare for times when those revenues decrease by setting aside funds when there are significant increases in revenue. The Upper Santa Margarita Watershed had a substantial increase in the total inventory of taxable properties during the past housing boom of the early 2000s. Even while assessed values have decreased, the valuation has not dropped below 2004 levels and the inventory continues to increase.

Please see the responses to comments 8 and 9 for a discussion about the Copermittees' revenue sources for funding their storm water programs.

Comment # 127 **Commentor** 4 **Comment Subject** Economic

Specific Comment

[From Attachment 2 to the RCFC&WCD comment letter]

Sales Tax Revenue
The next most significant revenue source for program funding is sales tax. Sales tax revenue is a function of population and relative income. As described, the Santa Margarita Region has a less affluent and smaller population than South Orange County and San Diego County on which to generate sales tax revenue.

The high levels of unemployment in Riverside County have reduced disposable income which has further depressed sales tax revenues. Retail sales in Riverside County fell by nearly 27% in 2008 and 2009.12 Statewide sales and use tax revenues for the second quarter of 2010 declined approximately 10.4 percent. Additionally, taxable sales for the first quarter of 2010 remained flat compared to a year earlier. Although data specific to the Santa Margarita Region is not available, it is anticipated that taxable sales have been impacted more significantly than in Orange and San Diego Counties due to the higher unemployment rate in Riverside County.

Taxable sales are directly proportional to sales tax revenue. Based on data presented in the Los Angeles Economic Development Corporation's July 2010 Economic Forecast, South Orange County generates 2.6 times the taxable sales generated in the Santa Margarita Region and San Diego County generates 13.3 times the taxable sales of the Santa Margarita Region. Clearly, the Copermittees in the Santa Margarita Region receive significantly less sales tax revenue than either Orange or San Diego Counties and are less able to fund additional MS4 permit compliance costs.

Comment Response

The San Diego Water Board recognizes that Riverside County is currently experiencing economic difficulties. If, however, the Copermittees choose to fund their storm water programs primarily through revenues generated by sales and property taxes and developer fees, then they must be able to plan and prepare for times when those revenues decrease by setting aside funds when there are significant increases in revenue.

Please see the responses to comments 8 and 9 for a discussion about the Copermittees' revenue sources for funding their storm water programs.

Comment # 128 **Commentor** 4 **Comment Subject** Economic

Specific Comment

[From Attachment 2 to the RCFC&WCD comment letter]

New Fees or Taxes
Another potential source of funding would be the establishment of a new fee or tax. Such revenues would be subject to the requirements of Proposition 218. Recent efforts to pass supplemental fees have been mixed and given the current economic conditions, this option appears infeasible. For example, on the March 2006 ballot, an attempt by the City of Encinitas to pass a Clean Water Fee was defeated by the voters. It is notable that this rejection of a Clean Water Fee occurred prior to the recession in a relatively affluent coastal city.

Comment Response

Please see the response to comment 8.

Comment # 129	**Commentor** 4	**Comment Subject** Economic

Specific Comment

[From Attachment 2 to the RCFC&WCD comment letter]

Economic Forecasts

The Riverside County Executive Office assessed Riverside County's economy in a report to the Board of Supervisors submitted with the FY 2010/2011 Recommended Budget. In this assessment, it was noted that the economy is still staggering and that economic news has been mixed. Although a slightly rising stock market and other nationwide measures could be interpreted to signal improvement, persistently high unemployment and personal and national debt call for caution, and a double-dip recession is possible. Locally, while some experts project revenues will shrink again in FY 2011/2012, Riverside County's economic consultants foresee a long and gradual muted recovery and the County will be managing with drastically reduced budgets for an extended period. Budget reductions of approximately $21 million are projected for FY 2011/2012. The County projects that it will see a balanced but significantly reduced budget in FY 2012/2013, with a total budget of $670 million (compared to $736 in 2007). Based on this assessment and reports in the media, it appears that the economy in Riverside County will stabilize at a reduced level and may not recover during the term of the SMR MS4 Permit.

Comment Response

Please see the response to comment 9.

Comment # 130 **Commentor** 4 **Comment Subject** Economic

Specific Comment

[From Attachment 2 to the RCFC&WCD comment letter]

Projected Increases in Compliance Costs
The draft Permit proposes a significant expansion of compliance requirements that would significantly increase the Copermittee compliance costs. The draft Permit was developed by starting with the MS4 Permit for South Orange County. The requirements proposed in the draft Permit that would significantly increase compliance costs include:

Regional Compliance Requirements
-Monitoring and special studies (See Attachment 4)
-Hyrdomodification Management Plan (including monitoring)
-Retrofit study
-Other general program updates (JRMP)

Individual Copermittee Compliance Requirements
-Enforcement of Irrigation runoff prohibition (See Attachment 6)
-Significantly Increased business and BMP inspections
-BMP retrofit requirements
-Regulation of unpaved roads (See attachment #5)
-Hydromodification requirements
-Monitoring Source Identifications
-Expanded IC/ID requirements

Estimates for implementation of the regional compliance requirements have been prepared and Figure 4 illustrates the disparity between projected Copermittee revenues and costs for implementation of the proposed regional programs. Due to the fact that calculating costs for implementing entirely new programs is excessively difficult, cost estimates for the implementation of individual Copermittee compliance requirements have not been completed, although it is expected that their individual costs will parallel the regional costs presented in Figure 4.

Comment Response

The San Diego Water Board has been sensitive to the current economic hardships that are being experienced by the Riverside County Copermittees. Between March and July 2010, we met with the Copermittees over a dozen times and modified the requirements and schedules for implementation to phase in the requirements with these economic concerns in mind. Many of the modifications were made because the Copermittees requested the changes. Many of the modifications to the implementation schedule that were agreed upon during those meetings between the Copermittees and the San Diego Water Board were also based on prioritizing the permit requirements to address the most critical issues. The Tentative Order now provides the Riverside County Copermittees more time than the San Diego County and Orange County Copermittees to develop and implement several elements of the permit, as well as reducing the potential development costs for those elements.

The San Diego Water Board recognizes there will be increases in costs to improve the Copermittees' storm water management programs. The improvements are necessary, especially given the intense growth and development that has occurred in the Upper Santa Margarita Watershed during the third-term of the MS4 Permit. We do not agree that the increases in costs will be as projected in Figure 4 since the Copermittees have already begun developing several of the program elements (as listed in Attachment 1 to the RCFC&WCD comment letter), and will be able to benefit from the experiences and the work already completed by the San Diego County and Orange County Copermittees.

Comment # 131 **Commentor** 4 **Comment Subject** General

Specific Comment

The Copermittees also have significant concern with the use of the South Orange County MS4 Permit as a model for our MS4 Permit area. As outlined in more detail throughout this letter and the attachments, the South Orange County and Santa Margarita Region MS4 Permit areas vary widely with regard to the water resources to be protected and available tax revenue to fund local programs and services, including compliance with MS4 permit requirements. Orange County has substantial coastal water resources with active recreational use, twice the population, and significantly higher tax revenues. The per capita cost for the residents within the Santa Margarita Region to comply with the requirements of the draft MS4 Permit is significantly greater than the per capita cost faced in South Orange County, with each dollar spent effectively hitting our residents three to four times harder. The expansion of regional program elements (e.g., coordination, monitoring, reporting, program development, effectiveness assessment) will result in an annual doubling of these costs, with a peak increase of nearly 300% for these programs alone. The Copermittees simply cannot economically support, nor does the Santa Margarita Region warrant, the same level of programs as South Orange County to protect our local receiving waters.

Comment Response

The federal requirements regulating MS4 discharges from Orange County and Riverside County are the same, providing flexibility for regional differences in implementation. To that extent, the Tentative Order has significant differences from the adopted South Orange County MS4 Permit to address Riverside County. These differences were identified by the San Diego Water Board or requested by the Copermittees. These changes include requirements addressing unpaved roads, watershed specific non-storm water dry weather action levels, specific monitoring provisions, special studies, street sweeping provisions, streamlined LID requirements, Hydromodification Management Plan changes, a lengthened implementation timeline, more specific action level response language, specific education requirements, standard roadway designs, specific LID waiver provisions, a HMP waiver provision, specific interim hydromodification criteria, requirement of Passive Sediment Treatment Systems, specific reporting requirements, retrofitting examination of areas of development, and unique program effectiveness assessment requirements. To some extent, the discharges, programs and land use from the Copermittees' MS4s are similar and thus have similar requirements.

Comment # 132 **Commentor** 4 **Comment Subject** General

Specific Comment

In summary, the meetings between Regional Board staff and Copermittee staff were honest, good faith and productive efforts to bridge the gaps between the requirements of the Orange County MS4 Permit and the specific needs of, and resources available to, the Upper Santa Margarita Watershed (the draft MS4 Permit area). However, given the constraints identified herein, the differing impacts on beneficial uses and current economic realities, the current draft MS4 Permit cannot be supported by the Copermittees.

The Copermittees, therefore, request that the Board direct staff to work with the Copermittees to resolve the issues identified in this letter prior to considering adoption of the Permit.

Comment Response

Please see the response to comment 121.

Comment # 133	**Commentor** 4	**Comment Subject** General

Specific Comment

Unlike several of the watersheds in South Orange County, which exhibit perennial flow, the Santa Margarita Region is an ephemeral watershed. The only areas of perennial flow in the Santa Margarita Region are located at the formation of the Santa Margarita River right at the County line and in mountain areas outside of the urbanized areas serviced by the MS4s. The creeks in the urbanized areas of the watershed serviced by the MS4s are ephemeral and flows are only observed during and immediately after significant storm events. Any non-stormwater flows quickly disappear by seepage into the alluvial sands. Additionally, rising groundwater has been observed in Murrieta and Temecula Creeks for a short distance at various locations upstream of the confluence with the Santa Margarita River; however such conditions existed prior to urbanization.

Comment Response

Please see the response to comment 175.

Comment # 134 **Commentor** 4 **Comment Subject** Economic

Specific Comment

[From Attachment 2 to the RCFC&WCD comment letter]

ECONOMIC SUMMARY

As all sources of revenues have been reduced significantly, the Copermittees have been required to reduce staffing through layoffs, attrition and furlough; reduce funding across the board for public services and programs, and, in some cases, completely eliminate public services and programs. For example, it is estimated that County of Riverside staffing has been reduced by 2,500 since FY 2006/2007 mostly in the form of early retirement and layoffs. It is estimated that an additional 500-700 staff positions will be eliminated by the County in FY 2011/2012.

Due to the loss of revenue, virtually all Copermittee programs or services have been reduced, including fire and police. As an example, the Riverside County FY 2010/2011 Recommended Budget for Riverside County proposes:

-Public safety department cuts of 3 – 5 percent
-Other department cuts averaging 19 percent
-Continued staff reductions

After three years of modest cuts culminating in a 25% decrease, the Board of Supervisors approved an additional 19% cut in the general fund and a 4% cut to public safety for FY 2010/2011. These additional cuts will decrease spending by an additional $71 million. The remaining budget gap will be filled from general fund reserves set aside for economic uncertainty. Since FY 2006/2007 Riverside County general fund reserves have declined from over $300 million to $30 million. The County cannot decrease the reserve fund any further without affecting the County's ability to obtain credit. According to the Associated Press Economic Stress Index, of counties with populations of at least 25,000, Riverside County was identified as the eleventh most economically stressed county in the nation based on its June 2010 stress scores.

All County departments have been directed to only provide those core services that the County is mandated to provide. At this point, the Copermittees are struggling to maintain the existing compliance programs required by the 2004 MS4 Permit with available staff and funding. Implementation of expanded or new Permit compliance requirements would require the Copermittees to either further reduce implementation of other mandated programs or reduce the level of implementation of MS4 Permit compliance programs - at risk of receiving an NOV and ACL. In other words, the Copermittees cannot increase MS4 Permit compliance expenditures without directly impacting compliance with other state or federally-mandated programs.

Comment Response

The San Diego Water Board is aware of the many and competing needs that the municipalities are responsible for. The mission of the San Diego Water Board, however, is to preserve, enhance, and restore the quality of the waters in the region. Our responsibility is to protect the beneficial uses of the waters of the state.

While we try to take other needs into consideration when developing the requirements included in the Tentative Order, the requirements must be able fulfill our mission and responsibilities. We understand that the provisions in the Tentative Order may require the Copermitttees to modify, reduce, or find additional efficiencies in their operations, but the Copermittees are still responsible for implementing and improving their storm water and non-storm water programs to protect water quality.

The San Diego Water Board has been sensitive to the current economic hardships that are being experienced by the Riverside County Copermittees. Between March and July 2010, we met with the Copermittees over a dozen times and modified the permit requirements and schedules for implementation to phase in the requirements with these economic concerns in mind. Through this process and series of meetings, the San Diego Water Board has tried to accommodate the needs of the Riverside County Copermittees as much as possible.

Comment # 135	**Commentor** 4	**Comment Subject** General

Specific Comment

Since the initial MS4 permit was issued in 1990, the Copermittees have been actively and successfully implementing programs to manage their MS4 discharges. As described in the 2009 report of waste discharge (ROWD) submitted by the Copermittees, there have been no statistically significant increases in pollutant concentrations since issuance of the initial MS4 permit in 1990, despite the fact that the Santa Margarita Region has experienced over 300% population growth over the same time period. Further, although staff points out several recent 303(d) listings as basis for the need to enhance regulations, these listings were based on data that mostly predates our existing management programs implemented under the 2004 NPDES MS4 Permit. Further, the Permittees have submitted additional data for the current round of listings that should result in the removal of some of these additional listings based on more recent data. Additionally, the likely sources of these impairments include natural background concentrations in soils and groundwater (iron and manganese), natural and/or agricultural source loads (nutrients, total dissolved solids, sulfates and bacteria), and/or federally authorized uses of products (pesticides and copper). Although all of these sources can have urban components, it is also clear that these sources are mostly non-point in nature and not solely urban sourced, as implied in the Fact Sheet and Findings.

Comment Response

The San Diego Water Board disagrees that the Copermittees' programs have been successfully implemented. The San Diego Water Board disagrees that there have been no statistically significant increases in pollutant concenrtrations. The Copermittees' ROWD states that not enough data has been collected to date by the current and past MRPs to statistically detect any change or trend in water quality. If not enough data has been collected, how can any statistically significant increases in pollutant concentrations be detected?

Enough data, however, have been collected to see a statistically significant increase in 303(d) listings for the waters in the Upper Santa Margarita Watershed. On the 2002 303(d) List there were 3 water body/pollutant combinations listed. On the 2008 303(d) List there were over 50 water body/pollutant combinations listed. This signicant increase in 303(d) listings indicates that water quality has degraded, not improved.

The San Diego Water Board would be pleased if the data provided by the Copermittees supports the removal of some of these listings. Even if some listings are removed, there would be a significant number of listings that would still need to be addressed. In any case, the Copermittees must continue to improve their programs to prevent discharges of pollutants from their MS4s and protect the water quality of the receiving waters of the Upper Santa Margarita Watershed.

Comment # 136	**Commentor** 4	**Comment Subject** Economic

Specific Comment

[From Attachment 2 to the RCFC&WCD comment letter]

CONCLUSION

The draft Permit was developed by starting with the MS4 Permit for South Orange County. This represented a significant expansion of compliance requirements and compliance costs relative to the 2004 Permit issued to the Copermittees in the Santa Margarita Region, and by no means are the costs incremental in nature. South Orange County is a permit area with twice the population, 2.6 times the sales tax revenue, and over four times the property tax revenue of the Santa Margarita Region. The draft Permit was then expanded to include additional compliance and monitoring requirements, further increasing compliance costs. Plainly, it is unrealistic to impose greater, or even the same Permit requirements on the Santa Margarita Region, as have been imposed on South Orange County.

In addition to having a lower property tax revenue based on lower property tax base and lower per capita retail sales, the Santa Margarita Region has also been hit harder by the recession, which has further diminished funding resources. It is projected that revenues will continue at a reduced level for an extended period with recovery not expected within the term of the Permit term. Therefore, the available resources to fund public safety, existing state and federal mandates, and expanded water quality permit requirements are much less than San Diego and Orange Counties.

The economy has resulted in reductions of reserves to minimum levels and virtually all local services and programs have been reduced or eliminated. As increases in funding for the water quality mandates contained in the draft Permit can only come from reduced funding for public safety, existing state and federal mandates, the expanded compliance requirements proposed in the draft Permit are economically infeasible.

Comment Response

The San Diego Water Board recognizes that there are differences in the economic characteristics between the counties in the San Diego Region, but we do not agree that those differences should affect the provisions included in the Tentative Order to protect water quality. If anything, because of the signicant growth and development experienced by the Upper Santa Margarita Watershed within the last 10 years, the new and enhanced requirements are more necessary than ever. Significant changes in the Tentative Order's schedules and compliance requirements have been made to accommodate the Copermittees and the watersheds unique status.

The population of the Upper Santa Margarita Watershed has almost doubled in the last 10 years. The significant increase in population has resulted in a significant increase in development in the area. On the 2002 303(d) List, there were 3 water body/pollutant combinations listed for the waters in the Upper Santa Margarita Watershed. On the 2008 303(d) List, there are over 50 water body/pollutant combinations listed for the waters in the Upper Santa Margarita Watershed.

We understand that the current economic situation is challenging for the Copermittees. While the current economic environment is a cause for concern in the short term, it also provides the Copermittees an opportunity to find and implement improvements and efficiencies to their storm water programs before the next period of growth and development. In any case, the Copermittees must improve their storm water programs to be more protective of water quality.

Comment # 137 **Commentor** 4 **Comment Subject** Economic

Specific Comment

As the draft MS4 Permit for the Santa Margarita Region of Riverside County was modeled on the MS4 Permit developed for South Orange County, it is important to carefully contrast the economic resources available to the Counties:

The population of the Santa Margarita Region (289,765) is 48% less than the population of South Orange County (553,161).

The 2009 per capita income in Riverside County ($29,177) is 38% less than the per capita income in Orange County ($46,898).

The current unemployment rate in Riverside County is 15.3 percent, which is 56% higher than the unemployment rate in Orange County (9.8 percent).

Property and sales tax revenues are the primary sources of funding for local programs and services, including compliance with MS4 Permit requirements. Based on population and average home value, South Orange County generates over four times the property tax revenue generated in the Santa Margarita Region. Based on data presented in the Los Angeles Economic Development Corporation's July 2010 Economic Forecast, South Orange County generates 2.6 times the taxable sales generated in the Santa Margarita Region. As a less affluent area with a relatively small population, the Copermittees in the Santa Margarita Region receive significantly less property and sales tax revenue than municipalities in South Orange County and are less able to fund additional MS4 Permit compliance costs. These issues are discussed in detail in Attachment 2.

The recession also has impacted the economy in the Santa Margarita Region more than in South Orange County and it is projected that tax revenues will continue at a reduced level for an extended period, with recovery not expected within the Permit term. The poor economy has resulted in reductions of reserves to minimum levels and cuts or eliminations in virtually all local services and programs in the Santa Margarita Region. As a result any increases in funding for the water quality mandates contained in the draft MS4 Permit can come only by reducing funding for public safety or other existing state and federal mandates.

Modeling the draft MS4 Permit on the South Orange County permit represented a significant expansion of compliance requirements and compliance costs relative to the existing MS4 Permit issued to the Santa Margarita Region Copermittees. The requirements in the draft MS4 Permit have been expanded to include additional compliance and monitoring requirements beyond the South Orange County permit, further increasing compliance costs. We would submit that such an approach is fundamentally unfair and could be viewed as arbitrary.

Comment Response

Please see the responses to comments 8, 9, 115, 116, 122, 126, 127, 130, 134, and 136. The commenter is not consistent in the scope of statistical comparison of the two regions. For example, the population comparison is only for the Upper Santa Margarita Watershed while the economic indicators are compared for the whole of Riverside County. Factors within Riverside County yet outside of the Upper Santa Margarita Watershed may influence the statistics, e.g. agriculture in the Coachella Valley.

Comment # 138 **Commentor** 4 **Comment Subject** Unpaved Roads

Specific Comment

The requirements for unpaved roads are particularly cumbersome, onerous and unreasonable. Our detailed analysis of these requirements is provided in Attachment 5. In summary, the proposed unpaved road requirements may result in substantial and unnecessary additional Copermittee costs that are not justified by the facts in the Santa Margarita Region. The Copermittees believe that the existing MS4 Permit requirements for new development, construction, maintenance and IC/ID adequately address regulation of unpaved roads that threaten water quality. If the Regional Board believes that unpaved roads require further regulation, the Copermittees believe that the appropriate regulatory mechanism is a general permit (Waste Discharge Requirements or NPDES permit) that would apply to all unpaved roads in the San Diego Region, rather than only those that are under the jurisdiction of the Copermittees

The Copermittees request that Sections F.1.i, F.3.a.(11) and F.3.c.(5) regulating unpaved roads be deleted from the draft MS4 Permit.

Comment Response

The commenter does not provide any substantial data or reasoning to support their assertion that the requirements are "cumbersome, onerous and unreasonable." Despite the Copermittees' belief that existing MS4 Permit requirements adequately address pollution from unpaved roads, the San Diego Water Board has discovered numerous cases of unpaved roads creating or causing water quality impacts. Examples of unpaved roads causing water quality problems within the past year include Fairway Hills Estates, Rancho Glen Oaks, Santiago Road, and Lake Village Association. The San Diego Water Board reserves the right to issue a general permit to regulate unpaved roads; but until such time the unpaved roads are addressed through the MS4 permit. Please see the responses to comments 103 and 104.

Comment # 139 **Commentor** 4 **Comment Subject** Unpaved Roads

Specific Comment

Clarification that these requirements apply to those unpaved roads that the Copermittees maintain in their road system.

This should be commonly understood, but the clarification is important to include due to complex legal limitations and rights associated with access, ownership, and maintenance of unpaved roads.

Comment Response

Comment noted. Appropriate changes addressing the comment have been included in the errata.

Comment # 140 **Commentor** 4 **Comment Subject** Unpaved Roads

Specific Comment

Removal of language that specifies specific BMPs that must be implemented.

Specifying the method of compliance is prohibited pursuant to CWC Section 13360, and inappropriately forces the Copermittees to adopt particular solutions that may not best fit the situation.

Comment Response

Comment noted. Clarifying language has been included in the errata.

Comment # 141 **Commentor** 4 **Comment Subject** Unpaved Roads

Specific Comment

Removal of requirement for BMPs for private unpaved roads.

The proposed requirements would require the creation of an additional and unnecessary program element addressing privately owned unpaved roads. The Copermittees believe that a focused public outreach program should be implemented to educate property owners and associations about the need to properly maintain unpaved roads. This education program combined with existing IC/ID enforcement capabilities seems a more reasoned and responsible response to addressing this issue.

Comment Response

The San Diego Water Board is sensitive to the Copermittees' concerns. Upon considering various factors, we have removed the requirements for privately owned unpaved roads in the errata. The San Diego Water Board reserves the right to include this provision in future MS4 permits or general permits. The San Diego Water Board still expects the Copermittees to address illicit discharges from privately owned unpaved roads to their MS4 systems through their IC/ID programs.

Comment # 142 **Commentor** 4 **Comment Subject** Monitoring

Specific Comment

Since the initial MS4 permit was issued in 1990, the Copermittees have been actively and successfully implementing programs to manage their MS4 discharges. As described in the 2009 report of waste discharge (ROWD) submitted by the Copermittees, there have been no statistically significant increases in pollutant concentrations since issuance of the initial MS4 permit in 1990, despite the fact that the Santa Margarita Region has experienced over 300% population growth over the same time period. Further, although staff points out several recent 303(d) listings as basis for the need to enhance regulations, these listings were based on data that mostly predates our existing management programs implemented under the 2004 NPDES MS4 Permit. Further, the Permittees have submitted additional data for the current round of listings that should result in the removal of some of these additional listings based on more recent data. Additionally, the likely sources of these impairments include natural background concentrations in soils and groundwater (iron and manganese), natural and/or agricultural source loads (nutrients, total dissolved solids, sulfates and bacteria), and/or federally authorized uses of products (pesticides and copper). Although all of these sources can have urban components, it is also clear that these sources are mostly non-point in nature and not solely urban sourced, as implied in the Fact Sheet and Findings.

Comment Response

The San Diego Water Board finds the comment to be confusing and misleading on multiple accounts. First, the ROWD states that not enough data has been collected to date by the current and past MRPs to statistically detect any change or trend in water quality. Thus, if not enough data has been collected, how can any statistically significant increases in pollutant concentrations be detected? Secondly, the recent 303(d) listings referenced in the comment refer to the 2008 303(d) list, which relies on data collected up to that listing, including data collected under the current Order. New listings and re-listings for the 2008 list relied on data collected from 2004-2006. The list is required to be updated every 2 years, so it is unclear how new listings are based primarily on data prior to 2004. Lastly, it should be noted that speculation regarding likely sources of pollutants for 303(d) listed receiving waters should not take the place of active source identification, which been largely absent under the current Order.

Comment # 143	**Commentor** 4	**Comment Subject** Monitoring

Specific Comment

Monitoring and Reporting Program (Attachment 4)
Prior to the submittal of the ROWD, the Copermittees met with Board staff to propose changes to the Monitoring and Reporting Program (MRP). In these discussions, Board staff identified two areas for needed improvement:

• Relocation of Illicit Connection I Illicit Discharge (IC/ID) monitoring stations to MS4 outfalls, and
• Incorporation of Action Levels

In more recent discussions, Board staff noted that the MRP needed significant modification to reflect the South Orange County MRP, but would be scaled to be appropriate to the smaller Santa Margarita Region.

Unfortunately, the final MRP requirements have been expanded well beyond the South Orange County MRP requirements, resulting in a program that is completely out of proportion with the needs and resources of the Santa Margarita Region. In fact, the proposed MRP requirements will result in a 500% increase in monitoring program costs, costing our residents over two and a half times the per capita costs for South Orange County.

[Per Capita Monitoring Cost Comparison Table]

The Copermittees recognize that monitoring and data collection is necessary. However, the MRP requirements exceed what is necessary to address management questions related to water quality, are beyond requirements dictated in the South Orange County MRP, and are beyond the Copermittees' ability to fund. Not only are the level of requirements inappropriate for the Santa Margarita Region, but they disregard the economic realities faced by the Copermittees. As such, the MRP falls far short of meeting the Executive Officer's stated goals of affordability.

In the interest of finding ways to offer Board staff a comparable program in a more cost effective and appropriate manner, the Copermittees have identified nine adjustments to the MRP that will save approximately seven hundred and eighty thousand dollars ($780,000) allllually and bring per capita monitoring costs more in line with the South Orange County MRP, whi le maintaining the core components of the MRP. Table I summarizes the key changes and the respective cost savings. It is important to note that any change highlighted in RED reflects bringing the program in line with the South Orange County MRP. Figure I below shows graphically the comparative costs for the draft MRP with and without the requested adjustments. Please note that the 100% baseline in Figure 2 reflects the current cost of the Copermittees' current MRP.

[Table 1 - Cost Savings resulting from proposed MRP changes]
[Figure 1 - graph comparing draft permit costs with Requested Changes]
[Cost comparison table with Proposed Changes]

Although the requested adjustments to the MRP will not eliminate cost increases, and will result in an MRP which is more expensive, on a per capita basis, than the South Orange County MRP, they provide a more manageable program for the Copermittees.

The Copermittees requests that the Board make the adjustments identified in Attachment 4 before Permit adoption.

Comment Response

See the response to comment 92.

Comment # 144	**Commentor** 4	**Comment Subject** Monitoring

Specific Comment

[From Attachment 4 to the RCFC&WCD comment letter]

Prior to the release of the first draft of the MRP requirements to the Copermittees, Water Board staff indicated the program would be similar to the South Orange County MS4 Permit (OC Permit) yet scaled appropriately to the Santa Margarita Region. The first draft of the MRP was not released until three weeks prior to the public release draft MRP. To our surprise, instead of being appropriately scaled, the draft MRP actually exceeded the scope and costs of the OC Permit MRP. Due to limited time, Water Board staff recommended the discussions regarding MRP requirements be brought before the Regional Board at the appointed October 13, 2010 Board Hearing. This was particularly frustrating as it was not consistent with our mutual goal to resolve technical issues at the staff level and bring only necessary policy issues to the Regional Board.

Comment Response

Please see the response to comment 92. For clarification, San Diego Water Board allowed the Copermittees to select and prioritize topics for discussion at these meetings. Dedicated discussions regarding the MRP occurred at multiple meetings, including prior to public release of the Tentative Order. Some modifications and agreements were made regarding the MRP, but many issues came to an impasse at the staff level. Where impasse was met, staff provided a recommendation that the discussions be brought to the Board following review of public comments.

Comment # 145 **Commentor** 4 **Comment Subject** New Development

Specific Comment

Section F.1.f of the draft MS4 Permit includes new requirements for the Copermittees to verify that Post-Construction BMPs are being appropriately maintained. The new requirements appropriately develop a risk-based approach to inspections, defining eight factors that the Copermittees must
consider in determining 'high-priority' projects.

However, language in Section F.1.f.(2)(a) removes that discretion by stating:
'At a minimum, high priority projects include those projects that generate pollutants (prior to treatment) within the tributary area of a 303(d) listed waterbody impaired for that pollutant; or those projects generating pollutants within the tributary area for an observed action level exceedance of that pollutant.'

This language is excessively broad, and will require virtually all sites in the watershed to be designated as 'high priority' and, therefore, subject to annual inspections. This language is inconsistent with the goals of a socially responsible and affordable permit and should be modified for
several reasons:

Inspections frequencies should be based on risk of discharge. Annual inspections are not needed for all sites that generate a specific pollutant. For example, if a site generates a pollutant associated with 303(d) listing, but the site retains runoff onsite or stores those pollutants indoors, annual inspections would be unnecessary. However, sites that store 303(d) listed pollutants outdoors or otherwise have a high risk of discharge should be inspected more frequently.

The language dilutes Copermittee resources by requiring annual inspections of low-risk sites, preventing the Copermittees from appropriately concentrating resources on problematic sites/sources. This is because when an action level is exceeded then all parties in the watershed are assumed guilty until proven innocent.

While the Copermittees are not opposed to implementing a program to verify that these BMPs are being maintained, it is critically important that they be provided the flexibility to determine which sites warrant annual inspections. Specifically, the Permittees request that the language in
F.1.f.(2)(a) be amended as follows prior to adoption of the Permit:

At a minimum, high priority projects include those projects that have been determined to be the source of an observed action level exceedance.

Comment Response

Please see the response to comment 94.

Comment # 146 **Commentor** 4 **Comment Subject** Commercial/Industrial

Specific Comment

Section F.3.b. of the draft Permit includes requirements to inventory and inspect Commercial and Industrial businesses. The draft Permit expands upon existing inventory and inspection requirements in two problematic ways:

It requires significantly more businesses to be inspected, and

It includes new requirements specifying what the Copermittees are required to inspect when they are onsite.

Comment Response

Please see the response to comments 96 and 98.

Comment # 147	**Commentor** 4	**Comment Subject** Commercial/Industrial

Specific Comment

Sections F.3.b.(1)(a)(i) and (ii) identify 42 categories of businesses that must be inventoried and inspected based on risk of pollutant discharge. However, Section F.3.b.(1)(a)(iii) adds virtually any business in the Permit area, independent of pollutant discharge risk:

'All other commercial or industrial sites/sources within or directly adjacent to or discharging directly to receiving waters within environmentally sensitive areas (as defined in Attachment C of this Order) or that generate pollutants tributary to an observed exceedance of an action level.' (Bold emphasis added)

In effect, section F.3.b.(1)(a)(iii) adds the following additional businesses:

EVERY business that is adjacent to (or within) an Environmentally Sensitive Area (ESA), regardless of whether the business generates or discharges any pollutants, and

EVERY business that 'generates' pollutants which happens to be upstream of an action level exceedance, regardless of whether the site has ever discharged any pollutants.

This language expands the list of sites far beyond the current requirements, and well beyond those sites that actually pose a threat to water quality. This is clearly unnecessary and should be removed for several reasons:

It inappropriately separates 'risk' from the 'response', by requiring the Copermittees to inspect businesses irrespective of the risk that the business poses to water quality. For example, this language would require the Copermittees to expend resources and time inspecting hair salons, office buildings and other activities that happen to be adjacent to an ESA. This inappropriate broad-brush approach to permitting actually works to discredit the Copermittees' NPDES programs and dilute resources, rather than enhancing protection of water quality.

It will further remove the flexibility that the Copermittees need to be able to re-allocate resources to inspecting and following up with sites/sources that are problematic.

Therefore, the Copermittees request that the language in F.3.b.(1)(a)(iii) be amended as follows prior to adoption of the Permit:

All other commercial or industrial sites/sources that have been determined to be the source of an observed exceedance of an action level.

Comment Response

Please see the response to comment 96.

Comment # 148	**Commentor** 4	**Comment Subject** Commercial/Industrial

Specific Comment

Additional items to review during inspections:

Section F.3.b.(4)(a) specifies what the Copermittees must review when performing an inspection. The new requirements in subsections (i) and (ii) to review BMP implementation plans, and review facility monitoring data, respectively, are an unnecessary new mandate. They should be removed for several reasons:

The requirements burden the Copermittees with reviewing information that is required under General Permits and is the responsibility of the Regional Board to enforce.

The requirements would significantly increase the inspection time for sites with General Permits and endanger an existing collaborative inspection program (Complaince/Assistance Program (CAP)) that leverages the time highly trained Environmental Health Inspectors spend onsite for Certified Unified Program Agencies (CUPA) and Food Services inspections to also conduct NPDES inspections. The CAP program not only utilizes highly trained Environmental Health inspectors, but also regionalizes the inspections and, therefore, provides multiple benefits including uniformity, reduction in total number of inspections and higher-quality inspections. The Environmental Health HazMat inspection program administrators have indicated that they cannot accommodate the additional time required to implement the new requirements, as they would unduly cut into their ability to meet their own state-mandated inspection frequencies.

By virtue of eliminating the CAP program, the requirements would effectively mandate a more fractured and disconnected set of inspections for the businesses, contrary to CAL EPA mandates for consolidated inspections, and in turn diluting the effectiveness of the program.

The Copermittees request that the language in F.3.b.(1)(a)(iii) be amended as follows prior to adoption of the Permit:

(a) Inspection Procedures: Inspections must include but not be limited to:

(iii) Check for coverage under the General Industrial Permit (Notice of Intent (NOI) and/or Waste Discharge Identification Number), if applicable;
(iv) Assessment of compliance with Copermittee ordinances and Copermittee issued permits related to runoff;
(v) Assessment of the implementation, maintenance and effectiveness of the designated minimum and/or enhanced BMPs;

Comment Response

Please see the response to comment 98.

Comment # 149	**Commentor** 4	**Comment Subject** Retrofit

Specific Comment

Section F.3.d. proposes a program to develop an inventory of existing developments that may be candidates for future water quality retrofits. The requirement goes on to encourage the Copermittees to collaborate with local property owners to promote urban retrofit in an effort to accelerate reductions in pollutant loading from existing urban areas.

Although laudable, this requirement has two significant problems:

1) The program is self-defeating as it contains no "carrots" to lure private property owners into participating in the program. Any property owner that is interested in volunteering in this effort would be required to fully comply with all provisions of the draft MS4 Permit. This includes preparation of compliance documents such as SSMPs, LID and hydromodification studies, subjecting themselves to additional regulatory scrutiny through business and BMP inspection programs required by the MS4 Permit, and otherwise incurring a myriad of costs and requirements. These costs and requirements would provide a strong disincentive to participate in a retrofit program. This program will only work if it is modified to remove these disincentives.

2) Current and projected economic conditions will limit the interest and participation of private property owners. Long-term economic predictions for Riverside County indicate that assessed valuations and property values will likely remain stagnant for the term of this Permit. Similarly, sales tax and unemployment are not expected to significantly improve either.

Without Co-Permittee resources to supplement private retrofit projects, the current economic disincentives for private redevelopment that are built into the program and the current impact of the economy on private property owners, there is no real value to the program.

PREFERRED POLICY CHOICE: The Permittees strongly request that this program be deleted for the aforementioned reasons.

Alternatively, and at minimum, the Copermittees request that the schedule for completion of the retrofitting program be revised to provide for development during the term of the Permit and submittal of the proposed program with the next ROWD. This will allow the Copermittees to defer expenditures related to development of the program until later in the Permit term when it is hoped that economic conditions and local revenues will improve. The Copermittees expect few opportunities for retrofit until the economy improves. Due to the Copermittees' limited ability to require retrofit on private property, our best opportunities for retrofit may be associated with approvals of proposed modifications of existing developments.

ALTERNATE POLICY CHOICE: If the Retrofit requirements are not removed, the Copermittees request that the Regional Board modify Section F.3.d. as follows:

Each Copermittee must develop and implement a retrofitting program that meets the requirements of this section upon submittal of the ROWD.

Comment Response

Please see the response to comment 99.

Comment # 150 **Commentor** 4 **Comment Subject** Monitoring

Specific Comment

[From Attachment 4 to the RCFC&WCD comment letter]

One of the most significant issues with the MRP is that the Copermittees proposed several new special studies in the ROWD. The Copermittees moved forward on these studies in good faith, including a $3,000,000 LID Demonstration and Testing Facility at the District headquarters in Riverside. The final MRP does not recognize any of these efforts, and instead mandates six new special studies and a habitat monitoring program. Initially, Board staff indicated that these six studies were for discussion and that it was not their intent to include all of the studies, however, later Board staff changed their position and mandated all of the studies. Further, the habitat monitoring program was actually removed from the Orange County MS4 Permit due to the addition of the NAL/SAL monitoring which was expected to effectively address the underlying habitat monitoring questions. These unnecessary additions put the Copermittees in the precarious position of having to abandon special studies that were already deemed by local stakeholders to be of critical value to managing stormwater within our region.

Comment Response

San Diego Water Board staff did review the proposed special studies within the ROWD. Staff have made changes to the Special Studies to include the SMC Bioassessment study while concurrently removing the requirement for twice-annual bioassessment monitoring, and removed an additional special study on unpaved roads prior to public release of the MRP. In the 2004 SMC report, special studies are recommended when preliminary source identification work identifies a receiving water problem and/or to answer receiving water questions related to MS4 discharges not addressed by core monitoring programs. In addition, many of the special studies are regional issues, and the MRP allows Copermittees to propose participation in regional efforts to supplement and/or replace MRP requirements. San Diego Water Board staff did not include the Copermittees request to include a site-design LID special study in the MRP because it does not qualify as a MRP special study and the proposed study is outside of our jurisdictional region. Given the purpose of including special studies in the MRP, the proposed LID special study has no relation to a receiving water problem, question, or evaluation (including source identification monitoring). While the San Diego Water Board does not want in any way to discount the importance of LID demonstration and BMP testing, the study would only have an indirect relationship to the MRP.

In regards to the High Priority Inland Aquatic Habitat Monitoring ("habitat monitoring program"), this requirement was included as an important core MRP element per recommendations by the 2004 SMC report, of which the Copermittees took part. The High Priority Inland Aquatic Habitat Monitoring requirements were constructed to allow the Copermittees a maximum level of flexibility when proposing their monitoring program. For example, the Copermittees could choose to select some SAL/NAL monitoring outfalls and stream assessment monitoring at a site they deem to be High Priority Inland Aquatic Habitat. Furthermore, unlike Orange and San Diego County, the Copermittees' monitoring is limited only to inland surface waters. In regards to the removal of the High Priority Inland Aquatic Habitat requirement from Orange County, the removal was made under the Board's direction to attempt to make Orange County's MRP as "cost-neutral" as possible while prioritizing focus areas for monitoring. This direction was made due to the performance of the Orange County monitoring program during the previous permit term. The removal of the requirement was not a "trade" for NAL/SAL monitoring. MS4 effluent monitoring was already an existing MRP element prior to inclusion of NALs and SALs.

Comment # 151	**Commentor** 4	**Comment Subject** Monitoring

Specific Comment

[From Attachment 4 to the RCFC&WCD comment letter]

The proposed draft MRP includes additional stations, constituents, data analysis and multiple special studies that exceed other programs such as South Orange County's or established standards of practice. These elements will not add substantively to the understanding of MS4 water quality impacts within the Santa Margarita Region and vastly exceed the ability of the Copermittees to pay and staff. Table 1 summarizes the Copermittees' requested revisions to the draft MRP and the costs savings from each revision.

These changes are also critical as the draft MRP proposes a program that exceeds available monitoring staffing and equipment resources. The District is currently in the process of recruiting for budgeted positions that were based on the monitoring program contained in our ROWD. However, review of the MRP has determined that our estimations were woefully inadequate. The MRP special studies and other requirements require scientists and other staff with specialized training and backgrounds that are not readily available. The District will likely have to find staff with generalized knowledge in related fields and spend significant resources training them to be knowledgeable in the science of stormwater management. Even if we were to consult out most of the work, we would still need specialized staff to scope, manage and review the consultants' work. It is not feasible to find, recruit and train the necessary staff and also deploy the proposed MRP in the time allotted. The Copermittees' proposed revisions scale requirements to a more financially attainable and manageable level. Detailed justifications for each revision are described below.

Comment Response

Please see the response to comment 92.

Comment # 152 **Commentor** 4 **Comment Subject** Monitoring

Specific Comment

[From Attachment 4 to the RCFC&WCD comment letter]

Revision: Request wet weather monitoring to be required twice a year instead of three times a year.

Justification: (1) The Water Board Staff has referenced the SMC guidance and indicated not enough data has been collected to warrant a requirement change from three wet weather samples to two. However this guidance states once three wet weather samples have been collected for three years, sampling for two wet weather events is acceptable. This data has been collected by the Copermittees. The Copermittees successfully collected three wet weather events for three reporting periods; in addition, the Copermittees have over 10 years of data to form the basis of future analyses. Although the methods of collection have changed, our statistical analysis indicates that there is no statistically significant difference between data sets collected during prior terms and the current term. (2) The current OC and SD Permits require only two wet weather samples. (3) The Santa Margarita Region is semi arid with ephemeral flows, sampling for a third storm event has proven, and will continue to prove difficult and may result in non compliance due to climate (lack of storm events). (4) The cost to Copermittees to fund a third wet weather monitoring event during this permit term is significant.

Comment Response

The referenced SMC guidance recommends 3 storm events for at least 3 years, after which a power analysis should be conducted to determine what, if any, changes should be made. The ROWD provided an analysis that stated not enough data was available statistically detect any trends. Furthermore, two issues remain regarding the mass loading data collected to date:

1) Much of the mass loading monitoring had deficiencies that were documented in the 2008 USEPA audits. For example, the audits found the Copermittees collected grab in lieu of manual composite samples. These deficiencies make answering MRPs core management questions, as well as meeting the goals, very difficult. Composite sampling enables a better calculation of the extent and magnitude of impacts on receiving waters (i.e. loading, first flush, event mean concentrations, etc...)

2) The required list of pollutants have not been monitored at mass loading stations under the current Order.

The current Orange and San Diego County MRPs have a reduced frequency because they have collected a large number of samples from representative storms, have done composite sampling, and have sampled the first storm event of the rainy season. The statement regarding inability to sample storms in the Santa Margarita HU is addressed in the 2008 USEPA Audit Inspection Report.

Lastly, the draft MRP is consistent with the Santa Ana MRP (Order No. R8-2010-0033), which requires mass loading sampling for 3 storm events annually.

Comment # 153	**Commentor** 4	**Comment Subject** Monitoring

Specific Comment

[From Attachment 4 to the RCFC&WCD comment letter]

Revision: Request dry weather sampling method to be changed from composite sampling to grab samples.

Justification: (1) The Copermittees currently conduct dry weather sampling using an instantaneous grab sample. The MRP proposes 24-hour composite sampling, which represents a significant cost increase due to the need to construct infrastructure at the sampling sites to secure and facilitate portable automatic sampling equipment. (2) Composite samples will mask illicit discharges which is one of the primary reasons for dry weather monitoring. (3) Due to dry weather flows' steady nature, the flows can be accurately characterized using a grab sample. (4) The SMC Regional Bioassessment Program, which effectively defines the standard of practice for receiving waters monitoring, has found that chemistry samples must be collected at the most downstream transect (Transect A) to be representative of the flow through the assessed reach. This program therefore uses Grab samples collected immediately prior to benthomacroinvertebrate (BMI) and periphyton sampling. If composite sampling was required, it similarly must be done at the downstream transect; however, the composites would not be representative as they would pick up sediment, nutrients and other pollutants that had been unnaturally introduced by the BMI and periphyton collection activities. This would create an unrepresentative sample and the sampling equipment would be at risk of failure due to the suspension of sediment.

Comment Response

The purpose of dry weather mass loading is to determine concentrations and mass loads of pollutants within receiving waters during dry weather conditions. This is critical in order to meet the goals and answer the core management questions of the MRP. A 24-hour composite is required because flows may not have a steady nature during the course of 24 hours. The Copermittees are expected to utilize the concentration and loading information from the composite sampling to identify pollutants of concern that should be closely monitored for in their IC/ID monitoring. It is doubtful that 2 dry weather grab samples per year at a mass loading station will be representative of illicit discharges occurring upstream. It should also be noted that the SMC bioassessment monitoring does not include mass loading monitoring as part of receiving water monitoring. For bioassessment (stream assessment) conducted at mass loading stations, composite sampling is required to coincide with bioassessment monitoring in accordance with water chemistry sampling protocol in the bioassessment SOP. A statement to that effect has been added to the draft MRP.

Comment # 154	**Commentor** 4	**Comment Subject** Monitoring

Specific Comment

[From Attachment 4 to the RCFC&WCD comment letter]

Revision: Request change in toxicity testing from three organisms to two organisms.

Justification: (1) The MRP specified in the OC Permit requires toxicity testing of two organisms and this permit should not go beyond requirements found within the OC Permit due to limited funding and resources. This is an example of a simple change where cost-savings can be realized. (2) The USEPA only has chronic toxicity protocols for Pseudokirchneriella subcapitata (formerly, Selenastrum capricornutum). Therefore there are no established protocols for the other two species, and data collection results will be difficult to compare to other regions.

Comment Response

The toxicity testing required within the Orange County MRP is inappropriate for comparison to the Riverside County draft MRP, as the Orange County MRP includes toxicity testing for inland surfaces waters (2 organisms) as well as estuarine and marine organisms (1-2 organisms). Thus, Orange County actually includes the same number or additional organisms for toxicity testing at mass loading stations.

Furthermore, the testing of 3 organisms is recommended by USEPA and is discussed in the fact sheet. For clarification purposes, USEPA has published chronic toxicity protocols (see EPA-821-R-02-013) for
1) the fathead minnow, Pimephales promelas
2) the cladoceran, Ceriodaphnia dubia
3) the alga, Selenastrum capriconutum

In this respect, the draft MRP is consistent with the Santa Ana MRP (Order No. R8-2010-0033), which requires toxicity testing for 3 organisms of different phyla at mass loading stations.

Comment # 155 **Commentor** 4 **Comment Subject** Monitoring

Specific Comment

[From Attachment 4 to the RCFC&WCD comment letter]

Revision: Request that three stream assessment stations be monitored instead of six stations.

Justification: (1) The existing MS4 Permit requires three stream assessment stations annually. These stations are our mass loading stations. It should be noted that this is an ephemeral watershed. The current stations were selected because they were the only stations that had flowing water during the bioassessment sampling periods, not because they were necessary representative of urban runoff (although they are downstream of the entire MS4 system). Specifically, during dry weather, none of the current receiving waters stations receive runoff from the MS4 due to the ephemeral nature of the watershed. Similarly, efforts to find flowing water for the Regional Bioassessment Program have been challenging. For example, in 2009, the first year of the program, 35 random sites were evaluated before one perennial site could be identified. In 2010, 39 random sites were evaluated. The final sites that were selected were actually our CURRENT mass loading stations as they were the first randomly selected sites that had flow. This lack of flow was recognized by SCCWRP in establishing the distribution of Regional Bioassessment Stations in southern California. This is why southwest Riverside County is only assigned one Bioassessment station. (2) As is demonstrated above, the Copermittees are not likely to find three additional flowing stations that are indicative of impacts from MS4 discharges. The Permit requirement therefore puts the Copermittees in unavoidable non-compliance with the Permit. (3) The cost of monitoring the additional three stations is substantial, and given the relative size of the MS4 system and population of RC to OC, the additional stations are not appropriate on an environmental, economic or social justice scale.

Comment Response

The San Diego Water Board understands that there are areas within the Santa Margarita HU that have largely ephemeral and intermittent flows.

In response to the comment:

1) The existing Order requires three stream assessment stations monitored twice per year, not annually as the commentor states. Thus, 6 sampling events are currently required. Based upon discussions with the Copermttees, the draft MRP has been modified from requiring 6 stations twice per year to 6 stations once per year. Thus, the frequency of monitoring will remain unchanged from the current Order, and the Copermittees and required to sampling in the spring following storm flows.

2) For the Regional Bioassessment Monitoring Program, it is important to note the station selection criteria for inclusion in the program. For example, stations selected must be representative of certain land use criteria, as well as have sufficient flows during September. The draft MRP requires the Copermittees to select 3 additional stations for monitoring. The Copermittees already have selected 1 additional station to monitor as part of the Regional Bioassessment Monitoring Program. Thus, 2 additional stations, which are not required to be monitored in the fall, will need to be selected. The San Diego Water Board does not agree that this will put the Copermittees in unavoidable non-compliance.

3) As stated above, the frequency of monitoring will remain the same as in the current Order. In regards to the relative frequency of monitoring when compared to Orange County, the initial Orange County draft had 12 stations monitored twice per year. Following discussions with the Orange County Copermittees, this was reduced to 9 stations annually. Orange County also participates in the Regional Bioassessment Monitoring Program.

Comment # 156	**Commentor** 4	**Comment Subject** Monitoring

Specific Comment

[From Attachment 4 to the RCFC&WCD comment letter]

Revision: Request frequency be changed from twice per year to once per year for stream assessment monitoring.

Justification: (1) The Water Board Staff and Executive Officer agreed to make this change as a trade for the Copermittees participation in the SMC Regional Bioassment special study. The change was based on findings by the Southern California Coastal Watershed Research Project (SCCWRP) scientiests indicating that there is no seasonally signficant difference in bioassesment scores. The Copermittees volunteered to implement th Regional Bioassessment Program ahead of the necessary changes to the NPDES MS4 Permit program to reduce the ioassessment sampling events in a good faith effort. (2) To determine if two sampling events are in fact necessary, the Copermittees evaluated the difference in biological community scores between Spring and Fall for data collected at Lower Murrieta, Lower Temecula and Adobe Creeks during May and October from 2007 through 2009. Utilizing a Two-Way Analysis of Variance of Southern California Index of Biological Integrity (IBI) scores, with season (Spring/Fall) and year (2007 through 2009) as variables, results indicated no statistical difference between years for any of the Permittee's three sites. No seasonal statistical difference in IBI scores ($p \geq 0.19$) was noted within any of the three stations, indicating that the IBI scores were consistent across seasons, regardless of the year. This data confirmed SCCWRP findings that there is not a change in the biological communities between the Spring and Fall seasons. (3) Further, the MRP within the OC Permit states that stations with year-round flow conditions may be monitored in May/June or September/October. Current assessment stations at Murrieta Creek, Temecula Creek, and Adobe Creek are perennial stations. Consistency across programs would denote assessments of these creeks once per year.

Comment Response

Pursuant to discussions with the Copermittees, the frequency has been changed to 6 sites once per year. The monitoring will be required to be conducted in the spring.

Comment # 157 **Commentor** 4 **Comment Subject** Monitoring

Specific Comment

[From Attachment 4 to the RCFC&WCD comment letter]

Revision: Request "a representative percentage of the major outfalls within each hydrologic subarea" (II.B.1) and "a representative number of major outfalls within each hydrologic subarea" (II.C.1.b.(1)) be changed to "representative major outfalls" as shown in the redlines attached to this comment letter.

Justification: (1) The draft MRP requires sampling of a representative number or representative percentage of major outfalls. This is a problematic compliance target as it focuses the program on a particular and open-ended "number" or "percent" of outfalls. By revising the language to require monitoring of "representative major outfalls", the burden is on the Copermittees to come up with a program that is truly representative, without requirements to meet an arbitrary number or percent of outfalls. The Copermittees are concerned about subareas that have many outfalls, which could require sampling of more sites than are economically feasible. These costs could escalate beyond the initial sampling event because if a NAL or SAL exceedance is recorded, source assessments studies are triggered that require additional staff time and resources. If this requirement is not revised, costs will quickly rise beyond the Copermittees' ability to sustain the MS4 compliance program.

Comment Response

The language in the draft MRP is consistent with requirements under 40 CFR 122.26 for non-storm water field screening (122.26(d)(1)) and storm water characterization (122.26(d)(2)) requirements. The language “a representative percentage of the major outfalls within each hydrologic subarea” leaves it up to the Copermittees to determine what number would be a representative percentage. The comment speculates that areas with many outfalls would require sampling of more sites than economically feasible. The San Diego Water Board does not expect the Copermittees to propose a program with a frequency that is not economically feasible nor statistically defensible. In regards to rising costs, the SAL/NAL requirements in the Order have specific language which allows for prioritization of source identification if a situation arises where the number of exceedances of action levels exceeds the ability to adequately respond. Additionally, in discussions with the Copermittees, the Copermittees were unable to provide an accurate numerical count of MS4 outfalls within the permit coverage area. Lastly, the Copermittees to date have not characterized their storm and non-storm water MS4 effluent, as monitoring is currently conducted in the receiving waters. Effluent monitoring is a critical component of MS4 programs, and as a permanent MRP element, the San Diego Water Board expects that the Copermittees will be able to collect data over the permit term that provides a representative percentage or number of MS4 outfalls that discharge for differing watershed conditions in each hydrologic subarea. The lack of representative stations was also documented in the 2008 USEPA audits. Thus, no change has been made to the draft MRP.

Comment # 158	**Commentor** 4	**Comment Subject** Monitoring

Specific Comment

[From Attachment 4 to the RCFC&WCD comment letter]

Revision: Request the following text revisions in footnote:

"A representative determination must consider hydrologic conditions, total drainage area of the site, land use types (commercial, residential and industrial) , costs and other considerations as appropriate."

Justification: (1) The Copermittees originally asked for clarification on what factors would be considered for "representative percentage" and Water Board staff agreed to cost being included. The failure to include cost as a factor results in a program that reduces resources and diminishes funds quickly. The revision of the above allows for cost to be included through "other considerations as appropriate". (2) Deletion of percentage is consistent with previous comments. (3) Hydrologic conditions, population density of the site, traffic density and age of the structures or building in the area are all proposed "A representative percentage determination must consider hydrologic conditions, total drainage area of the site, population density of the site, traffic density, age of the structures or buildings in the area, and land use types (commercial, residential and industrial) , costs and other considerations as appropriate." deletions because each subarea may not be sensitive to these factors and if one of this factors is applicable it will be included under the addition "other considerations as appropriate".

Comment Response

Please see section VI of the Fact Sheet for a discussion regarding cost considerations in NPDES storm water permits. To clarify, the San Diego Water Board did not agree to include cost as a specific criteria for determining a “representative percentage” of sampling points. The San Diego Water Board agreed to clarify what factors (consistent with 40 CFR 122.26) to consider when evaluating representativeness under the MRP in order to meet the goals and answer the questions of the MRP. The existing language provides sufficient flexibility for the Copermittees to consider their program cost-efficiencies when evaluating factors in the draft MRP for proposing water quality monitoring. It is unclear how the “failure to include cost as a factor results in a program that reduces resources and diminishes funds quickly.” It is expected that sufficient water quality monitoring will require resources and funds. No changes were made based on this comment.

Comment # 159	**Commentor** 4	**Comment Subject** Monitoring

Specific Comment

[From Attachment 4 to the RCFC&WCD comment letter]

Revision: Request samples for Storm Water Action Levels (SALs) to be changed from 24-hour composite to grab.

Justification: (1) Composite sampling would result in significant increased cost due to the cost of purchasing additional automatic sampling equipment and constructing the necessary infrastructure to support its use. (2) Grab samples are likely more conservative. The Copermittees propose that grab samples be collected first and then, if a problem is indicated, the Copermittees would specify needed follow-up monitoring in the Source Assessment Monitoring Plan. (3) Freed resources can be dedicated to other key components of the program, such as follow-up source assessment studies.

Comment Response

The request to modify SALs to composites is not warranted on multiple accounts:

1) The draft MRP has flexibility that allows the Copermittees to select a representative percentage of sites, and frequency of sampling.

2) Grab samples may or may not be more conservative depending upon the time of sampling. Composite samples are what the SALs were calculated from, are what is required under 40CFR 122.21(g)(7), and composites provide additional information crucial to storm water programs (see the responses to comments 152 and 153, for example see 40 CFR 122.26(d)(2)(iii)(B)).

3) If grab samples are not representative of the discharge, it may actually waste resources on unnecessary follow-up source monitoring.

Comment # 160 **Commentor** 4 **Comment Subject** Overirrigation

Specific Comment

The draft MS4 Permit categorically prohibits the discharge of landscape irrigation; irrigation water; lawn watering; (collectively 'irrigation runoff') and non-emergency fire fighting flow runoff to the MS4. The basis for this requirement comes from the current Orange County stormwater permit within the San Diego Region (NPDES No. CAS0108740), which prohibits such discharges.

Although irrigation runoff may have been shown to be a problem in South Orange County, it has not been shown to be causing problems in receiving waters in the Santa Margarita Region. Attachment 6 summarizes the unique conditions and other facts that warrant the restoration of irrigation runoff as a non-prohibited non-stormwater discharge category. It is important to reiterate the three key points
made in Attachment 6:

Unlike the watersheds in South Orange County, the Santa Margarita Region is an ephemeral watershed;

Unlike South Orange County, the Copermittees have not identified landscape irrigation, irrigation water or lawn water as an actual source of pollutants or conveyance of pollutants to waters of the U.S.;

The draft MS4 Permit requires Copermittees to eliminate irrigation runoff TO THE MS4, which by definition, requires elimination of discharges to streets, curbs and gutters.

As noted above, the prohibition appears to hold the Copermittees responsible for any amount of irrigation runoff discharged to the curb and gutter, regardless of whether or not the discharge ever reaches receiving waters or causes or contributes to the exceedance of a water quality standard. This fact, combined with the fact that irrigation runoff has not been shown to be causing impairments in the local receiving waters, will make enforcement difficult to justify with residents and will likely result in community outrage over bans on irrigation. Further the Copermittees are not water purveyors, and as such, have little control over residential irrigation runoff outside of sending code enforcement officers out to look for incidents of excessive irrigation runoff. This is a very inefficient use of resources. In any event, the provisions as written will do little for water quality but potentially much for community outrage against water quality programs. The Copermittees do not believe this is the intent of the Board.

It is further worth noting that the Permit already contains an investigation and remediation process via Non-Stormwater Action Levels (NALs) by which the Copermittees will identify the source of problematic non-stormwater discharges. Should the source be found to be a conditionally exempt non-stormwater discharge, the permit requires the Copermittees to address that discharge or the entire category of discharges as appropriate. By allowing the NAL process to determine when and where conditionally exempt discharges need to be prohibited, the Copermittees are better positioned to justify any enforcement actions.

PREFERRED POLICY CHOICE: the Copermittees request that the Regional Board restore the conditional exemption for landscape irrigation, irrigation water and lawn watering as outlined in Attachments 6 and 7.

Alternatively, if the Regional Board nevertheless insists on prohibiting Irrigation Runoff, the Copermittees request that the draft MS4 Permit be revised to allow for irrigation runoff to be managed as a JRMP program, rather than as a prohibited discharge to the MS4. This alternative request is consistent with how the Permit currently deals with non-emergency fire fighting discharges, which was also removed from the list of non-prohibited non-storm water discharges. The Executive Officer stated that he would be open to consideration of a program for irrigation runoff that
would address discharges from the MS4. This alternative approach allows the Copermittees to develop a program that focuses on irrigation runoff problem areas, as opposed to holding the Copermittees responsible for eliminating any instant case of over-irrigation to a street independent of threat to receiving water quality.

ALTERNATIVE POLICY CHOICE: The Copermittees request that the Regional Board clarify that irrigation runoff is only prohibited where it is discharged from an MS4 (into receiving waters) by adding the following language:

B.4. As part of the JRMP, the Copermittees must develop and implement a program to address pollutants from landscape irrigation, irrigation water and lawn watering identified as significant sources of pollutants to waters of the United States.

Comment Response

Please see the response to comment 100.

Comment # 161 **Commentor** 4 **Comment Subject** Monitoring

Specific Comment

[From Attachment 4 to the RCFC&WCD comment letter]

Revision: Request removal of the High Priority Inland Aquatic Habitat Monitoring requirements.

Justification: (1) This is an entirely new monitoring program. This monitoring program was initially proposed in the Orange County NPDES MS4 Permit, but later deleted when the NAL/SAL monitoring requirement was added. This trade was made as it was expected that the outfall monitoring data from the NAL and SAL program would effectively answer the underlying management question – "are MS4s impairing beneficial uses in priority aquatic habitat areas?" The underlying logic for removing the requirement in Orange County similarly applies here. Given the current economic conditions and the fact that this was considered and deleted from the OC Permit; the Copermittees respectfully request that this requirement similarly be deleted from the Riverside County MRP.

Comment Response

Please see the response to comment 150.

Comment # 162 **Commentor** 4 **Comment Subject** Economic

Specific Comment

It is fundamental that the MS4 Permit be economically, technically, and legally feasible. To be credible, and to pass legal muster, MS4 Permit requirements must demonstrable a nexus to water quality improvements. Instead the current requirements, although well intended but not always well developed, will put the Copermittees in non-compliance since we cannot afford to implement all the requirements and consequently this will not lead to water quality improvement.

The present economic crisis has made daily headlines over the past three years and Riverside County has been identified as the 11th most impacted county in the nation. In the ROWD and throughout the development of the draft MS4 Permit, the Copermittees have provided abundant publicly available information regarding the impact of this crisis on their revenues, staffing, and programs. Virtually every program and service, including public safety services, has been impacted, and others have been eliminated. Contingency reserves have been depleted to the lowest levels allowable to maintain operations. At this point, the Copermittees cannot increase water quality compliance spending without real risks to reducing spending on existing state and federal mandates or other much-needed local programs and services. As proposed, the draft MS4 Permit is economically infeasible.

Comment Response

Please see the responses to comments 8, 9, 52, 134, and 136. The Tentative Order is economically, technically, and legally feasible as evidenced in the supporting Fact Sheet.

Comment # 163	**Commentor** 4	**Comment Subject** General

Specific Comment

In an effort to promote a viable 4th-term MS4 Permit, the Copermittees proactively engaged Regional Board staff in a collaborative dialogue with the intent of developing an economically feasible MS4 Permit that was protective of receiving water quality in the Santa Margarita Region. However, the following constraints have limited the benefits of the process:

1. The discussions were curtailed because the Board expected the draft MS4 Permit to be heard in October;

2. The Board had adopted the South Orange County MS4 Permit as a "model" permit, and, therefore, would have to approve any major revisions to the provisions of that Permit; and

3. The inclusion of several new provisions of the draft MS4 Permit addressing unpaved roads, inspection programs and monitoring requirements go well beyond the Orange County Permit.

Comment Response

Please see the responses to comments 121 and 131. The commentor presents a paradoxical argument of on the one hand complaining that the San Diego Water Board uses the South Orange County MS4 permit as a model permit and on the other hand complaining about uniques provisions in the Tentative Order that are not in the South Orange County MS4 permit.

Comment # 164	**Commentor** 4	**Comment Subject** Economic

Specific Comment

As noted in the Executive Summary, the MS4 Permit adopted for South Orange County was ultimately developed for a region with substantial coastal resources and perennial streams, twice the population, significantly higher property tax revenues, and more affluent tax payers.

Comment Response

Please see the responses to comments 8, 9, 115, 116, 122, 126, 127, 130, 134, and 136.

Comment # 165 **Commentor** 4 **Comment Subject** Monitoring

Specific Comment

[From Attachment 4 to the RCFC&WCD comment letter]

Revision: Request alteration of Special Study Program.

Justification: The Draft Permit requires six special studies to be conducted (TMDL Development and Implementation, Sediment Toxicity, Trash and Litter Investigation, Agricultural, Federal and Tribal Input Study, MS4 and Receiving Water Maintenance Study and Intermittent and Ephemeral Stream Perennial Conversion Study). This is in excess of the four special studies required by the OC MRP. Given the larger MS4 Permit Area, population and resources available to South Orange County, the additional studies proposed on Riverside County are inappropriate from a social, economic and environmental justice standpoint. (1) Water Board staff acknowledged multiple studies were added to the draft MRP with the intention that would be eliminated. (2) The issues addressed by these studies are not all specific to the Santa Margarita Region and would be more appropriate to be evaluated as part of a broader regional study, such as the Sediment Toxicity study. (3) The Agricultural, Federal, and Tribal Input Study is specifically inappropriate as it requires the Copermittees to monitor the discharges of other entities subject to separate NPDES regulations. (4) The Intermittent and Ephemeral Stream Perennial Conversion Study is specifically inappropriate as it incorrectly presumes that such ephemeral streams are actually being converted to perennial systems within the permit area due to MS4 discharges.

Comment Response

Please see the responses to comments 92 and 150. San Diego Water Board staff included special studies for issues of concern to the San Diego Water Board specific to the Santa Margarita Watershed, based upon our corrent knoledge of the watershed, including complaints and enforcement within the region, to answer specific questions outside the scope of the core MRP requirements, and as a result of issues raised in the ROWD. Based upon discussion with the Copermittees, one of the Special Studies was removed from the draft MRP prior to public release. For those remaining, San Diego Water Board staff included studies thought to be of importance from a water quality standpoint, and their removal or inclusion is appropriately considered by the Board.

Additionally, Copermittees are correct that some studies have a regional context and are of regional importance. Thus, as in the Orange County MRP, the Copermittees can propose to participate in a regional monitoring approach to supplement and/or replace MRP requirements. This is subject to Executive Officer approval.

Please see the response to comment 167 in regards to the Sediment Toxicity Study.

Please see the response to comment 168 in regards to the Agricultural, Federal, and Tribal Input Study.

Please see the response to comment 172 in regards to the Intermittent and Ephemeral Stream Perennial Conversion Study.

Comment # 166 **Commentor** 4 **Comment Subject** General

Specific Comment

By contrast, the ephemeral conditions found in the Santa Margarita Region result in stream channels that are dry during dry weather conditions and receive less rain during wet season conditions. The stream flow conditions in the Santa Margarita Region are entirely unlike the significant perennial flow conditions found in South Orange County. The proposed changes contained herein address these realities. The proposed changes also address necessary changes to ensure that the Copermittees can continue to afford implementation of the draft MS4 Permit given the significant economic disadvantages faced by the Santa Margarita Region, disadvantages that have been exacerbated by the impacts of the recession.

Comment Response

Please see the response to comment 175

Comment # 167 **Commentor** 4 **Comment Subject** Monitoring

Specific Comment

[From Attachment 4 to the RCFC&WCD comment letter]

Sediment Toxicity – In the waterbodies found in the Santa Margarita watershed (which are intermittent at best and dry most of the time) the idea of investigating sediment toxicity and its impacts on benthic macroinvertebrates seems a reach. Current sediment toxicity monitoring in the State is focused on year round streams and estuaries (e.g. the Delta). Furthermore the current state of sediment toxicity monitoring is at best in its infancy as is the State's policy regarding Sediment Quality Objectives. It would seem that a more reasonable approach associate with sediment toxicity is to allow the science to catch up with the policy and for the Copermittees to learn from these other statewide efforts.

Comment Response

As discussed in the Fact Sheet, Pyrethroid pesticides were identified from TIEs conducted in response to toxicity observed during sampling as part of the triad approach at Temecula and Murrieta Creek. This monitoring was water chemistry specific and did not include sediment monitoring for pesticides. Additionally, Temecula Creek, Murrieta Creek and the Santa Margarita River were 303(d) listed for toxicity for the 2008 list. In regards to current sediment toxicity monitoring, southern California specific monitoring has shown sediments to contain pyrethroids, specifically following storm events from residential areas. Thus, irrespective of watershed hydrology (i.e. intermittent streams), pyrethroids can have a large impact on the benthos during periods of flow both during and following storm events, which may be reflected in the observed low IBI scores.

The commentor also includes some discussion regarding the science behind sediment toxicity monitoring and the status of sediment quality objectives policy at a statewide level. It is important to note that the science is well-established as documented in peer-reviewed studies, and the rate of development of state policy does not provide a sufficient basis for removal of the special study. It is unclear how the science needs to "catch up with the policy," and how this warrants not evaluating the receiving waters for a pollutant already documented to be present in toxic amounts.

Comment # 168 **Commentor** 4 **Comment Subject** Monitoring

Specific Comment

[From Attachment 4 to the RCFC&WCD comment letter]

Agricultural, Federal, and Tribal Input Study - Ongoing monitoring efforts in the Central Valley and the Los Angeles Regions for the Agriculture Waiver Program are more robust and statistically valid to make any efforts by Riverside County to be pale in comparison and likely insignificant. Likewise, monitoring in watersheds (e.g. Lake Tahoe, and the northwest part of the State) where water bodies are impaired by sediment and where Federal and Tribal land uses have inputs to the impaired water bodies is significant and should take precedent over any efforts in Riverside County. As previously noted, it is inappropriate to require the Copermittees to not only monitor their own discharges, but also expend resources monitoring the discharges of others. The Regional Board has authorities to require these sources to collect their own data and should exercise that authority appropriately if such studies are required.

Comment Response

This special study was included based upon information provided in the Copermittees' ROWD, as the Copermittees stated their concern regarding the quality of storm water being discharged into their MS4s from Agricultural, Federal and Tribal areas without sufficient supporting data. The Copermittees are responsible for flows into, through and from their MS4s, and they cannot passively accept discharges from third parties (see Finding D.3.d and Discussion in the Fact Sheet). This special study is intended to identify those flows and determine the level of pollutants being discharged into their MS4s.

The information from this study will be useful in determining whether pollutant contributions from agricultural, federal, and tribal areas are actually a significant source of pollutants entering the Copermittees' MS4 systems, as they assert. This study can also be done in conjunction with the monitoring that will be performed by the irrigated agriculture community for Conditional Waiver No. 4.

Comment # 169 **Commentor** 4 **Comment Subject** Monitoring

Specific Comment

[From Attachment 4 to the RCFC&WCD comment letter]

MS4 and Receiving Water Maintenance Study - It is likely that every flood control district in the State and Caltrans would be impacted by the MS4 and Receiving Water Maintenance Study; therefore it would be imperative to have a well thought out, comprehensive, and regional study to answer the questions being posed in the MRP. Requiring the Copermittees to take on this responsibility is misleading and will not be sufficient to answer the broad questions being posed in the MRP. A more reasonable approach would be to model a regional program similar to the current SCCWRP efforts to assess hydromodification requirements for southern California.

Comment Response

Although MS4/receiving water maintenance activities are conducted throughout the region, they are not conducted in the same manner and magnitude as is the practice in Riverside County. This special study was included with the intention that the study would serve as a pilot study to assist in the San Diego Water Board's determination if further investigation is warranted. The special study requirements are flexible and require, at a minimum, 2 sites (1 reference and 1 maintained) with pre and post monitoring for 9 pollutants. There is no specific requirement for sampling frequencies, durations or specific locations. However, the Copermittees are encouraged to propose a regional approach or program, which is allowed under the draft MRP, with EO approval.

Comment # 170 **Commentor** 4 **Comment Subject** Economic

Specific Comment

The requirements in the Permit must protect beneficial uses in a cost effective manner. It is always a balance to protect water quality and avoid unnecessary increases in program compliance costs. Balancing local water quality needs and funding limitations should be paramount in the current economic climate. Proposed program expansions must be carefully weighed against economic realities and be justified by conditions actually found in the Santa Margarita Region. As described, unpaved roads and business inspections have been effectively addressed by existing programs, yet the draft MS4 Permit proposes requirements that can only be met by establishment of new compliance programs and, in the case of the business inspect ions, elimination of the highly effective CAP.

Comment Response

Please see the responses to comments 52, 130, and 134. Through meeting with the Copermittees over a dozen times spanning several months, the Tentative Order was modified to address cost effectiveness.

Comment # 171 **Commentor** 4 **Comment Subject** General

Specific Comment

The legislature created Regional Boards to protect our beneficial uses while carefully considering the technical and economical feasibility of such protection. Even in the best of economic times, state and local government must carefully manage public revenues. A policy-level decision by the Regional Board is necessary to direct staff to work with the Copermittees to address the comments contained herein . The Copermittees request your support in our effort to develop an economically, technically, and legally feasible MS4 Permit that is appropriate to the Santa Margarita Region. As noted in the opening Executive Summary of this comment letter we specifically request that you direct Regional Board provide staff with direction to resolve the issues identified in this letter and attachments.

Comment Response

Please see the responses to comments 8, 9, 52, 121, 134, 136, 162, and 170.

Comment # 172	**Commentor** 4	**Comment Subject** Monitoring

Specific Comment

[From Attachment 4 to the RCFC&WCD comment letter]

Intermittent and Ephemeral Stream Perennial Conversion Study – Finally, review of historical water resource data by the Copermittees (as indicated in the ROWD), USGS and state and federal courts have all found that the construction of Vale and Skinner dams has significantly increased the ephemeral nature of local watersheds, resulting in much drier conditions than naturally occurred. This is why Rancho California Water District is required to discharge raw water down the Santa Margarita River at the County Line. Requiring a study to study the impacts of ephemeral conversion demonstrates a clear lack of understanding of historical and current receiving water conditions. Further, similar to our comment above regarding the MS4 and Receiving Water Maintenance Study, this study is better addressed at a regional or statewide level. It is not possible to develop a sufficient local database to statistically validate any impacts from non-stormwater discharges within any reasonable timeframe. Furthermore any minimal monitoring effort that could be provide by the Copermittees would not comprehensively address the questions being proposed in the MRP and would be a waste of resources. Again a regional approach, whether it be SCCWRP or other combination of stormwater Copermittees, would be a more logical and constructive approach to address this issue.

Comment Response

The San Diego Water Board does not disagree with the impact of impoundments upon downstream hydrology, including historical conditions within the Santa Margarita HU. However, the commentor misunderstands the context of the special study. The purpose of the investigation is to assess if exempted non-storm water discharges from the MS4 are negatively impacting beneficial uses through the conversion of waters that historically were ephemeral or intermittent into perennial systems. For ephemeral systems, any discharge of effluent becomes the receiving water, and as such, can alter beneficial uses due to pollutants, flow, invasives species, etc… which would otherwise not be present. As described, this special study is meant to coincide with non-storm water discharge monitoring and provide a qualitative and quantitative evaluation of beneficial uses for receiving waters subject to the non-storm water discharges. This is expected to aid the Copermittees IC/ID efforts to determine if the discharges are causing a condition of pollution, contamination, or nuisance due to the non-storm water flows. The San Diego Water Board contends this is not a waste of resources.

The special study has been written with a great deal of flexibility and does not require the development of a database for statistical validation of results as the commentor states. Additionally, it is unclear what questions are proposed in the special study that could not be comprehensively addressed.

Again, the Copermittees may propose a regional approach under the draft MRP to supplement and/or replace monitoring requirements. While a regional approach may be warranted, the study's intent is to provide site-specific non-storm water evaluations within the Santa Margarita HU.

Comment # 173	**Commentor** 4	**Comment Subject** Monitoring

Specific Comment

[From Attachment 4 to the RCFC&WCD comment letter]

The Copermittees have proposed maintaining two of the special studies (TMDL Development and Trash Assessment), while replacing the other four with locally preferred special studies already in place (Regional Bioasessment Program and LID BMP design, maintenance, and effectiveness study). The Copermittees believe the alternate proposal provides information that is directly relevant and beneficial to the Santa Margarita Region. This would result in an annual cost savings of $314,000 per year. This would maintain parity with the OC Permit, which only has four special studies, three of which are identical to the studies proposed below (TMDL Development, Regional Bioassessment, Trash and Litter investigation). Specific language to incorporate the new studies is included in the redline markup of the MRP.

The Copermittees propose the following studies, the write-up for which can be found in Attachment 9 to the comment letter:

1. TMDL Development and Implementation

2. LID BMP design, maintenance and effectiveness study and demonstration
This study will be valuable in ensuring BMPs that are required are effective and the benefit and integration of LID BMPs into a site is understood. This proposed study would directly affect the Copermittees ability to ensure effective LID BMPs are being implemented.

3. Regional Bioassessment study
All the Southern California counties have committed to participate in this study, with the understanding that it would be written into the MS4 permits as a special study for which they would get credit. The Copermittees have been proactively implementing this study without a MS4 Permit requirement, and want to be able to continue to support these regional studies.

4. Trash and Litter Investigation

Comment Response

The San Diego Water Board is amenable to the addition of the Regional Bioassessment as a special study, and has modified the Stream Assessment Montioring Frequency to once annually, in exchange. The draft MRP has been modified accordingly. The San Diego Water Board disagrees with including the LID special study (see the response to comment 150).

Comment # 174 **Commentor** 4 **Comment Subject** Unpaved Roads

Specific Comment

[From Attachment 5 to the RCFC&WCD comment letter]

The Draft Municipal Separate Storm Sewer System Permit (Draft Tentative Order No. R9-2010-0016; NPDES No. CAS0108740) for the Santa Margarita Region of Riverside County (Draft MS4 Permit) includes proposed findings and requirements for development and maintenance of unpaved roads that are redundant to existing regulatory requirements. The proposed requirements for maintenance of unpaved roads may lead to the unintended consequence of discouraging maintenance of the majority of the unpaved roads in the Santa Margarita Region, which may increase the potential for erosion and sediment discharge from such roads. Statements in the Fact Sheet and Findings, monitoring data, and Permittee observations and experience do not support identification of unpaved roads as a significant source of pollutants to receiving waters in the Santa Margarita Region, thereby warranting additional regulation of unpaved roads.

The Copermittees request that the proposed requirements for development and maintenance of unpaved roads be removed from the Draft MS4 Permit. The Copermittees believe that enhancement of existing programs by identifying Best Management Practices (BMPs) specific to maintenance of unpaved roads and providing public education to owners and contractors providing maintenance of privately maintained unpaved roads will be as effective as the program in the draft Permit at substantially less cost. If the San Diego Regional Board determines that unpaved roads within their jurisdiction require further regulation, the Permittees believe that the appropriate regulatory mechanism is a General Permit (Waste Discharge Requirements or NPDES Permit) since the Draft MS4 Permit addresses only a fraction of unpaved roads within the jurisdiction of the San Diego Regional Board.

Comment Response

San Diego Water Board disagrees with the conclusion that these requirements are redundant to existing regulatory requirements.

Also, the comment fails to explain the reasoning or logic behind their assertion why requiring maintenance of unpaved roads will discourage the maintenance of the majority of unpaved roads. If indeed a reduction in maintenance does occur, to whatever extent that reduction results in water quality impacts, it must be addressed through the requirements proposed.

The San Diego Water Board has identified unpaved roads as a significant source of pollutants; please see the response to comment 138 for recent examples. The requirement to regulate unpaved roads has not been removed from the Tentative Order. Certain changes have been made to the exact language as requested by the Copermittees. The San Diego Water Board strongly encourages the Copermittees to educate the public on proper maintenance of unpaved roads. The San Diego Water Board reserves the right to issue a general permit regulating unpaved roads.

Comment # 175 **Commentor** 4 **Comment Subject** General

Specific Comment

[From Attachment 5 to the RCFC&WCD comment letter]

The stream system in the Santa Margarita Region is ephemeral, with only small isolated segments exhibiting natural perennial flow due to rising groundwater. Such a stream system does not support fish migration. Runoff from the Santa Margarita Region naturally exhibits high sediment loads due to precipitation patterns, limited vegetative cover, soil types and steep topography.

Comment Response

The San Diego Water Board disagrees with the comment as an over generalization of the stream conditions within the Santa Margarita watershed. The Santa Margarita River has historic fish migration and historic perennial flows. Groundwater harvesting has drawn down the water table and reduced surface flow availability. In addition, urbanization has created localized perennial flows and wetlands in historically ephemeral areas, much like other areas throughout the region.

Comment # 176 **Commentor** 4 **Comment Subject** Unpaved Roads

Specific Comment

[From Attachment 5 to the RCFC&WCD comment letter]

Most existing unpaved roads in the Santa Margarita Region are private roads on private property that have not been engineered and have evolved through use. Such unpaved roads consist of earthen materials that have been compacted by vehicular use and do not include improved drainage, engineered grading or surface improvement. However, proposed unpaved road projects are subject to the development requirements of the MS4 Permit and the Construction General Permit and would be engineered.

In contrast to paved roads, unpaved roads are predominantly lightly traveled and found in rural areas serving economically disadvantaged residents. Many of these roads remain unpaved for economic reasons. Moreover, some residents do not want paved roads as they desire to preserve the rural/rustic nature of their communities.

Comment Response

San Diego Water Board staff disagree that proposed unpaved road projects are already subject to the development requirements of the MS4 Permit and the Construction General Permit (see the response to comment 102)

The status of ownership may increase an unpaved roads' threat to water quality due to a private owner being less likely to be informed on the threat to water quality or have the ability to maintain the unpaved road. The frequency of travel may also correlate to a threat to water quality. Less frequently used roads are also less likely to be maintained, thereby being an increased threat to water quality. If residents choose to have unpaved roads as their preferred access for aesthetic reasons, those roads must have BMPs and be maintained to not cause a water quality impairment.

Comment # 177 **Commentor** 4 **Comment Subject** Monitoring

Specific Comment

[From Attachment 4 to the RCFC&WCD comment letter]

Revision: Request "Carbamates" be removed as a constituent for analytical testing in Table 1.

Justification: The testing of carbamates should be dictated by the completion of toxicity identification evaluations (TIEs). The use of carbaryl in urban areas throughout California dropped approximately 80% between 2004 and 2008. This drop is also matched by an 80% reduction in the number of USEPA registered carbaryl products between 2004 and 2008. A downward trend since 2006 likely reflects a long-term reduction in the availability of carbaryl products due to USEPA regulatory requirements. Further, once the USEPA completes its regulatory process for the full implementation of new carbayl restrictions3, urban carbaryl use is likely to continue to decline.

Comment Response

The Copermittees have not monitored for carbamates, and thus no evidence of their presence in the discharge is available. While the reduction in registration and projected use likely limits the possibility of the presence of carbamates in the future, it does not warrant removal of carbamates from the required monitoring list. Should toxicity be detected, the inclusion of carbamates will assist with conducting TIEs. It is also important to note that other pesticides required to be monitored regularly (chlorpyrifos) and through TIEs (pyrethroids) have been detected. Thus, it is probable carbamates are present. No change has been made to the draft MRP.

Comment # 178 **Commentor** 4 **Comment Subject** Unpaved Roads

Specific Comment

[From Attachment 5 to the RCFC&WCD comment letter]

Maintenance of unpaved roads in the Santa Margarita Region is generally limited to smoothing washboard depressions that have been created by vehicle use and to improve drainage by properly sloping the surface. The smoothed road surface is compacted by the grading equipment and, subsequently, by regular traffic use. This routine maintenance activity is intended to maintain original lines and grade, and the original purpose of the unpaved road. Repair of landslides and washouts, and replacement of culverts is also performed as needed, in some instances on an emergency basis. Landslide and washout repairs may require the implementation and maintenance of temporary erosion and sediment control BMPs until the disturbed area is stabilized.

The Permittees voluntarily provide limited maintenance of Copermittee maintained, dedicated and accepted unpaved roads for public access. This voluntary maintenance is provided for public safety, including emergency vehicle access, and to maintain utility of the public easement. There is no requirement that the Permittees provide this maintenance.

Comment Response

Unpaved roads should be maintained to prevent landslide and washouts that subsequently cause a water quality impairment. Regardless of ownership, the Copermittee can, through their storm water ordinances, require private owners of unpaved roads to maintain the road to prevent erosion and sedimententation downstream in receiving waters. The San Diego Water Board, however, is sensitive to the Copermittees' concerns. The unpaved roads requirements have been revised. Please see the responses to comments 101 and 139-141.

Comment # 179 **Commentor** 4 **Comment Subject** Unpaved Roads

Specific Comment

[From Attachment 5 to the RCFC&WCD comment letter]

Most unpaved roads in the Santa Margarita Region are not maintained by the Permittees, but instead are private roads located on private property. Permittee staff is only allowed to enter private property if a crime or illegal activity is observed. The County of Riverside has not accepted maintenance of unpaved roads since the late 1940s and now only accepts paved roads that have been designed and constructed to County standards. Murrieta and Temecula will only approve new subdivisions with paved roadways constructed to their standards. In some instances, the Permittees maintain unpaved roads under contract to Home Owners' Associations or through Community Service Areas. However, the Permittees are prohibited by law from using Gas Tax funds for maintenance of unpaved roads on private property.

Other entities that are not under the legal authority of the Permittees also own unpaved roads in the Santa Margarita Region. These entities include: Agricultural Operators, Eastern Municipal Water District, Federal Lands, Metropolitan Water District of Southern California, Nature Conservancy, Railroads, Rancho California Water District, Southern California Edison, State of California, Tribal Lands

Comment Response

The Tentative Order only regulates those unpaved roads within the Copermittee's jurisdiction. Outside of their jurisdicion, other regulatory mechanisms will be required to address pollution from unpaved roads.

Comment # 180 **Commentor** 4 **Comment Subject** Monitoring

Specific Comment

[From Attachment 4 to the RCFC&WCD comment letter]

Revision: Request "Hexavalent Chromium" be removed as a constituent for analytical testing in Table 1.

Justification: Since 2004, monitoring in the Santa Margarita Region has reflected that out of 62 total samples, there were 60 non-detected levels of Hexavalent chromium. The 2 detected levels of Hexavalent chromium occurred in April 2007 in wet weather samples. It may be notes that 2007 was the driest year on record for the region and analyzed samples reflect an extended period between wet weather events. Table 1 has been modified to reflect this change.

Comment Response

Based upon data collected to date, the requirement to monitor Hexavalent Chromium has been reduced to the 1st storm event of the season and 1 dry weather event at mass loading stations. Following results collected during the term of the Tentative Order, the inclusion of Hexavalent Chromium will be evaluated for continued monitoring. Table 1 has been modified to include this clarification.

Comment # 181 **Commentor** 4 **Comment Subject** Monitoring

Specific Comment

[From Attachment 4 to the RCFC&WCD comment letter]

Revision: Request "Biological Oxygen Demand, 5day" and "Chemical Oxygen Demand" be removed as constituents for analytical testing in Table 1.

Justification: The reference in the Fact Sheet supporting the inclusion of these constituents is to the initial Phase 1 application requirements. It should be noted that the initial constituent list is not required of future permits. Further, these constituents are costly to analyze and do not provide new information that is relevant to the management of the NPDES MS4 Program.

Comment Response

Biological and Chemical Oxygen Demand (BOD/COD) provide an indication of pollution from excess sources of organic waste (biologically available and inert) such as sewage, animal waste, and plant over-production due to nutrient enrichment. The initial NPDES application requires the collection of a minimum number of constituents, including a list of constituents that are used to characterize storm water discharges. The comment does not provide any supporting evidence or documentation that warrants removal of these constituents. No changes were made based on this comment.

Comment # 182 **Commentor** 4 **Comment Subject** Unpaved Roads

Specific Comment

[From Attachment 5 to the RCFC&WCD comment letter]

The evidence cited in the Finding, water quality monitoring data, and Permittee observations and experience since establishment of the MS4 Permit in 1990 do not identify unpaved roads as a significant source of pollutants resulting in water quality impairments. The Copermittees support the continued application of development and construction requirements and maintenance of temporary erosion and sediment control BMPs as specified in existing permits.

The requirements for development and maintenance of unpaved roads were proposed by Regional Board staff for inclusion in the Draft MS4 Permit just prior to its release for public comment. Prior to that time, and dating from the original establishment of the MS4 Permit requirements in 1990, unpaved roads had not once been mentioned by Regional Board staff as a significant source of water quality impairment requiring additional regulatory.

The discussion of Finding D.1.c. states that the inclusion of unpaved road requirements was based on "investigations and complaints" reviewed by the San Diego Regional Board. However, Regional Board staff identified only one recent case regarding an unpaved road in the Santa Margarita Region as a problem. The Copermittee in question has investigated this case and it is being addressed as an enforcement action. Although the Copermittees have not had the opportunity to review the investigations and complaints cited by Regional Board staff, no feedback from these investigations was reported to the Copermittees at the MS4 Permit discussions prior to the proposal of the unpaved road requirements. This indicates to the Copermittees that unpaved roads do not in fact present a significant water quality concern.

The Copermittees have reviewed the documents cited by Regional Board staff in the discussion of Finding D.1.c. and the conditions in the Santa Margarita Region are vastly different from those in Pennsylvania and Northern California cited in those documents. These areas receive regular precipitation, have significant vegetative cover, and perennial streams, some of which may support migrating fish. Nothing in these documents suggests that unpaved roads are a significant source requiring special attention in the Santa Margarita Region. Further, no data collected during Copermittee monitoring nor their observations support a conclusion that unpaved roads are a significant source of pollutants warranting special regulatory attention.

The lack of evidentiary support for the unpaved roads provisions makes their inclusion in the Draft MS4 Permit arbitrary and capricious. The Copermittees therefore request deletion of Finding D.1.C.

Comment Response

Contrary to the comment, the San Diego Water Board has identified several unpaved roads potentially causing water quality problems. Therefore, "continued application of development and construction requirements and maintenance of temporary erosion and sediment control BMPs" is clearly insufficient, and, to some extent inappropriate, since unpaved roads are not temporary.

The BMPs cited in USEPA and State of California can be equally effective at addressing sediment and erosion on unpaved roads in the Santa Margarita Watershed. In no way does a BMP manual infer similar geology, climate or habitat. The fact that the watershed has less vegetative cover and flashy flows undesrcores the need for proper BMPs in the watershed.

Finally, the statement that ," no data collected during Copermittee monitoring nor their observations support a conclusion that unpaved roads are a significant source of pollutants warranting special regulatory attention" is not surprising since no such data was collected. This was the basis for the San Diego Water Board proposing a Special Study on unpaved roads in earier drafts (prior to public release).

Please see the responses to comments 101, 103, and 138.

Comment # 183 **Commentor** 4 **Comment Subject** Monitoring

Specific Comment

[From Attachment 4 to the RCFC&WCD comment letter]

Revision: Request "Total Organic Carbon" and "Dissolved Organic Carbon" be removed as constituents for analytical testing in Table 1.

Justification: The reference within the Fact Sheet does not require these constituents and there is a significant cost in analyzing the constituents. It is not clear what additional information these constituents provide that would be useful in managing the MS4 program that is not already addressed through the collection of other constituents.

Comment Response

The reference in the Fact Sheet has been updated to reflect the reference for monitoring of organic carbon. Please also see the response to comment 181.

Comment # 184 **Commentor** 4 **Comment Subject** Unpaved Roads

Specific Comment

[From Attachment 5 to the RCFC&WCD comment letter]

For the reasons set forth above, there is no evidence that unpaved roads require special regulatory attention in the MS4 Permit. Moreover, proposed requirements specific to unpaved roads are redundant to existing requirements in both the existing Permit and the draft MS4 Permit, the state General Construction Permit, and the Copermittees' Stormwater ordinances. To the extent that unpaved roads are of concern to Regional Board staff, those concerns can be effectively addressed by minor adjustments to these existing compliance programs. In a time of tight regulatory budgets, adding these additional requirements, especially where there is no demonstrated need for them, is arbitrary and capricious. The Copermittees request deletion of requirements specific to unpaved roads (see discussion below) as well as these statements in the Fact Sheet.

Comment Response

Please see the response to comment 138 and 182. The Copermittees' existing permit requirements have failed to adequately address pollution coming from unpaved roads.

Comment # 185 **Commentor** 4 **Comment Subject** Unpaved Roads

Specific Comment

[From Attachment 5 to the RCFC&WCD comment letter]

Virtually all unpaved road development activities would be greater than one acre and/or be part of a priority development project of one acre or more. Such development projects are required to prepare and implement project-specific Standard Urban Stormwater Mitigation Plans (SUSMPs) under Section F of both the existing MS4 Permit and the Draft MS4 Permit. The SUSMPs identify post-construction BMPs that will be implemented for all elements of the project, including the unpaved road elements of the project. Unpaved road projects are also required to comply with the state General Construction Permit, which requires preparation of a SWPPP that identifies construction-phase BMPs and post-construction BMPs. These development and construction phase requirements are applicable to unpaved roads and are imposed by the Copermittees during the development review process, during the issuance of grading permits and during construction inspections. Either the general requirements for development projects in the existing or Draft MS4 Permit and/or the General Construction Permit already require identification and implementation of post-construction BMPs, including erosion and sediment control BMPs, when developing new unpaved roads. Therefore, additional requirements for development of unpaved roads are redundant and the Copermittees request that these redundant requirements be removed from the Draft MS4 Permit.

Comment Response

The San Diego Water Board disagrees with the comment's over generalization that virtually all unpaved road development activity would be greater than one acre. In particular, small roads crossing ephemeral stream can cause significant impacts through improperly engineered, designed and maintained culvert systems. Please see the response to comment 102.

Comment # 186 **Commentor** 4 **Comment Subject** Unpaved Roads

Specific Comment

[From Attachment 5 to the RCFC&WCD comment letter]

The documents cited in Finding D.1.c discuss shaping of the surface of unpaved roads during smoothing, and maintenance of temporary sediment and erosion control BMPs associated with maintenance activities, such as repair of landslides and wash outs. The temporary erosion and sediment control BMPs identified include straw bales and silt fencing. The documents do not describe conditions in the Santa Margarita Region, but rather in Pennsylvania and Northern California.

The conditions in the Santa Margarita Region are vastly different from the conditions found in Pennsylvania and Northern California. Nevertheless, the Copermittees conduct surface grading and maintain temporary erosion and sediment control BMPs as appropriate following completion of maintenance on unpaved roads. These BMPs associated with the routine maintenance of unpaved roads will be documented and procedures formalized in the Riverside County Drainage Area Management Plan (DAMP).

Comment Response

Finding D.1.c in the Tentative Order does not include any document citations. The Fact Sheet discussion for Finding D.1.c. does include some examples of existing BMP manuals that the Copermittees may draw upon as a cost -saving resource in designating BMPs for unpaved roads maintenance. The BMP manuals are in no way used to describe the geology, habitat and climate of the Santa Margarita Region. The manuals do include useful information regarding the impacts of unpaved roads reardless of location. See comment 182 response.

Comment # 187 **Commentor** 4 **Comment Subject** Unpaved Roads

Specific Comment

[From Attachment 5 to the RCFC&WCD comment letter]

As previously described, the vast majority of unpaved roads within the jurisdiction of the Copermittees are not maintained by the Copermittees, but are maintained by others, typically private property owners. As these are public easements over private property, however, the underlying property owner is under no legal obligation to provide maintenance. To provide reasonable access, maintenance of such unpaved roads is voluntarily provided by property owners and, in some cases, home owners' associations. State law prohibits the use of Gas Tax funds by the Copermittees for the maintenance of unpaved roads on private property. Requirements for implementation and maintenance of temporary erosion and sediment control BMPs in areas under the legal jurisdiction of the Copermittees are addressed by the general requirements of the Copermittees' stormwater ordinances and, where grading activities are significant, through the Copermittees' grading ordinances. As maintenance of unpaved roads on private property is voluntary, more aggressive regulation of such private roads may in fact discourage routine maintenance of unpaved roads, likely resulting in an increase in erosion and sediment discharge from such roads.

As an alternative, maintenance of unpaved roads can be effectively addressed by enhancing existing programs. There is no need to create a new compliance program requirement specific to unpaved roads, especially where such programs cannot in any event be implemented by the Copermittees on private property. The Copermittees believe that a better approach is to provide public education to property owners and grading contractors in areas served by unpaved roads, focusing on the proper methods of shaping unpaved road surfaces and the benefits of implementing and maintaining temporary erosion and sediment controls.

The Copermittees request that these proposed provisions be removed from the Draft MS4 Permit.

Comment Response

Please see the responses to comments 101, 102, 176, and 182.

Comment # 188 **Commentor** 4 **Comment Subject** Unpaved Roads

Specific Comment

[From Attachment 5 to the RCFC&WCD comment letter]

There is nothing unique about potential discharges from unpaved roads under the legal jurisdiction of the Copermittees such that they would require special regulation. As discussed above, there is significant mileage of unpaved roads in the Santa Margarita Region that are not under the legal jurisdiction of the Copermittees. If there is concern about the impact of unpaved roads on water quality (a concern that, for the reasons already stated, is not supported by the evidence), there is no reason to believe that unpaved roads not under the legal jurisdiction of the Copermittees do not present the same potential to affect receiving water quality.

If it is determined that development and maintenance of unpaved roads requires special additional regulation, then such regulation should apply equally and on the same schedule to all unpaved roads under the jurisdiction of the San Diego Regional Board, not just those under the legal authority of the Copermittees. The Copermittees request that, if staff continues to maintain that unpaved roads require additional regulation, those requirements be addressed through a general permit for unpaved roads, and not in the Draft MS4 Permit.

Comment Response

Because unpaved roads are a significant concern to water quality, the San Diego Water Board will regulate discharges from them under the appropriate mechanism. Please see the responses to comments 101 and 179.

Comment # 189	**Commentor** 4	**Comment Subject** Unpaved Roads

Specific Comment

[From Attachment 5 to the RCFC&WCD comment letter]

No evidence, whether statements in the Fact Sheet and Findings, monitoring data, or Copermittee observations and experience, supports identification of unpaved roads as a significant source of pollutants to receiving waters in the Santa Margarita Region warranting additional regulation. The proposed unpaved road requirements are redundant to requirements of existing permits, including the state General Construction Permit, as well as existing Copermittee ordinances and programs. To the extent that unpaved roads may be a source of pollutants to the MS4 and thence to receiving waters, the Copermittees believe that enhancement of existing programs by documenting BMPs specific to maintenance of unpaved roads and providing public education to owners and contractors who provide maintenance of privately maintained unpaved roads will be as effective in reducing such pollutants, at a much reduced cost.

If the Regional Board determines that unpaved roads within its jurisdiction require further regulation, the appropriate method for addressing those roads is through a General Permit (Waste Discharge Requirements or NPDES Permit) rather than the Draft MS4 Permit, since a General Permit would address all unpaved roads in the San Diego Region, not just the subset of unpaved roads under the legal jurisdiction of the Copermittees.

Comment Response

Please see the responses to comments 101 and 138.

Comment # 190 **Commentor** 4 **Comment Subject** General

Specific Comment

[From Attachment 6 to the RCFC&WCD comment letter]

Unlike the watersheds in South Orange County, the Santa Margarita Region is an ephemeral watershed that includes Murrieta and Temecula Creeks which are perennial interrupted streams, i.e., they include some reaches in which the flow is continuous and others where flow is ephemeral. However, the areas of perennial flow in the Santa Margarita Region are located in mountain area tributaries outside of the urbanized areas serviced by the MS4s. These perennial flows quickly disappear by seepage into the sands and gravels and resurface upstream of the confluence of Murrieta and Temecula Creeks. The creeks in the urbanized areas of the watershed, located primarily in the valley, are ephemeral and flows are only observed during and immediately following significant storm events.

Rising groundwater is currently observed in Murrieta Creek below its confluence with the Santa Gertrudis Channel, an observation consistent with the observations made by the State of California in 1956. Rising groundwater is also observed in Temecula Creek approximately one quarter mile upstream of the Interstate 15 Bridge. In 1956, the State observed more extensive rising groundwater conditions occurring as far upstream as the Highway 79 Bridge. Based on the virtual absence of non-stormwater flows and the rising groundwater conditions observed in lower Murrieta and Temecula Creeks prior to development of the watershed, there is no evidence that the rising groundwater currently observed is due to Urban Runoff nor that Urban Runoff has affected the quality of rising groundwater.

Comment Response

The San Diego Water Board recognizes that many of the streams should be ephemeral in the Upper Santa Margarita Watershed. The San Diego Water Board disagrees that the perennial flows in the upper parts of the watershed are all natural. This is the reason the Intermittent and Ephemeral Stream Perennial Conversion special study was included in the MRP. The San Diego Water Board recognizes that rising groundwater is likely to contribute to flows that are observed in some reaches. The San Diego Water Board does not contend that rising groundwater is necessarily due to non-storm water discharges. The San Diego Water Board does not agree that non-storm water discharges are not affecting groundwater quality. Much of the available groundwater monitoring data in the region indicate that there are elevated levels of nitrates and other forms of nutrients, as well as other pollutants that can likely be attributed to non-storm water discharges that infiltrate to groundwater.

The commenter misrepresents the State of California's 1956 report on the Santa Margarita Watershed. The report cites that flows in the watershed are highly "seasonal" not "ephemeral". In addition, the report demonstrates the seasonality with flow data in a table that shows diminished flows in the summer, but not an absence of flows, at the river gauge.

Also see the response to comment 175.

Comment # 191 **Commentor** 4 **Comment Subject** Monitoring

Specific Comment

[From Attachment 4 to the RCFC&WCD comment letter]

Revision: Request "Biological Oxygen Demand, 5day" and "Chemical Oxygen Demand" be removed as constituents for analytical testing in Table 4.

Justification: The reference in the Fact Sheet supporting the inclusion of these constituents is to the initial Phase 1 application requirements. It should be noted that the initial constituent list is not required of future permits. Further, these constituents are costly to analyze and do not provide new information that is relevant to the management of the NPDES MS4 Program.

Comment Response

Please see the response to comment 181. It is important to note that no data has been collected to date to characterize discharges of storm water effluent from the Copermittees' MS4s. No changes were made based on this comment.

Comment # 192 **Commentor** 4 **Comment Subject** Monitoring

Specific Comment

[From Attachment 4 to the RCFC&WCD comment letter]

Revision: Request "Total Organic Carbon" and "Dissolved Organic Carbon" be removed as constituents for analytical testing in Table 4.

Justification: The reference within the Fact Sheet does not require these constituents and there is a significant cost in analyzing the constituents. It is not clear what additional information these constituents provide that would be useful in managing the MS4 program that is not already addressed through the collection of other constituents.

Comment Response

Please see the responses to comments 181 and 183. It is important to note that no data has been collected to date to characterize discharges of storm water effluent from the Copermittees' MS4s. No changes were made based on this comment.

Comment # 193 **Commentor** 4 **Comment Subject** Monitoring

Specific Comment

[From Attachment 4 to the RCFC&WCD comment letter]

Revision: Request the following text revisions:

"The Copermittees must collaborate to develop and implement a program to identify sources of pollutants causing the priority water
quality problems within each hydrologic subarea. The program must include focused monitoring as necessary to identify source areas, or other methods to identify the societal sources of pollutants, as appropriate. This program must begin no later than the 2012-2013 monitoring year."

Justification: As drafted, the permit requires source identifications to start at the end point of the watershed and move upstream. The requested revisions are intended to provide flexibility to allocate resources appropriately based on field judgements. The second part of the revision is to acknowledge some pollutant contributions to the MS4 are in-fact, non-point source, and cannot be pinpointed through focused source ID Monitoring.

Comment Response

A key component of receiving water and effluent monitoring is to conduct source identification monitoring to identify specific sources and/or areas for pollutants causing priority water quality problems. This is done in conjunction with source identification as required under the Tentative Order on a watershed basis, moving upstream to identify specific sources and contributing areas. As stated in the fact sheet, all monitoring conducted under Order No. R9-2004-001 focused on receiving water conditions rather than MS4 effluent discharges. Outside of required toxicity identification and reduction evaluations, no source identification effluent monitoring was conducted for observed exceedances of water quality standards in receiving waters. The utilization of "other methods to identify the societal sources of pollutants," is not considered water quality monitoring, and thus does not fall under the MRP but rather the Tentative Order (i.e. construction site locations). See the Fact Sheet for further discussion. No changes were made based on this comment.

Comment # 194 **Commentor** 4 **Comment Subject** Monitoring

Specific Comment

[From Attachment 4 to the RCFC&WCD comment letter]

Revision: Request text additions:

"Sampling of non-storm water discharges may be done utilizing grab samples. If a ponded MS4 discharge is observed at a monitoring station, the Copermittee(s) must record the observation and collect at least one (1) grab sample, however ponded water samples will not be used in determining action level exceedances. If flow is evident, a 1-hour composite sample may be taken. The Copermittee(s) must estimate the flow using techniques such as by measuring the width of water surface, approximate depth of water, and approximate flow velocity."

Justification: The first text addition is to avoid triggering action levels due to increased concentrations caused by evaporation of ponded water. Evaporation of ponded water will result in increased concentrations of any constituents contained in the water. NALs are based on Water Quality Objectives that are based on stable, flowing stream conditions. The second text addition is to allow flexibility in measuring stream flows. In some cases, flow gauges or flow meters may be available to estimate flow.

Comment Response

In response to the comment regarding ponded MS4 discharge and concerns over higher concentrations, there are multiple factors to consider. Non-storm water discharge sampling requires sampling of the effluent discharged from the MS4 into receiving waters. First, if an MS4 discharge is ponded within the receiving water due to the receiving water's natural hydrology, then an increased concentration due to receiving water conditions (i.e. evaporation) is not a sufficient rationale for causing a condition of pollution, contamination, or nuisance as a result of the discharge. This is also reflected within the action level calculations, specifically in consideration of the appropriateness of granting dilution credits. Second, if an MS4 discharge is ponded within the MS4 prior to the discharge point, then action levels would also still apply, as there is visible evidence of a non-storm water discharge into the MS4 system which may be an illicit discharge. The ponding does not warrant foregoing proper IC/ID investigations.

In regards to the flow estimation language, edits have been made to ensure there is flexibility in measuring the flow of the effluent. For clarification, the commentor requests "flexibility in measuring stream flows", and the referenced flow estimation is for effluent discharge. The draft MRP has been modified to include this clarification.

Comment # 195 **Commentor** 4 **Comment Subject** Monitoring

Specific Comment

[From Attachment 4 to the RCFC&WCD comment letter]

Revision: Request text additions:

Monitoring Annual Report: The Principal Copermittee must submit the Receiving Waters and MS4 Discharge Monitoring Annual Report to the San Diego Water Board on October 1 of each year, beginning on October 1, 2013. Receiving Waters and MS4 Discharge Monitoring Annual Reports must cover the monitoring activities and results from the previous fiscal year, and must meet the following requirements:

Justification: All of the Copermittees' activities are tracked and reported on a Fiscal Year basis. This facilitates clearer data and cost tracking, and results that can be more effectively integrated into the JRMP reports in a clear and understandable manner, since the reporting periods are aligned. This change is important, so as to allow for a simpler transition from the existing monitoring and data tracking methods, to those that will be developed for compliance with the permit.

Comment Response

The San Diego Water Board finds this to be a reasonable request and has modified the draft MRP language.

Comment # 196 **Commentor** 4 **Comment Subject** Monitoring

Specific Comment

[From Attachment 4 to the RCFC&WCD comment letter]

Revision: Request the following text revisions:

"The 4th year monitoring report must include identification and analysis of any long-term trends in the Copermittees' MS4 storm water discharges or receiving water quality. Appropriate statistical methods shall be used to evaluate the water quality data."

Justification: The first edit is to require the long term statistical analyses be performed on a time schedule consistent with submission of the ROWD. Requiring long-term statistical trend analyses on an annual basis is unnecessary and inappropriately increases analysis and reporting costs and complexity. The second edit recognizes a multitude of different statistical methods could be used and others may be more appropriate to the dataset than those identified in the draft MRP.

Comment Response

The first proposed edit to reduce trend analysis to the 4th year monitoring report for submission with the ROWD is not appropriate for multiple reasons. This does not meet the goals of the MRP (I.A). For example, goal number 2 is to "Measure and improve the effectiveness of the Copermittees' runoff management programs." Trend analysis should be utilized as a tool to meet this goal, which arguably should not be done on a permit re-issuance basis. The proposed edit would also not answer the core management questions the MRP is designed to answer (I.B). For example, question 5 asks "are conditions in receiving waters getting better or worse?" Again, this should not be answered only on a permit re-issuance basis.

In regards to the second proposed edit, the commentor misconstrues the MRP language. The MRP language only requires a trend analysis to include a non-parametric approach, and provides some examples ("Trend analysis must use nonparametric approaches, such as"). A non-parametric approach is required to be included because stormwater data in southern California are not normally distributed, and comparison of statistical calculations on transformed data with a non-parametric approach aids in evaluating conducted trend analysis. No changes were made based on this comment.

Comment # 197 **Commentor** 4 **Comment Subject** Monitoring

Specific Comment

[From Attachment 4 to the RCFC&WCD comment letter]

Revision: Request elimination of requirement for annual monitoring reports to include total pollutant loads (wet weather loads plus dry weather loads) due to MS4 Discharge for each of the hydrologic subareas.

Justification: Many assumptions go into the calculations of total loads, making their use in statistical analyses questionable at best. The Copermittees have continued to provide this data, but do not see that it has any value.

Comment Response

The San Diego Water Board recognizes that multiple assumptions are integrated into the estimation of total pollutant loading from MS4 discharges. However, this does not warrant the removal of the calculation requirement, as load calculations play an important role in estimating the impact of MS4 discharges on receiving waters. Importantly, estimation of pollutant loading should be utilized by the Copermittees to meet the goals and answers the questions under I.A and I.B. Furthermore, the Copermittees have not conducted MS4 effluent monitoring under previous or the current Order, so it is expected that pollutant loading estimations under the draft MRP, which requires storm and non-storm water effluent monitoring, will be more accurate.

It is also important to note that the collection of MS4 effluent and receiving waters data and subsequent MS4 load estimation will assist in the evaluation of 303(d) listings and TMDL development. No changes were made based on this comment.

Comment # 199	**Commentor** 4	**Comment Subject** Overirrigation

Specific Comment

[From Attachment 6 to the RCFC&WCD comment letter]

The last sentence of this Finding [C.15] does not accurately reflect the facts. Unlike Orange County, and despite Board staff's contentions in the fact sheet the Copermittees have not identified landscape irrigation, irrigation water or lawn water as a source of pollutants or conveyance of pollutants to waters of the U.S. Rather, this statement is based on the efforts in Orange County where that County found that the significant perennial flows throughout the urbanized areas were caused by irrigation runoff. Not only has irrigation runoff not been found to be a source of pollutants to waters of the U.S. in the Santa Margarita Region as a category, no individual discharges of irrigation runoff in the region have been found to be a source of pollutants. As described in the Stream Flow Characteristics section above, during dry weather there is no perennial flow in the waters of the U.S. in the urbanized area until rising groundwater occurs just before the confluence of Murrieta and Temecula Creeks. This is unlike streams in South Orange County, that it was found that the significant perennial flows throughout the urbanized areas were caused by irrigation runoff. In the Santa Margarita Region, any weather runoff that does reach receiving waters quickly seeps into the alluvial soils.

Comment Response

Please see the responses to comments 27, 83, 175 and 233.

Comment # 200	**Commentor** 4	**Comment Subject** Overirrigation

Specific Comment

[From Attachment 6 to the RCFC&WCD comment letter]

Second, the Discussion of Finding C.15 in the Fact Sheet fails to demonstrate the need for a prohibition of this irrigation runoff as a non-stormwater runoff category. The discussion references conditions outside of and unlike those found in the Santa Margarita Region and misconstrues statements in public education materials that encourage runoff management as justification for the proposed prohibitions. Finally, no justification is provided in this discussion or elsewhere to support the prohibition of the non-emergency fire fighting flows runoff as a category.

Comment Response

Please see the responses to comments 25, 27, and 83.

Comment # 201	**Commentor** 4	**Comment Subject** Overirrigation

Specific Comment

[From Attachment 6 to the RCFC&WCD comment letter]

A prohibition of irrigation runoff will result in significant costs to the public and the Copermittees as the prohibition is TO THE MS4, which is defined to include streets, curbs and gutters. As the MS4 Permit has eliminated the MEP protections for dry weather non-stormwater discharges (see also legal comments in Attachment 7 to the comment letter), this makes the Copermittees responsible for every incidence of over-irrigation, regardless of whether such discharges ever affect receiving waters. As such, the cost to eliminate these discharges is not commensurate with any measurable environmental benefit. The Copermittees cannot impose fees to recover the costs of enforcing this new requirement and, as described in the Economics White Paper (Attachment 2 to the comment letter), the Copermittees have even fewer resources to carry out the requirements of the current MS4 Permit than in past years, much less carry out the additional requirements set forth in the draft Permit, including the development and implementation of a new program to prohibit irrigation runoff.

As this prohibition would also apply to Copermittees' facilities, retrofit of existing facilities would likely be immediately required to ensure compliance. The City of Murrieta, for example, has estimated that retrofit of their sprinklers to a drip system to avoid irrigation runoff from their facilities alone would cost $250,000.

Comment Response

Please see the response to comment 23. The San Diego Water Board disagrees that including the prohibition of irrigation runoff in the Tentative Order will result in significant costs to the public and Copermittees. The prohibition is consistent with the Water Conservation in Landscaping Act (AB1881), which already required cities and counties to adopted landscape water conservation ordinances prohibiting runoff from inefficient landscape irrigation by Janaury 1, 2010. The cities and counties are required to adopt ordinances that prohibit runoff from "the target landscape" to "adjacent property, non-irrigated areas, walks, roadways, parking lots, or structures." The Copermittees are already required to enforce these ordinances.

In the event that overirrigation runoff is identifed as an illicit discharge to "adjacent property, non-irrigated areas, walks, roadways, parking lots, or structures", which includes the Copermittees' MS4s, the Copermittees are expected to address the illicit discharge through their IC/ID programs. In addition, the San Diego Water Board encourages the Copermittees to identify and implement retrofit projects and education programs that can help to minimize or eliminate the potential for illicit discharges of overirrigation runoff into their MS4s.

Comment # 202 **Commentor** 4 **Comment Subject** Overirrigation

Specific Comment

[From Attachment 6 to the RCFC&WCD comment letter]

Management of irrigation runoff is currently addressed by existing requirements and programs and the additional requirements proposed in the draft Permit are unnecessary. The use of reclaimed water is regulated under Waste Discharge Requirements (WDRs) issued by the Regional Board.

The draft Permit also provides other mechanisms to address irrigation runoff. First, if a discharge of irrigation runoff was determined to be a source of stormwater pollutants, the Copermittees already have the legal authority to take appropriate enforcement action to control the discharge as an illegal discharge, under their existing storm water ordinances. Second, the non-stormwater action level monitoring required by this draft Permit will identify any potentially problematic non-stormwater discharges and identify the source of those discharges. Should the source be determined to be irrigation runoff, it will require the Copermittees to address that discharge. Both mechanisms are better suited (financially and legally) to deal with irrigation runoff than a complete prohibition provision in the absence of local data showing it as a problem.

Finally, local water purveyors are better equipped and able to address irrigation runoff. As an example, Rancho California Water District and Eastern Municipal Water District actively promote water conservation programs, which are supported by the Metropolitan Water District of Southern California. The County and the cities have adopted water conservation ordinances as required by the Water Conservation in Landscaping Act (AB 1881, Laird). Given these facts, there is even less justification for an extensive and expensive program to address an irrigation runoff issue that is not, in fact, a source of pollutants causing or contributing to a violation of water quality standards in the Santa Margarita Region.

Comment Response

The San Diego Water Board disagrees that the requirements in the Tentative Order are unnecessary. The San Diego Water Board has identified runoff from overirrigation as a significant source and conveyance of pollutants to the MS4 and receiving waters. This justifies the requirements of the Tentative Order. Please see the responses to comments 27 and 83.

In addition, the prohibition is consistent with the Water Conservation in Landscaping Act (AB1881), which already required cities and counties to adopted landscape water conservation ordinances prohibiting runoff from inefficient landscape irrigation by Janaury 1, 2010. The cities and counties are required to adopt ordinances that prohibit runoff from "the target landscape" to "adjacent property, non-irrigated areas, walks, roadways, parking lots, or structures." The Copermittees are already required to enforce these ordinances.

The San Diego Water Board agrees that NALs may idenify illicit discharges from overirrigation. In the event that an individual irrigation runoff discharge is identifed as an illicit discharge to the MS4, whether or not an NAL exceedance has been observed, the Copermittees are expected to address the illicit discharge through their IC/ID programs.

Comment # 203	**Commentor** 4	**Comment Subject** Overirrigation

Specific Comment

[From Attachment 6 to the RCFC&WCD comment letter]

Specifically, the Permittees request that the language in the Permit be amended as follows prior to adoption of the Permit:

Delete Finding C.15

As the last sentence of this Finding is not supported by fact, the Permittees request that it be deleted as noted in the following text and the entirety of the Discussion of Finding C.15 in the Fact Sheet be deleted.

Non-storm water discharges to the MS4 granted an influent exception [i.e., which are exempt from the effective prohibition requirement set forth in CWA section 402(p)(3)(B)(ii)] under 40 CFR 122.26 are included within this Order. Any exempted discharges identified by Copermittees as a source of pollutants are subsequently required to be addressed (emphasis added) as illicit discharges through prohibition and incorporation into existing IC/ID programs. Furthermore, the USEPA contemplates that permitting agencies such as the San Diego Water Board may also identify exempted discharges as a source of pollutants required to be addressed as illicit discharges (See VOl. 55 Fed. Reg. 48037).

Comment Response

Please see the responses to comments 27 and 83. No changes were made based on this comment.

Comment # 204	**Commentor** 4	**Comment Subject** Overirrigation

Specific Comment

[From Attachment 6 to the RCFC&WCD comment letter]

The Permittees request that the landscape irrigation; irrigation water; lawn watering; and non-emergency fire fighting flows runoff categories be restored to the list of non-prohibited, non-stormwater discharges identified in B.2 of the draft SMR MS4 Permit as noted below. In the event that an individual irrigation runoff discharge is determined to be a source of pollutants as identified by the non-stormwater dry weather action level (NAL) process, appropriate action can be taken by the Permittees to control that source.

B.2. Non-Stormwater Discharges
This item includes a listing of discharges that are not prohibited unless a discharge is determined to be a source of pollutants to waters of the U.S. Landscape irrigation, irrigation water, lawn watering and non-emergency fire fighting flows were deleted from this list as noted:
a. Diverted stream flows;
b. Rising groundwaters;
c. Uncontaminated groundwater infiltration [as defined at 40 CFR 35.2005(20)] to MS4s;
d. Uncontaminated pumped groundwater3;
e. Foundation drains3;
f. Springs;
g. Water from crawl space pumps3;
h. Footing drains3;
i. Air conditioning condensation;
j. Flows from riparian habitats and wetlands;
k. Water line flushing4,5;
l. Landscape irrigation;
m. Discharges from potable water sources not subject to NPDES Permit No. CAG679001, other than water main breaks;
n. Irrigation water;
o. Lawn watering;
p. Individual residential car washing;
q. Non-emergency fire fighting flows; and
r. Dechlorinated swimming pool discharges

Comment Response

Please see the responses to comments 27 and 83. In the event that an individual irrigation runoff discharge is identifed as an illicit discharge to the MS4, which may be after an NAL exceedance has been observed, the Copermittees are expected to address the illicit discharge through their IC/ID programs. No changes were made based on this comment.

Comment # 205	**Commentor** 4	**Comment Subject** Overirrigation

Specific Comment

[From Attachment 6 to the RCFC&WCD comment letter]

It is not practicable for the Copermittees to prevent or eliminate irrigation runoff. The Permittees request that the following requirements be revised as noted to provide achievable compliance requirements:

F.1.c.(1) Approval Process Criteria and Requirements for All Development Projects states:

Performance Criteria: Discharges from each approved development project must be subject to the following management measures:

(1) Source control BMPs that reduce stormwater pollutants of concern in runoff;prevent reduce the potential for illicit discharges into the MS4; prevent reduce the potential for irrigation runoff; storm drain system stenciling or signage; properly design outdoor material storage areas; properly design outdoor work areas; and properly design trash storage areas.

F.1.d.(5) Source Control BMP Requirements states:

Each Copermittee must require each Priority Development Project to implement applicable source control BMPs. The source control BMPs to be required must:

(a) Prevent illicit discharges into the MS4;
(b) Minimize storm water pollutants of concern in runoff;
(c) Eliminate Reduce the potential for irrigation runoff;
(d) Include storm drain system stenciling or signage;
(e) Include properly designed outdoor material storage areas;
(f) Include properly designed outdoor work areas;
(g) Include properly designed trash storage areas;
(h) Include water quality protection requirements applicable to individual priority project categories.

Comment Response

The San Diego Water Board disagrees with the proposed changes. The San Diego Water Board disagrees that it is not practicable for the Copermittees to prevent or eliminate irrigation runoff from entering their MS4 systems. The Copermittees are required by AB 1811 to prohibit overirrigation runoff. Please see the responses to comments 27, 83, and 201. The Copermittees are expected to implement their jursidictional programs, especially their IC/ID programs, to prevent or eliminate irrigation runoff from entering their MS4 systems. No changes were made based on this comment.

Comment # 206	**Commentor** 4	**Comment Subject** Overirrigation

Specific Comment

[From Attachment 6 to the RCFC&WCD comment letter]

Regulate irrigation runoff discharges from the MS4, rather than as prohibited discharge to the MS4:

If the Regional Board nevertheless insists on prohibiting irrigation runoff, the Copermittees request that the draft MS4 Permit be revised to allow for irrigation runoff to be managed as a Jurisdiction Runoff Management Plan (JRMP) program, rather than as a prohibited discharge to the MS4. This alternative request is consistent with how the Permit currently deals with non-emergency fire fighting discharges, which was also removed from the list of non-prohibited non-stormwater discharges. The Executive Officer stated that he would be open to consideration of a program for irrigation runoff that would address discharges from the MS4. This alternative approach allows the Copermittees to develop a program that focuses on irrigation runoff problem areas, as opposed to holding the Copermittees responsible for eliminating any instant case of over-irrigation independent of threat to receiving water quality.

As the alternative to restoring the conditional exemption, the Copermittees request the Board to ADD Provision B.4 as follows:

B.4. As part of the JRMP, the Copermittees must develop and implement a program to address pollutants from landscape irrigation, irrigation water and lawn watering identified as significant sources of pollutants to waters of the United States.

Comment Response

The San Diego Water Board disagrees with the requested change. The Copermittees are expected to implement their jursidictional programs, especially their IC/ID programs, to prevent or eliminate irrigation runoff from entering their MS4 systems. No changes were made based on this comment. Please see response to comment 201.

Comment # 207 **Commentor** 4 **Comment Subject** Legal

Specific Comment

[From Attachment 7 to the RCFC&WCD comment letter]

Throughout Part F. of the Tentative Order relating to the Jurisdictional Runoff Management Program, the language requires not only that the Copermittees adopt programs intended to achieve control of pollutants but also requires such programs to achieve certain ends. See, for example, Part F.1., where each Copermittee must implement a development planning program which meets the requirements of Section F of the Tentative Order and which requires such a program to (1) reduce development project discharges from the MS4 to the MEP, (2) prevent such discharges "from causing or contributing to a violation of water quality standards", (3) prevents illicit discharges to the MS4, and (4) manages increases in runoff discharge rates. A similar requirement is set forth in other provisions, including Part F.3, relating to existing development, Part F.3.b., relating to commercial/industrial programs, Part F.3.c., relating to residential programs and Part F.6, relating to the education component where, in each case, the Copermittees are required to develop programs and ensure their performance.

This dual requirement, to develop a program and then to ensure that it achieves the intended ends, is unlawful, as it goes beyond the requirements of the MS4 regulations and requires the Copermittees to guarantee the results of activities that will often be in the control of third parties. The MS4 regulations require that the MS4 permittees develop the required programs. See, for example, 40 CFR § 122.26(d)(2)(iv(A)((2), which requires the Copermittees to, among other things, develop and implement a management program including a "description of planning
procedures including a comprehensive master plan to develop, implement and enforce controls to reduce the discharge of pollutants from municipal separate storm sewers which receive discharges from areas of new development and significant redevelopment". The Copermittees certainly could be liable under the permit if they failed to adequately "develop, implement and enforce controls". However, the MS4 regulations do not require that the Copermittees guarantee, under threat of being found in violation of the permit, that such controls achieve the desired ends of the management programs. It should be also noted that in many other parts of the Order, the Copermittees are directed to develop programs "designed" to achieve water quality goals.

Further, the iterative BMP approach required by the State Water Resources Control Board ("State Board") in precedential State Board Order WQ 99-05 and subsequent rulings would be made meaningless if the Copermittees were strictly liable for ensuring in their programs that discharges did not cause or contribute to a violation of a water quality standard. It is appropriate for the Board to set forth in these sections the "elements needed in the Copermittees' program to fulfill the goals of [the] directive", as set forth in staff's Response to Comment 297 on the Orange County MS4 permit, Order No. R9-2009-0002. However, the Board has no authority to require the Copermittees to guarantee that such goals will be fulfilled, as the current language appears to require.

In addition to the portions of the Order cited, the Copermittees also request changes to similar provisions found at Sections F.1.d, F.1.d.5, F.2, F.3.a, F.4, and G. The attached redline identifies those and any additional parts.

Comment Response

40 CFR 122.44(d)(1) requires municipal storm water permits to include any requirements necessary to "[a]chieve water quality standards established under section 303 of the CWA, including State narrative criteria for water quality." 40 CFR 122.44(d)(1)(i) requires NPDES permits to include limitations to "control all pollutants or pollutant parameters (either conventional, nonconventional, or toxic pollutants) which the Director determines are or may be discharged at a level which will cause, have reasonable potential to cause, or contribute to an excursion above any State water quality standard, including State narrative criteria for water quality." Please also see the response to comment 76.

The Tentative Order's requirements are wholly lawful in accordance with the Clean Water Act, the Code of Federal Regulations and the California Water Code. The dual requirements are not in conflict, but work in harmony. The requirements set forth minimum programmatic actions that are expected to result in MS4 discharges meeting water quality standards. Where the Copermittees have implemented the minimum programmatic actions yet their discharges continue to violate water quality standards, the Copermittees must modify their programs and implement additional actions that are not specified within the Tentative Order to achieve water quality standards. The Tentative Order does not require strict compliance with water quality standards. See Defenders of Wildlife v Browner (9th Cir. 1999) 191 F.3d 1159, 1167-1168.

Comment # 208 **Commentor** 4 **Comment Subject** Legal

Specific Comment

[From Attachment 7 to the RCFC&WCD comment letter]

A number of requirements in the Tentative Order exceed the requirements of federal law. The Board may have discretion to impose such requirements under state law (Defenders of Wildlife v. Browner, 191 F.3d 1159 (9th Cir. 1999), however, the California Supreme Court has determined that to the extent such state law requirements are included in an NPDES permit, the Board must consider the factors set forth in Water Code § 13263(a) and § 13241, including the water quality that could reasonably be achieved by the requirements and economic considerations. City of Burbank v. State Water Resources Control Board (2005) 35 Cal. 4th 613. See also Water Code §13000, setting forth that the activities and factors which may affect the quality of the waters of the state "shall be regulated to attain the highest water quality which is reasonable, considering all demands being made on those waters and the total values involved, beneficial and detrimental, economic and social, tangible and intangible".

The Fact Sheet and findings for the Tentative Order do not establish that staff has considered such factors or, to the limited extent the factors were considered, staff used out-of-date and incomplete information. In particular, the economic analysis contained in Section VI of the Fact Sheet uses out-of-date information on the economic viability of the cities in the Santa Margarita Region, ignoring the impact of the national recession, which has hit the Region with particular force and which has caused a major reduction in property tax and sale tax revenues available to fund water quality activities under the Order. For a more complete economic analysis, please see Attachment 2 to the comment letter.

Comment Response

The federal statute provides that, in adopting MS4 permits, the permit "shall require . . . such other provisions as the Administrator or the State determines appropriate for the control of such pollutants." (See Defenders of Wildlife v Browner (9th Cir. 1999) 191 F.3d 1159) U.S. EPA and states have authority under federal law to go beyond the MEP standard and require strict compliance with water quality standards. (Building Industry Association of San Diego County v. State Water Resources Control Board, et al. (2004) 124 Cal.App 4th 866. The BIA court was persuaded that USEPA or the states have authority to require strict compliance with water quality standards under the "such other provisions as the Administrator . . . Determines appropriate for the control of such pollutants" language in CWA section 402(p)(3)(B)(iii). (Building Industry, 124 Cal.App 4th at 882-884.) In other words, even if the Permit somehow exceeded the federal minimum requirements of MEP, any discretion to exceed MEP originate in federal law, which requires the San Diego Water Board to include such other permit provisions as it deems appropriate.

However, in the Tentative Order, the San Diego Water Board has chosen not to exercise its discretion to go beyond MEP and require strict compliance with water quality standards. Thus, the Tentative Order's provisions clearly fall within the federal mandated requirements. The San Diego Water Board disagrees with the commenter's assertion that requirements in the Tentative Order exceed the requirements of federal law thus needing to consider the cited factors. However, where provided and available, staff has considered economic information in crafting the Tentative Order. Please see the responses to comments 8, 9, 77-79, and 86.

The economic analysis contained in section VI of the Fact Sheet is from up to date information, as reported by the Copermittees' Annual Reports, with information as of January 1, 2009. While we recognize that Riverside County is experiencing a period of economic hardship, the Copermittees do not provide an completely accurate characterization of the economic conditions. Please see the responses to comments 115, 116, 122, and 126-130.

Comment # 209 **Commentor** 4 **Comment Subject** Finding

Specific Comment

[From Attachment 8 to the RCFC&WCD comment letter]

Need for New Finding B.2: Section B in the findings describes the regulated parties. The District requests a new finding B.2, which provides as follows:

The Riverside County Flood Control and Water Conservation District (District) is not a municipality but rather operates various elements of the MS4 system within the San Diego Region in the form of flood control structures, including channels. Such channels and other flood control structures have been constructed and are operated by the District in accordance with its statutory obligations established by the Legislature in California Water Code App. § 48-9, to "control the flood and storm waters of said district" and to save and conserve in any manner all or any of such waters and protect from damage from such flood or storm waters the watercourses, watersheds, public highways, life and property in said district." Water Code App. § 48-9(8). As a creature of state law, and not a municipal corporation, the District does not exercise jurisdiction over land areas within the San Diego Region and the activities carried out on those land areas outside of its limited rights-of-way. Please see redline.

Comment Response

The San Diego Water Board disagrees with the requested change. As stated in the comment, the RCFC&WCD constructs and maintains channels and flood control structures, which are considered part of the MS4. The RCFC&WCD has jurisdiction within its right-of-way. The RCFC&WCD is responsible for implementing the requirements of the Tentative Order within its jurisdiction as is any other Copermittee. No changes were made based on this comment.

Comment # 210 **Commentor** 4 **Comment Subject** Legal

Specific Comment

[From Attachment 7 to the RCFC&WCD comment letter]

Finding A.4: This finding states that responses to comments on the Order would be "incorporated by reference" into the findings supporting the Order.

Comment: Incorporating responses to comments as to which interested parties have no chance to comment prior to the hearing on the Order raises a due process concern.

Comment Response

Finding A.4 has been modified to remove responses to comments as "incorporated by reference" into the findings of the Tentative Order. Although not part of the findings, the responses to comments remains part of the record and have been considered by the San Diego Water Board in adopting the Tentatie Order.

Comment # 211 **Commentor** 4 **Comment Subject** Finding

Specific Comment

[From Attachment 8 to the RCFC&WCD comment letter]

Findings, Section D.3: This section of the Findings referring to "Construction and Existing Development" is of limited applicability to the District, since the only construction projects that would be overseen by the District are of or within its own facilities. The redline sets forth a change to clarify this limited applicability.

Comment Response

The San Diego Water Board disagrees that the Findings referring to "Construction and Existing Development" are of limited applicability to the RCFC&WCD. Please see the response to comment 209. No changes were made based on this comment.

Comment # 212 **Commentor** 4 **Comment Subject** New Development

Specific Comment

[From Attachment 8 to the RCFC&WCD comment letter]

Section F.1.a: The District, as a non-municipality, does not prepare a General Plan or equivalent because it does not govern development within a geographical area. Thus, the requirements of this section of the Order are not applicable to it. Please see redline.

Comment Response

The requested changes are not necessary. The language also says "or equivalent plan". The RCFCD&WCD has Master Drainage Plans and Area Drainage Plans that must include watershd protection principles. No changes were made based on this comment.

Comment # 213 **Commentor** 4 **Comment Subject** New Development

Specific Comment

[From Attachment 8 to the RCFC&WCD comment letter]

Section F.1.d.(4)(a)(iii): Since the District, as a non-municipality, does not have land use codes, policies and ordinances, this provision, relating to the removal of "barriers to LID implementation," is not applicable to it. Please see redline.

Comment Response

The requested changes are not necessary. The RCFC&WCD has standard contract and bid specifications, encroachment permits and internal policies and procedures that all apply to this requirement. No changes were made based on this comment.

Comment # 214 **Commentor** 4 **Comment Subject** New Development

Specific Comment

[From Attachment 8 to the RCFC&WCD comment letter]

Section F.1.d.(9): The only Priority Development Projects (PDP) relevant to the District would be the District's owned non-flood control channel projects, since it has no authority to permit private or non-District facilities and exercises jurisdiction over no private land areas within the watershed, and because the construction of flood control channels is subject to the jurisdiction of the U.S. Army Corps of Engineers through the Clean Water Act Section 404 permit program, not the NPDES permit program under Section 402 of the Clean Water Act. Thus, this directive, which requires the verification of compliance by third parties with Standard Stormwater Mitigation Plan (SSMP) requirements, is not applicable to the District. Please see redline.

Comment Response

The requested changes are not necessary. The RCFC&WCD is required to verify compliance with SSMP requirements and track post-construction BMPs for its own projects. No changes were made based on this comment.

Comment # 215	**Commentor** 4	**Comment Subject** New Development

Specific Comment

[From Attachment 8 to the RCFC&WCD comment letter]

Section F.1.e: As noted above, the only PDPs over which the District would have authority are its own projects. Thus, this directive, which requires inspection of BMPs at PDPs constructed by third parties, is not applicable to the District. Please see redline.

Comment Response

The requested changes are not necessary. The RCFC&WCD is required to verify the construction of BMPs for its own projects. No changes were made based on this comment.

Comment # 216 **Commentor** 4 **Comment Subject** Legal

Specific Comment

[From Attachment 7 to the RCFC&WCD comment letter]

Finding C.14: This finding states, in relevant part, that "[n]on-storm water (dry weather) discharge from the MS4 is not considered a storm water (wet weather) discharge and therefore is not subject to regulation under the Maximum Extent Practicable (MEP) standard . . . .". The finding further asserts that such discharges are to be "effectively prohibited" from discharge into the MS4.

Comment: The rationale for this finding, as set forth in the Fact Sheet, relies on a State Board precedential decision, Order No. WQ 2009-0008. This order has been vacated by order of the Los Angeles County Superior Court in County of Los Angeles v. State Water Resources Control Board, Case No. BS 122724 (July 16, 2010). Thus, the order has no further effect and cannot be cited or relied upon by the Board in support of this finding or any other finding or directive in the Order.

Moreover, the finding incorrectly states that discharges of non-stormwater from the MS4 are not subject to the MEP standard. This parsing of "stormwater" and "non- stormwater" is not found in the Clean Water Act, which states only that the MS4 permit "shall require controls to reduce the discharge of pollutants to the maximum extent practicable . . . .". 33 U.S.C. 1342(p)(3)(B)(iii) (emphasis supplied). The preamble to the MS4 regulations promulgated by U.S. EPA moreover also acknowledges that "MEP control measures" would be implemented to address not only pollutants in "stormwater" but also from "non-stormwater discharges."

As the preamble states:

[Copermittees are required] to develop management programs for four types of pollutant sources which discharge to large and medium municipal storm sewer systems. Discharges from [such systems] are usually expected to be composed primarily of: (1) Runoff from commercial and residential areas; (2) storm water runoff from industrial areas; (3) runoff from construction sites; and (4) non-storm water discharges. Part 2 of the permit application has been designed to allow [permittees] the opportunity to propose MEP control measures for each of these components of the discharge". 55 Fed. Reg. at 48052 (emphasis supplied).

This language sets forth EPA's understanding of the plain language of the Act: "pollutants" must be controlled to the MEP from the MS4 "discharge", not merely stormwater. While State Board Order No. WQ 2009-0008 improperly attempted to ignore this distinction and liken non-stormwater discharges to prohibited "illicit discharges", that order has been vacated and cannot be cited by the Board.

Moreover, the interpretation that the Clean Water Act requires controls of dry weather discharges from the MS4 in the same manner as if such discharges were from an industrial wastewater source ignores the factual complexity of the MS4 discharge. For example, some of that discharge will be composed of exempt discharges, such as car washing runoff, swimming pool drainage, rising groundwater, foundation drains and other such sources. As to these types of discharges, U.S. EPA stated that "it is unlikely Congress intended to require municipalities to effectively prohibit . . . seemingly innocent flows that are characteristic of human existence in urban environments and which discharge to municipal separate storm sewers". 55 Fed. Reg. at 48037 (emphasis added). Other parts of that discharge will be comprised of industrial discharges separately permitted by the Board, such as well development discharges. These discharges cannot be distinguished from possible illicit discharges, yet they must still be treated to the MEP. There is no requirement in the Clean Water Act, or in the implementing regulations, to ensure that these mixed dry weather discharges must be "effectively prohibited" in the same way that an industrial plant would be required to control its discharges.

Comment Response

Please see the responses to comments 86 and 223.

Comment # 217 **Commentor** 4 **Comment Subject** New Development

Specific Comment

[From Attachment 8 to the RCFC&WCD comment letter]

Section F.1.g: Since the District is not a municipality, and does not permit third parties to build development projects, this provision is not applicable to it. (It should be noted that this directive also has been objected to by the District on behalf of itself and the other Copermittees.)

Comment Response

The requested changes are not necessary. The RCFC&WCD is required to enforce its storm water requirements and ensure compliance with the requirements of the Tentative Order for its own development projects. No changes were made based on this comment.

Comment # 218 **Commentor** 4 **Comment Subject** Construction

Specific Comment

[From Attachment 8 to the RCFC&WCD comment letter]

Sections F.2, F.2.a and F.2.f.: These directives require each Copermittee to comply with each of the requirements of the section, to review and update its grading and other ordinances, and implement an enforcement process for Construction sites. These requirements are not applicable to the District in the same manner as the other Copermittees, as the District is not a municipality and does not issue grading or other permits for private land use activities. Please see redline.

Comment Response

The San Diego Water Board disagrees that these requirements are not applicable to the RCFC&WCD in the same manner as the other Copermittees. The RCFC&WCD can review and update its grading and other requirements for construction projects implemented by the RCFC&WCD. The RCFC&WCD must enforce those requirements to ensure they are in compliance with the requirements of the Tentative Order. No changes were made based on this comment.

Comment # 219 **Commentor** 4 **Comment Subject** Commercial/Industrial

Specific Comment

[From Attachment 8 to the RCFC&WCD comment letter]

Sections F.3.b-c: These directives, which require the development of commercial/industrial and residential programs, are applicable to a municipality but not to the District, which does not have land area occupied by either commercial/industrial or residential developments. Such requirements may be applicable to the municipal Copermittees, but not to the District, which only operates MS4 within the Permit area. The District's rights-of-way are limited to that which is necessary to properly operate flood control infrastructure. Please see redline.

Comment Response

The San Diego Water Board disagrees that the proposed changes are necessary to make a distinction for the RCFC&WCD. If the RCFC&WCD does not have any commercial/industrial and residential land uses within their jurisdiction, they can report it in their Annual Report. The San Diego Water Board would not expect the RCFC&WCD to implement these programs if these land uses are not within their jurisdiction. No changes were made based on this comment.

Comment # 220 **Commentor** 4 **Comment Subject** Retrofit

Specific Comment

[From Attachment 8 to the RCFC&WCD comment letter]

Section F.3.d: This directive requires development of a retrofitting program for "municipal, industrial, commercial and residential" areas of development. The District only maintains MS4 facilities within the Santa Margarita Region, and does not have jurisdiction over other areas of development. The Order should make clear that any retrofitting requirements (which are the subject of separate comments by the District on behalf of other Copermittees) apply only to development with the jurisdiction of the Copermittee. Clarifying changes are set forth in the redline.

Comment Response

The San Diego Water Board disagrees with the requested changes. As stated in the comment, the RCFC&WCD maintains MS4 facilities within the Santa Margarita Region. MS4 facilities are considered municipal. There are potential retrofit opportunities for RCFC&WCD maintained MS4 facilities. Where there may be private property owners within other jurisdictions that could impact the RCFC&WCD MS4 facilities, the RCFC&WCD could work with those jurisdictions to identify ways to cooperate and encourage those private property owners to implement retrofit BMPs. No changes were made based on this comment.

Comment # 221 **Commentor** 4 **Comment Subject** General

Specific Comment

[From Attachment 8 to the RCFC&WCD comment letter]

Section F.6: This directive contains requirements for education of various target communities, including commercial and industrial owners and operators and residential communities, most of which are not within the jurisdiction of the District. The Order should make clear that such educational programs must be consistent with the jurisdiction of the Copermittees. Clarifying changes are set forth in the redline.

Comment Response

Through meetings with the Copermittees, modifications to the education section were made to accommodate the concern raised by the RCFC&WCD. Section F.6 requires each Copermittee to implement education programs. The Tentative Order is silent on how those education programs are implemented (i.e. for each jurisdiction, or regional). On several occasions, the RCFC&WCD has indicated that the Copermittees have a regional education program. As such, the RCFC&WCD is participating in educating and reaching out to the target communities in all the municipalities. No additional clarification is necessary.

Comment # 222 **Commentor** 4 **Comment Subject** General

Specific Comment

Attachment 9: Santa Margarita Region MS4 Copermittee Comments on Tentative Order R9-2010-0016 and Attachment E.

This attachment provides an underline strikeout text of Copermittee requested changes to the Tentative Order and Attachment E.

Comment Response

Where specific comments were provided in the underline-strikeout text, the San Diego Water Board has responded to those comments under a separate comment ID. Where comments were not provided in the text or where the comments were not otherwise addressed in other attachments of their comment letter, the San Diego Water Board has considered the change and either accepted the change as shown in the Errata or did not agree with the proposed change.

Comment # 223 **Commentor** 4 **Comment Subject** Legal

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

This order [WQ-2009-0008] has been vacated and can no longer be referenced

Comment Response

The San Diego Water Board disagrees with the commenter that discharges of non-storm water from the MS4 are subject only to the MEP standard. Non-storm water discharges into the MS4 are required to be effectively prohibited by the Copermittees. The San Diego Water Board acknowledges that State Water Board Order WQ-2009-0008 is no longer a precedential order by which the San Diego Water Board is bound, the court's opinion in County of Los Angeles v State Water Resources Control Board (Case No. BS 122724 (July 16, 2010)) does not address the substantive analysis and conclusions reached by the State Water Board in Order WQ-2009-0008. Rather, it vacates the permit issued by the Los Angeles Water Board that underlies Order WQ-2009-0008 on procedural grounds. The San Diego Water Board continues to agree with the State Water Board's findings and rationale as expressed in the Order. Findings in the Tentative Order will be revised to reflect that although Order WQ 2009-0008 is no longer a precedential order, the San Diego Water Board independently agrees with its findings and rationale.

Comment # 224 **Commentor** 4 **Comment Subject** Legal

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

This is inappropriate. The information in the fact sheet is/are not 'findings', they are explanations. Further a finding cannot be created through a response to comments.

Comment Response

Please see the response to comment 210. While the San Diego Water Board has modified the finding stating that responses to comments are incorporated as findings, it is appropriate to incorporate by reference the Fact Sheet into the Tentative Order.

Comment # 225 **Commentor** 4 **Comment Subject** Finding

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

No link has been demonstrated within this watershed. (Partially due to lack of recreation in receiving waters)

The findings should be accurate for reflective of the specific area the permit is regulating.

Comment Response

The San Diego Water Board contends that the finding is accurate for the specific area the permit is regulating. A landmark study, conducted by the Santa Monica Bay Restoration Project, found that there was an increased occurrence of illness in people that swam in proximity to a flowing storm drain. Although the Upper Santa Margarita Watershed is inland, the watershed drains to the Pacific Ocean, and pollutants generated in the area may impact coastal waters. For example, the Santa Margarita River system provides the main source of beach sand for the beaches in northern San Diego County. In addition, residents from the Upper Santa Margarita Watershed, who recreate at southern California beaches, benefit from clean water. Also, the waters in the Upper Santa Margarita Watershed are designated with water contact recreation (REC-1) beneficial use, and waders may come in direct contact with storm drain discharges. No changes were made based on this comment

Comment # 226 **Commentor** 4 **Comment Subject** Legal

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

[Copermittees request the word "violations" be replaced with the word "exceedances" in the Finding C.9 that states (in summary) that water quality monitoring data documents persistent violations of Basin Plan water quality objectives.]

It is only a violation if the pollutant has not been reduced to the MEP in accordance with a Permit.

Comment Response

Section A.2 of the current Riverside County MS4 Permit (Order No. R9-2004-001) prohibits [storm water and non-storm water] discharges from MS4s that cause or contribute to exceedances of water quality objectives for surface water or groundwater. Thus, the San Diego Water Board characterizes exceedances of the water quality objectives in the Basin Plan as violations of water quality objectives, especially if discharges from the MS4 is causing or contributing to those exceedances. This prohibition remains in the Tentative Order (see section A.3), but now also includes response requirements (see sections A.3.a-c).

Section A.3 of Order No. R9-2004-001 prohibits [storm water] discharges from MS4s containing pollutants which have not been reduced to the MEP. MEP only applies to storm water discharges. Please see response to comment 23. If pollutants in storm water discharges are not reduced to the MEP, the discharges would also be in violation of this prohibition. This prohibition remains in the Tentative Order (see section A.2). No changes were made based on this comment.

Comment # 227 **Commentor** 4 **Comment Subject** Finding

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

See legal comments in Attachment 7 Discharges of pollutants from the MS4, of whatever source, are subject to the MEP standard. The MEP standard applies to municipal discharges, not to only municipal storm water discharges.

Comment Response

Please see the response to comment 86.

Comment # 228 **Commentor** 4 **Comment Subject** Overirrigation

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

This is a false statement – the Copermittees have not made this determination (or 'identification') See also comments within the letter and attachments thereto.

Comment Response

Please see the responses to comments 27 and 83.

Comment # 229	**Commentor** 4	**Comment Subject** Finding

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

[Copermittees request the terms "Drainage Area Management Plan" be replaced with "Storm Water Management Plans" and that Storm Water Management Plans together with the DAMP describe the Copermittee's runoff management programs.]

Terminology in this paragraph was not correct for the Santa Margarita Region

Comment Response

Comment noted, the recommended changes have been made to the Tentative Order and reflected in the errata.

Comment # 230 **Commentor** 4 **Comment Subject** Legal

Specific Comment

[From Attachment 7 to the RCFC&WCD comment letter]

Finding C.15: This finding states, in relevant part, that the Board and the Copermittees have identified "landscape irrigation, irrigation water and lawn water, previously exempted discharges, as a source of pollutants and conveyance of pollutants to waters of the U.S." The finding further asserts that such non-exempt discharges are required to be "addressed" as "illicit discharges" and effectively prohibited from entry into the MS4.

Comment: The rationale for this prohibition lacks both a factual and legal basis. The factual issues are discussed in the District's technical comments on this issue. With regard to legal issues, the justification for removing the preexisting exemption for these discharges (referred to hereafter as "irrigation water") is completely lacking. First, given that the justification is based on State Board Order WQ 2009-0008, which likens dry weather discharges to "illicit discharges" required to be "effectively prohibited" from entry into the MS4, the vacation of this order by the Los Angeles County Superior court eliminates this Order as a justification for the prohibition.

Second, EPA, in the preamble to the federal MS4 regulations, required that a permittee must make a finding that the "irrigation water" discharges must be a "source of pollutants to waters of the United States . . . .". 55 Fed. Reg. 48037. Moreover, such discharges must represent a "significant" source of pollutants to waters of the United States "under certain conditions". U.S. EPA Guidance Manual for the Preparation of Part 2 of the NPDES Permit Application for Discharges from Municipal Separate Storm Sewer Systems, November 1992 ("EPA Part 2 Guidance Manual"), at p. 6-33. These conditions require a focus not on an entire category of discharges, but rather a discharger-by-discharger examination.

In the MS4 regulatory preamble, EPA stated that "[i]n general, municipalities will not be held responsible for prohibiting some specific components of discharges or flows listed below through their [MS4], even though such components may be considered non-storm water discharges, unless such discharges are specifically identified on a case-by-case basis as needing to be addressed". 55 Fed. Reg. 47995 (emphasis supplied). In the Guidance Manual, EPA states:

If an applicant knows . . . that landscape irrigation water from a particular site flows through and picks up pesticides or excess nutrients from fertilizer applications, there may be a reasonable potential for a storm water discharge to result in a water quality impact. In such an event, the applicant should contact the NPDES permitting authority to request that the authority order the discharger . . . to obtain a separate NPDES permit (or in this case, the discharge could be controlled through the storm water management program of the MS4).

EPA Part 2 Guidance Manual, p. 6-33 (emphasis added).

Third, the finding asserts that the Board has the authority to "identify exempted discharges as a source of pollutants" and that it has identified the irrigation discharges "as a source of pollutants and conveyance of pollutants to waters of the U.S." Read in the context of the previously cited language, however, the Board has no power greater than a municipality and must identify specific discharges, and not entire categories of discharges. See 55 Fed. Reg. 48037. And, as noted in the white paper on irrigation runoff, the Copermittees have not, in fact, identified irrigation discharges as a source of pollutants or a "conveyance of pollutants" to waters of the United States.

Comment Response

Please see the responses to comments 27, 83 and 223. The Fact Sheet describes that overirrigation discharges are a significant source of pollutants into and from the MS4 to water of the US.

The San Diego Water Board disagrees with the comment that: "These conditions require a focus not on an entire category of discharges, but rather a discharger-by-discharger examination." The Federal Register (as referenced in the above comment), in discussion of exempted categories of non-storm discharges states: "in general, municipalities will not be held responsible for prohibiting some specific components of discharges or flows listed below through their municipal separate storm sewer system, even though such components may be considered non-storm water discharges, unless such discharges are specifically identified on a case-by-case basis as needing to be addressed." (Vol. 55 Fed Reg 47995). The San Diego Water Board maintains that 40 CFR 122.26(d)(2)(iv)(B)(1) and the discussion in the Federal Register are clear in discussion of "components" and "categories" of non-storm water discharges, and that the exempted components and categories of non-storm water discharges are required to be addressed through prohibition on a category by category basis, not on a discharger by discharger basis, when identified as a source of pollutants.

The discussion in the Federal Register further clarifies that once a category of exempted non-storm water discharges has been identified and prohibited, "operators of such non-storm water discharges need to obtain NPDES permits for these discharges under the present framework of the CWA..." as "such illicit discharges are not authorized under the CWA" (55 Fed Reg 47995). This is consistent with existing NPDES permits applicable to categories of discharges.

Furthermore, in addition to the regulations under 40 CFR 122.26(d), the discussion in the Federal Register (55 Fed Reg 48037) clearly states that "the Director may include permit conditions that either require municipalities to prohibit or otherwise control any of these types of discharges where appropriate."

Comment # 231 **Commentor** 4 **Comment Subject** Legal

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

Not all non-storm water discharges need to be prohibited.

Comment Response

The Clean Water Act requires all non-storm water discharges to the MS4 be effectively prohibited. Section 402(p)(3)(B)(ii) reads "Municipal Discharge -- Permits for discharges from municipal storm sewers … shall include a requirement to effectively prohibit non-stormwater discharges into the storm sewers;"

Comment # 232 **Commentor** 4 **Comment Subject** Legal

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

The MS4 can never be comprised of natural waterbodies. See definition in federal MS4 regulations and legal comments in Attachment 7.

Comment Response

Please see the response to comment 22.

Comment # 233 **Commentor** 4 **Comment Subject** Finding

Specific Comment

[From Attachment 7 to the RCFC&WCD comment letter]

Finding D.1.b.: This finding states that "MS4 discharges, however, continue to cause or contribute to violations of water quality standards as evidenced by the Copermittees' monitoring results". (Emphasis added)

Comment: With respect to discharges that "contribute to" violations of water quality standards, it should be noted that for concentration-based water quality standards, an MS4 discharge at concentrations below the water quality standard cannot, as a matter of simple scientific fact, contribute to a violation of such a water quality standard. If the discharge is below the standard in question, that discharge will never exceed the water quality standard, no matter the volume of the discharge.

Comment Response

The Copermittees' water quality monitoring data submitted to date documents persistent violations of Basin Plan water quality objectives for various runoff-related pollutants (indicator bacteria, dissolved solids, turbidity, metals, pesticides, etc.) at various watershed monitoring stations. Additionally, available monitoring data submitted to the San Diego Water Board have resulted in a significant increase in 303(d) listings for the waters in the Upper Santa Margarita Watershed. On the 2002 303(d) List there were 3 water body/pollutant combinations listed. On the 2008 303(d) List there were over 50 water body/pollutant combinations listed. The 303(d) impaired water body listings are based on violations of water quality standards in the Basin Plan.

The commenter does not consider other ways that discharges to and from the MS4 can contribute to violations of water quality standards. Pollutants in discharges to the MS4 may be deposited within the MS4 and accumulate over time. Those accumulated pollutants could contribute to a violation of water quality standards when the next storm event washes those pollutants from the MS4 to the receiving waters.

Non-storm water discharges from the MS4 during dry weather may discharge at concentrations below the water quality standards, but can still contribute to a violation of water quality standards. Non-storm water discharges to the receiving waters, which may be dry at the time, could pool and concentrate the pollutants within the receiving water body as the water evaporates. The concentrated pollutants in the receiving water body could contribute to violations of water quality standards with the next storm event.

No changes were made based on this comment.

Comment # 234 **Commentor** 4 **Comment Subject** Legal

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

The MS4 operators are obligated to take storm water under state law, and therefore must "passively" receive such waters, whether or not they contain pollutants. Moreover, a number of separately permitted sources discharge into the MS4 through rights granted under the NPDES program. Control over such permitted sources is the responsibility of the owner of that permitted discharge in question.

Comment Response

Please see the response to comment 81. The Copermittees are responsible for flows into, through and from their MS4s, and they cannot passively accept discharges from third parties (see Finding D.3.d and Discussion in the Fact Sheet). If the Copermittees identify sources regulated under separate NPDES permits that are discharging pollutants into their MS4 systems and causing exceedances of water quality standards in the receiving waters, the Copermittees should identify those sources, with supporting data and documentation, to the San Diego Water Board so the NPDES requirements for those sources can be enforced and/or revised.

Comment # 235 **Commentor** 4 **Comment Subject** Finding

Specific Comment

[From Attachment 7 to the RCFC&WCD comment letter]

Finding D.2.g: This finding, which concerns the effects of urbanization on the characteristics of stormwater flow, states in part that "[h]ydromodification measures for discharges to hardened channels are needed for the future restoration of the hardened channels to their natural state . . . ."

Comment: Hardened flood control channels are in place in the Santa Margarita Region due to the need to protect the lives and property of Riverside County residents from floodwaters. Such channels, and other flood control structures, have been established by the District in accordance with its statutory obligations set down by the Legislature in California Water Code App. § 48-9. In particular, we draw the Board's attention to that section of the Water Code setting forth the power of the District to "control the flood and storm waters of said district" and to save and conserve in any manner all or any of such waters and protect from damage from such flood or storm waters the watercourses, watersheds, public highways, life and property in said district." Water Code App. § 48-9(8).

The Board has no statutory jurisdiction under the MS4 program to alter any flood control structures or channels of the District or to some jurisdiction over the construction or location of such structures or channels. Any such alteration or construction must be done with the cooperation and agreement of the District and in accord with the District's statutory mandate to protect the citizens of Riverside County. Please see changes in redline.

Comment Response

The Tentative Order does not require the alteration of any existing flood control structures or channels. Implementing hydromodification measures for discharges from development projects to hardened channels will allow those hardened channels to be restored to a more natural (i.e. non-hardened) state some day in the future. If those hydromodification measures are not implemented, there is not the possibility that those hardened channels could be restored to a more natural state.

Nor does the RCFC&WCD have a statutory obligation to degrade or destroy water quality and beneficial uses to control flood waters. Rather the opposite; per the federal Clean Water Act Section 101(a), the RCFC&WCD is required to "[r]estore and maintain the chemical, physical, and biological integrity of the Nation's waters." Controlling flood waters while protecting water quality are not mutually exclusive and can be done synergistically to provide economic, environmental and societal benefits. No changes were made based on this comment.

Comment # 236 **Commentor** 4 **Comment Subject** Legal

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

This finding is inaccurate and inappropriate, as the Commission on State Mandates, and not the Regional Board, has exclusive jurisdiction in determining whether a requirement is an unfunded state mandate. See legal comment white paper.

Comment Response

Please see the response to comment 77.

Comment # 237 **Commentor** 4 **Comment Subject** Finding

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

The federal regulations (that do not allow waste assimilation), do not apply to waters of the state.

Comment Response

The San Diego Water Board disagrees with the proposed change. Waste assimilation is not considered a beneficial use of waters of the U.S. or waters of the state. No changes were made based on this comment.

Comment # 238 **Commentor** 4 **Comment Subject** Finding

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

[Copermittees requested deletion of ", and Turbidity" from Finding E.9.]

This is not on the 303(d) list.

Comment Response

The commenter is correct that turbidity is not on the 303(d) list. Finding E.9 has been modified to accurately list the pollutants causing impairments as shown in the 2008 303(d) List.

Comment # 239 **Commentor** 4 **Comment Subject** Legal

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

See legal comment white paper. The scope of this Order is the discharge from MS4s. Moreover, MS4s are not receiving waters.

Comment Response

Please see the responses to comments 22, 233, and 290.

Comment # 240 **Commentor** 4 **Comment Subject** Legal

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

[Copermittees requested adding "Subject to the requirements of section A..3.a" to the opening sentence of section A.3.]

This change clarifies that the iterative process reflected in Part A.3 applies to the entire provision.

Comment Response

The requested changes are not necessary as it simply references the immediately following subsection. No changes were made based on this comment.

Comment # 241 **Commentor** 4 **Comment Subject** Legal

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

[Copermittees request adding "but the Copermittees shall not be liable for violation of section A.3 provided that they are in compliance with the requirements of this section" to the end of the sentence for section A.3.c.]

This change reiterates that the iterative process is in effect so long as the Copermittees remain in compliance with the process set forth in section A.3.

Comment Response

The San Diego Water Board disagrees with the proposed changes. The requested change makes the referenced provision entirely unenforceable and therefore, likely not complied with. The Copermittees must implement the iterative process. The San Diego Water Board reserves the enforcement authority to determine liability for a permit violation. The Tentative Order does not provide any "safe harbor" provisions for violations of water quality standards. No changes were made based on this comment.

Comment # 242 **Commentor** 4 **Comment Subject** Discharge Prohibitions

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

As noted in the comment letter and Attachment 6, irrigation runoff has not been shown to be an actual source of pollutants to the receiving waters in this watershed.

As such the comment letter requests that THE CONDTIONAL EXEMPTION BE RESTORED as shown in the redlines above.

Should the Board decide to prohibit the discharge anyway, the Copermittees request that at a minimum that the category of discharges be managed through a JRMP program similar to non-emergency fire fighting flows, as shown in these redlines.

Comment Response

Please see the response to comment 83. Irrigation runoff has been shown to be a source and conveyance of pollutants to receiving waters. The San Diego Water Board disagrees with the proposed changes. The Copermittees are expected to prevent discharges from overirrigation into the MS4 and eliminate those discharges through their IC/ID programs. No changes were made based on this comment.

Comment # 243 **Commentor** 4 **Comment Subject** Legal

Specific Comment

[From Attachment 7 to the RCFC&WCD comment letter]

Finding D.3.c: This finding states in part that "urban streams", whether natural, anthropogenic or partially modified, are considered part of the "MS4" if they are used as a conveyance for runoff.

Comment: The definition of "MS4" does not include any natural watercourse. This is evident both from the definition of "MS4" in the federal Clean Water Act regulations and from EPA's comments in the preamble to those regulations. First, the definition of "MS4", in relevant part, states that it consists of "a conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, manmade channels or storm drains" "owned or operated by" a municipality "having jurisdiction over disposal of . . . storm water" that is "designed or used for collecting or conveying storm water". 40 CFR § 122.26(b)(8). Nothing in that definition even suggests that natural watercourses are part of the MS4, only improved watercourses.

Second, U.S. EPA, in the preamble to the original MS4 regulations, stated unequivocally that "[t]he Agency also wants to clarify that streams, wetlands and other water bodies that are waters of the United States are not storm sewers for the purpose of this rule". 53 Fed Reg. 49442 (December 7, 1988).1

Moreover, none of the Copermittees "own" or "operate" a natural stream. Such streams are waters of the State and are "owned" by the people of California.

The authority cited in the Fact Sheet for this finding, a response filed with the State Board in opposition to a petition challenging an MS4 permit issued by the Board to San Diego County, contradicts the federal definition and, under the Supremacy Clause, cannot be employed. Please see changes in redline.

Comment Response

Please see the response to comment 22.

Comment # 244 **Commentor** 4 **Comment Subject** Action Levels

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

‘lack of compliance’ is in contradiction with the second sentence. The proposed language is more appropriate.

Comment Response

The San Diego Water Board disagrees that the two sentences are in contradiction. The second sentence has the clarifying phrase "does not alone" constitute a violation. In addition, the third sentence does not state that an NAL exceedance is unequivocally a lack of compliance; but only that an NAL exceedance "may indicate" a lack of compliance. The requested change has not been made.

Comment # 245 **Commentor** 4 **Comment Subject** Legal

Specific Comment

[From Attachment 7 to the RCFC&WCD comment letter]

Finding E.1: This finding states that the RWL language in the Tentative Order "requires compliance with water quality standards, which for stormwater discharges compliance is to be achieved through an iterative approach requiring the implementation of improved and better-tailored BMPs over time".

Comment: The District has two comments regarding this finding, one relating to the language of the finding and one relating to the Fact Sheet discussion of the finding. First, the language of State Board Order WQ 99-05, which establishes the RWL language required to be placed in MS4 permits statewide, is not limited to "stormwater" discharges, but rather to all discharges into receiving waters. See State Board Order WQ 99-05. This is consistent also with the requirement that "discharges" from the MS4, not merely stormwater discharges, must be controlled to the MEP and are not required to meet numeric effluent limitations. 33 U.S.C. § 1342(p)(3)(B)(iii). Second, while the language of the finding correctly states that compliance with water quality standards "is to be achieved through an iterative approach", language in the Fact Sheet improperly contradicts this finding by asserting that compliance with the iterative BMP process "does not shield the discharger from enforcement actions for continued non-compliance with water quality standards". Fact Sheet, page 91.

Such an interpretation contradicts the plain language of Order WQ 99-05 and appears to represent an "end-run" around the entire iterative process and the concept of MEP, which is a flexible concept, intended to allow the development of site-specific permit conditions based on the judgment of the permit writer. See, e.g., 55 Fed. Reg. 48038. The interpretation is, therefore, not consonant with the requirements of the State Board precedential order and the MS4 regulations and should be deleted from the Fact Sheet.

Comment Response

Please see the responses to comments 23, 207 and 290. The Tentative Order and Fact Sheet are consistent with Order WQ 99-05 as well as Order WQ-2001-015 (In the Matter of the Petitions of Building Industry Association of San Diego County and Western States Petroleum Association).

Comment # 246 **Commentor** 4 **Comment Subject** Action Levels

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

The previous sentence requires outfalls to be selected consistent with Attachment E. This sentence is not needed and is duplicative of Attachment E.

At a minimum, this language will need to be modified to be consistent with changes being requested in the Attachment 4 to the Comment Letter, including any footnotes.

Comment Response

The sentence simply reiterates the San Diego Water Board's requirement that a representative percentage of major outfalls are sampled. The requested change has not been made.

Comment # 247 **Commentor** 4 **Comment Subject** Action Levels

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

This value was incorrectly referencing the criteria for beach areas and needs to be updated to reflect the shown values for infrequently used areas.

Comment Response

The value is correct. For the application of Enterococcus REC-1 water quality objectives, unless otherwise specified in the Basin Plan, all waterbodies in the San Diego Region designated with REC-1 beneficial use are assumed to have a "designated beach" usage frequency. Until a lower usage frequency is designated in the Basin Plan for one or more water bodies in the Upper Santa Margarita Watershed, the water quality objective based on the "designated beach" usage frequency is the appropriate and correct value to be included in the action levels.

Comment # 248 **Commentor** 4 **Comment Subject** Action Levels

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

Conflicts with attachment E, which states to select 'representative' outfalls.

Comment Response

Comment noted. The requested change has been made in the errata.

Comment # 249 **Commentor** 4 **Comment Subject** Action Levels

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

[The Copermittees request addition of language that end-of-pipe assessment points for SAL complaince are major outfalls as also defined by Attachment E of the Tentative Order.]

Consistent with NALs section

Comment Response

Comment noted. This is a reasonable request and the change has been made in the errata document.

Comment # 250 **Commentor** 4 **Comment Subject** Legal

Specific Comment

[From Attachment 7 to the RCFC&WCD comment letter]

Finding E.6: This finding purports to determine that the Tentative Order "does not constitute an unfunded local government mandate subject to subvention under Article XIIIB, Section(6) of the California Constitution".

Comment: This finding has no place in the Tentative Order. The exclusive jurisdiction over a determination as to whether a mandate constitutes an unfunded state mandate lies with the Commission on State Mandates. The Commission has exclusive authority to determine, in the first instance, whether a requirement constitutes an unfunded state mandate. Government Code §§ 17751 and 17552; Lucia Mar Unified School District v. Honig (1988) 44 Cal.3d 830, 837; Hayes v. Commission on State Mandates (1992) 11 Cal.App.4th 1546, 1596-97. The findings of an agency that has no jurisdiction to make those findings are entitled to no weight.

Second, the finding is erroneous on several grounds. It is erroneous in its assertion that the Tentative Order "implements federally mandated requirements under CWA §402". While true, the Order also contains separate state-mandated requirements. As the California Supreme Court has held, NPDES permits (like the Tentative Order) can contain both federal and state requirements. See City of Burbank, supra, 35 Cal. 4th at 618, 628. Where those non-federal requirements constitute a new program or higher level of service ordered by the state or exceed federal requirements, those requirements can qualify as a state mandate requiring a subvention of funds. See Long Beach Unified School District v State of California (1990) 225 Cal.App.3d 155, 172-73. Even if the requirement derives from federal law, the requirement can still constitute an unfunded state mandate if the state agency has a choice as to whether to impose the requirement on the permittees, e.g., Hayes, 11 Cal.App.4th at 1593-94.

Recently, the Commission on State Mandates held that both the Los Angeles County MS4 Permit and the San Diego County MS4 Permit contained requirements that constituted an unfunded state mandate, not required by federal law. In re Test Claim on Los Angeles Regional Quality Control Board Order No. 01-182, July 31, 2009; In re Test Claim on San Diego Regional Water Quality Control Board Order No. R9-2007-0001, March 26, 2010.

The finding further asserts that the obligations to be imposed on the Copermittees are "similar to, and in many respects less stringent than" obligations on non-governmental discharges. A similar argument was considered and rejected by the Commission in the Los Angeles and San Diego MS4 Permit Test Claims. The District disagrees with this assertion, as there are numerous requirements in the Tentative Order that are uniquely applicable to governmental entities. This is, however, a question that would be addressed by the Commission on State Mandates were a test claim to be filed, the only procedure for the determination of this issue.

The finding further asserts that Copermittees "have the authority to levy service charges, fees, or assessments to pay for compliance with this Order". This finding is both erroneous on the facts and without any basis in the record. The question of how a state mandate is to be funded is beyond the scope of the Board's expertise and, again, is exclusively within the jurisdiction of the Commission on State Mandates. The finding also asserts that the "Copermittees requested permit coverage in lieu of compliance with the complete prohibition against the discharge of pollutants contained in CWA §301, subdivision (a)". A similar argument was made and rejected in the Los Angeles and San Diego MS4 Permit Test Claims. The finding further asserts that prohibitions against conditions of pollution or nuisance predate the enactment of Article XIIIB Section 6 of the California Constitution. The requirements of the Tentative Order far exceed such requirements. And, in any event, whether such requirements predate Article XIIIB Section 6 is an issue for the Commission on State Mandates.

The finding is not supported by evidence in the record and is in fact contradicted by controlling legal precedent. Even were it to be included in the Tentative Order, it is entitled to no weight since the Board lacks jurisdiction to make such a finding. For these reasons, the finding and any associated discussion in the Fact Sheet should be deleted. Please see changes in redline.

Comment Response

This comment contradicts comments made by other commenters that insist that the San Diego Water Board must recognize that certain Tentative Order provisions constitute unfunded state mandates and may not properly be adopted unless the State first provides funding to the Copermittees to carry out those provisions. The San Diego Water Board agrees that the Commission on State Mandates ultimately has jurisdiction to determine that a provision in an executive order constitutes an unfunded state mandate requiring state subvention. Finding E.6 is nonetheless appropriate and necessary to express the San

Diego Water Board's opinion that the Tentative Order is the result of a federal and not a state mandate. Please also see the responses to comments 8 and 77-81.

Comment # 251 **Commentor** 4 **Comment Subject** Action Levels

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

The previous sentence requires outfalls to be selected consistent with Attachment E. This sentence is not needed and is duplicative of Attachment E.

At a minimum, this language will need to be modified to be consistent with changes being requested in the Attachment 4 to this comment letter, including any footnotes.

Comment Response

Please see the response to comment 246.

Comment # 252 **Commentor** 4 **Comment Subject** Legal

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

See legal comments in Attachment 7. The Copermittees' responsibility under the Clean Water Act is to reduce the discharge of pollutants from the MS4 to the MEP. Therefore, the purpose of the BMP is to reduce pollutants in such discharges

Comment Response

Please see the response to comment 23. No changes were made based on this comment.

Comment # 253 **Commentor** 4 **Comment Subject** Legal

Specific Comment

[From Attachment 7 to the RCFC&WCD comment letter]

Section A.1: This directive mandates, among other things, that discharges "into" MS4s that would cause or threaten to cause a condition of "pollution, contamination, or nuisance" in receiving waters of the state are prohibited.

Comment: While the Board in this Order has jurisdiction to prohibit discharges "from" the MS4, it cannot regulate conditions within the MS4, since these are not in fact "receiving waters of the state". In any event, the language is superfluous, since regulation of a discharge from the MS4, which is subject matter of the Tentative Order, accomplishes the same end. Please see the accompanying redline.

Comment Response

Please see the responses to comments 23, 72, 233 and 290. No changes were made based on this comment.

Comment # 254 **Commentor** 4 **Comment Subject** Legal

Specific Comment

[From Attachment 7 to the RCFC&WCD comment letter]

Section A.3: This directive both recites the prohibition against discharges that cause or contribute to the violation of water quality standards and introduces the iterative process required by the State Board for MS4 permittees.

Comment: To clarify that the iterative process specifically applies to the Copermittees' compliance requirements in Section A.3, language has been added in the redline.

Comment Response

The proposed change is not necessary. Please see response to comment 23, 207 and 290. No changes were made based on this comment.

Comment # 255 **Commentor** 4 **Comment Subject** Legal

Specific Comment

[From Attachment 7 to the RCFC&WCD comment letter]

Section A.3.b: This directive relates to the requirement that the Copermittees repeat the iterative process to comply with receiving water limitations for continuing or recurring exceedances of the limitations.

Comment: Clarifying language changes are requested in the redline.

Comment Response

The proposed change is not necessary. Please see response to comment 23, 207 and 290. No changes were made based on this comment.

Comment # 256 **Commentor** 4 **Comment Subject** Legal

Specific Comment

[From Attachment 7 to the RCFC&WCD comment letter]

Section A.3.c: This directive indicates that nothing prevents the Board from enforcing any provision of the Order while the Copermittees are preparing and implementing the receiving water limitation report.

Comment: Clarifying language changes are included in the redline to make clear that so long as the Copermittees are in compliance with the requirements of Section A.3, they are not in violation of the section.

Comment Response

The San Diego Water Board disagrees with the proposed change. Please see response to comment 241. No changes were made based on this comment.

Comment # 257 **Commentor** 4 **Comment Subject** Legal

Specific Comment

[From Attachment 7 to the RCFC&WCD comment letter]

Section B.2: This section categorizes the types of non-stormwater discharges that are not prohibited from discharge into the MS4, and thus not subject to the "effectively prohibit" requirement in Section B.1. However, this section improperly omits several categories of non-stormwater discharges, landscape irrigation, irrigation water, lawn watering and non-emergency fire fighting flows. In addition, this section states that the Water Board may require controls for "non-anthropogenic sources".

Comment: As discussed above in the District's comment concerning Findings C.14 and C.15, the Board lacks authority to delete an entire category of discharge from the non-stormwater designation. Such authority must be exercised primarily by the Copermittees, based on their evaluation of source-specific facts. And, the ability of the RWQCB to liken such flows to "illicit discharges", apparently authorized by State Board Order No. WQ 2009-0008, is no longer in effect, as that Order has been vacated. Moreover, there is no requirement in the MS4 regulations for controls on "non-anthropogenic sources". Such natural sources are not within the control of the MS4 Copermittees. Moreover, controlling such natural sources as rising groundwater or springs by sealing the MS4 could raise concerns about interference with water rights. Given the natural source of such springs, the incidental presence of pollutants in the waters would have occurred whether an MS4 was in existence or not. Please see the accompanying redline as well as the District's technical comments on this directive.

Comment Response

Please see the responses to comments 27 and 83 in regards to the removal of landscape irrigation, irrigation water, lawn watering from the list of discharge categories that do not have to be prohibited from entering the MS4. The requirement to implement appropriate control measures for non-anthropogenic sources identified as sources of pollutants discharging into or from the MS4 is consistent with the federal regulations. To date, neither the Copermittees nor the San Diego Water Board has identified non-anthropogenic sources as significant sources of pollutants discharging into or from the MS4. No changes were based on this comment. Please also see the response to comment 223 concerning Order No. WQ-2009-0008.

Comment # 258 **Commentor** 4 **Comment Subject** Legal

Specific Comment

[From Attachment 7 to the RCFC&WCD comment letter]

Section C: This section establishes "non-stormwater dry weather action levels" ("NAL") monitoring and the requirements to be followed when NALs exceedances are identified.

Comment: In addition to the District's technical comments on this part, the District has the following concerns regarding legal aspects of this directive. The District wishes to incorporate its comments on Findings C.14 and C.15, which discuss the requirements applicable to any discharge from an MS4, which is that the Copermittees control pollutants in such discharges to the MEP. Such a requirement applies not only to discharges of stormwater, but also dry weather discharges, which may (as discussed above) include not only non-exempted non-stormwater discharges but also discharges from exempted non-stormwater sources (those identified in Section B.2 of the Order) as well as discharges from sources holding separate NPDES permits. We note that Section C.2.d. requires prompt notice to the RWQCB of a source that may require a separate NPDES permit. The Board must be prepared to address such sources and not require further investigation by the Copermittees. As also noted above, in the preamble to the MS4 regulations, U.S. EPA indicated that the MEP control requirement would apply to all discharges from MS4s, including "non-stormwater discharges". 55 Fed. Reg. 48052.

Comment Response

Please see the response to comment 23, 86 and 290.

Comment # 259 **Commentor** 4 **Comment Subject** General

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

[The Copermittees requested adding "to the extent of their legal authority established under the California Constitution and any enabling acts" to first sentence of section E.1.]

To address limitations of the District

Comment Response

The proposed change is not necessary. The Code of Federal Regulations requires the Copermittees including RCFC&WCD to have adequate legal authority to comply with the Tentative Order. No changes were made based on this comment.

Comment # 260 **Commentor** 4 **Comment Subject** Legal

Specific Comment

[From Attachment 7 to the RCFC&WCD comment letter]

Section E.1.a: This directive requires the Copermittees to have legal authority to, among other things, "control the quality of runoff from industrial and construction sites", including sites that have coverage under the general industrial and construction stormwater permits.

Comment: As separate NPDES permits, the general construction and general industrial stormwater permits allow discharge into the MS4 so long as those permits are being complied with. Copermittees do not have authority to contradict the requirements of the general permits. This requirement is vague and ambiguous, and goes beyond the requirements of the MS4 regulations, which require that Copermittees demonstrate that they have legal authority to control discharges into their MS4 systems.

Comment Response

The Copermittees must enforce their ordinances to prevent or eliminate discharges to their MS4s that can cause or contribute to a condition of pollution in receiving waters. Please see the response to comment 76. If construction or industrial sites are discharging pollutants that are causing a condition of pollution in receiving waters, they are likely in violation of their NPDES requirements. The Copermittees have the authority to enforce their ordinances. The Copermittees can report these violations to the San Diego Water Board, and the San Diego Water Board can also enforce the the NPDES requirements.

40 CFR 122.26 (d)(2)(i)(A) specifically requires the Copermitees to "Control through ordinance, permit, contract, order or similar means, the contribution of pollutants to the muniucipal storm sewer by storm water dischagres associated with industrial acitivity and the quality of storm water discharged form sites of industrial activity;" Construction activity is a subset of industrial activity. The USEPA in the Code of Federal Regulations purposefully required a dual permitting system, MS4 and individual, for industrial activites due to their heightened threat to water quality. The Copermitees' ordinances and requirements do not contradict the general industrial stormwater permits; rather the Copermittees can apply more stringent controls than those that are required under general permits.

Comment # 261 **Commentor** 4 **Comment Subject** LID

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

[The Copermittees requested deletion of "of storm water pollutants from the MS4 will be reduced to the MEP, will not cause or contribute to a violation of water quality standards, and" from first sentence of section F.1.c.]

This is duplicative of section A and is not needed. Further, the end of this sentence specifically requires compliance with this order.

Comment Response

The San Diego Water Board disagrees with the proposed change. The text was included to reiterate the requirements of section A and no changes were made in response to this comment.

Comment # 262 **Commentor** 4 **Comment Subject** Legal

Specific Comment

[From Attachment 7 to the RCFC&WCD comment letter]

Sections E.1.j and k: These directives require the Copermittees to have legal authority to require the use of BMPs to prevent or reduce the discharge of pollutants into MS4s from stormwater to the MEP and to require documentation on such BMPs.

Comment: The Copermittees are required under the Clean Water Act to control discharge of pollutants from their MS4 to the MEP standard. 33 U.S.C. § 1342(p)(3). There is no requirement that discharges into the MS4 meet this standard, though the Copermittees are free to impose such a standard voluntarily. These provisions are not required and should either be removed or made optional for the Copermittees. The requirements of these directives are also duplicative of Section E.1.i., which already requires the Copermittees to have the legal authority to require reports from dischargers to the MS4.

Comment Response

Please see the responses to comments 22, 23, 233, and 290.

Comment # 263 **Commentor** 4 **Comment Subject** New Development

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

Important not to penalize proactive efforts to retrofit existing development.

Comment Response

The San Diego Water Board disagrees with the proposed change. Please see the response to comment 353. No changes were made based on this comment.

Comment # 264 **Commentor** 4 **Comment Subject** New Development

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

[The Copermittees requested deletion of section F.1.d.(1)(c), which defines new Development Projects that disturb one or more acres of land as a Priority Development Project.]

Request deletion as disturbance threshold inappropriately captures non-development related activity (maintenance, agricultural, etc.) Further, the one acre threshold is not appropriately supported in the Fact Sheet.

Comment Response

The San Diego Water Board disagrees with the proposed change. Please see the response to comment 331. No changes were made based on this comment.

Comment # 265 **Commentor** 4 **Comment Subject** Legal

Specific Comment

[From Attachment 7 to the RCFC&WCD comment letter]

Section F.1.h(h): This directive requires that where Priority Development Projects are adjacent to or will modify stream channels, the use of hardscape and other materials is forbidden.

Comment: As noted above, the District has a statutory mandate to protect the lives and property of the citizens of Riverside County from floodwaters. If, in the professional judgment of the District's engineers, hardscape or other engineering improvements are required in a stream channel affected by this directive due to flood control concerns, the District must be allowed to make that judgment. The Board does not have the hydrologic/hydraulic expertise, nor is it authorized by the Legislature to make flood control judgments and presumably would not wish to be a defendant in a lawsuit brought by flood victims whose lives or property was affected by the inability of the District to make necessary flood control decisions.

In making this comment, the District wants to be clear that it is not unwilling to accommodate potential future channel rehabilitation efforts where flood control will not be affected. Please see the accompanying redline for suggested language to address these concerns.

Comment Response

Section F.1.h.(h) requires to Copermittees, as part of the HMP, to identify areas within the Santa Margarita Hydrologic Unit for potential opportunities to restore or rehabilitate stream channels with historic hydromodication of receiving waters that are tributary to documented low or very low IBI scores.

The hydromodication requirements do not allow the use of non-naturally occuring hardscape materials for stream restoration if the purpose of the stream restoration is to mitigate erosion impacts expected from potential hydromodication caused by the Priority Development Project. The hydromodification requirements do not necessarily apply if the stream restoration project is not part of a Priority Development Project.

The requirements within the Tentative Order do not limit the RCFC&WCD's authority to provide flood control to protect public safety. The RCFC&WCD's mandate for flood control does not allow the degradation and destruction of water quality or beneficial uses to fulfill that mandate. As public stewards, the RCFC&WCD must protect water quality and beneficial uses while providing flood control to protect the lives and property of the citizens of Riverside County. Existing projects and studies have demonstrated the hydraulic, economic and societal benefits to providing increased flood control through natural systems that also protect water quality. No changes were made based on this comment. Please also see the response to comment 233.

Comment # 266 **Commentor** 4 **Comment Subject** New Development

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

This requirement is clearly specifying the method of compliance in contradiction with state law (CWC 13360).

Comment Response

The San Diego Water Board has made appropriate changes in the errata to address the commentor's concern.

Comment # 267 **Commentor** 4 **Comment Subject** LID

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

This had been agreed to in discussions with RB staff, but was omitted from the draft.

Comment Response

The San Diego Water Board did not agree to make this change during the discussions with the Copermittees. Please see the response to comment 105. No changes were made in response to this comment.

Comment # 268 **Commentor** 4 **Comment Subject** New Development

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

Logistical issue for populating a database with BMPs that have as of- yet not been individually tracked, and potential legal issues for verifications of those BMPs that were built without requirements for such verifications.

Comment Response

The San Diego Water Board is concerned that apparently the Copermittees are unaware of whether or not post-construction BMPs were implemented as designed during the current permit term. This comment only reinforces the San Diego Water Board's position that the post-construction BMP verification and maintenance tracking requirements are necessary. This also reinforces the need for the Copermittees to review their records, identify these projects and BMPs, and verify and track the maintenance of those BMPs. The San Diego Water Board disagrees with the proposed change. No changes were made based on this comment.

Comment # 269	**Commentor** 4	**Comment Subject** Hydromod

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

It is not appropriate to require a single property owner to mitigate the effects caused by previous owners of that land. The current property owners can only be held responsible for their own actions.

Comment Response

The San Diego Water Board disagrees with the proposed change and the basis for the proposed change. If a project is a Priority Development Project (PDP) subject to the HMP requirements, then it is entirely appropriate for the owner, whether new or current, to be responsible for restoring the runoff from the site to a pre-development, more natural condition. If PDPs in undeveloped areas are expected to implement HMP requirements, there is no reason there should be a disparity for the application of the HMP requirements for PDPs in already developed areas. In fact, implementing the HMP requirements is even more necessary in already developed areas because of the ongoing hydromodication and water quality impacts caused by those existing developments. This is also consistent with, and can work in conjunction with, the retrofitting requirements in section F.3.d.

The San Diego Water Board recognizes that there may be some conditions in already developed areas that could limit the full implementation of the HMP requirements on site. Therefore, as recommended by the Riverside County Copermittees, we have included a provision in the Tentative Order that allows the Copermittees to develop a waiver program for re-development PDPs (see section F.1.h.(3)). No changes were made based on this comment.

Comment # 270	**Commentor** 4	**Comment Subject** Hydromod

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

This is not a necessary component of the HMP and unnecessarily increases costs.

Comment Response

The San Diego Water Board disagrees with the commenter that this is not a necessary component. Without having this knowledge, the Copermittees will not be able to plan and prepare for implementing the HMP requirements in the Upper Santa Margarita Watershed in a way that can coherently and efficiently restore or rehabilitate stream channels with historic hydromodification of receiving waters when those opportunities present themselves. No changes were made based on this comment.

Comment # 271 **Commentor** 4 **Comment Subject** Hydromod

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

Per discussions with Board staff on 8/18

Additionally, "wherever feasible" is an appropriate addition to this language for three reasons:

1) Based on the prioritization already identified in this section, instream controls will be a 'last resort'

2) If a project were to need to mitigate in-stream, preventing any man made materials would unnecessarily eliminate potentially viable solutions, even to the extent of eliminating options that would rehabilitate stream functions and uses.

3) The Water Board will still have oversight of the final in-stream plans through the 401 certifications, which will allow the Board to additionally ensure that such instream controls to not adversely affect the stream.

Comment Response

The San Diego Water Board disagrees with the proposed changes. The San Diego Water Board did not agree to make the proposed changes during the meeting with the Copermittees on August 18, 2010, as implied by the commenter. Please see the response to comment 265. No changes were made based on this comment.

Comment # 272 **Commentor** 4 **Comment Subject** Hydromod

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

This is not needed and makes the language confusing. The HMP must be approved by the board anyway. See legal comment white paper.

Comment Response

The San Diego Water Board disagrees that the language is confusing. The language is to clarify that it is not fully at the discretion of the Copermittees to identify these types of areas. No changes were made based on this comment.

Comment # 273 **Commentor** 4 **Comment Subject** Hydromod

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

As seen in the San Diego HMP process, things can change after submitting it to the Board for approval. This requirement will create problems where a project implements the early measures, and such early measures may conflict with the final requirements, thereby forcing the project to redesign.

Comment Response

The San Diego Water Board disagrees with the proposed change. Presumably, the HMP that is developed by the Riverside County Copermittees will include requirements that are more stringent than the interim hydromodification criteria. Many of those requirements are likely to be agreed upon prior to the acceptance of the final HMP. Where there is relative certainty that the HMP requirements will be accepted by the San Diego Water Board, the Copermittees should encourage the implementation of those expected requirements as early as possible. No changes were made based on this comment.

Comment # 274 **Commentor** 4 **Comment Subject** Hydromod

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

All the way to the ocean is unreasonable and unnecessary. In the interim, very few projects are expected within the watershed, and the cumulative effects of such few projects is negligible.

Comment Response

Please see the response to comment 119. The inclusion of "ocean, bay, lagoon" is simply to list all potential types of water bodies that could be included as part of the exemption. In the interim, any projects that do not quailfy for the exemptions provided in Section F.1.h.(6)(a)-(c) must meet the interim hydromodification criteria. We expect there to be very few projects that will be able to qualify for the exemptions.

Comment # 275 **Commentor** 4 **Comment Subject** Legal

Specific Comment

[From Attachment 7 to the RCFC&WCD comment letter]

Section F.2.a: This directive requires the Copermittees to update their grading and other ordinances as necessary to comply with the Order and including requirements for implementing all designated BMPs and other measures.

Comment: The drafting and enforcement of ordinances by a municipality is a municipal function that cannot be directed by the Regional Board. Article XI, section 7 of the Constitution guarantees municipalities the right to "make and enforce within [their] limits all local police, sanitary and other ordinances and regulations not in conflict with general laws". Thus, specific requirements as to the content of ordinances cannot be directed by the Board. The redline requests deletion of this directive.

Comment Response

Please see the response to comment 76.

Comment # 276 **Commentor** 4 **Comment Subject** Unpaved Roads

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

Pursuant to the comment letter:

THE COPERMITTEES REQUEST THIS SECTION BE DELETED IN ITS ENTIRETY.

See the comment letter, attachment 5, for further discussion of the issues and justification for this request.

Should the board decide to include such requirements despite the request and justifications provided in the comment letter, the edits shown below are the minimum changes that should be made.

Comment Response

The San Diego Water Board disagrees with the request to delete the section in its entirety. The San Diego Water Board has made appropriate changes in the errata to address the commentor's concern.

Comment # 277 **Commentor** 4 **Comment Subject** Legal

Specific Comment

[From Attachment 7 to the RCFC&WCD comment letter]

Section F.3.b.(5): This directive requires that the Copermittee stormwater ordinances must contain certain enforcement components.

Comment: The drafting and enforcement of ordinances by a municipality is a municipal function that cannot be directed by the Regional Board. Article XI, section 7 of the Constitution guarantees municipalities the right to "make and enforce within [their] limits all local police, sanitary and other ordinances and regulations not in conflict with general laws". Thus, specific requirements as to the content of ordinances cannot be directed by the Board. The redline requests deletion of this requirement.

Comment Response

Please see the response to comment 76.

Comment # 278 **Commentor** 4 **Comment Subject** Unpaved Roads

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

[The Copermittees requested deletion of sections F.1.i.(2) and F.1.i.(3) as required BMPs for unpaved roads development.]

These are specifying the method of compliance.

Comment Response

Comment noted. Clarifying language has been included in the errata.

Comment # 279 **Commentor** 4 **Comment Subject** Construction

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

[Copermittees request deletion of requirement that Copermittes must review a project proponent's runoff management plan to verify compliance.]

Specifying method of compliance.

Comment Response

The San Diego Water Board disagrees that the requirement for a project proponent's runoff management plan to be "reviewed to verify compliance" with local grading ordinance is specifying method of compliance. The requirement directs the Copermittees to do the review, but does not specify how the review is to be performed. The requirement includes a performance standard, that the plan complies with "local grading ordinance". No changes were made based on this comment.

Comment # 280 **Commentor** 4 **Comment Subject** Legal

Specific Comment

[From Attachment 7 to the RCFC&WCD comment letter]

Section F.3.c.(4): This directive requires that each Copermittee "must ensure that effective measures exist and are implement or required to be implemented to ensure that runoff within and from common interest developments, including areas managed by associations and mobile home parks, and meets the objectives of this section and Order".

Comment: The Fact Sheet inappropriately states that the Tentative Order "interprets common interest areas as property subject to the codes and ordinance and enforcement mechanisms of the city or county in which it resides and, therefore, holds the local government responsible for the discharge of wastes from storm water conveyance systems located within these areas".

The Tentative Order regulates discharges from the MS4. Drainage systems and the runoff handled within a private development or common interest area generally are not part of the Copermittees' MS4, as the Copermittees (unless they actually maintain their MS4 within such areas) have no right to maintain or regulate such internal systems, beyond the enforcement of local ordinances regulating discharges into the Copermittees' MS4 or through the requirement to install and maintain BMPs. Discharges from such systems are thus no different than discharges from any other private property within the Copermittees' jurisdiction. The first full paragraph in this section should be deleted because it is merely prefatory language to the specific requirements set forth in the remainder of the section.

Comment Response

The comment fails to address the San Diego Water Board's contention that common interest areas are subject to the codes and ordinance and enforcement mechanisms of the city or county. The comment has not provided any data or documentation to the contrary. Municipalities consistently enforce their ordinances and regulations within common interest areas. In fact, nothing within the law limits the municipality from taking enforcement within a common interest area. As such, the San Diego Water Board disagrees with the commenter's claim that the Copermittees have no rights to regulate common interest areas including their MS4s. On the contrary, the Copermittees have a public duty to do such to protect public and environmental health and safety.

The Copermittees are responsible for flows into, through and from their MS4s, and they cannot passively accept discharges from third parties (see Finding D.3.d and Discussion in the Fact Sheet), including from common interest areas.

Comment # 281 **Commentor** 4 **Comment Subject** Construction

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

[The Copermittees requested deletion of "Development and" from beginning of section F.2.d.(1)(a)(ii).]

Conflicts with the ‘off-the-shelf’ approach that may be appropriate for some sites. This issue was discussed with staff.

Comment Response

The San Diego Water Board disagrees with the proposed change. The “development” of a runoff management plan as a management measure for construction sites does not conflict with an “off-the-shelf” approach that may be appropriate for some sites. A runoff management plan may be developed for an “off-the-shelf” approach. No changes were made based on this comment.

Comment # 282 **Commentor** 4 **Comment Subject** Legal

Specific Comment

[From Attachment 7 to the RCFC&WCD comment letter]

Section F.3.c.(5): This directive requires the Copermittees to enforce their ordinances with respect to grading activities on privately owned unpaved roads "so as to prevent impacts to water quality".

Comment: In addition to the general objection to the requirement to regulate unpaved roads, found in a separate white paper and in the general comment letter, this specific directive violates the constitutional requirement that the drafting and enforcement of ordinances by a municipality is a municipal function that cannot be directed by the Regional Board. Article XI, section 7 of the Constitution guarantees municipalities the right to "make and enforce within [their] limits all local police, sanitary and other ordinances and regulations not in conflict with general laws". Thus, specific requirements as to the content of ordinances cannot be directed by the Board. Moreover, the scope of the Order is to address discharges from the MS4, not discharges from non-point or non-MS4 sources that may affect "water quality". The redline requests deletion of this requirement.

Comment Response

The commenter is incorrect in their interpretation of the cited section of the constitution. The Code of Federal Regulations that governs the issuance of municipal storm water NPDES permits specifically requires at section 40 CFR 122.26 (d)(2)(i) that the Copermittees have adequate legal authority established by statute, ordinance or series of contracts." Please see the Fact Sheet discussion on the broad and specific legal authority to require section E. LEGAL AUTHORITY. Also, please see the response to comment 76.

Comment # 283 **Commentor** 4 **Comment Subject** Construction

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

[The Copermittees requested deletion of section F.2.d.(3), to remove the Active/Passive Sediment Treatment requirements in their entirety.]

Specifying method of compliance, in violation of CWC 13360.

Comment Response

Please see the response to comment 47. The San Diego Water Board disagrees that section F.2.d.(3) specifies method of compliance. Section F.2.d.(3) directs the Copermittees to require implementation of Active/Passive Sediment Treatment (AST) at construction site if the Copermittee determines it to be an “exceptional” threat to water quality. The Tentative Order does not specify what AST technologies are required to be implemented. Furthermore, the Tentative Order provides flexibility for the Copermittees to determine which construction sites are “exceptional” threats to water quality. No changes were made based on this comment.

Comment # 284 **Commentor** 4 **Comment Subject** Construction

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

This section is setting the minimum frequencies, and as such should provide flexibility to inspect more frequently those sites that warrant additional focus / followup. The changes shown to F.2.e.(1) and (2) are to provide such flexibility. Additionally these frequencies are consistent with Riverside County's Santa Ana MS4 permit – which promotes consistency within the areas
serviced by the County.

Comment Response

The San Diego Water Board disagrees with the proposed changes. The inspection frequencies in the Tentative Order are consistent with the inspection frequencies for San Diego and Orange Counties. These inspection frequencies are necessary because the San Diego Water Board has found that these types of construction sites can pose a significant threat to water quality and require more scrutiny during the wet season. No changes were made based on this comment.

Comment # 285 **Commentor** 4 **Comment Subject** Legal

Specific Comment

[From Attachment 7 to the RCFC&WCD comment letter]

Section F.6: This directive includes a description of the purposes of the education program with respect to stormwater and non-stormwater discharges.

Comment: The redline includes revisions that correctly state the requirements of the Clean Water Act.

Comment Response

The proposed change is not necessary. Please see responses to comments 22, 23, and 290. No changes were made based on this comment.

Comment # 286 **Commentor** 4 **Comment Subject** Construction

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

This is a new and inappropriate requirement. Monitoring data is only required under the Statewide General Construction Permit, which is the Regional Board's responsibility to inspect and review. Copermittee review of data which falls under the regional board's responsibility should be optional.

Comment Response

The San Diego Water Board disagrees with the proposed change. If monitoring data are available, the inspector should review the data. Monitoring data can provide valuable information to an inspector and may help to identify any potential issues that may be on a construction site. No changes were made based on this comment.

Comment # 287 **Commentor** 4 **Comment Subject** Legal

Specific Comment

[From Attachment 7 to the RCFC&WCD comment letter]

Section H.1: This directive requires that each "Copermittees must exercise its full authority to secure the resources necessary to meet all requirements of this Order".

Comment: There is no statutory or regulatory authority for this requirement. The MS4 regulations require only that the Copermittees submit a "fiscal analysis" of the resources required to accomplish permit program activities, including a description of the sources of funds. 40 CFR § 122.26(d)(2)(vi). Moreover, this requirement is inherently vague and ambiguous and is, therefore, especially troublesome given the economic conditions now faced by the County and the Cities within the Santa Margarita region. This directive should be deleted, or at minimum, revised as shown in the redlines.

Comment Response

Please see the responses to comments 8, 9, 88, and 321. Without securing the resources necessary to meet all requirements of the Order, the Copermittee would be unable to meet the intended outcome of 40 CFR § 122.26(d)(2)(i) (i.e. carry out all inspection, surveillance and monitoring procedures necessary to determine compliance and noncompliance with permit conditions).

Comment # 288 **Commentor** 4 **Comment Subject** Municipal

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

Sites that do not have the potential to discharge pollutants, cannot affect discharges from the MS4.

Comment Response

The San Diego Water Board disagrees with the proposed change. Sites that do not have the potential to discharge pollutants are only through the implementation and maintenance of BMPs. Through inventorying their sites and conducting appropriate inspection and enforcement, the Copermittees can ensure that the sites continue to not have the potential to discharge pollutants. No changes were made based on this comment.

Comment # 289 **Commentor** 4 **Comment Subject** Legal

Specific Comment

[From Attachment 7 to the RCFC&WCD comment letter]

In the Standard Provisions, it is stated that the Order "may be modified, revoked and reissued, or terminated for cause", citing 40 CFR § 122.41(f). However, the Standard Provisions do not cite 40 CFR § 122.62 or provide that any such modification, revocation or reissuance may only be carried out upon prior notice and hearing. See Water Code § 13263 (regional board, "after any necessary hearing", may prescribe requirements for waste discharges). The Standard Provisions should make clear that any modification, revocation or reissuance of the Order can only be accomplished at a noticed public hearing, with opportunity for comment.

Comment Response

The requested change is unnecessary. In any matter, the San Diego Water Board is obligated to comply with existing federal and state regulations regarding revocation, reissuance or termination of the Tentative Order. No change made based on this comment.

Comment # 290 **Commentor** 4 **Comment Subject** Legal

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

The Copermittees are required to reduce pollutants in discharges from the MS4. See legal comments in Attachment 7

Comment Response

Please see response to comments 22, 23, 72, and 233. The Order's approach to regulating discharges into and from the MS4 is in accordance with State Water Board Order WQ 2001-15. In that order, the State Water Board reviewed the San Diego County MS4 Permit (Order No. 2001-01) requirements and made one change to one prohibition. The Order upheld all other requirements of the current permit. Order No. R9-2010-0016 incorporates the one change made by the State Water Board, and continues the approach of Order No. 2001-01 (the basis for the current permit), as it was upheld by the State Water Board in Order WQ 2001-15. State Water Board Order WQ 2001-15 supports such requirements, stating: "It is important to emphasize that dischargers into MS4s continue to be required to implement a full range of BMPs, including source control."

Oftentimes, the MS4 does not include structural BMPs at the outfalls to reduce pollutants of concern to the MEP from the MS4. Therefore, the municipalities must require and/or implement a full range of best management practices including source controls on discharges into the MS4 to comply with the MEP standard for discharges from the MS4. The requirements addressing "into and from" do not preclude the use of BMPs, structural or non-structural either within the MS4 or at the outfall, that reduce the discharge of pollutants from the MS4 to the MEP.

Comment # 291 **Commentor** 4 **Comment Subject** Municipal

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

There are cases where pesticides may be necessary due to health concerns (rodent infestations, etc) The concept of IPM does not preclude the use of chemical solutions where such solutions are needed or appropriate.

Comment Response

The Tentative Order does not preclude the use of chemical solutions for the management of pesticides, herbicides, and fertilizers where absolutely necessary. Non-chemical solutions are preferred and should be utilized first. In any case, the use of chemical solutions must comply with the requirements of the Tentative Order.

Comment # 292 **Commentor** 4 **Comment Subject** Municipal

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

[The Copermittees requested deletion of section F.3.a.(3)(c), requiring the use of native vegetation as a BMP.]

This is clearly overly specifying method of compliance, and is illegal pursuant to CWC 13360.

Comment Response

The San Diego Water Board disagrees that section F.3.a.(3)(c) is specifying method of compliance. The requirement provides a limitation as to which types of plants may be used, but does not specify which plants must be used; nor specifically where such plants should be used. The designation of the BMPs is up to the Copermittees to determine the circumstances when the use of such BMP is appropriate. No changes were made based on this comment.

Comment # 293 **Commentor** 4 **Comment Subject** Municipal

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

[The Copermittees highlighted section F.3.a.(4)(c), requiring the Copermittees to evaluate its existing flood control structures as part of ongoing routine maintenance.]

This is not required by the federal regulations as an ongoing permit requirement.

Accordingly, the Copermittees, request deletion of the section.

Should the board decide not to remove the section, at a minimum, the language should be restored to not require anything more than the
O.C. Permit.

Comment Response

This change was made at the Copermittees request during several months of meetings. According to the Copermittees, they preferred to evaluate their existing flood control structures as part of ongoing routine maintenance. No changes were made based on this comment.

Comment # 294 **Commentor** 4 **Comment Subject** Municipal

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

[The Copermittees requested deletion of section F.3.a.(5), rwhich includes requirements for sweeping of municipal areas.]

These are new requirements that are not necessary, and were not included in the draft OC Permit.

Further it is overly specific in forcing the Copermittees to identify high/moderate/ and low (trash) volume streets. Such specificity is not necessary.

Comment Response

The commenter is incorrect. Similar requirements were included in the Orange County MS4 Permit (Order No. R9-2009-0002). The Orange County Copermittees have shown they are proactively implementing street sweeping, thus less specificity was included in their requirements. The Riverside County Copermittees have not demonstrated that they are proactively implementing their programs, thus more specificity was included. These requirements are the same as in the San Diego County MS4 Permit (Order No. R9-2007-0001). No changes were made based on this comment.

Comment # 295 **Commentor** 4 **Comment Subject** Municipal

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

The term ‘facilities’ is confusing and unnecessary.

Request use of the language from the 2004 MS4 permit as shown in these redlines (though (b)(ii)). This is much clearer and simple to comply with.

Comment Response

The proposed change is not necessary. The San Diego Water Board prefers the term 'facilities' as more encompassing of devices needing cleaning. No changes were made based on this comment.

Comment # 296	**Commentor** 4	**Comment Subject** Municipal

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

Although the shown redlines will be much clearer, should board staff reject such changes, at a minimum the word 'detention basins' should be removed as it would otherwise conflict with subpart (iii)below.

Comment Response

The proposed change is not necessary. Section F.3.a.(6)(b)(iv) only addresses the cleaning of anthropogenic litter and does not address other sediment or debris cleaning activities that the Copermittees should do. Therefore, no conflict exists. No changes were made based on this comment.

Comment # 297	**Commentor** 4	**Comment Subject** Municipal

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

The MS4 Copermittees that do not own nor operate a sewer system cannot prevent seepage by maintaining their MS4.

Comment Response

The San Diego Water Board disagrees that the Copermittees cannot prevent sewage seeping into their MS4s by maintaining their MS4s. Through routine maintenance of their MS4, the Copermittees may identify sanitary sewer seepage and then take appropriate actions to temporarily divert the sewage, contact the responsible party for the sewage seepage to stop the seepage, or jacket the storm drain to prevent the sewage seepage. No changes were made based on this comment.

Comment # 298	**Commentor** 4	**Comment Subject** Municipal

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

See footnote explaining this change. The idea is that if a project has LID or Treatment Control BMPs in place – it should no longer be a mandatory high-priority site for municipal inspection purposes. It would then be subject to the requirements of Section F.1.f.

Comment Response

The San Diego Water Board disagrees with the proposed change. See the response to comment 288. No changes were made based on this comment.

Comment # 299 **Commentor** 4 **Comment Subject** Unpaved Roads

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

Pursuant to the comment letter:

THE COPERMITTEES REQUEST THIS SECTION BE DELETED IN ITS ENTIRETY.

See the comment letter, attachment 5, for further discussion of the issues and justification for this request.

Should the board decide to include such requirements despite the request and justifications provided in the comment letter, the edits shown below are the minimum changes that should be made.

Comment Response

Please see the response to comment 276.

Comment # 300 **Commentor** 4 **Comment Subject** Unpaved Roads

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

Regular maintenance of unpaved roads may have unintended negative effects by virtue of further loosening soil to maintain the roads. This requirement should be removed, or revised to only be required where necessary to resolve significant problems impacting streams and riparian habitat.

Comment Response

The requirement has been edited to require maintenance of unpaved roads "as necessary" to protect water quality.

Comment # 301 **Commentor** 4 **Comment Subject** Unpaved Roads

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

[The Copermittees requested deletion of section F.3.a.(11)(d), regarding re-grading of Copermittee maintained unpaved roads.]

Specifying method of compliance.

Comment Response

Comment noted. Clarifying language has been included in the errata.

Comment # 302	**Commentor** 4	**Comment Subject** Commercial/Industrial

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

[Copermittees request deletion of "marinas" from the list of commercial sites/sources required to be included in their inventory.]

Clearly not applicable within this permit area.

Comment Response

The requested change raises serious concerns that apparently the Copermittees are unaware that marinas are currently or have historically been in business at Lake Skinner, Vail Lake, and Diamond Valley Lake. As such, the Copermittees may be in violation of existing permit requirements under Order No. R9-2004-001. If it is not currently applicable, the Copermittees' inventory should not include such facilities. If, however, such a facility exists or does become established in the future, the Copermittees must include it in their inventory. No changes were made based on this comment.

Comment # 303	**Commentor** 4	**Comment Subject** Legal

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

This change reflects the purpose of the Order, which is to reduce pollutants discharged from the MS4.

Comment Response

The San Diego Water Board disagrees with the proposed change. Please see the responses to comments 22, 23, and 290. No changes were made based on this comment.

Comment # 304	**Commentor** 4	**Comment Subject** Commercial/Industrial

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

[Copermittees request language changed in the Mobile Business Program to read: Each Copermittee must keep as part of its commercial source inventory a listing of mobile business know to [delete: "operate" and replace with: "have bases of operation"] within tits jurisdiction that conduct services etc.]

This is an appropriate change, as it sets clear responsibility among the Copermittees.

Comment Response

The San Diego Water Board disagrees with the proposed change. The proposed change is already required under section F.3.b.(1)(a) and would make section F3.b.(3) unnecessary. No changes were made based on this comment.

Comment # 305 **Commentor** 4 **Comment Subject** General

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

[The Copermittees requested changes to section F.3.c.(1)(e), regarding the criterion to prioritize residential areas tributary to 303(d) listed water bodies as high priority.]

These requirements should be focused on discharges of pollutants

Comment Response

The San Diego Water Board disagrees with the proposed change. This requirement is focused on areas that can generate pollutants which may contribute to a 303(d) listed impairment. No changes were made based on this comment.

Comment # 306 **Commentor** 4 **Comment Subject** General

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

[The Copermittees requested deletion of section F.3.c.(1)(f), regarding the criterion to prioritize residential areas within or directly adjacent to or discharging directly to an ESA as high priority.]

This inappropriately separates the risk (pollutant discharge potential) from the action (regulation, minimum BMPs, etc), and should not be a mandated component of this permit.

Comment Response

The San Diego Water Board disagrees with the proposed change. This requirement is focused on areas that can generate pollutants which may impact an enironmentally sensitive area. No changes were made based on this comment.

Comment # 307 **Commentor** 4 **Comment Subject** Unpaved Roads

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

Pursuant to the comment letter:

THE COPERMITTEES REQUEST THIS SECTION BE DELETED IN ITS ENTIRETY.

See further discussion on this issue in Attachment 5 to this comment letter

Comment Response

Please see the response to comment 276.

Comment # 308	**Commentor** 4	**Comment Subject** Retrofit

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

[The Copermittees requested adding "Environmental Constraints (such as regulatory permits)" as a criterion for evaluating areas of existing development for retrofitting.]

There may be external constraints by other regulatory agencies that may affect the ranking of a particular candidate.

Comment Response

The San Diego Water Board disagrees with the requested change. Section F.3.d.(2) states that the evaluation criteria "is not limited to" the criteria included in the Tentative Order. The Copermittees may identify other criteria during their evaluation. The requested change is not necessary. No changes were made based on this comment.

Comment # 309	**Commentor** 4	**Comment Subject** Retrofit

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

A particular retrofit opportunity may have both positive and/or negative effects on public health and safety, and both should be considered.

Comment Response

Please see response to comment 308.

Comment # 310	**Commentor** 4	**Comment Subject** General

Specific Comment

[From Attachment 10 to the RCFC&WCD comment letter]

Fact Sheet Text, Page 7:
"The First and Second Term Permits, Order Nos. 90-46 and 98-02, provided maximum flexibility. San Diego Water Board Order No. 90-46 contained the "essentials" of the 1990 regulations, but the requirements were written in very broad, generic terms. This was done in order to provide the maximum amount of flexibility to the Copermittees in implementing the new requirements (flexibility was, in fact, the stated reason for issuing the permit in advance of the final regulations). From staff's perspective however, "flexibility" in the form of lack of specificity, combined with the Copermittees' lack of funding and political will, also provided the Copermittees with ample reasons to take few substantive steps towards achieving water quality standards. The situation was exacerbated by the San Diego Water Board's own lack of storm water resources for oversight."

Problem with Text:
The statement regarding a 'lack of funding and political will' is unsupported and inflammatory, and provides no benefit in a public document.

Suggestion:
Delete this statement.

Comment Response

The San Diego Water Board disagrees with the assertion that the statement is unsupported and inflammatory. During a time of increased economic activity, the Copermittees chose to do the minimum that is required in the current Order No. R9-2004-001 instead of identifying ways to improve upon those requirements and secure funding sources. The Copermittees chose to rely on funding sources that are not sustainable. The Copermittees chose not to actively pursue dedicated resources to support their storm water and non-storm water management programs. Now, with the current economic environment, the Copermittees use the reduction in the sources for their general funds as an excuse for not being able to support and expand their programs. Please see the responses to comments 8 and 9. No changes were made based on this comment.

Comment # 311 **Commentor** 4 **Comment Subject** Economic

Specific Comment

[From Attachment 10 to the RCFC&WCD comment letter]

Fact Sheet Text, Page 12 and 13:
"It is very difficult to ascertain the true cost of implementation of the Copermittees' management programs because of inconsistencies in reporting by the Copermittees. Reported costs of compliance for the same program element can vary widely from city to city, often by a very wide margin that is not easily explained. Despite these problems, efforts have been made to identify management program costs, which can be helpful in understanding the costs of program implementation….

A study on Phase I MS4 program cost was also conducted by the California Regional Water Quality Control Board, Los Angeles Region (Los Angeles Water Board), where program costs reported in the municipalities' annual reports were assessed. The Los Angeles Water Board estimated that average per household cost to implement the MS4 program in Los Angeles County was $12.50. 8 Since the Los Angeles County permit is very similar to Order No. R9-2004-001, this estimate is also useful in assessing general program costs in Riverside County.

The State Water Board also commissioned a study by the California State University, Sacramento to assess costs of the Phase I MS4 program. This study includes an assessment of costs incurred by Phase I MS4s throughout the State to implement their programs. Annual cost per household in the study ranged from $18-46, with the Fresno-Clovis Metropolitan Area (FCMA) representing the lower end of the range, and the City of Encinitas (in San Diego County) representing the upper end of the range.9 Included in the study is the City of Corona, which is in Riverside County under the jurisdiction of the California Regional Water Quality Control Board, Santa Ana Region (Santa Ana Water Board).

The annual cost per household for the City of Corona's program was estimated to be $32, which should be similar to the costs to implement the MS4 programs in the Riverside County portion of the San Diego Region. In contrast, the cost of the City of Encinitas' program, with an annual cost per household estimated to be $46, may represent the upper range of Riverside County MS4 programs. However, the City of Encinitas's program cost can be considered as the high end of the spectrum for management program costs because the City has a consent decree with environmental groups regarding its program, and City of Encinitas has received recognition for implementing a superior program.

The annual costs for the City of Corona and City of Encinitas were estimated from data collected in 2003-2004. Between 2003 and 2008, the number of households in both cities has increased by approximately 3 percent and 7 percent, respectively.10 In contrast, between 2003 and 2008 the number of households in the City of Temecula has increased from 23,199 to 31,135 (34 percent) and the City of Murrieta has increased from 22,020 to 32,664 (48 percent). This significant increase in number of households indicates a significant increase in the tax base (sales and property tax) available to fund the implementation of the MS4 programs for the City of Temecula and City of Murrieta, as well as for the County of Riverside and recently incorporated cities."

Problem with Text:
The text notes that it is difficult to compare costs between Cities for stormwater program implementation since the cost accounting varies widely, and the specific issues also vary widely. Despite this fact, the fact sheet goes on to make just such comparisons and further implies that the Santa Margarita Region Cities are underfunding their programs by comparison. For example, the City of Encinitas is cited as an example of a city that is spending on the upper end for a stormwater program. The City of Encinitas varies significantly from the cities in the Santa Margarita area in that it must address a major outfall (Cottonwood Creek) at its primary beach (Moonlight Beach). Cottonwood Creek has perennial dry weather flow from urban sources and exceeds REC-1 and REC-2 water quality standards. Since Cottonwood Creek discharges at Moonlight Beach, frequent sanitary standard exceedences were noted on a year–round basis. The City of Encinitas constructed a dry weather flow treatment plant near Moonlight Beach to treat Cottonwood Creek to correct this problem. No such compliance problems exist for the Copermittees. The comparisons in this part of the fact sheet are not valid.

In addition, the Fact Sheet leaves the inaccurate impression that the Copermittees have ample financial resources to fund MS4 programs by completely ignoring the effects of the current national recession. (See Attachment 2). As pointed out in Attachment 2 (Economic Assessment), declines in home values and tax receipts have crippled the ability of the Copermittees to finance such programs. The Fact Sheet selectively examines the period 2003-2008, when there was significant growth, but ignores the period 2008-2010, when that growth ended and the economy declined precipitously, affecting property and sale tax receipts as well as other sources of revenue.

Suggestion: Delete the text on Page 13 and 14 of the Fact Sheet.

Comment Response

Please see the responses to comments 9, 115, 116, 122, 126-130, and 208.

In addition to the City of Encinitas, the comparison in the Fact Sheet also includes the City of Corona, which is in Riverside County. The City of Encinitas was included in the comparison to provide a contrast in the varying amounts expended by different municipalities. The City of Corona was included in the comparison to provide a more region specific cost comparison. The comparison showed that the Cities of Murrieta and Temecula expended significantly less for their storm water management program, on a per household basis, compared to to the City of Corona, all of which are in the same county. According to the information provided in their FY 2008-2009 Annual Reports, the City of Corona reportedly spent approximately 50-60 percent more per household than the Cities of Murrieta and Temecula. The information was provided by the Cities. The comparison is accurate and valid. No changes were made based on this comment.

Comment # 312 **Commentor** 4 **Comment Subject** Legal

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

[The Copermittees requested deletion of section F.4.a.(1), requiring each Copermittee to retain legal authority to prevent and eliminate illicit discharges and connections to the MS4.]

This measure is already covered in Part E of the Order.

Comment Response

This level of specificity provides clarity to the Copermittee's to ensure their compliance with the Tentative Order's provisions. The proposed change is not necessary. No changes were made based on this comment.

Comment # 313 **Commentor** 4 **Comment Subject** IDDE

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

[The Copermittees requested deletion of "all known locations of access points (i.e. manholes) to the Copermittee's MS4, all known
locations of connections with other MS4s (e.g. Caltrans)" from section F.4.b.]

These are not required under the federal regulations, and are not necessary for the Copermittees' programs.

Comment Response

Section F.4.b of the Tentative Order and the corresponding text in the Fact Sheet have been modified to remove the requirement to include access points (i.e. manholes) in the MS4 Map.

Comment # 314 **Commentor** 4 **Comment Subject** IDDE

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

[The Copermittees requested deletion of section F.4.g, requiring each Copermittee to implement and enforce its ordinances, orders, or other legal authority.]

This requirement is already covered in Part E.1 of the Order.

Comment Response

This level of specificity provides clarity to the Copermittee's to ensure their compliance with the Tentative Order's provisions. The proposed change is not necessary. No changes were made based on this comment.

Comment # 315 **Commentor** 4 **Comment Subject** IDDE

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

The Copermittees do not own nor operate such systems, and as such cannot 'prevent' such spills from occurring.

Comment Response

Section F.4.g does not require the prevention of the spills from occurring, but the prevention of the spills from entering the MS4. Please see the response to comment 82. No changes were made based on this comment.

Comment # 316 **Commentor** 4 **Comment Subject** General

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

These entities are subject to individual NPDES regulations, and the Copermittees should not be required to educate them on the general requirements below.

Comment Response

Section F.6 has been modified as recommended.

Comment # 317 **Commentor** 4 **Comment Subject** General

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

The language should be clear that the minimum topics should be tailored as appropriate to the target audience.

Comment Response

Section F.6.a.(1) has been modified to clarify that the Copermittees' education programs must educate as appropriate to the target community's potential storm water and non-storm water discharges.

Comment # 318 **Commentor** 4 **Comment Subject** General

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

[The Copermittees requested deletion of "and review of monitoring data" from section F.6.b.(1)(a)(vii).]

As discussed in the comment letter, this is a requirement for other NPDES permits, and it is inappropriate to mandate upon the Copermittees.

Comment Response

The San Diego Water Board disagrees with the proposed change. Copermittee personnel (e.g., inspectors) should be educated on how to review monitoring data, especially if monitoring data are available for review at a site that is being inspected. Monitoring data provide valuable information to an inspector. No changes have been made based on this comment.

Comment # 319 **Commentor** 4 **Comment Subject** General

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

The requirement to educate the residential and general public communities will necessarily include these underserved audiences.

Comment Response

The San Diego Water Board agrees that the requirement will necessarily include these underserved audiences. Removing the text as proposed is not necessary. No changes were made based on this comment.

Comment # 320 **Commentor** 4 **Comment Subject** General

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

Goal is to pursue these agreements where we determine it is needed. Otherwise this requirement is diverting our time and resources from other more important efforts.

Comment Response

The Tentative Order describes that interagency agreements are necessary to control the contribution of pollutants from one portion of the shared MS4 to another portion of the shared MS4. If the agencies do not share portions of the MS4, then such agreements are not necessary.

Comment # 321 **Commentor** 4 **Comment Subject** Economic

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

This clarifies that the Copermittees have the option to request modification of the order for reasons such as inability to obtain the requisite funding for the programs.

Comment Response

The San Diego Water Board does not agree with the proposed change. The Copermittees are responsible for securing the resources necessary to meet the requirements of the Order. Please see the responses to comments 8 and 9. The Copermittees are free to request modification to the Order at any time. Until those modification are made, the Copermittees' storm water and non-storm water programs must be able to be protective of water quality and meet the requirements of the Order. In addition, the "Need to halt or reduce activity is not a defense" per the standard provisions in Attachment B.1(b) and 40 CFR 122.41(c). No changes were made based on this comment.

Comment # 322 **Commentor** 4 **Comment Subject** General

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

Although the Copermittees prefer to not be required to develop another compliance document, the edits below are intended to focus such a document on information that is relevant to the Copermittes' response.

Comment Response

The requested information is vital to formulating and implementing an appropriate workplan that addresses water quality. The level of detail is specific to provide the Copermittees more certainty on the status of their compliance. The suggested language is vague and open to multiple interpretations that would create confusion and uncertainty on the status of compliance.

Comment # 323 **Commentor** 4 **Comment Subject** Reporting

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

As drafted (without the changes shown) the requirements will be a significant and lengthy reporting exercise.

Request keeping this as a 'summary' report on compliance with the inspection frequencies, and identifying any follow-up actions (as shown via
the markup)

Comment Response

The San Diego Water Board disagrees with the requested changes and feels the reporting requirements are similar in breadth as current reporting requirements. No changes were made based on this comment.

Comment # 324	**Commentor** 4	**Comment Subject** Reporting

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

As drafted (without the changes shown) the requirements will be a significant and lengthy reporting exercise.

Request keeping this as a 'summary' report on compliance with the inspection frequencies, and identifying the high-level enforcement actions
(as shown via the markup).

Comment Response

The San Diego Water Board disagrees with the requested changes and feels the reporting requirements are similar in breadth as current reporting requirements. No changes were made based on this comment.

Comment # 325 **Commentor** 4 **Comment Subject** Economic

Specific Comment

[From Attachment 10 to the RCFC&WCD comment letter]

Fact Sheet Text Page 15:
"The vast majority of costs that will be incurred as a result of implementing Order No. R9-2010-0016 is not new. Storm water management programs have been in place in Riverside County for over 15 years. As shown in the discussion above, the amount spent for MS4 Permit compliance per household in the municipalities in the Riverside County portion of the San Diego Region is already low compared to other regions. Any increase in cost to the Copermittees, however, is still expected to be incremental in nature. Since Order No. R9-2010-0016 "fine tunes" the requirements of Order No. R9-2004-001, these cost increases are expected to be modest.

Where there may be additional elements that will incur new costs, the Riverside County Copermittees are given the time to develop the budgets and funding mechanisms to phase those elements into their programs. Additionally, development of these additional elements by the Riverside County Copermittees will have the benefit of the experiences and work already done by the San Diego County and Orange County Copermittees."

Problem with Text:
The Fact Sheet states that the vast majority of costs for implementing the Tentative Order are 'not new'. This is not correct. Almost every program in the Tentative Order has been amended and require new resources. Specific programs include, but are not limited to, the monitoring program (over fivefold increase in costs), hydromodification management programs, new development programs, inspection programs, irrigation runoff prohibitions, retrofit studies and MS4 maintenance programs. The very prescriptive and detailed requirements of the Tentative Order impose new requirements on the Copermittees at a time when funding sources are drying up. The Copermittees estimate that implementation of the regional components of the new Order (as written) will cost approximately $11,500,000 (e.g. the costs to write the new compliance documents, develop the retrofit, hydromodification programs and develop and implement the new monitoring program). These costs are on top of the current expenditures to implement the existing regional monitoring program (approximately $5,000,000 for the five-year permit term). These costs are further amplified by the direct cost of implementation that will be incurred by the individual Permittees (e.g. the cost to implement the new compliance documents and hydromodification programs). The text further indicates that the Tentative Order provides time for the Permittees to 'develop…funding mechanisms'. This statement assumes that the Copermittees have the ability to collect additional funds from taxpayers to support the stormwater program implementation. This is false, since any such funds, outside of inspection or plan review fees, would be required to be submitted to a vote of the people pursuant to Propostion 218. In the current economic and political climate, a successful vote to increase taxes is extremely remote. The Copermittees further note that in the City of Encinitas in Orange County, cited by the staff as an example of proactive MS4 regulation, a minimal stormwater proposition recently was voted down.

Suggestion: Delete the text noted above in the Fact Sheet and add a discussion on the difficulties of funding expansions to the Copermittees' stormwater programs due to Proposition 218.

Comment Response

Please see the responses to comments 8 and 9. No changes were made based on this comment.

Comment # 326	**Commentor** 4	**Comment Subject** Economic

Specific Comment

[From Attachment 10 to the RCFC&WCD comment letter]

Fact Sheet Text Page 16:
"For example, household willingness to pay for improvements in fresh water quality for fishing and boating has been estimated by USEPA to be $158-210. This estimate can be considered conservative, since it does not include important considerations such as marine waters benefits, wildlife benefits, or flood control benefits. The California State University, Sacramento study reports that the annual household willingness to pay for statewide clean water is approximately $180. When viewed in comparison to household costs for existing management programs, household willingness to pay estimates exhibit that per household costs incurred by the Riverside County Copermittees to implement their management programs are very low."

Problem with Text:
The discussion in the referenced text is not represented correctly. The figure cited in the California State University, Sacramento study includes the cost of wastewater treatment. The author of the study notes:

'The survey question was for restoring water quality for all waters throughout the state from all impairment, not just within a city or region and not just for impairment from stormwater pollution.' The current cost for sewer fees exceed $200 per year, Thus, the vast majority of the "household willingness" figure relates to sanitary sewer costs, and not to the costs of addressing stormwater.

Suggestion: Delete this text in the fact sheet and note that the cost consumers are currently paying for clean water in the Permit area exceeds that which studies cited have found they are willing to pay.

Comment Response

The commenter is correct that the figure cited in the California State University, Sacramento study is for "for restoring water quality for all waters throughout the state from all impairment, not just within a city or region and not just for impairment from stormwater pollution." The survey was about restoring water quality for all waters throughout the state, and does not state, as the commenter asserts, that the cited figure includes the cost of wastewater treatment. Thus, the figure indicates that the household willingness to pay for statewide clean water is higher than what the households in the Upper Santa Margarita Watershed are paying toward the Copermittees' storm water programs. No changes were made based on this comment.

Comment # 327	**Commentor** 4	**Comment Subject** Economic

Specific Comment

[From Attachment 10 to the RCFC&WCD comment letter]

Fact Sheet Text Page 17:
"University of California, Los Angeles assessed the costs and benefits of implementing various approaches for achieving compliance with the MS4 permits in the Los Angeles Region. The study found that non-structural systems would cost $2.8 billion but provide $5.6 billion in benefit. If structural systems were determined to be needed, the study found that total costs would be $5.7 to $7.4 billion, while benefits could reach $18 billion. Costs are anticipated to be borne over many years – probably ten years at least. As can be seen, the benefits of the programs are expected to considerably exceed their costs. Such findings are corroborated by USEPA, which found that the benefits of implementation of its Phase II storm water rule would also outweigh the costs."

Problem with Text:
It is a basic principle that public spending should have a positive cost-benefit. The Fact Sheet implies that since spending on stormwater has a positive cost-benefit, such spending should be increased. The reality is that there are also other public spending priorities such as police, fire, ambulance, and public utilities competing for the same funding, all of which have positive cost-benefit ratios. Moreover, the UCLA study specifically focused on the benefit of improving beach water quality, which is a very significant economic factor in terms of tourism in coastal Los Angeles County. No beaches exist in the Santa Margarita Region, and given the ephemeral nature of many of the Region's waterways, attempting to extrapolate the UCLA study is not appropriate. In the absence of a similar cost-benefit study being undertaken in the Santa Margarita Region, the studies cited by staff do not provide any basis for the conclusions reached in the Fact Sheet.

Suggestion:
As the fundamental basis for this comment is flawed, in the absence of any local data for inland waterbodies in semi-arid climates, the text should be deleted.

Comment Response

The San Diego Water Board disagrees with the commenter's assertion that the basis for the text in the Fact Sheet is flawed. The waters in the Upper Santa Margarita Watershed are designated with water contact recreation (REC-1) and rare, threatened, and endanged species (RARE) beneficial uses. The Upper Santa Margarita Watershed also has valuable resources that are worth protecting and provide value and benefits to the community. In general, the study shows that the costs of implementing programs to restore and protect water quality would provide benefits that exceed and outweigh the costs of implementing those programs. No changes were made based on this comment.

Comment # 328	**Commentor** 4	**Comment Subject** Finding

Specific Comment

[From Attachment 10 to the RCFC&WCD comment letter]

Fact Sheet Text Page 35:
"Trash, as litter in both solid and liquid form, is consistently found on and adjacent to roadways. A California Department of Transportation Litter Management Pilot Study found that of roadway trash, plastics and Styrofoam accounted for 33 percent of trash by weight, and 43 percent by volume. Further, the study found that approximately 80 percent of the litter associated with roadways was floatable, indicating that, without capture, this litter would enter Waters of the State after a storm event, resulting in the impairment of Beneficial Uses. The study, however, relied upon a mesh capture size of 0.25 inches (6.35 millimeters). This size is too large to effectively capture plastic pre-production pellets (a.k.a. "nurdles"), which are roughly 3 mm in size, and likely underestimated the total contribution of plastics. Furthermore, pre-production plastic pellets, which are small enough to be easily digested, have been found to carry persistent organic pollutants, including PCBs and DDT."

Problem with Text:
While the Fact Sheet suggests that there is a compelling argument to address trash along Caltrans highways, such a problem is not found on municipal streets. The Caltrans studies found that a substantial portion of the litter load comes from uncovered loads on commercial and private vehicles. The low speed roadways operated by the Copermittees do not create similar conditions or handle similar traffic. Further, the text discusses pre-production plastics (nurdles), yet fails to acknowledge that there are no industries within the Copermittees' jurisdiction that manufacture or use this material. The Fact Sheet's citation of studies that have no bearing on actual conditions within the Santa Margarita Region cannot be used to justify programs in the Tentative Order addressing such non-existent conditions. The ROWD has a more informed discussion of trash issues based on actual conditions in the Santa Margarita Region.

Suggestion:
Revise the fact sheet text to discuss the current findings relative to trash in the Permit region based on the ROWD.

Comment Response

The San Diego Water Board disagrees that the Fact Sheet requires revisions regarding trash. The discussion in the Fact Sheet includes information specific to high density urban areas in Southern California as well. The Caltrans study referenced in the Fact Sheet was provided as additional information about the amount and types of trash that can be found along Caltrans maintained roadways which can be discharged from the Caltrans MS4 system to the Copermittees' MS4 systems. No changes were made based on this comment.

Comment # 329	**Commentor** 4	**Comment Subject** Overirrigation

Specific Comment

[From Attachment 10 to the RCFC&WCD comment letter]

Fact Sheet Text Page 50 and 51
Pg. 50 - "To date the San Diego Water Board and the Copermittees have identified overspray and drainage from potable and reclaimed water landscape irrigation as a substantial source and conveyance mechanism for pollutants into waters of the United States."
Pg. 51 – "The San Diego Water Board and the Copermittees have identified irrigation water as a source of pollutants and conveyance of pollutants to waters of the United States, when applied improperly in excess and thereafter entering the MS4, in the following documents:"

Problem with Text:
The documents cited in the Fact Sheet do not support the conclusion that irrigation water is a source of pollutants or conveyance of pollutants in the Santa Margarita Region. First, the comments in the public education document cited in the Fact Sheet were borrowed from an Orange County publication, and do not represent any official conclusion by the Copermittees that irrigation water represents a water quality threat. Plainly over-irrigation is to be discouraged, as even if the water is clean, it adds to the Copermittees' costs of addressing such waters. Second, this public education document is the only document from a Santa Margarita Region source. The other documents cited by staff are studies conducted in other areas, with different hydrology and climate. For a more comprehensive assessment of the irrigation runoff issues, please see Attachment 6 (Prohibition of Irrigation Runoff).

Suggestion:
Delete the referenced text and the quotes referencing Permittee education materials. Also remove the improperly supported irrigation runoff prohibition.

Revise the text to accurately reflect the lack of any connection between irrigation runoff and impairments of receiving waters in the Santa Margarita Region.

Comment Response

Please see the reponse to comment 83. Also, there are two public education documents used by the Riverside County Copermittees cited, one of which is a survey developed by the Copermittees. These documents exhibit an explicit concern with pollutants contained in and conveyed by irrigation runoff. These documents may have been "borrowed", but the fact that they are being distributed by the Copermittees as part of their public participation program does make them an "official" publication. No changes were made based on this comment.

Comment # 330	**Commentor** 4	**Comment Subject** Unpaved Roads

Specific Comment

[From Attachment 10 to the RCFC&WCD comment letter]

Fact Sheet Text Page 58:
"Enforcement and inspection activities conducted by the San Diego Water Board during the previous permit term have found a lack of source control for many unpaved roads within the jurisdiction of the Copermittees."

Problem with Text:
The Copermittees submit that there is no evidence reflecting any substantial water quality problem relating to MS4 discharges affected by unpaved roads. Moreover, the mileage of unpaved roads in the jurisdiction of the Copermittees is a small percentage of the total mileage of unpaved roads in the Santa Margarita Region, given that many of these roads are operated by such jurisdictions as the U.S. Forest Service. Please see Attachment 5 (Unpaved Roads). Further, the Fact Sheet notes on page 27 that Permits "will cover municipal systems discharges in unincorporated portions of the county, it is the intent of EPA that management plans and other components of the program focus on the urbanized and developing area of the County". Dedicating resources to unpaved roads diverts already limited resources from the urbanized areas intended to be addressed by USEPA regulations.

Suggestion:
The references and associated program requirements should be removed from the Permit and addressed through a separate general permit for unpaved roads, if in fact unpaved roads are a significant source of pollutants.

Comment Response

Please see the responses to comments 101, 138, and 179. Although the USEPA intends the regulations to "focus" on urban areas, the regulations are not limited to urban areas. As necessary in the rural areas, the Copermittees must enforce their ordinances to maintain compliance with the Tentative Order thereby protecting water quality.

Comment # 331 **Commentor** 4 **Comment Subject** New Development

Specific Comment

[From Attachment 10 to the RCFC&WCD comment letter]

Fact Sheet Text Page 69:
"The order also found that the SSMP requirements are appropriately applied to the majority of the Priority Development Project categories that are also contained in section F.1 of this Order. The State Water Board also gave California Regional Water Quality Control Boards (Regional Water Boards) the needed discretion to include additional categories and locations, such as retail gasoline outlets(RGOs), in SSMPs "

"The provisions of the SSMP section of the Order are also consistent with those previously issued by the San Diego Water Board for Riverside County (Order No. R9-2004-001), Southern Orange County (Order Nos. R9-2002-0001 and R9-2009-0002) and San Diego County."

Problem with Text:
Several PDP categories or thresholds are not supported by Order WQ 2000-11 such as the 10,000 square feet requirement for residential areas nor the 1-acre threshold for all development projects. Further the Order ignores other applicable portions of Order WQ 2000-11. Specifically, the memo from State Board Chief Counsel Craig S. Wilson transmitted WQ Order 2000-11 to the Regional Board executive officers states that with regard to discretion that:

"3. The Order allows broader discretion by the Regional Water Boards to decide whether to include additional types of development in future SUSMPs. These areas for potential future inclusion in SUSMPs include retail gasoline outlets, ministerial projects (only discretionary projects are included in the approved SUSMPs), and projects in environmentally sensitive areas. If Boards include these types of developments in future permits, the Order explains the types of evidence and findings that are necessary."

Order 2000-11 requires that revisions to regulatory thresholds be justified economically. The Copermittees have expressed their concern with requirement F.1.d.(2)(a) regulating residential developments of 10,000 sq. ft. or more and requirement F.1.d.(1)(c) regulating any project 1-acre or more. These thresholds, and their relative impact on project proponents, have not been adequately justified. The Permittees have noted that these regulations will negatively impact the construction of custom homes (individual lot developments). The relative economic impact of meeting the SSMP requirements for individual homeowners has not been justified in the fact sheet.

Suggestion:
As shown in the redline markup (Attachment 9); The 1-acre SSMP threshold (F.1.d.(1)(c)) should be deleted and the 10,000 square feet threshold for residential areas (F.1.d.(2)(a)) should be made the same as the requirement contained in the Riverside County Santa Ana NPDES MS4 Permit.

Comment Response

The 10,000 square feet threshold is appropriate, since it is consistent with requirements in other Phase I NPDES storm water regulations throughout California. The 10,000 square feet threshold is also included in the Santa Ana Water Board Riverside County MS4 Permit (Order No. R8-2010-0033), but section F.1.d.(2)(a) of the Tentative Order does not differentiate residential new development projects.

This one-acre threshold is appropriate, since it was selected to be consistent with the State Water Board's Phase II NPDES requirements for small municipalities (Order No. 2003-0005-DWQ). The one-acre threshold is consistent with the San Diego County MS4 Permit (Order No. R9-2007-0001) and Orange County MS4 Permit (Order No. R9-2009-0002). The one-acre threshold is also included to be consistent with the State Water Board's Construction General Permit (Order No. 2009-0009-WQO), to ensure all Development Projects subject to the post-construction BMP requirements of the Construction General Permit will implement SSMP post-construction BMP requirements.

No changes were made based on this comment.

Comment # 332 **Commentor** 4 **Comment Subject** Hydromod

Specific Comment

[From Attachment 10 to the RCFC&WCD comment letter]

Fact Sheet Text Page76:
"The success of future stream restoration and stabilization is, however, dependent on preventing and reducing physical impacts from activities upstream. Therefore, hydromodification management measures are necessary upstream of modified (e.g. concrete, rip rap, etc.) channels in addition to non-modified channels."

Problem with Text:
In some areas, hardened channels may be needed for flood control and public safety. In those areas, channel restoration may not be feasible and onsite controls are not warranted. The protection of public safety from flooding is a statutorily required duty of the District. See Water Code App. Section 48-9. Any provisions of the Tentative Order that would presume to challenge this duty must be deleted. The District assumes that the Regional Board and staff are not placing themselves in the position of making flood control judgments, as the agency is neither charged by the Legislature with such obligation nor is the agency equipped to do so.

Suggestion:
Revise the text to add "except where hardened channels are required for the protection of public safety"

Comment Response

Please see the responses to comments 235 and 265. No changes were made based on this comment.

Comment # 333 **Commentor** 4 **Comment Subject** Commercial/Industrial

Specific Comment

[From Attachment 10 to the RCFC&WCD comment letter]

Fact Sheet Text Page 77:
"Since municipalities are the lead permitting authority for industrial land use and construction activities, they are also the lead for enforcement regarding runoff discharges from these sites."

Problem with Text:
This is a leap of logic we should probably not let pass. The Copermittees can greatly influence the design and construction, but the Industrial Permit is focused on the operation of the facility, and that is where the authority of the Board lies - and is arguably the most important aspect of runoff quality from the site.

Suggestion:
Delete the sentence.

Comment Response

The San Diego Water Board maintains that it is logical for the municipalities to be the lead for enforcement regarding runoff discharges from these sites into their MS4. The Copermittees are responsible for enforcing their ordinances within their jurisdiction regarding discharges to their MS4 systems. The Copermittees have land use permitting authority for industrial land use and construction activities and can require implementation of BMPs to reduce or eliminate runoff discharges into their MS4 systems. No changes were made based on this comment.

Comment # 334	**Commentor** 4	**Comment Subject** Legal

Specific Comment

[From Attachment 10 to the RCFC&WCD comment letter]

Fact Sheet Text Page 79:
"To clarify, an unaltered natural drainage, which receives runoff from a point source (channeled by a Copermittee to drain an area within their jurisdiction), which then conveys the runoff to an altered natural drainage or a man-made MS4, is both an MS4 and a receiving water."

Problem with Text:
As noted in Attachment 7 (General Legal Comments) regarding Finding D.3.c., a natural drainage, whether or not it conveys point source runoff to a man-made MS4, is not itself part of the MS4.

Suggestion:
Delete text.

Comment Response

Please see the response to comment 22.

Comment # 335 **Commentor** 4 **Comment Subject** Legal

Specific Comment

[From Attachment 10 to the RCFC&WCD comment letter]

Fact Sheet Text Page 79:
"As operators of the MS4s, the Copermittees cannot passively receive and discharge pollutants from third parties. By providing free and open access to an MS4 that conveys discharges to waters of the U.S., the operator essentially accepts responsibility for discharges into the MS4 that it does not prohibit or otherwise control. These discharges may cause or contribute to a condition of contamination or a violation of water quality standards."

Problem with Text:
First, the Copermittees, as operators of the MS4, are required to address storm drainage. During storm conditions in particular, the District is required to handle flood waters so as to protect the lives and property of residents of Riverside County. The failure to do so is a violation of state law. See Water Code App. Section 48-9. Thus, the Copermittees must "passively receive and discharge" waters from third parties, which waters may contain pollutants. Moreover, the operator of the MS4 is NOT accepting responsibility for discharges from other MS4 systems. There is no provision for joint liability under the federal Clean Water Act or the California Water Code. The former directs its prohibitions against a "discharger," and no others. 33 U.S.C. §§ 1319 and 1342. A party is responsible only for its own discharges or those over which it has control. Jones v. E.R. Snell Contractor, Inc., 333 F.Supp.2d 1344, 1348 (N.D. Ga. 2004); United States v. Sargent County Water Dist., 876 F.Supp. 1081, 1088 (D.N.D. 1992).

The Clean Water Act MS4 regulations, moreover, specifically provide that Copermittees under an MS4 Permit are required to "comply with permit conditions relating to discharges from the municipal separate storm sewers for which they are operators." 40 C.F.R. § 122.26(a)(3)(vi) (emphasis supplied). Moreover, the Regional Board, as the permitting agency for stormwater and Industrial Permits, and the State Board as the overall agency responsible for compliance with the Clean Water Act in California, are responsible for ensuring that the discharges from such permitted facilities, whether or not they enter the MS4, are in compliance with the requirements of those permits. Finally, many sources of pollutants are beyond the control of the MS4 operators but are within the control of other agencies, if those agencies elect to exercise their authority. A major example is the discharge of metals from motor vehicle brake pads, which contributes to exceedances of copper, zinc and potentially other metals in stormwater. The MS4 operators cannot control the composition of brake pads, nor can the MS4 operators control air emissions from domestic and foreign sources that discharge pollutants onto the surface area of the region, which can then wash into the MS4 systems.

Suggestion:
Delete cited text.

Comment Response

The text cited from the Fact Sheet is a Finding that is included as part of the Findings of the Tentative Order. The San Diego Water Board disagrees with the recommendation to delete the finding from the Fact Sheet or the Tentative Order. Please see the responses to comments 81, 233-235, 260, and 265.

Comment # 336 **Commentor** 4 **Comment Subject** Legal

Specific Comment

[From Attachment 10 to the RCFC&WCD comment letter]

Fact Sheet Text Page 81:
"Since treatment generally does not occur within the MS4, in such cases reduction of storm water pollutants to the MEP must occur prior to discharges entering the MS4."

Problem with Text:
Nothing in the MS4 regulations prohibits use of the MS4 for treatment. Frankly, some of the most effective treatment facilities for pollutants may be located in the MS4 as part of regional treatment systems. An example are catch basins, which collect trash and other debris and detention and retention basins that can be used to capture, treat and infiltrate runoff.

Suggestion:
Delete cited text.

Comment Response

The San Diego Water Board agrees that nothing in the MS4 regulations prohibits use of treatment devices within the MS4 to treat pollutants prior to discharge into receiving waters, subject to appropriate NPDES requirements. Although more often than not, structural treatment controls within the MS4 are costly and maintenance intensive, and therefore not implemented by the Copermittees. The text clarifies the most common case; that treatment controls for priority pollutants do not exist within the MS4 and the most cost efficient and effective controls are at the source of the pollutants prior to entering the MS4. Please see the response to comment 290. No changes were made based on this comment.

Comment # 337 **Commentor** 4 **Comment Subject** Retrofit

Specific Comment

[From Attachment 10 to the RCFC&WCD comment letter]

Fact Sheet Text Page 84:
"When appropriately applied as in this Order, retrofitting existing development meets MEP."

Problem with Text:
Only retrofits that are applied with the requirements of the Order meet MEP, which is not the case.

Suggestion:
Delete the text.

Comment Response

If retrofits are applied appropriately, in compliance with the requirements of the Tentative Order, the San Diego Water Board considers that as controlling pollutants in storm water discharges from existing development to the MEP. No changes were made based on this comment.

Comment # 338	**Commentor** 4	**Comment Subject** Monitoring

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

[Copermittees requested deletion of "Where such monitoring is not practical, such as for large watersheds with significant groundwater recharge flows, composites must be" from Attachment E, section II.A.1.d.]

As discussed in our meeting, this is a large watershed with significant GW recharge flows.

Comment Response

This requirement is referring to the watershed area for the specific monitoring stations and not for the Santa Margarita Watershed as a whole. The practicality of collecting a sample for the duration of the event is based on the availablilty of flows during that storm event which may be impacted by the condition of the watershed depending on the size of the storm event, i.e. small storm events in a large watershed with significant groundwater recharge may not have flows during the duration of the entire runoff event.

Comment # 339	**Commentor** 4	**Comment Subject** Monitoring

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

Language from MLS section. This is to allow for changes in MLS locations, and then allow the stream assessment stations to follow.

Comment Response

The San Diego Water Board agrees with this request with the caveat that the bioassessment stations location remains with the mass loading station. The following language has been added "Copermittees may propose, for San Diego Water Board review and approval, changing the location of stream assessment monitoring stations where the mass loading stations location has changed pursuant to section II.A.1.a."

Comment # 340	**Commentor** 4	**Comment Subject** Monitoring

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

Only the Bioassessment component of stream assessment monitoring must be conducted according to the SOP.

Comment Response

Section II.A.2.c.(3) requires that the monitoring at the stream assessment stations be conducted according to the most current applicable SOPs developed by SWAMP, and includes a footnote with current SOPs. These SOPs are also applicable to the following water chemistry constituents: Temperature, pH, Dissolved Oxygen, Specific Conductance, and Alkalinity. The Tentative Order has been revised to clarify this.

Comment # 341 **Commentor** 4 **Comment Subject** Legal

Specific Comment

[From Attachment 10 to the RCFC&WCD comment letter]

Fact Sheet Text Page 88:
"The RWL language in the Order requires storm water compliance with water quality standards through an iterative approach for implementing improved and better-tailored BMPs over time. The iterative BMP process requires the implementation of increasingly stringent BMPs until receiving water quality standards are achieved. This is necessary because implementation of BMPs alone cannot ensure attainment of receiving water quality standards."

Problem with Text:
61 Federal Register 57425 (1996), Interim Permitting Approach for Water Quality-Based Effluent Limitations in Storm Water Permits states "expanded or better-tailored BMPs in subsequent permits, where necessary, to provide for the attainment of water quality standards."

Suggestion:
The second sentence should be revised to reflect the actual text from federal regulations (specifically "in subsequent permits"). Further the last sentence does not make sense and is contrary to the proceeding text and should be deleted.

Comment Response

The cited guidance is for NPDES storm water permit writing and not for storm water program management. The implementation of improved and better-tailored BMPs does not have to wait for subsequent permit iterations. A proactive storm water program will continuously review and improve their BMPs for the attainment of water quality standards. The last sentence has not been changed because it refers to the iterative process and not BMPs alone. No changes were made based on this comment.

Comment # 342 **Commentor** 4 **Comment Subject** Monitoring

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

This section is referring to the Bioassessment component of stream assessment monitoring.

Comment Response

This section is referring to the stream assessment monitoring. See response to comment No. 340.

Comment # 343	**Commentor** 4	**Comment Subject** Overirrigation

Specific Comment

[From Attachment 10 to the RCFC&WCD comment letter]

Fact Sheet Text Page 112:
"The San Diego Water Board has responded to complaints about and observed runoff from over-irrigation entering the MS4s in the Riverside County portion of the San Diego Region."

Problem with Text:
There is no evidence in the fact sheet supporting this statement.

Suggestion:
Provide evidence or delete statement.

Comment Response

This finding states the fact that the San Diego Wate Board has received and responded to complaints about and observed runoff from overirrigation entering the MS4s in the Riverside County portion of the San Diego Region. The documentation is available in the records available to the public at the San Diego Water Board. No changes were made based on this comment.

Comment # 344	**Commentor** 4	**Comment Subject** Monitoring

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

This presumes we are starting at the 'bottom of the watershed'. We may approach this differently, but would come up with something to help identify source areas.

Comment Response

Please see the response to comment 193.

Comment # 345	**Commentor** 4	**Comment Subject** Monitoring

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

This is necessary because some pollutants have broad societal sources that cannot be pinpointed through focused source ID 'Monitoring'.

Comment Response

Please see the response to comment 193.

Comment # 346	**Commentor** 4	**Comment Subject** Monitoring

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

Table 4 is more appropriate – consistency for all MS4 outfall stations.

Comment Response

The San Diego Water Board does not agree with the proposed change. Table 1 is appropriate. No changes were made based on this comment.

Comment # 347 **Commentor** 4 **Comment Subject** LID

Specific Comment

[From Attachment 10 to the RCFC&WCD comment letter]

Fact Sheet Text Page 130:
"This section requires the use of native and/or low water use plants for landscaping."

Problem with Text:
There was an agreement that this would be suggested but not a requirement. This requirement also mandates the means of compliance, in violation of Water Code section 13360.

Suggestion:
Change the text:
"Section suggests the use of native and/or low water use plants for landscaping,"

Comment Response

No change is needed in response to the comment. The full text of the the fact sheet accurately reflects the language in the Tentative Order which requires the use of native and/or low water use plants for landscaping where feasible.

Comment # 348 **Commentor** 4 **Comment Subject** Monitoring

Specific Comment

[From Attachment 9 to the RCFC&WCD comment letter]

The existing monitoring program is reported on a fiscal year basis. Need to align the monitoring report with the fiscal year and the JRMP annual report. Also consistent with the change requested in III.A.2.

Comment Response

Please see the response to comment 195.

Comment # 349 **Commentor** 4 **Comment Subject** New Development

Specific Comment

[From Attachment 10 to the RCFC&WCD comment letter]

Fact Sheet Text Page 136:
"This requirement is needed because to date, the Copermittees have generally approved low removal efficiency treatment control BMPs without justification or evidence that use of higher efficiency treatment BMPs was considered and found to be infeasible."

Problem with Text:
The Copermittees challenge the accuracy of this Statement. Riverside County has been requiring landscaped based low impact development BMPs since 2005. The District has also spent a substantial sum of money and time developing BMP manuals with specific criteria to ensure the effectiveness of BMPs.

Suggestion:
Delete the unsupported and offensive statement.

Comment Response

The statement is accurate. The Fact Sheet references a Program Evaluation Report from 2008, in which an audit of the Copermittees' SSMP programs found that many SSMP reports do not describe the selection of treatment control BMPs. Where treatment control BMPs were implemented for a SSMP project, no justification or evidence was provided for the selection of those treatment control BMPs. The pollutant removal efficiency of those treatment control BMPs was not known or evaluated in the SSMP report. The requirement is necessary to ensure that the Copermittees ensure the use of treatment control BMPs with the highest feasible pollutant removal efficiency. No changes were made based on this comment.

Comment # 350 **Commentor** 4 **Comment Subject** Hydromod

Specific Comment

[From Attachment 10 to the RCFC&WCD comment letter]

Fact Sheet Text Page 142:
"Where streams are hardened and/or buried to convey storm water, they cannot provide adequate water quality."

Problem with Text:
Unsupported and incorrect. Hardened channels can be designed to provide both flood protection and natural stream function. For example, hardened levees can be designed to be set back and backfilled with native material, effectively providing a natural substrate for stream function. Similarly, porous channel materials such as gabions can provide both flood protection and substrate for native habitat. Finally, even underground systems can be connected to regional treatment systems that provide requisite water quality benefits where appropriate.

Suggestion:
Delete.

Comment Response

The San Diego Water Board disagrees with the commenter. We fail to see how a channel that is lined with hardscape materials or an underground pipe would be able to support habitat necessary to support rare, threatened, or endangered species (i.e. RARE beneficial use). The Finding in the Fact Sheet is correct to state that hardened stream channels (i.e. lined with hardcape materials) and underground systems (i.e. pipes) cannot provide water quality and other necessary conditions to support beneficial uses. No changes were made based on this comment.

Comment # 351	**Commentor** 4	**Comment Subject** Hydromod

Specific Comment

[From Attachment 10 to the RCFC&WCD comment letter]

Fact Sheet Text Page 145:
"Redevelopment projects, however, must be able to achieve post-project runoff flow rates and durations that are less than or equal to pre-project and down to pre-development runoff flow rates and durations to be eligible to receive a waiver under the program."

Problem with Text:
This requirement is self-defeating. By placing regulatory obligations on redevelopments that make the cost of redevelopment greater than the cost of developing on virgin land, the Permit effectively promotes inner-city blight as existing structures are abandoned and suburban development is promoted due to economic factors. The Permit should include accommodations for redevelopment to ensure that existing developed areas are economically preferable for new development and to prevent the onset of unnecessary additional impervious area.

Suggestion:
The Permit and fact sheet should be revised to offer exemptions for hydromodification requirements for redevelopments where such improvements are infeasible.

Comment Response

The San Diego Water Board disagrees that the requirement is self-defeating. Language has been added to the fact sheet clarifying the difference between pre-project and pre-development. The waiver provides the appropriate level of accomodations to redevelopment projects while protecting water quality. In addition, the San Diego Water Boad believes the commentor over estimates the extent to which development may be preffered on pristine land over redevelopment with the current landuse zoning and dedicated open space requirements. Please see the response to comment 269. No changes were made based on this comment.

Comment # 352	**Commentor** 4	**Comment Subject** Retrofit

Specific Comment

[From Attachment 10 to the RCFC&WCD comment letter]

Fact Sheet Text Page 160:
"Retrofitting existing development is practicable for a municipality through a systematic evaluation, prioritization and implementation plan focused on impaired water bodies, pollutants of concern, areas of downstream [hydromodification, feasibility and effective communication and cooperation with private property owners]."

Problem with Text:
Although the current requirement simply calls for a study, it is expected that future permits will require implementation of said study. This study exceeds the requirements for Copermittees to evaluate opportunities for retrofit of the MS4 contained in the federal regulations and federal Clean Water Act. There are no revenues to promote such a program.

Suggestion:
The Board should recognize in the fact sheet that without funding provided by the state, there is no revenue for such a program.

Comment Response

The San Diego Water Board disagrees that funding must be provided by the State for the Copermittees to implement a retrofitting program. Retrofitting is anticipated to be most feasible and implementable at publicly owned properties and areas. Retrofit opportunities at publicly owned properties and areas can be implemented whenever maintenance or upgrades are necessary, which should already be included in the Copermittee's budget. If private owners choose to retrofit their properties, the cost may be borne by the property owner and may not require additional resources from the Copermittees. Also, retrofit opportunities may be funded by the CWA Section 401 certification project proponents, Supplemental Environmental Project (SEP) proponents, and grant programs.

The requirement to implement retrofits is fully supported by the federal regulations to reduce storm water pollutants to the MEP. 40 CFR 122.26 (d)(2)(iv) provides that the Copermittees storm water program shall include control techniques and engineering methods. Retrofitting BMPs are such control techniques and engineering methods for discharges from existing developments. 40 CFR 122.26(d)(2)(iv)(A) specifies that the Copermittee's program must include "a description of structural and source control measures to reduce pollutants from runoff from commercial and residential areas". Retrofitting BMPs are both structural and source control measures to reduce pollutants. 40 CFR 122.44(d)(1) requires municipal storm water permits to include any requirements necessary to "[a]chieve water quality standards established under section 303 of the CWA, including State narrative criteria for water quality." To date, the receiving waters with the Copermittees' jurisdiction are not meeting water quality standards as evidenced by the San Diego Region Clean Water Act Section 303(d) List of Water Quality Limited Segments. Experience has shown that retrofitting existing development is necessary to meet water quality standards.

Retrofits do not have to be expensive. Retrofits could be as simple as redirecting downspouts from roofs to pervious or landscaped areas instead of to hardscaped areas discharging directly to the MS4. The San Diego Water Board encourages the Copermittees to identify simple, low-cost retrofit opportunities that can be easily implemented, in addition to other more expensive retrofit opportunities, as part of their retrofitting program.

Comment # 353	**Commentor** 4	**Comment Subject** Retrofit

Specific Comment

[From Attachment 10 to the RCFC&WCD comment letter]

Fact Sheet Text Page 161:
"Section F.3.d.(4) requires each Copermittee to cooperate with private property owners to encourage the implementation of site specific retrofitting projects. Because the Copermittees have limited authority to directly require retrofitting projects on private property, the Copermittees must encourage private property owners to implement retrofitting projects through indirect programs and incentives."

Problem with Text:
If the Board wishes to promote urban retrofit, then they also need to incentivize the program. Currently, property owners wishing to volunteer for urban retrofit projects are required to comply with the SSMP, including hydromodification and LID requirements, opt into BMP inspection programs and subject themselves to ongoing scrutiny through business inspection programs required by the Permit. The permit places an ECONOMIC DISINCENTIVE in the way of promoting a general good for the watershed. The purpose of this requirement is to promote acceleration of water quality benefits from existing urban areas. The requirements, as written, promote a program that is doomed to failure.

Suggestion:
The Board should clearly exempt urban retrofit projects from the new development requirements of the Permit if they wish to accelerate water quality improvements from existing urban areas.

Comment Response

The San Diego Water board disagrees that urban retrofit project should be exempt from the new development requirements. The San Diego Water Board disagrees with the commenter than all retrofit projects on privately owned properties will be or must be subject to SSMP requirements (See response to Comment #99).

Many retrofit projects could easily be less than 1 acre in size. For example, as described in the response to comment 352, a retrofit project could be a simple as redirecting downspouts from roofs to pervious or landscaped areas instead of hardscaped areas discharging directly to the MS4. To take such a project one step further, the owner of the property may wish add a planter box that can receive roof runoff, which can retain, filter, and evapotranspire the runoff, as well as provide aesthetic value. Or, the property owner could direct the roof runoff to a series of rain barrels that allow the overflow to discharge to a landscaped area or pervious surface. These types of retrofits are unlikely be subject to SSMP requirements.

On the other hand, if a private owner is planning to implement a project that is subject to SSMP requirements, that would essentially mean the project is a redevelopment Priority Development Project (PDP). Such projects would be adding, creating, or replacing at least 5,000 square feet of impervious surface. It is necessary for these redevelopment PDPs to implement the LID and HMP requirements to protect water quality from the runoff that is generated from the impervious surface. If, however, the project were to redevelop the site and replace at least 5,000 square feet of impervious surface with pervious surface, and not add or create at least 5,000 square feet of impervious surface, that project may no longer meet the definition of a PDP. Section F.3.d.(4) provides several practices to encourage retrofit projects to be implemented by private property owners. The San Diego Water Board encourage the Copermittees to implement these practices and identify other practices that may be effective in incentivizing retrofit projects for private property owners. In the unlikely event that a retrofit project triggers the redevelopment PDP criteria, then that project would most likely be self mitigating.

Comment # 354 **Commentor** 4 **Comment Subject** Retrofit

Specific Comment

[From Attachment 10 to the RCFC&WCD comment letter]

Fact Sheet Text Page 162:
"Periodic inspections may be performed to ensure the site owner has not removed the retrofit BMPs."

Problem with Text:
Similar to the prior comment, this creates a disincentive to retrofit BMPs.

Suggestion:
Delete.

Comment Response

The San Diego Water Board disagrees that this creates a disincentive to retrofit BMPs. The Tentative Order only requires retrofit BMPs implemented by private property owners to be inspected as needed. An inspection does not have to be intrusive. The inspection could be as simple as driving by and verifying that the retrofit BMP is still there.

The water quality benefit of a retrofit BMP is only realized though continued proper operation of that BMP. Knowing where there are retrofit BMPs and that those BMPs are being maintained properly is important information for the Copermittees to reduce storm water pollutants to the MEP. Knowing if the retrofit BMP has been removed is also important information for the Copermittees. No changes were made based on this comment.

Comment # 355 **Commentor** 4 **Comment Subject** IDDE

Specific Comment

[From Attachment 10 to the RCFC&WCD comment letter]

Fact Sheet Text Page 163:
"Section F.4.b …access points (i.e. manholes), connections…"

Problem with Text:
The text from the Phase I rule implementing the NPDES regulations and the requirement of the storm drain system map is:

(from Federal Register, Vol 55, No 222, Friday Nov 18, 1990):

"[submit] a USGS 7.5 minute topographic map...[showing] The location of known municipal storm sewer system outfalls discharging to waters of the United States...the location of major structural controls for storm water discharge (retention basins etc) and the identification of publicly owned parks, recreation areas and other open lands."

The proposed requirements exceed the federal regulatory requirements for MS4 mapping. Further, the mapping of manholes is a significant economic burden that would have no benefit for our staff. Manholes are typically placed at regular intervals (300 – 500 feet) on underground storm drain systems. Once a map providing the location of the MS4 system is available, manholes are quickly located through visual inspection in the field. Further, storm drain plans that are available to Permittee staff can be used to locate specific manholes where absolutely necessary. The economic costs of mapping potentially thousands of manholes is not offset by any known benefit.

Suggestion:
Delete requirement to map manholes.

Comment Response

Please see response to comment 313.

Comment # 356	**Commentor** 4	**Comment Subject** Monitoring

Specific Comment

[From Attachment 10 to the RCFC&WCD comment letter]

Fact Sheet Text Page 198:
"Section II.D (High Priority Inland Aquatic Habitat) of the MRP describes required monitoring to be done in order to assess if MS4 storm water and/or non-storm water discharges are affecting high priority aquatic and/or riparian species."

Problem with Text:
This requirement was deleted from the Orange County NPDES MS4 Permit when the provision to assess outfalls using NALs and SALs was added. It is not clear why such an accommodation would not also be provided to the Riverside County NPDES MS4 Program. This region has significantly less economic resources than south Orange County or San Diego County to implement monitoring programs. The Permittees specifically request this be deleted as impacts to aquatic habitat will be detected through the NAL/SAL program.

Suggestion:
This requirement should be deleted.

Comment Response

Please see the response to comment 150.

October 13, 2010

Item No. 5

Supporting Document No. 9

Written Comments on Tentative Order No. R9-2010-0016

a. Tressa Coco, Riverside County resident
b. Natural Resources Defense Counsel
c. City of Murrieta
d. City of Temecula
e. United States Army Corps of Engineers
f. United States Environmental Protection Agency
g. City of Wildomar
h. City of San Diego
i. San Diego Bay Council
j. United States Marine Corps Base Camp Pendleton
k. Construction Industry Coalition on Water Quality
l. County of Riverside Transportation Department
m. Riverside County Flood Control & Water Conservation District

July 26, 2010

San Diego Water Quality Board
Re: Tentative Order No. R9-2010-0016

Dear Board:

I have been involved in trying to find a solution to the erosion problems in the unincorporated hills of Temecula for almost three years.

I live in Rancho Glenoaks, a community of about 8 miles of dirt roads within approximately 640 acres. These roads were dedicated to the County of Riverside in 1982 by the developer. The unprofessional continuous grading of these roads by our HOA road committee has caused silt and sediment to flow through blue line tributaries to San Gertrudis Creek, down to DePortola and into the Santa Margarita watershed.

I was alerted to this problem when my own blue line creek bed habitat was destroyed by sand and silt. The road adjoining my property eroded into the creek and debris and vegetation clogged the undersized, poorly installed culvert created under the road by the original developer.

In my quest for a solution to the damage that was being done to my oaks, native habitat and environment, I contacted the County of Riverside. I believe I spoke to more than one person in every department of the County. I was told to contact Fish & Game, Flood Control, RCD, etc., etc. – always reaching a dead-end. (I even contacted the EPA and every environmental agency I could find!) I was told not to contact water quality as the County would be fined for allowing this erosion to continue. Every agency continually told me there was nothing they could do – even as I contacted them again and again. I still can not understand what any of these state and federal agencies are about. They seem to be just words and ordinances that mean nothing.

Finally, last year, Code Enforcement contacted the board of directors of our homeowner's association and tried to educate them on the importance of BMPs; however, oaks are still dying and sediment from grading of the roads is still being pushed into our many watersheds as the road committee continues to grade as they always do - not even recognizing the pollution they are causing to our stream channels. Our tributaries flow to a 100-year flood zone that is continuing to be destroyed. This watercourse/flood zone is on private property. Inhabitants of this community drive through this watercourse, crossing a creek bed, having no concern for the destruction they are continuing to cause.

I contacted an agency called Pacific Watershed Associates, who are hydrologists that specialize in assessing, redesigning and repairing road-related erosion problems, and offer environmental services, with funding being administered by state and federal grants. PWA states: "These programs can cover the costs of both the assessment and implementation"; however, I have been unable to convince the BOD of our HOA that we

need professional help. They have told me that I cannot represent this HOA, and it is my understanding that I cannot apply for grants as an individual.

I have now found that the new requirements for Copermittees include a draft for "Unpaved Roads Construction and Maintenance" that spells out "sediment control measures during construction and maintenance activities on unpaved roads, including developing and implementing appropriate training and technical assistance resources".

This has given me new hope that these hills have a chance of being returned to the once beautiful land that I loved so many years ago. Is it possible that this new order can require help from the County to solve the erosion problems in Rancho Glenoaks, as well as others in the same situation as I? I truly hope it can happen. The County and environmental agencies need to take responsibility.

Tressa Coco
39740 Via Carmelo
Temecula, CA 92592

951-302-0421

NATURAL RESOURCES DEFENSE COUNCIL

August 13, 2010

Via electronic mail

Executive Officer David Gibson and Members of the Board
California Regional Water Quality Control Board, San Diego Region
9174 Sky Park Court, Suite 100
San Diego, CA 92123

Re: Comments on Tentative Order R9-2010-0016.

Dear Mr. Gibson and Members of the Board:

We write on behalf of the Natural Resources Defense Council ("NRDC"). We have reviewed the July 23, 2010 draft of Tentative Order No. R9-2010-0016, NPDES No. CAS0108740 ("Permit"), the latest draft of the Municipal Separate Storm Sewer System NPDES Permit for Riverside County, and appreciate the opportunity to submit the following comments. Overall, we support the draft Permit's inclusion of Low Impact Development ("LID") based onsite retention requirements for new development and significant redevelopment. However, we are concerned that as written, the Permit fails to fully implement provisions present in other MS4 permits throughout California, thereby failing to meet the Clean Water Act's "maximum extent practicable" standard (*see* 33 U.S.C. 1342(p)(3)(b)(iii)), and is in critical aspects vague or otherwise requires clarification to ensure that its terms are enforceable.

In particular, we focus our comments here on the Permit's Development Planning Component, which is crucial to addressing the root causes of stormwater pollution. As the U.S. EPA has noted:

> Most stormwater runoff is the result of the man-made hydrologic modifications that normally accompany development. The addition of impervious surfaces, soil compaction, and tree and vegetation removal result in alterations to the movement of water through the environment. As interception, evapotranspiration, and infiltration are reduced and precipitation is converted to overland flow, these modifications affect not only the characteristics of the developed site but also the watershed in which the development is located. Stormwater has been identified as one of the leading sources of pollution for all waterbody types in the United

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> States. Furthermore, the impacts of stormwater pollution are not static; they usually increase with more development and urbanization.[1]

In order to address this source of pollution, the U.S. EPA has stated that "permit[s] must include clear, measurable, enforceable provisions for implementation of LID. . . ."[2]

1. The Permit Should Ensure that Only Water Retained Onsite Counts Toward the Design Capture Volume

Section F.1.d mandates that "[e]ach Copermittee must require LID BMPs or make a finding of technical infeasibility for each Priority Development Project in accordance with the LID waiver program in section F.1.d.(7)." LID BMPs then "must be sized and designed to ensure onsite retention without runoff, of the volume of runoff produced from a 24-hour 85th percentile storm event (design capture volume)." Permit at ¶ F.1.d.(4)(c)(i). However, the Permit also allows that "[i]f onsite infiltration LID BMPs are technically infeasible per section F.1.d.(7)(b), other LID BMPs may treat any volume that is not retained onsite provided that the other LID BMPs are sized to hold the design storm volume that is not infiltrated." Permit at ¶ F.1.d.(4)(c)(ii). This language is problematic for several reasons, outlined below.

First, this section erroneously states that where infiltration BMPs alone are technically infeasible, other LID BMPs may be employed to treat the volume of runoff *not retained* onsite. This language improperly excludes any requirement that a site first use all LID practices that *retain* water onsite—including those other than infiltration such as evapotranspiration or capture and onsite reuse—to meet the design capture requirement where feasible, even where infiltration may not be. A Priority Development Project should not be permitted to participate in the Permit's offsite mitigation program or to employ other means of addressing the design capture volume where LID based options for the onsite retention of stormwater are available. The Permit's language in section F.1.d.(4)(c) must therefore reflect that a finding of infeasibility may only be made where use of any and all LID practices that retain water onsite, including evapotranspiration and capture, is infeasible.

Second, this section would allow for measures that do not retain water onsite, described by the Permit as "other LID BMPs," to count toward the design capture requirement. Practices that allow for the discharge of any volume of stormwater to receiving waters would have to be 100% effective at removing pollutants—a condition almost certain not to be attained—in order to provide the equivalent water quality benefit derived from retaining the same volume of stormwater onsite. The Permit should be revised such that it clearly states that only water

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[1] U.S. Environmental Protection Agency (December 2007) *Reducing Stormwater Costs through Low Impact Development (LID) Strategies and Practices*, at v.

[2] Letter from Douglas E. Eberhardt, EPA, to Michael Adackapara, Santa Ana Regional Water Quality Control Board (February 13, 2009), at 2-3.

retained onsite may count towards the design capture requirement and that a site using BMPs that allow for offsite discharge must participate in the LID Waiver Program to address the volume not retained onsite.[3]

Of particular concern in this regard is that the Permit does not define the term "LID BMPs." As a result, the Permit would allow virtually any practice, potentially including conventional stormwater management techniques, which have been demonstrated to be far less effective at removing pollutants than LID-based retention practices,[4] to count toward meeting the Permit's design capture requirement. While we argue here that practices that do not retain stormwater onsite, such as biofiltration, should not count towards the onsite retention standard at all, should the Board determine to allow the use of such practices, it should clearly define the term "LID BMPs," or more appropriately, delete the phrase and explicitly state which practices may be used. The Board should additionally ensure that conventional or structural treatment practices that are not LID based may not count toward the Permit's LID requirements.

Further troubling is that, in allowing "LID BMPs" to count toward the design capture requirement, the Permit includes no performance requirements or metrics, and requires only that "other LID BMPs [shall be] sized to hold the design storm volume that is not infiltrated," or that "LID BMPs must be designed for an appropriate surface loading rate to prevent erosion, scour and channeling within the BMP." Permit at ¶ F.1.d.(4)(c)(ii). The Permit should be revised to require that, in addition to the above standard, any practices that allow for the discharge of stormwater in-lieu of onsite retention must, at a minimum, reduce the pollutant load in such discharge to equivalent levels as would be achieved through use of onsite retention. The Board should further ensure that discharges resulting from other BMPs not contribute to erosion or other volume based impacts to receiving waters, as opposed to impacts only within the BMP.[5] Given that practices that do not incorporate onsite retention have been shown to be less effective at reducing pollution in stormwater runoff, we suggest that biofiltration or other practices allowing for discharge of runoff may be allowed, if at all, only if accompanied by a "multiplier"

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[3] We do not oppose the use of, for example, biofiltration as a means of addressing stormwater runoff when onsite retention of the design storm is demonstrated to be technically infeasible, however, when biofiltration is used it should trigger a requirement to provide alternative or in-lieu compliance under Section F.1.d.(7) and should not be a means of satisfying these requirements.

[4] R. Horner, *Investigation of the Feasibility and Benefits of Low-Impact Site Design Practices ("LID") for Ventura County* (February 2007); R. Horner, *Investigation of Low-Impact Site Design Practices for the San Diego Region* (2008).

[5] This approach was recently adopted by the Los Angeles Regional Board in Order No. R4-2010-0108, the Ventura County MS4 Permit, which requires that use of biofiltration practices that discharge a portion of the design capture volume must achieve equivalent environmental benefits as would onsite retention practices. Los Angeles Regional Water Quality Control Board, Order No. R4-2010-0108, at E.III.1.(b).

or "mitigation factor," requiring treatment of between 1.5 to 2.0 times the volume required to be treated through onsite retention.[6]

2. The Low Impact Development Waiver Program Should Require Use of Practices that Retain Water Onsite

The Permit requires that the "LID waiver program must clearly exhibit that it will not allow Priority Development Projects to result in a net impact (after consideration of any mitigation) from pollutant loadings over and above the impact caused by projects meeting LID requirements." Permit at ¶ F.1.d.(7)(a). While we support the use of a performance requirement for waiver projects in general, we note that as currently drafted, the Permit allows for its "LID Requirements" to be met through use of unspecified "LID BMPs" with no express performance requirement or standard. We suggest, in order to ensure that any alternative or in-lieu program adequately protects surface waters in Riverside County, that the Permit language be changed to state that Priority Development Projects shall not result in a net impact "from pollutant loadings over and above the impact caused by projects meeting the onsite LID retention requirements." This requirement would tie use of alternative or in-lieu programs specifically to achieving equivalent benefits to onsite retention, and remove any confusion over what standard of performance is required under this provision of the Permit.

Further, the Permit's inclusion of a provision allowing for a LID waiver program to authorize implementation of either "an off-site mitigation project," or "other mitigation developed by the Copermittees" should be clarified to require that any such project or mitigation measure must incorporate practices that result in the onsite retention of stormwater runoff equivalent to the volume not retained onsite by the Priority Development Project.

Such a move could help to ensure compliance with the Clean Water Act, would protect Riverside County's aquatic resources, and would further serve important policy goals of the State. Given our current state of drought, Governor Schwarzenegger has issued a proclamation calling on water agencies to take additional actions to protect and enhance water supplies.[7] By requiring offsite mitigation through practices that retain stormwater runoff, captured or infiltrated water could be used to increase water supplies through onsite use or recharging groundwater, in furtherance of this goal. In contrast, the draft Permit would currently allow most or all of that water to be discharged through use of biofiltration or "other LID BMPs," without any volume retained to increase water supplies.

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[6] *Id*. See Also, State of West Virginia (June 22, 2009) Department of Environmental Protection, Division of Water and Waste Management, General National Pollution Discharge Elimination System Water Pollution Control Permit, NPDES Permit No. WV0116025 at 15.

[7] Gov. Arnold Schwarzenegger, Proclamation, State of Emergency: Water Shortage, Feb. 27, 2009, available at http://gov.ca.gov/proclamation/11557.

Conclusion

We appreciate the efforts made to date to implement sound LID standards in the Permit, and would be pleased to respond to any questions you may have about our comments. We believe the above suggested changes will significantly improve the effectiveness of the permit, and we urge that the Board implement these modifications before it is adopted.

Sincerely,

Noah Garrison
Natural Resources Defense Council

CITY OF MURRIETA

September 2, 2010

Mr. David King, Chairman
California Regional Water Quality Control Board
San Diego Region
9174 Sky Park Court, Suite 100
San Diego, CA 92123-4353

RE: COMMENTS TO PROPOSED TENTATIVE ORDER NO. R9-2010-0016, REISSUANCE OF RIVERSIDE COUNTY MS4 NPDES PERMIT

Dear Honorable Board Members:

The City of Murrieta is pleased to have this opportunity to comment on the draft of the Riverside County Municipal Separate Storm Sewer System (MS4) Permit, Tentative Order R9-2010-0016. City staff has reviewed the MS4 permit and has serious concerns about the financial implications on our region. Based on our research, the new requirements will significantly increase the City's program cost, and it is doubtful the City will be able to comply with the MS4 permit as drafted.

The City is committed to effectively utilizing public funds for the various services our citizens require, including the protection of our natural resources such as our water quality. The proposed MS4 permit, however, would require the City to expend significant additional resources, while the current and forecasted economic conditions have constrained our ability to meet the basic needs of our citizens. The City has been forced to make significant budget reductions due to reductions in sales tax and property tax revenue. The proposed MS4 permit will drastically increase our program cost, likely by twice the current budget.

On several occasions, Regional Water Quality Control Board (RWQCB) staff has stated their desire is to have similar requirements in all three MS4 permits issued by the Board, yet scaled or focused as appropriate to each region. Yet the proposed MS4 permit seems to contradict that goal. Recently, RWQCB issued Order R9-2009-001 to the south Orange County MS4 permittees. R9-2009-001, by our analysis, is less stringent. This despite the fact that Orange County has double the population of Riverside County with much higher property tax revenues to be able to budget for the necessary programs to comply with the permit. These metrics (population and tax revenues) often determine the strength of such programs. Unfortunately, these metrics do not appear to be considered in the proposed MS4 permit for Riverside County.

RWQCB staff has expressed their opinion that the cities are able to create new fees or tax assessments to pay for the requirements they have placed in the proposed MS4 permit. We strongly disagree with this assertion. Fees can only be collected from new development if there is a nexus to offset impacts created by development. There is simply no mechanism to impose a new fee or assessment on existing development to fund the stormwater program. Furthermore, due to Proposition 218, any tax or fee increase must be approved by the voters. California history has not

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been sympathetic to those cities that have attempted to increase clean water fees. For example, the City of Encinitas, a relatively prosperous coastal city, attempted to pass a clean water fee in 2006, and it was defeated by 61 percent of the voters at a time when the economy was doing well. It does not bode well to think that voters in Riverside County would approve a fee increase during one of the worst economies in the history of our nation.

Due to the historic decrease in property tax and sales tax revenues, the primary funding mechanism for the City to implement programs, it is unlikely we would be able to comply with the proposed MS4 permit. In order to do so, the City would have to make budget cuts to other programs. Considering we have already considerably cut our budget two years in a row, implemented layoffs and furloughs, and put other cost savings measures into practice, a further decrease to critical city services to fund the additional requirements is impractical. Of greatest concern to the City is that the proposed MS4 permit does not take the current economic climate into consideration, and yet has more costly and stringent requirements than other permits throughout the region that are more suitable to fund such programs. In our opinion, this seems inequitable and unfair.

The City of Murrieta joins the vast majority of Californians in supporting a balanced, cost-effective strategy to guarantee clean water. However, we remain concerned that the MS4 permit will impose additional costs on the City that we cannot afford at this time. Additionally, it seems the new regulations are inequitable compared to other regions. Therefore, the City is opposed to the proposed permit in its current form. Increasing the cost to the public on a region that is one of the hardest hit during this economic crisis seems excessive. Instead, the City would be more supportive of efforts that would phase in requirements once revenue levels can support the additional costs. Moreover, we request that the Board direct their staff to prioritize what permit requirements are necessary to address the most critical issues that will give the most efficient use of available funds. This will allow the City to allocate the funds they have for these programs while not increasing current expenditures.

Thank you again for the opportunity to comment on the MS4 proposal. The City of Murrieta looks forward to working towards a solution with the Regional Water Quality Control Board on this issue. If I can be of any assistance, please do not hesitate to contact me at (951) 461-6015.

Respectfully,

Kelly A. Bennett

Kelly A. Bennett, Esq.
Mayor

Cc: City Council
Dave Gibson, Dave Barker, Chiara Clemente, Ben Neil, Chad Loften, and Wayne Chiu: San Diego Regional Board Staff
Rick Dudley, City Manager
Jim Holston, Assistant City Manager
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City of Temecula

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September 7th, 2010

Mr. David King
Chairman
San Diego Regional Water Quality Control Board
9174 Sky Park Court, Suite 100
San Diego, California 92123-4353

Chairman King,

The City of Temecula (City) is one of five permittees within Riverside County that would be regulated under the Santa Margarita River (SMR) Municipal Separate Storm Sewer System (MS4) Order (Tentative Order R9-2010-0016). The City has reviewed Tentative Order No. R9-2010-0016, including its findings, attachments, and accompanying Fact Sheet, and submits the following comments for your consideration. There are several extensive new and expanded requirements proposed throughout the Order. These requirements are based on a model permit adopted in Orange County and are in excess of what is necessary to protect receiving waters within the Permit Area. As currently written, these requirements extend far beyond our financial ability to effectively implement them. The City expresses its concern that this Order will pit the limited funds currently available for critical services against unnecessarily stringent requirements mandated throughout this Order.

While the City shares the Regional Board's goal of protecting the quality of water in our local creeks, it is not fiscally responsible to adopt a new Model Permit that does not accurately reflect the needs of the local watershed. The Regional Board must allow the City to prioritize and balance finite public resources in order to provide numerous vital public services. The City's responsibilities also include providing for public safety (police and fire services), installing and maintaining infrastructure (roads, drainage facilities, etc.), public facilities (parks, libraries, community centers, etc.), providing recreational programs, conserving land (MSHCP), promoting habitat conservation, etc. All of these needs are equally important, but public funding mechanisms do not allow any one of them to be funded without consideration to competing needs, priorities, and expected outcomes. New requirements must carefully weigh the benefits achieved against their real costs to implement. From a public agency perspective, all expenditures must be justified and supported by the general public.

Although the Order has been slightly modified from the previous version issued to the South Orange

County permittees, it continues to retain numerous provisions that do not apply to this region and are unnecessarily costly and administratively burdensome to the City and, ultimately, to our citizens. To this end, the City agrees with, and supports, the comments provided by the Riverside County Flood Control and Water Conservation District on behalf of the SMR permitees, and also submits the following information to explain why the requirements in the Order will be difficult to fund and cause unavoidable non-compliance.

Economic conditions have forced significant workforce reductions since 2007. Three rounds of staff reductions have occurred due to the City's severe budget cuts. To date, 75 project-employees and 48 full-time employees were cut from the City budget. In addition, two contract fire-prevention positions had to be cut as well. The City's workforce has been reduced, thus far, by 25%. Consequently, no new positions are being proposed and the City unfunded thirteen previously authorized positions, adding to the 26 existing unfunded positions from last year. In total 39 positions are no longer funded. Furthermore, positions that become vacant from hereon will no longer be refilled.

Historic and ongoing revenue reductions are causing significant cuts in the number and level of service to all other City programs. The City has experienced tremendous losses as a result of the nationwide recession. Preliminary year-end revenues for fiscal year 09-10 are projected to be $50.5M; compared to a $67.7M annual revenue just three years ago. That equates to general fund revenues decreasing nearly 26%. Despite falling revenues, the costs to maintain remaining city services, particularly public safety, continue to rise. Annual expenditures to maintain current levels of service are expected to rise to $59M by the end of the Permit term. If revenues do not increase, or even flat-line as currently projected, the City will not be able to maintain the current level of service for other programs including public safety. Despite this well recognized trend, Tentative Order R9-2010-0016 proposes significant increases in level of service for this program.

One of the harder hit areas is development driven revenue streams. The Planning Department user fee revenue fell by 42%, while that of the Building and Safety Department fell by as much as 49%. The City's Land Development division revenue dropped significantly from $1.8M in fiscal year 06-07 down to $484K in fiscal year 09-10, a 73% decrease due to the drastic reduction in development activity within the City. In like manner, Development Impact Fees (DIF) tumbled from $6.5M to $1.1M, an 83% drop, in that same period. These examples show the true impacts to the City that are crippling our ability to continue providing even the most minimum level of services required by law and expected of the public.

The City's Capital Improvement Program (CIP) budget has been decimated. The majority of the projects in the City's CIP are funded with either one-time outside funding sources, DIF or Capital Project Reserves (General funds). The City's ability to supplement or provide matching dollars for this program has been severely impacted. In fiscal year 06-07 the General Fund contributed $11.2M toward the CIP, that figure is down to $2.4M in fiscal year 09-10, a 79% decrease. At this point, only projects with outside funding sources or the most significant traffic circulation projects are moving forward, while many other projects are being postponed indefinitely.

Many of the most significant and inappropriate cost ramifications of the Order are as a result of new requirements that exceed the current "model" Orange County NPDES MS4 Permit. Specifically, there were significant changes to the Monitoring and Reporting Program (MRP) as well as the addition of a series of new special studies requiring special expertise. The City estimates that

the annual cost to support the changes to the regional component of the Order will increase our current cost by 3 times. In addition, there will also be additional annual costs associated with implementing the required changes to the City's NON-regional components. These components have been projected to increase the City's existing annual costs by no less than 1.5 times.

There are no new revenue sources available to fund these program expansions. Revenue reductions are occurring in almost all revenue categories. Although the City's largest single revenue source, Sales Tax, is projected to increase slightly in the coming year, Sales Tax revenues are still over $8.0M below the FY06-07 value of $30.1M. Some of the more significant decreases from last fiscal year alone include: $283K in Property Tax revenue, $232K in Motor Vehicle in Lieu revenue, $499K reduction in Investment Interest revenue, $182K in Development fees, $212K in Franchise Fees, $332K in reimbursement revenues, and $280K in other existing miscellaneous revenue sources. Other potential sources of funding, including taxes, fee increases, surcharges, establishment of utilities, etc., have all been evaluated and determined not to be feasible or realistically available to the City. Further, with the high unemployment and foreclosure rates within Riverside County, the voters are not willing to support new taxes or bonds in the current economic climate.

This information leads to the inevitable conclusion that implementation costs of the new Order will exceed our currently available resources and cause additional impacts to other City departments, which will then begin affecting the number and level of services the City currently provides. **It is important to note that the federal regulations regulating MS4 discharges have not changed since 1987. There is no policy basis for the significant changes proposed by this Tentative Order. The majority of the changes proposed to this Tentative Order are to accommodate Regional Board staff wishes to move to a model MS4 Permit that treats Riverside, Orange and San Diego County's equally. These changes were not specifically designed to address the local needs of this watershed**. Further, the Permit does not reflect the relative resources available to each Permit area. The area regulated by this Tentative Order has only half the taxpaying population of the Orange County NPDES MS4 Permit and 1/10th the taxpaying population of the San Diego County NPDES MS4 Permit. These relative economic discrepancies create not only a social injustice, but impacts that will be exacerbated by the State's reduced funding of other state mandated City services.

There are numerous legal concerns that need to be considered. As such, the following provides ten categorical points for consideration. However, these ten points do not represent all of the legal inconsistencies that exist in the Order. To this end, the City agrees with, and supports, the legal comments provided by the Riverside County Flood Control and Water Conservation District on behalf of the SMR permitees.

The City has serious concerns regarding the legality of the provisions contained in this Tentative Order. The prescriptive nature of this Order will ensure that any resident or business challenging these conditions would not only sue the municipality charged with implementing these requirements, but would also bring suit against the Regional Board itself to obtain the requested relief. The City does not believe this was the intent of the Regional Board.

1. THE TENTATIVE ORDER ATTEMPTS TO REDEFINE WHAT CONSTITUTES A WATER OF THE UNITED STATES

Section 3.C of the Findings section on page 11 of the Tentative Order states:

> "Historic and current development makes use of natural drainage patterns and features as conveyances for urban runoff. Urban streams used in this manner are part of the municipalities MS4 regardless of whether they are natural, man-made, or partially modified features. In these cases, the urban stream is both an MS4 and a receiving water."

The City does not believe that such a finding is warranted or lawful under either the clear statutory provisions of the Clean Water Act or recent judicial interpretations of the Act. The language in the Tentative Order could be construed as seeking to regulate all discharges into MS4s, changing the very nature of MS4s so as to constitute a receiving water.

This is contrary to the plain language of section 402(p)(3)(B) of the Clean Water Act, which requires: "Permits for discharges from municipal storm sewers . . ." 33 U.S.C. § 1342(p)(3)(B) (emphasis added.). Based on this assertion, the Regional Board does not have the authority to regulate water entering into MS4s as receiving waters of the United States.

Furthermore, even if the statutory language indicated that Permits were required for discharges into MS4s, recent holdings from the United States Supreme Court conclusively show such structures would not constitute a water of the United States. According to the plurality decision in *Rapanos v. United States* (2006) 126 S. Ct. 2208, 2225:

> "In sum, on its only plausible interpretation, the phrase 'the waters of the United States' includes only those relatively permanent, standing or continuously flowing bodies of water 'forming geographic features' that are described in ordinary parlance as 'streams[,] ... oceans, rivers, [and] lakes.' *See* Webster's Second 2882. ***The phrase does not include channels through which water flows intermittently or ephemerally, or channels that periodically provide drainage for rainfall.*** The Corps' expansive interpretation of the 'the waters of the United States' is thus not 'based on a permissible construction of the statute."

(Emphasis added.). The MS4 systems and urban streams that the Regional Board is seeking to regulate as receiving waters are intermittent, ephemeral, and used only periodically as drainage for rainfall. As such, these systems and streams would not constitute a water of the United States. Because the Clean Water Act extends solely to waters of the United States, the Regional Board has no authority to regulate MS4s or urban streams as defined in its Permit.

Even under Justice Kennedy's more lenient interpretation of what constitutes a water of the United States, the Regional Board has still not adequately met the requirements for establishing that an MS4 or urban stream is subject to regulation as a Water of the United States. According to Justice Kennedy, the Regional Board must establish that the MS4 system and urban streams bear a significant nexus to the other regulated waters so as to qualify for regulation as a water of the United States. *Rapanos,* 126 S. Ct. at 2249. Such a determination must be made on a case-by-case basis, and must contain some measure of the significance of the connection for downstream water quality. *Id.* at 2250-2251. In other words, the Regional Board must conduct an analysis of the "quantity and regularity of flow" in the relevant MS4s and urban streams prior to holding that these structures merit regulation under the Clean Water Act. *Id.* at 2251. Absent conclusive findings, the Regional Board is without authority to regulate MS4s and urban streams as receiving waters under the Clean Water Act.

The City requests that the Board members direct staff to modify the language in the Tentative Order to ensure regulations of only those systems and streams discharging directly into waters of the United States as defined according to the Supreme Court's holding in *Rapanos* in order to avoid random interpretations of the CWA.

2. THE TENTATIVE ORDER UNLAWFULLY PURPORTS TO RESTRICT THE LOCATION OF TREATMENT OPTIONS

Section F.1.d.(6)(d) on page 35 of the Tentative Order states:

> "All treatment control BMPs for Priority Development Projects must, at a minimum, be implemented close to pollutant sources (where shared BMPs are not proposed), and prior to discharging into waters of the U.S."

The implementation of this provision presents a number of potentially serious problems.

First, this provision of the Tentative Order violates Water Code section 13360. According to Water Code section 13360(a):

> "No waste discharge requirement or other order of a regional board or the state board or decree of a court issued under this division shall specify the design, ***location***, type of construction, or particular manner in which compliance may be had with that requirement, order, or decree, and the person so ordered shall be permitted to comply with the order in any lawful manner."

(Emphasis added.) As noted above, the Regional Board is already attempting to define MS4s and urban streams as waters of the United States. *Supra*, p. 11. The proposed regulation would therefore effectively limit the ability for Permittees to implement any BMPs in any area except at the exact location of the source generating pollutants and would exclude Permittees from choosing to implement what may be less-costly, more effective BMPs in other areas. But Water Code section 13360(a) expressly prohibits this type of regulation.

Second, the comparison to wetlands regulation misconstrues USEPA guidance on this issue. The USEPA guidance document referenced by the Regional Board does not preclude Permittees from locating structural controls within a natural wetland. Rather, the guidelines simply state:

> "***To the extent possible***, municipalities should avoid locating structural controls in natural wetlands. Before considering siting of controls in a natural wetland, the municipality should demonstrate that it is not possible or practicable to construct them in sites that do not contain natural wetlands...."

(Fact Sheet, p. 96, fn. 154, *citing* USEPA, 1992. Guidance Manual for the Preparation of Part II of the NPDES Permit Applications for Discharges from Municipal Separate Storm Sewer Systems. EPA 833-B-92-002. (Emphasis added.)) While the Permittees may agree that they should generally avoid in stream treatment to the extent possible, outright prohibition of an option would be counterproductive.

The City requests that the Board members direct staff to modify the language in the Tentative Order to allow permittees to make the determination of the exact placement location of BMPs.

3. THE TENTATIVE ORDER IMPROPERLY INTRUDES UPON THE CITY'S LAND USE AUTHORITY IN VIOLATION OF THE TENTH AMENDMENT OF THE U.S. CONSTITUTION

To the extent that this Tentative Order relies on federal authority under the Clean Water Act to impose land use regulations and dictate specific methods of compliance, it violates the Tenth Amendment of the U.S. Constitution. Furthermore, to the extent the Tentative Order **requires** a Municipal Permittee to modify its city ordinances in a specific manner; it also violates the Tenth Amendment.

According to the Tenth Amendment:

> "The powers not delegated to the United States by the Constitution, nor prohibited by it to the States, are reserved to the States respectively, or to the people."

Article XI, section 7 of the California Constitution, California guarantees municipalities the right to "make and enforce within [their] limits all local police, sanitary and other ordinances and regulations not in conflict with general laws." The United States Supreme Court has held that the ability to enact land use regulations is delegated to municipalities as part of their inherent police powers to protect the public health, safety, and welfare of its residents. *See **Berman v. Parker*** (1954) 348 U.S. 26, 32-33. Because it is a constitutionally conferred power, land use powers cannot be overridden by State or federal statutes.

From the City's perspective, under the guise of federal law, the Regional Board is attempting to dictate the precise manner in which cities must exercise their police powers. The City does not believe that such a requirement is consistent with the Tenth Amendment.

The City requests that the Board members direct staff to modify the language in the Tentative Order to ensure consistency with the Tenth Amendment, rather than applying random interpretations of it, with regard to issuing requirements which dictate the precise method of compliance.

4. THE TENTATIVE ORDER CONSTITUTES AN UNFUNDED STATE MANDATE

The Regional Board seeks to impose new provisions that require a higher level of service of existing programs that are not required or mandated under the Clean Water Act or any federal regulations thereunder. Yet, according to the Fiscal Analysis provided in Section H.1. of the Tentative Order:

> "Each Copermittee must exercise its full authority to secure the resources necessary to meet all requirements of this Order."

(Tentative Order, p. 74.) To the extent the Tentative Order imposes additional programs on the Permittees without providing additional funds, they are unfunded mandates.

The Commission on State Mandates recently held that both the Los Angeles County MS4 Permit and the San Diego County MS4 Permit contained provisions that constituted unfunded state mandates. *In re Test Claim on Los Angeles Regional Quality Control Board Order No. 01-182* (July 31, 2009); *In re Test Claim on San Diego Regional Water Quality Control Board Order No. R9-2007-0001* (March 26, 2010). As such, the Regional Board cannot merely dismiss the suggestion that the Tentative Order does contain provisions that constitute unfunded state mandates.

The imposition of unfunded programs and mandates in the Tentative Order is inconsistent with the provisions of the California Constitution, specifically Article XIII B, Section 6, which requires a state agency mandating a new program or a higher level of service to provide a "subvention" of funds to reimburse local governments for the costs of the program or increased level of service.

Article XIII B, Section 6 of the Constitution prevents the state from shifting the cost of government from itself to local agencies without providing a "subvention of funds to reimburse that local government for the costs of the program or increased level of service . . ." State agencies are not free to shift state costs to local agencies without providing funding merely because those costs were imposed upon the state by the federal government. If the state freely chooses to impose additional costs upon a local agency as a means of implementing its policy, then those costs should be reimbursed by the state agency. *See Hayes v. Commission on State Mandates* (1992) 11 Cal. App. 4th 1564, 1593-1594. If the state refuses to appropriate money to reimburse a city, the enforcement of the state mandate can potentially be enjoined by a court. *See Lucia Mar Unified School District v. Honig* (1988) 44 Cal. 3d 830, 833-834.

The Tentative Order will require a substantial capital investment, which individual cities will have to fund, despite the fact that no funding mechanism, nor any assistance, financial or otherwise, from the Regional Board is provided to the Permittees. To our knowledge, the Regional Board has made no provision to provide any level of financial relief to the permittees for any of the provisions proposed in the Tentative Order.

The Tentative Order explicitly provides that the Tentative Order does not constitute an unfunded state mandate for four reasons in paragraph 6 of page 14 of the Tentative Order. The City disagrees with all four stated reasons. . To the extent the Tentative Order imposes additional programs on the City and its co-permittees without providing additional funds, they are unfunded mandates.

A. The Tentative Order Imposes Requirements that Go Beyond Federal Law

To the extent the Tentative Order imposes requirements that go beyond what is required by federal law, the Regional Board is required to consider and address among other things the constitutional prohibition on unfunded state mandates. In fact, there are many specific obligations in the Tentative Order that are not federally mandated.

For example, Section E, on page 24 of the Tentative Order, requires that each permittee submit a certification statement, signed by its chief legal counsel, that the permittee has taken the steps necessary to obtain and maintain full legal authority to implement and enforce each of the requirements in 40 CFR 122.26(d)(2)(i)(A-F) and the Tentative Order. The Clean Water Act does not require the certification statement mandated by the Regional Board. 40 CFR 122.26(d)(2)(i) only requires "[a] demonstration that the applicant can operate pursuant to legal authority established by statute, ordinance or series of contracts...." Arguably, the City can demonstrate its legal authority by submitting copies of ordinances, resolution or contracts certified by the City Clerk. The Clean Water Act does not require permittees to submit a certification statement.

Furthermore, the Tentative Order goes beyond federal law in that it is at least twice as long, and in some cases, three times as long as other MS4 Permits developed by other Regional Boards in the State of California such as the Lahonten Regional Board and the Central Valley Regional Board. This means that either some Regional Boards are failing to impose federally mandated requirements pursuant to the Clean Water Act, or the San Diego Regional Board is imposing requirements that go

beyond federal law.

B. The Fact that Industrial Dischargers are More Strictly Regulated than Municipal Dischargers is Irrelevant to the Unfunded Mandate Issue

The Tentative Order asserts that the Order does not constitute an unfunded mandate because the Order regulates discharges of waste from municipal sources more leniently than they could regulate discharges from non-governmental dischargers. *See* paragraph 6 on page 14 of Tentative Order. The City fails to see how this statutory distinction between the regulation of municipal dischargers and industrial dischargers affects whether the Order imposes requirements on co-permittees that go beyond federal law. Municipalities are not industrial sites. Municipal discharges are not industrial discharges.

C. The City Does Not Have the Authority to Randomly Levy Fees at Will to Pay For Compliance With the Order

The Tentative Order also alleges that the Order does not constitute an unfunded mandate because co-permittees have the authority to levy service fees to pay for compliance with the Order. *See* paragraph 6 on page 14 of Tentative Order. Pursuant to Government Code Section 17556(d), if a local agency can levy service fees to pay for a State mandate, the State is not required to provide funding for the mandate.

The City does not have the authority to levy service fees to pay for the State mandate. The Tentative Order presumes, but makes no specific findings that co-permittees have the authority to levy such service fees. In fact, to the extent such service fees are "property-related," co-permittees can only levy them once approved by the affected property owners or electorate. *See* California Constitution, Article XIIID, Section 6(c); *Howard Jarvis Taxpayers Ass'n, v. City of Salinas*, 98 Cal. App. 4th 1351 (2002). The *City of Salinas* case dealt precisely with this issue. The City of Salinas established a fee to recover costs related to compliance with its MS4 Permit. The fee was based largely on the amount of impervious area on a developed parcel. The Court held that this fee was property-related and, thus, subject to voter-approval requirements. *Salinas*, 98 Cal. App. 4th at 1356. Only if the fee was a use-based charge, directly based on use of city services (such as the metered use of water), could the fee avoid the voter-approval requirements of Article XIIID. The City of Salinas's method to allocate the fee based on the amount of impervious area so as to assure that the fee charged would be proportional to the burden being placed on the City's storm drain system was not sufficiently direct to qualify as a use-based fee exempt from the requirements of Article XIIID. *Id.* at 1355.

Because storm water running off of real property and into the MS4 is not a precise measurement, it would be impossible to meet the direct usage requirements of the *City of Salinas*. Accordingly, without voter approval, which would be almost impossible to successfully obtain during the current economic crisis, the City of Temecula does not have the authority to levy service fees to pay for compliance with the Order.

D. The City Does Not Have a Real Choice in Requesting Permit Coverage

The fourth reason provided in the Tentative Order for why the Order does not constitute an unfunded mandate is that co-permittees requested permit coverage under the Order. Thus, according to the

Tentative Order, co-permittees have not been mandated to do anything.

The City adamantly disagrees. It is disingenuous for Regional Board staff to suggest that co-permittees have voluntarily chosen coverage under the Order and that the Order cannot be considered a State mandate.

The City requests that the Board members direct staff to modify the language in the Tentative Order to include State-sponsored relief for the permittees to carry out the requirements in the Order. To the extent that these requirements will require additional funds, the Board should direct staff to assist the permittees in securing such funds.

5. THE TENTATIVE ORDER IMPROPERLY ATTEMPTS TO HOLD THE CITY RESPONSIBLE FOR SEWAGE SPILLS WHEN THIS RESPONSIBILITY HAS BEEN CLEARLY ASSIGNED TO LOCAL WATER DISTRICTS

Section F.4.h. of the Tentative Order states:

> "Each Copermittee must implement management measures and procedures (including a notification mechanism) to prevent, respond to, contain and clean up all sewage (see below) and other spills that may discharge into its MS4 from any source (including private laterals and failing septic systems.) Copermittees must coordinate with spill response teams to prevent entry of spills into the MS4 and contamination of surface water, ground water and soil. Each Copermittee must coordinate spill prevention, containment and response activities throughout all appropriate departments, programs and agencies so that maximum water quality protection is available at all times."

(Tentative Order, p. 69).

For many cities, implementation of this provision is simply not feasible. The City of Temecula does not own or operate its own sewage system. All of the sewer systems in the City's jurisdiction are owned, operated, and maintained by water districts, specifically the Rancho California Water District and Eastern Municipal Water District. These water districts have their own separate Regional Board Orders/NPDES permits. The City does not have the equipment or expertise to manage a sewage spill of any size, and its staff is not adequately trained to respond to potential spills. All of the water districts in the City's jurisdiction already respond to sewer spills (including sewer spills from private laterals). Furthermore, this provision is duplicative because the Regional Board is seeking to make the City responsible for a task already delegated to the water districts. By making the City responsible for sewer spills, there is a high risk of creating confusion in determining who (water districts or the City) will respond to a spill and who is responsible for associated costs and reporting requirements. Such an act would result in a tremendous waste of scarce public resources.

The State Water Resources Control Board has previously issued a stay on this exact issue. After extensive hearings and briefing on the matter, the State Board issued Order WQO 2002-0014 on August 15, 2002, granting a stay as to this provision. In that Order, the State Board held:

> "The record shows that three separate water districts operate these sewers within Mission Viejo, and are regulated by a sanitary sewer NPDES permit issued by the Regional Board. Mission Viejo alleged that the duplication of effort that would

> ensue by having Mission Viejo also be responsible for preventing and responding to sanitary sewage spills could lead to delayed responses as agencies try to determine jurisdiction and primary responsibility. Orange County's cost table for the upcoming year estimated total copermittee costs at $56,512 to implement this requirement. While these costs, by themselves do not constitute substantial harm, we find that the duplicative nature of the costs, combined with potential response delay and confusion, do."

(State Board Order WQO 2002-0014, p. 6).

In deciding to grant a stay as to this provision, the State Board concluded:

> "**The regulation of sanitary sewer overflows by municipal storm water entities, while other public entities are already charged with that responsibility in separate NPDES permits, may result in significant confusion and unnecessary control activities.** For example, the Permit appears to assign primary spill prevention and response coordination authority to the co-permittees. While the federal regulations clearly assign some spill prevention and response duties to the co-permittees, we find that the extent of these duties is a substantial question of law and fact."

(State Board Order WQO 2002-0014, p. 8. (Emphasis added)).

Given the previous findings of the State Board on this same issue, the City requests that the Board members direct staff to modify the language in the Tentative Order to reduce duplicity of effort and the implementation of unnecessary control activities.

6. THE TENTATIVE ORDER IMPROPERLY DELETES CATEGORIES OF EXEMPT NON-STORMWATER DISCHARGES

Federal law requires that MS4 permits include a requirement that the Permittees effectively prohibit the discharge of non-stormwater into the MS4. 33 U.S.C. 1342(p)(3)(B)(ii). Federal regulations exempt certain discharge categories from this effective prohibition requirement. 40 C.F.R. 122.26(d)(2)(iv)(B)(1). A Permittee must address a discharge in one of these exempt categories only when a Permittee identifies the discharge as a source of pollutants to waters of the United States. *Id.*

The Tentative Order impermissibly deletes three of the non-stormwater discharge categories – landscape irrigation, irrigation water, and lawn watering (collectively, "irrigation"). (See subparagraphs a-n on page 19 of Tentative Order.) The federal regulations require that permittees address discharges within an exempt category when they identify a discharge as a source of pollutants to waters of the United States. Neither the regulations nor EPA's guidance allow the Regional Board to delete entire categories of exempt non-stormwater discharges when the Permittees identify a discharge within one of the categories as a source of pollutants.

Accordingly, since the permittees have not identified irrigation runoff as a source of pollutants, the City requests that the Board members direct staff to restore the irrigation categories of exempt non-stormwater discharges in the Tentative Order.

7. THE TENTATIVE ORDER'S RETROFITTING REQUIREMENT IMPOSES POTENTIALLY SIGNIFICANT COSTS WITHOUT ANY CORRESPONDING GAINS IN WATER QUALITY

The Tentative Order requires the Permittees to develop and implement a program to retrofit existing development with additional structural measures to control runoff. (See Section F.3.d (Retrofitting Existing Development) on page 64 of the Tentative Order). This new provision is in addition to the New Development/Redevelopment provisions in the Tentative Order. However, the City does not have the ability under existing statutes and under the California and the United States Constitutions to force private landowners to retrofit existing developments to improve water quality when these landowners didn't have any plans to retrofit their properties in the first place. As such, the expense entailed in developing and implementing a retrofitting program will not be matched by any gains in water quality. Federal law does not require retrofitting of existing development. In fact, EPA's regulations acknowledge that MS4 regulation would have to be limited largely to undeveloped sites and sites being developed/redeveloped. Accordingly, the City requests that the Board members direct staff to either remove this provision in its entirety from the Tentative Order, or modify the language to exclude private property.

8. THE TENTATIVE ORDER LACKS FLEXIBILITY IN IMPLEMENTING LOW IMPACT DEVELOPMENT AND HYDROMODIFICATION REQUIREMENTS

The Tentative Order requires that development projects include prescriptive Low Impact Development ("LID") requirements. (*See, e.g.*, Section F.1 of the Tentative Order). The Tentative Order also requires the Permittees to develop and implement a Hydromodification Management Plan ("HMP") for the same development projects. (Section F.1.h. of the Tentative Order) However, the LID and HMP provisions are not required by federal law and violate state law in that, among other things, they prescribe how the Permittees are to comply with the MEP standard. *See* Water Code § 13360(a). Moreover, the LID and HMP provisions in this Tentative Order are overbroad and will not necessarily result in any improvement to the quality of water entering Waters of the U.S.. For example, HMP requirements for hardened channels will not have any water quality benefits. Finally, to the extent the LID requirements would interfere with downstream or upstream water rights holders, compliance with the requirements potentially expose the Permittees to common law liability.

In addition, the Regional Board's imposition of a highly prescriptive Low Impact Development strategy may have an unintended consequence—potential lawsuits from downstream users of the surface water that the City is now purportedly "diverting for reuse or infiltration." As one attorney expert in the field of water law has put it:

> "First, to the extent that one can obtain a right to capture diffuse surface waters . . . any capture of diffuse surface waters without a permit from the State Water Resources Control Board could well be a trespass against the State of California. Second, even if one cannot obtain a 'right' to diffuse surface waters, though, the capture of such waters in a manner that interferes with the diversion of the same water once it reaches a watercourse constitutes injury to legal users of water that rely on such diffuse surface water contributing to the water that they are able to divert."

D. Aladjem, "Who Owns the Water? The Looming Conflict Between Low Impact Development and the Water Rights System" at p.5 (Paper presented at American Bar Association 17th Environmental Law Fall Section Meeting, Sept. 24, 2009).

The City believes that the law in this area, particularly with respect to ownership of diffuse surface waters, is quite uncertain. The City also believes that, to the extent that the Regional Board imposes these additional obligations upon the City pursuant to the Permit, then the Regional Board should insert sufficient findings and authorization for the capture of surface water through LID systems to protect the City against claims of either a trespass against the State or claims of unlawful diversion of stormwater that would otherwise flow into watercourses that might be the subject of claims of diversion rights by downstream users.

Because the LID and HMP provisions are not required by federal law and violate state law, the City requests that the Board members direct staff to insert sufficient findings and authorization for the capture of surface water through LID systems to protect the City against claims of either a trespass against the State or claims of unlawful diversion of stormwater. In addition, the City also requests that the Board members direct staff to modify the language in the Tentative Order to provide the Permittees with required flexibility in implementing the LID and HMP requirements.

9. THE TENTATIVE ORDER DOES NOT CONSIDER COSTS TO IMPLEMENT THE STORMWATER AND NON-STORMWATER ACTION LEVELS AS REQUIRED BY FEDERAL LAW, AND THE WATER QUALITY BENEFITS ACHIEVED BY THESE REQUIREMENTS HAVE NOT BEEN ADEQUATELY CONSIDERED BY THE REGIONAL BOARD

Federal law requires that permittees effectively prohibit the discharge of pollutants in non-stormwater into the MS4 and to reduce the discharge of pollutants in stormwater from the MS4 to the maximum extent practicable. To assist the Permittees in meeting these two standards, the Tentative Order imposes action levels on pollutants in the discharge of stormwater (SALs) and non-stormwater (NALs) from the MS4. (Sections C and D on pages 20 and 23, respectively, of the Tentative Order.). Ideally, action levels would be a tool that would help the City focus resources on more significant water quality problems. However, the City is concerned that, depending on how the provisions are interpreted, the cost to implement the action levels may far outweigh any benefit to water quality. Moreover, rather than a tool to help the Permittees, the action levels may be used against the Permittees.

As an initial matter, the City objects to the distinction made in the Tentative Order between the discharge of stormwater from the MS4 and the discharge of non-stormwater from the MS4. Federal law does not support this distinction. Under federal law, permittees must control the discharge of ***pollutants*** from the MS4 to the maximum extent practicable, regardless of whether the pollutants are in ***stormwater*** or ***non-stormwater***. Permittee's obligation with respect to non-stormwater is to effectively prohibit the discharge of pollutants in non-stormwater into the MS4. To the extent the Permit imposes separate requirements on the discharge of pollutants in non-stormwater from the MS4, such requirements must be supported by state law.

Because neither the SALs or NALs are required by federal law, the Regional Board must comply with state law in imposing these requirements. For example, in issuing waste discharge requirements under State law, the Regional Board must consider certain factors, including the water quality conditions that could be reasonably achieved and economic considerations. Water Code §§ 13263(a) and 13241. The City is hopeful that the Tentative Order's SAL and NAL provisions will provide the City with flexibility to prioritize its response to any actual exceedances. However, if the City is required to respond to and address all exceedances without reasonable prioritization, the cost will be significant. Because some exceedances will not be indicative of impacts to water quality, the cost to implement the SALs and NALs may have little if any commensurate environmental benefit. There is

nothing in the record that suggests that the Regional Board has considered these water quality and economic factors.

Accordingly, the City requests that the Board members direct staff to provide the analysis required under state law to ensure that economic factors are considered and that the water quality goals are reasonably achievable through implementation of the SALs and NALs.

10. THE TENTATIVE ORDER IMPROPERLY INCORPORATES TOTAL MAXIMUM DAILY LOAD WASTELOAD ALLOCATIONS

The Tentative Order includes limitations based on wasteload allocations ("WLAs") developed in fully approved and adopted Total Maximum Daily Loads ("TMDLs"). (Section I of the Tentative Order.) The Tentative Order characterizes the limitations as Water Quality Based Effluent Limitations. However, the WLAs are to be achieved in the receiving water. Accordingly, the City considers the limitations to be receiving water limitations. *See, e.g.*, State Board Order WQ 2009-0008. The Permittees are to comply with the limitations by implementing best management practices ("BMPs").

Federal and state policy provide that an iterative BMP approach is appropriate in MS4 permits for achieving receiving water limitations. *See, e.g.*, State Board Order WQ 99-05. Where existing BMPs are not sufficient to meet the receiving water limitations, permittees are to implement more effective BMPs. This approach is consistent with the MEP standard governing the discharge of all pollutants from the MS4. The City submits that to be consistent with federal and state policy, the Permit must be clarified to provide for compliance with WLAs through an iterative BMP approach. To the extent the Regional Board can rely on state law to support the TMDL provisions, the City submits that the Regional Board has not complied with relevant requirements (*e.g.*, Water Code §§ 13000, 13263(a), 13241, etc.). Accordingly, the City requests that the Board members direct staff to revise the Tentative Order's TMDL provisions to be consistent with federal and state law and policy.

As a public agency, we have the obligation to carry out our duties in a responsible, realistic, and reasoned manner. Requirements that tether public agencies to impractical positions are counterproductive and violate our sacred charge as representatives of the people. It must be emphasized that the City is very committed to water quality protection, but in a manner that balances this goal with the resources, needs, and expected results of the community. In submitting these comments, the City hopes it has provided a better perspective, from a local level, of the impacts that the current state of the economy has had on the City, the additional hardships that will be incurred to fund and implement the Order at this time, and the magnitude of legal liability it will expose both of our agencies to.

The City recommends that the Permit be remanded to staff with direction to address the unnecessary economic impacts imposed by the Permit. The monitoring program, unfunded roads mandates, retrofitting, and changes to the various existing inspection programs must, at minimum, be addressed. We request that the Board members direct staff to continue meeting with the permittees prior to adopting the permit and to work through these concerns, or at least defer the costly provisions until the permittees can adequately fund the requirements rather than fall into unavoidable non-compliance. The 2007 ROWD prepared by the Permittees addressed necessary changes to Water Quality Protection programs by building on existing programs and leveraging other available local resources. The programs in the 2007 ROWD should be carefully reconsidered in lieu of the model program elements proposed by Board staff. Thank you.

If you have any questions regarding this information, please contact Aldo Licitra, our Associate Engineer for NPDES, at 951-308-6387.

Sincerely,

Greg Butler
Director of Public Works/City Engineer

Cc: Shawn Nelson, City Manager
City Council

DEPARTMENT OF THE ARMY
6010 Hidden Valley Road Suite 105
Carlsbad, CA 92011

September 7, 2010

REPLY TO
ATTENTION OF:
Office of the Chief
Regulatory Division

ATTN: **NWU:749045:bneili**

David Gibson, Executive Officer
Regional Water Quality Control Board
9174 Sky Park Court, Suite 100,
San Diego, California 92123-4353

Dear Mr. Gibson:

Thank you for the opportunity to comment on the San Diego Region – Riverside County Storm Water Permit. As you are aware, the U.S. Army Corps of Engineers has been developing a Special Area Management Plan (SAMP) for the San Jacinto and Santa Margarita Watersheds. There is direct overlap between the Santa Margarita portion of the SAMP and the San Diego Region – Riverside County Storm Water Permit.

The language proposed in the permit and the actions and studies proposed would complement the work being done for the SAMP. Ideally, the regulatory processing and permitting for the State and Federal agencies would be aligned and streamlined for the cities and County within this area. We remain committed to working with the Regional Water Quality Control Board (Board) and the jurisdictions to bring this idea to fruition.

Within the permit itself, the Watershed Water Quality work plan and the Jurisdictional Runoff Management Program are of particular interest. Unfortunately due to time constraints, we are not able to do a thorough review and comparison of the language at this time, but would like to work with the Board and the affected jurisdictions to streamline permitting and improved the water quality in the watershed.

The studies mentioned in the permit appear to have great value, and we would encourage the jurisdictions to complete them and applaud the Board for including them in the permit. Although all the studies mentioned in the permit are worthwhile, we draw particular interest to and support the inclusion of the MS4 and Receiving Water Maintenance Study and the Intermittent and the Ephemeral Stream Perennial Conversion Study in the final permit.

There are many additional comments that could be made regarding the permit; however,

due to staffing and time limitations, these comments are abbreviated and limited. We would like to dedicate time in the near future to work with your staff and the jurisdictions in supporting actions to comply with the Clean Water Act and provide clean water to all of our communities.

Thank you for receiving our comments, should you have any questions, please contact me at 760.602.4830 or via e-mail at therese.orourke@usace.army.mil. Please refer to this letter and SPL-2010-00860-TOR in your reply.

Sincerely,

Therese O'Rourke Bradford
Chief, South Coast Branch
Regulatory Division

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105-3901

SEP 07 2010

Mr. Ben Neill
Northern Watersheds Protection Unit
San Diego Regional Water Quality Control Board
9174 Sky Park Court, Suite 100
San Diego, CA 92123

Re: Draft MS4 Permit for Riverside County

Dear Mr. Neill:

The following are EPA Region 9's comments on the draft NPDES permit for the municipal separate storm sewer system (MS4) serving the portion of Riverside County within the jurisdiction of the San Diego Regional Board (SDRB), which was public noticed on July 23, 2010. We would first like to point out there appears to be an error in the NPDES permit number for the draft permit (page i). Permit No. CAS0108740 proposed for the Riverside County MS4 permit, is also the number used for the SDRB's MS4 permit for South Orange County. We suggest the SDRB retain the permit number used for the previous permit for Riverside County, which is CAS0108766.

As you know, Region 9 has been working with Regional Boards throughout the State over the last several years in an effort to develop clear, measurable and enforceable requirements for MS4 permits. We have focused most of our attention on requirements related to low impact development (LID) and TMDL implementation, given the potential environmental benefits to be derived from these particular components of the stormwater permit program. Since there are no approved wasteload allocations applicable to the Riverside County MS4 discharges at this time, the following comments focus on LID requirements, but also address several other issues as well. However, with regards to TMDLs, section I of the draft permit would incorporate applicable requirements of future TMDLs when fully approved, and we support this provision.

A. LID Requirements

We recommend section F.1.d.(4)(c)(ii) of the draft permit (page 33) be revised as follows:

> "If onsite ~~infiltration~~ retention LID BMPs are technically infeasible per section F.1.d.(7)(b), other LID BMPs may treat any volume that is not retained onsite provided that the other LID BMPs are sized to achieve equivalent stormwater volume and pollutant load reduction as if the entire design capture volume were retained onsite ~~to hold the design storm volume that is not infiltrated~~."

The proposed language in the draft Riverside County MS4 permit (which only mentions infiltration as an LID BMP) is inconsistent with the analogous section in the adopted South Orange County MS4 permit, and would not require a consideration of LID measures such as evapotranspiration, or capture and reuse of stormwater in determining the feasibility of the permit's onsite retention requirement in section F.1.d.(7)(a). The revised approach we've suggested here is derived from the requirements of the Ventura County MS4 permit (section E.III.1.b) adopted by the Los Angeles Regional Board in July 2010, and we believe it is more consistent with the intent of LID for stormwater, i.e., retention of stormwater onsite, and section F.1.d.(7)(a) of the draft permit. Further, although the draft permit includes a rough definition of "LID" in Attachment C-2, the permit is still not entirely clear concerning what is intended by the term "LID BMPs." We suggest additional descriptive information such as the following (also derived from the Ventura County MS4 permit) be added to Finding 2.c (page 9) or the definitions section of the draft Riverside County permit:

> "LID site design BMPs, utilizing infiltration, storage for reuse, evapotranspiration, or biofiltration/bioretention help preserve and restore the natural hydrologic cycle of the site~~, allowing for filtration and infiltration~~ which can greatly reduce the volume, peak flow rate, velocity, and pollutant loads of storm water runoff."

B. Comments on Other Issues

1. Issues Related to Non-Stormwater Discharges

We understand that concerns have been raised regarding the proposed numeric action levels for non-stormwater dry weather discharges (section C of the draft Riverside County MS4 permit). However, we would point out that these requirements are consistent with requirements adopted by the SDRB in December 2009 for the MS4 permit for South Orange County. Such requirements are also consistent with our efforts to ensure MS4 permit requirements are more measurable and enforceable, and we would encourage the SDRB to retain the proposed requirements in the final Riverside County MS4 permit.

We also understand that concerns have been raised regarding the deletion of landscape irrigation, irrigation water, and lawn watering from the list of non-stormwater discharges which are not necessarily prohibited by the permit (section B.2). We previously supported this same revision in a letter to the SDRB dated June 18, 2009 commenting on the draft South Orange County MS4 permit; we support the revision in the Riverside County MS4 permit as well. In our previous letter, we noted that the fact sheet for the Orange County MS4 permit had identified these categories of discharges as significant sources of pollutants, and as such, it would be appropriate for the SDRB to remove these discharges from the list of non-prohibited non-stormwater discharges in the Orange County MS4 permit. The fact sheet for the draft Riverside County MS4 permit

includes similar information on the discharges, and we believe removal of the discharges from the list of non-prohibited discharges would be appropriate in both counties.

2. Stormwater Action Levels (SALs)

In a previous letter to the SDRB dated September 28, 2009, we supported the SALs proposed for the South Orange County MS4 permit; we noted the proposed requirements would help clarify the term "maximum extent practicable" (MEP), and would be consistent with our goal of including more measurable and enforceable requirements in MS4 permits. The proposed SAL requirements in the Riverside County MS4 permit are consistent with requirements for South Orange County, and for the same reasons noted in the case of South Orange County, we would also support the proposed requirements for the Riverside County MS4 permit.

3. Retrofitting Requirements for Existing Development

As you know, EPA is considering requirements for retrofitting BMPs into existing developments as one of the key components of national stormwater rulemaking currently underway to improve the stormwater program (74 FR 68621, December 28, 2009). We note that the proposed retrofitting requirements for Riverside County are very similar to the requirements of the MS4 permit adopted by the SDRB in December 2009 for South Orange County. Given the potential environmental benefits of retrofitting in reducing pollutant discharges in stormwater runoff, we strongly encourage the SDRB to retain the proposed requirements in the final Riverside County MS4 permit.

4. Hydromodification Requirements

We have reviewed the proposed requirements related to hydromodification in the draft Riverside County MS4 permit (section F.1.h), and we would encourage the SDRB to retain these requirements in the final permit. The proposed requirements in the Riverside County permit are similar to requirements in other recently-adopted Southern California MS4 permits, and the requirements will further the objectives of the LID provisions in the permit.

5. Requirements for Unpaved Roads

We understand that concerns have been raised regarding the new requirements in the draft Riverside County MS4 permit to implement additional controls for stormwater discharges from unpaved roads (sections F.1.i, F.3.a.10 and F.3.c.5 of the permit). We believe the new requirements are fully supported by the fact sheet and the Findings for the permit (Finding D.1.c), which identify the discharges as a significant source of pollutants. As such, we urge the SDRD to retain the proposed requirements in the final permit. Lastly, we would note the proposed requirements are similar to requirements in

the Municipal Regional Permit for MS4s in the San Francisco Bay Area adopted in 2009 by the San Francisco Bay Regional Board.

6. Monitoring Requirements

We understand that concerns have been raised about the monitoring requirements of the draft Riverside County MS4 permit (Attachment E to the permit). However, the proposed requirements are consistent with the requirements of other recent MS4 permits adopted by the SDRB such as the 2009 South Orange County MS4 permit. We strongly encourage the SDRB to retain the requirements in the final permit. Measuring the effectiveness of the stormwater program continues to be a challenge and thus, is an important priority for EPA; we believe the proposed monitoring details and requirements will improve permittee and Regional Board's ability to measure program effectiveness.

We appreciate the opportunity to provide comments on the draft permit. If you would like to discuss this matter further, please contact Eugene Bromley of the NPDES Permits Office at (415) 972-3510.

Sincerely,

David Smith, Manager
NPDES Permits Office (WTR-5)

Bridgette Moore, Mayor
Marsha Swanson, Mayor Pro Tem
Sheryl Ade, Council Member
Bob Cashman, Council Member
Scott Farnam, Council Member

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September 7th, 2010

Mr. David King
Chairman
San Diego Regional Water Quality Control Board
9174 Sky Park Court, Suite 100
San Diego, California 92123-4353

Re: Tentative Order R9-2010-0016, NPDES No. CAS0108740, Riverside County Municipal Separate Storm Sewer System Permit Reissuance *NWU:749045:bneill*

Chairman King:

The City of Wildomar is providing these comments on the above listed Tentative Order, and appreciates the Board's consideration of the issues described herein. Tentative Order R9-2010-0016 (draft Permit) has been drafted by Board staff to serve as the reissuance of Order R9-2004-0001 (existing Permit) which was originally issued to the County of Riverside, the Riverside County Flood Control and Water Conservation District (District), and the cities of Temecula and Murrieta. Additionally the draft Permit adds the recently incorporated City of Wildomar.

The City would like to thank the Board and the Executive Officer for committing their staff's time for a number of meetings with the City and fellow Copermittees in the development of the draft Permit. This collaborative approach to permit development is crucial to developing effective programs, and the City strongly believes that only through such effective communication and collaboration will our mutual goals of protecting water quality be realized. As a result of the meetings, the Permittees and Regional Board staff worked collaboratively to develop language for consideration in the Tentative Order.

We are most appreciative of the Board staff's consideration of allowing Wildomar to be regulated by one region with respect to the MS4 permit requirements. Although the City will still be mandated to participate in the Lake Elsinore/Canyon Lake TMDL as part of Region 8, the option of having the entire City regulated by one region will greatly help with the implementation of the permit requirements.

While the collaborative discussions have been fruitful and have resulted in a draft permit that is substantively improved over the initial draft, we unfortunately cannot support the tentative order as currently drafted due to (1) the projected cost exceeding our available resources and (2) shortcomings in the permit language itself.

The City therefore requests that the Board direct staff to work with the Copermittees to resolve the issues identified in this and the Riverside County Flood Control letter, including attachments, prior to considering adoption of the Permit.

This letter provides additional background, information and perspective specific to the City of Wildomar for the Board's consideration.

Background

City of Wildomar

Wildomar is one of the newest cities in the state having officially become a city on July 1, 2008. It is home to approximately 25,000 residents and encompasses about 24 square miles between the cities of Murrieta and Lake Elsinore in south western Riverside County. Wildomar is a community of old and new, mature homes and property with horses and other animals mixed with modern housing tracts. The name Wildomar was coined from the names of its three original founders – the "WIL" from William Collier, the "DO" from Donald Graham and the "MAR" from Margaret Collier Graham.

Economic Conditions

The adopted 2010-11 city **budget reflects the harsh reality of the City having <u>only 64% of the revenue</u> shown in the Comprehensive Fiscal Analysis (CFA) that was used for incorporation**. An examination of the major sources of revenue in the City reveals a grim picture:

Revenue Source	Estimate in Comprehensive Fiscal Analysis (CFA)	Revised Estimate for 2010-11 Budget	Difference
Taxes *(sales, property, franchise, etc.)*	$7.9 million	$5.1 million	**35% ↓**
Permits, Licenses, Fees	$2.5 million	$0.9 million	**25% ↓**
Total General Fund	$14.1 million	$9 million	**36% ↓**

The City is somewhat fortunate in that it can adjust to the demands of services and available funding because of its contract service arrangements for police and fire services provided to the community. However, the **City currently has only three authorized positions**: City Manager, Assistant City Manager/Finance Director and City Clerk. All other services are provided by contract services. The equivalent staff for city hall operations is approximately 13 staff members.

While it is difficult to estimate the exact cost of the permit, based on available budget estimates and assumptions made on the level of effort needed to implement and administer the permit as currently

drafted, the City's cost will be in the range of $250,000 – $350,000 in the first two years and $150,000-$250,000 in years three through five. **This cost was simply not contemplated in the Comprehensive Fiscal Analysis (CFA) that was used for incorporation**. While the collaborative process has resulted in successes that should not be overlooked, the shortcomings have resulted in a permit that cannot meet its core purpose of protecting water quality, by virtue of not being economically feasible for the City to implement.

Shortcomings:

Despite the noteworthy and important improvements in the permit, the publically released draft remains **far beyond the economic reach of the City**. Further in as much as the requirements are unattainable, and the public's resources are spread too thin, the Permit cannot, and **will not be effective at protecting water quality**. There are several fundamental issues that have caused or contributed to the shortcomings of the collaborative process:

- The baseline OC permit was designed for a region with significantly more resources than Riverside County
- New programs were added which go well beyond the OC permit requirements
- Several major programmatic changes were introduced at the end of the process
- The continuing recession

Priority Issues and Solutions

The Copermittees have identified specific and focused changes to the Permit that will allow the Copermittees to address staff's primary water quality concerns, while reducing compliance costs in a manner that is appropriate for the local watersheds. The City of Wildomar supports these changes. As previously noted, Board staff has directed the Copermittees to bring these changes directly to the Board for consideration, although we are hopeful that by summarizing them in writing that they may be addressed ahead of the scheduled October 13 hearing.

Monitoring and Reporting Program

Prior to the submittal of the ROWD, the Copermittees met with Board staff to propose changes to the Monitoring and Reporting Program (MRP). In these discussions, Board staff identified two areas for needed improvement:

- Relocation of Illicit Connection / Illicit Discharge (IC/ID) monitoring stations to MS4 outfalls, and
- Incorporation of Action Levels

In more recent discussions, Board staff noted that the MRP needed significant modification to reflect the South Orange County MRP, but would be scaled to be appropriate to the smaller Santa Margarita Region.

Unfortunately, the final MRP requirements have been expanded well beyond the South Orange County MRP requirements, resulting in a program that is completely out of proportion with the needs and resources of the Santa Margarita Region. In fact, the proposed MRP requirements will result in a **500% increase in monitoring program costs**, costing our residents **over two and a half times the per capita costs for South Orange County**.

Per Capita Monitoring Cost Comparison

Draft Permit	OC Permit
$5.13 per capita	~$2.00 per capita

The Copermittees recognize that monitoring and data collection is necessary. However, the MRP requirements exceed what is necessary to address management questions related to water quality, are beyond requirements dictated in the South Orange County MRP, and are beyond the Copermittees' ability to fund. Not only are the level of requirements inappropriate for the Santa Margarita Region, but they disregard the economic realities faced by the Copermittees. As such, the MRP falls far short of meeting the Executive Officer's stated goals of affordability.

In the interest of finding ways to offer Board staff a comparable program in a more cost effective and appropriate manner, the Copermittees have identified nine adjustments to the MRP that will **save approximately seven hundred and eighty thousand dollars ($780,000)** ***annually*** and bring per capita monitoring costs more in line with the South Orange County MRP, while maintaining the core components of the MRP. Table 1 summarizes the key changes and the respective cost savings. It is important to note that any change highlighted in RED reflects bringing the program in line with the South Orange County MRP. Figure 1 below shows graphically the comparative costs for the draft MRP with and without the requested adjustments. Please note that the 100% baseline in Figure 2 reflects the current cost of the Copermittees' current MRP.

Table 1 - Cost Savings resulting from proposed MRP changes[1]

Component	Requested Change	Cost reduction
Mass Loading Stations	1) Wet Weather - 3 wet -> 2 wet	**~$79,000**
	2) Dry Weather - Composite -> Grab	**~$66,000**
Toxicity Testing (MLS and Bioassessment)	3) 3 organisms -> 2 organisms	**~$14,000**
Bioassessment	4) 6 stations -> 3 stations	**~$158,000**
	5) 2X each -> 1X each	**~$95,000**
Action Levels	6) 'Representative Number/Percent' -> Representative - and remove 'within each sub area'	**~$241,000**
	7) SAL Composites -> Grab	**~$165,000**
Inland Aquatic Habitat Monitoring	8) Eliminate requirement	**~$140,000**
Special Studies	9) 6 special studies -> 4 studies, and Replace with more locally appropriate	**~$220,000/year**

	studies	
TOTAL ESTIMATED SAVINGS	Net savings of all recommended changes (annualized)	***~780,000/year***

Note: Red text refers to requirements currently in the South Orange County MRP.

Figure 1

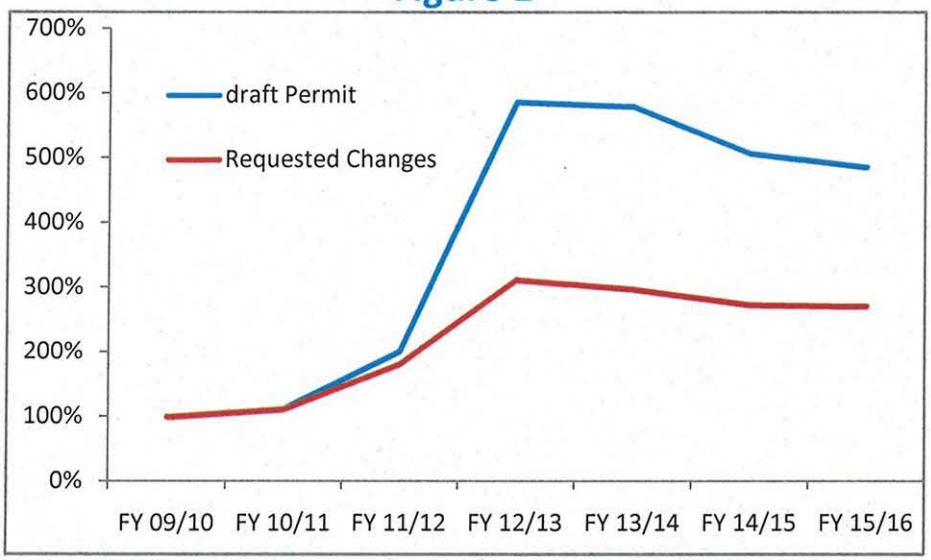

Draft Permit	OC Permit	Proposed Changes
~~$5.13/ per capita~~	~$2.00/per capita	**$2.54/per capita**

Although the requested adjustments to the MRP will not eliminate cost increases, and will result in an MRP which is more expensive, on a per capita basis, than the South Orange County MRP, they provide a more manageable program for the Copermittees.

The City requests that the Board make the adjustments identified above before Permit adoption.

Unpaved Roads Requirements (Sections F.1.i, F.3.a.(11), F.3.c.(5))

The requirements for unpaved roads are particularly cumbersome, onerous and unreasonable. In summary, the proposed unpaved road requirements may result in substantial and unnecessary additional Copermittee costs that are not justified by the facts in the Santa Margarita Region. The Copermittees believe that the existing MS4 Permit requirements for new development, construction, maintenance and IC/ID adequately address regulation of unpaved roads that threaten water quality. If the Regional Board believes that unpaved roads require further regulation, the Copermittees believe that the appropriate regulatory mechanism is a general permit (Waste Discharge Requirements or NPDES permit) that would

apply to *all* unpaved roads in the San Diego Region, rather than only those that are under the jurisdiction of the Copermittees.

The City requests that Sections F.1.i, F.3.a.(11) and F.3.c.(5) regulating unpaved roads be deleted from the draft MS4 Permit.

However, should the Water Board insist on retaining unpaved road requirements in this Permit, the Copermittees request the following revisions. These revisions are needed to ensure that all parties have a clear understanding of the requirements. In summary, the Copermittees request:

- Clarification that these requirements apply to those unpaved roads that the Copermittees maintain in their road system.
    - This should be commonly understood, but the clarification is important to include due to complex legal limitations and rights associated with access, ownership, and maintenance of unpaved roads.
- Removal of language that specifies specific BMPs that must be implemented.
    - Specifying the method of compliance is prohibited pursuant to CWC section 13360, and inappropriately forces the Copermittees to adopt particular solutions that may not best fit the situation.
- Removal of requirement for BMPs for private unpaved roads.
    - The proposed requirements would require the creation of an additional and unnecessary program element addressing privately owned unpaved roads. The Copermittees believe that a focused public outreach program should be implemented to educate property owners and associations about the need to properly maintain unpaved roads. This education program combined with existing IC/ID enforcement capabilities seems a more reasoned and responsible response to addressing this issue.

Should Sections F.1.i, F.3.a.(11) and F.3.c.(5) regulating unpaved roads not be removed from the Permit, the City requests they be modified as noted above.

Post-Construction BMP Inspections

Section F.1.f of the draft MS4 Permit includes new requirements for the Copermittees to verify that Post-Construction BMPs are being appropriately maintained. The new requirements appropriately develop a risk-based approach to inspections, defining eight factors that the Copermittees must consider in determining 'high-priority' projects.

However, language in Section F.1.f.(2)(a) removes that discretion by stating:

> *'At a minimum, high priority projects include those projects that generate pollutants (prior to treatment) within the tributary area of a 303(d) listed waterbody impaired for that pollutant; or those projects generating pollutants within the tributary area*

for an observed action level exceedance of that pollutant.'

This language is excessively broad, and will require virtually all sites in the watershed to be designated as 'high priority' and therefore subject to annual inspections. This language is inconsistent with the goals of a socially responsible and affordable permit and should be modified for several reasons:

- Inspections frequencies should be based on risk of discharge. Annual inspections are not needed for all sites that *generate* a specific pollutant. For example, if a site generates a pollutant associated with 303(d) listing, but the site retains runoff onsite or stores those pollutants indoors, annual inspections would be unnecessary. However, sites that store 303(d) listed pollutants outdoors or otherwise have a high risk of discharge should be inspected more frequently.

- The language dilutes Copermittee resources by requiring annual inspections of low-risk sites, preventing the Copermittees from appropriately concentrating resources on problematic sites/sources. This is because when an action level is exceeded then all parties in the watershed are assumed guilty until proven innocent.

While the Copermittees are not opposed to implementing a program to verify that these BMPs are being maintained, it is critically important that they be provided the flexibility to determine which sites warrant annual inspections. **Specifically, the City requests that the language in F.1.f.(2)(a) be amended as follows prior to adoption of the Permit:**

> *At a **minimum**, high priority projects include those projects that ~~generate pollutants (prior to treatment) within the tributary area of a 303(d) listed waterbody impaired for that pollutant; or those projects generating pollutants within the tributary area for~~ have been determined to be the source of an observed action level exceedance. ~~of that pollutant.~~*

Commercial and Industrial Inspections

Section F.3.b. of the draft Permit includes requirements to inventory and inspect Commercial and Industrial businesses. The draft Permit expands upon existing inventory and inspection requirements in two problematic ways:

- It requires *significantly* more businesses to be inspected, and

- It includes new requirements specifying what the Copermittees are required to inspect when they are onsite.

More inspections

Sections F.3.b.(1)(a)(i) and (ii) identify forty-two (42) categories of businesses that must be inventoried and inspected based on risk of pollutant discharge. However, Section F.3.b.(1)(a)(iii) adds virtually any business in the Permit area, independent of pollutant discharge risk:

> *'**All** other commercial or industrial sites/sources **within or directly adjacent to or discharging directly to receiving waters within environmentally sensitive areas** (as defined in Attachment C of this Order) or **that generate** pollutants tributary to an observed exceedance of an action level.' (Bold emphasis added)*

In effect, section F.3.b.(1)(a)(iii) adds the following additional businesses:

- EVERY business that is adjacent to (or within) an Environmentally Sensitive Area (ESA), regardless of whether the business generates or discharges *any* pollutants, and
- EVERY business that '*generates*' pollutants which happens to be upstream of an action level exceedance, *regardless* of whether the site has ever *discharged any* pollutants.

This language expands the list of sites far beyond the current requirements, and well beyond those sites that actually pose a threat to water quality. This is clearly unnecessary and should be removed for several reasons:

- It inappropriately separates 'risk' from the 'response', by requiring the Copermittees to inspect businesses irrespective of the risk that the business poses to water quality. For example, this language would require the Copermittees to expend resources and time inspecting hair salons, office buildings and other activities that happen to be adjacent to an ESA. This inappropriate broad-brush approach to permitting actually works to discredit the Copermittees NPDES programs and dilute resources, rather than enhancing protection of water quality.
- It will further remove the flexibility that the Copermittees need to be able to re-allocate resources to inspecting and following up with sites/sources that are problematic.

Therefore, the City requests that the language in F.3.b.(1)(a)(iii) be amended as follows prior to adoption of the Permit:

> *All other commercial or industrial sites/sources ~~within or directly adjacent to or discharging directly to receiving waters within environmentally sensitive areas (as defined in Attachment C of this Order) or that generate pollutants tributary to~~ that have been determined to be the source of an observed exceedance of an action level.*

Additional items to review during inspections

Section F.3.b.(4)(a) specifies what the Copermittees must review when performing an inspection. The new requirements in sub sections (i) and (ii) to review BMP implementation plans, and review facility monitoring data, respectively, are an unnecessary new mandate. They should be removed for several reasons:

- The requirements burden the Copermittees with reviewing information that is required under General Permits and is the responsibility of the Regional Board to enforce.
- The requirements would significantly increase the inspection time for sites with General Permits and endanger an existing collaborative inspection program (Complaince/Assistance Program (CAP)) that leverages the time highly trained Environmental Health Inspectors spend onsite for Certified Unified Program Agencies (CUPA) and Food Services inspections to also conduct NPDES inspections. The CAP program not only utilizes highly trained Environmental Health inspectors, but also regionalizes the inspections and therefore provides multiple benefits including uniformity, reduction in total number of inspections and higher-quality inspections. The

Environmental Health HazMat inspection program administrators have indicated that they cannot accommodate the additional time required to implement the new requirements, as they would unduly cut into their ability to meet their own state-mandated inspection frequencies.

- By virtue of eliminating the CAP program, the requirements would effectively mandate a more fractured and disconnected set of inspections for the businesses, contrary to CAL EPA mandates for consolidated inspections, and in turn diluting the effectiveness of the program.

The City requests that the language in F.3.b.(1)(a)(iii) be amended as follows prior to adoption of the Permit:

(a) Inspection Procedures: Inspections must include but not be limited to:

(i) ~~*Review of BMP implementation plans, if the site uses or is required to use such a plan*~~*;*

(ii) ~~*Review of facility monitoring data, if the site monitors its runoff*~~*;*

(iii) Check for coverage under the General Industrial Permit (Notice of Intent (NOI) and/or Waste Discharge Identification Number), if applicable;

(iv) Assessment of compliance with Copermittee ordinances and Copermittee issued permits related to runoff;

(v) Assessment of the implementation, maintenance and effectiveness of the designated minimum and/or enhanced BMPs;

Retrofit

Section F.3.d. proposes a program to develop an inventory of existing developments that may be candidates for future water quality retrofits. The requirement goes on to encourage the Copermittees to collaborate with local property owners to promote urban retrofit in an effort to accelerate reductions in pollutant loading from existing urban areas.

Although laudable, this requirement has two significant problems:

1) The program is self-defeating as it contains no "carrots" to lure private property owners into participating in the program. Any property owner that is interested in volunteering in this effort would be required to fully comply with all provisions of the draft MS4 Permit. This includes preparation of compliance documents such as SSMPs, LID and hydromodification studies, subjecting themselves to additional regulatory scrutiny through business and BMP inspection programs required by the MS4 Permit, and otherwise incurring a myriad of costs and requirements. These costs and requirements would provide a strong disincentive to participate in a retrofit program. This program will only work if it is modified to remove these disincentives.

2) Current and projected economic conditions will limit the interest and participation of private property owners. Long-term economic predictions for Riverside County indicate that assessed valuations and property values will likely remain stagnant for the term of this Permit. Similarly, sales tax and unemployment are not expected to significantly improve either.

Without Co-Permittee resources to supplement private retrofit projects, the current economic dis-incentives for private redevelopment that are built into the program and the current impact of the economy on private property owners, there is no real value to the program.

PREFERRED POLICY CHOICE: The City strongly requests that this program be deleted for the aforementioned reasons.

Alternatively, and at minimum, the Copermittees request that the schedule for completion of the retrofitting program be revised to provide for development during the term of the Permit and submittal of the proposed program with the next ROWD. This will allow the Copermittees to defer expenditures related to development of the program until later in the Permit term when it is hoped that economic conditions and local revenues will improve. The Copermittees expect few opportunities for retrofit until the economy improves. Due to the Copermittee's limited ability to require retrofit on private property, our best opportunities for retrofit may be associated with approvals of proposed modifications of existing developments.

ALTERNATE POLICY CHOICE: If the Retrofit requirements are not removed, the City requests that the Regional Board modify Section F.3.d. as follows:

> *Each Copermittee must develop and implement a retrofitting program that meets the requirements of this section upon submittal of the ROWD.*

Irrigation Runoff

The Draft MS4 Permit categorically prohibits the discharge of landscape irrigation; irrigation water; lawn watering; (collectively 'irrigation runoff') and non-emergency fire fighting flow runoff to the MS4. The basis for this requirement comes from the current Orange County storm water permit within the San Diego Region (NPDES No. CAS0108740), which prohibits such discharges.

Although irrigation runoff may have been shown to be a problem in South Orange County, it has **not** been shown to be causing problems in receiving waters in the Santa Margarita Region. Attachment 6 summarizes the unique conditions and other facts that warrant the restoration of irrigation runoff as a non-prohibited non-storm water discharge category. It is important to reiterate the three key points made in Attachment 6

- Unlike the watersheds in South Orange County, the Santa Margarita Region is an ephemeral watershed;
- Unlike South Orange County, the Copermittees have **not** identified landscape irrigation, irrigation water or lawn water as an actual source of pollutants or conveyance of pollutants to waters of the U.S.;
- The draft MS4 Permit requires Copermittees to eliminate irrigation runoff ***TO THE MS4,*** which by definition, requires elimination of discharges to streets, curbs and gutters.

As noted above, the prohibition appears to hold the Copermittees responsible for any amount of irrigation runoff discharged to the curb and gutter, *regardless* of whether or not the discharge ever reaches receiving waters or causes or contributes to the exceedance of a water quality standard. This fact, combined with the fact that irrigation runoff has not been shown to be causing impairments in the local receiving waters, will make enforcement difficult to justify with residents and will likely result in community outrage over bans on irrigation. Further the Copermittees are not water purveyors, and as such, have little control over residential irrigation runoff outside of sending code enforcement officers out to look for incidents of

excessive irrigation runoff. This is a very inefficient use of resources. In any event, the provisions as written will do little for water quality but potentially much for community outrage against water quality programs. The Copermittees do not believe this is the intent of the Board.

It is further worth noting that the Permit already contains an investigation and remediation process via Non-Storm water Action Levels (NALs) by which the Copermittees will identify the source of problematic non-storm water discharges. . Should the source be found to be a conditionally exempt non-storm water discharge, the permit requires the Copermittees to address that discharge or the entire category of discharges as appropriate. By allowing the NAL process to determine when and where conditionally exempt discharges need to be prohibited, the Copermittees are better positioned to justify any enforcement actions.

PREFERRED POLICY CHOICE: The City requests that the Regional Board restore the conditional exemption for landscape irrigation, irrigation water and lawn watering.

Alternatively, if the Regional Board nevertheless insists on prohibiting Irrigation Runoff, the Copermittees request that the draft MS4 Permit be revised to allow for irrigation runoff to be managed as a JRMP program, rather than as a prohibited discharge to the MS4. This alternative request is consistent with how the Permit currently deals with non-emergency fire fighting discharges, which was also removed from the list of non-prohibited non-storm water discharges. The Executive Officer stated that he would be open to consideration of a program for irrigation runoff that would address discharges from the MS4. This alternative approach allows the Copermittees to develop a program that focuses on irrigation runoff problem areas, as opposed to holding the Copermittees responsible for eliminating any instant case of over-irrigation to a street independent of threat to receiving water quality.

ALTERNATIVE POLICY CHOICE: The City requests that the Regional Board clarify that irrigation runoff is only prohibited where it is discharged *from* an MS4 (into receiving waters) by adding the following language:

B.4. *As part of the JRMP, the Copermittees must develop and implement a program to address pollutants from landscape irrigation, irrigation water and lawn watering identified as significant sources of pollutants to waters of the United States.*

Legal Issues

The Copermittees have identified legal issues that raise fundamental questions regarding several of the key elements of the Tentative Order.

The City requests review of the legal issues raised in the RCFC comment letter and revision of the Tentative Order prior to adoption.

Conclusion

The City of Wildomar is very appreciative of the process and consideration given thus far to our concerns related to the draft permit. With very few exceptions, your staff has done an excellent job in communicating and explaining the proposed requirements. As a result of the discussions with your staff, we believe that sections of the permit have been refined in a manner that will benefit both the board and the city.

We understand that the federal regulations require that municipalities obtain a permit and renew it every 5 years. We understand that each city must develop a storm water management program designed to control the discharge of pollutants into and from the MS4 (or from being dumped directly into the MS4). We also understand that the purpose of the permit is to protect local waterbodies since storm drains typically dump their water into streams, bays, and/or the ocean without being treated.

However, at this time, we need the Board's help in meeting these requirements. **Specifically, we need time: time to fully flesh out new permit language (some that has never appeared in an MS4 permit before!) and time to allow the city (and the economy!) to recover from the devastating impacts of the recession – we simply can't afford the permit as currently drafted.**

Thank you in advance for your consideration of the issues raised in this comment letter. We look forward to the opportunity to continue working with you, your Executive Director and your staff on the refinement and implementation of this important permit.

Sincerely,

Frank Oviedo
City Manager

THE CITY OF SAN DIEGO

September 7, 2010

Electronic Submission to: bneill@waterboards.ca.gov

Mr. David Gibson, Executive Director
San Diego Regional Water Quality Control Board
9174 Sky Park Court, Suite 100
San Diego, CA 92123

Ben Neill, WRC Engineer
San Diego Regional Water Quality Control Board
9174 Sky Park Court, Suite 100
San Diego, CA 92123

Dear Sirs:

Subject: City of San Diego Comments on the Tentative Municipal Storm Water Permit for Riverside County (NWU:749045:bneill)

The City of San Diego wishes to provide the Regional Water Quality Control Board with comments regarding the tentative Riverside County Municipal Storm Water Permit. We understand the need to continue moving forward with water quality improvements and want to work with you on permit revisions to maximize our water quality efforts in a cost effective and efficient manner.

If you have any questions or require more information, please don't hesitate to contact me at (858) 541-4328.

Sincerely,

Ruth Kolb
Program Manager

Enclosure: City of San Diego Comments on Draft Riverside County Municipal Permit (Tentative Order No. R9-2010-0016)

cc: Tony Heinrichs
Kris McFadden
Drew Kleis
Chron File

CITY OF SAN DIEGO COMMENTS ON DRAFT RIVERSIDE COUNTY MUNICIPAL PERMIT (TENTATIVE ORDER NO. R9-2010-0016)				
Permit Section	**Permit Page**	**Section Title/Topic**	**Reason for Proposed Changes/Comments**	**Comments/Proposed Changes**
FINDINGS				
D.3.	10	Construction & Existing Development	Make findings consistent with JRMP.	Provide separate sections for Construction vs. Existing Development.
D.3.c.	11	Construction & Existing Development	Definition of "urban stream" contradicts 40CFR 122.	Provide clearer definition as to what an "urban stream" is.
DISCHARGE AND LEGAL PROVISIONS				
B.2.	18	Non-Storm Water Discharges	Discharge category found to be a source of pollutants requires implementation of appropriate control measures to **prevent** the discharge of pollutants to the MS4.	Should state: Implement appropriate control measures to **reduce** the discharge of pollutants to the **MEP**.
B.2.foot note 8	19	Non-Storm Water Discharges	Discharges into MS4 require authorization from owner and operator of the MS4 system, specifically for uncontaminated pumped ground water, foundation drains, and water from crawl space pumps.	Support change, and recommend that dischargers are required to obtain authorization prior to the commencement of the discharge.
B.3.a.	19	Non-Storm Water Discharges	States that building fire suppression system maintenance discharges contain **waste** and must be prohibited.	Not clear what **waste** the discharges contain and the basis for prohibiting it.
B.4.	19	Non-Storm Water Discharges	Must identify and **control** any non-prohibited discharge that creates water quality problems.	Should define what is meant by **control** the discharge.
C.2.c.	20	Non-Storm Water dry weather Numeric effluent limitations	This requires the Copermittee to determine whether a discharge type should be exempt.	This is the responsibility of the Regional Board.
C.4.	21	Non-storm water dry weather numeric effluent limitation	Copermittees must develop monitoring plans to sample a representative percentage of major outfalls and identified stations within each hydrologic subarea.	Make consistent with 40CFR.
C.5 Tables 3a.1, 3.a.2	22	Non-Storm Water dry weather Numeric effluent limitations	The NELs as defined are receiving water standards. This would apply receiving water standards to the water within the MS4. Some of the NELs are not appropriately applied. (Fecal Coliform 400 for AMEL, this is a single sample standard not an average standard).	There needs to be a way to account for receiving water quality.

CITY OF SAN DIEGO COMMENTS ON DRAFT RIVERSIDE COUNTY MUNICIPAL PERMIT (TENTATIVE ORDER NO. R9-2010-0016)				
Permit Section	**Permit Page**	**Section Title/Topic**	**Reason for Proposed Changes/Comments**	**Comments/Proposed Changes**
C.5.a.	22	Discharges to inland surface waters	Non-storm water discharges from MS4 to inland surface waters	What about when an MS4 flow discharges to dry sediment and not to actual water?
C.5.	22	Table 3.a.1	Need to define WARM & COLD water for DO effluent limitations.	Should use > < with specific temperatures.
C.5.a.	22	Table 3.a.1	Fecal coliform AMELs are inappropriate for multiple reasons.	Imposes AB411 standards for Rec 1 waters on non-storm water, non-recreational flows. If it must be applied then B should move to Instantaneous Maximum column.
C.5.a.	22	Table 3.a.1	Enterococcus inappropriately set to Ocean Plan Designated beach area standards.	This is non-storm water, non-recreational flow. Why is it being held to beach standards when 5+ years of paired sampling data do not indicate strong links between even higher levels of bacteria than being allowed, and detected AB411 exceedances.
C.5.a.	22	Table 3.a.1	MDEL limits.	Where are MDELs defined in 40CFR?
C.5.a.	22	Table 3.a.1	Table 4.a.1 does not list an instantaneous maximum for Fecal Coliform .	Should list a maximum if less than 5 samples collected in 30-day period.
C.5.a.	22	Table 3.a.1	Table 4.a.1 subject storm drain flows to the very stringent AB-411 Rec-1 Criteria standards.	The maximums should be adjusted to attainable limits.
C.5.a.	22	Table 3.a.1	Turbidity.	What is the justification for turbidity limitations in Region 9 being so much lower than other regions in the state?
C.5.a.	22	Non-Storm Water Dry Weather Numeric Effluent Limitations	..freshwater criteria are based on site-specific water quality data (**receiving** water hardness).	Should be changed to **effluent** water hardness.
C.5.a	22	Table 3.a.1	pH.	6.5-8.5 for freshwater 6-9 for saline waters – based on?
D.1.	23	Storm water Action Levels	This requires "implementation of all necessary storm water controls and measures to reduce…" when there is no evidence of a receiving water exceedance. The assessment point is "end-of-pipe" and SALs do not have any justification for applicability.	This seems to require an action when there is no evidence of a receiving water violation.
D.Table 4	23	Storm water Action Levels	Metals SALs are in direct contradiction with statement on "table 3.a.2: Priority Pollutants" page 22	Contradiction between NEL section and SAL in terms of metals values.

CITY OF SAN DIEGO COMMENTS ON DRAFT RIVERSIDE COUNTY MUNICIPAL PERMIT (TENTATIVE ORDER NO. R9-2010-0016)				
Permit Section	**Permit Page**	**Section Title/Topic**	**Reason for Proposed Changes/Comments**	**Comments/Proposed Changes**
D.2.	23	Storm Water Action Levels	"...assessment points for determination of SAL compliance are all major outfalls...." Seems to contradict the following sentence "...monitoring plans to sample a representative percent of the outfalls...."	Sentences seem to contradict each other.
D.5.	25	Storm Water Action Levels	"...to have outfall storm water discharges meet all applicable water quality standards."	This applies receiving water standards to the storm drain.
F.1 – DEVELOPMENT PLANNING				
d(2)(d).	31	Hillside development category	It is not clear what is intended to be included this category. A steep hillside development with known erosion soil conditions would need to address erosion. Treatment control and hydromodification requirements are not justified.	Remove this from the Priority Development Project Categories, and define elsewhere in Section F.1 how these projects would need to include measures that protect slopes from erosion.
d(4)(c)(i).	33	Retention of 85th percentile storm event	Retention of the 85th percentile storm event does not mimic the natural hydrology. The amount of runoff under natural conditions is dependent on soil type and other factors.	Retention requirements should be revised with intent of matching hydrology under natural conditions.
d(7).	37	LID waiver program	It may be unrealistic for municipalities to implement the various processes required under this section within the amount of time allowed.	Provide a feasible time schedule for municipalities to put such a program in place.
F.2 – CONSTRUCTION				
d(1)(c)(i).	50	AST mandate	It is neither wise nor necessary to mandate use of a particular technology for managing sediment from construction sites. The Construction General Permit has adequate and more appropriate measures for ensuring sediment discharges will not create a pollution problem.	Remove the requirement that Copermittees mandate use of AST. Allow Copermittees to rely on the Risk based approach that was developed for the Construction General Permit, which does not mandate a particular technology.
e(2).	49	Inspection of Construction Sites	This section requires inspection of construction sites of 1 acre or more at least monthly	Propose language that is definitive and require construction site inspections monthly for sites of 1 acre or more
F.3.a – EXISTING DEVELOPMENT: MUNICIPAL ACTIVITIES				
(3).	55	BMP Implementation for Management of Pesticides, Herbicides and Fertilizers	Reduction of pesticides, herbicides, and fertilizers into the storm water to the MS4 and receiving waters.	Support inclusion of "storm water" and "and receiving waters" in the opening paragraph.

CITY OF SAN DIEGO COMMENTS ON DRAFT RIVERSIDE COUNTY MUNICIPAL PERMIT (TENTATIVE ORDER NO. R9-2010-0016)				
Permit Section	**Permit Page**	**Section Title/Topic**	**Reason for Proposed Changes/Comments**	**Comments/Proposed Changes**
(6)(b)(i).	56	Operation and Maintenance of Municipal Separate Storm Sewer System and Structural Controls	Inspecting and cleaning all MS4 facilities between May 1 and September 30 is infeasible for those Copermittees that have tens of thousands of structures.	Inspection and removal of accumulated waste at least once a year between May 1 and September 30 of each year for ~~all~~ MS4 facilities that receive or collect high volumes of trash and debris.
(7).	54	Infiltration From Sanitary Sewer to MS4/Provide Preventative Maintenance of Both	Sections (a) and (b) are redundant.	Delete Section (b) as the implementation of the provisions in Section (a) would maximize pollutant reductions by providing greater flexibility to Copermittees to manage their programs.
F.3.b – Existing Development: Commercial/Industrial				
F.3.c – EXISTING DEVELOPMENT: RESIDENTIAL				
F.3.d – RETROFITTING EXISTING DEVELOPMENT				
F.4 – ILLICIT DISCHARGE DETECTION AND ELIMINATION				
d.	67	Dry Weather Field Screening and Analytical Monitoring	Paragraph makes a reference to attachment E, which does not in fact contain a description of this particular program.	Include a description of the Dry Weather Field Screening and Analytical Monitoring Program in Attachment E.
e.	67	Investigation/Inspection and follow-up	...based on results of **field screening**...	Field screening is not included as a component of any monitoring programs and should be removed from this sentence.
e.	67	Investigation / Inspection and Follow Up	References a monitoring effort that does not exist anywhere else in the permit (field screening)	The inconsistency in the permit for the different programs and the referenced sections need to be straightened out. Add description of referenced program to Attachment E.
e(1).	72	Develop response criteria for data	Contradictory paragraph. Numeric action levels must be developed, but "the criteria must consider numeric effluent limitation (see Section C)".	The NELs from Section C or develop numeric action levels? Recommend selecting one criteria.
F.5 – PUBLIC PARTICIPATION				

CITY OF SAN DIEGO COMMENTS ON DRAFT RIVERSIDE COUNTY MUNICIPAL PERMIT (TENTATIVE ORDER NO. R9-2010-0016)				
Permit Section	**Permit Page**	**Section Title/Topic**	**Reason for Proposed Changes/Comments**	**Comments/Proposed Changes**
G. – WATERSHED RUNOFF MANAGEMENT PLAN				
G.2.	73	Watershed Water Quality Workplan	The workplan is for development of a BMP strategy and implementation of BMPs to improve urban runoff water quality contributions to the receiving water. Calling it a "Water Quality" workplan is misleading because the regulated parties under this permit are not responsible for every contribution to every water body in the entire watershed. The requirements should focus on urban runoff contributions to the receiving waters for which the regulated parties are responsible.	Revise the section to state: The Watershed Workplan shall describe the Permittees' development and implementation of a collective watershed strategy to assess and prioritize the water quality problems due to runoff discharging to the watershed's receiving waters, identify and/or model sources of the highest priority water quality problem(s), develop a watershed-wide BMP implementation strategy to abate highest priority water quality problems and the relative contribution from runoff discharges, and a monitoring strategy to evaluate BMP effectiveness and changing water quality prioritization in the WMA.
1.e.	72	Develop strategy to model and monitor improvements	The use of the word "proper" for installation of BMPs is subjective and not defined by this permit. There may be many different ways to "properly" design and install a BMP, and the regulated parties may or may not choose to test different ways for each BMP to determine which works best.	Revise to state: Develop a strategy to model and/or monitor improvements in runoff discharge quality resulting from implementation of the BMPs described in the Watershed Workplan. The modeling and/or monitoring strategy shall generate the necessary data to report on the measured pollutant reduction that results from BMP implementation.
H. – Fiscal Analysis				
I. – Total Maximum Daily Loads				
J. – Program Effectiveness Assessment				
K. – Reporting				
1.b.	77	Watershed Workplans	The reference to a watershed workplan should use a consistent naming convention. It is referred to as a "Watershed Workplan" in Section K.1.b., and a "Watershed Water Quality Workplan" in Section G.2.	The reference to a watershed workplan should use a consistent naming convention.
L. – MODIFICATION OF PROGRAMS				

CITY OF SAN DIEGO COMMENTS ON DRAFT RIVERSIDE COUNTY MUNICIPAL PERMIT (TENTATIVE ORDER NO. R9-2010-0016)				
Permit Section	**Permit Page**	**Section Title/Topic**	**Reason for Proposed Changes/Comments**	**Comments/Proposed Changes**
M. – PRINCIPAL COPERMITTEE RESPONSIBILITIES				
N. – RECEIVING WATERS MONITORING AND REPORTING PROGRAM				
O. – STANDARD PROVISIONS, REPORTING REQUIREMENTS, AND NOTIFICATIONS				
Attachments (A Through E)				
E. II. A.1.g, Table 1	5	Mass Loading Station Monitoring	Typo at the base of the table: "Nitrate and nitrate may be combined…"	Change to: "Nitrite and nitrate may be combined…"
E.II.B.1.b.	12	MS4 Outfall Monitoring	Comparing Metals SALs with CTR values	Question is if you can use the "1 hour maximum concentration" criteria in this way?
E.II.C.a. (1).	13	Dry weather non-storm water effluent analytical monitoring stations	"Stations must be all major outfalls" plus "other outfall points…"	This far exceeds CWA 500 point maximum for dry weather monitoring.
E.II.C. b.2.	13	Dry weather non-storm water effluent analytical monitoring stations	If flow is evident a 1 hour composite sample may be taken.	Should elaborate on sampling procedures for flowing outfalls.
E.II.C.b. (2).	13	Dry weather non-storm water effluent analytical monitoring stations	"if flow is evident a 1 hour composite sample may be taken"	There is no definition of what comprises a composite sample. This would significantly increase this program.

San Diego Bay Council

A coalition of San Diego environmental organizations dedicated to protection and restoration of San Diego's Coastal water resources

September 7, 2010

via Electronic Mail to:
Ben Neill: *bneill@waterboards.ca.gov*
Chiara Clemente: *cclemente@waterboards.ca.gov*

RE: Riverside County Municipal Storm Water Permit Reissuance
Tentative Order No. R9-2010-0016

Dear Mr. Gibson:

Please accept these comments on behalf of the San Diego Bay Council ("Bay Council"), a coalition of environmental organizations dedicated to the protection and restoration of regional coastal waters in San Diego. Member organizations, representing 22,000 San Diegans, act through community involvement, regulatory participation, and legal action to ensure the protection restoration of San Diego Bay, Mission Bay, and the region's coastal waters.

The Bay Council appreciates and welcomes the opportunity to comment on the Regional Water Quality Control Board's ("Regional Board") draft Municipal Storm Water Permit ("Permit") for Riverside County. As with the recently adopted Orange County permit (Order No. R9-2009-0002), this draft Permit represents a significant improvement to past storm water permits in not only the San Diego region, but the entire state. The Bay Council applauds the Regional Board for its leadership in advancing municipal storm water permits to reflect the iterative approach of the maximum extent practicable ("MEP") standard mandated by the Clean Water Act.

I. Permit Improvement Highlights

Although the Bay Council is composed of local San Diego organizations, it nonetheless has great interest in the Permit, as it will pave the way for the forthcoming San Diego County municipal storm water permit and perhaps the regionwide permit. (Permit Findings. E.12.). Moreover, the Santa Margarita Watershed links Riverside and San Diego Counties. Therefore, the Bay Council is pleased to see the Regional Board continue its progress in developing storm water permits that will result in greater protections for water quality throughout the region. These areas warrant specific mention.

A. Hydromodification Requirements Are More Protective

Bay Council member San Diego Coastkeeper was part of the Technical Advisory Committee for the San Diego region Hydromodification Management Plan (HMP) development. Many of Coastkeeper's concerns, as well as committee member NRDC's, focused on the standard set in the San Diego HMP. The hydromodification susceptibility and the resulting BMP sizing tools were set to meet predevelopment standards, not the naturally occurring condition. It was ultimately the San Diego MS4 Permit language—which defines predevelopment as the condition onsite immediately before the

planned development—that constrained the development of the HMP. (Order No. R9-2007-0001, C-7). This Permit, however, is in line with Coastkeeper and NRDC's view that predevelopment and pre-project are the naturally occurring condition—as opposed to simply the condition immediately preceding the new development. This definition will create a more robust and effective HMP for the Riverside area, protecting natural stream hydrology as opposed to merely preventing further degradation. (Permit, F.1.h). Further, the required prioritization of BMPs will ensure the most effective BMPs are evaluated first, instead of the least expensive or easiest to implement BMPs. (Permit, F.1.g.(2).

B. Unpaved Road BMPs and Flood Control Maintenance Requirements Are a Welcome New Addition

A new addition to this Permit is the regulation of unpaved roads, which now require implementation of BMPs. (F.1.i.; F.3.a.(10); F.3.c.(5)). Not only will these new permit provisions help alleviate sediment and erosion problems; they will also promote smart maintenance and planning. For example, the permit requirement that BMPs include "[u]npaved roads and culvert designs that do not impact creek functions and where applicable, that maintain migratory fish passage" will help maintain natural water courses. (F.1.i). The following requirement will also serve to promote long-term maintenance and planning to protect water quality and geomorphology:

> Through their regular maintenance of unpaved roads, the Copermittees must examine the feasibility of replacing existing culverts or design of new culverts or bridge crossings to reduce erosion and maintain natural stream geomorphology.

(F.3.a.(10)(e)). These types of Permit conditions will incentivize municipalities to plan ahead, and will prevent the perpetuation of the currently fragmented maintenance activities.

In addition, municipal flood control structure BMP implementation will also serve to benefit Copermittees in maintaining their storm water systems. (F.3.a.(4)(a)-(c)). The requirement that Copermittees assess flood management project impacts on water quality, evaluate existing flood control structures as part of ongoing maintenance, and inventory such activities in the JRMP Annual Report is particularly important to avoid poor planning such as evidenced in the City of San Diego's Master Storm Water System Maintenance Program. (Id.)

C. Retrofit Requirements Will Expedite the Water Quality Improvement Process

Largely ignored in the past, the retrofit requirements in the Permit will help Copermittees tackle the storm water issues that cannot be solved through new construction and development standards alone. Many water quality issues are historical, due to poor planning and the proliferation of impervious surfaces. Permit-required assessment of retrofit opportunities, and permissive language with regard to implementation of retrofits will spur Copermittees to action, but allow them flexibility to choose the most effective projects. (F.3.d.). The novel idea of using retrofits as an enforcement or mitigation measure will also likely prove more appealing than simple monetary penalties.

D. The Removal of Over-Irrigation as an Exempt Non-Stormwater Discharge Addresses Both Water Quality and Water Supply Issues

Bay Council has been collectively, and through its individual organizations, advocating for conservation and smart water use for years. Every drop of water that remains at its source is a drop that has not contributed to urban runoff. Nonetheless, many municipalities have been reluctant to enforce over-irrigation as either a water supply or water quality issue, citing the previous permit

exemption as authority for such practice. Now, with the removal of this exemption, municipalities will not only be required to enforce over-irrigation runoff, but will be able to use the revised Permit as authority for urging residents, developments, and commercial and industrial facilities to conserve water.

E. Numeric Limits Will Help Assess Water Quality Improvements and BMP Effectiveness

As with the Orange County permit, this Permit is a great leap forward in achieving the MEP standard. With the Orange County permit paving the way, the Regional Board has created a mechanism to evaluate BMP effectiveness and ensure the iterative approach is truly progressive. As Bay Council members have previously commented on the Orange County permit, the Regional Board has broad authority to impose numeric effluent limits.[1] The Bay Council fully supports the Regional Board in requiring both non-storm water dry weather action levels ("NALs") and storm water action levels ("SALs"). (Permit, C. and D.).

II. Copermittees Must Stop Using Cost as An Excuse For Non-compliance

Though the Permit, as other past permits, requires a Fiscal Analysis, the Copermittees are surely to view this component of the Permit as another draconian measure that requires them to "check the box" as opposed to viewing this Permit condition as a tool. Copermittees should rather use the Fiscal Analysis requirement to plan ahead, financing necessary projects and measures not only for Permit compliance, but to achieve actual water quality improvements. (H.1.).

The current practice with respect to the Fiscal Analysis component of storm water permits is exemplified in the City of San Diego's 2009 Annual Report. This Report provides a "Future Projection" analysis consisting of two paragraphs which simply reiterate funds are generated from general fund and non-general fund sources, and costs will continue to rise.[2] Earlier in the same section, the City provides an explanation of how funds are generally used, but provides no insight into the amount of money applicable to each funding source.

Such cursory fiscal analysis is common in Annual Reports, while municipalities refuse to face the real problem. They continuously fail to adequately pass on the true costs of compliance. Time and again, environmental groups and the Regional Board are faced with the same excuse: protecting water quality and restoring beneficial uses is too expensive. From Permit approval to Permit implementation, the same excuse persists. Nonetheless, the reluctance of the Copermittees to adequately fund their respective storm water programs is not the result of a lack of desire to improve water quality by municipal staff or managers, but rather poor decisionmaking and lack of political will. Decisionmakers at the city and county level must pass their costs on to those reaping the benefits. Recent news articles highlight the City's reluctance to increase storm water fees, requiring 95 cents per month per residence across the board, while to recoup its costs, the City should be charging $3 per month.[3]

Now is the time for the Regional Board to clearly articulate in the Permit: noncompliance due to cost will not be tolerated. The Permit is a tool underutilized by Copermittees to obtain necessary funds

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[1] *Defenders of Wildlife v. Browner* (9th Cir. 1999) 191 F.3d. 1159; 1166-67("Under 33 U.S.C. § 1342(p)(3)(B)(iii), the EPA's choice to include either management practices or numeric limitations in the permits was within its discretion." citing *Natural Resources Defense Council*, *Inc. v. United States EPA*, (9th Cir. 1992) 966 F.2d 1292, 1308); *see also*, *City of Abilene v. United States EPA*, (5th Cir. 2003) 325 F.3d 657, 661.
[2] http://www.sandiego.gov/stormwater/pdf/urmp09ar.pdf (p. 10-4).
[3] http://www.voiceofsandiego.org/government/article_f4be2cbd-c631-51fc-a428-a7e64773eac4.html; http://www.voiceofsandiego.org/government/thehall/article_4531d4ce-95ba-11df-8ab8-001cc4c03286.html; http://www.sdcitybeat.com/sandiego/article-8041-show-us-the-money.html

and plan for the future. If the Copermittees once again fail to use Permit section H., they risk enforcement action. We urge the Regional Board to make clear that noncompliance due to cost is not an excuse. After almost three decades, Copermittees should no longer be allowed to claim poverty as an excuse for post-approval weakening of permits and the requirements therein.

III. Specific Permit Areas Require Further Improvement

Notwithstanding the many advances in the current permit, a few aspects of the permit remain incomplete. Our specific comments and suggestions with respect to these topics are below.

A. Residential Carwashing Should Not Be an Allowed Non-Stormwater Discharge

Individual residential car washing is currently listed as exempt from the prohibition against non-stormwater discharge. However, this allowance contradicts other permit sections that evidence the negative water quality impact residential car washing poses. Indeed, car washing is specifically listed as a threat to water quality in the residential permit section. (F.6.b.(3)). It is also provided as an example topic for discussion in the education component for residential and general public outreach. (F.6.b.(4)). Clearly a threat to water quality, and a water supply issue, residential car washing should not be made exempt simply because it requires a change in public behavior. Just as over-irrigation should not be exempt non-storm water, neither should this source of urban runoff.

B. NAL Requirements Are Too Lax

As mentioned above, the Bay Council is extremely supportive of the inclusion of NALs and SALs in this Permit. However, the vague Permit language leaves much to be desired. The Permit requires investigation and source identification for a NAL exceedance in a “timely manner”. (Permit C.2. and C.3.). It is entirely unclear what constitutes a “timely manner”. Further, because the NALs are an illicit discharge identification and elimination tool, time is of the essence. (C.2.b.). In many instances, a NAL exceedance must be investigated contemporaneously with the return of monitoring results, or the source will evade detection. Therefore, the Regional Board should impose a strict numeric deadline for “timely action”. We suggest the Copermittee begin investigation of the source of the exceedance the business day following receipt of the monitoring results. The investigation should be expedited, and should not take more than two weeks.

In addition, development of the monitoring plan for dry weather is largely left to the Copermittees. (Permit, Attachment E, C.1.b.). Sampling frequency must simply be “representative” of major outfalls and identified stations within each hydrologic subarea. (Id.). The actual frequency of sampling is not mentioned at all. As with most plans developed by Copermittees, this monitoring plan will surely be greatly and artificially constrained by costs. Therefore, we urge the Regional Board to set a minimum monitoring frequency that is scientifically sound, as opposed to a cost-driven frequency.

C. Publicly and Electronically Available Documents and Monitoring Will Help Inform the Public and Regional Board, and Reduce Annual Report Burdens

Most Copermittees expend tremendous resources on preparing and submitting their Annual Reports, but view this requirement as overly burdensome and largely an exercise in futility. After reading numerous and varied municipality Annual Reports, we tend to agree. Annual Reports are massive documents with surface-level detail, no depth, and very little substance. Copermittees are loath to point out any failures or inadequacies in their storm water programs, and virtually never

highlight deficiencies. Instead, systemic issues such as lack of enforcement and funding, evident during field visits, remain unmentioned in Annual Reports.

Therefore, the Bay Council suggests a more appropriate tool for public involvement, reporting, and monitoring progress would be real-time or quarterly electronic reporting. The State Water Resources Control Board has moved into the digital age, making a variety of documents and reports publicly available via the internet.[4] We encourage the Regional Board to work with Copermittees, utilizing the permissive Permit language to explore such a possibility. Neither the Regional Board, nor the individual Copermittee, is served by rigid reporting requirements that result in largely unread or useless documents. (Permit, K.)

Specifically, the dry and wet weather monitoring results should be available publicly online as soon as the results are received. NAL and SAL exceedance real-time reporting would benefit Copermittees as the public could aid in investigations or prove an otherwise valuable source of information. Such real-time reporting might also prove a successful deterrent to illicit discharges. The Copermittees should further report inspections, BMP maintenance tracking, and SSMP project inventories quarterly. Construction site, municipal, industrial, and commercial inspections should also be reported quarterly. This type of information is invaluable to the public and the Regional Board, but is largely unavailable to either as Annual Reports are an attempt to summarize such information compiled over long periods of time. Smaller doses would prove more useful and easily digestible.

D. HMP Exemptions Will Prevent Rehabilitation of Channelized Streams

As with the San Diego HMP, the exemption for conveyance channels whose bed and bank are concrete lined all the way from the point of discharge to water storage reservoirs and lakes will prevent rehabilitation of these areas, especially in light of the retrofit requirements elsewhere in the Permit. (Permit, F.1.h.(4)(b)). Moreover, this exemption encourages continued channelization efforts. We urge the Regional Board to remove this exemption.

E. The Regional Board Should Develop Plans – Rather Than Copermittees

With the HMP and with all other plans required by the Permit, such as monitoring, it is imperative that the Regional Board play the lead role. Bay Council understands, given budget constraints and furlough restrictions, the Regional Board has fewer resources and more work to do. Nonetheless, as permit requirements are delegated to Copermittees for development and planning, water quality suffers and NGOs and the public are left out of the process.

As with the San Diego HMP, this Permit requires Copermittee-driven HMP development. However, the San Diego process serves to shed light on the likely result: an artificially cost-constrained plan with frequent exercise of exemptions. Therefore, it is critical that the Regional Board play a lead role in the development of the HMP and all other plans.

If the current practice remains, Copermittees will expend large sums of money in developing a plan made publicly available (and indeed reviewed by the Regional Board) at the end of the process. Often the Regional Board and public are faced with two equally unappealing options: force the Copermittees to start anew and delay implementation; or accept an inadequate plan. The final product in this type of planning further represents a financial commitment by Copermittees. Because of this financial investment, Copermittees that may have been able to proceed in a different direction at the

[4] Geotracker, DMR, CIWQS, and ESI.

beginning stages of development, are unable to afford (or unwilling to pay for) repeating the process after the plan is fully developed.

A possible remedy is a cost-share plan, or outside consultant who is employed by the Regional Board, reports to the Regional Board, but is paid via Copermittee funds. In order to foster a truly public process, and scientifically driven compliance (as opposed to cost-constrained), the Regional Board must remain the ultimate decisionmaker, with staff developing plans—not Copermittees.

Therefore, we urge the Regional Board to commit to heavy oversight if not a cost-share mechanism to take charge of the development of these plans in order to ensure timely completion and true advancement of water quality.

F. The Watershed Water Quality Workplan Presents A Unique Opportunity for Public Involvement

The Permit requires identification of sources causing the highest water quality problems within the Upper Santa Margarita Watershed. (Permit, G.1.c.). A relatively easy aid to identification of such sources is expanded public outreach. We urge the Copermittees to survey the public and NGOs in the area in ranking water quality problems. In addition, Copermittees should provide bilingual public notice of annual watershed workplan meetings by sending such notices directly to area residents or holding special semi-annual workshops, especially in underserved communities. Copermittees might find the public particularly useful in source identification and BMP implementation strategies. This could further serve as an effective tool to meet the education and public participation Permit requirements. (Permit, G.4.). Lastly, we urge the Copermittees in Riverside County to reach out to Copermittees in the lower portion of the Watershed to coordinate source identification and monitoring activities.

IV. Conclusion

The San Diego Bay Council applauds the Regional Board for many of the Permit measures, while offering suggestions for needed improvements. We look forward to continued participation in the review process and approval hearing. Thank you for your consideration of these comments.

Sincerely,

Bruce Reznik
Executive Director
San Diego Coastkeeper

Marco Gonzalez
Legal Director
Coastal Environmental Rights Foundation

Joe Geever
CA Policy Coordinator
Surfrider Foundation

James A. Peugh,
Conservation Chair
San Diego Audubon Society

UNITED STATES MARINE CORPS
MARINE CORPS BASE
BOX 555008
CAMP PENDLETON, CALIFORNIA 92055-5008

In Reply Refer to:
5090.7B
ENVSEC/426
September 7, 2010

Executive Officer
Attention: Mr. Ben Neill
California Regional Water Quality Control Board
San Diego Region
9174 Sky Park Court, Suite 100
San Diego, CA 92123

Subj: San Diego Regional Water Quality Control Board, Order No. R9-2010-0016, NPDES No. CAS0108740, County of Riverside, the Incorporated Cities of Riverside County, and the Riverside County Flood Control Water Conservation District

Marine Corps Base Camp Pendleton supports the Regional Water Quality Control Board's efforts to promote water quality and low impact development and appreciates the opportunity to review and comment upon the subject draft permit. Camp Pendleton's Director of Water Resources has expressed concerns over potential unintended consequences to water rights and water supply that could result from requirements contained in the draft permit. Please consider the enclosed comments.

If you have any questions, please contact Ms. Gabrielle Skipper at (760) 725-9760. Thank you.

Sincerely,

A. C. ENTINGH
Head, Environmental Compliance Department
Assistant Chief of Staff, Environmental Security
By direction of the Commanding Officer

Enclosures: Director of Office of Water Resources Letter

UNITED STATES MARINE CORPS
OFFICE OF WATER RESOURCES
MARINE CORPS BASE
BOX 555013
CAMP PENDLETON, CALIFORNIA 92055-5013

07 Sept 10

MEMORANDUM

From: Director, Office of Water Resources, AC/S Facilities, Camp Pendleton
To: Compliance Department Head, AC/S Environmental Security, Camp Pendleton

Subj: San Diego Regional Water Quality Control Board ("Regional Board"), Order No. R9-2010-0016, NPDES No. CAS0108740, County of Riverside, the Incorporated Cities of Riverside County, and the Riverside County Flood Control Water District Conservation

The Office of Water Resources (OWR) respectfully requests that the below comments regarding the Proposed Tentative Order be forwarded to Regional Board for consideration. Submitting such comments will help ensure that the national defense priorities of Camp Pendleton, particularly as they pertain to water supply and water rights, are not frustrated by the potential unintended consequences of the Proposed Tentative Order.

The Office of Water Resources Supports Low Impact Development (LID) in Concept:

The Office of Water Resources (OWR) supports the concept of LID from a water quality perspective. Cleaner water coming onto Camp Pendleton not only sustains healthy ecosystems, but also ensures water in Camp Pendleton's aquifers is safe and suitable for potable use. Although, implementation of LID is expected to improve the quality of water that reaches Camp Pendleton via the Santa Margarita River (SMR), if improperly structured, LID has the potential to reduce the volume of high quality water that would otherwise arrive downstream to support beneficial uses on Camp Pendleton. Beneficial uses on Camp Pendleton, which are supported by historic baseflows in the SMR, include—but are not limited to--providing seventy percent of Camp Pendleton's water supply and sustaining populations of threatened and endangered species.

The Proposed Tentative Order Remains Problematic From a Water Supply Perspective:

OWR appreciates that the Regional Board has already included provisions in the Proposed Tentative Order that appear oriented towards protecting downstream water users from encroachment of historical flows. However OWR remains concerned that some provisions in the Proposed Tentative Order could be read to incentivize removal of native SMR water from the watershed in a manner that has the potential to reduce SMR baseflows. We have suggested revisions to the Proposed Tentative Order at the end of this memorandum that we believe will further reduce the risk to our water supply.

Treatment of Runoff Before Discharge into Receiving Waters:

Finding E.7 on (page 14) raises a potential dilemma for MS4 operators that could facilitate large scale impoundment and export of stormflows for "runoff treatment" to the detriment of downstream water right holders. Specifically, Finding E.7 states that"[t]reatment and/or mitigation must occur prior to the discharge of runoff into receiving waters." Because achieving water quality standards may require extensive treatment—particularly to achieve the existing nutrient standards in the Basin

Plan, there is real risk that developers of large scale development/retrofit projects will impound large amounts of water onsite in lined facilities or export the water to a watershed with less stringent water quality objectives where the water can be discharged (or reclaimed for consumptive use) at significant savings to the MS4 or project developer.

To address this concern, the Regional Board should consider adding a section to the Findings in the Proposed Tentative Order which clarifies that impoundment or export of stormwater/rainwater for the purpose of avoiding pertinent discharge standards and/or basin plan objectives is not a proper use of stormwater absent demonstration of compliance with California Water Code Sections 1200-1225.

Along these lines, and to reduce risk that stormwater capture will reduce historic baseflows or otherwise diminish the water rights of downstream water users, we recommend the following additional revisions to the Proposed Tentative Order:

1. Revise Section F.1c.8 (page 29) to read as follows:

   Rain water harvesting, where feasible *and fully protective of downstream water rights*, must be implemented as part of the site design and construction, and to supplement offsite beneficial uses.

2. Amend Section F.3.d.2 to add an additional criterion, along the lines below for prioritizing retrofit of existing development:

   (k) the extent such projects are fully protective of downstream water rights[1]

J.N. JUNGREIS

[1] This recommended amendment will promote consistency with Section F.3.d.6(d) and ensure that the prioritization of retrofit projects properly considers the ramifications of retrofit on downstream baseflows.

Construction Industry Coalition on Water Quality

September 7, 2010

David Barker, Supervising Water Resources Control Engineer
San Diego Regional Water Quality Control Board
9174 Sky Park Court, Suite 100
San Diego, CA 92123

Public Comments Regarding Tentative Order R9-2010-0016, Waste Discharge Requirements for Discharges from the Municipal Separate Storm Sewer System (MS4); the National Pollutant Discharge Elimination System (NPDES) MS4 Permit No. CAS0108740, to the County of Riverside, the Riverside County Flood Control and Water Conservation District, and the Cities of Murrieta, Wildomar, and Temecula

Dear Mr. Barker:

On behalf of the more than 3,000 member companies of the Construction Industry Coalition on Water Quality (CICWQ), we would like to thank the San Diego Regional Water Quality Control Board (Regional Board) for the opportunity to offer this public comment on the revised tentative order (Tentative Order or Permit) No. R9-2010-0016. This letter provides brief constructive suggestions that we have for the Tentative Order and is in support of those comments (written and oral) that we have made to the Regional Board previously on several occasions during the South Orange County MS4 permit adoption process (permit adopted in December 2009).

We have concerns with the Tentative Order relating to the implementation of Low Impact Development (LID) best management practices as described in Program Provisions, F.1.d.(4). Of these concerns, the principal issues that we raise here are: i) the exclusion of economic feasibility when a project proponent is required to evaluate and install LID best practices and; ii) the requirement for onsite retention of stormwater with no discharge.

Exclusion of Economic Feasibility in Considering Appropriate LID BMPs

The exclusion of economic feasibility in provisions F.1.d.(4)(a), F.1.d.(4)(c), and F.1.d.(7)(b) is readily apparent (only technical feasibility is mentioned) and we urge correction and explicit recognition of conducting both technical and economic feasibility analysis when evaluating the appropriate combination of LID controls that meet the Permit's performance sizing criteria as defined in F.1.d.(4)(c). In particular, the Tentative Order requires in F.1.d.(4)(a) that "each copermittee must require LID BMPs or make a finding of technical infeasibility for each priority development project" and in F.1.d.(4)(c) that "if onsite infiltration LID BMPs are technically infeasible per section F.1.d(7)(b), other LID BMPs may be allowed for use to treat stormwater onsite provided that other LID BMPs are sized to hold the design storm volume that

is not infiltrated." In both instances, economic feasibility is excluded and this omission must be corrected given the importance of balancing technical and economic feasibility. In fact, the San Diego Regional Board recognized the importance of economic feasibility in the South Orange County MS4 permit and included the following language in the adopted permit (R9—2009-0002, Section F.(7)(b)):

"For each PDP participating, a technical feasibility analysis must be included demonstrating that it is technically infeasible to implement LID BMPs that comply with the requirements of Section F.1.(d)(4). ***The Copermittee(s) must develop criteria for the technical feasibility analysis including a cost benefit analysis, examination of LID BMPs considered and alternatives chosen****." (Emphasis added).*

We ask that the Board make the south Riverside County permit language at least consistent with that included in the adopted south Orange County MS4 permit and explicitly allow economic feasibility to be considered when evaluating appropriate LID BMPs to meet the onsite performance standard.

Onsite Retention of Stormwater with No Discharge

We appreciate the Board's recognition in the Fact Sheet that properly engineered LID filtration BMPs are available to a project developer to meet the LID performance standard. However, we are troubled by the pervasive use of the terms "without runoff" and "hold the design storm volume that is not infiltrated" in the Tentative Order. These terms continue to propagate the incorrect application of LID in that stormwater that has undergone filtration and/or treatment cannot be of equal or better quality than that retained on site given the performance criteria specified in F.1.d.(4)(c). We again urge the Regional Board to eliminate these terms and expressly allow biofiltration and biotreatment LID practices to meet the onsite performance standard without having to perform an exhaustive technical and economic feasibility analysis and to not relegate these controls to a lesser status.

If you have any questions or want to discuss the content of our comment letter, please feel free to contact me at (909) 525-0623, or mgrey@biasc.org.

Respectfully,

Mark Grey, Ph.D.
Technical Director
Construction Industry Coalition on Water Quality

COUNTY OF RIVERSIDE
TRANSPORTATION AND LAND MANAGEMENT AGENCY
Transportation Department

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Juan C. Perez, P.E., T.E.
Director of Transportation

September 7, 2010

Chairman David King and Members of the Board
San Diego Regional Water Quality Control Board
Attn: Executive Director Gibson
9174 Sky Park Court, Suite 100
San Diego CA 92123-4353

RE: Draft Tentative Order No. R9-2010-0016 (NPDES No. CAS0108740) - Proposed Unpaved Road Requirements

Dear Mr. Gibson:

The Riverside County Transportation Department has reviewed the proposed requirements applicable to unpaved roads presented in the Draft Municipal Separate Storm Sewer System Permit (Draft Tentative Order No. R9-2010-0016 (NPDES No. CAS0108740) for the Santa Margarita Region of Riverside County (Draft MS4 Permit) and has identified several major concerns. We appreciated the opportunity to meet recently with you and staff to discuss our concerns. Primarily, they have to do with requirements being imposed through this permit that go well above-and-beyond what is required in the Orange County permit to regulate the operation and maintenance of unpaved roads.

SUMMARY

There are many different categories of unpaved roads within the unincorporated County area. These include County-Maintained unpaved roads, dedicated and accepted public roads (which are not County maintained), roads dedicated but not accepted, private roads, utility access roads, roads through tribal lands, and others. These roads are maintained by numerous entities besides the County, such as Homeowners Associations, Quasi-public entities like County Service Areas, Community Service Districts, public and private utilities, Tribes, and in many cases, individual property owners. The County in fact is prohibited by law from spending general gas tax dollars (our main funding source) for maintenance of roads not in the County Maintained Road System, and is not financially able to take on new unpaved roads into the County Maintained System until they are improved to County Standards.

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The proposed permit requirements would therefore impose an undue and substantial regulatory burden on the County and would create a class of potential unwitting "violators" that are not familiar with these requirements, including hundreds if not thousands of property owners that have been maintaining unpaved roads for many decades as needed to access their property. The special requirements for development and maintenance of unpaved roads were proposed by Regional Board staff for inclusion in the draft MS4 Permit very late in the process, after a number of weeks of discussions on the overall permit language and just prior to release for the Santa Margarita Region for public comment. During those discussions, unpaved roads were not raised by Regional Board staff as a source requiring additional regulatory attention.

Given the complexity of these jurisdictional issues, and the number of stakeholders that would be impacted, we respectfully request that the regulation of unpaved roads be removed from this permit. Alternatively, unpaved roads could be considered as part of a separate general permit to allow for proper stakeholder involvement and vetting, at the least within those areas of the permit (see below) that have to do with maintenance provisions. Given the complexity of this issue and the impact on thousands of properties, another option is to achieve a water quality benefit through education programs, not using limited resources on regulation and enforcement. We also note that unpaved road regulation was not included in the recent Orange County permit. Orange County receives approximately 8 times the amount of funding on a per mile basis towards their County-Maintained roads as does Riverside County, so imposing additional requirements on the Riverside County permit magnifies the undue regulatory and financial burden.

The Draft MS4 Permit includes requirements for unpaved roads that are either redundant to existing regulatory requirements or that impose new regulation requirements at a time that the County can ill afford to start new programs. The language proposed needs clarification to avoid potential misinterpretations that may result in operational disruptions to the transportation system and/or compliance costs way out of proportion to the potential impact on receiving water quality. Although the Department supports implementation of erosion and sediment control best management practices (BMPs) as appropriate for development of new unpaved roads, it does not agree that the statements in the Fact Sheet and Findings support identification of unpaved roads as a significant source of pollutants warranting special regulation. The following summarizes the Department's specific concerns and perspectives.

UNPAVED ROAD DEVELOPMENT REQUIREMENTS

Requirements for the development of unpaved road projects are addressed in section F.1.i. on page 45 of the Draft MS4 Permit. This requirement states:

i. Unpaved Roads Development

> The Copermittees must develop, where they do not already exist, and implement or require implementation of erosion and sediment control BMPs after construction of new unpaved roads. At a minimum, the BMPs must include:
>
> (1) Practices to minimize road related erosion and sediment transport;
> (2) Grading of unpaved roads to slope outward where consistent with road engineering safety standards;
> (3) Installation of water bars as appropriate;
> (4) Unpaved roads and culvert designs that do not impact creek functions and where applicable, that maintain migratory fish passage;

It is our contention that construction of new unpaved roads is already adequately regulated through development regulations. New unpaved roads built through development fall under the definition of a "project", and as such are already required to develop and implement project-specific SUSMPs, which include identification of BMPs in the same manner as required of other development projects. Unpaved road projects are also required to comply with the General Permit-Construction which requires preparation of a SWPPP. These requirements are implemented by the Permittees during the development review process and in issuance of grading permits. We also note that the development process already achieves a gradual "retirement" of unpaved roads, as the County requires in many cases that new development replace unpaved access roads with paved access.

Additional separate requirements for development of unpaved roads are redundant to these requirements and may only complicate compliance. However, if the Board wishes to include permit language to further clarify what is already required through these permits, we would be pleased to work with the Board to help craft appropriate language.

UNPAVED ROAD MAINTENANCE

This is our primary issue of major concern, particularly since the proposed language would appear to impose regulatory requirements on roads that are not part of the County Maintained Road System that we operate.

Requirements for the maintenance of unpaved road projects are addressed in section F.3.a.(10) on page 56 of the Draft MS4 Permit. This requirement states:

> (10) Unpaved Roads Maintenance
>
> (a) The Copermittees must develop, where they do not already exist, and implement or require implementation of BMPs for erosion and sediment control

measures during maintenance activities on unpaved roads, particularly in or adjacent to receiving waters.
(b) The Copermittees must develop and implement or require implementation of appropriate BMPs to minimize impacts on streams and wetlands during unpaved road maintenance activities.
(c) The Copermittees must regularly maintain their unpaved roads adjacent to streams and riparian habitat to reduce erosion and sediment transport;
(d) Re-grading of unpaved roads during maintenance must be sloped outward where consistent with road engineering safety standards;
(e) Through their regular maintenance of unpaved roads, the Copermittees must examine the feasibility of replacing existing culverts or design of new culverts or bridge crossings to reduce erosion and maintain natural stream geomorphology.

As we have stated, this issue should be addressed through a broad general permit or an education program. However, if the Board finds it necessary to impose additional permit requirements on maintenance activities, which go well beyond the Board's previous definitions of a "project", we respectfully request that this language be re-written to make it clear that it applies to those roads within the County (or City) Maintained Road System.

UNPAVED ROADS ARE NOT A SIGNIFICANT SOURCE OF WATER QUALITY IMPAIRMENT

Findings D.1.C, pg 57-59, states:

> "During the previous permit period, the San Diego Water Board identified, through investigations and complaints, sediment discharges from unpaved roads as a significant source of water quality problems in the Riverside County portion of the San Diego Region. Enforcement and inspection activities conducted by the San Diego Water Board during the previous permit term have found a lack of source control for many unpaved roads within the jurisdiction of the Copermittees".

The Department supports the continued application of development and construction requirements and maintenance of temporary post-maintenance erosion and sediment control BMPs as specified in existing permits. However, we do not believe that sufficient justification has been presented to support the identification of unpaved roads as a significant source of water quality problems in the Santa Margarita Region. In these days of uncertain state funding and dwindling local funding sources, every dollar spent on additional regulatory requirements needs to be weighed against the benefit of otherwise using funding on basic public health-and-safety needs such as road maintenance and safety improvements.

The discussion of Finding D.1.c. states that the inclusion of unpaved road requirements were based on findings by the San Diego Regional Board during typical compliance assurance activities, audits, or receipt of complaints. However no feedback from these activities were reported to the Permittees at the MS4 Permit discussions prior to the proposal of the unpaved road requirements just before the draft permit was released.

The Department has reviewed the documents cited by Regional Board staff in the discussion of Finding D.1.c. and the conditions in the Santa Margarita River are vastly different from those in Pennsylvania and Northern California cited in those documents. Nevertheless, these documents do not suggest that unpaved roads are a significant source requiring special attention in MS4 permits. Further, neither the Permittee's monitoring data nor our observations support a conclusion that unpaved roads are a significant source of pollutants warranting special regulatory attention and we request that this finding be deleted unless significant data specific to the Santa Margarita Region can be produced. In particular, the Department requests a copy of the investigations and complaints along with the data that supports a significant source of water quality problems on unpaved roads, including a listing of roadways where water quality problems have been identified.

Thank you for the opportunity to review and comment on the Draft MS4 Permit. The County of Riverside Transportation Department is committed to managing the roads and highways within our County Maintained Road System in a manner that protects water quality. Our goal is to work constructively with the Regional Board staff to improve the effectiveness with which we address water quality issues, and put limited public and private dollars into those programs that provide the best return. We would be pleased to meet with you to discuss regulation of unpaved roads further and to explain our unpaved road development, construction, and maintenance practices.

Please feel free to contact me or Ward Maxwell at 951-955-6740 if you have any questions regarding our comments on the proposed unpaved road requirements or our requests for modification of the draft Santa Margarita Region MS4 Permit.

Sincerely,

Juan C. Perez
Director of Transportation

CC: George A. Johnson, TLMA Director
Mike Shelter, Executive Office
Patty Romo, Deputy Director of Transportation
Ward Maxwell, Engineering Project Manager
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RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

September 7, 2010

Chairman David King and Members of the Board
San Diego Regional Water Quality Control Board
9174 Sky Park Court, Suite 100
San Diego, California 92123-4353

Dear Chairman King:

Re: Tentative Order R9-2010-0016, NPDES No. CAS0108740, Riverside County Municipal Separate Storm Sewer System Permit Reissuance *NWU:749045:bneill*

The Riverside County Flood Control and Water Conservation District (District) is submitting this comment letter on the above listed Tentative Order, on behalf of the Riverside County MS4 Permittees within the San Diego Region (Copermittees). Tentative Order R9-2010-0016 (draft MS4 Permit) was drafted by Board staff to serve as the reissuance of Order R9-2004-0001 (existing MS4 Permit) which covers the Santa Margarita Region of Riverside County. This letter was developed in consultation with the Copermittees and reflects our most critical concerns. The Board's careful consideration of these critical concerns will be appreciated.

This comment letter is organized as follows:

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- Receiving Waters and Water quality Conditions 4
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Conclusion 17

In addition, the following attachments provide support for our priority issues and solutions, provide additional legal comments and/or summarize additional technical changes recommended to the draft MS4 Permit. Attachment 9 is a full redline markup of the draft MS4 Permit incorporating all of our recommended edits. Attachment 9 also includes additional minor edits not found elsewhere in this letter or its attachments.

Attachment 1 – Summary of Proactive Efforts to Manage Stormwater
Attachment 2 – Economic Assessment
Attachment 3 – Language Changes Supported by Board Staff and Copermittees
Attachment 4– Monitoring and Reporting Program Requirements
Attachment 5 – Proposed Unpaved Road Requirements of the Draft 2010 Santa Margarita Region MS4 Permit
Attachment 6 – Prohibition of Irrigation Runoff
Attachment 7 – General Legal Comments
Attachment 8 – District Specific Comments
Attachment 9 – Redline Comments of MS4 Permit and Attachments
Attachment 10 - Fact Sheet Comments

EXECUTIVE SUMMARY

It is the goal of the Copermittees to obtain an MS4 permit that is both protective of the beneficial uses of the receiving waters in the Santa Margarita Region and respectful of the unprecedented economic conditions impacting the Copermittees. Further, the Copermittees have no interest in repeating the three-year Orange County MS4 Permit adoption process. In an effort to achieve our goal and head off a renewal process similar to Orange County's, the Copermittees approached David Gibson, Regional Board Executive Officer, in February 2010 regarding implementing a win-win process for developing the draft MS4 Permit.

In response, the Executive Officer authorized Board staff to meet with the Copermittees to foster communication and understanding. The Copermittees appreciate the Executive Officer's decision to dedicate staff time to meetings regarding the individual requirements of the South Orange County MS4 Permit and the appropriateness of those individual requirements to the Santa Margarita Region. The meetings provided an opportunity to foster a mutual understanding of the goals and objectives of Board staff and the capabilities and limitations of the Copermittees. As a result, the Permittees and Regional Board staff worked collaboratively to develop language for consideration in the Tentative Order.

However, the process did not resolve several significant issues due to the following constraints:

1. The process needed to be cut short as the Board expected the draft MS4 Permit to be heard in October. Copermittee staff requested that the hearing be delayed to allow the process to complete several times, but these requests were denied;

2. Regional Board staff indicated that the Board had adopted the South Orange County MS4 Permit as a model permit and, therefore, the Board would have to approve any major revisions to the provisions established in that MS4 Permit; and

3. Regional Board staff indicated that the Board would have to resolve our issues with several new provisions of the draft MS4 Permit addressing unpaved roads, inspection programs and monitoring requirements, all requirements that exceed the provisions of the Orange County MS4 Permit.

Although the collaborative process has improved the draft MS4 Permit with respect to several provisions of the Orange County MS4 Permit, Board staff also introduced several costly compliance and monitoring requirements, many of these requirements were introduced during the very latter part of the collaborative process. As described within this letter and its attachments, **the remaining issues and these new requirements result in a Permit that is economically infeasible** and has no substantiated nexus to demonstrated impairments of beneficial uses within the Santa Margarita Region caused by MS4 discharges. **At a minimum, the Priority issues outlined below must be addressed before the Copermittees can support the draft MS4 Permit.**

The Copermittees note that despite being directed to take several important issues to the Board, we have not been provided an opportunity for a formal or informal workshop before the Board. By contrast, the South Orange County MS4 Copermittees had at least three workshops and five formal hearings prior to adoption of that permit. Although we do not want to duplicate the Orange County renewal process, it is common practice to allow at least one workshop on significant permit issues before holding an adoption hearing. Given the issues outlined in this letter and in the attachments, there are numerous issues worthy of at least one workshop.

The Copermittees also have significant concern with the use of the South Orange County MS4 Permit as a model for our MS4 Permit area. As outlined in more detail throughout this letter and the attachments, the South Orange County and Santa Margarita Region MS4 Permit areas vary widely with regard to the water resources to be protected and available tax revenue to fund local programs and services, including compliance with MS4 permit requirements. Orange County has substantial coastal water resources with active recreational use, twice the population, and significantly higher tax revenues. The per capita cost for the residents within the Santa Margarita Region to comply with the requirements of the draft MS4 Permit is significantly greater than the per capita cost faced in South Orange County, with each dollar spent effectively hitting our residents three to four times harder. The expansion of regional program elements (e.g., coordination, monitoring, reporting, program development, effectiveness assessment) will result in an annual doubling of these costs, with a peak increase of nearly 300% for these programs alone. The Copermittees simply cannot economically support, nor does the Santa Margarita Region warrant, the same level of programs as South Orange County to protect our local receiving waters.

In summary, the meetings between Regional Board staff and Copermittee staff were honest, good faith and productive efforts to bridge the gaps between the requirements of the Orange County MS4 Permit and the specific needs of, and resources available to, the Upper Santa Margarita Watershed (the draft MS4 Permit area). However, given the constraints identified herein, the differing impacts on beneficial uses and current economic realities, the current draft MS4 Permit cannot be supported by the Copermittees.

> ***The Copermittees, therefore, request that the Board direct staff to work with the Copermittees to resolve the issues identified in this letter prior to considering adoption of the Permit.***

In the interest of developing economically feasible requirements for Board consideration, the balance of this letter and its attachments propose and justify changes to the draft MS4 Permit that will reduce costs to an achievable level, while continuing to raise the bar, where appropriate, to effectively protect the beneficial uses of receiving waters in the Santa Margarita Region. Please note that the Copermittees have many other concerns in addition to those identified in this letter with provisions in the draft MS4 Permit. These concerns are discussed in the Attachments to this letter, the redline of the Permit and the letters drafted by individual Copermittees.

BACKGROUND

Receiving Waters and Water Quality Conditions

This draft Permit proposes to regulate discharges from the MS4 owned by the Copermittees within the Santa Margarita Region of Riverside County. The MS4 in the Santa Margarita Region primarily discharges into Murrieta and Temecula Creeks and immediate tributaries thereto.

Unlike several of the watersheds in South Orange County, which exhibit perennial flow, the Santa Margarita Region is an ephemeral watershed. The only areas of perennial flow in the Santa Margarita Region are located at the formation of the Santa Margarita River right at the County line and in mountain areas outside of the urbanized areas serviced by the MS4s. The creeks in the urbanized areas of the watershed serviced by the MS4s are ephemeral and flows are only observed during and immediately after significant storm events. Any non-stormwater flows quickly disappear by seepage into the alluvial sands. Additionally, rising groundwater has been observed in Murrieta and Temecula Creeks for a short distance at various locations upstream of the confluence with the Santa Margarita River; however such conditions existed prior to urbanization.[1]

Since the initial MS4 permit was issued in 1990, the Copermittees have been actively and successfully implementing programs to manage their MS4 discharges. As described in the 2009 report of waste discharge (ROWD) submitted by the Copermittees, there have been no statistically

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[1] [1] State of California Department of Public Works Division of Water Resources, Bulletin No. 57, "Santa Margarita River Investigation," Volume I, June 1956, p. 48.

significant increases in pollutant concentrations since issuance of the initial MS4 permit in 1990, despite the fact that the Santa Margarita Region has experienced over 300% population growth over the same time period. Further, although staff points out several recent 303(d) listings as basis for the need to enhance regulations, these listings were based on data that mostly predates our existing management programs implemented under the 2004 NPDES MS4 Permit. Further, the Permittees have submitted additional data for the current round of listings that should result in the removal of some of these additional listings based on more recent data. Additionally, the likely sources of these impairments include natural background concentrations in soils and groundwater (iron and manganese), natural and/or agricultural source loads (nutrients, total dissolved solids, sulfates and bacteria), and/or federally authorized uses of products (pesticides and copper). Although all of these sources can have urban components, it is also clear that these sources are mostly non-point in nature and not solely urban sourced, as implied in the Fact Sheet and Findings.

Proactive Permittee Programs to Protect Local Resources

Murrieta and Temecula Creeks and their tributaries are an important economic, environmental and social resource for the Santa Margarita Region. The Copermittees are cognizant of these benefits and have implemented or initiated proactive programs beyond the requirements of the current and previous MS4 permits to ensure that these resources remain viable and are protected for future generations. These programs are described in Attachment 1 and include:

- Integrated Planning, including the development of an Integrated Regional Water Management Plan that is actively coordinated with San Diego and Orange Counties.

- Management of New Development, including a progressive LID BMP implementation program five years in the making. The program includes a comprehensive LID BMP design manual, proposed public maintenance mechanism and a $3,000,000 LID BMP Testing and Demonstration Facility.

- Water Quality Monitoring and Assessment, including active participation in the Southern California Stormwater Monitoring Coalition, California Stormwater Quality Association (CASQA) and Santa Margarita Region Executive Management Team, and including funding of several special studies designed to improve the science of stormwater management.

- Statewide Stormwater Leadership, including active leadership in promoting changes in the regulations of pesticides at the state and federal level and strong leadership and representation within the CASQA organization.

- Habitat and Aquatic Resource Conservation, including development of the largest and most comprehensive Multiple Species Habitat Conservation Plan in California.

Economic Conditions

As the draft MS4 Permit for the Santa Margarita Region of Riverside County was modeled on the MS4 Permit developed for South Orange County, it is important to carefully contrast the economic resources available to the Counties:

- The population of the Santa Margarita Region (289,765) is 48% less than the population of South Orange County (553,161).[2]

- The 2009 per capita income in Riverside County ($29,177) is 38% less than the per capita income in Orange County ($46,898).[3]

- The current unemployment rate in Riverside County is 15.3 percent, which is 56% higher than the unemployment rate in Orange County (9.8 percent).[4]

Property and sales tax revenues are the primary sources of funding for local programs and services, including compliance with MS4 Permit requirements. Based on population and average home value, South Orange County generates over <u>four times</u> the property tax revenue generated in the Santa Margarita Region. Based on data presented in the Los Angeles Economic Development Corporation's July 2010 Economic Forecast, South Orange County generates <u>2.6 times</u> the taxable sales generated in the Santa Margarita Region. As a less affluent area with a relatively small population, the Copermittees in the Santa Margarita Region receive significantly less property and sales tax revenue than municipalities in South Orange County and are less able to fund additional MS4 Permit compliance costs. These issues are discussed in detail in Attachment 2.

The recession also has impacted the economy in the Santa Margarita Region more than in South Orange County and it is projected that tax revenues will continue at a reduced level for an extended period, with **recovery not expected within the Permit term**. The poor economy has resulted in reductions of reserves to minimum levels and cuts or eliminations in virtually all local services and programs in the Santa Margarita Region. As a result any increases in funding for the water quality mandates contained in the draft MS4 Permit can come only by reducing funding for public safety or other existing state and federal mandates.

Modeling the draft MS4 Permit on the South Orange County permit represented a significant expansion of compliance requirements and compliance costs relative to the existing MS4 Permit issued to the Santa Margarita Region Copermittees. The requirements in the draft MS4 Permit have been expanded to include additional compliance and monitoring requirements beyond the South

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[2] Richard Boon, County of Orange, personal communication, September 1, 2010.
[3] Economic Forecast, Los Angeles Economic Development Corporation, July 2010.
[4] Monthly Labor Force Data for Counties, July 2010 – Preliminary, Labor Market Information Division, Employment Development Department, August 20, 2010. http://www.calmis.ca.gov/file/lfmonth/countyur-400c.pdf

Orange County permit, further increasing compliance costs. We would submit that such an approach is fundamentally unfair and could be viewed as arbitrary.

Approach to the Permit Renewal

As noted above, the Copermittees share the Board's goal of continually improving both the effectiveness and the efficiency of the MS4 compliance program. To that end, the Copermittees proposed program revisions in the ROWD that were designed to effectively manage/address the discharge of pollutants from their MS4, while making effective and responsible use of sharply reduced and further declining public funds. The ROWD recognized the Copermittees' proactive efforts and integrated those efforts into our recommendations for enhancing the MS4 Permit program. Further, the Copermittees met with Regional Board staff prior to the submittal of the ROWD in January 2009 to ensure that we had identified and addressed all of staff's concerns.

In March 2010, the Copermittees met with the Regional Board staff to discuss a collaborative process for renewing the draft Permit. At that time, the Executive Officer identified that the Board's fundamental goals for the renewal would be to develop a permit that is:

- Socially responsible;
- Environmentally responsible;
- Affordable; and
- Protective of water quality.

The Copermittees proposed initiating the discussions by focusing on the existing MS4 Permit and identifying what provisions needed to be changed to address local water quality conditions, the approach outlined in the ROWD. Regional Board staff preferred to start with the South Orange County permit and require the Copermittees to justify why programs in the Santa Margarita Region should be different than those proposed for Orange County. Regional Board staff also noted that none of the major provisions of the South Orange County permit could likely be altered, as that permit was now a model for the San Diego Region. In the interest of moving the process forward in light of the current economy, the Copermittees agreed to proceed based on the Board staff's terms.

Outcome of Discussions with Board Staff

The discussions resulted in several improvements to the draft Permit including:

- Streamlined and more useful reporting and effectiveness assessment requirements.
- Greatly improved Development Planning / Low Impact Development (LID) requirements (further discussed in Attachment 3).

- Language clarifications to more clearly state the intent of various requirements and to eliminate ambiguity.

- Enhanced understanding of the permit requirements and intent.

However, the addition of several new requirements not originally in the Orange County MS4 Permit as well as the constraints of working from within the boundaries of the existing Orange County MS4 Permit, resulted in an economically infeasible draft MS4 Permit that exceeds the water resource protection needs of the Santa Margarita Region and is too expensive for implementation by the Copermittees. Unless the permit requirements are revised to address specific local needs and resources, the Copermittees will not be able to implement the Permit requirements in a manner that is protective of water quality.

PRIORITY ISSUES AND SOLUTIONS

The Copermittees have identified specific and focused changes to the Permit that will allow the Copermittees to address staff's primary water quality concerns, while reducing compliance costs in a manner that is appropriate for the local watersheds. As previously noted, Board staff has directed the Copermittees to bring these changes directly to the Board for consideration, although we are hopeful that by summarizing them in writing that they may be addressed ahead of the scheduled October 13th hearing.

Monitoring and Reporting Program (Attachment 4)
Prior to the submittal of the ROWD, the Copermittees met with Board staff to propose changes to the Monitoring and Reporting Program (MRP). In these discussions, Board staff identified two areas for needed improvement:

- Relocation of Illicit Connection / Illicit Discharge (IC/ID) monitoring stations to MS4 outfalls, and

- Incorporation of Action Levels

In more recent discussions, Board staff noted that the MRP needed significant modification to reflect the South Orange County MRP, but would be scaled to be appropriate to the smaller Santa Margarita Region.

Unfortunately, the final MRP requirements have been expanded well beyond the South Orange County MRP requirements, resulting in a program that is completely out of proportion with the needs and resources of the Santa Margarita Region. In fact, the proposed MRP requirements will result in a **500% increase in monitoring program costs**, costing our residents **over two and a half times the per capita costs for South Orange County**.

Per Capita Monitoring Cost Comparison

Draft Permit	OC Permit
$5.13 per capita	~$2.00 per capita

The Copermittees recognize that monitoring and data collection is necessary. However, the MRP requirements exceed what is necessary to address management questions related to water quality, are beyond requirements dictated in the South Orange County MRP, and are beyond the Copermittees' ability to fund. Not only are the level of requirements inappropriate for the Santa Margarita Region, but they disregard the economic realities faced by the Copermittees. As such, the MRP falls far short of meeting the Executive Officer's stated goals of affordability.

In the interest of finding ways to offer Board staff a comparable program in a more cost effective and appropriate manner, the Copermittees have identified nine adjustments to the MRP that will **save approximately seven hundred and eighty thousand dollars ($780,000)** ***annually*** and bring per capita monitoring costs more in line with the South Orange County MRP, while maintaining the core components of the MRP. Table 1 summarizes the key changes and the respective cost savings. It is important to note that any change highlighted in RED reflects bringing the program in line with the South Orange County MRP. Figure 1 below shows graphically the comparative costs for the draft MRP with and without the requested adjustments. Please note that the 100% baseline in Figure 2 reflects the current cost of the Copermittees' current MRP.

Table 1 - Cost Savings resulting from proposed MRP changes[1]

Component	Requested Change	Cost reduction
Mass Loading Stations	1) Wet Weather - 3 wet -> 2 wet	**~$79,000**
	2) Dry Weather - Composite -> Grab	**~$66,000**
Toxicity Testing (MLS and Bioassessment)	3) 3 organisms -> 2 organisms	**~$14,000**
Bioassessment	4) 6 stations -> 3 stations	**~$158,000**
	5) 2X each -> 1X each	**~$95,000**
Action Levels	6) 'Representative Number/Percent' -> Representative - and remove 'within each sub area'	**~$241,000**
	7) SAL Composites -> Grab	**~$165,000**
Inland Aquatic Habitat Monitoring	8) Eliminate requirement	**~$140,000**
Special Studies	9) 6 special studies -> 4 studies, and Replace with more locally appropriate studies	**~$220,000/year**
TOTAL ESTIMATED SAVINGS	Net savings of all recommended changes (annualized)	***~780,000/year***

Note: Red text refers to requirements currently in the South Orange County MRP.

1. See Attachment 4 for detail descriptions of requested changes.

Figure 1

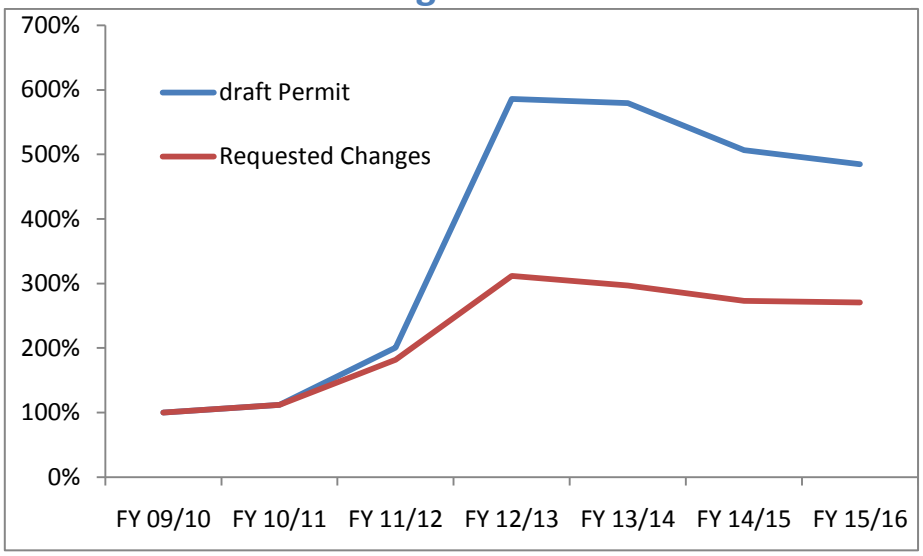

Draft Permit	OC Permit	Proposed Changes
~~$5.13/ per capita~~	~$2.00/per capita	**$2.54/per capita**

Although the requested adjustments to the MRP will not eliminate cost increases, and will result in an MRP which is more expensive, on a per capita basis, than the South Orange County MRP, they provide a more manageable program for the Copermittees.

The Copermittees request that the Board make the adjustments identified in Attachment 4 above before Permit adoption.

Each of these requested adjustments and justifications for each is further discussed in Attachment 4 to this letter.

Unpaved Roads Requirements (Sections F.1.i, F.3.a.(11), F.3.c.(5))
The requirements for unpaved roads are particularly cumbersome, onerous and unreasonable. Our detailed analysis of these requirements is provided in Attachment 5. In summary, the proposed unpaved road requirements may result in substantial and unnecessary additional Copermittee costs that are not justified by the facts in the Santa Margarita Region. The Copermittees believe that the existing MS4 Permit requirements for new development, construction, maintenance and IC/ID adequately address regulation of unpaved roads that threaten water quality. If the Regional Board believes that unpaved roads require further regulation, the Copermittees believe that the appropriate regulatory mechanism is a general permit (Waste Discharge Requirements or NPDES permit) that would apply to *all* unpaved roads in the San Diego Region, rather than only those that are under the jurisdiction of the Copermittees.

The Copermittees request that Sections F.1.i, F.3.a.(11) and F.3.c.(5) regulating unpaved roads be deleted from the draft MS4 Permit.

However, should the Water Board insist on retaining unpaved road requirements in this Permit, the Copermittees request the following revisions. These revisions are needed to ensure that all parties have a clear understanding of the requirements as clarified in Attachment 9. In summary, the Copermittees request:

- Clarification that these requirements apply to those unpaved roads that the Copermittees maintain in their road system.
    - This should be commonly understood, but the clarification is important to include due to complex legal limitations and rights associated with access, ownership, and maintenance of unpaved roads.
- Removal of language that specifies specific BMPs that must be implemented.
    - Specifying the method of compliance is prohibited pursuant to CWC Section 13360, and inappropriately forces the Copermittees to adopt particular solutions that may not best fit the situation.
- Removal of requirement for BMPs for private unpaved roads.
    - The proposed requirements would require the creation of an additional and unnecessary program element addressing privately owned unpaved roads. The Copermittees believe that a focused public outreach program should be implemented to educate property owners and associations about the need to properly maintain unpaved roads. This education program combined with existing IC/ID enforcement capabilities seems a more reasoned and responsible response to addressing this issue.

Should Sections F.1.i, F.3.a.(11) and F.3.c.(5) regulating unpaved roads not be removed from the Permit, the Copermittees request they be modified as noted above. Specific redline edits to address the requested changes are contained in Attachment 9.

Post-Construction BMP Inspections

Section F.1.f of the draft MS4 Permit includes new requirements for the Copermittees to verify that Post-Construction BMPs are being appropriately maintained. The new requirements appropriately develop a risk-based approach to inspections, defining eight factors that the Copermittees must consider in determining 'high-priority' projects.

However, language in Section F.1.f.(2)(a) removes that discretion by stating:

> *'At a minimum, high priority projects include those projects that generate pollutants (prior to treatment) within the tributary area of a 303(d) listed waterbody impaired for that pollutant; or those projects generating pollutants within the tributary area for an observed action level exceedance of that pollutant.'*

This language is excessively broad, and will require virtually all sites in the watershed to be designated as 'high priority' and, therefore, subject to annual inspections. This language is inconsistent with the goals of a socially responsible and affordable permit and should be modified for several reasons:

- Inspections frequencies should be based on risk of discharge. Annual inspections are not needed for all sites that *generate* a specific pollutant. For example, if a site generates a pollutant associated with 303(d) listing, but the site retains runoff onsite or stores those pollutants indoors, annual inspections would be unnecessary. However, sites that store 303(d) listed pollutants outdoors or otherwise have a high risk of discharge should be inspected more frequently.

- The language dilutes Copermittee resources by requiring annual inspections of low-risk sites, preventing the Copermittees from appropriately concentrating resources on problematic sites/sources. This is because when an action level is exceeded then all parties in the watershed are assumed guilty until proven innocent.

While the Copermittees are not opposed to implementing a program to verify that these BMPs are being maintained, it is critically important that they be provided the flexibility to determine which sites warrant annual inspections. **Specifically, the Permittees request that the language in F.1.f.(2)(a) be amended as follows prior to adoption of the Permit:**

> *At a **minimum**, high priority projects include those projects that ~~generate pollutants (prior to treatment) within the tributary area of a 303(d) listed waterbody impaired for that pollutant; or those projects generating pollutants within the tributary area for~~ have been determined to be the source of an observed action level exceedance. ~~of that pollutant.~~*

Commercial and Industrial Inspections

Section F.3.b. of the draft Permit includes requirements to inventory and inspect Commercial and Industrial businesses. The draft Permit expands upon existing inventory and inspection requirements in two problematic ways:

- It requires significantly more businesses to be inspected, and

- It includes new requirements specifying what the Copermittees are required to inspect when they are onsite.

More inspections

Sections F.3.b.(1)(a)(i) and (ii) identify 42 categories of businesses that must be inventoried and inspected based on risk of pollutant discharge. However, Section F.3.b.(1)(a)(iii) adds virtually any business in the Permit area, independent of pollutant discharge risk:

> *'**All** other commercial or industrial sites/sources **within or directly adjacent to or discharging directly to receiving waters within environmentally sensitive areas** (as defined in Attachment C of this Order) or **that generate** pollutants tributary to an observed exceedance of an action level.' (Bold emphasis added)*

In effect, section F.3.b.(1)(a)(iii) adds the following additional businesses:

- EVERY business that is adjacent to (or within) an Environmentally Sensitive Area (ESA), regardless of whether the business generates or discharges any pollutants, and

- EVERY business that 'generates' pollutants which happens to be upstream of an action level exceedance, *regardless* of whether the site has ever *discharged any* pollutants.

This language expands the list of sites far beyond the current requirements, and well beyond those sites that actually pose a threat to water quality. This is clearly unnecessary and should be removed for several reasons:

- It inappropriately separates 'risk' from the 'response', by requiring the Copermittees to inspect businesses irrespective of the risk that the business poses to water quality. For example, this language would require the Copermittees to expend resources and time inspecting hair salons, office buildings and other activities that happen to be adjacent to an ESA. This inappropriate broad-brush approach to permitting actually works to discredit the Copermittees' NPDES programs and dilute resources, rather than enhancing protection of water quality.

- It will further remove the flexibility that the Copermittees need to be able to re-allocate resources to inspecting and following up with sites/sources that are problematic.

Therefore, the Copermittees request that the language in F.3.b.(1)(a)(iii) be amended as follows prior to adoption of the Permit:

> *All other commercial or industrial sites/sources ~~within or directly adjacent to or discharging directly to receiving waters within environmentally sensitive areas (as~~*

~~defined in Attachment C of this Order) or that generate pollutants tributary to~~ that have been determined to be the source of an observed exceedance of an action level.

Additional items to review during inspections

Section F.3.b.(4)(a) specifies what the Copermittees must review when performing an inspection. The new requirements in subsections (i) and (ii) to review BMP implementation plans, and review facility monitoring data, respectively, are an unnecessary new mandate. They should be removed for several reasons:

- The requirements burden the Copermittees with reviewing information that is required under General Permits and is the responsibility of the Regional Board to enforce.

- The requirements would significantly increase the inspection time for sites with General Permits and endanger an existing collaborative inspection program (Complaince/Assistance Program (CAP)) that leverages the time highly trained Environmental Health Inspectors spend onsite for Certified Unified Program Agencies (CUPA) and Food Services inspections to also conduct NPDES inspections. The CAP program not only utilizes highly trained Environmental Health inspectors, but also regionalizes the inspections and, therefore, provides multiple benefits including uniformity, reduction in total number of inspections and higher-quality inspections. The Environmental Health HazMat inspection program administrators have indicated that they cannot accommodate the additional time required to implement the new requirements, as they would unduly cut into their ability to meet their own state-mandated inspection frequencies.

- By virtue of eliminating the CAP program, the requirements would effectively mandate a more fractured and disconnected set of inspections for the businesses, contrary to CAL EPA mandates for consolidated inspections, and in turn diluting the effectiveness of the program.

The Copermittees request that the language in F.3.b.(1)(a)(iii) be amended as follows prior to adoption of the Permit:

(a) Inspection Procedures: Inspections must include but not be limited to:
- *(i) ~~Review of BMP implementation plans, if the site uses or is required to use such a plan~~;*
- *(ii) ~~Review of facility monitoring data, if the site monitors its runoff~~;*
- *(iii) Check for coverage under the General Industrial Permit (Notice of Intent (NOI) and/or Waste Discharge Identification Number), if applicable;*
- *(iv) Assessment of compliance with Copermittee ordinances and Copermittee issued permits related to runoff;*
- *(v) Assessment of the implementation, maintenance and effectiveness of the designated minimum and/or enhanced BMPs;*

Retrofit

Section F.3.d. proposes a program to develop an inventory of existing developments that may be candidates for future water quality retrofits. The requirement goes on to encourage the Copermittees to collaborate with local property owners to promote urban retrofit in an effort to accelerate reductions in pollutant loading from existing urban areas.

Although laudable, this requirement has two significant problems:

1) The program is self-defeating as it contains no "carrots" to lure private property owners into participating in the program. Any property owner that is interested in volunteering in this effort would be required to fully comply with all provisions of the draft MS4 Permit. This includes preparation of compliance documents such as SSMPs, LID and hydromodification studies, subjecting themselves to additional regulatory scrutiny through business and BMP inspection programs required by the MS4 Permit, and otherwise incurring a myriad of costs and requirements. These costs and requirements would provide a strong disincentive to participate in a retrofit program. This program will only work if it is modified to remove these disincentives.

2) Current and projected economic conditions will limit the interest and participation of private property owners. Long-term economic predictions for Riverside County indicate that assessed valuations and property values will likely remain stagnant for the term of this Permit. Similarly, sales tax and unemployment are not expected to significantly improve either.

Without Co-Permittee resources to supplement private retrofit projects, the current economic dis-incentives for private redevelopment that are built into the program and the current impact of the economy on private property owners, there is no real value to the program.

PREFERRED POLICY CHOICE: The Permittees strongly request that this program be deleted for the aforementioned reasons.

Alternatively, and at minimum, the Copermittees request that the schedule for completion of the retrofitting program be revised to provide for development during the term of the Permit and submittal of the proposed program with the next ROWD. This will allow the Copermittees to defer expenditures related to development of the program until later in the Permit term when it is hoped that economic conditions and local revenues will improve. The Copermittees expect few opportunities for retrofit until the economy improves. Due to the Copermittees' limited ability to require retrofit on private property, our best opportunities for retrofit may be associated with approvals of proposed modifications of existing developments.

ALTERNATE POLICY CHOICE: If the Retrofit requirements are not removed, the Copermittees request that the Regional Board modify Section <u>F.3.d. as follows:</u>

Each Copermittee must develop and implement a retrofitting program that meets the requirements of this section upon submittal of the ROWD.

Irrigation Runoff

The draft MS4 Permit categorically prohibits the discharge of landscape irrigation; irrigation water; lawn watering; (collectively 'irrigation runoff') and non-emergency fire fighting flow runoff to the MS4. The basis for this requirement comes from the current Orange County stormwater permit within the San Diego Region (NPDES No. CAS0108740), which prohibits such discharges.

Although irrigation runoff may have been shown to be a problem in South Orange County, it has **not** been shown to be causing problems in receiving waters in the Santa Margarita Region. Attachment 6 summarizes the unique conditions and other facts that warrant the restoration of irrigation runoff as a non-prohibited non-stormwater discharge category. It is important to reiterate the three key points made in Attachment 6:

- Unlike the watersheds in South Orange County, the Santa Margarita Region is an ephemeral watershed;

- Unlike South Orange County, the Copermittees have **not** identified landscape irrigation, irrigation water or lawn water as an actual source of pollutants or conveyance of pollutants to waters of the U.S.;

- The draft MS4 Permit requires Copermittees to eliminate irrigation runoff ***TO THE MS4,*** which by definition, requires elimination of discharges to streets, curbs and gutters.

As noted above, the prohibition appears to hold the Copermittees responsible for any amount of irrigation runoff discharged to the curb and gutter, *regardless* of whether or not the discharge ever reaches receiving waters or causes or contributes to the exceedance of a water quality standard. This fact, combined with the fact that irrigation runoff has not been shown to be causing impairments in the local receiving waters, will make enforcement difficult to justify with residents and will likely result in community outrage over bans on irrigation. Further the Copermittees are not water purveyors, and as such, have little control over residential irrigation runoff outside of sending code enforcement officers out to look for incidents of excessive irrigation runoff. This is a very inefficient use of resources. In any event, the provisions as written will do little for water quality but potentially much for community outrage against water quality programs. The Copermittees do not believe this is the intent of the Board.

It is further worth noting that the Permit already contains an investigation and remediation process via Non-Stormwater Action Levels (NALs) by which the Copermittees will identify the source of problematic non-stormwater discharges. Should the source be found to be a conditionally exempt non-stormwater discharge, the permit requires the Copermittees to address that discharge or the entire category of discharges as appropriate. By allowing the NAL process to determine when and where

conditionally exempt discharges need to be prohibited, the Copermittees are better positioned to justify any enforcement actions.

PREFERRED POLICY CHOICE: the Copermittees request that the Regional Board restore the conditional exemption for landscape irrigation, irrigation water and lawn watering as outlined in Attachments 6 and 7.

Alternatively, if the Regional Board nevertheless insists on prohibiting Irrigation Runoff, the Copermittees request that the draft MS4 Permit be revised to allow for irrigation runoff to be managed as a JRMP program, rather than as a prohibited discharge to the MS4. This alternative request is consistent with how the Permit currently deals with non-emergency fire fighting discharges, which was also removed from the list of non-prohibited non-storm water discharges. The Executive Officer stated that he would be open to consideration of a program for irrigation runoff that would address discharges from the MS4. This alternative approach allows the Copermittees to develop a program that focuses on irrigation runoff problem areas, as opposed to holding the Copermittees responsible for eliminating any instant case of over-irrigation to a street independent of threat to receiving water quality.

ALTERNATIVE POLICY CHOICE: The Copermittees request that the Regional Board clarify that irrigation runoff is only prohibited where it is discharged *from* an MS4 (into receiving waters) by adding the following language:

B.4. *As part of the JRMP, the Copermittees must develop and implement a program to address pollutants from landscape irrigation, irrigation water and lawn watering identified as significant sources of pollutants to waters of the United States.*

Legal Issues
The Copermittees have identified legal issues that raise fundamental questions regarding several of the key elements of the Tentative Order.

The Copermittees request review of the legal issues and revision of the Tentative Order prior to adoption.

Each of the legal issues and requested adjustments and justifications for each requested revision is further discussed in Attachments 7 and 8 to this letter.

CONCLUSION

It is fundamental that the MS4 Permit be economically, technically, and legally feasible. To be credible, and to pass legal muster, MS4 Permit requirements must demonstrable a nexus to water quality improvements. Instead the current requirements, although well intended but not always well

developed, will put the Copermittees in non-compliance since we cannot afford to implement all the requirements and consequently this will not lead to water quality improvement.

The present economic crisis has made daily headlines over the past three years and Riverside County has been identified as the 11th most impacted county in the nation. In the ROWD and throughout the development of the draft MS4 Permit, the Copermittees have provided abundant publicly available information regarding the impact of this crisis on their revenues, staffing, and programs. Virtually every program and service, including public safety services, has been impacted, and others have been eliminated. Contingency reserves have been depleted to the lowest levels allowable to maintain operations. At this point, the Copermittees cannot increase water quality compliance spending without real risks to reducing spending on existing state and federal mandates or other much-needed local programs and services. As proposed, the draft MS4 Permit is economically infeasible.

In an effort to promote a viable 4th-term MS4 Permit, the Copermittees proactively engaged Regional Board staff in a collaborative dialogue with the intent of developing an economically feasible MS4 Permit that was protective of receiving water quality in the Santa Margarita Region. However, the following constraints have limited the benefits of the process:

1. The discussions were curtailed because the Board expected the draft MS4 Permit to be heard in October;

2. The Board had adopted the South Orange County MS4 Permit as a "model" permit, and, therefore, would have to approve any major revisions to the provisions of that Permit; and

3. The inclusion of several new provisions of the draft MS4 Permit addressing unpaved roads, inspection programs and monitoring requirements go well beyond the Orange County Permit.

As noted in the Executive Summary, the MS4 Permit adopted for South Orange County was ultimately developed for a region with substantial coastal resources and perennial streams, twice the population, significantly higher property tax revenues, and more affluent tax payers.

By contrast, the ephemeral conditions found in the Santa Margarita Region result in stream channels that are dry during dry weather conditions and receive less rain during wet season conditions. The stream flow conditions in the Santa Margarita Region are entirely unlike the significant perennial flow conditions found in South Orange County. The proposed changes contained herein address these realities. The proposed changes also address necessary changes to ensure that the Copermittees can continue to afford implementation of the draft MS4 Permit given the significant economic disadvantages faced by the Santa Margarita Region, disadvantages that have been exacerbated by the impacts of the recession.

The requirements in the Permit must protect beneficial uses in a cost effective manner. It is always a balance to protect water quality and avoid unnecessary increases in program compliance costs. Balancing local water quality needs and funding limitations should be paramount in the current economic climate. Proposed program expansions must be carefully weighed against economic realities and be justified by conditions actually found in the Santa Margarita Region. As described, unpaved roads and business inspections have been effectively addressed by existing programs, yet the draft MS4 Permit proposes requirements that can only be met by establishment of new compliance programs and, in the case of the business inspections, elimination of the highly effective CAP.

The legislature created Regional Boards to protect our beneficial uses while carefully considering the technical and economical feasibility of such protection. Even in the best of economic times, state and local government must carefully manage public revenues. A policy-level decision by the Regional Board is necessary to direct staff to work with the Copermittees to address the comments contained herein. The Copermittees request your support in our effort to develop an economically, technically, and legally feasible MS4 Permit that is appropriate to the Santa Margarita Region. As noted in the opening Executive Summary of this comment letter we specifically request that you direct Regional Board provide staff with direction to resolve the issues identified in this letter and attachments.

Thank you for your time and consideration. We look forward to discussing this issue further at the October 13th hearing.

Very truly yours,

JASON E. UHLEY
Chief of the Watershed Protection Division

JEU:bjp

Attachment 1: Summary of Proactive Efforts to Manage Stormwater

Introduction

Murrieta and Temecula Creeks and their tributaries are an important economic, environmental and social resource for the Santa Margarita Region. As an example, Murrieta Creek serves as the backdrop for Old Town Temecula, an important local tourist attraction. Several ecological preserves that are utilized by local residents and tourists are also located within the Santa Margarita Region. The Permittees are cognizant of these resources and their benefits and have implemented or initiated proactive programs beyond the requirements of the NPDES MS4 Permits to ensure that these resources remain viable and are protected for future generations.

Integrated Planning

Upper Santa Margarita River Integrated Water Management (IRWM) Plan
The County of Riverside, Riverside County Flood Control and Water Conservation District (District) and Rancho California Water District proactively entered into an agreement to form this program to manage the Upper Santa Margarita River Watershed. These three agencies have proactively engaged tribes, local stakeholders, and other local, state and federal agencies in an effort to develop a comprehensive plan to manage the watershed. Further, we have also built bridges to the San Diego County and Orange County IRWM programs to ensure proactive inter-regional planning of cross-jurisdiction watersheds such as the Santa Margarita River Watershed. The three-party agreement reached by the IRWM programs within the San Diego Region is the only one of its kind in California.

Santa Margarita River Executive Management Team
The Permittees also coordinate more technical issues with San Diego County, the U.S. Bureau of Reclamation, Camp Pendleton, and other stakeholders to address coordination of monitoring and analysis of monitoring data within the region.

Murrieta Creek Flood Control, Environmental Restoration and Recreation Project
Murrieta Creek poses a severe flood threat to the cities of Murrieta and Temecula. Overflow flooding from the undersized creek has periodically wreaked havoc on the communities – most recently in 1993 when nearly $20 million in damages was incurred by the public and private sectors.

In 1997, at the request of District, the U.S. Army Corps of Engineers initiated studies on the Creek. The outcome of this endeavor was Congressional authorization in 2000 of a $90 million, multi-faceted project known as the Murrieta Creek Flood Control, Environmental Restoration and Recreation Project. What was once viewed only as a needed local flood control project was now a federally cost shared, community endorsed corridor project that would not only safeguard the two cities from the ravages of uncontrolled flooding, but would celebrate the unique character of the communities by restoring and enhancing the environmental distinctiveness of the Creek bottom, utilizing the top of the river banks for hiking, biking and equestrian trails, and developing a 240-acre flow attenuation basin that would encompass 160 acres of new environmental habitat and a 50 acre sports park. The project is currently undergoing design of Phase II.

Attachment 1: Summary of Proactive Efforts to Manage Stormwater

Management of New Development

LID BMP Design Manual

The County, with input from the Permittees has spent the last five years developing and field testing a manual promoting Low Impact Development (LID). The manual is due to be published by December 31, 2010. The development of the manual was informed by meetings with authors of key LID manuals from throughout the nation, field visits to existing LID BMP sites to evaluate design and maintenance characteristics, and years of research into design methodologies and water quality effectiveness data. The manual includes detailed design criteria, standard drawings, maintenance requirements and other key information that will ensure that LID BMPs deployed in the Santa Margarita Region will provide long-term water quality benefits.

Public BMP Maintenance Mechanism

The District has also been developing a plan for public maintenance of post-construction BMPs that meet specified requirements. This mechanism will go hand-in-hand with the release of the LID BMP Design Manual. Development projects that design their BMPs to the criteria in the manual and place the BMPs consistent with our guidelines will be able to opt into a public maintenance mechanism that will provide for consistent and ongoing maintenance of post-construction BMPs throughout the region.

Management of New Development

LID BMP Testing and Demonstration Facility

The LID BMPs incorporated into our LID BMP Design Manual are being incorporated into a $3,000,000 retrofit of the District's headquarters in the City of Riverside. The project will provide a regional center for LID BMP training and demonstration, include a five-year study to collect water quality and field data on the effectiveness of the BMP designs and maintenance programs, and facilitate a cycle of continuous improvement for LID BMP techniques.

Southern California Stormwater Monitoring Coalition

The Permittees voluntarily participate in a collaborative effort with the other Counties in southern California to conduct special studies to advance the science of stormwater management. These studies include regional bioassessment programs, inter-lab calibration programs, hydromodification management studies, programs to develop the scientific methods used to monitor for toxics, biological indicators and chemistry, and more.

Statewide Stormwater Leadership

Pesticide Regulation

The Permittees have proactively met with management of California Department of Pesticide Regulation and USEPA staff regarding negative receiving water impacts of authorized pesticides use in California. District staff have also submitted multiple comments and provided testimony at applicable state and federal listening sessions regarding the need to change the regulatory framework to better protect receiving waters.

Attachment 1: Summary of Proactive Efforts to Manage Stormwater

California Stormwater Quality Association (CASQA)

The District proactively participates in the activities of this pre-eminent organization addressing stormwater issues in California. District staff serves on the Board of Directors, as the Chairs for the Legislative Committee and Conference and on several committees including Monitoring, Pesticides, and Policy and Permitting. This organization and these committees are developing the programs and science that are driving the management of stormwater programs forward.

Habitat and Aquatic Resource Conservation

Western Riverside County Multiple Species Habitat Conservation Plan (MSHCP)

The Permittees have established the MSHCP to identify and proactively protect critical habitat for threatened and endangered species in Riverside County. The MSHCP establishes several key linkage corridors along existing streams and creeks to ensure protection of the habitat and safe paths of migration for species. The MSHCP will ultimately conserve over 40% of the lands within the Santa Margarita Region of Riverside County. Further, the plan proposes to purchase and preserve several of the remaining natural stream systems in the region for use as habitat conservation and species corridors.

Special Area Management Plan (SAMP)

The Permittees have also entered into ongoing negotiations with the San Diego Regional Water Quality Control Board and United States Army Corps of Engineers staff regarding a SAMP to proactively identify and protect the most important aquatic resources in the Santa Margarita Region of Riverside County.

Economic Assessment
Draft 2010 Santa Margarita Region MS4 Permit
September 2, 2010

The Draft Municipal Separate Storm Sewer System Permit (Draft Tentative Order No. R9-2010-0016; NPDES No. CAS0108740) for the Santa Margarita Region of Riverside County (draft Permit) proposes new and expanded compliance requirements that would significantly increase the Copermittee compliance costs. Further, the draft Permit expands the compliance requirements and compliance costs beyond those required by the recently adopted MS4 Permit for South Orange County, a more populous and affluent area with significantly greater tax revenues to support the compliance programs. These additional requirements and costs are proposed at a time when the Copermittees have been severely impacted by the most significant economic downturn since the Great Depression. These impacts include high levels of unemployment and homes in default, sharply reduced Copermittee revenues and increased demands on public services. Moreover, these impacts have fallen disproportionately on communities in Riverside County relative to South Orange County and San Diego County, due in large part to the crash of the housing market.

Due to their reduced revenues, the Copermittees budgets and staffing have been significantly reduced for virtually all services and programs operated by the Copermittees, including police, fire, and paramedic services. Funding has been focused on essential public safety and existing state and federally mandated programs. Increases in funding for the water quality mandates contained in the draft Permit can only come from reduced funding for these basic priorities. Therefore, the expanded compliance requirements proposed in the draft Permit are economically infeasible. This paper describes the general economic conditions in the Santa Margarita Region, the Copermittees' current budget and budget projections, their assessment of projected increases in compliance costs, and economic forecasts provided by other parties.

POPULATION

Riverside County, which is subject to three NPDES MS4 permits, has a total population of 2,153,186. However, only 289,765 persons (approximately 13 percent) reside within the Santa Margarita Region.[1] Population and housing projections for the Santa Margarita Region are summarized in Table 1. MS4 discharges in Riverside County are regulated by separate NPDES stormwater permits issued by the Colorado River, Santa Ana, and San Diego Regional Water Quality Control Boards. Although these three MS4 permits address the same federal regulatory requirements, the provisions in the draft Permit are often not well aligned with the requirements of the other two MS4 permits. As such, the cost for complying with those requirements is borne entirely by the 289,765 residents within the Santa Margarita Region.

[1] Riverside County Projections 2010 (RCP-10), Transportation and Land Management Agency, Administrative Services, Center for Demographic Research, June 23, 2010.

Attachment 2: Economic Assessment

Table 1: Santa Margarita Region Population & Housing Projections 2010[2]

	Population / Housing Units		
Jurisdiction	**2010**	**2015**	**2020**
Murrieta	101,680/34,812	105,513/36,162	109,343/37,512
Temecula	102,727/33,194	109,136/35,270	112,242/36,321
Wildomar	32,720/11,123	37,289/12,722	42,475/14,537
Unincorporated	52,638/17,546	54,584/18,195	59,878/19,959
Total	**289,765/96,675**	**306,522/102,349**	**323,938/108,329**

CURRENT ECONOMIC CONDITIONS

Unemployment

Higher unemployment directly impacts the revenue streams available to the County and the Cities for funding programs and services. As illustrated in Figure 1, the unemployment rate in Riverside County is currently 15.3 percent, which is 42 percent higher than the unemployment rate in San Diego County (9.8 percent) and 56 percent higher than the unemployment rate in Orange County (9.8 percent).[3]

SOURCES OF LOCAL REVENUE

The Copermittee's primary revenue sources for implementation of programs and services are property taxes, sales taxes, and development/construction permit fees. Each of these sources has declined substantially since the beginning of the recession in FY 2006/2007. The 2009 per capita income in Riverside County ($29,177) is 31% lower than the per capita income in San Diego County ($42,094) and 32% lower than the per capita income in Orange County ($46,898).[4] The population of the Santa Margarita Region (289,765) is 48% lower than the population of South Orange County (553,161[5]) and 91% lower than the population of San Diego County. As a less affluent area with relatively small

[2] Riverside County Projections 2010 (RCP-10), Transportation and Land Management Agency, Administrative Services, Center for Demographic Research, June 23, 2010.

[3] Monthly Labor Force Data for Counties, July 2010 – Preliminary, Labor Market Information Division, Employment Development Department, August 20, 2010. http://www.calmis.ca.gov/file/lfmonth/countyur-400c.pdf

population, the Santa Margarita Region has far less revenue than South Orange County and San Diego County to fund local programs and services, and MS4 permit compliance costs.

Per Capita Income[6]

	Riverside County	Orange County	San Diego County
2006	29,148	49,098	42,110
2007	29,950	49,790	43,816
2008	30,088	49,650	44,438
2009	29,177	46,898	42,094
2010 (forecast)	28,117	47,435	42,651

Figure 1. Unemployment Rates of California Counties (title for figure on next page)

[4] Economic Forecast, Los Angeles Economic Development Corporation, July 2010.
[5] Richard Boon, County of Orange, personal communication, September 1, 2010.
[6] Economic Forecast, Los Angeles Economic Development Corporation, July 2010.

Attachment 2: Economic Assessment

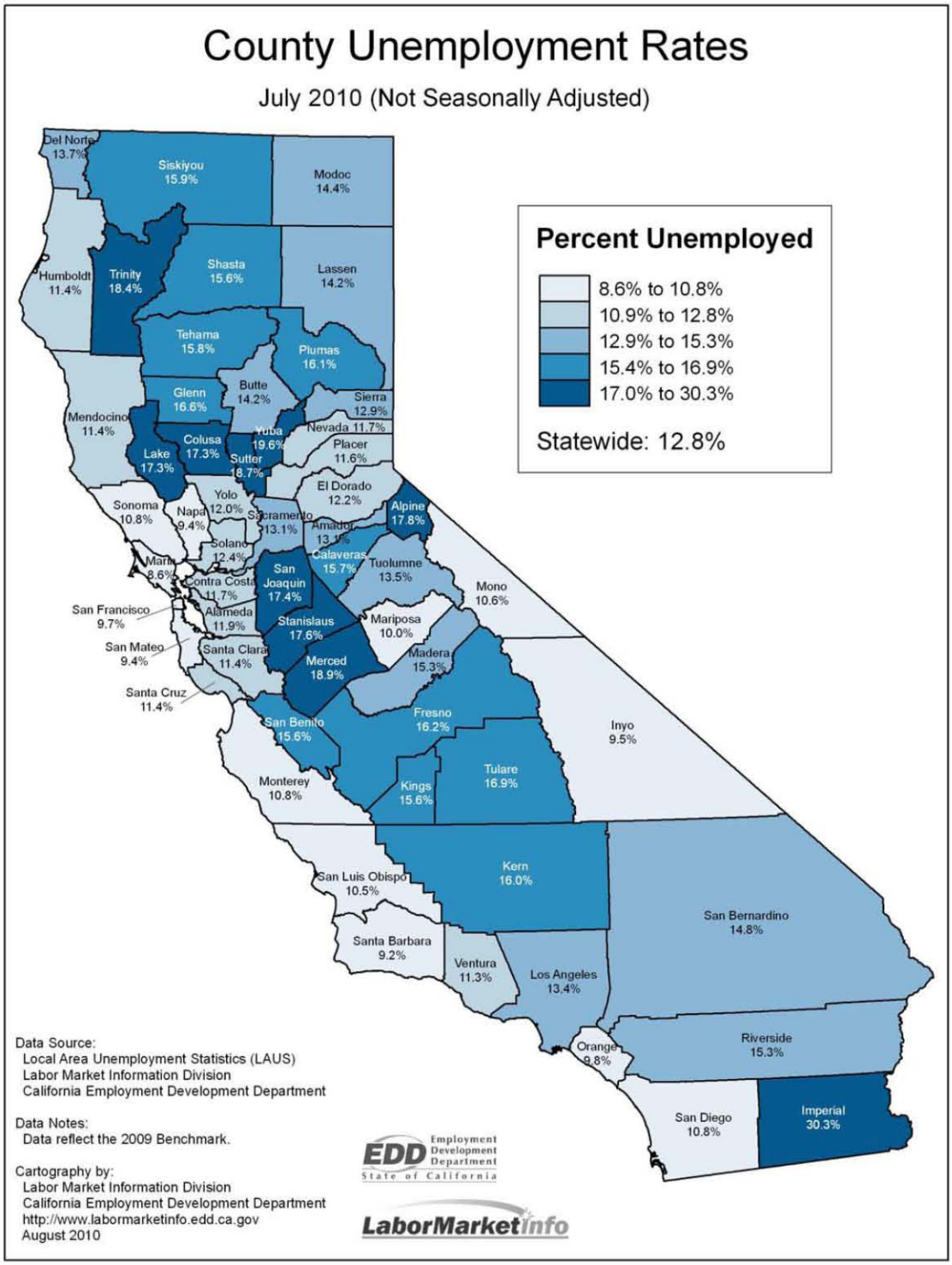

Home Values/Property Tax Revenue

Property tax revenue, which is a major source of funding for the County and Cities, is a direct function of the total inventory of real estate and the assessed values of the real estate. With a small population relative to South Orange County and San Diego County and a limited amount of commercial and industrial property, the Santa Margarita Region is supported by a much smaller inventory of real estate from which to obtain property tax revenue. The high rate of foreclosures in Riverside County has also resulted in significant declines in real estate values and, consequently, property tax revenue. The Riverside County Auditor-Controller projects that property values will fall over 10 percent in FY 2009-10 and could fall further in FY 2010/2011.[7] Figure 3 illustrates the decline in median home values in the Santa Margarita Region and South Orange County. Although home values in both areas have declined, home values in the Santa Margarita Region have declined at a greater rate and the difference in home values between the two areas has grown with the recession.

Figure 3. Median Home Values[8]

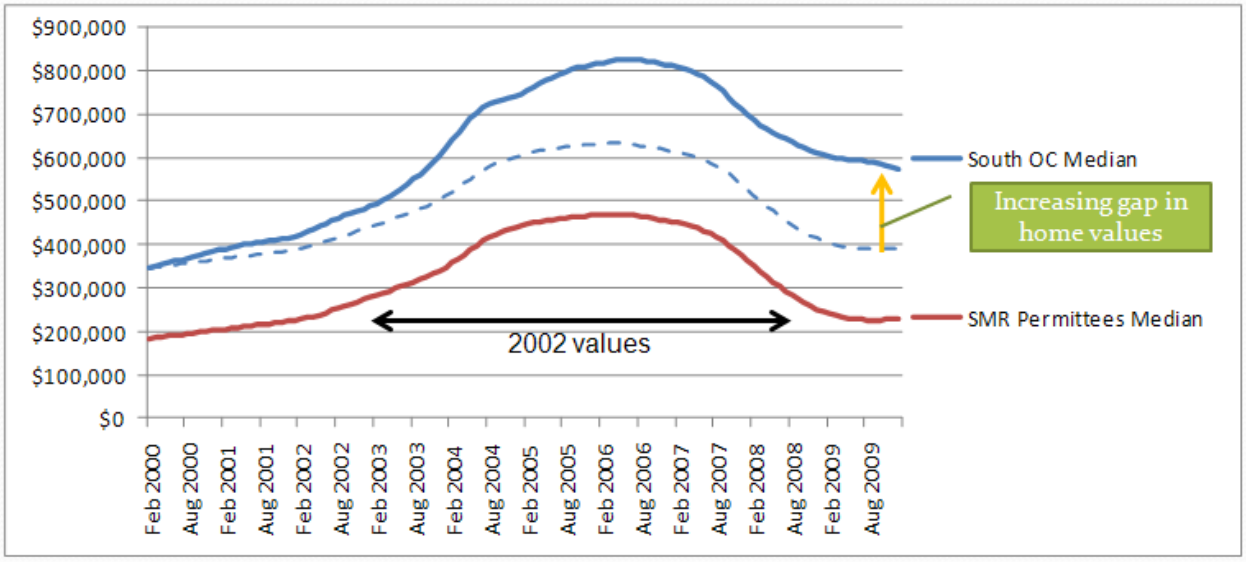

The Inland Empire (Riverside and San Bernardino Counties) registered more defaults and foreclosures than any other area of Southern California.[9] The Inland Empire was ranked No. 5 in nationwide foreclosure activity during the first half of 2010, with almost 4.5 percent of households in default. A total 63,717 mortgage default notices, auction sale notices, and bank repossessions were recorded in the Riverside-San Bernardino-Ontario metropolitan area between January and June 2010, according to RealtyTrac. Accordingly, one in 23 households were in some stage of foreclosure during this six-month period. Additionally, almost 45 percent of homeowners with a mortgage in Riverside and San Bernardino Counties owe more on their homes than the homes are worth. As illustrated in Figure 3, Orange County

[7] Comprehensive Annual Financial Report of the County of Riverside for the Fiscal Year Ended June 30, 2009, Robert E. Byrd, Riverside County Auditor-Controller, December 9, 2009. P. vii. http://www.auditorcontroller.org/opencms/publications/FinancialPub/cafr/CAFR_2009/Introductory.pdf
[8] Source: www.zillow.com
[9] Economic Forecast, Los Angeles Economic Development Corporation, July 2010, p. 50.

and San Diego County have not been impacted by "upside-down mortgages" to the same extent as has Riverside County.

Figure 3. "Upside-Down Mortgages"

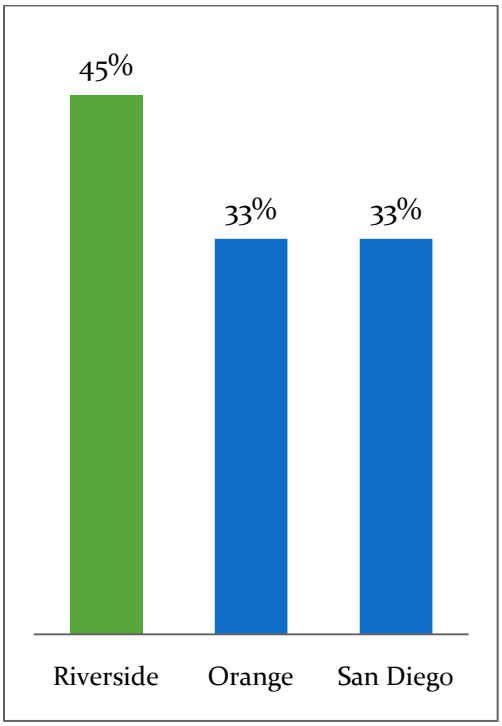

One expert, Professor Mason Gaffney of the UC Riverside Economics Department believes that the housing market is in a vicious cycle simply because there are too many homes. According to Professor Gaffney, because demand is down, prices will go down, and more people will go "upside-down" on their mortgage, and then go into foreclosure. Professor Gaffney estimates that the bottom of the housing market will not be seen for another three years, due to the previous overbuilding in Riverside County.[10]

Although the recession has impacted property values throughout Southern California, Riverside County remains at a distinct disadvantage relative to Orange and San Diego Counties. The average home value in Riverside County is $207, 900, which is 58% less than the average home value in South Orange County ($499,500) and 45% less than the average home value in San Diego County ($378,800).[11] As a result, property tax revenues per home in Riverside County are 58% less than in Orange County and 45% less than in San Diego County. The larger populations and number of homes in Orange and San Diego Counties multiply this disparity in property tax revenue that can be used to help fund NPDES compliance programs. Based on population and average home value, South Orange County generates over <u>four times</u> the property tax revenue generated in the Santa Margarita Region, and San Diego County generates <u>20 times</u> the property tax revenue of the Santa Margarita Region. Clearly, the Copermittees in the Santa Margarita Region receive significantly less property tax revenue than either Orange or San Diego Counties and are less able to fund additional MS4 permit compliance costs.

[10] Ibid.
[11] Zillow Home Value Index – Riverside County, Zillow.com. August 10, 2010.

Attachment 2: Economic Assessment

Sales Tax Revenue

The next most significant revenue source for program funding is sales tax. Sales tax revenue is a function of population and relative income. As described, the Santa Margarita Region has a less affluent and smaller population than South Orange County and San Diego County on which to generate sales tax revenue.

The high levels of unemployment in Riverside County have reduced disposable income which has further depressed sales tax revenues. Retail sales in Riverside County fell by nearly 27% in 2008 and 2009.[12] Statewide sales and use tax revenues for the second quarter of 2010 declined approximately 10.4 percent. Additionally, taxable sales for the first quarter of 2010 remained flat compared to a year earlier.[13] Although data specific to the Santa Margarita Region is not available, it is anticipated that taxable sales have been impacted more significantly than in Orange and San Diego Counties due to the higher unemployment rate in Riverside County.

Taxable sales are directly proportional to sales tax revenue. Based on data presented in the Los Angeles Economic Development Corporation's July 2010 Economic Forecast, South Orange County generates 2.6 times the taxable sales generated in the Santa Margarita Region and San Diego County generates 13.3 times the taxable sales of the Santa Margarita Region. Clearly, the Copermittees in the Santa Margarita Region receive significantly less sales tax revenue than either Orange or San Diego Counties and are less able to fund additional MS4 permit compliance costs.

Development and Construction Permit Fees

Prior to the recession, development and construction permit fees funded a variety of compliance activities related to review, approval, inspection and enforcement associated with development and construction activities. Since the recession, revenues from these fees have been virtually eliminated. As a result, Copermittee inspection and enforcement of development and construction activities, including abandoned projects, has been funded by the Copermittees' general funds. General fund budgets are in turn supported by sales and property tax revenues which, as described, have declined significantly.

New Fees or Taxes

Another potential source of funding would be the establishment of a new fee or tax. Such revenues would be subject to the requirements of Proposition 218. Recent efforts to pass supplemental fees have been mixed and given the current economic conditions, this option appears infeasible. For example, on the March 2006 ballot, an attempt by the City of Encinitas to pass a Clean Water Fee was defeated by the voters.[14] It is notable that this rejection of a Clean Water Fee occurred prior to the recession in a relatively affluent coastal city.

Economic Forecasts

The Riverside County Executive Office assessed Riverside County's economy in a report to the Board of Supervisors submitted with the FY 2010/2011 Recommended Budget. In this assessment, it was noted that the economy is still staggering and that economic news has been mixed. Although a slightly rising

[12] Economic Forecast, Los Angeles Economic Development Corporation, July 2010, p. 51.
[13] News release "Local Sales Tax Allocations Reduced in Many Areas of the State," California Board of Equalization, August 27, 2010. http://www.boe.ca.gov/news/2010/92-10-G.pdf
[14] FY 2008-2009 JURMP Annual Report, City of Encinitas, p. 10-3.

stock market and other nationwide measures could be interpreted to signal improvement, persistently high unemployment and personal and national debt call for caution, and a double-dip recession is possible. Locally, while some experts project revenues will shrink again in FY 2011/2012, Riverside County's economic consultants foresee a long and gradual muted recovery and the County will be managing with drastically reduced budgets for an extended period. Budget reductions of approximately $21 million are projected for FY 2011/2012. The County projects that it will see a balanced but significantly reduced budget in FY 2012/2013, with a total budget of $670 million (compared to $736 in 2007). Based on this assessment and reports in the media, it appears that the economy in Riverside County will stabilize at a reduced level and may not recover during the term of the SMR MS4 Permit.

Projected Increases in Compliance Costs

The draft Permit proposes a significant expansion of compliance requirements that would significantly increase the Copermittee compliance costs. The draft Permit was developed by starting with the MS4 Permit for South Orange County. The requirements proposed in the draft Permit that would significantly increase compliance costs include:

Regional Compliance Requirements

- Monitoring and special studies (See Attachment 4)
- Hyrdomodification Management Plan (including monitoring)
- Retrofit study
- Other general program updates (JRMP)

Individual Copermittee Compliance Requirements

- Enforcement of Irrigation runoff prohibition (See Attachment 6)
- Significantly Increased business and BMP inspections
- BMP retrofit requirements
- Regulation of unpaved roads (See attachment #5)
- Hydromodification requirements
- Monitoring Source Identifications
- Expanded IC/ID requirements

Estimates for implementation of the regional compliance requirements have been prepared and Figure 4 illustrates the disparity between projected Copermittee revenues and costs for implementation of the proposed regional programs. Due to the fact that calculating costs for implementing entirely new programs is excessively difficult, cost estimates for the implementation of individual Copermittee compliance requirements have not been completed, although it is expected that their individual costs will parallel the regional costs presented in Figure 4.

Attachment 2: Economic Assessment

Figure 3. Projected Revenues vs MS4 Permit Compliance Costs

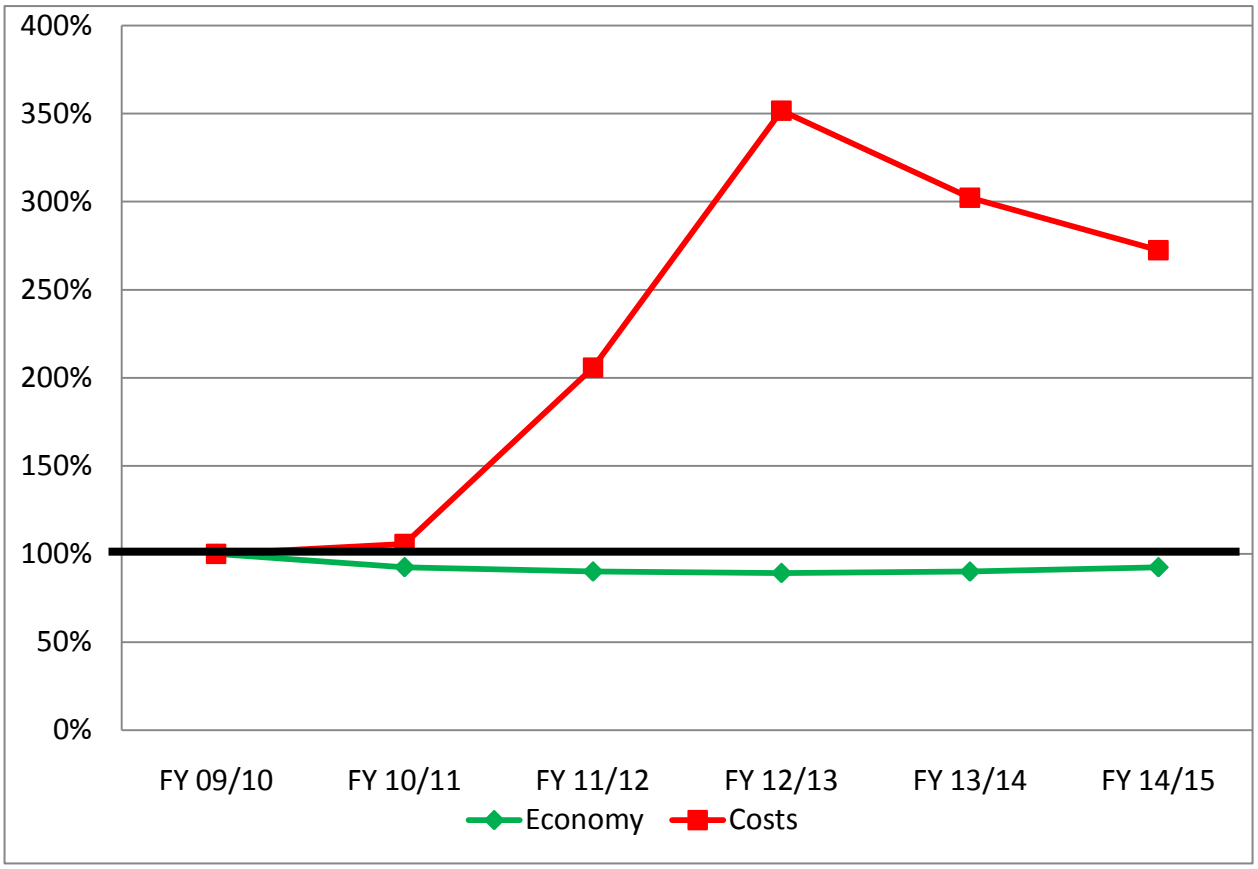

ECONOMIC SUMMARY

As all sources of revenues have been reduced significantly, the Copermittees have been required to reduce staffing through layoffs, attrition and furlough; reduce funding across the board for public services and programs, and, in some cases, completely eliminate public services and programs. For example, it is estimated that County of Riverside staffing has been reduced by 2,500 since FY 2006/2007 mostly in the form of early retirement and layoffs. It is estimated that an additional 500-700 staff positions will be eliminated by the County in FY 2011/2012.

Due to the loss of revenue, virtually all Copermittee programs or services have been reduced, including fire and police. As an example, the Riverside County FY 2010/2011 Recommended Budget for Riverside County proposes:

- Public safety department cuts of 3 – 5 percent
- Other department cuts averaging 19 percent
- Continued staff reductions

Attachment 2: Economic Assessment

After three years of modest cuts culminating in a 25% decrease, the Board of Supervisors approved an additional 19% cut in the general fund and a 4% cut to public safety for FY 2010/2011. These additional cuts will decrease spending by an additional $71 million. The remaining budget gap will be filled from general fund reserves set aside for economic uncertainty. Since FY 2006/2007 Riverside County general fund reserves have declined from over $300 million to $30 million. The County cannot decrease the reserve fund any further without affecting the County's ability to obtain credit. According to the Associated Press Economic Stress Index, of counties with populations of at least 25,000, Riverside County was identified as the eleventh most economically stressed county in the nation based on its June 2010 stress scores.[15]

All County departments have been directed to only provide those core services that the County is mandated to provide. At this point, the Copermittees are struggling to maintain the existing compliance programs required by the 2004 MS4 Permit with available staff and funding. Implementation of expanded or new Permit compliance requirements would require the Copermittees to either further reduce implementation of other mandated programs or reduce the level of implementation of MS4 Permit compliance programs - at risk of receiving an NOV and ACL. In other words, the Copermittees cannot increase MS4 Permit compliance expenditures without directly impacting compliance with other state or federally-mandated programs.

CONCLUSION

The draft Permit was developed by starting with the MS4 Permit for South Orange County. This represented a significant expansion of compliance requirements and compliance costs relative to the 2004 Permit issued to the Copermittees in the Santa Margarita Region, and by no means are the costs incremental in nature. South Orange County is a permit area with twice the population, 2.6 times the sales tax revenue, and over four times the property tax revenue of the Santa Margarita Region. The draft Permit was then expanded to include additional compliance and monitoring requirements, further increasing compliance costs. Plainly, it is unrealistic to impose greater, or even the same Permit requirements on the Santa Margarita Region, as have been imposed on South Orange County.

In addition to having a lower property tax revenue based on lower property tax base and lower per capita retail sales, the Santa Margarita Region has also been hit harder by the recession, which has further diminished funding resources. It is projected that revenues will continue at a reduced level for an extended period with recovery not expected within the term of the Permit term. Therefore, the available resources to fund public safety, existing state and federal mandates, and expanded water quality permit requirements are much less than San Diego and Orange Counties.

The economy has resulted in reductions of reserves to minimum levels and virtually all local services and programs have been reduced or eliminated. As increases in funding for the water quality mandates contained in the draft Permit can only come from reduced funding for public safety, existing state and federal mandates, the expanded compliance requirements proposed in the draft Permit are economically infeasible.

[15] "20 Most Stressed, 20 Least Stressed Counties, The Associated Press, August 2, 2010.

Attachment 3: Language Changes Supported by Board Staff and Copermittees

Introduction

This document highlights the agreed upon revisions resulting from detailed discussions between Water Board Staff and the Copermittees on program implementation. The intent of these revisions is to ensure that requirements in the Draft MS4 Permit continue to be protective of water quality while allowing the Copermittees flexibility in resource allocation and cost efficiencies. This collaborative process enhanced a mutual understanding of these goals and, consequently, many of the Permit's requirements are streamlined, clearer, implementable and protective. This document highlights specifically the Low Impact Development (LID) and the Interim Hydromodification requirements that have been revised from the Orange County NPDES MS4 Permit in order to recognize the Copermittees' advanced efforts.

Important Program Revisions

Low Impact Development (LID)

The Copermittees strongly support the language in the draft Permit with regard to Low Impact Development (LID) BMPs (Section F.1.d.(4)). Through discussions with staff, the Copermittees have presented their commitment and vision for LID, emphasizing that their programs' goals are in line with the intent of the LID language found in the Orange County permit. The District and the County, with input from the Copermittees, have invested five years into developing a well thought through LID program including:

- The design of a detailed and thoroughly researched LID BMP Manual,
- An implementation policy focused on a tiered approach to BMP selection,
- Incorporation of a public maintenance mechanism, and
- Construction of a $3,000,000 LID BMP retrofit, demonstration and testing facility.

These various features are already in effect in the unincorporated County, or in the process of being finalized, for broader use.

The LID BMP manual provides the development community guidance for designing LID BMPs that will be effective at reducing pollutants from the site to the MEP. While the current program is based on a tiered approach that encourages landscaped LID BMPs first, above detention BMPs, and those above proprietary/mechanical BMPs, this tiered approach will be further revised to support Staff's goal for more onsite BMPs to infiltrate runoff, although some Copermittees are still concerned with the infiltration mandate. Specifically, this tiered approach will prioritize BMPs for new development and redevelopment that:

- Provide for the harvest and reuse of stormwater through safe infiltration of site runoff, similar to natural conditions where such runoff can then help replenish the groundwater table,
- Treat site stormwater runoff on a project scale, generally providing a more robust system as compared to individual lot features,

Attachment 3: Language Changes Supported by Board Staff and Copermittees

- Are the most protective of surface water resources, providing 100% 'removal' of pollutants for the water quality volume infiltrated,
- Even for runoff that is biotreated, provide substantial benefit by ensuring that BMP designs maximize the opportunities for incidental infiltration and runoff capture,
- Focus on passive/landscape BMPs that do not require extensive or special maintenance, or that rely on external factors to function for water quality purposes,
- Provide hydromodification mitigation by more closely mimicking pre-development hydrology,
- Ensure that all sites will have runoff water quality that is consistent.

Not only are the Copermittees committed to implementing effective BMPs, they are also committed to effective maintenance. The District's proposed public maintenance mechanism will bolster BMP maintenance for areas where private BMP maintenance has historically been found to be lacking, thus ensuring a higher level of protection for receiving waters. Lastly, the retrofit, demonstration and testing facility will be used to confirm the effectiveness of BMPs included within the BMP manual, provide Copermittees data to review and enhance the program, and provide a demonstration of BMPs for the Copermittees, developers, and the general public.

The Copermittees also believe the passive-treatment BMPs, as opposed to capture and re-use BMPs, are the most reliable for the ongoing protection of water quality. For example, properly designed infiltration BMPs provide benefit during and between storms, without intervention from site owners, operators or occupants, and only require occasional and relatively simple landscape contractor maintenance on an annual basis. This concept has been integrated into the LID BMP Manual through conservative designs that provide a significant margin of safety against failure, and have design features that facilitate proactive maintenance (e.g., integrated landscape features). For the purposes of requiring BMPs that will be most protective of water quality, the Copermittees have de-emphasized the use of BMPs that harvest stormwater for on-site use, since the BMP will not operate passively, and if the BMP 'use' or maintenance should not occur, the BMP will bypass 100% of runoff without treatment. The Copermittees believe that the draft Permit appropriately encourages such water conservation technologies, while not mandating their use.

Regional Board Staff has recognized the efforts, thoughtfulness, and funding that the County has invested in their LID BMP approach, and have, in coordination with the Copermittees, developed a prioritization process that supports the Copermittees' investment in a plan for LID, while ensuring that an appropriate prioritization for the most effective BMPs is implemented. As such, infiltration BMPs must be used for all sites unless it is technically infeasible to infiltrate. Technical infeasibility will be based on criteria that will be developed by the Copermittees and approved by the Regional Board. Only when infiltration is deemed infeasible through the approved analysis can other LID BMPs be used in place of infiltration. These LID BMPs must be consistent with the Copermittees design manual or other regional LID manuals, which have been developed to ensure these LID BMPs are designed to have the greatest pollutant removal

over the life of a project. If LID BMPs are found to be technically infeasible due to poor site or other conditions, then conventional BMPS must be implemented and the project must participate in the LID waiver/mitigation program that will ensure pollutant removal effectiveness consistent with the preferred LID BMPs.

One other important consideration for new development and LID requirements in MS4 permits is the ability for the project proponent (developer) to understand and easily comply with the requirements, such that they can easily be incorporated into projects. Recently adopted MS4 permits, such as the south Orange County MS4 Permit, have very complicated new development and LID requirements. The result of such requirements is a WQMP guidance document that can be confusing, and may be difficult to implement consistently and in a way that will provide consistent protection of water quality. The Copermittees and Regional Board staff, working together, have crafted new development LID requirements that are easily understood, and will ensure the highest likelihood of integration of LID features consistently into projects.

Interim Hydromodification Criteria

Pursuant to discussions between the Copermittees and Water Board staff, the proposed interim hydromodification criteria is aligned with the Copermittees' existing hydromodification program. This agreed language ensures that adequate hydromodification protection measures continue to be in place, while allowing the Copermittees to focus resources and funds on developing the Final Hydromodification Management Program and avoid diversion of scarce resources to developing new interim criteria that will only be in effect for a short duration. In addition, this approach will save the development community from confusion as to which requirements are in effect.

The Copermittees' current hydromodification mitigation program is described in the WQMP, but has been slightly modified as presented in the draft MS4 Permit. Although the Copermittees request the minimal changes to the language shown in the attached redlines, the Copermittees otherwise support the currently drafted interim hydromodification requirements. Under the proposed interim requirements, project applicants must either demonstrate numerically that the project will not adversely impact downstream alluvial channels, or, they must mitigate both the two-year and 10-year recurrence interval storms to pre-project levels in the post-project condition. All analysis must be performed by a registered civil engineer specializing in water resources. Mitigation of both the two-year and the 10-year storms to pre-project levels has been demonstrated to be consistent with the range of flows that are the primary determinants of the stream geomorphology in the southern California area. By maintaining these storm events at pre-project levels, impacts to the downstream alluvial channel should be mitigated to a level of less than significant. Additionally, the Copermittees believe that the onsite LID requirements will further reduce the need for on-site hydromodification controls that would otherwise be required with conventional treatment BMPs. The final comprehensive hydromodification mitigation program will further develop more detailed analysis methods, as well as establish a monitoring program to help verify the effectiveness of the HMP requirements.

Attachment 3: Language Changes Supported by Board Staff and Copermittees

Revisions tentatively agreed to with Board Staff

Per discussions between the Water Board Staff and Copermittees the following revisions were agreed upon.

Section	Alternate Permit Language	Page in T.O.
Non-Stormwater Dry Weather Action Levels (NALs)		
C.2	In response to an exceedance of an NAL, the Copermittee(s) having jurisdiction must investigate and seek to identify the source of the exceedance in a timely manner.	20
Legal Authority		
E.1	Each Copermittee must establish, maintain, and enforce adequate legal authority within their jurisdiction to control pollutant discharges into and from its MS4 through ordinance, statute, permit, contract or similar means.	24
E.2	Each Copermittee must submit on or before June 30, 2012, a statement certified by its chief legal counsel that the Copermittee has taken the necessary steps to obtain and maintain full legal authority within their jurisdiction to implement and enforce each of the requirements contained in 40 CFR 122.26(d)(2)(i)(A-F) and this Order.	25
Jurisdictional Runoff Management Program - JRMP (Development Planning)		
F.1.c.(8)	Rain water harvesting, where feasible, ~~must~~ shall be ~~implemented~~ encouraged as part of the site design and construction~~, and to supplement offsite beneficial uses.~~	29
F.1.d.(4)(b)(i) Footnote	Maintain or restore natural storage reservoirs and drainage corridors (including depressions, areas of permeable soils, swales, and ephemeral and intermittent streams) to the extent feasible[12]. [12] Priority Development Projects proposing to dredge or fill materials in waters of the U.S. must obtain a CWA §401 Water Quality Certification .~~and/or~~Priority Development Projects proposing to dredge or fill materials in waters of the State must obtain ~~a CWA §401 Water Quality Certification and/or~~ Waste Discharge Requirements.	34

Attachment 3: Language Changes Supported by Board Staff and Copermittees

Section	**Alternate Permit Language**	**Page in T.O.**
F.1.f.(1)	Inventory of SSMP projects: Each Copermittee must develop and maintain a watershed-based database to track and inventory all projects within their jurisdiction, that have a final approved SSMP (SSMP projects), and its structural post-construction BMPs implemented therein ~~within its jurisdiction~~ since July, 2005. LID BMPs implemented on a lot by lot basis ~~in low density residential areasfor~~ at single family residential homes, such as rain barrels, are not required to be tracked or inventoried.	38-39
F.1.f.(2)(b)(iv)	~~At least 20 percent of all approved and inventoried SSMP projects must be inspected by the Copermittee annually;~~	39
F.1.h.(2)	In addition to the control measures that must be implemented by Priority Development Projects per section F.1.h.(1)(d), the HMP must include a suite of management measures ~~to~~ that can be used on Priority Development Projects to mitigate hydromodification impacts, protect and restore downstream beneficial uses and prevent or further prevent adverse physical changes to downstream channels.	43
F.1.h.(3)	As part of the HMP, the Copermittees may develop a waiver program that allows a redevelopment Priority Development Project, as defined in Section F.1.d.(1)(b), to implement offsite mitigation measures. A waiver may be granted if onsite management and control measures are technically infeasible to fully achieve post-project runoff flow rates and durations that do not exceed the pre-development (naturally occurring) runoff flow rates and durations. Redevelopment projects that are granted a waiver under the program must not have post-project runoff flow rates and durations that exceed the pre-project runoff flow rates and durations. The estimated incremental hydromodification impacts from not achieving the pre-development (naturally occurring) runoff flow rates and durations for the project site must be fully mitigated.	43
Commercial / Industrial		
F.3.b.(2)(b)	Designate / Update Minimum BMPs: Each Copermittee must designate a minimum set of BMPs for all inventoried industrial and commercial sites/sources. Where BMPs have already been designated, each Copermittee must review and update its existing BMPs for adequacy ~~within one year of permit adoption~~by no later than the submittal of the JRMP. Copermittees may continue to regularly review and update their designated BMPs for adequacy and subsequently submit any updates in their Annual Report.	58

Attachment 3: Language Changes Supported by Board Staff and Copermittees

Section	Alternate Permit Language	Page in T.O.
F.3.b.(4)(b) And **NEW** F.3.b.(6)(a)	F.3.b.(4)(b) ~~Each Copermittee must annually notify the San Diego Water Board, prior to the commencement of the rainy season, of all Industrial Sites and Industrial Facilities subject to the General Industrial Permit or other individual NPDES permit with alleged violations of the Copermittees ordinances, that pose a significant threat to water quality~~. F.3.b.(6)(a) – New (6) Reporting of Non-Compliant Sites (a) Each Copermittee must annually notify the San Diego Water Board, prior to the commencement of the wet season, of any unresolved high level enforcement action (as defined in the Copermittees' JRMP) that poses a significant threat to water quality in its jurisdiction as a result of violations of their stormwater ordinances.	60-62
Retrofit		
F.3.d.	Each Copermittee must develop and implement a retrofitting program that meets the requirements of this section. The goals of the existing development retrofitting program are to provide a means to the Copermittees to address the impacts of existing development through retrofit projects that reduce impacts from hydromodification, promote LID, support riparian and aquatic habitat restoration, reduce the discharges of stormwater pollutants from the MS4 to the MEP, and prevent discharges from the MS4 from causing or contributing to a violation of water quality standards.	64
F.3.d.(5)	The completed retrofit BMPs must be tracked in accordance with Section F.1.f. Retrofit BMPs on publicly owned properties must be inspected per section F.1.f. Privately owned retrofit BMPs must be inspected as needed ~~to ensure proper operation and maintenance~~.	65
IDDE		
F.4.b	Remove the following language: ~~all known locations of access points (i.e. manholes) to the Copermittee's MS4~~	67

Attachment 3: Language Changes Supported by Board Staff and Copermittees

Section	Alternate Permit Language	Page in T.O.
Education		
F.6.	~~Quasi-Governmental Agencies / Districts (i.e., educational institutions, water districts, sanitation districts, etc.)~~	
Watershed Workplan		
G.1.d.	Develop a watershed BMP implementation strategy to attain receiving water quality objectives in the identified highest priority water quality problem(s) and locations. The BMP implementation strategy must include a schedule for implementation of the BMP ~~project~~s to abate specific receiving water quality problems and a list of criteria to be used to evaluate BMP effectiveness. Identified watershed water quality problems may be the result of jurisdictional discharges that will need to be addressed with BMPs applied in a specific jurisdiction in order to generate a benefit to the watershed. This implementation strategy must include a map of any implemented and/or proposed structural BMPs.	72
Principal Copermittee Responsibilities		
M.3.	~~Produce and submit~~Coordinate the submittal of the documents and reports as required by section K of this Order and Receiving Waters and MS4 Discharge Monitoring and Reporting Program No. R9-2010-0016 in Attachment E of this Order.	84

Attachment 4: Monitoring and Reporting Program Requirements

Introduction

Tentative Order R9-2010-0016 (draft MS4 Permit) includes proposed requirements within Attachment E Monitoring and Reporting Program (draft MRP) that are not necessary to address management questions related to water quality, beyond requirements dictated to Orange County and beyond the Copermittees' ability to fund. Due to the expansion of monitoring requirements proposed by Regional Board staff, costs for monitoring program compliance are two and half times more expensive for Santa Margarita Region residents than to South Orange County residents. The Copermittees recognize monitoring and data collection are necessary to assist with program effectiveness assessment and address stormwater management questions within the Santa Margarita Region. However, the proposed revisions provided within this paper allow these assessments and questions to be answered in a more cost effective manner while retaining all major components of the draft MRP. The proposed revisions prune requirements that are not necessary to answer key management questions for this MS4 program, eliminate elements that may be of general interest and therefore should be handled at a more regional, state or federal level and/or correct provisions that are contrary to, or not aligned with, methods of practice established by the Southern California Stormwater Monitoring Coalition or other MS4 Permits approved by your Board. The changes proposed herein result in annual savings of approximately $780,000 while maintaining the integrity of the MRP. Even with these proposed revisions, this MRP is significantly more expensive than the Copermittees' current program.

Table 1 - Cost Savings resulting from proposed MRP changes

Section	Component	Requested Change	Cost reduction
A	**Mass Loading Stations**	1) Wet Weather - 3 wet -> 2 wet	**~$79,000**
		2) Dry Weather - Composite -> Grab	**~$66,000**
B	**Toxicity Testing (MLS and Bioassessment)**	3) 3 organisms -> 2 organisms	**~$14,000**
C	**Bioassessment**	4) 6 stations -> 3 stations	**~$158,000**
		5) 2X each -> 1X each	**~$95,000**
D	**Action Levels**	6) 'Representative Number/Percent' -> Representative - and remove 'within each sub area'	**~$241,000**
		7) SAL Composites -> Grab	**~$165,000**
E	**Inland Aquatic Habitat Monitoring**	8) Eliminate requirement	**~$140,000**
F	**Special Studies**	9) 6 special studies -> 4 studies, and Replace with more locally appropriate studies	**~$220,000/year**
	TOTAL ESTIMATED SAVINGS	Net savings of all recommended changes (annualized)	***~780,000/year***

Note: Red text refers to the requirements that are beyond the MRP requirements in the OC permit.

Attachment 4: Monitoring and Reporting Program Requirements

Draft Monitoring and Reporting Program Requirements

Background

Prior to the release of the first draft of the MRP requirements to the Copermittees, Water Board staff indicated the program would be similar to the South Orange County MS4 Permit (OC Permit) yet scaled appropriately to the Santa Margarita Region. The first draft of the MRP was not released until three weeks prior to the public release draft MRP. To our surprise, instead of being appropriately scaled, the draft MRP actually exceeded the scope and costs of the OC Permit MRP. Due to limited time, Water Board staff recommended the discussions regarding MRP requirements be brought before the Regional Board at the appointed October 13, 2010 Board Hearing. This was particularly frustrating as it was not consistent with our mutual goal to resolve technical issues at the staff level and bring only necessary policy issues to the Regional Board.

One of the most significant issues with the MRP is that the Copermittees proposed several new special studies in the ROWD. The Copermittees moved forward on these studies in good faith, including a $3,000,000 LID Demonstration and Testing Facility at the District headquarters in Riverside. The final MRP does not recognize any of these efforts, and instead mandates six new special studies and a habitat monitoring program. Initially, Board staff indicated that these six studies were for discussion and that it was not their intent to include all of the studies, however, later Board staff changed their position and mandated all of the studies. Further, the habitat monitoring program was actually removed from the Orange County MS4 Permit due to the addition of the NAL/SAL monitoring which was expected to effectively address the underlying habitat monitoring questions. These unnecessary additions put the Copermittees in the precarious position of having to abandon special studies that were already deemed by local stakeholders to be of critical value to managing stormwater within our region.

Cost Saving Requirement Revisions – Overview

The proposed draft MRP includes additional stations, constituents, data analysis and multiple special studies that exceed other programs such as South Orange County's or established standards of practice. These elements will not add substantively to the understanding of MS4 water quality impacts within the Santa Margarita Region and vastly exceed the ability of the Copermittees ability to pay and staff. Table 1 summarizes the Copermittees' requested revisions to the draft MRP and the costs savings from each revision.

These changes are also critical as the draft MRP proposes a program that exceeds available monitoring staffing and equipment resources. The District is currently in the process of recruiting for budgeted positions that were based on the monitoring program contained in our ROWD. However, review of the MRP has determined that our estimations were woefully inadequate. The MRP special studies and other requirements require scientists and other staff with specialized training and backgrounds that are not readily available. The District will likely have to find staff with generalized knowledge in related fields and spend significant resources training them to be knowledgeable in the science of stormwater management. Even if we were to consult out most of the work, we would still need specialized staff to scope, manage and review the consultants' work. It is not feasible to find, recruit and train the necessary staff and also deploy the proposed MRP in the time allotted. The Copermittees' proposed revisions scale

requirements to a more financially attainable and manageable level. Detailed justifications for each revision are described below.

Cost Saving Requirement Revisions – Section A

Mass Loading Station Monitoring - Attachment E: II.A.1.b & II.A.1.c

Revision: Request wet weather monitoring to be required twice a year instead of three times a year.

Justification: (1) The Water Board Staff has referenced the SMC guidance and indicated not enough data has been collected to warrant a requirement change from three wet weather samples to two. However this guidance states once three wet weather samples have been collected for three years, sampling for two wet weather events is acceptable. This data has been collected by the Copermittees. The Copermittees successfully collected three wet weather events for three reporting periods; in addition, the Copermittees have over 10 years of data to form the basis of future analyses. Although the methods of collection have changed, our statistical analysis indicates that there is no statistically significant difference between data sets collected during prior terms and the current term. (2) The current OC and SD Permits require only two wet weather samples. (3) The Santa Margarita Region is semi arid with ephemeral flows, sampling for a third storm event has proven, and will continue to prove difficult and may result in non compliance due to climate (lack of storm events). (4) The cost to Copermittees to fund a third wet weather monitoring event during this permit term is significant.

Mass Loading Station Monitoring - Attachment E: II.A.1.d

Revision: Request dry weather sampling method to be changed from composite sampling to grab samples.

Justification: (1) The Copermittees currently conduct dry weather sampling using an instantaneous grab sample. The MRP proposes 24-hour composite sampling, which represents a significant cost increase due to the need to construct infrastructure at the sampling sites to secure and facilitate portable automatic sampling equipment. (2) Composite samples will mask illicit discharges which is one of the primary reasons for dry weather monitoring. (3) Due to dry weather flows' steady nature, the flows can be accurately characterized using a grab sample. (4) The SMC Regional Bioassessment Program, which effectively defines the standard of practice for receiving waters monitoring, has found that chemistry samples must be collected at the most downstream transect (Transect A) to be representative of the flow through the assessed reach. This program therefore uses Grab samples collected immediately prior to benthomacroinvertebrate (BMI) and periphyton sampling. If composite sampling was required, it similarly must be done at the downstream transect; however, the composites would not be representative as they would pick up sediment, nutrients and other pollutants that had been unnaturally introduced by the BMI and periphyton collection activities. This would create an unrepresentative sample and the sampling equipment would be at risk of failure due to the suspension of sediment.

Cost Saving Requirement Revisions – Section B

Toxicity Testing - Attachment E: II.A.1.h

Revision: Request change in toxicity testing from three organisms to two organisms.

Justification: (1) The MRP specified in the OC Permit requires toxicity testing of two organisms and this permit should not go beyond requirements found within the OC Permit due to limited funding and resources. This is an example of a simple change where cost-savings can be realized. (2) The USEPA only has chronic toxicity protocols for *Pseudokirchneriella. Subcapitata* (formerly, *Selenastrum capricornutum*). Therefore there are no established protocols for the other two species, and data collection results will be difficult to compare to other regions.

Cost Saving Requirement Revisions – Section C

Stream Assessment Monitoring - Attachment E: II.A.2.a

Revision: Request that three stream assessment stations be monitored instead of six stations.

Justification: (1) The existing MS4 Permit requires three stream assessment stations annually. These stations are our mass loading stations. It should be noted that this is an ephemeral watershed. The current stations were selected because they were the only stations that had flowing water during the bioassessment sampling periods, not because they were necessary representative of urban runoff (although they are downstream of the entire MS4 system). Specifically, during dry weather, none of the current receiving waters stations receive runoff from the MS4 due to the ephemeral nature of the watershed. Similarly, efforts to find flowing water for the Regional Bioassessment Program have been challenging. For example, in 2009, the first year of the program, 35 random sites were evaluated before one perennial site could be identified. In 2010, 39 random sites were evaluated. The final sites that were selected were actually our CURRENT mass loading stations as they were the first randomly selected sites that had flow. This lack of flow was recognized by SCCWRP in establishing the distribution of Regional Bioassessment Stations in southern California. This is why southwest Riverside County is only assigned one Bioassessment station. (2) As is demonstrated above, the Copermittees are not likely to find three additional flowing stations that are indicative of impacts from MS4 discharges. The Permit requirement therefore puts the Copermittees in unavoidable non-compliance with the Permit. (3) The cost of monitoring the additional three stations is substantial, and given the relative size of the MS4 system and population of RC to OC, the additional stations are not appropriate on an environmental, economic or social justice scale.

Stream Assessment Monitoring - Attachment E: II.A.2.b

Revision: Request frequency be changed from twice per year to once per year for stream assessment monitoring.

Justification: (1) The Water Board Staff and Executive Officer agreed to make this change as a trade for the Copermittees participation in the SMC Regional Bioassment special study. The change was based on findings by the Southern California Coastal Watershed Research Project (SCCWRP) scientiests indicating that there is no seasonally signficant difference in bioassesment scores. The Copermittees volunteered to implement th Regional Bioassessment Program ahead of the necessary changes to the NPDES MS4 Permit program to reduce the bioassessment sampling events in a good faith effort. (2) To determine if two sampling events are in fact necessary, the Copermittees evaluated the difference in biological community scores between Spring and Fall for data collected at Lower Murrieta, Lower Temecula and

Adobe Creeks during May and October from 2007 through 2009. Utilizing a Two-Way Analysis of Variance of Southern California Index of Biological Integrity (IBI) scores, with season (Spring/Fall) and year (2007 through 2009) as variables, results indicated no statistical difference between years for any of the Permittee's three sites. No seasonal statistical difference in IBI scores ($p \geq 0.19$) was noted within any of the three stations, indicating that the IBI scores were consistent across seasons, regardless of the year. This data confirmed SCCWRP findings that there is not a change in the biological communities between the Spring and Fall seasons. (3) Further, the MRP within the OC Permit states that stations with year-round flow conditions may be monitored in May/June or September/October. Current assessment stations at Murrieta Creek, Temecula Creek, and Adobe Creek are perennial stations. Consistency across programs would denote assessments of these creeks once per year.

Cost Saving Requirement Revisions – Section D

MS4 Outfall Monitoring - Action Levels - Attachment E: II.B.1 and II.C.1.b.(1)

Revision: Request "a representative percentage of the major outfalls within each hydrologic subarea" (**II.B.1)** and "a representative number of major outfalls within each hydrologic subarea" (**II.C.1.b.(1)**) be changed to "representative major outfalls" as shown in the redlines attached to this comment letter.

Justification: (1) The draft MRP requires sampling of a representative number or representative percentage of major outfalls. This is a problematic compliance target as it focuses the program on a particular and open-ended "number" or "percent" of outfalls. By revising the language to require monitoring of "representative major outfalls", the burden is on the Copermittees to come up with a program that is truly representative, without requirements to meet an arbitrary number or percent of outfalls. The Copermittees are concerned about subareas that have many outfalls, which could require sampling of more sites than are economically feasible. These costs could escalate beyond the initial sampling event because if a NAL or SAL exceedance is recorded, source assessments studies are triggered that require additional staff time and resources. If this requirement is not revised, costs will quickly rise beyond the Copermittees' ability to sustain the MS4 compliance program.

MS4 Outfall Monitoring - Action Levels - Attachment E: II.B.1 and II.C.1.b.(1)

Revision: Request the following text revisions in footnote:

> "A representative ~~percentage~~ determination must consider hydrologic conditions, total drainage area of the site, ~~population density of the site, traffic density, age of the structures or buildings in the area, and~~ land use types (commercial, residential and industrial) , costs and other considerations as appropriate."

Justification: (1) The Copermittees originally asked for clarification on what factors would be considered for "representative percentage" and Water Board staff agreed to cost being included. The failure to include cost as a factor results in a program that reduces resources and diminishes funds quickly. The revision of the above allows for cost to be included through "other considerations as appropriate". (2) Deletion of percentage is consistent with previous comments. (3) Hydrologic conditions, population density of the site, traffic density and age of the structures or building in the area are all proposed

deletions because each subarea may not be sensitive to these factors and if one of this factors is applicable it will be included under the addition "other considerations as appropriate".

MS4 Outfall Monitoring - Action Levels - Attachment E: II.B.1.a

Revision: Request samples for Storm Water Action Levels (SALs) to be changed from 24-hour composite to grab.

Justification: (1) Composite sampling would result in significant increased cost due to the cost of purchasing additional automatic sampling equipment and constructing the necessary infrastructure to support its use. (2) Grab samples are likely more conservative. The Copermittees propose that grab samples be collected first and then, if a problem is indicated, the Copermittees would specify needed follow-up monitoring in the Source Assessment Monitoring Plan. (3) Freed resources can be dedicated to other key components of the program, such as follow-up source assessment studies.

Cost Saving Requirement Revisions – Section E

High Priority Inland Aquatic Habitat Monitoring - Attachment E: II.D

Revision: Request removal of the High Priority Inland Aquatic Habitat Monitoring requirements.

Justification: (1) This is an entirely new monitoring program. This monitoring program was initially proposed in the Orange County NPDES MS4 Permit, but later deleted when the NAL/SAL monitoring requirement was added. This trade was made as it was expected that the outfall monitoring data from the NAL and SAL program would effectively answer the underlying management question – "are MS4s impairing beneficial uses in priority aquatic habitat areas?" The underlying logic for removing the requirement in Orange County similarly applies here. Given the current economic conditions and the fact that this was considered and deleted from the OC Permit; the Copermittees respectfully request that this requirement similarly be deleted from the Riverside County MRP.

Cost Saving Requirement Revisions – Section F

Special Studies - Attachment E: II.E

Revision: Request alteration of Special Study Program.

Justification: The Draft Permit requires six special studies to be conducted (TMDL Development and Implementation, Sediment Toxicity, Trash and Litter Investigation, Agricultural, Federal and Tribal Input Study, MS4 and Receiving Water Maintenance Study and Intermittent and Ephemeral Stream Perennial Conversion Study). *This is in excess of the four special studies required by the OC MRP*. Given the larger MS4 Permit Area, population and resources available to South Orange County, the additional studies proposed on Riverside County are inappropriate from a social, economic and environmental justice standpoint. (1) Water Board staff acknowledged multiple studies were added to the draft MRP with the intention of that would be eliminated. (2) The issues addressed by these studies are not all specific to the Santa Margarita Region and would be more appropriate to be evaluated as part of a broader regional study, such as the Sediment Toxicity study. (3) The Agricultural, Federal, and Tribal Input Study is specifically inappropriate as it requires the Copermittees to monitor the discharges of other entities subject to separate NPDES regulations. (4) The Intermittent and Ephemeral Stream Perennial

Conversion Study is specifically inappropriate as it incorrectly presumes that such ephemeral streams are actually being converted to perennial systems within the permit area due to MS4 discharges. Some additional specific points include:

- Sediment Toxicity – In the waterbodies found in the Santa Margarita watershed (which are intermittent at best and dry most of the time) the idea of investigating sediment toxicity and its impacts on benthic macroinvertebrates seems a reach. Current sediment toxicity monitoring in the State is focused on year round streams and estuaries (e.g. the Delta). Furthermore the current state of sediment toxicity monitoring is at best in its infancy as is the State's policy regarding Sediment Quality Objectives. It would seem that a more reasonable approach associate with sediment toxicity is to allow the science to catch up with the policy and for the Copermittees to learn from these other statewide efforts.

- Agricultural, Federal, and Tribal Input Study - Ongoing monitoring efforts in the Central Valley and the Los Angeles Regions for the Agriculture Waiver Program are more robust and statistically valid to make any efforts by Riverside County to be pale in comparison and likely insignificant. Likewise, monitoring in watersheds (e.g. Lake Tahoe, and the northwest part of the State) where water bodies are impaired by sediment and where Federal and Tribal land uses have inputs to the impaired water bodies is significant and should take precedent over any efforts in Riverside County. As previously noted, it is inappropriate to require the Copermittees to not only monitor their own discharges, but also expend resources monitoring the discharges of others. The Regional Board has authorities to require these sources to collect their own data and should exercise that authority appropriately if such studies are required.

- MS4 and Receiving Water Maintenance Study - It is likely that every flood control district in the State and Caltrans would be impacted by the MS4 and Receiving Water Maintenance Study; therefore it would be imperative to have a well thought out, comprehensive, and regional study to answer the questions being posed in the MRP. Requiring the Copermittees to take on this responsibility is misleading and will not be sufficient to answer the broad questions being posed in the MRP. A more reasonable approach would be to model a regional program similar to the current SCCWRP efforts to assess hydromodification requirements for southern California.

- Intermittent and Ephemeral Stream Perennial Conversion Study – Finally, review of historical water resource data by the Copermittees (as indicated in the ROWD), USGS and state and federal courts have all found that the construction of Vale and Skinner dams has significantly increased the ephemeral nature of local watersheds, resulting in much drier conditions than naturally occurred. This is why Rancho California Water District is required to discharge raw water down the Santa Margarita River at the County Line. Requiring a study to study the impacts of ephemeral conversion demonstrates a clear lack of understanding of historical and current receiving water conditions. Further, similar to our comment above regarding the MS4 and Receiving Water Maintenance Study, this study is better addressed at a regional or statewide level. It is not possible to develop a sufficient local database to statistically validate any impacts from non-stormwater discharges within any reasonable timeframe. Furthermore any minimal

monitoring effort that could be provide by the Copermittees would not comprehensively address the questions being proposed in the MRP and would be a waste of resources. Again a regional approach, whether it be SCCWRP or other combination of stormwater Copermittees, would be a more logical and constructive approach to address this issue. The Copermittees have proposed maintaining two of the special studies (TMDL Development and Trash Assessment), while replacing the other four with locally preferred special studies already in place (Regional Bioasessment Program and LID BMP design, maintenance, and effectiveness study). The Copermittees believe the alternate proposal provides information that is directly relevant and beneficial to the Santa Margarita Region. This would result in an annual cost savings of $314,000 per year. This would maintain parity with the OC Permit, which only has four special studies, three of which are identical to the studies proposed below (TMDL Development, Regional Bioassessment, Trash and Litter investigation). Specific language to incorporate the new studies is included in the redline markup of the MRP.

The Copermittees propose the following studies, the write-up for which can be found in Attachment 9 to the comment letter:

1. TMDL Development and Implementation

2. **LID BMP design, maintenance and effectiveness study and demonstration**

   This study will be valuable in ensuring BMPs that are required are effective and the benefit and integration of LID BMPs into a site is understood. This proposed study would directly affect the Copermittees ability to ensure effective LID BMPs are being implemented.

3. **Regional Bioassessment study**

   All the Southern California counties have committed to participate in this study, with the understanding that it would be written into the MS4 permits as a special study for which they would get credit. The Copermittees have been proactively implementing this study without a MS4 Permit requirement, and want to be able to continue to support these regional studies.

4. Trash and Litter Investigation

Other Changes

Table 1: Analytical Testing for Mass Load (A.1) and Bioassessment (A.2)

Revision: Request "Carbamates" be removed as a constituent for analytical testing in Table 1.

Justification: The testing of carbamates should be dictated by the completion of toxicity identification evaluations (TIEs). The use of carbaryl in urban areas throughout California dropped approximately 80% between 2004 and 2008[1]. This drop is also matched by an 80% reduction in the number of USEPA-registered carbaryl products between 2004 and 2008. A downward trend since 2006 likely reflects a long-

[1] TDC Environmental, LLC (2010). *Annual Urban Pesticide Use Data Report 2010.* Prepared for the Urban Pesticide Pollution Prevention Project (UP3 Project) and the San Francisco Estuary Partnership (SFEP) through grant agreement from the State Water Resources Control Board (Agreement 09-305-550-1). June.

term reduction in the availability of carbaryl products due to USEPA regulatory requirements.[2] Further, once the USEPA completes its regulatory process for the full implementation of new carbayl restrictions[3], urban carbaryl use is likely to continue to decline.

Revision: Request "Hexavalent Chromium" be removed as a constituent for analytical testing in Table 1.

Justification: Since 2004, monitoring in the Santa Margarita Region has reflected that out of 62 total samples, there were 60 non-detected levels of Hexavalent chromium. The 2 detected levels of Hexavalent chromium occurred in April 2007 in wet weather samples. It may be notes that 2007 was the driest year on record for the region and analyzed samples reflect an extended period between wet weather events.

Revision: Request "Biological Oxygen Demand, 5day" and "Chemical Oxygen Demand" be removed as constituents for analytical testing in Table 1.

Justification: The reference in the Fact Sheet supporting the inclusion of these constituents is to the initial Phase 1 application requirements. It should be noted that the initial constituent list is not required of future permits. Further, these constituents are costly to analyze and do not provide new information that is relevant to the management of the NPDES MS4 Program.

Revision: Request "Total Organic Carbon" and "Dissolved Organic Carbon" be removed as constituents for analytical testing in Table 1.

Justification: The reference within the Fact Sheet does not require these constituents and there is a significant cost in analyzing the constituents. It is not clear what additional information these constituents provide that would be useful in managing the MS4 program that is not already addressed through the collection of other constituents.

Table 4: Analytical Testing for Wet Weather MS4 Discharges

Revision: Request "Biological Oxygen Demand, 5day" and "Chemical Oxygen Demand" be removed as constituents for analytical testing in Table 4.

Justification: The reference in the Fact Sheet supporting the inclusion of these constituents is to the initial Phase 1 application requirements. It should be noted that the initial constituent list is not required of future permits. Further, these constituents are costly to analyze and do not provide new information that is relevant to the management of the NPDES MS4 Program.

Revision: Request "Total Organic Carbon" and "Dissolved Organic Carbon" be removed as constituents for analytical testing in Table 4.

Justification: The reference within the Fact Sheet does not require these constituents and there is a significant cost in analyzing the constituents. It is not clear what additional information these constituents

[2] USEPA (2008). Amended Reregistration Eligibility Decision (RED) for Carbaryl. EPA-738-R-08-010. August.
[3] USEPA (2007). Reregistration Eligibility Decision (RED) for Carbaryl. EPA-738-R-07-018. September.

provide that would be useful in managing the MS4 program that is not already addressed through the collection of other constituents.

Attachment E: II.B.2

Revision: Request the following text revisions:

> "The Copermittees must collaborate to develop and implement a ~~monitoring~~program to identify sources of pollutants causing the priority water quality problems within each hydrologic subarea. The ~~monitoring~~ program must include focused monitoring ~~which moves upstream into each watershed~~ as necessary to identify source areas, or other methods to identify the societal sources of pollutants, as appropriate. This ~~monitoring~~ program must ~~be implemented within each hydrologic subarea and must begin~~ no later than the 2012-2013 monitoring year."

Justification: As drafted, the permit requires source identifications to start at the end point of the watershed and move upstream. The requested revisions are intended to provide flexibility to allocate resources appropriately based on field judgements. The second part of the revision is to acknowledge some pollutant contributions to the MS4 are in-fact, non-point source, and cannot be pinpointed through focused source ID Monitoring.

Attachment E: II.C.1.b.(2)

Revision: Request text additions:

> "Sampling of non-storm water discharges may be done utilizing grab samples. If a ponded MS4 discharge is observed at a monitoring station, the Copermittee(s) must record the observation and collect at least one (1) grab sample, however ponded water samples will not be used in determining action level exceedances. If flow is evident, a 1-hour composite sample may be taken. The Copermittee(s) must estimate the flow using techniques such as by measuring the width of water surface, approximate depth of water, and approximate flow velocity."

Justification: The first text addition is to avoid triggering action levels due to increased concentrations caused by evaporation of ponded water. Evaporation of ponded water will result in increased concentrations of any constituents contained in the water. NALs are based on Water Quality Objectives that are based on stable, flowing stream conditions. The second text addition is to allow flexibility in measuring stream flows. In some cases, flow gauges or flow meters may be available to estimate flow.

Attachment E: III.A.2.

Revision: Request text additions:

Attachment 4: Monitoring and Reporting Program Requirements

> Monitoring Annual Report: The Principal Copermittee must submit the Receiving Waters and MS4 Discharge Monitoring Annual Report to the San Diego Water Board on October 1 of each year, beginning on **October 1, 2013**. Receiving Waters and MS4 Discharge Monitoring Annual Reports must cover the monitoring activities and results from the previous fiscal year, and must meet the following requirements:

Justification: All of the Copermittees' activities are tracked and reported on a Fiscal Year basis. This facilitates clearer data and cost tracking, and results that can be more effectively integrated into the JRMP reports in a clear and understandable manner, since the reporting periods are aligned. This change is important, so as to allow for a simpler transition from the existing monitoring and data tracking methods, to those that will be developed for compliance with the permit.

Attachment E: III.A.2.e

Revision: Request the following text revisions:

> "~~Annual~~ The 4th year monitoring report must include identification and analysis of any long-term trends in the Copermittees' MS4 storm water discharges or receiving water quality. Appropriate statistical methods shall be used to evaluate the water quality data. ~~Trend analysis must use nonparametric approaches, such as the Mann-Kendall test, including exogenous variables in a multiple regression model, and/or using a seasonal nonparametric trend model, where applicable~~"

Justification: The first edit is to require the long term statistical analyses be performed on a time schedule consistent with submission of the ROWD. Requiring long-term statistical trend analyses on an annual basis is unnecessary and inappropriately increases analysis and reporting costs and complexity. The second edit recognizes a multitude of different statistical methods could be used and others may be more appropriate to the dataset than those identified in the draft MRP.

Attachment E: III.A.2.f

Revision: Request elimination of requirement for annual monitoring reports to include total pollutant loads (wet weather loads plus dry weather loads) due to MS4 Discharge for each of the hydrologic subareas.

Justification: Many assumptions go into the calculations of total loads, making their use in statistical analyses questionable at best. The Copermittees have continued to provide this data, but do not see that it has any value.

Note: Other redlines noted but not included in this paper are for clarification purposes and to make sure permit language is consistent with requested changes throughout Attachment E.

Attachment 5: Proposed Unpaved Road Requirements of the Draft 2010 Santa Margarita Region MS4 Permit

Executive Summary

The Draft Municipal Separate Storm Sewer System Permit (Draft Tentative Order No. R9-2010-0016; NPDES No. CAS0108740) for the Santa Margarita Region of Riverside County (Draft MS4 Permit) includes proposed findings and requirements for development and maintenance of unpaved roads that are redundant to existing regulatory requirements. The proposed requirements for maintenance of unpaved roads may lead to the unintended consequence of discouraging maintenance of the majority of the unpaved roads in the Santa Margarita Region, which may increase the potential for erosion and sediment discharge from such roads. Statements in the Fact Sheet and Findings, monitoring data, and Permittee observations and experience do not support identification of unpaved roads as a significant source of pollutants to receiving waters in the Santa Margarita Region, thereby warranting additional regulation of unpaved roads.

The Copermittees request that the proposed requirements for development and maintenance of unpaved roads be removed from the Draft MS4 Permit. The Copermittees believe that enhancement of existing programs by identifying Best Management Practices (BMPs) specific to maintenance of unpaved roads and providing public education to owners and contractors providing maintenance of privately maintained unpaved roads will be as effective as the program in the draft Permit at substantially less cost. If the San Diego Regional Board determines that unpaved roads within their jurisdiction require further regulation, the Permittees believe that the appropriate regulatory mechanism is a General Permit (Waste Discharge Requirements or NPDES Permit) since the Draft MS4 Permit addresses only a fraction of unpaved roads within the jurisdiction of the San Diego Regional Board.

Attachment 5: Proposed Unpaved Road Requirements of the Draft 2010 Santa Margarita Region MS4 Permit

1.0 Background

The stream system in the Santa Margarita Region is ephemeral, with only small isolated segments exhibiting natural perennial flow due to rising groundwater. Such a stream system does not support fish migration. Runoff from the Santa Margarita Region naturally exhibits high sediment loads due to precipitation patterns, limited vegetative cover, soil types and steep topography.

Most existing unpaved roads in the Santa Margarita Region are private roads on private property that have not been engineered and have evolved through use. Such unpaved roads consist of earthen materials that have been compacted by vehicular use and do not include improved drainage, engineered grading or surface improvement. However, proposed unpaved road projects are subject to the development requirements of the MS4 Permit and the Construction General Permit and would be engineered.

In contrast to paved roads, unpaved roads are predominantly lightly traveled and found in rural areas serving economically disadvantaged residents. Many of these roads remain unpaved for economic reasons. Moreover, some residents do not want paved roads as they desire to preserve the rural/rustic nature of their communities.

Maintenance of unpaved roads in the Santa Margarita Region is generally limited to smoothing washboard depressions that have been created by vehicle use and to improve drainage by properly sloping the surface. The smoothed road surface is compacted by the grading equipment and, subsequently, by regular traffic use. This routine maintenance activity is intended to maintain original lines and grade, and the original purpose of the unpaved road. Repair of landslides and washouts, and replacement of culverts is also performed as needed, in some instances on an emergency basis. Landslide and washout repairs may require the implementation and maintenance of temporary erosion and sediment control BMPs until the disturbed area is stabilized.

The Permittees voluntarily provide limited maintenance of Copermittee maintained, dedicated and accepted unpaved roads for public access. This voluntary maintenance is provided for public safety, including emergency vehicle access, and to maintain utility of the public easement. There is no requirement that the Permittees provide this maintenance.

Most unpaved roads in the Santa Margarita Region are not maintained by the Permittees, but instead are private roads located on private property. Permittee staff is only allowed to enter private property if a crime or illegal activity is observed. The County of Riverside has not accepted maintenance of unpaved roads since the late 1940s and now only accepts paved roads that have been designed and constructed to County standards. Murrieta and Temecula will only approve new subdivisions with paved roadways constructed to their standards. In some instances, the Permittees maintain unpaved roads under contract to Home Owners' Associations or through Community Service Areas. However, the Permittees are prohibited by law from using Gas Tax funds for maintenance of unpaved roads on private property.

Other entities that are not under the legal authority of the Permittees also own unpaved roads in the Santa Margarita Region. These entities include:

- Agricultural Operators
- Eastern Municipal Water District
- Federal Lands
- Metropolitan Water District of Southern California
- Nature Conservancy
- Railroads
- Rancho California Water District
- Southern California Edison
- State of California
- Tribal Lands

2.0 Findings Addressing Proposed Requirements for Unpaved Roads

Finding D.1.c of the Draft MS4 Permit states:

> This Order contains new or modified requirements that are necessary to improve Copermittees' efforts to reduce the discharge of pollutants in storm water runoff to the MEP and achieve water quality standards. Some of the new or modified requirements, such as the revised Watershed Water Quality Workplan (Watershed Workplan) section, are designed to specifically address these high priority water quality problems. Other requirements, such as for unpaved roads, are a result of San Diego Water Board's identification of water quality problems through investigations and complaints during the previous permit period. Other new or modified requirements address program deficiencies that have been noted during audits, report reviews, and other San Diego Water Board compliance assessment activities. Additional changes in the monitoring program provide consistency with the Code of Federal Regulations, USEPA guidance, State Water Board guidance, and the Southern California Monitoring Coalition recommendations.

The discussion of Finding D.1.c states:

> The Copermittees are required to update and expand their runoff management programs on jurisdictional and watershed levels in order to improve their efforts to reduce the contribution of storm water pollutants in runoff to the MEP and meet water quality standards. Changes to Order No. R9-2004-001's requirements have been made to help ensure these two standards are achieved by the Copermittees.
>
> The Orders' jurisdictional requirements have changed based on findings by the San Diego Water Board during typical compliance assurance activities, audits, or receipt of complaints. Where the audits found common implementation problems, requirements have been altered to better ensure compliance. In addition, the San Diego Water Board conducted reviews of the jurisdictional annual reports submitted by the Copermittees. Updates to the requirements for the Copermittees' programs are also based in part on

information found in the Copermittees' ROWD requirements that were included in the San Diego and Orange County MS4 permits, and discussions with the Riverside County Copermittees.

To better focus on attainment of water quality standards, the Order's jurisdictional and watershed requirements have been improved. The conditions of the receiving waters now drive management actions, which in turn focus diminishing resources on the highest priority water quality problems within the receiving waters in the watershed. Improvements to jurisdictional and watershed requirements were also made to facilitate a mutually clear understanding of the requirements between the San Diego Water Board and Copermittees.

During the previous permit period, the San Diego Water Board identified, through investigations and complaints, sediment discharges from unpaved roads as a significant source of water quality problems in the Riverside County portion of the San Diego Region. Enforcement and inspection activities conducted by the San Diego Water Board during the previous permit term have found a lack of source control for many unpaved roads within the jurisdiction of the Copermittees. Unpaved roads are a source of sediment that can be discharged in runoff to receiving waters, especially during storm events. Erosion of unpaved roadways occurs when soil particles are loosened and carried away from the roadway base, ditch, or road bank by water, wind, traffic, or other transport means. Exposed soils, high runoff velocities and volumes, sandy or silty soil types, and poor compaction increase the potential for erosion. Road construction, culvert installation, and other maintenance activities can disturb the soil and drainage patterns to streams in undeveloped areas, causing excess runoff and thereby erosion and the release of sediment. Poorly designed roads can act as preferential drainage pathways that carry runoff and sediment into natural streams, impacting water quality. In addition, other public works activities along unpaved roads have the potential to significantly affect sediment discharge and transport within streams and other waterways, which can degrade the beneficial uses of those waterways.

USEPA also recognizes that discharges from unpaved roads are a threat to water quality. USEPA guidance emphasizes the threat of unpaved roads to water quality:

"Dirt and gravel roads are a major potential source of these pollutants [sediment] and pollutants that bind to sediment such as oils, nutrients, pesticides, herbicides, and other toxic substances]. Many roads have unstable surfaces and bases. Roads act like dams, concentrating flows that accelerate erosion of road materials and roadsides. Both unstable surfaces and accelerated erosion then lead to sediment and dust."

There are several guidance documents, developed by the USEPA, the US Forest Service, the University of California, and others, that include design and construction specifications and BMPs that are readily available for implementation by private and

> public entities. Implementing design and other source control BMPs for unpaved roads in the region is necessary to reduce and minimize the impacts of sediment discharged during storm events from unpaved roads to the MS4s and receiving waters.

Comment: The evidence cited in the Finding, water quality monitoring data, and Permittee observations and experience since establishment of the MS4 Permit in 1990 do not identify unpaved roads as a significant source of pollutants resulting in water quality impairments. The Copermittees support the continued application of development and construction requirements and maintenance of temporary erosion and sediment control BMPs as specified in existing permits.

The requirements for development and maintenance of unpaved roads were proposed by Regional Board staff for inclusion in the Draft MS4 Permit just prior to its release for public comment. Prior to that time, and dating from the original establishment of the MS4 Permit requirements in 1990, unpaved roads had not once been mentioned by Regional Board staff as a significant source of water quality impairment requiring additional regulatory.

The discussion of Finding D.1.c. states that the inclusion of unpaved road requirements was based on "investigations and complaints" reviewed by the San Diego Regional Board. However, Regional Board staff identified only one recent case regarding an unpaved road in the Santa Margarita Region as a problem. The Copermittee in question has investigated this case and it is being addressed as an enforcement action. Although the Copermittees have not had the opportunity to review the investigations and complaints cited by Regional Board staff, no feedback from these investigations was reported to the Copermittees at the MS4 Permit discussions prior to the proposal of the unpaved road requirements. This indicates to the Copermittees that unpaved roads do not in fact present a significant water quality concern.

The Copermittees have reviewed the documents cited by Regional Board staff in the discussion of Finding D.1.c. and the conditions in the Santa Margarita Region are vastly different from those in Pennsylvania and Northern California cited in those documents. These areas receive regular precipitation, have significant vegetative cover, and perennial streams, some of which may support migrating fish. Nothing in these documents suggests that unpaved roads are a significant source requiring special attention in the Santa Margarita Region. Further, no data collected during Copermittee monitoring nor their observations support a conclusion that unpaved roads are a significant source of pollutants warranting special regulatory attention.

The lack of evidentiary support for the unpaved roads provisions makes their inclusion in the Draft MS4 Permit arbitrary and capricious. The Copermittees therefore request deletion of Finding D.1.C.

3.0 Fact Sheet Addressing Proposed Requirements for Unpaved Roads

Page 146 of the Fact Sheet states:

> **Section F.1.i** (Unpaved Roads Development) specifically requires the Copermittees to implement or require implementation of BMPs for erosion and sediment control after construction of all new unpaved roads. As discussed for Finding D.1c, design and source control BMPs for unpaved roads are needed to minimize the discharge of sediment to the MS4s and receiving waters,

especially during storm events. There are several guidance documents available (see Discussion for Finding D.1.c) that include design and source control BMPs that can be readily implemented by the Copermittees for the development of new unpaved roads.

Page 155 of the Fact Sheet states:

> **Section F.3.a.(10)** (Unpaved Roads Maintenance) requires the Copermittees to implement or require implementation of BMPs for erosion and sediment control during and after maintenance activities on unpaved roads, particularly in or adjacent to stream channels or wetlands. As discussed for Finding D.1c, source control BMPs for unpaved roads are needed to minimize the discharge of sediment to the MS4s and receiving waters. There are several guidance documents available (see Discussion for Finding D.1.c) that include BMPs that can be readily implemented by the Copermittees for the development of new unpaved roads. This requirement is necessary to ensure the Copermittees minimize the discharge of sediment from their unpaved roads used for their maintenance activities.

Page 160 of the Fact Sheet states:

> **Section F.3.c.(5)** (Privately Owned Unpaved Roads Maintenance) includes requirements for privately owned unpaved roads. The Copermittees must require implementation of BMPs for erosion and sediment control during maintenance activities on privately owned unpaved roads, particularly roads that are in or adjacent to receiving waters. As discussed for Finding D.1.c, BMPs for unpaved roads are needed to minimize the discharge of sediment to the MS4s and receiving waters. There are several guidance documents available (see Discussion for Finding D.1.c) that include design and source control BMPs that can the Copermittees can readily require to be implemented.
>
> In addition, where the Copermittees identify illegal construction and maintenance grading activities on privately owned unpaved roads, the Copermittees must enforce their ordinances to prevent illicit discharges of sediment and other pollutants from privately owned unpaved roads to their MS4s and receiving waters.

Comment: For the reasons set forth above, there is no evidence that unpaved roads require special regulatory attention in the MS4 Permit. Moreover, proposed requirements specific to unpaved roads are redundant to existing requirements in both the existing Permit and the draft MS4 Permit, the state General Construction Permit, and the Copermittees' Stormwater ordinances. To the extent that unpaved roads are of concern to Regional Board staff, those concerns can be effectively addressed by minor adjustments to these existing compliance programs. In a time of tight regulatory budgets, adding these additional requirements, especially where there is no demonstrated need for them, is arbitrary and capricious. The Copermittees request deletion of requirements specific to unpaved roads (see discussion below) as well as these statements in the Fact Sheet.

Attachment 5: Proposed Unpaved Road Requirements of the Draft 2010 Santa Margarita Region MS4 Permit

4.0 Draft MS4 Permit Requirements for Unpaved Roads

4.1 Unpaved Road Development Requirements

Proposed requirements for the development of unpaved road projects appear on page 45 in section F.1.i of the Draft MS4 Permit. The proposed requirements state:

> **i. Unpaved Roads Development**
>
> The Copermittees must develop, where they do not already exist, and implement or require implementation of erosion and sediment control BMPs after construction of new unpaved roads. At a minimum, the BMPs must include:
>
> (1) Practices to minimize road related erosion and sediment transport;
>
> (2) Grading of unpaved roads to slope outward where consistent with road engineering safety standards;
>
> (3) Installation of water bars as appropriate;
>
> (4) Unpaved roads and culvert designs that do not impact creek functions and where applicable, that maintain migratory fish passage.

Virtually all unpaved road development activities would be greater than one acre and/or be part of a priority development project of one acre or more. Such development projects are required to prepare and implement project-specific Standard Urban Stormwater Mitigation Plans (SUSMPs) under Section F of both the existing MS4 Permit and the Draft MS4 Permit. The SUSMPs identify post-construction BMPs that will be implemented for all elements of the project, including the unpaved road elements of the project. Unpaved road projects are also required to comply with the state General Construction Permit, which requires preparation of a SWPPP that identifies construction-phase BMPs and post-construction BMPs. These development and construction phase requirements are applicable to unpaved roads and are imposed by the Copermittees during the development review process, during the issuance of grading permits and during construction inspections. Either the general requirements for development projects in the existing or Draft MS4 Permit and/or the General Construction Permit already require identification and implementation of post-construction BMPs, including erosion and sediment control BMPs, when developing new unpaved roads. Therefore, additional requirements for development of unpaved roads are redundant and the Copermittees request that these redundant requirements be removed from the Draft MS4 Permit.

4.2 Unpaved Road Maintenance Requirements

Proposed requirements for the maintenance of unpaved roads appear on page 56 in Section F.3.a(10) and on page 64 in Section F.3.c.(5) of the Draft MS4 Permit. The proposed requirements state:

> **F.3.a. (10) <u>Unpaved Roads Maintenance</u>**

(a) The Copermittees must develop, where they do not already exist, and implement or require implementation of BMPs for erosion and sediment control measures during such maintenance activities on unpaved roads, particularly in or adjacent to receiving waters.

(b) The Copermittees must develop and implement or require implementation of appropriate BMPs to minimize impacts on streams and wetlands during unpaved road maintenance activities.

(c) The Copermittees must regularly maintain their unpaved roads adjacent to streams and riparian habitat to reduce erosion and sediment transport;

(d) Re-grading of unpaved roads during maintenance must be sloped outward where consistent with road engineering safety standards;

(e) Through their regular maintenance of unpaved roads, the Copermittees must examine the feasibility of replacing existing culverts or design of new culverts or bridge crossings to reduce erosion and maintain natural stream geomorphology.

F.3.c. (5) <u>Privately Owned Unpaved Roads Maintenance</u>

(a) The Copermittees must require implementation of BMPs for erosion and sediment control during maintenance activities on privately owned unpaved roads, particularly in or adjacent to stream channels or wetlands.

(b) The Copermittees must enforce their ordinances against illegal construction and maintenance grading activities on privately owned unpaved roads, so as to prevent impacts to water quality.

The documents.[1,2,3] cited in Finding D.1.c discuss shaping of the surface of unpaved roads during smoothing, and maintenance of temporary sediment and erosion control BMPs associated with maintenance activities, such as repair of landslides and wash outs. The temporary erosion and sediment control BMPs identified include straw bales and silt fencing. The documents do not describe conditions in the Santa Margarita Region, but rather in Pennsylvania and Northern California.

Unpaved Roads Maintained by Copermittees

The conditions in the Santa Margarita Region are vastly different from the conditions found in Pennsylvania and Northern California. Nevertheless, the Copermittees conduct surface grading and maintain temporary erosion and sediment control BMPs as appropriate following completion of maintenance on unpaved roads. These BMPs associated with the routine maintenance of unpaved roads

[1] USEPA 2006 "Environmentally Sensitive Maintenance for Dirt and Gravel Roads." Gesford and Anderson,USEPA-PA-2005.

[2] US Forest Service, 1996. Forest Service Specifications for Construction of Roads & Bridges. EM-7720-100. Revised August 1996.

[3] University of California Division of Agriculture and Natural Resources, 2007. Rural Roads: A Construction and Maintenance Guide of California Landowners. Publication 8262.

will be documented and procedures formalized in the Riverside County Drainage Area Management Plan (DAMP).

Unpaved Roads Maintained by Others

As previously described, the vast majority of unpaved roads within the jurisdiction of the Copermittees are not maintained by the Copermittees, but are maintained by others, typically private property owners. As these are public easements over private property, however, the underlying property owner is under no legal obligation to provide maintenance. To provide reasonable access, maintenance of such unpaved roads is voluntarily provided by property owners and, in some cases, home owners' associations. State law prohibits the use of Gas Tax funds by the Copermittees for the maintenance of unpaved roads on private property. Requirements for implementation and maintenance of temporary erosion and sediment control BMPs in areas under the legal jurisdiction of the Copermittees are addressed by the general requirements of the Copermittees' stormwater ordinances and, where grading activities are significant, through the Copermittees' grading ordinances. As maintenance of unpaved roads on private property is voluntary, more aggressive regulation of such private roads may in fact discourage routine maintenance of unpaved roads, likely resulting in an increase in erosion and sediment discharge from such roads.

As an alternative, maintenance of unpaved roads can be effectively addressed by enhancing existing programs. There is no need to create a new compliance program requirement specific to unpaved roads, especially where such programs cannot in any event be implemented by the Copermittees on private property. The Copermittees believe that a better approach is to provide public education to property owners and grading contractors in areas served by unpaved roads, focusing on the proper methods of shaping unpaved road surfaces and the benefits of implementing and maintaining temporary erosion and sediment controls.

The Copermittees request that these proposed provisions be removed from the Draft MS4 Permit.

5.0 Alternative Regulation of Unpaved Roads

There is nothing unique about potential discharges from unpaved roads under the legal jurisdiction of the Copermittees such that they would require special regulation. As discussed above, there is significant mileage of unpaved roads in the Santa Margarita Region that are not under the legal jurisdiction of the Copermittees. If there is concern about the impact of unpaved roads on water quality (a concern that, for the reasons already stated, is not supported by the evidence), there is no reason to believe that unpaved roads not under the legal jurisdiction of the Copermittees do not present the same potential to affect receiving water quality.

If it is determined that development and maintenance of unpaved roads requires special additional regulation, then such regulation should apply equally and on the same schedule to all unpaved roads under the jurisdiction of the San Diego Regional Board, not just those under the legal authority of the Copermittees. The Copermittees request that, if staff continues to maintain that unpaved roads require additional regulation, those requirements be addressed through a general permit for unpaved roads, and not in the Draft MS4 Permit.

6.0 Conclusion

No evidence, whether statements in the Fact Sheet and Findings, monitoring data, or Copermittee observations and experience, supports identification of unpaved roads as a significant source of pollutants to receiving waters in the Santa Margarita Region warranting additional regulation. The proposed unpaved road requirements are redundant to requirements of existing permits, including the state General Construction Permit, as well as existing Copermittee ordinances and programs. To the extent that unpaved roads may be a source of pollutants to the MS4 and thence to receiving waters, the Copermittees believe that enhancement of existing programs by documenting BMPs specific to maintenance of unpaved roads and providing public education to owners and contractors who provide maintenance of privately maintained unpaved roads will be as effective in reducing such pollutants, at a much reduced cost.

If the Regional Board determines that unpaved roads within its jurisdiction require further regulation, the appropriate method for addressing those roads is through a General Permit (Waste Discharge Requirements or NPDES Permit) rather than the Draft MS4 Permit, since a General Permit would address all unpaved roads in the San Diego Region, not just the subset of unpaved roads under the legal jurisdiction of the Copermittees.

Attachment 6: Prohibition of Irrigation Runoff

Introduction

The Draft Municipal Separate Storm Sewer System Permit (Draft Tentative Order No. R9-2010-0016 (NPDES No. CAS0108740) for the Santa Margarita Region of Riverside County (Draft SMR MS4 Permit) categorically prohibits the discharge of landscape irrigation; irrigation water; lawn watering; (collectively 'irrigation runoff') and non-emergency fire fighting flows runoff to the MS4. The basis for this requirement comes from the current Orange County Stormwater Permit within the San Diego Region (NPDES No. CAS0108740), which prohibits such discharges.

Context of Requested Changes

Stream and Watershed Characteristics

Unlike the watersheds in South Orange County, the Santa Margarita Region is an ephemeral watershed that includes Murrieta and Temecula Creeks which are perennial interrupted streams, i.e., they include some reaches in which the flow is continuous and others where flow is ephemeral. However, the areas of perennial flow in the Santa Margarita Region are located in mountain area tributaries outside of the urbanized areas serviced by the MS4s. These perennial flows quickly disappear by seepage into the sands and gravels and resurface upstream of the confluence of Murrieta and Temecula Creeks. The creeks in the urbanized areas of the watershed, located primarily in the valley, are ephemeral and flows are only observed during and immediately following significant storm events[1].

Rising groundwater is currently observed in Murrieta Creek below its confluence with the Santa Gertrudis Channel, an observation consistent with the observations made by the State of California in 1956.[2] Rising groundwater is also observed in Temecula Creek approximately one quarter mile upstream of the Interstate 15 Bridge. In 1956, the State observed more extensive rising groundwater conditions occurring as far upstream as the Highway 79 Bridge. Based on the virtual absence of non-stormwater flows and the rising groundwater conditions observed in lower Murrieta and Temecula Creeks prior to development of the watershed, there is no evidence that the rising groundwater currently observed is due to Urban Runoff nor that Urban Runoff has affected the quality of rising groundwater.

Irrigation Runoff is Not a Source of Pollutants

Finding C.15 states:

> *Non-storm water discharges to the MS4 granted an influent exception [i.e., which are exempt from the effective prohibition requirement set forth in CWA section 402(p)(3)(B)(ii)] under 40 CFR 122.26 are included within this Order. Any exempted discharges identified by Copermittees as a source of pollutants are subsequently required to be addressed (emphasis added) as illicit discharges through prohibition and incorporation into existing IC/ID programs. Furthermore, the USEPA contemplates that permitting agencies such as the San Diego Water Board may also identify exempted discharges as a source of pollutants required to be addressed as illicit discharges (See VOl.*

[1] Riverside Flood Control and Water Conservation District, "Hydrologic Data for 1975-76 Season," March 1982, p. 49.

[2] State of California Department of Public Works Division of Water Resources, Bulletin No. 57, "Santa Margarita River Investigation," Volume I, June 1956, p. 48.

> *55 Fed. Reg. 48037). The San Diego Water Board and the Copermittees have identified landscape irrigation, irrigation water and lawn water, previously exempted discharges, as a source of pollutants and conveyance of pollutants to waters of the U.S. Of course, rising groundwater is exempt from regulation under 40 CFR 122.26 as a non-prohibited non-storm water discharge.*

The last sentence of this Finding does not accurately reflect the facts. Unlike Orange County, and despite Board staff's contentions in the fact sheet the Copermittees have **not** identified landscape irrigation, irrigation water or lawn water as a source of pollutants or conveyance of pollutants to waters of the U.S. Rather, this statement is based on the efforts in Orange County where that County found that the significant perennial flows throughout the urbanized areas were caused by irrigation runoff. Not only has irrigation runoff not been found to be a source of pollutants to waters of the U.S. in the Santa Margarita Region as a category, no individual discharges of irrigation runoff in the region have been found to be a source of pollutants. As described in the Stream Flow Characteristics section above, during dry weather there is no perennial flow in the waters of the U.S. in the urbanized area until rising groundwater occurs just before the confluence of Murrieta and Temecula Creeks. This is unlike streams in South Orange County, that it was found that the significant perennial flows throughout the urbanized areas were caused by irrigation runoff. In the Santa Margarita Region, any weather runoff that does reach receiving waters quickly seeps into the alluvial soils.

Second, the Discussion of Finding C.15 in the Fact Sheet fails to demonstrate the need for a prohibition of this irrigation runoff as a non-stormwater runoff *category*. The discussion references conditions outside of and unlike those found in the Santa Margarita Region and misconstrues statements in public education materials that encourage runoff management as justification for the proposed prohibitions. Finally, no justification is provided in this discussion or elsewhere to support the prohibition of the non-emergency fire fighting flows runoff as a category.

Prohibition Not Economically Justifiable

A prohibition of irrigation runoff will result in significant costs to the public and the Copermittees as the prohibition is ***TO THE MS4***, which is defined to include streets, curbs and gutters. As the MS4 Permit has eliminated the MEP protections for dry weather non-stormwater discharges (see also legal comments in Attachment 7 to the comment letter), this makes the Copermittees responsible for every incidence of over-irrigation, regardless of whether such discharges ever affect receiving waters. As such, the cost to eliminate these discharges is not commensurate with any measurable environmental benefit. The Copermittees cannot impose fees to recover the costs of enforcing this new requirement and, as described in the Economics White Paper (Attachment 2 to the comment letter), the Copermittees have even fewer resources to carry out the requirements of the current MS4 Permit than in past years, much less carry out the additional requirements set forth in the draft Permit, including the development and implementation of a new program to prohibit irrigation runoff.

As this prohibition would also apply to Copermittees' facilities, retrofit of existing facilities would likely be immediately required to ensure compliance. The City of Murrieta, for example, has estimated that retrofit of their sprinklers to a drip system to avoid irrigation runoff from their facilities alone would cost $250,000.

Attachment 6: Prohibition of Irrigation Runoff

Irrigation Runoff Addressed by Existing Requirements and Programs

Management of irrigation runoff is currently addressed by existing requirements and programs and the additional requirements proposed in the draft Permit are unnecessary. The use of reclaimed water is regulated under Waste Discharge Requirements (WDRs) issued by the Regional Board.

The draft Permit also provides other mechanisms to address irrigation runoff. **First**, if a discharge of irrigation runoff was determined to be a source of stormwater pollutants, the Copermittees already have the legal authority to take appropriate enforcement action to control the discharge as an illegal discharge, under their existing storm water ordinances. **Second**, the non-stormwater action level monitoring required by this draft Permit will identify any potentially problematic non-stormwater discharges and identify the source of those discharges. Should the source be determined to be irrigation runoff, it will require the Copermittees to address that discharge. Both mechanisms are better suited (financially and legally) to deal with irrigation runoff than a complete prohibition provision in the absence of local data showing it as a problem.

Finally, local water purveyors are better equipped and able to address irrigation runoff. As an example, Rancho California Water District and Eastern Municipal Water District actively promote water conservation programs, which are supported by the Metropolitan Water District of Southern California. The County and the cities have adopted water conservation ordinances as required by the Water Conservation in Landscaping Act (AB 1881, Laird). Given these facts, there is even less justification for an extensive and expensive program to address an irrigation runoff issue that is not, in fact, a source of pollutants causing or contributing to a violation of water quality standards in the Santa Margarita Region.

Preferred Requested Permit Revisions

Specifically, the Permittees request that the language in the Permit be amended as follows prior to adoption of the Permit:

Delete Finding C.15

As the last sentence of this Finding is not supported by fact, the Permittees request that it be deleted as noted in the following text and the entirety of the Discussion of Finding C.15 in the Fact Sheet be deleted.

> *Non-storm water discharges to the MS4 granted an influent exception [i.e., which are exempt from the effective prohibition requirement set forth in CWA section 402(p)(3)(B)(ii)] under 40 CFR 122.26 are included within this Order. Any exempted discharges identified by Copermittees as a source of pollutants are subsequently required to be addressed (emphasis added) as illicit discharges through prohibition and incorporation into existing IC/ID programs. Furthermore, the USEPA contemplates that permitting agencies such as the San Diego Water Board may also identify exempted discharges as a source of pollutants required to be addressed as illicit discharges (See VOl. 55 Fed. Reg. 48037). ~~The San Diego Water Board and the Copermittees have identified landscape irrigation, irrigation water and lawn water, previously exempted discharges, as a source of pollutants and conveyance of pollutants to waters of the U.S.~~*

Attachment 6: Prohibition of Irrigation Runoff

Restore Conditional Exemption

The Permittees request that the landscape irrigation; irrigation water; lawn watering; and non-emergency fire fighting flows runoff categories be restored to the list of non-prohibited, non-stormwater discharges identified in B.2 of the draft SMR MS4 Permit as noted below. In the event that an individual irrigation runoff discharge is determined to be a source of pollutants as identified by the non-stormwater dry weather action level (NAL) process, appropriate action can be taken by the Permittees to control that source.

B.2. Non-Stormwater Discharges

> This item includes a listing of discharges that are not prohibited unless a discharge is determined to be a source of pollutants to waters of the U.S. Landscape irrigation, irrigation water, lawn watering and non-emergency fire fighting flows were deleted from this list as noted:

a. Diverted stream flows;
b. Rising groundwaters;
c. Uncontaminated groundwater infiltration [as defined at 40 CFR 35.2005(20)] to MS4s;
d. Uncontaminated pumped groundwater[3];
e. Foundation drains[3];
f. Springs;
g. Water from crawl space pumps[3];
h. Footing drains[3];
i. Air conditioning condensation;
j. Flows from riparian habitats and wetlands;
k. Water line flushing[4,5;]
l. <u>Landscape irrigation;</u>
m. Discharges from potable water sources not subject to NPDES Permit No. CAG679001, other than water main breaks;
n. <u>Irrigation water;</u>
o. <u>Lawn watering;</u>
p. Individual residential car washing;
q. <u>Non-emergency fire fighting flows; and</u>
r. Dechlorinated swimming pool discharges

Additional Clarifications

It is not practicable for the Copermittees to <u>prevent or eliminate</u> irrigation runoff. The Permittees request that the following requirements be revised as noted to provide achievable compliance requirements:
F.1.c.(1) Approval Process Criteria and Requirements for All Development Projects states:

[3] Requires enrollment under Order R9-2008-002. Discharges into the MS4 require authorization from the owner and operator of the MS4 system.
[4] This exemption does not include fire suppression sprinkler system maintenance and testing discharges. Those discharges may be regulated under Section B.3.
[5] Requires enrollment under Order R9-2002-0020.

Performance Criteria: Discharges from each approved development project must be subject to the following management measures:

(1) Source control BMPs that reduce stormwater pollutants of concern in runoff;~~prevent~~ reduce the potential for illicit discharges into the MS4; ~~prevent~~ reduce the potential for irrigation runoff; storm drain system stenciling or signage; properly design outdoor material storage areas; properly design outdoor work areas; and properly design trash storage areas.

F.1.d.(5) Source Control BMP Requirements states:

Each Copermittee must require each Priority Development Project to implement applicable source control BMPs. The source control BMPs to be required must:

(a) Prevent illicit discharges into the MS4;
(b) Minimize storm water pollutants of concern in runoff;
(c) ~~Eliminate~~ Reduce the potential for irrigation runoff;
(d) Include storm drain system stenciling or signage;
(e) Include properly designed outdoor material storage areas;
(f) Include properly designed outdoor work areas;
(g) Include properly designed trash storage areas;
(h) Include water quality protection requirements applicable to individual priority project categories.

Alternative Requested Permit Revisions

Regulate irrigation runoff discharges from the MS4, rather than as prohibited discharge to the MS4

If the Regional Board nevertheless insists on prohibiting irrigation runoff, the Copermittees request that the draft MS4 Permit be revised to allow for irrigation runoff to be managed as a Jurisdiction Runoff Management Plan (JRMP) program, rather than as a prohibited discharge to the MS4. This alternative request is consistent with how the Permit currently deals with non-emergency fire fighting discharges, which was also removed from the list of non-prohibited non-stormwater discharges. The Executive Officer stated that he would be open to consideration of a program for irrigation runoff that would address discharges from the MS4. This alternative approach allows the Copermittees to develop a program that focuses on irrigation runoff problem areas, as opposed to holding the Copermittees responsible for eliminating any instant case of over-irrigation independent of threat to receiving water quality.

As the alternative to restoring the conditional exemption, the Copermittees request the Board to ADD Provision B.4 as follows:

B.4. *As part of the JRMP, the Copermittees must develop and implement a program to address pollutants from landscape irrigation, irrigation water and lawn watering identified as significant sources of pollutants to waters of the United States.*

Attachment 7: General Legal Comments

LEGAL COMMENTS OF THE RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT ON TENTATIVE ORDER NO. R9-2010-0016, WASTE DISCHARGE REQUIREMENTS FOR DISCHARGES FROM THE MUNICIPAL SEPARATE STORM SEWER SYSTEMS (MS4s) DRAINING THE COUNTY OF RIVERSIDE, THE INCORPORATED CITIES OF RIVERSIDE COUNTY, AND THE RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT WITHIN THE SAN DIEGO REGION

The following comments are made by the Riverside County Flood Control and Water Conservation District (District) with respect to legal issues raised by the above-referenced Tentative Order (Order). These comments are being made on behalf of the District and, with respect to issues common to the other Copermittees, also on behalf of the County of Riverside and the Cities of Menifee (to the extent that this City will remain as a Co-Permittee under the Order), Murrieta, Temecula and Wildomar. We also understand that the County and the individual Cities will be filing comments on the Order under separate cover. The comments contained in this document are intended to complement, but not supersede, the individual comments of the County and the City. Also, the District will be filing separate comments concerning issues specific to it.

The District reserves the right to make additional legal comments on the Order prior to the close of the public hearing to adopt the order. In addition, legal comments may also be included in the Technical Comments separately filed herewith by the District.

The redlined version of the Order submitted with the District's comment letter also addresses the following and additional comments, along with requested changes in the text of the Order.

General Comments:

1. *Dual Requirement to Adopt Programs and Guarantee Results*

Throughout Part F. of the Tentative Order relating to the Jurisdictional Runoff Management Program, the language requires not only that the Copermittees adopt programs intended to achieve control of pollutants but also requires such programs to achieve certain ends. See, for example, Part F.1., where each Copermittee must implement a development planning program which meets the requirements of Section F of the Tentative Order *and* which requires such a program to (1) reduce development project discharges from the MS4 to the MEP, (2) prevent such discharges "from causing or contributing to a violation of water quality standards", (3) prevents illicit discharges to the MS4, and (4) manages increases in runoff discharge rates. A similar requirement is set forth in other provisions, including Part F.3, relating to existing development, Part F.3.b., relating to commercial/industrial programs, Part F.3.c., relating to residential programs and Part F.6, relating to the education component where, in each case, the Copermittees are required to develop programs <u>and ensure their performance</u>.

This dual requirement, to develop a program and then to ensure that it achieves the intended ends, is unlawful, as it goes beyond the requirements of the MS4 regulations and requires the Copermittees to guarantee the results of activities that will often be in the control of third parties.

Attachment 7: General Legal Comments

The MS4 regulations require that the MS4 permittees develop the required programs. See, for example, 40 CFR § 122.26(d)(2)(iv(A)((2), which requires the Copermittees to, among other things, develop and implement a management program including a "description of planning procedures including a comprehensive master plan to develop, implement and enforce controls to reduce the discharge of pollutants from municipal separate storm sewers which receive discharges from areas of new development and significant redevelopment". The Copermittees certainly could be liable under the permit if they failed to adequately "develop, implement and enforce controls". However, the MS4 regulations do not require that the Copermittees guarantee, under threat of being found in violation of the permit, that such controls achieve the desired ends of the management programs. It should be also noted that in many other parts of the Order, the Copermittees are directed to develop programs "designed" to achieve water quality goals.

Further, the iterative BMP approach required by the State Water Resources Control Board ("State Board") in precedential State Board Order WQ 99-05 and subsequent rulings would be made meaningless if the Copermittees were strictly liable for ensuring in their programs that discharges did not cause or contribute to a violation of a water quality standard. It is appropriate for the Board to set forth in these sections the "elements needed in the Copermittees' program to fulfill the goals of [the] directive", as set forth in staff's Response to Comment 297 on the Orange County MS4 permit, Order No. R9-2009-0002. However, the Board has no authority to require the Copermittees to guarantee that such goals will be fulfilled, as the current language appears to require.

In addition to the portions of the Order cited, the Copermittees also request changes to similar provisions found at Sections F.1.d, F.1.d.5, F.2, F.3.a, F.4, and G. The attached redline identifies those and any additional parts.

2. *Requirement to Follow State Law on Requirements Not Required by Federal Law*

A number of requirements in the Tentative Order exceed the requirements of federal law. The Board may have discretion to impose such requirements under state law (*Defenders of Wildlife v. Browner*, 191 F.3d 1159 (9th Cir. 1999), however, the California Supreme Court has determined that to the extent such state law requirements are included in an NPDES permit, the Board must consider the factors set forth in Water Code § 13263(a) and § 13241, including the water quality that could reasonably be achieved by the requirements and economic considerations. *City of Burbank v. State Water Resources Control Board* (2005) 35 Cal. 4th 613. See also Water Code § 13000, setting forth that the activities and factors which may affect the quality of the waters of the state "shall be regulated to attain the highest water quality which is reasonable, considering all demands being made on those waters and the total values involved, beneficial and detrimental, economic and social, tangible and intangible".

The Fact Sheet and findings for the Tentative Order do not establish that staff has considered such factors or, to the limited extent the factors were considered, staff used out-of-date and incomplete information. In particular, the economic analysis contained in Section VI of the Fact Sheet uses out-of-date information on the economic viability of the cities in the Santa Margarita Region, ignoring the impact of the national recession, which has hit the Region with particular force and which has caused a major reduction in property tax and sale tax revenues available to

fund water quality activities under the Order. For a more complete economic analysis, please see Attachment 2 to the comment letter.

Findings in Tentative Order:

Finding A.4: This finding states that responses to comments on the Order would be "incorporated by reference" into the findings supporting the Order.

Comment: Incorporating responses to comments as to which interested parties have no chance to comment prior to the hearing on the Order raises a due process concern.

Finding C.14: This finding states, in relevant part, that "[n]on-storm water (dry weather) discharge from the MS4 is not considered a storm water (wet weather) discharge and therefore is not subject to regulation under the Maximum Extent Practicable (MEP) standard . . . .". The finding further asserts that such discharges are to be "effectively prohibited" from discharge into the MS4.

Comment: The rationale for this finding, as set forth in the Fact Sheet, relies on a State Board precedential decision, Order No. WQ 2009-0008. This order has been vacated by order of the Los Angeles County Superior Court in *County of Los Angeles v. State Water Resources Control Board*, Case No. BS 122724 (July 16, 2010). Thus, the order has no further effect and cannot be cited or relied upon by the Board in support of this finding or any other finding or directive in the Order.

Moreover, the finding incorrectly states that discharges of non-stormwater from the MS4 are not subject to the MEP standard. This parsing of "stormwater" and "non- stormwater" is not found in the Clean Water Act, which states only that the MS4 permit "shall require controls to reduce the discharge of *pollutants* to the maximum extent practicable . . . .". 33 U.S.C. 1342(p)(3)(B)(iii) (emphasis supplied). The preamble to the MS4 regulations promulgated by U.S. EPA moreover also acknowledges that "MEP control measures" would be implemented to address not only pollutants in "stormwater" but also from "non-stormwater discharges."

> As the preamble states:
>
> [Copermittees are required] to develop management programs for four types of pollutant sources which discharge to large and medium municipal storm sewer systems. Discharges from [such systems] are usually expected to be composed primarily of: (1) Runoff from commercial and residential areas; (2) storm water runoff from industrial areas; (3) runoff from construction sites; and (4) *non-storm water discharges*. Part 2 of the permit application has been designed to allow [permittees] the opportunity to propose *MEP control measures for each of these components of the discharge"*. 55 Fed. Reg. at 48052 (emphasis supplied).

This language sets forth EPA's understanding of the plain language of the Act: "pollutants" must be controlled to the MEP from the MS4 "discharge", not merely stormwater. While State Board Order No. WQ 2009-0008 improperly attempted to ignore this distinction and liken non-stormwater discharges to prohibited "illicit discharges", that order has been vacated and cannot be cited by the Board.

Moreover, the interpretation that the Clean Water Act requires controls of dry weather discharges from the MS4 in the same manner as if such discharges were from an industrial wastewater source ignores the factual complexity of the MS4 discharge. For example, some of that discharge will be composed of exempt discharges, such as car washing runoff, swimming pool drainage, rising groundwater, foundation drains and other such sources. As to these types of discharges, U.S. EPA stated that "it is unlikely Congress intended to require municipalities to effectively prohibit . . . *seemingly innocent flows that are characteristic of human existence in urban environments and which discharge to municipal separate storm sewers"*. 55 Fed. Reg. at 48037 (emphasis added). Other parts of that discharge will be comprised of industrial discharges separately permitted by the Board, such as well development discharges. These discharges cannot be distinguished from possible illicit discharges, yet they must still be treated to the MEP. There is no requirement in the Clean Water Act, or in the implementing regulations, to ensure that these mixed dry weather discharges must be "effectively prohibited" in the same way that an industrial plant would be required to control its discharges.

Finding C.15: This finding states, in relevant part, that the Board and the Copermittees have identified "landscape irrigation, irrigation water and lawn water, previously exempted discharges, as a source of pollutants and conveyance of pollutants to waters of the U.S." The finding further asserts that such non-exempt discharges are required to be "addressed" as "illicit discharges" and effectively prohibited from entry into the MS4.

Comment: The rationale for this prohibition lacks both a factual and legal basis. The factual issues are discussed in the District's technical comments on this issue. With regard to legal issues, the justification for removing the preexisting exemption for these discharges (referred to hereafter as "irrigation water") is completely lacking. First, given that the justification is based on State Board Order WQ 2009-0008, which likens dry weather discharges to "illicit discharges" required to be "effectively prohibited" from entry into the MS4, the vacation of this order by the Los Angeles County Superior court eliminates this Order as a justification for the prohibition.

Second, EPA, in the preamble to the federal MS4 regulations, required that a *permittee* must make a finding that the "irrigation water" discharges must be a "source of pollutants to waters of the United States . . . .". 55 Fed. Reg. 48037. Moreover, such discharges must represent a "significant" source of pollutants to waters of the United States "under certain conditions". U.S. EPA *Guidance Manual for the Preparation of Part 2 of the NPDES Permit Application for Discharges from Municipal Separate Storm Sewer Systems,* November 1992 ("EPA Part 2 Guidance Manual"), at p. 6-33. These conditions require a focus not on an entire category of discharges, but rather a discharger-by-discharger examination.

In the MS4 regulatory preamble, EPA stated that "[i]n general, municipalities will not be held responsible for prohibiting some specific components of discharges or flows listed below through their [MS4], even though such components may be considered non-storm water discharges, unless such discharges *are specifically identified on a case-by-case basis as needing to be addressed"*. 55 Fed. Reg. 47995 (emphasis supplied). In the Guidance Manual, EPA states:

> If an applicant knows . . . that landscape irrigation water from a ***particular site*** flows through and picks up pesticides **or *excess*** nutrients from fertilizer applications, there may

> be a reasonable potential for a storm water discharge to result in a water quality impact. In such an event, the applicant should contact the NPDES permitting authority to request that the authority order ***the discharger*** . . . to obtain a separate NPDES permit (or in this case, the discharge could be controlled through the storm water management program of the MS4).
>
> EPA Part 2 Guidance Manual, p. 6-33 (emphasis added).

Third, the finding asserts that the Board has the authority to "identify exempted discharges as a source of pollutants" and that it has identified the irrigation discharges "as a source of pollutants and conveyance of pollutants to waters of the U.S." Read in the context of the previously cited language, however, the Board has no power greater than a municipality and must identify specific discharges, and not entire categories of discharges. See 55 Fed. Reg. 48037. And, as noted in the white paper on irrigation runoff, the Copermittees have not, in fact, identified irrigation discharges as a source of pollutants or a "conveyance of pollutants" to waters of the United States.

Finding D.1.b.: This finding states that "MS4 discharges, however, continue to cause *or contribute to* violations of water quality standards as evidenced by the Copermittees' monitoring results". (Emphasis added)

Comment: With respect to discharges that "contribute to" violations of water quality standards, it should be noted that for concentration-based water quality standards, an MS4 discharge at concentrations *below* the water quality standard cannot, as a matter of simple scientific fact, *contribute to* a violation of such a water quality standard. If the discharge is below the standard in question, that discharge will never exceed the water quality standard, no matter the volume of the discharge.

Finding D.2.g: This finding, which concerns the effects of urbanization on the characteristics of stormwater flow, states in part that "[h]ydromodification measures for discharges to hardened channels are needed for the future restoration of the hardened channels to their natural state . . . ."

Comment: Hardened flood control channels are in place in the Santa Margarita Region due to the need to protect the lives and property of Riverside County residents from floodwaters. Such channels, and other flood control structures, have been established by the District in accordance with its statutory obligations set down by the Legislature in California Water Code App. § 48-9. In particular, we draw the Board's attention to that section of the Water Code setting forth the power of the District to "control the flood and storm waters of said district" and to save and conserve in any manner all or any of such waters and protect from damage from such flood or storm waters the watercourses, watersheds, public highways, life and property in said district." Water Code App. § 48-9(8).

The Board has no statutory jurisdiction under the MS4 program to alter any flood control structures or channels of the District or to some jurisdiction over the construction or location of such structures or channels. Any such alteration or construction must be done with the cooperation and agreement of the District and in accord with the District's statutory mandate to protect the citizens of Riverside County. Please see changes in redline.

Attachment 7: General Legal Comments

Finding D.3.c: This finding states in part that "urban streams", whether natural, anthropogenic or partially modified, are considered part of the "MS4" if they are used as a conveyance for runoff.

Comment: The definition of "MS4" does *not* include any natural watercourse. This is evident both from the definition of "MS4" in the federal Clean Water Act regulations and from EPA's comments in the preamble to those regulations. First, the definition of "MS4", in relevant part, states that it consists of "a conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, manmade channels or storm drains" "owned or operated by" a municipality "having jurisdiction over disposal of . . . storm water" that is "designed or used for collecting or conveying storm water". 40 CFR § 122.26(b)(8). Nothing in that definition even suggests that natural watercourses are part of the MS4, only improved watercourses.

Second, U.S. EPA, in the preamble to the original MS4 regulations, stated unequivocally that "[t]he Agency also wants to clarify that streams, wetlands and other water bodies that are waters of the United States are not storm sewers for the purpose of this rule". 53 Fed Reg. 49442 (December 7, 1988).[1]

Moreover, none of the Copermittees "own" or "operate" a natural stream. Such streams are waters of the State and are "owned" by the people of California.

The authority cited in the Fact Sheet for this finding, a response filed with the State Board in opposition to a petition challenging an MS4 permit issued by the Board to San Diego County, contradicts the federal definition and, under the Supremacy Clause, cannot be employed. Please see changes in redline.

Finding E.1: This finding states that the RWL language in the Tentative Order "requires compliance with water quality standards, which for stormwater discharges compliance is to be achieved through an iterative approach requiring the implementation of improved and better-tailored BMPs over time".

Comment: The District has two comments regarding this finding, one relating to the language of the finding and one relating to the Fact Sheet discussion of the finding. First, the language of State Board Order WQ 99-05, which establishes the RWL language required to be placed in MS4 permits statewide, is not limited to "stormwater" discharges, but rather to all discharges into receiving waters. See State Board Order WQ 99-05. This is consistent also with the requirement that "discharges" from the MS4, not merely stormwater discharges, must be controlled to the MEP and are not required to meet numeric effluent limitations. 33 U.S.C. § 1342(p)(3)(B)(iii). Second, while the language of the finding correctly states that compliance with water quality standards "is to be achieved through an iterative approach", language in the Fact Sheet improperly contradicts this finding by asserting that compliance with the iterative BMP process

[1] EPA saw no need to further clarify this point in the final rulemaking for the MS4 regulations. The absence of any discussion of this point in the final rulemaking does not, contrary to comments made by Board staff in responses to comments on the South Orange County MS4 Permit, Order No. R9-2009-0002, indicate that EPA abandoned this reading of the Act.

"does not shield the discharger from enforcement actions for continued non-compliance with water quality standards". Fact Sheet, page 91.

Such an interpretation contradicts the plain language of Order WQ 99-05 and appears to represent an "end-run" around the entire iterative process and the concept of MEP, which is a flexible concept, intended to allow the development of site-specific permit conditions based on the judgment of the permit writer. See, e.g., 55 Fed. Reg. 48038. The interpretation is, therefore, not consonant with the requirements of the State Board precedential order and the MS4 regulations and should be deleted from the Fact Sheet.

Finding E.6: This finding purports to determine that the Tentative Order "does not constitute an unfunded local government mandate subject to subvention under Article XIIIB, Section(6) of the California Constitution".

Comment: This finding has no place in the Tentative Order. The exclusive jurisdiction over a determination as to whether a mandate constitutes an unfunded state mandate lies with the Commission on State Mandates. The Commission has exclusive authority to determine, in the first instance, whether a requirement constitutes an unfunded state mandate. Government Code §§ 17751 and 17552; *Lucia Mar Unified School District v. Honig* (1988) 44 Cal.3d 830, 837; *Hayes v. Commission on State Mandates* (1992) 11 Cal.App.4th 1546, 1596-97. The findings of an agency that has no jurisdiction to make those findings are entitled to no weight.

Second, the finding is erroneous on several grounds. It is erroneous in its assertion that the Tentative Order "implements federally mandated requirements under CWA §402". While true, the Order also contains separate state-mandated requirements. As the California Supreme Court has held, NPDES permits (like the Tentative Order) can contain both federal and state requirements. See *City of Burbank, supra,* 35 Cal. 4th at 618, 628. Where those non-federal requirements constitute a new program or higher level of service ordered by the state or exceed federal requirements, those requirements can qualify as a state mandate requiring a subvention of funds. See *Long Beach Unified School District v State of California* (1990) 225 Cal.App.3d 155, 172-73. Even if the requirement derives from federal law, the requirement can still constitute an unfunded state mandate if the state agency has a choice as to whether to impose the requirement on the permittees, e.g., *Hayes,* 11 Cal.App.4th at 1593-94.

Recently, the Commission on State Mandates held that both the Los Angeles County MS4 Permit and the San Diego County MS4 Permit contained requirements that constituted an unfunded state mandate, not required by federal law. *In re Test Claim on Los Angeles Regional Quality Control Board Order No. 01-182,* July 31, 2009; *In re Test Claim on San Diego Regional Water Quality Control Board Order No. R9-2007-0001,* March 26, 2010.

The finding further asserts that the obligations to be imposed on the Copermittees are "similar to, and in many respects less stringent than" obligations on non-governmental discharges. A similar argument was considered and rejected by the Commission in the Los Angeles and San Diego MS4 Permit Test Claims. The District disagrees with this assertion, as there are numerous requirements in the Tentative Order that are uniquely applicable to governmental entities. This is, however, a question that would be addressed by the Commission on State Mandates were a test claim to be filed, the only procedure for the determination of this issue.

Attachment 7: General Legal Comments

The finding further asserts that Copermittees "have the authority to levy service charges, fees, or assessments to pay for compliance with this Order". This finding is both erroneous on the facts and without any basis in the record. The question of how a state mandate is to be funded is beyond the scope of the Board's expertise and, again, is exclusively within the jurisdiction of the Commission on State Mandates. The finding also asserts that the "Copermittees requested permit coverage in lieu of compliance with the complete prohibition against the discharge of pollutants contained in CWA §301, subdivision (a)". A similar argument was made and rejected in the Los Angeles and San Diego MS4 Permit Test Claims. The finding further asserts that prohibitions against conditions of pollution or nuisance predate the enactment of Article XIIIB Section 6 of the California Constitution. The requirements of the Tentative Order far exceed such requirements. And, in any event, whether such requirements predate Article XIIIB Section 6 is an issue for the Commission on State Mandates.

The finding is not supported by evidence in the record and is in fact contradicted by controlling legal precedent. Even were it to be included in the Tentative Order, it is entitled to no weight since the Board lacks jurisdiction to make such a finding. For these reasons, the finding and any associated discussion in the Fact Sheet should be deleted. Please see changes in redline.

Directives in Tentative Order:

Section A.1: This directive mandates, among other things, that discharges "into" MS4s that would cause or threaten to cause a condition of "pollution, contamination, or nuisance" in receiving waters of the state are prohibited.

Comment: While the Board in this Order has jurisdiction to prohibit discharges "from" the MS4, it cannot regulate conditions within the MS4, since these are not in fact "receiving waters of the state". In any event, the language is superfluous, since regulation of a discharge from the MS4, which is subject matter of the Tentative Order, accomplishes the same end. Please see the accompanying redline.

Section A.3: This directive both recites the prohibition against discharges that cause or contribute to the violation of water quality standards and introduces the iterative process required by the State Board for MS4 permittees.

Comment: To clarify that the iterative process specifically applies to the Copermittees' compliance requirements in Section A.3, language has been added in the redline.

Section A.3.b: This directive relates to the requirement that the Copermittees repeat the iterative process to comply with receiving water limitations for continuing or recurring exceedances of the limitations.

Comment: Clarifying language changes are requested in the redline.

Section A.3.c: This directive indicates that nothing prevents the Board from enforcing any provision of the Order while the Copermittees are preparing and implementing the receiving water limitation report.

Attachment 7: General Legal Comments

Comment: Clarifying language changes are included in the redline to make clear that so long as the Copermittees are in compliance with the requirements of Section A.3, they are not in violation of the section.

Section B.2: This section categorizes the types of non-stormwater discharges that are not prohibited from discharge into the MS4, and thus not subject to the "effectively prohibit" requirement in Section B.1. However, this section improperly omits several categories of non-stormwater discharges, landscape irrigation, irrigation water, lawn watering and non-emergency fire fighting flows. In addition, this section states that the Water Board may require controls for "non-anthropogenic sources".

Comment: As discussed above in the District's comment concerning Findings C.14 and C.15, the Board lacks authority to delete an entire category of discharge from the non-stormwater designation. Such authority must be exercised primarily by the Copermittees, based on their evaluation of source-specific facts. And, the ability of the RWQCB to liken such flows to "illicit discharges", apparently authorized by State Board Order No. WQ 2009-0008, is no longer in effect, as that Order has been vacated. Moreover, there is no requirement in the MS4 regulations for controls on "non-anthropogenic sources". Such natural sources are not within the control of the MS4 Copermittees. Moreover, controlling such natural sources as rising groundwater or springs by sealing the MS4 could raise concerns about interference with water rights. Given the natural source of such springs, the incidental presence of pollutants in the waters would have occurred whether an MS4 was in existence or not. Please see the accompanying redline as well as the District's technical comments on this directive.

Section C: This section establishes "non-stormwater dry weather action levels" ("NAL") monitoring and the requirements to be followed when NALs exceedances are identified.

Comment: In addition to the District's technical comments on this part, the District has the following concerns regarding legal aspects of this directive. The District wishes to incorporate its comments on Findings C.14 and C.15, which discuss the requirements applicable to any discharge from an MS4, which is that the Copermittees control pollutants in such discharges to the MEP. Such a requirement applies not only to discharges of stormwater, but also dry weather discharges, which may (as discussed above) include not only non-exempted non-stormwater discharges but also discharges from exempted non-stormwater sources (those identified in Section B.2 of the Order) as well as discharges from sources holding separate NPDES permits. We note that Section C.2.d. requires prompt notice to the RWQCB of a source that may require a separate NPDES permit. The Board must be prepared to address such sources and not require further investigation by the Copermittees.

As also noted above, in the preamble to the MS4 regulations, U.S. EPA indicated that the MEP control requirement would apply to all discharges from MS4s, including "non-stormwater discharges". 55 Fed. Reg. 48052.

Section E.1.a: This directive requires the Copermittees to have legal authority to, among other things, "control the quality of runoff from industrial and construction sites", including sites that have coverage under the general industrial and construction stormwater permits.

Attachment 7: General Legal Comments

Comment: As separate NPDES permits, the general construction and general industrial stormwater permits allow discharge into the MS4 so long as those permits are being complied with. Copermittees do not have authority to contradict the requirements of the general permits. This requirement is vague and ambiguous, and goes beyond the requirements of the MS4 regulations, which require that Copermittees demonstrate that they have legal authority to control discharges into their MS4 systems.

Sections E.1.j and k: These directives require the Copermittees to have legal authority to require the use of BMPs to prevent or reduce the discharge of pollutants into MS4s from stormwater to the MEP and to require documentation on such BMPs.

Comment*:* The Copermittees are required under the Clean Water Act to control discharge of pollutants *from* their MS4 to the MEP standard. 33 U.S.C. § 1342(p)(3). There is no requirement that discharges *into* the MS4 meet this standard, though the Copermittees are free to impose such a standard voluntarily. These provisions are not required and should either be removed or made optional for the Copermittees. The requirements of these directives are also duplicative of Section E.1.i., which already requires the Copermittees to have the legal authority to require reports from dischargers to the MS4.

Section F.1.h(h): This directive requires that where Priority Development Projects are adjacent to or will modify stream channels, the use of hardscape and other materials is forbidden.

Comment: As noted above, the District has a statutory mandate to protect the lives and property of the citizens of Riverside County from floodwaters. If, in the professional judgment of the District's engineers, hardscape or other engineering improvements are required in a stream channel affected by this directive due to flood control concerns, the District must be allowed to make that judgment. The Board does not have the hydrologic/hydraulic expertise, nor is it authorized by the Legislature to make flood control judgments and presumably would not wish to be a defendant in a lawsuit brought by flood victims whose lives or property was affected by the inability of the District to make necessary flood control decisions.

In making this comment, the District wants to be clear that it is not unwilling to accommodate potential future channel rehabilitation efforts where flood control will not be affected. Please see the accompanying redline for suggested language to address these concerns.

Section F.2.a: This directive requires the Copermittees to update their grading and other ordinances as necessary to comply with the Order and including requirements for implementing all designated BMPs and other measures.

Comment: The drafting and enforcement of ordinances by a municipality is a municipal function that cannot be directed by the Regional Board. Article XI, section 7 of the Constitution guarantees municipalities the right to "make and enforce within [their] limits all local police, sanitary and other ordinances and regulations not in conflict with general laws". Thus, specific requirements as to the content of ordinances cannot be directed by the Board. The redline requests deletion of this directive.

Section F.3.b.(5): This directive requires that the Copermittee stormwater ordinances must contain certain enforcement components.

Attachment 7: General Legal Comments

Comment: The drafting and enforcement of ordinances by a municipality is a municipal function that cannot be directed by the Regional Board. Article XI, section 7 of the Constitution guarantees municipalities the right to "make and enforce within [their] limits all local police, sanitary and other ordinances and regulations not in conflict with general laws". Thus, specific requirements as to the content of ordinances cannot be directed by the Board. The redline requests deletion of this requirement.

Section F.3.c.(4): This directive requires that each Copermittee "must ensure that effective measures exist and are implement or required to be implemented to ensure that runoff within and from common interest developments, including areas managed by associations and mobile home parks, and meets the objectives of this section and Order".

Comment: The Fact Sheet inappropriately states that the Tentative Order "interprets common interest areas as property subject to the codes and ordinance and enforcement mechanisms of the city or county in which it resides and, therefore, holds the local government responsible for the discharge of wastes from storm water conveyance systems located within these areas".

The Tentative Order regulates discharges from the MS4. Drainage systems and the runoff handled *within* a private development or common interest area generally are not part of the Copermittees' MS4, as the Copermittees (unless they actually maintain their MS4 within such areas) have no right to maintain or regulate such internal systems, beyond the enforcement of local ordinances regulating discharges *into* the Copermittees' MS4 or through the requirement to install and maintain BMPs. Discharges from such systems are thus no different than discharges from any other private property within the Copermittees' jurisdiction. The first full paragraph in this section should be deleted because it is merely prefatory language to the specific requirements set forth in the remainder of the section.

Section F.3.c.(5): This directive requires the Copermittees to enforce their ordinances with respect to grading activities on privately owned unpaved roads "so as to prevent impacts to water quality".

Comment: In addition to the general objection to the requirement to regulate unpaved roads, found in a separate white paper and in the general comment letter, this specific directive violates the constitutional requirement that the drafting and enforcement of ordinances by a municipality is a municipal function that cannot be directed by the Regional Board. Article XI, section 7 of the Constitution guarantees municipalities the right to "make and enforce within [their] limits all local police, sanitary and other ordinances and regulations not in conflict with general laws". Thus, specific requirements as to the content of ordinances cannot be directed by the Board. Moreover, the scope of the Order is to address discharges from the MS4, not discharges from non-point or non-MS4 sources that may affect "water quality". The redline requests deletion of this requirement.

Section F.6: This directive includes a description of the purposes of the education program with respect to stormwater and non-stormwater discharges.

Comment: The redline includes revisions that correctly state the requirements of the Clean Water Act.

Attachment 7: General Legal Comments

Section H.1: This directive requires that each "Copermittees must exercise its full authority to secure the resources necessary to meet all requirements of this Order".

Comment: There is no statutory or regulatory authority for this requirement. The MS4 regulations require *only* that the Copermittees submit a "fiscal analysis" of the resources required to accomplish permit program activities, including a description of the sources of funds. 40 CFR § 122.26(d)(2)(vi). Moreover, this requirement is inherently vague and ambiguous and is, therefore, especially troublesome given the economic conditions now faced by the County and the Cities within the Santa Margarita region. This directive should be deleted, or at minimum, revised as shown in the redlines.

Standard Provisions, Attachment B:

In the Standard Provisions, it is stated that the Order "may be modified, revoked and reissued, or terminated for cause", citing 40 CFR § 122.41(f). However, the Standard Provisions do not cite 40 CFR § 122.62 or provide that any such modification, revocation or reissuance may only be carried out upon prior notice and hearing. See Water Code § 13263 (regional board, "after any necessary hearing", may prescribe requirements for waste discharges). The Standard Provisions should make clear that any modification, revocation or reissuance of the Order can only be accomplished at a noticed public hearing, with opportunity for comment.

Attachment 8: District-Specific Comments

DISTRICT-SPECIFIC COMMENTS OF THE RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT ON TENTATIVE ORDER NO. R9-2010-0016, WASTE DISCHARGE REQUIREMENTS FOR DISCHARGES FROM THE MUNICIPAL SEPARATE STORM SEWER SYSTEMS (MS4s) DRAINING THE COUNTY OF RIVERSIDE

The following comments are made by the Riverside County Flood Control and Water Conservation District (District) with respect to District-specific issues raised by the above referenced Tentative Order (Order) as the Order pertains to the District. These comments are in addition to the comments made by the District and on behalf of the other Copermittees, the County of Riverside and the Cities of Menifee (to the extent that this City will remain as a Copermittee under the Order), Murrieta, Temecula and Wildomar. We also understand that the County and the individual Cities will be filing comments on the Order under separate cover. These comments are intended to supplement those comments filed by the District on behalf of itself and the other Copermittees.

The District reserves the right to make additional comments on the Order prior to the close of the public hearing to adopt the Order.

The focus of these comments is to apprise Regional Board staff of the limited jurisdiction of the District within the Santa Margarita Region and to suggest language clarifying the requirements of the Order to reflect the District's limited jurisdiction. While aspects of the Order clearly apply to the District as an owner and operator of the Municipal Separate Storm Sewer System (MS4) serving the watershed, because of the limited nature of the District's jurisdiction over land areas within the watershed, many cannot. For example, the District, unlike other Copermittees, does not control activities on land not directly owned by the District, nor does it have ordinances or issue permits governing the use of such land. The District simply does not have statutory authority to govern the activities of the residents within a municipal area, unlike the other Copermittees.

Thus, a number of the provisions in the Order are not applicable to the District in the same manner and some are entirely not applicable. This letter highlights those provisions. The comments noted below also are reflected in the redline of the Order submitted with these and other comment white papers.

Comments on Findings

1. Need for New Finding B.2: Section B in the findings describes the regulated parties. The District requests a new finding B.2, which provides as follows:

> The Riverside County Flood Control and Water Conservation District (District) is not a municipality but rather operates various elements of the MS4 system within the San Diego Region in the form of flood control structures, including channels. Such channels and other flood control structures have been constructed and are operated by the District in accordance with its statutory obligations established by the Legislature in California Water Code App. § 48-9, to "control the flood and storm waters of said district" and to save and conserve in any manner all or any of such waters and protect from damage from such flood or storm waters the watercourses, watersheds, public highways, life and property in said district." Water Code App. § 48-9(8). As

a creature of state law, and not a municipal corporation, the District does not exercise jurisdiction over land areas within the San Diego Region and the activities carried out on those land areas outside of its limited rights-of-way. Please see redline.

2. Findings, Section D.3: This section of the Findings referring to "Construction and Existing Development" is of limited applicability to the District, since the only construction projects that would be overseen by the District are of or within its own facilities. The redline sets forth a change to clarify this limited applicability.

COMMENTS ON DIRECTIVES

1. Section F.1.a: The District, as a non-municipality, does not prepare a General Plan or equivalent because it does not govern development within a geographical area. Thus, the requirements of this section of the Order are not applicable to it. Please see redline.

2. Section F.1.d.(4)(a)(iii): Since the District, as a non-municipality, does not have land use codes, policies and ordinances, this provision, relating to the removal of "barriers to LID implementation," is not applicable to it. Please see redline.

3. Section F.1.d.(9): The only Priority Development Projects (PDP) relevant to the District would be the District's owned non-flood control channel projects, since it has no authority to permit private or non-District facilities and exercises jurisdiction over no private land areas within the watershed, and because the construction of flood control channels is subject to the jurisdiction of the U.S. Army Corps of Engineers through the Clean Water Act Section 404 permit program, not the NPDES permit program under Section 402 of the Clean Water Act. Thus, this directive, which requires the verification of compliance by third parties with Standard Stormwater Mitigation Plan (SSMP) requirements, is not applicable to the District. Please see redline.

4. Section F.1.e: As noted above, the only PDPs over which the District would have authority are its own projects. Thus, this directive, which requires inspection of BMPs at PDPs constructed by third parties, is not applicable to the District. Please see redline.

5. Section F.1.g: Since the District is not a municipality, and does not permit third parties to build development projects, this provision is not applicable to it. (It should be noted that this directive also has been objected to by the District on behalf of itself and the other Copermittees.)

6. Sections F.2, F.2.a and F.2.f.: These directives require each Copermittee to comply with each of the requirements of the section, to review and update its grading and other ordinances, and implement an enforcement process for Construction sites. These requirements are not applicable to the District in the same manner as the other Copermittees, as the District is not a municipality and does not issue grading or other permits for private land use activities. Please see redline.

7. Sections F.3.b-c: These directives, which require the development of commercial/industrial and residential programs, are applicable to a municipality but not to the District, which does not have land area occupied by either commercial/industrial or residential developments. Such requirements may be applicable to the municipal Copermittees, but not to the District, which only operates MS4 within the

Permit area. The District's rights-of-way are limited to that which is necessary to properly operate flood control infrastructure. Please see redline.

8. Section F.3.d: This directive requires development of a retrofitting program for "municipal, industrial, commercial and residential" areas of development. The District only maintains MS4 facilities within the Santa Margarita Region, and does not have jurisdiction over other areas of development. The Order should make clear that any retrofitting requirements (which are the subject of separate comments by the District on behalf of other Copermittees) apply only to development with the jurisdiction of the Copermittee. Clarifying changes are set forth in the redline.

9. Section F.6: This directive contains requirements for education of various target communities, including commercial and industrial owners and operators and residential communities, most of which are not within the jurisdiction of the District. The Order should make clear that such educational programs must be consistent with the jurisdiction of the Copermittees. Clarifying changes are set forth in the redline.

Attachment 9: Santa Margarita Region MS4 Copermittees Comments on Tentative Order R9-2010-0016 and Attachment E

California Regional Water Quality Control Board
San Diego Region

Waste Discharge Requirements for Discharges from the Municipal Separate Storm Sewer Systems (MS4s) Draining the County of Riverside, the Incorporated Cities of Riverside County, and the Riverside County Flood Control and Water Conservation District within the San Diego Region

Tentative Order No. R9-2010-0016
NPDES NO. CAS0108740

October 13, 2010

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
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To request copies of the Riverside County Municipal Storm Water Permit, please contact Ben Neill, Water Resources Control Engineer at (858) 467 – 2983, bneill@waterboards.ca.gov

Documents also are available at: http://www.waterboards.ca.gov/sandiego

Waste Discharge Requirements for Discharges from the Municipal Separate Storm Sewer Systems (MS4s) Draining the County of Riverside, the Incorporated Cities of Riverside County, and the Riverside County Flood Control and Water Conservation District within the San Diego Region

Adopted by the
California Regional Water Quality Control Board
San Diego Region
on October 13, 2010

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LINDA S. ADAMS, Agency Secretary, California Environmental Protection Agency

California Regional Water Quality Control Board
San Diego Region

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Grant Destache *Vice Chair*	Industrial Water Use
Eric Anderson	Irrigated Agriculture
Wayne Rayfield	Water Quality
George Loveland	Water Supply
Marc Luker	Undesignated (Public)

David W. Gibson, *Executive Officer*
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DRAFT

The California Regional Water Quality Control Board, San Diego Region (hereinafter San Diego Water Board), finds that:

A. BASIS FOR THE ORDER

1. This Order is based on the federal Clean Water Act (CWA), the Porter-Cologne Water Quality Control Act (Division 7 of the Water Code, commencing with Section 13000), applicable State and federal regulations, all applicable provisions of statewide Water Quality Control Plans and Policies adopted by the State Water Resources Control Board (State Water Board), the Water Quality Control Plan for the San Diego Basin adopted by the San Diego Water Board (Basin Plan), the California Toxics Rule, and the California Toxics Rule Implementation Plan.

2. This Order reissues National Pollutant Discharge Elimination System (NPDES) Permit No. CAS0108766, which was first adopted by the San Diego Water Board on July 16, 1990 (Order No. 90-38), and then reissued on May 13, 1998 (Order No. 98-02). On May 26, 1998, the United States Environmental Protection Agency (USEPA), Region IX, objected to Order No. 98-02 due to concerns regarding Receiving Water Limitations (RWL) language. The USEPA concluded that the RWL language in the permit did not comply with the CWA and its implementing regulations. On April 27, 1999, the USEPA reissued the MS4 permit, which the San Diego Water Board adopted as Addendum No. 1 to Order No. 98-02 on November 8, 2000. On July 14, 2004, the San Diego Water Board adopted the third term MS4 permit, Order No. R9-2004-001. On January 15, 2009, the Riverside County Flood Control and Water Conservation District (RCFCD), as the Principal Copermittee, submitted a Report of Waste Discharge (ROWD) for reissuance of the municipal separate storm sewer system (MS4) Permit.

3. This Order is consistent with the following precedential Orders adopted by the State Water Board addressing MS4 NPDES Permits: Order 99-05, Order WQ-2000-11, Order WQ 2001-15, Order WQO 2002-0014, and ~~Order WQ 2009-0008~~ (*SWRCB/OCC FILE A-1780).*

4. The Fact Sheet / Technical Report for the Order No. R9-2010-0016, NPDES No. CAS0108766, Waste Discharge Requirements for Discharges from the MS4s Draining the County of Riverside, the Incorporated Cities of Riverside County, and the Riverside County Flood Control and Water Conservation District within the San Diego Region, includes cited regulatory and legal references and additional explanatory information and data in support of the requirements of this Order. ~~This information, including any supplements thereto, and any response to comments on the Tentative Orders, is hereby incorporated by reference into these findings.~~

Comment [CP1]: This order has been vacated and can no longer be referenced

Comment [CP2]: This is inappropriate. The information in the fact sheet is/are not 'findings', they are explanations. Further a finding cannot be created through a response to comments.

B. REGULATED PARTIES

1. Each of the persons in Table 1 below, hereinafter called Copermittees or dischargers, owns or operates an MS4, through which it discharges into waters of the United States (U.S.) within the San Diego Region. These MS4s fall into one or more of the following categories: (1) a medium or large MS4 that services a population of greater than 100,000 or 250,000 respectively; or (2) a small MS4 that is "interrelated" to a medium or large MS4; or (3) an MS4 that contributes to a violation of a water quality standard; or (4) an MS4 which is a significant contributor of pollutants to waters of the U.S.

Table 1. Municipal Copermittees

1. City of Murrieta	4. County of Riverside
2. City of Temecula	5. Riverside County Flood Control and Water Conservation District
3. City of Wildomar	
6. City of Menifee[1]	

The Cities of Murrieta, Menifee and Wildomar also discharge into the waters of the U.S. in the California Regional Water Quality Control Board, Santa Ana Region (Santa Ana Water Board), so are located partially within both the San Diego and Santa Ana Water Board boundaries. As allowed by California Water Code (CWC) §13228, these Cities submitted written requests to be regulated for MS4 purposes under a permit adopted by only one Water Board. As authorized by CWC §13228 and pursuant to a written agreement between the San Diego Water Board and the Santa Ana Water Board, the Cities of Murrieta and Wildomar are wholly regulated by the San Diego Water Board under this Order, including those portions of the Cities jurisdiction not within the San Diego Water Board's region. Similarly, the City of Menifee is wholly regulated by the Santa Ana Water Board under Order No. R8-2010-0033, including those portions of the City of Menifee within the San Diego Water Board's region.[1]

2. The Riverside County Flood Control and Water Conservation District (District) is not a municipality but rather operates various elements of the MS4 system within the San Diego Region in the form of flood control structures, including channels. Such channels and other flood control structures have been constructed and are operated by the District in accordance with its statutory obligations established by the Legislature in California Water Code App. § 48-9, to "control the flood and storm waters of said district" and to save and conserve in any manner all or any of such waters and protect from damage from such flood or storm waters the watercourses, watersheds, public highways, life and property in said district." Water Code App. § 48-9(8). As a creature of state law, and not a municipal corporation, the District

[1] Until an agreement is finalized, the City of Menifee is included as a Copermittee in this Order.

does not exercise jurisdiction over land areas within the San Diego Region and the activities carried out on those land areas.

Comment [DB3]: See legal comments in Attachment 8

C. DISCHARGE CHARACTERISTICS

1. Discharges from the MS4 may contain waste, as defined in the CWC, and pollutants that adversely affect the quality of the waters of the State. The discharge of pollutants from an MS4 is a "discharge of pollutants from a point source" into waters of the U.S. as defined in the CWA.

2. MS4 storm water and non-storm water discharges are likely to contain pollutants that cause or threaten to cause a violation of water quality standards, as outlined in the Basin Plan. Storm water and non-storm water discharges from the MS4 are subject to the conditions and requirements established in the Basin Plan for point source discharges.

3. The most common categories of pollutants in runoff include total suspended solids, sediment, pathogens (e.g., bacteria, viruses, protozoa), heavy metals (e.g., copper, lead, zinc and cadmium), petroleum products and polynuclear aromatic hydrocarbons, synthetic organics (e.g., pesticides, herbicides, and PCBs), nutrients (e.g., nitrogen and phosphorus fertilizers), oxygen-demanding substances (decaying vegetation, animal waste), detergents, and trash.

4. The discharge of pollutants and/or increased flows from MS4s may cause or threaten to cause the concentration of pollutants to exceed applicable receiving water quality objectives and/or impair or threaten to impair designated beneficial uses resulting in a condition of pollution (i.e., unreasonable impairment of water quality for designated beneficial uses), contamination, or nuisance.

5. Pollutants in runoff can threaten and adversely affect human health. Human illnesses ~~have been clearly linked to~~ can be caused by recreating near storm drains flowing to receiving waters. Also, runoff pollutants in receiving waters can bioaccumulate in the tissues of invertebrates and fish, which may be eventually consumed by humans.

Comment [CP4]: No link has been demonstrated within this watershed. (Partially due to lack of recreation in receiving waters)

The findings should be accurate for reflective of the specific area the permit is regulating.

6. Runoff discharges from MS4s often contain pollutants that cause toxicity to aquatic organisms (i.e., adverse responses of organisms to chemicals or physical agents ranging from mortality to physiological responses such as impaired reproduction or growth anomalies). Toxic pollutants impact the overall quality of aquatic systems and beneficial uses of receiving waters.

7. The Copermittees' MS4 discharges runoff into lakes, drinking water reservoirs, rivers, streams, creeks, bays, estuaries, coastal lagoons, the Pacific Ocean, and tributaries thereto within one of the eleven hydrologic units (Santa Margarita Hydrologic Unit) comprising the San Diego Region as shown in Table 2. Some of

the receiving water bodies have been designated as impaired by the San Diego Water Board in 2009 pursuant to CWA section 303(d).

Table 2. Common Watersheds and CWA Section 303(d) Impaired Waters in the San Diego Region.

Hydrologic Area (HA) or Hydrologic Subarea (HSA) of the Santa Margarita Hydrologic Unit	**Major Receiving Water Bodies**	**303(d) Pollutant(s)/stressor or Water Quality Effect[2]**
DeLuz Creek HSA (902.21)	De Luz Creek	Iron, Manganese, Nitrogen, Sulfates
Murrieta HSA (902.32)	Long Canyon Creek (tributary to Murrieta Creek	Chlorpyrifos, E. Coli, Fecal Coliform, Iron, Manganese
Wolf HSA (902.52)	Murrieta Creek	Chlorpyrifos, Copper, Iron, Manganese, Nitrogen, Toxicity
Pauba HSA (902.51)	Redhawk Channel	Chlorpyrifos, Copper, Diazinon, E. Coli, Fecal Coliform, Iron, Manganese, Nitrogen, Phosphorus, Total Dissolved Solids
Gavilan HSA (902.22)	Sandia Creek	Iron, Sulfates
Gertrudis HSA (902.42)	Santa Gertrudis Creek	Chlorpyrifos, Copper, E. Coli, Fecal Coliform, Iron, Phosphorous
Lower Ysidora HSA (902.11)	Santa Margarita Lagoon	Eutrophic
Lower Ysidora HSA (902.11)	Santa Margarita River (Lower)	Enterococcus, Fecal Coliform, Phosphorus, Total Nitrogen as N
Gavilan HSA	Santa Margarita River (Upper)	Toxicity

[2] The listed 303(d) pollutant(s) do not necessarily reflect impairment of the entire corresponding WMA or all corresponding major surface water bodies. The specific impaired portions of each WMA are listed in the State Water Resources Control Board's 2008 Section 303(d) List of Water Quality Limited Segments.

Table 2. Common Watersheds and CWA Section 303(d) Impaired Waters in the San Diego Region.

Hydrologic Area (HA) or Hydrologic Subarea (HSA) of the Santa Margarita Hydrologic Unit	**Major Receiving Water Bodies**	**303(d) Pollutant(s)/stressor or Water Quality Effect[2]**
(902.22)		
Pauba HSA (902.51)	Temecula Creek	Chlorpyrifos, Copper, Phosphorus, Total Dissolved Solids, Toxicity
French HSA (902.33)	Warm Springs Creek (Riverside County)	Chlorpyrifos, E. Coli, Fecal Coliform, Iron, Manganese, Phosphorus, Total Nitrogen as N

8. Trash is a ~~persistent~~ pollutant that can enter receiving waters from the MS4, accumulate, and be transported downstream into receiving waters over time. Trash poses a serious threat to the beneficial uses of the receiving waters, including, but not limited to, human health, rare and endangered species, navigation and human recreation.

9. The Copermittees' water quality monitoring data submitted to date documents persistent ~~violations~~ exceedances of Basin Plan water quality objectives for various runoff-related pollutants (indicator bacteria, dissolved solids, turbidity, metals, pesticides, etc.) at various watershed monitoring stations. Persistent toxicity has also been observed at some watershed monitoring stations. In addition, bioassessment data indicate that the majority of the monitored receiving waters have Poor to Very Poor Index of Biotic Integrity ratings. In sum, the above findings indicate that runoff discharges are causing or contributing to water quality impairments, and are a leading cause of such impairments in Riverside County.

Comment [CP5]: It is only a violation if the pollutant has not been reduced to the MEP in accordance with a Permit.

10. When natural vegetated pervious ground cover is converted to impervious surfaces such as paved highways, streets, rooftops, and parking lots, the natural absorption and infiltration abilities of the land are lost. Therefore, runoff leaving a developed area ~~is~~ can be significantly greater in runoff volume, velocity, and peak flow rate than pre-development runoff from the same area. Runoff durations can also increase as a result of flood control and other efforts to control peak flow rates. Increased volume, velocity, rate, and duration of runoff, and decreased natural clean sediment loads, greatly accelerate the erosion of downstream natural channels. Significant declines in the biological integrity and physical habitat of streams and other receiving waters have been found to occur with as little as a 3-5 percent conversion from

natural to impervious surfaces. The increased runoff characteristics from new development must be controlled to protect against increased erosion of channel beds and banks, sediment pollutant generation, or other impacts to beneficial uses and stream habitat due to increased erosive force.

11. Development creates new pollution sources as human population density increases and brings with it proportionately higher levels of car emissions, car maintenance wastes, municipal sewage, pesticides, household hazardous wastes, pet wastes, trash, etc. which can either be washed or directly dumped into the MS4. As a result, the runoff leaving the developed urban area is typically significantly greater in pollutant load than the pre-development runoff from the same area. These increased pollutant loads must be controlled to protect downstream receiving water quality.

12. Development and urbanization especially threaten environmentally sensitive areas (ESAs), such as water bodies designated as supporting a RARE beneficial use (supporting rare, threatened or endangered species) and CWA 303(d)-impaired water bodies. Such areas have a much lower capacity to withstand pollutant loads than other, more sensitive areas. In essence, development that is ordinarily insignificant in its impact on the environment may become significant in a particularly sensitive environment. Therefore, additional controls to reduce storm water pollutants from new and existing development may be necessary for areas adjacent to or discharging directly to an ESA.

13. Although dependent on several factors, the risks typically associated with properly managed infiltration of runoff (especially from residential land use areas) are not significant. The risks associated with infiltration can be managed by many techniques, including (1) designing landscape drainage features that promote infiltration of runoff, but do not "inject" runoff (injection bypasses the natural processes of filtering and transformation that occur in the soil); (2) taking reasonable steps to prevent the illegal disposal of wastes; (3) protecting footings and foundations; (4) ensuring that each drainage feature is adequately maintained in perpetuity; and (5) pretreatment.

~~14. Non-storm water (dry weather) discharge from the MS4 is not considered a storm water (wet weather) discharge and therefore is not subject to regulation under the Maximum Extent Practicable (MEP) standard from CWA 402(p)(3)(B)(iii), which is explicitly for "Municipal … *Stormwater Discharges* (emphasis added)" from the MS4. Rather, non-storm water discharges into the storm sewers, per CWA 402(p)(3)(B)(ii), are to be effectively prohibited. Such dry weather non-storm water discharges have been shown to contribute significant levels of pollutants and flow in arid, developed Southern California watersheds and are to be effectively prohibited under the CWA.~~

Comment [DB6]: See legal comments in Attachment 7 Discharges of pollutants from the MS4, of whatever source, are subject to the MEP standard. The MEP standard applies to municipal discharges, not to only municipal storm water discharges.

~~15.~~ Non-storm water discharges to the MS4 granted an influent exception [i.e., which are exempt from the effective prohibition requirement set forth in CWA section 402(p)(3)(B)(ii)] under 40 CFR 122.26 are included within this Order. Any exempted

discharges identified by Copermittees as a source of pollutants are subsequently required to be *addressed* (emphasis added) as illicit discharges through prohibition and incorporation into existing IC/ID programs. Furthermore, the USEPA contemplates that permitting agencies such as the San Diego Water Board may also identify exempted discharges as a source of pollutants required to be addressed as illicit discharges (See VOl. 55 Fed. Reg. 48037). ~~The San Diego Water Board and the Copermittees havehas identified landscape irrigation, irrigation water and lawn water, previously exempted discharges, as a source of pollutants and conveyance of pollutants to waters of the U.S.~~

Comment [CP7]: This is a false statement – the Copermittees have not made this determination (or 'identification') See also comments within the letter and attachments thereto

~~16.~~14.

D. RUNOFF MANAGEMENT PROGRAMS

1. General

a. This Order specifies requirements necessary for the Copermittees to reduce the discharge of pollutants in storm water to the MEP. However, since MEP is a dynamic performance standard, which evolves over time as runoff management knowledge increases, the Copermittees' runoff management programs m*ust contin*ually be assessed and modified to incorporate improved programs, control measures, best management practices (BMPs), etc. in order to achieve the evolving MEP standard. Absent evidence to the contrary, this continual assessment, revision, and improvement of runoff management program implementation is expected to ultimately achieve compliance with water quality standards in the Region. However, it is recognized that there are other sources of pollutants into the receiving waters other than the Copermittees' MS4, and there are certain activities and sources that generate pollutants present in MS4 discharges may be beyond the ability of Copermittees to prevent or eliminate. Examples of these activities and sources include, but are not limited to: emissions from internal combustion engines, brake pad wear and tear, atmospheric deposition, bacteria and wildlife and leaching of naturally occurring nutrients and minerals from local soils. This Order is not intended to address these background or naturally occurring pollutants or flows.

b. The Copermittees have generally been implementing the jurisdictional runoff management programs (JRMPs) required pursuant to Order No. R9-2004-001 since July 14, 2005. Prior to that, the Copermittees were regulated by Order No. 98-02, since May 13, 1998. MS4 discharges, however, continue to cause or contribute to violations of water quality standards as evidenced by the Copermittees' monitoring results.

c. This Order contains new or modified requirements that are necessary to improve Copermittees' efforts to reduce the discharge of pollutants in storm water runoff to the MEP and achieve water quality standards. Some of the new or modified requirements, such as the revised Watershed Water Quality Workplan (Watershed Workplan) section, are designed to specifically address high priority

water quality problems. Other requirements, such as for unpaved roads, are a result of San Diego Water Board's identification of water quality problems through investigations and complaints during the previous permit period. Other new or modified requirements address program deficiencies that have been noted during audits, report reviews, and other San Diego Water Board compliance assessment activities. Additional changes in the monitoring program provide consistency with the Code of Federal Regulations, USEPA guidance, State Water Board guidance, and the Southern California Monitoring Coalition recommendations.

d. Updated individual ~~Drainage Area~~Storm Water Management Plans (~~DAMP~~Individual SWMP), and Watershed Stormwater Management Plans (watershed SWMPs), which, together with the DAMP describe the Copermittees' runoff management programs in their entirety, are needed to guide the Copermittees' runoff management efforts and aid the Copermittees in tracking runoff management program implementation. Hereinafter, the individual ~~DAMP~~ SWMP is referred to as the JRMPs and the Watershed SWMP is referred to as the Watershed Workplan. It is practicable for the Copermittees to update the JRMPs and Watershed Workplans within the timeframe specified in this Order, since significant efforts to develop these programs have already occurred.

Comment [CP8]: Terminology in this paragraph was not correct for the Santa Margarita Region

e. Pollutants can be effectively reduced in storm water runoff by the application of a combination of pollution prevention, source control, and treatment control BMPs. Pollution prevention is the reduction or elimination of pollutant generation at its source and is the best "first line of defense." Source control BMPs (both structural and non-structural) minimize the contact between pollutants and flows (e.g., rerouting run-on around pollutant sources or keeping pollutants on-site and out of receiving waters). Treatment control BMPs remove pollutants that have been mobilized by wet-weather or dry-weather flows.

f. Runoff needs to be addressed during the three major phases of urban development (planning, construction, and use) in order to reduce the discharge of pollutants from storm water to the MEP, effectively prohibit non-storm water discharges and protect receiving waters. Development which is not guided by water quality planning policies and principles can unnecessarily result in increased pollutant load discharges, flow rates, and flow durations which can negatively impact receiving water beneficial uses. Construction sites without adequate BMP implementation can result in sediment runoff rates which greatly exceed natural erosion rates of undisturbed lands, causing siltation and impairment of receiving waters. Existing development can generates substantial pollutant loads which are can be discharged in runoff to receiving waters.

g. Annual reporting requirements included in this Order are necessary to meet federal requirements and to evaluate the effectiveness and compliance of the Copermittees' programs.

h. This Order establishes Storm Water Action Levels (SALs) for selected pollutants based on USEPA Rain Zone 6 (arid southwest) Phase I MS4 monitoring data for pollutants in storm water. The SALs were computed as the 90th percentile of the data set, utilizing the statistical based population approach, one of three approaches recommended by the State Water Board's Storm Water Panel in its report, 'The Feasibility of Numerical Effluent Limits Applicable to Discharges of Storm Water Associated with Municipal, Industrial and Construction Activities (June 2006). SALs are identified in Section D of this Order. Copermittees must implement a timely, comprehensive, cost-effective storm water pollution control program to reduce the discharge of pollutants in storm water from the permitted areas so as not to exceed the SALs to the MEP. Exceedance of SALs may indicate inadequacy of programmatic measures and BMPs required in this Order.

2. **Development Planning**

a. The Standard Storm Water Mitigation Plan (SSMP) requirements contained in this Order are consistent with Order WQ-2000-11 adopted by the State Water Board on October 5, 2000. In the precedential order, the State Water Board found that the design standards, which essentially require that runoff generated by 85 percent of storm events from specific development categories be infiltrated or treated, reflect the MEP standard. The order also found that the SSMP requirements are appropriately applied to the majority of the Priority Development Project categories that are also contained in Section F.1 of this Order. The State Water Board also gave California Regional Water Quality Control Boards (Regional Water Boards) the needed discretion to include additional categories and locations, such as retail gasoline outlets (RGOs), in SSMPs.

b. Controlling runoff pollution by using a combination of onsite source control and site design BMPs augmented with treatment control BMPs before the runoff enters the MS4 is important for the following reasons: (1) Many end-of-pipe BMPs (such as diversion to the sanitary sewer) are typically ineffective during significant storm events. (2) Whereas, onsite source control BMPs can be applied during all runoff conditions end-of-pipe BMPs are often incapable of capturing and treating the wide range of pollutants which can be generated on a sub-watershed scale; (3) End-of-pipe BMPs are more effective when used as polishing BMPs, rather than the sole BMP to be implemented; (4) End-of-pipe BMPs do not protect the quality or beneficial uses of receiving waters between the pollutant source and the BMP; and (5) Offsite end-of-pipe BMPs do not aid in the effort to educate the public regarding sources of pollution and their prevention.

c. Use of Low-Impact Development (LID) site design BMPs at new development, redevelopment and retrofit projects can be an effective means for minimizing the

impact of storm water runoff discharges from the development projects on receiving waters. LID is a site design strategy with a goal of maintaining or replicating the pre-development hydrologic regime through the use of design techniques. LID site design BMPs help preserve and restore the natural hydrologic cycle of the site, allowing for filtration and infiltration which can greatly reduce the volume, peak flow rate, velocity, and pollutant loads of storm water runoff. Current runoff management, knowledge, practices and technology have resulted in the use of LID BMPs as an acceptable means of meeting the storm water MEP standard.

d. RGOs ~~are~~ can be significant sources of pollutants in storm water runoff. RGOs are points of convergence for motor vehicles for automotive related services such as repair, refueling, tire inflation, and radiator fill-up and consequently produce significantly higher loadings of hydrocarbons and trace metals (including copper and zinc) than other developed areas.

e. Industrial sites ~~are~~ can be significant sources of pollutants in runoff. Pollutant concentrations and loads in runoff from industrial sites are similar or exceed pollutant concentrations and loads in runoff from other land uses, such as commercial or residential land uses. As with other land uses, LID site design, source control, and treatment control BMPs are needed at industrial sites in order to meet the MEP standard. These BMPs are necessary where the industrial site is larger than 10,000 square feet. The 10,000 square feet threshold is appropriate, since it is consistent with requirements in other Phase I NPDES storm water regulations throughout California.

f. If not properly designed or maintained, certain BMPs implemented or required by municipalities for runoff management may create a habitat for vectors (e.g. mosquitoes and rodents). Proper BMP design and maintenance to avoid standing water, however, can prevent the creation of vector habitat. Nuisances and public health impacts resulting from vector breeding can be prevented with close collaboration and cooperative effort between municipalities, local vector control agencies, and the California Department of Public Health during the development and implementation of runoff management programs.

g. The increased volume, velocity, frequency and discharge duration of storm water runoff from developed areas has the potential to greatly accelerate downstream erosion, impair stream habitat in natural drainages, and negatively impact beneficial uses. Development and urbanization increase pollutant loads in storm water runoff and the volume of storm water runoff. Impervious surfaces can neither absorb water nor remove pollutants and thus lose the purification and infiltration provided by natural vegetated soil. Hydromodification measures for discharges to hardened channels ~~are~~ may be needed ~~for the~~so as to not prevent potential future ~~restoration~~ rehabilitation of the hardened channels ~~to their natural state~~, thereby restoring the chemical, physical, and biological integrity and beneficial uses of local receiving waters. Any rehabilitation of hardened channels

must take into account flood control considerations, which are within the jurisdiction of the Riverside County Flood Control and Water Conservation District, under Water Code App. Section 48.

Comment [DB9]: See legal comments in Attachment 7

3. **Construction and Existing Development**

   a. In accordance with federal NPDES regulations and to ensure the most effective oversight of industrial and construction site discharges, discharges of runoff from industrial and construction sites are subject to dual (State and local) storm water regulation. Under this dual system, each Copermittee, consistent with its jurisdiction, is responsible for enforcing its local permits, plans, and ordinances, and the San Diego Water Board is responsible for enforcing the General Construction Activities Storm Water Permit, State Water Board Order 2009-0009-DWQ, NPDES No. CAS000002 (General Construction Permit) and the General Industrial Activities Storm Water Permit, State Water Board Order 97-03 DWQ, NPDES No. CAS000001 (General Industrial Permit) and any reissuance of these permits. NPDES municipal regulations require that municipalities develop and implement measures to address runoff from industrial and construction activities. Those measures may include the implementation of other BMPs in addition to those BMPs that are required under the statewide general permits for activities subject to both State and local regulation.

   b. Identification of sources of pollutants in runoff (such as municipal areas and activities, industrial and commercial sites/sources, construction sites, and residential areas), development and implementation of BMPs to address those sources, and updating ordinances and approval processes are necessary for the Copermittees to ensure that discharges of pollutants from its MS4 in storm water are reduced to the MEP and that illegal non-storm water discharges are not occurring. Inspections and other compliance verification methods are needed to ensure minimum BMPs are implemented. Inspections are especially important at areas that are at high risk for pollutant discharges.

Comment [CP10]: Not all non-storm water discharges need to be prohibited.

   c. Historic and current development ~~sometime~~may makes use of natural drainage patterns and features as conveyances for runoff. ~~Urban streams owned or operated by the Copermittees that are used in this manner are part of the municipalities' MS4s regardless of whether they are natural, anthropogenic, or partially modified features. In these cases, the urban stream is both an MS4 and receiving water.~~

Comment [DB11]: The MS4 can never be comprised of natural waterbodies. See definition in federal MS4 regulations and legal comments in Attachment 7

   ~~d. As operators of the MS4s, the Copermittees cannot passively receive and discharge pollutants from third parties. By providing free and open access to an MS4 that conveys discharges to waters of the U.S., the operator essentially accepts responsibility for discharges into the MS4 that it does not prohibit or otherwise control. These discharges may cause or contribute to a condition of~~

~~contamination or a violation of water quality standards.~~

~~e.~~d. Waste and pollutants which are deposited and accumulate in MS4 drainage structures will be discharged from these structures to waters of the U.S. unless they are removed. These discharges may cause or contribute to, or threaten to cause or contribute to, a condition of pollution in receiving waters. For this reason, pollutant discharges from storm water into MS4s must be reduced using a combination of management measures, including source control and an effective MS4 maintenance program implemented by each Copermittee.

~~f.~~e. Enforcement of local runoff related ordinances, permits, and plans is an essential component of every runoff management program and is specifically required in the federal storm water regulations and this Order. Each Copermittee is, to the extent of its legal authority, individually responsible for adoption and enforcement of ordinances and/or policies, implementation of identified control measures/BMPs needed to prevent or reduce pollutants in storm water runoff, and for the allocation of funds for the capital, operation and maintenance, administrative, and enforcement expenditures necessary to implement and enforce such control measures/BMPs under its jurisdiction. Education is an important aspect of every effective runoff management program and the basis for changes in behavior at a societal level. Education of municipal planning, inspection, and maintenance department staffs is especially critical to ensure that in-house staffs understand how their activities impact water quality, how to accomplish their jobs while protecting water quality, and understand their specific roles and responsibilities for compliance with this Order. Public education, designed to target various urban land users and other audiences, is also essential to inform the public of how individual actions affect receiving water quality and how adverse effects can be minimized.

~~g.~~f. Public participation during the development of runoff management programs is necessary to ensure that all stakeholder interests and a variety of creative solutions are considered.

g. Retrofitting existing development with storm water treatment controls, including LID, ~~is~~ may be necessary to address storm water discharges from existing development that may cause or contribute to a condition of pollution or a violation of water quality standards. Although SSMP BMPs are required for redevelopment, the current rate of redevelopment will not address water quality problems in a timely manner. Cooperation with private landowners is necessary to effectively identify, implement and maintain retrofit projects for the preservation, restoration, and enhancement of water quality.

h. Emergency Copermittee public works projects required to protect public health and safety are exempted from these requirements until the emergency ends, at which time they need to comply with the requirements.

Comment [DB12]: The MS4 operators are obligated to take storm water under state law, and therefore must "passively" receive such waters, whether or not they contain pollutants. Moreover, a number of separately permitted sources discharge into the MS4 through rights granted under the NPDES program. Control over such permitted sources is the responsibility of the owner of that permitted discharge in question, .

4. **Watershed Runoff Management**

a. Since runoff within a watershed can flow from and through multiple land uses and political jurisdictions, watershed-based runoff management can greatly enhance the protection of receiving waters. Such management provides a means to focus on the most important water quality problems in each watershed. By focusing on the most important water quality problems, watershed efforts can maximize protection of beneficial use in an efficient manner. Effective watershed-based runoff management actively reduces pollutant discharges and abates pollutant sources causing or contributing to watershed water quality problems. Watershed-based runoff management that does not actively reduce pollutant discharges and abate pollutant sources causing or contributing to watershed water quality problems can necessitate implementation of the iterative process outlined in section A.3 of this Order. Watershed management of runoff does not require Copermittees to expend resources outside of their jurisdictions. In some cases, however, this added flexibility provides more, and possibly more effective, alternatives for minimizing waste discharges. Watershed management requires the Copermittees within a watershed to develop a watershed-based management strategy, which can then be implemented on a jurisdictional basis.

~~a.~~b. The Copermittees have jointly pursued several watershed based management programs including the Upper Santa Margarita River Integrated Regional Watershed Management Plan (USMR IRWM). The USMR IRWM management team, which includes the County of Riverside and the Riverside County Flood Control and Water Conservation District, has also formed cooperative agreements with the San Diego and Orange County IRWM programs to integrate watershed planning efforts of the three counties. These efforts have identified and prioritized key watershed management issues related to the protection and restoration of beneficial uses in the Permit Area. The Board encourages the Copermittees to use these forums to prioritize actions and support the allocation of resources to protect water quality.

~~b.~~c. Some runoff issues, such as general education, monitoring, and training, can be effectively addressed on a regional basis. Regional approaches to runoff management can improve program consistency and promote sharing of resources, which can result in implementation of more efficient programs.

~~c.~~d. It is important for the Copermittees to coordinate their water quality protection and land use planning activities to achieve the greatest protection of receiving water bodies. Copermittee coordination with other watershed stakeholders, especially the State of California Department of Transportation, the U.S. federal government, sovereign American Indian tribes, and water and sewer districts, is also important.

E. STATUTE AND REGULATORY CONSIDERATIONS

1. The RWL language specified in this Order is consistent with language recommended by the USEPA and established in State Water Board Order WQ-99-05, *Own Motion Review of the Petition of Environmental Health Coalition to Review Waste Discharge Requirements Order No. 96-03, NPDES Permit No. CAS0108740*, adopted by the State Water Board on June 17, 1999. The RWL language in this Order requires compliance with water quality standards, which for ~~storm water~~MS4 discharges is to be achieved through an iterative approach requiring the implementation of improved and better-tailored BMPs over time. Compliance with receiving water limits based on applicable water quality standards is necessary to ensure that MS4 discharges will not cause or contribute to violations of water quality standards and the creation of conditions of pollution, contamination, or nuisance.

Comment [DB13]: See legal comments in Attachment 7

2. The Basin Plan, identifies the following existing and potential beneficial uses for surface waters in Riverside County: Municipal and Domestic Supply (MUN), Agricultural Supply (AGR), Industrial Process Supply (PROC), Hydropower Generation (POW), Industrial Service Supply (IND), Ground Water Recharge (GWR), Contact Water Recreation (REC1), Non-contact Water Recreation (REC2), Warm Freshwater Habitat (WARM), Cold Freshwater Habitat (COLD), Wildlife Habitat (WILD), Rare, Threatened, or Endangered Species (RARE), Spawning, Reproduction and/or Early Development (SPWN) and Preservation of Biological Habitats of Special Significance (BIOL).

3. This Order is in conformance with State Water Board Resolution No. 68-16, *Statement of Policy with Respect to Maintaining High Quality Waters in California*, and the federal Antidegradation Policy described in 40 CFR 131.12.

4. Section 6217(g) of the Coastal Zone Act Reauthorization Amendments of 1990 (CZARA) requires coastal states with approved coastal zone management programs to address non-point pollution impacting or threatening coastal water quality. CZARA addresses five sources of non-point pollution: agriculture, silviculture, urban, marinas, and hydromodification. This NPDES permit addresses the management measures required for the urban category, with the exception of septic systems. The adoption and implementation of this NPDES permit relieves the Copermittee from developing a non-point source plan, for the urban category, under CZARA. The San Diego Water Board addresses septic systems through the administration of other programs.

5. Section 303(d)(1)(A) of the CWA requires that "Each state shall identify those waters within its boundaries for which the effluent limitations…are not stringent enough to implement any water quality standard (WQS) applicable to such waters." The CWA also requires states to establish a priority ranking of impaired water bodies known as Water Quality Limited Segments and to establish Total Maximum Daily Loads

(TMDLs) for such waters. This priority list of impaired water bodies is called the Section 303(d) List. The 2006 Section 303(d) List was approved by the State Water Board on October 25, 2006. On June 28, 2007, the 2006 303(d) list for California was given final approval by the USEPA. The 303(d) List was recently updated, and on December 16, 2009, the 2008 303(d) List was approved by the San Diego Water Board. The 2008 List is awaiting State Water Board and USEPA approval.

6. ~~This Order does not constitute an unfunded local government mandate subject to subvention under Article XIIIB, Section (6) of the California Constitution for several reasons, including, but not limited to, the following. First, this Order implements federally mandated requirements under CWA §402. (33 U.S.C. § 1342(p)(3)(B).) Second, the local agency Copermittees' obligations under this Order are similar to, and in many respects less stringent than, the obligations of non-governmental and new dischargers who are issued NPDES permits for storm water and non-storm water discharges. Third, the local agency Copermittees have the authority to levy service charges, fees, or assessments sufficient to pay for compliance with this Order. Fourth, the Copermittees have requested permit coverage in lieu of compliance with the complete prohibition against the discharge of pollutants contained in CWA §301, subdivision (a) (33 U.S.C. § 1311(a)) and in lieu of numeric restrictions on their MS4 discharges (i.e. effluent limitations). Fifth, the local agencies' responsibility for preventing discharges of waste that can create conditions of pollution or nuisance from conveyances that are within their ownership or control under State law predates the enactment of Article XIIIB, Section (6) of the California Constitution. Likewise, the provisions of this Order to implement TMDLs are federal mandates. The CWA requires TMDLs to be developed for water bodies that do not meet federal water quality standards. (33 U.S.C. sec. 1313(d).) Once the USEPA or a state develops a TMDL, federal law requires that permits must contain effluent limitations consistent with the assumptions of any applicable wasteload allocation. (40 C.F.R. sec. 122.44(d)(1)(vii)(B).)~~

7. Runoff treatment and/or mitigation must occur prior to the discharge of runoff into receiving waters. Treatment BMPs must not be constructed in waters of the U.S. ~~or State~~ unless the runoff flows are sufficiently pretreated to protect the values and functions of the water body. Federal regulations at 40 CFR 131.10(a) state that in no case shall a state adopt waste transport or waste assimilation as a designated use for any waters of the U.S. Authorizing the construction of an runoff treatment facility within a water of the U.S., or using the water body itself as a treatment system or for conveyance to a treatment system, would be tantamount to accepting waste assimilation as an appropriate use for that water body. Furthermore, the construction, operation, and maintenance of a pollution control facility in a water body can negatively impact the physical, chemical, and biological integrity, as well as the beneficial uses, of the water body. Without federal authorization (e.g., pursuant to CWA § 404), waters of the U.S. may not be converted into, or used as, waste treatment or conveyance facilities. Similarly, waste discharge requirements pursuant to CWC §13260 are required for the conversion or use of waters of the

Comment [DB14]: This finding is inaccurate and inappropriate, as the Commission on State Mandates, and not the Regional Board, has exclusive jurisdiction in determining whether a requirement is an unfunded state mandate. See legal comment white paper.

Comment [CP15]: The federal regulations (that do not allow waste assimilation), do not apply to waters of the state.

State as waste treatment or conveyance facilities. Diversion from waters of the U.S./State to treatment facilities and subsequent return to waters of the U.S. is allowable, provided that the effluent complies with applicable NPDES requirements.

8. The issuance of waste discharge requirements and an NPDES permit for the discharge of runoff from MS4s to waters of the U.S. is exempt from the requirement for preparation of environmental documents under the California Environmental Quality Act (CEQA) (Public Resources Code, Division 13, Chapter 3, section 21000 et seq.) in accordance with the CWC section 13389.

9. Storm water discharges from developed and developing areas in Riverside County are ~~significant~~ potential sources of certain pollutants that can cause, may be causing, threatening to cause or contributing to water quality impairment in the waters of Riverside County. Furthermore, as delineated in the CWA section 303(d) list in Table 2, the San Diego Water Board has found that there is a reasonable potential that municipal storm water and non-storm water discharges from MS4s cause or may cause or contribute to an excursion above water quality standards for the following pollutants: Indicator Bacteria, Copper, Manganese, Iron, Chlorpyrifos, Sulfates, Phosphorous, Nitrogen, Toxicity~~, and Turbidity~~. In accordance with CWA section 303(d), the San Diego Water Board is required to establish TMDLs for these pollutants to these waters to eliminate impairment and attain water quality standards. Therefore, certain early pollutant control actions and further pollutant impact assessments by the Copermittees are warranted and required pursuant to this Order.

Comment [CP16]: This is not on the 303(d) list.

10. This Order requires each Copermittee to effectively prohibit all types of unauthorized discharges of non-storm water into its MS4. However, historically pollutants have been identified as present in dry weather ~~non-storm water discharges from the MS4s~~ conditions within the receiving waters through 303(d) listings, monitoring conducted by the Copermittees under Order No. R9-2004-0001, and there are others expected to be present in dry weather non-storm water discharges because of the nature of these discharges. These pollutants in the receiving waters may be associated with activities that may or may not be under the authority of the Copermittees to address. This Order includes action levels for pollutants in non-storm water, dry weather discharges from the MS4. The non-storm water action levels are designed to ensure that the Order's requirement to effectively prohibit all types of unauthorized discharges of non-storm water into the MS4 from areas under the authority of the Copermittees is being complied with. Non-storm water action levels in the Order are based upon numeric or narrative water quality objectives and criteria as defined in the Basin Plan, the State Water Board's Water Quality Control Plan for Ocean Waters of California (Ocean Plan), and the State Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California

(State Implementation Policy or SIP). An exceedance of an action level requires specified responsive action by the Copermittees. This Order describes what actions the Copermittees must take when an exceedance of an action level is observed. Exceedances of non-storm water action levels do not alone constitute a violation of this Order but could indicate non-compliance with the requirement to effectively prohibit all types of unauthorized non-storm water discharges into the MS4 or other prohibitions established in this Order. Failure to undertake required source investigation and elimination action following an exceedance of a non-storm water action level (NAL or action level) is a violation of this Order. The San Diego Water Board recognizes that use of action levels will not necessarily result in detection of all unauthorized sources of non-storm water discharges because there may be some discharges in which pollutants do not exceed established action levels. However, establishing NALs at levels appropriate to protect water quality standards is expected to lead to the identification of significant sources of pollutants in dry weather non-storm water discharges.

11. In addition to federal regulations cited in the Fact Sheet / Technical Report for the Order No. R9-2010-0016, monitoring and reporting required under Order No. R9-2010-0016 is required pursuant to authority under CWC section 13383.

12. With this Order, the San Diego Water Board has completed the re-issuance of the fourth iteration of the Phase I MS4 NPDES Permits for the Copermittees in the portions of San Diego County, Orange County, and Riverside County within the San Diego Region. The NPDES Permit requirements issued to the Copermittees in each county have substantially the same core requirements such as discharge prohibitions, receiving water limitations, jurisdictional components, and monitoring. In addition, the Copermittees cooperate regionally to develop monitoring with the Southern California Stormwater Monitoring Coalition and to develop program effectiveness with the California Stormwater Quality Association. Regional programs could improve the Copermittees' compliance with other permit components such as development of the Hydromodification Management Plans and Retrofitting Existing Development with more consistent implementation and cost sharing. Re-issuing the NPDES Permit requirements within five years for three counties under three different permits requires the San Diego Water Board to expend significant time and resources for issuance of the permits through three separate public proceedings, thereby greatly reducing the time and resources available to oversee compliance. Multiple permits also create confusion for determining compliance among regulated entities, especially the land development community. The San Diego Water Board recognizes that issuing a single MS4 permit for all Phase I entities in the San Diego Region will provide consistent implementation, improve communication among agencies within watersheds crossing multiple jurisdictions, and minimize staff resources spent with each permit renewal. The San Diego Water Board plans to develop a single regional MS4 permit prior to the expiration of this Order that will transfer the Copermittees' enrollment to the regional permit upon expiration of this Order.

F. PUBLIC PROCESS

1. The San Diego Water Board has notified the Copermittees, all known interested parties, and the public of its intent to consider adoption of an Order prescribing waste discharge requirements that would serve to renew an NPDES permit for the existing MS4 discharges of pollutants in waters of the U.S.

2. The San Diego Water Board has held a public hearing on October 13, 2010 and heard and considered all comments pertaining to the terms and conditions of this Order.

IT IS HEREBY ORDERED that the Copermittees, in order to meet the provisions contained in Division 7 of the CWC and regulations adopted thereunder, and the provisions of the CWA and regulations adopted thereunder, must each comply with the following to the extent of their legal authority~~ies~~ established under the California Constitution and any~~their~~ enabling acts:

A. PROHIBITIONS AND RECEIVING WATER LIMITATIONS

1. Discharges ~~into and~~ from MS4s in a manner causing, or threatening to cause, a condition of pollution, contamination, or nuisance (as defined in CWC section 13050), in receiving waters of the state are prohibited.[3]

Comment [DB17]: See legal comment white paper. The scope of this Order is the discharge from MS4s. Moreover, MS4s are not receiving waters.

2. Storm water discharges from MS4s containing pollutants which have not been reduced to the MEP are prohibited.[3]

3. Subject to the requirements of section A.3.a., d~~D~~ischarges from MS4s that cause or contribute to the violation of water quality standards (designated beneficial uses, water quality objectives developed to protect beneficial uses, and the State policy with respect to maintaining high quality waters) are prohibited.

Comment [DB18]: This change clarifies that the iterative process reflected in Part A.3 applies to the entire provision.

a. Each Copermittee must comply with section A.3 and section A.4 as it applies to Prohibition 5 in Attachment A of this Order through timely implementation of control measures and other actions to reduce pollutants in storm water discharges in accordance with this Order, including any modifications. If exceedance(s) of water quality standards persist notwithstanding implementation of this Order, the Copermittee must assure compliance with section A.3 and section A.4 as it applies to Prohibition 5 in Attachment A of this Order by complying with the following procedure:

(1) Upon a determination by either the Copermittee or the San Diego Water Board that storm water MS4 discharges are causing or contributing to an exceedance of an applicable water quality standard, the Copermittee must notify the San Diego Water Board within 30 days and thereafter submit a report to the San Diego Water Board that describes best management practices (BMPs) that are currently being implemented and additional BMPs that will be implemented to prevent or reduce any pollutants that are causing or contributing to the exceedance of water quality standards. The report may be incorporated in the Annual Report unless the San Diego Water

[3] This prohibition does not apply to MS4 discharges which receive subsequent treatment to reduce pollutants in storm water discharges to the MEP prior to entering receiving waters (e.g., low flow diversions to the sanitary sewer). Runoff treatment and/or mitigation must occur prior to the discharge of runoff into receiving waters per finding E.7.

Board[4] directs an earlier submittal. The report must include an implementation schedule. The San Diego Water Board may require modifications to the report

(2) Submit any modifications to the report required by the San Diego Water Board within 30 days of notification;

(3) Within 30 days following acceptance of the report described above by the San Diego Water Board, the Copermittee must revise its JRMP and monitoring program to incorporate the approved modified BMPs that have been and will be implemented, the implementation schedule, and any additional monitoring required; and

(4) Implement the revised JRMP and monitoring program in accordance with the approved schedule.

b. The Copermittee must repeat the procedure set forth above to comply with the receiving water limitations for continuing or recurring exceedances of the same water quality standard(s) that occur following ~~implementation~~ completion of scheduled actions unless directed to do otherwise by the San Diego Water Board's Executive Officer.

c. Nothing in section A.3 prevents the San Diego Water Board from enforcing any provision of this Order while the Copermittee prepares and implements the above report but the Copermittees shall not be liable for violation of section A.3 provided that they are in compliance with the requirements of this section.

Comment [DB19]: This change reiterates that the iterative process is in effect so long as the Copermittees remain in compliance with the process set forth in section A.3.

4. In addition to the above prohibitions, discharges from MS4s are subject to all Basin Plan prohibitions cited in Attachment A to this Order.

B. NON-STORM WATER DISCHARGES

1. Each Copermittee must effectively prohibit all types of non-storm water discharges into its MS4 unless such discharges are either authorized by a separate NPDES permit; or not prohibited in accordance with sections B.2, ~~and~~ B.3, and B.4 below.

Comment [CP20]: Change consistent with the addition of B.4. below, and the comments thereto.

2. The following categories of non-storm water discharges are not prohibited unless a Copermittee or the San Diego Water Board identifies the discharge category as a source of pollutants to waters of the U.S. Where the Copermittee(s) have identified a category as a source of pollutants, the category must be addressed as an illicit discharge and prohibited through ordinance, order or similar means. The San Diego

[4] The San Diego Water Board by prior resolution has delegated all matters that may legally be delegated to its Executive Officer to act on its behalf pursuant to CWC §13223. Therefore, the Executive Officer is authorized to act on the San Diego Water Board's behalf on any matter within this Order unless such delegation is unlawful under CWC §13223 or this Order explicitly states otherwise.

Water Board may identify categories of discharge that either require prohibition, or other controls ~~for non-anthropogenic sources~~. For a discharge category determined to be a source of pollutants, the Copermittee, under direction of the San Diego Water Board, must either prohibit the discharge category or develop and implement appropriate control measures ~~for non-anthropogenic sources~~ to prevent the discharge of pollutants to the MS4 and report to the San Diego Water Board pursuant to Section K.1 and K.3 of this Order. The discharge categories are:

a. Diverted stream flows;
b. Rising ground waters;
c. Uncontaminated ground water infiltration [as defined at 40 CFR 35.2005(20)] to MS4s;
d. Uncontaminated pumped ground water[5];
e. Foundation drains[5];
f. Springs;
g. Water from crawl space pumps[5];
h. Footing drains[5];
i. Air conditioning condensation;
j. Flows from riparian habitats and wetlands;
k. Water line flushing[6,7];
l. Landscape irrigation;
m. Discharges from potable water sources not subject to NPDES Permit No. CAG679001, other than water main breaks;
n. Irrigation water;
o. Lawn watering;
p. Individual residential car washing; and
q. Dechlorinated swimming pool discharges[8].

3. Emergency fire fighting flows (i.e., flows necessary for the protection of life or property) do not require BMPs and need not be prohibited.

a. As part of the JRMP, each Copermittee must develop and implement a program to address pollutants from non-emergency fire fighting flows (i.e., flows from controlled or practice blazes and maintenance activities) identified as significant sources of pollutants to waters of the U.S.
b. Building fire suppression system maintenance discharges (e.g. sprinkler line flushing) may contain waste. Therefore, such discharges are to be prohibited by the Copermittees as illicit discharges through ordinance, order, or similar means.

4. As part of the JRMP, the Copermittees must develop and implement a program to

[5] Requires enrollment under Order R9-2008-002. Discharges into the MS4 require authorization from the owner and operator of the MS4 system.
[6] This exemption does not include fire suppression sprinkler system maintenance and testing discharges. Those discharges may be regulated under Section B.3.
[7] Requires enrollment under Order R9-2002-0020.
[8] Excluding saline swimming pool discharges.

Comment [DB21]: See legal comments in Attachment 7

Comment [DB22]: See legal comments white paper.

Comment [CP23]: See discussion in the comment letter, and Attachment 6

Comment [CP24]: As noted in the comment letter and Attachment 6, irrigation runoff has not been shown to be an actual source of pollutants to the receiving waters in this watershed.

As such the comment letter requests that THE CONDTIONAL EXEMPTION BE RESTORED as shown in the redlines above.

Should the Board decide to prohibit the discharge anyway, the Copermittees request that at a minimum that the category of discharges be managed through a JRMP program similar to non-emergency fire fighting flows, as shown in these redlines

address pollutants from landscape irrigation, irrigation water and lawn watering identified as significant sources of pollutants to waters of the United States.

4.5. Each Copermittee must examine all dry weather effluent analytical monitoring results collected in accordance with section F.4 of this Order and Receiving Waters and MS4 Discharge Monitoring and Reporting Program No. R9-2010-0016 to identify water quality problems which may be the result of any non-prohibited discharge category(ies) identified above in section B.2. Follow-up investigations must be conducted to identify and control, pursuant to section B.2, any non-prohibited discharge category(ies) listed above.

C. NON-STORM WATER DRY WEATHER ACTION LEVELS

1. Each Copermittee, beginning no later than July 1, 2012, must implement the non-storm water dry weather action level (NAL) monitoring as described in Attachment E of this Order.

2. In response to an exceedance of an NAL, the Copermittee(s) having jurisdiction must investigate and seek to identify the source of the exceedance in a timely manner. However, if any Copermittee identifies a number of NAL exceedances that prevents it from adequately conducting source investigations at all sites in a timely manner, then that Copermittee may submit a prioritization plan and timeline that identifies the timeframe and planned actions to investigate and report its findings on all of the exceedances. Depending on the source of the pollutant exceedance, the Copermittee(s) having jurisdiction must take action as follows:

Comment [CP25]: Per discussions with Board staff on 8/18

a. If the Copermittee identifies the source of the exceedance as natural (non-anthropogenically influenced) in origin and in conveyance into the MS4; then the Copermittee must report its findings and documentation of its source investigation to the San Diego Water Board in its Annual Report.

b. If the Copermittee identifies the source of the exceedance as an illicit discharge or connection, then the Copermittee must eliminate the discharge to its MS4 pursuant to Section F.4.f and report the findings, including any enforcement action(s) taken, and documentation of the source investigation to the San Diego Water Board in the Annual Report. If the Copermittee is unable to eliminate the source of discharge prior to the Annual Report submittal, then the Copermittee must submit, as part of its Annual Report, its plan and timeframe to eliminate the source of the exceedance. Those dischargers seeking to continue such a discharge must become subject to a separate NPDES permit prior to continuing any such discharge.

c. If the Copermittee identifies the source of the exceedance as an exempted category of non-storm water discharge, then the Copermittees must determine if this is an isolated circumstance or if the category of discharges must be

addressed through the prevention or prohibition of that category of discharge as an illicit discharge. The Copermittee must submit its findings including a description of the steps taken to address the discharge and the category of discharge, to the San Diego Water Board for review in its Annual Report. Such description must include relevant updates to or new ordinances, orders, or other legal means of addressing the category of discharge, and the anticipated schedule for doing so. The Copermittees must also submit a summary of its findings with the Report of Waste Discharge.

d. If the Copermittee identifies the source of the exceedance as a non-storm water discharge in violation or potential violation of an existing separate NPDES permit (e.g. the groundwater dewatering permit), then the Copermittee must report, within three business days, the findings to the San Diego Water Board including all pertinent information regarding the discharger and discharge characteristics.

e. If the Copermittee is unable to identify the source of the exceedance after taking and documenting reasonable steps to do so, then the Copermittee must perform additional focused sampling. If the results of the additional sampling indicate a recurring exceedance of NALs with an unidentified source, then the Copermittee must update its programs within a year to address the common contributing sources that may be causing such an exceedance. The Copermittee's annual report must include these updates to its programs including, where applicable, updates to their watershed workplans (Section G.2), retrofitting consideration (Section F.3.d) and program effectiveness work plans (Section J.4).

f. The Copermittees or any interested party, may evaluate existing NALs and propose revised NALs for future Board consideration.

3. NALs can help provide an assessment of the effectiveness of the prohibition of non-storm water discharges and of the appropriateness of exempted non-storm water discharges. An exceedance of an NAL does not alone constitute a violation of the provisions of this Order. An exceedance of an NAL may indicate a ~~lack of compliance with the requirement that~~ need to enhance the Copermittees efforts to effectively prohibit all types of unauthorized non-storm water discharges into the MS4 or other prohibitions set forth in Sections A and B of this Order. Failure to timely implement required actions specified in this Order following an exceedance of an NAL constitutes a violation of this Order. Neither the absence of exceedances of NALs nor compliance with required actions following observed exceedances, excuses any non-compliance with the requirement to effectively prohibit all types of unauthorized non-storm water discharges into the MS4s or any non-compliance with the prohibitions in Sections A and B of this Order. During any annual reporting period in which one or more exceedances of NALs have been documented the Copermittee must report in response to Section C.2 above, a description of whether and how the observed exceedances did or did not result in a discharge from the MS4 that caused, or threatened to cause or contribute to a condition of pollution, contamination, or nuisance in the receiving waters.

Comment [CP26]: 'lack of compliance' is in contradiction with the second sentence. The proposed language is more appropriate.

4. Monitoring of effluent will occur at the end-of-pipe prior to discharge into the receiving waters, with a focus on Major Outfalls, as defined in 40 CFR 122.26(B 5-6) and Attachment E of this Order. ~~The Copermittees must develop their monitoring plans to sample a representative percentage of major outfalls and identified stations within each hydrologic subarea.~~ At a minimum, outfalls that exceed any NALs once during any year must be monitored in the subsequent year. Any station that does not exceed an NAL, or only has exceedances that are identified as natural in origin and conveyance into the MS4 pursuant to Section C.2.a, for 3 successive years may be replaced with a different station.

Comment [CP27]: The previous sentence requires outfalls to be selected consistent with Attachment E. This sentence is not needed and is duplicative of Attachment E.

At a minimum, this language will need to be modified to be consistent with changes being requested in the Attachment 4 to the Comment Letter, including any footnotes.

5. Each Copermittee must monitor for the non-storm water dry weather action levels, which are incorporated into this Order as follows:

   a. Action levels for discharges to inland surface waters:

Table 3.a.1: General Constituents

Parameter	Units	AMAL	MDAL	Instantaneous Maximum	Basis
Fecal Coliform	MPN/ 100 ml	200[A] 400[B]	-		BPO
Enterococci	MPN/ 100 ml	33	-	~~61[C]~~ 151[C]	BPO
Turbidity	NTU	-	20		BPO
pH	Units	Within limit of 6.5 to 8.5 at all times			BPO
Dissolved Oxygen	mg/L	Not less than 5.0 in WARM waters and not less than 6.0 in COLD waters			BPO
Total Nitrogen	mg/L	-	1.0	See MDAL	BPO
Total Phosphorus	mg/L	-	0.1	See MDAL	BPO
Methylene Blue Active Substances	mg/L	-	0.5	See MDAL	BPO
Iron	mg/L	-	0.3	See MDAL	BPO
Manganese	mg/L	-	0.05	See MDAL	BPO

A – Based on a minimum of not less than five samples for any 30-day period
B – No more than 10 percent of total samples may exceed 400 per 100 ml during any 30 day period
C – This Value has been set to Basin Plan Criteria for ~~Designated Beach~~infrequently used Areas
BPO – Basin Plan Objective
MDAL – Maximum Daily Action Level AMAL – Average Monthly Action Level

Comment [CP28]: This value was incorrectly referencing the criteria for beach areas and needs to be updated to reflect the shown values for infrequently used areas.

Table 3.a.2: Priority Pollutants

		Freshwater (CTR)	
Parameter	Units	MDAL	AMAL
Cadmium	ug/L	**	**
Copper	ug/L	*	*
Chromium III	ug/L	**	**
Chromium VI (hexavalent)	ug/L	16	8.1
Lead	ug/L	*	*
Nickel	ug/L	**	**

Silver	ug/L	*	*
Zinc	ug/L	*	*

CTR – California Toxic Rule
*- Action Levels developed on a case-by-case basis (see below)
**- Action Levels developed on a case-by-case basis (see below), but calculated criteria are not to exceed Maximum Contaminant Levels under the California Code of Regulations[9]

The NALs for Cadmium, Copper, Chromium (III), Lead, Nickel, Silver and Zinc will be developed on a case-by-case basis because the freshwater criteria are based on site-specific water quality data (receiving water hardness). For these priority pollutants, the following equations (40 CFR 131.38.b.2) will be required:

Cadmium (Total Recoverable) = exp(0.7852[ln(hardness)] -2.715)
Chromium III (Total Recoverable) = exp(0.8190[ln(hardness)] + .6848)
Copper (Total Recoverable) = exp(0.8545[ln(hardness)] - 1.702)
Lead (Total Recoverable) = exp(1.273[ln(hardness)] - 4.705)
Nickel (Total Recoverable) = exp(.8460[ln(hardness)] + 0.0584)
Silver (Total Recoverable) = exp(1.72[ln(hardness)] - 6.52)
Zinc (Total Recoverable) = exp(0.8473[ln(hardness)] + 0.884)

D. STORM WATER ACTION LEVELS

1. The Copermittees must implement the Wet Weather MS4 Discharge Monitoring as described in Attachment E of this Order, and beginning three years after the Order adoption date, the Copermittees must annually evaluate their data compared to the Stormwater Action Levels (SALs). At each monitoring station, a running average of twenty percent or greater of exceedances of any discharge of storm water from the MS4 to waters of the U.S. that exceed the SALs for each of the pollutants listed in Table 4 (below) requires the Copermittee(s) having jurisdiction to affirmatively augment and implement all necessary storm water controls and measures to reduce the discharge of the associated class of pollutants(s) to the MEP. The Copermittees must utilize the exceedance information when adjusting and executing annual work plans, as required by this Order. Copermittees must take the magnitude, frequency, and number of constituents exceeding the SAL(s), in addition to receiving water quality data and other information, into consideration when prioritizing and reacting to SAL exceedances in an iterative manner. Failure to appropriately consider and react to SAL exceedances in an iterative manner creates a presumption that the Copermittee(s) have not reduced pollutants in storm water discharges to the MEP.

Table 4. Storm Water Action Levels

Pollutant	Action Level
Turbidity (NTU)	126
Nitrate & Nitrite total (mg/L)	2.6
P total (mg/L)	1.46

[9] California Code of Regulations, Title 22, Division 4, Chapter 15, Article 4, Section 64431.

Cd total (µg/L)	3.0
Cu total (µg/L)	127
Pb total (µg/L)	250
Zn total (µg/L)	976

2. The end-of-pipe assessment points for the determination of SAL compliance are ~~all~~ major outfalls, as defined in 40 CFR 122.26(b)(5) and (b)(6) and Attachment E of this Order. ~~The Copermittees must develop their monitoring plans to sample a representative percentage of the major outfalls within each hydrologic subarea.~~ At a minimum, outfalls that exceed SALs must be monitored in the subsequent year. Any station that does not exceed an SAL for 3 successive years may be replaced with a different station. SAL samples must be 24 hour time-weighted composites.

3. The absence of SAL exceedances does not relieve the Copermittees from implementing all other required elements of this Order.

4. This Order does not regulate natural sources and conveyances into the MS4 of constituents listed in Table 5. To be relieved of the requirements to take action as described in D.1 above, the Copermittee must demonstrate that the likely and expected cause of the SAL exceedance is not anthropogenic in nature. This demonstration does not need to be repeated for subsequent exceedances of the same SAL at the same monitoring station.

5. The SALs will be reviewed and updated at the end of every permit cycle. The data collected pursuant to D.2 above and Attachment E can be used to create SALs based upon local data. The purpose of establishing the SALs is that through the iterative and MEP process, outfall storm water discharges will meet all applicable water quality standards.

Comment [CP29]: Conflicts with attachment E, which states to select 'representative' outfalls.

Comment [CP30]: Consistent with NALs section

Comment [CP31]: The previous sentence requires outfalls to be selected consistent with Attachment E. This sentence is not needed and is duplicative of Attachment E.

At a minimum, this language will need to be modified to be consistent with changes being requested in the Attachment 4 to this comment letter, including any footnotes.

E. LEGAL AUTHORITY

1. Each Copermittee must, to the extent of their legal authority established under the California Constitution and any enabling acts, establish, maintain, and enforce adequate legal authority within their legal authority to control pollutant discharges into and from its MS4 through ordinance, statute, permit, contract or similar means. Nothing herein shall authorize a Copermittee or other discharger regulated under the terms of this order to divert, store or otherwise impound water if such action is reasonably anticipated to harm downstream water rights holders in the exercise of their water rights. This legal authority must, at a minimum, authorize the Copermittee to:

   a. Control the contribution of pollutants in discharges of runoff associated with industrial and construction activity to its MS4 and control the quality of runoff from industrial and construction sites. This requirement applies both to industrial and construction sites which have coverage under the statewide general industrial or

construction storm water permits, as well as to those sites which do not. Grading ordinances must be updated and enforced as necessary to comply with this Order;

b. Prohibit all identified illicit discharges not otherwise allowed pursuant to section B.2;

c. Prohibit and eliminate illicit connections to the MS4;

d. Control the discharge of spills, dumping, or disposal of materials other than storm water to its MS4;

e. Require compliance with conditions in Copermittee ordinances, permits, contracts or orders (i.e., hold dischargers to its MS4 accountable for their contributions of pollutants and flows);

f. Utilize enforcement mechanisms to require compliance with Copermittee storm water ordinances, permits, contracts, or orders;

g. Control the contribution of pollutants from one portion of the shared MS4 to another portion of the MS4 through interagency agreements among Copermittees.

h. Control of the contribution of pollutants from one portion of the shared MS4 to another portion of the MS4 through interagency agreements with other owners of the MS4 such as the State of California Department of Transportation, the U.S. federal government, or sovereign Native American Tribes is encouraged;

i. Carry out all inspections, surveillance, and monitoring necessary to determine compliance and noncompliance with local ordinances and permits and with this Order, including the prohibition on illicit discharges to the MS4. This means the Copermittee must have authority to enter, monitor, inspect, take measurements, review and copy records, and require regular reports from industrial facilities discharging into its MS4, including construction sites;

j. Require the use of BMPs to prevent or reduce the discharge of pollutants ~~into~~ fromMS4s ~~from storm water~~ to the MEP; and

k. Require documentation on the effectiveness of BMPs implemented to reduce the discharge of ~~storm water~~ pollutants from~~to~~ the MS4 to the MEP.

2. Each Copermittee must submit on or before June 30, 2012, a statement certified by its chief legal counsel that the Copermittee has taken the necessary steps to obtain and maintain full legal authority within their jurisdiction to implement and enforce each of the requirements contained in 40 CFR 122.26(d)(2)(i)(A-F) and this Order. As applicable to each Copermittee, ~~T~~these statements must include:

a. Citation of runoff related ordinances and the reasons they are enforceable;

b. Identification of the local administrative and legal procedures available to mandate compliance with runoff related ordinances and therefore with the conditions of this Order, and a statement as to whether enforcement actions can be completed administratively or whether they must be commenced and completed in the judicial system; and

c. A brief description of how runoff related ordinances are adopted and the process by which they may be challenged.

Comment [DB32]: See legal comments in Attachment 7. The Copermittees' responsibility under the Clean Water Act is to reduce the discharge of pollutants from the MS4 to the MEP. Therefore, the purpose of the BMP is to reduce pollutants in such discharges.

Comment [CP33]: To address limitations of the District

F. JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM (JRMP)

Each Copermittee must implement all requirements of section F of this Order no later than July 1, 2012, unless otherwise specified. Upon adoption of this Order and until an updated JRMP is developed and implemented or July 1, 2012, whichever occurs first,, each Copermittee must at a minimum implement its ~~JRMP~~ Individual SWMP document, as the document was developed and amended to comply with the requirements of Order No. R9-2004-001.

Each Copermittee must develop and implement an updated JRMP for its jurisdiction no later than July 1, 2012. Each updated JRMP must meet the requirements of section F of this Order, reduce the discharge of storm water pollutants from the MS4 to the MEP, effectively prohibit non-storm water discharges, and prevent runoff discharges from the MS4 from causing or contributing to a violation of water quality standards. In addition, each Copermittee's JRMP must identify all departments and positions within its jurisdiction that conduct runoff related activities, and their roles and responsibilities under this Order. This identification must include an up to date organizational chart specifying these departments and key personnel.

1. DEVELOPMENT PLANNING COMPONENT

Each Copermittee must implement a program which meets the requirements of this section as applicable to their authority, that ~~and~~ is designed to (1) reduce~~s~~ Development Project discharges of storm water pollutants from the MS4 to the MEP; (2) prevent~~s~~ Development Project discharges from the MS4 from causing or contributing to a violation of water quality standards; (3) prevent~~s~~ illicit discharges into the MS4; and (4) manage~~s~~ increases in runoff discharge rates and durations from Development Projects that are likely to cause increased erosion of stream beds and banks, silt pollutant generation, or other impacts to beneficial uses and stream habitat due to increased erosive force.

Comment [DB34]: See legal comments in Attachment 8

Comment [DB35]: See general comment 1 in Attachment 7

a. GENERAL PLAN

Each Copermittee (except the District) must revise as needed its General Plan or equivalent plan (e.g., Comprehensive, Master, or Community Plan) to include water quality and watershed protection principles and policies that direct land-use decisions and require implementation of consistent water quality protection measures for all development, redevelopment, and retrofit projects. Examples of water quality and watershed protection principles and policies to be considered include the following:

Comment [CP36]: See legal comments in Attachment 8

(1) Minimize the amount of impervious surfaces and directly connected impervious surfaces in areas of new development and redevelopment and where feasible slow runoff and maximize on-site infiltration of runoff.

(2) Implement pollution prevention methods supplemented by pollutant source controls and treatment BMPs. Use small collection strategies located at, or as close as possible to, the source (i.e., the point where water initially meets the ground) to minimize the transport of urban runoff and pollutants offsite and into an MS4.

(3) Preserve, and where possible, create, or restore areas that provide important water quality benefits, such as riparian corridors, wetlands, and buffer zones. Encourage land acquisition of such areas.

(4) Limit disturbances of natural water bodies and natural drainage systems caused by development including roads, highways, and bridges.

(5) Prior to making land use decisions, utilize methods available to estimate increases in pollutant loads and flows resulting from projected future development. Require incorporation of BMPs to mitigate the projected increases in pollutant loads and flows.

(6) Avoid development of areas that are particularly susceptible to erosion and sediment loss; or establish development guidance that identifies these areas and protects them from erosion and sediment loss.

(7) Reduce pollutants associated with vehicles and increasing traffic resulting from development.

(8) Post-development runoff from a site must not contain pollutant loads that cause or contribute to an exceedance of receiving water quality objectives and which have not been reduced to the MEP.

b. ENVIRONMENTAL REVIEW PROCESS

Each Copermittee must revise as needed its current environmental review processes to accurately evaluate water quality impacts and cumulative impacts and identify appropriate measures to avoid, minimize, and mitigate those impacts for all Development Projects.

c. APPROVAL PROCESS CRITERIA AND REQUIREMENTS FOR ALL DEVELOPMENT PROJECTS

For all proposed Development Projects, each Copermittee, during the planning process, and prior to project approval and issuance of local permits, must prescribe the necessary requirements so that Development Project discharges ~~of storm water pollutants from the MS4 will be reduced to the MEP, will not cause or contribute to a violation of water quality standards, and~~ will comply with the Copermittee's ordinances, permits, plans, and requirements, and with this Order.

Comment [CP37]: This is duplicative of section A and is not needed. Further, the end of this sentence specifically requires compliance with this order.

Performance Criteria: Discharges from each approved development project must be subject to the following management measures:

(1) Source control BMPs that reduce storm water pollutants of concern in runoff; prevent illicit discharges into the MS4; ~~prevent~~ minimize irrigation runoff; storm drain system stenciling or signage; properly design outdoor material storage areas; properly design outdoor work areas; and properly design trash storage areas.

(2) The following LID BMPs listed below must be implemented at all Development Projects where applicable and feasible.

(a) Conserve natural areas, including existing trees, other vegetation, and soils,
(b) Construct streets, sidewalks, or parking lot aisles to the minimum widths necessary, provided that public safety is not compromised,
(c) Minimize the impervious footprint of the project,
(d) Minimize soil compaction to landscaped areas,
(e) Minimize disturbances to natural drainages (e.g., natural swales, topographic depressions, etc.), and
(f) Disconnect impervious surfaces through distributed pervious areas.

(3) Buffer zones for natural water bodies, where technically feasible. Where buffer zones are technically infeasible, require project proponent to implement other buffers such as trees, access restrictions, etc;

(4) Other measures necessary so that grading or other construction activities meet the provisions specified in section F.2 of this Order.

(5) Submittal of documentation of a mechanism under which ongoing long-term maintenance of all structural post-construction BMPs will be conducted.

(6) Infiltration and Groundwater Protection

To protect groundwater quality, each Copermittee must apply restrictions to the use of treatment control BMPs that are designed to primarily function as large, centralized infiltration devices (such as large infiltration trenches and infiltration basins). Such restrictions must be designed so that the use of such infiltration treatment control BMPs does not cause or contribute to an exceedance of groundwater quality objectives. At a minimum, each treatment control BMP designed to primarily function as a centralized infiltration device must meet the restrictions below, unless the Development Project demonstrates to the Copermittee that a restriction is not necessary to protect groundwater quality. The Copermittees may collectively or individually develop alternative restrictions on the use of treatment control BMPs which

are designed to primarily function as centralized infiltration devices. Alternative restrictions developed by the Copermittees can partially or wholly replace the restrictions listed below. The restrictions do not apply to small infiltration systems dispersed throughout a development project.

(a) Runoff must undergo pretreatment such as sedimentation or filtration prior to infiltration;

(b) All dry weather flows containing significant pollutant loads must be diverted from infiltration devices and treated through other BMPs;

(c) Pollution prevention and source control BMPs must be implemented at a level appropriate to protect groundwater quality at sites where infiltration treatment control BMPs are to be used;

(d) Infiltration treatment control BMPs must be adequately maintained so that they remove storm water pollutants to the MEP;

(e) The vertical distance from the base of any infiltration treatment control BMP to the seasonal high groundwater mark must be at least 10 feet. Where groundwater basins do not support beneficial uses, this vertical distance criteria may be reduced, provided groundwater quality is maintained;

(f) The soil through which infiltration is to occur must have physical and chemical characteristics (such as appropriate cation exchange capacity, organic content, clay content, and infiltration rate) which are adequate for proper infiltration durations and treatment of runoff for the protection of groundwater beneficial uses;

(g) Infiltration treatment control BMPs must not be used for areas of industrial or light industrial activity; and other high threat to water quality land uses and activities as designated by each Copermittee unless first treated or filtered to remove pollutants prior to infiltration; and

(h) Infiltration treatment control BMPs must be located a minimum of 100 feet horizontally from any water supply wells.

(7) Where feasible, landscaping with native or low water species shall be preferred in areas that drain to the MS4 or to waters of the U.S.

(8) Rain water harvesting, where feasible~~, must be implemented~~ shall be encouraged as part of the site design and construction,~~ and to supplement offsite beneficial uses~~.

d. STANDARD STORM WATER MITIGATION PLANS (SSMPS) – APPROVAL PROCESS

CRITERIA AND REQUIREMENTS FOR PRIORITY DEVELOPMENT PROJECTS

On or before June 30, 2012, the Copermittees must submit an updated SSMP, to the San Diego Water Board's Executive Officer for a 30 day public review and comment period. The San Diego Water Board's Executive Officer has the discretion to determine whether to hold a public hearing or to limit public input to written comments. Within 180 days of determination that the SSMP is in compliance with this Order's provisions, each Copermittee must amend its local ordinances consistent with the updated SSMP, and begin implementing the updated SSMP. Any updated local ordinances must be submitted to the San Diego Water Board with the applicable Annual Report . The SSMP must meet the requirements of section F.1.d of this Order to (1) be designed to reduce Priority Development Project discharges of storm water pollutants from the MS4 to the MEP, and (2) be designed to prevent Priority Development Project runoff discharges from the MS4 from causing or contributing to a violation of water quality standards.[10]

Comment [CP38]: Per discussions with Board staff on 8/18

Comment [DB39]: See general comment 1 in Attachment 7.

Comment [DB40]: See general comment 1 in Attachment 7.

(1) Definition of Priority Development Project:

Priority Development Projects are:

(a) All new Development Projects that fall under the project categories or locations listed in section F.1.d.(2), and

(b) Those redevelopment projects that create, add, or replace at least 5,000 square feet of impervious surfaces on an already developed site and the existing development and/or the redevelopment project falls under the project categories or locations listed in section F.1.d.(2). Where redevelopment results in an increase of less than fifty percent of the impervious surfaces of a previously existing development, and the existing development was not subject to SSMP requirements, the numeric sizing criteria discussed in section F.1.d.(6) applies only to the addition or replacement, and not to the entire development. Where redevelopment results in an increase of more than fifty percent of the impervious surfaces

[10] Updated SSMP and hydromodification requirements must apply to all priority projects or phases of priority projects which have not yet begun grading or construction activities at the time any updated SSMP or hydromodification requirement commences. If lawful prior approval of a project exists, whereby application of an updated SSMP or hydromodification requirement to the project is illegal, the updated SSMP or hydromodification requirement need not apply to the project. Updated Development Planning requirements set forth in Sections F.1. (a) through (h) of this Order must apply to all projects or phases of projects, unless, at the time any updated Development Planning requirement commences, the projects or project phases meet any one of the following conditions: (i) the project or phase has begun grading or construction activities; or (ii) a Copermittee determines that lawful prior approval rights for a project or project phase exist, whereby application of the Updated Development Planning requirement to the project is legally infeasible. Where feasible, the Permittees must utilize the SSMP and hydromodification update periods to ensure that projects undergoing approval processes include application of the updated SSMP and hydromodification requirements in its plans.

of a previously existing development, the numeric sizing criteria applies to the entire development.

(c) Redevelopment also does not include projects that are implemented solely pursuant to section F.3.d of this order.

~~(b)~~(d) PDPs do not include Emergency projects required to protect public health and safety, consistent with CEQA § 15269.

~~(c) One acre threshold: In addition to the Priority Development Project Categories identified in section F.1.d.(2), Priority Development Projects must also include all other post-construction pollutant-generating new Development Projects that result in the disturbance of one acre or more of land by July 1, 2012.~~[11]

Comment [CP41]: Important not to penalize proactive efforts to retrofit existing development.

Comment [amm42]: Request deletion as disturbance threshold inappropriately captures non-development related activity (maintenance, agricultural, etc.) Further, the one acre threshold is not appropriately supported in the Fact Sheet.

(2) Priority Development Project Categories

Where a new Development Project feature, such as a parking lot, falls into a Priority Development Project Category, the entire project footprint is subject to SSMP requirements.

(a) New development projects that create 10,000 square feet or more of impervious surfaces (collectively over the entire project site) including commercial, industrial, residential (excluding individual single family home projects not part of a larger common plan of development), mixed-use, and public projects. This category includes development projects on public or private land which fall under the planning and building authority of the Copermittees.

(b) Automotive repair shops. This category is defined as a facility that is categorized in any one of the following Standard Industrial Classification (SIC) codes: 5013, 5014, 5541, 7532-7534, or 7536-7539.

(c) Restaurants. This category is defined as a facility that sells prepared foods and drinks for consumption, including stationary lunch counters and refreshment stands selling prepared foods and drinks for immediate consumption (SIC code 5812), where the land area for development is greater than 5,000 square feet. Restaurants where land development is less than 5,000 square feet must meet all SSMP requirements except for

[11] ~~Pollutant generating Development Projects are those projects that generate pollutants at levels greater than natural background levels.~~

LID and structural treatment BMP and numeric sizing criteria requirement F.1.d.(4) and F.1.d.(6) and hydromodification requirement F.1.h.

(d) All hillside development greater than 5,000 square feet. This category is defined as any development which creates 5,000 square feet of impervious surface which is located in an area with known erosive soil conditions, where the development will grade on any natural slope that is twenty-five percent or greater.

(e) Environmentally Sensitive Areas (ESAs). All development located within, or directly adjacent to, or discharging directly to an ESA (where discharges from the development or redevelopment will enter receiving waters within the ESA), which either creates 2,500 square feet of impervious surface on a proposed project site or increases the area of imperviousness of a proposed project site to 10 percent or more of its naturally occurring condition. "Directly adjacent" means situated within 200 feet of the ESA. "Discharging directly to" means outflow from a drainage conveyance system that is composed entirely of flows from the subject development or redevelopment site, and not commingled with flows from adjacent lands.

(f) Impervious parking lots 5,000 square feet or more and potentially exposed to runoff. Parking lot is defined as a land area or facility for the temporary parking or storage of motor vehicles used personally, for business, or for commerce.

(g) Street, roads, highways, and freeways. This category includes any paved impervious surface that is 5,000 square feet or greater used for the transportation of automobiles, trucks, motorcycles, and other vehicles. To the extent that the Copermittees develop revised standard roadway design and post-construction BMP guidance that comply with the provisions of Section F.1 of the Order, then public works projects that implement the ~~revised standard roadway sections~~designs/guidance do not have to develop a project specific SSMP. The standard roadway design and post-construction BMP guidance must be submitted with the Copermittee's updated SSMP.

(h) Retail Gasoline Outlets (RGOs). This category includes RGOs that meet the following criteria: (a) 5,000 square feet or more or (b) a projected Average Daily Traffic (ADT) of 100 or more vehicles per day.

(3) Pollutants of Concern

As part of its local SSMP, each Copermittee must implement an updated procedure for identifying pollutants of concern for each Priority Development Project. The procedure must address, at a minimum: (1) Receiving water quality (including pollutants for which receiving waters are listed as impaired under CWA section 303(d)); (2) Land-use type of the Development Project and pollutants associated with that land use type; and (3) Pollutants expected to be present on site.

(4) Low Impact Development BMP Requirements

Each Copermittee must require each Priority Development Project to implement LID BMPs which will collectively minimize directly connected impervious areas, limit loss of existing infiltration capacity, and protect areas that provide important water quality benefits necessary to maintain riparian and aquatic biota, and/or are particularly susceptible to erosion and sediment loss.

(a) The Copermittees must take the following measures to ensure that LID BMPs are implemented at Priority Development Projects:

(i) Each Copermittee must require LID BMPs or make a finding of technical infeasibility for each Priority Development Project in accordance with the LID waiver program in Section F.1.d.(7);

(ii) Each Copermittee must incorporate formalized consideration, such as thorough checklists, ordinances, and/or other means, of LID BMPs into the plan review process for Priority Development Projects;

(iii) On or before July 1, 2012, each Copermittee, to the extent of its jurisdiction, must review its local codes, policies, and ordinances and identify barriers therein to implementation of LID BMPs. Following the identification of these barriers to LID implementation, where feasible, the Copermittee must take, by the end of the permit cycle, appropriate actions to remove such barriers. The Copermittees must include this review with the updated JRMP.

Comment [DB43]: See legal comments in Attachment 8.

(b) The following LID BMPs must be implemented at each Priority Development Project:

(i) Maintain or restore natural storage reservoirs and drainage corridors (including depressions, areas of permeable soils, swales, and ephemeral and intermittent streams) to the extent feasible[12].

(ii) Projects with landscaped or other pervious areas must, where feasible, properly design and construct the pervious areas to

Comment [CP44]: Footnote edits per discussions with Board staff on 8/18

[12] Priority Development Projects proposing to dredge or fill materials in waters of the U.S. must obtain a CWA §401 Water Quality Certification. Discharges of dredge or fill materials in ~~and/or~~ waters of the State must obtain ~~a CWA §401 Water Quality Certification and/or~~ Waste Discharge Requirements.

effectively receive and infiltrate, retain and/or treat runoff from impervious areas, prior to discharge to the MS4. Soil compaction for these areas must be minimized. The amount of the impervious areas that are to drain to pervious areas must be based upon the total size, soil conditions, slope, and other pertinent factors.

(iii) ~~Projects with low traffic areas and appropriate soil conditions must construct walkways, trails, overflow parking lots, alleys, or other low-traffic areas with permeable surfaces, such as pervious concrete, porous asphalt, unit pavers, and granular materials~~.

Comment [CP45]: This requirement is clearly specifying the method of compliance in contradiction with state law (CWC 13360).

(c) LID BMPs sizing criteria:

(i) LID BMPs must be sized and designed to ensure onsite retention without runoff, of the volume of runoff produced from a 24-hour 85th percentile storm event[13] ("design capture volume");

(ii) If onsite infiltration LID BMPs are technically infeasible per section F.1.d.(7)(b), other LID BMPs may treat any volume that is not retained onsite provided that the other LID BMPs are sized to hold the design storm volume that is not infiltrated. The LID BMPs must be designed for an appropriate surface loading rate to prevent erosion, scour and channeling within the BMP.

(d) If it is shown to be technically infeasible per Section F.1.d.(7)(b) to retain and/or treat the remaining volume up to and including the design capture volume using LID BMPs, then the project must implement conventional treatment control BMPs in accordance with Section F.1.d.(6) below and must participate in the LID waiver program in Section F.1.d.(7).

(e) All LID BMPs must be designed and implemented with measures to avoid the creation of nuisance or pollution associated with vectors, such as mosquitoes, rodents, and flies.

(5) Source Control BMP Requirements

Each Copermittee must require each Priority Development Project to implement applicable source control BMPs. The source control BMPs to be required must be designed to:

Comment [DB46]: See general comment 1 in Attachment 7 .

[13] This volume is not a single volume to be applied to all of Riverside County. The size of the 85th percentile storm event is different for various parts of the County. The Copermittees are encouraged to calculate the 85th percentile storm event for each of its jurisdictions using local rain data pertinent to its particular jurisdiction (0.6 inch standard is a rough average for the County and should only be used where appropriate rain data is not available). In addition, isopluvial maps may be used to extrapolate rainfall data to areas where insufficient data exists in order to determine the volume of the local 85th percentile storm event in such areas. Where the Copermittees will use isopluvial maps to determine the 85th percentile storm event in areas lacking rain data, the Copermittees must describe their method for using isopluvial maps in its SSMPs.

(a) Prevent illicit discharges into the MS4;
(b) Minimize storm water pollutants of concern in runoff;
(c) ~~Eliminate~~ Minimize irrigation runoff;
(d) Include storm drain system stenciling or signage;
(e) Include properly designed outdoor material storage areas;
(f) Include properly designed outdoor work areas;
(g) Include properly designed trash storage areas;
(h) Include water quality protection requirements applicable to individual priority project categories.

(6) Treatment Control BMP Requirements

Each Copermittee must require each Priority Development Project that meets the Copermittee's technical infeasibility criteria in Section F.1.d(7) below, to implement conventional treatment control BMPs to treat the portion of the "design capture volume" that was not treated by LID BMPs per Section F.1.d(4) above. Conventional treatment control BMPs must meet the following requirements:

(a) All treatment control BMPs for a single Priority Development Project must collectively be sized to comply with the following numeric sizing criteria:

(i) Volume-based treatment control BMPs must be designed to mitigate (infiltrate, filter, or treat) the remaining portion of the design capture volume that was not retained and/or treated with LID BMPs; or

(ii) Flow-based treatment control BMPs must be designed to mitigate (filter, or treat) either: a) the maximum flow rate of runoff produced from a rainfall intensity of 0.2 inch of rainfall per hour, for each hour of a storm event; or b) the maximum flow rate of runoff produced by the 85th percentile hourly rainfall intensity (for each hour of a storm event), as determined from the local historical rainfall record, multiplied by a factor of two.

(b) All treatment control BMPs for Priority Development Projects must, at a minimum:

(i) Be ranked with high or medium pollutant removal efficiency for the project's most significant pollutants of concern, as the pollutant removal efficiencies are identified in the Copermittees' SSMP. Treatment control BMPs with a low removal efficiency ranking must only be approved by a Copermittee when a feasibility analysis has been conducted which exhibits that implementation of treatment control BMPs with high or medium removal efficiency rankings are infeasible for a Priority Development Project or portion of a Priority

Development Project.

(ii) Be correctly sized and designed so as to remove storm water pollutants to the MEP.

(c) Target removal of pollutants of concern from runoff.

(d) Be implemented close to pollutant sources, and prior to discharging into waters of the U.S.

(e) Include proof of a mechanism under which ongoing long-term maintenance will be conducted to ensure proper maintenance for the life of the project. The mechanisms may be provided by the project proponent or Copermittee.

(f) Be designed and implemented with measures to avoid the creation of nuisance or pollution associated with vectors, such as mosquitoes, rodents, and flies.

(7) Low Impact Development (LID) BMP Waiver Program

The Copermittees must develop, collectively or individually, a LID waiver program for incorporation into the SSMP, which would allow a Priority Development Project to substitute implementation of all or a portion of required LID BMPs in Section F.1.d(4) with implementation of treatment control BMPs and either 1) on-site mitigation, 2) an off-site mitigation project, and/or 3) other mitigation developed by the Copermittees. The Copermittees must submit the LID waiver program as part of their updated SSMP. At a minimum, the program must meet the requirements below:

(a) Prior to implementation, the LID waiver program must clearly exhibit that it will not allow Priority Development Projects to result in a net impact (after consideration of any mitigation) from pollutant loadings over and above the impact caused by projects meeting LID requirements;

(b) For each Priority Development Project participating, the Copermittee must find that it is technically infeasible to implement LID BMPs that comply with the requirements of Section F.1.(d)(4). The Copermittee(s) must develop criteria to determine the technical feasibility of implementing LID BMPs . Each Priority Development Project participating must demonstrate that LID BMPs were implemented as much as feasible given the site's unique conditions. Technical infeasibility may result from conditions including, but not limited to:

(i) Locations that cannot meet the infiltration and groundwater protection requirements in section F.1.c.(6) for large, centralized infiltration BMPs. Where infiltration is technically infeasible, the

project must still examine the feasibility of other onsite LID BMPs;

(ii) Insufficient demand for storm water reuse;

(iii) Smart growth and infill or redevelopment locations where the density and/or nature of the project would create significant difficulty for compliance with the LID BMP requirements;

~~(iii)~~(iv) Results of a Cost-Benefit Analysis; and

~~(iv)~~(v) Other site, geologic, soil, or implementation constraints identified in the Copermittees updated SSMP document.

Comment [CP47]: This had been agreed to in discussions with RB staff, but was omitted from the draft.

(c) Each Priority Development Project that participates in the LID waiver program must mitigate for the pollutant loads expected to be discharged due to not implementing the LID retention BMPs in section F.1.d.(4). The pollutant loading must be estimated for each project participating in the LID waiver program. The estimated impacts from not implementing the required LID retention BMPs in section F.1.d.(4) must be fully mitigated. Mitigation projects must be implemented within the same hydrologic unit as the Priority Development Project. Mitigation projects outside of the hydrologic subarea but within the same hydrologic unit may be approved provided that the project proponent demonstrates that mitigation projects within the same hydrologic subarea are infeasible and that the mitigation project will address similar beneficial use impacts as expected from the Priority Development Projects pollutant load. Onsite mitigation may include increasing the conventional treatment sizing factors to achieve pollutant load removal equal to or greater than the pollutant load removal expected from implementing onsite retention of the design capture volume. Offsite mitigation projects may include green streets projects, existing development retrofit projects, retrofit incentive programs, regional BMPs and/or riparian restoration projects. Project applicants seeking to utilize these alternative compliance provisions may propose other offsite mitigation projects, which the Copermittees may approve if they meet the requirements of this subpart.

(d) A Copermittee may choose to implement additional mitigation programs (e.g., pollutant credit system, mitigation fund) as part of the LID waiver program provided that the mitigation program clearly exhibits that it will not allow Priority Development Projects to result in a net impact from pollutant loadings over and above the impact caused by projects meeting LID requirements. Any additional mitigation programs that a Copermittee chooses to implement must be submitted to the San Diego Water Board Executive Officer for review and acceptance prior to implementation.

(8) LID and Treatment Control BMP Standards

(a) As part of the SSMP, each Copermittee must develop and require Priority Development Projects to implement siting, design, and maintenance criteria for each LID and treatment control BMP listed in the SSMP to

determine feasibility and applicability and so that implemented LID and treatment control BMPs are constructed correctly and are effective at pollutant removal, runoff control, and vector minimization. Development of BMP design worksheets which can be used by project proponents is encouraged.

(b) LID and treatment control BMPs implemented at any Priority Development Projects must mitigate (treat through infiltration, settling, filtration or other unit processes) the required volume or flow of runoff from all developed portions of the project, including landscaped areas.

(c) All LID and treatment control BMPs must be located so as to remove pollutants from runoff prior to its discharge to any receiving waters. Multiple Priority Development Projects may use shared post-construction BMPs as long as construction of any shared BMP is completed prior to the use or occupation of any Priority Development Project from which the BMP will receive runoff. Post construction BMPs must not be constructed within a waters of the U.S. or waters of the State.

(9) Implementation Process

(a) As part of its local SSMP, each Copermittee, to the extent of its jurisdiction, must implement a process to verify compliance with SSMP requirements. The process must identify at what point in the planning process Priority Development Projects will be required to meet SSMP requirements and at a minimum, the Priority Development Project must implement the required post-construction BMPs prior to occupancy and/or the intended use of any portion of that project. The process must also include identification of the roles and responsibilities of various municipal departments in implementing the SSMP requirements, as well as any other measures necessary for the implementation of SSMP requirements.

Comment [DB48]:

(b) Each Copermittee, to the extent of its jurisdiction, must establish a mechanism not only to track post-construction BMPs, but also to ensure that appropriate easements and ownerships are properly recorded in public records and the information is conveyed to all appropriate parties when there is a change in project or site ownership.

Comment [DB49]:

(10) Post-construction BMP Review

(a) The Copermittees must review and update the BMPs that are listed in their SSMP as options for treatment control. At a minimum, the update must include removal of obsolete or ineffective BMPs and addition of LID BMPs that can be used for treatment, such as bioretention cells, bioretention swales, etc. The update must also add appropriate LID BMPs to any tables or discussions in the local SSMPs addressing pollutant

removal efficiencies of treatment control BMPs. In addition, the update must include review and revision where necessary of treatment control BMP pollutant removal efficiencies.

(b) The update must incorporate findings from BMP effectiveness studies conducted by the Copermittees for projects funded wholly or in part by the State Water Board or Regional Water Boards.

(c) Each Copermittee must implement a mechanism for annually incorporating findings from local treatment BMP effectiveness studies (e.g., ones conducted by, or on-behalf of, public agencies in Riverside County) into SSMP project reviews and permitting

e. BMP CONSTRUCTION VERIFICATION

Prior to occupancy and/or intended use of any portion of the Priority Development Project subject to SSMP requirements, each Copermittee, to the extent of its jurisdiction, must inspect the constructed site design, source control, and treatment control BMPs applicable to the constructed portion of the project to verify that they have been constructed and are operating in compliance with all specifications, plans, permits, ordinances, and this Order.

Comment [DB50]: See District-specific comments in Attachment 8.

f. BMP MAINTENANCE TRACKING

(1) Inventory of SSMP projects: Each Copermittee must develop and maintain a watershed-based database to track and inventory all projects ~~constructed~~ within their jurisdiction, that have a final approved SSMP (SSMP projects), and its structural post-construction BMPs, ~~within its jurisdiction since July, 2005~~. LID BMPs implemented on a lot by lot basis ~~in low density residential areas~~ at single family residential homes~~,~~ such as rain barrels, are not required to be tracked or inventoried. At a minimum, the database must include information on BMP type(s), location, watershed, date of construction, party responsible for maintenance, dates and findings of maintenance verifications, and corrective actions, including whether the site was referred to the local vector control agency or department.

Comment [CP51]: Per discussions with Board staff on 8/18

Comment [CP52]: Logistical issue for populating a database with BMPs that have as-of-yet not been individually tracked, and a potential legal issues for verifications of those BMPs that were built without requirements for such verifications.

Comment [CP53]: Per discussions with Board staff on 8/18

(2) Each Copermittee must verify that approved post-construction BMPs are operating effectively and have been adequately maintained by implementing the following measures:

(a) The designation of high priority SSMP Projects must consider the following:

(i) BMP size,
(ii) Recommended maintenance frequency,
(iii) Likelihood of operational and maintenance issues,

(iv) Location,
(v) Receiving water quality,
(vi) Compliance record,
(vii) Land use,
(viii) and other pertinent factors;

At a minimum, high priority projects include those projects that ~~generate pollutants (prior to treatment) within the tributary area of a 303(d) listed waterbody impaired for that pollutant; or those projects generating pollutants within the tributary area for~~have been determined to be the source of an observed action level exceedance~~ of that pollutant~~.

Comment [CP54]: See discussion in comment letter

(b) Beginning on July 1, 2012, each Copermittee must implement a program to verify that the required structural post-construction BMPs on the inventoried SSMP projects have been implemented, are maintained, and operating effectively through inspections, self-certifications, surveys, or other equally effective approaches with the following conditions:

(i) The implementation, operation, and maintenance of all (100 percent) approved and inventoried final project public and private SSMPs (a.k.a. WQMPs) must be verified every five years;

(ii) All (100 percent) projects with BMPs that are high priority must be inspected by the Copermittee annually prior to each rainy season;
(iii) All (100 percent) Copermittee projects with BMPs must be inspected by the Copermittee annually;
~~(iv) At least 20 percent of all approved and inventoried SSMP projects must be inspected by the Copermittee annually;~~
~~(v)~~(iv) At the discretion of the Copermittee, its inspections may be coordinated with the facility inspections implemented pursuant to section F.3. of this Order;
~~(vi)~~(v) For verifications performed through a means other than direct Copermittee inspection, adequate documentation must be submitted to the Copermittee to provide assurance that the required maintenance has been completed;
~~(vii)~~(vi) Appropriate follow-up measures (including re-inspections, enforcement, maintenance, etc.) must be conducted to ensure the treatment BMPs continue to reduce storm water pollutants as originally designed; and
~~(viii)~~(vii) Inspections must note observations of vector conditions, such as mosquitoes. Where conditions are identified as contributing to mosquito production, the Copermittee must notify its local vector control agency.

Comment [CP55]: Per discussions with Board staff on 8/18

g. ENFORCEMENT OF DEVELOPMENT SITES

Each Copermittee must, to the extent of its jurisdiction, enforce its storm water ordinance for all development projects as necessary to maintain compliance with this Order. Copermittee ordinances or other regulatory mechanisms must include appropriate sanctions to achieve compliance. Sanctions must include the following tools or their equivalent: Non-monetary penalties, fines, bonding requirements, liens, and/or permit or occupancy denials for non-compliance.

Comment [CP56]: See District-specific comments in Attachment 8

h. HYDROMODIFICATION – LIMITATIONS ON INCREASES OF RUNOFF DISCHARGE RATES AND DURATIONS[14]

Each Copermittee shall collaborate with the other Copermittees to develop and implement a Hydromodification Management Plan (HMP) to manage increases in runoff discharge rates and durations from all Priority Development Projects. The HMP must be incorporated into the SSMP and implemented by each Copermittee so that estimated post-project runoff discharge rates and durations must not exceed pre-development discharge rates and durations. Where the proposed project is located on an already developed site, the pre-project discharge rate and duration must be that of the pre-~~developed, naturally occurring~~project condition. The draft HMP must be submitted to the San Diego Water Board on or before June 30, ~~2013~~2014. The HMP will be made available for public review and comment and the San Diego Water Board Executive Officer will determine whether to hold a public hearing before the full San Diego Water Board or whether public input will be through written comments to the Executive Officer only.

Comment [CP57]: It is not appropriate to require a single property owner to mitigate the effects caused by previous owners of that land. The current property owners can only be held responsible for their own actions.

(1) The HMP must:

(a) Identify a method for assessing susceptibility and geomorphic stability of channel segments which receive runoff discharges from Priority Development Projects. A performance standard must be established that ensures that the geomorphic stability within the channel will not be compromised as a result of receiving runoff discharges from Priority Development Projects.

(b) Identify a range of runoff flows[15] based on continuous simulation of the entire rainfall record (or other analytical method proposed by the

[14] Updated SSMP and hydromodification requirements must apply to all Priority Development Projects or phases of Priority Development Projects which have not yet begun grading or construction activities at the time any updated SSMP or hydromodification requirement commences. If a Copermittee determines that lawful prior approval of a project exists, whereby application of an updated SSMP or hydromodification requirement to the project is legally infeasible, the updated SSMP or hydromodification requirement need not apply to the project. The Copermittees must utilize the SSMP and hydromodification update periods to ensure that projects undergoing approval processes include application of the updated SSMP and hydromodification requirements in its plans.

[15] The identified range of run off flows to be controlled should be expressed in terms of peak flow rates of rainfall events, such as "10% of the pre-development 2-year runoff event up to the pre-development 10-year runoff event."

Copermittees and deemed acceptable by the San Diego Water Board) for which Priority Development Project post-project runoff flow rates and durations must not exceed pre-development ~~(naturally occurring)~~ runoff flow rates and durations by more than 10 percent, where the increased flow rates and durations will result in increased potential for erosion or other significant adverse impacts to beneficial uses. The lower boundary of the range of runoff flows identified must correspond with the critical channel flow that produces the critical shear stress that initiates channel bed movement or that erodes the toe of channel banks. The identified range of runoff flows may be different for specific watersheds, channels, or channel reaches. In the case of an artificially hardened (concrete lined, rip rap, etc.) channel, the lower boundary of the range of runoff flows identified must correspond with the critical channel flow that produces the critical shear stress that initiates channel bed movement or that erodes the toe of channel banks of a comparable natural channel (i.e. non-hardened, pre-development).

(c) Identify a method to assess and compensate for the loss of sediment supply to streams due to development. A performance and/or design standard must be created and required to be met by Priority Development Projects to ensure that the loss of sediment supply due to development does not cause or contribute to increased erosion within channel segments downstream of Priority Development Project discharge points.

(d) Designate and require Priority Development Projects to implement control measures so that (1) post-project runoff flow rates and durations do not exceed pre-development ~~(naturally occurring)~~ runoff flow rates and durations by more than 10 percent for the range of runoff flows identified under section F.1.h.(1)(b), where the increased flow rates and durations will result in increased potential for erosion or other significant adverse impacts to beneficial uses; (2) post-project runoff flow rates and durations do not result in channel conditions which do not meet the channel standard developed under section F.1.h.(1)(a) for channel segments downstream of Priority Development Project discharge points; and (3) the design of the project and/or control measures ~~compensate for~~minimize the loss of sediment supply due to development.

(e) Include a protocol to evaluate potential hydrograph change impacts to downstream watercourses from Priority Development Projects to meet the range of runoff flows identified under Section F.1.h.(1)(b).

(f) Include other performance criteria (numeric or otherwise) for Priority Development Projects as necessary to prevent runoff from the projects from increasing and/or continuing unnatural rates of erosion of channel beds and banks, silt pollutants generation, or other impacts to beneficial uses and stream habitat due to increased erosive force.

(g) Include a review of pertinent literature.

~~(h) Identify areas within the Santa Margarita Hydrologic Unit for potential opportunities to restore or rehabilitate stream channels with historic hydromodification of receiving waters that are tributary to documented low or very low Index of Biotic Integrity (IBI) scores.~~

Comment [CP58]: This is not a necessary component of the HMP and unnecessarily increases costs.

~~(i)~~(h) Include a description of how the Copermittees will incorporate the HMP requirements into their local approval processes.

~~(j)~~(i) Include criteria on selection and design of management practices and measures (such as detention, retention, and infiltration) to control flow rates and durations and address potential hydromodification impacts.

~~(k)~~(j) Include technical information, including references, supporting any standards and criteria proposed.

~~(l)~~(k) Include a description of inspections and maintenance to be conducted for management practices and measures to control flow rates and durations and address potential hydromodification impacts.

~~(m)~~(l) Include a description of monitoring and other program evaluations to be conducted to assess the effectiveness of implementation of the HMP. Monitoring and other program evaluations must include an evaluation of changes to physical (e.g., cross-section, slope, discharge rate, vegetation, pervious/impervious area) and biological (e.g., habitat quality, benthic flora and fauna, IBI scores) conditions of receiving water channels as areas with Priority Development Projects are constructed (i.e. pre- and post-project), as appropriate.

~~(n)~~(m) Include mechanisms for assessing and addressing cumulative impacts of Priority Development Projects within a watershed on channel morphology.

(2) In addition to the control measures that must be implemented by Priority Development Projects per section F.1.h.(1)(d), the HMP must include a suite of management measures ~~to~~ that can be be used on Priority Development Projects to mitigate hydromodification impacts, protect and restore downstream beneficial uses and prevent or further prevent adverse physical changes to downstream channels. The measures must be based on a prioritized consideration of the following elements in this order:

Comment [CP59]: Per discussions with Board staff on 8/18

(a) Site design control measures;
(b) On-site management measures;
(c) Regional control measures located upstream of receiving waters; and

(d) In-stream management and control measures.

Where stream channels are adjacent to, or are to be modified as part of a Priority Development Project, management measures must include buffer zones and setbacks. The suite of management measures must also include stream restoration as a viable option to achieve the channel standard in section F.1.h.(1)(a). Whenever feasible, In-stream controls that are implemented by a PDP to mitigate that project's impact on hydromodification ~~used as management measures to protect and restore downstream beneficial uses and for preventing or minimizing further adverse physical changes~~ must not include the use of non-naturally occurring hardscape materials such as concrete, riprap, gabions, etc. to reinforce stream channels.

(3) As part of the HMP, the Copermittees may develop a waiver program that allows a redevelopment Priority Development Project, as defined in Section F.1.d.(1)(b), to implement offsite mitigation measures. A waiver may be granted if onsite management and control measures are technically infeasible to fully achieve post-project runoff flow rates and durations that do not exceed the pre-development (naturally occurring) runoff flow rates and durations. Redevelopment projects that are granted a waiver under the program must not have post-project runoff flow rates and durations that exceed the pre-project runoff flow rates and durations. The estimated incremental hydromodification impacts from not achieving the pre-development (naturally occurring) runoff flow rates and durations for the project site must be fully mitigated. The offsite mitigation must be within the same stream channel system to which the project discharges. Mitigation projects not within the same stream channel system but within the same hydrologic unit may be approved provided that the project proponent demonstrates that mitigation within the same stream channel is infeasible and that the mitigation project will address similar impacts as expected from the project.

(4) Each individual Copermittee has the discretion to not require Section F.1.h. at Priority Development Projects where the project:

(a) Discharges storm water runoff into underground storm drains discharging directly to water storage reservoirs and lakes;
(b) Discharges storm water runoff into conveyance channels whose bed and bank are concrete lined all the way from the point of discharge to water storage reservoirs and lakes; or
(c) Discharges storm water runoff into other areas identified in the HMP as acceptable to not need to meet the requirements of Section F.1.h ~~by the San Diego Water Board Executive Officer~~.

(5) HMP Reporting and Implementation

Comment [CP60]: Per discussions with Board staff on 8/18

Additionally, "wherever feasible" is an appropriate addition to this language for three reasons:

1)Based on the prioritization already identified in this section, instream controls will be a 'last resort'
2)If a project were to need to mitigate in-stream, preventing any man made materials would unnecessarily eliminate potentially viable solutions, even to the extent of eliminating options that would rehabilitate stream functions and uses.
3)The Water Board will still have oversight of the final in-stream plans through the 401 certifications, which will allow the Board to additionally ensure that such instream controls to not adversely affect the stream.

Comment [CP61]: Per discussions with Board staff on 8/18

Comment [CP62]: This is not needed and makes the language confusing. The HMP must be approved by the board anyway. See legal comment white paper.

(a) On or before June 30 , 2013, the Copermittees must submit to the San Diego Water Board a draft HMP that has been reviewed by the public, including the identification of the appropriate limiting range of flow rates per section F.1.h.(1)(b).

(b) Within 180 days of receiving San Diego Water Board comments on the draft HMP, the Copermittees must submit a final HMP that addressed the San Diego Water Board's comments.

(c) Within 90 days of receiving a determination of adequacy from the San Diego Water Board issued at a noticed public hearing, each Copermittee must incorporate and implement the HMP for all Priority Development Projects.

~~(d) Prior to acceptance of the HMP by the San Diego Water Board, the early implementation measures likely to be included in the HMP must be encouraged by the Copermittees.~~

Comment [CP63]: As seen in the San Diego HMP process, things can change after submitting it to the Board for approval. This requirement will create problems where a project implements the early measures, and such early measures may conflict with the final requirements, thereby forcing the project to re-design.

(6) Interim Hydromodification Criteria

Immediately following adoption of this Order and until the final HMP required by this Order has been determined by the San Diego Water Board to be adequate, each Copermittee must ensure that all Priority Development Projects are implementing the hydromodification (aka Hydrologic Condition of Concern) requirements found in Section 4.4 of the 2006 Riverside County WQMP (updated in 2009) unless one of the following conditions in lieu of those specified in the WQMP are met:

(a) Runoff from the Priority Development Project discharges (1) directly to a conveyance channel or storm drain that is concrete lined all the way from the point of discharge to the ocean, bay, lagoon, water storage reservoir or ~~lake~~Murrieta or Temecula creeks; and (2) the discharge is in full compliance with Copermittee requirements for connections and discharges to the MS4 (including both quality and quantity requirements); and (3) the discharge will not cause increased upstream or downstream erosion or adversely impact downstream habitat; and (4) the discharge is authorized by the Copermittee.

Comment [CP64]: All the way to the ocean is unreasonable and unnecessary. In the interim, very few projects are expected within the watershed, and the cumulative effects of such few projects is negligible.

(b) The Priority Development Project disturbs less than one acre. The Copermittee has the discretion to require a project specific WQMP to address hydrologic condition concerns on projects less than one acre on a case by case basis. The disturbed area calculation should include all disturbances associated with larger common plans of development.

(c) The runoff flow rate, volume, velocity, and duration for the post-

development condition of the Priority Development Project do not exceed the pre-development (i.e. naturally occurring) condition for the 2-year, 24-hour and 10-year, 24-hour rainfall events. This condition must be substantiated by hydrologic modeling acceptable to the Copermittee.

Once a final HMP is determined to be adequate and is required to be implemented, compliance with the final HMP is required by this Order and compliance with the 2004 WQMP (updated in 2009) or the in-lieu interim hydromodification criteria set forth above no longer satisfies the requirements of this Order.

(7) No part of section F.1.h eliminates the Copermittees' responsibilities for implementing the Low Impact Development requirements under section F.1.d.(4).

i. UNPAVED ROADS DEVELOPMENT

The Copermittees must develop, where they do not already exist, and implement or require implementation of erosion and sediment control BMPs after construction of new unpaved roads that are within their legal authority to regulate. At a minimum, the BMPs must include:

(1) Practices to minimize road related erosion and sediment transport;
~~(2) Grading of unpaved roads to slope outward where consistent with road engineering safety standards;~~
~~(3) Installation of water bars as appropriate;~~
~~(4)~~(2)Unpaved roads and culvert designs that ~~do not~~minimize impacts to creek functions and where applicable, that maintain migratory fish passage;

Comment [CP65]: Pursuant to the comment letter:

THE COPERMITTEES REQUEST THIS SECTION BE DELETED IN ITS ENTIRETY.

See the comment letter, attachment 5, for further discussion of the issues and justification for this request.

Should the board decide to include such requirements despite the request and justifications provided in the comment letter, the edits shown below are the minimum changes that should be made.

Comment [CP66]: These are specifying the method of compliance.

2. CONSTRUCTION COMPONENT

Each Copermittee must implement a construction program as applicable to its jurisdiction, which meets the requirements of this section, and is designed to prevent~~s~~ illicit discharges into the MS4, implement~~s~~ and maintain~~s~~ structural and non-structural BMPs to reduce pollutants in storm water runoff from construction sites to the MS4, reduce~~s~~ construction site discharges of storm water pollutants from the MS4 to the MEP, and prevent~~s~~ construction site discharges from the MS4 from causing or contributing to a violation of water quality standards.

Comment [DB67]: See general comment 1 in Attachment 7

a. ORDINANCE UPDATE

By July 1, 2012, each Copermittee (except the District) must review and update its grading ordinances and other ordinances as necessary to comply with the

Comment [CP68]: See District Legal Comments in Attachment 8

requirements of ~~achieve full compliance with~~ this Order~~, including requirements for the implementation of all designated BMPs and other measures.~~

Comment [DB69]: See legal comments in Attachment 7

b. SOURCE IDENTIFICATION

Each Copermittee must maintain an updated watershed-based inventory of all construction sites within its jurisdiction. The use of an automated database system, such as Geographical Information Systems (GIS) is strongly encouraged.

c. SITE PLANNING AND PROJECT APPROVAL PROCESS

Each Copermittee must incorporate consideration of potential water quality impacts prior to approval and issuance of construction and grading permits.

(1) Each construction and grading permit must require proposed construction sites to implement designated BMPs and other measures so that illicit discharges into the MS4 are prevented, storm water pollutants discharged from the site will be reduced to the MEP, and construction discharges from the MS4 are prevented from causing or contributing to a violation of water quality standards.

(2) Prior to permit issuance, the project proponent's runoff management plan (or equivalent construction BMP plan) must be required to comply~~, and reviewed to verify compliance~~ with the local grading ordinance, other applicable local ordinances, and this Order.

Comment [CP70]: Specifying method of compliance

(3) Prior to permit issuance, each Copermittee must verify that project proponents subject to California's statewide General NPDES Permit for Storm Water Discharges Associated With Construction Activities, (hereinafter General Construction Permit), have existing coverage under the General Construction Permit.

d. BMP IMPLEMENTATION

(1) Designate BMPs: Each Copermittee must designate a minimum set of BMPs and other measures to be implemented at all construction sites within their jurisdiction. The designated minimum set of BMPs must include:

(a) Management Measures:

(i) Pollution prevention, where appropriate;

(ii) ~~Development and~~ implementation of a runoff management plan;

Comment [CP71]: Conflicts with the 'off-the-shelf' approach that may be appropriate for some sites. This issue was discussed with staff.

(iii) Minimization of areas that are cleared and graded to only the portion of the site that is necessary for construction;
(iv) Minimization of exposure time of disturbed soil areas;
(v) Minimization of grading during the rainy season and correlation of grading with seasonal dry weather periods to the extent feasible;
(vi) Limitation of grading to a maximum disturbed area as determined by each Copermittee before either temporary or permanent erosion controls are implemented to prevent storm water pollution. The Copermittee has the option of temporarily increasing the size of disturbed soil areas by a set amount beyond the maximum, if the individual site is in compliance with applicable storm water regulations and the site has adequate control practices implemented to prevent storm water pollution;
(vii) Temporary stabilization and reseeding of disturbed soil areas as rapidly as feasible;
(viii) Wind erosion controls;
(ix) Tracking controls;
(x) Non-stormwater management measures to prevent illicit discharges and control storm water pollution sources;
(xi) Waste management measures;
(xii) Preservation of natural hydrologic features where feasible;
(xiii) Preservation of riparian buffers and corridors where feasible;
(xiv) Evaluation and maintenance of all BMPs, until removed; and
(xv) Retention, reduction, and proper management of all storm water pollutant discharges on site to the MEP standard.

(b) Erosion and Sediment Controls:

(i) Erosion prevention. Erosion prevention is to be used as the most important measure for keeping sediment on site during construction;
(ii) Sediment controls. Sediment controls are to be used as a supplement to erosion prevention for keeping sediment on-site during construction;
(iii) Slope stabilization must be used on all active slopes during rain events regardless of the season and on all inactive slopes during the rainy season and during rain events in the dry season;
(iv) Permanent revegetation or landscaping as early as feasible; and
(v) Erosion and sediment controls must be required during the construction of unpaved roads.

(2) Each Copermittee must implement, or require implementation of,

enhanced[16] measures to address the threat to water quality posed by all construction sites tributary to CWA section 303(d) water body segments impaired for sediment or turbidity. Each Copermittee must also implement, or require implementation of, enhanced, measures for construction sites within, or adjacent to, or discharging directly to receiving waters within environmentally sensitive areas (as defined in Attachment C of this Order).

~~(3) Active/Passive Sediment Treatment (AST): Each Copermittee must require implementation of AST for sediment at construction sites (or portions thereof) that are determined by the Copermittee to be an exceptional threat to water quality. In evaluating the threat to water quality, the following factors must be considered by the Copermittee:~~

Comment [CP72]: Specifying method of compliance, in violation of CWC 13360.

~~(a) Soil erosion potential or soil type;~~
~~(b) The site's slopes;~~
~~(c) Project size and type;~~
~~(d) Sensitivity of receiving water bodies;~~
~~(e) Proximity to receiving water bodies;~~
~~(f) Non-storm water discharges;~~
~~(g) Ineffectiveness of other BMPs;~~
~~(h) Proximity and sensitivity of aquatic threatened and endangered species of concern;~~
~~(i) Known effects of AST chemicals; and~~
~~(j) Any other relevant factors.~~

~~(4)~~(3) Implement BMPs: Each Copermittee must implement, or require the implementation of, the designated minimum BMPs and any additional measures necessary to comply with this Order at each construction site within its jurisdiction year round. BMP implementation requirements, however, can vary based on wet and dry seasons. Dry season BMP implementation must plan for and address unseasonal rain events that may occur during the dry season (May 1 through September 30).

e. Inspection of Construction Sites

Each Copermittee must conduct construction site inspections for compliance with its ordinances (grading, storm water, etc.), permits (construction, grading, etc.), and this Order. Priorities for inspecting sites must consider the nature and size of the construction activity, topography, and the characteristics of soils and receiving water quality.

[16] Enhanced BMPs are control actions specifically targeted to the pollutant or condition of concern and should be of higher quality and effectiveness than the minimum control measures otherwise required. ~~Enhanced in this Order means better, not simply more, BMPs.~~

(1) During the rainy season, each Copermittee must inspect at least ~~every two weeks~~monthly, all construction sites within its jurisdiction meeting any of the following criteria:

(a) All sites ~~30~~ 50 acres or more in size with rough grading or with active, unstabilized slopes occurring during the rainy season;

(b) All sites one acre or more, and within the same hydrologic subarea and tributary to a CWA section 303(d) water body segment impaired for sediment; or within, directly adjacent to, or discharging directly to a receiving water within an ESA; and

(c) Other sites determined by the Copermittees or the San Diego Water Board as a significant threat to water quality. In evaluating threat to water quality, the following factors must be considered: (1) soil erosion potential; (2) site slope; (3) project size and type; (4) sensitivity of receiving water bodies; (5) proximity to receiving water bodies; (6) non-storm water discharges; (7) known past record of non-compliance by the operators of the construction site; and (8) any other relevant factors.

(2) During the rainy season, each Copermittee must inspect at least ~~monthly~~twice during the wet season, all construction sites with one acre or more of soil disturbance not meeting the criteria specified above in section F.2.e.(1).

(3) During the rainy season, each Copermittee must inspect construction sites less than one acre in size as needed to ensure compliance with its ordinances and this Order.

(4) Each Copermittee must inspect all construction sites as needed during the dry season. Sites meeting the criteria in section F.2.e.(1) must be inspected at least once in August or September each year.

(5) Re-inspections: Based upon site inspection findings, each Copermittee must implement all follow-up actions (i.e., re-inspection, enforcement) necessary to comply with this Order. Reinspection frequencies must be determined by each Copermittee based upon the severity of deficiencies, the nature of the construction activity, and the characteristics of soils and receiving water quality.

(6) Inspections of construction sites must include, but not be limited to:

(a) Check for coverage under the General Construction Permit (Notice of Intent (NOI) and/or Waste Discharge Identification No.) during initial

Comment [CP73]: This section is setting the minimum frequencies, and as such should provide flexibility to inspect more frequently those sites that warrant additional focus / follow-up. The changes shown to F.2.e.(1) and (2) are to provide such flexibility.
Additionally these frequencies are consistent with Riverside County's Santa Ana MS4 permit – which promotes consistency within the areas serviced by the County.

Comment [CP74]: See comment above

inspections;

(b) Assessment of compliance with Copermittee ordinances and permits related to runoff, including the implementation and maintenance of designated minimum BMPs;

(c) Assessment of BMP effectiveness;

(d) Visual observations for non-storm water discharges, potential illicit connections, and potential discharge of pollutants in storm water runoff;

(e) ~~Review of site monitoring data results, if the site monitors its runoff~~

(f) Education and outreach on storm water pollution prevention, as needed; and

(g) Creation of a written or electronic inspection report.

(7) The Copermittees must track the number of inspections for each inventoried construction site throughout the reporting period to verify that each site is inspected at the minimum frequencies required.

Comment [CP75]: This is a new and inappropriate requirement. Monitoring data is only required under the Statewide General Construction Permit, which is the Regional Board's responsibility to inspect and review.

Copermittee review of data which falls under the regional board's responsibility should be optional.

f. Enforcement of Construction Sites

(1) Each Copermittee must develop and implement an escalating enforcement process that achieves prompt corrective actions at construction sites within their jurisdiction, for violations of the Copermittee's water quality protection permits, requirements, and ordinances. This enforcement process must include authorizing the Copermittee's construction site inspectors to take immediate enforcement actions when appropriate and necessary. The enforcement process must include appropriate sanctions such as stop work orders, non-monetary penalties, fines, bonding requirements, and/or permit denials for non-compliance.

(2) Each Copermittee must be able to respond to construction complaints received from third-parties and to ensure the San Diego Water Board that corrective actions have been implemented, if warranted.

g. Reporting of Non-compliant Sites

(1) In addition to the notification requirements in Attachment B, each Copermittee must notify the San Diego Water Board when the Copermittee issues high level enforcement (as defined in the Copermittee's JRMP) to a construction site that poses a significant threat to water quality in its jurisdiction as a result of violations of its storm water ordinances.

(2) Each Copermittee must annually notify the San Diego Water Board, prior to the commencement of the rainy season, of all construction sites with alleged

violations that pose a significant threat to water quality. Information may be provided as part of the JRMP annual report if submitted prior to the rainy season. Information provided must include, but not be limited to, the following:

(a) WDID number if enrolled under the General Construction Permit
(b) Site Location, including address
(c) Current violations or suspected violations

3. EXISTING DEVELOPMENT COMPONENT

a. MUNICIPAL

Each Copermittee must implement a municipal program for the Copermittee's areas and activities that meets the requirements of this section, and is designed to prevent~~s~~ illicit discharges into the MS4, reduce~~s~~ municipal discharges of storm water pollutants from the MS4 to the MEP, and prevent~~s~~ municipal discharges from the MS4 from causing or contributing to a violation of water quality standards.

Comment [DB76]: See general comment 1 in Attachment 7

(1) Source Identification / Inventory

Each Copermittee must maintain an updated watershed-based inventory of all its municipal areas and those activities that have the potential to generate and discharge pollutants. The inventory must include the name, address (if applicable), and a description of the area/activity; which pollutants are potentially generated by the area/activity; whether the area/activity is adjacent to an ESA; and identification of whether the area/activity is tributary to and within the same hydrologic sub area as a CWA section 303(d) water body segment and generates pollutants for which the water body segment is impaired. Linear facilities, such as roads, streets, and highways, do not need to be individually inventoried. The use of an automated database system, such as Geographical Information Systems (GIS) is highly recommended.

Comment [CP77]: Sites that do not have the potential to discharge pollutants, cannot affect discharges from the MS4.

Comment [CP78]: Per discussions with Board staff on 8/18

(2) General BMP Implementation

(a) Pollution Prevention: Each Copermittee must implement pollution prevention methods in its municipal program and must require their use by appropriate departments, personnel, and contractors.

(b) Designate Minimum BMPs: Each Copermittee must designate a minimum set of BMPs for all municipal areas and those activities that have the potential to generate and discharge pollutants. The designated minimum

Comment [CP79]: See comment above

BMPs for municipal areas and activities must be area or activity specific as appropriate.

(c) Each Copermittee must designate BMPs for special events that are expected to generate significant trash and litter. Controls to consider must include:

(i) Temporary screens on catch basins and storm drain inlets;
(ii) Temporary fencing to prevent windblown trash from entering adjacent water bodies and MS4 channels;
(iii) Proper management of trash and litter;
(iv) Catch basin cleaning following the special event and prior to an anticipated rain event;
(v) Street sweeping of roads, streets, highways and parking facilities following the special event; and
(vi) Other equivalent controls.

(d) Designate BMPs for ESAs and 303(d) Impairments: Each Copermittee must designate enhanced measures for its municipal areas and activities tributary to and within the same hydrologic sub area as a CWA section 303(d) impaired water body segments when an area or those activities have the potential to generate pollutants for which the water body segment is impaired. Each Copermittee must also designate additional controls for its municipal areas and activities within or directly adjacent to or discharging directly to receiving waters within environmentally sensitive areas (as defined in Attachment C of this Order).

Comment [CP80]: Per discussions with Board staff on 8/18

(e) Implement BMPs: Each Copermittee must implement, or require the implementation of, the designated minimum and enhanced BMPs and any additional measures necessary based on its inventory to comply with this Order for each of its municipal area and those activities that have the potential to discharge pollution.

(3) BMP Implementation for Management of Pesticides, Herbicides, and Fertilizers

Each Copermittee must implement BMPs to reduce the contribution of storm water pollutants to the MEP associated with the application, storage, and disposal of pesticides, herbicides and fertilizers from its municipal areas and activities from its MS4~~to MS4s and receiving waters~~. Such BMPs must include, at a minimum:

Comment [DB81]: The Copermittees are required to reduce pollutants in discharges from the MS4. See legal comments in Attachment 7

(a) Educational activities, permits, certifications and other measures for municipal applicators and distributors;
(b) Integrated Pest Management (IPM) measures that ~~rely on~~ emphasize non-chemical solutions;

Comment [CP82]: There are cases where pesticides may be necessary due to health concerns (rodent infestations, etc) The concept of IPM does not preclude the use of chemical solutions where such solutions are needed or appropriate.

(c) ~~The use of native vegetation~~;
(d) Schedules for irrigation and chemical application; and
(e) The collection and proper disposal of unused pesticides, herbicides, and fertilizers.

(4) BMP implementation for Flood Control Structures

(a) Each Copermittee must implement procedures to assure that flood management projects assess the impacts on the water quality of receiving water bodies.
(b) Each Copermittee must include water quality protection measures, where feasible, when retrofitting existing flood control structural devices.
(c) Each Copermittee must evaluate its existing flood control structures ~~as part of ongoing routine maintenance~~, identify structures causing or contributing to a condition of pollution, ~~implement~~identify measures to reduce or eliminate the structure's effect on pollution, and evaluate the feasibility of retrofitting the structural flood control device. The inventory and evaluation must be completed by and submitted to the San Diego Water Board in ~~each~~ the 2nd year (i.e. FY 2012/2013) JRMP Annual Report.

(5) ~~BMP Implementation for Sweeping of Municipal Areas~~

~~Where municipal area sweeping is implemented as an MS4 BMP for municipal roads, streets, highways, and parking facilities, each Copermittee must design and implement the program based on the following criteria:~~

~~(a) Roads, streets, highways, and parking facilities identified as consistently generating the highest volumes of trash and/or debris must be swept at least two times per month.~~

~~(b) Roads, streets, highways, and parking facilities identified as consistently generating moderate volumes of trash and/or debris must be swept at least monthly.~~

~~(c) Roads, streets, highways, and parking facilities identified as generating low volumes of trash and/or debris must be swept as necessary, but no less than once per year.~~

(6) Operation and Maintenance of Municipal Separate Storm Sewer System (MS4) and Treatment Controls

(a) Treatment Controls: Each Copermittee must implement a schedule of inspection and maintenance activities to verify proper operation of all its municipal structural treatment controls designed to reduce storm water pollutant discharges to or from its MS4s and related drainage structures.

Comment [CP83]: This is clearly overly specifying method of compliance, and is illegal pursuant to CWC 13360.

Comment [CP84]: This is not required by the federal regulations as an ongoing permit requirement.

Accordingly, the Copermittees, request deletion of the section.

Should the board decide not to remove the section, at a minimum, the language should be restored to not require anything more than the O.C. Permit.

Comment [CP85]: These are new requirements that are not necessary, and were not included in the draft OC Permit.

Further it is overly specific in forcing the Copermittees to identify high/moderate/ and low (trash) volume streets. Such specificity is not necessary.

(b) MS4 ~~and Facilities~~: Each Copermittee must implement a schedule of maintenance activities for its MS4 ~~and facilities (including but not limited to catch basins, storm drain inlets, detention basins, etc).~~ . The maintenance activities must, at a minimum, include:

(i) Inspection and removal of accumulated waste at least once a year between May 1 and September 30 of each year for all ~~MS4 facilities~~catch basins and storm drain inlets, with~~;~~ Additional ~~facilities~~ cleaning as necessary between October 1 and April 30 of each year;
(ii) Following two years of inspections, any MS4 ~~facility~~ that requires inspection and cleaning less than annually may be inspected as needed, but not less than every other year;
(iii) Open channels and basins must be cleaned of observed anthropogenic litter in a timely manner;
(iv) Maintenance activities within open channels must not adversely impact beneficial uses within those channels;
(v) Record keeping of the maintenance and cleaning activities including the overall quantity of waste removed;
(vi) Proper disposal of waste removed pursuant to applicable laws; and
(vii) Measures to eliminate waste discharges during MS4 maintenance and cleaning activities.

(7) Infiltration From Sanitary Sewer to MS4/ Provide ~~Preventive~~ Maintenance

(8) Each Copermittee must implement controls and measures to prevent and eliminate infiltration of seepage from sanitary sewers to MS4s ~~through thorough, routine preventive maintenance of the MS4~~. Each Copermittee that operates both a municipal sanitary sewer system and a MS4 must implement controls and measures to prevent and eliminate infiltration of seepage from the sanitary sewers to the MS4s that must include overall sanitary sewer and MS4 surveys and thorough, routine preventive maintenance of both.

(a) Each Copermittee must implement controls to limit infiltration of seepage from sanitary sewers to municipal separate storm sewer systems where necessary. Such controls must include:

(i) Adequate plan checking for construction and new development;
(ii) Incident response training for its municipal employees that identify sanitary sewer spills;
(iii) Code enforcement inspections;
(iv) MS4 maintenance and inspections;
(v) Interagency coordination with sewer agencies; and

Comment [CP86]: The term 'facilities' is confusing and unnecessary.

Request use of the language from the 2004 MS4 permit as shown in these redlines (though (b)(ii)). This is much clearer and simple to comply with.

Comment [CP87]: Although the shown redlines will be much clearer, should board staff reject such changes, at a minimum the word 'detention basins' should be removed as it would otherwise conflict with subpart (iii)below.

Comment [CP88]: The MS4 Copermittees that do not own nor operate a sewer system cannot prevent seepage by maintaining their MS4.

(vi) Proper education of its municipal staff and contractors conducting field operations on the MS4 or its municipal sanitary sewer (if applicable).

(9) Inspection of Municipal Areas and Activities

(a) At a minimum, each Copermittee must inspect their following high priority municipal areas and activities annually:

(i) Roads, Streets, Highways, and Parking Facilities;
(ii) Flood Management Projects and Flood Control Devices not otherwise inspected per Section F.3.a.(6)(b);
(iii) Areas and activities tributary to and within the same hydrologic sub area as a CWA section 303(d) impaired water body segment, where an area or activity ~~generates~~ has the potential to discharge pollutants[17] for which the water body segment is impaired.
(iv) Areas and activities within or adjacent to or discharging directly to receiving waters within environmentally sensitive areas (as defined in Attachment C of this Order);
(v) Municipal Facilities:
[a] Active or closed municipal landfills;
[b] Publicly owned treatment works (including water and wastewater treatment plants) and sanitary sewage collection systems;
[c] Solid waste transfer facilities;
[d] Land application sites;
[e] Corporate yards including maintenance and storage yards for materials, waste, equipment and vehicles; and
[f] Household hazardous waste collection facilities.
(vi) Municipal airfields;
(vii) Parks and recreation facilities;
(viii) Special event venues following special events (festivals, sporting events, etc.);
(ix) Power washing activities; and
(x) Other municipal areas and activities that the Copermittee determines may contribute a significant pollutant load to the MS4.

(b) Other municipal areas and activities must be inspected as needed and in response to water quality data, valid public complaints, and findings from municipal or contract staff.

(c) Based upon site inspection findings, each Copermittee must implement all follow-up actions necessary to comply with this Order.

[17] A project is considered to have the potential to discharge a pollutant if it does not have LID or treatment controls BMPs in place that treat the design capture volume for the areas of the site generating that pollutant.

Comment [CP89]: Per discussions with Board staff on 8/18

Comment [CP90]: See footnote explaining this change. The idea is that if a project has LID or Treatment Control BMPs in place – it should no longer be a mandatory high-priority site for municipal inspection purposes. It would then be subject to the requirements of Section F.1.f.

(10) Enforcement of Municipal Areas and Activities

Each Copermittee must enforce its storm water ordinance for all its municipal areas and activities as necessary to maintain compliance with this Order.

(11) Copermittee Maintained Unpaved Roads Maintenance

(a) The Copermittees must develop, where they do not already exist, and implement or require implementation of BMPs for erosion and sediment control measures during their maintenance activities on unpaved roads, ~~particularly~~ in or adjacent to receiving waters.

(b) The Copermittees must develop and implement or require implementation of appropriate BMPs to minimize impacts on streams and wetlands during their unpaved road maintenance activities.

(c) ~~The Copermittees must regularly maintain their unpaved roads adjacent to streams and riparian habitat to reduce erosion and sediment transport~~;

(d) ~~Re-grading of unpaved roads during maintenance must be sloped outward where consistent with road engineering safety standards~~;

(e) Through their ~~regular~~ maintenance of unpaved roads, the Copermittees must examine the feasibility of replacing existing culverts or design of new culverts or bridge crossings to reduce erosion and maintain natural stream geomorphology.

Comment [CP91]: Pursuant to the comment letter:

THE COPERMITTEES REQUEST THIS SECTION BE DELETED IN ITS ENTIRETY.

See the comment letter, attachment 5, for further discussion of the issues and justification for this request.

Should the board decide to include such requirements despite the request and justifications provided in the comment letter, the edits shown below are the minimum changes that should be made.

Comment [CP92]: Regular maintenance of unpaved roads may have unintended negative effects by virtue of further loosening soil to maintain the roads. This requirement should be removed, or revised to only be required where necessary to resolve significant problems impacting streams and riparian habitat.

Comment [CP93]: Specifying method of compliance

b. COMMERCIAL / INDUSTRIAL

Each Copermittee (except the District) must implement a commercial / industrial program that meets the requirements of this section for facilities whose operation is under its jurisdiction, and is designed to prevent~~s~~ illicit discharges into the MS4, reduce~~s~~ commercial / industrial discharges of storm water pollutants from the MS4 to the MEP, and prevent~~s~~ commercial / industrial discharges from the MS4 from causing or contributing to a violation of water quality standards.

Comment [CP94]: See District-specific Legal comments

Comment [DB95]: See general comment 1 in Attachment 7

(1) Source Identification

(a) Each Copermittee must maintain an updated watershed-based inventory of all industrial and commercial sites/sources within its jurisdiction (regardless of ownership) that could contribute a significant pollutant load to the MS4. The inventory must include the following minimum information for each industrial and commercial site/source: name; address; pollutants potentially generated by the site/source; and

identification of whether the site/source is tributary to a CWA §303(d) water body segment and generates pollutants for which the water body segment is impaired; and a narrative description including SIC codes which best reflects the principal products or services provided by each facility.

At a minimum, the following sites/sources must be included in the inventory:

(i) Commercial Sites/Sources:

[a] Automobile repair, maintenance, fueling, or cleaning;
[b] Airplane repair, maintenance, fueling, or cleaning;
[c] Boat repair, maintenance, fueling, or cleaning;
[d] Equipment repair, maintenance, fueling, or cleaning;
[e] Automobile and other vehicle body repair or painting;
[f] Mobile automobile or other vehicle washing;
[g] Automobile (or other vehicle) parking lots and storage facilities;
[h] Retail or wholesale fueling;
[i] Pest control services;
[j] Eating or drinking establishments, including such retail establishments with food markets;
[k] Mobile carpet, drape or furniture cleaning;
[l] Cement mixing or cutting;
[m] Masonry;
[n] Painting and coating;
[o] Botanical or zoological gardens and exhibits;
[p] Landscaping;
[q] Nurseries and greenhouses;
[r] Golf courses, parks and other recreational areas/facilities;
[s] Cemeteries;
[t] Pool and fountain cleaning;
[u] ~~Marinas~~;
[v] Portable sanitary services;
[w] Building material retailers and storage;
[x] Animal boarding facilities and kennels;
[y] Mobile pet services;
[z] Power washing services;
[aa] Plumbing services; and
[bb] Other sites and sources with a history of un-authorized discharges to the MS4.

Comment [CP96]: Clearly not applicable within this permit area.

(ii) Industrial Sites/Sources:

[a] Industrial Facilities, as defined at 40 CFR § 122.26(b)(14), including those subject to the General Industrial Permit or other individual NPDES permit;
[b] Operating and closed landfills;
[c] Facilities subject to SARA Title III; and
[d] Hazardous waste treatment, disposal, storage and recovery facilities.

(iii) ~~ESAs and~~ 303(d) Listed Waterbodies: All other commercial or industrial sites/sources tributary to and within the same hydrologic sub area as a CWA Section 303(d) impaired water body segment, where the site/source generates pollutants for which the water body segment is impaired. All other commercial or industrial sites/sources ~~within or directly adjacent to or discharging directly to receiving waters within environmentally sensitive areas (as defined in Attachment C of this Order) or that generate pollutants tributary to~~ determined to be the source of an observed exceedance of an action level.

(iv) All other commercial or industrial sites/sources that the Copermittee determines may contribute a significant pollutant load to the MS4.

(2) General BMP Implementation

(a) Pollution Prevention: Each Copermittee must require the use of pollution prevention methods by the inventoried industrial and commercial sites/sources, where appropriate.

(b) Designate / Update Minimum BMPs: Each Copermittee must designate a minimum set of BMPs for all inventoried industrial and commercial sites/sources. Where BMPs have already been designated, each Copermittee must review and update its existing BMPs for adequacy ~~within one year of permit adoption~~by no later than the submittal of the JRMP. Copermittees may continue to regularly review and update their designated BMPs for adequacy and subsequently submit any updates in their Annual Report. The designated minimum BMPs must be specific to facility types and pollutant-generating activities, as appropriate.

(c) Designate Enhanced BMPs for ESAs and 303(d) Impairments: Each Copermittee must designate enhanced measures for inventoried industrial and commercial sites/sources tributary to and within the same hydrologic subarea as a CWA section 303(d) impaired water body segments (where a site/source generates pollutants for which the water body segment is impaired). Each Copermittee must also designate additional controls for industrial and commercial sites/sources within or directly adjacent to or discharging directly to coastal lagoons, the ocean, or other receiving

Comment [CP97]: See discussion in the comment letter.

Comment [CP98]: Per discussions with Board staff on 8/18

Comment [CP99]: See discussion in the comment letter.

Comment [c100]: From 2004 permit

Comment [CP101]: Per discussions with Board staff on 8/18

Comment [CP102]: Per discussions with Board staff on 8/18

waters within environmentally sensitive areas (as defined in Attachment C of this Order). Copermittees may continue to regularly review and update their designated enhanced BMPs for adequacy and subsequently submit any updates in their next Annual Report.

(d) Implement BMPs: Each Copermittee must implement, or require the implementation of, the designated minimum and enhanced BMPs and any additional measures necessary based on inspections, incident responses, and water quality data to comply with this Order at each industrial and commercial site/source within its jurisdiction.

(3) Mobile Businesses Program

(a) Each Copermittee must develop and implement a program designed to reduce the discharge of storm water pollutants from the MS4 attributable to ~~from~~ mobile businesses to the MEP ~~and to prohibit non-storm water discharges pursuant to Section B of this Order~~. Each Copermittee must keep as part of its commercial source inventory a listing of mobile businesses known to ~~operate~~ have bases of operation within its jurisdiction that conduct services listed above in section F.3.b.(1)(a). The program must include:

(i) Development and implementation of minimum standards and BMPs to be required for each of the various types of mobile businesses;
(ii) Development and implementation of an enforcement strategy which specifically addresses the unique characteristics of mobile businesses;
(iii) Notification of those mobile businesses known to ~~operate~~ have bases of operation within the Copermittee's jurisdiction of the minimum standards and BMP requirements;
(iv) Development and implementation of an outreach and education strategy; and
(v) Inspection of mobile businesses as needed to implement the program.

(b) If they choose to, the Copermittees may cooperate in developing and implementing their programs for mobile businesses, including sharing of mobile business inventories, BMP requirements, enforcement action information, and education.

(4) Inspection of Industrial and Commercial Sites/Sources

Each Copermittee must conduct industrial and commercial site inspections for compliance with its ordinances, permits, and this Order. Mobile businesses must be inspected as needed pursuant to section F.3.b.(3).

(a) Inspection Procedures: Inspections must include but not be limited to:

Comment [DB103]: See general comment 1 Attachment 7 to the comment letter

Comment [DB104]: This change reflects the purpose of the Order, which is to reduce pollutants discharged from the MS4.

Comment [CP105]: This is an appropriate change, as it sets clear responsibility among the Copermittees.

(i) ~~Review of BMP implementation plans, if the site uses or is required to use such a plan~~;
(ii) ~~Review of facility monitoring data, if the site monitors its runoff~~;
(iii) Check for coverage under the General Industrial Permit (Notice of Intent (NOI) and/or Waste Discharge Identification Number), if applicable;
(iv) Assessment of compliance with Copermittee ordinances and Copermittee issued permits related to runoff;
(v) Assessment of the implementation, maintenance and effectiveness of the designated minimum and/or enhanced BMPs;
(vi) Visual observations for non-storm water discharges, potential illicit connections, and potential discharge of pollutants in storm water runoff; and
(vii) Education and training on storm water pollution prevention, as conditions warrant.

Comment [CP106]: See discussion in comment letter.

~~(b) Each Copermittee must annually notify the San Diego Water Board, prior to the commencement of the rainy season, of all Industrial Sites and Industrial Facilities subject to the General Industrial Permit or other individual NPDES permit with alleged violations of the Copermittees ordinances, that pose a significant threat to water quality.~~

Comment [CP107]: Per discussions with Board staff on 8/18. (comparable language added to F.3.b.(5)(b))

~~(c)~~(b) Frequencies: At a minimum all sites determined to pose a high threat to water quality must be inspected each year. All inventoried sites must be inspected at least once during a five year period. In evaluating threat to water quality, each Copermittee must consider, at a minimum, the following:

(i) Type of activity (SIC code);
(ii) Materials used at the facility;
(iii) Wastes generated;
(iv) Pollutant discharge potential, including whether the facility generates a pollutant that exceeds an action level;
(v) Non-storm water discharges;
(vi) Size of facility;
(vii) Proximity to receiving water bodies;
(viii) Sensitivity of receiving water bodies;
(ix) Whether the facility is subject to the General Industrial Permit or an individual NPDES permit;
(x) Whether the facility has filed a No Exposure Certification/Notice of Non-Applicability;
(xi) Facility design;
(xii) Total area of the site, portion of the site where industrial or commercial activities occur, and area of the site exposed to rainfall and runoff;
(xiii) The facility's compliance history; and

(xiv) Any other relevant factors.

~~(d)~~(c) Third-Party Certifications: Each Copermittee may propose to develop and implement a third party certification program subject to San Diego Water Board Executive Officer acceptance. This program would verify industrial and commercial site/source compliance with the Copermittees' ordinances, permits, and this Order. To the extent that third party certifications are conducted to fulfill the requirements of Section F.3.b.(4) above, the Copermittee retains responsibility for compliance with this Order and will be responsible for conducting and documenting quality assurance and quality control of the third-party certifications.

(i) The Copermittee's proposed third party certification program must include the following:

[a] A description of the procedures and measures for quality assurance and quality control;
[b] A listing of sites/sources that may and may not participate in the program;
[c] The representative percentage of certifications that would qualify to satisfy the inspection requirements in section F.3.b(4)(c) above;
[d] Photo documentation of potential storm water violations identified during the third party inspection;
[e] Reporting to the Copermittee of identified significant potential violations, including imminent or observed illegal discharges, within 24 hours of the third party inspection;
[f] Reporting to the Copermittee of all findings within one week of the inspection being conducted; and
[g] Copermittee follow-up and/or enforcement actions for identified potential storm water violations within two business days of the potential violation report receipt.

~~(e)~~(d) Based upon site inspection findings, each Copermittee must implement all follow-up actions and enforcement necessary to comply with this Order.

~~(f)~~(e) To the extent that the San Diego Water Board has conducted an inspection of an industrial site during a particular year, the requirement for the responsible Copermittee to inspect this facility during the same year is deemed satisfied.

~~(g)~~(f) The Copermittees must track the number of inspections for the inventoried industrial and commercial sites/sources throughout the reporting period to verify that the sites/sources are inspected at the minimum frequencies listed in this Order.

(5) Enforcement of Industrial and Commercial Sites/Sources

Each Copermittee must enforce its storm water ordinance for all industrial and commercial sites/sources as necessary to maintain compliance with this Order. ~~Copermittee ordinances or other regulatory mechanisms must include appropriate sanctions to achieve compliance. Sanctions must include the following tools or their equivalent: Non-monetary penalties, fines, bonding requirements, liens and/or permit denials for non-compliance.~~

(a) Each Copermittee shall annually notify the San Diego Water Board, prior to the commencement of the wet season, of any unresolved high level enforcement action (as defined in the Copermittee's JRMP) that poses a significant threat to water quality in its jurisdiction as a result of violations of their storm water ordinances.

Comment [DB108]: See legal comments in Attachment 7

Comment [CP109]: Per discussions with Board staff on 8/18, language such as this would serve as an alternative to F.3.b.(4)(b) above.This proposed language is more consistent with the requirements in the Construction section.

c. RESIDENTIAL

Each Copermittee (except the District) must implement a residential program that meets the requirements of this section, and is designed to prevent~~s~~ illicit discharges into the MS4, reduce~~s~~ residential discharges of storm water pollutants from the MS4 to the MEP, and prevent~~s~~ residential discharges from the MS4 from causing or contributing to a violation of water quality standards.

Comment [DB110]: See legal comments in Attachment 8

Comment [DB111]: See general comment 1 in Attachment 7

(1) Threat to Water Quality Prioritization

Each Copermittee must, within its jurisdiction, identify residential areas and activities that pose a high threat to water quality. At a minimum, these must include:

(a) Automobile repair, maintenance, washing, and parking;
(b) Home and garden care activities and product use (pesticides, herbicides, and fertilizers);
(c) Disposal of trash, pet waste, green waste, and household hazardous waste (e.g., paints, cleaning products);
(d) Any other residential source that the Copermittee determines may contribute a significant pollutant load to the MS4;
(e) Any residential areas tributary to and within the same hydrologic sub area as a CWA section 303(d) impaired water body, where the residential area ~~ce generates~~ discharges pollutants for which the water body is impaired; and
(f) ~~Any residential areas within or directly adjacent to or discharging directly to receiving waters within an environmentally sensitive area (as defined in~~

Comment [CP112]: Per discussions with Board staff on 8/18

Comment [CP113]: These requirements should be focused on discharges of pollutants

Comment [CP114]: This inappropriately separates the risk (pollutant discharge potential) from the action (regulation, minimum BMPs, etc), and should not be a mandated component of this permit.

~~Attachment C of this Order)~~.

(2) BMP Implementation

(a) Pollution Prevention: Each Copermittee must actively encourage the use of pollution prevention methods by residents.

(b) Designate BMPs: Each Copermittee must designate minimum BMPs for high-threat-to-water quality residential areas and activities. The designated minimum BMPs for high-threat-to-water quality residential areas and activities must be area or activity specific.

(c) Hazardous Waste BMPs: Each Copermittee must facilitate the proper management and disposal of used oil, toxic materials, and other household hazardous wastes. Such facilitation must include educational activities, public information activities, and establishment of collection sites operated individually and/or jointly by the Copermittee(s) or a private entity. Curbside collection of household hazardous wastes is encouraged.

(d) Implement BMPs: Each Copermittee must implement, or require implementation of, the designated minimum BMPs and any additional measures necessary to comply with Sections A and B of this Order.

(e) Each Copermittee must implement, or require implementation of, BMPs for residential areas and activities that have not been designated a high threat to water quality, as necessary.

(3) Enforcement of Residential Areas and Activities

Each Copermittee must enforce its storm water ordinance for all residential areas and activities as necessary to maintain compliance with this Order.

(4) Common Interest Areas (CIA) / Home Owner Association (HOA) Areas, and Mobile Home Parks

Each Copermittee must ensure that effective measures exist and are implemented or required to be implemented to ensure that runoff within and from common interest developments, including areas managed by associations and mobile home parks, and meets the objectives of this section and Order.

(a) BMP Implementation: Each Copermittee must implement or require implementation of management measures based on ~~a review of~~ pertinent factors, including:

(i) Maintenance duties and procedures typically used by CIA/HOA

maintenance associations within its jurisdiction;

(ii) Whether streets and storm drains are publicly or privately owned within the CIA/HOA or mobile home park;

(iii) Whether the CIA/HOA area or mobile home park has been identified as a high priority residential area based on ~~an evaluation of~~ the site potential to generate pollutants contributing to a 303(d) listed waterbody or an observed action level exceedance;

(iv) Other activities conducted or authorized by the HOA that may pose a significant risk to inland receiving waters.

(b) Legal Authority and Enforcement: By July 1, 2012, each Copermittee must review, and if necessary update, its Municipal Code to verify that they have the legal authority to implement and enforce its ordinances within CIA/HOA areas and mobile home parks.

(5) Privately Owned Unpaved Roads Maintenance

~~(a) The Copermittees must require implementation of BMPs for erosion and sediment control during maintenance activities on privately owned unpaved roads, particularly in or adjacent to stream channels or wetlands.~~

~~(b) The Copermittees must enforce their ordinances against illegal construction and maintenance grading activities on privately owned unpaved roads, so as to prevent impacts to water quality.~~

Comment [CP115]: Pursuant to the comment letter:

THE COPERMITTEES REQUEST THIS SECTION BE DELETED IN ITS ENTIRETY.

See further discussion on this issue in Attachment 5 to this comment letter

d. Retrofitting Existing Development

Each Copermittee must develop and implement a retrofitting program that meets the requirements of this section upon submittal of the ROWD. The goals of the existing development retrofitting program are to provide an means to the Copermittees to address the impacts of existing development through retrofit projects that reduce impacts from hydromodification, promote LID, support riparian and aquatic habitat restoration, reduce the discharges of storm water pollutants from the MS4 to the MEP, and prevent discharges from the MS4 from causing or contributing to a violation of water quality standards. Where feasible, at the discretion of the Copermittee, the existing development retrofitting program may be coordinated with flood control projects and other infrastructure improvement programs.

Comment [CP116]: Clarifying edit Per discussions with Board staff on 8/18

(1) The Copermittee(s) must identify and inventory existing areas of development (i.e. municipal, industrial, commercial, residential) within their jurisdiction as candidates for retrofitting. Potential retrofitting candidates must include but are not limited to:

Comment [CP117]: See District-specific comment white paper. (Attachment 8)

(a) Areas of development that generate pollutants of concern to a TMDL or an ESA;
(b) Receiving waters that are channelized or otherwise hardened;
(c) Areas of development tributary to receiving waters that are channelized or otherwise hardened;
(d) Areas of development tributary to receiving waters that are significantly eroded;
(e) Areas of development tributary to an ASBS or SWQPA; and

(2) Each Copermittee must evaluate and rank their inventoried areas of existing developments to prioritize retrofitting. Criteria for evaluation must include but is not limited to:

(a) Feasibility;
(b) Cost effectiveness;
(c) Pollutant removal effectiveness, including reducing pollutants exceeding action level;
(d) Tributary area potentially treated;
(e) Maintenance requirements;
(f) Landowner cooperation;
(g) Neighborhood acceptance;
(h) Aesthetic qualities;
~~(h)~~(i) Environmental Constraints (such as regulatory permits)
~~(i)~~(j) Efficacy at addressing concern; and
~~(j)~~(k) Potential ~~improvements~~ effects on public health and safety

(3) Each Copermittee must consider the results of the evaluation in prioritizing work plans for the following year in accordance with Sections G.1 and J. Highly feasible projects expected to benefit water quality should be given a high priority to implement source control and treatment control BMPs. Where feasible, the retrofit projects may be designed in accordance with the SSMP requirements within sections F.1.d.(3) through F.1.d.(8) and the Hydromodification requirements in Section F.1.h.

(4) The Copermittees (except the District) must cooperate with private landowners to encourage site specific retrofitting projects. The Copermittee must consider the following practices in cooperating and encouraging private landowners to retrofit their existing development:

(a) Demonstration retrofit projects;
(b) Retrofits on public land and easements that treat runoff from private developments;
(c) Education and outreach;
(d) Subsidies for retrofit projects;
(e) Requiring retrofit projects as enforcement, mitigation or ordinance compliance;

Comment [CP118]: See District-specific comment white paper, Attachment 8.

Comment [CP119]: There may be external constraints by other regulatory agencies that may affect the ranking of a particular candidate.

Comment [CP120]: A particular retrofit opportunity may have both positive and/or negative effects on public health and safety, and both should be considered.

Comment [CP121]: See District-specific comment white paper. (Attachment 8)

(f) Public and private partnerships; and
(g) Fees for existing discharges to the MS4 and reduction of fees for retrofit implementation.

(5) The known completed retrofit BMPs must be tracked in accordance with Section F.1.f. Retrofit BMPs on publicly owned properties must be inspected per section F.1.f . Privately owned retrofit BMPs must be inspected as needed ~~to ensure proper operation and maintenance~~.

Comment [CP122]: Per discussions with Board staff on 8/18

Comment [CP123]: Per discussions with Board staff on 8/18

(6) Where constraints on retrofitting preclude effective BMP deployment on existing developments at locations critical to protect receiving waters (as identified in section F.3.d.(1)), a Copermittee may propose a regional mitigation project to improve water quality. Such regional projects may include but are not limited to:

(a) Regional water quality treatment BMPs;
(b) Urban creek or wetlands restoration and preservation;
(c) Daylighting and restoring underground creeks;
(d) Localized rainfall storage and reuse to the extent such projects are fully protective of downstream water rights;
(e) Hydromodification project; and
(f) Removal of invasive plant species.

(7) A retrofit project or regional mitigation project may qualify as a Watershed Water Quality Activity provided it meets the requirements in section G. Watershed Workplan.

4. ILLICIT DISCHARGE DETECTION AND ELIMINATION

Each Copermittee must implement a program that meets the requirements of this section and is designed to actively detect and eliminate illicit discharges and disposal into the MS4. The program must address all types of illicit discharges and connections excluding those non-storm water discharges not prohibited by the Copermittee in accordance with section B of this Order.

Comment [DB124]: See general comment 1 in Attachment 7

a. PREVENT AND DETECT ILLICIT DISCHARGES AND CONNECTIONS

Each Copermittee must implement measures to prevent and detect illicit discharges to the MS4.

~~(1) Legal Authority: Each Copermittee must retain legal authority to prevent and eliminate illicit discharges and connections to the MS4.~~

Comment [DB125]: This measure is already covered in Part E of the Order.

~~(2)~~(1)Inspections: Each Copermittee must include use of appropriate

Copermittee personnel and contractors to assist in identifying illicit discharges and connections during their daily activities.

(a) Visual inspections for illegal discharges and connections must be conducted during routine maintenance of all MS4 facilities.

(b) Copermittee staff and contractors conducting non-MS4 field operations must be trained to report suspected illegal discharges and connections to proper Copermittee staff.

b. MAINTAIN MS4 MAP

Each Copermittee must maintain an updated map of its entire MS4 and the corresponding drainage areas within its jurisdiction. The use of GIS is strongly encouraged. The MS4 map must include all segments of the storm sewer system owned, operated, and maintained by the Copermittee, as well as all known locations of inlets that discharge and/or collect runoff into the Copermittee's MS4~~, all known locations of access points (i.e. manholes) to the Copermittee's MS4, all known locations of connections with other MS4s (e.g. Caltrans),~~ and all known locations of all the outfalls that discharge runoff from the Copermittee's MS4. The accuracy of the MS4 map must be confirmed during dry weather field screening and analytical monitoring and must be updated at least annually. The MS4 map including any GIS layers must be submitted with the updated JRMP.

Comment [CP126]: These are not required under the federal regulations, and are not necessary for the Copermittees' programs.

c. FACILITATE PUBLIC REPORTING OF ILLICIT DISCHARGES AND CONNECTIONS - PUBLIC HOTLINE

Each Copermittee must promote, publicize and facilitate public reporting of illicit discharges or water quality impacts associated with discharges into or from MS4s. Each Copermittee must facilitate public reporting through development and operation of a public hotline. Public hotlines can be Copermittee-specific or shared by Copermittees. All storm water hotlines must be capable of receiving reports in both English and Spanish 24 hours per day and seven days per week. All reported incidents, and how each was resolved, must be summarized in each Copermittee's Annual Report.

d. DRY WEATHER FIELD SCREENING AND ANALYTICAL MONITORING

Each Copermittee must conduct dry weather field screening and analytical monitoring of MS4 outfalls and other portions of its MS4 within its jurisdiction to detect illicit discharges and connections in accordance with Receiving Waters and MS4 Discharge Monitoring and Reporting Program No. R9-2010-0016 in Attachment E of this Order.

e. INVESTIGATION / INSPECTION AND FOLLOW-UP

Each Copermittee must implement procedures to investigate and inspect portions of its MS4 that, based on the results of field screening, analytical monitoring, or other appropriate information, indicate a reasonable potential of containing illicit discharges, illicit connections, or other sources of pollutants in non-storm water.

(1) Develop response criteria for data: Each Copermittee must develop, update, and use numeric criteria action levels (or other actions level criteria where appropriate) to determine when follow-up investigations will be performed in response to water quality monitoring. The criteria must include required non-storm water action levels (see Section C) and a consideration of 303(d)-listed waterbodies and environmentally sensitive areas (ESAs) as defined in Attachment C.

(2) Respond to data: Each Copermittee must investigate portions of the MS4 for which water quality data or conditions indicates a potential illegal discharge or connection.

(a) Obvious illicit discharges (i.e. color, odor, or significant exceedances of action levels) must be investigated immediately.

(b) Field screen data: Within two business days of receiving dry weather field screening results that exceed action levels, the Copermittee(s) having jurisdiction must either initiate an investigation to identify the source of the discharge or document the rationale for why the discharge does not pose a threat to water quality and does not need further investigation. This documentation must be included in the Annual Report.

(c) Analytical data: Within five business days of receiving analytical laboratory results that exceed action levels, the Copermittee(s) having jurisdiction must either initiate an investigation to identify the source of the discharge or document the rationale for why the discharge does not pose a threat to water quality and does not need further investigation. This documentation must be included in the Annual Report.

(3) Respond to notifications: Each Copermittee must respond to and resolve each reported incident (e.g., public hotline, staff notification, etc.) made to the Copermittee in a timely manner. Criteria may be developed to assess the validity of, and prioritize the response to, each report.

f. ELIMINATION OF ILLICIT DISCHARGES AND CONNECTIONS

Each Copermittee must take immediate action to initiate steps necessary to eliminate all detected illicit discharges, illicit discharge sources, and illicit connections after detection within its jurisdiction. Elimination measures may include an escalating series of enforcement actions for those illicit discharges

that are not a serious threat to public health or the environment. Illicit discharges that pose a serious threat to the public's health or the environment must be eliminated immediately.

~~g. ENFORCE ORDINANCES~~

~~Each Copermittee must implement and enforce its ordinances, orders, or other legal authority to prevent illicit discharges and connections to its MS4 and to eliminate detected illicit discharges and connections to its MS4.~~

Comment [DB127]: This requirement is already covered in Part E.1 of the Order.

~~h.~~g. PREVENT AND RESPOND TO SEWAGE SPILLS (INCLUDING FROM PRIVATE LATERALS AND FAILING SEPTIC SYSTEMS) AND OTHER SPILLS

Each Copermittee must implement management measures and procedures (including a notification mechanism) to ~~prevent,~~ respond to, contain and clean up all sewage (see below) and other spills that may discharge into its MS4 from any source (including private laterals and failing septic systems). Copermittees must coordinate with spill response teams to prevent entry of spills into the MS4 and contamination of surface water, ground water and soil. Each Copermittee must coordinate spill prevention, containment and response activities throughout all appropriate Copermittee departments, programs and agencies so that maximum water quality protection is available at all times.

Comment [CP128]: The Copermittees do not own nor operate such systems, and as such cannot 'prevent' such spills from occurring.

Comment [CP129]: Per discussions with Board staff on 8/18

5. PUBLIC PARTICIPATION COMPONENT

Each Copermittee must incorporate a mechanism for public participation in the updating, development, and implementation of the JRMP.

6. EDUCATION COMPONENT

Each Copermittee must implement education programs designed to (1) measurably increase the knowledge regarding MS4s, impacts of runoff on receiving waters, and potential BMP solutions for the target audience; and (2) to measurably change the behavior of target communities and thereby reduce pollutants in ~~storm water~~ discharges from MS4s to the MEP~~and eliminate prohibited non-storm water discharges to MS4s and the environment~~. At a minimum, the education programs must meet the requirements of this section and address the following target communities within their jurisdiction:

Comment [DB130]: See general comment 1 in Attachment 7 to the comment letter .

Comment [DB131]: See legal comments white paper in Attachment 8 to the comment letter .

Comment [DB132]: See District-specific comment white paper in Attachment 8 to the comment letter .

- Copermittee Departments and Personnel

- New Development / Redevelopment Project Applicants, Developers, Contractors, Property Owners, and other Responsible Parties
- Construction Site Owners and Operators
- Commercial Facility Owners and Operators
- Industrial Facility Owners and Operators
- Residential Community and General Public
- ~~Quasi-Governmental Agencies / Districts (i.e., educational institutions, water districts, sanitation districts, etc.)~~

Comment [CP133]: These entities are subject to individual NPDES regulations, and the Copermittees should not be required to educate them on the general requirements below.

a. General Requirements

(1) At a minimum, the Copermittee education programs must implement educational programs for ~~educate~~ each target community on the following topics as appropriate to the community's activities and their impact discharges from the MS4 :

Comment [CP134]: The language should be clear that the minimum topics should be tailored as appropriate to the target audience.

(a) Applicable water quality laws, regulations, permits, and/or other requirements;
(b) Best management practices;
(c) General runoff concepts;
(d) Existing water quality, including local water quality conditions, impaired waterbodies and environmentally sensitive areas; and
(e) Other topics as determined by the Copermittee, such as public reporting mechanisms, water conservation, low-impact development techniques, and public health and vector issues associated with runoff.

(2) Each Copermittee must implement educational activities, public information activities, and other appropriate activities to facilitate the proper management and disposal of used oil and toxic materials.

b. Specific Requirements

(1) Copermittee Departments and Personnel

(a) Each Copermittee must implement an education program so its staff and contractors (and Planning Boards and Elected Officials, if applicable) responsible for implementing the requirements of this Order have an understanding of the following topics, as applicable to their responsibilities:

(i) Applicable water quality laws and regulations;
(ii) The potential effects and impacts that Copermittee departments and personnel activities related to their job duties can have on water quality);

(iii) Plan review policies and procedures to verify consistent application;
(iv) Methods of minimizing impacts to receiving water quality resulting from development, construction, and other potential pollutant generating activities;
(v) Proper implementation of erosion and sediment control, source control, treatment control, and other BMPs to minimize the impacts to receiving water quality resulting from development, construction, and other potential pollutant generating activities;
(vi) Applicable recordkeeping and tracking mechanisms;
(vii) Inspection and enforcement procedures and~~,~~ BMP implementation, ~~and review of monitoring data~~.

Comment [CP135]: As discussed in the comment letter, this is a requirement for other NPDES permits, and it is inappropriate to mandate upon the Copermittees.

(b) Each Copermittee must train its staff responsible for oversight and conducting storm water compliance inspections and enforcement of construction activities (e.g. construction, building, code enforcement, grading review staffs, inspectors, and other responsible construction staff) annually prior to the rainy season.

(c) Each Copermittee must train its staff responsible for conducting storm water compliance inspections and enforcement of industrial and commercial facilities at least once a year.

(2) New Development / Redevelopment and Construction Sites

As early in the planning and development process as possible and all through the permitting and construction process, each Copermittee must notify parties responsible for the project about the importance of educating all construction workers in the field about storm water issues and BMPs, in addition to the topics under Section F.6.a.(1).

(3) Commercial and Industrial Sites / Sources

At least once during the five-year period of this Order, each Copermittee must notify the owner/operator of each of its inventoried commercial and industrial site/source of the BMP requirements applicable to the site/source.

(4) Residential and General Public

Each Copermittee shall collaboratively conduct or participate in development and implementation of a program to educate residential and general public target communities. The Copermittee residential and general public education programs must address potential pollutant generating activities (e.g., car washing, mobile operations, yard maintenance) and pollutant generating products (e.g., pesticides, fertilizers, household chemicals). ~~The target audiences of the residential and general public education programs must include underserved target audiences (e.g., disadvantaged~~

~~communities), residents and managers of CIA/HOA areas, and owners and residents of mobile home parks.~~

Comment [DB136]: The requirement to educate the residential and general public communities will necessarily include these underserved audiences.

G. WATERSHED WATER QUALITY WORKPLAN

Each Copermittee must collaborate with other Copermittees to develop and implement a Watershed Water Quality Workplan (Watershed Workplan) designed to identify, prioritize, address, and mitigate the highest priority water quality issues/pollutants in the Upper Santa Margarita Watershed relating to discharges from the MS4.

Comment [DB137]: See general comment 1 in Attachment 7 to the comment letter .

1. Watershed Workplan Components:

The work plan must, at a minimum:

a. Characterize the receiving water quality in the watershed. Characterization must include assessment and analysis of regularly collected water quality data, reports, monitoring and analysis generated in accordance with the requirements of the Receiving Waters Monitoring and Reporting Program, as well as applicable information available from other public and private organizations. This characterization must include an updated watershed map.

b. Identify and prioritize water quality problem(s) in terms of constituents by location, in the watershed's receiving waters. In identifying water quality problem(s), the Copermittees must, at a minimum, give consideration to TMDLs, receiving waters listed on the CWA section 303(d) list, waters with persistent violations of water quality standards, toxicity, or other impacts to beneficial uses, and other pertinent conditions.

c. Identify the likely sources, pollutant discharges and/or other factors causing the highest water quality problem(s) within the watershed resulting from discharges from the MS4. Efforts to determine such sources must include, but not be limited to: use of information from the construction, industrial/commercial, municipal, and residential source identification programs required within the JRMP of this Order; water quality monitoring data collected as part of the Receiving Water Monitoring and Reporting Program required by this Order, and additional focused water quality monitoring to identify specific sources within the watershed.

d. Develop a watershed BMP implementation strategy to attain receiving water quality objectives in the identified highest priority water quality problem(s) and locations. The BMP implementation strategy must include a schedule for implementation of the BMP ~~project~~s to abate specific receiving water quality problems and a list of criteria to be used to evaluate BMP effectiveness. Identified watershed water quality problems may be the result of jurisdictional discharges that will need to be addressed with BMPs applied in a specific jurisdiction in order to generate a benefit to the watershed. This implementation

Comment [CP138]: Changes in this section are requested pursuant to discussions with Board staff on 8/18

strategy must include a map of any implemented and/or proposed structural BMPs.

e. Develop a strategy to monitor improvements in receiving water quality directly resulting from implementation of the BMPs described in the Watershed Workplan. The monitoring strategy must review the necessary data to report on the measured pollutant reduction that results from proper BMP implementation. Monitoring must, at a minimum, be conducted in the receiving water to demonstrate reduction in pollutant concentrations and progression towards attainment of receiving water quality objectives.

f. Establish a schedule for development and implementation of the Watershed strategy outlined in the Workplan. The schedule must, at a minimum, include forecasted dates of planned actions to address Provisions E.2(a) through E.2(e) and dates for watershed review meetings through the remaining portion of this Permit cycle. Annual watershed workplan review meetings must be open to the public and appropriately publically noticed such that interested parties may come and provide comments on the watershed program.

2. **Watershed Workplan Implementation –** Watershed Copermittee's must implement the Watershed Workplan within 90 days of submittal unless otherwise directed by the San Diego Water Board.

3. **Copermittee Collaboration** – Watershed Copermittees must collaborate to develop and implement the accepted Watershed Workplan. Watershed Copermittee collaboration must include frequent regularly scheduled meetings. The Copermittees must pursue ~~efforts to obtain any~~ interagency agreements, or other coordination efforts, with non-Copermittee owners of the MS4 (such as Caltrans, Native American tribes, and school districts) where determined by the Copermittee as necessary to control the contribution of pollutants from one portion of the shared MS4 to another portion of the shared MS4. The Copermittees must, as appropriate, participate in watershed management efforts to address water quality issues within the entire Santa Margarita Watershed (such as the County of San Diego and U.S. Marine Corps Camp Pendleton).

Comment [CP139]: Goal is to pursue these agreements where we determine it is needed. Otherwise this requirement is diverting our time and resources from other more important efforts.

4. **Public Participation –** Watershed Copermittees must implement a watershed-specific public participation mechanism within each watershed. A required component of the watershed-specific public participation mechanism must be a minimum 30-day public review of and opportunity to comment on the Watershed Workplan prior to submittal to the San Diego Water Board. The Workplan must include a description of the public participation mechanisms to be used and identification of the persons or entities anticipated to be involved during the development and implementation of the Watershed Workplan.

5. **Watershed Workplan Review and Updates –** Watershed Copermittees must review and update the Watershed Workplan annually to identify needed changes to

the prioritized water quality problem(s) listed in the workplan. All updates to the Watershed Workplan must be presented during an Annual Watershed Review Meeting. Annual Watershed Review Meetings must occur once every calendar year and be conducted by the Watershed Copermittees. Annual Watershed Review Meetings must be open to the public and adequately noticed. Individual Watershed Copermittees must also review and modify their jurisdictional programs and JRMP Annual Reports, as necessary, so that they are consistent with the updated Watershed Workplan.

6. **Pyrethroid Toxicity Reduction Evaluation –** The Watershed Copermittees must incorporate the pyrethroid pollutant reduction program[18] into the Watershed Workplan. The pyrethroid pollutant reduction program must include the following elements:

   a. Pursue state and federal regulatory change.
   b. Implement a set of source controls targeted specifically at urban pyrethroid use,
   c. Through the annual reporting process, monitor the implementation of those controls, assess effectiveness, and identify sources or areas where additional effort is needed,
   d. Implement additional controls as needed,
   e. Continue to monitor implementation, as well as conditions within the target receiving waters, assess effectiveness, and re-evaluate control programs.

H. FISCAL ANALYSIS

1. Secure Resources: Each Copermittee must ~~exercise its full authority to~~ secure the resources necessary to meet all requirements of this Order. If the Copermittees are unable to secure the funding necessary to implement the requirements of this order, the Copermittees may request modification of the Order consistent with the MEP standard.

Comment [CP140]: This clarifies that the Copermittees have the option to request modification of the order for reasons such as inability to obtain the requisite funding for the programs.

2. Annual Analysis: Each Copermittee must conduct an annual fiscal analysis of the necessary capital and operation and maintenance expenditures necessary to accomplish the activities of the programs required by this Order. The analysis must include estimated expenditures for the current reporting period, the preceding period, and the next reporting period.

   a. Each analysis must include a description of the source of funds that are proposed to meet the necessary expenditures.
   b. Each analysis must include a narrative description of circumstances resulting in a 25 percent or greater annual change for any budget line items.

[18] The pyrethroid pollutant reduction program is described in the "Riverside County – Santa Margarita Region Pyrethroid Source Identification Toxicity Reduction Evaluation, Final Phase II Report", January 2009 by MACTEC.

3. Annual Reporting: Each Copermittee must submit its annual fiscal analysis with the annual JRMP report.

I. TOTAL MAXIMUM DAILY LOADS

1. The waste load allocations (WLAs) of fully approved and adopted TMDLs are incorporated as Water Quality Based Effluent Limitations on a pollutant by pollutant, watershed by watershed basis. Early TMDL requirements, including monitoring, may be required and inserted into this Order pursuant to Finding E.10.

2. The Cities of Wildomar and Murrieta must comply with the requirements and WLAs assigned to the discharges from their MS4s contributing to the Lake Elsinore/Canyon Lake (San Jacinto Watershed) Nutrient TMDLs as specified in Section VI.D.2 of the Santa Ana Water Board's Order R8-2010-0033, -including the relevant sections of the fact sheet and findings, and subsequent revisions thereto.

J. PROGRAM EFFECTIVENESS ASSESSMENT AND REPORTING

Beginning with the Annual Report due in 2013, each Copermittee must annually assess and report upon the effectiveness of its JRMP and Watershed Workplan implementation to (1) reduce the discharge of storm water pollutants from its MS4 to the MEP; (2) prohibit non-stormwater discharges; and (3) prevent runoff discharges from the MS4 from causing or contributing to a violation of water quality standards.

1. Program Effectiveness Assessments

a. IDENTIFY EFFECTIVENESS ASSESSMENTS

With the JRMP and Watershed Workplan submittal, each Copermittee must establish assessment measures or methods for each of the six outcome levels described by CASQA[19], using data from each JRMP program component as appropriate, the MRP, and the Watershed Workplan.

(1) Assessment interval: For each established assessment measure or method, an assessment interval must be established as appropriate to the measure or method.

(2) Projected Timeframe: For each established assessment measure or method, each Copermittee must identify the projected timeframe within which the associated outcome level can adequately assess change.

[19] Effectiveness assessment outcome levels as defined by CASQA are defined in Attachment C of this Order. See "*Municipal Stormwater Program Effectiveness Assessment Guidance"* (CASQA, May 2007) for guidance for assessing program activities at the various outcome levels.

b. PERFORM ASSESSMENTS

(1) Annually: Each year, the Copermittee must perform each applicable assessment based on the associated assessment interval, and determine whether the desired outcome has been met;

(2) With the submittal of the Report of Waste Discharge, the Copermittees must determine whether their program implementation is resulting in the protection and/or improvement of water quality through an Integrated Assessment;

2. Respond to Assessments

a. Where the assessments indicate that the desired outcome level has not been achieved at the end of the projected timeframe, the Copermittee must review its applicable activities and BMPs to identify any modifications and improvements needed to maximize effectiveness, as necessary to comply with this Order. If the Copermittee determines that the existing activities/BMPs are adequate, or that the projected timeframe should be extended, justification and an updated timeframe for attainment of the outcome level must be provided in the Annual Report.

b. Each Copermittee must develop and implement a work plan and schedule to address any program modifications and improvements in response to the findings of its assessment. The work plan and schedule must be provided and updated with the applicable Annual Report. The work plan must include, at a minimum, the following:

(1) A description of the program modifications / improvements that will be implemented to achieve the intended outcome level.
(2) A schedule for development and implementation of the program modifications / improvements, including any significant milestones.
(3) Establishment of appropriate assessment measure(s) or method(s), assessment interval(s), and projected timeframe(s) in accordance with Section J.1.a. for the program modifications / improvements.
~~(1) The problems and priorities identified during the assessment;~~
~~(2) A list of priority pollutants and known or suspected sources;~~
~~(3) A brief description of the strategy employed to reduce, eliminate or mitigate the negative impacts;~~
~~(4) A description and schedule for new and/or modified BMPs. The schedule is to include dates for significant milestones;~~
~~(5) A description of how the selected activities will address an identified high priority problem. This will include a description of the expected effectiveness and benefits of the new and/or modified BMPs;~~
~~(6) A description of implementation effectiveness metrics;~~
~~(7) A description of how efficacy results will be used to modify priorities and~~

Comment [CP141]: Although the Copermittees prefer to not be required to develop another compliance document, the edits below are intended to focus such a document on information that is relevant to the Copermittes' response.

~~implementation; and~~

~~(8) A review of past activities implemented, progress in meeting water quality standards, and planned program adjustments.~~

3. Assessment and Response Reporting

Each Copermittee must include a summary of its effectiveness assessments within each Annual Report. Beginning with the FY 2012-2013 Annual Report, the Program Effectiveness reporting must include:

a. The results of each of the effectiveness assessments performed pursuant to J.1.b, including the demonstrated CASQA effectiveness level(s);

b. Responses to effectiveness assessments; A description of any program modifications planned in accordance with section J.2, including the work plan and identified schedule for implementation. The description must include the basis for determining that each modified activity and/or BMP represents an improvement expected to result in improved water quality;

c. A description of any steps to be implemented to improve the Copermittee's ability to assess program effectiveness.

K. REPORTING

The Copermittees may propose alternate reporting criteria and schedules, as part of their updated JRMP, for the Executive Officer's acceptance.

1. Runoff Management Plans

a. JURISDICTIONAL RUNOFF MANAGEMENT PLANS

(1) The written account of the overall program to be conducted by each Copermittee to meet the jurisdictional requirements of section F of this Order is referred to as the Jurisdictional Runoff Management Plan (JRMP). Each Copermittee must revise and update its existing JRMP so that it describes all activities the Copermittee will undertake to implement the requirements of this Order. Each Copermittee must submit its updated and revised JRMP to the San Diego Water Board <u>no later than June 30, 2012</u>.

(2) At a minimum, each Copermittee's JRMP must be updated and revised to

demonstrate compliance with each applicable section of this Order.

b. WATERSHED WORKPLANS

Copermittees must update and revise the Watershed Workplan to describe any changes in water quality problems or priorities, and any necessary change to actions Copermittees will take to implement jurisdictional or watershed BMPs to address those identified. The Copermittees must assemble and submit the Watershed Workplan to the San Diego Water Board no later than June 30, 2012, and must implement the Workplan within 90 days unless otherwise directed by the San Diego Water Board.

2. Other Required Reports and Plans

a. SSMP UPDATES

(1) Copermittees must submit their updated SSMP in accordance with the applicable requirements of section F.1 with the JRMP by June 30, 2012.
(2) Within 180 days of determination that the SSMP is in compliance with this Order's provisions, each Copermittee must amend its ordinances consistent with the SSMP and implement the updated SSMP. Any amended or new ordinances must be submitted to the San Diego Water Board within ~~30 days of adoption~~the applicable annual report.

Comment [CP142]: Per discussions with Board staff on 8/18

b. HMP

(1) By June 30, 2013, the Copermittees must submit to the San Diego Water Board Executive Officer a draft HMP that has been reviewed by the public, including identification of the appropriate limiting range of flow rates in accordance with the applicable requirements of section F.1.h.

(2) Within 180 of receiving San Diego Water Board comments on the draft HMP, the Copermittees must submit a final HMP that addressed the San Diego Water Board's comments.

(3) Within 90 days of receiving a finding of adequacy from the Executive Officer each Copermittee must incorporate and implement the HMP for all Priority Development Projects.

(4) Prior to acceptance of the HMP by the San Diego Water Board, the early implementation measures likely to be included in the HMP shall be

encouraged by the Copermittees.

c. REPORT OF WASTE DISCHARGE

The Copermittees must submit to the San Diego Water Board, no later than 180 days in advance of the expiration date of this Order, a Report of Waste Discharge (ROWD) as an application for issuance of new waste discharge requirements. The fourth annual report for this Order ~~may supplement~~serve as the ROWD, provided ~~the ROWD~~it contains the minimum information below.

At a minimum, the ROWD must include the following: (1) Proposed changes to the Copermittees' runoff management programs; (2) Proposed changes to monitoring programs; (3) Justification for proposed changes; (4) Name and mailing addresses of the Copermittees; (5) Names and titles of primary contacts of the Copermittees; (6) Any other information necessary for the reissuance of this Order and (7) Any other information required by federal regulations for permit reapplications.

3. Annual Reports

a. JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM (JRMP) ANNUAL REPORTS

(1) Each Copermittee must generate individual JRMP Annual Reports that cover implementation of its jurisdictional activities during the past annual reporting period. Each Annual Report must verify and document compliance with this Order as directed in this section. Each Copermittee must retain records in accordance with the Standard Provisions in Attachment B of this Order, available for review, that document compliance with each requirement of this Order. The reporting period for these annual reports must be the previous fiscal year.

(2) Each Copermittee must submit its JRMP Annual Reports to the San Diego Water Board by October 31of each year, beginning on October 31, 2013.

(3) Each JRMP Annual Report must contain, at a minimum, the following information, as applicable to the Copermittee:

(a) Information required to be reported annually in Section H (Fiscal Analysis) of this Order;
(b) Information required to be reported annually in Section J (Program Effectiveness) of this Order;
(c) The completed Reporting Checklist found in Attachment D, and
(d) Information for each program component as described in the following Table 9:

Table 9. Annual Reporting Requirements

Program Component	Reporting Requirement
New Development	1. All updated relevant sections of the General Plan and environmental review process and a description of any planned updates within the next annual reporting period, if applicable
	2. All revisions to the SSMP, including where applicable: (a) Identification and summary of where the SSMP fails to meet the requirements of this Order; (b) Updated procedures for identifying pollutants of concern for each Priority Development Project; (c) Updated treatment BMP ranking matrix; and (d) Updated site design and treatment control BMP design standards;
	3. Number of Priority Development Projects reviewed and approved during the reporting period. Brief description of BMPs required at approved Priority Development Projects. Verification that site design, source control, and treatment BMPs were required on all applicable Priority Development Projects;
	4. Name (or other identifier) and location of all Priority Development Projects that were granted a waiver from implementing LID BMPs pursuant to section F.1.d.(4) during the reporting period;
	5. Updated watershed-based BMP maintenance tracking database of approved treatment control BMPs and treatment control BMP maintenance within its jurisdiction, including updates to the list of high-priority Priority Development Projects; and verification that the requirements of this Order were met during the reporting period.
New Development	6. Name and brief description of all approved Priority Development Projects ~~required to~~exempted from implementing hydrologic control measures in compliance with section F.1.h ~~including a brief description of the management measures planned to protect downstream beneficial uses and prevent adverse physical changes to downstream stream channels;~~
	7. Number and description of all enforcement activities applicable to the new development and redevelopment component and a summary of the effectiveness of those activities;
Construction	1. All updated relevant ordinances and description of planned ordinance updates within the next annual reporting period, if applicable;
	2. A description of any changes to procedures used for identifying priorities for inspecting sites and enforcing control measures ~~that consider the nature of the construction activity, topography, and the characteristics of soils and receiving water quality~~;
	3. Any changes to the designated minimum and enhanced BMPs;

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Program Component	Reporting Requirement
	4. Summary of the inspection program, including the following information: (a) Total number and date of inspections conducted at each facility; ~~(b) Number, date, and types of enforcement actions by facility~~; (c) Brief description of each high-level enforcement actions at construction sites including the ~~effectiveness~~ outcome of the enforcement. Supporting paper (or electronic) files must be maintained by the Copermittees and made available upon San Diego Water Board request. Supporting files must include a record of inspection dates, the results of each inspection , photographs (if any), and a summary of any enforcement actions taken.
Municipal	1. Updated source inventory;
	2.All changes to the designated municipal BMPs;
	3. Descriptions of any changes to procedures to assure that flood management projects assess the impacts on the water quality of receiving water bodies;
	4. Summary and assessment of BMPs retrofits implemented at flood control structures, including: (a) List of projects retrofitted; and (b) List and description of structures evaluated for retrofitting; (c) List of structures still needing to be evaluated and the schedule for evaluation.;
	5. Summary of the municipal structural treatment control operations and maintenance activities, including: (a) Number of inspections and types of facilities; and (b) Summary of findings;
Municipal	6. Summary of the MS4 and MS4 facilities operations and maintenance activities, including: (a) Number and types of facilities maintained; (b) Amount of material removed; and (c) Updates to the List of facilities planned for bi-annual inspections and the justification;
	7. Summary of the municipal areas/programs inspection activities, including: (a) Number and date of inspections conducted at each facility; ~~(c) The BMP violations identified during the inspection by facility;~~ ~~(d) Number, date and types of enforcement actions by facility~~; (e) Summary of inspection findings and follow-up activities for each facility;
	8. Description of activities implemented to address sewage infiltration into the MS4;
	~~9. Description of BMPs and their implementation for unpaved roads construction and maintenance.~~

Comment [CP143]: As drafted (without the changes shown) the requirements will be a significant and lengthy reporting exercise. Request keeping this as a 'summary' report on compliance with the inspection frequencies, and identifying any follow-up actions (as shown via the markup).

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Program Component	Reporting Requirement
Commercial / Industrial	1. Updated inventory of commercial / industrial sources;
	2. Summary of the inspection program, including the following information: (a) Number and date of inspections conducted at each facility or mobile business;; ~~(c) The BMP violations identified during the inspection by facility;~~ (d) Number, date, and types of high-level enforcement actions by facility or mobile business, and the outcome of each; ~~(e) Brief description of each high-level enforcement actions at commercial/industrial sites including the effectiveness of the enforcement and follow-up activities for each facility;.~~
	3. All changes to designated minimum and enhanced BMPs;
	4. A list of industrial sites, including each name, address, and SIC code, that the Copermittee suspects may require coverage under the General Industrial Permit, but has not submitted an NOI;
Residential	1. All updated minimum BMPs required for residential areas and activities;
	2. Quantification and summary of applicable runoff and storm water enforcement actions within residential areas and activities;
	3. Description of efforts to manage runoff and storm water pollution in common interest areas and mobile home parks;
Retrofitting Existing Development	1. Updated inventory and prioritization of existing developments identified as candidates for retrofitting.
	2. Description of efforts to retrofit existing developments during the reporting year.
Retrofitting Existing Development	3. Description of efforts taken to encourage private landowners to retrofit existing development.
	4. A list of all known retrofit projects that have been implemented within the reporting period, including site location, a description of the retrofit project, pollutants expected to be treated, and the tributary acreage of runoff that will be treated.
	5. Any proposed retrofit or regional mitigation projects and timelines for future implementation.
	6. Any proposed changes to the Copermittee's overall retrofitting program.
Illicit Discharge Detection and Elimination	1. Any changes to the legal authority to implement Illicit Discharge Detection and Elimination activities;
	2. Any Changes to the established investigation procedures;
	3. Any changes to public reporting mechanisms, including phone numbers and web pages;
	4. Summaries of illicit discharges (including spills and water quality data events) and how each significant case was resolved;
	5. A description of instances when field screening and analytical data exceeded action levels, including those instances for which no investigation was conducted;

Comment [CP144]: As drafted (without the changes shown) the requirements will be a significant and lengthy reporting exercise. Request keeping this as a 'summary' report on compliance with the inspection frequencies, and identifying the high-level enforcement actions (as shown via the markup).

Program Component	Reporting Requirement
	6. A description of follow-up and enforcement actions taken in response to investigations of illicit discharges and a description of the outcome of the investigation/enforcement actions;
Workplans	Updated workplans including priorities, strategy, implementation schedule and effectiveness evaluation;

(4) Each JRMP Annual Report must also include the following information regarding non-storm water discharges (see Section B.2. of this Order):

(a) Identification of non-storm water discharge categories identified as a source of pollutants to waters of the U.S;
(b) A description of any updates to ordinances, orders, or similar means to prohibit non-storm water discharge categories identified under section B.2 above ;
(c) Identification of any control measures to be required and implemented for non-storm water discharge categories identified as needing controls by the San Diego Water Board; and
(d) A description of a program to address pollutants from non-emergency fire fighting flows identified by the Copermittee to be significant sources of pollutants.

4. Interim Reporting Requirements

For the reporting periods, prior to submittal of the JRMP, Each JRMP Annual Report must be submitted in accordance with the requirements and deadlines described in Order No. 2004-001.

5. Universal Reporting Requirements

All submittals must include an executive summary, ~~introduction, conclusion, recommendations,~~ and signed certified statement. Each Copermittee must submit a signed certified statement covering its responsibilities for each applicable submittal. The Principal Copermittee must submit a signed certified statement covering its responsibilities for each applicable submittal and the sections of the submittals for which it is responsible.

Comment [CP145]: Per discussions with Board staff on 8/18

L. MODIFICATION OF PROGRAMS

Modifications of JRMPs and/or Watershed Workplan may be initiated by the Executive Officer of the San Diego Water Board or by the Copermittees. Requests by Copermittees must be made to the Executive Officer, and must be submitted during the annual review process. Requests for modifications should be incorporated, as appropriate, into the Annual Reports or other deliverables required or allowed under this Order.

1. Minor modifications to JRMPs, and/or Watershed Workplan, may be accepted by the Executive Officer where the Executive Officer finds the proposed modification complies with all discharge prohibitions, receiving water limitations, and other requirements of this Order.

2. Proposed modifications that are not minor require amendment of this Order in accordance with this Order's rules, policies, and procedures.

M. PRINCIPAL COPERMITTEE RESPONSIBILITIES

Within 180 days of adoption of this Order, the Copermittees must designate the Principal Copermittee and notify the San Diego Water Board of the name of the Principal Copermittee. The Principal Copermittee must, at a minimum:

1. Serve as liaison between the Copermittees and the San Diego Water Board on general permit issues, and when necessary and appropriate, represent the Copermittees before the San Diego Water Board.

2. Coordinate permit activities among the Copermittees and facilitate collaboration on the development and implementation of programs required under this Order.

3. ~~Produce and submit~~Coordinate the submittal of the documents and reports as required by section K of this Order and Receiving Waters and MS4 Discharge Monitoring and Reporting Program No. R9-2010-0016 in Attachment E of this Order.

Comment [CP146]: Per discussions with Board staff on 8/18

N. RECEIVING WATERS AND MS4 DISCHARGE MONITORING AND REPORTING PROGRAM

Pursuant to CWC section 13267, the Copermittees must comply with all the requirements contained in Receiving Waters and MS4 Discharge Monitoring and Reporting Program No. R9-2010-0016 in Attachment E of this Order.

O. STANDARD PROVISIONS, REPORTING REQUIREMENTS, AND NOTIFICATIONS

1. Each Copermittee must comply with Standard Provisions, Reporting Requirements,

and Notifications contained in Attachment B of this Order. This includes 24 hour/5 day reporting requirements for any instance of non-compliance with this Order as described in section 5.e of Attachment B.

2. All plans, reports and subsequent amendments submitted in compliance with this Order must be implemented immediately (or as otherwise specified). All submittals by Copermittees must be adequate to implement the requirements of this Order.

I, David W. Gibson, Executive Officer, do hereby certify the foregoing is a full, true, and correct copy of an Order adopted by the California Regional Water Quality Control Board, San Diego Region, on October 13, 2010.

\\TENTATIVE

David W. Gibson
Executive Officer

I. PURPOSE

A. This Receiving Waters and MS4 Discharge Monitoring and Reporting Program (MRP) is intended to meet the following goals as they relate to discharges from the Copermittees' MS4:
   1. Assess compliance with Order No. R9-2010-0016;
   2. Measure and improve the effectiveness of the Copermittees' runoff management programs;
   3. Assess the chemical, physical, and biological impacts to receiving waters resulting from MS4 discharges;
   4. Characterize storm water discharges;
   5. Identify sources of specific pollutants;
   6. Prioritize drainage and sub-drainage areas that need management actions;
   7. Detect and eliminate illicit discharges and illicit connections to the MS4;
   8. Assess the overall health of receiving waters; and
   9. Provide information to implement required BMP improvements.

B. This Receiving Waters and MS4 Discharges Monitoring and Reporting Program is designed to answer the following core management questions[1]:
   1. Are conditions in receiving waters protective, or likely to be protective, of beneficial uses?
   2. What is the extent and magnitude of the current or potential receiving water problems?
   3. What is the relative MS4 discharge contribution to the receiving water problem(s)?
   4. What are the sources of pollutants in MS4 discharges that contribute to receiving water problem(s)?
   5. Are conditions in receiving waters getting better or worse?

II. MONITORING PROGRAM

The Monitoring Program is designed to assess the condition of receiving waters, monitor pollutants in storm and non-storm water effluent from the MS4, and conduct Special Studies to address conditions of concern. Where feasible, the Monitoring Program is designed to allow the Copermittees to

[1] Core management questions from "*Model Monitoring Program for Municipal Separate Storm Sewer Systems in Southern California: A report from the Stormwater Monitoring Coalition's Model Monitoring Technical Committee.*" Technical Report No. 419. August 2004.

combine required monitoring elements or efforts that are not mutually exclusive while still meeting the requirements of the Order.

A. Receiving Waters Monitoring Program

Each Copermittee must collaborate with the other Copermittees to develop, conduct, and report on a year-round watershed based Receiving Waters Monitoring Program. The monitoring program design, implementation, analysis, assessment, and reporting must be conducted on a watershed basis for the Santa Margarita Hydrologic Unit (HU) and must be designed to meet the goals and answer the questions listed in section I above. The monitoring program must include the following components:

1. MASS LOADING STATION (MLS) MONITORING

a. Locations: The following existing mass loading stations must continue to be monitored: Lower Temecula Creek, Lower Murrieta Creek at the USGS Weir, and a permanent reference station.[2] Copermittees may propose, for San Diego Water Board review and approval, changing the location of a mass loading station.

b. Frequency: Each mass loading station must be monitored each year ~~three~~ two times during wet weather events and twice during dry weather flow conditions.

Comment [CP1]: See discussion in Attachment 4 to the Comment Letter

c. Timing: Each mass loading station must be monitored for the first wet weather event of the season which meets USEPA's criteria described in 40 CFR 122.21(g)(7). Monitoring of the ~~third~~ second wet weather event must be conducted after February 1. Dry weather mass loading monitoring events must be sampled at least three months apart between May and October. If flows are not evident for the second event, then sampling must be conducted during non-rain events in the following wet weather season.

Comment [CP2]: Consistent with above

d. Protocols: Protocols for mass loading sampling and analysis including analytical methods, target reporting limits, and data reporting formats must be compatible with the State Water Resources Control Board's (State Water Board's) State Surface Water Ambient Monitoring Program (SWAMP). If the mass loading sampling and analysis are determined to be impracticable with the SWAMP standards, the Copermittees must provide a written explanation and discussion in the submittal of the Planned

[2] A map depicting mass loading stations can be found in the Fact Sheet for Order R9-2010-0016.

Monitoring Program. Wet weather samples must be time-weighted composites, ~~collected for the duration of the entire runoff event. Where such monitoring is not practical, such as for large watersheds with significant groundwater recharge flows, composites must be~~ collected at a minimum during the first 3 hours of flow or for the duration of the entire runoff event if it is less than three hours. Grab samples are acceptable for Dry weather event sampling ~~must be time-weighted composites composed of 24 discrete hourly samples, whereby the mass loads of pollutants are calculated as the product of the composite sample concentration and the total volume of water discharged past the monitoring point during the time of sample collection~~.

Comment [CP3]: As discussed in our meeting, this is a large watershed with significant GW recharge flows

Comment [CP4]: See discussion in Attachment 4 to the Comment Letter

(1) Automatic samplers must be used to collect wet weather samples from mass loading stations.

(2) Grab samples must be analyzed for temperature, pH, specific conductance, biochemical oxygen demand, oil and grease, total coliform, fecal coliform, enterococcus and for total petroleum hydrocarbons whenever a sheen is observed.

e. Copermittees must measure or estimate flow rates and volumes for each mass loading station sampling event to determine mass loadings of pollutants. Data from nearby USGS gauging stations may be utilized, or flow rates may be estimated in accordance with the USEPA Storm Water Sampling Guidance Document (EPA-833-B-92-001), Section 3.2.1.

f. In the event that the required number of sampling events are not conducted during one monitoring year at any given station, the Copermittees must provide a written explanation for the reduced number of sampling events in the subsequent Receiving Waters Monitoring Annual Report. The explanation must include, at a minimum, streamflow data from the nearest USGS gauging station, a full description of any equipment failures and subsequent remedies, efforts made to resample a future event, and any quality assurance or quality control issues encountered. The explanation must also include a description of steps taken to prevent further sampling failures.

g. The following constituents must be analyzed for each monitoring event at each station:

Table 1. Analytical Testing for Mass Loading (A.1) and Bioassessment (A.2)

Comment [CP5]: See discussion in Attachment 4 to the Comment Letter

Conventionals, Nutrients, Hydrocarbons	Pesticides	Metals (Total and Dissolved)	Bacteriological (mass loading)
• Total Dissolved Solids • Total Suspended Solids • Turbidity • Total Hardness • pH • Specific Conductance • Temperature • Dissolved Oxygen • Total Phosphorus • Dissolved Phosphorus • Nitrite ◌̊ • Nitrate ◌̊ • Total Kjeldahl Nitrogen • Ammonia • ~~Biological Oxygen Demand, 5-day~~ • ~~Chemical Oxygen Demand~~ • ~~Total Organic Carbon~~ • ~~Dissolved Organic Carbon~~ • Methylene Blue Active Substances • Oil and Grease • Sulfate	• Diazinon • Chlorpyrifos • Malathion • ~~Carbamates~~ • Pyrethroids	• Arsenic • Cadmium • Total Chromium • ~~Hexavalent Chromium~~ • Copper • Lead • Iron • Manganese • Nickel • Selenium • Zinc • Mercury • Silver • Thallium	• Total Coliform • Fecal Coliform • Enterococcus

◌̊ Nitrate and nitrate may be combined and reported as nitrate + nitrite.

h. Toxicity testing must be conducted for each monitoring event at each station according to the following Table 2:

Table 2. Toxicity Testing for Mass Loading (A.1) and Bioassessment (A.2)

Program Component	*Dry Weather Flows*	*Storm Water Flows*
	Freshwater Organisms	**Freshwater Organisms**
Mass Loading	~~3~~ 2 chronic* ~~3~~ 2 acute*	~~3~~ 2 acute*
Bioassessment**	~~3~~ 2 chronic* ~~3~~ 2 acute*	n/a
Sediment Toxicity Special Study	1 chronic 1 acute	n/a

Table Notes
* Toxicity testing must include use of *Pimephales promelas* (fathead minnow), *Hyalella azteca* ~~and *Pseudokirchneriella subcapitata (formerly Selenastrum capricornutum, unicellular algae*~~).
** Duplicative toxicity testing is not required for bioassessment stations located at mass loading stations as bioassessment must be conducted in conjunction with dry weather mass loading

Species Notes:
1. Acute toxicity may be determined during the course of chronic toxicity monitoring per U.S. EPA protocols.

Comment [CP6]: See discussion in Attachment 4 to the Comment Letter

Comment [CP7]: Consistent with the changes discussed in the comment letter

i. The presence of acute toxicity must be determined in accordance with USEPA protocol (EPA-821-R-02-012). The presence of chronic freshwater toxicity must be determined in accordance with USEPA protocol (EPA-821-R-02-013).

2. Stream Assessment Monitoring

Copermittees must conduct Stream Assessment Monitoring using multiple lines of evidence to assess the condition of biological communities in freshwater receiving waters. Stream assessment must include the collection and reporting of the following specified instream biological, chemical, physical (including habitat) data.

a. Locations: At a minimum, the program must consist of station identification, sampling, monitoring, and analysis of data for ~~six~~ three stream assessment stations in order to determine the biological and physical integrity of streams within the County of Riverside. The two existing mass loading stations at Murrieta and Temecula Creeks ~~must continue to be monitored. Two reference stream bioassessment stations, including~~and the existing Adobe Creek reference station, must continue to be monitored.~~be~~

Comment [CP8]: See discussion in Attachment 4 to the Comment Letter

~~identified, sampled, monitored, and analyzed~~. Copermittees may propose, for San Diego Water Board review and approval, changing the location of a Bioassessment station. Locations of alternate reference stations must be identified according to protocols outlined in "A Quantitative Tool for Assessing the Integrity of Southern Coastal California Streams," by Ode, et al. 2005.[3]

Comment [CP9]: Language from MLS section. This is to allow for changes in MLS locations, and then allow the stream assessment stations to follow.

b. Frequency: Stream assessment stations must be monitored in May or June (to represent the influence of wet weather on the communities) ~~and~~ or September or October (to represent the influence of dry weather flows on the communities). The timing of monitoring of stream assessment stations must coincide with dry weather monitoring of mass loading stations.

Comment [CP10]: See discussion in Attachment 4 to the Comment Letter

c. Parameters / Methods: Stream assessment monitoring must include bioassessment, aquatic chemistry, and aqueous toxicity.

(1) Aquatic chemistry and aqueous toxicity must be conducted as outlined in Tables 1 and 2 using the same parameters and methods as the mass loading station monitoring.

(2) Bioassessment analysis procedures must include calculation of the Index of Biotic Integrity (IBI) for benthic macroinvertebrates for all bioassessment stations, as outlined in "A Quantitative Tool for Assessing the Integrity of Southern Coastal California Streams," by Ode, et al. 2005.

(3) ~~Monitoring of stream bioassessment stations~~Bioassessment must be conducted according to bioassessment Standard Operating Procedures (SOP) developed by the Surface Water Ambient Monitoring Program (SWAMP), as amended.[4] In collecting macroinvertebrate samples, the discharger must use the "Reachwide Benthos (Multihabitat) Procedure." The discharger must conduct, concurrently with all required macroinvertebrate collections, the "full" suite of physical/habitat characterization measurements specified in the SWAMP Bioassessment SOP, and as summarized in the *SWAMP*

Comment [CP11]: Only the Bioassessment component of stream assessment monitoring must be conducted according to the SOP.

[3] Ode, et al. 2005. "A Quantitative Tool for Assessing the Integrity of Southern Coastal California Streams." Environmental Management. Vol. 35, No. 1, pp. 1-13.
[4] Ode, P.R.. 2007. Standard operating procedures for collecting macroinvertebrate samples and associated physical and chemical data for ambient bioassessments in California. California State Water Resources Control Board Surface Water Ambient Monitoring Program (SWAMP) Bioassessment SOP 001.

Stream Habitat Characterization Form — Full Version. [5]

(4) Monitoring of stream assessment stations must incorporate assessment of algae using SWAMP's SOP for Collecting Stream Algae Samples.[6] Assessment of freshwater algae must include algal taxonomic composition (diatoms and/or soft algae) and algal biomass. Future bioassessment must incorporate algal IBI scores, when developed.

d. A qualified professional environmental laboratory must perform all Bioassessment sampling, laboratory, quality assurance, and analytical procedures in accordance with the Southern California Regional Watershed Monitoring Program Bioassessment Quality Assurance Project Plan.[7] The Copermittees must utilize future Quality Assurance Project Plans as developed by SWAMP.

Comment [CP12]: This section is referring to the Bioassessment component of stream assessment monitoring

(1) The Copermittees must have and follow a quality assurance (QA) plan that covers the required stream assessment monitoring. External QA check must be funded by the Copermittees, and performed by the California Department of Fish and Game's Aquatic Bioassessment Laboratory. An alternate laboratory with equivalent expertise and performance may be used if approved in advance in writing by San Diego Water Board.

(2) Identified organisms must be archived (i.e., retained) by the Copermittee(s) for a period of not less than three years from the date that all QA steps are completed. The identified organisms must be relinquished to the San Diego Water board upon request by the San Diego Board.

(3) The macroinvertebrate results (i.e., taxonomic identifications consistent with the specified SAFIT STEs, and number of organisms within each taxa) must be submitted to the San Diego Water Board in electronic format. SWAMP is currently developing standardized formats for reporting bioassessment data. All bioassessment data collected after those formats become available must be submitted using the SWAMP

[5] Available at: http://www.waterboards.ca.gov/water_issues/programs/swamp/docs/reports/fieldforms_fullversion052908.pdf

[6] Fetcher et al. 2009. Standard Operating Procedures for Collecting Stream Algae Samples and Associated Physical Habitat and Chemical Data for Ambient Bioassessments in California.

formats. Until those formats are available, the biological data must be submitted in MS-Excel[87] (or equivalent) format.

~~(4)~~ The physical/habitat data must be reported using the standard format titled *SWAMP Stream Habitat Characterization Form — Full Version*.

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3. Follow-up Analysis and Actions (TIE and TRE Triad Approach)

When results from the required monitoring indicate water quality impacts at a mass loading station or stream assessment station as defined in Table 3, Copermittees within the watershed(s) that discharge to that location must evaluate the extent and causes of MS4 discharge pollution in receiving waters and prioritize and implement management actions to eliminate or reduce sources of pollutants from the MS4 as described in Table 3. Toxicity Identification Evaluations (TIEs) must be conducted to determine the cause of toxicity as outlined in Table 3 below. Other follow-up activities, which must be conducted by the Copermittees, are also identified in Table 3. Once the cause of toxicity has been identified by a TIE, the Copermittees must perform source identification projects as needed and implement the measures necessary to reduce or eliminate the pollutant discharges and abate the sources causing the toxicity.

[8] Any version of Excel, 2000 or later, may be used.

approval. Documentation of participation and monitoring must be included in the annual report(s).

B. Wet Weather MS4 Discharge Monitoring

Each Copermittee must collaborate with the other Copermittees to develop, conduct, and report on a year-round, watershed-based, Wet Weather MS4 Discharge Monitoring Program. The monitoring program design, implementation, analysis, assessment, and reporting must be conducted on a watershed basis for each of the hydrologic subareas within the Santa Margarita HU under jurisdiction of the Copermittees. The monitoring program must be designed to meet the goals, and answer the questions, listed in Section I above, as well as to implement required Storm Water Action Levels (SALs) in the Order. The monitoring program must include the following components;

1. MS4 OUTFALL MONITORING

The Copermittees must collaborate to develop and implement a monitoring program to characterize pollutant discharges from MS4 outfalls in each watershed during wet weather. The program must include the rationale and criteria for selection of outfalls to be monitored. The program must, at a minimum, include collection of samples for pollutants listed in Table 4 (below). This monitoring program must be designed to sample ~~a~~ representative ~~percentage~~[11] ~~of the~~ major outfalls ~~within each hydrologic subarea~~ and must begin no later than the 2012-2013 monitoring year.

a. The program must comply with Section D of this Order for Storm Water Action Levels (SALs). ~~Samples must be collected during the first 24 hours of the storm water discharge or for the entire storm water discharge if it is less than 24 hours~~.

(1) Sampling may be done utilizing grab samples, though composite samples are encouraged. ~~Grab samples may be utilized only for pH, indicator bacteria, DO, temperature and hardness.~~

~~(2) All other constituents must be sampled using 24-hour composite samples or for the entire storm water discharge if the storm event is less than 24 hours.~~

b. Sampling to compare MS4 outfall discharges with total metal SALs must include a measurement of receiving water hardness at each

[11] A representative ~~percentage~~ determination must consider ~~hydrologic conditions,~~ total drainage area of the site, ~~population density of the site, traffic density, age of the structures or buildings in the area, and~~ land use

Comment [CP13]: See discussion in Attachment 4 to the Comment Letter, including footnote

Comment [CP14]: See discussion in Attachment 4 to the Comment Letter

Language from the Inland Aquatic Habitat Monitoring section.

types (commercial, residential and industrial), and other considerations as appropriate.

outfall. If a total metal concentration exceeds a SAL in Section D of the Order, that concentration must be compared to the California Toxic Rule criteria and the USEPA 1-hour maximum concentration for the detected level of receiving water hardness associated with that sample. If it is determined that the sample's total metal concentration for that specific pollutant exceeds the SAL but does not exceed the applicable 1-hour criteria for the measured level of hardness, then the SAL shall be considered not exceeded for that measurement.

Table 4. Analytical Testing for Wet Weather MS4 Discharges

Conventionals, Nutrients, Hydrocarbons	Pesticides	Metals (Total and Dissolved)	Bacteriological
• Total Dissolved Solids • Total Suspended Solids • Turbidity★ • Total Hardness • pH • Specific Conductance • Temperature • Dissolved Oxygen • Total Phosphorus★ • Dissolved Phosphorus • Nitrite ♁★ • Nitrate ♁★ • Total Kjeldahl Nitrogen • Ammonia • ~~Biological Oxygen Demand, 5-day~~ • ~~Chemical Oxygen Demand~~ • ~~Total Organic Carbon~~ • ~~Dissolved Organic Carbon~~ • Oil and Grease • Sulfate	• Diazinon • Chlorpyrifos • Pyrethroids	• Arsenic • Cadmium★ • Chromium • Copper★ • Lead★ • Nickel • Selenium • Zinc★ • Mercury • Silver • Thallium • Iron • Manganese	• Fecal Coliform • Enterococcus • E. coli
♁ Nitrate and nitrate may be combined and reported as nitrate + nitrite. ★Pollutant for which there is a Storm Water Action Level			

Comment [CP15]: See discussion in Attachment 4 to the Comment Letter

2. SOURCE IDENTIFICATION ~~MONITORING~~

Comment [CP16]: Source identifications for wet weather may or may not include "monitoring".

See discussion in Attachment 4 to the Comment Letter

The Copermittees must collaborate to develop and implement a ~~monitoring~~ program to identify sources of pollutants causing the priority water quality problems within each hydrologic subarea. The ~~monitoring~~ program must include focused monitoring ~~which moves upstream into each watershed~~ as necessary to identify source areas,

Comment [CP17]: This presumes we are starting at the 'bottom of the watershed'. We may approach this differently, but would come up with something to help identify source areas.

or other methods to identify the societal sources of pollutants, as appropriate. This ~~monitoring~~ program must ~~be implemented within each hydrologic subarea and must~~ begin no later than the 2012-2013 monitoring year.

Comment [CP18]: This is necessary because some pollutants have broad societal sources that cannot be pinpointed through focused source ID 'Monitoring'.

3. COMMENCEMENT OF MS4 OUTFALL AND SOURCE IDENTIFICATION MONITORING

The Principal Copermittee must submit to the San Diego Water Board for review and approval, a detailed draft of the wet weather MS4 discharge monitoring program to be implemented. The description must identify and provide the rationale for all constituents monitored, locations of monitoring, frequency of monitoring, and analyses to be conducted with the data generated. The draft must be submitted With the proposed monitoring program (Secion III.A.1).

C. Non-Storm Water Dry Weather Action Levels and Illicit Discharge Detection and Elimination

Each Copermittee must collaborate with the other Copermittees to conduct, and report on a year-round watershed based Dry Weather Non-storm Water MS4 Discharge Monitoring Program. The monitoring program's implementation, analysis, assessment, and reporting must be conducted to assess compliance with section B and C of this Order, meet the goals of the MRP, and conduct Illicit Discharge Detection and Elimination Activities under Section F.4 of this Order. The monitoring program must also be designed to assess the contribution of dry weather flows to Clean Water Act Section 303(d) listed impairments. The monitoring program must include the following components:

1. MS4 OUTFALL MONITORING

Each Copermittee's program must be designed to determine levels of pollutants in effluent discharges from the MS4 into receiving waters. Each Copermittee must conduct the following dry weather field screening and analytical monitoring tasks:

a. Dry Weather Non-storm Water Effluent Analytical Monitoring Station Identification

(1) Sampling Stations must be located at major outfalls pursuant to section C of this Order. Other outfall sampling points (or any other point of access such as manholes) identified by the

Copermittees as potential high risk sources of polluted effluent or as identified under Section C.4 of the Order must be sampled.

(2) Each Copermittee must clearly identify each dry weather effluent analytical monitoring station on its MS4 Map as either a separate GIS layer or a map overlay hereinafter referred to as a Dry Weather Non-storm Water Effluent Analytical Stations Map.

b. Develop Dry Weather Non-storm Water Effluent Analytical Monitoring Procedures

Each Copermittee must develop and/or update written procedures for effluent analytical monitoring including field observations, monitoring, and analyses to be conducted. These procedures must be consistent with 40 CFR part 136. At a minimum, the procedures must meet the following guidelines and criteria:

(1) Determining Sampling Frequency: Effluent analytical monitoring must be conducted at major outfalls and identified stations. The Copermittees must sample ~~a~~ representative ~~number of~~ major outfalls and identified stations ~~within each hydrologic subarea~~.[12] The sampling must be done to assess compliance with dry weather non-storm water action levels pursuant to section C of this Order. All monitoring conducted must be preceded by a minimum of 72 hours of dry weather.

Comment [CP19]: See discussion in Attachment 4 to the Comment Letter, including footnote

(2) Sampling of non-storm water discharges may be done utilizing grab samples. If a ponded MS4 discharge is observed at a monitoring station, the Copermittee(s) must record the observation and collect at least one (1) grab sample See discussion in Attachment 4 to the Comment Letter. If flow is evident, a 1-hour composite sample may be taken. The Copermittee(s) must estimate the flow using techniques such as by measuring the width of water surface, approximate depth of water, and approximate flow velocity.

(3) Effluent samples must undergo analytical laboratory analysis for (a) all constituents described in *Table 4. Analytical Testing for Wet Weather MS4 Discharges* ~~*Table 1. Analytical Testing for Mass Loading and Bioassessment*~~ of this Order; (b) Constituents with assigned non-storm water action levels under Section C of this Order; and (c) Total Residual Chlorine.

Comment [CP20]: Table 4 is more appropriate – consistency for all MS4 outfall stations.

[12] A representative ~~percentage~~ determination must consider ~~hydrologic conditions~~, total drainage area of the site, ~~population density of the site, traffic density, age of the structures or buildings in the area~~, and land use

types (commercial, residential and industrial) , and other considerations as appropriate.

(4) If the station is dry (i.e. no flowing or ponded MS4 discharge is observed), the Copermittee(s) must make and record all applicable observations on the ~~MS4 outfall and receiving waters~~monitoring site, including any evidence of past non-storm water flows and the presence of trash.

2. SOURCE IDENTIFICATION MONITORING

The Copermittees must collaborate to develop and implement a monitoring program to identify sources of pollutants in non-storm water discharges in accordance with Sections C and F.4 of this Order. The source identification portion of the monitoring program must include: the following components:

a. Development and/or update of response criteria for dry weather non-storm water effluent analytical monitoring results:

(1) Response Criteria must include action levels described in Section C of this Order.

(2) Response Criteria must include evaluation of LC_{50} levels for toxicity to appropriate test organisms.

b. Develop and/or update Illicit Discharge Detection and Elimination response procedures for source identification follow up investigations and elimination in the event of exceedance of dry weather non-storm water effluent analytical monitoring result criteria (see above). These procedures must be consistent with procedures required in section C, F.4.d, and F.4.e. of this Order.

3. COMMENCEMENT OF MS4 OUTFALL AND SOURCE IDENTIFICATION MONITORING

The Copermittees must commence implementation of dry weather effluent analytical monitoring under the requirements of this Order no later than **July 1, 2012**. If monitoring indicates an illicit connection or illegal discharge, the Copermittee(s) must conduct the follow-up investigation and elimination activities described in sections C, F.4.d and F.4.e of this Order. In the interim period until the dry weather non-storm water effluent analytical monitoring program of this Order is implemented, each Copermittee must continue to implement dry weather field screening and analytical monitoring as it was most recently implemented pursuant to Order No. 2004-001.

D. ~~**High Priority Inland Aquatic Habitat Monitoring**~~

Comment [CP21]: See discussion in Attachment 4 to the Comment Letter

The Copermittees must develop and submit for approval to the San Diego Water Board by April 01, 2012, an inland aquatic habitat monitoring program for areas supporting high priority aquatic and/or riparian species. The goal of the monitoring program is to assess if MS4 storm water and non-storm water discharges are affecting high priority inland aquatic habitat. The monitoring will assist the Copermittees in preventing the degradation of high quality waters within the jurisdiction of this Order that support high priority species by identifying discharges from MS4s which may cause or have the potential to cause impairment of beneficial uses within these areas.[1310] High priority species include those federally and/or state listed as endangered, threatened, or as a species of concern. The design and goal of the monitoring program must be consistent with the criteria listed in Section I.B of this Monitoring Program, including evaluation of the protection of high priority species in receiving waters. The Copermittees must implement the program unless otherwise directed in writing by the San Diego Water Board.

The monitoring program must include the following components:

1. OUTFALL AND RECEIVING WATER MONITORING

   The program must be designed to determine levels of pollutants in storm water and non-storm water effluent discharges from the MS4 discharged into high priority inland aquatic habitat(s) and the level of those pollutants found in ambient receiving waters subject to the discharge. The Copermittees must conduct the following field screening and analytical monitoring tasks:

   a. MS4 and Receiving Waters Monitoring Station Identification

      (1) MS4 Discharge Stations must be major outfalls that directly discharge into high priority inland aquatic habitat. MS4 Discharge Stations may be selected in conjunction with monitoring required under Section II.B and II.C of the Receiving Waters and MS4 Discharge Monitoring Program.

      (2) Receiving water station(s) must be located upstream and downstream of the discharge within the high priority inland aquatic habitat. Receiving water stations must be located to prevent any significant co-mingling of receiving water flows with

[10] [13]In accordance with requirements of State Water Resources Control Board Resolution No. 68-16, Statement of Policy with Respect to Maintaining High Quality Waters in California.

other sources.

b. Develop Analytical Monitoring Procedures

Each Copermittee must develop procedures for analytical monitoring (these procedures must be consistent with 40 CFR part 136), including field observations, pollutants to be monitored, analyses to be conducted, and quality assurance/control. At a minimum, the procedures must meet the following guidelines and criteria:

(1) Determining Sampling Frequency: The Copermittees must sample ~~a~~ representative ~~number of~~ major outfalls and receiving waters that are considered high priority inland aquatic habitat. Sampling of the discharge and receiving waters must be paired and occur during both storm and non-storm conditions.

(2) Sampling may be done utilizing grab samples, though composite samples are encouraged. ~~Sampling of storm and non-storm water discharges from the MS4 must be done in accordance with Section II.B and II.C.~~ If ponded discharge or receiving waters is/are observed at a monitoring station, the Copermittees must make written observations and collect at least one (1) grab sample. The Copermittee(s) must estimate the flow using techniques such as by measuring the width of water surface, approximate depth of water, and approximate flow velocity

(3) The proposed constituents for which samples will undergo analytical laboratory analysis.

(4) Procedures for recording applicable observations when monitoring stations are dry (i.e. no flowing water or ponded conditions).

3. ASSESSMENT OF MONITORING RESULTS

The program must include a discussion of monitoring results within the monitoring annual report. The discussion must include an evaluation of the contribution of MS4 discharges to ambient water conditions within high priority inland aquatic habitats, as well as any actions taken to prevent and/or reduce sources of those pollutants.

4. SOURCE IDENTIFICATION MONITORING

The Copermittees must collaborate to conduct source identification monitoring in accordance with Section II.B and II.C of the Monitoring and Reporting Program of this Order.

E. Special Studies

1. The Copermittees must conduct special studies, including any monitoring required for TMDL development and implementation, as directed by the San Diego Water Board.

2. Stormwater Monitoring Coalition Regional Monitoring of Southern California's Coastal Watersheds:

   The Copermittees must implement the monitoring program developed by the Bioassessment Workgroup of the Stormwater Monitoring Coalition, for Regional Monitoring of the Southern California's Coastal Watersheds within the San Juan Hydrologic Unit. Each Copermittee must evaluate the results of the monitoring program within and downstream of its jurisdiction and integrate the results into program assessments and modifications.

3. Low Impact Development Integrated Management Practices, testing and demonstration facility

   The Southern California Stormwater Monitoring Coalition (SMC) is conducting a study to measure the effectiveness of various LID BMPs. The Copermittees must participate in that study through implementation of their plan to construct an LID IMP Testing and Demonstration Facility at the District's headquarters. The project shall monitor effectiveness of the tested BMPs at pollutant reduction. The results of this study shall be summarized in the fourth year annual report and utilized in future revisions to the County's LID BMP manual.

~~2.~~4. ~~Sediment Toxicity Study~~

The Copermittees must develop and submit for approval to the San Diego Water Board by April 01, 2012, a special study workplan to investigate the toxicity of sediment in streams and potential impact on benthic macroinvertebrate IBI scores. The Sediment Toxicity Special Study must be implemented in conjunction with the Stream Assessment Monitoring in II.A.2.. The Copermittees must implement the special study unless otherwise directed in writing by the San Diego Water Board.

Comment [CP22]: See discussion in Attachment 4 to the Comment Letter

Comment [CP23]: See discussion in Attachment 4 to the Comment Letter

Comment [CP24]: Request remove **See discussion in Attachment 4 to the Comment Letter**

The Sediment Toxicity Special Study must include the following elements:

a. Sampling Locations: At ~~least 4~~the bioassessment locations identified pursuant to II.A.2. must be sampled, including 1 reference site and 1 mass loading site. Selection of sites must be done with consideration of subjectivity of receiving waters to discharges from residential and agricultural land uses.

b. Frequency: At a minimum, sampling must occur once per year at each site for at least 2 years. Sampling must be done in conjunction with the bioassessment sampling required under Section II.A.2 of the Monitoring and Reporting Program of this Order.

c. Parameters/Methods: At a minimum, sediment toxicity analysis must include the measurement of metals, pyrethroids and organochlorine pesticides. The analysis must include estimates of bioavailability based upon sediment grain size, organic carbon and receiving water temperature at the sampling site. Acute and chronic toxicity testing must be done using *Hyalella azteca* in accordance with Table 2.

d. Results: Results and a Discussion must be included in the Monitoring Annual Report (see III.A). The Discussion must include an assessment of the relationship between observed IBI scores under Section II.A.2 and all variables measured.

~~3.~~5. Trash and Litter Investigation

The Copermittees must develop and submit for approval to the San Diego Water Board by September 01, 2012, a special study workplan to assess trash (including litter) as a pollutant within receiving waters on a watershed based scale. Litter is defined in California Government Code 68055.1g as "…improperly discarded waste material, including, but not limited to, convenience food, beverage, and other product packages or container constructed of steel, aluminum, glass, paper, plastic and other natural and synthetic, materials, thrown or deposited on lands and waters of the state, but not including the properly discarded waste of the primary processing of agriculture, mining, logging, sawmilling, or manufacturing." A lead Copermittee must be selected for the Santa Margarita HU for the purposes of this Special Study. The Copermittees must implement the special study unless

otherwise directed in writing by the San Diego Water Board

The Trash and Litter Investigation must include the following elements:

a. Locations: The lead Copermittee must identify suitable sampling locations within the Santa Margarita HU.

b. Frequency: Trash at each location must be monitored a minimum of twice during the wet season following a qualified monitoring storm event (minimum of 0.1 inches preceded by 72 hours of dry weather) and twice during the dry season.

c. Protocol: The lead Copermittee for the watershed must use the "Final Monitoring Workplan for the Assessment of Trash in San Diego County Watersheds" and "A Rapid Trash Assessment Method Applied to Waters of the San Francisco Bay Region" to develop a monitoring protocol for the Santa Margarita HU.

d. Results and Discussion from the Trash and Litter Impairment Study must be included in the Monitoring Annual Report. The Results and Discussion must, at a minimum, include source identification, an evaluation of BMPs for trash reduction and prevention, and a description of any BMPs implemented in response to study results.

4.6. ~~Agricultural, Federal and Tribal Input Study~~

Comment [CP25]: Request remove
See discussion in Attachment 4 to the Comment Letter

The Copermittees must develop and submit for approval to the San Diego Water Board by September 01, 2012, a special study workplan to investigate the water quality of agricultural, federal and tribal runoff that is discharged into their MS4 (see Finding D.3.c of the Order). The Copermittees must implement the special study unless otherwise directed in writing by the San Diego Water Board.

The Agricultural, Federal and Tribal Input Special Study must include the following elements:

a. Locations: The Copermittees must identify a representative number of sampling stations within their MS4 that receive discharges of agricultural, federal, and tribal runoff that has not co-mingled with any other source. At least one station from each category must be identified.

b. Frequency: One storm event must be monitored at each sampling location each year for at least 2 years.

c. Parameters/Methods: At a minimum, analysis must include those constituents listed in Table 1 of the MRP (see II.A.1). Grab samples may be utilized, though composite samples are preferred. Copermittees must also measure or estimate flow rates and volumes of discharges into the MS4.

d. Results: Results and Discussion from the Agricultural, Federal and Tribal Input Study must be included in the Monitoring Annual Report.

~~5. MS4 and Receiving Water Maintenance Study~~

Comment [CP26]: Request remove
See discussion in Attachment 4 to the Comment Letter

The Copermittees must develop and submit for approval to the San Diego Water Board by April 01, 2012, a special study workplan to investigate receiving waters that are also considered part of the MS4 (see Finding D.3.c of the Order) and which are subject to continual vegetative clearance activities (e.g. mowing). The study must be designed to assess the effects of vegetation removal activities and water quality, including, but not limited to, modification of biogeochemical functions, in-stream temperatures, receiving water bed and bank erosion potential and sediment transport. The Copermittees must implement the special study unless otherwise directed in writing by the San Diego Water Board.

The MS4 and Receiving Water Maintenance Special Study must include the following elements:

~~a.~~e. Locations: The Copermittees must identify suitable sampling locations, including at least one reference system that is not subject to maintenance activities.

~~b.~~f. Parameters/Methods: At a minimum, the Copermittees must monitor pre and post maintenance activities for indicator bacteria, turbidity (NTU), temperature, dissolved oxygen and nutrients (Nitrite, Nitrate, Total Kjeldahl Nitrogen, Ammonia and Total Phosphorous). Copermittees must also measure or estimate flow rates and volumes.

~~c.~~g. Results and Discussion from the MS4 and Receiving Water Maintenance Study must be included in the Annual Monitoring Report. The Discussion must include relevance of findings to CWA

Section 303(d) listed impaired waters.

6.7. ~~Intermittent and Ephemeral Stream Perennial Conversion Study~~

Comment [CP27]: Request remove
See discussion in Attachment 4 to the Comment Letter

The Copermittees must develop and submit for approval to the San Diego Water Board by April 01, 2013, a special study workplan to investigate the extent of any impacts to beneficial uses from the conversion of historically ephemeral or intermittent receiving waters to perennially flowing waters due to the continued discharge of currently exempted non-storm water from the MS4 and/or discharges into MS4s covered under a separate NPDES permit into receiving waters. The goal of the study is to assess if any impacts to beneficial uses, including, but not limited to, WILD, WARM, COLD or RARE, have occurred due to continuous discharge of currently exempted non-storm water discharges, and if the discharges should no longer be exempt. The Copermittees must implement the special study unless otherwise directed in writing by the San Diego Water Board.

The Intermittent and Ephermeral Stream Perennial Conversion Special Study must include the following elements:

a. Locations: The Copermittees must investigate their MS4 and adjacent downstream receiving waters to identify portions that have historically been ephemeral or intermittent but currently exhibit perennial flow due to exempted non-storm water discharges. Investigation must include historic habitat assessments, USGS gauging information, and historic aerial photography. Sampling must occur at a minimum of 2 identified perennially converted locations. Should the Copermittees be unable to locate any converted waters, a full description of the investigation must be documented in the annual report.

b. Parameters/Methods: The Copermittees must conduct water quality monitoring of the non-storm water discharge in accordance with Section C of this Order. In addition, the Copermittees must select a minimum of 2 downstream sampling points within the receiving waters subject the discharge and conduct the following:

(1) Grab samples must be taken and analyzed for indicator bacteria, nutrients (Nitrite, Nitrate, Total Kjeldahl Nitrogen, Ammonia and Total Phosphorous), turbidity (NTU), temperature, dissolved oxygen, total hardness, pH and 303(d) listed pollutants for all receiving waters at or downstream of the sampling site. The Copermittees must measure or estimate flow

2. Monitoring Annual Report: The Principal Copermittee must submit the Receiving Waters and MS4 Discharge Monitoring Annual Report to the San Diego Water Board on October 1 of each year, beginning on **October 1, 2013**. Receiving Waters and MS4 Discharge Monitoring Annual Reports must cover the monitoring activities and results from the previous fiscal year, and must meet the following requirements:

Comment [CP28]: See discussion in Attachment 4 to the Comment Letter

a. Annual monitoring reports must include the data/results, methods of evaluating the data, graphical summaries of the data, and an explanation/discussion of the data for each monitoring program component.

b. Annual monitoring reports must include a watershed-based analysis of the findings of each monitoring program component (mass loading, bioassessment, etc…). Each watershed-based analysis must include:

(1) Identification and prioritization of water quality problems within each watershed.
(2) Identification and description of the nature and magnitude of potential sources of the water quality problems within each watershed.
(3) Evaluation and presentation of pollutant load and concentration increases or decreases at each mass loading station over time.
(4) Evaluation of pollutant loads and concentrations measured at mass loading stations with respect to land use, population, sources, and other characteristics of watersheds using tools such as multiple linear regression, factor analysis, and cluster analysis.
(5) Identification of links between source activities/conditions and observed receiving water impacts.
(6) Identification of recommended future monitoring to identify and address sources of water quality problems.
(7) Results and discussion of any TIE conducted, together with actions that will be implemented to reduce the discharge of pollutants in storm water MS4 discharges, eliminate any discharge of pollutants in non-storm water MS4 discharges, and abate the sources causing the toxicity.

c. Annual monitoring reports must include an analysis and interpretation of the data for each watershed with respect to the management questions listed in section I.B of this Receiving Waters Monitoring and Reporting Program.

d. Annual monitoring reports must include a discussion describing how each of the goals listed in section I.A of this MRP is addressed by the Copermittees' monitoring program for the monitoring year covered by the report.

e. ~~Annual~~ The 4th year monitoring report~~s~~ must include identification and analysis of any long-term trends in the Copermittees' MS4 storm water discharges or receiving water quality. Appropriate statistical methods shall be used to evaluate the water quality data. ~~Trend analysis must use nonparametric approaches, such as the Mann-Kendall test, including exogenous variables in a multiple regression model, and/or using a seasonal nonparametric trend model, where applicable.~~

f. ~~Annual monitoring reports must provide an estimation of total pollutant loads (wet weather loads plus dry weather loads) due to MS4 Discharge for each of the hydrologic subareas, including for 303(d) pollutants specified in Table 2 of the Order~~.

g. Annual monitoring reports must, for each monitoring program component listed above, include an assessment of compliance with applicable water quality standards.

h. Annual monitoring reports must describe monitoring station locations by latitude and longitude coordinates, frequency of sampling, quality assurance/quality control procedures, and sampling and analysis protocols.

i. Annual monitoring reports must use a standard report format and include the following elements:

(1) A stand alone comprehensive executive summary addressing all sections of the monitoring report;
(2) Comprehensive interpretations and conclusions; and
(3) Recommendations for future actions.

j. All monitoring reports submitted to the Principal Copermittee or the San Diego Water Board must contain the certified perjury statement described in Attachment B of this Order No. R9-2010-0016.

k. Annual monitoring reports must be reviewed prior to submittal to the San Diego Water Board by a committee of the Copermittees (consisting of no less than three different Copermittee members).

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Comment [CP29]: See discussion in Attachment 4 to the Comment Letter

Comment [CP30]: See discussion in Attachment 4 to the Comment Letter

l. Annual monitoring reports must be submitted in both electronic and paper formats. Electronic formats must be CEDEN or SWAMP-uploadable.[1411]

3. Monitoring programs and reports must comply with section II.F of Receiving Waters and MS4 Discharge Monitoring and Reporting Program No. R9-2010-0016 and Attachment B of this Order.

4. Following completion of an annual cycle of monitoring in October, the Copermittees must make the monitoring data and results available to the San Diego Water Board at the San Diego Water Board's request.

B. Interim Reporting Requirements

Prior to July 1, 2012 ~~For the October 2010 to October 2012 monitoring period,~~ the Principal Copermittee must submit the Receiving Waters Monitoring Annual Report as required under Order No. 2004-0001. The Receiving Waters Monitoring Annual Report must address the monitoring conducted to comply with the requirements of Order No. 2004-0001.

Comment [CP31]: The existing monitoring program is reported on a fiscal year basis. Need to align the monitoring report with the fiscal year and the JRMP annual report.

Also consistent with the change requested in III.A.2.

C. Reporting Dates

Table 5. Table of Required MRP Reporting Dates and Frequencies.

Comment [CP32]: See discussion in Attachment 4 to the Comment Letter related to the special studies changes.

Submittal	Section	Completion Date	Frequency
Description of Proposed Monitoring Program	III.A.1	June 1, 2012	One Time
Receiving Waters and MS4 Discharge Monitoring Annual Reports, Including Proposed Updates to the Monitoring Program	III.A.2	Starting October 1, 2013	Annual
Copermittees submit Interim Monitoring Program Annual Report	III.B	As required under Order No. 2004-001	One Time
Draft Wet Weather MS4 Discharge Monitoring Program	II.B	July 01, 2012	One Time
~~Draft High Priority Inland Aquatic Habitat Monitoring~~	~~II.D~~	~~April 01, 2012~~	~~One Time~~
~~Draft Sediment Toxicity Special Study~~	~~II.E.2~~	~~April 01, 2012~~	~~One Time~~
Draft Trash and Litter Impairment Special Study	II.E.3	September 01, 2012	One Time

[11] [14] For updates to the SWAMP templates and formats, see http://www.waterboards.ca.gov/swamp.

Submittal	Section	Completion Date	Frequency
~~Draft Agricultural, Federal and Tribal Input Study~~	~~II.E.4~~	~~September 01, 2012~~	~~One Time~~
~~Draft MS4 and Receiving Water Maintenance Study~~	~~II.E.5~~	~~April 01, 2012~~	~~One Time~~
~~Draft Intermittent and Ephemeral Stream Perennial Conversion Study~~	~~II.E.6~~	~~April 01, 2013~~	~~One Time~~

Attachment 10: Fact Sheet Comments

Introduction

These comments on the Fact Sheet should be read in conjunction with the other white papers submitted as part of the comments on the Tentative Order.

Fact Sheet Text, Page 7:

> "The First and Second Term Permits, Order Nos. 90-46 and 98-02, provided maximum flexibility**.** San Diego Water Board Order No. 90-46 contained the "essentials" of the 1990 regulations, but the requirements were written in very broad, generic terms. This was done in order to provide the maximum amount of flexibility to the Copermittees in implementing the new requirements (flexibility was, in fact, the stated reason for issuing the permit in advance of the final regulations). From staff's perspective however, "flexibility" in the form of lack of specificity, combined with the Copermittees' *lack of funding and political will,* also provided the Copermittees with ample reasons to take few substantive steps towards achieving water quality standards. The situation was exacerbated by the San Diego Water Board's own lack of storm water resources for oversight."

<u>Problem with Text</u>:
The statement regarding a 'lack of funding and political will' is unsupported and inflammatory, and provides no benefit in a public document.

<u>Suggestion:</u>
Delete this statement.

Fact Sheet Text, Page 12 and 13:

> "It is very difficult to ascertain the true cost of implementation of the Copermittees' management programs because of inconsistencies in reporting by the Copermittees. Reported costs of compliance for the same program element can vary widely from city to city, often by a very wide margin that is not easily explained.[6] Despite these problems, efforts have been made to identify management program costs, which can be helpful in understanding the costs of program implementation….
>
> A study on Phase I MS4 program cost was also conducted by the California Regional Water Quality Control Board, Los Angeles Region (Los Angeles Water Board), where program costs reported in the municipalities' annual reports were assessed. The Los Angeles Water Board estimated that average per household cost to implement the MS4 program in Los Angeles County was $12.50. 8 Since the Los Angeles County permit is very similar to Order No. R9-2004-001, this estimate is also useful in assessing general program costs in Riverside County.
>
> The State Water Board also commissioned a study by the California State University, Sacramento to assess costs of the Phase I MS4 program. This study includes an assessment of costs incurred by Phase I MS4s throughout the State to implement their programs. Annual cost per household in the study ranged from $18-46, with the Fresno-Clovis Metropolitan Area (FCMA) representing the lower end of the range, and the City of Encinitas (in San Diego County) representing the upper end of the range.9 Included in the study is the City of Corona, which is in Riverside County

> under the jurisdiction of the California Regional Water Quality Control Board, Santa Ana Region (Santa Ana Water Board).
>
> The annual cost per household for the City of Corona's program was estimated to be $32, which should be similar to the costs to implement the MS4 programs in the Riverside County portion of the San Diego Region. In contrast, the cost of the City of Encinitas' program, with an annual cost per household estimated to be $46, may represent the upper range of Riverside County MS4 programs. However, the City of Encinitas's program cost can be considered as the high end of the spectrum for management program costs because the City has a consent decree with environmental groups regarding its program, and City of Encinitas has received recognition for implementing a superior program.
>
> The annual costs for the City of Corona and City of Encinitas were estimated from data collected in 2003-2004. Between 2003 and 2008, the number of households in both cities has increased by approximately 3 percent and 7 percent, respectively.10 In contrast, between 2003 and 2008 the number of households in the City of Temecula has increased from 23,199 to 31,135 (34 percent)11 and the City of Murrieta has increased from 22,020 to 32,664 (48 percent).12 This significant increase in number of households indicates a significant increase in the tax base (sales and property tax) available to fund the implementation of the MS4 programs for the City of Temecula and City of Murrieta, as well as for the County of Riverside and recently incorporated cities."

<u>Problem with Text:</u>
The text notes that it is difficult to compare costs between Cities for stormwater program implementation since the cost accounting varies widely, and the specific issues also vary widely. Despite this fact, the fact sheet goes on to make just such comparisons and further implies that the Santa Margarita Region Cities are underfunding their programs by comparison. For example, the City of Encinitas is cited as an example of a city that is spending on the upper end for a stormwater program. The City of Encinitas varies significantly from the cities in the Santa Margarita area in that it must address a major outfall (Cottonwood Creek) at its primary beach (Moonlight Beach). Cottonwood Creek has perennial dry weather flow from urban sources and exceeds REC-1 and REC-2 water quality standards. Since Cottonwood Creek discharges at Moonlight Beach, frequent sanitary standard exceedences were noted on a year–round basis. The City of Encinitas constructed a dry weather flow treatment plant near Moonlight Beach to treat Cottonwood Creek to correct this problem. No such compliance problems exist for the Copermittees. The comparisons in this part of the fact sheet are not valid.

In addition, the Fact Sheet leaves the inaccurate impression that the Copermittees have ample financial resources to fund MS4 programs by completely ignoring the effects of the current national recession. (See Attachment 2). As pointed out in Attachment 2 (Economic Assessment), declines in home values and tax receipts have crippled the ability of the Copermittees to finance such programs. The Fact Sheet selectively examines the period 2003-2008, when there was significant growth, but ignores the period 2008-2010, when that growth ended and the economy declined precipitously, affecting property and sale tax receipts as well as other sources of revenue.

Attachment 10: Fact Sheet Comments

Suggestion:
Delete the text on Page 13 and 14 of the Fact Sheet.

Fact Sheet Text Page 15:

> "The vast majority of costs that will be incurred as a result of implementing OrderNo. R9-2010-0016 is not new. Storm water management programs have been in place in Riverside County for over 15 years. As shown in the discussion above, the amount spent for MS4 Permit compliance per household in the municipalities in the Riverside County portion of the San Diego Region is already low compared to other regions. Any increase in cost to the Copermittees, however, is still expected to be incremental in nature. Since Order No. R9-2010-0016 "fine tunes" the requirements of Order No. R9-2004-001, these cost increases are expected to be modest.
>
> Where there may be additional elements that will incur new costs, the Riverside County Copermittees are given the time to develop the budgets and funding mechanisms to phase those elements into their programs. Additionally, development of these additional elements by the Riverside County Copermittees will have the benefit of the experiences and work already done by the San Diego County and Orange County Copermittees."

Problem with Text:
The Fact Sheet states that the vast majority of costs for implementing the Tentative Order are 'not new'. This is not correct. Almost every program in the Tentative Order has been amended and require new resources. Specific programs include, but are not limited to, the monitoring program (over fivefold increase in costs), hydromodification management programs, new development programs, inspection programs, irrigation runoff prohibitions, retrofit studies and MS4 maintenance programs. The very prescriptive and detailed requirements of the Tentative Order impose new requirements on the Copermittees at a time when funding sources are drying up. The Copermittees estimate that implementation of the regional components of the new Order (as written) will cost approximately $11,500,000 (e.g. the costs to write the new compliance documents, develop the retrofit, hydromodification programs and develop and implement the new monitoring program). These costs are on top of the current expenditures to implement the existing regional monitoring program (approximately $5,000,000 for the five-year permit term). These costs are further amplified by the direct cost of implementation that will be incurred by the individual Permittees (e.g. the cost to implement the new compliance documents and hydromodification programs). The text further indicates that the Tentative Order provides time for the Permittees to 'develop…funding mechanisms'. This statement assumes that the Copermittees have the ability to collect additional funds from taxpayers to support the stormwater program implementation. This is false, since any such funds, outside of inspection or plan review fees, would be required to be submitted to a vote of the people pursuant to Propostion 218. In the current economic and political climate, a successful vote to increase taxes is extremely remote. The Copermittees further note that in the City of Encinitas in Orange County, cited by the staff as an example of proactive MS4 regulation, a minimal stormwater proposition recently was voted down.

Suggestion:
Delete the text noted above in the Fact Sheet and add a discussion on the difficulties of funding expansions to the Copermittees' stormwater programs due to Proposition 218.

Attachment 10: Fact Sheet Comments

Fact Sheet Text Page 16:

> "For example, household willingness to pay for improvements in fresh water quality for fishing and boating has been estimated by USEPA to be $158-210.18. This estimate can be considered conservative, since it does not include important considerations such as marine waters benefits, wildlife benefits, or flood control benefits. The California State University, Sacramento study reports that the annual household willingness to pay for statewide clean water is approximately $180.19. When viewed in comparison to household costs for existing management programs, household willingness to pay estimates exhibit that per household costs incurred by the Riverside County Copermittees to implement their management programs are very low."

Problem with Text:

The discussion in the referenced text is not represented correctly. The figure cited in the California State University, Sacramento study includes the cost of wastewater treatment. The author of the study notes:

'The survey question was for restoring water quality for all waters throughout the state from all impairment, not just within a city or region and not just for impairment from stormwater pollution.' The current cost for sewer fees exceed $200 per year, Thus, the vast majority of the "household willingness" figure relates to sanitary sewer costs, and not to the costs of addressing stormwater.

Suggestion:

Delete this text in the fact sheet and note that the cost consumers are currently paying for clean water in the Permit area exceeds that which studies cited have found they are willing to pay.

Fact Sheet Text Page 17:

> "University of California, Los Angeles assessed the costs and benefits of implementing various approaches for achieving compliance with the MS4 permits in the Los Angeles Region. The study found that non-structural systems would cost $2.8 billion but provide $5.6 billion in benefit. If structural systems were determined to be needed, the study found that total costs would be $5.7 to $7.4 billion, while benefits could reach $18 billion.[21] Costs are anticipated to be borne over many years – probably ten years at least. As can be seen, the benefits of the programs are expected to considerably exceed their costs. Such findings are corroborated by USEPA, which found that the benefits of implementation of its Phase II storm water rule would also outweigh the costs."

Problem with Text:

It is a basic principle that public spending should have a positive cost-benefit. The Fact Sheet implies that since spending on stormwater has a positive cost-benefit, such spending should be increased. The reality is that there are also other public spending priorities such as police, fire, ambulance, and public utilities competing for the same funding, all of which have positive cost-benefit ratios. Moreover, the UCLA study specifically focused on the benefit of improving beach water quality, which is a very significant economic factor in terms of tourism in coastal Los Angeles County. No beaches exist in the Santa Margarita Region, and given the ephemeral nature of many of the Region's waterways, attempting to extrapolate the UCLA study is not appropriate. In the absence of a similar cost-benefit study being undertaken in the Santa Margarita Region, the studies cited by staff do not provide any basis for the conclusions reached in the Fact Sheet.

Suggestion:
As the fundamental basis for this comment is flawed, in the absence of any local data for inland waterbodies in semi-arid climates, the text should be deleted.

Fact Sheet Text Page 35:

> "Trash, as litter in both solid and liquid form, is consistently found on and adjacent to roadways. A California Department of Transportation Litter Management Pilot Study found that of roadway trash, plastics and Styrofoam accounted for 33 percent of trash by weight, and 43 percent by volume. Further, the study found that approximately 80 percent of the litter associated with roadways was floatable, indicating that, without capture, this litter would enter Waters of the State after a storm event, resulting in the impairment of Beneficial Uses.[45] The study, however, relied upon a mesh capture size of 0.25 inches (6.35 millimeters). This size is too large to effectively capture plastic pre-production pellets (a.k.a. "nurdles"), which are roughly 3 mm in size, and likely underestimated the total contribution of plastics. Furthermore, pre-production plastic pellets, which are small enough to be easily digested, have been found to carry persistent organic pollutants, including PCBs and DDT."

Problem with Text:
While the Fact Sheet suggests that there is a compelling argument to address trash along Caltrans highways, such a problem is not found on municipal streets. The Caltrans studies found that a substantial portion of the litter load comes from uncovered loads on commercial and private vehicles. The low speed roadways operated by the Copermittees do not create similar conditions or handle similar traffic. Further, the text discusses pre-production plastics (nurdles), yet fails to acknowledge that there are no industries within the Copermittees' jurisdiction that manufacture or use this material. The Fact Sheet's citation of studies that have no bearing on actual conditions within the Santa Margarita Region cannot be used to justify programs in the Tentative Order addressing such non-existent conditions. The ROWD has a more informed discussion of trash issues based on actual conditions in the Santa Margarita Region.

Suggestion:
Revise the fact sheet text to discuss the current findings relative to trash in the Permit region based on the ROWD.

Fact Sheet Text Page 50 and 51

> Pg. 50 - "To date the San Diego Water Board and the Copermittees have identified overspray and drainage from potable and reclaimed water landscape irrigation as a substantial source and conveyance mechanism for pollutants into waters of the United States."
>
> Pg. 51 – "The San Diego Water Board and the Copermittees have identified irrigation water as a source of pollutants and conveyance of pollutants to waters of the United States, when applied improperly in excess and thereafter entering the MS4, in the following documents:"

Problem with Text:
The documents cited in the Fact Sheet do not support the conclusion that irrigation water is a source of pollutants or conveyance of pollutants in the *Santa Margarita Region*. First, the comments in the public education document cited in the Fact Sheet were borrowed from an Orange County publication, and do not represent any official conclusion by the Copermittees that irrigation water represents a water quality

threat. Plainly over-irrigation is to be discouraged, as even if the water is clean, it adds to the Copermittees' costs of addressing such waters. Second, this public education document is the *only* document from a Santa Margarita Region source. The other documents cited by staff are studies conducted in other areas, with different hydrology and climate. For a more comprehensive assessment of the irrigation runoff issues, please see Attachment 6 (Prohibition of Irrigation Runoff).

Suggestion:
Delete the referenced text and the quotes referencing Permittee education materials. Also remove the improperly supported irrigation runoff prohibition.

Revise the text to accurately reflect the lack of any connection between irrigation runoff and impairments of receiving waters in the Santa Margarita Region.

Fact Sheet Text Page 58:

> "Enforcement and inspection activities conducted by the San Diego Water Board during the previous permit term have found a lack of source control for many unpaved roads within the jurisdiction of the Copermittees."

Problem with Text:
The Copermittees submit that there is no evidence reflecting any substantial water quality problem relating to MS4 discharges affected by unpaved roads. Moreover, the mileage of unpaved roads in the jurisdiction of the Copermittees is a small percentage of the total mileage of unpaved roads in the Santa Margarita Region, given that many of these roads are operated by such jurisdictions as the U.S. Forest Service. Please see Attachment 5 (Unpaved Roads). Further, the Fact Sheet notes on page 27 that Permits "will cover municipal systems discharges in unincorporated portions of the county, it is the intent of EPA that management plans and other components of the program focus on the urbanized and developing area of the County". Dedicating resources to unpaved roads diverts already limited resources from the urbanized areas intended to be addressed by USEPA regulations.

Suggestion:
The references and associated program requirements should be removed from the Permit and addressed through a separate general permit for unpaved roads, if in fact unpaved roads are a significant source of pollutants.

Fact Sheet Text Page 69:

> "The order also found that the SSMP requirements are appropriately applied to the majority of the Priority Development Project categories that are also contained in section F.1 of this Order. The State Water Board also gave California Regional Water Quality Control Boards (Regional Water Boards) the needed discretion to include additional categories and locations, such as retail gasoline outlets(RGOs), in SSMPs "
>
> "The provisions of the SSMP section of the Order are also consistent with those previously issued by the San Diego Water Board for Riverside County (Order No. R9-2004-001), Southern Orange County (Order Nos. R9-2002-0001 and R9-2009-0002) and San Diego County."

Attachment 10: Fact Sheet Comments

Problem with Text:
Several PDP categories or thresholds are not supported by Order WQ 2000-11 such as the 10,000 square feet requirement for residential areas nor the 1-acre threshold for all development projects. Further the Order ignores other applicable portions of Order WQ 2000-11. Specifically, the memo from State Board Chief Counsel Craig S. Wilson transmitted WQ Order 2000-11 to the Regional Board executive officers states that with regard to discretion that:

> "3. The Order allows broader discretion by the Regional Water Boards to decide whether to include additional types of development in future SUSMPs. These areas for potential future inclusion in SUSMPs include retail gasoline outlets, ministerial projects (only discretionary projects are included in the approved SUSMPs), and projects in environmentally sensitive areas. **If Boards include these types of developments in future permits, the Order explains the types of evidence and findings that are necessary."**

Order 2000-11 requires that revisions to regulatory thresholds be justified economically. The Copermittees have expressed their concern with requirement F.1.d.(2)(a) regulating residential developments of 10,000 sq. ft. or more and requirement F.1.d.(1)(c) regulating any project 1-acre or more. These thresholds, and their relative impact on project proponents, have not been adequately justified. The Permittees have noted that these regulations will negatively impact the construction of custom homes (individual lot developments). The relative economic impact of meeting the SSMP requirements for individual homeowners has not been justified in the fact sheet.

Suggestion:
As shown in the redline markup (Attachment 9); The 1-acre SSMP threshold (F.1.d.(1)(c)) should be deleted and the 10,000 square feet threshold for residential areas (F.1.d.(2)(a)) should be made the same as the requirement contained in the Riverside County Santa Ana NPDES MS4 Permit.

Fact Sheet Text Page76:

> "The success of future stream restoration and stabilization is, however, dependent on preventing and reducing physical impacts from activities upstream. Therefore, hydromodification management measures are necessary upstream of modified (e.g. concrete, rip rap, etc.) channels in addition to non-modified channels."

Problem with Text:
In some areas, hardened channels may be needed for flood control and public safety. In those areas, channel restoration may not be feasible and onsite controls are not warranted. The protection of public safety from flooding is a statutorily required duty of the District. See Water Code App. Section 48-9. Any provisions of the Tentative Order that would presume to challenge this duty must be deleted. The District assumes that the Regional Board and staff are not placing themselves in the position of making flood control judgments, as the agency is neither charged by the Legislature with such obligation nor is the agency equipped to do so.

Suggestion:
Revise the text to add "except where hardened channels are required for the protection of public safety"

Attachment 10: Fact Sheet Comments

Fact Sheet Text Page 77:

> "Since municipalities are the lead permitting authority for industrial land use and construction activities, they are also the lead for enforcement regarding runoff discharges from these sites."

Problem with Text:
This is a leap of logic we should probably not let pass. The Copermittees can greatly influence the design and construction, but the Industrial Permit is focused on the operation of the facility, and that is where the authority of the Board lies - and is arguably the most important aspect of runoff quality from the site.

Suggestion:
Delete the sentence.

Fact Sheet Text Page 79:

> "To clarify, an unaltered natural drainage, which receives runoff from a point source (channeled by a Copermittee to drain an area within their jurisdiction), which then conveys the runoff to an altered natural drainage or a man-made MS4, is both an MS4 and a receiving water."

Problem with Text:
As noted in Attachment 7 (General Legal Comments) regarding Finding D.3.c., a natural drainage, whether or not it conveys point source runoff to a man-made MS4, is not itself part of the MS4.

Suggestion:
Delete text.

Fact Sheet Text Page 79:

> "As operators of the MS4s, the Copermittees cannot passively receive and discharge pollutants from third parties. By providing free and open access to an MS4 that conveys discharges to waters of the U.S., the operator essentially accepts responsibility for discharges into the MS4 that it does not prohibit or otherwise control. These discharges may cause or contribute to a condition of contamination or a violation of water quality standards."

Problem with Text:
First, the Copermittees, as operators of the MS4, are required to address storm drainage. During storm conditions in particular, the District is required to handle flood waters so as to protect the lives and property of residents of Riverside County. The failure to do so is a violation of state law. See Water Code App. Section 48-9. Thus, the Copermittees must "passively receive and discharge" waters from third parties, which waters may contain pollutants. Moreover, the operator of the MS4 is NOT accepting responsibility for discharges from other MS4 systems. There is no provision for joint liability under the federal Clean Water Act or the California Water Code. The former directs its prohibitions against a "discharger," and no others. 33 U.S.C. §§ 1319 and 1342. A party is responsible only for its own discharges or those over which it has control. *Jones v. E.R. Snell Contractor, Inc.*, 333 F.Supp.2d 1344, 1348 (N.D. Ga. 2004); *United States v. Sargent County Water Dist.*, 876 F.Supp. 1081, 1088 (D.N.D. 1992).

The Clean Water Act MS4 regulations, moreover, specifically provide that Copermittees under an MS4 Permit are required to "comply with permit conditions relating to discharges from the municipal separate storm sewers for which they are operators." 40 C.F.R. § 122.26(a)(3)(vi) (emphasis supplied). Moreover,

the Regional Board, as the permitting agency for stormwater and Industrial Permits, and the State Board as the overall agency responsible for compliance with the Clean Water Act in California, are responsible for ensuring that the discharges from such permitted facilities, whether or not they enter the MS4, are in compliance with the requirements of those permits. Finally, many sources of pollutants are beyond the control of the MS4 operators but are within the control of other agencies, if those agencies elect to exercise their authority. A major example is the discharge of metals from motor vehicle brake pads, which contributes to exceedances of copper, zinc and potentially other metals in stormwater. The MS4 operators cannot control the composition of brake pads, nor can the MS4 operators control air emissions from domestic and foreign sources that discharge pollutants onto the surface area of the region, which can then wash into the MS4 systems.

Suggestion:
Delete cited text.

Fact Sheet Text Page 81:

> "Since treatment generally does not occur within the MS4, in such cases reduction of storm water pollutants to the MEP must occur prior to discharges entering the MS4."

Problem with Text:
Nothing in the MS4 regulations prohibits use of the MS4 for treatment. Frankly, some of the most effective treatment facilities for pollutants may be located in the MS4 as part of regional treatment systems. An example are catch basins, which collect trash and other debris and detention and retention basins that can be used to capture, treat and infiltrate runoff.

Suggestion:
Delete cited text.

Fact Sheet Text Page 84:

> "When appropriately applied as in this Order, retrofitting existing development meets MEP."

Problem with Text:
Only retrofits that are applied with the requirements of the Order meet MEP, which is not the case.

Suggestion:
Delete the text.

Fact Sheet Text Page 88:

> "The RWL language in the Order requires storm water compliance with water quality standards through an iterative approach for implementing improved and better-tailored BMPs over time. The iterative BMP process requires the implementation of increasingly stringent BMPs until receiving water quality standards are achieved. This is necessary because implementation of BMPs alone cannot ensure attainment of receiving water quality standards."

Problem with Text:
61 Federal Register 57425 (1996), Interim Permitting Approach for Water Quality-Based Effluent Limitations in Storm Water Permits states "expanded or better-tailored BMPs in subsequent permits, where necessary, to provide for the attainment of water quality standards."

Attachment 10: Fact Sheet Comments

Suggestion:
The second sentence should be revised to reflect the actual text from federal regulations (specifically "in subsequent permits"). Further the last sentence does not make sense and is contrary to the proceeding text and should be deleted.

Fact Sheet Text Page 112:

> "The San Diego Water Board has responded to complaints about and observed runoff from over-irrigation entering the MS4s in the Riverside County portion of the San Diego Region."

Problem with Text:
There is no evidence in the fact sheet supporting this statement.

Suggestion:
Provide evidence or delete statement.

Fact Sheet Text Page 130:

> "This section requires the use of native and/or low water use plants for landscaping."

Problem with Text:
There was an agreement that this would be suggested but not a requirement. This requirement also mandates the means of compliance, in violation of Water Code section 13360.

Suggestion:
Change the text:

> "Section ~~requires~~ suggests the use of native and/or low water use plants for landscaping,"

Fact Sheet Text Page 136:

> "This requirement is needed because to date, the Copermittees have generally approved low removal efficiency treatment control BMPs without justification or evidence that use of higher efficiency treatment BMPs was considered and found to be infeasible."

Problem with Text:
The Copermittees challenge the accuracy of this Statement. Riverside County has been requiring landscaped based low impact development BMPs since 2005. The District has also spent a substantial sum of money and time developing BMP manuals with specific criteria to ensure the effectiveness of BMPs.

Suggestion:
Delete the unsupported and offensive statement.

Fact Sheet Text Page 142:

> "Where streams are hardened and/or buried to convey storm water, they cannot provide adequate water quality."

Problem with Text:
Unsupported and incorrect. Hardened channels can be designed to provide both flood protection and natural stream function. For example, hardened levees can be designed to be set back and backfilled with native material, effectively providing a natural substrate for stream function. Similarly, porous channel materials such as gabions can provide both flood protection and substrate for native habitat. Finally,

even underground systems can be connected to regional treatment systems that provide requisite water quality benefits where appropriate.

Suggestion:
Delete.

Fact Sheet Text Page 145:

> "Redevelopment projects, however, must be able to achieve post-project runoff flow rates and durations that are less than or equal to pre-project and down to pre-development runoff flow rates and durations to be eligible to receive a waiver under the program."

Problem with Text:
This requirement is self-defeating. By placing regulatory obligations on redevelopments that make the cost of redevelopment greater than the cost of developing on virgin land, the Permit effectively promotes inner-city blight as existing structures are abandoned and suburban development is promoted due to economic factors. The Permit should include accommodations for redevelopment to ensure that existing developed areas are economically preferable for new development and to prevent the onset of unnecessary additional impervious area.

Suggestion:
The Permit and fact sheet should be revised to offer exemptions for hydromodification requirements for redevelopments where such improvements are infeasible.

Fact Sheet Text Page 160:

> "Retrofitting existing development is practicable for a municipality through a systematic evaluation, prioritization and implementation plan focused on impaired water bodies, pollutants of concern, areas of downstream."

Problem with Text:
Although the current requirement simply calls for a study, it is expected that future permits will require implementation of said study. This study exceeds the requirements for Copermittees to evaluate opportunities for retrofit of the MS4 contained in the federal regulations and federal Clean Water Act. There are no revenues to promote such a program.

Suggestion:
The Board should recognize in the fact sheet that without funding provided by the state, there is no revenue for such a program.

Fact Sheet Text Page 161:

> **"Section F.3.d.(4)** requires each Copermittee to cooperate with private property owners to encourage the implementation of site specific retrofitting projects. Because the Copermittees have limited authority to directly require retrofitting projects on private property, the Copermittees must encourage private property owners to implement retrofitting projects through indirect programs and incentives."

Problem with Text:
If the Board wishes to promote urban retrofit, then they also need to incentivize the program. Currently, property owners wishing to volunteer for urban retrofit projects are required to comply with the SSMP,

including hydromodification and LID requirements, opt into BMP inspection programs and subject themselves to ongoing scrutiny through business inspection programs required by the Permit. The permit places an ECONOMIC DISINCENTIVE in the way of promoting a general good for the watershed. The purpose of this requirement is to promote acceleration of water quality benefits from existing urban areas. The requirements, as written, promote a program that is doomed to failure.

Suggestion:
The Board should clearly exempt urban retrofit projects from the new development requirements of the Permit if they wish to accelerate water quality improvements from existing urban areas.

Fact Sheet Text Page 162:

> "Periodic inspections may be performed to ensure the site owner has not removed the retrofit BMPs."

Problem with Text:
Similar to the prior comment, this creates a disincentive to retrofit BMPs.

Suggestion:
Delete.

Fact Sheet Text Page 163:

> **"Section F.4.b** …access points (i.e. manholes), connections…"

Problem with Text:
The text from the Phase I rule implementing the NPDES regulations and the requirement of the storm drain system map is:

(from Federal Register, Vol 55, No 222, Friday Nov 18, 1990):

> "[submit] a USGS 7.5 minute topographic map...[showing] The location of known municipal storm sewer system outfalls discharging to waters of the United States...the location of major structural controls for storm water discharge (retention basins etc) and the identification of publicly owned parks, recreation areas and other open lands."

The proposed requirements exceed the federal regulatory requirements for MS4 mapping. Further, the mapping of manholes is a significant economic burden that would have no benefit for our staff. Manholes are typically placed at regular intervals (300 – 500 feet) on underground storm drain systems. Once a map providing the location of the MS4 system is available, manholes are quickly located through visual inspection in the field. Further, storm drain plans that are available to Permittee staff can be used to locate specific manholes where absolutely necessary. The economic costs of mapping potentially thousands of manholes is not offset by any known benefit.

Suggestion:
Delete requirement to map manholes.

Attachment 10: Fact Sheet Comments

Fact Sheet Text Page 198:

> "**Section II.D** (High Priority Inland Aquatic Habitat) of the MRP describes required monitoring to be done in order to assess if MS4 storm water and/or non-storm water discharges are affecting high priority aquatic and/or riparian species."

Problem with Text:
This requirement was deleted from the Orange County NPDES MS4 Permit when the provision to assess outfalls using NALs and SALs was added. It is not clear why such an accommodation would not also be provided to the Riverside County NPDES MS4 Program. This region has significantly less economic resources than south Orange County or San Diego County to implement monitoring programs. The Permittees specifically request this be deleted as impacts to aquatic habitat will be detected through the NAL/SAL program.

Suggestion:
This requirement should be deleted.

Table of Deliverable Due Dates

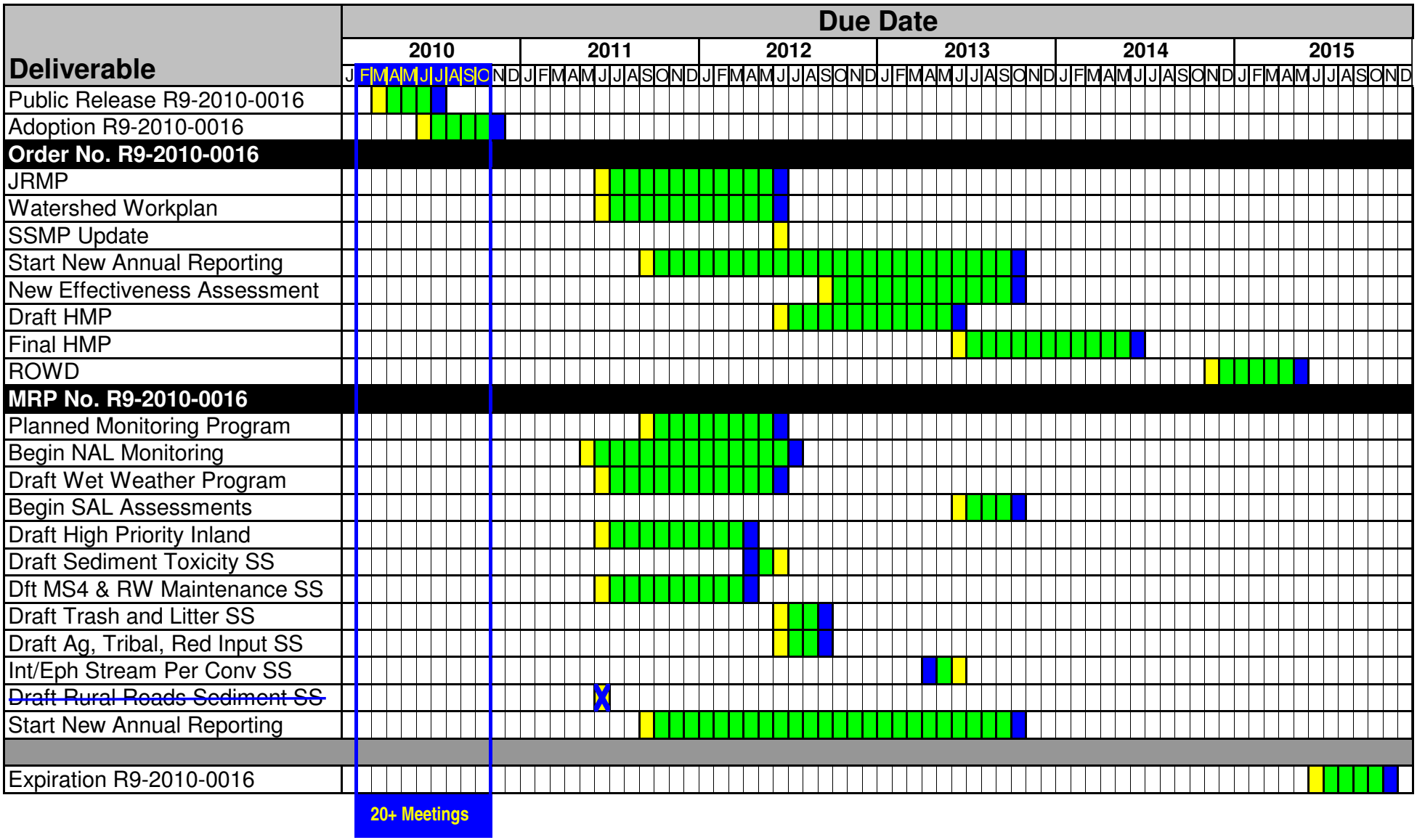

Dates based on original Order No. R9-2010-0016 scheduled for adoption in June 2010

Months due date for deliverable delayed

Dates based on current Order No. R9-2010-0016 scheduled for adoption in November 2010

Supporting Document No. 10
Item No. 6
November 10, 2010

WARREN D. WILLIAMS
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RIVERSIDE COUNTY FLOOD CONTROL
AND WATER CONSERVATION DISTRICT

September 28, 2010

Mr. David W. Gibson, Executive Officer
San Diego Regional Water Quality Control Board
9174 Sky Park Court, Suite 100
San Diego, CA 92123-4340

Dear Mr. Gibson:

Re: October 13, 2010 Board Meeting
Agenda Item 5: Tentative Order
No. R9-2010-0016

In accordance with Note D to the October 13, 2010 meeting agenda notice, the Riverside County Flood Control and Water Conservation District (District), on behalf of itself and the County of Riverside and the Cities of Menifee (to the extent that this City will be subject to the tentative order), Murrieta, Temecula and Wildomar (collectively, the "Permittees") are writing to request alternate hearing procedures for the Regional Board's consideration of Tentative Order No. R9-2010-0016, noticed as Agenda Item Number 5 on the October 13, 2010 Regional Board Meeting Agenda.

The Permittees are making this request for three reasons. First, the Tentative Order is a complex document, containing a number of provisions that have not been included in previous municipal stormwater permits issued by this Board. The Permittees have identified concerns and suggestions regarding these provisions and wish to be able to have sufficient time to share those concerns and suggestions directly with Regional Board members. Second, the Permittees have not been afforded a workshop on the terms of the Tentative Order, thus, Board members will not have had the benefit of hearing directly from the Permittees with respect to the provisions of the Order. Third, while the Permittees have submitted written comments highlighting their primary concerns on the Tentative Order, Regional Board staff has not responded to these written comments as of the deadline for this Notice and Board staff has indicated that they will not be willing to meet with us to resolve remaining issues until after the response to comments has been published.

In light of these reasons and in accordance with Note D, the Permittees hereby request alternate hearing procedures for Agenda Item 5 of the October 13th Board Meeting. As expressed previously to Regional Board staff, the specific format and time needed by the Permittees at the hearing will necessarily be dependent on the Regional Board staff's pending response to comments. Therefore, the Permittees additionally request a meeting between the Permittees and Regional Board staff on the second working day (Monday through Thursday) following the release of the response to comments. The purpose of this meeting will be to discuss and finalize the needed modifications to the hearing procedures, pursuant to this request.

On behalf of the Permittees, the District would like to thank Regional Board staff for the direct discussions that have occurred over the past several months. Those honest and direct discussions resulted in several key improvements to the Tentative Order. However, as we noted in our August 25, 2010 meeting, the process was cut short by the staff desire to hear the Permit on October 13th, resulting in issues which unavoidably must be taken to the Board for resolution. Further, the process as laid out by the Regional Board staff did not provide the Permittees with a workshop before the Board, or substantive time to respond to any revisions that may be proposed in the Response to Comments. Thus, sufficient time is required at the October 13th hearing so that the Permittees will have an adequate opportunity to verbally and directly convey their comments to the Board.

Please contact the undersigned with the Board's response to this request. Thank you for your attention to the Permittees' request.

Very truly yours,

JASON E. UHLEY
Chief of Watershed Protection Division

ec: Santa Margarita Region MS4 Permittees

CP:cw:bjp
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RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

October 4, 2010

Mr. David W. Gibson, Executive Officer
San Diego Regional Water Quality Control Board
9174 Sky Park Court, Suite 100
San Diego, California 92123-4340

Dear Mr. Gibson:

Re: Request for Alternate Hearing Procedures
October 13, 2010 Board Meeting
Agenda Item #5

In accordance with the Riverside County MS4 Permittees' (Permittees) request for an alternative hearing format dated September 28, 2010, and for the reasons specified therein, the Permittees hereby request the following schedule for providing testimony at the October 13th Water Board meeting:

1. Following the presentation by Board Staff, testimony by Permittees' elected officials (3-5 minutes each)

2. Joint Permittee Technical Presentation (1 hour)

3. Following testimony by other interested parties, Permittees' closing presentation (15 minutes, including providing an exhibit handout)

The Permittee presentations/testimony will likely utilize PowerPoint presentations and therefore, the Permittees additionally request a projector, screen and computer system pre-loaded with Microsoft PowerPoint software.

The Permittees reserve the right to assert additional hearing rights afforded by the Code of Regulations or the Administrative Procedure Act if required to respond to testimony or questions by the Board.

Thank you in advance for your consideration of these requests.

Very truly yours,

JASON E. UHLEY
Chief of Watershed Protection Division

CP:cw
P8/133616

California Regional Water Quality Control Board

San Diego Region

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TO: Acting Chairman Destache and San Diego Regional Water Quality Control Board Members

FROM: Catherine George Hagan, Senior Staff Counsel
Office of Chief Counsel

DATE: October 26, 2010

SUBJECT: **Tentative Order No. R9-2010-0016, Regulation of Non-Storm Water Discharges, Consideration of Economics and Unfunded State Mandates**

During the California Regional Water Quality Control Board, San Diego Region's (San Diego Water Board) proceedings last year to consider and reissue National Pollutant Discharge Elimination System (NPDES) Waste Discharge Requirements for Discharges of Runoff from the Municipal Separate Storm Sewer Systems (MS4s) draining the watersheds of Orange County within the San Diego Region (the Orange County MS4 permit), San Diego Water Board members requested that Board counsel respond to public comments and Board member questions on issues such as Water Board regulation of non-storm water discharges, unfunded state mandates and the extent of applicable requirements to consider economic information in adopting MS4 permits. Similar legal comments have been raised in the San Diego Water Board's proceeding to consider Tentative Order No. R9-2010-0016. the Riverside County MS4 Permit (Tentative Order). This legal memorandum, provided for your consideration along with Responses to Comments, addresses some of the key legal issues and has been updated to reflect recent legal developments since the Orange County MS4 proceeding ending in December of 2009.

I. Regulation of Non-Storm Water Discharges

Commenters assert that regardless of whether a discharge is composed entirely of storm water or non-storm water, any pollutants discharged *from* an MS4 are subject to the maximum extent practicable (MEP) standard and related iterative process, despite the Clean Water Act's (CWA) more stringent requirement that discharges of non-storm water into an MS4 be "effectively prohibited." Copermittees in the Orange County MS4 permit proceeding made essentially the same argument there to oppose proposed numeric effluent limitations for non-storm water discharges. Numeric effluent limitations were not adopted for the Orange County MS4 permit and are not proposed in this Tentative Order. But commenters raise the argument that non-storm water discharges from the MS4 need only be subject to the MEP standard and related iterative process in their objections to the Tentative Order's requirement that the Copermittees must effectively prohibit certain categories of previously

exempt non-storm water discharges, now identified as sources of pollutants, from entering the MS4.

For reasons stated in the Responses to Comments and elaborated on below, Board counsel does not agree with the comments that conclude non-storm water discharges from the MS4 are subject only to the MEP standard. The CWA employs the strategy of prohibiting the discharge of any pollutant from a point source into waters of the United States unless the discharger of the pollutant(s) obtains an NPDES permit pursuant to CWA Section 402. The 1987 amendment to the CWA includes provision 402(p) that specifically addresses NPDES permitting requirements for storm water discharges from MS4s. Section 402(p) prohibits the discharge of pollutants from specified MS4s to waters of the United States except as authorized by an NPDES permit and identifies two substantive standards for MS4 storm water permits. MS4 permits (1) "shall include a requirement to effectively prohibit non-stormwater discharges into the storm sewers[ ]" and (2) "shall require controls to reduce the discharge of pollutants to the maximum extent practicable, including management practices, control techniques and system, design and engineering methods, and such other provisions as the Administrator or State determines appropriate for the control of such pollutants." (CWA § 402(p)(3)(B)(ii-iii).)

In November 1990, the United States Environmental Protection Agency (USEPA) published regulations addressing storm water discharges from MS4s. (Vol. 55 Federal Register (Fed. Reg.) 47990 and following (Nov. 16, 1990) (Phase I Final Rule).) The regulations establish minimum requirements for MS4 permits, and generally focus on the requirement that MS4s implement programs to reduce the amount of pollutants found in storm water discharges to the MEP. The Clean Water Act's municipal storm water MEP standard does not require storm water discharges to strictly meet water quality standards, as is required for other NPDES permitted discharges. Compliance is achieved through an iterative approach of continuous implementation of improved best management practices (BMPs). This distinction reflects Congress's recognition that variability in flow and intensity of storm events render difficult strict compliance with water quality standards by MS4 permittees. In describing the controls that permits must include to reduce pollutants in storm water discharges to the MEP, the statute states that the controls shall include: "management practices, control techniques and system, design and engineering methods, and such other provisions as the [permit writer] determines appropriate for the control of such pollutants." (CWA § 402(p)(3)(B)(iii).)

In contrast, non-storm water discharges from the MS4 that are not authorized by separate NPDES permits, nor specifically exempted (see 40 C.F.R. § 122.26(d)(2)(iv)(B)), are subject to requirements under the NPDES program, including discharge prohibitions, technology-based effluent limitations and water quality-based effluent limitations. (40 C.F.R. § 122.44.) The regulations also require the MS4's program to include an element to detect and remove illicit discharges and improper disposal into the storm sewer. (40 CFR § 122.26(d)(2)(iv)(B).)

While "non-storm water" is not defined in the CWA or federal regulations, the federal regulations define "illicit discharge" as "any discharge to a municipal separate storm sewer that is not composed entirely of storm water and that is not covered by an NPDES permit (other than the NPDES permit for discharges from the municipal separate storm sewer and discharges resulting from fire fighting activities)." (Id., at § 122.26(b)(2).) This definition is the most closely applicable definition of "non-storm water" contained in federal law. As

stated in the Phase I Final Rule, USEPA added the illicit discharge program requirement to begin implementation of the 'effective prohibition' requirement to detect and control certain non-storm water discharges to their municipal system. USEPA stated: "Ultimately, such non-storm water discharges through a municipal separate storm sewer must either be removed from the system or become subject to an NPDES permit (other than the permit for the discharge from the [MS4])." (55 Fed. Reg. 47990, 47995 (Nov. 16, 1990).)[1]

Thus, federal law mandates that permits issued to MS4s must require management practices that will result in reducing storm water pollutants to the MEP yet at the same time requires that non-storm water discharges be effectively prohibited from entering the MS4. The argument that non-storm water discharges, prohibited from entry into the MS4 in the first instance, should be held to comply with only the less stringent MEP standard developed for storm water discharges is contrary to and potentially renders the "effectively prohibit" requirement in section 402(p)(3)(B)(ii) meaningless. Consistent with federal law, unless non-storm water discharges to the MS4 are authorized by a separate NPDES permit or are specifically exempted under federal regulations, non-storm water discharges are appropriately subject to the effective prohibition requirement in the CWA and regional water boards are not limited by the iterative MEP approach to storm water regulation in crafting appropriate regulations for non-storm water discharges.

B. Obligation to Consider Cost (Water Code § 13241)

Many commenters assert that provisions in the Tentative Order are new permit terms that exceed federal law and therefore the San Diego Water Board is required, but has failed, to consider factors in Water Code section 13241, including cost information, prior to approving the Tentative Order.

In *City of Burbank v. State Water Resources Control Board, et al.* ((2005) 35 Cal.4th 613) (*Burbank*), the California Supreme Court considered whether regional water boards must

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[1]As released for public comment, the Tentative Order included reference to State Water Board Order WQ 2009-0008 as a precedential order on the topic of regulation of non-storm water discharges. The memorandum prepared by Board counsel for the Orange County MS4 permit included citations to State Water Board Order WQ 2009-0008 in support of the above conclusions. State Water Board Order WQ 2009-0008 arose from the State Water Board's review of amendments to a Los Angeles Water Board MS4 permit to incorporate the implementation of summer dry weather Total Maximum Daily Load waste load allocations. In July 2010, the Superior Court for Los Angeles County remanded the Los Angeles Water Board's permitting action based upon procedural irregularities at the adoption hearing. This remand had the result of setting aside and voiding State Water Board Order WQ 2009-0008. The court set aside the order "without prejudice to the State Water Resources Control Board's consideration of the matters addressed in Order WQ 2009-0008 based on any new administrative record that may come before it . . . ." (*County of Los Angeles, et al. v. State Water Resources Control Board, California Regional Water Quality Control Board, Los Angeles Region, et al.,* Case No. BS1222724 (July 16, 2010) Judgment Granting Writ of Mandate, Exhibit 1, p. 2.). Thus, although commenters are correct that State Water Board Order WQ 2009-0008 is no longer a precedential State Water Board order (and was voided and set aside on October 11, 2010) and references to its precedential effect have been removed through errata, its substantive provisions were not reviewed by the court and it is appropriate for the San Diego Water Board to continue to agree with its reasoning, based upon evaluation of applicable federal authorities.

comply with Water Code section 13241 by taking into account the costs a permit holder will incur in complying with permit requirements when issuing waste discharge requirements under Water Code section 13263, subdivision (a). The court concluded that whether it is necessary to consider such cost information "depends on whether those restrictions meet or exceed the requirements of the federal Clean Water Act." (*Burbank,* 35 Cal.4th at 627.) The court reasoned that "[Water Code s]ection 13377 specifies that wastewater discharge permits must meet the federal standards set by federal law. In effect, section 13377 forbids a regional board's consideration of any economic hardship on the part of the permit holder if doing so would result in the dilution of the requirements set by Congress in the Clean Water Act. That act prohibits the discharge of pollutants into the navigable waters of the United States unless there is compliance with federal law (33 U.S.C. § 1322(a)), and publicly operated wastewater treatment plants such as those before us here must comply with the act's clean water standards, regardless of cost [citations]. Because [Water Code] section 13263 cannot authorize what federal law forbids, it cannot authorize a regional board, when issuing a wastewater discharge permit, to use compliance costs to justify pollutant restrictions that do not comply with federal clean water standards." (*Burbank,* 35 Cal.4th at 625.)

Therefore, while the *Burbank* decision does require an analysis of Water Code section 13241 factors including cost when the state adopts permit conditions that are more stringent than federal law (*id. at 618*) the Tentative Order, including Finding F.6., reflects that all of the challenged provisions of the Tentative Order are required to implement federal law. Thus, the Regional Board is not required to consider economic information to justify a "dilution of the requirements" established in federal law. Nonetheless, as staff has noted extensively in Responses to Comments, to the extent that economic information has been provided in connection with compliance and as to other costs associated with challenged permit provisions, the Tentative Order reflects staff has fully considered this information.

C. Unfunded State Mandates

Commenters in this proceeding have raised the issue of unfunded state mandates in connection with many of the proposed permit provisions. Some commenters have argued that a number of the provisions in the Tentative Order go beyond what is required under federal law and therefore constitute unfunded state mandates that may not be imposed without necessary funding first being provided to the Copermittees. Other commenters assert that the San Diego Water Board lacks jurisdiction to render an opinion on whether any of the Tentative Order's provisions exceed federal law and findings to that effect should be removed. Board counsel disagrees with both types of comments.

State Mandate Law

Briefly, Section 6 of Article XIII B of the California Constitution provides, in relevant part: "Whenever the Legislature or any state agency mandates a new program or higher level of service on any local government, the State shall provide a subvention of funds to reimburse that local government for the costs of the program or higher level of service . . . ." These subvention requirements are commonly referred to as a prohibition on unfunded state mandates. The California Supreme Court has recognized that requirements that flow from federal requirements are not state mandates and are therefore exempt from reimbursement

requirements. The Commission on State Mandates (Commission) evaluates local government "test claims" that seek reimbursement for claimed unfunded state mandates. This evaluation culminates with the Commission's written decision, which is a final agency action that may be challenged in superior court. Under mandates law, eligible local governments will receive a reimbursement for each fiscal year that the state mandate remains in effect. The reimbursement is provided as a line item in the Budget Act. If the Legislature fails to provide a subvention of funds, the local government may file a lawsuit to have the mandate declared unenforceable.

Recent Commission Proceedings

In September 2009, the Commission issued a Final Statement of Decision in a storm water permit Test Claim filed by the County of Los Angeles and several additional copermittee test claimants. (*Municipal Storm Water and Urban Runoff Discharges,* 03-TC-04, 03-TC-19, 03-TC-20, and 03-TC-21 (Los Angeles Regional Water Quality Control Board Order No. 01-182 (July 31, 2009) (Los Angeles Test Claim).) The Commission found that all but one of the challenged provisions issued by the Los Angeles Water Board in its MS4 permit did not qualify as unfunded state mandates as they did "not impose costs mandated by the state within the meaning of article XIII B, section 6 of the California Constitution because the claimants have fee authority (under Cal. Const. article XI, § 7) within the meaning of Government Code section 17556, subdivision (d), sufficient to pay for the activities in those parts of the permit." (Los Angeles Test Claim, Statement of Decision, p. 2.)

In March 2010, the Commission issued its final decision in the San Diego County Test Claim, in which 19 of 21 copermittees challenged multiple provisions in Order No. R9-2007-0001 (National Pollutant Discharge Elimination System (NPDES) No. CAS0108758), Waste Discharge Requirements for Discharges of Urban Runoff From the Municipal Separate Storm Sewer Systems (MS4s) within San Diego County (San Diego Test Claim). The Commission partially approved the test claim finding the following permit provisions to be state mandates subject to subvention: (1) conduct and report on street sweeping activities; (2) clean and report on storm sewer cleaning; (3) implement a regional urban runoff management program; (4) assess program effectiveness; (5) conduct public education and outreach; and (6) collaborate among copermittees to implement the program. The Commission found hydromodification and low impact development requirements to be state mandates, but not reimbursable mandates because the local agencies could charge fees for these programs.

In its final decisions, the Commission acknowledged that federal regulations require the co-permittees to secure NPDES permit coverage for their storm water discharges and that NPDES permits must include specific controls. But in the Commission's view, the lack of an explicit provision in the federal regulations replicating the permit requirements results in the permit establishing state as opposed to federal mandates. The State Water Board, together with the San Diego Water Board (concerning the San Diego Test Claim) and the Los Angeles Water Board (concerning the Los Angeles Test Claim), disagree that the respective permits exceed the federal mandate in the CWA and have filed petitions for writ of mandate in Sacramento County Superior Court to challenge the final Commission actions. In the

meantime, the provisions found to be reimbursable remain fully enforceable and must be complied with by the copermittees.[2]

With this background, commenters are correct that one factor to be considered in determining whether a requirement is an unfunded state mandate is whether the requirement goes beyond, or exceeds, what is required by federal law. Based upon a Test Claim proceeding to challenge a particular permit in this Tentative Order (once adopted), the Commission will decide whether a particular provision of an adopted order qualifies as an unfunded state mandate for which reimbursement is required. The Commission does not determine the validity of any particular provision; it addresses only whether the State or the local government will be required to pay for that provision. The San Diego Water Board is not, as some commenters assert, precluded from adopting otherwise lawful permit provisions simply because the Commission may subsequently determine that the provisions require reimbursement by the State.

Other commenters assert that the Tentative Order should be silent on the issue of unfunded mandates because the San Diego Water Board lacks jurisdiction to make such a determination. As stated above, the Commission will administratively decide whether one or more provisions are reimbursable mandates. However, it is entirely appropriate for the San Diego Water Board to set forth its legal bases to support the provisions in the Tentative Order, finding them to be necessary and appropriate to meet the federal MEP standard.

Board counsel will be available to answer any questions you may have at the hearing on the Tentative Order.

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[2] See attached memorandum from State Water Board Chief Counsel Michael Lauffer to Regional Water Board Executive Officers.

Linda S. Adams
Secretary for Environmental Protection

State Water Resources Control Board

Office of Chief Counsel
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Arnold Schwarzenegger
Governor

TO: Regional Water Board Executive Officers **[via email only]**

FROM: Michael A.M. Lauffer
Chief Counsel
OFFICE OF CHIEF COUNSEL

DATE: May 20, 2010

SUBJECT: RECENT DECISIONS ISSUED BY THE COMMISSION ON STATE MANDATES CONCERNING MUNICIPAL STORM WATER PERMITS

In two recent decisions, the Commission on State Mandates (Commission) found that certain provisions within two municipal storm water permits constituted reimbursable state mandates within the meaning of the California Constitution. The Los Angeles Regional Water Quality Control Board (Los Angeles Water Board), the San Diego Regional Water Quality Control Board (San Diego Water Board), and the State Water Resources Control Board (State Water Board) (collectively, the Water Boards) will challenge these decisions in court. In the meantime, regional water quality control boards (regional water boards) should understand the immediate effects of the decisions.

This memorandum briefly summarizes the two decisions and provides information on their immediate consequences, so that the regional water boards have a common understanding of the decisions.

BACKGROUND

State Mandates Law

Section 6 of Article XIII B of the California Constitution provides, in relevant part: "Whenever the Legislature or any state agency mandates a new program or higher level of service on any local government, the State shall provide a subvention of funds to reimburse that local government for the costs of the program or higher level of service. . . ." These subvention requirements are commonly referred to as a prohibition on unfunded state mandates.

Local governments seeking reimbursement for state mandates must file test claims with the Commission. The Commission evaluates test claims and determines whether laws or "executive orders" that are the subject of the test claim constitute state mandates. If the Commission determines a law or executive order is a state mandate, it then determines whether the local government can assess fees to offset the cost of the state mandate. If the

Commission determines the local government cannot assess fees for the state mandate, the state must provide a subvention of funds.

Subsequent proceedings before the Commission determine the local governments entitled to reimbursement and the amount of the reimbursement. Under mandates law, eligible local governments will receive a reimbursement for each fiscal year that the state mandate remains in effect. The reimbursement is provided as a line item in the Budget Act. If the Legislature fails to provide a subvention of funds, the local government may file a suit to have the mandate declared unenforceable.[1]

The Los Angeles Decision

In 2003 and 2007, the County of Los Angeles and 14 cities within the county (the Los Angeles claimants) submitted test claims 03-TC-04, 03-TC-19, 03-TC-20, and 03-TC-21. The test claims asserted that provisions of Los Angeles Water Board Order 01-182 constitute reimbursable state mandates. Order 01-182 is the 2001 renewal of the municipal storm water permit for Los Angeles County and most of its incorporated cities, and serves as a national pollutant discharge elimination system (NPDES) permit. The permit provisions require the Los Angeles claimants to install and maintain trash receptacles at specified transit stops and to inspect certain industrial, construction, and commercial facilities for compliance with local and/or state storm water requirements.

On September 3, 2009, the Commission issued a final decision entitled *In re Test Claim On: Los Angeles Regional Quality Control Board Order No. 01-182, Case Nos.: 03-TC-04, 03-TC-19, 03-TC-20, 03-TC-21* (Los Angeles Decision). The Los Angeles Decision partially approved the test claims. The Commission found the trash receptacle requirement to be a reimbursable state mandate.

The San Diego Decision

In 2007, the County of San Diego and 21 cities within the county (the San Diego claimants) submitted test claim 07-TC-09. The test claim asserted that many provisions of San Diego Water Board Order R9-2007-0001 constitute reimbursable state mandates. Order R9-2007-0001 is the 2007 renewal of the municipal storm water permit for San Diego County and many of its incorporated cities, and serves as an NPDES permit. The challenged permit provisions require the San Diego claimants to: (1) conduct and report on street sweeping activities; (2) clean and report on storm sewer cleaning; (3) implement a regional urban runoff management program; (4) assess program effectiveness; (5) conduct public education and outreach; (6) collaborate among co-permittees to implement the program; (7) implement hydromodification management plans; and (8) implement plans for low impact development.

On March 30, 2010, the Commission issued a final decision entitled *In re Test Claim on: San Diego Regional Quality Control Board Order No. R9-2007-0001, Case No. 07-TC-09* (San Diego Decision). The San Diego Decision partially approved the test claim. The

[1] Gov. Code, § 17612, subd. (c).

Commission's decision took the relatively narrow Los Angeles Decision to its logical conclusion. The Commission found the following permit requirements to be reimbursable state mandates: (1) conduct and report on street sweeping activities; (2) conduct and report on storm sewer cleaning activities; (3) implement a regional urban runoff management program; (4) assess program effectiveness; (5) conduct public education and outreach; and (6) collaborate among co-permittees to implement the program. The Commission found the hydromodification and low impact development requirements to be state mandates, but not reimbursable mandates because the local agencies could charge fees to pay for these programs.

DISCUSSION

The Water Boards will challenge both the Los Angeles and San Diego decisions and seek to have them overturned on a variety of grounds. In the meantime, the Office of Chief Counsel has received questions from the various regional water boards about the immediate consequences of the decisions. The summary below responds to many of those questions, both in terms of what the decisions do – and do not – mean for the municipal storm water program.

1. *The Decisions' Direct Effects Are Limited to the Storm Water Permits Identified in the Test Claims*

The decisions directly affect only the municipal storm water permits identified by the two test claims. That is, the effect of the decisions is limited to the provisions of Los Angeles Water Board Order 01-182 and San Diego Order R9-2007-0001 identified by the Commission as reimbursable state mandates. No other municipal storm water permits (or provisions therein) in California are directly affected by the decisions, even if those permits contain similar provisions.

2. *The Decisions' Effects Cannot Extend to Storm Water Permits Issued to State or Federal Agencies*

Under federal storm water regulations, entities that operate municipal separate storm sewer systems are subject to NPDES permitting requirements. Municipal separate storm sewer systems include systems owned or operated by federal and state agencies. For example, the California Department of Transportation is currently regulated by a municipal storm water permit.

Because state and federal agencies cannot receive state reimbursement pursuant to Article XIII B of the California Constitution, the Commission does not have any jurisdiction over municipal storm water permits issued to those agencies. Reimbursement requirements can only apply to mandates imposed upon "local government."[2]

[2] Cal. Const., art. XIII B, § 6, subd. (a).

3. *The Claimants Must Continue to Comply With the Permits While the Reimbursement Phase Proceeds*

The Los Angeles and San Diego claimants must, respectively, continue to comply with all provisions of their municipal storm water permits. These permits are still valid in their entirety. The Commission proceedings were not about validity of the permits; the proceedings are and have always been about funding. The Commission has determined that the state must reimburse the claimants for the costs of complying with the identified permit provisions, not that the provisions are invalid.

While, as described below, a provision of state law could affect the permits' enforceability should the state fail to provide reimbursement, that provision cannot apply until the Legislature considers a local government claims bill towards the end of the reimbursement phase or affirmatively indicates that it will not provide reimbursement for a specific fiscal year as part of a Budget Act.[3] The reimbursement phase includes, but is not limited to, the Commission's adoption of Parameters and Guidelines, the State Controller's adoption of Claiming Instructions, and the Legislature's consideration of a local government claims bill as part of the annual Budget Act.

4. *If the Legislature Does Not Provide Reimbursement, the Provisions May Become Unenforceable as a Matter of State Law*

As mentioned above, the Legislature ultimately considers a local government claims bill in order to provide the necessary reimbursement. At that point, the Legislature could choose not to provide a reimbursement of funds in the annual Budget Act. If the legislature deletes funding from the annual Budget Act, the affected municipalities could bring suit in Sacramento Superior Court to render unenforceable the permit provisions identified by the Commission as reimbursable mandates.[4] For that fiscal year, the provisions would be unenforceable for the purposes of state law.[5] Alternatively, the Legislature may affirmatively indicate that it will not provide a reimbursement for a particular fiscal year, which as a matter of state law suspends the mandate.[6]

CONCLUSION

The Los Angeles and San Diego decisions could have significant long-term consequences on California's municipal storm water program, but the immediate effects are limited. While the Water Boards' challenges to the Commission's decisions are pending, the regional water boards should understand the following: (1) the decisions' effects are limited to the storm water permits identified in the test claims; (2) the decisions' effects cannot extend to storm water permits issued to state or federal agencies; (3) the claimants must continue to comply with the permits

[3] Gov. Code, § 17581, subd. (a).

[4] *Id.*, § 17612, subd. (c).

[5] *Ibid.* It is unclear whether a legislative failure to provide the required reimbursement would relieve the permittees of their obligations under federal law to comply with the permits.

[6] *Id.*, § 17581, subd. (a).

while the reimbursement phase proceeds; and (4) the provisions may become unenforceable as a matter of state law if the legislature does not provide reimbursement or affirmatively indicates that it will not provide a reimbursement.

If you have any questions about this matter, please contact Alex P. Mayer of my staff at (916) 341-5051.

cc: **[All via email only]**

Dorothy Rice, EXEC
Jonathan Bishop, EXEC
Tom Howard, EXEC
Darrin Polhemus, DWQ
AEOs
Regional Board Attorneys

California Regional Water Quality Control Board
San Diego Region

REVISED DRAFT UPDATES & ERRATA

to the

July 23, 2010 PUBLIC RELEASE DRAFT

of the

Waste Discharge Requirements for Discharges from the Municipal Separate Storm Sewer Systems (MS4s) Draining the Watershed of the County of Riverside, the Incorporated Cities of Riverside County, and the Riverside County Flood Control and Water Conservation District within the San Diego Region

Tentative Order No. R9-2010-0016
NPDES NO. CAS0108766

REVISED ERRATA & UPDATES AS OF
November 3, 2010

This document represents tentative updates and errata to the July 23, 2010 release of Tentative Order No. R9-2010-0016 as of November 3, 2010. The errata represent minor clarifications and reference mistakes identified by Staff and/or in the response to comments on the public release of Tentative Order. The updates include changes made as a result of oral and written comments received on the July 23, 2010 public release of the Tentative Order. An original "Updates and Errata" document was released on September 29, 2010. This revised version includes those changes as well as minor revisions made to the following sections:

Errata: Finding B.1, Findings E.5, Attachment E Table 2, Attachment E Section II.A.2.c.(3), Attachment E footnotes 4 and 6, Fact Sheet discussion of Finding C.7, Fact Sheet footnote 42 and Note 2, Fact Sheet finding E.5, Fact Sheet footnote 153, Fact Sheet discussion on Finding E.9, and Fact Sheet footnote 158.

Updates: Finding A.3 with new footnote, Section F.1.d.(4)(c)(ii) with new footnote, Fact Sheet footnote 1, and Fact Sheet discussion of Finding C.14.

Global Change: Throughout the Tentative Order, Fact Sheet and Attachments, the adoption date is changed from ~~October 13, 2010~~ to November 10, 2010.

Permit Errata

Title Page i. - NPDES NO. CAS010876~~40~~40

Title Page iv. -

~~David King *Chair*~~	~~Recreation / Wildlife~~
Grant Destache *Vice Chair*	Industrial Water Use
Eric Anderson	Irrigated Agriculture
Wayne Rayfield	Water Quality
George Loveland	Water Supply
Marc Luker	Undesignated (Public)
Gary Strawn	Recreation / Wildlife
Bill Green	Water Quality

Page # 2, Finding B.1 - Each of the persons in Table 1 below, hereinafter called Copermittees or dischargers, owns or operates an MS4, through which it discharges into waters of the United States (U.S.) within the San Diego Region. These MS4s fall into one or more of the following categories: (1) a medium or large MS4 that services a population of greater than 100,000 or 250,000 respectively; or (2) a small MS4 that is "interrelated" to a medium or large MS4; or (3) an MS4 that contributes to a violation of a water quality standard; or (4) an MS4 which is a significant contributor of pollutants to waters of the U.S.

Table 1. Municipal Copermittees

1. City of Murrieta	4. County of Riverside
2. City of Temecula	5. Riverside County Flood Control and

3. City of Wildomar	Water Conservation District
~~6. City of Menifee~~[4]	

The Cities of Murietta, Menifee and Wildomar also discharge into the waters of the U.S. in the California Regional Water Quality Control Board, Santa Ana Region (Santa Ana Water Board), so are located partially within both the San Diego and Santa Ana Water Board boundaries. Water Code (WC) section 13228 provides a way to streamline the regulation of entities whose jurisdictions straddle the border of two or more Regions. WC section 13228 is implemented in this Order to ease the regulatory burden on Storm Water Agencies and Municipalities that lie in both the San Diego Water Board and the adjacent Santa Ana Water Board's jurisdiction. As allowed by California Water Code (CWC) §13228, the~~se~~ Cities of Murietta, Menifee, and Wildomar submitted written requests to be regulated for MS4 purposes under a permit adopted by only one Water Board. As authorized by CWC §13228 and pursuant to ~~a~~ written agreements dated September 28, 2010 between the San Diego Water Board and the Santa Ana Water Board, the Cities of Murrieta and Wildomar are wholly regulated by the San Diego Water Board under this Order, including those portions of the Cities jurisdiction not within the San Diego Water Board's region. Similarly, the City of Menifee is wholly regulated by the Santa Ana Water Board under Order No. R8-2010-0033, including those portions of the City of Menifee within the San Diego Water Board's region~~[4]~~.

Page # 7, Finding D.1.d - Updated individual ~~Drainage Area~~ Storm Water Management Plans (Individual ~~DA~~SWMP or JRMP), and Watershed Stormwater Management Plans (watershed SWMPs or Watershed Workplans), which, together with references in the DAMP, describe the Copermittees' runoff management programs in their entirety, are needed to guide the Copermittees' runoff management efforts and aid the Copermittees in tracking runoff management program implementation. Hereinafter, the individual ~~DA~~SWMP is referred to as the JRMPs and the Watershed SWMP is referred to as the Watershed Workplan. It is practicable for the Copermittees to update the JRMPs and Watershed Workplans within the timeframe specified in this Order, since significant efforts to develop these programs have already occurred.

Page # 13, Finding E.5 - Section 303(d)(1)(A) of the CWA requires that "Each state shall identify those waters within its boundaries for which the effluent limitations…are not stringent enough to implement any water quality standard (WQS) applicable to such waters." The CWA also requires states to establish a priority ranking of impaired waterbodies known as Water Quality Limited Segments and to establish Total Maximum Daily Loads (TMDLs) for such waters. This priority list of impaired waterbodies is called the Section 303(d) List. The 2006 303(d) List was approved by the State Water Board on October 25, 2006. On June 28, 2007 the 2006 303(d) List for California was given final approval by the USEPA. The 303(d) List was recently updated, and on December 16, 2009 the 2008 303(d) List was approved by the San Diego Water Board. The 2008 303(d) List for the San Diego Region was approved by the State Water Board on August 4, 2010. The 2008 303(d) List is awaiting ~~State Water Board and~~ USEPA approval.

Page # 15, Finding E.9 - Storm water discharges from developed and developing areas in Riverside County are significant sources of certain pollutants that can cause, may be causing, threatening to cause or contributing to water quality impairment in the waters of Riverside County. Furthermore, as delineated in the CWA section 303(d) list in Table 2,

~~[4] Until an agreement is finalized, the City of Menifee is included as a Copermittee in this Order.~~

the San Diego Water Board has found that there is a reasonable potential that municipal storm water and non-storm water discharges from MS4s cause or may cause or contribute to an excursion above water quality standards for the following pollutants: Indicator Bacteria (including Fecal Coliform and E. Coli), Copper, Manganese, Iron, Chlorpyrifos, Diazinon, Sulfates, Phosphorous, Nitrogen, Total Dissolved Solids (TDS), and Toxicity~~, and Turbidity~~. In accordance with CWA section 303(d), the San Diego Water Board is required to establish TMDLs for these pollutants to these waters to eliminate impairment and attain water quality standards. Therefore, certain early pollutant control actions and further pollutant impact assessments by the Copermittees are warranted and required pursuant to this Order.

Page # 20, Section C.2 – In response to an exceedance of an NAL, the Copermittee(s) having jurisdiction must investigate and seek to identify the source of the exceedance in a timely manner.

Page # 23, Section D.2 – The end-of-pipe assessment points for the determination of SAL compliance are ~~all~~ major outfalls, as defined in 40 CFR 122.26(b)(5) and (b)(6) and Attachment E of this Order.

Page # 24, Section E.1 - Each Copermittee must establish, maintain, and enforce adequate legal authority within its jurisdiction to control pollutant discharges into and from its MS4 through ordinance, statute, permit, contract or similar means.

Page # 25, Section E.2 - Each Copermittee must submit on or before June 30, 2012, a statement certified by its chief legal counsel that the Copermittee has taken the necessary steps to obtain and maintain full legal authority within its jurisdiction to implement and enforce each of the requirements contained in 40 CFR 122.26(d)(2)(i)(A-F) and this Order.

Page # 33, Section F.1.d.(4)(b)(i), Footnote 12 – Priority Development Projects proposing to dredge or fill materials in waters of the U.S. must obtain a CWA Section 401 Water Quality Certification.~~and/or~~ Priority Development Projects proposing to discharge waste in waters of the State must obtain ~~a CWA §401 Water Quality Certification and/or~~ Waste Discharge Requirements.

Page # 39, Section F.1.f.(2)(a) - At a minimum, high priority projects include those projects that generate pollutants (prior to treatment) within the tributary area of and within the same hydrologic subarea as a 303(d) listed waterbody impaired for that pollutant; or those projects generating pollutants within the tributary area for and within the same hydrologic subarea as an observed action level exceedance of that pollutant.

Page # 43, Section F.1.h.(2) - In addition to the control measures that must be implemented by Priority Development Projects per section F.1.h.(1)(d), the HMP must include a suite of management measures ~~to~~ that can be used on Priority Development Projects to mitigate hydromodification impacts, protect and restore downstream beneficial uses and prevent or further prevent adverse physical changes to downstream channels. The measures must be based on a prioritized consideration of the following elements in this order:

Page # 43, Section F.1.h.(3) - As part of the HMP, the Copermittees may develop a waiver program that allows a redevelopment Priority Development Project, as defined in

Section F.1.d.(1)(b), to implement offsite mitigation measures. A waiver may be granted if onsite management and control measures are technically infeasible to fully achieve post-project runoff flow rates and durations that do not exceed the pre-development (naturally occurring) runoff flow rates and durations. Redevelopment projects that are granted a waiver under the program must not have post-project runoff flow rates and durations that exceed the pre-project runoff flow rates and durations. The estimated incremental hydromodification impacts from not achieving the pre-development (naturally occurring) runoff flow rates and durations for the project site must be fully mitigated. The offsite mitigation must be within the same stream channel system to which the project discharges. Mitigation projects not within the same stream channel system but within the same hydrologic unit may be approved provided that the project proponent demonstrates that mitigation within the same stream channel is infeasible and that the mitigation project will address similar impacts as expected from the project.

Page # 45, Section F.1.i - The Copermittees must develop, where they do not already exist, and implement or require implementation, of erosion and sediment control BMPs after construction of new unpaved roads. At a minimum, the BMPs must include the following, or alternative BMPs that are equally effective:

Page # 51, Section F.3.a.(1) - Each Copermittee must maintain an updated watershed-based inventory of all its municipal areas and those activities that have the potential to generate pollutants. The inventory must include the name, address (if applicable), and a description of the area/activity; which pollutants are potentially generated by the area/activity; whether the area/activity is adjacent to an ESA; and identification of whether the area/activity is tributary to and within the same hydrologic subarea as a CWA section 303(d) water body segment and generates pollutants for which the water body segment is impaired. Linear facilities, such as roads, streets, and highways, do not need to be individually inventoried. The use of an automated database system, such as Geographical Information Systems (GIS) is highly recommended.

Page # 52, Section F.3.a.(2)(d) - Designate BMPs for ESAs and 303(d) Impairments: Each Copermittee must designate enhanced measures for its municipal areas and activities tributary to and within the same hydrologic subarea as CWA section 303(d) impaired water body segments when an area or those activities have the potential to generate pollutants for which the water body segment is impaired. Each Copermittee must also designate additional controls for its municipal areas and activities within or directly adjacent to or discharging directly to receiving waters within environmentally sensitive areas (as defined in Attachment C of this Order).

Page # 52, Section F.3.a.(8)(a)(iii) - Areas and activities tributary to and within the same hydrologic subarea as a CWA section 303(d) impaired water body segment, where an area or activity generates pollutants for which the water body segment is impaired.

Page # 56, Section F.3.a.(10) – Copermittee Maintained Unpaved Roads Maintenance

(a) The Copermittees must develop, where they do not already exist, and implement or require implementation of, BMPs for erosion and sediment control measures during their maintenance activities on Copermittee maintained unpaved roads, particularly in or adjacent to receiving waters.

(b) The Copermittees must develop and implement or require implementation of appropriate BMPs to minimize impacts on streams and wetlands during their unpaved road maintenance activities.

(c) The Copermittees must ~~regularly~~ maintain as necessary their unpaved roads adjacent to streams and riparian habitat to reduce erosion and sediment transport;
(d) Re-grading of unpaved roads during maintenance must be sloped outward where consistent with road engineering safety standards or alternative equally effective BMPs must be implemented to minimize erosion and sedimentation from unpaved roads;
(e) Through their ~~regular~~ maintenance of unpaved roads, the Copermittees must examine the feasibility of replacing existing culverts or design of new culverts or bridge crossings to reduce erosion and maintain natural stream geomorphology.

Page # 58, Section F.3.b.(1)(a)(iii) - ESAs and 303(d) Listed Waterbodies: All other commercial or industrial sites/sources tributary to and within the same hydrologic subarea as a CWA Section 303(d) impaired water body segment, where the site/source generates pollutants for which the water body segment is impaired. All other commercial or industrial sites/sources within or directly adjacent to or discharging directly to receiving waters within environmentally sensitive areas (as defined in Attachment C of this Order) or that generate pollutants tributary to and within the same hydrologic subarea as an observed exceedance of an action level.

Page # 58, Section F.3.b.(2)(b) - Designate / Update Minimum BMPs: Each Copermittee must designate a minimum set of BMPs for all inventoried industrial and commercial sites/sources. Where BMPs have already been designated, each Copermittee must review and update its existing BMPs for adequacy ~~within one year of permit adoption~~ no later than with the submittal of the JRMP. Copermittees may continue to regularly review and update their designated BMPs for adequacy and subsequently submit any updates in their Annual Report. The designated minimum BMPs must be specific to facility types and pollutant-generating activities, as appropriate.

Page # 58-59, Section F.3.b.(2)(c) - Designate Enhanced BMPs for ESAs and 303(d) Impairments: Each Copermittee must designate enhanced measures for inventoried industrial and commercial sites/sources tributary to and within the same hydrologic subarea as CWA section 303(d) impaired water body segments (where a site/source generates pollutants for which the water body segment is impaired). Each Copermittee must also designate additional controls for industrial and commercial sites/sources within or directly adjacent to or discharging directly to coastal lagoons, the ocean, or other receiving waters within environmentally sensitive areas (as defined in Attachment C of this Order). Copermittees may continue to regularly review and update their designated enhanced BMPs for adequacy and subsequently submit any updates in their next Annual Report.

Page # 60, Section F.3.b.(4)(a)(i) - Review of BMP implementation plans not including SSMPs required pursuant to section F.1.d, if the site uses or is required to use such a plan;

Page # 60, Section F.3.b.(4)(b) – Delete the section:
~~(b) Each Copermittee must annually notify the San Diego Water Board, prior to the commencement of the rainy season, of all Industrial Sites and Industrial Facilities subject to the General Industrial Permit or other individual NPDES permit with~~

~~alleged violations of the Copermittees ordinances, that pose a significant threat to water quality.~~

Page # 62, Section F.3.b.(6) – Add the section:
(6) Reporting of Non-Compliant Sites

Each Copermittee must annually notify the San Diego Water Board, prior to the commencement of the wet season, of any unresolved high level enforcement action (as defined in the Copermittees' JRMP) that poses a significant threat to water quality in its jurisdiction as a result of violations of their storm water ordinances.

Page # 62, Section F.3.c.(1)(e) - Any residential areas tributary to and within the same hydrologic subarea as a CWA section 303(d) impaired water body, where the residence generates pollutants for which the water body is impaired; and

Page # 64, Section F.3.d – Each Copermittee must develop and implement a retrofitting program that meets the requirements of this section. The goals of the existing development retrofitting program are to address the impacts of existing development through retrofit projects that reduce impacts from hydromodification, promote LID, support riparian and aquatic habitat restoration, reduce the discharges of storm water pollutants from the MS4 to the MEP, and prevent discharges from the MS4 from causing or contributing to a violation of water quality standards. Where feasible, at the discretion of the Copermittee, the existing development retrofitting program may be coordinated with flood control projects and other infrastructure improvement programs.

Page # 65, Section F.3.d.(5) – The known completed retrofit BMPs must be tracked in accordance with Section F.1.f. Retrofit BMPs on publicly owned properties must be inspected per section F.1.f . Privately owned retrofit BMPs must be inspected as needed ~~to ensure proper operation and maintenance~~.

Page # 69, Section F.4.h - Each Copermittee must implement management measures and procedures (including a notification mechanism) to prevent, respond to, contain and clean up all sewage (see below) and other spills that may discharge into its MS4 from any source (including private laterals and failing septic systems). Copermittees must coordinate with spill response teams to prevent entry of spills into the MS4 and contamination of surface water, ground water and soil. Each Copermittee must coordinate spill prevention, containment and response activities throughout all appropriate Copermittee departments, programs and agencies so that maximum water quality protection is available at all times.

Page # 69-70, Section F.6.a.(1) - At a minimum, the Copermittee education programs must educate each target community on the following topics, as appropriate to the target community's potential storm water and non-storm water discharges to the MS4:

(a) Applicable water quality laws, regulations, permits, and requirements;
(b) Best management practices;
(c) General runoff concepts;
(d) Existing water quality, including local water quality conditions, impaired waterbodies and environmentally sensitive areas; and

(e) Other topics, as determined by the Copermittee(s), such as public reporting mechanisms, water conservation, low-impact development techniques, and public health and vector issues associated with runoff.

Page # 72, Section G.1.d - Develop a watershed BMP implementation strategy to attain receiving water quality objectives in the identified highest priority water quality problem(s) and locations. The BMP implementation strategy must include a schedule for implementation of the BMPs ~~projects~~ to abate specific receiving water quality problems and a list of criteria to be used to evaluate BMP effectiveness. Identified watershed water quality problems may be the result of jurisdictional discharges that will need to be addressed with BMPs applied in a specific jurisdiction in order to generate a benefit to the watershed. This implementation strategy must include a map of any implemented and/or proposed BMPs.

Page # 74, Section I.2 - The Cities of Wildomar and Murrieta must comply with the requirements and WLAs assigned to the discharges from their MS4s contributing to the Lake Elsinore/Canyon Lake (San Jacinto Watershed) Nutrient TMDLs as specified in Section VI.D.2 of the Santa Ana Water Board's Order R8-2010-0033, including relevant sections of the fact sheet and findings, and subsequent revisions thereto.

Page # 77, Section K.2.a.(2) - Within 180 days of determination that the SSMP is in compliance with this Order's provisions, each Copermittee must amend its ordinances consistent with the SSMP and implement the updated SSMP. Any amended or new ordinances must be submitted to the San Diego Water Board within ~~30 days of adoption~~ the applicable Annual Report.

Page # 84, Section M.3 - ~~Produce and submit~~ Coordinate the submittal of the documents and reports as required by section K of this Order and Receiving Waters and MS4 Discharge Monitoring and Reporting Program No. R9-2010-0016 in Attachment E of this Order.

Attachments Errata

Page # B-9, Section Att. B.7.(m) - *Noncompliance*. Any noncompliance with this Order constitutes violation of the CWA~~C~~ and is grounds for denial of an application ~~f~~or modification of the Order (also see 40 CFR 122.41(a)).

Page # E-3, Section II.A.1.d - Protocols: Protocols for mass loading sampling and analysis including analytical methods, target reporting limits, and data reporting formats must be compatible with the State Water Resources Control Board's (State Water Board's) State Surface Water Ambient Monitoring Program (SWAMP). If the mass loading sampling and analysis are determined to be impracticable with the SWAMP standards, the Copermittees must provide a written explanation and discussion in the submittal of the Planned Monitoring Program. Wet weather samples must be ~~time~~flow-weighted composites, collected for the duration of the entire runoff event. Where such monitoring is not practical, such as for large watersheds with significant groundwater recharge flows, composites must be collected at a minimum during the first 3 hours of flow. Dry weather event sampling must be time-weighted composites composed of 24 discrete hourly samples, whereby the mass loads of pollutants are calculated as the product of the composite sample concentration and the total volume of water discharged past the monitoring point during the time of sample collection.

Page # E-6, Table 2. Toxicity Testing for Mass Loading (II.A.1) and Stream Assessment (II.A.2) – Delete "~~Bioassessment~~" and replace with "Stream Assessment".

Page # E-7, Section II.A.2.c.(3) - Monitoring of stream assessment stations must be conducted according to the most current bioassessment Standard Operating Procedures (SOP) developed by the Surface Water Ambient Monitoring Program (SWAMP), and amendments, as ~~amended~~applicable. In collecting macroinvertebrate samples, the discharger must use the "Reachwide Benthos (Multihabitat) Procedure." The discharger must conduct, concurrently with all required macroinvertebrate collections, the "full" suite of physical/habitat characterization measurements specified in the SWAMP Bioassessment SOP, and as summarized in the *SWAMP Stream Habitat Characterization Form — Full Version*.

Page # E-7, Footnote 4 - Ode, P.R.. 2007. Standard operating procedures for collecting macroinvertebrate samples and associated physical and chemical data for ambient bioassessments in California. California State Water Resources Control Board Surface Water Ambient Monitoring Program (SWAMP) Bioassessment SOP 001. http://www.swrcb.ca.gov/water_issues/programs/swamp/tools.shtml#monitoring

Page # E-8, Footnote 6 - Fetscher et al. 2009. Standard Operating Procedures for Collecting Stream Algae Samples and Associated Physical Habitat and Chemical Data for Ambient Bioassessments in California.

Page # E-14, Section II.C.1.b.(1) - Determining Sampling Frequency: Effluent analytical monitoring must be conducted at major outfalls and identified stations. The Copermittees must sample a representative ~~number~~ percentage of major outfalls and identified stations within each hydrologic subarea. The sampling must be done to assess compliance with dry weather non-storm water action levels pursuant to section C of this Order. All monitoring conducted must be preceded by a minimum of 72 hours of dry weather.

Page # E-14, Section II.C.1.b.(2) - Sampling of non-storm water discharges may be done utilizing grab samples. If a ponded MS4 discharge is observed at a monitoring station, the Copermittee(s) must record the observation and collect at least one (1) grab sample. If flow is evident, a 1-hour composite sample may be taken. The Copermittee(s) must estimate the discharge flow by measuring the width of water surface, approximate depth of water, and approximate flow velocity. A flow meter may also be utilized.

Page # E-27, Section III.B. - For the October 2010 to October 2012 monitoring period, the Principal Copermittee must submit the Receiving Waters Monitoring Annual Report as required under Order No. 2004-~~0~~001. The Receiving Waters Monitoring Annual Report must address the monitoring conducted to comply with the requirements of Order No. 2004-~~0~~001.

Page # E-27, Section III.C. – Table 5. Table of Required MRP Reporting Dates and Frequencies. … Draft Trash and Litter ~~Impairment~~ Special Study.

Fact Sheet Errata

Page # 23-24, Discussion of Finding B.1 - Included in Table 1 of the Order are the Cities of ~~Menifee,~~ Murrieta, Temecula, and Wildomar, the County of Riverside, and the Riverside County Flood Control and Water Conservation District. The Cities of Wildomar and Menifee are newly incorporated cities. Both Cities were previously a part of the County of Riverside's jurisdiction and have an MS4 interrelated to other Copermittee MS4s in the San Diego Region. The boundaries of the Cities of Menifee, Murrieta, and Wildomar fall within the jurisdiction of both the San Diego Water Board and the Santa Ana Water Board.

As requested by the Cities of Menifee, Murrieta, and Wildomar, and pursuant to an agreement between the San Diego and Santa Ana Water Boards as authorized by CWC section 13228, the MS4s of the Cities of Murrieta and Wildomar are to be wholly regulated by the San Diego Water Board under this Order, and the MS4 of the City of Menifee is to be wholly regulated by the Santa Ana Water Board under Order No. R8-2010-0033. The agreement between the San Diego and Santa Ana Water Board to regulate the Cities of Menifee, Murrieta, and Wildomar will be subject to change with ~~each permit renewal~~sufficient notice, and for good cause. ~~Until the an agreement between the San Diego Water Board and Santa Ana Water Board is finalized to allow the City of Menifee to be wholly regulated by the Santa Ana Water Board under Order No. R8-2010-0033, the City of Menifee will remain as a Copermittee under this Order.~~

Page # 32, Discussion of Finding C.7 - This finding identifies the major receiving water bodies in the Riverside County portion of the Santa Margarita Hydrologic Unit that are listed as impaired on the CWA section 303(d) List of Impaired Waters (303(d) List). The 2006 303(d) List has been approved by the San Diego Water Board, State Water Board, and USEPA. The 2008 303(d) List was approved by the San Diego Water Board on December 18, 2009 and by the State Water Board on August 4, 2010, and is awaiting ~~State Water Board and~~ USEPA approval. The 303(d) list identifies waters that do not meet water quality standards after applying certain required technology-based effluent limits ("impaired" water bodies). As part of this listing process, states are required to prioritize waters/watersheds for future development of Total Maximum Daily Loads (TMDLs). The listed 303(d) pollutant(s) of concern do not necessarily reflect impairment of the entire corresponding major surface water bodies. The specific impaired portions of each water body are listed in the 2006 and 2008 303(d) Lists.

Page # 32, Footnote 42 –

[42] The 2008 Clean Water Act Section 303(d) List of Water Quality Limited Segments, approved by the San Diego Water Board and State Water Board, is available on-line at http://www.swrcb.ca.gov/rwqcb9/water_issues/programs/303d_list/index.shtml

Page # 34, Note 2 to the Comparison of Riverside County 303(d) Listings Table -

2. Water bodies and pollutants on the 2008 303(d) List ~~was~~ were approved by the San Diego Water Board on December 18, 2009 and by the State Water Board on August 4, 2010, and ~~is~~ are awaiting final approval by the ~~State Water Board and~~ USEPA.

Page # 59, Finding D.1.d - Updated individual ~~Drainage Area~~ Storm Water Management Plans (Individual ~~DA~~SWMP or JRMP), and Watershed Stormwater Management Plans (watershed SWMPs or Watershed Workplans), which, together with references in the DAMP, describe the Copermittees' runoff management programs in

their entirety, are needed to guide the Copermittees' runoff management efforts and aid the Copermittees in tracking runoff management program implementation. Hereinafter, the individual ~~DA~~SWMP is referred to as the JRMPs and the Watershed SWMP is referred to as the Watershed Workplan. It is practicable for the Copermittees to update the JRMPs and Watershed Workplans within the timeframe specified in this Order, since significant efforts to develop these programs have already occurred.

Page # 93, Finding E.5 - Section 303(d)(1)(A) of the CWA requires that "Each state shall identify those waters within its boundaries for which the effluent limitations…are not stringent enough to implement any water quality standard (WQS) applicable to such waters." The CWA also requires states to establish a priority ranking of impaired waterbodies known as Water Quality Limited Segments and to establish Total Maximum Daily Loads (TMDLs) for such waters. This priority list of impaired waterbodies is called the Section 303(d) List. The 2006 303(d) List was approved by the State Water Board on October 25, 2006. On June 28, 2007 the 2006 303(d) List for California was given final approval by the USEPA. The 303(d) List was recently updated, and on December 16, 2009 the 2008 303(d) List was approved by the San Diego Water Board. The 2008 303(d) List for the San Diego Region was approved by the State Water Board on August 4, 2010. The 2008 303(d) List is awaiting ~~State Water Board and~~ USEPA approval.

Page # 93, Footnote 153 –

[153] The 2008 Clean Water Act Section 303(d) List of Water Quality Limited Segments, approved by the San Diego Water Board and State Water Board, is available on-line at http://www.swrcb.ca.gov/rwqcb9/water_issues/programs/303d_list/index.shtml

Page # 98, Finding E.9 - Storm water discharges from developed and developing areas in Riverside County are significant sources of certain pollutants that can cause, may be causing, threatening to cause or contributing to water quality impairment in the waters of Riverside County. Furthermore, as delineated in the CWA section 303(d) list in Table 2, the San Diego Water Board has found that there is a reasonable potential that municipal storm water and non-storm water discharges from MS4s cause or may cause or contribute to an excursion above water quality standards for the following pollutants: Indicator Bacteria (including Fecal Coliform and E. Coli), Copper, Manganese, Iron, Chlorpyrifos, Diazinon, Sulfates, Phosphorous, Nitrogen, Total Dissolved Solids (TDS), and Toxicity~~, and Turbidity~~. In accordance with CWA section 303(d), the San Diego Water Board is required to establish TMDLs for these pollutants to these waters to eliminate impairment and attain water quality standards. Therefore, certain early pollutant control actions and further pollutant impact assessments by the Copermittees are warranted and required pursuant to this Order.

Page #98-99, Discussion of Finding E.9 - The CWA also requires states to establish a priority ranking of impaired water bodies known as Water Quality Limited Segments and to establish Total Maximum Daily Loads (TMDLs) for such waters. This priority list of impaired water bodies is called the 303(d) List. The current 303(d) List was approved by the State Water Board on October 25, 2006. On June 28, 2007 the 2006 303(d) List for California was given final approval by USEPA. Every two years the State of California is required by CWA section 303(d) and 40 CFR(130.7) to develop and submit to the USEPA for approval an updated 303(d) list of impaired water bodies. The San Diego Water Board recently updated the 303(d) List and adopted the 2008 303(d) List on December 16, 2009. The 2008 303(d) List for the San Diego Region was approved by the State Water Board on August 4, 2010. The 2008 303(d) List is awaiting approval by

the ~~State Water Board and~~ USEPA. The number of water bodies listed as impaired in the Riverside County portion of the Santa Margarita Hydrologic Unit increased from 6 water bodies (13 water body / pollutant combinations) on the 2006 303(d) List to 9 water bodies (49 water body / pollutant combinations) on the 2008 303(d) List, indicating the receiving water quality has been degraded further (see Table 2).

Page # 99, Footnote 158 –

[158] The 2008 Clean Water Act Section 303(d) List of Water Quality Limited Segments, approved by the San Diego Water Board and State Water Board, is available on-line at http://www.swrcb.ca.gov/rwqcb9/water_issues/programs/303d_list/index.shtml

Page # 121, Section C - The maximum daily action level (MDAL) and average monthly action level (AMAL) will be based on the most limiting of the acute and chronic LTA, in the case for ~~copper~~ chromium VI the most limiting LTA is the acute of 5.23 ug/L.

Page # 144, Section F.1.h – In addition to the control measures that must be included in the HMP to prevent or minimize hydromodification effects from Priority Development Projects, section F.1.h.(2) requires the HMP to include additional management measures ~~to~~ that can be used on Priority Development Projects based on a prioritized consideration of the following elements in this order:

Page # 144-145, Section F.1.h – The San Diego Water Board recognizes that fully achieving post-project runoff flow rates and durations that do not exceed pre-development (naturally occurring) runoff flow rates and durations on redevelopment projects with existing impervious surfaces may be challenging. Thus, section F.1.h.(3) has been included to allow the Copermittees to propose, as part of the HMP, a waiver program specifically for Priority Development Projects that are redevelopment projects, as defined by section F.1.d.(1)(b). Because redevelopment projects may not be able to achieve post-project runoff flow rates and durations that do not exceed pre-development (naturally occurring) runoff flow rates and durations through onsite management and control measures, offsite mitigation measures may be required. Redevelopment projects~~, however,~~ must ~~be able to~~ achieve post-project runoff flow rates and durations that are less than or equal to pre-project and down to pre-development runoff flow rates and durations to be eligible to receive a waiver under the program. For a redevelopment project, the pre-project runoff flow rates and durations are those currently being discharged by the existing development prior to the redevelopment project being built. Meeting pre-project runoff flow rates and durations is usually a less stringent performance criteria than meeting the pre-development runoff flow rates and durations. Implementing BMPs to meet the pre-project flow rates and durations is significantly easier and cheaper for a redevelopment project compared to meeting pre-development flow rates and durations. If a project is granted a waiver, the estimated incremental hydromodification impacts from not achieving the pre-development (naturally occurring) runoff flow rates and durations for the project site must be fully mitigated with offsite mitigation. Offsite mitigation measures may include utilizing regional hydrologic control measures (e.g., regional detention or infiltration basins) or rehabilitation of stream channels to achieve sustainable channel configurations.

Page # 155, Section F.3.a.(10) - (Copermittee Maintained Unpaved Roads Maintenance) requires the Copermittees to implement or require implementation of BMPs for erosion and sediment control during and after maintenance activities on the unpaved roads that the Copermittees are responsible for maintaining, particularly in or

adjacent to stream channels or wetlands. As discussed for Finding D.1c, source control BMPs for unpaved roads are needed to minimize the discharge of sediment to the MS4s and receiving waters. There are several guidance documents available (see Discussion for Finding D.1.c) that include BMPs that can be readily implemented by the Copermittees for the development of new unpaved roads. This requirement is necessary to ensure the Copermittees minimize the discharge of sediment from their unpaved roads used for their maintenance activities.

Page # 158, Section F.3.b.(4) - The Order also requires that inspections include review of BMP implementation plans if the site uses or is required to use such a plan, and the review of facility monitoring data if the site monitors its runoff. BMP implementation plans do not include SSMPs required pursuant to section F.1.d. If a facility is not required to have a BMP implementation plan or required to collect monitoring data, the inspection does not need to include a review of this information. BMP implementation plans and monitoring data are expected to be available for any facility that is covered under the General Industrial Permit. The BMP implementation plans and monitoring data can provide the inspector pertinent information that can be used during the visual inspection of the facility (e.g., BMPs implemented, maintenance records for BMPs, pollutants in storm water runoff). The Copermittees' inspectors have the discretion to determine the depth and detail of the review and use of the information in conducting the inspection.

Page # 158-159, Section F.3.b.(4) – Delete the following paragraph:
~~An additional notification to the San Diego Water Board regarding industrial sites has been added. Copermittees are required to annually notify the San Diego Water Board of industrial sites that have suspected violations. This was added to enhance San Diego Water Board and Copermittee communication and coordination in regulating industrial sites. Information may be provided as part of the JRMP annual report if submitted prior to the rainy season.~~

Page # 159, Section F.3.b.(6) – Add the following section after the end of Section F.3.b.(4):
Section F.3.b.(6) (Reporting of Non-Compliant Sites) has been added as additional notification to the San Diego Water Board regarding commercial and industrial sites. Copermittees are required to annually notify, prior to the rainy season, the San Diego Water Board of commercial and industrial sites that have any unresolved high level enforcement actions. This was added to enhance San Diego Water Board and Copermittee communication. Information may be provided as part of the JRMP annual report if submitted prior to the rainy season.

Page # 174, Section I.2 – includes, by reference to Santa Ana Water Board Order No. R8-2010-0033, including the relevant sections of the fact sheet and findings (and subsequent revisions), the requirements and WLAs assigned to the MS4s for the Lake Elsinore/Canyon Lake (San Jacinto Watershed) Nutrient TMDLs that are being implemented for the Santa Ana Water Board. Because the San Jacinto Watershed is within the boundaries of the Santa Ana Water Board's region, the Lake Elsinore/Canyon Lake Nutrient TMDLs and its requirements must be implemented by the Cities of Murrieta and Wildomar for the areas within their jurisdictions located in the Santa Ana Region (Region 8).

Page # 192, Section II.A.1 – 1. All events must now include: Biological Oxygen Demand, 5-day Chemical Oxygen Demand, Total Organic Carbon, Dissolved Organic

Carbon. These are specifically required by 40 CFR 122.26(d)(2)(iii)(A) and (B), but were omitted from collection and reporting required by Order No. R9-2004-001.

Permit Updates

Page # 1, Finding A.3 – This Order is consistent with the following precedential Orders adopted by the State Water Board addressing MS4 NPDES Permits: Order 99-05, Order WQ-2000-11, Order WQ 2001-15, and Order WQO 2002-0014~~, and Order WQ 2009-0008 (SWRCB/OCC FILE A-1780)~~.

Page # 1, Finding A.3 – Add the following as a footnote to the end of the finding: In July 2010, the court in Los Angeles County v. State Water Resources Control Board remanded the Los Angeles Water Board's MS4 permit underlying Order WQ 2009-0008 for procedural reasons occurring during the permit adoption process. The court did not evaluate or rule upon the substantive findings and reasoning set forth in Order WQ 2009-0008. The State Water Board rescinded and voided Order WQ 2009-0008 to comply with the court's order. While the San Diego Water Board may no longer cite Order WQ 2009-0008, the San Diego Water Board has independently considered whether the requirement to eliminate non-stormwater discharges is subject to the MEP standard. The San Diego Water Board concludes that the MEP standard does not apply to non-stormwater discharges for the same reasons expressed by the State Water Board.

Page # 1, Finding A.4 - The Fact Sheet / Technical Report for the Order No. R9-2010-0016, NPDES No. CAS0108766, Waste Discharge Requirements for Discharges from the MS4s Draining the County of Riverside, the Incorporated Cities of Riverside County, and the Riverside County Flood Control and Water Conservation District within the San Diego Region, includes cited regulatory and legal references and additional explanatory information and data in support of the requirements of this Order. This information, including any supplements thereto,~~ and any response to comments on the Tentative Orders,~~ is hereby incorporated by reference into these findings.

Page #28, Section F.1.c.(6) – Infiltration and Groundwater Protection
To protect groundwater quality, each Copermittee must apply restrictions to the use of treatment control BMPs that are designed to primarily function as large, centralized infiltration devices (such as large infiltration trenches and infiltration basins). Such restrictions must be designed so that the use of such infiltration treatment control BMPs does not cause or contribute to an exceedance of groundwater quality objectives and must be fully protective of downstream water rights. At a minimum, each treatment control BMP designed to primarily function as a centralized infiltration device must meet the restrictions below, unless the Developemnt~~n~~ Project demonstrates to the Copermittee that a restriction is not necessary to protect groundwater quality. The Copermittees may collectively or individually develop alternative restrictions on the use of treatment control BMPs which are designed to primarily function as centralized infiltration devices. Alternative restrictions developed by the Copermittees can partially or wholly replace the restrictions listed below. The restrictions do not apply to small infiltration systems dispersed throughout a development project.

Page # 29, Section F.1.c.(8) - Rain water harvesting and water reuse, where feasible, must be ~~implemented~~ encouraged as part of the site design and construction to reduce pollutants in storm water discharges to the MEP~~, and to supplement offsite beneficial uses~~.

Page # 33, Section F.1.d.(4)(b)(iii) - Projects with low traffic areas and appropriate soil conditions must be constructed ~~walkways, trails, overflow parking lots, alleys, or other low-traffic areas~~ with permeable surfaces~~, such as pervious concrete, porous asphalt, unit pavers, and granular materials~~.

Page # 33-34, Section F.1.d.(4)(c)(ii) - If onsite retention[14] ~~infiltration~~ LID BMPs are technically infeasible per section F.1.d.(7)(b), other LID BMPs may treat any volume that is not retained onsite provided that the total volume of the other LID BMPs, including pore spaces and pre-filter detention volume, are sized to hold at least 0.75 times the portion of the design ~~storm~~ capture volume that is not ~~infiltrated~~retained onsite. The LID BMPs must be designed for an appropriate surface loading rate to prevent erosion, scour and channeling within the BMP.

Page # 33, Section F.1.d.(4)(c)(ii) – Insert footnote 14, for the word retention: Infiltration LID BMPs are the preferred method for onsite retention, but does not preclude the use and implementation of all other retention LID BMPs (e.g. evapotranspiration, evaporation, and/or harvest), where technically feasible, prior to considering biofiltration LID BMPs for treatment of the design capture volume that is not otherwise retained onsite.

Page # 36, Section F.1.d.(7)(a) - Prior to implementation, the LID waiver program must clearly exhibit that it will not allow Priority Development Projects to result in a net impact (after consideration of any mitigation) from pollutant loadings over and above the impact caused by projects meeting the onsite LID retention requirements;

Page # 38-39, Section F.1.f.(1) - Inventory of SSMP projects: Each Copermittee must develop and maintain a watershed-based database to track and inventory all projects constructed within their jurisdiction, that have a final approved SSMP (SSMP projects), and its structural post-construction BMPs ~~within its jurisdiction~~ implemented therein since July, 2005. LID BMPs implemented on a lot by lot basis ~~in low density residential areas~~ at single family residential houses, such as rain barrels, are not required to be tracked or inventoried.

Page # 39, Section F.1.f.(2)(b)(iv) – Delete the section:
~~(iv) At least 20 percent of all approved and inventoried SSMP projects must be inspected by the Copermittee annually;~~

Page # 64, Section F.3.c.(5) – Delete the section:
~~(5) Privately Owned Unpaved Roads Maintenance~~

~~(a) The Copermittees must require implementation of BMPs for erosion and sediment control during maintenance activities on privately owned unpaved roads, particularly in or adjacent to stream channels or wetlands.~~

~~(b) The Copermittees must enforce their ordinances against illegal construction and maintenance grading activities on privately owned unpaved roads, so as to prevent impacts to water quality.~~

Page # 66-67, Section F.4.b - Each Copermittee must maintain an updated map of its entire MS4 and the corresponding drainage areas within its jurisdiction. The use of GIS is strongly encouraged. The MS4 map must include all segments of the storm sewer

system owned, operated, and maintained by the Copermittee, as well as all known locations of inlets that discharge and/or collect runoff into the Copermittee's MS4~~, all known locations of access points (i.e. manholes) to the Copermittee's MS4~~, all known locations of connections with other MS4s (e.g. Caltrans), and all known locations of all the outfalls that discharge runoff from the Copermittee's MS4. The accuracy of the MS4 map must be confirmed during dry weather field screening and analytical monitoring and must be updated at least annually. The MS4 map including any GIS layers must be submitted with the updated JRMP.

Page # 69, Section F.6 - Each Copermittee must implement education programs to (1) measurably increase the knowledge regarding MS4s, impacts of runoff on receiving waters, and potential BMP solutions for the target audience; and (2) to measurably change the behavior of target communities and thereby reduce pollutants in storm water discharges and eliminate prohibited non-storm water discharges to MS4s and the environment. At a minimum, the education programs must meet the requirements of this section and address the following target communities:

- Copermittee Departments and Personnel
- New Development / Redevelopment Project Applicants, Developers, Contractors, Property Owners, and other Responsible Parties
- Construction Site Owners and Operators
- Commercial Owners and Operators
- Industrial Owners and Operators
- Residential Community and General Public
- ~~Quasi-Governmental Agencies / Districts (i.e., educational institutions, water districts, sanitation districts, etc.)~~

Attachment Updates

Page # C-7 - Add the following definition:
Low Impact Development Best Management Practices (LID BMPs) - LID BMPs include schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the pollution of waters of the United States through storm water management and land development strategies that emphasize conservation and the use of on-site natural features integrated with engineered, small-scale hydrologic controls to more closely reflect pre-development hydrologic functions. LID BMPs include retention practices that do not allow runoff, such as infiltration, rain water harvesting and reuse, and evapotranspiration. LID BMPs also include flow-through practices such as biofiltration that may have some discharge of storm water following pollutant reduction.

Page # E-5, Section II.A.1, Table 1 -
Table 1. Analytical Testing for Mass Loading (II.A.1) and Stream Assessment (II.A.2)

Conventionals, Nutrients, Hydrocarbons	Pesticides	Metals (Total and Dissolved)	Bacteriological (mass loading)
• Total Dissolved Solids • Total Suspended Solids • Turbidity • Total Hardness • pH • Specific Conductance • Temperature • Dissolved Oxygen • Total Phosphorus • Dissolved Phosphorus • Nitrite* • Nitrate* • Total Kjeldahl Nitrogen • Ammonia • Biological Oxygen Demand, 5-day • Chemical Oxygen Demand • Total Organic Carbon • Dissolved Organic Carbon • Methylene Blue Active Substances • Oil and Grease • Sulfate	• Diazinon • Chlorpyrifos • Malathion • Carbamates • Pyrethroids	• Arsenic • Cadmium • Total Chromium • Hexavalent Chromium** • Copper • Lead • Iron • Manganese • Nickel • Selenium • Zinc • Mercury • Silver • Thallium	• E. coli • Fecal Coliform • Enterococcus
* Nitrate and ~~nitrate~~ nitrite may be combined and reported as nitrate + nitrite. ** Hexavalent Chromium sampling must occur only for mass loading stations for the 1st wet weather event and 1 dry weather event.			

Page # E-6, Section II.A.2.a – … The two existing mass loading stations at Murrieta and Temecula Creeks must continue to be monitored. Copermittees may propose, for San Diego Water Board review and approval, changing the location of stream assessment monitoring stations where the mass loading stations location has changed pursuant to section II.A.1.a. Two reference stream assessment stations, including the existing Adobe Creek station, must be identified, sampled, monitored, and analyzed.

Page # E-7, Section II.A.2.b - Frequency: Stream assessment stations must be monitored in May or June (to represent the influence of wet weather on the communities) ~~and September or October (to represent the influence of dry weather flows on the communities)~~. The timing of monitoring of stream assessment stations located at mass loading stations must coincide with dry weather monitoring of those mass loading stations.

Page # E-22, Section II.E -
Add the following special study to the end of Section II.E:

7. Stormwater Monitoring Coalition (SMC) Regional Monitoring of Southern California Coastal Watersheds:

   The Copermittees must implement the monitoring program developed by the SMC for Regional Monitoring of the southern California coastal watersheds within the Santa Margarita Hydrologic Unit. Each Copermittee must evaluate the results of the monitoring program within and downstream of their jurisdiction and integrate the results into program assessments and modifications.

Page # E-25, Section III.A.2 - Monitoring Annual Report: The Principal Copermittee must submit the Receiving Waters and MS4 Discharge Monitoring Annual Report to the San Diego Water Board on October 1 of each year, beginning on **October 1, 2013**. Receiving Waters and MS4 Discharge Monitoring Annual Reports must include monitoring conducted under the previous fiscal year, and must meet the following requirements:

Page # E-27, Section III.A.4 - Following completion of an annual cycle of monitoring in October, the Copermittees must make the monitoring data and results available to the San Diego Water Board at the San Diego Water Board's request. Following completion of the annual cycle of monitoring, the Copermittees must upload monitoring data and results into the California Environmental Data Exchange Network (CEDEN)[15].

Footnote 15: http://www.ceden.org/

Fact Sheet Updates

Page # 5, Section II - Copermittees

1. City of Murrieta	4. County of Riverside
2. City of Temecula	5. Riverside County Flood Control and Water Conservation District
3. City of Wildomar	
~~6. City of Menifee~~[1]	

Page # 5, Footnote 1 – Delete the footnote:

[1] ~~Until an agreement to transfer the regulatory oversight of the City of Menifee's MS4 to the California Regional Water Quality Control Board, Santa Ana Region under Order No. R8-2010-0033 is finalized, the City of Menifee is included as a Copermittee under Order No. R9-2010-0016.~~

Page # 22, Finding A.4 - The Fact Sheet / Technical Report for the Order No. R9-2010-0016, NPDES No. CAS0108766, Waste Discharge Requirements for Discharges from the MS4s Draining the County of Riverside, the Incorporated Cities of Riverside County, and the Riverside County Flood Control and Water Conservation District within the San Diego Region, includes cited regulatory and legal references and additional explanatory information and data in support of the requirements of this Order. This information, including any supplements thereto, ~~and any response to comments on the Tentative Orders,~~ is hereby incorporated by reference into these findings.

Page # 45, Discussion of Finding C.14 - The State Water Board~~'s~~ recently recognized ~~precedential~~ in order (Order WQ 2009-0008) ~~affirming a Los Angeles County MS4 permit modification, consistent with USEPA's prior interpretations, recognizes~~ that "[n]either the Clean Water Act nor the federal storm water regulations define 'non-storm water.' 'Illicit discharge' is defined as any discharge to an MS4 'not composed entirely of storm water.' Thus, 'illicit discharge' is the most nearly applicable definition of 'non-storm water' found in federal law and is often used interchangeably with that term." In July 2010, the court in Los Angeles County v. State Water Resources Control Board remanded the Los Angeles Water Board's MS4 permit underlying Order WQ 2009-0008 for procedural reasons occurring during the permit adoption process. The court did not evaluate or rule upon the substantive findings and reasoning set forth in Order WQ 2009-0008. The State Water Board rescinded and voided Order WQ 2009-0008 to comply with the court's order. While the San Diego Water Board may no longer cite Order WQ 2009-0008, the San Diego Water Board has independently considered whether the requirement to eliminate non-stormwater discharges is subject to the MEP standard. The San Diego Water Board concludes that the MEP standard does not apply to non-stormwater discharges for the same reasons expressed by the State Water Board.

Page # 96, Finding E.6 – Add the following paragraph at the end of the discussion of Finding E.6:

The San Diego Water Board recognizes that the Commission on State Mandates recently found that certain provisions within two municipal storm water permits constituted reimbursable state mandates within the meaning of the California Constitution. The Commission did not determine the validity of those provisions; it only determined that the State must reimburse the claimants for the costs of implementing

those provisions. The decisions directly affect only the municipal storm water permits identified in the two test claims. That is, the effect of the decisions is limited to the provisions of Los Angeles Water Board Order 01-182 and San Diego Order R9-2007-0001 identified by the Commission as reimbursable state mandates. No other municipal storm water permits or provisions therein are directly affected by the decisions and the San Diego Water Board is not precluded from adopting similar or identical provisions in the Tentative Order. Subsequent proceedings before the Commission to determine the local governments entitled to reimbursement and the amount of reimbursement are underway before the Commission. Separately, the State Water Board and San Diego and Los Angeles Water Boards have challenged these decisions in court.

Page # 135, Section F.1.d.(4) - The Order provides the Copermittees with flexibility in implementing the LID site design BMP requirements by providing a LID BMP waiver program. For Priority Development Projects where ~~infiltration~~ retention LID BMPs are not technically feasible for retaining all or part of the design capture volume on site without runoff, a waiver may be granted for the remaining portion of the design capture volume to be treated with other LID BMPs. The Riverside County Copermittees plan on allowing the implementation of the LID BMPs contained in the Riverside County LID Design Manual if ~~infiltration~~ retention LID BMPs are found to be technically infeasible to retain all of the design capture volume. Other LID BMP design and guidance manuals that are acceptable to the Copermittees and/or San Diego Water Board may also be considered.

If ~~infiltration~~ retention LID BMPs and/or other LID BMPs are technically infeasible to retain and/or treat all or part of the design capture volume for a Priority Development Project, a waiver may be granted for the remaining portion of the design capture volume. The waiver would allow the remaining portion of the design capture volume to be treated with conventional treatment control BMPs and some form of mitigation.

Page # 139, Section F.1.f - To facilitate the tracking of BMP maintenance, each Copermittee must develop and maintain a database of Priority Development Projects subject to SSMP requirements (SSMP projects) and the post-construction BMPs implemented for each SSMP project. The inventory is not expected or required to include LID BMPs that are implemented on a lot by lot basis ~~in low density residential areas~~ at single family residential houses. The inventory, however, must include the post-construction BMPs for all other development or redevelopment SSMP project sites.

Page # 140, Section F.1.f – Delete the following paragraph:
~~Twenty percent of all SSMP projects are required to be inspected by the Copermittees annually. If the number of high priority SSMP project sites is 20 percent or more of the total number of SSMP projects in the Copermittee's inventory, this requirement will be met. If, however, the number of high priority SSMP project sites is less than 20 percent of the total number of SSMP projects in the Copermittee's inventory, additional lower priority SSMP project sites must be inspected to make up the difference. Selection of the additional lower priority SSMP project sites will be at the discretion of the Copermittee, but are selected based on each site's potential threat to water quality.~~

Page # 160, Section F.3.c.(5) – Delete the section:
~~**Section F.3.c.(5)** (Privately Owned Unpaved Roads Maintenance) includes requirements for privately owned unpaved roads. The Copermittees must require~~

~~implementation of BMPs for erosion and sediment control during maintenance activities on privately owned unpaved roads, particularly roads that are in or adjacent to receiving waters. As discussed for Finding D.1.c, BMPs for unpaved roads are needed to minimize the discharge of sediment to the MS4s and receiving waters. There are several guidance documents available (see Discussion for Finding D.1.c) that include design and source control BMPs that can the Copermittees can readily require to be implemented.~~

~~In addition, where the Copermittees identify illegal construction and maintenance grading activities on privately owned unpaved roads, the Copermittees must enforce their ordinances to prevent illicit discharges of sediment and other pollutants from privately owned unpaved roads to their MS4s and receiving waters.~~

Page # 163, Section F.4.b - requires each Copermittee to maintain an updated map of its entire MS4 and the corresponding drainage areas within its jurisdiction. The Order specifies that the map must include the segments of the storm sewer system owned, operated, and maintained by the Copermittee, and include locations of all known inlets, ~~access points (i.e. manholes),~~ connections with other MS4s, and outfalls to the Copermittee's MS4. Knowing where their inlets, access points, connections with other MS4s, and outfalls are located will allow the Copermittees to better track, identify, and eliminate IC/IDs. The use of a geographic information system (GIS) by the Copermittees is strongly encouraged for the MS4 map. The Riverside County Flood Control and Water Conservation District (RCFCD) currently maintains a GIS layer that is a compilation of all the Copermittee MS4 maps. Although an individual Copermittee may not have GIS capabilities, each Copermittee has agreements with RCFCD for providing updated MS4 maps to the RCFCD to update this GIS layer and subsequent submittal to the San Diego Water Board.

DRAFT MEMORANDUM

STETSON ENGINEERS INC.
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TEL: (415) 457-0701 FAX: (415) 457-1638 e-mail: @stetsonengineers.com

TO:	Jeremy Jungreis	DATE:	October 1, 2010
FROM:	Stetson Engineers	JOB NO:	2197-5000-5001AC
RE:	Comments on Tentative Order R9-2010-0016		

RWQCB Order R9-2010-0016 (Order) does not specifically address the quantities of water that may be lost from baseflows due to the impact of implementing on-site retention and infiltration of rainfall. However, by specifying the 85th percentile, 24-hour rainfall event as the standard for on-site retention (p. 33), the Order assures that significant amounts of rainfall may be captured. The impact to baseflows will depend on how widely LID retrofits are implemented, and on the size of the projects' drainage areas. The example below illustrates how streamflow may be affected in the Murrieta Creek sub-watershed of the Santa Margarita River watershed.

At the Wildomar rainfall station, located in Riverside County near the western boundary of the Murrieta Creek sub-watershed, the 85th percentile, 24-hour rainfall amount is about 0.8 inch. This station averages rainfall of about 14.0 inches per year. Two recent water years (WY) were reviewed in order to roughly estimate the amount of rainfall that would be captured by on-site LID detention designed for the 85th percentile rainfall. At the Wildomar station, WY 2003 was an above-average year, with 18.3 inches of rain. WY 2006 was a below-average year, with 7.4 inches of rain. In WY 2003 and 2006, the total measured streamflow at the Murrieta Creek streamflow gaging station (USGS 11043000, Murrieta Creek at Temecula) was 14,831 acre-feet and 5,523 acre-feet, respectively.

The impact to streamflow from the Order will depend upon the total drainage area of existing development that is retrofitted with on-site LID stormwater capture. The total area and types of developments are not known, but an example is provided here to illustrate potential impacts to streamflow in the Murrieta Creek drainage.

The net loss of streamflow due to LID retrofit projects depends on the proportion of rainfall that is lost on-site to groundwater infiltration and evapotranspiration compared to how

much rainfall became surface water runoff to streams. This percentage, known as the runoff coefficient, depends on the soil type, land cover, slope, and antecedent conditions of a particular site. Each area that undergoes a LID retrofit will have a runoff coefficient associated with it that is determined by its site-specific conditions. The impact associated with retrofitting a 1,000-acre commercial area in the Murrieta Creek sub-watershed with LID is discussed as an example. Rainfall amounts from WY 2003 are used in this example.

A typical estimate of the runoff coefficient[1] for a commercial site is 0.5, meaning 50% of rainfall will infiltrate or evaporate, and 50% will run off as surface water (Caltrans, 2008). Prior to LID retrofit, the quantity of surface water runoff from this area in WY 2003 was 760 acre-feet (50% of the 18.3 inches, applied to 1,000 acres). With LID in place, the first 0.8 inches of rainfall from each event is assumed to be captured and infiltrated on-site. The remainder of the rainfall is assumed to infiltrate and run off following the same runoff coefficient of 0.5. In WY 2003, about 6.5 inches of rainfall would be captured and infiltrated by LID measures; of the remaining 11.8 inches of rainfall, 5.9 would also infiltrate, and 5.9 inches would become surface runoff. This equates to an annual surface water runoff volume of 490 acre-feet. The result of LID is a 270 acre-feet net reduction in surface water runoff downstream of the LID site. For comparison, this amount equates to 2% of the flow at the Murrieta Creek gage for WY2003. The rainfall, infiltration, and runoff volumes are given in Table 1. Figure 1 also shows the infiltration and runoff depths before and after implementation of LID measures.

If the same assumptions are applied to the 1,000-acre commercial area using WY 2006 rainfall, 5.8 inches of the total 7.4 inches of rainfall would be captured by LID measures. However, in this case, the runoff coefficient is assumed to be 0.25, in order to account for the dry conditions. Dry antecedent conditions mean a higher percentage of rainfall would infiltrate. The pre-LID runoff quantity is 155 acre-feet, while the post-LID runoff quantity is 33 AF, resulting in a net reduction of 120 acre-feet of surface water flows immediately downstream of the site. Compared to the total flow at the Murrieta stream gage, the additional water infiltrated on-site amounts to 2% of the total flow at the gage for WY 2006. The rainfall, infiltration, and runoff volumes are given in Table 1. Figure 2 also shows the infiltration and runoff depths

[1] The runoff coefficient is a simplified concept intended to be used with the rational method, generally used to calculate single-event storm runoff. The coefficient is used here in lieu of a more sophisticated daily model, which would account for antecedent moisture conditions. However, for this general, order-of-magnitude-level analysis, the runoff coefficient provides a simple estimate of annual runoff volumes.

before and after implementation of LID measures. The net reduction in surface water flows could be higher if larger areas of existing development are retrofitted with LID or if the sites have higher runoff coefficients.

The policy of promoting on-site infiltration in the upper Santa Margarita River watershed will reduce surface water flows to Camp Pendleton. In the 1950s and 1960s, groundwater pumping in the upper Santa Margarita basin led to a disconnection between the upper basin and the lower basin (the limit between the two is the Temecula Gorge). This is demonstrated by Figure 3, which shows the decline in baseflows in the River at the Gorge. Because of this disconnection, increasing infiltration in the upper groundwater basin will increase groundwater storage in the upper basin, but none of this water will be conveyed to the lower watershed. Instead, additional water infiltrated on-site by the proposed Order will be retained for use by groundwater pumpers upstream of Camp Pendleton. The Base's ability to exercise its water right to use water from the Santa Margarita River will likely be impacted from diminished surface water flows resulting from the proposed Order.

Reference

California Department of Transportation (Caltrans) Highway Design Manual. 2008. Chapter 810 Hydrology. Updated July 1, 2008. Sacramento, CA.

TABLE 1. SUMMARY OF INFILTRATION AND RUNOFF FOR 1,000-ACRE COMMERCIAL AREA, BEFORE AND AFTER IMPLEMENTATION OF LID

[1]	[2]	[3]	[4]		[5]	[6]	[7]		[8]
Water Year	**Total Rainfall at Wildomar**	**Runoff Coef-ficient**	**Pre-LID Runoff**		**Rainfall Depth Captured by LID**	**Additional Infil-tration**	**Post-LID Runoff**		**Net Change in Surface Runoff**
			Depth	**Volume**			**Depth**	**Volume**	
	(inches)	**(--)**	**(in)**	**(AF)**	**(in)**	**(in)**	**(in)**	**(AF)**	**(AF)**
2003	18.3	0.50	9.1	760	6.5	5.9	5.9	490	-270
2006	7.4	0.25 [a]	3.7	155	5.8	1.2	0.4	35	-120

Column Descriptions:

[1] Water year: October 1 through September 30, 2010

[2] From daily data obtained from the Riverside County Flood Control and Water Conservation District; average annual amount is 14.0 inches.

[3] Estimated proportion of rainfall that becomes surface runoff; Range of values from Caltrans (2008) is 0.50 to 0.70 for a "neighborhood business district"; 0.50 was used for normal to wet hydrology but was reduced as described in note "a" for dry conditions.

[4] Total runoff from developed site, prior to LID retrofit, equal to the runoff coefficient in [3] multiplied by [2]; converted to a volume by multiplying by (1 ft/12 in) and multiplying by the area of the site, 1,000 acres.

[5] Rainfall depth captured by LID measures, assuming design volume equal to the 85th percentile, 24-hour rainfall, which is 0.8 inches for Wildomar. Capture rainfall was determined by examining the daily rainfall record for the water year and assuming the first 0.8 inches of each event is captured on-site. Converted from depth to volume by multiplying by (1 ft/12 in) and multiplying by the area of the site, 1,000 acres.

[6] Quantity of rainfall, after LID capture, which is infiltrated: ([2] – [5])* [3]

[7] Surface water runoff from the developed side, with LID implementation, equal to [2] – [5] – [6]. Converted from depth to volume by multiplying by (1 ft/12 in) and multiplying by the area of the site, 1,000 acres.

[8] Net change in surface runoff volume from the site: [4] – [7]

Note:

a. For WY 2006, the textbook value of 0.50 for a commercial site was reduced to 0.25 to account for antecedent conditions during the below-normal rainfall conditions of that water year. The rational method runoff coefficient does not account for antecedent soil conditions.

FIGURE 1. INFILTRATION AND RUNOFF DEPTHS FOR 1,000-ACRE LIGHT COMMERCIAL AREA FOR WY 2003

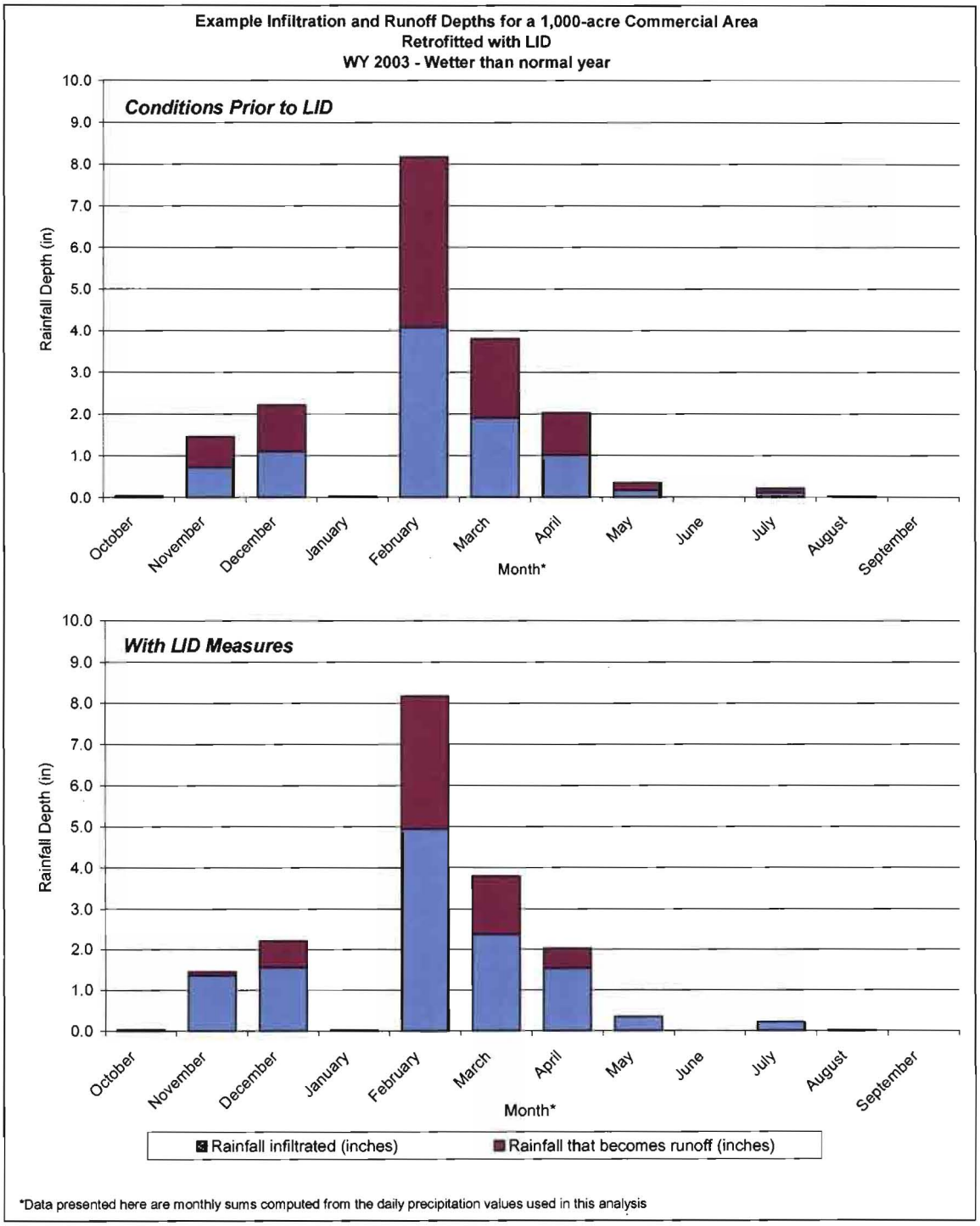

FIGURE 2. INFILTRATION AND RUNOFF DEPTHS FOR 1,000-ACRE COMMERCIAL AREA FOR WY 2006

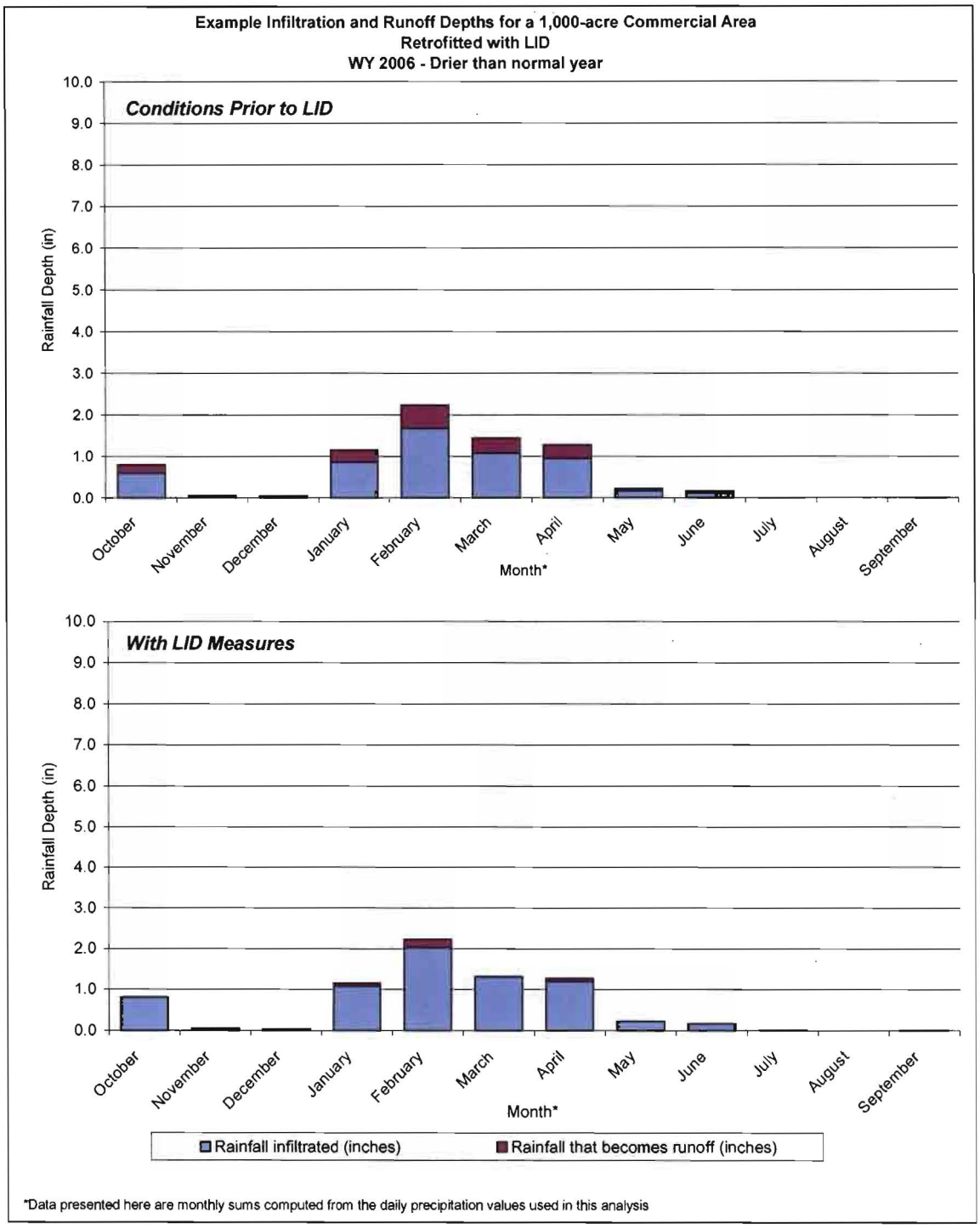

FIGURE 3. NON-AUGMENTED FLOW AT THE SANTA MARGARITA RIVER GORGE

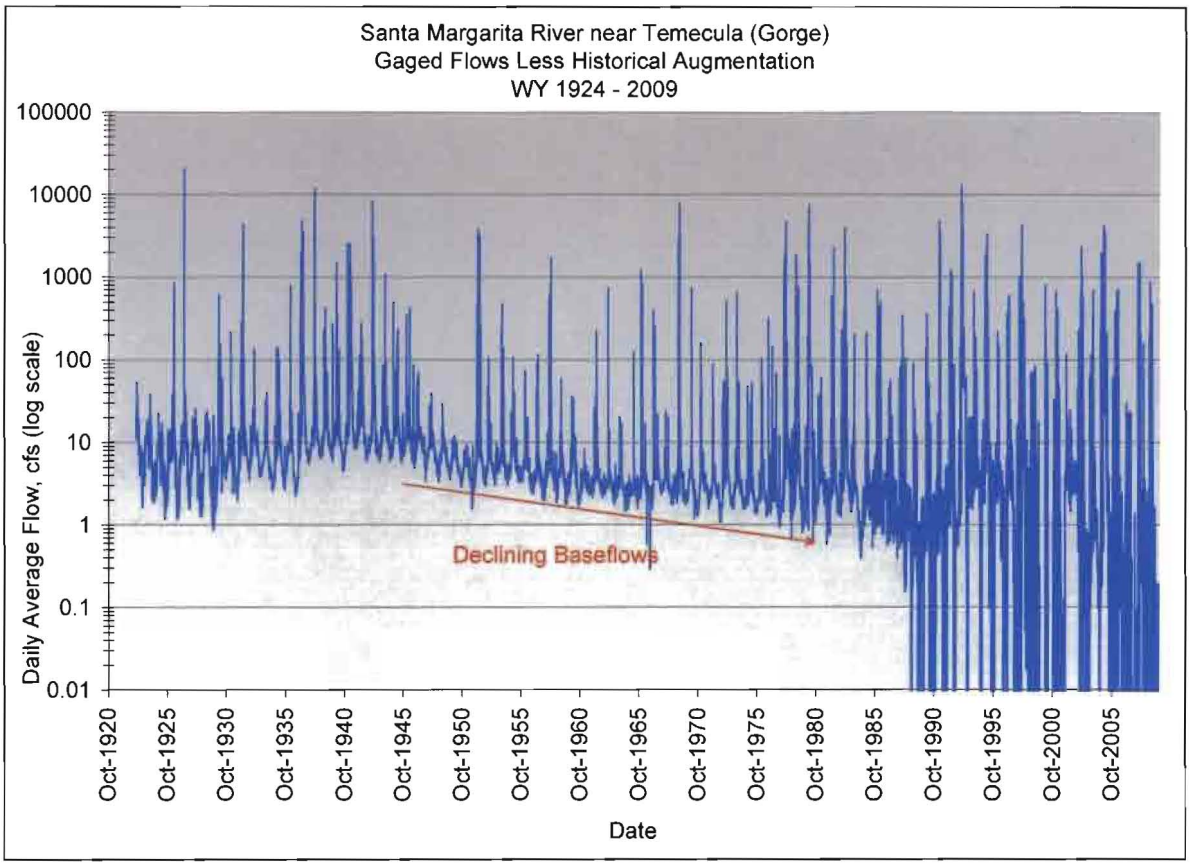

ALTERNATIVES BELOW ARE BASED ON THE LANGUAGE IN THE TENTATIVE ORDER

Preferred Language

(c) LID BMPs sizing criteria:

(i) LID BMPs must be sized and designed to ensure onsite retention without runoff, of the volume of runoff produced from a 24-hour 85th percentile storm event[1] ("design capture volume");

(ii) If onsite infiltration LID BMPs are technically infeasible per section F.1.d.(7)(b), other LID BMPs may treat any volume that is not retained onsite provided that the other LID BMPs are sized to hold the design storm volume that is not infiltrated. The LID BMPs must be designed for an appropriate surface loading rate to prevent erosion, scour and channeling within the BMP.

Alternate Language #1

From section F.1.d.

(d) LID BMPs sizing criteria:

(i) LID BMPs must be sized and designed to ensure onsite retention without runoff, of the volume of runoff produced from a 24-hour 85th percentile storm event[2] ("design capture volume") that is in excess of the runoff from the pre-development site;

(ii) If onsite ~~infiltration~~ retention LID BMPs are technically infeasible per section F.1.d.(7)(b), other LID BMPs may treat any volume that is not retained onsite. Due to the flow through design of non-retention LID BMPs, the total volume of the BMP, including pore spaces and pre-filter detention volume, must be sized to hold at least 0.75 times the portion of the design capture volume that is not retained onsite by LID retention BMPs. ~~provided that the other LID BMPs are sized to hold the design storm volume that is not infiltrated~~. The LID BMPs must be designed for an appropriate surface loading rate to prevent erosion, scour and channeling within the BMP.

Alternate Language #2

From section F.1.d.

(c) LID BMPs sizing criteria:

(i) LID BMPs must be sized and designed to ensure onsite retention without runoff, of the volume of runoff produced from a 24-hour 85th percentile storm event[3] ("design capture volume");

(ii) If onsite ~~infiltration~~ retention LID BMPs are technically infeasible per section F.1.d.(7)(b), other LID BMPs may treat any volume that is not retained onsite. Due to the flow through design of non-retention LID BMPs, the total volume of the BMP, including pore spaces and pre-filter detention volume, must be sized to hold at least 0.75 times the portion of the design capture volume that is not retained onsite by LID retention BMPs. ~~provided that the other LID BMPs are sized to hold the design storm volume that is not infiltrated~~. The LID BMPs must be designed for an appropriate surface loading rate to prevent erosion, scour and channeling within the BMP.

With concurrent changes to section F.1.d.(7)

(b) For each Priority Development Project participating, the Copermittee must find that it is technically infeasible to implement LID BMPs that comply with the requirements of Section F.1.(d)(4). The Copermittee(s) must develop criteria to determine the technical feasibility of implementing LID BMPs . Each Priority Development Project participating must demonstrate that LID BMPs were implemented as much as feasible given the site's unique conditions. Technical infeasibility may result from conditions including, but not limited to:

(i) Locations that cannot meet the infiltration and groundwater protection requirements in section F.1.c.(6) for large, centralized infiltration BMPs. Where infiltration is technically infeasible, the project must still examine the feasibility of other onsite LID BMPs;

(ii) Insufficient demand for storm water reuse;

(iii) Sites where full retention of the design capture volume would reduce runoff from the site below the pre-development conditions, or would otherwise conflict with hydromodification requirements, must still examine the feasibility of retaining that portion of the design capture volume that is in excess of the runoff from the pre-development site.

(iv) Smart growth and infill or redevelopment locations where the density and/or nature of the project would create significant difficulty for compliance with the LID BMP requirements; and

(v) Other site, geologic, soil, or implementation constraints identified in the Copermittees updated SSMP document.

Alternate Language #3

From section F.1.d.

(c) LID BMPs sizing criteria:

(i) LID BMPs must be sized and designed to ensure onsite retention without runoff, of the volume of runoff produced from a 24-hour 85th percentile storm event[4] ("design capture volume");

(ii) If onsite infiltration LID BMPs are technically infeasible per section F.1.d.(7)(b), other LID BMPs may treat any volume that is not retained onsite. Due to the flow through design of non-retention LID BMPs, the total volume of the BMP, including pore spaces and pre-filter detention volume, must be sized to hold at least 0.75 times the portion of the design capture volume that is not retained onsite by LID retention BMPs. ~~provided that the other LID BMPs are sized to hold the design storm volume that is not infiltrated~~. The LID BMPs must be designed for an appropriate surface loading rate to prevent erosion, scour and channeling within the BMP.

~~(iii)~~

(iii) The sizing criteria identified in section F.1.d.(4)(c)(i) above shall remain in effect until the completion of the special study identified in Attachment E, on the *Effects of LID retention of Downstream Hydrology.* At that time the following LID sizing criteria shall become effective unless the study has determined that the following criteria would be detrimental to downstream beneficial uses:

[a] LID BMPs must be sized and designed to ensure onsite retention without runoff, of the volume of runoff produced from a 24-hour 85th percentile storm event.

With concurrent addition to Attachment E, Section II.E. (in place of one of the other special studies)

Effects of LID Retention of Downstream Hydrology:

The Copermittees must conduct a study to assess if there will be any downstream hydrologic effects resulting from the full retention of the 24-hour 85th percentile storm runoff, that may negatively affect beneficial uses. The analysis should assess the potential effects on both habitat and municipal uses, and must be complete by XXXX. The Copermittees must implement the special study unless otherwise authorized in writing by the San Diego Water Board.

COOPERATIVE WATER RESOURCE MANAGEMENT AGREEMENT

between

CAMP PENDLETON

and

RANCHO CALIFORNIA WATER DISTRICT

March, 2002

PENGAD 800-631-6989
DEPOSITION EXHIBIT
474

COOPERATIVE WATER RESOURCE MANAGEMENT AGREEMENT

1. Purpose. This Cooperative Water Resources Management Agreement ("Agreement") is between the United States, on behalf of Camp Pendleton (sometimes "Camp Pendleton"), and the Rancho California Water District, ("District"), and is effective upon approval of the Court. Certain terms used in this Agreement are defined in Exhibit "A" hereto, including a map of the Santa Margarita River watershed. At the present time, two Judgments affect the rights of the parties with respect to water supplies from the Santa Margarita River watershed. The first is a Stipulated Judgment in the case of Rancho Santa Margarita v. Vail, San Diego Superior Court Action No. 42850 ("1940 Judgment"). The second is the Judgment in the case of United States v. Fallbrook Public Utility District, Civ. No. 1247, S.D. Cal. ("Fallbrook Case"). However, these Judgments do not fully meet the needs of the parties for effective water management under present conditions. The meanings of certain provisions of the 1940 Judgment are also in dispute. The parties, therefore, propose to manage these water resources in a practical way that will meet their needs, consistent with the essential rights and obligations of the two Judgments, while avoiding potential conflicts over disputed provisions.

2. Term. Unless sooner terminated because of an uncured default as set forth in Section 15 below, this Agreement shall remain in effect for a minimum of 10 years

from its effective date, and until either party exercises its right to terminate as set forth in Section 16 below.

3. Incorporation in Fallbrook Case and Continuing Jurisdiction. The Agreement will be submitted to the Court for approval and incorporated by stipulation into the Fallbrook Case, pursuant to the Court's continuing jurisdiction therein, and will be administered by the Watermaster appointed by the Federal District Court, Southern District of California, by order dated March 13, 1989, or subsequent order. The Court shall retain continuing jurisdiction to make such further orders as may be necessary to interpret or enforce this Agreement, provided that the Court shall not have the power to modify the terms of this Agreement or the 1940 Judgment. If either party believes there is a substantial change of circumstances, the parties shall attempt to reach agreement as may be appropriate in light of the changed circumstances, or shall engage in mediation if agreement is not reached.

4. 1940 Judgment. The United States is the successor in interest to the plaintiff Rancho Santa Margarita in the 1940 Judgment. The Rancho California Water District is a successor in interest to the defendants in the 1940 Judgment, and has certain rights and obligations under a 1978 Agreement between KACOR Realty and Rancho California Water District relative to Vail Lake. Both parties have certain rights and entitlements under the 1940 Judgment and are obligated to comply therewith. Without waiving their rights and entitlements under the 1940 Judgment, the parties

intend to forbear enforcing them for so long as this Agreement is in effect and being complied with. The parties realize that certain provisions of this Agreement differ from the 1940 Judgment. For example, the measurement of the flows required to be maintained under this Agreement will be accomplished at USGS Gage ID No. 11044000 on the Santa Margarita River near Temecula ("the Gorge"), and those guaranteed flows to Camp Pendleton are in terms of usable flows, including habitat maintenance flows, instead of total flows. Without waiving any of their rights and entitlements under the 1940 Judgment, the parties agree that, to the extent provisions of this Agreement are inconsistent with the 1940 Judgment, the provisions of this Agreement shall control for so long as this Agreement is in effect and being complied with. The parties agree further that, so long as this Agreement is in effect and is being complied with, neither party will undertake any proceeding with respect to the 1940 Judgment against the other, either judicially or administratively. Should either party fail to comply with this Agreement, or should it expire or be terminated, the parties preserve their respective rights to enforce the 1940 Judgment against each other, as each interprets it, and the provisions of this Agreement shall not be used to supply meaning to the 1940 Judgment.

5. Guaranteed Flows at the Gorge.

(a) The parties have developed a Groundwater Model, which indicates that the simulated total natural streamflow at the Gorge over the period 1935-1998 would have averaged 30.35 cfs, without diversions or pumping. For the purpose of establishing flow requirements, the daily natural streamflow at the Gorge was simulated using the Hydrologic Simulation Program Fortran (HSPF) model developed by Camp Pendleton and reviewed by both parties. Both models are more fully described in Exhibit "B" hereto. Flows at the Gorge, as set forth in the table on page 5, are based on two-thirds of the median natural flow during very wet, above normal, below normal, and critically dry conditions. Daily flow values for very wet and critically dry conditions are based on the daily median flows for the periods 1937 to 1946 and 1957 to 1966, respectively. Above normal flows are based on the mean of the median of very wet flows and the median of all flows for the period 1931-1996. Similarly, below normal flows are based on the mean of the median of critically dry flows and the median of all flows for the period 1931-1996. This methodology eliminates the large storm flows from the calculation of required flows for Camp Pendleton (two-thirds of natural flow), and results in average annual flows ranging from 3.6 cfs to 15.6 cfs, with a median flow of 8.8 cfs for the period 1931-1996. The results of the modeling efforts and the above calculations are shown on the following table:

	Critically Dry Flow	Below Normal Flow	Above Normal Flow	Very Wet Flow
Month	cfs	cfs	cfs	cfs
Jan - April	4.5	8.0	17.8	24.1
May	3.8	5.7	11.7	15.7
June	3.3	4.9	9.4	12.2
July	3.0	4.3	7.8	9.7
August	3.0	4.4	7.6	9.2
September	3.0	4.1	7.4	9.4
October	3.0	3.9	7.7	10.1
November	3.0	4.5	8.8	11.5
December	3.3	5.3	10.4	13.5

The hydrologic conditions described in the table above are derived from a hydrologic index combining the October through April natural streamflow at the Murrieta Creek gage, and the October through April natural streamflow at Vail Lake. Natural flow at Murrieta Creek is calculated using the rainfall/run-off relationship between rainfall at Wildomar and the HSPF natural flow at Murrieta Creek. Natural flow at Vail Lake is calculated using the run-off correlation between Aguanga streamflow and inflow to Vail Lake during the period water years 1958 to 1996.

On May 1st of each year the October through April rainfall at Wildomar is used to estimate natural flow at Murrieta, and the October through April measured

streamflow at Aguanga is used to estimate natural flow at Vail Lake. A simple computer spreadsheet, maintained and operated by the Technical Advisory Committee ("TAC"), adjusts for antecedent conditions and calculates the hydrologic index based on these input parameters. The computer spreadsheet is more fully described in Exhibit "C" hereto. Once the hydrologic condition is determined, the above table is then used to prescribe the flows at the Gorge.

Recognizing the seasonal variations in such flows that naturally occur under different hydrologic conditions, it is agreed that the District hereby guarantees winter and monthly minimum average flows at the Gorge as hereinafter provided. Full implementation of such guarantee requires the construction of certain facilities, which the District agrees to construct as expeditiously as possible. Any make-up obligations in excess of 3.0 cfs shall commence upon completion of such facilities, but in no event later than June 1, 2002, unless precluded by law.

(b) The winter period includes the months of January through April. For the winter period, minimum daily flow requirements are: 11.5 cfs for very wet and above normal conditions; 8.0 cfs for below normal conditions; and 4.5 cfs for critically dry conditions. Notwithstanding the foregoing, in the first winter period following the effective date of this Agreement, the minimum daily flow requirement is 11.5 cfs, calculated on a 10 day running average. The District shall provide whatever make-up water is needed to meet this requirement. On May 1st immediately following the first

winter period, and on each May 1st thereafter, the hydrologic condition for the immediately preceding October-April period shall be determined. Such condition, and the daily flow requirements set forth in this Section 5(b), shall be used to determine the actual flow requirement for the prior winter period, and whether this requirement was exceeded. In providing minimum daily flows of 11.5 cfs during the first winter period, if the District has provided make-up water in excess of its actual requirement, the District shall be entitled to a credit for such excess. The quantity of the excess flow shall be converted to a cfs equivalent, and applied during the following winter periods to reduce the 11.5 cfs requirement. In all years following the first winter period, the same procedure shall be followed, provided that the minimum daily flow requirement for each winter period shall be 11.5 cfs, less any credit unused in a previous year, and less any credit established by the May 1st accounting of the prior year.

(c) The non-winter period includes the remaining months of May through December. Minimum daily flow requirements, calculated on a 10 day running average, for the non-winter months are provided by the above table, based upon the particular hydrologic condition established on May 1st for the prior October-April period; provided that the 10 day average shall begin on the 11th day of each month. The District shall provide whatever make-up water is required to meet these monthly requirements.

(d) Notwithstanding any provision to the contrary, the District shall not be required to provide more than the equivalent of 11.5 cfs make-up water for any month.

(e) When the District is required under this Section to provide make-up water in any calendar year in excess of 4000 acre feet, measured at the Gorge, it shall be entitled to a credit for the excess, taking into account transmission losses, to be applied during the following two winter periods. Any deliveries pursuant to Section 17 are outside of, and in addition to, this subsection. The United States shall have the option of eliminating the District's credit in this subsection by the United States, or its designee, paying the District a cash amount equal to The Metropolitan Water District of Southern California's then current price for untreated water.

(f) Notwithstanding any provision to the contrary, the District guarantees that flows, based upon a 10 day running average, shall at no time be less than 3.0 cfs, and this obligation is independent of the construction of any facilities.

(g) Camp Pendleton, with the cooperation of the District, shall institute a monitoring program to assess the impacts of the parties' operations under this Agreement on the water supply, water quality and riparian habitat within Camp Pendleton. If adverse impacts are observed or if notice of such impacts is provided to Camp Pendleton by the Environmental Protection Agency, Fish and Wildlife Service, or other monitoring agencies, the District will cooperate with Camp Pendleton to assess operations under this Agreement to determine whether and what changes may be

needed to remedy such impacts. The District agrees to participate in good faith in appropriate watershed protection or watershed planning activities aimed at preserving water quality, enhancing watershed recharge, and encouraging watershed conservation within the Santa Margarita River watershed.

6. Makeup Water. Compliance with the requirements of Section 5 shall be based upon actual flow measurements as recorded by the USGS gage at the Gorge. Any losses of makeup water incurred between the point of discharge by the District and the Gorge shall be borne by the District, and shall not diminish the United States' entitlement, as measured at the Gorge. Makeup water which the District may be required to release at the Gorge in order to comply with the requirements of Section 5 may be supplied at its option from: (1) its wells upstream of the Gorge; (2) flows from its Live Stream Discharge Project subject to the provisions of the NPDES Permit and Section 9 below; (3) deliveries from its domestic water system; (4) deliveries of imported water from The Metropolitan Water District of Southern California; (5) or Vail Reservoir. With the consent of Camp Pendleton, the District may substitute treated water by exchange or direct delivery to Camp Pendleton for flow at the Gorge. Makeup water that the District releases to the stream shall meet all requirements of the California Water Quality Control Board, San Diego Region, and shall not cause a violation of any rule, regulation, standard or objective established by federal, state, or

local enforcement agencies, including but not limited to the federal and state Safe Drinking Water Acts.

7. Safe Yield Operation.

(a) The District agrees to manage its pumping of the "natural supply of groundwater" in the area upstream of the Gorge on a "safe yield" basis. The term "natural supply of groundwater" as it is used herein includes all return flows that recharge the groundwater supply, including return flows from imported and reclaimed water. "Safe yield" recognizes that groundwater levels will fluctuate during hydrologic cycles, and that amounts of pumping may also vary from year to year, but that the District's pumping over time will not cause damage to the aquifers. The District's demands in excess of safe yield will be met from imported or reclaimed water supplies.

(b) In addition to its pumping of the natural supply, the District shall be entitled to pump such amounts of direct import water recharge and direct reclaimed water recharge as may have been percolated and stored underground by way of the VDC operations or other direct recharge facilities.

(c) So long as the quantity of groundwater extracted by the District, including makeup and emergency water provided hereunder, does not exceed safe yield as set forth above, and subject to Section 19 of this Agreement, there are no restrictions on the number of wells which the District may operate, where they may be located, the

aquifers from which they may draw water, or the amounts of groundwater which may be pumped from each well.

(d) The District, with the cooperation of Camp Pendleton, shall install and maintain a multi-level monitoring network to obtain additional data which, when reviewed with the data from the surface monitoring system, may be used to assess safe-yield operations. The District, in consultation with Camp Pendleton, shall update the Groundwater Model from time to time but in no event less frequently than every five years. The Groundwater Model will be updated with current data and such other improvements as may be appropriate, and shall be utilized to monitor conditions, and to indicate whether adjustments to the District's pumping are required to operate within the safe yield of the basin.

8. Vail Dam and Reservoir.

(a) The District holds Permit 7032 from the State Water Resources Control Board for the construction and operation of Vail Dam and Reservoir. The Reservoir will be operated in accordance with such permit, as amended by the District's current application on file with the Board. The District's operations of the Reservoir are also constrained by its agreement with KACOR Realty, Inc., dated April 28, 1978, with respect to recreation levels in the Reservoir. The United States is not a party to this KACOR agreement and disputes the applicability of the Vail Lake recreational pool limit to the United States. The District agrees, in accord with the Mahlon Vail

letter dated October 6, 1947, that its yield from the Reservoir and all losses including net evaporation are chargeable against its one-third share under the 1940 Judgment. Moreover, the District agrees that the pumping of water that has been released from the Reservoir and has percolated underground downstream shall be a part of, and not an addition to, the natural supply and safe yield of the basin.

(b) The United States on behalf of Camp Pendleton only will withdraw without prejudice the protest filed with the State Water Resources Control Board to the District's Permit 7032 change petition, provided that if this Agreement should be terminated, the United States shall have the right to reinstitute its protest, and any Permit amendments shall be conditioned upon such right. The United States will also seek dismissal of the case entitled United States of America v. Rancho California Water District, Riverside County Superior Court, Case No. EO 14837, Court of Appeal, Fourth Judicial District, Case No. 229096, each side to bear its own costs and attorneys fees. Except as allowed under Permit 7032, or any license confirming such rights, the District agrees that it will not seek rights from the State Water Resources Control Board, or otherwise, to store natural surface water flows of the Santa Margarita River or its tributaries.

(c) On December 2, 1999 Vail Lake USA, LLC, as a claimed successor to KACOR Realty, Inc. under the April 28, 1978 Agreement with the District, gave notice to the District alleging that the District had failed to perform its obligations under

the Agreement; that Vail Lake USA, LLC was exercising its claimed right of reversion; and that it intended to retake possession of Vail Dam and Reservoir, among other properties. The District disputes this claim, and believes that it is without merit. However, the District's rights and obligations under this Agreement stem in part from the acquisition of Vail Dam and Reservoir pursuant to the April 28, 1978 Agreement, and should Vail Lake USA, LLC be successful in its claim, it may be necessary to modify this Agreement section accordingly. The District agrees to oppose, and the United States shall take such action as it deems appropriate, any effort by Vail Lake USA, LLC, or its successor, through amendment of Permit 7032 or otherwise, to export any waters subject to such permit for use outside of the Santa Margarita River watershed, or otherwise to interfere with the historic use of such stored waters.

9. Live Stream Discharge Project. Subject to the provisions of the Four Party Agreement, or any amendments thereto, flows discharged to the stream by the District from its Santa Rosa Water Reclamation Facility pursuant to and in compliance with Order No. 96-54, NPDES Permit No. CA0108821, or any amendments thereto or extension thereof, shall be considered part of the flows at the Gorge to which the United States is entitled, and may be used to provide any makeup water required to meet such entitlements.

10. Monitoring. In addition to the monitoring programs required under Section 5(g) hereunder, the Watermaster appointed in the Fallbrook Case shall measure

and monitor both water flows and water quality at the Gorge, and shall incorporate into his reports the results of all monitoring programs provided for in this Agreement.

11. Use of Flows. The flows at the Gorge guaranteed herein, and any make up obligation by the District, shall be subject to the reasonable and beneficial use requirements of federal and California law. It is expressly recognized that the minimum flows set forth in Section 5 may be used to meet the ecological habitat maintenance requirements for the riparian corridor below the Gorge, and that such use constitutes a reasonable and beneficial use.

12. Upstream Pumping by Others. To the extent that it is legally capable, the District shall be responsible for controlling, if necessary, any pumping or diversions by non-federal entities within its boundaries. Except for any actions undertaken by any Indian tribe, band or community or any federal agency, and further excepting any actions affecting federal lands or the trust resources of any Indian tribe, band or community located within the Santa Margarita River watershed, the parties agree to act jointly, by judicial means or otherwise, to prevent any pumping or diversion upstream of the Gorge by others located outside of the boundaries of the District from adversely affecting flows at the Gorge. In any event, none of the pumping upstream of the Gorge shall affect the District's obligations set forth in Sections 5 and 6.

13. Annual Report. By March 31 of each year, the Watermaster shall prepare an annual report for filing in the Fallbrook case on the performance of this Agreement

during the prior water year. He shall consult with the TAC on the contents of such report.

14. Technical Advisory Committee. The TAC, which shall continue to include the Watermaster, will serve as a forum for discussion and cooperation between the parties as to the performance of this Agreement. The TAC will conduct the reviews described in Sections 5 and 7, and may also, with the approval of the parties, undertake such studies as may be useful in implementing the Agreement. Such studies may include, but are not limited to, updating and reviewing the performance of the Groundwater Model and the HSPF Model; evaluating safe yield; calculating transmission losses; groundwater conditions and any changes in groundwater storage; comparing actual data with the assumptions used in negotiating this Agreement; identifying any substantially changed hydrologic conditions within the watershed; and determining losses of any groundwater stored for the account of Camp Pendleton.

15. Default. Should either party fail to perform any portion of this Agreement, or otherwise breach any of its respective obligations under this Agreement, and upon notice of such breach or failure to perform, the party which is alleged to be in default shall cure its default within thirty days of receipt of notice, or within a reasonable time in the event more time is required. In the event of a dispute over the default, either party may apply to the Federal Court in the Fallbrook case, under its continuing jurisdiction, to obtain appropriate judicial relief. During the pendency of the court

proceedings, the party alleged to be in default shall continue to cure the default, unless otherwise directed by the court. If the alleged default has been totally or partially cured, but an actual default is not finally established by the court, the curing party shall be entitled to appropriate relief to compensate it for the expense of its total or partial cure. If the default is not cured or excused by the court, the other party shall be entitled to terminate the Agreement without further notice, notwithstanding any provision in Section 16. Once terminated, the covenant to forbear from enforcing rights under the 1940 Judgment as set forth in Section 4 above will no longer apply and either party may then undertake judicial or administrative proceedings with respect to the 1940 Judgment.

16. Termination. In addition to the right to terminate upon an uncured default as set forth in the preceding Section, either party shall have the right to terminate this Agreement with or without cause upon two years written notice; provided, however, that in no event shall the right to terminate under this Section be exercised prior to ten years after the effective date of this Agreement, including the two years notice. Once terminated, the covenant to forbear from enforcing rights under the 1940 Judgment as set forth in Section 4 above will no longer apply, and either party may then undertake judicial or administrative proceedings with respect to the 1940 Judgment.

17. Emergency Supplies. In the event that the Commanding General of Camp Pendleton declares a water supply emergency based upon a drought affecting the water

supply to Camp Pendleton and its riparian habitat corridor, or upon mobilization demands requiring additional potable water supplies for Camp Pendleton, and upon agreement of the parties or approval of the Court, the District will: (1) work with Camp Pendleton to acquire untreated water from the San Diego Aqueduct of The Metropolitan Water District of Southern California, and discharging such water into the Santa Margarita River or its tributaries; (2) deliver water in the amount of any groundwater held by Camp Pendleton in the basin upstream of the Gorge into the Santa Margarita River at the Gorge; or (3) assist in supplying treated water directly or by exchange to Camp Pendleton. Camp Pendleton may acquire rights to such groundwater above the Gorge by foregoing its right to makeup water from the District; or to the extent that the District's actual flow maintenance requirements are less than the flows in the table in Section 5; provided: (1) that Camp Pendleton's rights to such groundwater in storage shall not exceed 5000 acre-feet at any one time; and provided further: (2) that the District's obligation to deliver stored groundwater shall not exceed 2200 acre-feet per year over any required makeup obligation which the District may have, and in no event at a rate in excess of 11.5 cfs. Any such groundwater held in the basin for the account of Camp Pendleton shall be subject to a proportionate share of losses. All governmental approvals required to discharge either Metropolitan Water District water or stored groundwater into the river, pursuant to this Section, shall be the responsibility of Camp Pendleton.

18. Use of River Channel. With respect to the flow requirements under Section 5 and the emergency surplus delivered to the Gorge under Section 17, it is the Parties' express intent that the natural channel of the Santa Margarita River serve as a conduit for delivery of those flows to Camp Pendleton.

19. Federal and Indian Water Rights. This Agreement is entered into by the United States solely on behalf of Camp Pendleton and not on behalf of any other federal agency or in any other capacity, including, but not limited to, its capacity as trustee for any Indian tribe, band or community. Nothing in this Agreement may affect the water quality, water rights or the water rights claims of any Indian tribe, band or community or federal agency located within the Santa Margarita River watershed, or of the United States acting on their behalf.

20. Representations and Warranties. The parties to this Agreement represent and warrant as follows:

(a) The parties affirm that the representatives executing the Agreement are empowered to do so and thereby bind the respective parties, and that there is no other condition to be satisfied or approval to be secured from any governmental or quasi-governmental agency or body in order to execute this Agreement;

(b) Each party affirms its present competence to enter into the settlement provided for in this Agreement, with respect to the advisability of executing this Agreement, and with respect to its meaning;

(c) Each party affirms that, as of the effective date of this Agreement, each has not previously assigned or transferred in any manner, or purported to have assigned or transferred in any manner, any of the claims set forth in this Agreement;

(d) No party is relying upon any statement, representation or promise of any other party or any officer, director, agent, partner, employee, consultant, representative or attorney of or for any other party in executing this Agreement or in making the settlement provided for, except as expressly stated in this Agreement and admissible to interpret the Agreement.

21. Successors-in-Interest and Assigns. Subject to any restriction on transferability contained in this Agreement, this Agreement shall be binding upon and shall inure to the benefit of the successors-in-interest and assigns of each party to this Agreement. Nothing in this Section shall create any rights enforceable by any person not a party to this Agreement, except for the rights of the successors-in-interest and assigns of each party to this Agreement, unless such rights are expressly granted in this Agreement to other specifically identified persons.

22. Integration. This Agreement is an integrated agreement and constitutes the entire Agreement between the parties and supersedes all prior and contemporaneous oral and written agreements and discussions.

23. Modification in Writing. This Agreement may be modified only by a writing executed by the parties to this Agreement against whom enforcement of such modification is sought.

24. Drafting Ambiguities. Each party to this Agreement and its counsel have reviewed and revised this Agreement. The rule of construction that any ambiguities are to be resolved against the drafting party shall not be employed in the interpretation of this Agreement or of any amendments or exhibits to this Agreement.

25. Partial Invalidity. Each provision of this Agreement shall be valid and enforceable to the fullest extent permitted by law. If any provision of this Agreement or the application of such provision to any person or circumstance shall, to any extent, be invalid or unenforceable, the remainder of this Agreement or the application of such provision to persons or circumstances other than those as to which it is held invalid or unenforceable, shall not be affected by such invalidity or unenforceability, unless such provision or such application of such provision is essential to this Agreement.

26. Waiver. Any waiver of a default under this Agreement must be in writing and shall not be a waiver of any other default concerning the same or any other provision of this Agreement. No delay or omission in he exercise of any right or remedy shall impair such right or remedy or be construed as a waiver. A consent to or approval of any act shall not be deemed to waive or render unnecessary consent to or approval of any other or subsequent act.

27. Further Assurances. Each party to this Agreement shall execute all instruments and documents and take all actions as may be reasonably required to effectuate this Agreement.

28. Time of Essence. Time and strict punctual performance are of the essence with respect to each provision of this Agreement.

29. Headings. The headings of the Sections of this Agreement have been included only for convenience, and shall not be deemed in any manner to modify or limit any of the provisions of this Agreement, or be used in any manner in the interpretation of this Agreement.

30. Effectiveness. This Agreement shall become effective when it has been executed by all of the parties, and approved by the Court as provided in Section 3.

31. Anti-Deficiency Act. The parties to this Agreement recognize and acknowledge that any payment obligations of the United States on behalf of Camp Pendleton in satisfaction of this Agreement can only be paid from appropriated funds legally available for such purpose. Nothing in this agreement shall be interpreted as a commitment or requirement that the United States obligate funds or pay costs in contravention of Anti-Deficiency Act, 31 USC §§ 1301, 1341, or any other applicable provision of law.

32. Notice. All notices or other communications required or permitted to be given to a party to this Agreement shall be in writing and shall be personally delivered,

sent by registered or certified mail, postage pre-paid, return receipt requested, or sent by an overnight express courier service that provides written confirmation of delivery to such party at the following respective addresses:

UNITED STATES:	Assistant Attorney General United States Department of Justice Environmental and Natural Resources Division Washington, DC
WITH A COPY TO:	Director, Office of Water Resources Box 555013, MCB Camp Pendleton, CA 92055-5013
DISTRICT:	General Manager Rancho California Water District P.O. Box 9017 Temecula, CA 92589-90017
WITH A COPY TO:	General Counsel Rancho California Water District P.O. Box 9017 Temecula, CA 92589-9017

UNITED STATES OF AMERICA

Date: _____ By:_____

Andrew F. Walch, Senior Counsel
United States Department of Justice
Environment and Natural
Resources Division
General Litigation Section
999 18th Street, Suite 945
Denver, CO 80202

Date: _____ By:_____

_____

_____

United States Marine Corps
Camp Pendleton, California

RANCHO CALIFORNIA WATER DISTRICT

Date: _____

By: _____
President

ATTEST:

_____
Secretary

APPROVED AS TO FORM

BEST BEST & KRIEGER LLP

_____
Arthur L. Littleworth

_____
C. Michael Cowett

EXHIBIT A

EXHIBIT A

DEFINITIONS AND MAP

EXHIBIT A

DEFINITIONS

Basin	The groundwater basin consists of the Temecula, Pauba, and Younger Alluvial aquifers. The younger alluvial aquifer is located along the river bottoms and is generally considered the most permeable. The Pauba and Temecula aquifers underlie the Younger Alluvium and are generally less permeable.
Direct Recharge Facilities	Direct recharge facilities presently include the Valle De Caballos located in the upper part of the Pauba Valley. Natural run-off from Temecula Creek is released from Vail Lake and imported waters are diverted to the VDC to recharge the aquifers used for groundwater production from the groundwater system.
Gorge	The Gorge is located at the head of the Santa Margarita River at the confluence of Murrieta and Temecula Creeks. The USGS presently operates streamflow gage 11044000 at the Gorge with a period of record beginning in 1923.
Groundwater Model	The groundwater model simulates surface and groundwater movement in the Younger Alluvium, Pauba, and Temecula aquifers. The groundwater model uses the USGS's finite difference code MODFLOW and consists of 102 rows, 127 columns, and three layers. The transient calibration period extends from 1935 to 1999 using quarterly stress periods. The groundwater model was developed from 1995 to 1999 by the District with continuous involvement by all members of the TAC.
Groundwater Supply	Groundwater supply includes the natural supply and that portion of imported water, reclaimed water, and other waters that directly or indirectly recharge the three aquifers.
Groundwater System	The Groundwater system is described by the groundwater model and consists of all aquifers located above the Gorge. Furthermore, recharge from direct precipitation, recharge from surface water, discharge to surface water, subsurface recharge, and movement of water between aquifers also pertain to the groundwater system.

HSPF Surface Water Model	The Hydrologic Simulation Program Fortran (HSPF) surface water model was developed to simulate natural flow at the Gorge. The model was calibrated using the period water year 1931 through 1936 as natural flow conditions in the upper basin. The model was developed in 1999 by Camp Pendleton and reviewed by the TAC.
Imported Water	Water the source of which is outside the Santa Margarita River watershed.
Natural Supply	The natural supply of water in the upper basin is defined by the amount of water that is recharged to the groundwater system from direct precipitation, surface flow, releases from Vail Lake, subsurface inflow, and return flow from imported or reclaimed water.
TAC	The Technical Advisory Committee (TAC) consists of representatives from the Rancho California Water District, Camp Pendleton, the United States Geological Survey, and the Watermaster.
VDC	The Valle De Caballos (VDC) is a direct recharge facility located in the upper portion of Pauba Valley. Both natural run-off and imported water are applied at these facilities in order to recharge the groundwater system.
Year	Unless otherwise indicated, year refers to the water year running from October 1st through September 30th of the following year.

SANTA MARGARITA RIVER WATERSHED

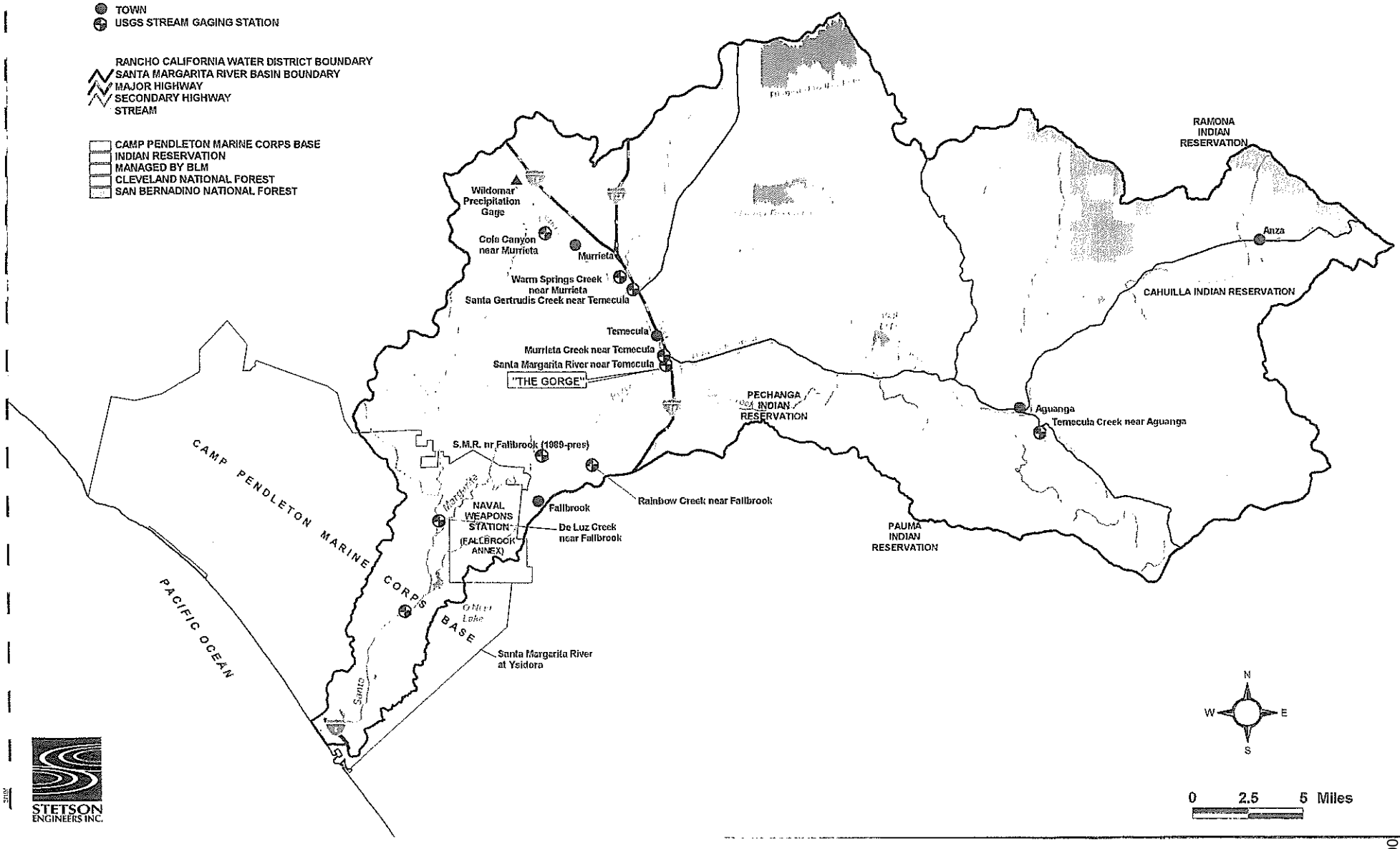

STETSON ENGINEERS INC.

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EXHIBIT B

EXHIBIT B

DESCRIPTION OF THE GROUNDWATER MODEL AND HSPF SURFACE WATER MODEL, AND APPLICATION TO FLOW REQUIREMENTS

DESCRIPTION OF THE GROUNDWATER MODEL AND HSPF SURFACE WATER MODEL, AND APPLICATION TO FLOW REQUIREMENTS

The purpose of this Exhibit is to memorialize and explain the method used to develop the flows guaranteed in the Agreement. To the extent there may be any inconsistencies, the language of the Agreement, and not this Exhibit, establishes the District's flow guarantees.

MODFLOW GROUNDWATER MODEL

The RCWD/CAMP PENDLETON surface and groundwater model (Groundwater Model) was developed to investigate the effects of groundwater pumping on streamflow within the Murrieta-Temecula area of Riverside County in southern California. The Groundwater Model was developed by GEOSCIENCE Support Services, Inc. (GEOSCIENCE) in cooperation with the United States Geologic Survey (USGS). Rancho California Water District (RCWD), the United States Marine Corps - Camp Pendleton Base (Camp Pendleton), Stetson Engineers, Inc. (Stetson), and the Santa Margarita River Watershed Watermaster (SMR Watermaster).

The Groundwater Model was developed for streams and the unconsolidated and poorly consolidated sediments of the Murrieta-Temecula Basin. The Groundwater Model consists of three distinct model layers: Layer 1 - Younger Alluvium; Layer 2 - Pauba Formation; and Layer 3 - Temecula Arkose. The streams crossing the model area in the aquifers (i.e., Younger Alluvium, Pauba Formation and Temecula Arkose) can be both influent (losing water to the aquifer) and effluent (gaining water from the aquifer). The streamflow inflow components are the surface runoff generated from rain events and water gained from aquifers. The streamflow outflow components are leakage into the aquifers and flow out of the model area through the Gorge. The primary sources of recharge to the aquifers include subsurface recharge, underflow recharge, areal recharge, artificial recharge, return flow and streamflow leakage. The primary discharge terms are groundwater pumping, evapotranspiration, underflow discharge and leakage out of the aquifer.

MODFLOW was the computer code used in the Murrieta-Temecula Basin model. MODFLOW is a block-centered, three-dimensional, finite-difference groundwater flow model developed by the USGS (McDonald and Harbaugh, 1988) for the purpose of modeling groundwater flow model to account for the interaction between surface streams and groundwater.

The model covers approximately 288 square miles with a three layer variable-grid network consisting of 102 nodes in the north-to-south direction (i-direction), 127 nodes in the west-to-east direction (j-direction), for a total of 38,862 nodes. Most nodes represent an area 600 ft (north-south) by 600 ft (east-west). Nodes near the edges of the model are of variable size, ranging up to 5,000 ft on a side.

The period selected for the model calibration was 1935 to 1994. This period covers various wet and dry hydrologic cycles, and pre-development and development conditions. A quarterly stress period was used for model calibration. After the model was calibrated, a verification run (Run 89) was simulated by adding the period 1995-1998 to the final model calibration run (Run 88B).

Model simulation (Run 93) of the condition of actual precipitation without any pumping or any effect of Vail Dam was conducted to calculate the natural streamflow at the Gorge. This was done using the same model input data from Model Run 89 (final calibration and verification) except for the Streamflow-Routing Package and Well Package. Quarterly flux for Vail Releases and Vail Spill of the Streamflow Routing Package was based on the net Vail Dam inflow. The net Vail Dam inflow calculation involve estimating the calculated Vail inflow by balancing the Vail Dam releases, Vail Dam spill, evaporation, precipitation and change in storage on a monthly basis. The net Vail Dam inflow then can be calculated by subtracting the evapotranspiration of the phreatophytes under no Vail Dam conditions, from the calculated Vail Dam inflow. The well package was recompiled to include only subsurface recharge, underflow recharge, and underflow discharge. RCWD pumping, private pumping, artificial recharge, and return flow were excluded. The results of this model run are presented in the report Surface and Groundwater Model of the Murrieta-Temecula Basin, California (GEOSCIENCE, 2000).

HSPF Surface Water Model

Monthly base flows at the Gorge are defined by hydrologic conditions based on rainfall at the Wildomar precipitation station and streamflow at the Aguanga streamflow gage (see Exhibit C). The current hydrologic condition and the monthly base flows are used in Section 5 of the Agreement to provide a basis for supplementing streamflow at the Gorge to meet the flow guarantees of the Agreement.

Natural streamflow at the Gorge was simulated using daily precipitation input values to the HSPF model. The calibration period chosen was from October 1930 to September 1936 and the transient period extended from 1936 to 1996. HSPF is able to account for antecedent conditions in the watershed using daily rainfall data from the Wildomar rain gage. Figure B-1 shows a comparison of simulated versus actual streamflow during the calibration period. Frequency distribution tables and plots were constructed to show the distribution of daily natural flow on a monthly basis. The results of this analysis is presented in Technical Memorandum 3.0 (Stetson Engineers, March 1, 2000)

COMPARISON OF HSPF AND RCWD/CAMP PENDLETON GROUNDWATER MODELS

The Environmental Protection Agency's Hydrologic Simulation Program Fortran (HSPF) was used to simulate daily streamflow based on daily precipitation data from the Wildomar station. The correlation between rainfall and runoff provides the ability to determine the conditions of the basin based on daily rainfall data. The RCWD/Camp Pendleton Groundwater Model simulates streamflow at the Gorge based on quarterly values of tributary inflow, subsurface inflow, aerial recharge and other recharge mechanisms.

TABLE B-1

COMPARISON OF HSPF AND GROUNDWATER MODEL NATURAL FLOW QUARTERLY STREAMFLOW VALUES AT THE GORGE (1935 TO 1996)

QUARTERLY PERIOD	MEDIAN HSPF (CFS)	MEDIAN G-W MODEL (CFS)	DIFFERENCE (%)
October – December	8.8	10.0	14
January – March	19.0	17.1	-10
April – June	11.7	10.1	-13
July – September	7.9	7.7	-2
Annual Mean	11.8	11.2	-5

Comparison of quarterly values of both the HSPF and Groundwater Model indicates a high degree of correlation. Statistically, the annual mean of quarterly median streamflow of both the HSPF and Groundwater Models is 11.82 cfs and 11.24 cfs, respectively. Quarterly medians are also similar between the two models, differing by no more than 1.9 cfs (10%) during the winter quarter (Table B-1). The natural flow analysis presented in this exhibit is based on the HSPF model since it compares well with the Groundwater Model, is based on daily precipitation, and can be calculated on either a daily, monthly, or annual basis.

NATURAL FLOW OF THE SANTA MARGARITA RIVER NEAR TEMECULA

The frequency distribution table and graphs allow the hydrologist to estimate the statistical occurrence and probabilities of specific flows. This method is extremely useful in southern California streams with flows that vary order of magnitudes during any given year. The 50% probability on the frequency distribution graph represents the median daily flow for the stream system. In general, flows calculated based on means will be greater than flows based on the median. For example, the mean daily natural flow during the month of October is calculated to be 10.6 cfs, while the median flow is simulated to be only 7.9. During high flow months such as February, mean daily natural flow is estimated to be 211 cfs, while median daily flow during the same month is 17.4 cfs. Frequency distribution allows hydrologists to estimate the variability and distribution of flows based on seasonal and hydrological changes.

Streamflow values during dry, normal, and wet hydrologic conditions may be estimated using the variability of the historical natural flow during dry, normal, and wet hydrologic conditions. In order to estimate median flows during dry and wet cycles, two separate period of records were chosen to represent these different hydrologic conditions. Water years 1957 to 1966 were selected to represent dry natural flow conditions, while water years 1937 to 1946 were chosen to represent a wet hydrologic cycle. In order to estimate median flows during these periods, frequency distribution analysis and plots were developed for each cycle.

The mean median annual natural flow during dry hydrologic conditions is 5.3 cfs, less than half of the annual natural flow for the entire period of record of 12.0 cfs. The mean median annual natural flow during wet hydrologic conditions is 23.4 cfs, almost twice the annual natural flow. The median daily flow during the wet period ranged from 13.8 cfs in August to 49.4 cfs in March.

DETERMINING FLOW REQUIREMENTS AT THE GORGE

Flow requirements at the Gorge are based on two-thirds the median natural flow during wet, normal, and dry conditions. Flow requirements for critically dry and very wet conditions are based on the 50% median flows for the period 1957 to 1966 and 1937 to 1946, respectively. Above normal flows are based on the mean of the 50% median wet flows and the 50% median all years. Similarly, below normal flows are based on the mean of the 50% median dry flows and the 50% median all years. Table B-2 shows the results of this determination and is the basis for the flow guarantees established in Section 5 of the Agreement.

TABLE B-2

DAILY FLOWS AT THE GORGE BASED ON TWO-THIRDS OF THE MEDIAN NATURAL FLOW AS DETERMINED BY THE HSPF MODEL

MONTH	CRITICALLY DRY FLOW (CFS)	BELOW NORMAL FLOW (CFS)	ABOVE NORMAL FLOW (CFS)	VERY WET FLOW (CFS)
October	3.0	3.9	7.7	10.1
November	3.0	4.5	8.8	11.5
December	3.3	5.3	10.4	13.5
January	3.3	6.9	13.6	16.8
February	4.6	8.1	17.5	23.4
March	4.9	8.7	22.7	32.9
April	5.0	8.2	17.2	23.1
May	3.8	5.7	11.7	15.7
June	3.3	4.9	9.4	12.2
July	3.0	4.3	7.8	9.7
August	3.0	4.4	7.6	9.2
September	3.0	4.1	7.4	9.4
Total	3.6	5.8	11.8	15.6

Note: Flow is based on 2/3 natural flow or 3 cfs, whichever is greater.

DETERMINATION OF HYDROLOGIC CONDITIONS

The methodology used to estimate the required monthly base flows at the Gorge is based on flows occurring during different hydrologic conditions. The median flow during the wet hydrologic cycle defines the break between above normal and very wet conditions when compared to the entire period of record. Similarly, the median flow during the dry hydrologic cycle defines the break between critically dry and below normal conditions. In order to determine the frequency at which these different hydrologic cycles occur, the median from the dry and wet cycles are compared to the monthly flow values for the entire period of record. Table B-3 below shows the results for each month when the dry and wet cycle median natural flow is plotted on the entire period of record for each month. For example, the December median dry cycle (WY 1957-1966) natural flow value of 4.9 cfs was plotted on the frequency distribution graph for the entire period of record (WY 1931-1996). The result indicated that the 4.9 cfs flow would be met or exceeded 87.4% of the time (Table B-3). The table shows the variation between the months for both dry and wet cycles. In order to remain consistent while determining different hydrologic cycles, the median values for the twelve months were used.

TABLE B-3

WET AND DRY TIME EXCEEDANCE VALUES FOR EACH MONTH USING THE ENTIRE PERIOD OF RECORD

MONTH	DRY FLOW (%)	WET FLOW (%)
October	84.5	22.1
November	84.7	22.8
December	87.4	24.2
January	90.1	28.1
February	87.1	26.8
March	86.9	26.5
April	83.3	24.6
May	84.7	25.1
June	85.0	21.4
July	83.8	24.2
August	82.7	27.8
September	80.4	19.8
Median	84.7	24.4

Exhibit C describes the development of a hydrologic index for the Santa Margarita River Basin which is based on the median values of the monthly wet and dry time exceedance. The hydrologic break between extremely dry and below normal occurs at the 84.7% exceedance value while the break between above normal and very wet hydrologic conditions occurs at 24.4%. The hydrologic break between above normal and below normal occurs at the 50% exceedance interval.

0008197

Simulated versus Historical Streamflow at the Gorge (WY 1931-1936)

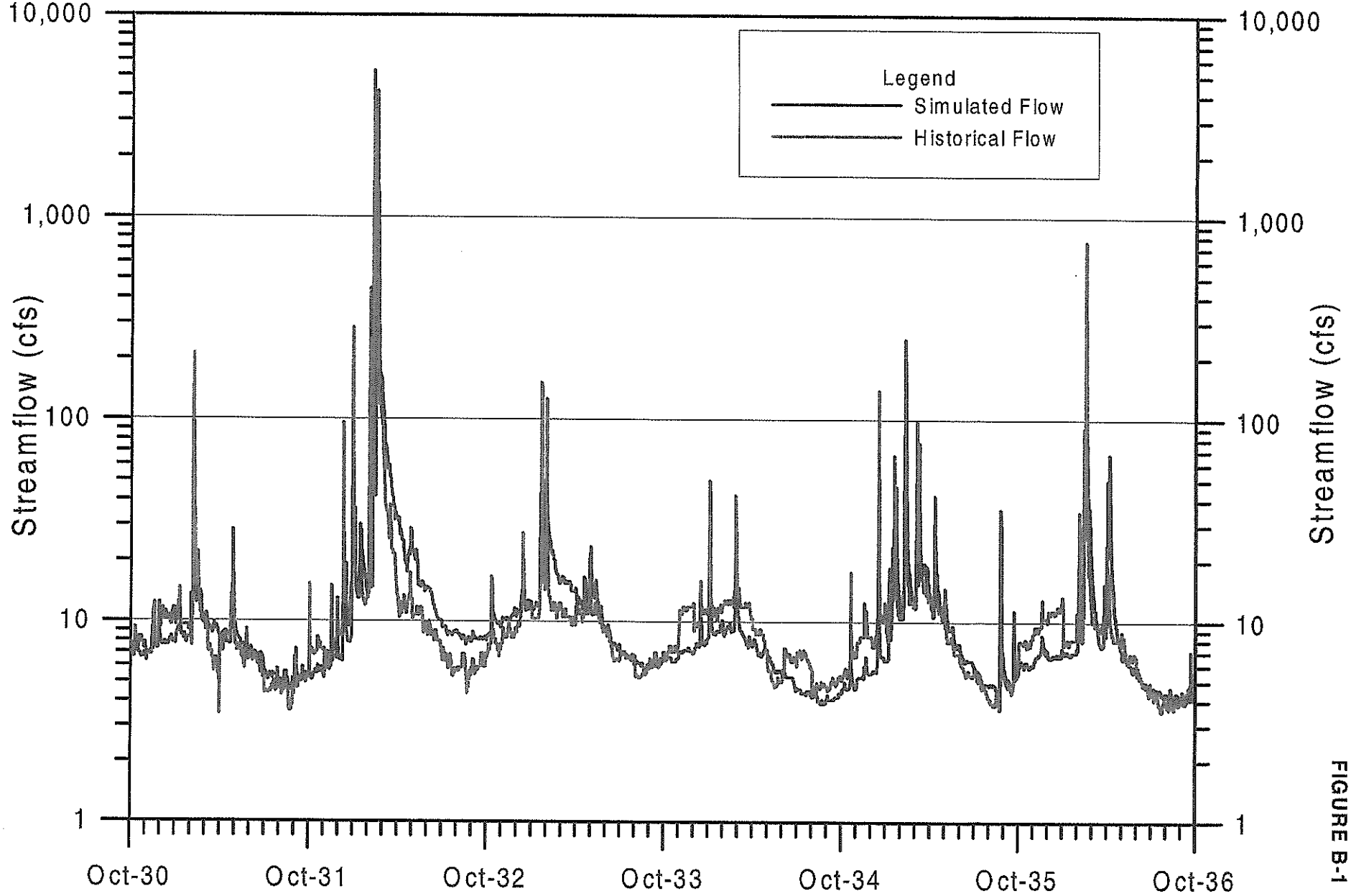

FIGURE B-1

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Frequency Distribution of Natural Flow at the Gorge During The Month of October (WY 1931-1996)

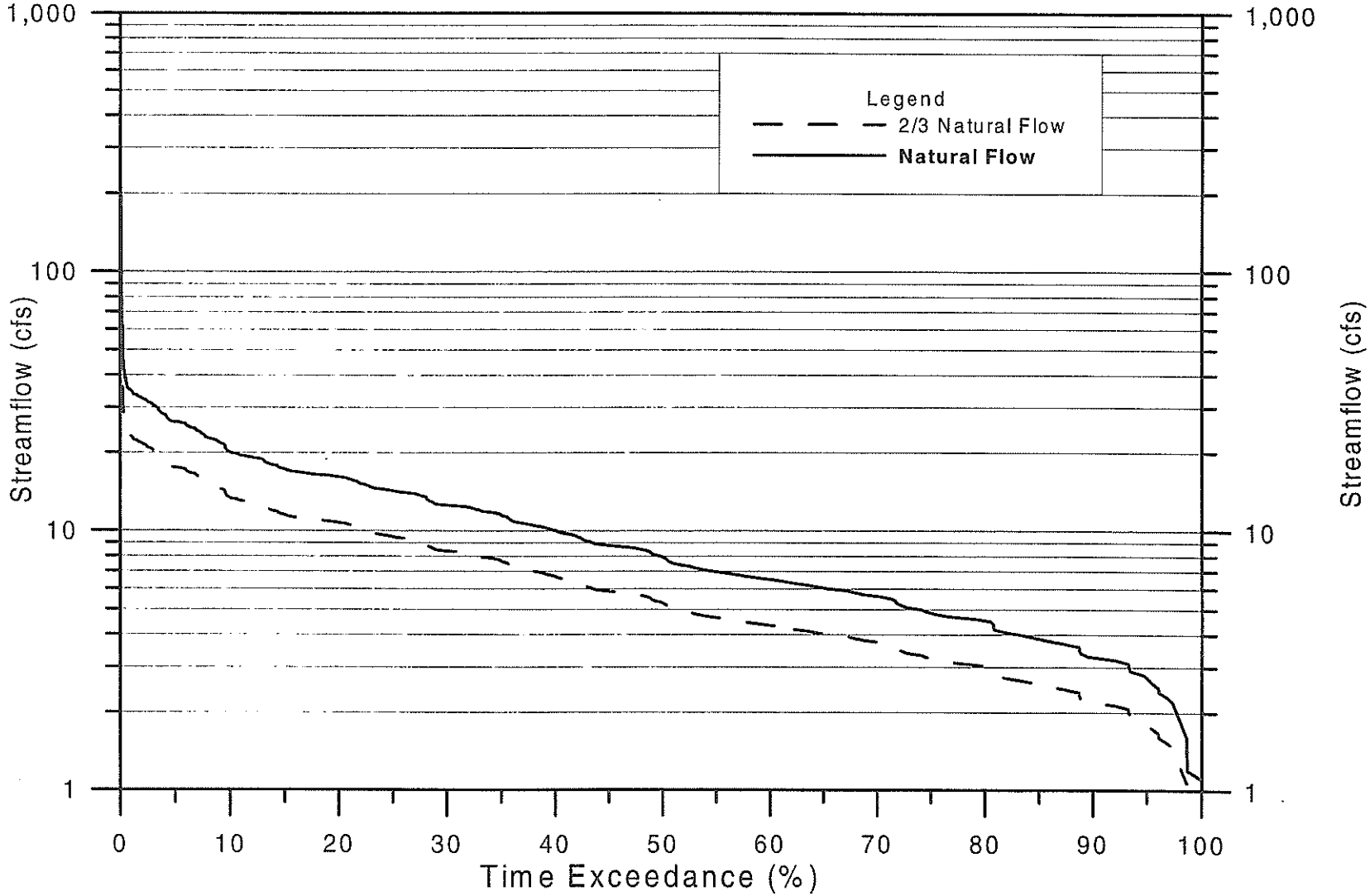

FIGURE B-2

EXHIBIT C

EXHIBIT C

DETERMINATION OF HYDROLOGIC CONDITIONS IN THE SANTA MARGARITA RIVER BASIN

EXHIBIT C

DETERMINATION OF HYDROLOGIC CONDITIONS IN THE SANTA MARGARITA RIVER BASIN

The purpose of this Exhibit is to memorialize and explain the method used to develop the flows guaranteed in the Agreement. To the extent there may be any inconsistencies, the language of the Agreement, and not this Exhibit, establishes the District's flow guarantees.

This Exhibit describes the streamflow and precipitation data available in the upper basin and the hydrologic index used to describe the hydrologic condition of the Santa Margarita River Basin above the Gorge. The hydrologic index is calculated using the historical precipitation record at the Wildomar precipitation gage, streamflow at the Aguanga streamflow gage, and calculated natural streamflow at the Gorge and Murrieta gages. The methodology accounts for antecedent conditions that existed prior to the year being determined, allowing for a previous wet year or dry year to influence the current year's hydrologic condition. The methodology provides a means to determine the flow requirements at the Gorge for twelve months, in conjunction with other provisions of the Agreement.

Based on the October through April's natural streamflow totals at Murrieta and Vail Lake, the May through December monthly streamflow requirement at the Gorge is categorized as either Critically Dry, Below Normal, Above Normal, or Very Wet hydrologic conditions. The January through April streamflow requirement is predetermined to be 11.5 cubic feet per second (cfs), calculated from the average of January through April's median natural flow requirement at the Gorge. The median natural flow requirement is two-thirds the simulated natural flow at the Gorge based on the period of record 1931 through 1996.

ESTABLISHMENT OF A HYDROLOGIC INDEX

The hydrologic index combines October through April natural streamflow at Murrieta, natural streamflow at Vail Lake, and natural streamflow from Pauba and Wolf Valleys. Natural flow at Murrieta is calculated using the rainfall/run-off relationship between rainfall at Wildomar and the HSPF natural flow at Murrieta, developed in Technical Memorandum 1.0 (January 20, 2000). Natural flow at Vail Lake is calculated using the run-off correlation between Aguanga streamflow and Inflow to Vail Lake during the period water years 1958 to 1996, also developed in Technical Memorandum 1.0 (January 20, 2000). The natural flow contribution from Pauba and Wolf Valleys is calculated to be 50% of the natural run-off into Vail Lake.

Natural streamflow at Murrieta is calculated by the rainfall/runoff relationship developed between monthly rainfall at Wildomar and monthly natural streamflow determined from the HSPF model. Equation 1 provides the polynomial equation that describes this relationship, where X is the monthly rainfall in inches and Y is the monthly natural streamflow at Murrieta in cubic feet per second (cfs):

$$Y = 9.068 - 34.798 * X + 11.339 * X^2. \qquad (X \geq 2.79) \qquad (1)$$
$$Y = 0 \qquad (X < 2.79)$$

Runoff at Vail Lake is calculated by the runoff/runoff relationship developed between runoff at Aguanga and inflow to Vail Lake. Equation 2 provides the linear equation that describes this relationship, where X is October through April natural streamflow at Aguanga (Acre-Feet) and Y is October through April natural streamflow at Vail Lake (Acre-Feet):

$$Y = 1.380 * X \quad \text{(Acre-Feet).} \qquad (2)$$

Contribution from the Pauba and Wolf valleys was estimated to be 50% of the natural inflow to Vail Lake. Run-off relationships between Aguanga, Murrieta, Pechanga Creek, and the Gorge, as well as sensitivity analysis during development of the Hydrologic Index, were used to determine the proportion of contribution from these two valleys..

Figure C-1 provides the frequency distribution curves of the combined total October through April natural streamflow at Murrieta, natural streamflow at Vail Lake, and natural streamflow contribution from Pauba and Wolf Valleys. The frequency distribution curve was divided into four parts established by the 24th, 50th, and 85th percentile breaks (Exhibit B and Technical Memorandum 3.0, February 25, 2000). Using these breakpoints, the division between Critically Dry, Below Normal, Above Normal, and Very Wet hydrologic conditions was established. The corresponding breaks between hydrologic conditions are 3,230 acre-feet, 14,510 acre-feet, and 47,810 acre-feet, respectively. Review of 66 years of historical data indicates that ten years would have been classified as Critically Dry, 23 years as Below Normal, 17 years as Above Normal, and 16 years as Very Wet.

The hydrologic index was compared to actual water years for the 66 year period from 1931 to 1996. Of the 66 years that were compared, the hydrologic index mismatched nineteen years; overestimating nine years while underestimating the hydrologic conditions during the other ten years (Table C-1, Attached). The antecedent conditions prior to the Below Normal and Above Normal "misses" were reviewed in order to correct errors. If the hydrologic condition was determined to be Below Normal and the prior year was determined to be Above Normal or Very Wet, 2,200 AF was added to the hydrologic condition. Similarly, if the hydrologic condition was determined to be Above Normal and the previous year was classified as Critically Dry, 10,000 AF was subtracted from the hydrologic condition. These adjustment values were developed from an iterative process of refining the Hydrologic Index by minimizing the number of mismatches. The algorithm used to adjust for antecedent conditions prior to Above Normal

and Below Normal years was applied to all values in column (7). Hydrologic conditions that were incorrectly classified as Very Wet or Critically dry were not adjusted.

The results of adjusting for antecedent conditions during Above Normal and Below Normal years decreases the number of misses to thirteen. Of these thirteen years, seven years are overestimated while six years are underestimated. Closer inspection of the data shows that the hydrologic index tends to overestimate hydrologic conditions during the first half of the data set and underestimate hydrologic conditions during the later half of the record. For example, five of the seven years that are overestimated occur when calculated inflow to Vail Lake or streamflow at Butterfield Canyon were used to estimate natural flow at Vail Lake. The data set used in the regression analysis used to convert streamflow at Aguanga to natural flow at Vail Lake began in 1958.

IMPLEMENTATION OF THE HYDROLOGIC INDEX

The hydrologic index used to estimate the required streamflow at the gorge is based on natural streamflow at Murrieta and Vail Lake. On May 1st of each year the rainfall at Wildomar is used to estimate natural flow at Murrieta and the streamflow at Aguanga is used to estimate natural flow at Vail Lake. A simple spreadsheet, that would adjust for antecedent conditions, may be used to calculate the hydrologic index based on these input parameters. Once the hydrologic condition is determined, the table in Section 5 of the Agreement is used to determine the required flows at the Gorge.

Figure C-2 provides a schematic diagram of the steps to be followed to determine the hydrologic condition that would prescribe the current year's summer time flows and the following year's winter flow requirement. The following outline provides the steps necessary to implement the Agreement. **[Both Figure C-2 and the following outline do not address credits for groundwater banking to Camp Pendleton]**

First Year of Agreement:

F-1. Provide 11.5 cfs at the Gorge from January 1 to April 30
F-2. Determine Hydrologic Condition on May 1
   a. Convert monthly precipitation at Wildomar to monthly natural flow at Murrieta using equation (1) above.
   b. Sum October through April natural flow at Murrieta.
   c. Sum October through April streamflow at Aguanga.
   d. Convert streamflow at Aguanga to natural flow at Vail lake using equation (2) above.
   e. Add 50% of Natural Flow at Vail Lake for Pauba and Wolf Valleys' contribution.
   f. Add (b) + (d) + (e) and calculate hydrologic condition Using Figure C-1.

g. Correct for antecedent condition:
   i. If hydrologic condition is classified as Above Normal and previous year was Critically Dry, subtract 10,000 from (f).
   ii. If hydrologic condition is classified as Below Normal and previous year was Above Normal or Very Wet, add 2,200 to (f).

h. Redetermine Hydrologic Condition Using corrected value and Figure C-1.

F-3. Determine Flow Requirements

a. Based on the Hydrologic Condition determined in F-2(h), specify May through December required flows at the Gorge using the table in Section 5 of the Agreement.

b. If Hydrologic Condition is "Below Normal" or "Critically Dry", determine the District's Carry-Over Credit to be applied the during the following winter.

c. If Hydrologic Condition is "Above Normal" or "Very Wet", no Carry-Over Credit is to be applied during the following winter.

Subsequent Years of the Agreement:

S-1. Provide 11.5 cfs less Carry-Over Credit, if available, from January 1 to April 30

S-2. Determine Hydrologic Condition on May 1

a. Follow F-2(a) through (h).

S-3. Determine Flow Requirements

a. Based on the Hydrologic Condition determined in S-2(a), specify May through December required flows at the Gorge using the table in Section 5 of the Agreement.

b. If Hydrologic Condition is "Below Normal" or "Critically Dry", determine the District's Carry-Over Credit to be applied during the following winter. Add to existing Carry-Over Credit that has not been applied.

c. If Hydrologic Condition is "Above Normal" or "Very Wet", apply any unused Carry-Over Credit to the following Winter.

In order to illustrate the procedure for determining and meeting flow requirements at the Gorge, actual rainfall and streamflow data from 1992 and 1993 were chosen. The example below would represent the implementation of the hydrologic determination and flow requirements during the first and second years of the Agreement. Although not shown below, if the Agreement were in place in 1991, the Carry-Over Credit to 1992 would have been 227 AF, reducing the winter flow requirement from 11.5 cfs to 10.5 cfs.

F-1. Provide 11.5 cfs at the Gorge from January 1, 1992 to April 30, 1992

F-2. Determine Hydrologic Condition on May 1

a. October 1991 through April 1992 rainfall at Wildomar:

10/91 precip = 0.18 inches	≡	0 AF streamflow
11/91 precip = 0.04 inches	≡	0 AF streamflow
12/91 precip = 1.79 inches	≡	0 AF streamflow
01/92 precip = 2.71 inches	≡	0 AF streamflow
02/92 precip = 7.06 inches	≡	20,204 AF streamflow
03/92 precip = 4.34 inches	≡	4,404 AF streamflow
04/92 precip = 0.26 inches	≡	0 AF streamflow

b. October 1991 through April 1992 natural streamflow at Murrieta = 24,608 AF.

c. October 1991 through April 1992 streamflow at Aguanga = 2,886 AF.

d. Natural flow at Vail Lake = 3,982 AF.

e. Add an additional 1,991 AF for contribution from Pauba and Wolf Valleys.

f. Hydrologic Condition is "Above Normal" based on 30,580 AF of Natural Flow (Figure C-1) at approximately 30% Exceedance.

g. Previous year classified as "Very Wet" so,

i. No correction necessary

h. Hydrologic Condition remains "Above Normal".

F-3. Determine Flow Requirements

a. Non-Winter Flow Requirements:

May =	11.5 cfs
June =	9.4 cfs
July =	7.8 cfs
August =	7.6 cfs
September =	7.4 cfs
October =	7.7 cfs
November =	8.8 cfs
December =	10.4 cfs

b./c. 0 AF Carry-Over Credit since Hydrologic Condition was "Above Normal".

S-1. Provide 11.5 cfs - 0 Carry-Over Credit from January 1, 1993 to April 30, 1993.

S-2. Determine Hydrologic Condition on May 1

a. October 1992 through April 1993 rainfall at Wildomar:

10/92 precip = 0.66 inches ≡ 0 AF streamflow
11/92 precip = 0.00 inches ≡ 0 AF streamflow
12/92 precip = 4.46 inches ≡ 4,884 AF streamflow
01/93 precip = 15.39 inches ≡ 132,767 AF streamflow
02/93 precip = 9.41 inches ≡ 42,161 AF streamflow
03/93 precip = 1.20 inches ≡ 0 AF streamflow
04/93 precip = 0.00 inches ≡ 0 AF streamflow

b. October 1992 through April 1993 natural streamflow at Murrieta = 179,812 AF.

c. October 1992 through April 1993 streamflow at Aguanga = 37,668 AF.

d. Natural flow at Vail Lake = 51,968 AF.

e. Add an additional 25,984 AF for contribution from Pauba and Wolf Valleys.

f. Hydrologic Condition is "Very Wet" based on 257,764 AF of Natural Flow (Figure C-1) at approximately 1% Exceedance.

g. Previous year classified as "Above Normal" and existing year classified as "Very Wet", so,

i. No correction necessary

h. Hydrologic Condition remains "Very Wet".

S-3. Determine Flow Requirements

a. Non-Winter Flow Requirements:

May = 11.5 cfs
June = 11.5 cfs
July = 9.7 cfs
August = 9.2 cfs
September = 9.4 cfs
October = 10.1 cfs
November = 11.5 cfs
December = 11.5 cfs.

b./c. 0 AF Carry-Over Credit since Hydrologic Condition was "Very Wet".

As mentioned above, if the Agreement had been in place in 1991 there would have been 227 AF of Carry-Over Credit from 1991 to 1992, reducing the flow requirement at the Gorge from 11.5 to 10.5. Since 1992 was an "Above Normal" year, only 161 AF of the 227 AF would have been applied as credit, leaving 66 AF to be applied in 1993. The 66 AF applied to 1993 would reduce the winter time flow requirement 0.3 cfs from 11.5 cfs to 11.2 cfs. **[The credit to Camp Pendleton for foregoing higher minimum flows during "Above Normal" and "Very Wet" years is not addressed in this example.]**

Figure C-1

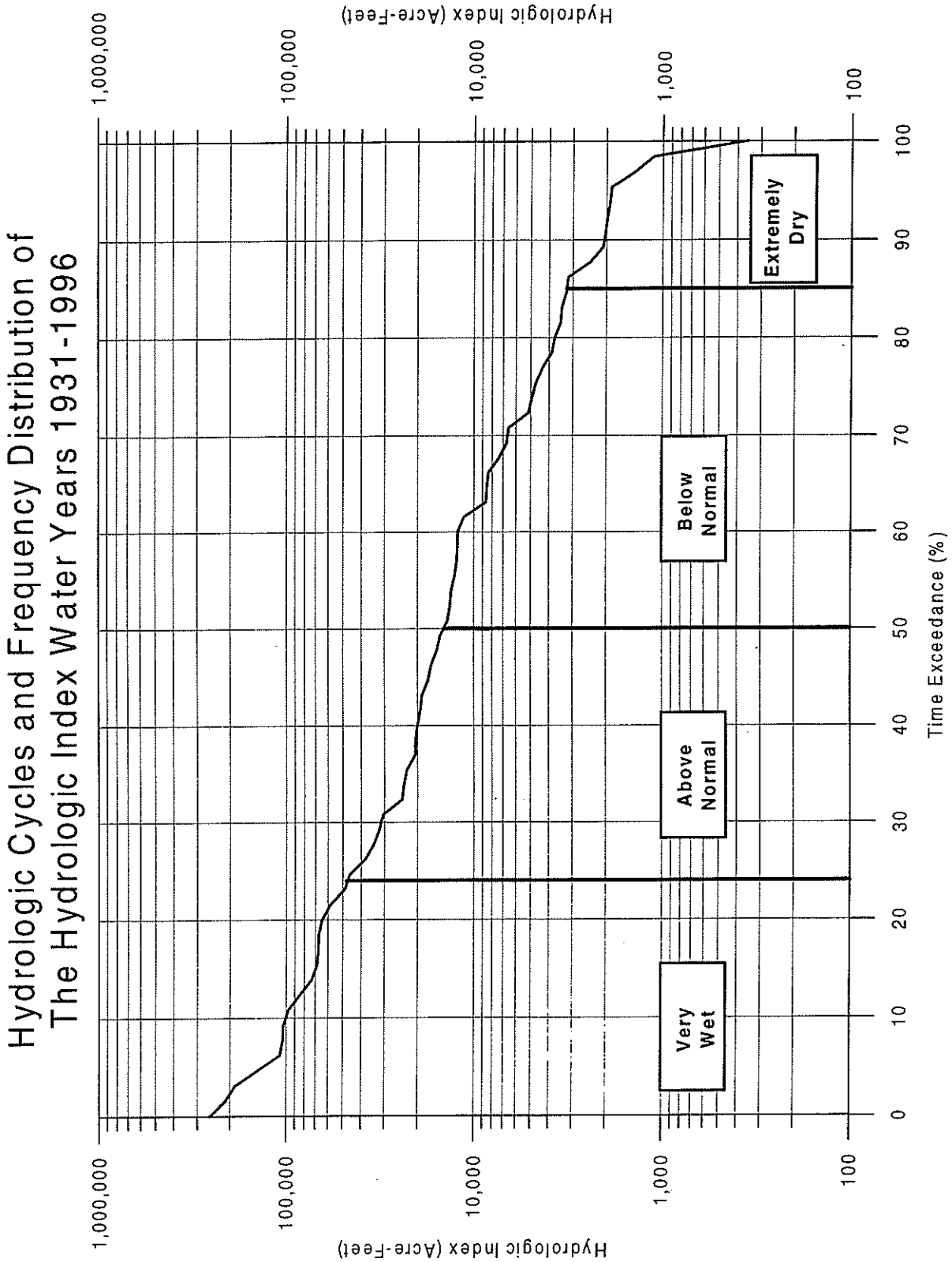
Hydrologic Cycles and Frequency Distribution of
The Hydrologic Index Water Years 1931-1996
Hydrologic Index (Acre-Feet)
1,000,000
100,000
10,000
1,000
100
Hydrologic Index (Acre-Feet)
1,000,000
100,000
10,000
1,000
100
Very Wet
Above Normal
Below Normal
Extremely Dry
0
10
20
30
40
50
60
70
80
90
100
Time Exceedance (%)

Flow Diagram of Settlement Agreement Minimum Flows

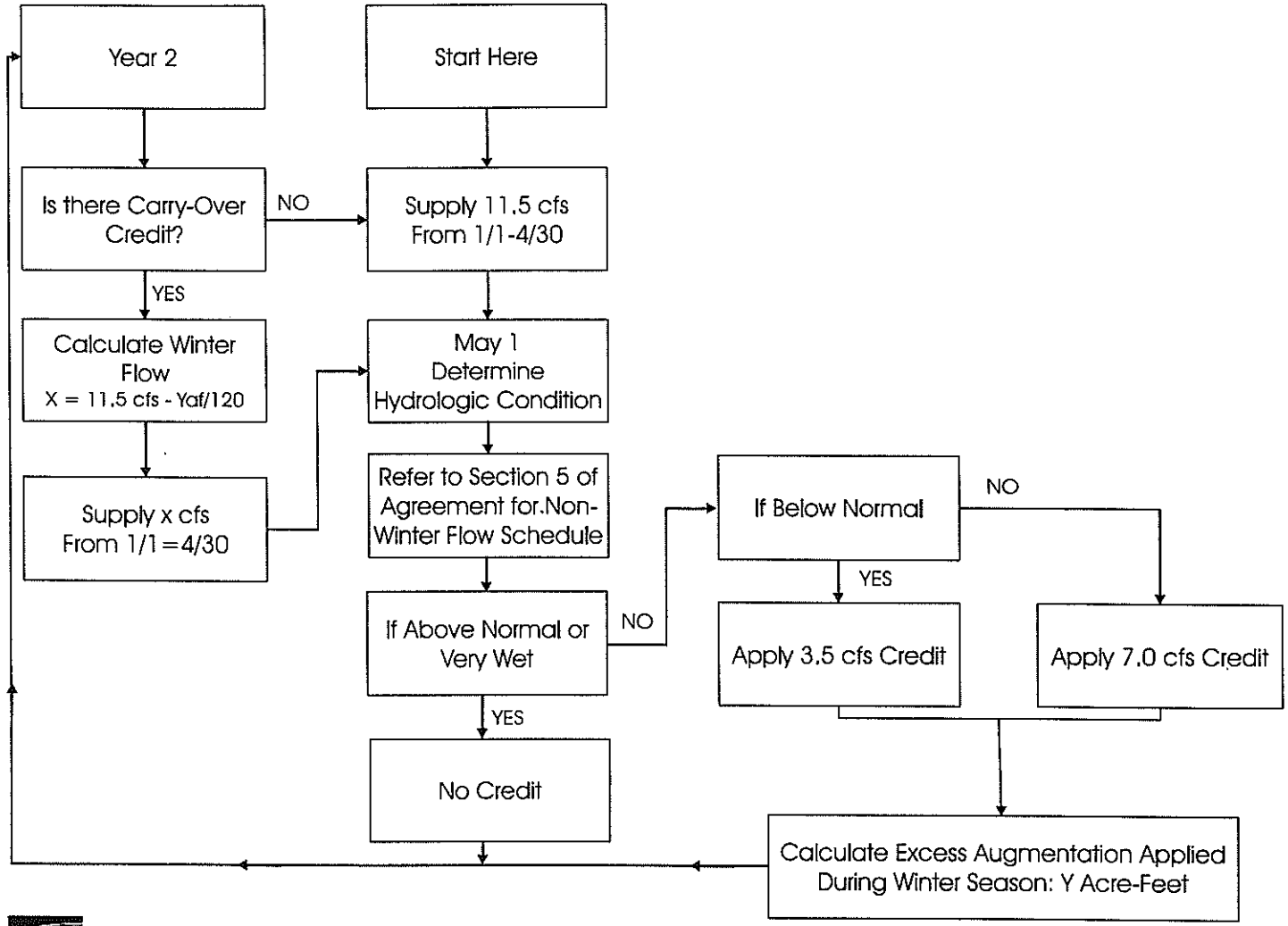

STETSON ENGINEERS INC.

Figure C-2

0008208

TABLE C-1

CALCULATION OF THE HYDROLOGIC INDEX
SANTA MARGARITA RIVER BASIN

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)		(10)
	Classification based on Majority	Aguanga Streamflow Oct-Apr Sum	Calculated Vail Inflow Oct-Apr Sum	Wildomar Precipitation Oct-Apr Sum	Calculated Murrieta Flow Oct-Apr Sum	Hydrologic Index	Water Year Classification	Water Year Classification Corrected for		Over/Under-Estimate
Water Year	WY Class	(AF)	(AF)	(in)	(AF)	(AF)		Anteceedent	Flag	
1931	Below Normal		1,512	9.87	2,066	4,334	Below Normal	Below Normal	0	
1932	Above Normal		14,778	18.30	44,975	67,143	Very Wet	Very Wet	1	Overestimate
1933	Below Normal		3,311	9.43	7,290	12,256	Below Normal	Below Normal	0	
1934	Extremely Dry		1,391	7.52	1,395	3,482	Below Normal	Below Normal	1	Overestimate
1935	Below Normal		3,365	16.38	2,325	7,372	Below Normal	Below Normal	0	
1936	Below Normal		3,445	10.64	15,354	20,522	Above Normal	Above Normal	1	Overestimate
1937	Very Wet		34,392	25.21	52,065	103,653	Very Wet	Very Wet	0	
1938	Very Wet		29,210	20.19	60,418	104,233	Very Wet	Very Wet	0	
1939	Above Normal		6,713	14.53	35,925	45,994	Above Normal	Above Normal	0	
1940	Above Normal		5,577	11.28	5,495	13,860	Below Normal	Above Normal	0	
1941	Very Wet		20,888	27.07	66,156	97,489	Very Wet	Very Wet	0	
1942	Above Normal		8,485	9.86	0	12,728	Below Normal	Above Normal	0	
1943	Very Wet		12,412	19.26	66,013	84,632	Very Wet	Very Wet	0	
1944	Above Normal		6,588	13.52	24,425	34,308	Above Normal	Above Normal	0	
1945	Above Normal		5,882	12.91	14,864	23,687	Above Normal	Above Normal	0	
1946	Above Normal		4,004	9.92	6,377	12,382	Below Normal	Above Normal	0	
1947	Below Normal		2,432	8.13	8,594	12,242	Below Normal	Below Normal	0	
1948	Below Normal		1,721	7.71	850	3,432	Below Normal	Below Normal	0	
1949	Below Normal		2,443	8.02	1,475	5,138	Below Normal	Below Normal	0	
1950	Extremely Dry		1,256	6.34	0	1,884	Extremely Dry	Extremely Dry	0	
1951	Extremely Dry		942	4.27	0	1,414	Extremely Dry	Extremely Dry	0	
1952	Very Wet		11,007	19.52	32,419	48,929	Very Wet	Very Wet	0	
1953	Below Normal		1,407	8.84	1,772	3,882	Below Normal	Below Normal	0	
1954	Above Normal		4,580	12.12	13,196	20,065	Above Normal	Above Normal	0	
1955	Below Normal		1,064	9.22	3,328	4,924	Below Normal	Below Normal	0	
1956	Extremely Dry		1,074	6.79	2,126	3,738	Below Normal	Below Normal	1	Overestimate
1957	Extremely Dry		740	9.61	16,526	17,635	Above Normal	Above Normal	1	Overestimate

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)		(10)
	Classification based on	Aguanga Streamflow	Calculated Vail Inflow	Wildomar Precipitation	Calculated Murrieta Flow	Hydrologic	Water Year	Water Year Classification		Over/Under-
Water	Majority	Oct-Apr Sum	Oct-Apr Sum	Oct-Apr Sum	Oct-Apr Sum	Index	Classification	Corrected for		Estimate
Year	WY Class	(AF)	(AF)	(in)	(AF)	(AF)		Anteceedent	Flag	
1958	Very Wet	8,669	11,961	26.00	49,581	67,522	Very Wet	Very Wet	0	
1959	Below Normal	716	987	5.24	1,693	3,174	Extremely Dry	Extremely Dry	1	Underestimate
1960	Extremely Dry	809	1,116	9.84	414	2,087	Extremely Dry	Extremely Dry	0	
1961	Extremely Dry	171	235	5.09	0	353	Extremely Dry	Extremely Dry	0	
1962	Below Normal	1,438	1,983	15.59	19,873	22,848	Above Normal	Below Normal	0	
1963	Below Normal	181	249	8.37	4,326	4,700	Below Normal	Below Normal	0	
1964	Extremely Dry	541	746	8.13	0	1,119	Extremely Dry	Extremely Dry	0	
1965	Below Normal	1,058	1,460	12.35	22,013	24,203	Above Normal	Below Normal	0	
1966	Above Normal	4,673	6,447	19.19	63,527	73,197	Very Wet	Very Wet	1	Overestimate
1967	Above Normal	7,082	9,770	15.55	17,364	32,020	Above Normal	Above Normal	0	
1968	Below Normal	1,018	1,404	11.79	4,602	6,708	Below Normal	Below Normal	0	
1969	Very Wet	17,107	23,601	29.40	176,676	212,077	Very Wet	Very Wet	0	
1970	Above Normal	1,183	1,632	11.42	16,878	19,325	Above Normal	Above Normal	0	
1971	Below Normal	896	1,236	7.67	580	2,435	Extremely Dry	Extremely Dry	1	Underestimate
1972	Below Normal	853	1,177	6.19	4,802	6,568	Below Normal	Below Normal	0	
1973	Above Normal	3,107	4,287	15.37	9,426	15,856	Above Normal	Above Normal	0	
1974	Below Normal	1,234	1,702	11.21	18,028	20,582	Above Normal	Above Normal	1	Overestimate
1975	Below Normal	935	1,290	12.84	6,482	8,417	Below Normal	Below Normal	0	
1976	Below Normal	964	1,330	10.39	11,484	13,478	Below Normal	Below Normal	0	
1977	Extremely Dry	510	704	7.00	968	2,024	Extremely Dry	Extremely Dry	0	
1978	Very Wet	11,723	16,174	31.24	118,004	142,264	Very Wet	Very Wet	0	
1979	Very Wet	8,404	11,594	21.46	51,097	68,488	Very Wet	Very Wet	0	
1980	Very Wet	26,114	36,027	27.82	134,267	188,308	Very Wet	Very Wet	0	
1981	Above Normal	4,198	5,791	7.32	2,655	11,342	Below Normal	Below Normal	1	Underestimate
1982	Above Normal	6,313	8,709	14.83	24,945	38,009	Above Normal	Above Normal	0	
1983	Very Wet	11,271	15,549	24.20	34,932	58,256	Very Wet	Very Wet	0	
1984	Above Normal	4,173	5,757	8.17	0	8,636	Below Normal	Below Normal	1	Underestimate

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)		(10)
	Classification based on Majority	Aguanga Streamflow Oct-Apr Sum	Calculated Vail Inflow Oct-Apr Sum	Wildomar Precipitation Oct-Apr Sum	Calculated Murrieta Flow Oct-Apr Sum	Hydrologic Index	Water Year Classification	Water Year Classification Corrected for Anteceedent		Over/Under-Estimate
Water Year	WY Class	(AF)	(AF)	(in)	(AF)	(AF)			Flag	
1985	Above Normal	3,590	4,953	9.54	11,543	18,972	Above Normal	Above Normal	0	
1986	Above Normal	5,174	7,139	11.64	2,547	13,255	Below Normal	Above Normal	0	
1987	Below Normal	1,567	2,162	7.75	0	3,243	Below Normal	Below Normal	0	
1988	Below Normal	1,831	2,526	17.33	4,756	8,545	Below Normal	Below Normal	0	
1989	Below Normal	934	1,289	6.65	51	1,984	Extremely Dry	Extremely Dry	1	Underestimate
1990	Below Normal	927	1,279	5.45	0	1,918	Extremely Dry	Extremely Dry	1	Underestimate
1991	Very Wet	8,775	12,106	14.39	46,117	64,277	Very Wet	Very Wet	0	
1992	Above Normal	2,886	3,982	16.38	24,608	30,580	Above Normal	Above Normal	0	
1993	Very Wet	37,668	51,968	31.12	179,812	257,763	Very Wet	Very Wet	0	
1994	Above Normal	4,574	6,310	10.97	7,533	16,999	Above Normal	Above Normal	0	
1995	Very Wet	14,874	20,521	22.55	77,346	108,127	Very Wet	Very Wet	0	
1996	Above Normal	3,424	4,724	8.73	8,081	15,167	Above Normal	Above Normal	0	
									13	

1) Water year based on October 1 to September 30.
2) Water Year classification based on majority of HSPF, Run 93, and natural flow at Vail Lake.
3) Total October through April streamflow at Aguanga
4) Calculated Vail Inflow based on streamflow at Aguanga
5) Total October through April Precipiation at Wildomar
6) Calculated Streamflow at Murrieta based on Wildomar Precipitation
7) Hydrologic Index - 150% Total Calculated Vail Inflow and Calculated Murrieta Flow (4) + (6) +.5*(4)
8) Water Year Classification based on 85%, 50% and 24% of column (7)
9) Water Year Classification corrected for Antecedent Conditions
10) Overestimate/Underestimate of required streamflow at the Gorge

Overestimate	7
Underestimate	6

0008212

Att hment No. 1

EXHIBIT "A"

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Attorneys for Plaintiff

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900 Title Insurance Bldg.,
433 So. Spring St.,
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Michigan 2611
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IN THE SUPERIOR COURT OF THE STATE OF CALIFORNIA

IN and For the County of San Diego

RANCHO SANTA MARGARITA a corporation Plaintiff vs. N. R. Vail, Mary Vail Wilkinson, Mahlon Vail, Edward N. Vail, Margaret Vail Bell, The Vail Company, an association of persons transacting business under that common name, N. R. Vail, Mary Vail Wilkinson, Mahlon Vail, Edward N. Vail and Margaret Vail Bell, as Trustees of said Vail Company, Mahlon Vail, Executor of the Estate of Margaret R. Vail, Deceased, and Laura Perry Vail, Executrix of the Estate of William Banning Vail, Deceased. Defendants. Guy Bogart, Lucy Parkman Bogart and Fred Reinhold, Executors of the will of Murray Schloss, deceased, and Philip Playtor, Interveners.	-No. 42850 STIPULATED JUDGMENT

This cause came on regularly for trial in the above entitled court and department thereof on Monday, October 18, 1926, at the hour of 10:00 o'clock A. M., before the court, Honorable L. D. Jennings, Judge, presiding; Messrs. Hunsaker, Britt & Cosgrove appearing as attorneys for the plaintiff, Messrs. Haas & Dunnigan, Messrs. Ward, Ward & Ward, Messrs. Stephens & Stephens, and Messrs. O'Melveny, Milliken & Tuller, appearing as attorneys for defendants, and Walter Gould Lincoln, Esq., appearing as attorney for intervenors. The introduction of evidence, oral and documentary, being completed, arguments, oral and in writing, having been submitted, the court having considered the same and being fully advised in the premises, findings of fact and conclusions of law having been signed by the court and filed with the clerk thereof, and judgment on said findings and conclusions having been signed and entered; defendants and each of them thereon appealed from said judgment and from each part thereof, but said interveners

EXHIBIT A

did not appeal from said judgment; the Supreme Court of said State of California upon said appeal having reversed said judgment and directed a new trial upon certain issues designated in the opinion of said court reported Rancho Santa Margarita, a corporation, vs. Margaret R. Vail, et al., L. A. No. 15078, 11 Cal. (2nd) 501, and said plaintiff and defendants having stipulated to the entry of the following judgment,

Now, therefore, IT IS ORDERED, ADJUDGED AND DECREED that:

Section First: The plaintiff, Rancho Santa Margarita, a corporation, and defendants, N. R. Vail, Mary Vail Wilkinson, Mahlon Vail, Edward N. Vail, Margaret Vail Bell, the Vail Company, an association of persons transacting business under that common name, N. R. Vail, Mary Vail Wilkinson, Mahlon Vail, Edward N. Vail and Margaret Vail Bell, as Trustees of said Vail Company, Mahlon Vail, Executor of the estate of Margaret R. Vail, Deceased, and Laura Perry Vail, Executrix of the Estate of William Banning Vail, Deceased, and intervenors, Guy Bogart, Lucy Parkman Bogart and Fred Reinhold, Executors of the Will of Murray Schloss, Deceased, and Philip Playtor, have and each has rights in and to the waters of the Temecula-Santa Margarita River and its tributaries, and in and to the use of said waters for all beneficial and useful purposes on their respective lands herein more specifically described.

Section Second: The plaintiff is entitled to take and use upon the whole or any part of its lands lying within the Rancho Santa Margarita y Las Flores, San Diego County, California, sixty-six and two-thirds per cent (66-2/3%) of the water of said Temecula-Santa Margarita River and all its tributaries which naturally, when not artificially diverted or abstracted, flows and descends in the channel thereof at that certain joint gaging station hereinafter in this judgment designated as Measuring Station No. Six (6).

Section Third: Defendants are entitled to take and use upon the whole or any part of their lands hereinafter mentioned, thirty-three and one-third per cent (33-1/3%) of the water of said Temecula-Santa Margarita River and all its tributaries which naturally, when not artificially diverted or abstracted, flows and descends in the channel thereof at that certain joint gaging station hereinafter designated Measuring Station No. Six (6).

The lands of the defendants herein referred to consist of those certain lands in Riverside County, California, known as Pauba Grant, Lost A, B, C, and D of Little Temecula Grant, or Rancho as shown on the Wolf partition map of Little Temecula Grant as described in the final decree of partition in the case of William Wold vs. Ramona Wolf, being Case No. 5756 in the Superior Court of San Diego County, State of California, said final decree of partition being recorded in Book 199 of Deeds, page 464, et seq., records of San Diego County, California, the southeasterly approximately one-half of Temecula Grant, excluding therefrom the town site of the unincorporated city of town of Temecula and the various parcels of land owned by persons other than the defendants herein, as shown by map entitled "Triangulation Map of Pauba Ranch and Vicinity, Riverside County" received in evidence in this case and marked "Plaintiff's Exhibit No. U-4", which exhibit has been incorporated into and constitutes a part of the Transcript on Appeal in this action, (reference is hereby made to said Transcript and to said Exhibit No. U-4 and by such reference said exhibit is incorporated into and constitutes a part of this judgment), Santa Rosa Grant, and Vail governments lands, which said Vail government lands, approximately four hundred sixty (460) acres in area, are more particularly described as: Those certain lands lying within sections twenty-one (21), twenty-seven (27), twenty-eight (28) and twenty-nine (29) of Township Eight (8) south, Range Two (2) west, S. B. B. M., Riverside County, California, and being more particularly identified as Lots Nineteen (19), Twenty (20), Twenty-one (21), Twenty-six (26), Twenty-seven (27), Thirty (30) and Thirty-one (31) of Block Fifteen (15), and those portions of Lots Seventeen (17) and Eighteen (18) of said Block Fifteen (15) lying without but contiguous to the southeasterly boundary of Lot D of said Little Temecula Grant.

Section Fourth: The intervenor Philip Playtor is entitled to take and use upon the whole or any part of his lands riparian to said Temecula-Santa Margarita River, as hereinafter delineated and defined, one (1) miner's inch continuous flow of the waters of said Temecula-Santa Margarita River. The lands of said Philip Playtor riparian to said river are described as follows: The northwest one-quarter (NW¼) of the southeast one-quarter (SE¼) and the south one-half (S½) of the south one-half (S½) of section thirty-three (33) and the southwest one-quarter (SW¼) of the southwest one-quarter (SW¼) of section thirty-four (34), Township Eight (8) South, Range Three (3) West, S. B. M., Riverside County, California.

Section Fifth: The interveners Guy Bogart, Lucy Parlman Bogart and Fred Reinhold, as executors under the will of Murray Schloss, deceased, own certain real property in San Diego County, California, of which approximately twenty (20) acres are riparian to a certain tributary of said Temecula-Santa Margarita River by the name of Stone Creek and are susceptible of practical and profitable irrigation with the water of said creek, said approximately twenty (20) acres being described as follows: The south one-half (S½) of the northeast one-quarter (NE¼) of the northeast one-quarter (NE¼) of section four (4) Township Nine (9) South, Range Three (3) west, S. B. M., San Diego County, in said state. Said interveners are entitled to take from the surface and subsurface waters of said Stone Creek and use the same on said twenty (20) acres riparian to said Stone Creek, throughout said dry or irrigation season of each calendar year and from the 1st day of May of each year until the 31st day of October of the same calendar year, the entire flow of the waters of said Stone Creek and all its tributaries which naturally, when not artificially diverted or abstracted, flows or descends in the channel thereof to and upon said twenty (20) acre parcel; and are entitled to take from said Stone Creek, during the rainy or winter season of each year, for use upon said twenty (20) acres of riparian land for all beneficial purposes, five (5) miner's inches continuous flow.

Section Sixth: The waters of said stream and its tributaries herein apportioned to the interveners shall be deducted from the fractional part of the waters of said stream herein allotted to plaintiff.

Section Seventh: For the purpose of dividing among, and allocating to, the parties of this action, the waters of the Temecula-Santa Margarita River and its tributaries, at the places and in the amounts specified in this judgment, the plaintiff and the defendants immediately shall establish, and thereafter shall maintain jointly (unless established and/or maintained by U. S. Geological Survey, Division of Water Resources State Department of Public Works, or other public body), stream-flow (automatically registering) gaging stations at the following three locations on the Temecula-Santa Margarita River:

Station No. One (1): The upper end of Nigger Canyon at or near the present location of the Nigger Canyon gaging station;

Station No. Three (3): The upper end of Temecula Gorge, immediately downstream from the confluence of Murrieta Creek, at or near the present location of

the Temecula Gorge gaging station;

Station No. Six (6): The Narrows, at or near the present location of the Ysidora gaging station.

And plaintiff and defendants shall establish and maintain jointly (unless established and/or maintained by U. S. Geological Survey, Division of Water Resources State Department of Public Works, or other public body), gaging stations for measuring (and automatically registering) the surface flow of said stream, or any of its tributaries, at any point thereon where the plaintiff, the defendants, or the interveners, or any of them, hereafter may construct or maintain appliances for the diversions of the surface flow of said stream, or any of its tributaries. (The cost of establishing and maintaining joint gaging stations as are required hereunder, including the taking of measurements and observations thereof, shall be borne equally by the plaintiff and the defendants.)

Each party shall establish and maintain meters to determine and automatically register the amount of the underground waters abstracted or diverted by such party from the underground waters of Temecula-Santa Margarita River and/or its tributaries by means of wells, either artesian or pumped (except windmill wells and/or domestic use wells of the parties and/or their tenants); such meters shall be of a type which will meet the approval of both plaintiff and defendants or the approval of either party and the engineer in charge of the Los Angeles office of the U. S. Geological Survey, and shall be installed and maintained in such manner and place as to be available for inspection by either plaintiff or defendants at all times.

Section Eighth: Whenever the total normal flow of said Temecula-Santa Margarita River (when not artificially diverted or abstracted) measured at gaging station No. Three (3) exceeds the total normal flow measured at Gaging Station No. Six (6), then and in that instance the flow of said stream at said Gaging Station No. Three (3) shall be considered as the total flow of said stream, and at such time the apportionments and allotments herein provided for shall be predicated upon the flow of said stream at said Gaging Station No. Three (3).

Section Ninth: For the purpose of apportioning to defendants thirty-three and one-third per cent (33-1/3%) of the waters of said stream as in Section Third provided, it shall be deemed that an amount of water equal to one-half (1/2) the surface flow at Station No. Six (6) or Station No. Three (3), wherever the flow is the

greater (as provided in Section Eighth), pumped and/or diverted from the subsurface and/or surface waters of said river at points upstream from said Station No. Three (3), shall constitute thirty-three and one-third per cent (33-1/3%) of the waters of said stream.

It is recognized that the practical operation of the various pumping plants upon the defendants' lands for irrigation makes it difficult, if not impossible, for defendants to abstract and divert each day an amount of water the exact equivalent of the proportion of the stream flow measured at Station No. Six (6) or Station No. Three (3) to which defendants are entitled under this decree. Accordingly, whenever it is observed that defendants are abstracting and diverting, or have abstracted and diverted surface and/or underground waters in amounts in excess of that to which they are entitled hereunder, defendants, upon learning or being informed of such fact, thereupon shall reduce their diversions below the amount to which they are entitled under this decree, and shall continue such reduced diversions for the same period of time as near as is practicable and in an amount equivalent to the amount of water which defendants had diverted in excess of that to which they were entitled under this decree.

Section Tenth: In addition to the thirty-three and one-third per cent (33-1/3%) of the waters of said stream herein in Section Third allotted to defendants, they may also divert or abstract from the underground waters of said Temecula-Santa Margarita River, but not from the surface waters of said stream, at the places, during the times and upon the conditions hereinafter in this Section specifically set forth, but not otherwise, a specified amount of subsurface water herein in this judgment referred to as "Storage Water". The amount of Storage Water which the defendants may divert or abstract during any irrigation season shall be determined by the elevation of water (When not artificially disturbed) on May 1st of each year in a certain well located on defendants' land known as Windmill Well, in accordance with the following table:

Depth to water below ground surface as shown in casing of Windmill Well on May 1st	Amount of Storage Water defendants may divert and apply to beneficial use during irrigation season
20 feet or less	1,500 acre feet
30 feet	1,125 acre feet
40 feet	750 acre feet
50 feet	375 acre feet
60 feet or more	No acre feet

At depths to water intermediate to those above stated proportionate quantities of water may be taken.

The spreading of flood water which does not involve surface impoundment (either temporary or otherwise) but which may raise the level of water in the underground basin in which said Windmill Well is drilled and upon which said well is located, shall not be considered as an artificial disturbance of the elevation of water in said Windmill Well. Storage water may be directed and used only upon said lands of defendants hereinbefore described and not elsewhere.

For the purpose of indicating the places at which said Storage Water may be pumped, reference is hereby made to "Plaintiff's Exhibit No. 265". Said Exhibit by reference has been incorporated into and constitutes a part of the Transcript on Appeal in this action. Reference is hereby made to said Transcript and to said Exhibit No. 265 and by such reference said Exhibit is incorporated into and constitutes a part of this judgment.

Shown upon said Exhibit No. 265, and extending in a generally northerly and southerly direction, is a certain line of wells (hereafter referred to as the E line of wells) designated on said Exhibit as E-3, E-2 North, E-1 North, E-1 South and E-2 South.

Easterly thereof, shown upon said Exhibit, and extending in a generally northwesterly and southeasterly direction, is a certain line of wells (hereafter referred to as the P. V. line of wells) designated on said Exhibit as P.V.9, P.V.6, and P.V.6X. Immediately adjacent to said P.V. line of wells and parallel thereto, is a certain highway commonly known as Old Warners Ranch Road (now not in common use).

(a) Not more than Thirty per cent (30%) of said Storage Water which defendants are entitled to pump during any irrigation season may be pumped from that portion of defendants' lands lying between a line drawn through said E line of wells and extended across said underground basin, and a line drawn through said P.V. line of wells and extended across said basin.

(b) At least seventy per cent (70) of said Storage Water which defendants are entitled to pump during any irrigation season shall be pumped from that portion of defendants' lands lying easterly of a line drawn through said P. V. line of wells and extended across said underground basin.

The well hereinbefore described as Windmill Well is situated on Pauba Grant South Sixty-seven degrees fifteen minutes (S 67 deg. 15 min) East of B.M.11 a

distance of approximately eleven hundred (1100) feet, and South forty-seven degrees twenty minutes (S 47 deg. 20 min) West of B.M. 12 a distance of approximately fifteen hundred eighty (1580) feet, said bench marks being designated as Nos. 11 and 12 on said Exhibit No. 265.

Should said Windmill Well collapse or otherwise cease to be available or useful for the purpose of determining ground water elevations in the vicinity thereof, then another well shall be drilled by the defendants in the same general location, at approximately the same ground surface elevation above sea level, but not to exceed a distance of one hundred (100) feet from the location of said Windmill Well. Such new well shall be approximately the same depth and diameter of casing as said Windmill Well. In event the parties hereto are unable to agree upon location, depth and diameter of casing of such well, these matters, upon petition of the parties hereto or either of them, shall be determined by order of this court.

For the purpose of determining defendants' total diversions of the waters of the Temecula-Santa Margarita River and its tributaries (meaning thereby to include both the allotment of thirty-three and one third per cent (33-1/3%) of the waters of the river as defined in Section Third, and the additional Storage Water as defined in this Section Tenth hereof), any water abstracted or diverted by defendants from the underground waters of said river (including underground basins of percolating water within the watershed of said river and its tributaries) by use of wells or pumps or other means of diversion, whether now existing or hereafter established, except as hereinafter in this section provided, shall be added to any surface diversions by the defendants from the waters of said river. Such abstractions by the defendants of the underground waters of the Temecula-Santa Margarita River are, and for all purposes of this judgment shall be (except as hereinafter provided) considered as diversions of the waters of said river, and are and shall be chargeable against the fractional part of the surface flow of said stream and the additional amount of Storage Waters herein allotted to defendants.

Water abstracted or diverted from said underground Water of said river which shall not be subject to the provisions of this section are as follows:

1. Windmill wells maintained by defendants for the purpose of supplying water for cattle.

2. Water used by defendants or their tenants for domestic use exclusively

3. Waters which defendants may pump directly into the surface flow of said stream pursuant to the requirements of Section Eleventh hereof.

Section Eleventh:

Part 1. During the irrigation season of each year, to wit, May 1 to October 31, inclusive, excepting as otherwise in Part 1 of this Section permitted, defendants shall cause to be maintained at Gaging Station No. Three (3) a constant flow of water of not less than three (3) cubic feet per second (one (1) cubic foot per second being the equivalent of fifty (50) miner's inches.).

The surface flow at said Station No. Three (3) may be permitted to fall below three (3) cubic feet per second during said irrigation season upon the following conditions and not otherwise:

1. Said surface flow shall not be permitted to fall below three (3) cubic feet per second for any continuous period of more than ten (10) days:

2. An interval of at least ten (10) days shall elapse between periods during which said surface flow falls below three (3) cubic feet per second:

3. Defendants shall contribute to the surface flow at Station No. Three (3), by means of pumping from Temecula Alluvial Basin, or otherwise, an amount of water equal to the amount that the actual flow during said period was less than the required flow of three (3) second feet;

4. Such contributions shall be made at the same rate and over the same period (as near as practicable) as the rate at which said surface flow was less than Three (3) second feet;

5. Such contributions shall be made immediately following the period in which said required flow of three (3) second feet was not maintained;

6. Defendants by means of pumping underground waters directly into the surface flow of the stream or otherwise during any period in which said required flow of three (3) second feet was not maintained, shall always maintain a constant surface flow at Station No. Three (3) of not less than two (2) second feet.

Part II: In the event that, during the irrigation season of any year, to wit, May 1 to October 31, inclusive, the irrigation of crops on said lands of defendants reasonably requires more water than they otherwise are entitled to take under this decree, defendants may abstract and divert underground waters only, in amounts in excess of that to which they are otherwise entitled hereunder. Such excessive diversions may be made upon the following conditions and not otherwise:

1. Excessive diversions shall not continue for a period to exceed eight (8) days consecutively;

2. Following any period of excessive diversion, an interval shall elapse before any further period of excessive diversion, which interval shall not be less than the number of days during the period of excessive diversions immediately preceding;

3. Defendants shall reduce their diversions below the amount to which they are otherwise entitled under this decree, such reductions to be in an amount not less than the amount of water which defendants have diverted in excess of that to which they are otherwise entitled under this decree;

4. Such reductions of their diversions shall be made by defendants immediately following the period during which such excessive diversions were made and shall be completed within ten (10) days thereafter;

5. Defendants, at least one (1) day in advance of the commencement of such diversions, shall advise plaintiff in writing of their requirement and of their intention to avail themselves of the privilege of excessive diversions afforded under part II of this Section.

Parts I and II of this Section Eleventh are complementary one of the other and not inconsistent one with the other and hereafter shall be so construed. The purpose of Part I is to require defendants to maintain a constant flow at Station No. Three (3) of not less than three (3) cubic feet per second excepting under the conditions stated when the flow may be permitted to fall below three (3) cubic feet per second but not below two (2) cubic feet per second, and when such diminution of the stream flow occurs the amount of such diminution shall be contributed by the defendants by pumping directly into the surface flow of the stream from the Temecula Alluvial Basin or otherwise. Part II permits defendants under the conditions stated to use for short periods amounts of water in excess of their allotment but requires them to contribute shortly thereafter the amount of such excessive diversions by reducing (in an amount not less than the amount of such excessive diversions) the amount of the diversions to which they are otherwise entitled. No part of such excessive diversions is required to be contributed by defendants through direct pumping from the subsurface waters of the Temecula Alluvial Basin into the surface flow of the stream if, during the period of such excessive diversions, the constant stream flow at Station No. Three (3) equals or exceeds three (3) second feet.

Section Twelfth: Defendants at all times shall be entitled to divert from the Temecula-Santa Margarita River and its tributaries, and to apply to beneficial use upon their said lands, an amount of water equal to one-half the amount which the plaintiff is entitled to divert from said river and its tributaries and apply to beneficial use upon its lands.

For the purpose of determining the amount of water which defendants are entitled to divert and apply to such beneficial use, computations of the amount of water diverted and applied to beneficial use by each of the parties hereto shall be made monthly, based on joint measurements maintained as herein required. In event said measurements disclose that the amount of water which defendants are entitled to divert and apply to beneficial use pursuant to the provisions of this judgment is less than one-half the amount being applied to beneficial use by plaintiff, thereupon defendants shall be entitled to increase their diversions and applications to beneficial use to an amount sufficient to make defendants' diversions and applications to beneficial use equal to one-half the amount diverted and applied by plaintiff; provided, however, that such additional diversions and applications, if and when made, shall be in addition to diversions made under Sections Third and Tenth hereof, and shall be made by defendants during the irrigation season in which such right accrues, or in the first subsequent season, or part in the same season and the remainder in the first subsequent season, and such diversion, if any, shall be made by pumping from the underground basin at points easterly from said P. V. line of wells.

Section Thirteenth: Each of the parties hereto shall have the right to construct dams or reservoirs on its or their respective lands or elsewhere, for the purpose of intercepting or impounding or conserving such party's share of the flood waters of said river and its tributaries; provided, however, in the event any such dam or reservoir is hereafter constructed by defendants for such purpose, the rights of defendants to abstract and divert Storage Water pursuant to Section Tenth hereof shall cease and terminate.

Defendants shall not make, during any irrigation season, any surface diversions of the waters of said river at the Bridge Pumping Plant, The Cantarini Pumping Plant or the Tule Pumping Plant referred to in the findings herein, or at any other point

on said Temecula-Santa Margarita River below the point of Rising Water as shown on said Exhibit No. 265.

Section Fourteenth: The plaintiff, Rancho Santa Margarita, a corporation, shall have and recover of and from the defendants, its costs and disbursements herein taxed at Six Thousand Thirty-six and 62/100 Dollars ($6,036.62).

Dated at San Diego, California, this 26 day of December, 1940.

Gordon Thompson

Judge

Records indicate that this judgment was recorded in San Diego and Riverside Counties on 26 December 1940.

Assumptions and Realities in the SMR

	Assumptions	Reality
Vbmp	0.6”?	1.02” (70% greater)
Natural Runoff	10%?	Range from 7%-27%
Habitat Impacts	No impact?	Sub-Regional Scale* 95% less days of flow from site compared to pre-development condition Watershed Scale 40% of flow days are from storms under 1” in pre-development condition
Downstream Water Use	No impact?	Sub-Regional Scale* Average Loss of 30% of volume of runoff Loss of 7 ac-ft, per sq. mi., per year Watershed Scale XX% of volume is from storms under 1”

* Continuous simulation based on HSPF, Assumed 640 acres natural grass on B soils converted to 70% urban impervious

Assumptions and Realities in the SMR

	Assumptions	Reality
What Constitutes MEP?	85% Storm Retention most effective way to reduce pollution and protect uses	Current proposal leaves water above the 85% storm untreated, and loss of flow can itself constitute "water pollution." A mix of onsite infiltration and biofiltration may be more protective of downstream beneficial uses in the unique circumstances of the SMR Basin. 85% Retention is not "industry standard" as suggested by NRDC.
Impact of Urbanization on Flows in SMR	Urban runoff from impervious surfaces leaves the SMR with more water than it would "naturally" receive.	River Data from 1925-2008 suggest that the amount of runoff reaching the Temecula Gorge has been relatively constant. The increased runoff associated with impervious surfaces appears to have offset the losses associated with GW mining and Vail Dam.

Assumptions and Realities in the SMR

	Assumptions	Reality
Impact on Downstream Water Rights	Reductions in runoff will not harm CPEN/FPUD ability to fully utilize their water rights	Large scale development/redevelopment has the potential to reduce flows reaching Camp Pendleton
The CWRMA and Base Flow	CPEN is made whole for increased infiltration via the CWRMA Agreement	The CWRMA only addresses Base Flow. The majority of the water that replenishes CPEN's groundwater basins comes from storm flows. The CWRMA does not replace Storm Flows lost to infiltration or reuse in the upper basin

Assumptions and Realities in the SMR

	Assumptions	Reality
Federal Standard for Stormwater Capture	The Federal Standard requires capture of the 95th percentile storm under all circumstances.	The Federal standard requires 95th percentile storm capture unless hydrologic conditions indicate natural site conditions would yield less than 95% infiltration in a pre-development condition. No requirement to retain/infiltrate beyond Delta V.
Infiltration versus Retention Standards	CPEN is harmed equally by the retention versus infiltration standard	Retention or infiltration of the 85th percentile storm at every new or redeveloped property will reduce the hydrograph beyond that which would occur "naturally." However, retention is worse because the water in many cases is entirely lost to the hyrologic system.

Assumptions and Realities in the SMR

	Assumptions	Reality
Retrofit of Existing Properties	Retrofit will not cause any adverse effect on downstream flows because the 85th percentile retention standard is not mandated	Language in the existing permit is ambiguous and can be read to require retrofit projects to meet the EPA/NRDC proposed VBMP.

Land Use:	Runoff Coefficient		
	Low	High	Midpoint
Unimproved areas	0.10	0.30	0.20
Residential (suburban)	0.25	0.40	0.33
Residential multiunit, detached	0.40	0.60	0.50
Neighborhood business area	0.50	0.70	0.60
Light industrial	0.50	0.80	0.65

Source: Viessman & Lewis, Introduction to Hydrology, 4th edition, HarperCollins College Publishers: New York, 1996.

Example Comparing RB's Permit Requirements with Delta-V Alternative

- A 100-acre parcel is planned to be developed into a multi-family residential community
- Prior to development, the runoff coefficient is 0.20
- After development, the runoff coefficient will be 0.50
- This example compares runoff quantities from the 85th percentile, 24-hour storm, assuming it has a depth of 1 inch:
  - -Pre-development runoff = 0.2 inches or <u>1.7 acre-feet</u>
  - -Post-development runoff = 0.5 inches or <u>4.2 acre-feet</u>
- Design Capture Volume (DCV) as defined by permit = runoff from the 85th percentile, 24-hour storm. For this site, DCV is <u>4.2 acre-feet</u>.
- The Delta-V approach would require that LID retain the difference between pre- and post-development runoff, such that the natural hydrology of the site is maintained[1]:
  - -DCV for Delta-V = 4.2 ac-ft – 1.7 ac-ft = <u>2.5 acre-feet</u>
- The permit as written would alter the natural hydrology by retaining an <u>additional 1.7 acre-feet of runoff per event</u>. Multiplied by multiple sites, with many events per year over many years, this is a significant quantity of water over time, which should be quantified in more detailed studies.
- The Delta-V approach ensures that (1) the natural hydrology is maintained, i.e. the quantity of runoff is the same as under pre-development conditions, and (2) water quality objectives are met by treating the remainder of runoff for the 85th percentile, 24-hour storm using traditional BMPs.

[1] The Delta-V approach would require LID to retain the difference between pre- and post-development runoff. Runoff from the 85th percentile, 24-hour storm which is not retained by LID would be treated and released using traditional BMPs.

Impact of Retro-Fitting Developed Sites with LID

- An existing 100-acre, multi-family residential community will be outfitted with LID to comply with the permit
- The runoff coefficient of the site is 0.50
- This example uses runoff quantities from the 85th percentile, 24-hour storm, assuming it has a depth of 1 inch:
  - -Existing runoff = 0.5 inches or 4.2 acre-feet
- Design Capture Volume (DCV) as defined by permit = runoff from the 85th percentile, 24-hour storm. For this site, DCV is 4.2 acre-feet.
- After LID is implemented, 4.2 acre-feet of rainfall will be captured and retained per event, potentially removing that 4.2 acre-feet from the surface water flows as they exist today.
- This would alter the existing hydrology by potentially removing significant quantities of water from the surface water system.
- In order to quantify the total impact to Camp Pendleton's water supply, detailed studies are needed.
- Questions that must be answered by further study include:
  - -How many total acres of existing development will be retrofitted with LID?
  - -What are the actual runoff coefficients of sites to be outfitted with LID?
  - -What is the seasonal variation of those runoff coefficients?
  - -Will LID retention and infiltration be feasible during extended wet conditions?
  - -What are the locations of planned LID facilities, and how does runoff from those sites contribute to surface water flows leaving the upper watershed?
-

Impact of Using Different Design Storms for Design Capture Volume

- A hypothetical, daily model of LID capture was created to simulate long-term retention by LID at a single site.
- The site is assumed to have a runoff coefficient of 0.50 for every storm, regardless of antecedent conditions. This is a simplification which allows us to make a relative comparison between design storm percentiles.
- The table below presents the percent of rainfall that is retained by LID for different percentiles of the 24-hour storm
- The figure shows the data from the table in graphical format
- The slope of the line begins to increase at about the 50th percentile storm

	24-hour Storm Percentile	Corresponding 24-hour Rainfall Depth[1] (in)	Percent of Rainfall that is Retained by LID[2]
	1%	0.01	1%
	5%	0.02	1%
	10%	0.03	2%
	15%	0.04	2%
	20%	0.06	4%
	25%	0.08	5%
	30%	0.10	6%
	35%	0.12	7%
	40%	0.15	8%
	45%	0.18	9%
	50%	0.21	11%
	55%	0.25	12%
	60%	0.30	14%
	65%	0.37	16%
	70%	0.45	18%
	75%	0.51	20%
	80%	0.64	23%
*	85%	0.80	26%
	90%	1.06	30%
	95%	1.64	36%
	99%	2.90	43%

*Design storm as defined by current Permit

Notes:

1. Based on rainfall data from 1914-2008 at Wildomar station (Riverside County Flood Control Network)
2. Based on retention and runoff from a single site assuming a 50% runoff coefficient for all storms; also assumes that LID retention and infiltration is feasible in wet conditions.

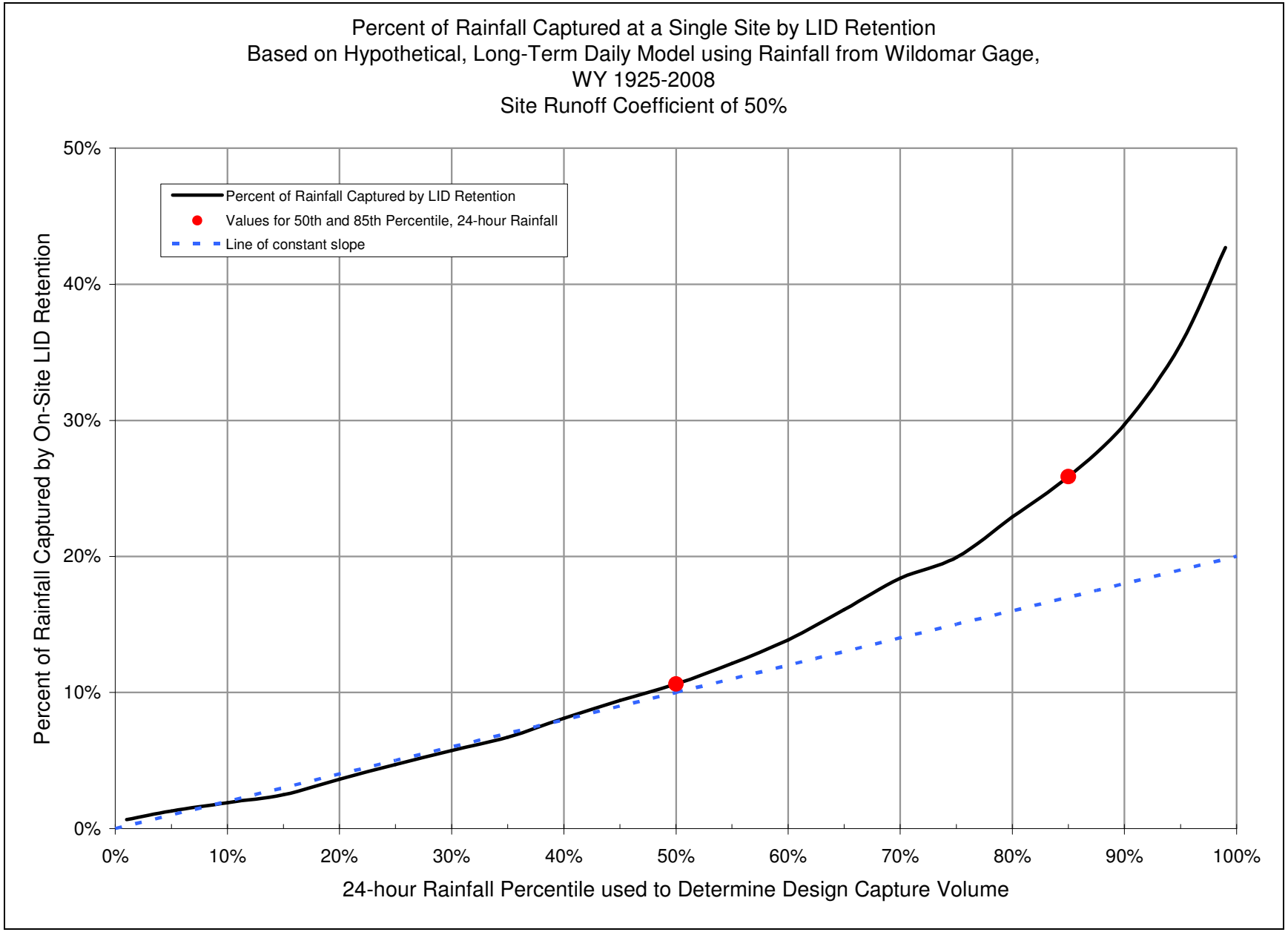
Percent of Rainfall Captured at a Single Site by LID Retention
Based on Hypothetical, Long-Term Daily Model using Rainfall from Wildomar Gage,
WY 1925-2008
Site Runoff Coefficient of 50%
Percent of Rainfall Captured by LID Retention
Values for 50th and 85th Percentile, 24-hour Rainfall
Line of constant slope
Percent of Rainfall Captured by On-Site LID Retention
50%
40%
30%
20%
10%
0%
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
24-hour Rainfall Percentile used to Determine Design Capture Volume

0008234

Wayne Chiu - Fwd: LID (non-retention) Sizing Methods

From: Chiara Clemente
To: Chiu, Wayne
Date: 10/29/2010 9:47 AM
Subject: Fwd: LID (non-retention) Sizing Methods
Attachments: Sizing of a Bioswale (w_att).pdf; Permit Language.docx

>>> "Padres, Claudio" <CMPadres@rcflood.org> 10/28/2010 1:32 PM >>>
Ben,

As we discussed in our last meeting, there are several significant problems with the performance criteria in the errata for *non-retention* LID BMPs. Below is a comparison of the two methods:

	Ventura	South OC
Implementation of performance criteria	'Equivalent Pollutant and Volume reduction' is undefined, un-implementable, and un-enforceable.	'hold' .75 times VBMP: is clear, implementable, and enforceable – this is why we agreed to it previously.
WQ Protection	Less Protective (see next column)	Results in BMPs over 30 times larger than Ventura Method*, which in turn will: • treat much more water, and • result in much more incidental volume loss through infiltration, surface wetting, and evapotranspiration. • Result in much greater pollutant removal. Because we all recognize the importance of these benefits, we had agreed to this sizing method, even knowing that it was very conservative.
LID Manual	Completely inconsistent with our LID BMP Design Manual	Based on our agreements leading to the public release, we have been finalizing our LID BMP Design Manual based on the non-retention sizing methodology in South OC. We are vested in that approach.

*See attached calculations for background on the size comparison.

It is highly appropriate that the performance standard for non-retention BMPs be restored to the 0.75 x VBMP standard as shown on the attached 'permit language' word document. This change (compared to the errata) will result in better protection of water quality, better and clearer implementation, and further it maintains the Copermittees' ability to implement the pending LID BMP Design Manual within this watershed.

Additionally, in our discussions prior to the public release we offered 1 x VBMP as an *additional* safety factor to

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only facilitate the change to infiltration. If the infiltration language does not remain as originally drafted (infiltration), that safety factor is not appropriate and should be restored to the 0.75 factor.

Please give me a call at your earliest convenience, and we can discuss this further.
Best regards,

Claudio M. Padres, PE
Senior Civil Engineer
Watershed Protection Division - NPDES

Riverside County Flood Control and Water Conservation District

1995 Market Street, Riverside, CA 92501

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Sizing of a Bioswale

Assumptions:

Project: 1-acre commercial development (95% Impervious)

Location: Temecula

24-hour 85th percentile storm volume: 1.02"

Peak hourly intensity (in/hr) for a 24-hour storm: 14% of storm volume (per Riverside County Hydrology Manual)

Runoff Coefficient C: 0.81

V_{BMP}: 2977 Ft^3 (See attachment 1)

Sizing Method: Flow

Per South OC Method

"HOLD 0.75 TIMES VBMP" (Requirements based on Volume)

Swale Volume = 0.75 x V_{BMP}

Swale Volume = **2,233 ft^3**

Per Ventura Method

"TREAT 1.5 TIMES VBMP" (Requirements based on Flow)

Need to calculate the Flow Rate (Q) that will treat a volume of 1.5 x V_{BMP}.

1.5 x V_{BMP} = 4466 ft^3

*Q= C x I x A => need to find **I** to be able to calculate **Q.***

To produce 4466 ft^3 of runoff, you would need a storm depth of 1.53" (See attachment 2)

24-hour peak hourly intensity (I) = 14% of storm volume = 0.14 x 1.53

I= 0.21 inches/hour

Q = C x I x A = 0.81 x 0.21 x 1(acre) = 0.17 cfs

Swale Volume = 71.40 ft^3 (See attachment 3)

BMP Design Volume, V_{BMP}, Santa Ana/ Santa Margarita	Legend:	Required Entries Calculated Cells

Company Name		Date	
Designed by		County/City Case No	
	Test Case: 1-acre commercial in Temecula (95% impervious)		

Enter the Area Tributary to this Feature A_T = 1 acres

Slope value from Design Volume Curve in Appendix A

Site Location

Township

Range

Section

24-hour 85th % Storm Volume = 1.02 inches

Calculate the Impervious Percentage

Total Impervious Area in the Area Tributary to the Feature A_{IMP} = 0.95 acres

Total Area Tributary to the Feature A_T = 1 acres

Impervious Percentage i = 95%

Calculate the composite Runoff Coefficient, C for the BMP Tributary Area

Use the following equation based on the WEF/ASCE Method

$C = 0.858i^3 - 0.78i^2 + 0.774i + 0.04$ C = 0.81

Determine Design Storage Volume, V_{BMP}

Calculate V_U, the 85% Unit Storage Volume $V_U = S_C \times C$ V_u = 0.82 (in*ac)/ac

Calculate the design storage volume of the BMP, V_{BMP}.

$$V_{BMP}\ (ft^3) = \frac{V_U\ (in\text{-}ac/ac) \times A_T\ (ac) \times 43{,}560\ (ft^2/ac)}{12\ (in/ft)}$$

V_{BMP} = 2,977 ft^3

Notes:

BMP Design Volume, V_{BMP}, Santa Ana/ Santa Margarita	Legend:	Required Entries Calculated Cells

Company Name		Date	
Designed by		County/City Case No	

Test Case: 1-acre commercial in Temecula (95% impervious)

Enter the Area Tributary to this Feature A_T = 1 acres

Slope value from Design Volume Curve in Appendix A

Site Location

Township

Range

Section

24-hour 85th % Storm Volume = 1.53 inches

Calculate the Impervious Percentage

Total Impervious Area in the Area Tributary to the Feature A_{IMP} = 0.95 acres

Total Area Tributary to the Feature A_T = 1 acres

Impervious Percentage i = 95%

Calculate the composite Runoff Coefficient, C for the BMP Tributary Area

Use the following equation based on the WEF/ASCE Method

$C = 0.858i^3 - 0.78i^2 + 0.774i + 0.04$ C = 0.81

Determine Design Storage Volume, V_{BMP}

Calculate V_U, the 85% Unit Storage Volume $V_U = S_C \times C$ V_u = 1.23 (in*ac)/ac

Calculate the design storage volume of the BMP, V_{BMP}.

$$V_{BMP}\ (ft^3) = \frac{V_U\ (in\text{-}ac/ac) \times A_T\ (ac) \times 43{,}560\ (ft^2/ac)}{12\ (in/ft)}$$

V_{BMP} = 4,465 ft^3

Notes:

Design Procedure - Bioswale	Legend:	Required Entries Calculated Cells

Company Name: Date:

Designed by: County/City Case No.:

Test Case: 1-acre commercial in Temecula (95% impervious)

Sized per Ventura Methodology

Enter the area tributary to the swale, max = 10-acres A_T = 1.0 acres

Enter Q_{BMP} from Flow Worksheet Q_{BMP} = 0.17 cfs

Enter Swale Slope, Sideslopes and depth of flow

Mannings roughness (n) = 0.20 unitless

Enter side slope of proposed swale — Side Slope (z) = 4

Max z = 4:1 (slopes must be 4:1 or flatter)

Enter longitudinal slope of the swale — slope (s) = 0.01

s_{min} = 0.002, s_{max} = 0.020

Enter depth, d, of flow in the swale — Depth of flow (d) = 5 inches

maximum 3 - 5 inches

Determine bottom width of swale

The simplified manning equation below will solve for the bottom width, b of the swale

$$b\ min = \frac{Q_{BMP}(n)}{1.49(d^{5/3})(s^{1/2})}$$

b min = 1.0 ft

Enter proposed swale bottom width, Minimum = 2 ft — b design = 2.0 ft

$$d\ design = \left(\frac{Q_{BMP}(n)}{1.49(b\ design)(s^{1/2})}\right)^{3/5} \times \left(\frac{12\ in}{1\ ft}\right)$$

d design = 3.3 inches

Check Velocity, V

Calculate cross sectional area of the swale

Area (A) = d (b+ zd) — A = 0.84 sq ft

Calculate the velocity of the swale, max = 1 foot/sec

$$V = \frac{Q_{BMP}}{A}$$

V = 0.20 fps

Calculate Minimum Length and Minimum Top Width

Design Length (L) = V (ft/s) x 7 min contact time x (60 sec/min) — L min = 85 ft

Minimum Top Width, T_W

T_W min = b design + d design (z)(2) — T_W min = 4.17 ft

Use pulldowns

Underdrains provided for C or D type soils or slopes < 0.5%? No

Check Dams provided for steep slopes? N/A

Volume = 71.40 ft^3

If the swale has been designed correctly, there should be no error messages on the spreadsheet.

Page # 33-34 Section F.1.d.(4)(c)(ii) - If onsite [*infiltration]** LID BMPs are technically infeasible per section F.1.d.(7)(b), other LID BMPs may treat any volume that is not retained onsite. Due to the flow through design of non-retention LID BMPs, the total volume of the BMP, including pore spaces and pre-filter detention volume, must be sized to hold at least 0.75 times the portion of the design capture volume that is not retained onsite by LID retention BMPs. ~~provided that the other LID BMPs are sized to achieve equivalent storm water volume and pollutant load reduction as if the entire design capture volume were retained onsite.~~ The LID BMPs must be designed for an appropriate surface loading rate to prevent erosion, scour and channeling within the BMP.

**The issue of 'retention' versus 'infiltration' is another independent point of contention. The proposed changes are appropriate regardless of the outcome of the retention/infiltration discussion.*

From: Jungreis CIV Jeremy N <jeremy.jungreis@usmc.mil>
To: <cclemente@waterboards.ca.gov>, Ben Neill <BNeill@waterboards.ca.gov>, W...
CC: Carlisle LtCol Kevin T <kevin.carlisle@usmc.mil>, Boughman CIV Paul R <p...
Date: 11/3/2010 2:41 PM
Subject: Draft Language for Hearing on 10 November
Attachments: Draft Memo 3 November 2010.doc; Assumptions and Realities of Riverside MS4 Permit.ppt; LID_examples_10-27-2010.doc; Hydrologic Points to R9-MS4 Order.pdf

Chiara:

Per our discussion of a short time ago, please find attached in the Memo entitled "3 November 2010," answers to the questions posed by your staff last Wednesday. The memo also contains proposed language that would, if adopted, eliminate the possibility of harm to downstream water uses as the result of volumetric losses associated with implementation of the proposed 85th percentile retention standard.

As reflected in the information previously provided to Board staff (also attached), we believe that we have been responsive in demonstrating the possibility of harm to downstream water uses associated with implementation of the proposed permit. As you have requested, we will endeavor to further refine the answers provided in the 3 November memo, and provide you with additional data regarding hydrologic implications before the November 10 Board meeting. However, we believe that our actions thus far demonstrate due diligence and a good faith effort to reach a mutually beneficial resolution based on available data. We continue to believe that a comprehensive study of the entire hydrograph is needed to determine what amount of onsite retention versus treatment is the best means of assuring that downstream beneficial uses are protected.

Best Regards,

Jeremy Jungreis

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Draft Memorandum 102910.2

STETSON ENGINEERS INC.

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TO: Camp Pendleton Office of Water Resources DATE: November 3, 2010

FROM: Stetson Engineers JOB NO: 2199-5001

RE: Impact to Water Resources on Camp Pendleton from RWQCB Tentative Order No. R9-2010-0016

INTRODUCTION

Stetson Engineers has performed a cursory review the Santa Margarita River hydrology and potential impacts from RWQCB Tentative Order No. R9-2010-0016. Generally, the implementation of LID as dictated in the tentative order may negatively impact the water resources available to Camp Pendleton and reduce the ability to fully exercise its water rights and protect its riparian ecosystems. The tentative order would cause impacts in the tributary areas of the Santa Margarita River upstream of Camp Pendleton's boundary in Riverside County. The purpose of this technical memorandum is to identify the potential impacts to Camp Pendleton's water rights and identify alternative language in the tentative order that could be adopted to mitigate future negative impacts to the Base's water supply caused by the wide-spread implementation of LID.

Alternative Language

Stetson advocates using the approach known as "Delta-V" for sizing LID facilities for projects greater than 1 acre. The Delta-V approach ensures that LID facilities are sized such that pre-development hydrology is maintained. The Design Capture Volume (DCV) for LID as currently defined by the permit is the runoff volume from the 85th percentile, 24-hour storm. The Delta-V approach would require that LID retain the difference between pre- and post-development runoff. That is, LID facilities would be required to retain the runoff in excess of that under pre-development conditions, rather than the entire runoff volume of the storm. However, the remaining runoff volume would still be required to be treated with traditional treatment control BMPs. The Delta-V approach would be required for projects with a size greater than 1 acre. Lacking detailed hydrologic analysis, the 1 acre threshold was chosen to be consistent with the State General Construction Permit requirements. Following collection and analysis of detailed data sets, the 1-acre threshold could be adjusted at the next permit renewal cycle if retention at the Delta-V level combined with biofiltration of residual runoff is found not to remove pollutants to the maximum extent practicable.

To implement this change, the following alternative language is proposed, with additions shown in red:

Add to Section F.1.d.(4):

(c) LID BMPs sizing criteria:

(i) For Priority Development Projects with a total area less than or equal to 1 acre, LID BMPs must be sized and designed to ensure onsite retention without runoff, of the volume of runoff produced from a 24-hour 85th percentile storm event ("design capture volume"); For Priority Development Projects greater than 1 acre, LID BMPs must be sized and designed to ensure onsite retention without runoff of the volume of runoff produced from a 24-hour 85th percentile storm event that is in excess of the runoff that would otherwise occur from the pre-development site. Conventional treatment control BMPs, such as biofiltration or other natural treatment systems, must be implemented to treat the remaining runoff from the site.

(ii) If onsite retention LID BMPs are technically infeasible per section F.1.d.(7)(b), other LID BMPs may treat any volume that is not retained onsite provided that the other LID BMPs are sized ~~to hold the design storm volume that is not infiltrated~~ to achieve equivalent storm water ~~volume and~~ pollutant load reduction ~~as if the entire design capture volume were retained onsite~~. The LID BMPs must be designed for an appropriate surface loading rate to prevent erosion, scour and channeling within the BMP.

Edit and Add to F.1.d.(7):

Technical infeasibility may result from conditions including, but not limited to:

(i) Locations that cannot meet the infiltration and groundwater protection requirements in section F.1.c.(6) for large, centralized infiltration BMPs. Where infiltration is technically infeasible, the project must still examine the feasibility of other onsite LID BMPs;
(ii) Insufficient demand for storm water outdoor reuse;
(iii) Smart growth and infill or redevelopment locations where the density and/or nature of the project would create significant difficulty for compliance with the LID BMP requirements; and
(iv) Other site, geologic, soil, or implementation constraints identified in the Copermittees updated SSMP document.
(v) Reduction in site runoff that negatively impacts downstream water availability.

Edit Errata language in Section F.1.C.(8):

Rain water harvesting and outdoor water reuse, where feasible ~~must~~ may be encouraged as part ~~if~~ of the site design and construction to reduce pollutants in storm water discharges to the MEP.

Edit the original language in F.3.D.(4):

(4) Each Copermittee must consider the results of the evaluation in prioritizing work plans for the following year in accordance with Sections G.1 and J. Highly feasible projects expected to benefit water quality should be given a high priority to implement source control and treatment control BMPs. Where feasible, ~~the~~ retrofit projects may be designed in accordance with the SSMP requirements for conventional treatment control BMPs. ~~within sections F.1.d.(3) through F.1.d.(8).~~

~~and the Hydromodification requirements in Section F.1.h.~~

Edit the Errata Page # C-7 - Add the following definition:

Low Impact Development Best Management Practices (LID BMPs) - LID BMPs include schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the pollution of waters of the United States through storm water management and land development strategies that emphasize conservation and the use of on-site natural features integrated with engineered, small-scale hydrologic controls to more closely reflect pre-development hydrologic functions. LID BMPs include retention practices that do not allow runoff such as infiltration, rain water harvesting for outdoor use, ~~and~~ reuse (outdoor), and evapotranspiration. Infiltration BMPs should be given priority over other LID BMPs during design of facilities. LID BMPs also include flow-through practices such as biofiltration that may have some discharge of storm water following treatment. Reuse or rainwater harvesting for indoor applications that may result in exportation of water from the Santa Margarita River Basin shall demonstrate compliance with California Water Code Sections 1200 through 1225.

Hydrologic Questions and Further Studies

Following an October 27, 2010 meeting with the RWQCB, the following questions were posed by the Camp Pendleton and the RWQCB Staff:

- What is the runoff coefficient for this watershed (understanding that this is based on a 5-year storm)?
- What is the annual runoff amount?
- What is the runoff percentage for the 85th percentile, 24-hour storm?
- What is the largest storm that would still likely have no runoff – the threshold storm?

To be properly answered with a high degree of certainty, each of these questions requires in-depth study that includes numerical modeling and use of hourly rainfall data to quantify the response. The limited period of time since the errata language requiring retention of the 85th percentile storm onsite was released has constrained the ability of Camp Pendleton to analyze the questions posed in a comprehensive manner. Implementation of the tentative order, depending on the final requirements, should include a requirement for the collection of hydrologic data so the questions outlined above may be addressed. The following section outlines each of these questions and the value for continuing studies.

What is the runoff coefficient for the Santa Margarita River watershed?

The runoff coefficient varies depending on land use, soil type, rainfall intensity, slope, vegetative cover, and antecedent conditions. Additionally, the runoff coefficient will vary from pre-developed to post-developed conditions based on anthropogenic changes to groundwater levels. For example, pre-development areas of rising or elevated groundwater levels would naturally support increased runoff, resulting in a higher runoff coefficient and lower infiltration rate. Post-development conditions in the Santa Margarita River watershed are characterized by lower groundwater levels that increase infiltration and reduce runoff. Given the same site, the runoff coefficient may vary between pre- and postdevelopment conditions.

The following are a list of factors, and a short description of the issues, that would need to be addressed to answer this question.

Antecedent conditions - What are the soil conditions during the design rainstorm? Flood analysis may typically assume saturated soils that maximize the run-off coefficient. While calculating the design flow runoff, unsaturated soils will dictate a lower runoff coefficient than saturated soils. The seasonal timing of storms will lead to different antecedent conditions for similar storm events; the frequency of storms within short (i.e. month-long) periods also affects runoff conditions.

Time - An analysis of the watershed on an annual or event driven rainfall event will affect the runoff coefficient. Generally, runoff coefficients are less during the beginning of the rainy season and greater at the end. An annual runoff coefficient would differ from an event-specific runoff coefficient.

Site Conditions - The soils are site-specific and will greatly affect the runoff coefficient. Runoff from granitic basement rock is greater than runoff from unsaturated alluvium. While a watershed runoff coefficient may be desired, it would vary from site to site. Runoff is also affected by site slope, with greater slopes generally leading to higher runoff percentages. In addition, vegetative cover affects runoff: bare soils generate more runoff than ground covered with thick vegetation.

EXAMPLE SITE SPECIFIC RUNOFF COEFFICIENTS FOR 5- TO 10-YEAR STORM EVENTS

Land Use:	Runoff Coefficient		
	Low	High	Midpoint
Unimproved areas	0.10	0.30	0.20
Residential (suburban)	0.25	0.40	0.33
Residential multiunit, detached	0.40	0.60	0.50
Neighborhood business area	0.50	0.70	0.60
Light industrial	0.50	0.80	0.65

Source: Viessman & Lewis, Introduction to Hydrology, 4th edition, HarperCollins College Publishers: New York, 1996.

What is the annual runoff amount?

The annual runoff is dependent on groundwater levels, antecedent conditions, precipitation, land use, soils type, and other factors that influence the runoff coefficient. It varies depending on the type of hydrologic condition: more runoff during heavy precipitation years and less runoff during drier years. The precipitation varies depending on natural and anthropogenic (eg. global warming) variations in hydrologic cycles. Precipitation in the Santa Margarita River watershed is controlled by northern Pacific storms, southern tropical storms, and to a lesser degree, summer monsoonal rains. As these storm cycles change from year to year, the annual runoff from the related precipitation also varies. For instance, given the same amount of rainfall, high intensity southern tropical storms may generate more runoff, on an annual basis, than more frequent and less intense northern pacific storms.

What is the runoff percentage for the 85th percentile, 24-hour storm?

The runoff percentage (eg. coefficient) for the 85th percentile, 24-hour storm, varies depending on soil type, land use, antecedent conditions, rainfall intensity, and other factors described in the response to the previous questions. Generally, runoff from a developed area on top of basement rock (or saturated alluvium) will generate more runoff than from an undeveloped area that overlies unsaturated alluvial sediments. The runoff percentage is a site-specific number that should be determined based on soils, groundwater levels, slope, vegetative cover, and rainfall intensity. Example site-specific runoff coefficients are shown in the previous table. The watershed-wide runoff coefficient could be estimated by using streamflow, precipitation, geology, and land use data to calculate the watershed-wide runoff coefficient.

The runoff measured by the USGS at the Santa Margarita River at Temecula Gage varied over the last 10 years between 3,350 AFY (WY2002) and 86,300 AFY (WY2005). During a longer period of record from 1974 through 2009, the flow from at the Temecula gage has varied

from a minimum of 1,570 AFY (WY 1987) to 132,400 AFY (WY 1993). While variability of runoff is related to hydrologic conditions, land use and other anthropenic changes also impact the amount of runoff measured at the Temecula gage. A relationship between precipitation and runoff, for varying antecedent conditions and changes in land use over time, could be developed through detailed studies.

What is the largest storm that would still likely have no runoff – the threshold storm?

The development of a threshold storm based on runoff is site specific, but would vary depending on soils, antecedent conditions, rainfall intensity, level of development, etc. When soils are saturated, the runoff from a site located on basement complex rock will be greater than a site that overlies unsaturated alluvium. Similarly, runoff during pre-developed conditions may be greater than runoff during developed conditions due to elevated groundwater levels and saturated stream channels. Estimating the impact of water development projects such as Vail Dam, Lake Skinner, and Diamond Valley Lake would be required to determine what level of storm would result in zero runoff from the watershed. Runoff from the site-level perspective is also affected by natural and anthropengic impacts that would need to be accounted for in analysis of the hydrology.

Data obtained from a detailed study that related precipitation versus runoff, given changing land use conditions discussed in the previous section, could be used to identify the threshold storm. The results of the study would likely identify the threshold storm for varying hydrologic condtions.

Conclusions That Can Be Made from Existing Data

Analysis of tentative Order No. R9-2010-0016 indicates that retention of the 85% percentile, 24-hour storm, will cause a reduction of downstream surface flow. This result has been preliminarily identified in Stetson's previous October 11, 2010 memorandum regarding Hydrologic Points Related to Tentative Order R9-2010-0016. The greatest impact to water resources downstream of the Temecula Gorge will occur during dry hydrologic conditions when limited water supplies are available to meet both domestic water supply and habitat requirements. A preliminary estimation of streamflow impacts due to the tentative order, based on a range of hydrologic conditions, will be prepared based on available datasets for the Board Hearing on November 10th.

Assumptions and Realities in the SMR

	Assumptions	Reality
Vbmp	0.6”?	1.02” (70% greater)
Natural Runoff	10%?	Range from 7%-27%
Habitat Impacts	No impact?	Sub-Regional Scale* 95% less days of flow from site compared to pre-development condition Watershed Scale 40% of flow days are from storms under 1” in pre-development condition
Downstream Water Use	No impact?	Sub-Regional Scale* Average Loss of 30% of volume of runoff Loss of 7 ac-ft, per sq. mi., per year Watershed Scale XX% of volume is from storms under 1”

* Continuous simulation based on HSPF, Assumed 640 acres natural grass on B soils converted to 70% urban impervious

Assumptions and Realities in the SMR

	Assumptions	Reality
What Constitutes MEP?	85% Storm Retention most effective way to reduce pollution and protect uses	Current proposal leaves water above the 85% storm untreated, and loss of flow can itself constitute "water pollution." A mix of onsite infiltration and biofiltration may be more protective of downstream beneficial uses in the unique circumstances of the SMR Basin. 85% Retention is not "industry standard" as suggested by NRDC.
Impact of Urbanization on Flows in SMR	Urban runoff from impervious surfaces leaves the SMR with more water than it would "naturally" receive.	River Data from 1925-2008 suggest that the amount of runoff reaching the Temecula Gorge has been relatively constant. The increased runoff associated with impervious surfaces appears to have offset the losses associated with GW mining and Vail Dam.

Assumptions and Realities in the SMR

	Assumptions	Reality
Impact on Downstream Water Rights	Reductions in runoff will not harm CPEN/FPUD ability to fully utilize their water rights	Large scale development/redevelopment has the potential to reduce flows reaching Camp Pendleton
The CWRMA and Base Flow	CPEN is made whole for increased infiltration via the CWRMA Agreement	The CWRMA only addresses Base Flow. The majority of the water that replenishes CPEN's groundwater basins comes from storm flows. The CWRMA does not replace Storm Flows lost to infiltration or reuse in the upper basin

Assumptions and Realities in the SMR

	Assumptions	Reality
Federal Standard for Stormwater Capture	The Federal Standard requires capture of the 95th percentile storm under all circumstances.	The Federal standard requires 95th percentile storm capture unless hydrologic conditions indicate natural site conditions would yield less than 95% infiltration in a pre-development condition. No requirement to retain/infiltrate beyond Delta V.
Infiltration versus Retention Standards	CPEN is harmed equally by the retention versus infiltration standard	Retention or infiltration of the 85th percentile storm at every new or redeveloped property will reduce the hydrograph beyond that which would occur "naturally." However, retention is worse because the water in many cases is entirely lost to the hyrologic system.

Assumptions and Realities in the SMR

	Assumptions	Reality
Retrofit of Existing Properties	Retrofit will not cause any adverse effect on downstream flows because the 85th percentile retention standard is not mandated	Language in the existing permit is ambiguous and can be read to require retrofit projects to meet the EPA/NRDC proposed VBMP.

Land Use:	Runoff Coefficient		
	Low	High	Midpoint
Unimproved areas	0.10	0.30	0.20
Residential (suburban)	0.25	0.40	0.33
Residential multiunit, detached	0.40	0.60	0.50
Neighborhood business area	0.50	0.70	0.60
Light industrial	0.50	0.80	0.65

Source: Viessman & Lewis, Introduction to Hydrology, 4th edition, HarperCollins College Publishers: New York, 1996.

Example Comparing RB's Permit Requirements with Delta-V Alternative

- A 100-acre parcel is planned to be developed into a multi-family residential community
- Prior to development, the runoff coefficient is 0.20
- After development, the runoff coefficient will be 0.50
- This example compares runoff quantities from the 85th percentile, 24-hour storm, assuming it has a depth of 1 inch:
  - -Pre-development runoff = 0.2 inches or <u>1.7 acre-feet</u>
  - -Post-development runoff = 0.5 inches or <u>4.2 acre-feet</u>
- Design Capture Volume (DCV) as defined by permit = runoff from the 85th percentile, 24-hour storm. For this site, DCV is <u>4.2 acre-feet</u>.
- The Delta-V approach would require that LID retain the difference between pre- and post-development runoff, such that the natural hydrology of the site is maintained[1]:
  - -DCV for Delta-V = 4.2 ac-ft – 1.7 ac-ft = <u>2.5 acre-feet</u>
- The permit as written would alter the natural hydrology by retaining an <u>additional 1.7 acre-feet of runoff per event</u>. Multiplied by multiple sites, with many events per year over many years, this is a significant quantity of water over time, which should be quantified in more detailed studies.
- The Delta-V approach ensures that (1) the natural hydrology is maintained, i.e. the quantity of runoff is the same as under pre-development conditions, and (2) water quality objectives are met by treating the remainder of runoff for the 85th percentile, 24-hour storm using traditional BMPs.

[1] The Delta-V approach would require LID to retain the difference between pre- and post-development runoff. Runoff from the 85th percentile, 24-hour storm which is not retained by LID would be treated and released using traditional BMPs.

Impact of Retro-Fitting Developed Sites with LID

- An existing 100-acre, multi-family residential community will be outfitted with LID to comply with the permit
- The runoff coefficient of the site is 0.50
- This example uses runoff quantities from the 85th percentile, 24-hour storm, assuming it has a depth of 1 inch:
  - -Existing runoff = 0.5 inches or <u>4.2 acre-feet</u>
- Design Capture Volume (DCV) as defined by permit = runoff from the 85th percentile, 24-hour storm. For this site, DCV is <u>4.2 acre-feet</u>.
- After LID is implemented, 4.2 acre-feet of rainfall will be captured and retained per event, potentially removing that 4.2 acre-feet from the surface water flows as they exist today.
- This would alter the existing hydrology by potentially removing significant quantities of water from the surface water system.
- In order to quantify the total impact to Camp Pendleton's water supply, detailed studies are needed.
- Questions that must be answered by further study include:
  - -How many total acres of existing development will be retrofitted with LID?
  - -What are the actual runoff coefficients of sites to be outfitted with LID?
  - -What is the seasonal variation of those runoff coefficients?
  - -Will LID retention and infiltration be feasible during extended wet conditions?
  - -What are the locations of planned LID facilities, and how does runoff from those sites contribute to surface water flows leaving the upper watershed?
-

Impact of Using Different Design Storms for Design Capture Volume

- A hypothetical, daily model of LID capture was created to simulate long-term retention by LID at a single site.
- The site is assumed to have a runoff coefficient of 0.50 for every storm, regardless of antecedent conditions. This is a simplification which allows us to make a relative comparison between design storm percentiles.
- The table below presents the percent of rainfall that is retained by LID for different percentiles of the 24-hour storm
- The figure shows the data from the table in graphical format
- The slope of the line begins to increase at about the 50th percentile storm

	24-hour Storm Percentile	Corresponding 24-hour Rainfall Depth[1] (in)	Percent of Rainfall that is Retained by LID[2]
	1%	0.01	1%
	5%	0.02	1%
	10%	0.03	2%
	15%	0.04	2%
	20%	0.06	4%
	25%	0.08	5%
	30%	0.10	6%
	35%	0.12	7%
	40%	0.15	8%
	45%	0.18	9%
	50%	0.21	11%
	55%	0.25	12%
	60%	0.30	14%
	65%	0.37	16%
	70%	0.45	18%
	75%	0.51	20%
	80%	0.64	23%
*	85%	0.80	26%
	90%	1.06	30%
	95%	1.64	36%
	99%	2.90	43%

*Design storm as defined by current Permit

Notes:

1. Based on rainfall data from 1914-2008 at Wildomar station (Riverside County Flood Control Network)
2. Based on retention and runoff from a single site assuming a 50% runoff coefficient for all storms; also assumes that LID retention and infiltration is feasible in wet conditions.

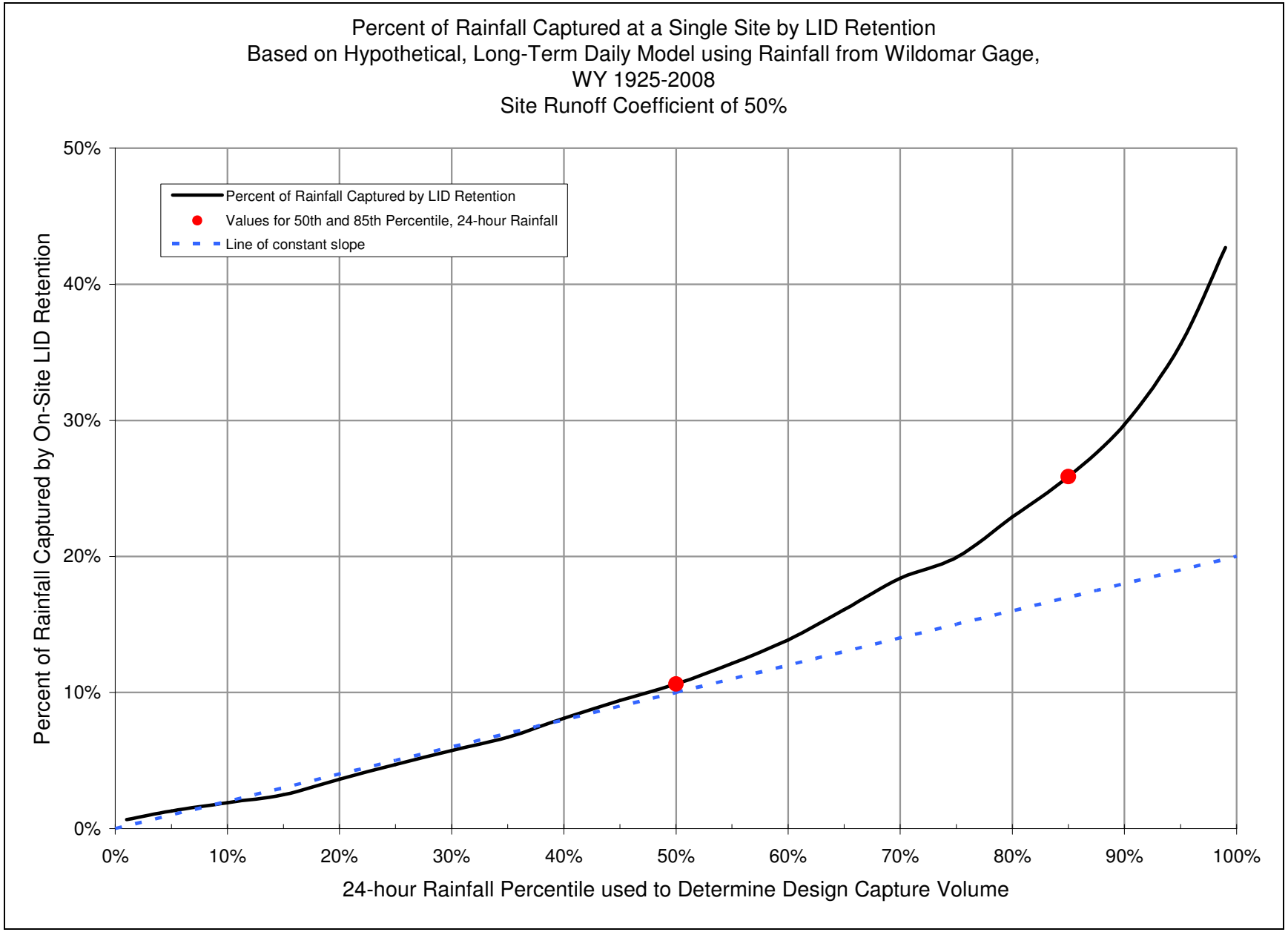
Percent of Rainfall Captured at a Single Site by LID Retention
Based on Hypothetical, Long-Term Daily Model using Rainfall from Wildomar Gage,
WY 1925-2008
Site Runoff Coefficient of 50%
Percent of Rainfall Captured by LID Retention
Values for 50th and 85th Percentile, 24-hour Rainfall
Line of constant slope
Percent of Rainfall Captured by On-Site LID Retention
50%
40%
30%
20%
10%
0%
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
24-hour Rainfall Percentile used to Determine Design Capture Volume

MEMORANDUM

2171 E. Francisco Blvd., Suite K • San Rafael, California • 94901
TEL: (415) 457-0701 FAX: (415) 457-1638 e-mail: @stetsonengineers.com

TO: Jeremy Jungreis DATE: October 11, 2010

FROM: Stetson Engineers JOB NO: 2197-5000-5001AC

RE: Hydrologic Points Related to Tentative Order R9-2010-0016

The San Diego Regional Water Quality Control Board (RWQCB) has published Tentative Order R9-2010-0016, entitled "Waste Discharge Requirements for Discharges from the Municipal Separate Storm Sewer Systems (MS4s) Draining the County of Riverside, the Incorporated Cities of Riverside County, and the Riverside County Flood Control and Water Conservation District within the San Diego Region". The Order introduces Low-Impact Development (LID) site design as an option for new development, redevelopment and retrofit projects to comply with the Order. Specifically, the Order requires that "LID BMPs must be sized and designed to ensure onsite retention without runoff, of the volume of runoff produced from a 24-hour 85th percentile storm event" (p 33).

The Order does not specifically address the quantities of water that may be lost from streamflow. However, by specifying the 85th percentile, 24-hour rainfall event as the standard for on-site retention (p. 33), this assures that significant amounts of rainfall may be captured and potentially affect water resources for domestic and environmental uses on Camp Pendleton. The following are topics that require discussion in order to understand the impact of R9-2010-0016 to Camp Pendleton's ability to meet its existing and future water requirements.

I. Hydrogeologic Setting – Upper v. Lower Groundwater Basins

II. Hydrology of the Santa Margarita River and its tributaries (Fig 1)

III. Order Requirements – Runoff from the 85% 24-Hour Rainfall/Capture Requirements

IV. Occurrence of Precipitation – Impact of antecedent conditions - Dry v. Wet Years

IV. Example during Wet (WY 2003) and Dry (WY 2006) conditions (Figs 2 and 3)

V. Impacts from Retrofit and Future Development

VI. Impact to CPEN Water Supply – Reliance on Stormflows

VII. Preferred Changes to Existing Order.

FIGURE 1. NON-AUGMENTED FLOW AT THE SANTA MARGARITA RIVER GORGE

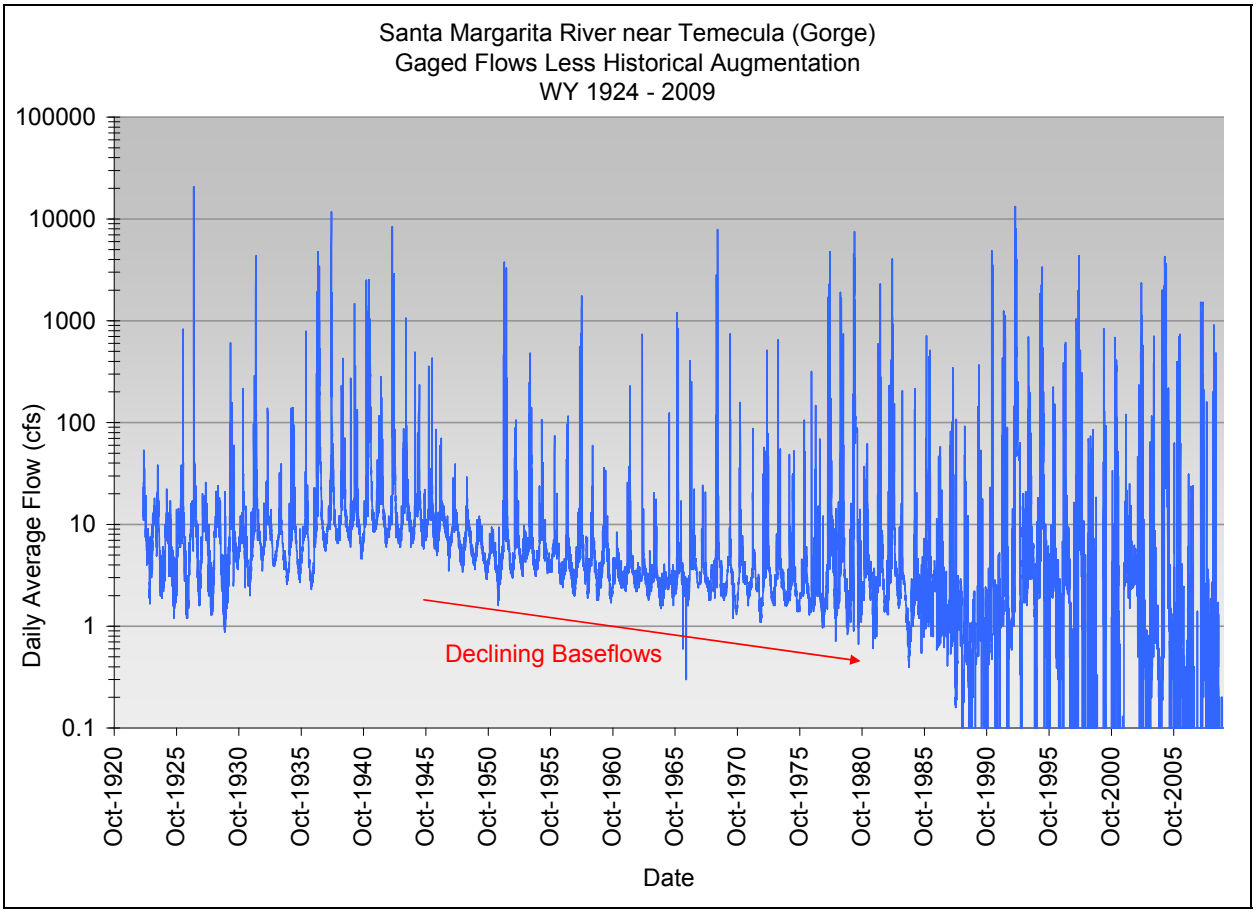

FIGURE 1. INFILTRATION AND RUNOFF DEPTHS FOR 1,000-ACRE COMMERCIAL AREA FOR WY 2003

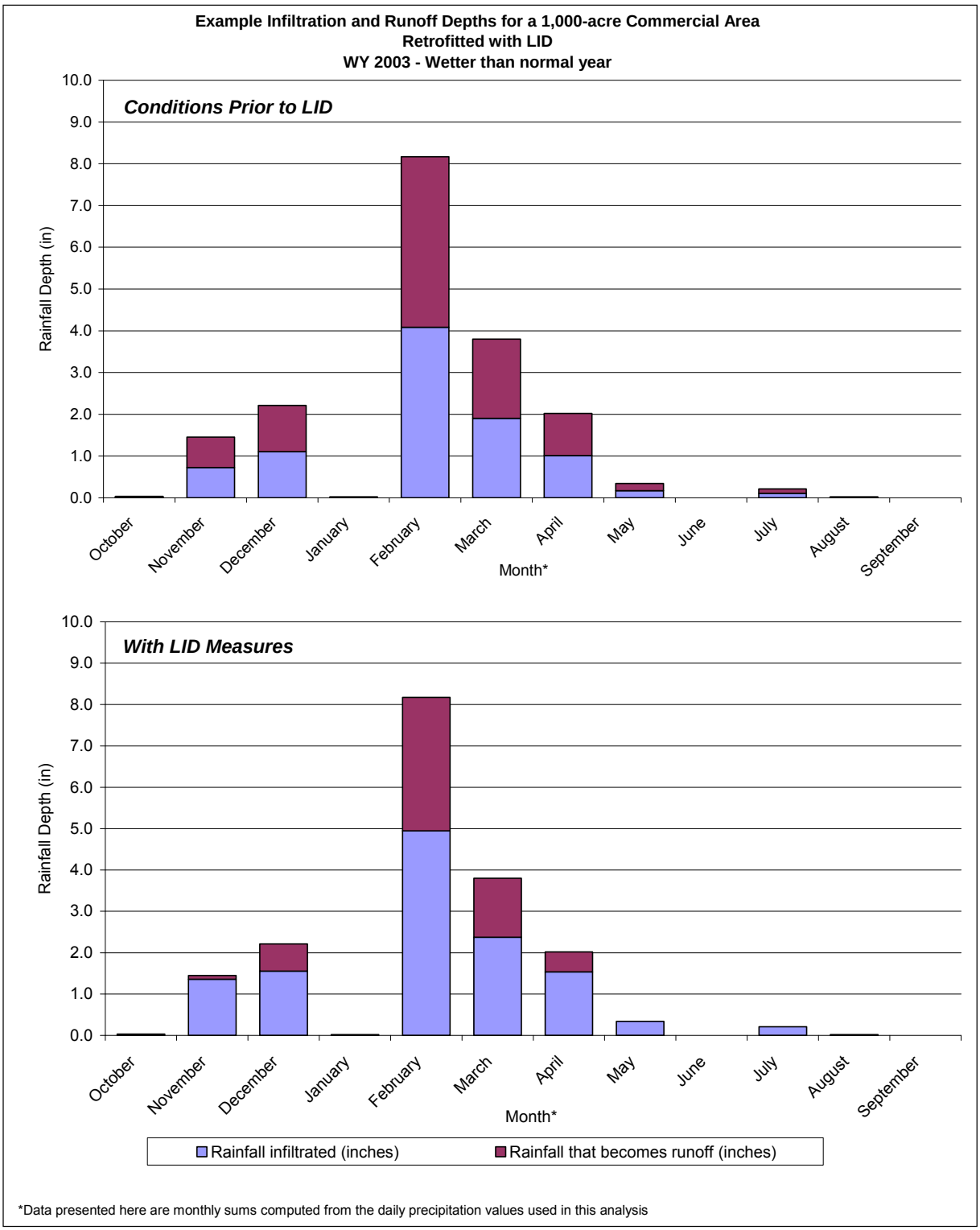

FIGURE 2. INFILTRATION AND RUNOFF DEPTHS FOR 1,000-ACRE COMMERCIAL AREA FOR WY 2006

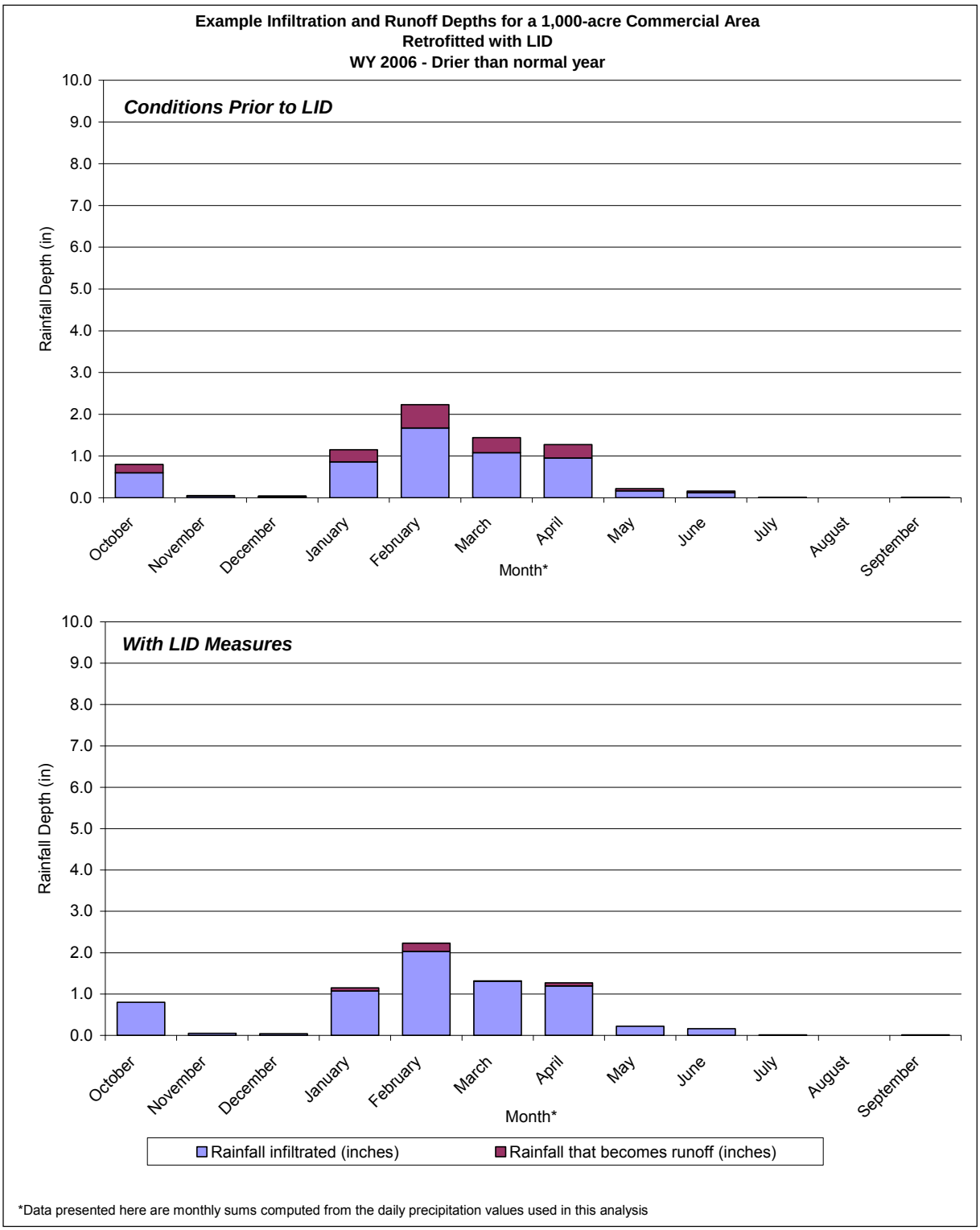

Riverside County MS4 Permit

Tentative Order No. R9-2010-0016
NPDES No. CAS0108766

California Regional Water Quality Control Board
San Diego Region

CALIFORNIA
Water Boards

Tentative Order R9-2010-0016 Item 6 Overview

- State of the Watershed
- Summary of Compliance
- Permit Development Process
- Key Issues
  - LID
  - Monitoring
  - Over-irrigation prohibition
  - Economic considerations

State of the Watershed

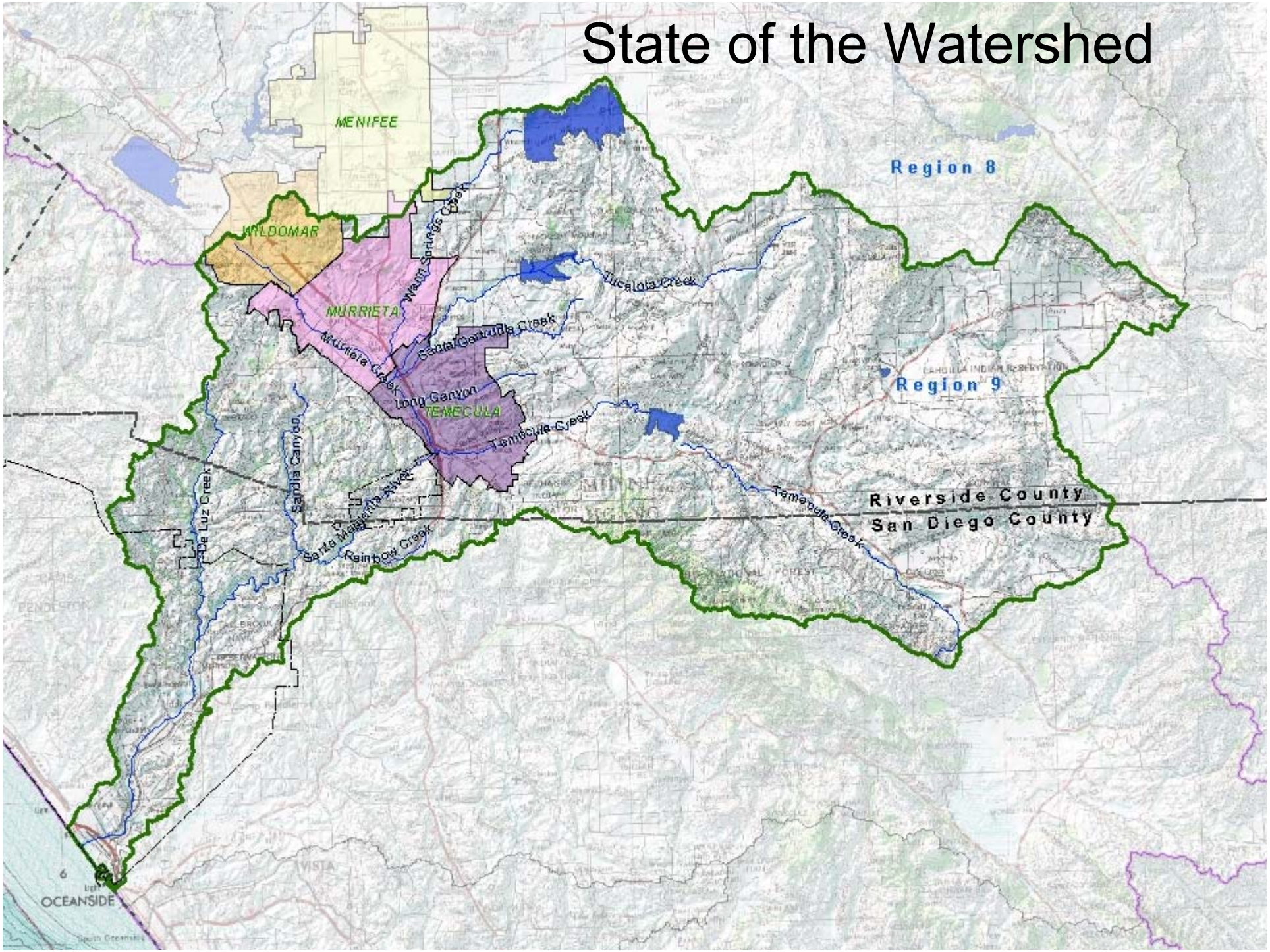

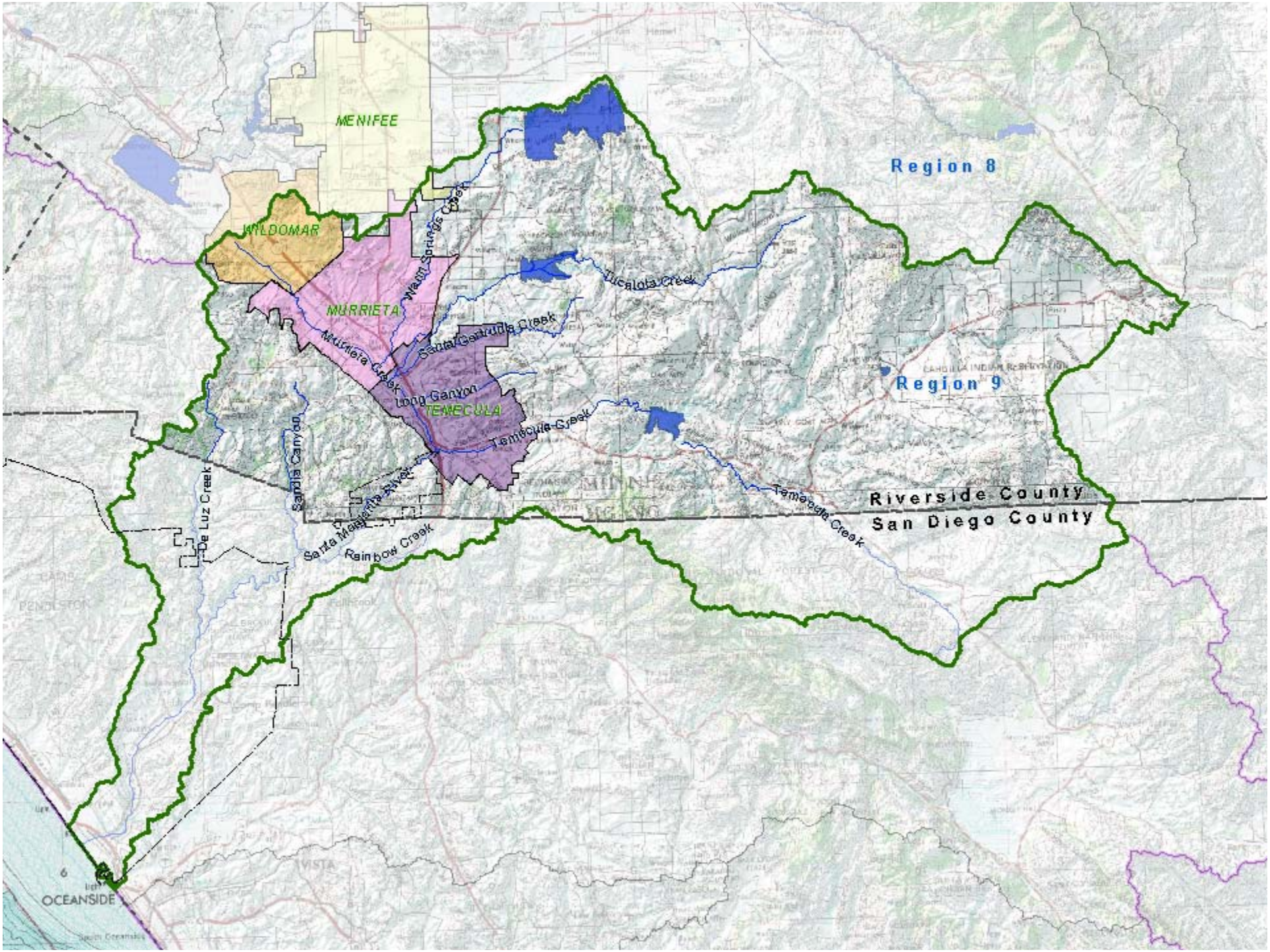
MENIFEE
WILDOMAR
MURRIETA
TEMECULA
Region 8
Region 9
Riverside County
San Diego County
Wasp Springs Creek
Murrieta Creek
Santa Gertrudis Creek
Long Canyon
Temecula Creek
Sandia Canyon
De Luz Creek
Santa Margarita River
Rainbow Creek
Temecula Creek
OCEANSIDE

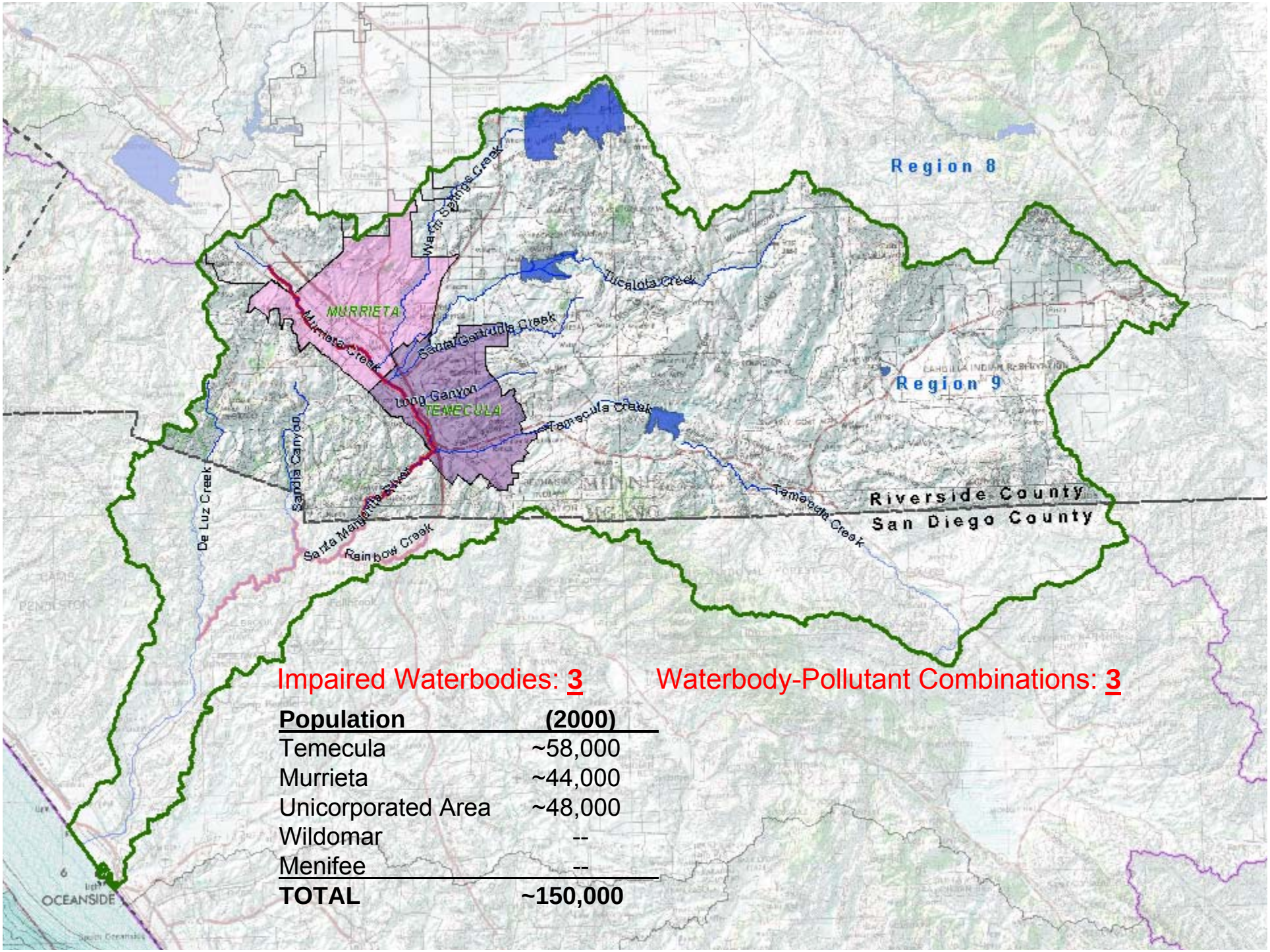

Impaired Waterbodies: **3** Waterbody-Pollutant Combinations: **3**

Population	**(2000)**
Temecula	~58,000
Murrieta	~44,000
Unicorporated Area	~48,000
Wildomar	--
Menifee	--
TOTAL	**~150,000**

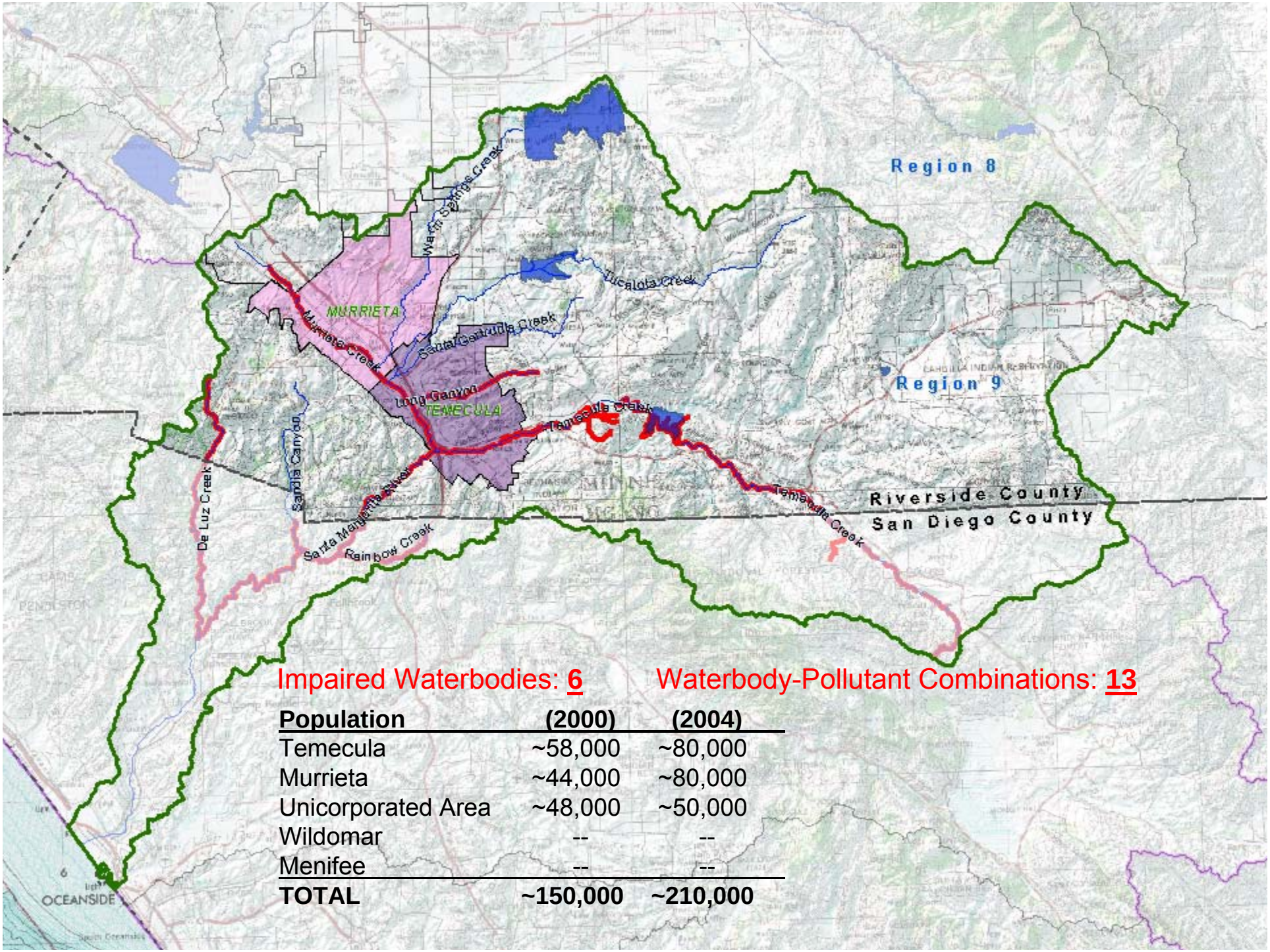

Impaired Waterbodies: **6** Waterbody-Pollutant Combinations: **13**

Population	**(2000)**	**(2004)**
Temecula	~58,000	~80,000
Murrieta	~44,000	~80,000
Unicorporated Area	~48,000	~50,000
Wildomar	--	--
Menifee	--	--
TOTAL	**~150,000**	**~210,000**

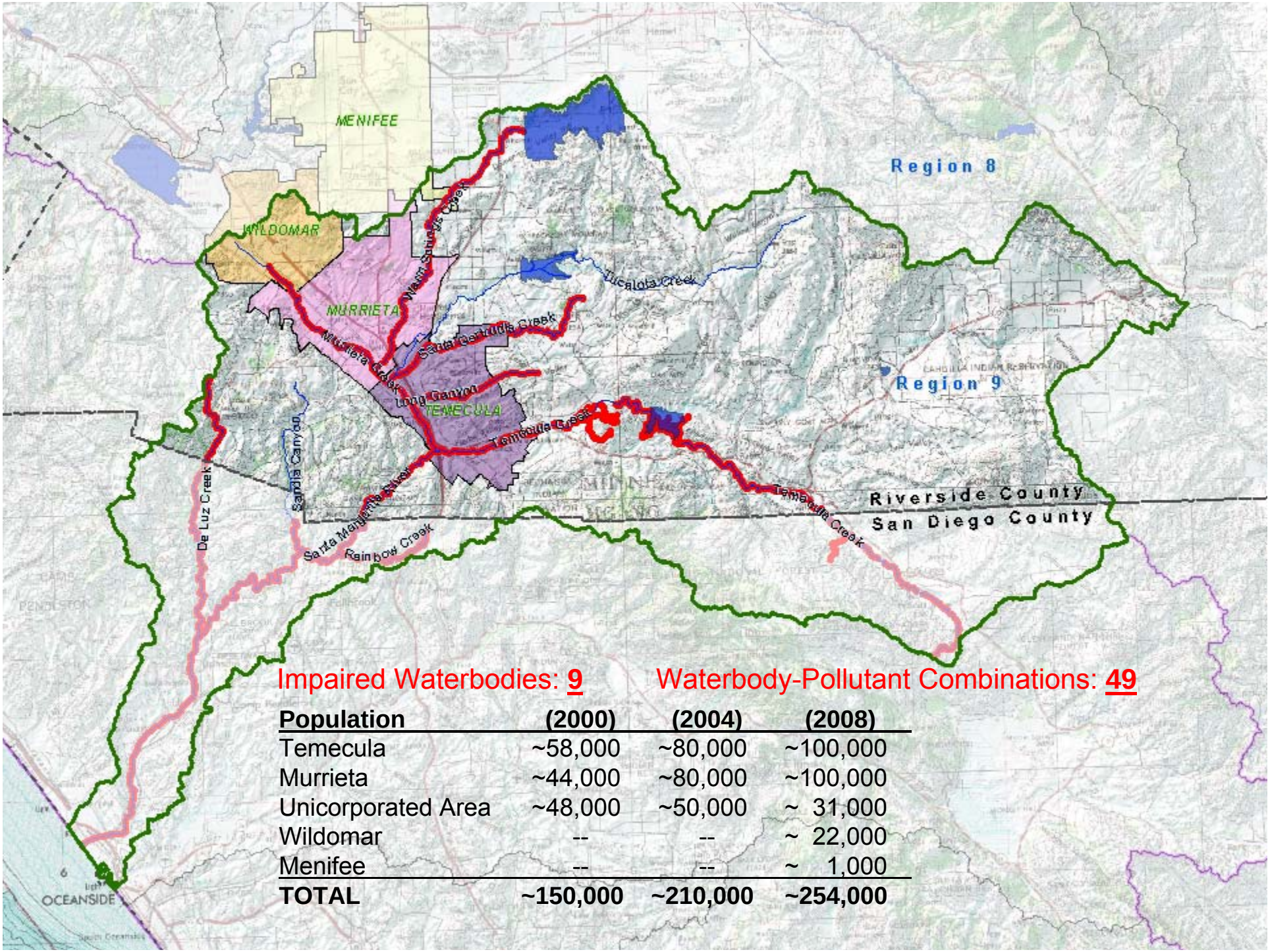

Impaired Waterbodies: **9** Waterbody-Pollutant Combinations: **49**

Population	**(2000)**	**(2004)**	**(2008)**
Temecula	~58,000	~80,000	~100,000
Murrieta	~44,000	~80,000	~100,000
Unicorporated Area	~48,000	~50,000	~ 31,000
Wildomar	--	--	~ 22,000
Menifee	--	--	~ 1,000
TOTAL	**~150,000**	**~210,000**	**~254,000**

Upper Santa Margarita Watershed 303(d) Listings

	Chlorpyrifos	Diazinon	E.Coli	Fecal Coliform	Copper	Iron	Manganese	Nitrogen	Phosphorus	Sulfates	TDS	Toxicity
2008												
De Luz Creek						X	X	X		X		
Long Canyon Creek	X		X	X		X	X					
Murrieta Creek	X				X	X	X	X	X			X
Redhawk Channel	X	X	X	X	X	X	X	X	X		X	
Sandia Creek						X				X	X	
Santa Gertrudis Creek	X		X	X	X	X			X			
Santa Margarita River									X			X
Temecula Creek	X				X				X		X	X
Warm Springs Creek	X		X	X		X	X	X	X			
2006												
De Luz Creek						X	X					
Long Canyon Creek											X	
Murrieta Creek									X			
Redhawk Channel												
Sandia Creek						X	X	X		X	X	
Santa Gertrudis Creek												
Santa Margarita River									X			
Temecula Creek								X	X		X	
Warm Springs Creek												
2002												
De Luz Creek												
Long Canyon Creek												
Murrieta Creek									X			
Redhawk Channel												
Sandia Creek											X	
Santa Gertrudis Creek												
Santa Margarita River									X			
Temecula Creek												
Warm Springs Creek												

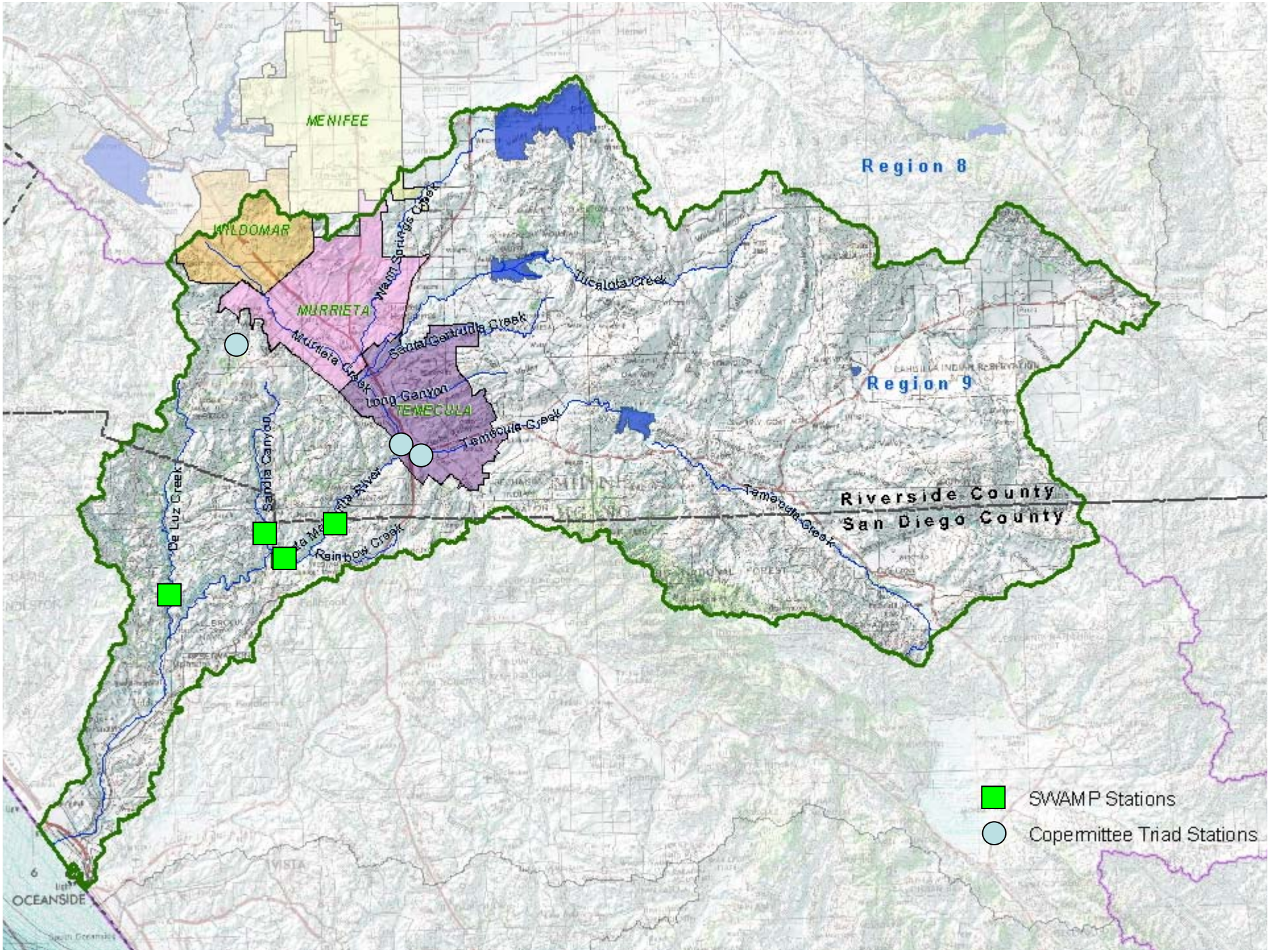
MENIFEE
WILDOMAR
MURRIETA
TEMECULA
Region 8
Region 9
Riverside County
San Diego County
Murrieta Creek
Warm Springs Creek
Santa Gertrudis Creek
Long Canyon
Temecula Creek
Tenaja Creek
Sandia Canyon
De Luz Creek
Rainbow Creek
OCEANSIDE
SWAMP Stations
Copermittee Triad Stations

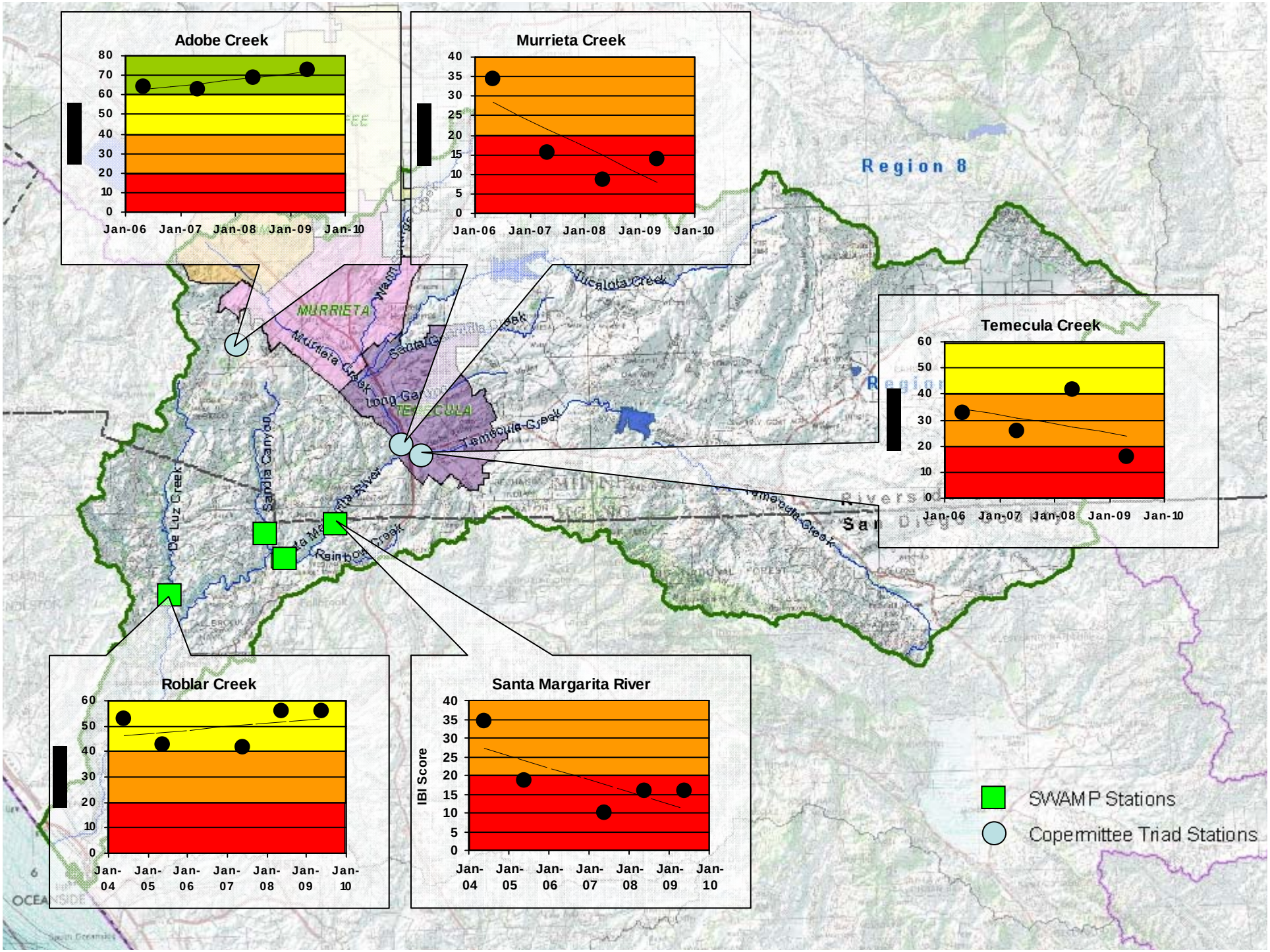
Adobe Creek
80
70
60
50
40
30
20
10
0
Jan-06 Jan-07 Jan-08 Jan-09 Jan-10
Murrieta Creek
40
35
30
25
20
15
10
5
0
Jan-06 Jan-07 Jan-08 Jan-09 Jan-10
Temecula Creek
60
50
40
30
20
10
0
Jan-06 Jan-07 Jan-08 Jan-09 Jan-10
Roblar Creek
60
50
40
30
20
10
0
Jan-04 Jan-05 Jan-06 Jan-07 Jan-08 Jan-09 Jan-10
Santa Margarita River
IBI Score
40
35
30
25
20
15
10
5
0
Jan-04 Jan-05 Jan-06 Jan-07 Jan-08 Jan-09 Jan-10
Region 8
MURRIETA
Murrieta Creek
Temecula Creek
Tucalota Creek
Santa Gertrudis Creek
Long Canyon
Sandia Canyon
De Luz Creek
Rainbow Creek
Temecula Creek
OCEANSIDE
SWAMP Stations
Copermittee Triad Stations

Tentative Order R9-2010-0016 Item 6 Overview

- State of the Watershed
- Summary of Compliance
- Permit Development Process
- Key Issues

Program Evaluations

- Audits in September, 2007 & January, 2008
- Riverside County & Flood Control
  - Development Planning & Monitoring
- Temecula & Murrieta
  - Development Planning, Monitoring, & Construction

Compliance History

- 2 Monitoring NOVs, 2008 & 2010
- 1 Development Planning NOV and an ACL settlement ~$230k
- Construction NOVs

Tentative Order R9-2010-0016 Item 6 Overview

- State of the Watershed
- Summary of Compliance
- Permit Development Process
- Key Issues

Timeline

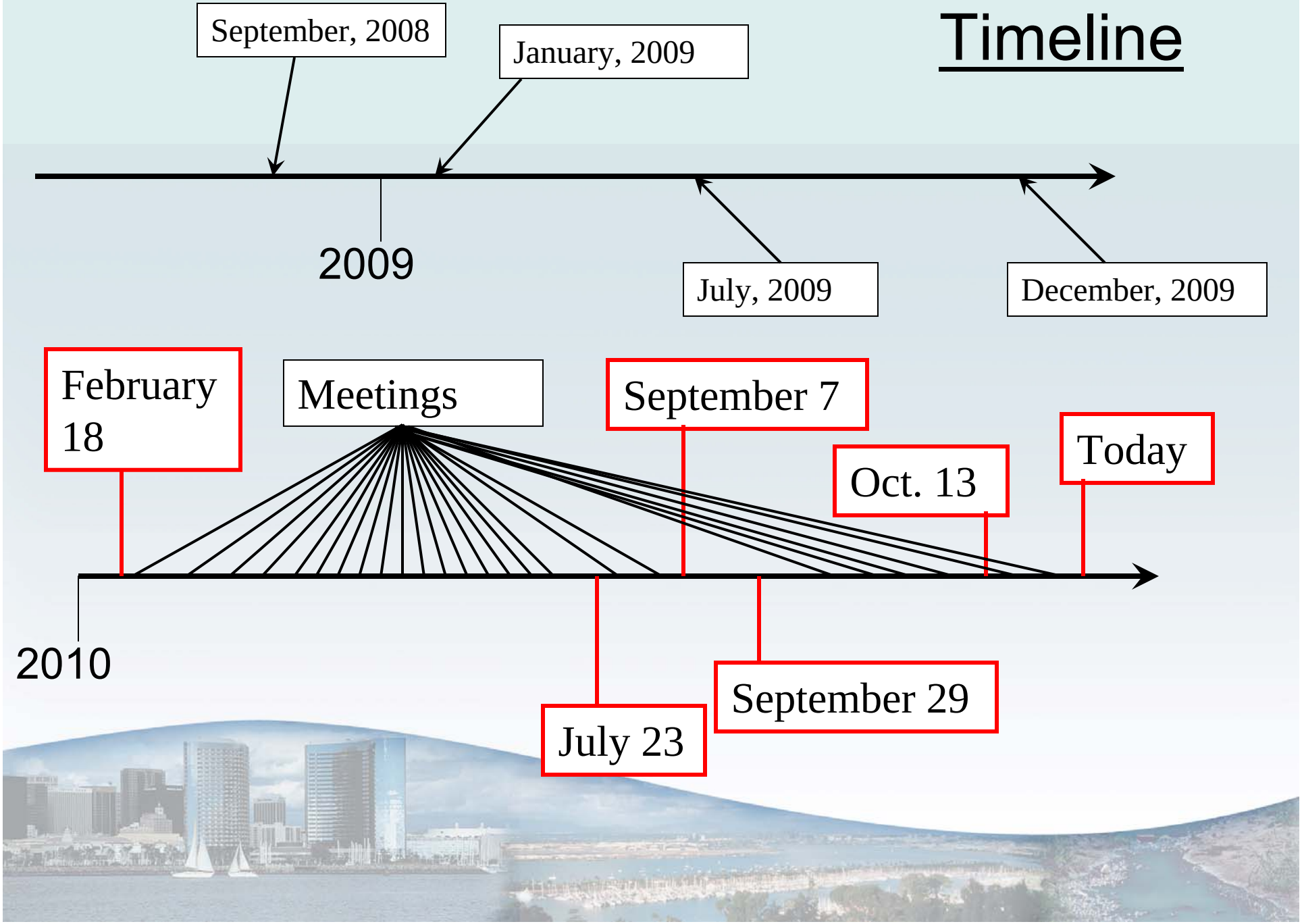
September, 2008
January, 2009
2009
July, 2009
December, 2009
February 18
Meetings
September 7
Oct. 13
Today
2010
July 23
September 29

Tentative Order R9-2010-0016 Item 6 Overview

- State of the Watershed
- Summary of Compliance
- Permit Development Process
- Key Issues – *Low Impact Development*

Low Impact Development

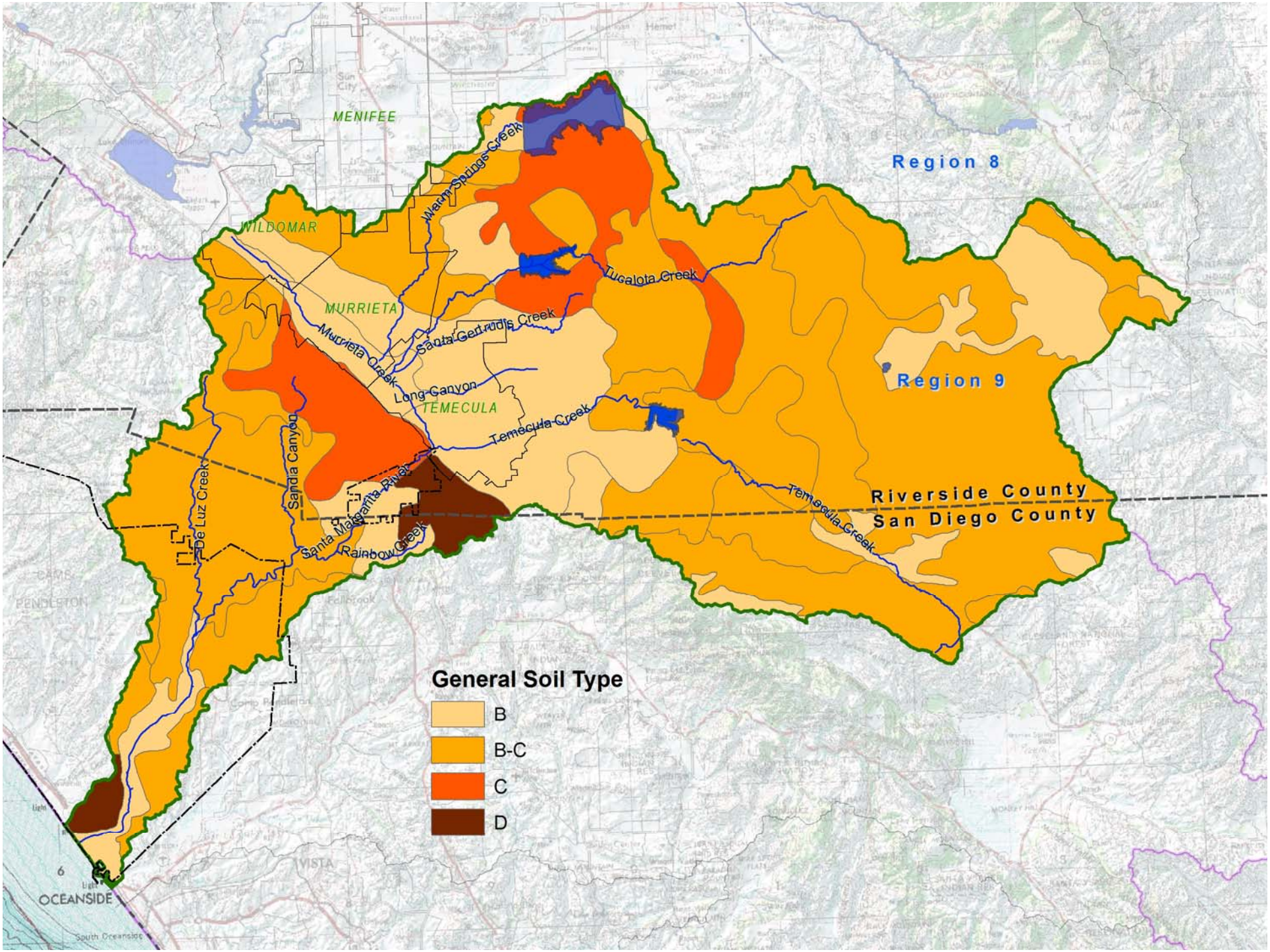
MENIFEE
WILDOMAR
MURRIETA
TEMECULA
Region 8
Region 9
Riverside County
San Diego County
Warm Springs Creek
Tucalota Creek
Murrieta Creek
Santa Gertrudis Creek
Long Canyon
Temecula Creek
Sandia Canyon
De Luz Creek
Santa Margarita River
Rainbow Creek
OCEANSIDE
General Soil Type
B
B-C
C
D

Low Impact Development

Retention (Infiltration, Harvest & Reuse, Evapotranspiration,)

Technically Infeasible

Biofiltration (Hold 0.75 times the Design Storm Volume)

Conventional Treatment with mitigation

Tentative Order R9-2010-0016 Item 6 Overview

- State of the Watershed
- Summary of Compliance
- Permit Development Process
- Key Issues - *Monitoring*

Monitoring and Reporting Program

Shift to Action

Redhawk Channel
January 2008
Following 0.10 inches of Rain

History

- Senate Bill 72 (Kuehl), October 2001
- Model Monitoring Program for MS4s in Southern California (August 2004)
  - Current MRP adopted in July 2004

Purpose of Monitoring: Assessment

What is the condition of the receiving water(s)?

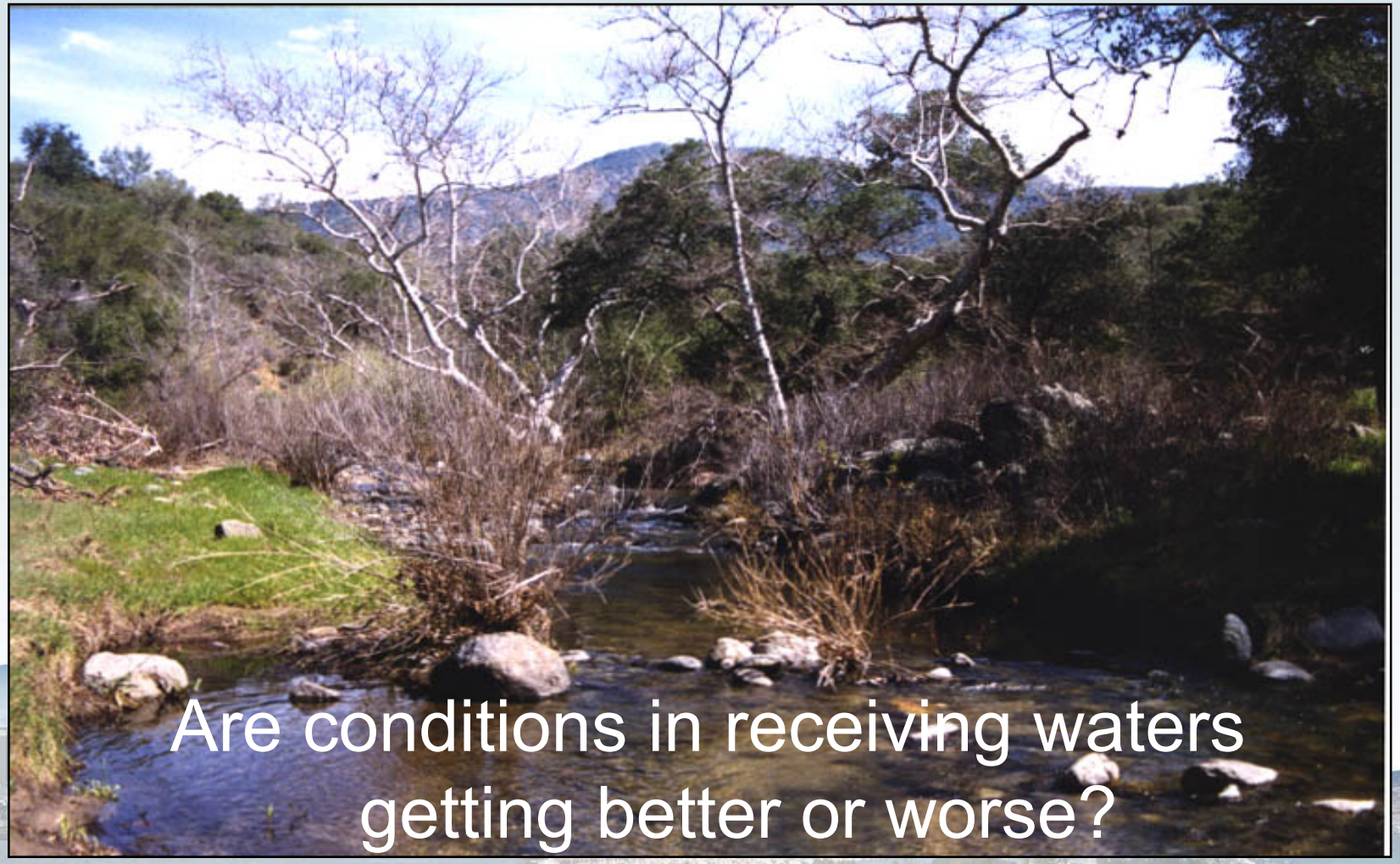

Purpose of Monitoring: Actions

- **Identify Sources of Specific Pollutants**
- **Detect and Eliminate Illicit Discharges**
- **Prioritize Areas that Need Management**
- **Implement required BMP Improvements**
- **Measure and improve programs**

Purpose of Monitoring: Assessment and Action

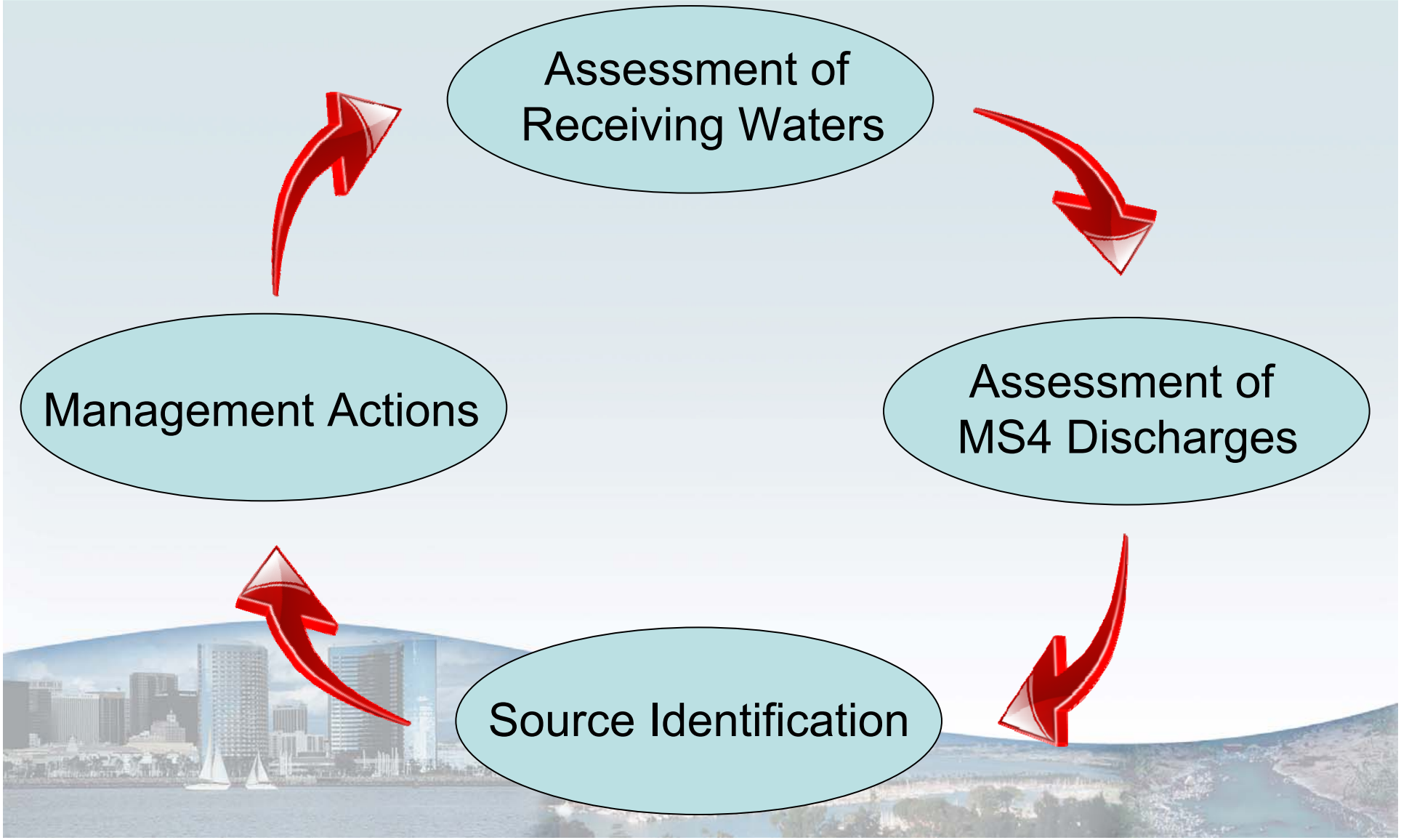

Purpose of Monitoring: Assessment and Action

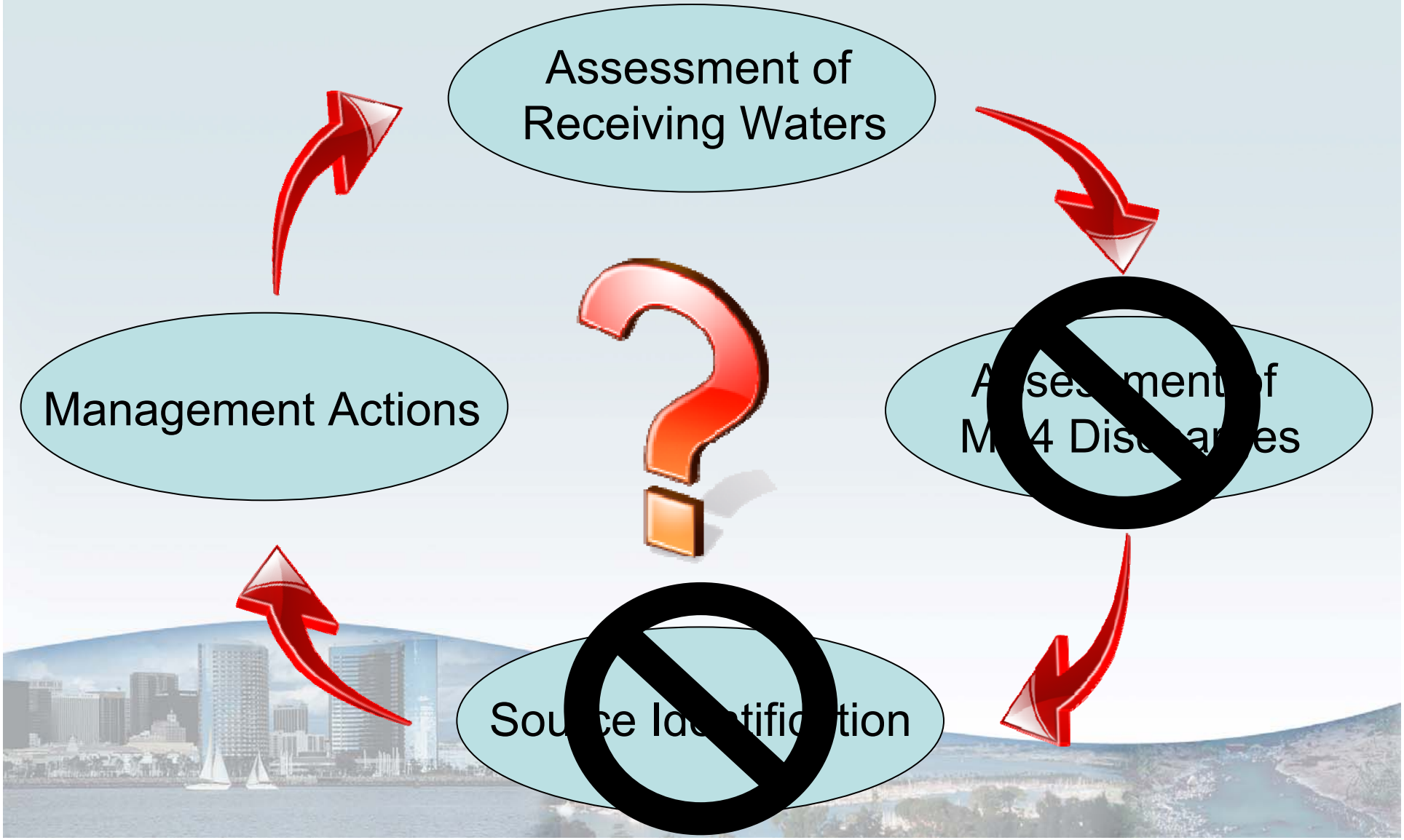

Shortcomings of Existing MRP

- No MS4 discharge monitoring
- Mass loading station focus
- Compliance Failures by Copermittees

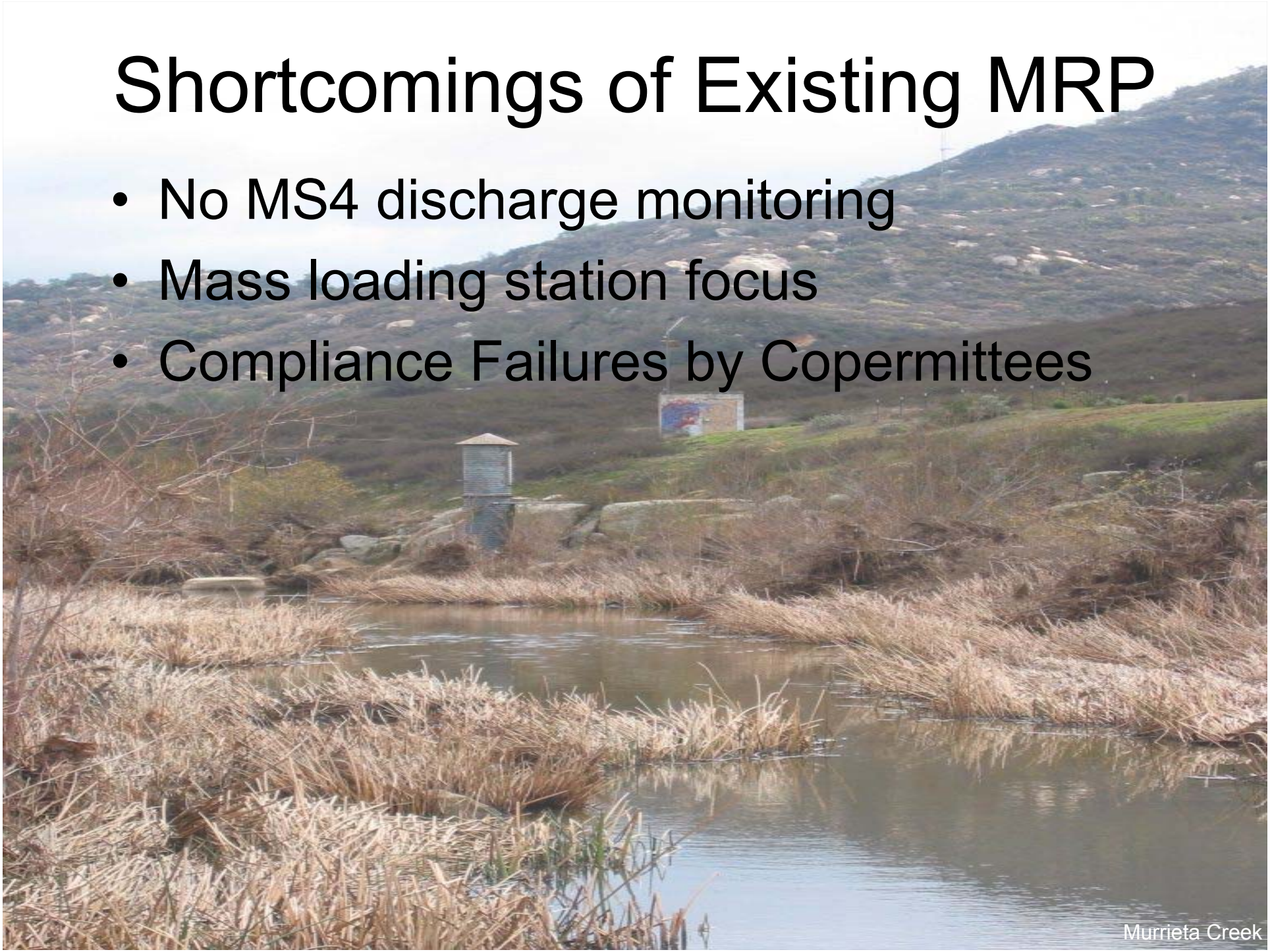

Shortcomings of Existing MRP

- Design and implementation status is inadequate
- The District acknowledged this assessment
- Only attempted to meet minimum requirements

USEPA Region IX
MS4 Inspection Report
March 2008

MRP Changes: Shift to Action

- Address Compliance Failures
- Sampling MS4 Discharges
- Focused Watershed Sampling
- Results are Tied to Required Actions (BMPS)
  - Action Levels, Triad, Source Identifications
- Consistent with Orange and San Diego, As Appropriate

Cost Considerations

- Pushed Back Dates
- Compatibility
- Regional Options
- Special Studies are Flexible and Adaptable
- Reduced Constituents
- No Ocean, Bay or Lagoon Monitoring

Warm Springs Creek

MRP Summary

- Requires a Response to Monitoring Results
- Consistent with Federal and State Requirements
- Assess Compliance with Order R9-2010-0016
- Necessary to Protect and Improve Water Quality

Warm Springs Creek

Santa Gertrudis

Tentative Order R9-2010-0016 Item 6 Overview

- State of the Watershed
- Summary of Compliance
- Permit Development Process
- Key Issues – *Over-irrigation*

Over-irrigation

Pesticides
Fertilizers
Pet Wastes

Pesticides
Fertilizers
Pet Wastes

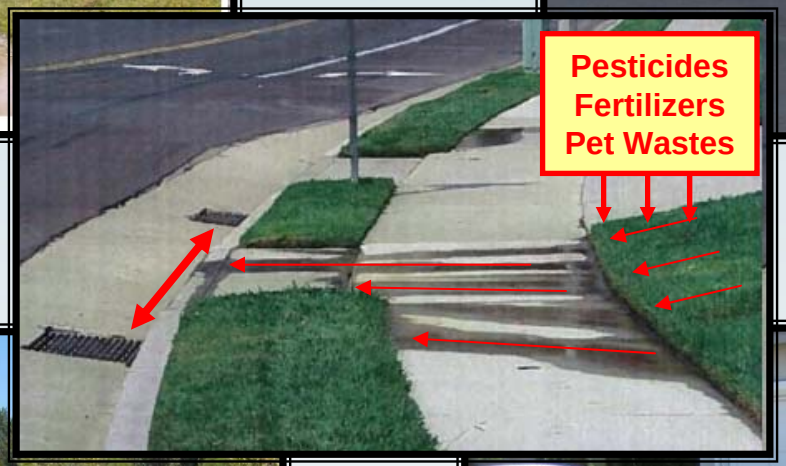
Pesticides
Fertilizers
Pet Wastes

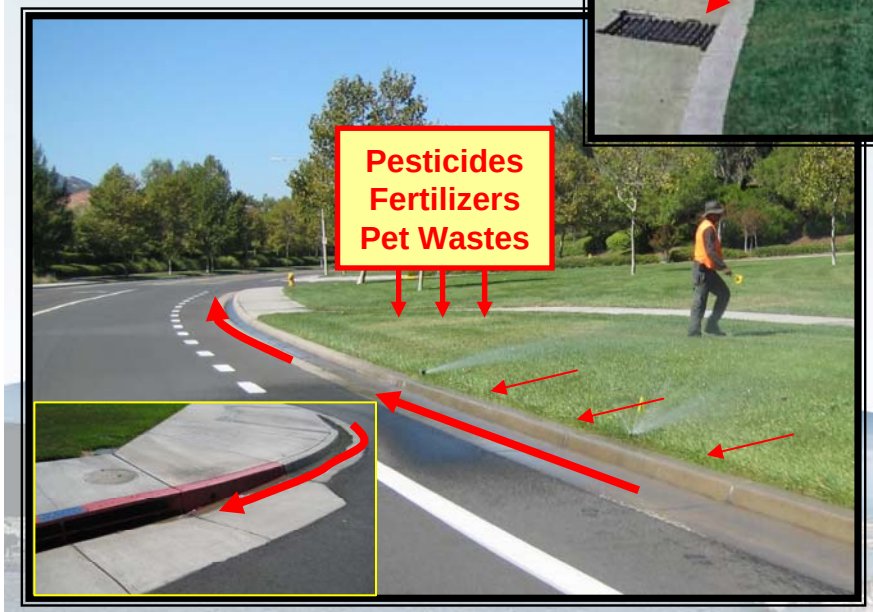
Pesticides
Fertilizers
Pet Wastes

Pesticides
Fertilizers
Pet Wastes

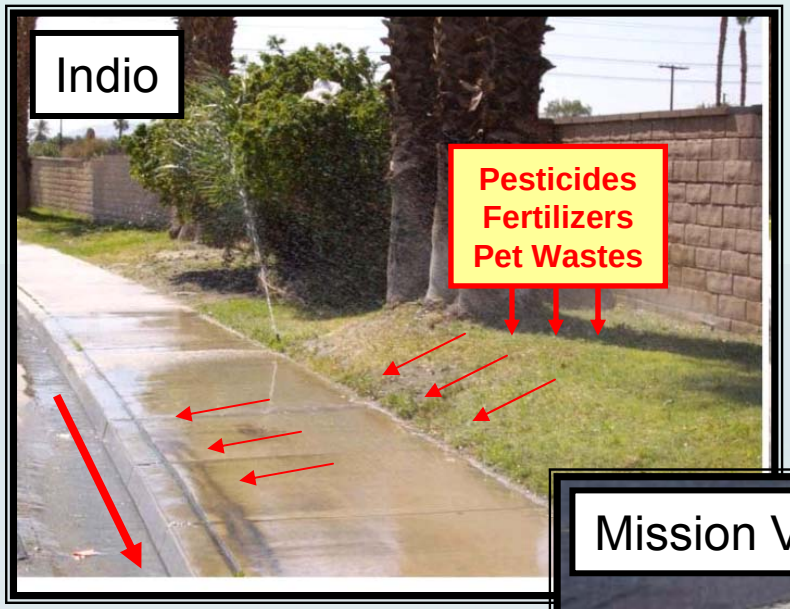
Indio
Pesticides
Fertilizers
Pet Wastes

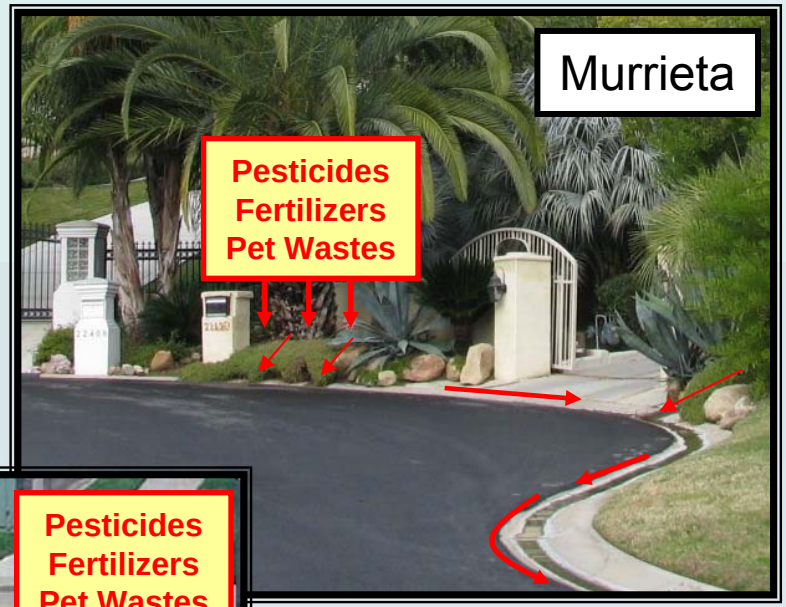
Murrieta
Pesticides
Fertilizers
Pet Wastes

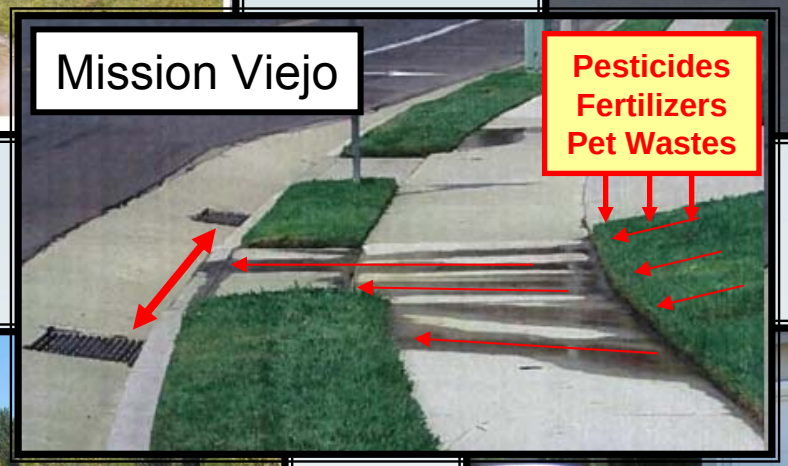
Mission Viejo
Pesticides
Fertilizers
Pet Wastes

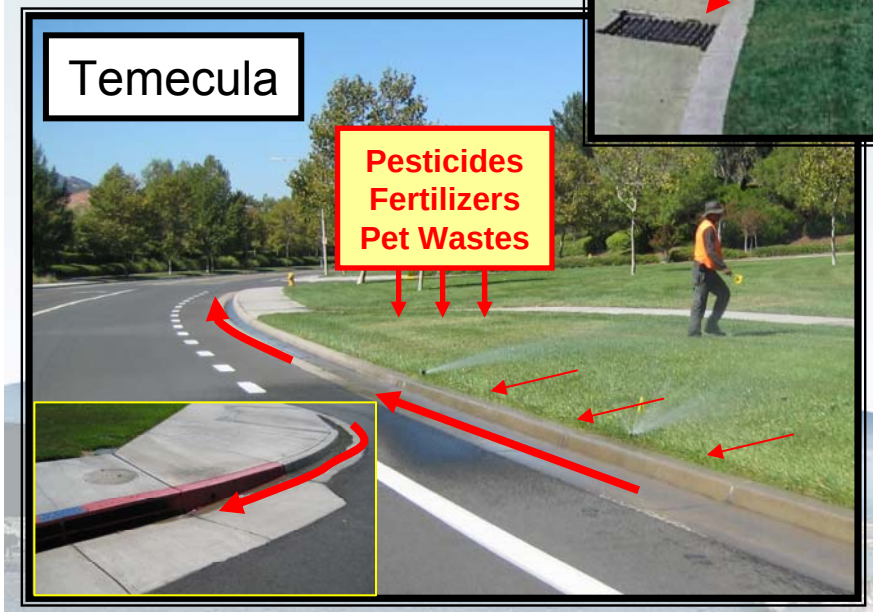
Temecula
Pesticides
Fertilizers
Pet Wastes

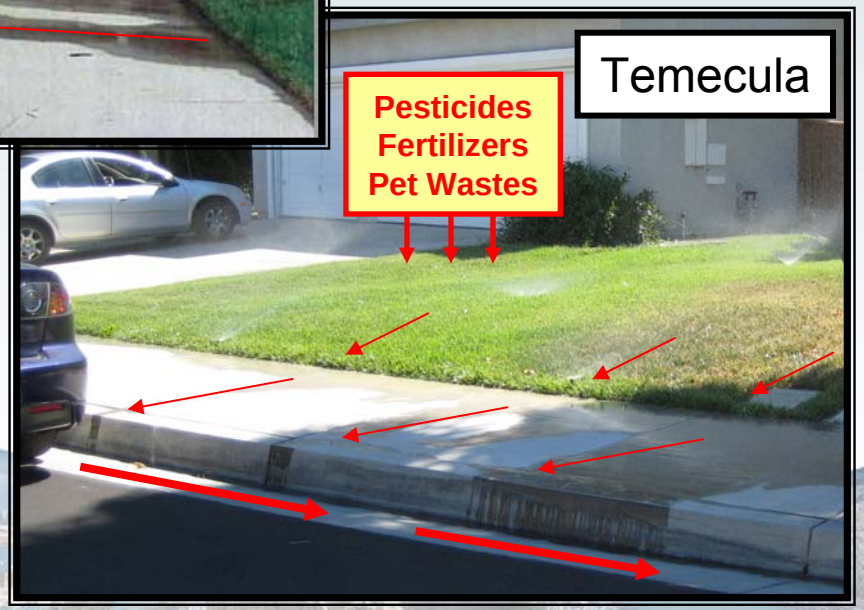
Temecula
Pesticides
Fertilizers
Pet Wastes

Mission Viejo

Chula Vista

Temecula

Mission Viejo

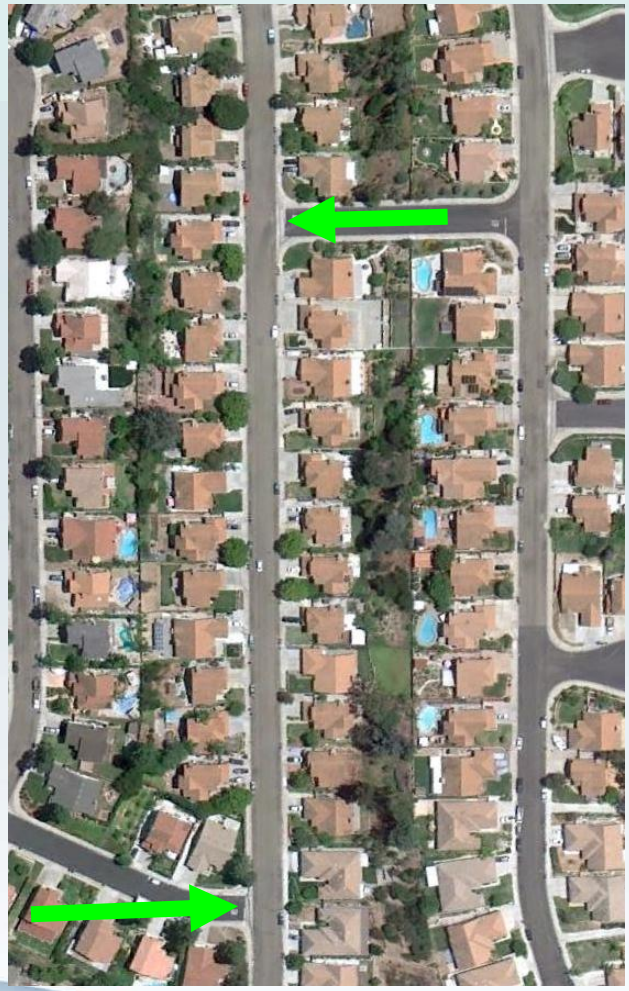

Chula Vista

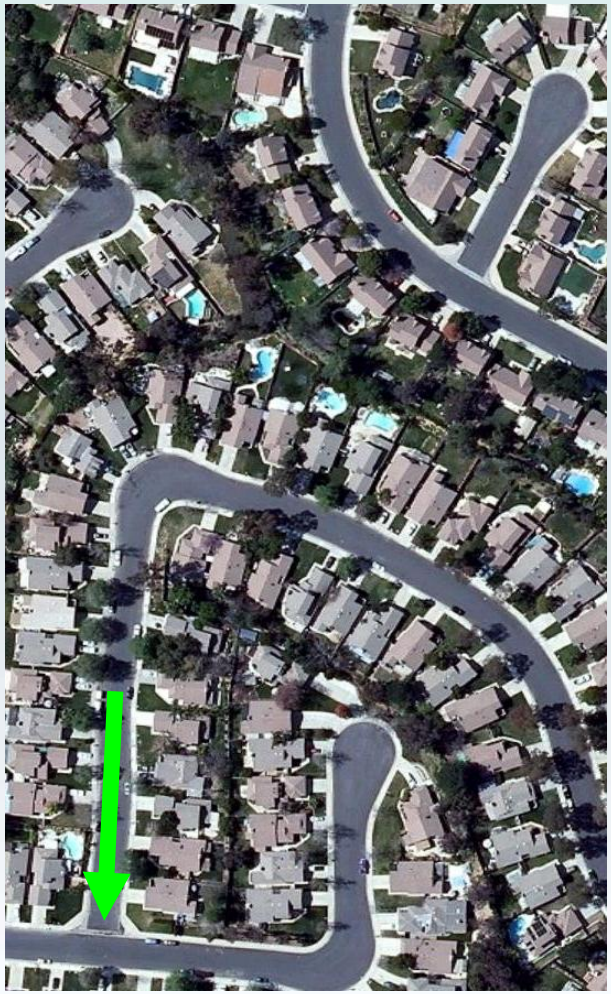

Temecula

Dana Point

Murrieta

Poway

Dana Point

Murrieta

Poway

California Code of Regulations Title 23, Section 490 Model Water Efficient Landscape Ordinance

The Copermittees are already required to prohibit over-irrigation

Over-irrigation

- Source and Conveyance of Pollutants Region-wide
  - Nutrients, Indicator Bacteria, Pesticides
  - 303(d) listings in Santa Margarita for Nutrients, Indicator Bacteria, Toxicity
- Existing IC/ID Programs In Place
- Already Required to Prohibit
- Necessary to Improve Water Quality

Tentative Order R9-2010-0016 Item 6 Overview

- State of the Watershed
- Summary of Compliance
- Permit Development Process
- Key Issues – *Economic Factors*

Table of Deliverable Due Dates

| Deliverable | Due Date | | |

Table of Deliverable Due Dates

| Deliverable | Due Date | | |

Table of Deliverable Due Dates

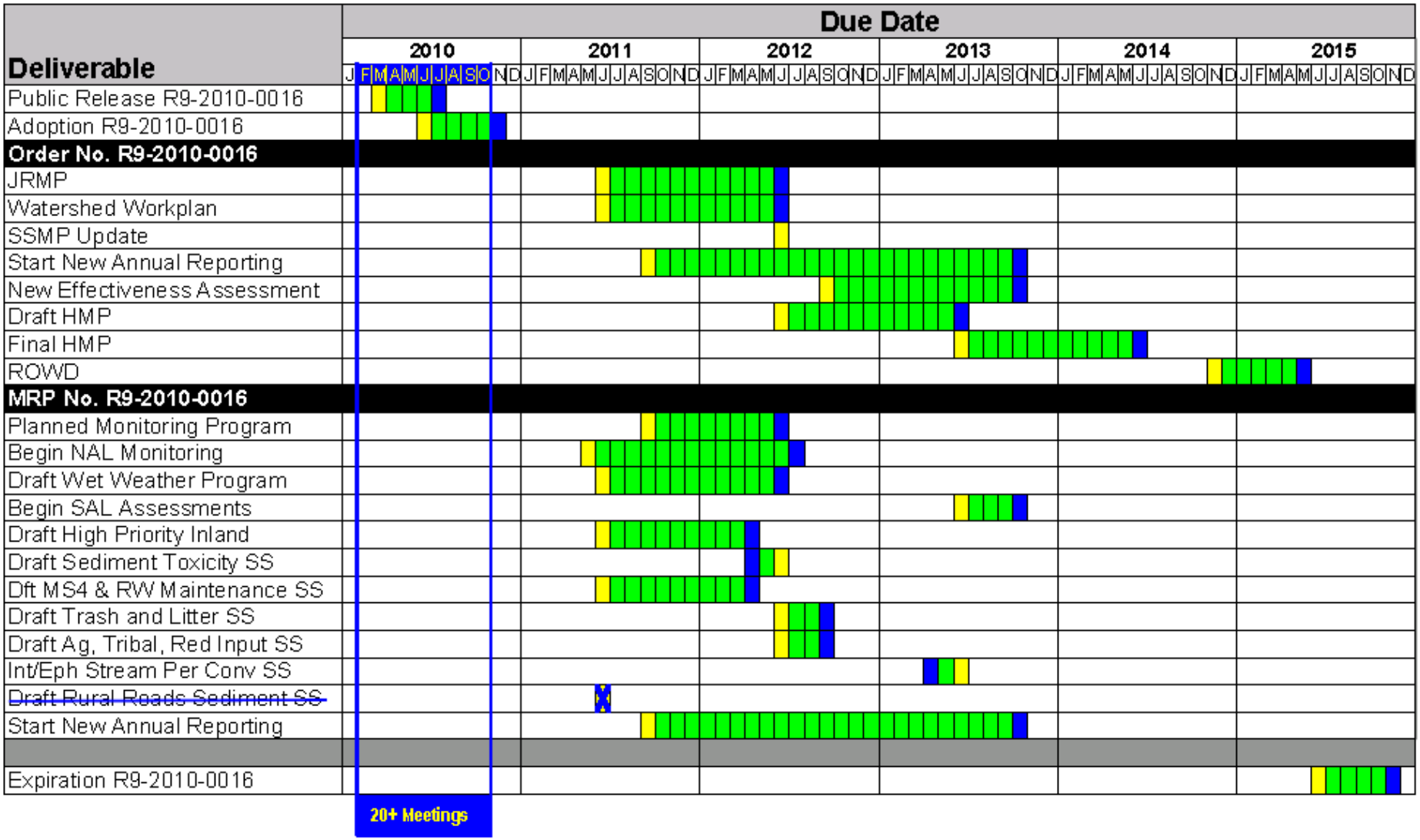

Dates based on original Order No. R9-2010-0016 scheduled for adoption in June 2010

Months due date for deliverable delayed

Dates based on current Order No. R9-2010-0016 scheduled for adoption in November 2010

Our mission is to preserve, enhance and restore the quality of California water resources, and ensure their proper allocation and efficient use for the benefit of present and future generations.

Tentative Order R9-2010-0016: A Developing Case Study in the Law of Unintended Consequences

Mr. Jeremy N. Jungreis, Esq.
Director, Office of Water Resources
Marine Corps Base, Camp Pendleton
Phone: (760) 725-1059
Email: jeremy.jungreis@usmc.mil

0008310

Stormwater Capture: Not a New Concept . . .

- Stormwater can form the basis for entire water supplies/ecosystems.
  - Stormwater that is “retained on site” can be critical to downstream uses.
- Stormwater capture via NPDES permits has the potential to impose “super priority” on otherwise very senior water rights
  - Potential to throw entire watersheds into litigation—the case in the SMR.
  - Potential to harm fish and wildlife that rely on certain quantities of flow.

Camp Pendleton—Water Independence From Local Supplies

-Unique Ecosystems, 18 distinct T/E Species
-Water lost to Camp Pendleton must be made up in imported water
-Very senior water rights—reason for site selection in 1940s.

CPEN: Responsible Steward of Local Water Resources

0008312

- **Camp Pendleton embraces the concept of Low Impact Development (LID)**
  - **Retention that goes above and beyond natural retention rates is not LID—particularly where retention BMPs themselves cause hydromodification onsite.**
  - **LID, by just about every definition, is focused on mimicking pre/post development hydrology—not on creating (or reallocating) water supplies.**
- **Reliable H2O supply critical to future sustainability.**
- **Stewardship--successful in recovery of T/E Species**
- **<u>Doing More With Less</u>:**
  - **Less than 100 GPD per capita water use**
  - **20% reduction in overall water use since 2007**
- **<u>Leader in the use of reclaimed water</u>:**
  - **First Salt/Nutrient Management Plan in SD County.**

So What is the Problem With LID in Tentative Order R9-2010-0016*?*

- **Staff is proposing 85% onsite retention, no runoff.**
- **Problem because:**
  - **More water is "retained" onsite than would occur in an undeveloped state (Stetson presentation).**
  - **Groundwater mining has broken the natural hydrologic groundwater connection. Unlike in other watersheds, infiltrated water is generally lost to the river.**
  - **Current language in draft permit encourages export of water from SMR Basin:**
    - **Groundwater WQOs and "cause or contribute" language may necessitate centralized treatment**
    - **Reused/Harvested water evaporates or is exported via wastewater conveyance.**
  - **SMR has generally avoided water "deficit" via the increase in runoff associated with impervious surfaces**

Changes to the Hydrograph Could Be Significant . . .

- **Approx. first inch of rain to be retained onsite per <u>Tentative Order R9-2010-0016</u>**
  - Example: 100 acre parcel zoned multi-family produces 4.2 AF runoff post development, 1.7 AF pre-development. The 85th Percentile Standard would require the entire 4.2 AF to be retained onsite. <u>Result:</u> Net loss of 1.7 AF to watershed.
- **Water infiltrated does not resurface.**
- **Water reused, harvested, or evaporated never returns to the SMR system.**
- **Loss of 1.7 AF alone may not be much, but applied over an entire watershed, it's a big deal.**

Magnitude of the Problem . . .We Won't Know Until the Damage is Done

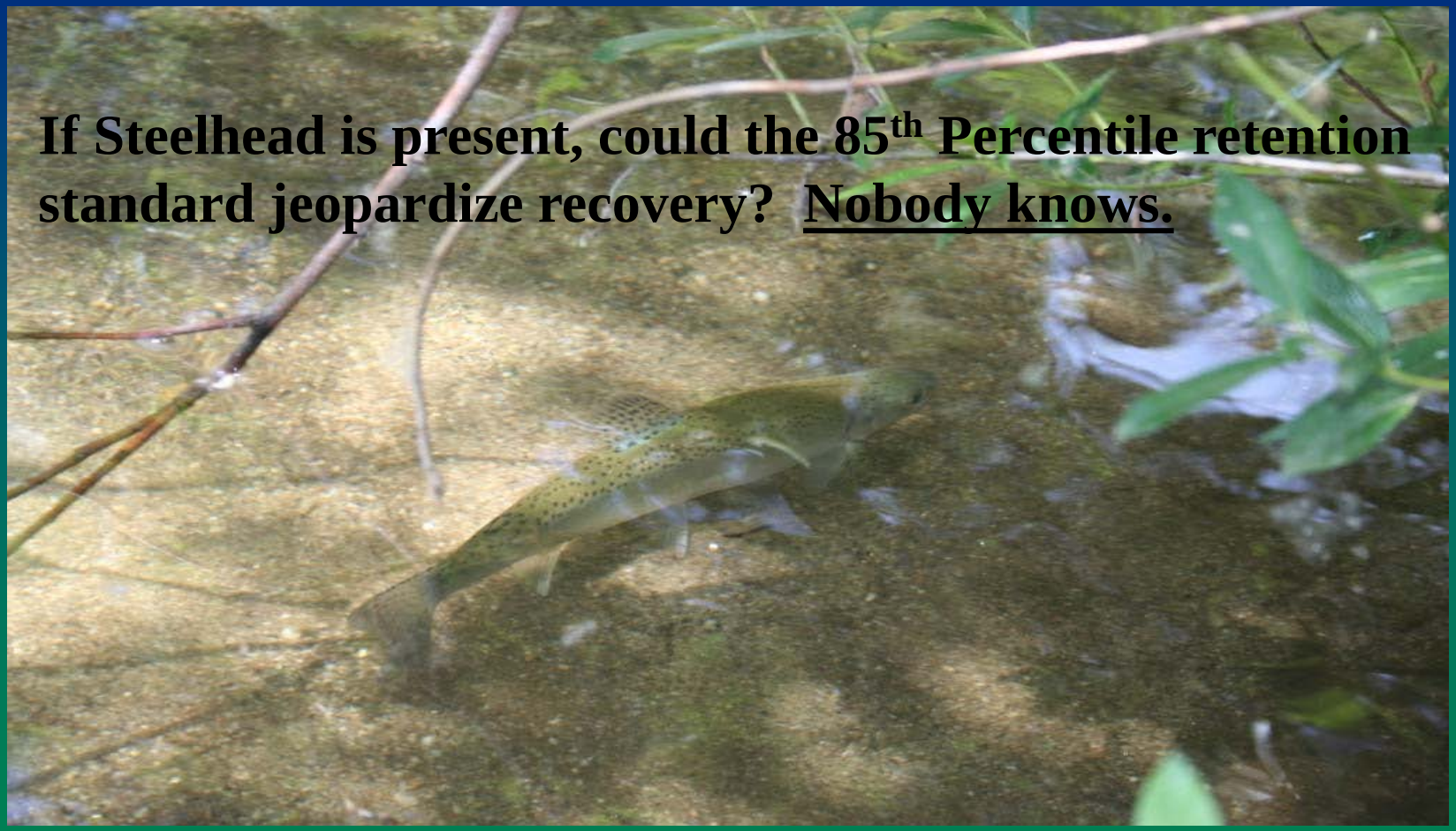

Possible Steelhead Sighting in the SMR, Camp Pendleton—April 2009

Magnitude of the Problem . . .We Won't Know Until the Damage is Done

0008316

Arroyo Toad

Loss of Sediment Transport from capturing 100% of the first inch of rain that falls? Could it be a problem for species that rely on sandbars? Nobody knows.

Some Difficult Questions

- **Given what is at stake and the known changes to the "natural" system, shouldn't the 85th Percentile Storm Retention Standard be thoroughly studied to see if it causes more harm than good to beneficial uses in the SMR?**
  - Is the 85th Percentile Retention Standard stated in Tentative Order R9-2010-0016 truly the MEP for pollutant removal?
  - Are benefits from pollutant removal in water column offset by detrimental effects associated with loss of flow?
  - Shouldn't the wildlife agencies be consulted?
  - Is the Regional Board encouraging the illegal appropriation of water without compliance with the California Water Code?
  - Does Tentative Order R9-2010-0016 stray outside the legal limits of the CWA as set forth in the Wallop Amendment?

Recommended Solutions: 0008318

- **Size retention facilities to capture only the amount of stormwater runoff that is the consequence of development (the "Delta V.").**
  - Runoff above Delta V should be treated and allowed to continue downstream.
  - Limit "consumptive" types of uses that permanently remove water from the watershed.
  - Follow EISA guidelines and allow for finding of technical infeasibility premised upon adverse impacts on downstream water uses or rights.
- **If sizing is to be premised upon <u>retention</u> of a uniform event (85th percentile storm), permit revisions must be preceded by a thorough study of the hydrograph and associated beneficial uses**

Thank You for Your Time and Consideration.

AND

HAPPY 235TH BIRTHDAY U.S. MARINE CORPS!

Santa Margarita Region MS4 Permit

Tentative Order Hearing

October 13, 2010

San Diego Regional Water Quality Control Board

Introduction

- Collaborative Discussion Goals:
  - Socially and Environmentally Responsible
  - Affordable
  - Protective of Water Quality

Positive Outcomes

- ✓ Resolved dual regulation for cities
- ✓ Refined unpaved roads provision
- ✓ Addressed some LID issues
- ✓ Streamlined reporting
- ✓ Clarified some provisions

Expanded Programs - ROWD

- LID
- Hydromodification
- Monitoring
- IDDE
- Program Effectiveness Assessment
- Measurable Goals

Expanded Programs - Permit

- LID
- Hydromodification
- Monitoring
- IDDE
- Program Effectiveness Assessment
- Measurable Goals (NALs/SALs)

- Construction
- Municipal
- Industrial
- Commercial
- Residential
- Irrigation Runoff

We must consider regional equity in a regional permit

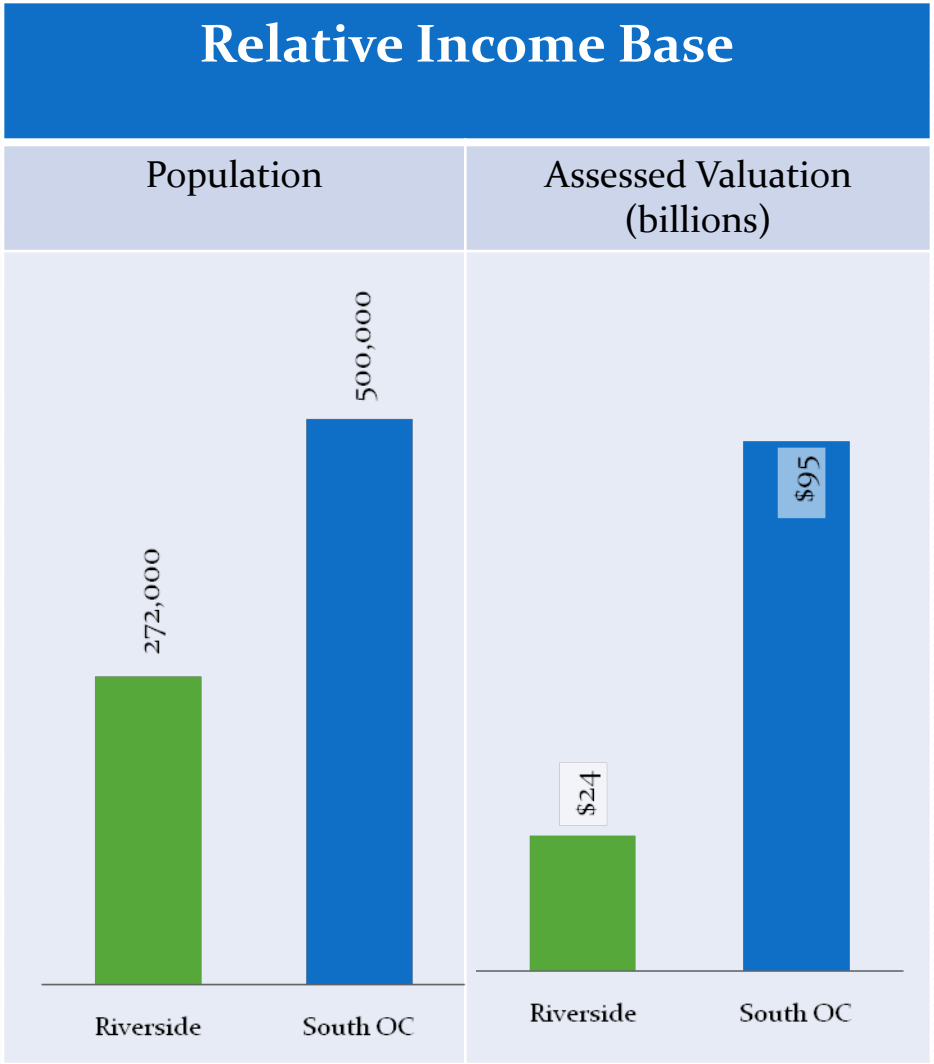

Resource Limitations:

- Smaller Population
- Lower Home Values
- Lower per-resident income
- Less tourist tax dollars

We must consider regional equity in a regional permit

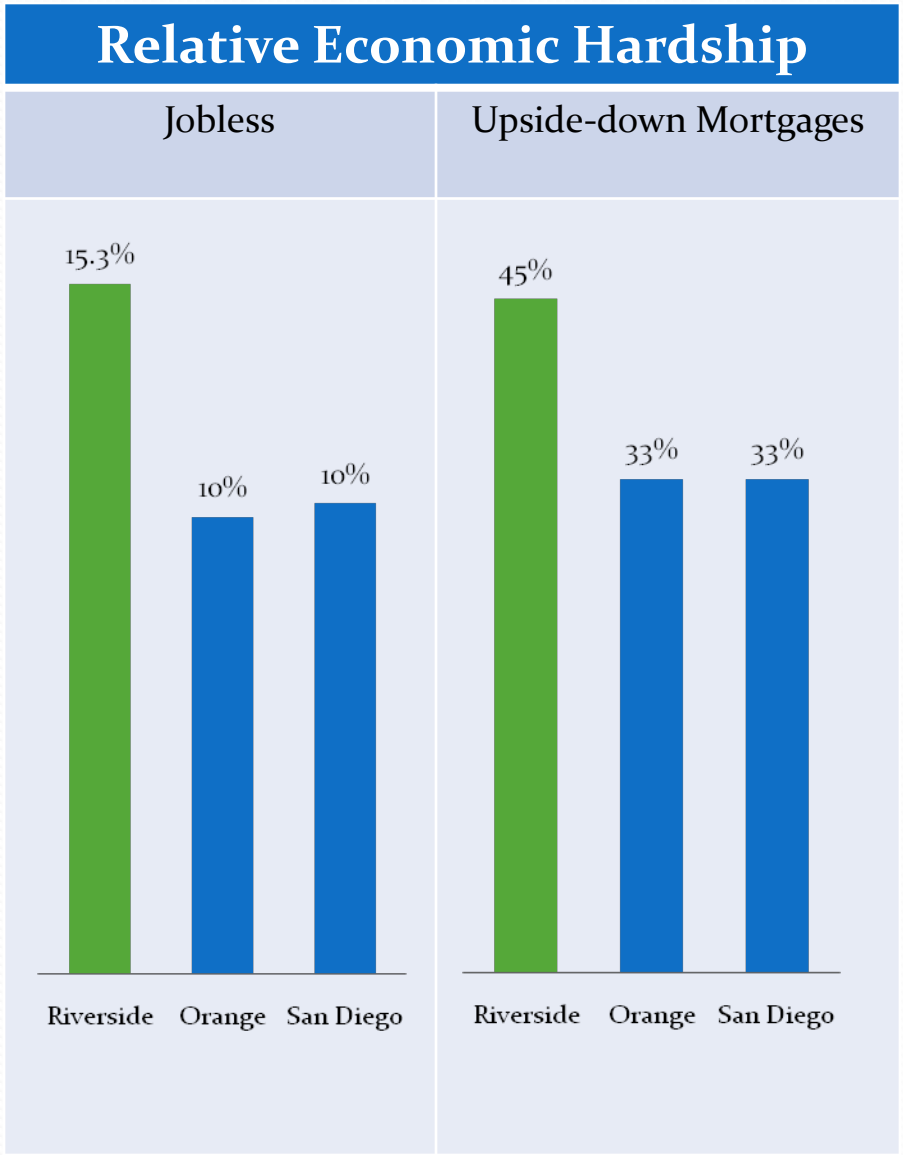

Economic Hardship:

- 50% Greater unemployment
- 50% Higher foreclosure rates

Funding Roadblocks:

- Proposition 26
- Proposition 218

Affordability?

Issues:

- Exceeds what is necessary
- Costs disproportionate to other regions

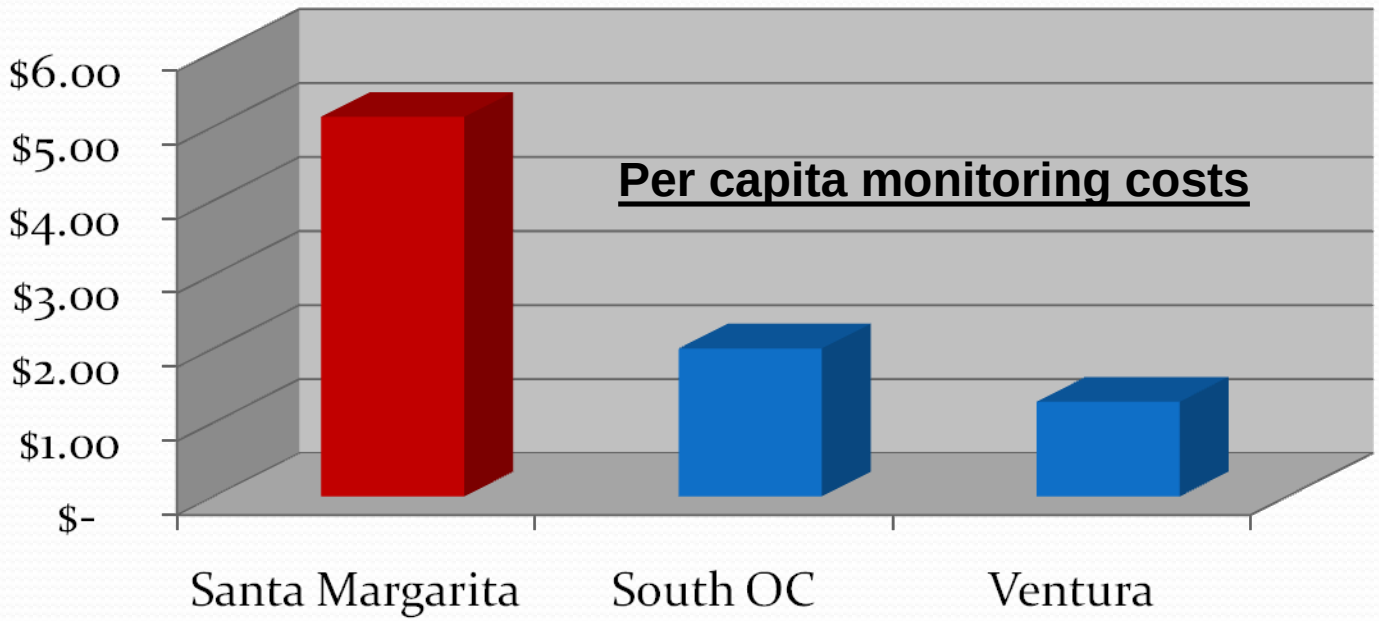

Today's Goal

- Maintain Outcomes, reduce costs
- Presentation:
  - Alternative Solutions
    - Monitoring
    - Irrigation Runoff
    - LID
  - Recommended Permit Revisions
- Our Request:
  - Make key Permit changes

Permit

FINDINGS:
- A. BASIS FOR THE ORDER
- B. REGULATED PARTIES
- C. DISCHARGE CHARACTERISTICS
- D. RUNOFF MANAGEMENT PROGRAMS
- E. STATUTE AND REGULATORY CONSIDERATIONS
- F. PUBLIC PROCESS

DISCHARGE AND LEGAL PROVISIONS:
- A. PROHIBITIONS AND RECEIVING WATER LIMITATIONS
- **B. NON-STORM WATER DISCHARGES**
- C. NON-STORM WATER DRY WEATHER ACTION LEVELS
- D. STORM WATER ACTION LEVELS
- E. LEGAL AUTHORITY

PROGRAM PROVISIONS:
- F. JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM (JRMP)
  - **1. DEVELOPMENT PLANNING COMPONENT**
  - 2. CONSTRUCTION COMPONENT
  - 3. EXISTING DEVELOPMENT COMPONENT
  - 4. ILLICIT DISCHARGE DETECTION AND ELIMINATION
  - 5. PUBLIC PARTICIPATION COMPONENT
  - 6. EDUCATION COMPONENT
- G. WATERSHED WATER QUALITY WORKPLAN
- H. FISCAL ANALYSIS
- I. TOTAL MAXIMUM DAILY LOADS

REPORTING AND PROGRAM MANAGEMENT PROVISIONS
- J. PROGRAM EFFECTIVENESS ASSESSMENT AND REPORTING
- K. REPORTING
- L. MODIFICATION OF PROGRAMS
- M. PRINCIPAL COPERMITTEE RESPONSIBILITIES
- N. RECEIVING WATERS AND MS4 DISCHARGE MONITORING AND REPORTING PROGRAM
- O. STANDARD PROVISIONS, REPORTING REQUIREMENTS, AND NOTIFICATIONS

Attachment A – Basin Plan Prohibitions
Attachment B – Standard Provisions, Reporting Requirements, and Notifications
Attachment C – Definitions
Attachment D – Scheduled Submittal Summary and Reporting Checklist Requirements
Attachment E – Receiving Waters And MS4 Discharge Monitoring And Reporting Program
Attachment F – Data

Today's Discussion

0008329

Section B:
Irrigation Runoff

Section F.1.d.(4)(c):
Low Impact Development

Attachment E:
Monitoring

Monitoring Program

Attachment E

Our Monitoring Goal

Improve

Monitoring

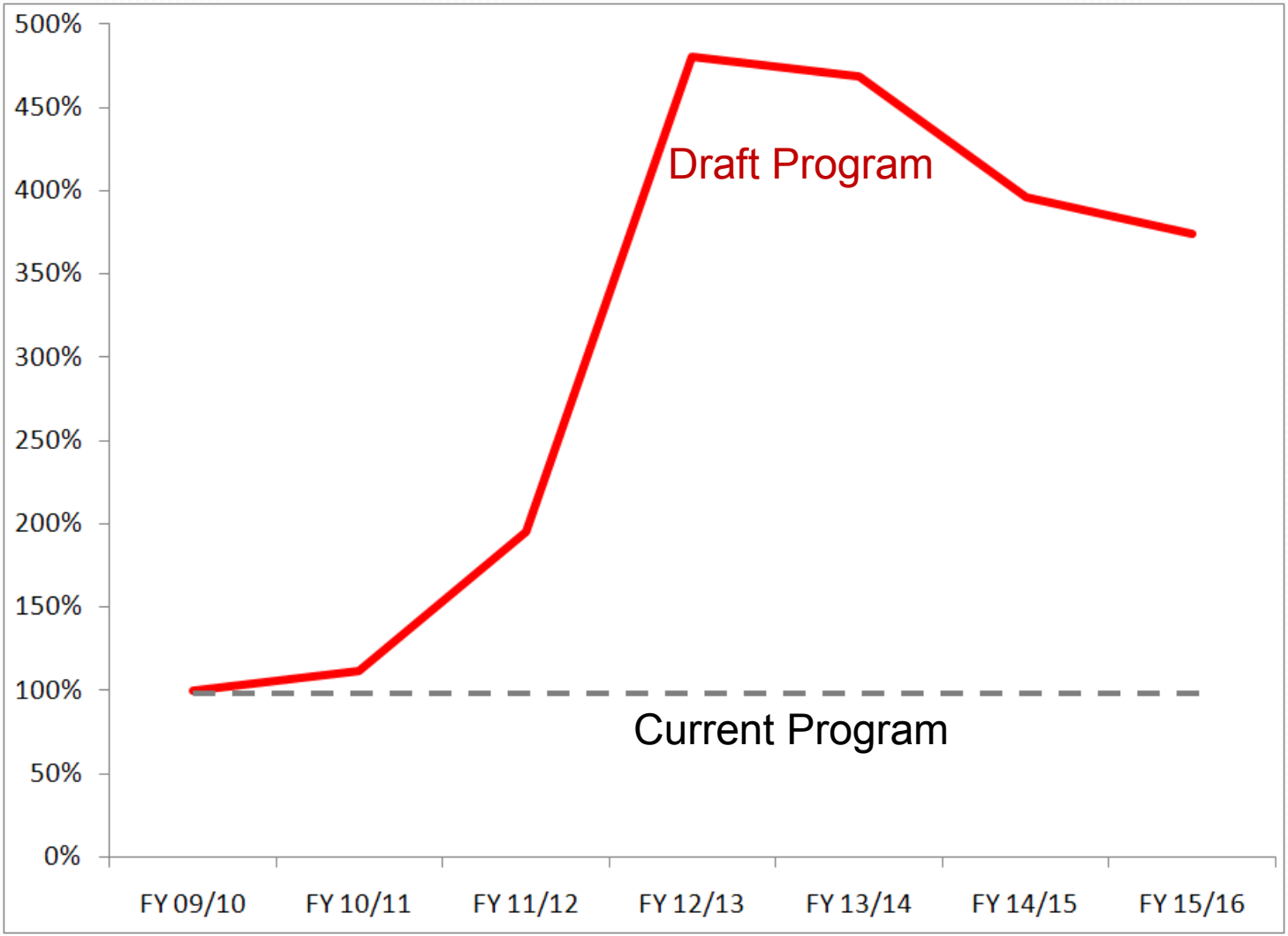
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FY 12/13
FY 13/14
FY 14/15
FY 15/16

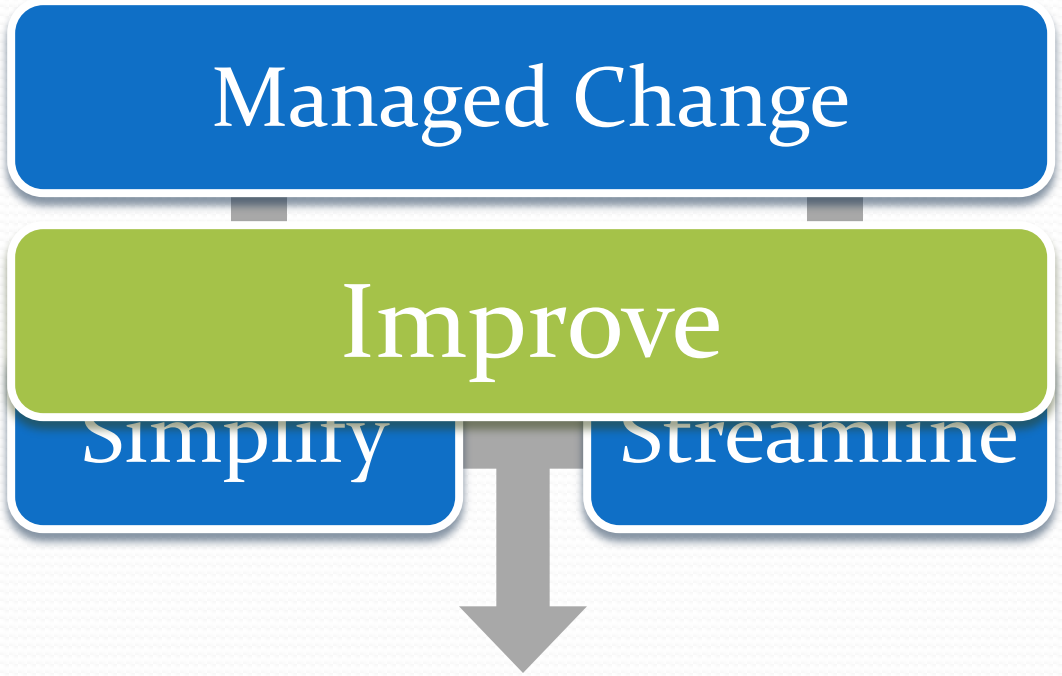
Managed Change
Improve
Simplify
Streamline

Monitoring Program Components

Baseline Monitoring

+

Special Studies

Baseline Monitoring

0008335

II.A.1. **Mass Loading Stations:**

- Require sampling of 2 storms instead of 3
  - Appropriate for this Watershed
  - Consistent with South OC and San Diego Permits
  - Consistent with SMC Guidance
  - Significant resource savings

- Allow grab samples for dry weather events
  - Composite samples not needed for dry weather
  - Unnecessary cost

Grab = $200

Composite = $10,000

Baseline Monitoring

0008336

II.A.2. **Stream Assessment:**

- Require sampling of 3 sites instead of 6
  - 6 sites is unattainable - streams are dry
  - Consistent with current program

II.B.1. **Storm Water Action Levels:**

- Allow grab samples
  - Grab samples likely conservative
  - Much less costly
  - Focus resources on follow-up actions

Baseline Monitoring

II.D. **Inland Aquatic Habitat Monitoring:**

5. Remove this new program
   - **Duplicative of Action Level Monitoring**
   - Removed from South OC Permit

Purpose of the MS4 Outfall Action Levels:

*"For discharges to **inland surface waters**, action levels are based on the USEPA water quality **criteria for the protection of aquatic species**." ***

Purpose of the High Priority Inland Aquatic Habitat Monitoring

*"...identify(ing) discharges from MS4s which may cause or have the potential to cause impairment of beneficial uses...**

*Attachment E, Section II.D. (High Priority Inland Aquatic Habitat Monitoring)
** Fact Sheet discussion for Action Levels, Page 117

Monitoring Program Components

Baseline Monitoring

+

Special Studies

Special Studies

0008339

SMR Draft (7 studies)
TMDL specific studies
Sediment Toxicity
Trash and Litter Study
SMC Bioassessment
Agricultural, Federal, and Tribal Input Study
MS4 and Receiving Water Maintenance Study
Intermittent and Ephemeral Stream - Perennial Conversion Study

South OC (4 studies)
TMDL specific studies
Sediment Toxicity
Trash and Litter study
SMC Bioassessment

Special Studies

0008340

SMR Draft (7 studies)	South OC (4 studies)	SMR (Requested) (5 studies)
TMDL specific studies	TMDL specific studies	TMDL specific studies
Sediment Toxicity	Sediment Toxicity	**Low Impact Development BMP Testing and Demonstration Facility**
Trash and Litter Study	Trash and Litter study	**NNE Study**
SMC Bioassessment	SMC Bioassessment	SMC Bioassessment
Agricultural, Federal, and Tribal Input Study		
MS4 and Receiving Water Maintenance Study		
Intermittent and Ephemeral Stream - Perennial Conversion Study		

Monitoring Request Summary

Component	Requested Change
Mass Loading Stations *Section II A.1.b.* *Section II A.1.d.*	Wet Weather – Sample 2 storms instead of 3 Collect grab samples for Dry Weather instead of composite
Stream Assessment *Section II A.2.a.*	Monitor at 3 stations instead of 6
Stormwater Action Levels *Section II B.1.a.(2)*	Collect grab samples instead of composite
Inland Aquatic Habitat Monitoring *Section II D*	Eliminate as duplicative of NAL/SAL monitoring
Special Studies *Section II E*	Replace Special Studies II.E.2 thru II.E.6 with LID Study and Nutrient Study (see back for descriptions)

Managed Change

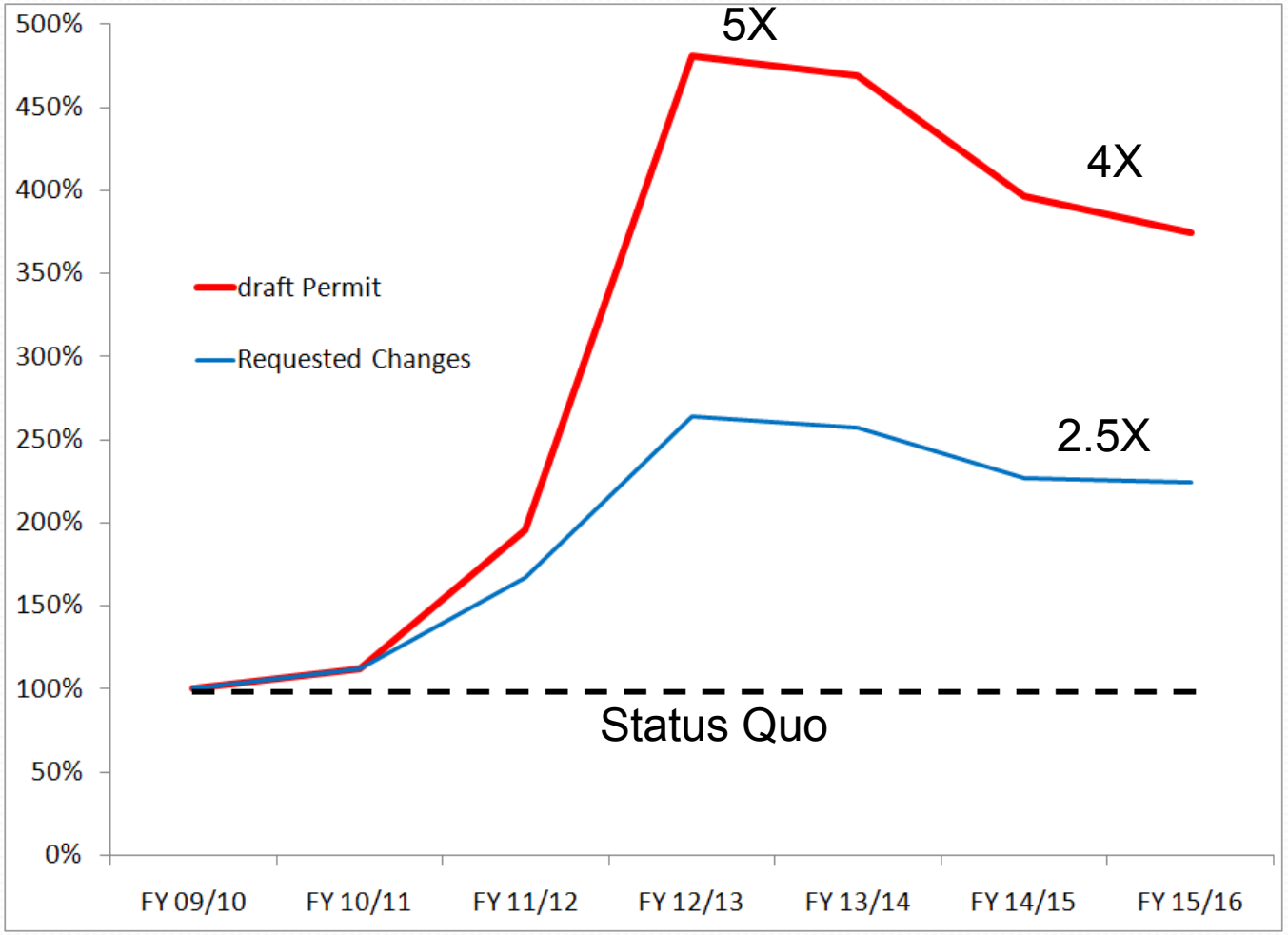

Irrigation Runoff

Section B.2.

Irrigation Runoff

- Not a problem in this watershed
- NAL Monitoring will identify any problematic discharges
- Permittees are NOT water purveyors and cannot set higher rates
- Arbitrary prohibition will undermine credibility

The Board has discretion to make a choice

Irrigation Prohibition

Discharges to the Curb

Vs

✓ Discharges to the Receiving Waters (NALs / SALs)

Irrigation Prohibition

- Regulate Irrigation Runoff that actually impact receiving waters
- Consistent with your requirements for Non-Emergency Fire Fighting Flows (Section B.3)

Request

Add (new) section B.4 to the Permit:

(and change existing section B.4. to B.5)

> *B.4. As part of the JRMP, the Copermittees must develop and implement a program to address pollutants from landscape irrigation, irrigation water and lawn watering identified as significant sources of pollutants to waters of the United States.*

- Benefits
  - ✓ Equal protection
  - ✓ More flexible solution set
  - ✓ Cost Savings
  - ✓ Stronger public support

Low Impact Development

Must address local watershed needs

Problem with LID Errata

"Retention"

significant ramifications:

- ✗ *Artificial Retention*

  Doesn't mimic natural hydrology

- ✗ *Mandates Capture and Use*

  Unreliable for pollutant removal

What is LID?

EPA

"LID is a site design strategy with a GOAL OF MAINTAINING OR REPLICATING THE PRE-DEVELOPMENT HYDROLOGIC REGIME through the use of design techniques to create a functionally equivalent hydrologic landscape."**

STATE WATER BOARD

"The GOAL OF LID IS TO MIMIC A SITE'S PREDEVELOPMENT HYDROLOGY by using design techniques that infiltrate, filter, store, evaporate, and detain runoff close to the source of rainfall."***

NRDC

"Low Impact Development is a comprehensive land planning and engineering design approach with a GOAL OF MAINTAINING AND ENHANCING THE PRE-DEVELOPMENT HYDROLOGIC REGIME…."*

** "A Clear Blue Future": page 10, National Resources Defense Council*
*** "Low Impact Development (LID) A Literature Review", EPA-841-B-00-005, October 2000*
**** "**Low Impact Development – Sustainable Storm Water Management - http://www.waterboards.ca.gov/water_issues/programs/low_impact_development***

Natural Hydrology

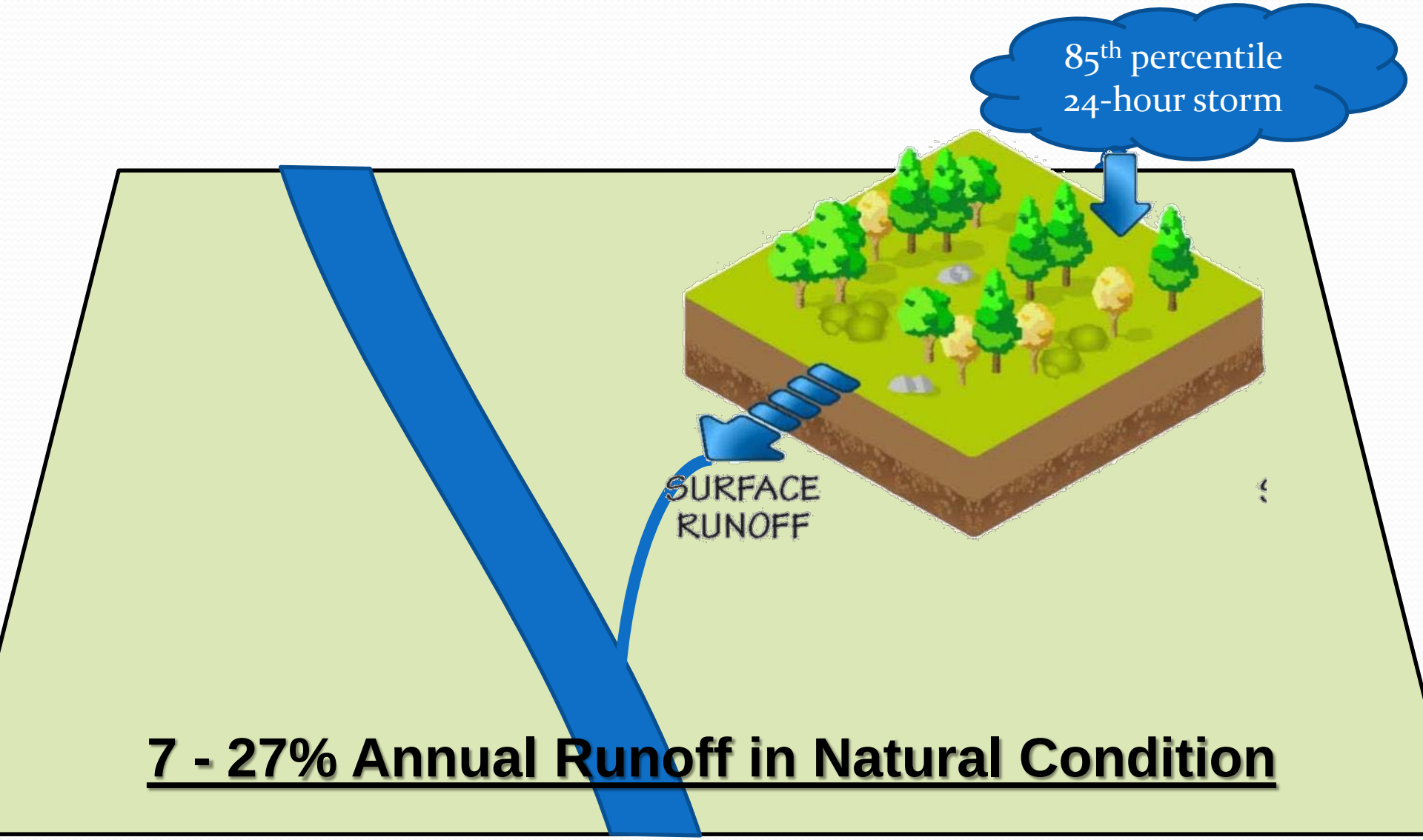

7 - 27% Annual Runoff in Natural Condition

Runoff in Natural Condition?

Rainfall

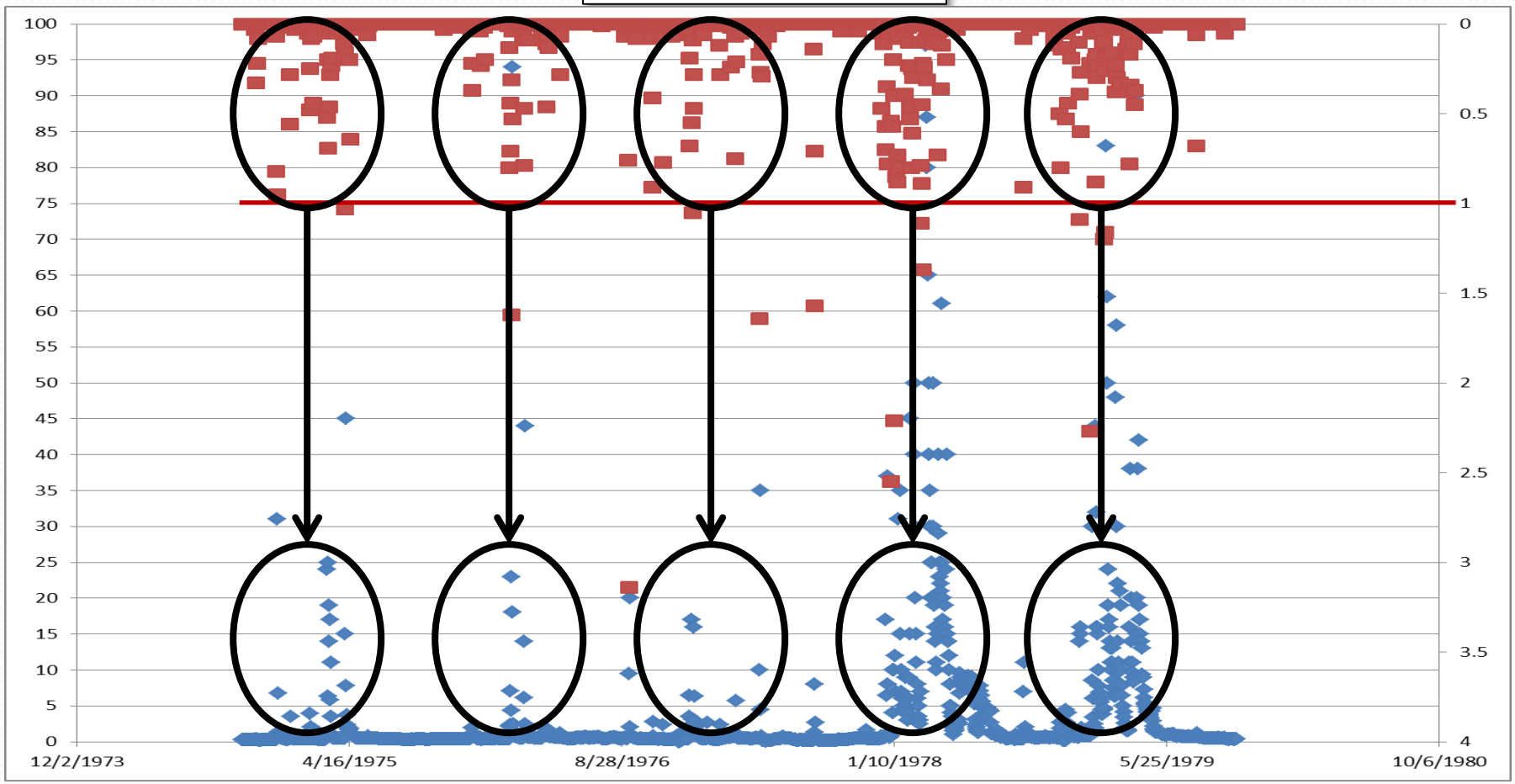

Pre-Urbanization Runoff

Artificial Retention?

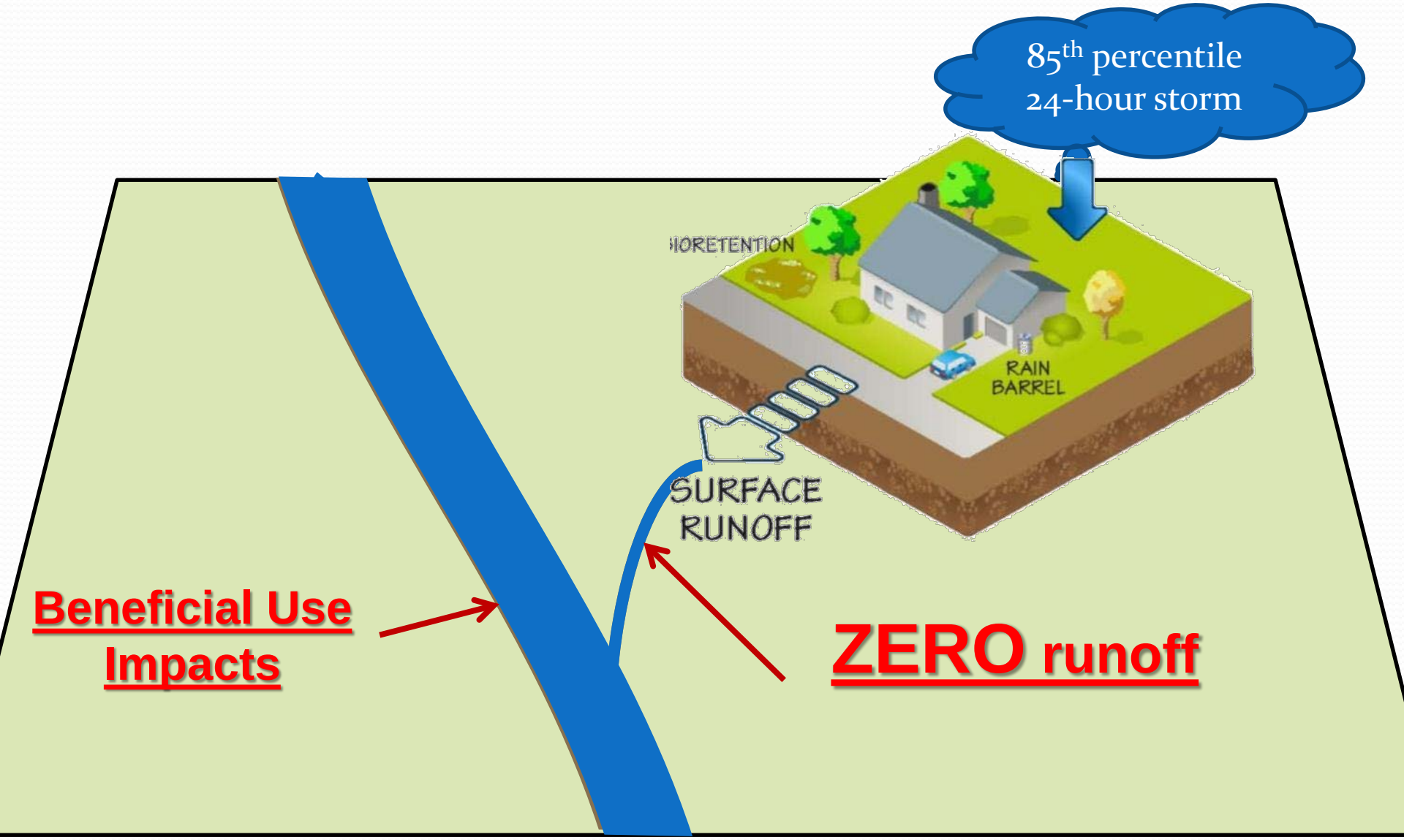

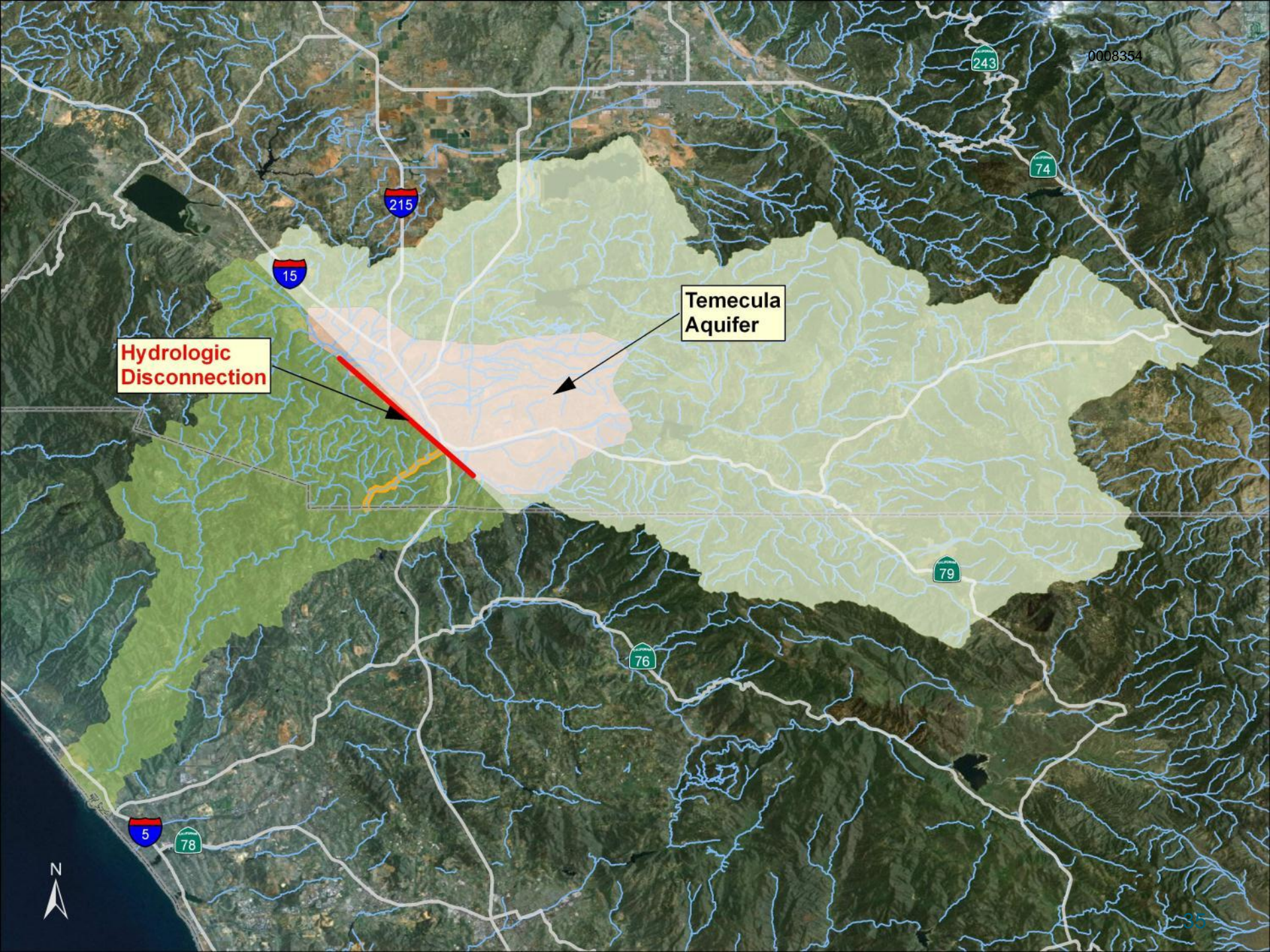
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243
74
215
15
Temecula
Aquifer
Hydrologic
Disconnection
79
76
5
78
N

Solutions

Problem:

✗ *Artificial Retention - Doesn't mimic natural hydrology*

Solution

✓ ***"Delta V" Approach:***

Add the following language

F.1.d.(4)(c) LID BMPs sizing criteria:

(i) LID BMPs must be sized and designed to ensure onsite retention without runoff, of the volume of runoff produced from a 24-hour 85th percentile storm event ("design capture volume") that exceeds the runoff from the pre-development site;

"Delta V" Retention

Runoff in 24-hour 85th Percentile Storm (example)**:**

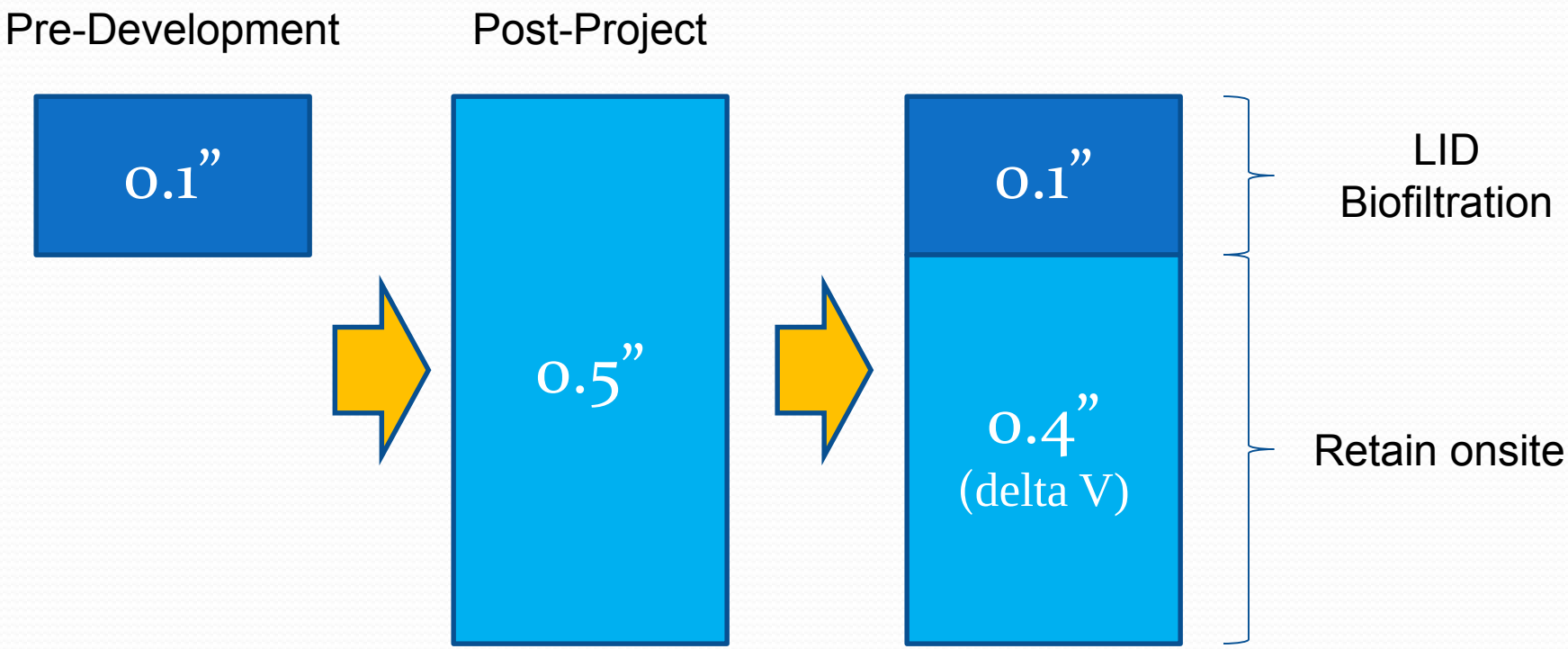

Problem with LID Errata

"Retention"

significant ramifications:

- ✗ *Artificial Retention*
  Doesn't mimic natural hydrology

- ✗ ***Mandates Capture and Use***
  Unreliable for pollutant removal

Riverside County LID Design Manual:

Landscape Filter Basin

Type of BMP	Filtration
Maximum treatment area	15,000 sq. ft
Other names	Rain Garden, Bioretention Cell, Porous Landscape Detention

Description
Landscape filter basins are shallow, vegetated basins underlain by an engineered soil mixture (soil filter). Landscape Filter Basins remove pollutants from stormwater runoff by passing the V_{BMP} through the filter media, before discharging the flows to under drains. These surfaces work best when they are designed to be flat or with gentle slopes.

Filtration Design	
Removal Efficiency	Targeted Constituents
	Sediment
	Nutrient
	Trash
	Metal
	Bacteria
	Oil and Grease
	Organic Compounds
	Pesticides
H = High, M = Medium L = Low, U = Unknown	

Siting Considerations
Unlike other Best Management Practices (BMP), Landscape Filter Basins can be used in smaller landscaped spaces on the site, such as:

- ✓ Parking islands
- ✓ Medians
- ✓ Site entrances

Landscape Filter Basins should not be used in areas where large amounts of sediment can enter the landscaped area. For example, placing a Landscape Filter Basin at the toe of a steep slope is not advised. The erosion from the slope could clog the engineered soil mixture and damage the vegetation. If a Landscape Filter Basin is to be placed at such a location, it is recommended that a pretreatment option be used, please see Section X.X.

Design and Sizing Criteria
The minimum cross section necessary for a Landscape Filter Basin includes:

- Vegetated area
- 18" minimum sand/peat layer, this layer is made up of two-thirds CalTrans fine aggregate and one-third peat or Class 'A' compost by volume. The sand and peat shall be mixed prior to placement.
- 8" minimum gravel layer
- Existing Subgrade

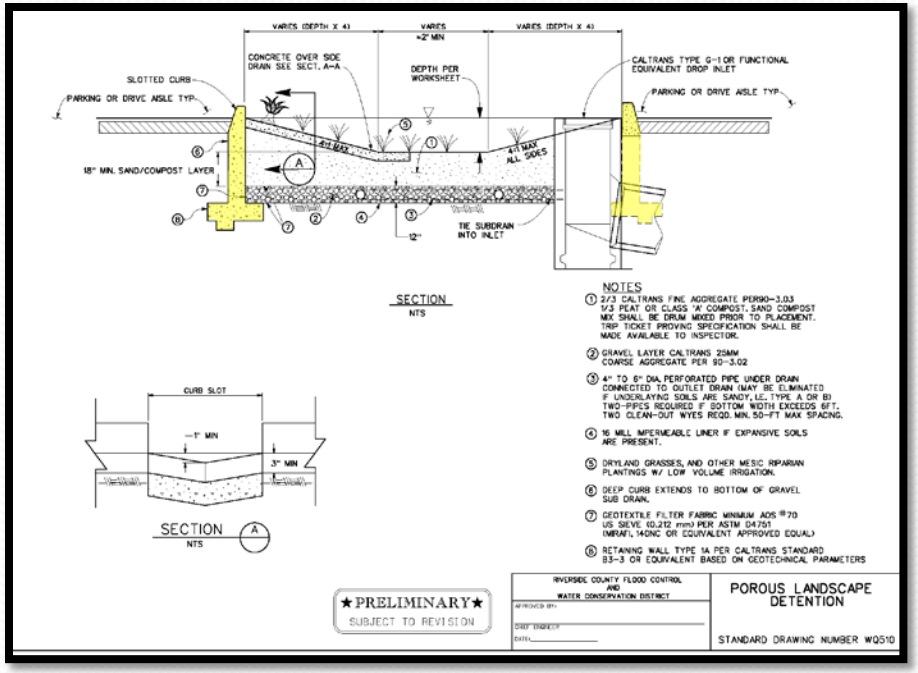

- **What makes LID BMPs so effective?**

  - ✓Passive Treatment *(Minimal Human Interaction)*
  - ✓Natural Processes
  - ✓Volume Reduction

Capture and Use = Highly Effective?

– 25% ANNUAL failure

- ✗ ~~Passive Treatment~~
- ✗ ~~Natural Processes~~
- ❑ Volume Reduction
  (only if consumptive use occurs)

LID Solutions

Problem

✗ *Consumptive Use – Ineffective as a BMP*

Solution

✓ ***Modify footnote 14 in errata:***

Modify footnote 14 (in Supporting Document 13, page 17) as follows:

Infiltration LID BMPs are the preferred method for onsite retention, but does not preclude the use and implementation of all other retention LID **BMPs that function passively** (e.g. evapotranspiration, **and/or** evaporation~~, and/or harvest~~), where technically feasible, prior to considering biofiltration LID BMPs for treatment of the design capture volume that is not otherwise retained onsite.

Summary

Monitoring Program – Streamline requirements to reduce costs

Conditional Exemptions – Allow regulation of actual impacts

LID – Protect downstream Beneficial Uses, and Fix the prioritization

Summary

Tentative Order R9 2010-0016 Proposed Modifications by Copermittees

0008363

Monitoring Reporting Program

Component	Requested Change
Mass Loading Stations *Section II A.1.b.* *Section II A.1.d.*	Wet Weather – Sample 2 storms instead of 3 Collect grab samples for Dry Weather instead of composite
Stream Assessment *Section II A.2.a.*	Monitor at 3 stations instead of 6
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Irrigation Runoff

(1) Add B.4 below and renumber existing B.4 to B.5

B.4. As part of the JRMP, the Copermittees must develop and implement a program to address pollutants from landscape irrigation, irrigation water and lawn watering identified as significant sources of pollutants to waters of the U.S.

Low Impact Development (LID)

(1) **Modify Section F.1.d.(4)(c)(i)**

LID BMPs must be sized and designed to ensure onsite retention without runoff, of the volume of runoff produced from a 24-hour 85th percentile storm event ("design capture volume") that exceeds the runoff from the pre-project site;

(2) **Modify footnote 14 (*Supporting Document 13, page 17*)**

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Closing Comments

Receiving Water Limitations

Order R9-2010-0016, Section B.2 – Riverside County

The San Diego Water Board may identify categories of discharge that either require prohibition, or other controls for non-anthropogenic sources.

For a discharge category determined to be a source of pollutants, the Copermittee, under direction of the San Diego Water Board, must either prohibit the discharge category or **develop and implement appropriate control measures for non-anthropogenic sources** to prevent the discharge of pollutants to the MS4 and report to the San Diego Water Board pursuant to Section K.1 and K.3 of this Order.

Order R9-2009-0002, Section B.2 – Orange County

The Regional Board may identify categories of discharge that either requires prohibition or other controls.

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Federal Register – Volume 55, No. 222 –Non-stormwater discharges

"**However, the Director may include permit conditions that either require municipalities to prohibit or otherwise control** any of these discharges where appropriate.

- **Permittee Vision:**

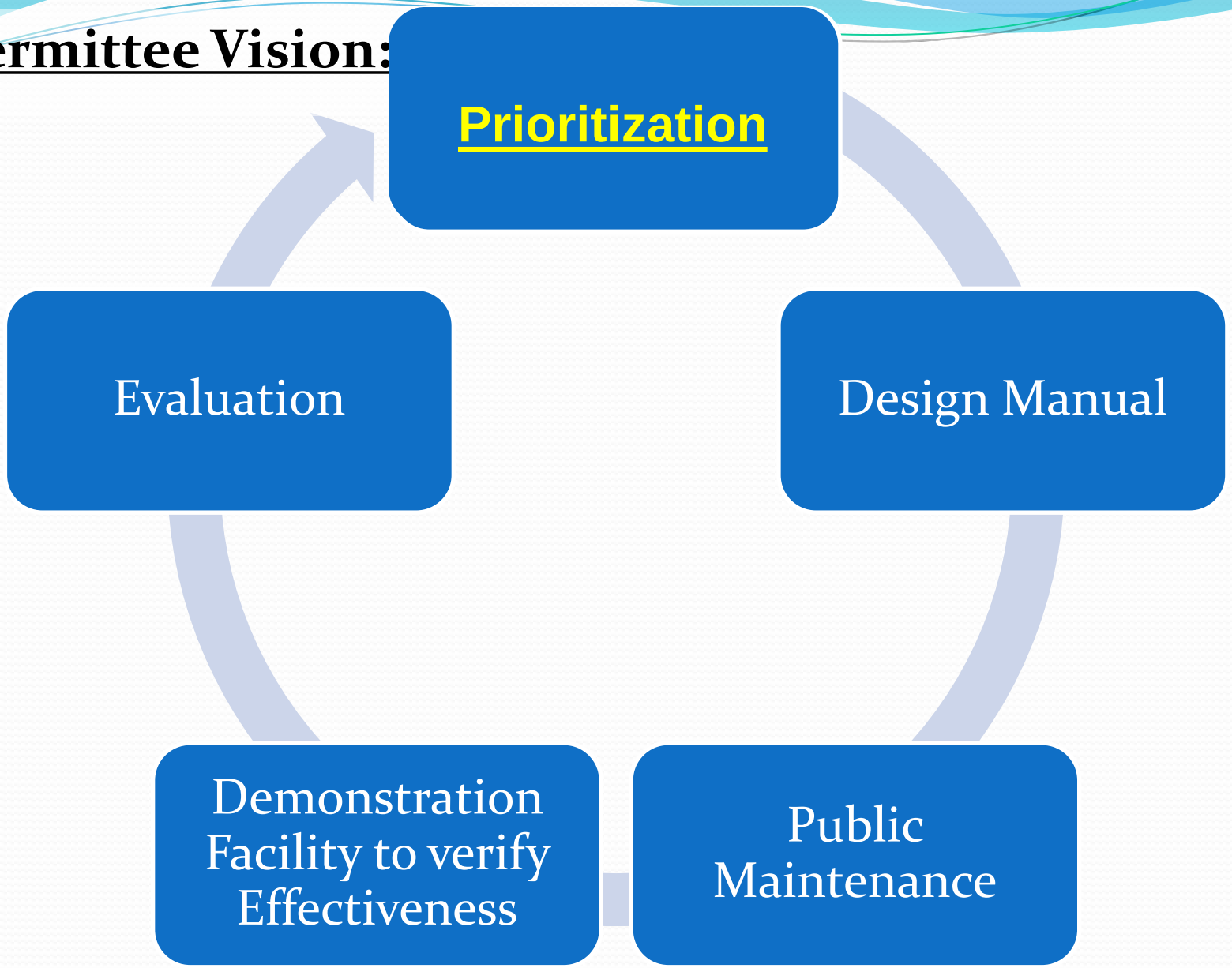

- **Permittee Vision:** Prioritization

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Maximum treatment area	15,000 sq. ft
Other names	Rain Garden, Bioretention Cell, Porous Landscape Detention

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- 8" minimum gravel layer
- Existing Subgrade

Design Manual

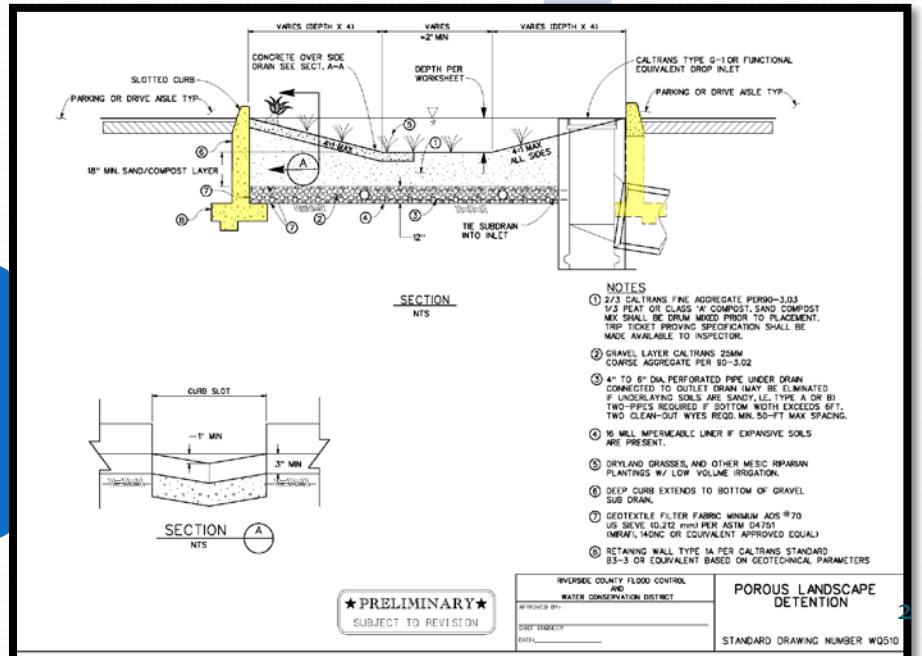

- **Permittee Vision:**

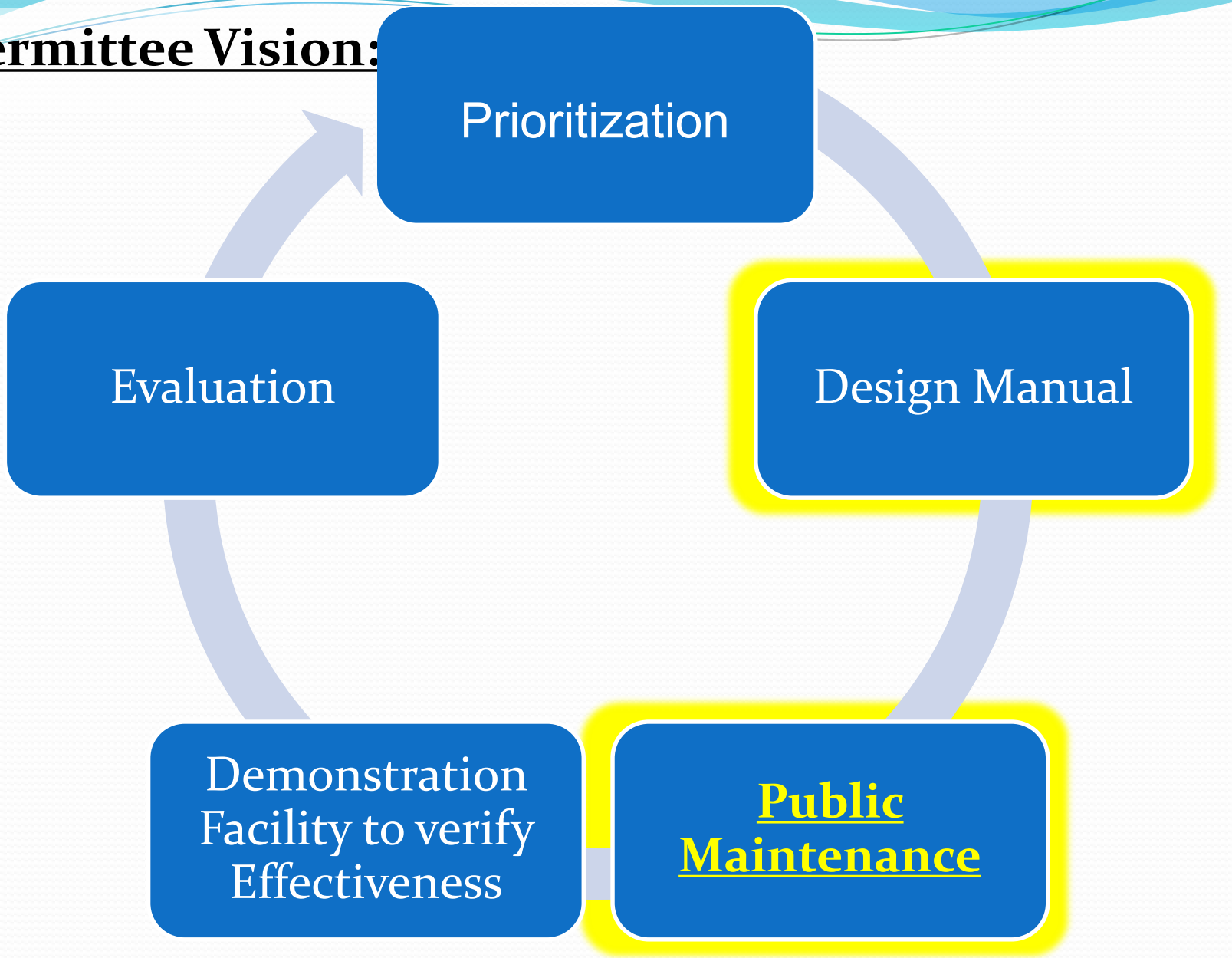

- **Permittee Vision:**

Ev

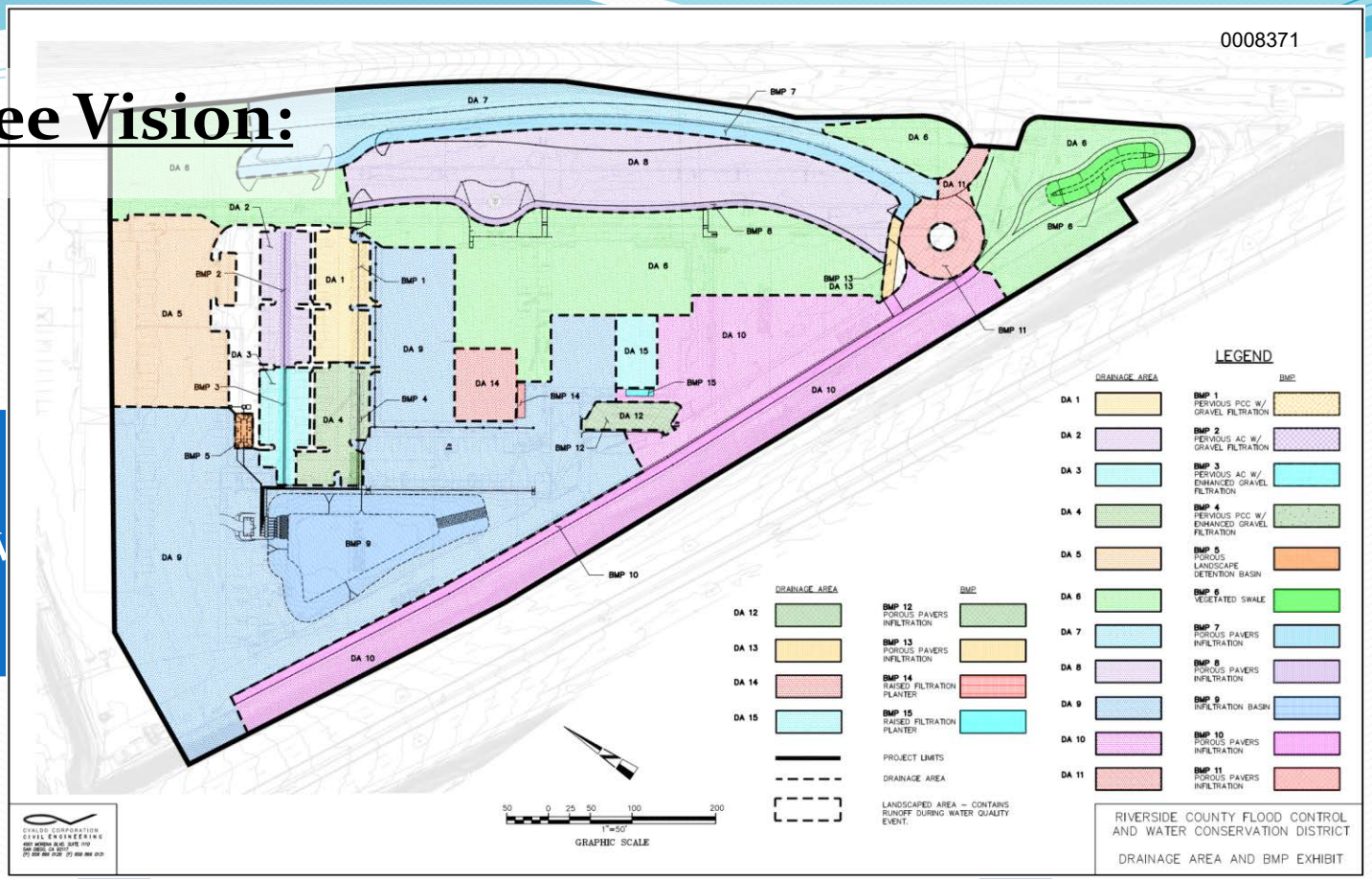

Demonstration Facility to verify Effectiveness

Public Maintenance

- **Permittee Vision:**

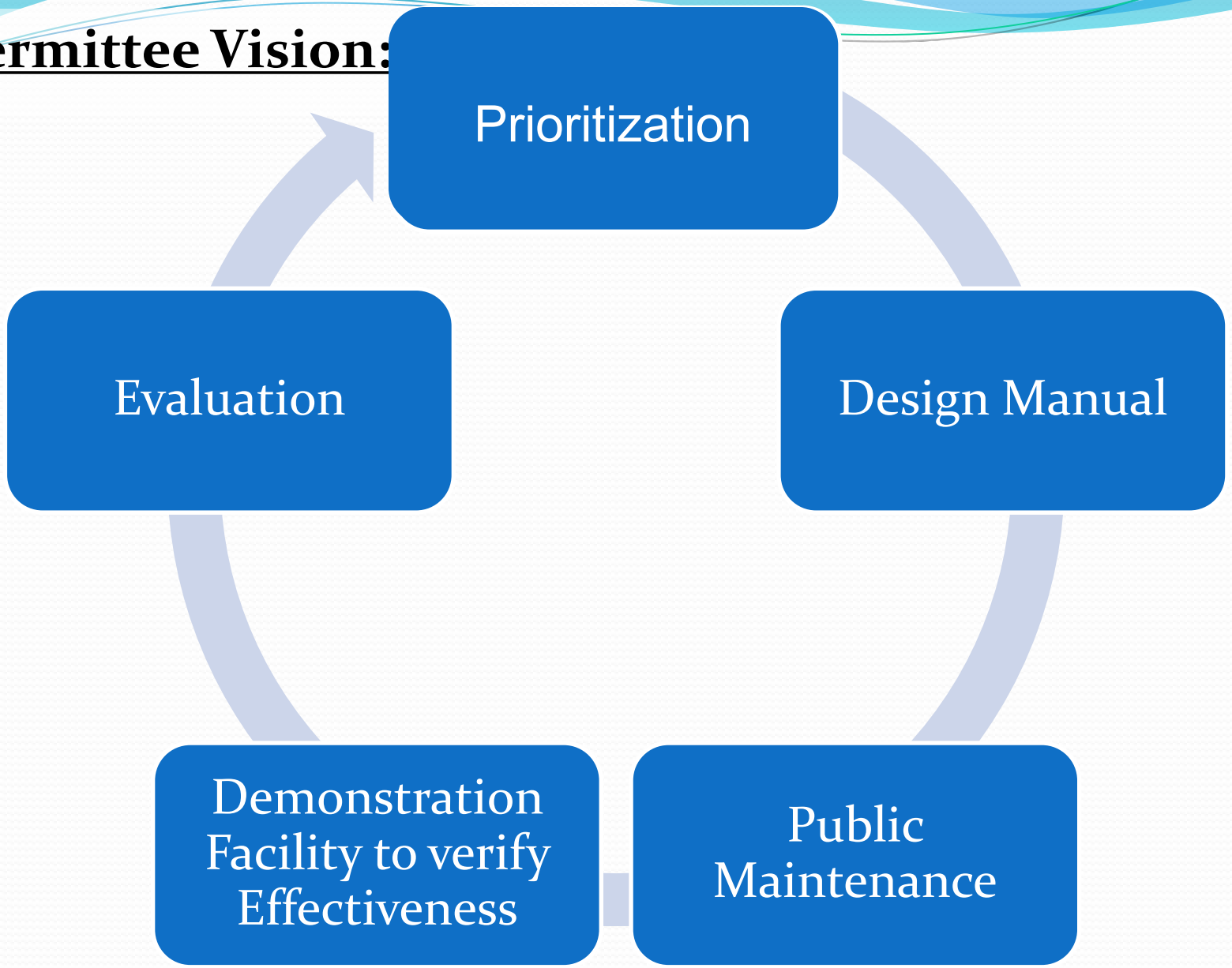

0008373

Impact of LID Retention BMPs on Downstream Water Availability

10 November 2010

Steve Reich
Stetson Engineers

Presentation Summary

- 85% 24-hour Storm Definition
- Impacts to on-site Hydrology under Tentative Order
- Santa Margarita River Hydrology
- Downstream Impacts
- Proposed Implementation Methodology

STETSON ENGINEERS INC.

Tentative Order R9-2010-0016

- F.1.D.(4) (c) LID BMPs sizing criteria:

(i) LID BMPs must be sized and designed to ensure onsite retention without runoff, of the volume of runoff produced from a 24-hour 85th percentile storm event ("design capture volume")

The entire volume of **runoff** from the 85th percentile 24-hour storm event will be captured and retained on-site

STETSON ENGINEERS INC.

Defining the 85th Percentile 24-Hour Storm *INTENSITY*

0008376

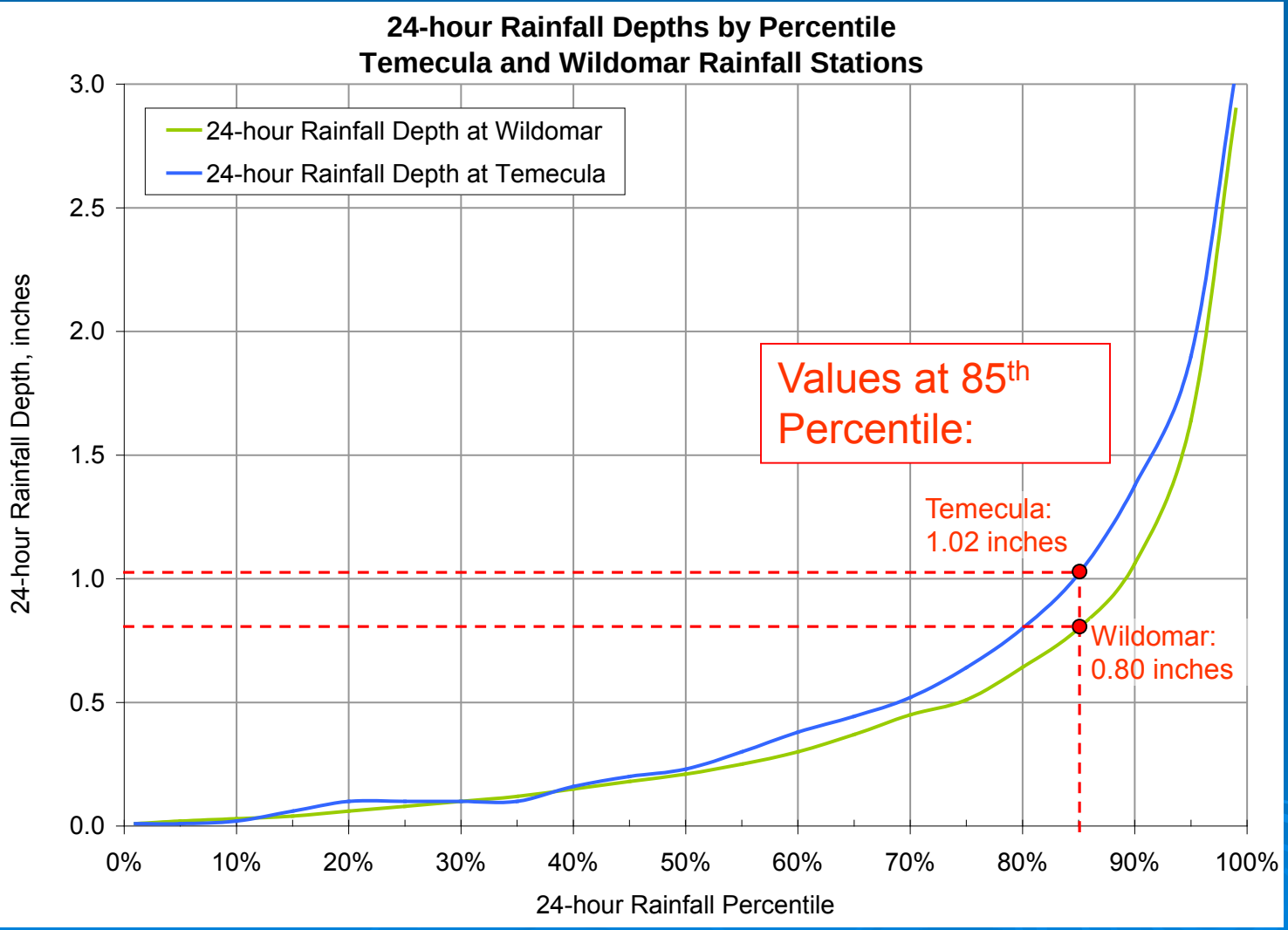

Note: Value of the 85th Percentile 24-hour rainfall intensity will vary for each site depending on its location within the watershed

STETSON ENGINEERS INC.

Example of Event Site Runoff Under the Conditions of R9-2010-0016

000837

- Example 100-acre Undeveloped Property
  - Pre-Development R/O coefficient is 0.2
  - Post-Development R/O coefficient is 0.5
  - 85th percentile 24-hour rainfall depth is 0.8 inches
  - Storm duration is 1 day
  - Storm depth is 0.8 inch
  - Under Pre-Development

    Results – 0.64 inches infiltrated and 0.16 inches runoff
  - Under Post-Development Before LID Retention BMP

    Results – 0.40 inches infiltrated and 0.40 inches runoff

Pre-Development R/O is 1.3 AF (0.16 inches)

Post Development R/O is 0.0 AF (0.0 inches) since LID Retention BMP captures R/O from 85th percentile, 24-hour rainfall depth (0.40 inches)

STETSON ENGINEERS INC.

Impact from Hypothetical 100-Acre Site

00083781

The permit as written would alter the natural hydrology by retaining an additional 1.3 acre-feet of runoff per event. Applied over multiple sites, with many events per year over many years, this is a significant quantity of water that is lost to the lower watershed.

When runoff from a storm event exceeds the Design Capture Volume, the excess will run off the site since it will exceed the capacity of the required retention facility.

STETSON ENGINEERS INC.

Annual Runoff Calculation with LID Retention BMP Rainfall at Wildomar in WY 2006

0008379

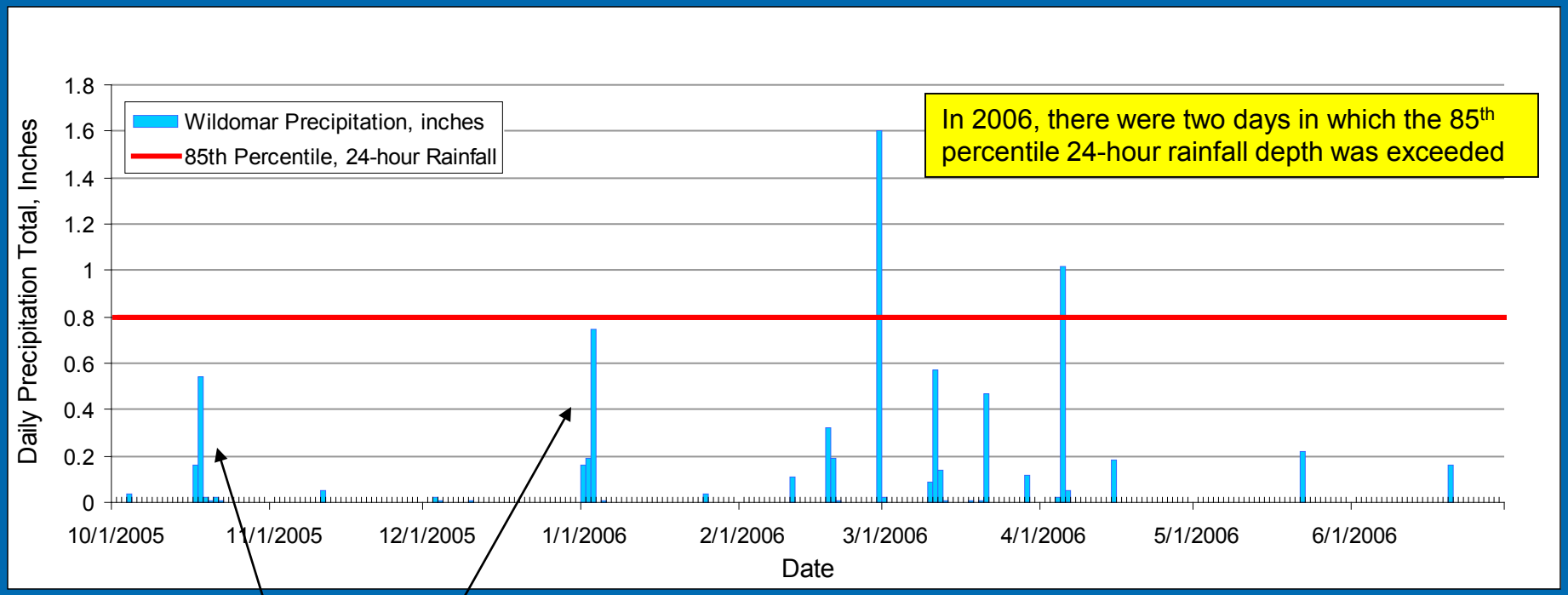

In 2006, there were two days in which the 85th percentile 24-hour rainfall depth was exceeded

Storm Depth greater than 85th percentile 24-hour precipitation depth

STETSON ENGINEERS INC.

Annual Site Runoff Under the Conditions of R9-2010-0016 (continued)

Daily Model of Precipitation Distribution for Water Year 2006

- Daily Wildomar rainfall data used
- 85th 24-hour rainfall depth is 0.8 inches
- Runoff coefficients account for Pre- and Post-Development Conditions
- Pre-development percentile (natural runoff) and Post-development (with LID Retention BMP) infiltration and runoff simulated

Distribution of Annual Rainfall Volume at a Future Development Site

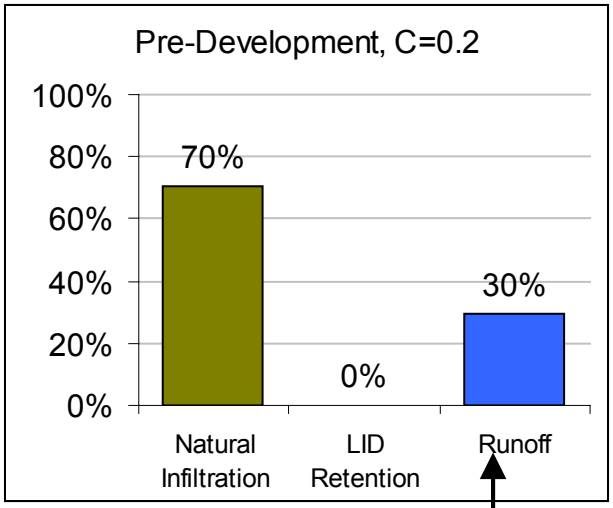

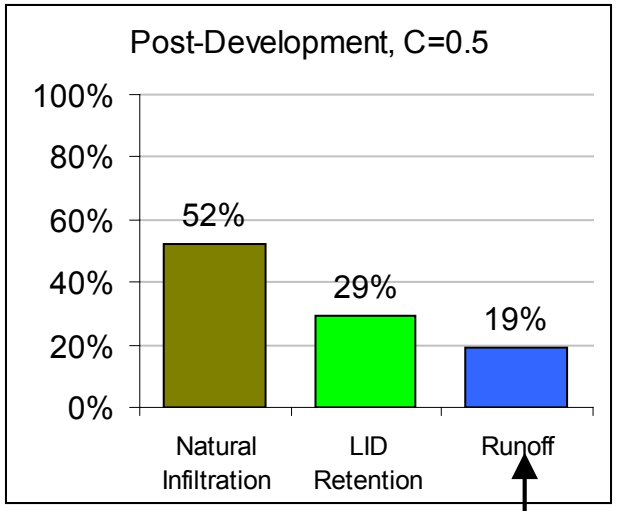

•Site Runoff Reduced from 30% to 19%

•Implementation of LID Retention Results in ***changes to natural hydrograph***

STETSON ENGINEERS INC.

Impacts To Hydrology

0008381

- LID Retention BMPs reduce site runoff and increase infiltration
- Recharge to Murrieta-Temecula groundwater basin will increase due to retention of what would otherwise be naturally occurring surface flows
- Design of oversized retention BMPs may itself cause hydromodification at individual sites

- Level of impact to watershed-wide hydrology will vary depending on site location, antecedent conditions, physical site characteristics, and groundwater conditions, but there will be an impact on downstream hydrology

Reduced runoff from LID Retention BMPs can be mitigated using Delta-V approach

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Why the Santa Margarita Watershed is Different than Other Watersheds

0008382

- The natural interaction between groundwater and surface water has been altered by urbanization and water development projects.
- Vail Dam adversely affects the streamflow and groundwater levels in the Murrieta-Temecula Groundwater Basin.
- There is no connection between the groundwater aquifer and streamflow in the Upper Santa Margarita River Basin (ie. Infiltration will not benefit downstream flow).
- Predevelopment hydrology prior to groundwater pumping and construction of dams had greater average annual streamflow than under developed conditions.

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Tentative Order's Impact to Downstream Resources in the SMR

0008383

- LID Retention BMPs designed for runoff from the 85th percentile 24-hour rainfall depth will increase infiltration to groundwater
- Additional infiltration to groundwater will not benefit downstream habitat or water supplies since groundwater is disconnected from surface water in the Upper Basin
- Implementation of the LID Retention BMPs in the Tentative Order will reduce downstream flow due to reduced runoff and result in hydromodification
- Antecedent moisture and hydrologic conditions will affect the impact of LID Retention BMPs on downstream flow in the Santa Margarita River

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Suggested Approach for Quantifying Downstream Impacts and Developing The Most Effective Flow Regime to Protect Beneficial Uses

- Delineate watershed areas based on infiltration rate
  - Geology, soils, vegetation, and slope
- Identify groundwater conditions and impact to infiltration rate
- Measure hydraulic efficiency of LID Retention BMP
  - Time dependency and maintenance requirements
- Measure water quality efficiency of LID Retention BMPs as they relate to multiple storm events
- Monitor hydrology (hydraulic and water quality) for pre- and post-development sites
- Develop time-appropriate model to simulate watershed hydrology for pre- and post development conditions

- GOAL: Create a watershed-wide relationship between specific site locations and downstream water availability.
- GOAL: We know there is harm, we are limited in our ability to quantify it without additional study.

STETSON ENGINEERS INC.

State of California
Regional Water Quality Control Board
San Diego Region

SUPPLEMENTAL
EXECUTIVE OFFICER SUMMARY REPORT
November 10, 2010

ITEM: 6

SUBJECT: PUBLIC HEARING: Reissuance of NPDES Waste Discharge Requirements for Discharges from the Municipal Separate Storm Sewer Systems (MS4s) draining the County of Riverside, the Incorporated Cities of Riverside County, and the Riverside County Flood Control and Water Conservation District (RCFC), within the San Diego Region. (Tentative Order No. R9-2010-0016, (NPDES Permit No. CAS0108766) *(Chad Loflen, Ben Neill, Wayne Chiu)*

DISCUSSION: Following the cancellation of the October 13, 2010 San Diego Water Board hearing on this matter, staff took advantage of the additional time to meet and discuss the proposed low impact development (LID) requirements with all parties that submitted comments on the originally proposed language (i.e. USEPA, USMCB Camp Pendleton, Building Industry Association, Natural Resources Defense Council, and the Copermittees). The discussions were limited to the LID requirements and were held over several meetings and telephone calls with one or more of the interested parties.

The Copermittees and USMCB Camp Pendleton provided several documents to staff in support of, and to clarify, their original written comments. These documents were submitted after the close of the written comment period specified in the notice for public comments. Many of these documents were in draft form and presented unsubstantiated information and conclusions. Although staff reviewed these documents, the evidence was not sufficiently conclusive or persuasive to warrant changes to the proposed LID permit language. In the interest of public disclosure, these documents are being provided as Supporting Document No. 14.

Staff has also had the opportunity since the cancellation of the October meeting to reconsider the original written

comments on the LID requirements received during the written comment period. In light of some of the verbal clarifications to the written comments provided by the interested parties, revised errata for the LID requirements have been made. These revisions make the LID requirements more consistent with the recently adopted Orange County MS4 Permit LID requirements, and specify a preference for infiltration LID BMPs. Staff did not rely on any of the documents in Supporting Document No. 14 in making these revisions.

In addition to the revised errata for the LID requirements, additional errata to the Tentative Order and Fact Sheet have been made to acknowledge the State Water Board's approval of the 2008 Clean Water Act Section 303(d) List for the San Diego Region and the rescission of the State Water Board's Order WQO 2009-0008 (Supporting Document No. 13).

SUPPORTING DOCUMENTS: Supporting Document Nos. 1-12 were provided in the first mailout.

13. Revised Draft Updates and Errata (November 3, 2010).

14. Documents provided by commenting parties after the close of the written comment period.

RECOMMENDATION: It is recommended that the Board receive public testimony at today's hearing, close the public comment period, and adopt the Tentative Order (with updates and errata).

BEFORE THE REGIONAL WATER QUALITY CONTROL BOARD
SAN DIEGO REGION
STATE OF CALIFORNIA

In the Matter of Reissuance of)
NPDES Waste Discharge Requirements)
for Discharges from MS4's draining)
in Riverside County and)
Consideration of Adoption of)
Tentative Order No. R9-2010-0016)
)
ITEM NO. 6)
_____)

TRANSCRIPT OF PROCEEDINGS
Temecula, California
Wednesday, November 10, 2010

Reported by:
MARIE BOYD
CSR No. 13450

Job No:
B5975WQSD

BEFORE THE REGIONAL WATER QUALITY CONTROL BOARD
SAN DIEGO REGION
STATE OF CALIFORNIA

In the Matter of Reissuance of)
NPDES Waste Discharge Requirements)
for Discharges from MS4's draining)
in Riverside County and)
Consideration of Adoption of)
Tentative Order No. R9-2010-0016)
)
ITEM NO. 6)
_____)

TRANSCRIPT OF PROCEEDINGS, taken at 43200 Business Park Drive, Temecula, California, commencing at 9:15 a.m. on Wednesday, November 10, 2010, heard before the CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD, reported by MARIE BOYD, CSR No. 13450, a Certified Shorthand Reporter in and for the State of California.

APPEARANCES:

For the California Regional Water Quality Control Board San Diego Region Board Members:	Grant Destache, Vice Chair Eric Anderson Bill Green George Loveland Marc Luker Wayne Rayfield Gary Strawn
Executive Staff:	David Gibson, Executive Officer
State Board Staff Counsel:	Catherine Hagan
Northern Watershed Unit:	Chiara Clemente, Senior Environmental Scientist; Ben Neill, Water Resource Control Engineer; Chad Loflen, Environmental Scientist
Southern Watershed Unit:	Wayne Chiu, Water Resource Control Engineer
For Speakers in Opposition to Recommended Action:	Jason Uhley, Chief of Watershed Protector, Riverside County Flood Control; Jeff Comerchero, Mayor City of Temecula; Bridgette Moore, Mayor City of Wildomar; Randon Lane, Mayor Pro-Tem, City of Murrieta; Patrick Thomas, Director of Public Works,City of Murrieta;

APPEARANCES: (Continued)

For Speakers in Opposition to Recommended Action:

Verne Lauritzen, Chief of Staff for Supervisor

Jeff Stone;

Claudio Padres, Senior Civil Engineer, Riverside County Flood Control;

John Kemmerer, Associate Director EPA Region I

Jeremy Jungreis, Director, Office of Water Resources, Camp Pendleton;

Stephen Reich, Engineer, Stetson Engineers;

Toby Roy, Water Resources Manager, San Diego County Water Authority;

Paul Boughman, Special Counsel, Camp Pendleton;

Jack Bebee, Engineering and Planning Manager, Fallbrook Public Utilities District;

John Van Rhyn, County of San Diego, Water Quality Program Manager;

Mark Grey, Director of Environmental Affairs, BIA/SC Construction Industry Coalition on Water Quality;

Gabriel Solmer, Legal Director, San Diego Coast Keeper;

APPEARANCES: (Continued)

For Speakers in Opposition to Recommended Action:

Livia Borac, Attorney, Coast Law Groups, Coast Environmental Rights Foundation;

David Burhenn, Counsel, Riverside Flood Control District

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Temecula, California, Wednesday, November 10, 2010
9:15 a.m.

MR. DESTACHE: I'm going to read a statement to open this, and then we'll proceed from there. The hearing to receive testimony and consider the adoption of Tentative Order R9-2010-0016. Reissuance of the NPDES Waste Discharge Requirements for the discharges from Municipal Separate Storm Sewer Systems draining watersheds of the County of Riverside and the incorporated cities of Riverside County, and Riverside County Flood Control and Water Conservation District within the San Diego region.

This is the time and place for the public hearing to consider the testimony of the Tentative Order R9-2010-0016. And for the Board to consider the adoption of the Tentative Order. Does any member wish to recuse himself in this matter?

MR. GREEN: Mr. Chairman, I need to recuse myself, only because our firm was involved with the co-permittees of Riverside County, my engineering firm. So I need to step out.

MR. DESTACHE: Let the record show that Board Member Green has recused himself. The procedure of the

hearing will be as follows: First, we'll hear from the elected officials, and we're limiting that time to five minutes each. Then we will hear from the Regional Board staff. They have stated that they need 45 minutes for their presentation. And then we'll hear from the County of Riverside, and that would be the co-permittees. That is a 60-minute presentation. Then we will hear from Camp Pendleton, and we will allow 30 minutes for Camp Pendleton. We have a slot for the USEPA, but we don't have a specific time -- ten minutes should be fine for that. And then we'll hear from interested persons regarding this reissuance, and those individuals will be given three minutes each. Then the co-permittees will present closing arguments for ten minutes. The Regional Board staff will respond with an allotted time, as necessary to give proper testimony, and then we'll hear recommendations from the Executive Officer.

All persons expecting to testify, please stand at this time. Raise your right hand. Take the following oath: "I do swear that the testimony you are to hear--" and I goofed that up. So we're going to start over. "I do swear that the testimony you are about to hear-- about to give is the truth," and if you do, answer "I do."

(Speakers answered "I do.")

And then when you take the DSU, they're going to

state their name and their affiliation, and whether you've taken the oath. Then we'll begin with the staff testimony.

MS. CLEMENTE: I just already have a clarification. The Riverside County has asked that the elected officials go as part of their presentation, instead of up front.

MR. DESTACHE: So we're going to add 20 minutes to their presentation?

MR. UHLEY: Yes. Good morning, Chairman Destache. I'm Jason Uhley with North Riverside County Flood Control. What we'd like to do is have the staff give their presentation first. And then we have four elected's who are going to speak. They'll need about 20 minutes. And then we've requested an hour for our presentation, but it's looking like we're going to be closer to half an hour. We'll be a little bit shorter, but would like to reserve that time for use in our closing comment to distribute to other people who may wish to present.

THE COURT: Well, we like shorter is better. So we're going to hear a lot of testimony today. So we can allow you to push that to your closing testimony.

MR. UHLEY: We'll keep it as short as possible, sir.

MS. CLEMENTE: Good morning, Mr. Chair, Members of the Board, my name is Chiara Clemente. I'm a senior environmental scientist and supervisor with the Northern Watershed Unit. With me are Water Resources Control engineers Wayne Chiu and Ben Neill, and environmental scientist Chad Loflen. Collectively, they've drafted the materials you have before you today. I'd like to introduce Item No. 6, the 4th-generation Municipal Separate Storm Sewer System, or MS4 permit for Southwest Riverside County. As part of your materials for this item, you should have received the Executive Officer Summary Report, with supporting documents 1 through 12, and a supplemental Executive Officer Summary Report with supporting Documents 13 and 14.

At this time I would like to enter the regional Board files on this matter into the record as well. Here's a brief overview of our roughly 45-minute presentation. We'll try to keep it brief. In response to the Board discussion on monitoring that occurred at the last Board meeting, we heard you say that you want information in context. So today I'll start our presentation by giving you a brief of the watershed report. Basically, this is a summary of the water quality conditions in the Santa Margarita River, which is the main watershed affected by this tentative order.

Then Ben Neill will give you a brief summary of the discharger status of compliance with the existing order, that is R92004001. And then he'll describe the process we underwent for developing the tentative order. And then Wayne and Chad will cover what we believe to be some of the key issues being currently contested. These are the low-impact development language, the monitoring requirements, the prohibition on over irrigation, and economic considerations.

So starting with the state of the watershed, the upper watershed which is north of -- the upper watershed which is north of the county line. This is Riverside County on this side and this is the lower watershed, which is down here. This is the Santa Margarita River watershed, or sometimes referred to as hydrologic unit, from our basic plan. We have the I-15 going up here, splits with the I-215, and I believe this is the 75 or 79. And then we've got Vail, Skinner and Diamond Valley reservoirs. And the watershed primarily consists or Murrieta Creek, which is this one right here, and Temecula Creek over here, which come together to form the Santa Margarita River, which goes all the way down to the Pacific Ocean, and the Camp Pendleton, shown by this boundary right here, owns most of the property in the surrounding Santa Margarita River in the lower watershed, and you've got

the San Diego, sorry, the Santa Margarita Ecological Reserve right here, just north of the county line. So this is the part, this is the portion of the Santa Margarita hydrologic unit that will be regulated, that will be regulated through the Tentative Order.

As of 2008, there are four incorporated cities in Riverside County, with all or part of their boundaries within the Santa Margarita hydrologic unit. That is, Temecula in purple, Murrieta in pink, Wildomar in orange, and Menifee in yellow. And Menifee, Murrieta, and Wildomar would have MS4 discharges that are regulated by both us and Region 8, and I'm going to -- okay. As you can see, there's a little sliver of Menifee right there, little sliver of Murrieta, roughly 40 percent of Wildomar in Region 8 straddling the boundaries. And Wayne will cover how, in an effort to streamline regulatory requirements with the adoption of this permit, they would become wholly regulated or MS4 discharges would become wholly regulated by one region. The remaining regulated area is all unincorporated Riverside County, which also covers Region 8.

In terms of water quality, I'll limit my presentation to two broad metrics. The Clean Water Act section 303D lists of impaired water bodies and benefit background for analysis. By looking at these two

metrics, it becomes clear that MS4 discharges are currently one of our biggest threats to water quality in the watershed. In 2000, only the cities of Temecula and Murrieta were incorporated, and the remaining area was unincorporated Riverside County. The population at the time, according to the 2000 census, was approximately 150,000, and according to the 2002 list, 303D list, there were 3 impaired water bodies, each listed as impaired for one pollutant, totaling 3 water body pollutant combinations. The impaired water bodies are depicted by the dark red line on your map.

In 2004, the population in this part of Riverside County grew by 40 percent, to approximately 210,000 with most of the growth seen in Temecula and Murrieta. According to the 2006 303D list, there were 6 impaired water bodies, most impaired by more than one pollutant, for a total of 13 water body pollutant combinations.

In 2008, the Cities of Wildomar and Menifee became incorporated. The population in this part of Riverside County grew another 20 percent to approximately 254,000 again, with the most of the growth seen in Temecula and Murrieta. According to 2008 303d list, adopted by this Board in December of 2009, there are now nine impaired water bodies, all impaired by multiple pollutants totaling 49 water body pollutant

combinations. The general message we're trying to get across here is that as the population grows, so does the list of impaired water bodies in the watershed. Over the last eight years, the population grew by over 100,000, the Riverside projected the population in this area will reach approximately 290,000 in 2010, meaning the population has almost doubled in 10 years.

With that growth came a lot of development, which usually means increased impervious surfaces and human activities that result in unnatural amounts of stormwater runoff during dry periods. And increased stormwater runoff during storm events, all which convey pollutants to the receiving water. This table shows the number of pollutants identified as causing impairment has increased with each iteration of the 303D list. The most current iteration is the 2008, then followed by the 2006, identified in black line, each one of the white squares with an X is a pollutant water body combination that has been listed as impaired for that given year.

Pollutants typically associated with human activities are becoming more prevalent with each of the listings. For example, Pyrococcus, a pesticide known to be used for residential and commercial landscaping applications, fecal indicator bacteria, E-coli and fecal commonly associated with pet waste. And nutrients,

nitrogen and phosphorous, which are often linked to fertilizers used for landscaping applications.

Now, looking at the Benthic Macroinvertebrate Analysis, we see that these impaired water bodies are also suffering from impaired beneficial uses. It becomes clear that water bodies not affected by urban runoff are not subject to the same degradation. The same way the coal mines have canaries, streams have bottom-dwelling bugs and larvae that integrate the effects of multiple stressors and can tell us a great deal about the overall condition of a stream. Certain species are extremely pollutant-sensitive, whereas others are more tolerant.

By looking at a series of metrics like species distribution, abundance, richness, and diversity, you can characterize water quality conditions into what's called an IBI score, which stands for Index of Biotic Integrity. IBI scores range from 0 to 100, with 0 being the worst and 100 being ideal conditions. The green squares you see over here are monitoring station samples through our surface water monitoring program, or SWAMP. The blue circles you see here are monitoring samples as part of the co-permittees existing monitoring program. Both the co-permittees and SWAMP monitoring programs include reference stations. These are stations that remain largely undeveloped or subject to pollution. The water

shed currently has two reference stations. One in Adobe Creek in Riverside County, and one in Roobarb Creek, which is in San Diego County. The next slide shows the IBI results at various monitoring stations. As you can see here, Roobard Creek and Adobe Creek the reference stations have IBI scores that are fair and good, respectively, indicated by the fair being yellow and good being green and both show a slight improvement in conditions over time. The station at the base of Murrieta Creek, which would be right here, shows a consistent decline in conditions since 2006 from poor in orange to very poor in red. Likewise, at the base of Temecula Creek, that would be this station right here, and this data right here, there's a slight drop from "poor" to "very poor" since 2006, and then at the Santa Margarita River monitoring station at the county line, there is also a decline to from "poor" to "very poor" conditions since 2004.

Overall, the IBI scores provide further evidence of the water quality conditions in urbanized areas have declined from poor to very poor while reference stations have remain relatively consistent. It also underscores the need and value of monitoring data. We couple this monitoring data with the observations and complaint investigations and we can make some conclusions as to

what is causing these deteriorating conditions. We have drafted the tentative order accordingly to address these issues. This concludes my statements of the watershed report. Now, Ben Neill will be providing information on the status of compliance, the permitting process, and one of the key issues.

MR. NEILL: Thanks, Chiara. My name is Ben Neill, and I am an engineer working for Chiara in the Northern watershed unit, and I've been the lead staff member writing this permit. This is the last of the three counties in our region to go through the NPDES permits. These are national pollutant discharge elimination system permits required by the Clean Water Act, of the 3 counties, San Diego, Orange and Riverside County. They've had these permits over the past 20 years. We finished the San Diego permit in 2007. We finished the Orange County permit a year ago in December 2009. And this will finish the Riverside County permit. Each one of the counties, it's the 4th time of being reissued. And this permit will replace the current permit, which was adopted in July of 2004. I want to start out by describing to you some the co-permittees' compliance history with that permit since 2004.

In September of 2007, in January of 2008, a contractor for the United States Environmental Protection

Agency evaluated the stormwater programs for each of the co-permittees. Results of these audits identified several adverse findings with their programs. For Riverside County Flood Control District, the evaluation identified 5 adverse findings with the permits development planning requirements, including two of their county departments that had not adopted or otherwise implemented the requirements.

The evaluation found 10 adverse findings with the permit's monitoring requirements, including a failure to analyze the monitoring samples for pollutants that are expected from municipal discharges, but rather analyzing the monitoring samples for pollutants that are expected from steam electric power generating plants. For the cities of Temecula and Murrieta, the audits found similar adverse findings for their development, planning, and monitoring programs, and also found adverse findings in their construction oversight program, including several sites that were not properly implementing pollution prevention controls.

Now, after further investigation by Board staff, a few enforcement actions were issued. Notice of violation was issued to the co-permittees in 2008 for their lack of monitoring, and again in 2010 for continuing failures in properly conducting their

monitoring programs. In June of 2008, the County of Riverside was issued notice of violation for deficiencies in their development planning program. Upon further investigation, an administrative civil liability was assessed and settled for $230,000 in May of this year.

The City of Temecula had received three notice of violations over the last permitter at some individual city construction projects for MS4 permit violations. So with the results of those audits and the compliance history in mind, we started the process of reissuing the MDSP permit. Our objective with the permit was first and foremost, to have a permit that fulfilled the Board's mission to the people of California that reserves and enhances and restores the quality of water resources.

To achieve that we needed a permit that could easily assess compliance with clear measurable performance criteria, and that's achieved through action levels and monitoring and design standards, and the permit needed to address any known deficiencies in the co-permittees' programs, bring them up to the standard of expectations found throughout our region in the other counties. Also, this next permit we took the opportunity to seize any improvements we could by recognizing the co-permittees' existing programs.

To start the process, in September of 2008,

we held an initial meeting with the co-permittees to discuss their waste discharge submittal, which was then submitted in January of 2009. The current permits, 2004 permit, 2004 expired in July of 2009. Last year in December, the Board adopted the Orange County stormwater permit, which established the standards of expectations for subsequent permits throughout our regions. In February of this year, we gave the co-permittees our comments on their reported waste discharge.

And at that time the co-permittees approached us requesting to take a different approach for permit reissuance that was not used through the Orange or San Diego County permit process. To do that we have held a series of meetings with the co-permittees 17 times discussing every component of the permit. And we discussed some of the issues multiple times. These meetings were generally held once a week in Temecula and lasted about four to six hours. After having these meetings, we issued the tentative order for public comment on July 23rd looking towards a Board adoption meeting in October.

We held two more meetings with the co-permittees before written comments were due on September 7th. Of the written comments we received, we had 13 comment letters. We had around 350 comments with the bulk of the

comments, about 240 of those comments coming from the County Flood Control Districts. On September 29th, we released our draft response to the written comments, and following the cancellation of the October Board meeting, we thought it was an opportunity to meet again an additional four times with co-permittees in Camp Pendleton to try and resolve any continuing outstanding issues.

In particular, we felt there was an opportunity to resolve any lingering doubts about the low-impact development requirements, which is the first of the key issues that I will be presenting. First, I want to explain what low-impact development is, and it's using site planning and small distributed natural systems. It treats the stormwater runoff at its source prior to the runoff, the polluted runoff, discharging to the storm drain system, and ultimately, receiving waters.

An example of this is on your screen. We have a pervious statement, where on the right is the pervious statement where the rain water soaks into the pavement, and then on the left is an impervious statement, where the rain water runs off the side with the pollution into the storm drain system, and ultimately, the creeks and rivers. Another example is the green roof system; a vegetative roof provides some retention through the vegetation and the soil substrate, and it also treats any runoff through

pollutant uptake in the plants.

And the final example I'll show you is the infiltration swell where the stormwater would go into the infiltration swell and infiltrate down into the groundwater. And that's the one I would like to talk the most about here is because both have development and infiltration in particular has great potential in Riverside County. And we have seen some progress in Riverside County by developers in low-impact development.

Infiltration largely depends on soil types. The soil types, define soil types as 4 general types of classifications, A, B, C, and D. A, B, and C type soil is generally good for infiltration, can do infiltration. D type soils really don't provide much infiltration. So this map shows the soil types in Riverside County. And we're seeing B and C type soils. We see one area in D type soil in the right-hand corner, southeast of where we're meeting. That's primarily the Pechanga Indian Reservation and the future Liberty Quarry site.

Also, one other thing that is different about Riverside County and Orange County is that Riverside County still has some areas of land that could be developed and still have opportunities to implement low-impact development. So we received comments about low-impact development from the USEPA, the Natural

Resources Defense Council, the co-permittees, and Camp Pendleton.

To summarize those comments, the USEPA thought that our requirements be more consistent with the national standard and with the other adoptive Southern California permits, including the Boards, Orange County permit that was adopted last year. The NRDC asked for a larger sizing criteria for the biofiltration systems. County Flood Control requested LID requirements that examined technical infeasibility of infiltration and not other retention practices. And Camp Pendleton gave us a brief comment letter that said that the requirements might potentially impact their water rights. Although they support LID, they were concerned that retaining water at the development in the upper watershed would potentially deprive runoff to the Santa Margarita River that ultimately provides the camp's water supply.

We reviewed the documents that they provided and did some general runoff calculations on our own, we found their concern was not substantiated or sufficiently conclusive or persuasive to us to warrant further changes. Nevertheless, the permit does contain language protective of water rights within the permit's legal authority. Also, at the Camp, specific requests in their written comment, rain water harvesting practice are

encouraged, rather than mandatorily required at all development projects.

Throughout the comments and discussions, there really was not an issue with the first box, which is requiring a retention standard. There was a lot of discussion of focusing on two questions. First, what does it mean to be technically feasible, and what do we have to look at to determine feasibility. And then the second question, what is an appropriate design standard for biofiltration.

So to answer those questions, we took a middle ground in the errata, and we proposed requirements that are functionally identical to the requirements found in the Orange County permit adopted in December of last year, and also found in the neighboring Region 8 Santa Ana Water Boards permits for both Orange County and Riverside County. Those requirements say that a site must be designed to retain without runoff the 24 hour 85th percentile storm event, which is about 0.6 inches as defined in the 2004 permit.

The requirements also give a preference to infiltration over other retention practices in deference to Flood Control's request. The overall retention is the most effective method at pollutant reduction, and is widely required throughout the United States. If

retention practices are found to be not technically feasible at a development site, and a project can go on to the next step and look at biofiltration practices. And then lastly, they can examine conventional storm water treatment devices with appropriate mitigation.

So to summarize the permit's requirements for low-impact development, they protect water quality, they protect downstream water rights holders, they have clear measurable performance criteria that's easy to assess compliance for us and the dischargers. And the requirements provide a solid foundation for the future regional stormwater permit. So now I'd like to turn the podium to my colleague Chad Loflen to discuss monitoring.

MR. LOFLEN: Thank you, Ben. My name is Chad Loflen. I am the environmental scientist in the Northern watershed units, and I have taken the oath. So first I'm going to talk to you about the monitoring and reporting program in the tentative order. Also, I generally refer to the monitoring and reporting program as the "MRP." The monitoring program, the same thing. You can see in this slide that I'm calling the MRP into action, when compared to the MRP in the current order, and I'll explain what that means during the course of my presentation.

This picture was taken in Red Hawk Channel back in January of 2008, following approximately a 10th of an

inch of rain, and you can see MS4 discharging to Red Hawk Channel. So first, I'd like to start off with some history of MRP's and MS4 permits. Back in October of 2001, a Senate bill was passed that required the State to develop minimum standardized monitoring requirements and protocols for MS4 permits. As a result, a technical committee composed of Southern California Regional Boards, various co-permittees, including Riverside County Flood Controls.

And other stakeholders developed a model monitoring program for MS4 in Southern California. This was developed and released in August 2004, after the adoption of the current order and MRP. The technical committee asked a question, why require a monitoring? Well, from a Regional Board perspective, monitoring is done to assess conditions of receiving waters, and to assess if these conditions are getting better or worse. These are all the questions that the co-permittees should be asking through the course of their monitoring program.

Additionally, and importantly, the co-permittees monitor so they can take actions to protect and improve water quality. These actions include the identification of the sources of specific pollutants, the detention and elimination of discharges prioritizing areas that need management actions; implementing required BMP

improvements, and measuring and improving the programs continuously.

For example, this picture shows hydromodification and impacts to beneficial uses that are occurring downstream of these culverts. For example, monitoring could be done to determine what actions the co-permittees can and should take to improve these beneficial uses to prevent further degradation. The model monitoring committee combined these questions and action to create a basic flow process for MS4 permit monitoring programs.

MS4 monitoring programs should go through a process of continuous assessment and actions. First, they should assess the condition of the receiving waters, looking at what pollutants are present, their toxicity, what their IBI scores are, hydromodifications presence. Secondly, they should be assessing their MS4 discharges for what pollutants are in the discharges, what the loading of those pollutants are, and also those hydromodification problems.

Third, they should be conducting the source identification to identify the source of these pollutants in the MS4 system. And subsequently taking management action to reduce and eliminate those pollutants. And they should be continuing this process while measuring the outcomes from those management

actions that they have taken. This is also called adaptive management. But the Orange and San Diego County MS4 permit monitoring programs go through this entire process. However, this plan represents the stage of the existing MRP for the Riverside permits. Currently, no MS4 discharge monitoring of stormwater or multiple water flows is required. Additionally, source identification requirements are extremely limited. This makes the selection of successful management actions very difficult. And it also arguably makes the evaluation of outcomes from management actions nearly impossible to determine.

Now, two scenarios, unfortunately, arise from this situation. First, management actions are not implemented, because there's no reason to implement them, because nothing is detected. And this does not improve water quality. And secondly, management actions are implemented, but they run a high risk of insufficiency and misapplication. This can result in waste of the costs on unnecessary or inappropriate BMPs.

So unfortunately, as I've already shown you, the existing MRP has some shortcomings. First, and perhaps most importantly, there is no MS4 discharge monitoring required for either stormwater or non-stormwater. Additionally, there are shortcomings in the receiving water monitoring. First, the design of the monitoring

program has a mass loading station focus. While mass loading stations are a crucial aspect of monitoring programs, there really is not an adequate watershed approach in the current MRP, and a watershed approach is found in the current MRP for Orange and San Diego Counties.

There are also the compliance failures by the co-permittees that have been touched upon pretty quickly. While valuable monitoring data has been collected during this last permit cycle, there have been some problems. Primarily, they did not collect composite samples for storm events. They did not monitor their required number of storm events, including the first storm event of the season, and they did not monitor for some pollutants, and therefore, did not conduct any follow-up monitoring at later storm events. The inadequacy of the MRP itself, and the compliance failures for that MRP were reflected during USEPA's audit back in 2008. The audits found multiple shortcomings. First, they found that the design and implementation status of the monitoring program was inadequate. They also found that the flood control district acknowledged this assessment.

And they also found that the flood control district stated that they only attempted to meet the minimum long-term requirements in the order, simply

because they were minimum monitoring requirements. What that basically means is they did the monitoring for the sake of monitoring. They didn't do any, didn't take any action above and beyond what was required with that monitoring data.

So the MRP, under the Tentative Order represents the shift to action. It fixes the inadequacies of the existing MRP, and it tells the co-permittees specifically how to monitor and what action to take. First, the compliance failures have been addressed by requiring more focus for receiving water monitoring, including special studies, and by including more specificity in the monitoring requirements. This specificity is to ensure the required balloons are monitored at the required frequencies using the correct methodology. Second, the sampling of MS4 discharge during storm and non-stormwater conditions -- storm and non-storm conditions is required.

There are also actual levels associated with the monitoring before MS4 is discharged. Third, there is more focus in watershed sampling efforts, which is reflected in the additional receiving water monitoring requirements and source identification requirements. Fourth, the results from the monitoring are tied directly to required actions in form the BMPs, management action service to improve your programs. These are action

levels, triad, and source identification. These drive the additional BMP implementation requirements. And lastly, the monitoring program has been improved to be consistent with the Orange and San Diego permits as appropriate.

What I mean by this is that the MRP has been scaled in accordance with the co-permittees' compliance record and watershed characteristics, not their budget. However, we have made cost considerations when drafting the Tentative Order. It will be clearly recognized that existing MRP has significant shortcomings, which to remedy requires additional monitoring records. However, we have made attempts to reduce costs where appropriate. We have pushed back dates, required dates for monitoring elements in order to delay cost of the -- we have focused on the compatibility of monitoring elements. It's a streamline monitoring. We have also provided regional options. The co-permittees may propose for executive officer approval, participation in the regional monitor program to replace existing monitoring requirements. In fact, this is already reflected in the tentative errata that we have reduced stream assessment monitoring at the co-permittees' request in exchange for their participation in the Southern California regional bio-assessment monitoring effort.

We have included special studies that are important but also flexible and adaptable. We actually removed the special study prior to release of the public order, public draft. And we have reduced the required frequency of monitoring of some pollutants. Lastly, there is no required ocean or lagoon monitoring in this MRP. The Orange and San Diego MRP both require ocean, bay, and lagoon monitoring. The co-permittees do discharge to the Santa Margarita Lagoon and the Pacific Ocean. But no monitoring of further discharges is required. So in summary, this MRP requires a response to monitoring results. It's consistent with federal and state requirements for long-term programs and NPD'S programs. And it will enable staff to assess compliance with the Tentative Order. Lastly and most importantly, it's necessary to protect and improve water quality.

So next I will move onto another key issue, over irrigation. The co-permittees oppose the removable of landscape irrigation, irrigation of water -- lawn watering, collectively referred to as over irrigation. From the list of discharge categories, not prohibited from discharging into the MS4. So this is non-stormwater discharge. So unlike stormwater, non-storm discharges must be effectively prohibited unless they are specifically exempted. Over irrigation is currently

exempt under their current order, and co-permittees assert that removing this exemption is not justified because a direct link between pollutants and irrigated runoff and receiving waters have not been established by the co-permittees. They've also voiced concerns regarding the prohibition requirement of over irrigation natural prohibition. Staff contend that the process raised by the co-permittees on over irrigation are not warranted, and we find over irrigation to be a pervasive problem, and a source of pollutants throughout the region.

And as an example of this, this picture was taken during the middle of the summer within the city of Murrieta. And this is an example of some over irrigation occurring at houses upstream, and running down through the MS4. So let me first clarify that the removal of these categories are not prohibited irrigation activity. Properly implemented irrigation should not result in discharges to the MS4. When irrigation practices are not -- are improperly implemented, this is what results.

The runoff conveys pollutants such nutrients, pet waste, and fertilizers into the MS4, which is subsequently discharged into receiving waters. So to illustrate my earlier point about a region-wide problem, look at where these pictures were taken. The picture on

the upper left was taken in Indio, which is in Riverside County, but not within Region 9. The picture in the middle was taken in Mission Viejo, in Orange County, and the other three pictures were taken within the jurisdiction of cities within Region 9. And it's important to note that these are not one-time non-spill water discharges. These occur on a frequent basis.

And they're region wide. Here are some residential areas of Orange County, Riverside County, San Diego County. Again, to illustrate my earlier point, the one on the left is Orange, the middle is San Diego, and the right is Riverside. And if you look closely, you can actually see in satellite imagery evidence of non-storm water flows, neither likely from irrigation. It's also not limited to residential development throughout our region. The commercial development is included. So here are some commercial areas, from Orange County, Riverside County and San Diego County, and again, you can't really tell them apart. Dana Point in Orange County on the left, Murrieta, Riverside County in the middle, and Poway, San Diego County on the right. And these all have evidence of non-stormwater discharges in the MS4 likely from over irrigation.

Lastly, I'd like to point out that the California Code of Regulations requires municipalities to

have a model water efficient landscape ordinance. And this requires -- model water efficient landscape requires the municipality currently to prohibit over irrigation activities. While the purpose of this prohibition is to prevent the waste of water, the department of water resources did document benefits of the prohibition due to pollution prevention.

So to summarize over irrigation, the source and conveyance of pollutants region wide. These pollutants include nutrients, indicator bacteria, and pesticides. With the Santa Margarita hydrologic unit, there are 3O3D listings for nutrients, indicator bacteria, and toxicity. The co-permittees already have existing ITID programs in place, as required under the current order, so the prohibition would just incorporate that non-stormwater discharge into their existing IDID programs. They're already required to prohibit over irrigation pursuant to California Code of Regulations. And this a necessary step to improve water quality. So that concludes my portion of the presentation. I'd like turn it over to Wayne Chiu, who will discuss economic factors.

MR. CHIU: Good morning. My name is Wayne Chiu, and I'm one of your water resource control engineers. I have taken the oath. I will be discussing the economic factors that were considered during the Tentative Order.

First, I would like to inform the Board about what the federal and state laws requires you to consider, in terms of economics, when developing the Tentative Order.

The Federal Clean Water Act does not include any requirement to consider cost and development of an NPDES permit. The San Diego Water Board is required, regardless of cost, to develop and adopt a permit that is able to implement the Federal Clean Water Act. Ms. Hagan provided to you in her memo, which is Document No. 12 in your addendum material, her legal opinion about the San Diego Water Board's obligation to consider cost in the development of the order. In short, her legal opinion is that state and federal laws forbid the consideration of economic hardships if doing so would result in a dilution of the Federal Clean Water Act.

That said, we did not completely disregard the current economic conditions and hardship that are being experienced by co-permittees. In fact, we fully considered the economic conditions and economic information the co-permittees provided to us. We've gone to great lengths to be sensitive to their economic concerns and hardships, but not at the expense of having a permit that will not be protective of water quality. As many of you may recall, and it's been noted earlier, the Orange County MS4 permit was adopted by this Board in

December of 2009.

The process that led up to that adoption took over 2 years to complete. During that time the Riverside County co-permittees were involved in the full participation process for that permit. They were informed on several occasions during the process that many of the requirements from the Orange County permits would likely be included in the next generation of the Riverside County MS4 permit. Given the amount of time that it took to adopt the Orange County permit, we wanted to avoid another long and drawn out permit renewal process.

So while it was still fresh in the Board Members' minds, the original schedule was to release, for public comment, a draft of the Riverside County permit that was essentially the same as the Orange County permit in March, and bring it to the Board for adoption in June of this year. If we had done so, this slide shows the dates that deliverables from that original version of that tentative order would have been due. The original due dates would have provided Riverside County co-permittees the same amount of time given to the Orange County co-permittees for most of the deliverables.

Also, it's been informed of you earlier in February, before the originally scheduled release of the

tentative order, the co-permittees met with our Executive Officer, Mr. Gibson, and requested that they be allowed to meet staff, meet with us on a staff level to review the tentative order and to, "close the gaps" and try to reach consensus on the controversial issues as much as possible. Mr. Gibson agreed to the request with the understanding on all issues may not be achieved.

Mr. Gibson directed staff to meet with the co-permittees to try to close those gaps, which we did on a weekly basis for 4 months delaying the release of tentative order for public comment from March to July. We practically discussed every line of the tentative order during that time. In all, in February, we have held well over 20 meetings with the co-permittees to discuss their concerns. An our goals for many of those meetings was to try to find ways to minimize the cost increases to co-permittees, while including enforceable permits provisions and requirements that will improve the co-permittees' programs to be more protective of water quality.

Based on the discussions during those meetings, we made several modifications to the due dates deliverables required, and you can see on this slide, which is also supporting Document number 10 in your addendum materials. We delayed most of the major

deliverables by a year or more. As Chad mentioned earlier, we also removed a special study from the monitoring and recording program. These were all due dates to modifications agreed to by the co-permittees during our meetings. We tried to provide the co-permittees as much time as possible to develop and implement these permit elements while still requiring them to be implemented within this permit cycle.

These new due dates provide the Riverside County co-permittees considerably more time to complete these requirements than was provided to the Orange County co-permittees for the same requirements. By delaying these deliverables, the co-permittees have been given more time to secure the resources and the ability to stretch out the cost for a longer period of time for the development and implementation of these permit elements. We did a lot to accommodate the co-permittees' economic concerns and hardship in many regards with these new deliverable due dates. Not only did we change the deliverable due dates, but we also made several modifications to the tentative order that reduces the scope of some of the elements of the stormwater program, and allow some of the co-permittees more flexibility to prioritize their efforts.

The tentative order has been also been modified

to allow co-permittees the ability to utilize the work already completed by other counties in the region, or work already in progress to meet the requirements of the MS4 permit in the Santa Ana Region. Many specific examples of the changes that we made are listed on Pages 3 and 4 of the Executive Officer's Summary Report. In addition, we worked with co-permittees on the Santa Ana Water Board to streamline the regulation of the cities of Menifee, Murrieta, and Wildomar. So they will be regulated under one MS4 permit.

This will save the cities from having to duplicate many of their reporting requirements, and eliminate the complexity of having to implement the requirements of two MS4 permits in different parts of their cities. The MS4's in the cities of Wildomar and Murrieta will be wholly regulated under this permit. And the MS4 in the city of Menifee will be wholly regulated under the MS4 permit under the Santa Ana Region. The written requests from the cities in the written agreements between the Santa Ana and San Diego Water Boards for this regulatory swap was provided to you as supporting Document No. 6 in your agenda materials.

So we have gone to great lengths to try and minimize the potential costs of the co-permittees will have to extend to improve their stormwater management

programs. We have made several modifications that allow the co-permittees to utilize their resources in the most efficient way possible. If you also take into account the amount of time that the Riverside County co-permittees have had based on the information they received during the Orange County permit public participation process, they have had almost three years to anticipate and prepare for the requirements on the tentative order.

And now they will be given more than a year before they are required to implement many of the requirements in the tentative order after it is adopted. As you've heard, the co-permittees currently do the minimal possible, and in some cases, have done less than what is required, which has resulted in several enforcement actions. Much of this happened during a period when there was significant economic growth and the economic conditions were very good. When economic times were good, they did not amend their permit to include the requirements, but they had an opportunity to take advantage of their economic windfall to improve their programs to be more protective of water quality, or at least prepare for times of economic hardship.

Unfortunately, they did not do so, and chose to continue expending the least amount of resources

necessary to do the minimum required under the current permit. It's unfortunate that now the economic conditions have deteriorated. The co-permittees, however, continue to discharge waste, and what the significant increases in development they have experienced, and are projected to experience, they are discharging more waste from under their program than ever before.

We would like to believe that they would improve their programs on their own, given the chance, but they have demonstrated on several occasions that they will not improve their programs to be more protective of water quality, unless it is specifically required in the permit. We understand that these are challenging times to have a new permit with new permit requirements. To fully consider the economic information provided to us, we have made many modifications to allow the co-permittees to minimize the increases in cost as much as possible.

Where we have made modifications, we have provided co-permittees more discretion to prioritize their effort and to find efficiencies within the programs that can minimize those additional costs. As with every permit renewal, and as the co-permittees will likely tell you, there will be an increase in the cost to implement requirements of the Tentative Order. The co-permittees will likely tell you how significant they believe those

costs may be, and inform you of their economic hardships. We understand this is a time of economic difficulties.

We work with co-permittees on a weekly basis or monthly to make any modifications that we could to the Tentative Order to try and minimize the increases in costs. Unfortunately, we could not close all the gaps, and the co-permittees continue to advocate a reduction or elimination of many permit requirements due to economic hardships. Your economic hardships, however, should not, and according to the Clean Water Act, cannot be a reason to reduce or eliminate permit requirements that are necessary to protect water quality.

To close our presentation, I would like to remind the Board of our mission, and the reason why this permit is necessary. Our mission is to preserve, enhance, and restore the quality of the region's water resources for the benefit of present and future generations. Our agency is also responsible for issuing permits that implement the NPDES requirements of the Clean Water Act. The objective of the Clean Water Act is to restore and maintain the chemical and physical and biological integrity to the nation's waters.

In short, our function, and the function of this permit is to protect the quality of the waters in our region. We want to see our waters to look like the

pictures on the left, and try to prevent our waters from becoming pictures like pictures on the right. You've seen evidence that the water quality in this part of our region is showing signs of degradation, and by an assessment standpoint, they will point to water quality as getting worse.

You've heard that the Riverside County co-permittees are lagging behind the other counties in our region when it comes to implementation and monitoring requirements in the current permits. And the stormwater management programs are not adequately protecting water quality. We need the co-permittees' programs to improve significantly if the water quality in this part of our region is going to get better instead of getting worse.

This tentative order is a permit for the discharge of waste. Discharges of waste from the MS4 are required to have an MPS permit, which are issued by this Board. The California Water Code clearly states that the discharges of waste is a privilege, and not a right. In order to have this privilege, discharges of waste are responsible for meeting requirements of their permits, and try to do more when necessary, to make sure their discharges do not degrade water quality.

What you have before you today is the permit

that is substantively the same as permits already adopted in Orange and San Diego County. The provisions and requirements in the Tentative Order are all necessary to improve the Storm Water Management Program in Riverside County to become more protective of water bodies, and to bring them up to the same level of effort that is already required of the other counties in our region.

The adoption of this program will take us one step further toward fulfilling our mission in meeting the objectives of the Clean Water Act, while still providing the Riverside County co-permittees the time to develop their resources, to make the changes necessary to improve their program. Today the Board will receive testimony regarding several elements of the permit. And we ask that you allow us time to provide responses as well as time for us to make any necessary closing remarks. We also provided the Board with our recommendation regarding the adoption of tentative order No. R9-2010-0016 with our closing remarks. Thank you.

MR. DESTACHE: I want to thank the Staff for your report. I think we're going to take a 10-minute break, and then go into the Riverside presentations. It will give everyone a chance to have a nice break.

(Recess)

MR. UHLEY: Good morning, Chairman Destache and

Members of the Board. My name is Jason Uhley. I'm a chief of the watershed protection at the Riverside County Flood Control and Water Conservation District, and I have taken the oath. Today was my intent to lead the joint presentation on this MS4 on behalf of the cities and county that are named in the tentative order, including Riverside County, Wildomar, Menifee, Temecula, and Murrieta. However, we originally intended to have our elected speak first, but listening to the staff presentation, I was really a bit disheartened by what I viewed as an attack on us, especially after we just spent so much time working collaboratively with the Board in trying to develop a good permit for this region.

And so if you don't mind, I'd like to take a few minutes to respond to some of the issues raised in the staff presentation, because I think there were some things said that were not true and that really mischaracterized what we are trying to do in Riverside County. I'd like to start out by talking about our monitoring program. One of the things stated several times is that we're doing the absolute minimum and nothing more, and when we were asked to improve, we resisted. And that is absolutely not true. Just as a few examples, there's a group called the Southern California Regional Monitoring Coalition the staff referenced there. The group in the

counties and the regional boards get together to basically develop monitoring requirements and monitoring programs and monitoring standards that we can all implement so we can effectively gather and use data.

And one of the programs that group came up with is called Regional Biomonitoring Program. And that program was intended to be implemented in all the regions and intended to be incorporated into -- a permit to be ultimately into our permits. That program started two years ago. We voluntarily started implementing that program ahead of our permit in recognition that this was something that was necessary for us to learn more about our watersheds and take action to better improve our program. And I want to be very clear in stating that our goal always has been and continues to be to improve.

As a matter of fact, when I started working in the NPDES section back in seven years ago, one of first things I realized was that I was an engineer, and I didn't know everything. I made myself go back to school to get an MBA. I realized working in this program, it affects almost every aspect of local government, and I realized for me to do my job well, I needed to understand government at a higher level. So I personally invested the time to get an MBA to try to better understand how we could use government and use resources to improve our

programs and continue to protect water quality.

Another example of some of the things we've been doing ahead of the permit and as necessary to protect water quality is aligning our program with SMC programs. One of the things the staff noted in their presentation was that the SMC developed a monitoring program that came on board after our MS4 program was adopted. Our MS4 program was built on a much earlier draft of that that included less monitoring. And one of the things we did three years ago was modify our monitoring program to be consistent with the final guidance that was developed by the SMC.

And that final guidance required us to do additional monitoring, more monitoring in both dry and wet weather than what was required in our order. And so by no means did we try to hold the minimum bar. The third thing I noted there were several points raised about our monitoring program with regard to our ability to comply with it. And I would point out that in 2004 when this permit was adopted last time, as well as this time, monitoring is one of the key issues. And we'd identified at that time that we would have issues with the monitoring program, and we asked for some changes. And we got some of what we wanted, but not everything.

But I would point out that we've been 98 percent

compliant with that monitoring program. The issues that were raised about that monitoring were either one time mistakes or were human error, or very minor; we failed to collect the data, or we failed to collect it for a storm. Riverside County is very unique, in that we've got a lot of mountains, a lot more ORIF graphics, the ORIF graphics affect the ability of efficiency like the national weather service to predict rainfall. And that's one of the problems we had is mobilizing. When do we mobilize? And so we've had issues with trying to get out at the right time.

How we used to do the monitoring was by having staff go out and sit and wait for a storm. We've modified our program, so we're using automatic samples so we could be better than that. And so we've fixed those types of problems when they're raised. So I want to be very clear, we're not static. I'd like to point out a couple of other programs where we've made some substantial changes ahead of the permit. We've tried to be very proactive in managing our watershed. The second item I'd like to raise, is the Santa Margarita River region integrated regional watershed management plan.

Now, you guys may be familiar with the integrated regional watershed management plan. I know San Diego County's put one together. We've put one

together. And I know Orange County's put one together. I know there's been presentations to your Board about those plans. One of the things that's unique about this region is that when we put our plan together, we had a bifurcated watershed. Because Riverside County was putting a plan together to try to manage water resources in the upper watershed; San Diego County had a plan to try to manage resources in the lower portion of the watershed.

We worked with San Diego County to develop a mechanism to merge those plans so that we could manage the watershed as a whole. And the development of that plan was a requirement of the permit. The actions to try to make sure we were doing a thorough job of managing our watershed weren't required by the permit. That was something we took on our own because we realized it was necessary to achieve our goal to developing a community for our residents that was livable.

And finally, I'd like to talk about what I think is our crown jewel of our program, something we've done well for the last five years. And that's our efforts to initiate low-impact development well ahead of any permit requirement. And if you look at on the slide before you right here, there's a kind of circular diagram, which is kind of very -- if you heard of continuous improvement,

it's a kind of an example of a program that's designed to have continuous improvement. And I want to talk about what we've been doing in our county to incorporate LID, so that developments are protective of water quality.

It starts five years ago when our Board recognized that post-construction BMP's that were required in new developments were ultimately our responsibility to maintain. Ultimately, if those BMPs that are failed that we tell the developers to put in, the developers are not on the hook for that, we are. So our County Board of Supervisors said we need to take ownership of this. We need to take responsibility for this.

And so they gave direction for our staff to do three things. One is they said, "We want you to develop a manual that will provide for consistent and effective deployment of BMPs," so that we know when we tell someone to do something it's going to work. Second thing they told us to do is it to develop a prioritization scheme so that we used the most effective BMPs first. The third thing they told us to do was to develop a public maintenance mechanism, because one of the things we recognized is that the common practice is to require the developers to do things, then leave them to private maintenance. And that's typically a recipe for failure.

So for the last five years we've been developing

this manual, and actually kind of testing the manual as we go. It was noted by the Regional Board staff, they saw some examples of LID on our county. That's because we are trying to teach ourselves how to do this. We're asking developers, "Hey, can you work with us. Let's try this out and see if we got it right." And so we've even started to implement these things ahead of our final plan.

But the last piece of this was the public maintenance mechanism. And that was to ensure that these things would be operated and maintained for the life of the development. And none of this was required by the permit, and none of this is being done by any other county in California. So what we have here is, the first piece of that is this lifecycle we were looking at for development, because we didn't want to just put a plan out. We wanted to make sure that our plan would be effective and approved.

And so we started out with our design manual, which we've been researching for the better part of five years. We have talked to every agency throughout the U.S. who's ever put a manual together in trying to research how to do this right. This manual will be produced at the end of this year. As a matter of fact, the reason it's not out now is because we've been working

on this permit and trying to get this permit right first. The second thing we did was the public maintenance mechanism. The third thing we did, we wanted to make sure the manual we put together was effective. And so we're spending $3,000,000 on a low-impact development BMT testing and demonstration facility, so we can verify that the BMPs that we're putting in the ground and requiring of the developers are going to net the benefits that we're expecting.

And once we collect data from this facility -- again, this is a monitoring project. Once we collect data from this facility, we will then be able to go back and look at our program, look at our maintenance mechanism, look at our BMPs and figure out what we need to do to improve them, to make them work better, so we can continuously improve water quality. And so I'm sorry to have to do this, but I just really felt that I had to respond to the staff presentation. It really kind of caught me by surprise. If it's okay with you, what I'd like to do is return and allow our electives to speak.

MR. COMERCHERO: Good morning. My name is Jeff Comerchero, and I'm the Mayor of the city of Temecula, and I have taken the oath. Before I get into my remarks, though, I would certainly like to welcome you all to our fair city. We're glad to have you here, and we're glad

that you decided to conduct this meeting here within our city. I would like to address some of the issues that we find critical in terms of this Tentative Order in the City of Temecula and in fact the cities of the region. I'd like to give you a little bit of background about who we are and where we've come in the last 21 years since our incorporation in 1989.

We incorporated with approximately 28,000 people. Today we have 105,029 people. So, obviously, we've experienced dramatic growth in the last 21 years, and we're virtually built out at this point. We'll never see again the kind of growth we saw in the boom of 2000 to 2007. The main reason we're confident in saying that is we just don't have the land anymore to accommodate that kind of development. This city has been well planned, and has always adhered to the environmental standards that we feel are necessary in order to produce a balanced community. We just don't have the same types of environmental issues that larger, or more importantly, older cities face that were developed during the times when we didn't have that same sense of awareness.

We pride ourselves in our strong commitment to these well-balanced communities that integrate responsible growth with environmental protection. There are six natural water courses that meander through our

city, although they're dry most of the year. We strongly believe in keeping them clean, and we make every effort to eliminate pollutants from going into them.

Overall clean water is important to our city, and to our constituents. However, we have serious concerns with the expansion of the compliance requirements proposed in the tentative order. Temecula has not been immune from this economy. In 2007 our total general fund annual revenues were approaching $68,000,000. Today just three years later, we find an $18,000,000 shortfall compared to those numbers. That's a 26 percent reduction in the overall revenue that we have available to us to provide the level of services that are essential to our constituents.

We do five-year forecasting in our budgeting, and from what we see, 2011 and mostly through the next five years will be flat, although we do see some very modest increases in the out years. What have we had to do during the last three years to accommodate the shortfall in our revenue? Well, the most visual result that I can give you is that we've gone from 210 full-time employees to 158. That's a substantial reduction, and yet, we're still charged with providing the same level of services. I don't have to tell you what that means. We are all responsible in some way for the budgeting of our own

agencies. It's very difficult to make those kinds of cuts and be able to satisfy our citizens that we're still looking out for their best interest.

This Board deals with the critical issue of water quality control. And we have great respect for the work that needs to be done in that regard. We as cities must deal with many critical issues, and it takes a very delicate balance of budgeting in order to reach the goals and objectives that we all face. Contrary to what you heard earlier this morning, the City of Temecula has maintained compliance with the existing MS4 permit.

The staff estimated that our annual cost to comply with regional components of the tentative order is currently written, especially with all the new monitoring requirements and all the new special studies, is expected to triple. In like manner, our annual cost to comply with the non-regional components of the order will almost double. With these numbers, it will be impossible to maintain the other public services that we need to provide.

We believe the best approach to effectively implement these new requirements is a balanced approach where programs from both of our agencies do not have to compete against each other. You're going to hear in a few minutes presentation from the Riverside County Flood

Control and Water Conversation District. One of the things they will ask is that you and your staff work with us to make adjustments to the monitoring program, adjustments to the over irrigation prohibition, and refinements to the low-impact development, or LID language.

I want to make it very clear that we are not your adversary in this process. We all serve the same constituents. We are, in fact, your allies here. We want to achieve the same goals that you want to achieve with the tentative order. We just believe that we haven't gone far enough working together to minimize the costs of getting to those same goals and objectives. We have to do a better job collectively of balancing the needs of all of us. And with that, I would ask your staff to modify and find additional efficiencies that will improve our chances with successfully implementing this Tentative Order. Thank you.

MS. MOORE: Good Morning. My name is Bridgette Moore, and I'm Mayor for the City of Wildomar. I will provide testimony today on behalf of the citizens on this important matter. Wildomar strongly supports clean, healthy lakes, rivers, and streams. We understand that the federal regulations require that municipalities obtain a permit and renew it every 5 years. We

understand that each city must develop a stormwater management program designed to control the discharge of pollutants to and from the MS4.

We also understand that the purpose of a permit is to protect local water bodies, since storm drains typically dump water into the streams, bay, or ocean without being treated. The City would like to thank the Board and Executive Officer for commuting their staff time for a number of meetings with the City and fellow co-permittees in the development of the draft permit. This collaborative approach permit development is crucial to developing effective programs, and the City strongly believes that only through such effective communication and collaboration can our mutual goals of protecting water quality be realized.

As a result of the meeting, the permittees can reach an award, staff work together to develop language for consideration in the Tentative Order. We're most appreciative of the Board's staff consideration of allowing Wildomar to be regulated by one region with respect to the MS4 permit requirements. All of the city will still be mandated to participate in the Lake Elsinore, Canyon Lake TMDL as part of region 8. The option of having the entire city regulated by one region will greatly help the implementation of the permit

requirements.

While the collaborative discussions have been fruitful and have resulted in a draft-full permit. That is, improved early initial draft. We unfortunately, cannot support the tentative order as currently drafted due to one, the projected cost exceeding our available resources, and two, shortcomings in the permit language itself. At this time we need the Board's help, specifically, we need time, time to fully flush out the new permit language, some that has never appeared in MS4 permit before. And time to allow our city and economy to recover the devastating impacts of the recession.

Simply put, we cannot afford this permit as currently drafted. Wildomar is one of the newest cities, incorporating on July 1st, 2008. It is home to approximately 30,000 residents and 26 square miles. The adopted 2010-11 city budget reflects the harsh reality of a city having only 64 percent of our revenue that was shown the comprehensive fiscal analysis that we used for incorporation. The city is somewhat fortunate that we can adjust to the demands and services of available funding because of its contract service arrangements for the critical services of police and fire provided to our community.

However, unlike Temecula with the 210, or now

the 158, Wildomar has three employees, the city manager -- the city manager, finance director, and city clerk. All other services are provided by contract. Now, as an elected representative, I must balance the needs, all the needs that have come to us, and simply, we do not have enough funding to do that. While it is difficult to estimate the extra cost of the permit based on available budget assumption and level effort needed to implement and administer this permit currently as drafted.

The City's cost will be in the range of $250,000 to $350,000 for the first two years, and $150,000 to $250,000 in years 2 through 5. This cost was not contemplated in our comprehensive fiscal analysis that we use for incorporation. Where the corporation process has resulted in successes that should not be overlooked, the shortcomings have resulted in a permit that cannot meet its core purpose of protecting the water quality by virtue of not being economically feasible for the city to implement.

Besides this important issue, Wildomar is dealing with a parks issue. We have lost all our funding for our parks due to a lawsuit. We cannot take that money out of the general fund. We do not have it. We're currently keeping our parks open by fundraisers. We have a seven-year-old little girl out selling lemonade to

keep our parks open. In addition to, we've had 10 fundraisers in the month of October alone. We do not have the extra money at this time for this permit.

It is perplexing that the Board staff issues us a discount. The very real economic conditions facing the city, the county, and the nation. Several comments are particularly troubling, including claims that the permittees need to find room in the budget to save for the requirements of future stormwater permits. The permit requirements can be funded by reducing other discretionary expenditures. The economic figures provided by the permittees do not accurately reflect conditions at the Santa Margarita watershed.

I don't believe that any of us in this room could accurately forecast the depth of economic recession in which we currently find ourselves. Even the state water reserve control Board has been impacted by the economic downturn. The June 2010 Water Board strategic plan update states the following: "The Water Board has been compelled, as had most State agencies, to evaluate and update the plan based on various factors affecting the amount and nature of our work. These factors include worsening state budget issues, mandatory furloughs, new legislation, and shifting priorities. Such as adjusting state infrastructure needs; enter the American Recovery

Reinvestment Act of 2009. Consequently, completion of work and some of the actions identified in the strategic plan have been delayed beyond the timeframe specified in the plan, and shifts in priorities have been identified."

The City of Wildomar, too, has had to delay programs because of factors outside of our control. I do take exception to previous testimony regarding -- Wildomar's different. We've only been a city for two years. Saying that--Wildomar, we didn't incorporate in the good times. We didn't have money to put aside. So some of the testimony earlier simply does not apply to the city of Wildomar. Despite the noteworthy and important permit, the permit in the initial draft, the draft before you today remains far beyond economic reach of the city and the required adjustments.

Further, in as much as the requirements are unobtainable, and the public resources are spread too thin, the permit cannot and will not be effective in protecting water quality. The City of Wildomar respectfully requests that the Board direct staff to continue to work with the co-permittee with the specific assignment to identify ways to eliminate or delay costly requirements prior to considering adoption of the permit. Thank you in advance for your consideration of these

issues. We look forward for the opportunity to continue working with you, your executive director, and your staff on the refinement and implementation of this important permit. Thank you.

MR. LANE: Thank you, Chairman Destache and Board Members for allowing us to be here today. I want to agree with both the mayors before me who spoke, talking about being your allies being in support of what we have to accomplish. I'm not going to take too much time to add on to that. I want to get directly into our concerns. Our city staff has reviewed the MS4 permit, and we have some serious concerns about the financial implications. Based on our research, the new requirements will significantly increase the cities' program costs, and it is doubtful the city be able to comply with the MS4 permit as drafted.

I attended the Beacon Economic Outlook for our region yesterday. I was disappointed to hear that even their review was an economic recovery far into 2018, 2020 in this region. I keep hearing things from your staff and your presentations about challenging times, economic difficulty, economic hardships, when everybody from the national level on down talks about the worst recession since the great depression that we're in right now. I would say that it goes far beyond challenging times,

economic difficulty. And economic hardships.

The City of Murrieta is committed to effectively utilizing public funds for the various services of our citizens, including the protection of our natural resources, such as our water quality. The proposed MS4 permit, however, would require the City to expand, expend significant additional resources, while the current forecast conditions have constrained our ability to meet the basic needs of our citizens. The City has been forced to make significance budget reductions, due to reduction in sales tax and property tax revenue. The proposed MS4 permit will drastically increase our program cost likely by twice the current budget.

Since 2007, the cost for this has more than doubled in what we are spending for this type of monitoring. When we look at our city, our budget, as the City of Temecula had dropped since the '08 budget year by 25 percent in our general fund revenue. In the last year, in the last six months, we've had to lay off 15 employees. We've asked our employees to take a 5 percent pay cut. We have 46 positions current that we have left unfilled, including the police and fire positions due to lack of revenue. We have postponed maintenance and replaced the vehicles throughout the city, and we are currently using reserves to balance our budget.

The State came in recently and raided our RDA funds. We had to write a check to the State for $3,000,000. At the end of the year we, do not look at, "Do we have a surplus?" We look at it now as how much of our reserve do we have to spend in order to balance the budget? And now we have the Board who is asking us to double our costs in order to meet this new permit process. The RWQCB staff has expressed their opinion that cities are able to create new fees or tax assessments to pay for the requirements that are placed in a proposed MS4 permit. We strongly disagree with this assertion. Fees can only be collected from new development if there's a nexus to offset impact created by development.

There's simply no mechanism to impose a new fee or assessment on existing development to fund the Storm Water Program. Furthermore, due to Proposition 218, any tax or fee increases must be approved by voters. California history has not been so sympathetic to those cities that have attempted to increase clean water fees. For example, the City of Encinitas, a relatively prosperous and coastal city, attempted to pass a clean water fee in 2006, and it was defeated by 61 percent of voters at a time when the economy was doing well. Due to the historic decrease in property tax and sales revenue,

the primary funding mechanism for the city to implement programs, is unlikely it would be able to comply with the proposed MS4 permit.

In order to do so, the city would have to make budget cuts to other programs, considering we have already considerably cut our budget two years in a row, implemented layoffs and furloughs and put other cost-saving measures into practice. A further decrease to critical city services to fund additional requirements is impractical. Our greatest concern to the city is that the proposed MS4 permit does not take the current economic climate into consideration.

The City of Murrieta joins the vast majority of Californians in supporting a balanced cost-effective strategy to guarantee clean water. However, we remain concerned that the MS4 permit would impose additional cost on the City that we cannot afford at this time. Therefore, the cities oppose the proposed permit in its current form. Increasing the cost to the public on a region that is one of the hardest hit during this economic crisis seems excessive. Instead, the city would be more supportive of efforts that would phase in requirements once revenue levels can support additional costs.

Moreover, we request that the Board direct their

staff to prioritize what permit requirements are necessary to address the cost-critical issues that will give the most efficient use of available funds. I would ask that, in closing, I would just simply ask again. We would work together. We're your allies. We want to achieve the same goals, but we want to make sure that we do it in an efficient, cost-effective manner. And we would want to work with you in dealing with the monitoring, the over irrigation, and low-impact development when it comes through the city.

And then we have one last thing, our staff. I'm going have our staff, who I believe is going to speak next, that is going to address the issue we have in our Notice of Violation in the City of Murrieta. Thank you very much.

MR. THOMAS: Good morning, Board Members. My name is Pat Thomas. I'm the Director of Public Works for the City of Murrieta, and I've also taken the oath. I didn't come prepared to speak on the permit today. Most of the co-permittee presentation will come from the Riverside Flood Control District. But I was a little bit offended by the suggestion that the City of Murrieta is in noncompliance with the current permit. In the 4 years that I've been with the city, I'm only aware of one notice of violation that was issued to the city.

It was for a construction site. It happened to be a fire station that was being constructed by the city that was fully responded to, and to the Board, and no further follow-up action was taken. So that's the only potential violation of the permit that I was aware of. We take our responsibility for implementation of the permit and our relationship with the regional Board very seriously. And I just want to assure you that my understanding is that we're incomplete compliance with the current permit. Thank you.

MR. LAURITZEN: Thank you, Chairman Destache, and Members of the Board. I appreciate being able to be here. My name is Verne Lauritzen. It asked me to spell that, L-a-u-r-i-t-z-e-n. I am the Chief of Staff for Supervisor Jeff Stone, who was unable to be here today. His schedule prevented him from being here today. He was desirable that we could have this hearing on a day that he could be here, but understanding the difficulty of your schedule, that just wasn't feasible, and we understand that. If you'll allow me, he has asked me to speak on his behalf.

Supervisor Stone represents the third supervisorial district in the County of Riverside, which includes the portions of Menifee, Murrieta, and Temecula and the majority of the incorporated area of the upper

Santa Margarita watershed. He is also the chairman of the Riverside County Flood Control and Water Conservation District. And he's been asked by his fellow supervisors to provide testimony today and, of course, he's asked me to speak on his behalf.

Riverside County strongly supports healthy and clean bodies of water, particularly those found within our county. Protecting and conserving water resources promotes a vibrant economy, which we desperately need. And a higher standard of living for our residents. As an example, the Riverside County integrated plan combines previously independent general, transportation, and environmental planning for further planning documents into a single comprehensive plan that focuses on preserving the unique features of habitat and water conservation resources found in the upper Santa Margarita watershed.

Similarly, the recent formation of the Santa Margarita Regional Integrated Water Management planning group by the Rancho California Water District, the County, and the Flood Control District merges previously fragmented water resources planning within the Santa Margarita River watershed. County agencies have worked proactively to ensure that Santa Margarita region has not only addressed development in an environmentally

responsible way, but continues to be a community that respects and protects important environmental resources.

Similarly, the district has taken proactive steps to ensure that stormwater is managed and water quality preserved within the Santa Margarita watershed, as shown by the $90 million Murrieta Creek Flood Control Environmental Restoration and Recreation Project. And the $3 million low-impact development testing and demonstration project the district has led efforts to integrate flood control, stormwater management, and water quality into its own planning processes. And in turn, has shared its knowledge with its permittees.

In 2005 the county, with assistance from the district, initiated policies promoting green infrastructure, including low-impact development or LID. The district is also on the verge, as has been mentioned, of publishing a LID design manual, well ahead of the requirements contained in this order. Riverside County also was among the very first in the state to implement a landscape ordinance to preserve water and to protect water quality. Thus, it is not the case, as had been stated by Board staff, in responding to our comments on the new permit, that the permittees have been doing only the minimum. The facts, as demonstrated by the programs that I have mentioned, are otherwise. And the permittees

staff presentation later will provide you with more examples of how the permittees have actively responded to stormwater quality issues.

Similarly and unfortunately, in their responses, Board staff at times chosen to diminish the very real economic conditions that face our county as well as other counties. Several responses are particularly troubling, including claims that permittees needed to find room in our budget to plan for future requirements of the future stormwater permits. That the permit requirements can be funded by reducing other discretionary expenditures. And that economic figures provided by the permittees do not accurately reflect the conditions of the watershed.

To assist the Board in further understanding some of these conditions I would like to just highlight a few that we find within our district: An unemployment rate of over 15 percent; assessed valuations that have declined 15 percent since only 2007; a foreclosure rate that is 3 to 4 times higher than in Northern San Diego County, and one of the highest in the entire country; household median incomes that are 15 percent lower than those in Orange County; a structural deficit that is expected to top $130 million in this fiscal year.

The consequences of these economic conditions are being faced by our county every day. Some of these

are $71 million budget cuts in this fiscal year. We also in our RDA funds were borrowed by the state to the tune of nearly $43 million. Another estimated $60 million are projected for our budget cuts for next year. The layoff of over a thousand county employees through attrition, early retirement, and terminations has been ongoing since June 2009. The phasing out of several hundred jobs this fiscal year. In 2010 alone, a 4 percent reduction in public safety services. That's the last thing you want to do as an elected official.

We know that city representatives here today can tell their own depressing stories of how they've had to make cuts. Unfortunately, these economic conditions are not expected to abate within the 5-year term of the permit. Thus, comments that permittees have set aside, should have set aside rainy day funds and try to enact new taxes for water quality control problems -- programs. At the same time we were being forced to cut other programs to the bone, including public safety just don't hold water. The county has taken fiscally-responsible steps to manage the budget, and although water quality protection is an important priority, it's one of many that citizens expect from local government.

In addition to public safety, we must also find environmental programs, social services, libraries

recreation facilities, safe roads, health services, and a myriad of other programs that are vital to maintaining our communities. All of these prior programs must be funded with finite and now much-reduced revenues. As an elected official, Supervisor Stone must balance these priorities to best meet the public's needs. Whether for a stormwater permit, a public safety requirement, or health services, programs that represent a wish list instead of practical, affordable, and effective programs are not best meeting the public's needs.

A dollar spent on non-necessary elements of any other program means a dollar that you cannot spend on a crucial public need. This permit is economically unachievable for Riverside County. On behalf of the County, I respectfully ask that Board carefully consider the alternatives that have been set forth in the permittees' comment letter, as well as the comments made by my municipal colleagues and our staff here today. And direct that the staff work with the permittees in this effort. In closing, I would like to reiterate that Riverside county has implemented proactive, collaborative, and effective approaches to managing its local stormwater resources.

Our objective has been and remains to be to find a way to reach our mutual goals in the most effective

cost manner. Our goals are mutual. We really are on the same team. We encourage you to strike an appropriate and reasonable balance in the implementation of this permit. Thank you.

MR. UHLEY: I've introduced myself before. I'm Jason Uhley, the Chief of Watershed protection at the Riverside County Flood Control and Water Conservation District. And I noted that I was going to lead a joint technical presentation on behalf of the city or county. I'd just like to lead off and build on some of the comments by our elected by stating that our goal has been and always is to improve. As a matter of fact, we have tried to work collaboratively with the Board staff to that effect.

And we point out when Board staff informed us that it was their intention to use the Orange County permit in place of our existing permit, for this renewal, we knew that there was going to be a lot of change, a lot of issues to be addressed. And we knew that we had to get in early and start meeting with them to try to collaboratively try to develop that permit. The reason for that is that the Orange County permit developed over 20 years to be specific to the need and resources of Coastal Orange County.

We also had a permit that had been developed for

our region over 20 years that was specific to the needs and resources of our watershed. In transplanting that permit into our region, was going to cause a lot of change that may not have been absolutely been necessary to address prior water quality issues. And so that is why in February after the Orange County permit had been adopted, and after David Gibson had been appointed the new executive officer, I gave him a call and asked him if we could meet to discuss how we might be able to collaboratively develop this permit.

And David, of course, was interested in meeting, and we had a good discussion, and had some follow-up meetings. And although it was really our hope that we would be able to use our existing permit as the base, and then just move the new programs that had been introduced to Orange County, this most recent permitter into our programs. Board staff was really insistent we had to start with literally, the Orange County permit, and then justify every change from that permit. Now, we were very concerned about that, because it meant that we actually were going to be asked to make more change, thus required of Orange County.

But David Gibson did agree to having follow-up meetings. He did agree, he did propose a common goal that we agreed to, which was to develop a permit that was

socially and environmentally responsible, affordable, and protective of water quality. And so although we did have concerns with the starting point for the permit, we move forward with the process, because if we believed that we had a common goal, we should be able to reach common ground.

There were many positive outcomes of those meetings we had with Board staff. Probably the most significant of which, from our perspective, was the elimination of the dual regulations of the cities of Wildomar, Murrieta, and Menifee. I would extend a hearty thank you to both our San Diego Board colleagues and Michael Parra from the Santa Ana Board, who's in the audience, for working together to make that happen. Because the two permits between Santa Ana and San Diego are very different. And they cause a lot of problems when you're a small city trying to administer those programs. So that will help our cities with compliance.

County continue to be regulated by three permits. It's harder to justify changing our condition, because we're wholly in all three watersheds. So the differences that exist between these permits still have a direct effect on the county and flood control district. We also were able to these meetings to come to terms on revisions to the unpaved roads. And some low-impact development

requirements that are on your errata sheet that's before you today. As well as streamlining reporting requirements, changing some elements in the Orange County permits to reduce costs, and to clarify some provisions to the permit where we were expecting a much larger program than staff was envisioning.

So there was a positive outcome, and the meetings were worthwhile. But there is still a large gap. It's hard to fully explain that gap, and I'm going to try to do that now. And I think the easiest way to do that is by going back to where we were working on our report was discharge, our permit reapplication. When we prepare for reapplication, one of the requirements is to identify changes that we think need to be made to our programs, to enhance them and move them forward.

And so we recognized that we had some ideas, but wanted to do it with Board staff to get off on the right foot for this permit reapplication. And so we met with Board staff, and as a result of those meetings, we identified six major program elements that need to be addressed in RRWD, and those elements are highlighted on the slide for you. I'm not going to go into detail, about those, I'm just going to take these issues that were specific to the Santa Margarita watershed.

However, later, after the really robust

discussions and hearings on the Orange County permit, the Board staff had a change of heart. And the change of heart, was well, we now want to have the Orange County permit as a model for our region, and we want the Orange County program to be implemented wholly in Riverside and San Diego County. And the net impact of that, why we needed so many meetings, and why there's still a gap, is because the Orange County permit, as I noted earlier, was very differently than our permit.

And it introduced a number of the new changes that weren't necessary for the protection of our local water resources, and these changes are being asked for at a time of particular economic difficulty for our cities. And so these changes resulted in changes to how we do inspection in enforcement, all the way down to changing the names of our compliance documents and our compliance programs.

These issues are still in the permit. Our whole program is built around certain terminology. We now have to erase all that terminology and use new terminology. And that creates huge training issues for us. Now we just don't have to train to priority issues, we've got to train all these ancillary issues as well. And that takes a lot of effort.

And we're not just training our staff, we

training our citizens, our developers, our construction sites. And I'm not going to harp very long on the economics. It's been touched a great deal by our elected. But I do want to point out just very quickly, that you're asking us to do more change.

Because you're asking us to make all the changes Orange County made, plus additional changes to standardized Orange County. But at the same time, we have less resources. We're a smaller watershed with half the population, and we have lower assessed evaluation property taxes. We have lower residential income. And we don't have nearly the tourist dollars that Orange County has available to them to help fund these programs.

So we're asked to be doing more with less. And what that really does is dilute our ability to protect water quality. Because instead of focusing on high-priority resources, we're now going to spread the resources really thin to get the changes the Board staff are looking for. And also noted by our electives, the economy has hit Riverside harder. We've got 15 percent greater unemployment, higher foreclosure rates.

And maybe the last point I'll make, that I don't think was made before this, is that on November 2nd, there was an election, and Proposition 26 passed. And what Proposition 26 does is it provides significant

restrictions on how cities can develop new fees to pay for new programs. And so this is going to be an additional hindrance to our ability to develop the revenues we're going to need to implement these new programs.

And so I'd just like to provide one specific example before I turn the podium over to conclude about the type of ramifications that are a result of this permit -- I'd like to focus on the monitoring program. I want to say we are proposing to enhance our monitoring programs. But the language in the permit now not only asks us to meet Orange County requirements, it asks us to exceed Orange County requirements, because the Board staff, I think, is trying to penalize us for what they perceive as previous infractions.

And the net result of that is to show on this graph, and what you see on this graph in red is the cost per capita for the Santa Margarita Region monitoring program. And what I've done is compared those per capita costs to the costs that Orange County is incurring in the monitoring program per capita in their region based on the permit you just adopted, and the cost for the Ventura County that was just adopted by the L.A. Board. And although we understand monitoring is important, and we are integrating monitoring into our programs, this permit

is asking us to spend three times more per capita than Orange County on monitoring and four times more than Ventura.

And that is why monitoring is going to be one of our central issues today. Just kind of in closing, because we're moving to this model Orange County permit, and we trying to take our programs, and we've been existing and implementing and specialized to our region for 20 years, and kind of throwing those away and incorporating these new Orange County requirements. And that's why we're here today. And that's why our comment letter was so extensive. Because there's just a lot of change in here, and change isn't really focused on doing on what's most important.

And that's where we need to be in this current economic climate. And we understand you guys hear a lot of people come in and complain about economics and about permits requirements. Our goal today is it to move past that. What we're going to do today is not focus on all the issues that are raised in our comment letter. We're going to to do instead is focus those issues that we absolutely think need to be addressed from a fiscal, liability, or environmental stewardship perspective. And we're doing that so we can try to develop a permit that we can implement. And our goal is not to maintain to

status quo. Our goal is to maintain the programs, achieve the goals you guys are looking for, but at the same time, do it in a more fiscally responsible way for our cities, and in a way that we can administer the staff levels that we currently have.

And so the issues that we're going to present to you today are really threefold. We're going to talk about the monitoring program. We're going to talk about the irrigation runoff prohibition and an alternative way to approach that. And we're going to talk about the low-impact development retention requirements, and I think there're going to be some additional testimony from other state quarters on that issue. I'd like to give you a handout right now. I think I left it on my desk.

MR. DESTACHE: Catherine, do we accept into the public record?

MS. HAGAN: I'd like to take a look at it and see what it is. I was assured by Mr. Burhenn, counsel for the co-permittees, that it doesn't contain new information that was not included either in the written comments -- well, I was assured that it either addresses written comments, or that it addresses changes that were made to the permit, and the response to comments that occurred since the comments period closed. In which case I think it's appropriate to allow as long as you have

time to adequately review it.

MR. UHLEY: And I will say that this is a one-page handout. And it just summarizes the changes we're asking for in the permit. And what I will note is that despite all of the issues that I've raised today, what we're representing before you is a one-page handout with some very specific, targeted, and surgical changes to the permit to improve it.

And we're going to ask you to act on that today. I will note we do have our other issues, and we, of course, ask that you ask the Board staff to address those other issues. But we do understand that you do want to take action potentially today, if you're inclined to do so, this will help you to do that.

MR. DESTACHE: Catherine?

MS. HAGAN: If you wish to consider it, you can do that.

MR. UHLEY: So with that, I'd like to thank you guys for your time, and I would like to introduce to you Claudio Padres of my staff, who's are senior in charge of our MPS programs, and he's going to be presenting our three technical issues today. Thank you very much for your time.

MR. PADRES: Good morning Chairman Destache and Members of the Board. My name is Claudio Padres with the

Riverside County Flood Control Water Conservation District, and I have taken the oath. And like was mentioned, I'm the leader of the PDS unit that oversees the three MSF4 permits. And I'll be presenting on some significant issues that remain in the monitoring, irrigation runoff, and low-impact development sections of the permit.

But more importantly, I will be presenting solutions that will resolve issues and result in a better, more implementable, and protective permit overall. And the first and most significant issue that we want to discuss is the monitoring requirements that are in Attachment E of the permit. And when it comes to the importance of monitoring, the first thing I want to express is that we completely agree with what David Gibson stated in your September meeting. And of the importance of monitoring.

Monitoring is crucial to understanding the needs of our watershed. And in turn, guiding and improving our programs. So by no means are we against doing monitoring in this watershed. But on the contrary, our goal is to improve our monitoring efforts. And like staff mentioned in their presentation, we're at a point in a call to action, or a shift to action was their statement, and that is our goal. It is however, crucial that we improve

in a managed and balance manner. Because if we do too many things, we'll be stretched too thin, so that we will not do any of them well, and that's works against us, because we do want to improve.

And there were two other things I wanted to point out real quick that were brought up in the staff's presentation. One of them was regards to the notice of violations for the monitoring program. And what I want to point out is that by staff's own admission, in meetings with them, those NOVs are allegation of potential violation. And actually, a great majority of everything that was alleged, was successfully refuted. We actually showed that there was no violation in our response to those NOVs.

And other point, one of the other points I wanted to highlight is that staff mentioned that we didn't actual do anything with the data. And I think we've already discussed that to some extent. But another point I was going to bring up on that, is that in showing that that's actually not true. An example, in regards to and in response to the toxicity monitoring we've done, we've actually developed a comprehensive to address pyrethrum, those are pesticides, in our watershed.

So we're actually responding to and using this data, and we look forward to, again, like I mentioned,

improving our ability to do that in the next permitter. Unfortunately, the requirements in the current Tentative Order do exactly that and actually dilute our resources and spread us too thin. And it defines the monitoring program over four times the size of our current program. Which not only results in four times the cost, and we've discussed that a lot, but it requires a level of staffing resources that we simply do not have.

So to be able to get to our goal of improving that we discussed, we need to find ways to simplify and streamline the monitoring requirements, so we can manage that change and improvement, and focus our resources on doing the most important things better. So in turn, we can get better results. And so our presentation on monitoring today will identify focused and necessary changes in what I call the baseline monitoring program, and also in the special studies requirements. And you have the full discretion to make these changes today.

And just getting into it, in the baseline monitoring program, which includes our receiving water sampling and MS4 outfall sampling, we've identified five opportunities to streamline the requirement. The first two are related to mass-floating stations. And our first request is that similar to both of your other MS4 permits, and consistent with guidance from the Southern

California Monitoring Coalition that we've discussed, we would only be required to sample two storms each year, instead three, again consistent with the other regions in that guidance.

And this is particularly appropriate for this watershed. Because in typical years, there are barely three sampleable storm events, if at all. So whether it's Thanksgiving or Christmas or 2:00 a.m. on a Monday, we end up expending significant resources chasing every cloud, so as to not take a chance on missing what may turn out to be the very last storm of the season, violation of the permit.

And the second change we are requesting in the mass loading stations is to continue to allow grab samples to be used for dry-weather samplings, instead of composite samples. And not getting into the depth, but composite samples are simply not necessary for characterizing dry-weather discharges.

In fact, the Southern California Monitoring Coalition, again, one of the agencies and groups that establishes their protocols that we use in Southern California, for their monitoring and dry-weather, they do not use composite samples. And so this is an unnecessary change, and is a problem because composite further samples can cost up to 50 times per event than

grab samples, and is especially not necessary when composite are not needed for dry weather.

The next and third opportunity we found to streamline requirements pertains to the stream assessment stations. And this direct permit requires us to assess six locations annually, which is double our current program. So we would be required to search for and find three additional locations. And we've actually already gone through this exercise. In fact, we have already investigated over 70 potential sites. And consistently, the only sites with flow that we can sample are the three that we are already.

So our request is a simple and clear one on that. It's to reduce this requirement to three sites, as our current permit. Because mandating more sites is simply unattainable and doesn't make sense. If fact, even those existing sites, what we were sampling is rising groundwater. And frankly, that's because that was the only perennial groundwater that we could of find. The next, opportunity is the stormwater action level requirements.

And while we're not contesting the action level requirements themselves today, what we have found is that it also is requiring composite samples to be collected rather than grabs. And our request is to again, to allow

grab samples. As we discussed, collecting grab samples requires significantly less resources than composites.

And the benefit we get from making that change, it goes beyond the cost. And what it does is allows us to focus our resources on conducting the follow-up analysis and actions of the Board and we want, so that we can actually start to make improvements. And it does that while not reducing our ability to assess exceedance of those action levels. So we'll still be able to assess actual exceedances of those action levels. So we'll still be able asses action-level exceedances, but we'll allow to focus those resources on follow-up actions.

And the last item on the baseline monitoring, is another very clear opportunity. The Tentative Order requires us to do two completely new MS4 outfall monitoring program. And we'll note that as was thought by Board staff as far as MS4 outfalls and whether we're doing that. The previous monitoring program included what we call our tributary stations, which actually are MS4.

But in a way that MS4 are all being defined now, the staff is interpreting those to not the MS4 outfalls. But those locations that we're sampling currently, are in word-defined by the permit. So inasmuch as they're making that point, it was a requirement that was set

forth by this Board.

Now, we're replacing those requirements with a new program, for action levels. And is this permit adds onto that the inland aquatic habitat monitoring, which also assesses MS4 outfalls. And when you look at what these two programs are intended to do, you find that both are designed to identify discharges that threaten beneficial uses in our receiving waters. And as such, the are duplicative and one of them should be removed.

And in comparing the two, the inland aquatic habitat monitoring seems less conservative because it inherently accounts for dilution in the receiving waters, whereas, the action levels don't. And further, the action level monitoring includes triggers, again, to identify specifically when a response is needed. So it's getting more apt at taking action and identifying when the action needs to be taken to protect our receiving waters.

So I'd also note that in the South Orange County permit, early iterations about permit included this, and because of this obvious duplication, it was removed from that permit. So similarly, our last request on the baseline monitoring be eliminated in our permit as well. So, like I said, there's a two component that I was going to talk about. That was the baseline monitoring. I've

going to move quickly into the special studies requirements. And I would note that all of these requirements you do have the discretion to make change. And when talking about the special studies, the current draft permit is proposing seven special studies, and just for comparison, the South Orange County permit that you just recently adopted only requires four.

And further, none of special studies that we proposed in our RWD, or in discussions with staff since has been included. Instead, the draft permit requires a diversion of our scarce resources to a large number of other studies that are frankly, either inappropriate, duplicative of other efforts, or just simply not very well thought through. And for example, one of the studies requires us to gift public funds to other agricultural, federal, and tribal entities by requiring us to sample their discharges. And if the desire is to understand these other dischargers, it's more appropriate to require them to do their own sampling rather than burdening us with the additional cost.

And when you compare those studies to the ones that we are proposing, you'll find that ours are well-thought out, have broad stakeholder support, and are directly relevant to two of the most important issues in this watershed, nutrients, which as talked about earlier,

and also low-impact development, which I believe a lot of people in this room are actually interested in. The low-impact development study is specifically designed to construct, demonstrate, and perform water quality sampling on actual installations of the LID POPs we'll be deploying in this watershed. And then use that information to improve them over time, so that we can be as protective as possible.

And the nutrient study will identify nutrient levels that can be used to better protect beneficial uses and target future actions. By focusing our efforts on these studies, we will not only be answering high-priority questions for the stakeholders in this watershed, but we will again be focusing our efforts so that we can do those well. So in all, we've recommended six focus changes to the monitoring program, that, if made, will allow us to address our immediately priorities in this watershed, while bringing the requirements to a level that we can manage.

And in fact, with these changes, we will better be able to address the goals of the monitoring program by allowing us to focus on assessing and responding to data that we collect, which is the whole point in the first place is using that data to drive our actions. And the other thing I want to make clear is that with our

request, we are not trying to maintain the status quo. If fact, with the changes that we're requesting, our monitoring program will still grow significantly, but to a much more manageable level.

And so like what was discussed earlier, our next issue that we wanted to discuss with you today is the irrigation runoff prohibition. And like was mentioned, an alternative approach to dealing with that. And as we stated in our comment letter, the co-permittees have not found irrigation runoff to be a source of pollutants to our receiving waters. And staff presentation that you just heard was focused on showing that an exempt non-storm discharge, meaning a type of discharge that is allowed, their presentation focused on showing that that could happen.

So it focused on showing that allowed discharges happen. Not that those discharges have actually caused problems in our receiving waters, which is actually the test that is required for the removal of those conditionally exempt discharges. And it's worth noting that with the new direction this new permit is taking with regards to action levels, that those action levels, and specifically the numeric -- the non-stormwater, excuse me, action levels were designed specifically to find out if it ever does become a problem. But rather

than allowing that new action level process to do what it's supposed to do, this permit prohibits the entire category of discharges without local water quality data to support such an action.

However, we have identified the solution that will help bridge that gap. And I would note that the Board also has discretion to make this choice, and can either prohibit discharges to the curb, or prohibit discharges to the receiving waters. As currently written, the point of compliance for this prohibition is the curb. And what that means is that the permittees would be required enforce against any person whose sprinkler gets the curb wet, regardless of whether or not that overspray ever reaches, or negatively impacts our receiving water, or if it just evaporates a few feet down the stream.

And in turn, a failure to enforce against even a single person could be a violation of this permit. And we know that one of the best things we can do to foster stewardship among our residents is to build credibility for the message we provide. But if we're required to enforce against residence that simply got their curb wet, it will only serve to discredit our programs and redirect our resources away from addressing the true and credible threats to water quality.

Alternatively and more appropriately, you can prohibit discharges that impact receiving waters and doing so, we'll ensure that we can focus our resources on addressing and eliminating problematic discharges rather than chasing down every slightly misaligned sprinkler head. And that's what we're requesting you to do today, to regulate irrigation runoff to the receiving waters. And this request is similar actually to the requirements already in the permit in section B3 for addressing non-stall monitoring firefighting flows, where that provision prohibits the discharge, but only requires the discharge to be addressed when it is shown to be impacting receiving waters.

And thus, our request to you is to implement the prohibition in the same way it's been done for non-emergency firefighting flows, and this will require the permittees to proactively develop a program for this potential issue, and commit an appropriate level of resources, but allow us to focus those resources rather than scattering them by requiring sprinkler police to literally to enforce against every wet curb.

And I'd also note that this approach is likely to garner public support, because any action we would be taking is directly related to an impact. If we were to -- instead to regulate at the curb, we would be required to

enforce in situations where there is no such impact, which will not be very well received by the public.

And of the three issues we said we'd discuss, we also wanted to touch on the low-impact development requirements, and we're all aware LID had become the standard of practice for treating stormwater flows from development sites. And as we've discussed, the permittees are fully vested in committed to implementing LID in this region. In fact, each of the pictures on the screen are examples of low-impact development already being implemented on projects in Riverside County.

And while the original public draft was mutually supported by Board staff and permittees, the errata that is being considered today has flaws that need to be addressed before adoption. And while some of the changes that are in the errata might seem minor, we can say with certainty that they will cause negative unintended consequences and that's what I wanted to talk to you today about: Low-impact development. And the first problem is that it does not mimic natural hydrology. And it mandates artificial retention on these sites.

And the second issue is that it mandates capturing use of stormwater, which the permittees know will be ineffective in the long term. So we looked at what EPA had to say about LID and specifically also NRDC,

because we know they were commenting on this issue. And we wanted to find out what they view LID as. And all of these agencies have definitions that are out there. And we found that they all have a common thread, in that they require the use of natural features to mimic the site's natural or predevelopment hydrology. And it's widely held that using these natural features and mimicking that natural hydrology is one of the most effective ways to reduce pollutant discharges from development sites.

And when we talk about natural hydrology, this is what we know: In the 85th percentile, 24-hour storm, which is the standard established in this permit, there is runoff in the natural conditions. In fact, on an average annual basis, we know there's a range from 7 to 27 percent runoff in that natural condition. In fact, even in Staff's presentation moments ago, they indicated that even in a rainfall depth of only .1 inches, and they actually show a photo of that runoff that happened due to .1 inches.

But what we know is that in that 85th percentile, 24-hour event that rainfall depth is one inch; much greater than that. So we do know that there will be runoff in that natural condition. And that can also simply be verified by looking at the relationship between the rainfall versus the runoff in a period before

urbanization is to happen. And what this graphic shows is the rainfall in red and the runoff in blue during the 1970's again, before the urbanization in the watershed.

And each red dot above this red line is a storm that's smaller than that design storm, that 85th percentile event. And each blue dot down at the bottom is a resulting day of runoff in Murrieta Creek. And from this information, it's clear that even in the predevelopment condition, storms smaller than the 85th percentile event, the red dot is at the top, resulted in measurable runoff in Murrieta Creek, the blue dot's at the bottom.

So however, we know that there is runoff in the natural condition. What the permit requires is that, in the developed condition, that there be absolutely zero runoff for storms up to the 24 hour, 85th percentile event. And this is what I mean when I say artificial retention. And this change in runoff will actually result in hydro modification. And may very well hinder our ability to comply with those hydro modification requirements elsewhere in this order. And it will result in impacts to beneficial uses.

And one other thing that needs to be understood in this watershed is that there is a natural barrier along the coastal range that causes the hydrologic disconnect between the groundwater basins in the upper

watershed and in the lower watershed such that any drop of water that is retained in the upper watershed, essentially the Riverside County portion of watershed, will not be reintroduced into the lower watershed through groundwater. Only surface runoff will be conveyed downstream so any artificial retention is especially harmful to the lower watershed by resulting in artificially dryer streams, which will again, will impact beneficial uses.

And so although the issue of downstream impact is a complicated one, there is a simple solution that can prevent that from happening. And we respectfully request that the Board continue to ensure the protection of our beneficial uses by incorporating the Delta V approach, as shown on the screen and on your handout. This approach, instead of requiring the retention of all runoff, will require retention of the increased volume caused by development, and then LID treatment of the rest.

So for example, if the predevelopment site had one tenth of an inch in runoff, and five tenths in the post development condition, then under the Delta V standard, one tenth would be treated and discharged and consistent with the natural hydrology, and then four tenths would be required to be retained onsite. And this

further is not without precedent. In fact, the Energy Independent Security Act, which was put forth by EPA, specifically recognizes a similar Delta V approach from mimicking natural hydrology on federal projects.

So with making that change, we will have prevented the problems caused by artificial retention, and the other major problem we identified is that it mandates captured BMPs that cannot be effective unless the stormwater that is captured is used. And I also want to talk real quickly out of point that was made by staff in their presentation, that the way the permit is written, according to the presentation, the capture under use is only encouraged, and that's actually not the case. It's actually mentioned in two places of the permit.

In one place where it establishes requirements for all projects, which is kind of a general statement for all projects, it encourages it. But when it comes to the priority development projects, it actually mandates its use. And when it comes to understanding the effectiveness and reliability of BMPs, this is an area that we have actually invested a lot of effort. As was mentioned before, we will be releasing an LID BMP design manual before the end of this year. And in developing that manual, we have coordinated with experts across the country that have actual experience in implementing these

types of BMPs.

And through our research, we have been focused on finding out what works and what doesn't, so that we can maximize the design of our BMPs and our manual. And what we found is that there are three primary treatments that make LID BMPs more effective than other more conventional BMPs. And the first is that they remove pollutants passively. And what means is that it doesn't take human intervention for that treatment or for that pollutant removal to occur. And the second is that they rely on highly effective and robust natural processes to remove pollutants.

And the third is that they also naturally reduce the volume of polluted runoff. And capturing used BMPs are actually not based on passive treatment nor natural processes, but instead can only reduce pollutants if stormwater is actually used as shown in this photo. But studies have confirmed that these types of BMPs have an annual failure rate of 5 to 25 percent, because of people don't intervene and use that water the BMP will fail. And when the BMP fails, runoff will be discharged from the site with zero treatment into our waterways.

And as a flood control agency, those failure statistics don't actually surprise us, because it is our direct experience imposing stormwater systems on private

property owners, especially those who don't otherwise want such systems, rarely results in those systems functioning properly. So the problem is, although the co-permittees even know that capturing uses BMPs cannot be relied on for the protection of our receiving orders. The permit is mandating their use anyway. And by virtue of the receiving orders language and the action level requirements, is holding us responsible when they fail.

So we therefore request that the Board modify Footnote 14 in the revised errata, and is also shown in your handout as shown. And the one thing I want to be clear on is that we don't have the fundamental issue with encouraging LID BMPs in general. But we can know that we cannot rely on them for the protection of water quality. So those are our three issues that we wanted to bring to you today in our presentation. And we've identified some specific and surgical changes to these three sections.

And as we've mentioned, it is our goal with this process to find ways to improve our programs, again, not the status quo. And so with that goal in mind, none of these changes we're requesting will reduce our ability to attain or assess our outcomes that we're seeking. In fact, the changes are intended to enable us to do things better and not hinder us unnecessarily. And every change

that is accommodated by the Board will further free up our resources to allow us to do things better and actually improve.

And I'd note that all of our requests are either seeking to find better ways and more effective ways to do things, but several are actually identifying deficiencies in the permit that really need to be addressed. And in either case, we provided solutions that will avoid unintended negative consequences. So I'll wrap up just reiterating that we've summarized these requests on the handout that we've given to you.

And our final request to the Board, as part of this presentation, is that you direct staff to make at least those identified changes on that handout. And with that, I conclude our combined presentation, and I thank you for your time and I welcome any questions that you may have. I do have a request that if we do have remaining time, that we reserve that for later, if needed. Thank you.

MR. RAYFIELD: Thank you for your presentation. A couple questions, but to begin, where is the LID demonstration facility located, and is it almost finished, or status?

MR. UHLEY: It's actually about to be constructed, and it's actually being -- a cooperative

effort among counties and regulatory agencies in Southern California. It's actually being constructed at the flood control facility in Riverside. As a regional demonstration facility and testing facility for BMP, developing and planning would like to implement within this region.

MR. RAYFIELD: So we can't go kick the tires yet?

MR. UHLEY: No. I don't know the exact schedule, but I already know we have the construction documents out, and it's in the process of -- it's a big process, so we already have a contract ready for that. It's moving right along.

MR. RAYFIELD: Okay, that's fine. Actually, this time, my other question is I got the feeling, and I want to confirm if that's correct interpretation of what you said or not that these "surgical changes to the Tentative Order," that the co-permittees could accept, or live with, is a better way to put that, the order, if these changes were made, or is that a misunderstanding on my part?

MR. UHLEY: We wanted to put the Board in a position to be able act today, if you so chose. We do have additional issues that are identified in our comment letter. And we do request that those issues are

addressed. But we understand that you guys may have other motivations and may be looking to take adoption. These changes are those changes that we've identified as being the most critical to improving this permit to making it acceptable for us to implement.

MR. RAYFIELD: Thank you. That answers the questions.

(Lunch recess)

MR. JENGREIS: Yes sir. I regret to inform the Chair there are other cohorts. We have a total of 30 minutes planned, sir, with your indulgence, and also Riverside County's indicated we just can't get it done 30 minutes, they'll give me an additional five. But I'll try to be brief. Well, I've kind of a big voice. I don't want to blast you out of the room, so I'll try to be careful with my mic.

Good afternoon, gentlemen, my name is Jeremy Jungreis. I'm here on behalf of Marin Corps Base Camp Pendleton as a non-permit holder in this case, but really I'm here and a variety of other folks are here to represent the interests of some of the downstream water users. Who ordinarily, you'd think would be pleased at this increased efforts to regulate water quality, but because of the unintended consequences and the way the permit is structured, we're very concerned as a whole,

that our water quality may actually decrease along with the flows that come down the river. And that's what we wanted talk a little bit about.

In addition to myself will be Steve Reich from Stetson Engineers, Toby Roy from the San Diego County Water Authority, Lt. Col. Carlisle, from on base with the Western Area Counsel Office, Mr. Paul Boughman, who is our water counsel, will be discussing a couple issues as well, and finally Jack Bebee from the Fallbrook Public Utilities District will be making some remarks.

Gentlemen, one of the things about this permit that is troubling is, I think we all agree that LID is something that is a good thing on the whole, and Camp Pendleton is in favor of the low-impact development. But like any other good thing, there's such things as taking it too far.

Now, stormwater capture is not a new concept. Water supplies, as you can see right there the mother of all stormwater capture devices, the Hoover Dam, it also captures stormwater. But there is only so much water in the watershed. So what's captured upstream, particularly, there's a hydrologic barrier, such as the Hoover Dam or the Temecula Gorge, the groundwater line. It can really lead to problems downstream. And a lot of folks have recognized that, including EPA in their storm

water guidance for the Energy Independence and Security Act.

Okay. So Camp Pendleton, water independence from local supplies were unique in Southern California in that respect. I should say coastal Southern California. The folks at Twenty-nine Palms get mad at me when I say things like that. They say, "We're water independent, too." Of course, they're using dinosaur water; we're not.

It comes down the Santa Margarita River; 70 percent of our water comes from that. We have a unique ecosystem, which are all supportive of that water in the southern portion of the Base. And water loss at Camp Pendleton is a zero-sum game. If we lose it, we have to make it up somewhere, which means that everybody else in San Diego County has to give up some of their allocation potentially, so we have that water near our mission, if the water is available.

So you get issues of sustainability of our military mission, which obviously on the Marine Corps birthday, I'll put it out there for you, is a pretty important thing to me. Very senior water rights is the reason Camp Pendleton was sited where it was, is because of its location in the watershed. As I mentioned a second ago, we embrace the concept of low-impact

development. However, retention that goes above and beyond natural retention rates is not LID; it's something else.

And that's unfortunately, after some of the RDC's presentations, I know they're very well-meaning. They're trying to do the right thing, but what they're trying to do is not actually LID; it's water supply and development. And maybe that has a place, but not in this NPDS program. LID budgets but every definition is focused on mimicking pre-imposed development hydrology.

Gentlemen, this permit does not do that. My next presentation will really go into more detail as to why that's the case. Reliable water supply, we have to have it if Camp Pendleton is going to fight the battles of tomorrow for our national defense. We have to know that we're going to have the water supply we need, or we wouldn't be here today. It's that important.

Stewardship, not only do we train Marines to fight the nation's battles, we also take care of our own on Camp Pendleton. We take care of our resources. We have 18, I believe it was -- that's just a glare. We have a variety of threatened and endangered species that inhabit Camp Pendleton. They call it home, and we take our responsibilities to them very seriously. We're doing more with less. We are below 100 gallons per capita per

person. And we've reduced in 2007, 20 percent of our water use. We're not being greedy here.

We're already getting more efficient, but we need that water. So we need to make sure that it keeps coming. And we're a leader in use of reclaimed water, again, trying to reduce our reliance on the water. But, our water footprint, we're trying to do our part, but we need your help.

So what's the problem with LID and the tentative order? Primarily, it's more water should be onsite than the current undeveloped state. Now to be honest with you, we would be harmed -- today we're going to ask you basically to look at the Delta B Standard.

Basically, rather than just doing a cookie-cutter 85th percentile retention approach to only size the BMPs to capture the water that would otherwise -- we only want the water that is running off because of the impervious surfaces, the water that's running off because of development, the water that would otherwise run off naturally, we want to continue to run off, because that's part of natural hydrologic system.

That's our concern, and the 85th percentile retention standard, the way permit is currently crafted, really doesn't provide that flexibility. And why is it so important for Santa Margarita River? Because of

historic groundwater binaries taking place. Before many of us were even alive, in the '60's, the 50's, the upper basin, Temecula Basin is blessed with big aquifers, but people got a little carried away, and consequently, the water levels are way down.

And as a result of that, water that used to make it as rising groundwater to Santa Margarita River, no longer does. So when water is infiltrated in accordance with its 85th-percentile retention standard, it's not going to us down in Santa Margarita. It's not going to get below the gorge. That's why we're a little bit different than some of the other permits that maybe you've seen, or that happened in other places. And it's a critical distinction.

Another problem is the current language in draft permit encourages export of water from the Santa Margarita Basin. Another unique circumstance here, the Rancho California Water District exports -- if water is reused indoors, it then goes into the sewer system. And some of that water makes it back to reclaim, potentially, but a lot of it also goes up is exported to the Santa Ana Basin.

So that creates risk right there of loss, the natural hydrology goes to a different watershed. But it's an really area that none of us really benefit by

going to.

I'll just say that we are generally--one the only ways we've avoided a real deficit because of Vail Dam and the groundwater mining, of with the natural hydrology would be, is because of the impervious surfaces in the runoff, and they've allowed us -- we're still below probably where we should be naturally, but unfortunately that deficit, as far as wet water, has been made up by impervious surfaces in the amount of flow. We're not saying to protect them; all we're saying is new development should be looking at what the natural runoff should be.

Changes to the hydrograph would be significant; Steve Reich will talk more about this. Hundred acre parcel, if 4.2 acre feet runoff post-development, and you have 1.7 predevelopment, so the way we calculated it, so the entire 4.2 acre feet from a 24-hour 85th percentile storm would be retained onsite. The result of that is that 1.7 acre feet that would originally run off is not going to run off anymore.

So that's the watershed. Now, once it's going to be infiltrated, or it's going to be reused, it's not going to make its way back to the system. San Mateo had a similar kind of permit condition in that basin. There wasn't a hydrologic disconnect. So we figured what's on

the ground there is ultimately going to make its way back, and onto our wells downstream. And it's not the case here. That's why it's very problematic.

Harvest or reused, it leaves the system, and if you look at cumulatively with all the development that could still take place, all the redevelopment, where right now, it's running off where runoff coefficients are 25 or above, and we're going to go back to run all of the water runoff captured onsite. It could be a significant amount of flow we lose, not just for our water supply, but for the entire system, ecosystem that relies on us as well.

So the magnitude to the problem, we don't know. The staff has asked us, "Well, how bad is it? Tell us. Show us how much you are going to lose?" Well, we can show that at the individual sites there's going to be less water running off. We can show that, but what we can't do is say, below the gorge, this is how much is going to be lost. But we shouldn't have the burden of proving it. It really should be on the staff. If they're going to change the way the natural hydrology is, change the way that we handle water everywhere.

You got to at least, before you make that leap, you better look. Because there's some unintended consequences that could be very severe for the entire

watershed. One example is the Steelhead right there. He's a juvenile Steelhead. And there's a hot debate in the Steelhead community as to whether that's eligible for protection or not. I don't know, but the bottom line is, is the 85th-percentile retention standard going to harm the Steelhead's chances of recovery in Santa Margarita? Beats me. Like it beats them too, because they haven't consulted with the wildlife agencies.

Same, similar issue, the Arroyo toad. It's prolific on Camp Pendleton. I know because it's all over one of our construction sites right now. And that's a good thing, because one of the reasons, we believe very strongly in that ethic of trying to recover the species. But when you capture 100 percent, 85th percentile storm onsite, all of that sediment transport would have occurred, it won't occur anymore.

It's going to stay onsite right? What happens to this guy? The Arroyo toad, they like to mate on sandbars in the river. We've seen when the water starts coming down in the middle of spring is where they mate, in the breeding season. What does that do for the Arroyo toad? No one knows. No one's studied it.

Some difficult questions for you gentlemen to struggle with. Here's what's at stake and the fact that there's going to be changes to the natural system,

shouldn't we be thoroughly studying it before we make this giant leap the staff is recommending today? And there's no reason why it has to happen. We can protect against pollution from the max to the practicable with the Delta B Standard. In fact, that's what EPA recommends in their guides, their headquarters guide, not in their comment letter, unfortunately.

So what is the MEP? We don't know. Given that if we lose flow, it could actually harm downstream beneficial uses. Are benefits from pollutant removal -- same point. Wildlife agency consultation probably should happen, because it could have some effects. We've got to be thinking about this stuff. Are we encouraging illegal appropriation of water without compliance to California Water Code?

People build these giant structures on their property to retain 85th percentile storm, and have to build new channels for the rechanneling of runoff. Are they appropriators? I don't know. Interesting question, but if we go, this permit could wind up before a federal judge who has jurisdiction over this case, determining the validity of some of the water right decisions, or water right implications.

I don't know where it's going to go, but I don't think anyone wants to go there. So recommend solutions,

size retention facilities to only capture the amount of runoff as the consequence of development, Delta B, and Steve Reich will tell you a little bit more about that, follow the EPA guidelines, limit consumptive use to types of uses that keep the water in the watershed. If we really want a cookie cutter's approach in this regional permit that Staff wants to use, let's not make the mistake and try to correct it later, because it may be impossible to correct it later. The damage may already be done.

So if we're going to go to this kind of standard, let's study it first. Camp Pendleton is potentially willing to participate in the action, if it's necessary. But we really think, based on the EPA guidance survey and everyone else we've seen, the Delta B standard makes a heck of a lot of sense. So I want to thank you for your time and consideration, and happy birthday to Marine Corps. And I want to turn things over to Steve Reich, Stetson Engineers.

MR. REICH: Good afternoon, Chairman and Members of the Board. My name is Steve Reich, and I'm with Stetson Engineers. Just to let you know, I've been participating in one faction or another in this basin since about 1993. So I have a fair amount of experience in terms of water quality, water flow, surface water,

groundwater, processes that are taking place. Camp Pendleton has asked me to take a look at some of the impact of what types of permit would do in terms of downstream flow.

So to go through really quick, and I don't want to bore folks today with technical details, but I certainly want to get some of the points across on why this could be a harm to the downstream water ability. So I want to talk a little bit about the storm definition, some of the impact on the side of hydrology, talk about the actual Santa Margarita River, why the concern that I think Mr. Jungreis brought up, and some of the other folks that you heard from today. That there is a disconnect between the actual surface water, groundwater, and why the infiltration is actually harmful, and why it's a loss to the basin, talk about those impacts, and also proposed implementation methodology that we talked about.

First of all, I think everybody's familiar with this. The one thing I wanted to talk about was, really, you know this is the entire volume of the runoff of the 85th percentile 24-hour storm will be captured. You've heard about Delta V; you've heard about the runoff. What I really want to do is to go through and show you different examples, site-specific example of what this

means as well as an example, a location over a period of time, say one year. So we're going to first go in and actually show you what does it really mean? What we do in terms of determining the hydrology? We go through and take a look and rank all the daily precipitation events. And we come up with a factor.

In this case, we see that during the 85th percentile, the storms, anything larger than that are going to occur 15 percent or less of the time. At the Wildomar gauge, it's .8 inches. Down at the Temecula gauge is 1.02 inches. And the way the permit is written, the permit will look at different areas of the watershed, and apply whatever appropriate rain gauge, as well as orographic effects to determine what that runoff and what that requirement will be at that location.

So what this does for us is that it really talks about intensity. So when we're talking about an 85th 24-hour storm, we use this as the intensity of the storm and how the permit will be designed for us. So the retention basin will be designed to capture this amount of water. But getting on to the example, what I want to show is what happens to that one-hundred acre undeveloped property. Now in this case, I'm using the Wildomar gauge. The Wildomar gauge is the gauge up in Wildomar where it shows a 0.8 inches.

And we talk about the predevelopment and post-development coefficient. So under natural conditions, how much water runs off? Under developed conditions, how much water runs off? You can see we're using a .2 and .5 factor. So those reflect the type of land they are; they reflect the moisture conditions; they reflect the hard scape that may be out there in post-development conditions.

For a duration of one day, the results are, under a predevelopment condition, we might have had up to .64 inches of infiltration, and .16 of runoff. Under post-development LID retention, it's actually .4 inches of runoff. So the permit, the way it's written today, is that it intends to capture that entire .4 inches of runoff that would have gone down the stream. So you can see that the loss at the individual site is to capture that initial runoff and infiltration into the basin.

In summary, the way the permit is written is that there would be an additional approximate 1.4 acre feet for every hundred acre feet of development area that we have out there. And so when you look at this, you know, we've got to remember there are many variables. There are things that control these calculations. The soil, I think Staff did a very good job at showing the soils survey, where some places are more hard escaped.

Some places have very good infiltration. So the amount of runoff is going to vary from site to site. When we start taking about the amount of water that's going to be captured, retained on site and either infiltrated or somehow operated.

As I indicated before, I want to talk about what happens over a period of time. So we look at this, before we just looked at a one single event and a single site, this is more of an annual idea of what's going on. What's interesting if you look at, this is the entire water year '06, you can see that the storm on the left, sometime in October, and again in January. We had storm value and these are single day events that are actually less than the design capture volumes. These are less than what would be required to be captured in the actual permit itself.

But when you add them up over the period of the storm, you start to see that the design capture volume of this LID will capture that first portion and the additional amount will continue to run off. So what we did was, we wanted to see what are the impacts of looking at the implications of the permit over the period of one year.

So I've chosen '06 to kind of give us an example of the typical rainfall. This is below normal condition.

You can see that we're a couple of rainfall events where it was greater than the 85th percentile. Those are shown there in March and April. But what we see is a reduction in site runoff.

Now, what we look at on the left, on the graph portion of this, you can see that the predevelopment coefficient is .2. There's no LID retention under natural conditions. There's approximately 30 percent of runoff over that period of that entire year. We took into account moisture conditions, strong durations, length of storms, and so forth, and we implemented what would have been the requirements under the permit. And we re-ran that model and we showed that now, the portion of that water, because of the change in runoff coefficient, you can see that the infiltration went down, but more importantly, what used to be runoff now becomes retained by the LID, which is the green.

If you look at the blue, what we want to take away from this, is that at a particular site, over a period of one year, we see a reduction of about 30 percent down to almost 20 percent in terms of surface runoff. The rest being retained by the lid retention BMP. So what does it mean? These are impacts to hydrology. We talked about how it reduces site runoff and increases infiltration. We talked about how it

recharges the groundwater. But really, how do we relate this to a level of impact to a watershed hydrology?

So what does this mean? It's one thing to talk about the site locations. So how do we talk about what happens down the stream? So that's why I want to bring up why the Santa Margarita River watershed is different from other watersheds. As I indicated before, there's a paramount development that's taken place in the Santa Margarita River constructions of dams, pumping of the groundwater basin.

And what that has resulted in, it's resulted in a disconnection between the groundwater, the groundwater levels, and the surface flow at what we call the gorge, which is the beginning of the Santa Margarita River as it flows down onto Camp Pendleton.

What used to be back in the '60's and '50's and the '40's was rising groundwater. As development took place and the groundwater pumping drew those water levels down, there was a separation from the rising groundwater, and the flow down to the gorge. So this impacts us in a couple ways. It impacts us because no longer do those elevated water levels actually support the runoff. So in fact, what we talked about already today, is that lowering ground waters now take in and use that additional stormwater as recharge, which will never rise

up down from below.

What we really want to take away, because of the impact of the development in the upper basin, because of the separation between groundwater and surface water. It's really none of this infiltration will benefit any of the downstream users. So what do we want to do? Well in order to really quantify and answer, I think, some of the concerns that have come up today, is we want to create a watershed-wide relation between specific site locations and downstream water availability.

As I mentioned before, the things that make a difference, and the things that really impact this, are the geology of the soils, the vegetation, the time dependency. What all this comes about is, how do we develop a time appropriate model that can actually say this is what the impact is going to be? The data does not exist right now. We do know that as I've shown in both the single as well as the multiple events over a period of a year, there is harm.

The only problem is how -- we are limited in our ability to quantify that. But there are data that we can collect, and I think that Mr. Youngwright has suggested that we're willing to participate in the collection of that data, but there are data that we can do to go to the next step, and be able to quantify the impact of each of

these. If there are any questions on the technical side, I know your staff is very well versed on this, but I'll be available to answer anything you may have. Thank you.

MS. ROY: Good afternoon, Chair Destache, and Members of the Board. My name is Toby Roy. I'm the Water Resources Manager at the San Diego County Water Authority. And I'm here to speak on this issue related to Camp Pendleton. The water authority is a wholesale water agency. We have 24 member agencies, and that includes Camp Pendleton and Fallbrook. Currently, about 80 percent of our water supply is imported from the Sacramento River Delta and the Colorado River.

Since the early '90s, it's been the policy of the Water Authority to diversify our water supply, increase our use of local supply, and reduce our dependence on the imported water. Camp Pendleton currently is extremely self-sufficient. In fact, almost all of their water supply is a local supply that comes down the Santa Margarita River and recharges their groundwater basins. Both Fallbrook at Camp Pendleton in the future are planning conjunctive use of water on Santa Margarita River.

This stormwater permit, as currently written, will transfer water from the downstream beneficial uses into the upper watershed. Ultimately, that's going to

reduce Camp Pendleton's water supply, and would result in them being more dependent on the water authority, more dependent on water supplies in the Delta and Colorado River. In San Diego, we have a real strong interest in water quality, and in particular, the Santa Margarita Watershed is a part of our integrated regional management plan. We have projects that look at water quality on the Santa Margarita, and it is a high priority for us.

We also support the concept of low-impact development from improving the quality. However, we cannot support the permit as currently written, as it will reduce the flows coming down the river. We would support the Delta V approach that has been proposed by Riverside County and Camp Pendleton, so that we can maintain and improve water quality, but at the same time, protect downstream beneficial uses. I thank you for your time today.

MR. DESTACHE: Lt. Col. Carlisle?

LT. COL. CARLISLE: Good afternoon Chairman, and good afternoon, Members, and happy birthday to all the Marines in the room. Reject any wholesale 85 percent reduction standards, because EPA guidance contemplates more flexible options that don't threaten downstream surface or groundwater or downstream ecological processes.

As recent as December 2009, USEPA published a technical guidance on implementing the stormwater runoff requirements for federal project under the Energy Independence Security Act. USEPA guidance focused on maintaining and restoring the predevelopment hydrology during the development. EPA's guidance also advocates for performance-based approach by restricted requirements.

In order to provide the maximum flexibility, and also in selecting control practice appropriate for the location. EPA's guidance says that predevelopment hydrology is a guiding control principle that allows project proponents to consider climatic and geologic reliability, and tailor the solutions to the project location. Finally, the important thing for you to know, about the technical guidance provides a window on EPA's position on whether a cookie-cutter approach in regards to the retention standards, always the most appropriate means to address stormwater pollution.

As you heard, low-impact development is a set of management approaches. But it used to mimic the natural hydrological process, but ironically, a wholesale 85 percent retention standard could be destined to purposely change the hydrologic process to the other extreme, and trying to address the problem of increased

duration in the rate of stormwater flows, a wholesale retention standard could have an adverse impact on ecology by altering the natural hydrology the opposite direction with decreased flows. Or altogether removing the predevelopment stormwater flows on which various ecological processes now rely.

Finally, and most importantly, the USEPA technical guidance explains that there are situations where conditions may make retention and or use of storm water onsite inappropriate. Okay. That's something that's very important that comes from this technical guidance. In it, it actually expressly states there's times when it could be absolutely inappropriate to use a retention standard.

Those situations are when the onsite retention would have a significant adverse effect on the down grade water balance of surface waters, ground waters, or receiving watershed ecological processes, or when retention of the stormwater causes an adverse water balance impact of the water body or the groundwater. Both of those apply here.

You should also reject the 85 percent retention standard, because a wait-and-see approach could cause ecological harm. And once established, the Clean Water Act anti-backsliding provision may prevent modification.

To explain a little further, the anti-backsliding provision to the Clean Water Act prevents regulators from issuing permits that have a less stringent ethylene limitations than in the previous permit. EPA regulations prohibit anti-backsliding not just to terms and ethylene limitations though. There are other "standards or conditions." One of those "standard or conditions" falling within an anti-backsliding could be the 85 percent retention standard at issue here.

And the choice to apply an 85 percent standard now, under the theory that you could always dial it down later, may be with a legal challenge that such an action violates Section 13.20 of the anti-backsliding statute. What is even more troubling is that it could be possible for any interested party, either for water rights, or for other reasons.

To challenge for this Board's future modification to the 85 percent retention standard, because such a modification could be deemed to violated the anti-backsliding provision. For these reasons, I urge the Board to reject the wholesale 85 percent standard and use the Delta V approach. Thank you, Gentlemen.

MR. BOUGHMAN: I'm Paul Boughman. I'm with the Western Counsel Office on Camp Pendleton. I'm on staff

there as an attorney. Bottom line up front, if you do the Delta V, what I'm getting ready to tell you is all in a good mood, but there is an unintended legal consequence of this. As you, like every California watershed around here, it's heavily litigated. There's three major cases going on around here. We're in heavy negotiations with the Fallbrook Public Utility district. That's been ongoing.

I'm happy to say right now, we've got a tentative agreement. It's on it's way to headquarters Marine Corps. It's been signed by the CG. The second thing is our QUAWRMA. Quality Water Resources Management Agreement. It's almost ten years old, and that's been very success to Rancho California Water District.

The other thing I get the privilege of, since I'm a federal attorney, I get briefed from the federal attorneys who are dealing water right settlements with the Indian tribes in the watershed. Those are moving. They're successful, a lot of details. All three of these things are based on the current hydrology of the river.

If that changes, that's going to change how we exercise those rights and probably put some the these negotiations back to square one, because we're working off current hydrology and stuff that's been modeled. So the Delta V won't change that. That's why it so

important.

One other case I thought about while I was sitting here today, the four-party litigation with Eastern and Rancho and Fallbrook is almost completed. That one dealt with shipping water out of the watershed. That's another one of our concerns here, gentlemen.

Bottom line, the proposed permit, the way it's written right now, in not exercising the Delta V, is going to impair the ability of Camp Pendleton to exercise water rights as, and we have some of the oldest on the river. That's all that I have, gentlemen. Thank you.

MR. BEBEE: Jack Bebee, Fallbrook Public Utility District. I apologize for us inserting ourselves later in the process. Quite honestly, we're a water -- wastewater district. We don't do any stormwater. So we really didn't pay attention to this order until recently. And the points that everyone had brought up, the key is, we've been in litigation with Camp Pendleton since the '50's, and we're very close to resolving this litigation. But the key part of it is not changing the downstream hydrology.

The one thing you do not want to do is get in water rights disputes with Camp Pendleton, which is exactly what this is going to do. So I'll make sure to state Fallbrook Public Utility District also supports

the Delta V approach. Water quality is a great concern to us too, because this is water we're going to treat and deliver to our customers. But we think the Delta V approach is a good balance of quality and quantity. Thanks.

MR. JUNGREIS: Gentlemen, we've identified the problem. We've given you the potential solution, and we've given you the draft language. Thank you very much for your time.

MR. DESTACHE: We are going to move onto the USEPA. And hopefully we can stay within the ten minutes.

MR. KEMMERER: My name is John Kemmerer. I'm an Associate Director of the EPA Region I Water District, and I have taken the oath. We support the adoption of the proposed permit the staff presented to you today, including the errata sheet dated November 3rd. Just to recap a little bit of what Chiara mentioned earlier. Not only here in the Santa Margarita Watershed, but across the country, EPA is seeing the impacts of municipal storm water, I mean, severe impacts on the water quality. And it's really critical for us as a nation to get a better handle on managing of stormwater runoff.

There was some reference to the audit that we did here in Riverside County a few years back that was part of, one of 56 audits that we've been doing of

municipal stormwater programs across our region, in the states of Arizona, Hawaii, Nevada, and California. And we have been finding actually a lot of great things about the work being done by the municipal stormwater programs. We're also seeing some real problems with permit language, and one of the big initiatives that we've been taking is trying to encourage more measurable and quantifiable requirements in permits.

And since, in the last just few years, actually right around the time you guys adopted the -- renewed the San Diego permit, we started working with the regional boards across the state, and especially here in Southern California to focus on how is the next generation of permits can be written so that we can get a better handle on strong verbiage, and how can we include measurable and enforceable requirements into this permit.

A big focus of our work on this has been on the low-impact development. And I'd like to spend most of my time here talking about the few issues on low-impact development that you've been hearing about today. We really support the work this Board's been doing on low-impact development.

You're part of the leadership across the country in incorporating LID into permits with the South Orange County permit, and Riverside County also is a

national leader with the work they're doing with their design manual, and this demonstration project that they're doing, and it's really going to be exciting to see that.

So there's been some discussion about what's the definition of what low-impact development? You can find dozens of them, of course, but from our standpoint, the principle of LID are to manage stormwater at its source by infiltration, capturing use, and evapotranspiration, so that one doesn't have a chance to pick up pollutants, which otherwise would impair surface water bodies.

And of course, we're all here today about water quality benefits, and there's very clear water quality benefits from implementing LID, but we would be foolish to ignore the other benefits from LID, which include by capturing rainwater for irrigation and other non-potable uses, we conserve our precious portable water supplies. So this is particularly important here in Southern California to reduce our dependence on imported water supplies from outside our arid region.

So we supported the approach that was taken in South Orange County permit, which is the basis for the provisions, eight in the proposed Riverside permit. And these same conceptual approaches, that is using, capturing use, infiltration, evapotranspiration to retain

stormwater onsite have been incorporated into eight MS4 Permits since last May in California. So this is basically continuing the trend that's been going on since last May.

And we'd like to see it continued to be supported here today. One of the issues that's been proposed here is to diverge from the previous permits and essentially only require that infiltration be used among the suite of LID tools. This would be contrary to the approach you previously adopted and the approach that the Santa Ana Regional Board adopted for the rest, the most of Riverside County. It would also be inconsistent with the direction we are taking nationally at EPA to encourage utilization of all available LID tools, including those that capture and use stormwater.

There's a photo that Neill showed you earlier of the green roof. One of the advantages of green roof since you get that from transpiration of the plants that are on that roof. So there's a lot of different tools that can be used to implement LID, and we'd be opposed to any change in the permit that would limit LID to only infiltration.

The other big issue you've heard a lot about are the potential unintended consequences of downstream water supplies. And I should probably stop here and talk a

little bit about EISA Guide, which has been mentioned a lot here today. Again, in the Energy Independent and Security Act, which was passed by Congress, signed by the President. Under, which basically requires that federal agencies for new and redevelopment projects on federal facilities implement LID. And under that law, there was an executive order issued to EPA to write guidance for implementing that.

And so the EISA guidance, which I was involved in a little bit in some of the early drafts, we at EPA don't necessarily think of it as the EPA guidance. We were asked to draft, and it was signed off on by all involved federal agencies, all military services and other relevant federal agencies.

And what the EISA does is that it sets a benchmark for, first of all, for retaining stormwater on site. The benchmark is 95 percent. So the 95 percentile storm is what's the benchmark underneath the guidance. That is a significantly bigger storm if you look at how, when you map out the 85th percentile storm what that volume is going to be versus the 95th. It's going to be a significantly bigger storm.

It also provides, it's like the thing that we've heard a lot about. We didn't hear about the 85th percentile in previous presentations, but the other

part that it does include is that it gives people the opportunity to do site-specific analysis to match predevelopment hydrology on them. And the EISA guide actually mentioned that in all case -- it's possible that in some cases, can retain, the 95th percentile storm may not be sufficient to retain, to basically reflect predevelopment hydrology, because in some areas there isn't going to be so much retention on the site that actually the 95th percentile score is not going to be sufficient.

But it also gives the opportunity to do site-specific analysis, and I would disagree with the presentation that Carlisle gave earlier that seems to imply that under the 85th percentile storm, there's always going to be some degree of runoff. That's not necessarily the case. You could have, depending on the landscapes and soil, you could have much more greater retention. In some cases, the 95th percentile storm would not have any runoff. The thing, the issue that I really want to get out of in 85th percentile, predevelopment, hydrology, all of that.

When we sat down about two years ago, with the regional board, we talked about how is LID going to be incorporated into these permits? And how can it get done in a measurable, enforceable way? We looked at a lot of

different options for how it could be done. One of the options on the table, let's just say match predevelopment hydrology.

The decision made in California was to use 85th percentile storm. That was a metric that had been used in previous permits under the system requirements. It was a requirement that had been well understood, practical, implementable by the regional boards and by the permittees in California. It was never -- it's often seen as a kind of approximating predevelopment hydrology. But it's not the same predevelopment hydrology. In some cases, it's going to be under-retaining predevelopment hydrology; and in some cases, it's going to be over-retaining predevelopment hydrology.

So basically, I think from our standpoint at EPA, we can live with the idea of a permit based on predevelopment hydrology. The point is that everyone needs to have their eyes open going in tonight. When we talk about predevelopment hydrology, it's not a cookie-cutter approach necessary to come up with what the number is, what you're going to spit out as the number for the predevelopment hydrology.

Especially, where you have already developed property that you're going to do redevelopment on. You have all that calculations what the native state of the

landscape was, and what should be retained as a result of what that property was like before any development was done on it.

It's not a straightforward exercise, but it needs to be done in a thoughtful way, and it needs appropriate I was by the regulatory agencies. So the way we would look at it, if redevelopment hydrology is going to be used, the permit language needs to be crystal clear on what that means.

I don't really believe I have to tell you the approach was proposed to leave the door open for some loopholes. I think if you clearly define in the permit what you mean by predevelopment hydrology, how it's going to be calculated, et cetera. That would be a big step forward. I think you really be to be concerned about is what are the resource demands on your staff. We heard this morning issues you're prioritization before your staff.

So 85th percentile is not a perfect metric. It's a metric that's been used in eight different permits that have been reviewed in the past year. If you're going to go down the predevelopment hydrology route, keep in mind that it's going to be resource-intensive for your staff to oversee. It's also going to be more resource-intensive for the development community to put

things together. It is our recommendation that you would stick with the 85th percentile storm approach that you previously talked about here.

I'm going to just make two last points before I'm done. There are two other aspects of the permit that we're supportive of that have come up today. One is the landscape irrigation lawn watering provision. We support the deletion of this from the list of non-stormwater discharges.

Now, I'm surprised by the County's presentation on this, because one of the things we looked at closely when we reviewed the permit was, what is the basis for this? And we found in the fact sheet that the fact sheet appropriately supports the fact that this category of discharges is a significant source of this pollutant. So that's the reason we felt like that was a good addition, a good change to the permit.

Lastly, on the monitoring provision, I'm sure you're going to hear a lot more from your staff on that front. We understand that monitoring is very resource-intensive. We believe that these requirements are consistent with the Board's other recent MS4 Permits. And monitoring is, I think everybody recognizes, is really key to be able to show progress and determine the effectiveness of what we're doing under these stormwater

permits.

So we support the monitoring requirements that I've been proposed to. So thanks for the opportunity to speak to you today, and I encourage you to adopt the permit as proposed. Thank you.

MR. GIBSON: Let me make sure I heard you correctly. You'd be in favor of predevelopment hydrology similar to a Delta B approach if it was more spelled out and more articulated?

MR. KEMMERER: Frankly, if we're going to use the Delta B, I heard somebody say we should follow the EPA guidance. The Delta B should be predevelopment versus the 95th percentile if we're going to use the EPA approach. But you know, so we pick, support, and approach that's based on predevelopment hydrology. I'm not sure if the Delta V approach exactly. If it's drafted properly, I think it can be done.

MR. DESTACHE: And now I think we'll go to other interested parties.

MS. SOLMER: Thank you. Good afternoon. My name is Gabriel Solmer, Legal Director to San Diego Coast Keeper. I'm also making my comments today on behalf of NRDC, who was unable to be here today. And did I take the oath this morning. I want to give a quick background, and I believe we worked out that between Ms. Borac and

myself that we will, if we have 15 minutes, we'll get ready to in 10 minutes between us, and just allocate our time that way.

Just by way of a background for this information, the structural practices that we have been using for stormwater for the last 20 years have gotten us to the position that we're in now. They haven't worked. You have a problem. This permit is part of that solution. The low-impact development we've so much today is that superior means of addressing stormwater runoff. I think that you heard things today that are the general consensus. There's just no general consensus on how to actually implement low-impact development, unfortunately.

You have a top-notch staff that is looking at that. And then again, just by way of background, you have had extensive outreach and discuss with the stakeholders here. I just recall the slide that went out during the staff presentation, with those 17 initial meetings and then the two and the four and the many, many meetings. So we are at a decision point today, and I know that you appreciate your charge here today.

And what I want to say is be consistent. You have looked at this, and the other permits that you looked at. Your sister regions have looked at these exact issues. I think just by a time-saving mechanism,

it's safe to say that the environmental groups do not agree with the surgical changes, and I think there are far more than surgical changes that the co-permittees outlined, and their response that they support your staff and each of their comments that they have made as well as EPA.

Like I said, look to the pass practices, look at the Orange County, MS4 Permits, those in Region 8. It's just, it's just not, we agree those permits are not stringent enough in regard to biofiltration, or biofiltration counting towards your retention requirements, but we do support the requirements to retain the 85th percentile.

I heard the 95th percentile may be all right. That one is more desirous, but we're here to talk about the 85th percentile, and the consistency with the permits that you've looked at. That's a consistent requirements through all those permits. Those properly meet the MUP requirements of the Clean Water Act, and that really should be the floor that we're looking at. Anything less stringent really fails the MUP and we would ask you to reject that proposal.

One large concern that we have is the standard that's proposed by the co-permittee and I think Camp Pendleton that we find technical infeasibility, and

that allows biofiltration when something like infiltration isn't feasible. So even though what capturing use means, I want to let you know that those are the techniques that keep 100 percent of the pollutants generated by these land use choices onsite, and don't let those go downstream.

So that's what we're looking at. I heard a comment that, a slide, that some of these things are not working when people put in rain barrels and then they're undersized. I think most of cities have that public outreach, and they can make some of those changes. If people aren't installing them correctly, that's not a reason not to use them.

I just want to talk a little bit about the water supply side of things. We're talking about the page 16 of the errata which adds the phrase, "Infiltration Requirements," that they're fully protective of downstream water rights. Which I think is your Staff's way of trying to address these issues, even though you heard Staff say this morning that those water supply issues have not been substantiated. I think that language, that ambiguous language is an inappropriate way of dealing with this discussion. It's ambiguous. I think it's honestly right for litigation. What does that mean, "fully protective of downstream water rights"?

Let's go back into what we're talking about here. What you've heard today is people asking you to make up this deficit and historical flows on the backs of impervious surfaces and this permit. And that's just inappropriate. If the disconnect between the upper and lower watershed is the dam, that should be the target of what we're doing. That's the natural hydrology and then the disconnect that what we should be looking at. It's not fair to put that on the backs of recapture and a new LIP requirements.

We heard talk about the giant structures that are going to keep all of this water from downstream uses. I just don't see that. We're talking about people installing rain barrels. There is just a little bit of a disconnect there. And also just to follow up with that, a lot of the region here is developed with sites that don't currently incorporate LID retention practices. So the impervious surfaces at those developments generate substantial volumes of manmade stormwater runoff and non-stormwater runoff over and above what would happen naturally. So again, I think the Board should reject this call to weaken the standard. And I'll turn it over to Livia. Thank you.

MS. BORAC: Good afternoon, Chair Destache and Board Members, my name is Livia Borac. I am an attorney

at Coast Law Groups. And I am speaking on behalf of Coast Law Group, Coastal Environmental Rights Foundation and the Members of the San Diego Bay Counsel. Also, I did take the oath earlier. They counseled me about the San Diego Chapter of Sierra Club, Audubon, San Diego Coast Keeper. And I'm also going to speak a little bit about comments from NRDC. The two issues I'm going to try to hit are over irrigations and economics.

The exemption and the permit that currently exists for over-irrigation in the tentative draft permit would be taken away. We have, in the environmental community, have a huge problem with this exception of non-stormwater for a long time. Back in the days of working at Coast Keeper, we did a stormwater audit, and every co-permittee used this as an excuse to do nothing about over-irrigation.

I can't tell you how many pictures on my phone I have of over-irrigation that drains to stormwater drains, and goes into the storm water systems. And you can visibly see pollutants in there. You don't have to do monitoring to know that's it's an impact quality.

And so I take offense to the fact that you would have to do some more monitoring to prove that over-irrigation has an impact on water quality. It does, not to mention, over irrigation is a water supplies

issue. So to hear some of the co-permittees and Camp Pendleton talking about how water supply is a big deal, but overlooking the water quality impacts that are the basis of the stormwater permit, which is the point of the Clean Water Act, it is a little disconcerting.

You've also heard from Staff that people are overfertilizing, they have pet waste. There's all these issues with watering their lawns and then not reaching the storm drains. That, in and of itself, is also a basis to show that over-irrigation is a problem to water quality.

The second part of my comments is economics. You heard every single public representatives from all the municipalities talking about economic hardships. I think Wayne made a really good point in saying, in the good times, there's not extra money that's put into the Storm Water Program. In the bad times, everybody cries poverty. Well, that's actually not a new argument. Every time the stormwater permits comes before the regional board -- I'm sure you've heard this -- every time anything comes before the regional board, co-permittees cry poverty. "We don't have enough money to do this."

As was already mentioned by Staff, discharging into the waters of the United States and into local waters is a privilege. If you can't afford to comply

with the permit, don't discharge. There's an inherent feeling in the municipality that they have a right to build these flood controlled, historical flood-control capacity mechanism to usher water away so that they prevent damage to property, but the water quality issue is second, comes second to moving the water away.

But the water quality issue is the priority, and that's what the stormwater permit is meant to address: water quality impact. The other thing is, these municipalities, it rings a little bit false to say, "We don't have the means for collect the money to pay for this." The City of San Diego, I know they're not one of the permittees, but as an example, is a huge city. They charge 84 cents a month to their water users for the stormwater fee; 84 cents a month.

They would have to charge three times that to recoup their entire stormwater program fees. That's the City of San Diego. All the other cities are doing, have the same inherent issue. They don't pass them across. They don't charge the users. They don't trust the developers, the residences, or the industrial users to pay for the stormwater program.

So it's not a matter of not having the mechanism, the political will to do it. You have everybody that was an elected official up here saying,

"We can't charge. We don't have the money." But it's a matter of passing out the costs onto the constituents. We'll require it and the money will come. The other thing is you can kind of see where the prioritization comes of the money that the co-permittees do have.

I believe it was one of the supervisors, his representative saying that $9 million was built on flood control and creek restoration. So $9 million was spent on ushering water away against flood control devices, and $3 million has been spent on LID. And that's $9,000,000 compared to $3,000,000. Moving water away flood control, property value versus water quality. The issue isn't, "We'll never have the money to pay for this."

So choice is, "We won't have police officers on the street protecting people, because you're making us put in LID infiltration devices, or to go out and enforce." It's political will. So what we're asking today is please don't weaken this, the stormwater permit. The Clean Water Act doesn't have an exception for economic hardship. Our staff has said there's no consideration of cost in the Clean Water Act. It's not allowed. So to come up here and say, "These are fanciful requirements, and you don't need to put them in the storm water permit, because we can't afford them." That's not a valid basis for not approving the stormwater permit.

And I think staff has shown you, even with the inadequate monitoring that you have to date, you've seen the IBI index and you've seen the monitoring. Water quality is poor. The iterative loop isn't working you need to ration up, not ration down. The Orange County permit is not just Orange County specific, it's a nation-wide standard. From APA, eight other permits are doing the same thing. So we urge you to accept and adopt the tentative permit, and not accept the changes either from the Flood Control District or Camp Pendleton. Thank you.

MR. VAN RHYN: Good afternoon, Chairman Destache and Members of the Board. My name is John Van Rhyn, and I'm with the County of San Diego Watershed Protection Program. The County took the lead on the MS4 Permit. And it's in that capacity that I'm here addressing you today. And we'd specifically like to address two provisions in the draft permit findings that I think have considerable relevance to the long-term time implementation of the permit you're being asked to adopt today.

The first of these is finding E12, which briefly summarizes the history of the Region I MS4 Permit issuance, and ends with the following statement: "The San Diego Water Board plans to develop a single regional

MS4 Permit prior to the expiration of this order that will transfer the co-permittees enrollment to the regional permit on expiration of this order."

Although several reasons for the issuance of the single permit are sited, these are not supported with the additional discussion or analysis in the draft permit or the fact sheet. We therefore, find it impossible at this time to support a conclusion that a single regional permit is necessary or a preferable option. If, in fact, there are reasons for looking at new approaches to permitting, we believe that these should be explored in an inclusive process, and that all reasonable alternatives should be considered.

A single regional permit may be one the those alternatives. To date, none of the three regions have been included in such a dialog, and it's dismaying to see a finding in this permit describing Staff's intended plan of action. I'm requesting today that the last sentence of finding E12 be replaced with the following: "In cooperation with representatives of the three existing MS4 Permits, the San Diego Board plans to investigate the need for development of alternative permitting approaches prior to the expiration of this order."

I would also like to comment on finding E6, which addresses the issue of unfunded mandates. I don't

need to remind your Board that the March 2010 decision of the State's mandates commission has important bearing on the future content of the San Diego MS4 Permit, and most likely on other permits issued by your board.

Finding E6 states: "This order does not constitute an unfunded local government mandate subject to subventions under Article 8B, Section 6 of the California Constitution. And goes on to cite several reasons why Staff believes this to be true. This assertion is also unsupported by discussion or analysis in the draft permit or the fact sheet.

Since there's a process for determining the existence of unfunded mandates, and since it's too early to know whether or not that process will be invoked, it seems inappropriate to include definitive statements regarding the applicability of unfunded mandates. At best, this is speculation. I'm therefore, requesting to finding 86 either be removed or modified to reflect that it's staff's opinion that the order does not constitute an unfunded mandate.

As a longer-term consideration, I'm also requesting the that staff gives serious consideration in its permittee approaches to the relevance of the San Diego decision, including the possibility that it will be upheld. Assuming that the State will not

reimburse permittees for provisions determined to be unfunded mandates, and assuming the possibility that the San Diego decision will be upheld by the Courts, which will likely take another year or two to be resolved, I don't think it's overreaching to say that the San Diego decision has likely bearing on the permit before you today, and certain bearing on the content on the consolidated regional permit in the future.

Permit programs are much more likely to be successful when all affected parties are brought into the dialogue early. With respect to the issue of a regional permit, this has not been the case. To date, staff has shared nothing with us other than their retention to issue us a regional permit, starting with the 2012 reissuance of the San Diego.

Yet, within the San Diego Region, considerable discussion has already been put forward on this issue. The San Diego permittees are currently finishing off a series of five facilitated visioning workshops conducted over a three-month period to more fully explore options for future improvement of programs.

We'd like to see that work considered in the reissuance of our permit. This work also follows on watershed permitting discussions that were initiated by regional board staff in late 2008, conducted into 2009,

and subsequently dropped. We believe a decision to pursue regional permit should not be a forgone conclusion and should ultimately rest with your board. We would simply like to see a decision-making process that's fully supported by a participatory process grounded in dialogue.

In closing, I would like to request first, in finding E6 and E12, be modified as I've described, and that Staff be directed to a cooperatively with representatives of the three MS4 Permits to explore options for improving MS4 Permitting, and two, that all the parties report back here for the findings of these discussions. At that point, a reasoned decision can be made as to how we might better move forward with MS4 Permitting in this region. Thank you for your consideration.

MR. GREY: Chair Destache, Members of the Board, my name is Mark Grey. I'm Director of Environmental Affairs for the BIA of Southern California, and the Technical Director of the Construction Industry Coalition on Water Quality, and I've taken the oath. I have a few brief remarks. First off, we've heard much today about consideration of economics, and I couldn't agree with that focus more. We need to do that.

I want to point out something, BIA and Kick Wick have consistently advocated for this permit since it was

first released, and that is, I've talked to Staff about this, and that is to include from the South Orange County permit that you adopted in 2009, Section S7B, in part, it says, "The permittee must develop technical feasibility criteria, including a cost benefit analysis, when looking at the feasibility of various LID BMPs."

And I would urge you to include that same language in section F1D in this permit, to include that, because that's a very important consideration when evaluating the feasibility of LID BMPs, not only their technical feasibility, but their cost effectiveness as well. So I urge you to please include that, and I've made that comment in a couple different comment letters to the Board.

Secondly and finally, I, you know, get paid to evaluate these permits. And I've noted something in the fact sheet update that's inconsistent with the permit, and this is also related to the LID BMP technical feasibility process. And the fact sheet now reads on Page 135, Section F1D4, it reads that for priority development projects where retention, and that's a change in the errata, where retention LID BMPs are not technically feasible for retaining all or a part of the design capture volume onsite, without runoff, a waiver may be granted for the remaining portion of the design

capture volume to be treated with other LID BMPs, that interpretation of requiring a waiver is inconsistent with the text in the permit.

If you have evaluated infiltration, harvesting use, and evaporative BMPs and gone to biofiltration, and your staff has made a good change in the errata in allowing biofiltration with some specific sizing criteria, then you have met your obligation. You don't need to go into a waiver program. So the way that staff in the sheet is interpreting the need for a waiver is inconsistent with what's in the permit.

That's my point. You don't need a waiver to use biofiltration. In talking about creating more paperwork, more hassle, more reviews. That would do that. So I urge you to change the fact sheet, and make it consistent with how the LID BMP Waiver program is envisioned in the draft permit with errata changes. Thank you.

MR. UHLEY: Thank you. Once again, Jason Uhley, Riverside County Flood Control. I have taken the oath. I guess what I want to start with, our goal all along has been to improve and move the programs forward, and I want to make sure that's been heard clearly. What we're here asking for today is not maintenance to the status quo; what we're asking for is very specific changes to the permit to adjust the costs, to adjust liability

issues, and to adjust environmental stewardship issues that's been raised by Camp Pendleton. So that the permit implementable for us and achievable and we can achieve outcomes that you're looking for.

Mr. Rayfield, I think earlier you we're asking about our LID BMP demonstration project. We have actually just issued a notice to proceed on that project. And so we're expecting construction to start on that in December, where everything is going to take three or four months to get that built, and then start to be able to collect data. And we would very much like to invite you down to see that project, either during construction or after it's completed.

Because it was intended to serve as a regional demonstration project for LID concepts, not only for Riverside County, but for San Diego, Orange, San Bernardino County, really all of Southern California.

The second thing along the theme of moving our program forward, we had extensive comments in our letter, and that explained why that was, because we're basically eliminating our existing programs and transferring the Orange County compliance programs here. But we're not coming with all that. We came with a one-page errata of very specific changes we wanted, and then those were the changes we felt we absolutely needed to have.

Like the first touch on monitoring program requirements, you know, there's been a lot of talk about can or can't, consistent, not consistent. What we're looking at is a five-fold increase in the cost of the monitoring program for us. And for me, it's not necessarily the cost, although that becomes an issue for our cities who share that cost with us.

My staff has to implement that program. And I can tell you that we do not have the expertise and the staff to develop a five-fold increase in what we're doing now. And we're actually looking for new staff now, and we're having a heck of time finding people who are qualified to do this. And there's not a lot of consultants who do this in Riverside County, and so we have to bring people in from out of the county to collect data in our county, and it gets very expensive.

And so the changes we've asked for in the monitoring program, actually, in some cases, just bring it back to Orange County. We want to go back to the number of special studies in Orange County. We want to go back to a number of weather sample collection events that they do in Orange County. Others are simply to try to balance the cost of collecting samples. Composite samples have their place. It's a way of using automatic technology to collect samples.

And we can do that, but it is very expensive. Setting up a site to collect composite data can cost $10,000, $20,000 a site. And then there's the implementation cost. For dry weather sampling, the flows are very constant, the pollutant loads tend to be very constant. We can use grabs there, and we're not damaging our ability to collect quality information. But it's not like stormwater where the flow and pollutants are very variable.

Dry weather is typically more static. That's why we're making those changes there, because for us to go out in dry weather and send one staff person out there to collect a sample, bring it back to the lab, and analyze it is much more cost effective. And we don't think it causes damage to our ability to collect adequate information for the permit, and to be able to analyze that information and use it for our programs.

We've also brought out the irrigation runoff prohibition, and I'd like to note, we're not saying that we don't want to manage irrigation runoff, we're talking about where the point of compliance is. And really, the issue comes down to do we regulate it at the curb, or do we regulate it prior to the outfall, where it goes to the receiving waters? And what we're simply asking you to do is move the compliance point downstream. And what

does for us is it opens up a number of options for how we can address irrigation runoff where it's a problem.

We can do things like use MS4 system to do infiltration to capture it and put it in the ground consistent of LID requirements before it gets to the receiving waters. Those types of solutions are precluded by the way the order is currently written where it says you can actually prohibit discharges of irrigation runoff to the MS4. And the MS4 is defined up to the curb and gutter.

So we're simply asking you to move the point of compliance. And, finally, there's been a lot discussion on the LID provisions. And I guess the first thing I noted is that EPA did say they would support a method whereby we could look at a managing to the existing, the predevelopment condition, and so we definitely support that, and I'm going to yield a little bit of a my time at the end of Jeremy's so he can provide some additional comments.

So we can do that. And the way the permit is written, it says we just have to develop a method to accomplish that. And I don't think we need to negotiate that method today at the hearing. It's actually, in my experience, trying to negotiate those kind of details in a hearing is bad news. So what we simply recommend is

leave the language as we have it proposed.

We can develop a recommendation as part of building our compliance documents, and we can bring that back to you. It will go through a public review process, everybody will get a chance to see it, and we can make sure we've got it done right at that time, when we've got more time to think about how to really do this right.

On the reuse issue, our last point, in LID, there's a lot of discussion about reuse, and as noted our efforts in developing LID criteria for the County are starting to get some larger recognition, maybe even nationwide. So we've got a lot of research in this. So we're not saying we aren't precluding the use of reuse. Our experience and our expectation is that the reuse technologies are subject to failure. But this permit mandates that we use them.

And in mandating that we use them, it also mandates that we ensure that they're functional for the life of the development. And so there's an issue of holding us responsible for the failures of BMPs that are incorporated into people's homes. And that's just a level of administration and government that's somewhat, I view as somewhat obtrusive, at the homeowner level, and also very different to manage. And so what we're simply asking is for you to remove reuse as one the priority

requirements in the LID provisions.

And then we honestly believe that biofiltration is actually more effective, because it doesn't rely on private maintenance. We're going to put a biofiltration BMP as public maintenance, and so we'll have a much better chance of ensuring those BMPs function in producing water quality benefits we're asking for a long term.

I'd also like to note that we support the comments 1 made by Jan Van Rhyn on behalf of the San Diego Program and we support the comments raised by the BIA. With that, I'd like to check to see if anyone else would like to add anything to our closing statement, and if not, I'd like to yield in the additional time I have to Jeremy in case he wants to add anything from Camp Pendleton's perspective. Unless you'd like me to go over the monitoring requests in more details more specifically, I'll yield my time over to Jeremy.

MR. JUNGREIS: Gentlemen, you already heard a lot from me, so I'll keep it very, very brief. One, I didn't say before that we were all sworn. I don't want you ignoring all of our testimony, so I want to say that we were all sworn before we spoke. Another thing, there's been discussion with EPA, and I respect Jan's new interpretative definition of LID.

I haven't seen that before; hopefully someone was writing it down while he was there so we could all catch that in the future. But read the EISA guidance. It speaks for itself. It's a good document. He's correct. There's a 95 percent infiltration, not retention, infiltration standard, but basically, it's a choice. For those who are less sophisticated, you can go with the 95th percentile infiltration standard.

If you have the wherewithal to figure out the pre-imposed development hydrology, then that's what you do. But it gives you an option. It's a pretty good document. And then, finally, I'd like to respond to a couple comments made by folks from Coast Keeper: We care about the environment, too. If we didn't, we wouldn't be here. This is all about protecting our environment on Camp Pendleton and downstream use of the future.

There are places in California people fight over in-stream flows. Well, in-stream flows are part of the water quality, too. So that's why I was a little surprised. Why wouldn't you want to protect those in-stream-flows? But it's a difficult issue. I certainly understand that. Our water supply is at stake. We're water independent, and it's in everyone's best interest that we stay that way. And I thank you all for giving us the time to make our case today.

MS. HAGAN: Just on the issue of water rights, a couple of -- Camp Pendleton and a couple of other commenters have pointed out the issue of water rights. As a legal matter, I just wanted you to understand that a property owner does not need a water right to divert stormwater that falls on property before it gets into groundwater surface stream and make use of that water on their property.

So whether or not you adopt this provision in the permit, the landowner has the ability without meeting a lot of rights to make use of the rainwater that falls on their property. They also mention the anti-backsliding issue. And if in fact, there's an exception to the anti-backsliding issue for new information that was not available at the time the permit was adopted and that would have justified a different limitation had it been known at the time, it would have allowed you to effectively adopting a later permit with a less stringent standard.

Although, it would need to achieve equivalent pollutant reduction, so it could be a different, less stringent standard, but so, there is an exception to the anti-back sliding rules that would not necessarily be running afoul that if you later decided to make a change to the permit based on new information. And then I also

wanted to point out the state water board has a division of water rights and a complaint process for hearing complaints about harm to water rights.

So that's an avenue that is available to Camp Pendleton or other downstream water rights holders if they feel that their water rights are being infringed upon. And I think that's it on the water rights issues, and then just on the County of San Diego's comments about the findings of unfunded mandates in permit. The legal memo that's in your packet, I think it's supporting -- actually, I don't remember which number it is.

I touched upon the unfunded mandated issue, and I just wanted to remind you that two decisions that have been issued by the Commission of State Mandates and Final Forum applied only to the permits that were challenged, the San Diego County permit that was adopted in 2007 and some of the Los Angeles' permits. So it's not determinative of what might happen to this permit and finding is as appropriate, as written. You're free to make some changes to it if you wish, but I don't think any are necessary.

MR. DESTACHE: Thank you.

MS. CLEMENTE: Okay. Since everybody took liberties on their time limit, we may as well indulge ourselves as well. My name is Chiara Clemente and I

forgot to say before that I did take oath. For those of you that are new to the Board, I'm so sorry. This must feel a little overwhelming. I feel overwhelmed myself. I just want to point out that we can't get into the nitty gritty details of this permit and explain our rationale for everything.

If we missed something, feel free to call us up and ask us for a little more background or information as to why we did a certain thing the way we did it. And I just want to apologize if our presentation appeared to be an attack on co-permittees. We were just stating facts that came from either our compliance data base, our monitoring data base, or the PG audits. It was not our intent to do so. Next, I just want to read into the record, just as a matter of housekeeping.

For starters, on the pronounced status position, which is that we adopt the tentative order with the last version of errata plus one more errata change that I'll read into the record now, and then pretty much the rest of our presentation is going to explain why we think that's still wanted. The errata change I'd like to read as a matter of housekeeping by request of the co-permittees for further clarification, is on page 4 of the September 29 revised errata footnote 12 to F1D1 for the I of the permit which reads currently, "Priority

development projects proposing to dredge or fill materials on waters of the U.S. must obtain a Clean Water Act Section 401 water quality certification."

Then it says, "Priority development projects proposing to discharge waste and waters of the State must obtain waste discharge requirements." The co-permittees have asked that we clarify our intent with that language, and we proposed that the errata should be revised as follows: "Priority development projects proposing to dredge or fill materials and waters in the U.S. must obtain a Clean Water Act Section 401 certification priority development projects proposing to dredge or fill in waters of the State must obtain waste discharge requirements."

I believe that's right. We can ask the co-permittees for clarification on that. This is, in our opinion, a very minor clarification, and then I can talk a little bit about all the other proposed changes. While it's not staff's recommendations to adopt the proposed changes, I can tell you some places where the Board is amenable. We would be willing to accept those changes.

Starting with Riverside County's one-pager. Chad is going to go into a little bit, actually, he'll probably go into great detail as to why composite samples are appropriate, why we think that we have the appropriate

number of mass loading stations, and he's going to tell you the difference between the aquatic habitat monitoring, and any other monitoring programs.

The one change that we may be amenable to is would be replacing one of our existing special studies with the nutrient management in the Santa Margarita Watershed special study, as they have proposed here. But Chad will elaborate as to how we would want to structure it, and what we would want to see if we were to make that change. In terms of over irrigation, the rest of these things on this page are a "No," from Staff's prospective. An absolute "No."

With regards to the over- irrigation prohibition, I'm just going to use a very simple analogy here: If you don't start by designating a speed limit, how are you going to prosecute reckless drivers? But Chad will go into a little bit more about that, but I think we'll focus are discussions on the LID language. In terms of the Delta B -- I'm kind of skipping around, so bear with me.

Actually, I'll move onto Camp Pendleton's proposed changes, and then move onto the Delta B language. Basically, the only change that we would be amenable to is the term "outdoor water use." That's because we don't believe that the viability of indoor

water reuse likely to happen within the course of the permit.

Okay. So moving on, well, I guess I'll start by addressing with what is probably first and foremost on all your minds, which is the LID language and the Delta B. We don't, for starters, we believe that the proposed language in the errata is the appropriate language. We don't believe that the proposed language will affect downstream beneficial uses, including municipal supply. As a matter of fact, Ben can, if you guys want, Ben can run you through the calculations.

He has conducted internally that can actually demonstrate that the Delta B could harm downstream beneficial uses more than the 85th percentile would. I just also want to make clear that going with the Delta V standard is a relaxation of the standard. Just to make a clarification, it was, the LID is for treatment, or pollutant removal purposes.

So if you're removing less pollutants by retaining less water, then you are essentially relaxing the standard. So we believe all forms of LID are more effective than biofiltration, and so on. And that's why we have that hierarchy. That's why you need that waiver. And I also want to clarify one more thing, the difference between LID and hydromodz. You heard today that LID will

affect hydromodz, but the LID design standard has a certain objective, and that is pollutant removal, and the hydromodz, which is another design standard in the permit, has another objective, which is to the take into consideration the effects of the LID design standards.

So there should be no sediment problems or hydrology problems that were cited in today's testimony. Okay. So, it's opportune that Camp Pendleton has benefited from the nonhistorical urban slobber resulting from the last development bubble, but it is time to focus on water quality here. So keep in mind that again we're contesting that there will be no loss, but if there's such a loss, the proposed language would be storing conditions back to their historical state, that is, by promoting infiltration and reuse, we are replenishing the overdrawn groundwater supply in the basin, thus restoring beneficial uses that have already been degraded in that groundwater basin.

Let's see next, in light of the projected slow-development curb cited in the record, we believe this does provide Camp Pendleton another five-year opportunity to conduct studies on the existing standard, validate their claim, and then as Ms. Hagan pointed out, there is a re-opener clause in the permit, and it's perfect timing, because you've got the co-permittees

doing effectiveness assessment on LID BMP.

So within the course of the next five years, we will have effectiveness performance criteria, essentially, on different LID BMPs, and then we'd also have evidence, real evidence as to whether or not the current standard is impacting it. And we can actually make a much more educated decision on what standard is appropriate for this watershed.

Then one last thing, I wanted to touch on the LID is that we heard claims that there would be effects to non-water beneficial uses. You know, first of all, I just want to point out, there is no Section 7 obligation on us, or anything of the such.

But we did take into consideration effects to other non-drinking water beneficial uses such as Warm Wild Bear, et cetera. And again, we don't think that they'll be affected. And as further testimony to that, if we talk about Steelhead passage, we just want to point out, that's not a problem, because the first barrier to steelhead is Camp Pendleton's divergent structure for their water right use.

I guess the point I'm trying to say is that dams, water divergents, flood control structures, and development have already changed the magnitude, duration, timing, and quality of the storm flows in the

Santa Margarita Hydrologic Unit. So that concludes my over the surface run-through the LID language. But again, we've got Ben, who can run through the calculations of why we don't think it's an impact.

Oh, one more thing in. In terms of the regional permit, I just want to point out that the reason, so far all we have is the finding stating our intent of what to do with regional permit. The reason we haven't been information-sharing with any of the co-permittees as to the status of the regional permit is because we really have no information to share yet. We're putting out there this finding to you, and the lead permittee on that is the very same staff that you're looking at here. And the reason we haven't made much progress on that is because we need to get this permit out the way before we can work on that permit.

To that note, I want to point out the resource burden that it is to get these permits adopted. This permit has taken 25 percent of all of our stormwater budget for the year. And in terms of timing, it doesn't leave us much for compliance assessment. I also want to point out the resource drain that the Orange County permit -- it was a two-year effort. And that's where we had a lot of these battles. So we hope not to have to reinvent the wheel every time. And that's exactly why we

hope to have a regional permit.

So we can tie together the common elements and the common standards and not worry so much about the details of each of these permits. And that concludes my presentation. I would like to give some time to each of the technical staff to go into the details on key issues that you heard today and kind of wrap up, if you have questions on those key issues, I encourage you to ask them. And then I guess we'll defer to the executive officer for his recommendation.

MR. STRAWN: I think you answered my question, but DFG did a study a few years ago about the potential for Steelhead in San Diego County streams, actually, Southern California streams. And I know it included Santa Margarita. My question to you is just, was that considered in your approach? Have you seen that study?

MS. CLEMENTE: Chad will cover that when he takes the podium.

MR. STRAWN: Okay. Just for the record, you're aware of the study, and it's been considered; correct? That's all I'm --

MR. STRAWN: I believe so. We're aware of the biological opinion. We're aware of the recent citing.

MR. STRAWN: When you talked about the first barrier, I think that's what they were just filling us in

what the barriers were, which things might possibly --

MS. CLEMENTE: Okay. So I am aware of the national fishery service document, which identifies all of the fish passage structures in each of the watersheds.

MR. STRAWN: It may be the same thing. I saw it at a DFG meeting. Thank you.

MR. LUKER: Ms. Clemente, I had one question for you. You mentioned the consistency between the three permits that we have to issue in our region. Maybe you can explain why, there are, I believe, three more special reports required for Riverside versus Orange County, I think the flood control mentioned?

MS. CLEMENTE: Yes. Chad was going to get into that a little bit more, but one of those reports, the TMDL special study, it's a non-report, because right now, there are no TMDLs in the watershed. So there's no obligation to do anything. It's essentially a placeholder. And Chad will go into the other one as well.

MR. LOFLEN: Good afternoon. Chad Loflen, Environmental Scientist, and I did take the oath, to reiterate it again. I can start out about answering your question if you'd like. The special studies are included in MS4 Permit MRP's because they're studies to look at the extent and mechanism of impacts in receiving waters

from documented problems that haven't really been addressed through the existing monitoring efforts. So there are a number of the special studies in this MRP that are looking at problems that have been identified in the receiving waters, or that the co-permittees have identified in receiving waters. And the studies are basically kind of an introductory look into, okay, is the MS4 system causing some of these problems, and what extent, things of that nature.

MR. LUKER: So these special studies are tailored for this watershed to increase the monitoring and what kind of effects are taking place?

MR. LOFLEN: Well, that's yes and no. Some of the special studies are region-wide concerns for Staff and for regional board substance. There's a trash special study, on trash that's been documented concern of this Board and Staff. And we've included special study that's consistent with San Diego and Orange County. And it's asking the co-permittees, through their existing monitoring efforts, to propose some kind of methodology to provide an initial assessment of trash. And they have some protocols that San Diego and Orange County have developed, and also San Francisco Bay to look at.

MR. DESTACHE: I'm going to delve a little bit further into the MRP, and that is in multiple locations

it looks like there are additional tests that are required above and beyond the South Orange County permit. Can you talk about those?

MR. LOFLEN: Can you be more specific? I'm sorry.

MR. DESTACHE: Like wet weather. I think there's three required?

MR. LOFLEN: Storm events?

MR. DESTACHE: I believe so, mass loading stations.

MR. LOFLEN: If you'd like, I'd be happy to go through their proposed changes.

MR. DESTACHE: Okay. That would be great.

MR. LOFLEN: So the first proposed change is the change from three storm events annually to two. The current MRP requires three events annually. Orange County the permits, the co-permittees requires two storm events annually. And the reason being for that is the Orange County co-permittees, during the past storm cycles, has consistently monitored for the required number of storm events. They've used composite sampling, and they've monitored for all of the required pollutants.

The co-permittees have not monitored all required storm events. They've missed the first storm event of the season. They've been utilizing grab

samples, and they've missed all the required pollutants. So the retention of the three storm events is to ensure that through this point in the cycle we get and adequate representative number of storm events to characterize the loads and concentration of pollutants that are coming down.

The second request to collect grab samples for dry water instead of composites. I remind you that this is, these are mass loading stations. The purpose of these stations is to look at concentration, which you could get from the grab, but it's also to look at load, and to calculate mass load, you need to do composite samples.

For the stream assessment stations, they're requesting that they monitor three stations instead of six. And I may have been misinterpreting the co-permittees' request for this, but I believe they said that this is consistent with the level of monitoring of monitoring that they currently are doing. Would I clarify that, it's actually the same. Right now, they're monitoring three stations twice per year. Our proposal is that they monitor for six stations once per year.

So the level of effort is maintained as in the current MRP, but they have more distributive stations within the receiving waters.

MR. DESTACHE: I think we'll have to get a clarification on that, because I think I heard was that there were only three locations where they have actually have regular flows that they can test.

MR. LOFLEN: If that's correct, I would disagree with that statement.

MR. DESTACHE: Let's let Chad finish with his MRP.

MR. LOFLEN: In regards to these stormwater action levels, and the aquatic grab samples composites, again, the purpose of the action levels is to look at concentrations and loads, and secondly, which is also very important, the data base for these stormwater action levels is based off of composite sampling and stormwater discharge.

And it is our intent that we build upon that data base and update these action levels, and if they're just grabbing samples, that's going to be inconsistent with what the rest of the country is got going for this type of sampling. In regards to the inland aquatic habitat monitoring, this is an additional requirement above the existing MRPs, and there's a couple reasons for that. First, like I said, the existing MRPs, the receiving water monitoring is mass loading based.

So this requires the co-permittees to actually

do some receiving water monitoring to areas that are high-priority inland aquatic habitat. And the information for those areas is readily available to the co-permittees. If fact, they have been involved in designating areas just through the MSHP process. They have MS4 systems that discharge to various preserves, mitigation areas, things like that. And their proposal to eliminate it is its duplicative of the NALSAL monitoring. Well, the requirement is written so it's compatible.

It's written so you'll monitor the receiving waters to assess what the conditions are in these high-priority receiving waters. And then you do that in conjunction with the NALSAL monitoring to look at the discharges into these receiving waters, which are a priority. So it's not really duplicative. It's meant to be compatible. And this is a permit element that was rendered by the monitoring committee back in 2004.

They're correct in that it was included initially in the Orange County Draft MRP, and it was removed. However, they're incorrect into the reasoning. If you would recall, this Board directed, based on Staff's assessment of the quality of Orange County's past monitoring efforts to maintain a cost-neutral monitoring programs for the Orange County permit. And with, through

discussions with the Orange County co-permittees, their focus, emphasis, and based on inland receiving waters lead them to want to focus their efforts on their Ambian Bay, lagoon and ocean monitoring.

MR. UHLEY: Just to do a little follow-up on these special studies. I reviewed the proposed changes for the special studies. And the only one that I would recommend the Board consider would be the nutrients special study. It does get at some of the assessment of discharges to the Santa Margarita Lagoon, which has some nutrient issues. Albeit, I wouldn't recommend modifying the language, and I would recommend that that special study replace one of the special studies in the tentative MRP marked 2 through 6 as described.

I would clarify that as response to comments, the LID testing and demonstration facility really is not a special study for the purpose of the MRP. It may be monitoring the effectiveness of a BMP, but the purpose of a special, and this is laid out in the modeling monitoring program is to look at, there's a problem in the receiving water.

Our current monitoring program doesn't really assess the MS4 as contributing to this, so we're going to do some initial small investigation to determine if we need to do any additional monitoring to take any

additional actions, or anything like that. So that doesn't really qualify as a special study for the MRP floodings.

MR. DESTACHE: And you would be likely to accept a nutrient study in place along the other studies?

MR. UHLEY: Yes. I would recommend that to the Board, albeit with some different language, and the main reason is I would like the language to be consistent with the special studies, but right now, it's written as, the purpose is to establish water quality objectives, which is really not appropriate for special studies. But do you have any other questions regarding the monitoring program? I'd be more than happy to answer them.

MR. GIBSON: I have a question regarding the irrigation runoff.

MR. LOFLEN: Sure.

MR. GIBSON: In co-permittees' testimony, they stated that, the test, there was a question of where the testing was happening, or where the monitoring is going to happen. Is it Staff's understanding that the monitoring will be where it enters the MS4, or is the MS4 occur in the gutter, and how do you view that?

MR. LOFLEN: In terms of the non-stormwater?

MR. GIBSON: Yes.

MR. LOFLEN: The monitoring for those, which is

done also in San Diego and Orange County permits, is that the end of pipe upon discharge into receiving waters. So you have sections of the MS4 that are going to discharge into receiving waters, but if you go upstream, it's not going to be a receiving water. It's actually pipe. So it's literally end of pipe into a receiving water.

MR. GIBSON: That's so it's in a facilitate basin. That's not where the monitoring should be?

MR. LOFLEN: No. Because the facilitate basin is not a receiving water still.

MR. DESTACHE: The compliance of that location that I review is where it dumps onto the street. However, where do you test that to be in compliance?

MR. GIBSON: Where we would consider to be in and out of compliance? That would be upon entering into the MS4. I could point out that right now that for any illicit discharge, we could take, pursue enforcement action for any illicit discharges that go into the MS4 today.

MR. DESTACHE: Which is? Which location in the gutter?

MR. LOFLEN: The current gutter system, yes. I'll point out, too, that the model landscape ordinance, which they're required to be in compliance with right now, requires them to prohibit over spray onto the

sidewalk. So we're saying it's prohibited into MS4 system.

MR. DESTACHE: Okay. So you could take a sample at the curb and current gutter, but that's not a regular location that you would do monitoring?

MR. LOFLEN: No. The monitoring is typically done, for non-stormwater, it's done end of pipe, with discharging into their receiving waters.

MR. DESTACHE: I'm not sure how we resolve this because I know the Orange County permit that we talk about and where that monitoring was going to be done, and I think Orange County permit, it's in the right location.

MR. LOFLEN: In terms of the co-permittees conducting monitoring to make sure that if theoretically, if this type of order had over irrigation, then they would use the end of pipe monitoring as well as the existing ICID programs to identify illicit discharges.

MR. GIBSON: That's fine. I got the information I needed. Katherine, are we going to allow the co-permittees to come back?

MS. HAGAN: You can if you want the clarify something, you can allow them to or ask them to, but you don't need to let them rebut what staff is commenting on.

MR. LOFLEN: Unless there's any questioning on monitoring, I will defer to my colleagues for discussion

and other issues. Thank you.

MR. NEILL: My name is Ben Neill, and I think I forgot to say it earlier that I took the oath. I talked to you earlier about the status of compliance, and there seems to be some confusion. I'm sorry about that. And I just want to clear it up that I was only talking about historical compliance.

I wasn't talking about what compliance is going on now, any enforcement actions that are going on right now with the co-permittees. I don't think I can even talk about any active enforcement actions going on right now with the co-permittees. All the NOBs and HOB, those are all historic.

Also, I want to make sure that even though we have an issuance of the single NOB, it doesn't mean that there's other complaint issues that we haven't been able to follow up on and do enforcement actions on. As you heard in public comment period earlier this morning, we've got a lot of limitations of our staff's time, resources to investigate and follow up and do enforcement on it.

And so we can only pursue those of the highest types of cases of enforcement that we've that have triggered like a high priority enforcement for us. There's a lot of issue that's remain unresolved, and we

just don't have time. And we're kind of frustrated on all of these issues for the permit compliance. Now about the process for the permit reissuance. We did start kind of as the Orange County permit as the model, but that is the way that we've always done our permits in the past 20 years.

It's the natural evolution of permits that we build upon the previous permits that were adopted by the Board. And that's why the Orange County permit was the basis, and the San Diego permit was the basis for the Orange County permit. We also look at permits from other regions. We looked at Region 8's permit. We looked at Region 2's permit. And we looked at Region 4 Ventura permit. I also looked at permits from the State of Washington, and the State of West Virginia, and Pennsylvania.

It's just part of the process -- we take all the information we have about permits and to bring it in to make this permit. I had to prepare remarks about over irrigation. I don't think you have any more questions about over irrigation, so we're not going to talk about those. I'm going to move onto low-impact development, and I'll talk about low-impact development requirements. And there's a lot of talk about the water quality and the water rights. And let me first say clearly, that this is

a water quality permit.

It does not designate or authorize any particular water rights for any parties. That's not our job that we can do that. And the permit doesn't do that. It's somebody else's job to authorized those water rights. This here is the infamous EISA document that we've heard a lot people talk about, and if you wanted to read it, you could, but I read it. I was up for days, and Jimmy, I work for them, and they told me I have to do these things. So I read this document. A couple of things it does that's really different than our permit is it has a 95th percentile retention, and we have an 85th percentile retention.

It also has another option. That other option is not Delta B. That other option is matching the predevelopment hydrology, which is not doing some type of subtraction, and the other thing, when going into that second option, it gives us a reference, the Natural Resource Conservation Service is set to release 55 manual for calculating how much rainfall would naturally be retained in a natural environment.

So I did my own calculations, and looking at that kind of in a general, I show you a soil map, the soil maps B, type B soil, type C soils, knowing that in a natural environment, we kind of have chaparral, sagebrush

environment in Riverside County and the calculations I ran, it showed that under natural systems, the first 1.17 inches of rainfall would be retained in the natural environment without any runoff, which is much higher than what we're requiring, which is 85th percentile, estimated at. Six inches of runoff in the 2004 permit. And the 1.17 inches was used in very conservative variables.

If I looked at soil that were really good at infiltration, I got numbers that said that in a natural environment, it would retain up to 3.2 inches of rainfall. So if we go to the option 2 in EISA , mimicking the predevelopment hydrology, then we would require three inches of rainfall to be retained onsite and not run off downstream for Camp Pendleton, the permit does the mandate the rainwater harvesting and reuse. We had that in there before. That was language that got changed.

And now it says that they have to examine the technical feasibility of implementing rainwater harvesting and reuse on the site. To go through some of their changes, co-permittees requested on their first requested change for low-impact development. I've seen these changes before in our numerous meetings with them, and we've talked about this before with them also but, when we talk about using a Delta B, or a predevelopment

hydrology. We are getting away from just having a clear measurable performance criteria.

It's really site-specific to measure enforcement, to measure compliance to do enforcement to make sure the project is in compliance. It would take a lot more effort to know they're in compliance. It would also take the co-permittees a lot more in planning review, developers a lot more to do a site-specific hydrology model for a site to calculate that. I don't think it's necessary or I don't think the change is necessary or clear.

And on the second change, this change where they have to look up retention LID BMPs that functions passably, and I honestly don't know what that means. I haven't heard of a passive LID, and what I've been, studies that I've read and stuff, it's not really defined what is a passive LID BMP. It pains to say that meaning passive LID BMP to be anything except for harvesting and reuse.

And then on the LID study, they've come to us before with this, and we didn't accept it for a few reasons. One, that this LID facility is not in our region, so we didn't feel comfortable requiring them to expend funds for a special study for something that was not in our region; it's in the City of Riverside, on the

banks of the Santa Ana River in Region 8. This special study is actually referenced in the Region 8 permit. So that is appropriate to have it in the Region 8 for Riverside.

And the other thing is that we require special studies when we have some burning question that's unknown to help us manage stormwater, and we don't have that with LID. There's lots of studies with LID, we know it's good, we know it's most effective, we know retention is the most effective in LID. Those questions have been answered. So those are the reasons why we didn't include LID.

I had some other slides showing the calculations that I did on the retention plates. I don't know if you're interested in that or if you have any other questions about the comments that we heard.

MR. GIBSON: Actually, do you mind going through your over irrigation briefly?

MR. NEILL: That's okay. We're talking about the State's Assembly Bill 1881, the Water Conversation and Landscaping Act. And my opinion with that, that was a state's statute and the state's permit should also be consistent with another state's statute. I didn't think it would be right to have the permit with the state that said over irrigation is okay. We have state assembly

bill that says over irrigation should be prohibited. It would be kind of a conflicting message to the citizens of the state.

What the statute says is that the cities and counties are required to adopt ordinances that prohibit runoff from the target landscape to adjacent property non-irrigated areas, walkways, roadways, parking lots or other structures. The prohibition is a lot more broader than just into the MS4, which is what our permit does. The other over irrigation permits was that in response to their proposed language for irrigation runoff.

And they said that they wanted to add this language then to develop and implement a program. Now, I don't know about you, but that sounds like an added cost developed into other programs to address over irrigation discharges. We felt that they could already address over irrigation discharges through their existing non-storm water discharge elimination program that consisted of ordinances and code enforcement, and monitoring. But then in their comments, they said that over irrigation was not a significant source of pollutants.

So then with that comment and with their proposed language, then the over irrigation would never be prohibited and the proposed language would be moot. In light of their proposed view that it's not a

significant source of pollutant, it would be like changing a traffic laws to stop a red light when it's only dangerous not to do so. Over irrigation has been identified as a source of pollutants by co-permittees in Orange County, in San Diego County. It's been identified as a source of pollutants by the State.

It's been -- on a national level, been identified as a source of pollutant. It's been identified by Riverside in their education materials. It's been identified by USEPA as a source of pollutants. And what the Clean Water Act requires is it requires the prohibition of non-stormwater discharges into the MS4. That's straight out of Clean Water Act, Section 402. The section that regulates the MPS permits. That's the summary of my over irrigation comments.

MR. GIBSON: I think I get that part. But the main concern is that you have a lot of fairly new installed irrigation. And you're introducing a new way to approach watering those, and to me, it would be more a length of time to require that, and how do you get the public on board in a timely manner without all of a sudden creating prohibition when we implement this? That's how I look at trying to resolve irrigation conflicts.

MR. LUKER: So it would be like a process of

education and increasing enforcement as time goes on, as problems are made more aware as general knowledge of the problem increases throughout the site.

MR. RAYFIELD: Well, no. I think we know it's a problem, but the way to get there is not necessarily, I mean, you'll have a hard time going out and making everybody change their --

MR. LUKER: That's not what I'm expecting, a water cop for people watering their lawns.

MR. DESTACHE: Your language was a little vague about the timing issue that would help me figure out what's the right way to do it.

MS. HAGAN: Mr. Chair, I neglected to mention one responsible legal nature to a comment raised by Ms. Solmer that I wanted to bring to your attention. She mentioned an errata item and it's in the November errata page 28, and there's an insertion for, in regards treatment control BMPs, and it says that restrictions that are implemented by co-permittees must be fully protected of downstream water rights. And I agree with Ms. Solmer that that's a very vague and ambiguous trade. It's not clear who would make that determination.

What would be done with it, and if seems as though the Division Water Rights and the State Board itself is the more appropriate entity and impacts to

water rights could be addressed through the re-opener as we've already discussed. So I'd recommend that if you consider the errata, that you would exclude that proposed item.

MR. DESTACHE: Okay. Yeah. I did note that. I think we have three or four now that are in the errata that were changing some, or that we've been requested to change. Is that the case?

MS. KATHERINE: I think when they added a clarification, that was requested by a co-permittee on the dredge and fill, and proposing that you would exclude that errata from any errata that you adopt. And I don't know if there were any others.

MR. DESTACHE: I think that's all.

MS. CLEMENTE: Just to clarify, my reading into the errata, is on the Waters of the U.S. versus Space. She's suggesting a removal from the errata, and then I believe, do we have a third one? And Wayne's going to propose the third one. The other things that I said we would be okay with, the outdoor water reuse, those examples, that's not part of our staff recommendation, but that's something for the Board to consider.

MR. CHIU: I just want to touch upon the over irrigation issue one last time, just to try to clarify some of the issues here. Now, for your question,

Mr. Destache, about determining compliance. When we're talking about identifying non-stormwater discharges that are prohibited from entering the MS4, that is typically monitored and identified at the end of pipe and subsequently -- a non-stormwater discharge would be identified at the end of pipe.

And then a subsequent investigation would identify the source. And if the source identifies irrigation discharges as the source, then obviously, that is a violation that would need to be addressed through some means. If we were to observe it on our own, doing a drive by or something, we might inform the co-permittee or the jurisdiction where that was occurring, and then have them do the investigation, do a follow-up and make sure they address it. If we keep on seeing the problem, then we might step it up a notch after that.

In terms of whether or not it would be appropriate to have an additional program that they develop to address irrigation discharges into the MS4, again, that would be an additional cost. We believe they have an ICID program in place, or at least they should. They already have an ordinance in place, or they should. Or the prohibition of irrigation, or over irrigation, over spray into the MS4. So they have all the tools in place already to address this prohibition.

Second, Ben wanted me to read in the additional errata to the errata. This was in response to the issue brought up by Mr. Gray from the BIA. This is on page 22 of 23 in the November 3rd errata a revised errata. It says page number 135, Section F1D4, second sentence, which is, "For priority development projects for infiltrate for water retention, LID BMPs are not technically feasible for retaining all or part of the design capture volume onsite without runoff, a waiver may be granted for the remaining portion of the design capture volume to be treated with other LID BMPs.

We add, we want to delete that from that paragraph. And we believe that should address his concerns and clarifies the intent.

MS. HAGAN: You mean, the entire sentence?

MR. CHIU: Yes. Finally, I have the unfortunate task of responding to the economic issues. I know this is a topic that really, everybody always talks about at these proceedings, and we're often characterized as being, I should probably not say this, but seeming heartless, cold, not considering these types of issues, which is the furthest thing from the truth.

We are incredibly sensitive to these economic times. Our agency is experiencing the same kind of issues. We internally are trying to find ways to find

efficiencies within our programs to best utilize our resources in the most efficient way possible, given the resources that we have. We try to prioritize our issues. We try to make sure that we address the highest priority issues in the quickest way and most efficient way possible.

You know, when I was listening to the elected officials talking about all the dire economic situations that they're in, I have to be honest, I was moved. I mean, I really felt sympathetic. But, unfortunately, this is a Clean Water Act Requirement. We are here to protect water quality. That's our mission. That's our role. That's what the purpose of this permit is upon.

I think one of the elected officials might have said this is of kind of a low-priority for them, and it's not a critical component for a city, but we would have a different opinion. We believe the Clean Water Act mandates that we all, you know, make sure that our discharges of waste are not causing or contributing to exceedances of water quality objectives and standards. That is a critical city function in our opinion. That's why there's this permit. It makes it a critical city function.

Now, they often cite that new fees are impossible, and that it's extremely difficult to have new

fees and taxes. And I don't dispute that, but part of it is that it requires a good amount of education, and informing the public the necessity for it. These are critical issues that need to be addressed. Our waterways are our water resources, are valuable resources that are held in our trust. We are here to protect.

Many of the comment letters cited the City of Encinitas as an example. I think we answered that in our response to comments document. We identified several examples where stormwater fees or stormwater-related fees had been passed and adopted by other cities. It is possible. It is not improbable that it would happen. It's a matter of education.

Next, I'd like to say that -- oh, one other thing. There are several guidance manuals that are available that help municipalities to identify fees or develop fees. They're available in the response to comments document. I think it's response to Comment number 8. So we did take all these things into consideration. We are not working in a vacuum. We are not blind to the economic hardships that we are experiencing.

Now, I think there were several speakers that implied that we were telling them to shift their discretionary expenditures to back-fill some of the needs

for the stormwater permit. No where in the response to comments did we say anything in such a way. What we did say was we recognize that this permit may require them to modify, reduce, possibly find new efficiencies within their programs and within their different departments in order to meet these requirements.

But we believe there are efficiencies to be found. We believe there are ways that they can modify their programs so that these requirements can be met. There are several departments all working separately, doing multiple functions that could probably overlap in several ways. But I'm not sure they're taking the time to identify those types of efficiencies, simply because they haven't been really required to yet. Now, in terms of the amount that they're spending, and amount that they're going to have to spend in order to meet the requirements of this permit.

I do have some economic information that I can share with you. What I wanted to say was what they presented, while true for each slide, was different context for each slide. In some cases, they who talk about their economic situation in terms of Riverside County as a whole. Riverside County had several different economic areas with different economic situations, so to compile that into one number, kind of

splice into that number a little bit.

And then in some splice, they would say, okay, if we look at the numbers for the population within Santa Margarita Watershed only, the per capita cost would be such and such. I think they're managing their programs on a county-wide basis, and then the municipalities are spending, correct spending resources within a jurisdiction.

Left me try to provide you some more comparable information I've prepare for you. What you have here is information that I've compiled from publicly available information. The left column, there's the amount expended by each stormwater program, has reported in their annual report that were either submitted to us or available on the Riverside County website. I have Murrieta and Temecula, and then Corona and Riverside, which are in Region 8. All of them in Riverside County.

Then I have Orange County, two cities there, and two cities in Encinitas. Now, the information in the center columns is the number of households per jurisdiction. And I got that from the California Department of Finance. These are the estimates of the number of occupied households in the city. And then the third is the amount expended in their stormwater programs per household, broken out by the city.

So I summarized this in a table here, or a chart. Now, if you take a look over here, Dana Point and Mission Viejo, both in Orange County. These are per household expenditures. And this is before the 2009 permit had been adopted. So this is what they're spending during their old permit. And then you have Encinitas and Santee. The first column is 2006, 2007, and the center column, where you'll see kind of a jump, that's where the new 2007 had been adopted.

So you did see an increase in the cost to the programs. And then over here, you have Murrieta and Temecula, and then the City of Riverside and City of Corona. And you'll notice that Murrieta and Temecula are quite a bit lower than what you see over in quite lower Encinitas and Santee, and in Dana Point and Mission Viejo.

But what's striking is that compared to the City of Riverside, which is in Riverside County, they're spending about half or less than what the City of Riverside is expending. We take a look at, per city within Riverside, and take a look at the amount that they're expending per household compared to the average family income per household, and this is the information I got from the Southern California Area of Government's profiles.

The numbers up there are from 2007. Those are the estimates per coverage family household incomes. Cities of Hesperia and Temecula are well over 80,000. City of Riverside is approximately 58,000, and then Corona is 78,000. So if you take a look at their numbers in terms of how much per household in things spent, versus how much an average family income is, you'll see that they are lagging a bit when it comes to the amount that they're spending per household. So that's just to illustrate that, you know --

MR. BURHENN: Mr. Chair, I'm sorry. I must raise a point of order. Maybe it's just a point of inquiry. My name is David Burhenn, Counsel for the Riverside Flood Control District. I'd like to know whether these charts are in the record in some way. I don't believe we've seen them. If they're in the record, that's fine. If they're not, I think they're surprise testimony. We haven't had a chance to evaluate them. So I'd like some clarification on them.

MS. HAGAN: The public hearing is still open, and staff is responding to the comments that they heard today to ask the Board to understand and put the comment in context. And Mr. Chiu stated that these are from publicly available information. I certainly think it's appropriate if you were to give the co-permittees a short

break to take a look at them and have them make comments on them as they wish.

MR. BURHENN: That would be appreciated, as well as some of the other many points that have been made by the Board Staff.

MR. CHIU: Okay. I'll try to wrap up my discussion here, or my closing comments. So basically, I just want to point out the different numbers that are lying around, that there is information that shows that they aren't spending as much as they could be, in comparisons to jurisdictions within their own county. Now, we have met with them on several occasions. We've done whatever we could during these meetings to reduce or modify those permit requirements.

And we've made a lot of modifications to allow them to prioritize and make their programs more efficient. We phase in a lot of the requirements, and delayed them, a lot of them by over a year, which gives them more time to develop the resources. Much more time than Orange County had to do the same requirements. We held 17 meetings with them over a four-month period.

By the 10th or 12th meeting, we were already repeating some of the issues, because we didn't make them to their liking. So we didn't give them everything that they asked for. And those last five to seven meeting were

essentially just repeats of everything we heard before. So, essentially, we got to a point where we couldn't close the gaps anymore.

We had done everything that we believed could be, but still being protective of water quality. What you have in this permit is a set of minimum requirements that are essentially the same as what you have in San Diego and Orange County permits. They're not discharging any less waste now than they were before. If this were a wastewater treatment plant, and they came to us pleading, "Oh, economic times are hard," would we reduce their requirements? I doubt we would. So I would just like to say that what you have before you is the right permit for this time, for this county.

And our recommendation for this time would be to adopt this permit, Tentative Order R 9-2010-0016 with the revised errata and the errata read into the record by Chiara and myself. Thank you.

MR. DESTACHE: Okay. Do you have this document in hardcopy that we could --

MR. CHIU: I do not. Is there a printer somewhere? I guess I could --

MR. UHLEY: If I may, sir, it's just a graphical representation of the information that's already been provided to you on the fact sheet. It's specifically on

pages 13 and 14 of the economic analysis.

MR. BURHENN: We'd like to have the opportunity to -- there were some other statements made. I understand, I'm not asking for the last word, but I think it's important for this record to be accurate, which is to your benefit and to water quality, that we have a chance to respond to some of these issues. I would appreciate that. I know it's a long day, but this is important stuff. Thank you very much.

Oh, I'm sorry, Mr. Youngwright has also asked me -- I guess I'm speaking for Camp Pendleton today -- he's had the same concerns that I raised by some of the charts with respect to the analysis performed by Mr. Neill, was it, the impacts on downstream water rights. And he would like an opportunity to review that and potentially respond to that. Again, I apologize, but this is important stuff. Thank you.

MR. DESTACHE: Did you take the oath?

MR. BURHENN: Yes, I did. My name again is David Burhenn. I did take the oath.

MS. HAGAN: One possibility, it's not ideal, but Mr. Burhenn and any of his clients could scroll through the presentation right there, and I don't know if Mr. Neill has his calculations on an electronic format that they could -- that we could give him.

MR. BURHENN: Well, that's up to Mr. Youngwright's team to look at, so --

MR. DESTACHE: At this point, Mr. Jungreis, how much time -- have you reviewed what you need to review, or have you gotten it?

MR. JUNGREIS: Sir, as far as I know, it's on the back of a napkin. I don't know where it came from. We heard testimony about all these great calculations, which we've never seen as part of the record. The same objection they had. Maybe they're perfectly legitimate, but we'd never know because we've never seen them before. So it's a critical issue. Is there going to be more or less water? We believe very strongly there should be less water, but we have no way of knowing what he's basing it on, because we've never seen it. And so if the Board is going to rely on his testimony, we should have to review it and question him on it.

MR. DESTACHE: I don't know if we've seen actual documentation. Is it part of the --

MR. NEILL: I have some slides -- they're not -- they're pretty rough. They're not as smooth as Jeremy's slides, but -- we've already seen this map. This was a map trying to determine what is the frequency of storms that we're talking about here. This is a excerpt from the Riverside County Flood Control Water

Conservation District. And the details in the map are pretty poor, because we're blowing it up and expanding it.

Anyway, for a two-year, 24-hour precipitation event in the Temecula area, it's roughly saying it's about 1.5 inches of rainfall. Our calculation show 85th percentile storm to be about .6 inches of rainfall. This becomes important in the engineering when it's trying to determine the appropriate curve number for the runoff equation, which is next. This is the equation from the Natural Resource Conservation Service, TR55, which was referenced in the EISA document that Camp Pendleton was talking about.

That's the equation. I looked at it. It modeled the runoff based on how much precipitation we have, soil types, vegetative coverage, hydrologic conditions, and the antecedent moisture content. So I was looking at precipitation of about .6 inches for 24 hours, or if it's per hour, it would be .025 inches per hour. Looking at soil types B and C type soil. This is the predominant soil in Riverside County. Those are the descriptions from TR55.

Looking at the natural vegetative coverage in Riverside County for natural system. We're talking about chaparral and sagebrush. And we did an average soil

moisture content, meaning the soil's not completely dry, like it would be the first rainfall event of the year. But it's about average, which is midway through the wet season. Putting all those numbers into the equation, and you would get no natural runoff from the first 1.17 inches over a 24-hour storm up to 3.7 inches. So then looking at different variables of --

MR. DESTACHE: Now, I'm going to stop you right there. Is any of this documentation in any of the respondent information, or any of your calculations originally?

MR. NEILL: It was all done after Camp Pendleton sent us their E-mail of the supporting documents in number 14.

MR. GRAY: What date was that E-mail received, Benny?

MR. NEILL: I don't remember. Wednesday, like a week ago?

MR. GIBSON: Mr. Chairman, if I may offer an observation and the Board can deliberate and decide how it wants to proceed on this matter. You are not being asked to allocate water in Santa Margarita River. You're being asked to consider new development and significant redevelopment requirements for low-impact development that are part of the complex decision tree for land use

decisions by the municipal stormwater co-permittees.

There's been a lot of talk about math and analysis, and I would submit that most of it is the back of the envelope at this point in time. We simply don't have hard quantitative numbers in front of us to show what those speculative new developments that will take place over the five or ten years will or will not include, that will or will not change flows, or will or will not put more water into groundwater.

So I would submit that you have the opportunity to find an investigation further, if that's Board's decision, or you can move forward with the decision before you wish what should the stormwater permit requirements be for the next five years.

MR. DESTACHE: Thank you, Mr. Gibson, for bringing us back to the direction which we're supposed to be in. And this is one of the issues that I had with allowing the testimony from Camp Pendleton in regards to this MS4, although we understand the requirements and the need for to consider the flows in Santa Margarita River.

We're talking about the MS4 upstream, and there will have to be significant analysis on what the LID, how they affect the Santa Margarita River Valley and the drainage into Camp Pendleton. And I have to agree with an important issue.

However, we're tasked today to approve or move in some fashion on the MS4 for South Riverside County. And I think we need today move forward on that and if -- I'm not sure how we consider the Camp Pendleton side of it, Catherine, in the future, but I'm sure there's a way that we can get to that point.

MS. HAGAN: Right. I think Dave Gibson is correct that you're not determining whether the water rights will or won't be impacted, or you're not in a position to do that at this point. That's for the State Water Board to make that determination, and you can reevaluate your permit requirements at that time to see in any appropriate changes should be made.

MR. GIBSON: Mr. Chairman, if I could follow up, it was offered that some additional study and work might be done in partnership between the co-permittees and Camp Pendleton and perhaps the water districts themselves who are certainly key players in water allocations to that river.

That option exists to the Board if they adopt the order as proposed today. That analysis can be done and that information can be brought back to us, and if, indeed, the issue is germane and ripe, the Board may make changes to the order at that later date, based on a more quantitative and thorough review of that

information.

MR. DESTACHE: Okay. At this point, there were a couple of items that County of Riverside -- or the co-permittees want to come back on and clarify. However, at this point, I'm going to leave the Camp Pendleton issue to the side and look at the issue of the actual MS4 today. So we were talk about irrigation runoff and a couple of other issues. Is that the direction we should be --

MR. UHLEY: If I may make one clarification on the Camp Pendleton issue. I think we've lost track in regards to the focus on water rights. A large portion of their issue, and we agree with, that there's a potential impact to downstream beneficial uses, which is very much the purview of this Board. And so this isn't solely about the issue of water rights, this is about does a retention standard negatively impact downstream beneficial uses by eliminating natural flows that would have got to those beneficial uses under the predevelopment condition.

And I would note in regard to Staff's analysis, I'm not going to get into what Ben did, I think we did catch a mistake, at least from what he said. But I'm a hydrologist. I work for a flood control agency, as well as Claudio's job, as well as the consultants that are

working for Camp Pendleton.

We're all licensed engineers that do this for a living, and we've looked at the data in yesterday's; it isn't a perfect analysis, but the conclusion we come to again and again, looking at separate data tests, is that there is an impact. So I would just leave you with that point on that issue.

MR. GIBSON: I would agree that there would potentially be an impact, but it's not this Board's purview to look at water rights.

MR. UHLEY: I'm not discussing water rights, I'm saying that there's a beneficial use impact, because if you're cutting off water to the streams, then you're potentially impacting habitat and endangered species, which we do know exist on the Santa Margarita Watershed. And I know this has been a long day. It's been long for me; I'm sure it's been longer for you guys. And so I'm going to try and keep myself short here. There were a few things that were mentioned about our monitoring program, and Chad made us just a little bit nervous. He said we kept missing the first storm. We missed it once.

Board Staff said, "Hey, you have to go the first storm." The next year came along. We had a pretty good storm. I talked about the difficulty of predicting rainfall in this watershed because of orographic effects.

What we did is instead of not collecting the storm, as we actually went out. I said, "Go out. Collect samples. Let's get at least grab samples. Let's get something from this event even though we missed the first part of it."

And we have been nothing but beat back and forth about having tried to do something ever since we did that. And so I guess the lesson learned is just don't try. This is what I'm pulling away from this, unfortunately. I also wanted to touch on a couple of other things. He mentioned that Orange County was allowed to do two storms instead of three on the wet weather sampling, because they had a more robust data set.

But the Southern California Monitoring Coalition has actually established criteria for when you can move from three to two storms. And that criteria is if you've gotten three storm events for three years, you've met the minimum bar, and we've done that. Now Staff had also mentioned that we had not collected all the constituents we were required to collect. And I point out that we were required to collect over 3,000 data points in our monitoring program, different parameters, different storms, different stations.

And they've implied that we've been a complete

failure in doing that. And in both times when they raised that issue, we went through and collected our effectiveness data on that, we were 98 to 99 percent effective in getting all of those data points. So we had 20 or 30 data points that we didn't collect, but that was out of the data set of 3,000 data points. And so I want to make sure that there's a scale issue that's discussed here.

I just want to come back to our goal here is to improve. Our goal here is to move the program forward, but it's to do it in so a way that we can manage. And I think another thing that Chad or Ben had touched is, well, you can't backtrack. They're asking you to backtrack. No, we're not asking you to backtrack. Everything before you today is discretionary. You have the choice to make a decision to do what we're asking, or what Board asks, or any other variation upon that.

But we're asking you to reign in changes to our existing programs. These aren't existing programs we're asking you to change, these are proposed programs that are expanding what we're doing and we've tried to hand-select those that we think will be the most important for us to be able to successfully manage our program, and we're just asking you to reign that change back, because it is discretionary, because we're going

through a tough economic time right now, and because you do have a choice. So I'll leave you with that. I'm going to ask Claudio with my staff if he has any other technical issues he wishes to raise. I'll ask him to keep it short.

MR. DESTACHE: Before we hear you, I want to hear what we're doing with the ACL.

MS. HAGAN: We're going to move the ACL to the December meeting, because there's just enough time to hear it today.

MR. GREY: Mr. Chairman, if I may also, you also have an additional item on the agenda which will probably not require very much time if you want to try to get that one done today.

MR. DESTACHE: We're going to try to get that one in.

MR. PADRES: One other thing that I wanted to touch on, and I know we discussed it to some extent, but it was on AD1881 and what that requires, and although it does require an ordinance that only applies to new or significantly redone landscapings, it does not apply to existing businesses. But the prohibition applies to everyone. And it would apply at the curb.

And I understood the discussion was talking about where you sample for non-stormwater discharges.

And that's a fair point. But any report or any knowledge or any, like you said, if we drive by and see it, would have to be enforced on. And if their curb is wet effectively, and that's irrespective of whether or not that water actually went down to the receiving water.

And we've all seen sprinklers that were misaligned and sure the curb gets wet, and sometimes it is a large amount, and sometimes it's not, but what this requires is it actually separates the response from the impact and says you shall respond even though there is no impact.

And it has nothing to do with whether there's a water quality impact, it has nothing to do whether there's any pollutants in that irrigation runoff that hit that curb. It's strictly the fact that is was wet that it requires enforcement. That was one clarification that I had. I think the rest of it has been adequately discussed.

MR. DESTACHE: I think we're going to move on to the recommendation by the executive officer.

MS. HAGAN: Mr. Destache, I think Mr. Burhenn still has not had his opportunity to look at the cost slides, or have you had an opportunity to look at the slide sufficiently. Otherwise, you could take a short break and allow him to look at the slides.

MR. UHLEY: We don't need to waste any more time with that issue. I would note in the fact sheet that one of first things that Staff said was that you can't compare costs among MS4 programs, because they track the costs differently. They report costs differently. There's no standard method for doing this. And even in Riverside County, we don't have standard method. We ask for reporting of certain things in our Santa Ana permit and other things in our Santa Margarita permit.

I'm not going to go into the specifics of their analysis, but my experience has been, and I know what our permittees pay to us to implement this program, the Santa Margarita region permit is the most expensive per capita between all three of our regions. For what the permittees pay to us, they pay 10 times as much to us as our Santa Ana or Colorado River permittees for an existing program that we implement today.

The other thing I was going to note is, he was doing household comparisons to present the numbers, but I know the populations of those cities and Corona and Riverside have much higher populations. So I would expect that their implementation costs are higher.

Corona's got a population of 200,000. Riverside has a population of 300,000. Temecula and Murrieta are both at about 100,000. And so the scale of the cost for

those programs didn't surprise me too much. But I don't even trust those numbers, because, like I said, I know the cities report things differently. And Staff even said that in their fact sheet in the permit. So I'd be very careful about considering cost numbers.

The last point I was going to make, is all of the economic data that we presented, particularly the data that was in my presentation, was Santa Margarita region-specific. And that's why we asked for our elected to speak on economics, because we wanted to make it very clear that we're presenting data that was local to this area, and not trying to find the numbers, but using county-wide data. Thank you.

MR. GIBSON: Mr. Chairman, it's been a very long day. And I hope that the record will show that you have shown great forbearance in allowing repeated rebuttals to the Staff's closing presentation. I would like to offer a few of my remarks, if I may.

First of all, this is clearly the most important action whenever the Board takes an action on an aerial-wide MS4 Permit. It regulates the largest land area. It regulates important decisions like land use, although you don't have land use authority, you touch upon that.

It regulates the largest number of discharges and pollutants, measured by households or municipalities.

It is the large action the Board takes. And it takes that action after a great deal of investment to time and resources in this permit, and today, you're no exception. I hope that the Board has benefited from the dialog you've had in front of you this afternoon.

The decision that you make should be predicated on the water quality impacts. And I have not heard any of speakers today state any opposition or challenge to the Board's presentation at the beginning of their presentation as to the state of the waters of the watershed, and the effects correlated with the discharge in increasing of discharges in that watershed.

Clearly this permit would require some stretching of the municipalities. It would required some big steps forward. I would agree with the Staff's recommendations on the monitoring, that composite monitoring is the correct way to go. Grab samples are simply not good surrogates. If they were, we'd be doing that in San Diego and Orange County as well, and we're not. It is an important way of quantifying the results.

That is absolutely critical to this Board if indeed it wants to go down the road of performance measures, tier 4 performance measures, and evaluating the efficacy of its actions, as well as those of the storm water programs on other programs. How can we measure

that if we don't have interim milestones to track?

The IBI scores show poor and very poor conditions. We would like to be able to show that they get better over time. But we cannot do that if we're not monitoring adequately. We're seeing impacts to water chemistry in terms of 303D listings. But we can't see if that's getting better if we aren't doing water chemistry monitoring that is quantitative and repeatable and analyzable.

Similarly, we are seeing physical impacts so on all three of the goals of the Clean Water Act, to restore and maintain the chemical, physical and biological integrity. We see serious issues in the program that has been implemented to date for the last 20 years in Riverside County in the upper Santa Margarita River Watershed. The monitoring that is proposed now is intended to track the improvement as programs are implemented.

It is intended to show success as well as shortcomings. My recommendation to you today would be that with the errata that has been proposed by Catherine Hagan and the Staff, that the Board close the hearing today and adopt the tentative order as it is currently proposed to you by the Staff.

MR. DESTACHE: Thank you very much. At this time, I'm going to close the public hearing and go to

deliberation by the Board and vote. Mr. Rayfield.

MR. RAYFIELD: Thank you, Mr. Chairman, and thanks to everyone who testified today. I thought all the presentations and testimony provided was very helpful. I think this Board is well aware of the economic situation facing every county, municipality in the state, as well as the state. Certainly, those of us who are elected officials know it well.

But yet, I have never run into a resident of Southern California, or California as a whole for that matter, who would have said, "The way to save on the budget is to have dirty, polluted water." No one says that, whether they live on the coast or inland or Northern California, and I think to a person, residence of California truly understands the value of clean waterways, watersheds, and oceans. They are just vital to our economy and to the reason many of us choose to live here.

I was kind of appalled to hear one the speakers talked about basic needs, and then put water quality in the category of a wish list. To my mind, water quality is a basic need, basic health need, for that matter, a basic safety need, comparable to fire, police and the like. If we look at the record, the record isn't very positive.

In fact, one, the slides shows the degradation in water quality in the watershed in the environment over time, that we just shouldn't tolerate. We, meaning all of us, not this Board, not the staff, but just the whole community. So in my mind clearly, what we have been doing hasn't been working; it hasn't been working at all.

So Mr. Chairman, I do support the Staff recommendation with the runoff event, and I think there are examples of municipalities and others dealing with the funding for water quality. There's some good examples, San Clemente in Orange County is one of them, where the residences passed a fee. And that has helped immensely in the City of San Clemente.

So I support Staff recommendation. I am concerned somewhat about the supply to Camp Pendleton, more than somewhat. And I'm wondering if there's some way either as a side, letter, or agreement, or something that the executive officer can provide to Pendleton an examination of their possibly -- and this was done under the heading of unintended consequences, not water rights, but just that we don't know.

And I'm wondering if there's some way to give an assurance to the Camp Pendleton folks a quick response, a quick analysis, if based on some amount of experience with LID and the control of runoff if things begin to

degrade or fall off for Camp Pendleton. So the Marines don't have to go through some bureaucratic process that takes longer than it's ever worth to try to deal with this quickly.

That's a thought I'd like to see, something like that to give maybe a measure of confidence to Camp Pendleton that we understand the issues they presented today. And that's the extent of my comments.

MR. LUKER: I appreciate everyone coming today. For me, it was a nice short drive down to San Diego versus the hour drive, but a lot this--all of these requirements are the cost of doing business. If you want to discharge into an MS4, there are some costs associated. Unfortunately, that's just some tough decisions that you're going to have to make when you allocate funds.

I had the honor of serving as a constituency when I was a tribal counsel member of Pechanga, and there were some tough decisions that you have to make. And everybody has their issue that they need addressed, and they need funds for it. Over irrigation is a problem in our area. It's a problem in all of California.

I drive around town, people are not responsible with the way they water their lawns. It's just irresponsible, and I think people need some kind up

wake-up call. It's not just a water supply problem, it is an issue of degradating our water supply. Some of the problems that I have with this permit as it's written right now is the fact that this permit was not taken and improved upon the current Riverside permit. You take the Orange County permit, and as a template, place it on Riverside County.

And I've noticed that as we decided to tailor this back to Riverside County; you modified it and added additional things. But in my opinion, a better approach would have been to take the Riverside County permit, and improve it. And there's some areas that are a concern to me, the low-impact development.

Requiring the retention of stormwater that exceeds natural conditions is a concern. I'm not in favor of it. I think that's kind of counter-intuitive. I think if we take some time and maybe address this at potentially the February or March meeting.

It will give the shareholders an opportunity to evaluate what the EPA seem to say was something that they would consider appropriate with the Delta V, or, there was language. I can't remember the exact language that he used, but using historic hydrology when evaluating how much water need to be retained.

Groundwater flow is very important to this

valley and to this watershed. I know, for example, Pechanga, 100 percent of its water used on its reservation is from the groundwater. And Rancho California, who pumps groundwater, the amount of water and the quality of water is very important to the folks that live up here.

For some reason, I get this feeling that we're rushed. We're rushed to get this permit done. The Orange County permit seemed to take two years to finish, and we're trying to do it in a period of four to six months. I know you have some language that you're excited about, you're happy about, but I'm not sure that it currently fits what this watershed needs.

And I know there needs to be improvements, and the co-permittees are going to have to take the fact that we need more monitoring, we need more samples to see what's going on in the hydrology up here. But at this time, guys, I don't feel like we're ready to -- personally, I don't feel like we're ready to approve this.

MR. ANDERSON: I did take to heart the Riverside comments about not wanting to repeat the Orange County permit process having lasted excruciatingly long. But I know you guys have been working really hard on trying to get a meeting of the minds on this permit.

So this is really the first time that we're getting a shot at this. And maybe your workshop would

have been beneficial before we actually got to trying to passing the MS4 Permit, because as David said, it's important on how it affects everybody.

I'm really cognizant of the economic problems the cities are facing, and how they go about finding the funds to do this. And I appreciate the additional time there was given in the permit in implementation. I don't know if that is enough time to actually get it done right and to get it done and fully funded.

But I agree with Wayne that it does need to get done. The over irrigation runoff issue, I hate seeing that spray over the edge, and it really rankles me as a farmer to see water just going down the curb. But I also understand that we have a lot of education, and before we actually get to fining people and creating notice of violation per region, per cities and anything about over irrigation. So I prefer seeing some sort of base implementation of that irrigation runoff ordinance.

Maybe you do already have existing ordinances within the cities to take it on. But I don't know if there's been the policy where they actually threw it out and sent the water cops out there. And, finally, on the LID, the design capture volume idea makes perfect sense to me. But I did understand that it would be difficult to figure.

I mean, it's like trying to figure out when you do a new general plan, what you could actually do in the old general plan under the new general plan a number of homes. It's kind of hard to figure unless you actually go through the process. I kind of rambled on a little bit. I'm sympathetic with Mark as far as, I probably have a lot of angst for voting for this one.

And without a little bit more compromise to get it, so that everybody can live with it. I'm especially cognizant of the fact that there's a whole lot of water that used to go towards Pendleton that's going up to Lake Elsinore, because all the parties were so stubborn about how they went about intimating water quality in this basin.

And I think the past, you know, refers to well, all you have to do is a site-specific study. But by that time, everybody dug in their heels, and we didn't get any site-specific studies down at the bottom of the basin. Instead, the water is going over to Lake Elsinore and everybody knew it. We've got PID and Pendleton and all that sort of thing. Because that's a lot of water. I mean, I thought three to five million gallons per day was a lot of water. Now it's probably even more.

That's the reason why I think it would be -- try to approach it with more sensitivity and try to get those

last details ironed out. I really appreciate the fact how far everybody's come, and because when I got this package, I thought, there's no way we could get anywhere close to this much agreement. And I think we're pretty close, and if you guys came up with a couple of recommendations on there, I'm probably not smart enough to figure it out. That would make everybody happy. I'm glad we passed this permit today, so as to not hear it again. So that's my two cents.

MR. STRAWN: Being the new kid on the block, this has been a little bit of an education today. I share everybody's concerns about cost, but I'm reminded that we're really are about water quality. And I think if you picture your nice new neighborhood, sitting down around Chollas Creek and looked at property values and tax assessments would in a case like that, if we let the water become like that, that polluted. Some of the cost questions brought up today might look a little differently to us. Maybe I picked a bad example, but I think you get where I'm going.

My other two concerns is: One, I'm uncomfortable with the idea that Staff is essentially requiring more sampling sites in Riverside as some sort of punitive action, if I heard that correctly. I'm not comfortable with that. If it's just about forcing mass-loading

measurements as opposed to grabs. I understand that. I've done bioassessment. I know a good bit about what's required there. And the amount of space and water and timing and all involved with that.

But if it was just a punitive thing, I'm not comfortable. I guess I don't quite understand what the rationale was in requiring more sampling of Riverside than you did in Orange county. The third one, and probably the biggest issue, and I agree with Wayne's comments on this, is we heard two sides of the story. We heard Ben's comments, and we heard, basically, a lot of other experts counter that as far as what the effect of water flow into Camp Pendleton would be.

And I agree with Wayne, I don't know that we know that answer, and I was thinking along that line, even before you said it, amazingly. But I wish there was some way we could give some assurance to Camp Pendleton, or Kent here is to not reducing the flow. We're going on Staff recommendation that it would not reduce the flow.

And if, in fact, data becomes available that shows that the flow is reduced, we need to go back and review this decision. I don't know if that's possible or how, but the vehicle would be, but that's certainly my number one concern here. Thank you.

MR. DESTACHE: I have several issues. But I

want to echo Mr. Rayfield's comments about water quality, and it is paramount to all of us: Residents, businesses, public agencies, everyone, that water quality is one of most important issues that we are going to deal with over the long term.

And Mr. Strawn stated that, you don't want to have property against Chollas Creek in San Diego, because that's the ultimate downsize of what happens when pollution inundates a watershed, and absolutely makes it an unlivable and unfathomable position. And with the fact that we've seen some degradation in the watershed, I don't think anyone here would say that there isn't degradation in the watershed and the water quality that's associated with it.

My issues are more related to the monitoring side. I would like it to be more mirrored towards what we're seeing in South Orange County and San Diego. I think there's a couple of items we can adjust there. However, this is an important permit, and we need to get through this, and I don't know whether delaying the process is actually going to help the process, although we took a significant amount of time doing South Orange County.

I think that -- on another point, on the irrigation runoff, all the agencies in the affected area

in the permit, would have legislation or ordinances that determine how much water that can runoff your site. When you're developing a new site, you have requirements to go to reclaimed water, if eventually it came. Well, reclaimed water coming off the site is not allowed either, because it's not considered a potable, or a source that could be dumped into the MS4.

I think the irrigation runoff issue, if we can get through the issue of where do you monitor it, and how do you approach the long term, for lack of another word, policing of that. I think that we can get through that issue. And I think it gets away from having to drive by somebody that is dumping water onto the street and having to knock on his door and give him a fine.

In San Diego, they implemented a door hanger, door knocker program, where they actually put a door knocker on everybody's door. And the amount of individuals and homeowners that stopped their water from going into the streets was unbelievable. The quantity, I would have to say it was 75 to 80 percent of the people really took umbrage to that program.

So I think there's a way to police that isn't a real detrimental cost issue. You can't argue with low-impact development, other than the fact that probably you do the analysis on it. And I think long term, if we

come to some agreement that we can effectively help Camp Pendleton and the co-permittees realize how they affect each other, we can get the low-impact development. We have to refill our aquifers, regardless. If you look across the state, aquifers have been pumped to a point where they're also in a state of collapse.

So until you start infiltrating water into those aquifers, you're not going to get to a point where that water is going to get to historic levels. But we have to get the empirical data, and I've said this to Staff, and I've said it to the EO, that we need the empirical data to get to the point where we can make more decisions long term.

And we have a re-opener clause in this permit to allow it to be reopened and look at those. However, it still goes back to how do we address the monitoring. If Staff can give me some alternatives to the current monitoring the MRP program, potentially we could move forward on this. However, I do want the monitoring to mirror -- I would like to see the monitoring to mirror Orange County and San Diego.

And I think in both of those locations we're doing composite sampling. So the differences are relatively minimal. And with that, I'm going to look for a motion, one of the other Board members and then we

could move forward.

MR. GIBSON: Mr. Chairman, if I may ask, did you want Staff to answer any particular questions based on the deliberations you just heard? I heard a proposal from Mr. Rayfield; I heard a question from Mr. Strawn. I can address those if you would like.

MR. DESTACHE: If we can get a response in which we can make a decision to approve this permit with some adjustments, I would love to hear that, absolutely.

MR. GIBSON: Do we have any specific adjustments, Chad, in particular, with the monitoring? While he's approaching the podium, with regard to the question that Mr. Rayfield asked, the Board could consider a re-opener at a date certain, or upon receipt of certain studies. One of the options that I had in my mind is that there is the option for the regional Board Executive Officer to approve a Regional monitoring.

And regional monitoring can take several forms. It can be an analysis based on modeling information. And so that is an option of the permittees have available to them now to investigate whether there would, in fact, be impacts to beneficial uses downstream, as well as to flow itself downstream from implementation of their low-impact development on new development significant redevelopment. But that is an option that they have available to them.

You can also direct me to meet with them and work with them over the next year of implementation of the order to help quantify and address those issues, and bring it back to you at an appropriate time. I would like to at least address Mr. Strawn's question. My understanding and my interpretation is that there is no punitive action in the monitoring that is proposed in this order.

That is, monitoring as necessary for the order to bring it up to the kind of monitoring that's being done elsewhere in the region. When we take punitive action, they are very specific under the water code, and they're clearly identified as such. The monitoring that we're proposing here is to develop the body of data that we currently have for the other ten hydrologic units in the region, which we do not have because the permittees have not implemented that type of monitoring over the last 20 years.

Mass-loading stations were not introduced into this order until 2004, where they were in common use the San Diego County in 1990, 1991, 1992. And in Orange County, about the same time. There's a basic reason for stepping up monitoring requirements at this point in time. I would like to offer an additional observation regarding costs. We heard discussion, it

costs the taxpayers of California about $1,000,000 to write one TMDL.

And you heard testimony during the Board presentation of a number of 303D list exceedances that would all require a TMDL if there was no other options available. It then costs the permittees millions of dollars to comply with the water quality based ethylene or wave foot allocations. And then you would probably then hear the same permittees come to you a few years hence, explaining that they could not comply with those number, and those numbers.

And those numbers, in some cases, actually take away a lot of the BMP flexibility because now, they have numeric ethylene limits they have to meet in those permits. So I offer those observations and those options for you, and would I like to ask Mr. Loflen if he has any specific changes. He's indicating that he does not on the monitoring.

MS. CLEMENTE: With regards to the monitoring, I think Mr. Gibson said it best. I want to make clear that the Mass-Loading Station three samples is not a punitive measure. It's because they were not able to collect sufficient data, so it did not pass the power analysis, and that's why we needed it to be another three.

Next permit iteration, just like we did with

San Diego and Orange County, we have the power analysis that David said we can scale it down. In terms of -- so if you're asking me to scale it down to be consistent with Orange and San Diego, I believe we're there. This is what we're giving you right now. Nevertheless, we can always make more compromises if you're asking it because of cost considerations.

Is that where you want me to go with this?

MR. DESTACHE: I think the cost considerations are one thing, but consistency is what I'm really looking for. Because eventually, regardless of where we're headed, we're going to head to regional permit, and we have to have everybody consistently operating under that umbrella.

And from what I've read in the co-permittees, actually Riverside County floods responses, if in fact, we did go to two, we're saving $79,000, or something like that. And that number is written on this piece of paper. Whether it's right or wrong, I can't tell you that. If, in fact, the other permits are looking for three and some of them drop to two, because of their sampling processes and history that they've gone through, that's the way the permit is written.

MR. STRAWN: Thank you for that explanation. That's satisfactory.

MR. RAYFIELD: I just wanted to comment on Mr. Gibson's thought about how to give some assurance for prompt action, which is what we're seeking for Camp Pendleton, and I would be personally satisfied with the notion that you, throughout meeting with them and tracking regularly if they have an issue. So long as that is connected with the pledge to take immediate, prompt, and effective action. So if there is a need. And I think that's what it comes down to in my mind.

Mr. UHLEY: I believe that we can provide that in the terms our military parlance of surgical strike could be ordered.

MR. RAYFIELD: All right. I like that.

MS. HAGAN: Mr. Rayfield, we could include a specific opener along the lines of the executive officer shall meet with Camp Pendleton and other interested parties at six-month intervals, and upon evaluating -- I'm trying to think of what the language would be.

MR. RAYFIELD: For a surgical strike.

MS. HAGAN: Consider information regarding impact to downstream water rights and evaluate whether to recommend a reopening.

MR. RAYFIELD: I'd rather start out with something like six months and see how it goes, and then expand, let it get, the period get longer if we have to.

MS. HAGAN: Since we need to have the precise language how about, or we could add it to the end of the permit on page 84. It could be on paragraph P that says the executive officer shall meet with Camp Pendleton and other interested parties at six months interval to determine whether the permit should be reopened for consideration of downstream water quality and water rights.

MR. RAYFIELD: Maybe downstream water volume. I'm not sure -- you're the attorney, but you told us earlier this isn't about water rights, so I'd be a little reluctant to put that in there. But it is about flow and water volume.

MR. UHLEY: I would offer a small suggestion to Catherine's language. I would, first of all, include other parties besides Camp Pendleton, the Water Authority, Fallbrook Utilities District permittees. I would certainly meet with all of them.

And second of all, the purpose of those meetings would be to identify and investigate impacts from implementation of low-impact development BMPs required by this order R9-2010-0016, as they are developed by the stormwater permittees, and to bring to the Board any key issues or amendments to the order that derive from those analysis and those discussions.

MR. RAYFIELD: I'm okay with that.

MR. DESTACHE: Yes, and I am, too. I think it addresses a need to continue, do a continued analysis on what effects are in Camp Pendleton, and I think that is within our purview, and allows us to be cognizant of your needs.

Mr. Chair, I'll make a motion for the Staff recommendation with the errata, and in addition to the errata that describes our potential actions with Camp Pendleton and other stakeholders downstream, if that is about what you said.

MR. NEILL: That and to specifically to identify water quality impacts, flow impacts, impacts on water rights, that whole continuum of issues that may derive from the implementation of low-impact development of BMPs under this order.

MR. DESTACHE: Do we have a second?

MR. STRAWN: I'll second it.

MR. DESTACHE: And I'll call for a vote. All in favor?

(Committee simultaneously stated "Aye")

MR. DESTACHE: I think we're going to have to do a hand vote. And so it's Strawn voted "Aye"; Anderson "Aye"; Mr. Destache "Aye"; and Mr. Rayfield "Aye"; and I'm voting yes, also. At that point, it's four to one

and is an approved permit, as Mr. Rayfield has described.

(Hearing adjourned at 5:30 p.m.)

California Regional Water Quality Control Board
San Diego Region

Waste Discharge Requirements for Discharges from the Municipal Separate Storm Sewer Systems (MS4s) Draining the County of Riverside, the Incorporated Cities of Riverside County, and the Riverside County Flood Control and Water Conservation District within the San Diego Region

Order No. R9-2010-0016
NPDES No. CAS0108766

November 10, 2010

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To request copies of the Riverside County Municipal Storm Water Permit, please contact Ben Neill, Water Resources Control Engineer at (858) 467 – 2983, bneill@waterboards.ca.gov

Documents also are available at: http://www.waterboards.ca.gov/sandiego

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California Regional Water Quality Control Board
San Diego Region
on
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The California Regional Water Quality Control Board, San Diego Region (hereinafter San Diego Water Board), finds that:

A. BASIS FOR THE ORDER

1. This Order is based on the federal Clean Water Act (CWA), the Porter-Cologne Water Quality Control Act (Division 7 of the Water Code, commencing with Section 13000), applicable State and federal regulations, all applicable provisions of statewide Water Quality Control Plans and Policies adopted by the State Water Resources Control Board (State Water Board), the Water Quality Control Plan for the San Diego Basin adopted by the San Diego Water Board (Basin Plan), the California Toxics Rule, and the California Toxics Rule Implementation Plan.

2. This Order reissues National Pollutant Discharge Elimination System (NPDES) Permit No. CAS0108766, which was first adopted by the San Diego Water Board on July 16, 1990 (Order No. 90-38), and then reissued on May 13, 1998 (Order No. 98-02). On May 26, 1998, the United States Environmental Protection Agency (USEPA), Region IX, objected to Order No. 98-02 due to concerns regarding Receiving Water Limitations (RWL) language. The USEPA concluded that the RWL language in the permit did not comply with the CWA and its implementing regulations. On April 27, 1999, the USEPA reissued the MS4 permit, which the San Diego Water Board adopted as Addendum No. 1 to Order No. 98-02 on November 8, 2000. On July 14, 2004, the San Diego Water Board adopted the third term MS4 permit, Order No. R9-2004-001. On January 15, 2009, the Riverside County Flood Control and Water Conservation District (RCFCD), as the Principal Copermittee, submitted a Report of Waste Discharge (ROWD) for reissuance of the municipal separate storm sewer system (MS4) Permit.

3. This Order is consistent with the following precedential Orders adopted by the State Water Board addressing MS4 NPDES Permits: Order 99-05, Order WQ-2000-11, Order WQ 2001-15, and Order WQO 2002-0014.[1]

[1] In July 2010, the court in Los Angeles County v. State Water Resources Control Board remanded the Los Angeles Water Board's MS4 permit underlying Order WQ 2009-0008 for procedural reasons occurring during the permit adoption process. The court did not evaluate or rule upon the substantive findings and reasoning set forth in Order WQ 2009-0008. The State Water Board rescinded and voided Order WQ 2009-0008 to comply with the court's order. While the San Diego Water Board may no longer cite Order WQ 2009-0008, the San Diego Water Board has independently considered whether the requirement to eliminate non-storm water discharges is subject to the MEP standard. The San Diego Water Board concludes that the MEP standard does not apply to non-storm water discharges for the same reasons expressed by the State Water Board.

4. The Fact Sheet / Technical Report for the Order No. R9-2010-0016, NPDES No. CAS0108766, Waste Discharge Requirements for Discharges from the MS4s Draining the County of Riverside, the Incorporated Cities of Riverside County, and the Riverside County Flood Control and Water Conservation District within the San Diego Region, includes cited regulatory and legal references and additional explanatory information and data in support of the requirements of this Order. This information, including any supplements thereto, is hereby incorporated by reference into these findings.

B. REGULATED PARTIES

Each of the persons in Table 1 below, hereinafter called Copermittees or dischargers, owns or operates an MS4, through which it discharges into waters of the United States (U.S.) within the San Diego Region. These MS4s fall into one or more of the following categories: (1) a medium or large MS4 that services a population of greater than 100,000 or 250,000 respectively; or (2) a small MS4 that is "interrelated" to a medium or large MS4; or (3) an MS4 that contributes to a violation of a water quality standard; or (4) an MS4 which is a significant contributor of pollutants to waters of the U.S.

Table 1. Municipal Copermittees

1. City of Murrieta	4. County of Riverside
2. City of Temecula	5. Riverside County Flood Control and Water Conservation District
3. City of Wildomar	

The Cities of Murrieta, Menifee and Wildomar also discharge into the waters of the U.S. in the California Regional Water Quality Control Board, Santa Ana Region (Santa Ana Water Board), so are located partially within both the San Diego and Santa Ana Water Board boundaries. Water Code (WC) section 13228 provides a way to streamline the regulation of entities whose jurisdictions straddle the border of two or more Regions. WC section 13228 is implemented in this Order to ease the regulatory burden on Storm Water Agencies and Municipalities that lie in both the San Diego Water Board and the adjacent Santa Ana Water Board's jurisdiction. As allowed by California Water Code (CWC) §13228, the Cities of Murietta, Menifee, and Wildomar submitted written requests to be regulated for MS4 purposes under a permit adopted by only one Water Board. As authorized by CWC §13228 and pursuant to written agreements dated September 28, 2010 between the San Diego Water Board and the Santa Ana Water Board, the Cities of Murrieta and Wildomar are wholly regulated by the San Diego Water Board under this Order, including those portions of the Cities jurisdiction not within the San Diego Water Board's region. Similarly, the City of Menifee is wholly regulated by the Santa Ana Water Board under Order No. R8-2010-0033, including those portions of the City of Menifee within the San Diego Water Board's region.

C. DISCHARGE CHARACTERISTICS

1. Discharges from the MS4 contain waste, as defined in the CWC, and pollutants that adversely affect the quality of the waters of the State. The discharge from an MS4 is a "discharge of pollutants from a point source" into waters of the U.S. as defined in the CWA.

2. MS4 storm water and non-storm water discharges are likely to contain pollutants that cause or threaten to cause a violation of water quality standards, as outlined in the Basin Plan. Storm water and non-storm water discharges from the MS4 are subject to the conditions and requirements established in the Basin Plan for point source discharges.

3. The most common categories of pollutants in runoff include total suspended solids, sediment, pathogens (e.g., bacteria, viruses, protozoa), heavy metals (e.g., copper, lead, zinc and cadmium), petroleum products and polynuclear aromatic hydrocarbons, synthetic organics (e.g., pesticides, herbicides, and PCBs), nutrients (e.g., nitrogen and phosphorus fertilizers), oxygen-demanding substances (decaying vegetation, animal waste), detergents, and trash.

4. The discharge of pollutants and/or increased flows from MS4s may cause or threaten to cause the concentration of pollutants to exceed applicable receiving water quality objectives and/or impair or threaten to impair designated beneficial uses resulting in a condition of pollution (i.e., unreasonable impairment of water quality for designated beneficial uses), contamination, or nuisance.

5. Pollutants in runoff can threaten and adversely affect human health. Human illnesses have been clearly linked to recreating near storm drains flowing to receiving waters. Also, runoff pollutants in receiving waters can bioaccumulate in the tissues of invertebrates and fish, which may be eventually consumed by humans.

6. Runoff discharges from MS4s often contain pollutants that cause toxicity to aquatic organisms (i.e., adverse responses of organisms to chemicals or physical agents ranging from mortality to physiological responses such as impaired reproduction or growth anomalies). Toxic pollutants impact the overall quality of aquatic systems and beneficial uses of receiving waters.

7. The Copermittees discharge runoff into lakes, drinking water reservoirs, rivers, streams, creeks, bays, estuaries, coastal lagoons, the Pacific Ocean, and tributaries thereto within one of the eleven hydrologic units (Santa Margarita Hydrologic Unit) comprising the San Diego Region as shown in Table 2. Some of the receiving water bodies have been designated as impaired by the San Diego Water Board in 2009 pursuant to CWA section 303(d).

Table 2. Common Watersheds and CWA Section 303(d) Impaired Waters in the San Diego Region.

Hydrologic Area (HA) or Hydrologic Subarea (HSA) of the Santa Margarita Hydrologic Unit	Major Receiving Water Bodies	303(d) Pollutant(s)/Stressor or Water Quality Effect[2]
DeLuz Creek HSA (902.21)	De Luz Creek	Iron, Manganese, Nitrogen, Sulfates
Murrieta HSA (902.32)	Long Canyon Creek (tributary to Murrieta Creek)	Chlorpyrifos, E. Coli, Fecal Coliform, Iron, Manganese
Wolf HSA (902.52)	Murrieta Creek	Chlorpyrifos, Copper, Iron, Manganese, Nitrogen, Toxicity
Pauba HSA (902.51)	Redhawk Channel	Chlorpyrifos, Copper, Diazinon, E. Coli, Fecal Coliform, Iron, Manganese, Nitrogen, Phosphorus, Total Dissolved Solids
Gavilan HSA (902.22)	Sandia Creek	Iron, Sulfates
Gertrudis HSA (902.42)	Santa Gertrudis Creek	Chlorpyrifos, Copper, E. Coli, Fecal Coliform, Iron, Phosphorous
Lower Ysidora HSA (902.11)	Santa Margarita Lagoon	Eutrophic
Lower Ysidora HSA (902.11)	Santa Margarita River (Lower)	Enterococcus, Fecal Coliform, Phosphorus, Total Nitrogen as N
Gavilan HSA (902.22)	Santa Margarita River (Upper)	Toxicity
Pauba HSA (902.51)	Temecula Creek	Chlorpyrifos, Copper, Phosphorus, Total Dissolved Solids, Toxicity
French HSA (902.33)	Warm Springs Creek (Riverside County)	Chlorpyrifos, E. Coli, Fecal Coliform, Iron, Manganese, Phosphorus, Total Nitrogen as N

[2] The listed 303(d) pollutant(s) do not necessarily reflect impairment of the entire corresponding WMA or all corresponding major surface water bodies. The specific impaired portions of each WMA are listed in the State Water Resources Control Board's 2008 Section 303(d) List of Water Quality Limited Segments.

8. Trash is a persistent pollutant that can enter receiving waters from the MS4, accumulate, and be transported downstream into receiving waters over time. Trash poses a serious threat to the beneficial uses of the receiving waters, including, but not limited to, human health, rare and endangered species, navigation and human recreation.

9. The Copermittees' water quality monitoring data submitted to date documents persistent violations of Basin Plan water quality objectives for various runoff-related pollutants (indicator bacteria, dissolved solids, turbidity, metals, pesticides, etc.) at various watershed monitoring stations. Persistent toxicity has also been observed at some watershed monitoring stations. In addition, bioassessment data indicate that the majority of the monitored receiving waters have Poor to Very Poor Index of Biotic Integrity ratings. In sum, the above findings indicate that runoff discharges are causing or contributing to water quality impairments, and are a leading cause of such impairments in Riverside County.

10. When natural vegetated pervious ground cover is converted to impervious surfaces such as paved highways, streets, rooftops, and parking lots, the natural absorption and infiltration abilities of the land are lost. Therefore, runoff leaving a developed area is significantly greater in runoff volume, velocity, and peak flow rate than pre-development runoff from the same area. Runoff durations can also increase as a result of flood control and other efforts to control peak flow rates. Increased volume, velocity, rate, and duration of runoff, and decreased natural clean sediment loads, greatly accelerate the erosion of downstream natural channels. Significant declines in the biological integrity and physical habitat of streams and other receiving waters have been found to occur with as little as a 3-5 percent conversion from natural to impervious surfaces. The increased runoff characteristics from new development must be controlled to protect against increased erosion of channel beds and banks, sediment pollutant generation, or other impacts to beneficial uses and stream habitat due to increased erosive force.

11. Development creates new pollution sources as human population density increases and brings with it proportionately higher levels of car emissions, car maintenance wastes, municipal sewage, pesticides, household hazardous wastes, pet wastes, trash, etc. which can either be washed or directly dumped into the MS4. As a result, the runoff leaving the developed urban area is significantly greater in pollutant load than the pre-development runoff from the same area. These increased pollutant loads must be controlled to protect downstream receiving water quality.

12. Development and urbanization especially threaten environmentally sensitive areas (ESAs), such as water bodies designated as supporting a RARE beneficial use (supporting rare, threatened or endangered species) and CWA 303(d)-impaired water bodies. Such areas have a much lower capacity to withstand pollutant loads than other, more sensitive areas. In essence, development that is ordinarily insignificant in its impact on the environment may become significant in a particularly sensitive environment. Therefore, additional controls to reduce storm water pollutants from new and existing development may be necessary for areas adjacent to or discharging directly to an ESA.

13. Although dependent on several factors, the risks typically associated with properly managed infiltration of runoff (especially from residential land use areas) are not significant. The risks associated with infiltration can be managed by many techniques, including (1) designing landscape drainage features that promote infiltration of runoff, but do not "inject" runoff (injection bypasses the natural processes of filtering and transformation that occur in the soil); (2) taking reasonable steps to prevent the illegal disposal of wastes; (3) protecting footings and foundations; (4) ensuring that each drainage feature is adequately maintained in perpetuity; and (5) pretreatment.

14. Non-storm water (dry weather) discharge from the MS4 is not considered a storm water (wet weather) discharge and therefore is not subject to regulation under the Maximum Extent Practicable (MEP) standard from CWA 402(p)(3)(B)(iii), which is explicitly for "Municipal … *Stormwater Discharges* (emphasis added)" from the MS4. Rather, non-storm water discharges into the storm sewers, per CWA 402(p)(3)(B)(ii), are to be effectively prohibited. Such dry weather non-storm water discharges have been shown to contribute significant levels of pollutants and flow in arid, developed Southern California watersheds and are to be effectively prohibited under the CWA.

15. Non-storm water discharges to the MS4 granted an influent exception [i.e., which are exempt from the effective prohibition requirement set forth in CWA section 402(p)(3)(B)(ii)] under 40 CFR 122.26 are included within this Order. Any exempted discharges identified by Copermittees as a source of pollutants are subsequently required to be *addressed* (emphasis added) as illicit discharges through prohibition and incorporation into existing IC/ID programs. Furthermore, the USEPA contemplates that permitting agencies such as the San Diego Water Board may also identify exempted discharges as a source of pollutants required to be addressed as illicit discharges (See Vol. 55 Fed. Reg. 48037). The San Diego Water Board and the Copermittees have identified landscape irrigation, irrigation water and lawn water, previously exempted discharges, as a source of pollutants and conveyance of pollutants to waters of the U.S.

D. RUNOFF MANAGEMENT PROGRAMS

1. General

a. This Order specifies requirements necessary for the Copermittees to reduce the discharge of pollutants in storm water to the MEP. However, since MEP is a dynamic performance standard, which evolves over time as runoff management knowledge increases, the Copermittees' runoff management programs must continually be assessed and modified to incorporate improved programs, control measures, best management practices (BMPs), etc. in order to achieve the evolving MEP standard. Absent evidence to the contrary, this continual assessment, revision, and improvement of runoff management program implementation is expected to ultimately achieve compliance with water quality standards in the Region.

b. The Copermittees have generally been implementing the jurisdictional runoff management programs (JRMPs) required pursuant to Order No. R9-2004-001 since July 14, 2005. Prior to that, the Copermittees were regulated by Order No. 98-02, since May 13, 1998. MS4 discharges, however, continue to cause or contribute to violations of water quality standards as evidenced by the Copermittees' monitoring results.

c. This Order contains new or modified requirements that are necessary to improve Copermittees' efforts to reduce the discharge of pollutants in storm water runoff to the MEP and achieve water quality standards. Some of the new or modified requirements, such as the revised Watershed Water Quality Workplan (Watershed Workplan) section, are designed to specifically address high priority water quality problems. Other requirements, such as for unpaved roads, are a result of San Diego Water Board's identification of water quality problems through investigations and complaints during the previous permit period. Other new or modified requirements address program deficiencies that have been noted during audits, report reviews, and other San Diego Water Board compliance assessment activities. Additional changes in the monitoring program provide consistency with the Code of Federal Regulations, USEPA guidance, State Water Board guidance, and the Southern California Monitoring Coalition recommendations.

d. Updated individual Storm Water Management Plans (Individual SWMP or JRMP), and Watershed Stormwater Management Plans (watershed SWMPs or Watershed Workplans), which, together with references in the DAMP, describe the Copermittees' runoff management programs in their entirety, are needed to guide the Copermittees' runoff management efforts and aid the Copermittees in tracking runoff management program implementation. Hereinafter, the individual SWMP is referred to as the JRMPs and the Watershed SWMP is referred to as the Watershed Workplan. It is practicable for the Copermittees to update the

JRMPs and Watershed Workplans within the timeframe specified in this Order, since significant efforts to develop these programs have already occurred.

e. Pollutants can be effectively reduced in storm water runoff by the application of a combination of pollution prevention, source control, and treatment control BMPs. Pollution prevention is the reduction or elimination of pollutant generation at its source and is the best "first line of defense." Source control BMPs (both structural and non-structural) minimize the contact between pollutants and flows (e.g., rerouting run-on around pollutant sources or keeping pollutants on-site and out of receiving waters). Treatment control BMPs remove pollutants that have been mobilized by wet-weather or dry-weather flows.

f. Runoff needs to be addressed during the three major phases of urban development (planning, construction, and use) in order to reduce the discharge of pollutants from storm water to the MEP, effectively prohibit non-storm water discharges and protect receiving waters. Development which is not guided by water quality planning policies and principles can unnecessarily result in increased pollutant load discharges, flow rates, and flow durations which can negatively impact receiving water beneficial uses. Construction sites without adequate BMP implementation result in sediment runoff rates which greatly exceed natural erosion rates of undisturbed lands, causing siltation and impairment of receiving waters. Existing development generates substantial pollutant loads which are discharged in runoff to receiving waters.

g. Annual reporting requirements included in this Order are necessary to meet federal requirements and to evaluate the effectiveness and compliance of the Copermittees' programs.

h. This Order establishes Storm Water Action Levels (SALs) for selected pollutants based on USEPA Rain Zone 6 (arid southwest) Phase I MS4 monitoring data for pollutants in storm water. The SALs were computed as the 90th percentile of the data set, utilizing the statistical based population approach, one of three approaches recommended by the State Water Board's Storm Water Panel in its report, 'The Feasibility of Numerical Effluent Limits Applicable to Discharges of Storm Water Associated with Municipal, Industrial and Construction Activities (June 2006). SALs are identified in Section D of this Order. Copermittees must implement a timely, comprehensive, cost-effective storm water pollution control program to reduce the discharge of pollutants in storm water from the permitted areas so as not to exceed the SALs. Exceedance of SALs may indicate inadequacy of programmatic measures and BMPs required in this Order.

2. Development Planning

a. The Standard Storm Water Mitigation Plan (SSMP) requirements contained in this Order are consistent with Order WQ-2000-11 adopted by the State Water Board on October 5, 2000. In the precedential order, the State Water Board

found that the design standards, which essentially require that runoff generated by 85 percent of storm events from specific development categories be infiltrated or treated, reflect the MEP standard. The order also found that the SSMP requirements are appropriately applied to the majority of the Priority Development Project categories that are also contained in Section F.1 of this Order. The State Water Board also gave California Regional Water Quality Control Boards (Regional Water Boards) the needed discretion to include additional categories and locations, such as retail gasoline outlets (RGOs), in SSMPs.

b. Controlling runoff pollution by using a combination of onsite source control and site design BMPs augmented with treatment control BMPs before the runoff enters the MS4 is important for the following reasons: (1) Many end-of-pipe BMPs (such as diversion to the sanitary sewer) are typically ineffective during significant storm events. (2) Whereas, onsite source control BMPs can be applied during all runoff conditions end-of-pipe BMPs are often incapable of capturing and treating the wide range of pollutants which can be generated on a sub-watershed scale; (3) End-of-pipe BMPs are more effective when used as polishing BMPs, rather than the sole BMP to be implemented; (4) End-of-pipe BMPs do not protect the quality or beneficial uses of receiving waters between the pollutant source and the BMP; and (5) Offsite end-of-pipe BMPs do not aid in the effort to educate the public regarding sources of pollution and their prevention.

c. Use of Low-Impact Development (LID) site design BMPs at new development, redevelopment and retrofit projects can be an effective means for minimizing the impact of storm water runoff discharges from the development projects on receiving waters. LID is a site design strategy with a goal of maintaining or replicating the pre-development hydrologic regime through the use of design techniques. LID site design BMPs help preserve and restore the natural hydrologic cycle of the site, allowing for filtration and infiltration which can greatly reduce the volume, peak flow rate, velocity, and pollutant loads of storm water runoff. Current runoff management, knowledge, practices and technology have resulted in the use of LID BMPs as an acceptable means of meeting the storm water MEP standard.

d. RGOs are significant sources of pollutants in storm water runoff. RGOs are points of convergence for motor vehicles for automotive related services such as repair, refueling, tire inflation, and radiator fill-up and consequently produce significantly higher loadings of hydrocarbons and trace metals (including copper and zinc) than other developed areas.

e. Industrial sites are significant sources of pollutants in runoff. Pollutant concentrations and loads in runoff from industrial sites are similar or exceed pollutant concentrations and loads in runoff from other land uses, such as commercial or residential land uses. As with other land uses, LID site design,

source control, and treatment control BMPs are needed at industrial sites in order to meet the MEP standard. These BMPs are necessary where the industrial site is larger than 10,000 square feet. The 10,000 square feet threshold is appropriate, since it is consistent with requirements in other Phase I NPDES storm water regulations throughout California.

f. If not properly designed or maintained, certain BMPs implemented or required by municipalities for runoff management may create a habitat for vectors (e.g. mosquitoes and rodents). Proper BMP design and maintenance to avoid standing water, however, can prevent the creation of vector habitat. Nuisances and public health impacts resulting from vector breeding can be prevented with close collaboration and cooperative effort between municipalities, local vector control agencies, and the California Department of Public Health during the development and implementation of runoff management programs.

g. The increased volume, velocity, frequency and discharge duration of storm water runoff from developed areas has the potential to greatly accelerate downstream erosion, impair stream habitat in natural drainages, and negatively impact beneficial uses. Development and urbanization increase pollutant loads in storm water runoff and the volume of storm water runoff. Impervious surfaces can neither absorb water nor remove pollutants and thus lose the purification and infiltration provided by natural vegetated soil. Hydromodification measures for discharges to hardened channels are needed for the future restoration of the hardened channels to their natural state, thereby restoring the chemical, physical, and biological integrity and beneficial uses of local receiving waters.

3. Construction and Existing Development

a. In accordance with federal NPDES regulations and to ensure the most effective oversight of industrial and construction site discharges, discharges of runoff from industrial and construction sites are subject to dual (State and local) storm water regulation. Under this dual system, each Copermittee is responsible for enforcing its local permits, plans, and ordinances, and the San Diego Water Board is responsible for enforcing the General Construction Activities Storm Water Permit, State Water Board Order 2009-0009-DWQ, NPDES No. CAS000002 (General Construction Permit) and the General Industrial Activities Storm Water Permit, State Water Board Order 97-03 DWQ, NPDES No. CAS000001 (General Industrial Permit) and any reissuance of these permits. NPDES municipal regulations require that municipalities develop and implement measures to address runoff from industrial and construction activities. Those measures may include the implementation of other BMPs in addition to those BMPs that are required under the statewide general permits for activities subject to both State and local regulation.

b. Identification of sources of pollutants in runoff (such as municipal areas and activities, industrial and commercial sites/sources, construction sites, and residential areas), development and implementation of BMPs to address those sources, and updating ordinances and approval processes are necessary for the Copermittees to ensure that discharges of pollutants from its MS4 in storm water are reduced to the MEP and that non-storm water discharges are not occurring. Inspections and other compliance verification methods are needed to ensure minimum BMPs are implemented. Inspections are especially important at areas that are at high risk for pollutant discharges.

c. Historic and current development makes use of natural drainage patterns and features as conveyances for runoff. Urban streams used in this manner are part of the municipalities' MS4s regardless of whether they are natural, anthropogenic, or partially modified features. In these cases, the urban stream is both an MS4 and receiving water.

d. As operators of the MS4s, the Copermittees cannot passively receive and discharge pollutants from third parties. By providing free and open access to an MS4 that conveys discharges to waters of the U.S., the operator essentially accepts responsibility for discharges into the MS4 that it does not prohibit or otherwise control. These discharges may cause or contribute to a condition of contamination or a violation of water quality standards.

e. Waste and pollutants which are deposited and accumulate in MS4 drainage structures will be discharged from these structures to waters of the U.S. unless they are removed. These discharges may cause or contribute to, or threaten to cause or contribute to, a condition of pollution in receiving waters. For this reason, pollutant discharges from storm water into MS4s must be reduced using a combination of management measures, including source control and an effective MS4 maintenance program implemented by each Copermittee.

f. Enforcement of local runoff related ordinances, permits, and plans is an essential component of every runoff management program and is specifically required in the federal storm water regulations and this Order. Each Copermittee is individually responsible for adoption and enforcement of ordinances and/or policies, implementation of identified control measures/BMPs needed to prevent or reduce pollutants in storm water runoff, and for the allocation of funds for the capital, operation and maintenance, administrative, and enforcement expenditures necessary to implement and enforce such control measures/BMPs under its jurisdiction. Education is an important aspect of every effective runoff management program and the basis for changes in behavior at a societal level. Education of municipal planning, inspection, and maintenance department staffs is especially critical to ensure that in-house staffs understand how their activities impact water quality, how to accomplish their jobs while protecting water quality, and understand their specific roles and responsibilities for compliance with this

Order. Public education, designed to target various urban land users and other audiences, is also essential to inform the public of how individual actions affect receiving water quality and how adverse effects can be minimized.

g. Public participation during the development of runoff management programs is necessary to ensure that all stakeholder interests and a variety of creative solutions are considered.

h. Retrofitting existing development with storm water treatment controls, including LID, is necessary to address storm water discharges from existing development that may cause or contribute to a condition of pollution or a violation of water quality standards. Although SSMP BMPs are required for redevelopment, the current rate of redevelopment will not address water quality problems in a timely manner. Cooperation with private landowners is necessary to effectively identify, implement and maintain retrofit projects for the preservation, restoration, and enhancement of water quality.

4. Watershed Runoff Management

a. Since runoff within a watershed can flow from and through multiple land uses and political jurisdictions, watershed-based runoff management can greatly enhance the protection of receiving waters. Such management provides a means to focus on the most important water quality problems in each watershed. By focusing on the most important water quality problems, watershed efforts can maximize protection of beneficial use in an efficient manner. Effective watershed-based runoff management actively reduces pollutant discharges and abates pollutant sources causing or contributing to watershed water quality problems. Watershed-based runoff management that does not actively reduce pollutant discharges and abate pollutant sources causing or contributing to watershed water quality problems can necessitate implementation of the iterative process outlined in section A.3 of this Order. Watershed management of runoff does not require Copermittees to expend resources outside of their jurisdictions. In some cases, however, this added flexibility provides more, and possibly more effective, alternatives for minimizing waste discharges. Watershed management requires the Copermittees within a watershed to develop a watershed-based management strategy, which can then be implemented on a jurisdictional basis.

b. Some runoff issues, such as general education and training, can be effectively addressed on a regional basis. Regional approaches to runoff management can improve program consistency and promote sharing of resources, which can result in implementation of more efficient programs.

c. It is important for the Copermittees to coordinate their water quality protection and land use planning activities to achieve the greatest protection of receiving water bodies. Copermittee coordination with other watershed stakeholders, especially the State of California Department of Transportation, the U.S. federal government, sovereign American Indian tribes, and water and sewer districts, is also important.

E. STATUTE AND REGULATORY CONSIDERATIONS

1. The RWL language specified in this Order is consistent with language recommended by the USEPA and established in State Water Board Order WQ-99-05, *Own Motion Review of the Petition of Environmental Health Coalition to Review Waste Discharge Requirements Order No. 96-03, NPDES Permit No. CAS0108740*, adopted by the State Water Board on June 17, 1999. The RWL language in this Order requires compliance with water quality standards, which for storm water discharges is to be achieved through an iterative approach requiring the implementation of improved and better-tailored BMPs over time. Compliance with receiving water limits based on applicable water quality standards is necessary to ensure that MS4 discharges will not cause or contribute to violations of water quality standards and the creation of conditions of pollution, contamination, or nuisance.

2. The Basin Plan, identifies the following existing and potential beneficial uses for surface waters in Riverside County: Municipal and Domestic Supply (MUN), Agricultural Supply (AGR), Industrial Process Supply (PROC), Hydropower Generation (POW), Industrial Service Supply (IND), Ground Water Recharge (GWR), Contact Water Recreation (REC1), Non-contact Water Recreation (REC2), Warm Freshwater Habitat (WARM), Cold Freshwater Habitat (COLD), Wildlife Habitat (WILD), Rare, Threatened, or Endangered Species (RARE), Spawning, Reproduction and/or Early Development (SPWN) and Preservation of Biological Habitats of Special Significance (BIOL).

3. This Order is in conformance with State Water Board Resolution No. 68-16, *Statement of Policy with Respect to Maintaining High Quality Waters in California*, and the federal Antidegradation Policy described in 40 CFR 131.12.

4. Section 6217(g) of the Coastal Zone Act Reauthorization Amendments of 1990 (CZARA) requires coastal states with approved coastal zone management programs to address non-point pollution impacting or threatening coastal water quality. CZARA addresses five sources of non-point pollution: agriculture, silviculture, urban, marinas, and hydromodification. This NPDES permit addresses the management measures required for the urban category, with the exception of septic systems. The adoption and implementation of this NPDES permit relieves the Copermittee from developing a non-point source plan, for the urban category, under CZARA. The San Diego Water Board addresses septic systems through the administration of other programs.

5. Section 303(d)(1)(A) of the CWA requires that "Each state shall identify those waters within its boundaries for which the effluent limitations…are not stringent enough to implement any water quality standard (WQS) applicable to such waters." The CWA also requires states to establish a priority ranking of impaired water bodies known as Water Quality Limited Segments and to establish Total Maximum Daily Loads (TMDLs) for such waters. This priority list of impaired water bodies is called the Section 303(d) List. The 2006 Section 303(d) List was approved by the State Water Board on October 25, 2006. On June 28, 2007, the 2006 303(d) List for California was given final approval by the USEPA. The 303(d) List was recently updated, and on December 16, 2009, the 2008 303(d) List was approved by the San Diego Water Board. The 2008 303(d) List for the San Diego Region was approved by the State Water Board on August 4, 2010. The 2008 303(d) List is awaiting USEPA approval.

6. This Order does not constitute an unfunded local government mandate subject to subvention under Article XIIIB, Section (6) of the California Constitution for several reasons, including, but not limited to, the following. First, this Order implements federally mandated requirements under CWA §402. (33 U.S.C. § 1342(p)(3)(B).) Second, the local agency Copermittees' obligations under this Order are similar to, and in many respects less stringent than, the obligations of non-governmental and new dischargers who are issued NPDES permits for storm water and non-storm water discharges. Third, the local agency Copermittees have the authority to levy service charges, fees, or assessments sufficient to pay for compliance with this Order. Fourth, the Copermittees have requested permit coverage in lieu of compliance with the complete prohibition against the discharge of pollutants contained in CWA §301, subdivision (a) (33 U.S.C. § 1311(a)) and in lieu of numeric restrictions on their MS4 discharges (i.e. effluent limitations). Fifth, the local agencies' responsibility for preventing discharges of waste that can create conditions of pollution or nuisance from conveyances that are within their ownership or control under State law predates the enactment of Article XIIIB, Section (6) of the California Constitution. Likewise, the provisions of this Order to implement TMDLs are federal mandates. The CWA requires TMDLs to be developed for water bodies that do not meet federal water quality standards. (33 U.S.C. sec. 1313(d).) Once the USEPA or a state develops a TMDL, federal law requires that permits must contain effluent limitations consistent with the assumptions of any applicable wasteload allocation. (40 C.F.R. sec. 122.44(d)(1)(vii)(B).)

7. Runoff treatment and/or mitigation must occur prior to the discharge of runoff into receiving waters. Treatment BMPs must not be constructed in waters of the U.S. or State unless the runoff flows are sufficiently pretreated to protect the values and functions of the water body. Federal regulations at 40 CFR 131.10(a) state that in no case shall a state adopt waste transport or waste assimilation as a designated use for any waters of the U.S. Authorizing the construction of an runoff treatment facility within a water of the U.S., or using the water body itself as a treatment system or for conveyance to a treatment system, would be tantamount to accepting waste assimilation as an appropriate use for that water body. Furthermore, the

construction, operation, and maintenance of a pollution control facility in a water body can negatively impact the physical, chemical, and biological integrity, as well as the beneficial uses, of the water body. Without federal authorization (e.g., pursuant to CWA § 404), waters of the U.S. may not be converted into, or used as, waste treatment or conveyance facilities. Similarly, waste discharge requirements pursuant to CWC §13260 are required for the conversion or use of waters of the State as waste treatment or conveyance facilities. Diversion from waters of the U.S./State to treatment facilities and subsequent return to waters of the U.S. is allowable, provided that the effluent complies with applicable NPDES requirements.

8. The issuance of waste discharge requirements and an NPDES permit for the discharge of runoff from MS4s to waters of the U.S. is exempt from the requirement for preparation of environmental documents under the California Environmental Quality Act (CEQA) (Public Resources Code, Division 13, Chapter 3, section 21000 et seq.) in accordance with the CWC section 13389.

9. Storm water discharges from developed and developing areas in Riverside County are significant sources of certain pollutants that cause, may be causing, threatening to cause or contributing to water quality impairment in the waters of Riverside County. Furthermore, as delineated in the CWA section 303(d) list in Table 2, the San Diego Water Board has found that there is a reasonable potential that municipal storm water and non-storm water discharges from MS4s cause or may cause or contribute to an excursion above water quality standards for the following pollutants: Indicator Bacteria (including Fecal Coliform and E. Coli), Copper, Manganese, Iron, Chlorpyrifos, Diazinon, Sulfates, Phosphorous, Nitrogen, Total Dissolved Solids (TDS), and Toxicity. In accordance with CWA section 303(d), the San Diego Water Board is required to establish TMDLs for these pollutants to these waters to eliminate impairment and attain water quality standards. Therefore, certain early pollutant control actions and further pollutant impact assessments by the Copermittees are warranted and required pursuant to this Order.

10. This Order requires each Copermittee to effectively prohibit all types of unauthorized discharges of non-storm water into its MS4. However, historically pollutants have been identified as present in dry weather non-storm water discharges from the MS4s through 303(d) listings, monitoring conducted by the Copermittees under Order No. R9-2004-0001, and there are others expected to be present in dry weather non-storm water discharges because of the nature of these discharges. This Order includes action levels for pollutants in non-storm water, dry weather discharges from the MS4. The non-storm water action levels are designed to ensure that the Order's requirement to effectively prohibit all types of unauthorized discharges of non-storm water into the MS4 is being complied with. Non-storm water action levels in the Order are based upon numeric or narrative water quality objectives and criteria as defined in the Basin Plan, the State Water Board's Water Quality Control Plan for Ocean Waters of California (Ocean Plan), and the State Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California (State Implementation Policy or SIP). An exceedance of an action level

requires specified responsive action by the Copermittees. This Order describes what actions the Copermittees must take when an exceedance of an action level is observed. Exceedances of non-storm water action levels do not alone constitute a violation of this Order but could indicate non-compliance with the requirement to effectively prohibit all types of unauthorized non-storm water discharges into the MS4 or other prohibitions established in this Order. Failure to undertake required source investigation and elimination action following an exceedance of a non-storm water action level (NAL or action level) is a violation of this Order. The San Diego Water Board recognizes that use of action levels will not necessarily result in detection of all unauthorized sources of non-storm water discharges because there may be some discharges in which pollutants do not exceed established action levels. However, establishing NALs at levels appropriate to protect water quality standards is expected to lead to the identification of significant sources of pollutants in dry weather non-storm water discharges.

11. In addition to federal regulations cited in the Fact Sheet / Technical Report for the Order No. R9-2010-0016, monitoring and reporting required under Order No. R9-2010-0016 is required pursuant to authority under CWC section 13383.

12. With this Order, the San Diego Water Board has completed the re-issuance of the fourth iteration of the Phase I MS4 NPDES Permits for the Copermittees in the portions of San Diego County, Orange County, and Riverside County within the San Diego Region. The NPDES Permit requirements issued to the Copermittees in each county have substantially the same core requirements such as discharge prohibitions, receiving water limitations, jurisdictional components, and monitoring. In addition, the Copermittees cooperate regionally to develop monitoring with the Southern California Stormwater Monitoring Coalition and to develop program effectiveness with the California Stormwater Quality Association. Regional programs could improve the Copermittees' compliance with other permit components such as development of the Hydromodification Management Plans and Retrofitting Existing Development with more consistent implementation and cost sharing. Re-issuing the NPDES Permit requirements within five years for three counties under three different permits requires the San Diego Water Board to expend significant time and resources for issuance of the permits through three separate public proceedings, thereby greatly reducing the time and resources available to oversee compliance. Multiple permits also create confusion for determining compliance among regulated entities, especially the land development community. The San Diego Water Board recognizes that issuing a single MS4 permit for all Phase I entities in the San Diego Region will provide consistent implementation, improve communication among agencies within watersheds crossing multiple jurisdictions, and minimize staff resources spent with each permit renewal. The San Diego Water Board plans to develop a single regional MS4 permit prior to the expiration of this Order that will transfer the Copermittees' enrollment to the regional permit upon expiration of this Order.

F. PUBLIC PROCESS

1. The San Diego Water Board has notified the Copermittees, all known interested parties, and the public of its intent to consider adoption of an Order prescribing waste discharge requirements that would serve to renew an NPDES permit for the existing MS4 discharges of pollutants in waters of the U.S.

2. The San Diego Water Board has held a public hearing on November 10, 2010 and heard and considered all comments pertaining to the terms and conditions of this Order.

IT IS HEREBY ORDERED that the Copermittees, in order to meet the provisions contained in Division 7 of the CWC and regulations adopted thereunder, and the provisions of the CWA and regulations adopted thereunder, must each comply with the following:

A. PROHIBITIONS AND RECEIVING WATER LIMITATIONS

1. Discharges into and from MS4s in a manner causing, or threatening to cause, a condition of pollution, contamination, or nuisance (as defined in CWC section 13050), in receiving waters of the state are prohibited.[3]

2. Storm water discharges from MS4s containing pollutants which have not been reduced to the MEP are prohibited.[3]

3. Discharges from MS4s that cause or contribute to the violation of water quality standards (designated beneficial uses, water quality objectives developed to protect beneficial uses, and the State policy with respect to maintaining high quality waters) are prohibited.

a. Each Copermittee must comply with section A.3 and section A.4 as it applies to Prohibition 5 in Attachment A of this Order through timely implementation of control measures and other actions to reduce pollutants in storm water discharges in accordance with this Order, including any modifications. If exceedance(s) of water quality standards persist notwithstanding implementation of this Order, the Copermittee must assure compliance with section A.3 and section A.4 as it applies to Prohibition 5 in Attachment A of this Order by complying with the following procedure:

(1) Upon a determination by either the Copermittee or the San Diego Water Board that storm water MS4 discharges are causing or contributing to an exceedance of an applicable water quality standard, the Copermittee must notify the San Diego Water Board within 30 days and thereafter submit a report to the San Diego Water Board that describes best management practices (BMPs) that are currently being implemented and additional BMPs that will be implemented to prevent or reduce any pollutants that are causing or contributing to the exceedance of water quality standards. The report may be incorporated in the Annual Report unless the San Diego Water Board[4] directs an earlier submittal. The report must include an implementation

[3] This prohibition does not apply to MS4 discharges which receive subsequent treatment to reduce pollutants in storm water discharges to the MEP prior to entering receiving waters (e.g., low flow diversions to the sanitary sewer). Runoff treatment and/or mitigation must occur prior to the discharge of runoff into receiving waters per finding E.7.

[4] The San Diego Water Board by prior resolution has delegated all matters that may legally be delegated to its Executive Officer to act on its behalf pursuant to CWC §13223. Therefore, the Executive Officer is authorized to act on the San Diego Water Board's behalf on any matter within this Order unless such delegation is unlawful under CWC §13223 or this Order explicitly states otherwise.

schedule. The San Diego Water Board may require modifications to the report

(2) Submit any modifications to the report required by the San Diego Water Board within 30 days of notification;

(3) Within 30 days following acceptance of the report described above by the San Diego Water Board, the Copermittee must revise its JRMP and monitoring program to incorporate the approved modified BMPs that have been and will be implemented, the implementation schedule, and any additional monitoring required; and

(4) Implement the revised JRMP and monitoring program in accordance with the approved schedule.

b. The Copermittee must repeat the procedure set forth above to comply with the receiving water limitations for continuing or recurring exceedances of the same water quality standard(s) following implementation of scheduled actions unless directed to do otherwise by the San Diego Water Board's Executive Officer.

c. Nothing in section A.3 prevents the San Diego Water Board from enforcing any provision of this Order while the Copermittee prepares and implements the above report.

4. In addition to the above prohibitions, discharges from MS4s are subject to all Basin Plan prohibitions cited in Attachment A to this Order.

B. NON-STORM WATER DISCHARGES

1. Each Copermittee must effectively prohibit all types of non-storm water discharges into its MS4 unless such discharges are either authorized by a separate NPDES permit; or not prohibited in accordance with sections B.2 and B.3 below.

2. The following categories of non-storm water discharges are not prohibited unless a Copermittee or the San Diego Water Board identifies the discharge category as a source of pollutants to waters of the U.S. Where the Copermittee(s) have identified a category as a source of pollutants, the category must be addressed as an illicit discharge and prohibited through ordinance, order or similar means. The San Diego Water Board may identify categories of discharge that either require prohibition, or other controls for non-anthropogenic sources. For a discharge category determined to be a source of pollutants, the Copermittee, under direction of the San Diego Water Board, must either prohibit the discharge category or develop and implement appropriate control measures for non-anthropogenic sources to prevent the discharge of pollutants to the MS4 and report to the San Diego Water Board pursuant to Section K.1 and K.3 of this Order. The discharge categories are:

a. Diverted stream flows;
b. Rising ground waters;
c. Uncontaminated ground water infiltration [as defined at 40 CFR 35.2005(20)] to MS4s;
d. Uncontaminated pumped ground water[5];
e. Foundation drains[5];
f. Springs;
g. Water from crawl space pumps[5];
h. Footing drains[5];
i. Air conditioning condensation;
j. Flows from riparian habitats and wetlands;
k. Water line flushing[6,7];
l. Discharges from potable water sources not subject to NPDES Permit No. CAG679001, other than water main breaks;
m. Individual residential car washing; and
n. Dechlorinated swimming pool discharges[8].

3. Emergency fire fighting flows (i.e., flows necessary for the protection of life or property) do not require BMPs and need not be prohibited.

a. As part of the JRMP, each Copermittee must develop and implement a program to address pollutants from non-emergency fire fighting flows (i.e., flows from controlled or practice blazes and maintenance activities) identified as significant sources of pollutants to waters of the U.S.

b. Building fire suppression system maintenance discharges (e.g. sprinkler line flushing) contain waste. Therefore, such discharges are to be prohibited by the Copermittees as illicit discharges through ordinance, order, or similar means.

4. Each Copermittee must examine all dry weather effluent analytical monitoring results collected in accordance with section F.4 of this Order and Receiving Waters and MS4 Discharge Monitoring and Reporting Program No. R9-2010-0016 to identify water quality problems which may be the result of any non-prohibited discharge category(ies) identified above in section B.2. Follow-up investigations must be conducted to identify and control, pursuant to section B.2, any non-prohibited discharge category(ies) listed above.

[5] Requires enrollment under Order R9-2008-002. Discharges into the MS4 require authorization from the owner and operator of the MS4 system.
[6] This exemption does not include fire suppression sprinkler system maintenance and testing discharges. Those discharges may be regulated under Section B.3.
[7] Requires enrollment under Order R9-2002-0020.
[8] Excluding saline swimming pool discharges.

C. NON-STORM WATER DRY WEATHER ACTION LEVELS

1. Each Copermittee, beginning no later than July 1, 2012, must implement the non-storm water dry weather action level (NAL) monitoring as described in Attachment E of this Order.

2. In response to an exceedance of an NAL, the Copermittee(s) having jurisdiction must investigate and seek to identify the source of the exceedance in a timely manner. However, if any Copermittee identifies a number of NAL exceedances that prevents it from adequately conducting source investigations at all sites in a timely manner, then that Copermittee may submit a prioritization plan and timeline that identifies the timeframe and planned actions to investigate and report its findings on all of the exceedances. Depending on the source of the pollutant exceedance, the Copermittee(s) having jurisdiction must take action as follows:

a. If the Copermittee identifies the source of the exceedance as natural (non-anthropogenically influenced) in origin and in conveyance into the MS4; then the Copermittee must report its findings and documentation of its source investigation to the San Diego Water Board in its Annual Report.

b. If the Copermittee identifies the source of the exceedance as an illicit discharge or connection, then the Copermittee must eliminate the discharge to its MS4 pursuant to Section F.4.f and report the findings, including any enforcement action(s) taken, and documentation of the source investigation to the San Diego Water Board in the Annual Report. If the Copermittee is unable to eliminate the source of discharge prior to the Annual Report submittal, then the Copermittee must submit, as part of its Annual Report, its plan and timeframe to eliminate the source of the exceedance. Those dischargers seeking to continue such a discharge must become subject to a separate NPDES permit prior to continuing any such discharge.

c. If the Copermittee identifies the source of the exceedance as an exempted category of non-storm water discharge, then the Copermittees must determine if this is an isolated circumstance or if the category of discharges must be addressed through the prevention or prohibition of that category of discharge as an illicit discharge. The Copermittee must submit its findings including a description of the steps taken to address the discharge and the category of discharge, to the San Diego Water Board for review in its Annual Report. Such description must include relevant updates to or new ordinances, orders, or other legal means of addressing the category of discharge, and the anticipated schedule for doing so. The Copermittees must also submit a summary of its findings with the Report of Waste Discharge.

d. If the Copermittee identifies the source of the exceedance as a non-storm water discharge in violation or potential violation of an existing separate NPDES permit

(e.g. the groundwater dewatering permit), then the Copermittee must report, within three business days, the findings to the San Diego Water Board including all pertinent information regarding the discharger and discharge characteristics.

e. If the Copermittee is unable to identify the source of the exceedance after taking and documenting reasonable steps to do so, then the Copermittee must perform additional focused sampling. If the results of the additional sampling indicate a recurring exceedance of NALs with an unidentified source, then the Copermittee must update its programs within a year to address the common contributing sources that may be causing such an exceedance. The Copermittee's annual report must include these updates to its programs including, where applicable, updates to their watershed workplans (Section G.2), retrofitting consideration (Section F.3.d) and program effectiveness work plans (Section J.4).

f. The Copermittees, or any interested party, may evaluate existing NALs and propose revised NALs for future Board consideration.

3. NALs can help provide an assessment of the effectiveness of the prohibition of non-storm water discharges and of the appropriateness of exempted non-storm water discharges. An exceedance of an NAL does not alone constitute a violation of the provisions of this Order. An exceedance of an NAL may indicate a lack of compliance with the requirement that Copermittees effectively prohibit all types of unauthorized non-storm water discharges into the MS4 or other prohibitions set forth in Sections A and B of this Order. Failure to timely implement required actions specified in this Order following an exceedance of an NAL constitutes a violation of this Order. Neither the absence of exceedances of NALs nor compliance with required actions following observed exceedances, excuses any non-compliance with the requirement to effectively prohibit all types of unauthorized non-storm water discharges into the MS4s or any non-compliance with the prohibitions in Sections A and B of this Order. During any annual reporting period in which one or more exceedances of NALs have been documented the Copermittee must report in response to Section C.2 above, a description of whether and how the observed exceedances did or did not result in a discharge from the MS4 that caused, or threatened to cause or contribute to a condition of pollution, contamination, or nuisance in the receiving waters.

4. Monitoring of effluent will occur at the end-of-pipe prior to discharge into the receiving waters, with a focus on Major Outfalls, as defined in 40 CFR 122.26(B 5-6) and Attachment E of this Order. The Copermittees must develop their monitoring plans to sample a representative percentage of major outfalls and identified stations within each hydrologic subarea. At a minimum, outfalls that exceed any NALs once during any year must be monitored in the subsequent year. Any station that does not exceed an NAL, or only has exceedances that are identified as natural in origin and conveyance into the MS4 pursuant to Section C.2.a, for 3 successive years may be replaced with a different station.

5. Each Copermittee must monitor for the non-storm water dry weather action levels, which are incorporated into this Order as follows:

Action levels for discharges to inland surface waters:

Table 3.a: General Constituents

Parameter	Units	AMAL	MDAL	Instantaneous Maximum	Basis
Fecal Coliform	MPN/ 100 ml	200[A] 400[B]	-		BPO
Enterococci	MPN/ 100 ml	33	-	61[C]	BPO
Turbidity	NTU	-	20		BPO
pH	Units	Within limit of 6.5 to 8.5 at all times			BPO
Dissolved Oxygen	mg/L	Not less than 5.0 in WARM waters and not less than 6.0 in COLD waters			BPO
Total Nitrogen	mg/L	-	1.0	See MDAL	BPO
Total Phosphorus	mg/L	-	0.1	See MDAL	BPO
Methylene Blue Active Substances	mg/L	-	0.5	See MDAL	BPO
Iron	mg/L	-	0.3	See MDAL	BPO
Manganese	mg/L	-	0.05	See MDAL	BPO

A – Based on a minimum of not less than five samples for any 30-day period
B – No more than 10 percent of total samples may exceed 400 per 100 ml during any 30 day period
C – This Value has been set to Basin Plan Criteria for Designated Beach Areas
BPO – Basin Plan Objective
MDAL – Maximum Daily Action Level
AMAL – Average Monthly Action Level

Table 3.b: Priority Pollutants

		Freshwater (CTR)	
Parameter	Units	MDAL	AMAL
Cadmium	ug/L	**	**
Copper	ug/L	*	*
Chromium III	ug/L	**	**
Chromium VI (hexavalent)	ug/L	16	8.1
Lead	ug/L	*	*
Nickel	ug/L	**	**
Silver	ug/L	*	*
Zinc	ug/L	*	*

CTR – California Toxic Rule
*- Action Levels developed on a case-by-case basis (see below)
**- Action Levels developed on a case-by-case basis (see below), but calculated criteria are not to exceed Maximum Contaminant Levels under the California Code of Regulations[9]

[9] California Code of Regulations, Title 22, Division 4, Chapter 15, Article 4, Section 64431.

The NALs for Cadmium, Copper, Chromium (III), Lead, Nickel, Silver and Zinc will be developed on a case-by-case basis because the freshwater criteria are based on site-specific water quality data (receiving water hardness). For these priority pollutants, the following equations (40 CFR 131.38.b.2) will be required:

Cadmium (Total Recoverable) = exp(0.7852[ln(hardness)] -2.715)
Chromium III (Total Recoverable) = exp(0.8190[ln(hardness)] + .6848)
Copper (Total Recoverable) = exp(0.8545[ln(hardness)] - 1.702)
Lead (Total Recoverable) = exp(1.273[ln(hardness)] - 4.705)
Nickel (Total Recoverable) = exp(.8460[ln(hardness)] + 0.0584)
Silver (Total Recoverable) = exp(1.72[ln(hardness)] - 6.52)
Zinc (Total Recoverable) = exp(0.8473[ln(hardness)] + 0.884)

D. STORM WATER ACTION LEVELS

1. The Copermittees must implement the Wet Weather MS4 Discharge Monitoring as described in Attachment E of this Order, and beginning three years after the Order adoption date, the Copermittees must annually evaluate their data compared to the Stormwater Action Levels (SALs). At each monitoring station, a running average of twenty percent or greater of exceedances of any discharge of storm water from the MS4 to waters of the U.S. that exceed the SALs for each of the pollutants listed in Table 4 (below) requires the Copermittee(s) having jurisdiction to affirmatively augment and implement all necessary storm water controls and measures to reduce the discharge of the associated class of pollutants(s) to the MEP. The Copermittees must utilize the exceedance information when adjusting and executing annual work plans, as required by this Order. Copermittees must take the magnitude, frequency, and number of constituents exceeding the SAL(s), in addition to receiving water quality data and other information, into consideration when prioritizing and reacting to SAL exceedances in an iterative manner. Failure to appropriately consider and react to SAL exceedances in an iterative manner creates a presumption that the Copermittee(s) have not reduced pollutants in storm water discharges to the MEP.

Table 4. Storm Water Action Levels

Pollutant	Action Level
Turbidity (NTU)	126
Nitrate & Nitrite total (mg/L)	2.6
P total (mg/L)	1.46
Cd total (µg/L)	3.0
Cu total (µg/L)	127
Pb total (µg/L)	250
Zn total (µg/L)	976

2. The end-of-pipe assessment points for the determination of SAL compliance are major outfalls, as defined in 40 CFR 122.26(b)(5) and (b)(6) and Attachment E of this Order. The Copermittees must develop their monitoring plans to sample a representative percentage of the major outfalls within each hydrologic subarea. At a minimum, outfalls that exceed SALs must be monitored in the subsequent year. Any station that does not exceed an SAL for 3 successive years may be replaced with a different station. SAL samples must be 24 hour time-weighted composites.

3. The absence of SAL exceedances does not relieve the Copermittees from implementing all other required elements of this Order.

4. This Order does not regulate natural sources and conveyances into the MS4 of constituents listed in Table 5. To be relieved of the requirements to take action as described in D.1 above, the Copermittee must demonstrate that the likely and expected cause of the SAL exceedance is not anthropogenic in nature. This demonstration does not need to be repeated for subsequent exceedances of the same SAL at the same monitoring station.

5. The SALs will be reviewed and updated at the end of every permit cycle. The data collected pursuant to D.2 above and Attachment E can be used to create SALs based upon local data. The purpose of establishing the SALs is that through the iterative and MEP process, outfall storm water discharges will meet all applicable water quality standards.

E. LEGAL AUTHORITY

1. Each Copermittee must establish, maintain, and enforce adequate legal authority within its jurisdiction to control pollutant discharges into and from its MS4 through ordinance, statute, permit, contract or similar means. Nothing herein shall authorize a Copermittee or other discharger regulated under the terms of this order to divert, store or otherwise impound water if such action is reasonably anticipated to harm downstream water rights holders in the exercise of their water rights. This legal authority must, at a minimum, authorize the Copermittee to:

a. Control the contribution of pollutants in discharges of runoff associated with industrial and construction activity to its MS4 and control the quality of runoff from industrial and construction sites. This requirement applies both to industrial and construction sites which have coverage under the statewide general industrial or construction storm water permits, as well as to those sites which do not. Grading ordinances must be updated and enforced as necessary to comply with this Order;
b. Prohibit all identified illicit discharges not otherwise allowed pursuant to section B.2;
c. Prohibit and eliminate illicit connections to the MS4;

d. Control the discharge of spills, dumping, or disposal of materials other than storm water to its MS4;
e. Require compliance with conditions in Copermittee ordinances, permits, contracts or orders (i.e., hold dischargers to its MS4 accountable for their contributions of pollutants and flows);
f. Utilize enforcement mechanisms to require compliance with Copermittee storm water ordinances, permits, contracts, or orders;
g. Control the contribution of pollutants from one portion of the shared MS4 to another portion of the MS4 through interagency agreements among Copermittees;
h. Control of the contribution of pollutants from one portion of the shared MS4 to another portion of the MS4 through interagency agreements with other owners of the MS4 such as the State of California Department of Transportation, the U.S. federal government, or sovereign Native American Tribes is encouraged;
i. Carry out all inspections, surveillance, and monitoring necessary to determine compliance and noncompliance with local ordinances and permits and with this Order, including the prohibition on illicit discharges to the MS4. This means the Copermittee must have authority to enter, monitor, inspect, take measurements, review and copy records, and require regular reports from industrial facilities discharging into its MS4, including construction sites;
j. Require the use of BMPs to prevent or reduce the discharge of pollutants into MS4s from storm water to the MEP; and
k. Require documentation on the effectiveness of BMPs implemented to reduce the discharge of storm water pollutants to the MS4 to the MEP.

2. Each Copermittee must submit on or before June 30, 2012, a statement certified by its chief legal counsel that the Copermittee has taken the necessary steps to obtain and maintain full legal authority within its jurisdiction to implement and enforce each of the requirements contained in 40 CFR 122.26(d)(2)(i)(A-F) and this Order. These statements must include:

a. Citation of runoff related ordinances and the reasons they are enforceable;
b. Identification of the local administrative and legal procedures available to mandate compliance with runoff related ordinances and therefore with the conditions of this Order, and a statement as to whether enforcement actions can be completed administratively or whether they must be commenced and completed in the judicial system; and
c. A brief description of how runoff related ordinances are adopted and the process by which they may be challenged.

F. JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM (JRMP)

Each Copermittee must implement all requirements of section F of this Order no later than July 1, 2012, unless otherwise specified. Upon adoption of this Order and until an updated JRMP is developed and implemented or July 1, 2012, whichever occurs first, each Copermittee must at a minimum implement its JRMP document, as the document was developed and amended to comply with the requirements of Order No. R9-2004-001.

Each Copermittee must develop and implement an updated JRMP for its jurisdiction no later than July 1, 2012. Each updated JRMP must meet the requirements of section F of this Order, reduce the discharge of storm water pollutants from the MS4 to the MEP, effectively prohibit non-storm water discharges, and prevent runoff discharges from the MS4 from causing or contributing to a violation of water quality standards. In addition, each Copermittee's JRMP must identify all departments and positions within its jurisdiction that conduct runoff related activities, and their roles and responsibilities under this Order. This identification must include an up to date organizational chart specifying these departments and key personnel.

1. DEVELOPMENT PLANNING COMPONENT

Each Copermittee must implement a program which meets the requirements of this section and (1) reduces Development Project discharges of storm water pollutants from the MS4 to the MEP; (2) prevents Development Project discharges from the MS4 from causing or contributing to a violation of water quality standards; (3) prevents illicit discharges into the MS4; and (4) manages increases in runoff discharge rates and durations from Development Projects that are likely to cause increased erosion of stream beds and banks, silt pollutant generation, or other impacts to beneficial uses and stream habitat due to increased erosive force.

a. GENERAL PLAN

Each Copermittee must revise as needed its General Plan or equivalent plan (e.g., Comprehensive, Master, or Community Plan) to include water quality and watershed protection principles and policies that direct land-use decisions and require implementation of consistent water quality protection measures for all development, redevelopment, and retrofit projects. Examples of water quality and watershed protection principles and policies to be considered include the following:

(1) Minimize the amount of impervious surfaces and directly connected impervious surfaces in areas of new development and redevelopment and where feasible slow runoff and maximize on-site infiltration of runoff.

(2) Implement pollution prevention methods supplemented by pollutant source controls and treatment BMPs. Use small collection strategies located at, or as close as possible to, the source (i.e., the point where water initially meets the ground) to minimize the transport of urban runoff and pollutants offsite and into an MS4.

(3) Preserve, and where possible, create, or restore areas that provide important water quality benefits, such as riparian corridors, wetlands, and buffer zones. Encourage land acquisition of such areas.

(4) Limit disturbances of natural water bodies and natural drainage systems caused by development including roads, highways, and bridges.

(5) Prior to making land use decisions, utilize methods available to estimate increases in pollutant loads and flows resulting from projected future development. Require incorporation of BMPs to mitigate the projected increases in pollutant loads and flows.

(6) Avoid development of areas that are particularly susceptible to erosion and sediment loss; or establish development guidance that identifies these areas and protects them from erosion and sediment loss.

(7) Reduce pollutants associated with vehicles and increasing traffic resulting from development.

(8) Post-development runoff from a site must not contain pollutant loads that cause or contribute to an exceedance of receiving water quality objectives and which have not been reduced to the MEP.

b. **ENVIRONMENTAL REVIEW PROCESS**

Each Copermittee must revise as needed its current environmental review processes to accurately evaluate water quality impacts and cumulative impacts and identify appropriate measures to avoid, minimize, and mitigate those impacts for all Development Projects.

c. **APPROVAL PROCESS CRITERIA AND REQUIREMENTS FOR ALL DEVELOPMENT PROJECTS**

For all proposed Development Projects, each Copermittee, during the planning process, and prior to project approval and issuance of local permits, must prescribe the necessary requirements so that Development Project discharges of storm water pollutants from the MS4 will be reduced to the MEP, will not cause or

contribute to a violation of water quality standards, and will comply with the Copermittee's ordinances, permits, plans, and requirements, and with this Order.

Performance Criteria: Discharges from each approved development project must be subject to the following management measures:

(1) Source control BMPs that reduce storm water pollutants of concern in runoff; prevent illicit discharges into the MS4; prevent irrigation runoff; storm drain system stenciling or signage; properly design outdoor material storage areas; properly design outdoor work areas; and properly design trash storage areas.

(2) The following LID BMPs listed below must be implemented at all Development Projects where applicable and feasible.

(a) Conserve natural areas, including existing trees, other vegetation, and soils;
(b) Construct streets, sidewalks, or parking lot aisles to the minimum widths necessary, provided that public safety is not compromised;
(c) Minimize the impervious footprint of the project;
(d) Minimize soil compaction to landscaped areas;
(e) Minimize disturbances to natural drainages (e.g., natural swales, topographic depressions, etc.); and
(f) Disconnect impervious surfaces through distributed pervious areas.

(3) Buffer zones for natural water bodies, where technically feasible. Where buffer zones are technically infeasible, require project proponent to implement other buffers such as trees, access restrictions, etc.

(4) Other measures necessary so that grading or other construction activities meet the provisions specified in section F.2 of this Order.

(5) Submittal of documentation of a mechanism under which ongoing long-term maintenance of all structural post-construction BMPs will be conducted.

(6) Infiltration and Groundwater Protection

To protect groundwater quality, each Copermittee must apply restrictions to the use of treatment control BMPs that are designed to primarily function as large, centralized infiltration devices (such as large infiltration trenches and infiltration basins). Such restrictions must be designed so that the use of such infiltration treatment control BMPs does not cause or contribute to an exceedance of groundwater quality objectives. At a minimum, each treatment control BMP designed to primarily function as a centralized infiltration device must meet the restrictions below, unless the Development Project demonstrates to the Copermittee that a restriction is not necessary to protect groundwater quality. The Copermittees may collectively or individually

develop alternative restrictions on the use of treatment control BMPs which are designed to primarily function as centralized infiltration devices. Alternative restrictions developed by the Copermittees can partially or wholly replace the restrictions listed below. The restrictions do not apply to small infiltration systems dispersed throughout a development project.

(a) Runoff must undergo pretreatment such as sedimentation or filtration prior to infiltration;

(b) All dry weather flows containing significant pollutant loads must be diverted from infiltration devices and treated through other BMPs;

(c) Pollution prevention and source control BMPs must be implemented at a level appropriate to protect groundwater quality at sites where infiltration treatment control BMPs are to be used;

(d) Infiltration treatment control BMPs must be adequately maintained so that they remove storm water pollutants to the MEP;

(e) The vertical distance from the base of any infiltration treatment control BMP to the seasonal high groundwater mark must be at least 10 feet. Where groundwater basins do not support beneficial uses, this vertical distance criteria may be reduced, provided groundwater quality is maintained;

(f) The soil through which infiltration is to occur must have physical and chemical characteristics (such as appropriate cation exchange capacity, organic content, clay content, and infiltration rate) which are adequate for proper infiltration durations and treatment of runoff for the protection of groundwater beneficial uses;

(g) Infiltration treatment control BMPs must not be used for areas of industrial or light industrial activity; and other high threat to water quality land uses and activities as designated by each Copermittee unless first treated or filtered to remove pollutants prior to infiltration; and

(h) Infiltration treatment control BMPs must be located a minimum of 100 feet horizontally from any water supply wells.

(7) Where feasible, landscaping with native or low water species shall be preferred in areas that drain to the MS4 or to waters of the U.S.

(8) Rain water harvesting and water reuse, where feasible, must be encouraged as part of the site design and construction to reduce pollutants in storm water discharges to the MEP.

d. **STANDARD STORM WATER MITIGATION PLANS (SSMPS) – APPROVAL PROCESS CRITERIA AND REQUIREMENTS FOR PRIORITY DEVELOPMENT PROJECTS**

On or before June 30, 2012, the Copermittees must submit an updated SSMP, to the San Diego Water Board's Executive Officer for a 30 day public review and comment period. The San Diego Water Board's Executive Officer has the discretion to determine whether to hold a public hearing or to limit public input to written comments. Within 180 days of determination that the SSMP is in compliance with this Order's provisions, each Copermittee must amend its local ordinances consistent with the updated SSMP, and begin implementing the updated SSMP. Any updated local ordinances must be submitted to the San Diego Water Board with the Annual Report. The SSMP must meet the requirements of section F.1.d of this Order to (1) reduce Priority Development Project discharges of storm water pollutants from the MS4 to the MEP, and (2) prevent Priority Development Project runoff discharges from the MS4 from causing or contributing to a violation of water quality standards.[10]

(1) Definition of Priority Development Project:

Priority Development Projects are:

(a) All new Development Projects that fall under the project categories or locations listed in section F.1.d.(2), and

(b) Those redevelopment projects that create, add, or replace at least 5,000 square feet of impervious surfaces on an already developed site and the existing development and/or the redevelopment project falls under the project categories or locations listed in section F.1.d.(2). Where redevelopment results in an increase of less than fifty percent of the impervious surfaces of a previously existing development, and the existing development was not subject to SSMP requirements, the numeric sizing criteria discussed in section F.1.d.(6) applies only to the addition or replacement, and not to the entire development. Where redevelopment

[10] Updated SSMP and hydromodification requirements must apply to all priority projects or phases of priority projects which have not yet begun grading or construction activities at the time any updated SSMP or hydromodification requirement commences. If lawful prior approval of a project exists, whereby application of an updated SSMP or hydromodification requirement to the project is illegal, the updated SSMP or hydromodification requirement need not apply to the project. Updated Development Planning requirements set forth in Sections F.1. (a) through (h) of this Order must apply to all projects or phases of projects, unless, at the time any updated Development Planning requirement commences, the projects or project phases meet any one of the following conditions: (i) the project or phase has begun grading or construction activities; or (ii) a Copermittee determines that lawful prior approval rights for a project or project phase exist, whereby application of the Updated Development Planning requirement to the project is legally infeasible. Where feasible, the Permittees must utilize the SSMP and hydromodification update periods to ensure that projects undergoing approval processes include application of the updated SSMP and hydromodification requirements in its plans.

results in an increase of more than fifty percent of the impervious surfaces of a previously existing development, the numeric sizing criteria applies to the entire development.

(c) One acre threshold: In addition to the Priority Development Project Categories identified in section F.1.d.(2), Priority Development Projects must also include all other post-construction pollutant-generating new Development Projects that result in the disturbance of one acre or more of land by July 1, 2012.[11]

(2) Priority Development Project Categories

Where a new Development Project feature, such as a parking lot, falls into a Priority Development Project Category, the entire project footprint is subject to SSMP requirements.

(a) New development projects that create 10,000 square feet or more of impervious surfaces (collectively over the entire project site) including commercial, industrial, residential, mixed-use, and public projects. This category includes development projects on public or private land which fall under the planning and building authority of the Copermittees.

(b) Automotive repair shops. This category is defined as a facility that is categorized in any one of the following Standard Industrial Classification (SIC) codes: 5013, 5014, 5541, 7532-7534, or 7536-7539.

(c) Restaurants. This category is defined as a facility that sells prepared foods and drinks for consumption, including stationary lunch counters and refreshment stands selling prepared foods and drinks for immediate consumption (SIC code 5812), where the land area for development is greater than 5,000 square feet. Restaurants where land development is less than 5,000 square feet must meet all SSMP requirements except for structural treatment BMP and numeric sizing criteria requirement F.1.d.(6) and hydromodification requirement F.1.h.

(d) All hillside development greater than 5,000 square feet. This category is defined as any development which creates 5,000 square feet of impervious surface which is located in an area with known erosive soil conditions, where the development will grade on any natural slope that is twenty-five percent or greater.

(e) Environmentally Sensitive Areas (ESAs). All development located within, or directly adjacent to, or discharging directly to an ESA (where

[11] Pollutant generating Development Projects are those projects that generate pollutants at levels greater than natural background levels.

discharges from the development or redevelopment will enter receiving waters within the ESA), which either creates 2,500 square feet of impervious surface on a proposed project site or increases the area of imperviousness of a proposed project site to 10 percent or more of its naturally occurring condition. "Directly adjacent" means situated within 200 feet of the ESA. "Discharging directly to" means outflow from a drainage conveyance system that is composed entirely of flows from the subject development or redevelopment site, and not commingled with flows from adjacent lands.

(f) Impervious parking lots 5,000 square feet or more and potentially exposed to runoff. Parking lot is defined as a land area or facility for the temporary parking or storage of motor vehicles used personally, for business, or for commerce.

(g) Street, roads, highways, and freeways. This category includes any paved impervious surface that is 5,000 square feet or greater used for the transportation of automobiles, trucks, motorcycles, and other vehicles. To the extent that the Copermittees develop revised standard roadway design and post-construction BMP guidance that comply with the provisions of Section F.1 of the Order, then public works projects that implement the revised standard roadway sections do not have to develop a project specific SSMP. The standard roadway design and post-construction BMP guidance must be submitted with the Copermittee's updated SSMP.

(h) Retail Gasoline Outlets (RGOs). This category includes RGOs that meet the following criteria: (a) 5,000 square feet or more or (b) a projected Average Daily Traffic (ADT) of 100 or more vehicles per day.

(3) Pollutants of Concern

As part of its local SSMP, each Copermittee must implement an updated procedure for identifying pollutants of concern for each Priority Development Project. The procedure must address, at a minimum: (1) Receiving water quality (including pollutants for which receiving waters are listed as impaired under CWA section 303(d)); (2) Land-use type of the Development Project and pollutants associated with that land use type; and (3) Pollutants expected to be present on site.

(4) Low Impact Development BMP Requirements

Each Copermittee must require each Priority Development Project to implement LID BMPs which will collectively minimize directly connected impervious areas, limit loss of existing infiltration capacity, and protect areas that provide important water quality benefits necessary to maintain riparian and aquatic biota, and/or are particularly susceptible to erosion and sediment loss.

(a) The Copermittees must take the following measures to ensure that LID BMPs are implemented at Priority Development Projects:

(i) Each Copermittee must require LID BMPs or make a finding of technical infeasibility for each Priority Development Project in accordance with the LID waiver program in Section F.1.d.(7);

(ii) Each Copermittee must incorporate formalized consideration, such as thorough checklists, ordinances, and/or other means, of LID BMPs into the plan review process for Priority Development Projects; and

(iii) On or before July 1, 2012, each Copermittee must review its local codes, policies, and ordinances and identify barriers therein to implementation of LID BMPs. Following the identification of these barriers to LID implementation, where feasible, the Copermittee must take, by the end of the permit cycle, appropriate actions to remove such barriers. The Copermittees must include this review with the updated JRMP.

(b) The following LID BMPs must be implemented at each Priority Development Project:

(i) Maintain or restore natural storage reservoirs and drainage corridors (including depressions, areas of permeable soils, swales, and ephemeral and intermittent streams) to the extent feasible[12].

(ii) Projects with landscaped or other pervious areas must, where feasible, properly design and construct the pervious areas to effectively receive and infiltrate, retain and/or treat runoff from impervious areas, prior to discharge to the MS4. Soil compaction for these areas must be minimized. The amount of the impervious areas that are to drain to pervious areas must be based upon the total size, soil conditions, slope, and other pertinent factors.

(iii) Projects with low traffic areas and appropriate soil conditions must be constructed with permeable surfaces.

[12] Priority Development Projects proposing to dredge or fill materials in waters of the U.S. must obtain a CWA Section 401 Water Quality Certification. Priority Development Projects proposing to dredge or fill waters of the State must obtain Waste Discharge Requirements.

(c) LID BMPs sizing criteria:

(i) LID BMPs must be sized and designed to ensure onsite retention without runoff, of the volume of runoff produced from a 24-hour 85th percentile storm event[13] ("design capture volume");

(ii) If onsite retention[14] LID BMPs are technically infeasible per section F.1.d.(7)(b), other LID BMPs may treat any volume that is not retained onsite provided that the total volume of the other LID BMPs, including pore spaces and pre-filter detention volume, are sized to hold at least 0.75 times the portion of the design capture volume that is not retained onsite. The LID BMPs must be designed for an appropriate surface loading rate to prevent erosion, scour and channeling within the BMP.

(d) If it is shown to be technically infeasible per Section F.1.d.(7)(b) to retain and/or treat the remaining volume up to and including the design capture volume using LID BMPs, then the project must implement conventional treatment control BMPs in accordance with Section F.1.d.(6) below and must participate in the LID waiver program in Section F.1.d.(7).

(e) All LID BMPs must be designed and implemented with measures to avoid the creation of nuisance or pollution associated with vectors, such as mosquitoes, rodents, and flies.

(5) Source Control BMP Requirements

Each Copermittee must require each Priority Development Project to implement applicable source control BMPs. The source control BMPs to be required must:

(a) Prevent illicit discharges into the MS4;
(b) Minimize storm water pollutants of concern in runoff;
(c) Eliminate irrigation runoff;

[13] This volume is not a single volume to be applied to all of Riverside County. The size of the 85th percentile storm event is different for various parts of the County. The Copermittees are encouraged to calculate the 85th percentile storm event for each of its jurisdictions using local rain data pertinent to its particular jurisdiction (0.6 inch standard is a rough average for the County and should only be used where appropriate rain data is not available). In addition, isopluvial maps may be used to extrapolate rainfall data to areas where insufficient data exists in order to determine the volume of the local 85th percentile storm event in such areas. Where the Copermittees will use isopluvial maps to determine the 85th percentile storm event in areas lacking rain data, the Copermittees must describe their method for using isopluvial maps in its SSMPs.

[14] Infiltration LID BMPs are the preferred method for onsite retention, but does not preclude the use and implementation of all other retention LID BMPs (e.g. evapotranspiration, evaporation, and/or harvest), where technically feasible, prior to considering biofiltration LID BMPs for treatment of the design capture volume that is not otherwise retained onsite.

(d) Include storm drain system stenciling or signage;
(e) Include properly designed outdoor material storage areas;
(f) Include properly designed outdoor work areas;
(g) Include properly designed trash storage areas; and
(h) Include water quality protection requirements applicable to individual priority project categories.

(6) Treatment Control BMP Requirements

Each Copermittee must require each Priority Development Project that meets the Copermittee's technical infeasibility criteria in Section F.1.d(7) below, to implement conventional treatment control BMPs to treat the portion of the "design capture volume" that was not treated by LID BMPs per Section F.1.d(4) above. Conventional treatment control BMPs must meet the following requirements:

(a) All treatment control BMPs for a single Priority Development Project must collectively be sized to comply with the following numeric sizing criteria:

(i) Volume-based treatment control BMPs must be designed to mitigate (infiltrate, filter, or treat) the remaining portion of the design capture volume that was not retained and/or treated with LID BMPs; or

(ii) Flow-based treatment control BMPs must be designed to mitigate (filter, or treat) either: a) the maximum flow rate of runoff produced from a rainfall intensity of 0.2 inch of rainfall per hour, for each hour of a storm event; or b) the maximum flow rate of runoff produced by the 85th percentile hourly rainfall intensity (for each hour of a storm event), as determined from the local historical rainfall record, multiplied by a factor of two.

(b) All treatment control BMPs for Priority Development Projects must, at a minimum:

(i) Be ranked with high or medium pollutant removal efficiency for the project's most significant pollutants of concern, as the pollutant removal efficiencies are identified in the Copermittees' SSMP. Treatment control BMPs with a low removal efficiency ranking must only be approved by a Copermittee when a feasibility analysis has been conducted which exhibits that implementation of treatment control BMPs with high or medium removal efficiency rankings are infeasible for a Priority Development Project or portion of a Priority Development Project.
(ii) Be correctly sized and designed so as to remove storm water pollutants to the MEP.

(c) Target removal of pollutants of concern from runoff.

(d) Be implemented close to pollutant sources, and prior to discharging into waters of the U.S.

(e) Include proof of a mechanism under which ongoing long-term maintenance will be conducted to ensure proper maintenance for the life of the project. The mechanisms may be provided by the project proponent or Copermittee.

(f) Be designed and implemented with measures to avoid the creation of nuisance or pollution associated with vectors, such as mosquitoes, rodents, and flies.

(7) Low Impact Development (LID) BMP Waiver Program

The Copermittees must develop, collectively or individually, a LID waiver program for incorporation into the SSMP, which would allow a Priority Development Project to substitute implementation of all or a portion of required LID BMPs in Section F.1.d(4) with implementation of treatment control BMPs and either 1) on-site mitigation, 2) an off-site mitigation project, and/or 3) other mitigation developed by the Copermittees. The Copermittees must submit the LID waiver program as part of their updated SSMP. At a minimum, the program must meet the requirements below:

(a) Prior to implementation, the LID waiver program must clearly exhibit that it will not allow Priority Development Projects to result in a net impact (after consideration of any mitigation) from pollutant loadings over and above the impact caused by projects meeting the onsite LID retention requirements;

(b) For each Priority Development Project participating, the Copermittee must find that it is technically infeasible to implement LID BMPs that comply with the requirements of Section F.1.(d)(4). The Copermittee(s) must develop criteria to determine the technical feasibility of implementing LID BMPs . Each Priority Development Project participating must demonstrate that LID BMPs were implemented as much as feasible given the site's unique conditions. Technical infeasibility may result from conditions including, but not limited to:

(i) Locations that cannot meet the infiltration and groundwater protection requirements in section F.1.c.(6) for large, centralized infiltration BMPs. Where infiltration is technically infeasible, the project must still examine the feasibility of other onsite LID BMPs;
(ii) Insufficient demand for storm water reuse;

(iii) Smart growth and infill or redevelopment locations where the density and/or nature of the project would create significant difficulty for compliance with the LID BMP requirements; and

(iv) Other site, geologic, soil, or implementation constraints identified in the Copermittees updated SSMP document.

(c) Each Priority Development Project that participates in the LID waiver program must mitigate for the pollutant loads expected to be discharged due to not implementing the LID retention BMPs in section F.1.d.(4). The pollutant loading must be estimated for each project participating in the LID waiver program. The estimated impacts from not implementing the required LID retention BMPs in section F.1.d.(4) must be fully mitigated. Mitigation projects must be implemented within the same hydrologic unit as the Priority Development Project. Mitigation projects outside of the hydrologic subarea but within the same hydrologic unit may be approved provided that the project proponent demonstrates that mitigation projects within the same hydrologic subarea are infeasible and that the mitigation project will address similar beneficial use impacts as expected from the Priority Development Projects pollutant load. Onsite mitigation may include increasing the conventional treatment sizing factors to achieve pollutant load removal equal to or greater than the pollutant load removal expected from implementing onsite retention of the design capture volume. Offsite mitigation projects may include green streets projects, existing development retrofit projects, retrofit incentive programs, regional BMPs and/or riparian restoration projects. Project applicants seeking to utilize these alternative compliance provisions may propose other offsite mitigation projects, which the Copermittees may approve if they meet the requirements of this subpart.

(d) A Copermittee may choose to implement additional mitigation programs (e.g., pollutant credit system, mitigation fund) as part of the LID waiver program provided that the mitigation program clearly exhibits that it will not allow Priority Development Projects to result in a net impact from pollutant loadings over and above the impact caused by projects meeting LID requirements. Any additional mitigation programs that a Copermittee chooses to implement must be submitted to the San Diego Water Board Executive Officer for review and acceptance prior to implementation.

(8) <u>LID and Treatment Control BMP Standards</u>

(a) As part of the SSMP, each Copermittee must develop and require Priority Development Projects to implement siting, design, and maintenance criteria for each LID and treatment control BMP listed in the SSMP to determine feasibility and applicability and so that implemented LID and treatment control BMPs are constructed correctly and are effective at pollutant removal, runoff control, and vector minimization. Development of

BMP design worksheets which can be used by project proponents is encouraged.

(b) LID and treatment control BMPs implemented at any Priority Development Projects must mitigate (treat through infiltration, settling, filtration or other unit processes) the required volume or flow of runoff from all developed portions of the project, including landscaped areas.

(c) All LID and treatment control BMPs must be located so as to remove pollutants from runoff prior to its discharge to any receiving waters. Multiple Priority Development Projects may use shared post-construction BMPs as long as construction of any shared BMP is completed prior to the use or occupation of any Priority Development Project from which the BMP will receive runoff. Post construction BMPs must not be constructed within a waters of the U.S. or waters of the State.

(9) Implementation Process

(a) As part of its local SSMP, each Copermittee must implement a process to verify compliance with SSMP requirements. The process must identify at what point in the planning process Priority Development Projects will be required to meet SSMP requirements and at a minimum, the Priority Development Project must implement the required post-construction BMPs prior to occupancy and/or the intended use of any portion of that project. The process must also include identification of the roles and responsibilities of various municipal departments in implementing the SSMP requirements, as well as any other measures necessary for the implementation of SSMP requirements.

(b) Each Copermittee must establish a mechanism not only to track post-construction BMPs, but also to ensure that appropriate easements and ownerships are properly recorded in public records and the information is conveyed to all appropriate parties when there is a change in project or site ownership.

(10) Post-construction BMP Review

(a) The Copermittees must review and update the BMPs that are listed in their SSMP as options for treatment control. At a minimum, the update must include removal of obsolete or ineffective BMPs and addition of LID BMPs that can be used for treatment, such as bioretention cells, bioretention swales, etc. The update must also add appropriate LID BMPs to any tables or discussions in the local SSMPs addressing pollutant removal efficiencies of treatment control BMPs. In addition, the update must include review and revision where necessary of treatment control BMP pollutant removal efficiencies.

(b) The update must incorporate findings from BMP effectiveness studies conducted by the Copermittees for projects funded wholly or in part by the State Water Board or Regional Water Boards.

(c) Each Copermittee must implement a mechanism for annually incorporating findings from local treatment BMP effectiveness studies (e.g., ones conducted by, or on-behalf of, public agencies in Riverside County) into SSMP project reviews and permitting.

e. **BMP CONSTRUCTION VERIFICATION**

Prior to occupancy and/or intended use of any portion of the Priority Development Project subject to SSMP requirements, each Copermittee must inspect the constructed site design, source control, and treatment control BMPs applicable to the constructed portion of the project to verify that they have been constructed and are operating in compliance with all specifications, plans, permits, ordinances, and this Order.

f. **BMP MAINTENANCE TRACKING**

(1) Inventory of SSMP projects: Each Copermittee must develop and maintain a watershed-based database to track and inventory all projects constructed within their jurisdiction, that have a final approved SSMP (SSMP projects), and its structural post-construction BMPs implemented therein since July, 2005. LID BMPs implemented on a lot by lot basis at single family residential houses, such as rain barrels, are not required to be tracked or inventoried. At a minimum, the database must include information on BMP type(s), location, watershed, date of construction, party responsible for maintenance, dates and findings of maintenance verifications, and corrective actions, including whether the site was referred to the local vector control agency or department.

(2) Each Copermittee must verify that approved post-construction BMPs are operating effectively and have been adequately maintained by implementing the following measures:

(a) The designation of high priority SSMP Projects must consider the following:

(i) BMP size,
(ii) Recommended maintenance frequency,
(iii) Likelihood of operational and maintenance issues,
(iv) Location,

(v) Receiving water quality,
(vi) Compliance record,
(vii) Land use, and
(viii) Other pertinent factors;

At a minimum, high priority projects include those projects that generate pollutants (prior to treatment) within the tributary area of and within the same hydrologic subarea as a 303(d) listed waterbody impaired for that pollutant; or those projects generating pollutants within the tributary area for and within the same hydrologic subarea as an observed action level exceedance of that pollutant.

(b) Beginning on July 1, 2012, each Copermittee must verify that the required structural post-construction BMPs on the inventoried SSMP projects have been implemented, are maintained, and are operating effectively through inspections, self-certifications, surveys, or other equally effective approaches with the following conditions:

(i) The implementation, operation, and maintenance of all (100 percent) approved and inventoried final project public and private SSMPs (a.k.a. WQMPs) must be verified every five years;
(ii) All (100 percent) projects with BMPs that are high priority must be inspected by the Copermittee annually prior to each rainy season;
(iii) All (100 percent) Copermittee projects with BMPs must be inspected by the Copermittee annually;
(iv) At the discretion of the Copermittee, its inspections may be coordinated with the facility inspections implemented pursuant to section F.3. of this Order;
(v) For verifications performed through a means other than direct Copermittee inspection, adequate documentation must be submitted to the Copermittee to provide assurance that the required maintenance has been completed;
(vi) Appropriate follow-up measures (including re-inspections, enforcement, maintenance, etc.) must be conducted to ensure the treatment BMPs continue to reduce storm water pollutants as originally designed; and
(vii) Inspections must note observations of vector conditions, such as mosquitoes. Where conditions are identified as contributing to mosquito production, the Copermittee must notify its local vector control agency.

g. **ENFORCEMENT OF DEVELOPMENT SITES**

Each Copermittee must enforce its storm water ordinance for all development projects as necessary to maintain compliance with this Order. Copermittee ordinances or other regulatory mechanisms must include appropriate sanctions to achieve compliance. Sanctions must include the following tools or their equivalent: Non-monetary penalties, fines, bonding requirements, liens, and/or permit or occupancy denials for non-compliance.

h. **HYDROMODIFICATION – LIMITATIONS ON INCREASES OF RUNOFF DISCHARGE RATES AND DURATIONS**[15]

Each Copermittee shall collaborate with the other Copermittees to develop and implement a Hydromodification Management Plan (HMP) to manage increases in runoff discharge rates and durations from all Priority Development Projects. The HMP must be incorporated into the SSMP and implemented by each Copermittee so that estimated post-project runoff discharge rates and durations must not exceed pre-development discharge rates and durations. Where the proposed project is located on an already developed site, the pre-project discharge rate and duration must be that of the pre-developed, naturally occurring condition. The draft HMP must be submitted to the San Diego Water Board on or before June 30, 2013. The HMP will be made available for public review and comment and the San Diego Water Board Executive Officer will determine whether to hold a public hearing before the full San Diego Water Board or whether public input will be through written comments to the Executive Officer only.

(1) The HMP must:

(a) Identify a method for assessing susceptibility and geomorphic stability of channel segments which receive runoff discharges from Priority Development Projects. A performance standard must be established that ensures that the geomorphic stability within the channel will not be compromised as a result of receiving runoff discharges from Priority Development Projects.

[15] Updated SSMP and hydromodification requirements must apply to all Priority Development Projects or phases of Priority Development Projects which have not yet begun grading or construction activities at the time any updated SSMP or hydromodification requirement commences. If a Copermittee determines that lawful prior approval of a project exists, whereby application of an updated SSMP or hydromodification requirement to the project is legally infeasible, the updated SSMP or hydromodification requirement need not apply to the project. The Copermittees must utilize the SSMP and hydromodification update periods to ensure that projects undergoing approval processes include application of the updated SSMP and hydromodification requirements in its plans.

(b) Identify a range of runoff flows[16] based on continuous simulation of the entire rainfall record (or other analytical method proposed by the Copermittees and deemed acceptable by the San Diego Water Board) for which Priority Development Project post-project runoff flow rates and durations must not exceed pre-development (naturally occurring) runoff flow rates and durations by more than 10 percent, where the increased flow rates and durations will result in increased potential for erosion or other significant adverse impacts to beneficial uses. The lower boundary of the range of runoff flows identified must correspond with the critical channel flow that produces the critical shear stress that initiates channel bed movement or that erodes the toe of channel banks. The identified range of runoff flows may be different for specific watersheds, channels, or channel reaches. In the case of an artificially hardened (concrete lined, rip rap, etc.) channel, the lower boundary of the range of runoff flows identified must correspond with the critical channel flow that produces the critical shear stress that initiates channel bed movement or that erodes the toe of channel banks of a comparable natural channel (i.e. non-hardened, pre-development).

(c) Identify a method to assess and compensate for the loss of sediment supply to streams due to development. A performance and/or design standard must be created and required to be met by Priority Development Projects to ensure that the loss of sediment supply due to development does not cause or contribute to increased erosion within channel segments downstream of Priority Development Project discharge points.

(d) Designate and require Priority Development Projects to implement control measures so that (1) post-project runoff flow rates and durations do not exceed pre-development (naturally occurring) runoff flow rates and durations by more than 10 percent for the range of runoff flows identified under section F.1.h.(1)(b), where the increased flow rates and durations will result in increased potential for erosion or other significant adverse impacts to beneficial uses; (2) post-project runoff flow rates and durations do not result in channel conditions which do not meet the channel standard developed under section F.1.h.(1)(a) for channel segments downstream of Priority Development Project discharge points; and (3) the design of the project and/or control measures compensate for the loss of sediment supply due to development.

[16] The identified range of run off flows to be controlled should be expressed in terms of peak flow rates of rainfall events, such as “10% of the pre-development 2-year runoff event up to the pre-development 10-year runoff event.”

(e) Include a protocol to evaluate potential hydrograph change impacts to downstream watercourses from Priority Development Projects to meet the range of runoff flows identified under Section F.1.h.(1)(b).

(f) Include other performance criteria (numeric or otherwise) for Priority Development Projects as necessary to prevent runoff from the projects from increasing and/or continuing unnatural rates of erosion of channel beds and banks, silt pollutants generation, or other impacts to beneficial uses and stream habitat due to increased erosive force.

(g) Include a review of pertinent literature.

(h) Identify areas within the Santa Margarita Hydrologic Unit for potential opportunities to restore or rehabilitate stream channels with historic hydromodification of receiving waters that are tributary to documented low or very low Index of Biotic Integrity (IBI) scores.

(i) Include a description of how the Copermittees will incorporate the HMP requirements into their local approval processes.

(j) Include criteria on selection and design of management practices and measures (such as detention, retention, and infiltration) to control flow rates and durations and address potential hydromodification impacts.

(k) Include technical information, including references, supporting any standards and criteria proposed.

(l) Include a description of inspections and maintenance to be conducted for management practices and measures to control flow rates and durations and address potential hydromodification impacts.

(m) Include a description of monitoring and other program evaluations to be conducted to assess the effectiveness of implementation of the HMP. Monitoring and other program evaluations must include an evaluation of changes to physical (e.g., cross-section, slope, discharge rate, vegetation, pervious/impervious area) and biological (e.g., habitat quality, benthic flora and fauna, IBI scores) conditions of receiving water channels as areas with Priority Development Projects are constructed (i.e. pre- and post-project), as appropriate.

(n) Include mechanisms for assessing and addressing cumulative impacts of Priority Development Projects within a watershed on channel morphology.

(2) In addition to the control measures that must be implemented by Priority Development Projects per section F.1.h.(1)(d), the HMP must include a suite of management measures that can be used on Priority Development Projects to mitigate hydromodification impacts, protect and restore downstream beneficial uses and prevent or further prevent adverse physical changes to downstream channels. The measures must be based on a prioritized consideration of the following elements in this order:

(a) Site design control measures;
(b) On-site management measures;
(c) Regional control measures located upstream of receiving waters; and
(d) In-stream management and control measures.

Where stream channels are adjacent to, or are to be modified as part of a Priority Development Project, management measures must include buffer zones and setbacks. The suite of management measures must also include stream restoration as a viable option to achieve the channel standard in section F.1.h.(1)(a). In-stream controls used as management measures to protect and restore downstream beneficial uses and for preventing or minimizing further adverse physical changes must not include the use of non-naturally occurring hardscape materials such as concrete, riprap, gabions, etc. to reinforce stream channels.

(3) As part of the HMP, the Copermittees may develop a waiver program that allows a redevelopment Priority Development Project, as defined in Section F.1.d.(1)(b), to implement offsite mitigation measures. A waiver may be granted if onsite management and control measures are technically infeasible to fully achieve post-project runoff flow rates and durations that do not exceed the pre-development (naturally occurring) runoff flow rates and durations. Redevelopment projects that are granted a waiver under the program must not have post-project runoff flow rates and durations that exceed the pre-project runoff flow rates and durations. The estimated incremental hydromodification impacts from not achieving the pre-development (naturally occurring) runoff flow rates and durations for the project site must be fully mitigated. The offsite mitigation must be within the same stream channel system to which the project discharges. Mitigation projects not within the same stream channel system but within the same hydrologic unit may be approved provided that the project proponent demonstrates that mitigation within the same stream channel is infeasible and that the mitigation project will address similar impacts as expected from the project.

(4) Each individual Copermittee has the discretion to not require Section F.1.h. at Priority Development Projects where the project:

(a) Discharges storm water runoff into underground storm drains discharging directly to water storage reservoirs and lakes;

(b) Discharges storm water runoff into conveyance channels whose bed and bank are concrete lined all the way from the point of discharge to water storage reservoirs and lakes; or
(c) Discharges storm water runoff into other areas identified in the HMP as acceptable to not need to meet the requirements of Section F.1.h by the San Diego Water Board Executive Officer.

(5) HMP Reporting and Implementation

(a) On or before June 30, 2013, the Copermittees must submit to the San Diego Water Board a draft HMP that has been reviewed by the public, including the identification of the appropriate limiting range of flow rates per section F.1.h.(1)(b).

(b) Within 180 days of receiving San Diego Water Board comments on the draft HMP, the Copermittees must submit a final HMP that addressed the San Diego Water Board's comments.

(c) Within 90 days of receiving a determination of adequacy from the San Diego Water Board, each Copermittee must incorporate and implement the HMP for all Priority Development Projects.

(d) Prior to acceptance of the HMP by the San Diego Water Board, the early implementation measures likely to be included in the HMP must be encouraged by the Copermittees.

(6) Interim Hydromodification Criteria

Immediately following adoption of this Order and until the final HMP required by this Order has been determined by the San Diego Water Board to be adequate, each Copermittee must ensure that all Priority Development Projects are implementing the hydromodification (aka Hydrologic Condition of Concern) requirements found in Section 4.4 of the 2006 Riverside County WQMP (updated in 2009) unless one of the following conditions in lieu of those specified in the WQMP are met:

(a) Runoff from the Priority Development Project discharges (1) directly to a conveyance channel or storm drain that is concrete lined all the way from the point of discharge to the ocean, bay, lagoon, water storage reservoir or lake; and (2) the discharge is in full compliance with Copermittee requirements for connections and discharges to the MS4 (including both quality and quantity requirements); and (3) the discharge will not cause increased upstream or downstream erosion or adversely impact downstream habitat; and (4) the discharge is authorized by the Copermittee.

(b) The Priority Development Project disturbs less than one acre. The Copermittee has the discretion to require a project specific WQMP to address hydrologic condition concerns on projects less than one acre on a case by case basis. The disturbed area calculation should include all disturbances associated with larger common plans of development.

(c) The runoff flow rate, volume, velocity, and duration for the post-development condition of the Priority Development Project do not exceed the pre-development (i.e. naturally occurring) condition for the 2-year, 24-hour and 10-year, 24-hour rainfall events. This condition must be substantiated by hydrologic modeling acceptable to the Copermittee.

Once a final HMP is determined to be adequate and is required to be implemented, compliance with the final HMP is required by this Order and compliance with the 2004 WQMP (updated in 2009) or the in-lieu interim hydromodification criteria set forth above no longer satisfies the requirements of this Order.

(7) No part of section F.1.h eliminates the Copermittees' responsibilities for implementing the Low Impact Development requirements under section F.1.d.(4).

i. UNPAVED ROADS DEVELOPMENT

The Copermittees must develop, where they do not already exist, and implement or require implementation of erosion and sediment control BMPs after construction of new unpaved roads. At a minimum, the BMPs must include the following, or alternative BMPs that are equally effective:

(1) Practices to minimize road related erosion and sediment transport;
(2) Grading of unpaved roads to slope outward where consistent with road engineering safety standards;
(3) Installation of water bars as appropriate; and
(4) Unpaved roads and culvert designs that do not impact creek functions and where applicable, that maintain migratory fish passage.

2. CONSTRUCTION COMPONENT

Each Copermittee must implement a construction program which meets the requirements of this section, prevents illicit discharges into the MS4, implements and maintains structural and non-structural BMPs to reduce pollutants in storm water runoff from construction sites to the MS4, reduces construction site discharges of storm water pollutants from the MS4 to the MEP, and prevents construction site discharges from the MS4 from causing or contributing to a violation of water quality standards.

a. ORDINANCE UPDATE

By July 1, 2012, each Copermittee must review and update its grading ordinances and other ordinances as necessary to achieve full compliance with this Order, including requirements for the implementation of all designated BMPs and other measures.

b. SOURCE IDENTIFICATION

Each Copermittee must maintain an updated watershed-based inventory of all construction sites within its jurisdiction. The use of an automated database system, such as Geographical Information Systems (GIS) is strongly encouraged.

c. SITE PLANNING AND PROJECT APPROVAL PROCESS

Each Copermittee must incorporate consideration of potential water quality impacts prior to approval and issuance of construction and grading permits.

(1) Each construction and grading permit must require proposed construction sites to implement designated BMPs and other measures so that illicit discharges into the MS4 are prevented, storm water pollutants discharged from the site will be reduced to the MEP, and construction discharges from the MS4 are prevented from causing or contributing to a violation of water quality standards.

(2) Prior to permit issuance, the project proponent's runoff management plan (or equivalent construction BMP plan) must be required to comply, and reviewed to verify compliance with the local grading ordinance, other applicable local ordinances, and this Order.

(3) Prior to permit issuance, each Copermittee must verify that project proponents subject to California's statewide General NPDES Permit for Storm Water Discharges Associated With Construction Activities, (hereinafter General Construction Permit), have existing coverage under the General Construction Permit.

d. **BMP IMPLEMENTATION**

(1) Designate BMPs: Each Copermittee must designate a minimum set of BMPs and other measures to be implemented at all construction sites. The designated minimum set of BMPs must include:

(a) Management Measures:

(i) Pollution prevention, where appropriate;
(ii) Development and implementation of a runoff management plan;
(iii) Minimization of areas that are cleared and graded to only the portion of the site that is necessary for construction;
(iv) Minimization of exposure time of disturbed soil areas;
(v) Minimization of grading during the rainy season and correlation of grading with seasonal dry weather periods to the extent feasible;
(vi) Limitation of grading to a maximum disturbed area as determined by each Copermittee before either temporary or permanent erosion controls are implemented to prevent storm water pollution. The Copermittee has the option of temporarily increasing the size of disturbed soil areas by a set amount beyond the maximum, if the individual site is in compliance with applicable storm water regulations and the site has adequate control practices implemented to prevent storm water pollution;
(vii) Temporary stabilization and reseeding of disturbed soil areas as rapidly as feasible;
(viii) Wind erosion controls;
(ix) Tracking controls;
(x) Non-stormwater management measures to prevent illicit discharges and control storm water pollution sources;
(xi) Waste management measures;
(xii) Preservation of natural hydrologic features where feasible;
(xiii) Preservation of riparian buffers and corridors where feasible;
(xiv) Evaluation and maintenance of all BMPs, until removed; and
(xv) Retention, reduction, and proper management of all storm water pollutant discharges on site to the MEP standard.

(b) Erosion and Sediment Controls:

(i) Erosion prevention. Erosion prevention is to be used as the most important measure for keeping sediment on site during construction;
(ii) Sediment controls. Sediment controls are to be used as a supplement to erosion prevention for keeping sediment on-site during construction;

(iii) Slope stabilization must be used on all active slopes during rain events regardless of the season and on all inactive slopes during the rainy season and during rain events in the dry season;
(iv) Permanent revegetation or landscaping as early as feasible; and
(v) Erosion and sediment controls must be required during the construction of unpaved roads.

(2) Each Copermittee must implement, or require implementation of, enhanced[17] measures to address the threat to water quality posed by all construction sites tributary to CWA section 303(d) water body segments impaired for sediment or turbidity. Each Copermittee must also implement, or require implementation of, enhanced, measures for construction sites within, or adjacent to, or discharging directly to receiving waters within environmentally sensitive areas (as defined in Attachment C of this Order).

(3) Active/Passive Sediment Treatment (AST): Each Copermittee must require implementation of AST for sediment at construction sites (or portions thereof) that are determined by the Copermittee to be an exceptional threat to water quality. In evaluating the threat to water quality, the following factors must be considered by the Copermittee:

(a) Soil erosion potential or soil type;
(b) The site's slopes;
(c) Project size and type;
(d) Sensitivity of receiving water bodies;
(e) Proximity to receiving water bodies;
(f) Non-storm water discharges;
(g) Ineffectiveness of other BMPs;
(h) Proximity and sensitivity of aquatic threatened and endangered species of concern;
(i) Known effects of AST chemicals; and
(j) Any other relevant factors.

(4) Implement BMPs: Each Copermittee must implement, or require the implementation of, the designated minimum BMPs and any additional measures necessary to comply with this Order at each construction site within its jurisdiction year round. BMP implementation requirements, however, can vary based on wet and dry seasons. Dry season BMP implementation must plan for and address unseasonal rain events that may occur during the dry season (May 1 through September 30).

[17] Enhanced BMPs are control actions specifically targeted to the pollutant or condition of concern and of higher quality and effectiveness than the minimum control measures otherwise required. Enhanced in this Order means better, not simply more, BMPs.

e. **INSPECTION OF CONSTRUCTION SITES**

Each Copermittee must conduct construction site inspections for compliance with its ordinances (grading, storm water, etc.), permits (construction, grading, etc.), and this Order. Priorities for inspecting sites must consider the nature and size of the construction activity, topography, and the characteristics of soils and receiving water quality.

(1) During the rainy season, each Copermittee must inspect at least every two weeks, all construction sites within its jurisdiction meeting any of the following criteria:

(a) All sites 30 acres or more in size with rough grading or with active, unstabilized slopes occurring during the rainy season;

(b) All sites one acre or more, and within the same hydrologic subarea and tributary to a CWA section 303(d) water body segment impaired for sediment; or within, directly adjacent to, or discharging directly to a receiving water within an ESA; and

(c) Other sites determined by the Copermittees or the San Diego Water Board as a significant threat to water quality. In evaluating threat to water quality, the following factors must be considered: (1) soil erosion potential; (2) site slope; (3) project size and type; (4) sensitivity of receiving water bodies; (5) proximity to receiving water bodies; (6) non-storm water discharges; (7) known past record of non-compliance by the operators of the construction site; and (8) any other relevant factors.

(2) During the rainy season, each Copermittee must inspect at least monthly, all construction sites with one acre or more of soil disturbance not meeting the criteria specified above in section F.2.e.(1).

(3) During the rainy season, each Copermittee must inspect construction sites less than one acre in size as needed to ensure compliance with its ordinances and this Order.

(4) Each Copermittee must inspect all construction sites as needed during the dry season. Sites meeting the criteria in section F.2.e.(1) must be inspected at least once in August or September each year.

(5) Re-inspections: Based upon site inspection findings, each Copermittee must implement all follow-up actions (i.e., re-inspection, enforcement) necessary to comply with this Order. Reinspection frequencies must be determined by each Copermittee based upon the severity of deficiencies, the nature of the construction activity, and the characteristics of soils and receiving water quality.

(6) Inspections of construction sites must include, but not be limited to:

(a) Check for coverage under the General Construction Permit (Notice of Intent (NOI) and/or Waste Discharge Identification No.) during initial inspections;
(b) Assessment of compliance with Copermittee ordinances and permits related to runoff, including the implementation and maintenance of designated minimum BMPs;
(c) Assessment of BMP effectiveness;
(d) Visual observations for non-storm water discharges, potential illicit connections, and potential discharge of pollutants in storm water runoff;
(e) Review of site monitoring data results, if the site monitors its runoff
(f) Education and outreach on storm water pollution prevention, as needed; and
(g) Creation of a written or electronic inspection report.

(7) The Copermittees must track the number of inspections for each inventoried construction site throughout the reporting period to verify that each site is inspected at the minimum frequencies required.

f. **ENFORCEMENT OF CONSTRUCTION SITES**

(1) Each Copermittee must develop and implement an escalating enforcement process that achieves prompt corrective actions at construction sites for violations of the Copermittee's water quality protection permits, requirements, and ordinances. This enforcement process must include authorizing the Copermittee's construction site inspectors to take immediate enforcement actions when appropriate and necessary. The enforcement process must include appropriate sanctions such as stop work orders, non-monetary penalties, fines, bonding requirements, and/or permit denials for non-compliance.

(2) Each Copermittee must be able to respond to construction complaints received from third-parties and to ensure the San Diego Water Board that corrective actions have been implemented, if warranted.

g. **REPORTING OF NON-COMPLIANT SITES**

(1) In addition to the notification requirements in Attachment B, each Copermittee must notify the San Diego Water Board when the Copermittee issues high level enforcement (as defined in the Copermittee's JRMP) to a construction site that poses a significant threat to water quality in its jurisdiction as a result of violations of its storm water ordinances.

(2) Each Copermittee must annually notify the San Diego Water Board, prior to the commencement of the rainy season, of all construction sites with alleged violations that pose a significant threat to water quality. Information may be

provided as part of the JRMP annual report if submitted prior to the rainy season. Information provided must include, but not be limited to, the following:

(a) WDID number if enrolled under the General Construction Permit
(b) Site Location, including address
(c) Current violations or suspected violations

3. EXISTING DEVELOPMENT COMPONENT

a. MUNICIPAL

Each Copermittee must implement a municipal program for the Copermittee's areas and activities that meets the requirements of this section, prevents illicit discharges into the MS4, reduces municipal discharges of storm water pollutants from the MS4 to the MEP, and prevents municipal discharges from the MS4 from causing or contributing to a violation of water quality standards.

(1) Source Identification / Inventory

Each Copermittee must maintain an updated watershed-based inventory of all its municipal areas and those activities that have the potential to generate pollutants. The inventory must include the name, address (if applicable), and a description of the area/activity; which pollutants are potentially generated by the area/activity; whether the area/activity is adjacent to an ESA; and identification of whether the area/activity is tributary to and within the same hydrologic subarea as a CWA section 303(d) water body segment and generates pollutants for which the water body segment is impaired. Linear facilities, such as roads, streets, and highways, do not need to be individually inventoried. The use of an automated database system, such as Geographical Information Systems (GIS) is highly recommended.

(2) General BMP Implementation

(a) Pollution Prevention: Each Copermittee must implement pollution prevention methods in its municipal program and must require their use by appropriate departments, personnel, and contractors.

(b) Designate Minimum BMPs: Each Copermittee must designate a minimum set of BMPs for all municipal areas and those activities that have the potential to generate pollutants. The designated minimum BMPs for municipal areas and activities must be area or activity specific as appropriate.

(c) Each Copermittee must designate BMPs for special events that are expected to generate significant trash and litter. Controls to consider must include:

(i) Temporary screens on catch basins and storm drain inlets;
(ii) Temporary fencing to prevent windblown trash from entering adjacent water bodies and MS4 channels;
(iii) Proper management of trash and litter;
(iv) Catch basin cleaning following the special event and prior to an anticipated rain event;
(v) Street sweeping of roads, streets, highways and parking facilities following the special event; and
(vi) Other equivalent controls.

(d) Designate BMPs for ESAs and 303(d) Impairments: Each Copermittee must designate enhanced measures for its municipal areas and activities tributary to and within the same hydrologic subarea as CWA section 303(d) impaired water body segments when an area or those activities have the potential to generate pollutants for which the water body segment is impaired. Each Copermittee must also designate additional controls for its municipal areas and activities within or directly adjacent to or discharging directly to receiving waters within environmentally sensitive areas (as defined in Attachment C of this Order).

(e) Implement BMPs: Each Copermittee must implement, or require the implementation of, the designated minimum and enhanced BMPs and any additional measures necessary based on its inventory to comply with this Order for each of its municipal area and those activities that have the potential to discharge pollution.

(3) <u>BMP Implementation for Management of Pesticides, Herbicides, and Fertilizers</u>

Each Copermittee must implement BMPs to reduce the contribution of storm water pollutants to the MEP associated with the application, storage, and disposal of pesticides, herbicides and fertilizers from its municipal areas and activities to MS4s and receiving waters. Such BMPs must include, at a minimum:

(a) Educational activities, permits, certifications and other measures for municipal applicators and distributors;
(b) Integrated Pest Management (IPM) measures that rely on non-chemical solutions;
(c) The use of native vegetation;
(d) Schedules for irrigation and chemical application; and

(e) The collection and proper disposal of unused pesticides, herbicides, and fertilizers.

(4) BMP implementation for Flood Control Structures

(a) Each Copermittee must implement procedures to assure that flood management projects assess the impacts on the water quality of receiving water bodies.

(b) Each Copermittee must include water quality protection measures, where feasible, when retrofitting existing flood control structural devices.

(c) Each Copermittee must evaluate its existing flood control structures as part of ongoing routine maintenance, identify structures causing or contributing to a condition of pollution, implement measures to reduce or eliminate the structure's effect on pollution, and evaluate the feasibility of retrofitting the structural flood control device. The inventory and evaluation must be completed by and submitted to the San Diego Water Board in each JRMP Annual Report.

(5) BMP Implementation for Sweeping of Municipal Areas

Where municipal area sweeping is implemented as an MS4 BMP for municipal roads, streets, highways, and parking facilities, each Copermittee must design and implement the program based on the following criteria:

(a) Roads, streets, highways, and parking facilities identified as consistently generating the highest volumes of trash and/or debris must be swept at least two times per month.

(b) Roads, streets, highways, and parking facilities identified as consistently generating moderate volumes of trash and/or debris must be swept at least monthly.

(c) Roads, streets, highways, and parking facilities identified as generating low volumes of trash and/or debris must be swept as necessary, but no less than once per year.

(6) Operation and Maintenance of Municipal Separate Storm Sewer System (MS4) and Treatment Controls

(a) Treatment Controls: Each Copermittee must implement a schedule of inspection and maintenance activities to verify proper operation of all its municipal structural treatment controls designed to reduce storm water pollutant discharges to or from its MS4s and related drainage structures.

(b) MS4 and Facilities: Each Copermittee must implement a schedule of maintenance activities for its MS4 and facilities (including but not limited to catch basins, storm drain inlets, detention basins, etc). The maintenance activities must, at a minimum, include:

(i) Inspection and removal of accumulated waste at least once a year between May 1 and September 30 of each year for all MS4 facilities;
(ii) Additional facilities cleaning as necessary between October 1 and April 30 of each year;
(iii) Following two years of inspections, any MS4 facility that requires inspection and cleaning less than annually may be inspected as needed, but not less than every other year;
(iv) Open channels and basins must be cleaned of observed anthropogenic litter in a timely manner;
(v) Maintenance activities within open channels must not adversely impact beneficial uses;
(vi) Record keeping of the maintenance and cleaning activities including the overall quantity of waste removed;
(vii) Proper disposal of waste removed pursuant to applicable laws; and
(viii) Measures to eliminate waste discharges during MS4 maintenance and cleaning activities.

(7) <u>Infiltration From Sanitary Sewer to MS4/Provide Preventive Maintenance</u>

(a) Each Copermittee must implement controls and measures to prevent and eliminate infiltration of seepage from sanitary sewers to MS4s through thorough, routine preventive maintenance of the MS4. Each Copermittee that operates both a municipal sanitary sewer system and a MS4 must implement controls and measures to prevent and eliminate infiltration of seepage from the sanitary sewers to the MS4s that must include overall sanitary sewer and MS4 surveys and thorough, routine preventive maintenance of both.

(b) Each Copermittee must implement controls to limit infiltration of seepage from sanitary sewers to municipal separate storm sewer systems where necessary. Such controls must include:

(i) Adequate plan checking for construction and new development;
(ii) Incident response training for its municipal employees that identify sanitary sewer spills;
(iii) Code enforcement inspections;
(iv) MS4 maintenance and inspections;
(v) Interagency coordination with sewer agencies; and

(vi) Proper education of its municipal staff and contractors conducting field operations on the MS4 or its municipal sanitary sewer (if applicable).

(8) Inspection of Municipal Areas and Activities

(a) At a minimum, each Copermittee must inspect the following high priority municipal areas and activities annually:

(i) Roads, Streets, Highways, and Parking Facilities;
(ii) Flood Management Projects and Flood Control Devices not otherwise inspected per Section F.3.a.(6)(b);
(iii) Areas and activities tributary to and within the same hydrologic subarea as a CWA section 303(d) impaired water body segment, where an area or activity generates pollutants for which the water body segment is impaired;
(iv) Areas and activities within or adjacent to or discharging directly to receiving waters within environmentally sensitive areas (as defined in Attachment C of this Order);
(v) Municipal Facilities:
[a] Active or closed municipal landfills;
[b] Publicly owned treatment works (including water and wastewater treatment plants) and sanitary sewage collection systems;
[c] Solid waste transfer facilities;
[d] Land application sites;
[e] Corporate yards including maintenance and storage yards for materials, waste, equipment and vehicles; and
[f] Household hazardous waste collection facilities.
(vi) Municipal airfields;
(vii) Parks and recreation facilities;
(viii) Special event venues following special events (festivals, sporting events, etc.);
(ix) Power washing activities; and
(x) Other municipal areas and activities that the Copermittee determines may contribute a significant pollutant load to the MS4.

(b) Other municipal areas and activities must be inspected as needed and in response to water quality data, valid public complaints, and findings from municipal or contract staff.

(c) Based upon site inspection findings, each Copermittee must implement all follow-up actions necessary to comply with this Order.

(9) Enforcement of Municipal Areas and Activities

Each Copermittee must enforce its storm water ordinance for all its municipal areas and activities as necessary to maintain compliance with this Order.

(10) Copermittee Maintained Unpaved Roads Maintenance

(a) The Copermittees must develop, where they do not already exist, and implement or require implementation of BMPs for erosion and sediment control measures during their maintenance activities on Copermittee maintained unpaved roads, particularly in or adjacent to receiving waters.

(b) The Copermittees must develop and implement or require implementation of appropriate BMPs to minimize impacts on streams and wetlands during their unpaved road maintenance activities.

(c) The Copermittees must maintain as necessary their unpaved roads adjacent to streams and riparian habitat to reduce erosion and sediment transport;

(d) Re-grading of unpaved roads during maintenance must be sloped outward where consistent with road engineering safety standards or alternative equally effective BMPs must be implemented to minimize erosion and sedimentation from unpaved roads; and

(e) Through their maintenance of unpaved roads, the Copermittees must examine the feasibility of replacing existing culverts or design of new culverts or bridge crossings to reduce erosion and maintain natural stream geomorphology.

b. COMMERCIAL / INDUSTRIAL

Each Copermittee must implement a commercial / industrial program that meets the requirements of this section, prevents illicit discharges into the MS4, reduces commercial / industrial discharges of storm water pollutants from the MS4 to the MEP, and prevents commercial / industrial discharges from the MS4 from causing or contributing to a violation of water quality standards.

(1) Source Identification

(a) Each Copermittee must maintain an updated watershed-based inventory of all industrial and commercial sites/sources within its jurisdiction (regardless of ownership) that could contribute a significant pollutant load to the MS4. The inventory must include the following minimum

information for each industrial and commercial site/source: name; address; pollutants potentially generated by the site/source; and identification of whether the site/source is tributary to a CWA §303(d) water body segment and generates pollutants for which the water body segment is impaired; and a narrative description including SIC codes which best reflects the principal products or services provided by each facility.

At a minimum, the following sites/sources must be included in the inventory:

(i) Commercial Sites/Sources:

[a] Automobile repair, maintenance, fueling, or cleaning;
[b] Airplane repair, maintenance, fueling, or cleaning;
[c] Boat repair, maintenance, fueling, or cleaning;
[d] Equipment repair, maintenance, fueling, or cleaning;
[e] Automobile and other vehicle body repair or painting;
[f] Mobile automobile or other vehicle washing;
[g] Automobile (or other vehicle) parking lots and storage facilities;
[h] Retail or wholesale fueling;
[i] Pest control services;
[j] Eating or drinking establishments, including such retail establishments with food markets;
[k] Mobile carpet, drape or furniture cleaning;
[l] Cement mixing or cutting;
[m] Masonry;
[n] Painting and coating;
[o] Botanical or zoological gardens and exhibits;
[p] Landscaping;
[q] Nurseries and greenhouses;
[r] Golf courses, parks and other recreational areas/facilities;
[s] Cemeteries;
[t] Pool and fountain cleaning;
[u] Marinas;
[v] Portable sanitary services;
[w] Building material retailers and storage;
[x] Animal boarding facilities and kennels;
[y] Mobile pet services;
[z] Power washing services;
[aa] Plumbing services; and
[bb] Other sites and sources with a history of un-authorized discharges to the MS4.

(ii) Industrial Sites/Sources:

[a] Industrial Facilities, as defined at 40 CFR § 122.26(b)(14), including those subject to the General Industrial Permit or other individual NPDES permit;
[b] Operating and closed landfills;
[c] Facilities subject to SARA Title III; and
[d] Hazardous waste treatment, disposal, storage and recovery facilities.

(iii) ESAs and 303(d) Listed Waterbodies: All other commercial or industrial sites/sources tributary to and within the same hydrologic subarea as a CWA Section 303(d) impaired water body segment, where the site/source generates pollutants for which the water body segment is impaired. All other commercial or industrial sites/sources within or directly adjacent to or discharging directly to receiving waters within environmentally sensitive areas (as defined in Attachment C of this Order) or that generate pollutants tributary to and within the same hydrologic subarea as an observed exceedance of an action level.

(iv) All other commercial or industrial sites/sources that the Copermittee determines may contribute a significant pollutant load to the MS4.

(2) General BMP Implementation

(a) Pollution Prevention: Each Copermittee must require the use of pollution prevention methods by the inventoried industrial and commercial sites/sources.

(b) Designate / Update Minimum BMPs: Each Copermittee must designate a minimum set of BMPs for all inventoried industrial and commercial sites/sources. Where BMPs have already been designated, each Copermittee must review and update its existing BMPs for adequacy no later than with the submittal of the JRMP. Copermittees may continue to regularly review and update their designated BMPs for adequacy and subsequently submit any updates in their Annual Report. The designated minimum BMPs must be specific to facility types and pollutant-generating activities, as appropriate.

(c) Designate Enhanced BMPs for ESAs and 303(d) Impairments: Each Copermittee must designate enhanced measures for inventoried industrial and commercial sites/sources tributary to and within the same hydrologic subarea as CWA section 303(d) impaired water body segments (where a site/source generates pollutants for which the water body segment is

impaired). Each Copermittee must also designate additional controls for industrial and commercial sites/sources within or directly adjacent to or discharging directly to coastal lagoons, the ocean, or other receiving waters within environmentally sensitive areas (as defined in Attachment C of this Order). Copermittees may continue to regularly review and update their designated enhanced BMPs for adequacy and subsequently submit any updates in their next Annual Report.

(d) Implement BMPs: Each Copermittee must implement, or require the implementation of, the designated minimum and enhanced BMPs and any additional measures necessary based on inspections, incident responses, and water quality data to comply with this Order at each industrial and commercial site/source within its jurisdiction.

(3) Mobile Businesses Program

(a) Each Copermittee must develop and implement a program to reduce the discharge of storm water pollutants from mobile businesses to the MEP and to prohibit non-storm water discharges pursuant to Section B of this Order. Each Copermittee must keep as part of its commercial source inventory a listing of mobile businesses known to operate within its jurisdiction that conduct services listed above in section F.3.b.(1)(a). The program must include:

(i) Development and implementation of minimum standards and BMPs to be required for each of the various types of mobile businesses;
(ii) Development and implementation of an enforcement strategy which specifically addresses the unique characteristics of mobile businesses;

(iii) Notification of those mobile businesses known to operate within the Copermittee's jurisdiction of the minimum standards and BMP requirements;
(iv) Development and implementation of an outreach and education strategy; and
(v) Inspection of mobile businesses as needed to implement the program.

(b) If they choose to, the Copermittees may cooperate in developing and implementing their programs for mobile businesses, including sharing of mobile business inventories, BMP requirements, enforcement action information, and education.

(4) Inspection of Industrial and Commercial Sites/Sources

Each Copermittee must conduct industrial and commercial site inspections for compliance with its ordinances, permits, and this Order. Mobile businesses must be inspected as needed pursuant to section F.3.b.(3).

(a) Inspection Procedures: Inspections must include but not be limited to:

(i) Review of BMP implementation plans not including SSMPs required pursuant to section F.1.d, if the site uses or is required to use such a plan;
(ii) Review of facility monitoring data, if the site monitors its runoff;
(iii) Check for coverage under the General Industrial Permit (Notice of Intent (NOI) and/or Waste Discharge Identification Number), if applicable;
(iv) Assessment of compliance with Copermittee ordinances and Copermittee issued permits related to runoff;
(v) Assessment of the implementation, maintenance and effectiveness of the designated minimum and/or enhanced BMPs;
(vi) Visual observations for non-storm water discharges, potential illicit connections, and potential discharge of pollutants in storm water runoff; and
(vii) Education and training on storm water pollution prevention, as conditions warrant.

(b) Frequencies: At a minimum all sites determined to pose a high threat to water quality must be inspected each year. All inventoried sites must be inspected at least once during a five year period. In evaluating threat to water quality, each Copermittee must consider, at a minimum, the following:

(i) Type of activity (SIC code);
(ii) Materials used at the facility;
(iii) Wastes generated;
(iv) Pollutant discharge potential, including whether the facility generates a pollutant that exceeds an action level;
(v) Non-storm water discharges;
(vi) Size of facility;
(vii) Proximity to receiving water bodies;
(viii) Sensitivity of receiving water bodies;
(ix) Whether the facility is subject to the General Industrial Permit or an individual NPDES permit;
(x) Whether the facility has filed a No Exposure Certification/Notice of Non-Applicability;
(xi) Facility design;

(xii) Total area of the site, portion of the site where industrial or commercial activities occur, and area of the site exposed to rainfall and runoff;
(xiii) The facility's compliance history; and
(xiv) Any other relevant factors.

(c) Third-Party Certifications: Each Copermittee may propose to develop and implement a third party certification program subject to San Diego Water Board Executive Officer acceptance. This program would verify industrial and commercial site/source compliance with the Copermittees' ordinances, permits, and this Order. To the extent that third party certifications are conducted to fulfill the requirements of Section F.3.b.(4) above, the Copermittee retains responsibility for compliance with this Order and will be responsible for conducting and documenting quality assurance and quality control of the third-party certifications.

The Copermittee's proposed third party certification program must include the following:

(i) A description of the procedures and measures for quality assurance and quality control;
(ii) A listing of sites/sources that may and may not participate in the program;
(iii) The representative percentage of certifications that would qualify to satisfy the inspection requirements in section F.3.b(4)(c) above;
(iv) Photo documentation of potential storm water violations identified during the third party inspection;
(v) Reporting to the Copermittee of identified significant potential violations, including imminent or observed illegal discharges, within 24 hours of the third party inspection;
(vi) Reporting to the Copermittee of all findings within one week of the inspection being conducted; and
(vii) Copermittee follow-up and/or enforcement actions for identified potential storm water violations within two business days of the potential violation report receipt.

(d) Based upon site inspection findings, each Copermittee must implement all follow-up actions and enforcement necessary to comply with this Order.

(e) To the extent that the San Diego Water Board has conducted an inspection of an industrial site during a particular year, the requirement for the responsible Copermittee to inspect this facility during the same year is deemed satisfied.

(f) The Copermittees must track the number of inspections for the inventoried industrial and commercial sites/sources throughout the reporting period to verify that the sites/sources are inspected at the minimum frequencies listed in this Order.

(5) Enforcement of Industrial and Commercial Sites/Sources

Each Copermittee must enforce its storm water ordinance for all industrial and commercial sites/sources as necessary to maintain compliance with this Order. Copermittee ordinances or other regulatory mechanisms must include appropriate sanctions to achieve compliance. Sanctions must include the following tools or their equivalent: Non-monetary penalties, fines, bonding requirements, liens and/or permit denials for non-compliance.

(6) Reporting of Non-Compliant Sites

Each Copermittee must annually notify the San Diego Water Board, prior to the commencement of the wet season, of any unresolved high level enforcement action (as defined in the Copermittees' JRMP) that poses a significant threat to water quality in its jurisdiction as a result of violations of their storm water ordinances.

c. RESIDENTIAL

Each Copermittee must implement a residential program that meets the requirements of this section, prevents illicit discharges into the MS4, reduces residential discharges of storm water pollutants from the MS4 to the MEP, and prevents residential discharges from the MS4 from causing or contributing to a violation of water quality standards.

(1) Threat to Water Quality Prioritization

Each Copermittee must identify residential areas and activities that pose a high threat to water quality. At a minimum, these must include:

(a) Automobile repair, maintenance, washing, and parking;
(b) Home and garden care activities and product use (pesticides, herbicides, and fertilizers);
(c) Disposal of trash, pet waste, green waste, and household hazardous waste (e.g., paints, cleaning products);
(d) Any other residential source that the Copermittee determines may contribute a significant pollutant load to the MS4;

(e) Any residential areas tributary to and within the same hydrologic subarea as a CWA section 303(d) impaired water body, where the residence generates pollutants for which the water body is impaired; and
(f) Any residential areas within or directly adjacent to or discharging directly to receiving waters within an environmentally sensitive area (as defined in Attachment C of this Order)

(2) BMP Implementation

(a) Pollution Prevention: Each Copermittee must actively encourage the use of pollution prevention methods by residents.

(b) Designate BMPs: Each Copermittee must designate minimum BMPs for high-threat-to-water quality residential areas and activities. The designated minimum BMPs for high-threat-to-water quality residential areas and activities must be area or activity specific.

(c) Hazardous Waste BMPs: Each Copermittee must facilitate the proper management and disposal of used oil, toxic materials, and other household hazardous wastes. Such facilitation must include educational activities, public information activities, and establishment of collection sites operated individually and/or jointly by the Copermittee(s) or a private entity. Curbside collection of household hazardous wastes is encouraged.

(d) Implement BMPs: Each Copermittee must implement, or require implementation of, the designated minimum BMPs and any additional measures necessary to comply with Sections A and B of this Order.

(e) Each Copermittee must implement, or require implementation of, BMPs for residential areas and activities that have not been designated a high threat to water quality, as necessary.

(3) Enforcement of Residential Areas and Activities

Each Copermittee must enforce its storm water ordinance for all residential areas and activities as necessary to maintain compliance with this Order.

(4) Common Interest Areas (CIA) / Home Owner Association (HOA) Areas, and Mobile Home Parks

Each Copermittee must ensure that effective measures exist and are implemented or required to be implemented to ensure that runoff within and from common interest developments, including areas managed by associations and mobile home parks, and meets the objectives of this section and Order.

(a) BMP Implementation: Each Copermittee must implement or require implementation of management measures based on a review of pertinent factors, including:

(i) Maintenance duties and procedures typically used by CIA/HOA maintenance associations within its jurisdiction;
(ii) Whether streets and storm drains are publicly or privately owned within the CIA/HOA or mobile home park;
(iii) Whether the CIA/HOA area or mobile home park has been identified as a high priority residential area based on an evaluation of the site potential to generate pollutants contributing to a 303(d) listed waterbody or an observed action level exceedance; and
(iv) Other activities conducted or authorized by the HOA that may pose a significant risk to inland receiving waters.

(b) Legal Authority and Enforcement: By July 1, 2012, each Copermittee must review, and if necessary update, its Municipal Code to verify that they have the legal authority to implement and enforce its ordinances within CIA/HOA areas and mobile home parks.

d. RETROFITTING EXISTING DEVELOPMENT

Each Copermittee must develop and implement a retrofitting program that meets the requirements of this section. The goals of the existing development retrofitting program are to address the impacts of existing development through retrofit projects that reduce impacts from hydromodification, promote LID, support riparian and aquatic habitat restoration, reduce the discharges of storm water pollutants from the MS4 to the MEP, and prevent discharges from the MS4 from causing or contributing to a violation of water quality standards. Where feasible, at the discretion of the Copermittee, the existing development retrofitting program may be coordinated with flood control projects and other infrastructure improvement programs.

(1) The Copermittee(s) must identify and inventory existing areas of development (i.e. municipal, industrial, commercial, residential) as candidates for retrofitting. Potential retrofitting candidates must include but are not limited to:

(a) Areas of development that generate pollutants of concern to a TMDL or an ESA;
(b) Receiving waters that are channelized or otherwise hardened;
(c) Areas of development tributary to receiving waters that are channelized or otherwise hardened;

(d) Areas of development tributary to receiving waters that are significantly eroded; and
(e) Areas of development tributary to an ASBS or SWQPA.

(2) Each Copermittee must evaluate and rank the inventoried areas of existing developments to prioritize retrofitting. Criteria for evaluation must include but is not limited to:

(a) Feasibility;
(b) Cost effectiveness;
(c) Pollutant removal effectiveness, including reducing pollutants exceeding action level;
(d) Tributary area potentially treated;
(e) Maintenance requirements;
(f) Landowner cooperation;
(g) Neighborhood acceptance;
(h) Aesthetic qualities;
(i) Efficacy at addressing concern; and
(j) Potential improvements on public health and safety.

(3) Each Copermittee must consider the results of the evaluation in prioritizing work plans for the following year in accordance with Sections G.1 and J. Highly feasible projects expected to benefit water quality should be given a high priority to implement source control and treatment control BMPs. Where feasible, the retrofit projects may be designed in accordance with the SSMP requirements within sections F.1.d.(3) through F.1.d.(8) and the Hydromodification requirements in Section F.1.h.

(4) The Copermittees must cooperate with private landowners to encourage site specific retrofitting projects. The Copermittee must consider the following practices in cooperating and encouraging private landowners to retrofit their existing development:

(a) Demonstration retrofit projects;
(b) Retrofits on public land and easements that treat runoff from private developments;
(c) Education and outreach;
(d) Subsidies for retrofit projects;
(e) Requiring retrofit projects as enforcement, mitigation or ordinance compliance;
(f) Public and private partnerships; and
(g) Fees for existing discharges to the MS4 and reduction of fees for retrofit implementation.

(5) The known completed retrofit BMPs must be tracked in accordance with Section F.1.f. Retrofit BMPs on publicly owned properties must be inspected per section F.1.f . Privately owned retrofit BMPs must be inspected as needed.

(6) Where constraints on retrofitting preclude effective BMP deployment on existing developments at locations critical to protect receiving waters (as identified in section F.3.d.(1)), a Copermittee may propose a regional mitigation project to improve water quality. Such regional projects may include but are not limited to:

(a) Regional water quality treatment BMPs;
(b) Urban creek or wetlands restoration and preservation;
(c) Daylighting and restoring underground creeks;
(d) Localized rainfall storage and reuse to the extent such projects are fully protective of downstream water rights;
(e) Hydromodification project; and
(f) Removal of invasive plant species.

(7) A retrofit project or regional mitigation project may qualify as a Watershed Water Quality Activity provided it meets the requirements in section G. Watershed Workplan.

4. ILLICIT DISCHARGE DETECTION AND ELIMINATION

Each Copermittee must implement a program that meets the requirements of this section to actively detect and eliminate illicit discharges and disposal into the MS4. The program must address all types of illicit discharges and connections excluding those non-storm water discharges not prohibited by the Copermittee in accordance with section B of this Order.

a. PREVENT AND DETECT ILLICIT DISCHARGES AND CONNECTIONS

Each Copermittee must implement measures to prevent and detect illicit discharges to the MS4.

(1) Legal Authority: Each Copermittee must retain legal authority to prevent and eliminate illicit discharges and connections to the MS4.

(2) Inspections: Each Copermittee must include use of appropriate Copermittee personnel and contractors to assist in identifying illicit discharges and connections during their daily activities.

(a) Visual inspections for illegal discharges and connections must be conducted during routine maintenance of all MS4 facilities.

(b) Copermittee staff and contractors conducting non-MS4 field operations must be trained to report suspected illegal discharges and connections to proper Copermittee staff.

b. **MAINTAIN MS4 MAP**

Each Copermittee must maintain an updated map of its entire MS4 and the corresponding drainage areas within its jurisdiction. The use of GIS is strongly encouraged. The MS4 map must include all segments of the storm sewer system owned, operated, and maintained by the Copermittee, as well as all known locations of inlets that discharge and/or collect runoff into the Copermittee's MS4, all known locations of connections with other MS4s (e.g. Caltrans), and all known locations of all the outfalls that discharge runoff from the Copermittee's MS4. The accuracy of the MS4 map must be confirmed during dry weather field screening and analytical monitoring and must be updated at least annually. The MS4 map including any GIS layers must be submitted with the updated JRMP.

c. **FACILITATE PUBLIC REPORTING OF ILLICIT DISCHARGES AND CONNECTIONS - PUBLIC HOTLINE**

Each Copermittee must promote, publicize and facilitate public reporting of illicit discharges or water quality impacts associated with discharges into or from MS4s. Each Copermittee must facilitate public reporting through development and operation of a public hotline. Public hotlines can be Copermittee-specific or shared by Copermittees. All storm water hotlines must be capable of receiving reports in both English and Spanish 24 hours per day and seven days per week. All reported incidents, and how each was resolved, must be summarized in each Copermittee's Annual Report.

d. **DRY WEATHER FIELD SCREENING AND ANALYTICAL MONITORING**

Each Copermittee must conduct dry weather field screening and analytical monitoring of MS4 outfalls and other portions of its MS4 within its jurisdiction to detect illicit discharges and connections in accordance with Receiving Waters and MS4 Discharge Monitoring and Reporting Program No. R9-2010-0016 in Attachment E of this Order.

e. **INVESTIGATION / INSPECTION AND FOLLOW-UP**

Each Copermittee must implement procedures to investigate and inspect portions of its MS4 that, based on the results of field screening, analytical monitoring, or other appropriate information, indicate a reasonable potential of containing illicit discharges, illicit connections, or other sources of pollutants in non-storm water.

(1) Develop response criteria for data: Each Copermittee must develop, update, and use numeric criteria action levels (or other actions level criteria where appropriate) to determine when follow-up investigations will be performed in response to water quality monitoring. The criteria must include required non-storm water action levels (see Section C) and a consideration of 303(d)-listed waterbodies and environmentally sensitive areas (ESAs) as defined in Attachment C.

(2) Respond to data: Each Copermittee must investigate portions of the MS4 for which water quality data or conditions indicates a potential illegal discharge or connection.

(a) Obvious illicit discharges (i.e. color, odor, or significant exceedances of action levels) must be investigated immediately.

(b) Field screen data: Within two business days of receiving dry weather field screening results that exceed action levels, the Copermittee(s) having jurisdiction must either initiate an investigation to identify the source of the discharge or document the rationale for why the discharge does not pose a threat to water quality and does not need further investigation. This documentation must be included in the Annual Report.

(c) Analytical data: Within five business days of receiving analytical laboratory results that exceed action levels, the Copermittee(s) having jurisdiction must either initiate an investigation to identify the source of the discharge or document the rationale for why the discharge does not pose a threat to water quality and does not need further investigation. This documentation must be included in the Annual Report.

(3) Respond to notifications: Each Copermittee must respond to and resolve each reported incident (e.g., public hotline, staff notification, etc.) made to the Copermittee in a timely manner. Criteria may be developed to assess the validity of, and prioritize the response to, each report.

f. **ELIMINATION OF ILLICIT DISCHARGES AND CONNECTIONS**

Each Copermittee must take immediate action to initiate steps necessary to eliminate all detected illicit discharges, illicit discharge sources, and illicit connections after detection within its jurisdiction. Elimination measures may include an escalating series of enforcement actions for those illicit discharges that are not a serious threat to public health or the environment. Illicit discharges that pose a serious threat to the public's health or the environment must be eliminated immediately.

g. **ENFORCE ORDINANCES**

Each Copermittee must implement and enforce its ordinances, orders, or other legal authority to prevent illicit discharges and connections to its MS4 and to eliminate detected illicit discharges and connections to its MS4.

h. **PREVENT AND RESPOND TO SEWAGE SPILLS (INCLUDING FROM PRIVATE LATERALS AND FAILING SEPTIC SYSTEMS) AND OTHER SPILLS**

Each Copermittee must implement management measures and procedures (including a notification mechanism) to prevent, respond to, contain and clean up all sewage (see below) and other spills that may discharge into its MS4 from any source (including private laterals and failing septic systems). Copermittees must coordinate with spill response teams to prevent entry of spills into the MS4 and contamination of surface water, ground water and soil. Each Copermittee must coordinate spill prevention, containment and response activities throughout all appropriate Copermittee departments, programs and agencies so that maximum water quality protection is available at all times.

5. PUBLIC PARTICIPATION COMPONENT

Each Copermittee must incorporate a mechanism for public participation in the updating, development, and implementation of the JRMP.

6. EDUCATION COMPONENT

Each Copermittee must implement education programs to (1) measurably increase the knowledge regarding MS4s, impacts of runoff on receiving waters, and potential BMP solutions for the target audience; and (2) to measurably change the behavior of target communities and thereby reduce pollutants in storm water discharges and eliminate prohibited non-storm water discharges to MS4s and the environment. At a minimum, the education programs must meet the requirements of this section and address the following target communities:

- Copermittee Departments and Personnel
- New Development / Redevelopment Project Applicants, Developers, Contractors, Property Owners, and other Responsible Parties
- Construction Site Owners and Operators
- Commercial Owners and Operators
- Industrial Owners and Operators
- Residential Community and General Public

a. **GENERAL REQUIREMENTS**

(1) At a minimum, the Copermittee education programs must educate each target community on the following topics, as appropriate to the target community's potential storm water and non-storm water discharges to the MS4:

(a) Applicable water quality laws, regulations, permits, and requirements;
(b) Best management practices;
(c) General runoff concepts;
(d) Existing water quality, including local water quality conditions, impaired waterbodies and environmentally sensitive areas; and
(e) Other topics, as determined by the Copermittee(s), such as public reporting mechanisms, water conservation, low-impact development techniques, and public health and vector issues associated with runoff.

(2) Each Copermittee must implement educational activities, public information activities, and other appropriate activities to facilitate the proper management and disposal of used oil and toxic materials.

b. **SPECIFIC REQUIREMENTS**

(1) <u>Copermittee Departments and Personnel</u>

(a) Each Copermittee must implement an education program so its staff and contractors (and Planning Boards and Elected Officials, if applicable) responsible for implementing the requirements of this Order have an understanding of the following topics as applicable to their responsibilities:

(i) Applicable water quality laws and regulations;
(ii) The potential effects and impacts that Copermittee departments and personnel activities related to their job duties can have on water quality);
(iii) Plan review policies and procedures to verify consistent application;
(iv) Methods of minimizing impacts to receiving water quality resulting from development, construction, and other potential pollutant generating activities;

(v) Proper implementation of erosion and sediment control, source control, treatment control, and other BMPs to minimize the impacts to receiving water quality resulting from development, construction, and other potential pollutant generating activities;
(vi) Applicable recordkeeping and tracking mechanisms; and
(vii) Inspection and enforcement procedures, BMP implementation, and review of monitoring data.

(b) Each Copermittee must train its staff responsible for oversight and conducting storm water compliance inspections and enforcement of construction activities (e.g. construction, building, code enforcement, grading review staffs, inspectors, and other responsible construction staff) annually prior to the rainy season.

(c) Each Copermittee must train its staff responsible for conducting storm water compliance inspections and enforcement of industrial and commercial facilities at least once a year.

(2) New Development / Redevelopment and Construction Sites

As early in the planning and development process as possible and all through the permitting and construction process, each Copermittee must notify parties responsible for the project about the importance of educating all construction workers in the field about storm water issues and BMPs, in addition to the topics under Section F.6.a.(1).

(3) Commercial and Industrial Sites / Sources

At least once during the five-year period of this Order, each Copermittee must notify the owner/operator of each of its inventoried commercial and industrial site/source of the BMP requirements applicable to the site/source.

(4) Residential and General Public

Each Copermittee shall collaboratively conduct or participate in development and implementation of a program to educate residential and general public target communities. The Copermittee residential and general public education programs must address potential pollutant generating activities (e.g., car washing, mobile operations, yard maintenance) and pollutant generating products (e.g., pesticides, fertilizers, household chemicals). The target audiences of the residential and general public education programs must include underserved target audiences (e.g., disadvantaged communities), residents and managers of CIA/HOA areas, and owners and residents of mobile home parks.

G. WATERSHED WATER QUALITY WORKPLAN

Each Copermittee must collaborate with other Copermittees to develop and implement a Watershed Water Quality Workplan (Watershed Workplan) to identify, prioritize, address, and mitigate the highest priority water quality issues/pollutants in the Upper Santa Margarita Watershed.

1. Watershed Workplan Components

The work plan must, at a minimum:

a. Characterize the receiving water quality in the watershed. Characterization must include assessment and analysis of regularly collected water quality data, reports, monitoring and analysis generated in accordance with the requirements of the Receiving Waters Monitoring and Reporting Program, as well as applicable information available from other public and private organizations. This characterization must include an updated watershed map.

b. Identify and prioritize water quality problem(s) in terms of constituents by location, in the watershed's receiving waters. In identifying water quality problem(s), the Copermittees must, at a minimum, give consideration to TMDLs, receiving waters listed on the CWA section 303(d) list, waters with persistent violations of water quality standards, toxicity, or other impacts to beneficial uses, and other pertinent conditions.

c. Identify the likely sources, pollutant discharges and/or other factors causing the highest water quality problem(s) within the watershed. Efforts to determine such sources must include, but not be limited to: use of information from the construction, industrial/commercial, municipal, and residential source identification programs required within the JRMP of this Order; water quality monitoring data collected as part of the Receiving Water Monitoring and Reporting Program required by this Order, and additional focused water quality monitoring to identify specific sources within the watershed.

d. Develop a watershed BMP implementation strategy to attain receiving water quality objectives in the identified highest priority water quality problem(s) and locations. The BMP implementation strategy must include a schedule for implementation of the BMPs to abate specific receiving water quality problems and a list of criteria to be used to evaluate BMP effectiveness. Identified watershed water quality problems may be the result of jurisdictional discharges that will need to be addressed with BMPs applied in a specific jurisdiction in order to generate a benefit to the watershed. This implementation strategy must include a map of any implemented and/or proposed BMPs.

e. Develop a strategy to monitor improvements in receiving water quality directly

resulting from implementation of the BMPs described in the Watershed Workplan. The monitoring strategy must review the necessary data to report on the measured pollutant reduction that results from proper BMP implementation. Monitoring must, at a minimum, be conducted in the receiving water to demonstrate reduction in pollutant concentrations and progression towards attainment of receiving water quality objectives.

f. Establish a schedule for development and implementation of the Watershed strategy outlined in the Workplan. The schedule must, at a minimum, include forecasted dates of planned actions to address Provisions E.2(a) through E.2(e) and dates for watershed review meetings through the remaining portion of this Permit cycle. Annual watershed workplan review meetings must be open to the public and appropriately publically noticed such that interested parties may come and provide comments on the watershed program.

2. Watershed Workplan Implementation

Watershed Copermittee's must implement the Watershed Workplan within 90 days of submittal unless otherwise directed by the San Diego Water Board.

3. Copermittee Collaboration

Watershed Copermittees must collaborate to develop and implement the accepted Watershed Workplan. Watershed Copermittee collaboration must include frequent regularly scheduled meetings. The Copermittees must pursue efforts to obtain any interagency agreements, or other coordination efforts, with non-Copermittee owners of the MS4 (such as Caltrans, Native American tribes, and school districts) to control the contribution of pollutants from one portion of the shared MS4 to another portion of the shared MS4. The Copermittees must, as appropriate, participate in watershed management efforts to address water quality issues within the entire Santa Margarita Watershed (such as the County of San Diego and U.S. Marine Corps Camp Pendleton).

4. Public Participation

Watershed Copermittees must implement a watershed-specific public participation mechanism within each watershed. A required component of the watershed-specific public participation mechanism must be a minimum 30-day public review of and opportunity to comment on the Watershed Workplan prior to submittal to the San Diego Water Board. The Workplan must include a description of the public participation mechanisms to be used and identification of the persons or entities anticipated to be involved during the development and implementation of the Watershed Workplan.

5. Watershed Workplan Review and Updates

Watershed Copermittees must review and update the Watershed Workplan annually to identify needed changes to the prioritized water quality problem(s) listed in the workplan. All updates to the Watershed Workplan must be presented during an Annual Watershed Review Meeting. Annual Watershed Review Meetings must occur once every calendar year and be conducted by the Watershed Copermittees. Annual Watershed Review Meetings must be open to the public and adequately noticed. Individual Watershed Copermittees must also review and modify their jurisdictional programs and JRMP Annual Reports, as necessary, so that they are consistent with the updated Watershed Workplan.

6. Pyrethroid Toxicity Reduction Evaluation

The Watershed Copermittees must incorporate the pyrethroid pollutant reduction program[18] into the Watershed Workplan. The pyrethroid pollutant reduction program must include the following elements:

a. Pursue state and federal regulatory change;
b. Implement a set of source controls targeted specifically at urban pyrethroid use;
c. Through the annual reporting process, monitor the implementation of those controls, assess effectiveness, and identify sources or areas where additional effort is needed;
d. Implement additional controls as needed; and
e. Continue to monitor implementation, as well as conditions within the target receiving waters, assess effectiveness, and re-evaluate control programs.

H. FISCAL ANALYSIS

1. Secure Resources: Each Copermittee must exercise its full authority to secure the resources necessary to meet all requirements of this Order.

2. Annual Analysis: Each Copermittee must conduct an annual fiscal analysis of the necessary capital and operation and maintenance expenditures necessary to accomplish the activities of the programs required by this Order. The analysis must include estimated expenditures for the current reporting period, the preceding period, and the next reporting period.

a. Each analysis must include a description of the source of funds that are proposed to meet the necessary expenditures.
b. Each analysis must include a narrative description of circumstances resulting in a 25 percent or greater annual change for any budget line items.

[18] The pyrethroid pollutant reduction program is described in the "Riverside County – Santa Margarita Region Pyrethroid Source Identification Toxicity Reduction Evaluation, Final Phase II Report", January 2009 by MACTEC.

3. Annual Reporting: Each Copermittee must submit its annual fiscal analysis with the annual JRMP report.

I. TOTAL MAXIMUM DAILY LOADS

1. The waste load allocations (WLAs) of fully approved and adopted TMDLs are incorporated as Water Quality Based Effluent Limitations on a pollutant by pollutant, watershed by watershed basis. Early TMDL requirements, including monitoring, may be required and inserted into this Order pursuant to Finding E.10.

2. The Cities of Wildomar and Murrieta must comply with the requirements and WLAs assigned to the discharges from their MS4s contributing to the Lake Elsinore/Canyon Lake (San Jacinto Watershed) Nutrient TMDLs as specified in Section VI.D.2 of the Santa Ana Water Board's Order R8-2010-0033, including relevant sections of the fact sheet and findings, and subsequent revisions thereto.

J. PROGRAM EFFECTIVENESS ASSESSMENT AND REPORTING

Beginning with the Annual Report due in 2013, each Copermittee must annually assess and report upon the effectiveness of its JRMP and Watershed Workplan implementation to (1) reduce the discharge of storm water pollutants from its MS4 to the MEP; (2) prohibit non-stormwater discharges; and (3) prevent runoff discharges from the MS4 from causing or contributing to a violation of water quality standards.

1. Program Effectiveness Assessments

a. IDENTIFY EFFECTIVENESS ASSESSMENTS

With the JRMP and Watershed Workplan submittal, each Copermittee must establish assessment measures or methods for each of the six outcome levels described by CASQA[19], using data from each JRMP program component, the MRP, and the Watershed Workplan.

(1) Assessment interval: For each established assessment measure or method, an assessment interval must be established as appropriate to the measure or method.

(2) Projected Timeframe: For each established assessment measure or method, each Copermittee must identify the projected timeframe within which the associated outcome level can adequately assess change.

[19] Effectiveness assessment outcome levels as defined by CASQA are defined in Attachment C of this Order. See "*Municipal Stormwater Program Effectiveness Assessment Guidance"* (CASQA, May 2007) for guidance for assessing program activities at the various outcome levels.

b. **PERFORM ASSESSMENTS**

(1) Annually: Each year, the Copermittee must perform each applicable assessment based on the associated assessment interval, and determine whether the desired outcome has been met.

(2) With the submittal of the Report of Waste Discharge, the Copermittees must determine whether their program implementation is resulting in the protection and/or improvement of water quality through an Integrated Assessment.

2. Respond to Assessments

a. Where the assessments indicate that the desired outcome level has not been achieved at the end of the projected timeframe, the Copermittee must review its applicable activities and BMPs to identify any modifications and improvements needed to maximize effectiveness, as necessary to comply with this Order. If the Copermittee determines that the existing activities/BMPs are adequate, or that the projected timeframe should be extended, justification and an updated timeframe for attainment of the outcome level must be provided in the Annual Report.

b. Each Copermittee must develop and implement a work plan and schedule to address any program modifications and improvements in response to the findings of its assessment. The work plan and schedule must be provided and updated with the applicable Annual Report. The work plan must include, at a minimum, the following:

(1) The problems and priorities identified during the assessment;
(2) A list of priority pollutants and known or suspected sources;
(3) A brief description of the strategy employed to reduce, eliminate or mitigate the negative impacts;
(4) A description and schedule for new and/or modified BMPs. The schedule is to include dates for significant milestones;
(5) A description of how the selected activities will address an identified high priority problem. This will include a description of the expected effectiveness and benefits of the new and/or modified BMPs;
(6) A description of implementation effectiveness metrics;
(7) A description of how efficacy results will be used to modify priorities and implementation; and
(8) A review of past activities implemented, progress in meeting water quality standards, and planned program adjustments.

3. Assessment and Response Reporting

Each Copermittee must include a summary of its effectiveness assessments within each Annual Report. Beginning with the FY 2012-2013 Annual Report, the Program Effectiveness reporting must include:

a. The results of each of the effectiveness assessments performed pursuant to J.1.b, including the demonstrated CASQA effectiveness level(s);

b. Responses to effectiveness assessments: A description of any program modifications planned in accordance with section J.2, including the work plan and identified schedule for implementation. The description must include the basis for determining that each modified activity and/or BMP represents an improvement expected to result in improved water quality; and

c. A description of any steps to be implemented to improve the Copermittee's ability to assess program effectiveness.

K. REPORTING

The Copermittees may propose alternate reporting criteria and schedules, as part of their updated JRMP, for the Executive Officer's acceptance.

1. Runoff Management Plans

a. **JURISDICTIONAL RUNOFF MANAGEMENT PLANS**

(1) The written account of the overall program to be conducted by each Copermittee to meet the jurisdictional requirements of section F of this Order is referred to as the Jurisdictional Runoff Management Plan (JRMP). Each Copermittee must revise and update its existing JRMP so that it describes all activities the Copermittee will undertake to implement the requirements of this Order. Each Copermittee must submit its updated and revised JRMP to the San Diego Water Board <u>no later than June 30, 2012</u>.

(2) At a minimum, each Copermittee's JRMP must be updated and revised to demonstrate compliance with each applicable section of this Order.

b. **WATERSHED WORKPLANS**

Copermittees must update and revise the Watershed Workplan to describe any changes in water quality problems or priorities, and any necessary change to actions Copermittees will take to implement jurisdictional or watershed BMPs to address those identified. The Copermittees must assemble and submit the Watershed Workplan to the San Diego Water Board no later than June 30, 2012, and must implement the Workplan within 90 days unless otherwise directed by the San Diego Water Board.

2. Other Required Reports and Plans

a. **SSMP UPDATES**

(1) Copermittees must submit their updated SSMP in accordance with the applicable requirements of section F.1 with the JRMP by June 30, 2012.

(2) Within 180 days of determination that the SSMP is in compliance with this Order's provisions, each Copermittee must amend its ordinances consistent with the SSMP and implement the updated SSMP. Any amended or new ordinances must be submitted to the San Diego Water Board the applicable Annual Report.

b. **HMP**

(1) By June 30, 2013, the Copermittees must submit to the San Diego Water Board Executive Officer a draft HMP that has been reviewed by the public, including identification of the appropriate limiting range of flow rates in accordance with the applicable requirements of section F.1.h.

(2) Within 180 of receiving San Diego Water Board comments on the draft HMP, the Copermittees must submit a final HMP that addressed the San Diego Water Board's comments.

(3) Within 90 days of receiving a finding of adequacy from the Executive Officer each Copermittee must incorporate and implement the HMP for all Priority Development Projects.

(4) Prior to acceptance of the HMP by the San Diego Water Board, the early implementation measures likely to be included in the HMP shall be encouraged by the Copermittees.

c. **REPORT OF WASTE DISCHARGE**

The Copermittees must submit to the San Diego Water Board, no later than 180 days in advance of the expiration date of this Order, a Report of Waste Discharge (ROWD) as an application for issuance of new waste discharge requirements. The fourth annual report for this Order may supplement the ROWD, provided the ROWD contains the minimum information below.

At a minimum, the ROWD must include the following: (1) Proposed changes to the Copermittees' runoff management programs; (2) Proposed changes to monitoring programs; (3) Justification for proposed changes; (4) Name and mailing addresses of the Copermittees; (5) Names and titles of primary contacts of the Copermittees; (6) Any other information necessary for the reissuance of this Order and (7) Any other information required by federal regulations for permit reapplications.

3. Annual Reports

JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM (JRMP) ANNUAL REPORTS

a. Each Copermittee must generate individual JRMP Annual Reports that cover implementation of its jurisdictional activities during the past annual reporting period. Each Annual Report must verify and document compliance with this Order as directed in this section. Each Copermittee must retain records in accordance with the Standard Provisions in Attachment B of this Order, available for review, that document compliance with each requirement of this Order. The reporting period for these annual reports must be the previous fiscal year.

b. Each Copermittee must submit its JRMP Annual Reports to the San Diego Water Board by October 31of each year, beginning on October 31, 2013.

c. Each JRMP Annual Report must contain, at a minimum, the following information, as applicable to the Copermittee:

(1) Information required to be reported annually in Section H (Fiscal Analysis) of this Order;
(2) Information required to be reported annually in Section J (Program Effectiveness) of this Order;
(3) The completed Reporting Checklist found in Attachment D; and
(4) Information for each program component as described in the following Table 5:

Table 5. Annual Reporting Requirements

Program Component	Reporting Requirement
New Development	1. All updated relevant sections of the General Plan and environmental review process and a description of any planned updates within the next annual reporting period, if applicable;
	2. All revisions to the SSMP, including where applicable: (a) Identification and summary of where the SSMP fails to meet the requirements of this Order; (b) Updated procedures for identifying pollutants of concern for each Priority Development Project; (c) Updated treatment BMP ranking matrix; (d) Updated site design and treatment control BMP design standards;
	3. Number of Priority Development Projects reviewed and approved during the reporting period. Brief description of BMPs required at approved Priority Development Projects. Verification that site design, source control, and treatment BMPs were required on all applicable Priority Development Projects;
	4. Name and location of all Priority Development Projects that were granted a waiver from implementing LID BMPs pursuant to section F.1.d.(4) during the reporting period;
	5. Updated watershed-based BMP maintenance tracking database of approved treatment control BMPs and treatment control BMP maintenance within its jurisdiction, including updates to the list of high-priority Priority Development Projects; and verification that the requirements of this Order were met during the reporting period;

Table 5. Annual Reporting Requirements (Cont'd)

Program Component	Reporting Requirement
New Development (Cont'd)	6. Name and brief description of all approved Priority Development Projects required to implement hydrologic control measures in compliance with section F.1.h including a brief description of the management measures planned to protect downstream beneficial uses and prevent adverse physical changes to downstream stream channels;
	7. Number and description of all enforcement activities applicable to the new development and redevelopment component and a summary of the effectiveness of those activities.
Construction	1. All updated relevant ordinances and description of planned ordinance updates within the next annual reporting period, if applicable;
	2. A description of any changes to procedures used for identifying priorities for inspecting sites and enforcing control measures that consider the nature of the construction activity, topography, and the characteristics of soils and receiving water quality;
	3. Any changes to the designated minimum and enhanced BMPs;
	4. Summary of the inspection program, including the following information: (a) Total number and date of inspections conducted at each facility; (b) Number, date, and types of enforcement actions by facility; (c) Brief description of each high-level enforcement actions at construction sites including the effectiveness of the enforcement. Supporting paper (or electronic) files must be maintained by the Copermittees and made available upon San Diego Water Board request. Supporting files must include a record of inspection dates, the results of each inspection, photographs (if any), and a summary of any enforcement actions taken.
Municipal	1. Updated source inventory;
	2. All changes to the designated municipal BMPs;
	3. Descriptions of any changes to procedures to assure that flood management projects assess the impacts on the water quality of receiving water bodies;
	4. Summary and assessment of BMP retrofits implemented at flood control structures, including: (a) List of projects retrofitted; (b) List and description of structures evaluated for retrofitting; (c) List of structures still needing to be evaluated and the schedule for evaluation;

Table 5. Annual Reporting Requirements (Cont'd)

Program Component	Reporting Requirement
Municipal (Cont'd)	5. Summary of the municipal structural treatment control operations and maintenance activities, including: (a) Number of inspections and types of facilities; (b) Summary of findings;
	6. Summary of the MS4 and MS4 facilities operations and maintenance activities, including: (a) Number and types of facilities maintained; (b) Amount of material removed; (c) List of facilities planned for bi-annual inspections and the justification;
	7. Summary of the municipal areas/programs inspection activities, including: (a) Number and date of inspections conducted at each facility; (b) The BMP violations identified during the inspection by facility; (c) Number, date and types of enforcement actions by facility; (d) Summary of inspection findings and follow-up activities for each facility;
	8. Description of activities implemented to address sewage infiltration into the MS4;
	9. Description of BMPs and their implementation for unpaved roads construction and maintenance.
Commercial / Industrial	1. Updated inventory of commercial / industrial sources;
	2. Summary of the inspection program, including the following information: (a) Number and date of inspections conducted at each facility or mobile business; (b) The BMP violations identified during the inspection by facility; (c) Number, date, and types of enforcement actions by facility or mobile business; (d) Brief description of each high-level enforcement actions at commercial/industrial sites including the effectiveness of the enforcement and follow-up activities for each facility;
	3. All changes to designated minimum and enhanced BMPs;
	4. A list of industrial sites, including each name, address, and SIC code, that the Copermittee suspects may require coverage under the General Industrial Permit, but has not submitted an NOI.

Table 5. Annual Reporting Requirements (Cont'd)

Program Component	Reporting Requirement
Residential	1. All updated minimum BMPs required for residential areas and activities;
	2. Quantification and summary of applicable runoff and storm water enforcement actions within residential areas and activities;
	3. Description of efforts to manage runoff and storm water pollution in common interest areas and mobile home parks.
Retrofitting Existing Development	1. Updated inventory and prioritization of existing developments identified as candidates for retrofitting;
	2. Description of efforts to retrofit existing developments during the reporting year;
	3. Description of efforts taken to encourage private landowners to retrofit existing development;
	4. A list of all retrofit projects that have been implemented, including site location, a description of the retrofit project, pollutants expected to be treated, and the tributary acreage of runoff that will be treated;
	5. Any proposed retrofit or regional mitigation projects and timelines for future implementation;
	6. Any proposed changes to the Copermittee's overall retrofitting program.
Illicit Discharge Detection and Elimination	1. Any changes to the legal authority to implement Illicit Discharge Detection and Elimination activities;
	2. Any Changes to the established investigation procedures;
	3. Any changes to public reporting mechanisms, including phone numbers and web pages;
	4. Summaries of illicit discharges (including spills and water quality data events) and how each significant case was resolved;
	5. A description of instances when field screening and analytical data exceeded action levels, including those instances for which no investigation was conducted;
	6. A description of follow-up and enforcement actions taken in response to investigations of illicit discharges and a description of the outcome of the investigation/enforcement actions.
Workplans	Updated workplans including priorities, strategy, implementation schedule and effectiveness evaluation.

d. Each JRMP Annual Report must also include the following information regarding non-storm water discharges (see Section B.2. of this Order):

(1) Identification of non-storm water discharge categories identified as a source of pollutants to waters of the U.S;
(2) A description of any updates to ordinances, orders, or similar means to prohibit non-storm water discharge categories identified under section B.2 above ;
(3) Identification of any control measures to be required and implemented for

non-storm water discharge categories identified as needing controls by the San Diego Water Board; and

(4) A description of a program to address pollutants from non-emergency fire fighting flows identified by the Copermittee to be significant sources of pollutants.

4. Interim Reporting Requirements

For the reporting periods, prior to submittal of the JRMP, each JRMP Annual Report must be submitted in accordance with the requirements and deadlines described in Order No. 2004-001.

5. Universal Reporting Requirements

All submittals must include an executive summary, introduction, conclusion, recommendations, and signed certified statement. Each Copermittee must submit a signed certified statement covering its responsibilities for each applicable submittal. The Principal Copermittee must submit a signed certified statement covering its responsibilities for each applicable submittal and the sections of the submittals for which it is responsible.

L. MODIFICATION OF PROGRAMS

Modifications of JRMPs and/or Watershed Workplan may be initiated by the Executive Officer of the San Diego Water Board or by the Copermittees. Requests by Copermittees must be made to the Executive Officer, and must be submitted during the annual review process. Requests for modifications should be incorporated, as appropriate, into the Annual Reports or other deliverables required or allowed under this Order.

1. Minor modifications to JRMPs, and/or Watershed Workplan, may be accepted by the Executive Officer where the Executive Officer finds the proposed modification complies with all discharge prohibitions, receiving water limitations, and other requirements of this Order.

2. Proposed modifications that are not minor require amendment of this Order in accordance with this Order's rules, policies, and procedures.

M. PRINCIPAL COPERMITTEE RESPONSIBILITIES

Within 180 days of adoption of this Order, the Copermittees must designate the Principal Copermittee and notify the San Diego Water Board of the name of the Principal Copermittee. The Principal Copermittee must, at a minimum:

1. Serve as liaison between the Copermittees and the San Diego Water Board on general permit issues, and when necessary and appropriate, represent the Copermittees before the San Diego Water Board.

2. Coordinate permit activities among the Copermittees and facilitate collaboration on the development and implementation of programs required under this Order.

3. Coordinate the submittal of the documents and reports as required by section K of this Order and Receiving Waters and MS4 Discharge Monitoring and Reporting Program No. R9-2010-0016 in Attachment E of this Order.

N. RECEIVING WATERS AND MS4 DISCHARGE MONITORING AND REPORTING PROGRAM

Pursuant to CWC section 13267, the Copermittees must comply with all the requirements contained in Receiving Waters and MS4 Discharge Monitoring and Reporting Program (MRP) No. R9-2010-0016 in Attachment E of this Order.

O. STANDARD PROVISIONS, REPORTING REQUIREMENTS, AND NOTIFICATIONS

1. Each Copermittee must comply with Standard Provisions, Reporting Requirements, and Notifications contained in Attachment B of this Order. This includes 24 hour/5 day reporting requirements for any instance of non-compliance with this Order as described in section 5.e of Attachment B.

2. All plans, reports and subsequent amendments submitted in compliance with this Order must be implemented immediately (or as otherwise specified). All submittals by Copermittees must be adequate to implement the requirements of this Order.

P. ADDITIONAL PROVISIONS

The Executive Officer shall meet with Camp Pendleton and other stakeholders at six (6) month intervals to identify and investigate water quality impacts, flow impacts, and impacts to water rights that may derive from the implementation of Low Impact Development BMPs required by Order R9-2010-0016 as they are developed by the storm water Copermittees. Any key issues or amendments to the Order that derive from those analyses and discussions will be promptly brought to the San Diego Water Board for their consideration.

I, David W. Gibson, Executive Officer, do hereby certify the foregoing is a full, true, and correct copy of an Order adopted by the California Regional Water Quality Control Board, San Diego Region, on November 10, 2010.

David W. Gibson
Executive Officer

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN DIEGO REGION

FACT SHEET / TECHNICAL REPORT

FOR

ORDER NO. R9-2010-0016
NPDES NO. CAS0108766

WASTE DISCHARGE REQUIREMENTS

FOR

DISCHARGES FROM THE
MUNICIPAL SEPARATE STORM SEWER SYSTEMS (MS4s)
DRAINING THE COUNTY OF RIVERSIDE,
THE INCORPORATED CITIES OF RIVERSIDE COUNTY,
AND THE RIVERSIDE COUNTY FLOOD CONTROL
AND WATER CONSERVATION DISTRICT
WITHIN THE SAN DIEGO REGION

NOVEMBER 10, 2010

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LIST OF ACRONYMS AND ABBREVIATIONS

ADT	Average Daily Traffic
AMAL	Average Monthly Action Level
AST	Active/Passive Sediment Treatment
BAT	Best Available Technology
BIA	Building Industry Association
BMP	Best Management Practice
Basin Plan	Water Quality Control Plan for the San Diego Basin
CASQA	California Stormwater Quality Association
CCC	California Coastal Commission
CC&Rs	Covenants, Conditions and Restrictions
CDFG	California Department of Fish and Game
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
Colorado River Water Board	California Regional Water Quality Control Board, Colorado River Region
Copermittees	County of Riverside, the 4 incorporated cities within the County of Riverside in the San Diego Region, and the Riverside County Flood Control and Water Conservation District
CWA	Clean Water Act
CWC	California Water Code
CZARA	Coastal Zone Act Reauthorization Amendments of 1990
DAMP	Drainage Area Management Plan
DNQ	Did Not Quantify
ESAs	Environmentally Sensitive Areas
FR	Federal Register
GIS	Geographic Information System
HMP	Hydromodification Management Plan
HU	Hydrologic Unit
IBI	Index of Biotic Integrity
IC/ID	Illicit Connections and Illicit Discharges
JRMP	Jurisdictional Runoff Management Plan
Los Angeles Water Board	California Regional Water Quality Control Board, Los Angeles Region
LID	Low Impact Development
MDAL	Maximum Daily Action Level
MEP	Maximum Extent Practicable
MRP	Receiving Waters Monitoring and Reporting Program
MS4	Municipal Separate Storm Sewer System

LIST OF ACRONYMS AND ABBREVIATIONS (CONT'D)

NAL	Non-storm Water Action Levels
ND	Not Detected
NPDES	National Pollutant Discharge Elimination System
NRDC	Natural Resources Defense Council
NURP	Nationwide Urban Runoff Program
OAL	Office of Administrative Law
RCFCD	Riverside County Flood Control and Water Conservation District
Regional Water Board	California Regional Water Quality Control Board
RGOs	Retail Gasoline Outlets
ROWD	Riverside County Copermittees' Report of Waste Discharge (application for NPDES reissuance)
RWL	Receiving Water Limitations
SAL	Storm Water Action Level
Santa Ana Water Board	California Regional Water Quality Control Board, Santa Ana Region
San Diego Water Board	California Regional Water Quality Control Board, San Diego Region
San Francisco Bay Water Board	California Regional Water Quality Control Board, San Francisco Bay Region
SIC	Standard Industrial Classification Code
SIP	State Implementation Plan
SSMP	Standard Storm Water Mitigation Plan
State Water Board	State Water Resources Control Board
SWMP	Storm Water Management Plan
TAC	State Water Resources Control Board Urban Runoff Technical Advisory Committee
TIE	Toxicity Identification Evaluation
TMDL	Total Maximum Daily Load
USEPA	United States Environmental Protection Agency
WDRs	Waste Discharge Requirements
WLA	Waste Load Allocation
WQO	Water Quality Objective
WQBEL	Water Quality Based Effluent Limitations
WQMP	Water Quality Management Plan
WQS	Water Quality Standard
WRMP	Watershed Runoff Management Plan

I. FACT SHEET FORMAT

This Fact Sheet briefly sets forth the principle facts and the significant factual, legal, methodological, and policy questions that the California Regional Water Quality Control Board, San Diego Region (San Diego Water Board) considered in preparing Order No. R9-2010-0016. In accordance with the Code of Federal Regulations (CFR) title 40 parts 124.8 and 124.56 (40 CFR 124.8 and 124.56), this Fact Sheet includes, but is not limited to, the following information:

A. Contact information
B. Public process and notification procedures
C. Background information
D. Permitting approach
E. Economic issues
F. Legal authority
G. Findings
H. Directives

Tentative Order No. R9-2010-0016 was distributed for public review on July 23, 2010. The San Diego Water Board accepted written comments on the Tentative Order until September 7, 2010. A public hearing was subsequently held on November 10, 2010 to receive oral comments from interested persons.

The San Diego Water Board's files applicable to the issuance of Order No. R9-2010-0016 are incorporated into the administrative record in support of the findings and requirements of Order No. R9-2010-0016.

II. CONTACT INFORMATION

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The Order and other related documents can be downloaded from the San Diego Water Board website at
http://www.waterboards.ca.gov/sandiego/water_issues/programs/stormwater/rsd_stormwater.shtml

All documents referenced in this Fact Sheet and in Order No. R9-2010-0016 are available for public review at the San Diego Water Board office, located at the address listed above. Public records are available for inspection during regular business hours, from 8:00 am to 5:00 pm Monday through Friday. To schedule an appointment to inspect public records, contact the San Diego Water Board Records Management Officer at 858-467-2952.

Copermittees

1. City of Murrieta	4. County of Riverside
2. City of Temecula	5. Riverside County Flood Control and Water Conservation District
3. City of Wildomar	

III. PUBLIC PROCESS AND NOTIFICATION PROCEDURES

The San Diego Water Board followed the schedule listed below for the preparation of Order No. R9-2010-0016:

A. In December 2008, the San Diego Water Board met with the Copermittees to discuss the Report of Waste Discharge (ROWD) required by Order No. R9-2004-001.
B. On January 15, 2009, the San Diego Water Board received the ROWD for the permit renewal.
C. On October 29, 2009, the San Diego Water Board received the 2008-09 annual reports from the Copermittees for the existing permit.
D. On February 8, 2010, the San Diego Water Board notified all known interested parties that an electronic email listserv had been established to provide information and notices on the reissuance of the municipal storm water NPDES permit for southern Riverside County.
E. On February 18, 2010 the San Diego Water Board provided written comments on the ROWD to the Copermittees.
F. On March 22, 2010, the San Diego Water Board met with the Copermittees to discuss the potential changes to the permit based on the ROWD and annual reports.
G. Between April 22 and July 23, 2010, the San Diego Water Board met with the Copermittees on a weekly basis to discuss the Copermittees' concerns with the provisions of the Tentative Order.
H. On July 23, 2010, the San Diego Water Board released the Tentative Order for public review and comment.
I. Written comments were accepted until September 7, 2010.
J. A public hearing of the Tentative Order was conducted on November 10, 2010.

IV. BACKGROUND

Order No. R9-R9-2010-0016 is the fourth iteration of the storm water permit for the municipal separate storm sewer systems (MS4s) in the Riverside County portion of the San Diego Region. The first permit was adopted in 1990. The San Diego Water Board adopted the second iteration of the permit in 1998. The U.S. Environmental Protection Agency (USEPA) objected to the 1998 permit and reissued the permit in 1999. In 2000, the San Diego Water Board issued an addendum to the 1998 permit and incorporated the USEPA's permit by reference. The San Diego Water Board reissued the third iteration of the permit in 2004.

Municipal Storm Water Permits are required by the Federal Clean Water Act 1987 Amendments. The federal Clean Water Act (CWA) was amended in 1987 to address storm water runoff from municipal and industrial dischargers. One requirement of the amendment was that many municipalities throughout the United States were obligated for the first time to obtain National Pollutant Discharge Elimination System (NPDES) permits for discharges of storm water runoff from their MS4s. In response to the CWA amendment (and the pending federal NPDES regulations which would implement the amendment), the San Diego Water Board issued a municipal storm water permit, Order No. 90-46, in July 1990 to the Copermittees for their municipal separate storm sewer system (MS4) discharges.[1]

The First and Second Term Permits, Order Nos. 90-46 and 98-02, provided maximum flexibility. San Diego Water Board Order No. 90-46 contained the "essentials" of the 1990 regulations, but the requirements were written in very broad, generic terms. This was done in order to provide the maximum amount of flexibility to the Copermittees in implementing the new requirements (flexibility was, in fact, the stated reason for issuing the permit in advance of the final regulations). From staff's perspective however, "flexibility" in the form of lack of specificity, combined with the Copermittees' lack of funding and political will, also provided the Copermittees with ample reasons to take few substantive steps towards achieving water quality standards. The situation was exacerbated by the San Diego Water Board's own lack of storm water resources for oversight.

The Third-Term Permit introduced specific requirements. The regulatory approach incorporated into Order No. R9-2004-001 was a significant departure from the regulatory approach of the First and Second-Term Permits. Where San Diego Water Board Order Nos. 90-46 and 98-02 included broad, nonspecific requirements in order to provide the Copermittees with the maximum amount of flexibility in developing their programs, Order No. R9-2004-001 used detailed, specific requirements which outlined the minimum level of implementation required for the Copermittees' programs. In order to provide the Copermittees with the minimum requirements to meet the

[1] The 1990 permit was issued to the County of Riverside, the Orange County Flood Control and Water Conservation District, and the City of Temecula. Additional municipalities have been added to the MS4 NPDES permit as they have incorporated.

maximum extent practicable (MEP) standard for storm water of the San Diego Water Board, Order No. R9-2004-001 included more detail to emphasize the strong jurisdictional level programs developed by the Copermittees during the First and Second-Term Permits, as well as including the watershed-level program. The shift in permitting approaches resulted from the San Diego Water Board's conclusion that the lack of specificity in earlier Orders resulted in frequently unenforceable permit requirements, which in turn allowed some Copermittees to only make limited progress in implementing their programs.

The Third-Term Permit followed the San Diego County and Orange County permit templates. The shift in regulatory approaches for MS4 permits was first manifested in the 2001 MS4 permit to the owners and operators of San Diego County MS4s (Order No. 2001-01) and subsequently incorporated into the 2002 MS4 permit to the owners and operators of the Orange County MS4s (Order No. R9-2002-0001). The Third-Term Riverside County Permit included similar requirements as the 2001 San Diego County Permit and the 2002 Orange County Permit. Both the San Diego and Orange County Permits were appealed to the State Water Resources Control Board (State Water Board).[2] Minor modifications of each were made by the State Water Board, but the vast majority of the requirements were upheld. The San Diego County permit was also challenged in the Superior Court of the State of California and the Court of Appeal, Fourth Appellate District. Further litigation on the Orange County permit was held pending the precedential decisions on the San Diego Permit. The San Diego Permit was largely upheld in the Superior and Appellate Courts. The State of California Supreme Court declined to hear a final appeal from the Building Industry Association in March 2005. Thus, the Third-Term Riverside County permit requirements remained as slightly modified by the State Water Board.

The Third-Term Permit was adopted following substantial public participation. Public participation was extensive during the adoption process of the Third-Term Permit. The draft permit was released for public review and comment on December 15, 2003. Because the proposed requirements for Riverside County were similar to those that had recently been adopted and contested in San Diego County, much of the public participation dialogue echoed the discussions held during the San Diego renewal. A public workshop was held at the Temecula City Hall on January 23, 2004 to answer questions about the Tentative Order for the Third-Term Riverside County permit. A public hearing was held on February 11, 2004 to receive testimony. The public comment period was closed on March 10, 2004. Approximately 165 written and verbal comments were received and responded to during the public workshop, the public hearing, and the written comment period on the Tentative Order for the Third-Term Riverside County permit. Following the extensive public participation process, the San Diego Water Board adopted Order No. R9-2004-001 on July 14, 2004.

[2] Seven petitions were filed with the State Water Board over the Third-Term Orange County Permit. Six were placed in abeyance. Three of the petitioners sought stays. One stay request was dismissed and one was withdrawn. The active petition and stays were addressed by the State Water Board in Order WQO 2002-0014. That Order stayed provision F.5.f regarding sewage spills and modified Finding No. 26 regarding chronic toxicity.

Storm water programs have improved under the Third-Term Permit. Since adoption of Order No. R9-2004-001, the Copermittees' storm water programs have expanded. Audits of the Copermittees' programs and reviews of annual reports exhibit that the Copermittees' jurisdictional programs are largely in compliance with the Order. Some of the efforts currently being conducted on a regular basis by the Copermittees that were not conducted on a widespread basis prior to adoption of Order No. R9-2004-001, include: construction site storm water inspections, industrial and commercial facility storm water inspections, municipal facility storm water inspections, management of storm water quality from new development, development of best management practice (BMP) requirements for existing development, interdepartmental coordination, comprehensive water quality monitoring, and assessment of storm water program effectiveness.

Significant challenges remain. When viewed relative to the magnitude of the storm water runoff problem, enormous challenges remain, particularly regarding the management of storm water runoff on a watershed scale. Today, storm and non-storm water discharges from the MS4 continue to be the leading cause of water quality impairment in the San Diego Region.[3] Since 1998, the number of impaired water bodies in the Riverside County portion of the San Diego Region on the CWA section 303(d) List of Water Quality Impaired Segments (303(d) List) has increased with each new list (i.e. new impaired water bodies listed on the 2002, 2006, and 2008 303(d) Lists). The Copermittees' monitoring data exhibits persistent exceedances of water quality objectives in the Santa Margarita watershed.[4] The Santa Margarita watershed also has conditions that are frequently toxic to aquatic life. Bioassessment data from the watersheds further reflects these conditions, finding that macroinvertebrate communities in creeks have widespread Poor to Very Poor Index of Biotic Integrity (IBI) ratings.

[3] The potential sources of impairments are identified on the CWA section 303(d) list of impaired water bodies for the San Diego Region.
[4] Data is provided in annual reports to the San Diego Water Board. A summary of data collected during the Third-Term Permit is provided in the Riverside County Copermittees' application for permit reissuance. That summary is available on-line at:
http://www.waterboards.ca.gov/sandiego/water_issues/programs/stormwater/rsd_stormwater.shtml

V. PERMITTING APPROACH (PROGRAM INTEGRATION, FLEXIBILITY, AND DETAIL)

The Order contains an increased emphasis on storm water discharge management on a watershed basis. This shift towards increased watershed management is consistent with planning efforts conducted by the San Diego Water Board regarding reissuance of the San Diego Permit (Order No. R9-2007-0001) and Orange County Permit (Order No. R9-2009-0002). This shift reflects recognition of the maturity of the storm water programs since they began implementing the Third-Term Permit. Addressing storm water discharge management on a watershed basis is only possible if effective jurisdictional programs have been established, and maintaining effective jurisdictional programs is crucial to the success of watershed-focused management.

There are several reasons for this shift in emphasis. An emphasis on watersheds is necessary to shift the focus of the Copermittees from program development and implementation to water quality results. After over 20 years of Copermittee program implementation, it is critical that the Copermittees link their efforts with positive impacts on water quality. Addressing storm water on a watershed scale focuses on water quality results by emphasizing the receiving waters within the watershed. The conditions of the receiving waters drive management actions, which in turn focus on the water quality problems in each watershed.

Focusing on watershed implementation does not mean that the Copermittees must expend funds outside of their jurisdictions. Rather, the Copermittees within each watershed are expected to collaborate to develop a watershed strategy to address the high priority water quality problems within each watershed. They have the option of implementing the strategy in the manner they find to be most effective. Each Copermittee can implement the strategy individually within its jurisdiction, or the Copermittees can group together to implement the strategy throughout the watershed.

While the Order includes a new emphasis on addressing storm water discharges on a watershed basis, the Order includes recognition of the importance of continued program implementation on jurisdictional and countywide levels. The Order also acknowledges that jurisdictional, watershed, and countywide efforts are not always mutually exclusive. For this reason, an attempt has been made to allow for the Copermittees' jurisdictional, watershed, and countywide programs to integrate.

In the Order, the watershed requirements serve as the mechanism for this program integration. Since jurisdictional and countywide activities can also serve watershed purposes, such activities can be integrated into the Copermittees' watershed programs, provided the activities meet certain criteria. In this manner, the Copermittees' activities do not always need to distinguish between jurisdictional, watershed, and countywide levels of implementation. Instead, they can be integrated on multiple levels.

Such opportunities for program integration inherently provide flexibility to the Copermittees in implementing their programs. Program integration can be expanded or minimized as the Copermittees see fit. For example, there is flexibility provided in determining the activities to be integrated and implemented in the watershed programs – watershed-based efforts, countywide efforts, enhanced jurisdictional efforts, or a mixture of the three. Significant flexibility is also provided throughout other portions of the Order.

Copermittees can choose the best management practices (BMPs) to be implemented, or required to be implemented, for development, construction, and existing development areas. Flexibility to determine which industrial or commercial sites are to be inspected is also provided to the Copermittees. Educational approaches are also to be determined by the Copermittees under the Order. Implementation of certain efforts on a countywide basis is largely optional for the Copermittees as well. Significant leeway is also provided to the Copermittees in using methods to assess the effectiveness of their various runoff management programs. This flexibility is further extended to the monitoring program requirements, which allow the Copermittees to develop monitoring approaches to several aspects of the monitoring program.

The challenge in drafting the Order is to provide the flexibility described above while ensuring that the Order is still enforceable. To achieve this, the Order frequently prescribes minimum measurable outcomes, while providing the Copermittees with flexibility in the approaches they use to meet those outcomes. Enforceability has been found to be a critical aspect of the Order. For example, the watershed requirements of Order No. R9-2004-001 were some of the Order's most flexible requirements. This lack of specificity in the watershed requirements resulted in inefficient watershed compliance efforts. This situation reflects a common outcome of flexible permit language. Such language can be unclear and unenforceable, and it can lead to implementation of inadequate programs.

To avoid these types of situations, a balance between flexibility and enforceability has been crafted into the Order. Minimum measurable outcomes are utilized to ensure the Order is enforceable, while the Copermittees are provided flexibility in deciding how they will implement their programs to meet the minimum measurable outcomes.

VI. ECONOMIC ISSUES

Economic discussions of storm and non-storm water management programs tend to focus on the significant costs incurred by municipalities in developing and implementing the programs. However, when considering the cost of implementing the programs, it is also important to consider the alternative costs incurred by not fully implementing the programs, as well as the benefits which result from program implementation.

The financial crisis and current economic environment has amplified the concerns about the costs incurred by the municipalities in implementing their programs. It is frequently cited by many of the Copermittees as a justification for reducing or modifying the requirements that must be met by their programs. While the current economic environment is a cause for concern in the short term, it also provides an opportunity for these programs to find and implement improvements and efficiencies before the next period of growth and development.

It is very difficult to ascertain the true cost of implementation of the Copermittees' management programs because of inconsistencies in reporting by the Copermittees. Reported costs of compliance for the same program element can vary widely from city to city, often by a very wide margin that is not easily explained.[5] Despite these problems, efforts have been made to identify management program costs, which can be helpful in understanding the costs of program implementation.

Estimates of Phase I Storm Water Program Costs

The USEPA, the California Regional Water Quality Control Boards (Regional Water Boards), and the State Water Board have attempted to evaluate the costs of implementing municipal storm water programs. The assessments demonstrate that true costs are difficult to ascertain and reported costs vary widely. Nonetheless, they provide a useful context for considering the costs of requirements within Order No. R9-2010-0016. In addition, reported fiscal analyses tend to neglect the costs incurred to municipalities when storm water runoff is not effectively managed. Such costs result from pollution, contamination, nuisance, and damage to ecosystems, property, and human health.

In 1999 USEPA reported on multiple studies it conducted to determine the cost of management programs. A study of Phase II municipalities determined that the annual cost of the Phase II program was expected to be $9.16 per household. USEPA also studied 35 Phase I municipalities, finding costs to be $9.08 per household annually, similar to those anticipated for Phase II municipalities.[6]

[5] LARWQCB, 2003. Review and Analysis of Budget Data Submitted by the Permittees for Fiscal Years 2000-2003. P. 2.
[6] Federal Register / Vol. 64, No. 235 / Wednesday, December 8, 1999 / Rules and Regulations. P. 68791-68792.

A study on Phase I MS4 program cost was also conducted by the California Regional Water Quality Control Board, Los Angeles Region (Los Angeles Water Board), where program costs reported in the municipalities' annual reports were assessed. The Los Angeles Water Board estimated that average per household cost to implement the MS4 program in Los Angeles County was $12.50.[7] Since the Los Angeles County permit is very similar to Order No. R9-2004-001, this estimate is also useful in assessing general program costs in Riverside County.

The State Water Board also commissioned a study by the California State University, Sacramento to assess costs of the Phase I MS4 program. This study includes an assessment of costs incurred by Phase I MS4s throughout the State to implement their programs. Annual cost per household in the study ranged from $18-46, with the Fresno-Clovis Metropolitan Area (FCMA) representing the lower end of the range, and the City of Encinitas (in San Diego County) representing the upper end of the range.[8] Included in the study is the City of Corona, which is in Riverside County under the jurisdiction of the California Regional Water Quality Control Board, Santa Ana Region (Santa Ana Water Board).

The annual cost per household for the City of Corona's program was estimated to be $32, which should be similar to the costs to implement the MS4 programs in the Riverside County portion of the San Diego Region. In contrast, the cost of the City of Encinitas' program, with an annual cost per household estimated to be $46, may represent the upper range of Riverside County MS4 programs. However, the City of Encinitas's program cost can be considered as the high end of the spectrum for management program costs because the City has a consent decree with environmental groups regarding its program, and City of Encinitas has received recognition for implementing a superior program.

The annual costs for the City of Corona and City of Encinitas were estimated from data collected in 2003-2004. Between 2003 and 2008, the number of households in both cities has increased by approximately 3 percent and 7 percent, respectively.[9] In contrast, between 2003 and 2008 the number of households in the City of Temecula has increased from 23,199 to 31,135 (34 percent)[10] and the City of Murrieta has increased from 22,020 to 32,664 (48 percent).[11] This significant increase in number of households indicates a significant increase in the tax base (sales and property tax) available to fund the implementation of the MS4 programs for the City of Temecula and City of Murrieta, as well as for the County of Riverside and recently incorporated cities.

[7] Los Angeles Water Board, 2003. Review and Analysis of Budget Data Submitted by the Permittees for Fiscal Years 2000-2003. P. 2.
[8] State Water Board, 2005. NPDES Stormwater Cost Survey. P. ii.
[9] Southern California Association of Governments, Profile of the City of Corona, dated May 2009; and City of Encinitas, Comprehensive Financial Annual Report, dated June 30, 2009.
[10] Southern California Association of Governments, Profile of the City of Temecula, dated May 2009.
[11] Southern California Association of Governments, Profile of the City of Murrieta, dated May 2009.

The average amount spent per household in the Cities of Temecula and Murrieta, however, does not correspond with the increase in the number of households or the amount spent in municipalities in other regions. The table below compares the reported expenditures for the MS4 programs from 2006-07 to 2008-09 compared to number of households in the Cities of Encinitas, Corona, Temecula, and Murrieta.[12]

	2006-07			2007-08			2008-09		
City	$ Spent	House-holds	$/House-hold	$ Spent	House-holds	$/House-hold	$ Spent	House-holds	$/House-hold
Encinitas	$1,192,174	23,798	$50.10	$2,052,671	23,871	$85.99	$1,729,962	24,100	$71.78
Corona	$988,547	43,000	$22.99	$1,151,779	43,482	$26.49	$1,162,928*	43,827	$26.53
Temecula	$566,952	28,890	$19.62	$748,267	30,222	$24.76	$534,492	31,135	$17.17
Murrieta	$186,377	30,237	$6.16	$258,247	31,758	$8.13	$541,180*	32,664	$16.56

It is important to note that the program costs reported above may not include costs incurred by other departments or programs that may support the MS4 permit programs. The costs only represent the funds spent by each municipality as reported in their jurisdictional program annual reports. In any case, the figures in the table above illustrate the disparity in the amounts reportedly budgeted and spent for the programs in the Riverside County portion of the San Diego Region in comparison to the amounts budgeted and spent in the Santa Ana Region and in the San Diego County portion of the San Diego Region.

It is also important to note that reported program costs are not all attributable to compliance with MS4 permits. Many program components, and their associated costs, existed before any MS4 permits were ever issued. For example, street sweeping and trash collection costs cannot be solely or even principally attributable to MS4 permit compliance, since these practices have long been expected from and implemented by municipalities.

Therefore, true program cost resulting from MS4 permit requirements is some fraction of reported costs. The California State University, Sacramento study found that only 38 percent of program costs are new costs fully attributable to MS4 permits. The remainder of the program costs was either pre-existing or resulted from enhancement of pre-existing programs.[13] In 2000, the County of Orange found that even lesser amounts of program costs are solely attributable to MS4 permit compliance, reporting that the amount attributable to implement the County or Orange Drainage Area Management Plan (DAMP), was less than 20 percent of the total budget. The remaining 80 percent was attributable to pre-existing programs.[14]

[12] Amount ($) Spent figures are the actual expenditures reported in the 2006-07, 2007-08, and/or 2008/09 Annual Reports for the jurisdictional programs for each municipality (figures with * are estimated/budgeted expenditures). Number of households derived from SCAG 2009 profiles of Corona, Temecula, and Murrieta, and from City of Encinitas 2009 Financial Annual Report.
[13] State Water Board, 2005. NPDES Stormwater Cost Survey. P. 58.
[14] County of Orange, 2000. A NPDES Annual Progress Report. P. 60. More current data from the County of Orange is not used in this discussion because the County of Orange no longer reports such information.

Estimating Costs of Reissued Storm Water Permits

The vast majority of costs that will be incurred as a result of implementing Order No. R9-2010-0016 is not new. Storm water management programs have been in place in Riverside County for over 15 years. As shown in the discussion above, the amount spent for MS4 Permit compliance per household in the municipalities in the Riverside County portion of the San Diego Region is already low compared to other regions. Any increase in cost to the Copermittees, however, is still expected to be incremental in nature. Since Order No. R9-2010-0016 "fine tunes" the requirements of Order No. R9-2004-001, these cost increases are expected to be modest.

Where there may be additional elements that will incur new costs, the Riverside County Copermittees are given the time to develop the budgets and funding mechanisms to phase those elements into their programs. Additionally, development of these additional elements by the Riverside County Copermittees will have the benefit of the experiences and work already done by the San Diego County and Orange County Copermittees.

The anticipated costs of program changes are difficult to estimate because of the flexibility inherent within the Permit and the recognition that program modifications will vary among the municipalities in response to the specific needs of the local and watershed programs. In other words, the Permit is intended to allow each Copermittee to de-emphasize some program components and strengthen others based on the experience of the jurisdictional programs.

The changes in Order No. R9-2010-0016 reflect the iterative process of BMP implementation and the necessarily adaptive nature of storm water management that is expected by the USEPA. In 1996, USEPA recognized that changes to MS4 programs would occur during the reapplication period based on new information on the relative magnitude of a problem, new data on water quality impacts of the storm water discharges, and experience gained under the prior permit.[15] Some changes have been proposed by the Copermittees in the permit reapplication package, and others have been included because the San Diego Water Board considers those measures necessary and feasible to protect water quality from the effects of MS4 discharges.

[15] Federal Register / Vol. 61, No. 155 / Friday, August 9, 1996 / Rules and Regulations. Interpretive policy memorandum on reapplication requirements for MS4s.

Other Economic Considerations

Economic considerations of management programs cannot be limited only to program costs. Evaluation of programs requires information on the implementation costs and information on the benefits derived from environmental protection and improvement.[16] Attention is often focused on program costs, but the programs must also be viewed in terms of their value to the public.

For example, household willingness to pay for improvements in fresh water quality for fishing and boating has been estimated by USEPA to be $158-210.[17] This estimate can be considered conservative, since it does not include important considerations such as marine waters benefits, wildlife benefits, or flood control benefits. The California State University, Sacramento study reports that the annual household willingness to pay for statewide clean water is approximately $180.[18] When viewed in comparison to household costs for existing management programs, household willingness to pay estimates exhibit that per household costs incurred by the Riverside County Copermittees to implement their management programs are very low.

Placing a value on good water quality in receiving waters is very difficult. The Santa Margarita River is one of the few remaining natural gorge rivers in southern California, with approximately 70 species of special concern (rare, threatened, or endangered) regularly inhabiting the watershed, including 30 that are currently protected under the Federal Endangered Species Act.[19] The Upper Santa Margarita Watershed provides significant habitat and recreation opportunities. In addition, residents and businesses in the Upper Santa Margarita Watershed rely heavily of local water for drinking, agriculture, and industrial supply.

Often the value of receiving waters with good water quality manifests in other forms, such as tourism, recreational opportunities, and increased property values. When surface waters are degraded, thereby degrading the habitat, the public loses the aesthetic value and benefit of being able to use the area in and around the water. Surface waters that are able to support the beneficial uses designated in the Water Quality Control Plan for the San Diego Basin (Basin Plan) can sustain plants and wildlife that can attract visitors and residents, providing aesthetic, recreational, as well as monetary value to the public. At this time, however, there have been no studies for the Riverside County portion of the San Diego Region to quantify the added value that surface waters with healthy water quality can provide.

It is also important to consider the benefits of management programs in conjunction with their costs. A study conducted by the University of Southern California and University of California, Los Angeles assessed the costs and benefits of implementing

[16] Ribaudo M.O. and D. Heelerstein. 1992, *Estimating Water Quality Benefits: Theoretical and Methodological Issues.* U.S. Department of Agriculture. Technical Bulletin No. 1808.
[17] Federal Register / Vol. 64, No. 235 / Wednesday, December 8, 1999 / Rules and Regulations. P. 68793.
[18] State Water Board, 2005. NPDES Stormwater Cost Survey. P. iv.
[19] Stein, E. and Ambrose, R. 1998. Cumulative Impacts of Section 404 Clean Water Act Permitting on the Riparian Habitat of the Santa Margarita, California Watershed. Wetlands, Vol. 18, No. 3.

various approaches for achieving compliance with the MS4 permits in the Los Angeles Region. The study found that non-structural systems would cost $2.8 billion but provide $5.6 billion in benefit. If structural systems were determined to be needed, the study found that total costs would be $5.7 to $7.4 billion, while benefits could reach $18 billion.[20] Costs are anticipated to be borne over many years – probably ten years at least. As can be seen, the benefits of the programs are expected to considerably exceed their costs. Such findings are corroborated by USEPA, which found that the benefits of implementation of its Phase II storm water rule would also outweigh the costs.[21]

[20] Los Angeles Water Board, 2004. Alternative Approaches to Stormwater Control.
[21] Federal Register / Vol. 64, No. 235 / Wednesday, December 8, 1999 / Rules and Regulations. P. 68791.

VII. LEGAL AUTHORITY

The following statutes, regulations, and Water Quality Control Plans provide the basis for the requirements of Order No. R9-2010-0016: Clean Water Act (CWA), California Water Code (CWC), Title 40 of the Code of Federal Regulations (40 CFR) Parts 122, 123, 124 (National Pollutant Discharge Elimination System Permit Application Regulations for Storm Water Discharges, Final Rule), Part II of 40 CFR Parts 9, 122, 123, and 124 (National Pollutant Discharge Elimination System – Regulations for Revision of the Water Pollution Control Program Addressing Storm Water Discharges; Final Rule), Water Quality Control Plan – Ocean Waters of California (California Ocean Plan), Water Quality Control Plan for the San Diego Basin (Basin Plan), 40 CFR 131 Water Quality Standards; Establishment of Numeric Criteria for Priority Toxic Pollutants for the State of California; Rule (California Toxics Rule), and the California Toxics Rule Implementation Plan.

The legal authority citations below generally apply to directives in Order No. R9-2010-0016, and provide the San Diego Water Board with ample underlying authority to require each of the directives of Order No. R9-2010-0016. Legal authority citations are also provided with each permit section discussion in section IX of this Fact Sheet/Technical Report.

CWA 402(p)(3)(B)(ii) – The CWA requires in section 402(p)(3)(B)(ii) that permits for discharges from municipal storm sewers "shall include a requirement to effectively prohibit non-storm water discharges into the storm sewers."

CWA 402(p)(3)(B)(iii) – The CWA requires in section 402(p)(3)(B)(iii) that permits for discharges from municipal storm sewers "shall require controls to reduce the discharge of pollutants to the maximum extent practicable, including management practices, control techniques and system, design and engineering methods, and such other provisions as the Administrator or the State determines appropriate for the control of such pollutants."

40 CFR 122.26(d)(2)(i)(B,C,E, and F) – Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B,C,E, and F) provide that each Copermittee's permit application "shall consist of: (i) Adequate legal authority. A demonstration that the applicant can operate pursuant to legal authority established by statute, ordinance or series of contracts which authorizes or enables the applicant at a minimum to: […] (B) Prohibit through ordinance, order or similar means, illicit discharges to the municipal separate storm sewer; (C) Control through ordinance, order or similar means the discharge to a municipal separate storm sewer of spills, dumping or disposal of materials other than storm water; […] (E) Require compliance with condition in ordinances, permits, contracts or orders; and (F) Carry out all inspection, surveillance and monitoring procedures necessary to determine compliance and noncompliance with permit conditions including the prohibition on illicit discharges to the municipal separate storm sewer."

40 CFR 122.26(d)(2)(iv) – Federal NPDES regulation 40 CFR 122.26(d)(2)(iv) provides that the Copermittee shall develop and implement a proposed management program which "shall include a comprehensive planning process which involves public participation and where necessary intergovernmental coordination, to reduce the discharge of pollutants to the maximum extent practicable using management practices, control techniques and system, design and engineering methods, and such other provisions which are appropriate. The program shall also include a description of staff and equipment available to implement the program. […] Proposed programs may impose controls on a system wide basis, a watershed basis, a jurisdiction basis, or on individual outfalls. […] Proposed management programs shall describe priorities for implementing controls."

40 CFR 122.26(d)(2)(iv)(A - D) – Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(A - D) require municipalities to implement controls to reduce pollutants in storm water runoff from new development and significant redevelopment, construction, and commercial, residential, industrial, and municipal land uses or activities. Prevention of illicit discharges is also required.

CWC 13377 – CWC section 13377 provides that "Notwithstanding any other provision of this division, the State Water Board or the Regional Water Boards shall, as required or authorized by the CWA, as amended, issue waste discharge requirements and dredged or fill material permits which apply and ensure compliance with all applicable provisions of the act and acts amendatory thereof or supplementary, thereto, together with anymore stringent effluent standards or limitation necessary to implement water quality control plans, or for the protection of beneficial uses, or to prevent nuisance."

Order No. R9-2010-0016 is an essential mechanism for achieving the water quality objectives that have been established for protecting the beneficial uses of the water resources in the San Diego Water Board's portion of Riverside County. Federal NPDES regulation 40 CFR 122.44(d)(1) requires MS4 permits to include any requirements necessary to "achieve water quality standards established under CWA section 303, including State narrative criteria for water quality." The term "water quality standards" in this context refers to a water body's beneficial uses and the water quality objectives necessary to protect those beneficial uses as established in the Basin Plan and antidegradation policies.

VIII. FINDINGS

The findings of the Order have been modified to reduce repetition in their discussions and address new requirements. Each finding of the Order is provided and discussed below. Additional discussion relative to the findings can be found in section IX of the Fact Sheet, which provides discussions of the Order's directives.

A. Basis For the Order

Finding A.1. This Order is based on the federal Clean Water Act (CWA), the Porter-Cologne Water Quality Control Act (Division 7 of the Water Code, commencing with Section 13000), applicable State and federal regulations, all applicable provisions of statewide Water Quality Control Plans and Policies adopted by the State Water Resources Control Board (State Water Board), the Water Quality Control Plan for the San Diego Basin adopted by the San Diego Water Board (Basin Plan), the California Toxics Rule, and the California Toxics Rule Implementation Plan.

Discussion of Finding A.1. In 1987, Congress established CWA Amendments to create requirements for storm water discharges under the NPDES program, which provides for permit systems to regulate the discharge of pollutants. Under the Porter-Cologne Water Quality Control Act, the State Water Board and the nine Regional Water Boards have primary responsibility for the coordination and control of water quality, including the authority to implement the CWA. Porter-Cologne (section 13240) directs the Regional Water Boards to set water quality objectives via adoption of Water Quality Control Plans (Basin Plans) that conform to all State policies for water quality control.

As a means for achieving those water quality objectives, Porter-Cologne (section 13243) further authorizes the Regional Water Boards to establish waste discharge requirements (WDRs) to prohibit waste discharges in certain conditions or areas. Since 1990, the San Diego Water Board has issued area-wide MS4 NPDES permits. The Order will renew Order No. R9-2004-001 to comply with the CWA and attain water quality objectives in the Basin Plan by including numeric storm water action levels to limit the contributions of pollutants conveyed by storm water, and by including numeric non-storm water action levels for dry weather non-storm water discharges designed to ensure that the Copermittees comply with the requirement to effectively prohibit all types of unauthorized non-storm water discharges into their MS4. Further discussions of the legal authority associated with the prohibitions and directives of the Order are provided in section VII this document.

Finding A.2. This Order reissues National Pollutant Discharge Elimination System (NPDES) Permit No. CAS0108766, which was first adopted by the San Diego Water Board on July 16, 1990 (Order No. 90-38), and then reissued on May 13, 1998 (Order No. 98-02). On May 26, 1998, the United States Environmental Protection Agency

(USEPA), Region IX, objected to Order No. 98-02 due to concerns regarding Receiving Water Limitations (RWL) language. The USEPA concluded that the RWL language in the permit did not comply with the CWA and its implementing regulations. On April 27, 1999, the USEPA reissued the MS4 permit, which the San Diego Water Board adopted as Addendum No. 1 to Order No. 98-02 on November 8, 2000. On July 14, 2004, the San Diego Water Board adopted the third term MS4 permit, Order No. R9-2004-001. On January 15, 2009, the Riverside County Flood Control and Water Conservation District (RCFCD), as the Principal Copermittee, submitted a Report of Waste Discharge (ROWD) for reissuance of the municipal separate storm sewer system (MS4) Permit.

Discussion of Finding A.2. This Order renews National Pollutant Discharge Elimination System (NPDES) Permit No. CAS0108766, which was first issued on July 16, 1990 (Order No. 90-38), and then renewed on May 13, 1998 (Order No. 98-02). The USEPA determined that Order No. 98-02 the Receiving Water Limitations (RWL) language in the permit did not comply with the CWA and its implementing regulations. The USEPA assumed responsibility and reissued the Riverside County MS4 permit on April 27, 1999. Subsequently, the San Diego Water Board adopted Addendum No. 1 to Order No. 98-02 on November 8, 2000, which incorporated the USEPA's permit by reference. On July 14, 2004, the San Diego Water Board adopted the third term MS4 permit, Order No. R9-2004-001. On January 15, 2009, in accordance with Order No. R9-2004-001, the Riverside County Flood Control and Water Conservation District (District), as the Principal Copermittee, submitted a Report of Waste Discharge (ROWD) for reissuance of the municipal separate storm sewer system (MS4) Permit. Supporting information discussing the topic of this finding can be found in section V of this document.

Finding A.3. This Order is consistent with the following precedential Orders adopted by the State Water Board addressing MS4 NPDES Permits: Order WQ 99-05, Order WQ 2000-11, Order WQ 2001-15, Order WQO 2002-0014, and Order WQ 2009-0008 (*SWRCB/OCC FILE A-1780)*.

Discussion of Finding A.3. In recent years the State Water Board has considered several appeals of MS4 permits issued by the Regional Water Boards. In State Water Board Order WQ 99-05, the State Water Board established Receiving Water Limitation Language for MS4 permits. In State Water Board Order WQ 2000-11, the State Water Board addressed design standards for Standard Urban Storm Water Mitigation Plan (SUSMP) requirements. In State Water Board Order WQ 2001-15, the State Water Board addressed Petitions of the San Diego County MS4 Permit issued by the San Diego Water Board in 2001 (San Diego Water Board Order No. 2001-001). In State Water Board Order WQO 2002-0014, the State Water Board addresses Petitions of the Orange County MS4 Permit issued by the San Diego Water Board in 2002 (San Diego Water Board Order No. R9-2002-0001). In State Water Board Order WQ 2009-0008, the State Water Board addresses Petitions of the Los Angeles County MS4 Permit issued by the Los Angeles Water Board in 2006 (Los Angeles Water Board Order No. R4-2006-0074).

Finding A.4. The Fact Sheet / Technical Report for the Order No. R9-2010-0016, NPDES No. CAS0108766, Waste Discharge Requirements for Discharges from the MS4s Draining the County of Riverside, the Incorporated Cities of Riverside County, and the Riverside County Flood Control and Water Conservation District within the San Diego Region, includes cited regulatory and legal references and additional explanatory information and data in support of the requirements of this Order. This information, including any supplements thereto, is hereby incorporated by reference into these findings.

Discussion of Finding A.4. This Fact Sheet briefly sets forth the principle facts and the significant factual, legal, methodological, and policy questions that the San Diego Water Board considered in preparing Order No. R9-2010-0016, in accordance with the Code of Federal Regulations (CFR) title 40 parts 124.8 and 124.56 (40 CFR 124.8 and 124.56). This Fact Sheet includes general information regarding the watershed and the Copermittees' discharges from their MS4 systems. The discussions in the Fact Sheet include references to applicable statutes and regulations, as well as other supporting documents. The discussions in the Fact Sheet also can clarify the permit writer's intent for requirements that may appear vague or open to multiple interpretations.

B. Regulated Parties

Finding B.1. Each of the persons in Table 1 below, hereinafter called Copermittees or dischargers, owns or operates an MS4, through which it discharges storm water and non-storm water into waters of the United States (U.S.) within the San Diego Region. These MS4s fall into one or more of the following categories: (1) a medium or large MS4 that services a population of greater than 100,000 or 250,000 respectively; or (2) a small MS4 that is "interrelated" to a medium or large MS4; or (3) an MS4 which contributes to a violation of a water quality standard; or (4) an MS4 which is a significant contributor of pollutants to waters of the U.S.

The Cities of Murietta, Menifee and Wildomar also discharge into waters of the U.S. in the California Regional Water Quality Control Board, Santa Ana Region (Santa Ana Water Board), so are located partially within both the San Diego and Santa Ana Water Board boundaries. As allowed by California Water Code (CWC) §13228, these Cities submitted written requests to be regulated for MS4 purposes under a permit adopted by only one Water Board. As authorized by CWC § 13228 and pursuant to a written agreement between the San Diego Water Board and the Santa Ana Water Board, the Cities of Murrieta and Wildomar are wholly regulated by the San Diego Water Board under this Order, including those portions of the Cities jurisdiction not within the San Diego Water Board's region. Similarly, the City of Menifee is wholly regulated by the Santa Ana Water Board under Order No. R8-2010-0033, including those portions of the City of Menifee within the San Diego Water Board's region.

Discussion of Finding B.1. Section 402 of the CWA prohibits the discharge of any pollutant to waters of the United States from a point source, unless that discharge is authorized by a NPDES permit. Though storm water and non-storm water may come from a diffuse source, it is discharged through MS4s, which are point sources under the CWA. Federal NPDES regulation 40 CFR 122.26(a) (iii) and (iv) provide that discharges from MS4s, which service medium or large populations greater than 100,000 or 250,000 respectively, shall be required to obtain a NPDES permit. Federal NPDES regulation 40 CFR 122.26(a)(v) also provides that a NPDES permit is required for "A [storm water] discharge which the Director, or in states with approved NPDES programs, either the Director or the USEPA Regional Administrator, determines to contribute to a violation of a water quality standard or is a significant contributor of pollutants to waters of the United States." Such sources are then designated into the program.

Included in Table 1 of the Order are the Cities of Murrieta, Temecula, and Wildomar, the County of Riverside, and the Riverside County Flood Control and Water Conservation District. The Cities of Wildomar and Menifee are newly incorporated cities. Both Cities were previously a part of the County of Riverside's jurisdiction and have an MS4 interrelated to other Copermittee MS4s in the San Diego Region. The boundaries of the Cities of Menifee, Murrieta, and Wildomar fall within the jurisdiction of both the San Diego Water Board and the Santa Ana Water Board.

As requested by the Cities of Menifee, Murrieta, and Wildomar, and pursuant to an agreement between the San Diego and Santa Ana Water Boards as authorized by CWC section 13228, the MS4s of the Cities of Murrieta and Wildomar are to be wholly regulated by the San Diego Water Board under this Order, and the MS4 of the City of Menifee is to be wholly regulated by the Santa Ana Water Board under Order No. R8-2010-0033. The agreement between the San Diego and Santa Ana Water Board to regulate the Cities of Menifee, Murrieta, and Wildomar will be subject to change with sufficient notice, and for good cause.

Other small MS4s also exist within the portion of Riverside County in the San Diego Region. While these small MS4s are not subject to this Order, they are subject to the Phase II NPDES storm water regulations. Over time, these small MS4s will be designated for coverage under the State Water Board's statewide general storm water permit for small MS4s.

C. Discharge Characteristics

Finding C.1. Discharges from the MS4 contain waste, as defined in the CWC, and pollutants that adversely affect the quality of the waters of the State. The discharge from an MS4 is a "discharge of pollutants from a point source" into waters of the U.S. as defined in the CWA.

Discussion of Finding C.1. Section 13050(d) of the CWC defines "waste" as "sewage and any and all other waste substances, liquid, solid, gaseous, or radioactive, associated with human habitation, or of human or animal origin, or from any producing, manufacturing, or processing operation, including waste placed within containers of whatever nature prior to, and for purposes of, disposal." 40 CFR 122.2 defines "point source" as "any discernable, confined, and discrete conveyance, including but not limited to, any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, landfill leachate collection system, vessel or other floating craft from which pollutants are or may be discharged. This term does not include return flows from irrigated agriculture or agricultural storm water runoff." 40 CFR 122.2 defines "discharge of a pollutant" as "Any addition of any pollutant or combination of pollutants to waters of the U.S. from any point source." Also, the justification for control of pollution into waters of the state can be found at CWC section 13260(a)(1). State Water Board Order No. WQ 2001-15 verifies that discharges from the MS4 contain waste.[22]

The term "urban runoff" has been removed throughout Order No. R9-2010-0016 and replaced with storm water (wet weather) or non-storm water (dry weather) runoff. This clarification is necessary to prevent the misunderstanding that regulation under this permit is subject only to urbanized areas. The term "urban runoff" is not defined in the Code of Federal Regulations or Federal Register in the regulation of Phase I MS4 discharges.

In the Copermittees' ROWD, a distinction is made between urban land use areas and non-urban land use areas. Urban land use areas include commercial, industrial, *urban residential (less than 1 acre)*, parks and recreation facilities, and streets and roads land use categories. Non-urban land use areas include preserves and open space, agriculture, federal/state/tribal lands/non-County jurisdiction, and *rural residential (greater than 1 acre)*. The ROWD implies that only discharges from the urban land use areas are subject to the requirements of the MS4 Permit, thus rural residential (greater than 1 acre) land use areas would not be subject to the requirements of the MS4 Permit. Rural residential land use areas, however, are subject to the requirements of the MS4 Permit. The removal of the term urban runoff will further clarify the application of the requirements of the MS4 Permit.

[22] State Water Board, 2001. Order WQ 2001-15. In the Matter of Petitions of Building Industry Association of San Diego County and Western States Petroleum Association: For Review of Waster Discharge Requirements Order No. 2001-01 for Urban Runoff from San Diego County [NPDES No. CAS0108758] Issued by the Regional Board.

The discharge of runoff from an MS4 is a "discharge of pollutants from a point source" into waters of the U.S. as defined in the CWA. The Permit defines runoff as all flows in a storm water conveyance system (MS4 defined below) and consists of the following components:

(1) storm water (wet weather flows) and
(2) non-storm water discharges (dry weather flows).

The Permit defines an MS4 as a conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, or storm drains):

(i) Owned or operated by a State, city, town, borough, county, parish, district, association, or other public body (created by or pursuant to State law) having jurisdiction over disposal of sewage, industrial wastes, storm water, or other wastes, including special districts under State law such as a sewer district, flood control district or drainage district, or similar entity, or an Indian tribe or an authorized Indian tribal organization, or designated and approved management agency under section 208 of the CWA that discharges to waters of the United States;

(ii) Designated or used for collecting or conveying storm water;

(iii) Which is not a combined sewer;

(iv) Which is not part of the Publicly Owned Treatment Works (POTW) as defined at 40 CFR 122.26.

Permit finding D.3.c. includes natural streams that convey runoff as part of the MS4. The presence of an MS4 system is not limited to areas considered to be "urban" in nature. Though the term urban is often referred to specifically as pertaining to cities, runoff means all flows in a storm water conveyance system, regardless of the location of the conveyance system. A conveyance system owned or operated by a State, city, town, borough, county, parish, district, association, or other public body (created by or pursuant to State law), may be located in a setting (e.g. unincorporated area, low density residential) that is not considered by the public to be "urban" in nature. These areas are contributing pollutants to the MS4 system that must be addressed. The term runoff applies to all flows in an MS4 system, no matter where the MS4 may be located in regards to incorporated or unincorporated property. Storm water and non-storm water discharges from the rural residential (greater than 1 acre) land use category, characterized as non-urban, that enter into any part of the MS4 system (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, or storm drains), are also subject to the requirements of the MS4 Permit.

The Code of Federal Regulations (CFR) at 40 CFR 122.26 requires that large and medium MS4s obtain a permit for all discharges from their systems. Appendix I to 40 CFR 122 designates Riverside County as having a large and medium MS4 requiring a permit. The regulations do not differentiate discharges from urban or rural MS4 systems. Rather, the regulations require the permit for all discharges from their systems. In the Final Rule establishing the Phase 1 storm water regulations, the USEPA clarified that all discharges are subject to a permit. On page 48041 of the Final Rule, the USEPA states:

> "EPA recognizes that some of the counties addressed by today's rule have, in addition to areas with high unincorporated urbanized populations, areas that are essentially rural or uninhabited and may not be the subject of planned development. While permits issued for these municipal systems ***will cover*** *(emphasis added) municipal systems discharges in unincorporated portions of the county* (emphasis added), it is the intent of EPA that management plans and other components of the programs focus on the urbanized and developing areas of the county."

So, while the Permit covers all MS4 discharges regardless if that discharge is in an urban or unincorporated area; the Copermittees management program should focus on urbanized areas. Due to the Permit's requirements, the Copermittees management programs will naturally focus on urbanized areas. Urbanized areas have more industry, construction, pollution and MS4s that require more inspection, maintenance, monitoring, enforcement and complaint follow-up.

USEPA further clarified on page 48041 that all MS4 discharges require permit coverage when addressing highway MS4 systems:

> "[The regulations] will result in discharges from separate storm sewer systems serving State highways and other highways through storm sewers … in unincorporated portions of specified counties being included as part of the large or medium municipal separate storm sewer systems, since all municipal separate storm sewers within the boundaries of these political entities are included."

In their summary on page 48043, the USEPA states:

> "The definition [of MS4] provides that all systems within a geographical area including highways and flood controls will be covered, thereby avoiding fragmented and ill-coordinated programs;"

Neither the State Water Board's storm water permit for Caltrans (State Water Board Order No. 99-06-DWQ) nor the Los Angeles Water Board's MS4 permit for Ventura County include the term "urban runoff" in a significant regulatory capacity. The Caltrans permit has one reference to "urban runoff" where the term is used interchangeably with "storm water." The draft Ventura permit uses the term "urban

runoff" when referring to titles of reference documents, previously adopted management plans and municipal ordinances that may contain the phrase.

The Copermittees have expressed concern regarding the regulation of pollutants from natural, undeveloped areas that enter the MS4 in an unincorporated area. Runoff and pollutants from any source entering the MS4, however, become the responsibility of the Copermittees upon entering the MS4. The assimilation of pollutants from natural, undeveloped areas is different under natural conditions compared to when they are transported through the MS4. The MS4 collection could change a natural sheet flow discharge to a concentrated point discharge. The MS4 does not provide natural infiltration or other pollutant remediation that these flows would receive in an otherwise natural drainage system. The MS4 may concentrate these natural pollutants and flows. In some cases, the MS4 may ultimately discharge the elevated concentrations of natural pollutants and flow rates to waters of the US far from the natural pollutant and flow source, causing a condition of pollution or a violation of water quality standards.

Finding C.2. MS4 storm water and non-storm water discharges are likely to contain pollutants that cause or threaten to cause a violation of surface water quality standards, as outlined in the Basin Plan. Storm water and non-storm water discharges from the MS4 are subject to the conditions and requirements established in the Basin Plan for point source discharges.

Discussion of Finding C.2. This finding is a clarification regarding the potential for discharges of storm water and non-storm water to impact the Beneficial Uses as described in the Basin Plan. As such these point source discharges require Waste Discharge Requirements (WDRs) to ensure that water quality standards are met. Furthermore, since point source discharges require WDRs, the discharges are subject to the prohibitions, conditions and requirements of the Basin Plan.

In addition, municipal discharges have been split into storm water and non-storm water discharges to represent the differing regulations applicable to storm water and non-storm water, though both types of discharges are likely to contain pollutants.

Finding C.3. The most common categories of pollutants in runoff include total suspended solids, sediment, pathogens (e.g., bacteria, viruses, protozoa), heavy metals (e.g., copper, lead, zinc and cadmium), petroleum products and polynuclear aromatic hydrocarbons, synthetic organics (e.g., pesticides, herbicides, and PCBs), nutrients (e.g., nitrogen and phosphorus fertilizers), oxygen-demanding substances (decaying vegetation, animal waste), detergents, and trash.

Discussion of Finding C.3. The National Urban Runoff Program (NURP) study showed that heavy metals, organics, coliform bacteria, nutrients, oxygen demanding substances (e.g., decaying vegetation), and total suspended solids are found at

relatively high levels in storm water and non-storm water discharges.[23] It also found that MS4 discharges draining residential, commercial, and light industrial areas contain significant loadings of total suspended solids and other pollutants. The Basin Plan goes on to identify runoff pollutants to include lawn and garden chemicals, household and automotive care products dumped or drained on streets, and sediment that erodes from construction sites.[24] In addition, the State Water Board Urban Runoff Technical Advisory Committee (TAC) finds that urban runoff pollutants include sediments, nutrients, oxygen-demanding substances, heavy metals, petroleum hydrocarbons, pathogenic bacteria, viruses, and pesticides.[25] Runoff that flows over streets, parking lots, construction sites, and industrial, commercial, residential, and municipal areas carries these untreated pollutants through storm drain networks directly to the receiving waters of the San Diego Region.

Finding C.4. The discharge of pollutants and/or increased flows from MS4s may cause or threaten to cause the concentration of pollutants to exceed applicable receiving water quality objectives and impair or threaten to impair designated beneficial uses resulting in a condition of pollution (i.e. unreasonable impairment of water quality for designated beneficial uses), contamination, or nuisance.

Discussion of Finding C.4. The 1992, 1994, and 1996 National Water Quality Inventory Reports to Congress prepared by USEPA showed a trend of impairment in the nation's waters from contaminated storm and non-storm water runoff.[26] The 1998 National Water Quality Inventory Report showed that runoff discharges affect 11 percent of rivers, 12 percent of lakes, and 28 percent of estuaries. Primary sources of impairment to rivers and streams included sediment, bacteria, nutrients, oxygen-depleting substances, metals, and pesticides. The report notes that runoff discharges are the leading source of pollution and the main factor in the degradation of surface water quality in California's coastal waters, rivers, and streams. Furthermore, the NURP study found that pollutant levels from illicit non-storm water discharges were high enough to significantly degrade receiving water quality, and threaten aquatic life, wildlife, and human health.[27]

In addition, the Region's CWA section 303(d) list, which identifies water bodies with impaired beneficial uses within the region, also indicates that the impacts of storm water and non-storm water runoff on receiving waters are significant. Many of the impaired water bodies on the 303(d) list are impaired by constituents that have been found at high levels within storm water and non-storm water runoff by the Riverside County storm water monitoring program.[28] Examples of constituents frequently

[23] Ibid.
[24] San Diego Water Board, 1994. Water Quality Control Plan, San Diego Basin, Region 9. San Diego.
[25] State Water Board, 1994. Urban Runoff Technical Advisory Committee Report and Recommendations. Nonpoint Source Management Program.
[26] USEPA, 2000. Quality of Our Nation's Waters: Summary of the National Water Quality Inventory 1998 Report to Congress – USEPA 841-S-00-001; Water Quality Conditions in the United States: Profile from the 1998 National Water Quality Inventory Report to Congress – USEPA 841-F-00-006.
[27] USEPA, 1993. Results of the Nationwide Urban Runoff Program, Volume 1 – Final Report.
[28] County of Riverside, 2009. Riverside County Municipal Copermittees 2008-09 Annual Storm Water Program Report, Section 11.

responsible for beneficial use impairment include indicator fecal bacteria, heavy metals, toxicity, pesticides, dissolved solids, turbidity, and nutrients. These constituents have been found at high levels in runoff both regionally and nationwide.[29,30] In addition, impairments may be caused by synergistic effects of multiple contaminants or by pollutants not currently monitored by storm water programs.

Finding C.5. Pollutants in runoff can threaten and adversely affect human health. Human illnesses have been clearly linked to recreating near storm drains flowing to receiving waters. Also, runoff pollutants in receiving waters can bioaccumulate in the tissues of invertebrates and fish, which may be eventually consumed by humans.

Discussion of Finding C.5. Human illnesses have been clearly linked to recreating near storm drains flowing to coastal waters. A landmark study, conducted by the Santa Monica Bay Restoration Project, found that there was an increased occurrence of illness in people that swam in proximity to a flowing storm drain.[31] A study of south Huntington Beach and north Newport Beach (both located in northern Orange County) found that an illness rate of about 0.8 percent among bathers at those beaches resulted in about $3 million annually in health-related expenses.[32] Although the Upper Santa Margarita Watershed is inland, the watershed drains to the Pacific Ocean, and pollutants generated in the area may impact coastal waters. For example, the Santa Margarita River system provides the main source of beach sand for the beaches in northern San Diego County.[33] In addition, residents from the Upper Santa Margarita Watershed, who recreate at southern California beaches, benefit from clean water.

Residents and businesses in the Upper Santa Margarita Watershed also rely heavily on local water for drinking, agriculture and industrial supply. Over 40 percent of the water used in the watershed is locally produced.[34] In addition, surface and ground water from the Upper Santa Margarita Watershed flow to Fallbrook in San Diego County and the U.S. Marine Corps Base Camp Pendleton where it is used as part of the municipal and domestic water supply.

According to the USEPA, spilled fuel, solvents, waste oil, paints, and other maintenance fluids pose a risk to the environment, but may be especially harmful if they enter someone's drinking water supply.[35] Discharges of runoff from urban areas were identified by the California Department of Health Services as one of the most

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[29] Ibid.
[30] USEPA, 1983. Results of the Nationwide Urban Runoff Program, Volume 1 – Final Report.
[31] Haile, R.W., et al., 1996. An Epidemiological Study of Possible Adverse Health Effects of Swimming in Santa Monica Bay. Santa Monica Bay Restoration Project.
[32] Dwight, R.H., et al., 2005. Estimating the Economic Burden From Illnesses Associated With Recreational Coastal Water Pollution – A Case Study in Orange County, California. Journal of Enviro. Management Vol.76. No.2 p.95-103. Also reported in: Los Angeles Times, May 2, 2005. Here's What Ocean Germs Cost You: A UC Irvine Study Tallies the Cost of Treatment and Lost Wages for Beachgoers Who Get Sick.
[33] Shapiro. 1991. Refuge in an urbanized land, the Santa Margarita River: cultural and natural resource value. Santa Margarita Research Foundation, Fallbrook, CA.
[34] Jenks, .J. 2002. Santa Margarita River Watershed Annual Watermaster Report: Water Year 2000-2001.
[35] USEPA. 2004. Municipal Storm Water and Ground Water Discharge Regulations in California. F-909-04-004.

prevalent possible contaminating activities for drinking water sources.[36] This issue of potential source water contamination is of fundamental importance, because of the dependence on local water for domestic use in the Santa Margarita Watershed.

Furthermore, runoff pollutants in receiving waters can bioaccumulate in the tissues of invertebrates and fish, which may eventually be consumed by humans. Pollutants such as heavy metals and pesticides, which are commonly found in MS4 runoff, have been found to bioaccumulate and biomagnify in long-lived organisms at the higher trophic levels.[37] Since many aquatic species are utilized for human consumption, toxic substances accumulated in species' tissues can pose a significant threat to public health. USEPA supports this finding when it states, "As runoff flows over areas altered by development, it picks up harmful sediment and chemicals such as oil and grease, pesticides, heavy metals, and nutrients (e.g., nitrogen and phosphorus). These pollutants often become suspended in runoff and are carried to receiving waters, such and lakes, ponds, and streams. Once deposited, these pollutants can enter the food chain through small aquatic life, eventually entering the tissues of fish and humans."[38]

Finding C.6. Runoff discharges from MS4s often contain pollutants that cause toxicity to aquatic organisms (i.e. adverse responses of organisms to chemicals or physical agents ranging from mortality to physiological responses such as impaired reproduction or growth anomalies). Toxic pollutants impact the overall quality of aquatic systems and beneficial uses of receiving waters.

Discussion of Finding C.6. The Copermittees' monitoring data exhibits frequent toxic conditions in runoff during storm events and dry weather. Toxicity varies significantly within and among sites and over time. The cause of toxicity may vary between locations, dates, and indicator organisms. The actual cause may be influenced by various factors such as development, land uses, runoff management, habitat modification, hydromodification, and native aquatic environment. Some toxicity identification evaluations (TIEs) have identified pyrethroids as a cause of toxicity in the receiving waters.[39]

Finding C.7. The Copermittees discharge runoff into lakes, drinking water reservoirs, rivers, streams, creeks, bays, estuaries, coastal lagoons, the Pacific Ocean, and tributaries thereto within one of the eleven hydrologic units (Santa Margarita Hydrologic Unit) comprising the San Diego Region as shown in Table 2. Some of the receiving water bodies have been designated as impaired by the San Diego Water Board in 2009 pursuant to CWA section 303(d).

[36] Ibid.
[37] Abel, P.D, 1996. Water Pollution Biology.
[38] USEPA, 2000. Storm Water Phase II Compliance Assistance Guide. Washington D.C. EPA 833-R-00-002.
[39] County of Riverside, 2009. Riverside County Municipal Copermittees 2008-09 Annual Storm Water Program Report, Section 11.

Discussion of Finding C.7. This finding identifies the major receiving water bodies in the Riverside County portion of the Santa Margarita Hydrologic Unit that are listed as impaired on the CWA section 303(d) List of Impaired Waters (303(d) List). The 2006 303(d) List has been approved by the San Diego Water Board, State Water Board, and USEPA.[40] The 2008 303(d) List was approved by the San Diego Water Board on December 18, 2009 and by the State Water Board on August 4, 2010, and is awaiting USEPA approval.[41] The 303(d) list identifies waters that do not meet water quality standards after applying certain required technology-based effluent limits ("impaired" water bodies). As part of this listing process, states are required to prioritize waters/watersheds for future development of Total Maximum Daily Loads (TMDLs). The listed 303(d) pollutant(s) of concern do not necessarily reflect impairment of the entire corresponding major surface water bodies. The specific impaired portions of each water body are listed in the 2006 and 2008 303(d) Lists.

Since 2002, the number of water bodies and water body – pollutant combinations included on the 303(d) List, located in the Riverside County portion of the San Diego Region, has increased. A comparison of the 2002, 2006, and 2008 303(d) listings are summarized in the following table.

[40] The approved 2006 Clean Water Act Section 303(d) List of Water Quality Limited Segments is on-line at: http://www.waterboards.ca.gov/tmdl/303d_lists2006.html
[41] The 2008 Clean Water Act Section 303(d) List of Water Quality Limited Segments, approved by the San Diego Water Board and State Water Board, is available on-line at http://www.swrcb.ca.gov/rwqcb9/water_issues/programs/303d_list/index.shtml

Comparison of Riverside County 303(d) Listings

Watershed[1]	2002 303(d) List		2006 303(d) List		2008 303(d) List[2]	
	Listed Water Body	Impairing Pollutants	Listed Water Body	Impairing Pollutants	Listed Water Body	Impairing Pollutants
De Luz Creek HSA (902.21)	NO LISTINGS	NOT APPLICABLE	De Luz Creek	Iron Manganese	De Luz Creek	Iron Manganese Nitrogen Sulfates
Gavilan HSA (902.22)	Sandia Creek	TDS	Sandia Creek	Iron Manganese Nitrogen Sulfates TDS	Sandia Creek	Iron Sulfates TDS
	Santa Margarita River (Upper)	Phosphorus	Santa Margarita River (Upper)	Phosphorus	Santa Margarita River (Upper)	Phosphorus Toxicity
Murrieta HSA (902.32)	NO LISTINGS	NOT APPLICABLE	Long Canyon Creek	TDS	Long Canyon Creek	Chlorpyrifos E. Coli Fecal Coliform Iron Manganese
French HSA (902.33)	NO LISTINGS	NOT APPLICABLE	NO LISTINGS	NOT APPLICABLE	Warm Springs Creek	Chlorpyrifos E. Coli Fecal Coliform Iron Manganese Phosphorus Total Nitrogen as N

Comparison of Riverside County 303(d) Listings (Cont'd)

Watershed[1]	2002 303(d) List		2006 303(d) List		2008 303(d) List[2]	
	Listed Water Body	Impairing Pollutants	Listed Water Body	Impairing Pollutants	Listed Water Body	Impairing Pollutants
Gertrudis HSA (902.42)	NO LISTINGS	NOT APPLICABLE	NO LISTINGS	NOT APPLICABLE	Santa Gertrudis Creek	Chlorpyrifos Copper E. Coli Fecal Coliform Iron Phosphorus
Pauba HSA (902.51)	NO LISTINGS	NOT APPLICABLE	Temecula Creek	TDS Phosphorus Nitrogen	Temecula Creek	Chlorpyrifos Copper Phosphorus TDS Toxicity
	NO LISTINGS	NOT APPLICABLE	NO LISTINGS	NOT APPLICABLE	Redhawk Channel	Chlorpyrifos Copper Diazinon E. Coli Fecal Coliform Iron Manganese Nitrogen Phosphorus TDS
Wolf HSA (902.52)	Murrieta Creek	Phosphorus	Murrieta Creek	Phosphorus	Murrieta Creek	Chlorpyrifos Copper Iron Manganese Nitrogen Phosphorus Toxicity

Notes:
1. Hydrologic subarea (HSA) within the Santa Margarita Hydrologic Unit (HU), located in the Riverside County portion of the San Diego Basin.
2. Water bodies and pollutants on the 2008 303(d) List were approved by the San Diego Water Board on December 18, 2009 and by the State Water Board on August 4, 2010, and are awaiting final approval by the USEPA.

Finding C.8. Trash is a persistent pollutant which can enter receiving waters from the MS4, accumulate and be transported downstream into receiving waters over time. Trash poses a serious threat to the beneficial uses of the receiving waters, including, but not limited to, human health, rare and endangered species, navigation and human recreation.

Discussion of Finding C.8. The Copermittees to date have documented high volumes of trash coming from the MS4 system and in receiving waters.[42]

The Basin Plan specifies the following narrative Water Quality Objective (WQO) for Floating Material:

> *"Waters shall not contain floating material, including solids, liquids, foams, and scum in concentrations which cause nuisance or adversely affect beneficial uses.*"

The Basin Plan specifies the following narrative WQO for Suspended and Settleable Solids: Material:

> *"Waters shall not contain suspended and settleable solids in concentrations of solids that cause nuisance or adversely affect beneficial uses.*"

Additionally, high density urban areas in Southern California have been shown to be responsible for up to 60 percent of the trash that enters receiving waters from the MS4.[43] The retrofitting of existing MS4 systems, such as catch basins, in targeted high trash areas can result in significant reductions in the amount of trash entering receiving waters from the MS4.

Trash, as litter in both solid and liquid form, is consistently found on and adjacent to roadways. A California Department of Transportation Litter Management Pilot Study found that of roadway trash, plastics and Styrofoam accounted for 33 percent of trash by weight, and 43 percent by volume. Further, the study found that approximately 80 percent of the litter associated with roadways was floatable, indicating that, without capture, this litter would enter Waters of the State after a storm event, resulting in the impairment of Beneficial Uses.[44] The study, however, relied upon a mesh capture size of 0.25 inches (6.35 millimeters). This size is too large to effectively capture plastic pre-production pellets (a.k.a. "nurdles"), which are roughly 3 mm in size, and likely underestimated the total contribution of plastics. Furthermore, pre-production plastic pellets, which are small enough to be easily digested, have been found to carry persistent organic pollutants, including PCBs and DDT.[45]

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[42] Fiscal Year 2008-2009 Santa Margarita Watershed Annual Report
[43] The City of Los Angeles Meets Trash TMDLs Compliance with CB Inserts and Opening Covers. August 06, 2008.
[44] California Department of Transportation District 7 Litter Management Pilot Study. June 26, 2000.
[45] Rios, L.M., Moore, C. and Patrick R. Jones. 2007. Persistent organic pollutants carried by synthetic polymers in the ocean environment. *Marine Pollution Bulletin.* Vol. 54.

Finding C.9. The Copermittees' water quality monitoring data submitted to date documents persistent violations of Basin Plan water quality objectives for various runoff-related pollutants (indicator bacteria, dissolved solids, turbidity, metals, pesticides, etc.) at various watershed monitoring stations. Persistent toxicity has also been observed at some watershed monitoring stations. In addition, bioassessment data indicate that the majority of the monitored receiving waters have Poor to Very Poor IBI ratings. In sum, the above findings indicate that runoff discharges are causing or contributing to water quality impairments, and are a leading cause of such impairments in Riverside County.

Discussion of Finding C.9. The Copermittees have produced data that demonstrates water quality objectives are frequently not met during dry and wet weather. The 2009 Report of Waste Discharge and the 2008-2009 Annual Reports document that receiving water monitoring stations often fail to meet water quality objectives established in the Basin Plan.

Water quality in receiving waters downstream of MS4 discharges fail to meet California Toxics Rule standards[46] and Basin Plan objectives. Data submitted in the MS4 Annual Reports indicate that at various times chemical, bacteria, pesticide, and metal concentrations may exceed water quality objectives in receiving waters in both wet and dry weather conditions.

There are no other significant NPDES permitted discharges to the creeks. For instance, there are no live-stream discharges of treated waste water in the Riverside County area of the Santa Margarita watershed. The few NPDES permits in the watershed are mainly for recycled water which only discharges occasionally during the rainy season. Because the water quality monitoring indicates exceedances of water quality standards and MS4 discharges are the main source of pollutants in the watersheds, it can be inferred that the MS4 discharges are causing or contributing to water quality impairments, and are a leading cause of such impairments in Riverside County.

Finding C.10. When natural vegetated pervious ground cover is converted to impervious surfaces such as paved highways, streets, rooftops, and parking lots, the natural absorption and infiltration abilities of the land are lost. Therefore, runoff leaving a developed area is significantly greater in runoff volume, velocity, and peak flow rate than pre-development runoff from the same area. Runoff durations can also increase as a result of flood control and other efforts to control peak flow rates. Increased volume, velocity, rate, and duration of runoff greatly accelerate the erosion of downstream natural channels. Significant declines in the biological integrity and physical habitat of streams and other receiving waters have been found to occur with as little as a 3-5 percent conversion from natural to impervious surfaces. The increased runoff characteristics from new development must be controlled to protect

[46] The California Toxics Rule criteria promulgated by the USEPA are directly applicable water quality standards for certain priority toxic pollutants in inland surface waters and enclosed bays and estuaries in California.

against increased erosion of channel beds and banks, sediment pollutant generation, or other impacts to beneficial uses and stream habitat due to increased erosive force.

Finding C.11. Development creates new pollution sources as human population density increases and brings with it proportionately higher levels of car emissions, car maintenance wastes, municipal sewage, pesticides, household hazardous wastes, pet wastes, trash, etc. which can either be washed or directly dumped into the MS4. As a result, the runoff leaving the developed area is significantly greater in pollutant load than the pre-development runoff from the same area. These increased pollutant loads must be controlled to protect downstream receiving water quality.

Discussion of Findings C.10 and C.11. The Natural Resources Defense Council (NRDC) 1999 Report, "*Stormwater Strategies, Community Responses to Runoff Pollution*" identifies two main causes of the storm water pollution problem in developed areas. Both causes are directly related to development:

1. Increased volume and velocity of surface runoff. There are three types of human-made impervious covers that increase the volume and velocity of runoff: (i) rooftop, (ii) transportation imperviousness, and (iii) non-porous (impervious) surfaces. As these impervious surfaces increase, infiltration will decrease, forcing more water to run off the surface, picking up speed and pollutants.

2. The concentration of pollutants in the runoff. Certain industrial, commercial, residential and construction activities are large contributors of pollutant concentrations in storm water runoff. As human population density increases, it brings with it proportionately higher levels of car emissions, car maintenance wastes, municipal sewage, pesticides, household hazardous wastes, pet wastes, trash, etc.

As a result of these two causes, runoff leaving developed areas is significantly greater in volume, velocity, and pollutant load than pre-development runoff from the same area.

By accommodating the traditional approach to storm water management, development has also altered the flow regime (rate, magnitude, frequency, timing, and flashiness of runoff) that supports aquatic and riparian habitats. These hydrologic changes are driven by the loss of water storage capacity in the watersheds,[47] and exacerbated by physical alterations of the stream channel network.[48] This relationship between development and stream channel integrity has been documented nationally and in southern California. The Copermittees support these findings in their 1993 DAMP,[49] which states:

[47] Konrad, Christopher P. and Derek K. Booth, 2005. *Hydrologic Changes in Urban Streams and Their Ecological Significance.* American Fisheries Society Symposium Vol.47 pp.157-177.
[48] Poff. N.L. et al. 1997. The Natural Flow Regime: A paradigm for river conservation and restoration. Bioscience Vol. 47, No. 11, pp.769-784.
[49] Riverside County Copermittees. 1993. Santa Margarita Regional Drainage Area Management Plan.

> "Many storm water runoff problems are primarily a consequence of urbanization. Water that previously soaked into the ground, removing pollutants by filtering through soil, and eventually replenishing groundwater supplies, now must flow overland and therefore enters local streams more rapidly. The rapid transport of water increases the erosion of stream banks and hillsides and does not permit filtering pollutants. Sediment carried by storm water runoff can build up in streambeds, harming fish and aquatic habitat. The sediment acts as a transport mechanism for pollutants which adhere to soil particles. Typical urban runoff pollutants found in surface waters include heavy metals, nutrients, petroleum products, sediment, bacteria, chemicals, and litter."

Hydrologic changes from development also directly and indirectly adversely affect wetlands. Natural wetlands support many beneficial uses and provide important water-quality related ecological services, including pollutant removal, flood attenuation, and groundwater recharge.[50] The Center for Watershed Protection recently provided USEPA with a synthesis of more than 100 scientific studies on the direct and indirect impacts of development, particularly urbanization, on wetlands and the role wetlands play in watershed quality. The report found that the three changes from land development with the most potential to impact wetlands include: Increased storm water runoff; decreased groundwater recharge; and flow constriction.[51] Each of these changes can often be avoided or minimized by implementing low impact development (LID) and hydromodification BMPs.

When Order No. R9-2004-001 was adopted, studies had shown that the level of imperviousness in an area strongly correlates with the quality of nearby receiving waters.[52] One comprehensive study, which looked at numerous areas, variables, and methods, revealed that stream degradation occurs at levels of imperviousness as low as 10 – 20 percent.[53] Stream degradation is a decline in the biological integrity and physical habitat conditions that are necessary to support natural biological diversity. For instance, few urban streams can support diverse benthic communities with imperviousness greater than or equal to 25 percent.[54] To provide some perspective, a medium density, single-family home area can be from 25 percent to 60 percent impervious (variation due to street and parking design).[55]

More recently, a report on the effects of impervious in southern California streams found that local ephemeral and intermittent streams are more sensitive to such effects than streams in other parts of the country. This study, by the Southern California

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[50] Wright, Tiffany, et al. 2006. "Direct and Indirect Impacts of Urbanization on Wetland Quality." Prepared by the Center for Watershed Protection. Available at: http://www.cwp.org. 81p.
[51] Ibid p.26
[52] USEPA, 1999. Part II. 40 CFR Parts 9, 122, 123, and 124. National Pollutant Discharge Elimination System – Regulations for Revision of the Water Pollution Control Program Addressing Storm Water Discharges; Final Rule. Federal Register.
[53] Ibid.
[54] Ibid.
[55] Schueler, T.R., 1994. The Importance of Imperviousness. Watershed Protection Techniques. As cited in 64 FR 68725.

Coastal Water Research Program, estimated a threshold of response at a two to three percent change in percent of impervious cover in a watershed. [56] This threshold is lower than the previously reported estimates by the USEPA that were cited in the Fact Sheet for Order No. R9-2004-001.

To demonstrate the principle of increased volume and velocity of runoff from urbanization, the figure below shows the flow rate of an urban vs. a natural stream. What the figure demonstrates is that urban stream flows have greater peaks and volumes, as well as shorter retention times than natural stream flows. The greater peak flows and volumes result in stream degradation through increased erosion of stream banks and damage to aquatic habitat. The shorter retention times result in less time for sediments and other pollutants to settle before being carried out to the ocean. This sediment, and the associated pollutants it carries, can be a significant cause of water quality degradation.

Flow Rate of Urban and Natural Streams[57]

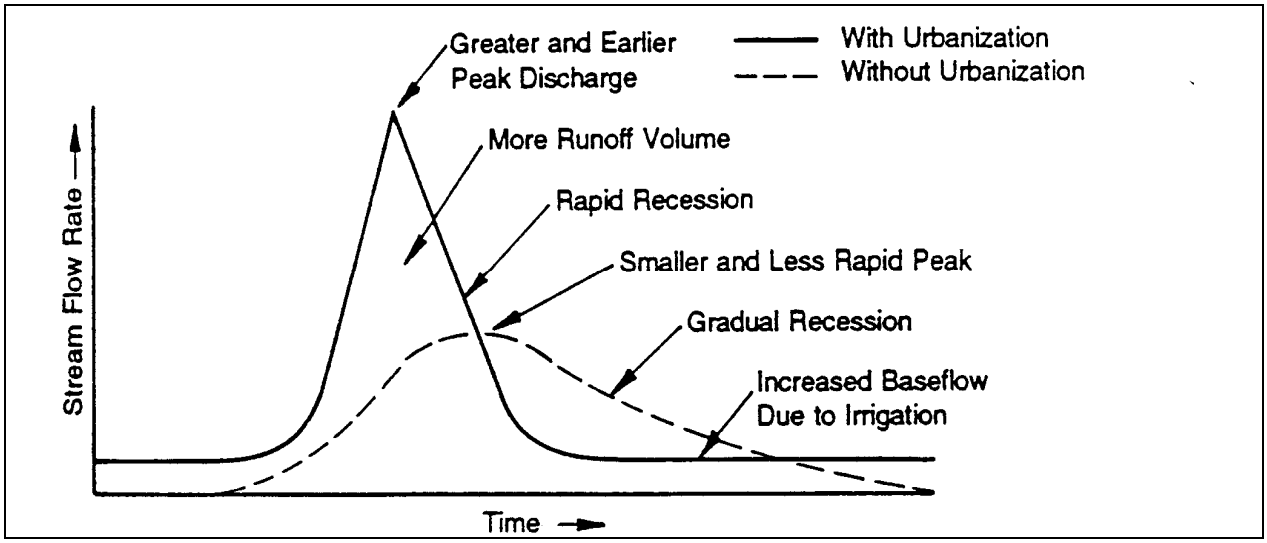

Increased volume and velocity of runoff adversely impacts receiving waters and their beneficial uses in many ways. According to the Urban Runoff TAC report,[58] increases in population density and imperviousness result in changes to stream hydrology including:

1. Increased peak discharges compared to pre-development levels;
2. Increased volume of storm water runoff with each storm compared to pre-development levels;

[56] Coleman, Derrick, et al. 2005. *Effect of Increases in Peak Flows and Imperviousness on the Morphology of Southern California Streams.* Technical Report No. 450 of the Southern California Coastal Water Research Project.
[57] Adapted from Schueler, T.R., 1987. Controlling Urban Runoff: A Practical Manual for Planning and Designing Urban BMPs. Metropolitan Washington Council of Governments.
[58] State Water Board, 1994. Urban Runoff Technical Advisory Committee Report and Recommendations. Nonpoint Source Management Program.

3. Decreased travel time to reach receiving water; increased frequency and severity of floods;
4. Reduced stream flow during prolonged periods of dry weather due to reduced levels of infiltration;
5. Increased runoff velocity during storms due to a combination of effects of higher discharge peaks, rapid time of concentration, and smoother hydraulic surfaces from channelization; and
6. Decreased infiltration and diminished ground water recharge.

Even though the rainfall depths in arid watersheds are lower, watershed development can greatly increase peak discharge rates during rare flood events.[59] A study conducted in arid watersheds around Riverside, CA showed that, over two decades, impervious cover increased from 9 percent to 22 percent, which resulted in an increase of more than 100 percent in the peak flow rate for the two-year storm event. The study also showed that the average annual storm water runoff volume had increased by 115 percent to 130 percent over the same time span.[60]

Flooding caused by the increased volume and velocity of runoff from urbanization in the upper Santa Margarita watershed are clear examples of the effects described above. Disastrous flooding has occurred more frequently in recent years. In the last century, flood events occurred in 1938, 1969, 1980, 1993, 1995, and 1998.[61] In the 1993 flood event, the Cities of Murrieta and Temecula sustained $12 million dollars in damage, and Camp Pendleton sustained $88 million in damage. Future flooding is expected to occur more frequently because of continued urban development within the watershed, and flood damages are expected to continue accruing at an estimated annual rate of $1,780,300.

Prior hydromodification studies in California have shown that the increase in impervious cover, and thus change in runoff volume, velocity, rate, and duration, results in a shift in the range of storms that produce geomorphically significant flows within receiving waters (see above discussion). Additionally, studies in California have determined that ninety percent of the geomorphic “work” done within channels receiving flows from developed areas now occurs from flows below the 10 year peak flow event.[62]

This increased volume, velocity, rate, and duration of runoff greatly accelerates the erosion of the beds and banks within downstream receiving waters. Additionally, storm water flows which runoff directly from impervious surfaces into the MS4 and thus receiving waters prevent the associated runoff of natural sediments which would occur in pre-project conditions. This combined alteration of the physical condition of storm water runoff results in accelerated downstream erosion of receiving water bed and

[59] Schueler and Holland, 2000. Storm Water Strategies for Arid and Semi-Arid Watersheds (Article 66). The Practice of Watershed Protection. P. 695-706.
[60] Ibid.
[61] U.S. Army Corps of Engineers, 2000. Final EIS/EIR, Murrieta Creek Flood Control Project.
[62] Santa Clara Valley Hydromodification Management Plan. April 21, 2005.

banks. The excessive erosion of stream beds and banks releases pollutants found in soils into receiving waters, degrades macroinvertebrate habitat (see D.2.c), eliminates spawning habitat, reduces associated wetland and riparian habitat, and threatens existing infrastructure adjacent to receiving waters. Bank sloughing within creeks and streams increases the pollutant loading to those receiving waters, particularly for turbidity and phosphorous.[63] In arid environments, accelerated channel erosion has been shown to have synergistic impacts within watersheds. Increased channel erosion within Las Vegas wash has resulted in the loss of over 1,000 acres of wetland and riparian habitat, released additional pollutants into downstream receiving waters, and eliminated in-stream habitat and water quality conditions required for existing threatened and endangered species.[64]

Regarding the impact of development on storm water runoff pollutant loads, the San Diego Water Board's Basin Plan states:

> *Nonpoint source pollution is primarily the result of man's uses of land such as urbanization, roads and highways, vehicles, agriculture, construction, industry, mineral extraction, physical habitat alteration (dredging/filling), hydromodification (diversion, impoundment, channelization), silviculture (logging), and other activities which disturb land.[65] As a result, when rain falls on and drains through urban freeways, industries, construction sites, and neighborhoods it picks up a multitude of pollutants. The pollutants can be dissolved in the runoff and quickly transported by gravity flow through a vast network of concrete channels and underground pipes referred to as storm water conveyance systems. Such systems ultimately discharge the polluted runoff, without treatment, into the nation's creeks, rivers, estuaries, bays, and oceans.[66]*

According to the Center for Watershed Protection, urbanization strongly shapes the quality of both surface and ground water in arid and semi-arid regions of the southwest. Since rain events are so rare, pollutants have more time to build up on impervious surfaces compared to humid regions. Therefore, the pollutant concentrations of storm water runoff from arid watersheds tend to be higher than that of humid watersheds.[67] The effect of antecedent rainfall events is demonstrated in a report from the California Department of Transportation (Caltrans) that found the concept of a seasonal first flush is applicable to the southern California climate.[68]

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[63] Sekely, A.C., Mulla, D.J. and D.W. Bauer. 2002. Streambank slumping and its contribution to the phosphorus and suspended sediment loads of the Blue Earth River, Minnesota. *Journal of Soil and Water Conservation.* September 2002 vol. 57 no. 5 243-250.

[64] Tuttle, P.L.. and E..L.. Orsak. 2002. Las Vegas Wash Water Quality and Implications to Fish and Wildlife. U.S. Fish and Wildlife Service.

[65] San Diego Water Board, 1994. Water Quality Control Plan for the San Diego Basin. P. 4-66.

[66] Ibid. P. 4-69 - 4-70.

[67] Schueler and Holland, 2000. Storm Water Strategies for Arid and Semi-Arid Watersheds (Article 66). The Practice of Watershed Protection. P. 695-706.

[68] Stenstrom, Michael and Masoud Kayhanian, 2005. *First Flush Phenomenon Characterization.* Prepared for Caltrans. Report No. CTSW-RT-05-73-02.6 Study jointly performed by UCLA and UCD. Most of the data presented was collected from three highly urbanized highway sites in west Los Angeles. Much effort went into developing a quantitative way of defining the mass first flush. Other aspects include: variability of water quality during storm events, litter characteristics, correlation among constituents, first flush of organics and particle size

Finding C.12. Development and urbanization especially threaten environmentally sensitive areas (ESAs), such as water bodies designated as supporting a RARE beneficial use (supporting rare, threatened or endangered species) and CWA 303(d)-impaired water bodies. Such areas have a much lower capacity to withstand pollutant loads than other, more sensitive areas. In essence, development that is ordinarily insignificant in its impact on the environment may become significant in a particularly sensitive environment. Therefore, additional controls to reduce storm water pollutants from new and existing development may be necessary for areas adjacent to or discharging directly to an ESA.

Discussion of Finding C.12. ESAs are defined in the Order as "Areas that include but are not limited to all CWA section 303(d) impaired water bodies; areas designated as Areas of Special Biological Significance by the Basin Plan; water bodies designated with the RARE beneficial use by the Basin Plan; areas designated as preserves or their equivalent under the Natural Communities Conservation Program within the Cities and County of Riverside; and any other equivalent environmentally sensitive areas which have been identified by the Copermittees."

Areas that meet this definition are inherently sensitive habitats containing unique, rare, threatened, or endangered species, or are not achieving their designated beneficial uses. As discussed above, runoff is known to contain a wide range of pollutants and has demonstrated toxicity to plants and animals. Therefore, it is necessary to apply additional storm water controls for developments within, adjacent to, or directly discharging to ESAs. This need for additional storm water controls is addressed within each component of the Order. USEPA supports the requirement for additional storm water controls, stating "For construction sites that discharge to receiving waters that do not support their designated use or other waters of special concern, additional construction site controls are probably warranted and should be strongly considered."[69] Further support for requiring additional controls to reduce pollutants in storm water discharges to ESAs can be found in *Mitigation of Storm Water Impacts From New Developments in Environmentally Sensitive Areas*, a technical report written by the Los Angeles Water Board.[70]

Finding C.13. Although dependent on several factors, the risks typically associated with properly managed infiltration of runoff (especially from residential land use areas) are not significant. The risks associated with infiltration can be managed by many techniques, including (1) designing landscape drainage features that promote infiltration of runoff, but do not "inject" runoff (injection bypasses the natural processes of filtering and transformation that occur in the soil); (2) taking reasonable steps to prevent the illegal disposal of wastes; (3) protecting footings and foundations; (4)

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distribution, new methods for measuring oil and grease, and grab and composite sampling strategies. The report is available on-line at: http://www.dot.ca.gov/hq/env/stormwater/special/newsetup/

[69] USEPA, 1992. Guidance Manual for the Preparation of Part II of the NPDES Permit Applications for Discharges from Municipal Separate Storm Sewer Systems. Washington D.C. EPA/833-B-92-002.

[70] Los Angeles Water Board, 2001. Mitigation of Storm Water Impacts From New Developments In Environmentally Sensitive Areas.

ensuring that each drainage feature is adequately maintained in perpetuity; and (5) pretreatment.

Discussion of Finding C.13. Infiltration is an effective means for managing runoff. However, measures must be taken to protect groundwater quality when infiltration of runoff is implemented. USEPA supports runoff infiltration and provides guidance for protection of groundwater: "With a reasonable degree of site-specific design considerations to compensate for soil characteristics, infiltration may be very effective in controlling both urban runoff quality and quantity problems. This strategy encourages infiltration of urban runoff to replace the natural infiltration capacity lost through urbanization and to use the natural filtering and sorption capacity of soils to remove pollutants; however, the potential for some types of urban runoff to contaminate groundwater through infiltration requires some restrictions."[71] The restrictions placed on runoff infiltration in this Order are based on recommendations provided by the USEPA Risk Reduction Engineering Laboratory. The State Water Board found in Order WQ 2000-11 on the appeal of the Los Angeles Water Board's Standard Urban Storm Water Mitigation Plan (SUSMP) requirements that the guidance provided in the above referenced document by the USEPA Risk Reduction Engineering Laboratory is sufficient for the protection of groundwater quality from runoff infiltration. To further protect groundwater quality, the Order also includes guidance from the Los Angeles Water Board,[72] the State of Washington,[73] and the State of Maryland.[74] Subsequently, the California Storm Water Quality Association (CASQA) has produced technical guidance for post-construction treatment BMPs to protect ground water quality[75].

Finding C.14. Non-storm water (dry weather) discharge from the MS4 is not considered a storm water (wet weather) discharge and therefore is not subject to regulation under the Maximum Extent Practicable (MEP) standard from CWA 402(p)(3)(B)(iii), which is explicitly for "Municipal … *Stormwater Discharges* (emphasis added)" from the MS4. Rather, non-storm water discharges into the storm sewers, per CWA 402(p)(3)(B)(ii), are to be effectively prohibited. Such dry weather non-storm water discharges have been shown to contribute significant levels of pollutants and flow in arid, developed Southern California watersheds and are to be effectively prohibited under the CWA.

[71] USEPA, 1994. Potential Groundwater Contamination from Intentional and Nonintentional Stormwater Infiltration. EPA 600 SR-94 051.
[72] Los Angeles Water Board, 2000. Standard Urban Storm Water Mitigation Plan for Los Angeles County and Cities in Los Angeles County.
[73] Washington State Department of Ecology, 1999. Draft Stormwater Management in Washington State. Volume V – Runoff Treatment BMPs. Pub. No. 99-15.
[74] Maryland Department of the Environment, 1999. 2000 Maryland Stormwater Design Manual. Volume I.
[75] CASQA. The New Development and Redevelopment Handbook, 2003. Available on-line at http://www.cabmphandbooks.org/Development.asp

Discussion of Finding C.14.

Permitting Framework

The CWA prohibits the discharge of any pollutant from a point source into waters of the United States unless the discharger of the pollutant(s) obtains a NPDES permit pursuant to CWA section 402. The discharge of storm water and/or non-storm water from an MS4 system is considered a discharge from a point source. As discussed below, however, the CWA regulates storm water and non-storm water discharges under different standards.

In 1987 the CWA was amended to include provisions that specifically concerned NPDES permitting requirements for storm water discharges from MS4 systems. Section 402(p) of the CWA regulates the discharge of storm water from a point source, the municipal separate storm sewers. Such discharges of storm water are subject to the maximum extent practicable (MEP) storm water standard and the related iterative process. The MEP standard for storm water discharges reflects Congress' recognition that the variability of flow and intensity of storm events render difficult strict compliance with water quality standards by MS4s. However, this standard was not considered applicable to non-storm water discharges, which under 402(p) are required to be effectively prohibited from entering the MS4. Clearly, if non-storm water discharges must be effectively prohibited from entering the MS4, the very next requirement (402(p)(3)(B)(iii)) requiring discharges from the MS4 be reduced to the MEP intends that the discharge of pollutants be limited to storm water. Unless exempt or authorized under a separate NPDES permit, non-storm water discharges are not authorized to enter the MS4 in the first instance and are considered to be illicit discharges.

The Federal Register further clarifies that such discharges through an MS4 are not authorized under the CWA (55 Federal Register (FR) 47995):

> "Today's rule defines the term "illicit discharge" to describe any discharge through a municipal separate storm sewer system that is not composed entirely of storm water and that is not covered by an NPDES permit. Such illicit discharges are not authorized under the Clean Water Act. Section 402(p(3)(B) requires that permits for discharges from municipal separate storm sewers require the municipality to "effectively prohibit" non-storm water discharges from the municipal separate storm sewer…Ultimately, such non-storm water discharges through a municipal separate storm sewer must either be removed from the system or become subject to an NPDES permit."

The federal regulations (40 CFR 122.26(d)(vi)(2)(B)) require that the municipal separate storm sewer discharger prohibit "through ordinance, order or similar means, illicit discharges to the municipal separate storm sewer." As owners and operators of the MS4, Copermittees cannot passively receive discharges from third parties (Federal Register 68766) and thus are responsible for the discharge of any non-storm water from their MS4.

The State Water Board recently recognized in order (Order WQ 2009-0008) that "[n]either the Clean Water Act nor the federal storm water regulations define 'non-storm water.' 'Illicit discharge' is defined as any discharge to an MS4 'not composed entirely of storm water.' Thus, 'illicit discharge' is the most nearly applicable definition of 'non-storm water' found in federal law and is often used interchangeably with that term."[76] In July 2010, the court in Los Angeles County v. State Water Resources Control Board remanded the Los Angeles Water Board's MS4 permit underlying Order WQ 2009-0008 for procedural reasons occurring during the permit adoption process. The court did not evaluate or rule upon the substantive findings and reasoning set forth in Order WQ 2009-0008. The State Water Board rescinded and voided Order WQ 2009-0008 to comply with the court's order. While the San Diego Water Board may no longer cite Order WQ 2009-0008, the San Diego Water Board has independently considered whether the requirement to eliminate non-stormwater discharges is subject to the MEP standard. The San Diego Water Board concludes that the MEP standard does not apply to non-stormwater discharges for the same reasons expressed by the State Water Board.

Storm Water and Non-storm Water Definitions

By definition non-storm water is not precipitation related. 40 CFR 122.26(b)(13) states that: "Storm water means storm water runoff, snowmelt runoff, and surface runoff and drainage." While "surface runoff and drainage" is not defined in federal law, it is related to precipitation events such as rain and/or snowmelt (see 55 FR 47995-96). The term "surface runoff and drainage" does not include all incidental flows in the MS4 system, but consists of flows relating to precipitation events as clarified by the Federal Register, USEPA's documents and permitting, and other Regional Water Board Orders.

The Federal Register (55 FR 47995-47996) provides clarification on the distinction between storm water and non-storm water discharges, including their regulation:

> "In response to the comments which requested EPA to define the term storm water broadly to include a number of classes of discharges **which are not in any way related to precipitation events, EPA believes that this rulemaking is not an appropriate forum for addressing the appropriate regulation of such non-storm water discharges**, even though some classes of non-storm water discharges may typically contain only minimal amounts of pollutants. Congress did not intend that the term storm water be used to describe any discharge that has a de minimis amount of pollutants, not did it intend for section 402(p) to be used to provide a moratorium from permitting other non-storm water discharges."

As recently recognized by the State Water Board in a precedential decision upholding an MS4 permit modification adopted by the Los Angeles Water Board, "U.S. EPA has previously rejected the notion that 'storm water,' as defined at 40 Code of Federal

[76] State Water Board Order WQ-2009-0008 (*In the Matter of the Petition of County of Los Angeles and Los Angeles County Flood Control District*, adopted August 4, 2009), p. 4.

Regulations section 122.26(b)(13), includes dry weather flows. In U.S. EPA's preamble to the storm water regulations, U.S. EPA rejected an attempt to define storm water to include categories of discharges 'not in any way related to precipitation events.'[77] Thus, USEPA has made it clear that it deems discharges unrelated to precipitation events to be non-storm water discharges. 40 CFR 122.26(d)(iv)(B) itself provides specific examples of non-storm water discharges:

> "…the following category of non-storm water discharges or flows shall only be addressed where such discharges are identified by the municipality as sources of pollutants to the United States: water line flushing, landscape irrigation, diverted stream flows, rising ground waters, uncontaminated groundwater infiltration (as defined at 40 CFR 35.2005(20) to separate storm sewers, uncontaminated pumped groundwater,…"

USEPA also removed street wash waters from the definition of storm water, as USEPA specifically identified this discharge as being non-storm water (55 FR page 47996). Additionally, section 1.2.2.2 of USEPA's Multi-Sector General Permit for Industrial Activities (MSGP-2000) considers fire hydrant flushings, irrigation drainage, landscape watering, and foundation or footing drains to be non-storm water discharges. USEPA's September 1999 Storm Water Management Fact Sheet for Non-Storm Water Discharges to Storm Sewers states that non-storm water discharges can include discharges of process water, air conditioning condensate, non-contact cooling water, vehicle wash water, or sanitary wastes.

While these types of non-storm water discharges (or illicit discharges) may be regulated under storm water permits because as a practical matter they can enter and be discharged from the MS4 systems, they are not regulated as storm water discharges under the CWA because they are unrelated to precipitation events. As indicated above, the State Water Board's recent discussion of this issue supports the conclusion that non-storm water discharges are unrelated to precipitation events. In its Order affirming amendments to the Los Angeles County MS4 permit to implement a TMDL to control bacteria in dry weather flows, the State Water Board rejected petitioners County of Los Angeles and the Los Angeles County Flood Control District implied assertion that the definition of "storm water" contained in the federal regulations (defined as "surface run-off and drainage") includes the run-off and drainage from non-storm events. The State Water Board notes that the challenged permit provisions do not apply to storm water flows in that they apply only during dry weather conditions as defined in the permit. In upholding the challenged order, the State Water Board notes that the Los Angeles Water Board's permit language followed USEPA's approach, referring to USEPA's rejection of attempts to define storm water to include categories of discharges "not in any way related to precipitation events."[78]

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[77] State Water Board Order WQ-2009-0008 (*In the Matter of the Petition of County of Los Angeles and Los Angeles County Flood Control District*, adopted August 4, 2009), p. 7.
[78] State Water Board Order WQ-2009-0008 (*In the Matter of the Petition of County of Los Angeles and Los Angeles County Flood Control District*, adopted August 4, 2009), p. 7 (quoting 55 FR 47990. 47995).

Lastly, the San Diego Water Board and State Water Board have issued multiple, separate NPDES permits for non-storm water discharges, including, but not limited to, San Diego Water Board Order No. R9-2008-0002 (extracted groundwater), San Diego Water Board Order No. R9-2002-0020 (hydrostatic discharge), and State Water Board Order No. 2006-0008-DWQ (utility vaults), pursuant to section 402 of the CWA.

Permitting Non-storm Water Discharges

Non-storm water discharges may contain pollutants which result from various activities that occur within areas draining into the MS4. This includes, but is not limited to, illicit discharges and connections, exempted categories of discharge not a source of pollutants (40 CFR 122.26(d)), and discharges into the MS4 covered under a separate NPDES permit. As such, existing and proposed discharges of non-storm water from MS4s:

a) Result from similar activities through the MS4 system;
b) Are the same type of water;
c) Require similar action levels for the protection of the Beneficial Uses of the receiving waters;
d) Require similar monitoring;
e) Are under the passive control of the owner and operator of the MS4 system; and
f) Are more appropriately regulated under a general permit than individual permits.

The U.S. EPA's approach (and the San Diego Water Board's under its approved program) for non-storm water discharges from MS4s is to regulate these discharges under the existing 402 NPDES framework (FR 47995 and 48037 see below) for discharges to surface waters. The NPDES program (40 CFR 122.44(d)) utilizes discharge prohibitions and effluent limitations as regulatory mechanisms to regulate non-storm water discharges, including the use of technology and water quality-based effluent limitations. Non-numerical effluent limitations, such as BMPs for non-storm water discharges may only be authorized where numerical effluent limits are infeasible or where the practices are reasonably necessary to achieve effluent limitations and standards or to carry out the purposes and intent of the CWA (40 CFR 122.44(k) see below).

The Federal Register (55, page 48037) provides clarification that non-storm water discharges from the MS4 are to be regulated under section 402, not 402(p):

> "Conveyances which continue to accept other "non-storm water" discharges (e.g. discharges without an NPDES permit) with the exceptions noted above (*exempted discharges that are not a source of pollutants*) do not meet the definition of municipal separate storm sewer and are not subject to 402(p)(3)(B) of the CWA unless such discharges are issued separate NPDES permits. Instead, conveyances which continue to accept non-storm water discharges

> which have not been issued separate NPDES permits are subject to sections 301 and 402 of the CWA."

This regulatory approach is consistent with the approach recently upheld by the State Water Board in a precedential order adopted on August 4, 2009. In this Order, the State Water Board rejected a challenge to amendments to the Los Angeles County MS4 permit that require compliance with receiving water limitations and discharge prohibitions for dry weather, non-storm water discharges. Petitioners there argued that the receiving water limits and discharge prohibitions for dry weather dischargers were inappropriate and that the Los Angeles Water Board should instead have regulated the discharges with the maximum extent practicable standard, through an iterative process. The State Water Board concludes that dry weather discharges, as defined in the permit and in the underlying TMDL, "are more appropriately regarded as non-storm water discharges, which the Clean Water Act requires to be effectively prohibited."[79]

As stated above, for NPDES permits under 402 of the CWA, the Code of Federal Regulations (122.44(k)) clarify that a discharger may utilize BMPs to control or abate the discharge of pollutants when:

> "(1) Authorized under section 304(e) of the CWA for the control of toxic pollutants and hazardous substances from ancillary industrial activities;
> (2) Authorized under section 402(p) of the CWA for the control of storm water discharges;
> (3) Numeric limits are infeasible; or
> (4) The practices are reasonably necessary to achieve effluent limitations and standards or to carry out the purposes and intent of the CWA."

For the last 20 years, Riverside County NPDES permits for discharges of storm water have regulated non-storm water discharges from the MS4. These permits required Copermittees (dischargers) to prohibit non-storm water discharges into (thus through and from) their MS4 systems, implement a program to prevent illicit discharges, and monitor to identify illicit discharges and exempted discharges that are a source of pollution. These measures are considered Best Management Practices (BMPs), are required to be included in NPDES permits issued under section 402(p) of the CWA, and are considered by USEPA to be an interim approach to permitting non-storm water discharges from the MS4 in accordance with section 402 of the CWA and CFR 122.44(k).

As explained in the discussion of Finding C.15., below, the Copermittees' reliance on BMPs for the past 20 years has not resulted in compliance with applicable water quality standards. The San Diego Water Board has evaluated (in accordance with 40 CFR 122.44(d)(1)) past and existing controls (BMPs), non-storm water monitoring results, the sensitivity of the species in receiving waters (e.g. endangered species),

[79] State Water Board Order WQ-2009-0008 (*In the Matter of the Petition of County of Los Angeles and Los Angeles County Flood Control District*, adopted August 4, 2009), p. 8

and the potential for effluent dilution, and has determined that existing BMPs to control pollutants in storm water discharges are not sufficient to protect water quality standards in receiving waters and the existing requirement that Copermittees effectively prohibit all types of unauthorized non-storm water discharges into the MS4 historically results in the discharge of pollutants to the receiving waters. Thus, numeric action levels for non-storm water, dry weather, discharges from the MS4 and required actions following observed exceedances of numeric action levels have been established. For further discussion regarding the development of action levels please see Finding E.10 and discussion.

Dry weather action levels are applicable to non-storm water discharges of effluent from the MS4 system. Non-storm water effluent discharges from the MS4 are those which occur during dry weather conditions. These action levels are not applied to storm water discharges, as defined within the Order. Storm water discharges regulated by the Order are required to meet the MEP standard and related iterative process and have separate action levels.

Dry weather action levels are applicable to non-storm water discharges from the MS4 system into receiving waters. Non-storm water discharges are already required to be prohibited unless specifically exempted or covered under a separate NPDES permit. Dry weather action levels apply to non-storm water discharges of effluent from a point source into receiving waters. The MS4 is not a receiving water. Should a discharger wish to discharge a non-exempt category to the MS4 system, such discharges require a separate NPDES permit pursuant to sections 402 and 301 of the CWA. It is also infeasible to monitor and sample every discharge into the MS4, as such discharges are diffuse by nature and may vary spatially and temporally.

Finding C.15. Non-storm water discharges to the MS4 granted an influent exception [i.e. which are exempt from the effective prohibition requirement set forth in CWA section 402(p)(3)(B)(ii)] under 40 CFR 122. 26 are included within this Order. Any exempted discharges identified by Copermittees as a source of pollutants are subsequently required to be *addressed* (emphasis added) as illicit discharges through prohibition and incorporation into existing IC/ID programs. Furthermore, the USEPA contemplates that permitting agencies such as the San Diego Water Board may also identify exempted discharges as a source of pollutants required to be addressed as illicit discharges (See Vol. 55 FR 48037). The San Diego Water Board and the Copermittees have identified landscape irrigation, irrigation water and lawn water, previously exempted discharges, as a source of pollutants and conveyance of pollutants to waters of the U.S.

Discussion of Finding C.15. The FR (Vol. 55, page 48037) and 40 CFR 122.26(d)(iv)(B) clarify that certain components and categories of non-storm water discharges into the MS4 are not required to be prohibited. The Code of Federal Regulations requires the discharger have:

> "…a program, including inspections, to implement through ordinance, orders or similar means to prevent illicit discharges to the municipal separate storm sewer system; this program shall address all types of illicit discharges, however, the following category of non-storm water discharges or flows shall only be addressed where such discharges are identified by the municipality as sources of pollutants to waters of the United States: water line flushing, landscape irrigation, diverted stream flows, rising ground waters, uncontaminated groundwater infiltration (as defined at 40 CFR 35.2005(20) to separate storm sewers, uncontaminated pumped groundwater,…"

The categories of non-storm water discharges into the MS4, as listed under 40 CFR 122.26(d)(iv)(B), are not required to be prohibited unless identified by the Copermittees as sources of pollutants to waters of the United States. The FR (Vol. 55, page 48037), however, goes on to clarify that:

> "However, the Director may include permit conditions that either require municipalities to prohibit or otherwise control any of these types of discharge where appropriate."

Thus, the Copermittees or the San Diego Water Board may identify any of these categories of non-storm water discharges as a source of pollutants. As such, the identification of any of these categories as a source of pollutants requires them to be addressed as illicit discharges, which are not authorized under the CWA, and are required to be "effectively prohibited" as illicit discharges via ordinance, order or similar means. The prohibition of previously exempted discharges of non-storm water to waters of the United States from entering, and necessarily being discharged from an MS4, conforms with CWA requirements for standards and enforcement for effluent limitations necessary to meet water quality standards (33 U.S.C. 1311(b)(1)(C)).

To date the San Diego Water Board and the Copermittees have identified overspray and drainage from potable and reclaimed water landscape irrigation as a substantial source and conveyance mechanism for pollutants into waters of the United States. Several municipalities throughout the San Diego Region (e.g., cities and counties of Orange County and San Diego County) have reported and/or identified runoff originating from landscape irrigation as potential sources of dry weather flows conveying pollutants into their MS4s. This is also supported by legislation (Assembly Bill 1881) recently enacted by the State of California, which has identified runoff resulting from over irrigation not only as a waste of water resources, but also as a source of pollutants to the state's waterways.

Irrigation runoff into the MS4, as identified by the San Diego Water Board and the Copermittees, is a source of pollutants to waters of the United States, and is required to be *addressed* (emphasis added) as an illicit discharge per 40 CFR 122.26(d)(2)(iv)(B)(1) by prohibition through implementing and enforcing an ordinance, order or similar means. The San Diego Water Board and the Copermittees have identified irrigation water as a source of pollutants and conveyance of pollutants to waters of the United States, when

applied improperly in excess and thereafter entering the MS4, in the following documents:

- The Cities and County of Riverside "Only Rain in the Storm Drain" Pollution Prevention Program identifies runoff from irrigation as a source of pollutants to waters of the United States in the following documents:

    1) The Landscape and Garden public education brochure states:

    "Soil, yard wastes, over-watering [emphasis added] *and garden chemicals become part of the urban runoff mix that winds it way through streets, gutters and storm drains before entering lakes, rivers, streams, etc."*

    2) In a survey distributed at public outreach events,[80] the answer to the question about where lawn irrigation water goes states:

    "Water that leaves your lawn from irrigation…can pick up motor oil and grease from vehicles, excess fertilizer from your lawn, bacteria from pet waste, and excess pesticides from your yard. These pollutants can be carried down streets and storm drains directly to our streams, lakes and rivers without treatment!"

- In 2006, the State Water Board allocated Grant funding to the **SmartTimer/Edgescape Evaluation Program (SEEP)**. The project targets irrigation runoff by retrofitting existing development and documenting the conservation and runoff improvements. The Grant Application states that:

    "*Irrigation runoff contributes flow & pollutant loads to creeks and beaches that are 303(d) listed for bacteria indicators.*"

    Furthermore, the grant application states:

    "*Regional program managers agree that the reduction and/or elimination of irrigation-related urban flows and associated pollutant loads may be key to successful attainment of water quality and beneficial use goals as outlined in the San Diego Basin Plan and Bacteria TMDL over the long term.*"

    This is reinforced in the project descriptions and objectives:

    "*Elevated dry-weather storm drain flows, composed primarily … of landscape irrigation water wasted as runoff, carry pollutants that impair recreational use and aquatic habitats all along Southern California's*

[80] A copy of the survey was provided in the Riverside County Copermittees' Report of Waste Discharge, dated January 15, 2009, page 39.

urbanized coastline. Storm drain systems carry the wasted water, along with landscape derived pollutants such as bacteria, nutrients and pesticides, to local creeks and the ocean. Given the local Mediterranean climate, excessive perennial dry season stream flows are an unnatural hydrologic pattern, causing species shifts in local riparian communities and warm, unseasonal contaminated freshwater plumes in the near-shore marine environment".

The basis of this grant project is that over-irrigation (landscape irrigation, irrigation water and lawn watering) into the MS4 is a source and conveyance of pollutants. In addition, they indicate that this alteration of natural flows is impacting the Beneficial Uses of Waters of the State and U.S. The results of this study can be applied broadly to any area where over-irrigation takes place, including Riverside County. Preliminary results from the study indicate that that over-irrigation (landscape irrigation, irrigation water and lawn watering) into the MS4 *is* a source and conveyance of pollutants.

- Several municipalities in the San Diego Region have identified runoff from irrigation as a source of pollutants to waters of the United States in the following documents:

  1) The **Watershed Action Plan Annual Report**(s) for the 2006-2007 reporting period was submitted by the County of Orange, Orange County Flood Control District and Copermittees within the San Juan Creek, Laguna Coastal Streams, Aliso Creek, and Dana Point Coastal Streams Watersheds. San Juan Creek, Laguna Coastal Streams, Aliso Creek and Dana Point Coastal Streams are all currently 303(d) listed as impaired for Indicator Bacteria within their watersheds and/or in the Pacific Ocean at the discharge points of their watersheds. The Orange County Copermittees, within their Watershed Action Strategy Table for Fecal Indicator Bacteria:

     "*Support programs to reduce or eliminate the discharge of anthropogenic dry weather nuisance flow throughout the […] watershed. Dry weather flow is the transport medium for bacteria and other 303(d) constituents of concern*". Additionally, they state that "*conditions in the MS4 contribute to high seasonal bacteria propagation in-pipe during warm weather. Landscape irrigation is a major contributor to dry weather flow, both as surface runoff due to over-irrigation and overspray onto pavements; and as subsurface seepage that finds its way into the MS4*."

  2) The **Carlsbad Watershed Urban Runoff Management Program (WURMP) Fiscal Year 2008 Annual Report** was submitted by the Carlsbad Watershed Copermittees (Cities of Carlsbad, Encinitas, Escondido, Oceanside, San Marcos, Solana Beach, and Vista, and the County of San Diego). In the WUMRP Annual Report, the Carlsbad

Watershed Copermittees stated the following:

"The Carlsbad Watershed Management Area (WMA) collective watershed strategy identifies bacteria, sediment, and nutrients as high priority water quality pollutants in the Agua Hedionda (904.3 – bacteria and sediment), Buena Vista (904.2 – bacteria), and San Marcos Creek (904.5 – nutrients) Hydrologic Areas. Bacteria, sediment, and nutrients have been identified as potential discharges from over-irrigation."

3) The **San Diego Bay Watershed Urban Runoff Management Program (WURMP) 2007-2008 Annual Report** was submitted by the San Diego Bay Watershed Copermittees (Cities of Chula Vista, Coronado, Imperial Beach, La Mesa, Lemon Grove, National City, and San Diego, the County of San Diego, the Port of San Diego, and the San Diego County Airport Authority). In Appendix D of the WUMRP Annual Report, titled Likely Sources of Pollutants, the San Diego Bay Watershed Copermittees identified over-irrigation of lawns as a pollutant generating activity from business and/or residential land uses for bacteria, pesticides, and sediment.

Within the reports above, municipalities throughout San Diego and Orange counties have acknowledged that runoff from over-irrigation is a potential or likely source of several types of pollutants to waters of the United States. Because there are landscaped areas in Riverside County that receive irrigation similar to San Diego and Orange counties, runoff from over-irrigation is also a likely source of pollutants to waters of the United States in Riverside County.

- There is statewide recognition of the pollution caused by over-irrigation, and current legislation already requires cities and counties to prohibit over-irrigation. On September 28, 2006 Governor Arnold Schwarzenegger approved Assembly Bill 1881, The Water Conservation in Landscaping Act (AB 1881, Laird). The act requires cities, counties, and charter cities and charter counties, to adopt landscape water conservation ordinances by January 1, 2010. Additionally, the law required the Department of Water Resources (DWR) to prepare a Model Water Efficient Landscape Ordinance for use by local agencies. The Water Efficient Landscape Ordinance was approved by the Office of Administrative Law on September 10, 2009. All local agencies were required to adopt a water efficient landscape ordinance by January 1, 2010. Local agencies could adopt the Water Efficient Landscape Ordinance developed by DWR, or an ordinance considered at least as effective as the Model Ordinance. The Water Efficient Landscape Ordinance includes a requirement that local agencies prohibit runoff from irrigation (§ 493.2):

  "(a) Local agencies shall prevent water waste resulting from inefficient landscape irrigation by prohibiting runoff *[emphasis added] from leaving the target landscape due to low head drainage, overspray, or other*

similar conditions where water flows onto adjacent property, non-irrigated areas, walks, roadways, parking lots, or structures. Penalties for violation of these prohibitions shall be established locally."

- On October 08, 2009, the State of California Department of Water Resources issued a letter to all cities and counties within the State of California giving reminder of required adoption of the Water Efficient Landscape Ordinance. The letter states that:

  "Other benefits include reduced irrigation runoff, reduced pollution of waterways, drought resistance, and less green waste."

- On December 18, 2009, the San Diego Water Board adopted Order No. R9-2009-0002, the fourth-term Orange County permit, which found that over-irrigation (landscape irrigation, irrigation water and lawn watering) into the MS4 is a source and conveyance of pollutants. Landscape irrigation, irrigation water, and lawn watering were categories removed from the list of non-storm water discharges not prohibited to be discharged into the MS4.

D. Runoff Management Programs

Finding D.1.a. This Order specifies requirements necessary for the Copermittees to reduce the discharge of pollutants in storm water to the MEP. However, since MEP is a dynamic performance standard, which evolves over time as runoff management knowledge increases, the Copermittees' runoff management programs must continually be assessed and modified to incorporate improved programs, control measures, best management practices (BMPs), etc. in order to achieve the evolving MEP standard. Absent evidence to the contrary, this continual assessment, revision, and improvement of runoff management program implementation is expected to ultimately achieve compliance with water quality standards in the Region.

Discussion of Finding D.1.a. Under CWA section 402(p), municipalities are required to reduce the discharge of storm water pollutants from their MS4s to the maximum extent practicable (MEP). MEP is the critical technology-based performance standard that municipalities must attain. The MEP standard is an ever-evolving, flexible, and advancing concept, which considers technical and economic feasibility. As knowledge about controlling storm water runoff continues to evolve, so does that which constitutes MEP. Reducing the discharge of storm water pollutants to the MEP requires Copermittees to assess each program component and revise activities, control measures, best management practices (BMPs), and measurable goals, as necessary to meet MEP.

To achieve the MEP standard, municipalities must employ whatever BMPs are technically feasible (i.e. are likely to be effective) and are not cost prohibitive. The major emphasis is on technical feasibility. Reducing storm water pollutants to the MEP means choosing effective BMPs, and rejecting applicable BMPs only where other effective BMPs will serve the same purpose, or the BMPs would not be technically feasible, or the cost would be prohibitive. In selecting BMPs to achieve the MEP standard, the following factors may be useful to consider:

1. Effectiveness: Will the BMPs address a pollutant (or pollutant source) of concern?
2. Regulatory Compliance: Is the BMP in compliance with storm water regulations as well as other environmental regulations?
3. Public Acceptance: Does the BMP have public support?
4. Cost: Will the cost of implementing the BMP have a reasonable relationship to the pollution control benefits to be achieved?
5. Technical Feasibility: Is the BMP technically feasible considering soils, geography, water resources, etc?

If a municipality reviews a lengthy menu of BMPs and chooses to select only a few of the least expensive BMPs, it is likely that MEP has not been met. On the other hand, if a municipal discharger employs all applicable BMPs except those where it can show that they are not technically feasible in the locality, or whose cost is prohibitive, it

would have met the standard. Where a choice may be made between two BMPs that should provide generally comparable effectiveness, the discharger may choose the least expensive alternative and exclude the more expensive BMP. However, it would not be acceptable either to reject all BMPs that would address a pollutant source, or to pick a BMP based solely on cost, which would be clearly less effective. In selecting BMPs the municipality must make a serious attempt to comply and practical solutions may not be easily dismissed. In any case, the burden is on the municipal discharger to comply with its permit. After selecting BMPs, it is the responsibility of the discharger to ensure that all BMPs are implemented.[81]

A definition of MEP is not provided in either the federal statute or in the federal regulations. The final determination regarding whether a municipality has reduced storm water pollutants to the MEP can only be made by the San Diego Water Board or the State Water Board, and not by the municipal discharger. While the San Diego Water Board or the State Water Board ultimately define MEP, it is the responsibility of the Copermittees to initially propose actions that implement BMPs to reduce storm water pollution to the MEP. In other words, the Copermittees' runoff management programs to be developed under the Order are the Copermittees' proposals of MEP. Their total collective and individual activities conducted pursuant to their runoff management programs become their proposal for MEP as it applies both to their overall effort, as well as to specific activities. The Order provides a minimum framework to guide the Copermittees in meeting the MEP standard for storm water.

It is the San Diego Water Board's responsibility to evaluate the proposed programs and specific BMPs to determine what constitutes MEP, using the above guidance and the court's 1994 decision in NRDC v. California Department of Transportation, Federal District Court, Central District of California. The federal court stated that a Copermittee must evaluate and implement BMPs except where (1) other effective BMPs will achieve greater or substantially similar pollution control benefits; (2) the BMP is not technically feasible; or (3) the cost of BMP implementation greatly outweighs the pollution control benefits. In the absence of a proposal acceptable to the San Diego Water Board, the San Diego Water Board will define MEP by requiring implementation of additional measures by the Copermittees.

The Copermittees' continual evolution in meeting the MEP standard is expected to achieve compliance with water quality standards. USEPA has consistently supported this expectation. In its Interim Permitting Approach for Water Quality-Based Effluent Limitations (WQBELs) in Storm Water Permits, USEPA states "the interim permitting approach uses best management practices (BMPs) in first-round storm water permits, and expanded or better-tailored BMPs in subsequent permits, where necessary, to provide for attainment of water quality standards."[82] USEPA reiterated its position in 1999, when it stated regarding the Phase II municipal storm water regulations that "successive iterations of the mix of BMPs and measurable goals will be driven by the objective of assuring maintenance of water quality standards" and "EPA anticipates

[81] State Water Board, 1993. Memo Entitled Definition of Maximum Extent Practicable.
[82] Federal Register / Vol. 61, No. 166 / August 26, 1996 / P. 43761.

that a permit for a regulated small MS4 operator implementing BMPs to satisfy the six minimum control measures will be sufficiently stringent to protect water quality, including water quality standards […].”[83]

The requirements of the Order are expected to achieve compliance with receiving water quality standards. The approach to be used is the continual assessment, revision, and improvement of Copermittee best management practice implementation. This approach is consistent with the CWA and State Water Board guidance. In Defenders of Wildlife v. Browner (1999, 197 F. 3d 1035), the United States Court of Appeals for the Ninth Circuit states: “Under 33 U.S.C. section 1342 (p)(3)(B)(iii), the EPA’s choice to include either management practices or numeric limitations in the permits was within its discretion.” In addition, the approach is consistent with State Water Board Order WQ 99-05, which outlines an iterative approach for achieving compliance with water quality standards.

Finding D.1.b. The Copermittees have generally been implementing the Jurisdictional Runoff Management Programs (JRMPs) required pursuant to Order No. R9-2004-001 since July 14, 2005. Prior to that, the Copermittees were regulated by Order No. 98-02 since May 13, 1998. MS4 discharges, however, continue to cause or contribute to violations of water quality standards as evidenced by the Copermittees’ monitoring results.[84]

Discussion of Finding D.1.b. In response to Order No. R9-2004-001, the Copermittees have developed their runoff management programs. In order to implement the plans, the Copermittees have, among other things, developed BMP requirements, improved inter- and intra-governmental coordination, improved training programs, improved illicit discharge detection procedures, and improved their monitoring efforts. Although the programmatic improvements have led to better implementation of BMPs, the Copermittees’ monitoring data demonstrate that additional or revised BMPs are necessary to prevent discharges from MS4s from causing and contributing to violations of water quality standards. A discussion of data collected by the Copermittees is included in the discussion for Finding C.9.

Finding D.1.c. This Order contains new or modified requirements that are necessary to improve Copermittees’ efforts to reduce the discharge of pollutants in storm water runoff to the MEP and achieve water quality standards. Some of the new or modified requirements, such as the revised Watershed Water Quality Workplan (Watershed Workplan) section, are designed to specifically address these high priority water quality problems. Other requirements, such as for unpaved roads, are a result of San Diego Water Board’s identification of water quality problems through investigations and complaints during the previous permit period. Other new or modified requirements address program deficiencies that have been noted during audits, report reviews, and other San Diego Water Board compliance assessment activities.

[83] Federal Register / Vol. 64, No. 235 / Wednesday, December 8, 1999 / Rules and Regulations. P. 68753-68754.
[84] County of Riverside, 2009. Riverside County Municipal Copermittees 2008-09 Annual Storm Water Program Report, Section 11..

Additional changes in the monitoring program provide consistency with the Code of Federal Regulations, USEPA guidance, State Water Board guidance, and the Southern California Monitoring Coalition recommendations.

Discussion of Finding D.1.c. The Copermittees are required to update and expand their runoff management programs on jurisdictional and watershed levels in order to improve their efforts to reduce the contribution of storm water pollutants in runoff to the MEP and meet water quality standards. Changes to Order No. R9-2004-001's requirements have been made to help ensure these two standards are achieved by the Copermittees.

The Orders' jurisdictional requirements have changed based on findings by the San Diego Water Board during typical compliance assurance activities, audits, or receipt of complaints.[85] Where the audits found common implementation problems, requirements have been altered to better ensure compliance. In addition, the San Diego Water Board conducted reviews of the jurisdictional annual reports submitted by the Copermittees. Updates to the requirements for the Copermittees' programs are also based in part on information found in the Copermittees' ROWD,[86] requirements that were included in the San Diego and Orange County MS4 permits, and discussions with the Riverside County Copermittees.

To better focus on attainment of water quality standards, the Order's jurisdictional and watershed requirements have been improved. The conditions of the receiving waters now drive management actions, which in turn focus diminishing resources on the highest priority water quality problems within the receiving waters in the watershed. Improvements to jurisdictional and watershed requirements were also made to facilitate a mutually clear understanding of the requirements between the San Diego Water Board and Copermittees.

During the previous permit period, the San Diego Water Board identified, through investigations and complaints, sediment discharges from unpaved roads as a significant source of water quality problems in the Riverside County portion of the San Diego Region. Enforcement and inspection activities conducted by the San Diego Water Board during the previous permit term have found a lack of source control for many unpaved roads within the jurisdiction of the Copermittees. Unpaved roads are a source of sediment that can be discharged in runoff to receiving waters, especially during storm events. Erosion of unpaved roadways occurs when soil particles are loosened and carried away from the roadway base, ditch, or road bank by water, wind, traffic, or other transport means. Exposed soils, high runoff velocities and volumes, sandy or silty soil types, and poor compaction increase the potential for erosion.

Road construction, culvert installation, and other maintenance activities can disturb the soil and drainage patterns to streams in undeveloped areas, causing excess runoff

[85] Audit reports, report reviews, and inspection reports are available for review at the San Diego Water Board office.
[86] All significant changes made to the Order's requirements are described and explained in detail in Fact Sheet section IX.

and thereby erosion and the release of sediment. Poorly designed roads can act as preferential drainage pathways that carry runoff and sediment into natural streams, impacting water quality. In addition, other public works activities along unpaved roads have the potential to significantly affect sediment discharge and transport within streams and other waterways, which can degrade the beneficial uses of those waterways.

USEPA also recognizes that discharges from unpaved roads are a threat to water quality. USEPA guidance[87] emphasizes the threat of unpaved roads to water quality:

> "*Dirt and gravel roads are a major potential source of these pollutants [sediment] and pollutants that bind to sediment such as oils, nutrients, pesticides, herbicides, and other toxic substances]. Many roads have unstable surfaces and bases. Roads act like dams, concentrating flows that accelerate erosion of road materials and roadsides. Both unstable surfaces and accelerated erosion then lead to sediment and dust.*"

There are several guidance documents, developed by the USEPA,[88] the US Forest Service,[89] the University of California,[90] and others, that include design and construction specifications and BMPs that are readily available for implementation by private and public entities. Implementing design and other source control BMPs for unpaved roads in the region is necessary to reduce and minimize the impacts of sediment discharged during storm events from unpaved roads to the MS4s and receiving waters.

Finding D.1.d. Updated individual Storm Water Management Plans (individual SWMPs or JRMPs) and Watershed Stormwater Management Plans (watershed SWMPs or Watershed Workplans), which, together with references in the DAMP, describe the Copermittees' runoff management programs in their entirety, are needed to guide the Copermittees' runoff management efforts and aid the Copermittees in tracking runoff management program implementation. Hereinafter, the individual SWMP is referred to as the JRMPs and the Watershed SWMP is referred to as the Watershed Workplan. It is practicable for the Copermittees to update the JRMPs and Watershed Workplans within the timeframe specified in this Order, since significant efforts to develop these programs have already occurred.

Discussion of Finding D.1.d. Development of runoff management plans is a crucial runoff management measure and should be considered a BMP. The plans help organize and focus the Copermittees' programs and guide their implementation. In its statewide assessment report to USEPA Region IX and the State Water Board, Tetra

[87] USEPA 2006 "Environmentally Sensitive Maintenance for Dirt and Gravel Roads." Gesford and Anderson, USEPA-PA-2005.
[88] Ibid.
[89] US Forest Service, 1996. Forest Service Specifications for Construction of Roads & Bridges. EM-7720-100. Revised August 1996.
[90] University of California Division of Agriculture and Natural Resources, 2007. Rural Roads: A Construction and Maintenance Guide of California Landowners. Publication 8262.

Tech, Inc. concluded that the lack of a master storm water planning document must be considered a serious program deficiency[91]. When submitted to the San Diego Water Board, the plans provide useful correspondence between the Copermittees and the San Diego Water Board. The Plans also become available for review by the public, and thus facilitate public participation in runoff management decisions. Finally, while development and submittal of runoff management plans are not necessary to ensure compliance of the Copermittees' runoff management programs with the Order, the San Diego Water Board is provided with a means to track Copermittee implementation.

The focus of the Order is on development and implementation of storm water programs which meet MEP, rather than creation of Copermittee plans which exhibit MEP. While the Order does not rely upon the plans to ensure MEP and other standards are achieved, the plans still serve a useful purpose. As stated above, the plans serve to organize the Copermittees' efforts to address runoff. As a practical matter, any program of the size required by the Order should be documented in writing. This serves to guide implementation of the program by the numerous individuals responsible for program implementation.

Runoff management plans are not necessary for ensuring compliance with the Order because the Order itself contains sufficient detailed requirements to ensure that compliance with discharge prohibitions, receiving water limitations, and the narrative standard of MEP for storm water are achieved. Implementation by the Copermittees of programs in compliance with the Order's requirements, prohibitions, and receiving water limitations is the pertinent compliance standard to be used under the Order, as opposed to assessing compliance by reviewing the Copermittees' implementation of their plans alone. The San Diego Water Board ensures compliance with the Order by reviewing annual reports, conducting inspections, performing audits, and through other general program oversight.

Runoff management plans are particularly important and useful for municipalities when program implementation is spread across several departments and/or when municipalities experience staff turnover.[92] Each Copermittee relies on multiple employees or contractors for program implementation, but the spread of responsibility varies among Copermittees.[93] Written jurisdictional plans ensure appropriate coordination within each municipality.

Copermittees' runoff management plans are simply descriptions of their runoff management programs required under the Order. These plans serve as procedural correspondence which guides program implementation and aids the Copermittees and San Diego Water Board in tracking implementation of the programs. In this manner,

[91] Tetra Tech, Inc. 2006. *Assessment Report on Tetra Tech's Support of California's MS4 Stormwater Program.* Produced for USEPA Region IX and the California State and Regional Water Quality Control Boards.
[92] Tetra Tech, Inc. 2005. Program Evaluation Report. Orange County Storm Water Program: Cities of Laguna Beach, Laguna Hills, Lake Forest, and Rancho Santa Margarita.
[93] Responsible departments and employees are described in the 2005-06 Annual Reports for the MS4 programs.

the plans are not functional equivalents of the Order. For these reasons, the Copermittees' runoff management plans need not be an enforceable part of the Order.

The Copermittees' plans and programs can be updated on or before June 30, 2012 because much of their plans and programs are already in existence. In fact, many parts of their plans and programs have been in place for 15 years. Moreover, the adoption of Order No. R9-2004-001 required a larger scale reorganization of the Copermittees' programs than Order No. R9-2010-0016, but also only allowed one year for program updates. The Copermittees were generally able to meet the time schedule required under Order No. R9-2004-001. After discussions with the Copermittees, based on the timing of the adoption of the Order and the Copermittee's fiscal planning cycles, in conjunction with consideration for the current economic conditions, the San Diego Water Board agreed that additional time to update the Copermittees' plans and programs may be warranted. Thus, the Copermittees must update their plans and programs on or before June 30, 2012, which provides the Copermittees over 18 months, instead of 1 year, to update their plans and programs.

Finding D.1.e. Pollutants can be effectively reduced in storm water runoff by the application of a combination of pollution prevention, source control, and treatment control BMPs. Pollution prevention is the reduction or elimination of pollutant generation at its source and is the best "first line of defense". Source control BMPs (both structural and non-structural) minimize the contact between pollutants and flows (e.g., rerouting run-on around pollutant sources or keeping pollutants on-site and out of receiving waters). Treatment control BMPs remove pollutants that have been mobilized by wet-weather or dry-weather flows.

Discussion of Finding D.1.e. The State Water Board finds in its Order WQ 98-01 that BMPs are effective in reducing pollutants in storm water runoff, stating that "implementation of BMPs [is] generally the most appropriate form of effluent limitations when designed to satisfy technology requirements, including reduction of pollutants to the maximum extent practicable." A State Water Board TAC further supports this finding by recommending "that nonpoint source pollution control can be accomplished most effectively by giving priority to [BMPs] in the following order:

1. Pollution Prevention – implementation of practices that use or promote pollution free alternatives;
2. Source Control – implementation of control measures that focus on preventing or minimizing urban runoff from contacting pollution sources;
3. Treatment Control – implementation of practices that require treatment of polluted runoff either onsite or offsite."[94]

Pollution prevention, the reduction or elimination of pollutant generation at its source, is an essential aspect of BMP implementation. Fewer pollutants are available to be washed from developed areas when the generation of pollutants by activities is limited.

[94] State Water Board, 1994. Urban Runoff Technical Advisory Committee Report and Recommendations. Nonpoint Source Management Program.

Thus, pollutant loads in storm water discharges are reduced from these areas. In addition, there is no need to control or treat pollutants that are never generated. Furthermore, pollution prevention BMPs are generally more cost effective than removal of pollutants by treatment facilities or cleanup of contaminated media.[95,96]

In the Pollution Prevention Act of 1990, Congress established a national policy that emphasizes pollution prevention over control and treatment. CWC section 13263.3(a) also supports pollution prevention, stating "The Legislature finds and declares that pollution prevention should be the first step in a hierarchy for reducing pollution and managing wastes, and to achieve environmental stewardship for society. The Legislature also finds and declares that pollution prevention is necessary to support the federal goal of zero discharge of pollutants into navigable waters." Finally, the Basin Plan also supports this finding by stating "To eliminate pollutants in storm water, one can either clean it up by removing pollutants or prevent it from becoming polluted in the first place. Because of the overwhelming volume of storm water and the enormous costs associated with pollutant removal, pollution prevention is the only approach that makes sense."[97]

USEPA also supports the utilization of a combination of BMPs to address pollutants in runoff. For example, USEPA has found there has been success in addressing illicit discharge related problems through BMP initiatives like storm drain stenciling and recycling programs, including household hazardous waste special collection days.[98] Structural BMP performance data has also been compiled and summarized by USEPA.[99]

The summary provides the performance ranges of various types of structural BMPs for removing suspended solids, nutrients, pathogens, and metals from storm water flows. These pollutants are generally a concern in storm water in the San Diego Region and Riverside County. For suspended solids, the least effective structural BMP type was found to remove 30-65 percent of the pollutant load, while the most effective was found to remove 65-100 percent of the pollutant load. For nutrients, the least effective structural BMP type was found to remove 15-45 percent of the pollutant load, while the most effective was found to remove 65-100 percent of the pollutant load. For pathogens, the least effective structural BMP type was found to remove <30 percent of the pollutant load, while the most effective was found to remove 65-100 percent of the pollutant load. For metals, the least effective structural BMP type was found to

[95] Devinny, J.S. et al. 2004. *Alternative Approaches to Stormwater Quality Control.* Prepared for the Los Angeles Regional Water Quality Control Board. Found as Appendix H to *NPDES Stormwater Cost Survey.* Prepared for the California State Water Resources Control Board by the Office of Water Programs California State University, Sacramento. Available on-line at: http://www.owp.csus.edu/research/npdes/
[96] Schueler, T.R.., 2000. Center for Watershed Protection. Assessing the Potential for Urban Watershed Restoration, Article 142.
[97] San Diego Water Board, 1994. Water Quality Control Plan, San Diego Basin, Region 9.
[98] USEPA, 1999. 40 CFR Parts 9, 122, 123, and 124 National Pollutant Discharge Elimination System-Regulations for Revision of the Water Pollution Control Program Addressing Storm Water Discharges. 64 FR 68728.
[99] USEPA, 1999. Preliminary Data Summary of Urban Storm Water Best Management Practices. EPA 821-R-99-012.

remove 15-45 percent of the pollutant load, while the most effective was found to remove 65-100 percent of the pollutant load.

It is important to note that the CWA and NPDES federal regulations clearly require control of discharges into the MS4. CWA section 402(p)(3)(B)(ii) states that MS4 permits must "prohibit non-storm water discharges into the storm sewers." 40 CFR 122.26(d)(2)(iv)(B) requires Copermittees to "detect and remove […] illicit discharges and improper disposal into the storm sewer." See Finding C.14 and Discussion.

The Order's approach to regulating discharges into and from the MS4 is in accordance with State Water Board Order WQ 2001-15. In that order, the State Water Board reviewed the San Diego County permit (Order No. 2001-01) requirements and made one change to one prohibition.[100] The Order upheld all other requirements of the current permit. Order No. R9-2010-0016 incorporates the one change made by the State Water Board, and continues the approach of Order No. 2001-01 (the basis for the current permit), as it was upheld by the State Water Board in Order WQ 2001-15. State Water Board Order WQ 2001-15 supports such requirements, stating: "It is important to emphasize that dischargers into MS4s continue to be required to implement a full range of BMPs, including source control."

The Court of Appeals, Fourth Appellate District, found that the current permit's approach to regulation of discharges into the MS4 was appropriate. Since the Order utilizes the same approach, the court decision supports the Order's requirements.

Finding D.1.f. Runoff needs to be addressed during the three major phases of urban development (planning, construction, and use) in order to reduce the discharge of storm water pollutants to the MEP, effectively prohibit non-storm water discharges and protect receiving waters. Development which is not guided by water quality planning policies and principles can unnecessarily result in increased pollutant load discharges, flow rates, and flow durations which can negatively impact receiving water beneficial uses. Construction sites without adequate BMP implementation result in sediment runoff rates which greatly exceed natural erosion rates of undisturbed lands, causing siltation and impairment of receiving waters. Existing development generates substantial pollutant loads which are discharged in runoff to receiving waters.

Discussion of Finding D.1.f. MS4 permits are issued to municipalities because of their land use authority. The ultimate responsibility for the pollutant discharges, increased runoff, and inevitable long-term water quality degradation that results from development lies with local governments. This responsibility is based on the fact that it is the local governments that have authorized the development (i.e. conversion of natural pervious ground cover to impervious surfaces) and the land uses that generate the pollutants and runoff. Furthermore, the MS4 through which the pollutants and

[100] The State Water Board removed the prohibition of discharges *into* the MS4 that cause or contribute to exceedances of water quality objectives. The revision allows for treatment of storm water flows once the pollutants have entered the MS4. It does not affect the effective prohibition on certain dry-weather flows into the MS4 that is required by the Clean Water Act.

increased flows are conveyed, and ultimately discharged into natural receiving waters, are owned and operated by the same local governments. In summary, the Copermittees under the Order are responsible for discharges into and out of their MS4s because (1) they own and operate the MS4; and (2) they have the legal authority that authorizes the very development and land uses with generate the pollutants and increased flows in the first place.

For example, since grading cannot commence prior to the issuance of a local grading permit, the Copermittees have a built-in mechanism to ensure that all grading activities are protective of receiving water quality. The Copermittee has the authority to withhold issuance of the grading permit until the project proponent has demonstrated to the satisfaction of the Copermittee that the project will not violate their ordinances or cause the Copermittee to be in violation of its MS4 permit. Since the Copermittee will ultimately be held responsible for any discharges from the grading project by the San Diego Water Board, the Copermittee will want to use its own permitting authority to ensure that whatever measures the Copermittee deems necessary to protect discharges into its MS4 are in fact taken by the project proponent.

The Order holds the local government accountable for this direct link between its land use decisions and water quality degradation. The Order recognizes that each of the three major stages in the development process (development planning, construction, and the use or operational stage) are controlled by and must be authorized by the local government. Accordingly, this permit requires the local government to implement, or require others to implement, appropriate best management practices to reduce storm water pollutant discharges and increased flow during each of the three stages of development.

Including plans for BMP implementation during the design phase of new development and redevelopment offers the most cost effective strategy to reduce storm water runoff pollutant loads to surface waters.[101] The Phase II regulations for small municipalities reflect the necessity of addressing runoff during the early planning phase. Due to the greater water quality concerns generally experienced by larger municipalities, Phase II requirements for small municipalities are also applicable to larger municipalities such as the Copermittees. The Phase II regulations direct municipalities to develop, implement, and enforce a program to address storm water runoff from new development and redevelopment projects that disturb greater than or equal to one acre, including projects less than one acre that are part of a larger common plan of development or sale. The program must ensure that controls are in place that would prevent or minimize water quality impacts. This includes developing and implementing strategies which include a combination of structural and/or non-structural BMPs appropriate to the locality. The program must also ensure the adequate long-term operation and maintenance of BMPs.[102] USEPA expands on the Phase II regulations for urban development when it recommends that Copermittees:

[101] USEPA, 2000. Storm Water Phase II Compliance Assistance Guide. EPA 833-R-00-002.
[102] USEPA, 1999. 40 CFR Parts 9, 122, 123, and 124 National Pollutant Discharge Elimination System-Regulations for Revision of the Water Pollution Control Program Addressing Storm Water Discharges; Final Rule. 64 FR 68845.

> "Adopt a planning process that identifies the municipality's program goals (e.g., minimize water quality impacts resulting from post-construction runoff from new development and redevelopment), implementation strategies (e.g., adopt a combination of structural and/or non-structural BMPs), operation and maintenance policies and procedures, and enforcement procedures. In developing your program, you should consider assessing existing ordinances, policies, programs and studies that address storm water runoff quality."

Management of storm water runoff during the construction phase is also essential. USEPA explains in the preamble to the Phase II regulations that storm water discharges generated during construction activities can cause an array of physical, chemical, and biological water quality impacts. Specifically, the biological, chemical and physical integrity of the waters may become severely compromised due to runoff from construction sites. Fine sediment from construction sites can adversely affect aquatic ecosystems by reducing light penetration, impeding sight-feeding, smothering benthic organisms, abrading gills and other sensitive structures, reducing habitat by clogging interstitial spaces within the streambed, and reducing intergravel dissolved oxygen by reducing the permeability of the bed material. Water quality impairment also results, in part, because a number of pollutants are preferentially absorbed onto mineral or organic particles found in fine sediment. The interconnected process of erosion (detachment of the soil particles), sediment transport, and delivery is the primary pathway for introducing key pollutants, such as nutrients, metals, and organic compounds into aquatic systems.[103]

Finally, storm water and non-storm water runoff from existing development must be addressed. The Copermittees' monitoring data exhibits that significant water quality problems exist in receiving waters which receive runoff from areas with extensive existing development, such as Aliso Creek. Source identification, BMP requirements, inspections, and enforcement are all important measures which can be implemented to address runoff from existing development. USEPA supports inspections and enforcement by municipalities when it states "Effective inspection and enforcement requires […] penalties to deter infractions and intervention by the municipal authority to correct violations. Enforcement mechanisms […] also must be described."[104]

Finding D.1.g. Annual reporting requirements included in this Order are necessary to meet federal requirements and to evaluate the effectiveness and compliance of the Copermittees' programs.

[103] Ibid., 64 FR 68728.
[104] USEPA, 1992. Guidance Manual for the Preparation of Part II of the NPDES Permit Applications for Discharges from Municipal Separate Storm Sewer Systems. EPA 833-B-92-002.

Discussion of Finding D.1.g. The annual reporting requirements are consistent with federal NPDES regulation 40 CFR 122.41, which states:

> "The operator of a large or medium municipal separate storm sewer system of a municipal separate storm sewer system that has been designated by the Director under section 122.26(a)(1)(v) of this part must submit an annual report by the anniversary of the date of the issuance of the permit for such a system. The report shall include: (1) The status of implementing the components of the storm water management program that are established as permit conditions; (2) Proposed changes to the storm water management program that are established as permit condition, Such proposed changes shall be consistent with § 122.26(d)(2)iii) of this part; (3) Revisions, if necessary, to the assessment of controls and the fiscal analysis reported in the permit application under § 122.26(d)(2)iv) and (d)(2)(v) of this part; (4) A summary of data, including monitoring data, that is accumulated throughout the reporting year; (5) Annual expenditures and budget for year following each annual report; (6) A summary describing the number and nature of enforcement actions, inspections, and public education programs; and (7) Identification of water quality improvements or degradation."

CWC section 13267 provides that "the regional board may require that any person who has discharged […] shall furnish, under penalty of perjury, technical or monitoring reports which the regional board requires."

The San Diego Water Board must assess the reports to ensure that the Copermittees' programs are adequate to assess and address water quality. The reporting requirements can also be useful tools for the Copermittees to review, update, or revise their programs. Areas or issues which have received insufficient efforts can also be identified and improved.

Finding D.1.h. This Order establishes Storm Water Action Levels (SALs) for selected pollutants based on USEPA Rain Zone 6 (arid southwest) Phase I MS4 monitoring data for pollutants in storm water. The SALs were computed as the 90th percentile of the data set, utilizing the statistical based population approach, one of three approaches recommended by the State Water Board's Storm Water Panel in its report, 'The Feasibility of Numerical Effluent Limits Applicable to Discharges of Storm Water Associated with Municipal, Industrial and Construction Activities (June 2006). SALs are identified in section D of this Order. Copermittees must implement a timely, comprehensive, cost-effective storm water pollution control program to reduce the discharge of pollutants in storm water from the permitted areas so as not to exceed the SALs. Exceedance of SALs may indicate inadequacy of programmatic measures and BMPs required in this Order.

Discussion of Finding D.1.h. Section 402(p) of the CWA states MS4 permits for storm water shall require controls to reduce the discharge of pollutants to the maximum extent practicable, including management practices, control techniques and system, design and engineering methods, and such other provisions as the Administrator or the State determines appropriate for the control of such pollutants. This includes requiring numeric effluent limitations for storm water.

SALs are not numeric effluent limitations, which is reflected in language which clarifies an excursion above a SAL does not create a presumption that MEP is not being met. Instead, a SAL exceedance is to be used by the Copermittee as an indication that the MS4 storm water discharge point is a definitive "bad actor," and the result from the monitoring needs to be considered as part of the iterative process for reducing pollutants in storm water to the MEP.

The CWA defines effluent limitations as:

> “Any restriction imposed by the Director on quantities, discharge rates, and concentrations of pollutants which are “discharged” from “point sources” into “waters of the United States”…” A SAL is not a restriction on a quantity, rate or concentration, but is a level at which actions that further reduce pollutants from that discharge point need to be evaluated in order to reduce storm water pollutants to the MEP. Thus, SALs are not effluent limitations as defined by the CWC or CWA.

The approach of using "action levels" is consistent with recommendations made by USEPA in their Interim Permitting Approach for Water Quality-Based Effluent Limitations in Storm Water Permits, dated August 26, 1996:

> "Under the Clean Water Act (CWA) and NPDES regulations, permitting authorities may employ a variety of conditions and limitations in storm water permits, including best management practices, performance objectives, narrative conditions, monitoring triggers, action levels (e.g., monitoring benchmarks, toxicity reduction evaluation action levels), etc., as the necessary water-quality based limitations, where numeric water quality based effluent limitations are determined to be unnecessary or infeasible". As such, these action levels are not considered numeric water quality-based effluent limitations.

It should be noted that a purpose of monitoring, required under this and previous Orders, is to aid in the evaluation of implemented programs and BMPs in reducing pollutants in storm water discharges to the MEP. The Monitoring and Reporting Program states:

This Receiving Waters Monitoring and Reporting Program is intended to meet the following goals:

2. Measure and improve the effectiveness of the Copermittees' runoff management programs;
3. Assess the chemical, physical, and biological impacts to receiving waters resulting from MS4 discharges;
4. Characterize storm water discharges;
5. Identify sources of specific pollutants;
6. Prioritize drainage and sub-drainage areas that need management actions; and
9. Provide information to implement required BMP improvements.

Since the first permit (adopted 20 years ago), Copermittees have utilized non-numerical limitations (BMPs) to control and abate the discharge of any pollutants in storm water discharges to the MEP. Copermittees have been accorded 20 years to research, develop, and deploy BMPs that are capable of reducing storm water discharges from the MS4 to levels represented in SALs. Storm Water Action Levels are set at such a level that any exceedance of a SAL will clearly indicate BMPs being implemented are insufficient to protect the Beneficial Uses of waters of the State. Copermittee shall utilize the exceedance information as a high priority consideration when adjusting and executing annual work plans, as required by this Permit. Failure to appropriately consider and react to SAL exceedances in an iterative manner creates a presumption that the Copermittee(s) have not complied to the MEP.

SALs have been developed utilizing Phase I storm water effluent data (updated February 2008, http://rpitt.eng.ua.edu/Research/ms4/mainms4.shtml) from the arid west region (USEPA Rain Zone 6). USEPA Rainfall Zone 6, which includes MS4 effluent data from Orange, San Diego, Los Angeles, Ventura and San Bernadino County. The approach taken to derive SALs is a straightforward percentile approach, with the SAL being set as the 90th percentile of the dataset for each constituent. This approach is consistent with the 2006 State Water Board Panel Report:

> "The statistically based population approach would once again rely on the average distribution of measured water quality values developed from many water quality samples taken for many events at many locations. In this case, however, the Action Level would be defined by the central tendency and variance estimates from the population data. For example, the Action Level could be set as two standard deviations above the mean, i.e. if measured concentrations are consistently higher than two standard deviations above the mean, an Action Level would be triggered. Other population based measures of central tendency could be used (i.e. geometric mean, median, etc.) or estimates of variance (i.e. prediction intervals, etc.). Regardless of which population based estimators are used (or percentile from above), the idea would be to identify the [statistically derived] point at which managers feel concentrations are significantly beyond the norm."

SALs are measurable criteria which quantify the performance of BMPs for a particular watershed or subwatershed that discharges storm water MS4 effluent from that particular discharge point. Thus, Copermittees can utilize SAL results to determine the effectiveness BMPs on the effluent from a particular area of the MS4.

SALs represent the lowest 10 percent of pollutant reduction for USEPA Rain Zone 6 MS4 Phase I programs discharging to waters of the United States. For the past 20 years, Copermittees have utilized non-numerical limitations (BMPs) to control and abate the discharge of any pollutants in storm water discharges to the MEP. Copermittees have been accorded 20 years to research, develop, and deploy BMPs that are capable of reducing storm water discharges from the MS4 to levels represented in SALs. Storm Water Action Levels are set at such a level that any exceedance of a SAL will indicate to the Copermittee(s) that the discharge is within the lowest 10% of monitored outfalls. Therefore, an exceedance of a SAL warrants priority consideration within the Copermittee iterative process.

Finding D.2.a. The Standard Storm Water Mitigation Plan (SSMP) requirements contained in this Order are consistent with Order WQ 2000-11 adopted by the State Water Board on October 5, 2000. In the precedential order, the State Water Board found that the design standards, which essentially require that runoff generated by 85 percent of storm events from specific development categories be infiltrated or treated, reflect the MEP standard. The order also found that the SSMP requirements are appropriately applied to the majority of the Priority Development Project categories that are also contained in section F.1 of this Order. The State Water Board also gave California Regional Water Quality Control Boards (Regional Water Boards) the needed discretion to include additional categories and locations, such as retail gasoline outlets (RGOs), in SSMPs.

Discussion of Finding D.2.a. The post-construction requirements and design standards contained in the SSMP section of Order No. R9-2010-0016 constitute MEP consistent with State Water Board guidance, court decisions, and San Diego Water Board requirements. The State Water Board and San Diego Water Board have made several recent decisions in regards to inclusion of SSMP requirements in MS4 permits. In a precedential decision, State Water Board Order WQ 2000-11, the State Water Board found that the SSMP provisions constitute MEP for addressing storm water pollutant discharges resulting from Priority Development Projects. The provisions of the SSMP section of the Order are also consistent with those previously issued by the San Diego Water Board for Riverside County (Order No. R9-2004-001), Southern Orange County (Order Nos. R9-2002-0001 and R9-2009-0002) and San Diego County (Order Nos. R9-2001-01 and R9-2007-0001), as well as requirements in the Los Angeles County MS4 permit (Order No. R4-2001-182). In State Water Board Order WQ 2001-15, the State Water Board reaffirmed that SSMP requirements constitute MEP. Moreover, the SSMP requirements of the San Diego County MS4 permit (Order No. R9-2001-01) were upheld when the California State Supreme Court declined to hear the matter on appeal.

Finding D.2.b. Controlling runoff pollution by using a combination of onsite source control and site design BMPs augmented with treatment control BMPs before the runoff enters the MS4 is important for the following reasons: (1) Many end-of-pipe BMPs (such as diversion to the sanitary sewer) are typically ineffective during significant storm events; (2) Whereas, onsite source control BMPs can be applied during all runoff conditions end-of-pipe BMPs are often incapable of capturing and treating the wide range of pollutants which can be generated on a sub-watershed scale; (3) End-of-pipe BMPs are more effective when used as polishing BMPs, rather than the sole BMP to be implemented; (4) End-of-pipe BMPs do not protect the quality or beneficial uses of receiving waters between the pollutant source and the BMP; and (5) Offsite end-of-pipe BMPs do not aid in the effort to educate the public regarding sources of pollution and their prevention.

Discussion of Finding D.2.b. Many end-of-pipe BMPs are designed for low flow conditions because their end-of-pipe location prevents them from being designed for large storm events. This results in the end-of-pipe BMPs being overwhelmed, bypassed, or ineffective during larger storm events more frequently than onsite BMPs designed for larger storms. BMPs are also frequently most effective for a particular type of pollutant (such as sediment). Such BMPs may be appropriate for small sites with a limited suite of pollutants generated; however, end-of-pipe BMPs must typically be able to address a wide range of pollutants generated by a sub-watershed, limiting their effectiveness and/or increasing costs. Moreover, the location of some end-of-pipe BMPs allow for untreated pollutants to be discharged to and degrade receiving waters prior to their reaching the BMPs. This fails to protect receiving waters, which is the purpose of BMP implementation. In addition, opportunities to educate the public regarding runoff pollution can be lost when end-of-pipe BMPs are located away from pollutant sources and out of sight. Onsite BMPs can lead to a better public understanding of runoff issues since their presence can provide a visible and/or tangible lesson in pollution prevention.

Finding D.2.c. Use of Low-Impact Development (LID) site design BMPs at new development, redevelopment and retrofit projects can be an effective means for minimizing the impact of storm water runoff discharges from the development projects on receiving waters. LID is a site design strategy with a goal of maintaining or replicating the pre-development hydrologic regime through the use of design techniques. LID site design BMPs help preserve and restore the natural hydrologic cycle of the site, allowing for filtration and infiltration which can greatly reduce the volume, peak flow rate, velocity, and pollutant loads of storm water runoff. Current runoff management, knowledge, practices and technology have resulted in the use of LID BMPs as an acceptable means of meeting the storm water MEP standard.

Discussion of Finding D.2.c. The CWA is the cornerstone of surface water quality protection in the United States. (The Act does not deal directly with ground water or with water quantity issues.) The statute employs a variety of regulatory and nonregulatory tools to sharply reduce direct pollutant discharges into waterways, and manage polluted runoff. These tools are employed to achieve the broader goal of

restoring and maintaining the chemical, physical, and biological integrity of the nation's waters so that they can support the protection and propagation of fish, shellfish, wildlife and recreation in and on the water.

Increasing the volume, velocity, frequency and discharge duration of storm water runoff from developed areas will eventually greatly accelerate downstream erosion, impair stream habitat in natural drainages, and negatively impact beneficial uses. Development and urbanization increase pollutant loads and volume while simultaneously increasing impervious area. Impervious surfaces can neither absorb water nor remove pollutants and thus lose the purification and infiltration provided by naturally vegetated soil. Furthermore, impervious surfaces tend to concentrate pollutants on the top of the surface that are then washed off into the MS4 and waters of the State in a concentrated manner. The use of LID site design BMPs can be an effective means of minimizing the impact of runoff discharges on receiving waters. By reducing water pollution, reducing runoff and increasing groundwater recharge, LID helps to improve the quality of receiving surface waters, stabilize the flow rates of receiving waters (preventing downstream hydromodification), reduce downstream flooding and protect and enhance water supply sources. Current runoff management, knowledge, practice and technology has resulted in the use of LID BMPs as an acceptable means of meeting the MEP standard for storm water treatment.

Current municipal codes may oppose or hinder the design, use and implementation of specific elements of LID. These codes include, but are not limited to, emergency services access requirements, building landscape ordinances, building height limits and parking space requirements. It is essential for Copermittees to work with other responsible agencies and/or update codes that have the potential to impact the use of LID.

The Local Government Commission, a non-profit organization working to build livable communities, developed a set of principles known as the *Ahwahnee Water Principles for Resource-Efficient Land Use*[105] that provide the opportunity to reduce costs and improve the reliability and quality of our water resources. Implementation of LID incorporates several of the Ahwahnee principles such as:

1. "Community Design should be compact, mixed use, walkable and transit-oriented so that urban runoff pollutants are minimized and the open lands that absorb water are preserved to the maximum extent possible."
3. "Water holding areas such as creek beds, recessed athletic fields, ponds, cisterns, and other features that serve to recharge groundwater, reduce runoff, improve water quality and decrease flooding should be incorporated into the urban landscape."
4. "All aspects of landscaping from the selection of plants to soil preparation and the installation of irrigation systems should be designed to reduce water demand, retain runoff, decrease flooding, and recharge groundwater."

[105] Local Government Commission, "The Ahwahnee Water Principles – A Blueprint for Regional Sustainability", http://water.lgc.org/Members/tony/docs/lgc_water_guide.pdf

5. "Permeable surfaces should be used for hardscape. Impervious surfaces such as driveways, streets, and parking lots should be minimized so that land is available to absorb storm water, reduce polluted urban runoff, recharge groundwater and reduce flooding."

The use of LID site design BMPs helps reduce the amount of impervious area associated with development and allows storm water to infiltrate into the soil. Natural vegetation and soil filters storm water runoff and reduces the volume and pollutant loads of storm water. Studies have revealed that the level of imperviousness resulting from development and urbanization is strongly correlated with the water quality impairment of nearby receiving waters.[106] In many cases, the impacts on receiving waters due to changes in hydrology can be more significant than those attributable to the contaminants found in storm water discharges.[107] These impacts include stream bank erosion (increased sediment load and subsequent deposition), benthic habitat degradation, and decreased diversity of macroinvertebrates. Although conventional BMPs do reduce storm water pollutant loads, they may not effectively control adverse effects from changes in the discharge hydrologic conditions.[108]

The Order includes requirements for developments to include site design BMPs that mimic or replicate the natural hydrologic cycle. Open space designs which maximize pervious surfaces and retention of "natural" drainages have been found to reduce both the costs of development and pollutant export.[109] Moreover, USEPA finds including plans for a "natural" site design and BMP implementation during the design phase of new development and redevelopment offers the most cost effective strategy to reduce storm water pollutant loads to surface waters.[110] In addition, a recent U.S. Department of Housing and Urban Development guidance document on low-impact development notes that the use of LID-based storm water management design allows land to be developed, but in a cost-effective manner that helps mitigate potential environmental impacts.[111]

Finding D.2.d. RGOs are significant sources of pollutants in storm water runoff. RGOs are points of convergence for motor vehicles for automotive related services such as repair, refueling, tire inflation, and radiator fill-up and consequently produce significantly higher loadings of hydrocarbons and trace metals (including copper and zinc) than other developed areas.

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[106] USEPA, 1999. 40 CFR Parts 9, 122, 123, and 124 National Pollutant Discharge Elimination System – Regulations for Revision of the Water Pollution Control Program Addressing Storm Water Discharges; Final Rule.
[107] Ibid.
[108] USEPA, 2000. Low-Impact Development: A literature review. EPA-841-B-00-005. 35p.
[109] Center for Watershed Protection, 2000. "The Benefits of Better Site Design in Residential Subdivisions." Watershed Protection Techniques. Vol. 3. No. 2.
[110] USEPA, 1999. 40 CFR Parts 9, 122, 123, and 124 National Pollutant Discharge Elimination System – Regulations for Revision of the Water Pollution Control Program Addressing Storm Water Discharges; Final Rule.
[111] U.S. Department of Housing and Urban Development, Office of Policy Development and Research, 2003. "The Practice of Low Impact Development." Prepared by: NAHB Research Center, Inc. Upper Marlboro, Maryland. Contract No. H-21314CA. 131p.

Discussion of Finding D.2.d. RGOs are included in the Order as a Priority Development Project category because RGOs produce significantly greater loadings of hydrocarbons and trace metals (including copper and zinc) than other developed areas. To meet the storm water MEP standard, source control and structural treatment BMPs are needed at RGOs that meet the following criteria: (a) 5,000 square feet or more or (b) an average daily traffic (ADT) of 100 or more vehicles per day. These are appropriate thresholds since vehicular development size and volume of traffic are good indicators of potential impacts of storm water runoff from RGOs on receiving waters.

This finding has been added to satisfy State Water Board Order WQ 2000-11's requirements for including RGOs as a Priority Development Category. State Water Board Order WQ 2000-11 acknowledged that a threshold (size, average daily traffic, etc.) appropriate to trigger SSMP requirements should be developed for RGOs and that specific findings regarding RGOs should be included in MS4 permits to justify the requirement.[112]

Finding D.2.e. Industrial sites are significant sources of pollutants in runoff. Pollutant concentrations and loads in runoff from industrial sites are similar or exceed pollutant concentrations and loads in runoff from other land uses, such as commercial or residential land uses. As with other land uses, LID site design, source control, and treatment control BMPs are needed at industrial sites in order to meet the MEP standard. These BMPs are necessary where the industrial site is larger than 10,000 square feet. The 10,000 square feet threshold is appropriate, since it is consistent with requirements in other Phase I NPDES storm water regulations throughout California.

Discussion of Finding D.2.e. Industrial sites can be a significant source of pollutants in storm water runoff. In an extensive review of storm water literature, the Los Angeles Water Board found widespread support for the finding that "industrial and commercial activities can also be considered hot spots as sources of pollutants." It also found that "industrial and commercial areas were likely to be the most significant pollutant source areas" of heavy metals.[113] Likewise, storm water runoff from heavy industry in the Santa Clara Valley has been found to be extremely toxic.[114] These findings are corroborated by USEPA, which states in the preamble to the 1990 Phase I NPDES storm water regulations that "Because storm water from industrial facilities may be a major contributor of pollutants to municipal separate storm sewer systems, municipalities are obligated to develop controls for storm water discharges associated

[112] State Water Board, 2000. Order WQ 2000-11. In the Matter of the Petitions of The Cities Of Bellflower, Et Al., The City Of Arcadia, And Western States Petroleum Association Review of January 26, 2000 Action of the Regional Board And Actions and Failures to Act by both the California Regional Water Quality Control Board, Los Angeles Region and Its Executive Officer Pursuant to Order No. 96-054, Permit for Municipal Storm Water and Urban Run-Off Discharges Within Los Angeles County [NPDES NO. CAS614001] SWRCB/OCC FILES A-1280, A-1280(a) and A-1280(b)
[113] Los Angeles Water Board. 2001.
[114] Schueler and Holland, 2000. Storm Water Strategies for Arid and Semi-Arid Watersheds (Article 66). The Practice of Watershed Protection.

with industrial activity through their system in their storm water management program." Since heavy industrial sites can be a significant source of pollutants in runoff in a manner similar to other SSMP project categories such as commercial development or automotive repair shops, it is appropriate to include heavy industrial sites as a SSMP category in the Order.

The Phase I NPDES storm water regulations require the Copermittees to "control through ordinance, permit, contract, order, or similar means, the contribution of pollutants to the municipal storm sewer by storm water discharges associated with industrial activity and the quality of storm water discharged from sites of industrial activity" (40 CFR 122.26(d)(2)(i)). In addition, it has been established that the MEP standard for the control of storm water runoff from new development projects includes incorporation of the SSMP requirements. Since the Copermittees must both control storm water pollutants from industrial sites and meet the storm water MEP standard for new development, it is appropriate to apply the SSMP requirements to heavy industrial sites.

The State Water Board's Order WQ 2000-11 indicates that it is appropriate to apply SSMP requirements to categories of development where evidence shows the category of development can be a significant source of pollutants. As evidenced above, heavy industrial sites can be a significant source of pollutants. Therefore, the Order includes heavy industrial sites as a SSMP Priority Development Project category.

Finding D.2.f. If not properly designed or maintained, certain BMPs implemented or required by municipalities for runoff management may create a habitat for vectors (e.g. mosquitoes and rodents). Proper BMP design and maintenance to avoid standing water, however, can prevent the creation of vector habitat. Nuisances and public health impacts resulting from vector breeding can be prevented with close collaboration and cooperative effort between municipalities, local vector control agencies, and the California Department of Public Health during the development and implementation of runoff management programs.

Discussion of Finding D.2.f. The implementation of certain structural BMPs or other runoff treatment systems can result in significant vector problems in the form of increased breeding or harborage habitat for mosquitoes, rodents or other potentially disease transmitting organisms. The implementation of BMPs that retain water may provide breeding habitat for a variety of mosquito species, some of which have the potential to transmit diseases such as Western Equine Encephalitis, St. Louis Encephalomyelitis, and malaria. Recent BMP implementation studies by Caltrans[115] in District 7 and District 11 have demonstrated mosquito breeding associated with some types of BMPs. The Caltrans BMP Retrofit Pilot study cited lack of maintenance and improper design as factors contributing to mosquito production. However, a Watershed Protection Techniques article describes management techniques for selecting, designing, and maintaining structural treatment BMPs to minimize mosquito

[115] Caltrans, 2000. BMP Retrofit Pilot Studies: A Preliminary Assessment of Vector Production.

production.[116] State and local runoff management programs that include structural BMPs with the potential to retain water have been implemented in Florida and the Chesapeake Bay region without resulting in significant public health threats from mosquitoes or other vectors.[117]

Finding D.2.g. The increased volume, velocity, frequency and discharge duration of storm water runoff from developed areas has the potential to greatly accelerate downstream erosion, impair stream habitat in natural drainages, and negatively impact beneficial uses. Development and urbanization increase pollutant loads in storm water runoff and the volume of storm water runoff. Impervious surfaces can neither absorb water nor remove pollutants and thus lose the purification and infiltration provided by natural vegetated soil. Hydromodification measures for discharges to hardened channels allow for the future restoration of the hardened channels to their natural state, thereby restoring the chemical, physical, and biological integrity and beneficial uses of local receiving waters.

Discussion of Finding D.2.g. Increasing the volume, velocity, frequency and discharge duration of storm water runoff from developed areas will eventually greatly accelerate downstream erosion, impair stream habitat in natural drainages, and negatively impact beneficial uses. Development and urbanization increase pollutant loads and volume while simultaneously increasing impervious area. Impervious surfaces can neither absorb water nor remove pollutants and thus lose the purification and infiltration provided by naturally vegetated soil.

Historic hydromodification impacts, such as concrete lining and channelization, have impacted the natural physical habitat of urban streams resulting in low IBI scores. The Copermittee's monitoring to date indicates decreased IBI scores in the developed watersheds when compared to reference sites, with developed sites consistently having poor or very poor IBI scores. While habitat scores remained stable over the last reporting period, with scores of marginal to sub-optimal, the Copermittees have consistently monitored high levels of fine sediment in habitat assessments and often changing vegetative cover. However, the impact of persistent toxicity at the bioassessment stations in conjunction with physical habitat scores is unknown.[118]

Hydromodification impacts result in poor physical habitat conditions through streambed scour, erosion, vegetation displacement, sediment deposition, channelization, and channel modifications. Increased sediment loads from hydromodification causes other impacts to physical habitats including increased turbidity which then may cause increased temperatures. In addition, an increased sediment load may have an increased biological content thereby increasing the

[116] Watershed Protection Techniques, 1995. Mosquitoes in Constructed Wetlands: A Management Bugaboo? 1(4):203-207.
[117] Shaver, E. and R. Baldwin , 1995. Sand Filter Design for Water Quality Treatment in Herricks, E., Ed. Stormwater Runoff and Receiving Systems: Impact, Monitoring, and Assessment, CRC Lewis Publishers, New York, NY.
[118] Riverside County Copermittees, 2008-2009 Santa Margarita Watershed Annual Report.

sediment oxygen demand and lowering the dissolved oxygen available for aquatic life.[119]

The objective of the CWA is "to restore and maintain the chemical, *physical,* and biological integrity of the Nation's waters (emphasis added)." Stream restoration by removing concrete and other unnatural materials is a major step toward achieving that objective. The success of future stream restoration and stabilization is, however, dependent on preventing and reducing physical impacts from activities upstream. Therefore, hydromodification management measures are necessary upstream of modified (e.g. concrete, rip rap, etc.) channels in addition to non-modified channels.

Please see discussion of Findings C.10 and C.11 for additional information about impacts due to increasing volume, velocity, frequency and discharge duration of storm water runoff from developed areas.

Finding D.3.a. In accordance with federal NPDES regulations and to ensure the most effective oversight of industrial and construction site discharges, discharges of runoff from industrial and construction sites are subject to dual (State and local) storm water regulation. Under this dual system, each Copermittee is responsible for enforcing its local permits, plans, and ordinances, and the San Diego Water Board is responsible for enforcing the General Construction Activities Storm Water Permit, State Water Board Order 2009-0009-DWQ, NPDES No. CAS000002 (General Construction Permit) and the General Industrial Activities Storm Water Permit, State Water Board Order97-03-DWQ, NPDES No. CAS000001 (General Industrial Permit). NPDES municipal regulations require that municipalities develop and implement measures to address runoff from industrial and construction activities. Those measures may include the implementation of other BMPs in addition to those BMPs that are required under the statewide general permits for activities subject to both State and local regulation.

Discussion of Finding D.3.a. USEPA finds the control of pollutant discharges from industry and construction so important to receiving water quality that it has established a double system of regulation over industrial and construction sites. This double system of regulation consists of two parallel regulatory systems with the same common objective: to keep pollutants from industrial and construction sites out of the MS4. In this double system of regulation for runoff from industrial and construction sites, local governments must enforce their legal authorities (i.e. local ordinances and permits) while the San Diego Water Board must enforce its legal authority (i.e. statewide general industrial and construction storm water permits). These two regulatory systems are designed to complement and support each other. Municipalities are not required to enforce San Diego Water Board and State Water Board permits. They are required, however, to enforce their ordinances and permits. The Federal regulations are clear that municipalities have responsibility to prevent

[119] USEPA, National Management Measures to Control Nonpoint Source Pollution from Hydromodification, EPA 841-B-07-002, July 2007.

non-storm water and address storm water runoff from industrial and construction sites which enters their MS4s.

Municipalities have this responsibility because they have the authority to issue land use and development permits. Since municipalities are the lead permitting authority for industrial land use and construction activities, they are also the lead for enforcement regarding runoff discharges from these sites. For sites where the municipality is the lead permitting authority, the San Diego Water Board will work with the municipality and provide support where needed. The San Diego Water Board will assist municipalities in enforcement against non-compliant sites after the municipality has exhibited a good faith effort to bring the site into compliance.

According to USEPA, the storm water regulations envision that NPDES permitting authorities and municipal operators will cooperate to develop programs to monitor and control pollutants in storm water discharges from industrial facilities.[120] USEPA discusses the "dual regulation" of construction sites in its Storm Water Phase II Compliance Assistance Guide, which states "Even though all construction sites that disturb more than one acre are covered nationally by an NPDES storm water permit, the construction site runoff control minimum measure […] is needed to induce more localized site regulation and enforcement efforts, and to enable operators […] to more effectively control construction site discharges into their MS4s."[121] While the Storm Water Phase II Compliance Assistance Guide applies to small municipalities, it is applicable to the Copermittees, because they are similar in size and have the potential to discharge similar pollutant types as Phase II municipalities.

Finding D.3.b. Identification of sources of pollutants in runoff (such as municipal areas and activities, industrial and commercial sites/sources, construction sites, and residential areas), development and implementation of BMPs to address those sources, and updating ordinances and approval processes are necessary for the Copermittees to ensure that discharges of pollutants from its MS4 in storm water are reduced to the MEP and that non-storm water discharges are not occurring. Inspections and other compliance verification methods are needed to ensure minimum BMPs are implemented. Inspections are especially important at areas that are at high risk for pollutant discharges.

Discussion of Finding D.3.b. Source identification is necessary to characterize the nature and extent of pollutants in discharges and to develop appropriate BMPs. It is the first step in a targeted approach to runoff management. Source identification helps identify the location of potential sources of pollutants in runoff. Pollutants found to be present in receiving waters can then be traced to the sites which frequently generate such pollutants. In this manner source inventories can help to target inspections, monitoring, and potential enforcement. This allows for limited inspection, monitoring, and enforcement time to be most effective. USEPA supports source identification as a

[120] USEPA, 1992. Guidance Manual for the Preparation of Part II of the NPDES Permit Applications for Discharges from Municipal Separate Storm Sewer Systems. EPA 833-B-92-002.
[121] USEPA, 2000. Storm Water Phase II Compliance Assistance Guide. EPA 833-R-00-002.

concept when it recommends construction, municipal, and industrial source identification in guidance and the federal regulations.[122,123]

The development of BMPs for identified sources will help ensure that appropriate, consistent controls are implemented at all types of development and areas. Copermittees must reduce the discharge of pollutants in storm water runoff to the maximum extent practicable. To achieve this level of pollutant reduction, BMPs must be implemented. Designation of minimum BMPs helps ensure that appropriate BMPs are implemented for various sources. These minimum BMPs also serve as guidance as to the level of water quality protection required. USEPA requires development and implementation of BMPs for construction, municipal, commercial, industrial, and residential sources at 40 CFR 122.26(d)(2)(iv)(A-D).

Updating ordinances and approval processes is necessary in order for the Copermittees to control discharges to their MS4s. USEPA supports updating ordinances and approval processes when it states "A crucial requirement of the NPDES storm water regulation is that a municipality must demonstrate that it has adequate legal authority to control the contribution of pollutants in storm water discharged to its MS4. […] In order to have an effective municipal storm water management program, a municipality must have adequate legal authority to control the contribution of pollutants to the MS4. […] 'Control,' in this context, means not only to require disclosure of information, but also to limit, discourage, or terminate a storm water discharge to the MS4."[124]

Inspections provide a necessary means for the Copermittees to evaluate compliance of pollutant sources with their municipal ordinances and minimum BMP requirements. USEPA supports inspections when it recommends inspections of construction, municipal, and industrial sources.[125] Inspection of high risk sources are especially important because of the ability of frequent inspections to help ensure compliance, thereby reducing the risk associated with such sources. USEPA suggests that inspections can improve compliance when it states "Effective inspection and enforcement requires […] penalties to deter infractions and intervention by the municipal authority to correct violations."[126]

Finding D.3.c. Historic and current development makes use of natural drainage patterns and features as conveyances for runoff. Urban streams used in this manner are part of the municipalities MS4s regardless of whether they are natural, anthropogenic, or partially modified features. In these cases, the urban stream is both an MS4 and receiving water.

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[122] USEPA, 1992. Guidance Manual for the Preparation of Part II of the NPDES Permit Applications for Discharges from Municipal Separate Storm Sewer Systems. EPA 833-B-92-002.
[123] 40 CFR 122.26(d)(2)(ii)
[124] USEPA, 1992. Guidance Manual for the Preparation of Part II of the NPDES Permit Applications for Discharges from Municipal Separate Storm Sewer Systems. EPA 833-B-92-002.
[125] Ibid.
[126] USEPA, 1992. Guidance Manual for the Preparation of Part II of the NPDES Permit Applications for Discharges from Municipal Separate Storm Sewer Systems. EPA 833-B-92-002.

Discussion of Finding D.3.c. An MS4 is defined in the federal regulations as a conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, or storm drains), owned or operated by a Copermittee, and designed or used for collecting or conveying runoff.[127] Natural drainage patterns and urban streams are frequently used by municipalities to collect and convey runoff away from development within their jurisdiction. Therefore, the San Diego Water Board considers natural drainages that are used for conveyances of runoff, regardless of whether or not they've been altered by the municipality, as both part of the MS4s and as receiving waters. To clarify, an unaltered natural drainage, which receives runoff from a point source (channeled by a Copermittee to drain an area within their jurisdiction), which then conveys the runoff to an altered natural drainage or a man-made MS4, is both an MS4 and a receiving water.[128]

Finding D.3.d. As operators of the MS4s, the Copermittees cannot passively receive and discharge pollutants from third parties. By providing free and open access to an MS4 that conveys discharges to waters of the U.S., the operator essentially accepts responsibility for discharges into the MS4 that it does not prohibit or otherwise control. These discharges may cause or contribute to a condition of contamination or a violation of water quality standards.

Discussion of Finding D.3.d. CWA section 402(p) requires operators of MS4s to prohibit non-storm water discharges into their MS4s. This is necessary because pollutants which enter the MS4 generally are conveyed through the MS4 to be eventually discharged into receiving waters. If a municipality does not prohibit non-storm water discharges, it is providing the pathway (its MS4) which enables pollutants to reach receiving waters. Since the municipality's storm water management service can result in pollutant discharges to receiving waters, the municipality must accept responsibility for the water quality consequences resulting from this service. Furthermore, third party discharges can cause a municipality to be out of compliance with its permit. Since pollutants from third parties which enter the MS4 will eventually be discharged from the MS4 to receiving waters, the third party discharges can result in a situation of municipality non-compliance if the discharges lead to an exceedance of water quality standards. For these reasons, each Copermittee must prohibit and/or control discharges from third parties to its MS4. USEPA supports this concept when it states "the operators of regulated small MS4s cannot passively receive and discharge pollutants from third parties" and "the operator of a small MS4 that does not prohibit and/or control discharges into its system essentially accepts 'title' for those discharges. At a minimum, by providing free and open access to the MS4s that convey discharges

[127] USEPA, 2000. EPA Administered Permit Programs: The National Pollutant Discharge Elimination System. Code of Federal Regulations, Vol. 40, Part 122.
[128] San Diego Water Board, 2001. Response in Opposition to Petitions for Review of California Regional Water Quality Control Board San Diego Region Order No. 2001-01 – NPDES Permit No. CAS0108758 (San Diego Municipal Storm Water Permit).

to the waters of the United States, the municipal storm sewer system enables water quality impairment by third parties."[129]

In a recent decision issued for *United States v. Washington State Department of Transportation (WSDOT)*,[130] the court found that WSDOT, by allowing runoff from its MS4 to a receiving water that is part of a Superfund site, is an "arranger" of "disposal or treatment of hazardous substances" as defined under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) by "designing, constructing, and operating drainage systems whose sole function was to collect highway runoff and dispose of it into nearby water-bodies." The court went on to state that "WSDOT did design the drainage system and…has the ability to redirect, contain or treat its contaminated runoff."

Finding D.3.e. Waste and pollutants which are deposited and accumulate in MS4 drainage structures will be discharged from these structures to waters of the U.S. unless they are removed. These discharges may cause or contribute to, or threaten to cause or contribute to, a condition of pollution in receiving waters. For this reason, pollutant discharges from storm water into MS4s must be reduced using a combination of management measures, including source control and an effective MS4 maintenance program implemented by each Copermittee.

Discussion of Finding D.3.e. When rain falls and drains freeways, industries, construction sites, and neighborhoods, it picks up a multitude of pollutants. Gravity flow transports the pollutants to the MS4. Illicit discharges and connections also can contribute a significant amount of pollutants to MS4s. MS4s are commonly designed to convey their contents as quickly as possible. Due to the resulting typically high flow rates within the concrete conveyance systems of MS4s, pollutants which enter or are deposited in the MS4 and not removed are generally flushed unimpeded through the MS4 to waters of the United States. Since treatment generally does not occur within the MS4, in such cases reduction of storm water pollutants to the MEP must occur prior to discharges entering the MS4.

The importance of this concept is supported by the tons of wastes/pollutants that have been removed from the Copermittees' MS4s as reported in their ROWD.[131] Moreover, these pollutants will be discharged into receiving waters unless an effective MS4 and structural treatment BMP maintenance program is implemented by the Copermittees. The requirement for Copermittees to conduct a MS4 maintenance program is specifically directed in both the Phase I and Phase II storm water regulations. Regarding MS4 cleaning, USEPA states "The removal of sediment, decaying debris, and highly polluted water from catch basins has aesthetic and water quality benefits, including reducing foul odors, reducing suspended solids, and reducing the load of

[129] Federal Register / Vol. 64, No. 235 / Wednesday, December 8, 1999 / Rules and Regulations. P. 68765-68766.
[130] United State District Court, Western District of Washington at Tacoma, Case No. C08-5722RJB, Order on Motions for Partial Summary Judgment, dated June 7, 2010.
[131] Riverside County Copermittees. 2009. Report of Waste Discharge (San Diego Region).

oxygen-demanding substances that reach receiving waters."[132] It goes on to say, "Catch basin cleaning is an efficient and cost-effective method for preventing the transport of sediment and pollutants to receiving water bodies." USEPA also finds that "Lack of maintenance often limits the effectiveness of storm water structural controls such as detention/retention basins and infiltration devices. […] The proposed program should provide for maintenance logs and identify specific maintenance activities for each class of control, such as removing sediment from retention ponds every five years, cleaning catch basins annually, and removing litter from channels twice a year."[133]

Finding D.3.f. Enforcement of local runoff related ordinances, permits, and plans is an essential component of every runoff management program and is specifically required in the federal storm water regulations and this Order. Each Copermittee is individually responsible for adoption and enforcement of ordinances and/or policies, implementation of identified control measures/BMPs needed to prevent or reduce pollutants in storm water runoff, and for the allocation of funds for the capital, operation and maintenance, administrative, and enforcement expenditures necessary to implement and enforce such control measures/BMPs under its jurisdiction. Education is an important aspect of every effective runoff management program and the basis for changes in behavior at a societal level. Education of municipal planning, inspection, and maintenance department staffs is especially critical to ensure that in-house staffs understand how their activities impact water quality, how to accomplish their jobs while protecting water quality, and understand their specific roles and responsibilities for compliance with this Order. Public education, designed to target various urban land users and other audiences, is also essential to inform the public of how individual actions affect receiving water quality and how adverse effects can be minimized.

Discussion of Finding D.3.f. The Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(A – D) are clear in placing responsibility on municipalities for control of runoff from third party activities and land uses to their MS4.[134] In order for municipalities to assume this responsibility, they must implement ordinances, permits, and plans addressing runoff from third parties. Assessments for compliance with their ordinances, permits, and plans are essential for a municipality to ensure that third parties are not causing the municipality to be in violation of its municipal storm water permit. When conditions of non-compliance are determined, enforcement is necessary to ensure that violations of municipality ordinances and permits are corrected. When the Copermittees determine a violation of its storm water ordinance, it must pursue correction of the violation. Without enforcement, third parties do not have incentive to correct violations. USEPA supports enforcement by municipalities when it states "Effective inspection and enforcement requires […] penalties to deter

[132] USEPA, 1999. Storm Water O&M Fact Sheet, Catch Basin Cleaning. EPA 832-F-99-011.
[133] USEPA, 1992. Guidance Manual for the Preparation of Part II of the NPDES Permit Applications for Discharges from Municipal Separate Storm Sewer Systems. EPA 833-B-92-002.
[134] USEPA, 2000. EPA Administered Permit Programs: The National Pollutant Discharge Elimination System. Code of Federal Regulations, Vol. 40, Part 122.

infractions and intervention by the municipal authority to correct violations. Enforcement mechanisms […] also must be described."[135]

Education is a critical BMP and an important aspect of runoff management programs. USEPA finds that "An informed and knowledgeable community is critical to the success of a storm water management program since it helps ensure the following: Greater support for the program as the public gains a greater understanding of the reasons why it is necessary and important, [and] greater compliance with the program as the public becomes aware of the personal responsibilities expected of them and others in the community, including the individual actions they can take to protect or improve the quality of area waters."[136]

Regarding target audiences, USEPA also states "The public education program should use a mix of appropriate local strategies to address the viewpoints and concerns of a variety of audiences and communities, including minority and disadvantaged communities, as well as children."

Finding D.3.g. Public participation during the development of runoff management programs is necessary to ensure that all stakeholder interests and a variety of creative solutions are considered.

Discussion of Finding D.3.g. This finding is supported by the Phase II Storm Water Regulations, which state "early and frequent public involvement can shorten implementation schedules and broaden public support for a program." USEPA goes on to explain, "Public participation is likely to ensure a more successful storm water program by providing valuable expertise and a conduit to other programs and governments."[137]

Finding D.3.h. Retrofitting existing development with storm water treatment controls, including LID, is necessary to address storm water discharges from existing development that may cause or contribute to a condition of pollution or a violation of water quality standards. Although SSMP BMPs are required for redevelopment, the current rate of redevelopment will not address water quality problems in a timely manner. Cooperation with private landowners is necessary to effectively identify, implement, and maintain retrofit projects for the preservation, restoration, and enhancement of water quality.

Discussion of Finding D.3.h. Existing BMPs are not sufficient to protect the Beneficial Uses of receiving waters from storm water MS4 discharges, as evidenced by 303(d) listings and exceedances of Water Quality Objectives from the Copermittees' monitoring reports. As recognized in USEPA guidance, waters in the region cannot be protected without also addressing degradation caused by storm

[135] USEPA, 1992. Guidance Manual for the Preparation of Part II of the NPDES Permit Applications for Discharges from Municipal Separate Storm Sewer Systems. EPA/833-B-92-002.
[136] USEPA, 2000. Storm Water Phase II Compliance Assistance Guide. EPA 833-R-00-002.
[137] Federal Register / Vol. 64, No. 235 / Wednesday, December 8, 1999 / Rules and Regulations. P. 68755.

water discharges from existing development. This requires more than just a new development and redeveloped sites program, which at best can only hold the line. For this reason USEPA recommends that storm water programs include a retrofit plan or program for retrofitting existing development.[138]

Implementing more advanced BMPs, including the retrofitting of existing development with LID BMPs, is part of the iterative process. Based on the current rate of redevelopment compared to existing BMPs, the use of LID only on new and redevelopment will not adequately address current water quality problems, including downstream hydromodification. Retrofitting existing development is practicable for a municipality through a systematic evaluation, prioritization and implementation plan focused on impaired water bodies, pollutants of concern, areas of downstream hydromodification, feasibility and effective communication and cooperation with private property owners.

To actually improve the quality of receiving waters, discharges from existing developed sites need to be mitigated, which generally means implementation of measures to retrofit existing development sites with storm water control measures that can retain and/or treat storm water on site. Retrofitting existing development is possible and reasonable to significantly improve water quality in receiving waters.

Successful retrofitting programs have been implemented in such diverse locations as Seattle, Washington[139]; Portland, Oregon[140], Santa Monica, California[141]; Kansas City, Kansas[142]; and Montgomery County, MD[143]. When appropriately applied as in this Order, retrofitting existing development meets MEP.

Finding D.4.a. Since runoff within a watershed can flow from and through multiple land uses and political jurisdictions, watershed-based runoff management can greatly enhance the protection of receiving waters. Such management provides a means to focus on the most important water quality problems in each watershed. By focusing on the most important water quality problems, watershed efforts can maximize protection of beneficial use in an efficient manner. Effective watershed-based runoff management actively reduces pollutant discharges and abates pollutant sources causing or contributing to watershed water quality problems. Watershed-based runoff management that does not actively reduce pollutant discharges and abate pollutant sources causing or contributing to watershed water quality problems can necessitate implementation of the iterative process outlined in section A.3 of the this Order. Watershed management of runoff does not require Copermittees to expend resources outside of their jurisdictions. In some cases, however, this added flexibility provides more, and possibly more effective, alternatives for minimizing waste discharges.

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[138] USEPA, 2010. MS4 Permit Improvement Guide. EPA 833-R-10-001.
[139] SEA Street, http://www.seattle.gov/dpd/Planning/CityDesign/What_We_Do/Outreach/Folio/DPDS_008014.asp
[140] Clean River Rewards, http://www.portlandonline.com/BES/index.cfm?c=edeef
[141] City of Santa Monica, Urban Runoff program, http://www.smgov.net/Departments/OSE/categories/content.aspx?id=4007
[142] 10,000 Rain Gardens, http://www.rainkc.com/
[143] Rainscapes, http://www.montgomerycountymd.gov/Content/DEP/Rainscapes/home.html

Watershed management requires the Copermittees within a watershed to develop a watershed-based management strategy, which can then be implemented on a jurisdictional basis.

Discussion of Finding D.4.a. In recent years, addressing water quality issues from a watershed perspective has increasingly gained attention. Regarding watershed-based permitting, the USEPA *Watershed-Based NPDES Permitting Policy Statement* issued on Jan. 7, 2004 states the following:

> USEPA continues to support a holistic watershed approach to water quality management. The process for developing and issuing NPDES permits on a watershed basis is an important tool in water quality management. USEPA believes that developing and issuing NPDES permits on a watershed basis can benefit all watershed stakeholders, from the NPDES permitting authority to local community members. A watershed-based approach to point source permitting under the NPDES program may serve as one innovative tool for achieving new efficiencies and environmental results. USEPA believes that watershed-based permitting can:
>
> - Lead to more environmentally effective results;
> - Emphasize measuring the effectiveness of targeted actions on improvements in water quality;
> - Provide greater opportunities for trading and other market based approaches;
> - Reduce the cost of improving the quality of the nation's waters;
> - Foster more effective implementation of watershed plans, including total maximum daily loads (TMDLs); and
> - Realize other ancillary benefits beyond those that have been achieved under the CWA (e.g., facilitate program integration including integration of Clean Water Act and Safe Drinking Water Act programs).
>
> Watershed-based permitting is a process that ultimately produces NPDES permits that are issued to point sources on a geographic or watershed basis. In establishing point source controls in a watershed-based permit, the permitting authority may focus on watershed goals, and consider multiple pollutant sources and stressors, including the level of nonpoint source control that is practicable. In general, there are numerous permitting mechanisms that may be used to develop and issue permits within a watershed approach.

This USEPA guidance is in line with State Water Board and San Diego Water Board watershed management goals. For example, the State Water Board's TAC recommends watershed-based water quality protection, stating "Municipal permits should have watershed specific components." The TAC further recommends that "All NPDES permits and Waste Discharge Requirements should be considered for reissuance on a watershed basis."

In addition, the Basin Plan states that "public agencies and private organizations concerned with water resources have come to recognize that a comprehensive evaluation of pollutant contributions on a watershed scale is the only way to realistically assess cumulative impacts and formulate workable strategies to truly protect our water resources. Both water pollution and habitat degradation problems can best be solved by following a basin-wide approach."

In light of USEPA's policy statement and the State Water Board's and San Diego Water Board's watershed management goals, the San Diego Water Board seeks to expand watershed management in the regulation of runoff from the MS4. Watershed-based MS4 permits can provide for more effective receiving water quality protection by focusing on specific water quality problems. The entire watershed for the receiving water can be assessed, allowing for critical areas and practices to be targeted for corrective actions. Known sources of pollutants of concern can be investigated for potential water quality impacts. Problem areas can then be addressed, leading to eventual improvements in receiving water quality. Management of runoff on a watershed basis allows for specific water quality problems to be targeted so that efforts result in maximized water quality improvements.[144]

Finding D.4.b. Some runoff issues, such as general education and training, can be effectively addressed on a regional basis. Regional approaches to runoff management can improve program consistency and promote sharing of resources, which can result in implementation of more efficient programs.

Discussion of Finding D.4.b. Copermittees in Riverside County participate in several runoff-related activities whose scope extends beyond the area subject to this Order. These include countywide activities (e.g., portions of Riverside County fall under the jurisdictions of the Santa Ana Water Board and California Regional Water Quality Control Board, Colorado River Region (Colorado River Water Board)), southern California, and statewide activities. Copermittees' participation in these regional activities is generally directed at improving management capability, preventing redundancy and taking advantage of economies of scale. For instance, Copermittees seek to develop consistency between watershed and/or jurisdictional programs (e.g., through standards development), and to collaborate on certain program activities such as education, training, and monitoring.

Finding D.4.c. It is important for the Copermittees to coordinate their water quality protection and land use planning activities to achieve the greatest protection of receiving water bodies. Copermittee coordination with other watershed stakeholders, especially the State of California Department of Transportation, the U.S. federal government, sovereign American Indian tribes, and water and sewer districts, is also important.

[144] San Diego Water Board, 2004. San Diego County Municipal Storm Water Permit Reissuance Analysis Summary. P. 1.

Discussion of Finding D.4.c. Conventional planning and zoning can be limited in their ability to protect the environmental quality of creeks, rivers, and other water bodies. Watershed-based planning is often ignored, despite the fact that receiving waters unite land by collecting runoff from throughout the watershed. Since watersheds unite land, they can be used as an effective basis for planning. Watershed-based planning enables local and regional areas to realize economic, social, and other benefits associated with growth, while conserving the resources needed to sustain such growth, including water quality.

This type of planning can involve four steps: (1) Identify the watersheds shared by the participating jurisdictions; (2) Identify, assess, and prioritize the natural, social, and other resources in the watersheds; (3) Prioritize areas for growth, protection, and conservation, based on prioritized resources; and (4) Develop plans and regulations to guide growth and protect resources. Local governments have started with simple, yet effective, steps toward watershed planning, such as adopting a watershed-based planning approach, articulating the basic strategy in their General Plans, and beginning to pursue the basic strategy in collaboration with neighboring local governments who share the watersheds. Examples of new mechanisms created to facilitate watershed-based planning and zoning include the San Francisquito Creek Watershed Coordinated Resource Management Process and the Santa Clara Basin Watershed Management Initiative.[145]

[145] Bay Area Stormwater Management Agencies Association., 1999. Start at the Source. Forbes Custom Publishing. Available on-line at: http://www.scvurppp-w2k.com/basmaa_satsm.htm

E. Statute and Regulatory Considerations

Finding E.1. The RWL language specified in this Order is consistent with language recommended by the USEPA and established in State Water Board Order WQ-99-05, *Own Motion Review of the Petition of Environmental Health Coalition to Review Waste Discharge Requirements Order No. 96-03, NPDES Permit No. CAS0108740*, adopted by the State Water Board on June 17, 1999. The RWL language in this Order requires compliance with water quality standards, which for storm water discharges is to be achieved through an iterative approach requiring the implementation of improved and better-tailored BMPs over time. Compliance with receiving water limitations based on applicable water quality standards is necessary to ensure that MS4 discharges will not cause or contribute to violations of water quality standards and the creation of conditions of pollution, contamination, or nuisance.

Discussion of Finding E.1. The RWL language in the Order requires storm water compliance with water quality standards through an iterative approach for implementing improved and better-tailored BMPs over time. The iterative BMP process requires the implementation of increasingly stringent BMPs until receiving water quality standards are achieved. This is necessary because implementation of BMPs alone cannot ensure attainment of receiving water quality standards. For example, a BMP that is effective in one situation may not be applicable in another. An iterative process of BMP development, implementation, and assessment is needed to promote consistent compliance with receiving water quality objectives. If assessment of a given BMP confirms that the BMP is ineffective, the iterative process should be restarted, with redevelopment of a new BMP that is anticipated to result in compliance with receiving water quality objectives.

The issue of whether storm water discharges from MS4s must meet water quality standards has been intensely debated in past years. The argument arises because CWA section 402(p) fails to clearly state that municipal dischargers of storm water must meet water quality standards. On the issue of industrial discharges of storm water, the statute clearly indicates that industrial dischargers must meet both (1) the technology-based standard of “best available technology economically achievable (BAT)” and (2) applicable water quality standards. On the issue of municipal discharges however, the statute states that municipal dischargers must meet (1) the technology-based standard of MEP” and (2) “such other provisions that the Administrator or the State determines appropriate for the control of such pollutants.” The statute fails, however, to specifically state that municipal dischargers must meet water quality standards.

As a result, the municipal storm water dischargers have argued that they do not have to meet water quality standards; and that they only are required to meet MEP for storm water. Environmental interest groups maintain that not only do MS4 discharges have to meet water quality standards, but that MS4 permits must also comply with numeric effluent limitations for the purpose of meeting water quality standards. On the issue of water quality standards, USEPA, the State Water Board, and the San Diego Water

Board have consistently maintained that MS4s must indeed comply with water quality standards. On the issue of whether water quality standards must be met by numeric effluent limitations, USEPA, the State Water Board (in Orders WQ 91-03 and WQ 91-04), and the San Diego Water Board have maintained that MS4 permits can contain narrative requirements for the implementation of BMPs in place of numeric effluent limitations for storm water discharges.[146]

In addition to relying on USEPA's legal opinion concluding that MS4s must meet MEP for storm water and water quality standards, the State Water Board also relied on the CWA's explicit authority for States to require "such other provisions that the Administrator or the State determines appropriate for the control of such pollutants" in addition to the technology-based standard of MEP for storm water discharges. To further support its conclusions that MS4 permit dischargers must meet water quality standards, the State Water Board relied on provisions of the CWC that specify that all waste discharge requirements must implement applicable Basin Plans and take into consideration the appropriate water quality objectives for the protection of beneficial uses.

The State Water Board first formally concluded that permits for MS4s must contain effluent limitations based on water quality standards in its Order WQ 91-03. In that Order, the State Water Board also concluded that it was appropriate for Regional Water Boards to achieve this result by requiring best management practices, rather than by inserting numeric effluent limitations into MS4 permits. Later, in Order WQ 98-01, the State Water Board prescribed specific precedent setting Receiving Water Limitations language to be included in all future MS4 permits. This language specifically requires that MS4 dischargers meet water quality standards and allows for the use of narrative BMPs (increasing in stringency and implemented in an iterative process) as the mechanism by which water quality standards can be met for storm water discharges.

In Order WQ 99-05, the State Water Board modified its receiving water limitations language in Order WQ 98-01 to meet specific objections by USEPA (the modifications resulted in stricter compliance with water quality standards). State Water Board Order WQ 99-05 states:

> "In Order WQ 98-01, the State Board ordered that certain receiving water limitation language be included in future municipal storm water permits. Following inclusion of that language in permits issued by the San Francisco Bay and San Diego Water Boards for Vallejo and Riverside respectively, the USEPA objected to the permits. The USEPA objection was based on the receiving water limitation language. The USEPA has now issued those permits itself and has included receiving water limitation language it deems appropriate.

[146] For the most recent assessment, see Storm Water Panel Recommendations to the California State Water Resources Control Board, 2006. *The Feasibility of Numeric Effluent Limits Applicable to Discharges of Storm Water Associated with Municipal, Industrial, and Construction Activities.*

> In light of USEPA's objection to the receiving water limitation language in Order WQ 98-01 and its adoption of alternative language, the State Board is revising its instructions regarding receiving water limitation language for municipal storm water permits. It is hereby ordered that Order WQ 98-01 will be amended to remove the receiving water limitation language contained therein and to substitute the USEPA language. Based on the reasons stated here, and as a precedent decision, the following receiving water limitation language shall be included in future municipal storm water permits."

In the 1999 case involving MS4 permits issued by USEPA to several Arizona cities (*Defenders of Wildlife v. Browner*, 1999, 197 F. 3d 1035), the United States Court of Appeals for the Ninth Circuit upheld USEPA's requirement for MS4 dischargers to meet water quality standards, but it did so on the basis of USEPA's discretion rather than on the basis of strict compliance with the CWA. In other words, while holding that the CWA does not require all MS4 discharges to comply strictly with state water quality standards, the Court also held that USEPA has the authority to determine that ensuring strict compliance with state water quality standards is necessary to control pollutants. On the question of whether MS4 permits must contain numeric effluent limitations, the court upheld USEPA's use of iterative BMPs in place of numeric effluent limitations for storm water discharges.

On October 14, 1999, the State Water Board issued a legal opinion on the federal appellate decision and provided advice to the Regional Water Boards on how to proceed in the future. In the memorandum, the State Water Board concludes that the recent Ninth Circuit opinion upholds the discretion of USEPA and the State to (continue to) issue storm water permits to MS4s that require compliance with water quality standards through iterative BMPs. Moreover, the memorandum states that "[…] because most MS4 discharges enter impaired water bodies, there is a real need for permits to include stringent requirements to protect those water bodies. As TMDLs are developed, it is likely that MS4s will have to participate in pollutant load reductions, and the MS4 permits are the most effective vehicles for those reductions." In summary, the State Water Board found that the Regional Water Boards should continue to include the RWL established in State Water Board Order WQ 99-05 in all future permits.

The issue of the RWLs language was also central to the Building Industry Association's (BIA's) (and others') appeal of San Diego Water Board Order No. 2001-01 (San Diego MS4 permit), which was used as a template for San Diego Water Board Order No. R9-2002-0001 (Orange County MS4 permit). BIA contended that the storm water MEP standard was a ceiling on what could be required of the Copermittees in implementing their runoff management programs, and that Order No. 2001-01's receiving water limitations requirements exceeded that ceiling. In other words, BIA argued that the Copermittees could not be required to comply with receiving water limitations if they necessitated efforts which went beyond the MEP standard. Again, the courts upheld the San Diego Water Board's discretion to require compliance with water quality standards in municipal storm water permits, without limitation. The Court

of Appeal, Fourth Appellate District found that the San Diego Water Board has "the authority to include a permit provision requiring compliance with water quality standards."[147] On further appeal by BIA, the California State Supreme Court declined to hear the matter.

While implementation of the iterative BMP process is a means to achieve compliance with water quality objectives for storm water MS4 discharges, it does not shield the discharger from enforcement actions for continued non-compliance with water quality standards. Consistent with USEPA guidance,[148] regardless of whether or not an iterative process is being implemented, discharges that cause or contribute to a violation of water quality standards are in violation of Order No. R9-2010-0016.

Finding E.2. The Basin Plan, identifies the following existing and potential beneficial uses for surface waters in Riverside County: Municipal and Domestic Supply (MUN), Agricultural Supply (AGR), Industrial Process Supply (PROC), Hydropower Generation (POW), Industrial Service Supply (IND), Ground Water Recharge (GWR), Contact Water Recreation (REC1), Non-contact Water Recreation (REC2), Warm Freshwater Habitat (WARM), Cold Freshwater Habitat (COLD), Wildlife Habitat (WILD), Rare, Threatened, or Endangered Species (RARE), Spawning, Reproduction and/or Early Development (SPWN) and Preservation of Biological Habitats of Special Significance (BIOL).

Discussion of Finding E.2. The southwestern portion of Riverside County is within the San Diego Region. The Riverside County portion of the San Diego Region falls within Santa Margarita Hydrologic Unit. The major streams within the Riverside County portion of the Santa Margarita Hydrologic Unit are the Santa Margarita River, Temecula Creek, and Murrieta Creek. Other surface water bodies include De Luz Creek, Sandia Canyon Creek, Warm Springs Creek, San Gertrudis Creek, and Wilson Creek. Major inland water bodies include Lake Skinner and Vail Lake.

The Riverside County portion of the Santa Margarita Hydrologic Unit includes unincorporated portions of Riverside County, the Cities of Menifee, Murrieta, Temecula, and Wildomar..

Based on the 2000 census, approximately 150,000 people resided within the permitted area. Since the 2000 census, however, several new developments, especially in the Cities of Temecula and Murrieta have increased the housing stock of the area, and the population is now significantly higher. As of January 1, 2009, approximately 250,000 people reside in the permitted area, with approximately 30,000 people living in the unincorporated area of Riverside County (31,163) and approximately 220,000 living in the Cities of Menifee (613), Murrieta (99,574), Temecula (102,604), and Wildomar (22,240).[149]

[147] Building Industry Association et al., v. State Water Resources Control Board, et al. 2004.
[148] USEPA, 1998. Jan. 21, 1998 correspondence, "State Board/OCC File A-1041 for Orange County," from Alexis Strauss to Walt Petit, and March 17, 1998 correspondence from Alexis Strauss to Walt Petit.
[149] Fiscal Year 2008-2009 Santa Margarita Watershed Annual Progress Report

Finding E.3. This Order is in conformance with State Water Board Resolution No. 68-16, *Statement of Policy with Respect to Maintaining High Quality Waters in California*, and the federal Antidegradation Policy described in 40 CFR 131.12.

Discussion of Finding E.3. Runoff management programs are required to be designed to reduce pollutants in storm water MS4 discharges to the maximum extent practicable and achieve compliance with water quality standards. Therefore, implementation of runoff management programs, which satisfy the requirements of Order No. R9-2010-0016, will prevent violations of receiving water quality standards. The Basin Plan states that "Water quality objectives must […] conform to US EPA regulations covering antidegradation (40 CFR 131.12) and State Water Board Resolution No. 68-16, Statement of Policy with Respect to Maintaining High Quality of Waters in California." As a result, when water quality standards are met, USEPA and State Water Board antidegradation policy requirements are also met.

Finding E.4. Section 6217(g) of the Coastal Zone Act Reauthorization Amendments of 1990 (CZARA) requires coastal states with approved coastal zone management programs to address non-point pollution impacting or threatening coastal water quality. CZARA addresses five sources of non-point pollution: agriculture, silviculture, urban, marinas, and hydromodification. This NPDES permit addresses the management measures required for the urban category, with the exception of septic systems. The adoption and implementation of this NPDES permit relieves the Copermittee from developing a non-point source plan, for the urban category, under CZARA. The San Diego Water Board addresses septic systems through the administration of other programs.

Discussion of Finding E.4. Coastal states are required to develop programs to protect coastal waters from nonpoint source pollution, as mandated by the federal CZARA. CZARA section 6217 identifies polluted runoff as a significant factor in coastal water degradation, and requires implementation of management measures and enforceable policies to restore and protect coastal waters. In lieu of developing a separate NPS program for the coastal zone, California's NPS Pollution Control Program was updated in 2000 to address the requirements of both the CWA section 319 and the CZARA section 6217 on a statewide basis. The California Coastal Commission (CCC), the State Water Board, and the nine Regional Water Boards are the lead State agencies for upgrading the program, although 20 other State agencies also participate. Pursuant to the CZARA (section 6217(g)) Guidance Document the development of runoff management programs pursuant to this NPDES permit fulfills the need for cities within watersheds that discharge to the coastal zone to develop an runoff non-point source plan identified in the State's Non-point Source Program Strategy and Implementation Plan.[150]

[150] State Water Board/CCC, 2000. Nonpoint Source Program Strategy and Implementation Plan, 1998-2013 (PROSIP).

Finding E.5. Section 303(d)(1)(A) of the CWA requires that "Each state shall identify those waters within its boundaries for which the effluent limitations…are not stringent enough to implement any water quality standard (WQS) applicable to such waters." The CWA also requires states to establish a priority ranking of impaired waterbodies known as Water Quality Limited Segments and to establish Total Maximum Daily Loads (TMDLs) for such waters. This priority list of impaired waterbodies is called the Section 303(d) List. The 2006 303(d) List was approved by the State Water Board on October 25, 2006. On June 28, 2007 the 2006 303(d) List for California was given final approval by the USEPA. The 303(d) List was recently updated, and on December 16, 2009 the 2008 303(d) List was approved by the San Diego Water Board. The 2008 303(d) List for the San Diego Region was approved by the State Water Board on August 4, 2010. The 2008 303(d) List is awaiting USEPA approval.

Discussion of Finding E.5. Section 303(d) of the federal CWA (CWA, 33 USC 1250, et seq., at 1313(d)), requires States to identify waters that do not meet water quality standards after applying certain required technology-based effluent limits ("impaired" water bodies). States are required to compile this information in a list and submit the list to USEPA for review and approval. This list is known as the Section 303(d) list of impaired waters, or 303(d) List. As part of this listing process, States are required to prioritize waters/watersheds for future development of TMDLs. The State Water Board and Regional Water Boards have ongoing efforts to monitor and assess water quality, to prepare the 303(d) List, to prioritize waters/watersheds for TMDL development, and to subsequently develop TMDLs. TMDLs developed and adopted by the San Diego Water Board are incorporated into the Basin Plan via a Basin Plan Amendment as authorized under CWC section 13240.

The 2006 California 303(d) List identifies impaired receiving water bodies and their watersheds within the State of California.[151] The San Diego Water Board recently updated the 303(d) List for the San Diego Region and adopted the 2008 303(d) List on December 16, 2009.[152] The number of water bodies listed as impaired in the Riverside County portion of the Santa Margarita Hydrologic Unit increased from 6 water bodies (13 water body / impairing pollutant combinations) on the 2006 303(d) List to 9 water bodies (49 water body / impairing pollutant combinations) on the 2008 303(d) List, indicating the receiving water quality has been degraded further (see Table 2). Storm water and non-storm water runoff that is discharged from the Copermittees' MS4s is a leading cause of receiving water quality impairment in the San Diego Region.

Finding E.6. This Order does not constitute an unfunded local government mandate subject to subvention under Article XIIIB, Section (6) of the California Constitution for several reasons, including, but not limited to, the following. First, this Order implements federally mandated requirements under CWA § 402. (33 U.S.C. §

[151] The approved 2006 Clean Water Act Section 303(d) List of Water Quality Limited Segments is on-line at: http://www.waterboards.ca.gov/tmdl/303d_lists2006.html.
[152] The 2008 Clean Water Act Section 303(d) List of Water Quality Limited Segments, approved by the San Diego Water Board and State Water Board, is available on-line at http://www.swrcb.ca.gov/rwqcb9/water_issues/programs/303d_list/index.shtml

1342(p)(3)(B).) Second, the local agency Copermittees' obligations under this Order are similar to, and in many respects less stringent than, the obligations of non-governmental and new dischargers who are issued NPDES permits for storm water and non-storm water discharges. Third, the local agency Copermittees have the authority to levy service charges, fees, or assessments sufficient to pay for compliance with this Order. Fourth, the Copermittees have requested permit coverage in lieu of compliance with the complete prohibition against the discharge of pollutants contained in CWA § 301, subdivision (a) (33 U.S.C. § 1311(a)) and in lieu of numeric restrictions on their MS4 discharges (i.e. effluent limitations). Fifth, the local agencies' responsibility for preventing discharges of waste that can create conditions of pollution or nuisance from conveyances that are within their ownership or control under State law predates the enactment of Article XIIIB, Section (6) of the California Constitution. Likewise, the provisions of this Order to implement TMDLs are federal mandates. The CWA requires TMDLs to be developed for water bodies that do not meet federal water quality standards. (33 U.S.C. sec. 1313(d).) Once the UUSEPA or a state develops a TMDL, federal law requires that permits must contain effluent limitations consistent with the assumptions of any applicable wasteload allocation. (40 C.F.R. sec. 122.44(d)(1)(vii)(B).)

Discussion of Finding E.6. This Order does not constitute an unfunded local government mandate subject to subvention under Article XIIIB, Section (6) of the California Constitution for several reasons, including, but not limited to, the following. First, this Order implements federally mandated requirements under CWA section 402, subdivision (p)(3)(B). (33 U.S.C. § 1342(p)(3)(B).) This includes federal requirements to effectively prohibit non-storm water discharges, to reduce the discharge of pollutants in storm water to the maximum extent practicable, and to include such other provisions as the Administrator or the State determines appropriate for the control of such pollutants. Federal cases have held these provisions require the development of permits and permit provisions on a case-by-case basis to satisfy federal requirements. (Natural Resources Defense Council, Inc. v. U.S. E.P.A. (9th Cir. 1992) 966 F.2d 1292, 1308, fn. 17.)

The authority exercised under this Order is not reserved state authority under the CWA's savings clause (cf. Burbank v. State Water Resources Control Bd. (2005) 35 Cal.4th 613, 627-628 [relying on 33 U.S.C. § 1370, which allows a state to develop requirements which are not "less stringent" than federal requirements]), but instead, is part of a federal mandate to develop pollutant reduction requirements for municipal separate storm sewer systems. To this extent, it is entirely federal authority that forms the legal basis to establish the permit provisions. (See, City of Rancho Cucamonga v. Regional Water Quality Control Bd.-Santa Ana Region (2006) 135 Cal.App.4th 1377, 1389; Building Industry Ass'n of San Diego County v. State Water Resources Control Bd. (2004) 124 Cal.App.4th 866, 882-883.)

Second, the local agency Copermittees' obligations under this Order are similar to, and in many respects less stringent than, the obligations of non-governmental dischargers who are issued NPDES permits for storm water discharges. With a few

inapplicable exceptions, the CWA regulates the discharge of pollutants from point sources (33 U.S.C. § 1342) and the Porter-Cologne regulates the discharge of waste (CWC § 13263), both without regard to the source of the pollutant or waste. As a result, the "costs incurred by local agencies" to protect water quality reflect an overarching regulatory scheme that places similar requirements on governmental and nongovernmental dischargers. (See County of Los Angeles v. State of California (1987) 43 Cal.3d 46, 57-58 [finding comprehensive workers compensation scheme did not create a cost for local agencies that was subject to state subvention].)

The CWA and the Porter-Cologne Water Quality Control Act largely regulate storm water with an even hand, but to the extent there is any relaxation of this even-handed regulation, it is in favor of the local agencies. Except for municipal separate storm sewer systems, the CWA requires point source dischargers, including discharges of storm water associated with industrial or construction activity, to comply strictly with water quality standards. (33 U.S.C. § 1311(b)(1)(C), Defenders of Wildlife v. Browner (1999) 191 F.3d 1159, 1164-1165 [noting that industrial storm water discharges must strictly comply with water quality standards].) As discussed in prior State Water Board decisions, this Order does not require strict compliance with water quality standards. (State Water Board Order WQ 2001-15, p. 7.) The Order, therefore, regulates the discharge of waste in municipal storm water more leniently than the discharge of waste from non-governmental sources.

Third, the local agency Copermittees have the authority to levy service charges, fees, or assessments sufficient to pay for compliance with this Order. The fact sheet demonstrates that numerous activities contribute to the pollutant loading in the municipal separate storm sewer system. Local agencies can levy service charges, fees, or assessments on these activities, independent of real property ownership. (See, e.g., Apartment Ass'n of Los Angeles County, Inc. v. City of Los Angeles (2001) 24 Cal.4th 830, 842 [upholding inspection fees associated with renting property].) The ability of a local agency to defray the cost of a program without raising taxes indicates that a program does not entail a cost subject to subvention. (County of Fresno v. State of California (1991) 53 Cal.3d 482, 487-488.)

Fourth, the Copermittees have requested permit coverage in lieu of compliance with the complete prohibition against the discharge of pollutants contained in CWA section 301, subdivision (a) (33 U.S.C. § 1311(a)) and in lieu of numeric effluent limitations on their storm water discharges. To the extent, the local agencies have voluntarily availed themselves of the permit, the program is not a state mandate. (Accord County of San Diego v. State of California (1997) 15 Cal.4th 68, 107-108.) Likewise, the Copermittees have voluntarily sought a program-based municipal storm water permit in lieu of a numeric limitations approach on their storm water discharge. (See City of Abilene v. U.S. E.P.A. (5th Cir. 2003) 325 F.3d 657, 662-663 [noting that municipalities can choose between a management permit or a permit with numeric limitations].) The local agencies' voluntary decision to file a report of waste discharge proposing a program-based permit is a voluntary decision not subject to subvention. (See Environmental Defense Center v. USEPA (9th Cir. 2003) 344 F.3d 832, 845-848.)

Fifth, the local agencies' responsibility for preventing discharges of waste that can create conditions of pollution or nuisance from conveyances that are within their ownership or control under state law predates the enactment of Article XIIIB, Section (6) of the California Constitution.

The San Diego Water Board recognizes that the Commission on State Mandates recently found that certain provisions within two municipal storm water permits constituted reimbursable state mandates within the meaning of the California Constitution. The Commission did not determine the validity of those provisions; it only determined that the State must reimburse the claimants for the costs of implementing those provisions. The decisions directly affect only the municipal storm water permits identified in the two test claims. That is, the effect of the decisions is limited to the provisions of Los Angeles Water Board Order 01-182 and San Diego Order R9-2007-0001 identified by the Commission as reimbursable state mandates. No other municipal storm water permits or provisions therein are directly affected by the decisions and the San Diego Water Board is not precluded from adopting similar or identical provisions in the Tentative Order. Subsequent proceedings before the Commission to determine the local governments entitled to reimbursement and the amount of reimbursement are underway before the Commission. Separately, the State Water Board and San Diego and Los Angeles Water Boards have challenged these decisions in court.

Finding E.7. Runoff treatment and/or mitigation must occur prior to the discharge of runoff into receiving waters. Treatment BMPs must not be constructed in waters of the U.S. or State unless the runoff flows are sufficiently pretreated to protect the values and functions of the water body. Federal regulations at 40 CFR 131.10(a) state that in no case shall a state adopt waste transport or waste assimilation as a designated use for any waters of the U.S. Authorizing the construction of a runoff treatment facility within a water of the U.S., or using the water body itself as a treatment system or for conveyance to a treatment system, would be tantamount to accepting waste assimilation as an appropriate use for that water body. Furthermore, the construction, operation, and maintenance of a pollution control facility in a water body can negatively impact the physical, chemical, and biological integrity, as well as the beneficial uses, of the water body. Without federal authorization (e.g., pursuant to CWA § 404), waters of the U.S. may not be converted into, or used as, waste treatment or conveyance facilities. Similarly, waste discharge requirements pursuant to CWC §13260 are required for the conversion or use of waters of the State as waste treatment or conveyance facilities. Diversion from waters of the U.S./State to treatment facilities and subsequent return to waters of the U.S. is allowable, provided that the effluent complies with applicable NPDES requirements.

Discussion of Finding E.7. Runoff treatment and/or mitigation in accordance with any of the requirements in the Order must occur prior to the discharge of storm water into receiving waters. Allowing storm water polluted runoff to enter receiving waters prior to treatment to the MEP will result in degradation of the water body and potential

exceedances of water quality standards, from the discharge point to the point of dissipation, infiltration, or treatment. Furthermore, the construction, operation, and maintenance of a pollution control facility in a water body can negatively impact the physical, chemical, and biological integrity, as well as the beneficial uses, of the water body. This requirement is supported by federal regulation 40 CFR 131.10(a) and USEPA guidance. According to USEPA,[153] "To the extent possible, municipalities should avoid locating structural controls in natural wetlands. Before considering siting of controls in a natural wetland, the municipality should demonstrate that it is not possible or practicable to construct them in sites that do not contain natural wetlands. Practices should be used that settle solids, regulate flow, and remove contaminants prior to discharging storm water into a wetland."

Additional Federal guidance discusses the implementation of wetlands to treat municipal storm water discharges (USEPA, 2000. *Guiding Principles for Constructed Treatment Wetlands: Providing for Water Quality and Wildlife Habitat*). It states:

> *"..treatment wetlands should not be constructed in a waters of the U.S. unless you can sufficiently pretreat the stormwater flows to protect the values and functions of the waters of the U.S. Because storm water is an unpredictable effluent source and can contain high levels of toxic substances, nutrients, and pathogens, we strongly encourage that you construct the treatment wetland in uplands and use best management practices in these projects."*[154]

Consistent with USEPA guidance, the conversion or use of waters of the U.S./State into runoff treatment facilities or conveyance facilities for untreated storm water discharges must be appropriately reviewed by both Federal and State resource agencies. Such projects may be subject to federal permitting pursuant to CWA section 404 if discharges of dredged or fill material is involved.

The placement of hydromodification controls within waters of the U.S./State may also be subject to federal and/or state permitting, but would not necessarily be considered a pollutant treatment BMP. Provided that grade control structures are designed to re-establish a natural channel gradient and correct excessive changes to the sediment transport regime caused by urbanization, rather than to create a series of artificial hydrological impoundments for the purpose of treating pollution, this type of project is not considered an in-stream treatment BMP.

Finding E.8. The issuance of waste discharge requirements and an NPDES permit for the discharge of runoff from MS4s to waters of the U.S. is exempt from the requirement for preparation of environmental documents under the California Environmental Quality Act (CEQA) (Public Resources Code, Division 13, Chapter 3, section 21000 et seq.) in accordance with the CWC section 13389.

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[153] USEPA, 1992. Guidance Manual for the Preparation of Part II of the NPDES Permit Applications for Discharges from Municipal Separate Storm Sewer Systems. EPA 833-B-92-002.
[154] USEPA, 2000. Guiding Principles for Constructed Treatment Wetlands: Providing for Water Quality and Wildlife Habitat, (EPA 843-B-00-003).

Discussion of Finding E.8. CWC section 13389 exempts the adoption of waste discharge requirements (such as NPDES permits) from CEQA requirements: "Neither the State Water Board nor the Regional Water Boards shall be required to comply with the provisions of Chapter 3 (commencing with section 21100) of Division 13 of the Public Resources Code prior to the adoption of any waste discharge requirement, except requirements for new sources as defined in the Federal Water Pollution Control Act or acts amendatory thereof or supplementary thereto."

This CEQA exemption was challenged during BIA's (and others') appeal of Order No. 2001-01. BIA contended that the CEQA exemption did not apply to permit requirements where the San Diego Water Board utilized its discretion to craft permit requirements which were more prescriptive than required by federal law. The Court of Appeal, Fourth Appellate District disagreed with this argument, stating "we also reject Building Industry's argument to the extent it contends the statutory CEQA exemption in CWC section 13389 is inapplicable to a particular NPDES permit provision that is discretionary, rather than mandatory, under the CWA."[155] On further appeal by BIA, the California State Supreme Court declined to hear the matter.

In a recent decision, the Court of Appeal of the State of California, Second Appellate District, upheld the CEQA exemption for municipal storm water NPDES permits (County of Los Angeles, et al. v. California State Water Resources Control Board, et al.).[156]

Finding E.9. Storm water discharges from developed and developing areas in Riverside County are significant sources of certain pollutants that cause, may be causing, threatening to cause or contributing to water quality impairment in the waters of Riverside County. Furthermore, as delineated in the CWA section 303(d) list in Table 2, the San Diego Water Board has found that there is a reasonable potential that municipal storm water and non-storm water discharges from MS4s cause or may cause or contribute to an excursion above water quality standards for the following pollutants: Indicator Bacteria (including Fecal Coliform and E. Coli), Copper, Manganese, Iron, Chlorpyrifos, Diazinon, Sulfates, Phosphorous, Nitrogen, Total Dissolved Solids (TDS), and Toxicity. In accordance with CWA section 303(d), the San Diego Water Board is required to establish TMDLs for these pollutants to these waters to eliminate impairment and attain water quality standards. Therefore, certain early pollutant control actions and further pollutant impact assessments by the Copermittees are warranted and required pursuant to this Order.

Discussion of Finding E.9. CWA section 303(d)(1)(A) requires that:

> "*Each state must identify those waters within its boundaries for which the effluent limitations…are not stringent enough to implement any water quality standard (WQS) applicable to such waters.*"

[155] Building Industry Association et al., v. State Water Resources Control Board, et al. 2004.
[156] Los Angeles County Super. Ct. No. BS080792. Partial publication dated November 6, 2006.

The CWA also requires states to establish a priority ranking of impaired water bodies known as Water Quality Limited Segments and to establish Total Maximum Daily Loads (TMDLs) for such waters. This priority list of impaired water bodies is called the 303(d) List. The current 303(d) List was approved by the State Water Board on October 25, 2006. On June 28, 2007 the 2006 303(d) List for California was given final approval by USEPA. Every two years the State of California is required by CWA section 303(d) and 40 CFR(130.7) to develop and submit to the USEPA for approval an updated 303(d) list of impaired water bodies. The San Diego Water Board recently updated the 303(d) List and adopted the 2008 303(d) List on December 16, 2009.[157] The 2008 303(d) List for the San Diego Region was approved by the State Water Board on August 4, 2010. The 2008 303(d) List is awaiting approval by the USEPA. The number of water bodies listed as impaired in the Riverside County portion of the Santa Margarita Hydrologic Unit increased from 6 water bodies (13 water body / pollutant combinations) on the 2006 303(d) List to 9 water bodies (49 water body / pollutant combinations) on the 2008 303(d) List, indicating the receiving water quality has been degraded further (see Table 2).

Multiple water bodies in Riverside County have been identified as impaired and placed on the 303(d) List. The 303(d) listing of a water body and subsequent TMDL development is required when regulations under current permits, such as Technology Based Effluent Limitations (TBELs), are not stringent enough to meet Water Quality Standards and protect the Beneficial Uses of Waters of the State.

Storm water discharges from developed and developing areas in Riverside County are a significant source of certain pollutants that cause, may be causing, threatening to cause, or contributing to water quality impairment in the waters of Riverside County. Furthermore, the CWA section 303(d) list indicates that there is a reasonable potential that municipal storm water and dry weather discharges from MS4s cause, or may cause, or contribute to an excursion above water quality standards for the following pollutants: Indicator Bacteria, Copper, Manganese, Iron, Chlorpyrifos, Sulfates, Phosphorous, Nitrogen, Total Dissolved Solids, Toxicity and Turbidity (see Table 2). In accordance with CWA section 303(d), the San Diego Water Board is required to establish TMDLs for these pollutants in these waters to eliminate impairment and attain water quality standards. Per 40 CFR(130.7), WLAs are required for all point sources, including storm water and non-storm water discharges from MS4s. Therefore, focused pollutant control actions and further pollutant impact assessments by the Copermittees are warranted and required pursuant to this Order.

MS4 Permits address only those TMDL WLAs that have been adopted by the San Diego Water Board and have been approved by the State Water Board, Office of Administrative Law (OAL) and USEPA. WLAs are portions of a receiving water's loading capacity that is allocated to one of its existing or future point sources of

[157] The 2008 Clean Water Act Section 303(d) List of Water Quality Limited Segments, approved by the San Diego Water Board and State Water Board, is available on-line at http://www.swrcb.ca.gov/rwqcb9/water_issues/programs/303d_list/index.shtml

pollution. To date, no TMDLs and WLAs have been adopted to address impaired water bodies in the Riverside County portion of the Santa Margarita Hydrologic Unit. When TMDLs and WLAs are adopted and approved, they will be incorporated into the MS4 permit. The TMDL WLAs in MS4 Permits can be addressed using water quality-based numeric effluent limitations (WQBELs) calculated at end-of-pipe. WQBELs must be consistent with the assumptions and requirements of the WLAs.[158]

Finding E.10. This Order requires each Copermittee to effectively prohibit all types of unauthorized discharges of non-storm water into its MS4. However, historically pollutants have been identified as present in dry weather non-storm water discharges from the MS4s through 303(d) listings, monitoring conducted by the Copermittees under Order No. R9-2004-001, and there are others expected to be present in dry weather non-storm water discharges because of the nature of these discharges. This Order includes action levels for pollutants in non-storm water, dry weather discharges from the MS4. The non-storm water action levels are designed to ensure that the Order's requirement to effectively prohibit all types of unauthorized discharges of non-storm water into the MS4 is being complied with. Non-storm water action levels in the Order are based upon numeric or narrative water quality objectives and criteria as outlined in the Basin Plan, the State Water Board's Water Quality Control Plan for Ocean Waters of California (Ocean Plan), and State Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California (State Implementation Policy or SIP). An exceedance of an action level requires specified responsive action by the Copermittees. This Order describes what actions the Copermittees must take when an exceedance of an action level is observed. Exceedances of non-storm water action levels do not alone constitute a violation of this Order but could indicate non-compliance with the requirement to effectively prohibit all types of unauthorized non-storm water discharges into the MS4 or other prohibitions established in this Order. Failure to undertake required source investigation and elimination action following an exceedance of a non-storm water action level (NAL or action level) is a violation of this Order. The San Diego Water Board recognizes that use of action levels will not necessarily result in detection of all unauthorized sources of non-storm water discharges because there may be some discharges in which pollutants do not exceed established action levels. However, establishing NALs at levels appropriate to protect water quality standards is expected to lead to the identification of significant sources of pollutants in dry weather non-storm water discharges.

Discussion of Finding E.10. This Order includes the existing requirement that Copermittees effectively prohibit all types of unauthorized non-storm water discharges in the MS4s. It also includes the following prohibition set forth in the Basin Plan: "The discharge of waste to waters of the state in a manner causing, or threatening to cause a condition of pollution, contamination or nuisance as defined in CWC section 13050 is prohibited." (Prohibition A.1.) As discussed in the Order's Findings on discharge characteristics, e.g., C.2., C.4., C.6., C.7., C.9., C.14., and C.15., the Copermittees'

[158] Per 40 CFR 122.44(d)(1)(vii)(B)

reliance on BMPs for the past 20 years has not resulted in compliance with applicable water quality standards or compliance with the requirement to effectively prohibit all types of unauthorized discharges of non-storm water in the MS4. The San Diego Water Board has evaluated (in accordance with 40 CFR 122.44(d)(1)) past and existing control BMPs, non-storm water effluent monitoring results, the sensitivity of the species in receiving waters (e.g. endangered species), and the potential for effluent dilution, and has determined that existing BMPs to control pollutants in storm water discharges are not sufficient to protect water quality standards in receiving waters, and the existing requirement that Copermittees effectively prohibit all types of unauthorized non-storm water discharges into the MS4, historically results in the discharge of pollutants to the receiving waters.

Therefore it is appropriate to establish dry weather non-storm water action levels based upon established water quality standards to measure pollutants levels in the discharge of dry weather non-storm water that could indicate non-compliance with the requirement to effectively prohibit all types of unauthorized non-storm water discharges into the MS4 and/or that these discharges are causing, or threatening to cause, a condition of pollution, contamination or nuisance in the receiving waters. NALs are not numeric effluent limitations. While not alone a violation of this Order, an exceedance of an NAL requires the Copermittees to initiate a series of source investigation and elimination actions to address the exceedance. Results from the NAL monitoring are to be used in developing the Copermittees annual work plans. Failure to undertake required source investigation and elimination action following an exceedance of an NAL is a violation of this Order. Also refer to further discussion in the Directives section C of the Fact Sheet.

A purpose of monitoring, required under this and previous Orders, as stated in the Monitoring and Reporting Program is to “detect and eliminate illicit discharges and illicit connections to the MS4” and to answer the following core management questions:

1. Are conditions in receiving waters protective, or likely to be protective, of beneficial uses?
2. What is the extent and magnitude of the current or potential receiving water problems?
3. What is the relative MS4 discharge contribution to the receiving water problem(s)?
4. What are the sources of MS4 discharge that contribute to receiving water problem(s)?
5. Are conditions in receiving waters getting better or worse?

For the past 20 years, Copermittees have utilized their illicit connection / illicit discharge (IC/ID) program to identify and eliminate non-storm water discharges that are sources of pollutants to the MS4. The Copermittees are also subject to the requirement to effectively prohibit all types of unauthorized discharges of non-storm water into the MS4s. Historically, discharges of unauthorized non-storm water do

occur, resulting in the discharge of pollutants to the receiving water. NALs have been included in this Order to ensure that the Copermittees comply with the requirement to effectively prohibit all types of unauthorized non-storm water discharges that are a source of pollutants in the receiving waters.

Finding E.12. With this Order, the San Diego Water Board has completed the re-issuance of the fourth iteration of the Phase I MS4 NPDES Permits for the Copermittees in the portions of San Diego County, Orange County, and Riverside County within the San Diego Region. The NPDES Permit requirements issued to the Copermittees in each county have substantially the same core requirements such as discharge prohibitions, receiving water limitations, jurisdictional components, and monitoring. In addition, the Copermittees cooperate regionally to develop monitoring with the Southern California Stormwater Monitoring Coalition and to develop program effectiveness with the California Stormwater Quality Association. Regional programs could improve the Copermittees' compliance with other permit components such as development of the Hydromodification Management Plans and Retrofitting Existing Development with more consistent implementation and cost sharing. Re-issuing the NPDES Permit requirements within five years for three counties under three different permits requires the San Diego Water Board to expend significant time and resources for issuance of the permits through three separate public proceedings, thereby greatly reducing the time and resources available to oversee compliance. Multiple permits also create confusion for determining compliance among regulated entities, especially the land development community. The San Diego Water Board recognizes that issuing a single MS4 permit for all Phase I entities in the San Diego Region will provide consistent implementation, improve communication among agencies within watersheds crossing multiple jurisdictions, and minimize staff resources spent with each permit renewal. The San Diego Water Board plans to develop a single regional MS4 permit prior to the expiration of this Order that will transfer the Copermittees' enrollment to the regional permit upon expiration of this Order.

Discussion of Finding E.12. With the advances in storm water science and regulation in the last decade, the additional complexity has resulted in a more significant amount of San Diego Water Board staff time and resources required to complete each Phase I MS4 Permit renewal. On average, the renewal of the fourth iteration of the Phase I MS4 Permits for each county has taken approximately 2 years and multiple staff to complete. The time and resources required to complete each renewal has diverted staff time and resources away from the San Diego Water Board's ability to oversee and ensure compliance with the permit provisions and requirements.

With the adoption of this Order, all the Phase I MS4s in the San Diego Region (i.e. Copermittees of Orange County, Riverside County and San Diego County) will essentially be subject to the same set of core requirements. Because there are now more similarities than differences among the permit provisions and requirements, developing and issuing a single regionwide permit to the Phase I MS4 entities may be appropriate with the next (i.e. fifth) iteration of the Phase I MS4 Permits.

This approach would provide a consistent set of regulatory requirements throughout the San Diego Region, thereby reducing the confusion that is created with different sets of requirements between areas in close proximity to each other. A regional set of requirements for the discharge prohibitions, receiving water limitations, jurisdictional program components (i.e., new development, construction, existing development, retrofitting), hydromodification management plans, low impact development design requirements, and monitoring would also make it easier for the programs in the three counties to share and transfer information and program efficiencies, and cooperate on a regionwide basis. Regionwide consistency would be especially beneficial where there are multiple counties involved in implementing permit requirements, such as the Santa Margarita watershed with parts of San Diego County and Riverside County, regional TMDLs (e.g., beaches and creeks bacteria TMDLs), or regional monitoring efforts or studies (e.g., Southern California Stormwater Monitoring Coalition, Bight ’08).

An additional benefit would be the reduction of staff time and resources that will be required to renew future Phase I MS4 Permits, which would only be required once every 5 years for a single regionwide permit instead of once every 1 to 3 years for three separate permits. Because of these benefits, the San Diego Water Board plans to develop a single regional Phase I MS4 Permit with the next iteration of the San Diego County MS4 Permit, which will incorporate the Orange County and Riverside County Phase I MS4 entities upon the expiration of their respective permits, or sooner.

F. Public Process

Finding F.1. The San Diego Water Board has notified the Copermittees, all known interested parties, and the public of its intent to consider adoption of an Order prescribing waste discharge requirements that would serve to renew an NPDES permit for the existing MS4 discharges of pollutants to waters of the U.S.

Discussion of Finding F.1. Public notification of development of a draft permit is required under Federal regulation 40 CFR 124.10(a)(1)(ii). This regulation states "(a) Scope. (1) The Director shall give public notice that the following actions have occurred: (ii) A draft permit has been prepared under Sec. 124.6(d)." Public notifications "shall allow at least 30 days for public comment," as required under Federal regulation 40 CFR 124.10(b)(1).

Finding F.2. The San Diego Water Board has held a public hearing on November 10, 2010 and heard and considered all comments pertaining to the terms and conditions of this Order.

Discussion of Finding F.2. Public hearings are required under CWC section 13378, which states "Waste discharge requirements and dredged or fill material permits shall be adopted only after notice and any necessary hearing." Federal regulation 40 CFR 124.12(a)(1) also requires public hearings for draft permits, stating "The Director shall hold a public hearing whenever he or she finds, on the basis or requests, a significant degree of public interest in a draft permit(s)." Regarding public notice of a public hearing, Federal regulation 40 CFR 124.10(b)(2) states that "Public notice of a public hearing shall be given at least 30 days before the hearing."

IX. DIRECTIVES

This section discusses significant changes which have been made to the requirements of the Order from the requirements which were previously included in Order No. R9-2004-001. For each section of the Order than has been changed there is a discussion which describes the change that was made and provides the rationale for the change. In addition, comments on the Copermittees' ROWD recommendations, as they pertain to each changed requirement of the Order, are provided.

Requirements of the Order that are not discussed in this section have not been significantly changed from those requirements previously included in Order No. R9-2004-001. For such requirements, discussions and rationale for the requirements can be found in section VIII of the Fact Sheet/Technical Report for San Diego Water Board Order No. R9-2004-001, dated July 14, 2004. Section VIII also provides additional background information for those requirements that have undergone significant change which are described in detail in this report. The Fact Sheet/Technical Report is available for download at:

http://www.waterboards.ca.gov/sandiego/water_issues/programs/stormwater/rsd_stormwater.shtml

Legal authority citations are provided for each major section of the Order. These citations apply to all applicable requirements within the section for which they are provided.

A. Prohibitions and Receiving Water Limitations

The following legal authority applies to section A:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: The Water Quality Control Plan for the San Diego Basin (Basin Plan) contains the following waste discharge prohibition: "The discharge of waste to waters of the state in a manner causing, or threatening to cause a condition of pollution, contamination, or nuisance as defined in CWC section 13050, is prohibited."

CWC section 13050(l) states "(1) 'Pollution' means an alteration of the quality of waters of the state by waste to a degree which unreasonably affects either of the following: (A) The water for beneficial uses. (B) Facilities which serve beneficial uses. (2) 'Pollution' may include "contamination."

CWC section 13050(k) states "Contamination' means an impairment of the quality of waters of the state by waste to a degree which creates a hazard to public health through poisoning or through the spread of disease. 'Contamination' includes any equivalent effect resulting from the disposal of waste, whether or not waters of the state are affected."

CWC section 13050(m) states "Nuisance' means anything which meets all of the following requirements: (1) Is injurious to health, or is indecent or offensive to the senses, or an obstruction to the free use of property, so as to interfere with the comfortable enjoyment of life or property. (2) Affects at the same time an entire community or neighborhood, or any considerable number of persons, although the extent of the annoyance or damage inflicted upon individuals may be unequal. (3) Occurs during, or as a result of, the treatment or disposal of wastes."

CWC section 13241 requires each Regional Water Board to "establish such water quality objectives in water quality control plans as in its judgment will ensure the reasonable protection of beneficial uses and the prevention of nuisance […]."

CWC section 13243 provides that "A regional board, in a water quality control plan or in waste discharge requirements, may specify certain conditions or areas where the discharge of waste, or certain types of waste, will not be permitted."

CWC section 13263(a) provides that waste discharge requirements prescribed by the San Diego Water Board implement the Basin Plan.

Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(A - D) require municipalities to implement controls to reduce pollutants in storm water runoff from commercial, residential, industrial, and construction land uses or activities.

Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(A - D) require municipalities to have legal authority to control various discharges to their MS4.

Federal NPDES regulation 40 CFR 122.44(d)(1) requires municipal storm water permits to include any requirements necessary to "[a]cheive water quality standards established under section 303 of the CWA, including State narrative criteria for water quality."

Federal NPDES regulation 40 CFR 122.44(d)(1)(i) requires NPDES permits to include limitations to "control all pollutants or pollutant parameters (either conventional, nonconventional, or toxic pollutants) which the Director determines are or may be discharged at a level which will cause, have reasonable potential to cause, or contribute to an excursion above any State water quality standard, including State narrative criteria for water quality."

Section A of the Order combines two previously distinct requirement sections – Prohibitions and Receiving Water Limitations. These sections have been combined into one section for organization purposes and to reduce redundancy, since both sections address the same issue. These changes have no net effect on the implementation and enforcement of the Order.

Section A.3 describes the “iterative process.” The Copermittees must reduce the discharge of storm water pollutants to the MEP and ensure that their MS4 discharges do not cause or contribute to violations of water quality standards. If the Copermittees have reduced storm water pollutant discharges to the MEP, but their discharges are still causing or contributing to violations of water quality standards, the Order provides a clear and detailed process for the Copermittees to follow. This process is often referred to as the "iterative process" and can be found at section A.3. The language of section A.3 is prescribed by the State Water Board and is included in MS4 permits statewide. Section A.3 essentially requires additional BMPs to be implemented until MS4 storm water discharges no longer cause or contribute to a violation of water quality standards.

The State Policy with respect to maintaining high quality waters has been added to clarify that discharges from the MS4 that cause or contribute to a violation of the Policy for high quality waters is prohibited.

The Copermittee must notify the San Diego Water Board of storm water discharges that are causing or contributing to an exceedance of applicable water quality standards. This notification can be in the form of an email or letter, with a summary of the pollutants in the storm water discharge that are exceeding the applicable water quality standards, and where and when the exceedances occurred. After notification is provided to the San Diego Water Board, the Copermittee must submit a report that describes the BMPs that are currently being implemented and the additional BMPs that will be implemented by the Copermittee to prevent or reduce the pollutants in the storm water discharge from causing or contributing to the exceedances of the applicable water quality standards. The report is separate from the notification and may be submitted with the Annual Report, unless the San Diego Water Board requests an earlier submittal of the report.

B. Non-Storm Water Discharges

The following legal authority applies to section B:

Broad Legal Authority: CWA sections 402, 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F), 40 CFR 122.26(d)(2)(iv) and 40 CFR 122.44.

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B) requires MS4 operators "to detect and remove (or require the discharger to the municipal separate storm sewer to obtain a separate NPDES permit for) illicit discharges and improper disposal into the storm sewer."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B)(1) provides that the Copermittees shall prevent all types of illicit discharges into the MS4 except for certain non-storm water discharges.

Section B of the Order has been reworded to simplify and clarify the requirements for addressing non-storm water discharges that are not prohibited. This rewording has no net effect on the implementation and enforcement of the Order.

Section B.2 identifies categories of non-storm water discharges that do not have to be addressed as illicit discharges unless identified by a Copermittee or the San Diego Water Board as a category that is a source of pollutants to waters of the U.S. If a Copermittee or the San Diego Water Board identifies a category of non-storm water discharges as a source of pollutants to waters of the U.S., the category must be addressed through a program, including inspections, to implement and enforce an ordinance, orders, or other similar means to prevent illicit discharges to the MS4.[159]

The program includes enforcement of an ordinance, orders, or other legal authority that prohibits the category of non-storm water discharges from entering the MS4. Implementation of the program is through the IC/ID program, described in Directive F.4, which includes requirements for investigating/inspecting illicit discharges and enforcing the ordinance, orders, or other legal authority that prohibits the category of non-storm water discharges from entering the MS4.

The federal regulations list several categories of non-storm water discharges or flows that do not have to be addressed by the program unless a Copermittee or the San Diego Water Board identifies a category as a source of pollutants to waters of the U.S. These categories are often referred to as "exempt" discharges that are "allowed" to be discharged into the MS4. There are two types of categories of non-storm water discharges or flows that are considered "exempt": 1) anthropogenic (e.g., water line

[159] Code of Federal Regulations Title 40 section 122.26(d)(2)(iv)(B)(1)

flushing, air conditioner condensate), and 2) non-anthropogenic (e.g., springs, rising ground water).

For "exempt" anthropogenic categories of non-storm water discharges or flows that are identified as sources of pollutants to waters of the U.S., those categories become illicit discharges and are no longer "allowed" to be discharged to the MS4. The IC/ID program addresses those discharges (i.e. investigation of illicit discharges and enforcement of ordinances prohibiting illicit discharges to the MS4).

For "exempt" non-anthropogenic discharges or flows that are identified as sources of pollutants to waters of the U.S., the IC/ID program cannot be fully implemented with enforcement. Categories of non-storm water discharges or flows that originate due to a natural source (e.g., springs or rising ground water) can be investigated and identified, but it would be difficult to enforce ordinances prohibiting these discharges to the MS4. In these cases, the Copermittee may need to implement other control measures to prevent the illicit discharges from non-anthropogenic sources from entering the MS4 (e.g., sealing the storm drains to prevent infiltration).

The IC/ID program also identifies categories of "exempt" non-storm water discharges that are sources of pollutants to waters of the U.S. If an individual discharge within a category of "exempt" non-storm water discharges is found to be an isolated incidence or source of pollutants and not representative of the category as a whole, the entire category does not need to be removed from the list of "exempt" categories of non-storm water discharges. If, however, the Copermittees or the San Diego Water Board find that a pattern of isolated incidents or sources are consistently discharging pollutants to waters of the U.S. over a period of time, or throughout the region, the category must be identified as a source of pollutants to waters of the U.S. warranting removal from the list of "exempt" categories of non-storm water discharges.

The San Diego Water Board and several municipalities throughout the San Diego Region (e.g., cities and counties of Orange County and San Diego County) have reported and/or identified runoff originating from landscape irrigation as likely sources of dry weather flows conveying pollutants into their MS4s. This is also supported by legislation (Assembly Bill 1881) recently enacted by the State of California, which has identified runoff resulting from over irrigation not only as a waste of water resources, but also as a source of pollutants to the state's waterways. Discharges from landscape irrigation have been identified by the San Diego Water Board and the Copermittees as a source of pollutants and conveyance of pollutants to waters of the United States in the following:

- In educational materials developed by The Cities and County of Riverside "Only Rain in the Storm Drain" Pollution Prevention Program, the Landscape and Garden brochure states: "Soil, yard wastes, *over-watering* [emphasis added] and garden chemicals become part of the urban runoff mix that winds it way through streets, gutters and storm drains before entering lakes, rivers, streams, etc."

- In an educational survey developed by The Cities and County of Riverside "Only Rain in the Storm Drain" Pollution Prevention Program distributed at Public Outreach events, the answer to the question about where lawn irrigation water goes states: *"Water that leaves your lawn from irrigation…can pick up motor oil and grease from vehicles, excess fertilizer from your lawn, bacteria from pet waste, and excess pesticides from your yard. These pollutants can be carried down streets and storm drains directly to our streams, lakes and rivers without treatment!"*

- In 2006, the State Water Board allocated Grant funding to the Smarttimer/Edgescape Evaluation Program (SEEP). The project targets irrigation runoff by retrofitting existing development and documenting the conservation and runoff improvements. The Grant Application states that "Irrigation runoff contributes flow & pollutant loads to creeks and beaches that are 303(d) listed for bacteria indicators". Furthermore, the grant application states that "Regional program managers agree that the reduction and/or elimination of irrigation-related urban flows and associated pollutant loads may be key to successful attainment of water quality and beneficial use goals as outlined in the Basin Plan and Bacteria TMDL over the long term". This is reinforced in the project descriptions and objectives: "Elevated dry-weather storm drain flows, composed primarily … of landscape irrigation water wasted as runoff, carry pollutants that impair recreational use and aquatic habitats all along Southern California's urbanized coastline. Storm drain systems carry the wasted water, along with landscape derived pollutants such as bacteria, nutrients and pesticides, to local creeks and the ocean. Given the local Mediterranean climate, excessive perennial dry season stream flows are an unnatural hydrologic pattern, causing species shifts in local riparian communities and warm, unseasonal contaminated freshwater plumes in the near-shore marine environment". The basis of this grant project is that over-irrigation (landscape irrigation, irrigation water and lawn watering) into the MS4 is a source and conveyance of pollutants. In addition, they indicate that the alteration of natural flows is impacting the Beneficial Uses of waters of the State. The results of this study can be applied broadly to any area where over-irrigation takes place, including Riverside County. Preliminary results from the study indicate that that over-irrigation (landscape irrigation, irrigation water and lawn watering) into the MS4 *is* a source and conveyance of pollutants.

- In the Watershed Action Plan Annual Report(s) for the 2006-2007 reporting period, submitted by the County of Orange, Orange County Flood Control District and Copermittees within the San Juan Creek, Laguna Coastal Streams, Aliso Creek, and Dana Point Coastal Streams Watersheds, the Orange County Copermittees, within their Watershed Action Strategy Table for Fecal Indicator Bacteria state that "*Support programs to reduce or eliminate the discharge of anthropogenic dry weather nuisance flow throughout the […] watershed. Dry weather flow is the transport medium for bacteria and other 303(d) constituents of concern*". Additionally, they state that "*conditions in the MS4 contribute to high seasonal bacteria propagation in-pipe during warm weather. Landscape irrigation is a major*

contributor to dry weather flow, both as surface runoff due to over-irrigation and overspray onto pavements; and as subsurface seepage that finds its way into the MS4."

- In the Carlsbad Watershed Urban Runoff Management Program (WURMP) Fiscal Year 2008 Annual Report, submitted by the Carlsbad Watershed Copermittees (Cities of Carlsbad, Encinitas, Escondido, Oceanside, San Marcos, Solana Beach, and Vista, and the County of San Diego), the Carlsbad Watershed Copermittees state *"The Carlsbad Watershed Management Area (WMA) collective watershed strategy identifies bacteria, sediment, and nutrients as high priority water quality pollutants in the Agua Hedionda (904.3 – bacteria and sediment), Buena Vista (904.2 – bacteria), and San Marcos Creek (904.5 – nutrients) Hydrologic Areas. Bacteria, sediment, and nutrients have been identified as potential discharges from over-irrigation."*

- In Appendix D of the San Diego Bay WURMP 2007-2008 Annual Report, submitted by the San Diego Bay Watershed Copermittees (Cities of Chula Vista, Coronado, Imperial Beach, La Mesa, Lemon Grove, National City, and San Diego, the County of San Diego, the Port of San Diego, and the San Diego County Airport Authority), the San Diego Bay Watershed Copermittees identified *over-irrigation of lawns* from business and/or residential land uses as a likely pollutant source for bacteria, pesticides, and sediment.

- On September 28, 2006 Governor Arnold Schwarzenegger approved Assembly Bill 1881, The Water Conservation in Landscaping Act (AB 1881, Laird). The act requires cities, counties, and charter cities and charter counties, to adopt landscape water conservation ordinances by January 1, 2010. Additionally, the law required the Department of Water Resources (DWR) to prepare a Model Water Efficient Landscape Ordinance for use by local agencies. The Water Efficient Landscape Ordinance was approved by the Office of Administrative Law on September 10, 2009. All local agencies were required to adopt a water efficient landscape ordinance by January 1, 2010. Local agencies could adopt the Water Efficient Landscape Ordinance developed by DWR, or an ordinance considered at least as effective as the Model Ordinance. The Water Efficient Landscape Ordinance includes a requirement that local agencies prohibit runoff from irrigation (§ 493.2): "*Local agencies shall prevent water waste resulting from inefficient landscape irrigation by* prohibiting runoff from leaving the target landscape *[emphasis added] due to low head drainage, overspray, or other similar conditions where water flows onto adjacent property, non-irrigated areas, walks, roadways, parking lots, or structures. Penalties for violation of these prohibitions shall be established locally.*"

- On October 08, 2009, the State of California Department of Water Resources issued a letter to all cities and counties within the State of California giving reminder of required adoption of the Water Efficient Landscape Ordinance. The letter states that: "*Other benefits include reduced irrigation runoff,* reduced

pollution of waterways *[emphasis added], drought resistance, and less green waste*."

- On December 18, 2009, the San Diego Water Board adopted Order. No. R9-2009-0002, the fourth-term Orange County permit, which found that over-irrigation (landscape irrigation, irrigation water and lawn watering) into the MS4 is a source and conveyance of pollutants. Landscape irrigation, irrigation water, and lawn watering were categories removed from the list of non-storm water discharges not prohibited to be discharged into the MS4.

- The San Diego Water Board has responded to complaints about and observed runoff from over-irrigation entering the MS4s in the Riverside County portion of the San Diego Region.

Several significant changes have been made to the list of categories of non-storm water discharges that do not have to be addressed as illicit discharges. A footnote has been added to dechlorinated swimming pool discharges on the list to specify that this category does not include saline swimming pool discharges. The list has been modified to remove the landscape irrigation, irrigation water and lawn watering "exempt" discharge categories (i.e. no longer "allowed" to enter the MS4). Language has been also added to the section to clarify differences in the federal regulations under 40 CFR 122.26(d)(iv)(B) and for the authority of the Director (i.e. San Diego Water Board) in regards to identifying exempted discharges.

Because the landscape irrigation, irrigation water and lawn watering "exempt" discharge categories have been removed from section B, per identification as a source and conveyance of pollutants to waters of the United States when discharged from the MS4, these illicit discharges must be addressed per 40 CFR 122.26(d)(iv)(B). The San Diego Water Board is requiring these discharges be addressed as illicit discharges by the Copermittees. This is consistent with the Federal Regulations (55 FR 48037). Thus, the discharges are to be prohibited via ordinance, order, or similar means and incorporated as part of the Copermittees IC/ID program.

Section B.3 has been clarified by the recognition of building fire suppression system maintenance (e.g. fire sprinklers) as an illicit discharge. The San Diego Water Board has found that such discharges contain waste, and as such the San Diego Water Board is requiring these discharges be addressed as illicit discharges by the Copermittees. This is consistent with the Federal Regulations (55 FR 48037). Thus, the discharges are to be prohibited via ordinance, order or similar means and incorporated as part of the Copermittees IC/ID program.

C. Non Storm Water Dry Weather Action Levels

The following legal authority applies to section C:

Broad Legal Authority: CWA section 402, 402(p)(3)(B)(ii), CWC §13377. 40 CFR 122.26(d)(2)(i)(B, C, E, and F), and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority:
CWA section 402(p)(3)(B)(ii) provides that MS4 permits "shall include a requirement to effectively prohibit non-storm water discharges into the storm sewers."

Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(B) provides that the proposed management program "shall be based on a description of a program including a schedule, to detect and remove (or require the discharger to the municipal storm sewer to obtain a separate NPDES permit for) illicit discharges and improper disposal into the storm sewer."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B)(1) provides that the Copermittee include in its proposed management program "a program, including inspections, to implement and enforce an ordinance, orders or similar means to prevent illicit discharges to the municipal storm sewer system; this program description shall address all types of illicit discharges, however the [listed exempt] category of non-storm water discharges or flows shall be addressed where such discharges are identified by the municipality as sources of pollutants to waters of the United States."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B)(2) provides that the Copermittee include in its proposed management program "a description of procedures to conduct on-going field screening activities during the life of the permit, including areas or locations that will be evaluated by such field screens."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B)(3) provides that the Copermittee include in its proposed management program "procedures to be followed to investigate portions of the separate storm sewer system that, based on the results of the field screen, or other appropriate information, indicate a reasonable potential of containing illicit discharges or other sources of non-storm water."

Section C establishes non-storm water dry weather action levels (see also Finding C.14, Finding E.10, and the Discussion for those sections).

Non-exempted, non-storm water discharges are to be effectively prohibited from entering the MS4 or become subject to another NPDES permit (see Federal Register, Vol. 55, No. 222, pg. 47995). Conveyances which continue to accept non-exempt, non-storm water discharges do not meet the definition of MS4 and are not subject to section 402(p)(3)(B) of the CWA unless the discharges are issued separate NPDES permits. Instead, conveyances that continue to accept non-exempt, non-storm water

discharges that do not have a separate NPDES permit are subject to sections 301 and 402 of the CWA (see Federal Register, Vol. 55, No. 222, pg. 48037).

The Order requires the sampling of a representative percentage of major outfalls and other identified stations within each hydrologic subarea. While it is important to assess all major outfall discharges from the MS4 into receiving waters, to date the Copermittees have implemented a dry-weather monitoring program that has consisted of 4 water quality parameters collected in receiving waters, not major outfalls. In the ROWD the Copermittees have proposed relocating IC/ID (non-storm water) monitoring sites to major outfalls and increasing the level of monitoring. It is expected that the Copermittees will need to utilize current 303(d) listings, land use, the history of IC/ID complaints and the sensitivity of receiving waters in the selection and annual sampling of a representative percentage of major outfalls in accordance with the requirements under section C.4. It is expected the selection of major outfalls will be done in conjunction with the Copermittees' required updates to the MS4 map in section F.4.b of the Order.

The Order requires an increase in the number and type of pollutants sampled in non-storm water from major outfalls. To date, Copermittees have not sampled major outfalls, only receiving waters, and sampling was limited to total dissolved solids, dissolved oxygen, pH, turbidity and specific conductance. Additional sampling was generally, though not always, conducted by Copermittees if initial sampling exceeded a Copermittee threshold. With the exception of dissolved oxygen, the current thresholds do not represent water quality objectives, as sampling may not trigger a threshold, but may still be exceeding a water quality objective. This Order requires non-storm water discharges to be sampled for additional pollutants including indicator bacteria, nutrients (nitrate and phosphorous), Methylene Blue Active Substances (MBAS), pesticides and metals. These pollutants are expected to be present in non-storm water discharges, are pollutants for which receiving waters are 303(d) listed as impaired or have been identified as present through receiving water monitoring.

<u>Background and Rationale for Requirements</u>
The San Diego Water Board developed the requirements for dry weather, non-storm water action levels based upon an evaluation of existing controls, monitoring and reporting programs (effluent and receiving water), special studies, and based upon Findings C.1 C.3, C.4, C.6, C.7 and C.14. In addition, the Copermittees' ROWD supports the establishment of action levels which can be used in the effectiveness assessment program to ensure a minimum level of program implementation and identify shortcomings in their MS4 programs.[160]

[160] Riverside County Copermittees. 2009. Report of Waste Discharge (San Diego Region).

Water Quality Control Plan

CWA section 303(c) requires the state to establish Water Quality Standards (WQS). WQS define the water quality goals of a water body, or part thereof, by designating their use or uses to be made of the water and by setting criteria necessary to protect those uses.

The San Diego Water Board's Water Quality Control Plan for the San Diego Basin (Basin Plan) designates beneficial uses, establishes water quality objectives, and contains implementation programs and policies to achieve those objectives for all waters addressed through the Basin Plan. The Basin Plan was adopted by the San Diego Water Board on September 8, 1994, and was subsequently approved by the State Water Board on December 13, 1994. Subsequent revisions to the Basin Plan have also been adopted by the San Diego Water Board and State Water Board.

National Toxics Rule (NTR) and California Toxics Rule (CTR)

The USEPA adopted the NTR on December 22, 1992, which was amended on May 4, 1995, and November 9, 1999. The CTR was adopted by USEPA on May 18, 2000,[161] and amended on February 13, 2001.[162] These rules include water quality criteria for priority pollutants and are applicable to non-storm water discharges from the MS4. Criteria for 126 priority pollutants are established by the CTR. USEPA promulgated this rule to fill a gap in California water quality standards that was created in 1994 when a California court overturned the State's water quality control plans containing criteria for priority toxic pollutants. The federal criteria are legally applicable in the State of California for inland surface waters, enclosed bays and estuaries for all purposes and programs under the CWA.

Antidegradation Policy

Section 131.12 of 40 CFR requires that the State water quality standards include an antidegradation policy consistent with the federal policy. The State Water Board established California's antidegradation policy in State Water Board Resolution No. 68-16. Resolution No. 68-16 incorporates the federal antidegradation policy where the federal policy applies under federal law. Resolution No. 68-16 requires that existing quality of waters be maintained unless degradation is justified based on specific findings. The Regional Water Boards' Basin Plans implement, and incorporate by reference, both the State and federal antidegradation policies. Permitted non-storm water discharges from the MS4 are consistent with the antidegradation provision of 40 CFR section 131.12 and State Water Board Resolution No. 68-16.

[161] Federal Register / Vol. 65, No. 97 / May 18, 2000 / Rules and Regulation P. 31861-31719; Code of Federal Regulations Title 40 Part 131

[162] Federal Register / Vol. 66, No. 30 / February 13, 2001 / Rules and Regulation P. 9960-9962; Code of Federal Regulations Title 40 Part 131

Sources of Drinking Water Policy
State Water Board Resolution No. 88-63 establishes state policy that all waters, with certain exceptions, should be considered suitable or potentially suitable for municipal and domestic supplies. Requirements of this Order include action levels, where appropriate, reflecting municipal and domestic supply use as all waters within the County of Riverside under this Order are specifically assigned municipal and domestic supply as a Beneficial Use.

Monitoring and Reporting
40 CFR section 122.48 requires that all NPDES permits specify requirements for recording and reporting monitoring results. Sections 13267 and 13383 of CWC authorize the Regional Water Boards to require technical and monitoring reports. The Monitoring and Reporting Program establishes monitoring and reporting requirements to implement state and federal regulations. The Monitoring and Reporting Program can be found as Attachment E of the Order.

Dilution or Mixing Zones
In order to protect the Beneficial Uses of receiving waters from pollutants as a result of non-storm water MS4 discharges, this Order does not provide for a mixing zone or a zone of initial dilution except when the discharge is to the surf zone.

The San Diego Region has predominantly intermittent and ephemeral rivers and streams (Inland Surface Waters) which vary in flow volume and duration at spatial and temporal scales. Therefore, it is assumed that any non-storm water discharge from the MS4 into the receiving water is likely to be of a quantity and duration that does not allow for dilution or mixing. For ephemeral systems, non-storm water discharges from the MS4 are likely to be the only surface flows present within the receiving water during the dry season. Additionally, all surface waters within the jurisdiction of this Order have been designated in the Basin Plan with municipal supply (MUN) as a beneficial use.

It is appropriate to base numeric action levels for dry weather non-storm water discharges on these considerations.

Establishment of Action Levels
Action levels in the Order are based upon numeric or narrative water quality objectives and criteria as defined in the Basin Plan and the State Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California (State Implementation Policy or SIP). The San Diego Water Board recognizes that use of action levels will not necessarily result in detection of all unauthorized sources of non-storm water discharges because there may be some discharges in which pollutants do not exceed established action levels.

In June of 2006, the State Water Board's Blue Ribbon Storm Water Panel released its report titled 'The Feasibility of Numerical Effluent Limits Applicable to Discharges of Storm Water Associated with Municipal, Industrial and Construction Activities.' The

report only examined numerical limits as applied to storm water and not non-storm water. In the recommendations, the Blue Ribbon panel proposed storm water action levels which are computed using statistical based population approaches. For example, section D of the Permit uses a recommended statistical approach to develop storm water action levels. The Blue Ribbon panel did not examine the efficacy of action levels or recommendations for development of action levels for non-storm water discharges.

For discharges to inland surface waters, action levels are based on the USEPA water quality criteria for the protection of aquatic species, the USEPA water quality criteria for the protection of human health, water quality criteria and objectives in the applicable State plans, effluent concentration available using best available technology, and 40 CFR 131.38. Since the assumed initial dilution factor for the discharge is zero and a mixing zone is not allowed, a non-storm water discharge from the MS4 could not cause an excursion from numeric receiving water quality objectives if the discharge is in compliance with the action levels contained in the Order.

Dry weather monitoring of non-storm water conducted in receiving waters under the previous Order (Order No. R9-2004-001), which relies on BMPs as controls to protect water quality standards, has identified the presence of pollutants commonly found in non-storm water discharges. Monitoring of Indicator Bacteria, pH, Dissolved Oxygen, Phosphorus, Nitrate, Turbidity, Methylene Blue Active Substances (MBAS), and metals in receiving waters has shown concentrations that exceed state water quality criteria. It is appropriate to establish numeric action levels for these pollutants to ensure that the Copermittees are complying with the requirement to effectively prohibit all types of unauthorized non-storm water discharges into the MS4s.

Water Quality Limited Segments on the current 303(d) list (2008) within the jurisdiction of this Order have been identified due to exceedances of Sulfate and Total Dissolved Solids criteria from a source which is currently unknown (see Table 2). These pollutants are not monitored for in non-storm water effluent under the current non-storm water MS4 monitoring program. While this Order does not establish a numeric action level for these constituents at this time, this Order now requires non-storm water MS4 discharge monitoring to include monitoring for Sulfates, Total Dissolved Solids, and Chlorides.

Priority pollutants analyzed included Cadmium, Copper, Chromium, Lead, Nickel, Silver and Zinc. These priority pollutants are likely to be present in non-storm water MS4 discharges (see Finding C.3) though dissolved metal effluent monitoring was not conducted under the previous Order. The most stringent applicable water quality criteria have been identified for these seven metals and, excluding Chromium (VI), and all are dependent on receiving water hardness. The conversion factors for Cadmium and Lead are also water hardness dependent (40 CFR 131.38(b)(2)). These levels are established as the action levels for these constituents.

While effluent monitoring is not available from the previous Order, the monitoring that was done for metal concentrations in receiving waters often lacked a measurement of receiving water hardness. Due to the multiple point source discharges of non-storm water from the MS4, a discharge may enter a receiving water whose hardness will vary temporally. In addition, hardness may vary spatially within and among receiving waters.

However, other information is available to determine the appropriateness of an action level. Existing monitoring concentrations absent of receiving water data, no dilution credit or mixing zone allowance, current 303(d) listings of receiving waters for other pollutants, receiving water monitoring data, and the classification of waters as critical habitat for endangered and species of concern, provide evidence that NALs are appropriate for these priority pollutants at this time in order to ensure that the Copermittees comply with the requirement to effectively prohibit all types of unauthorized non-storm water discharges into the MS4s.

Existing receiving water pollutant concentration data (see attachment F) provides evidence that it is appropriate to include NAL based comparisons to water quality criteria given observed hardness levels, assumption of a conservative hardness level when data is absent, or designation of receiving waters as having MUN as a beneficial use. Although dry weather receiving water data is limited (see attachment F), data has been collected that documents exceedances of CTR criteria for Lead, Nickel, and Copper given the measured hardness for the receiving water. Absent receiving water hardness, Zinc has been detected in receiving waters at concentrations which may be in exceedance of CTR criteria depending on receiving water hardness. Additionally, Cadmium and Chromium were detected at elevated levels, though the concentrations were within CTR criteria given the observed receiving water hardness. However, these detections typically coincided with detections of other exceedances of water quality standards for other pollutants, including metals. Chromium and Nickel were also detected at levels that did not exceed CTR, but did exceed Maximum Contaminant Levels (MCLs) for receiving waters.

As discussed, inland surface waters have conservatively been allotted a mixing zone and dilution credit of zero. As such, any discharge of these priority pollutants is likely to impact the receiving water, regardless of the quantity or rate of discharge.

As discussed in Finding C.7 and discussion, multiple receiving waters within the County of Riverside are 303(d) listed for a number of pollutants, including toxicity. The 303(d) listing of a water body as impaired provides evidence that the receiving water(s) are already experiencing negative impacts. These water quality limited segments are more susceptible to degradation from the synergistic addition of more pollutants, even from upstream discharges. It is therefore appropriate to include NALs designed to ensure that the Copermittees are complying with the requirement to effectively prohibit all types of unauthorized discharges of non-storm water into the MS4s.

Copermittees have monitored the receiving waters for MS4 discharges pursuant to requirements under Order No. R9-2004-001. Dry weather receiving water data indicates poor conditions within waters receiving non-storm water MS4 discharges. Bioassessment conducted under the Order (2004-present) has documented all non-reference sites as consistently having poor or very poor IBI scores, likely due in part to receiving water chemistry and toxicity[163].

Receiving waters and downstream receiving waters within the jurisdiction of this Order contain species and/or are classified as critical habitat (or are exempted pursuant to Integrated National Resource Management Plans) for endangered, threatened, and state species of special concern including, but not limited to, *E. newberryi, A. marmorata pallida*, and *G. orcutti.*

Furthermore, the Santa Margarita River has been designated with the RARE beneficial use.

Dry Weather Non-Storm Water Action Levels Calculations for Discharges to Inland Surface Waters

On the basis of the foregoing discussion, the NALs were calculated with the following considerations and assumptions:

> No dilution credit is considered for the discharge. Therefore, the discharge must comply with the Water Quality Objective at the point of discharge.
>
> For NALs based on CTR, implementation was done using the procedure list as outlined in the State Implementation Plan (SIP) (see below example).

NAL CTR/SIP Calculation – Chromium VI Example:

Criteria for Priority Toxic Pollutants in the State of California is described in the CTR table listed in 40 CFR 131.38.

[163] Riverside County Copermittees 2007-08 and 2008-09 Annual Progress Reports.

A		B Freshwater		C Saltwater		D Human Health (10^{-6} risk for carcinogens) For consumption of:	
# Compound	CAS Number	Criterion Maximum Conc. [d] B1	Criterion Continuous Conc. [d] B2	Criterion Maximum Conc. [d] C1	Criterion Continuous Conc. [d] C2	Water & Organisms (µg/L) D1	Organisms Only (µg/L) D2
1. Antimony	7440360					14 a,s	4300 a,t
2. Arsenic [b]	7440382	340 i,m,w	150 i,m,w	69 i,m	36 i,m		
3. Beryllium	7440417					n	n
4. Cadmium [b]	7440439	4.3 e,i,m,w,x	2.2 e,i,m,w	42 i,m	9.3 i,m	n	n
5a. Chromium (III)	16065831	550 e,i,m,o	180 e,i,m,o			n	n
5b. Chromium (VI) [b]	18540299	16 i,m,w	11 i,m,w	1100 i,m	50 i,m	n	n
6. Copper [b]	7440508	13 e,i,m,w,x	9.0 e,i,m,w	4.8 i,m	3.1 i,m	1300	
7. Lead [b]	7439921	65 e,i,m	2.5 e,i,m	210 i,m	8.1 i,m	n	n
8. Mercury [b]	7439976	[Reserved]	[Reserved]	[Reserved]	[Reserved]	0.050 a	0.051 a
9. Nickel [b]	7440020	470 e,i,m,w	52 e,i,m,w	74 i,m	8.2 i,m	610 a	4600 a
10. Selenium [b]	7782492	[Reserved] p	5.0 q	290 i,m	71 i,m	n	n
11. Silver [b]	7440224	3.4 e,i,m		1.9 i,m			
12. Thallium	7440280					1.7 a,s	6.3 a,t
13. Zinc [b]	7440666	120 e,i,m,w,x	120 e,i,m,w	90 i,m	81 i,m		

Freshwater criterion maximum concentration (CMC) = 16 ug/L
Freshwater criterion continuous concentration (CCC) = 11 ug/L

These criteria are expressed in terms of the dissolved fraction of the metal in the water column. [See footnote “m” to Table in paragraph (b)(1) of 40 CFR 131.38].

40 CFR 122.45(c) requires that this Order include effluent limitations as total recoverable concentration; therefore it is appropriate to include action levels also as total recoverable concentration.

The SIP requires that if it is necessary to express a dissolved metal value as a total recoverable and a site-specific translator has not yet been developed, the San Diego Water Board shall use the applicable conversion factor from 40 CFR 131.38.

The term “Conversion Factor” (CF) represents the recommended conversion factor for converting a metal criterion expressed as the total recoverable fraction in the water column to a criterion expressed as the dissolved fraction in the water column.

Total recoverable concentration * CF = Dissolved concentration criterion

or

Total recoverable concentration = Dissolved concentration criterion/ CF

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Metal	Conversion factor (CF) for freshwater acute criteria	CF for freshwater chronic criteria	CF for saltwater acute criteria	CF[a] for saltwater chronic criteria
Antimony	([d])	([d])	([d])	([d])
Arsenic	1.000	1.000	1.000	1.000
Beryllium	([d])	([d])	([d])	([d])
Cadmium	[b]0.944	[b]0.909	0.994	0.994
Chromium (III)	0.316	0.860	([d])	([d])
Chromium (VI)	0.982	0.962	0.993	0.993
Copper	0.960	0.960	0.83	0.83
Lead	[b]0.791	[b]0.791	0.951	0.951
Mercury				
Nickel	0.998	0.997	0.990	0.990
Selenium		([c])	0.998	0.998

CF for Chromium VI = .982 and .962, so the total recoverable concentrations for chromium VI:
16 ug/L dissolved (CMC)/ 0.982 (CF) = 16.3 ug/L total recoverable CMC
11 ug/L dissolved (CCC) / 0.962 (CF) = 11.4 ug/L total recoverable CCC

<u>Effluent Variability multiplier and Coefficient of Variation (CV)</u>
For each concentration based on an aquatic life criterion, the long-term average (LTA) is calculated by multiplying the concentration with a factor that adjusts for effluent variability. The multiplier can be found in Table 1 of the SIP. Since this Order does not have existing data to properly conduct a variability analysis in accordance with the SIP, the CV has been set equal to 0.6 per SIP requirements. The current effluent data is limited due to the small number of representative outfalls sampled, the lack of outfalls discharging to representative water bodies within the Region, and the targeted nature of the sampling design.

Based upon a CV of 0.6, Table 1 of the SIP requires an effluent variability as follows:
Acute Multiplier = 0.321
Chronic Multiplier = 0.527

The long-term average (LTA) is calculated by multiplying the total recoverable concentrations for zinc with the acute and chronic multipliers:
LTA Acute = 16.3 ug/L * 0.321 = 5.23
LTA Chronic = 86 11.4 ug/L * 0.527 = 6.01

The maximum daily action level (MDAL) and average monthly action level (AMAL) will be based on the most limiting of the acute and chronic LTA, in the case for chromium VI the most limiting LTA is the acute of 5.23 ug/L

NALs are calculated by multiplying the most limiting LTA with a multiplier that adjusts for the averaging periods and exceedance frequencies of the criteria and the effluent limitations. The multiplier can be found in Table 2 of the SIP. Since this Order has insufficient data, the CV has been set to 0.6 and since sampling frequency is four times a month or less, n has been set equal to 4 per the SIP.

Table 2. Long-Term Average (LTA) Multipliers for Calculating Effluent Limitations

Coefficient of Variation	MDEL Multiplier	AMEL Multiplier			MDEL/AMEL Multiplier		
	99th Percentile Occurrence Probability	95th Percentile Occurrence Probability			MDEL = 99th Percentile AMEL = 95th Percentile Occurrence Probability		
(CV)		n = 4	n = 8	n = 30	n = 4	n = 8	n = 30
0.1	1.25	1.08	1.06	1.03	1.16	1.18	1.22
0.2	1.55	1.17	1.12	1.06	1.33	1.39	1.46
0.3	1.90	1.26	1.18	1.09	1.50	1.60	1.74
0.4	2.27	1.36	1.25	1.12	1.67	1.82	2.02
0.5	2.68	1.45	1.31	1.16	1.84	2.04	2.32
0.6	3.11	1.55	1.38	1.19	2.01	2.25	2.62

Therefore, from Table 2 of the SIP, the LTA multipliers will be as follows:
MDAL Multiplier = 3.11
AMAL Multiplier = 1.55

The MDAL and AMAL limits are calculated by multiplying the LTA with an LTA multiplier for each limit:
MDAL = 5.23 ug/L * 3.11 = 16 ug/L
AMAL = 5.23 ug/L * 1.55 = 8.1 ug/L

Whole Effluent Toxicity (WET) Testing Requirements
A WET limit is required if a discharge causes, has a reasonable potential to cause, or contributes to an exceedance of applicable water quality standards, including numeric and narrative. Since these types of discharges are prohibited under this Order, WET limits are not applicable.

Discussion of AMALs, MDALs and Instantaneous Maximums
Where practical, action levels in this Order have been expressed as both AMALs and MDALs. Certain action levels may not practicably be expressed as AMALs and MDALs due to specific Basin Plan water quality objective language, sampling requirements and/or a lack of Criteria. Based upon the likely sampling frequency of the Copermittees, the frequency of sampling will occur such that grab samples are taken once per sampling day. This single sample would then be subject to MDALs and Instantaneous Maximum levels. In this case, the more conservative action level would apply. In addition, it is expected that some effluent monitoring will occur less than or equal to once per month. In this scenario, the MDAL, AMAL and Instantaneous Maximum levels would need to be met based upon one sample (unless sampling did

not occur). For some Basin Plan water quality objectives, AMALs have been excluded and only MDALs/Instantaneous Maximums set to prevent redundancy in action levels.

Compliance with Action Levels (Priority Pollutants)
Compliance with action levels shall be determined as follows:

Dischargers shall be deemed out of compliance with this Order if the Copermittee failed to take the prescribed action in response to a concentration of the priority pollutant in the monitoring sample that is greater than the action level and greater than or equal to the reported Minimum Level (exceedance of an action level). Regardless of the Copermittee's actions in response to an exceedance, they are still subject to the prohibitions found in sections A and B of the Order.

When determining to take an action in response to the AMALs and more than one sample result is available in a month, the discharger shall compute the arithmetic mean unless the data set contains one or more reported determinations of "did not quantify" (DNQ) or "not detected" (ND). In those cases, the discharger shall compute the median in place of the arithmetic mean in accordance with the following procedure:

(1) The data set shall be ranked from low to high, reported ND determinations lowest, DNQ determinations next, followed by quantified values (if any). The order of the individual ND or DNQ determinations is unimportant.

(2) The median value of the data set shall be determined. If the data set has an odd number of data points then the median is the middle value. If the data set has an even number of data points, then the median is the average of the two values around the middle unless one or both of those points are ND or DNQ, in which case the median value shall be the lower of the two data points where DNQ is lower than a value and ND is lower than DNQ.

D. Storm Water Action Levels

The following legal authority applies to section D:

Broad Legal Authority: CWA §402, §402(p)(3)(B)(iii), CWC §13377, 40 CFR §122.44, 40 CFR §122.26(d)(1)(iv), 40 CFR §122.26(d)(2)(i)(E and F), and 40 CFR §122.26(d)(2)(iii and iv).

Specific Legal Authority:
CWA section 402(p)(3)(B)(iii) provides that MS4 permits "shall require controls to reduce the discharge of pollutants to the maximum extent practicable, including management practices, control techniques and system, design and engineering methods and such other provisions as the Administrator or the State determines appropriate for the control of such pollutants."

Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(E and F) provides that the Copermittee "Require compliance with conditions in ordinances, permits, contracts or orders;" and "Carry out all inspection, surveillance and monitoring procedures necessary to determine compliance and noncompliance with permit conditions …"

Copermittees must conduct a comprehensive monitoring program as required under Federal NPDES regulations 40 CFR 122.26(d)(2)(iii), including the collection of quantitative MS4 storm water effluent data from outfalls.

Federal NPDES regulations 40 CFR 122.44 (d) provide that NPDES permits include any requirements necessary to "Achieve water quality standards,… including State narrative criteria for water quality."

Section D has been added to establish storm water action levels (see also Finding D.1.h and Discussion).

<u>Introduction</u>
The Copermittees' ROWD supports the establishment of action levels which can be used in the effectiveness assessment program to ensure a minimum level of program implementation and identify shortcomings in their MS4 programs.[164] Storm Water Action Level (SAL) concentrations, standards and constituents have been developed and incorporated into the monitoring requirements for wet weather.

[164] Riverside County Copermittees. 2009. Report of Waste Discharge (San Diego Region).

SAL Concentration/Standards

SAL pollutant levels were developed from a regional subset of nationwide Phase I MS4 data by using USEPA Climate Zone 6 (arid west) data.[165] Utilizing data from USEPA Climate Zone 6 resulted in SALs which closely reflect the environmental conditions experienced in Riverside County. The localized subset of data includes sampling events from multiple Southern California locations including Orange, San Diego, Riverside, Los Angeles, and San Bernardino Counties. The dataset includes samples taken from highly built-out impervious areas and from storm events representative of Southern California conditions.

Additionally, utilization of regional data is appropriate due to the addition of data into the nationwide Phase I MS4 monitoring dataset in February 2008. This additional data increased the number of USEPA Climate Zone 6 samples to more than 400, and included additional monitoring events within Southern California (see figure below).

Sample Sizes Used to Calculate Storm Water Action Levels

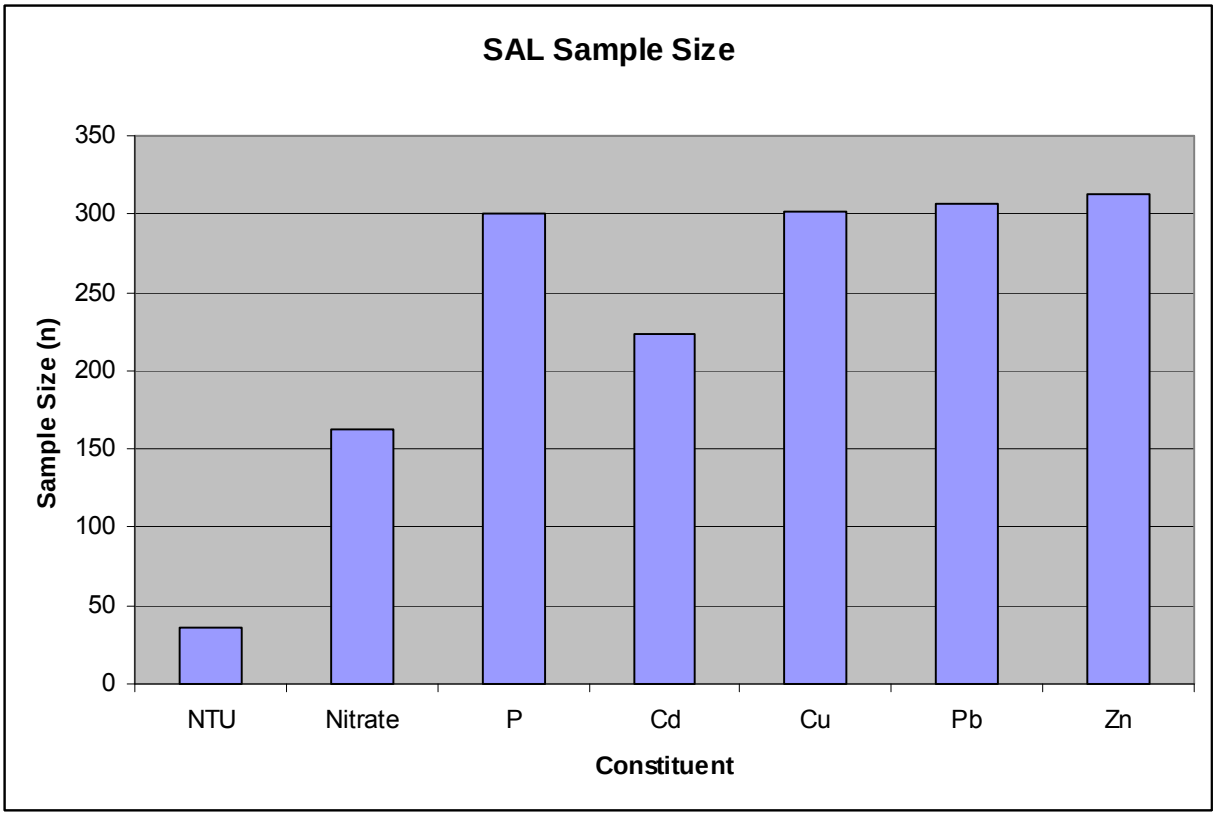

In addition, the SALs reflect the water quality standards in the Basin Plan for the San Diego Region, the California Toxic Rule and USEPA Water Quality Criteria. Since it is the goal of the SALs, through the iterative and MEP process, to have outfall storm water discharges meet all applicable water quality objectives, the list of constituents to

[165] Data used to develop SAL are provided in Attachment F to Order No. R9-2010-0016, and obtained from http://rpitt.eng.ua.edu/Research/ms4/mainms4.shtml

be tested and protocol for testing has been developed to provide a reference point to evaluate the iterative MEP process.

SALs were developed based upon receiving water monitoring results and CWA section 303(d) impaired waters listings. Nitrogen, Copper and Phosphorous are all pollutants for which receiving waters are 303(d) listed as impaired and for which sufficient data was available to develop SALs. Additionally, receiving water monitoring, including from storm events monitored by the Copermittees, has demonstrated excursions and/or potential excursions, often absent receiving water hardness, above water quality criteria for turbidity (NTU), Cadmium, Lead, and Zinc. SALs were not developed for some pollutants for which receiving waters are 303(d) listed as impaired due to a lack of representative data available. These pollutants are required to be monitored but are not subject to a SAL under the Order.

Monitoring

The SALs require the measurement of hardness and to provide more specificity in the assessment of samples with SALs for total metal concentrations. While USEPA Climate Region 6 data includes a large sample size for concentrations of total metals, the impact the concentration will have on receiving waters will vary with receiving water hardness. Since it is the goal of the SALs, through the iterative and MEP process, to have MS4 storm water discharges meet all applicable water quality objectives, the hardness of the receiving water should be used when assessing the total metal concentration of a sample. Thus, when an exceedance of a SAL concentration is detected for a metal, the Copermittee must determine if that exceedance is above the existing applicable water quality limitation based upon the hardness of the receiving water. The water quality limitations Copermittees must use to assess total metal SAL exceedances are the California Toxic Rule (CTR) and USEPA National Recommended Water Quality Criteria for Freshwater Aquatic Life 1 hour maximum concentrations. The 1 hour maximum concentration is to be used for comparison since it is expected to most replicate the impacts to waters of the State from the first flush following a precipitation event.

E. Legal Authority

The following legal authority applies to section E:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.26(d)(2)(i)(A) provides that the Copermittees shall develop and implement legal authority to "Control through ordinance, order or similar means, the contribution of pollutants to the municipal storm sewer by storm water discharges associated with industrial activity and the quality of storm water discharged from sites of industrial activity."

Federal NPDES regulation 40 CFR 122.26(d)(2)(i)(D) provides that the Copermittees shall develop and implement legal authority to "Control through interagency agreements among coapplicants the contribution of pollutants from one portion of the municipal system to another portion of the municipal system."

Illicit discharge is defined under Federal NPDES regulation 40 CFR 122.26(b)(2) as "any discharge to a municipal separate storm sewer system that is not composed entirely of storm water except discharges pursuant to a NPDES permit (other than the NPDES permit for discharges from the municipal separate storm sewer) and discharges resulting from fire fighting activities."

Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(A - D) require municipalities to implement controls to reduce pollutants in storm water runoff from commercial, residential, industrial, and construction land uses or activities.

Federal NPDES regulation 40 CFR 122.26(d)(1)(ii) requires from the Copermittee "A description of existing legal authority to control discharges to the municipal separate storm sewer system."

Section E.1.b requires the Copermittees to prohibit all identified illicit discharges not otherwise allowed pursuant to section B.2 including but not limited to:

(1) Sewage;
(2) Discharges of wash water resulting from the hosing or cleaning of gas stations, auto repair garages, or other types of automotive services facilities;
(3) Discharges resulting from the cleaning, repair, or maintenance of any type of equipment, machinery, or facility including motor vehicles, cement-related equipment, and port-a-potty servicing, etc.;
(4) Discharges of wash water from mobile operations such as mobile automobile washing, steam cleaning, power washing, and carpet cleaning, etc.;

(5) Discharges of wash water from the cleaning or hosing of impervious surfaces in municipal, industrial, commercial, and residential areas including parking lots, streets, sidewalks, driveways, patios, plazas, work yards and outdoor eating or drinking areas, etc.;
(6) Discharges of runoff from material storage areas containing chemicals, fuels, grease, oil, or other hazardous materials;
(7) Discharges of pool or fountain water containing chlorine, biocides, toxic amounts of salt, or other chemicals; discharges of pool or fountain filter backwash water;
(8) Discharges of sediment, pet waste, vegetation clippings, or other landscape or construction-related wastes; and
(9) Discharges of food-related wastes (e.g., grease, fish processing, and restaurant kitchen mat and trash bin wash water, etc.).

Section E.1.j has been added to the Order to ensure that BMPs implemented by third parties are effective. Since the Copermittees cannot passively receive and discharge pollutants from third parties, the Copermittees must ensure discharges of storm water pollutants to the MS4 are reduced to the MEP. In order to achieve this, the Copermittees must be able to ensure that effective BMPs are being implemented by requiring the third parties to document BMP effectiveness. Regarding the Copermittees' ability to require documentation and reporting from third parties, USEPA states "municipalities should provide documentation of their authority to enter, sample, inspect, review, and copy records, etc., as well as demonstrate their authority to require regular reports."[166]

[166] USEPA, 1992. Guidance Manual for the Preparation of Part 2 of the NPDES Permit Applications for Discharges from Municipal Separate Storm Sewer Systems. EPA 833-B-92-002.

F. Jurisdictional Runoff Management Program

F.1. Development Planning Component

The following legal authority applies to section F.1:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWA section 402(a), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F), 40 CFR 131.12, and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A)(2) provides that Copermittees develop and implement a management program which is to include "A description of planning procedures including a comprehensive master plan to develop, implement and enforce controls to reduce the discharge of pollutants from municipal separate storm sewers which receive discharges from areas of new development and significant redevelopment. Such plans shall address controls to reduce pollutants in discharges from municipal separate storm sewers after construction is completed."

Federal NPDES regulation 40 CFR 122.44(d)(1) requires municipal storm water permits to include any requirements necessary to "[a]cheive water quality standards established under section 303 of the CWA, including State narrative criteria for water quality."

Sections F.1.a and F.1.b (General Plan and Environmental Review Process) require the Copermittees to update and revise their General Plan (or equivalent plan) and environmental review processes to ensure water quality and watershed protection principles are included. The Copermittees are required to detail any changes to the General Plan or environmental review process in their Jurisdictional Runoff Management Program Annual Reports. The General Plan must be updated to include water quality and watershed protection principles for all new development and redevelopment projects.

The change made to these sections requires updating the General Plan and Environmental Review Process on an as-needed basis. Each Copermittee has either updated, is in the process of updating, or has assessed its General Plan to ensure the General Plans include the required principles and are in compliance with Order No. R9-2004-001.

Section F.1.c (Approval Process Criteria and Requirements) requires that all development projects (regardless of size) implement BMPs to reduce storm water pollutant discharges to the MEP. Source control and site design BMP requirements were not clearly described in this section of Order No. R9-2004-001. Additional detail has been added to this section to better describe the source control and site design BMPs needed for implementation. This additional detail is consistent with the

requirements of the SSMP, also known in Riverside County as the Water Quality Management Plan (WQMP). However, only source control and site design BMPs that apply to all types of development projects are required (e.g., properly designed trash storage areas).

The requirements are consistent with Order No. R9-2004-001. However, some elements are not contained in the current DAMP[167] (e.g., buffer zones). One exception is that Order No. R9-2004-001's requirement that applicants must provide evidence of coverage under the General Industrial Permit has been removed, since industrial tenants for a development project are usually not known during the planning stage.

The section has also been modified to reflect the prohibition of over-irrigation runoff to the MS4, as well as LID requirements. Additionally, this section requires the use of native and/or low water use plants for landscaping, and rainwater harvesting, where feasible.

Sections F.1.d and F.1.d.(1) (Standard Storm Water Mitigation Plans and Definition of Priority Development Project) require the Copermittees to review and update their SSMPs (also known in Riverside County as Water Quality Management Plans – WQMPs) for compliance with the Order. The sections also require all Priority Development Projects falling under certain categories to meet SSMP requirements. The update is necessary to ensure that the Copermittees' SSMPs are consistent with the changes that have been made to the Order's SSMP requirements. The requirement for the development/adoption of a Model SSMP has been removed since a model was completed and adopted in 2005.

The SSMP section of the Order has been reformatted for clarity. There are also some significant changes. Changes have been made in response to USEPA program evaluations, recent BMP development and effectiveness studies, recent reports on the magnitude of problems caused by hydromodification, and reviews of annual reports and the ROWD submitted by the Copermittees.

In addition, the Order requires that a one-acre threshold be phased in over two years for the priority development category. This one-acre threshold was selected to be consistent with the State Water Board's Phase II NPDES requirements for small municipalities (Order No. 2003-0005-DWQ). The one-acre threshold is also included to be consistent with the State Water Board's Construction General Permit (Order No. 2009-0009-WQO), to ensure all Development Projects subject to the post-construction BMP requirements of the Construction General Permit will implement SSMP post-construction BMP requirements. The one-acre determination applies to the amount of ground area disturbed, not the total size of the parcel or project. Each Copermittee may also lower this threshold if desired.

[167] Riverside County Copermittees. *Drainage Area Management Plan (DAMP)2006.* July 21, 2006.

Section F.1.d.(2) (Priority Development Project Categories) includes several changes to improve, simplify, and clarify the Priority Development Project categories.

One of the most significant changes is that where a new Development Project feature, such as a parking lot, falls into a Priority Development Project Category, the entire project footprint is subject to SSMP requirements. This criterion was not included in Order No. R9-2004-001. It is included, however, in the Model San Diego SSMP that was approved by the San Diego Water Board in 2002. It is included in this Order because existing development inspections by Riverside County municipalities show that facilities included in the Priority Development Project Categories routinely pose threats to water quality. This permit requirement will improve water quality and program efficiency by preventing future problems associated with partly treated storm water runoff from redevelopment sites. This approach to improving storm water runoff from existing developments is practicable because municipalities have a better ability to regulate new developments than existing developments.

Another significant change is a new category for any new development projects that create 10,000 square feet or more of impervious surfaces (collectively over the entire project site). This category applies to commercial, industrial, residential, mixed use, and public projects on private or public land.

Section F.1.d.(2)(g) was modified to allow the Copermittees to develop a standard roadway design and post-construction BMP guidance document that could be used by the Copermittees in lieu of a project specific SSMP for each public works road construction project. The guidance document must comply with the SSMP requirements, including the LID and hydromodification BMP requirements. The roadway design and post-construction BMP guidance must be included in the updated SSMP, and may be utilized after the San Diego Water Board has determined that the updated SSMP is acceptable.

Development of new industrial sites was not included as a category in the Priority Development Projects in Order No. R9-2004-001 because industrial NPDES requirements already establish storm water criteria. Industrial sites are now included in the new development category of the Order to be consistent with Phase II rules and to close loopholes.

Section F.1.d.(3) (Pollutants of Concern) requires Copermittees to update their procedures for identifying pollutants of concern for each Priority Development Project. This is important to do periodically because of changing water quality conditions and designations of impairments or areas of concern. Furthermore Copermittees continually learn more about pollutant-generating activities as they conduct inspections and investigations, and that information must be incorporated into the SSMP process.

Section F.1.d.(4) (Low Impact Development BMP Requirements) requires the Copermittees to require each Priority Development Project to implement low impact development (LID) BMPs to reduce the amount of polluted storm water runoff from

those sites. The Copermittees' ROWD proposes to revise the Riverside County Storm Water Quality BMP Design Handbook to incorporate LID design concepts.[168] The primary approach in LID site design BMPs is to limit the permanent loss of existing infiltration capacity because loss of infiltration is a major contributor to wet weather pollution discharges. General means to accomplish that goal include retaining natural infiltration areas of a site and limiting the amount of impervious surfaces. The Order does not require a specific or relative amount of pervious surfaces be added to a project. The Order seeks to retain on-site capture of the 85th percentile storm.

The Copermittees must require LID BMPs to be implemented for each Priority Development Project, unless found to be technically infeasible. LID BMPs must be formally considered during the plan review process for Priority Development Projects. The LID review process for each Priority Development Project is expected to include an assessment of LID BMP techniques to infiltrate, filter, store, evaporate, and/or retain runoff close to the source of the runoff. The review process is also expected to include an assessment of the potential collection of storm water for on site and off site reuse opportunities. In cases where LID BMPs are found to be technically infeasible, the Copermittees may grant a waiver to the Priority Development Project for all or a portion of the LID BMP requirements.

The Order directs the Copermittees to require new development projects to employ certain classes of LID site design BMPs. The required LID site design BMPs take advantage of features that are incorporated into the Priority Development Project, such as landscaping or walkways. It also requires that projects seek to maintain natural water drainage features rather than instinctively convey water in buried pipes and engineered ditches that eliminate natural water quality treatment functions. These types of site design BMPs are both effective and achievable.

LID BMPs must be sized and designed to ensure onsite retention without runoff, of the volume of runoff produced from a 24-hour 85th percentile storm event ("design capture volume"). This is consistent with other municipal storm water NPDES permits recently adopted by the Los Angeles and Santa Ana Water Boards, as well as the permit recently adopted by the San Diego Water Board for Orange County. The requirement for a numerical BMP design standard is well established for treatment control BMPs and is required in permits throughout the nation such as in Pennsylvania, West Virginia, Georgia, and Washington D.C. Since the 85th percentile storm event has previously been used as the numeric design standard for treatment control BMPs; the same size storm event can be applied as the numeric design standard for LID BMPs. The average 24-hour, 85th percentile rainfall for the Riverside County portion of the San Diego Region was calculated to be approximately 0.6 inches of rain.[169]

The retention and restoration of natural drainage features, such as ephemeral streams, wetlands, and depressions, can be particularly important because small tributaries are essential to the maintenance of the chemical, biological, and physical

[168] Riverside County Copermittees. 2009. Report of Waste Discharge (San Diego Region).
[169] San Diego Water Board, 2004. Fact Sheet/Technical report for Order No. R9-2004-001, dated July 14, 2004.

integrity of larger water bodies.[170] The loss and modification of such natural water resources to accommodate post-development storm water management leads to direct and indirect adverse effects on water quality that are felt both on the project site and off the site within the watershed.[171,172,173] Effects to aquatic beneficial uses from altered drainage features can occur downstream and upstream. The length of upstream or downstream effect of channel modifications is dependant on the specific structure type and channel slope.[174] For instance, road culverts can act as partial barriers to upstream distribution of native aquatic macroinvertebrates in urban streams, while bridges can provide adequate passage.[175] As a result of the adverse effects to water quality and beneficial uses, the State of California nonpoint source pollution program management measures for urban areas includes limiting the destruction of natural drainage features and natural conveyance areas.[176] Additionally, any project proposing to discharge dredge and/or fill material to waters of the United States and/or State is required to obtain a CWA section 401 Water Quality Certification and/or Waste Discharge Requirements from the San Diego Water Board or State Water Board.

LID site design BMP options do not need to be costly.[177] Some design options, such as concave vegetated surfaces or routing rooftop or walkway runoff to landscaped areas, are cost neutral.[178] Other LID site design BMPs, such as minimizing parking stall widths or use of efficient irrigation devices, are oftentimes already required. In addition, use of LID site design BMPs reduces storm water runoff quantity, allowing for treatment control BMPs and other storm water infrastructure on site to be smaller, therefore savings costs for both developers and municipalities.[179,180]

Because of the potential economic and environmental benefits of using LID site design, the U.S. Department of Housing and Urban Development, Office of Policy

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[170] Aquatic scientists comment letter (April 10, 2003) on the Advanced Notice of Proposed Rulemaking (ANPRM) on the Clean Water Act Regulatory Definition of "Waters of the United States." (Docket ID No. OW-2002-0050). This letter is a synthesis of scientific information regarding ephemeral, intermittent, and headwater streams. It was written to USEPA by 85 leading aquatic scientists.
[171] Wright, Tiffany, et al. 2006. *Direct and Indirect Impacts of Urbanization on Wetland Quality.* Prepared by the Center for Watershed Protection for the USEPA Office of Wetlands, Oceans, an Watersheds. 81p. Available on-line at http://www.cwp.org
[172] Konrad, Christopher P. and Derek K. Booth, 2005. *Hydrologic Changes in Urban Streams and Their Ecological Significance.* American Fisheries Society Symposium. Vol. 45 pp.157-177.
[173] Coleman, Derrick, et al. 2005. *Effect of Increases in Peak Flows and Imperviousness on the Morphology of Southern California Streams*. Technical Report No. 450 of the Southern California Coastal Water Research Project.
[174] Fischenich, J.C. 2001. "*Impacts of stabilization measures*," EMRRP Technical Notes Collection (ERDC TNEMRRP- SR-32), U.S. Army Engineer Research and Development Center, Vicksburg, MS. http://www.wes.army.mil/el/emrrp
[175] Blakely, Tanya J., et al. 2006. *Barriers To The Recovery Of Aquatic Insect Communities In Urban Streams* Freshwater Biology Vol. 51(9), 1634–1645.
[176] California Nonpoint Source Encyclopedia, Management Measure 3.1.b. Runoff from Developing Areas, Site Development and Management Measure 3.3.a. Runoff from Existing Development, Existing Development.
[177] USEPA, 2000. Low-Impact Development: A literature review. EPA-841-B-00-005. 35p.
[178] Bay Area Stormwater Management Agencies Association., 1999. Start at the Source. Forbes Custom Publishing. Available on-line at: http://www.scvurppp-w2k.com/basmaa_satsm.htm. pp. 149.
[179] National Association of Home Builders Research Center. *Builders Guide to Low Impact Development.* Available on-line at http://www.toolbase.org
[180] National Association of Home Builders Research Center. *Municipal Guide to Low Impact Development.* Available on-line at http://www.toolbase.org

Development and Research, developed "*The Practice of Low Impact Development (LID)*" to assist the housing industry during the land development process. [181] This document focuses specifically on technologies that affect both the cost impacts and environmental issues associated with land development. Much of the report focuses on storm water management because LID storm water management systems can save capital costs for developers and maintenance costs for municipalities.[182] The executive summary of the HUD report notes:

> *This approach to land development, called Low Impact Development (LID), uses various land planning and design practices and technologies to simultaneously conserve and protect natural resource systems and reduce infrastructure costs. LID still allows land to be developed, but in a cost-effective manner that helps mitigate potential environmental impacts. LID is best suited for new, suburban development.*

Developers can use site and structure designs that reduce building footprints, decrease the amount of paved infrastructure, and provide for dispersed drainage and infiltration of runoff from impervious surfaces to reduce the effective impervious surface.[183] The concept of effective impervious surface is important, because when runoff from these surfaces is directed to pervious areas rather to an impervious drainage system (i.e. curbs, gutters, street surfaces, storm drain pipes), it can infiltrate, evaporate, or be taken up by vegetation, thereby reducing the total volume of storm water runoff leaving a site.

In addition to all the benefits discussed above, LID BMPs have several other advantages over conventional treatment control BMPs. As previously discussed, implementing LID BMPs can save on maintenance costs for municipalities and property owners. LID BMPs are typically easier to operate and maintain compared to conventional mechanical treatment control BMP technologies. Because LID BMPs are easier to operate and maintain, they are also more reliable compared to conventional mechanical treatment control BMP technologies, thus more sustainable over the long term.

Through its process of conditioning development projects under the CWA section 401 Water Quality Certification program, the San Diego Water Board finds that the level of LID site design BMP implementation in the Order is feasible for all projects. The LID BMP requirements will help ensure that LID site design BMPs are implemented for new development projects. LID site design BMPs are a critical component of storm water runoff management at new development projects, since the LID BMPs provide multiple benefits including preservation of hydrologic conditions, reduction of pollutant discharges, cost effectiveness, and green space.

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[181] U.S. Department of Housing and Urban Development, Office of Policy Development and Research, 2003. *The Practice of Low Impact Development."* Prepared by: NAHB Research Center, Inc. Upper Marlboro, Maryland. Contract No. H-21314CA.
[182] Ibid. Executive Summary, p.x.
[183] Bay Area Stormwater Management Agencies Association. 2003. *Using Site Design Techniques to Meet Development Standards for Stormwater Quality*. Available on-line at: http://www.basmaa.org/

The Order provides the Copermittees with flexibility in implementing the LID site design BMP requirements by providing a LID BMP waiver program. The Riverside County Copermittees plan on allowing the implementation of the LID BMPs contained in the Riverside County LID Design Manual if retention LID BMPs are found to be technically infeasible to retain all of the design capture volume. Other LID BMP design and guidance manuals that are acceptable to the Copermittees and/or San Diego Water Board may also be considered.

If retention LID BMPs and/or other LID BMPs are technically infeasible to retain and/or treat all or part of the design capture volume for a Priority Development Project, a waiver may be granted for the remaining portion of the design capture volume. The waiver would allow the remaining portion of the design capture volume to be treated with conventional treatment control BMPs and some form of mitigation.

The use of conventional treatment control BMPs for Priority Development Projects is expected to be allowed by the Copermittees on a very limited basis, and only when a Copermittee finds that LID BMPs are technically infeasible for retaining and/or treating the full design capture volume. In such cases, the Copermittee may issue a waiver for the Priority Development Project from all or a portion of the LID BMP requirements. The LID BMP waiver program that must be developed and implemented by the Copermittee(s) is discussed below under section F.1.d.(7). The criteria that the Copermittee(s) may use to make a finding of technical infeasibility for implementing LID BMPs are also discussed under section F.1.d.(7).

Section F.1.d.(5) (Source Control BMP Requirements) requires that Priority Development Projects implement a minimum set of source control BMPs to protect the water quality of receiving waters from discharges of runoff from these projects. This section has been added to provide more detail and clarify the Order's requirements for source control BMPs. The minimum source control BMPs listed as required by this section must be implemented by each Priority Development Project. In cases where one or more of the minimum source control BMPs are not warranted as part of the site design for the Priority Development Project (e.g., no outdoor material storage and/or work areas), those source control BMPs are not expected to be implemented.

Section F.1.d.(6) (Treatment Control BMP Requirements) includes several design requirements for any treatment control BMPs that are allowed to be implemented (i.e. granted a waiver for all or part of the LID BMP requirements) on Priority Development Projects. These requirements are generally consistent with Order No. R9-2004-001, with two exceptions. First, the Order limits the selections of methods used to determine the appropriate volume of storm water runoff to be treated. The modification ensures that priority development project proponents utilize the most accurate information to determine the volume or flow of runoff which must be treated.

Second, the Order requires that treatment control BMPs selected for implementation at Priority Development Projects have a removal efficiency rating that is ranked with high

or medium pollutant removal frequency for the project's most significant pollutants of concern. The requirement allows exceptions for those projects that, with a feasibility analysis, can justify the use of a treatment control BMP with a low removal efficiency for a Priority Development Project. This requirement is needed because to date, the Copermittees have generally approved low removal efficiency treatment control BMPs without justification or evidence that use of higher efficiency treatment BMPs was considered and found to be infeasible. Specifically, it has been found during audits of the Copermittees' SSMP programs that many SSMP reports do not adequately describe the selection of treatment control BMPs.[184] Moreover, USEPA's contractor Tetra Tech, Inc. recommends that "project proponents should begin with the treatment control that is most effective at removing the pollutants of concern […] and provide justification if that treatment control BMP is not selected."[185]

In addition, treatment control BMPs must be designed and implemented with measures to avoid the creation of nuisance or pollution associated with vectors, such as mosquitoes, rodents, and flies. Related guidelines are identified in guidance from CASQA.[186] Additional considerations are outlined in publications from the California Department of Health Services and University of California Division of Agriculture and Natural Resources.[187]

Section F.1.d.(7) (Low-Impact Development BMP Waiver Program) requires the Copermittees to develop, collectively or individually, a LID BMP waiver program. For some Priority Development Project sites, it may be technically infeasible to implement the required LID BMPs to retain and/or treat the design capture volume due to the site constraints. For this reason, the San Diego Water Board has added to the Order a requirement for the Copermittees to develop such a program. The LID BMP waiver program would provide the opportunity for development projects to avoid partial or full LID BMP implementation in exchange for implementation of conventional treatment control BMPs and mitigation. The program would maintain equal water quality benefits as properly implemented LID BMPs when partial LID BMPs are coupled with some form of mitigation.

LID BMPs are not limited to infiltration BMPs, and may also include storage, evaporation, evapotranspiration, filtration, and/or on site reuse BMPs. Thus, the San Diego Water Board expects that every site will be able to implement some form of LID BMPs to some extent. The LID BMP waiver program is expected to be used by the Copermittees on a limited basis, and only when a Copermittee finds that LID BMPs are technically infeasible for retaining and/or treating the full design capture volume. The Order provides several conditions under which a Copermittee may find that the

[184] PG Environmental, 2008. Riverside County Flood Control and Water Conservation District and County of Riverside MS4 Inspection Report.
[185] Tetra Tech, Inc., 2005. Program Evaluation Report –San Diego Standard Urban Storm Water Mitigation Plan (SUSMP) Evaluation. P. 5.
[186] For example, see the California Stormwater BMP Handbook guidelines for Extended Detention Basins (TC-22) at http://www.cabmphandbooks.org.
[187] Marco Metzger. "Managing Mosquitoes in Stormwater Treatment Devices." University of California Division of Agriculture and Natural Resources Publication No. 8125. Available at http://anrcatalog.ucdavis.edu.

implementation of LID BMPs to retain and/or treat the design capture volume is technically infeasible [see section F.1.d.(7)(b)(i)-(iii)]. The Copermittees are not limited to the conditions listed in the Order, and may identify other conditions in the SSMP that would allow a finding of technical infeasibility.

Making a finding of technical infeasibility for the implementation of the LID BMP requirements on any Priority Development Project is at the discretion of each Copermittee through their SSMP plan review process. For any project proponent that would like to receive a waiver for all or part of the LID BMP requirements, the Copermittees may require and/or use any information to make a finding of technical infeasibility.

A separate technical report developed by the project proponent or the Copermittee to support a finding of technical infeasibility may not always be necessary to meet the requirements of this Order. In most cases, it is expected that the information that is provided in the project proponent's SSMP plan review documents (e.g., geotechnical reports, site design plans) will allow the Copermittees to determine whether or not it is technically feasible for LID BMPs to be implemented to retain and/or treat all or part of the design capture volume. The reason(s) for a Copermittee making a finding a technical infeasibility and granting a LID BMP waiver for any project must be provided in the Annual Report.

For Priority Development Projects that are granted a waiver for all or a portion of the LID BMP requirements, mitigation will be required to achieve water quality benefits that will be lost without the LID BMP retention and/or treatment. Any LID BMP waiver program which allows development projects to forgo all or part of the LID BMP implementation requirements must include mitigation provisions which will achieve similar water quality benefits. To ensure that this is the case for the LID BMP waiver program, minimum mitigation provisions for the program have been added to the Order.

Mitigation can be achieved on site or off site. On site mitigation may include additional sizing multipliers for conventional treatment control BMPs implemented on the site to treat a larger range of storm events to achieve the same or greater pollutant load removal expected from retention of the design capture volume. Off site mitigation may include other pollutant treatment projects that are not located on the site that will achieve the same or greater pollutant removal expected from on site LID BMPs for the design capture volume. For example, off site mitigation projects may include green streets projects, existing development retrofit projects, retrofit incentive programs, regional BMPs and/or riparian restoration projects. Off site mitigation projects may also satisfy the Order's retrofitting requirements in section F.3.d.

In addition to these mitigation options, the Order allows the Copermittees to develop and propose additional forms of mitigation (e.g., pollutant credit system, mitigation fund) that could be implemented as part of the LID BMP waiver program by the Copermittee(s). Any additional forms of mitigation proposed by the Copermittees

would be subject to approval by the San Diego Water Board Executive Officer prior to implementation.

Section F.1.d.(8) (LID and Treatment Control BMP Standards) addresses a need for the Copermittees to develop and apply consistent criteria for the design and maintenance of structural treatment BMPs. Correct BMP design is critical to ensure that BMPs are effective and perform as intended. Without design criteria, there is no assurance that this will occur, since there is no standard for design or review. As an example, Ventura County has developed a BMP manual that includes standard design procedure forms for BMPs. Ventura County's *Technical Guidance Manual for Storm Water Quality Control Measures* is available at http://www.vcstormwater.org/publications.htm."[188] CASQA also confirms the necessity of design criteria when it includes such criteria in its New Development and Redevelopment BMP Handbook.[189] This issue is noted in the ROWD, and the Copermittees propose to develop standard design checklist/plans/details for selected source control and treatment BMPs.[190]

Section F.1.d.(9) (Implementation Process) requires the Copermittee to implement a process to verify compliance with SSMP requirements. The process must identify at what point in the planning process that projects must meet SSMP requirements and what are roles/responsibilities of municipal departments. The intent of this requirement is to provide consistency in the application of the SSMP between the Copermittees. This requirement was included in previous Order No. R9-2004-001.

Section F.1.d.(10) (Post-construction BMP Review) requires the Copermittees to keep their SSMP up to date with BMP effectiveness studies for low-impact design and treatment control BMPs. This requirement will ensure that two important types of information be included in those efforts: Site design BMPs and treatment BMPs that are assessed as part of contracts with the State Water Board and San Diego Water Board. Projects funded with such state grants must include effectiveness assessments using a quality assurance plan. As a result, such studies generally provide reliable sources of local data and should be included in the SSMP.

Sections F.1.e (BMP Construction Verification)requires the Copermittees to verify that the BMPs are being constructed for each Priority Development Project subject to SSMP requirements (SSMP project). SSMP projects that improperly construct or fail to construct site design, source control, and treatment control BMPs can pose a significant threat to water quality. Section F.1.e is included in response to recommendations from USEPA.[191]

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[188] Ibid.
[189] California Stormwater Quality Association, 2003. Stormwater Best Management Practice Handbook – New Development and Redevelopment.
[190] Riverside County Copermittees. 2009. Report of Waste Discharge (San Diego Region).
[191] Federal Register / Vol. 64, No. 235 / Wednesday, December 8, 1999 / Rules and Regulations. P. 68845. USEPA recommends such practices in the Phase II storm water regulations, promoting "inspections during construction to verify BMPs are built as designed."

In some cases SSMP projects may wish to allow occupancy and/or use of a portion of the site prior to full completion of the project. Section F.1.e is not intended to require a project to be fully (i.e. all phases and areas) completed before the occupancy and/or intended use of a portion of the site is allowed. A Copermittee, however, must verify that the BMPs designed to treat and control pollutants from the completed portion of the project are properly constructed before the occupancy and/or intended use of the completed portion is allowed. The BMPs must be specifically designed to control pollutants from the completed portion of the site that will be occupied and/or used prior to the full completion of the SSMP project.

Section F.1.f (BMP Maintenance Tracking) is included in the Order to ensure the continued effectiveness of the post-construction BMP requirements. BMPs need to be properly constructed and adequately maintained to ensure that they are operating correctly and remain effective in removing pollutants from a project site's runoff prior to discharging to receiving waters.

To facilitate the tracking of BMP maintenance, each Copermittee must develop and maintain a database of Priority Development Projects subject to SSMP requirements (SSMP projects) and the post-construction BMPs implemented for each SSMP project. The inventory is not expected or required to include LID BMPs that are implemented on a lot by lot basis at single family residential houses. The inventory, however, must include the post-construction BMPs for all other development or redevelopment SSMP project sites.

The Order requires BMPs at all high priority SSMP project sites as well as all Copermittee project sites with BMPs to be inspected by the Copermittees annually. Other measures, verification methods, and inspection frequencies may be used for BMPs at lower priority SSMP project sites. SSMP project sites with the highest potential for causing or contributing to a threat to water quality or an existing impairment of water quality are required to be inspected by the Copermittees on an annual basis.

The prioritization of the SSMP project sites requiring inspections by the Copermittees will be developed by the Copermittees and reported in the updated JRMP. The prioritization of SSMP project sites may be revised on an annual basis based on inspection findings, and the Copermittees must report changes in prioritization, and justification for each change, in the Annual Report.

The Order includes several criteria that must be considered by the Copermittees in determining the priority of a SSMP project site's threat to water quality. Receiving waters that are listed as impaired by pollutants and/or with discharges exceeding action levels are water bodies most at risk for impairment of beneficial uses. Thus, at a minimum, high priority SSMP projects must include sites that are known or suspected to generate pollutants in an area that is tributary (i.e. upstream within the same Hydrologic Subarea) to a receiving water body listed as impaired for those pollutants; and/or, a receiving water body where exceedances of action levels for

those pollutants are observed; and/or, a receiving water body where exceedances of NALs for those pollutants are observed and the Copermittee has not been able to identify the source.

Section F.1.h (Hydromodification) expands and clarifies current requirements for control of MS4 discharges to limit hydromodification effects caused by changes in runoff resulting from development and urbanization. The requirements are based on findings and recommendations of the Riverside County Storm Water Program,[192] the Stormwater Monitoring Coalition (SMC),[193,194] and the Storm Water Panel on Numeric Effluent Limits (Numeric Effluent Panel).[195] Added specificity is needed due to the current lack of a clear standard for controlling hydromodification resulting from development. More specific requirements are also warranted because hydromodification is increasingly recognized as a major factor affecting water quality and beneficial uses.

Hydromodification is the change in a watershed's runoff characteristics resulting from development, together with associated morphological changes to channels receiving the runoff. As the total area of impervious surfaces increases, infiltration of rainfall decreases, causing more water to run off the surface and at a higher velocity than natural conditions. While erosion in channels is a naturally occurring process, increased runoff rates, volumes, and velocities from developed areas can produce erosive flows in channels under rainfall conditions which are unnatural and were not previously problematic. Moreover, runoff from developed areas increases the duration of time that channels are exposed to erosive flows. The increase in the volume of runoff and the length of time that erosive flows occur ultimately intensify the amount and potential of channel erosion, subsequently causing changes in sediment transport characteristics and the hydraulic geometry (width, depth, and slope) of channels.[196]

These types of changes have been documented in southern California. It has been reported that researchers studying flood frequencies in Riverside County have found that increases in watershed imperviousness of only 9-22 percent can result in increases in peak flow rates for the two-year storm event of up to 100 percent.[197] Such changes in runoff have significant impacts on channel morphology. It has recently been found that ephemeral/intermittent channels in southern California appear to be

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[192] Riverside County Copermittees. 2009. Report of Waste Discharge (San Diego Region).
[193] Coleman, Derrick, et al. 2005. *Effect of Increases in Peak Flows and Imperviousness on the Morphology of Southern California Streams.* Technical Report No. 450 of the Southern California Coastal Water Research Project.
[194] Stein, Eric and Susan Zaleski. 2005. Managing Runoff to Protect Natural Streams: The Latest Developments on Investigation and Management of Hydromodification in California. Proceedings of a special technical workshop co-sponsored by California Stormwater Quality Association (CASQA), Stormwater Monitoring Coalition (SMC), and University of Southern California Sea Grant (USC Sea Grant). Technical Report No. 475 of the Southern California Coastal Water Research Project.
[195] Storm Water Panel Recommendations to the California State Water Resources Control Board. 2006. The Feasibility of Numeric Effluent Limits Applicable to Discharges of Storm Water Associated with Municipal, Industrial, and Construction Activities.
[196] Santa Clara Valley Urban Runoff Pollution Prevention Program, 2005. Hydromodification Management Plan. P. 1-1.
[197] Schueler and Holland, 2000. Storm Water Strategies for Arid and Semi-Arid Watersheds (Article 66). The Practice of Watershed Protection.

more sensitive to changes in imperviousness than channels in other areas. Morphology of small channels in southern California was found to change with only 2-3 percent watershed imperviousness, as opposed to 7-10 percent watershed imperviousness in other parts of the nation.[198]

Sediment that would normally be eroded from the developed areas (i.e. naturally eroded if the area remained undeveloped) is typically coarser grained and deposited closer to the source. Coarser grained sediments that are deposited also provide or contribute to habitat that is more hospitable to aquatic flora and fauna.

Developed areas and increased impervious surface change the types and quality of sediment that are discharged in runoff to the channels under rainfall conditions, which can have an adverse impact on downstream habitats. Sediment in runoff from developed areas and impervious surfaces are typically finer grained, which remains suspended for longer periods of time and can affect aquatic flora (e.g., reduce photosynthesis by limiting transmittance of light) and fauna (e.g., interfere with respiration). Several types of pollutants generated on developed areas (e.g., pesticides, nutrients, bacteria, metals, hydrocarbons) also tend to adsorb on to finer grained sediments. In addition, finer grained sediments get deposited further away from the source or point of discharge. These changes in the characteristics and quality of the sediment in the runoff from developed areas also contribute to the hydromodification effects on downstream channels.

Effects of hydromodification are evident in Riverside County and recognized by the Copermittees. Analyses of bioassessment data within the San Diego Region has indicated that physical changes to stream channels caused by hydromodification are likely responsible, in part, for the low bioassessment scores in urbanized settings.[199] This pattern is consistent under Order No. R9-2004-001, although non-reference bioassessment monitoring was limited to two sites located at mass loading stations. These sites consistently exhibited poor or very poor IBI scores and sub-optimal or marginal habitat. In addition to poor habitat, water chemistry and toxicity impacts were documented at mass and tributary loading stations, likely exacerbating the observed low IBI scores.[200] It is important to recognize that the physical changes in stream channels are a direct result of MS4 discharges, but that two separate mechanisms are involved in bringing about those changes. First, is a change in the flow regime caused by the increase in impervious surfaces and loss of natural conveyance systems. Discharges to receiving waters from the MS4 outfalls do not mimic the natural discharges from former tributaries to that receiving water, and the change results in erosion. Second, the physical stream habitat in many places has been severely modified in order to efficiently convey those increased storm water discharges to the ocean. Where streams are hardened and/or buried to convey storm water, they

[198] Coleman, et. al., 2005. Effect of Increases in Peak Flows and Imperviousness on the Morphology of Southern California Streams. P. iv.
[199] See San Diego Water Board Order No. R9-2009-002 Fact Sheet.
[200] Riverside County Copermittees Fiscal Year 2008-2009 Santa Margarita Watershed Annual Progress Report.

cannot provide adequate water quality and other necessary conditions to support beneficial uses. Both of these issues are addressed in the Order.

The Copermittees' recognize the need to improve management of hydromodification. The ROWD proposes to revise the SSMP to incorporate additional information from ongoing hydromodification studies conducted by the SMC. The Order allows the Copermittees to adopt criteria consistent with future SMC findings in the development of their Hydromodification Management Plan.

Section F.1.h. requires the Copermittees to submit a draft Hydromodification Management Plan (HMP) on or before June 30, 2013. This will provide the Copermittees over 2 years to develop the draft HMP.

Section F.1.h (1) describes several elements that must be included in the HMP. For example, the HMP must identify a method for assessing susceptibility of channel segments which receive runoff discharges from Priority Development Projects, and include a channel standard to ensure that the stability of the channel is not compromised as a result of discharges from the Priority Development Projects. The HMP must also identify a range of flows where Priority Development Projects could cause hydromodification effects and subsequent stream instability.

Maintaining the pre-development flows and durations from a Priority Development Project will significantly reduce the potential for increased erosion caused by development. Loss of natural sediment that will be removed because of otherwise pervious areas covered by the impervious development and removal of pollutants in runoff from Priority Development Projects, however, can still increase the potential for increased erosion. Runoff that is discharged from a project that lacks sediment becomes "sediment hungry" and can result in increased erosion upstream and downstream from the point of discharge. Thus, the HMP must also identify a method and compensate for the loss of sediment supply that is expected due to development and include a performance and/or design standard that will be able to mitigate for that expected loss of sediment supply.

The HMP must require Priority Development Projects to implement control measures (such as LID or detention basins) to prevent hydromodification and resultant degradation of stream conditions upstream and/or downstream of project sites. To compare post-project flow rates and durations to pre-project flow rates and durations, the HMP must specify that the pre-development (naturally occurring) flow rates and durations shall be used when assessing pre-project conditions, so that the naturally occurring hydrology throughout the watershed is eventually restored.

In cases where a stream has been armored with concrete, rip rap, or other man-made materials, the HMP shall require the assessment of a comparable soft-bottom channel as the channel standard, as opposed to using the characteristics of the hardened channel as the channel standard. This is to ensure that hydromodification management measures are already in place should any portion of the hardened

channel be returned to its natural state, thereby restoring the physical integrity of the creek and its Beneficial Uses. The only exceptions are for projects that discharge storm water runoff into underground storm drains or conveyance channels with bed and banks that have been concrete lined all the way to water storage reservoirs or lakes, where effects from hydromodification are not expected. Other exceptions that are acceptable to the San Diego Water Board may be identified in the final HMP.

The HMP must also include metrics for assessing impacts to downstream watercourses from Priority Development Projects, as well as assessing improvements to these watercourses. The metrics must be able to assess changes to the channels as Priority Development Projects are developed and constructed in the watershed. Monitoring and evaluating changes to the physical conditions of the channels receiving runoff discharges from Priority Development Projects will provide the Copermittees data that can be used to determine whether or not the HMP is effective at reducing the increased erosive forces caused by development and impervious surfaces over time.

In addition to metrics to assess changes to the physical conditions of the channels, the Copermittees must monitor and evaluate the biological conditions (e.g., habitat quality, benthic flora and fauna, IBI scores) of the channels. This is because historic hydromodification impacts, such as concrete lining and channelization, are suspected to have impacted the natural physical habitat of urban streams resulting in low IBI scores. The Copermittee's 2008-2009 monitoring report indicated decreased IBI scores at mass loading stations below urbanized watersheds, in part due to marginal or suboptimal habitat. The Monitoring and Reporting Program in the Order includes new requirements for monitoring of habitat for bioassessment, with the "Full" suite of physical/habitat characterization measurements found in the SWAMP Bioassessment Standard Operating Procedures being required with each bioassessment sample. Additional bioassessment sites are also required at locations higher in the watershed, which is expected to more closely reflect localized impacts. Therefore, the IBI scores required by the Monitoring and Reporting Program will be a useful metric in terms of assessing both impacts to streams from Priority Development Projects and improvements due to implementation of the HMP management measures. The Copermittees may also develop or utilize other metrics and identify other monitoring locations that can be used to assess the effectiveness of the HMP on the physical and biological conditions of the channels.

In addition to the control measures that must be included in the HMP to prevent or minimize hydromodification effects from Priority Development Projects, section F.1.h.(2) requires the HMP to include additional management measures that can be used on Priority Development Projects based on a prioritized consideration of the following elements in this order: 1) site-design control measures, 2) on-site management measures, 3) the use of regional control measures upstream of receiving waters, and lastly, 4) in-stream management and control measures (not to include reinforcement with non-naturally occurring materials). The suite of management measures must also include stream restoration as a viable option to achieve the channel standard and subsequently restore Beneficial Uses. In-stream controls are

expected to be in the form of stream restoration or rehabilitation. The use of stream restoration is expected to be an option that is used in conjunction with other on site management measures and not by itself as the only management measure. Stream restoration or rehabilitation projects that are considered in-stream controls for the purpose of preventing or minimizing hydromodification effects do not include projects that use non-naturally occurring materials (e.g., concrete, rip-rap, or gabions, etc.), but may include projects that use natural materials and/or create stable and sustainable channel configurations.

The San Diego Water Board recognizes that fully achieving post-project runoff flow rates and durations that do not exceed pre-development (naturally occurring) runoff flow rates and durations on redevelopment projects with existing impervious surfaces may be challenging. Thus, section F.1.h.(3) has been included to allow the Copermittees to propose, as part of the HMP, a waiver program specifically for Priority Development Projects that are redevelopment projects, as defined by section F.1.d.(1)(b). Because redevelopment projects may not be able to achieve post-project runoff flow rates and durations that do not exceed pre-development (naturally occurring) runoff flow rates and durations through onsite management and control measures, offsite mitigation measures may be required. Redevelopment projects must achieve post-project runoff flow rates and durations that are less than or equal to pre-project and down to pre-development runoff flow rates and durations to be eligible to receive a waiver under the program. For a redevelopment project, the pre-project runoff flow rates and durations are those currently being discharged by the existing development prior to the redevelopment project being built. Meeting pre-project runoff flow rates and durations is usually a less stringent performance criteria than meeting the pre-development runoff flow rates and durations. Implementing BMPs to meet the pre-project flow rates and durations is significantly easier and cheaper for a redevelopment project compared to meeting pre-development flow rates and durations. If a project is granted a waiver, the estimated incremental hydromodification impacts from not achieving the pre-development (naturally occurring) runoff flow rates and durations for the project site must be fully mitigated with offsite mitigation. Offsite mitigation measures may include utilizing regional hydrologic control measures (e.g., regional detention or infiltration basins) or rehabilitation of stream channels to achieve sustainable channel configurations.

Section F.1.h (6) describes interim hydromodification criteria that must be implemented by the Copermittees until the final HMP is found to be adequate by the San Diego Water Board Executive Officer. The Copermittees currently have hydromodification requirements in the SSMP (section 4.4 of the Riverside County WQMP). Until the final HMP is required to be implemented, the Copermittees must continue implementing their existing hydromodification requirements. The existing hydromodification requirements[201] allow exemptions for Priority Development Projects if they meet one of three conditions. One of those conditions is if a project discharges directly to a publicly-owned, operated and maintained MS4. This condition has been

[201] Riverside County Copermittees, 2006 (updated in 2009). Riverside County Water Quality Management Plan (WQMP), Section 4.4.

too broadly applied and has resulted in many projects being exempt from the hydromodification requirements in the past.

Therefore, the Order modifies the conditions that may exempt Priority Development Projects from implementing the interim hydromodification criteria. The modifications to the conditions are minor and can be implemented in the interim until the final HMP is approved. This allows the Copermittees to focus their resources on development of the final HMP.

Finally, the requirements included in section F.1.h do not supersede the LID BMP requirements in section F.1.d. (4). In certain situations, the requirements to incorporate LID BMPs will satisfy the requirements for hydromodification management. Using LID is a viable option for both accomplishing hydromodification management and pollutant load reductions.

Section F.1.i (Unpaved Roads Development) specifically requires the Copermittees to implement or require implementation of BMPs for erosion and sediment control after construction of all new unpaved roads. As discussed for Finding D.1c, design and source control BMPs for unpaved roads are needed to minimize the discharge of sediment to the MS4s and receiving waters, especially during storm events. There are several guidance documents available (see Discussion for Finding D.1.c) that include design and source control BMPs that can be readily implemented by the Copermittees for the development of new unpaved roads.

F.2. Construction Component

The following legal authority applies to section F.2:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(D) provides that the proposed management program include “A description of a program to implement and maintain structural and non-structural best management practices to reduce pollutants in storm water runoff from construction sites to the municipal storm sewer system.”

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(D)(1) provides that the proposed management program include “A description of procedures for site planning which incorporate consideration of potential water quality impacts.”

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(D)(2) provides that the proposed management program include “A description of requirements for nonstructural and structural best management practices.”

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(D)(3) provides that the proposed management program include "A description of procedures for identifying priorities for inspecting sites and enforcing control measures which consider the nature of the construction activity, topography, and the characteristics of soils and receiving water quality."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(D)(4) provides that the proposed management program include "A description of appropriate educational and training measures for construction site operators."

Federal NPDES regulation 40 CFR 122.26(d)(2)(i)(A) provides that each Copermittee must demonstrate that it can control "through ordinance, permit, contract, order or similar means, the contribution of pollutants to the municipal storm sewer by storm water discharges associated with industrial activity and the quality of storm water discharged from site of industrial activity."

Federal NPDES regulation 40 CFR 122.26(b)(14) provides that "The following categories of facilities are considered to be engaging in 'industrial activity' for the purposes of this subsection: […] (x) Construction activity including cleaning, grading and excavation activities […]."

Federal NPDES regulation 40 CFR 122.44(d)(1)(i) requires NPDES permits to include limitations to "control all pollutants or pollutant parameters (either conventional, nonconventional, or toxic pollutants) which the Director determines are or may be discharged at a level which will cause, have reasonable potential to cause, or contribute to an excursion above any State water quality standard, including State narrative criteria for water quality."

Section F.2 has additions to ensure the protection of threatened and endangered species and requires the consideration of potential impacts from the use of Active/Passive Sediment Treatment (AST) at sites determined by the Copermittees to be exceptional threats to water quality. These requirements were added to ensure additional protection of the Beneficial Uses of waters of the State.

Section F.2.a (Ordinance Update) requires each Copermittee to review and update its grading and storm water ordinances as necessary to comply with the MS4 permit. By updating the grading and storm water ordinances, the Copermittees will have the necessary legal authority to require construction sites to implement effective BMPs that will reduce pollutant discharges to the maximum extent practicable. The Order allows the Copermittees 365 days to review and update their ordinances. The 365 days should be adequate to allow for the relatively minor changes that might be needed since their ordinances were last updated under Order No. R9-2004-001.

Section F.2.b (Source Identification) requires the Copermittees to develop and update a watershed based inventory of all construction sites regardless of size or ownership. This section has been modified to require the inventory be updated regularly, rather than annually because constructions sites tend to change often within the course of a year. More frequent updates will ensure the Copermittees have a more accurate inventory of construction sites within their jurisdiction. A regularly updated inventory of active construction sites will assist the Copermittees in ensuring that all sites are inspected per Order requirements. The Order does not specify the frequency of updates, and instead relies on each Copermittee to develop updates appropriate to local construction activity. Failure to maintain a useful inventory would be a violation of the Order.

Section F.2.c (Site Planning and Project Approval Process) requires Copermittees to incorporate consideration of potential water quality impacts prior to approval and issuance of construction and grading permits.

This section now requires the Copermittees to review project proponents' runoff management plans for compliance with local regulations, policies, and procedures. USEPA recommends that it is often easier and more effective to incorporate storm water quality controls during the site plan review process or earlier.[202] In the Phase I storm water regulations, USEPA states that a primary control technique is good site planning.[203] USEPA goes on to say that the most efficient controls result when a comprehensive storm water management system is in place.[204] To determine if a construction site is in compliance with construction and grading ordinances and permits, USEPA states that the "MS4 operator should review the site plans submitted by the construction site operator before ground is broken."[205] Site plan review aids in compliance and enforcement efforts since it alerts the "MS4 operator early in the process to the planned use or non-use of proper BMPs and provides a way to track new construction activities."[206]

The Copermittees have the discretion to determine the depth and detail of the review, as well as the method by which the review will be conducted. The Copermittees review must at least verify that the project proponent's runoff management plan complies with the Copermittee's construction, storm water, and grading ordinances and permits prior to issuing the permit.

Section F.2.d (BMP Implementation) includes modifications to the requirements for each Copermittee to designate and ensure implementation of a set of minimum BMPs at construction sites. These modifications are based on San Diego Water Board findings and experience during implementation of Order No. R9-2004-001.

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[202] USEPA, 1992. Guidance 833-8-92-002. Section 6.3.2.1.
[203] Federal Register / Vol. 55, No. 222 / Friday, November 16, 1990 / Rules and Regulations. P. 48034.
[204] Ibid.
[205] USEPA, 2000. Guidance 833-R-00-002. Section 4.6.2.4, P. 4-30.
[206] Ibid., P. 4-31.

As a result, the Order requires a minimum set of BMPs to be designated for all sites. In addition to the minimum set of BMPs, enhanced BMPs must be designated and implemented for sites tributary to (i.e. upstream within the same Hydrologic Subarea of) a 303(d) listed water body, or within, directly adjacent to, or discharging directly to ESAs. Enhanced BMPs are control actions and measures specifically targeted to the pollutant or condition of concern and of higher quality and effectiveness than the minimum control measures otherwise required. Enhanced BMPs are expected to be better and more effective for pollutant removal than the minimum set of BMPs.

For sites that are identified as exceptional threat to water quality, active/passive sediment treatment (AST) is required to be implemented in addition to the minimum set and/or enhanced sediment control BMPs. AST is required at construction sites that are identified by the Copermittee as an exceptional threat to water quality due to high turbidity or suspended sediment levels in the site's effluent even when other sediment control BMPs have been implemented. In cases where the Copermittee's designated minimum set of BMPs and/or enhanced BMPs are not able or expected to be able to reduce turbidity or suspended sediment levels to a level that will be protective of water quality, AST is necessary and is considered MEP for the discharges from these sites.

AST has been effectively implemented extensively in the other states and in the Central Valley Region of California.[207] In addition, the San Diego Water Board's inspectors have observed AST being effectively implemented at large sites greater than 100 acres and at small, less than 5 acre, in-fill sites. AST is often necessary for Copermittees to ensure that discharges from construction sites are not causing or contributing to a violation of water quality standards. For example, the Basin Plan lists the water quality objective for turbidity as 20 NTU for all hydrologic areas and subareas except for the Coronado HA (10.10) and the Tijuana Valley (11.10). For certain construction sites with high clay content soils, large slopes and exposed areas, the only technology that is likely to meet 20 NTU is AST combined with erosion and sediment controls. To ensure the MEP standard and water quality standards are met, the requirement for implementation of AST at exceptional threat construction sites has been added to the Order, while still providing sufficient flexibility for each Copermittee's unique program.

The Copermittees may define types of construction sites, and/or at any time identify any construction sites after inspections, that are considered exceptional threats to water quality warranting AST. AST may include any sediment control technologies that are capable of reducing turbidity or suspended sediment levels in a construction site's discharge to meet water quality standards in receiving waters.

The Order does not include seasonal restrictions on grading. Seasonal restrictions on grading for storm water are difficult to implement due to the conflict between seasonal grading restrictions, avian breeding and nesting seasons and the seasonal passage of

[207] State Water Board, 2004. Conference on Advanced Treatment at Construction Sites.

endangered salmonids; therefore the seasonal grading restrictions have not been included with the other BMPs in the Order. For example, the Least Bell's Vireo and the Coastal California Gnatcatcher, found in southern California, are listed as federally endangered and threatened, respectively.[208] Permits issued by the California Department of Fish and Game (CDFG) restrict grading during these birds' breeding seasons, which is from April 10 to August 31 for the Least Bell's Vireo[209] and from February 15 to August 31 for the Coastal California Gnatcatcher.[210] Ideally storm water restrictions on grading would be during the rainy season from October 1 through April 30.[211] Combined, these restrictions would limit construction grading to be during the month of September, which is infeasible. Section D.2.d of the Order still requires project proponents to minimize grading during the rainy season and coincide grading with seasonal dry weather periods to the extent feasible.

Section F.2.e (Inspections) establishes criteria for inspections based on risk factors including size, season, and location of the construction site. Modifications have been made to requirements of Order No. R9-2004-001 based on the experience of the Copermittees and San Diego Water Board construction programs.

The types of construction sites that must be inspected every two weeks during the rainy season have been changed from Order No. R9-2004-001. In general, because large construction sites (i.e. greater than 50 acres) have been closely scrutinized during the last permit period, they tend to be adequately implementing BMPs. Smaller construction sites (i.e. site with less than 50 acres), however, were not inspected as frequently and can pose a significant threat to water quality. The final rule recently promulgated by USEPA for construction sites[212] identified construction sites with 20 or more acres of land disturbed at one time as posing a significant threat to water quality during the rainy season. Thus, the San Diego Water Board recognized that smaller construction sites needed to be inspected more frequently. As with the construction inspection requirements that were recently adopted for the Orange County Phase I MS4s, this Order requires sites in active grading during the rainy season that are over 30 acres, rather than sites over 50 acres, be inspected every two weeks.

The Order also lowers the size of construction sites adjacent to or discharging directly to ESAs that receive scrutiny. Order No. R9-2004-001 requires such sites five acres and more to be inspected every two weeks during the rainy season. This Order requires such sites one acre and above and tributary to (i.e. with the same Hydrologic Subarea of) a CWA section 303(d) water body segment impaired for sediment; or within, directly adjacent to, or discharging directly to a receiving water within an ESA to be inspected every two weeks during the rainy season and once during August or

[208] State of California, Department of Fish and Game, 2010. State and Federally Listed Endangered and Threatened Animals of California.
[209] United States Department of the Interior, Fish and Wildlife Service, 2001. Least Bell's Vireo Survey Guidelines.
[210] United States Department of the Interior, Fish and Wildlife Service, 1997. Coastal California Gnatcatcher (*Polioptila californica californica)* Presence/Absence Survey Guidelines.
[211] San Diego Water Board, 2001. Order No. 2001-01, San Diego County MS4 Permit. Directive F.2.g.(2).

September. The lower size threshold is consistent with Phase II storm water permits and the Construction General Permit, State Water Board Order No. 2009-0009-DWQ.

The Copermittees also have the discretion to define or identify other construction sites that are significant threats to water quality that must be inspected every two weeks. Several factors are provided that must be considered by each Copermittee in evaluating threat to water quality.

Finally, types of construction sites that must be inspected at least monthly during the rainy season have been changed from Order No. R9-2004-001. All construction sites with one acre or more of soil disturbance must be inspected monthly during the rainy season instead of just 3 times during the rainy season. This level of inspection is necessary by the Copermittees to ensure adequate compliance with their grading, building, storm water or other water quality related orders and provisions.

This section also requires the Copermittees to track the number of inspections for each inventoried construction site. This requirement has been added to ensure that the Copermittees can demonstrate that construction sites are inspected at the minimum frequencies.

Section F.2.g requires the Copermittees to notify the San Diego Water Board when high level enforcement has been issued to a construction site as a result of storm water violations. The Copermittees will define the types of high level enforcement that will warrant a notification of the San Diego Water Board in their JRMPs. Copermittees are also required to annually notify the San Diego Water Board of construction sites that have alleged violations. This section was added to enhance San Diego Water Board and Copermittee communication and coordination in regulating construction sites.

F.3 Existing Development Component

F.3.a. Municipal
The following legal authority applies to section D.3.a:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A)(1) provides that the proposed management program include “A description of maintenance activities and a maintenance schedule for structural controls to reduce pollutants (including floatables) in discharges from municipal separate storm sewers.”

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A)(3) provides that the proposed management program include “A description for operating and maintaining public streets, roads and highways and procedures for reducing the impact on receiving

waters of discharges from municipal storm sewer systems, including pollutants discharged as a result of de-icing activities."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A)(4) provides that the proposed management program include "A description of procedures to assure that flood management projects assess the impacts on the water quality of receiving water bodies and that existing structural flood control devices have been evaluated to determine if retrofitting the device to provide additional pollutant removal from storm water is feasible."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A)(5) provides that the proposed management program include "A description of a program to monitor pollutants in runoff from operating or closed municipal landfills or other treatment, storage or disposal facilities for municipal waste, which shall identify priorities and procedures for inspections and establishing and implementing control measures for such discharges."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A)(6) provides that the proposed management program include "A description of a program to reduce to the maximum extent practicable, pollutants in discharges from municipal separate storm sewers associated with the application of pesticides, herbicides, and fertilizer which will include, as appropriate, controls such as educational activities, permits, certifications, and other measures for commercial applicators and distributors, and controls for application in public right-of-ways and at municipal facilities."

Federal NPDES regulation 40 CFR 122.44(d)(1)(i) requires NPDES permits to include limitations to "control all pollutants or pollutant parameters (either conventional, nonconventional, or toxic pollutants) which the Director determines are or may be discharged at a level which will cause, have reasonable potential to cause, or contribute to an excursion above any State water quality standard, including State narrative criteria for water quality."

Section F.3.a.(2) (General BMP Implementation) requires the Copermittees to designate minimum BMPs for general municipal areas and activities, regardless of their threat to water quality. BMPs must also be designated for special events. The designated minimum BMPs required to be implemented at a site can be based on the sources or activities present at the site. Threat to water quality is used to determine inspection frequencies in section F.3.a.(8).

Section F.3.a.(3), F.3.a.(4), and F.3.a.(5) (BMP Implementation for Specific Categories) establishes requirements for specific categories of activities and areas. These are selected based on the CWA and findings of the Copermittees in annual reports and ROWD that identify these activities as warranting special attention.

<u>Pesticides, Herbicides, and Fertilizers</u>. 40 CFR 122.26(d)(2)(iv)(A)(6) requires a description of a storm water program for pesticides, herbicides, and fertilizers. In addition, water quality data demonstrates widespread presence of such pollutants in

receiving waters and MS4 discharges. In response to similar requirements of Order No. R9-2004-001, the Copermittees have developed a specific Integrated Pest Management, Pesticides, and Fertilizer guidelines.

Flood Control Structures. In order to more closely meet the intent of the federal regulations and guidance, the requirement has been modified. 40 CFR 122.26(d)(2)(iv)(A)(4) requires "A description of procedures to assure that flood management projects assess the impacts on the water quality of receiving water bodies and that existing structural flood control devices have been evaluated to determine if retrofitting the device to provide additional pollutant removal from storm water is feasible." Retrofitting flood control devices can reduce storm water pollutants and improve water quality.

USEPA expands on the federal provision with the following information: "Storm water management devices and structures that focus solely on water quantity are usually not designed to remove pollutants, and may sometimes harm aquatic habitat and aesthetic values".[213] As flood control structures and other elements of the MS4 age and retrofitting becomes necessary, opportunities for water quality improvements arise.

Conveyance systems which take water quality consideration into account (such as grassed swales, vegetated detention ponds, etc.) can often cost less to construct than traditional concrete systems. Evaluation of the applicability of such systems during retrofitting must occur to ensure that pollutants in storm water runoff are reduced to the maximum extent practicable. USEPA supports utilizing BMPs for pollution reduction in flood management projects, stating that "The proposed management program must demonstrate that flood management projects take into account the effects on the water quality of receiving water bodies. […] Opportunities for pollutant reduction should be considered".[214]

There are generally two types of retrofits for flood control structures. The first type involves adding an engineered device to an existing structure in order to treat or divert runoff. Examples include catch basin inlet filters/screens, ultraviolet disinfection facilities, hydrodynamic separators, and diversions to the sanitary sewer. The second type involves re-installing pervious or natural treatment features to facilities. Examples include removing concrete portions of conveyances to create pervious conveyances; and creating treatment wetlands within flood detention facilities. The later type of retrofit is preferred by the San Diego Water Board. They are likely more sustainable over the long-term because they may require less rigorous operation and maintenance than the former. They may also provide the additional benefit of providing significant

[213] USEPA, 1992. Guidance Manual for the Preparation of Part II of the NPDES Permit Applications for Discharges from Municipal Separate Storm Sewer Systems. Washington D.C. EPA/833-B-92-002.
[214] Ibid.

or incidental opportunities for beneficial uses (e.g., recreation, wildlife, water supply).[215,216]

Sweeping of Municipal Areas. Sweeping municipal areas would likely be done in the absence of the Order. However, in certain cases it is an important component of a jurisdictional runoff management program. The Order contains requirements to ensure that the use of street sweeping is optimized for runoff applications if it is to be used and reported as a BMP.

Section F.3.a.(6) (Operation and Maintenance of MS4 and Treatment Controls) requires the Copermittees to inspect and remove waste from their MS4s prior to the rainy season.

Maintenance is critical to the successful implementation of every storm water runoff management program. USEPA finds that "Lack of maintenance often limits the effectiveness of storm water structural controls such as detention/retention basins and infiltration devices. […] The proposed program should provide for maintenance logs of, and identify specific maintenance activities for, each class of control, such as removing sediment from retention ponds every five years, cleaning catch basins annually, and removing litter from channels twice a year.

If maintenance activities are scheduled infrequently, inspections must be scheduled to ensure that the control is operating adequately. In cases where scheduled maintenance is not appropriate, maintenance should be based on inspections of the control structure or frequency of storm events. If maintenance depends on the results of inspections or if it occurs infrequently, the applicant must provide an inspection schedule. The applicant should also identify the municipal department(s) responsible for the maintenance program".[217] The MS4 maintenance requirements are based on the above USEPA recommendations. This maintenance will help ensure that structural controls are in adequate condition to be effective year round, but especially at the beginning of and throughout the rainy season.

Two requirements have been added to the Order that were not within Order No. R9-2004-001. Subsection (iii) allows a decreased inspection frequency for facilities that are routinely clean, and subsection (iv) requires trash to be removed from open channels and detention basins in a timely manner. Typically, Copermittees have reported annual or semi-annual creek cleanups as significant BMPs. The large volumes of trash reported to be removed during these events demonstrates the significant amount of trash that accumulates in the channels. In order to reduce the effect of the trash, the Order requires that trash be removed more frequently.

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[215] Burton, Carmen et al. 2005. Assessing Water Source and Channel Type as Factors Affecting Benthic Macroinvertebrate and Periphyton Assemblages in the Highly Urbanized Santa Ana River Basin, California. American Fisheries Society Symposium. Vol.47 pp.239-262.
[216] Stromberg, Juliet C. 2001. Restoration of Riparian Vegetation in the South-Western United States: the importance of flow regimes and fluvial dynamism. Journal of Arid Environments. Vol49, pp.17-34.
[217] USEPA, 1992. Guidance Manual for the Preparation of Part II of the NPDES Permit Applications for Discharges from Municipal Separate Storm Sewer Systems. Washington D.C. EPA/833-B-92-002.

Section F.3.a.(7) (Infiltration from Sanitary Sewer to MS4) requires the Copermittees to implement controls and measures to prevent and eliminate sewage infiltration or seepage from municipal sanitary sewers to MS4s through thorough, routine preventive maintenance of the MS4.

Sections F.3.a.(8) and F.3.a.(9) (Inspections and Enforcement) establishes a minimum set of municipal areas and activities for oversight and inspection by the Copermittees and requires that Copermittees properly enforce runoff requirements at municipal areas and activities.

Section F.3.a.(10) (Copermittee Maintained Unpaved Roads Maintenance) requires the Copermittees to implement or require implementation of BMPs for erosion and sediment control during and after maintenance activities on the unpaved roads that the Copermittees are responsible for maintaining, particularly in or adjacent to stream channels or wetlands. As discussed for Finding D.1c, source control BMPs for unpaved roads are needed to minimize the discharge of sediment to the MS4s and receiving waters. There are several guidance documents available (see Discussion for Finding D.1.c) that include BMPs that can be readily implemented by the Copermittees for the development of new unpaved roads. This requirement is necessary to ensure the Copermittees minimize the discharge of sediment from their unpaved roads used for their maintenance activities.

F.3.b. Commercial / Industrial
The following legal authority applies to section F.3.b:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(C) provides that the proposed management program include “A description of a program to monitor and control pollutants in storm water discharges to municipal systems from municipal landfills, hazardous waste treatment, disposal and recovery facilities, industrial facilities that are subject to section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA), and industrial facilities that the municipal permit applicant determines are contributing a substantial pollutant loading to the municipal storm sewer system.”

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(C)(1) provides that the Copermittee must “identify priorities and procedures for inspections and establishing and implementing control measures for such discharges.”

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(C)(2) provides that the proposed management program shall “Describe a monitoring program for storm water discharges associated with the industrial facilities identified in paragraph (d)(2)(iv)(C)

of this section, to be implemented during the term of the permit, including the submission of quantitative data on the following constituents: any pollutants limited in effluent guidelines subcategories, where applicable; any pollutant listed in an existing NPDES permit for a facility; oil and grease, COD, pH, BOD_5 , TSS, total phosphorus, total Kjeldhal nitrogen, nitrate plus nitrite nitrogen, and any information on discharges required under 40 CFR 122.21(g)(7)(iii) and (iv)."

Federal NPDES regulation 40 CFR 122.26(d)(2)(ii) provides that the Copermittee "Provide an inventory, organized by watershed of the name and address, and a description (such as Standard Industrial Classification [SIC] codes) which best reflects the principal products or services provided by each facility which may discharge, to the municipal separate storm sewer, storm water associated with industrial activity."

Federal NPDES regulation 40 CFR 122.44(d)(1)(i) requires NPDES permits to include limitations to "control all pollutants or pollutant parameters (either conventional, nonconventional, or toxic pollutants) which the Director determines are or may be discharged at a level which will cause, have reasonable potential to cause, or contribute to an excursion above any State water quality standard, including State narrative criteria for water quality."

Federal NPDES regulation 40 CFR 122.26(d)(2)(i)(A) provides that each Copermittee must demonstrate that it can control "through ordinance, permit, contract, order or similar means, the contribution of pollutants to the municipal storm sewer by storm water discharges associated with industrial activity and the quality of storm water discharged from site of industrial activity."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A) provides that the Copermittee develop a proposed management program which includes "A description of structural and source control measures to reduce pollutants from runoff from commercial and residential areas that are discharged from the municipal storm sewer system that are to be implemented during the life of the permit, accompanied with an estimate of the expected reduction of pollutant loads and a proposed schedule for implementing such controls."

Section F.3.b.(1) (Source Identification) requires that botanical and zoological gardens and exhibits, building material retailers and storage, animal boarding facilities and kennels, mobile pet services, plumbing services, and power washing services be included in the Copermittees' inventory of commercial sites/sources. These commercial or industrial sites and sources have been identified by the Copermittees and/or the San Diego Water Board as facilities that may contribute a significant pollutant load to the MS4. In cases where a particular type of facility is not present or known to operate within a Copermittee's jurisdiction, there is no expectation that there would be any such facilities included in the inventory. If, however, that type of facility does become established or begins operating within a Copermittee's jurisdiction during the period of this Order, the Copermittees are expected to identify those sites or sources and include them in their inventory of commercial or industrial facilities. This

is not a significant change because Order No. R9-2004-001 requires that any commercial or industrial site or source determined by a Copermittee to contribute a significant pollutant load to the MS4 be added to its inventory of commercial or industrial sites.

The inventory of commercial and industrial facilities is expected to be reviewed and, if necessary, updated at least annually and included in the Annual Report. The inventory is expected to include the prioritization of each facility to ensure the facility is inspected at the correct frequency. If changes are made to the prioritization for any facilities, justification for the changes is expected to be reported in the Annual Report. The inventory is the foundation for the tracking of BMP implementation, number and date(s) of inspections performed, inspection findings, violations, and enforcement actions for each commercial or industrial facility, all of which are expected to be included in the Annual Report.

Section F.3.b.(3) (Mobile Businesses Program) requires each Copermittee to develop and implement a program to reduce the discharge of storm water pollutants from mobile businesses to the MEP and to prevent the discharge of non-storm water. Mobile businesses are service industries that travel to the customer to perform the service rather than the customer traveling to the business to receive the service. Examples of mobile businesses are power washing, mobile vehicle washers, carpet cleaners, port-a-potty servicing, pool and fountain cleaning, mobile pet groomers, plumbers, and landscapers. These mobile services produce waste streams that could potentially impact water quality if appropriate BMPs are not implemented.

Order No. R9-2004-001 also requires BMP implementation for certain mobile businesses (e.g., mobile vehicle washing and mobile carpet cleaning). These storm water requirements of Order No. R9-2004-001 are not significantly different from the existing requirements. The Order specifies the Copermittees must prevent non storm water dry weather flows from entering the MS4 (see section C.2.b). Special attention is required for mobile businesses because of the difficultly of controlling discharges from mobile businesses with existing programs.

Mobile businesses present a unique difficulty in storm water regulation. Due to the transient nature of the business, the regular, effective practice of unannounced inspections is difficult to implement. Also, tracking these mobile businesses is difficult because they are often not permitted or licensed and their services cross Copermittee jurisdictions. Mobile businesses that operate within a municipality may be based in another municipality or even outside the Region.

The Order takes into account the difficulties in regulating mobile businesses. The Copermittees may choose to cooperate in developing and implementing their programs for mobile businesses, including sharing of mobile business inventories, BMP requirements, enforcement action information, and education. Sharing information will allow the Copermittees to better identify and track mobile businesses operating in their jurisdictions.

Because BMPs have been developed already, but communication with mobile businesses may be difficult, the Order provides broad flexibility to the Copermittees for developing a targeted program within the Commercial portion of each JRMP.

Section F.3.b.(4) (Inspection of Industrial and Commercial Sites/Sources) includes requirements for inspections of industrial and commercial sites/sources. The Order is similar to the Order No. R9-2004-001 in requiring that inspections check for coverage under the General Industrial Permit; assessment of compliance with Copermittee ordinances and permits related to storm water and non-storm water runoff; assessment of BMP implementation, maintenance, and effectiveness; visual observations for non-storm water discharges, potential illicit connections, and potential discharge of pollutants in storm water runoff; and education and outreach on storm water pollution prevention.

The Order also requires that inspections include review of BMP implementation plans if the site uses or is required to use such a plan, and the review of facility monitoring data if the site monitors its runoff. BMP implementation plans do not include SSMPs required pursuant to section F.1.d. If a facility is not required to have a BMP implementation plan or required to collect monitoring data, the inspection does not need to include a review of this information. BMP implementation plans and monitoring data are expected to be available for any facility that is covered under the General Industrial Permit. The BMP implementation plans and monitoring data can provide the inspector pertinent information that can be used during the visual inspection of the facility (e.g., BMPs implemented, maintenance records for BMPs, pollutants in storm water runoff). The Copermittees' inspectors have the discretion to determine the depth and detail of the review and use of the information in conducting the inspection.

Changes in the Order's requirements for inspection procedures mimic USEPA's guidance: "Site inspections should include (1) an evaluation of the pollution prevention plan and any other pertinent documents, and (2) an onsite visual inspection of the facility to evaluate the potential for discharges of contaminated storm water from the site and to assess the effectiveness of the pollution prevention plan."[218] In 1999, USEPA "recognized visual inspection as a baseline BMP for over 10 years," and "visual inspections are an effective way to identify a variety of problems. Correcting these problems can improve the water quality of the receiving water."[219]

Inspection frequencies in the Order have been modified from Order No. R9-2004-001. Order No. R9-2004-001 specifies frequencies for inspecting commercial/industrial sites based on threat to water quality and requires high priority sites to be inspected annually. For sites not identified as high priority, each site must be inspected at least once within a 5 year period.

[218] USEPA, 1992. Guidance 833-8-92-002, section 6.3.3.4 "Inspection and Monitoring".
[219] USEPA, 1999. 832-F-99-046, "Storm Water Management Fact Sheet – Visual Inspection".

Also, the option for implementing a third party certification program is included. To the extent that third party certifications are conducted to fulfill the inspection requirements for this section of this Order, the Copermittee will be responsible for conducting and documenting quality assurance and quality control of the third-party certifications. The Copermittees may propose a third party certification program that must receive approval from the San Diego Water Board Executive Officer prior to implementation. The Order includes several requirements that must be included in the third party certification program in order for it to be considered for approval by the San Diego Water Board.

Section F.3.b.(6) (Reporting of Non-Compliant Sites) has been added as additional notification to the San Diego Water Board regarding commercial and industrial sites. Copermittees are required to annually notify, prior to the rainy season, the San Diego Water Board of commercial and industrial sites that have any unresolved high level enforcement actions. This was added to enhance San Diego Water Board and Copermittee communication. Information may be provided as part of the JRMP annual report if submitted prior to the rainy season.

F.3.c. Residential
The following legal authority applies to section F.3.c:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A) provides that the Copermittee develop a proposed management program which includes “A description of structural and source control measures to reduce pollutants from runoff from commercial and residential areas that are discharged from the municipal storm sewer system that are to be implemented during the life of the permit, accompanied with an estimate of the expected reduction of pollutant loads and a proposed schedule for implementing such controls.”

Federal NPDES regulation 40 CFR 122.44(d)(1)(i) requires NPDES permits to include limitations to “control all pollutants or pollutant parameters (either conventional, nonconventional, or toxic pollutants) which the Director determines are or may be discharged at a level which will cause, have reasonable potential to cause, or contribute to an excursion above any State water quality standard, including State narrative criteria for water quality.”

Section F.3.c.(4) (Common Interest Areas / Home Owner Association Areas / Mobile Home Parks) includes requirements for common interest areas / homeowners’ associations and mobile home parks. Many residential neighborhoods and some commercial areas within the jurisdiction of the Copermittees are within common interest developments and are, therefore, subject to management of common areas by associations. The Declaration of the Covenants, Conditions and Restrictions (CC&Rs)

contains the ground rules for the operation of such an association. CC&Rs are an appropriate method for protecting the common plan of developments and to provide for a mechanism for financial support for the upkeep of common areas including roads, storm drains, and other components of storm water conveyance systems.

This Order interprets common interest areas as property subject to the codes and ordinance and enforcement mechanisms of the city or county in which it resides and, therefore, holds the local government responsible for the discharge of wastes from storm water conveyance systems located within these areas.

Section F.3.d. Retrofitting Existing Development
The following legal authority applies to section F.3.d:

Legal Authority: The legal authority for retrofitting existing development is the same legal authority as that identified for municipal, industrial, commercial and residential development sections (See fact sheet discussion on those sections, F.3.a – c). In particular, CWA sections 402(p)(3)(B)(ii-iii), and CWC section 13377 give the Regional Water Board the legal authority to require retrofitting of existing development.

Section F.3.d has been added to require a plan for the retrofit of existing development (see Finding D.3.h and Discussion). This section contains specific requirements for a program to retrofit existing development. When appropriately applied as in this Order, retrofitting existing development meets MEP standards.

Existing BMPs are not sufficient, as evidenced by 303(d) listings and exceedances of Water Quality Objectives from the Copermittees monitoring reports. More advanced BMPs, including the retrofitting of existing development with LID, are part of the iterative process. Previous permits limited the requirement of treatment control BMPs to new development and redevelopment. Based on the current rate of redevelopment compared to existing BMPs, the use of LID only on new and redevelopment will not adequately address current water quality pollution and problems, including downstream hydromodification. Retrofitting existing development is practicable for a municipality through a systematic evaluation, prioritization and implementation plan focused on impaired water bodies, pollutants of concern, areas of downstream hydromodification, feasibility and effective communication and cooperation with private property owners. The retrofitting requirements are based largely on guidance from the USEPA[220] and the Center for Watershed Protection.[221]

Section F.3.d.(1) requires the Copermittees to identify and inventory areas of existing development within their jurisdiction as candidates for retrofitting projects. The Copermittees are expected to examine the inventories that they are maintaining as required under sections F.3.a-c, inspection findings, and any other forms of data and information to identify the candidates for retrofitting projects. Several areas of existing

[220] USEPA , MS4 Permit Improvement Guide, EPA 833-R-10-001, April, 2010.
[221] Center for Watershed Protection, Urban Subwatershed Restoration Manual No. 3, Urban Stormwater Retrofit Practices Manual, Version 1.0, July/August 2007.

development that must be identified as candidates for retrofitting projects are listed. Based in part on guidance developed by the Center for Watershed Protection, these areas of existing development are expected to provide the most immediate improvements for water quality through retrofitting. This list of areas that must be considered does not limit the Copermittees from identifying other areas within their jurisdiction that may be evaluated for retrofitting projects.

Section F.3.d.(2) requires each Copermittee to evaluate the candidates identified under section F.3.d.(1) and rank them based on several criteria. One or more types of retrofit source control or treatment control BMPs may be evaluated for each candidate. Landowner cooperation is among the criteria to evaluate and prioritize retrofitting. For example, retrofitting projects on publicly owned properties are likely and expected to be feasible with sufficient funding secured.

Section F.3.d.(4) requires each Copermittee to cooperate with private property owners to encourage the implementation of site specific retrofitting projects. Because the Copermittees have limited authority to directly require retrofitting projects on private property, the Copermittees must encourage private property owners to implement retrofitting projects through indirect programs and incentives. Several programs and incentives that have been successful in other areas are provided in the Order for the Copermittees consideration in developing their practices to encourage private property owners to retrofit their sites. This list, however, does not limit the Copermittees from identifying and considering other practices that may be effective in encouraging private property owners to implement retrofitting projects on their sites.

Section F.3.d.(5) requires retrofit BMPs that are implemented to be tracked in accordance with section F.1.f. The retrofit BMPs must also be inspected. Retrofit BMPs on publicly owned properties must be inspected per section F.1.f. Privately owned retrofit BMPs must be inspected as needed to ensure proper operation and maintenance. Tracking and inspecting retrofit BMPs is necessary for the Copermittee to ensure that the retrofit BMPs are not removed and are maintained to remain effective. Inspections can also provide the Copermittee useful information on the effectiveness of individual retrofit BMPs. For retrofit BMPs on publicly owned properties, tracking and inspection will correct any problems with the BMPs as soon as a problem arises and will ensure proper maintenance.

For retrofit BMPs on privately owned properties, retrofit BMPs are expected to be implemented and maintained by the property owner on a voluntary basis. The retrofit BMPs must be tracked by the Copermittees, but their inspections are required less frequently due to access issues (i.e. on an as-needed basis). Voluntary retrofitting projects do not warrant frequent Copermittee inspections due to the property owner's willingness to retrofit. Periodic inspections may be performed to ensure the site owner has not removed the retrofit BMPs. Periodic inspections would also ensure that the retrofit BMPs remain effective by providing an opportunity for the inspector to educate the original and subsequent site owner(s) if the retrofit BMP is not operating effectively and requires some maintenance.

F.4. Illicit Discharge Detection and Elimination

The following legal authority applies to section F.4:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(B) provides that the proposed management program "shall be based on a description of a program, including a schedule, to detect and remove (or require the discharger to the municipal storm sewer to obtain a separate NPDES permit for) illicit discharges and improper disposal into the storm sewer."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B)(1) provides that the Copermittee include in its proposed management program "a program, including inspections, to implement and enforce an ordinance, orders or similar means to prevent illicit discharges to the municipal storm sewer system."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B)(2) provides that the Copermittee include in its proposed management program "a description of procedures to conduct on-going field screening activities during the life of the permit, including areas or locations that will be evaluated by such field screens."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B)(3) provides that the Copermittee include in its proposed management program "procedures to be followed to investigate portions of the separate storm sewer system that, based on the results of the field screen, or other appropriate information, indicate a reasonable potential of containing illicit discharges or other sources of non-storm water."

Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(B)(4) provides that the Copermittee include in its proposed management program "a description of procedures to prevent, contain, and respond to spills that may discharge into the municipal separate storm sewer."

Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(B)(5) provides that the Copermittee include in its proposed management program "a description of a program to promote, publicize, and facilitate public reporting of the presence of illicit discharges or water quality impacts associated with discharges from municipal separate storm sewers."

Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(B)(6) provides that the Copermittee include in its proposed management program "a description of educational activities, public information activities, and other appropriate activities to facilitate the proper management and disposal of used oil and toxic materials."

Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(B)(7) provides that the Copermittee include in its proposed management program "a description of controls to limit infiltration of seepage from municipal sanitary sewers to municipal separate storm sewer systems where necessary."

Section F.4.a (Prevent and Detect Illicit Discharges and Connections) requires the Copermittees to implement a program to actively seek and eliminate IC/IDs. Additional wording has been added to this section to clarify and ensure that all appropriate municipal personnel (i.e. field personnel) are utilized in the program to observe and report these illicit discharges and connections.

Section F.4.b (Maintain MS4 Map) requires each Copermittee to maintain an updated map of its entire MS4 and the corresponding drainage areas within its jurisdiction. The Order specifies that the map must include the segments of the storm sewer system owned, operated, and maintained by the Copermittee, and include locations of all known inlets, connections with other MS4s, and outfalls to the Copermittee's MS4. Knowing where their inlets, access points, connections with other MS4s, and outfalls are located will allow the Copermittees to better track, identify, and eliminate IC/IDs. The use of a geographic information system (GIS) by the Copermittees is strongly encouraged for the MS4 map. The Riverside County Flood Control and Water Conservation District (RCFCD) currently maintains a GIS layer that is a compilation of all the Copermittee MS4 maps. Although an individual Copermittee may not have GIS capabilities, each Copermittee has agreements with RCFCD for providing updated MS4 maps to the RCFCD to update this GIS layer and subsequent submittal to the San Diego Water Board.

Section F.4.e (Investigation / Inspection and Follow-Up) requires the Copermittees to conduct follow up investigations and inspect portions of the MS4 for illicit discharges and connections, based on dry weather effluent analytical monitoring results. The section also requires the Copermittees to establish criteria for triggering follow up investigations. Additional language has been added to this section to clarify the minimum level of effort and timeframes for follow up investigations when dry weather limitations are exceeded. This section requires the Copermittees to include and evaluate the specified action levels in their response criteria and to develop response criteria for pollutants without action levels.

Timely investigation and follow up of exceedances is necessary to identify sources of illicit discharges, especially since many of the discharges are transitory. The requirements for immediate response to obvious illicit discharges and a 2 business day minimum response time when field screening action levels are exceeded is necessary to ensure timely response by the Copermittees. When analytical data indicate an exceedance of action levels, the Copermittee(s) have 5 business days to confirm the need to initiate an investigation to identify the source of the exceedance. The Copermittees are expected to investigate for potential sources of the pollutant(s) that may have caused the exceedance of action levels upstream of the collection point and collect additional analytical and field data as necessary. If the quality of the data

is confirmed to be unreliable or inaccurate and the investigation indicates there were no sources of the pollutant that could have caused an exceedance of the applicable action level, then further investigation is no longer warranted and should be documented in the Annual Report.

Section F.4.f (Elimination of Illicit Discharges and Connections) requires the Copermittee(s) to take immediate action to initiate steps necessary to eliminate illicit discharges, illicit discharge sources, and illicit connections that have been detected as a result of the investigations required under section F.4.e. The steps necessary to eliminate the illicit discharge or connection are typically initiated with identifying and contacting the person responsible for the illicit discharge or connection. The Copermittee(s) are expected to eliminate the detected illicit discharges and connections as soon as possible after they are able to contact the person responsible for the illicit discharge or connection. The steps expected and/or necessary to eliminate illicit discharges and connections under different scenarios and for different sources should be developed and implemented by the Copermittee(s). These steps may be outlined by the Copermittee(s) in their JRMPs.

In some cases, the Copermittee(s) may determine that one of the necessary steps is to contact the San Diego Water Board to assist in resolving and eliminating illicit discharges and connections. The Copermittee(s), however, are expected to exhaust all of their available administrative and enforcement authorities and mechanisms for addressing and eliminating illicit discharges and connections before contacting the San Diego Water Board for assistance.

Section F.4.h (Prevent and Response to Sewage Spills and Other Spills) requires each Copermittee to implement measures to prevent and respond to spills into its MS4. These requirements are consistent with Order No. R9-2004-001 and based on federal regulations at 40 CFR 122.26(d)(2)(iv)(B)(4). Those federal NPDES regulations clearly require that owners and operators of MS4s have procedures to prevent, contain, and respond to spills that may discharge into the municipal separate storm sewer.

The Order includes sewage and non-sewage spills in the requirement for spill prevention and response. Federal regulations clearly define sewage as an illicit discharge that must be addressed by municipalities (see Phase II Final Rule, p.68758). Sewage is an illicit discharge to the MS4 that threatens public health. As such, the Copermittees must implement measures to prevent sewage from entering the MS4 system and must respond to illicit discharges that have entered the system. This section has been revised to clarify that management measures and procedures must be implemented to prevent, respond to, and cleanup spills. In addition to the management measures and procedures, a mechanism for the Copermittees to be notified of spills is necessary in order for those management measures and procedures to be implemented as soon as possible after a spill has occurred. The facilitation of public reporting of illicit discharges required by section F.4.c, in addition to regular and open communication with other agencies (e.g., sanitary sewer districts),

may also serve as a mechanism for notifying the Copermittees of spills within their jurisdiction.

Section F.3.a.(7) of the Order includes requirements for measures that must be taken to prevent sewage spills. Examples of measures being implemented by Copermittees include inspections of fats, oils, and grease management at restaurants. Other preventative measures can be implemented during routine planning efforts for new development and redevelopment projects. Similarly, building permit inspections should be used to verify the integrity of the sanitary and storm sewer infrastructure and ensure that cross-connections between the two are avoided.

F.5. Public Participation Component

The following legal authority applies to section F.5:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv).

No significant changes from Order No. R9-2004-001 have been made to this section of the Order.

F.6. Education Component

The following legal authority applies to section F.6:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A)(6) provides that the proposed management program include “A description of a program to reduce to the maximum extent practicable, pollutants in discharges from municipal separate storm sewers associated with the application of pesticides, herbicides, and fertilizer which will include, as appropriate, controls such as *educational activities*, permits, certifications, and other measures for commercial applicators and distributors, and controls for application in public right-of-ways and at municipal facilities."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B)(6) provides that the proposed management program include “A description of educational activities, public information activities, and other appropriate activities to facilitate the proper management and disposal of used oil and toxic materials.”

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(D)(4) provides that the proposed management program include “A description of appropriate educational and training measures for construction site operators.”

Section F.6 (Education Component) includes an introductory paragraph that is the same as in Order No. R9-2004-001, except for the addition of New Development / Redevelopment Project Applicants, Developers, Contractors, Property Owners, and other Responsible Parties to the list of target communities.

Section F.6.a (General Requirements) includes education topics that are required for the education programs developed and implemented for the target communities. The Copermittees can choose how and to what degree to address these topics. Some topics may be more important for certain target communities.

The requirement for educational activities, public information activities, and other appropriate activities to facilitate the proper management and disposal of used oil and toxic materials has been moved to this section from the Illicit Discharge Detection and Elimination section.

Section F.6.b (Specific Requirements) includes requirements for specific target communities, which are in addition to the general requirements. The education and training requirements previously included in other sections of Order No. R9-2004-001 (i.e. Development Planning, Construction, Existing Development) have been removed and consolidated under this section. Specific education requirements are included for: 1) the Copermittees' departments and personnel (i.e. staff and contractors, and Planning Boards and Elected Officials, if applicable), 2) new development / redevelopment and construction sites, 3) commercial and industrial sites/sources, and 4) residential and general public communities.

Section F.6.b.(1) (Copermittee Departments and Personnel) requires the Copermittees to implement an education program for their staff and contractors. Education is required at all levels of municipal staff and contractors. Education is especially important for the staff responsible for planning and development review, oversight, inspection and enforcement of construction activities, selecting and implementing BMPs for Copermittee areas, inspection and enforcement of industrial and commercial facilities, and other Copermittee activities which might result in discharges of pollutants if proper BMPs are not used.

Education of Copermittee departments and personnel may be conducted with joint and/or individual training programs (i.e. on a regional and/or jurisdictional scale), and may include both formal and informal training. The Copermittees may choose the scale and methods for educating their departments and personnel.

The annual training required for construction, building, code enforcement, grading review staffs, inspectors, and other responsible construction staff requires the training to occur annually, prior to the rainy season.

Section F.6.b.(2) (New Development / Redevelopment and Construction Sites) requires the Copermittees to educate parties responsible for a project (i.e. project applicants, developers, contractors, property owners, community planning groups, and other responsible parties) about storm water issues and BMPs. Different levels of training will be needed for planning groups, owners, developers, contractors, and construction workers, but all should get a general education of storm water requirements. Education of all construction workers can prevent unintentional discharges, such as discharges by workers who are not aware that they are not allowed to wash things down the storm drains. Training for BMP installation workers is imperative because the BMPs will fail if not properly installed and maintained. Training for field level workers can be formal or informal tail-gate format.

Section F.6.b.(3) (Commercial and Industrial Sites / Sources) requires the Copermittees to notify the owner/operator of each of their inventoried commercial and industrial sites/sources of the BMP requirements applicable to the site/source at least twice during the five-year period of the Order. Notification of BMP requirements may be fulfilled during the business license application/renewal process and/or during site inspections. Notifying commercial and industrial sites/sources of the BMP requirements will ensure the business owners are aware of the appropriate BMPs to implement that prevent discharges of pollutants from these sites/sources.

Section F.6.b.(4) (Residential and General Public) requires the target audiences for residential and general public communities to include underserved target audiences (e.g., disadvantaged communities), residents and managers of Common Interest Areas / Homeowner Associations, and owners and residents of mobile home parks. These communities are frequently neglected or underserved by most water quality education programs, but can be significant sources of pollutants. Thus, it is important for the residential and general public education programs to reach out to and educate these communities on their potential impacts to water quality.

G. Watershed Water Quality Workplan

The following legal authority applies to section G:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.26(a)(3)(ii) states: "The Director may […] issue distinct permits for appropriate categories of discharges […] including, but not limited to […] all discharges within a system that discharge to the same watershed […]"

Federal NPDES regulations 40 CFR 122.26(a)(3)(v) states: "Permits for all or a portion of all discharges from large or medium municipal separate storm sewer systems that are issued on a system-wide, jurisdiction-wide, watershed, or other basis may specify different conditions relating to different discharges covered by the permit, including different management programs for different drainage areas [watersheds] which contribute storm water to the system."

Federal NPDES regulation 40 CFR 122.26(a)(5) states: "The Director may issue permits for municipal separate storm sewers that are designated under paragraph (a)91)(v) of this section on a system-wide basis, a jurisdiction-wide basis, watershed basis, or other appropriate basis."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv) states: "Proposed programs may impose controls on a system-wide basis, a watershed basis, a jurisdiction basis, or on individual outfalls."

Section G requires Copermittees to continue implementation of their watershed runoff management program (WRMP), however the implementation approach has changed. Order No. R9-2004-001 required a Watershed SWMP that included a collaborative strategy to abate the sources and reduce the discharges causing high priority water quality problems. This strategy was to guide each watershed Copermittee's selection and implementation of Watershed Activities, so that the activities selected and implemented would remove that pollutant contribution responsible for the identified high priority water quality problem. Outcomes of these requirements were not able to demonstrate improvements to water quality.

Revised language in Order No. R9-2010-0016 attempts to focus each watershed Copermittee's efforts and resources on addressing the highest water quality problems in the watershed by focusing attention on the health of the receiving water body and the most efficient use of the watershed Copermittee's time and resources. Order No. R9-2010-0016 requires the watershed Copermittees to develop and follow a workplan approach towards assessing receiving water body conditions, prioritizing the highest

priority water quality problems, implementing effective BMPs, and measuring water quality improvement in the receiving water.

Section G.1. (Watershed Workplan Components) requires the watershed Copermittees to develop a workplan that will implement a collective watershed strategy to assess and prioritize the water quality problems, and identify, address, and mitigate the highest priority water quality issues/pollutants within the Upper Santa Margarita watershed's receiving waters. This section specifies the minimum components that must be included in the Watershed Workplan. Development of a workplan rather than watershed activities will allow the Copermittees flexibility to iteratively modify their watershed strategy over the course of future planning years as priorities change.

Section G.2 (Watershed Workplan Implementation) requires the Copermittee's to begin implementing the Watershed Workplan within 90 days of submittal unless otherwise directed by the San Diego Water Board. The Watershed Workplan must meet the requirements of the Order. The San Diego Water Board expects that implementing the Watershed Workplan, which will coordinate the Copermittees' efforts in the watershed, will result in water quality improvements sooner than later. If there are deficiencies in the Watershed Workplan, the San Diego Water Board will provide guidance to remedy those deficiencies as appropriate.

Section G.3 (Copermittee Collaboration) requires the Copermittees to collaborate to develop and implement the Watershed Workplan. Watershed Copermittee collaboration must include frequent regularly scheduled meetings. Because there are several other agencies with MS4s in the Upper Santa Margarita watershed that the Copermittees have indicated in the ROWD are a source of pollutants that may discharge into the MS4 systems of the Copermittees, the Copermittees are also required to pursue interagency agreements, or similar cooperative efforts, with non-Copermittee owners of the MS4 (such as Caltrans, Native American tribes, and school districts) to control the contribution of pollutants from one portion of the shared MS4 to another portion of the shared MS4. In addition, the Copermittees are required, as appropriate, to participate in watershed management efforts to address water quality issues within the entire Santa Margarita Watershed (such as the County of San Diego and United States Marine Corps Camp Pendleton).

Section G.4 (Public Participation) requires the Copermittees to implement a watershed-specific public participation mechanism within each watershed. A required component of the watershed-specific public participation mechanism must be a minimum 30-day public review of the Watershed Workplan. Opportunity for the public to review and comment on the Watershed Workplan must occur before the workplan is implemented.

Section G.5 (Watershed Workplan Review and Updates) requires the Copermittees to review and update the Watershed Workplan annually to identify needed changes to the prioritized water quality problem(s) listed in the workplan. This section requires the Copermittees to review and update their workplan each year to incorporate changing priorities and evolving watershed strategies.

Section G.6 (Pyrethroid Toxicity Reduction Evaluation) requires the Copermittees to incorporate the pyrethroid pollutant reduction program into the Watershed Workplan, as described in the ROWD.

H. Fiscal Analysis

The following legal authority applies to section H:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.26(d)(2)(vi) provides that "[The Copermittee must submit] for each fiscal year to be covered by the permit, a fiscal analysis of the necessary capital and operation and maintenance expenditures necessary to accomplish the activities of the programs under paragraphs (d)(2)(iii) and (iv) of this section. Such analysis shall include a description of the source of funds that are proposed to meet the necessary expenditures, including legal restrictions on the use of such funds."

Section H has been expanded in order to develop more useful and meaningful fiscal reporting. A revamped fiscal reporting strategy will provide the San Diego Water Board and the Copermittees with better capability to manage performance of the programs.

The Copermittees' effort is expected to provide standardization of reporting so that figures between Copermittees are comparable, which is one of many types of information which can be used by the San Diego Water Board to better understand Copermittee program implementation. Standardization and comparison of fiscal analysis reporting is supported by the State Water Board funded NPDES Stormwater Cost Survey, which finds that "standards for reporting costs and storm water activities are needed to allow accurate cost comparisons to be made between storm water activities."[222] This document also provides guidance regarding categorization of expenditures for tracking and reporting.

The Order establishes a criterion for when Copermittees must add narrative evaluations to the tables. This will address some of the variability in reporting and will provide the public and San Diego Water Board with improved understanding of how resources are shifted in response to annual assessments. This will also help ensure that projected annual costs adequately reflect planned program modifications described in the annual reports.

The San Diego Water Board has chosen not to require a description of fiscal benefits realized from implementation of the storm water protection program. This is a recommendation from the National Association of Flood and Stormwater Management

[222] Currier, et al., 2005. *NPDES Storm Water Cost Survey Final Report*. Prepared for California State Water Resources Control Board by Office of Water Programs, California State University, Sacramento. P. 63.

Agencies.[223] For instance, the current fiscal assessment does not address city-wide fiscal benefits of protection (e.g., public health, tourism, property values, economic activity, beneficial uses, etc.), even though many costs currently reported to the San Diego Water Board are for related activities. This type of assessment may help Copermittees improve the allocation of resources and it may help the Copermittees secure adequate funding for the program. Finally, it will provide a clearer picture of the storm water and non-storm water runoff program to the public and San Diego Water Board. However, qualitative assessments could be overly subjective and most Copermittees likely lack the ability to provide accurate quantitative assessments. The San Diego Water Board encourages Copermittees to consider means for conducting assessments of fiscal benefits derived from the programs. Such assessments could be conducted on a regional scale similar to studies of program costs conducted by the State Water Board.[224]

Currently, each Riverside County municipality's annual report includes a table based on a template developed by the principal Copermittee. The template was meant to facilitate reporting consistency among the Copermittees. The annual report table contains estimates of spending during the reported period and estimates of the next year's spending.

Review of the fiscal analysis tables included in the annual reports has not been as straightforward as expected, and the value of the information is moderate. The reviews indicate that cities do not use consistent methods to fill in the tables because they use different accounting and budgeting processes, and certain storm water program expenditures are not easily categorized into the table formats. Furthermore, storm water permit-related activities involve several departments, which makes it difficult for the storm water manager to gather and decipher actual costs.

These issues also make it difficult for the Copermittees to accurately compartmentalize expenditures within the format. As a result, the current financial reporting provides estimates at best and cannot be reliably used to compare program implementation among most municipalities.

[223] National Association of Flood and Stormwater Management Agencies. 2006. *Guidance for Municipal Stormwater Funding.* Prepared under a grant provided by the USEPA.
[224] State Water Board, 2005. NPDES Stormwater Cost Survey.

I. Total Maximum Daily Loads

The following legal authority applies to section I:

Broad Legal Authority: CWA section 303(d)(1)(A) and (C), and Federal regulations 40 CFR 130.2(i), 40 CFR 130.7(b)(1) and 40 CFR 122.44(d)(1)(vii)(B).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.44(d)(1)(vii)(B) requires that NPDES permit requirements incorporate water quality based effluent limitations that must be consistent with the requirements and assumptions of wasteload allocations (WLAs) assigned to the MS4 as part of the calculated TMDLs.

Section I.1. is a placeholder for the requirements and WLAs assigned to the Copermittees' MS4 discharges of any future TMDLs that are adopted by the San Diego Water Board.

Section I.2 includes, by reference to Santa Ana Water Board Order No. R8-2010-0033, including the relevant sections of the fact sheet and findings (and subsequent revisions), the requirements and WLAs assigned to the MS4s for the Lake Elsinore/Canyon Lake (San Jacinto Watershed) Nutrient TMDLs that are being implemented for the Santa Ana Water Board. Because the San Jacinto Watershed is within the boundaries of the Santa Ana Water Board's region, the Lake Elsinore/Canyon Lake Nutrient TMDLs and its requirements must be implemented by the Cities of Murrieta and Wildomar for the areas within their jurisdictions located in the Santa Ana Region (Region 8).

J. Program Effectiveness Component

The following legal authority applies to section J:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.26(d)(2)(v) provides that the Copermittees must include "Estimated reductions in loadings of pollutants from discharges of municipal storm sewer constituents from municipal storm sewer systems expected as the result of the municipal storm water quality management program. The assessment shall also identify known impacts of storm water controls on ground water." Under Federal NPDES regulation 40 CFR 122.42(c) applicants must provide annual reports on the progress of their storm water management programs.

Section J.1 (Program Effectiveness Assessments) of the Order requires the Copermittees to assess the effectiveness of the implementation of their jurisdictional, watershed, and monitoring programs and activities. The Riverside County Storm Water Program is supportive of the CASQA effort, and use of CASQA assessment techniques is consistent with the methodology proposed in the ROWD.[225,226]

This section requires the Copermittees to establish assessment measures or methods for each of the six outcome levels described by CASQA that will be used to assess the effectiveness of the Jurisdictional Runoff Management Program (JRMP) and Watershed Workplan implementation at (1) reducing the discharge of storm water pollutants from its MS4 to the MEP; (2) prohibit non-storm water discharges; and (3) preventing runoff discharges from the MS4 from causing or contributing to a violation of water quality standards.

The effectiveness assessment measures or methods must be established and included as part of the updated JRMPs and Watershed Workplan that are due on or before June 30, 2012. Beginning with the Annual Report due in 2013, the Copermittees are required to annually perform the assessments using the established assessment measures or methods.

Section J.2 (Respond to Assessments) of the Order requires the Copermittees to improve jurisdictional and watershed activities or BMPs when they are found to be ineffective or when water quality impairments are continuing. This requirement fulfills the purpose of conducting effectiveness assessments – to improve and refine the Copermittees' programs. The requirement is consistent with USEPA's Phase II

[225] The Riverside County Copermittees proposed an assessment strategy based on the CASQA Municipal Stormwater Program Effectiveness Assessment Guidance in section 6.1.2.1 of the ROWD.
[226] CASQA 2007. Municipal Stormwater Program Effectiveness Assessment Guidance.

regulations, which state: "If the permittee determines that its original combination of BMPs are not adequate to achieve the objectives of the municipal program, the MS4 should revise its program to implement BMPs that are adequate […]."[227]

Each Copermittee must update the effectiveness assessment work plan and schedule to address any program modifications and improvements in response to the findings of their assessment. The updates to the work plan and schedule must be incorporated into the applicable Annual Report.

Section J.3 (Assessment and Response Reporting) of the Order describes the information required to be submitted in the Annual Report pertaining to program effectiveness assessments, review, and response. A summary of the effectiveness assessments, responses to the effectiveness assessments, and any steps implemented to improve the Copermittee's ability to assess program effectiveness must be included with the Annual Report. The reporting will demonstrate whether Copermittees have appropriately responded to the effectiveness assessments.

[227] Federal Register / Vol. 64, No. 235 / Wednesday, December 8, 1999 / Rules and Regulations. P. 68762.

K. Reporting

The following legal authority applies to section K:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.42(c) requires that "The operator of a large or medium municipal separate storm sewer system or a municipal separate storm sewer system that has been designated by the director under § 122.26(a)(1)(v) of this part must submit an annual report by the anniversary of the date of the issuance of the permit for such system. The report shall include: (1) The status of implementing the components of the storm water management program that are established as permit conditions; (2) Proposed changes to the storm water management program that are established as permit condition. Such proposed changes shall be consistent with § 122.26(d)(2)(iii) of this part; (3) Revisions, if necessary, to the assessment of controls and the fiscal analysis reported in the permit application under § 122.26(d)(2)(iv) and (d)(2)(v) of this part; (4) A summary of data, including monitoring data, that is accumulated throughout the reporting year; (5) Annual expenditures and budget for year following each annual report; (6) A summary describing the number and nature of enforcement actions, inspections, and public education programs; (7) Identification of water quality improvements or degradation."

CWC section 13267 provides that "the Regional Board may require than any person who has discharged […] shall furnish, under penalty of perjury, technical or monitoring reports which the regional board requires."

Section K.1 (Runoff Management Plans) outlines the process and due dates for submitting JRMPs and Watershed Workplan. The information to be included in the Jurisdictional and Watershed plans must be sufficient to demonstrate the capacity to implement the requirements of section F and G, respectively, of the Order.

In many cases, the requirements of the Order should not necessitate a complete rewrite of the plans, as was basically done in 2005. Only sections of the Order which are new or have been significantly changed should warrant rewriting of plans' sections. The San Diego Water Board plans to work with the Copermittees and provide guidance regarding where JRMPs and Watershed Workplan must be updated in accordance with the Order. This will help ensure that rewriting, reporting, and review efforts are minimized.

Section K.2 (Other Required Reports and Plans) include requirements for information to be included in the SSMP update, the HMP, and the Report of Waste Discharge (ROWD) for the next permit reissuance. The Order requires submittal of an updated SSMP on or before June 30, 2012; a draft HMP on or before June 30, 2013; and a

ROWD 180 days in advance of the expiration of this Order. The section also identifies the minimum information to be included in the ROWD, based on USEPA's May 17, 1996 guidance "Interpretive Policy Memorandum on Reapplication Requirements for Municipal Separate Storm Sewer Systems."

Section K.3 (Annual Reports) outlines the process and roles of the Copermittees for developing and submitting the JRMP Annual Report. Information to be included in the Annual Reports is described in section K.3.a.(3).

Each Copermittee is required to maintain records demonstrating that Permit activity requirements have been met, which allows the San Diego Water Board to confirm compliance as needed, such as via inspections, program audits, or requests for information per CWC sections 13225 and 13267.

Reporting requirements in the Order focus on results and responses to the effectiveness assessments conducted by the Copermittees. This will allow the San Diego Water Board to determine how appropriately municipalities adapt and tailor their programs to findings from activities and monitoring results. Assessment of progress toward meeting the objectives is possible because the data collected by the Copermittees under Order No. R9-2004-001 can be used to establish baseline conditions. Compared to activity-based reporting, this will greatly enhance the ability of the San Diego Water Board, Copermittees, and the public to determine whether the programs are successful.

The Order reduces the amount of program activity-based reporting from Order No. R9-2004-001. Under the CASQA assessment model, activity-based reporting includes primarily outcomes that document compliance with permit requirements (Level 1 outcomes), rather than being indicators of the impact of activity implementation.[228] This approach is consistent with guidance from the USEPA, which notes that annual reports should highlight program effectiveness as well as describing activities.[229] This emphasis is also consistent with recommendations from the National Academy of Public Administration in its report to USEPA on Evaluating Environmental Progress, which suggest that reviewing activities data provides limited value when evaluating the effectiveness of programs and resulting environmental conditions.[230]

The Order maintains some reporting requirements for certain activity-based outcomes. These are mostly focused on activities that establish or revise municipal processes related to storm water runoff and management. The processes required by the Order are especially important in situations where sustaining water quality improvements may require activities that extend beyond the five-year period of the NPDES permit.

[228] Level 1 outcomes under the CASQA guidance include documentation that required activities have been implemented.
[229] USEPA 2007. *MS4 Program Evaluation Guidance.* USEPA Office of Wastewater Management EPA-833-R-07-003. January 2007 field test version.
[230] National Academy of Public Adminstration 2001. Evaluating Environmental Progress: How EPA and the States Can Improve the Quality of Enforcement and Compliance Information (June 2001). http://www.napawash.org

In addition, the Order maintains many activity-based reporting requirements related to enforcement of local requirements, with an emphasis on the results from such activities. This is intended to facilitate review of the contributions that inspection and enforcement activities have made toward meeting the goals of the Order. Reporting of these types of activities is supported by recommendations from the National Academy of Public Administration in its report to the USEPA: *Evaluating Environmental Progress: How EPA and the States Can Improve the Quality of Enforcement and Compliance Information* (June 2001).[231] Other activity-based reporting has been reduced to selected items based on consideration of program priorities.

Another source of prioritization for activity-based reporting is the *Storm Water Panel Recommendations to the California State Water Resources Control Board The Feasibility of Numeric Effluent Limits Applicable to Discharges of Storm Water Associated with Municipal, Industrial and Construction Activities* (June 19, 2006). In particular, the panel highlighted needs to improve the design, maintenance, and inspections of best management practices.

Section K.4 (Interim Reporting Requirements) specifies that the JRMP Annual Reports must be submitted in accordance with the requirements of Order No. R9-2004-001 prior to submittal of the JRMPs required under section K.1a.

[231] The National Academy of Public Administration report is available on-line at http://www.napawash.org

L. Modification of Programs

The following legal authority applies to section L:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv).

Section L of the Order provides a process for the Copermittees to modify their runoff management programs. This process will be useful so that the Copermittees can continue to refine and improve their programs based on the findings of their annual program effectiveness assessments. The process allows for minor modifications to the Copermittees' programs where the Copermittees can exhibit that the modifications meet or exceed existing legal requirements under the Order. Such a process avoids lengthy and time consuming formal approvals of proposed modifications before the San Diego Water Board, while still ensuring compliance with applicable legal standards and the Order. The process included in the Order is based on a process utilized by the California Regional Water Quality Control Board, San Francisco Bay Region (San Francisco Bay Water Board) in their MS4 permit for Alameda County.[232]

[232] San Francisco Bay Water Board, 2003. Order No. R2-2003-0021. P. 45.

M. Principal Permittee Responsibilities

The following legal authority applies to section M:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.26(a)(3)(iii)(C) provides that "A regional authority may be responsible for submitting a permit application."

Federal NPDES regulation 40 CFR 122.26(d)(2)(i)(D) provides that "[The Copermittee must demonstrate that it can control] through interagency agreements among coapplicants the contribution of pollutants from one portion of the municipal system to another portion of the municipal system."

No significant changes were made to this section.

N. Receiving Waters and MS4 Discharge Monitoring and Reporting Program

The following legal authority applies to section N:

Broad Legal Authority: CWA sections 402, 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulations 40 CFR 122.26(d)(2)(iii) and 122.44 require the Copermittees to conduct a comprehensive monitoring program.

See section T of this Fact Sheet/Technical Report for a discussion of changes to the Receiving Waters Monitoring and Reporting Program.

O. Standard Provisions, Reporting Requirements, And Notifications

The following legal authority applies to section O:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Standard provisions, reporting requirements, and notifications are consistent to all NPDES permits and are generally found in Federal NPDES regulation 40 CFR 122.41.

Section O.2 of the Order has been changed to remove the statement that all plans and reports submitted in compliance with the Order are an enforceable part of the Order. This statement has been removed because it is unnecessary. The Order itself contains sufficient detailed requirements to ensure that compliance with discharge prohibitions, receiving water limitations, non-storm water action levels and the narrative standard of MEP for storm water are achieved. Implementation by the Copermittees of programs in compliance with the Order's requirements, prohibitions, and receiving water limitations is the pertinent compliance standard to be used under the Order, as opposed to assessing compliance by reviewing the Copermittees' implementation of their plans alone.

Rather than being substantive components of the Order itself, the Copermittees' management plans are simply descriptions of their runoff management programs required under the Order. These plans serve as procedural correspondence which guides program implementation and aids the Copermittees and San Diego Water Board in tracking implementation of the programs. In this manner, the plans are not functional equivalents of the Order. For these reasons, the Copermittees' runoff management plans need not be an enforceable part of the Order.

P. Attachment A – Basin Plan Prohibitions

The following legal authority applies to Attachment A:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: CWC section 13243 provides that "A regional board, in a water quality control plan or in waste discharge requirements, may specify certain conditions or areas where the discharge of waste, or certain types of waste, will not be permitted."

CWC section 13263(a) provides that waste discharge requirements prescribed by the San Diego Water Board implement the Basin Plan.

No significant changes were made to this attachment.

Q. Attachment B – Standard Provisions

The following legal authority applies to Attachment B:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Standard provisions, reporting requirements, and notifications are consistent to all NPDES permits and are generally found in Federal NPDES regulation 40 CFR 122.41.

Attachment B includes Standard Provisions which have been developed by the State Water Board. These Standard Provisions ensure that NPDES permits are consistent and compatible with USEPA's federal regulations. Some Standard Provisions sections specific to publicly owned sewage treatment works are not included in Attachment B.

R. Attachment C – Definitions

The following legal authority applies to Attachment C:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv).

Attachment C contains definitions for terms found in the Order. In addition, definitions for terms previously defined in Order No. R9-2004-001 Attachment C, but which are not found in the current Order, have been deleted.

An additional section which includes acronyms and abbreviations has been added. This is to ensure clarity and prevent confusion of terms. Definitions have been added for new terms used in the permit to provide a clear understanding of their meaning and use.

S. Attachment D – Summary of Submittals

The following legal authority applies to Attachment D:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, 13383, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv) and 122.44(i).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.42(c) requires that "The operator of a large or medium municipal separate storm sewer system or a municipal separate storm sewer system that has been designated by the director under § 122.26(a)(1)(v) of this part must submit an annual report by the anniversary of the date of the issuance of the permit for such system. The report shall include: (1) The status of implementing the components of the storm water management program that are established as permit conditions; (2) Proposed changes to the storm water management program that are established as permit condition. Such proposed changes shall be consistent with § 122.26(d)(2)(iii) of this part; (3) Revisions, if necessary, to the assessment of controls and the fiscal analysis reported in the permit application under § 122.26(d)(2)(iv) and (d)(2)(v) of this part; (4) A summary of data, including monitoring data, that is accumulated throughout the reporting year; (5) Annual expenditures and budget for year following each annual report; (6) A summary describing the number and nature of enforcement actions, inspections, and public education programs; (7) Identification of water quality improvements or degradation."

CWC section 13267 provides that "the regional board may require than any person who has discharged […] shall furnish, under penalty of perjury, technical or monitoring reports which the regional board requires."

Attachment D to the Order provides a table summary of scheduled submittals required by the Order. Unscheduled submittals are no longer added to the table, since there is no proper due date for such submittals. A task summary has not been created for the Order, since the previous task summary was found to be redundant, repeating information found in the submittal summary and elsewhere in the Order.

A Jurisdictional Runoff Management Program (JRMP) Annual Report Checklist has been added to the reporting requirements. This addition is to determine and ensure that all requirements of the permit are being met. A Jurisdictional Runoff Management Program (JRMP) Annual Report Checklist has been added to the reporting requirements. This addition is to determine and ensure that all requirements of the permit are being met.

T. Attachment E - Receiving Waters and MS4 Discharge Monitoring and Reporting Program

The following legal authority applies to the Receiving Waters and MS4 Discharge Monitoring and Reporting Program:

Broad Legal Authority: CWA sections 402, 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv), 122.44 and 122.45.

Specific Legal Authority: Federal NPDES regulations 40 CFR 122.26(d)(2)(iii) requires the Copermittees to conduct a comprehensive monitoring program.

Federal NPDES regulation 40 CFR 122.42(c) requires that "The operator of a large or medium municipal separate storm sewer system or a municipal separate storm sewer system that has been designated by the director under § 122.26(a)(1)(v) of this part must submit an annual report by the anniversary of the date of the issuance of the permit for such system. The report shall include: (1) The status of implementing the components of the storm water management program that are established as permit conditions; (2) Proposed changes to the storm water management program that are established as permit condition. Such proposed changes shall be consistent with § 122.26(d)(2)(iii) of this part; (3) Revisions, if necessary, to the assessment of controls and the fiscal analysis reported in the permit application under § 122.26(d)(2)(iv) and (d)(2)(v) of this part; (4) A summary of data, including monitoring data, that is accumulated throughout the reporting year; (5) Annual expenditures and budget for year following each annual report; (6) A summary describing the number and nature of enforcement actions, inspections, and public education programs; (7) Identification of water quality improvements or degradation."

CWC section 13267 provides that "the regional board may require than any person who has discharged […] shall furnish, under penalty of perjury, technical or monitoring reports which the regional board requires."

I. Purpose

According to USEPA, the benefits of sampling data include, but are not limited to:

1. Providing a means for evaluating the environmental risk of storm water discharges by identifying types and amounts of pollutants present;
2. Determining the relative potential for storm water discharges to contribute to water quality impacts or water quality standard violations;
3. Identifying potential sources of pollutants; and

4. Eliminating or controlling identified sources more specifically through permit conditions.[233]

Equally important, monitoring programs are an essential link in the improvement of storm water management efforts. Data collected from monitoring programs can be assessed to determine the effectiveness of management programs and practices, which is vital for the success of the iterative approach used to meet the MEP standard for storm water. When water quality data indicate that water quality standards or objectives are being exceeded, particular pollutants, sources, and drainage areas can be identified and targeted for specific management efforts. When data indicate that a particular BMP or program component is not effective, improved efforts can be selected and implemented.

Considering the benefits described above, the Receiving Waters Monitoring and Reporting Program (MRP) has been designed to determine impacts to receiving water quality and beneficial uses from storm water runoff and to use the results to refine the Copermittees' storm water runoff management programs for the reduction of storm water pollutant loadings to the MEP. For non-storm water discharges, monitoring has been designed to identify and eliminate prohibited illicit discharges and to determine appropriate actions to take in response to dry weather non-storm water action levels. Additionally, the results from dry weather non-storm water monitoring can be used to evaluate exempted non-storm water discharges as a source or conveyance of pollutants. The primary goals of the MRP include:

1. Assess compliance with Order No. R9-2010-0016;
2. Measure and improve the effectiveness of the Copermittees' runoff management programs;
3. Assess the chemical, physical, and biological impacts of receiving waters from MS4 discharges;
4. Characterize storm water runoff discharges;
5. Identify sources of specific pollutants;
6. Prioritize drainage and sub-drainage areas that need management actions;
7. Detect and eliminate illicit discharges and illicit connections to the MS4;
8. Assess the overall health of receiving waters; and
9. Provide information to implement required BMP improvements

Each of the components of the MRP is necessary to meet the objectives listed above. In addition, the MRP has been designed in accordance with the guidance provided by the Southern California Stormwater Monitoring Coalition's Model Monitoring Technical Committee in its August 2004 "Model Monitoring Program for Municipal Separate Storm Sewer Systems in Southern California." This guidance document was developed in response to Senate Bill 72 (Kuehl), which addressed the standardization of sampling and analysis protocols in municipal storm water monitoring programs. The technical committee which developed the guidance included representatives from

[233] USEPA, 1992. NPDES Storm Water Sampling Guidance Document. EPA/833-B-92-001.

Southern California Regional Water Boards (including the San Diego Water Board), municipal storm water Copermittees (including Riverside County Flood Control District), Heal the Bay, and the Southern California Coastal Water Research Project.

As its title suggests, the guidance essentially developed a model municipal storm water monitoring program for use in Southern California. The model program is structured around five fundamental management questions, outlined below. The MRP is designed as an iterative step towards ensuring that the Copermittees' monitoring program can fully answer each of the five management questions.

1. Are conditions in receiving waters protective, or likely to be protective, of beneficial uses?
2. What is the extent and magnitude of the current or potential receiving water problems?
3. What is the relative storm water runoff contribution to the receiving water problem(s)?
4. What are the sources of storm water runoff that contribute to receiving water problem(s)?
5. Are conditions in receiving waters getting better or worse?

The three MS4 NPDES permits within San Diego Water Board jurisdiction each have very similar core monitoring requirements that include receiving water monitoring, effluent monitoring, and special studies (see Finding E.12 and Discussion). The justifications for each component of the monitoring program are discussed below.

II. Monitoring Program

The Monitoring Program has been organized into distinct sections and includes receiving water monitoring, MS4 effluent monitoring, a monitoring program in high priority inland aquatic habitat, and special studies. Each monitoring program is expected to answer specific questions and achieve goals outlined in section I. Some of these questions require the linkage of both receiving water monitoring and MS4 discharge monitoring that is required in the Order. As such, the Monitoring Program has been written to allow the Copermittees to utilize the same data and/or sampling effort where monitoring requirements overlap. For example, the Copermittees may elect to develop a Trash Special Study where the sampling is done at the same location and time as stream assessment monitoring. The Copermittees may evaluate the goals and questions of the Monitoring Program when evaluating how required monitoring programs may overlap.

Section II.A.1 (Mass Loading Station Monitoring) of the MRP requires mass loading and toxicity monitoring at monitoring stations located at the bottom of the Riverside County portion of the Santa Margarita watershed (see figure below).

Locations of Mass Loading Stations (MLS) under Order No. R9-2004-0001

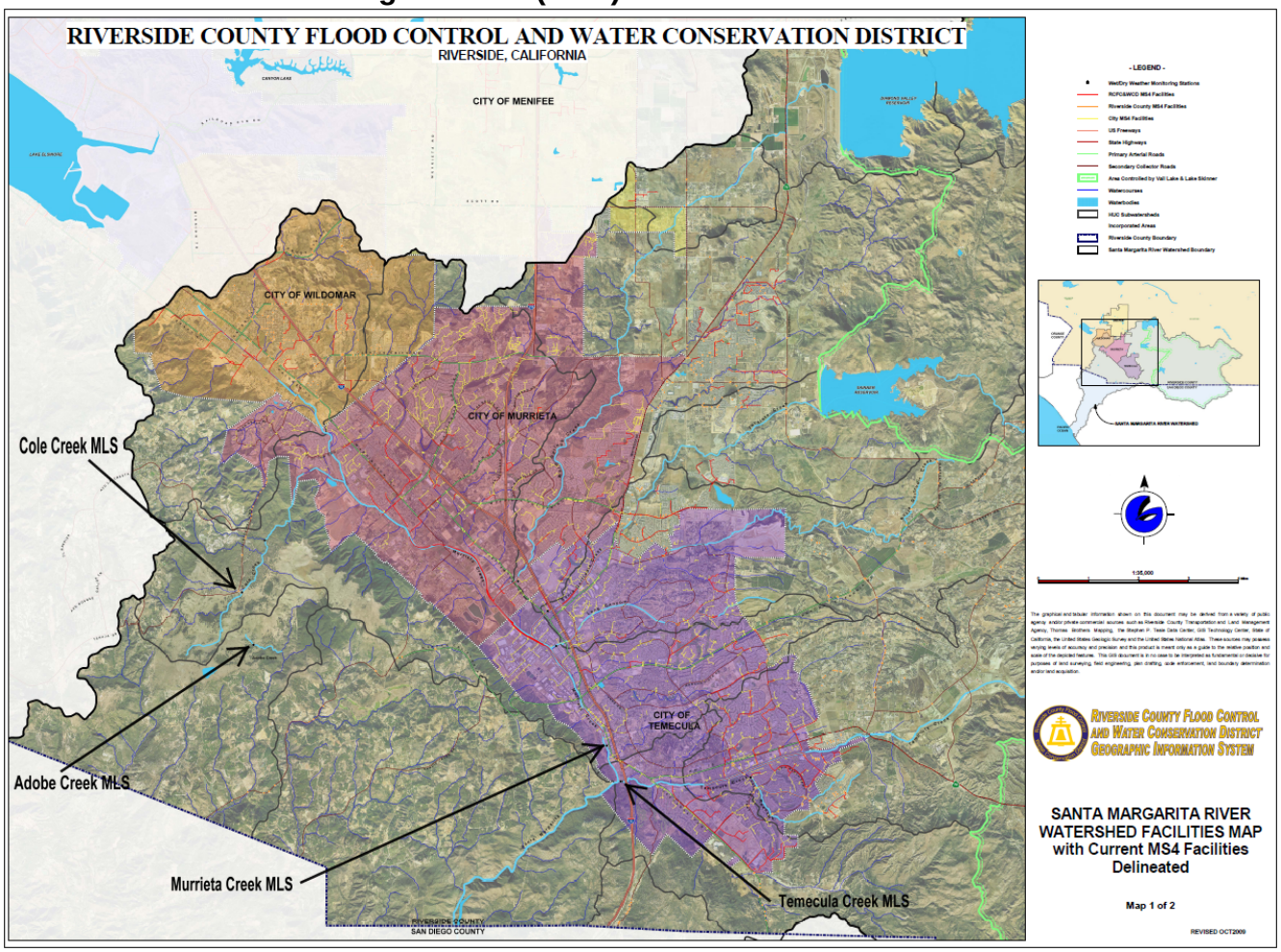

The intent of current mass loading monitoring as conducted by the Copermittees under Order No. R9-2004-001 is to use water chemistry data from storm events and dry weather flows to calculate pollutant loads and to assess water quality with respect to applicable acute and chronic toxicity criteria from the California Toxics Rule (CTR) and bioassessment as part of the triad monitoring approach.[234] The mass loading monitoring that is required by the Order will provide data representing event mean concentrations of pollutants, total pollutant loadings, and toxicity conditions from specific drainage areas. Mass loading monitoring stations are recommended by the Model Monitoring Technical Committee in order to answer management questions 1, 2, and 5.[235] The stations are also expected to contribute towards meeting MRP goals

[234] Riverside County Copermittees. 2009. Report of Waste Discharge, section 6.4 .
[235] Model Monitoring Technical Committee, 2004. Model Monitoring Program for Municipal Separate Storm Sewer Systems in Southern California. Chapter 5.

1, 2, 3, 4, 6, and 8. The locations of the mass loading monitoring stations are not changed from Order No. R9-2004-001. The MRP, however, retains flexibility to allow the Copermittees to propose changing the location of a mass loading station. The Copermittees may also propose additional mass loading stations should they determine more are needed. The Copermittees will identify a permanent mass loading reference station for the permit term.

Some revisions to the required list of constituents to be monitored at mass loading stations have been made. The changes are made to be compatible with the federal NPDES regulations and in response to data collected during the current permit term. Audits of the Copermittees' monitoring program and reviews of annual reports during the last permit term have found consistent shortcomings in the Copermittees' monitoring programs. As a result, some changes have been made to the monitoring requirements. The changes include:

1. All events must now include: Biological Oxygen Demand, 5-day Chemical Oxygen Demand, Total Organic Carbon, Dissolved Organic Carbon. These are specifically required by 40 CFR 122.26(d)(2)(iii)(A) and (B), but were omitted from collection and reporting required by Order No. R9-2004-001.

2. Carbamate and Pyrethroid pesticides must be monitored. Pyrethroid pesticides were identified from TIEs conducted in response to toxicity observed during sampling as part of the triad approach at Temecula and Murrieta Creek. Long term monitoring of pesticide presence is critical to evaluate Copermittees BMP efforts and program effectiveness. Carbamate pesticides are utilized in residential, agricultural and commercial applications, and have been shown to have negative direct and indirect impacts on aquatic invertebrates and vertebrates, as well as associated riparian species.[236] In addition, the National Marine Fisheries Service (NMFS) issued a Biological Opinion in 2009 that concluded pesticide products containing carbaryl and carbofuran are likely to jeopardize 22 listed salmonids, including Southern California Steelhead.[237]

3. Impaired water body pollutants. Specific pollutants have been added in response to the U.S. Environmental Protection Agency approval of California's 2004-2006 and the San Diego Water Board approval of the 2008 303(d) List.

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[236] See:
Boone and James. 2003. Interactions of an insecticide, herbicide, and natural stressors in amphibian community mesocosms. *Ecological Applications*: 13(3) pp. 829-841.
Hanazato. 2001. Pesticide effects on freshwater zooplankton: an ecological perspective. *Environmental Pollution*: 112 pp. 1-10.
USGS. 1999. Field Manual of Wildlife Diseases: General Field Procedures and Diseases of Birds. Chapter 39.
California Department of Pesticide Regulation. 2010. Urban Pesticide Monitoring in Northern and Southern California. http://www.cdpr.ca.gov/docs/emon/surfwtr/presentations.htm

[237] NMFS. 2009. Endangered Species Act Section 7 Consultation Biological Opinion: Environmental Protection Agency Registration of Pesticides Containing Carbaryl, Carbofuran, and Methomyl.

4. A requirement to collect a grab sample for total petroleum hydrocarbons whenever a sheen is observed has been added based upon results from IC/ID programs in existing southern California NPDES MS4 permits.

5. The required organisms for toxicity testing have changed from the previous order to be consistent with USEPA guidance.[238] *Ceriodaphnia dubia* (water flea) has been replaced with *Pimephales promelas* (fathead minnow) to provide at least three test species from different phyla. *Hyalella azteca* has been retained as a test organism due to sensitivity to pyrethroid pesticides.

6. A constituent-specific table has been added to provide clarity to the list of pollutants that are required to be monitored as part of the triad approach.

7. More prescriptive reporting requirements have been added in the event the Copermittees fail to monitor the required number of mass loading events.

Section II.A.2 (Stream Assessment Monitoring) of the MRP requires the Copermittees to conduct bioassessment monitoring using a multiple lines of evidence approach which includes collection of benthic macroinvertebrates and algae, a full physical habitat assessment, water chemistry sampling, and toxicity testing. Bioassessment monitoring is a cost-effective tool that measures the effects of water quality over time.[239] It is an important indicator of stream health and impacts from storm water and non-storm water runoff. It can detect impacts that chemical and toxicity monitoring alone cannot. USEPA encourages permitting authorities to consider requiring biological monitoring methods in conjunction with chemical and toxicity testing to fully characterize the nature and extent of impacts from runoff.[240] Therefore, the San Diego Water Board commonly requires bioassessment monitoring in MS4 and other types of discharge permits.

Bioassessment is the direct measurement of the biological, chemical, and physical condition, and attainment of beneficial uses of receiving waters (typically using benthic macroinvertebrates, periphyton, and fish). Bioassessment monitoring integrates the effects of both water chemistry (including toxicity) and physical habitat impacts (e.g., sedimentation or erosion) of various discharges on the biological community native to the receiving waters. Moreover, bioassessment is a direct measurement of the impact of cumulative, sub-lethal doses of pollutants that may be below reasonable water chemistry detection limits, but that still have biological affects.

Because bioassessment focuses on communities of living organisms as integrators of cumulative impacts resulting from water quality or habitat degradation, it defines the ecological risks resulting from storm water and non-storm water MS4 runoff.

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[238] USEPA, 1991. Technical Support Document for Water Quality Based Toxics Control. EPA 505-2-90-001.
[239] California Department of Fish and Game, 2002. California Regional Water Quality Control Board, San Diego Region 2002 Biological Assessment Report: Results of May 2001 Reference Site Study and Preliminary Index of Biotic Integrity.
[240] USEPA, 1999. Rapid Bioassessment Protocols for Use in Wadeable Streams and Rivers. EPA 841-B-99-002. P. 2-5.

Bioassessment not only identifies that an impact has occurred, but also measures the effect of the impact and tracks recovery when control or restoration measures have been taken. These features make bioassessment a powerful tool to assess compliance, evaluate the effectiveness of BMPs, and to track both short and long-term trends (MRP goals 1, 2, 3, and 8). Bioassessment can also help answer management questions 1, 2, and 5.

The Order also identifies the most current established protocol to be used in identifying bioassessment reference stations. The protocol referenced in the Order is specified because it provides a qualitative and repeatable method for identifying reference sites. Moreover, the protocol is well established, since it has been peer reviewed and published.

The Order includes four significant modifications to the bioassessment monitoring required under Order No. R9-2004-001. These changes include:

1. Bioassessment monitoring must be consistent with the State Water Board's Surface Water Ambient Monitoring Program (SWAMP) Standard Operating Procedures (SOP) as amended.[241]

2. Bioassessment monitoring is to include an assessment of periphyton (algae).[242] Advantages of bioassessment using periphyton include: (1) they have rapid reproduction rates and very short life cycles, making them valuable indicators of short-term impacts; (2) as primary producers, they are most directly affected by physical and chemical factors; (3) sampling is easy and inexpensive; and (4) algal assemblages are sensitive to some pollutants which may not visibly affect other aquatic assemblages.[243] Future bioassessment must use algal IBI scores, when developed.

3. The number of bioassessment stations has been increased from three to six. The Copermittees currently conduct bioassessment monitoring at one reference station and at the two mass loading stations at Temecula and Murrieta Creek. The increase in required sampling is needed to evaluate more localized impacts higher in the Santa Margarita Hydrologic Unit (HU) in conjunction with SAL and NAL monitoring, as well as to evaluate any impacts that occur from hydromodification. The additional required reference station will aid in detecting any differences in bioassessment scores over time that may be independent of MS4 discharges.

4. The bioassessment section title has been changed to Stream Assessment Monitoring. This was done to prevent confusion by the Copermittees in

[241] SWAMP February 2007 (amended September 2008). Standard Operating Procedures for Collecting Benthic Macroinvertebrate Samples and Associated Physical and Chemical Data for Ambient Bioassessments in California
[242] SWAMP June 2009. Standard Operating Procedures for Collecting Stream Algae Samples and Associated Physical Habitat and Chemical Data for Ambient Bioassessments in Califorinia.
[243] USEPA, 1999. Rapid Bioassessment Protocols for Use in Wadeable Streams and Rivers. EPA 841-B-99-002. P. 3-3.

understanding sampling differences between mass loading stations and bioassessment sites. Under Order No. 2004-0001 all bioassessment sites were co-located with mass loading stations. Thus, the collection of water chemistry and toxicity data was done simultaneously for mass loading and bioassessment purposes, which prevented duplicative water chemistry and toxicity testing. For new "Stream Assessment Monitoring" sites not located at mass loading stations, the nomenclature for monitoring has been changed to prevent possible misinterpretation of the term "bioassessment" to mean only the collection of benthic macroinvertebrates and physical habitat data.

Section II.A.3 (Follow-up Analysis and Actions) of the MRP requires the Copermittees to use the results of the receiving water monitoring to determine if impacts from MS4 discharges are occurring and when follow-up actions are necessary. The triad approach allows a wide range of measurements to be combined to more efficiently identify pollutants, their sources, and appropriate follow-up actions. Results from the three types of monitoring must be assessed to evaluate the extent and causes of pollution in receiving waters and to prioritize management actions to eliminate or reduce the sources. The framework provided is to be used to determine conclusions from the data and appropriate follow-up actions. The framework is proposed by the Copermittees and derived from the Model Monitoring Program for Municipal Separate Storm Sewer Systems in Southern California.[244] These follow-up actions are expected to primarily help answer management questions 2 and 4, as well as address MRP goals 2, 4, 5, 6 and 7.

When, based on the framework in Table 3 of the MRP, data indicates the presence of toxic pollutants in runoff, the Copermittees are required to conduct a Toxicity Identification Evaluation (TIE). A TIE is a set of procedures used to identify the specific chemical(s) responsible for toxicity to aquatic organisms. When discharges are toxic to a test organism, a TIE must be conducted to confirm potential constituents of concern and rule out others, therefore allowing Copermittees to determine and prioritize appropriate management actions. If a sample is toxic to more than one species, it is necessary to determine the toxicant(s) affecting each species. If the type and source of pollutants can be identified based on the data alone and an analysis of potential sources in the drainage area, a TIE is not necessary.

When a TIE identifies a pollutant associated with MS4 discharge as a cause of toxicity, it is then necessary to conduct follow-up actions to identify the causative agents of toxicity, isolate the sources of toxicity, evaluate the effectiveness of toxicity control options, and then confirm the reduction in toxicity. Follow-up actions should analyze all potential source(s) causing toxicity, potential BMPs to eliminate or reduce the pollutants causing toxicity, and suggested monitoring to demonstrate that toxicity has been removed.

[244] Model Monitoring Technical Committee, 2004. Model Monitoring Program for Municipal Separate Storm Sewer Systems in Southern California. P. 5-61.

Section II.A.4 (Regional Monitoring Programs) of the MRP identifies that the San Diego Water Board recognizes the importance of regional monitoring efforts to answer monitoring questions and/or address problems that may not be specific to only the Santa Margarita hydrologic unit (see Finding E.12 and Discussion). Additionally, the Copermittees' jurisdiction does not encompass the entire Santa Margarita hydrologic unit, as portions of the hydrologic unit include, but are not limited to, San Diego County, tribal lands, the Cleveland National Forest, and Marine Corps Base at Camp Pendleton.

Section II.B (Wet Weather MS4 Discharge Monitoring) of the MRP requires the Copermittees to develop and implement a program, in accordance with 40 CFR 122.26(d)(2)(iii), to monitor and characterize pollutants in discharges of storm water effluent from major MS4 outfalls. Currently the Copermittees do not monitor the discharge of storm water from the MS4 outfalls. As a result, a substantial amount of information regarding the quality of MS4 effluent is unknown, and in-stream stations monitored under R9-2004-001 have not accurately characterized MS4 effluent data during the permit term.[245] The collection of wet-weather MS4 effluent data will enable the Copermittees to assess the effectiveness of existing storm water BMP measures, estimate cumulative annual pollutant loads from MS4 storm water discharges, and estimate seasonal pollutant loads from individual major outfalls. This data can be used to more effectively target storm water management program efforts. The MRP also requires compliance with section D of the Order for Storm Water Action Levels.

The monitoring of outfalls is expected to be used to identify storm drains that are discharging pollutants in concentrations that may pose a threat to receiving waters. Source investigations are expected to be conducted as a response to the data. The Copermittees are required to monitor for those pollutants in 40CFR 122.26(d)(2)(iii)(B); for 303(d) listed pollutants for the Santa Margarita Hydrologic Unit; and for pollutants with Storm Water Action Levels.

The MRP provides the Copermittees great flexibility in assigning stations and sampling frequency for wet-weather monitoring. Copermittees are to propose the number and frequency of monitoring stations, thus proposing the overall cost of their program. The San Diego Water Board will review the proposed program to ensure it will comply with Federal regulations and section D of the Order for Storm Water Action Levels.

The monitoring requirements also include a requirement to measure receiving water hardness when comparing storm water MS4 discharge data to Storm Water Action Levels for priority pollutants (e.g. metals). The effect of these constituents upon receiving waters will vary depending upon the hardness of receiving waters.

Section II.B.2 (Source Identification Monitoring) requires the Copermittees to develop and implement a program to identify sources of discharges of pollutants causing the high priority water quality problems within each hydrologic subarea. The current

[245] Riverside County Copermittees. 2009. Report of Waste Discharge, section 5.1.

source identification monitoring program conducted by the Copermittees has not been demonstrated to be effective due to the continued receiving water monitoring that documents persistent exceedances of water quality objectives for 303(d) listed pollutants, as well as the listing of new water bodies and pollutants (see Finding C.7). Furthermore, all monitoring conducted under Order R9-2004-001 focused on receiving water conditions rather than MS4 effluent discharges. Outside of required toxicity identification and reduction evaluations, little to no source identification was conducted for observed exceedances of water quality standards in receiving waters.

Identification of sources causing high priority water quality problems is a central purpose of storm water runoff management programs. Monitoring which enables the Copermittees to identify sources of water quality problems aids the Copermittees in focusing their management efforts, improving their programs and choosing additional and/or better BMPs. In turn, the Copermittees' programs can abate identified sources, which will improve the quality of storm water runoff discharges and receiving waters. This monitoring is needed to address management questions 3 and 4, in addition to ensuring that pollutants in storm water discharges from the MS4 are reduced to the MEP. Moreover, in its review of the San Diego County Copermittees' monitoring proposal, Tetra Tech, Inc. finds that "after some years of assessment monitoring, it is time to look more systematically at determining the relative urban contributions and the sources of urban runoff that contribute to identified receiving water problems."[246]

Section II.C (Non-Storm Water Dry Weather Action Levels) of the MRP describes the monitoring to be conducted by the Copermittees to determine compliance with dry weather, non-storm water action levels.

The section for Dry Weather Non-Storm Water Action Level Monitoring has taken the place of Illicit Discharge Detection and Elimination Monitoring under the previous Order. This change is required to assess compliance with action levels for non-storm water discharges from the MS4 into receiving waters while the Copermittees simultaneously conduct Illicit Discharge Detection and Elimination activities. The prior Order did not require the testing of non-storm water MS4 effluent prior to discharge into receiving waters, and thus Illicit Discharge Detection and Elimination Monitoring was conducted in receiving waters that were technically considered part of the MS4 but did not necessarily contain solely MS4 effluent. Discussions between the San Diego Water Board and Copermittees identified this shortcoming, which is reflected in the Copermittees Annual Reports (2007-08 and 2008-09), and the Copermittees have requested the point of monitoring for non-storm water be changed to sample MS4 effluent.[247] The required sampling frequency has great flexibility and allows Copermittees to sample a representative number of discharge points while the sampling methodology continues to be grab sampling. Additionally, the selection of representative outfalls or other identified stations has been clarified to ensure that those selected are consistent with federal requirements under 40 CFR 122.26(d) and section C of the Order.

[246] Tetra Tech Inc., 2006. Review of San Diego County MS4 Monitoring Program.
[247] Riverside County Copermittees ROWD, January 2009. Section 7.8.2.

Section II.C.2 (Source Identification Monitoring) requires the Copermittees to develop and implement a program to identify the sources of pollutants in non-storm water discharges. The section provides clarification that the program must utilize action levels pursuant to section C of the Order as a source identification response criteria. The source identification monitoring program is required under sections C, F.4.d, and F.4.e of the Order and to comply with 40 CFR 122.26(d)(2)(iv)(B), which requires the Copermittees have a program to detect and remove illicit discharges into the MS4.

Section II.D (High Priority Inland Aquatic Habitat) of the MRP describes required monitoring to be done in order to assess if MS4 storm water and/or non-storm water discharges are affecting high priority aquatic and/or riparian species. The existing monitoring program does almost all monitoring at or near mass loading stations, which are located at and below the confluence of multiple major hydrologic subareas. While this approach may estimate cumulative loadings and impacts from entire hydrologic areas, it provides little information regarding localized impacts to receiving waters subject to MS4 discharges, especially for high priority habitats. This approach is also recommended by the Southern California Stormwater Monitoring Coalition's Model Monitoring Technical Committee as an integral part of a storm water monitoring program. The Model Monitoring Technical Committee, which includes a member from RCFCD, recommends the use of "site-specific stations focused on the status of high-priority inland habitats of concern, with monitoring based primarily on the Triad approach for dry weather sampling and on chemistry and toxicity for wet weather."[248]

The monitoring of MS4 discharges into high-priority inland habitats is of special importance to the species which rely on the habitat subject to the discharge. The Santa Margarita River, and its tributaries, has been designated with BIOL, WARM, COLD, RARE and WILD beneficial uses, in part due to the presence of threatened and endangered species.[249] Portions of the Santa Margarita HU also include areas designated as critical habitat by state and Federal agencies. Federal and State threatened and endangered species are particularly susceptible to negative direct and indirect effects of MS4 discharges because the habitat available to them has already been reduced, restricted, and/or degraded, and their populations have already been reduced to low levels.[250] Therefore, short-term or chronic degradation of habitat or exposure to pollutants caused by MS4 discharges results in a proportionally high level of negative impact to already impacted beneficial uses. Threatened or endangered species with reduced habitat availability may be restricted from avoiding pollutants associated with MS4 discharges,[251] and any reproductive impacts from pollutants would likely have significant negative effects on already low population sizes.

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[248] Model Monitoring Technical Committee, 2004. Model Monitoring Program for Municipal Separate Storm Sewer Systems in Southern California.
[249] See Federal Register 50 CFR 71.11 and the California Code of Regulations, Title 14 Section 670.5.
[250] Carroll, R., Augspurger, C., Dobson, A., Franklin, J., Orians, G., Reid, W., Tracy, R., Wilcove, D. and J. Wilson. 1996. Strengthening the use of science in achieving the goals of the Endangered Species Act: An Assessment by the Ecological Society of America. *Ecological Applications*. 6(1) pp. 1-11.
[251] For example, see National Marine Fisheries Service Draft Southern Steelhead Recovery Plan, July 2009.

Information regarding the extent of environmentally-sensitive habitats is available from sources familiar to the Copermittees.[252] Examples include the Western Riverside Multiple Species Habitat Conservation Plan, Santa Margarita HU assessments conducted by the U.S. Army Corps of Engineers, and California Department of Fish and Game Ecological Reserves. Therefore, a relatively small level of effort will be required to collect information to determine high priority inland aquatic habitats. In addition, the Copermittees already are required to have updated inventories of inland MS4 outfall locations. As a result, a monitoring plan can be developed within 36 months to address the new requirement.

Section II.E.2 (Sediment Toxicity Study) includes a requirement that the Copermittees conduct a sediment toxicity special study. This study has been added to the Monitoring and Reporting requirements to assess the quality of stream sediments and possible contamination due to runoff from the MS4. Toxicity tests focusing on aqueous toxicity may not account for the full toxicity of receiving waters if constituents, such as heavy metals or pesticides, are bound to sediments. Southern California studies have shown that stream sediments can exhibit significant levels of toxic metals and pesticides, including pyrethroids.[253,254] Additionally, the Copermittees have identified the presence of aqueous toxicity at both mass loading stations due to pyrethroid pesticides, but their presence in sediments is unknown.

Section II.E.3 (Trash and Litter Investigation) includes a requirement that the Copermittees conduct a Trash and Litter Investigation (see Finding C.8 and Discussion). The objective of the study is to evaluate the quantity, type, and source(s) of trash and litter in receiving waters (see Finding E.12 and Discussion regarding regional efforts). Although trash can impair beneficial uses, the amount and type of trash discharged into receiving waters from the Copermittee(s) MS4 is unknown. Thus, the Copermittees have largely been unable to assess the effectiveness of their BMPs that target trash as a pollutant. The special study requires the Copermittees to utilize previously developed protocols to determine the source of trash and litter in receiving waters, assess BMP effectiveness, and implement additional BMPs if needed according to the requirements of the Order. Qualitative and quantitative protocols for trash assessment have already been developed for San Diego County and the San Francisco Bay Region. These protocols are required to be used in the development of the special study, are expected to reduce Copermittee costs, and promote regional consistency in trash and litter assessments.

Section II.E.4 (Agricultural, Federal and Tribal Input Study) includes a requirement for the Copermittees to draft and subsequently conduct a special study to determine the water quality of storm water flows which are entering their MS4 from agricultural,

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[252] See Riverside County Copermittees ROWD, January 2009. Section 4.3.3.
[253] Holmes, R.W., Anderson, B.S., Phillips, B.M., Hunt, J.W., Crane, D.B., Mekebri, A. and V. Connor. 2008. Statewide Investigation of the Role of Pyrethroid Pesticides in Sediment Toxicity in California's Urban Waterways. *Environmental Science Technology* 42: 7003-7009..
[254] Crane, D.B. and C. Younghans-Haug. 1992. Oxadiazon residue concentrations in sediment, fish, and shellfish from a combined residential/agricultural area in Southern California. *Bulletin of Environmental Contamination and Toxicology.* Volume 48, no. 4.

federal and tribal areas. The objective of the study is to determine the type, quantity and estimated loading of pollutants in these discharges. In the ROWD, the Copermittees specifically state their concern regarding the quality of storm water which is discharged into their MS4 from such areas, and state that these discharges may affect overall water quality, primarily in the Murrieta and Temecula Creek watersheds.[255] However, no data, information, or analyses were presented or identified on the level of pollutants in such flows into their MS4. The special study has been designed with sampling frequency and parameter requirements that lend flexibility to the Copermittees. The minimum requirements are limited to grab samples for pollutants expected to be present in storm water discharges and at a number of representative sites chosen be the Copermittees. The special study requires testing to be source specific (e.g. only sampling discharge into from one of the three sources) and does not allow for sampling to be done on co-mingled flows within the MS4. Additionally, the Copermittees may elect to conduct composite sampling, toxicity testing, more targeted sites, or a combination thereof.

Section II.E.5 (MS4 and Receiving Water Maintenance Study) includes a requirement that the Copermittees investigate impacts to Beneficial Uses from routine removal of vegetation from portions of the MS4 that are also receiving waters (see Finding D.3.c and Discussion). The objective of the study is to determine if there are short-term or long-term in-stream water quality impacts from maintenance activities and to assess if the activities exacerbate the impairment of receiving waters 303(d) listed as impaired wholly or partially from MS4 discharges. Receiving waters within the Copermittees jurisdiction have been routinely cleared of vegetation by the Copermittees as part of their MS4 maintenance programs without mitigation efforts. The in-stream modification of vegetation may result in changes in water quality and Beneficial Uses from changes in nutrient cycling, the storage of organic matter, infiltration, flow attenuation, temperature and erosion potential.[256,257,258] The relative contribution, if any, of maintenance activities to CWA 303(d) water quality impairments in unknown. The program is also expected to work in conjunction with other permit requirements of the Order. For example, the Copermittees may choose to utilize study results when implementing the HMP, LID, and retrofitting programs.

Section II.E.6 (Intermittent and Ephemeral Stream Perennial Conversion Study) includes a study to assess specifically exempted non-storm water discharges[259] into surface waters and discharges into MS4s covered under a separate NPDES permit in order to determine if the exempted discharges and/or separate NPDES discharges to the MS4 are causing or contributing to a condition of pollution, contamination or nuisance. For ephemeral and intermittent inland surface waters, modification of flows

[255] Riverside County Copermittees ROWD, January 2009. Sections 3.2 and 3.3.
[256] Fischenich, J.C. and R.R. Copeland. 2001. Environmental Considerations for Vegetation in Flood Control Channels. US Army Corps of Engineers.
[257] Shade et al. 2005. Hydrologic exchange and N uptake by riparian vegetation in an arid-land stream. *Journal of North American Benthological Society*. 24(1):19–28.
[258] Warner, R.E. and K.M. Hendrix. 1984. California Riparian Systems: Ecology, Conservation, and Productive Management. *pp. 160-189*. University of California Press.
[259] See Finding C.15 of the Order for discussion of exempted non-storm water discharges.

may impact beneficial uses through modification of in-stream ecology including, but not limited to, sediment transport, biogeochemical functioning, water temperature, non-native species presence and exclusion of native species.[260,261] The objective of the study is to determine if the alteration of natural in-stream hydrologic regimes from intermittent or ephemeral to perennial due to exempted non-storm water discharges has modified the beneficial uses of the receiving water. The evaluation includes both qualitative and quantitative measurements of parameters which will help the Copermittees determine if exempted discharges and/or separate NPDES discharges into the MS4 are causing a condition of pollution, contamination, or nuisance. Such a determination would potentially require an action to be taken by the Copermittee(s) (i.e. prohibition of an exempted discharge), permit modification for a separate NPDES permit, and/or an action by the San Diego Water Board.

Section II.F (Monitoring Provisions) of the MRP includes monitoring provisions which are standard requirements for all municipal storm water permits.

III. Reporting Program

Section III of the MRP discusses submittal of the Planned Monitoring Program, the Receiving Waters and MS4 Discharge Monitoring Annual Reports, and Interim Reporting Requirements. For the purposes of Receiving Waters and MS4 Discharge Monitoring and Reporting Program, required reviews and approvals by the San Diego Water Board of draft monitoring plans, proposals or protocols shall be conducted by the San Diego Water Board Executive Officer.

Section III.C (Table of Reporting Requirements) has been added to the MRP to provide a quick reference for all required reporting dates found in the MRP

[260] Naiman, R.J., Bunn, S.E., Nilsson, C., Petts, G.E., Pinay, G., and L.C. Thompson. 2002. Legitimizing Fluvial Ecosystems as Users of Water: An Overview. *Environmental Management*: 30(4) pp. 455-467.
[261] Marchetti, M.P., Light, T., Moyle, P.B. and J.H. Viers. 2004. Fish Invasions in California Watersheds: Testing Hypotheses Using Landscape Patterns. *Ecological Applications*. 14(5) pp. 1507-1525.

U. Attachment F - Source Data

Attachment F contains data utilized for the development of Storm Water Action Levels and Non-storm Water Action Levels.

0008918

Ben Neill - R9- Riverside County MS4 NPDES Permit Order No. R9-2010-0016

From: <lyris@swrcb18.waterboards.ca.gov>
To: Ben Neill <bneill@waterboards.ca.gov>
Date: 12/21/10 3:41 PM
Subject: R9- Riverside County MS4 NPDES Permit Order No. R9-2010-0016
Attachments: FINAL_R9-2010-0016.PDF

This is a message from the California Regional Water Quality Control Board - San Diego Region 9.

Dear Interested Parties,

Attached is the final version of Order No. R9-2010-0016 as adopted on November 10, 2010 incorporating all of the errata. The attachments and fact sheet will soon be on our website at this location:

http://www.waterboards.ca.gov/sandiego/water_issues/programs/stormwater/rsd_stormwater.shtml

Feel free to contact me if you have any questions.

Sincerely,

Ben Neill
Water Resource Control Engineer
(858) 467-2983

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California Regional Water Quality Control Board
San Diego Region

Waste Discharge Requirements for Discharges from the Municipal Separate Storm Sewer Systems (MS4s) Draining the County of Riverside, the Incorporated Cities of Riverside County, and the Riverside County Flood Control and Water Conservation District within the San Diego Region

Order No. R9-2010-0016
NPDES No. CAS0108766

November 10, 2010

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
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To request copies of the Riverside County Municipal Storm Water Permit, please contact Ben Neill, Water Resources Control Engineer at (858) 467 – 2983, bneill@waterboards.ca.gov

Documents also are available at: http://www.waterboards.ca.gov/sandiego

Waste Discharge Requirements for Discharges from the Municipal Separate Storm Sewer Systems (MS4s) Draining the County of Riverside, the Incorporated Cities of Riverside County, and the Riverside County Flood Control and Water Conservation District within the San Diego Region

Adopted by the
California Regional Water Quality Control Board
San Diego Region
on
November 10, 2010

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Wayne Rayfield	Water Quality
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Gary Strawn	Recreation / Wildlife
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This permit was prepared under the direction of

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by

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The California Regional Water Quality Control Board, San Diego Region (hereinafter San Diego Water Board), finds that:

A. BASIS FOR THE ORDER

1. This Order is based on the federal Clean Water Act (CWA), the Porter-Cologne Water Quality Control Act (Division 7 of the Water Code, commencing with Section 13000), applicable State and federal regulations, all applicable provisions of statewide Water Quality Control Plans and Policies adopted by the State Water Resources Control Board (State Water Board), the Water Quality Control Plan for the San Diego Basin adopted by the San Diego Water Board (Basin Plan), the California Toxics Rule, and the California Toxics Rule Implementation Plan.

2. This Order reissues National Pollutant Discharge Elimination System (NPDES) Permit No. CAS0108766, which was first adopted by the San Diego Water Board on July 16, 1990 (Order No. 90-38), and then reissued on May 13, 1998 (Order No. 98-02). On May 26, 1998, the United States Environmental Protection Agency (USEPA), Region IX, objected to Order No. 98-02 due to concerns regarding Receiving Water Limitations (RWL) language. The USEPA concluded that the RWL language in the permit did not comply with the CWA and its implementing regulations. On April 27, 1999, the USEPA reissued the MS4 permit, which the San Diego Water Board adopted as Addendum No. 1 to Order No. 98-02 on November 8, 2000. On July 14, 2004, the San Diego Water Board adopted the third term MS4 permit, Order No. R9-2004-001. On January 15, 2009, the Riverside County Flood Control and Water Conservation District (RCFCD), as the Principal Copermittee, submitted a Report of Waste Discharge (ROWD) for reissuance of the municipal separate storm sewer system (MS4) Permit.

3. This Order is consistent with the following precedential Orders adopted by the State Water Board addressing MS4 NPDES Permits: Order 99-05, Order WQ-2000-11, Order WQ 2001-15, and Order WQO 2002-0014.[1]

[1] In July 2010, the court in Los Angeles County v. State Water Resources Control Board remanded the Los Angeles Water Board's MS4 permit underlying Order WQ 2009-0008 for procedural reasons occurring during the permit adoption process. The court did not evaluate or rule upon the substantive findings and reasoning set forth in Order WQ 2009-0008. The State Water Board rescinded and voided Order WQ 2009-0008 to comply with the court's order. While the San Diego Water Board may no longer cite Order WQ 2009-0008, the San Diego Water Board has independently considered whether the requirement to eliminate non-storm water discharges is subject to the MEP standard. The San Diego Water Board concludes that the MEP standard does not apply to non-storm water discharges for the same reasons expressed by the State Water Board.

4. The Fact Sheet / Technical Report for the Order No. R9-2010-0016, NPDES No. CAS0108766, Waste Discharge Requirements for Discharges from the MS4s Draining the County of Riverside, the Incorporated Cities of Riverside County, and the Riverside County Flood Control and Water Conservation District within the San Diego Region, includes cited regulatory and legal references and additional explanatory information and data in support of the requirements of this Order. This information, including any supplements thereto, is hereby incorporated by reference into these findings.

B. REGULATED PARTIES

Each of the persons in Table 1 below, hereinafter called Copermittees or dischargers, owns or operates an MS4, through which it discharges into waters of the United States (U.S.) within the San Diego Region. These MS4s fall into one or more of the following categories: (1) a medium or large MS4 that services a population of greater than 100,000 or 250,000 respectively; or (2) a small MS4 that is "interrelated" to a medium or large MS4; or (3) an MS4 that contributes to a violation of a water quality standard; or (4) an MS4 which is a significant contributor of pollutants to waters of the U.S.

Table 1. Municipal Copermittees

1. City of Murrieta	4. County of Riverside
2. City of Temecula	5. Riverside County Flood Control and Water Conservation District
3. City of Wildomar	

The Cities of Murrieta, Menifee and Wildomar also discharge into the waters of the U.S. in the California Regional Water Quality Control Board, Santa Ana Region (Santa Ana Water Board), so are located partially within both the San Diego and Santa Ana Water Board boundaries. Water Code (WC) section 13228 provides a way to streamline the regulation of entities whose jurisdictions straddle the border of two or more Regions. WC section 13228 is implemented in this Order to ease the regulatory burden on Storm Water Agencies and Municipalities that lie in both the San Diego Water Board and the adjacent Santa Ana Water Board's jurisdiction. As allowed by California Water Code (CWC) §13228, the Cities of Murietta, Menifee, and Wildomar submitted written requests to be regulated for MS4 purposes under a permit adopted by only one Water Board. As authorized by CWC §13228 and pursuant to written agreements dated September 28, 2010 between the San Diego Water Board and the Santa Ana Water Board, the Cities of Murrieta and Wildomar are wholly regulated by the San Diego Water Board under this Order, including those portions of the Cities jurisdiction not within the San Diego Water Board's region. Similarly, the City of Menifee is wholly regulated by the Santa Ana Water Board under Order No. R8-2010-0033, including those portions of the City of Menifee within the San Diego Water Board's region.

C. DISCHARGE CHARACTERISTICS

1. Discharges from the MS4 contain waste, as defined in the CWC, and pollutants that adversely affect the quality of the waters of the State. The discharge from an MS4 is a "discharge of pollutants from a point source" into waters of the U.S. as defined in the CWA.

2. MS4 storm water and non-storm water discharges are likely to contain pollutants that cause or threaten to cause a violation of water quality standards, as outlined in the Basin Plan. Storm water and non-storm water discharges from the MS4 are subject to the conditions and requirements established in the Basin Plan for point source discharges.

3. The most common categories of pollutants in runoff include total suspended solids, sediment, pathogens (e.g., bacteria, viruses, protozoa), heavy metals (e.g., copper, lead, zinc and cadmium), petroleum products and polynuclear aromatic hydrocarbons, synthetic organics (e.g., pesticides, herbicides, and PCBs), nutrients (e.g., nitrogen and phosphorus fertilizers), oxygen-demanding substances (decaying vegetation, animal waste), detergents, and trash.

4. The discharge of pollutants and/or increased flows from MS4s may cause or threaten to cause the concentration of pollutants to exceed applicable receiving water quality objectives and/or impair or threaten to impair designated beneficial uses resulting in a condition of pollution (i.e., unreasonable impairment of water quality for designated beneficial uses), contamination, or nuisance.

5. Pollutants in runoff can threaten and adversely affect human health. Human illnesses have been clearly linked to recreating near storm drains flowing to receiving waters. Also, runoff pollutants in receiving waters can bioaccumulate in the tissues of invertebrates and fish, which may be eventually consumed by humans.

6. Runoff discharges from MS4s often contain pollutants that cause toxicity to aquatic organisms (i.e., adverse responses of organisms to chemicals or physical agents ranging from mortality to physiological responses such as impaired reproduction or growth anomalies). Toxic pollutants impact the overall quality of aquatic systems and beneficial uses of receiving waters.

7. The Copermittees discharge runoff into lakes, drinking water reservoirs, rivers, streams, creeks, bays, estuaries, coastal lagoons, the Pacific Ocean, and tributaries thereto within one of the eleven hydrologic units (Santa Margarita Hydrologic Unit) comprising the San Diego Region as shown in Table 2. Some of the receiving water bodies have been designated as impaired by the San Diego Water Board in 2009 pursuant to CWA section 303(d).

Table 2. Common Watersheds and CWA Section 303(d) Impaired Waters in the San Diego Region.

Hydrologic Area (HA) or Hydrologic Subarea (HSA) of the Santa Margarita Hydrologic Unit	Major Receiving Water Bodies	303(d) Pollutant(s)/Stressor or Water Quality Effect[2]
DeLuz Creek HSA (902.21)	De Luz Creek	Iron, Manganese, Nitrogen, Sulfates
Murrieta HSA (902.32)	Long Canyon Creek (tributary to Murrieta Creek)	Chlorpyrifos, E. Coli, Fecal Coliform, Iron, Manganese
Wolf HSA (902.52)	Murrieta Creek	Chlorpyrifos, Copper, Iron, Manganese, Nitrogen, Toxicity
Pauba HSA (902.51)	Redhawk Channel	Chlorpyrifos, Copper, Diazinon, E. Coli, Fecal Coliform, Iron, Manganese, Nitrogen, Phosphorus, Total Dissolved Solids
Gavilan HSA (902.22)	Sandia Creek	Iron, Sulfates
Gertrudis HSA (902.42)	Santa Gertrudis Creek	Chlorpyrifos, Copper, E. Coli, Fecal Coliform, Iron, Phosphorous
Lower Ysidora HSA (902.11)	Santa Margarita Lagoon	Eutrophic
Lower Ysidora HSA (902.11)	Santa Margarita River (Lower)	Enterococcus, Fecal Coliform, Phosphorus, Total Nitrogen as N
Gavilan HSA (902.22)	Santa Margarita River (Upper)	Toxicity
Pauba HSA (902.51)	Temecula Creek	Chlorpyrifos, Copper, Phosphorus, Total Dissolved Solids, Toxicity
French HSA (902.33)	Warm Springs Creek (Riverside County)	Chlorpyrifos, E. Coli, Fecal Coliform, Iron, Manganese, Phosphorus, Total Nitrogen as N

[2] The listed 303(d) pollutant(s) do not necessarily reflect impairment of the entire corresponding WMA or all corresponding major surface water bodies. The specific impaired portions of each WMA are listed in the State Water Resources Control Board's 2008 Section 303(d) List of Water Quality Limited Segments.

8. Trash is a persistent pollutant that can enter receiving waters from the MS4, accumulate, and be transported downstream into receiving waters over time. Trash poses a serious threat to the beneficial uses of the receiving waters, including, but not limited to, human health, rare and endangered species, navigation and human recreation.

9. The Copermittees' water quality monitoring data submitted to date documents persistent violations of Basin Plan water quality objectives for various runoff-related pollutants (indicator bacteria, dissolved solids, turbidity, metals, pesticides, etc.) at various watershed monitoring stations. Persistent toxicity has also been observed at some watershed monitoring stations. In addition, bioassessment data indicate that the majority of the monitored receiving waters have Poor to Very Poor Index of Biotic Integrity ratings. In sum, the above findings indicate that runoff discharges are causing or contributing to water quality impairments, and are a leading cause of such impairments in Riverside County.

10. When natural vegetated pervious ground cover is converted to impervious surfaces such as paved highways, streets, rooftops, and parking lots, the natural absorption and infiltration abilities of the land are lost. Therefore, runoff leaving a developed area is significantly greater in runoff volume, velocity, and peak flow rate than pre-development runoff from the same area. Runoff durations can also increase as a result of flood control and other efforts to control peak flow rates. Increased volume, velocity, rate, and duration of runoff, and decreased natural clean sediment loads, greatly accelerate the erosion of downstream natural channels. Significant declines in the biological integrity and physical habitat of streams and other receiving waters have been found to occur with as little as a 3-5 percent conversion from natural to impervious surfaces. The increased runoff characteristics from new development must be controlled to protect against increased erosion of channel beds and banks, sediment pollutant generation, or other impacts to beneficial uses and stream habitat due to increased erosive force.

11. Development creates new pollution sources as human population density increases and brings with it proportionately higher levels of car emissions, car maintenance wastes, municipal sewage, pesticides, household hazardous wastes, pet wastes, trash, etc. which can either be washed or directly dumped into the MS4. As a result, the runoff leaving the developed urban area is significantly greater in pollutant load than the pre-development runoff from the same area. These increased pollutant loads must be controlled to protect downstream receiving water quality.

12. Development and urbanization especially threaten environmentally sensitive areas (ESAs), such as water bodies designated as supporting a RARE beneficial use (supporting rare, threatened or endangered species) and CWA 303(d)-impaired water bodies. Such areas have a much lower capacity to withstand pollutant loads than other, more sensitive areas. In essence, development that is ordinarily insignificant in its impact on the environment may become significant in a particularly sensitive environment. Therefore, additional controls to reduce storm water pollutants from new and existing development may be necessary for areas adjacent to or discharging directly to an ESA.

13. Although dependent on several factors, the risks typically associated with properly managed infiltration of runoff (especially from residential land use areas) are not significant. The risks associated with infiltration can be managed by many techniques, including (1) designing landscape drainage features that promote infiltration of runoff, but do not "inject" runoff (injection bypasses the natural processes of filtering and transformation that occur in the soil); (2) taking reasonable steps to prevent the illegal disposal of wastes; (3) protecting footings and foundations; (4) ensuring that each drainage feature is adequately maintained in perpetuity; and (5) pretreatment.

14. Non-storm water (dry weather) discharge from the MS4 is not considered a storm water (wet weather) discharge and therefore is not subject to regulation under the Maximum Extent Practicable (MEP) standard from CWA 402(p)(3)(B)(iii), which is explicitly for "Municipal … *Stormwater Discharges* (emphasis added)" from the MS4. Rather, non-storm water discharges into the storm sewers, per CWA 402(p)(3)(B)(ii), are to be effectively prohibited. Such dry weather non-storm water discharges have been shown to contribute significant levels of pollutants and flow in arid, developed Southern California watersheds and are to be effectively prohibited under the CWA.

15. Non-storm water discharges to the MS4 granted an influent exception [i.e., which are exempt from the effective prohibition requirement set forth in CWA section 402(p)(3)(B)(ii)] under 40 CFR 122.26 are included within this Order. Any exempted discharges identified by Copermittees as a source of pollutants are subsequently required to be *addressed* (emphasis added) as illicit discharges through prohibition and incorporation into existing IC/ID programs. Furthermore, the USEPA contemplates that permitting agencies such as the San Diego Water Board may also identify exempted discharges as a source of pollutants required to be addressed as illicit discharges (See Vol. 55 Fed. Reg. 48037). The San Diego Water Board and the Copermittees have identified landscape irrigation, irrigation water and lawn water, previously exempted discharges, as a source of pollutants and conveyance of pollutants to waters of the U.S.

D. RUNOFF MANAGEMENT PROGRAMS

1. General

a. This Order specifies requirements necessary for the Copermittees to reduce the discharge of pollutants in storm water to the MEP. However, since MEP is a dynamic performance standard, which evolves over time as runoff management knowledge increases, the Copermittees' runoff management programs must continually be assessed and modified to incorporate improved programs, control measures, best management practices (BMPs), etc. in order to achieve the evolving MEP standard. Absent evidence to the contrary, this continual assessment, revision, and improvement of runoff management program implementation is expected to ultimately achieve compliance with water quality standards in the Region.

b. The Copermittees have generally been implementing the jurisdictional runoff management programs (JRMPs) required pursuant to Order No. R9-2004-001 since July 14, 2005. Prior to that, the Copermittees were regulated by Order No. 98-02, since May 13, 1998. MS4 discharges, however, continue to cause or contribute to violations of water quality standards as evidenced by the Copermittees' monitoring results.

c. This Order contains new or modified requirements that are necessary to improve Copermittees' efforts to reduce the discharge of pollutants in storm water runoff to the MEP and achieve water quality standards. Some of the new or modified requirements, such as the revised Watershed Water Quality Workplan (Watershed Workplan) section, are designed to specifically address high priority water quality problems. Other requirements, such as for unpaved roads, are a result of San Diego Water Board's identification of water quality problems through investigations and complaints during the previous permit period. Other new or modified requirements address program deficiencies that have been noted during audits, report reviews, and other San Diego Water Board compliance assessment activities. Additional changes in the monitoring program provide consistency with the Code of Federal Regulations, USEPA guidance, State Water Board guidance, and the Southern California Monitoring Coalition recommendations.

d. Updated individual Storm Water Management Plans (Individual SWMP or JRMP), and Watershed Stormwater Management Plans (watershed SWMPs or Watershed Workplans), which, together with references in the DAMP, describe the Copermittees' runoff management programs in their entirety, are needed to guide the Copermittees' runoff management efforts and aid the Copermittees in tracking runoff management program implementation. Hereinafter, the individual SWMP is referred to as the JRMPs and the Watershed SWMP is referred to as the Watershed Workplan. It is practicable for the Copermittees to update the

JRMPs and Watershed Workplans within the timeframe specified in this Order, since significant efforts to develop these programs have already occurred.

e. Pollutants can be effectively reduced in storm water runoff by the application of a combination of pollution prevention, source control, and treatment control BMPs. Pollution prevention is the reduction or elimination of pollutant generation at its source and is the best "first line of defense." Source control BMPs (both structural and non-structural) minimize the contact between pollutants and flows (e.g., rerouting run-on around pollutant sources or keeping pollutants on-site and out of receiving waters). Treatment control BMPs remove pollutants that have been mobilized by wet-weather or dry-weather flows.

f. Runoff needs to be addressed during the three major phases of urban development (planning, construction, and use) in order to reduce the discharge of pollutants from storm water to the MEP, effectively prohibit non-storm water discharges and protect receiving waters. Development which is not guided by water quality planning policies and principles can unnecessarily result in increased pollutant load discharges, flow rates, and flow durations which can negatively impact receiving water beneficial uses. Construction sites without adequate BMP implementation result in sediment runoff rates which greatly exceed natural erosion rates of undisturbed lands, causing siltation and impairment of receiving waters. Existing development generates substantial pollutant loads which are discharged in runoff to receiving waters.

g. Annual reporting requirements included in this Order are necessary to meet federal requirements and to evaluate the effectiveness and compliance of the Copermittees' programs.

h. This Order establishes Storm Water Action Levels (SALs) for selected pollutants based on USEPA Rain Zone 6 (arid southwest) Phase I MS4 monitoring data for pollutants in storm water. The SALs were computed as the 90th percentile of the data set, utilizing the statistical based population approach, one of three approaches recommended by the State Water Board's Storm Water Panel in its report, 'The Feasibility of Numerical Effluent Limits Applicable to Discharges of Storm Water Associated with Municipal, Industrial and Construction Activities (June 2006). SALs are identified in Section D of this Order. Copermittees must implement a timely, comprehensive, cost-effective storm water pollution control program to reduce the discharge of pollutants in storm water from the permitted areas so as not to exceed the SALs. Exceedance of SALs may indicate inadequacy of programmatic measures and BMPs required in this Order.

2. Development Planning

a. The Standard Storm Water Mitigation Plan (SSMP) requirements contained in this Order are consistent with Order WQ-2000-11 adopted by the State Water Board on October 5, 2000. In the precedential order, the State Water Board

found that the design standards, which essentially require that runoff generated by 85 percent of storm events from specific development categories be infiltrated or treated, reflect the MEP standard. The order also found that the SSMP requirements are appropriately applied to the majority of the Priority Development Project categories that are also contained in Section F.1 of this Order. The State Water Board also gave California Regional Water Quality Control Boards (Regional Water Boards) the needed discretion to include additional categories and locations, such as retail gasoline outlets (RGOs), in SSMPs.

b. Controlling runoff pollution by using a combination of onsite source control and site design BMPs augmented with treatment control BMPs before the runoff enters the MS4 is important for the following reasons: (1) Many end-of-pipe BMPs (such as diversion to the sanitary sewer) are typically ineffective during significant storm events. (2) Whereas, onsite source control BMPs can be applied during all runoff conditions end-of-pipe BMPs are often incapable of capturing and treating the wide range of pollutants which can be generated on a sub-watershed scale; (3) End-of-pipe BMPs are more effective when used as polishing BMPs, rather than the sole BMP to be implemented; (4) End-of-pipe BMPs do not protect the quality or beneficial uses of receiving waters between the pollutant source and the BMP; and (5) Offsite end-of-pipe BMPs do not aid in the effort to educate the public regarding sources of pollution and their prevention.

c. Use of Low-Impact Development (LID) site design BMPs at new development, redevelopment and retrofit projects can be an effective means for minimizing the impact of storm water runoff discharges from the development projects on receiving waters. LID is a site design strategy with a goal of maintaining or replicating the pre-development hydrologic regime through the use of design techniques. LID site design BMPs help preserve and restore the natural hydrologic cycle of the site, allowing for filtration and infiltration which can greatly reduce the volume, peak flow rate, velocity, and pollutant loads of storm water runoff. Current runoff management, knowledge, practices and technology have resulted in the use of LID BMPs as an acceptable means of meeting the storm water MEP standard.

d. RGOs are significant sources of pollutants in storm water runoff. RGOs are points of convergence for motor vehicles for automotive related services such as repair, refueling, tire inflation, and radiator fill-up and consequently produce significantly higher loadings of hydrocarbons and trace metals (including copper and zinc) than other developed areas.

e. Industrial sites are significant sources of pollutants in runoff. Pollutant concentrations and loads in runoff from industrial sites are similar or exceed pollutant concentrations and loads in runoff from other land uses, such as commercial or residential land uses. As with other land uses, LID site design,

source control, and treatment control BMPs are needed at industrial sites in order to meet the MEP standard. These BMPs are necessary where the industrial site is larger than 10,000 square feet. The 10,000 square feet threshold is appropriate, since it is consistent with requirements in other Phase I NPDES storm water regulations throughout California.

f. If not properly designed or maintained, certain BMPs implemented or required by municipalities for runoff management may create a habitat for vectors (e.g. mosquitoes and rodents). Proper BMP design and maintenance to avoid standing water, however, can prevent the creation of vector habitat. Nuisances and public health impacts resulting from vector breeding can be prevented with close collaboration and cooperative effort between municipalities, local vector control agencies, and the California Department of Public Health during the development and implementation of runoff management programs.

g. The increased volume, velocity, frequency and discharge duration of storm water runoff from developed areas has the potential to greatly accelerate downstream erosion, impair stream habitat in natural drainages, and negatively impact beneficial uses. Development and urbanization increase pollutant loads in storm water runoff and the volume of storm water runoff. Impervious surfaces can neither absorb water nor remove pollutants and thus lose the purification and infiltration provided by natural vegetated soil. Hydromodification measures for discharges to hardened channels are needed for the future restoration of the hardened channels to their natural state, thereby restoring the chemical, physical, and biological integrity and beneficial uses of local receiving waters.

3. Construction and Existing Development

a. In accordance with federal NPDES regulations and to ensure the most effective oversight of industrial and construction site discharges, discharges of runoff from industrial and construction sites are subject to dual (State and local) storm water regulation. Under this dual system, each Copermittee is responsible for enforcing its local permits, plans, and ordinances, and the San Diego Water Board is responsible for enforcing the General Construction Activities Storm Water Permit, State Water Board Order 2009-0009-DWQ, NPDES No. CAS000002 (General Construction Permit) and the General Industrial Activities Storm Water Permit, State Water Board Order 97-03 DWQ, NPDES No. CAS000001 (General Industrial Permit) and any reissuance of these permits. NPDES municipal regulations require that municipalities develop and implement measures to address runoff from industrial and construction activities. Those measures may include the implementation of other BMPs in addition to those BMPs that are required under the statewide general permits for activities subject to both State and local regulation.

b. Identification of sources of pollutants in runoff (such as municipal areas and activities, industrial and commercial sites/sources, construction sites, and residential areas), development and implementation of BMPs to address those sources, and updating ordinances and approval processes are necessary for the Copermittees to ensure that discharges of pollutants from its MS4 in storm water are reduced to the MEP and that non-storm water discharges are not occurring. Inspections and other compliance verification methods are needed to ensure minimum BMPs are implemented. Inspections are especially important at areas that are at high risk for pollutant discharges.

c. Historic and current development makes use of natural drainage patterns and features as conveyances for runoff. Urban streams used in this manner are part of the municipalities' MS4s regardless of whether they are natural, anthropogenic, or partially modified features. In these cases, the urban stream is both an MS4 and receiving water.

d. As operators of the MS4s, the Copermittees cannot passively receive and discharge pollutants from third parties. By providing free and open access to an MS4 that conveys discharges to waters of the U.S., the operator essentially accepts responsibility for discharges into the MS4 that it does not prohibit or otherwise control. These discharges may cause or contribute to a condition of contamination or a violation of water quality standards.

e. Waste and pollutants which are deposited and accumulate in MS4 drainage structures will be discharged from these structures to waters of the U.S. unless they are removed. These discharges may cause or contribute to, or threaten to cause or contribute to, a condition of pollution in receiving waters. For this reason, pollutant discharges from storm water into MS4s must be reduced using a combination of management measures, including source control and an effective MS4 maintenance program implemented by each Copermittee.

f. Enforcement of local runoff related ordinances, permits, and plans is an essential component of every runoff management program and is specifically required in the federal storm water regulations and this Order. Each Copermittee is individually responsible for adoption and enforcement of ordinances and/or policies, implementation of identified control measures/BMPs needed to prevent or reduce pollutants in storm water runoff, and for the allocation of funds for the capital, operation and maintenance, administrative, and enforcement expenditures necessary to implement and enforce such control measures/BMPs under its jurisdiction. Education is an important aspect of every effective runoff management program and the basis for changes in behavior at a societal level. Education of municipal planning, inspection, and maintenance department staffs is especially critical to ensure that in-house staffs understand how their activities impact water quality, how to accomplish their jobs while protecting water quality, and understand their specific roles and responsibilities for compliance with this

Order. Public education, designed to target various urban land users and other audiences, is also essential to inform the public of how individual actions affect receiving water quality and how adverse effects can be minimized.

g. Public participation during the development of runoff management programs is necessary to ensure that all stakeholder interests and a variety of creative solutions are considered.

h. Retrofitting existing development with storm water treatment controls, including LID, is necessary to address storm water discharges from existing development that may cause or contribute to a condition of pollution or a violation of water quality standards. Although SSMP BMPs are required for redevelopment, the current rate of redevelopment will not address water quality problems in a timely manner. Cooperation with private landowners is necessary to effectively identify, implement and maintain retrofit projects for the preservation, restoration, and enhancement of water quality.

4. Watershed Runoff Management

a. Since runoff within a watershed can flow from and through multiple land uses and political jurisdictions, watershed-based runoff management can greatly enhance the protection of receiving waters. Such management provides a means to focus on the most important water quality problems in each watershed. By focusing on the most important water quality problems, watershed efforts can maximize protection of beneficial use in an efficient manner. Effective watershed-based runoff management actively reduces pollutant discharges and abates pollutant sources causing or contributing to watershed water quality problems. Watershed-based runoff management that does not actively reduce pollutant discharges and abate pollutant sources causing or contributing to watershed water quality problems can necessitate implementation of the iterative process outlined in section A.3 of this Order. Watershed management of runoff does not require Copermittees to expend resources outside of their jurisdictions. In some cases, however, this added flexibility provides more, and possibly more effective, alternatives for minimizing waste discharges. Watershed management requires the Copermittees within a watershed to develop a watershed-based management strategy, which can then be implemented on a jurisdictional basis.

b. Some runoff issues, such as general education and training, can be effectively addressed on a regional basis. Regional approaches to runoff management can improve program consistency and promote sharing of resources, which can result in implementation of more efficient programs.

c. It is important for the Copermittees to coordinate their water quality protection and land use planning activities to achieve the greatest protection of receiving water bodies. Copermittee coordination with other watershed stakeholders, especially the State of California Department of Transportation, the U.S. federal government, sovereign American Indian tribes, and water and sewer districts, is also important.

E. STATUTE AND REGULATORY CONSIDERATIONS

1. The RWL language specified in this Order is consistent with language recommended by the USEPA and established in State Water Board Order WQ-99-05, *Own Motion Review of the Petition of Environmental Health Coalition to Review Waste Discharge Requirements Order No. 96-03, NPDES Permit No. CAS0108740*, adopted by the State Water Board on June 17, 1999. The RWL language in this Order requires compliance with water quality standards, which for storm water discharges is to be achieved through an iterative approach requiring the implementation of improved and better-tailored BMPs over time. Compliance with receiving water limits based on applicable water quality standards is necessary to ensure that MS4 discharges will not cause or contribute to violations of water quality standards and the creation of conditions of pollution, contamination, or nuisance.

2. The Basin Plan, identifies the following existing and potential beneficial uses for surface waters in Riverside County: Municipal and Domestic Supply (MUN), Agricultural Supply (AGR), Industrial Process Supply (PROC), Hydropower Generation (POW), Industrial Service Supply (IND), Ground Water Recharge (GWR), Contact Water Recreation (REC1), Non-contact Water Recreation (REC2), Warm Freshwater Habitat (WARM), Cold Freshwater Habitat (COLD), Wildlife Habitat (WILD), Rare, Threatened, or Endangered Species (RARE), Spawning, Reproduction and/or Early Development (SPWN) and Preservation of Biological Habitats of Special Significance (BIOL).

3. This Order is in conformance with State Water Board Resolution No. 68-16, *Statement of Policy with Respect to Maintaining High Quality Waters in California*, and the federal Antidegradation Policy described in 40 CFR 131.12.

4. Section 6217(g) of the Coastal Zone Act Reauthorization Amendments of 1990 (CZARA) requires coastal states with approved coastal zone management programs to address non-point pollution impacting or threatening coastal water quality. CZARA addresses five sources of non-point pollution: agriculture, silviculture, urban, marinas, and hydromodification. This NPDES permit addresses the management measures required for the urban category, with the exception of septic systems. The adoption and implementation of this NPDES permit relieves the Copermittee from developing a non-point source plan, for the urban category, under CZARA. The San Diego Water Board addresses septic systems through the administration of other programs.

5. Section 303(d)(1)(A) of the CWA requires that "Each state shall identify those waters within its boundaries for which the effluent limitations…are not stringent enough to implement any water quality standard (WQS) applicable to such waters." The CWA also requires states to establish a priority ranking of impaired water bodies known as Water Quality Limited Segments and to establish Total Maximum Daily Loads (TMDLs) for such waters. This priority list of impaired water bodies is called the Section 303(d) List. The 2006 Section 303(d) List was approved by the State Water Board on October 25, 2006. On June 28, 2007, the 2006 303(d) List for California was given final approval by the USEPA. The 303(d) List was recently updated, and on December 16, 2009, the 2008 303(d) List was approved by the San Diego Water Board. The 2008 303(d) List for the San Diego Region was approved by the State Water Board on August 4, 2010. The 2008 303(d) List is awaiting USEPA approval.

6. This Order does not constitute an unfunded local government mandate subject to subvention under Article XIIIB, Section (6) of the California Constitution for several reasons, including, but not limited to, the following. First, this Order implements federally mandated requirements under CWA §402. (33 U.S.C. § 1342(p)(3)(B).) Second, the local agency Copermittees' obligations under this Order are similar to, and in many respects less stringent than, the obligations of non-governmental and new dischargers who are issued NPDES permits for storm water and non-storm water discharges. Third, the local agency Copermittees have the authority to levy service charges, fees, or assessments sufficient to pay for compliance with this Order. Fourth, the Copermittees have requested permit coverage in lieu of compliance with the complete prohibition against the discharge of pollutants contained in CWA §301, subdivision (a) (33 U.S.C. § 1311(a)) and in lieu of numeric restrictions on their MS4 discharges (i.e. effluent limitations). Fifth, the local agencies' responsibility for preventing discharges of waste that can create conditions of pollution or nuisance from conveyances that are within their ownership or control under State law predates the enactment of Article XIIIB, Section (6) of the California Constitution. Likewise, the provisions of this Order to implement TMDLs are federal mandates. The CWA requires TMDLs to be developed for water bodies that do not meet federal water quality standards. (33 U.S.C. sec. 1313(d).) Once the USEPA or a state develops a TMDL, federal law requires that permits must contain effluent limitations consistent with the assumptions of any applicable wasteload allocation. (40 C.F.R. sec. 122.44(d)(1)(vii)(B).)

7. Runoff treatment and/or mitigation must occur prior to the discharge of runoff into receiving waters. Treatment BMPs must not be constructed in waters of the U.S. or State unless the runoff flows are sufficiently pretreated to protect the values and functions of the water body. Federal regulations at 40 CFR 131.10(a) state that in no case shall a state adopt waste transport or waste assimilation as a designated use for any waters of the U.S. Authorizing the construction of an runoff treatment facility within a water of the U.S., or using the water body itself as a treatment system or for conveyance to a treatment system, would be tantamount to accepting waste assimilation as an appropriate use for that water body. Furthermore, the

construction, operation, and maintenance of a pollution control facility in a water body can negatively impact the physical, chemical, and biological integrity, as well as the beneficial uses, of the water body. Without federal authorization (e.g., pursuant to CWA § 404), waters of the U.S. may not be converted into, or used as, waste treatment or conveyance facilities. Similarly, waste discharge requirements pursuant to CWC §13260 are required for the conversion or use of waters of the State as waste treatment or conveyance facilities. Diversion from waters of the U.S./State to treatment facilities and subsequent return to waters of the U.S. is allowable, provided that the effluent complies with applicable NPDES requirements.

8. The issuance of waste discharge requirements and an NPDES permit for the discharge of runoff from MS4s to waters of the U.S. is exempt from the requirement for preparation of environmental documents under the California Environmental Quality Act (CEQA) (Public Resources Code, Division 13, Chapter 3, section 21000 et seq.) in accordance with the CWC section 13389.

9. Storm water discharges from developed and developing areas in Riverside County are significant sources of certain pollutants that cause, may be causing, threatening to cause or contributing to water quality impairment in the waters of Riverside County. Furthermore, as delineated in the CWA section 303(d) list in Table 2, the San Diego Water Board has found that there is a reasonable potential that municipal storm water and non-storm water discharges from MS4s cause or may cause or contribute to an excursion above water quality standards for the following pollutants: Indicator Bacteria (including Fecal Coliform and E. Coli), Copper, Manganese, Iron, Chlorpyrifos, Diazinon, Sulfates, Phosphorous, Nitrogen, Total Dissolved Solids (TDS), and Toxicity. In accordance with CWA section 303(d), the San Diego Water Board is required to establish TMDLs for these pollutants to these waters to eliminate impairment and attain water quality standards. Therefore, certain early pollutant control actions and further pollutant impact assessments by the Copermittees are warranted and required pursuant to this Order.

10. This Order requires each Copermittee to effectively prohibit all types of unauthorized discharges of non-storm water into its MS4. However, historically pollutants have been identified as present in dry weather non-storm water discharges from the MS4s through 303(d) listings, monitoring conducted by the Copermittees under Order No. R9-2004-0001, and there are others expected to be present in dry weather non-storm water discharges because of the nature of these discharges. This Order includes action levels for pollutants in non-storm water, dry weather discharges from the MS4. The non-storm water action levels are designed to ensure that the Order's requirement to effectively prohibit all types of unauthorized discharges of non-storm water into the MS4 is being complied with. Non-storm water action levels in the Order are based upon numeric or narrative water quality objectives and criteria as defined in the Basin Plan, the State Water Board's Water Quality Control Plan for Ocean Waters of California (Ocean Plan), and the State Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California (State Implementation Policy or SIP). An exceedance of an action level

requires specified responsive action by the Copermittees. This Order describes what actions the Copermittees must take when an exceedance of an action level is observed. Exceedances of non-storm water action levels do not alone constitute a violation of this Order but could indicate non-compliance with the requirement to effectively prohibit all types of unauthorized non-storm water discharges into the MS4 or other prohibitions established in this Order. Failure to undertake required source investigation and elimination action following an exceedance of a non-storm water action level (NAL or action level) is a violation of this Order. The San Diego Water Board recognizes that use of action levels will not necessarily result in detection of all unauthorized sources of non-storm water discharges because there may be some discharges in which pollutants do not exceed established action levels. However, establishing NALs at levels appropriate to protect water quality standards is expected to lead to the identification of significant sources of pollutants in dry weather non-storm water discharges.

11. In addition to federal regulations cited in the Fact Sheet / Technical Report for the Order No. R9-2010-0016, monitoring and reporting required under Order No. R9-2010-0016 is required pursuant to authority under CWC section 13383.

12. With this Order, the San Diego Water Board has completed the re-issuance of the fourth iteration of the Phase I MS4 NPDES Permits for the Copermittees in the portions of San Diego County, Orange County, and Riverside County within the San Diego Region. The NPDES Permit requirements issued to the Copermittees in each county have substantially the same core requirements such as discharge prohibitions, receiving water limitations, jurisdictional components, and monitoring. In addition, the Copermittees cooperate regionally to develop monitoring with the Southern California Stormwater Monitoring Coalition and to develop program effectiveness with the California Stormwater Quality Association. Regional programs could improve the Copermittees' compliance with other permit components such as development of the Hydromodification Management Plans and Retrofitting Existing Development with more consistent implementation and cost sharing. Re-issuing the NPDES Permit requirements within five years for three counties under three different permits requires the San Diego Water Board to expend significant time and resources for issuance of the permits through three separate public proceedings, thereby greatly reducing the time and resources available to oversee compliance. Multiple permits also create confusion for determining compliance among regulated entities, especially the land development community. The San Diego Water Board recognizes that issuing a single MS4 permit for all Phase I entities in the San Diego Region will provide consistent implementation, improve communication among agencies within watersheds crossing multiple jurisdictions, and minimize staff resources spent with each permit renewal. The San Diego Water Board plans to develop a single regional MS4 permit prior to the expiration of this Order that will transfer the Copermittees' enrollment to the regional permit upon expiration of this Order.

F. PUBLIC PROCESS

1. The San Diego Water Board has notified the Copermittees, all known interested parties, and the public of its intent to consider adoption of an Order prescribing waste discharge requirements that would serve to renew an NPDES permit for the existing MS4 discharges of pollutants in waters of the U.S.

2. The San Diego Water Board has held a public hearing on November 10, 2010 and heard and considered all comments pertaining to the terms and conditions of this Order.

IT IS HEREBY ORDERED that the Copermittees, in order to meet the provisions contained in Division 7 of the CWC and regulations adopted thereunder, and the provisions of the CWA and regulations adopted thereunder, must each comply with the following:

A. PROHIBITIONS AND RECEIVING WATER LIMITATIONS

1. Discharges into and from MS4s in a manner causing, or threatening to cause, a condition of pollution, contamination, or nuisance (as defined in CWC section 13050), in receiving waters of the state are prohibited.[3]

2. Storm water discharges from MS4s containing pollutants which have not been reduced to the MEP are prohibited.[3]

3. Discharges from MS4s that cause or contribute to the violation of water quality standards (designated beneficial uses, water quality objectives developed to protect beneficial uses, and the State policy with respect to maintaining high quality waters) are prohibited.

a. Each Copermittee must comply with section A.3 and section A.4 as it applies to Prohibition 5 in Attachment A of this Order through timely implementation of control measures and other actions to reduce pollutants in storm water discharges in accordance with this Order, including any modifications. If exceedance(s) of water quality standards persist notwithstanding implementation of this Order, the Copermittee must assure compliance with section A.3 and section A.4 as it applies to Prohibition 5 in Attachment A of this Order by complying with the following procedure:

(1) Upon a determination by either the Copermittee or the San Diego Water Board that storm water MS4 discharges are causing or contributing to an exceedance of an applicable water quality standard, the Copermittee must notify the San Diego Water Board within 30 days and thereafter submit a report to the San Diego Water Board that describes best management practices (BMPs) that are currently being implemented and additional BMPs that will be implemented to prevent or reduce any pollutants that are causing or contributing to the exceedance of water quality standards. The report may be incorporated in the Annual Report unless the San Diego Water Board[4] directs an earlier submittal. The report must include an implementation

[3] This prohibition does not apply to MS4 discharges which receive subsequent treatment to reduce pollutants in storm water discharges to the MEP prior to entering receiving waters (e.g., low flow diversions to the sanitary sewer). Runoff treatment and/or mitigation must occur prior to the discharge of runoff into receiving waters per finding E.7.

[4] The San Diego Water Board by prior resolution has delegated all matters that may legally be delegated to its Executive Officer to act on its behalf pursuant to CWC §13223. Therefore, the Executive Officer is authorized to act on the San Diego Water Board's behalf on any matter within this Order unless such delegation is unlawful under CWC §13223 or this Order explicitly states otherwise.

schedule. The San Diego Water Board may require modifications to the report

(2) Submit any modifications to the report required by the San Diego Water Board within 30 days of notification;

(3) Within 30 days following acceptance of the report described above by the San Diego Water Board, the Copermittee must revise its JRMP and monitoring program to incorporate the approved modified BMPs that have been and will be implemented, the implementation schedule, and any additional monitoring required; and

(4) Implement the revised JRMP and monitoring program in accordance with the approved schedule.

b. The Copermittee must repeat the procedure set forth above to comply with the receiving water limitations for continuing or recurring exceedances of the same water quality standard(s) following implementation of scheduled actions unless directed to do otherwise by the San Diego Water Board's Executive Officer.

c. Nothing in section A.3 prevents the San Diego Water Board from enforcing any provision of this Order while the Copermittee prepares and implements the above report.

4. In addition to the above prohibitions, discharges from MS4s are subject to all Basin Plan prohibitions cited in Attachment A to this Order.

B. NON-STORM WATER DISCHARGES

1. Each Copermittee must effectively prohibit all types of non-storm water discharges into its MS4 unless such discharges are either authorized by a separate NPDES permit; or not prohibited in accordance with sections B.2 and B.3 below.

2. The following categories of non-storm water discharges are not prohibited unless a Copermittee or the San Diego Water Board identifies the discharge category as a source of pollutants to waters of the U.S. Where the Copermittee(s) have identified a category as a source of pollutants, the category must be addressed as an illicit discharge and prohibited through ordinance, order or similar means. The San Diego Water Board may identify categories of discharge that either require prohibition, or other controls for non-anthropogenic sources. For a discharge category determined to be a source of pollutants, the Copermittee, under direction of the San Diego Water Board, must either prohibit the discharge category or develop and implement appropriate control measures for non-anthropogenic sources to prevent the discharge of pollutants to the MS4 and report to the San Diego Water Board pursuant to Section K.1 and K.3 of this Order. The discharge categories are:

a. Diverted stream flows;
b. Rising ground waters;
c. Uncontaminated ground water infiltration [as defined at 40 CFR 35.2005(20)] to MS4s;
d. Uncontaminated pumped ground water[5];
e. Foundation drains[5];
f. Springs;
g. Water from crawl space pumps[5];
h. Footing drains[5];
i. Air conditioning condensation;
j. Flows from riparian habitats and wetlands;
k. Water line flushing[6,7];
l. Discharges from potable water sources not subject to NPDES Permit No. CAG679001, other than water main breaks;
m. Individual residential car washing; and
n. Dechlorinated swimming pool discharges[8].

3. Emergency fire fighting flows (i.e., flows necessary for the protection of life or property) do not require BMPs and need not be prohibited.

a. As part of the JRMP, each Copermittee must develop and implement a program to address pollutants from non-emergency fire fighting flows (i.e., flows from controlled or practice blazes and maintenance activities) identified as significant sources of pollutants to waters of the U.S.

b. Building fire suppression system maintenance discharges (e.g. sprinkler line flushing) contain waste. Therefore, such discharges are to be prohibited by the Copermittees as illicit discharges through ordinance, order, or similar means.

4. Each Copermittee must examine all dry weather effluent analytical monitoring results collected in accordance with section F.4 of this Order and Receiving Waters and MS4 Discharge Monitoring and Reporting Program No. R9-2010-0016 to identify water quality problems which may be the result of any non-prohibited discharge category(ies) identified above in section B.2. Follow-up investigations must be conducted to identify and control, pursuant to section B.2, any non-prohibited discharge category(ies) listed above.

[5] Requires enrollment under Order R9-2008-002. Discharges into the MS4 require authorization from the owner and operator of the MS4 system.
[6] This exemption does not include fire suppression sprinkler system maintenance and testing discharges. Those discharges may be regulated under Section B.3.
[7] Requires enrollment under Order R9-2002-0020.
[8] Excluding saline swimming pool discharges.

C. NON-STORM WATER DRY WEATHER ACTION LEVELS

1. Each Copermittee, beginning no later than July 1, 2012, must implement the non-storm water dry weather action level (NAL) monitoring as described in Attachment E of this Order.

2. In response to an exceedance of an NAL, the Copermittee(s) having jurisdiction must investigate and seek to identify the source of the exceedance in a timely manner. However, if any Copermittee identifies a number of NAL exceedances that prevents it from adequately conducting source investigations at all sites in a timely manner, then that Copermittee may submit a prioritization plan and timeline that identifies the timeframe and planned actions to investigate and report its findings on all of the exceedances. Depending on the source of the pollutant exceedance, the Copermittee(s) having jurisdiction must take action as follows:

a. If the Copermittee identifies the source of the exceedance as natural (non-anthropogenically influenced) in origin and in conveyance into the MS4; then the Copermittee must report its findings and documentation of its source investigation to the San Diego Water Board in its Annual Report.

b. If the Copermittee identifies the source of the exceedance as an illicit discharge or connection, then the Copermittee must eliminate the discharge to its MS4 pursuant to Section F.4.f and report the findings, including any enforcement action(s) taken, and documentation of the source investigation to the San Diego Water Board in the Annual Report. If the Copermittee is unable to eliminate the source of discharge prior to the Annual Report submittal, then the Copermittee must submit, as part of its Annual Report, its plan and timeframe to eliminate the source of the exceedance. Those dischargers seeking to continue such a discharge must become subject to a separate NPDES permit prior to continuing any such discharge.

c. If the Copermittee identifies the source of the exceedance as an exempted category of non-storm water discharge, then the Copermittees must determine if this is an isolated circumstance or if the category of discharges must be addressed through the prevention or prohibition of that category of discharge as an illicit discharge. The Copermittee must submit its findings including a description of the steps taken to address the discharge and the category of discharge, to the San Diego Water Board for review in its Annual Report. Such description must include relevant updates to or new ordinances, orders, or other legal means of addressing the category of discharge, and the anticipated schedule for doing so. The Copermittees must also submit a summary of its findings with the Report of Waste Discharge.

d. If the Copermittee identifies the source of the exceedance as a non-storm water discharge in violation or potential violation of an existing separate NPDES permit

(e.g. the groundwater dewatering permit), then the Copermittee must report, within three business days, the findings to the San Diego Water Board including all pertinent information regarding the discharger and discharge characteristics.

e. If the Copermittee is unable to identify the source of the exceedance after taking and documenting reasonable steps to do so, then the Copermittee must perform additional focused sampling. If the results of the additional sampling indicate a recurring exceedance of NALs with an unidentified source, then the Copermittee must update its programs within a year to address the common contributing sources that may be causing such an exceedance. The Copermittee's annual report must include these updates to its programs including, where applicable, updates to their watershed workplans (Section G.2), retrofitting consideration (Section F.3.d) and program effectiveness work plans (Section J.4).

f. The Copermittees, or any interested party, may evaluate existing NALs and propose revised NALs for future Board consideration.

3. NALs can help provide an assessment of the effectiveness of the prohibition of non-storm water discharges and of the appropriateness of exempted non-storm water discharges. An exceedance of an NAL does not alone constitute a violation of the provisions of this Order. An exceedance of an NAL may indicate a lack of compliance with the requirement that Copermittees effectively prohibit all types of unauthorized non-storm water discharges into the MS4 or other prohibitions set forth in Sections A and B of this Order. Failure to timely implement required actions specified in this Order following an exceedance of an NAL constitutes a violation of this Order. Neither the absence of exceedances of NALs nor compliance with required actions following observed exceedances, excuses any non-compliance with the requirement to effectively prohibit all types of unauthorized non-storm water discharges into the MS4s or any non-compliance with the prohibitions in Sections A and B of this Order. During any annual reporting period in which one or more exceedances of NALs have been documented the Copermittee must report in response to Section C.2 above, a description of whether and how the observed exceedances did or did not result in a discharge from the MS4 that caused, or threatened to cause or contribute to a condition of pollution, contamination, or nuisance in the receiving waters.

4. Monitoring of effluent will occur at the end-of-pipe prior to discharge into the receiving waters, with a focus on Major Outfalls, as defined in 40 CFR 122.26(B 5-6) and Attachment E of this Order. The Copermittees must develop their monitoring plans to sample a representative percentage of major outfalls and identified stations within each hydrologic subarea. At a minimum, outfalls that exceed any NALs once during any year must be monitored in the subsequent year. Any station that does not exceed an NAL, or only has exceedances that are identified as natural in origin and conveyance into the MS4 pursuant to Section C.2.a, for 3 successive years may be replaced with a different station.

5. Each Copermittee must monitor for the non-storm water dry weather action levels, which are incorporated into this Order as follows:

Action levels for discharges to inland surface waters:

Table 3.a: General Constituents

Parameter	Units	AMAL	MDAL	Instantaneous Maximum	Basis
Fecal Coliform	MPN/ 100 ml	200[A] 400[B]	-		BPO
Enterococci	MPN/ 100 ml	33	-	61[C]	BPO
Turbidity	NTU	-	20		BPO
pH	Units	Within limit of 6.5 to 8.5 at all times			BPO
Dissolved Oxygen	mg/L	Not less than 5.0 in WARM waters and not less than 6.0 in COLD waters			BPO
Total Nitrogen	mg/L	-	1.0	See MDAL	BPO
Total Phosphorus	mg/L	-	0.1	See MDAL	BPO
Methylene Blue Active Substances	mg/L	-	0.5	See MDAL	BPO
Iron	mg/L	-	0.3	See MDAL	BPO
Manganese	mg/L	-	0.05	See MDAL	BPO

A – Based on a minimum of not less than five samples for any 30-day period
B – No more than 10 percent of total samples may exceed 400 per 100 ml during any 30 day period
C – This Value has been set to Basin Plan Criteria for Designated Beach Areas
BPO – Basin Plan Objective
MDAL – Maximum Daily Action Level
AMAL – Average Monthly Action Level

Table 3.b: Priority Pollutants

		Freshwater (CTR)	
Parameter	Units	MDAL	AMAL
Cadmium	ug/L	**	**
Copper	ug/L	*	*
Chromium III	ug/L	**	**
Chromium VI (hexavalent)	ug/L	16	8.1
Lead	ug/L	*	*
Nickel	ug/L	**	**
Silver	ug/L	*	*
Zinc	ug/L	*	*

CTR – California Toxic Rule
*- Action Levels developed on a case-by-case basis (see below)
**- Action Levels developed on a case-by-case basis (see below), but calculated criteria are not to exceed Maximum Contaminant Levels under the California Code of Regulations[9]

[9] California Code of Regulations, Title 22, Division 4, Chapter 15, Article 4, Section 64431.

The NALs for Cadmium, Copper, Chromium (III), Lead, Nickel, Silver and Zinc will be developed on a case-by-case basis because the freshwater criteria are based on site-specific water quality data (receiving water hardness). For these priority pollutants, the following equations (40 CFR 131.38.b.2) will be required:

Cadmium (Total Recoverable) = exp(0.7852[ln(hardness)] -2.715)
Chromium III (Total Recoverable) = exp(0.8190[ln(hardness)] + .6848)
Copper (Total Recoverable) = exp(0.8545[ln(hardness)] - 1.702)
Lead (Total Recoverable) = exp(1.273[ln(hardness)] - 4.705)
Nickel (Total Recoverable) = exp(.8460[ln(hardness)] + 0.0584)
Silver (Total Recoverable) = exp(1.72[ln(hardness)] - 6.52)
Zinc (Total Recoverable) = exp(0.8473[ln(hardness)] + 0.884)

D. STORM WATER ACTION LEVELS

1. The Copermittees must implement the Wet Weather MS4 Discharge Monitoring as described in Attachment E of this Order, and beginning three years after the Order adoption date, the Copermittees must annually evaluate their data compared to the Stormwater Action Levels (SALs). At each monitoring station, a running average of twenty percent or greater of exceedances of any discharge of storm water from the MS4 to waters of the U.S. that exceed the SALs for each of the pollutants listed in Table 4 (below) requires the Copermittee(s) having jurisdiction to affirmatively augment and implement all necessary storm water controls and measures to reduce the discharge of the associated class of pollutants(s) to the MEP. The Copermittees must utilize the exceedance information when adjusting and executing annual work plans, as required by this Order. Copermittees must take the magnitude, frequency, and number of constituents exceeding the SAL(s), in addition to receiving water quality data and other information, into consideration when prioritizing and reacting to SAL exceedances in an iterative manner. Failure to appropriately consider and react to SAL exceedances in an iterative manner creates a presumption that the Copermittee(s) have not reduced pollutants in storm water discharges to the MEP.

Table 4. Storm Water Action Levels

Pollutant	Action Level
Turbidity (NTU)	126
Nitrate & Nitrite total (mg/L)	2.6
P total (mg/L)	1.46
Cd total (µg/L)	3.0
Cu total (µg/L)	127
Pb total (µg/L)	250
Zn total (µg/L)	976

2. The end-of-pipe assessment points for the determination of SAL compliance are major outfalls, as defined in 40 CFR 122.26(b)(5) and (b)(6) and Attachment E of this Order. The Copermittees must develop their monitoring plans to sample a representative percentage of the major outfalls within each hydrologic subarea. At a minimum, outfalls that exceed SALs must be monitored in the subsequent year. Any station that does not exceed an SAL for 3 successive years may be replaced with a different station. SAL samples must be 24 hour time-weighted composites.

3. The absence of SAL exceedances does not relieve the Copermittees from implementing all other required elements of this Order.

4. This Order does not regulate natural sources and conveyances into the MS4 of constituents listed in Table 5. To be relieved of the requirements to take action as described in D.1 above, the Copermittee must demonstrate that the likely and expected cause of the SAL exceedance is not anthropogenic in nature. This demonstration does not need to be repeated for subsequent exceedances of the same SAL at the same monitoring station.

5. The SALs will be reviewed and updated at the end of every permit cycle. The data collected pursuant to D.2 above and Attachment E can be used to create SALs based upon local data. The purpose of establishing the SALs is that through the iterative and MEP process, outfall storm water discharges will meet all applicable water quality standards.

E. LEGAL AUTHORITY

1. Each Copermittee must establish, maintain, and enforce adequate legal authority within its jurisdiction to control pollutant discharges into and from its MS4 through ordinance, statute, permit, contract or similar means. Nothing herein shall authorize a Copermittee or other discharger regulated under the terms of this order to divert, store or otherwise impound water if such action is reasonably anticipated to harm downstream water rights holders in the exercise of their water rights. This legal authority must, at a minimum, authorize the Copermittee to:

a. Control the contribution of pollutants in discharges of runoff associated with industrial and construction activity to its MS4 and control the quality of runoff from industrial and construction sites. This requirement applies both to industrial and construction sites which have coverage under the statewide general industrial or construction storm water permits, as well as to those sites which do not. Grading ordinances must be updated and enforced as necessary to comply with this Order;
b. Prohibit all identified illicit discharges not otherwise allowed pursuant to section B.2;
c. Prohibit and eliminate illicit connections to the MS4;

d. Control the discharge of spills, dumping, or disposal of materials other than storm water to its MS4;
e. Require compliance with conditions in Copermittee ordinances, permits, contracts or orders (i.e., hold dischargers to its MS4 accountable for their contributions of pollutants and flows);
f. Utilize enforcement mechanisms to require compliance with Copermittee storm water ordinances, permits, contracts, or orders;
g. Control the contribution of pollutants from one portion of the shared MS4 to another portion of the MS4 through interagency agreements among Copermittees;
h. Control of the contribution of pollutants from one portion of the shared MS4 to another portion of the MS4 through interagency agreements with other owners of the MS4 such as the State of California Department of Transportation, the U.S. federal government, or sovereign Native American Tribes is encouraged;
i. Carry out all inspections, surveillance, and monitoring necessary to determine compliance and noncompliance with local ordinances and permits and with this Order, including the prohibition on illicit discharges to the MS4. This means the Copermittee must have authority to enter, monitor, inspect, take measurements, review and copy records, and require regular reports from industrial facilities discharging into its MS4, including construction sites;
j. Require the use of BMPs to prevent or reduce the discharge of pollutants into MS4s from storm water to the MEP; and
k. Require documentation on the effectiveness of BMPs implemented to reduce the discharge of storm water pollutants to the MS4 to the MEP.

2. Each Copermittee must submit on or before June 30, 2012, a statement certified by its chief legal counsel that the Copermittee has taken the necessary steps to obtain and maintain full legal authority within its jurisdiction to implement and enforce each of the requirements contained in 40 CFR 122.26(d)(2)(i)(A-F) and this Order. These statements must include:

a. Citation of runoff related ordinances and the reasons they are enforceable;
b. Identification of the local administrative and legal procedures available to mandate compliance with runoff related ordinances and therefore with the conditions of this Order, and a statement as to whether enforcement actions can be completed administratively or whether they must be commenced and completed in the judicial system; and
c. A brief description of how runoff related ordinances are adopted and the process by which they may be challenged.

F. JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM (JRMP)

Each Copermittee must implement all requirements of section F of this Order no later than July 1, 2012, unless otherwise specified. Upon adoption of this Order and until an updated JRMP is developed and implemented or July 1, 2012, whichever occurs first, each Copermittee must at a minimum implement its JRMP document, as the document was developed and amended to comply with the requirements of Order No. R9-2004-001.

Each Copermittee must develop and implement an updated JRMP for its jurisdiction no later than July 1, 2012. Each updated JRMP must meet the requirements of section F of this Order, reduce the discharge of storm water pollutants from the MS4 to the MEP, effectively prohibit non-storm water discharges, and prevent runoff discharges from the MS4 from causing or contributing to a violation of water quality standards. In addition, each Copermittee's JRMP must identify all departments and positions within its jurisdiction that conduct runoff related activities, and their roles and responsibilities under this Order. This identification must include an up to date organizational chart specifying these departments and key personnel.

1. DEVELOPMENT PLANNING COMPONENT

Each Copermittee must implement a program which meets the requirements of this section and (1) reduces Development Project discharges of storm water pollutants from the MS4 to the MEP; (2) prevents Development Project discharges from the MS4 from causing or contributing to a violation of water quality standards; (3) prevents illicit discharges into the MS4; and (4) manages increases in runoff discharge rates and durations from Development Projects that are likely to cause increased erosion of stream beds and banks, silt pollutant generation, or other impacts to beneficial uses and stream habitat due to increased erosive force.

a. GENERAL PLAN

Each Copermittee must revise as needed its General Plan or equivalent plan (e.g., Comprehensive, Master, or Community Plan) to include water quality and watershed protection principles and policies that direct land-use decisions and require implementation of consistent water quality protection measures for all development, redevelopment, and retrofit projects. Examples of water quality and watershed protection principles and policies to be considered include the following:

(1) Minimize the amount of impervious surfaces and directly connected impervious surfaces in areas of new development and redevelopment and where feasible slow runoff and maximize on-site infiltration of runoff.

(2) Implement pollution prevention methods supplemented by pollutant source controls and treatment BMPs. Use small collection strategies located at, or as close as possible to, the source (i.e., the point where water initially meets the ground) to minimize the transport of urban runoff and pollutants offsite and into an MS4.

(3) Preserve, and where possible, create, or restore areas that provide important water quality benefits, such as riparian corridors, wetlands, and buffer zones. Encourage land acquisition of such areas.

(4) Limit disturbances of natural water bodies and natural drainage systems caused by development including roads, highways, and bridges.

(5) Prior to making land use decisions, utilize methods available to estimate increases in pollutant loads and flows resulting from projected future development. Require incorporation of BMPs to mitigate the projected increases in pollutant loads and flows.

(6) Avoid development of areas that are particularly susceptible to erosion and sediment loss; or establish development guidance that identifies these areas and protects them from erosion and sediment loss.

(7) Reduce pollutants associated with vehicles and increasing traffic resulting from development.

(8) Post-development runoff from a site must not contain pollutant loads that cause or contribute to an exceedance of receiving water quality objectives and which have not been reduced to the MEP.

b. **ENVIRONMENTAL REVIEW PROCESS**

Each Copermittee must revise as needed its current environmental review processes to accurately evaluate water quality impacts and cumulative impacts and identify appropriate measures to avoid, minimize, and mitigate those impacts for all Development Projects.

c. **APPROVAL PROCESS CRITERIA AND REQUIREMENTS FOR ALL DEVELOPMENT PROJECTS**

For all proposed Development Projects, each Copermittee, during the planning process, and prior to project approval and issuance of local permits, must prescribe the necessary requirements so that Development Project discharges of storm water pollutants from the MS4 will be reduced to the MEP, will not cause or

contribute to a violation of water quality standards, and will comply with the Copermittee's ordinances, permits, plans, and requirements, and with this Order.

Performance Criteria: Discharges from each approved development project must be subject to the following management measures:

(1) Source control BMPs that reduce storm water pollutants of concern in runoff; prevent illicit discharges into the MS4; prevent irrigation runoff; storm drain system stenciling or signage; properly design outdoor material storage areas; properly design outdoor work areas; and properly design trash storage areas.

(2) The following LID BMPs listed below must be implemented at all Development Projects where applicable and feasible.

(a) Conserve natural areas, including existing trees, other vegetation, and soils;
(b) Construct streets, sidewalks, or parking lot aisles to the minimum widths necessary, provided that public safety is not compromised;
(c) Minimize the impervious footprint of the project;
(d) Minimize soil compaction to landscaped areas;
(e) Minimize disturbances to natural drainages (e.g., natural swales, topographic depressions, etc.); and
(f) Disconnect impervious surfaces through distributed pervious areas.

(3) Buffer zones for natural water bodies, where technically feasible. Where buffer zones are technically infeasible, require project proponent to implement other buffers such as trees, access restrictions, etc.

(4) Other measures necessary so that grading or other construction activities meet the provisions specified in section F.2 of this Order.

(5) Submittal of documentation of a mechanism under which ongoing long-term maintenance of all structural post-construction BMPs will be conducted.

(6) Infiltration and Groundwater Protection

To protect groundwater quality, each Copermittee must apply restrictions to the use of treatment control BMPs that are designed to primarily function as large, centralized infiltration devices (such as large infiltration trenches and infiltration basins). Such restrictions must be designed so that the use of such infiltration treatment control BMPs does not cause or contribute to an exceedance of groundwater quality objectives. At a minimum, each treatment control BMP designed to primarily function as a centralized infiltration device must meet the restrictions below, unless the Development Project demonstrates to the Copermittee that a restriction is not necessary to protect groundwater quality. The Copermittees may collectively or individually

develop alternative restrictions on the use of treatment control BMPs which are designed to primarily function as centralized infiltration devices. Alternative restrictions developed by the Copermittees can partially or wholly replace the restrictions listed below. The restrictions do not apply to small infiltration systems dispersed throughout a development project.

(a) Runoff must undergo pretreatment such as sedimentation or filtration prior to infiltration;

(b) All dry weather flows containing significant pollutant loads must be diverted from infiltration devices and treated through other BMPs;

(c) Pollution prevention and source control BMPs must be implemented at a level appropriate to protect groundwater quality at sites where infiltration treatment control BMPs are to be used;

(d) Infiltration treatment control BMPs must be adequately maintained so that they remove storm water pollutants to the MEP;

(e) The vertical distance from the base of any infiltration treatment control BMP to the seasonal high groundwater mark must be at least 10 feet. Where groundwater basins do not support beneficial uses, this vertical distance criteria may be reduced, provided groundwater quality is maintained;

(f) The soil through which infiltration is to occur must have physical and chemical characteristics (such as appropriate cation exchange capacity, organic content, clay content, and infiltration rate) which are adequate for proper infiltration durations and treatment of runoff for the protection of groundwater beneficial uses;

(g) Infiltration treatment control BMPs must not be used for areas of industrial or light industrial activity; and other high threat to water quality land uses and activities as designated by each Copermittee unless first treated or filtered to remove pollutants prior to infiltration; and

(h) Infiltration treatment control BMPs must be located a minimum of 100 feet horizontally from any water supply wells.

(7) Where feasible, landscaping with native or low water species shall be preferred in areas that drain to the MS4 or to waters of the U.S.

(8) Rain water harvesting and water reuse, where feasible, must be encouraged as part of the site design and construction to reduce pollutants in storm water discharges to the MEP.

d. **STANDARD STORM WATER MITIGATION PLANS (SSMPS) – APPROVAL PROCESS CRITERIA AND REQUIREMENTS FOR PRIORITY DEVELOPMENT PROJECTS**

On or before June 30, 2012, the Copermittees must submit an updated SSMP, to the San Diego Water Board's Executive Officer for a 30 day public review and comment period. The San Diego Water Board's Executive Officer has the discretion to determine whether to hold a public hearing or to limit public input to written comments. Within 180 days of determination that the SSMP is in compliance with this Order's provisions, each Copermittee must amend its local ordinances consistent with the updated SSMP, and begin implementing the updated SSMP. Any updated local ordinances must be submitted to the San Diego Water Board with the Annual Report. The SSMP must meet the requirements of section F.1.d of this Order to (1) reduce Priority Development Project discharges of storm water pollutants from the MS4 to the MEP, and (2) prevent Priority Development Project runoff discharges from the MS4 from causing or contributing to a violation of water quality standards.[10]

(1) Definition of Priority Development Project:

Priority Development Projects are:

(a) All new Development Projects that fall under the project categories or locations listed in section F.1.d.(2), and

(b) Those redevelopment projects that create, add, or replace at least 5,000 square feet of impervious surfaces on an already developed site and the existing development and/or the redevelopment project falls under the project categories or locations listed in section F.1.d.(2). Where redevelopment results in an increase of less than fifty percent of the impervious surfaces of a previously existing development, and the existing development was not subject to SSMP requirements, the numeric sizing criteria discussed in section F.1.d.(6) applies only to the addition or replacement, and not to the entire development. Where redevelopment

[10] Updated SSMP and hydromodification requirements must apply to all priority projects or phases of priority projects which have not yet begun grading or construction activities at the time any updated SSMP or hydromodification requirement commences. If lawful prior approval of a project exists, whereby application of an updated SSMP or hydromodification requirement to the project is illegal, the updated SSMP or hydromodification requirement need not apply to the project. Updated Development Planning requirements set forth in Sections F.1. (a) through (h) of this Order must apply to all projects or phases of projects, unless, at the time any updated Development Planning requirement commences, the projects or project phases meet any one of the following conditions: (i) the project or phase has begun grading or construction activities; or (ii) a Copermittee determines that lawful prior approval rights for a project or project phase exist, whereby application of the Updated Development Planning requirement to the project is legally infeasible. Where feasible, the Permittees must utilize the SSMP and hydromodification update periods to ensure that projects undergoing approval processes include application of the updated SSMP and hydromodification requirements in its plans.

results in an increase of more than fifty percent of the impervious surfaces of a previously existing development, the numeric sizing criteria applies to the entire development.

(c) One acre threshold: In addition to the Priority Development Project Categories identified in section F.1.d.(2), Priority Development Projects must also include all other post-construction pollutant-generating new Development Projects that result in the disturbance of one acre or more of land by July 1, 2012.[11]

(2) Priority Development Project Categories

Where a new Development Project feature, such as a parking lot, falls into a Priority Development Project Category, the entire project footprint is subject to SSMP requirements.

(a) New development projects that create 10,000 square feet or more of impervious surfaces (collectively over the entire project site) including commercial, industrial, residential, mixed-use, and public projects. This category includes development projects on public or private land which fall under the planning and building authority of the Copermittees.

(b) Automotive repair shops. This category is defined as a facility that is categorized in any one of the following Standard Industrial Classification (SIC) codes: 5013, 5014, 5541, 7532-7534, or 7536-7539.

(c) Restaurants. This category is defined as a facility that sells prepared foods and drinks for consumption, including stationary lunch counters and refreshment stands selling prepared foods and drinks for immediate consumption (SIC code 5812), where the land area for development is greater than 5,000 square feet. Restaurants where land development is less than 5,000 square feet must meet all SSMP requirements except for structural treatment BMP and numeric sizing criteria requirement F.1.d.(6) and hydromodification requirement F.1.h.

(d) All hillside development greater than 5,000 square feet. This category is defined as any development which creates 5,000 square feet of impervious surface which is located in an area with known erosive soil conditions, where the development will grade on any natural slope that is twenty-five percent or greater.

(e) Environmentally Sensitive Areas (ESAs). All development located within, or directly adjacent to, or discharging directly to an ESA (where

[11] Pollutant generating Development Projects are those projects that generate pollutants at levels greater than natural background levels.

discharges from the development or redevelopment will enter receiving waters within the ESA), which either creates 2,500 square feet of impervious surface on a proposed project site or increases the area of imperviousness of a proposed project site to 10 percent or more of its naturally occurring condition. "Directly adjacent" means situated within 200 feet of the ESA. "Discharging directly to" means outflow from a drainage conveyance system that is composed entirely of flows from the subject development or redevelopment site, and not commingled with flows from adjacent lands.

(f) Impervious parking lots 5,000 square feet or more and potentially exposed to runoff. Parking lot is defined as a land area or facility for the temporary parking or storage of motor vehicles used personally, for business, or for commerce.

(g) Street, roads, highways, and freeways. This category includes any paved impervious surface that is 5,000 square feet or greater used for the transportation of automobiles, trucks, motorcycles, and other vehicles. To the extent that the Copermittees develop revised standard roadway design and post-construction BMP guidance that comply with the provisions of Section F.1 of the Order, then public works projects that implement the revised standard roadway sections do not have to develop a project specific SSMP. The standard roadway design and post-construction BMP guidance must be submitted with the Copermittee's updated SSMP.

(h) Retail Gasoline Outlets (RGOs). This category includes RGOs that meet the following criteria: (a) 5,000 square feet or more or (b) a projected Average Daily Traffic (ADT) of 100 or more vehicles per day.

(3) Pollutants of Concern

As part of its local SSMP, each Copermittee must implement an updated procedure for identifying pollutants of concern for each Priority Development Project. The procedure must address, at a minimum: (1) Receiving water quality (including pollutants for which receiving waters are listed as impaired under CWA section 303(d)); (2) Land-use type of the Development Project and pollutants associated with that land use type; and (3) Pollutants expected to be present on site.

(4) Low Impact Development BMP Requirements

Each Copermittee must require each Priority Development Project to implement LID BMPs which will collectively minimize directly connected impervious areas, limit loss of existing infiltration capacity, and protect areas that provide important water quality benefits necessary to maintain riparian and aquatic biota, and/or are particularly susceptible to erosion and sediment loss.

(a) The Copermittees must take the following measures to ensure that LID BMPs are implemented at Priority Development Projects:

(i) Each Copermittee must require LID BMPs or make a finding of technical infeasibility for each Priority Development Project in accordance with the LID waiver program in Section F.1.d.(7);

(ii) Each Copermittee must incorporate formalized consideration, such as thorough checklists, ordinances, and/or other means, of LID BMPs into the plan review process for Priority Development Projects; and

(iii) On or before July 1, 2012, each Copermittee must review its local codes, policies, and ordinances and identify barriers therein to implementation of LID BMPs. Following the identification of these barriers to LID implementation, where feasible, the Copermittee must take, by the end of the permit cycle, appropriate actions to remove such barriers. The Copermittees must include this review with the updated JRMP.

(b) The following LID BMPs must be implemented at each Priority Development Project:

(i) Maintain or restore natural storage reservoirs and drainage corridors (including depressions, areas of permeable soils, swales, and ephemeral and intermittent streams) to the extent feasible[12].

(ii) Projects with landscaped or other pervious areas must, where feasible, properly design and construct the pervious areas to effectively receive and infiltrate, retain and/or treat runoff from impervious areas, prior to discharge to the MS4. Soil compaction for these areas must be minimized. The amount of the impervious areas that are to drain to pervious areas must be based upon the total size, soil conditions, slope, and other pertinent factors.

(iii) Projects with low traffic areas and appropriate soil conditions must be constructed with permeable surfaces.

[12] Priority Development Projects proposing to dredge or fill materials in waters of the U.S. must obtain a CWA Section 401 Water Quality Certification. Priority Development Projects proposing to dredge or fill waters of the State must obtain Waste Discharge Requirements.

(c) LID BMPs sizing criteria:

(i) LID BMPs must be sized and designed to ensure onsite retention without runoff, of the volume of runoff produced from a 24-hour 85th percentile storm event[13] ("design capture volume");

(ii) If onsite retention[14] LID BMPs are technically infeasible per section F.1.d.(7)(b), other LID BMPs may treat any volume that is not retained onsite provided that the total volume of the other LID BMPs, including pore spaces and pre-filter detention volume, are sized to hold at least 0.75 times the portion of the design capture volume that is not retained onsite. The LID BMPs must be designed for an appropriate surface loading rate to prevent erosion, scour and channeling within the BMP.

(d) If it is shown to be technically infeasible per Section F.1.d.(7)(b) to retain and/or treat the remaining volume up to and including the design capture volume using LID BMPs, then the project must implement conventional treatment control BMPs in accordance with Section F.1.d.(6) below and must participate in the LID waiver program in Section F.1.d.(7).

(e) All LID BMPs must be designed and implemented with measures to avoid the creation of nuisance or pollution associated with vectors, such as mosquitoes, rodents, and flies.

(5) Source Control BMP Requirements

Each Copermittee must require each Priority Development Project to implement applicable source control BMPs. The source control BMPs to be required must:

(a) Prevent illicit discharges into the MS4;
(b) Minimize storm water pollutants of concern in runoff;
(c) Eliminate irrigation runoff;

[13] This volume is not a single volume to be applied to all of Riverside County. The size of the 85th percentile storm event is different for various parts of the County. The Copermittees are encouraged to calculate the 85th percentile storm event for each of its jurisdictions using local rain data pertinent to its particular jurisdiction (0.6 inch standard is a rough average for the County and should only be used where appropriate rain data is not available). In addition, isopluvial maps may be used to extrapolate rainfall data to areas where insufficient data exists in order to determine the volume of the local 85th percentile storm event in such areas. Where the Copermittees will use isopluvial maps to determine the 85th percentile storm event in areas lacking rain data, the Copermittees must describe their method for using isopluvial maps in its SSMPs.

[14] Infiltration LID BMPs are the preferred method for onsite retention, but does not preclude the use and implementation of all other retention LID BMPs (e.g. evapotranspiration, evaporation, and/or harvest), where technically feasible, prior to considering biofiltration LID BMPs for treatment of the design capture volume that is not otherwise retained onsite.

(d) Include storm drain system stenciling or signage;
(e) Include properly designed outdoor material storage areas;
(f) Include properly designed outdoor work areas;
(g) Include properly designed trash storage areas; and
(h) Include water quality protection requirements applicable to individual priority project categories.

(6) Treatment Control BMP Requirements

Each Copermittee must require each Priority Development Project that meets the Copermittee's technical infeasibility criteria in Section F.1.d(7) below, to implement conventional treatment control BMPs to treat the portion of the "design capture volume" that was not treated by LID BMPs per Section F.1.d(4) above. Conventional treatment control BMPs must meet the following requirements:

(a) All treatment control BMPs for a single Priority Development Project must collectively be sized to comply with the following numeric sizing criteria:

(i) Volume-based treatment control BMPs must be designed to mitigate (infiltrate, filter, or treat) the remaining portion of the design capture volume that was not retained and/or treated with LID BMPs; or

(ii) Flow-based treatment control BMPs must be designed to mitigate (filter, or treat) either: a) the maximum flow rate of runoff produced from a rainfall intensity of 0.2 inch of rainfall per hour, for each hour of a storm event; or b) the maximum flow rate of runoff produced by the 85th percentile hourly rainfall intensity (for each hour of a storm event), as determined from the local historical rainfall record, multiplied by a factor of two.

(b) All treatment control BMPs for Priority Development Projects must, at a minimum:

(i) Be ranked with high or medium pollutant removal efficiency for the project's most significant pollutants of concern, as the pollutant removal efficiencies are identified in the Copermittees' SSMP. Treatment control BMPs with a low removal efficiency ranking must only be approved by a Copermittee when a feasibility analysis has been conducted which exhibits that implementation of treatment control BMPs with high or medium removal efficiency rankings are infeasible for a Priority Development Project or portion of a Priority Development Project.
(ii) Be correctly sized and designed so as to remove storm water pollutants to the MEP.

(c) Target removal of pollutants of concern from runoff.

(d) Be implemented close to pollutant sources, and prior to discharging into waters of the U.S.

(e) Include proof of a mechanism under which ongoing long-term maintenance will be conducted to ensure proper maintenance for the life of the project. The mechanisms may be provided by the project proponent or Copermittee.

(f) Be designed and implemented with measures to avoid the creation of nuisance or pollution associated with vectors, such as mosquitoes, rodents, and flies.

(7) Low Impact Development (LID) BMP Waiver Program

The Copermittees must develop, collectively or individually, a LID waiver program for incorporation into the SSMP, which would allow a Priority Development Project to substitute implementation of all or a portion of required LID BMPs in Section F.1.d(4) with implementation of treatment control BMPs and either 1) on-site mitigation, 2) an off-site mitigation project, and/or 3) other mitigation developed by the Copermittees. The Copermittees must submit the LID waiver program as part of their updated SSMP. At a minimum, the program must meet the requirements below:

(a) Prior to implementation, the LID waiver program must clearly exhibit that it will not allow Priority Development Projects to result in a net impact (after consideration of any mitigation) from pollutant loadings over and above the impact caused by projects meeting the onsite LID retention requirements;

(b) For each Priority Development Project participating, the Copermittee must find that it is technically infeasible to implement LID BMPs that comply with the requirements of Section F.1.(d)(4). The Copermittee(s) must develop criteria to determine the technical feasibility of implementing LID BMPs . Each Priority Development Project participating must demonstrate that LID BMPs were implemented as much as feasible given the site's unique conditions. Technical infeasibility may result from conditions including, but not limited to:

(i) Locations that cannot meet the infiltration and groundwater protection requirements in section F.1.c.(6) for large, centralized infiltration BMPs. Where infiltration is technically infeasible, the project must still examine the feasibility of other onsite LID BMPs;
(ii) Insufficient demand for storm water reuse;

(iii) Smart growth and infill or redevelopment locations where the density and/or nature of the project would create significant difficulty for compliance with the LID BMP requirements; and

(iv) Other site, geologic, soil, or implementation constraints identified in the Copermittees updated SSMP document.

(c) Each Priority Development Project that participates in the LID waiver program must mitigate for the pollutant loads expected to be discharged due to not implementing the LID retention BMPs in section F.1.d.(4). The pollutant loading must be estimated for each project participating in the LID waiver program. The estimated impacts from not implementing the required LID retention BMPs in section F.1.d.(4) must be fully mitigated. Mitigation projects must be implemented within the same hydrologic unit as the Priority Development Project. Mitigation projects outside of the hydrologic subarea but within the same hydrologic unit may be approved provided that the project proponent demonstrates that mitigation projects within the same hydrologic subarea are infeasible and that the mitigation project will address similar beneficial use impacts as expected from the Priority Development Projects pollutant load. Onsite mitigation may include increasing the conventional treatment sizing factors to achieve pollutant load removal equal to or greater than the pollutant load removal expected from implementing onsite retention of the design capture volume. Offsite mitigation projects may include green streets projects, existing development retrofit projects, retrofit incentive programs, regional BMPs and/or riparian restoration projects. Project applicants seeking to utilize these alternative compliance provisions may propose other offsite mitigation projects, which the Copermittees may approve if they meet the requirements of this subpart.

(d) A Copermittee may choose to implement additional mitigation programs (e.g., pollutant credit system, mitigation fund) as part of the LID waiver program provided that the mitigation program clearly exhibits that it will not allow Priority Development Projects to result in a net impact from pollutant loadings over and above the impact caused by projects meeting LID requirements. Any additional mitigation programs that a Copermittee chooses to implement must be submitted to the San Diego Water Board Executive Officer for review and acceptance prior to implementation.

(8) <u>LID and Treatment Control BMP Standards</u>

(a) As part of the SSMP, each Copermittee must develop and require Priority Development Projects to implement siting, design, and maintenance criteria for each LID and treatment control BMP listed in the SSMP to determine feasibility and applicability and so that implemented LID and treatment control BMPs are constructed correctly and are effective at pollutant removal, runoff control, and vector minimization. Development of

BMP design worksheets which can be used by project proponents is encouraged.

(b) LID and treatment control BMPs implemented at any Priority Development Projects must mitigate (treat through infiltration, settling, filtration or other unit processes) the required volume or flow of runoff from all developed portions of the project, including landscaped areas.

(c) All LID and treatment control BMPs must be located so as to remove pollutants from runoff prior to its discharge to any receiving waters. Multiple Priority Development Projects may use shared post-construction BMPs as long as construction of any shared BMP is completed prior to the use or occupation of any Priority Development Project from which the BMP will receive runoff. Post construction BMPs must not be constructed within a waters of the U.S. or waters of the State.

(9) Implementation Process

(a) As part of its local SSMP, each Copermittee must implement a process to verify compliance with SSMP requirements. The process must identify at what point in the planning process Priority Development Projects will be required to meet SSMP requirements and at a minimum, the Priority Development Project must implement the required post-construction BMPs prior to occupancy and/or the intended use of any portion of that project. The process must also include identification of the roles and responsibilities of various municipal departments in implementing the SSMP requirements, as well as any other measures necessary for the implementation of SSMP requirements.

(b) Each Copermittee must establish a mechanism not only to track post-construction BMPs, but also to ensure that appropriate easements and ownerships are properly recorded in public records and the information is conveyed to all appropriate parties when there is a change in project or site ownership.

(10) Post-construction BMP Review

(a) The Copermittees must review and update the BMPs that are listed in their SSMP as options for treatment control. At a minimum, the update must include removal of obsolete or ineffective BMPs and addition of LID BMPs that can be used for treatment, such as bioretention cells, bioretention swales, etc. The update must also add appropriate LID BMPs to any tables or discussions in the local SSMPs addressing pollutant removal efficiencies of treatment control BMPs. In addition, the update must include review and revision where necessary of treatment control BMP pollutant removal efficiencies.

(b) The update must incorporate findings from BMP effectiveness studies conducted by the Copermittees for projects funded wholly or in part by the State Water Board or Regional Water Boards.

(c) Each Copermittee must implement a mechanism for annually incorporating findings from local treatment BMP effectiveness studies (e.g., ones conducted by, or on-behalf of, public agencies in Riverside County) into SSMP project reviews and permitting.

e. **BMP CONSTRUCTION VERIFICATION**

Prior to occupancy and/or intended use of any portion of the Priority Development Project subject to SSMP requirements, each Copermittee must inspect the constructed site design, source control, and treatment control BMPs applicable to the constructed portion of the project to verify that they have been constructed and are operating in compliance with all specifications, plans, permits, ordinances, and this Order.

f. **BMP MAINTENANCE TRACKING**

(1) Inventory of SSMP projects: Each Copermittee must develop and maintain a watershed-based database to track and inventory all projects constructed within their jurisdiction, that have a final approved SSMP (SSMP projects), and its structural post-construction BMPs implemented therein since July, 2005. LID BMPs implemented on a lot by lot basis at single family residential houses, such as rain barrels, are not required to be tracked or inventoried. At a minimum, the database must include information on BMP type(s), location, watershed, date of construction, party responsible for maintenance, dates and findings of maintenance verifications, and corrective actions, including whether the site was referred to the local vector control agency or department.

(2) Each Copermittee must verify that approved post-construction BMPs are operating effectively and have been adequately maintained by implementing the following measures:

(a) The designation of high priority SSMP Projects must consider the following:

(i) BMP size,
(ii) Recommended maintenance frequency,
(iii) Likelihood of operational and maintenance issues,
(iv) Location,

(v) Receiving water quality,
(vi) Compliance record,
(vii) Land use, and
(viii) Other pertinent factors;

At a minimum, high priority projects include those projects that generate pollutants (prior to treatment) within the tributary area of and within the same hydrologic subarea as a 303(d) listed waterbody impaired for that pollutant; or those projects generating pollutants within the tributary area for and within the same hydrologic subarea as an observed action level exceedance of that pollutant.

(b) Beginning on July 1, 2012, each Copermittee must verify that the required structural post-construction BMPs on the inventoried SSMP projects have been implemented, are maintained, and are operating effectively through inspections, self-certifications, surveys, or other equally effective approaches with the following conditions:

(i) The implementation, operation, and maintenance of all (100 percent) approved and inventoried final project public and private SSMPs (a.k.a. WQMPs) must be verified every five years;
(ii) All (100 percent) projects with BMPs that are high priority must be inspected by the Copermittee annually prior to each rainy season;
(iii) All (100 percent) Copermittee projects with BMPs must be inspected by the Copermittee annually;
(iv) At the discretion of the Copermittee, its inspections may be coordinated with the facility inspections implemented pursuant to section F.3. of this Order;
(v) For verifications performed through a means other than direct Copermittee inspection, adequate documentation must be submitted to the Copermittee to provide assurance that the required maintenance has been completed;
(vi) Appropriate follow-up measures (including re-inspections, enforcement, maintenance, etc.) must be conducted to ensure the treatment BMPs continue to reduce storm water pollutants as originally designed; and
(vii) Inspections must note observations of vector conditions, such as mosquitoes. Where conditions are identified as contributing to mosquito production, the Copermittee must notify its local vector control agency.

g. **ENFORCEMENT OF DEVELOPMENT SITES**

Each Copermittee must enforce its storm water ordinance for all development projects as necessary to maintain compliance with this Order. Copermittee ordinances or other regulatory mechanisms must include appropriate sanctions to achieve compliance. Sanctions must include the following tools or their equivalent: Non-monetary penalties, fines, bonding requirements, liens, and/or permit or occupancy denials for non-compliance.

h. **HYDROMODIFICATION – LIMITATIONS ON INCREASES OF RUNOFF DISCHARGE RATES AND DURATIONS**[15]

Each Copermittee shall collaborate with the other Copermittees to develop and implement a Hydromodification Management Plan (HMP) to manage increases in runoff discharge rates and durations from all Priority Development Projects. The HMP must be incorporated into the SSMP and implemented by each Copermittee so that estimated post-project runoff discharge rates and durations must not exceed pre-development discharge rates and durations. Where the proposed project is located on an already developed site, the pre-project discharge rate and duration must be that of the pre-developed, naturally occurring condition. The draft HMP must be submitted to the San Diego Water Board on or before June 30, 2013. The HMP will be made available for public review and comment and the San Diego Water Board Executive Officer will determine whether to hold a public hearing before the full San Diego Water Board or whether public input will be through written comments to the Executive Officer only.

(1) The HMP must:

(a) Identify a method for assessing susceptibility and geomorphic stability of channel segments which receive runoff discharges from Priority Development Projects. A performance standard must be established that ensures that the geomorphic stability within the channel will not be compromised as a result of receiving runoff discharges from Priority Development Projects.

[15] Updated SSMP and hydromodification requirements must apply to all Priority Development Projects or phases of Priority Development Projects which have not yet begun grading or construction activities at the time any updated SSMP or hydromodification requirement commences. If a Copermittee determines that lawful prior approval of a project exists, whereby application of an updated SSMP or hydromodification requirement to the project is legally infeasible, the updated SSMP or hydromodification requirement need not apply to the project. The Copermittees must utilize the SSMP and hydromodification update periods to ensure that projects undergoing approval processes include application of the updated SSMP and hydromodification requirements in its plans.

(b) Identify a range of runoff flows[16] based on continuous simulation of the entire rainfall record (or other analytical method proposed by the Copermittees and deemed acceptable by the San Diego Water Board) for which Priority Development Project post-project runoff flow rates and durations must not exceed pre-development (naturally occurring) runoff flow rates and durations by more than 10 percent, where the increased flow rates and durations will result in increased potential for erosion or other significant adverse impacts to beneficial uses. The lower boundary of the range of runoff flows identified must correspond with the critical channel flow that produces the critical shear stress that initiates channel bed movement or that erodes the toe of channel banks. The identified range of runoff flows may be different for specific watersheds, channels, or channel reaches. In the case of an artificially hardened (concrete lined, rip rap, etc.) channel, the lower boundary of the range of runoff flows identified must correspond with the critical channel flow that produces the critical shear stress that initiates channel bed movement or that erodes the toe of channel banks of a comparable natural channel (i.e. non-hardened, pre-development).

(c) Identify a method to assess and compensate for the loss of sediment supply to streams due to development. A performance and/or design standard must be created and required to be met by Priority Development Projects to ensure that the loss of sediment supply due to development does not cause or contribute to increased erosion within channel segments downstream of Priority Development Project discharge points.

(d) Designate and require Priority Development Projects to implement control measures so that (1) post-project runoff flow rates and durations do not exceed pre-development (naturally occurring) runoff flow rates and durations by more than 10 percent for the range of runoff flows identified under section F.1.h.(1)(b), where the increased flow rates and durations will result in increased potential for erosion or other significant adverse impacts to beneficial uses; (2) post-project runoff flow rates and durations do not result in channel conditions which do not meet the channel standard developed under section F.1.h.(1)(a) for channel segments downstream of Priority Development Project discharge points; and (3) the design of the project and/or control measures compensate for the loss of sediment supply due to development.

[16] The identified range of run off flows to be controlled should be expressed in terms of peak flow rates of rainfall events, such as “10% of the pre-development 2-year runoff event up to the pre-development 10-year runoff event.”

(e) Include a protocol to evaluate potential hydrograph change impacts to downstream watercourses from Priority Development Projects to meet the range of runoff flows identified under Section F.1.h.(1)(b).

(f) Include other performance criteria (numeric or otherwise) for Priority Development Projects as necessary to prevent runoff from the projects from increasing and/or continuing unnatural rates of erosion of channel beds and banks, silt pollutants generation, or other impacts to beneficial uses and stream habitat due to increased erosive force.

(g) Include a review of pertinent literature.

(h) Identify areas within the Santa Margarita Hydrologic Unit for potential opportunities to restore or rehabilitate stream channels with historic hydromodification of receiving waters that are tributary to documented low or very low Index of Biotic Integrity (IBI) scores.

(i) Include a description of how the Copermittees will incorporate the HMP requirements into their local approval processes.

(j) Include criteria on selection and design of management practices and measures (such as detention, retention, and infiltration) to control flow rates and durations and address potential hydromodification impacts.

(k) Include technical information, including references, supporting any standards and criteria proposed.

(l) Include a description of inspections and maintenance to be conducted for management practices and measures to control flow rates and durations and address potential hydromodification impacts.

(m) Include a description of monitoring and other program evaluations to be conducted to assess the effectiveness of implementation of the HMP. Monitoring and other program evaluations must include an evaluation of changes to physical (e.g., cross-section, slope, discharge rate, vegetation, pervious/impervious area) and biological (e.g., habitat quality, benthic flora and fauna, IBI scores) conditions of receiving water channels as areas with Priority Development Projects are constructed (i.e. pre- and post-project), as appropriate.

(n) Include mechanisms for assessing and addressing cumulative impacts of Priority Development Projects within a watershed on channel morphology.

(2) In addition to the control measures that must be implemented by Priority Development Projects per section F.1.h.(1)(d), the HMP must include a suite of management measures that can be used on Priority Development Projects to mitigate hydromodification impacts, protect and restore downstream beneficial uses and prevent or further prevent adverse physical changes to downstream channels. The measures must be based on a prioritized consideration of the following elements in this order:

(a) Site design control measures;
(b) On-site management measures;
(c) Regional control measures located upstream of receiving waters; and
(d) In-stream management and control measures.

Where stream channels are adjacent to, or are to be modified as part of a Priority Development Project, management measures must include buffer zones and setbacks. The suite of management measures must also include stream restoration as a viable option to achieve the channel standard in section F.1.h.(1)(a). In-stream controls used as management measures to protect and restore downstream beneficial uses and for preventing or minimizing further adverse physical changes must not include the use of non-naturally occurring hardscape materials such as concrete, riprap, gabions, etc. to reinforce stream channels.

(3) As part of the HMP, the Copermittees may develop a waiver program that allows a redevelopment Priority Development Project, as defined in Section F.1.d.(1)(b), to implement offsite mitigation measures. A waiver may be granted if onsite management and control measures are technically infeasible to fully achieve post-project runoff flow rates and durations that do not exceed the pre-development (naturally occurring) runoff flow rates and durations. Redevelopment projects that are granted a waiver under the program must not have post-project runoff flow rates and durations that exceed the pre-project runoff flow rates and durations. The estimated incremental hydromodification impacts from not achieving the pre-development (naturally occurring) runoff flow rates and durations for the project site must be fully mitigated. The offsite mitigation must be within the same stream channel system to which the project discharges. Mitigation projects not within the same stream channel system but within the same hydrologic unit may be approved provided that the project proponent demonstrates that mitigation within the same stream channel is infeasible and that the mitigation project will address similar impacts as expected from the project.

(4) Each individual Copermittee has the discretion to not require Section F.1.h. at Priority Development Projects where the project:

(a) Discharges storm water runoff into underground storm drains discharging directly to water storage reservoirs and lakes;

(b) Discharges storm water runoff into conveyance channels whose bed and bank are concrete lined all the way from the point of discharge to water storage reservoirs and lakes; or
(c) Discharges storm water runoff into other areas identified in the HMP as acceptable to not need to meet the requirements of Section F.1.h by the San Diego Water Board Executive Officer.

(5) HMP Reporting and Implementation

(a) On or before June 30, 2013, the Copermittees must submit to the San Diego Water Board a draft HMP that has been reviewed by the public, including the identification of the appropriate limiting range of flow rates per section F.1.h.(1)(b).

(b) Within 180 days of receiving San Diego Water Board comments on the draft HMP, the Copermittees must submit a final HMP that addressed the San Diego Water Board's comments.

(c) Within 90 days of receiving a determination of adequacy from the San Diego Water Board, each Copermittee must incorporate and implement the HMP for all Priority Development Projects.

(d) Prior to acceptance of the HMP by the San Diego Water Board, the early implementation measures likely to be included in the HMP must be encouraged by the Copermittees.

(6) Interim Hydromodification Criteria

Immediately following adoption of this Order and until the final HMP required by this Order has been determined by the San Diego Water Board to be adequate, each Copermittee must ensure that all Priority Development Projects are implementing the hydromodification (aka Hydrologic Condition of Concern) requirements found in Section 4.4 of the 2006 Riverside County WQMP (updated in 2009) unless one of the following conditions in lieu of those specified in the WQMP are met:

(a) Runoff from the Priority Development Project discharges (1) directly to a conveyance channel or storm drain that is concrete lined all the way from the point of discharge to the ocean, bay, lagoon, water storage reservoir or lake; and (2) the discharge is in full compliance with Copermittee requirements for connections and discharges to the MS4 (including both quality and quantity requirements); and (3) the discharge will not cause increased upstream or downstream erosion or adversely impact downstream habitat; and (4) the discharge is authorized by the Copermittee.

(b) The Priority Development Project disturbs less than one acre. The Copermittee has the discretion to require a project specific WQMP to address hydrologic condition concerns on projects less than one acre on a case by case basis. The disturbed area calculation should include all disturbances associated with larger common plans of development.

(c) The runoff flow rate, volume, velocity, and duration for the post-development condition of the Priority Development Project do not exceed the pre-development (i.e. naturally occurring) condition for the 2-year, 24-hour and 10-year, 24-hour rainfall events. This condition must be substantiated by hydrologic modeling acceptable to the Copermittee.

Once a final HMP is determined to be adequate and is required to be implemented, compliance with the final HMP is required by this Order and compliance with the 2004 WQMP (updated in 2009) or the in-lieu interim hydromodification criteria set forth above no longer satisfies the requirements of this Order.

(7) No part of section F.1.h eliminates the Copermittees' responsibilities for implementing the Low Impact Development requirements under section F.1.d.(4).

i. UNPAVED ROADS DEVELOPMENT

The Copermittees must develop, where they do not already exist, and implement or require implementation of erosion and sediment control BMPs after construction of new unpaved roads. At a minimum, the BMPs must include the following, or alternative BMPs that are equally effective:

(1) Practices to minimize road related erosion and sediment transport;
(2) Grading of unpaved roads to slope outward where consistent with road engineering safety standards;
(3) Installation of water bars as appropriate; and
(4) Unpaved roads and culvert designs that do not impact creek functions and where applicable, that maintain migratory fish passage.

2. CONSTRUCTION COMPONENT

Each Copermittee must implement a construction program which meets the requirements of this section, prevents illicit discharges into the MS4, implements and maintains structural and non-structural BMPs to reduce pollutants in storm water runoff from construction sites to the MS4, reduces construction site discharges of storm water pollutants from the MS4 to the MEP, and prevents construction site discharges from the MS4 from causing or contributing to a violation of water quality standards.

a. ORDINANCE UPDATE

By July 1, 2012, each Copermittee must review and update its grading ordinances and other ordinances as necessary to achieve full compliance with this Order, including requirements for the implementation of all designated BMPs and other measures.

b. SOURCE IDENTIFICATION

Each Copermittee must maintain an updated watershed-based inventory of all construction sites within its jurisdiction. The use of an automated database system, such as Geographical Information Systems (GIS) is strongly encouraged.

c. SITE PLANNING AND PROJECT APPROVAL PROCESS

Each Copermittee must incorporate consideration of potential water quality impacts prior to approval and issuance of construction and grading permits.

(1) Each construction and grading permit must require proposed construction sites to implement designated BMPs and other measures so that illicit discharges into the MS4 are prevented, storm water pollutants discharged from the site will be reduced to the MEP, and construction discharges from the MS4 are prevented from causing or contributing to a violation of water quality standards.

(2) Prior to permit issuance, the project proponent's runoff management plan (or equivalent construction BMP plan) must be required to comply, and reviewed to verify compliance with the local grading ordinance, other applicable local ordinances, and this Order.

(3) Prior to permit issuance, each Copermittee must verify that project proponents subject to California's statewide General NPDES Permit for Storm Water Discharges Associated With Construction Activities, (hereinafter General Construction Permit), have existing coverage under the General Construction Permit.

d. **BMP IMPLEMENTATION**

(1) Designate BMPs: Each Copermittee must designate a minimum set of BMPs and other measures to be implemented at all construction sites. The designated minimum set of BMPs must include:

(a) Management Measures:

(i) Pollution prevention, where appropriate;
(ii) Development and implementation of a runoff management plan;
(iii) Minimization of areas that are cleared and graded to only the portion of the site that is necessary for construction;
(iv) Minimization of exposure time of disturbed soil areas;
(v) Minimization of grading during the rainy season and correlation of grading with seasonal dry weather periods to the extent feasible;
(vi) Limitation of grading to a maximum disturbed area as determined by each Copermittee before either temporary or permanent erosion controls are implemented to prevent storm water pollution. The Copermittee has the option of temporarily increasing the size of disturbed soil areas by a set amount beyond the maximum, if the individual site is in compliance with applicable storm water regulations and the site has adequate control practices implemented to prevent storm water pollution;
(vii) Temporary stabilization and reseeding of disturbed soil areas as rapidly as feasible;
(viii) Wind erosion controls;
(ix) Tracking controls;
(x) Non-stormwater management measures to prevent illicit discharges and control storm water pollution sources;
(xi) Waste management measures;
(xii) Preservation of natural hydrologic features where feasible;
(xiii) Preservation of riparian buffers and corridors where feasible;
(xiv) Evaluation and maintenance of all BMPs, until removed; and
(xv) Retention, reduction, and proper management of all storm water pollutant discharges on site to the MEP standard.

(b) Erosion and Sediment Controls:

(i) Erosion prevention. Erosion prevention is to be used as the most important measure for keeping sediment on site during construction;
(ii) Sediment controls. Sediment controls are to be used as a supplement to erosion prevention for keeping sediment on-site during construction;

(iii) Slope stabilization must be used on all active slopes during rain events regardless of the season and on all inactive slopes during the rainy season and during rain events in the dry season;
(iv) Permanent revegetation or landscaping as early as feasible; and
(v) Erosion and sediment controls must be required during the construction of unpaved roads.

(2) Each Copermittee must implement, or require implementation of, enhanced[17] measures to address the threat to water quality posed by all construction sites tributary to CWA section 303(d) water body segments impaired for sediment or turbidity. Each Copermittee must also implement, or require implementation of, enhanced, measures for construction sites within, or adjacent to, or discharging directly to receiving waters within environmentally sensitive areas (as defined in Attachment C of this Order).

(3) Active/Passive Sediment Treatment (AST): Each Copermittee must require implementation of AST for sediment at construction sites (or portions thereof) that are determined by the Copermittee to be an exceptional threat to water quality. In evaluating the threat to water quality, the following factors must be considered by the Copermittee:

(a) Soil erosion potential or soil type;
(b) The site's slopes;
(c) Project size and type;
(d) Sensitivity of receiving water bodies;
(e) Proximity to receiving water bodies;
(f) Non-storm water discharges;
(g) Ineffectiveness of other BMPs;
(h) Proximity and sensitivity of aquatic threatened and endangered species of concern;
(i) Known effects of AST chemicals; and
(j) Any other relevant factors.

(4) Implement BMPs: Each Copermittee must implement, or require the implementation of, the designated minimum BMPs and any additional measures necessary to comply with this Order at each construction site within its jurisdiction year round. BMP implementation requirements, however, can vary based on wet and dry seasons. Dry season BMP implementation must plan for and address unseasonal rain events that may occur during the dry season (May 1 through September 30).

[17] Enhanced BMPs are control actions specifically targeted to the pollutant or condition of concern and of higher quality and effectiveness than the minimum control measures otherwise required. Enhanced in this Order means better, not simply more, BMPs.

e. **INSPECTION OF CONSTRUCTION SITES**

Each Copermittee must conduct construction site inspections for compliance with its ordinances (grading, storm water, etc.), permits (construction, grading, etc.), and this Order. Priorities for inspecting sites must consider the nature and size of the construction activity, topography, and the characteristics of soils and receiving water quality.

(1) During the rainy season, each Copermittee must inspect at least every two weeks, all construction sites within its jurisdiction meeting any of the following criteria:

(a) All sites 30 acres or more in size with rough grading or with active, unstabilized slopes occurring during the rainy season;

(b) All sites one acre or more, and within the same hydrologic subarea and tributary to a CWA section 303(d) water body segment impaired for sediment; or within, directly adjacent to, or discharging directly to a receiving water within an ESA; and

(c) Other sites determined by the Copermittees or the San Diego Water Board as a significant threat to water quality. In evaluating threat to water quality, the following factors must be considered: (1) soil erosion potential; (2) site slope; (3) project size and type; (4) sensitivity of receiving water bodies; (5) proximity to receiving water bodies; (6) non-storm water discharges; (7) known past record of non-compliance by the operators of the construction site; and (8) any other relevant factors.

(2) During the rainy season, each Copermittee must inspect at least monthly, all construction sites with one acre or more of soil disturbance not meeting the criteria specified above in section F.2.e.(1).

(3) During the rainy season, each Copermittee must inspect construction sites less than one acre in size as needed to ensure compliance with its ordinances and this Order.

(4) Each Copermittee must inspect all construction sites as needed during the dry season. Sites meeting the criteria in section F.2.e.(1) must be inspected at least once in August or September each year.

(5) Re-inspections: Based upon site inspection findings, each Copermittee must implement all follow-up actions (i.e., re-inspection, enforcement) necessary to comply with this Order. Reinspection frequencies must be determined by each Copermittee based upon the severity of deficiencies, the nature of the construction activity, and the characteristics of soils and receiving water quality.

(6) Inspections of construction sites must include, but not be limited to:

(a) Check for coverage under the General Construction Permit (Notice of Intent (NOI) and/or Waste Discharge Identification No.) during initial inspections;
(b) Assessment of compliance with Copermittee ordinances and permits related to runoff, including the implementation and maintenance of designated minimum BMPs;
(c) Assessment of BMP effectiveness;
(d) Visual observations for non-storm water discharges, potential illicit connections, and potential discharge of pollutants in storm water runoff;
(e) Review of site monitoring data results, if the site monitors its runoff
(f) Education and outreach on storm water pollution prevention, as needed; and
(g) Creation of a written or electronic inspection report.

(7) The Copermittees must track the number of inspections for each inventoried construction site throughout the reporting period to verify that each site is inspected at the minimum frequencies required.

f. **ENFORCEMENT OF CONSTRUCTION SITES**

(1) Each Copermittee must develop and implement an escalating enforcement process that achieves prompt corrective actions at construction sites for violations of the Copermittee's water quality protection permits, requirements, and ordinances. This enforcement process must include authorizing the Copermittee's construction site inspectors to take immediate enforcement actions when appropriate and necessary. The enforcement process must include appropriate sanctions such as stop work orders, non-monetary penalties, fines, bonding requirements, and/or permit denials for non-compliance.

(2) Each Copermittee must be able to respond to construction complaints received from third-parties and to ensure the San Diego Water Board that corrective actions have been implemented, if warranted.

g. **REPORTING OF NON-COMPLIANT SITES**

(1) In addition to the notification requirements in Attachment B, each Copermittee must notify the San Diego Water Board when the Copermittee issues high level enforcement (as defined in the Copermittee's JRMP) to a construction site that poses a significant threat to water quality in its jurisdiction as a result of violations of its storm water ordinances.

(2) Each Copermittee must annually notify the San Diego Water Board, prior to the commencement of the rainy season, of all construction sites with alleged violations that pose a significant threat to water quality. Information may be

provided as part of the JRMP annual report if submitted prior to the rainy season. Information provided must include, but not be limited to, the following:

(a) WDID number if enrolled under the General Construction Permit
(b) Site Location, including address
(c) Current violations or suspected violations

3. EXISTING DEVELOPMENT COMPONENT

a. MUNICIPAL

Each Copermittee must implement a municipal program for the Copermittee's areas and activities that meets the requirements of this section, prevents illicit discharges into the MS4, reduces municipal discharges of storm water pollutants from the MS4 to the MEP, and prevents municipal discharges from the MS4 from causing or contributing to a violation of water quality standards.

(1) Source Identification / Inventory

Each Copermittee must maintain an updated watershed-based inventory of all its municipal areas and those activities that have the potential to generate pollutants. The inventory must include the name, address (if applicable), and a description of the area/activity; which pollutants are potentially generated by the area/activity; whether the area/activity is adjacent to an ESA; and identification of whether the area/activity is tributary to and within the same hydrologic subarea as a CWA section 303(d) water body segment and generates pollutants for which the water body segment is impaired. Linear facilities, such as roads, streets, and highways, do not need to be individually inventoried. The use of an automated database system, such as Geographical Information Systems (GIS) is highly recommended.

(2) General BMP Implementation

(a) Pollution Prevention: Each Copermittee must implement pollution prevention methods in its municipal program and must require their use by appropriate departments, personnel, and contractors.

(b) Designate Minimum BMPs: Each Copermittee must designate a minimum set of BMPs for all municipal areas and those activities that have the potential to generate pollutants. The designated minimum BMPs for municipal areas and activities must be area or activity specific as appropriate.

(c) Each Copermittee must designate BMPs for special events that are expected to generate significant trash and litter. Controls to consider must include:

(i) Temporary screens on catch basins and storm drain inlets;
(ii) Temporary fencing to prevent windblown trash from entering adjacent water bodies and MS4 channels;
(iii) Proper management of trash and litter;
(iv) Catch basin cleaning following the special event and prior to an anticipated rain event;
(v) Street sweeping of roads, streets, highways and parking facilities following the special event; and
(vi) Other equivalent controls.

(d) Designate BMPs for ESAs and 303(d) Impairments: Each Copermittee must designate enhanced measures for its municipal areas and activities tributary to and within the same hydrologic subarea as CWA section 303(d) impaired water body segments when an area or those activities have the potential to generate pollutants for which the water body segment is impaired. Each Copermittee must also designate additional controls for its municipal areas and activities within or directly adjacent to or discharging directly to receiving waters within environmentally sensitive areas (as defined in Attachment C of this Order).

(e) Implement BMPs: Each Copermittee must implement, or require the implementation of, the designated minimum and enhanced BMPs and any additional measures necessary based on its inventory to comply with this Order for each of its municipal area and those activities that have the potential to discharge pollution.

(3) <u>BMP Implementation for Management of Pesticides, Herbicides, and Fertilizers</u>

Each Copermittee must implement BMPs to reduce the contribution of storm water pollutants to the MEP associated with the application, storage, and disposal of pesticides, herbicides and fertilizers from its municipal areas and activities to MS4s and receiving waters. Such BMPs must include, at a minimum:

(a) Educational activities, permits, certifications and other measures for municipal applicators and distributors;
(b) Integrated Pest Management (IPM) measures that rely on non-chemical solutions;
(c) The use of native vegetation;
(d) Schedules for irrigation and chemical application; and

(e) The collection and proper disposal of unused pesticides, herbicides, and fertilizers.

(4) BMP implementation for Flood Control Structures

(a) Each Copermittee must implement procedures to assure that flood management projects assess the impacts on the water quality of receiving water bodies.

(b) Each Copermittee must include water quality protection measures, where feasible, when retrofitting existing flood control structural devices.

(c) Each Copermittee must evaluate its existing flood control structures as part of ongoing routine maintenance, identify structures causing or contributing to a condition of pollution, implement measures to reduce or eliminate the structure's effect on pollution, and evaluate the feasibility of retrofitting the structural flood control device. The inventory and evaluation must be completed by and submitted to the San Diego Water Board in each JRMP Annual Report.

(5) BMP Implementation for Sweeping of Municipal Areas

Where municipal area sweeping is implemented as an MS4 BMP for municipal roads, streets, highways, and parking facilities, each Copermittee must design and implement the program based on the following criteria:

(a) Roads, streets, highways, and parking facilities identified as consistently generating the highest volumes of trash and/or debris must be swept at least two times per month.

(b) Roads, streets, highways, and parking facilities identified as consistently generating moderate volumes of trash and/or debris must be swept at least monthly.

(c) Roads, streets, highways, and parking facilities identified as generating low volumes of trash and/or debris must be swept as necessary, but no less than once per year.

(6) Operation and Maintenance of Municipal Separate Storm Sewer System (MS4) and Treatment Controls

(a) Treatment Controls: Each Copermittee must implement a schedule of inspection and maintenance activities to verify proper operation of all its municipal structural treatment controls designed to reduce storm water pollutant discharges to or from its MS4s and related drainage structures.

(b) MS4 and Facilities: Each Copermittee must implement a schedule of maintenance activities for its MS4 and facilities (including but not limited to catch basins, storm drain inlets, detention basins, etc). The maintenance activities must, at a minimum, include:

(i) Inspection and removal of accumulated waste at least once a year between May 1 and September 30 of each year for all MS4 facilities;
(ii) Additional facilities cleaning as necessary between October 1 and April 30 of each year;
(iii) Following two years of inspections, any MS4 facility that requires inspection and cleaning less than annually may be inspected as needed, but not less than every other year;
(iv) Open channels and basins must be cleaned of observed anthropogenic litter in a timely manner;
(v) Maintenance activities within open channels must not adversely impact beneficial uses;
(vi) Record keeping of the maintenance and cleaning activities including the overall quantity of waste removed;
(vii) Proper disposal of waste removed pursuant to applicable laws; and
(viii) Measures to eliminate waste discharges during MS4 maintenance and cleaning activities.

(7) <u>Infiltration From Sanitary Sewer to MS4/Provide Preventive Maintenance</u>

(a) Each Copermittee must implement controls and measures to prevent and eliminate infiltration of seepage from sanitary sewers to MS4s through thorough, routine preventive maintenance of the MS4. Each Copermittee that operates both a municipal sanitary sewer system and a MS4 must implement controls and measures to prevent and eliminate infiltration of seepage from the sanitary sewers to the MS4s that must include overall sanitary sewer and MS4 surveys and thorough, routine preventive maintenance of both.

(b) Each Copermittee must implement controls to limit infiltration of seepage from sanitary sewers to municipal separate storm sewer systems where necessary. Such controls must include:

(i) Adequate plan checking for construction and new development;
(ii) Incident response training for its municipal employees that identify sanitary sewer spills;
(iii) Code enforcement inspections;
(iv) MS4 maintenance and inspections;
(v) Interagency coordination with sewer agencies; and

(vi) Proper education of its municipal staff and contractors conducting field operations on the MS4 or its municipal sanitary sewer (if applicable).

(8) Inspection of Municipal Areas and Activities

(a) At a minimum, each Copermittee must inspect the following high priority municipal areas and activities annually:

(i) Roads, Streets, Highways, and Parking Facilities;
(ii) Flood Management Projects and Flood Control Devices not otherwise inspected per Section F.3.a.(6)(b);
(iii) Areas and activities tributary to and within the same hydrologic subarea as a CWA section 303(d) impaired water body segment, where an area or activity generates pollutants for which the water body segment is impaired;
(iv) Areas and activities within or adjacent to or discharging directly to receiving waters within environmentally sensitive areas (as defined in Attachment C of this Order);
(v) Municipal Facilities:
[a] Active or closed municipal landfills;
[b] Publicly owned treatment works (including water and wastewater treatment plants) and sanitary sewage collection systems;
[c] Solid waste transfer facilities;
[d] Land application sites;
[e] Corporate yards including maintenance and storage yards for materials, waste, equipment and vehicles; and
[f] Household hazardous waste collection facilities.
(vi) Municipal airfields;
(vii) Parks and recreation facilities;
(viii) Special event venues following special events (festivals, sporting events, etc.);
(ix) Power washing activities; and
(x) Other municipal areas and activities that the Copermittee determines may contribute a significant pollutant load to the MS4.

(b) Other municipal areas and activities must be inspected as needed and in response to water quality data, valid public complaints, and findings from municipal or contract staff.

(c) Based upon site inspection findings, each Copermittee must implement all follow-up actions necessary to comply with this Order.

(9) Enforcement of Municipal Areas and Activities

Each Copermittee must enforce its storm water ordinance for all its municipal areas and activities as necessary to maintain compliance with this Order.

(10) Copermittee Maintained Unpaved Roads Maintenance

(a) The Copermittees must develop, where they do not already exist, and implement or require implementation of BMPs for erosion and sediment control measures during their maintenance activities on Copermittee maintained unpaved roads, particularly in or adjacent to receiving waters.

(b) The Copermittees must develop and implement or require implementation of appropriate BMPs to minimize impacts on streams and wetlands during their unpaved road maintenance activities.

(c) The Copermittees must maintain as necessary their unpaved roads adjacent to streams and riparian habitat to reduce erosion and sediment transport;

(d) Re-grading of unpaved roads during maintenance must be sloped outward where consistent with road engineering safety standards or alternative equally effective BMPs must be implemented to minimize erosion and sedimentation from unpaved roads; and

(e) Through their maintenance of unpaved roads, the Copermittees must examine the feasibility of replacing existing culverts or design of new culverts or bridge crossings to reduce erosion and maintain natural stream geomorphology.

b. COMMERCIAL / INDUSTRIAL

Each Copermittee must implement a commercial / industrial program that meets the requirements of this section, prevents illicit discharges into the MS4, reduces commercial / industrial discharges of storm water pollutants from the MS4 to the MEP, and prevents commercial / industrial discharges from the MS4 from causing or contributing to a violation of water quality standards.

(1) Source Identification

(a) Each Copermittee must maintain an updated watershed-based inventory of all industrial and commercial sites/sources within its jurisdiction (regardless of ownership) that could contribute a significant pollutant load to the MS4. The inventory must include the following minimum

information for each industrial and commercial site/source: name; address; pollutants potentially generated by the site/source; and identification of whether the site/source is tributary to a CWA §303(d) water body segment and generates pollutants for which the water body segment is impaired; and a narrative description including SIC codes which best reflects the principal products or services provided by each facility.

At a minimum, the following sites/sources must be included in the inventory:

(i) Commercial Sites/Sources:

[a] Automobile repair, maintenance, fueling, or cleaning;
[b] Airplane repair, maintenance, fueling, or cleaning;
[c] Boat repair, maintenance, fueling, or cleaning;
[d] Equipment repair, maintenance, fueling, or cleaning;
[e] Automobile and other vehicle body repair or painting;
[f] Mobile automobile or other vehicle washing;
[g] Automobile (or other vehicle) parking lots and storage facilities;
[h] Retail or wholesale fueling;
[i] Pest control services;
[j] Eating or drinking establishments, including such retail establishments with food markets;
[k] Mobile carpet, drape or furniture cleaning;
[l] Cement mixing or cutting;
[m] Masonry;
[n] Painting and coating;
[o] Botanical or zoological gardens and exhibits;
[p] Landscaping;
[q] Nurseries and greenhouses;
[r] Golf courses, parks and other recreational areas/facilities;
[s] Cemeteries;
[t] Pool and fountain cleaning;
[u] Marinas;
[v] Portable sanitary services;
[w] Building material retailers and storage;
[x] Animal boarding facilities and kennels;
[y] Mobile pet services;
[z] Power washing services;
[aa] Plumbing services; and
[bb] Other sites and sources with a history of un-authorized discharges to the MS4.

(ii) Industrial Sites/Sources:

[a] Industrial Facilities, as defined at 40 CFR § 122.26(b)(14), including those subject to the General Industrial Permit or other individual NPDES permit;
[b] Operating and closed landfills;
[c] Facilities subject to SARA Title III; and
[d] Hazardous waste treatment, disposal, storage and recovery facilities.

(iii) ESAs and 303(d) Listed Waterbodies: All other commercial or industrial sites/sources tributary to and within the same hydrologic subarea as a CWA Section 303(d) impaired water body segment, where the site/source generates pollutants for which the water body segment is impaired. All other commercial or industrial sites/sources within or directly adjacent to or discharging directly to receiving waters within environmentally sensitive areas (as defined in Attachment C of this Order) or that generate pollutants tributary to and within the same hydrologic subarea as an observed exceedance of an action level.

(iv) All other commercial or industrial sites/sources that the Copermittee determines may contribute a significant pollutant load to the MS4.

(2) <u>General BMP Implementation</u>

(a) Pollution Prevention: Each Copermittee must require the use of pollution prevention methods by the inventoried industrial and commercial sites/sources.

(b) Designate / Update Minimum BMPs: Each Copermittee must designate a minimum set of BMPs for all inventoried industrial and commercial sites/sources. Where BMPs have already been designated, each Copermittee must review and update its existing BMPs for adequacy no later than with the submittal of the JRMP. Copermittees may continue to regularly review and update their designated BMPs for adequacy and subsequently submit any updates in their Annual Report. The designated minimum BMPs must be specific to facility types and pollutant-generating activities, as appropriate.

(c) Designate Enhanced BMPs for ESAs and 303(d) Impairments: Each Copermittee must designate enhanced measures for inventoried industrial and commercial sites/sources tributary to and within the same hydrologic subarea as CWA section 303(d) impaired water body segments (where a site/source generates pollutants for which the water body segment is

impaired). Each Copermittee must also designate additional controls for industrial and commercial sites/sources within or directly adjacent to or discharging directly to coastal lagoons, the ocean, or other receiving waters within environmentally sensitive areas (as defined in Attachment C of this Order). Copermittees may continue to regularly review and update their designated enhanced BMPs for adequacy and subsequently submit any updates in their next Annual Report.

(d) Implement BMPs: Each Copermittee must implement, or require the implementation of, the designated minimum and enhanced BMPs and any additional measures necessary based on inspections, incident responses, and water quality data to comply with this Order at each industrial and commercial site/source within its jurisdiction.

(3) Mobile Businesses Program

(a) Each Copermittee must develop and implement a program to reduce the discharge of storm water pollutants from mobile businesses to the MEP and to prohibit non-storm water discharges pursuant to Section B of this Order. Each Copermittee must keep as part of its commercial source inventory a listing of mobile businesses known to operate within its jurisdiction that conduct services listed above in section F.3.b.(1)(a). The program must include:

(i) Development and implementation of minimum standards and BMPs to be required for each of the various types of mobile businesses;
(ii) Development and implementation of an enforcement strategy which specifically addresses the unique characteristics of mobile businesses;

(iii) Notification of those mobile businesses known to operate within the Copermittee's jurisdiction of the minimum standards and BMP requirements;
(iv) Development and implementation of an outreach and education strategy; and
(v) Inspection of mobile businesses as needed to implement the program.

(b) If they choose to, the Copermittees may cooperate in developing and implementing their programs for mobile businesses, including sharing of mobile business inventories, BMP requirements, enforcement action information, and education.

(4) Inspection of Industrial and Commercial Sites/Sources

Each Copermittee must conduct industrial and commercial site inspections for compliance with its ordinances, permits, and this Order. Mobile businesses must be inspected as needed pursuant to section F.3.b.(3).

(a) Inspection Procedures: Inspections must include but not be limited to:

(i) Review of BMP implementation plans not including SSMPs required pursuant to section F.1.d, if the site uses or is required to use such a plan;
(ii) Review of facility monitoring data, if the site monitors its runoff;
(iii) Check for coverage under the General Industrial Permit (Notice of Intent (NOI) and/or Waste Discharge Identification Number), if applicable;
(iv) Assessment of compliance with Copermittee ordinances and Copermittee issued permits related to runoff;
(v) Assessment of the implementation, maintenance and effectiveness of the designated minimum and/or enhanced BMPs;
(vi) Visual observations for non-storm water discharges, potential illicit connections, and potential discharge of pollutants in storm water runoff; and
(vii) Education and training on storm water pollution prevention, as conditions warrant.

(b) Frequencies: At a minimum all sites determined to pose a high threat to water quality must be inspected each year. All inventoried sites must be inspected at least once during a five year period. In evaluating threat to water quality, each Copermittee must consider, at a minimum, the following:

(i) Type of activity (SIC code);
(ii) Materials used at the facility;
(iii) Wastes generated;
(iv) Pollutant discharge potential, including whether the facility generates a pollutant that exceeds an action level;
(v) Non-storm water discharges;
(vi) Size of facility;
(vii) Proximity to receiving water bodies;
(viii) Sensitivity of receiving water bodies;
(ix) Whether the facility is subject to the General Industrial Permit or an individual NPDES permit;
(x) Whether the facility has filed a No Exposure Certification/Notice of Non-Applicability;
(xi) Facility design;

(xii) Total area of the site, portion of the site where industrial or commercial activities occur, and area of the site exposed to rainfall and runoff;
(xiii) The facility's compliance history; and
(xiv) Any other relevant factors.

(c) Third-Party Certifications: Each Copermittee may propose to develop and implement a third party certification program subject to San Diego Water Board Executive Officer acceptance. This program would verify industrial and commercial site/source compliance with the Copermittees' ordinances, permits, and this Order. To the extent that third party certifications are conducted to fulfill the requirements of Section F.3.b.(4) above, the Copermittee retains responsibility for compliance with this Order and will be responsible for conducting and documenting quality assurance and quality control of the third-party certifications.

The Copermittee's proposed third party certification program must include the following:

(i) A description of the procedures and measures for quality assurance and quality control;
(ii) A listing of sites/sources that may and may not participate in the program;
(iii) The representative percentage of certifications that would qualify to satisfy the inspection requirements in section F.3.b(4)(c) above;
(iv) Photo documentation of potential storm water violations identified during the third party inspection;
(v) Reporting to the Copermittee of identified significant potential violations, including imminent or observed illegal discharges, within 24 hours of the third party inspection;
(vi) Reporting to the Copermittee of all findings within one week of the inspection being conducted; and
(vii) Copermittee follow-up and/or enforcement actions for identified potential storm water violations within two business days of the potential violation report receipt.

(d) Based upon site inspection findings, each Copermittee must implement all follow-up actions and enforcement necessary to comply with this Order.

(e) To the extent that the San Diego Water Board has conducted an inspection of an industrial site during a particular year, the requirement for the responsible Copermittee to inspect this facility during the same year is deemed satisfied.

(f) The Copermittees must track the number of inspections for the inventoried industrial and commercial sites/sources throughout the reporting period to verify that the sites/sources are inspected at the minimum frequencies listed in this Order.

(5) Enforcement of Industrial and Commercial Sites/Sources

Each Copermittee must enforce its storm water ordinance for all industrial and commercial sites/sources as necessary to maintain compliance with this Order. Copermittee ordinances or other regulatory mechanisms must include appropriate sanctions to achieve compliance. Sanctions must include the following tools or their equivalent: Non-monetary penalties, fines, bonding requirements, liens and/or permit denials for non-compliance.

(6) Reporting of Non-Compliant Sites

Each Copermittee must annually notify the San Diego Water Board, prior to the commencement of the wet season, of any unresolved high level enforcement action (as defined in the Copermittees' JRMP) that poses a significant threat to water quality in its jurisdiction as a result of violations of their storm water ordinances.

c. RESIDENTIAL

Each Copermittee must implement a residential program that meets the requirements of this section, prevents illicit discharges into the MS4, reduces residential discharges of storm water pollutants from the MS4 to the MEP, and prevents residential discharges from the MS4 from causing or contributing to a violation of water quality standards.

(1) Threat to Water Quality Prioritization

Each Copermittee must identify residential areas and activities that pose a high threat to water quality. At a minimum, these must include:

(a) Automobile repair, maintenance, washing, and parking;
(b) Home and garden care activities and product use (pesticides, herbicides, and fertilizers);
(c) Disposal of trash, pet waste, green waste, and household hazardous waste (e.g., paints, cleaning products);
(d) Any other residential source that the Copermittee determines may contribute a significant pollutant load to the MS4;

(e) Any residential areas tributary to and within the same hydrologic subarea as a CWA section 303(d) impaired water body, where the residence generates pollutants for which the water body is impaired; and
(f) Any residential areas within or directly adjacent to or discharging directly to receiving waters within an environmentally sensitive area (as defined in Attachment C of this Order)

(2) BMP Implementation

(a) Pollution Prevention: Each Copermittee must actively encourage the use of pollution prevention methods by residents.

(b) Designate BMPs: Each Copermittee must designate minimum BMPs for high-threat-to-water quality residential areas and activities. The designated minimum BMPs for high-threat-to-water quality residential areas and activities must be area or activity specific.

(c) Hazardous Waste BMPs: Each Copermittee must facilitate the proper management and disposal of used oil, toxic materials, and other household hazardous wastes. Such facilitation must include educational activities, public information activities, and establishment of collection sites operated individually and/or jointly by the Copermittee(s) or a private entity. Curbside collection of household hazardous wastes is encouraged.

(d) Implement BMPs: Each Copermittee must implement, or require implementation of, the designated minimum BMPs and any additional measures necessary to comply with Sections A and B of this Order.

(e) Each Copermittee must implement, or require implementation of, BMPs for residential areas and activities that have not been designated a high threat to water quality, as necessary.

(3) Enforcement of Residential Areas and Activities

Each Copermittee must enforce its storm water ordinance for all residential areas and activities as necessary to maintain compliance with this Order.

(4) Common Interest Areas (CIA) / Home Owner Association (HOA) Areas, and Mobile Home Parks

Each Copermittee must ensure that effective measures exist and are implemented or required to be implemented to ensure that runoff within and from common interest developments, including areas managed by associations and mobile home parks, and meets the objectives of this section and Order.

(a) BMP Implementation: Each Copermittee must implement or require implementation of management measures based on a review of pertinent factors, including:

(i) Maintenance duties and procedures typically used by CIA/HOA maintenance associations within its jurisdiction;
(ii) Whether streets and storm drains are publicly or privately owned within the CIA/HOA or mobile home park;
(iii) Whether the CIA/HOA area or mobile home park has been identified as a high priority residential area based on an evaluation of the site potential to generate pollutants contributing to a 303(d) listed waterbody or an observed action level exceedance; and
(iv) Other activities conducted or authorized by the HOA that may pose a significant risk to inland receiving waters.

(b) Legal Authority and Enforcement: By July 1, 2012, each Copermittee must review, and if necessary update, its Municipal Code to verify that they have the legal authority to implement and enforce its ordinances within CIA/HOA areas and mobile home parks.

d. RETROFITTING EXISTING DEVELOPMENT

Each Copermittee must develop and implement a retrofitting program that meets the requirements of this section. The goals of the existing development retrofitting program are to address the impacts of existing development through retrofit projects that reduce impacts from hydromodification, promote LID, support riparian and aquatic habitat restoration, reduce the discharges of storm water pollutants from the MS4 to the MEP, and prevent discharges from the MS4 from causing or contributing to a violation of water quality standards. Where feasible, at the discretion of the Copermittee, the existing development retrofitting program may be coordinated with flood control projects and other infrastructure improvement programs.

(1) The Copermittee(s) must identify and inventory existing areas of development (i.e. municipal, industrial, commercial, residential) as candidates for retrofitting. Potential retrofitting candidates must include but are not limited to:

(a) Areas of development that generate pollutants of concern to a TMDL or an ESA;
(b) Receiving waters that are channelized or otherwise hardened;
(c) Areas of development tributary to receiving waters that are channelized or otherwise hardened;

(d) Areas of development tributary to receiving waters that are significantly eroded; and
(e) Areas of development tributary to an ASBS or SWQPA.

(2) Each Copermittee must evaluate and rank the inventoried areas of existing developments to prioritize retrofitting. Criteria for evaluation must include but is not limited to:

(a) Feasibility;
(b) Cost effectiveness;
(c) Pollutant removal effectiveness, including reducing pollutants exceeding action level;
(d) Tributary area potentially treated;
(e) Maintenance requirements;
(f) Landowner cooperation;
(g) Neighborhood acceptance;
(h) Aesthetic qualities;
(i) Efficacy at addressing concern; and
(j) Potential improvements on public health and safety.

(3) Each Copermittee must consider the results of the evaluation in prioritizing work plans for the following year in accordance with Sections G.1 and J. Highly feasible projects expected to benefit water quality should be given a high priority to implement source control and treatment control BMPs. Where feasible, the retrofit projects may be designed in accordance with the SSMP requirements within sections F.1.d.(3) through F.1.d.(8) and the Hydromodification requirements in Section F.1.h.

(4) The Copermittees must cooperate with private landowners to encourage site specific retrofitting projects. The Copermittee must consider the following practices in cooperating and encouraging private landowners to retrofit their existing development:

(a) Demonstration retrofit projects;
(b) Retrofits on public land and easements that treat runoff from private developments;
(c) Education and outreach;
(d) Subsidies for retrofit projects;
(e) Requiring retrofit projects as enforcement, mitigation or ordinance compliance;
(f) Public and private partnerships; and
(g) Fees for existing discharges to the MS4 and reduction of fees for retrofit implementation.

(5) The known completed retrofit BMPs must be tracked in accordance with Section F.1.f. Retrofit BMPs on publicly owned properties must be inspected per section F.1.f . Privately owned retrofit BMPs must be inspected as needed.

(6) Where constraints on retrofitting preclude effective BMP deployment on existing developments at locations critical to protect receiving waters (as identified in section F.3.d.(1)), a Copermittee may propose a regional mitigation project to improve water quality. Such regional projects may include but are not limited to:

(a) Regional water quality treatment BMPs;
(b) Urban creek or wetlands restoration and preservation;
(c) Daylighting and restoring underground creeks;
(d) Localized rainfall storage and reuse to the extent such projects are fully protective of downstream water rights;
(e) Hydromodification project; and
(f) Removal of invasive plant species.

(7) A retrofit project or regional mitigation project may qualify as a Watershed Water Quality Activity provided it meets the requirements in section G. Watershed Workplan.

4. ILLICIT DISCHARGE DETECTION AND ELIMINATION

Each Copermittee must implement a program that meets the requirements of this section to actively detect and eliminate illicit discharges and disposal into the MS4. The program must address all types of illicit discharges and connections excluding those non-storm water discharges not prohibited by the Copermittee in accordance with section B of this Order.

a. PREVENT AND DETECT ILLICIT DISCHARGES AND CONNECTIONS

Each Copermittee must implement measures to prevent and detect illicit discharges to the MS4.

(1) Legal Authority: Each Copermittee must retain legal authority to prevent and eliminate illicit discharges and connections to the MS4.

(2) Inspections: Each Copermittee must include use of appropriate Copermittee personnel and contractors to assist in identifying illicit discharges and connections during their daily activities.

(a) Visual inspections for illegal discharges and connections must be conducted during routine maintenance of all MS4 facilities.

(b) Copermittee staff and contractors conducting non-MS4 field operations must be trained to report suspected illegal discharges and connections to proper Copermittee staff.

b. **MAINTAIN MS4 MAP**

Each Copermittee must maintain an updated map of its entire MS4 and the corresponding drainage areas within its jurisdiction. The use of GIS is strongly encouraged. The MS4 map must include all segments of the storm sewer system owned, operated, and maintained by the Copermittee, as well as all known locations of inlets that discharge and/or collect runoff into the Copermittee's MS4, all known locations of connections with other MS4s (e.g. Caltrans), and all known locations of all the outfalls that discharge runoff from the Copermittee's MS4. The accuracy of the MS4 map must be confirmed during dry weather field screening and analytical monitoring and must be updated at least annually. The MS4 map including any GIS layers must be submitted with the updated JRMP.

c. **FACILITATE PUBLIC REPORTING OF ILLICIT DISCHARGES AND CONNECTIONS - PUBLIC HOTLINE**

Each Copermittee must promote, publicize and facilitate public reporting of illicit discharges or water quality impacts associated with discharges into or from MS4s. Each Copermittee must facilitate public reporting through development and operation of a public hotline. Public hotlines can be Copermittee-specific or shared by Copermittees. All storm water hotlines must be capable of receiving reports in both English and Spanish 24 hours per day and seven days per week. All reported incidents, and how each was resolved, must be summarized in each Copermittee's Annual Report.

d. **DRY WEATHER FIELD SCREENING AND ANALYTICAL MONITORING**

Each Copermittee must conduct dry weather field screening and analytical monitoring of MS4 outfalls and other portions of its MS4 within its jurisdiction to detect illicit discharges and connections in accordance with Receiving Waters and MS4 Discharge Monitoring and Reporting Program No. R9-2010-0016 in Attachment E of this Order.

e. **INVESTIGATION / INSPECTION AND FOLLOW-UP**

Each Copermittee must implement procedures to investigate and inspect portions of its MS4 that, based on the results of field screening, analytical monitoring, or other appropriate information, indicate a reasonable potential of containing illicit discharges, illicit connections, or other sources of pollutants in non-storm water.

(1) Develop response criteria for data: Each Copermittee must develop, update, and use numeric criteria action levels (or other actions level criteria where appropriate) to determine when follow-up investigations will be performed in response to water quality monitoring. The criteria must include required non-storm water action levels (see Section C) and a consideration of 303(d)-listed waterbodies and environmentally sensitive areas (ESAs) as defined in Attachment C.

(2) Respond to data: Each Copermittee must investigate portions of the MS4 for which water quality data or conditions indicates a potential illegal discharge or connection.

(a) Obvious illicit discharges (i.e. color, odor, or significant exceedances of action levels) must be investigated immediately.

(b) Field screen data: Within two business days of receiving dry weather field screening results that exceed action levels, the Copermittee(s) having jurisdiction must either initiate an investigation to identify the source of the discharge or document the rationale for why the discharge does not pose a threat to water quality and does not need further investigation. This documentation must be included in the Annual Report.

(c) Analytical data: Within five business days of receiving analytical laboratory results that exceed action levels, the Copermittee(s) having jurisdiction must either initiate an investigation to identify the source of the discharge or document the rationale for why the discharge does not pose a threat to water quality and does not need further investigation. This documentation must be included in the Annual Report.

(3) Respond to notifications: Each Copermittee must respond to and resolve each reported incident (e.g., public hotline, staff notification, etc.) made to the Copermittee in a timely manner. Criteria may be developed to assess the validity of, and prioritize the response to, each report.

f. **ELIMINATION OF ILLICIT DISCHARGES AND CONNECTIONS**

Each Copermittee must take immediate action to initiate steps necessary to eliminate all detected illicit discharges, illicit discharge sources, and illicit connections after detection within its jurisdiction. Elimination measures may include an escalating series of enforcement actions for those illicit discharges that are not a serious threat to public health or the environment. Illicit discharges that pose a serious threat to the public's health or the environment must be eliminated immediately.

g. **ENFORCE ORDINANCES**

Each Copermittee must implement and enforce its ordinances, orders, or other legal authority to prevent illicit discharges and connections to its MS4 and to eliminate detected illicit discharges and connections to its MS4.

h. **PREVENT AND RESPOND TO SEWAGE SPILLS (INCLUDING FROM PRIVATE LATERALS AND FAILING SEPTIC SYSTEMS) AND OTHER SPILLS**

Each Copermittee must implement management measures and procedures (including a notification mechanism) to prevent, respond to, contain and clean up all sewage (see below) and other spills that may discharge into its MS4 from any source (including private laterals and failing septic systems). Copermittees must coordinate with spill response teams to prevent entry of spills into the MS4 and contamination of surface water, ground water and soil. Each Copermittee must coordinate spill prevention, containment and response activities throughout all appropriate Copermittee departments, programs and agencies so that maximum water quality protection is available at all times.

5. PUBLIC PARTICIPATION COMPONENT

Each Copermittee must incorporate a mechanism for public participation in the updating, development, and implementation of the JRMP.

6. EDUCATION COMPONENT

Each Copermittee must implement education programs to (1) measurably increase the knowledge regarding MS4s, impacts of runoff on receiving waters, and potential BMP solutions for the target audience; and (2) to measurably change the behavior of target communities and thereby reduce pollutants in storm water discharges and eliminate prohibited non-storm water discharges to MS4s and the environment. At a minimum, the education programs must meet the requirements of this section and address the following target communities:

- Copermittee Departments and Personnel
- New Development / Redevelopment Project Applicants, Developers, Contractors, Property Owners, and other Responsible Parties
- Construction Site Owners and Operators
- Commercial Owners and Operators
- Industrial Owners and Operators
- Residential Community and General Public

a. **GENERAL REQUIREMENTS**

(1) At a minimum, the Copermittee education programs must educate each target community on the following topics, as appropriate to the target community's potential storm water and non-storm water discharges to the MS4:

(a) Applicable water quality laws, regulations, permits, and requirements;
(b) Best management practices;
(c) General runoff concepts;
(d) Existing water quality, including local water quality conditions, impaired waterbodies and environmentally sensitive areas; and
(e) Other topics, as determined by the Copermittee(s), such as public reporting mechanisms, water conservation, low-impact development techniques, and public health and vector issues associated with runoff.

(2) Each Copermittee must implement educational activities, public information activities, and other appropriate activities to facilitate the proper management and disposal of used oil and toxic materials.

b. **SPECIFIC REQUIREMENTS**

(1) <u>Copermittee Departments and Personnel</u>

(a) Each Copermittee must implement an education program so its staff and contractors (and Planning Boards and Elected Officials, if applicable) responsible for implementing the requirements of this Order have an understanding of the following topics as applicable to their responsibilities:

(i) Applicable water quality laws and regulations;
(ii) The potential effects and impacts that Copermittee departments and personnel activities related to their job duties can have on water quality);
(iii) Plan review policies and procedures to verify consistent application;
(iv) Methods of minimizing impacts to receiving water quality resulting from development, construction, and other potential pollutant generating activities;

(v) Proper implementation of erosion and sediment control, source control, treatment control, and other BMPs to minimize the impacts to receiving water quality resulting from development, construction, and other potential pollutant generating activities;
(vi) Applicable recordkeeping and tracking mechanisms; and
(vii) Inspection and enforcement procedures, BMP implementation, and review of monitoring data.

(b) Each Copermittee must train its staff responsible for oversight and conducting storm water compliance inspections and enforcement of construction activities (e.g. construction, building, code enforcement, grading review staffs, inspectors, and other responsible construction staff) annually prior to the rainy season.

(c) Each Copermittee must train its staff responsible for conducting storm water compliance inspections and enforcement of industrial and commercial facilities at least once a year.

(2) New Development / Redevelopment and Construction Sites

As early in the planning and development process as possible and all through the permitting and construction process, each Copermittee must notify parties responsible for the project about the importance of educating all construction workers in the field about storm water issues and BMPs, in addition to the topics under Section F.6.a.(1).

(3) Commercial and Industrial Sites / Sources

At least once during the five-year period of this Order, each Copermittee must notify the owner/operator of each of its inventoried commercial and industrial site/source of the BMP requirements applicable to the site/source.

(4) Residential and General Public

Each Copermittee shall collaboratively conduct or participate in development and implementation of a program to educate residential and general public target communities. The Copermittee residential and general public education programs must address potential pollutant generating activities (e.g., car washing, mobile operations, yard maintenance) and pollutant generating products (e.g., pesticides, fertilizers, household chemicals). The target audiences of the residential and general public education programs must include underserved target audiences (e.g., disadvantaged communities), residents and managers of CIA/HOA areas, and owners and residents of mobile home parks.

G. WATERSHED WATER QUALITY WORKPLAN

Each Copermittee must collaborate with other Copermittees to develop and implement a Watershed Water Quality Workplan (Watershed Workplan) to identify, prioritize, address, and mitigate the highest priority water quality issues/pollutants in the Upper Santa Margarita Watershed.

1. Watershed Workplan Components

The work plan must, at a minimum:

a. Characterize the receiving water quality in the watershed. Characterization must include assessment and analysis of regularly collected water quality data, reports, monitoring and analysis generated in accordance with the requirements of the Receiving Waters Monitoring and Reporting Program, as well as applicable information available from other public and private organizations. This characterization must include an updated watershed map.

b. Identify and prioritize water quality problem(s) in terms of constituents by location, in the watershed's receiving waters. In identifying water quality problem(s), the Copermittees must, at a minimum, give consideration to TMDLs, receiving waters listed on the CWA section 303(d) list, waters with persistent violations of water quality standards, toxicity, or other impacts to beneficial uses, and other pertinent conditions.

c. Identify the likely sources, pollutant discharges and/or other factors causing the highest water quality problem(s) within the watershed. Efforts to determine such sources must include, but not be limited to: use of information from the construction, industrial/commercial, municipal, and residential source identification programs required within the JRMP of this Order; water quality monitoring data collected as part of the Receiving Water Monitoring and Reporting Program required by this Order, and additional focused water quality monitoring to identify specific sources within the watershed.

d. Develop a watershed BMP implementation strategy to attain receiving water quality objectives in the identified highest priority water quality problem(s) and locations. The BMP implementation strategy must include a schedule for implementation of the BMPs to abate specific receiving water quality problems and a list of criteria to be used to evaluate BMP effectiveness. Identified watershed water quality problems may be the result of jurisdictional discharges that will need to be addressed with BMPs applied in a specific jurisdiction in order to generate a benefit to the watershed. This implementation strategy must include a map of any implemented and/or proposed BMPs.

e. Develop a strategy to monitor improvements in receiving water quality directly

resulting from implementation of the BMPs described in the Watershed Workplan. The monitoring strategy must review the necessary data to report on the measured pollutant reduction that results from proper BMP implementation. Monitoring must, at a minimum, be conducted in the receiving water to demonstrate reduction in pollutant concentrations and progression towards attainment of receiving water quality objectives.

f. Establish a schedule for development and implementation of the Watershed strategy outlined in the Workplan. The schedule must, at a minimum, include forecasted dates of planned actions to address Provisions E.2(a) through E.2(e) and dates for watershed review meetings through the remaining portion of this Permit cycle. Annual watershed workplan review meetings must be open to the public and appropriately publically noticed such that interested parties may come and provide comments on the watershed program.

2. Watershed Workplan Implementation

Watershed Copermittee's must implement the Watershed Workplan within 90 days of submittal unless otherwise directed by the San Diego Water Board.

3. Copermittee Collaboration

Watershed Copermittees must collaborate to develop and implement the accepted Watershed Workplan. Watershed Copermittee collaboration must include frequent regularly scheduled meetings. The Copermittees must pursue efforts to obtain any interagency agreements, or other coordination efforts, with non-Copermittee owners of the MS4 (such as Caltrans, Native American tribes, and school districts) to control the contribution of pollutants from one portion of the shared MS4 to another portion of the shared MS4. The Copermittees must, as appropriate, participate in watershed management efforts to address water quality issues within the entire Santa Margarita Watershed (such as the County of San Diego and U.S. Marine Corps Camp Pendleton).

4. Public Participation

Watershed Copermittees must implement a watershed-specific public participation mechanism within each watershed. A required component of the watershed-specific public participation mechanism must be a minimum 30-day public review of and opportunity to comment on the Watershed Workplan prior to submittal to the San Diego Water Board. The Workplan must include a description of the public participation mechanisms to be used and identification of the persons or entities anticipated to be involved during the development and implementation of the Watershed Workplan.

5. Watershed Workplan Review and Updates

Watershed Copermittees must review and update the Watershed Workplan annually to identify needed changes to the prioritized water quality problem(s) listed in the workplan. All updates to the Watershed Workplan must be presented during an Annual Watershed Review Meeting. Annual Watershed Review Meetings must occur once every calendar year and be conducted by the Watershed Copermittees. Annual Watershed Review Meetings must be open to the public and adequately noticed. Individual Watershed Copermittees must also review and modify their jurisdictional programs and JRMP Annual Reports, as necessary, so that they are consistent with the updated Watershed Workplan.

6. Pyrethroid Toxicity Reduction Evaluation

The Watershed Copermittees must incorporate the pyrethroid pollutant reduction program[18] into the Watershed Workplan. The pyrethroid pollutant reduction program must include the following elements:

a. Pursue state and federal regulatory change;
b. Implement a set of source controls targeted specifically at urban pyrethroid use;
c. Through the annual reporting process, monitor the implementation of those controls, assess effectiveness, and identify sources or areas where additional effort is needed;
d. Implement additional controls as needed; and
e. Continue to monitor implementation, as well as conditions within the target receiving waters, assess effectiveness, and re-evaluate control programs.

H. FISCAL ANALYSIS

1. Secure Resources: Each Copermittee must exercise its full authority to secure the resources necessary to meet all requirements of this Order.

2. Annual Analysis: Each Copermittee must conduct an annual fiscal analysis of the necessary capital and operation and maintenance expenditures necessary to accomplish the activities of the programs required by this Order. The analysis must include estimated expenditures for the current reporting period, the preceding period, and the next reporting period.

a. Each analysis must include a description of the source of funds that are proposed to meet the necessary expenditures.
b. Each analysis must include a narrative description of circumstances resulting in a 25 percent or greater annual change for any budget line items.

[18] The pyrethroid pollutant reduction program is described in the "Riverside County – Santa Margarita Region Pyrethroid Source Identification Toxicity Reduction Evaluation, Final Phase II Report", January 2009 by MACTEC.

3. Annual Reporting: Each Copermittee must submit its annual fiscal analysis with the annual JRMP report.

I. TOTAL MAXIMUM DAILY LOADS

1. The waste load allocations (WLAs) of fully approved and adopted TMDLs are incorporated as Water Quality Based Effluent Limitations on a pollutant by pollutant, watershed by watershed basis. Early TMDL requirements, including monitoring, may be required and inserted into this Order pursuant to Finding E.10.

2. The Cities of Wildomar and Murrieta must comply with the requirements and WLAs assigned to the discharges from their MS4s contributing to the Lake Elsinore/Canyon Lake (San Jacinto Watershed) Nutrient TMDLs as specified in Section VI.D.2 of the Santa Ana Water Board's Order R8-2010-0033, including relevant sections of the fact sheet and findings, and subsequent revisions thereto.

J. PROGRAM EFFECTIVENESS ASSESSMENT AND REPORTING

Beginning with the Annual Report due in 2013, each Copermittee must annually assess and report upon the effectiveness of its JRMP and Watershed Workplan implementation to (1) reduce the discharge of storm water pollutants from its MS4 to the MEP; (2) prohibit non-stormwater discharges; and (3) prevent runoff discharges from the MS4 from causing or contributing to a violation of water quality standards.

1. Program Effectiveness Assessments

a. IDENTIFY EFFECTIVENESS ASSESSMENTS

With the JRMP and Watershed Workplan submittal, each Copermittee must establish assessment measures or methods for each of the six outcome levels described by CASQA[19], using data from each JRMP program component, the MRP, and the Watershed Workplan.

(1) Assessment interval: For each established assessment measure or method, an assessment interval must be established as appropriate to the measure or method.

(2) Projected Timeframe: For each established assessment measure or method, each Copermittee must identify the projected timeframe within which the associated outcome level can adequately assess change.

[19] Effectiveness assessment outcome levels as defined by CASQA are defined in Attachment C of this Order. See "*Municipal Stormwater Program Effectiveness Assessment Guidance"* (CASQA, May 2007) for guidance for assessing program activities at the various outcome levels.

b. **PERFORM ASSESSMENTS**

(1) Annually: Each year, the Copermittee must perform each applicable assessment based on the associated assessment interval, and determine whether the desired outcome has been met.

(2) With the submittal of the Report of Waste Discharge, the Copermittees must determine whether their program implementation is resulting in the protection and/or improvement of water quality through an Integrated Assessment.

2. Respond to Assessments

a. Where the assessments indicate that the desired outcome level has not been achieved at the end of the projected timeframe, the Copermittee must review its applicable activities and BMPs to identify any modifications and improvements needed to maximize effectiveness, as necessary to comply with this Order. If the Copermittee determines that the existing activities/BMPs are adequate, or that the projected timeframe should be extended, justification and an updated timeframe for attainment of the outcome level must be provided in the Annual Report.

b. Each Copermittee must develop and implement a work plan and schedule to address any program modifications and improvements in response to the findings of its assessment. The work plan and schedule must be provided and updated with the applicable Annual Report. The work plan must include, at a minimum, the following:

(1) The problems and priorities identified during the assessment;
(2) A list of priority pollutants and known or suspected sources;
(3) A brief description of the strategy employed to reduce, eliminate or mitigate the negative impacts;
(4) A description and schedule for new and/or modified BMPs. The schedule is to include dates for significant milestones;
(5) A description of how the selected activities will address an identified high priority problem. This will include a description of the expected effectiveness and benefits of the new and/or modified BMPs;
(6) A description of implementation effectiveness metrics;
(7) A description of how efficacy results will be used to modify priorities and implementation; and
(8) A review of past activities implemented, progress in meeting water quality standards, and planned program adjustments.

3. Assessment and Response Reporting

Each Copermittee must include a summary of its effectiveness assessments within each Annual Report. Beginning with the FY 2012-2013 Annual Report, the Program Effectiveness reporting must include:

a. The results of each of the effectiveness assessments performed pursuant to J.1.b, including the demonstrated CASQA effectiveness level(s);

b. Responses to effectiveness assessments: A description of any program modifications planned in accordance with section J.2, including the work plan and identified schedule for implementation. The description must include the basis for determining that each modified activity and/or BMP represents an improvement expected to result in improved water quality; and

c. A description of any steps to be implemented to improve the Copermittee's ability to assess program effectiveness.

K. REPORTING

The Copermittees may propose alternate reporting criteria and schedules, as part of their updated JRMP, for the Executive Officer's acceptance.

1. Runoff Management Plans

a. **JURISDICTIONAL RUNOFF MANAGEMENT PLANS**

(1) The written account of the overall program to be conducted by each Copermittee to meet the jurisdictional requirements of section F of this Order is referred to as the Jurisdictional Runoff Management Plan (JRMP). Each Copermittee must revise and update its existing JRMP so that it describes all activities the Copermittee will undertake to implement the requirements of this Order. Each Copermittee must submit its updated and revised JRMP to the San Diego Water Board <u>no later than June 30, 2012</u>.

(2) At a minimum, each Copermittee's JRMP must be updated and revised to demonstrate compliance with each applicable section of this Order.

b. **WATERSHED WORKPLANS**

Copermittees must update and revise the Watershed Workplan to describe any changes in water quality problems or priorities, and any necessary change to actions Copermittees will take to implement jurisdictional or watershed BMPs to address those identified. The Copermittees must assemble and submit the Watershed Workplan to the San Diego Water Board no later than June 30, 2012, and must implement the Workplan within 90 days unless otherwise directed by the San Diego Water Board.

2. Other Required Reports and Plans

a. **SSMP UPDATES**

(1) Copermittees must submit their updated SSMP in accordance with the applicable requirements of section F.1 with the JRMP by June 30, 2012.

(2) Within 180 days of determination that the SSMP is in compliance with this Order's provisions, each Copermittee must amend its ordinances consistent with the SSMP and implement the updated SSMP. Any amended or new ordinances must be submitted to the San Diego Water Board the applicable Annual Report.

b. **HMP**

(1) By June 30, 2013, the Copermittees must submit to the San Diego Water Board Executive Officer a draft HMP that has been reviewed by the public, including identification of the appropriate limiting range of flow rates in accordance with the applicable requirements of section F.1.h.

(2) Within 180 of receiving San Diego Water Board comments on the draft HMP, the Copermittees must submit a final HMP that addressed the San Diego Water Board's comments.

(3) Within 90 days of receiving a finding of adequacy from the Executive Officer each Copermittee must incorporate and implement the HMP for all Priority Development Projects.

(4) Prior to acceptance of the HMP by the San Diego Water Board, the early implementation measures likely to be included in the HMP shall be encouraged by the Copermittees.

c. **REPORT OF WASTE DISCHARGE**

The Copermittees must submit to the San Diego Water Board, no later than 180 days in advance of the expiration date of this Order, a Report of Waste Discharge (ROWD) as an application for issuance of new waste discharge requirements. The fourth annual report for this Order may supplement the ROWD, provided the ROWD contains the minimum information below.

At a minimum, the ROWD must include the following: (1) Proposed changes to the Copermittees' runoff management programs; (2) Proposed changes to monitoring programs; (3) Justification for proposed changes; (4) Name and mailing addresses of the Copermittees; (5) Names and titles of primary contacts of the Copermittees; (6) Any other information necessary for the reissuance of this Order and (7) Any other information required by federal regulations for permit reapplications.

3. Annual Reports

JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM (JRMP) ANNUAL REPORTS

a. Each Copermittee must generate individual JRMP Annual Reports that cover implementation of its jurisdictional activities during the past annual reporting period. Each Annual Report must verify and document compliance with this Order as directed in this section. Each Copermittee must retain records in accordance with the Standard Provisions in Attachment B of this Order, available for review, that document compliance with each requirement of this Order. The reporting period for these annual reports must be the previous fiscal year.

b. Each Copermittee must submit its JRMP Annual Reports to the San Diego Water Board by October 31of each year, beginning on October 31, 2013.

c. Each JRMP Annual Report must contain, at a minimum, the following information, as applicable to the Copermittee:

(1) Information required to be reported annually in Section H (Fiscal Analysis) of this Order;
(2) Information required to be reported annually in Section J (Program Effectiveness) of this Order;
(3) The completed Reporting Checklist found in Attachment D; and
(4) Information for each program component as described in the following Table 5:

Table 5. Annual Reporting Requirements

Program Component	Reporting Requirement
New Development	1. All updated relevant sections of the General Plan and environmental review process and a description of any planned updates within the next annual reporting period, if applicable;
	2. All revisions to the SSMP, including where applicable: (a) Identification and summary of where the SSMP fails to meet the requirements of this Order; (b) Updated procedures for identifying pollutants of concern for each Priority Development Project; (c) Updated treatment BMP ranking matrix; (d) Updated site design and treatment control BMP design standards;
	3. Number of Priority Development Projects reviewed and approved during the reporting period. Brief description of BMPs required at approved Priority Development Projects. Verification that site design, source control, and treatment BMPs were required on all applicable Priority Development Projects;
	4. Name and location of all Priority Development Projects that were granted a waiver from implementing LID BMPs pursuant to section F.1.d.(4) during the reporting period;
	5. Updated watershed-based BMP maintenance tracking database of approved treatment control BMPs and treatment control BMP maintenance within its jurisdiction, including updates to the list of high-priority Priority Development Projects; and verification that the requirements of this Order were met during the reporting period;

Table 5. Annual Reporting Requirements (Cont'd)

Program Component	Reporting Requirement
New Development (Cont'd)	6. Name and brief description of all approved Priority Development Projects required to implement hydrologic control measures in compliance with section F.1.h including a brief description of the management measures planned to protect downstream beneficial uses and prevent adverse physical changes to downstream stream channels;
	7. Number and description of all enforcement activities applicable to the new development and redevelopment component and a summary of the effectiveness of those activities.
Construction	1. All updated relevant ordinances and description of planned ordinance updates within the next annual reporting period, if applicable;
	2. A description of any changes to procedures used for identifying priorities for inspecting sites and enforcing control measures that consider the nature of the construction activity, topography, and the characteristics of soils and receiving water quality;
	3. Any changes to the designated minimum and enhanced BMPs;
	4. Summary of the inspection program, including the following information: (a) Total number and date of inspections conducted at each facility; (b) Number, date, and types of enforcement actions by facility; (c) Brief description of each high-level enforcement actions at construction sites including the effectiveness of the enforcement. Supporting paper (or electronic) files must be maintained by the Copermittees and made available upon San Diego Water Board request. Supporting files must include a record of inspection dates, the results of each inspection, photographs (if any), and a summary of any enforcement actions taken.
Municipal	1. Updated source inventory;
	2. All changes to the designated municipal BMPs;
	3. Descriptions of any changes to procedures to assure that flood management projects assess the impacts on the water quality of receiving water bodies;
	4. Summary and assessment of BMP retrofits implemented at flood control structures, including: (a) List of projects retrofitted; (b) List and description of structures evaluated for retrofitting; (c) List of structures still needing to be evaluated and the schedule for evaluation;

Table 5. Annual Reporting Requirements (Cont'd)

Program Component	Reporting Requirement
Municipal (Cont'd)	5. Summary of the municipal structural treatment control operations and maintenance activities, including: (a) Number of inspections and types of facilities; (b) Summary of findings;
	6. Summary of the MS4 and MS4 facilities operations and maintenance activities, including: (a) Number and types of facilities maintained; (b) Amount of material removed; (c) List of facilities planned for bi-annual inspections and the justification;
	7. Summary of the municipal areas/programs inspection activities, including: (a) Number and date of inspections conducted at each facility; (b) The BMP violations identified during the inspection by facility; (c) Number, date and types of enforcement actions by facility; (d) Summary of inspection findings and follow-up activities for each facility;
	8. Description of activities implemented to address sewage infiltration into the MS4;
	9. Description of BMPs and their implementation for unpaved roads construction and maintenance.
Commercial / Industrial	1. Updated inventory of commercial / industrial sources;
	2. Summary of the inspection program, including the following information: (a) Number and date of inspections conducted at each facility or mobile business; (b) The BMP violations identified during the inspection by facility; (c) Number, date, and types of enforcement actions by facility or mobile business; (d) Brief description of each high-level enforcement actions at commercial/industrial sites including the effectiveness of the enforcement and follow-up activities for each facility;
	3. All changes to designated minimum and enhanced BMPs;
	4. A list of industrial sites, including each name, address, and SIC code, that the Copermittee suspects may require coverage under the General Industrial Permit, but has not submitted an NOI.

Table 5. Annual Reporting Requirements (Cont'd)

Program Component	Reporting Requirement
Residential	1. All updated minimum BMPs required for residential areas and activities;
	2. Quantification and summary of applicable runoff and storm water enforcement actions within residential areas and activities;
	3. Description of efforts to manage runoff and storm water pollution in common interest areas and mobile home parks.
Retrofitting Existing Development	1. Updated inventory and prioritization of existing developments identified as candidates for retrofitting;
	2. Description of efforts to retrofit existing developments during the reporting year;
	3. Description of efforts taken to encourage private landowners to retrofit existing development;
	4. A list of all retrofit projects that have been implemented, including site location, a description of the retrofit project, pollutants expected to be treated, and the tributary acreage of runoff that will be treated;
	5. Any proposed retrofit or regional mitigation projects and timelines for future implementation;
	6. Any proposed changes to the Copermittee's overall retrofitting program.
Illicit Discharge Detection and Elimination	1. Any changes to the legal authority to implement Illicit Discharge Detection and Elimination activities;
	2. Any Changes to the established investigation procedures;
	3. Any changes to public reporting mechanisms, including phone numbers and web pages;
	4. Summaries of illicit discharges (including spills and water quality data events) and how each significant case was resolved;
	5. A description of instances when field screening and analytical data exceeded action levels, including those instances for which no investigation was conducted;
	6. A description of follow-up and enforcement actions taken in response to investigations of illicit discharges and a description of the outcome of the investigation/enforcement actions.
Workplans	Updated workplans including priorities, strategy, implementation schedule and effectiveness evaluation.

d. Each JRMP Annual Report must also include the following information regarding non-storm water discharges (see Section B.2. of this Order):

(1) Identification of non-storm water discharge categories identified as a source of pollutants to waters of the U.S;
(2) A description of any updates to ordinances, orders, or similar means to prohibit non-storm water discharge categories identified under section B.2 above ;
(3) Identification of any control measures to be required and implemented for

non-storm water discharge categories identified as needing controls by the San Diego Water Board; and

(4) A description of a program to address pollutants from non-emergency fire fighting flows identified by the Copermittee to be significant sources of pollutants.

4. Interim Reporting Requirements

For the reporting periods, prior to submittal of the JRMP, each JRMP Annual Report must be submitted in accordance with the requirements and deadlines described in Order No. 2004-001.

5. Universal Reporting Requirements

All submittals must include an executive summary, introduction, conclusion, recommendations, and signed certified statement. Each Copermittee must submit a signed certified statement covering its responsibilities for each applicable submittal. The Principal Copermittee must submit a signed certified statement covering its responsibilities for each applicable submittal and the sections of the submittals for which it is responsible.

L. MODIFICATION OF PROGRAMS

Modifications of JRMPs and/or Watershed Workplan may be initiated by the Executive Officer of the San Diego Water Board or by the Copermittees. Requests by Copermittees must be made to the Executive Officer, and must be submitted during the annual review process. Requests for modifications should be incorporated, as appropriate, into the Annual Reports or other deliverables required or allowed under this Order.

1. Minor modifications to JRMPs, and/or Watershed Workplan, may be accepted by the Executive Officer where the Executive Officer finds the proposed modification complies with all discharge prohibitions, receiving water limitations, and other requirements of this Order.

2. Proposed modifications that are not minor require amendment of this Order in accordance with this Order's rules, policies, and procedures.

M. PRINCIPAL COPERMITTEE RESPONSIBILITIES

Within 180 days of adoption of this Order, the Copermittees must designate the Principal Copermittee and notify the San Diego Water Board of the name of the Principal Copermittee. The Principal Copermittee must, at a minimum:

1. Serve as liaison between the Copermittees and the San Diego Water Board on general permit issues, and when necessary and appropriate, represent the Copermittees before the San Diego Water Board.

2. Coordinate permit activities among the Copermittees and facilitate collaboration on the development and implementation of programs required under this Order.

3. Coordinate the submittal of the documents and reports as required by section K of this Order and Receiving Waters and MS4 Discharge Monitoring and Reporting Program No. R9-2010-0016 in Attachment E of this Order.

N. RECEIVING WATERS AND MS4 DISCHARGE MONITORING AND REPORTING PROGRAM

Pursuant to CWC section 13267, the Copermittees must comply with all the requirements contained in Receiving Waters and MS4 Discharge Monitoring and Reporting Program (MRP) No. R9-2010-0016 in Attachment E of this Order.

O. STANDARD PROVISIONS, REPORTING REQUIREMENTS, AND NOTIFICATIONS

1. Each Copermittee must comply with Standard Provisions, Reporting Requirements, and Notifications contained in Attachment B of this Order. This includes 24 hour/5 day reporting requirements for any instance of non-compliance with this Order as described in section 5.e of Attachment B.

2. All plans, reports and subsequent amendments submitted in compliance with this Order must be implemented immediately (or as otherwise specified). All submittals by Copermittees must be adequate to implement the requirements of this Order.

P. ADDITIONAL PROVISIONS

The Executive Officer shall meet with Camp Pendleton and other stakeholders at six (6) month intervals to identify and investigate water quality impacts, flow impacts, and impacts to water rights that may derive from the implementation of Low Impact Development BMPs required by Order R9-2010-0016 as they are developed by the storm water Copermittees. Any key issues or amendments to the Order that derive from those analyses and discussions will be promptly brought to the San Diego Water Board for their consideration.

I, David W. Gibson, Executive Officer, do hereby certify the foregoing is a full, true, and correct copy of an Order adopted by the California Regional Water Quality Control Board, San Diego Region, on November 10, 2010.

David W. Gibson
Executive Officer

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B004	Warner, R.E., and K.M. Hendrix. 1984. California Riparian Systems: Ecology, Conservation, and Productive Management. pp 160-189	000202
B005	County of Los Angeles v. State of California (1987) 43 Cal.3d 46, 57-58	000242
B006	Schueler, T.R., 1987. Controlling Urban Runoff: A Practical Manual for Planning and Designing Urban BMPs. Metropolitan Washington Council of Governments	000252
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B013	USEPA, 1991. Technical Support Document for Water Quality Based Toxics Control. EPA 505-2-90-001	000836
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B018	USEPA, 1992. NPDES Storm Water Sampling Guidance Document. EPA/833-B-92-001	001286
B019	Ribaudo M.O. and D. Heelerstein. 1992, Estimating Water Quality Benefits: Theoretical and Issues. U.S. Department of Agriculture. Technical Bulletin No. 1808 Methodologica	001463
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B021	USEPA, 1993. Results of the Nationwide Urban Runoff Program, Volume 1 - Final Repor	001644
B022	State Water Resources Control Board, 1993. Memo Entitled Definition of Maximum Extent Practicable	001842
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B024	State Board, 1994. Urban Runoff Technical Advisory Committee Report and Recommendations Nonpoint Source Management Program.	002192
B025	Schueler, T.R., 1994. The Importance of Imperviousness. Watershed Protection Techniques. As cited in 64 Fed Reg.	002217
B026	USEPA, 1994. Potential Groundwater Contamination from Intentional and Nonintentional Stormwater Infiltration EPA 600 SR 94 051.	002229
B027	Article 100 Technical Note #51 Watershed Protection Techniques, 1995. Mosquitoes in Constructed Wetlands: A Management Bugaboo?	002237
B028	Abel, P.D. 1996. Water Pollution Biology	002242
B029	Carroll, R., Augspurger, C., Dobson, A., Franklin, J., Orians, G., Reid, W., Tracy, R., Wilcove, D., and J. Wilson. 1996. Strengthening the use of science in achieving the goals of the Endangered Species Act: An Assessment by the Ecology Society of America. Ecological Application.	002539
B030	Haile, R.W., et al, 1996. An Epidemiological Study of Possible Adverse Health Effects of Swimming in Santa Monica Bay. Santa Monica Bay Restoration Project	002551
B031	US Forest Service. 1996. Forest Service Specifications for Construction of Roads & Bridges. EM-7720-100. Revised August 1996	002734
B032	Federal Register / Vol. 61, No. 155 / Friday, August 9, 1996 / Rules and Regulations. Interpretive Policy Memorandum on Reapplication Requirements for MS4s	002750
B033	USEPA, 1996. Interim Permitting Approach for Water Quality-Based Effluent Limitations in Storm Water Permits	002752
B034	United States Department of the Interior, Fish and Wildlife Service, 1997. Coastal California Gnatcatcher Presence/Absence Survey Guidelines.	002766
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B036	Poff. N.L. et al. 1997. The Natural Flow Regime: A paradigm for river conservation and restoration. Bioscience Vol. 47, No. 11,	002815
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B039	Letter from Alexis Strauss, Acting Director, Water Division, USEPA to Walt Pettit, Executive Officer, SWRCB dated January 21, 1998 in Regards to SWRCB/OCC File A-1041 for Orange County	002874
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B042	Defenders of Wildlife v. Browner, 1999. 197 F. 3d 1035	002898
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B044	USEPA, 1999. Field Manual of Wildlife Diseases: General Field Procedures and Diseases of Birds. Chapter 3	002905
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B046	State Water Board, 1999. Order No. 99-06-DWQ	003083
B047	USEPA, 1999. Rapid Bioassessment Protocols for Use in Wadeable Streams and Rivers. EPA 841-B-99-002	003127
B048	USEPA, 1999. Preliminary Data Summary of Urban Storm Water Best Management Practices. EPA 821-R-99-012	003471
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B062	USEPA, 2000. Storm Water Phase II Compliance Assistance Guide. Washington D.C. EPA 833-R-00-002	008260
B063	LARWQCB, 2000. Standard Urban Storm Water Mitigation Plan for Los Angeles County and Cities in Los Angeles County.	008357
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B066	Caltrans, 2000. BMP Retrofit Pilot Studies: A Preliminary Assessment for Vector Preventior	008767
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B068	USEPA, 2000. Guiding Principles for Constructed Treatment Wetlands: Providing for Water Quality and Wildlife Habitat (EPA 843-B-00-003).	009361
B069	Low Impact Development (LID) A Literature Review	009386
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B073	Fischenich, J.C. 2001. "Impacts of stabilization measures," EMRRP Technical Notes Collection (ERDC TNEMRRP- SR-32), U.S. Army Engineer Research and Development Center, Vicksburg	009473
B074	United States Department of the Interior, Fish and Wildlife Service, 2001. Least Bell's Vireo Survey Guidelines	009484
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B088	Naiman, R.J.m Bunn, S.E., Nilsson, C. Petts, G.E., Pinay, G, and L.C. Thompson. 2002. Legitimizing Fluvial Ecosystems and Useres of Water: An Overview. Environmental Management	012667
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STATE WATER RESOURCES CONTROL BOARD

RESOLUTION NO. 68-16

STATEMENT OF POLICY WITH RESPECT TO MAINTAINING HIGH QUALITY OF WATERS IN CALIFORNIA

WHEREAS the California Legislature has declared that it is the policy of the State that the granting of permits and licenses for unappropriated water and the disposal of wastes into the waters of the State shall be so regulated as to achieve highest water quality consistent with maximum benefit to the people of the State and shall be controlled so as to promote the peace, health, safety and welfare of the people of the State; and

WHEREAS water quality control policies have been and are being adopted for waters of the State; and

WHEREAS the quality of some waters of the State is higher than that established by the adopted policies and it is the intent and purpose of this Board that such higher quality shall be maintained to the maximum extent possible consistent with the declaration of the Legislature;

NOW, THEREFORE, BE IT RESOLVED:

1. Whenever the existing quality of water is better than the quality established in policies as of the date on which such policies become effective, such existing high quality will be maintained until it has been demonstrated to the State that any change will be consistent with maximum benefit to the people of the State, will not unreasonably affect present and anticipated beneficial use of such water and will not result in water quality less than that prescribed in the policies.

2. Any activity which produces or may produce a waste or increased volume or concentration of waste and which discharges or proposes to discharge to existing high quality waters will be required to meet waste discharge requirements which will result in the best practicable treatment or control of the discharge necessary to assure that (a) a pollution or nuisance will not occur and (b) the highest water quality consistent with maximum benefit to the people of the State will be maintained.

3. In implementing this policy, the Secretary of the Interior will be kept advised and will be provided with such information as he will need to discharge his responsibilities under the Federal Water Pollution Control Act.

BE IT FURTHER RESOLVED that a copy of this resolution be forwarded to the Secretary of the Interior as part of California's water quality control policy submission.

CERTIFICATION

The undersigned, Executive Officer of the State Water Resources Control Board, does hereby certify that the foregoing is a full, true, and correct copy of a resolution duly and regularly adopted at a meeting of the State Water Resources Control Board held on October 24, 1968.

Dated: October 28, 1968

Kerry W. Mulligan
Executive Officer
State Water Resources
Control Board

STATE OF CALIFORNIA
AUTHENTICATED
ELECTRONIC LEGAL MATERIAL
LEGISLATIVE COUNSEL BUREAU

CONSTITUTION OF THE STATE OF CALIFORNIA

ARTICLE XIII B GOVERNMENT SPENDING LIMITATION

Section 6

SEC. 6. (a) Whenever the Legislature or any state agency mandates a new program or higher level of service on any local government, the State shall provide a subvention of funds to reimburse that local government for the costs of the program or increased level of service, except that the Legislature may, but need not, provide a subvention of funds for the following mandates:

(1) Legislative mandates requested by the local agency affected.

(2) Legislation defining a new crime or changing an existing definition of a crime.

(3) Legislative mandates enacted prior to January 1, 1975, or executive orders or regulations initially implementing legislation enacted prior to January 1, 1975.

(4) Legislative mandates contained in statutes within the scope of paragraph (7) of subdivision (b) of Section 3 of Article I.

(b) (1) Except as provided in paragraph (2), for the 2005–06 fiscal year and every subsequent fiscal year, for a mandate for which the costs of a local government claimant have been determined in a preceding fiscal year to be payable by the State pursuant to law, the Legislature shall either appropriate, in the annual Budget Act, the full payable amount that has not been previously paid, or suspend the operation of the mandate for the fiscal year for which the annual Budget Act is applicable in a manner prescribed by law.

(2) Payable claims for costs incurred prior to the 2004–05 fiscal year that have not been paid prior to the 2005–06 fiscal year may be paid over a term of years, as prescribed by law.

(3) Ad valorem property tax revenues shall not be used to reimburse a local government for the costs of a new program or higher level of service.

(4) This subdivision applies to a mandate only as it affects a city, county, city and county, or special district.

(5) This subdivision shall not apply to a requirement to provide or recognize any procedural or substantive protection, right, benefit, or employment status of any local government employee or retiree, or of any local government employee organization, that arises from, affects, or directly relates to future, current, or past local government employment and that constitutes a mandate subject to this section.

(c) A mandated new program or higher level of service includes a transfer by the Legislature from the State to cities, counties, cities and counties, or special districts of complete or partial financial responsibility for a required program for which the State previously had complete or partial financial responsibility.

(Sec. 6 amended June 3, 2014, by Prop. 42. Res.Ch. 123, 2013.)

United States
Environmental Protection
Agency

Water Planning Division
WH-554
Washington, DC 20460

December 1983

Water

EPA

Results of the Nationwide Urban Runoff Program

Volume I - Final Report

RESULTS

OF THE

NATIONWIDE URBAN RUNOFF PROGRAM

December, 1983

VOLUME I - FINAL REPORT

Water Planning Division

U.S. Environmental Protection Agency

Washington, D.C. 20460

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DISCLAIMER

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FOREWORD

The U.S. Environmental Protection Agency was created because of increasing public and government concern about environmental quality. The complexity of our environment and the interplay among its components require concentrated and integrated approaches to pollution problems.

The possible deleterious water quality effects of nonpoint sources in general, and urban runoff in particular, were recognized by the Water Pollution Control Act Amendments of 1972. Because of uncertainties about the true significance of urban runoff as a contributor to receiving water quality problems, Congress made treatment of separate stormwater discharges ineligible for Federal funding when it enacted the Clean Water Act in 1977. To obtain information that would help resolve these uncertainties, the Agency established the Nationwide Urban Runoff Program (NURP) in 1978. This five-year program was designed to examine such issues as:

- The quality characteristics of urban runoff, and similarities or differences at different urban locations;

- The extent to which urban runoff is a significant contributor to water quality problems across the nation; and

- The performance characteristics and the overall effectiveness and utility of management practices for the control of pollutant loads from urban runoff.

The interim NURP report, published in March 1982, presented preliminary findings of the program. This document is the final report covering the overall NURP program. Several specialized technical reports are published under separate cover.

PREFACE

The Nationwide Urban Runoff Program (NURP) was conducted by the EPA and many cooperating federal, state, regional, and local agencies, distributed widely across the United States. The individual project studies, which were conducted over the past five years, were designed and overseen using a common technical team from EPA headquarters. This approach was taken to assure a desired level of commonality and consistency in the overall program, while allowing each individual project to specially tailor its effort to focus on local concerns.

The program has yielded a great deal of information which will be useful for a broad spectrum of planning activities for many years. Furthermore, it has fostered valuable cooperative relationships among planning and regulatory agencies. The most tangible products of the program are this report, the reports of various grantees (available under separate cover), and several technical reports which focus on specialized aspects of the program, its techniques, and its findings. In addition, a considerable number of individual articles drawing on information developed under the NURP program have already appeared in the technical literature and address specific technical or planning aspects of urban runoff.

At the time of publication of this Final Report, the main technical effort of the NURP program is complete; the field studies and the analysis of most of the resultant data are complete enough that the findings reported herein can be taken with confidence. However, there is still some work in progress to make certain details of the program available for future use. The products of this on-going work include:

- A summary database which is being compiled to make all technical information from the 28 projects available for review and use (DECEMBER 1985);

- A technical report which focuses on the program's studies and findings relative to detention and recharge devices (MAY 1984);

- A technical report on urban runoff effects on the water quality of rivers and streams (MARCH 1984); and

- A technical report on the effectiveness of street sweeping as a potential "best management practice" for water pollution control (MAY 1984).

This report and the supplementary technical documents identified above, supersedes the earlier NURP publication, "Preliminary Results of the Nationwide Urban Runoff Program," March 1982. Information presented there has been expanded, updated, and in some cases revised.

ACKNOWLEDGEMENTS

The Nationwide Urban Runoff Program was unusual in its large scale, covering a broad spectrum of technical and planning issues at many geographic locations. Because the program placed such emphasis on tailoring the results to support the planning process, it involved many participants - some from EPA, some from other federal agencies, and many from state, regional, and local planning agencies and other consultants.

The program was developed, implemented, and managed by the Water Planning Division, Office of Water, at EPA Headquarters, Washington, D.C. Principal contributors were: Dennis N. Athayde, Program Manager; and Patrice M. Bubar, Norman A. Whalen, Stuart S. Tuller, and Phillip H. Graham, all of whom served as Project Officers. Additional contributions from EPA personnel came from Rod E. Frederick and Richard P. Healy (Monitoring and Data Support Division), Richard Field (Storm and Combined Sewer Section, EPA Office of Research and Development), and many project staff in the various EPA Regional Offices.

As described elsewhere, much of the field work, water quality analysis, and data analysis was performed by the U.S. Geological Survey (USGS), under a Memorandum of Agreement with EPA. Both District Offices and National Headquarters participated actively. The contributions of Messrs. Ernest Cobb and David Lystrom are especially acknowledged.

Members of the project team which provided essential strategic, technical, and management assistance to the EPA Water Planning Division through a contract with Woodward-Clyde Consultants were: Gail B. Boyd, David Gaboury, Peter Mangarella, and James D. Sartor (Woodward-Clyde Consultants); Eugene D. Driscoll (E. D. Driscoll and Associates); Philip E. Shelley (EG&G Washington Analytical Services Center, Inc.); John L. Mancini (Mancini and DiToro Consultants); Robert E. Pitt (private consultant); Alan Plummer (Alan Plummer and Associates); and James P. Heaney and Wayne C. Huber (University of Florida).

The principal writers of this report were Dennis N. Athayde (EPA), Philip E. Shelley (EG&G Washington Analytical Services Center, Inc.), Eugene D. Driscoll (E. D. Driscoll & Associates), and David Gaboury and Gail B. Boyd (Woodward-Clyde Consultants).

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CHAPTER 1
INTRODUCTION

Rain falling on an urban area results in both benefits and problems. The benefits range from watering vegetation to area cleansing. Many of the problems are associated with urban runoff, that portion of rainfall which drains from the urban surfaces and flows via natural or man-made drainage systems into receiving waters.

The historical concern with urban runoff has been focused primarily on flooding. Urban development has the general effect of reducing pervious land surface area and increasing the impervious area (such as roof tops, streets, and sidewalks) where water cannot infiltrate. In comparison with an undeveloped area (for a given storm event), an urban area will yield more runoff, and it will occur more quickly. Such increases in the rate of flow and total volume often have a decided effect on erosion rates and flooding. It is not surprising, therefore, that at the local level the quantity aspect continues to be a principal concern.

In recent years, however, concern with urban runoff as a contributor to receiving water quality problems has been expressed. Section 62 of the Water Quality Act of 1965 (P.L. 89-234) authorized the Federal government to make grants for the purpose of "assisting in the development of any project which will demonstrate a new or improved method of controlling the discharge into any water of untreated or inadequately treated sewage or other waste from sewerage which carry storm water or both storm water and sewage or other waste ..." The Federal Water Pollution Control Act Amendments of 1972 (P.L. 92-500) signaled a heightened national awareness of the degraded state of the nation's surface waters and a Congressional intent that national water quality goals be pursued. The scarcely two-year old Environmental Protection Agency built upon its predecessors' activities by taking up the challenge and implementing this far reaching legislation.

As a result of Section 208 of The Act, State and local water quality management agencies were designated to integrate water quality activities. As point source discharges were increasingly brought under control and funds for the construction and upgrading of municipal sewage treatment plants were granted, the awareness of nonpoint sources (including urban runoff) as potential contributors to water quality degradation was heightened. Uncertainties associated with the local nature and extent of urban runoff water quality problems, the effectiveness of possible management and control measures, and their affordability in terms of benefits to be derived mounted as water quality management plans were developed. The unknowns were so great and certain control cost estimates were so high that the Clean Water Act of 1977 (P.L. 95-217) deleted Federal funding for the treatment of separate stormwater discharges. The Congress stated that there was simply not enough

known about urban runoff loads, impacts, and controls to warrant making major investments in physical control systems.

In 1978, EPA Headquarters reviewed the results of work on urban runoff by the technical community and the various 208 Areawide Agencies and determined that additional, consistent data were needed. The NURP program was implemented to build upon pertinent prior work and to provide practical information and insights to guide the planning process, including policy and program development and implementation. The NURP program included 28 projects, conducted separately at the local level, but centrally reviewed, coordinated, and guided. While these projects were separate and distinct, most share certain commonalities. All were involved with one or more of the following elements: characterizing pollutant types, loads, and effects on receiving water quality; determining the need for control; and evaluating various alternatives for the control of stormwater pollution. Their emphasis was on answering the basic questions underlying the NURP program and providing practical information needed for planning.

CHAPTER 2
BACKGROUND

EARLY PERCEPTIONS

As noted earlier, drainage is perhaps the single most important factor of the urban hydrologic cycle. Nuisance flooding, more than anything else, gives Public Works directors concern, as complaints are received from unhappy motorists, residents, and business. Drainage has typically been considered a local responsibility, usually that of the City or County Public Works Department. Rarely does this responsibility go to the State or Federal level, except in cases of catastrophic flooding involving risk to human life and extensive property damage.

By 1964, the U.S. Public Health Service had begun to be concerned about identified pollutants in urban runoff and concluded that there may be significant water quality problems associated with stormwater runoff. In 1969, the Urban Water Resources Research Committee of the American Society of Civil Engineers (directed by M. B. McPherson and sponsored by the U.S. Geological Survey) recognized the potential threat of pollution from urban runoff and described a research program intended to obtain needed information to characterize urban stormwater quality.

In the late 1960's, the Federal Water Quality Administration (FWQA) conducted a study in an area of Tulsa, Oklahoma which was served by separate storm sewers. This first attempt at using regression analysis on urban runoff indicated that there was only a very poor correlation between stormwater runoff quantity and water quality constituents (except for suspended solids). Comparing the concentrations of various pollutants examined by this study (separate storm sewers) with previous data on combined sewer overflows indicated that storm runoff from areas having separate sewers had much lower values for BOD, fecal coliform, and most other pollutant concentrations. The study concluded that the largest portion of pollutants resulted from (1) washoff of material from impervious surfaces and (2) the erosion of drainage channels (caused by high volumes of runoff from the impervious surfaces). Control of urban runoff was recommended to reduce both runoff volume and rates.

Atlanta, Georgia is an example of a city that has both a combined sewer system and a separate system. In 1971, EPA conducted a study which compared the contribution of various sources of pollutants. It was concluded that, on an annual basis, 64 percent of the BOD load came from separate storm sewers, and 19 percent came from combined sewers, the balance coming from treatment plants.

In 1971, EPA also conducted a study in Oakland and Berkeley, California, to assess the infiltration of stormwater into sanitary sewers. While only four

percent of the study area had combined sewerage and the remaining 96 percent separate, the study made it clear that infiltration can cause a separate system to function as though it were combined.

Studies in Sacramento, California, which has both combined and separate storm sewers, indicated that the stormwater was comparable to the average strength of domestic wastewater. However, the concentrations for BOD were found to be so unrealistically high, that contamination of the runoff by raw sanitary sewage was considered to be a distinct possibility.

In 1973, the Council on Environmental Quality published a report titled, "Total Urban Pollutant Loads: Sources and Abatement Strategies." The primary conclusion was that much pollution was coming from urban runoff and that, unless it was taken care of, the goals of the Act would not be met.

CONCLUSIONS FROM SECTION 208 EFFORTS

EPA guidance for conducting the early 208 planning efforts designated 17 topic areas (including urban runoff) that were to be addressed by all Water Quality Management agencies in developing their 208-funded plans. Although all topic areas were to be covered, the degree of emphasis to place on each was left to the individual agencies to decide. As a result, the amount of the 208 efforts spent in the area of urban runoff varied greatly (but was rarely a major portion).

Many of the 208 agencies began their studies with the assumption that urban runoff was an important cause of water quality problems. Although the studies developed much information on runoff and receiving waters, not enough basic information was known to assess urban runoff's role as a major cause of problems. This was partly because of interferences by other sources and complex relationships within the receiving waters. It was also due to the difficulties in deciding what constitutes a "problem." In some cases, "problems" were synonymous with criteria violations; in others, "problems" were synonymous with an impairment or denial of beneficial uses. In many cases, "problems" were concluded to exist, simply on the basis of the possible presence of certain contaminants in urban runoff, based solely on values taken from literature regarding studies conducted elsewhere. The practical implication of these differences (which were differences in viewpoints rather than differences in physical conditions, in many cases) was that local agencies were very reluctant to commit to implementing urban runoff controls in the absence of a clear problem definition.

Furthermore, in the early years of the 208 program, EPA's guidance on how to address urban runoff was vague. As a result, local agencies took a wait-and-see attitude on the stormwater portion of their plans. They simply did not know what EPA would eventually do on the issue of stormwater control.

Another major obstacle to implementation resulted from the uncertainties regarding the effectiveness of controls. Many of the measures proposed for controlling urban runoff are either new or special applications of conventional practices developed for other purposes. Little was known about how

well they would work in urban runoff applications. Engineers, planners, public works personnel, and other decision makers have been understandably reluctant to invest large amounts of time and money in controls which may not perform as hoped.

Another obstacle to implementation of controls was a lack of basic data on sources, transport mechanisms, and receiving water characteristics (hydrologic and water quality aspects). Some of the more important topic areas where knowledge was lacking are summarized below:

- Sources - Not enough was known about where pollutants originate. Major sources certainly include vehicles, vegetation, erosion, fertilizer and pesticide application, litter, animals, and air pollution. However, a better understanding of source contributions could enhance control opportunities.

- Washoff/transport mechanisms - Not enough was known about how pollutants get from the sources to the receiving waters. Models could be better used for simulating runoff in problem definition and control evaluation, if they more accurately reflected washoff and transport mechanisms.

- Impacts - It was difficult to go beyond speculation in assigning urban runoff its proper share of responsibility for problems in cases where several pollutant sources contribute. In cases where other sources create obvious problems, it was difficult to determine the appropriate degree to which urban runoff should be controlled.

- Relative benefits - Planners had difficulty deciding whether the various benefits of controlling urban runoff quality justify the costs involved. There was considerable controversy over the present dry weather standards' relationship to beneficial uses, given the time and space scales of storm events and their intermittent nature. Many plans failed to be implemented because of uncertainties regarding: How much control is enough? Who benefits? Who should pay? Who should decide?

- Controls - Both cost and effectiveness data on full-scale control programs were lacking. Some of the control measures cited for typical 208 plans were plausible candidates, but their application for the purpose of urban runoff pollution control had not been studied quantitatively.

EPA'S ORD EFFORT

During the past 15 years, EPA's Office of Research and Development (ORD) has conducted over 250 studies on the characterization and control of stormwater discharges and combined sewer overflows, with particular emphasis on the latter due to their greater pollution potential. Consistent with overall Agency policies, ORD has deemphasized studies on receiving water impacts and effects (although it has done some such work). Rather, ORD has focussed principally on multi-purpose analyses and controls, because it is nearly

impossible to segregate benefits and strategies of urban stormwater runoff pollution control from drainage, flood, and erosion control. Many significant results have been obtained by ORD's effort, which has dramatically increased the technical literature in the area.

Data from ORD studies indicate the high variability of pollutant concentrations in urban runoff. Based on loading projections, it is safe to conclude that urban stormwater can contribute significant pollutant loads to receiving waters, in many cases having pollutant concentrations on the order of secondary treatment plant effluent for some constituents. Nonetheless, in its efforts to find direct urban runoff generated receiving water impacts (using the conventional dissolved oxygen parameter as the indicator) ORD has been only partly successful. However, this was only one study and was not intended to be the final word. Nonetheless, based on the size of the load coming from urban runoff, a significant pollution potential is there for at least some types of receiving waters. For example, a small urban lake could receive nutrient loads sufficient to increase algal productivity and accelerate the eutrophication process. The existence of heavy metals and certain organics (mostly of petroleum origin) in urban runoff have also been documented by the ORD program.

In addition to studying urban runoff loads, the ORD program has investigated a number of management and control approaches. This effort has been very successful, and many innovative techniques have been proposed and tested. The results of such research, development, and demonstrations have been presented in reports which document many of these potential controls, thereby allowing the technology to be utilized in other programs and at other locations. Included have been such control measures as on-site (upstream) storage; porous pavement; the swirl concentrator, helical bend, tube settler, and fine mesh screens for grit and settleable solids removal; street sweeping; disinfection; and high rate filtration, dissolved air flotation, and microscreening for suspended solids and BOD removal. Most of these controls were developed principally to deal with combined sewer overflow problems. However, some may also have application in urban runoff control, once their effectiveness has been conclusively demonstrated and initial and operating cost data are available to allow the necessary trade-off studies to be made.

The ORD program's reports constitute an invaluable source of data and information that was used to design and guide the development of the emerging NURP program. Also, three of the NURP projects were joint efforts with ORD (i.e., West Roxbury, Massachusetts, Bellevue, Washington, and Lansing, Michigan).

OTHER PRIOR/ONGOING EFFORTS

The Clean Water Act requires EPA to provide Congress with a needs assessment every two years in the six categories of the construction grant funds program. In 1974, the Needs Survey for Separate Storm Sewer Discharges (Category VI) was done by each state. Using the goals of the Act as the criteria to be met, they identified a cost of about $235 billion (June 1973 dollars). One state alone identified $80 billion in needs to control separate storm sewer discharges. In 1976, the Needs Survey was conducted by the Agency, and it was found that Category VI would require $66 billion to meet the goals of

the Act. This survey broke the goals into three categories or levels of pollution abatement; (1) aesthetics, (2) fish and wildlife, and (3) recreation. Costs to meet each category were determined.

As noted previously, the ASCE defined a program in 1969 to identify the causes and effects of urban stormwater pollution. The recommendations were not followed, so in 1974 at the Rindge, New Hampshire, Engineering Foundation Conference (jointly sponsored with ASCE's Urban Water Resources Research Council), a similar program was again recommended. A similar scenario occurred at the Easton, Maryland, conference of 1976 sponsored by the same group.

DISCUSSION

In the past (ca 1890), dilution was considered to be the appropriate way to control combined sewer overflows, since the primary concern was odor and related nuisances. Between 1890 and 1960 little concern was shown for stormwater pollution. Stormwater concerns were primarily related to drainage problems. As time progressed, water quality began to be considered, and workers began to characterize problems in terms of concentrations of certain pollutants and loads of these pollutants. In the 1970's, problems were being defined in terms of pounds of pollutants needing to be removed from overflows, in the interest of preventing pollution.

Past work, reported by EPA and published in professional journals, tended to focus on determining (a) the type and amount of pollutants involved and/or (b) methods to reduce the loads. However, such reports and articles did not consider either the level of improvement attainable or the need to improve quality of the receiving water body associated with the study. A conclusion common to all such reports was that not enough was known about stormwater to adequately understand cause and effect relationships. Also common to such reports were recommendations for further study and more data. A tangible result of the lack of belief and uncertain attitude in this area is the fact that stormwater controls for water quality have been implemented in so few places throughout the nation. Thus, there has been a critical need to objectively examine the situation.

Many factors led to the development of NURP, one being a legally-mandated necessity. As implementation of P.L. 92-500 moved into full swing, the lack of progress in the area of urban runoff was becoming apparent. In 1974 EPA lost a court case, which led to the decision that EPA should issue permits for separate storm sewer discharges. In 1976 EPA requested that the Areawide Waste Management Planning Program focus on the three or four most important of the 17 items required by the regulations. Many of the 208 Areawide Agencies cited urban runoff as an important item.

Two years later, EPA reviewed ninety-three 208 Areawide Agencies' work plans to assess their basis for having identified urban runoff as an element upon which they would focus. Review of these projects' methods and findings did not provide much to further our understanding of the pollution aspects of urban runoff. If one reason can be identified, it was the lack of site-specific data to define the local conditions.

As mentioned earlier, the Rindge Conference recommended a candidate program for obtaining the data necessary to provide a good understanding of storm-water pollution (EFC/ASCE, 1974). It is not coincidental that the NURP program is quite similar in design to those recommendations.

THE NATIONWIDE URBAN RUNOFF PROGRAM

Program Design

NURP was not intended to be a research program, per se, and was not designed as such. Rather, the program was intended to be a support function which would provide information and methodologies for water quality planning efforts. Therefore, wherever possible, the projects selected were ones where the work undertaken would complete the urban runoff elements of formal water quality management plans and the results were likely to be incorporated in future plan updates and lead to implementation of management recommendations. Conduct of the program provided direction and assistance to 28 separate and distinct planning projects, whose locations are shown in Figure 2-1 and listed in Table 2-1, but the results will be of value to many other planning efforts. NURP also acted as a clearinghouse and, in that capacity, provided a common communication link to and among the 28 projects.

The NURP effort began with a careful review of what was known about urban runoff mechanisms, problems, and controls, and then built upon this base. The twin objectives of the program were to provide credible information on which Federal, State, and local decision makers could base future urban runoff management decisions and to support both planning and implementation efforts at the 28 project locations.

An early step in implementing the NURP program involved identifying a limited number of locations where intensive data gathering and study could be done. Candidate locations were assessed relative to three basic selection criteria:

- Meeting program objectives;
- Developing implementation plans for those areas; and
- Demonstrating transferability, so that solutions and knowledge gained in the study area could be applied in other areas, without need for intensive, duplicative data gathering efforts.

The program design used for NURP included providing a full range of technical and management assistance to each project as the needs arose. Several forums for the communication of experience and sharing of data were provided through semi-annual meetings involving participants from all projects. The roles and responsibilities of the various State, local, and regional agencies and participating Federal agencies were clearly defined and communicated at the outset. These were reviewed and revised where warranted as the projects progressed.

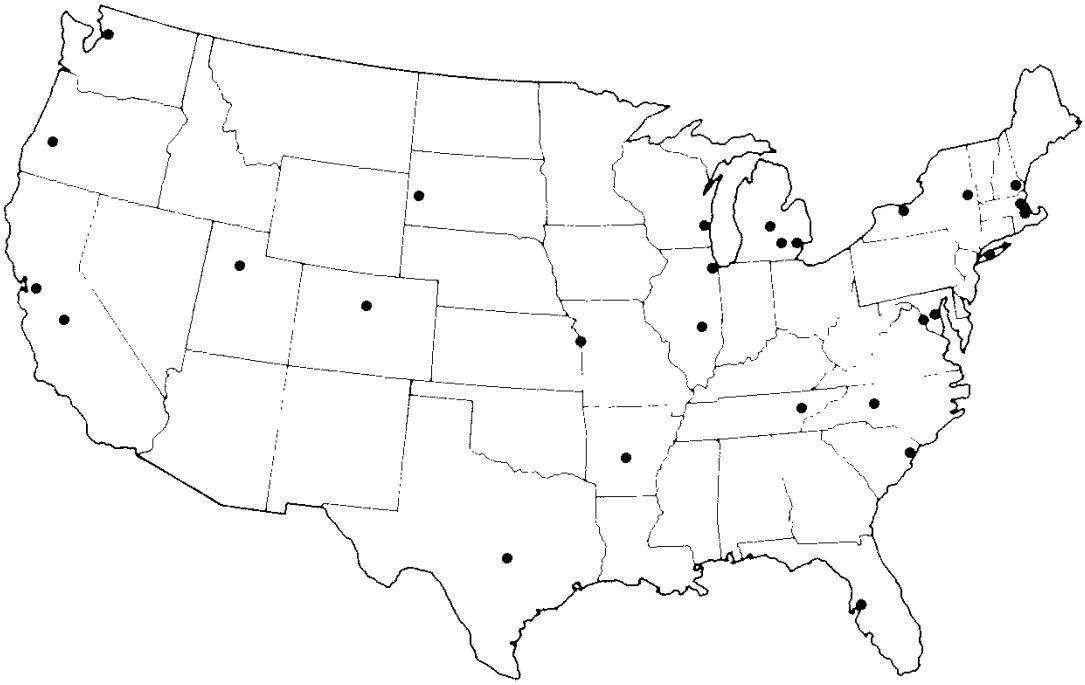

Figure 2-1. Locations of the 28 NURP Projects

TABLE 2-1. NURP PROJECT LOCATIONS

EPA Region	NURP Code	Project Name/Location	EPA Region	NURP Code	Project Name/Location
I	MA1	Lake Quinsigamond (Boston Area)	V	IL1	Champaign-Urbana, Illinois
	MA2	Upper Mystic (Boston Area)		IL2	Lake Ellyn (Chicago Area)
	NH1	Durham, New Hampshire		MI1	Lansing, Michigan
II	NY1	Long Island (Nassau and Suffolk Counties)		MI2	SEMCOG (Detroit Area)
	NY2	Lake George		MI3	Ann Arbor, Michigan
	NY3	Irondequoit Bay (Rochester Area)		WI1	Milwaukee, Wisconsin
III	DC1	WASHCOG (Washington, D.C. Metropolitan Area)	VI	AR1	Little Rock, Arkansas
	MD1	Baltimore, Maryland		TX1	Austin, Texas
IV	FL1	Tampa, Florida	VII	KS1	Kansas City
	NC1	Winston-Salem, North Carolina	VIII	CO1	Denver, Colorado
	SC1	Myrtle Beach, South Carolina		SD1	Rapid City, South Dakota
	TN1	Knoxville, Tennessee		UT1	Salt Lake City, Utah
			IX	CA1	Coyote Creek (San Francisco Area)
				CA2	Fresno, California
			X	OR1	Springfield-Eugene, Oregon
				WA1	Bellevue (Seattle Area)

The 28 NURP projects were managed by designated State, county, city, or regional governmental associations. The U.S. Geological Survey (USGS) was involved with EPA as a cooperator, through an inter-agency agreement, on 11 of the NURP projects. The Tennessee Valley Authority was also involved in one project.

A major objective of the program was the acquisition of data. Because these data will be used for several years to characterize problems, evaluate receiving water impacts from urban runoff, and evaluate management practices, consistent methods of data collection had to be developed and rigorously employed.

Project Selection

Projects were selected from among the 93 Areawide Agencies that had identified urban runoff as one of their significant problems. The intention was to build upon what these agencies had already accomplished in their earlier programs. Also, projects that would be a part of this program were screened to be sure that they represented a broad range of certain characteristics (e.g., hydrologic regimes, land uses, populations, drainage system types). Actual selection of projects was a joint effort among the States, local governments, and Regional EPA offices. The five major criteria used to screen candidate projects were as follows:

1. Problem Identified. Had a problem relative to urban runoff actually been identified? Could that problem be directly related to separate storm sewer discharges? What pollutant or pollutants were thought to be causing the problem? Using the NURP problem identification categories, what was the "problem" (i.e., denying a beneficial use, violating a State water quality standard, or public concern)?

2. Type of Receiving Water. The effects of stormwater runoff on receiving water quality were the NURP program's ultimate concern. Because flowing streams, tidal rivers, estuaries, oceans, impoundments, and lakes all have different hydrologic and water quality responses, the types of receiving waters associated with each candidate project had to be examined to ensure that an appropriately representative mix was included in the overall NURP program.

3. Hydrologic Characteristics. The pattern of rainfall in the study area is perhaps the single most important factor in studying urban runoff phenomena, because it provides the means of conveyance of pollutants from their source to the receiving water. For this reason, projects in locations having in different hydrologic regimes were chosen for the program.

4. Urban Characteristics. Characteristics such as population density, age of community, and land use were considered as

possible indicators of the waste loads and ultimately the rainfall-runoff water quality relationship. The type of sewerage system was another factor considered (e.g., whether it is combined, separate, or mixed; how severe the infiltration and inflow problems may be). Such factors have different effects on the quantity and quality of storm runoff, and were balanced as well as possible in selecting projects.

5. Beneficial Use of Receiving Water. Because this factor greatly affects the type of control measure that would be appropriate, attempts were made to include a wide range in selecting projects.

Although these were the primary criteria used to identify potential projects, other factors also had to be considered (e.g., the applicant agencies' willingness to participate, the State's acceptance of the project, the experience of the proposed project teams). Because the NURP program used planning grants (not research funds) a major consideration was the anticipated working relationships with local public agencies and the applicants' ability to raise local matching funds.

Program Assistance

Technical expertise and resources available for urban runoff planning varied among the various projects participating in NURP. Therefore, the program strategy called for providing a broad spectrum of technical assistance to each project as needed and for intercommunication of experiences and sharing of data in a timely manner.

Assistance was also provided to the applicants in developing their final work plans. This was done to ensure that there would be consistency among methods, especially in the collection of data. If there were to be differences in data from city to city, they must be due to the characteristics of each city and not a result of how the data were obtained.

Assistance with instrumentation was provided during the program in the form of information on available equipment, installation, calibration, etc. Because one of the more important elements of a data collection program is the "goodness" or quality of the data themselves, questionable data would be of little use. Accordingly, a quality assurance and quality control element was required in the plans for each project.

Periodic visits were made to each project site to ensure that the participants were provided opportunities to discuss any problems, technical or administrative. The visiting team typically included an EPA Regional Office representative, an EPA Headquarters representative, and one or two experienced consultants. All interested parties, including representatives from State or local governments, were requested to attend those visits.

As the projects moved farther into their planned activities and the time for data analysis approached, each project was required to describe how they were going to analyze their data. No single method was recommended for each project, because it was believed that a broad diversity of available methods

would be suitable, if used properly. Guidance on proper use was provided as a part of technical assistance through project visits and special workshops for this purpose.

Communication

It was intended that the entire group of NURP participants function as a single team. Accordingly, a communication program was developed. National meetings were conducted semi-annually so that key personnel from the individual projects would have an opportunity to discuss their experiences and findings.

Reports were required of each project quarterly. EPA Headquarters also provided composite quarterly reports summarizing the status of each project and discussing problems encountered and solutions found.

CHAPTER 3
URBAN RUNOFF PERSPECTIVES

In evaluating the impacts of urban runoff, one's perspective may be influenced by one's concerns and priorities - and what one defines to be a "problem". Recognizing this, the following discussion covers several such perspectives, including concerns over runoff quantity, water quality, and control possibilities.

RUNOFF QUANTITY

The following discussion covers a major cause and two major effects of runoff problems related to "quantity" (i.e., increased urbanization as a cause; flooding and erosion/sedimentation as effects).

Flooding Problems

As noted earlier, drainage has historically been the principal local-level concern regarding urban runoff. Concerns over quantity can be divided into two basic categories: nuisance flooding and major flooding. Nuisance flooding (e.g., temporary ponding of water on streets, road closings, minor basement flooding), although hardly tolerable to those immediately affected, rarely affects an entire urban populance. Nonetheless, the concerns of the (often vocal) minority of affected citizens commonly reach the point where local action is taken to minimize the recurrence of such events. Such mitigation activities are usually locally determined, funded, and implemented because both the affected public and government decision makers perceive and concur that such flooding constitutes a "problem".

Catastrophic flood events, on the other hand, have to be thought about differently for several reasons:

- They typically affect the majority of the urban populace.

- Mitigation measures often involve engineering improvements extending well beyond local jurisdictions.

- Mitigation measures often cost more than the local community could afford. Historically, the Federal government has become involved, in major flood control efforts through a number of related programs. In such cases, water quantity problems are relatively easy to define because the extent of flooding is readily observable, the degree of damage is easily determined, and the benefits of proposed flood control projects can be estimated. Thus, decision makers face a relatively low risk in prescribing courses of action and justifying the associated

costs in light of benefits. As will be discussed later, decision making in the case of water quality concerns is less straightforward.

Erosion and Sedimentation Problems

Erosion results from rainfall and runoff when soil and other particles are removed from the land surface and transported into conveyance systems and water bodies. Since land surface erosion is the principle source of stream sediment, the type of soil, land cover, and hydrologic conditions are major factors in determining the severity and extent of sedimentation problems. Although erosion is a natural process, it is frequently exacerbated by the activities of man, in both urban and rural environments.

When addressing the broad spectrum of receiving water problems which result from sedimentation, it is convenient to divide cases into two categories; (1) those that respond to control measures directed at nuisance flood prevention, and (2) those that are not controlled by such measures. When natural loads are discharged into receiving waters, the effects are primarily physical and only secondarily chemical (because the mineral constituents which make up the primary sediment load are relatively benign in most cases). Among the physical problems imposed upon the receiving waters are:

- Excess turbidity reduces light penetration, thereby interfering with sight feeding and photosynthesis;

- Particulate matter clogs gills and filter systems in aquatic organisms, resulting, for example, in retarded growth, systemic disfunction, or asphyxiation in extreme cases; and

- Benthal deposition can bury bottom dwelling organisms, reduce habitat for juveniles, and interfere with egg deposition and hatching.

Although sedimentation is storm-event related, its resultant problems are not exclusively either "quantity" problems or water "quality" problems. Being hybrid problems, sedimentation control has received a mixed approach. The organizations involved range widely, from Federal agencies (e.g., the Army Corps of Engineers, the Soil Conservation Service) to local drainage and sedimentation control officials, frequently with involvement from State and county governmental agencies.

Urbanization as a Cause of Problems

Urbanization accelerates erosion through alteration of the land surface. Disturbing the land cover, altering natural drainage patterns, and increasing impervious area all increase the quantity and rate of runoff, thereby increasing both erosion and flooding potential. Also, the sedimentation products which result from urban activities are generally not as benign as the natural mineral sediments which result from soil erosion. Atmospheric deposition (associated with industrial, energy, and agricultural production activities) and added surface particulates (resulting from tire wear, auto

exhaust, and road surface decomposition) fall in this latter category. Their effects on receiving waters tend to be more "chemical" than "physical". They may contain toxic substances and/or other compounds which can have adverse impacts upon receiving water quality and the associated ecological communities.

WATER QUALITY CONCERNS

The notion that urban runoff can be a significant contributor to the impairment or degradation of the quality of receiving waters has formed only recently and is not universally shared. It is the totality of receiving water characteristics (e.g., flow rate, size or volume, and physical and chemical characteristics) that determines its use, although some characteristics are more important than others (e.g., there must be present an appropriate rate of flow and/or volume in the receiving water to support the desired use).

In addressing the water quality needed to support a designated use, one must consider specific requisite characteristics. For example, in the case of swimming, total dissolved solids and dissolved oxygen levels are far less important than pathogenic organisms. For irrigation, the biochemical oxygen demand of the water is of little concern to the farmer, whereas the total dissolved solids level is of immense concern (to minimize salt buildup). Although high nutrient levels may be detrimental to the quality of impounded waters (by hastening eutrophication processes), a farmer may welcome nutrients in irrigation water.

It is also important to note that it is the concentration, rather than the mere presence of a water quality constituent, that affects use. The relationship between pollutant concentration and resultant impacts on receiving water use are quite non-linear, with plateau effects not uncommon. For example, consider dissolved oxygen and its effect upon fin fish. Down to a certain level below saturation, there are virtually no important effects (upon a given species). As dissolved oxygen levels fall below this threshold, the more sensitive members of the species begin to be affected. As levels continue to fall, the affected percentage of the population will increase until a level is reached at which the entire population can no longer survive. Obviously, any further reduction of dissolved oxygen level would have no further effect upon the community, since it no longer exists. It is important to keep this plateau effect in mind when considering the practical impacts of increased pollution and the practical value of remedial measures to restore beneficial uses, since limited removal of a polluting substance may do nothing to alleviate the problem. In the example given above, if one were to somehow reduce the input of oxygen demanding substances to the receiving water, the result might be that the dissolved oxygen level of the receiving water would rise from 1.0 mg/l to 3 mg/l. If the species of concern were trout, they still could not survive. Even though polluting substances were removed and money was spent, the desired benefit would not be achieved.

WATER QUANTITY AND QUALITY CONTROL

There is no question that excessive urban runoff causes problems. Remedial costs may be high, but the benefits are obvious. Currently, there is a growing national awareness that, if steps are taken during the planning phase

of development, excessive stormwater discharges can be prevented, at least from typical events (large infrequent storms will always present a greater threat).

Past And Current Work

During the past two decades attention has been focused on reducing runoff rates and volumes and reducing flood damage. During the early 1970's, a manual of practices was prepared under grants from the Office of Water Research and Technology sponsored by the American Public Works Association stressing detention (Poertner, 1974). The University of Delaware also issued a manual of practices on methods to control rates and volumes of urban runoff (Toubier and Westmacott, 1974).

Work done by the ASCE Urban Water Resources Research Council during the sixties stressed the concept of natural easements for drainage, observing that there were two drainage ways; major routes for large events and minor routes for smaller more frequent events (Jones, 1968). It was claimed that money could be saved by using natural channels, swales, etc., thus reducing the need for more expensive concrete conveyances.

The idea of intentionally using natural runoff courses, green belts, and the like was new to engineers who had long been trying to control runoff through more artificial conveyances. In 1970, EPA's Office of Research and Development initiated work on a development known as the Woodlands project in Texas near Houston. Studies were conducted to determine how storm flows could be managed and water quality could be protected or improved by the use of natural drainage ways, detention facilities, porous pavements, increased infiltration rates, and a decrease in runoff rates (Characklis, 1979).

Federal Involvement

As part of its national effort to control erosion from agricultural lands, the Soil Conservation Service (SCS) (Department of Agriculture) provides technical assistance in developing erosion control plans. During the past decade or so, the methods they have developed have been applied much more widely than just to agricultural situations. SCS has become increasingly involved in erosion control in urban areas and has produced a useful document for assessing urban hydrology in small watersheds (SCS, 1975).

Other Federal agencies that have an interest in urban runoff and its control include the U.S. Geological Survey, the Federal Highway Administration, the Federal Housing Administration, the Tennessee Valley Authority, and others too numerous to mention.

State And Local Involvement

Although some 27 states have adopted floodplain management legislation to protect property, the control of urban drainage has traditionally been a local matter. Some states have some form of erosion control laws in force; however few states have runoff rate/quantity legislation. This situation has begun to change over the last decade, and Maryland is one example where the statewide legislation for stormwater management is implemented at the county level.

The methods used tend to be preventive, wherein erosion is controlled by prescribing certain proven design practices and conventions. Many local agencies are developing control plans along these lines, so this report will not cover this aspect of control.

PROBLEM DEFINITION

As pointed out earlier, water quantity problems are relatively easy to identify and describe. Water quality problems, on the other hand, tend to be more elusive because their definition often involves some subjective considerations, including experiential aspects and expectations of the populace. They are not immediately obvious and are usually less dramatic than, for example, floods. They also tend to vary markedly with locality and geographic regions within the country. For example, a northwestern resident may want to upgrade stream quality to support some highly-prized species of game fish, while a northeastern resident contemplating the river flowing by the local factory might be grateful to see any game fish at all. Thus, a methodological approach to the determination of water quality problems is essential if one is to consider the relative role of urban runoff as a contributor. An important finding of the work conducted during this NURP program has been to learn to avoid the following simplistic logic train: (a) water quality problems are caused by pollutants, (b) there are pollutants in urban runoff, therefore, (c) urban runoff causes "problems". The unspoken implication is that a "problem" by definition requires action, and any type of "problem" warrants equally vigorous action. It becomes clear that a more fundamental and more precise definition of a water quality "problem" from urban runoff is necessary. For this purpose, the NURP has adopted the following three-level definition:

- Impairment or denial of beneficial uses;
- Water quality criterion violation; and
- Local public perception.

The first of these levels refers to cases of impairment or denial of a designated use. An example would be a case where a determination has been made that some specific beneficial use should be attained; however, present water quality characteristics are such that attainment of the use cannot be fully realized.

The second level of problem definition refers to violations of a designated water quality criterion. An example would be a case where some measure or measures of water quality characteristics have been found to violate recommended or mandatory levels for the receiving water classification. Some of the subtle distinctions between this and the preceding problem definition arise in the fact that receiving water classification may not be appropriate, the beneficial use may not be impaired or denied, and the water quality criteria associated with that classification may or may not be overly conservative or directly related to the desired use.

The third level of problem definition involves public perception. This may be expressed in a number of ways, such as telephone calls to public officials

complaining about receiving water color, odor, or general aesthetic appearance. Public perception of receiving water body problems is highly variable also. Some people enjoy fishing for carp or gar, children will play in almost any creek, and so on. This level of problem definition can also include one concept of anti-degradation. Here the thought is that no polluting substances of any kind in any quantity should be discharged into the receiving water regardless of its natural assimilative capacity. This concern has its ultimate expression in the "zero discharge" concept. EPA's concept of anti-degradation, on the other hand, refers to degradation of use; a subtle but essential difference.

The foregoing levels of problem definition provide an essential framework within which to discuss water quality problems associated with urban runoff. However, it is important to understand that when one is dealing at a local level all three elements are typically present. Thus, it is up to the local decision makers, influenced by other levels of support and concern, to carefully weigh each, prior to making a final decision about the existence and extent of a problem and how it is to be defined. It follows that, if this step of problem definition is done carelessly, it will be difficult, if not impossible, to plan an effective control strategy and establish a means for assessing its effectiveness.

CHAPTER 4
STORMWATER MANAGEMENT

INTRODUCTION

This chapter is included for those who wish to know more about how to plan and implement stormwater management programs. Most of the information contained herein was developed through several related programs that were proceeding in parallel with the NURP program.

- The Southeast Michigan Council of Governments (SEMCOG), a NURP grantee, was developing stormwater management procedures.
- The Midwest Research Institute (MRI) was collecting cost information on control practices from selected NURP projects.
- A related EPA Water Planning Division program, the Financial Management Assistance Program (FMAP), was developing financial and institutional planning procedures designed to be helpful in the implementation of stormwater management plans.

STORMWATER MANAGEMENT PLANNING[1]

Stormwater management planning develops policies, regulations, and programs for the control of runoff from the land. Stormwater management planning is normally directed toward either or both of two primary goals: the reduction of local flooding and/or the protection of water quality. However, stormwater management planning is also generally used to insure that stormwater programs and regulations provide multiple benefits to the affected communities and do so in a way that does not create additional problems.

Stormwater management planning need not involve expensive technical studies. Available data and maps, the experience of other communities, and advice from experts can be used to develop an effective planning program. Detailed technical studies can then be targeted toward specific issues and problems. Effective local planning can alleviate the need for costly remedial public works projects.

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[1] The material in this section of the chapter is largely from Technical Bulletin No. 1: Stormwater Management Planning: Cost-Saving Methods for Program Development, the first of a seven-part bulletin series on water quality management prepared by the Southeast Michigan Council of Governments and available from Information Service, SEMCOG, 8th Floor, Book Building, Detroit, Michigan 48226.

The Need

Stormwater runoff cannot be ignored in developing communities. As urban development occurs, the volume of stormwater and its rate of discharge increase. These increases are caused when pavement and structures cover soils and destroy vegetation which otherwise would slow and absorb runoff. Pollutants, washed from the land surface and carried by runoff into lakes and streams, may add to existing water quality problems.

Figure 4-1 illustrates the effects of paved surfaces on stormwater runoff volumes. When natural ground cover is present over the entire site, normally less than 10 percent of the stormwater runs off the land into nearby creeks, rivers, and lakes. When paved surfaces cover 10 to 30 percent of the site area, approximately 20 percent of the stormwater can be expected to run off. As paved surfaces increase, both the volume and the rate of runoff increase. Furthermore, paved surfaces prevent natural infiltration of stormwater into the ground, and increased runoff volumes and rates increase soil erosion and pollutant runoff. Stormwater management planning can be used to develop programs to reduce adverse affects and even to provide community benefits.

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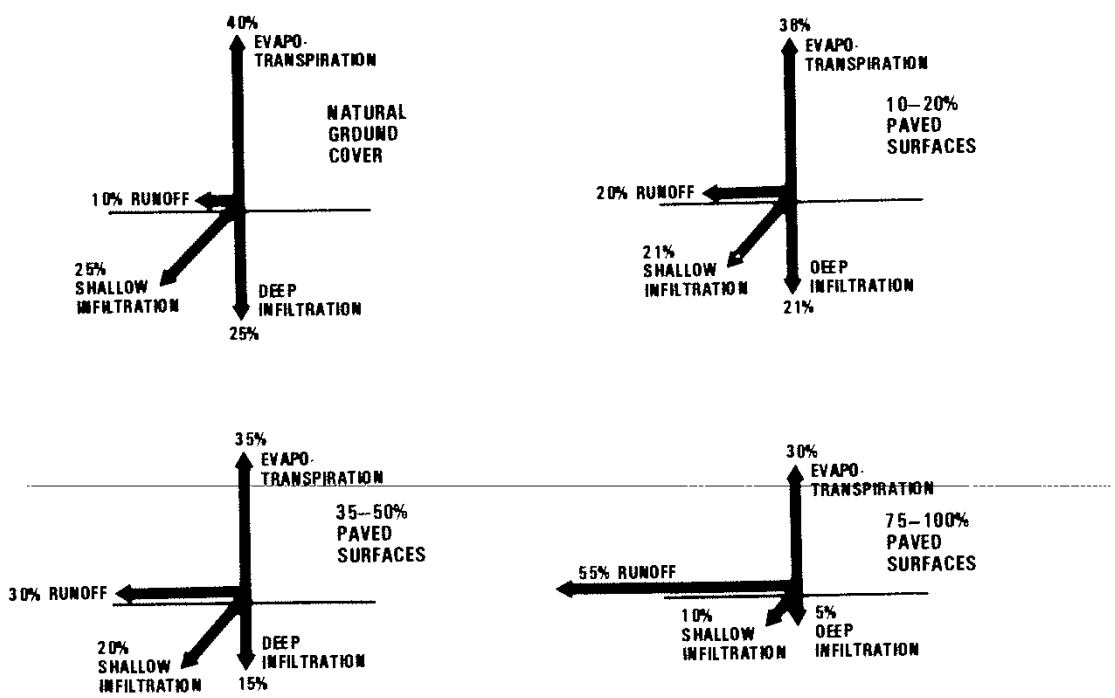

Source: J.T. Tourbier and R. Westmacott, *Water Resources Protection Technology: A Handbook of Measures to Protect Water Resources in Land Development*, p. 3.

Figure 4-1. Typical Changes in Runoff Flows Resulting from Paved Surfaces

Stormwater management can and should be directed toward two goals: the control of runoff flows (i.e., volumes and rates) and the control of pollutants in stormwater. Control measures which emphasize the storage of runoff rather than the immediate conveyance from the site and from the community often provide benefits which meet both goals. Stormwater storage and conveyance measures, however, affect the community in a variety of ways. Through stormwater management planning the effects of alternative policies, programs, control measures, and financing schemes can be evaluated.

Stormwater management planning is directed toward basic policy questions, such as:

- What should be done with runoff from the land?
- Is the temporary (detention) or permanent (retention) storage of stormwater runoff desirable?
- Under the circumstances, should retention basins, detention basins, natural infiltration areas, or dished parking lots be used to store runoff?
- What requirements should be placed on new developments?
- Do stormwater runoff problems in developed areas warrant special attention?
- Should communal retention or detention facilities be provided by the local jurisdiction? If so, how can such areas be financed?
- Who should pay for retention and detention facilities on private property?
- Are the local jurisdictions already carrying out programs (such as parkland acquisition programs or wetlands regulation) which affect stormwater runoff? Can programs and/or regulations be coordinated to achieve multiple purposes?
- Should enclosed drains or natural channels be used to convey stormwater to and from storage areas?
- Can routing and storage be provided for major storms (e.g., 100-year frequency) as well as minor storms (e.g., 10-year frequency)?
- Who should be responsible for facility maintenance?

The specific questions to be addressed in a local government planning program will vary among local jurisdictions, reflecting varying problems and community objectives. The answers to these questions may take the form of policy statements, changes in regulations or engineering design standards, technical assistance materials for landowners or consulting engineers, revisions to existing programs, or a written plan document.

Because stormwater management planning for quantity and quality control is relatively new, and because community stormwater concerns differ, there are no easy formulas for preparing stormwater management plans.

Stormwater Runoff as a Community Resource

Although, stormwater management programs are typically undertaken to avoid problems (e.g., flooding, pollution, lawsuits), effective planning can also be used to pursue potential community benefits. When effectively managed, stormwater can provide benefits such as:

- Recharge of groundwater supplies;
- Water quality enhancement;
- Recreational opportunities (e.g., use of large retention areas for boating, fishing, or nature study);
- Replenishment of wetlands which serve as wildlife habitats, absorb peak floods, and naturally break down certain pollutants;
- Maintenance of summertime lake levels and stream flows; and
- Enhancement of community appearance and image when facilities are attractively designed.

The Role of Local Governments

In some cases, the institutional systems for stormwater management may need to be complex, largely because State, county, and local agencies' policies, regulations, and procedures may all affect stormwater control within a particular development. For example, in Michigan, the following roles apply:

- County drain commissioners construct and manage county drains and also review subdivision plans to assure adequate drainage.
- County highway departments affect drainage in new developments by regulating connections to roadside drains and ditches.
- The State Department of Natural Resources regulates wetlands, dam construction, and floodplain alterations.
- The State Water Resource Commission issues permits for certain stormwater discharges when known water quality problems can be linked with a particular activity, (e.g., certain storm drains, animal feeding operations, industrial parking lots).
- Both the State Department of Public Health and county drain commissioners regulate drainage in proposed mobile home parks.
- County agencies and certain local governments issue erosion and sediment control permits for certain development sites.

Furthermore, there has been increasing emphasis upon the consideration of environmental factors in land use decisions. Recent amendments to the City or Village Zoning Act and the Township Rural Zoning Act have clarified the legal authority of local governments to complete site plan reviews for environmental management purposes. Standards for the review of land uses must be included in local ordinances and take natural resource preservation into account. The Michigan Environmental Protection Act (MEPA) (Act 127, P.A. of 1970) places a duty on all government agencies to prevent or minimize water pollution and other environmental problems while carrying on regular activities. Section 5(2) of MEPA addresses the actions of local officials in the following terms:

> In any ... administrative, licensing or other proceedings, and in any judicial review thereof, any alleged pollution impairment or destruction of the air, water or other natural resources or the public trust therein, shall be determined, and no conduct shall be authorized or approved which does, or is likely to have such effect so long as there is a feasible and prudent alternative consistent with the reasonable requirements of the public health, safety and welfare.

Environmental aspects of stormwater runoff may be addressed by local officials in response to MEPA.

None of the above laws specifically require local governments to undertake stormwater management programs. Instead, local governments have a wide range of possible roles available to them. Stormwater management planning programs can be directed toward the review of existing State and county programs affecting stormwater runoff and toward the evaluation of alternative roles for the local government.

Possible roles for local governments in stormwater management include the following:

- Planning - The term "stormwater management planning" refers to the process of developing policies, programs, regulations, and other recommendations to chart the future course of the community in terms of stormwater management. Such planning can address existing problems or help to avoid future problems and community expenses.

- Regulations - Stormwater runoff control for each site plan and subdivision plan can be reviewed and approved by the local government.

- Design and Construction - Storm drainage facilities (e.g., pipes, basins, areas for retention) can be designed and constructed by the local government. Purchase of lands to serve as community stormwater retention areas may also be undertaken.

- Inspection and Maintenance - Requirements for regular inspection and maintenance of stormwater facilities, including drains and retention or detention basins, may be enforced by

local governments. Requirements for easements are usually part of maintenance programs. Local governments may choose to undertake maintenance as a community service (such as a utility) or may require maintenance through contractual agreements with property owners.

The types of programs developed and the role assumed by a local government should, of course, reflect available financing options as well as program needs and management gaps.

FINANCIAL AND INSTITUTIONAL CONSIDERATIONS[2]

The traditional planning approach would ideally culminate in the successful implementation of a detailed design. In many cases, however, this objective is not accomplished due to financial and institutional constraints. Often a study team will fail to adequately consider such institutional and financial issues as who will manage the system and how will it be financed, thus creating a gap between technical planning and implementation. This omission is illustrated in Figure 4-2.

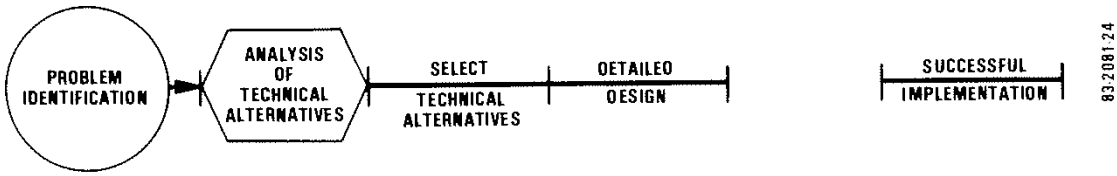

Figure 4-2. Incomplete Water Quality Planning

The implementation gap that results from the traditional planning approach has occurred all too often in attempts to control urban runoff.

As an illustration of the need to integrate financial and technical planning, consider the traditional process for developing a program to control construction runoff. A typical outcome of the process is a new ordinance. To reach this outcome, some of the issues that are normally considered from the technical perspective include:

- What are the technical construction requirements to be set out in the ordinance?
- What control measures will be required?
- How will compliance be monitored?

[2] This material is largely from the draft document, Planning for Urban Runoff Control: Financial and Institutional Issues, December 1981, prepared for FMAP by the Government Finance Research Center of the Municipal Finance Officers Association, Washington, D.C.

To balance the planning process, this technical analysis should be expanded to include financial and institutional issues such as:

- Does the city have legal authority to implement each requirement in an ordinance?

- How much will each cost, and who will pay for implementation of the control measures?

- Who will conduct compliance review, and who will pay for the reviews?

Numerous additional factors increase the need for financial and institutional analysis in all water quality management planning. Examples might include:

- Implementation of control programs occurs at the local level, and local budgets are being tightened as water quality expenditures compete with other local demands.

- Benefits from water quality projects are difficult to quantify and often accrue to people living downstream.

- It is becoming more difficult to obtain municipal funds through the bond market because of high interest rates.

- The cost of pollution controls is often sizable and difficult to allocate to specific polluters or beneficiaries.

These problems affect most areas of water quality management, but they are especially important in identifying and implementing solutions to urban runoff pollution.

Integrated Approach

An integrated planning approach helps water quality planners make the best control decisions in light of many complex issues. This approach takes the traditional planning process and adds to it financial and institutional elements at each step along the way. This integration is shown in Figure 4-3, with the traditional approach illustrated along the upper track and the financial and institutional elements added along the lower track.

During the early planning stages, financial and institutional issues are reviewed on a preliminary basis. This information becomes more detailed and refined as planning proceeds. Ultimately, the information forms the basis for a financial and institutional plan that supports the detailed design of a control alternative.

When very complex problems are being evaluated, it may be advisable to use a preliminary matrix early in the evaluation process for screening-out unacceptable alternatives. This approach permits a more detailed evaluation of issues surrounding the two or three best alternatives before a final selection is made. An example of a preliminary matrix is given in Figure 4-4.

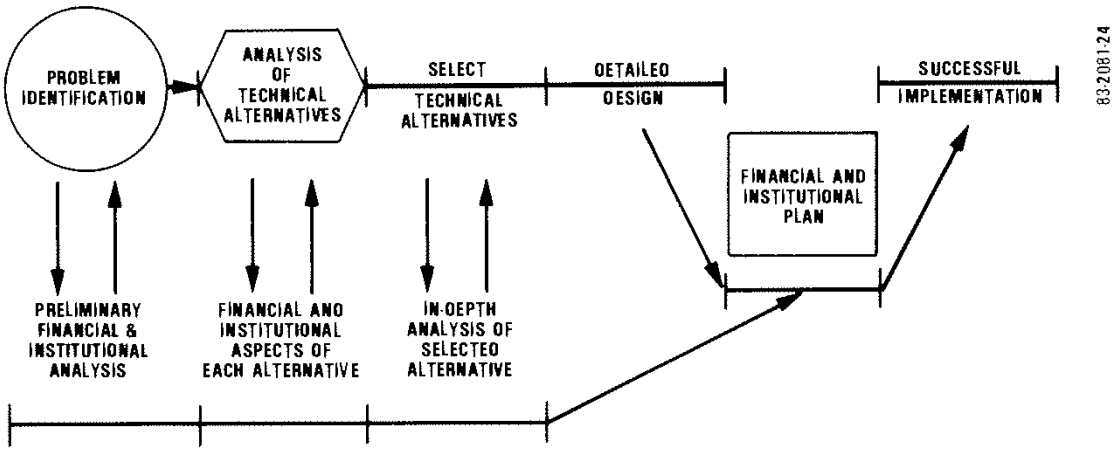

Figure 4-3. Integrated Water Quality Planning

CONTROL APPROACH	TECHNICAL DESCRIPTION	EFFECTIVENESS IN CONTROLLING POLLUTION	FINANCIAL ISSUES		INSTITUTIONAL ISSUES
			NET PRESENT VALUE	ABILITY TO PAY	
• SEPARATE SEWERS	CONSTRUCT NEW STORM SEWERS IN COMBINED AREAS	100% EFFECTIVE IN ELIMINATING CSOs	$1 BILLION	EXCEEDS CITY'S BONDING CAPACITY	EXISTING INSTITUTIONS COULD HANDLE THE PROJECT
• SELECTIVE EXPANSION OF UNDERSIZED TRUNK SEWERS	REMOVE BOTTLENECKS, REDUCE NUMBER OF OVERFLOW EVENTS	50% EFFECTIVE	$200 MILLION	IF STAGED OVER 10 YEARS, COULD BE FINANCED BUT WOULD RESTRICT OTHER PROGRAMS	EXISTING INSTITUTIONS COULD HANDLE THE PROJECT
• CONSTRUCTION OF DETENTION BASINS	CONSTRUCT 10 DETENTION BASINS SIZED TO HOLD THE FIRST FLUSH FROM A STORM	30% EFFECTIVE	$50 MILLION	IF STAGED OVER 5 YEARS, COULD BE FINANCED; COULD RESTRICT OTHER PROGRAMS	NEW ORGANIZATION MIGHT BE NEEDED TO MAINTAIN AND AND OPERATE BASINS

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Figure 4-4. Preliminary Matrix for Selection of a Control Approach (Combined Sewer Overflows)

Once a control approach is selected, a detailed design and a financial and institutional plan can be prepared. Figure 4-5 illustrates the major features of a financial and institutional plan. Key features of the detailed analysis required to prepare this plan are discussed in the following section.

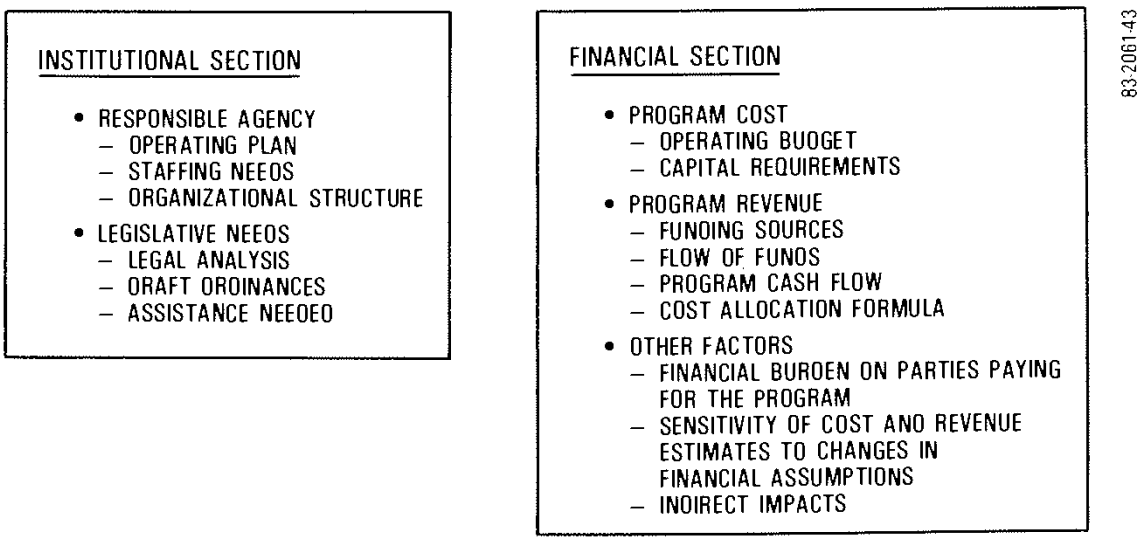

Figure 4-5. Major Components of a Financial and Institutional Plan

Key Financial and Institutional Elements

There are six essential elements[3] of financial and institutional analysis which provide a structure for the integrated planning process;

- institutional assessment,
- cost analysis,
- revenue analysis,
- ability-to-pay analysis,
- sensitivity analysis, and
- indirect impact analysis.

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[3] These elements were first defined in Planning for Clean Water Programs: The Role of Financial Analysis, U.S. EPA's Financial Management Assistance Program by the Government Finance Research Center of the Municipal Finance Officers Association, September 1981.

Each of these elements threads through the planning process and becomes more definitive as the process proceeds. The following discussion defines each element and identifies its major features.

Institutional Assessment

The institutional assessment identifies the organizations or participating agencies that would be affected or involved in implementing a particular control program. The role of each entity in a program is evaluated with respect to its interest in solving the problem and its planning, management, operating, and regulatory capabilities. If the study team identifies an urban runoff problem, a preliminary institutional analysis can provide insight into capabilities of agencies that may be asked to play a role in the implementation and can, in some cases, aid in determining the types of technical alternatives that are analyzed.

The key factors to consider in evaluating an agency's capabilities are its statutory authority and organizational ability. In order to control urban runoff, an agency must have or be able to obtain the authority to implement a control measure. The authority of an agency can be assessed by thoroughly reviewing applicable federal, state, and local legislation. This review helps to determine which agency can best manage a given problem and highlights areas where additional legislation or local ordinances are needed.

Cost Analysis[4]

A cost analysis is performed to identify the additional capital, operational, maintenance, and administrative costs of each activity that is part of a control program. These costs are estimated for each agency responsible for an activity. Cost estimates are prepared in uninflated dollars (using today's cost for all projections into the future) and brought back to their present value (or present worth) for comparison among alternatives. The interest rate to be used in the present value analysis is the agency's current interest rate for borrowing funds minus the expected rate of inflation.[5]

Cost analysis of control alternatives is included in increasing detail in each step of the planning process. It begins with "ball park" estimates in early stages which are refined as the process progresses and finalized in the detailed financial plan.

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[4] A substantial part of this material is from a report, Collection of Economic Data from Nationwide Urban Runoff Program Projects, prepared for EPA by the Midwest Research Institute, 425 Volker Boulevard, Kansas City, MO 64110.

[5] For a further discussion of present value analysis, see pp 36 to 42 of Facilities Planning 1981, U.S. Environmental Protection Agency, FRD-20, 1981.

Cost estimates cannot be static. They are prepared on a preliminary basis when an alternative is first considered and detail is added as an alternative becomes more feasible. As the planning process progresses, estimates are updated on a regular basis to account for changing costs.

To update and improve available data on the costs of specific urban runoff BMPs, EPA conducted a program to guide, assist, and coordinate the efforts of selected NURP projects in gathering cost data on the BMPs and BMP systems which they were evaluating as part of the NURP national workplan. A report[6] was prepared to summarize the preliminary economic data submitted by the NURP projects. Economic data were submitted for street sweeping, detention basins, catch basin cleaning, ocean discharge control systems, and a public education/information program by nine projects. The data must be considered preliminary and subject to change, particularly annual operating cost data. Most of the capital cost data are well documented and represent the actual cost of the BMP control and will not change. The annual operating cost data, however, range from detailed analyses to estimates, and some of the data reported are incomplete. Since most of the projects were still in progress, incomplete operating cost data were to be expected.

The capital costs of street sweepers varied from $21,988 (in 1975) to $40,000 in 1981. The annual operating costs of street sweeping programs varied from $53,445 to $1,138,097. The unit cost varied from $16.80 to $45.45 per hour of operation, and from $5.95 to $23.36 per curb-mile swept. This wide range indicates that many variables affect the actual cost of operating a street sweeper.

The installed capital costs of recharge basins in Fresno, California, ranged from $933,750 to $5,587,000. BMP modifications to three detention basins in Oakland County, Michigan, cost $2,345 to $8,442. The installed capital cost of the modifications to the wet pond in the Lansing, Michigan project was $50,149. Construction of the wet pond in the Salt Lake County, Utah project cost $41,138; modifications to the dry pond included placing aluminum plates in an existing underdrain and installing a redwood outlet skimmer at a nominal cost of $371.

The annual operating costs of the Fresno, California, basins range from $1,625 to $7,975. The annual cost for the basin in Lansing, Michigan is incomplete and includes only the interest cost on a 7 percent, $38,500 bond used to help finance the project. The annual operating costs for the ponds in the Salt Lake County, Utah project were estimated at $560 for the wet pond and $200 for the dry pond.

The costs of the structural control alternatives to control discharge to the ocean in Myrtle Beach, South Carolina, were presented in detail and are valid estimates of the costs that will be incurred if one of them is constructed.

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[6] Collection of Economic Data From Nationwide Urban Runoff Program Projects - Final Report, April 7, 1982, EPA Contract No. 68-01-5052. Detailed cost data provided by the projects are included in the appendices of this Report to show how the various projects prepared the data for submission.

The 1980 construction cost estimates ranged from $32,849,200 to $50,973,500, and the annual operating cost estimates ranged from $3,735,400 to $5,301,900. The cost of the public education program at Salt Lake County, Utah, was estimated at $1,550. The project will report the actual cost of the program upon its completion.

Revenue Analysis

The revenue analysis identifies the funding sources needed to match the estimated cost for control activities by participating agencies. This analysis is important because it ensures adequate funding to implement the technical solution to an urban runoff problem.

There are three categories of funding that are typically used to pay for runoff control: Federal and State funds, local public funds, and private funds. These sources include a variety of different financing mechanisms, each with advantages and disadvantages. The use of any or a combination of these sources requires consideration regarding:

- Revenue adequacy - Will funds be available in the long- and short-term?

- Equity - Are the beneficiaries of the control program paying their full share?

- Economic efficiency - Is the charge that is assessed equal to the social cost of the program?

- Administrative simplicity - Can the funds be managed and directed to the control program without significant administrative problems?

Ability-to-Pay Analysis

The ability-to-pay analysis evaluates the implementing agencies' and the individual user's ability to pay for the proposed program by determining how reasonable a proposed revenue program is in terms of its overall impact on the community as a whole as well as on individual residents.

For a given revenue source, the additional burden of the program is expressed as a percentage of the base costs. For example, if the proposed program is to be financed by property taxes and it adds $.50 to a $1,000 tax bill, the additional tax burden is .05 percent. In this instance, it would appear that the homeowner's ability to pay is quite high.

An important factor to remember is that programs to control urban runoff are not the only programs that are placing a burden on the people or institutions who must support them. Hence, the cost of a control program may not be excessive but cannot be imposed because ability to pay has already been exceeded due to other projects.

Sensitivity Analysis

The sensitivity analysis identifies the extent to which local ability to pay varies with changes in the assumptions used to estimate costs and revenues. Major assumptions that influence costs and revenues are: phasing of capital improvement, anticipated local funding requirements, rate of inflation, growth rate, and local fee policies.

The first step in this analysis is to determine a range of values for key cost and revenue assumptions that could occur during the program. (For example, inflation may vary between 5 percent and 15 percent.) The ability-to-pay analysis is then repeated using the high and low values for these assumptions. The final step is to evaluate the changes in burden with "best-" and "worst-" case situations in comparison with burden under the "most likely" assumption.

The purpose of this analysis is to identify control programs that are least vulnerable to changing conditions. It also helps to make the planner aware of best- and worst-case scenarios so that contingency plans can be developed to cope with such events.

Indirect Impact Analysis

The indirect impact analysis is an assessment of the costs and benefits that are not directly attributable to a proposed program. These costs and benefits can be economic, social, and/or environmental. Quantifying the indirect impacts of a program is usually quite difficult, so the planner generally resorts to qualitative measurement.

An Example: Planning an Educational Program

To illustrate further the process of identifying and resolving the financial and institutional issues connected with implementation of an urban runoff control program, the following spells out the steps involved in evaluating one control approach applicable in already developed areas. The example chosen is an educational program to inform citizens, industry, and public agencies of the problems caused by runoff-borne lawn and garden chemicals, oil and chemical residuals from industrial yards, and pesticides, herbicides, and fertilizer from parks and golf courses.

In this example, the activities would include: development of an informational brochure, including printing and distribution, and maintenance of an information center. In Figure 4-6, the institutional characteristics needed to accomplish these activities are compared with the capabilities of existing agencies. The matrix shows that the County Department of Pollution Control could provide the technical input to the Public Information Center to write the brochure. The Council of Governments might coordinate the effort and assume overall responsibilities for getting the job done.

INSTITUTIONAL CHARACTERISTICS NEEDED	AGENCIES					
	STATE	COUNCIL OF GOVERNMENTS	DEPARTMENT OF POLLUTION CONTROL	DEPARTMENT OF PLANNING	PUBLIC INFORMATION CENTER	CHAMBER OF COMMERCE
• COMMITMENT TO PROGRAM GOALS	*	*	*	*	*	*
• WORKING KNOWLEDGE OF EACH WASTE CONTRIBUTION TO THE RUNOFF PROBLEM	*	*	*	*		
• ABILITY TO WRITE CLEAR AND CONCISE INFORMATION FOR THE PUBLIC					*	
• ABILITY TO PRINT AND AND DISTRIBUTE BROCHURE				*		* DISTRIBUTE TO INDUSTRY
• STAFF TO RECEIVE FOLLOWUP CALLS		*				
• ABILITY TO ACCEPT FUNDS FROM SEVERAL AGENCIES TO PAY FOR THE PROGRAM		*				

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Figure 4-6. Institutional Assessment for Educational Program to Control Chemical Substances

Cost Analysis. Cost analysis determines the additional funds needed to implement a control alternative, including capital improvements and operation and maintenance. Additional administrative costs are less significant because most of these projects are undertaken by a public agency that is already performing the function to some extent.

Capital cost estimates are best prepared by the water quality planner with the assistance of the municipal engineer and in some cases his/her outside engineering advisor. These estimates identify all costs related to the purchase of a new facility or piece of equipment for a project and may require some research into vendor prices and bids on similar projects around the country. For programs which require changes to existing practices (street sweeping, etc.), the cost attributable to the water quality program is the incremental cost of the program.

Ultimately, the cost analysis is used to identify the least-cost method(s) for reducing pollution problems. It is important to remember that all costs associated with a given program must be considered. It is incorrect to assume that educational efforts, for example, are provided at no additional cost.

As an example of a cost analysis, a possible budget sheet for the educational program for the current year is presented in Figure 4-7.

ACTIVITIES	AGENCIES					
	STATE	COUNCIL OF GOVERNMENTS	DEPARTMENT OF POLLUTION CONTROL	DEPARTMENT OF PLANNING	PUBLIC INFORMATION CENTER	TOTAL
1. DEVELOP BROCHURE					$13,000	$13,000
2. PRINT BROCHURE				$1,500		$ 1,500
3 DISTRIBUTE BROCHURE				$ 800		$ 800
4. CONDUCT INFORMATIONAL MEETINGS	$2,000	$ 5,500	$2,000			$ 9,500
5. STAFF FOLLOWUP FOR PROGRAM		$24,000				$24,000
TOTAL	$2,000	$29,500	$2,000	$2,300	$13,000	$48,800

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Figure 4-7. Cost Analysis for Educational Program to Control Chemical, Herbicide, Fertilizer and Pesticide Runoff

Revenue Analysis. After the program cost estimate is prepared, the potential sources of revenue are analyzed. There are several critical factors in analyzing revenue for urban runoff programs including:

- Cost/Revenue Balance - Will the revenues be sufficient to cover the costs on an annual basis?

- Equitable Allocation of Costs to Different Groups - Do those who contribute to the problem pay their fair share? Do those who benefit from the program pay their fair share?

- Revenue Agreement - Do groups understand their participation in a program and its revenue formula? Have written agreements which define the cost allocation procedure been prepared ?

Revenue analysis will vary with the type of control approach selected. The critical factor in the revenue analysis is the identification of each entity that will provide revenues and the development of an understanding by that entity of the problem, the control approach, and its share of the cost.

Ability-to-Pay Analysis. Most of the costs to control runoff from developed areas are imposed on the general public or the benefiting population as a new and additional governmental expense. The ability-to-pay analysis evaluates this increased burden on the local community as a percentage of property taxes, average income, property evaluation, or other appropriate measures.

Figure 4-8 illustrates an ability-to-pay analysis for the educational program example. The key parameters to determine homeowners' ability to pay in this case are the cost of the program per household, cost as a percentage of average annual household income, and cost as a percentage of property taxes.

A. TOTAL PROGRAM COST (ONE-YEAR PROGRAM)	$48,000	
B. NUMBER OF HOUSEHOLOS AFFECTEO	19,000	
C. COST PER HOUSEHOLO (A OIVIOEO BY B)		$2.57
0. MEOIAN HOUSEHOLO INCOME	$14,700	
E. COST AS A % OF MEOIAN HOUSEHOLO INCOME (C OIVIOEO BY 0 TIMES 100)		.02%
F. AVERAGE ANNUAL PROPERTY TAXES	$ 1,200	
G. COST AS A % OF PROPERTY TAXES (C OIVIOEO BY F TIMES 100)		.21%

CONCLUSION: PROGRAM APPEARS TO NOT PLACE EXCESSIVE BUROEN ON LOCAL HOMEOWNERS

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Figure 4-8. Ability to Pay Analysis for Educational Program to Control Chemical, Herbicide, Fertilizer and Pesticide Runoff

Sensitivity Analysis. The sensitivity analysis will vary depending upon the revenue mechanism and program selected for implementing a proposed program. The most common revenue mechanisms for programs controlling runoff from developed areas are general funds and fees. Analyzing the sensitivity of general revenues requires a review of past collections relative to key parameters--inflation, housing starts, collection rates, capital improvements, and so on. Collections are then projected for worst and best case scenarios.

An additional consideration in the sensitivity analysis is revenue requirements. This relates to phasing a program, either handling capital improvements or starting a program on a limited basis with expansion to come in later years. For any one program, numerous options exist for staggering cash flows, and different scenarios should be developed to assess their impact on the program as part of the sensitivity analysis.

Indirect Impact. The indirect impact of a runoff control program for developed areas are extremely difficult to quantify. Educational programs will raise community awareness regarding the impacts of local activities on water pollution. Other indirect impacts from control programs may relate to recreational benefits, local improvements in quality of life, and increased tourism.

RELATIONSHIP BETWEEN NURP AND WQM PLANS

Of the locations selected for projects under the NURP effort, some 80 percent had state-approved (i.e., certified by the Governor) water quality management (WQM) plans with elements which addressed urban runoff. For 5 of these locations, the NURP project constituted the urban runoff element of the plan. For the other locations, however, the original 208 effort was unable to develop the necessary information on either water quality effects or performance of best management practices (BMPs) to justify structuring formal implementation plans for urban runoff control. Consequently, the typical WQM plan elements dealing with urban runoff identified the need for further study, usually specifying problem assessment and BMP performance evaluation. These elements became the focal points of the activities funded by NURP.

The WQM plans for the remaining 20 percent of the locations which participated in the NURP program did not contain a specific urban runoff element. Presumably this was due to time and resource constraints in relation to other issues which were assigned higher priorities in planning efforts. In these cases, the NURP projects provided the opportunity to address a water quality issue not adequately addressed in the original 208 planning studies.

Over two-thirds of the NURP project locations reported that NURP findings and recommendations have or will be incorporated in the next annual update of their formal WQM plans. The remainder generally indicate that they expect the planning issues to be addressed at the local level or that NURP results will support planning and implementation activities, even though they do not anticipate formal incorporation in WQM plans at this time.

Over half of the NURP project locations report either active or planned implementation efforts based on the results of NURP. Thirty percent indicated that no implementation is being planned because the need for or value of urban runoff control was not demonstrated. The balance (20 percent) of the NURP locations suggest that while implementation activities are not currently planned, they expect NURP results to influence future deliberations on this issue.

CHAPTER 5
METHODS OF ANALYSIS

INTRODUCTION

This chapter identifies and briefly discusses the methods adopted to assemble and analyze the large data base developed by the NURP projects and also provides the methods employed to develop and interpret results. The chapter is structured according to the three prime areas of program emphasis; (1) characteristics of pollutants in urban runoff, (2) water quality effects of urban runoff discharges including water quality criteria/standards violations and impairment or denial of beneficial uses of receiving water bodies, and (3) the effectiveness of control measures to reduce pollutant loads.

The procedures employed in this assessment were designed to provide generalized results and findings about urban runoff issues of interest for nationwide use. This national perspective, and the need to consider the fundamental variability of urban runoff processes, has prompted some significant advancements in the application of statistical methods and models. The basic methods used were, however, largely developed under different EPA efforts, many under the sponsorship of the Office of Research and Development, or other programs. In some cases, similar or equivalent procedures were applied in individual NURP projects; in other cases, methods adopted by individual projects in response to local needs and interests were different. Where possible, comparisons have been made between either detailed results, or conclusions drawn from such results, as derived from both local and national perspectives.

The descriptions provided in this chapter are brief and intended to communicate the technical framework upon which the results and conclusions are based. More detailed information on the methods and techniques are contained in other documents developed by NURP. Pertinent NURP reports cover, in separate volumes, probabilistic methods for analyzing water quality effects, detention and recharge basins for control of urban stormwater quality, and street sweeping for control of urban stormwater quality. The Data Management Procedures Manual, another of the project documents, is an additional source of information on details of the analysis methods utilized.

Because field measurements and sampling formed one of the most important information sources, it was essential that the monitoring and analysis programs produce consistent and sound data. Accordingly, NURP required that all projects adopt Quality Assurance/Quality Control elements as integral parts of their work plans. Key components of these plans include the following:

- Program Coordination. Projects were required to designate a QA/QC coordinator, responsible for the entire QA/QC effort.

- Field Quality Assurance. Guidance was provided to the projects for all key aspects of the data collection process.

- Laboratory Quality Assurance. A manual prepared by EPA's Environmental Monitoring and Support Laboratory was provided to all projects and contained analytical quality control information.

- Data Management. A manual entitled "Data Management Procedures" was provided to all projects and covered such topics as data formatting, data reduction, and some analysis.

- Data Analysis. To encourage innovative approaches and responsiveness to local conditions, uniform methods of data analysis were not stressed. Technical guidance and mandatory review of analytical procedures were provided.

I RUNOFF POLLUTANT CHARACTERISTICS

al

stantial component of the individual NURP projects was the acquisition subsequent analysis) of a data base for a number of storm events, con- ng of precipitation and the resulting quantity and quality of runoff a number of local urban catchments. One of the principal EPA objectives e analysis of these data has been to develop a concise summary of the cteristics of urban runoff. There are a number of questions concerning runoff characteristics which need to be addressed for water quality ing purposes, including what are the appropriate measures of the statis- characteristics of urban runoff (e.g., population distribution, central icy, variability, etc.)? Do distinct subpopulations exist and what are characteristics? Are there significant differences in data sets ed according to locations around the county (geographic zones), land season, rainfall amount, etc.? How may these variations be recognized? s the most appropriate manner in which to extrapolate the existing data to locations for which there are no or limited measurements? Though questions cannot be fully answered given the current state of knowledge ning urban runoff, these are the types of issues addressed by the ls described in this chapter and the results presented in Chapter 6.

rincipal thrust of the individual NURP projects, and thus this nation- assessment report, was the characterization of what has been adopted as lard Pollutants" of primary concern in urban runoff. These include , oxygen consuming constituents, nutrients, and a number of the more ly encountered heavy metals. The methods used to characterize these rd pollutants are described under a separate heading below.

roximately two-thirds of the NURP projects the occurrence of compounds s list of "Priority Pollutants" was investigated. This program element so described under a separate heading below. A number of additional have also been addressed in the program. These are briefly discussed

below because they relate closely to the general issue of pollutant characteristics. These include the following:

- Soluble vs Particulate Pollutant Forms. The distribution of soluble and particulate forms of a pollutant in urban runoff (particularly metals and nutrients) was examined in both the standard conventional pollutant and priority pollutant aspects of the study because certain beneficial use effects depend strongly on the form in which the contaminant is present. The priority pollutant program additionally determined "Total Recoverable" fractions, corresponding to contaminant forms used in EPA's published toxic criteria guidelines.

- Coliform Bacteria. Fecal coliform bacteria counts (and in some cases total coliform and fecal streptococcus as well) in urban runoff were monitored during a significant number of storms by seven of the NURP projects. Though the data base for bacteria is restricted, useful results are provided in Chapter 6.

- Wetfall/Dryfall. As part of program elements designed to examine sources of pollutants in urban runoff, a number of projects operated atmospheric monitoring stations for characterizing pollutant contributions from precipitation (wetfall) and from dry weather deposition (dryfall). Results of this work are reported in individual project reports and not included herein.

Standard Pollutants

The following constituents were adopted as standard pollutants characterizing urban runoff:

TSS - Total Suspended Solids
BOD - Biochemical Oxygen Demand
COD - Chemical Oxygen Demand
TP - Total Phosphorus (as P)
SP - Soluble Phosphorus (as P)
TKN - Total Kjeldahl Nitrogen (as N)
NO_{2+3}-N - Nitrite + Nitrate (as N)
Cu - Total Copper
Pb - Total Lead
Zn - Total Zinc

The list includes pollutants of general interest which are usually examined in both point and nonpoint source studies and includes representatives of important categories of pollutants--namely solids, oxygen consuming constituents, nutrients, and heavy metals.

The pollutant concentrations found in urban runoff vary considerably, both during a storm event, as well as from event to event at a given site and from site to site within a given city and across the country. This variability is the natural result of high variations in rainfall intensity and occurrence,

geographic features that affect runoff quantity and quality, and so on. Considering this situation, a measure of the magnitude of the urban runoff pollution level and methods for characterizing its variability were needed. The event mean concentration (EMC), defined as the total constituent mass discharge divided by the total runoff volume, was chosen as the primary measure of the pollutant load. The rationale for adopting the EMC for characterizing urban runoff is discussed in the receiving water effects section of this chapter as well as in subsequent chapters. Event mean concentrations were calculated for each event at each site in the accessible data base. If a flow-weighted composite sample was taken, its concentration was used to represent the event mean concentration. Where sequential discrete samples were taken over the hydrograph, the event mean concentration was determined by calculating the area under the loadograph (the curve of concentration times discharge rate over time) and dividing it by the area under the hydrograph (the curve of runoff volume over time). Details of the calculation procedure have been described in the Data Management Procedures Manual. For the purpose of determining event mean concentrations, rainfall events were defined to be separate precipitation events when there was an intervening time period of at least six hours without rain.

A statistical approach was adopted for characterizing the properties of EMCs for standard pollutants. Standard statistical procedures were used to define the probability distribution, central tendency (a mean or median) and spread (standard deviation or coefficient of variation) of EMC data. EMC data for each pollutant from all storms and monitoring sites were complied in a central data base management system at the National Computer Center. The SAS computer statistical routines and other standard statistical methods were used to explore and characterize the data. The statistical methods used are, for the most part, not explained in this report since these are readily available in the literature. Nor are the operations of the SAS routines, which are available at most computer centers.

The underlying probability distribution of the EMC data was examined and tested by both visual and statistical methods. With relatively few isolated exceptions, the probability distribution of EMCs at individual sites can be characterized by lognormal distributions. Given this, concise characterization of the variable urban runoff characteristics at each of the sites is defined by only two values, the mean or median and the coefficient of variation (standard deviation divided by mean). Because the underlying distributions are lognormal, the appropriate statistic to employ for comparisons between individual sites or groups of sites is the median value, because it is less influenced by the small number of large values typical of lognormal distributions and, hence, is a more robust measure of central tendency. However, for comparisons with other published data which usually report average values and for certain computations and analyses (e.g., annual mass loads), the mean value is more appropriate.

Relationships among a number of statistical properties of interest are easily determined when distributions are lognormal. Figure 5-1 illustrates some relationships for lognormal distributions. In (a) the frequency distributions of two variable data sets which are log-normal and have the same median are shown. The log transforms of the data result in normal bell

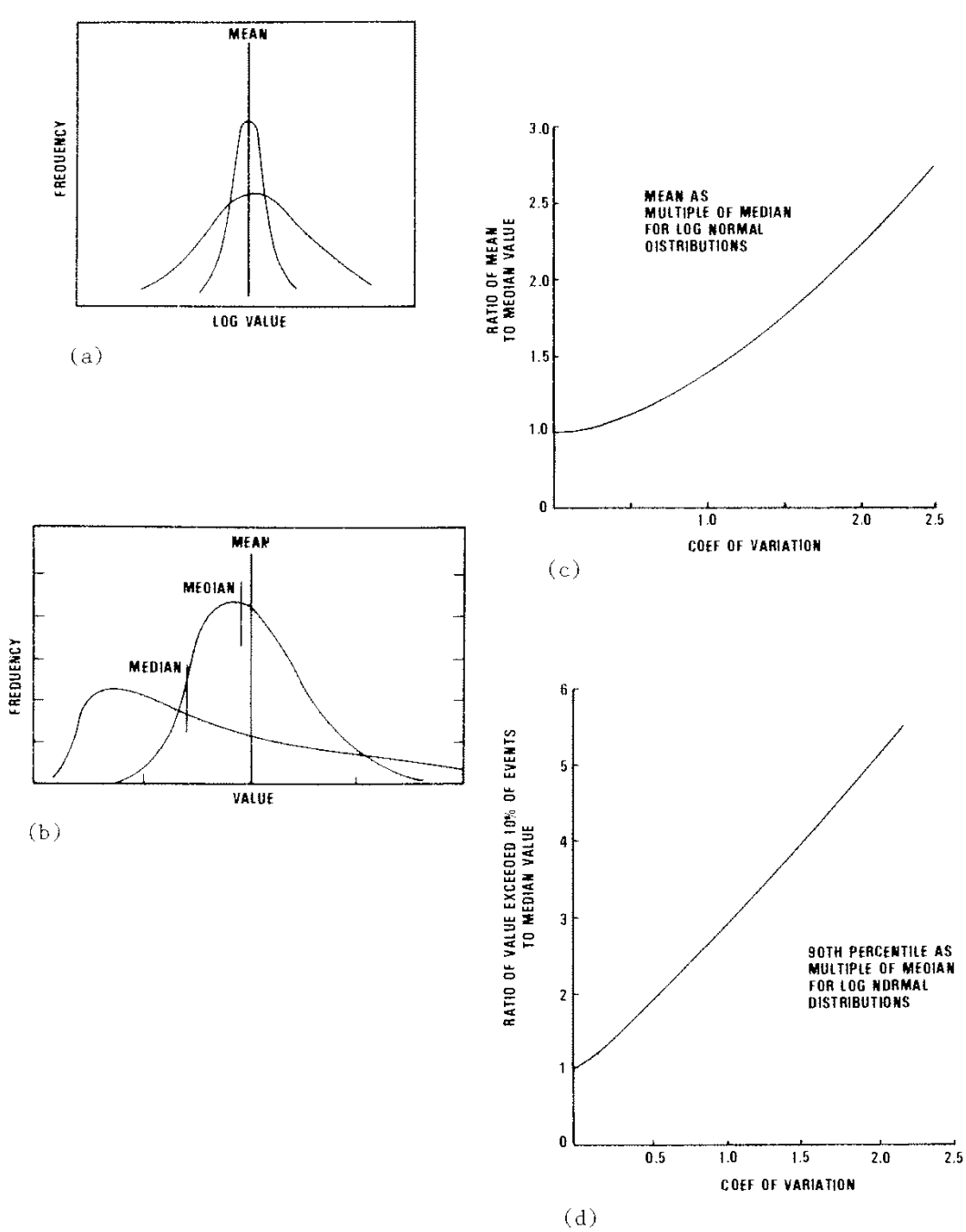

Figure 5-1. Lognormal Distribution Relationships

shaped distributions; more variable data (higher coefficient of variation) result in a greater spread. Frequency histograms prepared using untransformed data values produce skewed distributions, as shown by (b) which illustrates two data sets which have the same arithmetic mean. The effect of coefficient of variation is shown as well as the relation between mean and median for lognormal distributions. An established relationship exists between median and mean, as shown by (c) and described by:

$$\frac{\text{Mean}}{\text{Median}} = \sqrt{1 + (\text{Coef Var})^2}$$

When a distribution is known to be lognormal the best estimate of the population mean is that derived from the lognormal relationships. For small samples it can be expected to be different than the result of a straight arithmetic averaging of sample data; the two estimates of the mean will give similar values when the number of samples is very large.

In addition, the expected value at any probability or frequency of occurrence (X_α) can be determined by:

$$X_\alpha = \exp\ (\mu_{lnx} + Z_\alpha\ \sigma_{lnx})$$

where:

Z_α = the standard normal probability

μ_{lnx} = mean of log-transformed data

σ_{lnx} = standard deviation of log-transformed data

X_α can be expressed as a ratio to the median value by the following equation which defines the ratio in terms of the coefficient of variation

$$\frac{X_\alpha}{\text{Median}} = \exp\ (Z_\alpha \sqrt{\ln\ (1 + (\text{Coef Var})^2)}).$$

This relationship is shown by (d) for 90th percentile values (10 percent exceedance, $Z_\alpha = 1.2817$).

The establishment of the fundamental distribution as lognormal, and the availability of a sufficiently large sample population of EMCs to provide reliable derived statistics, has a number of benefits:

- Concise summaries of highly variable data can be developed.
- Comparisons of results from different sites, events, etc., are convenient and are more easily understood.

- Statements can be made concerning frequency of occurrence. One can express how often values will exceed various magnitudes of interest.

- A more useful method of reporting data than the use of ranges is provided; one which is less subject to misinterpretation.

- A framework is provided for examining "transferability" of data in a quantitative manner.

Priority Pollutants

In cooperation with EPA's Monitoring and Data Support Division (MDSD), a special study element was built into two-thirds of the NURP projects (20 of 28) to identify which of the compounds on EPA's list of "Priority Pollutants" are found in urban runoff, and the concentrations at which they occur. The base effort collected 121 samples of urban runoff which were analyzed for priority pollutants. A supplementary special metals study secured 147 samples. Methods utilized in this study element are described in the following report which covers this activity:

> "NURP Priority Pollutant Monitoring Project: Summary of Findings", December 1983; EPA Monitoring and Data Support Division, Office of Water Regulations and Standards, Washington, D.C.

In addition to the above special study, as previously mentioned, most NURP projects monitored selected heavy metals (principally total copper, total lead, and total zinc) in their routine monitoring programs. Summaries of these data are presented in Chapter 6.

Hydrometeorological Statistics

Consistent with the adoption of a storm "event" as the fundamental time scale used in the analysis of data and the interpretation of effects, rainfall data were analyzed to define "event" statistics for a significant number of locations throughout the country. The SYNOP program was employed for developing the statistical parameters of rainfall intensity, duration, volume, and interval between storm events. This program has been detailed in the NURP "Data Management Procedures Manual."

In addition to rainfall, rainfall-runoff relationships were characterized for monitored storm events. The runoff coefficient, defined as the ratio of runoff volume to rainfall volume, was computed, and effects of such catchment characteristics as land use and imperviousness were investigated. Long-term streamflow records for numerous stations across the country were also analyzed to characterize regional trends.

RECEIVING WATER QUALITY EFFECTS

General

A number of individual NURP projects examined the site-specific impacts of urban runoff on water quality for a variety of beneficial uses and receiving

water types. These results provide important information on the extent to which urban runoff constitutes a "problem" as well as "ground truth" measurements against which more generalized techniques can be compared. Methodologies employed in these local studies vary and are described in the individual project reports. Relevant site-specific project results are cited in Chapter 9.

Receiving water impact analyses cannot be readily generalized because there is a high degree of site-specificity to the important factors. The type of beneficial use dictates the pollutants which are of principal concern; the type of water body (e.g., stream, lake, estuary) determines how receiving water quality responds to loads; and physical characteristics (e.g., size, geometry, flows) have a major influence on the magnitude of response to a particular load.

Despite the inherent limitations of a set of generalized receiving water impact analyses, a screening level analysis was considered a necessary element for a nationwide assessment of the general significance of urban runoff in terms of water quality problems, especially adverse effects on beneficial uses. Accordingly, a set of analysis methodologies were adopted and utilized as screening techniques for characterizing water quality effects of urban runoff loads on receiving water bodies. A key requirement was to delineate the severity of water quality problems by quantifying the magnitude, and in the case of intermittent loads, the frequency of occurrence of water quality impacts of significance. These procedures are identified and described briefly below. Significant technical aspects are detailed further in the supplementary NURP report which addresses the receiving water impact analysis methodology.

It was not possible to perform a "National Assessment" in the usual sense of the term. NURP has determined that it is not realistic (if the basis is effect on beneficial use of a water body) to estimate the total number of water quality problem situations in the nation which result from urban stormwater runoff or the cost of control which would ultimately result. The available analysis methods do permit an assessment of a different kind. NURP applied the analysis procedures as a screening type analysis to define the conditions under which problems of different types are likely or unlikely to occur. From the results of these screening analyses, NURP has drawn inferences and made general statements (Chapters 7 and 9) on the significance of urban runoff. Where it has been possible or practical to do so, these general screening analyses were applied to local situations which exist within certain of the individual NURP projects. Comparisons were made between specific water quality effects or broader conclusions relative to problems derived from both local analysis and general screening methods.

Time Scales of Water Quality Impacts

There are three types of water quality impacts associated with urban runoff. The first type is characterized by rapid, short-term changes in water quality during and shortly after storm events. Examples of this water quality impact include periodic dissolved oxygen depressions due to oxidation of contaminants, or short-term increases in the receiving water concentrations of one

or more toxic contaminants. These short-term effects are believed to be an important concern and were the prime focus of the NURP analysis.

Long-term water quality impacts, on the other hand, may be caused by contaminants associated with suspended solids that settle in receiving waters and by nutrients which enter receiving water systems with long retention times. In both instances, long-term water quality impacts are caused by increased residence times of pollutants in receiving waters. Other examples of the long-term water quality impacts include depressed dissolved oxygen caused by the oxidation of organics in bottom sediments, biological accumulation of toxics as a result of up-take by organisms in the food chain, and increased lake entrophication as a result of the recycling of nutrients contributed by urban runoff discharges. The long-term water quality impacts of urban runoff are manifested during critical periods normally considered in point source pollution studies, such as summer, low stream flow conditions, and/or during sensitive life cycle stages of organisms. Since long-term water quality impacts occur during normal critical periods, it is necessary to distinguish between the relative contribution of urban runoff and the contribution from other sources, such as treatment plant discharges and other nonpoint sources. A site-specific analysis is required to determine the impact of various types of pollutants during critical periods, and this aspect of urban runoff effects was not addressed in detail in NURP.

A third type of receiving water impact is related to the quantity or physical aspects of flow and includes short-term water quality effects caused by scour and resuspension of pollutants previously deposited in the sediments. This category of impact was not addressed by NURP, in general, although one project provides some information.

As indicated previously, the first type of change in water quality associated with discharges from urban runoff is characterized by short-term degradation during and shortly after storm events. The rainfall process is highly variable in both time and space. The intensity of rainfall at a location can vary from minute to minute and from location to location. Phenomena which are driven by rainfall such as urban runoff and associated pollutant loadings are at least as variable. Short term measurements, on a time scale of minutes, to define rainfall, the runoff flow hydrograph, and concentrations of contaminants (pollutographs) feasibly can be taken at only a rather limited number of locations. These measurements have usually been employed in an attempt to refine or calibrate calculation procedures for estimating runoff flows and loads. Most urban areas contain a network of drainage systems which collect and discharge urban runoff into one or more receiving water bodies. Since the rainfall, runoff, and pollutant loads vary in both time and space, it is impossible to determine by calculation or measurement the very short time scale (minute-to-minute) changes in water quality of a receiving water and assign the changes to specific sources of runoff. Although very short duration exposures (on the order of minutes) to very high concentrations of toxics can produce environmental damage (mortality or sublethal effects) to aquatic organisms, it is likely that exposures on the order of hours have the highest possibility of causing adverse environmental impacts. This results, in part, from the smoothing obtained by mixing numerous sources which have high frequency (short-term) variability.

In view of the above discussion, the time scale used by NURP for analysis of short-term receiving water impacts is the rainfall event time scale which is on the order of hours. To represent the average concentration of pollutants in urban runoff produced during such an event, NURP used the event mean concentration.

Criteria/Standards and Beneficial Use Effects

As discussed in previous chapters, three definitions have been adopted to assess receiving water problems associated with urban runoff; (1) impairment or denial of beneficial use, (2) violation of numerical criteria/standards, and (3) local perception of a problem. The procedures and methods employed in the NURP assessment focus on the first two problem definitions. A framework for identifying target receiving water concentrations associated with the criteria standards and beneficial use problems are provided below. The third problem type, local perception of a problem and degree of concern cannot be addressed by these quantitative procedures.

The analysis methods employed make it possible to project water quality effects caused by intermittent, short-term urban runoff discharges. Where appropriate, these effects are expressed in terms of the frequency at which a pollutant concentration in the water body is equalled or exceeded. However, if the basis for determining the significance of such water quality impacts (and hence the need for control) is taken to be the effect such receiving water concentrations have on the impairment or denial of a specific beneficial use, then it is necessary to go one step further. A basis is required for judging the degree to which a particular water quality impact constitutes an impairment of a beneficial use. With intermittent pollutant discharges, effects are variable and are best expressed in terms of a probability distribution from which estimates can be made of the frequency with which effects of various magnitude occur.

There is a rather broad consensus that existing water quality criteria, and water uses based on such criteria, are most relevant when considered in terms of continuous exposures (ambient conditions). Even where continuous discharges are involved, there has been discussion and debate as to whether a particular criterion should be interpreted as some appropriate "average" condition or a "never-to-exceed" limit. The basic issue is whether the more liberal interpretation will provide acceptable protection to the beneficial use for which the criterion in question has been developed. The only reason such distinctions become an issue is because the practical feasibility or relative economics, or both, are sufficiently different that one is encouraged to question whether the more restrictive interpretation is overly (or even excessively) conservative in terms of providing protection for the associated beneficial use.

The issue (i.e., whether traditional ambient criteria are excessively conservative measures of conditions which provide reasonable assurances of protection for a beneficial use when exceeded only intermittently) is particularly appropriate in the case of urban storm runoff. Analysis of rainfall records for a wide distribution of locations in the nation indicates that, even in the wetter parts of the country, urban runoff events occur only

about 10 percent of the time. There are regional and seasonal differenc but typical values for annual average storm characteristics in the east half of the United States are:

	Average (Hours)	Median (Hours)	90th Percentile (Hours)
Storm Duration	6	4.5	15
Interval Between Storm Mid-Points	80	60	200

These estimates are based on results from an analysis of long-term rainfa records for 40 cities throughout the country. Median and 90th percenti values are derived from data mean and variance based on a gamma distributic which has been shown to characterize the underlying distribution of st event parameters quite well.

In the semi-arid regions of the western half of the country, average st durations tend to be comparable to the above, but average intervals betwe successive storms increase substantially (two to four fold) and are high seasonal. With urban storm runoff, therefore, one is dealing with polluta discharges which occur over a period of a few hours every several days more or after long dry periods. In advective rivers and streams, the wat mass influenced by urban runoff tends to move downstream in relatively di crete pulses. Because of the variability in the magnitude of the pollut loads from different storm events, only a small percentage of these puls have high pollutant concentrations.

There are currently no formal "wet weather" criteria and, thus, no general accepted way intermittent exposures having time scale characteristics typic of urban runoff can be related to use impairment. In the belief that would be inappropriate to ignore such considerations in a general evaluati of urban runoff, NURP has developed estimates for concentration levels whi result in adverse impacts on beneficial use when exposures occur intermi tently at intervals/durations typical of urban runoff. These "effec levels" were used to interpret the significance of the variable, intermitte water quality impacts of urban runoff. It should be understood that the effects levels do not represent any formal position taken by EPA, but a simply the most reasonable yardsticks available to meet the immediate nee of the evaluation of urban runoff. As used in the screening analysis proc dures, alternative values for "effects levels" may be readily substitut when either more accurate estimates can be made, or more (or less) conser tive approaches are indicated in view of the importance of a particular wat body or beneficial use.

Table 5-1 summarizes information on water quality criteria for a number contaminants routinely found in urban storm runoff. The data present include:

- Water quality criteria for substances on EPA's priority pollutant list (45 FR No. 79318, 11/28/80). These criteria provide

TABLE 5-1. SUMMARY OF RECEIVING WATER TARGET CONCENTRATIONS USED IN SCREENING ANALYSIS - TOXIC SUBSTANCES
(ALL CONCENTRATIONS IN MICROGRAMS/LITER, µg/ℓ)

Contaminant	Water Hardness mg/l (as Ca CO_3)	Freshwater Aquatic Life		Saltwater Aquatic Life		Human Ingestion	Estimated Effect Level For Intermittent Exposure	
		24 Hour	Max	24 Hour	Max	(1)	Thresh-hold	Significant Mortality
Copper	50	5.6	12	4.0	23	NP	20	50 - 90
	100	5.6	22	4.0	23		35	90 - 150
	200	5.6	42	4.0	23		80	120 - 350
	300	5.6	62	4.0	23		115	265 - 500
Zinc	50	47	180	58	170	NP	380	870 - 3,200
	100	47	321	58	170		680	1,550 - 4,500
	200	47	520	58	170		1,200	2,750 - 8,000
	300	47	800	58	170		1,700	3,850 - 11,000
Lead	50	0.75	74				150	350 - 3,200
	100	3.8	172	(25)	(670)	50.0	360	820 - 7,500
	200	12.5	400				850	1,950 - 17,850
	300	50.0	660	(C)	(A)		1,400	3,100 - 29,000
Chrome (+3)	50		2,200					
	100	(44)	4,700	N.P.	(10,300)	170.00	8,650	
	300	(C)	15,000		(A)			
Chrome (+6)	-	0.29	21.0	18	1260	50.0		
Cadmium	50	0.01	1.5				3	7 - 160
	100	0.02	3.0	4.5	59.0	10	6.6	15 - 350
	300	0.08	9.6				20	45 - 1,070
Nickel	50	56	1,090					
	100	96	1,800	7.1	140.0	13.4		
	300	220	4,250					

NOTES:

- NP = No criteria proposed.
- Some toxic criteria are related to Total Hardness of receiving water. Where this applies, several values are shown. Other values may be calculated from equations presented in EPA's Criteria Document (Federal Register, 45,231, November 28, 1980). Where a single value is shown, water hardness does not influence toxic criteria.
- Concentration values shown within parentheses ( ) are not formal criteria values. They reflect either chronic (C) or acute (A) toxicity concentrations which the EPA toxic criteria document indicated have been observed. Values of this type were reported where the data base was insufficient (according to the formally adopted guidelines which were used in developing the criteria) for EPA to develop 24 hour and Max values.
- Note (1): The "Human Ingestion" criteria developed by the EPA Toxic Criteria documents are indicated to relate to ambient receiving water quality. The Drinking Water Criteria relate to finished water quality at the point of delivery for consumption.
- Estimated Effects levels reflect estimates of the concertration levels which would impair beneficial uses under the kind of exposure conditions which would be produced by Urban Runoff. They are an estimate of the relationship between continuous exposure and intermittent, short duration exposures (several hours once every several days). Threshold concentrations are those estimated to cause mortality of the most sensitive individual of the most sensitive species.

  Significant Mortality concentrations are shown as a range which reflects 50 percent of the most sensitive species and mortality of the most sensitive individual of the 25th percentile species sensitivity.

an extensive set of numerical values derived from bioassay studies.

- Estimates of "effects levels" which are suggested by NURP analysis to be relevant for the intermittent exposures characteristic of urban runoff.

By incorporating the numerical values for EPA's ambient water quality criteria and the concentration levels suggested by NURP for intermittent effects in the same table (or on the same graph in Chapter 7), a convenient, concise comparison is provided of the practical implications of applying one or the other as the yardstick for judging the protection or impairment of water use. The two sets of numerical values thus provide measures for two of the three options for defining a problem: violation of criteria or actual impairment of a beneficial use.

Comparison of the pollutant concentrations in urban runoff showing the frequency and magnitude of exceedance of ambient criteria and intermittent effects levels provides a qualitative sense of the control requirements (and implications regarding costs) attendant on the adoption of either problem definition as the operative one.

Rivers and Streams

The approach adopted to quantify the water quality effects of urban runoff for rivers and streams focuses on the inherent variability of the runoff process. What occurs during an individual storm event is considered secondary to the overall effect of a continuous spectrum of storms from very small to very large. Of basic concern is the probability of occurrence of water quality effects of some relevant magnitude.

To consider the intermittent and variable nature of urban runoff, a stochastic approach was adopted. The method involves a direct calculation of receiving water quality statistics using the statistical properties of the urban runoff quality and other relevant variables. The approach uses a relatively simple model of the physical behavior of the stream or river (as compared to many of the deterministic simulation models). The results are therefore an approximation, but appropriate as a screening tool.

The theoretical basis of the technique is quite powerful as it permits the stochastic nature of runoff process to be explicitly considered. Application is relatively straightforward, and the procedure is relevant to a wide variety of cases. These attributes are particularly advantageous given the national scope of the NURP assessment. The details of the stochastic method are summarized and presented below.

Figure 5-2 contains an idealized representation of urban runoff discharges entering a stream. The discharges usually enter the stream at several locations but are considered here to be adequately represented by an equivalent discharge flow which enters the system at a single point.

Receiving water concentration (CO) is the resulting concentration after complete mixing of the runoff and stream flows and is interpreted as the mean

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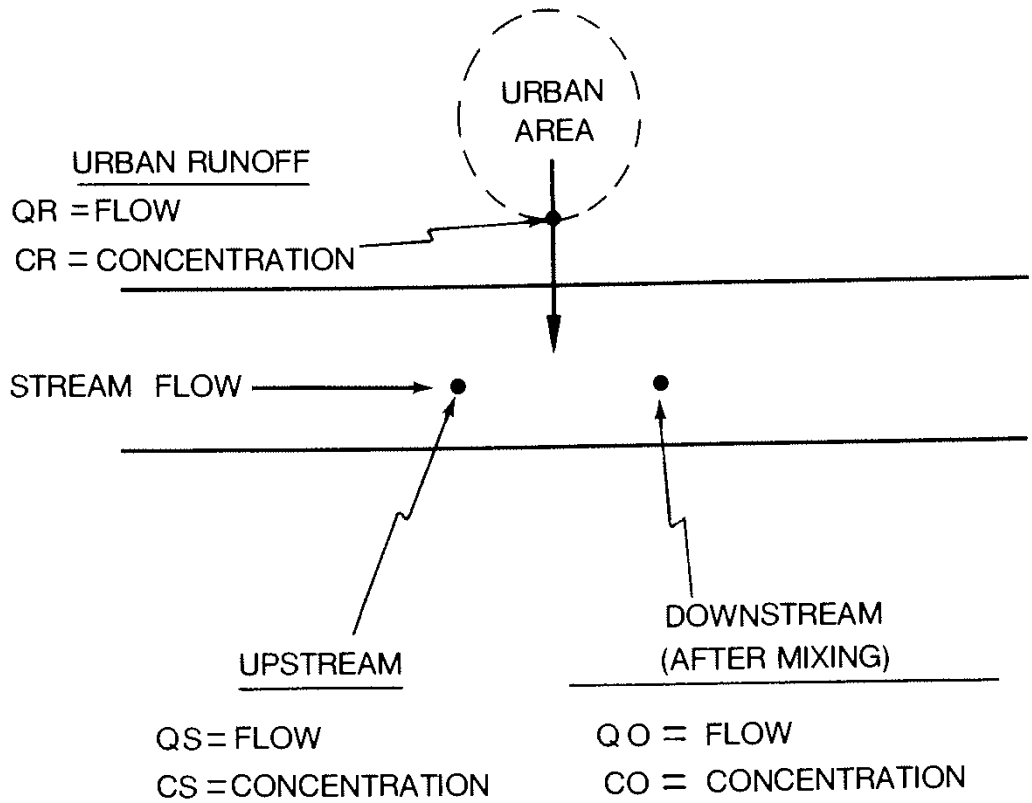

Figure 5-2. Idealized Representation of Urban Runoff Discharges Entering a Stream

stream concentration just downstream of all of the discharges as shown in Figure 5-2. The four input variables considered are:

- Urban runoff flow (QR)
- Urban runoff concentration (CR)
- Stream flow (QS)
- Stream concentration (CS)

Each is considered to be a stochastic random variable, which together combine to determine downstream flow and concentration. In addition, all variables are assumed to be independent, except urban runoff flow and streamflow where correlation effects can be incorporated as warranted.

An essential condition of the current computational structure is that each of the four variables which contribute to downstream receiving water quality can be adequately represented by a lognormal probability distribution; from analysis of data or other estimating procedures, the statistical properties of each of the input parameter distributions are defined. Examination of a reasonably broad cross-section of data indicates that lognormal probability distributions can adequately represent discharges from the rainfall/runoff process, the concentration of contaminants in the discharge, and the daily flow record of many rivers and streams, particularly for a national scale screening approach. It should be noted, however, that modifications of the computation techniques could be made to accommodate the use of other distributions (e.g., gamma, exponential) for some or all of the parameters.

The analysis procedure is described in more detail in the supplementary NURP report cited earlier. It essentially operates as follows:

- Downstream Concentrations. Stream concentrations of a pollutant are considered to result from the combination of upstream flow at background concentration and runoff flow at its concentration. Variations in stream concentrations below the urban runoff discharge result from variations in each of these inputs; the most significant source of variation being whether or not an event is occurring (i.e., whether runoff flows and loads are present). Stream flows must be considered because of the major effect of dilution on the resulting concentrations. Upstream concentrations can, however, be set at zero for the calculations; in which case, the result obtained is the exclusive effect of urban runoff discharges, and not the overall expected stream concentration. Effects of urban runoff can be evaluated by considering only the periods during which runoff occurs.

- Parameter Estimates. Estimates for runoff flows and concentrations are developed from information derived from the NURP monitoring programs. Information on stream flow can be obtained from analysis of local stream gage records. Upstream concentrations tend to be very site-specific; for this reason, the screening analysis calculated only the effect of urban runoff discharges.

- Statistical Calculations. From the statistical properties (specifically, the means and standard deviations) of the flows and concentrations, properties of the dilution ratio can be defined, and the statistical properties of the resulting in-stream concentrations are calculated directly. The frequency with which any particular target concentration is exceeded during wet weather can be calculated from the statistical properties of stream concentration, using formulas or scaled directly from a standard plot of cumulative (lognormal) probability distributions.

  The frequency with which the target concentration is exceeded during all periods -- wet and dry -- is simply the product of

the wet weather frequency and the probability (frequency) that it is raining. The probability that it is raining at any time is defined by the ratio of mean storm duration to mean inter-storm period, derived from the rainfall statistics.

$$\frac{D = \text{mean duration of storms}}{\Delta = \text{mean interval between storm midpoints}} = \text{fraction of time it is wet}$$

- Mean Recurrence Interval. In the presentation of results in Chapter 7, the probability distribution of event mean stream concentrations of an urban runoff pollutant during runoff periods is converted to a Mean Recurrence Interval (MRI) as a device to assist in the interpretation of results. The recurrence interval is defined as the reciprocal of probability. Because the basic calculation is based on storm events, this definition yields the overall average number of storms between specific event occurrences. Event recurrence is converted to what is believed to be a more meaningful time recurrence by dividing by the average number of storms per year, which is developed from analysis of rainfall records and defined as

$$\frac{\text{Hours/year} = 8760}{\text{Average interval between storm midpoints}} = \text{average \# storms per year}$$

As an example of the MRI calculations consider a stream concentration which has an exceedance probability of 1.0 percent (Pr = 0.01)

$$\text{Recurrence Interval} = 1/Pr = 1/0.01 = 100$$

The analysis is in terms of storm events, not time. Therefore this result is interpreted as one storm in every 100 events on average, will produce concentrations greater than the selected value. For an area where rainfall patterns produce an average of 100 storms per year, the average recurrence interval expressed in time units rather than events, is:

$$\text{Recurrence Interval (time)} = \frac{\text{event recurrence}}{\text{\# events/year}} = \frac{100 \text{ events}}{100 \text{ events/year}} = 1 \text{ year}$$

Currently, the primary use of the above procedure is as a screening tool in which approximate results and relative values are of interest. In this regard, NURP believes the Mean Recurrence Interval is a very useful definition. It should be interpreted as the long-term average interval between occurrences.

When results of this nature are interpreted, the following factors should be noted. The recurrence intervals of most interest relate to very low probabilities of occurrence. The tails of distributions may have appreciable uncertainty, and in the natural water systems, distributions may be lognormal

over the bulk of the range but may deviate from the assigned distribution at the extremes. Computed stream concentrations at long recurrence intervals are likely to be conservative, that is, overstated because there are likely to be practical upper limits for runoff concentrations and lower limits to stream flow.

It also should be noted that serial correlations of streamflows or the tendency of wet and dry years to occur in clusters, though not a general behavior, may be significant in some cases. This situation would cause the average one year condition, for example, not to repeat itself every year but rather to occur several times per year, at intervals greater than one year.

Other Receiving Waters

Other receiving waters of general interest in assessing urban runoff effects include lakes, estuaries, embayments, and coastal zones. The methods adopted for lakes are briefly described below. The other receiving waters generally require site-specific and often complex analysis techniques (numerical methods, multi-dimensional modeling, etc.). Given this, a generalized screening-level assessment was not believed to be appropriate for this report. A number of the individual NURP projects consider these coastal water bodies and report on the specific methods adopted and results obtained.

For lake eutrophication problems, the time scale for analysis is considerably longer than the short (event scale) periods necessary for estuaries and rivers. For this case, annual average loads were used in a steady-state analysis performed using the type of empirical model advanced by Vollenweider and others. The EMC data developed from NURP monitoring programs can be readily converted to annual loads directly from annual flows or indirectly based on annual rainfall.

For total phosphorus, typically the limiting nutrient of concern, average concentrations are calculated using the following formula:

$$P = \frac{W'}{H/\tau \cdot \upsilon_s} \cdot 1000$$

The input values include pollutant mass loading (W'), lake physical characteristics of depth (H) and residence time (τ) and reaction rate coefficients (υ_s). The relative contribution of all load sources to lake total P concentrations can be defined by solving this equation for each of the sources. By comparing results in terms of lake concentrations for initial conditions (no control), and then modifying loads to reflect various levels of control, alternative control operations can be compared directly to effect on lake water quality.

Some judgement is involved in defining acceptable lake water quality concentrations, which depend in part on water use and on regional norms and expectations.

EVALUATION OF CONTROLS

General

The evaluation of controls has two elements: (a) characterizing the controls' performance capabilities and (b) defining costs. For this report, only the characterization of performance is emphasized; cost relationships are addressed to a more limited extent. EPA's Economic Analyses Staff, Office of Analysis and Evaluation, has prepared the following report under contract:

> "Collection of Economic Data from Nationwide Urban Runoff Program Projects," EPA Office of Water Regulations and Standards, April 7, 1982.

This report, issued at an early stage in the NURP program, assembled and analyzed cost information on potential control measures. Useful cost information for detention basins was developed by the Washington, D.C. area NURP project and is discussed further in Chapter 8.

Detention Basins

There are a number of procedures which can be adopted for evaluation of detention basin control devices. Procedures adopted by individual NURP projects are described in project reports. The procedure adopted by NURP to generalize the analysis of detention basins, and provide a planning level basis for estimating capabilities and requirements, is detailed in a detention basin handbook being issued by NURP as a supplementary report.

Results presented in Chapter 8 provide a summary of observed performance characteristics of the detention devices monitored under the NURP program and a projection of long-term performance expected on the basis of basin size and regional rainfall characteristics. The latter result is based on the probabalistic analysis methodology described in the supplementary report. Planning level cost estimates for control of urban runoff using this technique are also presented.

Street Sweeping

A number of the individual NURP projects adopted street sweeping as a principal subject of investigation. Procedures and results are described in individual project reports and are consolidated and summarized in Chapter 8. The adopted procedure and detailed results are presented in the supplementary NURP report, which was cited earlier.

Recharge Devices

Recharge devices include impoundments or other structures such as pits, trenches, retention basins, percolating catch basins, in-line percolation chambers or perforated pipes, which function by intercepting some portion of storm runoff and allowing it to percolate into the ground.

One of the basic questions which arises when controls of this type are considered is whether the percolation encouraged will produce undesirable degradation of groundwater quality. This aspect was examined by two NURP projects, and is discussed in Chapter 7 of this report.

Evaluation of percolating basins of any size is readily accomplished using the standard storage/treatment routines of stormwater models such as STORM or SWMM. In such cases the local soil permeability (the percolation rate) is applied as the treatment rate. In addition, statistical analysis procedures described in "A Statistical Method for the Assessment of Urban Stormwater" (EPA 440/3-79-023, May 1979) have been developed. A probabalistic analysis methodology adapted from the latter approach has been used by NURP to provide estimates of performance capabilities of recharge devices, which are presented in Chapter 8. A detailed discussion of the methodology is provided in the supplementary NURP report on detention/recharge devices cited earlier.

CHAPTER 6
CHARACTERISTICS OF URBAN RUNOFF

INTRODUCTION

This chapter presents a condensed summary of data developed by the individual NURP projects together with analysis results and interpretations based on the aggregated data from all projects.

Both the format for the summaries and the evaluations performed were selected to best serve the NURP objective of developing a national perspective. The results presented do not exhaust the useful information and insights which can be derived from the extensive data base that has been assembled. Individual project reports and a substantial number of articles published in a variety of technical journals independently examine specific aspects of urban runoff, often from the perspective of local issues.

Comprehensive tabulations of NURP data have been assembled and will be made available to interested parties for use in local planning or continuing research or engineering activities. As noted below, only a portion of the entire data base generated by the 28 NURP projects has been made generally accessible at this time. Under an ongoing effort, the entire data base is being subjected to final quality assurance checks and placed into a separate file, copies of which will be made available to interested parties upon request. In addition, a summary of the event averaged data, used for the analyses presented in this chapter, is reproduced in a Data Appendix issued with this report.

Field monitoring was conducted to characterize urban runoff flows and pollutant concentrations and mass loadings. This was done for a variety of pollutants at a substantial number of sites distributed throughout the country. The resultant data represent a cross-section of regional climatology, land use types, slopes, and soil conditions and thereby provide a basis for identifying patterns of similarities or differences and testing for their significance. To meet the objective of maximizing the degree of transferability of urban runoff data, the NURP approach involved covering a spectrum of regional and land use characteristics, requiring consistent quality assurance programs among all projects, and encouraging each of the projects to obtain data for a statistically significant number of storm events at a site.

The portion of the NURP data base used in the characterization of urban runoff presented in this section excludes monitoring sites which are downstream of devices which modify runoff (e.g., detention basins). The data base of acceptable "loading sites" consists of 81 sites in 22 different cities, and includes more than 2300 separate storm events. The actual number of events

for specific pollutants varies, and is somewhat smaller than the total number of storms monitored because all pollutants were not measured for all storms at all sites.

Data summaries and analyses were performed using storm event average values; within-event fluctuations are not considered. An event mean concentration (EMC) for pollutants of interest has been determined for each monitored storm. Preliminary results presented in an earlier NURP report were based on analysis of "pooled" EMCs which were available at the time regardless of site. This provided a useful start, a reference for individual NURP project activities, and established the order of magnitude of concentrations of various pollutants in urban runoff. With the substantially larger data set now available, a more useful approach is possible. For the analyses and comparisons presented in this chapter, the storm event average data were aggregated by site to describe site characteristics. Site mean values were then aggregated or compared.

Summaries, comparisons, and evaluations were restricted to concentrations and runoff-rainfall ratios. Although loading data (Kg/Ha) are also available for all monitored storms, they have not been used in comparisons for the following reason. Mass load is very strongly influenced by the size (volume) of the monitored storm event. Monitored events usually represent a very small sample of all storms for an area, are generally biased toward larger events, and are different from site to site. Therefore comparisons between sites or locations using loading data derived from monitored storms are quite likely to present a distorted picture.

Event mean concentrations, on the other hand, have been determined to be essentially uncorrelated with runoff volume, as discussed further later in this chapter. Site comparisons can be made with high confidence levels using concentration data, and the most meaningful load comparisons would be those developed by using concentrations, area rainfall volumes, and runoff-rainfall relationships.

Separate summaries of results are provided below for standard pollutants, coliform bacteria, pollutant loads, and priority pollutants.

LOGNORMALITY

As was pointed out in Chapter 5, the key to the mathematical tractability of the NURP methodologies is that the data can be well represented by a known probability density function (pdf). There are actually two issues involved; (1) the adequacy of the assumed pdf in terms of representing the essential characteristics of the data set in question, and (2) the estimation of the parameters of the population pdf that the observed data set is presumed to represent. These will be discussed in turn.

Adequacy of Representation

One can fit a polynomial of order (n-1) exactly to any data set of n numerical items, but its utility in predicting the probability of realizing a given value on a subsequent trial (either within or outside the original data set,

i.e., the interpolation or extrapolation problem) is likely to be very limited. The number of parameters involved and the need to investigate its properties on an individual basis are further deterrents to such a practice. There is no dearth of pdf's that have been the subject of intensive investigation. However, the selection of a pdf is an objective choice that is best made based on professional knowledge of the processes deemed important to the desired probability model and the use to be made of it. For example, if the data are known to result from the product of many small effects, their logs will be the sum of the logs of these effects. By appeal to the central limit theorem, it is known that this sum is asymptotically normal and, therefore, that the data will be lognormally distributed. Based upon such natural expectations and prior experience (of a growing body of other workers in the field as well), the lognormal pdf was chosen. The fact that the variables of interest can assume only positive values with a finite mean and a finite nonzero lower bound (even in a standardized form) leads to the rejection of any pdf defined over the entire real domain, such as the normal distribution for instance.

There are a number of statistical procedures for evaluating the normality of a complete sample; at least nine can be found in the current literature. Some are origin and scale invariant (e.g., the Shapiro-Wilk, standard third moment, standard fourth moment, and studentized range) and thus are appropriate for testing the composite hypothesis of normality. Others require the complete specification of the null distribution (e.g., Kolmogorov-Smirnoff, Cramer-Von Mises, weighted Cramer-Von Mises, modified Kolmogorov-Smirnoff-D, and chi-squared), and typically, the mean and variance of the specified normal hypothesis are taken to be the known mean and variance of the complete sample. Some procedures (e.g., chi-squared) utilize the specified theoretical pdf, while others (e.g., the modified Kolmogorov-Smirnoff D-test) utilize the cumulative frequency distribution.

In testing for normality (in the logorithmic domain in our case), one specifies the level of significance (α), i.e., the probability of rejecting the null hypothesis when it is in fact true (Type I error). The choice of α requires tempered judgement, however. The power of a test (β) is the probability of rejecting the null hypothesis when it is in fact false. The probability of accepting the null hypothesis when it is in fact false (Type II error) is $1-\beta$. For a given sample size and test, fixing a value for α also determines a value for β (i.e., they are not independent). The smaller the α level, the less powerful the test. Thus one is forced to make a trade-off between the consequences of a Type I or II error when selecting an α value.

The median EMC values for each constituent at each site were calculated, and these sample sets were examined for lognormality using the Kolmogorov-Smirnoff D test. The α levels for TSS, Total P, TKN, Total Pb, and Total Zn were all greater than 0.15, indicating a high power level. In other words, these sample sets are extremely well represented by a lognormal distribution. For COD and nitrate + nitrite the α levels were 0.059 and 0.057 respectively, indicating a lower power level but suggesting that even for these constituents the lognormal distribution quite well describes the data. Because BOD, Soluble P, and Total Cu were measured at fewer than half of the project

sites, the D-test could not meaningfully be used (i.e., n is too small). Stated another way, at the $\alpha = 0.05$ level, the hypothesis that the samples were drawn from a population with a lognormal distribution cannot be rejected for any of the constituents examined.

Turning to the individual sites, there were very few instances where n was large enough to support the meaningful use of the D-test, and so a different approach for examining the appropriateness of the lognormal distribution was used. Essentially it consisted of examining the cumulative frequency distributions (in log space) and third and fourth moment based statistics for adequacy of representation. Taking into account detection limit phenomenon, uncertainties associated with sampling and analytical determination errors (especially at low concentration levels), and an occasional outlier, well over 90 percent of the constituent distribution at all NURP sites were quite well represented by the lognormal distribution. For the few remaining data sets, the lognormal distribution, although not perfect, was adequate for our purposes.

Estimation of Parameters

As noted in Chapter 5, the lognormal distribution is completely specified by two parameters, the mean and the coefficient of variation. The values of these two parameters as calculated from the sample data set are the best estimates of the parameters of the underlying population in the maximum likelihood sense. For this reason, they were used in the NURP analysis. However, due to the existence of detection limit problems and sampling/analytical determination errors, the reasonableness of this decision was examined in general for all constituents and in great detail for Total Cu, the results of which will be described below.

For each of the 49 NURP sites where at least five Total Cu determinations were made, data were plotted (in logarithmic form) on probability paper. A line of best fit was drawn in, using professional judgement where detection limit or outlier problems existed, and the values of the median and standard deviation were read from the plot and converted into arithmetic space. These were then compared with those values calculated from the data themselves. One example is given in Figure 6-1 (the 116th and Claude Street site in Denver). Here the median and coefficient of variation from the plot (20 µg/l and 0.75) compare very well with those calculated directly from the data (22 µg/l and 0.74).

An example of an outlier plot is given in Figure 6-2 (the strip commercial site in Knoxville, TN). The one very low value (1 µg/l) is one-twentieth the typical detection limit (20 µg/l) and clearly does not belong to the same distribution that the other values do. Ignoring it, a very good fit exists and the parameters of the plot are 30 µg/l and 0.37 for the median and coefficient of variation as compared with the 25 µg/l and 1.35 values calculated from the data. The difference in medians is not too great, but the difference in coefficients of variation is quite large (over a factor of 3.5). This means that the upper end of the tail of the pdf is quite overestimated by the parameters estimated from the data and, consequently, that

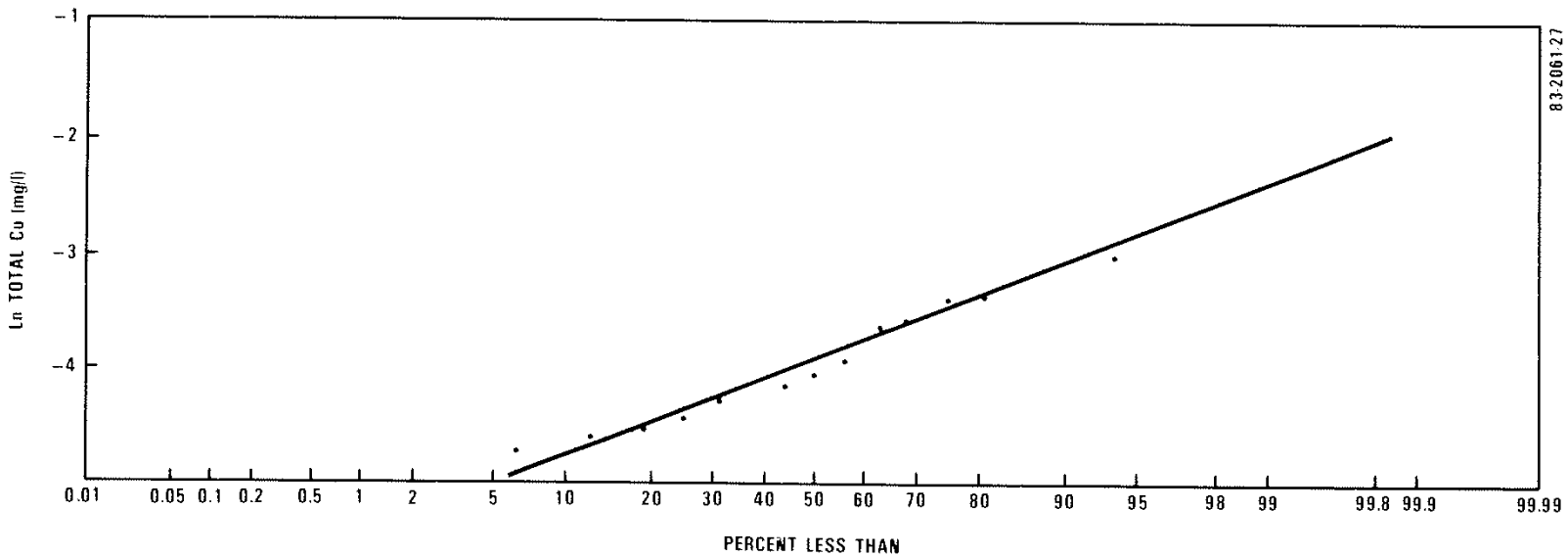

Figure 6-1. Cumulative Probability Distribution of Total Cu at CO1 116 and Claude Site

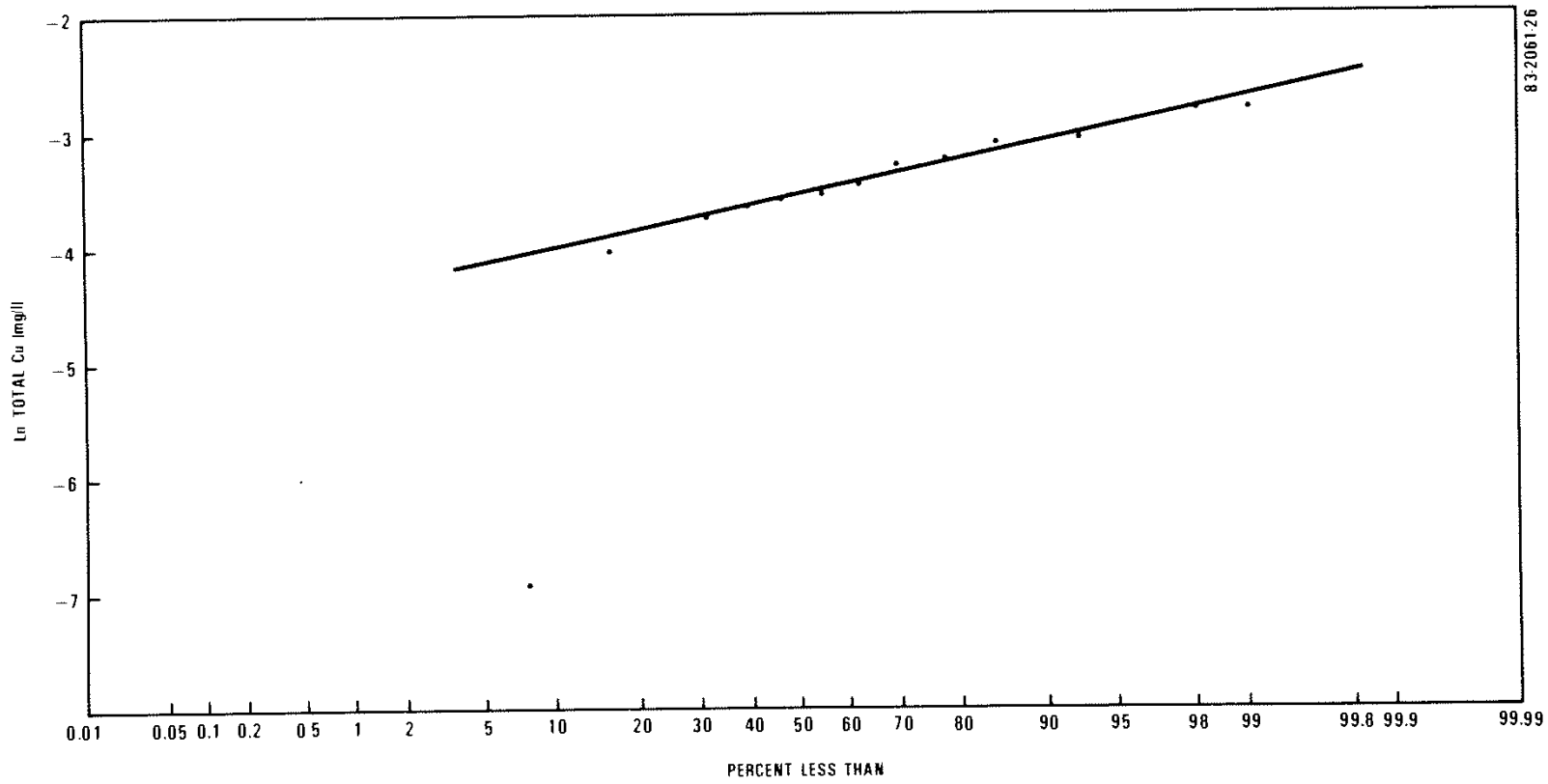

Figure 6-2. Cumulative Probability Distribution of Total Cu at TN1 SC Site

subsequent analyses will be extremely conservative, i.e., higher values of copper concentrations will occur less often than predicted. In general, the effect of an outlier is to increase or decrease the estimate of the median, depending upon whether the outlier is high or low, and to increase the estimate of the coefficient of variation as compared to those obtained from the remainder of the data.

An example of a detection limit problem is given in Figure 6-3, the plot of copper data of the Durham, NH parking lot site. Although only four points appear on the plot, actually n = 31, meaning that 27 points are represented by the first plotting position (90.6 percent). These values (all reported at 100 µg/l) are presumably the detection limit of the analytical laboratory. Of course in reality not all 27 values are 100 µg/l; they are simply equal to or less than this value. Fitting a line to the remaining four data points merely assigns appropriate plotting positions to these "less than" values. The estimates of the median and coefficient of variation from the plot are 63 µg/l and 0.36 respectively, as compared to the estimates from the data of 103 µg/l and 0.13. In this case, the latter significantly overestimates the median and significantly underestimates the coefficient of variation, and this is the general effect when a detection limit problem is present. In terms of the effect on prediction of rare occurrences of high copper levels (the upper tail of the pdf) these effects are somewhat counterbalancing. To the extent that the increase in the coefficient of variation dominates, the results of subsequent analyses will not be conservative, since larger concentrations will occur somewhat more frequently than would be predicted.

When the results of this exercise are compared for all 49 sites, the median as estimated from the plot was found to be higher than that estimated from all the data at only six sites, was equal at five sites, and was less at 38 sites. However, at only three sites was the change greater than 10 µg/l. Considering the population of all copper sites, the average median is 47 µg/l and the coefficient of variation is 0.84 when the estimates are based on all the data. If the estimates are based upon the plots, the respective values are 42 µg/l and 0.24 respectively. The significant reduction in the coefficient of variation in this latter case deserves comment, because it suggests that much of the apparent variability from site to site is due to data artifacts such as detection limit phenomena, outliers, and/or sampling/analytical errors. Similar comparisons of the coefficients of variation for each site showed increases at 21 sites, 6 unchanged, and decreases at 22 sites. Considering all sites, the average coefficient of variation is essentially unchanged (0.61 vs 0.63) as is its variability (0.47 vs 0.49).

Based on the results of the analyses which have been performed, the NURP findings are as follows:

- Lognormal distributions adequately represent both the storm-to-storm variations in pollutant EMC's at an urban site, and site-to-site variations in the median EMC's which characterize individual sites.

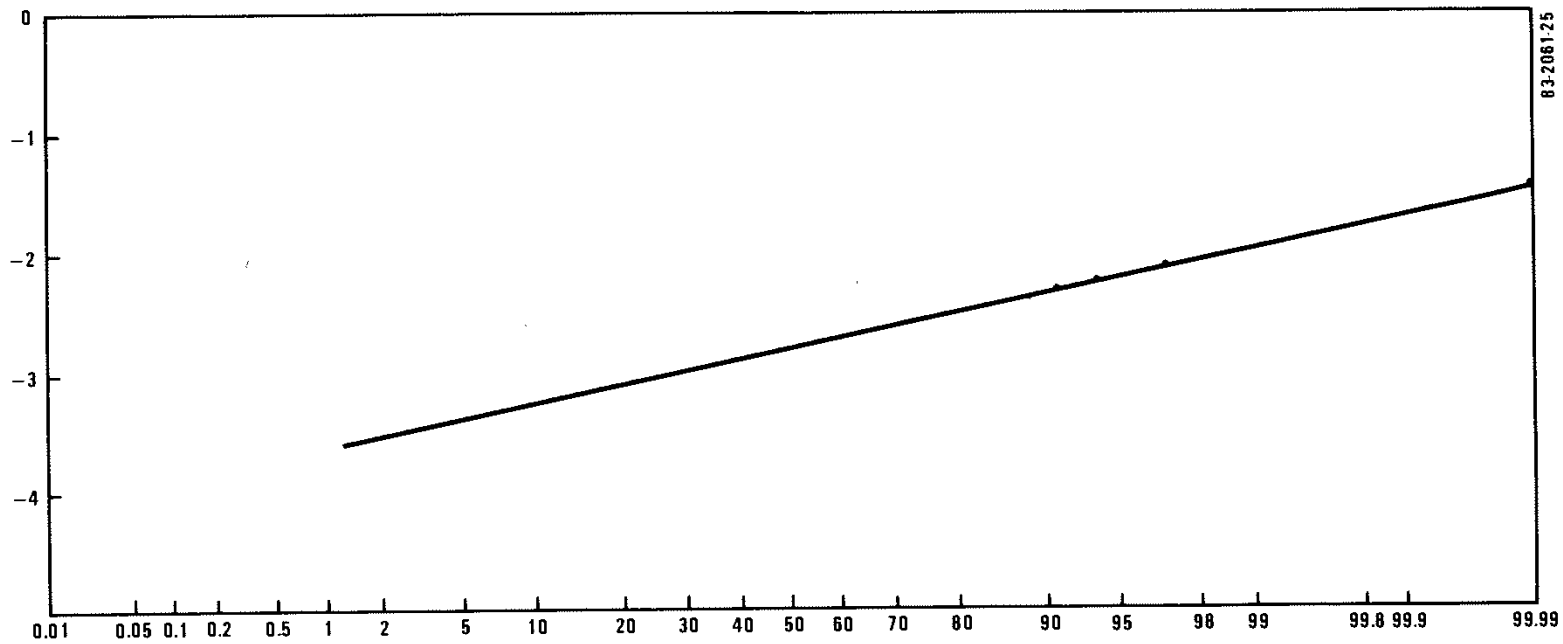

Figure 6-3. Cumulative Probability Distribution
of Total Cu at NH1 Pkg. Site

- More detailed analysis to compensate for sampling errors (e.g., outliers and detection limit problems) would result in some adjustments in the statistical parameters tabulated later on in this chapter. The data summaries presented are based on statistics computed directly from the log transforms of the data.

- Such adjustments would not have any significant effect on overall results nor on the general conclusions reached. However, at a small percentage of sites, the parameter estimates for some pollutants would change significantly.

- In general, estimates of the site median EMC would be least affected; estimates of variability more so. It is likely that the very high or very low values for coefficient of variation (storm-to-storm variability) would be adjusted to more central values.

STANDARD POLLUTANTS

This grouping includes the following pollutants:

TSS - Total Suspended Solids
BOD - Biochemical Oxygen Demand
COD - Chemical Oxygen Demand
TP - Total Phosphorus (as P)
SP - Soluble Phosphorus (as P)
TKN - Total Kjeldahl Nitrogen (as N)
NO_{2+3}-N - Nitrite + Nitrate (as N)
Cu - Total Copper
Pb - Total Lead
Zn - Total Zinc

It includes pollutants of general interest which are usually examined in other studies (both point and nonpoint sources) and includes representatives of important categories of pollutants, namely solids, oxygen consuming constituents, nutrients, and heavy metals.

Condensed Data Summary

Tables 6-1 through 6-10 summarize the NURP results for these pollutants. Monitoring sites are grouped in each of the tables according to dominant land use. Broad categories have been used; residential, commercial, industrial, urban open/nonurban (other), and mixed, this latter category being used for sites which had no predominant land use. It should be noted that the industrial category does not include heavy industry sites, but more typically reflects an industrial park type of use. As a result, most of these sites are more closely related to a commercial use than to the typical image called up by the term industrial site. For subsequent comparisons, the data shown in Tables 6-1 through 6-10 for the commercial and industrial sites, are combined and designated as commercial land use.

TABLE 6-1. SITE MEAN TSS EMCs (mg/ℓ)

Residential

	Site	Land Use %	Area (A)	Pop. Den (#/A)	% IMP.	No. of OBS	TSS Mean	TSS COV	TSS Median	TSS 90% Confidence Limits
1	CO1 Big Bear Cr	100	11	13	41	14	343	1.64	265	182-365
2	CO1 Cherry	100	57	24	18	14	160	.98	129	87-190
3	CO1 116 & Lowell	100	187	14	29	16	365	1.17	232	154-449
4	DC1 Duffield	100	13	-	-	8	56	1.02	39	51-74
5	DC1 Carriage	100	69	21	37	49	175	1.47	98	76-127
6	DC1 Stratton	100	6	-	-	11	54	1.01	38	30-49
7	IL1 Joel N	100	54	18	19	51	215	1.36	127	96-155
8	IS1 Overton	100	58	8	38	15	2216	1.32	1243	166-2037
9	MA2 Hemlock	100	59	5	18	5	78	2.49	29	8-111
10	MD1 Balsam Hill	100	14	10	51	18	74	1.32	45	30-68
11	MD1 Homeland	100	23	9	29	13	50	1.64	26	15-46
12	MD1 Mt Wash	100	17	12	29	20	95	1.17	62	84-89
13	MD1 Pos Hill	100	10	55	76	13	123	1.05	85	57-135
14	NY1 Farill's 9.	100	71	15	20	23	42	.85	32	25-47
15	NY1 Dugue	100	-	-	-	8	65	.53	57	41-83
16	NY1 Brazilian	100	160	5	72	30	114	1.15	98	57-150
17	NY1 T. Rach.	100	546	18	19	7	294	1.12	195	101-580
18	IL1 Fallingwood	100	69	3	21	9	227	1.13	150	85-761
19	WA1 Screen	100	95	9	29	117	111	.51	101	94-108
20	WI1 Burbank	100	61	15	50	45	266	.44	243	219-270
21	WI1 Hastings	100	13	37	51	35	170	.68	141	117-169
22	FL1 Wayne Apts	100	9	-	6	12	51	1.23	34	21-56
23	IL1 Mart	99	378	9	30	35	155	1.51	82	49-137
24	WI1 Lincoln	97	36	18	57	23	251	.89	206	165-258
25	TN1 R2	96	69	4	13	11	61	1.13	42	25-68
26	OC1 Nestleigh	93	41	3	71	41	75	1.48	43	35-57
27	CS1 IC - 92nd	92	63	-	37	11	156	.84	119	83-171
28	IL1 John S.	91	39	19	18	49	248	1.50	178	106-178
29	IN1 F1	91	19	21	33	11	611	.72	492	345-704
30	WA1 Lake Hills	91	102	12	37	126	127	.80	100	90-110
31	IL1 Maffly S.	90	28	22	19	59	111	1.08	211	174-256
32	FL1 Charter Hdq	89	42	-	16	12	31	1.76	19	9-10
33	DC1 Fairidge	88	19	-	14	47	26	1.55	14	13-18
34	CO1 Asbury	88	122	9	22	9	493	.92	380	344-593
35	IL7 Comb Inlets	86	528	8	17	27	250	.75	200	161-749
36	MA1 Locust	85	164	31	16	6	257	1.75	128	48-339
37	NC1 #3013	84	324	6	27	68	291	1.92	115	104-174
38	MA1 Jordan	79	110	10	21	9	79	1.74	39	19-81
39	DC1 Sledwick	78	22	15	34	47	54	1.02	38	11-43

Urban Open and Nonurban

	Site	Land Use % Open	Area (A)	Pop. Den (#/A)	% IMP.	No. of OBS	TSS Mean	TSS COV	TSS Median	TSS 90% Confidence Limits
1	CA1 Seaview	100	632	-	-	11	238	.83	551	185-188
2	CO1 Rooney Gulch	100	405	0	3	7	411	.60	341	223-921
3	MA2 Znucwell	100	28,416	-	4	11	154	.92	111	74-113
4	NY2 English Br	98	5,248	-	1	29	17	2.45	6	4-10
5	NY2 West Br	97	5,338	-	3	28	64	2.77	22	14-35
6	NY3 Thomas Cr	91	17,728	1	11	9	62	.74	51	14-77
7	MI3 Craver Cr	96	2,103	-	6	5	13	.17	26	14-50
8	MI2 Sherrill Dach	80	542	-	7	32	178	2.35	149	09-224

Mixed

	Site	Land Use %	Area (A)	Pop. Den (#/A)	% IMP.	No. of OBS	TSS Mean	TSS COV	TSS Median	TSS 90% Confidence Limits
1	KS1 Nolana	-	30	2	69	16	298	.91	208	146-2[illegible]
2	MD1 Hardpdon	-	12	8[illegible]	77	20	52	1.62	43	2[illegible]-[illegible]
3	IL1 Mayfly N	-	12	2	58	58	268	1.61	179	165-219
4	MI1 Waverly	-	10	11	68	15	85	1.28	52	39-69
5	IN1 SC	-	187	0	93	32	71	1.07	45	31-74
6	WI1 Wood Clr	-	45	12	51	37	363	.78	302	235-351
7	MA1 Rt 9	-	328	7	23	7	151	2.05	154	86-305
8	MA1 Convent	-	100	1	33	8	59	1.53	30	18-63
9	MI1 Grand R Gt	-	453	5	38	21	159	1.26	98	49-190
10	MI2 Pitt AA-S	-	2001	7	21	6	46	.17	43	37-55
11	MI2 Cedar	-	76	-	5	27	293	1.92	139	99-202
12	MA1 Anna	-	601	9	12	6	150	2.55	18	18-156
13	MI1 Pitt AA-W	-	2871	7	28	6	68	.47	53	52-85
14	MI1 Grace W	-	164	5	25	23	142	.95	143	121-171
15	MI3 Swift Run	-	1707	3	4	5	50	.93	59	26-124
16	SO1 Meadp	-	2036	-	-	15	1491	1.39	1004	1128-2897
17	CA1 Knox	-	1542	12	-	10	283	1.12	141	114-255
18	FL1 N. Jesuit	-	30	-	13	13	82	1.39	23	11-39
19	FL1 Wilger	-	194	-	97	10	43	.71	27	20-37
20	CO1 North Ave	-	69	9	50	32	492	.96	354	248-451

Commercial

	Site	Land Use % Coml	Area (A)	Pop. Den (#/A)	% IMP.	No. of OBS	TSS Mean	TSS COV	TSS Median	TSS 90% Confidence Limits
1	CO1 Villa Italia	100	74	0	91	27	360	1.89	122	61-183
1	NC1 1013 IC801	100	23	0	69	60	163	1.15	117	68-111
3	NI3 Southgate	100	179	7	21	12	141	.76	119	79-150
4	WI1 Post Office	100	12	0	100	58	212	.90	161	131-192
5	NH1 Pkg Lot	100	1	0	90	12	74	1.66	18	27-54
6	IN1 CBD	100	26	0	89	15	171	.72	99	74-133
7	WI1 Rustler	100	12	0	100	42	202	.68	167	142-196
8	KS1 IC Metcalf	96	58	-	97	32	80	2.12	34	21-55
9	FL1 Norma Pk	91	47	-	36	17	22	1.13	14	9-22
10	WI1 State Fair	34	29	10	77	29	412	.97	296	270-362

Industrial

	Site	Land Use %	Area (A)	Pop. Den (#/A)	% IMP.	No. of OBS	TSS Mean	TSS COV	TSS Median	TSS 90% Confidence Limits
1	MA2 Addition	100	15	0	69	5	48	.91	14	14-73
2	MI1 Indul Drain	100	63	0	64	18	92	.87	71	53-95
3	KS1 Lenexa	66	22	-	34	18	102	1.33	62	40-97
4	MI1 Grace S.	52	15	5	10	20	188	.94	137	101-185

TABLE 6-2. SITE MEAN BOD EMCs (mg/ℓ)

Residential

	Site	Land Use %	Area (A)	Pop. Den (#/A)	% IMP.	No. of OBS	BOD Mean	BOD CDV	BOD Median	BOD 90% Confidence Limits
1	CO1 Big Dry Cr	100	73	19	41	0	-	-	-	-
2	CO1 Cherry	100	57	24	38	0	-	-	-	-
3	CO1 116/Claude	100	167	14	24	0	-	-	-	-
4	DC1 Dutlof	100	12	-	-	0	-	-	-	-
5	DC1 Lakeridge	100	68	21	33	0	-	-	-	-
6	DC1 Littleton	100	8	-	-	4	-	-	-	-
7	IL1 John N	100	54	18	19	0	-	-	-	-
8	KS1 Overlon	100	58	8	38	5	12	.59	11	6-18
9	MA2 Needlcd	100	50	5	16	0	-	-	-	-
10	MO1 Bolton Hill	100	14	10	53	0	-	-	-	-
11	MO1 Moreland	100	23	9	29	0	-	-	-	-
12	MO1 Mt Wain	100	17	12	29	0	-	-	-	-
13	MO1 Rec Hill	100	10	56	76	0	-	-	-	-
14	NJ1 Cahill P.	100	31	13	20	0	-	-	-	-
15	NJ1 Linqua	100	-	-	-	0	-	-	-	-
16	NJ3 Cranston	100	106	5	22	0	-	-	-	-
17	NJ1 E. Rock.	100	346	18	38	0	-	-	-	-
18	JJ1 Rollingwood	100	60	3	21	0	-	-	-	-
19	WA1 Surrey	100	95	9	29	0	-	-	-	-
20	WI1 Burbank	100	61	15	50	28	1	.64	0	5-4
21	WI1 Mastingl	100	15	12	51	20	9	.62	8	6-10
22	IL1 Young Acres	100	9	-	6	12	16	1.10	11	1-17
23	TX1 Napl	99	528	0	40	4	-	-	-	-
24	WI1 Lincoln	91	16	18	67	11	18	1.21	17	7-20
25	IN1 R3	96	95	4	13	10	9	.66	7	5-10
26	DC1 Westleigh	93	41	1	21	2	-	-	-	-
27	TX1 IF - 92nd	92	63	-	17	5	29	.60	23	11-41
28	IL1 John S.	92	29	18	18	0	-	-	-	-
29	IN1 R1	91	69	11	13	9	14	.87	11	7-18
30	WA1 Lake Hills	91	192	12	32	0	-	-	-	-
31	IL1 Mallis S.	90	38	32	33	0	-	-	-	-
32	IL1 Charter Nou	89	42	-	15	12	11	1.24	8	5-13
33	DC1 Foxridge	88	19	-	34	6	5	.68	4	2-7
34	CO1 Ashury	86	171	9	22	1	-	-	-	-
35	IL2 Cook Inlet	85	524	8	17	1	-	-	-	-
36	MO1 Locust	85	154	11	16	0	-	-	-	-
37	NC1 #1023	84	334	6	27	7	11	.13	10	6-35
38	MB1 Jordan	79	110	14	21	0	-	-	-	-
39	OC1 Speedwell	78	77	15	14	0	-	-	-	-

Urban Open and Nonurban

	Site	Land Use % Open	Area (A)	Pop. Den (#/A)	% IMP.	No. of OBS	BOD Mean	BOD CDV	BOD Median	BOD 90% Confidence Limits
1	LA1 Seavlew	100	173*	-	-	0	-	-	-	-
2	CO1 Ramney Gulch	100	465	0	1	0	-	-	-	-
3	NJ1 Thornell	100	28,416	-	4	0	-	-	-	-
4	NJ1 English Br	99	5,248	-	1	0	-	-	-	-
5	NJ1 West Br	97	6,338	-	1	0	-	-	-	-
6	NJ3 Indian Cr	91	17,718	1	11	0	-	-	-	-
7	NJ3 Weaver Cr	90	7,304	-	6	5	2	.41	2	-
8	NJ2 Thorlif Duck	88	552	-	7	0	-	-	-	-

Mixed

	Site	Land Use %	Area (A)	Pop. Den (#/A)	% IMP.	No. of OBS	BOD Mean	BOD CDV	BOD Median	BOD 90% Confidence Limits
1	KS1 Ogland	-	36	1	68	5	-	-	-	-
2	MD1 Nampden	-	11	40	32	0	-	-	-	-
3	IL1 Mallis N	-	17	3	58	0	-	-	-	-
4	MI1 Waverly	-	10	31	68	21	9	.64	7	6-9
5	TN1 SC	-	187	3	47	12	14	.82	11	7-15
6	WI1 Wood Cir	-	45	12	81	11	14	.64	11	11-15
7	MA1 Al 9	-	138	1	21	0	-	-	-	-
8	MA1 Chevenl	-	100	1	33	0	-	-	-	-
9	MO1 Grand A Ot	-	453	5	18	13	9	.61	9	5-0
10	MI3 Pitt AA-S	-	2401	2	21	6	5	.49	5	2-7
11	MV2 Cedar	-	76	-	5	0	-	-	-	-
12	MA1 Anno	-	601	9	12	0	-	-	-	-
13	MI3 Pitt AA-N	-	2871	1	26	6	6	.76	5	3-9
14	MI1 Grace N	-	164	6	28	11	9	.78	7	5-10
15	MI3 Swift Run	-	1207	2	4	6	3	.41	3	3-4
16	SO1 Meade	-	2030	-	-	14	19	.25	15	11-21
17	CA1 Knox	-	1542	13	-	0	-	-	-	-
18	EL1 M. Jesuit	-	30	-	13	15	16	.95	12	9-17
19	EL1 Wilder	-	194	-	97	15	16	1.18	14	11-18
20	CO1 North Ave	-	69	9	50	12	-	-	-	-

Commercial

	Site	Land Use % Coml	Area (A)	Pop. Den (#/A)	% IMP.	No. of OBS	BOD Mean	BOD LDV	BOD Median	BOD 90% Confidence Limits
1	CO1 Villa Italia	100	74	0	91	9	-	-	-	-
2	MO1 JOIL (CBD)	100	21	0	69	23	18	.80	13	10-21
3	MV1 Southgate	100	170	2	21	0	-	-	-	-
4	WI1 Post Office	100	12	0	100	15	9	.50	8	7-9
5	NN1 Pkg Lot	100	1	0	40	11	17	.86	13	10-16
6	IN1 CBD	100	26	0	99	11	17	.48	13	10-15
7	WI1 Austler	100	12	4	-	27	13	.79	10	8-13
8	KS1 10 Metcalf	96	58	-	92	13	8	.48	7	6-9
9	EL1 Norma Pl	91	47	-	45	12	12	.88	9	6-17
10	WI1 State Tast	74	29	10	73	15	19	.73	15	11-26

Industrial

	Site	Land Use %	Area (A)	Pop. Den (#/A)	% IMP.	No. of OBS	BOD Mean	BOD CDV	BOD Median	BOD 90% Confidence Limits
1	MA1 Madison	100	18	0	65	0	-	-	-	-
2	MI1 Lucas Drain	100	61	0	64	9	10	.58	9	6-13
3	KS1 Lenexa	56	13	-	44	8	14	.77	11	7-17
4	MI1 Grace S.	61	15	5	39	9	5	.34	5	4-6

	Site	Land Use %	Area (A)	Pop. Den (P/A)	% IMP.	No. of DBS	COD Mean	COD COV	COD Median	COD 90% Confidence Limits
1	IP1 Big Oak Cr	100	33	19	43	16	129	.72	105	19-139
2	CO1 Cherry	100	57	24	38	18	122	.60	102	73-136
3	CA1 Little Plaude	100	163	14	24	15	137	.14	100	16-119
4	IA1 Miller	100	13	-	-	7	54	.26	62	51-74
5	OH1 Lakeridge	100	68	21	13	44	60	.56	50	43-58
6	IK1 Stratton	100	8	-	-	31	51	.55	45	39-53
7	IL1 Dobin N	100	94	18	19	31	126	.80	94	79-122
8	KS1 Overlook	100	58	8	18	14	162	.67	135	101-180
9	MA1 Meadow	100	50	5	10	11	-	-	-	-
10	MN1 Rosedale Mall	100	14	30	51	15	218	1.38	128	85-193
11	MO1 Springlake	100	93	9	29	13	177	.13	139	101-192
12	MO1 Mt Wash	100	17	12	29	10	164	.85	136	96-170
13	MN1 Pies Hill	100	161	55	76	13	273	.85	115	94-194
14	NY1 Earlis A.	100	73	33	20	0	-	-	-	-
15	NY1 Hagua	100	-	-	-	0	-	-	-	-
16	NY3 Prabstein	100	106	5	22	8	33	.43	31	24-41
17	NY3 E. Rock	100	346	18	35	7	86	.11	82	66-102
18	IA1 Allingwood	100	50	3	31	9	70	.65	64	54-84
19	WI1 Skyline	100	95	9	39	118	46	.54	42	39-46
20	WI1 Garland	100	53	15	50	27	39	.29	30	24-38
21	WI1 Wallens	100	33	17	51	73	41	.55	36	30-44
22	FL1 Lobig Apts	100	9	-	0	12	73	.96	52	34-79
23	IN1 Marl	90	328	9	40	11	83	.83	63	49-94
24	WI1 Hawald	80	36	15	52	16	91	.95	66	46-94
25	IN1 VC	90	89	4	13	11	45	.39	42	34-53
26	OC1 Westlatgll	93	41	3	21	39	51	.41	46	41-52
27	IS1 U. - 92nd	92	53	-	37	11	176	.98	126	80-147
28	IL1 John S.	91	10	16	19	29	111	.80	87	69-108
29	IN1 A1	91	69	11	33	11	120	.96	87	66-105
30	WA1 Lake Hills	91	102	12	37	127	44	.54	38	35-41
31	IL1 Mallers S.	90	28	22	37	10	180	.72	140	119-178
32	FL1 Charter Hdq	89	42	-	16	12	56	.64	47	35-64
33	OC1 Lakeridge	88	19	-	14	48	53	.46	47	42-52
34	CO1 Adams	85	127	9	33	9	234	1.12	155	49-273
35	IL1 Comb Intals	85	524	8	17	24	138	.90	102	78-134
36	MA1 Lisuit	85	154	11	16	6	104	.45	95	67-115
37	NJ1 Hills	84	324	8	19	34	90	.97	64	51-82
38	MA1 Jordan	79	110	10	21	9	79	.53	70	51-95
39	OC1 Glenwild	78	27	15	34	45	45	.60	19	34-45

Mixed Open and Manufacturing

	Site	Land Use % Open	Area (A)	Pop. Den (P/A)	% IMP.	No. of DBS	COD Mean	COD COV	COD Median	COD 90% Confidence Limits
1	CA1 Shawnee	100	831	-	-	14	113	.43	102	90-120
2	CO1 Penny Gulch	100	405	0	1	3	73	.33	69	54-87
3	NY1 Cornell	100	25,416	-	4	8	25	.10	21	18-24
4	NY2 Edgilson Rt	98	5,248	-	1	11	-	-	-	-
5	NY2 West Br	97	5,338	-	1	0	-	-	-	-
6	NY2 Tuhwas Cr	91	17,728	1	11	5	26	.20	25	21-32
7	NY3 Tinker Cr	90	2,303	-	6	5	25	.10	25	21-30
8	NY2 Shellit Cool	80	552	-	7	6	-	-	-	-

	Site	Land Use %	Area (A)	Pop. Den (P/A)	% IMP.	No. of DBS	COD Mean	COD COV	COD Median	COD 90% Confidence Limits
1	KS1 Noland	-	16	3	66	12	107	.56	89	55-132
2	MO1 Wampden	-	12	40	72	30	111	.33	69	59-117
3	IL1 Mallis N	-	17	3	56	35	195	.66	164	130-195
4	MI1 Waverly	-	30	11	68	27	64	.30	60	48-73
5	IN1 SC	-	147	3	41	13	40	.30	49	36-67
6	WI1 Wade Ctr	-	45	12	81	39	92	.57	90	80-102
7	MA1 Bl 9	-	318	7	23	6	107	.62	68	51-142
8	MA1 Convert	-	100	1	73	8	77	.62	61	40-89
9	MI1 Brallwr & 01	-	453	5	39	16	71	.47	65	56-74
10	MI1 Pitt AA-S	-	2001	2	21	4	-	-	-	-
11	NY2 Cedah	-	76	-	5	0	-	-	-	-
12	MA1 Anna	-	601	9	12	6	98	.51	76	53-116
13	MI1 Pitt 60-N	-	2871	2	26	3	-	-	-	-
14	MI1 Grace N	-	154	5	26	17	72	.03	68	55-79
15	MI3 Twyfl Rud	-	1357	2	4	5	39	.14	39	26-73
16	SD1 Meade	-	2030	-	-	14	179	.39	167	140-199
17	CA1 Xnoe	-	1543	12	-	21	93	.60	80	85-99
18	FL1 N. Jesuit	-	31	-	13	15	54	1.18	33	22-59
19	FL1 Wilder	-	194	-	92	13	51	.38	48	41-57
20	CO1 Nor CN Ave	-	59	9	50	33	280	.74	275	195-275

Commercial

	Site	Land Use % Comm	Area (A)	Pop. Den (P/A)	% IMP.	No. of DBS	COD Mean	COD COV	COD Median	COD 90% Confidence Limits
1	CO1 Villa Italia	100	14	0	91	27	184	.62	139	109-178
2	NC1 Still Creek	100	21	0	69	40	120	.79	84	76-113
3	MI1 Southgate	100	179	2	21	9	41	.34	38	31-47
4	WI1 Post Office	100	12	0	100	40	92	.12	48	41-55
5	MN1 Pkg Inc	100	3	0	90	13	96	.79	19	16-95
6	IN1 FRD	100	26	0	90	15	71	.52	55	53-81
7	WI1 Whistler	100	10	0	-	26	59	.76	47	37-54
8	IS1 IC Metcalf	96	59	-	97	36	76	.86	41	32-55
9	FL1 Norma Pl	91	47	-	45	12	41	.43	37	34-47
10	WI1 State Fair	34	29	10	77	21	113	.96	54	54-117

Industrial

	Site	Land Use % Ind	Area (A)	Pop. Den (P/A)	% IMP.	No. of DBS	COD Mean	COD COV	COD Median	COD 90% Confidence Limits
1	MA2 Addison	100	18	0	69	0	-	-	-	-
2	MI1 Indus Health	100	53	0	64	12	61	.45	53	43-77
3	KS1 Tenaza	56	72	-	44	16	58	.60	50	39-54
4	MI1 Grace S.	52	75	5	39	11	50	.70	42	33-54

TABLE 6-4. SITE MEAN TOTAL P EMCs (μg/ℓ)

Residential

	Site	Land Use - Res	Area (Ac)	Pop. Den (P/Ac)	% IMP.	No. of OBS	Total P Mean	COV	Median	90% Confidence Limits
1	C01 Big Dry Cr	100	31	19	41	16	693	.94	506	356-716
2	C02 Cherry	100	57	24	18	14	479	.54	332	293-479
3	C01 Ste Claude	100	147	14	24	16	630	.65	513	392-672
4	D01 Dufief	100	12	-	-	5	499	.32	436	353-640
5	D01 Lakeridge	100	68	21	15	48	321	.18	256	217-302
6	D01 Stratton	100	8	-	-	28	340	.54	300	258-351
7	I11 John N	100	54	19	19	13	750	.62	616	538-753
8	I51 Owyhee	100	58	8	39	8	1636	.91	1207	717-2031
9	MA2 Hemlock	100	50	9	16	5	314	1.05	236	95-491
10	M01 Bolton Hill	100	14	30	53	19	912	1.15	613	425-883
11	M01 Homeland	100	23	9	29	13	421	.20	345	253-471
12	M02 Mt Wash	100	11	12	29	20	856	.83	478	324-566
13	M01 Pks Hill	100	10	55	76	13	4090	1.05	2825	1845-4326
14	N12 Lovill's R.	100	73	13	20	24	221	.54	195	163-233
15	N11 Unqua	100	-	-	-	8	229	.61	196	134-285
16	N15 Livingston	100	166	5	22	13	301	.54	265	206-340
17	N13 E. Poch.	100	346	18	18	8	448	.47	405	300-546
18	T11 Rollingwood	100	60	3	21	9	268	.56	231	169-322
19	W03 Surrey	100	95	9	29	118	239	.83	184	164-205
20	W11 Burbank	100	63	16	10	45	229	.45	209	188-231
21	W11 Hastings	100	31	17	51	15	258	.51	230	203-264
22	T11 Young Apts	100	9	-	6	12	333	.65	279	205-380
23	T11 Hill	99	178	9	40	14	333	.80	260	189-349
24	W11 Lincoln	97	36	18	57	23	453	.69	373	298-466
25	T11 R3	98	29	4	11	11	346	.41	322	189-287
26	U11 Westleigh	93	41	3	21	41	397	.35	319	268-380
27	K51 18 - 92nd	92	63	-	37	10	1790	1.31	787	441-1405
28	U11 John L.	91	33	15	38	32	932	.65	604	502-727
29	T11 P1	93	69	11	33	13	705	.15	665	552-801
30	WA11 Pie Hills	51	102	12	37	127	264	.81	204	184-227
31	U11 Mallory S.	90	28	22	37	32	587	.69	483	401-582
32	F11 Charter Nbhd	69	42	-	16	36	395	1.61	208	116-414
33	N11 Fairidge	98	19	-	34	37	151	.13	254	242-234
34	C01 Pshuty	66	127	9	23	9	1125	.71	834	561-1239
35	N12 Comb Inlett	88	524	8	13	26	506	.29	293	314-611
36	M11 Locust	85	154	31	16	6	3228	.39	961	545-1711
37	N01 Hill 23	84	124	6	27	67	529	.99	175	117-444
38	M41 Jordan	79	110	10	21	8	448	.95	324	190-555
39	U11 Stedwick	71	21	15	34	44	388	.65	126	281-379

Urban Open and Nonurban

	Site	Land Use - Oppn	Area (Ac)	Pop. Den (P/Ac)	% IMP.	No. of OBS	Total P Mean	COV	Median	90% Confidence Limits
1	F01 Spectrum	100	633	-	-	13	490	.62	458	319-649
2	I01 Grumpy Gulch	100	405	0	1	7	420	.43	380	224-628
3	N13 Inwood	100	28,416	-	4	33	191	.46	175	141-217
4	N12 English Br	95	5,248	-	1	30	27	1.30	13	13-13
5	N12 West Br	97	5,138	-	1	31	52	1.27	32	24-41
6	N13 Tonnoy Cr	91	17,728	1	11	16	195	.42	177	140-271
7	N11 Traver Cr	90	2,303	-	6	5	91	.36	85	50-171
8	N12 Sheritt Cool	88	551	-	2	32	264	1.01	186	145-238

Mixed

	Site	Land Use -	Area (Ac)	Pop. Den (P/Ac)	% IMP.	No. of OBS	Total P Mean	COV	Median	90% Confidence Limits
1	L51 Noland	-	16	3	68	7	565	.34	524	413-671
2	M01 Hampden	-	17	40	72	20	750	1.41	436	251-852
3	U11 Mallory N	-	12	3	58	26	498	.56	431	370-503
4	M11 Waverly	-	30	11	68	16	186	.44	167	141-197
5	N13 SC	-	187	3	43	13	352	.64	296	[illegible]-399
6	W11 Wong Lin	-	48	12	81	47	289	.59	240	219-264
7	MA1 R1 P	-	339	7	23	8	1176	.63	995	[illegible]
8	MA1 Convena	-	109	1	31	8	459	1.99	205	57-4[illegible]
9	M11 Grand R St	-	453	5	38	22	450	.65	184	[illegible]-4[illegible]
10	M13 Pill AA-S	-	2001	2	21	6	103	.50	91	[illegible]
11	N12 Cedar	-	76	-	5	12	163	1.90	231	176-301
12	MA1 Rona	-	601	9	13	5	534	.80	405	[illegible]-749
13	M13 Pitt 4A-N	-	2871	7	26	6	768	.47	243	140-351
14	M11 Grace N	-	164	5	28	23	304	.64	301	225-410
15	M13 Swift Run	-	1207	2	4	5	134	.56	117	91-193
16	S03 Meadp	-	2030	-	-	15	1885	1.29	1163	743-1621
17	C01 Knox	-	3542	12	-	19	418	.50	374	314-451
18	F11 N. Detroit	-	30	-	13	18	196	.71	151	120-214
19	F11 Wilder	-	194	-	97	15	229	.52	204	183-255
20	C01 North Ave	-	59	9	50	38	784	.69	670	520-795

Commercial

	Site	Land Use - Coml	Area (Ac)	Pop. Den (P/Ac)	% IMP.	No. of OBS	Total P Mean	COV	Median	90% Confidence Limits
1	C01 Villa Italia	100	74	0	91	27	704	1.25	438	316-601
2	N01 1513 (C80)	100	73	0	69	51	395	.46	342	304-323
3	N15 Southgate	100	173	3	21	12	216	.26	219	193-239
4	W11 Post Office	100	12	0	100	10	110	.56	94	84-105
5	N51 Pkg Lot	100	1	0	46	27	173	1.21	114	137-238
6	N11 C60	100	26	0	99	15	212	.45	145	127-205
7	W11 Rustler	100	12	0	-	44	105	.79	80	69-98
8	K51 U. Metcalf	96	58	-	97	20	246	.98	126	126-[illegible]
9	F11 Norma Ek	91	47	-	45	12	151	.50	135	106-[illegible]
10	W11 State Fair	79	14	10	[illegible]	19	313	1.19	200	245-443

Industrial

	Site	Land Use - Ind	Area (Ac)	Pop. Den (P/Ac)	% IMP.	No. of OBS	Total P Mean	COV	Median	90% Confidence Limits
1	MA2 Adams	100	18	3	69	5	114	.89	85	41-176
2	U11 Lodes Drain	100	63	0	64	18	545	.58	472	375-589
3	K51 Lenana	98	72	-	44	16	891	.87	452	315-646
4	N01 Grace S.	52	25	5	19	17	438	.11	365	271-463

Residential

	Site	Land Use % Res	Area (A)	Pop. Den (#/A)	% IMP.	No. of OBS	SOL P Mean	COV	Median	90% Confidence limits
1	CO1 Big Dry Cr	100	33	19	41	15	193	.64	163	125-213
2	CO1 Cherry	100	57	24	38	14	212	.47	192	155-237
3	CO1 116/Claude	100	167	14	24	16	196	.35	179	154-208
4	DC1 Duflef	100	12	-	-	6	448	.55	392	257-598
5	DC1 takeridge	100	68	21	33	47	69	.62	59	51-68
6	DC1 Siration	100	8	-	-	27	251	.65	210	173-256
7	IL1 John N	100	54	18	19	0	-	-	-	-
8	IS1 Overton	100	58	8	38	8	313	41	290	223-378
9	MA2 Nemloct	100	50	5	16	5	167	.89	120	58-249
10	MD1 Bnlton Mill	100	14	30	51	14	-	-	-	-
11	MD1 Nome7an6	100	23	9	29	0	-	-	-	-
12	MD1 Mt Wasn	100	17	12	29	0	-	-	-	-
13	MD1 Pes Hill	100	10	55	76	0	-	-	-	-
14	NY1 Carll's R.	100	73	13	20	0	-	-	-	-
15	NT1 Unqua	100	-	-	-	0	-	-	-	-
16	NT3 Cranston	100	166	5	22	0	-	-	-	-
17	NY1 E. Roch.	100	346	18	38	0	-	-	-	-
18	TX1 Rollingwoo6	100	60	3	21	0	-	-	-	-
19	WA1 Surrey	100	95	9	29	0	-	-	-	-
20	WI1 Burbant	100	63	15	50	0	-	-	-	-
21	WI1 Haslings	100	33	17	51	0	-	-	-	-
22	FL1 Young Apls	100	9	-	6	0	-	-	-	-
23	TX1 Hart	99	178	9	40	0	-	-	-	-
24	WI1 Lincoln	97	36	18	57	0	-	-	-	-
25	TN1 P2	96	89	4	13	11	132	.63	112	82-154
26	DC1 Westleigh	93	41	3	21	41	223	.71	182	154-215
27	KS1 IC - 92n6	92	63	-	37	10	241	.62	205	147-285
28	IL1 John S.	91	19	18	18	0	-	-	-	-
29	TN1 R1	91	69	11	33	11	136	.94	99	64-153
30	WA1 Lake Hills	91	102	12	37	0	-	-	-	-
31	IL1 Mattis S.	90	28	22	37	0	-	-	-	-
32	FL1 Charler N6g	89	42	-	16	0	-	-	-	-
33	DC1 Fairidge	88	19	-	34	46	297	.87	224	186-270
34	CO1 Xsbury	86	127	9	22	9	212	.22	207	181-237
35	IL2 Comb Inlets	85	524	8	17	24	98	1.21	63	45-88
36	NJ1 Locust	85	154	11	16	6	184	.42*	169	121-235
37	NY1 #1023	84	374	6	22	0	-	-	-	-
38	MA1 Jordan	79	110	10	21	7	202	1.11	136	70-262
39	DC1 Stedwick	78	22	15	34	41	251	.70	206	174-243

Urban Open and Nonurban

	Site	Land Use % Open	Area (A)	Pop. Den (#/A)	% IMP.	No. of OBS	SOL P Mean	COV	Median	90% Confidence Limits
1	CA1 Sraview	100	633	-	-	12	145	1.20	91	55-150
2	CO1 Paoney Gulch	100	405	0	1	7	137	.46	124	90-171
3	NY3 Thornell	100	28,416	-	4	0	-	-	-	-
4	NY2 English Br	98	5,248	-	1	18	5	.35	5	4-6
5	NY2 West Br	93	5,138	-	1	26	8	.56	7	6-8
6	NY1 Thomas Cr	91	17,728	1	11	0	-	-	-	-
7	MI3 Traver Cr	90	2,301	-	6	5	31	.55	29	18-47
8	NY2 Sherriff Duck	80	552	-	7	12	39	1.11	25	20-14

Mixed

	Site	Land Use %	Area (A)	Pop. Den (#/A)	% IMP.	No. of OBS	SOL P Mean	COV	Median	90% Confidence limits
1	KS1 Noland	-	36	3	68	8	165	.52	146	105-203
2	MD1 Hampden	-	17	40	72	0	-	-	-	-
3	IL1 Mattis N	-	17	3	58	0	-	-	-	-
4	MI1 Waverly	-	30	11	68	32	43	.76	34	28-47
5	TN1 SC	-	187	3	43	13	192	1.17	128	81-203
6	WI1 Wood Ctn	-	45	12	81	0	-	-	-	-
7	MA1 Rt 9	-	338	7	23	5	160	.38	150	106-213
8	MA1 Convent	-	100	1	33	6	106	1.83	51	19-138
9	MI1 Grand R Ot	-	453	5	38	20	68	.68	56	44-71
10	MI3 Pitt AA-S	-	2001	2	21	6	13	.32	13	10-17
11	NY2 Cedar	-	76	-	5	26	49	1.16	32	23-44
12	MA1 Anna	-	601	9	12	4	-	-	-	-
13	MI3 Pitt AA-N	-	2871	7	26	6	59	.88	44	24-82
14	MI1 Grace M	-	164	5	28	21	47	.47	42	35-50
15	MI3 Swift Run	-	1207	2	4	5	39	.46	35	23-53
16	SD1 Meade	-	2030	-	-	14	87	.61	74	57-97
17	CA1 Knox	-	1542	12	-	18	169	.99	120	85-168
18	FL1 N. Jesuil	-	30	-	13	0	-	-	-	-
19	FL1 Wilder	-	194	-	97	0	-	-	-	-
20	CO1 North Ave	-	69	9	50	30	228	.95	165	179-212

Commercial

	Site	Land Use % Coml	Area (A)	Pop. Den (#/A)	% IMP.	No. of OBS	SOL P Mean	COV	Median	90% Confidence limits
1	CO1 Villa Italia	100	24	0	91	26	293	1.09	198	147-266
2	NC1 1013 (CBD)	100	23	0	69	0	-	-	-	-
3	NY3 Southgate	100	179	2	21	0	-	-	-	-
4	WI1 Post Office	100	12	0	100	0	-	-	-	-
5	NH1 Pkg Lot	100	1	0	90	0	-	-	-	-
6	TN1 CBD	100	26	0	99	15	46	.32	17	28-50
7	WI1 Rustler	100	12	0	-	0	-	-	-	-
8	KS1 IC Metcalf	96	58	-	97	21	116	1.06	80	58-111
9	FL1 Norma Pt	91	42	-	45	0	-	-	-	-
10	WI1 State Fair	74	29	10	77	3	-	-	-	-

Industrial

	Site	Land Use % Ind	Area (A)	Pop. Den (#/A)	% IMP.	No. of OBS	SOL P Mean	COV	Median	90% Confidence limits
1	MA2 Addison	100	18	0	69	5	75	.92	55	26-116
2	MI2 Indus Drain	100	63	0	64	14	127	.72	103	76-140
3	KS1 Lenexa	56	72	-	44	16	346	1.66	179	108-296
4	MI1 Grace S.	52	75	5	39	16	59	1.74	37	24-56

TABLE 6-6. SITE MEAN TKN EMCs (μg/ℓ)

Residential

	Site	Land Use % Res	Area (A)	Pop. Den (P/A)	% IMP.	No. of OBS	TKN Mean	TKN COV	TKN Median	TKN 90% Confidence Limits
1	CO1 Big Dry Cr	100	31	19	41	16	2,169	.58	2041	1617-2584
2	CO1 Cherry	100	57	24	38	14	2,609	.39	2430	2014-2904
3	CO1 116/Claude	100	167	14	74	19	2,891	.51	2501	2010-1112
4	DC1 Dufief	100	17	-	-	6	2,066	.11	2048	1841-2278
5	DC1 Lakeridge	100	68	21	33	48	1,774	.64	1450	1259-1670
6	DC1 Stratten	100	8	-	-	28	1,811	.34	1686	1494-1904
7	IL1 John N	100	54	18	19	13	1,994	.81	1107	7520-3811
8	LS1 Overton	100	58	8	38	5	-	-	-	-
9	MA2 Hemlock	100	50	5	16	5	1,679	.55	1217	1971-5252
10	MD1 Bolton Mill	100	34	39	51	18	6,067	.32	4815	3640-6170
11	MD1 Homeland	100	21	9	79	13	6,505	.40	6044	4996-7112
12	MD1 Mt Wash	100	17	12	29	70	6,915	.41	6408	5502-7461
13	MD1 Res Hill	100	10	55	76	13	10,803	.41	9915	8089-12154
14	NJ1 Carll's R.	100	71	11	20	24	1,487	.71	1201	955-1509
15	NY1 Hogua	100	-	-	-	8	1,408	.26	1161	1148-1618
16	NJ1 Cranston	100	166	5	77	11	1,492	.45	1358	1098-1679
17	NC3 E. Rock.	100	346	18	18	7	3,246	.90	7411	1369-4245
18	IL1 Rollingwood	100	60	1	21	9	5,004	2.37	1942	828-4554
19	WA1 Surrey	100	95	9	29	118	1,007	.62	857	785-915
20	WI1 Burbank	100	61	15	50		1,260	.50	1125	908-1195
21	WI1 Hastings	100	13	17	51	15	1,102	.54	969	801-1173
22	FL1 Young Aprs	100	9	-	6	12	1,139	.70	1097	791-1522
23	FX1 Wart	99	178	9	40	11	1,016	.25	2412	1674-3474
24	WI1 Lincoln	37	16	18	57	1	-	-	-	-
25	TN1 P2	96	84	4	11	11	426	.11	452	379-519
26	OC1 WestleighN	93	41	3	21	41	1,901	.56	1660	1442-1904
27	KS1 IC - 47nd	92	61	-	17	8	4,187	.94	3051	1790-5200
28	IL1 John S.	41	19	18	18	12	1,527	1.04	2441	1888-1155
29	FN1 Pi	91	69	11	11	11	1,131	.14	1071	894-1281
30	WP1 Lake Mills	91	102	12	37	127	1,656	.71	852	774-438
31	IL1 Mattis S.	90	28	77	37	37	1,440	.69	2825	2343-3406
32	FL1 CWarter Hdg	89	42	-	16	12	1,704	.83	1309	899-1905
33	OC1 Fairidge	88	19	-	34	46	2,712	.51	1958	1711-2215
34	CO1 Pasbury	86	177	9	72	1	3,435	.56	3761	2774-4788
35	IL2 Comb Intets	85	524	6	17	0	-	-	-	-
36	MP1 Locust	85	154	11	16	6	2,695	.38	2522	1864-3412
37	NC1 #1021	84	324	8	23	67	1,488	.94	1086	921-1277
38	WA1 Jordan	79	110	10	21	9	1,191	.60	1194	845-1681
39	DC1 Stedwict	78	27	15	34	43	1,895	.57	1543	1435-1881

Urban Open and Nonurban

	Site	Land Use % Open	Area (A)	Pop. Den (#/A)	% IMP.	No. of OBS	TKN Mean	TKN COV	TKN Median	TKN 90% Confidence Limits
1	FA1 Seaview	100	613	-	-	13	3674	.59	1159	7411-4139
2	CO1 Pooney GulcN	100	405	0	1	7	2954	.57	7615	1815-3768
3	NY1 INornell	100	28,416	-	4	11	1099	.50	482	778-1240
4	NY2 EnglisN Br	98	5,248	-	1	15	340	.50	305	246-178
5	NJ2 West Br	97	5,338	-	1	24	392	.57	147	792-412
6	NJ1 ZNomas Br	91	17,728	1	11	10	1111	.16	1045	854-1279
7	NJ3 Fraser Cr	90	2,101	-	6	5	889	.11	883	796-981
8	NY7 SNeriff Dock	80	552	-	7	13	963	.76	765	628-937

Mixed

	Site	Land Use %	Area (A)	Pop. Den (P/A)	% IMP.	No. of OBS	TKN Mean	TKN COV	TKN Median	TKN 90% Confidence Limits
1	KS1 Noland	-	36	3	68	0	-	-	-	-
2	MD1 HAmpden	-	17	40	72	19	6994	.55	6140	5004-7531
3	IL1 Mattis N	-	17	3	58	15	2872	.64	2172	7006-7805
4	WI1 WaWerly	-	10	11	68	15	1490	.51	1116	1142-1516
5	TN1 SC	-	182	1	41	11	623	.50	558	442-705
6	WI1 Wood Ctr	-	45	12	81	16	1452	.35	1369	1180-1589
7	MA1 Rt 9	-	338	7	23	5	2446	.50	2188	1194-1412
8	MA1 Consent	-	100	1	33	8	1080	.64	910	615-1147
9	WI1 Gegod R Ot	-	451	5	18	21	1631	.47	1506	1104-1740
10	WI1 Pttt AA-5	-	2001	2	21	6	845	.29	811	647-1025
11	NY2 Cedar	-	76	-	5	21	1237	.81	951	724-1749
12	MA1 Anna	-	601	9	12	6	1888	.70	1547	920-2601
13	WI3 Pttt AA-N	-	2891	7	76	6	1056	.22	1011	887-1215
14	WI1 Grace N	-	164	5	28	21	1988	.47	1807	1536-2115
15	NJ3 Swift Run	-	1707	2	4	5	1116	.15	1104	968-1273
16	SO1 Meade	-	2010	-	-	11	4741	.50	1807	3010-4802
17	CA1 Knox	-	1542	17	-	70	2770	.75	1775	1171-2298
18	FL1 N. Jesutt	-	30	-	11	15	1388	.49	1244	1011-1542
19	FL1 Wilder	-	194	-	47	15	1107	.11	1056	970-1212
20	CO1 NortN Aue	-	69	4	50	71	4196	.65	1522	2847-4166

Commercial

	Site	Land Use % Comm	Area (A)	Pop. Den (P/A)	% IMP.	No. of OBS	TKN Mean	TKN COV	TKN Median	TKN 90% Confidence Limits
1	CO1 Villa Italia	100	74	0	91	77	1657	.85	2785	2186-3548
2	NC1 1011 (CROl	100	71	0	64	61	1611	.10	1118	1152-1609
3	NY1 SoutNgate	100	174	2	21	13	1266	.45	1144	975-1414
4	WI1 Post Office	100	12	0	100	27	1021	.44	916	915-1015
5	NM1 Pkg Lot	100	1	0	47	18	7119	.66	1761	1116-2754
6	TN1 EBO	100	26	0	99	15	646	.41	597	499-714
7	WI1 Rustler	100	12	0	-	75	1073	.61	918	754-1110
8	KS1 IC Wetcalf	96	58	-	47	17	1175	.71	949	720-1253
9	FL1 Norma Pk	91	47	-	45	12	876	.84	633	437-925
10	WI1 State Fatr	74	29	10	77	8	1656	.65	1189	913-2068

Industrial

	Site	Land Use % Ind	Area (A)	Pop. Den (P/A)	% IMP.	No. of OBS	TKN Mean	TKN COV	TKN Median	TKN 90% Confidence Limits
1	MA2 Addison	100	18	0	69	5	2042	.49	1879	1227-2974
2	WI1 Indus Orain	100	63	0	64	18	1274	.57	1107	891-1376
3	KS1 Lenaka	56	72	-	44	17	1385	.71	1117	796-1568
4	WI1 Grace S.	52	75	5	39	18	1711	.56	1491	1205-1850

TABLE 6-7. SITE MEAN NITRITE PLUS NITRATE EMCs (μg/ℓ)

Residential

	Site	Land Use % Res	Area (A)	Pop. Den (#/A)	% IMP.	No. of OBS	NO_{2+3}-N Mean	COV	Median	90% Confidence Limits
1	CO1 Big Dry Cr	100	33	19	41	15	527	.34	499	429-580
2	CO2 Cherry	100	57	24	38	14	709	.40	657	542-288
3	CO1 116/Claude	100	167	14	24	16	670	.51	529	469-715
4	OC1 Dufief	100	12	-	-	8	420	.35	445	354-558
5	OC1 Lakebridge	100	68	21	33	49	246	.62	633	552-725
6	DC1 Stratton	100	8	-	-	33	418	.86	312	254-395
7	IL1 John K	100	54	18	14	-	-	-	-	-
8	KS1 Overlon	100	58	8	38	-	-	-	-	-
9	MA2 Memlock	100	50	5	16	4	-	-	-	-
10	MD1 Bolton Hill	100	14	10	52	19	9535	1.59	5073	3246-7930
11	MD1 Homeland	100	23	9	29	13	6343	4.56	1358	570-3234
12	MD1 Mt Wash	100	17	12	29	20	7822	1.56	4229	2253-6492
13	MD1 Res Mill	100	10	55	26	13	6938	1.08	4207	1048-2269
14	NY1 Carll's P.	100	73	13	20	24	230	1.38	442	31E-627
15	NY1 Pagoa	100	-	-	-	8	1593	-	-	1020-1872
16	NY3 Cranston	100	166	5	22	0	-	-	-	-
17	NY3 E. Roch.	100	346	18	38	0	-	-	-	-
18	TX1 Rollingwood	100	60	3	21	9	829	.51	283	581-1055
19	WA1 Surrey	100	95	9	79	0	-	-	-	-
20	WI1 Burbank	100	63	15	50	18	275	.48	699	580-843
21	WI1 Naslings	100	13	17	51	24	625	.39	582	510-664
22	FL1 Young Apls	100	9	-	6	12	311	.64	262	193-355
23	TX1 Harl	99	328	9	40	10	1625	.54	1430	1062-1912
24	WS1 Lincoln	97	36	18	57	3	-	-	-	-
25	IN1 R2	96	89	4	19	11	997	1.34	232	136-412
26	DC1 Westleigh	93	41	9	71	41	202	.59	606	525-700
27	KS1 IC - 92rd	92	63	-	37	0	-	-	-	-
28	IL1 John S.	91	39	28	18	0	-	-	-	-
29	IN1 R1	91	69	11	33	21	578	.72	458	315-665
30	WA1 Lake Hills	91	102	12	37	0	-	-	-	-
31	IL1 Malbs S.	90	28	22	37	0	-	-	-	-
32	FL1 Charler Mdg	89	42	-	16	12	610	.77	483	139-688
33	DC1 Fairbridge	88	19	-	34	48	927	.66	772	667-893
34	CO1 Asbury	86	122	9	22	9	881	.21	862	258-980
35	IL2 Comb Inlecs	85	524	8	12	21	296	.55	699	526-848
36	MA1 Locust	85	154	11	16	5	1705	.69	1406	726-2549
37	NC1 41023	84	324	6	27	67	716	.68	591	521-620
38	MA1 Jordnr	79	110	10	21	9	1747	.55	1094	795-1505
39	DC1 Sledwick	78	27	15	34	47	837	.70	686	588-800

Urban Open and Nonurban

	Site	Land Use % Open	Area (A)	Pop. Den (#/A)	% IMP.	No. of OBS	NO_{2+3}-N Mean	COV	Median	90% Confidence Limits
1	CA1 Seaview	100	611	-	-	12	1542	.49	1381	1087-1759
2	OH1 Rooney Gulch	100	405	51	1	7	581	1.03	405	217-756
3	NY3 Thurbell	100	28,416	-	4	6	-	-	-	-
4	NY2 English Br	98	5,248	-	1	30	240	.60	206	173-245
5	NY2 West Br	97	5,338	-	1	11	862	.53	761	656-868
6	NY3 Thomas Cr	91	17,228	5	11	0	-	-	-	-
7	MI3 Trayer Cr	90	2,303	-	6	5	1108	.17	1092	930-1283
8	NY2 Sherrill Bucy	86	552	-	7	33	383	1.02	268	209-143

Mixed

	Site	Land Use %	Area (A)	Pop. Den (#/A)	% IMP.	No. of OBS	NO_{2+3}-N Mean	COV	Median	90% Confidence Limits
1	KS1 Noland	-	36	3	68	0	-	-	-	-
2	MD1 Mampden	-	17	40	72	20	11,529	4.00	2293	1457-5355
1	IL1 Mallis N	-	17	3	58	0	-	-	-	-
4	WI1 Wayerly	-	30	11	68	35	725	.49	696	610-794
5	TN1 SC	-	187	3	43	13	582	1.49	327	192-558
6	WI1 Wood Clr	-	45	12	81	17	253	.69	618	474-805
7	MA1 R1 9	-	338	7	23	5	1,789	.48	1613	1045-2490
8	MA1 Convent	-	100	1	13	6	960	.39	894	656-1218
9	MI1 Grand R Ot	-	453	5	38	23	883	.44	807	694-938
10	WI3 P111 AA-S	-	2001	2	21	6	284	.48	256	176-322
11	NY2 Cedar	-	26	-	5	32	248	.72	201	-
12	MA1 Anna	-	601	9	52	6	1,268	.60	1086	688-1218
13	WI3 P111 AA-N	-	2821	7	26	5	469	.24	456	364-571
14	WI1 Grace N	-	164	5	28	21	825	.43	803	693-931
15	WI3 Swift Run	-	1202	7	4	5	1,033	.26	821	431-1563
16	SO1 Meade	-	2030	-	-	15	616	.40	521	429-680
17	CA1 Knoa	-	1542	12	-	17	1,111	.36	1044	901-1210
18	FL1 W. Jasoll	-	30	-	13	14	126	.54	392	261-422
19	FL1 Wilder	-	194	-	92	15	456	.42	412	336-505
20	CO1 North Ave	-	69	9	50	32	1,744	.92	1286	1012-1626

Commercial

	Site	Land Use % Coml	Area (A)	Pop. Den (#/A)	% IMP.	No. of OBS	NO_{2+3}-N Mean	COV	Median	90% Confidence Limits
1	CO1 Villa Italia	100	74	0	91	27	1180	.86	895	709-1143
2	NC1 1013 (CBD)	100	23	0	69	61	1518	.55	980	878-1098
3	NY3 Southgate	100	129	2	21	0	-	-	-	-
4	WS1 Post Office	100	12	0	100	28	708	.68	584	479-712
5	MN1 Pkg Lot	100	15	0	90	28	801	.84	615	486-778
6	TN1 TBD	100	26	0	99	15	662	.62	562	434-778
7	WI1 Roeller	100	12	0	-	25	781	.69	642	527-791
8	KS1 IC Melcolf	96	58	-	97	0	-	-	-	-
9	FL1 Norma Pk	91	42	-	45	12	356	.46	323	257-405
10	WI1 State Fair	74	29	10	72	12	781	.50	702	540-897

Industrial

	Site	Land Use % Ind	Area (A)	Pop. Den (#/A)	% IMP.	No. of OBS	NO_{2+3}-N Mean	COV	Median	90% Confidence Limits
1	MA2 Addison	100	18	0	69	5	1355	.79	1301	997-1706
2	MI1 Indus Drain	100	63	0	64	18	686	.40	637	544-746
3	KS1 Tenaaa	56	72	-	44	0	-	-	-	-
4	MI1 Grace S.	52	75	5	39	12	742	.52	657	534-808

TABLE 6-8. SITE MEAN TOTAL COPPER EMCs (μg/ℓ)

Residential

	Site	Land Use % Res	Area (A)	Pop. Den (#/A)	% IMP.	No. of OBS	Total Copper Mean	COV	Median	90% Confidence Limits
1	CO1 Big Dry Cr	100	33	19	41	16	32	.82	25	18-34
2	CO1 Cherry	100	67	24	38	14	36	1.48	20	12-33
3	CO1 116/Claude	100	167	14	24	16	28	.74	22	16-29
4	OR1 Buffalo	100	12	-	-	21	-	-	-	-
5	OR1 Laterldgr	100	68	21	33	14	18	.55	33	26-42
6	OR1 Strairon	100	8	-	-	10	28	.38	21	23-32
7	IL1 John N	100	54	18	39	36	83	.85	63	51-78
8	KS1 Overlon	100	58	8	38	12	91	.50	81	93-103
9	MA1 Hemlock	100	60	5	16	9	-	-	-	-
10	MD1 Bolton Hill	100	14	10	51	19	107	.70	88	68-112
11	MD1 Homelakn	100	23	9	79	13	312	.14	296	252-349
12	MD1 Mt Wash	100	32	12	29	20	26	.78	20	15-28
13	MI1 Lee Hill	100	10	65	76	13	42	.69	30	25-46
14	MI1 Carll's R.	100	71	13	20	0	-	-	-	-
15	MI1 Indian	100	-	-	-	0	-	-	-	-
16	NJ3 Cranston	100	166	5	22	0	-	-	-	-
17	NJ3 F. Avon.	100	246	18	38	0	-	-	-	-
18	TX1 Hollywood	100	60	1	21	0	-	-	-	-
19	WA1 Surrey	100	95	9	29	0	-	-	-	-
20	WI1 Burbend	100	61	15	60	0	-	-	-	-
21	WI1 Mastimns	100	31	17	51	0	-	-	-	-
22	FL1 Young Apts	100	4	-	6	12	6	.36	6	5-7
23	TX1 Marl	99	372	9	40	0	-	-	-	-
24	WI1 Lincoln	93	16	18	53	0	-	-	-	-
25	TN1 P2	96	89	4	13	11	28	1.54	15	8-22
26	DC1 Westleigh	93	41	3	21	6	33	.43	34	24-46
27	KS1 IL - 96nd	92	63	-	17	0	-	-	-	-
28	IL1 John S.	91	39	12	18	16	43	.84	33	26-40
29	TN1 P1	91	69	11	13	11	51	.60	52	38-70
30	WA1 Lake Mills	91	102	12	12	3	22	.34	21	15-29
31	IL1 Mallis S.	90	28	22	33	36	45	.76	36	30-44
32	IL1 Charlie Ndg	89	42	-	18	12	10	.94	7	6-11
33	IL1 Fairlgh	88	30	-	34	9	26	.39	26	19-31
34	CO1 Asbury	86	127	9	22	9	59	.84	45	29-71
35	IL1 Comb Inlets	85	124	8	17	26	49	.53	43	36-51
36	MA1 Locust	85	154	11	16	6	107	.21	104	80-135
37	NC1 #1001	84	344	6	27	66	39	.60	33	29-39
38	MA1 Jordin	79	110	10	31	8	24	.24	22	-
39	DC1 Stedwick	78	27	15	34	9	101	.15	25	21-25

Urban Uben and Nonurban

	Site	Land Use % Oped	Area (A)	Pop. Den (#/A)	% IMP.	No. of OBS	Total Copper Mean	COV	Median	90% Confidence Limits
1	LA1 Seaview	100	533	-	-	12	59	.33	55	46-65
2	MO1 Rooney Sulcr	100	400	0	1	3	37	1.09	25	17-48
3	NJ3 Thornell	100	38,410	-	4	11	-	-	-	-
4	NY2 English Cr	98	6,249	-	1	0	-	-	-	-
5	NC1 West Br	97	5,534	-	1	0	-	-	-	-
6	NJ3 Indian Cr	91	17,326	1	11	0	-	-	-	-
7	NJ3 Tenpin Cr	90	7,303	-	8	0	-	-	-	-
8	NJ3 Sheriff Ind	90	552	-	7	0	-	-	-	-

Mixed

	Site	Land Use %	Area (A)	Pop. Den (#/A)	% IMP.	No. of OBS	Total Copper Mean	COV	Median	90% Confidence Limits
1	KS1 Naland	-	36	1	68	9	48	.38	45	38-57
2	MO1 Hampden	-	13	40	78	30	81	.96	61	45-92
3	IL1 Mattis N	-	17	3	58	17	48	.81	17	31-45
4	MI1 Waverly	-	30	13	69	16	15	.50	13	10-16
5	TN1 SC	-	183	3	41	13	42	1.35	25	24-41
6	WI1 Wood Crr	-	45	12	81	11	-	-	-	-
7	MA1 Pi 9	-	139	7	23	7	112	.49	100	71-141
8	MA1 Springfd	-	180	1	31	7	209	.41	96	71-130
9	MI1 Grand R Ot	-	453	5	38	13	101	.63	96	70-15
10	NJ3 Pine AR-5	-	2003	2	23	0	-	-	-	-
11	NY2 Cedar	-	76	-	5	0	-	-	-	-
12	MA1 Anna	-	601	9	12	5	54	.51	46	30-70
13	MI3 Pitt AA-N	-	2811	7	26	0	-	-	-	-
14	MI1 Grand N	-	184	5	28	9	14	.31	13	11-18
15	MI3 Swift Ann	-	1703	2	4	0	-	-	-	-
16	SO1 Meade	-	2030	-	-	0	-	-	-	-
17	CA1 Knox	-	1542	12	-	17	98	1.14	65	44-96
18	FL1 N. Desoto	-	30	-	13	15	7	.61	5	5-9
19	FL1 Wilder	-	184	-	37	15	5	.84	5	4-7
20	CO1 North Ave	-	69	9	51	12	71	.83	54	42-74

Commercial

	Site	Land Use % Comm	Area (A)	Pop. Den (#/A)	% IMP.	No. of OBS	Total Copper Mean	COV	Median	90% Confidence Limits
1	CO1 Villa Italia	100	74	0	91	27	31	.47	25	20-32
2	NC1 Toll (CBD)	100	23	0	49	61	70	.54	61	54-69
3	NJ3 Sunlogatp	100	179	0	21	0	-	-	-	-
4	WI1 Post Office	100	12	2	100	0	-	-	-	-
5	NM1 Pkg Int	100	3	0	95	11	164	.13	161	-
6	TN1 CBD	100	26	0	99	15	42	.60	36	28-46
7	WI1 Rustler	100	12	0	-	0	-	-	-	-
8	KS1 IL Metcalf	96	68	-	65	6	81	.33	79	70-91
9	IL1 Norma Zk	93	42	-	65	12	31	.37	30	8-13
10	WI1 State Fair	74	24	10	37	0	-	-	-	-

Industrial

	Site	Land Use % Ind	Area (A)	Pop. Den (#/A)	% IMP.	No. of OBS	Total Copper Mean	COV	Median	90% Confidence Limits
1	MA2 Adamsvr	100	18	0	49	0	-	-	-	-
2	MI1 Inmus Drain	131	53	9	64	6	30	.55	37	32-43
3	KS1 Lenexa	98	72	-	44	5	45	.24	36	28-41
4	MI1 Grpie S.	97	15	5	37	7	24	.65	21	14-32

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TABLE 6-9. SITE MEAN TOTAL LEAD EMCs (μg/ℓ)

Residential

	Site	Land Use % Res	Area (A)	Pop. Den (P/A)	% IMP.	No. of OBS	Total lead Mean	COV	Median	90% Confidence Limits
1	CO1 Brg Dry Cr	100	13	19	41	16	183	.88	117	98-191
2	CO1 Cherry	100	57	24	18	14	194	.92	143	99-207
3	CO1 Hibr Glade	100	167	14	24	16	293	.87	210	151-292
4	DC1 Dufref	100	12	-	-	1	-	-	-	-
5	DL1 Lakeridge	100	68	21	33	18	227	.54	200	164-245
6	DC1 Stratton	100	8	-	-	0	-	-	-	-
7	IL1 John N	100	84	18	19	16	717	.71	191	158-211
8	IS1 Overton	100	58	8	16	11	118	.19	128	104-157
9	MA2 Hemlock	100	55	5	16	0	-	-	-	-
10	MD1 Dolling Brll	100	14	30	51	19	2345	4.53	592	295-1188
11	MD1 Homeland	100	21	9	29	19	76	.48	69	56-86
12	MD1 Mt Wash	100	17	12	29	20	86	.48	77	65-92
13	MO1 Res Mill	100	10	55	76	17	461	1.86	218	119-399
14	NA1 Carll's P	100	71	13	20	0	-	-	-	-
15	NY1 Depua	100	-	-	-	8	88	1.16	52	26-103
16	NY1 Cranstone	100	166	5	22	11	34	.77	27	19-38
17	NY3 E. Roch.	100	146	18	38	8	191	.89	144	86-240
18	NY1 Rollingwood	100	60	3	21	0	-	-	-	-
19	WA1 Surrey	100	98	9	29	118	152	.51	136	126-146
20	WI1 Birnbank	100	63	15	51	44	95	.72	77	65-91
21	WI1 Hastings	100	33	17	51	15	108	.67	90	75-107
22	IL1 Young Apts	100	9	-	6	12	36	1.03	51	14-82
23	TN1 Mart	99	178	9	40	0	-	-	-	-
24	WI1 Lincoln	91	16	18	47	22	303	1.19	200	141-280
25	TN1 Ay	96	89	4	13	11	111	.41	123	99-151
26	DC1 Westbrgh	97	41	1	21	5	186	.17	184	157-216
27	IS1 IL - 82nd	92	61	-	37	1	-	-	-	-
28	IL1 John S.	91	39	18	18	13	217	.80	169	138-208
29	TN1 Wl	91	69	11	11	11	440	.61	376	277-511
30	WA1 Lake Mills	91	102	17	39	126	192	.67	159	140-174
31	IL1 Mallis S.	98	28	22	17	37	595	1.12	196	308-508
32	IL1 Charter Hdg	89	92	-	16	12	49	1.60	26	14-47
33	DC1 Fairbridge	68	19	-	14	1	-	-	-	-
34	LB1 Asbury	86	127	9	22	9	431	.12	151	351-524
35	IL2 Comb Inlets	85	524	6	17	24	132	1.01	277	169-304
36	MA1 Locust	85	154	11	14	6	311	.67	225	116-171
37	MP1 Pt 1023	84	129	6	27	66	254	.98	182	151-215
38	MA1 Jordan	79	110	10	21	9	168	.12	160	112-194
39	DC1 Stydwick	78	27	15	34	11	141	.41	110	105-161

Mixed

	Site	Land Use %	Area (A)	Pop. Den (P/A)	% IMP.	No. of OBS	Total lead Mean	COV	Median	90% Confidence Limits
1	KS1 Noland	-	36	1	68	9	164	.49	142	110-196
2	MO1 Hampden	-	17	40	32	20	227	.82	176	131-242
3	IL1 Mattis N	-	17	3	58	41	554	1.06	180	103-478
4	MI1 Waverly	-	30	11	68	24	311	1.09	75	55-102
5	TM1 SC	-	187	1	43	13	237	.31	227	195-264
6	WI1 Wood Ctr	-	95	12	81	45	582	.94	424	348-517
7	MA1 Rt 9	-	338	7	11	7	419	1.02	167	165-471
8	MA1 Convent	-	100	1	13	7	196	.94	143	80-257
9	MI1 Grand R Ot	-	451	5	38	18	122	.90	91	66-125
10	MI3 Pitt AA-S	-	2001	2	23	6	21	1.63	11	4-29
11	NY2 Cedar	-	76	-	5	28	75	1.25	47	34-69
12	MA1 Anna	-	601	9	12	4	-	-	-	-
13	MI3 Pitt AA-N	-	2871	7	26	5	61	.71	50	27-93
14	MI1 Grace A	-	164	5	28	18	170	1.79	99	65-151
15	MI3 Swift Run	-	1207	2	4	4	-	-	-	-
16	SO1 Meade	-	2030	-	-	24	381	1.13	254	165-390
17	CA1 Knox	-	1542	12	-	22	495	.99	351	359-475
18	FL1 N. Jesult	-	10	-	13	15	56	1.22	35	23-54
19	FL1 Wilder	-	194	-	97	15	86	.85	55	47-91
20	CO1 North Ave	-	69	9	50	11	158	.51	278	226-343

Commercial

	Site	Land Use % Coml	Area (A)	Pop. Den (P/A)	% IMP.	No. of OBS	Total lead Mean	COV	Median	90% Confidence Limits
1	CO1 Villa Italia	100	74	6	91	27	262	1.27	187	172-224
2	MC1 1011 (CBD)	100	23	0	69	61	383	.83	296	254-349
3	NY3 Southgate	100	179	0	31	13	47	.50	42	31-53
4	WI1 Post Office	100	13	3	100	59	191	.93	148	128-173
5	MN1 Pkg Lot	100	1	0	90	11	208	.93	152	171-197
6	TM1 CBD	100	26	5	99	15	158	.52	140	112-175
7	WI1 Rustler	100	12	0	-	44	123	.73	98	83-115
8	RS1 IC Metcalf	96	58	-	97	7	-	-	-	-
9	FL1 Marma Pk	91	47	-	45	12	46	1.01	37	31-44
10	WI1 State Fair	74	29	10	37	27	409	.86	310	243-396

Urban Open and Nonurban

	Site	Land Use % Open	Area (A)	Pop. Den (P/A)	% IMP.	No. of OBS	Total lead Mean	COV	Median	90% Confidence Limits
1	FA1 Sayview	100	631	-	-	7	214	.54	159	91-278
2	CO1 Rocky Mtn N	100	305	1	1	7	52	.41	39	22-69
3	NY3 Thornell	100	24,416	-	4	10	12	.42	11	9-14
4	NY2 Endrich Rd	98	5,241	-	1	21	4	.69	8	6-10
5	NY2 West Gr	97	1,278	-	1	25	18	1.40	22	15-31
6	NY3 Thomas Cr	91	13,125	1	11	22	35	1.65	18	10-31
7	NY3 Beaver Cr	96	2,303	-	5	9	-	-	-	-
8	NY2 Sherriff Road	90	556	-	7	17	132	1.09	91	73-117

Industrial

	Site	Land Use % Ind	Area (A)	Pop. Den (P/A)	% IMP.	No. of OBS	Total lead Mean	COV	Median	90% Confidence Limits
1	MA2 Addison	100	18	0	69	0	-	-	-	-
2	MI1 Indus Drain	100	63	0	64	13	116	.77	93	65-124
3	KS1 Kenaka	56	22	-	44	6	-	-	-	-
4	MI1 Grace S.	52	15	5	39	17	114	.76	92	66-128

TABLE 6-10. SITE MEAN TOTAL ZINC EMCs (μg/ℓ)

Residential

	Site	Land Use	Area (A)	Pop. Den (#/A)	% IMP.	No. of OBS	Total Zinc Mean	CoV	Median	90% Confidence Limits
1	CO1 Eng Dry Cr	Res	37	19	41	15	190	.80	151	110-208
2	CO1 Cherry	Res	57	24	38	19	195	.61	155	126-217
3	CO1 Big Dlande	Res	16	14	24	13	195	.66	158	121-208
4	FL1 Duffel	Res	12	-	-	8	156	.26	151	127-179
5	FL1 Lakeridge	Res	58	21	31	48	129	.70	106	91-121
6	DC1 Stratton	Res	6	-	-	28	84	.42	76	66-88
7	TX1 John M	Res	34	18	19	0	-	-	-	-
8	MA1 Sherman	Res	58	8	38	13	831	.97	590	399-891
9	MA2 Pembroke	Res	50	5	16	0	-	-	-	-
10	MD1 Million Mill	Res	14	18	52	19	1388	2.21	573	112-971
11	MD1 Nomeland	Res	31	6	29	13	120	.15	113	96-114
12	MD1 Mt Wash	Res	12	12	39	29	92	.54	81	67-98
13	MD1 Pen Hill	Res	10	55	76	11	523	1.20	140	211-542
14	MD1 Garrett C	Res	75	11	20	0	-	-	-	-
15	MN1 Ohuus	Res	-	-	-	0	-	-	-	-
16	MN3 Crandage	Res	160	5	22	9	315	.88	117	195-499
17	MN3 L. Koch	Res	346	18	39	8	988	1.10	127	180-594
18	TX1 Rollingwood	Res	80	1	21	0	-	-	-	-
19	WA1 Sunney	Res	91	9	29	118	174	.82	114	107-121
20	WI1 Burbank	Res	63	15	50	18	106	1.14	62	42-95
21	WI1 Hastings	Res	23	17	51	21	106	1.20	69	49-99
22	WI1 Young Apts	Res	9	-	6	12	60	.45	55	44-69
23	FL1 Hart	Res	276	9	40	11	-	-	-	-
24	WI1 Lincoln	Res	36	18	57	8	-	-	-	-
25	TN1 RC	Res	89	4	32	11	91	.52	81	61-109
26	OC1 Wessleign	Res	41	1	21	14	67	.96	48	38-61
27	KS1 IC - 92nd	Res	63	-	17	3	-	-	-	-
28	IL1 John S.	Res	39	18	18	1	-	-	-	-
29	SN1 R1	Res	69	11	11	11	412	.59	754	261-427
30	WA1 Lake Mills	Res	102	12	17	126	120	.51	107	99-115
31	IL1 Mallts S.	Res	28	22	17	0	-	-	-	-
32	FL1 Charter Mag	Res	42	-	16	12	54	1.02	78	25-59
33	OC1 Fairidge	Res	19	-	10	44	86	.52	76	67-86
34	OC1 Asbury	Res	127	9	22	9	149	.61	295	206-427
35	IL2 Comb Inlets	Res	524	8	12	27	210	.69	189	154-212
36	MA1 Locust	Res	154	11	16	6	247	.11	216	184-301
37	NC1 #1073	Res	324	6	27	66	178	.81	118	139-160
38	MA1 Jordan	Res	110	10	21	9	218	.28	210	172-249
39	OC1 Sledwick	Res	27	15	14	45	91	.70	75	64-86

Mixed

	Site	Land Use	Area (A)	Pop. Den (#/A)	% IMP.	No. of OBS	Total Zinc Mean	CoV	Median	90% Confidence Limits
1	KS1 Holland	-	36	3	60	9	[illegible]	[illegible]	529	[illegible]
2	MO1 Hampden	-	11	40	72	17	318	.25	112	[illegible]
3	IL1 Mattis N	-	17	3	06	0	-	-	-	-
4	MI1 Waverly	-	30	11	58	13	121	95	110	92-113
5	TN1 SC	-	197	3	03	12	146	40	134	114-157
6	WI1 Wogo Clr	-	45	17	51	22	475	1.21	305	[illegible]
7	MA1 Rl y	-	238	3	22	3	244	13	229	166-304
8	MA1 Convent	-	130	1	33	7	207	60	172	135-270
9	MI1 Grand R Hill	-	453	6	38	14	245	71	09	146-[illegible]
10	WI1 Pitt AA-S	-	2901	2	21	4	-	-	-	-
11	PA2 Cedar	-	76	-	6	0	-	-	-	-
12	MA1 Anna	-	601	9	13	5	178	1.50	99	[illegible]
13	MI3 Pitt AA-N	-	2871	7	26	4	-	-	-	-
14	MI1 Grace M	-	154	5	28	9	149	35	140	[illegible]
15	MI3 Swift Run	-	1207	2	4	7	-	-	-	-
16	SD1 Meade	-	2610	-	-	0	-	-	-	-
17	CA1 Knox	-	1542	12	-	21	202	.55	31	[illegible]
18	FL1 N. Jesuit	-	20	-	11	15	94	68	78	69-103
19	FL1 Wilder	-	194	-	97	15	51	.05	27	[illegible]
20	CO1 North Ave	-	69	9	50	13	541	.82	471	341-[illegible]

Commercial

	Site	Land Use * Comm	Area (A)	Pop. Den (#/A)	% IMP.	No. of OBS	Total Zinc Mean	CoV	Median	90% Confidence Limits
1	CO1 Pello Llalta	100	74	0	41	27	120	.82	392	195-313
2	NC1 1011 (CBD)	100	21	0	109	60	571	.51	478	428-524
3	MI1 Saulnglle	101	179	2	21	9	1428	1.56	517	313-1247
4	WI1 Prsl Office	100	12	0	100	22	145	1.16	44	31-124
5	MN1 Plg Ldl	100	1	0	36	31	511	.65	410	361-512
6	TN1 CBD	100	26	0	99	15	115	.41	289	240-249
7	WI1 Bustler	100	12	0	-	19	156	.75	175	96-161
8	KS1 IC Meleglr	96	58	-	97	7	465	.79	168	272-511
9	FL1 Morma Pk	91	47	-	65	12	17	.88	29	19-41
10	WI1 Llale Farr	74	29	10	77	7	380	.65	234	150-163

Urban Open and Manurban

	Site	Land Use * Open	Area (A)	Pop. Den (#/A)	% IMP.	No. of OBS	Total Zinc Mean	CoV	Median	90% Confidence Limits
1	LA1 Greenview	100	613	-	-	17	190	.69	160	125-205
2	CO1 Rooney Gulch	100	405	0	1	7	115	.56	91	61-130
3	NY3 Thornell	100	35,415	-	4	4	292	2.39	306	110-720
4	NY3 English Pk	99	5,248	-	1	0	-	-	-	-
5	NY3 Best Br	97	5,138	-	1	0	-	-	-	-
6	NY3 Thomas Cr	51	17,724	1	11	9	1067	1.14	327	124-639
7	NY3 Prosec Cr	90	2,397	-	6	2	-	-	-	-
8	MI2 Sheridr Cool	80	552	-	7	0	-	-	-	-

Industrial

	Site	Land Use * Ind	Area (A)	Pop. Den (#/A)	% IMP.	No. of OBS	Total Zinc Mean	CoV	Median	90% Confidence Limits
1	MA2 Addison	100	10	0	69	8	-	-	-	-
2	MI1 Indus Drain	100	62	0	64	7	234	42	225	167-303
3	KS1 Lenexa	56	22	-	44	6	2721	2.29	701	217-2857
4	MI1 Grace S.	52	75	5	39	7	223	.54	196	175-264

* All observations below detection limit.

These tables (one for each pollutant) list each of the appropriate sites in the data base, grouped according to general land use category. Some pertinent site characteristics are identified: drainage area, population density, and the percentage of the total area covered by impervious surfaces. The number of monitored storms at each site is tabulated. Urban runoff quality is summarized by the mean and median EMC for all storms monitored at the site, the storm-to-storm variability of EMC's (defined by the coefficient of variation), and the 90 percent confidence limits for the site median EMC.

Transferability of Data

The urban runoff loading site EMC data were carefully examined in an effort to determine whether specific groupings of results would suggest the presence of consistent patterns of similarities and/or differences that could be used to support estimates of urban runoff characteristics at unmonitored locations and sites.

Variability of EMCs at a Site. Inspection and analysis of the individual site coefficient of variation entries in Tables 6-1 through 6-10 shows that with very few exceptions (usually associated with constituents that were monitored in fewer than 10 storm events) the coefficients of variation fall in the range of 0.5 to 1.0. This applies to all constituents except TSS, for which the range in coefficients of variation is more like 1 to 2.

The frequency of occurrence of any EMC of interest can be estimated readily from the coefficient of variation by using the procedures outlined in Chapter 5. Thus, for TSS, 90 percent of the individual storm events at a given site will have EMCs that do not exceed a value of roughly 3 to 5 times the median EMC value for that site. For the other constituents, 90 percent of the individual storm events at a site will have EMCs less than about 2 to 3 times the median EMC value for that site. More refined estimates and values for other exceedance probabilities can be readily computed using the relationships presented in Chapter 5.

Effect of Geographic Location. Figures 6-4 through 6-13 indicate the range of median EMC's at individual sites, grouped by project. The land use category of the site is indicated by the letter R for residential, M for mixed, and C for commercial/industrial, and the plotting position is the median value as given by the data in Tables 6-1 through 6-10. The ends of the bars for each project are the highest and lowest 90 percent confidence limits for site median EMCs at the project for the constituent in question. Inspection of Figures 6-4 through 6-13 indicates that, for any given constituent, each project can be put into one of three rather general categories: (1) low EMCs and tightly grouped; (2) average characteristics; and (3) wide range and high EMCs. Using the numbers 1, 2, and 3 as shorthand, project categories for each constituent are summarized in Table 6-11. Although no site is category consistent for all constituents, WASHCOG (DC1), Tampa (FL1), Lansing (MI1), and Ann Arbor (MI3) tend to have lower and more tightly grouped EMCs than the others while Kansas City (KS1), Lake Quinsigamond (MA1), and Baltimore (MD1) tend to have a wider range and higher EMCs than the others. Thus we can conclude that some projects represented in the database appear, from the monitoring sites selected, to tend towards somewhat higher or lower EMC median values and ranges than the bulk of the projects. However, there are no distinct geographical patterns revealed.

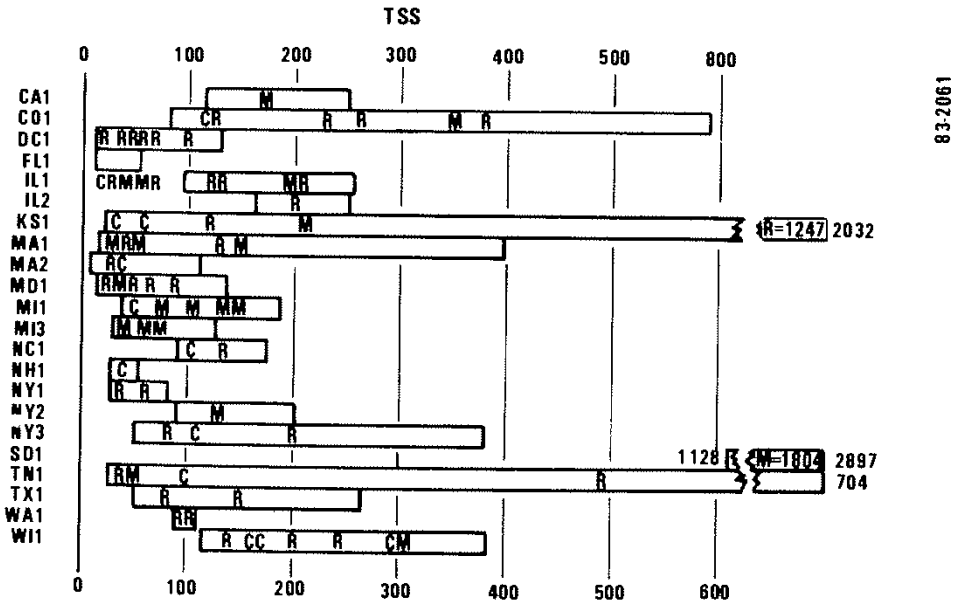

Figure 6-4. Range of TSS EMC Medians (mg/l) by Project

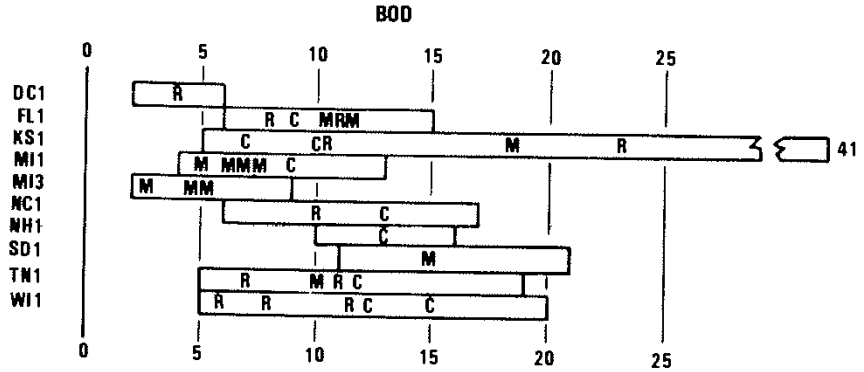

Figure 6-5. Range of BOD EMC Medians (mg/l) by Project

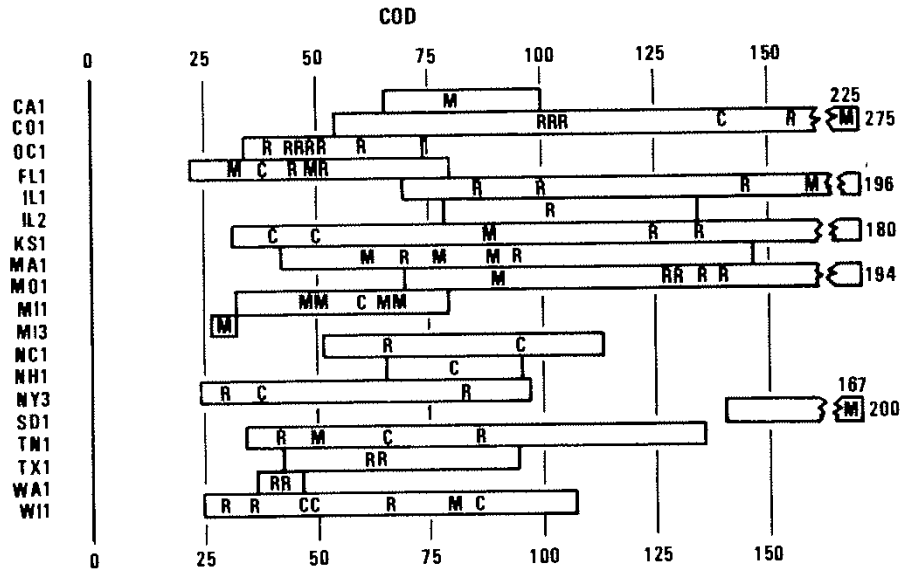

Figure 6-6. Range of COD EMC Medians (mg/l) by Project

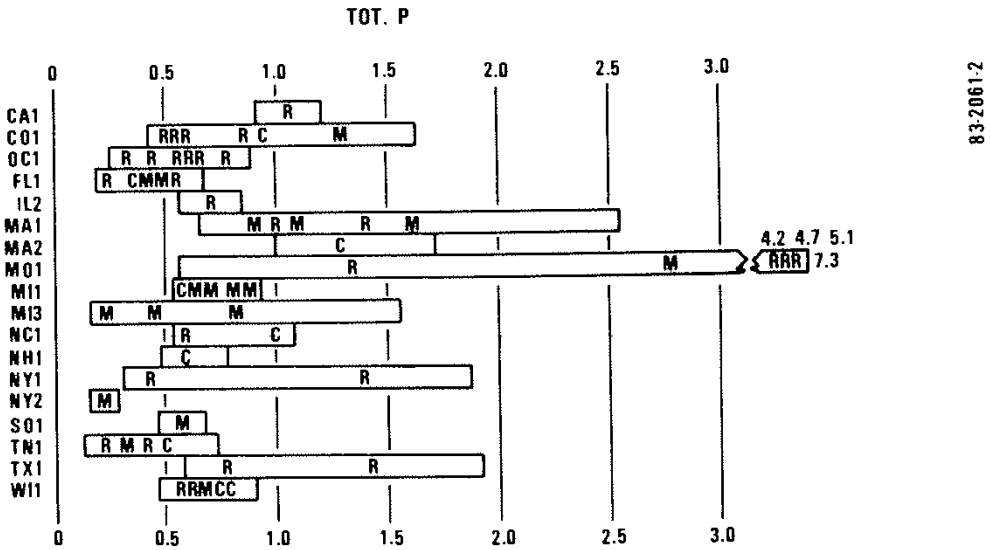

Figure 6-7. Range of Total P EMC Medians (mg/l) by Project

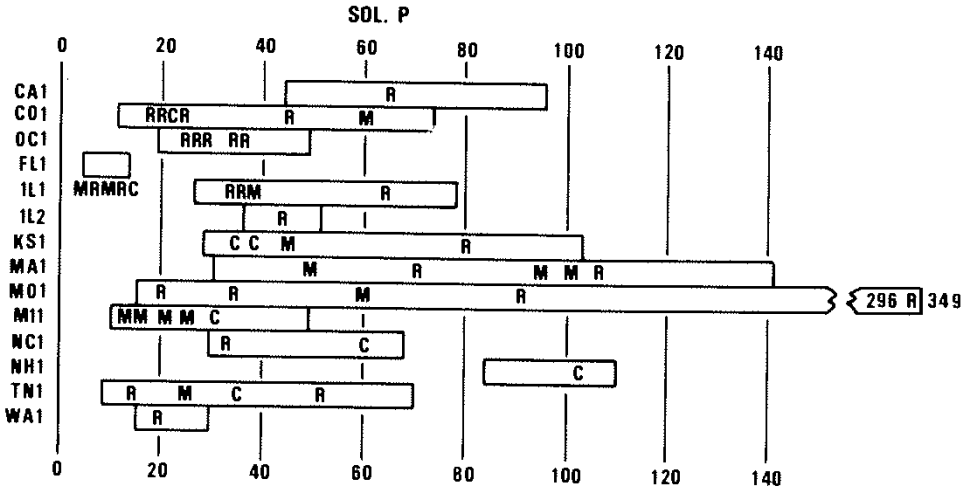

Figure 6-8. Range of Soluble P EMC Medians (mg/l) by Project

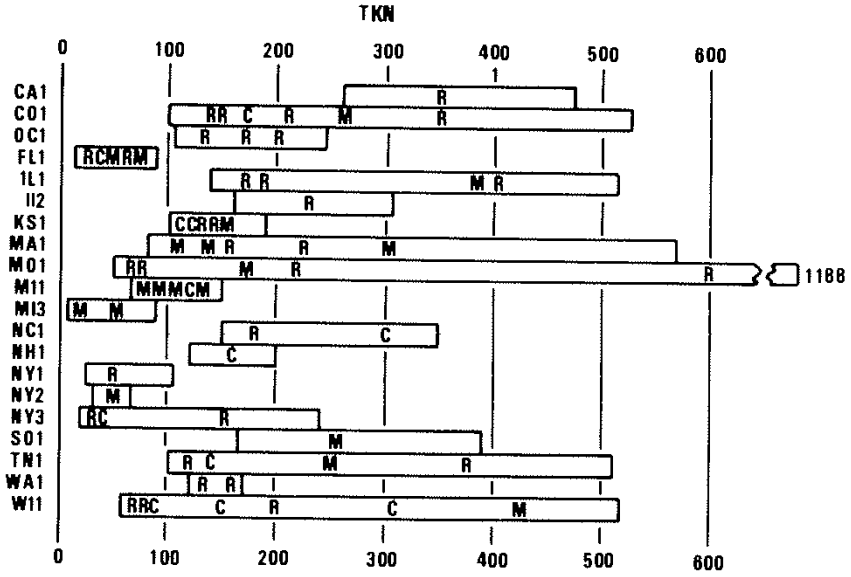

Figure 6-9. Range of TKN EMC Medians (mg/l) by Project

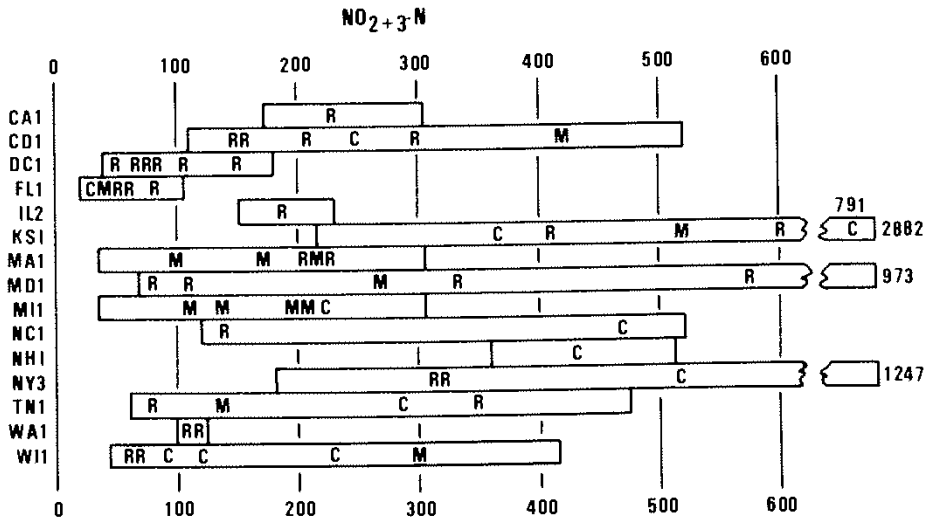

Figure 6-10. Range of NO_{2+3}-N EMC Medians (mg/l) by Project

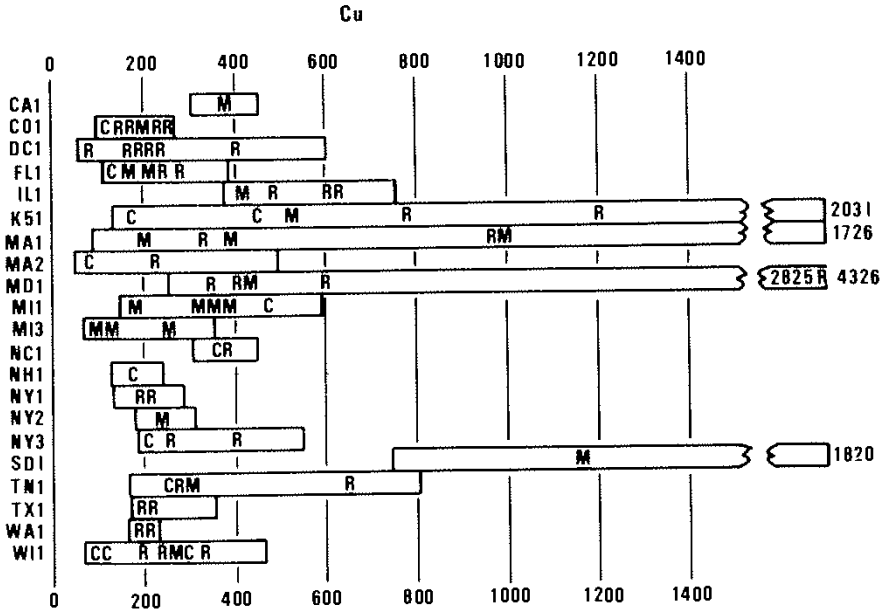

Figure 6-11. Range of Total Cu EMC Medians (µg/l) by Project

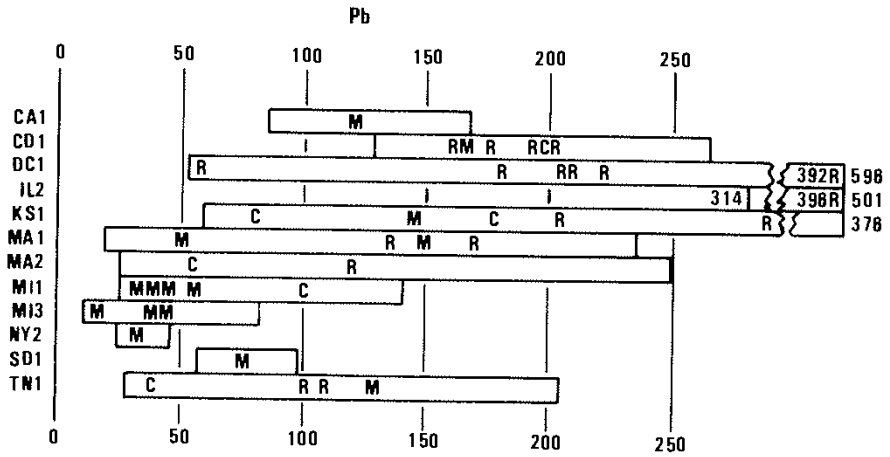

Figure 6-12. Range of Total Pb EMC Medians (µg/l) by Project

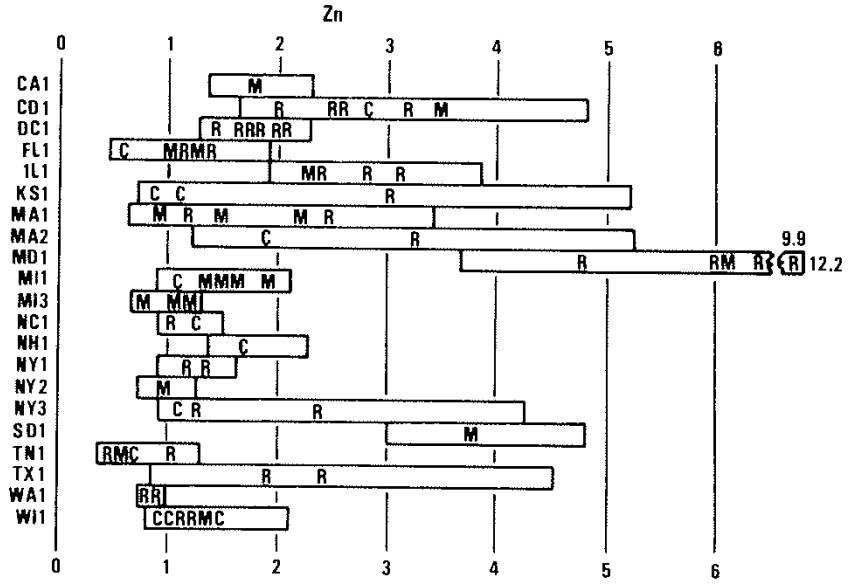

Figure 6-13. Range of Total Zn EMC Medians (µg/l) by Project

TABLE 6-11. PROJECT CATEGORY SUMMARIZED BY CONSTITUENT

	CO1	DC1	FL1	IL1	KS1	MA1	MD1	MI1	MI3	NY3	TN1	WI1
TSS	3	1	1	2	3	3	1	1	1	2	3	2
BOD	-	-	2	-	3	-	-	2	1	-	2	2
COD	3	1	1	3	3	2	3	1	-	1	2	2
Tot. P.	1	2	1	2	3	3	3	2	1	2	2	2
Sol. P.	2	3	-	-	3	2	-	2	1	-	2	-
TKN	2	1	1	2	2	2	3	1	1	2	1	1
NO_{2+3}-N	2	1	1	-	-	3	3	1	2	-	1	1
Tot. Cu	2	1	1	2	2	3	3	1	-	-	2	-
Tot. b	2	1	1	2	1	2	3	1	-	1	2	2
Tot. Zn	2	1	1	-	3	2	3	2	-	3	2	2

It must also be realized that had any particular project monitored other local sites (or additional sites) its categorization could well change. This can be seen qualitatively by perusing Figures 6-4 through 6-13 and mentally dropping the highest or lowest site from each grouping. Although some locations, such as Tampa, will undoubtably and appropriately be influenced by the relatively low EMCs and tight groupings found there in estimating probable values for other urban sites in the area, there is little to warrant attributing similar characteristics to other locations in the same geographical region. For the other locations it would appear that individual site differences eclipse any possible geographic ones.

Effect of Land Use Category. The data in Tables 6-1 through 6-10 were presented by land use category; residential, mixed, commercial, industrial, and open/non-urban. The question to be addressed here is the extent to which such site categorization can be used to assist in predicting EMC parameters for unmonitored sites. Two approaches were used. In the first, the site data for each project with more than three sites were normalized by dividing the site median and its upper and lower 90 percent confidence limits by the average project median value for the constituent in question. This procedure simply allows all constituents to be viewed on a common scale that is centered at unity. An example of the result is given in Figure 6-14. A legend is provided in Figure 6-14(a) showing the lower 90 percent confidence limit, the upper 90 percent confidence limit, and the location of the point estimate of the median within this confidence interval for a hypothetical constituent. Sites that fall to the right of the unity line have higher EMCs than average for this location, while sites that fall to the left of the unity line have lower EMCs than average. Thus, the interpretation is that for this location, Site #1 is the "dirtiest" (has the highest EMC value), Site #3 is the "cleanest", and Site #2 is in between, being somewhat "dirtier" than average. Since the 90 percent confidence limits for these three sites no not overlap, we know that this difference is statistically significant.

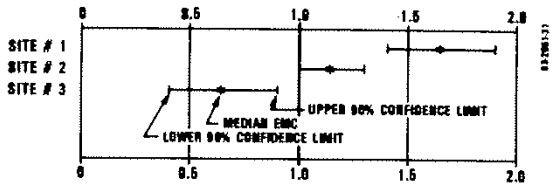

(a) Significantly Different Sites

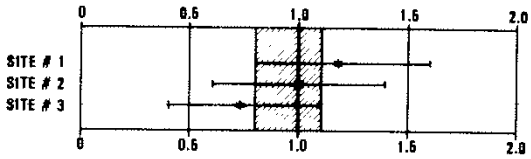

(b) Sites with No Significant Difference

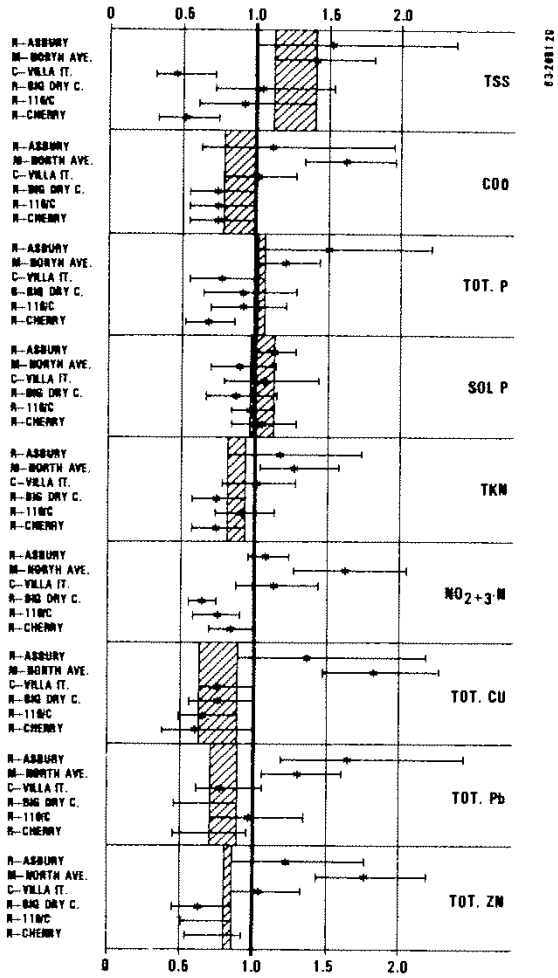

(c) EMC Data from Denver (CO1)

Figure 6-14. Range of Normalized EMC Medians at Denver (CO1)

The actual data for the Denver (CO1) project are presented in Figure 6-14(c). With the exception of nitrate + nitrite, there is little to no statistically significant difference among the majority of the sites for each constituent examined. The lack of consistency among the sites over the various constituents is apparent. One can observe that the Cherry site (residential) tends to plot at the lowest position for all constituents, suggesting that it is the "cleanest," the Asbury site (also residential) tends to plot at the highest position, suggesting that it is the "dirtiest." The Big Dry Cottonwood site, which is also residential, tends to fall between these two. Careful examination of other site data does not provide any evidence to explain this difference in response for sites in the same land use category at the same location. Thus, based on the information presented in Figure 6-14(c), one is forced to conclude that land use category does not provide a useful basis for predicting differences in site EMC values, at least for this project.

When the foregoing type of analysis was applied to the other applicable NURP projects, the results were the same. As another example, the range of normalized EMC medians at Tampa (FL1) and WASHCOG (DC1) are shown in Figure 6-15. These are essentially similar to the Denver results just discussed.

The WASHCOG data presented in Figure 6-15(b) suggest that there is little consistent difference among residential land use sites at that project. The data from Champaign/Urbana (IL1) presented in Figure 6-16 suggest just the opposite. As a part of this project's experimental design, two site pairs were selected. The sites of each pair were expected to respond in a similar fashion. That they do and that the responses of the two pairs are different from each other for most constituents is apparent in Figure 6-16. However, there is no consistency in the pair responses. For example, the Mattis pair has significantly higher EMC values for TSS, COD, and Total Pb, while the John Pair is higher in Total P. The residential land use category for these sites provides no explanation of these differences in response.

Based upon the foregoing approach, we can conclude that, while there can be differences in the responses of different sites at a given location, significant differences do not appear to be widespread, and where they occur, the site land use category is virtually useless in trying to understand or predict them.

The second approach to examining the effect of land use category on the EMC parameters of a site makes use of the observation, discussed earlier, that geographic location has no discernible effect on site response. Since site to site variability was shown to be very well represented by the lognormal distribution, analysis procedures similar to those described previously for characterizing an individual site were applied. Table 6-12 lists the median EMCs for all sites within each land use category. The coefficient of variation quantifies the variability of site characteristics within the land use category. To the extent that the sites included in this database provide a "representative" sample of the land use classifications, then the information summarized by Table 6-12 indicates the effect of land use on urban storm runoff pollutant discharges.

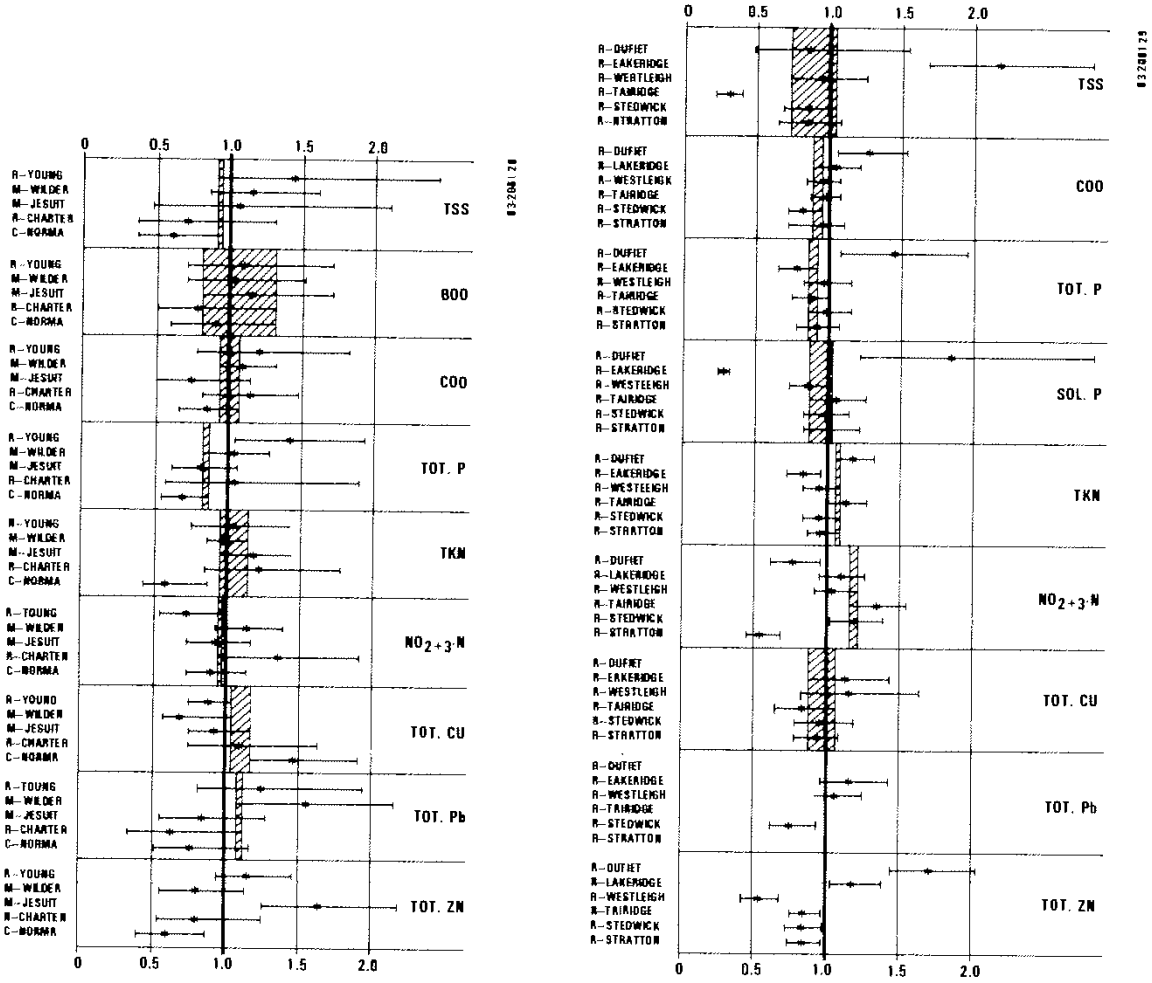

(a) Tampa Sites

(b) WASHCOG Sites

Figure 6-15. Range of Normalized EMC Medians at FL1 and DC1

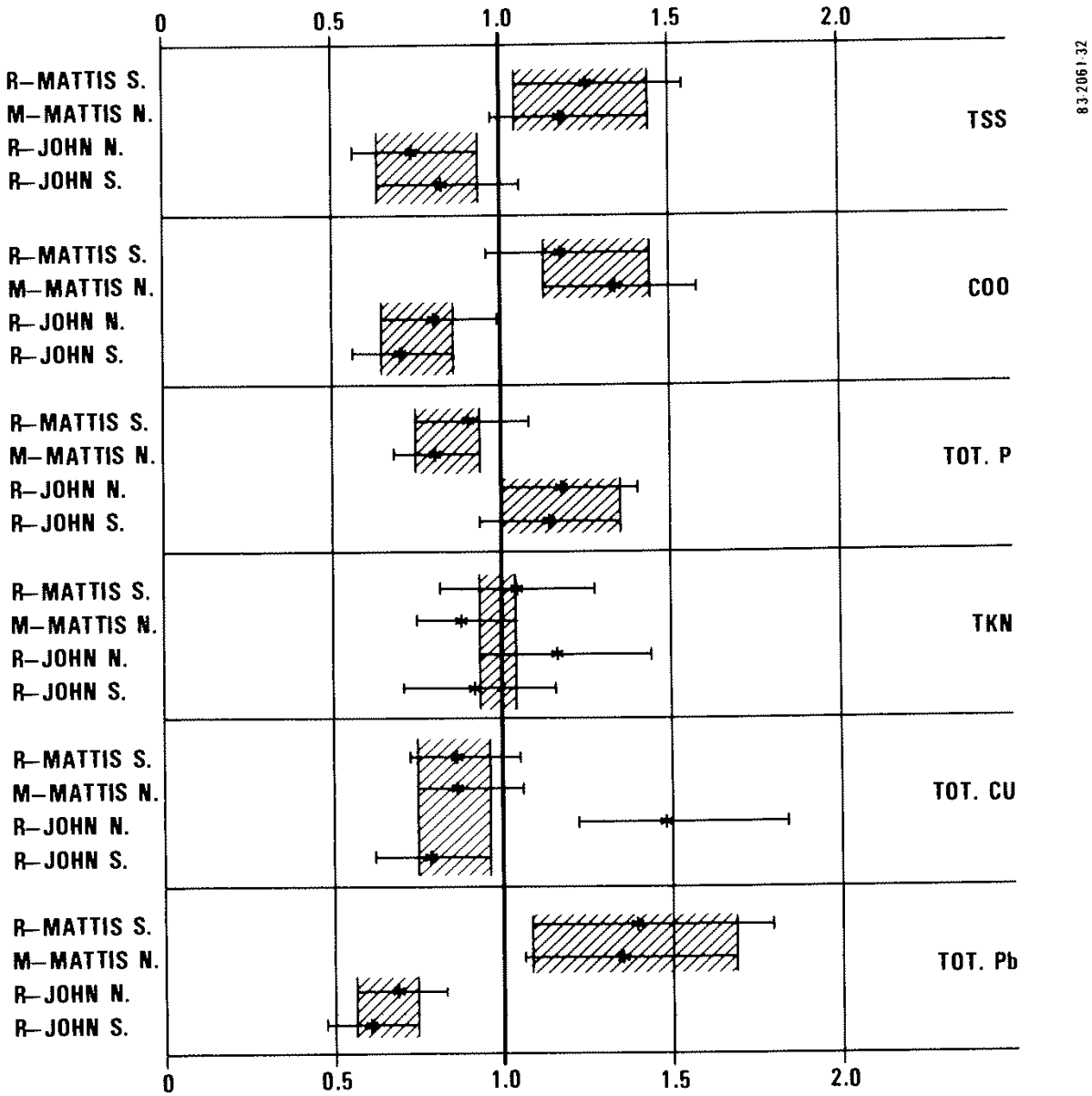

Figure 6-16. Range of Normalized EMC Medians at IL1

TABLE 6-12. MEDIAN EMCs FOR ALL SITES BY LAND USE CATEGORY

Pollutant		Residential		Mixed		Commercial		Open/Nonurban	
		Median	CV	Median	CV	Median	CV	Median	CV
BOD	mg/ℓ	10.0	0.41	7.8	0.52	9.3	0.31	-	-
COD	mg/ℓ	73	0.55	65	0.58	57	0.39	40	0.78
TSS	mg/ℓ	101	0.96	67	1.14	69	0.85	70	2.92
Total Lead	µg/ℓ	144	0.75	114	1.35	104	0.68	30	1.52
Total Copper	µg/ℓ	33	0.99	27	1.32	29	0.81	-	-
Total Zinc	µg/ℓ	135	0.84	154	0.78	226	1.07	195	0.66
Total Kjeldahl Nitrogen	µg/ℓ	1900	0.73	1288	0.50	1179	0.43	965	1.00
NO_2 -N + NO_3 -N	µg/ℓ	736	0.83	558	0.67	572	0.48	543	0.91
Total P	µg/ℓ	383	0.69	263	0.75	201	0.67	121	1.66
Soluble P	µg/ℓ	143	0.46	56	0.75	80	0.71	26	2.11

Some caution in the interpretation of the information presented in Table 6-12 is in order since statistical confidence limits are not given. These are indicated in Figure 6-17 (a through k), which illustrates land use differences graphically, with additional statistical detail derived from the basic parameters listed in Table 6-11, to assist in interpretation and comparisons. The box plots which compare characteristics of all sites within a land use category identify the land use, median EMC, its 90 percent confidence limits, and the 10, 25, 75 and 90 percent quantities for the sites. Careful perusal of these box plots leads one to the conclusion that only the open/non-urban land use category appears to be significantly different overall. Responses of the other land use categories are varied and inconsistent among constituents. This may be seen in a somewhat different way by observing the plotting positions of the land use categories presented in Figures 6-4 through 6-13. Here also, there are no consistent tendencies. There are undeniably some trends. For example, in Figure 6-7 commercial sites occupy the lowest plotting position at each project for total phosphorus (MI1 and one WI1 site are exceptions), which certainly suggests that there might be a land use category difference for this constituent.

Review of Figure 6-17(j), however, suggests that while a trend to lower total phosphorus EMC values is apparent as one goes from residential, to mixed, to commercial land uses, the statistical significance may not be great. The actual site median total phosphorus EMC probability density functions for each land use are presented in Figure 6-18. Here it can be seen that although three different pdfs can be drawn for residential, mixed, and commercial land use categories, their degree of overlap is so great that there is little statistical significance to the apparent difference. Since this was the strongest tendency towards land use effect, we must conclude that using this approach there is again no truly discernible and consistent effect of land use on the quality of urban runoff.

The one exception is the open/non-urban category which, as its name suggests, includes atypical sites. The data in Table 6-12 and the box plots of Figure 6-12 suggest that the pdfs for this land use category are quite different from those of the other land use categories, and this is in fact the case. Figure 6-18 shows it dramatically for total phosphorus.

Thus, regardless of the analytical approach taken, we are forced to conclude that, if land use category effects are present, they are eclipsed by the storm to storm variabilities and that, therefore, land use category is of little general use to aid in predicting urban runoff quality at unmonitored sites or in explaining site to site differences where monitoring data exist.

Correlation Between EMCs and Runoff Volume. To examine the possible relationship between the event mean concentration of a particular constituent and the runoff volume, linear correlation coefficients (r) were calculated. The null hypothesis that the two variables are linearly unrelated was tested at both the 90 and 95 percent confidence levels. Since it is possible for correlation to be either positive or negative, the two-tailed test was used. Failure to reject the null hypothesis is interpreted as meaning that linear dependency between the two variables in the population has not been shown.

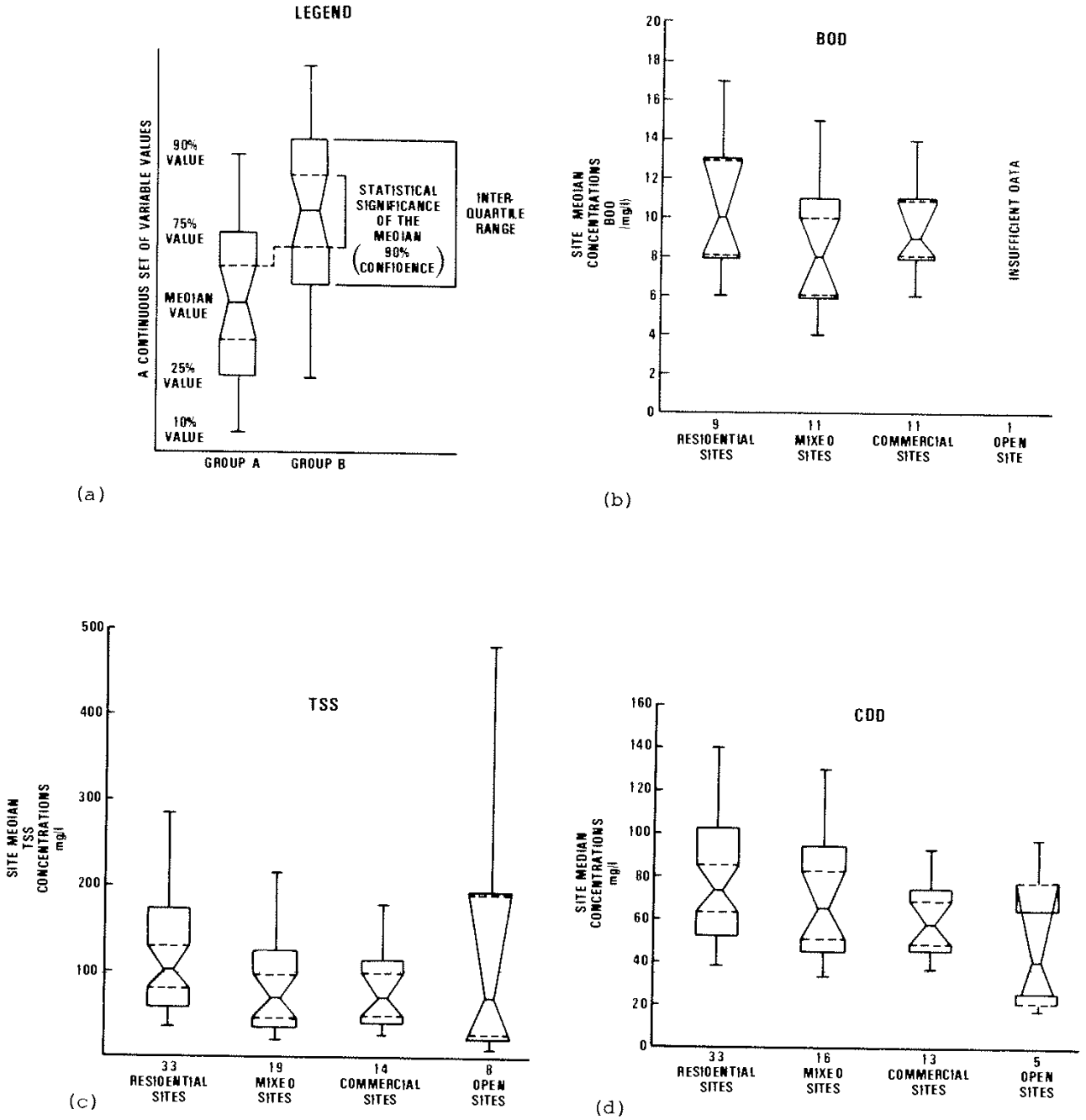

Figure 6-17. Box Plots of Pollutant EMCs for Different Land Uses

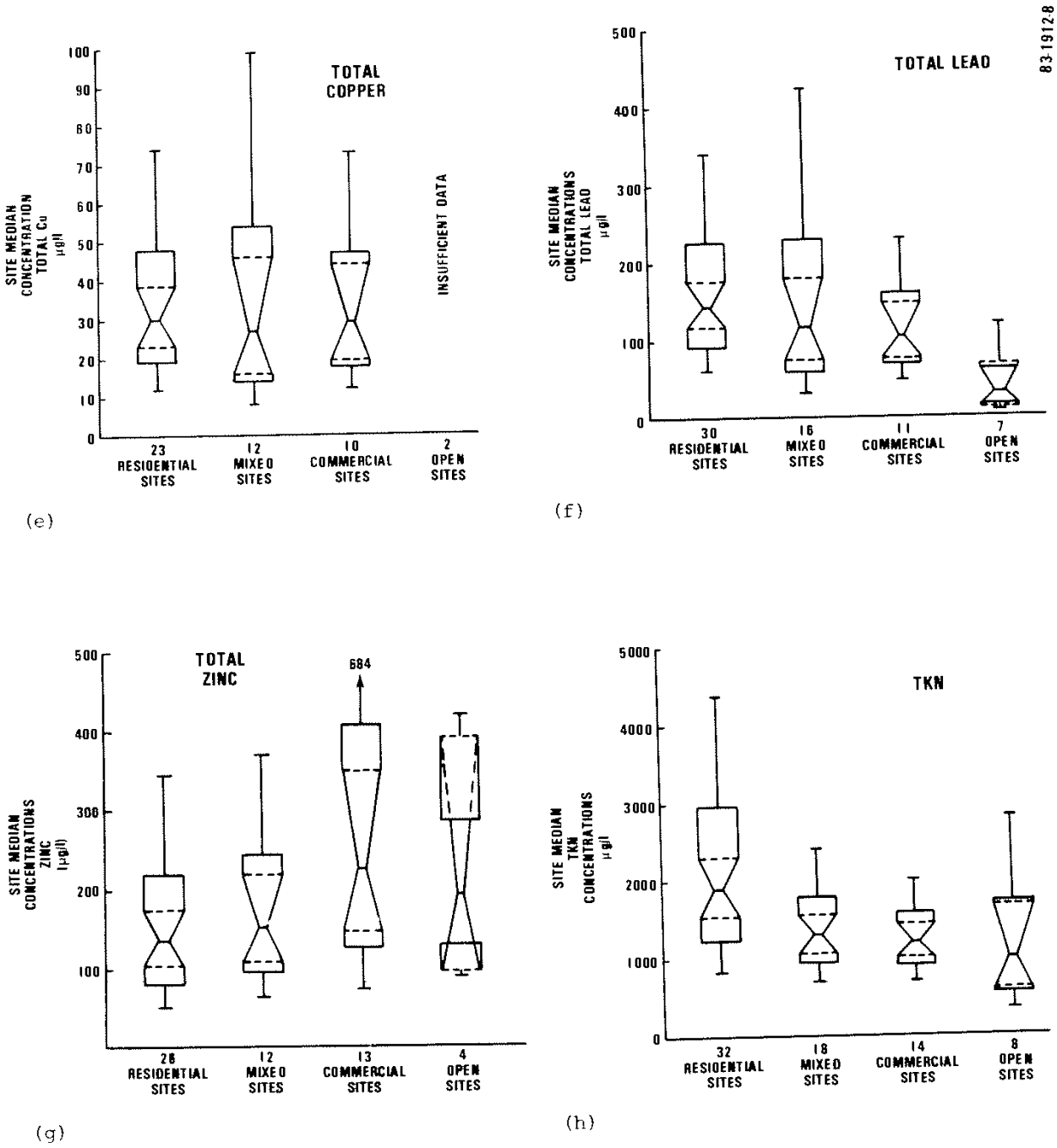

Figure 6-17. Box Plots of Pollutant EMCs for Different Land Uses (Cont'd)

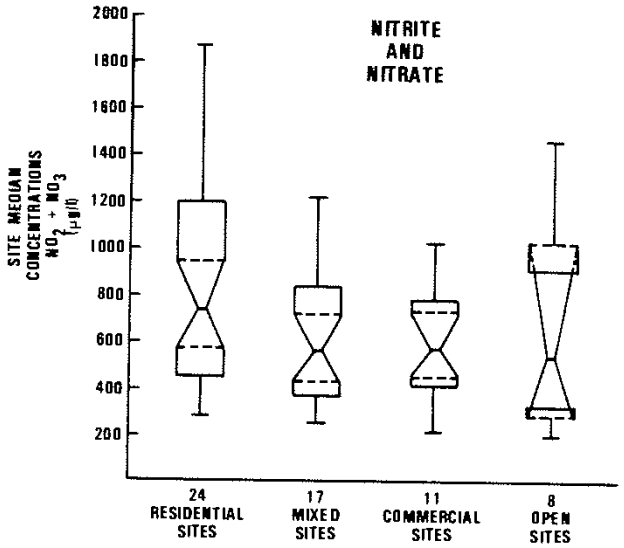

(i)

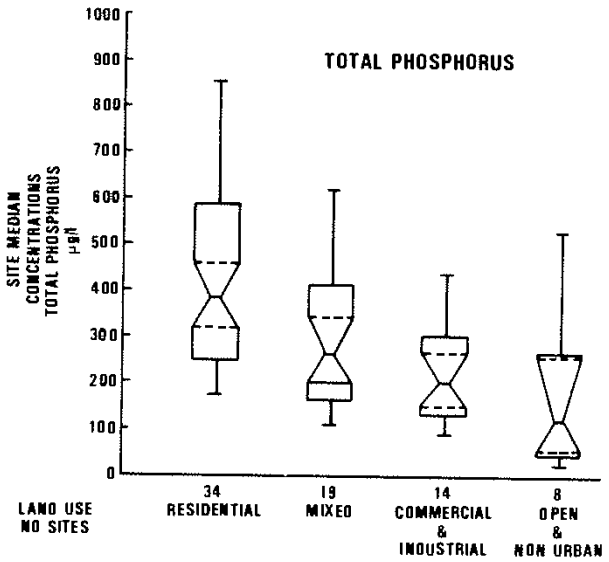

(j)

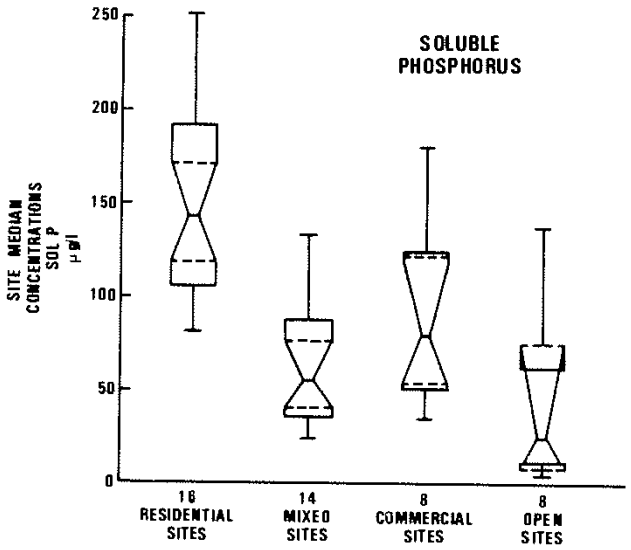

(k)

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Figure 6-17. Box Plots of Pollutant EMCs for Different Land Uses (Cont'd)

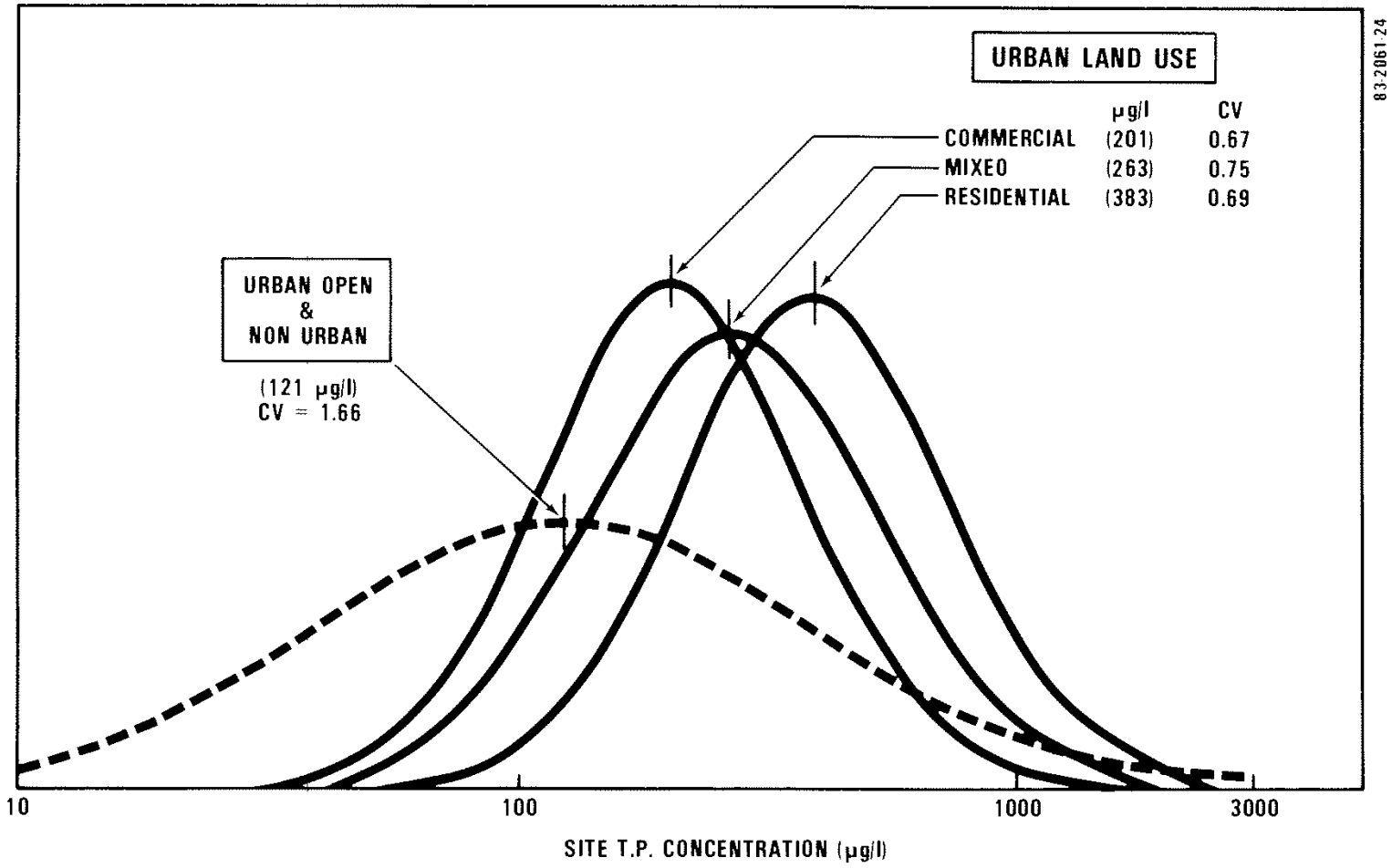

Figure 6-18. Site Median Total P EMC Probability Density Functions for Different Land Uses

The rejection of the null hypothesis means that there is evidence of a linear dependency between the two variables in the population, but it does not mean that a cause-and-effect relationship has been established.

General guidelines for the use of this test suggest that it be used with caution for values of n less than ten due to the high uncertainties associated with estimates of population variance with small samples. Furthermore, when n is 2 a perfect correlation will result but is meaningless. To include as many sites as possible in this examination, all constituents for which n was 5 or greater were included. At the other extreme, when n is very large, say over 100, correlation coefficients are almost always significant but can be so weak that they are meaningless. For n = 100 the critical value of r at the 90 percent confidence level is 0.164, meaning that the correlation explains less than 3 percent of the concentration variability.

A total of 67 sites from 20 of the NURP projects were examined for possible correlation for nine constituents. Of the 517 linear correlation coefficients calculated (not all constituents were measured at all sites), 116 (22 percent) were significant at the 95 percent confidence level and 154 (30 percent) were significant at the 90 percent confidence level. Of the r values that were significant, 83 and 87 percent were negative at the 90 and 95 percent confidence levels respectively. When sites with fewer than 10 events were dropped, the foregoing was essentially unchanged. Greater detail in terms of the number of significant linear correlation by constituent is provided in Table 6-13. There it can be seen that the greatest tendency for positive values of r occurs with TSS, followed by soluble phosphorus. The correlation coefficients for the other 7 constituents all strongly tend to be negative.

When the results are examined by sites, however, a clearer picture emerges. Although it can be correctly argued that unless a correlation coefficient is statistically significant the number is meaningless, it also follows that in such a case they are as likely to be positive as negative. On the other hand, if all the correlation coefficients (whether significant or not) have the same sign, it suggests a tendency for that site. The sign of the correlation coefficient (if greater than 0.1) for each site and constituent examined is given in Table 6-14. Giving appropriate weight to significant r values but considering others as well, some 37 of the sites tend to have negative correlations, 13 tend to be positive, and the remaining 17 tend to be mixed. Perusal of Table 6-14 reveals that this tendency for sites to have either positive or negative correlation coefficients is quite strong, especially for sites with a large number of significant correlations. Sites where erosion, scour, system lag, and such are present could be expected to exhibit a tendency towards positive correlations. Sites lacking such effects could be expected to have negative correlation due to dilution associated with larger runoff events.

The magnitude of the correlation coefficients is indicated in Table 6-15. Two points stand out in particular. First, the r values are not very large, averaging around 0.55. This means that the correlation is only able to explain about 30 percent of the concentration variability. The few high values are always associated with very few observations ($n<10$) for which the

TABLE 6-13. NUMBER OF SIGNIFICANT LINEAR CORRELATIONS BY CONSTITUENT

POLLUTANT	TOTAL # OF SITES	90% SIGNIFICANT CORRELATION			95% SIGNIFICANT CORRELATION		
		TOTAL #	# NEG.	# POS.	TOTAL #	# NEG.	# POS.
(a) ALL SITES							
TSS	67	13 (19%)	4	9	7 (10%)	3	4
COD	64	24 (38%)	23	1	19 (30%)	19	0
TOT. P	67	20 (30%)	16	4	15 (22%)	12	3
SOL. P	34	10 (29%)	6	4	7 (21%)	4	3
TKN	64	19 (30%)	18	1	14 (22%)	14	0
NO_{2+3}-N	57	17 (30%)	15	2	13 (23%)	11	2
TOT. Cu	49	17 (35%)	15	2	13 (27%)	12	1
TOT. Pb	59	15 (25%)	13	2	12 (20%)	11	1
TOT. Zn	56	19 (34%)	18	1	16 (29%)	15	1
TOTAL	517	154	128	26	116	101	15
PERCENT		30%	83%	17%	22%	87%	13%
(b) SITES WITH n ≥ 10							
TSS	56	9 (16%)	4	5	7 (12%)	3	4
COD	52	21 (40%)	20	1	16 (31%)	16	0
TOT. P	53	17 (32%)	15	2	12 (23%)	11	1
SOL. P	23	8 (35%)	5	3	6 (26%)	4	2
TKN	50	17 (34%)	16	1	12 (24%)	12	0
NO_{2+3}-N	41	14 (34%)	12	2	12 (29%)	10	2
TOT. Cu	31	13 (42%)	12	1	12 (39%)	11	1
TOT. Pb	45	13 (29%)	12	1	11 (24%)	10	1
TOT. Zn	37	14 (38%)	13	1	11 (30%)	10	1
TOTAL	388	126	109	17	99	87	12
PERCENT		32%	87%	13%	26%	88%	12%

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TABLE 6-14. SIGN OF CORRELATION COEFFICIENTS BY SITES

	TSS	COD	TOT. P	SOL. P	TKN	NO_{2+3}-N	TOT. CU	TOT. Pb	TOT. ZN
CA1 KNOX	+	−	+	(+)		(+)	−	−	
S. VIEW.	(+)	+			(+)		+	−	+
CO1 ASBURY	(+)	+	(+)	+	+	−	(+)	+	+
B. DRY C.		−	−	−	(−)	−	−		−
CHERRY			+	(+)		−	+		
N. AVE.		(−)	(−)	(−)	(−)	(−)	(−)	(−)	(−)
ROONEY	−	(−)	−	−	−	−	−	−	(−)
VILLA IT.	−	(−)	(−)	(−)	(−)	(−)	(−)	(−)	(−)
116/C	+	−	(+)			−	+		+
OC1 OUFIEF	−	(−)	+	−	−	−			−
FAIRIDGE		+	+	+	+				+
LAKERIDGE	+		+	(+)		(−)		−	(−)
STEDWICK		−		+		(−)	+	−	(−)
STRATTON	+	−			+		−		−
WESTLEIGH		(−)			−	(−)	(−)	−	(−)
FL1 CHARTER/H	−	(−)	(−)		(−)	−	(−)	(−)	(−)
YOUNG		−	−			−	+		
NORMA P.	+	+				+			−
IL1 JOHN N.	+	(−)	(−)		(−)		−	−	
JOHN S.	+	(−)	(−)		−		−		
MATTIS N.		(−)	(−)		(−)		(−)	(−)	
MATTIS S.	−	(−)	(−)		(−)		(−)	(−)	
KS1 92nd	−	+	−	+	+				

	TSS	COD	TOT P.	SOL P	TKN	NO_{2+3}-N	TOT. CU	TOT. Pb	TOT. ZN
KS1 LENAXA	+	(−)	(−)	−	−		(−)		
METCALF		−	−	−	−		−		−
NOLAND		(−)	−	(−)			+	−	−
OVERTON	+		+				−	−	(−)
MA1 ANNA	+		+		+	−		−	+
CONVENT	−	+		+	−	−	+		+
JORDAN			+	+	−	(−)	−		(−)
LOCUST	(+)	+	(+)	+	+	(−)	+	(+)	
RT. 9	+			+	−	(−)	+	+	
MA2 ADDISON	(+)		−	−	+	−			
HEMLOCK	(+)		+	(+)	+	−			
MD1 BOLTON	(+)	−	+		−	−	(−)	+	−
HAMPDEN		−	(−)				(−)		−
HOMELAND	+	+	+		−	+	−	+	+
MT. WASH.	(+)	−	−		−	−	+	−	−
RES. HILL	+	(−)			(−)		(−)	−	−
MI1 GRACE S.	+	−	−		−	−	(−)	−	−
GRACE N.	+	−		+					(−)
GRAND		−	−		−		−	−	(−)
IND. DR.	+		+	+		−	−	−	−
WAVERLY		−	−	−	−	−	−		−
NC1 1D13		(−)	(−)		(−)	(−)	(−)	(−)	(−)
1D23	(+)		+			−	+		
NH1 PKG.	−	(−)	−		(−)	(−)	(−)	(−)	(−)

	TSS	COD	TOT. P	SOL. P	TKN	NO_{2+3}-N	TOT. CU	TOT. Pb	TOT. ZN
NY1 CARLL R.	+					(−)			
NY2 CEDAR				+		(+)		+	
NY3 CRANSTON	+	+	+		−			−	−
E. ROCH.	−	(−)	(−)		(−)			(−)	(−)
SOUTHGATE	+	−	+	−					−
TN1 CBO	(−)	−	(−)	(−)	(−)	−	(−)	(−)	(−)
R1	(+)	+	+	(−)	+	−	(+)	(+)	(+)
R2	+	−	−	−	(−)	−			−
SC	+		−	(−)	−	(−)		+	
TX1 HART	+	(+)			+	+			
R'WOOD.	−	+			(−)				
WA1 LAKE H.	−	(−)	−		(−)		+	(−)	(−)
SURREY D.	−	(−)	(−)		(−)			(−)	(−)
WI1 BURBANK		−	(+)						+
HASTINGS		(−)	−		+	+		(−)	−
LINCOLN		−	−			−		+	
POST D.	(−)	(−)	(−)		(−)	(−)		(−)	−
RUSTLER	(−)	(−)	−		(−)	(−)			−
STATE F.	(−)	(−)	(−)		−	(−)		−	+
WOOD C.					−	−			+

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+ INDICATES A POSITIVE R VALUE
− INDICATES A NEGATIVE R VALUE
◯ INDICATES A SIGNIFICANT R VALUE
BLANK INDICATES EITHER R LESS THAN 0.1 OR NO DATA

TABLE 6-15. CORRELATION COEFFICIENT VALUES BY SITE

	TSS	COD	TOT. P	SOL. P	TKN	NO_{2+3}-N	TOT. CU	TOT. Pb	TOT. ZN
CA1 KNOX				.43		.70			
S. VIEW.	.57				.49				
CO1 ASBURY	.58		.84				.58		
B. ORY C.					.47				
CHERRY				.10					
N. AVE.		.58	.47	.42	.72	.52	.47	.42	.41
ROONEY		.78							.75
VILLA IT.		.70	.58	.67	.69	.44	.46	.55	.61
I16/C			.85						
OC1 OUFIEF		.76							
FAIRIDGE									
LAKERIDGE				.42		.28			.41
STEOWICK						-.28			-.26
STRATTON				-.2					
WESTLEIGH		.32				-.38	.94		.44
FL1 CHARTER/H		.82	.54	U	.68		-.54	.67	.58
YOUNG				U					
NORMA P.				U					
IL1 JOHN N.		-.31	.39	U	-.29	U			U
JOHN S.		.36	.42	U		U			U
MATTIS N.		.84	.58	U	.48	U	.40	.46	U
MATTIS S.		.81	.56	U	.53	U	.34	.46	U
KS1 92nd				U		U			

	TSS	COD	TOT P.	SOL P	TKN	NO_{2+3}-N	TOT. CU	TOT. Pb	TOT. ZN
KS1 LENAXA		.70	.51	U		U	-.80		
METCALF		.40	-.40	U		U			
NOLANO		.77		.82	U	U			
OVERTON					U	U			.57
MA1 ANNA									
CONVENT									
JORDAN						.68			.74
LOCUST	.80		.91			-.82		.78	
RT. 9						-.87			
MA2 ADDISON	.83	U							
HEMLOCK	.85	U		.94					
MO1 BOLTON	.50			U			.47		
HAMPDEN			.42	U			.61		
HOMELAND				U					
MT. WASH.	.42			U					
RES. HILL		.79		U	.58		.55		
MI1 GRACE S.							.70		
GRACE N.									.80
GRAND									-.51
IND. DR.									
WAVERLY									
NC1 1013		.58	.49	U	.57	.67	.32	.29	.64
1023	.32			U					
NH1 PKG.		.58		U	.48	.46	.50	.41	.58

	TSS	COD	TOT. P	SOL. P	TKN	NO_{2+3}-N	TOT. CU	TOT. Pb	TOT. ZN
NY1 CARLL R.		U		U		.70	U		
NY2 CEDAR		U				.42	U		
NY3 CRANSTON				U		U	U		
E. ROCH.		.79	.84	U	.70	U	U	.72	.72
SOUTHGATE				U		U	U		
TN1 CBO	.48		.82	-.47	.56		.51	.51	.85
RI	.82			.62			.72	.85	.82
R2					.81				
SC				.49		.85			
TX1 HART		.57		U			U		
R'WOOD.				U	.77		U		
WA1 LAKE H.		.33		U	.34			.29	.37
SURREY D.		.38	.30	U	.21		U	.18	.23
WI1 BURBANK			.26	U			U		
HASTINGS		.49		U			U	.32	
LINCOLN				U	U		U		U
POST D.	.39	.28	.24	U	.48	.53	U	.23	
RUSTLER	.37	.55		U	.39	.37	U		
STATE F.	.47	.48	.47	U		.72	U		
WOOD C.				U			U		

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◯ INDICATES 95% LEVEL OF SIGNIFICANCE, OTHERS ARE AT THE 90% LEVEL
U INDICATES AN UNMEASURED CONSTITUENT
BLANK INDICATES NO SIGNIFICANT CORRELATION

test is suspect since one or two events may dominate the correlation or otherwise cause it to be overstated due to uncertainties in parameter estimation. Second, only 25 percent of the sites account for over two-thirds of the significant correlations. In fact, 33 of the 67 sites had at most one significant correlation, 16 had 2 or 3, and 18 had 4 or more significant r values.

Data for the sites with many significant correlations are presented in Table 6-16. It can be noted that the r values for all constituents are around 0.55. Thus, there is no overall tendency to have strong correlations for some constituents and weak correlations for others. On a site by site basis, the strength of the apparent correlation varies inversely with n as does the significance requirement. Discounting the sites with very low or high values of n, however, the r values for the remainder are again around 0.55, which is the average for all 19 of these sites. Turning to land use, it is significant that half of the sites with many significant correlations have a large commercial/industrial component. Discounting sites with a small number of observations ($n \leq 12$), the sites in Table 6-16 are smaller (average size is 41 acres vs 126 acres for all sites), more impervious (average of 65 percent vs 40 percent for all sites), and have higher runoff coefficients (0.5 vs 0.3 for all sites). Thus, one could conjecture that their responses might tend to be somewhat less random and more ameanable to deterministic analysis (i.e., with conventional modeling approaches). Since they represent only around 25 percent of the total number of sites, however, and the correlations are rather weak, any effect of EMC correlation with runoff volume can be ignored without serious overall error.

This finding of no significant linear correlation between EMCs and runoff volumes is important for several reasons. First, in stormwater monitoring programs there is a natural and appropriate bias that favors emphasizing resource allocation to larger storm events. This was generally the case with the NURP projects as well. However, because of differences in local meteorological conditions, degree of site imperviousness, and other factors, there are appreciable differences in the average sizes of storms monitored by site in the NURP database. Since no significant linear correlation was found, such biases and differences are not expected to influence EMC comparisons to any appreciable extent.

Secondly, the probabilistic methodologies for examining receiving water impacts identified in Chapter 5 assume, as they are now structured, that concentration and runoff volume are independent (i.e., that there is no significant correlation). Although the methods can be modified to account for such correlations if they exist, the finding of no significant correlation indicates that such refinement is not warranted at this time.

Other Factors. We have not exhaustively analyzed all potential effects of other factors that might influence and hence modify our interpretations and conclusions regarding site differences. Factors such as slope, population density, soil type, seasonal bias in monitored events, and precipitation characteristics (average rainfall intensity, peak rainfall intensity, rainfall duration, time since last storm event, etc.) all have a potential

TABLE 6-16. SITES WITH MANY SIGNIFICANT CORRELATIONS

		TSS	COD	TOT. P	SOL. P	TKN	NO_{2+3}-N	Cu	Pb	Zn	AVG r^2	AVG r	$\tilde{n}$	LAND USE	% IMPERVIOUS	RUNOFF COEFFICIENT
CO1	NORTH AVE.	–	–.58	–.47	–.42	–.72	–.52	–.47	–.42	–.46	.28	52	32	30%C	50%	.239
	VILLA IT.	–	–.70	–.58	–.67	–.69	–.44	–.46	–.55	–.65	.35	.59	27	100%C	91%	.927
OC1	WESTLEIGH	–	–.32	–	–	–	–.39	–.84	–	–.44	.29	.54	35	93%R	21%	.119
FL1	CHARTER/H	–	–.62	–.54	U	–.68	–	–.54	–.67	–.56	.37	.60	12	89%R	16%	.153
IL1	MATTIS N.	–	–.64	–.59	U	–.48	U	–.40	–.46	U	.27	.52	35	50%C	58%	.639
	MATTIS S.	–	–.61	–.55	U	–.53	U	–.34	–.46	U	.26	.51	33	90%R	37%	.330
KS1	LENAXA	–	–.70	–.51	U	–	U	–.80	–	–	.46	.68	16	50%I	44%	.540
MA 1	LOCUST	.80	–	.91	–	–	–.82	–	.78	–	.69	.83	6	85%R	16%	.209
MO 1	RES. HILL	–	–.79	–	U	–.58	–	–.55	–	–	.42	.65	13	100%R	76%	.486
NC1	1013 (CBO)	–	–.58	–.46	U	–.57	–.67	–.32	–.29	–.54	.26	.51	61	100%C	69%	.791
NH1	PKG.	–	–.58	–	U	–.49	–.46	–.50	–.41	–.58	.26	.51	33	100%C	90%	.658
NY3	E. ROCHESTER	–	–.79	–.84	U	–.70	U	U	–.72	–.72	.57	.76	8	100%R	38%	.195
TN1	CBO	–.48	–	–.62	–.47	–.56	–	–.51	–.51	–.65	.30	.55	15	100%C	99%	.206
	R1	.82	–	–	–.62	–	–	.72	.85	.82	.57	.77	11	91%R	33%	.032
WA 1	LAKE H.	–	–.33	–	U	–.34	U	U	–.29	–.37	.11	.33	126	91%R	37%	.199
	SURREY O.	–	–.34	–.30	U	–.21	U	U	–.18	–.23	.07	.26	118	100%R	29%	.177
WI1	P.O.	–.39	–.28	–.24	U	–.46	–.53	U	–.23	–	.14	.37	40	100%C	95%	.899
	RUSTLER	–.37	–.55	–	U	–.39	–.37	U	–	–	.18	.43	20	100%C	95%	.793
	STATE FAIR	–.47	–.48	–.47	U	–	–.72	U	–	–	.30	.55	25	74%C	77%	.622
	AVERAGE r^2	.34	.33	.29	.31	.30	.30	.31	.28	.32						
	AVERAGE r	.58	.58	.53	.55	.55	.55	.56	.53	.57						

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influence on the median and variability of pollutant concentrations at a site.

On the basis of limited screening, however, we have concluded that such factors do not appear to have any real consistent significance in explaining observed similarities or differences among individual sites. Therefore, although more detailed and rigorous analysis and evaluation of the NURP database may well provide additional useful insight and understanding of the influence of such other factors, we do not believe that the basic findings and conclusions presented in this report will be significantly altered by the results of such efforts. Furthermore, the value of any such insights as may be developed are likely to have limited influence on general decisions on control of urban runoff. For example, the finding of a strong seasonal effect on EMC values would have little influence on a decision to require detention basins in all newly developing urban areas, nor would it be likely to influence their design.

Urban Runoff Characteristics

Having determined, as discussed in the preceding section, that geographic location, land use category, or other factors appear to be of little utility in explaining overall site-to-site variability or predicting the characteristics of unmonitored sites, the best general characterization of urban runoff can be obtained by pooling the site data for all sites (other than the open/non-urban ones). This approach is appropriate, given the need for a nationwide assessment and the general planning thrust of this report. Recognizing that there tend to be exceptions to any generalization, however realistic and appropriate, in the absence of better information the data given in Table 6-17 are recommended for planning level purposes as the best description of the characteristics of urban runoff.

TABLE 6-17. WATER QUALITY CHARACTERISTICS OF URBAN RUNOFF

Constituent	Event to Event Variability in EMC's (Coef Var)	Site Median EMC	
		For Median Urban Site	For 90th Percentile Urban Site
TSS (mg/l)	1-2	100	300
BOD (mg/l)	0.5-1.0	9	15
COD (mg/l)	0.5-1.0	65	140
Tot. P (mg/l)	0.5-1.0	0.33	0.70
Sol. P (mg/l)	0.5-1.0	0.12	0.21
TKN (mg/l)	0.5-1.0	1.50	3.30
NO_{2+3}-N (mg/l)	0.5-1.0	0.68	1.75
Tot. Cu (μg/l)	0.5-1.0	34	93
Tot. Pb (μg/l)	0.5-1.0	144	350
Tot. Zn (μg/l)	0.5-1.0	160	500

Coliform Bacteria

Coliform bacteria counts in urban runoff were monitored for a significant number of storm events by seven of the NURP projects at 17 different sites. Data were collected at twelve of these sites for more than five and up to 20 storm events. Data on either Fecal Coliform or both Fecal and Total Coliform counts are available for a total of 156 separate storm events. Although the data base for bacteria is thus considerably more restricted than for other pollutants, useful results have been obtained.

Table 6-18 summarizes the results of an analysis of these data. Some variability exists from site to site, and data are too limited to identify any land use distinctions. However, results from the different sites and projects are consistent in showing a very dramatic seasonal effect. Coliform counts in urban runoff during the warmer periods of the year are approximately 20 times greater than those in urban runoff that occurs during colder periods.

The substantial seasonal differences which are observed do not correspond with comparable variations in urban activities. This suggests that seasonal temperature effects and sources of coliform unrelated to those traditionally associated with human health risk may be significant.

In addition to the summarized data presented here, special study reports prepared by the Long Island and Baltimore projects address the issue of animal and other sources of coliform bacteria using information derived from field monitoring and the technical literature. The Baltimore NURP project also conducted small scale site studies which simulated washoff by storms and identified that quite substantial differences in coliform levels can result from the general cleanliness of an area, which they associate with the socio-economic strata of the neighborhood. A special study by the Long Island NURP project examined salmonella counts in urban runoff and in an adjacent shellfish area influenced by urban runoff. The Knoxville, TN project also conducted a special study on Salmonella. These project reports may be obtained through NTIS.

Other issues related to bacteria as a health risk were raised and warrant further investigation. A better understanding is needed of the contribution of domestic animals or such wildlife as may be expected in urban areas to observed coliform levels.

Though high levels of indicator microorganisms were found in urban runoff, the analysis as well as current literature suggests that indicators such as fecal coliform may not be useful in identifying health risks from urban runoff pollutions.

PRIORITY POLLUTANTS

'ackground

he NURP priority pollutant monitoring project was conducted to evaluate the resence, concentration, and potential water quality impacts of priority pollutants in urban runoff. A total of 121 urban runoff samples were collected

TABLE 6-18. FECAL COLIFORM CONCENTRATIONS IN URBAN RUNOFF

Project and Site		Warm Weather			Cold Weather		
		Site No. Obs	Median EMC (1000/ 100 ml)	C.V.	Site No. Obs	Median EMC (1000/ 100 ml)	C.V.
DC1	Burke	1	4.6	-	1	0.02	-
	Westleigh	1	46	-	2	0.35	-
	Stedwick	2	10	-	1	0.2	-
MD1	Homeland	7	11	1.8	-	-	-
	Mt Wash	1	130	-	1	3.3	-
	Res Hill	1	281	-	1	330	-
NC1	(CBD) 1013	11	15	1.6	8	1.0	0.6
	Res 1023	2	23	-	4	2.6	1.1
NH1	Pkg Lot	20	0.3	0.5	-	-	-
NY1	Carll	12	24	0.9	15	1.4	1.5
	Unqua	7	11	1.6	4	0.9	14
SD1	Meade	9	57	0.7	-	-	-
TN1	CBD	7	54	1.5	7	1.0	1.4
	R1	6	56	2.0	4	1.6	1.9
	R2	6	19	6.2	4	0.5	2.4
	SC	7	12	2.8	4	0.9	1.7
		76 Events			52 Events		
All Sites*		11	21	0.8	9	1	0.7

Notes:

* For general characterization of urban runoff, exclude the following sites:

- NH1 - A small (0.9A) Parking Lot; concentrations low and atypical.

- Four sites with only one observation for season; variability is too high for any confidence in representativeness of a single value.

at 61 sites (two storm events per site) in 20 of the NURP projects that participated in this phase of the program. These sites were predominantly in the residential, mixed, or commercial land use areas as defined earlier. Thus, the results of this effort cannot be attributed to runoff from industrial facilities or complexes. Furthermore, an especially exhaustive quality control component, over and above the standard NURP QA/QC effort, was imposed on the priority pollutant portion of the program, resulting in the rejection of nearly 14 percent of the data. Therefore, there is a high level of confidence in the results of this project.

Since only two samples were collected at each site, no meaningful site statistic could be calculated. Therefore the data were pooled for analysis. In view of the discussion in the preceding section, however, this approach seems to be justified.

A detailed compilation of NURP priority pollutant analytical results including city and site where the sample was collected, date of collection; discrete or composite sample, pH, and pollutant concentration can be found in the final report on the NURP Priority Pollutant Monitoring Program soon to be issued by the Monitoring and Data Support Division of the agency. A summary of the findings taken from the December 5, 1983 draft of that report follows.

Pollutants Not Included in NURP. Asbestos and dioxin were excluded from the NURP program. However, standard laboratory methods will reveal the presence of dioxin at concentrations of 1 to 10 µg/l, and most laboratories did scan their chromatograms for the possible presence of this pollutant. All such scans were negative, and on this basis dioxin is included as "not detected".

Results Not Valid. The NURP results for seven priority pollutants cannot be considered valid. Recent EPA investigation has revealed that standard methods are not appropriate for the measurement of hexachlorocyclopentadiene, dimethyl nitrosamine, diphenyl nitrosamine, benzidine, and 1,2-diphenylhydrazine. Two other pollutants, acrolein and acrylonitrile, must be analyzed within three days of sample collection. Such a time constraint was an impractical one for the NURP program.

Pollutants Detected in Runoff

Seventy-seven priority pollutants were detected in the NURP urban runoff samples. This group includes 14 inorganic and 63 organic pollutants (Table 6-19).

Inorganic Pollutants. As a group, the toxic metals are by far the most prevalent priority pollutant constituents of urban runoff. All 14 inorganics (13 metals, plus cyanides; asbestos excluded) were detected, and all but three at frequencies of detection greater than 10 percent. Most often detected among the metals were copper, lead, and zinc, all of which were found in at least 91 percent of the samples. Their concentrations were also among the highest for any pollutant, and reached a maximum of 100, 460, and 2,400 µg/l, respectively. Other frequently detected inorganics included arsenic, chromium, cadmium, nickel, and cyanide (Table 6-20). Twelve of the thirteen toxic metals (antimony excluded) were also sampled in the special

TABLE 6-19. SUMMARY OF ANALYTICAL CHEMISTRY FINDINGS FROM NURP PRIORITY POLLUTANT SAMPLES[1]

(Includes information received through September 30, 1983)

Pollutant	Cities Where Detected[2]	Frequency of Detection[3]	Range of Detected Concentrations (µg/ℓ)[4]
I. PESTICIDES			
1. Acrolein	Holding times exceeded		
2. Aldrin	4,7,26	6	0.002T-0.1M
3. α-Hexachlorocyclohexane (α-BHC) (Alpha)	7,8,22,26	20	0.002?-0.1M
4. β-Hexachlorocyclohexane (β-BHC) (Beta)	7,8	5	0.018-0.1M
5. γ-Hexachlorocyclohexane (γ-BHC) (Gamma) (Lindane)	7,8,22,26	15	0.007-0.1M
6. δ-Hexachlorncyclohexane (δ-BHC) (Delta)	7,26	6	0.004-0.1M
7. Chlordane	2,8,21,26	17	0.01C-10
8. DDD	Not detected		
9. DDE	26	6	0.007-0.027
10. DDT	7	1	0.1M
11. Dieldrin	26,27	6	0.007-0.1
12. α-Endosulfan (Alpha)	7,26,27	19	0.008-0.2
13. β-Endosulfan (Beta)	Not detected		
14. Endosulfan sulfate	Not detected		
15. Endrin	Not detected		
16. Endrin aldehyde	Not detected		
17. Heptachlor	7,8,27	6	0.01-0.1M
18. Heptachlor epoxide	7,26	2	0.003T-0.1M
19. Isophorone	7	3	10M
20. TCDD (2,3,7,8-tetrachlorodibenzo-p-dinxin)	Not included in NURP program		
21. Toxaphene	Not detected		
II. METALS AND INORGANICS			
22. Antimony	7,24,26	13	2.6-23A
23. Arsenic	2,3,7,12,19,20,21,22,26,27	52	1-50.5
24. Asbestos	Not included in NURP program		
25. Beryllium	7,12,20,21	12	1-49
26. Cadmium	1,2,3,7,12,20,21,27	48	0.1M-14
27. Chromium	1,2,7,8,12,17,19,20,21,22,26,27,28	58	1-190
28. Copper	1,2,3,4,7,8,12,17,19,20,21,22,23,26,27,28	91	1L-100
29. Cyanides	4,8,19,22,26,27	23	2-300
30. Lead	1,2,3,4,7,8,12,17,19,20,21,22,26,28	94	6-460
31. Mercury	7,20,28	9	0.6-1.2
32. Nickel	2,3,7,12,20,21,26,27	43	1-182
33. Selenium	7,19,23	11	2-77
34. Silver	3,17,27	7	0.2M-0.8
35. Thallium	7	6	1-14
36. Zinc	1,2,3,7,12,17,19,20,21,22,23,27,28	94	1C-2400
III. PCBs AND RELATED COMPOUNDS			
37. PCB-1016 (Aroclor 1016)	Not detected		
38. PCB-1221 (Aroclor 1221)	Not detected		
39. PCB-1232 (Aroclor 1232)	Not detected		
40. PCB-1242 (Aroclor 1242)	Not detected		
41. PCB-1248 (Aroclor 1248)	Not detected		
42. PCB-1254 (Aroclor 1254)	Not detected		
43. PCB-1260 (Aroclor 1260)	2	1	0.03
44. 2-Chloronaphthalene	Not detected		

TABLE 6-19. SUMMARY OF ANALYTICAL CHEMISTRY FINDINGS FROM NURP PRIORITY POLLUTANT SAMPLES[1] (Cont'd)

(Includes information received through September 30, 1983)

Pollutant	Cities Where Detected[2]	Frequency of Detection[3]	Range of Detected Concentrations (ug/L)[4]
14. HALOGENATED ALIPHATICS			
45. Methane, bromo- (methyl bromide)	Not detected		
46. Methane, chloro- (methyl chloride)	Not detected		
47. Methane, dichloro- (methylene chloride)	4,17,22	11	5-14.5A
48. Methane, chlorodibromo-	28	1	2
49. Methane, dichlorobromo-	28	1	2
50. Methane, tribromo - (bromoform)	28	1	1
51. Methane, trichloro- (chloroform)	4,17,20,22,23,27,28	9	0.2T-12E
52. Methane, tetrachloro- (carbon tetrachloride)	4,28	3	1-2
53. Methane, trichlorofluoro-[5]	2,4,24,28	5	0.61-27
54. Methane, dichlorodifluoro- [Freon-12][5]	Not detected		
55. Ethane, chloro-	Not detected		
56. Ethane, 1,1-dichloro-	4,28	4	1.5A-3
57. Ethane, 1,2-dichloro-	28	1	4
58. Ethane, 1,1,1-trichloro-	4,2,7,22,24	6	1.6-10M
59. Ethane, 1,1,2-trichloro-	28	2	2-3
60. Ethane, 1,1,2,2-tetrachloro-	4	2	2U-3
61. Ethane, hexachloro-	Not detected		
62. Ethene, chloro- (vinyl chloride)	Not detected		
63. Ethene, 1,1-dichloro-	28	2	1.5-4
64. Ethene, 1,2-trans-dichloro-	20,28	4	1-5
65. Ethene, trichloro-	2,4,8,24,28	6	0.3T-12
66. Ethene, tetrachloro-	8,17,22,28	5	19-43
67. Propane, 1,2-dichloro-	28	1	3
68. Propene, 1,3-dichloro-	28	2	1-2
69. Butadiene, hexachloro-	Not detected		
70. Cyclopentadiene, hexachloro-	Standard methods inappropriate		
7. ETHERS			
71. Ether, bis(chloromethyl)[5]	Not detected		
72. Ether, bis(2-chloroethyl)	Not detected		
73. Ether, bis(2-chloroisopropyl)	Not detected		
74. Ether, 2-chloroethyl vinyl	Not detected		
75. Ether, 4-bromophenyl phenyl	Not detected		
76. Ether, 4-chlorophenyl phenyl	Not detected		
77. Bis(2-chloroethoxy) methane	Not detected		
VI. MONOCYCLIC AROMATICS (EXCLUDING PHENOLS, CRESOLS, PHTHALATES)			
78. Benzene	4,17,27	5	1-13
79. Benzene, chloro-	7,20,26,28	5	10-10M
80. Benzene, 1,2-dichloro-	Not detected		
81. Benzene, 1,3-dichloro-	Not detected		
82. Benzene, 1,4-dichloro-	Not detected		
83. Benzene, 1,2,4-trichloro-	Not detected		
84. Benzene, hexachloro-	Not detected		
85. Benzene, ethyl-	4,8,17,20,26,28	6	1-7
86. Benzene, nitro-	Not detected		
87. Toluene	4,17	2	2-9
88. Toluene, 2,4-dinitro-	Not detected		
89. Toluene, 2,6-dinitro	Not detected		

TABLE 6-19. SUMMARY OF ANALYTICAL CHEMISTRY FINDINGS FROM NURP PRIORITY POLLUTANT SAMPLES[1] (Cont'd)

(Includes information received through September 30, 1983)

Pollutant	Cities Where Detected[4]	Frequency of Detection[3]	Range of Detected Concentrations (µg/l)[5]
VII. PHENOLS AND CRESOLS			
90. Phenol	4,7,26	14	1T-15T
91. Phenol, 2-chloro-	28	1	2
92. Phenol, 2,4-dichloro-	Not detected		
93. Phenol, 2,4,6-trichloro-	Not detected		
94. Phenol, pentachloro-	4,8,19,20,26,27,28	19	1T-115
95. Phenol, 2-nitro-	8	1	1M
96. Phenol, 4-nitro-	4,7,8,20,26,28	16	1T-37
97. Phenol, 2,4-dinitro-	Not detected		
98. Phenol, 2,4-dimethyl-	4,7,8,26	8	1T-10M
99. m-Cresol, p-chloro-	4	1	1.5A
100. o-Cresol 4,6-dinitro-	Not detected		
VIII. PHTHALATE ESTERS			
101. Phthalate, dimethyl	8	1	1L
102. Phthalate, diethyl	3,4,17,20,21	6	1-10M
103. Phthalate, di-n-butyl	4,22,24	6	0.5T-11
104. Phthalate, di-n-octyl	8,20,26,27,28	6	0.4T-26
105. Phthalate, bis(2-ethylhexyl)	4,12,14,22,24,28	22	4T-62
106. Phthalate, butyl benzyl	2,8,26	6	1-10M
IX. POLYCYCLIC AROMATIC HYDROCARBONS			
107. Acenaphthene	Not detected		
108. Acenaphthylene	Not detected		
109. Anthracene	2,17,20,21,26,28	7	1-10M
110. Benzo (a) anthracene	2,21,27	4	1-10M
111. Benzo (b) fluoranthene	26,27	5	1-5
112. Benzo (k) fluoranthene	2,21,27	3	4-14
113. Benzo (g,h,i) perylene	21	1	5
114. Benzo (a) pyrene	2,21,26,27	6	1-10M
115. Chrysene	2,7,17,21,26,27	10	0.6T-10M
116. Dibenzo (a,h) anthracene	21	1	1T
117. Fluoranthene	2,8,12,17,21,26,27,28	16	0.3T-21
118. Chrysene	28	1	1
119. Indeno (1,2,3-c,d) pyrene	21	1	4
120. Naphthalene	4,24,26,28	9	0.8T-2.5
121. Phenanthrene	2,8,17,20,21,26,27,28	12	0.3T-10M
122. Pyrene	2,3,8,12,17,21,26,27,28	15	0.3T-16

TABLE 6-19. SUMMARY OF ANALYTICAL CHEMISTRY FINDINGS FROM NURP PRIORITY POLLUTANT SAMPLES[1] (Cont'd)

(Includes information received through September 30, 1983)

Pollutant	Cities Where Detected[2]	Frequency of Detection[3]	Range of Detected Concentrations (µg/ℓ)[4]
X. NITROSAMINES AND OTHER NITROGEN-CONTAINING COMPOUNDS			
123. Nitrosamine, dimethyl (DMN)	Standard methods inappropriate		
124. Nitrosamine, diphenyl	Standard methods inappropriate		
125. Nitrosamine, di-n-propyl	Not detected		
126. Benzidine	Standard methods inappropriate		
127. Benzidine, 3,3'-dichloro-	Nnt detected		
128. Wydrazine, 1,2-diphenyl-	Standard methods inappropriate		
129. Acrylonitrile	Holding times exceeded		

[1] Based on 121 sample results received as of 9/30/83, adjusted for quality control review.

[2] Cities from which data are available:

1. Durham, NH
2. Lake Duinsigamond, MA
3. Mystic River, MA
4. Long Island, NY
7. Washington, DC
8. Baltimore, MD
12. Knoxville, TN
17. Glen Ellyn, IL
19. Austin, TX
20. Little Rock, AR
21. Kansas City, KS
22. Denver, CO
23. Salt Lake City, UT
24. Rapid City, SD
26. Fresno, CA
27. Bellevue, WA
28. Eugene, OR

Numbering of cities conforms to NURP convention.

[3] Percentages rounded to nearest whole number.

[4] Some reported concentrations are qualified by STORET quality control remark codes, to wit: A = Value reported is the mean of two or more determinations; G = Value reported is the maximum of two or more determinations; L = Actual value is known to be greater than value given; M = Presence of material verified but not quantified; T = Value reported is less than criteria of detection. One value in this column indicates one positive observation or that all observations were equal.

[5] No longer included as a priority pollutant.

TABLE 6-20. MOST FREQUENTLY DETECTED PRIORITY POLLUTANTS IN NURP URBAN RUNOFF SAMPLES[1]

Priority Pollutants Detected in 75 Percent or More of the NURP Samples

Inorganics	Organics
30. Lead (94%)	None
36. Zinc (94%)	
28. Copper (91%)	

Priority Pollutants Detected in 50 percent to 74 percent of the NURP Samples

Inorganics	Organics
27. Chrominum (58%)	None
23. Arsenic (52%)	

Priority Pollutants Detected in 20 percent to 49 percent of the NURP Samples

Inorganics	Organics
26. Cadmium (48%)	105. Bis(2-ethylhexyl) phthalate (22%)
32. Nickel (43%)	3. α-Hexachlorocyclohexane (20%)
29. Cyanides (23%)	

Priority Pollutants Detected in 10 percent to 19 percent of the NURP Samples

Inorganics	Organics
22. Antimony (13%)	12. α-Endosulfan (19%)
25. Beryllium (12%)	94. Pentachlorophenol (19%)
33. Selenium (11%)	7. Chlordane (17%)
	5. γ-Hexachlorocyclohexane (Lindane) (15%)
	122. Pyrene (15%)
	90. Phenol (14%)
	121. Phenanthrene (12%)
	47. Dichloromethane (methylene chloride) (11%)
	96. 4-Nitrophenol (10%)
	115. Chrysene (10%)
	117. Fluoranthene (16%)

[1] Based on 121 sample results received as of September 30, 1983, adjusted for quality control review. Does not include special metals samples.

metals project in order to determine the relationships among dissolved, total, and total recoverable concentrations. The discussion and result of this separate effort are in a subsequent section of this chapter.

A comparison of individual urban runoff sample concentrations undiluted by stream flow (i.e., end of pipe concentrations) with EPA water quality criteria and drinking water standards reveals numerous exceedances of these levels, as shown in Table 6-21. Freshwater acute criteria were exceeded by copper concentrations in 47 percent of the samples and by lead in 23 percent. Freshwater chronic exceedances were common for lead (94 percent), copper (82 percent), zinc (77 percent), and cadmium (48 percent). One organ oleptic (taste and odor) criteria exceedance was observed. Regarding human toxicity, the most significant pollutant was lead. Lead concentrations violated drinking water criteria in 73 percent of the observations.

Whenever an exceedance is noted above, it does not necessarily imply that an actual violation of criteria did or will take place in receiving waters. Rather, the enumeration of exceedances is used as a screening procedure to make a preliminary identification of those pollutants for which their presence in urban runoff requires highest priority for further evaluation. Exceedances of freshwater chronic criteria levels may not persist for a full 24-hour period, for example. However, many small urban streams probably carry only slightly diluted runoff following storms, and acute criteria or other exceedances may in fact be real in such circumstances.

Among the inorganics, the most frequently detected pollutants are also those which are found at the highest concentrations, which most frequently exceed water quality criteria and which are the most geographically well-distributed. One additional observation can be made concerning the samples from Washington, D.C. These samples accounted for a preponderance of the detections of many of the less frequently detected inorganics, including antimony, beryllium, mercury, nickel, selenium, and thallium. No sampling or analytical irregularities have been identified which explain this result.

Organic Pollutants. In general, the organic pollutants were detected less frequently and at lower concentrations than the inorganic pollutants. Sixty-three of a possible 106 organics were detected. The most commonly found organic was the plasticizer bis (2-ethylhexyl) phthalate (22 percent) followed by the pesticide α-hexachlorocyclohexane (α-BHC) (20 percent). An additional 11 organic pollutants were reported with detection frequencies between 10 and 20 percent; 3 pesticides, 3 phenols, 4 polycyclic aromatics, and a single haloginated aliphatic (Table 6-20).

Criteria exceedances were less frequently observed among the organics than the inorganics. One unusually high pentachlorophenol concentration of 115 μg/l resulted in the only exceedance of the organoleptic criteria (Table 6-21). This observation and one for the chlordane exceeded the freshwater acute criteria. Freshwater chronic criteria exceedances were observed for pentochlorophenol, bis (2-ethylhexyl) phthalate, γ-hexachlorocyclohexane (Lindane), α-endosulfan, and chlordane. All other organic exceedances were in the human carcinogen category and were most serious for α-hexachlorocyclohexane (α-BHC), γ-hexachlorocyclohexane (γ-BHC or Lindane), chlordane, phenanthrene, pyrene, and chrysene.

TABLE 6-21. SUMMARY OF WATER QUALITY CRITERIA EXCEEDANCES FOR POLLUTANTS DETECTED IN AT LEAST 10 PERCENT OF NURP SAMPLES: PERCENTAGE OF SAMPLES IN WHICH POLLUTANT CONCENTRATIONS EXCEED CRITERIA[1]

Pollutant	Frequency of Detection (%)	Detections/ Samples[2]	Criteria Exceedances[3,4]						
			None	FA	FC	OD	HH	HF[5]	DW
I. PESTICIDES									
3. α-Hexachlorocyclohexane	20	21/106						8,18,20	
5. γ-Hexachlorocyclohexane (lindane)	15	15/100			8			0,16,15	
7. Chlordane	17	7/42		2	17			17,17,17	
12. α-Endosulfan	19	9/49			19				
II. METALS AND INORGANICS									
22. Antimony	13	14/106	X						
23. Arsenic	52	45/87						52,52,52	1
25. Beryllium	12	11/94			6*			12,12,12	
26. Cadmium[5]	48	44/91		8	48		1		1
27. Chromium[5,6]	58	47/81			1*				1
28. Copper[5]	91	79/87		47	82				
29. Cyanides	23	16/71		3	22		4		
30. Lead[5]	94	75/80		23	94		23		73
32. Nickel[5]	43	39/91			6		21		
33. Selenium	11	10/88			5		10		10
36. Zinc[5]	94	88/94		14	77				
IV. HALOGENATED ALIPHATICS									
47. Methane, dichloro-	11	3/28						0,0,71	
VII. PHENOLS AND CRESOLS									
90. Phenol	14	13/91	X						
94. Phenol, pentachloro-	19	21/111		1*	11*	1			
96. Phenol, 4-nitro-	10	11/107	X						
VIII. PHTHALATE ESTERS									
105. Phthalate, bis(2-ethylhexyl)	22	15/69			22*				
IX. POLYCYCLIC AROMATIC HYDROCARBONS									
115. Chrysene	10	11/109						10,10,10	
117. Fluoranthene	16	17/109	X						
121. Phenanthrene	12	13/110						12,12,12	
122. Pyrene	15	16/110						15,15,15	

* Indicates FTA or FTC value substituted where FA or FC criterion not available (see below).

1 Based on 121 sample results received as of September 30, 1983, adjusted for quality control review.

2 Number of times detected/number of acceptable samples.

3 FA = Freshwater ambient 24-hour instantaneous maximum criterion ("acute" criterion).
FC = Freshwater ambient 24-hour average criterion ("chronic" criterion).
FTA = Lowest reported freshwater acute toxic concentration. (Used only when FA is not available.)
FTC = Lowest reported freshwater chronic toxic concentration. (Used only when FC is not available.)
OD = Taste and odor (organoleptic) criterion.
HH = Non-Carcinogenic human health criterion for ingestion of contaminated water and organisms.
HF = Protection of human health from carcinogenic effects for ingestion of contaminated water and organisms.
DW = Primary drinking water criterion.

4 Entries in this column indicate exceedances of the human carcinogen value at the 10^{-5}, 10^{-6}, and 10^{-7} risk level, respectively. The numbers are cumulative, i.e., all 10^{-5} exceedances are included in 10^{-6} exceedances, and all 10^{-6} exceedances are included in 10^{-7} exceedances.

5 Where hardness dependent, hardness of 100 mg/l $CaCO_3$ equivalent assumed.

6 Different criteria are written for the trivalent and hexavalent forms of chromium. For purposes of this analysis, all chromium is assumed to be in the less toxic trivalent form.

An additional 50 organic pollutants were found in one to nine percent of the samples. These frequencies of detection are low, and the pollutant is noted in Table 6-22.

Among the PCB group, there was only a single detection of one PCB type among all the samples. Approximately two-thirds of the halogenated aliphatic compounds were detected. Among those cities reporting these compounds, the city of Eugene, Oregon, figured prominently. For example, eight pollutants from this group were found in Eugene only. None of the pollutants in the ethers group were detected.

Monocyclic aromatics were rarely detected in the samples. However, many reported detections of benzene and toluene, two commonly reported pollutants, had to be withdrawn due to contamination problems.

Of the 11 phenolics, four have not been reported in urban runoff, while three have been observed only once. The remaining four have been found fairly frequently but at low concentrations. Exceedances of criteria were noted only for pentachlorophenol.

All the phthalate esters were detected at least once in the NURP program, with bis (2-ethylhexyl) found most frequently. Several times the reported concentration exceeded the lowest observed freshwater acute toxic concentration for this pollutant. Given the significant blank contamination problems with the phthalates, however, these findings must be interpreted with caution.

Only two of the polycyclic aromatic hydrocarbons were not detected in at least one sample. Crysene, phenanthrene, pyrene, and fluoranthene were each found at least 10 percent of the time. All the observed concentrations for the first three of these pollutants exceeded the criteria for the protection of human health from carcinogenic effects (there are no such criteria for fluoranthene). Results for the polycyclic aromatics were generally free from quality control problems.

There were no detections of nitrosamines or other nitrogen-containing compounds. Due to methodological and holding time problems, however, results for only two compounds can be used. Moreover, for one of these compounds, 3,3-dichlorobenzidine, performance evaluation results were unacceptable in several cases.

Pollutants Not Detected In Urban Runoff

Some 43 priority pollutants were not detected in any acceptable runoff samples (Table 6-22). All of these pollutants are organics. This group of substances should be considered to pose a minimal threat to the quality of surface waters from runoff contamination.

While the priority pollutants which were not detected are of less immediate concern than those pollutants found often, they cannot safely be eliminated from all future consideration. Many of these pollutants have associated water quality criteria which are below the limits of detection of routine

TABLE 6-22. INFREQUENTLY DETECTED ORGANIC PRIORITY POLLUTANTS IN NURP URBAN RUNOFF SAMPLES[1]

Priority Pollutants Detected in 1 percent to 9 percent of the NURP Samples

51. Trichloromethane (9%)
120. Naphthalene (9%)
98. 2,4-Dimethyl phenol (8%)
109. Anthracene (7%)
2. Aldrin (6%)
6. δ-Hexachlorocyclohexane (6%)
9. DDE (6%)
11. Dieldrin (6%)
17. Heptachlor (6%)
58. 1,1,1-Trichloroethane (6%)
65. Trichloroethene (6%)
85. Ethylbenzene (6%)
102. Diethyl phthalate (6%)
103. Di-n-butyl phthalate (6%)
104. Di-n-octyl phthalate (6%)
106. Butyl benzyl phthalate (6%)*
114. Benzo(a)pyrene (6%)
4. β-Hexachlorocyclohexane (5%)
53. Trichlorofluoromethane (5%)[2]
66. Tetrachloroethene (5%)
78. Benzene (5%)
79. Chlorobenzene (5%)
111. Benzo(b)fluoranthene (5%)*
64. 1,2-trans-dichloroethene (4%)
110. Benzo(a)anthracene (4%)
19. Isophorone (3%)
52. Tetrachloromethane (carbon tetrachloride) (3%)
56. 1,1-Dichloroethane (3%)
87. Toluene (3%)
112. Benzo(k)fluoranthene (3%)
18. Heptachlor epoxide (2%)*
59. 1,1,2-Trichloroethane (2%)*
60. 1,1,2,2-Tetrachloroethane (2%)*
63. 1,1-Dichloroethene (2%)
68. 1,3-Dichloropropene (2%)*
113. Benzo(g,h,i)perylene (2%)
10. DDT (1%)*
43. PCB-1260 (1%)*
48. Chlorodibromomethane (1%)*
49. Dichlorobromomethane (1%)*
50. Tribromomethane (bromoform) (1%)*
57. 1,2-Dichloroethane (1%)*
67. 1,2-Dichloropropane (1%)*
91. 2-Chlorophenol (1%)*
95. 2-Nitrophenol (1%)*
99. p-Chloro-m-creosol (1%)*
101. Dimethyl phthalate (1%)*
116. Dibenzo(a,h)anthracene (1%)*
118. Fluorene (1%)*
119. Indeno(1,2,3-cd)pyrene (1%)*

TABLE 6-22. INFREQUENTLY DETECTED ORGANIC PRIORITY POLLUTANTS IN NURP URBAN RUNOFF SAMPLES[1] (Cont'd)

Priority Pollutants Not Detected in NURP Samples

8. DDD
13. β-Endosulfan
14. Endosulfan sulfate
15. Endrin
16. Endrin aldehyde
21. Toxaphene
37. PCB-1016
38. PCB-1221
39. PCP-1232
40. PCB-1242
41. PCB-1248
42. PCB-1254
44. 2-Chloronaphthalene
45. Bromomethane (methyl bromide)
46. Chloromethane (methyl chloride)
54. Dichlorodifluoromethane (Freon-12)[2]
55. Chloroethane
61. Hexachloroethane
62. Chloroethene (vinyl chloride)
69. Hexachlorobutadiene
71. Bis(chloromethyl) ether[2]
72. Bis(chloroethyl) ether
73. Bis(chloroisopropyl) ether
74. 2-Chloroethyl vinyl ether
75. 4-Bromophenyl phenyl ether
76. 4-Chlorophenyl phenyl ether
77. Bis(2-chloroethoxy) methane
80. 1,2-Dichlorobenzene
81. 1,3-Dichlorobenzene
82. 1,4-Dichlorobenzene
83. 1,2,4-Trichlorobenzene
84. Hexachlorobenzene
86. Nitrobenzene
88. 2,4-Dinitrotoluene
89. 2,6-Dinitrotoluene
92. 2,4-Dichlorophenol
93. 2,4,6-Trichlorophenol
97. 2,4-Dinitrophenol
100. 4,6-Dinitro-o-cresol
107. Acenaphthene
108. Acenaphthylene
125. Di-n-propyl nitrosamine
127. 3,3'-Dichlorobenzidine

TABLE 6-22. INFREQUENTLY DETECTED ORGANIC PRIORITY POLLUTANTS IN NURP URBAN RUNOFF SAMPLES[1] (Cont'd)

Priority Pollutants Not Analyzed for or Withdrawn for Methodological Reasons or Holding Time Violations

1. Acrolein
20. TCDD (Dioxin)
24. Asbestos
70. Hexachlorocyclopentadiene
123. Dimethyl nitrosamine (DMN)
124. Diphenyl nitrosamine
126. Benzidine
128. 1,2-Diphenyl hydrazine
129. Acrylonitrile

* Detected in only one or two samples.

[1] Based on 121 sample results received as of September 30, 1983, adjusted for quality control review.

[2] No longer on the priority pollutant list.

analytical methods. Some of these substances may in fact have been present in the NURP samples. Four priority pollutants not detected in runoff were found in street dust sweepings from Bellevue, Washington, suggesting that further urban runoff samplings can be expected to detect more priority pollutants. More sensitive analytical methodologies must be used and dilution effects considered before it can be said with assurance that these pollutants are not found in urban stormwater runoff at levels which, without dilution, pose a threat to human health or aquatic life.

DDD, chloromethane, 1,2-dichlorobenzene, and 2,4-dichlorophenol were detected in runoff samples at least once, but these observations had to be withdrawn for quality control reasons. Therefore, among the not detected pollutants, these four can be considered to have a slightly elevated possibility of actually being present in the runoff samples.

RUNOFF-RAINFALL RELATIONSHIPS

A runoff coefficient (Rv), defined as the ratio of runoff volume to rainfall volume, has been determined for each of the monitored storm events. As with the EMCs, the runoff coefficient values at a particular site are, with relatively few exceptions, well characterized by a lognormal distribution. Table 6-23 summarizes the statistical properties of Rv's at the loading sites in the data base.

Figure 6-19 illustrates the relationship between percent impervious area and the median runoff coefficient for the site. Sites which monitored fewer than 5 storms are excluded. The upper plot (a) groups the results from 16 of the

TABLE 6-23. RUNOFF COEFFICIENTS FOR LAND USE SITES

Residential

	Site	Land Use Code	No. of Events	Drainage Area (Acs)	Population Density (Pers/Acre)	Imperv.	Runoff Coef (Rv) Median	Coef Var
1	CO1 Log Angeles	100	36	33	19	37	.37	.37
2	CO1 Inverv	100	35	67	24	36	.35	.68
3	IL1 Glendale	100	94	167	14	34	.6	.4
4	CO1 Boulder	100	93	17	9	19	.06	.61
5	CO1 Lakewood	100	88	68	3	27	.13	.3
6	CO1 Stratton	100	31	2	-	37	.37	.37
7	CO1 Golden Acr	100	17	3	-	-	.05	.64
8	CO1 John W	100	23	63	14	19	.13	.37
9	CO1 Overlsn	100	31	56	9	18	.08	.11
10	MA2 Sebidol	100	6	50	5	36	.15	.16
11	MO1 Ashton Park	100	15	14	30	11	.44	.37
12	MO1 Homeland	100	25	29	9	29	.01	.29
13	MO1 Mt Wash	100	20	17	17	29	.14	1.25
14	MO1 Pes Hill	100	11	10	55	36	.41	.54
15	MO1 Carll S W.	100	25	73	15	20	.21	.51
16	MO1 Grinston	100	11	166	5	27	.18	.15
17	MO1 E. Lych.	100	9	146	18	35	.20	.42
18	CO1 Rollinwood	100	9	60	3	27	.02	.29
19	WA1 Surrey	100	134	95	9	29	.12	.56
20	WI1 Burbank	100	44	13	15	50	.17	.50
21	WI1 Hastings	100	33	33	17	51	.27	.37
22	IL1 Park	95	24	176	4	40	.09	.36
23	WI1 Lincoln	97	19	37	10	57	.21	.52
24	TN1 LF	76	21	89	4	13	.01	.67
25	CO1 Wellington	45	14	41	3	21	.12	1.15
26	KS1 [illegible]	37	14	61	-	37	.25	1.00
27	IL1 John S.	91	28	39	12	17	.15	.54
28	TN1 P1	91	9	69	11	32	.01	.90
29	WA1 Lake Hills	87	1.1	102	12	17	.20	.51
30	IL1 Harris S	95	20	25	22	17	.13	.16
31	CO1 Chapter M.	29	11	42	-	35	.2	4.55
32	CO1 Fairmont	28	44	13	-	34	.15	1.20
33	CO1 Aspen	26	16	127	9	7	.19	.92
34	IL1 Cook Dolph	25	29	574	2	17	.17	.48
35	MO1 Locust	25	6	156	11	15	.21	.33
36	NC1 #1022	24	53	324	1	[illegible]	[illegible]	.67
37	MA1 Jordan	19	9	1111	10	21	.5	.05
38	CO1 Stadwell	12	45	[illegible]	15	14	.20	1.07

Mixed

	Site	Land Use Code	No. of Events	Drainage Area (Acs)	Population Density (Pers/Acre)	Imperv	Runoff Coef (Rv) Median	Coef Var
1	KS1 Wichita	-	15	28	3	65	.09	1.04
2	IL1 Hampton	-	22	2	40	72	.29	.51
3	IL1 Harris N	-	26	17	2	56	.64	.57
4	MS1 Waverly	-	25	32	11	68	.06	.25
5	TN1 CC	-	12	157	3	45	.16	.46
6	WI1 [illegible] Cir	-	44	45	16	51	.26	.42
7	MA1 [illegible]	-	1	55	-	11	.20	.99
8	MA1 Sorrel	-	6	180	1	37	.50	.36
9	MI1 Grand R Ot	-	23	453	5	36	.31	.50
10	IL1 Wilger	-	15	194	-	-	.31	1.12
11	MI1 Pres 8A-S	-	6	2001	-	21	.29	.41
12	NJ1 Cedar	-	12	76	-	5	.08	1.05
13	IL1 Jesbit	-	15	30	-	12	.12	1.03
14	MA1 Adam	-	6	602	5	12	.17	1.64
15	MI1 IL1 8A-X	-	6	2671	7	26	.18	.43
16	MI1 Grove B	-	22	104	5	26	.11	.41
17	IL1 Swift Tur	-	5	1107	1	4	.21	.18
18	SD1 Meade	-	12	2000	-	-	.10	.57
19	CA1 Kobr	-	42	1690	12	-	.26	.71
20	CO1 North Ave	-	33	19	9	50	.24	.59

Commercial

	Site	Land Use Code	No. of Events	Drainage Area (Acs)	Population Density (Pers/Acre)	Imperv	Runoff Coef (Rv) Median	Coef Var
1	IL1 Little Italy	100	23	14	0	91	.93	.45
2	NC1 1012 (CBD)	100	112	21	6	69	.79	.49
3	NJ1 Southgate	100	12	179	2	21	.20	.28
4	WI1 Law Office	100	54	12	0	100	.90	.19
5	MI1 Rustler	100	39	12	0	100	.79	.19
6	NB1 Ag Bar	100	14	1	10	90	.66	.50
7	TN1 CBD	100	14	31	0	99	.73	.41
8	KS1 CC Meitzler	96	29	58	-	97	.46	.55
9	CA1 Normal Park	93	12	47	-	95	.48	.86
10	WI1 State Fair	74	21	29	10	77	.62	.28

Industrial

	Site	Land Use Code	No. of Events	Drainage Area (Acs)	Population Density (Pers/Acre)	Imperv	Runoff Coef (Rv) Median	Coef Var
1	MA1 Abbotsch	100	6	18	0	69	.50	.53
2	NJ1 Indus Drive	100	16	61	1	64	.16	.71
3	KS1 Lenexa	50	19	72	2	44	.54	.37
4	MI1 House 1	62	20	5	5	19	.12	.43

Metal Open and Mountain

	Site	Land Use Code	No. of Events	Drainage Area (Acs)	Population Density (Pers/Acre)	Imperv	Runoff Coef (Rv) Median	Coef Var
	CO1 Sheridan	100	27	653	-	1	.03	5.84
	CO1 Denver Cable	[illegible]		1.05	-	1	.14	2.04
	NJ1 Morris	100	33	[illegible]	-	2	.06	.92
1	NJ1 [illegible]	98	9	1.47	-	3	.02	1.23
2	NJ1 [illegible]	97	10	[illegible]	-	1	.07	.14
3	NJ1 [illegible]	96	17	[illegible]	1	[illegible]	.03	.56
4	NJ1 [illegible]	96	1	[illegible]		2	3	[illegible]
5	NJ1 [illegible]	20	1	[illegible]			.15	1.24

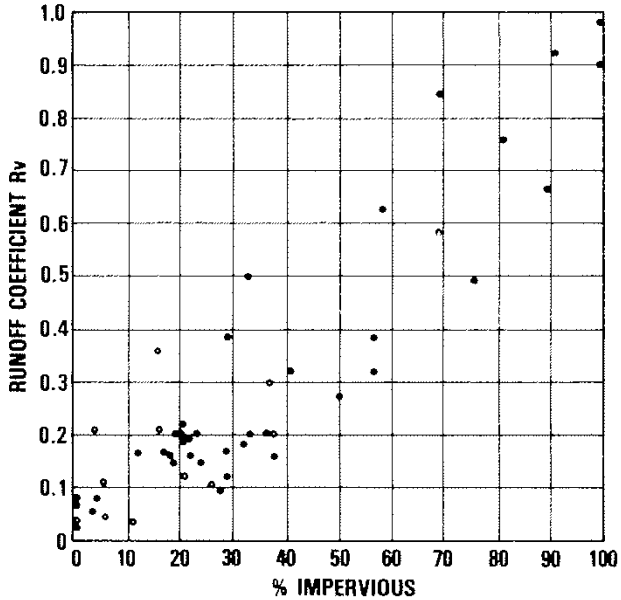

(a) 16 Projects

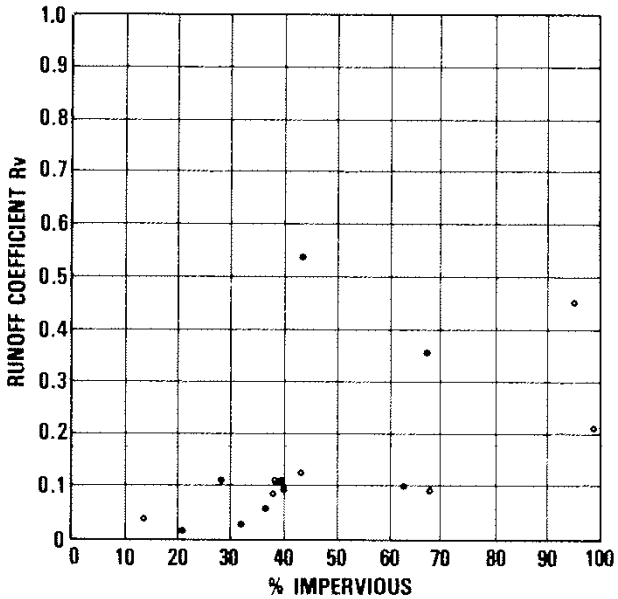

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(b) 4 Projects (KS1, MI1, TN1, TX1)

Figure 6-19. Relationship Between Percent Impervious Area and Median Runoff Coefficient

20 projects investigated. The lower plot (b) groups results from the remaining four projects (KS1, MI1, TN1, TX1). The reason for the difference is unexplained. However, the separate grouping is based on the fact that the relationship for these sites is internally consistent and significantly different than the bulk of the project results.

Figure 6-20 illustrates the same impervious area/runoff coefficient relationship, but shows the 90 percent confidence limits for median Rv's.

POLLUTANT LOADS

Although the EMC median concentration values are appropriate for many applications (e.g., assessing water quality impacts in rivers and streams), when cumulative effects such as water quality impacts in lakes and comparisons with other sources on a long-term basis (e.g., annual or seasonal loads) are to be examined, the EMC mean concentration values should be used. Taking the EMC median and coefficient of variation values given in Table 6-17, we have converted them into mean values using the relationship given in Chapter 5. These EMC mean concentrations and the values used in the load comparison to follow are listed in Table 6-24.

The range shown for site mean concentrations for both the median and 90th percentile urban sites reflects the difference in means depending on whether the higher or lower value of coefficient of variation listed in Table 6-17 is used to describe event-to-event variability of EMC's at urban sites. The range in values shown for use in the load comparisons below reflects the median and 90th percentile site mean concentrations, using the average of the range caused by coefficient of variation effects.

TABLE 6-24. EMC MEAN VALUES USED IN LOAD COMPARISON

Constituent	Site Mean EMC		
	Median Urban Site	90th Percentile Urban Site	Values Used in Load Comparison
TSS (mg/l)	141 - 224	424 - 671	180 - 548
BOD (mg/l)	10 - 13	17 - 21	12 - 19
COD (mg/l)	73 - 92	157 - 198	82 - 178
Tot. P (mg/l)	0.37 - 0.47	0.78 - 0.99	0.42 - 0.88
Sol. P (mg/l)	0.13 - 0.17	0.23 - 0.30	0.15 - 0.28
TKN (mg/l)	1.68 - 2.12	3.69 - 4.67	1.90 - 4.18
NO_{2+3}-N (mg/l)	0.76 - 0.96	1.96 - 2.47	0.86 - 2.21
Tot. Cu (ug/l)	38 - 48	104 - 132	43 - 118
Tot. Pb (ug/l)	161 - 204	391 - 495	182 - 443
Tot. Zn (ug/l)	179 - 226	559 - 707	202 - 633

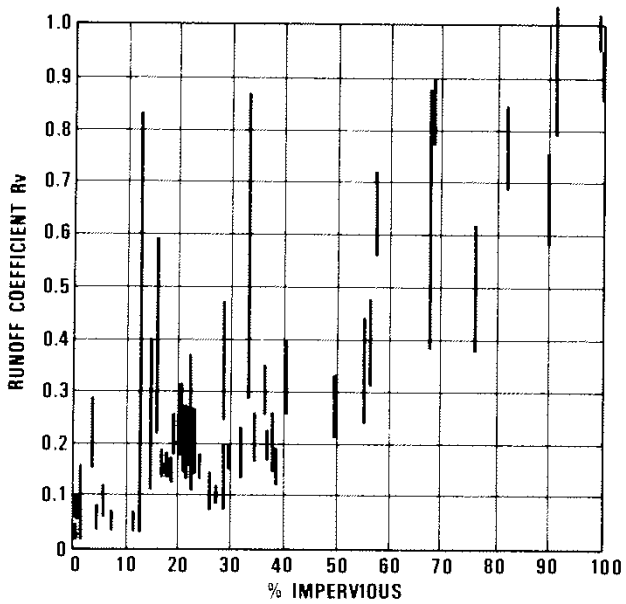

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(a) 16 Projects

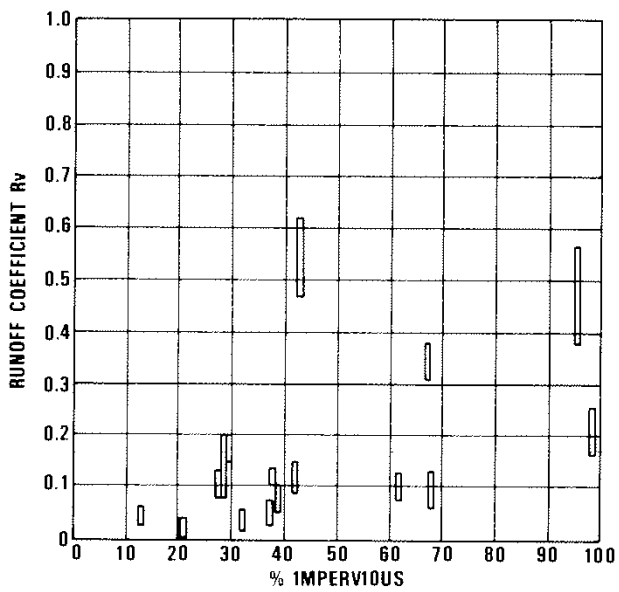

(b) 4 Projects (KS1, MI1, TN1, TK1)

Figure 6-20. 90 Percent Confidence Limits for Median Runoff Coefficients

It is a straightforward procedure to calculate mean annual load estimates for urban runoff constituents on a Kg/Ha basis by assigning appropriate rainfall and runoff coefficient values and selecting EMC mean concentration values from Table 6-24. In and of themselves, however, such estimates seem to be of little utility. Therefore, it was decided to do a comparison of the mean annual loads from urban runoff with those of a "well run" secondary treatment plant. We chose to use TSS = 25 mg/l, BOD = 15 mg/l, and Tot. P = 8 mg/l for the effluents from such plants for the purposes of this order of magnitude comparison. For a meaningful comparison for a specific situation, locally appropriate values should be used. Based upon Table 6-24, the corresponding urban runoff mean concentrations used were TSS = 180 mg/l, BOD = 12 mg/l, and Total P = 0.4 mg/l as typical and TSS = 548 ug/l, BOD = 19 mg/l, and Tot. P = 0.88 mg/l as a "worst case" for comparison purposes.

The value of 0.35 was selected as a typical mean runoff coefficient. It is the median of the NURP mean runoff coefficient database for the twenty projects discussed earlier; their average is 0.42, but we believe that this number is overly weighted by the disproportionate number of highly impervious sites in the database. Assuming an average population density of 10 persons per acre (the average of the NURP sites) and a mean annual rainfall of 40 inches per year, urban runoff averages 104 gallons per day per capita. This is also a reasonable estimate of sewage generation in an urban area. Therefore, as a first cut, the ratio of mean pollutant concentrations of urban runoff and POTW effluents will also be the ratio of their annual loads. Thus, we have;

$$\text{TSS} = \frac{180}{25} \approx 7 \ ; \ \text{BOD} = \frac{12}{15} \approx 0.8 \ ; \ \text{Tot. P} = \frac{0.4}{8} \approx 0.05$$

using typical urban runoff values, and;

$$\text{TSS} = \frac{548}{25} \approx 22 \ ; \ \text{BOD} = \frac{19}{15} \approx 1.3 \ ; \ \text{Tot. P} = \frac{0.88}{8} \approx 0.1$$

using the "worst case" values. These numbers suggest that annual loads from urban runoff are approximately one order of magnitude higher than those from a well run secondary treatment plant for TSS, the same order of magnitude for BOD, and an order of magnitude less for Tot. P.

If the hypothetical urban area just described were to go to advanced waste treatment and achieve an effluent quality of TSS = 10 mg/l, BOD = 5 mg/l, and Total P = 1 mg/l and no urban runoff controls were instituted, the mean annual load reductions to the receiving water would be:

$$\text{TSS} = \frac{25 - 10}{180 + 25} \approx 7\% \ ; \ \text{BOD} = \frac{15 - 5}{12 + 15} \approx 37\% \ ; \ \text{Tot. P} = \frac{8 - 1}{0.4 + 8} \approx 83\%$$

for our typical case, and;

$$\text{TSS} = \frac{25 - 10}{548 + 25} \approx 3\% \ ; \ \text{BOD} = \frac{15 - 5}{19 + 15} \approx 29\% \ ; \ \text{Tot. P} = \frac{8 - 1}{0.88 + 8} \approx 79\%$$

for our "worst case." On the other hand, if urban runoff controls that reduced TSS by 90 percent, BOD by 60 percent, and Total P by 50 percent were instituted, (typical results from a well-designed detention basin), the mean annual load reductions to the receiving water would be:

$$\text{TSS} = \frac{180 - 18}{180 + 25} \approx 79\% \ ; \ \text{BOD} = \frac{12 - 7}{12 + 15} \approx 19\% \ ; \ \text{Total P} = \frac{0.4 - 0.2}{0.4 + 8} \approx 2\%$$

for our typical case, and;

$$\text{TSS} = \frac{548 - 55}{548 + 25} \approx 86\% \ ; \ \text{BOD} = \frac{19 - 8}{19 + 15} \approx 32\% \ ; \ \text{Total P} = \frac{0.88 - 0.44}{0.58 + 8} \approx 5\%$$

Thus, if these pollutants are causing receiving water quality problems, consideration of urban runoff control appears warranted for TSS, both urban runoff control and AWT might be considered for BOD, and only AWT would be effective for Total P.

The foregoing should be viewed as illustrative of a preliminary screening for trade-off studies that can be performed using appropriate values for a specific urban area, rather than as description of any particular real-world case. They are, however, believed useful in providing order of magnitude comparisons. Local values for annual rainfall, runoff coefficient, or point source characteristics that are different than those used in the illustration will of course change the results shown; although in most cases the changes would not be expected to cause a significant change in the general relationship.

As a final perspective on urban runoff loads, Table 6-25 presents an estimate of annual urban runoff loads, expressed as Kg/Ha/year, for comparison with other data summaries of nonpoint source loads which state results in this manner. Load computations are based on site mean pollutant concentrations for the median urban site and on the specified values for annual rainfall and runoff coefficient. Typical values for mean runoff coefficient (based on NURP data) have been assigned for residential land use (Rv = 0.3), commercial land use (Rv = 0.8), and for an aggregate urban area which is assumed to have representative fractions of the total area in residential, commercial, and open uses (Rv = 0.35).

Several useful observations can be made. The annual load estimates which results are comparable to values and ranges reported in the literature. Although the findings presented earlier in this chapter indicated that the land use category does not have a significant influence on site concentrations of pollutants, on a unit area basis total pollutant loads are significantly higher for commercial areas because of the higher degree of imperviousness typical of such areas. For broad urban areas, however, the relatively small fraction of land with this use considerably mitigates such an effect.

Finally, the annual loads shown by Table 6-25 have been computed on the basis of a 40 inch annual rainfall volume. For urban areas in regions with higher

TABLE 6-25. ANNUAL URBAN RUNOFF LOADS KG/HA/YEAR

Constituent	Site Mean Con.mg/l	Residential	Commercial	All Urban
Assumed Rv		0.3	0.8	0.35
TSS	180	550	1460	640
BOD	12	36	98	43
COD	82	250	666	292
Total P	0.42	1.3	3.4	1.5
Sol. P	0.15	0.5	1.2	0.5
TKN	1.90	5.8	15.4	6.6
NO_{2+3}-N	0.86	2.6	7.0	3.6
Tot. Cu	0.043	0.13	0.35	0.15
Tot. Pb	0.182	0.55	1.48	0.65
Tot. Zn	0.202	0.62	1.64	0.72

NOTE. Assumes 40 inches/year rainfall as a long-term average.

or lower rainfall, these load estimates must be adjusted. The results presented earlier suggest that pollutant concentrations are not sensitive to runoff volume; however, total loads (the product of concentration and volume) are strongly influenced by the volume of runoff. For estimates using equivalent site conditions (Rv), loads for areas with other rainfall amounts are obtained by factoring by the ratio of local rainfall volume to the 40 inch volume used for the table. Planners who believe that the average annual runoff coefficients in their local areas are substantially different from those used in the table can make similar adjustments.

CHAPTER 7
RECEIVING WATER QUALITY EFFECTS OF URBAN RUNOFF

INTRODUCTION

The effects of urban runoff on receiving water quality are very site specific. They depend on the type, size, and hydrology of the water body, the designated beneficial use and the pollutants which affect that use, the urban runoff (URO) quality characteristics, and the amounts of URO dictated by local rainfall patterns and land use.

A number of the NURP projects examined receiving water impacts in some detail, others less rigorously. Because of the uniqueness of URO water quality impacts, individual project results are considered best used for confirmation and support, rather than as a basis for broad generalizations.

Accordingly, this chapter is structured to address each of the principal categories of receiving water bodies separately; streams and rivers, lakes, estuaries and embayments, and groundwater aquifers. Some can be addressed more thoroughly than others at this time. The approach taken to develop a general, national scale screening assessment of the significance of URO pollutant discharges is to compute anticipated effects using analysis methodologies identified in Chapter 5, where these are appropriate and to compare anticipated effects indicated by such generalizations to specific experiences and conclusions drawn by relevant individual NURP projects.

As with any generalization, there will be exceptions. Specific local situations can be expected which are either more or less favorable than the general case. The results presented herein should therefore be interpreted as representative estimates of a substantial percentage of urban runoff sites, but not all of them.

Receiving waters have distinctive general characteristics which depend on the water body type (e.g., stream, lake, estuary) and relatively unique individual characteristics which depend on geometry and hydrology. Given a minimum acceptable amount of data on water bodies and their setting, it appears possible to make useful generalizations regarding the quantitative effects of urban runoff on concentrations of various pollutants in the receiving waters and to draw inferences concerning the influence urban runoff may have on the beneficial uses of the water bodies. However extending the results of such an analysis to an assessment of the prevalence of urban runoff induced "problems" on a national scale cannot be accomplished in a way would provide an acceptable level of confidence in any conclusions drawn therefrom. In addition to the importance of local hydrology, meteorology, and urban characteristics, the emphasis placed on each of the three elements that influence problem definition;

(1) Denial or serious impairment of beneficial use;

(2) Violation of ambient water quality standards; and

(3) Local perception;

will result in a high degree of site-specificity to the determination of the existence of a problem.

RIVERS AND STREAMS

General

Flowing streams carry pollutant discharges downstream with the stream flow. For intermittent stormwater discharges, a specific stream location and the biota associated with it are exposed to a sequence of discrete pulses contaminated by the pollutants which enter with urban runoff. Because of the inherent variability of urban runoff (URO), the average concentrations in such pulses vary, as do their duration and the interval between successive pulses. Table 7-1 summarizes average values for storm duration and intervals between storm events for selected locations in the U.S., based on analysis of long term rainfall records using a methodology (SYNOP) presented in an earlier NURP document (the NURP Data Management Procedures Manual). The information presented provides a sense of the temporal aspects of such intermittent pulses and, by inference, the intermittent exposure patterns to which stream biota are subjected. For many locations, storm pulses are produced for about six hours every three days or more, on average.

A probabalistic methodology has been used to examine the concentration characteristics of the storm pulses produced in streams, given the variability of the relevant processes which are directly involved. Stream flow rates, runoff flow rates, and concentrations vary and result in variable stream concentrations. For streams, it is not the runoff volume per se that is important. The combination of stream and runoff flow rates (together with runoff concentration) determine the pollutant concentration in the stream pulse. The duration of the runoff event and the stream velocity dictate the spatial extent of the storm pulse in the stream. The analysis presented in this section addresses the frequency and magnitude of pollutant concentrations in the instream storm pulses which are produced.

Runoff and Stream Flow Rates

The local combination of stream and runoff flow rates for an urban location are, as indicated, important determinants of the stream concentrations which will result. For long-range projections, the most appropriate data sources for characterizing these parameters are long-term stream flow gauging records (USGS) and long-term rainfall records (USWS).

Figure 7-1(a) illustrates the regional variation of average daily stream flows expressed as cfs/sq mile of drainage area, based on long-term (50 years or more) gauging records at over 1000 stations. Figure 7-1(b) presents a somewhat simplified regional pattern for average rainfall intensity. The data base for this plot is considerably smaller, consisting of rainfall records (usually 10 to 30 years of record) for approximately 40 cities. Localized peturbations exist, but are smoothed out by contours presented.

TABLE 7-1. AVERAGE STORM AND TIME BETWEEN STORMS FOR SELECTED LOCATIONS IN THE UNITED STATES

Location	Average Annual Values in Hours	
	Storm Duration	Time Between Storm Midpoints
Atlanta, GA	8.0	94
Birmingham, AL	7.2	85
Boston, MA	6.1	68
Caribou, ME	5.8	55
Champaign-Urbana, IL	6.1	80
Chicago, IL	5.7	72
Columbia, SC	4.5	68
Davenport, IA	6.6	98
Detroit, MI	4.4	57
Gainesville, FL	7.6	106
Greensboro, SC	5.0	70
Kingston, NY	7.0	80
Louisville, KY	6.7	76
Memphis, TN	6.9	89
Mineola, NY	5.8	89
Minneapolis, MN	6.0	87
New Orleans, LA	6.9	89
New York City, NY	6.7	77
Steubenville, OH	7.0	79
Tampa, FL	3.6	93
Toledo, OH	5.0	62
Washington, DC	5.9	80
Zanesville, OH	6.1	77
Mean	6.1	81
Denver, CO	9.1	144
Oakland, CA	4.3	320
Phoenix, AZ	3.2	286
Rapid City, SD	8.0	127
Salt Lake City, UT	7.8	133
Mean	6.5	202
Portland, OR	15.5	83
Seattle, WA	21.5	101
Mean	18.5	92

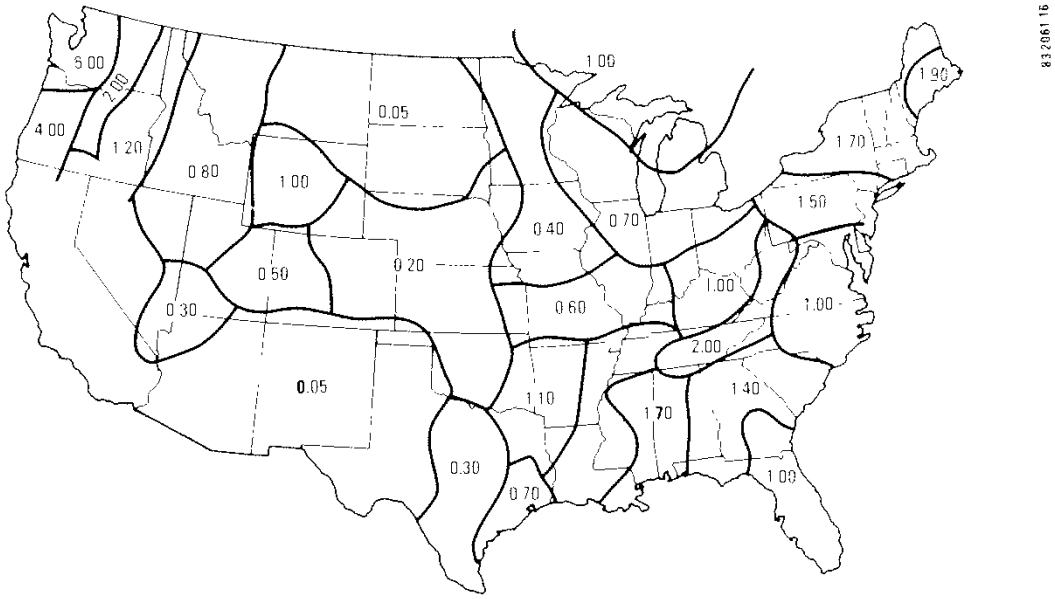

Figure 7-1(a). Regional Value of Average Annual Streamflow (cfs/sq mi)

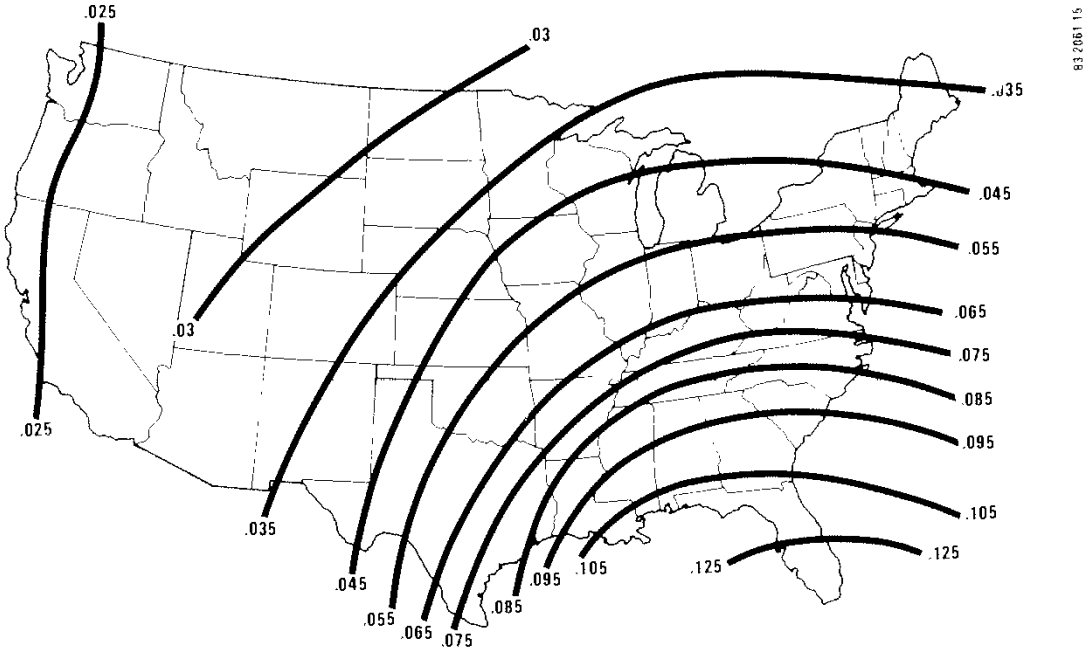

Figure 7-1(b). Regional Value of Average Storm Event Intensity (inch/hr)

Variability of daily stream flows was determined for a smaller sample (about 150 sites) of the stream sites. Variability of storm event average intensities was determined for all of the rain gauge locations in the current data base. These results are summarized in Table 7-2.

Total Hardness of Receiving Streams

Where the beneficial use of principal concern is the protection of aquatic life, the URO pollutants of major concern appear to be heavy metals, particularly copper, lead and zinc. The potential toxicity of these pollutants are strongly influenced by total hardness, as indicated by Table 5-1 in Chapter 5. Other beneficial uses deal with pollutants and effects that are not influenced by total hardness or (as with drinking water supplies) do not modify the assigned significance of heavy metal concentrations on the basis of total hardness.

As with stream flow and precipitation, distinct regional patterns also exist for receiving water total hardness concentrations. Figure 7-2 delineates the national pattern of regional differences. These patterns impose an additional regional influence on the potential of urban runoff to create problem conditions in streams and rivers.

Technical Approach To Screening Analysis

The magnitude and frequency of occurrence of intermittent stream concentrations of pollutants of interest, that result from urban runoff, has been computed using the probabilistic methodology discussed in Chapter 5.

The input data required for application of the methodology includes representative values for the mean and variability of stream flow, runoff flow, and runoff pollutant concentrations. The material presented earlier in this chapter provides the basis for assigning values for the flows; the results summarized in Chapter 6 provide the basis for specifying pollutant concentration inputs. In order to translate the probability distribution of stream concentrations (which is the basic output of the analysis methodology) to an average recurrence interval, which is considered to provide a more understandable basis for comparisons, the average number of storms per year is also required. This is estimated directly from the average interval between storm midpoints generated by the statistical analysis of hourly rainfall records.

For a general screening on a national scale, an estimate of typical values for a selected geographic location must be made. This has been done, and the set of input values considered to be typical of geographical location are described and summarized below. The values used should be considered reasonably representative of the majority of sites in the area, but it should be recognized that not all potential sites will have conditions either as favorable or unfavorable as those listed.

We have worked with a limited sample in assigning typical values. A greater data base on rainfall and stream flow would permit greater spatial definition

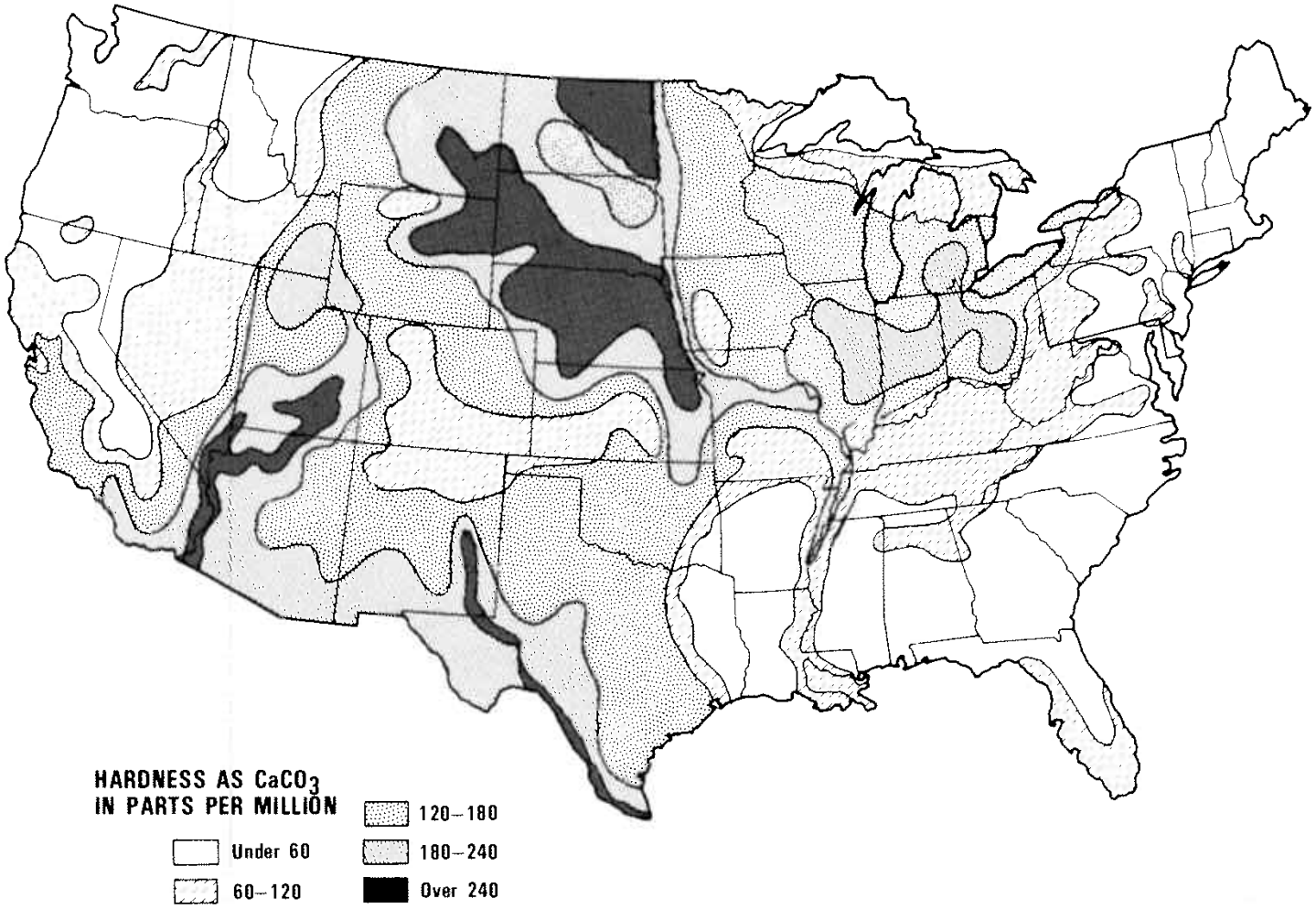

Figure 7-2. Regional Values for Surface Water Hardness

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than shown in the results. Specific regions or states could, with development of a more detailed spatial definition of stream flows and rainfall, extend the analysis presented to provide a considerably more comprehensive assessment of problem potential for local areas. This would involve the development of input parameters (rainfall and streamflow) readily derived from available long term USGS stream flow records and USWS rainfall records and their use in the methodology with quality parameters based either on the NURP analysis presented in Chapter 6, or on local monitoring activities.

The analysis methodology presently available permits computation of the probability distribution of instream concentrations, incorporating the effect of upstream (background) concentrations of the pollutant of interest. The results presented here assume upstream concentrations of zero, principally because of our inability at present to make reliable estimates of typical values for the magnitude and variability for pollutants of interest, especially on the broad national scale being examined. As a result, the summaries will show the effects of urban runoff contributions only. In cases where the background is small relative to the URO contribution, the summaries will represent actual conditions quite closely. However, where background is high and has appreciable variability, the implications of the URO contribution will be overstated, particularly the inferred improvement which could result from control of URO.

In order to perform a national screening of regional influences on urban runoff impacts, eight geographical regions illustrated by Figure 7-3 have been delineated. Using the information summarized by Figures 7-1 and 7-2, typical values for the pertinent rainfall/runoff and stream parameters have been assigned for each of the regions. Table 7-2 summarizes the values for these parameters which are used in the screening analysis.

TABLE 7-2. TYPICAL REGIONAL VALUES

Area	Event Average Rainfall Intensity		Average Number of Events/year	Average Runoff Flow Rate		Stream Flow Rate (Daily Avg Flows)		Stream Total Hardness (mg/l)
	Mean (in/hr)	c.v.		Mean Event (cfs/sq mi)	c.v.	Mean (cfs/sq mi)	c.v.	
1	0.04	1.00	110	5	0.85	1.75	1.25	50
2	0.10	1.35	100	12	1.15	1.25	1.25	50
3	0.08	1.35	90	10	1.15	1.00	1.25	50
4	0.055	1.25	110	7	1.05	0.75	1.25	200
5	0.04	1.10	63	5	0.95	0.35	1.25	200
6	0.03	1.10	70	4	0.95	0.05	1.25	300
7	0.045	1.20	30	5	1.00	0.05	1.25	200
8	0.025	0.85	80	3	0.75	4.50	1.25	50

Average stream flow and rainfall intensity were taken from the plots, which are based on sources previously described. The estimate for variability of daily stream flows (coefficient of variation) is based on computed values for a sample of about 150 perennial streams. Results for a number of regional

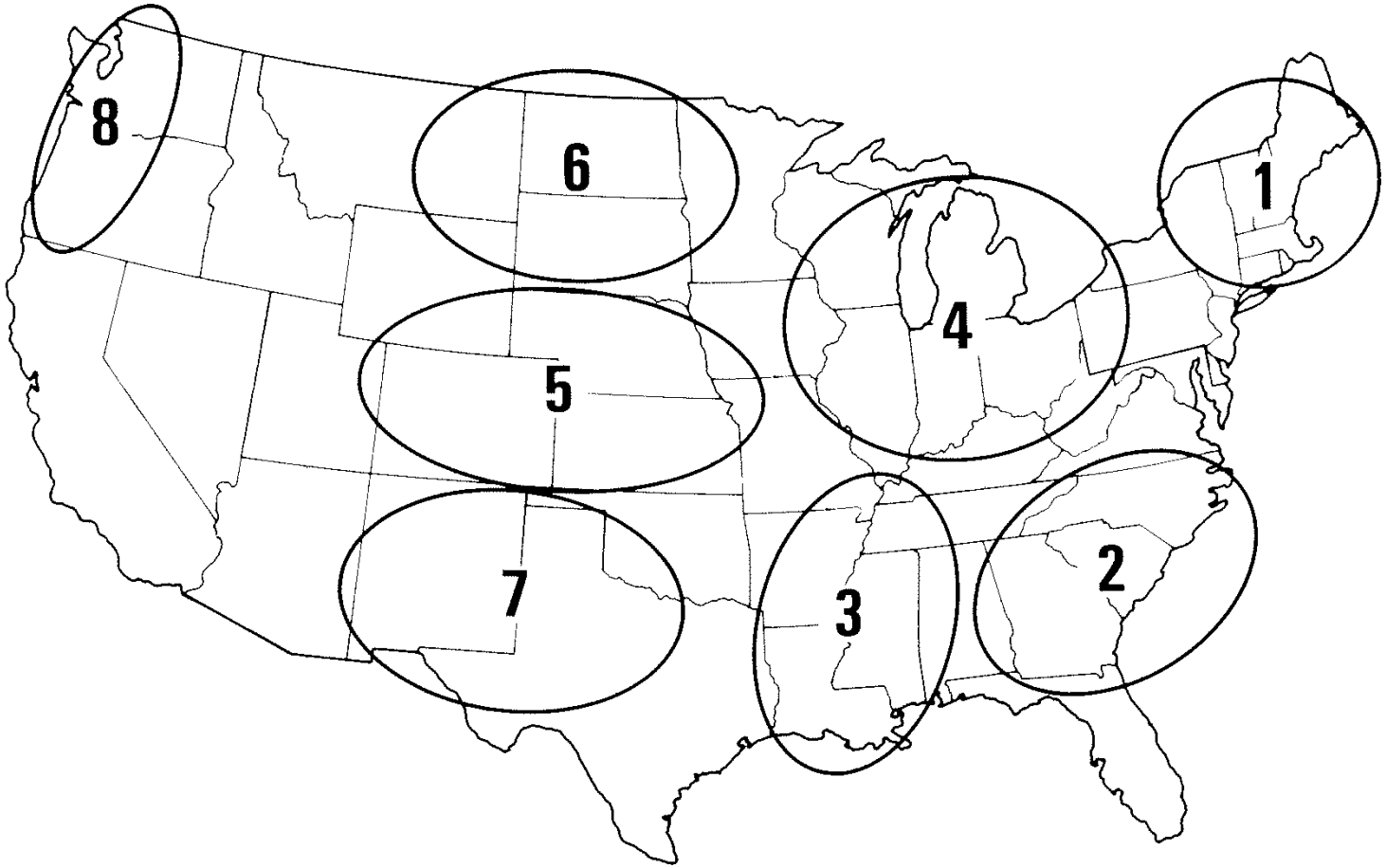

Figure 7-3. Geographic Regions Selected for Screening Analysis

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groupings indicated median values for coefficient of variation to fall between approximately 1 and 1.5. Since there were no clear regional patterns apparent, a uniform value for coefficient of variation of stream flows of 1.25 was assigned.

The coefficient of variation of rainfall intensities was taken directly from the statistical analysis of the rainfall records examined. This was reduced by 15 percent to provide estimates of the coefficient of variation of runoff flow rates, based on a recent published report, "Comparison of Basin Performance Modeling Techniques", Goforth, Heaney and Huber, ASCE JEED, November 1983, using the SWMM model on a long-term rainfall record.

The quality characteristics of urban runoff used in the screening analysis are listed in Table 7-3, and are based on the results summarized in Chapter 6. The analysis results have been rounded in the selection of representative site median EMCs and are interpreted as being representative of an array of urban sites discharging into the receiving stream being analyzed.

Average site conditions are based on the 50th percentile of all urban sites. Since the data analysis indicated that sites at some locations tend to cluster at either the higher or lower ends of the range for all sites, high range and low range site conditions were also selected for use in the screening analysis. High range site conditions are nominally based on the 90th percentile of all site median concentrations; the low range on the 10th percentile site. The variability of EMCs from storm to storm at any site is based on the median of the coefficients of variation of EMCs at sites monitored by NURP. This value was used for the low range and average site condition and was increased nominally for the high range site condition.

TABLE 7-3. URBAN RUNOFF QUALITY CHARACTERISTICS
USED IN STREAM IMPACT ANALYSIS
(Concentrations in μg/l)

	COPPER		LEAD		ZINC	
	Site Median EMC	Coef Var	Site Median EMC	Coef Var	Site Median EMC	Coef Var
Low Range of Site Conditions	15	0.6	50	0.75	75	0.7
Average Site Conditions	35	0.6	135	0.75	165	0.7
High Range of Site Conditions	90	0.7	350	0.85	450	0.8

An illustrative example of a site-specific application of the probabilistic analysis methodology employed is presented in order to:

1. Illustrate the nature of the computational results produced;

2. Assist in the interpretation of the tabulations presented later which summarize results of the national scale screening analysis;

3. Indicate how magnitude/frequency of instream concentrations may be interpreted for inferences concerning the absence or presence of a "problem" and where a problem is concluded to exist, its degree of severity; and

4. Demonstrate how alternative URO control options may be evaluated in terms of their expected impact on water quality and potential effect on problem severity.

From selected representative values for mean and variability of stream and runoff conditions, the probability distribution of resulting instream concentrations during storm events can be computed. Figure 7-4 illustrates a plot of such an output. Uncertainty in estimates for specific inputs can be accommodated by sensitivity analyses which incorporate upper and lower bounds for specific parameter values. Results are then presented as a band rather than a specific projection. The probabilities which are the basic output of the analysis may be converted to average recurrence intervals to provide what is believed to be a more understandable basis for interpreting and evaluating results.

Figure 7-5 presents results converted to the average recurrence interval at which specific stream concentrations will be produced during storm runoff periods.

The significance of a particular magnitude/frequency pattern of stream concentrations caused by urban runoff can be evaluated by comparing them with concentrations which are significant for the beneficial use of the water body. In the example presented, we have excluded comparisons with drinking water criteria on the basis that urban streams are not generally used as domestic water sources, and in any event, the criteria relate to finished water, and surface water supplies almost invariably receive treatment.

Protection of aquatic life is selected for the screening analysis of the impact of urban runoff because it is believed to be the predominant potential beneficial use for urban streams on a national scale. The concentrations which result from urban runoff are compared with stream target concentrations associated with different degrees of adverse impact, as discussed and tabulated in Chapter 5.

In the site specific situation illustrated, the stream concentrations of copper caused by untreated urban runoff discharges exceed the "EPA Maximum" criterion more than ten times per year on average. The concentration level suggested by the NURP analysis to be the Threshold level of adverse biological impacts is exceeded an average of five times per year (recurrence interval 0.2 year), and significant mortality of more sensitive biological species occurs about once every three years on average. Although this stress level may not be great enough to result in a total denial of the use, there are many who would argue that it represents an unacceptably severe degree of impairment of this beneficial use.

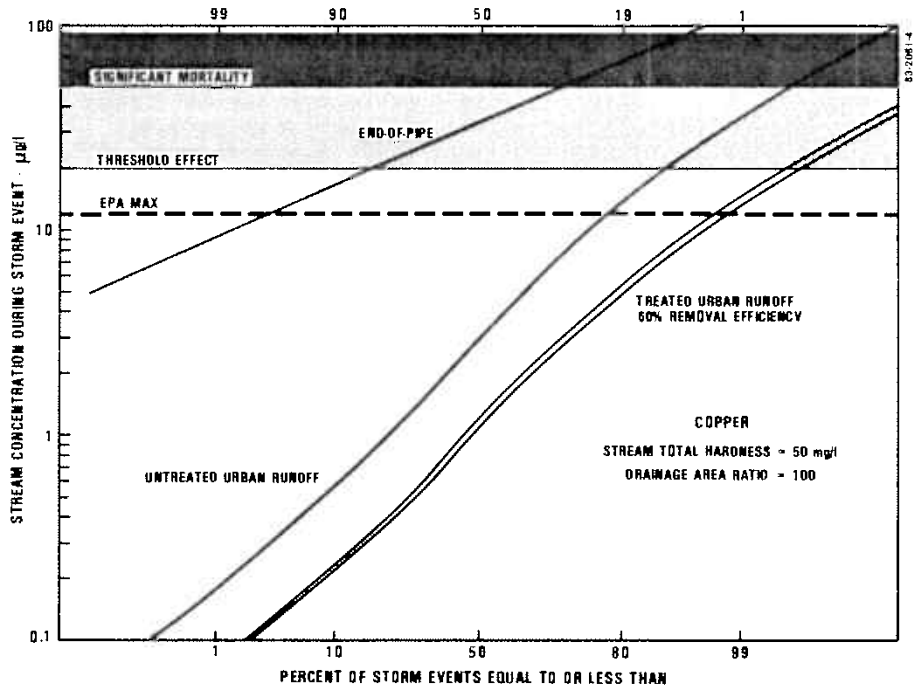

Figure 7-4. Probability Distributions of Pollutant Concentrations During Storm Runoff Periods

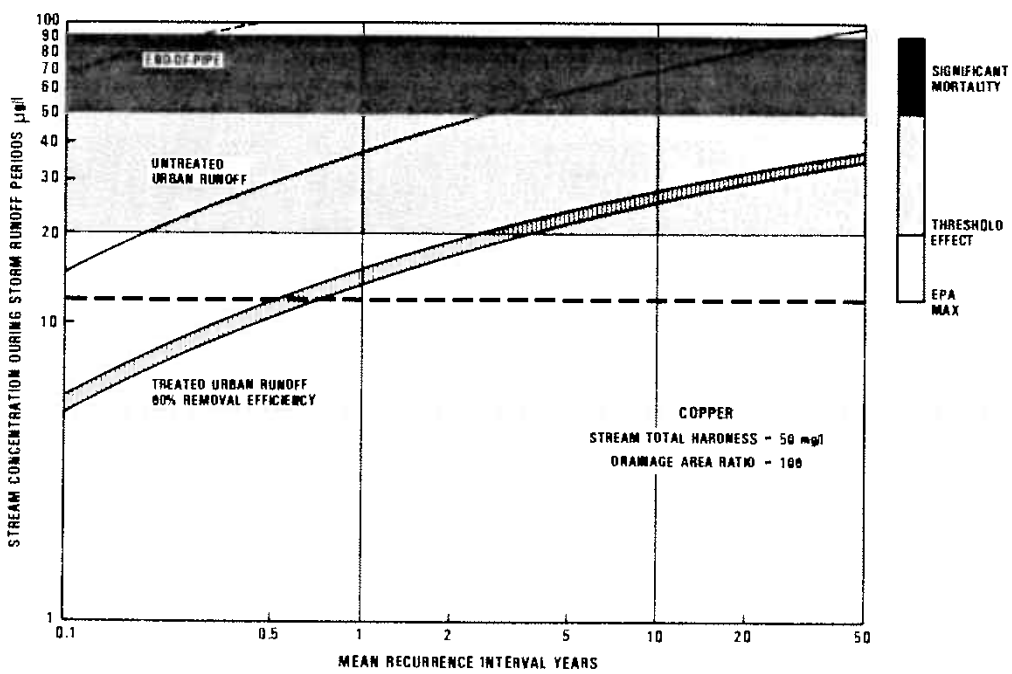

Figure 7-5. Recurrence Intervals for Pollutant Concentrations

The projection labeled "treated urban runoff" may be taken to represent the in-stream result for either the originally considered discharge following the application of controls which effect a 60 percent reduction, or of an uncontrolled urban runoff site with lower levels of copper in the runoff. In this case, threshold levels are reached only once every 3 or 4 years on average, and significant mortality levels are virtually never reached. Even though the ambient "EPA MAX" criterion is exceeded once or twice a year on average, one might conclude that the implied degree of stress is tolerable and is not interpreted to represent a significant degree of impairment of the use.

The Threshold and Significant Mortality levels are estimates, which have been explained earlier. In addition, the "acceptable" frequency at which specific adverse effects can be tolerated is subjective at this time, since there are no formal guidelines. However, an approach of this nature must be taken in any evaluation of the significance of urban runoff and the importance of applying control measures. There are two reasons why this is necessary. First, because of the stochastic nature of the system we are dealing with, virtually any target concentration we elect to specify will be exceeded at some frequency, however rare. Secondly, from a practical point of view, there are limits to the capabilities of controls, however rigorously applied. In the illustration presented, the untreated urban runoff site assigned urban runoff copper concentrations equivalent to the average urban site. Since NURP analysis data indicate that the copper in urban runoff has a soluble fraction of about 40 percent, the level of removal used in the example reflects a control efficiency approaching the practical limit. Receiving water impacts are significantly reduced, but not totally eliminated.

Results of Screening Analysis

A projection of stream water quality responses has been made for each of the eight geographical areas shown by Figure 7-3. The rainfall, runoff, and stream flow estimates used in the computations are those summarized in Table 7-2. The urban runoff quality characteristics used are those presented in Table 7-3.

To consolidate screening analysis results for easier comparison, results are not presented as continuous concentration/frequency curves as used in the illustrative example presented above. Instead, the comparison plots which follow show only the recurrence interval at which specified biological effects levels are exceeded. The concentrations which correspond with these effects are strongly influenced by stream total hardness, and hence vary regionally. Table 7-4, based on information presented in Chapter 5, summarizes the stream target concentrations used in the screening analysis summary.

Analysis results are presented for Copper (Figure 7-6), Lead (Figure 7-7) and Zinc (Figure 7-8). Each individual bar represents a different geographical region, and the analysis is performed for two drainage area ratios. Since regional stream flow differences are based on unit flows (cfs/sq mile of drainage area), actual flow in a receiving stream at a particular location is

TABLE 7-4. REGIONAL DIFFERENCES IN TOXIC CONCENTRATION LEVELS
(Concentrations in μg/l)

Pollutant	Stream Total Hardness μg/l	Geo-graphic Regions	EPA MAX	Suggested Values For		
				Threshold Effects[1]	Significant Mortality[2] (a)	(b)
Copper	50	1,2,3,8	12	20	50	90
	200	4,5,7	42	80	180	350
	300	6	62	115	265	500
Lead	50	1,2,3,8	74	150	350	3200
	200	4,5,7	400	850	1950	17,850
	300	6	660	1400	3100	29,000
Zinc	50	1,2,3,8	180	380	870	3200
	200	4,5,7	570	1200	2750	8000
	300	6	800	1700	3850	11,000

[1] Threshold Effects - mortality of the most sensitive individual of the most sensitive species.

[2] Significant Mortality

Level (a) - mortality of 50 percent of the most sensitive species.

Level (b) - mortality of the most sensitive individual of 25th percentile sensitive species.

a function of both the unit flow rate and the size of the contributing drainage area. The "drainage area ratio" (DAR) used in the analysis is

$$DAR = \frac{\text{Urban Area Contributing Runoff}}{\text{Stream Drainage Area Upstream of Urban Input}}$$

It is a measure of the location of the urban area relative to the headwaters of the receiving stream.

The shading scheme used on the bars duplicates that used earlier in the illustrative example (Figure 7-5), and identifies the recurrence interval for each of the target concentrations. For example, instream copper concentrations during storm runoff periods in geographic region 1, with average site conditions for copper concentrations in urban runoff, and a DAR = 10, are projected to be as follows (middle plot, Figure 7-6).

- EPA MAX - ambient criterion is exceeded at a frequency of 0.02 year (= 50 times/year) or about every other storm event on average.

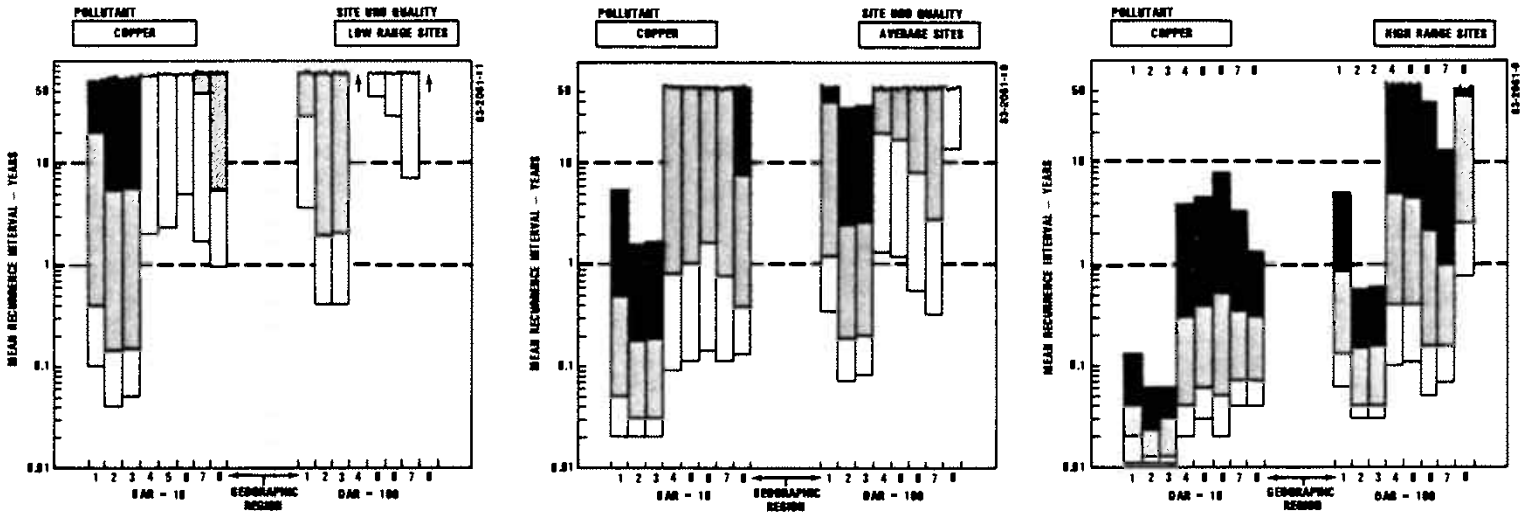

Figure 7-6. Exceedance Frequency for Stream Target Concentration
COPPER

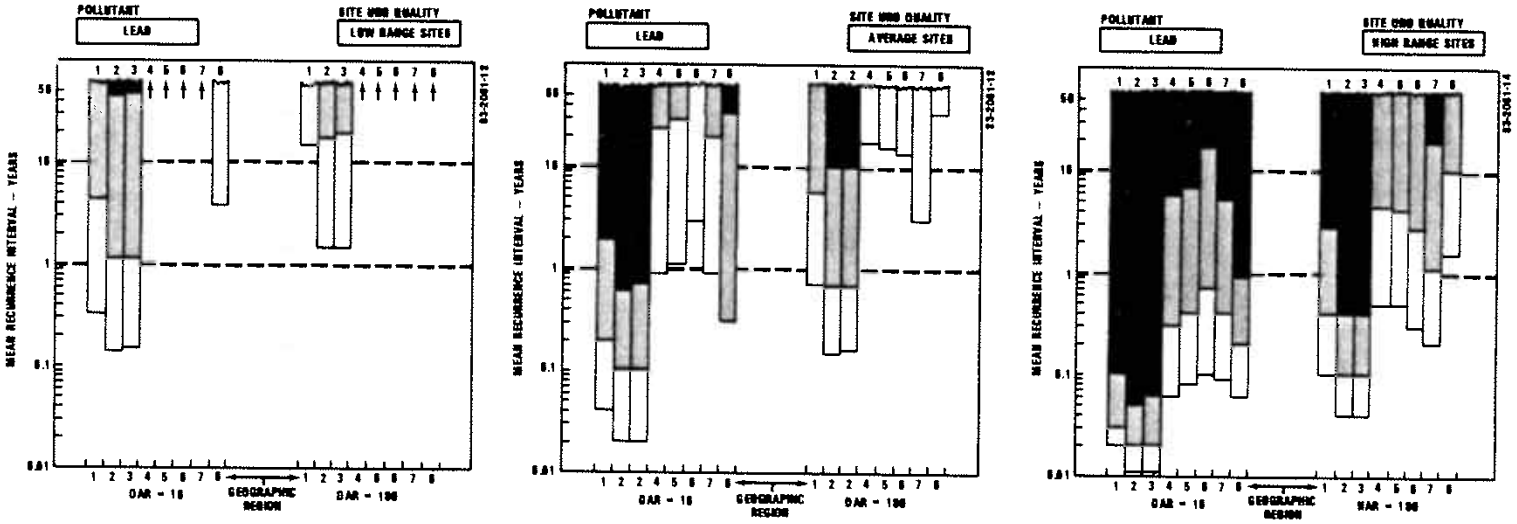

Figure 7-7. Exceedance Frequency for Stream Target Concentration
LEAD

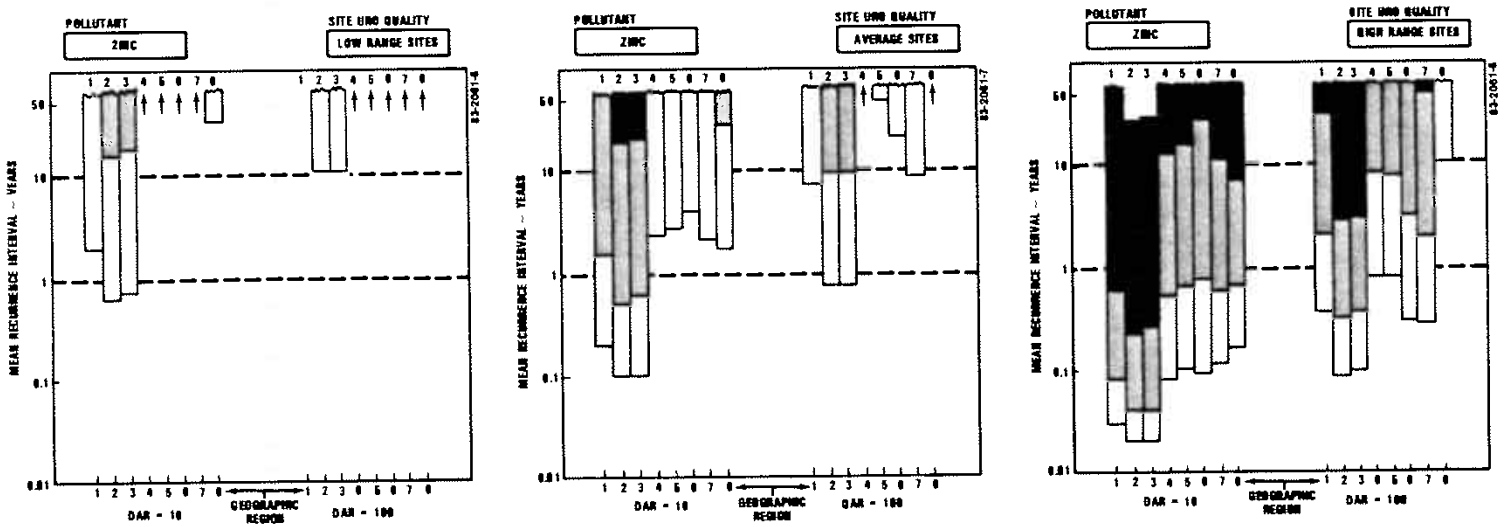

Figure 7-8. Exceedance Frequency for Stream Target Concentration
ZINC

- Threshold concentration levels at which adverse biological stress for short duration exposures is projected to occur have a recurrence interval of about 0.05 years (20 times/year).

- Significant mortality levels are exceeded at intervals of about 0.5 year (twice/year) for the less severe effect, to about once in 5.5 year for the more severe impact specified.

The plot is terminated at an upper level for recurrence interval of 50 years. Although the analysis procedure computes specific recurrence intervals in excess of this value, a realistic interpretation suggests that such conditions are for practical purposes quite unlikely to ever be reached or exceeded. At computed recurrence intervals of about 10 years or more estimates are not considered to be reliable and are very probably conservative. Therefore, indicated mean recurrence intervals in excess of 10 years probably (and 50 years certainly) should be interpreted as "unlikely" or "highly unlikely".

Discussion

An inspection of the screening analysis results (Figures 7-6 through 7-8) indicates the reason why it is unrealistic to attempt a broad generalization on whether urban runoff is, or is not a "problem" in rivers and streams. Water quality impacts can vary widely, depending on regional rainfall and stream hydrology, urban site quality characteristics, drainage area ratio (reflecting the size of the receiving stream relative to the urban area), and the total hardness of the receiving stream. While the screening analysis results provide an informative and useful perspective on the issue, it should be recognized that any specific site may differ considerably from the typical conditions used to characterize rainfall and stream flow for the area, and further, that local variations in runoff quality characteristics within the range defined by the NURP data can also have significant influence. The dominant indication of the analysis is that the problem potential for urban runoff is highly site-specific. Nevertheless some useful generalizations can be made.

Perhaps the major factor which dictates whether urban runoff discharges of copper, lead, or zinc will adversely impact aquatic life is the natural hardness of the receiving streams. As a result, the southeast and gulf coast areas are consistently indicated to be more sensitive than other areas of the country. Of the remaining soft water areas, the northeast is somewhat less sensitive; the Pacific northwest markedly less. This is attributed to significantly lower storm intensities in these areas, coupled in the northwest with appreciably higher stream flows.

Drainage area ratios have an important effect, reflecting as they do the magnitude of stream flow at the urban location. The effect is much greater for geographical regions with high unit flow (cfs/sq mile) than for lower stream flow regions.

Finally, the quality characteristics of the urban sites have a significant influence. Stream concentrations differ markedly depending on whether the local urban sites tend to cluster toward the lower or higher end of the range of site median concentrations indicated by the NURP data base.

A comparison of the relative position of the bars on Figures 7-6, 7-7 and 7-8, is sufficient to indicate the comparative sensitivity to urban runoff pollutant discharges. However, it is also desirable to decide whether a given stream effect constitutes a serious degree of impairment of an aquatic life beneficial use. There are no formal guidelines, and interpretations that are either more liberal or more restrictive than those suggested below may be preferred by others dealing with specific stream segments. For the interpretation of the national scale screening analysis, the following decision basis has been used to identify the situations in which urban runoff is likely to result in a water use "problem", (i.e., cause an unacceptable degree of use impairment):

- Threshold effects - (mortality of the most sensitive individual of the most sensitive species) occur more often than about once a year on average.

- Significant mortality - using the lower of the two levels (i.e., 50 percent mortality of the most sensitive species), occurs more often than about once every 10 years on average.

Using these guidelines for assessing the occurrence of problem situations, copper is shown to be the most significant of the three heavy metals consistently found in urban runoff at elevated concentration levels. Where site concentrations are at the high range of observed urban site conditions, problems are expected in all geographic regions at a DAR = 10, and in all geographic regions except region 8 at DARs as high as 100. When site concentrations are in the average range of observed conditions, problem situations are restricted to geographic regions 2 and 3 (plus region 1 at DAR = 10). When site copper concentrations are in the lower range of observed site conditions, problem situations are restricted to geographic regions 2 and 3 at low DARs. They are marginal (significant mortality once every 5 years) but remain a problem according to the definition adopted. The "marginal" attribution is used here, because the more severe degree of significant mortality (most sensitive individual of 25th percentile sensitive species) is indicated by the analysis virtually never to occur.

Thus, copper discharges in urban runoff are indicated to represent a significant threat to aquatic life use in regions 2 and 3 (southeast and Gulf Coast) under almost all possibilities for urban site runoff quality. In region 1 (northeast), problems would be expected at all but the lower range of site concentrations. In the hard water areas (regions 4, 5, 6, 7) problems are expected only where site runoff quality is in the high end of the range of observed site median concentrations.

It should be noted that the analysis has been based on <u>total</u> copper concentrations in urban runoff. Toxic effects are usually considered to be exerted by the soluble form of the metal, and EPA defines an "active" fraction based on a mild digestion which converts some of the inactive particulates to soluble forms, to account for transformations which may occur in the natural water systems. Copper in urban runoff has a typical soluble fraction of about 50 percent, and the active fraction would therefore fall somewhere between 50 and 100 percent of the total concentration used in the analysis. The analysis has been performed using the total fraction, since adequate

information is not available at present to reliably adjust these values. However, although the problem assessment presented above may be somewhat conservative, further refinement along these lines would not change the inferences drawn from the screening analysis results.

Zinc, like copper, has an indicated soluble fraction in the order of 50 percent, and the screening analysis indications will also be unaffected by this consideration. It is indicated to be unlikely to pose a significant threat to aquatic life in most urban runoff situations. Exceptions are restricted to soft water areas in the east and south, lower DARs, and sites with high zinc concentrations in urban runoff.

Lead results must be viewed with greater caution, because soluble fractions in urban runoff are indicated to be quite low (less than 10 percent). Problem indications are therefore likely to be reasonably conservative, i.e., overstate the problem potential. Problem situations may be expected to be restricted to soft water areas in the east and Gulf areas when urban sites have average site concentrations and DARs are low, and even at high DARs when site concentrations are in the high range. Lead is not indicated to be a threat to aquatic life in the hard water areas of the country or in the Pacific northwest, except for the combination of low DAR and high site concentration.

In performing the screening analysis, upstream concentrations were assumed to be zero; that is, the receiving stream had only a diluting effect on the urban runoff pollution. In actual cases background concentrations will be greater than zero, and in some instances upstream contributions (e.g., agricultural runoff, another city) could be significant and result in more severe conditions than those identified in the screening analysis.

On the basis of the foregoing, it appears appropriate to identify copper as the key toxic pollutant in urban runoff, for the following reasons:

- Problem situations anticipated for lead and zinc do not occur under any conditions for which copper does not show up as a problem as well - and with more severe impacts. On the other hand, copper is indicated to be a problem in situations where lead or zinc are not.

- Based on the ratios between concentrations producing increasingly severe effects, copper is suggested to be a more generic toxicant. It has an effect on a broad range of species. This is in contrast to lead and zinc for which a substantially greater degree of species selectivity is indicated. Some species are sensitive, others relatively insensitive to lead and zinc.

- From the NURP data, locations which tend to have site median concentrations in the low, average, or high end of the range have generally consistent patterns for each of the three heavy metals.

- Control measures which produce reductions in copper discharges to receiving waters could be expected to result in equivalent reductions in zinc, and greater reductions in lead, by virtue of its significantly greater particulate fraction.

Copper is accordingly suggested to be an effective indicator for all heavy metals in urban runoff relative to aquatic life. It might be used as the focus for control evaluations, site specific bioassays, monitoring activities, and the like.

It should be noted that while immediate water column impacts of lead are not as significant as those for copper, the high particulate fraction of lead would tend to result in greater accumulations in the stream bed. This aspect has not been addressed by the NURP program in sufficient detail to warrant any comment on its potential significance.

The results of the screening analysis summarized by Figures 7-6 through 7-8 are approximate, because they are influenced by the suitability of the typical values for stream and runoff flows which were assigned. This however can be refined by the use of appropriate values which can be developed from readily available data bases, and thus adjusted for local variations which are to be expected. A second issue relative to the reliability of the projections is the validity of the computations, given that the input parameters are representative. This has been confirmed by a number of validation tests, discussed in the NURP supporting document referenced earlier, which addresses the stream analysis methodology.

The remaining issue for evaluating the reliability of the indications of problem potential produced by the screening analysis is the reasonableness of the intermittent exposure concentration levels, which have been associated with various biological effects levels, and the guidelines adopted for this discussion, which determine whether or not a problem is expected. While rather tenuous at this time, the information available does provide support.

Two of the NURP projects examined aquatic life effects in streams receiving runoff from monitored sites.

- Bellevue, WA concluded that whatever adverse effects were observed were attributable to habitat impacts (stream bed scour and deposition) as opposed to chemical toxicity. For this project, heavy metal concentrations in the monitored urban runoff sites were typical of the average for all urban sites. The screening analysis results under these conditions do not indicate the expectation of a problem.

- Tampa, FL conducted extensive bioassay tests but failed to show any adverse effect of water column concentrations of pollutants in urban runoff. The screening analysis results presented in Figure 7-6 indicate marginal problem conditions at low DAR for this geographic region. At this project however, all monitored sites show heavy metal concentrations significantly lower than the low range conditions used in the screening analysis. When

the screening analysis is repeated using site concentrations representative of Tampa monitoring results, a problem situation is not predicted, even at DARs lower than is probably the case for this location.

LAKES

Because lakes provide extended residence times for pollutants, the significant time scale for evaluating urban runoff impacts is at least seasonal, and usually annual or longer, rather than the storm event scale used for streams. The screening methodology identified in Chapter 5, uses annual nutrient loads to assess the tendency for development of undesirable eutrophication effects.

Figure 7-9 illustrates the effect of urban runoff on average lake phosphorus concentration. The very significant influence of area ratio is evident. The larger the urban area which drains into a lake of a given size, the greater the annual loading, and the higher will be the lake phosphorus concentration and the eutrophication effects produced.

The phosphorus concentrations characteristic of the urban sites surrounding a particular lake are also seen to be significant. The three bands shown reflect the range of possibilities, based on the NURP data. The same basis is used to estimate the phosphorus loads from average urban sites and those at the higher and lower ends of site conditions, as was described for heavy metals in the previous section. In this case, because it is annual mass loads which are of interest, site median concentrations have been converted to site mean values for use in the computations.

Lake phosphorus concentrations are also influenced by the annual runoff volume (annual precipitation and runoff coefficient). The results illustrated are based on an annual rainfall of 30 inches and an overall average runoff coefficient of 0.2. Plotted results may be scaled up or down in proportion to the ratio between local values for these parameters and those used in the illustration.

Finally, the lake morphology and hydrology influence the outcome; specifically depth (H) and residence time (τ). This is reflected by the width of each of the bands, which are based on a range of values for H/τ (1 to 10) estimated to be fairly typical for lakes in urban settings.

If an average lake phosphorus concentration of 20 µg/l is used as a reference concentration to assess the tendency for producing undesirable levels of biostimulation, it is apparent that only lakes with rather small area ratios are likely to be unaffected by urban runoff nutrient discharges. Since the three bands represent different concentration levels of phosphorus in urban runoff, qualitative inferences may be drawn concerning the beneficial use impacts of control activities. More detailed estimates may of course be made by use of the methodology with site specific parameters.

The salient feature of the situation, as generalized by the analysis summarized by Figure 7-9, is that the problem potential of urban runoff for lakes is quite site specific. The illustration considers only urban runoff loads; in an actual situation, all nutrient sources (point and nonpoint)

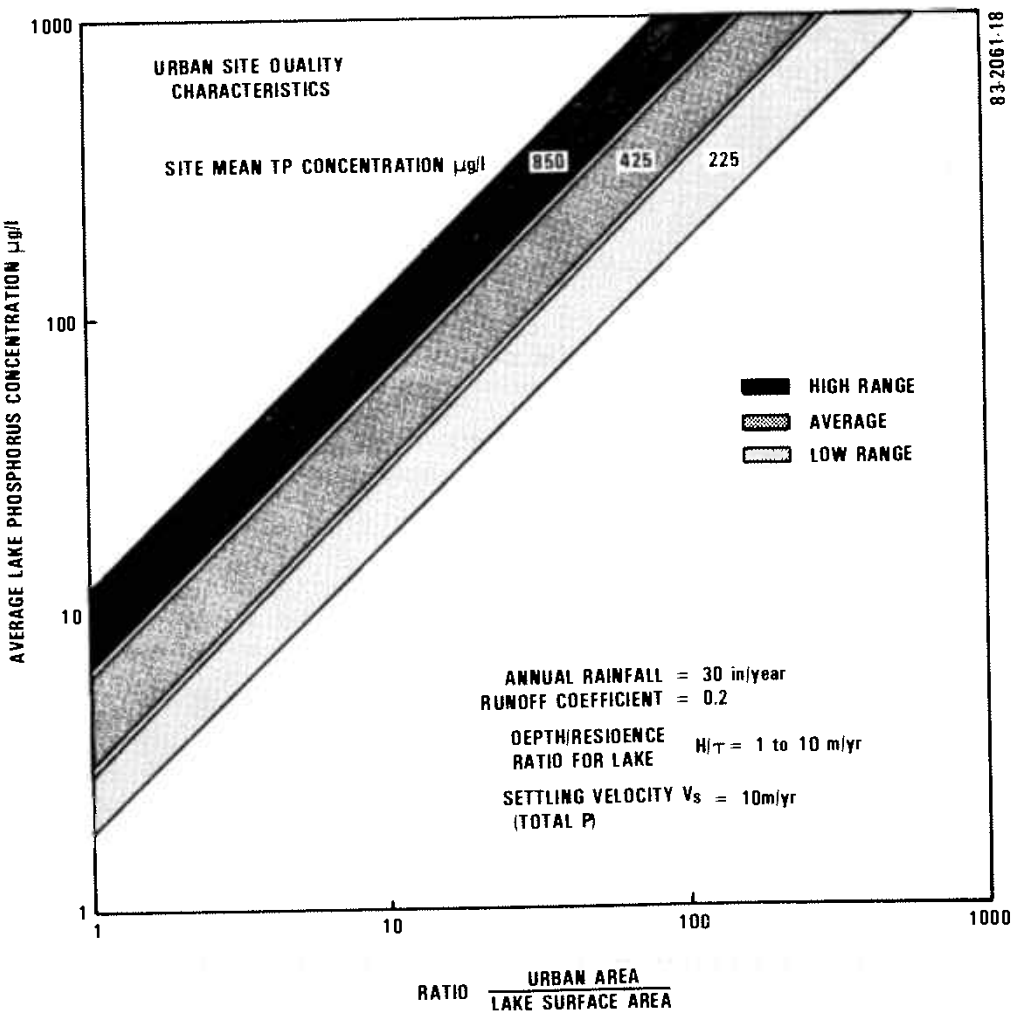

Figure 7-9. Effect of Urban Runoff on Lake Phosphorus Concentrations

would be considered, and this would tend to modify the relative significance of urban runoff on lake conditions.

Several of the NURP projects addressed impacts on lake quality in some depth. These projects include the following:

- Irondequoit Bay, NY - Lake has been highly eutrophic, due to point and nonpoint discharges. Sewage treatment plant and combined sewer overflow discharges have been removed, so that residual sources are recycle from lake sediments and nonpoint sources, including urban runoff, from the contributing drainage area. Further reductions are considered necessary to meet targets. (Area ratio is high at this location.)

- Lake George, NY - Lake is oligotrophic; the study addressed the concern that urban runoff from present and potential future development would unacceptably accelerate degradation of existing water quality. (Area ratio is low at this location.)

- Lake Quinsigamond, MA - Urban runoff was determined to be one of a number of sources preventing water quality objectives from being met. Some control of urban runoff phosphorus loads was recommended as one of the elements of an overall management plan.

Each of the above situations is sufficiently unique, and the mix of urban runoff and other load sources is sufficiently different to suggest that it is inappropriate to attempt a broad generalization. The interested reader may refer to the individual project documents which are available through NTIS for more information.

ESTUARIES AND EMBAYMENTS

These water bodies are normally of sufficient size and complexity that simple screening analyses have not been considered to be sufficiently useful or effective to justify their use.

The Long Island, NY NURP project examined and confirmed that urban runoff sources of coliform bacteria are the principal contributors to the water column concentrations that result in closure of shellfish beds in a number of embayments (principally the Great South Bay). Estimates of control activities that would allow the opening of presently closed areas were also made. The reader is referred to the project documents for further information.

The significance of urban runoff and other nonpoint source loads on eutrophic levels in the Potomac estuary is being investigated under a study which is not associated with the NURP program. However, among other objectives of the WASHCOG NURP project, estimates of urban nonpoint source loads have been developed to support this study.

Although specific situations where urban runoff is significant have been identified, no general assessment for water bodies of this type can be made at this time.

GROUNDWATER AQUIFERS

Much of the precipitation which falls on an area either percolates directly into the ground, or does so after relatively short overland flow distances. This condition is essentially uncontrollable and distinctly different from the case where urban runoff from impervious areas is deliberately collected and routed to a recharge device which causes it to percolate to groundwaters.

This type of control approach is a practical and effective technique for reducing pollutant loads which would otherwise reach surface waters as discussed in Chapter 8. The concern addressed here is with the extent to which groundwater aquifers may be contaminated by this practice.

The Long Island, NY and Fresno, CA NURP projects examined this issue through extensive tests utilizing recharge basins ranging from recent installations to others which have been in service in excess of 20 years. A somewhat simplified consolidation of the salient findings of these two projects is presented below. The interested reader is referred to the individual project report documents, available through NTIS, for the important details and qualifications.

- Most pollutants of importance in urban runoff are intercepted during the process of infiltration and quite effectively prevented from reaching the groundwater aquifers underlying recharge basins. The pollutants tested and found to behave in this manner include the heavy metals, an appreciable number of the organic priority pollutants and pesticides, and coliform bacteria.

- Chlorides, which are sometimes present in urban runoff at elevated concentrations due to road deicing practices, are not attenuated during recharge.

- Pollutants accumulate in the upper soil layers. The concentrations found are a function of the length of time a basin has been in service. Effective retention of pollutants takes place with all soil types tested, ranging from clays to sands. The depth of pollutant penetration is affected by soil type; however in no case did contaminant enrichment of soil exceed several meters depth, and highest concentrations were found near the surface.

- The limit of the ability of the soil to retain the pollutants of interest is unknown. Additional study of this aspect is appropriate. However given the long service periods of a number of the recharge basins studied, this does not appear to represent an imminent concern.

- At both of these NURP locations, groundwater surfaces were at least 20 feet, and often appreciably more, below the base of the recharge device. The indicated findings may not be applicable at locations with shallow depths to groundwater.

- No significant differences in interception/retention of pollutants is apparent for basins with bare versus vegetated recharge surfaces. However vegetation does apparently help to maintain infiltration rates normal for the soil type.

- Surface soil accumulations of priority pollutants in dual purpose installations used for both recharge and recreational use warrants further investigation to determine whether such practice creates unacceptable health risks or requires appropriately designed and conducted maintenance procedures.

CHAPTER 8
URBAN RUNOFF CONTROLS

INTRODUCTION

This chapter summarizes the information developed by the individual NURP project studies relating to performance characteristics of selected techniques for the control of urban runoff quality. The number of control practices addressed here is considerably smaller than the array of best management practices suggested in prior studies and publications. This is not intended to exclude consideration of other approaches. However, the techniques discussed in this chapter may be taken as an expression of controls considered by the agencies involved to be potentially attractive and practicable at localized planning levels. They represent the practices for which performance data were obtained under the NURP program and which can be analyzed and evaluated in this report.

Most of the NURP projects provide in their project reports a detailed analysis and evaluation of the controls that were studied. These reports are available through NTIS. In addition to this information source, an analysis was performed by EPAs NURP headquarters team, using results available from all project studies. The objective was to provide an overview and a generic description of performance characteristics in a format considered to be useful for planning activities. Thus, in addition to providing a consolidated summary of project results, this chapter presents a summary of the results of applying analysis methodologies developed under the NURP program. Further detail on the former can be obtained by reference to relevant project report documents; a more comprehensive development of the latter is provided in separate NURP documents ("Detention and Recharge Basins for Control of Urban Runoff Quality", and "Street Sweeping for Control or Urban Runoff Quality").

The types of control techniques which received attention (to a greater or lesser degree) in the NURP program can be grouped into four general categories.

- Detention Devices - These include normally dry detention basins typically designed for runoff quantity control, normally wet detention basins, dual purpose basins, over-sized drain pipes, and catchbasins.

- Recharge Devices - These include infiltration pits, trenches, and ponds; open-bottom galleries and catchbasins; and porous pavements.

- Housekeeping Practices - These are principally street sweeping, but also include sidewalk cleaning, litter containers, catchbasin cleaning, etc.

- Other - These include the so-called "living filter" approaches, grassed swales, wetlands, etc.

DETENTION DEVICES

General

Detention basins proved to be one of the most popular approaches to urban runoff quality control selected at the local level, based on the number of individual projects which elected to study them and the number of detention devices tested in the study. It is perhaps instructive to note that nearly all the detention facilities studied were either already in place, or required only modifications of outlet structures before initiation of the NURP-supported studies. In general, detention devices proved to provide a highly effective approach to control of urban runoff quality, although the design concept has a significant bearing on performance characteristics.

Table 8-1 lists the NURP projects that included detention devices as elements of their study program. Both the number of devices, and the number of storms analyzed vary considerably, as indicated in Table 8-1, depending on project priorities and other relevant activities. As a result, not all of the sites are incorporated in the summary presented below. The Washington Area Council of Governments (WASHCOG) conducted a particularly thorough and comprehensive investigation of control techniques, particularly detention basins. They have prepared several useful and informative analyses of performance results on these devices.

Dry Basins

This is a type of detention basin which is currently in fairly extensive service in various parts of the country. The performance objective of such basins is commonly called "peak shaving", that is, to limit the maximum rate of runoff to some preselected magnitude, usually a maximum pre-development rate. The purpose is to control flooding and erosion potential in areas downstream of new development. Such basins employ a bottom outlet having a hydraulic capacity restricted to the maximum allowable flow. Runoff from smaller storms flows along the bottom of the basin and is discharged without restriction. Flows in excess of design are backed up in the basin temporarily and ponding occurs only during larger storms and for relatively short periods of time. This class of retention basin is thus normally dry.

Performance of such basins, from a pollutant removal aspect, range from insignificant to quite poor. Accordingly, the limited data available are not discussed in this chapter.

Wet Basins

This designation covers detention basins which maintain a permanent pool of water. They may vary considerably in appearance, ranging from natural ponds or small lakes dedicated urban runoff control to enlarged sections in

TABLE 8-1. DETENTION BASINS MONITORED BY NURP STUDIES

Project	Site	Design Type	No. Events in/out
CO1 Denver	North Ave	Dry Basin	39/21
DC1 Washington, D.C.	Burke	Wet Basin	60/35
	Lakeridge	Dry Basin	49/41
	Stedwick	Dual-Purpose	48/34
	Westleigh	Wet Basin	41/45
IL2 N. Illinois	Lake Ellyn	Wet Basin	29/23
MI1 Lansing	Dryer Farms	Dry Basin	2/8
	Grace St. N*	Wet Basin	23/21
	Grace St. S*	Wet Basin	20/22
	Waverly Hills	Wet Basin	35/30
MI3 Ann Arbor	Pitt-AA	Wet Basin	6/6
	Traver	Wet Basin	5/5
	Swift Run	Wet Basin	5/5
NY1 Long Island	Unqua Pond	Wet Basin	8/8

* These are oversized storm drains installed below street level. Inverts of control sections are below the general grade line, so a permanent pool is maintained.

constructed drainage systems. Runoff from an individual storm displaces all or part of the prior volume, and the residual is retained until the next storm event. This pattern may or may not be modified by natural base inflows during dry weather depending on the local situation.

Detention basins utilizing this design concept have been shown by the NURP studies to be capable of highly effective performance in urban runoff applications, as summarized below. Although performance characteristics of individual basins ranged from poor to excellent, analysis shows these differences to be attributable to the size of the basin relative to the connected urban area and local storm characteristics. Performance data also indicate that in addition to removal of particulate forms or pollutants by sedimentation, some basins exhibit substantial reductions in soluble nutrients (soluble phosphorus, nitrate + nitrite nitrogen). This is attributed to biological processes which are permitted to proceed in the permanent water pool.

There are a number of ways to characterize detention basin performance. The primary basis selected by NURP for doing so is to define performance efficiency on the basis of the total pollutant mass removed over all storms. This provides a meaningful general measure for comparison, is relevant for water quality effects associated with extended time scales (e.g., nutrient load impacts on lakes), and conforms with the capabilities of the NURP analysis methodology developed to provide a planning-level basis for estimating cost/benefit differences in size or application density of this type control.

Table 8-2 tabulates performance in terms of reduction in pollutant mass loads over all monitored storm events. The analysis methodology developed under the NURP program activities suggests that performance should be expected to improve as the overflow rate (QR/A = mean runoff rate ÷ basin surface area) decreases and as the volume ratio (VB/VR = basin volume ÷ mean runoff volume) increases. The NURP basins used in the analysis are listed in increasing order of expected performance capabilities.

The wide range of relative basin sizes provided by this data base is apparent, and performance is seen to generally correspond with expectations. The poorest performance occurs in a basin with an average overflow rate during the mean storm of about six times the median settling velocity (1.5 ft/hr) of particles in urban runoff. In addition, less than 5 percent of the mean storm runoff volume remains in this basin following the event, to be susceptible to additional removal by quiescent settling during the interval between storms. The basins which exhibit high removal efficiencies, at the other end of the scale, have size relationships which result in the mean storm displacing only about 10 percent of the available volume, and producing overflow rates which are only a small fraction of the median particle settling velocity.

This rationale is described more completely in the supporting NURP document on detention basins identified earlier. The testing of the methodology against the NURP monitoring data is presented, and the basis for the performance projections illustrated below is documented.

Figure 8-1 presents a projection of removal efficiency of urban runoff detention devices as a function of basin size relative to the contributing catchment area and regional differences in typical rainfall patterns. The removal rates apply for TSS, which are all settleable, and must be factored by the particulate/soluble fraction of other pollutants which have significant soluble fractions in urban runoff. It applies for the specific basin average depth and area runoff coefficient indicated (which are fairly typical based on NURP data). However performance relationships could be different than indicated based on relevant local values for the controlling parameters.

An alternate approach for characterizing performance of detention basins concentrates on the variable characteristics of individual storm events and how these are modified by the detention device. A comparison of the mean and coefficient of variation of basin inflow and discharge concentrations provides another measure of performance of an urban runoff detention device.

TABLE 8-2. OBSERVED PERFORMANCE OF WET DETENTION BASINS
REDUCTION IN PERCENT OVERALL MASS LOAD

Project and Site	No. of Storms	Size Ratios		Average Mass Removals - All Monitored Storms (Percent)									
		QR/A	VB/VR	TSS	BOD	COD	TP	Sol.P	TKN	NO_{2+3}	T.Cu	T.Pb	T.Zn
Lansing Grace St. N.	18	8.75	0.05	(-)	14	(-)	(-)	(-)	(-)	(-)	(-)	9	(-)
Lansing Grace St. S.	18	2.37	0.17	32	3	(-)	12	23	7	1	(-)	26	(-)
Ann Arbor Pitt-AA	6	1.86	0.52	32	21	23	18	(-)	14	7	•	62	13
Ann Arbor Traver	5	0.30	1.16	5	(-)	15	34	56	20	27	•	•	5
Ann Arbor Swift Run	5	0.20	1.02	85	4	2	3	29	19	80	•	82	(-)
Long Island Unqua	8	0.08	3.07	60	(TOC=7)		45	•	(-)	(-)	•	80	•
Washington, D.C. Westleigh	32	0.05	5.31	81	•	35	54	71	27	•	•	•	26
Lansing Waverly Hills	29	0.04	7.57	91	69	69	79	70	60	66	57	95	71
NIPC Lake Ellyn	23	0.10	10.70	84	•	•	34	•	•	•	71	78	71

Notes: (-) Indicates apparent negative removals.

• Indicates pollutant was not monitored.

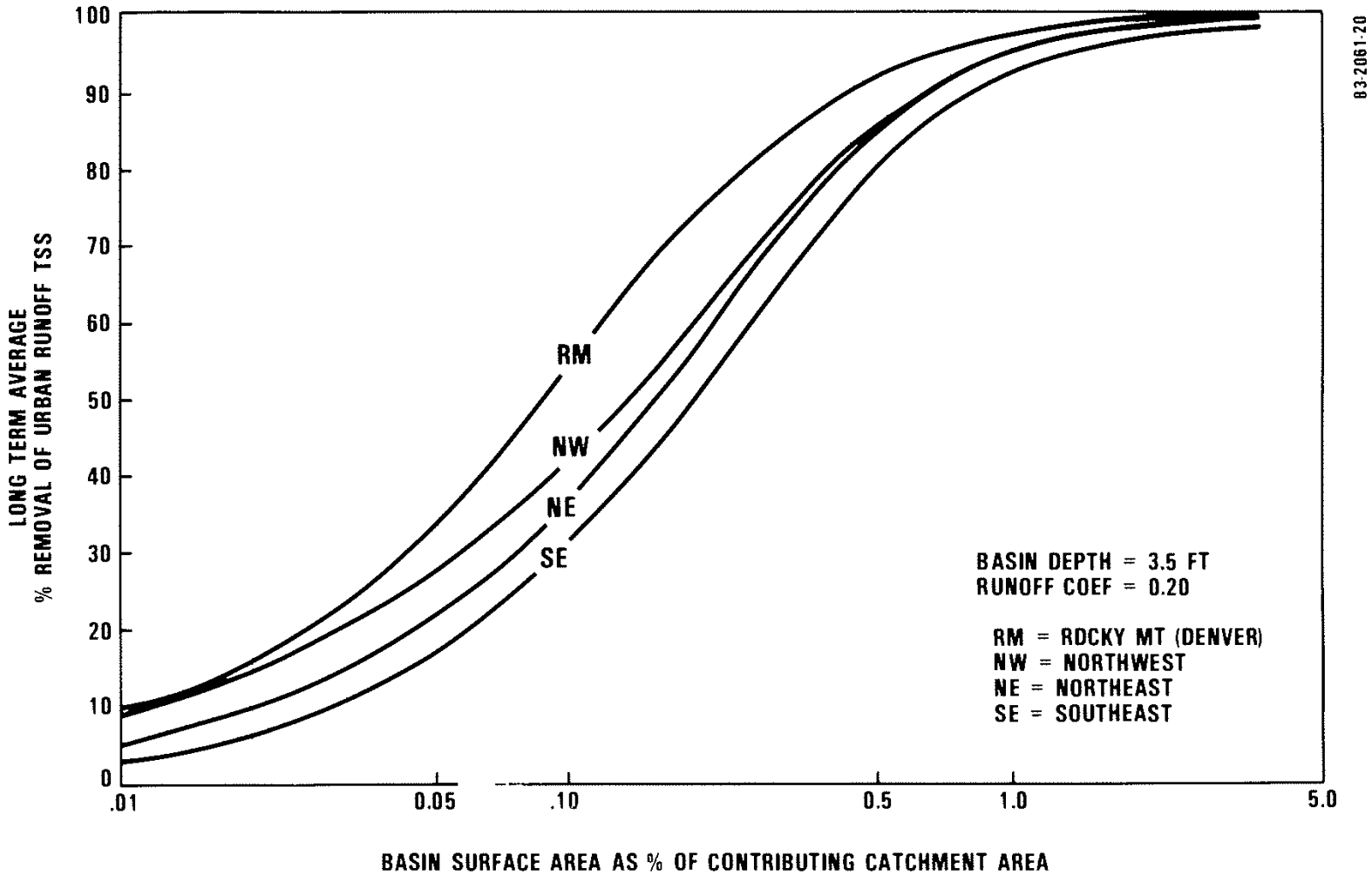

Figure 8-1. Regional Differences in Detention Basin Performance

This approach provides more useful information for subsequently evaluating the effect of controls on water quality impacts on rivers and streams. As evident from the discussion in Chapter 6, reductions in the mean and variability of runoff concentrations (and the inferred reduction in mean and variability of runoff rates) will have a significant beneficial effect on the severity of impacts on flowing streams.

Table 8-3 summarizes detention basin performance when assessed in this manner. It should be noted that in most cases more inlet storm events were monitored than discharge events, and that some inlet events do not have a matching discharge event and vice-versa. Further, for the larger basins where storm inflow displaces only a fraction of the basin volume, it is unlikely that influent and effluent for a specific event represent the same volume of water. The tacit assumption in this analysis is that the inflow events which were monitored provide a representative sample of the total population of all influent event mean concentrations (EMCs). Similarly, the monitored effluent events are assumed to be a representative sample of all basin discharge EMCs. The appropriateness of this assumption is obviously more uncertain where the number of individual storm events monitored is small.

For each basin influent and effluent, the arithmetic mean and variance were computed based on the relationships for lognormal distributions. The percent reduction in the mean concentration and the coefficient of variation are tabulated (Table 8-3). Note that where the number of monitored events shown in this table differ from those listed in Table 8-2, it is because the mass removal computations were restricted to synoptic storms (i.e., matching influent and effluent results were available for an event).

Performance characteristics are generally consistent using either approach, even though each displays a different type of information. Performance improves with detention basin size relative to catchment size and hence the magnitude of the runoff processed. Giving greater weight to the sites monitoring large numbers of storms, indications are that for most pollutants wet ponds also generally result in a considerable reduction in the variability of pollutant concentrations.

A significant exception to this tendency to reduce variability is shown for the soluble nitrogen forms (NO_2 + NO_3). The positive removal efficiency indicated by reduction of mean concentrations must be attributed to biological processes rather than sedimentation. A substantial increase in variability is consistently indicated by the data. Among the heavy metals, lead which is nearly all in particulate form shows significant reductions in variability. Copper and zinc which have high (40 to 60 percent) soluble fractions show an ambiguous pattern with regard to changes in variability.

In a few of the cases where atypical results are indicated, unique local conditions suggest plausible explanations. For example, at the Ann Arbor (Traver) site, erosion from an unstabilized bank at the outlet of this newly constructed basin is attributed to the poor suspended solids removal observed. The poor removal characteristics at the Unqua site for TKN and nitrate may be associated with the significant wildfowl population at this site.

TABLE 8-3. OBSERVED PERFORMANCE OF WET DETENTION BASINS
(PERCENT REDUCTION IN POLLUTANT CONCENTRATIONS)

(a) Mean EMC

Project and Site	No. of Storms (1)	Percent Reduction in Mean EMC									
		TSS	BOD	COD	TP	Sol.P	TKN	NO_{2+3}	T.Cu	T.Pb	T.Zn
Lansing Grace St. N.	23/20	(6)	(26)	15	(10)	(26)	11	(1)	(9)	39	(9)
Lansing Grace St. S.	18/17	22	4	(3)	6	0	(5)	(20)	25	14	7
Ann Arbor Pitt-AA	6/6	38	17	23	28	(2)	11	8	·	59	22
Ann Arbor Traver	5/5	0	(66)	12	37	63	19	28	·	·	19
Ann Arbor Swift Run	5/5	83	11	(3)	(38)	21	25	77	·	86	·
Long Island Unqua	8/8	34	(TOC=26)		38	·	(31)	(10)	·	78	·
Washington, D.C. Westleigh	40/40	83	·	33	59	70	19	28	10	·	10
Lansing Waverly Hills	35/30	87	52	52	69	56	30	54	53	93	58
NIPC Lake Ellyn	25/20	92	·	64	61	62	·	82	88	91	87

(b) Coefficient of Variation of EMCs

Project and Site	No. of Storms (1)	Percent Reduction in Coef of Variation of EMCs									
		TSS	BOD	COD	TP	Sol.P	TKN	NO_{2+3}	T.Cu	T.Pb	T.Zn
Lansing Grace St. N.	23/20	14	49	35	(7)	(13)	30	0	0	45	(31)
Lansing Grace St. S.	18/17	(7)	(59)	39	13	0	20	21	17	18	15
Ann Arbor Pitt-AA	6/6	17	(6)	10	28	(84)	37	0	·	53	(5)
Ann Arbor Traver	5/5	14	(109)	58	(3)	42	(150)	(82)	·	·	0
Ann Arbor Swift Run	5/5	(5)	39	50	(150)	0	20	(150)	·	26	·
Long Island Unqua	8/8	(87)	(TOC=66)		47	·	19	(66)	·	65	·
Washington, D.C. Westleigh	40/40	46	·	(26)	15	20	41	(280)	0	·	(14)
Lansing Waverly Hills	35/30	38	5	69	34	26	(8)	(198)	(22)	34	(36)
NIPC Lake Ellyn	25/20	44	·	41	71	48	·	(115)	60	19	41

Notes: (1) In/Out; numbers are approximate, and vary with pollutant. Removals in parentheses indicate negative removal.

Oot (·) indicates pollutant either not monitored or number of observations is too small for reliable estimate of percent reduction.

The ability of detention basins to reduce coliform bacteria concentrations is also of considerable interest because of the significant impact these urban runoff contaminants exert on recreational or shellfish harvesting beneficial uses. Other than at the Unqua site of the Long Island NURP project, the number of observations made for indicator bacteria were too few to support a reliable assessment of the ability of detention basins to effect quality improvements. However, extensive data of this nature were secured on detention basin influent and effluent during all monitored storms at the Unqua site.

Since coliform bacteria have a high rate of die-off in natural waters, performance characteristics based on total mass reductions are not particularly meaningful. The Unqua site data were analyzed to evaluate performance in terms of reductions in concentration levels. Over eight monitored storms at this site, covering a wide range in storm size, the mean EMC (MPN/100 ml) was reduced by 94 percent for total coliform, 91 percent for fecal coliform, and 95 percent for fecal streptococcus bacteria. Variability of bacteria concentrations in the pond outlet increased, with effluent coefficients of variation ranging from about 10 to 100 percent greater than influents. Accordingly, detention basins employing permanent pools (wet ponds) are indicated to be capable of substantial reductions in indicator bacteria.

Dual Purpose Basins

In the absence of a well defined terminology, we have adopted this designation to define basins that are normally dry, and hence retain their full potential for flood control, but which have outlet designs that result in a slow release rate for detained storm flows. Detention time is extended considerably compared with that provided by dry basins employing conventional outlet designs.

One of the detention basins examined by the WASHCOG NURP project, was of this type. This project designates such designs as "Extended Detention Dry Ponds." The pond was converted from a conventional dry pond by replacing the outlet pipe with a perforated riser enclosed in a gravel jacket. The modification was designed to detain stormwater runoff for up to 24 hours, instead of the 1 to 2 hours typically observed in conventional dry ponds.

For undetermined reasons, average detention periods during the study were in the order of 4 to 8 hours, and hence considerably shorter than the design objective. Nevertheless, based on monitoring of more than 30 storm events, the removal of particulate forms of urban pollutants was typically high and comparable to the performance efficiency of wet ponds.

Observed removals for this site (Stedwick) are summarized by Table 8-4, showing percent reductions in both mass and concentration distributions. The principal differences in performance of dual purpose basins compared with wet basins are suggested by the available data to consist of the following:

- Soluble pollutants (e.g., soluble P and Nitrate/Nitrite) are not effectively reduced because of the absence of a permanent pool within which biological reactions have an opportunity to occur in addition to sedimentation.

- The variability of pollutant EMC's does not appear to be modified to the extent that this occurs in wet ponds.

TABLE 8-4. PERFORMANCE CHARACTERISTICS OF A DUAL-PURPOSE DETENTION DEVICE

(Stedwick Site - Washington Area NURP Project)

Pollutant	Percent Reduction In		
	Pollutant Mass Load Over All Monitored Storms	Pollutant EMC's	
		Mean	Coef Var
TSS	64	63	(31)
COD	30	41	17
Total P	< 15	11	0
Sol P	1	(4)	(13)
TKN	•	8	(11)
Organic N	30	•	•
NO_{2+3}	10	13	6
T. Cu	•	•	•
T. Pb	84	•	•
T. Zn	57	43	33

Although the performance characteristics of basins of this type are indicated to be somewhat inferior to the potential offered by wet ponds, there are a number of considerations which make dual purpose basins highly attractive candidates for quality control of urban runoff. These include the fact that flood control requirements are likely to be more economically obtained than with wet basins and that many existing stormwater management basins may be readily modified to significantly enhance their capability for improving the quality of urban runoff. In areas where ordinances requiring conventional stormwater management ponds are already in existence, the only changes required would be an alternate specification of the outlet design.

Costs

The information presented here is intended to provide an order of magnitude estimate of the cost of providing different levels of control of urban runoff pollutant discharges, when wet detention devices are used as the best management practice (BMP). The summary is based on the size versus performance relationship presented earlier in Figure 8-1 and on the size versus cost relationships presented below.

The analysis is based on cost information developed by the WASHCOG NURP project and discussed in detail in one of their project reports produced for the NURP effort. Construction cost estimates as a function of basin volume are shown by Figure 8-2, adopted from this source. This estimate compares quite favorably with a similar cost/size relationship developed previously by the Soil Conservation Service (SCS).

The cost relationship shown by this figure applies to "dry pond" designs and relates only to expected cost of construction activities. For specific cost estimates, the results derived from Figure 8-2 should be modified as appropriate, in accordance with the following:

- The highly variable capital cost of land acquisition is not included in the construction costs.

- Outlet modifications to provide a dual purpose basin design will increase construction costs by about 10 to 12 percent.

- Pond designs which meet the peak shaving requirements of conventional (dry) pond designs, but also provide a permanent pool of water may have costs up to 40 percent greater than indicated by the cost relationship shown by Figure 8-2.

- An additional allowance equal to 25 percent of construction costs is suggested to allow for planning, design, administration, and construction related contingencies.

- Operation and maintenance costs are estimated to involve an annual expenditure of approximately 3 to 5 percent of base construction cost, that is, before application of the 25 percent factor for design, planning, and administration. The total is composed of two elements: 2 to 3 percent of construction cost estimates the annual cost of routine maintenance and upkeep; an additional 1 to 2 percent of construction cost estimates the annualized cost of sediment removal operations for a 10 year clean-out cycle.

Planning agencies often distinquish between "on-site" controls, which are applied to relatively small urban catchments, often installed by the developer of an urban property, and "off-site" controls, which involve larger basins and serve substantially larger urban drainage areas. Because of the appreciable economy of scale inherent in the cost relationship defined by Figure 8-2, this factor must be taken into account in developing cost/performance summaries for urban runoff quality control using detention basins. Accordingly, the control costs presented below for wet basin designs indicate the differences based on the size of the urban catchment the basin is designed to serve.

Figure 8-3 presents a planning level approximation of both present value and annual cost of wet detention basins. Amoritization of costs is based on a 20 year basin life and an interest rate of 10 percent.

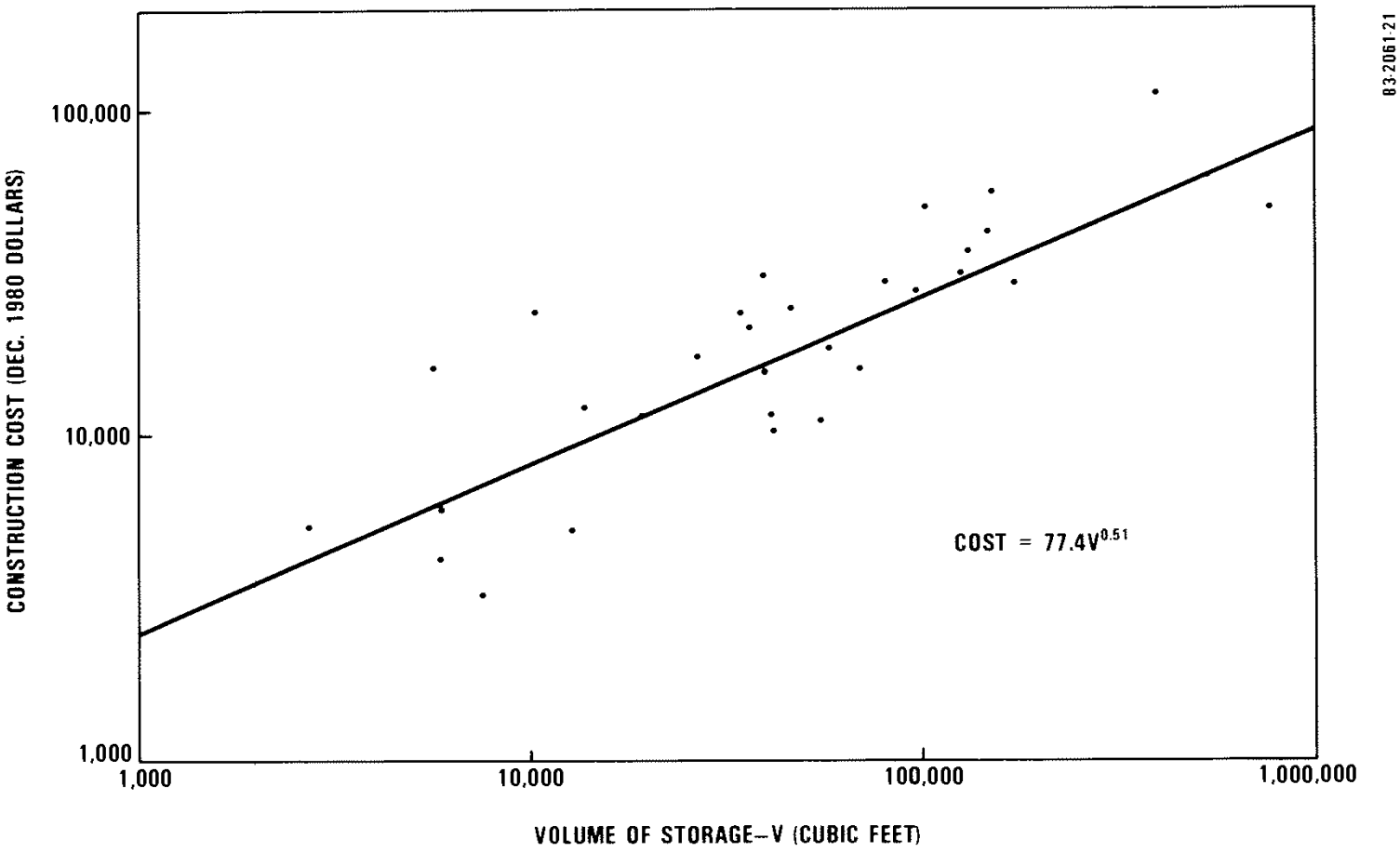

Figure 8-2. Average Stormwater Management (Dry) Pond Construction Cost Estimates Vs. Volume of Storage

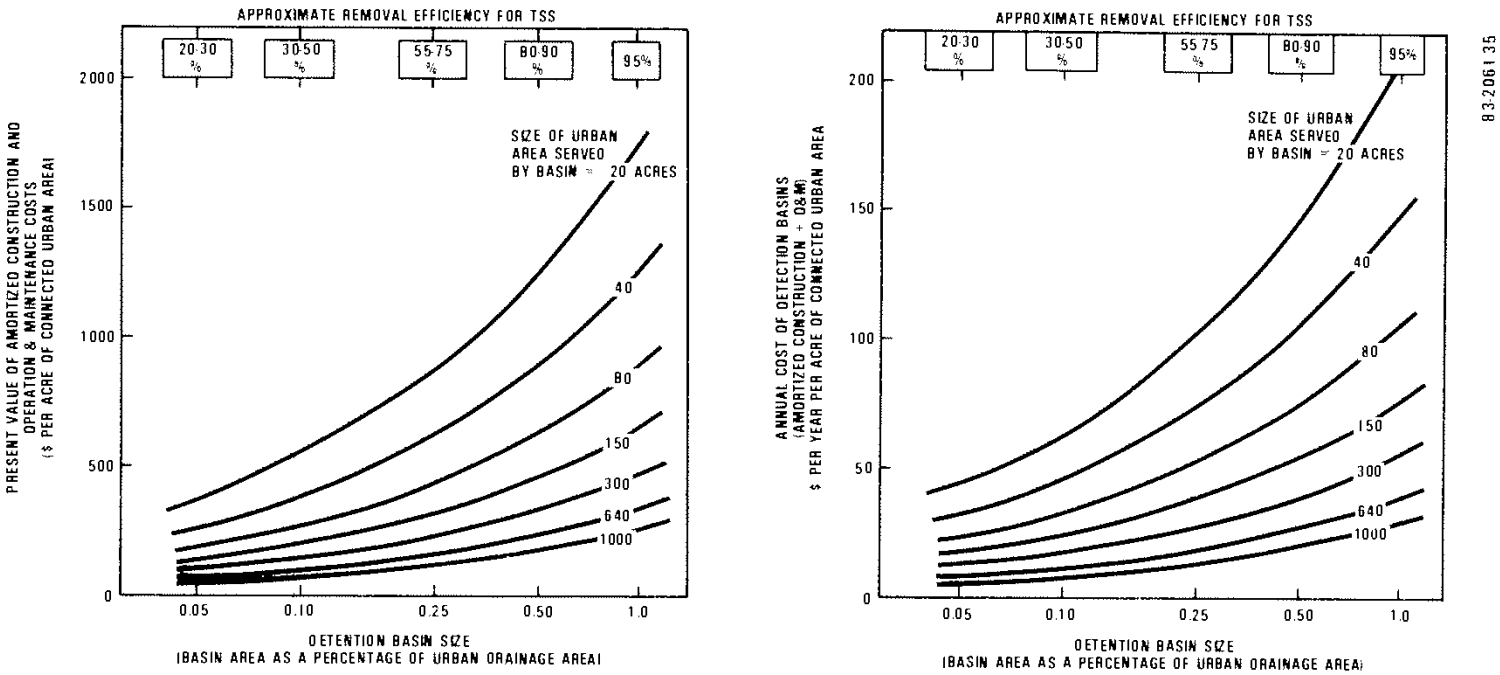

BASIS WET BASINS--CONSTRUCTION COSTS 40% GREATER THAN FIGURE B 2
ANNUAL O&M COST-5% OF BASE CONSTRUCTION COST
BASIN AVG DEPTH 3.5 FEET
INTEREST RATE 10%
BASIN LIFE 20 YEARS

Figure 8-3. Cost of Urban Runoff Control Using Wet Detention Basins

The performance levels associated with a particular basin size are shown at the top of the plots as a range for long-term average removal efficiencies for TSS. The range associated with a particular size reflects the regional differences in performance which can be expected (Figure 8-1) as a result of regional differences in storm characteristics. Approximate removal efficiencies for pollutants other than TSS can be estimated by factoring the indicated TSS removal by the particulate fraction of the pollutant of interest. The supplementary NURP document dealing with detention basins provides information to permit further refinement. A more concise local summary of cost/performance relationships can be developed using the NURP data and analysis methods, if local rainfall and land use characteristics, and design and planning preferences are utilized.

The generalized relationships shown by Figure 8-3 can be summarized as follows, if an urban catchment size of 20 to 40 acres is taken to represent a typical "on-site" control application, and an "off-site" application is reflected by detention basins serving 640 to 1000 acres.

Control Application	Approximate Level of Control (% TSS Reduction)	Cost Per Acre of Urban Area (Approximate)	
		Present Value	Annual Cost
On-site	50	$500 - $700	$60 - $80
	90	$1000 - $1500	$125 - $175
Off-site	50	$100	$10
	90	$250	$25

RECHARGE DEVICES

Control measures which enhance the infiltration of urban runoff are indicated by the NURP studies to be techniques which are practical to apply and capable of effective reductions in urban runoff quantity and quality. This finding is based on project reports and on the results of a screening analysis using a probabilistic methodology described in a supplementary NURP document on detention basins.

The issue of the potential contamination of groundwater aquifers due to enhanced infiltration of urban storm runoff has been discussed in the previous chapter dealing with receiving water impacts. The favorable findings support further consideration of this technique. At the same time, it must be emphasized that specific local conditions may make recharge inappropriate. Such conditions can include steep slopes, soil conditions, depth to groundwater, and the proximity of water supply wells. Sound planning and engineering judgement must be applied to determine the acceptability of this control approach in a local situation.

However, where local conditions premit, a wide variety of design concepts are available for use. These range from off-site applications consisting of

large retention basins, to small individual on-site units which include infiltration pits and trenches, percolating catch basins, and porous pavement. The operating principle is the same regardless of size or design concept. The important elements are the surface area provided for sub-surface percolation and the storage volume of the device. Overall performance will be related to the size of the recharge device relative to the urban catchment it serves and the permeability (infiltration rate) of the soil.

The context in which the performance capabilities of recharge devices are evaluated is the extent to which urban runoff is "captured" and prevented from discharging directly to surface waters. Pollutant removals are reduced in direct proportion to the runoff volume which is intercepted and recharged. Load reductions will be further enhanced if quality improvements occur in the portion of the runoff which is not captured. The combination of soil infiltration rate and percolating area provided determines the "treatment rate" of a specific recharge device. When storm runoff is applied to the device at rates of flow equal to or less than this rate, 100 percent of the runoff is captured during that event. At higher applied rates, the fraction of the runoff flow in excess of the treatment rate will escape and discharge to surface waters.

Most recharge devices other than porous pavement also provide storage volume. This improves performance capability because portions of the excess runoff can be retained for subsequent percolation when applied rates subside. Overflow to surface water occurs only when the available storage is exceeded.

The Long Island and Metropolitan Washington, D.C. (WASHCOG) NURP projects examined the performance of on-site recharge devices. An interconnected system of percolating catch basins in Long Island was estimated to reduce surface water discharges of storm runoff by more than 99 percent. The WASHCOG project found that a porous pavement site produced pollutant load reductions on the order of 85 to 95 percent depending on the specific pollutant considered. An infiltration trench studied by this project produced reductions in the order of 50 percent.

The NURP analysis methodology was employed in a screening analysis to assist planning evaluations by establishing the relationship between performance level and device size and soil percolation rates. Figure 8-4 presents a planning level estimate of the influence of size, soil characteristics, and regional rainfall differences on the performance of recharge devices.

The upper plot illustrates the significant effect regional differences in rainfall characteristics can have on the performance of identical recharge devices. Basin depth, soil percolation rate, and runoff coefficient for the urban catchment are the same for each case. The performance differences result from differences in the intensity and volume of the average storms in each region. Basin size is represented on the horizontal axis by expressing the percolation area that is provided as a percentage of the area of the contributing urban catchment. For example, a recharge device with a percolating surface area equal to 0.10 percent of an urban catchment represents a design which provides (43,560 sq ft/acre x 0.10/100% =) 43.5 square feet of

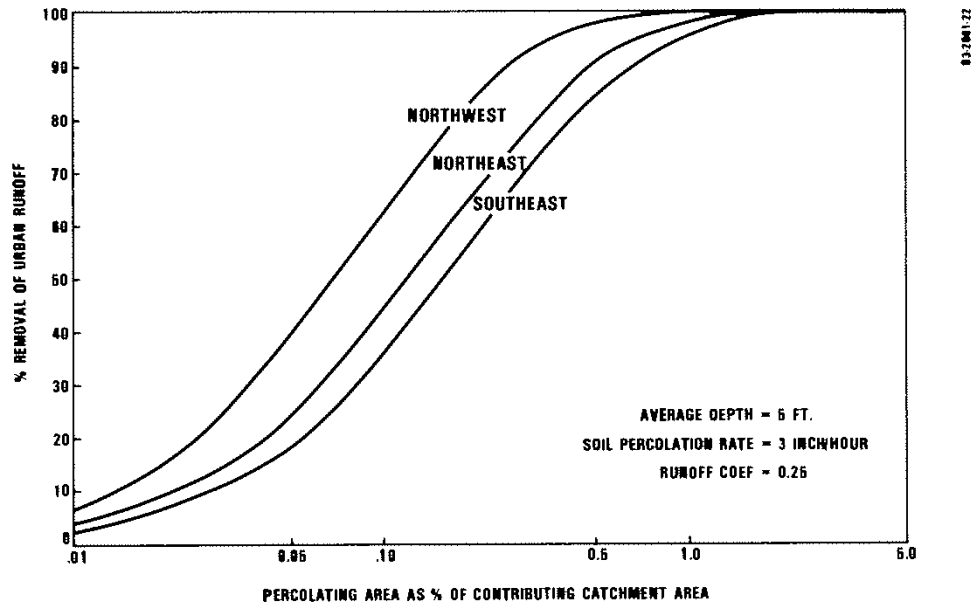

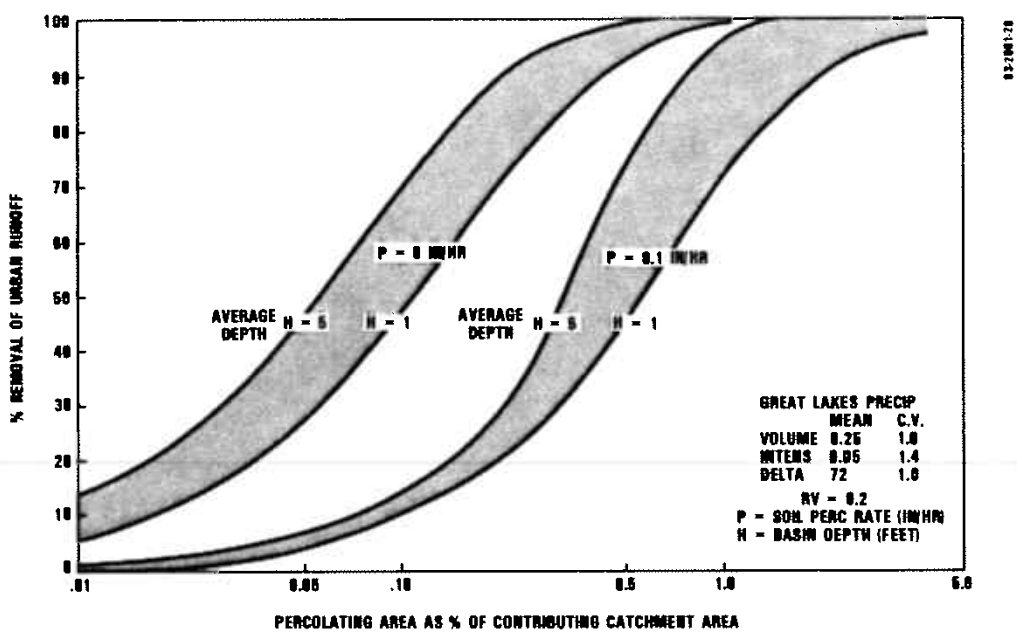

Figure 8-4. Long Term Average Performance of Recharge Devices

percolating surface area for each acre of urban catchment it serves. The long-term average reductions in urban runoff volume and pollutant load which can be expected will be approximately 35 percent in the southeast, 45 percent in the northeast and 65 percent in the Pacific northwest.

The lower plot illustrates the much more significant influence of the amount of storage volume provided (incidated by basin average depth), and the permeability of the soil through which the storm runoff must percolate. The rainfall characteristics used in this analysis are typical of the Great Lakes region of the United States and are roughly comparable to those in the northeastern part of the country. As might be expected, the permeability of the soil in which the recharge device is constructed has a dominant influence on performance capability. However significant compensation for low percolation rates can be achieved by increases in percolation area and storage volume.

When the screening analysis results are considered along with the favorable results from the NURP studies, the NURP findings indicate that with a reasonable degree of design flexibility to compensate for soils with lower percolation rates, recharge devices provide a very effective method for control of urban runoff.

STREET SWEEPING

End-of-pipe urban runoff pollutant concentrations have been commonly viewed as being a function of two prime factors -- accumulation of contaminants on street surfaces and rainfall/runoff washoff. The postulated beneficial effect of street sweeping was to reduce contaminant accumulation. Prior to NURP, emphasis of street sweeping investigations was placed on street surface mechanisms (e.g., accumulation and washoff) and sweeper equipment performance in removing street dirt. While these studies provided valuable insights into the possible benefits of street sweeping, measurements of end-of-pipe concentrations are the only direct measures of street sweeping effectiveness in water quality terms.

Recognizing this, NURP was designed to provide a large data base of urban runoff water quality concentrations for both swept and unswept conditions. In addition, the NURP street sweeping projects gathered and evaluated data on atmospheric deposition (i.e., wetfall and dryfall), street surface accumulation and washoff, and street sweeper removal rates and costs. The individual project reports look at these other issues, and the results are not repeated herein. Of prime interest and provided below is the effectiveness of street sweeping in reducing end-of-pipe urban runoff pollutant concentrations (and ultimately receiving water impacts). The findings presented below are based upon the analyses performed by the individual projects, as well as other statistical techniques, and are generally consistent with the projects' conclusions.

Five of the 28 NURP prototype projects had the evaluation of street sweeping as a central element of their work plans. These projects were as follows:

Project	Number of Sites
Castro Valley, CA	1
Milwaukee, WI	8
Champaign-Urbana, IL	4
Winston-Salem, NC	2
Bellevue, WA	2

Long Island, NY and Baltimore, MD also collected limited street sweeping data. The experimental designs of the projects varied in detail, but essentially followed either a paired basin or serial basin approach to gather test and control data, with some projects using both approaches. The general concept was that during a test period street sweeping would be more intensive (up to daily) and thorough (e.g., with operator training, parking bans, etc.) than during control periods when the streets were to be swept as usual or not at all.

In the paired basin approach, two adjacent or close-by basins were operated in a "control" or unswept mode for certain periods of time to establish a baseline comparison, and then street sweeping was performed in a "test" basin while the other remained as a control. The data provided an overall comparison between basins as well as a series of synoptic events for both basins. In the serial approach, a basin was periodically operated in either a control or test mode, with the periods adjusted so that all seasons of the year were represented in each mode. Here, rather than synoptic data pairs, one has data strings for both "swept" and "unswept" conditions.

There are no well established or prescribed procedures for evaluating the possible reduction in runoff concentrations due to street sweeping. Issues of concern include storm size and intensity effects, time since last rain, ability to select truly paired basins, seasonal effects, etc. In an attempt to sort out these issues, an exploratory data analysis was performed, and the following findings were established:

- Street sweeping has not been found to change the basic probability distribution of event mean concentrations. That is, the fundamental assumption of random, lognormal behavior is valid during sweeping operations.

- The runoff quality characteristics of a basin during swept or unswept conditions is best measured by the maximum likelihood estimator of the median EMC, with the uncertainty indicated by the 90 percent confidence interval of the median.

- There is in most cases no significant correlation (and in a few cases a weak negative correlation) between EMCs and storm runoff volume. EMCs and storm runoff intensities are also generally uncorrelated (but in isolated cases exhibit a weak positive correlation). The implication of these findings is that differences in concentrations between swept and unswept conditions will be largely unaffected by the size of the storms during the monitoring periods. Because of this independence between concentration and volume, effects of sweeping on EMCs will also indicate effects on mass pollutant loads.

- EMCs for synoptic events on paired basins are, in general, not significantly correlated or in some cases are weakly correlated; however, over the longer term (e.g., mean, frequency distribution, etc.), there are no significant differences between the distribution of EMCs of paired basins. These results show that basins are independent from storm to storm, and thus, comparisons between basins should not be attempted using synoptic events, but the basins do have similar statistical properties and thus can be considered paired.

To evaluate the effectiveness of street sweeping, a series of bivariate plots were constructed for projects using the serial basin approach. The site median EMCs for swept and unswept conditions form the data pairs of the plots. Bivariate plots are presented in Figure 8-5 for TSS, COD, TP, TKN, and Pb concentrations, respectively. Each plot contains swept or unswept conditions for multiple project sites. The assumption of the analysis is that a large enough data base was collected to negate any temporal effects such as seasonal, land use conditions, parking patterns, and other possible factors (as noted earlier, storm volume and intensity effects are not believed to be significant). Examining the bivariate plots, it is observed that, for the NURP data, the median concentrations are as likely to be increased as decreased by street sweeping. Further, street sweeping never produced a dramatic (e.g., >50 percent) reduction in concentrations (or loads).

Street sweeping performance, as measured by the percent change in the site median EMC, for selected NURP sites is graphically displayed in Figure 8-6. The results are for five constituents (TSS, COD, TP, TKN, and Pb) at 10 sites nationwide). For each site, the median EMC is based on data from between 10 and 60 events, with 30 events typical. Based on Figure 8-6 a number of important observations are evident.

- Performance as measured by change in site median EMC is highly variable.

- Where reductions occur, they generally occur for all constituents.

- Reductions never exceed 50 percent.

(TSS Concentrations)

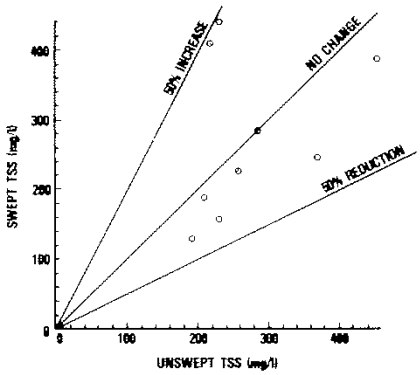

(TKN Concentrations)

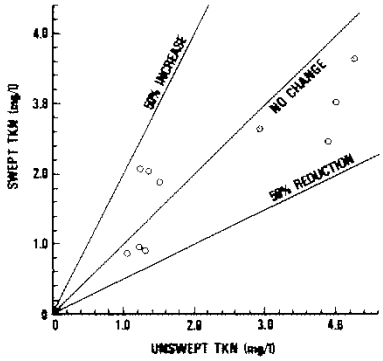

(COD Concentrations)

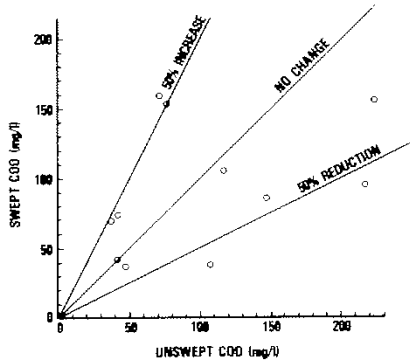

(Pb Concentrations)

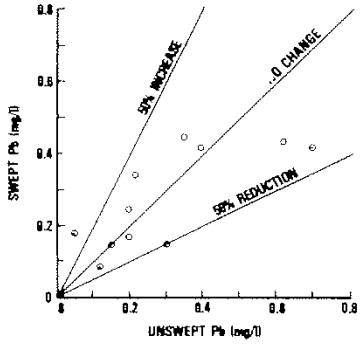

(TP Concentrations)

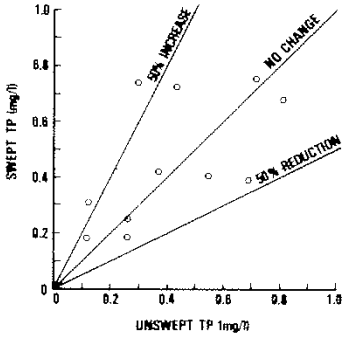

Figure 8-5. Bivariate Plots of Median EMCs for Swept and Unswept Conditions

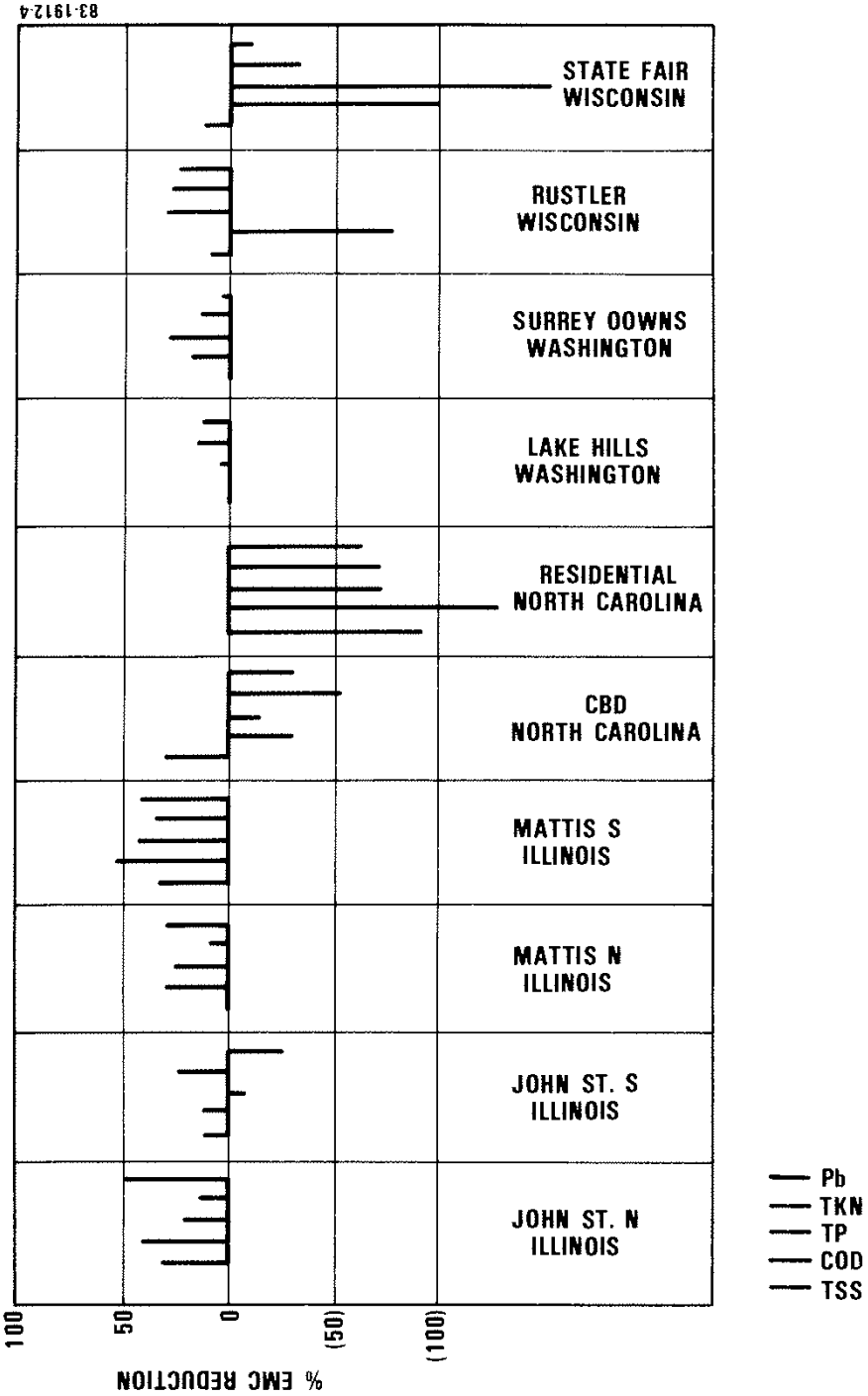

Figure 8-6. Street Sweeping Performance

In evaluating the results, it is critical that the uncertainty in the estimate of median EMCs based on limited observed data, and thus the uncertainty in performance estimates, be assessed. This is especially true for the cases of apparent increases in concentrations indicated by Figure 8-6.

For each of the 10 sites considered, the 90 percent confidence intervals of the site median EMCs were computed as indicated in Figure 8-7. This analysis indicates that there is generally no significant difference between median EMCs for swept and unswept conditions. The implications of this analysis of uncertainty are as follows:

- Based on statistical testing, no significant reductions in EMCs are realized by street sweeping.

- The indicated changes in site median EMCs (increases or decreases) are much more likely due to random sampling than actual effects of sweeping operations.

- Benefits of street sweeping (if any) are masked by the large variability of the EMCs, therefore the benefit is certainly not large (e.g., >50 percent), and an even larger site data base is required to further identify the possible effect.

- In the above context, the hypothesis that street sweeping increases EMCs is generally not shown by the data, though it could occur in isolated, site specific cases.

Urban runoff loads are the product of long term (e.g., annual) runoff volume and event mean concentration. Under this definition, statements concerning EMCs also hold for loads.

OTHER CONTROL APPROACHES

Several best management practices (BMPs) in addition to those discussed above should be identified on the basis that local planning efforts determined them to be practical to apply and to have the potential to provide significant improvements in the quality characteristics of urban runoff. They are grouped together in this section and discussed only briefly, principally because, for one reason or another, sufficient data to characterize their performance capabilities was not developed during the NURP program.

Grass Swales

Three grass swales were monitored by the Washington, D.C. area NURP project. No significant improvement is urban runoff quality was indicated for pollutants analyzed. Increases in zinc concentration which were observed were attributed to mobilization of zinc from the galvanized culverts which carried runoff under the driveways at the monitored residential sites. However the project study report concluded that modifications which would increase residence of runoff in the swales and enhance infiltration capability could make this BMP effective for control of urban runoff.

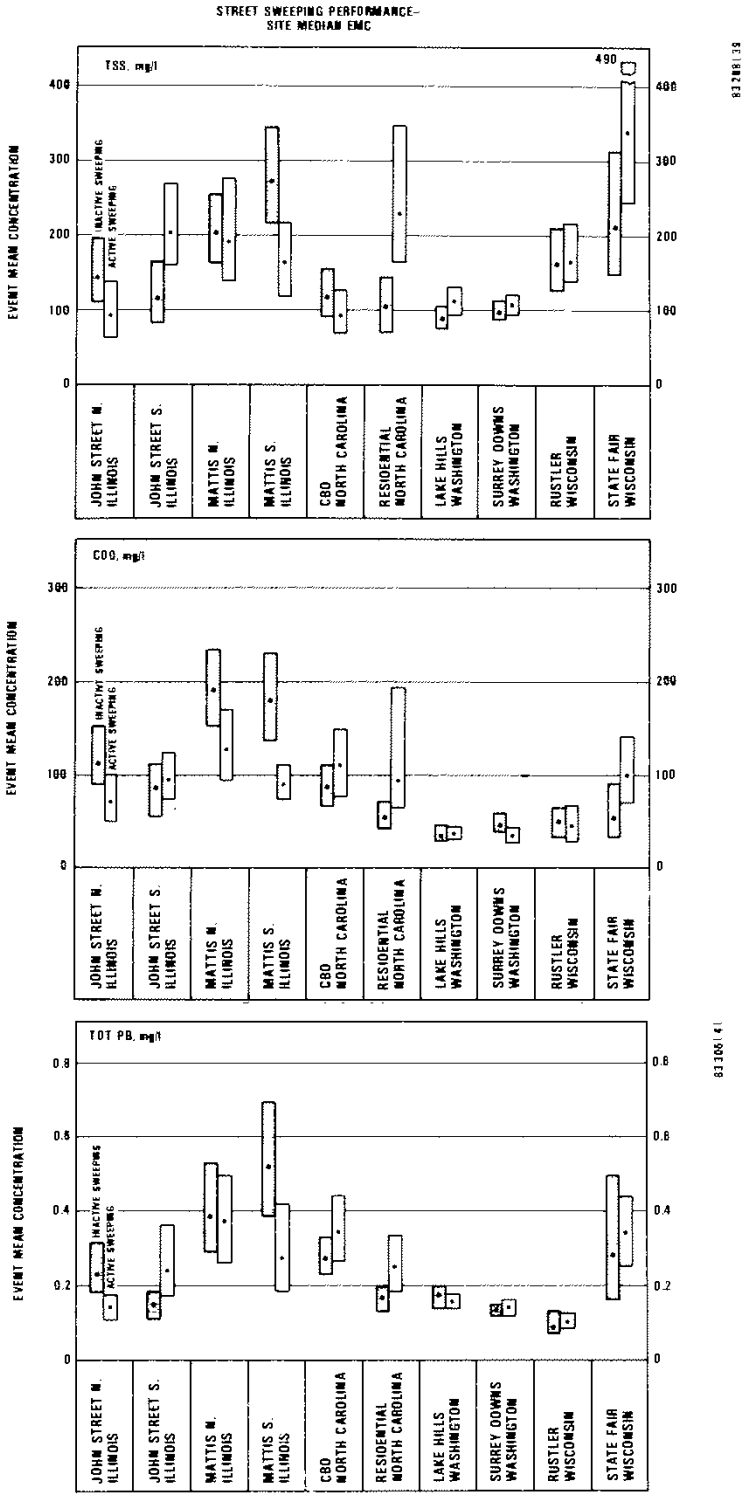

Figure 8-7. Effect of Street Sweeping on Site Median EMC Values

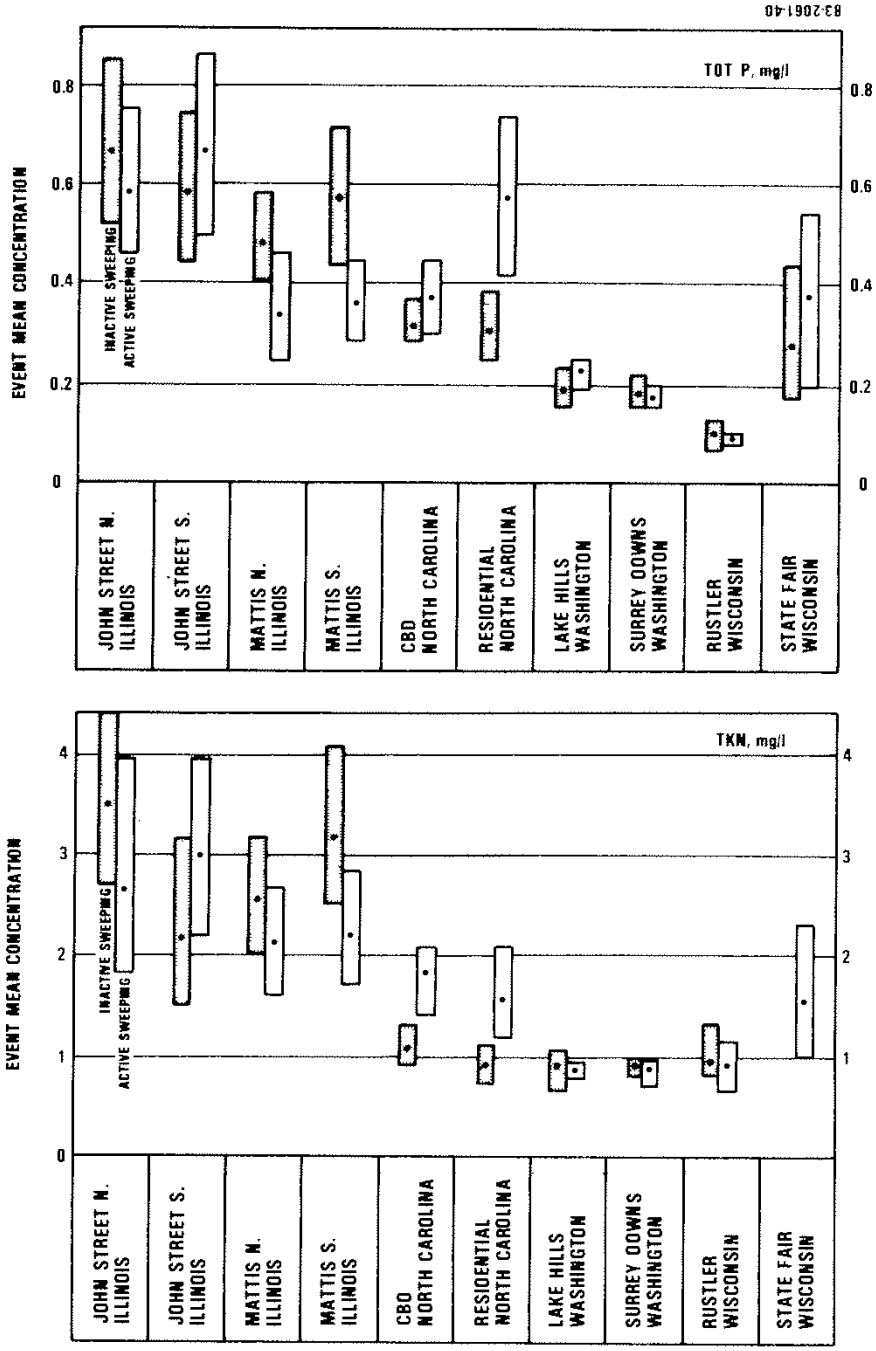

Figure 8-7. Effect of Street Sweeping on Site Median EMC Values (Cont'd)

The Durham, New Hampshire NURP project monitored performance of a carefully designed artificial swale which received runoff from a commercial parking lot. Over 11 monitored storms, both soluble and particulate fractions of heavy metals (Cu, Pb, Zn, and Cd) were reduced by approximately 50 percent. Reductions in COD, nitrate, and ammonia were on the order of 25 percent. The swale did not prove to be effective in reducing concentrations or organic nitrogen, phosphorus, or bacterial species. It should be noted that the performance capabilities indicated are based only on the concentration changes produced in the stormwater which passes completely through the swale. To the extent that infiltration of a portion of the runoff is effected by a swale, load reductions would be increased in proportion.

The NURP results suggest that grass swales represent a practical and potentially effective technique for control of urban runoff quality; that design conditions are of major significance; and that additional study is necessary to establish such parameters.

Wetlands

The potential of either natural or artificially created wetland areas to effect favorable modification of urban runoff pollutant loads (particularly sediment, nutrients, and heavy metals) has been widely suggested. The NURP experience reinforces this expectation, but has not developed the detailed performance data to permit either characterizing general performance capabilities or identifying general design principles and parameters. Additional study will be required to develop such information.

Miscellaneous

This category encompasses a variety of BMPs which were identified at the local level as techniques of quality control which appeared to be relevant for the circumstances which were operative. They are grouped under this category because (a) their applicability tends to be site-specific rather than general, and (b) while their effectiveness as a BMP may be substantial on a relatively small spatial scale, the broad-scale effect on urban runoff loads has not been possible to document.

BMPs in this category include erosion control practices and urban housekeeping practices. As an example of the former, the Little Rock, Arkansas NURP project widened and stabilized (with rip rap) a segment of an urban stream to reduce erosion potential. The Baltimore NURP project data clearly indicated the substantial difference in urban runoff quality that can result from the general level of cleanliness maintained in an urban neighborhood.

CHAPTER 9
CONCLUSIONS

INTRODUCTION

The Nationwide Urban Runoff Program has addressed such issues as quantifying the characteristic of urban runoff, assessing the water quality effects on receiving water bodies attributable to urban runoff discharges, and examining the effectiveness of control practices in removing the pollutants found in urban runoff. This chapter summarizes NURP's conclusion relating to these issues and is based on the results presented in Chapters 6, 7, and 8 of this report. Conclusions reached by the individual NURP projects are also presented to further support the results of the national level analysis.

URBAN RUNOFF CHARACTERISTICS

General

Field monitoring was conducted to characterize urban runoff flows and pollutant concentrations. This was done for a variety of pollutants at a substantial number of sites distributed throughout the country. The resultant data represent a cross-section of regional climatology, land use types, slopes, and soil conditions and thereby provide a basis for identifying patterns of similarities or differences and testing their significance.

Urban runoff flows and concentrations of contaminants are quite variable. Experience shows that substantial variations occur within a particular event and from one event to the next at a particular site. Due to the high variability of urban runoff, a large number of sites and storm events were monitored, and a statistical approach was used to analyze the data. Procedures are available for characterizing variable data without requiring knowledge of or existence of any underlying probability distribution (nonparametric statistical procedures). However, where a specific type of probability distribution is known to exist, the information content and efficiency of statistical analysis is enhanced. Standard statistical procedures allowed probability distributions or frequency of occurrence to be examined and tested. Since the underlying distributions were determined to be adequately represented by the lognormal distribution, the log (base e) transforms of all urban runoff data were used in developing the statistical characterizations.

The event mean concentration (EMC), defined as the total constituent mass discharge divided by the total runoff volume, was chosen as the primary water quality statistic. Event mean concentrations were based on flow weighted composite samples for each event at each site in the accessible data base. EMCs were chosen as the primary water quality characteristic subjected to detailed analysis, even though it is recognized that mass loading characteristics of urban runoff (e.g., pounds/acre for a specified time interval) is

ultimately the relevant factor in many situations. The reason is that, unlike EMCs, mass loadings are very strongly influenced by the amount of precipitation and runoff, and estimates of typical annual mass loads will be biased by the size of monitored storm events. The most reliable basis for characterizing annual or seasonal mass loads is on the basis of EMC and site-specific rainfall/runoff characteristics.

Establishing the fundamental distribution as lognormal and the availability of a sufficiently large population of EMCs to provide reliability to the statistics derived has yielded a number of benefits, including the ability to provide:

- Concise summaries of highly variable data
- Meaningful comparisons of results from different sites, events, etc.
- Statements concerning frequency of occurrence. One can express how often values will be expected to exceed various magnitudes of interest.
- A more useful method of reporting data than the use of ranges; one which is less subject to misinterpretation
- A framework for examining "transferability" of data in a quantitative manner

Conclusions

1. Heavy metals (especially copper, lead and zinc) are by far the most prevalent priority pollutant constituents found in urban runoff. End-of-pipe concentrations exceed EPA ambient water quality criteria and drinking water standards in many instances. Some of the metals are present often enough and in high enough concentrations to be potential threats to beneficial uses.

   All 13 metals on EPA's priority pollutant list were detected in urban runoff samples, and all but three at frequencies of detection greater than 10 percent. Most often detected among the metals were copper, lead, and zinc, all of which were found in at least 91 percent of the samples.

   Metal concentrations in end-of-pipe urban runoff samples (i.e., before dilution by receiving water) exceeded EPA's water quality criteria and drinking water standards numerous times. For example, freshwater acute criteria were exceeded by copper concentrations in 47 percent of the samples and by lead in 23 percent. Freshwater chronic exceedances were common for lead (94 percent), copper (82 percent), zinc (77 percent), and cadmium (48 percent). Regarding human toxicity, the most significant pollutants were lead and nickel, and for human carcinogenesis, arsenic and beryllium. Lead concentrations violated drinking water criteria in 73 percent of the samples.

It should be stressed that the exceedances noted above do not necessarily imply that an actual violation of standards will exist in the receiving water body in question. Rather, the enumeration of exceedances serves a screening function to identify those heavy metals whose presence in urban runoff warrants high priority for further evaluation.

Based upon the much more extensive NURP data set for total copper, lead, and zinc, the site median EMC values for the median urban site are: Cu = 34 µg/l, Pb = 144 µg/l, and Zn = 160 µg/l. For the 90th percentile urban site the values are: Cu = 93 µg/l, Pb = 350 µg/l, and Zn = 500 µg/l. These values are suggested to be appropriate for planning level screening analyses where data are not available.

Some individual NURP project sites (e.g., at DC1, MD1, NH1) found unusually high concentrations of certain heavy metals (especially copper and zinc) in urban runoff. This was attributed by the projects to the effect of acid rain on materials used for gutters, culverts, etc.

2. <u>The organic priority pollutants were detected less frequently and at lower concentrations than the heavy metals.</u>

Sixty-three of a possible 106 organics were detected in urban runoff samples. The most commonly found organic was the plasticizer bis (2-ethylhexl) phthalate (22 percent), followed by the pesticide α-hexachlorocyclohexane (α-BHC) (20 percent). An additional 11 organic pollutants were reported at frequencies between 10 and 20 percent; 3 pesticides, 3 phenols, 4 polycyclic aromatics, and a single halogenated aliphatic.

Criteria exceedances were less frequently observed among the organics than the heavy metals. One unusually high pentachlorophenol concentration of 115 µg/l resulted in exceedances of the freshwater acute and organoleptic criteria. This observation and one for chlordane also exceeded the freshwater acute criteria. Freshwater chronic criteria exceedances were observed for pentachlorophenol, bis (2-ethylhexyl) phthalate, gamma-BHC, chlordane, and alpha-endosulfan. All other organic exceedances were in the human carcinogen category and were most serious for alpha-hexachlorocyclohexane (alpha-BHC), gamma-hexachlorocyclohexane (gamma-BHC or Lindane), chlordane, phenanthrene, pyrene, and chrysene.

The fact that the NURP priority pollutant monitoring effort was limited to two samples at each site leaves us unable to make many generalizations about those organic pollutants which occurred only rarely. We can speculate that their occurrences tend to be very site specific as opposed to being a generally widespread phenomena, but much more data would be required to conclusively prove this point.

3. <u>Coliform bacteria are present at high levels in urban runoff and can be expected to exceed EPA water quality criteria during and immediately after storm events in many surface waters, even those providing high degrees of dilution.</u>

Fecal coliform counts in urban runoff are typically in the tens to hundreds of thousand per 100 ml during warm weather conditions, with the median for all sites being around 21,000/100 ml. During cold weather, fecal coliform counts are more typically in the 1,000/100 ml range, which is the median for all sites. Thus, violations of fecal coliform standards were reported by a number of NURP projects. High fecal coliform counts may not cause actual use impairments, in some instances, due to the location of the urban runoff discharges relative to swimming areas or shellfish beds and the degree of dilution/dispersal and rate of die off. The same is true of total coliform counts, which were found to exceed EPA water quality criteria in undiluted urban runoff at virtually every site every time it rained.

The substantial seasonal differences noted above do not correspond with comparable variations in urban activities. The NURP analyses as well as current literature suggest that fecal coliform may not be the most appropriate indicator organism for identifying potential health risks when the source is stormwater runoff.

4. Nutrients are generally present in urban runoff, but with a few individual site exceptions, concentrations do not appear to be high in comparison with other possible discharges to receiving water bodies.

NURP data for total phosphorus, soluble phosphorus, total kjeldahl nitrogen, and nitrate plus nitrite as nitrogen were carefully examined. Median site EMC median concentrations in urban runoff were TP = 0.33 mg/l, SP = 0.12 mg/l, TKN = 1.5 mg/l, and NO2+3 - N = 0.68 mg/l. On an annual load basis, comparison with typical monitoring data, literature values, and design objectives for discharges from a well run secondary treatment plant suggests that mean annual nutrient loads from urban runoff are around an order of magnitude less than those from a POTW.

5. Oxygen demanding substances are present in urban runoff at concentrations approximating those in secondary treatment plant discharges. If dissolved oxygen problems are present in receiving waters of interest, consideration of urban runoff controls as well as advanced waste treatment appears to be warranted.

Urban runoff median site EMC median concentrations of 9 mg/l BOD5 and 65 mg/l COD are reflected in the NURP data, with 90th percentile site EMC median values being 15 mg/l BOD5 and 140 mg/l COD. These concentrations suggest that, on an annual load basis, urban runoff is comparable in magnitude to secondary treatment plant discharges.

It can be argued that urban runoff is typically well oxygenated and provides increased stream flow and, hence, in view of relatively long travel times to the critical point, that dissolved oxygen problems attributable solely to urban runoff should not be widespread occurrences. No NURP project specifically identified a low DO condition resulting from

urban runoff. Nonetheless, there will be some situations where consideration of urban runoff controls for oxygen demanding substances in an overall water quality management strategy would seem appropriate.

6. Total suspended solids concentrations in urban runoff are fairly high in comparison with treatment plant discharges. Urban runoff control is strongly indicated where water quality problems associated with TSS, including build-up of contaminated sediments, exist.

   There are no formal water quality criteria for TSS relating to either human health or aquatic life. The nature of the suspended solids in urban runoff is different from those in treatment plant discharges, being higher in mineral and man-made products (e.g., tire and street surface wear particles) and somewhat lower in organic particulates. Also, the solids in urban runoff are more likely to have other contaminants adsorbed onto them. Thus, they cannot be simply considered as benign, nor do they only pose an aesthetic issue. NURP did not examine the problem of contaminated sediment build-up due to urban runoff, but it undeniably exists, at least at some locations.

   The suspended solids in urban runoff can also exert deleterious physical effects by sedimenting over egg deposition sites, smothering juveniles, and altering benthic communities.

   On an annual load basis, suspended solids contributions from urban runoff are around an order of magnitude or more greater than those from secondary treatment plants. Control of urban runoff, as opposed to advanced waste treatment, should be considered where TSS-associated water quality problems exist.

7. A summary characterization of urban runoff has been developed and is believed to be appropriate for use in estimating urban runoff pollutant discharges from sites where monitoring data are scant or lacking, at least for planning level purposes.

   As a result of extensive examination, it was concluded that geographic location, land use category (residential, commercial, industrial park, or mixed), or other factors (e.g., slope, population density, precipitation characteristics) appear to be of little utility in consistently explaining overall site-to-site variability in urban runoff EMCs or predicting the characteristics of urban runoff discharges from unmonitored sites. Uncertainty in site urban runoff characteristics caused by high event-to-event variability at most sites eclipsed any site-to-site variability that might have been present. The finding that EMC values are essentially not correlated with storm runoff volumes facilitates the transfer of urban runoff characteristics to unmonitored sites. Although there tend to be exceptions to any generalization, the suggested summary urban runoff characteristics given in Table 6-17 of the report are recommended for planning level purposes as the best estimates, lacking local information to the contrary.

RECEIVING WATER EFFECTS

General

The effects of urban runoff on receiving water quality are highly site-specific. They depend on the type, size, and hydrology of the water body; the urban runoff quantity and quality characteristics; the designated beneficial use; and the concentration levels of the specific pollutants that affect that use.

The conclusions which follow are based on screening analyses performed by NURP, observations and conclusions drawn by individual NURP projects that examined receiving water effects in differing levels of detail and rigor, and NURP's three levels of problem definition. Conclusions are organized on the basis of water body type: rivers and streams, lakes, estuaries and embayments, and groundwater aquifers. Site-specific exceptions should be expected, but the statements presented are believed to provide an accurate perspective on the general tendency of urban runoff to contribute significantly to water quality problems.

Rivers and Streams

1. Frequent exceedances of heavy metals ambient water quality criteria for freshwater aquatic life are produced by urban runoff.

   The Denver NURP project found that in-stream concentrations of copper, lead, zinc, and cadmium exceeded State ambient water quality standards for the South Platte River during essentially all storm events.

   NURP screening analyses suggest that frequent exceedances of both EPA 24-hour and maximum water quality criteria for heavy metals should be expected on a relatively general basis.

2. Although a significant number of problem situations could result from heavy metals in urban runoff, levels of freshwater aquatic life use impairment suggested by the magnitude and frequency of ambient criteria exceedances were not observed.

   Based upon the magnitude and frequency of freshwater aquatic life ambient criteria exceedances, one would expect to observe impairment of this beneficial use in most streams that receive urban runoff discharges. However, those NURP project studies which examined this issue did not report significant use impairment problems associated with urban runoff.

   The Bellevue, Washington NURP project concluded that toxic effects of urban runoff pollutants did not appear to be a significant factor.

   The Tampa, Florida NURP project conducted biological studies of the impact of stormwater runoff upon the biological community of the Hillsborough River. They conducted animal bioassay experiments on five sensitive species in two samples of urban runoff from the Arctic Street drainage basin. Thirty-two bioassay experiments were completed including 22 acute tests and 10 chronic tests. Neither sample of stormwater was acutely toxic to test organisms. Long-term chronic experiments were

undertaken with two species and resulted in no significant effects attributable to stormwater exposure.

NURP screening analyses suggest that the potential of urban runoff to seriously impair this beneficial use will be strongly influenced by local conditions and the frequency of occurrence of concentration levels which produce toxic effects under the intermittent, short duration exposures typically produced by urban runoff.

While the application of the screening analysis to the Bellevue and Tampa situations supports the absence of a problem situation in these cases, it also suggests that a significant number of problem situations should be expected. Therefore, although not the general, ubiquitous problem situation that criteria exceedances would suggest, there are site-specific situations in which urban runoff could be expected to cause significant impairment of freshwater aquatic life uses.

Because of the inconsistency between criteria exceedances and observed use impairments due to urban runoff, adaptation of current ambient quality criteria to better reflect use impacts where pollutant exposures are intermittent and short duration appears to be a useful area for further investigation.

3. Copper, lead and zinc appear to pose a significant threat to aquatic life uses in some areas of the country. Copper is suggested to be the most significant of the three.

Regional differences in surface water hardness, which has a strong influence on toxicity, in conjunction with regional variations in stream flow and rainfall result in significant differences in susceptibility to adverse impacts around the nation.

The southern and southeastern regions of the country are the most susceptible to aquatic life effects due to heavy metals, with the northeast also a sensitive area, although somewhat less so.

Copper is the major toxic metal in urban runoff, with lead and zinc also prevalent but a problem in more restricted cases. Copper discharges in urban runoff are, in all but the most favorable cases, a significant threat to aquatic life uses in the southeast and southern regions of the country. In the northeast, problems would be expected only in rather unfavorable conditions (large urban area contribution and high site concentrations). In the remainder of the country (and for the other metals) problems would only be expected under quite unfavorable site conditions. These statements are based on total metal concentrations.

4. Organic priority pollutants in urban runoff do not appear to pose a general threat to freshwater aquatic life.

This conclusion is based on limited data on the frequency with which organics are found in urban runoff discharges and measured end-of-pipe concentrations relative to published toxic criteria. One unusually high pentachlorophenol concentration of 115 μg/l resulted in the only exceedance of the organoleptic criteria. This observation and one for

chlordane exceeded the freshwater acute criteria. Freshwater chronic criteria exceedances were observed for pentochlorophenol, bis (2-ethylhexyl) phlhalate, γ-hexachlorocyclohexane (lindane), α-endosulfan, and chlordane.

5. The physical aspects of urban runoff, e.g., erosion and scour, can be a significant cause of habitat disruption and can affect the type of fishery present. However, this area was studied only incidentally by several of the projects under the NURP program and more concentrated study is necessary.

   The Metropolitan Washington Council of Governments (MWCOG) NURP project did an analysis of fish diversity in the Seneca Creek Watershed, 20 miles northwest of Washington, D.C. In this study, specific changes in fishery diversity were identified due to urbanization in some of the sub-watersheds. Specifically, the number of fish species present are reduced and the types of species present changed dramatically, e.g., environmentally sensitive species were replaced with more tolerant species. For example, the Blacknose Dace replaced the Mottled Sculpin. MWCOG concluded that the changes in fish diversity were due to habitat deterioration caused by the physical aspects of urban runoff.

   The Bellevue, Washington NURP project concluded that habitat changes (streambed scour and sedimentation) had a more significant effect than pollutant concentrations, for the changes produced by urbanization.

6. Several projects identified possible problems in the sediments because of the build-up of priority pollutants contributed wholly or in part by urban runoff. However, the NURP studies in this area were few in number and limited in scope, and the findings must be considered only indicative of the need for further study, particularly as to long-term impacts.

   The Denver NURP project found significant quantities of copper, lead, zinc, and cadmium in river sediments. The Denver Regional Council of Governments is concerned that during periods of continuous low flow, lead may reach levels capable of adversely affecting fish.

   The Milwaukee NURP project reported the observation of elevated levels of heavy metals, particularly lead, in the sediments of a river receiving urban runoff.

7. Coliform bacteria are present at high levels in urban runoff and can be expected to exceed EPA water quality criteria during and immediately after storm events in most rivers and streams.

   Violations of the fecal coliform standard were reported by a number of NURP projects. In some instances, high fecal coliform counts may not cause actual use impairments due to the location of the urban runoff discharge relative to swimming areas and the degree of dilution or dispersal and rate of die off.

   Coliform bacteria are generally accepted to be a useful indicator of the possible presence of human pathogens when the source of contamination is sanitary sewage. However, no such relationship has been demonstrated for

urban runoff. Therefore, the use of coliforms as an indicator of human health risk when the sole source of contamination is urban runoff, warrants further investigation.

8. Domestic water supply systems with intakes located on streams in close proximity to urban runoff discharges are encouraged to check for priority pollutants which have been detected in urban runoff, particularly those in the organic category.

   Sixty-three of a possible 106 organics were detected in urban runoff samples. The most commonly found organic was the plasticizer bis (2-ethylhexl) phthalate (22 percent), followed by the pesticide α-hexachlorocyclohexane (α-BHC) (20 percent). An additional 11 organic pollutants were reported at frequencies between 10 and 20 percent; 3 pesticides, 3 phenols, 4 polycyclic aromatics, and a single halogenated aliphatic.

Lakes

1. Nutrients in urban runoff may accelerate eutrophication problems and severely limit recreational uses, especially in lakes. However, NURP's lake projects indicate that the degree of beneficial use impairment varies widely, as does the significance of the urban runoff component.

   The Lake Quinsigamond NURP project in Massachusetts identified eutrophication as a major problem in the lake, with urban runoff being a prime contributor of the critical nutrient phosphorus. Point source discharges to the lake have been eliminated almost entirely. However, in spite of the abatement of point sources, survey data indicate that the lake has shown little improvement over the abatement period. In particular, the trophic status of the lake has shown no change, i.e., it is still classified as late mesotrophic-early eutrophic. Substantial growth is projected in the basin, and there is concern that Lake Quinsigamond will become more eutrophic. A proposed water quality management plan for the lake includes the objective of reducing urban runoff pollutant loads.

   The Lake George NURP project in New York State also identified increasing eutrophication as a potential problem if current development trends continue. Lake George is not classified as eutrophic, but from 1974 to 1978 algae production in the lake increased logarithmically. Lake George is a very long lake, and the limnological differences between the north and south basins provide evidence of human impact. The more developed, southern portion of the lake exhibits lower transparencies, lower hypolimnetic dissolved oxygen concentrations, higher phosphorus and chlorophyll a concentrations, and a trend toward seasonal blooms of blue-green algae. These differences in water quality indicators are associated with higher levels of cultural activities (e.g., increased sources of phosphorus) in the southern portion of the lake's watershed, and continued development will tend to accentuate the differences.

The Lake George NURP project estimated that urban runoff from developed areas currently accounts for only 13.6 percent of the annual phosphorus loadings to Lake George as a whole. In contrast, developed areas contribute 28.9 percent of the annual phosphorus load to the NURP study areas at the south end of the Lake. Since there are no point source discharges, this phosphorus loading is due solely to urban runoff. These data illustrate the significant impact of urbanization on phosphorus loads.

The NURP screening analysis suggests that lakes for which the contributions of urban runoff are significant in relation to other nonpoint sources (even in the absence of point source discharges) are indicated to be highly susceptible to eutrophication and that urban runoff control may be warranted in such situations.

2. Coliform bacteria discharges in urban runoff have a significant negative impact on the recreational uses of lakes.

As was the case with rivers and streams, coliform bacteria in urban runoff can cause violations of criteria for the recreational use of lakes. When unusually high fecal coliform counts are observed, they may be partially attributable to sanitary sewage contamination, in which case significant health risks may be involved.

The Lake Quinsigamond NURP project in Massachusetts found that bacterial pollution was widespread throughout the drainage basin. In all cases where samples were taken, fecal coliforms were in excess of 10,000 counts per 100 ml, with conditions worse in the Belmont street storm drains. This project concluded that the very high fecal coliform counts in their stormwater are at least partially due to sewage contamination apparently entering the stormwater system throughout the local catchment.

The sources of sewage contamination are leaking septic tanks, infiltration from sanitary sewers into storm sewers, and leakage at manholes. In the northern basin, the high fecal coliform counts are attributed to known sewage contamination sources on Poor Farm Brook. The data from the project suggest that it would be unwise to permit body contact recreation in the northern basin of the lake during or immediately following significant storm events. The project concluded that disinfection at selected storm drains should be considered in the future, especially if the sewage contamination cannot be eliminated.

The Mystic River NURP project in Massachusetts found various areas where fecal coliform counts were extremely high in urban stormwater. Fecal coliform levels of up to one million with an average of 178,000/100 ml were recorded in Sweetwater Brook, a tributary to Mystic River, during wet weather. These high fecal coliform levels were specifically attributed to surcharging in their sanitary sewers, which caused sanitary sewage to overflow into their storm drains via the combined manholes present in this catchment. Fecal coliform levels above the class B fecal coliform standard of 200 per 100 ml were found in approximately one-third of the samples tested in the upper and lower forebays of the Upper Mystic Lake and occasionally near the lake's outlet. In addition, Sandy Beach, a public swimming area on Upper Mystic Lake, exceeded the State fecal

coliform criteria in July of 1982, and warnings that swimming may be hazardous to public health were posted for several days. It is important to note that sewage contamination of surface waters is a major problem in the watershed. The project concluded that urban runoff contributes to the bacteria load during wet weather but, comparatively, is much less significant than the sanitary sources.

Estuaries and Embayments

1. Adverse effects of urban runoff in marine waters will be a highly specific local situation. Though estuaries and embayments were studied to a very limited extent in NURP, they are not believed to be generally threatened by urban runoff, though specific instances where use is impaired or denied can be of significant local and even regional importance. Coliform bacteria present in urban runoff is the primary pollutant of concern, causing direct impacts on shellfish harvesting and beach closures.

   The significant impact of urban runoff on shellfish harvesting has been well documented by the Long Island, New York NURP project. In this project, stormwater runoff was identified as the major source of bacterial loading to marine waters and, thus, the indirect cause of the denial of certification by the New York State Department of Conservation for about one-fourth of the shellfishing area. Much of this area is along the south shore, where the annual commercial shellfish harvest is valued at approximately $17.5 million.

   The Myrtle Beach, South Carolina NURP project found that stormwater discharges from the City of Myrtle Beach directly onto the beach showed high bacterial counts for short durations immediately after storm events. In many instances these counts violated EPA water quality criteria for aquatic life and contact recreation. The high bacteria counts, however, were associated with standing pools formed at the end of collectors for brief periods following the cessation of rainfall and before the runoff percolated into the sand. Consequently, the threat to public health was not considered great enough to warrant closure of the beach.

Groundwater Aquifers

1. Groundwater aquifers that receive deliberate recharge of urban runoff do not appear to be imminently threatened by this practice at the two locations where it was investigated.

   Two NURP projects (Long Island and Fresno) are situated over sole source acquifers. They have been practicing recharge with urban runoff for two decades or more at some sites, and extensively investigated the impact of this practice on the quality of their groundwater. They both found that soil processes are efficient in retaining urban runoff pollutants quite close to the land surface, and concluded that no change in the use of recharge basins is warranted.

   Despite the fact that some of these basins have been in service for relatively long periods of time and pollutant breakthrough of the upper soil

layers has not occurred, the ability of the soil to continue to retain pollutants is unknown. Further attention to this issue is recommended.

CONTROL EFFECTIVENESS

General

A limited number of techniques for the control of urban runoff quality were evaluated by the NURP program. The set is considerably smaller than previously published lists of potential management practices. Since the control approaches that were investigated were selected at the local level, the choices may be taken as an initial indication of local perceptions regarding practicality and feasibility from the standpoint of implementation.

Conclusions

1. There is a strong preference for detention devices, street sweeping, and recharge devices as reflected by the control measures selected at the local level for detailed investigation. Interest was also shown in grass swales and wetlands.

   Six NURP projects monitored the performance of a total of 14 detention devices. Five separate projects conducted in-depth studies of the effectiveness of street sweeping on the control of urban runoff quality. A total of 17 separate study catchments were involved in this effort. Three NURP projects examined either the potential of recharge devices to reduce discharges of urban runoff to surface waters or the potential of the practice to contaminate groundwaters. A total of 12 separate sites were covered by this effort.

   Grass swales were studied by two NURP projects. Two swales in existing residential areas, and one experimental swale constructed to serve a commercial parking lot were studied.

   A number of NURP projects indicated interest in wetlands for improving urban runoff quality at early stages of the program. Only one allocated monitoring activity to this control measure, however.

   Various other management practices were identified as having local interest by individual NURP projects, but none of them was allocated the necessary resources to be pursued to a point which allowed an evaluation of their ability to control pollution from urban runoff. Management practices in this category included urban housekeeping (e.g., litter programs, catch basin cleaning, pet ordinances) and public information programs.

2. Detention basins are capable of providing very effective removal of pollutants in urban runoff. Both the design concept and the size of the basin in relation to the urban area served have a critical influence on performance capability.

   Wet basins (designs which maintain a permanent water pool) have the greatest performance capabilities. Observed pollutant reductions varied from excellent to very poor in the basins which were monitored. However,

when basins are adequately sized, particulate removals in excess of 90 percent (TSS, lead) can be obtained. Pollutants with significant soluble fractions in urban runoff show lower reductions; on the order of 65 percent for total P and approximately 50 percent for BOD, COD, TKN, Copper, and Zinc. Results indicate that biological processes which are operative in the permanent pool produce significant reductions (50 percent or more) in soluble nutrients, nitrate and soluble phosphorus. These performance characteristics are indicated by both the NURP analysis results and conclusions reached by individual projects.

Dry basins, (conventional stormwater management basins), which are designed to attenuate peak runoff rates and hence only very briefly detain portions of flow from the larger storms, are indicated by NURP data to be essentially ineffective for reducing pollutant loads.

Dual-purpose basins (conventional dry basins with modified outlet structures which significantly extend detention time) are suggested by limited NURP data to provide effective reductions in urban runoff loads. Performance may approach that of wet ponds; however, the additional processes which reduce soluble nutrient forms do not appear to be operative in these basins. This design concept is particularly promising because it represents a cost effective approach to combining flood control and runoff quality control and because of the potential for converting existing conventional stormwater management ponds.

Approximate costs of wet pond designs are estimated to be in the order of $500 to $1500 per acre of urban area served, for on-site applications serving relatively small urban areas, and about $100 to $250 per acre of urban area for off-site applications serving relatively large urban areas. The costs reflect present value amounts which include both capital and operating costs. The difference is due to an economy of scale associated with large basin volumes. The range reflects differences in size required to produce particulate removals in the order of 50 percent or 90 percent. Annual costs per acre of urban area served are estimated at $60 to $175, and $10 to $25 respectively.

3. Recharge Devices are capable of providing very effective control of urban runoff pollutant discharges to surface waters. Although continued attention is warranted, present evidence does not indicate that significant groundwater contamination will result from this practice.

Both individual project results and NURP screening analyses indicate that adequately sized recharge devices are capable of providing high levels of reduction in direct discharges of urban runoff to surface waters. The level of performance will depend on both the size of the unit and the soil permeability.

Application will be restricted to areas where conditions are favorable. Soil type, depth to groundwater, land slopes, and proximity of water supply wells will all influence the appropriateness of this control technique.

Surface accumulations which result from the high efficiency of soils to retain pollutants, suggest further attention in applications where dual purpose recharge areas also serve as recreational fields or playground areas.

4. Street sweeping is generally ineffective as a technique for improving the quality of urban runoff.

Five NURP projects evaluated street sweeping as a management practice to control pollutants in urban runoff. Four of these projects concluded that street sweeping was not effective for this purpose. The fifth, which had pronounced wet and dry seasons, believed that sweeping just prior to the rainy season could produce some benefit in terms of reduced pollution in urban runoff.

A large data base on the quality of urban runoff from street sweeping test sites was obtained. At 10 study sites selected for detailed analysis, a total of 381 storm events were monitored under control conditions, and an additional 277 events during periods when street sweeping operations were in effect. Analysis of these data indicated that no significant reductions in pollutant concentrations in urban runoff were produced by street sweeping.

There may be special cases in which street cleaning applied at restricted locations or times of year could provide improvements in urban runoff quality. Some examples that have been suggested, though not demonstrated by the NURP program, include periods following snow melt or leaf fall, or urban neighborhoods where the general level of cleanliness could be significantly improved.

5. Grass swales can provide moderate improvements in urban runoff quality. Design conditions are important. Additional study could significantly enhance the performance capabilities of swales.

Concentration reductions of about 50 percent for heavy metals, and 25 percent for COD, nitrate, and ammonia were observed in one of the swales studied. However the swale was ineffective in reducing concentrations of organic nitrogen, phosphorus, or bacterial species. Two other swales studied failed to demonstrate any quality improvements in the urban runoff passing through them.

Evaluations by the NURP projects involved concluded, however, that this was an attractive control technique whose performance could be improved substantially by application of appropriate design considerations. Additional study to develop such information was recommended.

Design considerations cited included slope, vegetation type and maintenance, control of flow velocity and residence time, and enhancement of infiltration. The latter factor could produce load reductions greater than those inferred from concentration changes and effect reductions in those pollutant species which are not attenuated by flow through the swale.

6. Wetlands are considered to be a promising technique for control of urban runoff quality. However, neither performance characteristics nor design characteristics in relation to performance were developed by NURP.

   Although a number of projects indicated interest, only one assigned NURP monitoring activity to a wetland. This was a natural wetland, and flows passing though it were uncontrolled. Results suggest its potential to improve quality, but the investigation was not adequate to associate necessary design factors to performance capability. Additional attention to this control technique would be useful, and should include factors such as the need for maintenance harvesting to prevent constituent recycling.

ISSUES

A number of issues with respect to managing and controlling urban runoff emerge from the conclusions summarized above. In some instances they represent the need for additional data/information or for further study. In others they point to the need for follow-up activity by EPA, State, or local officials to assemble and disseminate what is already known regarding water quality problems caused by urban runoff and solutions.

Sediments

The nature and scope of the potential long-term threat posed by nutrient and toxic pollutant accumulation in the sediments of urban lakes and streams requires further study. A related issue is the safe and environmentally sound disposal of sediments collected in detention basins used to control urban runoff.

Priority Pollutants

NURP clearly demonstrated that many priority pollutants can be found in urban runoff and noted that a serious human health risk could exist when water supply intakes are in close proximity to urban stormwater discharges. However, questions related to the sources, fate, and transport mechanisms of priority pollutants borne by urban runoff and their frequencies of occurrence will require further study.

Rainfall pH Effects

The relationship between pH and heavy metal values in urban runoff has not been established and needs further study. Several NURP projects (mostly in the northeastern states) attributed high heavy metals concentrations in urban runoff to the effects of acid rain. Although it is quite plausible that acid rain increases the level of pollutants in urban runoff and may transform them to more toxic and more easily assimilated forms, further study is required to support this speculation.

Industrial Runoff

No truly industrial sites (as opposed to industrial parks) were included in any of the NURP projects. A very limited body of data suggests, however, that runoff from industrial sites may have significantly higher contaminant

levels than runoff from other urban land use sites, and this issue should be investigated further.

Central Business Districts

Data on the characteristics of urban runoff from central business districts are quite limited as opposed to other land use categories investigated by NURP. The data do suggest, however, that some sites may produce pollutant concentrations in runoff that are significantly higher than those from other sites in a given urban area. When combined with their typically high degrees of imperviousness, the pollutant loads from central business districts can be quite high indeed. The opportunities for control in central business districts are quite limited, however.

Physical Effects

Several projects concluded that the physical impacts of urban runoff upon receiving waters have received too little attention and, in some cases, are more important determinants of beneficial use attainment than chemical pollutants. This contention requires much more detailed documentation.

Synergy

NURP did not evaluate the synergistic effects that might result from pollutant concentrations experienced in stormwater runoff, in association with pH and temperature ranges that occur in the receiving waters. This type of investigation might reveal that control of a specific parameter, such as pH, would adequately reduce an adverse synergistic effect caused by the presence of other pollutants in combination and be the most cost effective solution. Further investigations should include this issue.

Opportunities for Control

Based upon the results of NURP's evaluation of the performance of urban runoff controls, opportunities for significant control of urban runoff quality are much greater for newly developing areas. Institutional considerations and availability of space are the key factors. Guidance on this issue in a form useful to States and urban planning authorities should be prepared and issued.

Wet Weather Water Quality Standards

The NURP experience suggests that EPA should evaluate the possible need to develop "wet weather" standards, criteria, or modifications to ambient criteria to reflect differences in impact due to the intermittent, short duration exposures characteristic of urban runoff and other nonpoint source discharges.

Coliform Bacteria

The appropriateness of using coliform bacteria as indicator organisms for human health risk where the source is exclusively urban runoff warrants further investigation.

Wetlands

The use of wetlands as a control measure is of great interest in many areas, but the necessary information on design performance relationships required before cost effective applications can be considered has not been adequately documented. The environmental impacts of such use upon wetlands is a critical issue which, at present, has been addressed marginally, if at all.

Swales

The use of grass swales was suggested by two NURP projects to represent a very promising control opportunity. However, their performance is very dependent upon design features about which information is lacking. Further work to address this deficiency and appropriate maintenance practices appears warranted.

Illicit Connections

A number of the NURP projects identified what appeared to be illicit connections of sanitary discharges to stormwater sewer systems, resulting in high bacterial counts and dangers to public health. The costs and complications of locating and eliminating such connections may pose a substantial problem in urban areas, but the opportunities for dramatic improvement in the quality of urban stormwater discharges certainly exist where this can be accomplished. Although not emphasized in the NURP effort, other than to assure that the selected monitoring sites were free from sanitary sewage contamination, this BMP is clearly a desirable one to pursue.

Erosion Controls

NURP did not consider conventional erosion control measures because the information base concerning them was considered to be adequate. They are effective, and their use should be encouraged.

Combined Sewer Overflows

In order to address urban runoff from separate storm sewers, NURP avoided any sites where combined sewers existed. However, in view of their relative levels of contamination, priority should be given to control of combined sewer overflows.

Implementation Guidance

The NURP studies have greatly increased our knowledge of the characteristics of urban runoff, its effects upon designated uses, and of the performance efficiencies of selected control measures. They have also confirmed earlier impressions that some States and local communities have actually begun to develop and implement stormwater management programs incorporating water quality objectives. However, such management initiatives are, at present, scattered and localized. The experience gained from such efforts is both needed and sought after by many other States and localities. Documentation,

evaluation, refinement and transfer of management and financing mechanisms/ arrangements, of simple and reliable problem assessment methodologies, and of implementation guidance which can be used by planners and officials at the State and local level are urgently needed as is a forum for the sharing of experiences by those already involved, both among themselves and with those who are about to address nonpoint source issues.

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California Riparian Systems

Ecology, Conservation, and Productive Management

Edited by

Richard E. Warner *and* Kathleen M. Hendrix

AQUATIC/RIPARIAN INTERACTIONS IN RIVERINE SYSTEMS

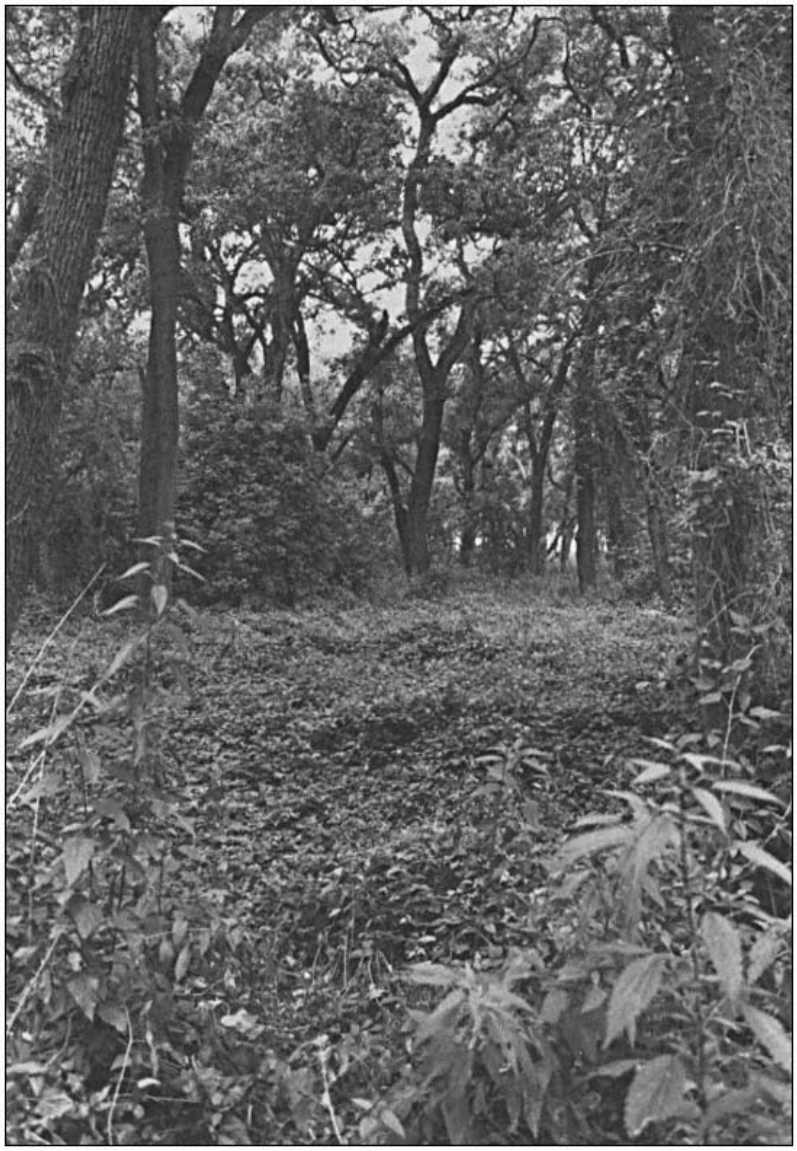

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The Importance of Riparian Vegetation to Stream Ecosystems[1]

Allen W. Knight and Richard L. Bottorff[2]

Abstract.—Riparian vegetation is very important in determining the structure and function of stream ecosystems. Most aquatic organisms, both invertebrates and fish, are directly or indirectly dependent on inputs of terrestrial detritus to the stream for their food. Natural changes in riparian vegetation and the biotic processing of detritus, as well as other factors, determine the kinds and abundance of aquatic invertebrates living in streams, from headwaters to large rivers. Removal of riparian vegetation will significantly affect stream organisms by: 1) decreasing detrital (food) inputs; 2) increasing the potential for primary production in aquatic plants; 3) increasing summer water temperatures; 4) changing water quality and quantity; and 5) decreasing terrestrial habitat for adult insects.

Introduction

The manner in which riparian systems are managed and protected is commonly related to their value as buffer strips, stream bank stabilizers, and fish and wildlife habitat. These strips of streamside vegetation may be the only habitat remaining for some wildlife species. As riparian vegetation is modified or destroyed by grazing, logging, urbanization, road construction, water development, mining, and recreation, interest in its importance is increasing. Our objective is to briefly review the role of riparian vegetation in the structure and function of stream ecosystems, especially headwater streams. We also explore the possible effects of vegetation modification or destruction in headwater streams. Whenever possible, our review emphasizes conditions found in Sierra Nevada streams.

Headwater Streams

Headwater streams are greatly influenced by riparian vegetation since they function as processors of natural organic matter coming from the watershed (Cummins and Spengler 1978). These small streams are characteristically shaded and kept cool by overhanging riparian vegetation, which also contributes dead organic matter (detritus) to the stream. Shading not only affects water quality but influences the activities of primary producers such as algae and aquatic macrophytes. Riparian vegetation supplies organic matter in the form of dead leaves, needles, twigs, branches, logs, bud scales, fruit, droppings of terrestrial animals (frass), and dissolved organic matter (DOM).

The direct input of organic matter from riparian vegetation is substantial: annual values range from about 100 gm. per m^2 to more than 1,000 gm. per m^2 (Bray and Gorham 1964; Anderson and Sedell 1979), and values for standing crops can be much higher (Naiman and Sedell 1979). The addition of this organic matter is fundamentally important to the stream biota since this is often its major energy source, which is supplemented by lesser amounts of autochthonous production (Hynes 1963; Cummins 1974). Dead organic matter may contribute as much as 99% of the annual energy input to headwater streams covered by a dense forest canopy (Fisher and Likens 1973). Particulate detritus accounted for 53% of the annual energy input to Bear Brook, New Hampshire, and DOM input accounted for 47%; autochthonous primary production by mosses contributed very little. These streams are termed "heterotrophic", because in effect they consume organic matter produced by adjacent terrestrial systems.

Although allochthonous detrital input to streams continues throughout the year, seasonal pulses do occur. Detritus is added in autumn from deciduous leaf-fall and plant die-off. In winter and spring it is washed in by higher runoff (Minshall 1968; Fisher and Likens 1973;

Hobbie and Likens 1973). Additional pulses may include bud scales in spring and frass in summer. Tree branches broken by wind and snow may drop into streams in winter. Rainstorms periodically wash in DOM exuded from plants or collected on leaves from arboreal animals, while groundwater continuously brings in DOM.

Although the heterotrophic nature of headwater streams enclosed in forests has been well emphasized by recent research (Fisher and Likens 1973; Cummins 1974), headwater streams in unforested or sparsely-forested regions can be autotrophic, receiving most of their energy from primary production of aquatic macrophytes and algae (Minshall 1978). Autotrophy has been documented in desert streams lacking riparian vegetation and shading (Naiman 1976; Minshall 1978; Busch and Fisher 1981) and has been suggested for high-altitude streams (Cummins and

Klug 1979), especially in western montane regions (Wiggins and Mackay 1978). Headwater streams within forests can also change seasonally from heterotrophy to autotrophy, depending upon natural variations in light intensity, nutrients, hydrologic factors, and detrital input (Naiman and Sedell 1980).

Data are currently lacking to classify Sierra Nevada headwater streams as either heterotrophic or autotrophic. The vegetation, climate, and geology of Sierra Nevada mountains vary substantially from location to location. Thus headwater streams may vary widely in their heterotrophy/autotrophy balance. The extensive forests and chaparral on the western slope of the Sierras do suggest that detritus from riparian vegetation is very important to stream energetics. Even above the timberline, dense growths of willow, alder, grasses, and herbs overhang the small stream channels, supplying detritus and shading the water. Only at high elevations when streams flow over granite bedrock is riparian vegetation sparse and the stream unshaded.

Organic Matter Processing

The importance of organic matter contributions from riparian vegetation to stream ecosystems has been fully appreciated for only about 10 years (Cummins 1974). The manner in which aquatic organisms utilize and process organic matter at different seasons and locations along streams is a current research topic (Cummins 1973, 1975; Cummins and Klug 1979; Anderson and Sedell 1979; Hawkins and Sedell 1981). We briefly summarize here the role of aquatic organisms in continually processing and transforming organic matter from the time it enters the stream (fig. 1).

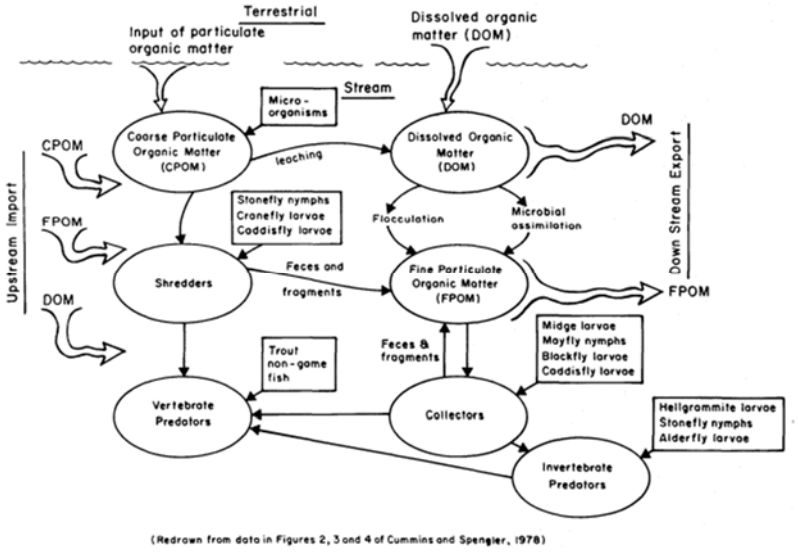

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Figure I.

Schematic diagram depicting the processing of dead organic matter in headwater streams (redrawn from data in Cummins and Spengler 1978).

Coarse particulate organic matter (CPOM: > 1 mm. diameter), such as leaves, starts leaching DOM once it enters the water. Up to 30% of dry weight may be leached in the first day; deciduous leaves leach faster than coniferous needles (Cummins 1974; Hynes etal . 1974). Fungi and bacteria rapidly colonize the leaves undergoing leaching. Although most of these microbes can metabolize cellulose, only some can use lignin (Cummins and Spengler 1978). Certain aquatic insects such as some stonefly nymphs, midge larvae, cranefly larvae, and caddisfly larvae shred or break down leaves (CPOM) during feeding and are called "shredders" (Cummins

1973). The microorganisms that colonize the leaves are an important source of shredder nutrition.

Shredder and microorganism feeding eventually breaks down CPOM into fine particulate organic matter (FPOM: < 1 mm. diameter). However this process is only one source of FPOM. FPOM may result from: 1) shredder and microorganism feeding on CPOM; 2) physical abrasion of CPOM by stream turbulence; 3) fine particles eroded from streambed algae; 4) fine material washed or blown in from the surrounding watershed; and 5) conversion from DOM by chemical and microbial activity (Cummins 1974). Dissolved organic matter leached from CPOM, plus DOM entering from the watershed, aquatic plants, and microbial excretions, can be partially converted into FPOM. This conversion is accomplished by physical flocculation and microbial assimilation, processes dependent on water turbulence, temperature, pH, and various ionic concentrations (Lush and Hynes 1973).

FPOM is the food for aquatic organisms known as "collectors". These animals obtain FPOM either by gathering it from stream substrate deposits or by filtering it from the flowing water. Deposit feeders include certain midge larvae and mayfly nymphs. Filter feeders have diverse ways of capturing FPOM from the passing water (Wallace and Merritt 1980). Blackfly larvae possess fan-shaped structures on their heads for filtering FPOM and transferring it to their mouths. Some caddisfly larvae construct detailed silk nets capable of sieving out FPOM. The net is often held between small twigs or stones exposed to the current, and the larva hides in a tube just behind. The collected FPOM contains bacteria on its surfaces, which increases the quality of the food for the collector. Particle size is very important to collectors since their mouthparts and sieving devices have specific shapes and openings for obtaining and handling FPOM.

A thin film of algae covers most stream substrates and contributes to instream primary production, especially when light intensity and nutrient concentrations are high. Microscopic diatoms are often the most abundant algal group, but larger filamentous green and blue-green algae are also common. Aquatic organisms known as "scrapers" have well-adapted mouthparts for scraping up and consuming this algal film, which also includes some FPOM and microscopic animals. Scrapers in Sierra streams include many mayfly nymphs, water penny beetles, riffle beetles, and some midge larvae.

Some aquatic invertebrates and vertebrates prey on shredders, collectors, scrapers, and each other; they are known as "predators". Predators in Sierra streams include many stonefly nymphs, dragonfly nymphs, some midge larvae, alderfly larvae, and dobsonfly larvae. Most aquatic insects in streams, even those that are predatory, are potential prey for trout and many nongame fish species.

The amount, kind, and timing of riparian vegetation additions to the stream and the shading provided by streamside plants will determine which feeding groups (shredders, collectors, scrapers, predators) prosper at any site. Thus, the population abundance of stream animals and community composition of the stream ecosystem are dependent on riparian vegetation.

The River Continuum Concept

The structure and function of aquatic communities along a river system have recently been organized into the River Continuum Concept (Cummins 1975; Vannote etal . 1980). This concept involves several stream factors—temperature, substrate, water velocity, stream morphology, and energy inputs from allochthonous and autochthonous sources—which interact to influence the availability of food for stream animals. These factors should vary in a predictable fashion from headwaters to downstream locations, and should produce predictable distributions of the four feeding groups along the continuum (fig. 2).

Since headwater streams (orders 1-3) are often heavily shaded and receive large amounts of organic matter from riparian vegetation, these streams are heterotrophic. Their ratio of gross photosynthesis (P) to respiration (R) will be less than one. Coarse substrates predominate, since stream gradients and erosive power are high. Shredders reach maximum abundance in these upper stream sections because of the abundant CPOM. FPOM and DOM are used and exported downstream. Because many Sierra headwater streams originate within coniferous forests, they

may differ from typical headwater streams originating within deciduous forests of the eastern United States in detrital input and lighting conditions.

Organic matter input and shading are less important in medium-sized rivers (orders 4-6) because of the greater widths and more open canopy. Increased primary production shifts these streams from heterotrophy into autotrophy, and a P:R ratio greater than one. Increased algal production allows scrapers to be abundant. Collectors are also common, and a few shredders are still present. FPOM and DOM are again used and exported downstream.

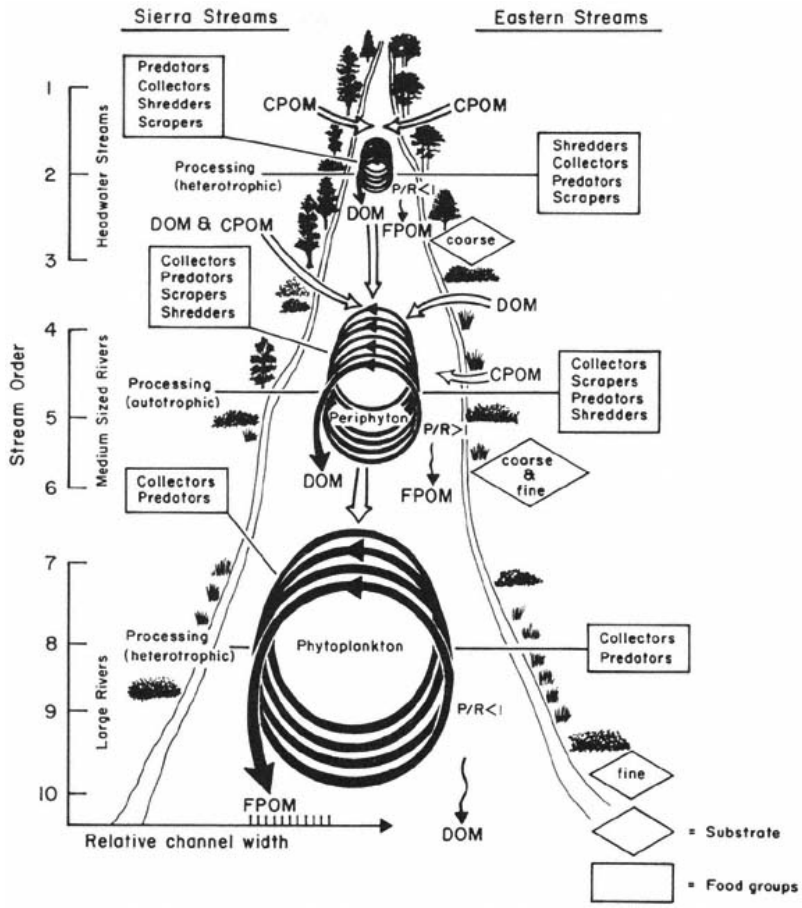

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Figure 2.

The relationship between stream size and the progressive shift in structural and functional components of streams. Box graphs of feeding groups are provided to compare Sierra streams with eastern streams. The relative number of organisms in each feeding group is indicated by rank-ordered lists, from large to small (from Cummins 1975; Vannote et al . 1980).

Riparian vegetation has little direct influence on large rivers (orders > 6) since the wide channels are open to sunlight, and the input of terrestrial detritus relative to water volume is small. However, FPOM from upstream sources is very important, and for this reason collectors are the predominant aquatic organisms of large rivers. Although these rivers are open to sunlight, increased turbidity restricts both light penetration and primary production by algae on the fine river substrates. Instead, phytoplankton may be important primary producers in the upper water layers, although turbidity may restrict the depth of their production. Therefore, large rivers are thought to be heterotrophic and have a P:R ratio less than one.

Shredders and scrapers are essentially absent because their food resource and coarse substrate are lacking.

Streams on the western slope of the Sierra Nevada typically pass through several plant communities—subalpine forests (conifers), red fir forests, mixed conifer forests, oak woodlands, chaparral, and grasslands—each of which contributes different organic matter inputs and shading effects. In addition, alpine tundra, montane meadows, and montane chaparral may be locally important. It is not known if all aspects of the river continuum concept apply to Sierra streams.

It is possible to summarize predictions of the river continuum concept (Vannote etal . 1980), especially as they are thought to be true for many streams in forested regions. Exceptions are known to occur for desert streams (Minshall 1978), and possibly for western montane streams (Wiggins and Mackay 1978). Some of these predictions have recently been tested in four Oregon streams, and shown to support the river continuum concept (Naiman and Sedell 1980; Hawkins and Sedell 1981).

Width, depth, and discharge increase as stream order increases. Substrate size changes from coarse to fine going from headwaters to large rivers. Diel changes in water temperature increase to a maximum in medium stream orders (3–5), then decrease downstream.
CPOM and riparian vegetation shading decrease in importance downstream, and FPOM increases in importance. This causes the CPOM:FPOM ratio to decrease as stream order increases. The particle size of detritus decreases downstream.
DOM diversity decreases downstream as labile components are used by microorganisms, causing refractory components to accumulate.
P:R ratio < 1 for stream orders 1–3—heterotropic condition.
P:R ratio > 1 for stream orders 4–6—autotrophic condition.
P:R ratio < 1 for stream orders > 6—heterotrophic condition.
Shredders decrease downstream as CPOM becomes less abundant.
Collectors increase downstream as FPOM becomes more important.
Scrapers increase to a maximum abundance in medium-sized rivers (orders 4–6) as the canopy opens and admits light to the substrate, but then decrease in larger rivers (orders > 6) because turbid water shades algae on the stream substrate.
Predators maintain approximately constant abundance along the continuum.
Biotic diversity is low in the headwaters, increases to a maximum in medium stream orders (3–5), and decreases in larger rivers.

Effects of Riparian Vegetation Removal

Some of the major inputs of riparian vegetation to instream systems are shown in figure 3. Effects on stream invertebrates of disruptions to five of these inputs will be discussed: 1) decrease of detrital inputs; 2) loss of shade as it affects primary production; 3) loss of shade as it affects stream temperature; 4) water quality and quantity alterations; and 5) loss of terrestrial habitat. The intensity of these effects is related to the degree of modification of the vegetation.

Decrease of Detrital Inputs

Riparian vegetation often supplies large amounts of organic matter (energy) to the stream, forming a dependable food base for stream invertebrates year after year. Many of these animals have complex structures, behaviors, and life cycle events which are specially adapted for using different kinds and sizes of detritus as food. Decrease of detritus will cause decreased populations of these species, although instream production may still maintain some at lower densities.

Loss of Shade

Effect on Primary Production

Riparian vegetation is a major control on light intensities reaching algae and macrophytes in headwater streams, and therefore on the level of primary production that can occur. Shade removal has been demonstrated to increase primary production and cause algal mats in small streams, both in the field (Brown and Krygier 1970; Likens etal . 1970; Granoth 1979), and in

the laboratory (McIntire and Phinney 1965; Brocksen etal . 1968). For example, vegetation removal along a small stream in Kansas changed it from heterotrophy to autotrophy (Gelroth and Marzolf 1978). Also, in laboratory streams exposed to two different light levels, the stream receiving twice as much light had twice the gross plant production (Brocksen etal . 1968). If nutrients or other factors are not limiting, increased illumination due to shade removal will increase primary production and the food resources used by scrapers.

Loss of Shade

Effect on Stream Temperature

Shade from riparian vegetation moderates stream temperatures, often preventing excessive summer temperatures that may be lethal to invertebrates or fish. Field studies have demonstrated significant increases in summer water temperatures and decreases in winter temperatures when shade is removed from small streams (table 1).

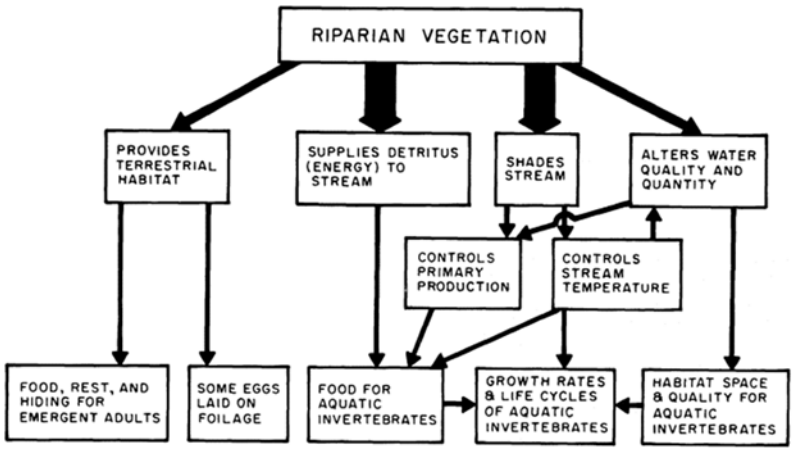

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Figure 3.
Relationships between riparian vegetation and stream components.

Table I.—Water temperature changes in small streams caused by riparian vegetation removal, in relation to undisturbed conditions.

		Temperature change		
Location	Forest type	Summer[1]	Winter	References
Oregon	Coniferous	+8(a)	—	Brown and Krygier (1970)
		+15(b)	—	
		+8(a)	0	Levno and Rothacher (1967, 1969)
Alaska	Coniferous	+5(a)	0	Meehan etal . (1969)
Kansas	Deciduous	+5(c)	—	Gelroth and Marzolf (1978)
New Hampshire	Deciduous	+5(c)	+	Likens etal . (1970)
		+4(d)	—	
West Virginia	Deciduous	+8(a)	−2	Aubertin and Patric (1974) Lee and Samuel (1976)

North Carolina	Deciduous	+7(a)	−2	Greene (1950)
		+13(e)	—	
		+7(e)	—	Swift and Messer (1971)
New Zealand	Mixed coniferous and deciduous	+4(a)	−2.5	Graynoth (1979)
		+7(b)	—	

[1] Summer increase in water temperature based on:

(a) mean monthly maximum water temperatures,
(b) instantaneous water temperatures recorded for one year,
(c) instantaneous water temperatures recorded for only one summer day,
(d) mean weekly water temperatures,
(e) weekly maximum water temperatures.

Studies on clear-cut watersheds show that when riparian buffer strips are used, stream temperatures remain essentially the same as in undisturbed watersheds (Brown and Krygier 1970; Swift and Messer 1971; Graynoth 1979), and stream macroinvertebrate diversities remain high (Erman etal . 1977).

Water temperature affects numerous important stream functions, such as processing rates of organic matter, chemical reactions and concentrations, metabolic rates of stream invertebrates, and cues for life cycle events. Because of these complex interactions it is very difficult to assess the ultimate effects of shade removal and water temperature changes on stream animals. Stream invertebrates have different tolerances for water temperature variations, but most species in headwater streams are narrowly adapted for cool temperatures and may use dormant strategies to survive natural warm periods (Hynes 1970). Some stoneflies in Sierra streams survive summer temperatures lethal to mature nymphs by being in the egg stage or by diapausing as young nymphs. Although some survival strategies can be used whenever conditions become unfavorable, other strategies are closely timed to natural stream temperature cycles and might not be useable during abnormal temperature patterns.

Water Quality and Quantity Alterations

Riparian vegetation affects water quality not only by moderating water temperature and influencing chemical reactions, but also by contributing DOM and nutrients to the stream. Riparian vegetation also protects streambanks from excessive erosion, minimizing the input of fine sediments which can fill the numerous cracks, crevices, narrow channels, and openings that ramify through the upper substrate layers that form the invertebrate habitat of normal headwater streams. Removal of riparian vegetation may increase the annual amount of stream runoff, increase peak discharges after rainstorms, and change the timing of peak flows. Change in runoff quantity will cause the stream channel to readjust its velocity patterns, channel dimensions, frequency of pools and riffles, and substrate composition, all of which are important for the amount and quality of invertebrate habitat. Since invertebrate species vary in their habitat requirements, some species may benefit while others are harmed. Nonetheless, disturbances that add fine sediment to streams decrease the species diversity.

Loss of Terrestrial Habitat

Most aquatic insects, including those in Sierra streams, emerge into terrestrial ecosystems as adults with wings for dispersing and searching for mates. Riparian vegetation is an important habitat used by these adult insects for feeding, resting, and hiding. Use of this foliage is heavy in spring and somewhat less in summer and autumn. Some use occurs even in winter. Without this

vegetation, predation by birds, terrestrial insects, and mammals would undoubtedly be much greater. Some insect adults lay eggs on riparian vegetation overhanging the stream so that upon hatching the young larvae will drop back into the stream for the aquatic life stages. This method of egg laying is used by the alderfly Sialis in Sierra streams. Stoneflies signal and find mates by drumming with their abdomens on streamside vegetation.

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The Role of Streamside Bufferstrips in the Ecology of Aquatic Biota[1]

Don L. Mahoney and Don C. Erman[2]

Abstract.—Riparian vegetation is important as a source of food to stream organisms, as shade over small-order streams, and as a bank-stabilizing force to prevent excessive sedimentation and to intercept pollutants. Logging may significantly affect each of these factors unless proper protective measures are employed. Current research is underway on the recovery of small northern California streams after logging. Analysis of algal samples from 30 streams shows light intensity and chlorophyll concentrations are major factors related to logging intensity that affect instream primary production. Transportable sediment from 24 streambeds has shown that this measure of sediment is higher (P = .001) in logged and narrow buffered streams than in controls 7 to 10 years after logging.

Introduction

Streamside vegetation is a source of food, provides shade which prevents excessive water temperatures, provides cover, and gives stability to the soil along the stream. If land-use activity on the slopes around a stream creates erosion or pollution hazards, streamside vegetation can intercept and filter sediments and contaminants before they enter the stream. Several studies have examined the value of streamside vegetation (bufferstrips) in protecting streams from timber management activities; we will emphasize these studies in this paper. In addition, preliminary results from our study of the recovery of logged streams in northern California will be presented.

Streamside Vegetation As a Source of Food

Streams are often classified according to the predominant source of energy used as a base for their food chains. Some streams receive energy primarily from leaffall and litter entering the stream, while others receive energy primarily from instream plant production. These two sources of energy can vary over the course of a year and from one section of stream to another. Recent emphasis has been placed on the role of outside energy sources to stream macroinvertebrates (Cummins 1974). Numerous studies (see Erman 1983; Knight and Bottorff 1983) have focused on the feeding habits of individual species of invertebrates, both as larvae and as adults. Much of this work has examined the functional aspects of the aquatic animals or the way that they obtain their food, rather than the origin of the food, the taxonomic nature of the species, or the trophic level they might occupy (Cummins 1973).

In a recent study, for example, Hawkins and Sedell (1981) have shown that the relative abundance of each functional group depends on the kind of food inputs into the stream system. They studied a relatively undisturbed stream system, from headwaters to lowlands, in the Oregon Cascades and found that shredders of large organic particles dominated upper shaded reaches; collectors of fine organic particles increased in abundance from the headwaters down; filterers of fine organic particles were only locally important; predators became equally distributed in the summer and fall, increasing in the lower reaches from a spring minimum; and algal scrapers became an important part of the fauna once the stream became wider and more open to light through the middle reaches. Obviously, if riparian vegetation is destroyed and a stream changes from a food web based on outside inputs to one based on internal production, then the various types of invertebrates will change in abundance also.

Another effect of streamside vegetation removal, although more indirect, is to alter

predation pressure from fish. Insects falling from the riparian zone are significant sources of food for stream fishes (Hunt 1975; Cadwallader etal . 1980), and when vegetation is removed, fish switch to feeding predominantly on instream invertebrates as the aerial source is diminished (Hess 1969; Cadwallader etal . 1980).

A compensating effect of the removal of the streamside shade is to increase the growth of certain algae, especially diatoms and filamentous green algae. Increased algal growth has been associated with increased biomass of some invertebrates and fish (Lyford and Gregory 1975; Murphy and Hall 1981), and may mask detrimental effects of increased sedimentation (Murphy etal . 1981), especially if adequate spawning sites for fish are available in nearby undisturbed sections of stream and if adequate care has been taken of the streambed. An increase in the amount of algae, however, may be at the expense of mosses and vascular macrophytes (Mahoney and Erman, unpublished), organisms which have been used as indicators of good water quality in Europe (Empain 1978; Wiegleb 1981).

Temperature Effects of Streamside Vegetation

Streamside vegetation has a marked effect on the temperature of stream water (Hall and Lantz 1970; Meehan 1970; Swift and Messer 1971; Brazier and Brown 1973). Temperature increases after removal of streamside vegetation can be expected to be greater where stream discharges are smaller, as in low-order, headwater mountain streams. Methods are now available for quantifying the relationship between the amount of streamside vegetation and the change in stream temperature (Brown 1972). Temperature change is related to the amount of solar radiation at critical periods that is intercepted by the canopy, the surface area of the stream, and stream discharge. In some cases the annual maximum temperature has increased 12°C by complete canopy removal in small streams (Brown and Krygier 1970). By way of comparison, the average increase in water temperature caused by once-through cooling of electric generation stations was 10–11°C a few years ago (Mittursky etal . 1970; Levin etal . 1972).

There are detrimental effects of temperature increases on fish survival (e.g., Paladino etal . 1980) including those caused by riparian vegetation removal (Swift and Messer 1971; Ringler and Hall 1975). But Hunt (1979) intentionally cleared upper-story vegetation from along a small

Michigan stream in order to recreate a meadow environment and reported that temperature increases were ameliorated once meadow vegetation began overhanging the stream.

While many of these studies have shown that temperature increases affect fish populations, there have been fewer studies to determine the effect of temperature increases on invertebrates. The change in fish production would by itself change the predation pressure on the invertebrate community. Burton and Likens (1973) discussed possible changes in stream macroinvertebrate communities due to temperature increases from vegetation removal, and a number of other studies have demonstrated significant changes in populations and decreased diversity of macroinvertebrates in waters heated by power plant cooling systems (Howell and Gentry 1974; Ward 1976).

Streamside Vegetation as a Protection from Erosion and Pollution

One benefit of the herbaceous growth (including mosses and liverworts) along the banks of streams is to provide stability to the banks and thus prevent streambed erosion due to undercutting (e.g., Pfankuch 1975; Cederholm and Koski 1977). Taller, more woody growth along streams can prevent the debris produced by human activities or natural landslides from entering the channel (Benoit 1978). There are many reports of changes in the invertebrate biota that occur with increases in sedimentation (Cordone and Kelly 1961; Chutter 1964; Nuttal 1972; Rosenberg and Weins 1978). The exact mechanisms responsible for these changes are complex, involving smothering, loss of food or space, and substrate instability (Cederholm etal . 1978; Lenat etal . 1978; Williams and Mundie 1978).

When streams are buffered from the effect of road-building and logging by strips of vegetation, they have much lower increases in suspended sediment than comparable streams that are not protected by bufferstrips (Burns 1972; Moring 1975). Table 1 gives data from the Alsea watershed study in Oregon (Moring 1975), covering a period of 15 years; it clearly demonstrates the protective value of streamside vegetation. Similarly, in another study (Aubertin etal . 1974) only slight increases in stream turbidity occurred after clearcutting a 34-ha. watershed in West Virginia. The success in maintaining water quality was attributed to the retention of a 10-to 20-m. forest strip along the stream.

Table 1.—Average percentage of change in suspended sediment in the Alsea watershed seven years before and seven years after logging (Moring 1975).

Control	0.1
Clear-cut with bufferstrip	54
Clear-cut	205

Other studies, chiefly in the Midwest, have examined the value of vegetative bufferstrips as a protection from agricultural pollution. Vegetative strips around feedlots substantially reduced runoff, total solids, total nitrogen, and total phosphorus (Young etal . 1980). Asmussen

etal . (1977) found that vegetative bufferstrips effectively reduced pollution from agricultural chemicals. An extensive review of the impact of nearstream vegetation on water quality and stream biota (Karr and Schlosser 1977) concluded that "proper management of nearstream vegetation and stream morphology may produce substantial improvement in water quality and the stream biota of agricultural watersheds." A summary of this report is available in Karr and Schlosser (1978),

The exact extent of bufferstrip that is necessary to protect water quality has been calculated for some situations. Based on soil stability ratings and slope, Haupt (1959) developed guidelines for the width of bufferstrips necessary to protect streams from road-building activities. Benoit (1978) has done the same for timber management activities based on data from a number of streams in Oregon. Federal regulations for national forests, and the Forest Practices

Act regulations on private lands in California, limit the extent of timber harvesting activities near watercourses, but they do not dictate specific buffer widths.

A major study of macroinvertebrates in streams in northern California was undertaken at the University of California, Berkeley, to see if macroinvertebrates could indicate water quality in streams associated with logging activities (Erman et al . 1977; Roby etal . 1977; Newbold etal . 1980). A total of 65 buffered, unbuffered, and control streams was sampled, mostly on national forest land. These investigations showed that invertebrate communities of logged or disturbed streams had a lower diversity index and higher populations (primarily of Chironomidae, Baetis , and Nemoura) than streams in unlogged areas. Streams with bufferstrips wider than 30 m. had invertebrate communities no different than control streams; whereas, if bufferstrips were less than 30 m., some differences in communities were detected. The relationship between diversity and various land-use practice (no buffer, narrow buffer, wide buffer, control) is summarized in figure 1.

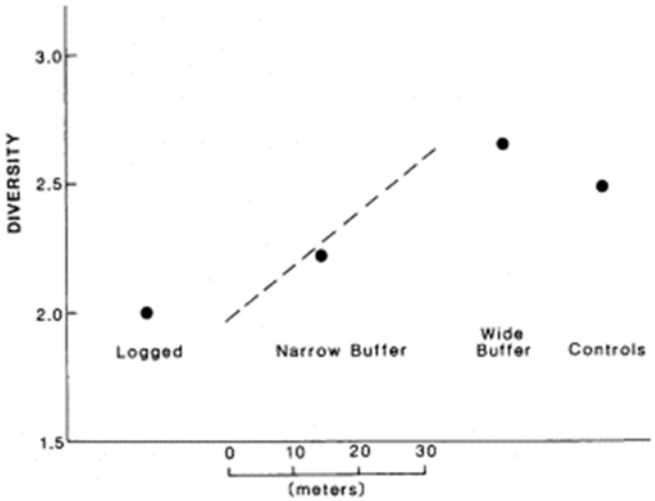

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Figure I.

Diversity of macroinvertebrate communities in streams in northern California as affected by varying forestry practices.

Similar work in New Zealand found changes in invertebrate abundances and diversity after streamside vegetation was cleared during logging operations (Graynoth 1979). Where a buffer of vegetation was left along the stream, changes in invertebrate populations did not occur.

A major concern of regulatory policy is whether fixed widths of vegetation along the streamside should be specified or land managers should make site-specific recommendations to balance resource use and stream protection. A fixed width (or some range of values) is appealing because of its simplicity of application and its provision of at least minimum stream protection. Site-specific recommendations theoretically allow for more precise adjustments to local risks (or lack of risks) and permit resource use (timber harvesting) to the limit of sound forest practices. Evidence is available to support either approach (Burns 1972; Erman etal . 1977). In the long run, we believe, use and protection must be balanced by the land manager, who needs to view land and water systems with equal concern.

Ongoing Study of Post-Logging Recovery

While the previous study of logging and bufferstrips in California demonstrated significant reductions in invertebrate diversity in unbuffered and narrow buffered streams, causal mechanisms were not investigated thoroughly. As a follow-up study, 30 of the streams in the original investigation are currently being studied to see the recovery rate of narrow and unbuffered streams and to investigate possible causal mechanisms. Data on invertebrate

distributions and abundances, algal production, and transportable sediment stored in the substrate have been collected. Invertebrate analysis is not yet complete; preliminary data on algal production and sediment storage will be presented here.

Algae Production

As mentioned earlier, one of the effects of removing the stream canopy is to alter the instream algal community. There are many methods to quantify this community, and comparisons between methods have been attempted (e.g., Bott etal . 1978). While oxygen evolution methods may provide a more accurate measure of primary production under some circumstances, the ease with which chlorophyll and biomass estimates can be made has assured these methods a place in the literature, even though extraction methods for chlorophyll remain uncertain (Rai 1980). But before chlorophyll analyses can be used as indicators of perturbations, factors affecting differen-

ces in chlorophyll concentration must be fully understood.

We used an approach similar to that of Bannister (1974), where the amount of chlorophyll was weighted by the amount of available light. Higher chlorophyll concentrations are usually present in shade plants (Brown and Richardson 1968; Boardman 1977), but they do not necessarily mean higher production; this method takes that relationship into account in making estimates of potential production. The presence of more chlorophyll in shade plants has been known for some time to plant physiologists, but apparently is not appreciated by limnologists (Naiman and Sedell 1980). A full description of the methods used in this study will be available in a later publication.

Algae for this study was removed from constant rock sizes (2–4 cm.), size-classes that are moved by moderate storms. No noticeable differences were detected between logged, buffered, and control streams. In those streams that were not light-saturated (i.e., did not receive 10% of full sunlight), there was a relationship between the amount of chlorophyll per unit area and the amount of radiant energy—the less energy received the more chlorophyll present (fig. 2). Potential production for these streams was inversely related to the chlorophyll concentration present (fig. 2). Streams that were not lightlimited had a wide range of chlorophyll concentrations and production estimates. This range is due to a number of factors, the most prominent being the place in the bloom-dieoff cycle that was sampled. High values were obtained if samples were taken as a particular species of algae (usually filamentous) reached bloom proportions in streams modified to receive full sunlight. Low values were obtained from the same stream-types if samples were taken after a bloom of algae had begun to senesce. These results indicate some of the difficulties with, and hence limitations to, interpretation of algal chlorophyll data in evaluating stream perturbations.

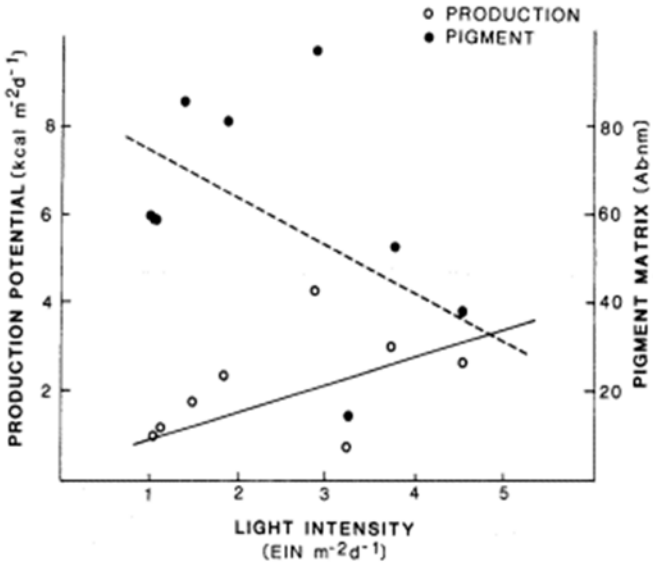

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Figure 2.
Potential algal production and total pigment concentration for 8 light-limited streams in northern California.

Changes in Transportable Sediment

The amount and size of sediments in stream substrates is a result of many processes. Inputs may come from human activities such as logging or road-building, or from natural causes such as landslides. How fast sediment is moved through the stream depends on such things as slope, instream vegetation, instream sediment traps, and the frequency of large storms for the period in question. It may easily take five years or more for a pulse of sediment to flow completely through a stream system (Dunn and Leopold 1978). Thus the amount of sediment that is currently in the process of being moved through a stretch of stream (including that temporarily stored) is a summation of all the land-use activity and weather patterns that have prevailed in the basin in question for the preceding several years.

For this study we measured the sediment that was present in a stream and could be easily moved (transportable sediment) by summer low flows. We stirred a small area of streambottom to a depth of 10 cm. and placed cylindrical containers into the substrate downstream to collect sediment (Beschta and Jackson 1979; Blomqvist and Hakanson 1981; Blomqvist and Kofoed 1981).

Figure 3 shows the percentage change in transportable sediment in logged or narrow-buffer treatment streams when compared with control streams. Each treatment (either logged or buffered) is compared with each control within that block of streams (a group of treatment and control streams from the same area). Transportable sediment was higher in 17 out of 20 comparisons of treatment to control (sign test: P = .001), even though several of the control streams were degraded by recent road-building activity. Figure 4 shows the change in transportable sediment, transportable detritus, and the ratio of the two for each block of streams. The average of treatment streams is compared against the average of control streams for each block. Comparisons between blocks are not completely analyzed. In all blocks, transportable sediment was higher in treatments than in controls (fig. 4). Transportable detritus was higher in five of the six blocks, while the ratio of detritus to sediment was lower in four of six blocks. These findings indicate that seven to ten years after logging, in unprotected streams and streams protected by buffers less than 30 m. wide, more sediment is being transported than in comparable controls. Detritus (from either out-of-stream or in-stream sources) is also higher in treatment streams, but this increase is not as great as the increase in sediments.

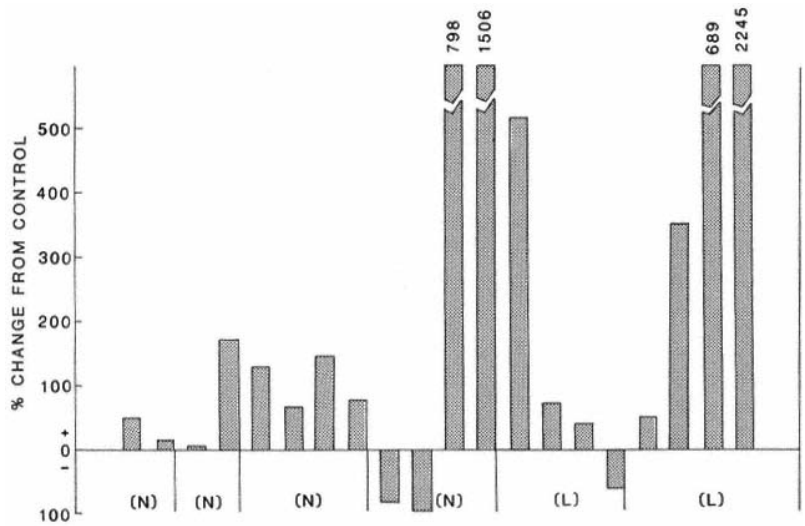

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Figure 3.

Percentage change from control in transportable sediment in narrow-buffered (N) and logged (L) streams in northern California.

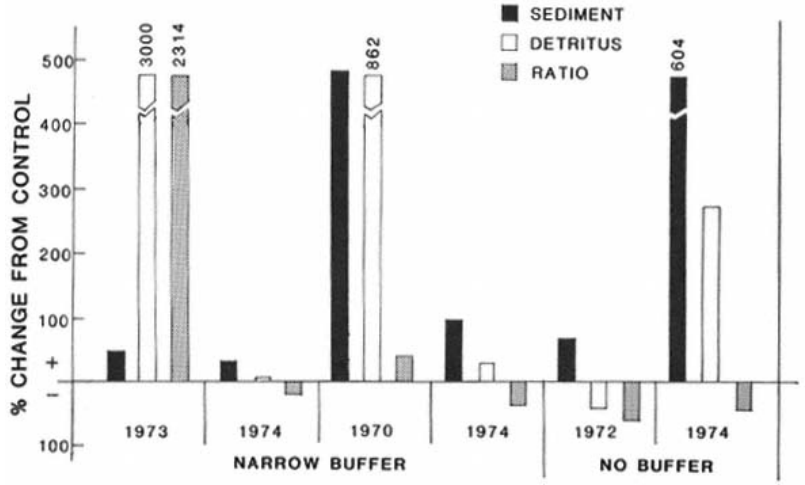

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Figure 4.

Percentage change from control in transportable sediment, detritus, and the detritus: sediment r atio in narrow-buffered and unbuffered streams in northern California (dates are year of initial logging).

Conclusion

Streamside vegetation has been shown to play an important role in the ecology of aquatic plants, macroinvertebrates, and fish. The sources cited in the review sections of this paper are meant solely as an introduction to a greater body of literature available on many aspects of the subject. Perhaps the best way to summarize the importance of streamside vegetation is to place it in the context of the river continuum concept (Vannote etal . 1980). In this concept, the biotic

community is shaped by both the immediate physical environment and by inputs from further upstream. Furthermore, the stream biota, after an extended period of time, reaches a dynamic equilibrium with the physical environment which itself undergoes periodic fluctuations.

It is in the headwaters of a stream that riparian vegetation plays its most important role in the ecology of invertebrates, both as a predictable annual source of food and as protection from excessive heating. The influence of this vegetation, however, is felt not only in the headwaters but also further downstream, where much of it eventually drifts. In the middle reaches of stream systems, the immediate riparian vegetation becomes less important as food, relative to the instream algal production, and in the lowest reaches, in large rivers, it plays an even lesser role as food. In these lower reaches riparian vegetation has its greatest importance as a soilstabilizing force. This bank stabilization role is of course doubly important in the headwaters, as any sediment produced there will eventually find its way downstream.

Bufferstrips of vegetation left along streams affected by human activities have been shown to protect the integrity of stream systems. This vegetation is important in protecting not only the stream immediately adjacent to it, but also in protecting the biota further downstream since it prevents excessive sediment pulses from being flushed downstream. This downstream protective benefit of bufferstrips is usually not included in economic analyses of the costs and benefits of not harvesting the timber immediately adjacent to a stream (e.g., Gillick and Scott 1975). These downstream effects of riparian vegetation need more study so that they can be more realistically evaluated.

It is presently questionable how much riparian vegetation can be removed from a stream system without affecting the stability of the system. Natural resilience (e.g., increased algal blooms) may temporarily mask detrimental effects of this practice, but there is increasing evidence that decades may be necessary for the stream biota to return to normal. Since so much of the riparian vegetation in California has already been destroyed, it becomes even more imperative that what remains be managed wisely so that this important natural resource with all its diversity is not lost to posterity.

Acknowledgments

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The Use of Riparian Systems by Aquatic Insects[1]

Nancy A. Erman[2]

Abstract.—Nearly all aquatic insects spend some portion of their lives in riparian zones. Many examples are given of terrestrial stages and activities of aquatic insects. The examples are divided into the areas of feeding, pupation, emergence and mating, and egg laying. Special emphasis is given to recent studies on caddisflies (Trichoptera) in riparian systems of the Sierra Nevada. The examples illustrate the point that knowledge of life cycles is essential for predicting the effect of disturbance in riparian areas on populations of aquatic insects.

Introduction

Most aquatic insects are either directly or indirectly dependent on riparian vegetation at some stage in their life cycles. This dependence has two aspects. The first is that the riparian system affects the aquatic system. The second is that nearly all aquatic insects are terrestrial at some stage in their life cycle and many at several stages in their life cycle (table 1). These terrestrial stages are usually spent close to the water in the riparian zone. It is the second aspect of riparian use that will be covered in this paper, but a brief review of the first is relevant to the theme of this symposium.

Riparian systems act on streams to produce shade and maintain cool summer stream temperature, to provide leaf fall, and to prevent soil erosion (Ross 1963). The smaller the stream, the greater is the effect of the riparian system on it and the more restricted to terrestrial biomes are the aquatic insects (Ross ibid .). In small streams in upper watersheds, terrestrial leaf litter is an important part of the diet of aquatic insects (Cummins 1973). Indirectly, insects farther downstream depend on the same food source when they eat fine particulate organic matter chewed and egested by those upstream. Carnivorous insects are indirectly dependent on riparian vegetation because their prey feed on it. Insects feed also on food produced within the aquatic system—algae and aquatic macrophytes (Merritt and Cummins 1978). The relative importance of allochthonous and autochthonous food sources continues to be discussed (Kaushik and Hynes 1971; Hynes 1975; Minshall 1978; Vannote etal . 1980), but there is no doubt that the riparian zone contri-

Table l.—Use of terrestrial vegetation (usually riparian) by aquatic insects. Orders in which nearly all members have an aquatic stage are all capitals. Orders in which only some families are aquatic are in lowercase type.

ORDER	LIFE STAGE			
	Egg	Nymph	Adult	
EPHEMEROPTERA	A[1]	A	T[2]	
ODONATA	A/t[3]	A	T	
PLECOPTERA	A	A	T/a[4]	
Hemiptera	A/T[5]	A/T[6]	A[7] /T	
	Egg	Larva	Pupa	Adult
MEGALOPTERA	T	A	T	T
Neuroptera	T	A	T	T
TRICHOPTERA	A/t	A/t	A/t	T
Lepidoptera	A/t	A	A	T/a
Coleoptera	A/t	A/t	T/a	A/T
Diptera	A/t	A	A/T	T

[1] A—all members aquatic.
[2] T—all members terrestrial.
[3] A/t—most members aquatic, a few members terrestrial.
[4] T/a—most members terrestrial, a few members aquatic.
[5] A/T—many members aquatic, many members terrestrial.
[6] Insects live on surface film, adjacent banks and at aquatic margins.
[7] Insects may leave water to migrate.

butes a large part of the food base to any stream system.

Detailed studies of aquatic insect food habits have shown that many insects are omnivorous and that food needs change with instars (Chapman and Demory 1963; Winterbourn 1971; Mecom 1972; Anderson and Cummins 1979; Erman 1981). Therefore, an insect that may exist on algae produced within the stream in the early instars, may later shred decaying leaves from the riparian zone and later still become carnivorous.

The second aspect of riparian use by aquatic insects, that of their terrestrial stages, can be divided into four areas—feeding and, in the Trichoptera, case building; pupation; emergence and mating; and egg laying. Table 1 is a general representation of life stages of aquatic insects. Many exceptions have been omitted for simplification. It is particularly difficult to classify an order aquatic or terrestrial in any given stage when some orders (Hemiptera, Lepidoptera, Coleoptera, Diptera) have so many semiaquatic members. These members should be kept in mind, because although they are not covered in this paper, they are undoubtedly important in riparian zones. Special emphasis is given here to recent studies on caddisflies (Trichoptera) in riparian systems of the Sierra Nevada.

Feeding on Streamside Vegetation

Most feeding by aquatic insects occurs in the nymphal or larval stage and, as discussed above, in the water. However, one caddisfly, Desmonabethula (Trichoptera: Limnephilidae) leaves the water to feed on several species of semiaquatic plants (Erman 1981). The life cycle is shown in figure 1. The larvae live in slow, unshaded stretches of small spring-streams in the Sierra Nevada and were studied at the Sagehen Creek Field Station (Nevada County). In most instances the larvae are in sections of springstreams associated with fens or minerotrophic peatlands, described elsewhere (Erman and Erman 1975). Larvae leave the water at night to feed on Carex nebraskensis , C . praegracilis , C . rostrata , Calamagrostiscanadensis (leaves and developing flowers), Veronicaamericana , Saxifragaoregana , Dodecatheonalpinum (developing fruits only), and Polygonumbistortoides . In all but the species indicated, larvae strip the tenderest tips and edges of the leaves (fig. 2). Such feeding is typical of many herbivores, probably because of richer nutrient concentrations in those portions of the plants.

Population estimates of Desmonabethula revealed that 14–16% of the population migrated on any one night but that a different segment migrated the following night. All or nearly all of the population may depend on terrestrial feeding at a critical stage in its life cycle Fifth instar larvae had high densities, 1220/m^2 and 1662/m^2 in optimum stream sections. It may be that D . bethula reaches high numbers

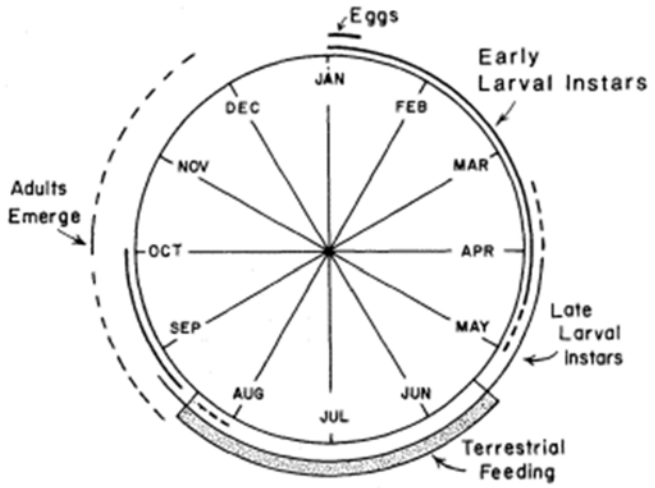

Desmona bethula (larvae terrestrial)

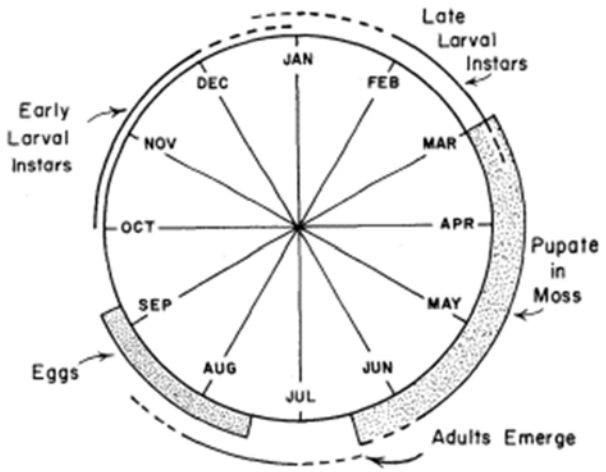

Limnephilus peltus (eggs and pupae terrestrial)

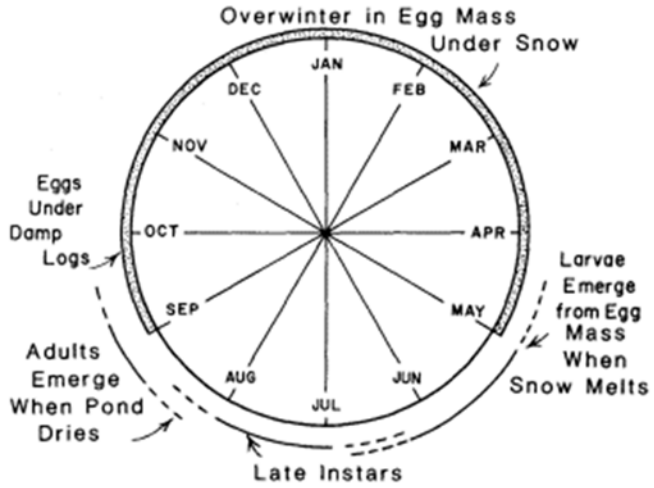

Lenarchus rillus (eggs terrestrial)

[Full Size]

Figure l.
Life cycle of three Trichoptera (Limnephilidae) in the Sagehen Creek basin (Nevada County, Calif.) showing aquatic and terrestrial periods.

[Full Size]
Figure 2.
The caddisfly larva, Desmona bethula (Trichoptera : Limnephilidae) feeding at night on emergent vegetation (Carex spp.). Photo by Jerry Morse.

because it can leave the stream and use a food source unavailable to other aquatic insects.

Another group of caddisfly larvae, Cryptochia spp. (Limnephilidae) has been found on wet wood and leaves at the water's edge as well as in the water (Wiggins 1977). Psychoglypha spp. (Limnephilidae) have been observed at the edge of spring-streams in the Sagehen Creek basin, Sierra Nevada, feeding on Veronicaamericana (N.A. Erman unpublished).

Some species of Lepidostoma (Trichoptera: Lepidostomatidae) are found only along the very edges of streams in the roots of sedges and other aquatic plants. These species are rarely if ever collected in open water. They use root material in their cases and may feed on it (N.A. Erman unpublished). Also Onocosmoecus spp. (Trichoptera:Limnephilidae) live along stream edges and feed on decaying grass that bends into the stream (Wiggins 1977).

There are other caddisflies, particularly in the family Limnephilidae, that live in springs, seeps, temporary streams, and along the edges of larger streams in California, and probably use the riparian zone as a food source. The Limnephilidae is a highly diverse family, important in California because it is dominant at higher elevations in the Nearctic region. The above are only given as examples and should not be considered an inclusive list.

Many of the aquatic and semiaquatic Lepidoptera larvae feed on cattail (Typha spp.), bulrush (Scirpus spp.) or other vascular hydrophytes (Lange 1978). Also some of the aquatic

Diptera larvae and some of the aquatic Coleoptera feed on living vascular plant tissue (Doyen and Ulrich 1978; Merritt and Schlinger 1978) though usually the plants are hydrophytes and might not be strictly riparian.

Adult stoneflies (Plecoptera) live on streamside vegetation where species of several families (Taeniopterygidae, Nemouridae, Capniidae, Chloroperlidae, some Perlodidae) feed on epiphytic algae or young leaves and buds (Harper 1978; Jewett 1963; Brinck 1949).

Pupation Outside the Water

All the Megaloptera and aquatic Neuroptera leave the water to pupate on land, usually very close to the water. The alderflies (Megaloptera: Sialidae) burrow into soil along the bank (Azam and Anderson 1969). The dobsonflies and fishflies (Megaloptera:Corydalidae) pupate either in the soil or in decaying shoreline trees or stumps. And the spongillaflies (Neuroptera: Sisyridae) spin silk cocoons usually located in protected terrestrial sites near shore (Evans 1978).

In the Trichoptera terrestrial pupation is the exception but seems to have evolved as an adaptation to life in intermittent streams. Caddisfly larvae leave the water in the final instar and pupate on land as the water evaporates. Examples are Ironoquiaparvula (Limnephilidae) (Ross 1944; Flint 1958), I . punctatissima (Williams and Williams 1975), and I . lyrata (Mackay unpublished).

Limnephiluspeltus (Limnephilidae) leave spring-streams shortly after snowmelt in the Sagehen Creek basin and burrow into moss along the stream edges in the fens (fig. 1). In dry years when spring flow recedes and moss dries out early, some pupae die befor emerging (N.A. Erman upublished).

Nearly all aquatic Tipulidae (Diptera) leave the water to pupate in nearby soil, moss or litter (Byers 1978), and pupation is terrestrial in almost all species of aquatic Coleoptera (Leech and Chandler 1956; Pennak 1978). Usually they pupate in cells excavated by larvae under stones or logs. The Gyrinidae make mud cells on aquatic vegetation (Doyen and Ulrich 1978).

Adult Emergence and Mating in the Riparian Zone

By the very fact of emerging from the water most aquatic insects "use" the riparian zone, at

least for resting, but in some the use is more specific than in others.

The mayflies (Ephemeroptera) emerge from the water as subimagoes (winged adults but sexually immature). They may perch on streamside vegetation for only a few minutes or for as long as 48 hours (about 24 hours for most species) before molting to the imago (Day 1963; Edmunds etal . 1976).

Adults of the dragonfly genus Aeshna (Odonata:Aeshnidae) tend to hang in the shade on the underside of leaves of trees in hot weather (Smith and Pritchard 1963).

Males of some Plecoptera wait on the shoreline for females to emerge. They drum on dry leaves, rocks, and moss by striking their abdomen on the substrate apparently to attract females. Mating takes place on the ground (Brinck 1949).

Adult caddisflies, Desmonabethula , fly up into lodgepole pines (Pinuscontorta) along streams and peatlands immediately upon emerging from the water (Erman 1981). This same behavior has been observed in Heteroplectron californica (Trichoptera:Calamoceratidae), and Limnephiluspeltus is known to mate on lodgepole pines near wetlands (N.A. Erman unpublished).

Several families of aquatic Diptera fly in mating swarms above vegetation, and most adults of aquatic Diptera use riparian vegetation or ground near the water as resting sites (Merritt and Schlinger 1976).

Egg Laying in the Riparian Zone

Eggs of aquatic insects laid outside the water must have a mechanism for entering the water either as an egg or as a newly hatched larva. Therefore, they must be close to the water, often on overhanging vegetation.

Some species of Odonata attach their eggs onto plant stems, while others deposit them in plant tissue above drying ponds where they do not hatch until the ponds are refilled (Westfall 1978). Certain damselflies use emergent vegetation in another way during egg laying. The male clings to a plant, grasps the female by the prothorax with his terminal abdominal appendages, and lowers her into the water while she deposits eggs (Smith and Pritchard 1963).

All of the Megaloptera and aquatic Neuroptera lay their eggs out of water, often on leaves or branches overhanging the water. Eggs hatch and larvae fall or crawl into the water (Gurney and Parfin 1959; Azam and Anderson 1969).

Several Trichoptera species lay eggs outside the water, and as in the case of terrestrial pupation, it seems often to be another adaptation to drying conditions. Eggs are laid along the edges of drying streams and ponds, often under damp logs. Larvae hatch but remain in the gelatinous egg mass until the stream or pond is reflooded (Novak and Sehnal 1963; Wiggins 1973; Wiggins etal . 1980). An example of this adaptation is known for Lenarchusrillus in the Sierra Nevada (N.A. Erman unpublished), shown in figure 1.

In other Trichoptera species the gelatinous egg masses are laid on stems above the water. When the larvae hatch and become active the gelatinous matrix thins, liquifies, and flows down the stem into the water (Wiggins 1973).

The female of Yphriacalifornica (Trichoptera:Phryganeidae) swims underwater and attaches egg masses to the underside of overhanging moss in small streams in the Sierra Nevada (N.A. Erman unpublished).

It is highly likely that as caddisfly behavior is studied in more specific detail, other species with aquatic/terrestrial adaptations may be revealed because Trichoptera is an order in which several members have reinvaded the land as larvae (Tomaszewski 1973; Mackay and Wiggins 1978; Erman 1981).

Beetles of some of the aquatic and semiaquatic families, i.e. Dytiscidae, Helodidae, Georyssidae, Heteroceridae, Hydraenidae; oviposit in wet, shoreline places (Leech and Chandler 1963; Doyen and Ulrich 1978).

Aquatic Diptera often attach eggs to rocks or aquatic vegetation (Teskey 1978). Some of the Simuliidae oviposit on wet surfaces such as grass trailing in the water (Peterson 1978), and Chironomidae deposit gelatinous egg masses on emergent substrates or vegetation (Coffman 1978). The aquatic Diptera, like the Trichoptera, is an ecologically diverse and understudied group that will no doubt reveal more aquatic/terrestrial interactions when it is further investigated.

Management Implications

It is evident from the foregoing discussion that disturbance in the riparian zone will ultimately affect the large and varied group of aquatic insects present in any reasonably healthy stream or lake. Aquatic insects have intricate life cycles which if interrupted at any point may mean the disappearance or reduction of a given species in a given area. While many insects have life cycles with great flexibility, enabling them to respond to environmental conditions, i.e. diapause which delays development of an egg, larva, pupa, or adult until conditions are favorable, it must be remembered that such flexibility has evolved over long periods in response to gradually changing conditions. Such activities as channeling streams, logging, building dams, grazing livestock, drawing water out of streams, and putting in riprap have the potential for sudden interference with life cycles.

Dams are so disruptive to all stream life that there is no point in discussing them in this context. The effects of logging on stream life are being considered elsewhere (Mahoney and Erman 1981).

An insect that needs soil along a bank for a pupation chamber will not find it in a channelized stream or one with riprapped banks. Larvae that must immediately drop into water upon hatching may be eliminated if vegetation is destroyed because adults will not find suitable egg-laying sites. It is worth noting that Desmonabethula , the first caddisfly larva known to migrate daily from the water to feed, was found in a study area where grazing has been eliminated for many years. Its habitat, springstream in peatlands, is also a favorite of livestock in the Sierra Nevada. It may be no coincidence that these larvae have never been reported from any other area.

The more we know about life cycles, behavior, and feeding habits of individual species of aquatic insects, the more accurate can be our predictions on the effects of changes in the riparian zone. It is already clear that the riparian zone and aquatic insects are connected in an inseparable and intricate web of relationships.

Acknowledgements

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The Influence of Riparian Vegetation on Stream Fish Communities of California[1]

Donald M. Baltz and Peter B. Moyle[2]

Abstract.—The direct and indirect interactions between native stream fishes and riparian vegetation of central California are reviewed. The relationships between riparian vegetation and temperature and cover are shown to have a number of effects on the composition of stream fish communities.

Introduction

Fishes are not usually considered as part of riparian communities. Yet they interact directly with such communities in many ways, such as feeding on terrestrial insects, using overhanging plants as cover, or using flooded vegetation for spawning. Even more important are indirect interactions through nutrient cycling and through effects of riparian vegetation on flows and temperatures. Since the human impact upon riparian systems is still increasing, knowledge of the relationship between riparian systems and fish communities is needed to permit effective management of the fish communities.

A fish community is defined broadly here as the assemblage of fishes generally associated with a given geographic location. In central California such assemblages in undisturbed situations show considerable annual fluctuation in composition, yet show a long-term persistence in structure (Moyle etal . in press). However, the composition at any given time (or place) is determined in a good part by the differential response of each species to variation in the physical characteristics of the habitats. The most important physical parameters to fish are generally identified as stream depth, current velocity, substrate composition, cover, and temperature. All of these factors, and some others as well, can be changed when the riparian community is altered. Consequently the fish communities are likely to change as well. Riparian systems affect instream fish communities because they are the parts of stream ecosystems that tie together the aquatic and terrestrial components, through energy exchange, interaction with flow regimes, and impact on temperature regimes. The purpose of this paper is to review these interactions and to demonstrate how alteration of riparian systems can cause changes in the fish communities of California streams.

Energy Exchange

While the energy input in streams is ultimately photosynthetic in origin, it can enter the stream either from the surrounding vegetation or from producers within the stream. The relative importance of these two sources of energy varies from stream to stream and is the subject of some debate (Naiman and Sedell 1980). Regardless of source, this input eventually reaches fishes directly as detritus or indirectly through the aquatic food chain (Cummins 1974). In low-order streams the immature stages of aquatic insects, together with microbes, process coarse particulate organic matter (CPOM) into consumer biomass which becomes available to predators and fine particulate organic matter (FPOM) which is exported downstream where it is further processed. Other important energy inputs to the stream include aquatic insects that graze on riparian vegetation (Erman 1981) and terrestrial insects that are consumed by fish. In low-order streams the canopy decreases light penetration and temperature, and provides the CPOM in the form of leaves, twigs, and branches which form snags or packs. Overhanging vegetation,

submerged root masses, aquatic macrophytes, and debris (CPOM) provide cover for fishes (Hynes 1970; Westlake 1975).

Flow regime and solar radiation interact with riparian canopy to determine stream temperature; reduction or removal of the canopy increases stream temperature, reduces the input of CPOM and increases the importance of primary producers within the stream. Generally, increased temperature and increased primary production in a small stream are likely to increase

aquatic insect production and consequently fish production. The increase in fish production is most likely to be in nongame fish, such as the native minnows and suckers, which have higher temperature tolerances. However, Burns (1972) indicates that salmon and trout production in California streams may increase in some situations where the riparian forest is thinned by careful logging.

Flow Regime

Variation in stream flow may affect fish populations directly by changing the amount and quality of instream habitat available to fishes, or indirectly through interactions with the riparian community. Indirect effects of natural or unnatural variation in stream flow include changing the temperature, substrate, or availability of cover. At flood stage the water flowing through the riparian vegetation is slowed enough to provide refuge to fishes from excessively high velocities. During low flow, the riparian vegetation may further reduce flows through water removal via transpiration. Transpiration rates by riparian vegetation along small streams at low elevations may be high enough that flows become intermittent during late summer, confining the fish to isolated pools. Natural variation in stream flow strikes a long-term balance in riparian communities, whereas reduced and stabilized flows often result in drastically modified systems. In small, regulated streams the encroaching riparian vegetation may reduce stream width and shade the stream enough to significantly reduce production. The best known local example of riparian modification resulting from stabilized flows is the Trinity River, Trinity County. Following completion of the Lewiston Dam in 1965, the salmonid fishery in the Trinity River declined drastically due to low stabilized streamflow. This unnatural flow regime increased sedimentation and permitted riparian vegetation encroachment into the stream-bed, including areas once important for salmon spawning (Fraser 1972; Hoffman 1980). The negative effects of water diversion by Lewiston Dam were accentuated by logging and road construction in the drainage below the dam.

Cover

One of the more important ways variation in flow regulates fish populations is by moderating the availability of cover needed for protection against predators. Quantifying the importance of cover is difficult, however, because each species and each life history stage within a species is likely to have different cover requirements. For many fishes, but especially adult life history stages of larger species, instream cover is usually adequate: deep pools, the irregular surface of a riffle, or large boulders. However, the complex cover provided by overhanging or submerged riparian vegetation, including dead trees, or by beds of aquatic macrophytes seems to be particularly important to young-of-year fish, to small active species, and to life history stages of larger fishes that need special protection from predators. Thus the small (3–5cm. standard length (SL)) threespine stickleback (Gasterosteusaculeatus) are absent from pools containing Sacramento squawfish (Ptychocheilus grandis) unless complex cover is available to them (Smith in press). Similarly, the poor reproductive success of many fishes during low-water years may be due to the absence of suitable rearing habitat for their young when the riparian edge of a stream, which provides most of the complex cover, is dry. For larger fish, the importance of riparian vegetation as cover lies not only in the physical refuges created but in the shade. Helfman (1980) has demonstrated that fish holding in shaded areas are not only less visible to underwater predators, but can usually see the predators before the predators see them. However, too much shade by

tall trees can have a negative effect on fishes by reducing the complex cover created by smaller riparian plants.

The importance of complex cover to fishes is reflected in the life history adaptations of the tule perch (Hysterocarpustraski), a species we have studied intensively (Baltz 1980; Baltz and Moyle 1981). The tule perch is a viviparous fish endemic to central California. Three subspecies have been recognized. Each of these has different life history characteristics which reflect the relative predictability of availability of complex cover for parturating females and for young. Essentially, female longevity and length at first reproduction vary directly with environmental predictability, while the number of young produced per female varies inversely.

In Clear Lake, Lake County, the subspecies H . t . lagunae has the longest life span; is largest when reproducing for the first time; and has the fewest young per female (but the young are larger than those of other subspecies). This seems to be largely the result of the constant availability of cover for pregnant females (which have reduced swimming abilities due to their distended abdomens) and for their young. This cover consists of submerged riparian vegetation and tule beds during high-water years, and beds of aquatic macrophytes in low-water years.

In contrast, the tule perch of the Russian River drainage (H . t . pomo) has the shortest life span, produces young at the smallest adult size, and produces comparatively large numbers of small young per female. This reflects the highly unpredictable nature of the flow regime of the Russian River, a coastal stream whose water level rises and falls with the seasonal rains and is not buffered (as are streams draining the Sierra) by snowmelt. As a consequence, adequate cover for females and young—mainly submerged trees and bushes—is available only on an irregular basis. Thus it is advantageous for each female to produce as many young as possible to exploit those times when the cover is available.

The third subspecies (H . t . traski) is found in the streams, rivers, and sloughs of the Sacramento Valley. As might be expected, its life history characteristics are intermediate between those of the Clear Lake and Russian River populations, reflecting the less extreme nature of the fluctuations in flows than in the Russian River and the more consistent availability of the complex cover they need for successful reproduction. Curiously, this subspecies seems to benefit from the stabilization of flows characteristic of the lower Sacramento and American Rivers, presumably because complex cover is consistently available. Even so, in the lower American River, tule perch are a major prey of striped bass (Moronesaxatilis), an exotic species (Dehaven 1978).

Temperature

The shade created by riparian vegetation is effective in reducing summer maximum temperatures and in diminishing daily temperature variation. The importance of this phenomenon to the fish communities of central California is illustrated by two of our recent studies of species interactions: one on sculpins and dace, and one on suckers and trout.

Temperature modifies interactions between riffle sculpin (Cottusgulosus) and the speckled dace (Rhinichthysosculus) in Deer Creek, Tehama County, California.[3] Deer Creek is a western slope Sierra foothill stream. After leaving a steep-sided canyon, Deer Creek flows 12.5 km. (8 mi.) through low rolling hills to the Sacramento River. However, temperature differences between the upper and lower riffles in this section are substantial (fig. 1). Between the canyon and the river, the stream warms rapidly during the warm season. Just 9.7 km. (6 mi.) from the canyon mouth, the riffles are occupied exclusively by speckled dace. But only 6.4 km. (4 mi.) upstream, riffle sculpin occupy the riffles exclusively and the speckled dace are displaced to slower waters. Within this study area there are no significant differences in the microhabitat parameters (mean water column velocity, stream depth, and substrate) utilized by dace and sculpin.

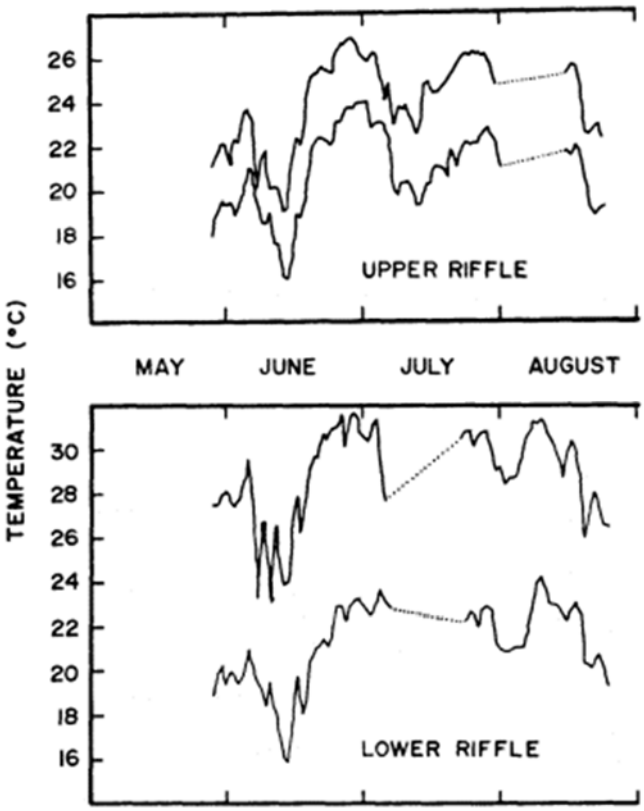

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Figure I.

Daily minimum and maximum stream temperatures in two reaches of Deer Creek, Tehama County, California, 1981.

Between the lower and upper riffles there is a highly significant negative correlation between the relative abundances of the two species ($r = -0.86$, $P < 0.01$). Warm summer temperatures exceed the tolerance of riffle sculpin in the lowermost reaches, but where temperatures are cooler riffle sculpin apparently aggressively force dace out of their preferred habitat. The riparian vegetation in the study area is only a relict of its historical expanse (Roberts, Howe, and Major 1977), and the downstream range of riffle sculpin has probably been restricted by the resulting warmer stream temperatures.

The second example involves two rather similar Sierra streams which differ physically mainly in temperature regimes.[4] Eleanor Creek, Tuolumne County, is controlled by an older dam which discharges warm water from the epilimnion during the summer, whereas Cherry Creek, Tuolumne County, is controlled by a newer dam which discharges cooler water from the hypolimnion. Cherry Creek is also more shaded by riparian vegetation than Eleanor Creek. Summer temperatures in Eleanor Creek are higher and less variable than in Cherry Creek (fig. 2). Both streams have healthy rainbow trout (Salmogairdneri) populations, but Sacramento suckers (Catostomus occidentalis) are found only in Eleanor Creek and in Cherry Creek below its confluence with Eleanor Creek. Suckers are absent from the cold upper sections of Cherry Creek, despite their presence in a reservoir above the section. Both the sculpin/dace example and the sucker/trout example demonstrate how relatively minor changes in temperature can cause major changes in fish communities. The temperature changes studied are well within the changes

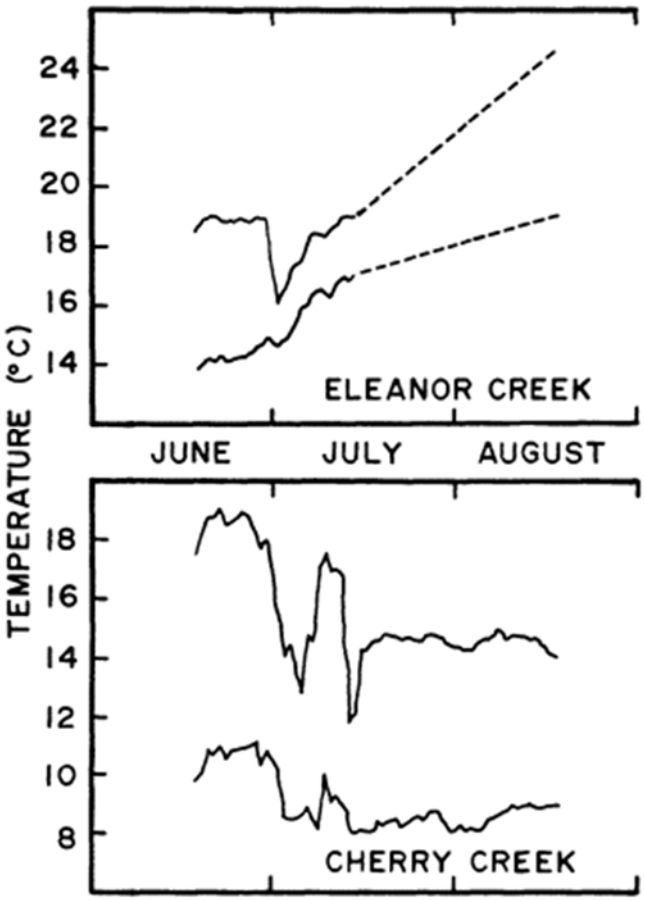

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Figure 2.
Daily minimum and maximum stream temperatures in comparable reaches of Eleanor and Cherry Creeks, Tuolumne County, California, 1981.

possible on a stream through removal of a dense canopy.

Fish Communities

Recent studies of the distribution patterns of central California fishes indicate that distinct habitat conditions are usually associated with distinct fish communities (see review in Moyle etal . in press). These studies indicate that both the type and amount of riparian vegetation often have a strong association with different fish communities. For example, Taylor etal . (in press) studied fish communities in streams of the Clear Lake drainage. The fish communities dominated by rainbow trout were found mainly in densely shaded streams surrounded by coniferous forest, while communities dominated by native nongame species were associated with chaparral or foothill woodland plant communities, where cottonwood and sycamore are common riparian trees.

In the Pit River drainage, Shasta County, Moyle and Daniels (in press) found that fish communities dominated by non-native fishes were associated with streams in which the riparian canopy was small or absent. The absence of a significant canopy was generally an indication of a degraded stream. Similarly, Moyle and Nichols (1973, 1974) studied the zonal distribution of Sierra foothill fishes in the San Joaquin Valley. The Introduced Species association (mainly

centrarchids and cyprinids) has apparently displaced the Native Cyprinid-Catostomid association (mainly hardhead, Sacramento squawfish, and Sacramento sucker) from low-level streams which have been extensively modified by man. The introduced association was typically found in pools in reaches which lacked shade, had large amounts of aquatic vegetation, and had muddysandy bottoms. The native association persisted in reaches which were often sparsely shaded but contained little evidence of human modification. The rainbow trout was found mainly by itself in the densely shaded upper reaches of these streams.

General Discussion

Although we have treated energy flow, cover, and stream temperature as separate topics, they are intricately interrelated. Seemingly harmless modifications in one aspect of the riparian or stream ecosystem may have severe repercussions elsewhere. There is a large literature on the effects of human disturbance of riparian and stream ecosystems by logging (Hansmann and Phinney 1973; Newbold, Erman, and Roby 1980); road building (Burns 1972); water diversion and impoundment (Ward and Stanford 1979); channelization and bank stabilization (Moyle 1976; Stern and Stern 1980a,b); clearing and snagging (Marzolf 1978; Bilby and Likens 1980); and grazing (Cope 1979). The alterations of the natural systems reviewed in these studies (and here) clearly result in changes in fish habitats, changes generally recorded as negative. These habitat changes, even seemingly minor changes, can have major effects on the composition of fish communities. It is also clear, however, that our understanding of the interactions between fishes and riparian communities is incomplete and that more attention needs to be paid to them in the future.

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OPINION DOCKET

County of Los Angeles v. State of California (1987) 43 Cal.3d 46 , 729 P.2d 202; 233 Cal.Rptr. 38

[L.A. No. 32106. Supreme Court of California. January 2, 1987.]

COUNTY OF LOS ANGELES et al., Plaintiffs and Appellants, v. THE STATE OF CALIFORNIA et al., Defendants and Respondents.

CITY OF SONOMA et al., Plaintiffs and Appellants, v. THE STATE OF CALIFORNIA et al., Defendants and Respondents

(Opinion by Grodin, J., with Bird, C. J., Broussard, Reynoso, Lucas and Panelli, JJ., concurring. Separate concurring opinion by Mosk, J.)

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OPINION

GRODIN, J.

We are asked in this proceeding to determine whether legislation enacted in 1980 and 1982 increasing certain workers' compensation benefit payments is subject to the command of article XIII B of the California Constitution that local government costs mandated by the state must be funded by the state. The County of Los Angeles and the City of Sonoma sought review by this court of a decision of the Court of Appeal which held that state-mandated increases in workers' compensation benefits that do not exceed the rise in the cost of living are not costs which must be borne by the state under article XIII B, an initiative constitutional provision, and legislative implementing statutes.

Although we agree that the State Board of Control properly denied plaintiffs' claims, our conclusion rests on grounds other than those relied upon by the Court of Appeal, and requires that its judgment be reversed. [1] We conclude that when the voters adopted article XIII B, section 6, their intent was not to require the state to provide

subvention whenever a newly enacted statute resulted incidentally in some cost to local agencies. Rather, the drafters and the electorate had in mind subvention for the expense or [43 Cal.3d 50] increased cost of programs administered locally and for expenses occasioned by laws that impose unique requirements on local governments and do not apply generally to all state residents or entities. In using the word "programs" they had in mind the commonly understood meaning of the term, programs which carry out the governmental function of providing services to the public. Reimbursement for the cost or increased cost of providing workers' compensation benefits to employees of local agencies is not, therefore, required by section 6.

We recognize also the potential conflict between article XIII B and the grant of plenary power over workers' compensation bestowed upon the Legislature by section 4 of article XIV, but in accord with established rules of construction our construction of article XIII B, section 6, harmonizes these constitutional provisions.

I

On November 6, 1979, the voters approved an initiative measure which added article XIII B to the California Constitution. That article imposed spending limits on the state and local governments and provided in section 6 (hereafter section 6): "Whenever the Legislature or any state agency mandates a new program or higher level of service on any local government, the state shall provide a subvention of funds to reimburse such local government for the costs of such program or increased level of service, except that the Legislature may, but need not, provide such subvention of funds for the following mandates: [¶] (a) Legislative mandates requested by the local agency affected; [¶] (b) Legislation defining a new crime or changing an existing definition of a crime; or [¶] (c) Legislative mandates enacted prior to January 1, 1975, or executive orders or regulations initially implementing legislation enacted prior to January 1, 1975." No definition of the phrase "higher level of service" was included in article XIII B, and the ballot materials did not explain its meaning. fn. 1

The genesis of this action was the enactment in 1980 and 1982, after article XIII B had been adopted, of laws increasing the amounts which [43 Cal.3d 51] employers, including local governments, must pay in workers' compensation benefits to injured employees and families of deceased employees.

The first of these statutes, Assembly, Bill No. 2750 (Stats. 1980, ch. 1042, p. 3328), amended several sections of the Labor Code related to workers' compensation. The amendments of Labor Code sections 4453, 4453.1 and 4460 increased the maximum weekly wage upon which temporary and permanent disability indemnity is computed from $231 per week to $262.50 per week. The amendment of section 4702 of the Labor Code increased certain death benefits from $55,000 to $75,000. No appropriation for increased state-mandated costs was made in this legislation. fn. 2

Test claims seeking reimbursement for the increased expenditure mandated by these changes were filed with the State Board of Control in 1981 by the County of San Bernardino and the City of Los Angeles. The board rejected the claims, after hearing, stating that the increased maximum workers' compensation benefit levels did not change the terms or conditions under which benefits were to be awarded, and therefore did not, by increasing the dollar amount of the benefits, create an increased level of service. The first of these consolidated actions was then filed by the County of Los Angeles, the County of San Bernardino, and the City of San Diego, seeking a writ of mandate to compel the board to approve the reimbursement claims for costs incurred in providing an increased level of service mandated by the state pursuant to Revenue and Taxation Code section 2207. fn. 3 They also sought a declaration that because the State of California and the board were obliged by article XIII B to reimburse them, they were not obligated to pay the increased benefits until the state provided reimbursement.

The superior court denied relief in that action. The court recognized that although increased benefits reflecting cost of living raises were not expressly [43 Cal.3d 52] excepted from the requirement of state reimbursement in section 6 the intent of article XIII B to limit governmental expenditures to the prior year's level allowed local governments to make adjustment for changes in the cost of living, by increasing their own appropriations. Because the Assembly Bill No. 2750 changes did not exceed cost of living changes, they did not, in the view of the trial court, create an "increased level of service" in the existing workers' compensation program.

The second piece of legislation (Assem. Bill No. 684), enacted in 1982 (Stats. 1982, ch. 922. p. 3363), again changed the benefit levels for workers' compensation by increasing the maximum weekly wage upon which benefits were to be computed, and made other changes among which were: The bill increased minimum weekly earnings for temporary and permanent total disability from $73.50 to $168, and the maximum from $262.50 to $336. For permanent partial disability the weekly wage was raised from a minimum of $45 to $105, and from a maximum of $105 to $210, in each case for injuries occurring on or after January 1, 1984. (Lab. Code, § 4453.) A $10,000 limit on additional compensation for injuries resulting from serious and willful employer misconduct was removed (Lab. Code, § 4553), and the maximum death benefit was raised from $75,000 to $85,000 for deaths in 1983, and to $95,000 for deaths on or after January 1, 1984. (Lab. Code, § 4702.)

Again the statute included no appropriation and this time the statute expressly acknowledged that the omission was made "[n]otwithstanding section 6 of Article XIIIB of the California Constitution and section 2231 ... of the Revenue and Taxation Code." (Stats. 1982, ch. 922, § 17, p. 3372.) fn. 4

Once again test claims were presented to the State Board of Control, this time by the City of Sonoma, the County of Los Angeles, and the City of San Diego. Again the claims were denied on grounds that the statute made no change in the terms and conditions under which workers' compensation benefits were to be awarded, and the increased costs incurred as a result of higher benefit levels did not create an increased level of service as defined in Revenue and Taxation Code section 2207, subdivision (a).

The three claimants then filed the second action asking that the board be compelled by writ of mandate to approve the claims and the state to pay them, and that chapter 922 be declared unconstitutional because it was not adopted in conformity with requirements of the Revenue and Taxation Code or [43 Cal.3d 53] section 6. The trial court granted partial relief and ordered the board to set aside its ruling. The court held that the board's decision was not supported by substantial evidence and legally adequate findings on the presence of a state-mandated cost. The basis for this ruling was the failure of the board to make adequate findings on the possible impact of changes in the burden of proof in some workers' compensation proceedings (Lab. Code, § 3202.5); a limitation on an injured worker's right to sue his employer under the "dual capacity" exception to the exclusive remedy doctrine (Lab. Code, §§ 3601-3602); and changes in death and disability benefits and in liability in serious and wilful misconduct cases. (Lab. Code, § 4551.)

The court also held: "[T]he changes made by chapter 922, Statutes of 1982 may be excluded from state-mandated costs if that change effects a cost of living increase which does not impose a higher or increased level of service on an existing program." The City of Sonoma, the County of Los Angeles, and the City of San Diego appeal from this latter portion of the judgment only.

II

The Court of Appeal consolidated the appeals. The court identified the dispositive issue as whether legislatively mandated increases in workers' compensation benefits constitute a "higher level of service" within the meaning of section 6, or are an "increased level of service" fn. 5 described in subdivision (a) of Revenue and Taxation Code section 2207. The parties did not question the proposition that higher benefit payments might constitute a higher level of "service." The dispute centered on whether higher benefit payments which do not exceed increases in the cost of living constitute a higher level of service. Appellants maintained that the reimbursement requirement of section 6 is absolute and permits no implied or judicially created exception for increased costs that do not exceed the inflation rate. The Court of Appeal addressed the problem as one of defining "increased level of service."

The court rejected appellants' argument that a definition of "increased level of service" that once had been included in section 2231, subdivision (e) of the Revenue and Taxation Code should be applied. That definition brought any law that imposed "additional costs" within the scope of "increased level of service." The court concluded that the repeal of section 2231 in 1975 (Stats. 1975, ch. 486, § 7, pp. 999-1000) and the failure of the Legislature by statute or the electorate in article XIII B to readopt the [43 Cal.3d 54] definition must be treated as reflecting an intent to change the law. (Eu v. Chacon (1976) 16 Cal.3d 465, 470 [128 Cal.Rptr. 1, 546 P.2d 289].) fn. 6 On that

basis the court concluded that increased costs were no longer tantamount to an increased level of service.

The court nonetheless assumed that an increase in costs mandated by the Legislature did constitute an increased level of service if the increase exceeds that in the cost of living. The judgment in the second, or "Sonoma" case was affirmed. The judgment in the first, or "Los Angeles" case, however, was reversed and the matter "remanded" to the board for more adequate findings, with directions. fn. 7

III

The Court of Appeal did not articulate the basis for its conclusion that costs in excess of the increased cost of living do constitute a reimbursable increased level of service within the meaning of section 6. Our task in ascertaining the meaning of the phrase is aided somewhat by one explanatory reference to this part of section 6 in the ballot materials.

A statutory requirement of state reimbursement was in effect when section 6 was adopted. That provision used the same "increased level of service" phraseology but it also failed to include a definition of "increased level of service," providing only: "Costs mandated by the state' means any increased costs which a local agency is required to incur as a result of the following: [¶] (a) Any law ... which mandates a new program or an increased level of service of an existing program." (Rev. & Tax. Code § 2207.) As noted, however, the definition of that term which had been [43 Cal.3d 55] included in Revenue and Taxation Code section 2164.3 as part of the Property Tax Relief Act of 1972 (Stats. 1972, ch. 1406, § 14.7, p. 2961), had been repealed in 1975 when Revenue and Taxation Code section 2231, which had replaced section 2164.3 in 1973, was repealed and a new section 2231 enacted. (Stats. 1975. ch. 486, §§ 6 & 7, p. 999.) fn. 8 Prior to repeal, Revenue and Taxation Code section 2164.3, and later section 2231, after providing in subdivision (a) for state reimbursement, explained in subdivision (e) that ""Increased level of service' means any requirement mandated by state law or executive regulation ... which makes necessary expanded or additional costs to a county, city and county, city, or special district." (Stats. 1972, ch. 1406, § 14.7, p. 2963.)

[2] Appellants contend that despite its repeal, the definition is still valid, relying on the fact that the Legislature, in enacting section 2207, explained that the provision was "declaratory of existing law." (Stats. 1975, ch. 486, § 18.6, p. 1006.) We concur with the Court of Appeal in rejecting this argument. "[I]t is ordinarily to be presumed that the Legislature by deleting an express provision of a statute intended a substantial change in the law." (Lake Forest Community Assn. v. County of Orange (1978) 86 Cal.App.3d 394, 402 [150 Cal.Rptr. 286]; see also Eu v. Chacon, supra, 16 Cal.3d 465, 470.) Here, the revision was not minor: a whole subdivision was deleted. As the Court of Appeal noted, "A change must have been intended; otherwise deletion of the preexisting definition makes no sense."

Acceptance of appellants' argument leads to an unreasonable interpretation of section 2207. If the Legislature had intended to continue to equate "increased level of service" with "additional costs," then the provision would be circular: "costs mandated by the state" are defined as "increased costs" due to an "increased level of service," which, in turn, would be defined as "additional costs." We decline to accept such an interpretation. Under the repealed provision, "additional costs" may have been deemed tantamount to an "increased level of service," but not under the post-1975 statutory scheme. Since that definition has been repealed, an act of which the drafters of section 6 and the electorate are presumed to have been [43 Cal.3d 56] aware, we may not conclude that an intent existed to incorporate the repealed definition into section 6.

[3] In construing the meaning of the constitutional provision, our inquiry is not focussed on what the Legislature intended in adopting the former statutory reimbursement scheme, but rather on what the voters meant when they adopted article XIII B in 1979. To determine this intent, we must look to the language of the provision itself. (ITT World Communications, Inc. v. City and County of San Francisco (1985) 37 Cal.3d 859, 866 [210 Cal.Rptr. 226, 693 P.2d 811].) In section 6, the electorate commands that the state reimburse local agencies for the cost of any "new program or higher level of service." Because workers' compensation is not a new program, the parties have focussed on whether providing higher benefit payments constitutes provision of a higher level of service. As we have observed, however, the

former statutory definition of that term has been incorporated into neither section 6 nor the current statutory reimbursement scheme.

[4] Looking at the language of section 6 then, it seems clear that by itself the term "higher level of service" is meaningless. It must be read in conjunction with the predecessor phrase "new program" to give it meaning. Thus read, it is apparent that the subvention requirement for increased or higher level of service is directed to state mandated increases in the services provided by local agencies in existing "programs." But the term "program" itself is not defined in article XIII B. What programs then did the electorate have in mind when section 6 was adopted? We conclude that the drafters and the electorate had in mind the commonly understood meanings of the term - - programs that carry out the governmental function of providing services to the public, or laws which, to implement a state policy, impose unique requirements on local governments and do not apply generally to all residents and entities in the state.

The concern which prompted the inclusion of section 6 in article XIII B was the perceived attempt by the state to enact legislation or adopt administrative orders creating programs to be administered by local agencies, thereby transferring to those agencies the fiscal responsibility for providing services which the state believed should be extended to the public. In their ballot arguments, the proponents of article XIII B explained section 6 to the voters: "Additionally, this measure: (1) Will not allow the state government to force programs on local governments without the state paying for them." (Ballot Pamp., Proposed Amend. to Cal. Const. with arguments to voters, Spec. Statewide Elec. (Nov. 6, 1979) p. 18. Italics added.) In this context the phrase "to force programs on local governments" confirms that the intent underlying section 6 was to require reimbursement to local agencies for the costs involved in carrying out functions peculiar to government, not [43 Cal.3d 57] for expenses incurred by local agencies as an incidental impact of laws that apply generally to all state residents and entities. Laws of general application are not passed by the Legislature to "force" programs on localities.

The language of section 6 is far too vague to support an inference that it was intended that each time the Legislature passes a law of general application it must discern the likely effect on local governments and provide an appropriation to pay for any incidental increase in local costs. We believe that if the electorate had intended such a far-reaching construction of section 6, the language would have explicitly indicated that the word "program" was being used in such a unique fashion. (Cf. Fuentes v. Workers' Comp. Appeals Bd. (1976) 16 Cal.3d 1, 7 [128 Cal.Rptr. 673, 547 P.2d 449]; Big Sur Properties v. Mott (1976) 63 Cal.App.3d 99, 105 [132 Cal.Rptr. 835].) Nothing in the history of article XIII B that we have discovered, or that has been called to our attention by the parties, suggests that the electorate had in mind either this construction or the additional indirect, but substantial impact it would have on the legislative process.

Were section 6 construed to require state subvention for the incidental cost to local governments of general laws, the result would be far-reaching indeed. Although such laws may be passed by simple majority vote of each house of the Legislature (art. IV, § 8, subd. (b)), the revenue measures necessary to make them effective may not. A bill which will impose costs subject to subvention of local agencies must be accompanied by a revenue measure providing the subvention required by article XIII B. (Rev. & Tax. Code, §§ 2255, subd. (c).) Revenue bills must be passed by two-thirds vote of each house of the Legislature. (Art. IV, § 12, subd. (d).) Thus, were we to construe section 6 as applicable to general legislation whenever it might have an incidental effect on local agency costs, such legislation could become effective only if passed by a supermajority vote. fn. 9 Certainly no such intent is reflected in the language or history of article XIII B or section 6.

[5] We conclude therefore that section 6 has no application to, and the state need not provide subvention for, the costs incurred by local agencies in providing to their employees the same increase in workers' compensation [43 Cal.3d 58] benefits that employees of private individuals or organizations receive. fn. 10 Workers' compensation is not a program administered by local agencies to provide service to the public. Although local agencies must provide benefits to their employees either through insurance or direct payment, they are indistinguishable in this respect from private employers. In no sense can employers, public or private, be considered to be administrators of a program of workers' compensation or to be providing services incidental to administration of the program. Workers' compensation is administered by

the state through the Division of Industrial Accidents and the Workers' Compensation Appeals Board. (See Lab. Code, § 3201 et seq.) Therefore, although the state requires that employers provide workers' compensation for nonexempt categories of employees, increases in the cost of providing this employee benefit are not subject to reimbursement as state-mandated programs or higher levels of service within the meaning of section 6.

IV

[6] Our construction of section 6 is further supported by the fact that it comports with controlling principles of construction which "require that in the absence of irreconcilable conflict among their various parts, [constitutional provisions] must be harmonized and construed to give effect to all parts. (Clean Air Constituency v. California State Air Resources Bd. (1974) 1 Cal.3d 801, 813-814 [114 Cal.Rptr. 577, 523 P.2d 617]; Serrano v. Priest (1971) 5 Cal.3d 584, 596 [96 Cal.Rptr. 601, 487 P.2d 1241, 41 A.L.R.3d 1187]; Select Base Materials v. Board of Equal. (1959) 51 Cal.2d 640, 645 [335 P.2d 672].)" (Legislature v. Deukmejian (1983) 34 Cal.3d 658, 676 [194 Cal.Rptr. 781, 669 P.2d 17].)

Our concern over potential conflict arises because article XIV, section 4, fn. 11 gives the Legislature "plenary power, unlimited by any provision of [43 Cal.3d 59] this Constitution" over workers' compensation. Although seemingly unrelated to workers' compensation, section 6, as we have shown, would have an indirect, but substantial impact on the ability of the Legislature to make future changes in the existing workers' compensation scheme. Any changes in the system which would increase benefit levels, provide new services, or extend current service might also increase local agencies' costs. Therefore, even though workers' compensation is a program which is intended to provide benefits to all injured or deceased employees and their families, because the change might have some incidental impact on local government costs, the change could be made only if it commanded a supermajority vote of two-thirds of the members of each house of the Legislature. The potential conflict between section 6 and the plenary power over workers' compensation granted to the Legislature by article XIV, section 4 is apparent.

The County of Los Angeles, while recognizing the impact of section 6 on the Legislature's power over workers' compensation, argues that the "plenary power" granted by article XIV, section 4, is power over the substance of workers' compensation legislation, and that this power would be unaffected by article XIII B if the latter is construed to compel reimbursement. The subvention requirement, it is argued, is analogous to other procedural [43 Cal.3d 60] limitations on the Legislature, such as the "single subject rule" (art. IV, § 9), as to which article XIV, section 4, has no application. We do not agree. A constitutional requirement that legislation either exclude employees of local governmental agencies or be adopted by a supermajority vote would do more than simply establish a format or procedure by which legislation is to be enacted. It would place workers' compensation legislation in a special classification of substantive legislation and thereby curtail the power of a majority to enact substantive changes by any procedural means. If section 6 were applicable, therefore, article XIII B would restrict the power of the Legislature over workers' compensation.

The City of Sonoma concedes that so construed article XIII B would restrict the plenary power of the Legislature, and reasons that the provision therefore either effected a pro tanto repeal of article XIV, section 4, or must be accepted as a limitation on the power of the Legislature. We need not accept that conclusion, however, because our construction of section 6 permits the constitutional provisions to be reconciled.

Construing a recently enacted constitutional provision such as section 6 to avoid conflict with, and thus pro tanto repeal of, an earlier provision is also consistent with and reflects the principle applied by this court in Hustedt v. Workers' Comp. Appeals Bd. (1981) 30 Cal.3d 329 [178 Cal.Rptr. 801, 636 P.2d 1139]. There, by coincidence, article XIV, section 4, was the later provision. A statute, enacted pursuant to the plenary power of the Legislature over workers' compensation, gave the Workers' Compensation Appeals Board authority to discipline attorneys who appeared before it. If construed to include a transfer of the authority to discipline attorneys from the Supreme Court to the Legislature, or to delegate that power to the board, article XIV, section 4, would have conflicted with the constitutional power of this court over attorney discipline and might have violated the separation of powers doctrine. (Art. III,

§ 3.) The court was thus called upon to determine whether the adoption of article XIV, section 4, granting the Legislature plenary power over workers' compensation effected a pro tanto repeal of the preexisting, exclusive jurisdiction of the Supreme Court over attorneys.

We concluded that there had been no pro tanto repeal because article XIV, section 4, did not give the Legislature the authority to enact the statute. Article XIV, section 4, did not expressly give the Legislature power over attorney discipline, and that power was not integral to or necessary to the establishment of a complete system of workers' compensation. In those circumstances the presumption against implied repeal controlled. "It is well established that the adoption of article XIV, section 4 'effected a repeal pro tanto' of any state constitutional provisions which conflicted with that [43 Cal.3d 61] amendment. (Subsequent Etc. Fund. v. Ind. Acc. Com. (1952) 39 Cal.2d 83, 88 [244 P.2d 889]; Western Indemnity Co. v. Pillsbury (1915) 170 Cal. 686, 695, [151 P. 398].) A pro tanto repeal of conflicting state constitutional provisions removes 'insofar as necessary' any restrictions which would prohibit the realization of the objectives of the new article. (Methodist Hosp. of Sacramento v. Saylor (1971) 5 Cal.3d 685, 691-692 [97 Cal.Rptr. 1, 488 P.2d 161]; cf. City and County of San Francisco v. Workers' Comp. Appeals Bd. (1978) 22 Cal.3d 103, 115-117 [148 Cal.Rptr. 626, 583 P.2d 151].) Thus the question becomes whether the board must have the power to discipline attorneys if the objectives of article XIV, section 4 are to be effectuated. In other words, does the achievement of those objectives compel the modification of a power -- the disciplining of attorneys -- that otherwise rests exclusively with this court?" (Hustedt v. Workers' Comp. Appeals Bd., supra, 30 Cal.3d 329, 343.) We concluded that the ability to discipline attorneys appearing before it was not necessary to the expeditious resolution of workers' claims or the efficient administration of the agency. Thus, the absence of disciplinary power over attorneys would not preclude the board from achieving the objectives of article XIV, section 4, and no pro tanto repeal need be found.

[7] A similar analysis leads to the conclusion here that no pro tanto repeal of article XIV, section 4, was intended or made necessary here by the adoption of section 6. The goals of article XIII B, of which section 6 is a part, were to protect residents from excessive taxation and government spending. (Huntington Park Redevelopment Agency v. Martin (1985) 38 Cal.3d 100, 109-110 [211 Cal.Rptr. 133, 695 P.2d 220].) Section 6 had the additional purpose of precluding a shift of financial responsibility for carrying out governmental functions from the state to local agencies which had had their taxing powers restricted by the enactment of article XIII A in the preceding year and were ill equipped to take responsibility for any new programs. Neither of these goals is frustrated by requiring local agencies to provide the same protections to their employees as do private employers. Bearing the costs of salaries, unemployment insurance, and workers' compensation coverage -- costs which all employers must bear -- neither threatens excessive taxation or governmental spending, nor shifts from the state to a local agency the expense of providing governmental services.

Therefore, since the objectives of article XIII B and section 6 can be achieved in the absence of state subvention for the expense of increases in workers' compensation benefit levels for local agency employees, section 6 did not effect a pro tanto repeal of the Legislature's otherwise plenary power over workers' compensation, a power that does not contemplate that the Legislature rather than the employer must fund the cost or increases in [43 Cal.3d 62] benefits paid to employees of local agencies, or that a statute affecting those benefits must garner a supermajority vote.

Because we conclude that section 6 has no application to legislation that is applicable to employees generally, whether public or private, and affects local agencies only incidentally as employers, we need not reach the question that was the focus of the decision of the Court of Appeal -- whether the state must reimburse localities for state-mandated cost increases which merely reflect adjustments for cost-of-living in existing programs.

V

It follows from our conclusions above, that in each of these cases the plaintiffs' reimbursement claims were properly denied by the State Board of Control. Their petitions for writs of mandate seeking to compel the board to approve the claims lacked merit and should have been denied by the superior court without the necessity of further proceedings before the board.

In B001713, the Los Angeles case, the Court of Appeal reversed the judgment of the superior court denying the petition. In the B003561, the Sonoma case, the superior court granted partial relief, ordering further proceedings before the board, and the Court of Appeal affirmed that judgment.

The judgment of the Court of Appeal is reversed. Each side shall bear its own costs.

Bird, C. J., Broussard, J., Reynoso, J., Lucas, J., and Panelli, J., concurred.

MOSK, J.

I concur in the result reached by the majority, but I prefer the rationale of the Court of Appeal, i.e., that neither article XIII B, section 6, of the Constitution nor Revenue and Taxation Code sections 2207 and 2231 require state subvention for increased workers' compensation benefits provided by chapter 1042, Statutes of 1980, and chapter 922, Statutes of 1982, but only if the increases do not exceed applicable cost-of-living adjustments because such payments do not result in an increased level of service.

Under the majority theory, the state can order unlimited financial burdens on local units of government without providing the funds to meet those burdens. This may have serious implications in the future, and does violence to the requirement of section 2231, subdivision (a), that the state reimburse local government for "all costs mandated by the state."

In this instance it is clear from legislative history that the Legislature did not intend to mandate additional burdens, but merely to provide a cost-of-living [43 Cal.3d 63] adjustment. I agree with the Court of Appeal that this was permissible.

FN 1. The analysis by the Legislative Analyst advised that the state would be required to "reimburse local governments for the cost of complying with 'state mandates.' 'State mandates' are requirements imposed on local governments by legislation or executive orders." Elsewhere the analysis repeats: "[T]he initiative would establish a requirement that the state provide funds to reimburse local agencies for the cost of complying with state mandates. ...

The one ballot argument which made reference to section 6, referred only to the "new program" provision, stating, "Additionally, this measure [¶] (1) will not allow the state government to force programs on local governments without the state paying for them."

FN 2. The bill was approved by the Governor and filed with the Secretary of State on September 22, 1980. Prior to this, the Assembly gave unanimous consent to a request by the bill's author that his letter to the Speaker stating the intent of the Legislation be printed in the Assembly Journal. The letter stated: (1) that the Assembly Ways and Means Committee had recommended approval without appropriation on grounds that the increases were a result of changes in the cost of living that were not reimbursable under either Revenue and Taxation Code section 2231, or article XIII B; (2) the Senate Finance Committee had rejected a motion to add an appropriation and had approved a motion to concur in amendments of the Conference Committee deleting any appropriation.

Legislative history confirms only that the final version of Assembly Bill No. 2750, as amended in the Assembly on April 16, 1986, contained no appropriation. As introduced on March 4, 1980, with a higher minimum salary of $510 on which to base benefits, an unspecified appropriation was included.

FN 3. The superior court consolidated another action by the County of Butte, Novato Fire Protection District, and the Galt Unified School District with that action. Neither those plaintiffs nor the County of San Bernardino are parties to the appeal.

FN 4. The same section "recognized," however, that a local agency "may pursue any remedies to obtain reimbursement available to it" under the statutes governing reimbursement for state-mandated costs in chapter 3 of the Revenue and Taxation Code, commencing with section 2201.

FN 5. The court concluded that there was no legal or semantic difference in the meaning of the terms and considered the intent or purpose of the two provisions to be identical.

FN 6. The Court of Appeal also considered the expression of legislative intent reflected in the letter by the author of Assembly Bill No. 2750 (see fn. 2, ante). While consideration of that expression of intent may have been proper in construing Assembly Bill No. 2750, we question its relevance to the proper construction of either section 6, adopted by the electorate in the prior year, or of Revenue and Taxation Code section 2207, subdivision (a) enacted in 1975. (Cf. California Employment Stabilization Co. v. Payne (1947) 31 Cal.2d 210, 213-214 [187 P.2d 702].) There is no assurance that the Assembly understood that its approval of printing a statement of intent as to the later bill was also to be read as a statement of intent regarding the earlier statute, and it was not relevant to the intent of the electorate in adopting section 6.

The Court of Appeal also recognized that the history of Assembly Bill No. 2750 and Statutes 1982, chapter 922, which demonstrated the clear intent of the Legislature to omit any appropriation for reimbursement of local government expenditures to pay the higher benefits precluded reliance on reimbursement provisions included in benefit-increase bills passed in earlier years. (See e.g., Stats. 1973, chs. 1021 and 1023.)

FN 7. We infer that the intent of the Court of Appeal was to reverse the order denying the petition for writ of mandate and to order the superior court to grant the petition and remand the matter to the board with directions to set aside its order and reconsider the claim after making the additional findings. (See Code Civ. Proc. § 1094.5, subd. (f).)

FN 8. Pursuant to the 1972 and successor 1973 property tax relief statutes the Legislature had included appropriations in measures which, in the opinion of the Legislature, mandated new programs or increased levels of service in existing programs (see, e.g., Stats. 1973, ch. 1021, § 4, p. 2026; ch. 1022, § 2, p. 2027; Stats. 1976, ch. 1017, § 9, p. 4597) and reimbursement claims filed with the State Board of Control pursuant to Revenue and Taxation Code sections 2218-2218.54 had been honored. When the Legislature fails to include such appropriations there is no judicially enforceable remedy for the statutory violation notwithstanding the command of Revenue and Taxation Code section 2231, subdivision (a) that "[t]he state shall reimburse each local agency for all 'costs mandated by the state,' as defined in Section 2207" and the additional command of subdivision (b) that any statute imposing such costs "provide an appropriation therefor." (County of Orange v. Flournoy (1974) 42 Cal.App.3d 908, 913 [117 Cal.Rptr. 224].)

FN 9. Whether a constitutional provision which requires a supermajority vote to enact substantive legislation, as opposed to funding the program, may be validly enacted as a Constitutional amendment rather than through revision of the Constitution is an open question. (See Amador Valley Joint Union High Sch. Dist. v. State Bd. of Equalization (1978) 22 Cal.3d 208, 228 [149 Cal.Rptr. 239, 583 P.2d 1281].)

FN 10. The Court of Appeal reached a different conclusion in City of Sacramento v. State of California (1984) 156 Cal.App.3d 182 [203 Cal.Rptr. 258], with respect to a newly enacted law requiring that all public employees be covered by unemployment insurance. Approaching the question as to whether the expense was a "state mandated cost," rather than as whether the provision of an employee benefit was a "program or service" within the meaning of the Constitution, the court concluded that reimbursement was required. To the extent that this decision is inconsistent with our conclusion here, it is disapproved.

FN 11. Section 4: "The Legislature is hereby expressly vested with plenary power, unlimited by any provision of this Constitution, to create, and enforce a complete system of workers' compensation, by appropriate legislation, and in that behalf to create and enforce a liability on the part of any or all persons to compensate any or all of their workers for injury or disability, and their dependents for death incurred or sustained by the said workers in the course of their employment, irrespective of the fault of any party. A complete system of workers' compensation includes adequate provisions for the comfort, health and safety and general welfare of any and all workers and those dependent upon them for support to the extent of relieving from the consequences of any injury or death incurred or sustained by workers in the course of their employment, irrespective of the fault of any party; also full provision for securing safety in places of employment; full provision for such medical, surgical, hospital and other remedial treatment as is requisite to cure and relieve from the effects of such injury; full provision for adequate insurance coverage against liability to

pay or furnish compensation; full provision for regulating such insurance coverage in all its aspects, including the establishment and management of a State compensation insurance fund; full provision for otherwise securing the payment of compensation and full provision for vesting power, authority and jurisdiction in an administrative body with all the requisite governmental functions to determine any dispute or matter arising under such legislation, to the end that the administration of such legislation shall accomplish substantial justice in all cases expeditiously, inexpensively, and without encumbrance of any character; all of which matters are expressly declared to be the social public policy of this State, binding upon all departments of the State government.

"The Legislature is vested with plenary powers, to provide for the settlement of any disputes arising under such legislation by arbitration, or by an industrial accident commission, by the courts, or by either, any, or all of these agencies, either separately or in combination, and may fix and control the method and manner of trial of any such dispute, the rules of evidence and the manner of review of decisions rendered by the tribunal or tribunals designated by it; provided, that all decisions of any such tribunal shall be subject to review by the appellate courts of this State. The Legislature may combine in one statute all the provisions for a complete system of workers' compensation, as herein defined.

"The Legislature shall have power to provide for the payment of an award to the state in the case of the death, arising out of and in the course of the employment, of an employee without dependents, and such awards may be used for the payment of extra compensation for subsequent injuries beyond the liability of a single employer for awards to employees of the employer.

"Nothing contained herein shall be taken or construed to impair or render ineffectual in any measure the creation and existence of the industrial accident commission of this State or the State compensation insurance fund, the creation and existence of which, with all the functions vested in them, are hereby ratified and confirmed." (Italics added.)

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CONTROLLING URBAN RUNOFF:

A PRACTICAL MANUAL FOR PLANNING AND DESIGNING URBAN BMPs

Department of Environmental Programs
METROPOLITAN WASHINGTON COUNCIL OF GOVERNMENTS

CONTROLLING URBAN RUNOFF:

A Practical Manual for Planning and Designing Urban BMPs

by

Thomas R. Schueler

Department of Environmental Programs
Metropolitan Washington Council of Governments

prepared for

Washington Metropolitan Water Resources Planning Board

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AUTHOR: Thomas R. Schueler
Department of Environmental Programs
Metropolitan Washington Council of Governments
Water Resources Planning Board

AGENCY: The Metropolitan Washington Council of Governments is the regional organization of the Washington area's major local governments and their elected officials. COG works towards solutions to such regional problems as energy shortages, traffic congestion, inadequate housing, air and water pollution. The Washington Metropolitan Water Resources Planning Board serves as the area wide wastewater management agency. The Board is involved with regional policy issues related to provision of adequate wastewater treatment, sludge disposal, non-point source pollution control, and municipal water supplies.

REPORT ABSTRACT: Manual provides detailed guidance for engineers and siteplanners on how to plan and design urban best management practices (BMPs) to remove pollutants and protect stream habitat. Describes water quality and habitat impact in streams that result from uncontrolled watershed development. Contains a simple method for estimating pollutant export from development sites. Presents a series of tools to assist the site designed in selecting the best BMP option for a site. Provides detailed design guidance on seven major urban BMP practices in use in the Washington metropolitan area: extended detention ponds, wet ponds, infiltration basins and trenches, porous pavement, water quality inlets and vegetative practices. Each BMP is reviewed from the standpoint of stormwater management benefits, pollutant removal, physical feasibility, costs, maintenance requirements, and impact to the environment and adjacent communities. A list of recommended design standards that enhance BMP performance is also presented.

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PREFACE

Over eight years ago, the Water Resources Planning Board (WRPB) published the Guidebook For Screening Nonpoint Pollution Strategies. This landmark document (NVPDC,1979) provided some of the first concrete guidance on how to plan and design urban Best Management Practices (BMPs). Since that time, the emerging field of urban runoff control has expanded dramatically. Local research and experience have greatly added to our capability to predict how well a BMP will perform, how it should be designed and how it must be maintained.

This manual was prepared with the goal of describing the state of the art in urban runoff control and focuses on the Washington D.C., area. As with any emerging field, significant gaps still remain in our understanding, and more research and experience must be gathered. Creative and innovative controls need to be tested, and existing techniques need further refinement. Although gaps do remain to be bridged, enough knowledge has been gained to lay out many important principles relating to the design of urban BMPs. This manual is a first approach towards this goal, and it is hoped that the information it contains will be expanded and refined in the coming years.

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INTRODUCTION

In recent years, a growing body of research has shown that urbanization in a watershed can have adverse consequences on streams and receiving waters. These include an increase in flooding, streambank erosion and pollutant export. Historically, management efforts have primarily concentrated on reducing the risk of downstream flooding. The major tool used in this effort has been the dry detention basin that temporarily stores and releases runoff from large storms to reduce peak stormwater discharges. Over 3000 dry detention basins have been constructed in the Washington, D.C. area over the past two decades. A second approach utilized by local governments has been to restrict development along stream floodplains that are susceptible to frequent flooding. Many local governments have also purchased floodplains for public use as stream valley parks.

While both approaches have proven reasonably effective in curtailing flooding problems, they cannot mitigate the adverse impacts urbanization has on stream habitat or increased pollutant export. During the late 1970s, a series of Best Management Practices (BMPs) were developed for urbanizing areas that could remove urban pollutants and, in some cases, protect downstream aquatic life. Most of these practices involved extra detention, retention or infiltration of urban stormwater to enhance pollutant removal and provide additional stormwater management. Initial field testing conducted in the Washington area, and elsewhere in the country, demonstrated that BMPs could serve a dual purpose; controlling nonpoint source pollution from urban areas while providing effective stormwater management.

Since the development of best management practices, a profusion of laws, regulations, and policies have been adopted, at both the local and state level, to encourage or mandate the use of urban BMPs. Recent efforts have caused a dramatic shift in the techniques used to manage stormwater. In a 1982 survey conducted by the Metropolitan Washington Council of Governments (MWCOG, 1984), about 10% of stormwater structures constructed in the region were capable of providing effective pollutant removal; whereas, preliminary results from a similar survey in 1986 indicated that over 50% of stormwater management structures have such capabilities.

Effective implementation of urban BMPs, however, has been mixed. An important factor has been the lack of practical, detailed guidance on how to plan, design and maintain BMPs at the scale of the development site. This manual is an attempt to bridge that gap. It presents an integrated approach toward urban BMP design, that seeks not only to maximize pollutant removal, but also to minimize costs, reduce future maintenance burdens, and to blend facilities into both the natural and human landscape.

The integrated approach requires more thoughtful planning and sophisticated design. Consequently, a wider circle of people are now involved in the process of implementing urban BMPs including planners, engineers, developers, contractors, landscape architects, biologists, hydrologists, homeowner associations and concerned citizens.

This manual attempts to summarize what is currently known about urban BMPs, and has three basic purposes:

1. To enable planners/engineers to define the impacts that are likely to occur as a consequence of developing a site (**Chapter 1**).

2. To enable planners and engineers to rapidly screen available BMP options, and select the one most appropriate for the unique conditions at a particular development site (**Chapter 2**).

3. To review the capabilities and limitations of the various urban best management practices that can be used to mitigate these impacts, with a special emphasis on design considerations that maximize pollutant removal, reduce maintenance requirements and construction costs, and provide environmental amenities (**Chapters 3-9**).

Scope of Manual

The manual summarizes recent local and national research on BMP performance, design and costs, as well as the practical experience gained in urban BMP implementation at the local level.

Due to the wide diversity in existing local stormwater management regulations, BMP design requirements will vary from jurisdiction to jurisdiction. This manual is not intended to substitute for or replace local regulations, nor does it attempt to promote a single kind of urban BMP or strategy. Rather, the basic objective of the manual is to encourage more innovative and practical BMP designs, which not only fulfill local SWM requirements, but are also suited to the unique characteristics of the individual development site.

How to Use the Manual

The manual is oriented towards a diverse audience, and is organized so that each user can rapidly find the guidance they may need.

Chapter 1 begins with a general summary of the sequence of environmental impacts and changes that occur as a result of the development process. Next, the specific water quality problems created by urban runoff are reviewed so planners and engineers can determine which urban pollutants should be the focus of control efforts. Chapter 1 concludes with the presentation of a Simple Method for estimating changes in storm pollutant export from development sites.

Chapter 2 outlines some of the factors planners and engineers need to consider when selecting an urban BMP for a development site. Each of the BMP options for a site can only partially mitigate the quantity and quality impacts of urban runoff. A series of screening tools are presented to guide the designer in choosing a BMP. The first group of screening tools can be used to determine which BMP options are most suitable for the site, given its physical conditions and development characteristics. Subsequent tools detail the stormwater management, pollutant removal and environmental benefits of the practice. The section concludes with an index that indicates where further information used in the final design of the BMP can be found in the manual.

Chapters 3 through 9 review the capabilities and limitations of the seven most commonly used urban best management practices in the region. Particular attention is paid to practical design tips and methods that improve the performance of the BMP options. The BMPs reviewed include:

- Extended detention ponds (Chapter 3)
- Wet ponds (Chapter 4)
- Infiltration trenches (Chapter 5)
- Infiltration basins (Chapter 6)
- Porous pavement (Chapter 7)
- Water quality inlets (Chapter 8)
- Vegetative systems: grassed swales, filter strips, marsh creation, urban forestry, and basin landscaping (Chapter 9)

Each chapter begins with a general summary, followed by a brief review of the major design variations of the practice. Subsequent sections detail:

- What kind of stormwater benefits are provided by the BMP, and how they can be augmented.
- What kind of performance it is likely to have in removing urban pollutants, and how it can be enhanced in the design phase.
- What site conditions prevent or restrict the use of the BMP.
- How much it will cost to construct the BMP.
- What are the routine and non-routine maintenance tasks that must be performed for the BMP to function as intended, and how much will these cost.
- What design and construction techniques are needed to prevent premature failure of the BMP.
- What adverse or positive impacts the BMP will have on local habitat or downstream aquatic life.
- What impacts will the BMP have on the human environment (e.g., safety, recreation, community acceptance).

Each chapter concludes with a summary of design features that should be included in a BMP plan. The designer is encouraged to use these as a checklist during the final design process.

A glossary is included at the end of the manual to define some of the terms used in the emerging field of urban nonpoint source control. The derivation of the Simple Method (Chapter 1) and the Bankfull Flooding Frequency Analysis (Chapter 3) are presented in Appendices A and B, respectively. Finally, a reference list is provided for readers who would like to obtain further information on a particular BMP.

CHAPTER 1: THE IMPACTS OF URBAN RUNOFF

This chapter reviews the diverse impacts that the urbanization process has on streams and other receiving waters. It begins with a summary of the likely changes in water quality and hydrology resulting from uncontrolled stormwater runoff. Next, the specific impacts associated with the pollutants in urban runoff are reviewed. The chapter concludes with the presentation of a Simple Method for estimating storm pollutant export from development sites.

STREAM QUALITY AND THE URBANIZATION PROCESS

Urbanization has a profound influence on stream quality. These impacts are readily seen when a stream in an older urban area is compared to one located in a more natural setting. The following narrative describes the sequence of changes associated with development in a hypothetical small watershed. The pattern presented here is generalized from over two decades of local research and experience.

Changes in Watershed Hydrology

The hydrology of a stream changes in response to initial site clearing and grading. Trees that had intercepted rainfall are felled (Figure 1.1a). Natural depressions which temporarily ponded water are graded to a uniform slope. The thick humus layer of the forest floor that had absorbed rainfall is scraped off or erodes away. Having lost much of its natural storage capacity, the cleared and graded site can no longer prevent rainfall from being rapidly converted to runoff.

The situation worsens after construction is completed (Figure 1.1a). Rooftops, roads, parking lots, sidewalks and driveways make much of the site impervious to rainfall. Unable to percolate into the soil, rainfall is almost completely converted into runoff. The excess runoff becomes too great for the existing drainage system to handle. As a result, the drainage network must be "improved" to direct and convey the runoff away from the site (i.e., by installing culverts, curbs, gutters, storm sewers, or lined channels).

In a typical, moderately developed watershed, the net effect of development is a series of changes to stream hydrology (Figure 1.1b), including:

- Increased peak discharges about two to five times higher than pre-development levels (Leopold, 1968; Anderson, 1970).
- Increased volume of storm runoff produced by each storm, in comparison to pre-development conditions. A moderately developed watershed may produce 50% more runoff volume than a forested watershed during the same storm.
- Decreased time needed for runoff to reach the stream (termed the time of concentration) by as much as 50% (Leopold, 1968), particularly if extensive drainage improvements are made.

- Increased frequency and severity of flooding. A short, intense summer thunderstorm that had only slightly raised water levels in the past now turns the stream into a torrent. In a natural state, a stream experiences bankfull discharges (i.e., runoff entirely fills the stream channel) only about once every two years. In moderately developed watersheds, bankfull discharges may occur as often as three or four times a year.

- Reduced streamflow during prolonged periods of dry weather due to the reduced level of infiltration in the watershed. In smaller, headwater streams, the reduction may be enough to cause a perennial stream to become seasonally dry.

- Greater runoff velocity during storms, due to the combined effect of higher peak discharges, rapid time of concentration, and smoother hydraulic surfaces that occur as a result of development.

Changes in Stream Geometry

The channel of an urbanizing stream must adjust to the new hydrological conditions, and this results in the following responses:

- The primary adjustment to the increased storm flows is through channel widening (Figure 1.1c). Numerous surveys (Robinson, 1976; Fox, 1974; Hammer, 1972) and anecdotal evidence (Ragan and Dietemann, 1976) have shown that most streams widen two to four times their original size if post-development runoff is not effectively controlled. The resulting streambank erosion is severe because most floodplain soils are unconsolidated and highly erodible.

- The elevation of the stream's floodplain must increase to accommodate the higher post-development peak discharge rate (Figure 1.1c). Property and structures which had not previously been subject to flooding now may be at risk.

- Streambanks are gradually undercut and slump into the channel. Trees that had protected the banks are exposed at the roots, and are more likely to be windthrown, triggering a second phase of bank erosion.

- The prodigious quantities of the sediment eroded from streambanks and upland areas is seldom completely exported from the watershed. Much of it remains as temporary channel storage in the form of sandbars and other sediment deposits. Gradually, the extra sediment moves through the stream network as bedload. However, for many years the channel substrate is covered by shifting deposits of mud and coarse sand.

Degradation of Aquatic Ecosystems

The aquatic ecosystems in urban headwater streams are particularly susceptible to the impacts of urbanization. The massive shift from the natural flow and channel conditions reduce the habitat value of the stream. Dietemann (1975), Ragan and Dietemann (1976), Klein (1979) and MWCOG (1982) have all tracked trends in fish diversity and abundance over time in local urbanizing streams. Each of the studies has shown that fish communities become less diverse and are composed of more tolerant species after the surrounding watershed is developed. Sensitive fish species either disappear or occur very rarely. In most cases, the total number of fish in urbanizing streams may also decline.

Figure 1.1: Changes in Watershed Hydrology as a Result of Urbanization

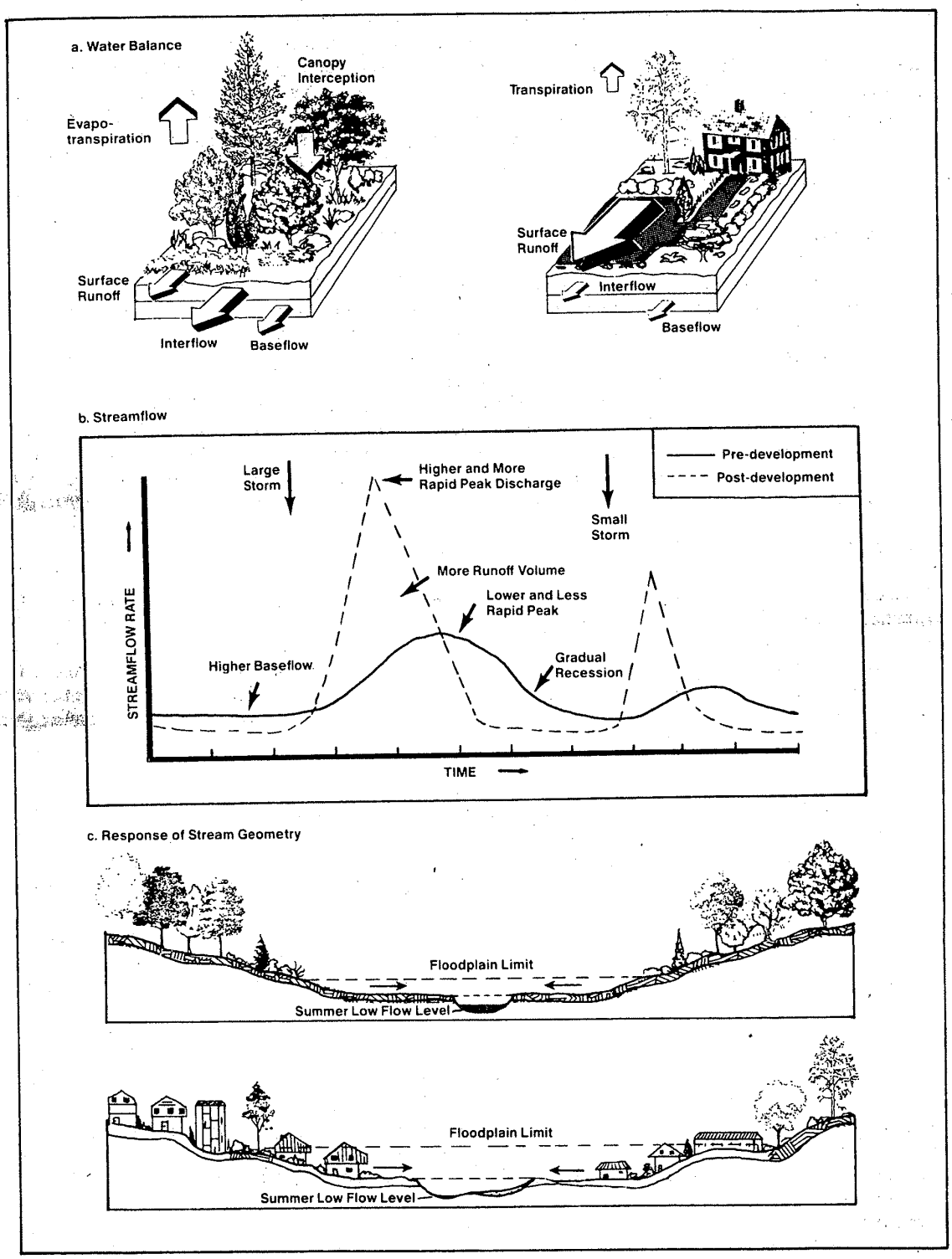

Similar trends have been noted among aquatic insects which are the major food resource for fish. These species cling to rocks and rely on the passing flow of leaf litter and organic matter for sustenance. Higher post-development sediment and trace metals can interfere in their efforts to gather food. Changes in water temperature, oxygen levels, and substrate composition can further reduce the species diversity and abundance of the aquatic insect community. No single factor is responsible for the progressive degradation of urban stream ecosystems. Rather, it is probably the cumulative impacts of many individual factors such as sedimentation, scouring, increased flooding, lower summer flows, higher water temperatures, and pollution.

Pollutant Export During the Construction Phase

Pollutant export increases dramatically both during and after development. Initial clearing and grading operations during construction expose much of the surface soils. Unless adequate erosion controls are installed and maintained at the site, enormous quantities of sediment are delivered to the stream channel, along with attached soil nutrients and organic matter (Pitt, 1985). Uncontrolled construction site sediment loads have been reported to be on the order of 35 to 45 tons/acre/year (Novotny and Chesters, 1981; Wolman and Schick, 1967; Yorke and Herb, 1976, 1978). By way of comparison, sediment loads from agricultural and stabilized urban land uses are one and two orders of magnitude lower, respectively.

Pollutant Export After Site Stabilization

Once the site is stabilized, pollutants accumulate rapidly on impervious surfaces and are easily washed off. The primary source of most pollutants is from the atmosphere, in the form of wetfall and dryfall. Once deposited, up to 90% of the atmospheric pollutants deposited on impervious surfaces are delivered to receiving waters (Oberts, 1985). In most areas, the annual load of pollutants deposited from the atmosphere equals or exceeds the total load exported in runoff. Measured rates of atmospheric deposition of pollutants in the Washington area are summarized in Table 7.1.

The various surfaces of the urban landscape are also an important source of many pollutants. Trace metals, for example, are a common component of many urban surfaces, such as flashing and other roofing materials, downspouts, galvanized pipes, metal plating, paints, wood preservatives, catalytic converters, brake linings, and tires. Over time, these surfaces corrode, flake, decay, dissolve or leach out, enabling the metals to wash away in urban runoff. This process is often exacerbated by the acidity of the rainfall (pH 3.9 to 4.5 in the Washington, D.C. area; OWML, 1983; BRPC, 1986a).

Other sources of pollutants that accumulate and subsequently wash off impervious surfaces include pet droppings, vegetative matter, litter and debris. Several studies suggest that as neighborhoods become mature, some of these sources can become very important (BRPC, 1986). Litter generation and pet dropping rates increase, and the general level of "urban housekeeping" often declines as neighborhoods grow older (Syrek, 1981; BRPC, 1986a). Poor housekeeping is easier to define than to control. For example, heavy use creates bare spots that erode, dumpsters are overloaded, out of sight alleyways and service areas are not kept up, used motor oil is dumped into storm sewers, homeowners apply excessive quantities of pesticides and fertilizers, and so on. The Citizens Program for the Chesepeake Bay's Baybook (CPCB, 1985) is an excellent guide that shows how homeowners can

improve the level of their urban housekeeping, and, consequently, improve the quality of urban runoff.

Older neighborhoods tend to become more impervious over time, as each new deck, patio, driveway, infill development and road improvement is constructed. Also, as both intended landscaping and "weed" trees grow older and become more widespread, their leaves and pollen (which would normally be slowly converted to humus on the forest floor) are more likely to fall on impervious surfaces and be washed into the channel. During the growing season, nutrients leach from tree leaves and stems during storms, and are quickly conveyed to the stream if the trees' drip line extends over an impervious area.

IMPACTS OF URBAN POLLUTANTS ON RECEIVING WATERS

The net effect of urbanization is to increase pollutant export by at least an order of magnitude over pre-development levels. The impact of the higher export is felt not only on adjacent streams, but also on downstream receiving waters such as lakes, rivers and estuaries. The nature of the impacts associated with specific urban pollutants are reviewed below. Also, the development situations that are likely to result in the most severe receiving water impacts are identified. Planners and designers should become familiar with these situations so that they can determine the pollutants of greatest concern and then choose the most appropriate BMP for the site.

Sediment

High concentrations of suspended sediment in streams cause many adverse consequences including increased turbidity, reduced light penetration, reduced prey capture for sight feeding predators, clogging of gills/filters of fish and aquatic invertebrates, reduced spawning and juvenile fish survival, and reduced angling success. Additional impacts result after sediment is deposited in slower moving receiving waters, such as smothering of the benthic community, changes in the composition of the bottom substrate, more rapid filling of small impoundments which create the need for costly dredging, and reduction in aesthetic values. Sediment is also an efficient carrier of toxicants and trace metals. Once deposited, pollutants in these enriched sediments can be remobilized under suitable environmental conditions posing a risk to benthic life (Gavin and Moore, 1982).

The greatest sediment loads are exported during the construction phase of any development site. On stabilized develpoment sites, the greatest sediment loads are exported from larger, intensively developed watersheds, that are not served by BMPs that effectively control streambank erosion.

Nutrients

Excess levels of phosphorus and nitrogen in urban runoff can lead to undesirable algal blooms in downstream receiving waters (also known as eutrophication). Generally, phosphorus is the controlling nutrient in freshwater systems. Bioassays (OWML, 1983) have indicated that the typical nutrient concentrations in urban runoff are more than sufficient to stimulate excessive algal growth. A major reason is that a majority of the nutrients in urban runoff are present in soluble forms that are readily taken up by algae.

The greatest risk of eutrophication is in urban lakes and impoundments that have long retention times (2 weeks or greater). Under optimal environmental growing conditions, these lake systems can experience chronic and severe eutrophic symptoms such as surface algal scums, water discoloration, strong odors, depressed oxygen levels (as the bloom decomposes), release of toxins, and reduced palatability to aquatic consumers. High nutrient levels also promote the growth of dense mats of green algae that attach to rocks and cobbles in shallow, unshaded headwater streams. Finally, nutrient loads from urban runoff, in combination with other sources, can contribute to eutrophication in both fresh and tidal waters. Regional examples in the Washington, D.C. area include the Occoquan and Little Seneca reservoirs, the upper Potomac and Patuxent estuaries, and the Chesapeake Bay.

As a general rule of thumb, nutrient export is greatest from development sites with the most impervious area. Exceptions include land uses that receive unusually high fertilizer inputs, such as golf courses, cemeteries, and other intensively landscaped areas.

Bacteria

Bacterial levels in undiluted urban runoff exceed public health standards for water contact recreation almost without exception. Bacteria standards violations are also a routine occurrence during storms in most of the urban streams monitored in the Washington region (MWCOG, 1984). Because bacteria multiply faster during warm weather, it is not uncommon to find a twenty-fold difference in bacterial levels between summer and winter. (US EPA, 1983). Even though bacterial levels are very high, there is some debate whether the kinds of bacteria found in urban runoff really present a severe health hazard (BRPC, 1986b). The test itself is only a count of coliform bacteria, which are an indirect and often imprecise indicator that more potent pathogens and viruses might be present (US EPA, 1983).

Although nearly every urban and suburban land use exports enough bacteria to violate health standards, older and more intensively developed urban areas produce the greatest export. The problem is especially significant in urban areas that experience combined or sanitary sewer overflows that export bacteria derived from human wastes.

Oxygen Demand

Decomposition of organic matter by microorganisms depletes dissolved oxygen (DO) levels in slower moving receiving waters such as lakes and estuaries. The degree of potential DO depletion is measured by the biochemical oxygen demand (BOD) test that expresses the amount of easily oxidized organic matter present in water. Unfortunately, the BOD test is somewhat unreliable for measuring the oxygen demand of urban runoff since trace metals may inhibit bacterial growth and thus interfere with the test (OWML, 1982). The simpler chemical oxygen demand (COD) test, which measures all the oxidizable matter present in urban runoff, is not much better, since it includes some organic matter that does not ordinarily contribute to oxygen demand, and is only weakly correlated with BOD levels (OWML, 1982).

Despite the problems in measuring oxygen demand, it is clear that urban runoff can severely depress DO levels after large storms. BOD levels can exceed 10 to 20 mg/l during storm "pulses" which can lead to anoxic conditions (zero oxygen) in shallow, slow-moving or poorly-flushed receiving waters. The problem is particularly acute in some older urban areas, where

pulses of storm runoff BOD mix with overflows from combined or sanitary sewers. Chronic examples in the Washington-Baltimore region include the lower Anacostia River in the District of Columbia and the mouth of Jones Falls in Baltimore.

The greatest export of BOD occurs from older, highly impervious residential areas with outdated combined storm sewers and large populations of pets. In contrast, only moderate BOD export has been reported from newer, low density suburban residential development.

Oil and Grease

Oil and grease contain a wide array of hydrocarbon compounds, some of which are known to be toxic to aquatic life at low concentrations (Stenstrom et al., 1984). The major source of hydrocarbons in urban runoff is through leakage of crankcase oil and other lubricating agents from the automobile (Tanacredi and Stainken, 1981). As might be expected, hydrocarbon levels are highest in the runoff from parking lots, roads, and service stations. Residential land uses generate less hydrocarbon export, although illegal disposal of waste oil into storm sewers can be a local problem.

While hydrocarbons have never been routinely monitored in Washington, D.C. area storm runoff, numerous studies in other regions of the country (Hoffmann et al., 1984; Stenstrom et al., 1984, and references cited therein) have reported average hydrocarbon levels during storms ranging from 2-10 mg/l. Hydrocarbons are lighter than water and are initially found in the form of a rainbow colored film on the water's surface. However, hydrocarbons have a strong affinity for sediment, and much of the hydrocarbon load eventually adsorbs to particles and settles out. If not trapped by BMPs hydrocarbons tend to rapidly accumulate in the bottom sediments of lakes and estuaries (Wakeham, 1977; Tanacredi and Stainken, 1981), where they may persist for long periods of time, and exert adverse impacts on benthic organisms (Whipple and Hunter, 1979).

The precise impacts of hydrocarbons on the aquatic environment are not well understood. Remarkably few toxicity tests have been performed to examine the effect of urban runoff hydrocarbon loads on aquatic communities under the typical exposure conditions found in urban streams. Bioassay data which does exist is largely confined to laboratory exposure tests for specific hydrocarbon compounds, which are difficult and expensive to routinely measure in the field. Clearly, community level toxicity testing for hydrocarbons should be a high research priority, both in the water column and sediment layer.

Trace Metals

Trace metals are primarily a concern because of their toxic effects on aquatic life, and their potential to contaminate drinking water supplies. As noted before, most of the metals found in urban runoff are derived from "leakage" of the urban landscape.

A wide variety of trace metals were found in urban runoff samples taken during the special trace metals sampling program conducted as part of the Washington, D.C. area and national Nationwide Urban Runoff Program (NURP) studies. Specifically, the following metals were measured in detectable concentrations: arsenic, beryllium, cadmium, chromium, copper, cyanide, mercury, nickel, lead, selenium, thallium, and zinc (JTC, 1982; DDN, 1982). With the significant exceptions of lead, cadmium, copper and zinc, most of

the trace metals were found in only a few samples, and then only in minute amounts that were well below human health or aquatic life criteria. Lead, copper and zinc were generally found in most samples, and were occasionally recorded at levels an order of magnitude higher than recommended aquatic life criteria. Maximum reported trace metal concentrations in the Occoquan Watershed Monitoring Laboratory (OWML) study of Washington area urban runoff concentrations were 0.720 mg/l for lead, 1.20 mg/l for zinc, 0.310 mg/l for copper and 0.117 mg/l for cadmium (OWML, 1983).

A few caveats should be kept in mind when evaluating the risks of trace metals in urban runoff. First, a large fraction (often over half) of the trace metals are attached to sediment. This effectively reduces the level which is immediately available for biological uptake and subsequent bioaccumulation. Metals associated with the sediment rapidly settle out of the water column and accumulate in soils and aquatic sediments (OWML, 1983; Gavin and Moore, 1982). Second, urban runoff events typically occur over a shorter duration (2 to 8 hours) than the exposure intervals used in aquatic bioassay tests (24 hours to a week for chronic toxicity criteria). Third, urban runoff is often subject to substantial dilution after mixing with other runoff sources. Nonetheless, it is likely that trace metals are toxic to stream life in certain situations (JTC, 1982), particularly for the more soluble metals such as copper and zinc.

An interesting note concerning metals concentrations is that both atmospheric and storm runoff levels of lead in the Washington region have dropped by about 50% since the late 1970s (MWCOG, 1983b). The sharp drop is believed to be due to the increased use of unleaded gasoline in the early 1980s, that has historically been the major source of lead to the environment.

Toxic Chemicals

A "priority pollutant scan" was conducted during both the national and Washington area NURP studies to determine the presence of over 120 toxic or carcinogenic chemicals and compounds. While very limited in scope, the scans rarely turned up toxic chemicals in amounts that exceeded current safety criteria (DDN, 1982; JTC, 1982). The urban runoff scans were primarily conducted in suburban residential areas not expected to have many sources of toxic pollutants (with the possible exception of illegally disposed or applied household hazardous wastes, such as waste oil, paint thinners, preservatives and pesticides). The Washington area scan indicated the presence of ten pesticides in urban runoff, but the concentrations were near the limits of detection (less than 1 ppb) (OWML, 1983). Other priority pollutants detected in Washington area runoff samples included bis(2-ethylhexyl) phthalate (a widely used plasticizer that leaches from plastic products), and several phenols and cresols (associated with wood preservatives). All of the priority pollutants detected in the Washington, D.C. scan (with the exception of trace metals) were well below relevant criteria or guidelines.

While the priority pollutant scans generally indicated that exotic chemicals are not commonly found in residential runoff, it should be remembered that the limited number of samples analyzed were not collected from existing or abandoned industrial areas that might serve as a greater source of toxicants.

Chlorides

Chlorides or salts are often introduced into streams after they are applied to remove ice and snow from roads, parking lots and sidewalks. Salt levels in snowmelt runoff have been reported to exceed several thousand milligrams per liter (about as salty as the Chesapeake Bay) (Novotny and Jones, 1986; Scott, 1981). Due to its extreme solubility, almost all the chloride applied for snow removal purposes ends up in surface or ground waters (Pitt, 1985). At high levels, chlorides are toxic to many freshwater aquatic organisms, as they are only adapted to withstand a relatively narrow range of salinity.

Thermal Impacts

Elevated water temperatures can have dire consequences for stream biota which are adapted to a coldwater environment. A rise in water temperature of just a few degrees Celsius over ambient conditions can reduce or eliminate sensitive stream insects and fish species, such as stoneflies, mayflies and trout. In general, sustained summertime water temperatures in excess of 21 degrees Celsius (70 degrees Fahrenheit) are considered to be stressful, if not lethal, to many coldwater organisms. Thermal enrichment problems are critical for many Piedmont streams that straddle the geographic and/or thermal borderline between coldwater and warmwater stream conditions.

A number of factors can increase summertime water temperatures in urban headwater streams. Of these, three factors often act synergistically to increase water temperatures. First, as the urban landscape heats up on warm summer days, it tends to impart a great deal of heat to any runoff passing over it. Second, fewer trees are present on the streambank to shade the stream channel, adding to the warming effect. Third, runoff stored in shallow wet ponds and other impoundments is heated in between storms, and then may be released in a rapid pulse, following a storm.

ESTIMATING URBAN STORMWATER POLLUTANT EXPORT

This section presents a Simple Method for estimating pollutant export from urban development sites. The Simple Method is empirical in nature, and utilizes the extensive database obtained in the Washington, D.C. area NURP study, as well as the national NURP data analysis (MWCOG, 1983b; US EPA, 1983; Driscoll, 1983a). The Simple Method is versatile in that it predicts pollutant loadings under a variety of planning conditions. It can also be used to estimate the probability that pollutant concentrations exceed a given threshold level.

The Simple Method is primarily intended for use on development sites less than a square mile in area. Moreover, the Simple Method is designed to provide an quick, easy and versatile means for estimating pollutant loads. Therefore, the method sacrifices some precision for the sake of simplicity and generality. Despite its limitations, the Simple Method is considered precise enough to make reasonable and reliable nonpoint pollution management decisions at the site-planning level. Examples of how to use the method are provided at the end of the section. Additional documentation on the derivation of the Simple Method is presented in detail in Appendix A.

Storm pollutant export (L, in pounds) from a development site can be determined by solving the following equation:

(EQ 1.1) $L = [(P)(Pj)(Rv)/12](C)(A)(2.72)$

where P = rainfall depth (inches) over the desired time interval.
Pj = factor that corrects P for storms that produce no runoff.
Rv = runoff coefficient, which expresses the fraction of rainfall which is converted into runoff.
C = flow-weighted mean concentration of the pollutant in urban runoff (mg/l).
A = area of the development site (acres).

12, 2.72 are unit conversion factors.

The user need only define five parameters, each of which are readily determined from site plan data, or are constants:

P (depth of rainfall)

The value of P selected depends on the time interval over which loading estimates are desired. For a normal year of rainfall, P will be about 40 inches in the Washington, D.C. area. Values of 30 and 50 inches can be used to characterize extremely dry and wet years, respectively. Long-term rainfall records from National Weather Service (NWS) stations should be used to estimate P in other regions of the country. If a load estimate is desired for a specific design storm or year of record, then the user can supply the relevant value of P.

Pj (correction factor)

The value of Pj is used to account for the fraction of annual or seasonal rainfall that does not produce any measurable runoff. Approximately 50% of the storms each year drop less than two-tenths of an inch of precipitation. Storms of this size are often not sufficient to create runoff; the rainfall is stored in surface depressions that eventually evaporate. An analysis of Washington, D.C. area rainfall/runoff patterns (Appendix A, Section 7) suggests that only 90% of rainfall events produce any runoff. Therefore, Pj should be set to 0.9 for annual and seasonal calculations. For individual storms, Pj should be set to 1.0 to avoid double counting.

Rv (runoff coefficient)

Rv is the measure of site response to rainfall events, and is calculated as:

(EQ 1.2) $Rv = r/p$

where r = storm runoff (inches).
p = storm rainfall (inches).

The Rv for a site depends on the nature of the soils, topography, and cover. However, the primary influence on the Rv is the degree of watershed imperviousness. Figure 1.2 shows the relation between the mean Rv and the degree of watershed imperviousness for 47 small urban catchments monitored throughout the region and the nation (Appendix A, Section 6). Although some scatter is evident in the plot, watershed imperviousness (I) does appear to be a reasonable predictor of the Rv. The following equation represents the best fit line through the dataset (adjusted R^2=0.71):

(EQ 1.3) $Rv = 0.05 + 0.009(I)$

where I = the percent of site imperviousness.

Values for I are readily obtained from site plans or accompanying hydrological computations. This is done by summing the area of the site covered by structures, sidewalks, driveways, parking lots, roads, patios and other impermeable areas (by planimetry or square counting) and dividing it by the total site area.

Figure 1.2: Relationship Between Watershed Imperviousness (I) and the Storm Runoff Coefficient (Rv)

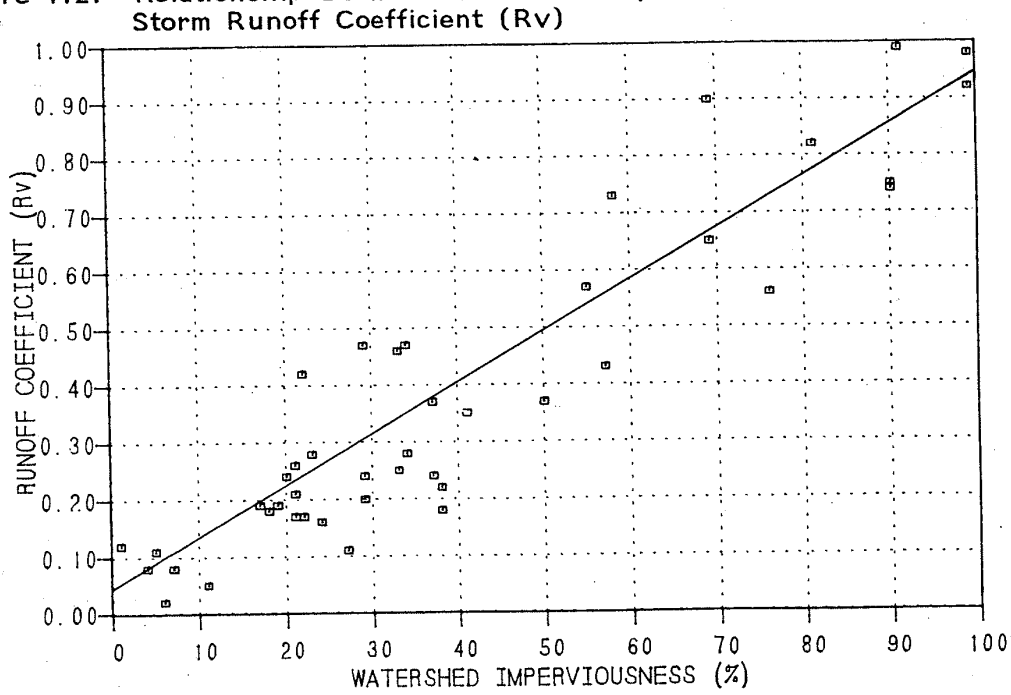

NOTE: 44 small urban catchments monitored during the national NURP study. (For mean values, see Table A.5).

A (site area)

The total area of the site (in acres) can be obtained from site plans. Caution should be exercised if site area (A) is greater than one square mile (640 acres). Alternate procedures, outlined in Section 6 of Appendix A, should be employed in these larger watersheds to account for baseflow runoff volumes.

C (pollutant concentration)

Statistical analysis of over 300 runoff events monitored during the 1980-81 Washington, D.C. area NURP project indicated that there was; 1) no significant difference in average pollutant concentrations between the eight widely different urban sites measured, and 2) no consistent correlation between pollutant concentrations and storm volume or intensity (Appendix A, Section 5). A similar analysis conducted on the much larger national NURP database reached the same conclusions (US EPA, 1983; Driscoll, 1983a). The practical implication of these findings is that a single concentration value (C) can be applied for purposes of estimating pollutant loads.

Average, flow-weighted C values for selected pollutants measured during the NURP study are presented in Table 1.1. These values generally represent the pollutant levels emanating from stabilized, relatively recent suburban development sites in the region. These values, however, may not always be appropriate for all site conditions. Alternative values of C for special watershed conditions are presented in Table 1.1 and are described below.

1. OLDER, POORLY MAINTAINED URBAN NEIGHBORHOODS often have significantly higher pollutant concentrations during storms than newer developments. Mean pollutant levels monitored in five older residential catchments in downtown Baltimore, Maryland (BRPC, 1986b) are provided in Table 1.1. As can be seen, the pollutant levels in downtown Baltimore are approximately 2 to 5 times higher than those reported for suburban Washington, D.C., and are attributed to poor urban "housekeeping" (i.e., poor trash removal, accumulation of debris, deteriorating housing stock, high traffic volumes, poor upkeep of lawns and open space). These C values can be used in lieu of the suburban Washington C values when assessing loads for older urban residential areas.

2. HIGHLY IMPERVIOUS CENTRAL BUSINESS DISTRICTS generate urban pollutant levels that are also slightly higher than the suburban Washington C values. This is due in part to greater traffic volume and higher atmospheric loading rates (MWCOG, 1983a). Pollutant levels monitored in the K Street corridor of Washington, D.C. are provided in Table 1.1. Nutrient, BOD and trace metal levels measured during 27 storms at two sites were often higher than other residential or commercial suburban sites monitored in the Washington, D.C. NURP study (MWCOG, 1983b; NVPDC, 1981).

3. FOREST C values are provided for comparative purposes in Table 1.1, and were obtained from extensive storm monitoring of pollutant levels in several small forested watersheds in the Occoquan basin in Northern Virginia (OWML, 1983). These C values can be used to roughly estimate "natural" background storm loadings contributed from undeveloped areas to aid in assessing how much pollutant export will increase as a result of urban development activity.

4. NATIONAL RUNOFF CONCENTRATIONS were obtained from over 2300 storms monitored at 22 NURP project sites across the nation (US EPA, 1983). These average values are recommended for use in areas outside of the Middle Atlantic states. The national C values are slightly higher than the values for new suburban sites in the Washington, D.C. area, and slightly lower than values for the older urban areas of Baltimore.

5. NATIONAL URBAN HIGHWAY CONCENTRATIONS were computed from over 250 storm EMC samples collected at eight urban highway sites across the nation as part of a Federal Highway Administration study (Shelley and Gaboury, 1986). The high concentration of metals and phosphate apparently reflects the impact of vehicle emissions. The same study indicated that pollutant concentrations in rural highway runoff were typically one half of the NURP urban runoff average.

The Simple Method has been designed such that any urban storm monitoring dataset can be used as a basis for estimating loads. Thus, if newer or more site specific pollutant concentration data becomes available in the future, the Simple Method can be easily modified to incorporate the new C values. The appropriate procedures for developing new C values are given in Section 3 of Appendix A.

Table 1.1: Urban 'C' Values For Use With the Simple Method (mg/l)

POLLUTANT	NEW SUBURBAN NURP SITES (Wash.,DC)	OLDER URBAN AREAS (Baltimore)	CENTRAL BUSINESS DISTRICT (Wash.,DC)	NATIONAL NURP STUDY AVERAGE	HARDWOOD FOREST (Northern Virginia)	NATIONAL URBAN HIGHWAY RUNOFF
PHOSPHORUS						
Total	0.26	1.08	-	0.46	0.15	-
Ortho	0.12	0.26	1.01	-	0.02	-
Soluble	0.16	-	-	0.16	0.04	0.59
Organic	0.10	0.82	-	0.13	0.11	-
NITROGEN						
Total	2.00	13.6	2.17	3.31	0.78	-
Nitrate	0.48	8.9	0.84	0.96	0.17	-
Ammonia	0.26	1.1	-	-	0.07	-
Organic	1.25	-	-	-	0.54	-
TKN	1.51	7.2	1.49	2.35	0.61	2.72
COD	35.6	163.0	-	90.8	>40.0	124.0
BOD (5-day)	5.1	-	36.0	11.9	-	-
METALS						
Zinc	0.037	0.397	0.250	0.176	-	0.380
Lead	0.018	0.389	0.370	0.180	-	0.550
Copper	-	0.105	-	0.047	-	-

Predicting Suspended Sediment Levels

Suspended sediment concentrations in urban runoff cannot be predicted by the previously described methods. The only predictive relationship to emerge from the Washington, D.C. NURP study was that sediment levels are generally related to watershed size. As shown in Figure 1.3, mean storm sediment concentrations tend to increase with drainage area in 25 urban watersheds in the region (watershed areas ranging from 5 to 100,000 acres in size) (Hickman, 1984; OWML, 1983; MWCOG, 1983b; NVPDC, 1979).

Higher storm sediment levels in larger watersheds are primarily due to bank and channel erosion, rather than erosion of pervious areas by overland flow or washoff of sediments from impervious areas within the watershed. Under this theory, as watershed size becomes larger, the length of the stream channel network and the susceptibility to channel erosion increases markedly. Most small headwater streams in the region have abundant supplies of stored sediment that have been gradually deposited by previous centuries of agricultural erosion, or more recently, by construction-related erosion (Meade, 1982; Costa, 1975; Wolman and Schick, 1967). The large quantities of sediment in channel storage can become resuspended and transported out of the watershed by the increased severity of flooding that often follows urbanization.

Figure 1.3: Relationship Between Watershed Area and Sediment Event Mean Concentration (EMC)

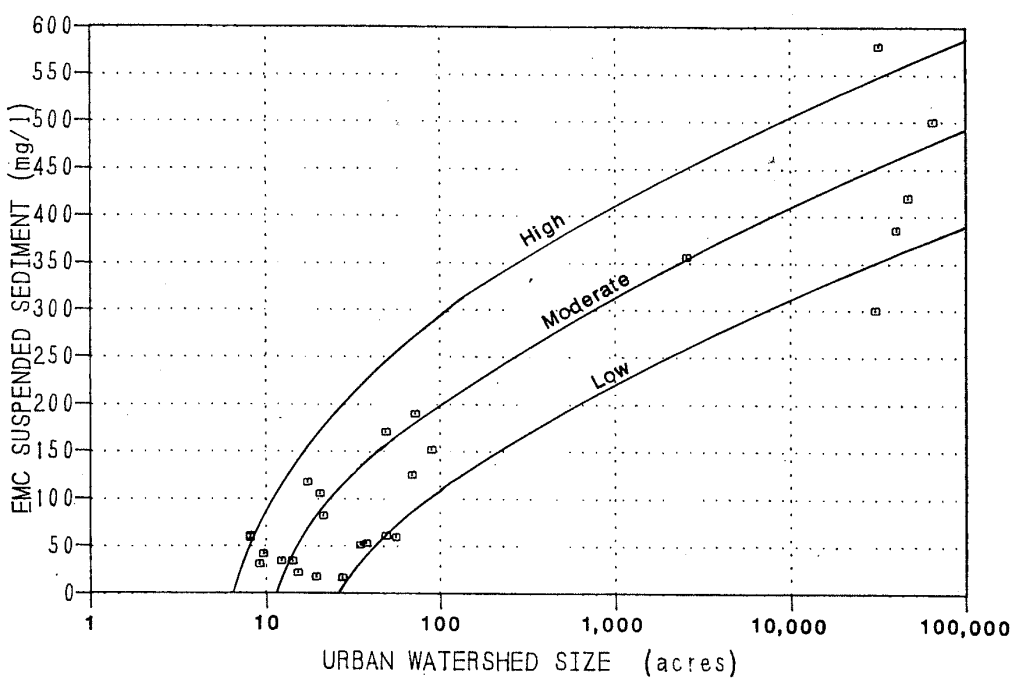

Alternative sources of sediment (pervious area erosion and/or impervious area washoff) do not appear to be capable of producing high sediment concentrations. Erosion of pervious areas in most stabilized urban areas is minimized by the extensive cover of lawns and open space, and washoff from impervious areas is limited by the atmospheric supply of solids, which amounts to less than a tenth of a ton per year (see Table 7.1). Both sources are probably responsible for the relatively low suspended sediment concentrations (15-25 mg/l) reported for very small watersheds.

The relationship between mean storm sediment levels and drainage area provides a first-cut estimate of the expected storm sediment concentrations for specific development situations. The rather wide band drawn around the data points in Figure 1.3 reflects the wide variability observed in the field. The choice of a high, moderate or low value on the curve is a matter of subjective interpretation, but some general guidance is offered in Table 1.2 below.

Table 1.2: Watershed Channel Network Condition

CRITERIA	LOW EMC	MODERATE EMC	HIGH EMC
STABILITY CONDITION OF CHANNEL	vegetated swales or storm sewers	intermediate	open channel, cut banks alternating w/ channel sandbars, fallen trees
CHANNEL SEDIMENT STORAGE	small deposits in storm drains, stabilized land use	"	large silt or clay deposits, evidence of recent or ongoing construction, water becomes murky after disturbing bottom
STREAM VELOCITY	low slope, low imperviousness	"	high slope, high watershed imperviousness

ESTIMATING URBAN POLLUTANT THRESHOLDS AND FREQUENCY

In some cases, the concentration of an urban pollutant, rather than the annual load, is needed to assess a water quality problem. This is often the case with trace metals and toxicants which primarily impact the environment when their ambient concentration exceeds a critical threshold over some specified period of time. It is more useful then, to express the delivery of these urban pollutants in terms of an expected maximum concentration which recurs over a given time interval. For example, trace metal X, exceeds a critical concentration threshold Y, in Z percent of all storms.

Data of this nature was produced using statistical procedures outlined in US EPA (1983) and Section 2 of Appendix A in this manual, for the entire Washington, D.C. NURP database of over 300 runoff events. The results are detailed for selected pollutants in Table 1.3. Note that the exceedance frequency refers to the percent of runoff events in which a given concentration level is equaled or exceeded. Since, on average, there are about 65 measurable runoff events per year in the Washington, D.C. area (Appendix A, Section 7), the exceedance frequency can be converted into a return interval by the following equations:

(EQ 1.4) $e = (p)(St)$ and,

(EQ 1.5) $r = 1/[(p)(St)] = 1/e$

where
- e = number of exceedances per year.
- p = number of exceedance events/number of runoff events.
- St = number of runoff events/year (average of 65).
- r = recurrence interval (years) for a given exceedance.

The pollutant levels shown in Table 1.3 are rarely experienced in downstream receiving waters due to dilution and adsorption. Mancini (1983) and US EPA (1983) provide useful screening procedures for treating these factors, and an example calculation is provided later in this chapter.

Table 1.3: Exceedance Frequency (e) for Selected Urban Pollutant

POLLUTANT CONCENTRATION (mg/l)	PERCENT OF STORMS IN WHICH GIVEN CONCENTRATION IS EXCEEDED				
	50%	25%	10%	5%	1%
SEDIMENT	31	71	151	235	545
TOTAL PHOSPHORUS	0.27	0.43	0.65	0.82	1.31
TOTAL NITROGEN	2.2	3.2	4.5	5.6	8.2
COD	42	61	84	103	149
LEAD	0.021	0.042	0.076	0.109	0.149
COPPER	0.010	0.020	0.037	0.055	0.114
ZINC	0.06	0.101	0.161	0.216	0.355

For reference purposes, calculated threshold concentrations can be compared to existing water quality standards and criteria, some of which are shown in Table 1.4. These criteria were developed by US EPA (1983) to attempt to define the effects of short duration and intermittent exposures typical of urban runoff. As one might guess from the large spread in the numbers, there is considerable scientific uncertainty about the chronic or immediate effects of trace metals on aquatic life.

Table 1.4: U.S. EPA Trace Metal Criteria For Urban Runoff Exposure

TRACE METAL CONTAMINANT	WATER[1] HARDNESS (mg/l as CACO3)	HUMAN[2] INGESTION (Food/Drink) (ug/l)	AMBIENT LIFE CRITERIA FOR INTERMITTENT EXPOSURE (ug/l)[3] Threshold[4] Effect	Significant[5] Mortality
Copper	50	-	20	50-90
	100	-	35	90-150
	200	-	80	120-350
Cadmium	50	10	3	7-160
	100	10	6.6	15-350
	300	10	20	45-1070
Lead	50	50	150	350-3200
	100	50	360	820-7500
	200	50	850	1950-17850
Zinc	50	-	380	870-3200
	100	-	680	1550-4500
	200	-	1200	2750-8000
Nickel	-	13.4	-	-

[1] See glossary for definition.

[2] Derived from EPA drinking water criteria.

[3] EPA estimate of toxicity under intermittent, short duration exposure (several hours once every several days).

[4] Concentration causing mortality to the most sensitive individual of the most sensitive species.

[5] Significant mortality shown as a range: 50% mortality in the most sensitive species, and mortality of the most sensitive individual in the species in the 25th percentile of sensitivity.

EXAMPLE 1-1: ESTIMATING THE INCREASED NUTRIENT LOADING FROM AN UNCONTROLLED DEVELOPMENT SITE

Given a 38 acre development site being converted from woodland to a townhouse community (total imperviousness-45%), what will the annual post-development nitrogen and phosphorus loads be during a normal year of rainfall? How great of an increase is this over the pre-development nutrient loads?

Step 1. Estimate Parameters For Pre- and Post-Development Conditions. Use Washington, D.C. suburban and forest C values (from Table 1.1). Compute Rv using general equation (EQ 1.3). (Assume I= 2% for forest).

Parameter	Pre-Development	Post-Development
P	40 inches	40 inches
Pj	0.9	0.9
Rv	0.05 + .009(2)= 0.07	0.05 + .009(45)= 0.46
C (total N)	0.78 mg/l	2.00 mg/l
C (total P)	0.15 mg/l	0.26 mg/l
A	38 acres	38 acres

Step 2. Compute Annual Storm Loads (EQ 1.1).

L = [(P)(Pj)(Rv)/12](C)(A)(2.72)

Pre-Development:
TN = [(40)(0.9)(0.07)/12](0.78)(38)(2.72) = 17 pounds/year
TP = [(40)(0.9)(0.07)/12](0.15)(38)(2.72) = 3 pounds/year

Post-Development:
TN = [(40)(0.9)(0.46)/12](2.0)(38)(2.72) = 285 pounds/year
TP = [(40)(0.9)(0.46)/12](0.26)(38)(2.72) = 37 pounds/year

Step 3. Calculate Increase in Storm Nutrient Loads After Development.

As a result of the development of the site, annual storm nutrient loadings are expected to increase by 268 and 34 pounds/year for nitrogen and phosphorus, respectively. In reality, the increase in storm nutrient loads may be slightly less since the pre-development land use (forest) often exports a modest nutrient load in baseflow. Even so, the large change in nutrient loads as a result of the development could very likely cause eutrophication or nutrient enrichment of downstream receiving waters, particularly if they are slow-moving or poorly-flushed. A more precise analysis of receiving water response to the increased nutrient load would be warranted. The simple nutrient loading response model described by Reckhow (1980) or other similar models could be used for this purpose.

EXAMPLE 1-2: DETERMINING LONG-TERM SEDIMENT ACCUMULATION IN A WET POND

A planner wants to know how much storage volume will be eventually lost due to sediment deposition in a 7,500 cubic yard wet pond draining a 106 acre, 55% impervious watershed over a twenty year period. Assume that 1) the average sediment removal efficiency of the pond is 60%, 2) one ton of sediment eroded from the watershed fills a volume equivalent to one cubic yard within the pond, 3) the open channel network within the watershed is in poor condition, 4) the average annual rainfall is 40 inches.

SOLUTION: From Figure 2, the expected mean sediment concentration for a 100 acre watershed in poor condition is about 280 mg/l. The post-development storm runoff coefficient (Rv) will be 0.55. Therefore, the annual sediment load during a normal year of rainfall can be obtained by solving the general equation (EQ 1.1).

$$L = [(P)(Pj)(Rv)/12](C)(A)(2.72)$$

$$L = [(40)(0.9)(.55)/12](280)(106)(2.72) = 133{,}200 \text{ pounds}$$
(67 tons/year)

If the pond is 60% efficient in trapping sediment, the total load delivered over twenty years would be:

(67 tons/yr)(20 yr)(0.6) = 800 tons.

The trapped sediment load would fill up about 800 cubic yards, or about 11% of the ponds's total stormwater storage capacity.

It should be noted that the sediment load calculated represents the sediment load from a stabilized urban watershed and its channel network. It does not include any sediment supplied during the construction phase, which can be extremely large load. Construction phase sediment loads can be roughly calculated assuming a sediment C of 10,000 mg/l (Yorke and Herb; 1976), and an Rv of 0.9 per exposed acre. Thus, the annual uncontrolled sediment load during construction is on the order of:

$$L = [(40)(0.9)(0.9)/12](10{,}000)(106)(2.72)/2000 = 3890 \text{ tons/year}$$
(37 tons/acre/yr).

This estimate falls within the field measurements of average sediment loss from uncontrolled construction sites reported by Wolman and Schick (1967) and Yorke and Herb (1976) for the Washington, D.C. area of 30 to 40 tons per acre. The calculation dramatically illustrates the need for effective on-site sediment controls during construction.

EXAMPLE 1-3: EVALUATING THE POSSIBLE EXCEEDANCE OF TRACE METAL WATER QUALITY CRITERIA IN A SENSITIVE TROUT STREAM

A planner wants to evaluate whether a proposed development will increase levels of trace metals sufficiently to adversely impact aquatic life in a trout stream. The 75 acre, 27% impervious site is situated within a 320 acre woodland watershed. The following planning conditions are assumed, 1) a storm with one inch precipitation, 2) a softwater stream with a hardness of 100 mg/l ($CaCO_3$) 3) the effective imperviousness of the forest area is 2%, and 4) the background concentration of trace metals in the forest runoff is negligible. Determine the expected level of the trace metals lead, zinc and copper which are exceeded 5% of the time, and compare these with established instantaneous water quality criteria.

SOLUTION: Separately calculate the volume of storm runoff from the developed and forested portions of the watershed for a one-inch storm, using a modified form of the general equation (EQ 1.1):

Runoff volume (acre-feet) = (P)(Rv)(A)/12 (Note: Pj is not used for a single storm.)

DEVELOPMENT SITE: (1)(.29)(75)/12 = 1.81 ac-ft

FORESTED AREA: (1)(.07)(245)/12 = 1.43 ac-ft

The total runoff volume for the watershed would be equal to 3.24 ac-ft, and the dilution ratio (developed site runoff/watershed runoff) is 0.56.

The next step involves selecting the trace metal concentration level which is exceeded in 5% of all storms (Table 1.3), or about 3 times per year. Trace metal criteria established for protection of aquatic life are given in Table 1.4. The estimated in-stream metals concentrations can be compared to the threshold values in Table 1.4. as a first cut assessment of potential metal toxicity. As shown below, it is evident that lead and zinc levels appear "safe", while copper levels approach the criteria, even after dilution takes place.

TRACE METAL	Undiluted 5% Exceed. Conc. (C) (Table 1.3)	Stream Concentration After Correcting for Stream Dilution = (C)(0.56)	US EPA "Threshold" Criteria (Table 1.4)
Lead	109 ug/l	61 ug/l	360 ug/l
Zinc	216 ug/l	121 ug/l	680 ug/l
Copper	55 ug/l	31 ug/l	35 ug/l

Annual Storm Export of Pollutants from Development Sites

For the convenience of the reader, the Simple Method has been solved to provide estimates of urban storm pollutant export for incremental values of impervious cover. The results are shown in Table 1.5 for several urban pollutants. Table 1.5 also provides a general range of impervious cover associated with common development situations. Unless noted otherwise, all calculations assume a normal year of rainfall (P=40 inches) and suburban NURP pollutant concentration values.

Proper Use of the Simple Method

The Simple Method should provide reasonable estimates of changes in pollutant export resulting from development activity. However, several caveats should be kept in mind when applying this method:

- The Simple Method only estimates pollutant loads generated during storms. It does not consider baseflow runoff and associated pollutant loads. Typically, baseflow is negligible or non-existent at the scale of a small development site, and can be safely neglected. However, larger residential watersheds often do generate appreciable volumes of baseflow. Pollutant levels in baseflow are generally low and can seldom be distinguished from natural background levels (NVPDC, 1979). Consequently, baseflow pollutant loads normally constitute only a small fraction of the total load delivered from a site. Nevertheless, it is important to remember that load estimates derived by the Simple Method refer only to stormflow loads and should not be confused with the total load from the site, particularly when the density of watershed development is low. For example, in large low density residential watersheds (I less than 5%), as much as 75% of the annual runoff volume may occur as baseflow. In such a case, the annual baseflow nutrient load may be equivalent to the annual stormflow nutrient load (Appendix A, Section 3). Procedures for calculating baseflow runoff volumes and associated pollutant loads can be found in Appendix A, Section 6.

- The Simple Method provides estimates of storm pollutant export that are probably close to the "true" but unknown value for the site. However, it is very important not to overemphasize the precision of the results obtained. For example, it would be inappropriate to use the method to evaluate relatively similar development proposals (e.g., 34.3% I versus 36.9% I).

- The Simple Method is based on urban runoff monitoring data from recently stabilized suburban watersheds. Although modifications have been made to extend the method to older urban areas, central business districts and some natural reference areas, there are still several areas in which a reliable C value may not exist. These include construction areas, industrial areas, rural development and agricultural uses.

- The Simple Method provides a general planning estimate of likely storm pollutant export from development sites. More sophisticated methods, such as watershed and receiving water simulation modeling, may be needed to analyze larger and more complex watersheds.

Table 1.5: Annual Storm Pollutant Export For Selected Values of Impervious Cover (I) Developed from the Simple Method[1]

LAND[2] USE	SITE IMPERVIOUSNESS	TOTAL PHOSPHORUS[3]	TOTAL NITROGEN	BOD 5-day	EXTRACTABLE ZINC	EXTRACTABLE LEAD
		pounds/acre/year				
RURAL	0	0.11	0.8	2.1	0.02	0.01
RESIDENTIAL	5	0.20	1.6	4.0	0.03	0.01
	10	0.30	2.3	5.8	0.04	0.02
LARGE LOT	10	0.30	2.3	5.8	0.04	0.02
SINGLE	15	0.39	3.0	7.7	0.06	0.03
FAMILY	20	0.49	3.8	9.6	0.07	0.04
MEDIUM	20	0.49	3.8	9.6	0.07	0.04
DENSITY	25	0.58	4.5	11.4	0.08	0.05
SINGLE	30	0.68	5.2	13.3	0.10	0.05
FAMILY	35	0.77	6.0	15.2	0.11	0.06
TOWNHOUSE	35	0.77	6.0	15.2	0.11	0.06
	40	0.87	6.7	17.1	0.12	0.07
	45	0.97	7.4	18.9	0.14	0.07
	50	1.06	8.2	20.8	0.15	0.08
GARDEN	50	1.06	8.2	20.8	0.15	0.08
APARTMENT	55	1.16	8.4	22.7	0.16	0.09
	60	1.25	9.6	24.6	0.18	0.09
HIGH RISE,	60	1.25	9.6	24.6	0.18	0.09
LIGHT	65	1.35	10.4	26.4	0.19	0.10
COMMERICAL/	70	1.44	11.1	28.3	0.21	0.10
INDUSTRIAL	75	1.54	11.8	30.2	0.22	0.11
	80	1.63	12.6	32.0	0.23	0.11
HEAVY	80	1.63	12.6	32.0	0.23	0.11
COMMERCIAL,	85	1.73	13.3	33.9	0.25	0.12
SHOPPING	90	1.82	14.0	35.8	0.26	0.13
CENTER	95	1.92	14.8	37.7	0.27	0.13
	100	2.00	15.4	39.2	0.28	0.14

[1] P=40 inches, Pj=0.9, Rv=0.05+0.009(I), C=suburban values, A=1 acre.

[2] Rural Residential: 0.25-0.50 Dwelling Units (DU)/acre
Large Lot Single Family: 1.0-1.5 DUs/acre
Medium Density Single Family: 2-10 DUs/acre
Townhouse and Garden Apartment: 10-20 DUs/acre

[3] These values are for NEW DEVELOPMENT SITES ONLY. For older urban areas, central business districts, sites with highways, or areas outside of the Middle Atlantic region, use a more appropriate "C" value in Equation 1.1 (see Table 1.1).

CHAPTER 2: CHOOSING THE BEST BMP OPTION FOR A SITE

This chapter outlines factors that planners and engineers need to consider when choosing an urban best management practice (BMP) for a particular development site. It begins with a brief discussion of the minimum objectives that a BMP plan for a site should meet. The next section provides a series of screening tools that can be used to select the most appropriate BMP for a particular development site. These screening tools can be used to evaluate the following:

- BMP options that are suitable for a site, given its physical condition and development status.
- Stormwater control benefits provided by each BMP option.
- The expected pollutant removal capability for each BMP option, under several different design scenarios.
- Environmental and human amenity values associated with the BMP option selected.

The screening tools can be used in any order, or may be used as an overall summary of BMP performance. Several examples of how the screening tools can be used for a particular development site are presented. The chapter concludes with a summary index that shows where more information on the design, cost and maintenance of a BMP option can be found elsewhere in the manual.

OBJECTIVES IN BMP PLANNING

Over the past two decades, a number of urban BMPs have been developed and refined to mitigate some of the adverse impacts associated with development activity. Experience has shown that each BMP option has both unique capabilities and persistent limitations. These, in turn, must be balanced with both the physical constraints imposed by the development site and the overall management objectives for the watershed. In practice, this balance is achieved through a negotiating process between the engineering consultant and the local planner. Typically, the engineering consultant is responsible for developing the initial BMP plan, and represents the interests of the developer. The planner reviews the plan to ensure that it conforms with local policies and design standards, and represents the interests of the community.

During the BMP review process, it is important to identify the ultimate objectives for managing runoff from the site. The objectives in nonpoint source pollution and stormwater management have gradually evolved over the years, and may vary considerably among jurisdictions. However, the local planner and engineering consultant often do recognize several common and general goals which should be incorporated into a BMP plan. At a minimum, the BMP plan jointly developed for a site should accomplish the following goals:

- Reproduce, as nearly as possible, the hydrological conditions in the stream prior to development.
- Provide a moderate level of removal for most urban pollutants.
- Be appropriate for the site, given physical constraints.
- Be reasonably cost-effective in comparison with other BMPs.
- Have an acceptable future maintenance burden.
- Have a neutral impact on the natural and human environment.

Reproduce Pre-development Hydrological Conditions

The historical concern in stormwater management has been to reduce the frequency and severity of downstream floods. In most areas, this goal is achieved by controlling the peak discharge computed for a specific design storm to pre-development levels. In reality, however, floods are but one of a series of hydrological changes brought about by watershed development. Other hydrological changes can have equally profound impacts on the quality of downstream aquatic habitat and/or the severity of streambank erosion. Some BMP options are capable of mitigating these impacts through artificial groundwater recharge or the control of small to intermediate storm events. Both the planner and the engineer should check the condition of stream channels downstream to determine if such options should be required.

Provide Moderate Pollutant Removal Capability

In recent years, BMP designs have been adapted to enhance pollutant removal during storms, and thereby, improve the quality of stormwater runoff delivered to receiving waters. BMPs differ markedly in the pollutant removal mechanisms they employ, and consequently, their performance in removing different pollutants can vary significantly. However, the engineer has some ability to enhance removal rates by increasing the volume of runoff effectively treated by the BMP, or by adding extra design features. The planner's responsibility is to provide specific guidance to the engineer on which urban pollutants are to be targeted for removal in the watershed.

Feasibility for the Site

A surprisingly high number of BMPs are constructed on sites for which they are not suitable. As a consequence, some BMPs are often plagued with chronic maintenance problems or nuisance conditions, and in extreme cases, may no longer function as designed. To prevent these sorts of problems from occurring, both the planner and engineer should clearly understand the physical restrictions associated with each BMP. In addition, the engineer should perform field tests to verify the physical condition of the site. Depending on the results, the engineer may have to modify the BMP plan or incorporate preventative design features.

Cost-effectiveness

The construction costs for different BMP options can vary substantially, even on similar sites. This is due to inherent differences in the methods and materials used for BMPs, as well as certain economies-of-scale. Since BMP costs are eventually passed on to the consumer, cost-minimization should

be a priority for both the engineering consultant and the planner. Generally, the engineering consultant, who has a legitimate interest in developing the least cost plan for his or her client, will perform the needed cost analyses.

Acceptable Future Maintenance Burden

Like any other pollution control device, BMPs can only continue to be effective if they are regularly inspected and maintained. Maintenance tasks for most BMPs include both low cost routine tasks and more expensive non-routine tasks, such as rehabilitation or sediment removal. Maintenance costs for BMPs are significant. Over a twenty year interval they will often equal or exceed the initial construction cost. However, the cost and responsibility for maintenance is normally passed on to future residents or the public sector, and not the original developer.

Consequently, the planner must clearly vest responsibility for maintenance: How and when tasks will be performed, how it is to be financed, and who will inspect the BMP. In most cases, the maintenance burden of a BMP is ultimately rooted in the initial design and construction of the facility. Planners and engineers should work together in this phase to anticipate future maintenance problems at the site and develop designs that can alleviate them. If maintenance requirements are addressed during the design and construction phases, both the scope and cost of future maintenance activities can be sharply reduced.

Neutral Impact on the Environment

Urban BMPs nearly always represent a significant modification to both the natural environment and the adjacent community. As such, BMPs can either enhance or degrade the amenity values that both provide. Comparatively small investments in design, landscaping and maintenance can make a BMP an attractive feature of a community, or at least an unobtrusive one. Without such efforts, many BMPs become "dead space" in a development; that is, they appear unsightly or discordant, provide no habitat or recreational opportunities, and are plagued by nuisance problems. The importance of enhancing the amenity values of a BMP cannot be overemphasized, as resident perceptions about a BMP are generally formed by the amenities they do or do not provide. These perceptions, in turn, strongly influence their acceptance of and support for BMPs, which is critical if the same residents are expected to pay for maintenance.

BMP SCREENING TOOLS

To aid the planner or engineer in choosing the best BMP for a site, a series of screening tools have been developed to compare the capabilities and limitations of each BMP. The first screening tool can be used to identify which BMP options are physically feasible for the site (Figures 2.1 and 2.2). These help the designer to shorten the list of BMP options that need be considered at a site. The second screening tool (Figure 2.3) summarizes the stormwater benefits which are provided by each BMP option. The third screening tool (Figure 2.4) provides rapid guidance on the relative pollutant removal capability of BMPs for a number of urban pollutants of concern. Finally, the fourth screening tool (Figure 2.5) indicates what natural or human amenities, if any, can be provided by the BMP.

Assuming that one or more BMP option has been selected, final design can then begin. More detailed information on the specific design methods, maintenance requirements and cost estimating techniques for the BMP option can be found using the summary index (Table 2.1). The reader is also encouraged to refer to each individual BMP chapter during all phases of the design.

SCREENING BMPs BASED ON PHYSICAL SUITABILITY

The first step in choosing a BMP is to identify which BMPs are actually suitable for physical conditions of the site. The two most important physical factors to consider in this assessment are the total contributing watershed area, and the infiltration rate of the soils of the site. Most BMPs can only be applied within relatively narrow ranges of watershed area and soil types. Figure 2.1 shows these ranges in schematic fashion. Solid black bars indicate when these two factors do not pose a problem, and the absence of a bar denotes that the BMP probably should not be applied under the specified condition. In cases where the bar becomes narrow, the BMP may or may not be feasible for the site depending on local design standards, development intensity, or the expected level of future maintenance.

Figure 2.2 presents a matrix that shows whether a BMP is also subject to other physical restrictions. In these cases, a solid dot indicates that the factor is not normally a restriction, whereas an open dot suggests that it is a restriction. In most cases, these restrictions do not necessarily prevent the use of a BMP option, but may affect where a BMP is located on a site, or how it is designed. As a general rule, pond BMPs normally face fewer of these site restrictions than infiltration BMPs.

The nature of each of the physical factors outlined in these screening tools are described below.

Watershed Area Served

Pond BMPs normally require a significant contributing watershed area (greater than ten acres) to ensure proper operation. The lower range of suitability for ponds is set by the minimum orifice size for dry extended detention ponds, or the capacity to maintain water levels in wet ponds and wet extended detention ponds. By way of contrast, infiltration and vegetative BMPs are generally only applicable on sites less than ten acres, due to space, economic or flow velocity constraints.

It should be noted that the contributing area of a site does not always have to be fixed. By creatively using local topography and drainage, site area can be increased or decreased to better accommodate a particular BMP. For example, additional runoff generated away from the site (off-site runoff) can be routed to the BMP, thereby increasing total site area and making pond options more feasible. Conversely, various portions of the total runoff from a site can be routed to individual BMPs (decreasing site area, and making infiltration and vegetative BMPs more practical).

Figure 2.1: Watershed Area and Soil Permeability Restrictions for BMPs

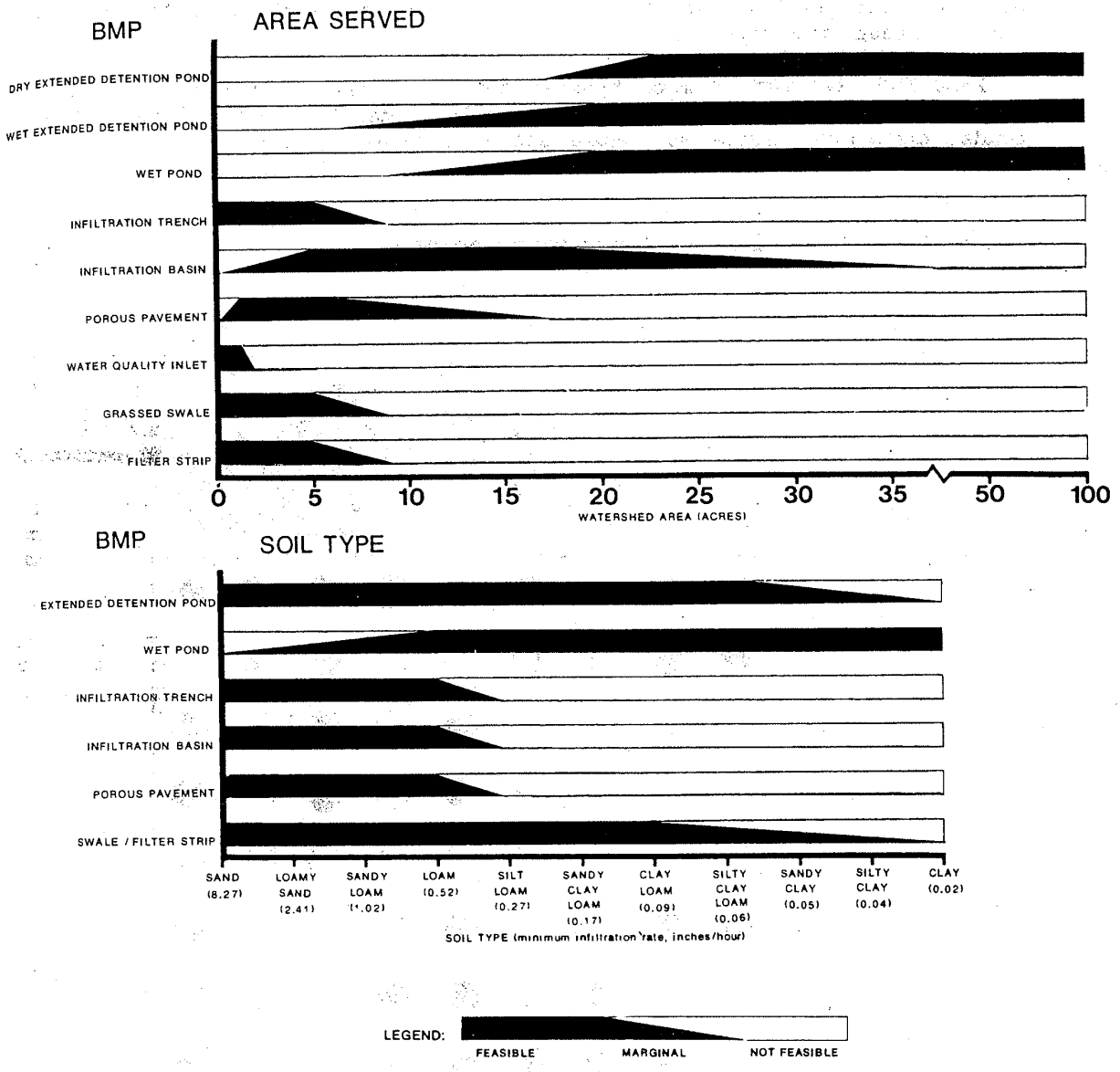

Soil Type

The permeability of the soil underlying a BMP has a profound influence on its effectiveness. This is particularly true for infiltration BMPs, which cannot be applied on sites with soils that have infiltration rates (fc) less than 0.27 inches/hour, as defined by the least permeable layer in the soil profile. This excludes most "C" and "D" soils which cannot exfiltrate enough runoff through the subsoil.

Pond BMPs tolerate a much broader range of soil conditions. Extremely permeable sandy soils may make it difficult to maintain water levels in wet ponds, and clayey soils may cause standing water problems in dry extended detention ponds.

Figure 2.2: Other Common Restrictions on BMPs

BMP	SLOPE	HIGH WATER TABLE	CLOSE TO BEDROCK	PROXIMITY TO FOUNDATIONS	SPACE CONSUMPTION	MAXIMUM DEPTH	RESTRICTED LAND USES	HIGH SEDIMENT INPUT	THERMAL IMPACTS
EXTENDED DETENTION POND	●	●	◑	●	○	●	●	◑	●
WET POND	●	●	◑	●	○	○	●	◑	○
INFILTRATION TRENCH	○	○	○	○	●	○	●	○	●
INFILTRATION BASIN	◑	○	○	◑	◑	○	●	○	●
POROUS PAVEMENT	○	○	○	○	○	○	○	○	●
WATER QUALITY INLET	●	●	○	○	●	○	○	○	●
GRASSED SWALE	○	○	◑	◑	●	●	○	○	●
FILTER STRIP	◑	◑	◑	◑	●	●	◑	○	●

○ MAY PRECLUDE THE USE OF A BMP

◑ CAN BE OVERCOME w/ CAREFUL SITE DESIGN

● GENERALLY NOT A RESTRICTION

Slope

Steep slopes restrict the use of several BMPs. For example, porous pavement and grassed swales must be situated in sites with slopes of 5% or less. Also, infiltration trenches and filter strips are not practical when slopes exceed 20%.

High Water Table

The water table acts as an effective barrier to exfiltration and can sharply reduce the ability of an infiltration BMP to drain properly. If the height of the seasonally high water table extends to within four feet of the bottom of an infiltration BMP, the site is seldom considered suitable.

Close to Bedrock

The downward exfiltration of storm runoff is also impeded if the bedrock layer lies too close to the soil surface. As with a high water table, a close bedrock layer prevents an infiltration BMP from draining properly. Therefore, if the bedrock layer extends to within 2 to 4 feet of the bottom of an infiltration BMP, the site is not feasible. Similarly, pond BMPs are often not feasible if bedrock lies within the area that must be excavated to provide stormwater storage.

Proximity to Foundations and Wells

Since infiltration BMPs divert runoff back into the soil, some sites may experience problems with local seepage. This can be a real problem if the BMP is located too close to a building foundation. Another risk is that the runoff and pollutants diverted into the groundwater may contaminate water supplies. While relatively little research has been performed to evaluate this risk, it is advisable to keep infiltration BMPs located at least 100 feet away from drinking water wells.

Land Consumption

Some sites are so small or so intensively developed that no room is available for BMP options that consume a large amount of space. Pond BMPs and porous pavement both require a large surface area and a generous buffer, and consequently may not fit into extremely tight sites.

Maximum Depth

To preserve storage capacity and provide optimal pollutant removal conditions, infiltration BMPs must be designed to completely drain within 2 to 3 days after a storm. If the infiltration rates of the underlying soils are marginal, the depth of the infiltration facility may be limited. These restrictions vary depending on whether the facility is a trench, basin or porous pavement facility.

Wet ponds are also subject to a maximum depth limit as well. Extremely deep ponds (greater than 8 feet deep) may stratify during the summer and create low oxygen conditions near the bottom of the pond. This in turn, creates the potential for the release of pollutants from the sediments back into the water column.

Restricted Land Uses

Certain BMPs can only be applied to particular land uses, and are not broadly applicable for all development sites. Porous pavement, for example, can only be used for sites with parking lots not expected to receive heavy car or truck traffic. Similarly, grassed swales can only be used in conjunction with low density residential areas or roads.

High Sediment Input

Most BMPs are unable to handle the large loads of sediment eroded during the construction phase of development. Infiltration BMPs are particularly susceptible to rapid clogging and subsequent failure if significant sediment loads are allowed to enter the structure. As a general rule, these BMPs should not be installed until all of the land disturbed by construction in the contributing watershed is effectively stabilized. Contractors must often take unusual steps during the actual installation of the infiltration BMPs to prevent soil compaction or sediment contamination. Although sediment loads drop sharply after the construction phase, gradual clogging of infiltration BMPs can still occur, so many designs call for the use of a pre-treatment device to filter out sediment and other coarse particles before they reach the facility.

Pond BMPs can be used for sediment control during the construction phase of development, with proper conversion, clean-out and regrading. After the site is stabilized, significant amounts of pond storage capacity can still be lost due to the gradual accumulation of deposited sediments. After 5 to 20 years, the sediment deposits are large enough to impair the function of a pond, and must be removed. The cost and scope of sediment removal can be reduced by preventative design, extra storage and/or sediment forebays.

Thermal Enhancement

Shallow marshes and wet ponds warm up rapidly during the summer months. Under certain circumstances, runoff leaving these BMPs can be 5 to 10 degrees warmer than the runoff entering the structure. Such warm water release can be a lethal thermal shock to aquatic organisms that are adapted to coldwater conditions. Thus, the use of wet ponds and shallow marshes should be avoided in watersheds with sensitive coldwater streams.

SCREENING BMPs BASED ON STORMWATER BENEFITS PROVIDED

The objective of stormwater management is to attempt to reproduce the pre-development hydrology of the site. As noted earlier, this can be done through a combination of peak discharge control, volume control, groundwater recharge and streambank erosion control. Figure 2.3 shows the extent to which common BMP designs provide these benefits. A solid dot indicates that the BMP normally provides the benefit; an open dot indicates that it does not; and a half dot suggests that the benefit might be provided in certain sites or with special design modifications. As can be seen, very few BMP options can achieve the full spectrum of desirable stormwater benefits. This is because a different flow condition and/or frequency must be controlled to provide each benefit. As an example, the designer needs to control very large, infrequent storms to attain peak discharge control, yet must concentrate on much smaller and more frequent storms to provide groundwater recharge.

The design variations for infiltration BMPs shown in Figure 2.3 deserve some additional explanation. The term "exfiltration" refers to the amount of runoff that is effectively infiltrated through the soil profile. Full exfiltration occurs when all of the runoff delivered to an infiltration BMP is completely exfiltrated back into the soil. As one might imagine, full exfiltration BMPs need to be very large in volume. Partial exfiltration BMPs only divert a fixed volume of runoff into the soil (the remaining runoff is conveyed through the BMP, but may be detained long enough to provide some peak discharge control). In water quality exfiltration BMPs, a small, fixed runoff volume is diverted into the soil. The remaining runoff is conveyed away, and is not detained long enough to provide any peak discharge control.

Peak Discharge Control

As shown in Figure 2.3, peak discharge control is often required for one or more design storms under local regulations. The most common design storm used is the 2 year storm, which is a flood that occurs, on average, every two years. In natural watersheds, the two year storm produces a flood that fills a stream to the top of its banks (i.e., the bankfull flood). Some jurisdictions also require control of the 10 or 100 year design storms, particularly if there is unprotected development further downstream on the floodplain. Even if a BMP does not control these larger design storms, they must still be designed to safely pass them through (e.g., using an emergency spillway or an overflow pipe).

Peak discharge control is accomplished in pond BMPs by temporarily detaining a large portion of the runoff volume for the design storm, and then releasing it at the lower pre-development rate. This is done by using a vertical riser with a control orifice or weir. A single pond can control a series of design storms by using a series of orifices and weirs at progressively higher elevations. In general, pond BMPs are an excellent means of providing peak discharge control.

Infiltration BMPs have a more limited capacity to control peak discharges. Full exfiltration systems are normally only capable of controlling peak discharges for the 2 year storm (and in rare cases, the 10 year storm). Most partial exfiltration systems can control the 2 and 10 year storm, and pass the 100 year storm. Water quality exfiltration systems, water quality inlets, swales, and filter strips normally have little or no capacity to control peak discharges.

Volume Control

Infiltration BMPs can help to reduce the increased runoff volumes generated from small and intermediate storms, since they divert a significant fraction of storm runoff volume back into the soil. Pond BMPs, on the other hand, are ineffective in reducing runoff volume. Ponds only detain or retain runoff for a short period of time before releasing it downstream.

Figure 2.3: Comparative Stormwater Benefits Provided by Urban BMPs

BMP	PEAK DISCHARGE CONTROL: 2 YEAR STORM	10 YEAR STORM	100 YEAR STORM	VOLUME CONTROL	GROUNDWATER RECHARGE	STREAMBANK EROSION CONTROL
EXTENDED DETENTION						
DRY	●	●	●	○	○	●
DRY w/ MARSH	●	●	●	◑	○	●
WET	●	●	●	○	○	●
WET POND	●	●	●	◑	○	○
INFILTRATION TRENCH						
FULL EXFILTRATION	●	◑	○	●	●	●
PARTIAL EXFILTRATION	●	●	○	●	●	●
WATER QUALITY TRENCH	○	○	○	●	●	●
INFILTRATION BASIN						
FULL EXFILTRATION	●	◑	○	●	●	●
INFILTRATION/DETENTION	●	●	●	●	●	◑
OFF-LINE BASIN	○	○	○	●	●	◑
POROUS PAVEMENT						
FULL EXFILTRATION	●	◑	○	●	●	●
PARTIAL EXFILTRATION	●	●	◑	●	●	◑
WATER QUALITY	○	○	○	●	●	◑
WATER QUALITY INLET	○	○	○	○	○	○
GRASSED SWALE	◑	○	○	◑	◑	○
FILTER STRIP	◑	○	○	◑	◑	○

○ SELDOM OR NEVER PROVIDED
◑ SOMETIMES PROVIDED w/ CAREFUL DESIGN
● USUALLY PROVIDED

Groundwater Recharge

Infiltration BMPs are an excellent means of providing for groundwater recharge, which is often lost as a consequence of watershed development. "Natural" levels of groundwater recharge can be duplicated by diverting a significant fraction of the runoff from frequent small and moderate storms back into the soils. Most exfiltration designs recharge the groundwater sufficiently to sustain normal low flows in headwater streams during the critical summer months. Vegetative BMPs, such as grassed swales and filter strips have a more limited capability, and pond BMPs generally have little or none.

Streambank Erosion Control

All BMPs that control peak discharges for the 2 year storm provide some degree of streambank erosion control. However, the 2 year storm creates an erosive condition in natural channels (i.e., a bankfull discharge). To adequately protect downstream channels, it is necessary to control both the post-development increase in the 2 year bankfull flood and the increased frequency with which it occurs. This normally entails the control of storm events of intermediate size (less than the 2 year storm and greater than the mean storm). Some preliminary design suggestions for minimizing the increased frequency of bankfull flooding are provided in Appendix B. Based on this analysis, it appears that extended detention ponds and some infiltration BMPs can effectively reduce the frequency with which bankfull flooding occurs, if sized properly. Wet ponds (without extended detention), vegetative BMPs, and water quality inlets show little capability in this regard.

SCREENING BMPs BASED ON POLLUTANT REMOVAL BENEFITS

The pollutant removal capability of a BMP is primarily governed by three interrelated factors: 1) the removal mechanisms used, 2) the fraction of the annual runoff volume that is effectively treated, and 3) the nature of the urban pollutant being removed. The designer has a limited ability to control the first two factors, but has no influence on the third.

Figure 2.4 illustrates the comparative pollutant removal capabilities of BMP options. The removal rates shown are inferred from field performance monitoring, laboratory experiments, modeling analyses and theoretical considerations. Due to the inherent uncertainties involved, removal rates are expressed in 20 percent increments. A removal rate has been estimated for several design variations of each BMP. The design variations for each BMP are arrayed in order of increasing fractions of annual runoff volume treated.

As noted earlier, the nature of the pollutant being removed often sets an upper limit on the potential removal rate that can be achieved. From an operational standpoint, pollutants can be said to exist in either particulate or soluble forms, or more commonly, as a mix of both forms (MWCOG, 1987). Particulate pollutants, such as sediment and lead, are relatively easy to remove by common BMP removal mechanisms, including settling and filtering. Soluble pollutants, such as nitrate, phosphate, and some trace metals, are much more difficult to remove. Settling and filtering removal mechanisms have little or no effect, and biological mechanisms, such as uptake by bacteria, algae, rooted aquatic plants or terrestrial vegetation, must be used.

The importance of pollutant form can clearly be seen in Figure 2.4. Most BMPs can achieve an extremely high removal rate for suspended sediment and trace metals that exist largely in particulate forms. Much lower removal rates are generally obtained for total phosphorus, oxygen-demanding materials and total nitrogen, since they typically exist as a mix of particulate and soluble forms.

The following sections summarize the pollutant removal capability of BMPs, with an emphasis on their major removal mechanisms, and design enhancements which can be used to improve their performance.

Extended Detention Ponds

Dry extended detention ponds rely primarily on settling to remove pollutants. Depending on how much and how long runoff is detained, it is possible to achieve moderate or high removal rates for particulate pollutants that are relatively easy to settle. However, removal rates for most soluble pollutants are quite low for dry extended detention ponds, although it is possible to enhance rates by incorporating biological removal mechanisms into the design of the pond (e.g., by establishing a shallow marsh in the bottom stage of a dry extended detention pond, or by using extended detention in combination with a wet pond).

Wet Ponds

Wet ponds have a moderate to high capability of removing most urban pollutants, depending on how large the volume of the permanent pool is in relation to the runoff produced from the surrounding watershed. Wet ponds utilize both settling and biological uptake, and are capable of removing both particulate and soluble pollutants. In addition to increasing the volume of the permanent pool, wet pond removal rates can be enhanced by establishing marshes around the perimeter, and by adjusting the geometry of the pond.

Infiltration Practices (trenches, basins, porous pavement)

From a pollutant removal standpoint, infiltration trenches, basins, and porous pavement behave in a similar manner, and can be treated as a group. Infiltration practices filter runoff through the soil layer, where a number of physical, chemical and biological removal processes occur. Infiltration practices have a moderate to high removal capability for both particulate and soluble urban pollutants, depending how much of the annual runoff volume is effectively exfiltrated through the soil layer. Removal rates can be further enhanced by increasing the surface area reserved for exfiltration and adjusting the geometry of the practice to achieve a draining time of less than 3 days. It should be noted that infiltration practices should <u>not</u> be relied on to achieve high levels of particulate pollutant removal (particularly sediments), since these particles can rapidly clog the device. Rather, particulate pollutants should be removed before they enter the structure by means of a filter strip, sediment trap or other pretreatment device.

Figure 2.4: Comparative Pollutant Removal Of Urban BMP Designs

BMP/design	SUSPENDED SEDIMENT	TOTAL PHOSPHORUS	TOTAL NITROGEN	OXYGEN DEMAND	TRACE METALS	BACTERIA	OVERALL REMOVAL CAPABILITY
EXTENDED DETENTION POND							
DESIGN 1	◕	◔	◔	◔	◑	⊗	MODERATE
DESIGN 2	●	◑	◔	◑	◕	⊗	MODERATE
DESIGN 3	●	◕	◑	◑	◕	⊗	HIGH
WET POND							
DESIGN 4	◕	◑	◔	◔	◔	⊗	MODERATE
DESIGN 5	◕	◑	◔	◔	◕	⊗	MODERATE
DESIGN 6	●	◕	◑	◑	◕	⊗	HIGH
INFILTRATION TRENCH							
DESIGN 7	◕	◑	◑	◕	◕	◕	MODERATE
DESIGN 8	●	◑	◑	◕	●	◕	HIGH
DESIGN 9	●	◕	◕	●	●	●	HIGH
INFILTRATION BASIN							
DESIGN 7	◕	◑	◑	◕	◑	◕	MODERATE
DESIGN 8	●	◑	◑	◕	●	◕	HIGH
DESIGN 9	●	◕	◕	●	●	●	HIGH
POROUS PAVEMENT							
DESIGN 7	◑	◕	◑	◕	◑	◕	MODERATE
DESIGN 8	●	◕	◕	◕	●	●	HIGH
DESIGN 9	●	◕	◕	●	●	●	HIGH
WATER QUALITY INLET							
DESIGN 10	○	⊗	⊗	⊗	⊗	⊗	LOW
FILTER STRIP							
DESIGN 11	◔	○	○	○	◔	⊗	LOW
DESIGN 12	●	◑	◑	◕	●	⊗	MODERATE
GRASSED SWALE							
DESIGN 13	○	○	○	○	○	⊗	LOW
DESIGN 14	◔	◔	◔	◔	○	⊗	LOW

KEY:

- ○ 0 TO 20% REMOVAL
- ◔ 20 TO 40% REMOVAL
- ◑ 40 TO 60% REMOVAL
- ◕ 60 TO 80% REMOVAL
- ● 80 TO 100% REMOVAL
- ⊗ INSUFFICIENT KNOWLEDGE

Design 1: First-flush runoff volume detained for 6-12 hours.
Design 2: Runoff volume produced by 1.0 inch, detained 24 hours.
Design 3: As in Design 2, but with shallow marsh in bottom stage.
Design 4: Permanent pool equal to 0.5 inch storage per impervious acre.
Design 5: Permanent pool equal to 2.5 (Vr); where Vr=mean storm runoff.
Design 6: Permanent pool equal to 4.0 (Vr); approx. 2 weeks retention.
Design 7: Facility exfiltrates first-flush; 0.5 inch runoff/imper. acre.
Design 8: Facility exfiltrates one inch runoff volume per imper. acre.
Design 9: Facility exfiltrates all runoff, up to the 2 year design storm.
Design 10: 400 cubic feet wet storage per impervious acre.
Design 11: 20 foot wide turf strip.
Design 12: 100 foot wide forested strip, with level spreader.
Design 13: High slope swales, with no check dams.
Design 14: Low gradient swales with check dams.

Water Quality Inlets

Current designs of water quality inlets appear to have low to moderate removal rates for particulate pollutants, and low to zero rates for soluble pollutants. Water quality inlets rely primarily on settling for removal, and given their small storage capacity and brief residence times, it is likely that only coarse grit, sand, and some silts will be trapped. Inlets do show some promise in removing hydrocarbons, such as oil, gas and grease, from runoff. Due to resuspension problems, however, pollutant removal can only be attained in water quality inlets if they are cleaned regularly.

Filter Strips

Filter strips have a low to moderate capability of removing pollutants in urban runoff, and exhibit higher removal rates for particulate rather than soluble pollutants. Removal mechanisms include filtering (through vegetation and/or soil), settling/deposition and uptake by vegetation. Forested buffer strips appear to have a higher removal capability than grass buffer strips. However, length, slope and soil permeability are critical factors which influence the effectiveness of any strip. Another practical design problem is how to prevent runoff from concentrating and thereby "short-circuiting" the strip. Special design modifications and regular maintenance are needed to provide optimal removal rates in the field.

Grassed Swales

Grassed swales have a low capability of removing urban pollutants, except under site conditions which are unusual in the Washington metropolitan area (e.g., extremely gentle slopes, permeable and uncompacted soils, installation of check dams and maintenance of a dense grass turf). If constructed under these conditions, pollutants can be removed through the filtering action of the grass, by deposition in low velocity areas, and by exfiltration through the soil layer. Moderate removal of particulate pollutants, and low removal of soluble pollutants can be expected under these optimal conditions.

SCREENING BMPs FOR ENVIRONMENTAL AMENITIES

Figure 2.5 is a screening tool that shows the environmental and human amenities which can be provided by a particular BMP. In most cases, these amenities are not automatically provided when a BMP is built. Rather, they are a result of thoughtful design, regular maintenance, and creative landscape planting. In this matrix, a solid dot indicates that there is a strong potential for a BMP to provide the amenity; an open dot indicates the BMP has little or no potential; and a half dots suggests that a BMP might provide the amenity with some design modifications or as a result of unusual site conditions.

The first five headings in Figure 2.5 refer to amenities related to the improvement of the natural environment, while the last five headings pertain to amenities which are provided to the adjacent community. As might be expected, community amenities are quite subjective, and often adjacent residents hold widely divergent opinions as to their value. However, based on opinion surveys and less formal surveys of complaints to public works officials, some generalities have been made.

Figure 2.5: Environmental and Community Amenities Provided by BMPs

BMP	LOW FLOW MAINTENANCE	STREAMBANK EROSION CONTROL	AQUATIC HABITAT CREATION	WILDLIFE HABITAT CREATION	NO THERMAL ENHANCEMENT	LANDSCAPE ENHANCEMENT	RECREATIONAL BENEFITS	HAZARD REDUCTION	AESTHETICS	COMMUNITY ACCEPTANCE
DRY EXTENDED DETENTION	○	●	◑	●	●	◑	◑	◑	◑	◑
DED DETENTION w/ MARSH	○	●	●	●	○	◑	○	◑	◑	◑
VET EXTENDED DETENTION	○	●	●	●	○	●	●	◑	◑	●
WET POND	○	○	●	●	○	●	●	◑	◑	●
INFILTRATION TRENCH	●	◑	○	○	●	○	○	●	○	●
INFILTRATION BASIN	●	◑	○	●	●	◑	◑	●	○	◑
POROUS PAVEMENT	●	◑	○	○	●	○	○	●	○	●
WATER QUALITY INLET	○	○	○	○	●	○	○	●	○	●
GRASSED SWALE	◑	○	○	◑	●	◑	○	●	◑	●
FILTER STRIP	◑	○	○	●	●	◑	○	●	◑	●
SHALLOW MARSH	○	○	●	●	○	◑	○	◑	◑	◑

○ SELDOM PROVIDED

◑ SOMETIMES PROVIDED (w/ Design Modifications)

● USUALLY PROVIDED

Low Flow Maintenance

Downstream aquatic life can be jeopardized when the natural low flow levels experienced during the summer months decline even further because of reduced infiltration in urbanized watersheds. Infiltration BMPs contribute significantly to groundwater recharge and appear to be capable of sustaining low flows during the critical summer months if widely applied in a watershed. Vegetative BMPs, such as swales and filter strips, appear to have modest potential in this regard, and pond BMPs have little effect in maintaining low flows.

Streambank Erosion Control

Streambank erosion not only contributes large sediment loads to receiving waters, but also has an adverse impact on the habitat quality for downstream aquatic life. Some BMPs, such as extended detention ponds and full exfiltration BMPs, can control erosive stormflows enough to keep downstream channels and banks relatively stable, whereas most other BMPs have only marginal capabilities.

Aquatic Habitat Creation

Some BMP options are attractive in that they can create wetland or open water areas utilized by waterfowl, marsh birds, and other wildlife. Shallow marshes and wet ponds are particularly well suited for this role, if relatively small investments are made in landscaping design and plant selection. "Volunteer" wetland plants may also colonize these BMPs (and poorly drained extended detention ponds) without intentional planting efforts, but may not provide high quality habitat. Tips for enhancing aquatic habitat are presented in the Chapter 4 and the Basin Landscaping Guide (Chapter 9).

Wildlife Habitat Creation

BMPs with generous buffers (wet ponds, extended detention ponds, infiltration basins and filter strips) present good opportunities for creating terrestrial wildlife habitat. The buffer areas (and sometimes the basin floors) can be managed as wet meadows, thus reducing mowing costs for the facility. Relatively diverse biological communities can be further enhanced through judicious planting of trees, shrubs and grasses that provide food and cover for wildlife (see Chapter 9). These communities have added value because of the general scarcity of wildlife habitat in urbanized areas.

No Thermal Enhancement

As noted earlier, wet ponds can be detrimental in some watersheds as they heat water passing through the structure during the summer months. Their use is often restricted in watersheds that contain sensitive coldwater fisheries, such as those that support native trout populations.

Landscape Enhancement

Few BMPs will be an attractive feature of a community unless serious efforts are directed toward natural grading, landscaping and regular maintenance. If properly designed, pond options probably have the most potential to enhance the urban landscape. Wet ponds are frequently used to create a waterfront effect in residential developments, and may actually increase the value of adjacent property. Vegetative BMPs have a less

dramatic effect on landscape values, and most infiltration BMPs and dry extended detention ponds have a neutral or negative effect.

Recreational Benefits

With the exception of large wet ponds, few BMPs provide active recreational opportunities (e.g., fishing, swimming, or skating). In fact most jurisdictions generally do not encourage such activities, as they may invite vandalism or liability problems. However, if properly landscaped, pond BMP options can provide passive recreation opportunities for adjacent residents, such as walking, birdwatching, or nature enjoyment, particularly when combined with bike or jogging paths, picnic areas, and tot-lots situated in nearby open space. In rare instances, the floors of extended detention ponds can even be used for ballfields and play areas.

Hazard Reduction

Careful design of pond BMPs is needed to reduce potential safety hazards. Plans should be analyzed to eliminate obvious hazards, such as steep side-slopes, deep water, sudden drop-offs from the shore, or dangerous outlet/pipe configurations. Most infiltration BMPs entail little if any safety risks, and some (porous pavement) are thought to reduce certain traffic safety problems.

Aesthetic Value

As shown in Figure 2.5, most pond options have the potential to be either an attractive or an unattractive feature of a community, depending on the attention paid to their design, landscaping ,and maintenance. Artificial contours should be avoided, and control structures (risers, low flow channels, outlets and riprap) should be concealed in the embankment, or by vegetation where feasible. Infiltration BMPs generally have little potential to be attractive, but can at least be designed to be unobtrusive.

Community Acceptance

Surveys of resident perceptions about adjacent BMPs have revealed that most BMPs are acceptable if regular cosmetic maintenance is performed. Residents often indicate a preference for wet ponds over dry ponds. Their response to infiltration BMPs is not well documented. Residents' primary concerns often center around perceived nuisance conditions (algae blooms, odors, mosquitos, weeds, trash, turbidity, etc.), most of which are temporary conditions which should seldom occur if the BMP is properly designed and maintained.

HOW TO USE THE SCREENING TOOLS

The following examples provide illustrations of how the screening tools provided in this Chapter are best used.

EXAMPLE 2-1:USE OF THE SCREENING TOOLS

A developer has a 5 acre parcel which will be converted into an office complex and parking lot. The site has low slopes and permeable, sandy loam soils. The management objectives for the site are; 1) 2 year peak discharge control, 2) groundwater recharge, and 3) moderate to high removal of all urban pollutants.

Step 1. Using Figure 2.1 the following BMPs are suitable, given the area and soil characteristics of the site:

1. Infiltration Trench
2. Infiltration Basin
3. Porous Pavement
4. Grassed Swale
5. Filter Strip

After checking the other site restrictions contained in Figure 2.2, and the accompanying text, it is apparent that grassed swales and filter strips are not appropriate, given the proposed high land-use intensity. The remaining BMP options appear feasible, but must have some kind of pretreatment device to protect them from high sediment inputs.

Step 2. Full or partial exfiltration designs of the infiltration BMP options can provide the desired 2 year peak discharge control and groundwater recharge benefits:

1. Infiltration trench
2. Infiltration basin
3. Porous pavement

Step 3. If the infiltration BMPs are sized according to design rules 8 or 9, high levels of pollutant removal can be expected for all of the remaining options (see Figure 2.4).

Step 4. All of the remaining BMP options provide a similar level of environmental amenities (Figure 2.5).

Step 5. A final BMP option can now be selected on the basis of costs or maintenance requirements. Estimation of both can be found elsewhere in the text using Table 2.1.

EXAMPLE 2-2:USE OF THE SCREENING TOOLS

A developer is planning to build a residential subdivision on a 40 acre parcel of land, with moderate slopes (5%) and sandy clay loam soils. Local ordinances require peak discharge control for the 2 and 10 year design storm. In addition, the planning review agency has specified that the BMP should provide a high level of streambank erosion control, and provide a moderate to high level of nutrient removal. Because of the intended character of the residential area, the developer would like the BMP to provide environmental amenities. Using the screening tools, identify the BMP option(s) which are physically suitable for the site, and determine whether they can provide the desired benefits.

Step 1. From Figure 2.1, it is evident that most infiltration BMPs are not feasible because of watershed area and soil permeability restrictions. The remaining options are:

1. Dry extended detention pond
2. Wet extended detention pond
3. Wet pond

Based on Figure 2.2, which shows other common site restrictions for BMPs, it appears that no other insurmountable limitations exist for the use of the BMPs listed above.

Step 2. Using Figure 2.3, it is evident that all these BMPs can control peak discharges from the 2 and 10 year storm. However, only dry and wet extended detention ponds can provide the desired level of streambank erosion control.

Step 3. From a nutrient removal standpoint, dry extended detention (design 3, with marsh) and wet extended detention (design 6) both have the potential to provide high levels of removal (Figure 2.4).

Step 4. As shown in Figure 2.5, both dry extended detention with marsh, and wet extended detention ponds provide several natural environmental amenities, with proper landscaping and maintenance. These include streambank erosion control, and wildlife and aquatic habitat creation. From the standpoint of community amenities, wet extended detention appears to be preferable, as it gets higher marks for landscaping, recreation, and resident acceptance.

Based on the screening tool, and the stated management objectives for the site, the most appropriate BMP would be a wet extended detention pond. Methods for estimating construction costs and maintenance requirements for the BMP can be found by referring to the appropriate section of this manual, as outlined in Table 2.1.

FINAL DESIGN CONSIDERATIONS

Once a BMP has been selected for the site, more detailed design of the facility can begin. As noted earlier, the designer should consider a number of design features that can enhance pollutant removal, reduce maintenance needs and costs, reduce construction costs, and provide desired environmental and community amenities. Table 2.1 provides a summary index on where such design information can be found within this manual.

Tips for Enhancing Pollutant Removal

Each BMP chapter in this manual contains a section that provides a series of design tips to maximize the pollutant removal capability of a BMP. These guidelines include: ways of adjusting the size and geometry of a BMP to create ideal removal conditions; how vegetation can be effectively used to promote biological removal; how optimum detention/draining times can be achieved; and other means of achieving high pollutant removal requirements.

Table 2.1: Summary Index for BMP Design

	TIPS FOR ENHANCING POLLUTANT REMOVAL	MAINTENANCE REQUIREMENTS FOR THE BMP	TIPS FOR REDUCING MAINTENANCE NEEDS	PROJECTING BMP CONSTRUCTION COSTS	DESIGN VARIATIONS FOR THE BMP	DETAILED DESIGN METHODS FOR THE BMP	DESIGN SUMMARIES
EXTENDED DETENTION	3.14	3.21	3.24	3.20	3.2	3.26	3.27
WET PONDS	4.4	4.13	4.15	4.12	4.4	4.20	4.21
INFILTRATION TRENCH	5.15	5.21	5.23	5.18	5.2	5.25	5.26
INFILTRATION BASIN	6.9	6.14	6.15	6.13	6.2	6.17	6.18
POROUS PAVEMENT	7.10	7.17	7.20	7.13	7.2	7.22	7.23
WATER QUALITY INLET	8.5	8.8	8.8	8.8	8.2	8.8	8.9
GRASSED SWALE	9.3	9.6	9.6	9.6	–	9.10	–
FILTER STRIP	9.7	9.9	9.9	9.9	–	9.10	–
SHALLOW MARSH	–	–	–	9.5	–	9.18	–

Common Maintenance Requirements

Both the regular and non-routine maintenance requirements for each BMP are described in detail elsewhere in this manual. Where data is available, estimates of the costs associated with maintenance are provided, as are inspection schedules and methods. Where construction methods are critical to the successful operation of the BMP, recent specifications on materials and workmanship are also provided.

Tips For Reducing Maintenance Needs

Engineers should make maintenance reduction a major element of every BMP design. A significant amount of future maintenance activities and costs can be eliminated through preventative design. Each BMP chapter includes a series of tips which should be carefully reviewed. These include suggestions on how to reduce maintenance needs by providing access, using long-lasting construction materials, trapping sediment inputs, creative use of the geometry of the BMP to make routine maintenance easier, providing backup drainage systems, and proper stabilization of erosion-prone areas.

Projecting BMP Construction Costs

Each BMP chapter presents a method for computing a rapid planning estimate of the construction costs of a BMP. Unit costs for major construction components are provided for infiltration and pond BMPs (see Table 7.4). Cost equations are also provided for a number of BMPs. The cost-effectiveness of each BMP, in relation to watershed size, development intensity, and other BMP options, is also discussed (see also MWCOG, 1983a; Wiegand et al, 1986).

Design Variations

Each BMP chapter begins with a section that describes several variations in the basic design of a BMP. These designs, drawn from applications around the Washington, D.C. area, illustrate innovative ways to fit a BMP into a particular development site and combine BMPs together to improve performance or minimize maintenance needs.

Design Methods

This manual does not provide step-by-step methods for the hydrological design of BMPs, nor does it give specific models or equations that can be used to accurately determine the necessary storage requirements, geometry and configuration of a BMP at a particular site. These technical aids, used for the final BMP design, are provided by reference at the end of each chapter.

Design Summary

Each chapter concludes with a brief design summary that highlights some of the recommended BMP design features that should be included in every site plan. Both the engineering consultant and the site-plan reviewer can use these summaries as a checklist to ensure that the BMP plan for the site will be effective.

CHAPTER 3: EXTENDED DETENTION PONDS

Extending the detention time of dry or wet ponds is an effective, low cost means of removing particulate pollutants and controlling increases in downstream bank erosion. If stormwater is detained for 24 hours or more, as much as 90% removal of particulate pollutants is possible. However, extended detention only slightly reduces levels of soluble phosphorus and nitrogen found in urban runoff. Removal of these pollutants can be enhanced if the normally inundated area of the pond is managed as a shallow marsh or a permanent pool.

Extended detention ponds significantly reduce the frequency of occurrence of erosive floods downstream, depending on the quantity of stormwater detained and the time over which it is released. Extended detention is extremely cost-effective, with construction costs seldom more than 10% above those reported for conventional dry ponds.

Figure 3.1: Schematic of a Dry Extended Detention Pond

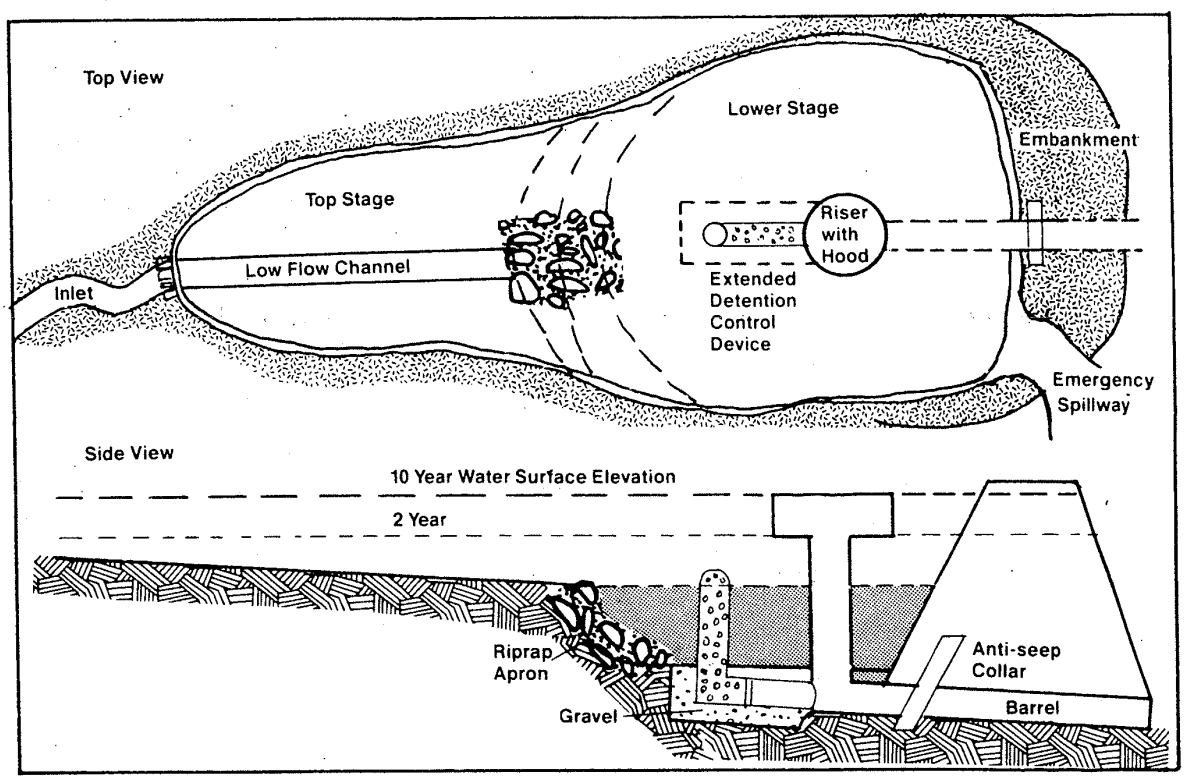

Positive impacts of extended detention ponds include creation of local wetland and wildlife habitat, limited protection of downstream aquatic habitat, and recreational use in the infrequently inundated portion of the pond. Negative impacts include occasional nuisance and aesthetic problems in the inundated portion of the pond (e.g., odor, debris, and weeds), moderate to high routine maintenance requirements, and the eventual need for costly sediment removal. Extended detention generally can be applied in most new development situations, and also is an attractive option for retrofitting existing dry and wet ponds in older urbanized areas.

METHODS USED TO EXTEND DETENTION TIMES

Both wet and dry ponds are easily adapted to achieve extended detention times. A two-stage design is recommended for dry ponds whereby the top portion of the pond is designed to remain dry most of the time, and a smaller portion near the riser is regularly inundated (Figure 3.1). The devices used for extended detention are normally attached to the low flow orifice or the riser. Some frequently used methods to extend detention times in dry and wet ponds are shown in Figures 3.2 and 3.3, respectively, and are described below:

Perforated Riser Enclosed in a Gravel Jacket (dry ponds) [Figure 3.2a]

This experimental design was utilized during the Washington NURP study (MWCOG,1983a). The standard corrugated metal pipe (CMP) riser is perforated with small diameter holes and the normal low flow orifice is closed. The total diameter of all the holes regulates the outflow to achieve the required detention time for all storm events smaller than the two year design storm (which is controlled by the weir on top). A gravel jacket and wire mesh screen are used as a filter to prevent clogging. The perforated riser design has some drawbacks. First, hydraulics of flow through vertical risers are not well defined, which makes it difficult to achieve the target detention time. Second, the bottom portion of the gravel jacket may become clogged over time by deposited sediments.

Perforated Extension of Low Flow Orifice, Inlet Controlled (dry ponds) [Figure 3.2b]

This design is often applied in Northern Virginia (BDET,1986), and entails extending and capping the low flow orifice. Small diameter holes are drilled into the extended PVC pipe, which are protected by 1/4 inch wire mesh, and a layer of gravel and stone. An elbow joint is used to extend the pipe above the surface of the pond to facilitate clean-out operations with high velocity jet hoses. This design should only be considered in areas where regular maintenance clean-outs will be performed, as this device is prone to clogging.

Figure 3.2: Methods For Extending Detention Times in Dry Ponds

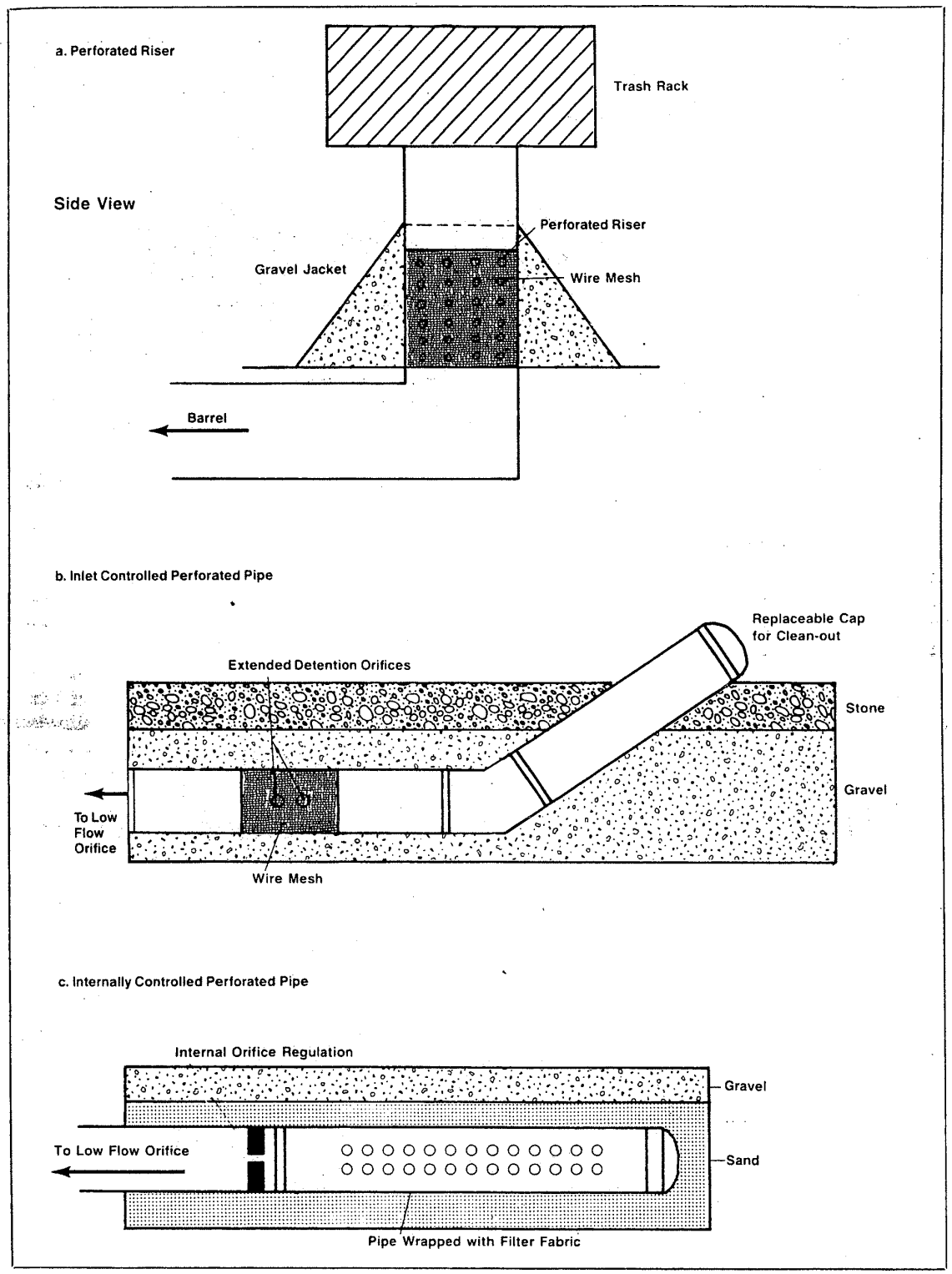

Figure 3.3: Methods For Extending Detention Times In Wet Ponds

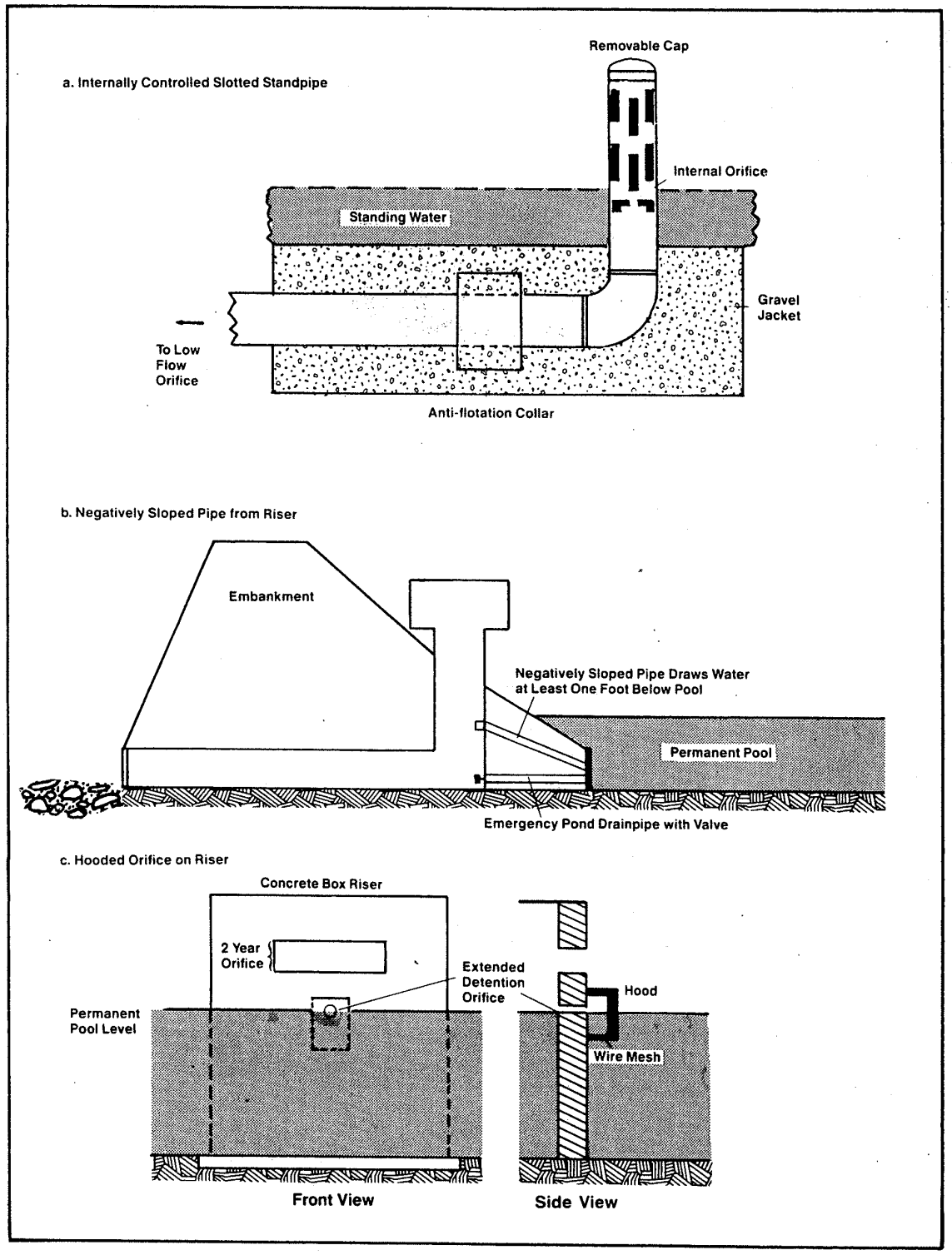

Perforated Extension of Low Flow Orifice, Outlet Control (dry ponds) [Figure 3.2c]

Developed by the Baltimore Dept. of Public Works (DPW), this control device also employs a perforated pipe extended from the low flow orifice. The major difference between this design and the previous design is that the release rate of the pipe is regulated by an internal flange within the pipe, rather than by holes drilled through the pipe. This provides additional protection from clogging, as a large number of holes can be drilled on the outward side of the flange. In the event that sediment partially clogs the gravel/cloth filters or the outside of the perforated pipe itself, enough water can flow through the remaining holes to satisfy the design release.

Slotted Standpipe from Low Flow Orifice, Inlet Control (dry pond, shallow wet pond, or shallow marsh) [Figure 3.3a]

In this Baltimore DPW design, an "L" shaped PVC pipe is attached to the low flow orifice. An orifice plate is located within the PVC pipe which internally controls the release rate. Slots or perforations are all spaced vertically above the orifice plate, so that sediment deposited around the standpipe will not impede the supply of water to the orifice plate.

Negatively Sloped Pipe from Riser (wet ponds or shallow marshes) [Figure 3.3b]

This design was developed in Montgomery County, Maryland to allow for extended detention in wet ponds. The release rate is governed merely by the orifice of the pipe. The risk of clogging is largely eliminated by locating the opening of the pipe at least one foot below the water surface where it is well away from floatable debris. Also, the negative slope of the pipe reduces the chance that debris will be pulled into the opening by suction. As a final defense against clogging, the orifice can be protected by wire mesh.

Hooded Riser (wet ponds) [Figure 3.3c]

In this design, the extended detention orifice is located on the face of the riser near the top of the permanent pool elevation. The orifice is protected by wire mesh and a hood, which prevents floatable debris from clogging the orifice.

EFFECTIVENESS IN STORMWATER CONTROL

Peak Discharge Control

Extended detention ponds are effective in controlling post-development peak discharge rates to the desired pre-development levels for the design storm(s) specified. The optimum level of flood control is achieved when multiple design storms are controlled. Recent modeling analyses suggest that control of both the 2 and 10 year design storm may be sufficient to adequately control the entire spectrum of expected flood frequencies (Md WRA, 1983a). Extended detention ponds are also capable of managing smaller floods that contribute to channel erosion problems that occur more frequently than the annual or two year flood.

Groundwater Recharge

Groundwater recharge in extended detention ponds is limited to the runoff that infiltrates through the pond bottom during the relatively infrequent periods when the pond is inundated. The total volume of recharge is negligible in comparison to that provided by infiltration BMPs.

Volume Control

The post-development increase in the total runoff volume from a site is not significantly changed by extended detention ponds.

Downstream Effects

As with other detention ponds, the desired downstream reduction in peak discharge associated with the two year flood may not be achieved in watersheds if the ponds are randomly sited, due to the location and timing of individual releases (Schueler and Sullivan, 1983; APWA, 1981; NVPDC, 1979). For example, an extended detention pond near the bottom of a watershed may detain stormwater just long enough to coincide with the arrival of the upstream peak, and actually add to the peak discharge at that point. Therefore, it is advisable to perform detailed watershed modeling, such as TR-20 (SCS, 1982), to evaluate the cumulative hydrological impact of ponds on the total watershed hydrograph, and locate ponds and adjust release rates accordingly. Generally, watershed timing problems are not a concern during smaller, more frequent storms because of the low discharge rates of extended detention ponds.

Streambank Erosion Control

Peak-shaving detention ponds have traditionally been thought to reduce the extent of downstream channel erosion when geared to control the two year storm. This belief has its roots in the the early research of Wolman and Leopold which demonstrated that bankfull discharges, that occur on average every 1.5 to 2 years, control the shape and form of natural channels. Many local governments have subsequently adopted stormwater management policies that require the post-development peak discharge for the two year storm be controlled to pre-development levels. However, keeping the post-development two year design storm within the banks is normally not sufficient to prevent downstream bank erosion, since the two year flood is itself an erosive condition.

As noted by Andersen (1970) and Leopold et al (1964), streambank erosion can only be controlled when both the magnitude <u>and</u> frequency of the post-development two year flood are adequately managed. After a watershed is developed, small intense storms can dramatically increase the frequency with which two year bankfull discharges occur. The increased number of bankfull floods, in turn, increases the probability of downstream bank and channel erosion. The higher frequency of bankfull flooding after development can be readily demonstrated using the Rational formula:

(EQ 3.1) $Qp = (C)(i)(A)$

where Qp = instantaneous peak discharge (cfs).
C = runoff coefficient.
i = rainfall intensity for a duration equal to the watershed time of concentration (inches/hour).
A = watershed area (acres).

If Qp is set equal to the 2 year bankfull discharge, A is held constant, and the runoff coefficient is expressed as the ratio of pre- to post-development values, the equation can be rearranged to solve for the minimum rainfall intensity producing the two year flood as a function of watershed development:

(EQ 3.2) $Ia = i / (Cb/Ca)$

where Ia = minimum post-development rainfall intensity that produces bankfull flow.
i = rainfall intensity for the two year storm.
Ca = post-development runoff coefficient.
Cb = pre-development runoff coefficient.

Values for i as a function of C are shown in Table 3.1. As an example, an undeveloped watershed with a 15 minute time of concentration (Tc), will generally experience a two year flood after a 15 minute rainfall depth of about 0.9 inches. However, after the watershed becomes 50% impervious, only 0.2 inches of rain over a 15 minute period are needed to produce the same peak discharge rate.

Table 3.1: Limiting Rainfall Depths (inches) for Different Storm Durations that Produce Bankfull Flow Conditions

Rainfall Intensity for Watershed Time of Concentration (inches/interval)	Runoff Coefficients								
	.1	.2	.3	.4	.5	.6	.7	.8	.9
15 minutes	.88	.44	.30	.22	.18	.15	.13	.11	.10
30 minutes	1.20	.60	.40	.30	.24	.20	.17	.15	.14
45 minutes	1.33	.67	.45	.33	.27	.22	.19	.17	.15
1 hour	1.40	.70	.47	.35	.28	.23	.20	.18	.16
2 hours	1.80	.90	.60	.45	.36	.30	.26	.22	.20
3 hours	1.80	.90	.60	.45	.36	.30	.26	.22	.21
24 hours	3.10	1.55	1.03	.80	.62	.53	.43	.38	.34

Estimating Post-Development Bankfull Flooding Frequency

The number of bankfull floods expected to occur each year under various levels of development can be crudely calculated by solving the Rational formula for individual storms over a long period of time, and recording the frequency that postdevelopment peak discharges equal or exceed the pre-development bankfull discharge level.

Figure 3.4 was constructed in this manner, utilizing a six year record of maximum monthly short-term precipitation intensity values from the Greenbelt, Maryland station (NOAA, 1977-83). The bankfull flooding frequency analysis is described in greater detail in Appendix B. As can be seen in the figure, bankfull discharges normally occur once every two years in undeveloped watersheds (zero imperviousness). At a moderate level of development (25% imperviousness), bankfull floods are predicted to occur about twice a year, on average. Once a watershed becomes completely impervious, bankfull flows are expected to occur on nearly a monthly basis.

Figure 3.4: Increased Frequency of Bankfull Flow Conditions as a Result of Watershed Imperviousness, for Selected Values of Watershed Time of Concentration (Tc)

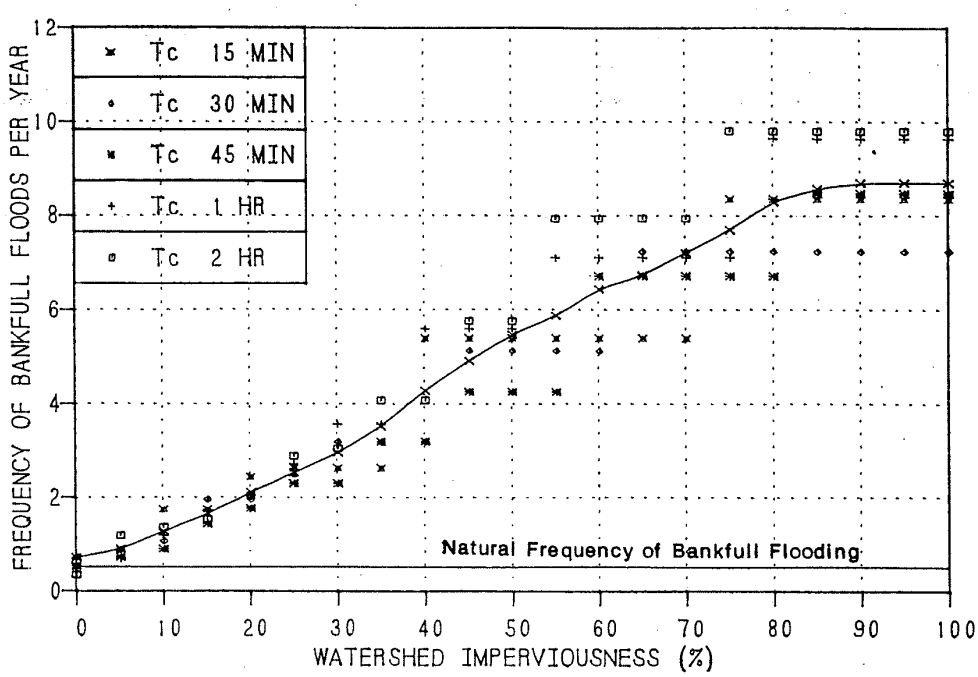

Effect of Extended Detention on Bankfull Flooding Frequency

The net effect of extended detention is to store a fraction of the incoming storm runoff volume and release it later so that it does not materially influence the uncontrolled postdevelopment storm hydrograph. Figure 3.5 shows the estimated effect of extended detention storage on the frequency of bankfull discharge under varying degrees of watershed development. Again, the assumptions and techniques underlying the analysis are described in detail in Appendix B. As shown, the curves suggest that extended detention storage equivalent to the runoff volume produced by a one-inch storm should be capable of reproducing the natural frequency of bankfull flooding, and thus reduce the probability of downstream erosion.

Local governments have developed a number of sizing rules for extended detention; each rule specifies both a volume to be detained and a duration over which this volume is released. Some of the extended detention sizing rules used in the region include:

SIZING RULE 1: A volume equivalent to one-half inch of runoff distributed over the contributing watershed released over a 40 hour period (Montgomery County, Maryland, DEP, 1984a).

SIZING RULE 2: The runoff volume generated from the one year, 24 hour storm be released over a minimum of 24 hours, equivalent to 2.6 inches. (Md WRA, 1985b; Prince Georges County, Maryland, DER, 1984).

SIZING RULE 3: The runoff volume generated from the two year, 24 hour design storm released over 24 hours (about 3.2 inches).

SIZING RULE 4: The runoff volume generated from a one inch storm released over 24 hours.

SIZING RULE 5: A volume equivalent to a land use dependent runoff depth distributed over the contributing watershed, released over a 40 hour period (Chart A: NVPDC, 1980; Fairfax County DEM, 1980).

SIZING RULE 6: The "first flush" runoff volume (i.e., one-half inch per impervious acre) released over 24 hours (Md WRA, 1986b).

Based on the bankfull flooding analysis presented in Appendix B, and shown in Figure 3.5, it is apparent that all of the sizing rules should be capable of reducing bankfull flooding episodes sharply. As might be expected, the sizing rules that specify the greatest detention volume (2 to 5) should be able to reduce bankfull flooding frequencies to at or below natural, pre-development levels.

As a final check, the extended detention release rates from the pond should be evaluated to determine if they are still erosive. A handy procedure (Helfrich, personal communication) is to find the nearest natural channel cross section below the pond, and calculate the discharge rate for the channel running a quarter full, assuming moderate but non-erosive stream velocities (3-5 feet per second). If the extended detention release rate exceeds the calculated discharge for the natural channel, the design detention time should be increased incrementally until the the release rate is smaller than the channel discharge. The procedure is illustrated in example 3-1.

EXAMPLE 3-1: CALCULATING NON-EROSIVE EXTENDED DETENTION RELEASE RATES

Step 1. Determine Average Discharge (cfs) for Extended Detention Release (Qex).

Qex = S/T

where S = detention storage volume (cubic feet).
T = detention time (hours*3600 secs/hour).

Step 2. Determine Discharge For Natural Channel Segment (Qc).

Qc = 0.25 (Xc)(Va)

where Xc = Channel Cross-sectional area (square feet).
Va = permissible velocity (3-5 feet per second).

Step 3. If Qex is greater than Qc, then repeat Steps 1 and 2, using either a longer detention time (T) or a smaller detention storage volume (S), until Qex becomes less than Qc.

Figure 3.5: Effect of Extended Detention Storage on Bankfull Flooding Frequency

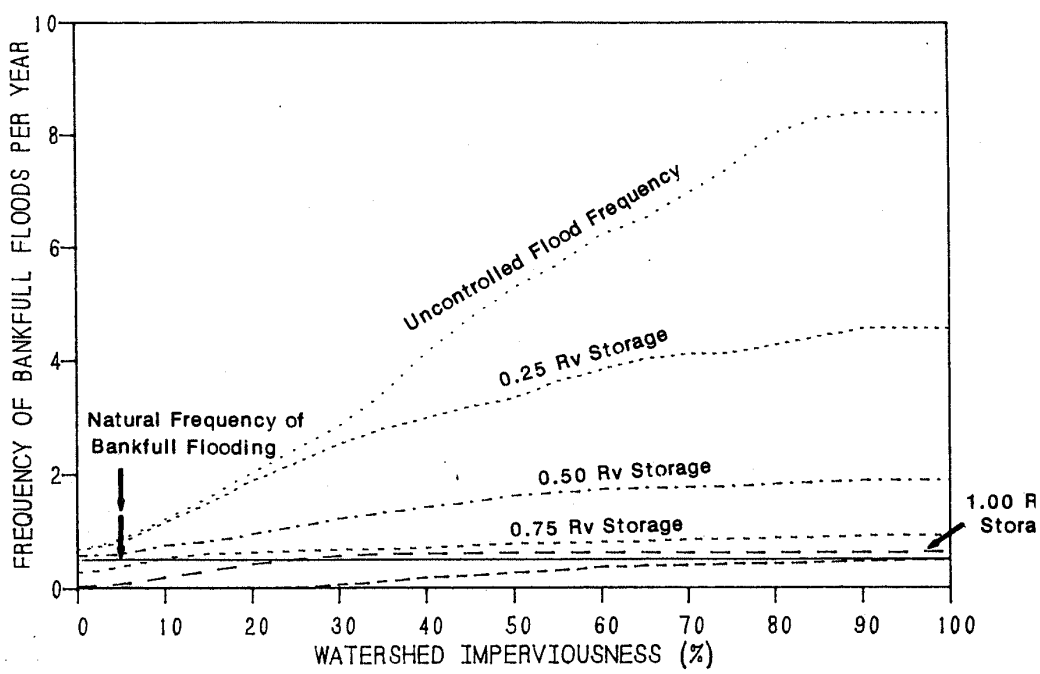

NOTE: Extended detention storage (STOR) equals the volume equivalent to the given rainfall depth times the runoff coefficient.

POLLUTANT REMOVAL

Settling is the primary pollutant removal mechanism associated with extended detention. As such, the degree of removal is dependent on whether a given pollutant is in particulate or soluble form. Removal is likely to be quite high if a pollutant is particulate, whereas very limited removal can be expected for soluble pollutants. Unfortunately, some of the urban pollutants of greatest concern occur primarily in soluble forms (e.g, nitrate and ortho-phosphorus). Removal of these soluble pollutants may be obtained if the lower stage of the extended detention pond is managed as a shallow wetland to utilize natural biological removal processes.

Settling Behavior of Urban Pollutants

The settling behavior of urban pollutants has been evaluated in a series of laboratory and field studies. Grizzard et al. (1986), Driscoll (1986), and Whipple and Hunter (1981) have utilized experimental settling column data to assess pollutant settling behavior over time. In each study, urban runoff was introduced into four to six foot deep plexiglass chambers and the change in pollutant concentration over time was measured at sampling ports located at different depths on the column. In addition, the long term pollutant removal performance of two extended detention ponds have been evaluated in local field monitoring efforts. During the Washington NURP study (MWCOG, 1983b) a dry pond (Stedwick) in Montgomery County, Maryland was modified to achieve 6-12 hours of extended detention, and monitored over a 18 month period. Interim results are also available for an extended detention pond (London Commons) monitored in suburban Northern Virginia (OWML, 1986a). Together, these studies provide a basis for estimating the detention time needed to obtain maximum possible removal for specific pollutants of interest listed below.

SEDIMENT

The settling column experiments indicated that 60-70% of urban sediments settle out within the first six hours. The remaining sediment may take as much as 2 days to settle out (Figure 3.6). Maximum removal rates after 48 hours of detention ranged from 80-90%. The rather slow sediment settling rates are primarily due to the very fine-grained particle distribution of sediment in urban runoff (OWML, 1983). Washington NURP field monitoring at the Stedwick extended detention pond generally supports the lab measurements. The pond was estimated to remove 65% of incoming sediment over the long term (MWCOG, 1983a), which is similar to the 6-12 hour removal rate reported in the settling column study (Figure 3.7). An average storm removal of approximately 65% was also reported for the London Commons pond (OWML, 1986a), which also experienced relatively brief detention times (estimated at 6-12 hours).

PHOSPHORUS

Both settling column studies indicated a maximum upper limit of about 40-50% removal for total phosphorus after 48 hours, with most of the removal occurring within the first 6 to 12 hours. The upper limit for phosphorus removal by settling is due to the fact that soluble forms comprise over half of all phosphorus found in urban runoff (Chapter 1). Nearly all the particulate phosphorus settled out in the OWML experiments, accounting for the majority of observed removal. In addition, a small fraction of soluble phosphorus adsorbed to sediment and eventually settled out during the experiments.

The field studies showed variable performance in removing phosphorus. Less than 15% of total phosphorus was removed at the Stedwick site over the long-term; whereas, initial results at the London Commons site indicated much higher average (70%) total phosphorus removal (OWML, 1986a). However, it is very likely that the long-term total phosphorus removal at the site is much lower, since very low (or even negative) removal rates were reported for larger storms. Resuspension of total phosphorus was cited as the likely cause.

NITROGEN

In the OWML (1983) settling column experiments, the upper limit on nitrogen removal achieved after 48 hours of detention was about 40%. Again, this is due to the predominance of soluble forms of nitrogen that comprise about 70-80% of the total nitrogen found in the Washington, D.C. area urban runoff (NVPDC, 1983). Field studies at the Stedwick extended detention pond suggested a long-term total nitrogen removal rate of about 25%, which compares well with the lab studies (Figure 3.7). Almost all of the particulate nitrogen settled out from the pond, but only limited settling of soluble nitrogen forms was reported. A higher average storm removal of total nitrogen was reported (52%) at the London Commons site (OWML, 1986a), although the long-term removal rates may not be as high.

Figure 3.6: Removal Rate vs. Detention Time For Selected Pollutants

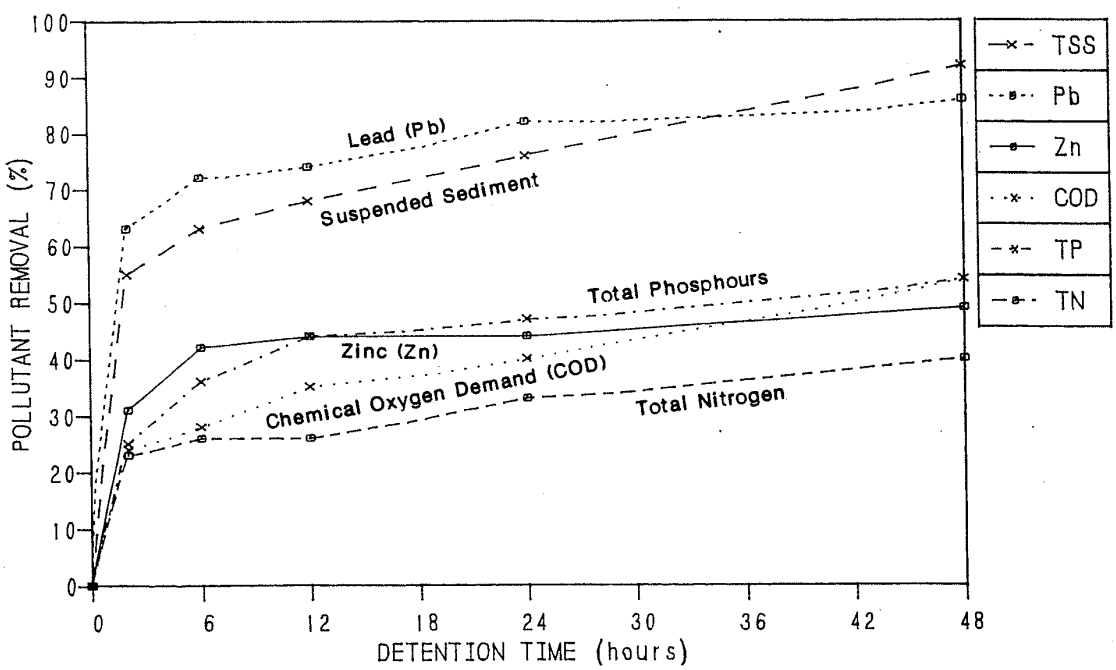

NOTE: Based on OWML (1983) settling column data. Average values for seven tests. Removal equivalent to 4 feet of settling.

Figure 3.7: Urban Pollutant Removal After 6 to 12 Hours Detention Time Comparison of Lab Studies and Field Measurements

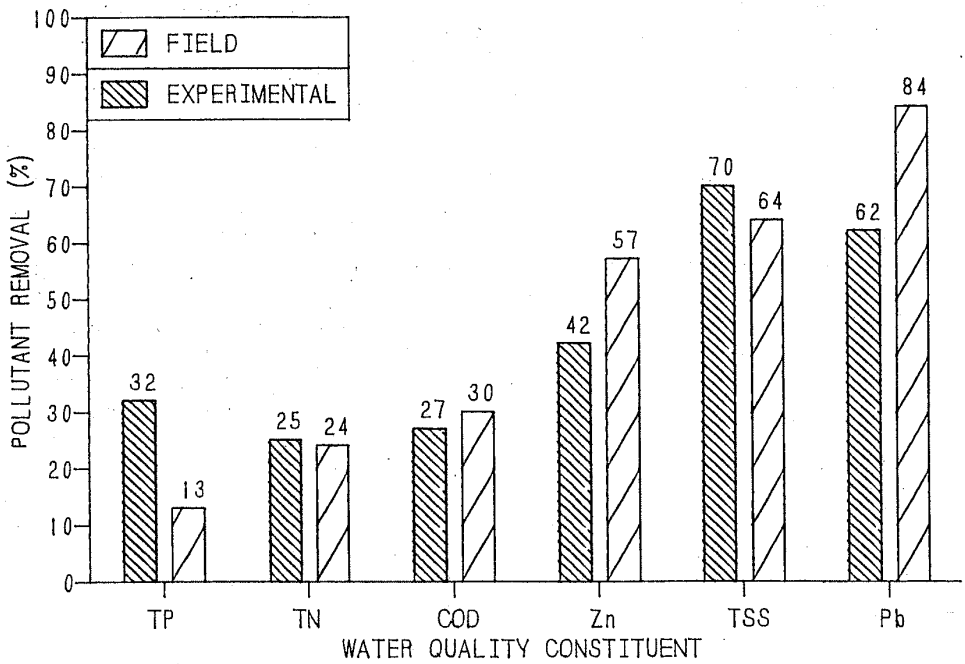

ORGANIC MATTER

Organic matter, as measured by BOD in Whipple and Hunter (1981) and COD in OWML (1983), exhibited similar settling behavior in the column tests. Average maximum removal after 32 and 48 hours, respectively, was about 40-50%. Organic matter exhibited rapid settling rates over the first 6-8 hours, followed by gradual but steady removal thereafter. Long-term COD removal rates at the Stedwick site were on the order of 30%, which compare favorably to the six-hour detention removals observed in the lab (Figure 3.7).

TRACE METALS

Settling of most trace metals in the column tests was initially quite rapid. Lead, which has a close affinity with suspended sediment, exhibited essentially similar settling behavior (Figure 3.6) (Whipple and Hunter, 1981). Maximum average removal after 48 hours was greater than 90%, with about two-thirds of the settlement occurring within the first six hours. Long-term lead removal measured in the field was even greater, with 84% removal recorded after the first 6 hours. Maximum removal of zinc was much lower, averaging about 50% in the OWML experiments and about 30% in Whipple's. Unlike lead, most of the zinc (<70%) in urban runoff is in soluble form (NVPDC, 1983). However, a significant portion of the soluble zinc appears to adsorb to sediment particles and settle out of the water column. This appeared to be the case at the Stedwick site, where long-term removal rates were estimated to be near 60%, despite the fact that less than 20% of the incoming zinc was in particulate form at the site.

OTHER POLLUTANTS

Whipple and Hunter (1981) noted an order of magnitude reduction in bacterial counts after 32 hours of detention. Also, about 60-70% removal of hydrocarbons was reported over the same interval.

Additional Removal by Biological Means

Biological removal of soluble pollutants can be achieved by creating artificial wetlands in the lower stage of a dry extended detention pond. Marsh plants, algae and bacteria that grow on the shallow, organic rich sediments can take up soluble forms of nutrients needed for their growth. Also, the marsh sediments are an excellent substrate for pollutant sorption. The degree of pollutant removal attained in shallow wetlands is uncertain, but appears to be dependent on the size of the wetland in relation to pollutant load delivered to it (Nichols, 1983). Removal varies seasonally, with the most removal during the growing season, and the least removal occurring in the late fall and winter after the plants have died back.

Wetlands can sometimes become a net source of nutrients in the fall and winter months, as nutrients stored in above-ground plant tissue are "pumped out" to the water column during senescence. Indeed, the only permanent sinks for pollutants in an artificial marsh are gradual burial in the sediments, harvesting, and occasional episodes of denitrification. However, even though much of the incoming nutrient load may only be temporarily stored in wetlands, the nutrients are released at a time of the year when they will have the least direct impact on receiving waters.

DESIGN TIPS FOR ENHANCING POLLUTANT REMOVAL

Detention Time

For water quality purposes, detention times of at least 24 hours are probably necessary to achieve maximum removal of most pollutants. While most of the settling occurs within the first 12 hours in the settling column experiments, it is advisable to provide further detention since several hours may be needed before ideal settling conditions develop in a pond. Slightly longer detention times may be needed for downstream channel erosion control if indicated by the method outlined in Example 3-1 (Helfrich, personal communication).

Achieving Adequate Detention For All Storms

One of the most difficult problems in extended detention design involves sizing the control device so that it provides adequate detention time for the entire spectrum of storms. For example, if an extended detention pond is designed to store and release the one-year storm over a 24 hour period, storms smaller than the one year storm event will pass through the orifice much more rapidly, and in some cases, may only have an average detention time of a few hours. Unfortunately, small storms deliver a majority of the annual runoff volume to the pond (Figure 3.8). As a result, the annual pollutant removal of the extended detention pond may be reduced if the small storms are not adequately detained.

Therefore, it is recommended that the pond designer perform several storage routing calculations (TR-20 method or equivalent) to determine the

approximate detention time for the smaller, more frequent runoff events. Grizzard et al. (1986) suggest that as a target the average detention time in the pond should be 24 hours for the entire spectrum of storms each year. This can be done if the maximum detention time for the maximum detention volume is about 40 hours. Figure 3.8, which shows the approximate size distribution of storm runoff events in the Washington, D.C. area for moderately developed small watersheds, can be used to estimate inflow hydrographs for small storms for the routing calculations (i.e., the runoff volumes can be converted to SCS Triangular Unit Hydrographs using the methods outlined in Appendix B).

As a general rule, it is recommended that the average detention time for small runoff events (0.1-0.2 inches) should be no less than six hours.

Figure 3.8: Frequency Distribution Of Runoff Events in Moderately Developed Watersheds

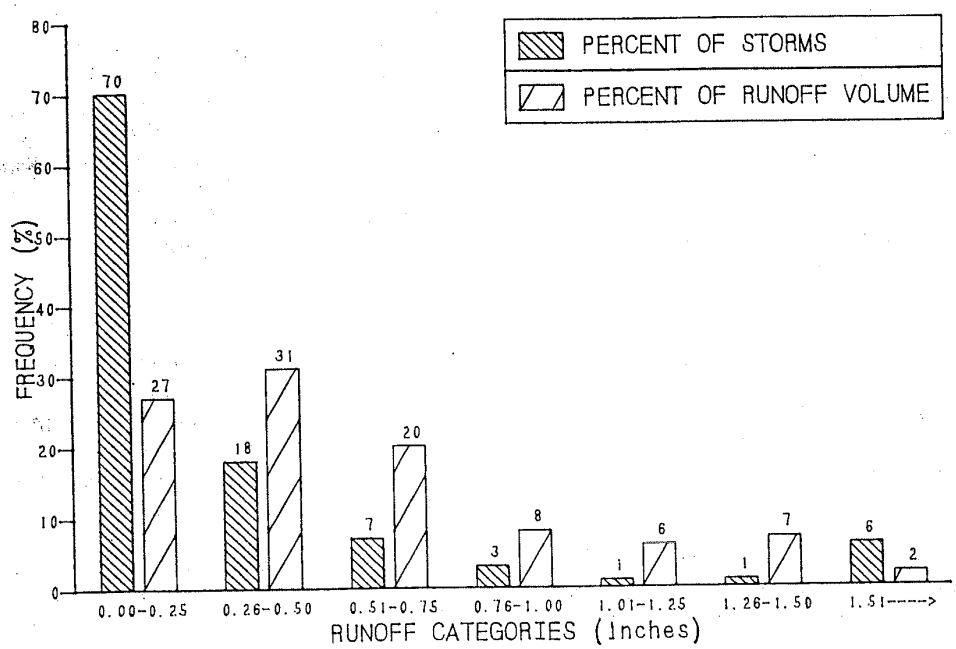

NOTE: Based on Washington D.C. metropolitan area data; 300 storms, seven sites, I=10-30%.

Quantity Detained

The amount of runoff detained heavily influences the pollutant removal performance of an extended detention pond. Incoming runoff is only partially treated if a storm exceeds the detention storage volume provided in the pond. At a minimum, extended detention ponds should be sized to accommodate the runoff produced by the mean storm, and preferably should be capable of storing the runoff volume of a one-inch storm. However, in many cases, the stricter storage requirements recommended above for streambank erosion control (1.0-1.5 inches * Rv) will govern how much extra detention storage is needed.

Pond Shape: Two Stage Design

A two stage extended detention pond is recommended to improve pollutant removal and reduce maintenance requirements. Basically, the upper stage of the pond is intended to be dry except during large infrequent storms, whereas the lower stage is sized to accept regular inundation. As a general rule, the lower stage should have a minimum volume equivalent to:

(EQ 3.3) $$Volb = [(Rm)(Rv)/12]\ (A)$$

where Volb = volume of bottom stage (acre-feet).
Rm = volume of mean storm (0.4 to 0.5 inches).
Rv = rainfall/runoff coefficient (see Chapter 1).
A = area of contributing watershed (acres).

The lower stage volume will be the site of the bulk of the pollutant removal, as it will normally handle about 50-90% of storms in a given year (see Figure 3.8). Care must be taken to prevent the resuspension of previously deposited materials in the lower stage. This can be done by creating an artificial wetland to stabilize the bottom sediments, or by modifying the extended detention control to create a permanent pool. The risk of resuspending pollutants can be further minimized by installing a riprap apron or gabion baffle between the the pilot channel of the upper stage and the bottom of the lower stage. The two stage design (Figure 3.1) helps to reduce the velocity of runoff as it enters the lower stage, prevents concentrated flows from scouring or resuspending deposited sediments, and improves the overall settling characteristics of the lower stage.

Marsh Establishment

Wetland vegetation in the lower stage of an extended detention pond enhances removal of soluble nutrients and has several other benefits as well. Emergent marsh plants such as three-square, sedges, spatterdock, switchgrass and bulrush provide an attractive habitat for both wildlife and waterfowl, enhance sediment trapping, prevent sediment resuspension, and conceal trash and debris that normally accumulate near the riser.

Studies of the capacity of wetlands to assimilate wastewater indicate that they perform best when exposed to relatively dilute nutrient loads. Nichols (1983) presents summary data from many sites around the nation that suggests that maximum levels of nutrient removal can be achieved if loadings do not exceed 45 pounds of phosphorus or 225 pounds of nitrogen per surface wetland acre per year. Until more accurate criteria are developed from ongoing research on actual extended detention wetlands, these guidelines may be used to size artificial wetlands (see example 3-2).

Guidance on the methods for propagating and managing artificial wetlands is presented in detail in Chapter 9. The inlet-controlled slotted standpipe (Figure 3.3a). is probably the best control device for creating shallow wetlands in extended detention ponds because it can regulate water levels within the lower stage, and also maintain target detention times even when partially clogged.

EXAMPLE 3-2: DETERMINING THE FEASIBILITY OF USING A WETLAND TO AUGMENT EXTENDED DETENTION POLLUTANT REMOVAL

Given a 30 acre, 35% impervious townhouse development in a watershed that drains to an extended detention dry pond, calculate the volume of the lower stage of the pond and assess the feasibility of using the lower stage as an artificial wetland to augment pollutant removal:

STEP 1. The volume of the lower stage is equal to:
[(Rm)(Rv)/12](A) (Equation 3.3)
[(0.45)(0.36)/12](30) = 0.4 acre-feet.

STEP 2. The annual nutrient load to the lower stage is given by:
[(P)(Pj)(Rv)/12](C)(A)(2.72) (Equation 1.1)

for N = [(40)(0.9)(.36)/12](2.00)(2.72)(30) = 176 lbs/yr
for P = [(40)(0.9)(.36)/12](0.26)(2.72)(30) = 23 lbs/yr

STEP 3. Assume that the lower stage will be six inches deep to promote optimum wetland conditions. The area of the bottom stage is then: (0.4)/(0.5) = 0.8 acres

The average annual loading per wetland acre is:

(176)/(0.8)= 220 lbs/acre/yr of nitrogen
(23)/(0.8) = 29 lbs/acre/yr of phosphorus

STEP 4. Since the average annual wetland loading is below the recommended limits of 225 lbs/acre and 45 lbs/acre of N and P, respectively, the 0.8 acre artificial wetland should be large enough to provide significant pollutant removal.

Pilot Channels

Erosion will often occur within the low flow channel through the upper stage of an extended detention pond, unless it is stabilized by riprap. The lack of channel protection within the pond can actually make a pond a net sediment source (Schaefer, 1986; MWCOG, 1983b). However, pollutant removal is impaired if the pilot channel extends all the way through the lower stage to the riser, as sediment and other pollutants are often deposited on the pilot channel and can be subsequently resuspended. Optimally, in a two stage pond design, the stabilized low flow channel should extend to the lip of the lower stage of the pond.

Pond Slopes

The slopes leading to the pond should be gentle enough to prevent gully erosion of the banks during larger storms. Most local SWM guidelines suggest that side-slopes be no greater than 3:1 (h:v), and preferably flatter. Banks steeper than 2:1 (h:v) should be stabilized with riprap to prevent erosion. Gentle slopes make routine mowing of the banks easier and safer, allow easier pond access and are preferred by wildlife and waterfowl (Adams et al., 1983). The slope of the upper stage of an extended detention pond should be between 2 and 5% to promote rapid drainage.

Inlet and Outlet Protection

The stream channel immediately below the pond outlet should be lined with large stone riprap and graded to a slope of approximately 0.5% (MNCPPC, 1984) to prevent scouring during large storm events. A layer of filter cloth should be laid down that conforms to the natural dimensions of the channel, and then anchored with 18-30 inch stone riprap. Smaller sized riprap (9-12 inches) can be used if the diameter of the pipe outfall is less than 24 inches. Stilling basins can also be helpful in reducing the runoff velocity from the pond.

The invert elevation for inlet pipes should be as close to the surface of the upper stage as feasible. The outfall pipe should discharge at the bottom of the embankment directly to the outflow channel. Pipes that discharge above this level may cause erosion and undercutting of the embankment.

PHYSICAL SUITABILITY AT THE SITE LEVEL

Minimum Drainage Area

Dry extended detention ponds can theoretically be applied even on very small development sites (less than 10 acres). However, in practice, extended detention ponds are constrained by the minimum orifice diameter of the control device. Figure 3.9 shows the number of half-inch diameter holes needed to achieve desired detention times as a function of watershed size for each of the extended detention sizing rules outlined earlier (see EQ 3.4). As the example shows, less than ten half-inch diameter holes are needed in small watersheds under most of the sizing rules.

The minimum acceptable size for an orifice should be based on the engineer's confidence that it can remain unobstructed under realistic levels of future maintenance, given the kind of control device and the measures used to protect it against clogging. Under most current designs and maintenance programs, it is doubtful that control devices will function properly for long, if only a few half inch holes are used. As a result, several jurisdictions do not encourage dry extended detention on sites less tha n twenty acres in size.

Wet extended detention ponds often require larger drainage areas, as well. The larger area, however, is needed to maintain the permanent pool level rather than to prevent clogging (as wet extended detention ponds utilize submerged orifices that are not as susceptible to clogging (see Chapter 4).

Soils

While basin soils seldom prevent the application of extended detention, they should be checked when designing a pond. If soils are relatively impermeable (D soils), it is likely that a dry extended detention pond will experience problems with standing water. Conversely, if soils are very permeable (A soils) it will be difficult to establish an artificial wetland on the site.

Figure 3.9: Number of Extended Detention Orifice Holes (1/2 inch diameter) as a Function of Watershed Size. Assume H=3, and I=20%

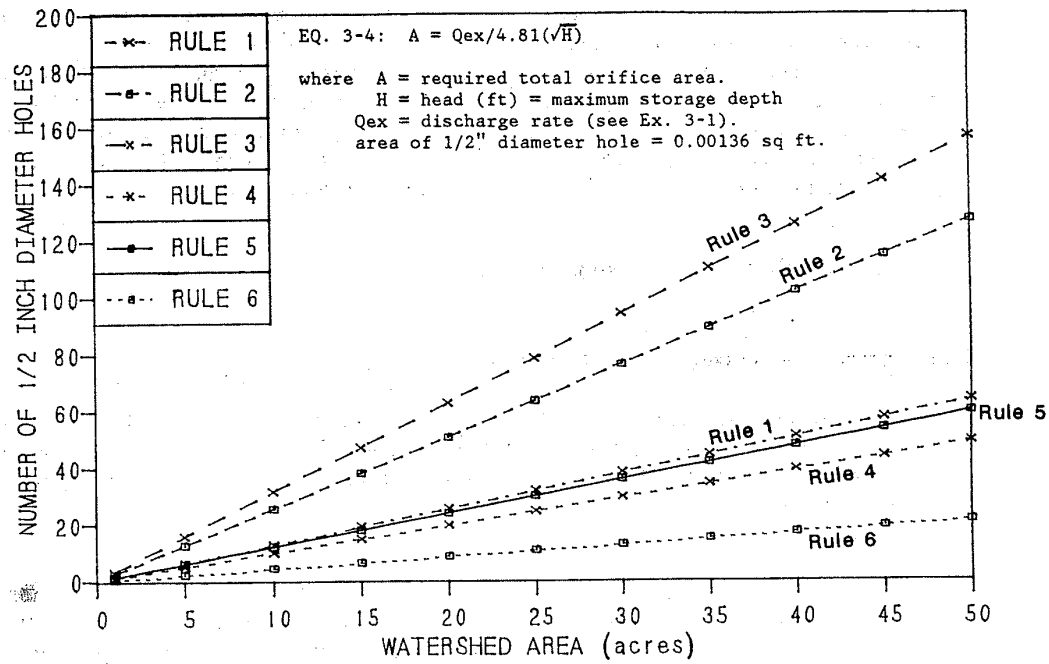

Depth to Bedrock

If the bedrock layer lies close to the surface of the soil, it may become too difficult or expensive to excavate needed storage for an extended detention pond. Soil maps should be consulted, and soil borings need to be taken to confirm that no bedrock needs to be excavated.

Land Requirements

Extended detention ponds are not always feasible at sites where land costs or space are at a premium. This is particularly true when shallow artificial wetlands are used in combination with extended detention on small, heavily developed sites. In some cases, the shallow wetland pond and its buffer can consume as much as 10% of the site area. Normally, however, the space required for extended detention is less than 5% of the total site area.

Utility Relocation

Most utility companies will not allow existing underground pipes to be submerged under a permanent pool of water, as this can lead to infiltration/inflow problems and make maintenance efforts extremely difficult. Therefore, if wet extended detention with shallow marshes are to be used, the site designers should check to see if the pool area will cross any utility right of ways.

Wetland Permits

Often, the best place to put a pond on a site is in low marshy areas and natural depressions. Unfortunately, these areas are often classified as freshwater wetland habitat, and as such, may be protected under state or federal wetland laws. It is important to note that many wetland habitats are not easy to identify. The designer should consult local wetland maps and wetland permitting agencies to determine if the area has wetland status. If so, permits must be secured. See Herson et al. (1987) for a summary of local wetland requirements and the permitting process.

EXTENDED DETENTION POND COSTS

Predicting Extended Detention Pond Costs

A planning estimate of the base construction cost for a dry extended detention pond with greater than 10,000 cubic feet of storage can be approximated using the dry pond cost equation developed by MWCOG (Wiegand et al., 1986):

(EQ 3.5) $C = 10.71Vs^{0.69}$

where C = construction cost in 1985 dollars.
Vs = volume of storage (cubic feet) of the pond up to the crest of the emergency spillway.

As an example, if a dry extended detention pond is designed to have a total storage volume of 50,000 cubic feet (cf), the estimated construction cost for the BMP would be 10.7 (50,000)**0.69 or about $ 18,700. The actual cost will vary around this value, depending on the degree of excavation required. Costs can be significantly lower if natural depressions and topography are creatively used to reduce excavation requirements. The equation only estimates the labor and material costs involved in extended detention pond construction. It is recommended that about 25% should be added to estimate the extra "contingency" costs involved in designing the pond, securing the necessary permits, and overseeing construction. Therefore, the total construction cost of the dry extended detention pond in the example above would be 1.25 times $18,700 or approximately $23,400.

Generally, the extra storage needed for dry extended detention can easily fit within the much larger stormwater storage volume reserved in the pond for the 2 and 10 year storm, particularly if extra freeboard is available. An analysis of the incremental costs associated with modifying dry ponds for extended detention indicated that the extra storage volume and outlet modifications averaged about 10% more than the normal cost of constructing a existing dry pond (MWCOG, 1983a). The total incremental cost to modify a dry pond for extended detention seldom exceeds $2000 (Stack, 1987; MWCOG, 1983a).

Cost-Effectiveness

Extended detention ponds are the least cost urban BMP available that can both remove pollutants and control stormwater. While they are a cost-effective option for any sized development, economies of scale make dry extended detention ponds particularly attractive in moderate to large development areas (50 acres and above).

Creating an artificial wetland (or preserving a natural wetland) in the lower stage of a dry extended detention pond does not increase construction costs substantially. The total cost of grading the lower stage and purchasing/planting wetland stock should be less than $5,000 in most cases (Athanas, personal communication). Maintenance cost savings are realized when wetlands are created in the form of reduced mowing costs (i.e., a large and often soggy portion of the pond need not be mowed) and reduced length of costly pilot channels.

Over 3000 conventional dry ponds have been built throughout the Washington, D.C. metropolitan area since the early 1970s (MWCOG, 1985). Given the relative ease and low cost involved in modifying existing dry ponds to achieve extended detention, these ponds are ideal candidates for urban retrofit programs. Conversion of dry ponds presents a cost-effective opportunity to improve water quality in older, urbanized areas. Local governments, in some cases, may require a developer to convert an existing dry pond to compensate for not meeting stormwater quantity and/or quality requirements at a new development site, or alternately, fund a conversion program out of revenues collected from stormwater waiver fees.

MAINTENANCE REQUIREMENTS

Extended detention ponds have moderate to high maintenance requirements, depending on the extent to which future maintenance needs are anticipated during the design stage. Responsibilities for both routine and non-routine maintenance tasks need to be clearly understood and enforced. If regular maintenance and inspections are not undertaken, the pond will not achieve its intended purpose. For example, in two recent surveys, 40-50% of conventional dry ponds built in suburban Maryland were found to be structurally unsatisfactory as a result of poor or no maintenance (Geiss et al., 1984; Md WRA, 1986a). The basic elements of a dry extended detention pond maintenance program are described below.

Routine Maintenance

MOWING

The upper stage, side-slopes, embankment and emergency spillway of an extended detention dry pond must be mowed at least twice a year to discourage woody growth and control weeds. More frequent mowing may be required in residential areas by adjacent home-owners. This usually entails about 14 mowings annually, and constitutes the largest routine maintenance expense. Soggy conditions can make mowing costly and difficult within the pond unless a two-stage design is used. The use of native or introduced grasses which are water-tolerant, hardy and slow-growing are recommended. Some representative species, such as K-31 Tall Fescue, Crown Vetch, and Switchgrass are listed in the basin landscaping guide provided in Chapter 9 (see also Table 51 in Md SCS, 1983).

INSPECTIONS

Ponds should be inspected on an annual basis to ensure that the structure operates in the manner originally intended. When possible, inspections should be conducted during wet weather to determine if the pond is meeting the targeted detention times. In particular, the extended detention control device should be regularly inspected for evidence of clogging, or conversely, for too rapid a release. The upper stage pilot channel, and the flow path to

the lower stage should be checked for erosion problems. Other problems which should be checked for include: subsidence, erosion, cracking or tree growth on the embankment; the condition of the emergency spillway; the accumulation of sediment around the riser; the adequacy of upstream/downstream channel erosion control measures; erosion of the pond's bed and banks; and modifications to the pond or its contributing watershed that may influence pond performance. Inspections should be carried out with as-built pond plans in hand.

DEBRIS AND LITTER REMOVAL

Debris and litter will accumulate near the extended detention control device and should be removed during regular mowing operations. Particular attention should be paid to floatable debris that can eventually clog the control device or riser.

EROSION CONTROL

The pond side-slopes, emergency spillway and embankment all may periodically suffer from slumping and erosion, although this should not occur often if the soils are properly compacted during construction. Regrading and revegetation may be required to correct the problems. Similarly, the riprap that connects the pilot channel of the upper stage with the lower stage may periodically need to be regrouted or repaired.

NUISANCE CONTROL

Standing water or soggy conditions within the lower stage of an extended detention pond can create nuisance conditions for nearby residents. Odors, mosquitos, weeds and litter are all occasionally perceived to be problems in dry ponds (Adams et al., 1983). Most of these problems are generally a sign that regular inspections and maintenance are not being performed (e.g., mowing, debris removal, clearing the extended detention control device). Nuisance problems can be concentrated into the lower stage if a two stage design is used. Also, wetland plants established in the lower stage can harbor birds and predacious insects that serve as a natural check on mosquitos, and will also conceal trash and debris.

Non-Routine Maintenance

STRUCTURAL REPAIRS AND REPLACEMENT

Eventually, the various inlet/outlet and riser works in a pond will deteriorate and must be replaced. Some local public works experts have estimated that corrugated metal pipe (CMP) has a useful life of about 25 years, whereas reinforced concrete barrels and risers may last from 50 to 75 years (MNCPPC, 1985). No stormwater management ponds have been in the ground for more than twenty years in the Washington region, and as a result, there is not much local experience in this area. However, since the various water works constitute about 25% of the initial construction cost (Wiegand et al., 1986), their replacement will be a significant future expense.

SEDIMENT REMOVAL

When properly designed, dry extended detention ponds will accumulate significant quantities of sediment over time. Sediment accumulation is a serious maintenance concern in dry extended detention ponds for several

reasons. First, the sediment gradually reduces available stormwater management storage capacity within the pond. The best available estimate is that approximately 1% of the storage volume capacity associated with the two year design storm can be lost annually (a more precise estimate can be be made using the Simple Method in Chapter 1). Thus, as much as 20% of a pond's total storage capacity can be lost within 20 years. Even more storage capacity can be lost if the pond receives large sediment input during the construction phase. Second, unlike wet extended detention ponds (which have a permanent pool to conceal deposited sediments), sediment accumulation can make dry extended detention ponds very unsightly. Third, and perhaps most importantly, sediment tends to accumulate around the control device of dry extended detention ponds. Sediment deposition increases the risk that either the orifice or the filter medium will become clogged, and also gradually reduces storage capacity reserved for pollutant removal in the lower stage.

For these reasons, accumulated sediment may need to be removed from the lower stage every 5 to 10 years in a dry extended detention pond. More frequent spot clean-outs may be needed around the detention control device for some designs. Sediment removal operations are relatively simple if access for heavy equipment is provided. Front-end loaders or backhoes can be used to scrape off the bulk of the accumulated sediment, followed by manual removal of sediment deposited around the the control device. The disturbed area should be immediately stabilized with vegetation after removal operations are completed to prevent the control device from clogging again. The cost of mechanical sediment removal in extended detention ponds typically ranges from $5 to $10 per cubic yard (cy), depending on the size and accessibility of the pond. If an on-site disposal area is not available, then transport and landfill tipping fees may double or even triple the total cost of sediment removal operations.

The procedures and cost associated with sediment removal in wet extended detention ponds are somewhat different, and are discussed in greater detail in Chapter 4.

Although sediment removal must be performed more frequently in dry extended detention ponds than in wet ponds, the removal cost per clean-out cycle may be lower. One reason is that the sediment in extended detention ponds can dry out between storms, and consequently has a greater density than wet pond sediments (i.e., a ton of sediment will displace less volume in an extended detention pond). In addition, the relatively dry extended detention pond sediments do not need to be "de-watered" in special holding sites prior to disposal. Finally, the more expensive drag-line or hydraulic dredging methods required for sediment removal in larger wet ponds are not needed.

Total Maintenance Costs

The annual cost for routine maintenance in ponds averages about $300 to $500 per maintained acre (a "maintained acre" includes the pond and the surrounding buffer, and is generally equivalent to three times the surface area of the pond). Annual costs for non-routine maintenance (mainly sediment removal) are estimated to range from 1-2% of the pond's base construction cost. Therefore, it is recommended that homeowners and public works agencies budget 3-5% of the base construction cost of the extended detention pond, annually, to cover both routine and non-routine maintenance costs (Wiegand et al., 1986).

Design Tips to Reduce O&M Costs

1. The pond should have a two stage design with a top stage (2-5% grade) draining to a level, lower stage (Figure 3.1). Care should be taken during the grading phase to insure that no low pockets develop in the upper stage that might fill up with standing water. This design should make mowing operations easier on the top stage.

2. For easier mowing, sideslopes should be no steeper than 3:1 (h:v) and no flatter than 20:1 (h:v). Flatter slopes improve access and are generally safer, while steeper sloper help to prevent soggy conditions that impede mowing. Mowing costs can be sharply reduced if the pond buffer and upper stage are managed as a meadow rather than as a lawn. If this is done, the frequency of mowing can be reduced from approximately 14 to 2 operations a year (late spring and late fall).

3. All extended detention control devices should be surrounded by a filter of gravel or coarse stone and filter cloth. Externally regulated extended detention orifices are strongly recommended. All devices should have an accessible, above-ground cap to allow for easy clean-out.

4. Extra fill should be placed on the pond embankment to account for future settling or subsidence. An allowance of 10-15% is required in SCS pond designs (Md SCS, 1976).

5. Maintenance access must be provided to the pond by a public or private right-of-way, that has a minimum width of 10 feet and maximum slope of 15%. The maintenance access should never cross the emergency spillway, unless the spillway has been designed for that purpose and is properly stabilized. Lack of adequate access to ponds can lead to difficult and costly disputes over residential property damage during maintenance operations.

6. On-site disposal areas capable of receiving sediment from at least two clean-out cycles should be reserved in adjacent areas. The size of the required disposal area can be roughly calculated as shown in Example 3-3:

> EXAMPLE 3-3: CALCULATING ON-SITE SEDIMENT DISPOSAL REQUIEMENTS
>
> Step 1. Use the simple method (Chapter 1, Ex. 1-2) to determine the long-term sediment load to the pond.
>
> Step 2. Based on the design detention time, determine the pond's sediment trapping capacity (from Figure 3.6).
>
> Step 3. Compute the volume of trapped sediment; assuming one ton equals 0.8 cubic yards of periodically submerged sediment.
>
> Step 4. Solve for area assuming the disposal area can accept a 24 inch depth of dry sediment per unit area.

7. Extra storage can be provided near the pond inlet or the lower stage to trap incoming sediments. This represents an extremely cost-effective means of reducing sediment removal costs, since removing a cubic yard of sediment after a dry extended detention pond is built is at least three

times more expensive than the cost of excavating it during construction (Wiegand et al., 1986). The minimum size for a sediment forebay located above the upper stage can be provisionally calculated using the first three steps in Example 3-3.

8. The responsibilities for both routine and non-routine maintenance need to be clearly vested so that funds can be budgeted for a regular maintenance program. If the responsibilities fall to a homeowners association, the nature and extent of their obligations should be clearly spelled out in a legally binding agreement or covenant. Even if a public agency is not responsible for maintenance, they should monitor and enforce private maintenance efforts as a normal part of the inspection process. Because of the limited financial reserves and technical expertise of homeowners associations, public maintenance is clearly preferable.

ENVIRONMENTAL ATTRIBUTES OF EXTENDED DETENTION

An extended detention pond is a significant modification to the urban landscape. The positive and negative impacts on both the natural and human environment should be carefully evaluated during the site review process.

Impacts to the Natural Environment

An extended detention dry pond can improve local wildlife habitat if an artificial wetland is created and/or the buffer is planted with plant species that provide food and cover for wildlife. As with most ponds, aquatic habitat in channels above the pond may be sacrificed since stormwater flows are not controlled. Unlike conventional wet ponds, however, dry and/or wet extended detention ponds can help to prevent degradation of downstream aquatic habitat by controlling channel destruction caused by post-development streambank erosion. Also, dry extended detention ponds do not generally release warm or anoxic water downstream due to their relatively brief detention times.

Impacts on the Human Environment

The primary impact of extended detention ponds on the human environment is related to aesthetic value. Most residents surveyed consider existing dry ponds to be fairly unattractive, unless they are maintained as a lawn (Geiss et al., 1984). Unlike wet ponds, most residents feel that dry ponds do not enhance property values, and in the case of poorly maintained ponds, can actually detract from them. While most residents do not consider dry ponds to be a safety hazard, many complain about mosquito and other nuisance problems (Adams et al., 1983). Both surveys indicated that dry ponds were perceived to have limited recreational, wildlife and aesthetic values, particularly in comparison to wet ponds and urban lakes.

Resident attitudes should be an important consideration in the planning and design of extended detention ponds, particularly when the same residents will eventually have to pay for maintenance. Careful attention should be paid to the landscaping value of the pond. Rectangular, steep-sided designs should be avoided. Where possible, natural depressions and lowlands should be utilized to make the pond as inconspicuous as possible. Moreover, since dry ponds will never have the amenity values of wet ponds, it makes sense to locate them as far from residences as possible.

Landscaping plans should be prepared for extended detention ponds. The plans should emphasize native plants and natural landscaping (i.e., using vegetation to break up any sharp angles created by the pond and pilot channel). A two-stage design for the pond is desirable to make the upper stage of the pond more suitable for regular mowing, or as a site for a wet meadow. The lower stage can then be managed as a wetland area. It is much more likely that citizens will accept a planned marsh in their community than if an unintended swampy area develops on its own. As with many BMPs, residents may need to be educated about the environmental benefits provided by the extended detention pond.

RELEVANT DESIGN GUIDANCE

The design summary presented on the following pages summarizes some of the more important design features to consider when planning an extended detention pond. The design features are also shown in schematic form in Figure 3.10. In addition, the following references should be consulted during final design:

Maryland Soil Conservation Service, 1981. Standards and Specifications for Ponds. Practice Code No. 378.

Maryland Association of Soil Conservation Districts, 1976. Stormwater Management Pond Design and Construction Manual.

DESIGN SUMMARY: EXTENDED DETENTION PONDS

- **QUANTITY DETAINED:**
  At a minimum, the volume of runoff detained should be equivalent to the runoff volume produced by a one inch storm. This volume is sufficient to achieve both high levels of particulate removal and downstream channel erosion protection for most of the storms that occur during a year. Higher levels of control can be achieved when the runoff volume from the one or two year storm is detained.

- **DURATION:**
  24 hours of extra detention are needed for optimal pollutant removal for the design detention volume. The control device should be adjusted so that smaller runoff events (0.1 to 0.2 inches), which normally pass through the pond quickly, are detained for at least a minimum of six hours. In larger watersheds, up to 40 hours of extended detention may be needed for streambank erosion control. As a final check, the runoff velocity of the downstream channel at the extended detention release rate should be computed to make sure that it is not erosive (Example 3-1).

- **TWO STAGE DESIGN:**
  A two stage pond design is recommended when extended detention is applied to dry ponds. The upper stage of the pond is sized and graded (2% minimum) to remain dry except during infrequent large storms, while the bottom stage is expected to be regularly inundated. The volume of the bottom stage should be set to store the runoff produced by the mean storm (approximately 0.45 inches; see EQ 3.3). The bottom stage will frequently be too wet to mow, and is best managed as a wetland or as a shallow pool. Both techniques act to prevent resuspension of previously deposited materials. Extra storage, over and above stormwater and extended detention requirements, should be provided within the bottom stage, or at the inlet to account for 20 years of sediment deposition.

- **WETLAND CREATION:**
  Wherever possible, a wetland marsh should be created in the bottom stage of an extended detention pond to help remove soluble pollutants that cannot be removed by conventional settling. Wetlands also provide wildlife habitat and hide unsightly debris and sediment deposits that frequently accumulate near the riser. The area of the wetland should be adjusted so that the average annual watershed loading (as computed by the Simple Method) does not exceed 45 pounds of phosphorus or 225 pounds of nitrogen per surface acre of wetland. Water depths of 6-12 inches are needed for optimal wetland growth. The wetland should be planted with native species which are suited to that environment (see Chapter 9 for further guidance on wetland plantings).

- **EXTENDED DETENTION CONTROL DEVICE:**
  In dry ponds, a vertical, internally controlled extension of the low flow orifice is the most trouble-free design, since it can withstand partial clogging and gradual sediment accumulation, and also can be used to set water levels. If the control device is below the ground surface, it should be protected with filter cloth and/or wire mesh, and encased in a trench of stone or gravel with a diameter greater than the orifice. The device should also have an above-ground extension, with a tight-fitting replaceable cap to facilitate clean-out. In wet ponds, a

negatively-sloped pipe protected by a wire mesh that extends from riser and withdraws water from at least a foot below the surface should be used.

- **PILOT CHANNELS**
  A riprap, concrete or paved low flow channel is required to route water through the upper stage of the extended detention pond. The pilot channel should end at the lip of the lower stage, where riprap or gabion baffles are placed to reduce velocities and spread out the flow path of the runoff reaching the lower stage, thus preventing scour and resuspension.

- **SIDE-SLOPES:**
  Side slopes should be no steeper than 3:1 (h:v), and no flatter than 20:1 (h:v).

- **POND BUFFER:**
  A minimum 25 foot wide buffer strip away from pond to the nearest lot should be reserved, and landscaped using low-maintenance grasses, shrubs and trees. A landscaping plan should be prepared for the pond and buffer, that improves the appearance for adjacent residents, meets specific design functions, and provides local wildlife habitat (see Chapter 9 for further details).

- **EMBANKMENT:**
  At least 10-15% extra fill should be allowed on the embankment to account for possible subsidence. The embankment should have at least one foot of freeboard above the emergency spillway. Anti-seep collars should be used to prevent seepage around the barrel. The embankment should be graded to allow access for heavy equipment, and should be mowed twice a year to prevent woody growth.

- **SITE ACCESS:**
  Adequate access from public or private right of way to the pond should be reserved. The access should be at least 10 feet wide, on a slope of 5:1 (h:v) or less, and stabilized to withstand the passage of heavy equipment.

- **MAINTENANCE:**
  Wet-weather inspections should be conducted annually, with as-built plans in hand. Inspections should emphasize the condition of the extended detention control device and low flow pilot channel. Extended detention facilities should be maintained as a meadow to reduce mowing frequency (2 times per year) and maintenance costs. Maintenance responsibilities should be clearly vested with funds reserved for both routine and non-routine activities.

- **SEDIMENT REMOVAL:**
  A five to ten year sediment clean-out cycle is recommended. Extra storage in the lower stage of the pond can be provided to accommodate sediment deposition. Also, on-site sediment disposal areas should be reserved to reduce removal costs. Do not begin final pond construction until upland area is stabilized.

Figure 3.10: Schematic of Extended Detention Pond Design Features

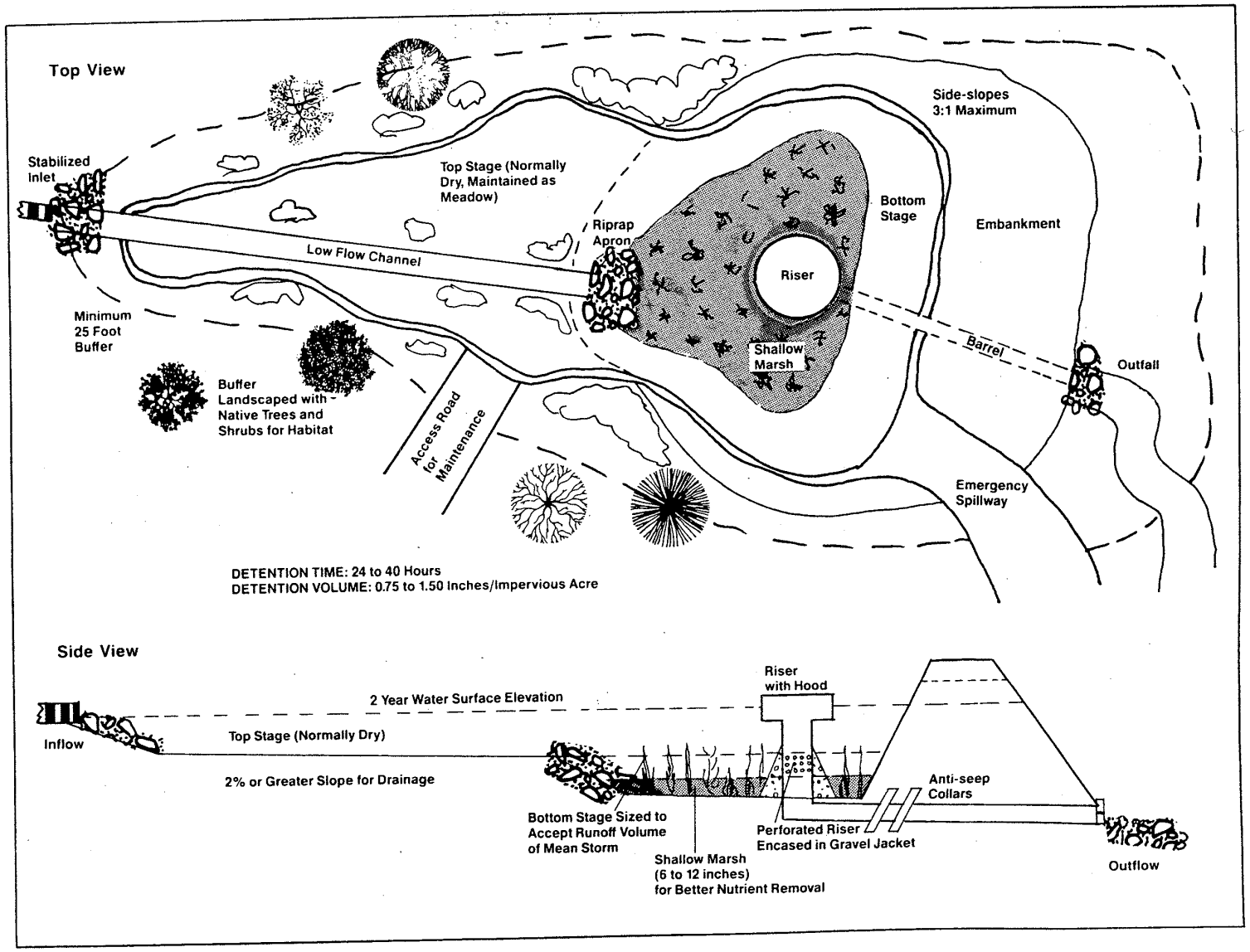

CHAPTER 4: WET PONDS

Wet ponds, also known as retention ponds, are an extremely effective water quality BMP. If properly sized and maintained, wet ponds can achieve a high removal rate of sediment, BOD, organic nutrients and trace metals. Biological processes within the pond also remove soluble nutrients (nitrate and ortho-phosphorus) that contribute to nutrient enrichment (eutrophication). Wet ponds are most cost-effective in larger, more intensively developed sites. Positive impacts of wet ponds include: creation of local wildlife habitat, higher property values, recreation, and landscape amenities. Negative impacts include: possible upstream and downstream habitat degradation, potential safety hazards, occasional nuisance problems (e.g., odor, algae, and debris), and the eventual need for costly sediment removal.

Perhaps more than any other BMP, wet ponds require careful planning and thoughtful design, and regular maintenance. Competing objectives must be reconciled at every potential pond site, and the final design may never achieve all of them. However, wet ponds are unique in that they can truly be a multi-purpose BMP, by providing stormwater management, pollutant removal and landscaping/habitat improvement.

Figure 4.1: Schematic of a Wet Pond

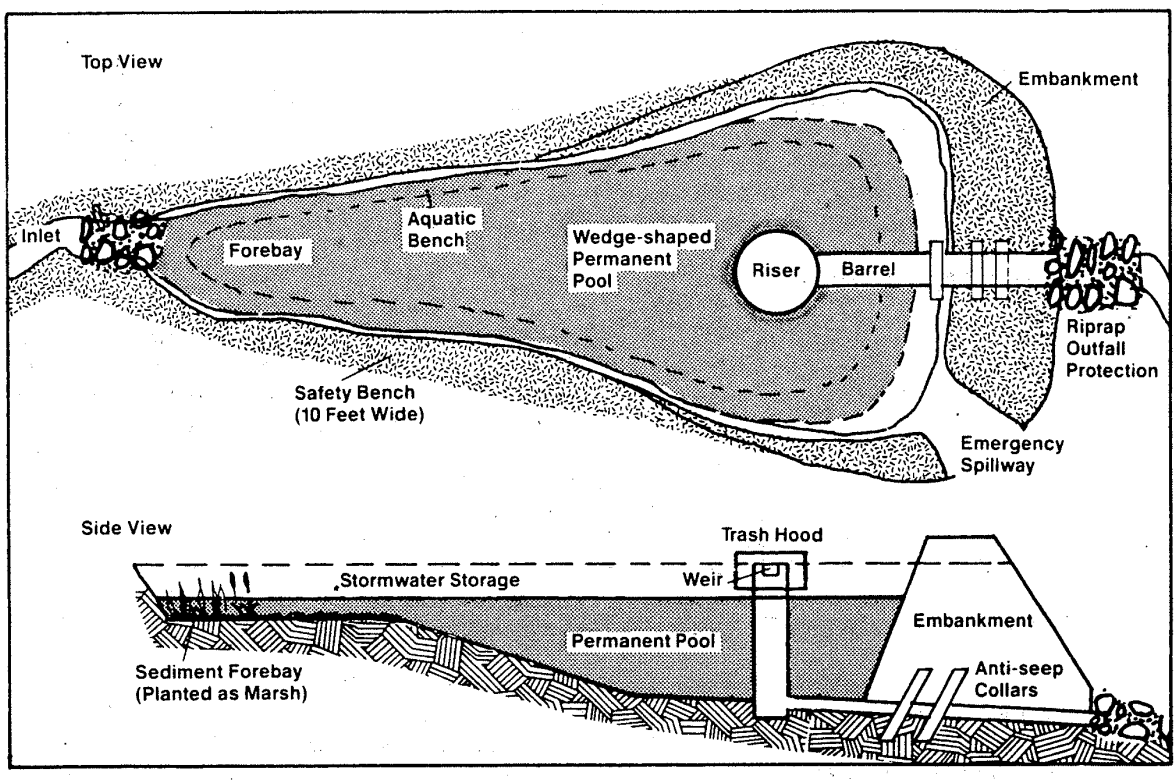

The best situation for employing wet ponds is in residential or commercial developments greater than twenty acres in size with a reliable source of water. Wet ponds can be an attractive feature in well-planned residential communities, particularly if a stable homeowners association exists to insure regular and non-routine maintenance. Otherwise, a public sector commitment to maintenance will be required.

EFFECTIVENESS IN STORMWATER CONTROL

Peak Discharge Control

Wet ponds can be effective in controlling post-development peak discharge rates to pre-development levels for desired design storms. Numerous methods exist for accurately defining stormwater storage needs by reservoir routing (SCS TR-20 and SWMM models, for example). As with any other peak-shaving facility, the optimal level of flood control is achieved when multiple design storms are controlled. Recent analyses suggest that control of both the 2 and 10 year design storm is sufficient to adequately control the entire spectrum of expected flood frequencies (Md WRA, 1983a).

Groundwater Recharge

Groundwater recharge in wet ponds is limited to the storage lost to infiltration through the pond bottom. The quantity of recharge is greater than that achieved in dry or extended detention ponds, but is negligible in comparison to infiltration basins and other volume control BMPs. In some sites, recharge may actually need to be to prevented to maintain a permanent pool.

Volume Control

The post-development increase in the total runoff volume from a site is not effectively modified by wet ponds. Some temporary control of runoff volume may be achieved when extra dead-storage is created by evaporation or infiltration. However, the volume control generally only occurs during minor storms in the summer months and after prolonged droughts.

Downstream Effects

As with all peak-shaving facilities, the desired downstream reduction in peak discharge may not be achieved in watersheds with many ponds because of the location and timing of individual releases (Schueler and Sullivan, 1983; APWA, 1981; NVPDC, 1979). As an example, a pond situated at the bottom of a watershed may detain stormwater just long enough to coincide with the arrival of the upstream peak, and actually increase the peak discharge. Therefore, it is advisable to perform detailed watershed modeling (such as TR-20) to evaluate the cumulative hydrological impact of wet ponds on the total watershed hydrograph, and locate ponds and adjust release rates accordingly.

Streambank Erosion Control

Peak-shaving wet ponds have traditionally been thought to reduce the extent of downstream channel erosion when high return storms (two year return frequency or less) are controlled. This belief has its roots in the early research of Wolman and Schick (1967) and Leopold (1968) which, demonstrated that bankfull discharges, which occur, on average, every 1.5 to 2 years,

control the form of natural channels. Many local governments have subsequently adopted stormwater management policies which require the peak discharge of the two year storm be controlled to pre-development levels. However, after a watershed becomes developed, the frequency of bankfull discharges can increase markedly. In some highly impervious areas, bankfull discharges may occur as often as six times a year following development (Leopold, 1968 and Figure 3.4). The relatively small and frequent storms may have to be controlled to adequately protect streambanks from further erosion. This can be accomplished by extending the detention time of runoff within the wet pond by 24 to 40 hours. Suggested designs and sizing methods for incorporating extended detention into wet ponds are provided in Chapter 3.

POLLUTANT REMOVAL

The capability of wet ponds to remove pollutants borne in urban runoff has been demonstrated in local and national field studies (US EPA, 1983; MWCOG, 1983b). These studies have found pollutant removal to be variable from storm to storm, but generally high over the long-term, for well designed and maintained ponds. The degree of pollutant removal achieved by a pond is a function of the size and design of the permanent pool and the characteristics of individual urban pollutants.

Pollutant Removal Mechanisms in Wet Ponds

SEDIMENTATION

In theory, the incoming storm runoff displaces "old water" out of the pond and is then stored until the next storm. Suspended pollutants settle out from the water column to the pond sediments. Moreover, the permanent pool acts as a barrier to resuspension of deposited materials, improving removal performance over that achieved by dry ponds. The greatest initial settling often occurs near the inlet of the pond, where the velocity of the incoming runoff is dissipated by the still waters of the permanent pool. Settling in ponds during quiescent conditions can be modeled assuming Stokes Law Type I Sedimentation. Coarser materials are deposited first, followed by progressively finer-sized fractions. In practice, sedimentation is an effective pollutant removal mechanism unless short-circuiting occurs (i.e., incoming runoff passes through the pond without displacing the old water), or the volume of incoming runoff is greater than the volume of the permanent pool (in which case some portion of the runoff passes through the pond unmodified). As a result of these factors, pollutant removal rates often decline during larger storms in smaller ponds.

BIOLOGICAL UPTAKE

A unique feature of wet ponds is the presence of aquatic plants and algae that can remove significant amounts of soluble nutrients from the water column. Since soluble nutrients have minimal settling velocities, biological uptake represents an important removal pathway. In short, the plants convert the soluble nutrients into biomass which in turn can settle to the pond sediments. Once nutrients and organic materials are trapped in the sediments, they may be consumed by bacteria and removed from the system.

Estimates of Wet Pond Removal Efficiency

The pollutant removal capability of two wet pond facilities were evaluated during the Washington, D.C. area NURP study (MWCOG, 1983b; OWML, 1983). The wet ponds were found to be effective in removing particulate pollutants, with long-term average removal for the two ponds of 54% for sediment, 30% for chemical oxygen demand, 51% for zinc, 65% for lead, and approximately 20% for both organic nitrogen and phosphorus. In general, the removal of particulate pollutants in the wet ponds was very similar to that observed in extended detention ponds. Removal of organic materials was slightly lower in wet ponds in comparison to extended detention ponds, perhaps as a result of export of biomass and/or detritus from the ponds. The wet ponds were more effective in removing soluble nutrients with long-term removal of 60% of the nitrate and over 80% of the soluble phosphorus recorded during the course of the study. Uptake by algae and aquatic plants was apparently responsible for the removal.

Wet ponds monitored at other NURP projects (Tri-County RPC, 1983; US EPA, 1983; Driscoll, 1983b) followed the same pattern of pollutant removal observed in the Washington, D.C. area, with high sediment and trace metal removal, moderate removal of organic nutrients and COD, and apparently high removal of soluble nutrients. The absolute level of pollutant removal was found to be primarily a function of the ratio of pond volume to watershed size (US EPA, 1986; Driscoll, 1983b). Relatively undersized wet ponds had low and occasionally negative removal efficiencies, while moderate to large-sized ponds had correspondingly higher removal rates.

DESIGN TIPS FOR ENHANCING POLLUTANT REMOVAL

Pool Volume

The size of the permanent pool in relation to the contributing watershed is perhaps the single greatest factor influencing pollutant removal in wet ponds. Larger ponds remove pollutants better than smaller ones, and in general, "bigger is better". However, after a certain threshold size is reached, further removal by sedimentation is negligible. Also, an upper limit on pond size may be imposed by construction costs and site constraints. A number of wet pond sizing rules have been proposed to optimize pollutant removal. These alternative rules variously specify that the minimum volume of the permanent pool be equivalent to:

SIZING RULE 1: One-half inch of runoff distributed over the contributing watershed area (Montgomery County DEP, 1984a).

SIZING RULE 2: One-half inch of runoff distributed over the impervious portion of the contributing watershed (Md WRA, 1986b).

SIZING RULE 3: Volume of permanent pool equivalent to a variable depth of runoff distributed over the contributing watershed, depending on land use (NVPDC, 1980; Fairfax County DEM, 1980).

SIZING
RULE 4: Two and a half times the volume of runoff generated from the mean storm over the watershed area (Md WRA, 1986c).

SIZING
RULE 5: Adjusted to achieve an average of two weeks of retention within the pond (Hartigan, 1986), or about 4 times the volume of runoff generated by the mean storm over the watershed area.

The first four pond sizing rules presume Type I sedimentation is the primary pollutant removal mechanism in wet ponds, while the fifth is designed to maximize biological uptake within the pond. The comparative impacts of each pond sizing rule on permanent pool volume, estimated pollutant removal, and construction cost were evaluated. Hypothetical land development scenarios described in Schueler et al. (1985) were used to determine the required permanent pool volume under each rule. The wet pond performance model of Driscoll (1983b) was adapted to project the estimated pollutant removal under each sizing rule (Figure 4.2). The output from the Driscoll model is somewhat conservative since it only considers removal by sedimentation during dynamic and quiescent (i.e., continuous and plug flow) conditions. However, it is very useful for comparing sizing rules, because; 1) pollutant removal is assumed to be a function of the ratio VB/VR (volume of the basin to the volume runoff generated from the mean storm) which is easily determined for each sizing rule, 2) the model has been calibrated to field data from numerous NURP pond monitoring sites, and 3) it generates long-term average removal rates from a statistical description of regional climate data.

The different pond sizing rules create a great deal of variability in permanent pool storage volume for a given development scenario (Figure 4.3). Rules 4 and 5 create the largest permanent pool; rules 2 and 3 result in the smallest pools.

The impact of each sizing rule on the VB/VR ratio is shown in Figure 4.4. With the exception of Rule 1, all the sizing criteria have a constant or slightly decreasing VB/VR ratio as development becomes more intensive. VB/VR ratios for all of the pond sizing rules achieve or exceed an estimated long-term sediment removal of 60% (Figures 4.2 and 4.6). The larger ponds (VB/VR of 2.5 or more) are expected to achieve 71% sediment removal. Thereafter, additional small increments of sediment removal are only achieved by large increases in pool volume (Figure 4.2). Other urban pollutants have less rapid settling rates, and their long-term removal rates are proportionally lower than sediment (Figure 4.6).

The economic impacts of the sizing rules are depicted in Figure 4.5, in which the cost of constructing each hypothetical pond is compared with the cost of building a dry pond (the cheapest SWM alternative). The cost difference among the alternative rules is wide, with rule 5 producing wet ponds as much as 100% more expensive than dry ponds. Rules 2 and 3 are more economical with incremental costs of 25% or less.

The choice of an appropriate pond sizing rule necessarily invites a trade-off between the degree of removal efficiency desired and the cost of achieving it. The comparative effects of each pool sizing rule are detailed in Table 4.1. Since all of the pool sizing rules produce at least moderate levels of sediment removal (60 to 90%), no individual rule is recommended here. The matter is properly the concern of local stormwater management policymakers.

Figure 4.2: Relationship Between VB/VR and Pond Sediment Removal

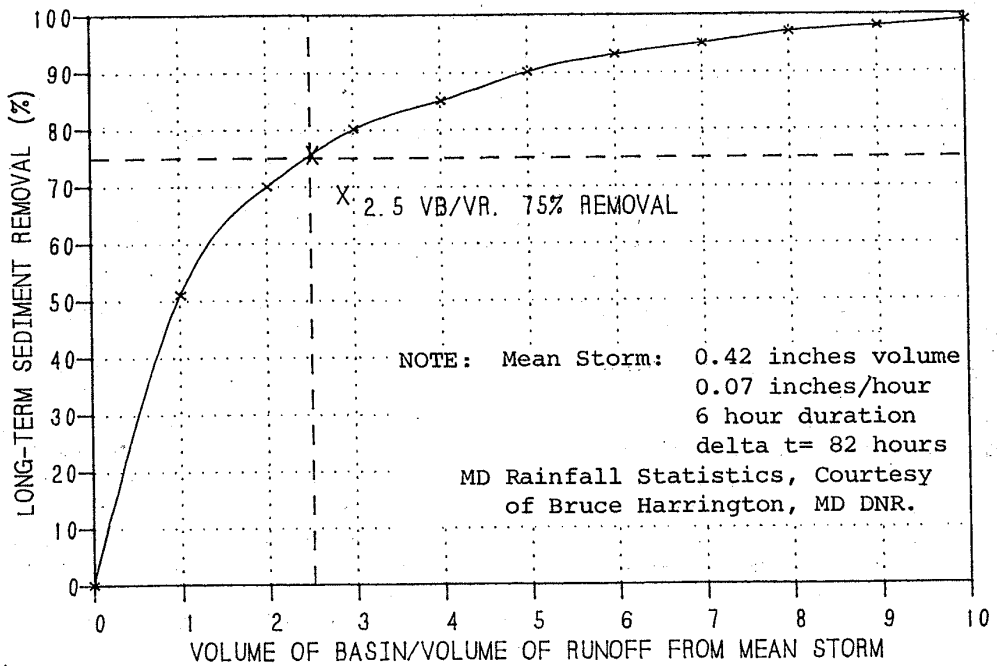

Figure 4.3: Effect of Pool Sizing Rules on Wet Pond Storage Volumes

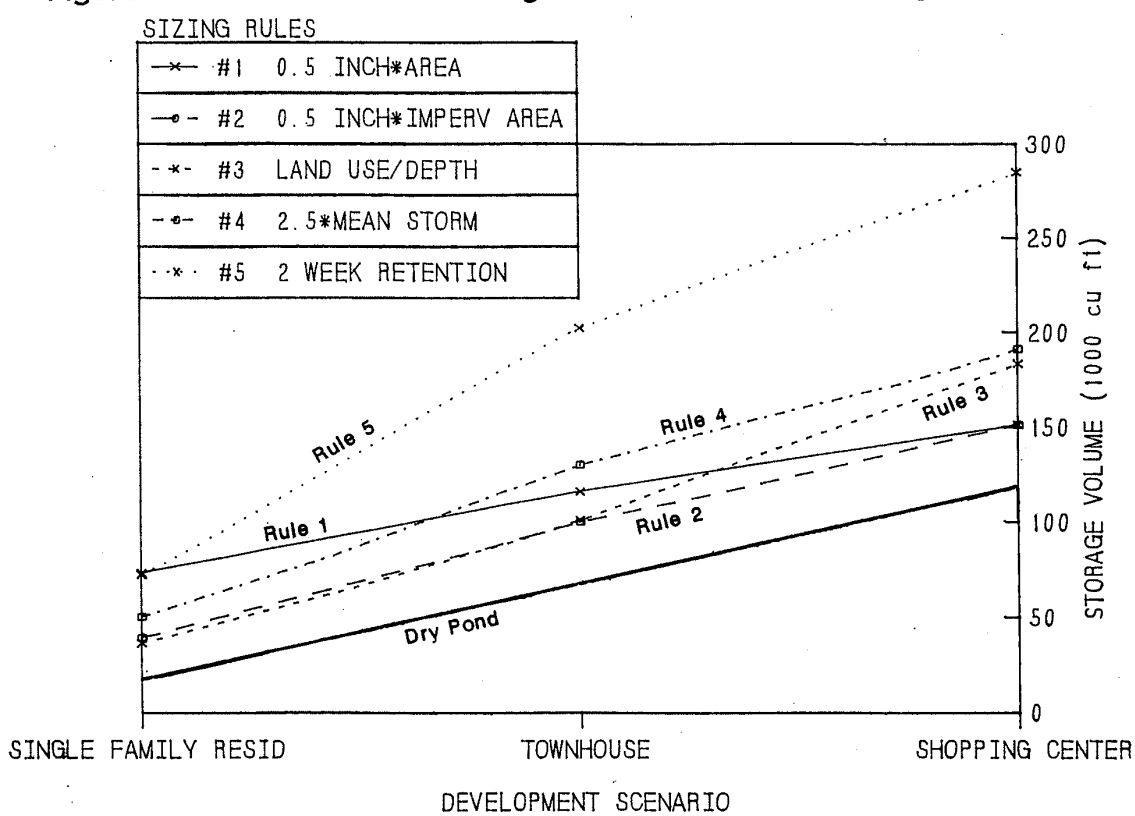

NOTE: Storage includes 2 year design storm control.
Plot assumes a 25 acre watershed.

Figure 4.4: Effect of Pool Sizing Rules on Sediment Removal

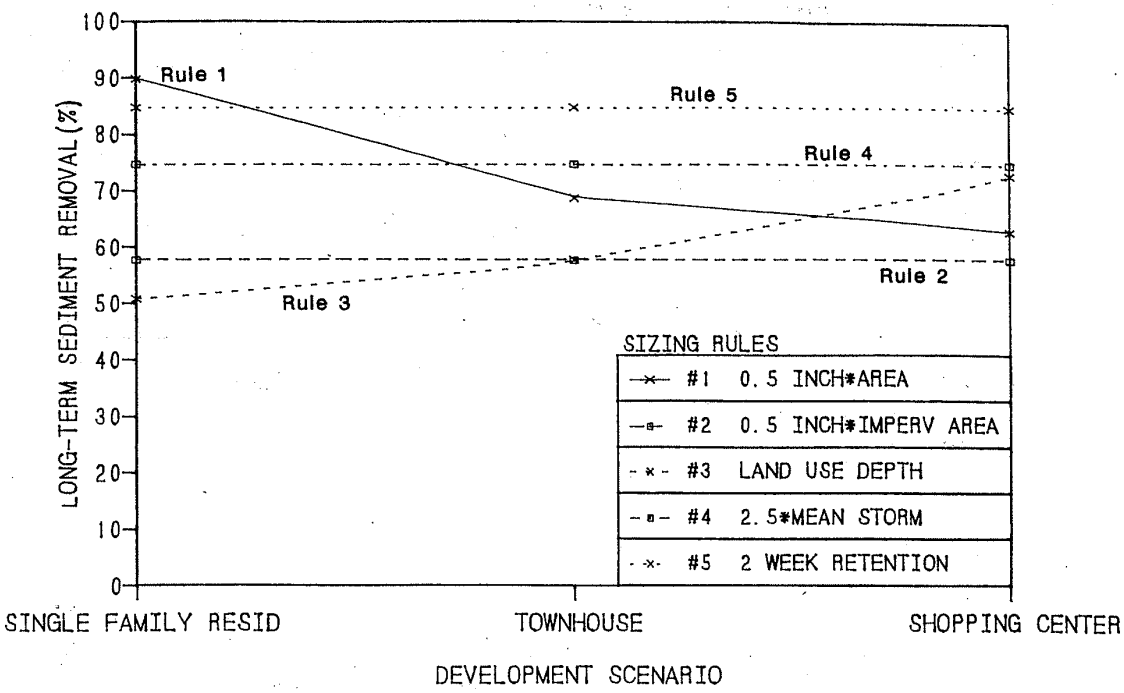

NOTE: Plot based on VB/VR ratio, Driscoll (1983).
Plot assumes a 25 acre watershed.

Figure 4.5: Effect of Pool Sizing Rules on Construction Cost Increase Over Conventional Dry Pond, 2 Year Design

NOTE: Projected construction cost for wet ponds shown as the incremental cost over that for a 2 year design stormwater management pond. Assumes 25 acre watershed.

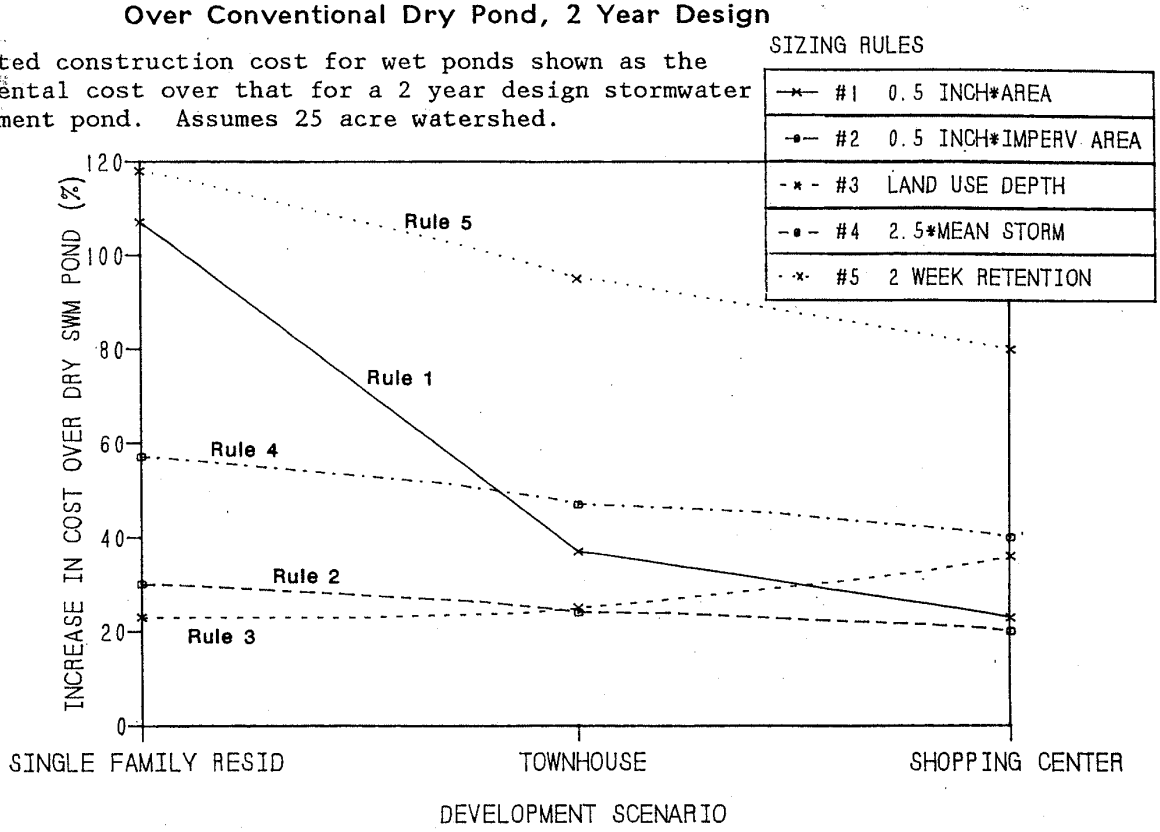

Figure 4.6: Estimated Removal of Selected Urban Pollutants as a Function of Permanent Pool Size

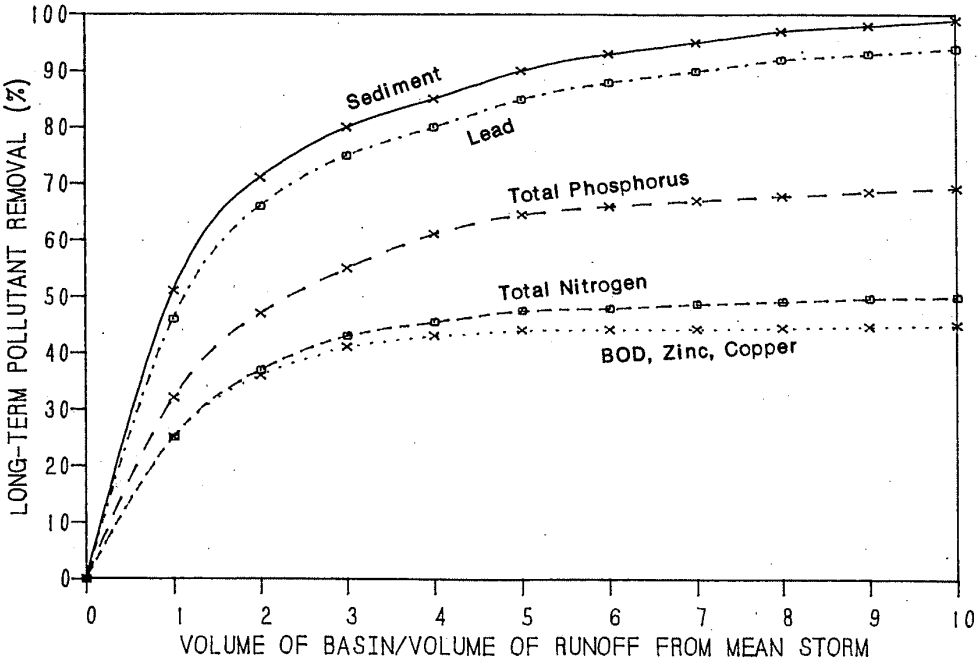

NOTE: Average results from U.S. EPA (1986), and adapted to reflect modifications of Walker (1986).

Table 4.1: Summary of Wet Pond Pool Sizing Rules

SIZING RULE	SEDIMENT REMOVED	PHOSPHORUS REMOVED	EXTRA STORAGE (compared to 2 year dry pond)	EXTRA COST
RULE 1: 0.5 inch runoff per acre	60-90%	35-90%	35-200%	20-90%
RULE 2: 0.5 inch runoff per impervious acre	60%	35-40%	30%	20-25%
RULE 3: 0.1 to 0.8 inches depending on land use	55-80%	30-50%	30-70%	20-40%
RULE 4: 2.5 times the runoff of the mean storm	75%	55%	75%	40-50%
Rule 5: 4.0 times the runoff of the mean storm (≈2 week retention)	85-90%	65%	200-250%	80-100%

Pond Shape

Short-circuiting is a frequently cited problem in wet pond design, whereby incoming runoff passes through the pond without displacing the old water. (Schaefer, 1986). Short-circuiting can be largely prevented by maximizing the distance between the pond inlet(s) and outlet. For this reason, many local stormwater management ordinances specify minimum length to width ratios of 3:1 or greater. If local topography makes the excavation of a long, narrow pond impossible, baffles or gabions can be placed within the pond to lengthen the flow-path between the inlet and outlet.

Long, narrow and irregular shapes are also desirable for shallower ponds since they reduce surface area exposed to the wind and thereby prevent resuspension of previously deposited materials (Schaefer, 1986). Irregularly shaped ponds also have a less "engineered" appearance, and produce a more natural landscaping effect.

Pond Depth

Since much of the pollutant removal in a wet pond is accomplished by gradual settling, pond depth is an important design aspect. Settling column studies and modeling analyses indicate that shallow ponds have higher removal efficiencies than deeper ones. However, extremely shallow ponds (< 2 feet in depth) may be prone to resuspension problems, caused by wind generated disturbances of bottom sediments. Therefore, shallow ponds should be avoided unless they are stabilized by aquatic vegetation. On the other hand, pond depths in excess of 8 feet should also be avoided to prevent the onset of thermal stratification. Stratified ponds tend to become anoxic more frequently than shallower ponds, have non-ideal settling characteristics, and may release previously deposited pollutants from the sediment back to the water column. For design purposes, an average pond depth of 3 to 6 feet should be optimal.

As shown in the schematic wet pond design (Figure 4.1), the depth of the permanent pool should be variable. For example, a minimum 10 foot wide, one foot deep shelf is needed around the perimeter of the pond to provide suitable conditions for the establishment of aquatic vegetation, and to reduce the potential safety hazard to the public. Shallow depths near the pond inlet may be required to concentrate sediment deposition in a smaller, more easily accessible area. Pockets of deeper water (6 feet +) are necessary as habitat refuges for fish, if the pond is managed for recreation. Normally, the riser should be located in a deeper area within the pond to accommodate coldwater bottom release if thermal impacts need to be mitigated.

Aquatic Vegetation

Establishment of aquatic vegetation around the perimeter of a wet pond enhances pollutant removal, and also has several other beneficial uses. Emergent plants such as bulrush, three-square and lizards tail can provide an attractive fringe habitat, providing food and cover for wildlife and waterfowl. The marsh fringe also protects the shoreline from erosion, and if situated near the inlet to the pond, can trap incoming sediment. While most emergent plants withdraw nutrients from the sediments rather than the water column, associated algae which are attached to the plants, or grow nearby on the shallow sediments, are capable of soluble nutrient removal. Shallow, organic-rich waters in the marsh fringe provide an ideal environment for bacteria and other microorganisms that reduce organic matter and nutrients. Similarly, the marsh fringe provides a habitat for predacious insects that

can serve as a natural population control for mosquitos and other nuisance insects. From an aesthetic standpoint, the fringe of aquatic vegetation conceals trash and floatable debris and disguises and stabilizes the pond shoreline (which is often barren due to fluctuating water levels). Appropriate wetland plant species and propagation techniques are described in the basin landscaping guide in Chapter 9.

Side-slopes

The slopes leading to the wet pond should be gradual to prevent erosion of the banks. Dense vegetation is hard to establish and maintain on steeply sloping banks. In the absence of vegetative cover, gully erosion may actually make the pond a sediment source. Most local stormwater management guidelines suggest that side-slopes be no greater than 3:1 (h:v), and preferably flatter. Banks steeper than 3:1 should be stabilized with riprap to prevent erosion. Low slopes make routine mowing of the banks easier and safer, and allow better pond access for maintenance purposes. Adams et al. (1983) have demonstrated greater wildlife and waterfowl utilization of ponds with gentle side-slopes in comparison to steep side-slopes, and recommend 10:1 (h:v) slopes where feasible. The risk of a child stumbling into a wet pond is also presumably minimized with low sloping banks. Naturally, there is a trade-off in having extremely flat side-slopes, since steeply sloped banks provide more stormwater capacity per surface area.

Inlet and Outlet Protection

The stream channel immediately below the pond outlet should be lined with large stone riprap to prevent scouring and have a slope close to 0.5% (MNCPPC, 1984). A layer of filter cloth should be laid down first to conform to the natural dimensions of the channel, and then anchored with 18 to 30 inch stone riprap. If the outfall pipe diameter is less than 24 inches, smaller sized 9 to 12 inch riprap can be used. Structural measures such as stilling basins can also be employed to reduce the runoff velocity from the pipe outfall.

The invert elevation for all inlet pipes should be set to discharge at or below the surface of the permanent pool. Pipes which outfall above the pool are not acceptable as they erode the banks and side-slopes of the pond. Inlet pipes should be located within a foot of the permanent pool elevation.

PHYSICAL SUITABILITY AT THE SITE LEVEL

Minimum Drainage Area

Construction of wet ponds is not generally feasible in watersheds less than ten acres in size, unless a natural spring occurs on-site (infiltration basins can be used as an alternative). Maintenance of a permanent pool is difficult in these small watersheds because infiltration and evaporation losses will often result in severe pond drawdowns. Baseflow in small watersheds often runs out during the summer months and cannot compensate for the gradual drawdown. Consequently, pond stagnation may result in algal matting and odor problems. During extremely dry periods, the pond may completely dry up. While none of these factors reduces the pond's capability to remove pollutants (and may actually enhance them to some degree), it is not likely that residents will be pleased to live near such an unattractive

nuisance. For these reasons, infiltration basins or extended detention ponds are a more suitable alternative on very small development sites.

The feasibility of constructing wet ponds on moderate sized watersheds (10 to 30 acres) should be checked using the procedures set forth in Md WRA (1986c). A general rule of thumb is that four acres of contributing watershed are needed for each acre-foot of storage (Md SCS, 1976).

Permeable Soils

Severe pond drawdowns may occur even in larger wet ponds if pond soils are permeable (hydrological soil groups "A" and "B"), or, if they extend into fractured bedrock. Drawdowns can be minimized by installing a six inch liner of clay soil, filter fabric, or merely by compacting the pond soils (Md WRA, 1986c). In most areas of the Piedmont, clay soils (minimum 25% clay by weight) can be scavenged from other areas of the development site during the grading process.

Depth to Bedrock

If the bedrock layer lies close to the surface of the soil, it may become too difficult or expensive to excavate needed storage for an extended detention pond. Soil maps should be consulted, and soil borings need to be taken to confirm that no bedrock needs to be excavated.

Land Requirements

Wet ponds are probably not a feasible BMP in watersheds where land costs or space are at a premium. In small watersheds, the pond and its buffer can consume as much as 10% of the watershed area, particularly if a generous pond sizing rule is used. In most cases, however, the pond and its buffer will consume much less than 5% of the total watershed area. Most local governments have adopted open space requirements for new developments which usually reserve more than sufficient land for siting a pond.

Utility Relocation

Most utility companies will not allow existing underground pipes to be submerged under a permanent pool of water (as this can lead to infiltration/inflow problems and make maintenance efforts extremely difficult). Therefore, if wet ponds are to be used, the site designer should check to see if the pool area will cross any utility right of way.

Wetland Permits

Often, the best location to put a pond in a site is in low marshy areas and natural depressions. Unfortunately, these areas are often classified as freshwater wetland habitat, and may be protected under state or federal wetland law. It is important to note that many wetland habitats are not easy to identify. The designer should consult local wetland maps and wetland permitting agencies to determine if the area has wetland status. If so, permits must be secured. See Herson (1987) for a summary of local wetland requirements and the permitting process.

WET POND COSTS

Predicting Wet Pond Costs

A planning estimate of the base construction cost for a wet pond of less than 100,000 cubic feet of storage can be approximated using the MWCOG equation (Wiegand et al., 1986):

(EQ 4.1) $C = 6.1Vs^{0.75}$

where C = construction cost in 1985 dollars.
Vs = volume of storage (cubic feet) of the pond up to the crest of the emergency spillway, including the permanent pool.

Similarly, first-cut cost estimates for larger wet ponds (greater than 100,000 cubic feet storage) can be derived from the following:

(EQ 4.2) $C = 34Vs^{0.64}$

As an example, if a planned wet pond were to have a permanent pool of 12,000 cf and additional stormwater storage of 30,000 cf, the estimated total cost of the BMP would be 6.11(42,000)**.75 or about 18,000 dollars. The actual cost at a site will vary around this value, depending on the degree of excavation required. Costs can be significantly lowered if natural depressions and topography are creatively used.

Both equations only estimate the cost of constructing a wet pond. Land costs are not considered because of their great variability. In most cases, the assumption of zero land costs is reasonable since most zoning boards require that a minimum percentage of site area be reserved for open space. Additional contingency costs associated with designing the pond, securing the necessary permits, and overseeing construction can be estimated using a rule of thumb that these costs generally add 25% to the base construction cost (C).

As the form of the equations indicate, wet pond construction costs are largely determined by the total storage volume. Since the stormwater component of the total storage volume is fixed, the incremental cost of wet ponds over dry ponds is a function of permanent pool size. Thus, the sizing rule selected for the permanent pool will strongly influence the total cost. Figure 4.4 shows the impact of each pond sizing rule on wet pond construction cost. In most cases, the unit cost of wet ponds declines as development intensity increases. Likewise, the fact that the exponent in the equation is less than one indicates the presence of economies of scale, such that wet ponds are relatively cheaper when applied to larger watershed areas than to smaller ones.

Cost-Effectiveness

Previous studies have shown that the most cost-effective application of wet ponds is in larger and more intensive development sites (Schueler et al., 1985). Because of this, wet ponds are good candidates for regional stormwater management, whereby the runoff from several development sites is treated in one central facility. Wet ponds are not the most cost-effective BMP option in smaller residential sites, where extended detention or infiltration basins/trenches may be more economical. The most cost-effective wet pond designs are generally 30-60% more expensive than a dry pond of similar stormwater capacity (Figure 4.4).

Other Economic Factors

In addition to removing urban pollutants, wet ponds also provide several urban amenities of economic value. These include aesthetics, recreation, wildlife habitat, and landscape value. While it is often impossible to assign these an exact dollar value, there is ample documentation that homes located near well designed and maintained wet ponds command higher prices than homes not so located (Baxter et al., 1985; Adams et al., 1983) or homes situated near less attractive BMPs such as dry ponds. Higher land values may compensate for the greater incremental cost of constructing a wet pond. Numerous opinion surveys have indicated that a majority of homeowners are willing to pay more for a home situated near a naturally landscaped pond managed for wildlife (Adams et al., 1983). An implication of this finding is that modest extra investments in designing and landscaping wet ponds will probably be recouped in the form of higher housing prices.

MAINTENANCE REQUIREMENTS

A clear requirement for wet ponds is that a firm institutional commitment be made to carry out both routine and non-routine maintenance tasks. The nature and cost of wet pond maintenance requirements are outlined below, along with design tips that can help to reduce the maintenance burden.

Routine Maintenance

MOWING

The side-slopes, embankment and emergency spillway of a wet pond must be mowed at least twice a year to prevent woody growth and control weeds. More frequent mowing may be demanded in residential areas by adjacent homeowners concerned about neighborhood appearance or allergies. This usually entails about 14 mowing operations annually, and constitutes the largest routine maintenance expense. The use of native or introduced grasses which are water tolerant, hardy and slow-growing is recommended. Some representative species, such as K-31 Tall Fescue and Crown Vetch, are described in the basin landscaping guide in Chapter 9.

INSPECTIONS

Wet ponds need to be inspected on an annual basis to ensure that the structure operates in the manner originally intended. When possible, inspections should be conducted during wet weather to determine if the pond is functioning properly. Inspection priorities should include checking the embankment for subsidence, erosion, cracking, and tree growth; the condition of the emergency spillway and drain; the accumulation of sediment, clogging

of the barrel and outlet; the adequacy of upstream and downstream channel erosion protection measures; any modifications which have occurred to the contributing watershed and the pond structure; and the stability of the side-slopes. Inspections should be carried out with as-built pond plans in hand.

DEBRIS AND LITTER REMOVAL

As a part of periodic mowing operations, debris and litter should be removed from the surface of the pond. Particular attention should be paid to floatable debris around the riser, and the outlet should be checked for possible clogging.

EROSION CONTROL

The pond side-slopes, emergency spillway and embankment all may periodically suffer from slumping and erosion. Corrective measures such as regrading and revegetation may be necessary. Similarly, the riprap protecting the channel near the outlet may need to be repaired or replaced.

NUISANCE CONTROL

Most public agencies surveyed indicate that control of insects, weeds, odors, and algae may be needed in some problem ponds. Indeed, nuisance control is probably the most frequent maintenance item demanded by local residents. If properly sized and vegetated, these problems should be rare in wet ponds except under extremely dry weather conditions. Biological control of algae and mosquitos, by the use of fathead minnows and other fish, is preferable to chemical applications.

Non-Routine Maintenance

STRUCTURAL REPAIRS AND REPLACEMENT

Eventually, the various inlet/outlet and riser works in a wet pond will deteriorate and must be replaced. Some local public works experts have estimated that corrugated metal pipe (CMP) has a useful life of about 25 years, while concrete barrels and risers may last from 50 to 75 years (MNCPPC, 1985) No stormwater management pond has been in the ground for longer than twenty years in the Washington, D.C. area, so there is little local experience in this area. However, since the various water works constitute about 25% of the initial construction cost (Wiegand et al., 1986), their replacement can be a significant future expense.

Some ponds that suffer from excessive and chronic drawdowns often may have problems with leakage or seepage of water through the embankment. Corrective measures can be difficult, but can be avoided if the embankment has been compacted, and if anti-seep collars are used around the barrel.

SEDIMENT REMOVAL

If properly designed, wet ponds will eventually accumulate enough sediment to significantly reduce storage capacity of the permanent pool. As might be expected, the accumulated sediment can reduce both the appearance and pollutant removal performance of the pond. The best available estimate is that approximately one percent of the storage volume capacity associated with the two year design storm can be lost annually. Smaller, stabilized

watersheds accumulate sediment at lower rates, while larger watersheds with unprotected channels or ongoing construction fill in more rapidly. (A planning estimate of the likely sediment accumulation at a site can be rapidly made using the Simple Method outlined in Chapter 1, Example 1-2).

A sediment clean-out cycle of ten to twenty years is frequently recommended in the Washington, D.C. metropolitan area (APWA, 1981; MWCOG, 1983b). The costs associated with each cycle of sediment removal can be staggering. One-time operations in excess of $100,000 are not uncommon in larger wet ponds and urban lakes. A review of several recent pond dredging projects in suburban Northern Virginia indicated that the average dredging cost was over $14 per cubic yard (cy), with a range of $6.25-22.40/cy (Wiegand et al, 1986). The variation in these costs is due to differences in the size and accessibility of the pond, the proximity of the disposal site, and the method used to remove and transport sediment. Costs for smaller wet ponds (Vs< 100,000 cf) typically range from $5-10/cy since sediment can be mechanically removed with a front-end loader after the basin is de-watered. Larger ponds normally require the use of the more expensive dragline or hydraulic dredge methods. Also, higher costs are incurred in transporting dredged materials to a suitable on-site disposal area, and in the grading and reclamation of the site after dredging has been completed.

Sediment removal costs become even higher when on-site disposal areas are not available. Hauling increases costs by $5-10/cy, depending on distance traversed. If dredged sediments are land-filled, tipping fees will increase removal costs by another $15-25/cy, depending on the jurisdiction.

Total Maintenance Costs

The annual cost for routine maintenance averages about $300-500 per maintained acre (which includes the pond and the surrounding buffer, and as a rule of thumb is oftened estimated at three times the surface area of the pond). Annual costs for non-routine maintenance (mainly sediment removal) are estimated to range from 1-2% of the pond's base construction cost. Therefore, it is recommended that homeowners and public works agencies budget 3-5% of the base construction cost of the wet pond annually to cover the routine and unexpected maintenance expenses.

Design Tips to Reduce Maintenance Costs

1. For easier mowing, side-slopes should be no steeper than 3:1 and no flatter than 20:1. The first guideline allows for easier access and safety, while the latter guideline acts to prevent soggy conditions.

2. Mowing costs can be reduced if the pond buffer is managed as a meadow rather than a lawn, as the frequency of mowing operations can be reduced from 14 to 2 times per year.

3. Hoods or trash racks should be installed on both the low flow and design storm orifices to prevent clogging. The low flow orifice pipe should be negatively sloped so that it draws water at least one foot below the surface of the permanent pool (see Chapter 3, Figure 3.3b).

4. Leakage through the embankment can often be prevented by using anti-seep collars around the barrel, and by compacting the embankment.

5. Reinforced concrete pipes, barrels and risers should be utilized because of their greater longevity (MNCPPC, 1985). The use of corrugated metal pipe should be kept to a minimum.

6. Where possible, the riser should be located within or on the face of the embankment rather than out in the middle of the pool. This makes the riser easier to maintain and inspect, visually pleasing, and also prevents floatation problems.

7. Extra fill should be placed on the pond embankment to account for future settling or subsidence. An allowance of 10-15% is often used.

8. All ponds should have an emergency drain (with the pipe sized to completely drain the pond in less than 24 hours), to allow access for riser repairs and heavy equipment needed for sediment removal.

9. Maintenance access must be provided to the pond from public or private right of way with a minimum width of 10 feet and maximum slope of 5:1 (h:v). Lack of proper access to ponds can lead to difficult and costly disputes over residential property damage in the future. The access road should never cross the emergency spillway.

10. On-site disposal areas capable of receiving sediment from at least two clean-out cycles should be reserved in adjacent open space, if possible. The size of the required disposal area can be roughly calculated as follows:

EXAMPLE 4-1: CALCULATING THE AREA NEEDED FOR ON-SITE SEDIMENT DISPOSAL

Step 1. Use the Simple Method in Chapter 1 to determine long-term sediment load from the upland watershed.

Step 2. Estimate wet pond trapping efficiency from Figure 4.2.

Step 3. Compute the volume of sediment trapped in the pond, assuming one ton equals a cubic yard of wet sediment.

Step 4. Solve for area assuming the disposal area can accept a 12 inch depth of wet sediment per unit area.

11. Extra storage, in the form of a sediment forebay, should be provided near the inlet to trap incoming sediments. This represents an extremely cost-effective means of reducing sediment removal costs, because dredging a cubic yard of sediment after a pond is built is at least five times more expensive than the cost of excavating it during construction. Shallow sediment forebays with aquatic plants are an attractive option, since they enhance the sediment trapping, pollutant removal, and concentrate accumulated sediment in an area where it can be readily removed without having to drain the entire permanent pool. The minimum volume required for a sediment forebay can be provisionally calculated using Steps 1 to 3 of the disposal area procedure outlined above.

12. The responsibilities for both routine and non-routine wet pond maintenance need to be clearly vested so that funds can be budgeted for a

regular maintenance program. If the responsibilities fall to a homeowners association, the nature and extent of their obligations should be clearly delineated in a legally binding agreement or covenant. Even if a public agency is not responsible for maintenance, private maintenance efforts should be monitored as a normal part of the inspection process. Because of the limited financial reserves and technical expertise of homeowners associations, public maintenance is clearly preferred.

ENVIRONMENTAL ATTRIBUTES OF WET PONDS

A wet pond represents a significant modification to the urban landscape, and has both positive and negative impacts on the natural and human environment. These impacts need to be carefully assessed during the site review stage to ensure that a pond is an appropriate choice.

Impacts on the Natural Environment

When properly designed and managed, wet ponds are an attractive habitat for fish and wildlife. Adams et al. (1983) have documented high wildlife and waterfowl utilization in wet ponds in Columbia, Maryland, particularly in comparison to adjacent dry ponds. Several local stocking programs have also shown that several species of warmwater fish can thrive in larger and deeper wet ponds. The value of wet pond habitat is high because of the general lack of quality habitat in urban areas and its close proximity to local residents.

On the other hand, wet ponds can severely disturb the sensitive ecology of headwater streams. The complex downstream impacts to aquatic life caused by stream regulation have been extensively studied (Ward and Stanford, 1979). For example, wet ponds heat up rapidly during the warmer months and increase downstream water temperatures by as much as 10-11°F (Galli, 1986). In a recent Maryland study, maximum water temperatures of 85°F were recorded in the discharge from a wet pond. This temperature exceeds most coldwater fishery standards in Maryland and Virginia, and perhaps more importantly, can severely stress and even kill sensitive fish populations. The problem is most pronounced in wet ponds situated in narrow, deep valleys that are not well mixed by the wind.

Wet ponds have been prohibited in the upper Paint Branch watershed in Montgomery County, Maryland which supports a native brown trout population because of concerns over thermal discharges (CH2M-Hill, 1980). Unfortunately, few other headwater streams in the region support coldwater fisheries due to past watershed and riparian disturbances. Even so, thermal discharges from wet ponds probably will stress the more tolerant and degraded stream biota that exists in most parts of the region today. Thermal discharges can be mitigated, to some extent, by bottom water releases and deep, over-sized pond designs. Planners should be sure to consult with state fish biologists when reviewing proposed wet pond applications.

Dissolved oxygen can become depleted periodically during the summer in wet ponds. This may result in the release of anoxic waters downstream (Galli, 1986; Free and Mulamootil, 1983). Natural reaeration processes will normally allow dissolved oxygen levels to recover within a few hundred yards below the pond. However, aquatic life within this short "mixing zone" may be drastically altered.

While wet ponds manage post-development peak discharges, they typically do not control increases in the frequency of bankfull discharges or the decrease in summer low flows. Both factors can degrade the quality of downstream aquatic habitat (see Chapter 1).

Concern has also been expressed about the impacts of wet ponds on upstream aquatic life, particularly when large regional structures are constructed. In these instances, the channel network conveying runoff to the pond is not protected from bank erosion, which may reduce the value of aquatic habitats.

Two points should be kept in mind when evaluating the overall impact of wet ponds on the local environment. First, while wet ponds may have potentially severe downstream impacts on aquatic life, it is also likely that impacts of urbanization may produce the same result. Preservation of sensitive aquatic environments in urbanizing areas requires a comprehensive watershed protection program including land use control, sediment control enforcement, land acquisition, monitoring and critical review of each new development proposal (CH2M-Hill, 1980). Unless these commitments are made, it is probable that downstream habitat will become degraded with or without wet ponds.

Design Tips to Improve Wet Pond Wildlife Habitat

The following management guidelines have been adapted from various wildlife management documents:

1. Aquatic vegetation which provides food and cover for wildlife should be established in the pond. General procedures for selecting and propagating wetland plants which have wildlife or waterfowl value are described in Chapter 9. Additional technical assistance can be obtained from cooperative extension agents.

2. A buffer strip with a minimum width of 25 feet around the pond should be planted with shrubs, trees and grasses, preferably those that provide food and cover for wildlife. The strip should not be continuous, since some species need bare loafing areas. No trees should be planted on the embankment. Adams et al. (1983) recommend that no more than 50% of the perimeter of the pond be heavily vegetated if waterfowl are the desired management objective.

3. The depth of the pond should be variable with at least 25% of the pond less than two feet deep. This objective can usually be met by a 10 to 20 foot aquatic bench around the perimeter and a shallow sediment forebay near the pond inlet.

4. Deeper areas (>5 feet) and large surface areas (>1 acre) may be required to maintain fish populations (SCS, 1986).

5. Baseflow must be present to maintain water levels near the design elevation in the summer months. Wet ponds located in watersheds of less than 20 acres should have a reliable water source and a clay liner.

6. Side-slopes should be gentle to promote wildlife and waterfowl utilization. If feasible, slopes should be graded to 10:1 (h:v).

Design Tips For Mitigating Downstream Impacts

1. Thermal discharges from wet ponds may be alleviated by designing risers to withdraw water from the bottom of the pond where water will normally be cooler. If bottom water releases are contemplated, it is often advisable to place surge stone in the barrel to help re-aerate the low oxygen bottom waters before they are discharged. Trees can also be planted (or saved during site clearing) around the perimeter of the pond to provide shade that prevents rapid warming. Additionally, ponds can be located in exposed areas where prevailing winds can help to mix the waters of the pond, thereby reducing the stratification in the pond.

2. Aerators or fountains can be installed in ponds to maintain dissolved oxygen levels. Relatively cheap wind-driven aerator models are now available. A well-anchored riprap "cascade" can be incorporated into the outfall of the pond for better reareation.

3. Detention times in wet ponds can be extended to provide greater downstream bank erosion control at little additional expense (see Chapter 3).

4. Various stream improvement techniques can be applied to mitigate downstream habitat degradation, such as log check dams, rock or log deflectors, and vegetative or riprap protection of channels. An excellent state of the art review of stream improvement technologies is provided in Wesche (1985).

5. Additional mitigation measures may be suggested by fisheries and wildlife professionals that are consulted during the design phase.

Impacts on the Human Environment

Resident surveys indicate that wet ponds are a popular BMP with the public, if they are well designed and maintained. Both Adams et al. (1983) and Tassone (1984) found that residents preferred wet ponds over dry ponds by a three to one margin in separate surveys in Maryland. Residents feel that ponds enhance property values, add to the appearance of the community, and promote a sense of community (Baxter et al., 1985). Deeper, vegetated ponds that are managed for wildlife were clearly preferred by residents. Some respondents complained about safety, mosquitos, odor, turbidity, and algae problems, but on the whole, most felt that the beneficial aspects of wet ponds outweighed the temporary nuisances.

Most of the residents surveyed recognized the need for frequent maintenance of ponds in the surveys. Several larger homeowners associations in the region (Columbia, Maryland; Reston, Virginia; and Montgomery Village, Maryland) have gone so far as to adopt watershed and pond management/maintenance programs in recent years.

Concerns have been raised about the safety aspects of wet ponds, particularly with respect to liability. A few jurisdictions do require that wet ponds be fenced to prevent access by children; most, however, feel that fences are an "attractive nuisance". Wet ponds can be designed to minimize the risk of accidental drowning by keeping them relatively shallow, installing an underwater safety bench, avoiding any sharp drop-offs from shores, keeping sideslopes gentle, and fencing off large diameter outfalls.

RELEVANT DESIGN GUIDANCE

The design summary presented on the following pages provides a summary of some of the more important design features to consider when planning a wet pond. These are also shown in schematic form in Figure 4.7. In addition, the following references should be consulted when designing a wet pond:

Md. Soil Conservation Service. 1981. Standards and Specifications for Ponds. Practice Code No. 378.

Md. Association of Soil Conservation Districts. 1976. Stormwater Management Pond Design and Construction Manual.

Md. Water Resources Administration. 1986. Feasibility and Design of Wet Ponds to Achieve Water Quality Control.

U.S. Environmental Protection Agency. 1986. Methodology for Analysis of Detention Basins for Control of Urban Runoff Quality. EPA-600/2-80-135.

U.S. Soil Conservation Service. 1987. Revised Urban Hydrology for Small Watersheds. Technical Release No. 55.

DESIGN SUMMARY: WET PONDS

- **SIZE:**
  At a minimum, the volume of the permanent pool should be at least 2.5 times greater than the runoff volume generated by the mean storm (0.45 inches*runoff coefficient*watershed acres). The contributing watershed area should be at least ten acres in size, the pond surface area at least 1/4 acre.

- **SHAPE:**
  The pond should be wedge-shaped, narrowest at the inlet and widest at the embankment. A minimum length to width ratio of 3:1 should be used unless gabion baffles are used to extend the flow path. Irregular shorelines are preferred.

- **DEPTH:**
  Pond depth should average 3-6 feet, with a shallow underwater bench (minimum 10 feet wide) around the pond's perimeter. Water depths should be shallow near the inlet and deeper at the riser. Extremely deep ponds (average depth 8 feet or more) should normally be avoided to prevent stratification and to minimize excavation costs.

- **SIDE-SLOPES:**
  Side-slopes should be no steeper than 3:1 (h:v) and not flatter than 20 to 1. A flat safety bench, at least 10 feet wide, should be located near the toe of the slope.

- **SOILS:**
  If soils at the pond site are highly permeable, (in the "A" or "B" hydrologic groupings), it may be necessary to line the bottom of the pond with an impermeable geotextile or a six inch clay liner. Often, impermeable fill soils can be found elsewhere in the development for this purpose.

- **RISER DESIGN:**
  Where feasible, wet ponds should be designed to accommodate 24 to 40 hours of extended detention for a one-inch storm. Orifices used to maintain the permanent pool level should withdraw water at least one foot below the surface, and where environmental conditions warrant, close to the pond bottom. Hoods or trash racks should be installed on the riser to prevent clogging. For access and aesthetic reasons, the riser should be placed near or within the embankment. However, if the riser is located on the face of the embankment, fencing may be required. To reduce future maintenance requirements, concrete, rather than corrugated metal pipe, should be used for barrels and risers.

- **OUTFALL PROTECTION:**
  The channel immediately below the pond should be modified to conform to natural dimensions, and lined with large rip-rap placed over filter cloth. Stilling basins, rock deflectors, check dams and other devices should be used to reduce flow velocities to non-erosive levels.

- **POND BUFFER:**
  Wet ponds should be surrounded by a buffer strip, at 25 feet wide. The buffer strip should be planted with water tolerant, low maintenance grasses, shrubs and trees.

- **VEGETATION:**
  When feasible, it is suggested that artificial marsh fringe be established near the inlet or forebay, and around at least 50% of the pond perimeter.

- **EMBANKMENT:**
  At least 10-15% extra fill should be allowed on the embankment to account for possible subsidence. The embankment should have at least one foot of freeboard above emergency spillway. Anti-seep collars should be used to prevent seepage around the barrel, and a core trench installed under the embankment to key it to the substrate. The embankment should be graded to allow access, and mowed twice annually to prevent woody growth.

- **SITE ACCESS:**
  Adequate access from public or private right of way to the pond should be reserved. The access should be at least 10 feet wide, on a slope of 5:1 or less, and stabilized to withstand the passage of heavy equipment. The access road should not cross the emergency spillway, unless it is properly stabilized.

- **ENVIRONMENTAL REVIEW:**
  Consult with planners and biologists to develop a design that mitigates impacts to downstream aquatic life. Prepare a landscaping plan that provides habitat requirements for wildlife and waterfowl and is attractive to local residents.

- **MAINTENANCE:**
  Wet weather inspections should be conducted annually, with as-built plans in hand. Maintenance responsibilities should be clearly vested, with funds reserved for both routine and non-routine tasks.

- **SEDIMENT REMOVAL:**
  Begin final construction after upland area has been stabilized. Construct a sediment forebay near the inlet of the pond with extra storage equal to the volume of projected sediment trapping over a 20 to 40 year period. Reserve on-site sediment disposal areas near the pond in the form of a site easement.

Figure 4.7: Design Schematic of a Wet Pond

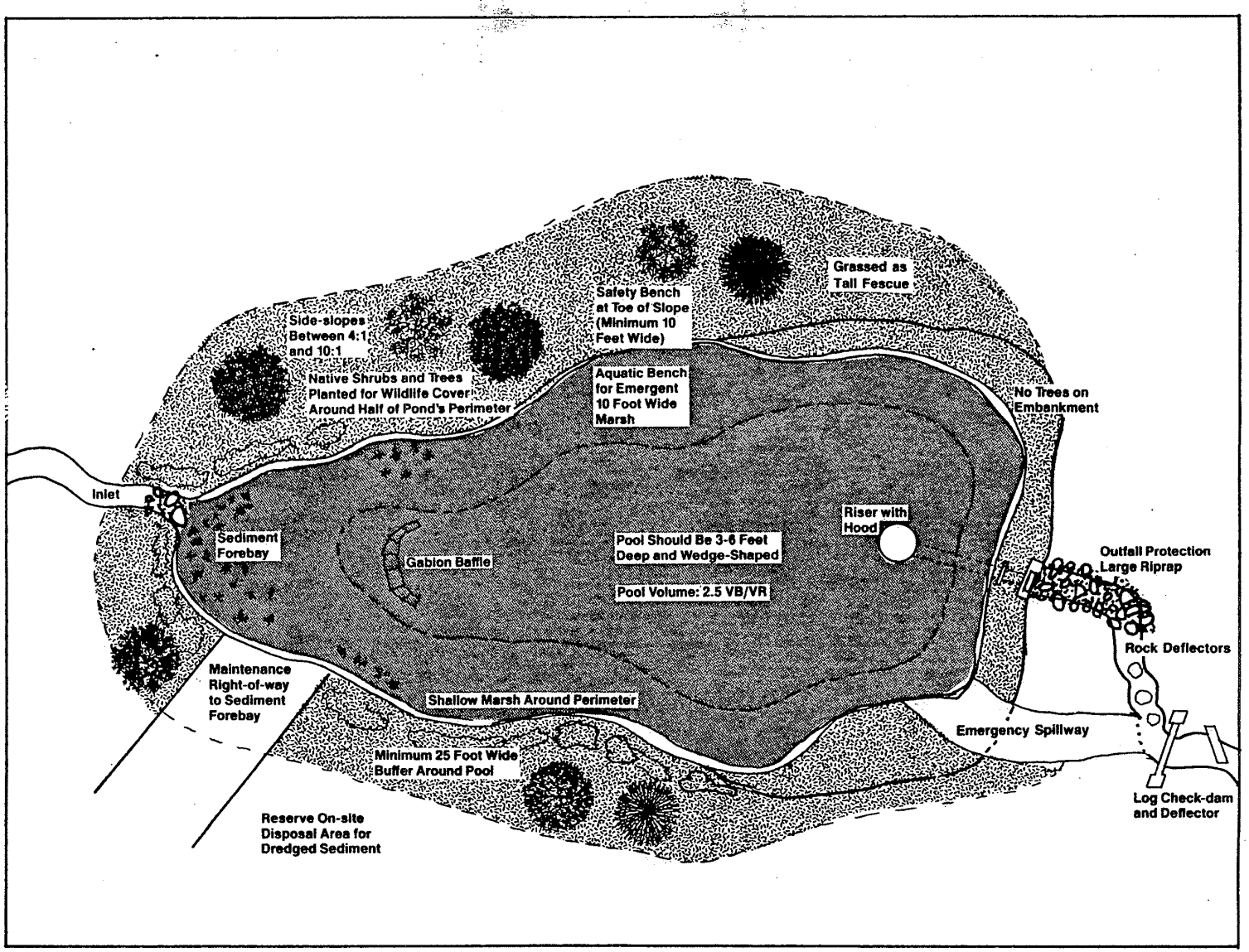

CHAPTER 5: INFILTRATION TRENCHES

Infiltration trenches are an adaptable BMP that effectively remove both soluble and particulate pollutants. As with other infiltration systems, trenches are not intended to trap coarse sediments. Grass buffers (for surface trenches) or special inlets (for underground trenches) must be installed to capture sediment before it enters the trench. Depending on the degree of storage/exfiltration achieved, trenches can provide groundwater recharge, low flow augmentation and localized streambank erosion control. Individual trenches are primarily an on-site control, and are seldom practical or economical on sites larger than 5 or 10 acres. Trenches are only feasible when soils are permeable and the water table and bedrock are situated well below the bottom of the trench. Aside from regular inspections and more rigorous sediment and erosion control, trenches have limited routine maintenance requirements. However, trenches will prematurely clog if sediment is not kept out before, during and after construction of a site. If a trench does become severely clogged, partial or complete replacement of the structure may be required.

Figure 5.1: Schematic of an Infiltration Trench

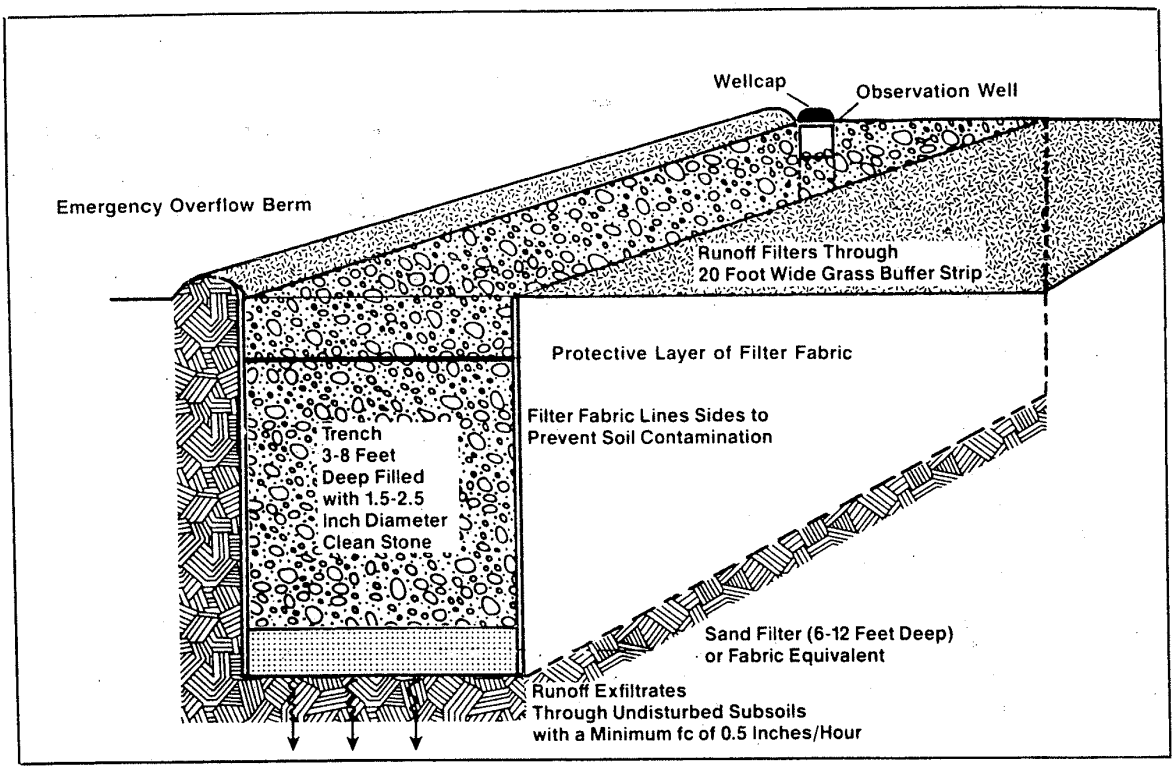

Advantages of infiltration trenches are that they preserve the natural groundwater recharge capabilities of the site, are relatively easy to fit into the margins, perimeters and other unutilized areas of a development site, and are one of the few BMPs that provide pollutant removal on small sites or infill developments.

The disadvantages associated with infiltration trenches include practical difficulties in keeping sediment out of the structure during site construction (particularly if development occurs in phases), the need for careful construction of the trench and regular maintenance thereafter, and a possible risk of groundwater contamination.

INFILTRATION TRENCH METHODS

A schematic of an infiltration trench is shown in Figure 5.1. Basically, runoff is diverted into a shallow (3-8 feet deep) excavated trench that has been backfilled with stone to form an underground reservoir. Runoff is then either exfiltrated from the reservoir into the underlying subsoil or is collected by perforated underdrain pipes and routed to an outflow facility.

Trench size depends on two factors: the volume of runoff controlled, and the degree to which exfiltration is used to dispose of runoff. Typically, larger trenches are needed for stormwater control, whereas smaller versions can be employed for water quality purposes. The three basic trench systems are described below.

Complete Exfiltration System

In this design, runoff can only exit the trench by exfiltrating through the stone reservoir and into the underlying soils (i.e., there is no positive pipe outlet from the trench). As a result, the stone reservoir must be large enough to accommodate the entire expected design runoff volume, less any runoff volume lost via exfiltration during the storm. The complete exfiltration system provides total peak discharge, volume, and water quality control for all rainfall events less than or equal to the design storm. A rudimentary overflow channel, such as a shallow berm or dike, may be needed to handle any excess runoff from storms greater than the design storm.

Partial Exfiltration System

It may not always be feasible or prudent to rely totally on exfiltration to dispose of runoff. For example, there may be concerns about the long-term permeability of the underlying soils, downstream seepage, or clogging at the interface between the filter fabric and subsoil.

Many current designs use a perforated underdrain at the bottom of the trench to collect runoff and direct it to a central outlet. Since trenches are narrow, the collection efficiency of the underdrain is very high. As a result, these designs may only act as a short-term underground detention system. The low exfiltration rates and short residence times, together, result in poor pollutant removal and hydrologic control.

Performance of partial exfiltration systems can be improved during smaller storms when perforated underdrains are not used. Instead, a perforated pipe can be inserted near the top of the trench (Figure 5.2). Runoff then will not exit the trench until it rises to the level of the outlet pipe. Storms with less volume than the design storm may never fill the trench to this level, and will be subject to complete exfiltration.

In either design, the passage of the inflow hydrograph through the trench can be modeled using the modified TR-20 procedure (Md WRA, 1983b) to determine the appropriate sizing of the trench. Due to storage/timing effects, partial exfiltration trenches will be smaller in size than full exfiltration trenches serving the same site.

Water Quality Exfiltration Systems

The storage volume of a water quality trench is set to receive only the first flush of runoff volume during a storm. The first flush volume has been variously defined as; 1) one-half inch of runoff per impervious acre, 2) one-half inch runoff per acre, and 3) the volume of runoff produced by a one inch storm. The remaining runoff volume is not treated by the trench, and is conveyed to a conventional detention or retention facility downstream.

While water quality exfiltration systems do not satisfy stormwater storage requirements, they may result in smaller, less costly facilities downstream. The smaller size and area requirements of water quality exfiltration systems allows considerable flexibility in their placement within a development site, an important factor for "tight" sites. Additionally, if for some reason, the water quality trench fails, stormwater may still adequately be controlled by a downstream SWM facility.

INFILTRATION TRENCH DESIGN VARIATIONS

Trench designs can be further distinguished as to whether they are located on the surface or below ground. Surface trenches accept diffuse runoff (sheet flow) directly from adjacent areas, after it has been filtered through a grass buffer. Underground trenches can accept more concentrated runoff (from pipes and storm drains), but require the installation of special inlets to prevent coarse sediment and oil/grease from clogging the stone reservoir. Several examples of surface and underground trench designs are shown in Figures 5.2 to 5.9, and are described below. In most cases, these designs are adaptable for either full, partial or water quality exfiltration.

Surface Trench Applications

Surface trenches are typically applied in residential areas, where smaller loads of sediment and oil can effectively be trapped by grass filter strips. Since the surface is exposed, these trenches have a slightly higher risk of clogging than underground trenches. However, if preventative measures are taken (e.g., placing permeable filter fabric 6-12 inches below the surface of the trench to intercept sediment), any surface clogging that occurs can be relieved without having to reconstruct the entire trench. Because of their accessibility, surface trenches are easier to maintain and inspect.

DESIGN 1:

Median Strip Design (Figure 5.2). This design is frequently used for highway median strips and parking lot "islands" (depressions in between two lots or adjacent sides of one lot). Sheet flow is accepted from both sides of the trench, and is filtered through a 20 foot wide grassed buffer strip. The strip is an integral part of the trench, and should be graded to have a uniform slope not greater than 5%, and should directly abut the contributing impervious area. Berms located on each side of the strip form a shallow depression that temporarily stores runoff before it enters the trench. An overflow pipe is used to pass excess runoff.

Figure 5.2: Median Strip Trench Design

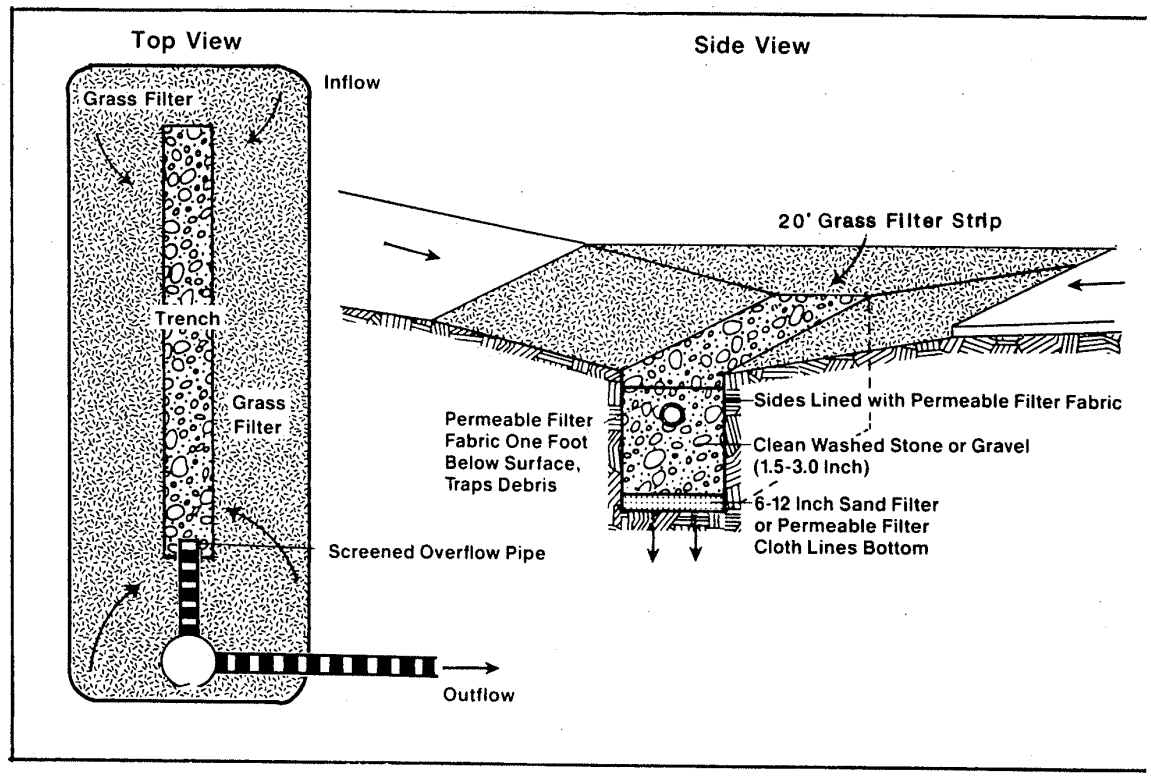

DESIGN 2:

Parking Lot Perimeter (Figure 5.3). This design accepts sheet flow from the lower end of a parking lot. Slotted curb spacers are used as level spreaders to route sheet flow from the parking lot over the 20 foot wide filter strip (and also keep cars from damaging the strip). After being filtered over the grass strip, runoff enters the surface of the trench. A shallow berm is installed at the far end of the trench to ensure that runoff does not escape. The trench should have an overflow to pass large design storms, such as a PVC pipe with holes drilled on its underside, set near the top of the trench (Figure 5.3).

Figure 5.3: Parking Lot Perimeter Trench Design

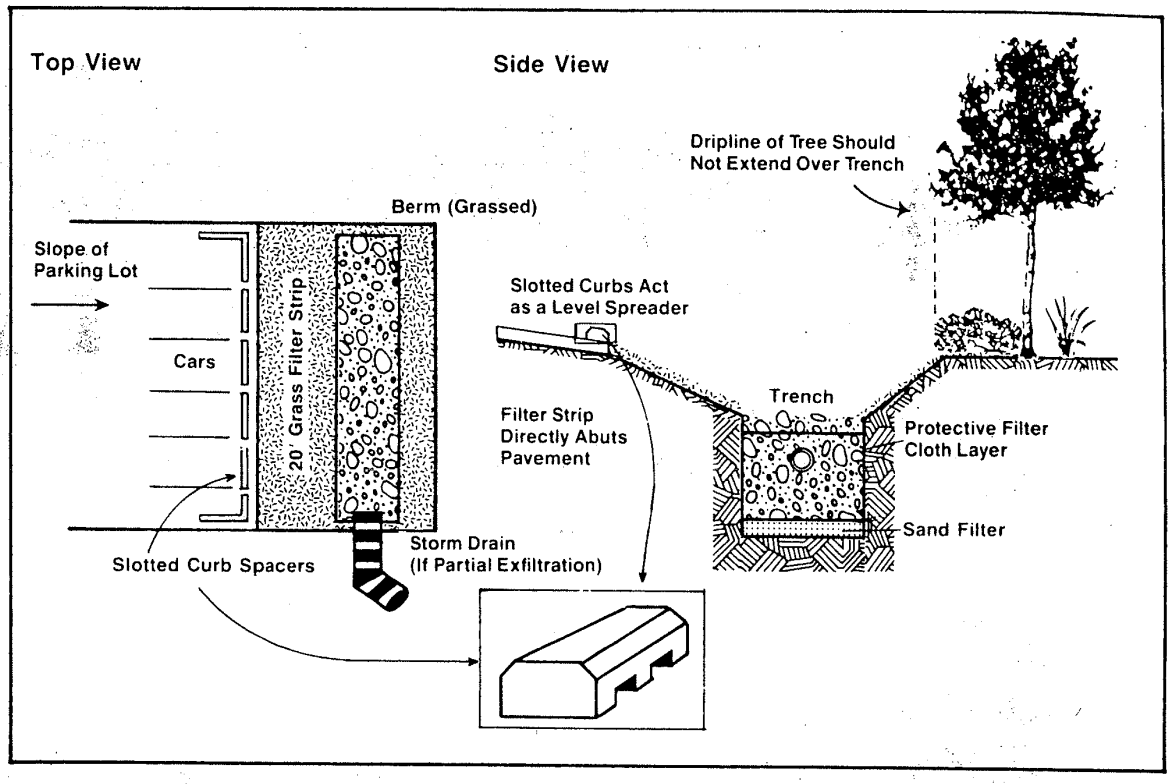

DESIGN 3:

Swale Designs (Figure 5.4). Low density residential runoff (5-15% impervious) can be treated through a series of surface trenches located in swale drainage systems. The major design requirement is that the longitudinal slope of the swale collection system should never exceed 5%. Otherwise, concentrated flows will develop that might erode the swales and contaminate the trench. In addition, concentrated flows may pass around or over the surface of the trench and never infiltrate. An earthen check dam or railroad tie placed perpendicularly to the flow path, on the downstream side of the trench, can prevent "short-circuiting" and increase the volume of runoff exfiltrated by the trench. The slope of the trench should be as close to zero as feasible, and should have sideslopes of 5:1 (h:v) or less.

Figure 5.4: Swale/Trench Design

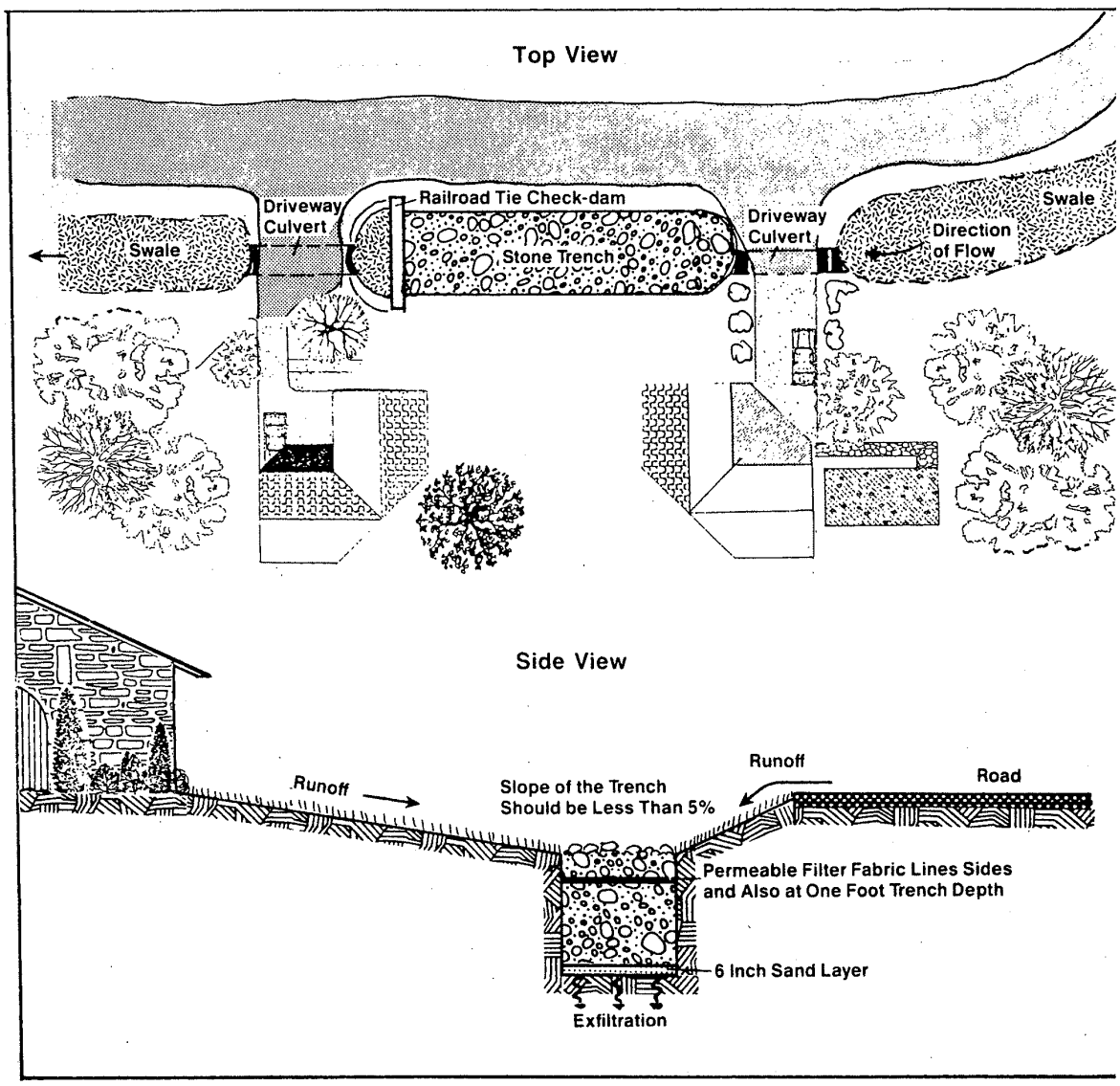

Underground Trench Applications

Underground trenches can be applied in a variety of development situations, and are particularly suited to accept concentrated runoff. However, it is important to pretreat concentrated runoff before it enters underground trenches, and to evenly distribute it within the trench. The top of the trench is protected by a layer of impermeable geo-textile, and is covered by topsoil and planted with grass. While the aesthetics of underground trenches may be better than surface trenches, maintenance can be more difficult and costly (particularly, if the trench must be covered by pavement or concrete). Often "out-of-sight" means "out-of-mind". Consequently, underground trenches should only be installed when strong, enforceable maintenance agreements can be secured from the property owner.

DESIGN 1:
Over-sized Pipe Trench (Figure 5.5). In some designs, an oversized corrugated metal pipe is placed within the trench. Holes are drilled through the pipe to allow runoff to drain to the stone reservoir and then into the subsoil. The oversized pipe is protected from clogging by a layer of filter fabric. The primary advantage of this approach is that it increases the available temporary storage of the trench (i.e., more void space is provided within the pipe than if it was occupied by stone aggregate). The feasibility of the oversized pipe approach is governed by the exfiltration rate of the subsoil, as the pipe must completely drain within 72 hours. As with other underground trench designs, runoff must be pretreated. A two chamber inlet design is shown in Figure 5.5.

Figure 5.5: Oversized Pipe Trench Design

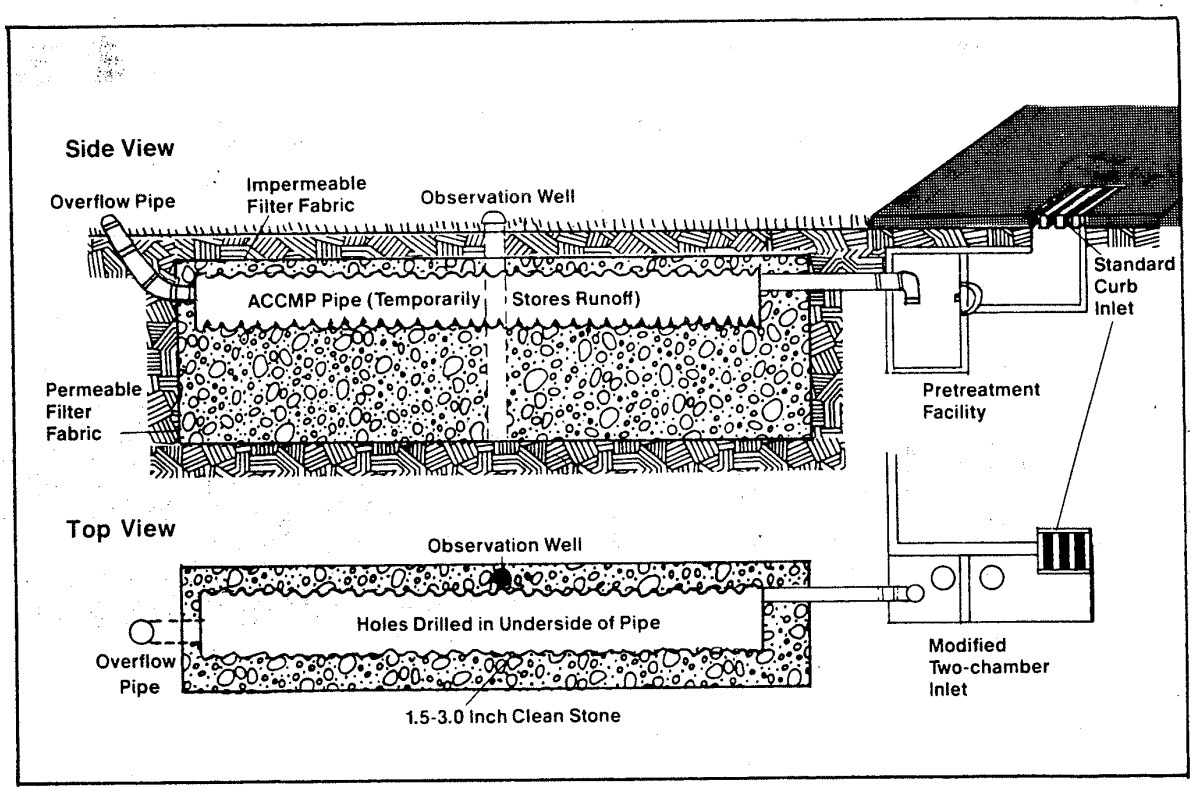

DESIGN 2:

Underground Trench with Oil/Grit Inlet. (Figure 5.6). Commercial/industrial parking lots produce significant loads of grit and oil, that can, and do, rapidly clog the top of surface trenches, and also provide greater stormwater flows that must be collected by a stormdrain. In these development situations, an oil/grit inlet is needed to pretreat the runoff before it enters the trench. Three-chamber designs (Chapter 8) are popular, whereby the first chamber traps coarse sediment and litter, the second chamber separates out the oil and grease, and the third chamber serves as the inlet to the trench. If the trench is desired for either partial or water quality exfiltration, the third chamber must also have the capability to divert overflow to a storm drain network. More detailed guidance on oil/grit inlets is provided in Chapter 8. A perforated pipe extends along the top of the underground trench so the runoff can be evenly distributed across the stone reservoir.

Figure 5.6: Underground Trench with Oil/Grit Chamber

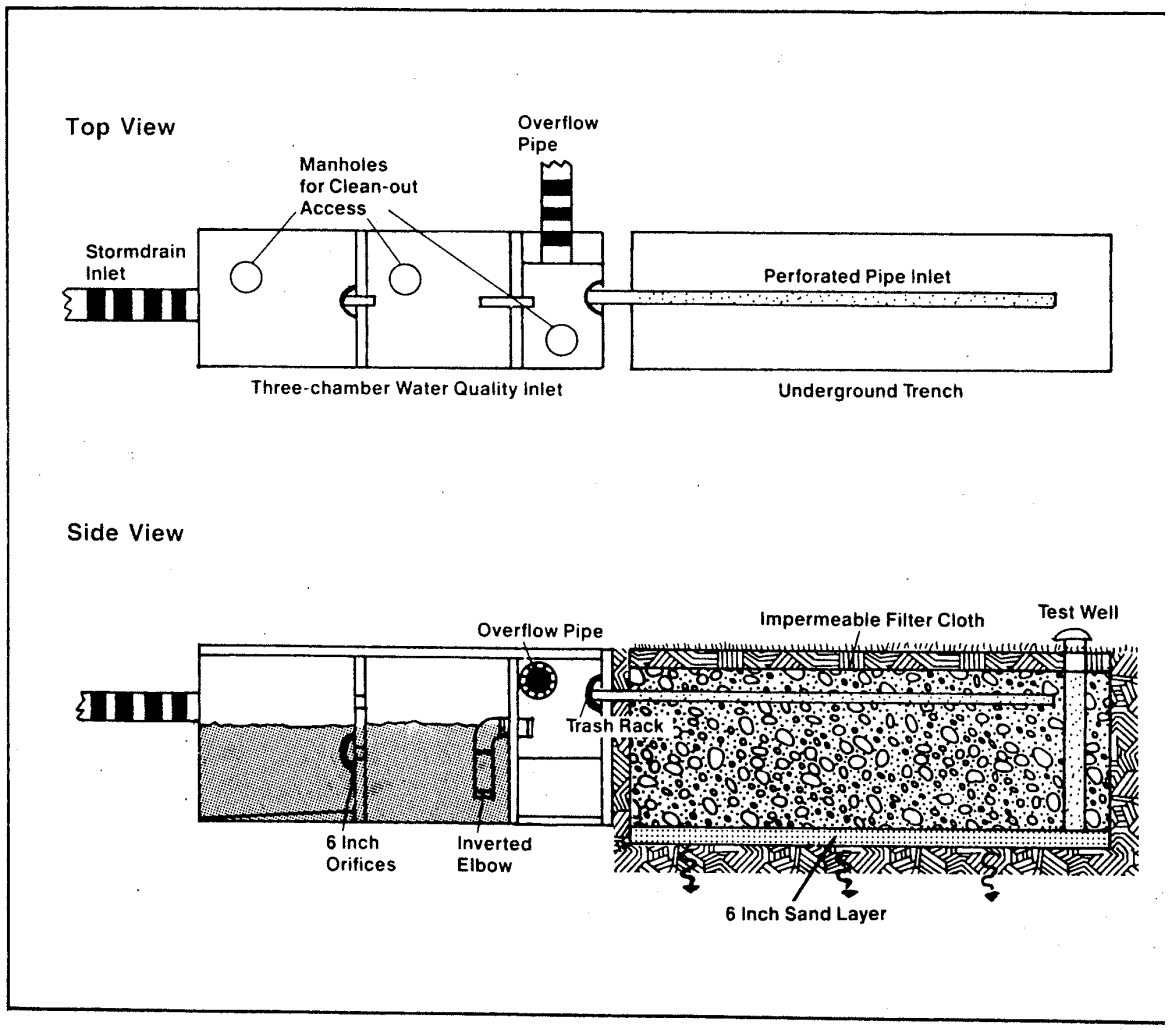

DESIGN 3:

Under-the-Swale Design (Figure 5.7). A surface trench located in a swale may not always be a popular choice for nearby residents. An alternative approach is to place a railroad tie weir across the swale, drop a barrel inlet at the base of the weir to trap sediment, and extend a perforated pipe from the barrel and along the top surface of the trench to distribute runoff evenly. The top of the trench is then covered by at least two layers of nearly impermeable geo-textile, with a 6-12 inch layer of topsoil laid on top. After grass is established, only the test well and railroad tie weir will be visible to residents.

Figure 5.7: Under-the-Swale Trench Design

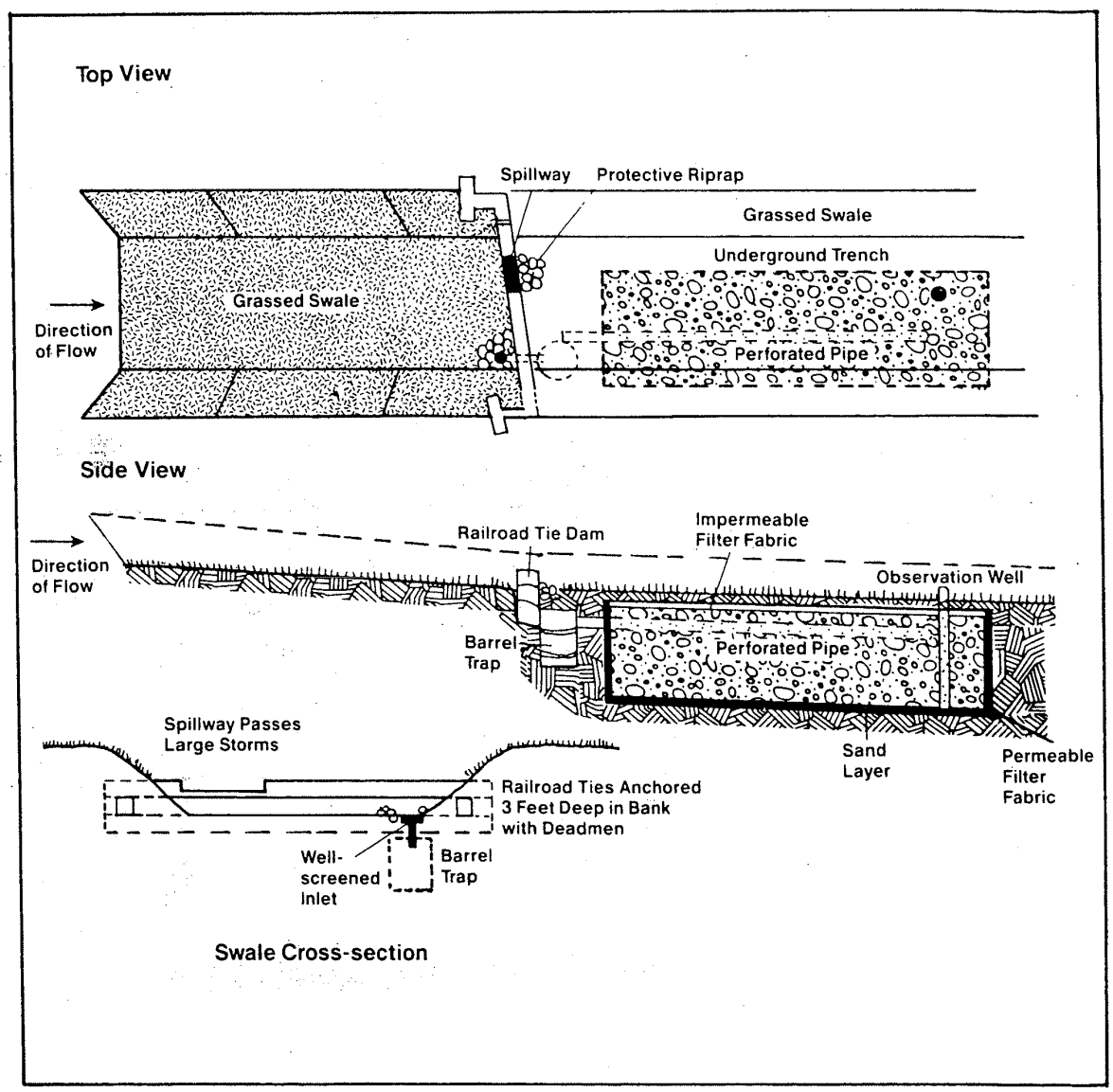

DESIGN 4:

Dry Well Designs. (Figure 5.8). Dry wells are a basic trench variation which are designed exclusively to accept rooftop runoff from residential or commercial buildings (Figure 5.8). Additional guidance on dry well design is available from Md WRA (1984). Basically, the leader from the roof is extended into an underground trench, which is situated a minimum of ten feet away from the building foundation. Rooftop gutter screens are needed to trap any particles, leaves and other debris, and must be regularly cleared.

Figure 5.8: Dry Well Design (adapted from Md WRA,1986)

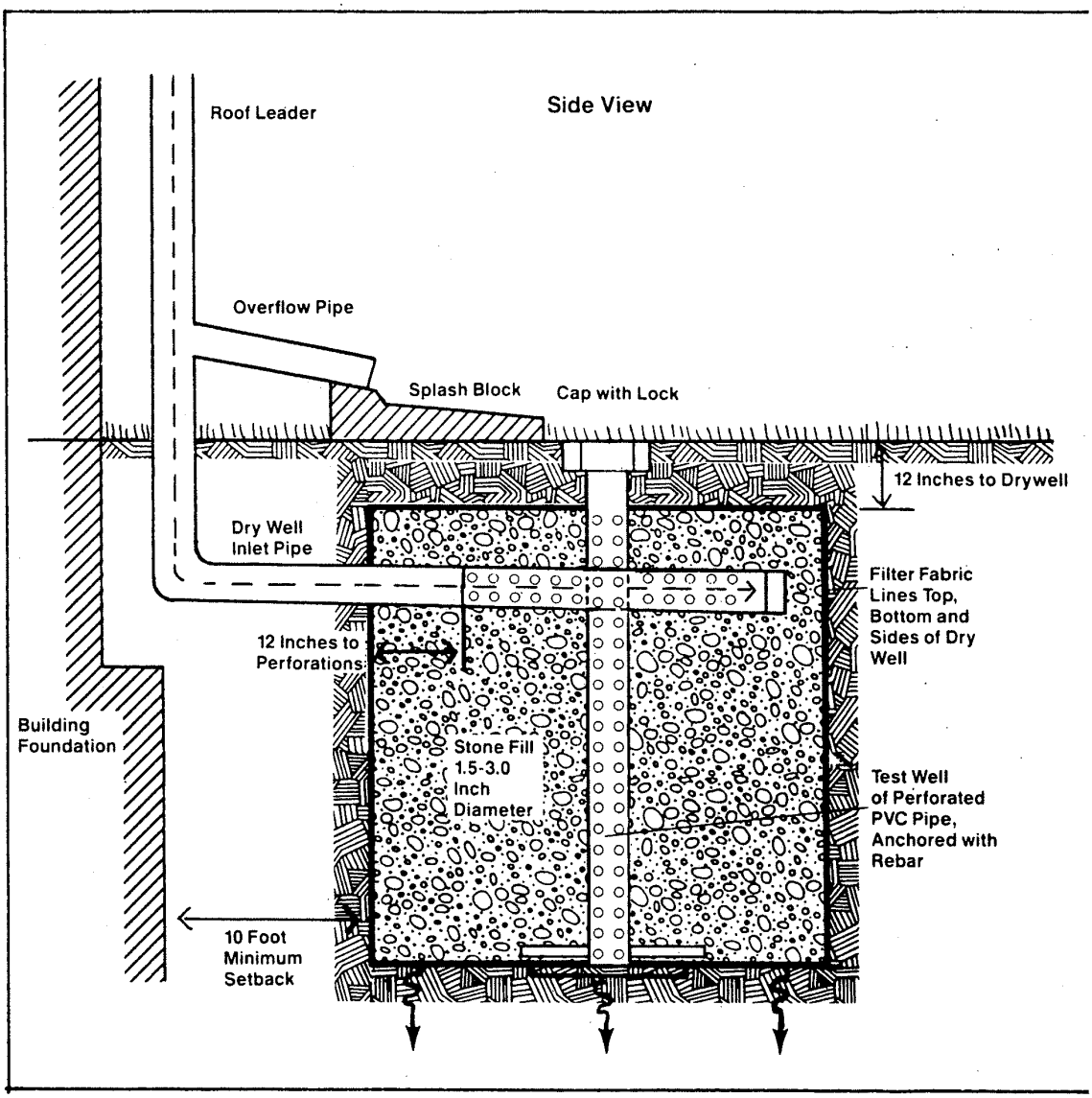

DESIGN 5:

Off-Line Trench System Designs. (Figure 5.9). Several designs have been originated in Texas (Austin DPW, 1986) that utilize a combination of off-line sediment traps, sand filters and infiltration trenches to treat the first flush of runoff. In one design, a weir is placed across a natural or man-made channel that diverts runoff into an off-line sediment trap. After sediment drops out, the runoff enters a vertical perforated pipe that drains to a level-spreading weir. Runoff then passes over a sand filter to remove any fine particulates or grease remaining in the runoff. After percolating through the sand filter and a layer of permeable filter fabric, runoff is stored in a gravel or stone reservoir, and then exfiltrated into the subsoil (alternatively, runoff from the gravel or stone reservoir can be collected by an underdrain network and be returned to the stream). Some general sizing rules for the area of the sediment trap and trench surface area adapted from Austin DPW (1986) are shown in Figure 5.9.

Figure 5.9: Off-line Trench System Design

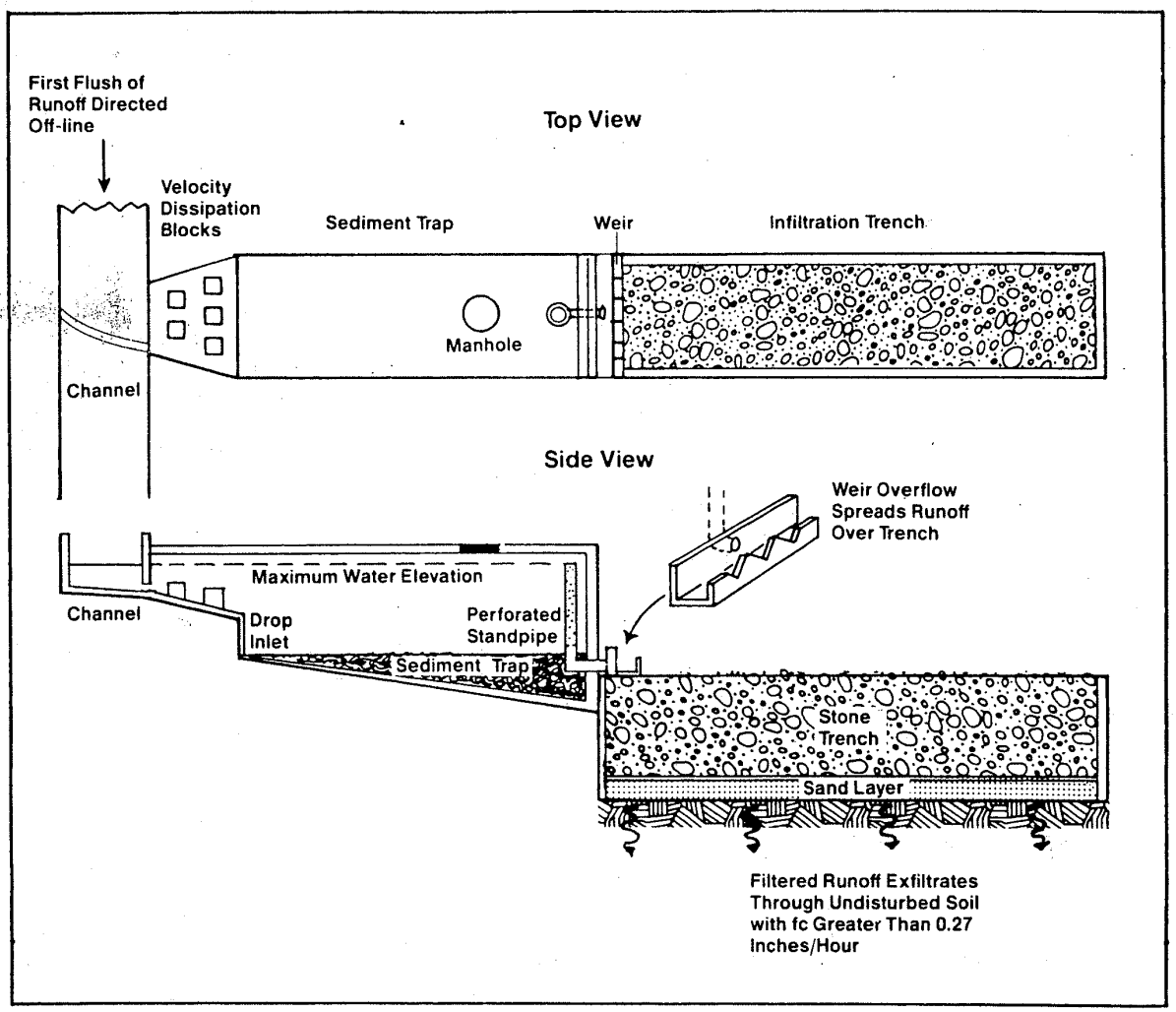

EFFECTIVENESS IN STORMWATER CONTROL

Infiltration trenches have the potential to nearly reproduce natural, pre-development hydrologic conditions.

Peak Discharge Control

Full exfiltration trenches completely attenuate the peak discharge associated with the design storm, often well below pre-development levels. For physical and economic reasons, however, it is not always practical to provide enough storage for very large and infrequent design storms (e.g., the 10 or 100 year storms). In such instances, partial exfiltration trenches are used to pass the design storm, and peak discharge control is provided for either the 2 or 10 year design storm. Water quality exfiltration cannot adequately control peak discharges for most design storms, because of their minimal storage capacity, but can reduce the storage needs of a downstream control device in some cases.

Groundwater Recharge

Most trench systems are able to divert a large fraction (60-90%) of the annual runoff volume into the soil. This enhanced recharge helps to maintain flow levels in small headwater streams during critical dry weather periods. Maryland WRA (1986b) estimates that even the smaller sized water quality exfiltration systems can maintain summer baseflow levels to within 90% of natural pre-development conditions. When full exfiltration trenches are utilized, it is actually possible to increase summer baseflow levels slightly above pre-development levels, as diverted runoff is not subject to losses via transpiration.

Volume Control

Unlike retention/detention ponds, trenches can effectively reduce the increase in post-development runoff volume produced during small and moderate sized storms. Storm runoff exfiltrated into the soil profile does not normally appear as part of the downstream storm hydrograph. The effectiveness of a trench in reducing storm runoff volumes is a function of the degree of exfiltration attained (i.e, full exfiltration is better than partial exfiltration, which in turn, is better than water quality exfiltration).

Streambank Erosion Control

The superior hydrologic performance of exfiltration systems should prevent serious streambank erosion immediately below the site. However, since trenches are applied to very small sites, and will only manage stormwater from a small portion of a stream's watershed, other practices (such as extended detention or infiltration basins) must be installed elsewhere in the basin to provide comprehensive protection.

POLLUTANT REMOVAL

As with porous pavement BMPs (see Chapter 7), infiltration trenches are not really intended to provide much removal of coarse particulate pollutants. These must be removed by a pre-treatment device before they enter the trench. Fine particulates and soluble pollutants are effectively removed after exfiltrating through the trench and into the soil. Several decades of

experience of land disposal of wastewater has shown that the soil layer is a highly effective and normally safe means of removing pollutants (MWCOG, 1979). Removal mechanisms involve sorption, precipitation, trapping, straining and bacterial degradation or transformation, and are quite complex. The actual removal rates for an individual pollutant depend on its solubility and biochemistry.

Full and Partial Exfiltration Trenches

Table 5.1 provides estimates of pollutant removal rates that might be expected for full exfiltration systems, based on field testing of similar rapid infiltration land treatment systems (NVPDC, 1979; US EPA, 1977).

Table 5.1: Estimated Long-Term Pollutant Removal Rate for Full Exfiltration Trenches

URBAN POLLUTANT	REMOVAL RATE	LIMITING FACTOR
SEDIMENT	99%	Should actually be trapped before reaching the trench.
TOTAL PHOSPHORUS	65-75%	Leaching of remineralized organic P.
TOTAL NITROGEN	60-70%	Leaching of soluble nitrate.
TRACE METALS	95-99%	Behavior similar to sediment.
BOD	90%	Leaching of dissolved organic matter.
BACTERIA	98%	Straining.

Water Quality Trenches

A significant portion of the annual runoff volume will bypass a water quality trench, and is not then subject to removal by exfiltration. Therefore, the pollutant removal capability of water quality trenches are somewhat lower than other designs. As noted earlier, there are two sizing rules for water quality trenches:

SIZING RULE 1: Trench storage volume should be equivalent to 0.5 inches of runoff per impervious acre in the contributing watershed (Md WRA, 1986b).

SIZING RULE 2: Trench storage volume should be capable of storing the runoff produced from a one inch storm over the contributing watershed (1.0*Rv*A) (see Chapter 1 for an explanation of variables).

The comparative runoff capture efficiency for each of these trench sizing rules was evaluated using observed runoff time-series for 300 storms at seven Washington, D.C. NURP sites (imperviousness: 11-27%, "B" soils). A series of calculations were made to determine the runoff volume diverted into, and

bypassed over hypothetical trenches according to the water quality rules shown above. The results are shown in Figure 5.10. Under Rule 1 (0.5 inches/impervious acre), approximately 40-50% of storm runoff volumes is captured and exfiltrated over the long-term. For the more generous Rule 2 (runoff from one inch storm), capture efficiencies on the order of 65-75% of storm runoff volumes can be expected.

Actual pollutant removal rates in water quality trenches are slightly higher than the runoff volume capture efficiency, primarily because of the first flush phenomenon (Griffin et al., 1980; Md WRA, 1986b). That is, a greater portion of storm pollutant loads are delivered during the early part of storms due to the rapid wash-off of accumulated pollutants (Sartor and Boyd, 1977). Based on local modeling studies (NVPDC,1979) and field studies (Griffin et al., 1980) of the first flush effect, expected pollutant removal rates for water quality trenches are estimated in Table 5.2.

Figure 5.10: Runoff Capture Efficiency of Water Quality Trenches

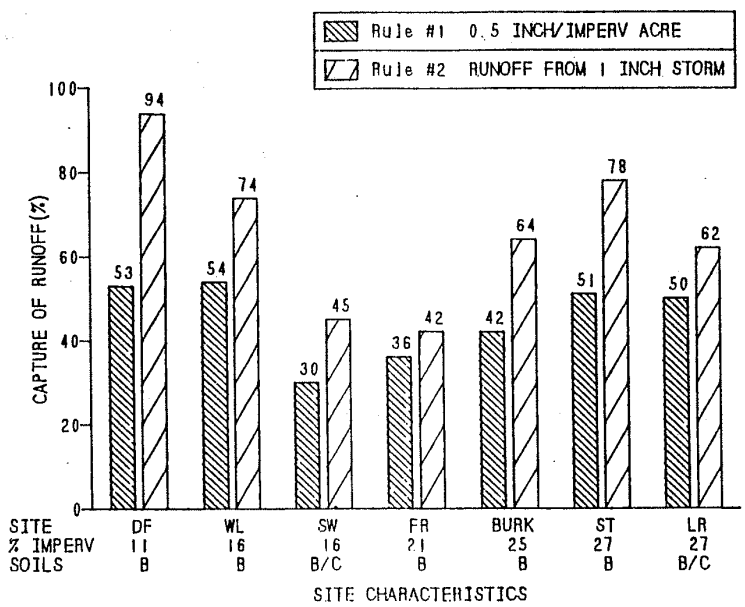

Table 5.2: Estimated Long-Term Pollutant Removal Rate (%) for Water Quality Trenches

POLLUTANT	SIZING RULE 1	SIZING RULE 2
SEDIMENT	75%	90%
TOTAL PHOSPHORUS	50-55%	60-70%
TOTAL NITROGEN	45-55%	55-60%
TRACE METALS	75-80%	85-90%
BOD	70%	80%
BACTERIA	75%	90%

DESIGN TIPS FOR ENHANCING POLLUTANT REMOVAL

Apart from maximizing the amount of runoff exfiltrated, other steps can be taken to promote enhanced pollutant removal.

Surface Area of the Trench Bottom

Pollutant removal in a trench can be enhanced by increasing the surface area of the trench bottom. This is done by adjusting the geometry to make the trench shallow and broad, rather than deep and narrow. More extensive bottom surface area increases exfiltration rates and also provides more area and depth for soil filtering. In addition, broader trench bottoms reduce the risk of clogging at the soil/filter cloth interface by spreading exfiltration over a wider area.

Nature of Subsoils

The greatest sorption of nutrients and metals occurs in soils with a high content of clay and/or organic matter; whereas, the least sorption is observed in sandy soils (US EPA, 1977). The same trend holds true for bacterial densities as well. Unfortunately, soils that maximize sorption and bacterial growth also have low and sometimes unacceptable infiltration rates.

Maximum Draining Time

The trench should be designed to completely drain within three days after the maximum design storm event. Complete drainage is needed to maintain aerobic conditions in the underlying soil long enough to favor bacteria that aid in pollutant removal (and also to ensure that the trench can accept runoff from the next storm).

If a trench is constructed over soils with a marginal infiltration capacity (e.g, loam and silt loam soils), it may be advisable to adjust the depth of the trench so that it drains in two days or less, as a safety margin.

Minimum Draining Time

Moderate to poor pollutant removal has been observed in partial exfiltration systems which hold water less than 6 hours (MWCOG, 1983b). Short residence times do not allow for adequate exfiltration, and thus limit pollutant removal capability. Several design factors lead to rapid passage of runoff through a trench. In particular, perforated underdrains in the bottom of a narrow trench will often be very efficient in collecting runoff, thereby reducing residence time.

Low pollutant removal rates were observed in a perimeter parking trench monitored during the Washington, D.C. NURP project (MWCOG, 1983b). Virtually no exfiltration was observed at the site. The problem was further compounded by low permeability soils and the absence of filter strips on the site. Consequently, the poorly designed trench exhibited no removal of nutrients and soluble trace metals, and, unfortunately, trapped moderate amounts of coarse particulates that apparently clogged the trench (MWCOG, 1983b).

Maintenance

Test wells should be installed in every trench to monitor draining times after installation. The water level in the well should be measured daily after a large storm. If the trench does not completely drain after 3 days, it usually means that the bottom of the trench has clogged and remedial measures need to be taken to improve performance. Conversely, if a partial exfiltration trench empties completely within a day, it means either the collection efficiency of the underdrain is too great, or the bottom of the trench has clogged, or both. Again, remedial measures will have to be taken to ensure adequate pollutant removal.

PHYSICAL SUITABILITY AT THE SITE LEVEL

Before a trench is constructed, the site should be carefully evaluated to be determine whether it is feasible and practical to rely on exfiltration to dispose of runoff. The following factors need to be examined early in the site planning stage to adequately screen the site. More detailed guidance on trench feasibility can be found in Md WRA (1984).

Soils

Trenches are not a feasible option for sites with "D" soils (i.e., infiltration rates of less than 0.27 inches per hour), or any soil with a clay content greater than 30% (as determined from the SCS soil textural triangle). Silt loams and sandy clay loams ("C" soils) provide marginal infiltration rates, and should probably only be considered for partial exfiltration systems (see Table 5.3). Soils with a combined silt/clay percentage greater than 40% by weight are susceptible to frost-heave, and are not good candidates for infiltration trench applications. No matter what soil type is present, the stone subgrade must extend below the frost-line (typically 8-12 inches in the Washington D.C. metropolitan area). Also, trenches are not suitable over fill soils that form an unstable subgrade, and are prone to slope failure.

If the soils at a site pass these tests, a series of soil cores or trenches should be taken at the site, to a depth at least five feet below the anticipated level of the stone reservoir bottom. These should be examined for evidence of any impermeable soil strata that might impede infiltration, such as localized clay lenses, hardpans, or fragipans. The presence of such layers do not necessarily preclude a trench, as long as the stone reservoir completely penetrates them.

Slope

An underground trench is not a feasible option on sites with a slope greater than 20%. Surface trenches are not recommended when contributing slopes are greater than 5%. The slope of the bottom of the trench should be close to zero to evenly distribute exfiltration, unless the design includes a positive outlet.

Depth to Bedrock

At least four feet of clearance will be needed between the bottom of the stone reservoir and the bedrock level. Depth to rock can be estimated from local soil maps but should always be confirmed by several soil test borings.

Depth to Seasonally High Water Table

A minimum of two to four feet of clearance is needed from the bottom of the stone reservoir to the seasonally high water table. This is readily determined by soil borings taken during a wet period.

Proximity of Wells and Foundations

Trenches in commercial and industrial areas should be located at least 100 feet away from a drinking water well to minimize the possibility of groundwater contamination, and should be situated at least 10 feet down-gradient and 100 feet up-gradient from building foundations.

Maximum Depth of Reservoir

To insure that the stone reservoir completely drains in 72 hours, it may be necessary to limit the depth of the stone reservoir when underlying soils have relatively low exfiltration rates. These limits are shown for various soil textures in Table 5.3. If necessary, the dimensions of an infiltration trench would have to be modified in order to accommodate the necessary volume without exceeding the maximum depth limits.

Table 5.3: Soil Limitations For Infiltration Trenches

SOIL TEXTURE	MINIMUM INFILTRATION RATE (fc-inches/hour)	SCS SOIL GROUP	MAXIMUM DEPTH OF TRENCH (in) 48 hours	72 hours
Sand	8.27	A	992	1489
Loamy Sand	2.41	A	290	434
Sandy Loam	1.02	B	122	183
Loam	0.52	B	62	93
Silt Loam	0.27	C	32	49
Sandy Clay Loam	0.17	C	20	31
Clay Loam	0.09	D	11	16
Silty Clay Loam	0.06	D	7	11
Sandy Clay	0.05	D	6	9
Silty Clay	0.04	D	6	7
Clay	0.02	D	2	4

Sources: Maryland WRA (1984) and Shaver (1986).

Watershed Size

Md WRA (1984) suggests that trenches be restricted in size to serve drainage areas of less than 5 acres. This guideline reflects the fact that larger watersheds are more practically and cost-effectively served by other BMPs.

Space Limitations

The application of surface trenches could conceivably be space-limited on some "tight" sites because of the 20 foot buffer strip requirement.

INFILTRATION TRENCH COSTS

Predicting Infiltration Trench Costs

A general planning estimate of trench costs can be made using equation 5.1 (Wiegand et al, 1986):

(EQ 5.1) $C = 26.6\ (Vs^{**}0.63)$

where C = construction cost in 1985 dollars, and
Vs = storage volume (cf) of the void space in the trench (≈40% of the excavated trench volume).

The planning equation should not be used if trench storage volumes are greater than 10,000 cubic feet, and does not include costs related to pretreatment of runoff (special inlets or grass filters). An additional 25% should be added to the cost estimate to cover contingency costs.

A more accurate infiltration trench cost estimate can be derived using the in-place unit cost data for infiltration trench components supplied in Table 5.4. Component costs for trenches fall into five general categories, and the quantity of each component can be quickly estimated from trench geometry. The five categories include the following:

1. EXCAVATION constitutes about 20-25% of the total trench cost (Wiegand et al., 1986). Excavation requirements for a trench are equivalent to the total trench volume (width*depth*length).

2. STONE FILL typically comprises 45-55% of the total trench cost. Again, the quantity of stone required can be estimated on the basis of trench volume. Stone fill should be clean/washed material ranging from 1.5 to 3 inches in diameter. Bluestone is generally not recommended. In some cases, washed gravel may be substituted for stone fill.

3. FILTER CLOTH needed to line the sides, bottom and optional top protective layer may contribute approximately 10-15% of the total cost. The quantity of filter cloth needed is approximately equal to: 2(width*depth)+2(length*depth)+2(width*length)+10% overlap allowance.

4. INLET AND OUTLET PIPES needed for underground trenches make up about 10-30% of the total cost of the trench.

5. SODDING rather than hydroseeding should be used for filter strips to ensure that the trench is not contaminated by sediment before grass is established.

EXAMPLE 5-1: UNIT COSTING ESTIMATION FOR A HYPOTHETICAL INFILTRATION TRENCH.

Estimate the costs of constructing a planned partial exfiltration surface trench of the following dimensions: 150 feet long, 6 feet deep, and 6 feet wide.

Step 1. Trench Volume = (l)(w)(d) or (150)(6)(6) = 5400 cubic feet. (converted to cubic yards, 27 cf=1 cy = 200 cubic yards)

Surface Area= (l)(w) or (150)(6) = 900 square feet.

Step 2. Calculate the component costs:

EXCAVATION:	(150)(6)(6)=5400, 5400/27 = 200 cy	@ $2.82/cy	$564
STONE FILL:	(150)(6)(6)=5400, 5400/27 = 200 cy	@ $22.50/cy	$4500
FILTER CLOTH:	2(6*6)+2(150*6)+2(150*6) = 3672, 10% added (3672)(1.10) = 4039 4039/9 = 449 sy	@ $2.71/sy	$1217
INLET PIPE:	50 feet + 6 feet = 56 feet	@ $10.00/ft	$560
SODDING:	(20)(150) = 3000 square feet	@ $.25/sf	$750
TOTAL COST			$7591

Cost-Effectiveness

Figure 5.8 shows the relationship between construction cost and storage volume provided for 53 BMPs installed in the Washington D.C. metropolitan area (Wiegand et al., 1986). As can be seen, infiltration trenches exclusively serve very small areas (< 10,000 cubic feet storage volume), and, in fact, are the only economical BMP employed in this size range. Extended detention and wet ponds are generally not recommended for small watersheds. Dry ponds, which can be applied on small sites, but have little or no pollutant removal capability, are seldom economically competitive when compared with trenches due to the high fixed costs associated with inlets and risers.

While trenches are the most economical BMP application for small sites, they are probably not the most cost-effective BMP for widespread application in a basin, due to economies of scale. As an example, suppose the total stormwater management storage requirement for a large development is 100,000 cubic feet (cf). The total cost of constructing twenty 5000 cf trenches would be slightly over 100,000 dollars; whereas, the cost of constructing two 50,000 cf extended detention ponds or one 100,000 cf wet pond would be approximately 38,000 and 54,000 dollars, respectively.

Table 5.4: In-Place Unit Costs For Infiltration Trench Construction Components

ITEM	UNITS[1]	AVERAGE IN-PLACE UNIT COST[2]	TYPICAL RANGE
Common Excavation	cy	2.82	2.00-5.00
Clear and Grub	ac	2800.00	1,500-3,500
Seed/Mulch	sy	0.58	0.25-1.00
Rip-Rap	sy	38.00	25.00-55.00
Select Fill	cy	3.97	3.00-5.50
Silt Fence	lf	4.11	2.00-5.00
Gabions	cy	114.00	****
Filter Cloth	sy	2.71	2.00-5.00
PVC Pipe			
6 inch	lf	10.00	8.00-12.00
8 inch	lf	10.50	****
10 inch	lf	15.00	****
Stone Fill (1-2")	cy	22.50	15.00-25.00
Clean Washed Sand	cy	14.00	****
Pea Gravel	cy	7.50	****
Stone Tamping	cy	2.00	****
Observation Well	lf	150.00	25.00-400.00
Sediment Control	lf		1,000-8,000

[1] Unit cost data derived from MWCOG (1983a) and supplemented by 45 itemized SWM construction bids or bonding estimates analyzed in the Washington, D.C. area, 1983-1986. Items for which less than five independent estimates were available are denoted by ****. Material costs may vary among jurisdictions and regionally.

[2] cy=cubic yard, sy=square yard, ac=acre, lf=linear foot.

Figure 5.11: Construction Cost Versus Storage Volume in the Washington, D.C. Region

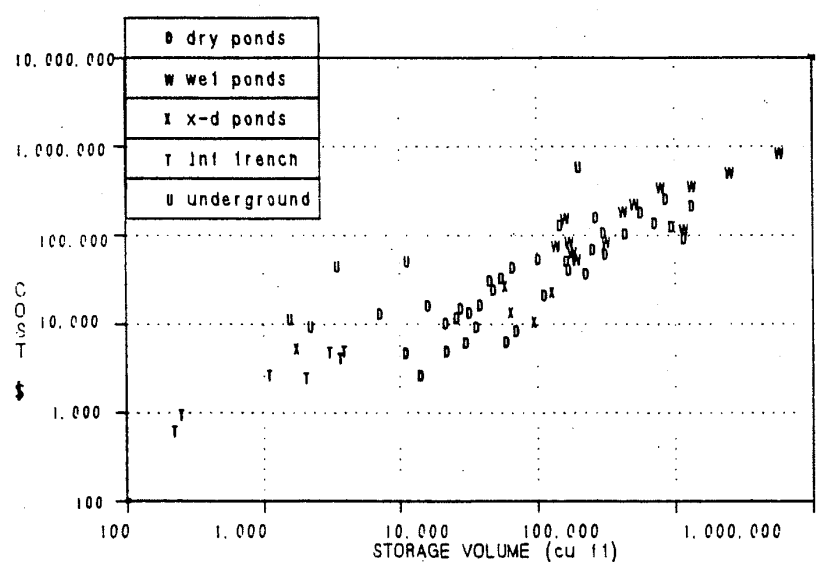

CONSTRUCTION SPECIFICATIONS AND MAINTENANCE REQUIREMENTS

Proper construction and routine maintenance are extremely important for successful trench applications. A substantial number of trenches have failed shortly after being built, primarily due to poor construction practices, inadequate field testing or lack of sediment control. Also, a high percentage of trenches built in the 1970's in the suburban Washington area have failed, primarily because sediment was not filtered or trapped before entering the trench. The discussion below highlights construction and maintenance procedures that should minimize the risk of premature clogging.

Construction Specifications

1. Before the entire development site is graded, the area planned for the trench should be roped off to prevent heavy equipment from compacting the underlying soils.

2. Diversion berms should be placed around the perimeter of the trench during all phases of construction. Sediment and erosion control plans for the site should be oriented to keep sediment and runoff completely away from the trench area. Actual construction of the trench should not begin until after the site is completely stabilized.

3. The trench should be excavated using a backhoe or trencher equipped with tracks or over-sized tires. Normal rubber tires should be avoided since they compact the subsoil and may reduce infiltration capability. For the same reason, the use of bulldozers or front-end loaders should be avoided. Excavated material should be stored at least 10 feet from the trench to avoid backsliding and cave-ins

4. Once the trench is excavated, the bottom and sides of the stone reservoir should be lined with filter fabric to prevent upward piping of underlying soils. The fabric should be placed flush with the sides and bottom with a generous overlap at the seams. Care should be taken in selecting the proper kind of filter fabric, as available brands differ significantly in their permeability and strength. A partial list of approved filter fabric brands is shown in Table 5.5 (Prince Georges County, 1984). If desired, a six inch deep filter of clean, washed sand may be substituted for filter fabric on the bottom of the trench.

5. Clean, washed 1-3 inch stone aggregate should be placed in the excavated reservoir in lifts, and <u>lightly</u> compacted with plate compactors to form the course base. Unwashed stone has enough associated sediment to pose a clear risk of clogging at the soil/filter cloth interface. In some jurisdictions, washed pea-gravel is an acceptable substitute. Where possible, the use of bluestone aggregate should be avoided.

6. A simple observation well should be installed in every trench. Typical details for the well are provided in Figure 5.12. The observation well is needed to monitor the performance of the trench, and is also useful in marking its location. The drain time for a trench can be measured by placing a graduated dip-stick down the well immediately after a storm and again 24 and 48 hours later.

7. Post-construction sediment control is critical. It is therefore important that; 1) sediment and erosion controls be inspected to make

sure they still work, 2) the vegetated buffer strips are established immediately, preferably by sodding, and 3) if hydroseeding is used, reinforced silt fences or Austin triangles must be placed between the buffer and trench to prevent sediment entry before the buffer becomes fully established.

Table 5.5: Approved Geo-Textiles For Use in Infiltration Trenches

Mirafi 140-N	NOTE: This is a partial list of acceptable filter fabrics for use in infiltration trenches available from suppliers in the Washington, D.C. area. The use of a brand name does not constitute an endorsement by MWCOG of any particular product or company.
Supac 4NP, 4.5NP, 5NP and 8NP	
Typar 3401	
AMOCO 4545	
EXXON Geo-textiles No. 125D, 130D and 150D	
TerraTex SD	

Source: Prince George's County Stormwater Bulletin No. 4, 1986.

Figure 5.12: Detailed Schematic of a Typical Observation Well

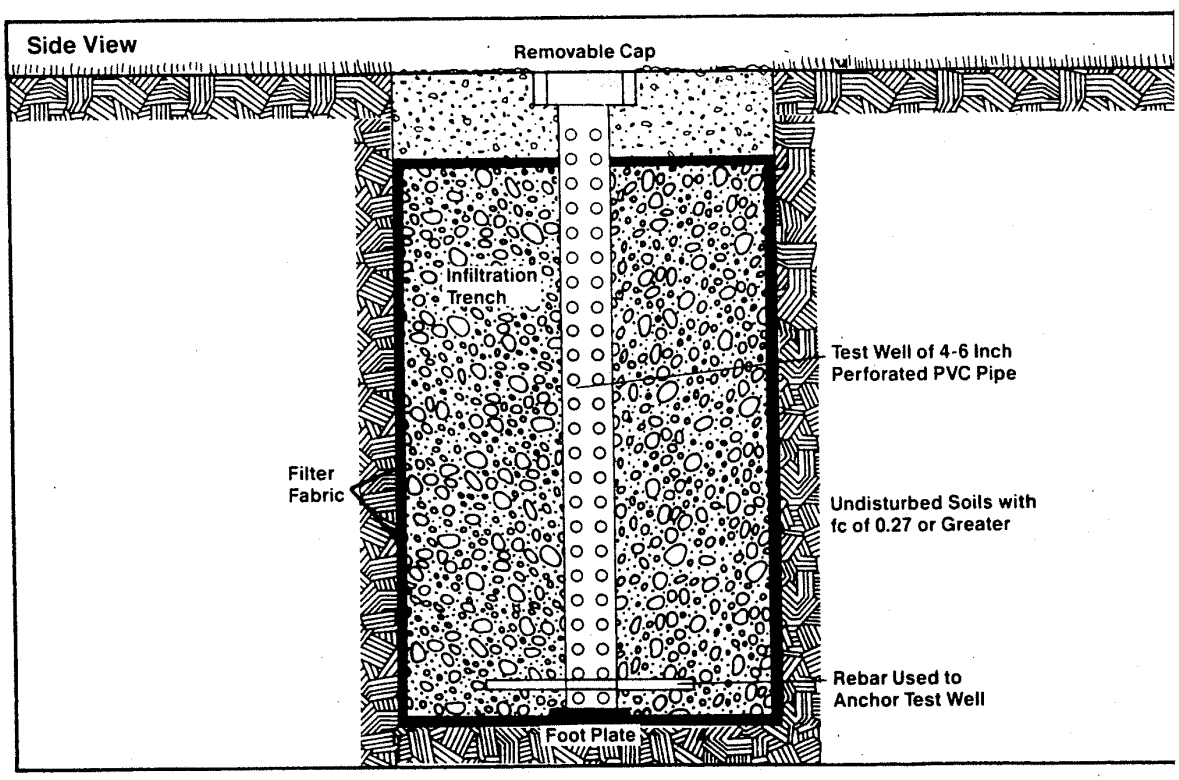

Routine Maintenance

The routine maintenance requirements of trenches are not great. However, getting property owners to actually perform them may be very difficult. Trenches are smaller and more inconspicuous than most other BMPs, and when located underground, may not be visible or accessible. As a result, residents are not likely to exhibit much concern over trench maintenance as they might for more visible BMPs, such as wet or extended detention ponds. For these reasons, a public sector commitment to regularly inspect privately owned trenches is a necessity. Property owners will need to be educated about the function and maintenance requirements of the trench. A legally binding maintenance agreement should be included with the property deed that clearly describes maintenance tasks and schedules. Further, the agreement should grant access for regular inspections, and enable the public sector to perform maintenance (and bill the owners) if the trench has been neglected. Some of the normal maintenance tasks for trenches are detailed below.

INSPECTION

The trench should be inspected several times in the first few months of operation, and then annually thereafter. The inspections should be conducted after large storms to check for surface ponding that might indicate local or wide spread clogging. Water levels in the observation well should be recorded over several days to check trench drainage. Surface trenches can be inspected by hand by digging with a trowel down to the first layer of filter fabric located one foot below the surface.

BUFFER MAINTENANCE

The condition of the grass buffer strips in surface trenches should be inspected annually. Growth should be vigorous and dense. Bare spots, eroded areas, or "burned out" areas (from road salt or gasoline spills) should be reseeded or re-sodded. Watering and/or fertilization should be provided during the first few months after the strip is established, and may periodically be needed in times of drought.

MOWING

Grass filter strips should be mowed at least twice a year to prevent woody growth as well as for aesthetic reasons. Filter strips in residential areas will need to be mowed more frequently (10 to 14 times per year). Filter strip performance will be impaired if the grass is cut too short (Tollner, 1976). To prevent lawn clippings from clogging the trench, mowers should be equipped with baggers or at a minimum be directed away from the trench.

SEDIMENT REMOVAL

The pre-treatment inlets of underground trenches should be checked periodically and cleaned out when sediment depletes more than 10% of available capacity. This can be done manually or by a vacuum pump. Inlet and outlet pipes should be checked for clogging and vandalism.

TREE PRUNING

Adjacent trees may need to be trimmed if their drip-line (i.e. the reach of the branches) extends over a surface trench so that tree leaves do not clog the trench. In addition, pioneer trees that start to grow in the vicinity of a trench should be removed immediately thereby avoiding root

puncture of the filter fabric through which sediment might enter the structure.

Non-Routine Maintenance

The primary non-routine maintenance task involves rehabilitation of the trench after it becomes clogged. Unfortunately, acceptably designed trenches have only recently come into use in the Washington, D.C. area. As a result, there is no reliable estimate as to how long trenches will function before they clog. Emphasis throughout this chapter has been on designs and procedures which minimize the likelihood of clogging. However, it is probable that some trenches will eventually clog despite careful design, construction and maintenance. Md WRA (1985b) suggests that the longevity of trenches may be on order of 10-15 years.

Clogging in surface trenches is most likely to occur near the top of the trench, between the upper layer of stone and the protective layer of filter fabric. Surface clogging can be relieved by carefully removing the top layer of stone, removing the clogged filter fabric, installing new filter fabric, and cleaning or replacing the top stone layer. The costs for rehabilitating a surface trench are not known, but are not likely to exceed 20% of the initial construction cost.

Clogging of underground trenches is a much more serious problem, as it is likely to occur at the bottom of the trench, at the filter fabric/soil interface. Rehabilitation of an underground trench requires the removal of 1) the topsoil/vegetation layer, 2) the protective plastic layer, 3) entire stone aggregate layer, and 4) the bottom filter fabric layer. Then, the subsoil layer must be tilled to promote better infiltration, and each layer must be replaced. If pavement or concrete are used for the surface layer (instead of topsoil/grass), the rehabilitation effort becomes more difficult and costly.

Total Maintenance Costs

No reliable data is presently available to assess maintenance costs for trenches. Routine maintenance costs will probably run higher for surface trenches than underground trenches, primarily due to the mowing operation needed for the filter strip. As noted above, the opposite is probably true for non-routine maintenance tasks. It is probably reasonable to assume that the cost of rehabilitating an underground trench will be roughly equivalent to the initial construction cost. Surface trench rehabilitation should only be approximately 20% of the initial construction cost; however, there are reasons to expect that the clogging of surface trenches may occur more frequently.

If it is assumed that surface and underground trenches will need rehabilitation every 5 to 15 years, respectively, then an annual maintenance set-aside of 5-10% (surface trenches) and 10-15% (underground trenches) of the initial construction cost may be needed to cover routine/non-routine maintenance expenditures. It must be emphasized that these estimates are highly uncertain. Until more local experience is obtained, the issue of trench maintenance costs remains largely speculative.

ENVIRONMENTAL ATTRIBUTES OF TRENCHES

Impacts to the Natural Environment

Infiltration trenches generally receive high marks for protecting downstream aquatic life, as they maintain the pre-development water balance at the site, minimize streambank erosion and filter out pollutants.

One potential negative impact of trenches is the risk of groundwater contamination. Long-term studies of pollutant migration in soils underneath various infiltration practices indicate only limited downward migration of pollutants through the soil (Nightingale,1987; OWML, 1983; US EPA, 1983). Possible exceptions include very soluble pollutants such as nitrate, chlorides and gasoline. A more definitive assessment of the possible risks of groundwater contamination by trenches is the focus of a current monitoring survey being conducted in Maryland by the U.S. Geological Survey

Impacts on the Human Environment

Trenches should be designed to be an unobtrusive feature of the landscape. Since trenches are largely or entirely underground, they are not likely to have any strongly positive or negative impacts on the human environment.

RELEVANT DESIGN GUIDANCE

A summary of important design features for infiltration trenches can be found in Table 5.6, and are shown in schematic form in Figure 5.10. The following references should also be consulted for more detailed guidance on the design and installation of infiltration trenches:

Maryland Water Resources Administration, 1984. Standards and Specifications for Infiltration Practices.

Maryland Water Resources Administration, 1986. Inspectors Guideline Manual for Stormwater Management Infiltration Practices.

DESIGN SUMMARY: INFILTRATION TRENCHES

- **SITE EVALUATION:**
  Soils must be tested prior to design to determine whether infiltration is feasible for a site. Soil borings should be taken to a depth at least five feet below the anticipated bottom of the trench to check for soil infiltration capability, depth to seasonally high water table, and bedrock level. The minimum field infiltration rate (fc) of the underlying soils should be greater than 0.27 inches/hour.

- **WATERSHED SIZE:**
  The watershed area contributing to each trench should not exceed 5 acres.

- **DEGREE OF EXFILTRATION:**
  To achieve significant pollutant removal, at least one-half inch of runoff per contributing impervious acre should be exfiltrated into the underlying soils. A more efficient design will accommodate the runoff produced from a 1 inch storm over the contributing watershed.

- **CONSTRUCTION:**
  All trenches should be excavated using light equipment, taking care not to compact the underlying soils used for exfiltration. The sides of the trench should be lined with filter fabric to prevent the entry of sediment into the trench. A six inch layer of sand, or filter fabric should be used to line the bottom of the trench. Clean, washed stone aggregate, 1.5-3.0 inches in diameter, should be used for fill, although washed pea-gravel may be an acceptable alternate in some cases.

- **PRETREATMENT OF RUNOFF:**
  To prevent premature clogging of trenches, sediment, grit, and oil must to be removed by a pre-treatment facility before they enter a trench. For surface trenches, a minimum 20 foot wide grass buffer is required as a filter. In addition, a layer of filter fabric placed one foot below the surface of the trench can be used to trap sediments that get through the grass buffer. Pretreatment technologies for Underground trenches include barrel inlets, water quality inlets, and modified catch-basins.

- **MAXIMUM DRAINING TIME:**
  All trenches should be designed to completely drain within 72 hours after the design exfiltration event. This enables the underlying soils to dry out (improving pollutant removal capability) and frees up storage capacity for the next storm. On sites with soils of marginal infiltration capacity (silt loams, loams), it may be advisable to design trenches to drain within 48 hours. This is done by maximizing the surface area of the trench floor, or reducing the depth of the trench, or both.

- **MINIMUM DRAINING TIME:**
  Partial exfiltration trenches should be designed so that all available storage space in the trench is filled before runoff is collected by the underdrain and routed out of the facility. This can be done by installing a perforated pipe (with holes drilled through the bottom) near the top of the trench to collect excess runoff. Perforated underdrains

situated at the bottom of the trench may become too efficient at collecting runoff, and thus reduce pollutant removal.

- **OBSERVATION WELLS:**
  An observation well, consisting of a well-anchored vertical perforated PVC pipe, should be installed in every trench to monitor its performance. The well should be checked several times within the first few months after construction, by recording trench water depth at 0, 24 and 48 hours after a storm. The clearance rate of runoff (inches/hour) in the trench can be calculated by dividing the drop in water level (inches) by the time elapsed from the end of the storm. A measurement of trench clearance rate should be taken during each annual maintenance inspection. A series of such measurements over the years provides an excellent means of tracking any clogging within the trench.

- **EROSION CONTROL:**
  Trenches should not be constructed until the entire upland contributing area has been stabilized (i.e., after construction is completed). The planned area for the trench should be roped off to prevent compaction by heavy equipment. During construction, sediment and erosion controls such as diversion berms, for example, should be used to keep sediment and runoff completely away from the trench site.

- **ANNUAL MAINTENANCE:**
  A legally enforceable and binding maintenance agreement should be included in the property deed for each trench that clearly spells out maintenance tasks and schedules. Annual public sector inspections should be conducted to check on the performance of the trench and the required maintenance tasks. These include maintaining a dense grass buffer strip for surface trenches, removing accumulated sediments within the pre-treatment devices of underground trenches, and partially or totally reconstructing the trench in the event of clogging.

CHAPTER 6: INFILTRATION BASINS

Infiltration basins are effective in removing both soluble and fine particulate pollutants borne in urban runoff. Coarse-grained pollutants should generally be removed before they enter a basin. Unlike other infiltration systems, basins can be easily adapted to provide full control of peak discharges for large design storms. Also, basins can serve relatively large drainage areas (up to 50 acres). Depending on the degree of storage/exfiltration achieved in the basin, significant groundwater recharge, low flow augmentation and localized streambank erosion control can be achieved.

Figure 6.1: Schematic of an Infiltration Basin

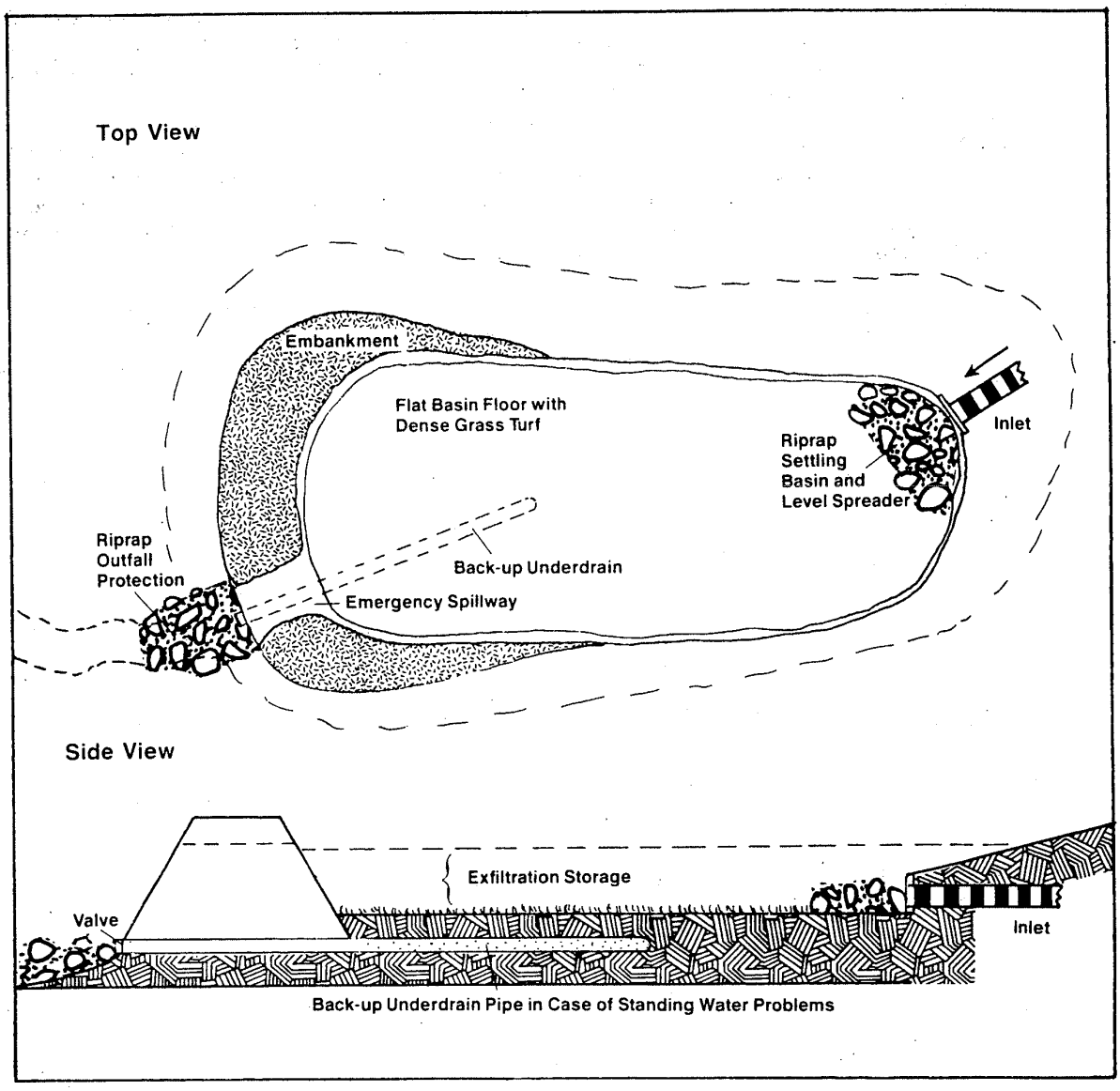

Basins are a feasible option where soils are permeable and the water table and bedrock are situated well below the soil surface. Both the construction costs and maintenance requirements for basins are similar to those for conventional dry ponds. Infiltration basins do need to be inspected regularly to check for standing water. Experience to date has indicated that infiltration basins have one of the higher failure rates of any BMP.

Advantages of infiltration basins are that they preserve the natural water balance of the site, can serve larger developments, can be used as sediment basins during the construction phase, and are reasonably cost-effective in comparison with other BMPs. Disadvantages of infiltration basins include a fairly high rate of failure due to unsuitable soils, the need for frequent maintenance, possible nuisances (e.g., odors, mosquitos, soggy ground), and some practical design problems.

INFILTRATION BASIN DESIGNS

A schematic of an infiltration basin is shown in Figure 6.1. The appearance and construction of infiltration basins is similar in many respects to conventional dry ponds. An impoundment is formed by excavation or by constructing an embankment. The impoundment stores a defined quantity of runoff, allowing it to slowly exfiltrate through the permeable soils of the basin floor. The floor is graded as flat as possible and a dense turf of grass is established to promote infiltration and bind up deposited sediments. Additional storage can be provided in the basin for temporary detention of the larger runoff volumes associated with the two year and/or ten year design storm, utilizing a conventional riser. An emergency spillway is used to pass runoff volumes in excess of the design storm controlled.

While simple in concept, infiltration basins do present some practical problems from a design standpoint. Problems emerge because infiltration methods are not very good at handling the concentrated flows and sediment loads that are generated from larger watersheds. Thus, basin design must incorporate measures that:

1. Trap excess loads of coarse grained sediment before they enter the basin and clog the surface soil pores on the basin floor.

2. Route design stormflows through the basin without scouring or eroding the basin floor.

3. Route baseflow (if any exists) rapidly through the basin to prevent ponding or standing water.

4. Distribute storm runoff volume evenly over the floor of the basin to maximize exfiltration rates.

5. Provide a back-up drainage system should the infiltration capacity of the basin fail.

Some variations in infiltration basin design that address these problems are discussed below.

Full Infiltration Basin

This simple design is commonly used on sites with extremely permeable soils. The basin is sized to accommodate the entire runoff volume associated with the two year design storm, and the only outlet from the pond is an emergency spillway which passes larger storm events (Figure 6.1). A riprap apron is needed near the inlet to reduce incoming runoff velocities to promote more uniform infiltration. Otherwise, this rudimentary design has no other features for routing stormflow or baseflow through the structure. Consequently, the the use of a full infiltration basin is generally restricted to smaller watersheds (5 to 20 acres) that do not have concentrated, erosive flows.

Combined Infiltration/Detention Basin

This design is one of the more common infiltration basin designs in use today (Figure 6.2). Runoff entering the top of the basin is first trapped in a modified riprap settling basin. Coarse sediment drops out, and the remaining runoff filters through the riprap apron and is spread out over the level basin floor. The depth of runoff in the basin is controlled by a vertical riser. The 2 year control orifice is placed several feet above the bottom of the pond, creating a zone of dead storage. The runoff within the dead storage zone will be completely exfiltrated. If any baseflow exists, a low flow channel should be installed to pass it rapidly through the basin.

Figure 6.2: Combined Infiltration/Detention Basin Design

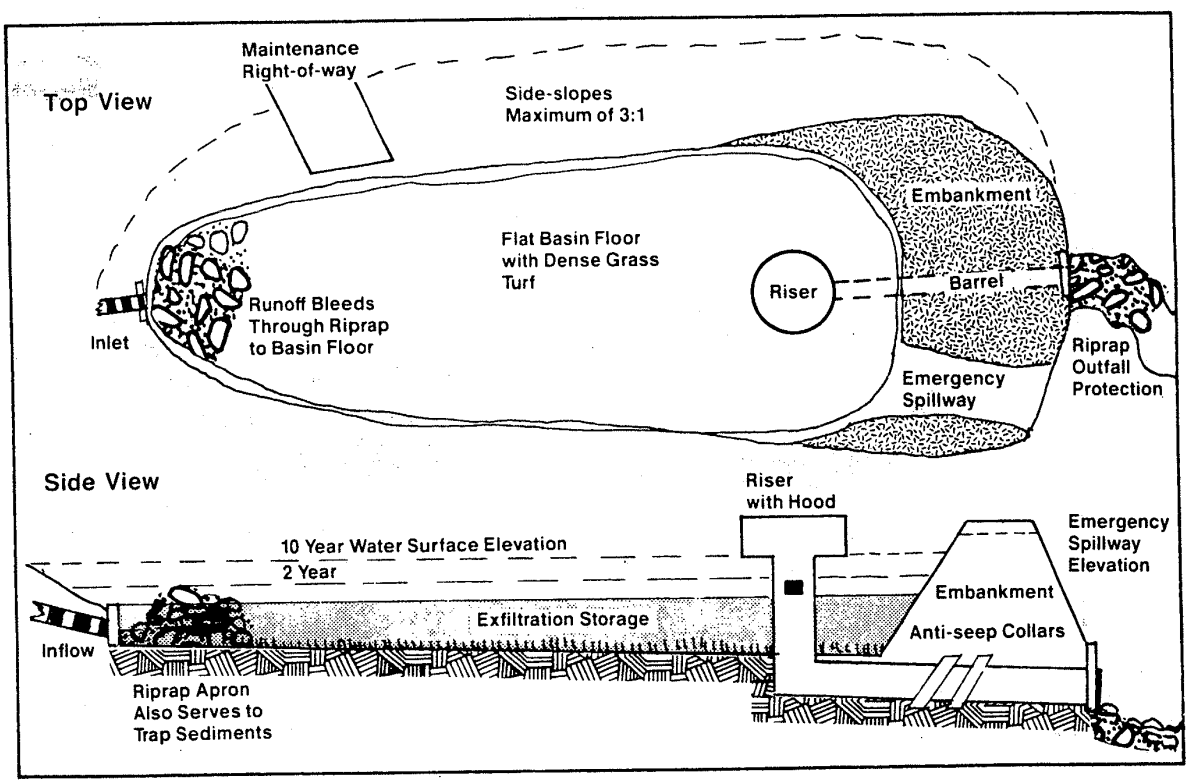

Figure 6.3: Side-by-Side Infiltration Basin Design

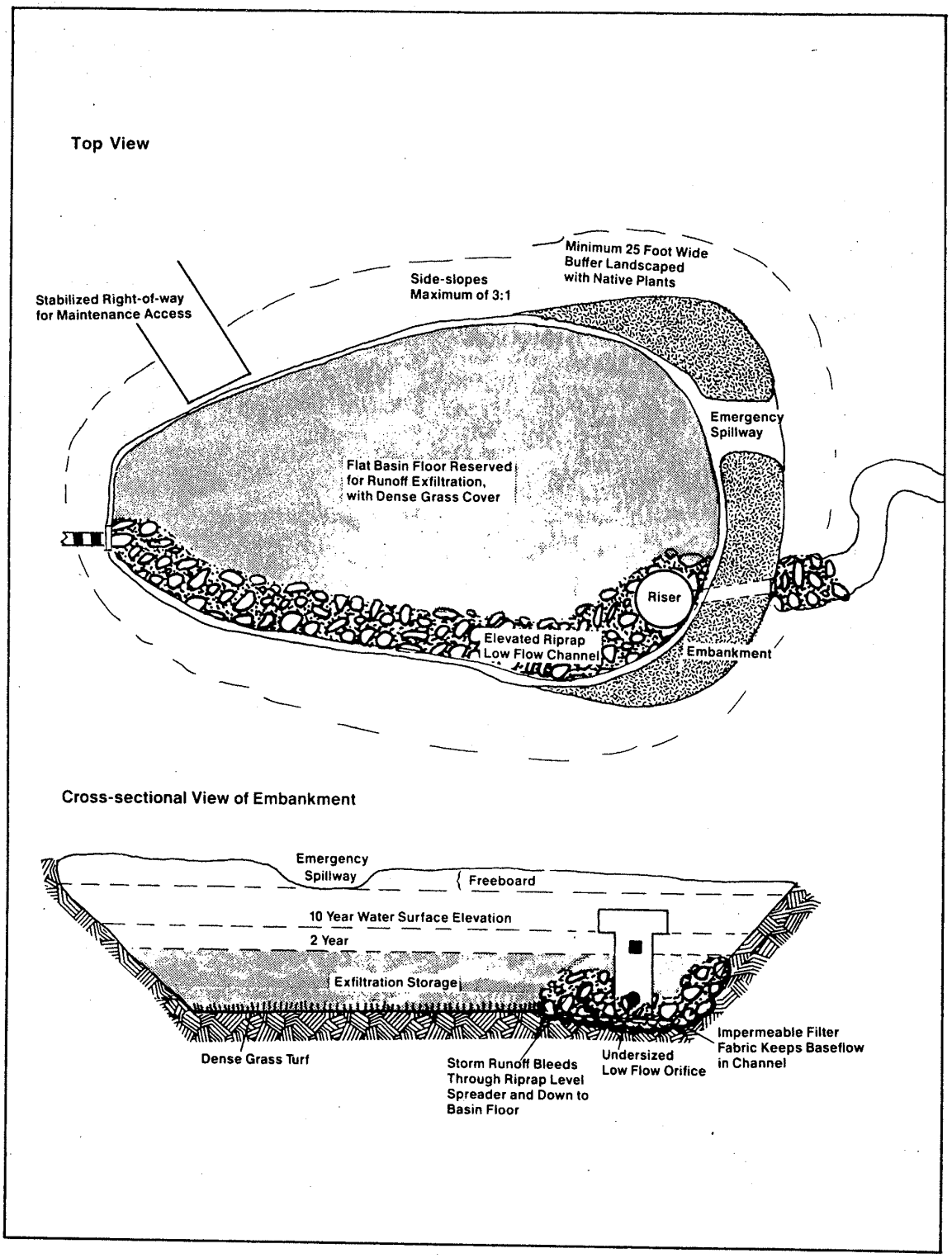

Runoff volume in excess of the dead storage volume drains through the low flow orifice, while the very large runoff volumes associated with the design storm spills over the drop inlet at the top of the riser. Extremely large storms (such as the 10 or 100 year storm) are routed through the basin and discharged via the emergency spillway. If the basin is located over soils with marginal infiltration capacity, it may be prudent to extend some capped underground perforated pipes from the riser to drain the basin floor in the event that exfiltration rates are overestimated. The pipes can then be uncapped later, if it is found that the basin suffers from chronic standing water problems or local groundwater mounding.

This basic design can be applied to serve most residential and commercial developments. However, it must be modified if the basin is expected to receive a sustained input of baseflow, or large sediment loads.

Side-by-Side Basin

The design of larger infiltration basins must address the tricky problem of routing small baseflow and large stormflows through the basin, while still providing good exfiltration capability for small and moderate sized storm events. One solution is a side-by-side design (Figure 6.3), wherein a riprap pilot channel is constructed along one margin of the basin and extends all the way to the riser. The pilot channel is elevated several feet above the basin floor. Baseflow is confined to the pilot channel (by a layer of impermeable geo-textile) and travels directly to an undersized low flow orifice at the base of the riser, and then out of the basin.

Stormflow pulses are also directed through the pilot channel. However, once incoming stormflows reach a given depth they are no longer confined by the impermeable geo-textile, and may leak through the riprap and down across the basin floor. Storm runoff that does travel all the way to the riser is then diverted down a riprap bench and back into the basin floor. The invert of the low flow orifice is set to form a dead storage zone down to the basin floor that stores the equivalent of the first flush runoff volume.

Off-line Infiltration Basins

Off-line designs are used to divert and exfiltrate the first flush runoff volume from a storm sewer or surface channel. They are particularly useful in development situations where exfiltration cannot be achieved by a downstream stormwater detention facility due to soil limitations. An off-line design modified from Austin DPW (1986) is shown in Figure 6.4. This design utilizes a combination of an off-line sand filter and infiltration basin to treat the first flush runoff volume. A weir is placed across a natural or man made channel that diverts runoff into an off-line sand filter. After percolating through the sand filter, runoff is collected by underdrains which lead to a level, vegetated infiltration basin. This is a particularly appropriate design for sites that drain land uses which produce high sediment or hydrocarbon loads.

Figure 6.4: Off-line Infiltration Basin Design

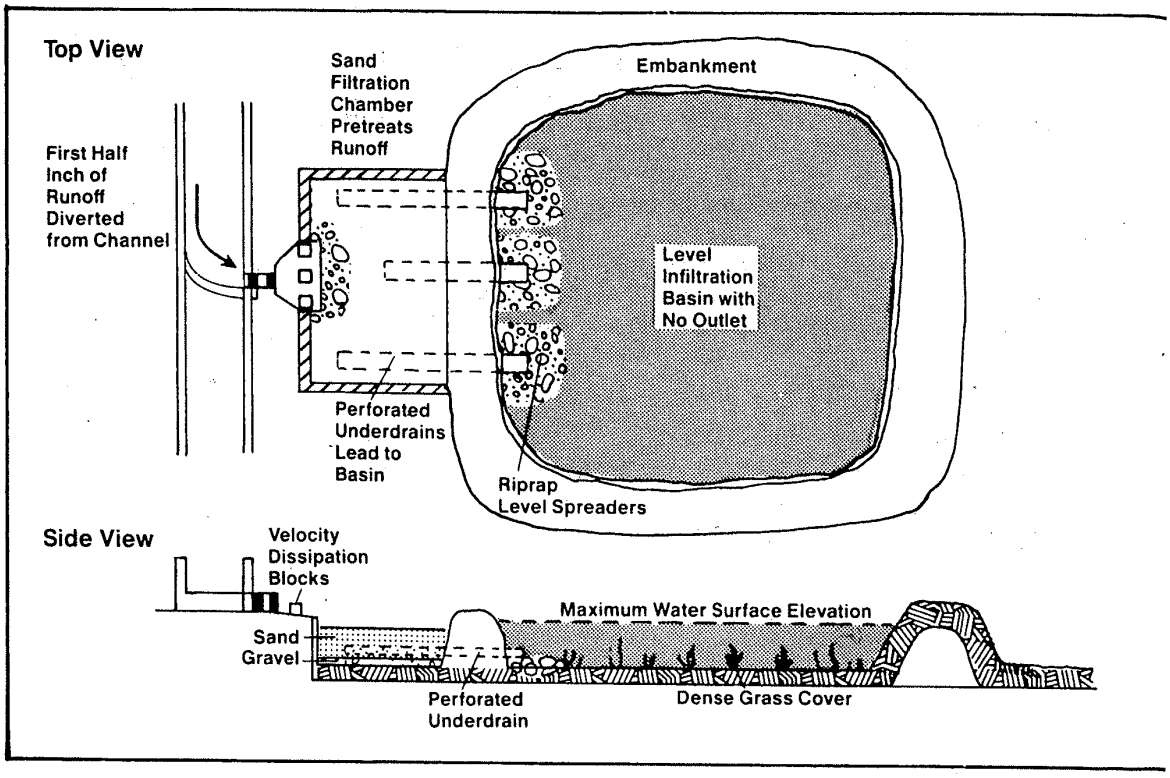

EFFECTIVENESS IN STORMWATER CONTROL

Infiltration basins are unique among all the BMPs reviewed here in that they can most closely reproduce natural, pre-development hydrologic conditions. When properly designed and sized, infiltration basins can completely manage peak discharges from design storms, provide groundwater recharge and low flow augmentation, reduce storm runoff volumes, and protect downstream channels from erosion.

Peak Discharge Control

Full infiltration basins are typically sized to store and exfiltrate the entire runoff volume associated with the design storm. These basins often have no direct outlet apart from an emergency spillway which passes extreme storm events. As a result, full infiltration basins will control post-development peak discharge rates at or below pre-development levels.

The infiltration/detention basin design can completely attenuate the peak discharges associated with the design storm to pre-development levels. As with other detention ponds, the optimum level of flood control is achieved when multiple design storms are controlled (in particular, the 2 and 10 year storm events). The dead storage provided for exfiltration purposes also helps to partially or completely attenuate the peak discharges of intermediate design storms.

Off-line infiltration basin systems are not intended to provide peak discharge control for the design storm. However, these smaller basins often reduce the size of downstream stormwater facilities.

Groundwater Recharge

Infiltration basins divert a significant fraction of the annual runoff volume back into the soil. This enhanced recharge can maintain flow levels in small headwater streams during critical dry weather periods. Without the artificial recharge, even moderate levels of development will drastically reduce summer flows in small and mid-sized streams, that in turn, severely stress aquatic life and degrade water quality. Md WRA (1986b) suggests that infiltration systems sized according to Sizing Rule 1 or 2 will be able to maintain summer baseflow levels to within 90% of natural, pre-development conditions.

Volume Control

Infiltration basins effectively reduce the increase in post-development runoff volume produced from small and moderate sized storms, as all of the runoff volume retained will be temporarily stored and then gradually exfiltrated in the dead storage area. Full infiltration basins are capable of providing almost complete volume control.

Downstream Effects

Random siting of infiltration/detention basins in a watershed may not result in the desired downstream reduction in peak discharges for the design storm, because of differences in the location and timing of releases from individual basins. For example, a basin situated at the bottom of a watershed may detain stormwaters just long enough to coincide with the arrival of the upstream flood peak, and thus add to the cumulative watershed peak discharge. Therefore, it is advisable to perform detailed hydrological modelling to assess the hydrological impacts of individual basins on the cumulative watershed hydrograph; and to locate basins or adjust release rates accordingly. Random siting will normally not be a problem with full infiltration basins.

Streambank Erosion Control

Infiltration basins can help to control both the magnitude and frequency of post-development bankfull discharges. The dead storage provided for exfiltration in a basin functions in the same manner as the storage/release of an extended detention pond (i.e., a defined runoff volume is retained and slowly released over time). Therefore, it is reasonable to assume that infiltration basins can exert roughly the same degree of control over post-development increases in bankfull flood frequency as extended detention ponds, when similar runoff volumes are stored. As noted earlier, the degree of control of bankfull flooding frequency is a function of the volume of runoff detained/exfiltrated (Chapter 3). Control of the runoff volume generated by a 1.0 to 1.5 inch storm should reduce the frequency of bankfull flooding to pre-development levels, and thus keep downstream channels relatively stable. The smaller runoff volumes specified for water quality control (0.5 inch/impervious acre) can also curtail the number of bankfull flooding episodes sharply, but probably not to pre-development levels.

POLLUTANT REMOVAL

The pollutant removal capability of infiltration basins has not been extensively tested in the field. As with other infiltration systems, pollutant removal is achieved by diverting stormwater runoff through the floor of the basin and into the soil. Limited field data from other infiltration systems, and several decades of experience in land disposal of wastewater suggest that the soil is a highly effective and normally safe filter for removing pollutants (MWCOG, 1979). Removal mechanisms involve sorption, precipitation, trapping, straining and bacterial degradation or transformation. Removal mechanisms are quite complex, and actual removal rates depend on the solubility and chemistry of each individual pollutant. Table 6.1 provides estimates of pollutant removal rates that might be achieved in various sized infiltration basins. The differences in estimated removal rates shown reflect differences in the amount of the annual runoff volume that passes through the basin without exfiltrating. Three frequently used basin sizing rules are defined below.

SIZING RULE 1: Basin sized to store and exfiltrate 0.5 inches of runoff per impervious acre in the contributing watershed (Md WRA, 1986b), with excess runoff only temporarily detained.

SIZING RULE 2: Basin sized to store and exfiltrate the runoff produced from a one inch storm over the contributing watershed (1.0*Rv*A) (see page 1.10), with excess runoff only temporarily detained.

SIZING RULE 3: Basin sized to store and exfiltrate runoff volumes up to and including the two year design storm runoff volume, with excess runoff volume associated with larger storms only briefly detained or bypassed entirely.

Table 6.1: Estimated Long-Term Pollutant Removal Rates (%) For Infiltration Basins

POLLUTANT	SIZING RULE 1 0.5 in/imperv acre	SIZING RULE 2 1.0 inch*Rv*A	SIZING RULE 3 2 yr runoff volume
SEDIMENT	75%	90%	99%
TOTAL PHOSPHORUS	50-55%	60-70%	65-75%
TOTAL NITROGEN	45-55%	55-60%	60-70%
TRACE METALS	75-80%	85-90%	95-99%
BOD	70%	80%	90%
BACTERIA	75%	90%	98%

NOTE: Estimated removal efficiencies based on runoff capture efficiency of exfiltration storage (see Chapter 5, page 5.13 for derivation).

DESIGN TIPS FOR ENHANCING POLLUTANT REMOVAL

The estimated removal rates shown in Table 6.1 presume ideal exfiltration conditions within the basin. The following design steps can help to assure that these conditions will occur in the field.

Surface Area of Basin Floor

The rate and quantity of exfiltration is enhanced by increasing the surface area of the basin floor, particularly when the soil infiltration capacity is marginal. Thus, large, relatively shallow basins are preferable to those which are small and deep. Excess surface area in the basin floor can also compensate for diminished infiltration capacity resulting from surface clogging.

Tilling

If heavy equipment is used to grade the basin floor, the floor should be immediately filled to offset any compaction that has taken place.

Reducing Incoming Water Velocities

Inlet channels leading to the basin should be stabilized to prevent incoming runoff velocities from reaching erosive levels and scouring the basin floor. This is customarily done by riprapping the inlet channels or pipe outfalls. A second design objective of the riprapping is to spread the incoming runoff more evenly over the surface of the basin to promote better infiltration. As a result, the riprap should not be used to form a pilot channel. Instead, the riprap should terminate in a broad apron that serves as a crude level spreader (see Figure 6.1).

Basin Slopes

It is very important to grade the floor of the basin to have a slope close to zero. Unlike detention ponds, the objective in infiltration basin design is to achieve a uniform ponding depth across the entire surface of the basin. If the basin is sloped toward the riser, or if low spots are created, storm runoff will concentrate only in a small portion of the basin. Since the soil has only a limited infiltration capacity, these low spots will remain under water for a longer time, and may become chronically wet. Over a period of time, the enhanced deposition of sediment in low areas may clog the surface soils.

The side-slopes of the basin should be no steeper than 3:1 (h:v) to allow for proper vegetative stabilization, as it is extremely difficult to establish and maintain erosion resistant ground covers on steep slopes. Gentle slopes also allow for easier mowing and access, and better public safety.

Establishing Vegetation

A dense turf of water tolerant grass should be established on the floor and side-slopes of infiltration basins immediately after construction. The turf promotes better pollutant removal in several ways. First, root penetration and thatch formation by the turf maintains and sometimes even improves the original infiltration capacity of the basin floor. Secondly, the turf grows through the accumulated pollutants that are deposited within the basin, preventing their resuspension during larger storms. Thirdly, the

turf takes up soluble nutrients for growth, and converts then into less available particulate forms. If clippings are bagged or raked as part of routine mowing operations, the plant nutrients can effectively be removed from the system. Finally, a dense growth of turf will prevent soil erosion and basin scouring that could negate the removal efficiency of the basin. Ground covers such as tall fescues and bermuda grass are generally used for this purpose.

Trees and shrub plantings can achieve many of the same goals as ground covers, but may pose a maintenance problem if the basin floor will frequently be mowed or tilled.

Nature of Soils

As noted earlier, the greatest amount of nutrient and metal sorption occurs in soils that typically have the least capacity to infiltrate runoff. One notable exception are soils with a high content of organic matter, which provide an abundance of binding sites for pollutants. Basin sites with poor organic soils can be improved over time by the natural thatch formation of the turf. The organic matter content can be improved by tilling plant residues below ground during normal maintenance tilling operations.

Maximum Draining Time

The depth of exfiltration storage within the basin needs to be adjusted so that it completely drains within three days after the maximum design exfiltration event. The appropriate design techniques are discussed in Md WRA (1984). Complete drainage is needed to maintain aerobic conditions in the soil profile within the basin long enough to favor bacteria that aid in pollutant removal (and also to ensure that the basin will be empty in time for the next storm).

If a basin is constructed over soils with marginal infiltration capacity (silt loams or loams), it is prudent to adjust the depth of exfiltration storage to completely drain within two days. Recent experience has shown that optimistic projections of future infiltration capacity on marginal sites can lead to chronic standing water problems.

Minimum Draining Time

Moderate to poor pollutant removal has been observed in partial exfiltration systems that detain water for less than 6 hours (MWCOG, 1983b). Short residence times do not allow for adequate exfiltration which, in turn, limits pollutant removal capability. Several design factors can lead to too rapid a passage of runoff through a basin. One of the most frequent problems involves setting the elevation and diameter of the low flow orifice. If the orifice diameter is too wide, small runoff events pass through the basin too quickly to achieve any storage/exfiltration. As a consequence, the pollutant removal capability of the basin will be diminished. Conversely, if the low flow orifice diameter is too narrow, the designer runs the risk of creating a quasi-permanent pool. The backed up water diminishes the exfiltration capacity of the basin, and is likely to produce a host of nuisance and maintenance problems as well.

This design problem becomes even more difficult for basins serving large areas which have sustained baseflows that must be passed through the basin. In such cases, the low-flow orifice must be set so that runoff is retained but baseflow is not allowed to back up in the basin, a problem which would

significantly reduce available storage and exfiltration capacity between storms. This particular problem can be circumvented by using either the side-by-side or off-line design variations. In most cases, the existence of baseflow at a potential basin location is a good tip-off that the site may not be suitable for infiltration. A wet pond or extended detention pond may prove to be a better alternative on these sites.

Sediment Forebays

The longevity of an infiltration basin can be enhanced if sediment forebays are constructed near the inlets to trap incoming sediment loads. Forebays are also an important design element because they help to reduce incoming water velocity, and distribute it more evenly across the basin floor.

PHYSICAL SUITABILITY AT THE SITE LEVEL

Development sites should be carefully evaluated to be certain that they are actually capable of disposing runoff via exfiltration. The following factors should be examined early in the site-planning stage to adequately screen the feasibility of the site. More detailed guidance on feasibility tests for basins can be found in Md WRA (1984).

Soils

Basin are not a feasible option on sites with "D" soils (infiltration rates of less than 0.27 inches per hour), or any soil with a clay content greater than 30% (as determined from the SCS soil textural triangle). Silt loams and sandy clay loams ("C" soils) provide marginal infiltration rates, and should probably not be considered for basin applications in most circumstances (Table 6.2). Soils with a combined silt/clay percentage of over 40% by weight are susceptible to frost-heave, and are not good candidates for infiltration basin applications. Also, basin are unsuitable if the site is located over fill soils that form an unstable subgrade, and are prone to slope failure.

If the soils at a site pass these preliminary tests, an additional series of soil cores or trenches should be gathered to a depth at least five feet below the elevation of the basin floor. Because soil conditions vary substantially over short distances, up to 6 cores per trench may be needed at each site to adequately characterize future infiltration capacity. These should be examined for evidence of any impermeable soil strata that might impede infiltration, such as localized clay lenses, hardpans, or fragipans. The presence of such layers do not necessarily preclude a basin, as long as it penetrates them completely.

Slope

Infiltration basins are not feasible if the slope of the contributing watershed is greater than 20%. Within the basin itself, a slope of less than 5% is preferable.

Depth to Bedrock

At least four feet of clearance will be needed between the floor of the basin and the bedrock level. This data can be obtained from local soil maps and should always be confirmed with soil test borings.

Depth to Seasonally High Water Table

A minimum of two to four feet of clearance is needed between the floor of the basin and the seasonally high water table. This depth can be readily determined from soil borings taken during wet weather. High water tables often present a major obstacle to the use of infiltration basins, since basins are usually located in depressions at the low end of a watershed where local water tables are located near the the ground surface.

Proximity to Wells and Foundations

Basins should be located at least 100 feet away from drinking water wells to minimize the possibility of groundwater contamination, and should be situated at least 10 feet down-gradient and 100 feet up-gradient from building foundations to avoid potential seepage problems.

Maximum Depth of Reservoir

To insure that the basin completely drains within 72 hours, it may be necessary to limit the depth of the basin if underlying soils have relatively low exfiltration rates. Recommended depth limits for basins are shown for various soil textures in Table 6.2.

Watershed Size

Md WRA (1983b) suggests that basins can be applied to sites ranging from 5 to 50 acres in size. Other BMPs, such as extended detention ponds and wet ponds, are better candidates on larger sites as they are more capable of handling sustained baseflow.

Table 6.2: Soil Limitations For Infiltration Basins

SOIL TYPE	MINIMUM INFIL-TRATION RATE (fc--inches/hr)	SCS SOIL[1] GROUP	MAXIMUM DEPTH OF[2] STORAGE (inches) 48 hrs	72 hrs
Sand	8.27	A	397	595
Loamy Sand	2.41	A	116	174
Sandy Loam	1.02	B	49	73
Loam	0.52	B	25	37
Silt Loam	0.27	C	13	19

[1] Sandy Clay Loams, Clay Loams, Silty Clay Loams, Sandy Clay, Silty Clay,and Clay Soils are not included as these soil types are all NOT FEASIBLE for infiltration basins.

[2] Maximum Depth in the Basin that can drain completely within 48 or 72 hours after a storm, given the soil infiltration rate.

INFILTRATION BASIN COSTS

Predicting Infiltration Basin Costs

Because so few infiltration basins have been built, there is not enough data to develop specific cost projections for this practice. However, given the many similarities in design and construction methods between infiltration basins and dry ponds, it is reasonable to assume that the dry pond cost equation (Wiegand et al., 1986) can be used as a surrogate measure of cost. Thus, for infiltration basins greater than 10,000 cubic feet in volume, the following equation can be used to predict cost, until better infiltration basin cost data becomes available:

(EQ 6.1) $C = 10.7\ Vs^{0.69}$

where: C = construction cost in 1985 dollars.
Vs = storage volume up to the crest of the emergency spillway in the basin (including any dead storage reserved for exfiltration purposes).

The cost equation does not include additional costs for land acquisition (if any) or for any sediment trapping structures. An additional 25% should be added to the cost estimate to account for contingencies involved in planning, design, and administration.

One cost advantage unique to infiltration basins (in comparison with other infiltration practices) is that they can serve as temporary sediment basins during the construction phase of development, thereby fulfilling both stormwater and erosion control requirements at one time. However, if a basin is used as a temporary sediment control facility, it should not be excavated to more than two feet above the final elevation of the basin floor, so that the infiltration capacity is preserved.

Cost-Effectiveness

Infiltration/detention basins seldom cost much more than conventional dry ponds. Some extra costs are incurred to provide extra dead storage needed for exfiltration, but this storage is usually small in relation to that needed for stormwater management purposes. As a result of these economies, infiltration/detention basins are one of the most cost-effective water quality BMPs available.

The full infiltration basin design will cost somewhat more since a larger storage volume must be reserved to store the entire runoff hydrograph associated with the design storm. Cost projections prepared over a wide range of land uses and watershed areas (Wiegand et al., 1986), however, indicate that full infiltration basins may only cost 10 to 20% more than conventional dry ponds, which still makes them a competitive BMP option.

Infiltration basins also exhibit economies of scale with regard to construction costs. This means that it costs less per unit volume to build an infiltration basin on a large watershed than on a small one, or on commercial rather than residential developments.

CONSTRUCTION SPECIFICATIONS AND MAINTENANCE REQUIREMENTS

Proper construction and routine maintenance are extremely important for sucessful infiltration basin implementation. Initial field reports suggest that basins appear to fail at a higher rate than other infiltration practices. In a recent survey conducted by Md WRA (1986b), approximately 40% of the infiltration basins sampled had partially or totally clogged within the first few years of operation. Moreover, many of the structures failed almost immediately after completion or never worked properly from the outset. The most common problem has been the partial or total loss of infiltration capacity, typified by the presence of standing water for long periods of time. In most instances, basin failure was primarily due to inadequate field testing of soil infiltration rates, prior use as a sediment basin, compaction by heavy equipment, or poor upland sediment control practices. The discussion below highlights construction and maintenance procedures that can prevent or at least alleviate premature surface clogging.

Construction Specifications

1. Before the development site is graded, the area planned for the basin should be roped off to prevent heavy equipment from compacting the underlying soils.

2. If the basin is not designated for sediment control, diversion berms should be placed around its perimeter during all phases of construction. Sediment and erosion control plans for the site should be oriented to keep sediment and runoff completely away from the basin. Actual construction of the basin should not begin until after the site has been completely stabilized.

3. If the basin is to be used as a temporary sediment basin during the construction phase, it should only be excavated to within two feet of the final design elevation of the basin floor. Sediment which accumulates during the construction phase can then be removed when the basin undergoes final excavation after the development has been completed.

4. The basin should be excavated using light earth-moving equipment with tracks or over-sized tires. Normal rubber tires should be avoided since they compact the subsoil and reduce its infiltration capabilities. For the same reason, the use of bulldozers or front end-loaders should be avoided. Since some compaction of the underlying soils is still likely to occur during excavation, the floor of the basin should be deeply tilled with a rotary tiller or disc harrow. Several passes with a leveling drag should can then be made to smooth out the basin floor.

5. The basin embankment and inlet/outlet channels should be constructed following local pond specifications, such as core trenches and anti-seep collars (Md SCS, 1976).

6. The basin should be stabilized with vegetation within a week after construction. Use of low maintenance, rapid germinating grasses such as fescues are recommended. The condition of the newly established vegetation should be checked several times over the first two months, and any necessary remedial actions taken (e.g., reseeding, fertilization, and irrigation).

Routine Maintenance

The maintenance required for infiltration basins is slightly greater than that needed for dry detention ponds. Some of the normal maintenance tasks for infiltration basins are detailed below.

INSPECTION

The performance of the infiltration basin should be checked after every major storm in the first few months after construction. Particular attention should be paid to how long runoff remains in the structure. Standing water in the basin within 48 to 72 hours after a storm, is a good indication that the infiltration capacity of the basin may have been overestimated. The inspector should look for factors which may be responsible for clogging the basin, such as upland sediment erosion, low spots, excessive compaction, or marginal soils; and then get the contractor to make any needed repairs. As a practical matter, local governments should not release any bonds posted for a basin until the inspector determines that it is performing as designed.

Thereafter, the basin should be inspected annually. Some of the more important items to check for include: differential settlement, cracking, erosion, leakage or tree growth on the embankment; the condition of the riprap in the inlet, outlet and pilot channels; sediment accumulation in the basin; and the vigor and density of the grass turf on the floor of the basin.

MOWING

The buffer, side-slopes, and basin floor must be mowed at least twice a year to prevent woody growth. More frequent mowing may be needed if the basin is to be used as a passive recreation area. Mowing operations may be difficult since the basin floor may often be soggy. If a low maintenance grass such as Tall Fescue is used, basin mowing can be performed in the normally dry months of June and September (Md WRA, 1983a).

DEBRIS AND LITTER REMOVAL

Trash will tend to collect in full-infiltration basins since they do not have outlets. Infiltration/detention designs also will collect trash that might clog the riser or low flow orifice. Therefore, it is a good practice to remove all debris and litter during each mowing operation.

EROSION CONTROL

This is a very important maintenance task since eroded sediments can adversely affect the infiltration capacity of a basin. Eroding or barren areas should be immediately revegetated.

TILLING

If a basin is located on marginally permeable soils, annual or semi-annual tilling operations may be needed to maintain infiltration capacity. A rotary tiller or disc harrow can be used, preferably in the late summer months when soil permeability is likely to be the lowest (freezing and thawing of the soil in the winter and spring months often helps to break up the soil and keep infiltration capacity high). Tilled areas should be immediately revegetated to prevent erosion.

Non-Routine Maintenance

STRUCTURAL REPAIRS/REPLACEMENT

If the basin is of the infiltration/detention basin design, the pipes and barrels will eventually need to be replaced. Corrugated metal pipe has an estimated longevity of approximately 25 years in the field; whereas, concrete pipe and other structures may last up to 50 years. However, if the basin is designed for full exfiltration (i.e., no outlet apart from an earthen emergency spillway) then the frequency and cost of structural repairs is sharply reduced.

RESTORATION OF INFILTRATION CAPACITY.

Over time, the original infiltration capacity of the basin floor will gradually be lost. If the problem has been caused by surface clogging (e.g., sediment accumulation or local compaction), deep tilling can be used to break up the clogged surface layer, followed by regrading and leveling. Md WRA (1986b) suggests that deep tilling may be needed every 5 to 10 years. In some instances, sand or organic matter can be tilled into the basin soils to restore infiltration capacity as well. If a basin still experiences chronic problems with standing water after these measures have been taken, it is likely that the original infiltration capacity was overestimated. It may then be necessary to install perforated underdrains beneath the basin to remove the excess water.

SEDIMENT REMOVAL.

Infiltration basins are normally located in smaller residential watersheds that do not generate large sediment loads, or are equipped with some kind of sediment trap. However, even though sediment loads to the basin are likely to be low, they will still have a negative impact on basin performance, since the sediment deposits will reduce the storage capacity reserved for exfiltration and may also clog the surface soils.

Sediment removal methods in infiltration basins are different from those utilized for extended detention and wet ponds. Removal should not begin until the basin has had a chance to thoroughly dry out, preferably to the point where the top layer begins to crack. The top layer should then be removed by light equipment, taking care not to unduly compact the basin floor. The remaining soil can then be deeply tilled with a rotary tiller or disc harrow to restore infiltration rates. Areas disturbed during sediment removal should be revegetated immediately to prevent erosion.

Total Maintenance Costs

Infiltration basins have only recently come into widespread use in the Washington region, and consequently, there is very little data on which to base maintenance cost projections. However, since the routine and non-routine maintenance tasks for infiltration basins appear to be similar to those associated with conventional dry detention ponds, it may be reasonable to assume that annual maintenance costs (routine and non-routine) will comprise 3-5% of a basin's initial construction cost (Wiegand et al., 1986). This should be considered an interim estimate until more infiltration basin maintenance experience has been gained.

ENVIRONMENTAL ATTRIBUTES OF BASINS

Impacts to the Natural Environment

Infiltration basins are probably the best available BMP for protecting downstream aquatic life. Basins help to maintain the pre-development water balance at the site, minimize streambank erosion, filter out pollutants and augment low flows during the summer months. In addition, infiltration basins do not produce thermal or low dissolved oxygen impacts that can be associated with wet ponds.

The value of infiltration basins in creating local wildlife habitat, however, is not as great as for wet or extended detention ponds. This is largely because the floor in most basins is managed to maintain a dense growth of turf and, as a result, the food and cover supplied to wildlife is poor. However, the perimeter of the basin may be planted with trees and shrubs that provide better wildlife habitat. Suggested species can be found in the basin landscaping guide provided in Chapter 9.

One potential negative impact of basins is the risk of groundwater contamination. Long-term studies of pollutant migration in soils underneath various infiltration practices indicate only limited downward migration of pollutants through the soil (US EPA, 1983; OWML, 1982). Possible exceptions include very soluble pollutants such as nitrate, chlorides and gasoline. Nightingale (1987) found no evidence of groundwater contamination underneath five infiltration basins in California that had been in operation for 5-20 years. A more definitive assessment of the possible risks of groundwater contamination by infiltration is the focus of a current monitoring survey being conducted in Maryland.

Impacts on the Human Environment

While infiltration basins do not provide all the amenities associated with wet ponds, they can look attractive when they are well landscaped, naturally contoured and frequently maintained. In some cases, the basin can be utilized for recreation (e.g., ball fields and playgrounds).

The importance of regular maintenance cannot be overstated. Lack of regular maintenance can quickly turn an infiltration basin into an community eyesore. Standing water may breed mosquitos or create undesirable odors (Hantzsche and Franzini, 1980), and may kill the turf on the basin floor.

RELEVANT DESIGN GUIDANCE

A summary of design criteria for infiltration basins is provided in Table 6.3. In addition, the following references should be consulted for more detailed guidance on the design and construction of infiltration basins.

Maryland Water Resources Administration, 1984. Standards and Specifications for Infiltration Practices. Annapolis, MD.

Maryland Water Resources Administration, 1985b. Inspectors Guideline Manual for Stormwater Management Infiltration Practices. Annapolis, MD.

DESIGN SUMMARY: INFILTRATION BASINS

- **SITE EVALUATION:**
  Soils must be tested prior to design to ensure that the site is capable of infiltration. Since soil characteristics vary spatially, a minimum of three soil borings and/or trenchings should made within the basin. Each core should extend at least five feet below the anticipated floor of the basin. Soils within this zone (0-5 feet below basin floor) should have a minimum field infiltration rate of 0.5 inches/hr (fc), and be above the seasonally high water table and bedrock level. Basins should never be constructed over fill soils.

- **WATERSHED SIZE:**
  Full exfiltration basins can be applied on small watersheds (5 to 25 acres) that do not have a permanent source of baseflow. Infiltration/detention basins can be used on larger watersheds (up to 50 acres) if there is a design feature for routing baseflow through the structure without infiltrating (side-by-side design).

- **DEGREE OF EXFILTRATION:**
  To achieve significant pollutant removal and downstream channel protection, the basin should be capable of completely exfiltrating the first half inch of runoff per contributing impervious acre. When possible, even greater quantities of exfiltration are preferable.

- **SHAPE OF BASIN:**
  The floor of the basin should be graded as flat as possible to permit uniform ponding and exfiltration. Low spots and depressions should be leveled out. Side-slopes leading to the floor should have a maximum slope of 3:1 (h:v) to allow for easier mowing and better bank stabilization.

- **CONSTRUCTION:**
  The basin should be excavated with light equipment equipped with tracks or over-sized tires to minimize compaction of the underlying soils. After the basin is excavated to the final design elevation, the floor should be deeply tilled with a rotary tiller or disc harrow to restore infiltration rates, followed by a pass with a leveling drag. Vegetation should be established immediately. The riser, embankment, and emergency spillway should be sized and constructed to the normal specifications for conventional ponds.

- **VEGETATION:**
  The floor of the basin should be stabilized by a dense turf of water tolerant reed canary grass or tall fescue, immediately after basin construction. The grass turf promotes better infiltration, pollutant filtering, and prevents erosion of the basin floor.

- **BASIN INLETS:**
  All basins should have sediment forebays or riprap aprons that dissipate the velocity of incoming runoff, spread out the flow and trap sediments before they reach the basin floor.

- **INLET/OUTLET INVERT ELEVATIONS:**
  The storm drain inlet pipe (or channel) leading to the basin should discharge at the same invert elevation as the basin floor. Similarly, the low flow orifice in infiltration/detention basins should be set at the same elevation as the basin floor, to prevent baseflow from ponding and thus impeding the function of the basin.

- **MAXIMUM DRAINING TIME:**
  As a general rule, the depth of storage should be adjusted so that the basin completely drains within 72 hours. On sites with marginal soils, or basins with a large floor, it is prudent to design the basin to drain within 48 hours. This can be accomplished by increasing the surface area of the basin floor, or by reducing the depth of storage, or both. infiltration/detention basins is sized too large.

- **BASIN BUFFER:**
  A minimum buffer of 25 feet from the edge of the basin floor to the nearest adjacent lot should be reserved. A landscaping plan should be prepared for the basin buffer that emphasizes the use of low maintenance, water tolerant, native plant species that provide food and cover for wildlife, and when necessary, can act as a screen.

- **INSPECTIONS:**
  The change in standing water depth above the basin floor over time should be checked after each major storm in the first few months after basin construction to monitor exfiltration rates. Similar tests should be conducted annually to gage the degree of surface clogging that may occur over the years, and to help in scheduling restorative deep tilling operations.

- **EROSION CONTROL:**
  Infiltration basins can be used as temporary sediment control basins during the construction phase, as long as at least two feet of original soil is preserved (that will be excavated later for the basin). As with all infiltration facilities, upland construction areas should be completely stabilized prior to permanent basin construction.

- **ACCESS:**
  Adequate access to the basin floor should be provided from public or private right-of-way that can withstand light equipment. Such access should be at least 12 feet wide, and should not cross the emergency spillway.

- **MAINTENANCE:**
  Maintenance responsibilities should be clearly vested, and funds reserved for both routine and non-routine maintenance tasks. Wet-weather inspections, with as-built plans in hand, should be conducted annually. The basin floor is best maintained as wet meadow, and should be mowed twice a year to prevent woody growth. If standing water becomes a problem over time due to gradual surface clogging, infiltration rates can be restored by deep tilling operations. If tilling does not solve the problem, it may be necessary to convert the basin into a wet pond or shallow marsh, or install underdrains to collect the water.

CHAPTER 7: POROUS PAVEMENT

Porous pavement has a high capability to remove both soluble and fine particulate pollutants in urban runoff, and also provides groundwater recharge, low flow augmentation, and streambank erosion control. Its use is generally restricted to low volume parking areas, although it can accept runoff from rooftop storage or adjacent conventionally paved areas. As a BMP, porous pavement is only feasible on sites with gentle slopes, permeable soils, and relatively deep water table and bedrock levels. When these conditions are met, porous pavement is a reasonably cost-effective BMP, particularly if off-site runoff contributions are not great.

When properly designed and carefully installed, porous pavement has load bearing strength, longevity, and maintenance requirements similar to conventional pavement. Some other advantages of porous pavement are reduced land consumption, reduction or elimination of the need for curb and gutters and downstream conveyance systems, the preservation of the natural water balance at the site, and a safer driving surface which offers better skid resistance and reduced hydroplaning.

Figure 7.1: Schematic of Typical Porous Pavement Section

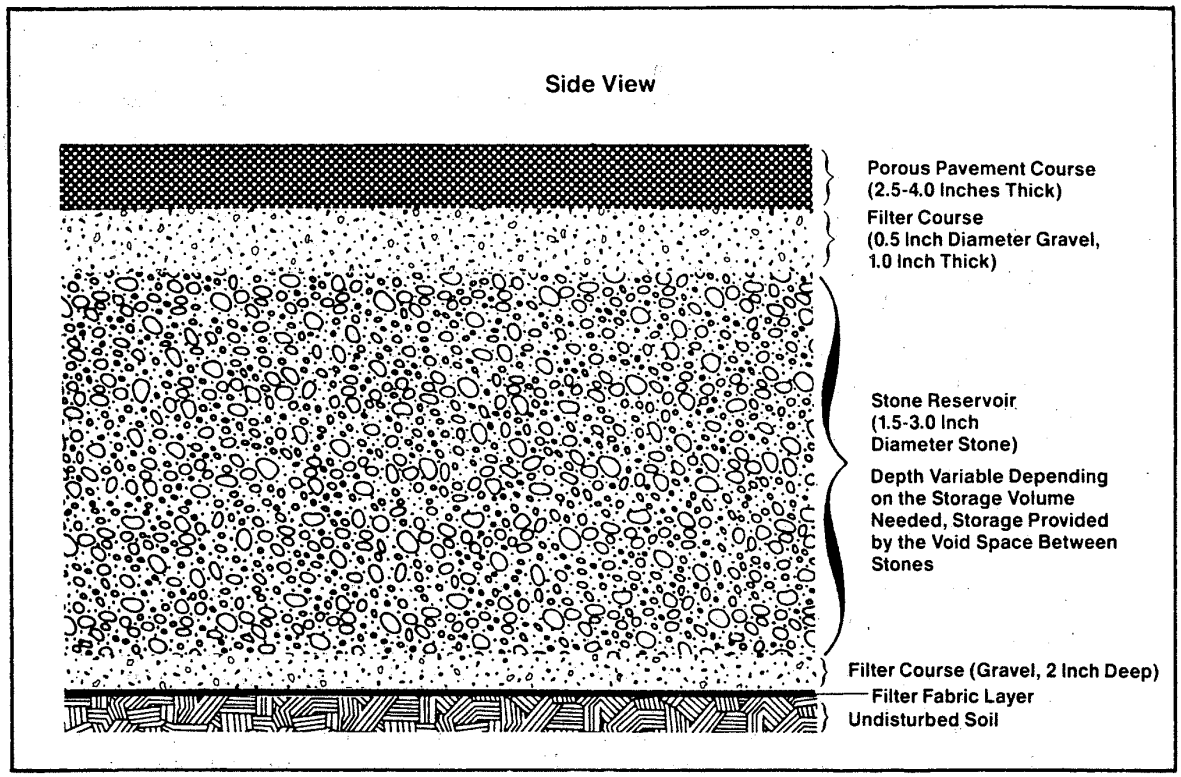

Source: City of Rockville (1984a)

The major drawback associated with porous pavement is that if it becomes clogged it is difficult and costly to rehabilitate. The risk of premature clogging of the pavement is fairly high, and can be prevented only if sediment is kept off of the pavement before, during and after construction. Other disadvantages include the need for extensive feasibility tests, inspections, very high levels of construction workmanship (which cannot always be assured), and a possible risk of groundwater contamination (probably slight).

METHODS USED FOR POROUS PAVEMENT

A typical cross-section of porous pavement is shown in Figure 7.1. Runoff rapidly infiltrates through the pores of the 2-4 inch porous asphalt layer into the void spaces of an underground stone reservoir. The reservoir is composed of two layers: a one-inch filter course of half-inch diameter gravel placed over a deeper reservoir course of 1.5-3.0 inch diameter stone. Runoff then exfiltrates out of the stone reservoir and into the underlying subsoil or is collected by perforated underdrain pipes and routed to an outflow facility. Thus, the storage capacity of porous pavement is primarily a function of the depth of the underground reservoir (plus any runoff lost via exfiltration through the subsoils).

Under normal conditions, the porous asphalt layer merely acts as a rapid conduit for runoff to reach the stone reservoir (typical infiltration rates for open-graded porous asphalt are in excess of 150 inches/hour). A less preferable alternative for directing runoff into the stone reservoir is to install drop inlets or drill holes through a layer of conventional asphalt.

Porous pavement designs fall into three basic categories, based on the runoff storage provided by the stone reservoir and the degree of reliance on exfiltration. These are described below and are illustrated in Figure 7.2.

Full Exfiltration System

With this design, the only way runoff can exit the stone reservoir is to exfiltrate through the underlying subsoil (i.e., there is no positive pipe oulet draining the stone reservoir). Consequently, the stone reservoir must be large enough to accommodate the entire increase in runoff volume for the design storm , less any runoff volume which is exfiltrated during a storm. The complete exfiltration system provides total peak discharge, volume, and water quality control for all rainfall events less than or equal to the design storm. An emergency overflow channel (such as a raised curb) is located above-ground to handle the excess runoff from storms greater than the design storm.

Partial Exfiltration System (stone filtration system)

It may not always be feasible or prudent to totally rely on exfiltration to dispose of runoff. For example, there may be concerns about the long term permeability of the underlying soils, downstream seepage, or clogging at the interface between the filter fabric and subsoil. In these situations, an underground drainage system can be installed, comprised of regularly spaced perforated pipes located in shallow depressions that collect the runoff and direct it to a central outlet. The size and spacing of the underdrain network is set to pass the two year storm. However, most of the runoff volume from smaller storms will still be exfiltrated before it is collected, thereby providing significant water quality control.

An alternative method of controlling the design storm in partial exfiltration systems is to place perforated pipes (on the underside only) near the top of the stone reservoir (NVPDC, 1987). Runoff then must entirely fill up the stone reservoir before it is discharged from the facility. This design should promote a greater degree of exfiltration, particularly for smaller storms.

Water Quality Exfiltration System

With the water quality design, the storage volume of the stone reservoir is set to only handle the first flush of runoff volume during a storm. The first flush has been variously defined as 1) one-half inch of runoff per contributing impervious acre, 2) one-half inch runoff per contributing total acres and 3) the volume of runoff produced by a one-inch storm. Runoff volumes in excess of the first flush are not treated by the system, and instead, are conveyed to a conventional stormwater management facility further downstream. Water quality exfiltration system will not satisfy stormwater storage requirements, but may result in smaller, less costly facilities downstream. In most sites, the first flush runoff volume can fit within the normal six-inch layer of stone aggregate required for conventional paving. Slot or drop inlets through conventional asphalt can be used in addition to porous asphalt to route the first flush into the stone reservoir.

Figure 7.2: Comparison of Selected Exfiltration Systems For Porous Pavement

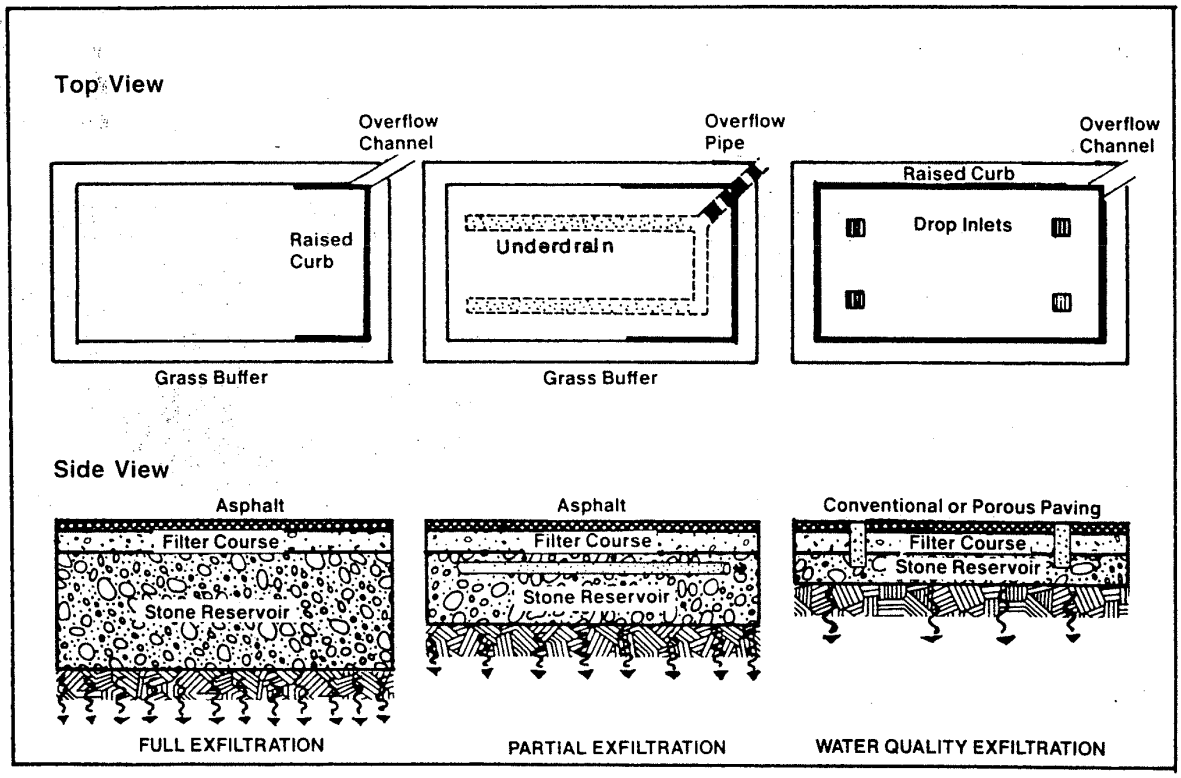

A design variation that enables a porous pavement site to accept runoff contributed from off-site areas is shown in Figure 7.3. As shown, a series of underground perforated inflow pipes are used to convey runoff into the porous pavement and evenly distribute it throughout the stone reservoir. In addition, a pretreatment facility is needed to remove sediment, oil and grit before it reaches the reservoir. Some useful pretreatment techniques for porous pavement are shown in Figure 7.4.

Figure 7.3: Design Technique For Accepting Off-Site Runoff

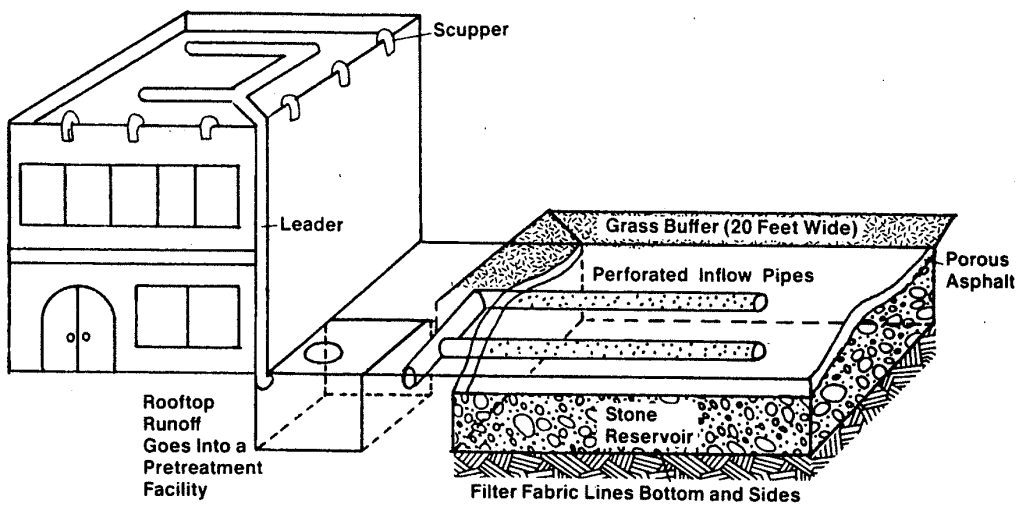

Figure 7.4: Pretreatment Methods For Porous Pavement Sites

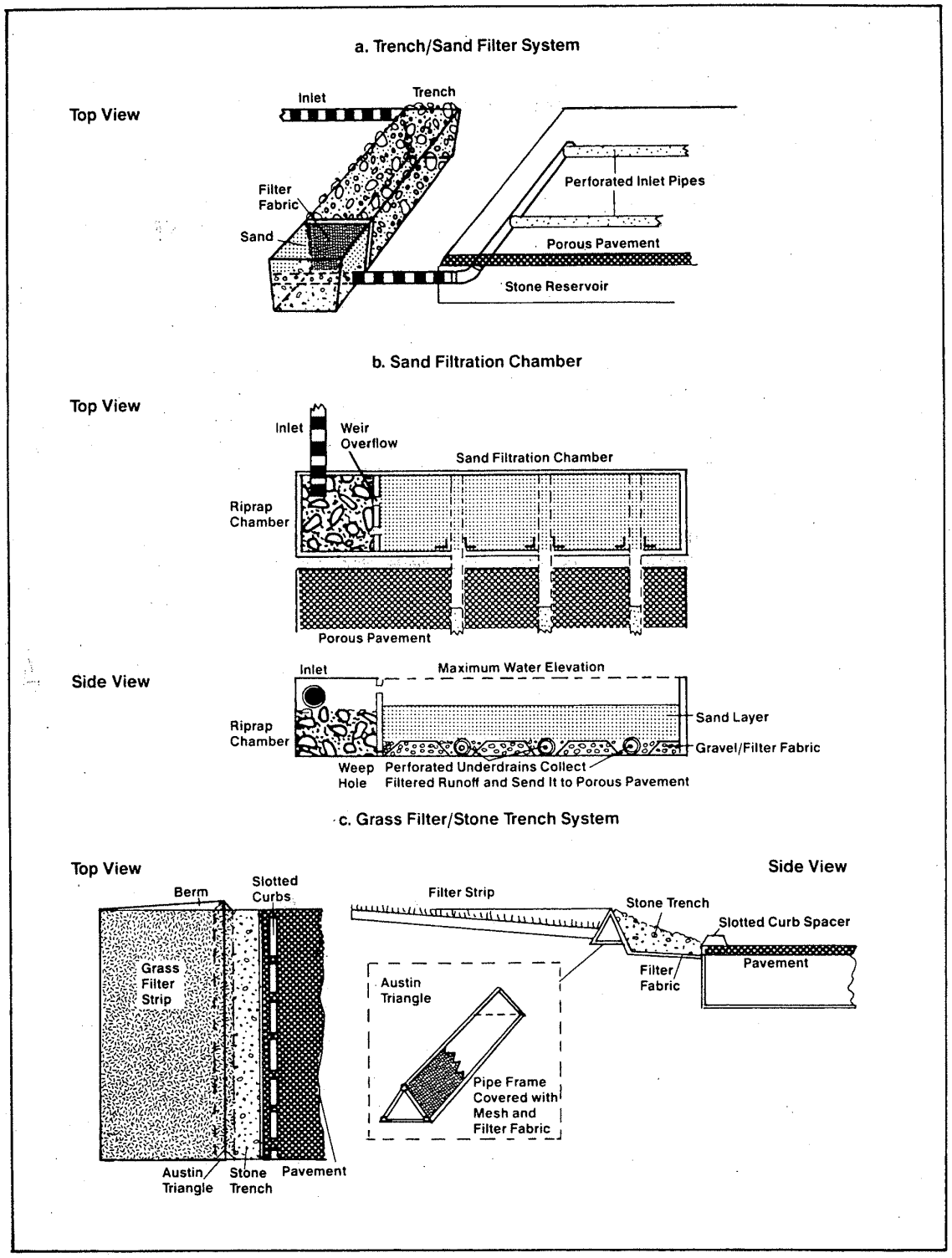

EFFECTIVENESS IN STORMWATER CONTROL

Porous pavement is unique in that it can almost completely reproduce the natural, pre-development hydrologic regimen at a site.

Peak Discharge Control

Both complete and partial exfiltration systems can control peak discharges to pre-development levels for both the design storm and smaller storms. The only limitation of either porous pavement system is that there may not be sufficient depth for the stone reservoir to accommodate the runoff volume from large (10 to 100 year) design storms, particularly if there are large off-site areas contributing runoff to the pavement. The required depth for the stone reservoir can be calculated using Md WRA (1984) design equations.

Figure 7.5 presents graphical solutions for stone reservoir depth based on capturing the entire runoff volume from contributing impervious areas for selected design storms and soil conditions, assuming full exfiltration. As can be seen, stone reservoirs up to 3 feet deep may be needed in some circumstances. Apart from requiring a hefty investment in stone, these deep reservoirs may be too close to the water table or bedrock to be feasible. In such cases, partial exfiltration systems may be a desirable alternative, since they normally require shallower stone reservoirs.

Figure 7.5: Minimum Stone Reservoir Depths For Full Exfiltration Porous Pavement Systems, For Selected Design Storms and Soils

NOTE: Partial exfiltration and water quality designs will not be as deep.

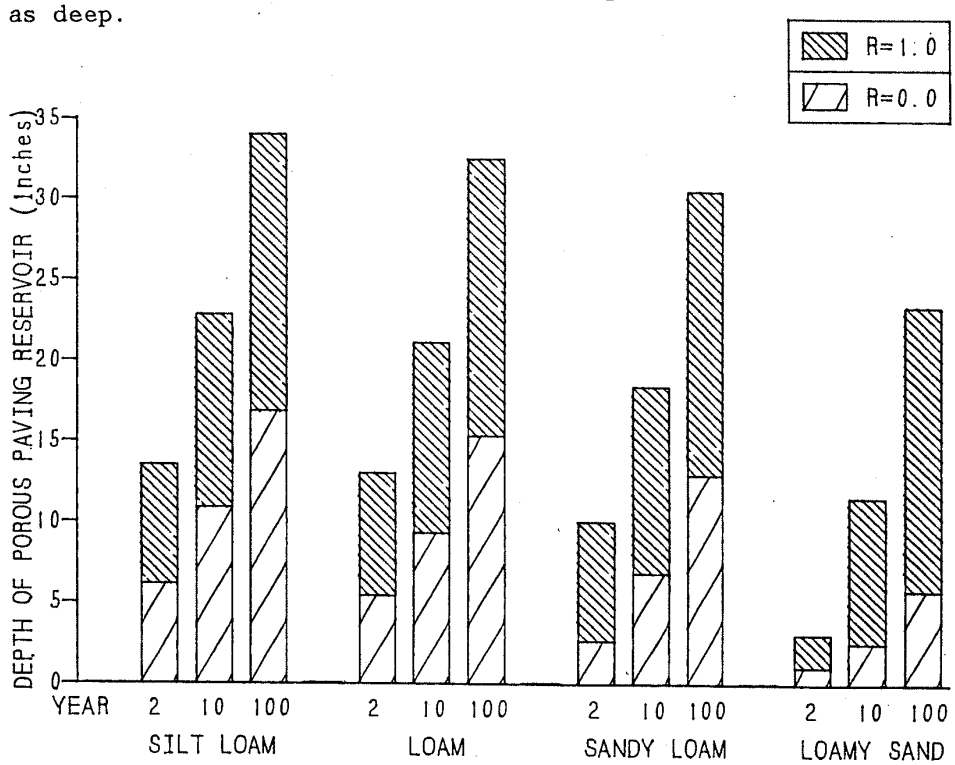

Groundwater Recharge

Water balance studies of porous pavement sites in Willow Grove, Pennsylvania (Gburek and Urban, 1980), Rockville, Maryland (MWCOG, 1983b), and Prince William County, Virginia (OWML, 1986b) indicate that 60-90% of the annual rainfall volume is diverted to groundwater. Groundwater recharge rates are slightly higher under porous pavement than under natural conditions (Gburek and Urban, 1980), as vegetation is absent and soil water is not transpired during the summer months.

Enhanced groundwater recharge is very important since it maintains flow levels in small headwater streams during critical dry weather periods. Even moderate levels of development have been shown to drastically reduce summer baseflow levels in small and mid-sized streams, with adverse consequences to water quality and aquatic habitat. Md WRA (1986b) estimates that even the smaller sized water quality exfiltration systems are capable of maintaining summer baseflow levels to within 90% of natural, pre-development levels.

Volume Control

Unlike detention or retention ponds, porous pavement reduces the volume of storm runoff produced following development. Only about 20-40% of storm runoff that entered the Willow Grove, Rockville, and Prince William porous pavement sites emerged again as surface runoff. The remainder either evaporated within the structures or was diverted to groundwater recharge.

Streambank Erosion Control

The superior hydrologic performance of complete and partial exfiltration systems should prevent serious streambank erosion immediately below the site. However, since porous pavement normally only serves a small portion of a stream's watershed, other practices (such as extended detention or infiltration basins) may need to be installed elsewhere in the basin to provide a comprehensive level of streambank protection.

POLLUTANT REMOVAL

Field studies have demonstrated that partial exfiltration systems are capable of achieving high levels of removal of both soluble and particulate pollutants. It should be emphasized, however, that porous pavement IS NOT intended to remove coarse particulate pollutants, as they can rapidly clog asphalt and filter cloth pores. Because of the cost and difficulty of rehabilitating clogged pavement, every effort should be made to keep coarse grained particles from ever entering the surface of the pavement.

Porous pavement is primarily designed to remove pollutants deposited on the pavement surface from the atmosphere. These pollutants are normally either very fine grained or are soluble, and should not normally present any problems with respect to clogging. The annual rate of atmospheric pollutant deposition is considerable (Table 7.1), and accounts for most, if not all, of the pollutant export from completely impervious surfaces (MWCOG, 1983b).

Table 7.1: Average Annual Atmospheric Deposition Rates for the Washington, D.C. Area

POLLUTANT	RURAL (a)	SUBURBAN (b) (lbs/acre/year)	URBAN (c)
Total Solids	99	155	245
Chemical Oxygen Demand	199	133	210
Total Nitrogen	19.9	12.8	17.0
Nitrate-N	9.4	5.6	6.8
Ammonia-N	5.5	1.1	1.0
Total Kjeldahl N	10.5	7.2	10.2
Total Phosphorus	0.71	0.50	0.84
Ortho-phosphorus	0.28	0.26	0.35
Trace Metals			
Cadmium	ND	0.09	0.003
Copper	ND	0.21	0.61
Lead	0.06	0.44	0.53
Iron	ND	1.57	5.60
Zinc	0.67	1.35	0.65

Source: MWCOG (1983b). Note: ND = no data

Pollutant Removal Mechanisms of Porous Pavement

Most of the pollutant removal in a porous pavement site is accomplished after the runoff has exfiltrated through the stone reservoir and into the underlying soil (except for the undesirable trapping of particulates in the asphalt pores or stone reservoir). Thus, the degree of pollutant removal achieved in porous pavement is closely related to the amount of runoff that is actually exfiltrated into the soil.

SORPTION

Some soluble forms of pollutants such as ortho-phosphorus and zinc become attached to binding sites on soil particles as they pass through the soil layer. Most of the sorption occurs within the first foot of soil, and is bound up for long periods of time (US EPA, 1977). The greatest sorption of nutrients and metals occurs in soils with a high content of clay and/or organic matter. Conversely, sandy soils exhibit much lower sorption rates. The same trend holds true for bacterial densities as well (US EPA, 1977). Unfortunately, soils that maximize sorption and bacterial growth also have low and sometimes unacceptable infiltration rates.

TRAPPING/STRAINING

Fine-grained particles eventually become trapped in the void spaces between soil particles as they percolate through the soil.

BACTERIAL REDUCTION

Aerobic bacteria within the soil consume and reduce organic matter. Thelen and Howe (1978) suggests that soil bacteria populations can thrive under porous pavement if the underlying soils get a chance to dry out every few days.

GROUNDWATER DIVERSION

Pollutants which have not been trapped, absorbed or reduced continue to move through the soil profile and into groundwater. This is not a desirable removal method, as it could lead to the contamination of drinking water supplies. Limited studies to date suggest that migration of urban stormwater pollutants through soils is normally not rapid nor deep (Nightingale, 1987; US EPA, 1983; OWML, 1983), except for extremely soluble pollutants such as nitrate or chloride.

Estimates of Porous Pavement Pollutant Removal Efficiency

Two long-term monitoring studies have been conducted in the Washington area on partial exfiltration systems by the OWML (1986b, 1983) in suburban Maryland and Virginia. In both cases, the pollutant export over a series of storms was monitored at a terminal underdrain, and compared to pollutant loads in the runoff from adjacent conventional pavement. Both partial exfiltration sites exhibited similar and quite high removal capabilities. Mass removal of solids was 85% at the Prince William County, Virginia site and 95% at the site in Rockville, Maryland. Approximately 65% of the total phosphorus and 75-85% of the total nitrogen load was removed at both sites. Removal of trace metals, such as zinc and lead, at the Rockville site approached 98%, and over 80% of the COD load was effectively removed (Table 7.2).

In some cases, increased export of the inorganic ions (such as Ca, Mg, K, and Na) has been observed from porous pavement, presumably from the dissolution or leaching of asphalt or stone aggregate (Gburek and Urban, 1980). However, these ions do not represent water quality problems.

Table 7.2: Pollutant Removal Rates Reported at Porous Pavement Sites (Partial Exfiltration Systems)

POLLUTANT	LONG TERM REMOVAL RATE (%)	
	Rockville, Md. Site	Prince William, Va. Site
Sediment	95	82
Total Phosphorus	65	65
Total Nitrogen	85	80
Chemical Oxygen Demand	82	-
Zinc	99	-
Lead	98	-

Sources: OWML, 1986b; MWCOG, 1983b

DESIGN TIPS FOR ENHANCING POLLUTANT REMOVAL

Degree of Exfiltration

The pollutant removal performance of porous pavement depends, to a great extent, on how much of the annual runoff volume is exfiltrated into the soil. Runoff which is not exfiltrated (i.e., collected by an underdrain and routed out of the stone reservoir) receives little effective treatment. For example, OWML (1986b) reported only minor improvement in nutrient concentrations in runoff measured at a terminal underdrain at the Prince William County, Virginia site. Thus, the pollutant removal capability of porous pavement appears to be limited by how much runoff "bypasses" the underlying soil. Only a minor amount of runoff is bypassed in full and partial exfiltration systems for most storms, which contributes to their very high annual removal efficiencies shown in Table 7.2. However, water quality exfiltration systems only exfiltrate approximately 50-75% of the average annual runoff they receive. As a result, removal capability is somewhat reduced. Estimated removal rates for water quality exfiltration systems under various first flush sizing rules are given in Table 5.1.

Surface Area

The more soil surface area available for exfiltration and pollutant adsorption, the better the pollutant removal performance of the structure will be. Thus, a shallow stone reservoir with a large bottom area will normally perform better than a deep one with a smaller bottom area.

Maximum Draining Time

The stone reservoir should be designed to completely drain within a maximum of three days after the maximum design storm event. This allows the underlying soils to dry out and maintain aerobic conditions that favor beneficial bacteria. In addition, this ensures that the stone reservoir will be empty in time for the next storm. Appropriate design techniques are discussed in Md WRA (1984).

If porous pavement is constructed over soils with marginal infiltration capacity (e.g., loams and silt loams), it is prudent to reduce the depth of the stone reservoir (and increase the bottom surface area) so it completely drains within two days. Thus, in the event that the soil infiltration rate turns out to have been overestimated, or diminishes over time because of clogging, the facility will still drain adequately.

Minimum Draining Time

Moderate to poor pollutant removal has been reported for partial exfiltration systems that hold water less than six hours (MWCOG, 1983b). This problem may occur if perforated underdrains are very closely spaced and become too efficient at draining the stone reservoir. The placement of underdrains near the top of the stone reservoir, rather than the bottom, should help to alleviate this problem.

Routine Vacuum Sweeping

The surface of the porous pavement should be vacuum swept at least four times a year, followed immediately by high pressure jet hosing, to keep the asphalt pores free from clogging. Although numerous NURP vacuum sweeping demonstration projects failed to show any great removal of fine-grained pollutants by this method (US EPA, 1983), they did show that sweeping is effective in removing quantities of coarse-grained sediments that are likely to clog porous pavement.

PHYSICAL SUITABILITY AT THE SITE LEVEL

Before porous pavement is constructed, the site should be carefully evaluated to be certain that it is feasible and practical to rely on exfiltration to dispose of runoff. The following factors need to be examined early in the site-planning stage to adequately screen the site. More detailed guidance on porous pavement feasibility can be found in Md WRA (1984) and Thelen and Howe (1978).

Soils

Porous pavement is not feasible for sites with soil infiltration rates of less than 0.27 inches per hour (D soils), or any soil with a clay content greater than 30%. C soils (silt loams and sandy clay loams) provide marginal infiltration rates, and should probably only be considered for partial exfiltration systems (see Table 7.3). Soils that have a combined silt/clay percentage of over 40% by weight are susceptible to frost-heave, and are not good candidates for porous pavement applications. No matter what soil is present, the stone subgrade must extend below the frost line. Also, porous pavement should never be constructed over fill soils, which often form an unstable subgrade, and are prone to slope failure.

If the soils at a site pass these tests, a series of soil cores or trenches should be taken at the site, to a depth at least four feet below the anticipated level of the bottom of the stone reservoir. These should be examined for evidence of any impermeable soil strata that might impede infiltration, such as localized clay lenses, hardpans, or fragipans. The presence of such layers does not necessarily preclude porous pavement applications as long as the stone reservoir penetrates them completely.

Slope

Porous pavement is not recommended on sites with a slope greater than 5%.

Depth to Bedrock

At least two feet of clearance (and preferably four) are needed between the bottom of the stone reservoir and the bedrock level (Md WRA, 1984). This data can be obtained from local soil maps and should always be confirmed by several test soil borings.

Depth to Seasonally High Water Table

A minimum of two to four feet of clearance is needed from the bottom of the stone reservoir and the seasonally high water table. This can be determined by soil borings taken during wet weather.

Expected Traffic Intensity

Porous pavement is generally only used for parking lots and lightly used access roads. Guidelines for determining the corresponding thickness are provided in NVPDC (1987) and Thelen and Howe (1978). If a portion of the parking lot is expected to receive moderate or heavy traffic use, it can be conventionally paved and sloped to drain to a porous pavement area.

Proximity of Wells and Foundations

Porous pavement should be located at least 100 feet away from a drinking water well to minimize the possibility of groundwater contamination, and should be situated at least 10 feet down-gradient from building foundations, and 100 feet up-gradient.

Maximum Depth of Reservoir

To insure that the stone reservoir completely drains in 72 hours, it may be necessary to limit the depth of the stone reservoir if underlying soils have relatively low exfiltration rates. These limits are shown for various soil textures in Table 7.3

Table 7.3: Soil Limitations For Porous Pavement

SOIL TYPE	MINIMUM INFIL-TRATION RATE (fc--inches/hr)	SCS SOIL[1] GROUP	MAXIMUM DEPTH OF[2] STORAGE* (inches) 48 hrs	72 hrs
Sand	8.27	A	992	595
Loamy Sand	2.41	A	290	174
Sandy Loam	1.02	B	122	183
Loam	0.52	B	62	93
Silt Loam	0.27	C	32	49

[1] Sandy Clay Loams, Clay Loams, Silty Clay Loams, Sandy Clay, Silty Clay,and Clay Soils are not included as these soil types are all NOT FEASIBLE for infiltration basins.

[2] Maximum Depth of stone reservoir that can drain completely within 48 or 72 hours after a storm, given the soil infiltration rate.

Watershed Size

Md WRA (1984) suggests that porous pavement be restricted to sites between 1/4 acre and ten acres in size. This guideline appears to reflect the fact that other BMPs are more practical and cost-effective outside of this range.

Miscellaneous Factors

Porous pavement is not recommended in areas where wind erosion is expected to supply large quantities of sediment from adjacent barren areas. Also, clogging is likely to be problem if earth-moving equipment or dump-trucks are expected to park at the lot, or if many vehicles are being serviced in or near the lot.

POROUS PAVEMENT COSTS

Predicting Porous Pavement Costs

Porous pavement costs should only be considered as the incremental, or extra costs, incurred over and above the cost of installing a normal conventional parking lot. A preliminary cost estimate can be prepared for a site using the average in-place unit costs combined with the basic geometry of the site. Table 7.4 provides unit cost data for common porous pavement construction components, and was obtained from a survey of over 60 construction bid or bonding estimates prepared by both the public and private sectors in the Washington metropolitan area between 1983 and 1985. An example cost estimate for a hypothetical porous pavement application is provided in Example 7-1. The incremental costs associated with various components of porous pavement are detailed below, and are listed in decreasing order of approximate cost.

Table 7.4: Unit Costs For Porous Pavement Construction Components

ITEM	UNITS[1]	AVERAGE IN-PLACE UNIT COST[2]	TYPICAL RANGE
Common Excavation	cy	2.82	2.00-5.00
Clear and Grub	ac	2800.00	1,500-3,500
Seed/Mulch	sy	0.58	0.25-1.00
Rip-Rap	sy	38.00	25.00-55.00
Select Fill	cy	3.97	3.00-5.50
Silt Fence	lf	4.11	2.00-5.00
Gabions	cy	114.00	***
Filter Cloth	sy	2.71	2.00-5.00
PVC Pipe			
6 inch	lf	10.00	8.00-12.00
8 inch	lf	10.50	***
10 inch	lf	15.00	***
Stone Fill (1-2")	cy	22.50	15.00-25.00
Clean Washed Sand	cy	14.00	***
Pea Gravel	cy	7.50	***
Stone Tamping	cy	2.00	***
Observation Well	lf	150.00	25.00-400.00
Sediment Control	lf		1,000-8,000

[1] Unit cost data derived from MWCOG (1983a) and supplemented by 45 itemized SWM construction bids or bonding estimates analyzed in the Washington, D.C. area, 1983-1986. Items for which less than five independent estmates were available are denoted by ***. Material costs may vary among jurisdictions and regionally.

[2] cy=cubic yard, sy=square yard, ac=acre, lf=linear foot.

ADDITIONAL DEPTH OF STONE RESERVOIR

This refers to the difference between the normal design depth of stone aggregate under conventional pavement and the design depth of the stone reservoir needed for porous pavement. The additional excavation and stone backfill runs about 80-90 cents per cubic foot. The depth of the stone reservoir varies from site to site, depending on the volume of the design storm controlled, degree of off-site drainage (if any), and the soil infiltration rate. The depth of the stone aggregate required for conventional pavement is also variable, but tends to average about 6 feet in most low intensity parking situations. At most sites, the extra excavation and stone fill needed for the deeper stone reservoir is the single largest cost component for porous pavement.

EXTRA COST FOR POROUS ASPHALT

Normal asphalt typically runs about $1.10-1.20 per square foot. Reported prices for porous asphalt typically run about 10-15% higher ($1.30-1.40 per square foot) although recently reported unit costs from some jobs have been as high as $2.00 per square foot. The price differential reflects the extra costs involved in procuring, producing, transporting and rolling the porous asphalt, and probably will narrow as the demand for this relatively new product increases.

EXTRA COST FOR FILTER FABRIC

Filter fabric, or similar geo-textiles, are needed to line the bottom and sides of the stone reservoir to prevent lateral or upward movement of soil into the stone reservoir. Although the unit price of filter fabric is not great (approximately $0.30 per square foot), the large surface area that must be lined make it a high cost component.

EXTRA COST FOR SEDIMENT AND EROSION CONTROL

Greater efforts must be made in sediment and erosion control as an insurance policy against premature clogging. Sediment and erosion controls must keep sediment completely out of the planned porous pavement area, rather than the normal practice of merely keeping sediment from leaving the construction site. Normally, this entails constructing a diversion berm around the perimeter of the pavement area, or less preferably, the installation of an extensive filtering system (e.g., silt fences or Austin triangles at the end of a sodded waterway). A sediment basin will still be needed elsewhere at the site to trap sediment. As a result, the common cost saving practice of converting a sediment basin into a stormwater pond after construction is completed cannot be used. Although sediment and erosion control costs vary from site to site, a lump sum cost of between $2000 and $5000 per acre controlled is often assigned in many area jobs (Md WRA, 1986b). It is probably reasonable to assume that an extra $1000 will need to be specifically targeted for sediment and erosion control measures to protect the pavement area.

EXTRA COST FOR PRE-TREATMENT

A 20 foot wide grass buffer is required around the perimeter of the pavement if adjacent areas will contribute runoff to the pavement area. Unit prices for topsoil, mulch and seed average about 58 cents per square yard. If the porous pavement accepts runoff from off-site areas, more expensive

pre-treatment facilities such as pre-cast drop boxes, oil/grit chambers or sand filters will be needed.

EXTRA COST FOR UNDERDRAINAGE

For partial exfiltration systems, a network of perforated underdrains must be installed. The unit price depends on the diameter and material of the pipe selected. Underdrainage may not always be considered an extra cost; larger, conventionally paved parking lots may also require the installation of an underground pipe network.

EXTRA CONTINGENCY COST

After all in-place unit costs are estimated, it is customary for a contractor to add an additional 25% to the total cost to cover contingencies, such as job design, inspection, oversight and administration. Because more extensive soil testing, drainage surveys, inspection, and higher workmanship is required for porous pavement, it may more realistic to add at least 10% more to the normal contingency rate for porous pavement jobs.

Potential Savings Associated with Porous Pavement

Balanced against the extra costs are the following savings that might result from porous pavement:

REDUCTION/ELIMINATION OF CURB AND GUTTERS

With the exception of a raised curb on the down-slope portion of a porous pavement site, the standard curb and gutter system needed for most conventional parking lots can be reduced in size or eliminated altogether.

REDUCED LAND CONSUMPTION

Cost savings can be realized since porous pavement conserves the amount of developable land on a property. Additional land at the site is not needed for stormwater management purposes, and is then available for more economic purposes. Also, porous pavement is an attractive option when the size of the development, or lack of available space, limit the use of other BMPs.

REDUCED RUNOFF STORAGE REQUIREMENTS

By using porous pavement rather than impermeable conventional pavement, the developer can reduce the runoff storage requirement for the site, if permitted by the local reviewing authority.

Example 7-1: UNIT COST ESTIMATION FOR A HYPOTHETICAL POROUS PAVEMENT PARKING LOT.

Estimate the cost of constructing a one acre partial exfiltration porous pavement parking lot which accepts runoff from an adjacent one acre parking lot of conventional pavement. Preliminary design calculations indicate that the stone reservoir will be 18 inches deep, compared to 6 inches for the adjacent conventional paving. Overflow pipes are spaced as shown in the figure below.

EXAMPLE 7-1
continued

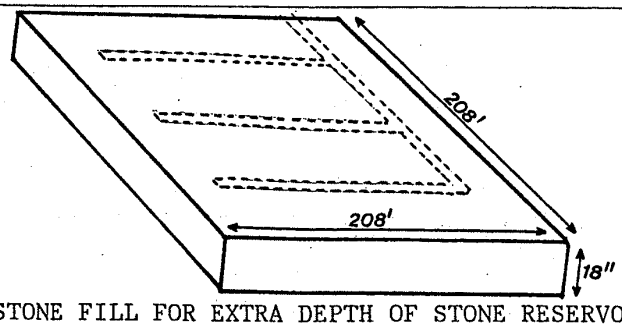

1. EXCAVATION/STONE FILL FOR EXTRA DEPTH OF STONE RESERVOIR:
   18-6 = 12 inches or 1 ft extra reservoir
   (43560 sf)(1 ft) = 43560 cf or 1613 cy

   Excavation @ $2.82/cy * 1613 cy = $4,549
   Stone Fill @ $22.50/cy * 1613 cy = $36,293

2. EXTRA COST FOR FILTER CLOTH:
   Bottom = 43,560 sf
   Sides = (4)(208)(1.5) = 1248 sf
   + 5% allowance for overlap = 47,048 sf or 5228 sy

   Filter Cloth @ $2.71/sy * 5228 sy = $14,167

3. EXTRA COST FOR POROUS ASPHALT:
   Assume 15% price differential for porous pavement,
   and $10.50 unit price for conventional pavement:
   Extra Cost = (0.15)($10.50/sy) = $1.58 sy
   43,560 sf = 4840 sy

   Porous Asphalt @ $1.58/sy * 4840 sy = $7,647

4. EXTRA COST FOR OVERFLOW PIPES:
   Assume three (3), 6" PVC pipes spaced 50' apart and
   100' in length, with a 8" lateral PVC pipe, 150' long:

   300' of 6" PVC @ $10.00/1f = $3,000
   150' of 8" PVC @ $10.50/1f = $1,575

5. EXTRA COST FOR GRASS BUFFER: (none in this example) 0

6. EXTRA COST FOR SEDIMENT AND EROSION CONTROL:
   Assume lump sum of $1000.00 for special measures. $1,000

7. SUB TOTAL $68,231

8. EXTRA CONTINGENCY COSTS
   @ 0.10 of SUB-TOTAL = 6,823

9. GRAND TOTAL $75,054

NOTE: Any cost savings resulting from reduced requirements for curbs and gutters, pipe-sizing, or SWM land consumption should be subtracted from the grand total before comparing it to other BMP alternatives.

Due to all the complexities in the design and economics of porous pavement, it is not easy to compare it with other competing BMP alternatives. Rather crude cost comparisons contained in Wiegand et al. (1986) and Schueler et al. (1985) suggest that both partial and complete exfiltration systems can be extremely cost-effective when applied to smaller parking lots (10 acres or less), with no off-site runoff contribution. Both systems are reasonably cost-effective if the off-site runoff contribution is less than or equal to that of the porous pavement area. If the off-site runoff contribution is greater than the pavement area, and/or the pavement area is greater than ten acres, porous pavement is not usually very competitive in relation to other BMP options. This is due to the fact that economies of scale (which are very pronounced for ponds) are not particularly evident in porous pavement applications.

CONSTRUCTION SPECIFICATIONS AND MAINTENANCE REQUIREMENTS

Proper construction and routine maintenance are extremely important for porous pavement. If installed properly, porous pavement should last as long as conventional pavement. However, a substantial number of recent projects have failed shortly after being built, primarily due to poor construction practices, inadequate field testing or lack of sediment control. Appropriate preventative measures are discussed below (Maryland WRA, 1986b; City of Rockville, Maryland, 1984a; Diniz, 1980; Thelen and Howe, 1978).

Construction Specifications

Table 7.5 summarizes the construction specifications for preparing the stone reservoir and porous asphalt layer. As can be seen, porous asphalt has special requirements during each phase of installation: mixing, transport, laying and rolling. Similar care needs to be taken during the preparation of the stone reservoir. Rather than provide detailed step by step guidance on the entire construction procedure (which is well summarized in Md WRA, 1986b, 1984; Diniz, 1980), the summary below emphasizes those practices that can prevent premature clogging during the construction phase:

1. Before the entire development site is graded, the planned area for the porous pavement should be roped off to prevent heavy equipment from compacting the underlying soils.

2. Diversion berms should be placed around the perimeter of the porous pavement to keep runoff and sediment <u>completely</u> away from the site both before and during construction.

3. Excavation of the sub-grade should be performed by earthmoving equipment with tracks or over-sized tires. Normal rubber tires should be avoided since they compact the subsoil and reduce its infiltration capabilities.

4. After excavation is completed, the bottom and sides of the stone reservoir should be lined with filter fabric to prevent upward piping of underlying soils. The fabric should be placed flush with a generous overlap between rolls.

5. Clean, washed 1-2 inch stone aggregate should be placed in the excavated reservoir in lifts, and <u>lightly</u> compacted with plate compactors to form the base course. Unwashed stone has enough associated sediment to pose a clear risk of clogging at the soil/filter cloth interface.

Table 7.5: Construction Specifications For Porous Pavement

STABILIZATION

TO PRECLUDE PREMATURE CLOGGING AND/OR FAILURE OF THIS PRACTICE POROUS PAVING STRUCTUI SHALL NOT BE PLACED INTO SERVICE UNTIL ALL OF THE SURFACE DRAINAGE AREAS CONTRIBUTING THE PAVEMENT HAVE BEEN EFFECTIVELY STABILIZED IN ACCORDANCE WITH THE MARYLAND STANDA AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL FOR DISTURBED AREAS.

FILTRATION

WHEN OVERLAND FLOW FROM ADJACENT AREAS IS DIRECTED TOWARD THE PARKING LOT, A DES VEGETATIVE FILTER STRIP WILL BE REQUIRED TO PROTECT THE PAVED AREA. SEE SECTION 3.7 VEGETATIVE FILTER STRIP DESIGN SPECIFICATIONS.

SUBGRADE PREPARATION

1. ALTER AND REFINE THE GRADES AS NECESSARY TO BRING SUBGRADE TO REQUIRED GRADES SECTIONS AS SHOWN IN THE DRAWINGS.

2. THE TYPE OF EQUIPMENT USED IN SUBGRADE PREPARATION CONSTRUCTION SHALL NOT CAUSE UN SUBGRADE COMPACTION. (USE TRACKED EQUIPMENT OR OVERSIZED RUBBER TIRE EQUIPMENT - NOT USE STANDARD RUBBER TIRED EQUIPMENT.) TRAFFIC OVER SUBGRADE SHALL BE KEPT A MINIMUM. WHERE FILL IS REQUIRED, IT SHALL BE COMPACTED TO A DENSITY EQUAL TO UNDISTURBED SUBGRADE, AND INHERENT SOFT SPOTS CORRECTED.

STONE BASE COURSE

1. ALL STONE USED SHALL BE CLEAR, WASHED, CRUSHED STONE, MEETING LOCAL HIGHWAY DEPARTM SPECIFICATIONS.

2. STONE SHALL BE OF TWO SIZES: THE RESERVOIR BASE COURSE SHALL BE TO DEPTH AS NOTED DRAWINGS OF CRUSHED STONE (MAXIMUM OF 2", MINIMUM OF 1"), AND A 2-INCH DEEP TOP COU OF 1/2" STONE (MAXIMUM OF 5/8", MINIMUM OF 3/8").

3. STONE BASE COURSE SHALL BE LAID OVER A DRY SUBGRADE COVERED WITH ENGINEERING FIL FABRIC SUCH AS MIRAFI #14N OR EQUAL TO A DEPTH SHOWN IN DRAWINGS, IN LIFTS TO NATURALLY COMPACTED. THE STONE BASE COURSE SHALL BE COMPACTED LIGHTLY. KEEP THE B COURSE CLEAN FROM DEBRIS, AND SEDIMENT.

POROUS ASPHALTIC CONCRETE SURFACE COURSE

1. THE SURFACE COURSE SHALL BE LAID DIRECTLY OVER THE 1/2" STONE BASE COURSE AND SHALL LAID IN ONE LIFT.

2. THE LAYING TEMPERATURE SHALL BE BETWEEN 240 AND 260, WITH MINIMUM AIR TEMPERATURE O 50F, TO MAKE SURE THAT THE SURFACE DOES NOT COOL PRIOR TO COMPACTION.

3. COMPACTION OF SURFACE COURSE SHALL BE DONE WHILE THE SURFACE IS COOL ENOUGH TO RES A 10-TON ROLLER. ONE OR TWO PASSES BY THE ROLLER IS ALL THAT IS REQUIRED FOR PRO COMPACTION. MORE ROLLING COULD CAUSE A REDUCTION IN THE SURFACE COURSE POROSITY.

4. MIXING PLANT SHALL CERTIFY THE AGGREGATE MIX AND ABRASION LOSS FACTOR AND THE ASPH CONTENT IN THE MIX. THE ASPHALTIC MIX SHALL BE TESTED FOR ITS RESISTANCE TO STRIPP BY WATER USING ASTM D 1664. IF THE ESTIMATED COATING AREA IS NOT ABOVE 95 PERCE ANTI-STRIPPING AGENTS SHALL BE ADDED TO THE ASPHALT.

5. TRANSPORTING OF MIX TO SITE SHALL BE IN CLEAN VEHICLE WITH SMOOTH DUMP BEDS THAT H BEEN SPRAYED WITH A NON-PETROLEUM RELEASE AGENT. THE MIX SHALL BE COVERED DUR TRANSPORTATION TO CONTROL COOLING.

6. MIX OF ASPHALTIC CONCRETE SHALL BE 5.75 TO 6 PERCENT OF WEIGHT OF DRY AGGREGATE.

7. ASPHALTIC GRADE SHALL MEET AASHTO SPECIFICATION M-20 FOR 85 TO 100 PENETRATION R ASPHALT AS A BINDER IN THE NORTHERN UNITED STATES, 65 TO 80 IN THE MIDDLE STATES, 50 TO 65 IN THE SOUTH.

8. AGGREGATE GRADING SHALL BE AS SPECIFIED IN TABLE 3-3.

PROTECTION

AFTER FINAL ROLLING, NO VEHICULAR TRAFFIC OF ANY KIND SHALL BE PERMITTED ON PAVEMENT UNTIL COOLING AND HARDENING HAS TAKEN PLACE, IN NO CASE SHOULD THE TIME BE LI THAN 6 HOURS (PREFERABLY A DAY OR TWO).

WORKMANSHIP

1. WORK SHALL BE DONE EXPERTLY THROUGHOUT AND WITHOUT STAINING OR INJURY TO OTHER PERMANENT WORK.

2. MAKE TRANSITION BETWEEN EXISTING AND NEW PAVING WORK NEAT AND FLUSH.

3. FINISHED PAVING SHALL BE EVEN, WITHOUT POCKETS, AND GRADED TO ELEVATIONS SHOWN. POROUS PAVING WITH RESERVOIRS BELOW FROST LINE CAN AND SHOULD BE AS FLAT AS POSSIBLE.

MAINTENANCE

THE SURFACE OF POROUS PAVEMENT ESPECIALLY WHERE WATER IS CONCENTRATED MUST BE CLEANED REGULARLY TO AVOID ITS BECOMING CLOGGED BY FINE MATERIAL. THIS CLEANING IS BEST ACCOMPLISHED THROUGH USE OF A VACUUM CLEANING STREET SWEEPER. OUTSIDE OF REGULAR CLEANING, POROUS PAVEMENT REQUIRES NO MORE MAINTENANCE THAN CONVENTIONAL PAVEMENT. IN TIMES OF HEAVY SNOWFALL IT MUST BE RECOGNIZED THAT APPLICATION OF ABRAISIVE MATERIAL SHOULD BE CLOSELY MONITORED TO AVOID CLOGGING PROBLEMS ONCE THE SNOW AND ICE MELTED. NO METHOD OF MAINTENANCE HAS BEEN SATISFACTORY ON FULLY CLOGGED PAVEMENTS, AND ONLY A SUPERFICIALLY CLOGGED SECTION SHOWING A WATER INFILTRATION RATE OF 0.1 INCHES PER SECOND COMPARED TO A NORMAL WATER PENETRATION OF 0.38 INCHES PER SECOND CAN BE RESTORED TO NORMAL OPERATION. THE BEST METHOD FOR CLEANING IS BRUSH AND VACUUM SWEEPING FOLLOWED BY HIGH PRESSURE WATER WASHING OF THE PAVEMENT. VACUUM CLEANING ALONG, ONCE THE PAVEMENT IS CLOGGED, HAS BEEN FOUND INEFFECTIVE. THE OILS IN THE ASPHALT BIND DIRT, AND ONLY AN ABRADING AND WASHING TECHNIQUE CAN BE EFFECTIVE IN THE REMOVAL OF SUCH DIRT. CLOGGING TO A DEPTH OF 0.5 INCH IS SUFFICIENT TO PREVENT WATER PENETRATION. FOR CLOGGED PAVEMENT, DRILLING OF ONE QUARTER INCH HOLES EACH SQUARE FOOT IS RECOMMENDED TO RESTORE ORIGINAL DRAINAGE CAPACITY.

TRAFFIC CONTROL

EXPERIENCE HAS SHOWN THE NEED FOR CLOSE CONTROL OF CONTRACTOR VEHICLES ON NEWLY INSTALLED AREAS OF POROUS PAVEMENT. DAMAGE TO PAVEMENT POROSITY RESULTS CHIEFLY FROM ABUSE DURING THE EARLY LIFE OF THE PAVEMENT. NORMALLY, PAVING IS DONE WHILE HEAVY CONSTRUCTION OR EARTH MOVING IS CONTINUING IN AN AREA. THE PAVEMENT IS THUS SUBJECTED TO MUD AND DIRT FROM CONTRACTOR VEHICLES FOR UP TO SEVERAL MONTHS, AND THE CONTINUAL PASSAGE OF THESE VEHICLES COMPACTS THE DIRT INTO THE PORES. ONLY IF CAKED MUD IS CLEANED FROM VEHICLE WHEELS AND THE PAVEMENT IS CLEANED DAILY BY SWEEPING AND HIGH-PRESSURE WATER WASHING CAN POROSITY BE RETAINED. CLOGGING CAN BE FURTHER MINIMIZED BY PROPER USE OF CURBING TO PREVENT SURROUNDING SOILS FROM WASHING ONTO THE PAVEMENT SURFACE.

TYPE AND QUALITY OF AGGREGATE

THE AGGREGATES SELECTED FOR POROUS PAVEMENT CONSTRUCTION SHOULD MEET REQUIREMENTS OF THE STANDARD SPECIFICATION FOR "CRUSHED STONE, CRUSHED SLAG AND CRUSHED GRAVEL FOR DRY-OR-WATER-BOUND MACADAM BASE AND SURFACE COURSED OF PAVEMENTS," ASTM D693-77, WITH TWO EXCEPTIONS, FIRST, THE GRADATION TEST MUST BE OF THE OPEN GRADED TYPE DESCRIBED HERE. SECOND, A SOUNDNESS TEST IS REQUIRED, AS SPECIFIED IN ASTM D 692-79, COURSE AGGREGATE FOR BITUMINOUS PAVING MIXTURES, TO DETERMINE IF THE AGGREGATE IS SUSCEPTIBLE TO DISINTEGRATION BY WATER.

ASPHALT CEMENT GRADE IN MIX

THE SUGGESTED VISCOSITY GRADE OF ASPHALT CEMENT TO BE USED IS AS-20 AASHTO M-226-73 I. THIS GRADE IS TO CONSIDERED A TENTATIVE STARTING POINT BECAUSE TEST RESULTS OBTAINED FROM THE DESIGN PROCESS MAY INDICATE AN ADVANTAGE OR A NECESSITY TO ALTER THE ASPHALT GRADE.

MIXING TEMPERATURE

TO ENSURE THE INDIVIDUAL AGGREGATE PARTICLES ARE COMPLETELY SURROUNDED BY ASPHALT, AND THAT THE ASPHALT IS TIGHTLY BOUND TO EACH PARTICLE, TEMPERATURE OF MIXING AT THE HOT MIX PLANT MUST BE RIGIDLY CONTROLLED. TO LOW A MIXING TEMPERATURE WILL RESULT IN INADEQUATE ASPHALT BINDING AND COVERAGE OF THE AGGREGATE, WHILE TOO HIGH A MIXING TEMPERATURE WILL ALLOW ASPHALT TO DRAIN FROM THE MIX, RESULTING IN A LOWER ASPHALT CONTENT AND DECREASED STRENGTH. SUITABLE MIXING TEMPERATURES RANGE FROM 230 TO 260 DEGREES FARENHEIT, BUT THE LOWER END OF THAT RANGE (230 TO 240F) IS RECOMMENDED.

ASPHALTIC CONTENT IN MIX

FOR ROAD PAVING DURABILITY AND TO PREVENT TOO RAPID HARDENING OF THE ASPHALT, IT IS DESIRABLE TO HAVE THE HIGHEST ASPHALT CONTENT POSSIBLE IN THE MIX. TOO MUCH ASPHALT WOULD SEPARATE OUR UNDER TRAFFIC, SO THAT MAXIMUM ASPHALT CONTENT IS GENERALLY LIMITED BY THAT FACTOR. EXPERIENCE HAS SHOWN THAT 5.5 PERCENT BY WEIGHT IS THE MINIMUM RECOMMENDED ASPHALT CONTENT. ASPHALT CONTENT SHOULD BE DETERMINED ACCORDING TO THE TESTING PROCEDURE RECOMMENDED IN FEDERAL HIGHWAY ADMINISTRATION REPORT NO. FHWA-RD-74-2, ALREADY CITED. THE MARSHALL DESIGN METHOD FOR DETERMINING MIX CONTENT IS NOT RECOMMENDED. USING A 5.5 PERCENT ASPHALT CONTENT AND THE ASPHALT INSTITUTE'S RECOMMENDED 4-INCH MINIMUM SURFACE COURSE, A 0.6 INCH RAINFALL RESERVOIR CAPACITY IS OBTAINED WITH AN INFILTRATION RATE OF 176 INCHES PER HOUR.

Table 7.5 (continued)

OPEN-GRADED ASPHALT CONCRETE FORMULATION

MATERIAL	PASSES THRU SCREEN:	WEIGHT (%)	VOLUME (%)	---- PROBABLE PARTICLE DATA ---------- width, mm	weight,g	No. Per 100g of asphalt concrete
AGGREGATE	1/2	2.8	2.2	10.7	1.667	1.7
	3/8	59.6	46.3	8.0	0.697	85.5
	#4	17.0	13.3	4.0	0.087	195.4
subtotal coarse aggregate:		79.4	61.8			282.6
	#8	2.8	2.2	2.0	0.0109	255.6
	#16	10.4	8.0	1.0	0.00136	7647.0
	#200	1.9	1.5	0.06	0.000294	6462.0
ASPHALT		5.5	10.5			
AIR		0.0	16.0			
		100.0	100.0			

SOURCE: City of Rockville (1984a).

6. A one-inch deep layer of 3/8- to 5/8-inch stone is placed over the base course, and manually graded to plan specifications.

7. The porous asphalt layer is then added, when the air temperature is above 50 degrees F and the laying temperature is between 230-260 degrees F. Failure to follow these guidelines can lead to premature hardening of the asphalt and subsequent loss of infiltration capacity.

8. Rolling can begin when the asphalt is cool enough to withstand a ten ton roller. Normally, only one or two passes of the roller are necessary. More frequent rolling can reduce the infiltration capabilities of the open-graded asphalt mix.

9. After rolling is complete, all traffic should be kept out of the porous pavement area for a minimum of one day to allow proper hardening.

10. Post-construction sediment control is critical. The majority of porous pavement failures occur in the first few weeks and months after the asphalt has been rolled, usually from clogging caused by adjacent erosion or sediment tracked in from elsewhere on the site by construction vehicles. Therefore, it is very important that 1) S&E practices be inspected to make sure they still work, 2) the vegetated buffer strips are immediately established, 3) reinforced silt fences or Austin triangles are placed between the buffer and pavement to prevent sediment entry until the buffer is well established, 4) signs are posted and construction personnel advised not to enter the parking lot with muddy tires, and 5) if such traffic cannot be prohibited, a temporary stone construction entrance should be installed.

Routine Maintenance

The following routine maintenance tasks should be a legally binding element of the property deed:

VACUUM SWEEPING

The porous pavement surface should be vacuum swept at least four times per year, followed by high-pressure jet hosing, to keep the asphalt pores open. Several firms in the region now provide this service as part of a regular, relatively low cost contract. Evidence of such a contract should be provided to the inspector before any bonds are released on the job.

INSPECTION

The pavement should be inspected several times in the first few months after construction, and then annually thereafter. Inspections should be conducted after large storms to check for surface ponding that might indicate local or widespread clogging. Also, the condition of the vegetated buffer strips should be examined.

PATCHING

Potholes and cracks can be repaired using conventional, non-porous patching mixes as long as the cumulative area repaired does not exceed 10% of the parking lot area.

RELIEVING SURFACE CLOGGING

Spot clogging of the porous pavement layer can be relieved by drilling half-inch holes through the porous asphalt layer every few feet. In cases where clogging occurs in a low spot in the parking lot, it may be advisable to install a drop inlet to route water into the stone reservoir.

SNOW REMOVAL

Sand or ash should never be applied to porous pavement for snow removal purposes. This site should be posted to that effect. Thelen and Howe (1980) report that snow and ice melt is more rapid on porous pavement than conventional pavement, which suggests that prohibiting these materials may not be a major inconvenience.

Non-Routine Maintenance

The routine maintenance tasks outlined above should prevent or relieve surface clogging in the asphalt layer. A much more serious problem occurs if the subsoil, or the subsoil/filter cloth interface becomes clogged over time. At present, nothing short of complete replacement can correct this condition. It may be advisable to install a backup underdrainage system of capped perforated pipes to convert the pavement into a partial exfiltration system in the event of bottom clogging (particularly if subsoils initially have marginal infiltration capacity).

Total Maintenance Costs

Very limited data is presently available to assess porous pavement maintenance costs. However, it is probably reasonable to assume that routine costs are lower in comparison to ponds, whereas non-routine maintenance costs may run much higher.

ENVIRONMENTAL ATTRIBUTES OF POROUS PAVEMENT

Impacts to the Natural Environment

Both partial and complete porous pavement designs get high marks for protecting downstream aquatic life (if any exists), as they maintain the pre-development water balance at the site, minimize streambank erosion and filter out pollutants. Also, because of the high groundwater recharge associated with porous pavement, perimeter landscape plantings will tend to grow more vigorously than those adjacent to conventional pavement.

One potential negative impact of porous pavement is the risk of groundwater contamination. Long-term studies of pollutant migration in soils underneath various infiltration practices indicate only limited downward migration of pollutants through the soil (Nightingale, 1987; OWML, 1983, Appendix E; US EPA, 1983). Possible exceptions include very soluble pollutants such as nitrate, and chlorides. Also, there is some concern that some toxic chemicals could potentially leach from the asphalt or binder, although the limited lysimeter studies to date have not confirmed this (Gburek and Urban, 1980). The possible risks of groundwater contamination by porous pavement is currently the object of an intensive monitoring survey conducted by the USGS. Until more is known, it is advisable not to site porous pavement near groundwater drinking supplies.

Impacts on the Human Environment

In terms of traffic safety, porous pavement is generally superior to conventional pavement. Thelen and Howe (1978) report that vehicles have better skid resistance and are less susceptible to hydroplaning on porous pavement, in comparison to regular paving. Porous pavement also produces less headlight glare on rainy nights.

RELEVANT DESIGN GUIDANCE

Table 7.7 summarizes some of the design criteria for porous pavement, which are also shown in schematic form in Figure 7.6. In addition, the following references should be consulted for more detailed guidance on the design and installation of porous pavement:

Maryland Water Resources Administration, 1983. Standards and Specifications for Infiltration Practices.

Maryland Water Resources Administration, 1985a. Inspectors Guideline Manual for Stormwater Management Infiltration Practices.

DESIGN SUMMARY: POROUS PAVEMENT

- **SITE EVALUATION:**
  Prior to design, the site should be carefully evaluated to determine whether it is feasible for infiltration. This involves taking at least three soil borings or trenches, to a depth of 4 feet below the anticipated bottom of the stone reservoir. Evidence of the seasonally high water table, bedrock level, fill soils, or localized clay lenses should not be present in the cores. Underlying soils should have a minimum infiltration rate of 0.27 in/hr (for partial exfiltration systems) or 0.52 in/hr (for full exfiltration systems).

- **TRAFFIC INTENSITY:** Porous pavement is generally only feasible for low volume automobile parking areas (0.25 to 10.0 acres in size) and lightly used access roads. Areas within a large parking lot that are expected to receive moderate or heavy traffic intensity, or that will accommodate heavy trucks, can be conventionally paved and then sloped to drain over to an adjacent porous pavement area.

- **DEGREE OF EXFILTRATION:**
  Most porous pavement applications will be of the full or partial exfiltration variety, and should be designed to exfiltrate a minimum of runoff volume equivalent to the first one-half inch of runoff from contributing impervious areas.

- **SLOPE:**
  The slope of porous pavement should not exceed 5% and is best when as flat as possible. If low spots do develop in the parking lot, it may be advisable to install drop inlets to divert runoff into the stone reservoir more quickly.

- **CONSTRUCTION:**
  Probably more than any other BMP, porous pavement requires a high level of construction expertise and workmanship. The construction guidelines presented in Table 7.5 should be followed precisely.

- **MAXIMUM DRAINING TIME:**
  The depth of the stone reservoir should be adjusted so it drains completely within 72 hours. This allows the underlying soils to dry out between storms (improving pollutant removal) and also preserves capacity for the next storm. If the site has marginal soils for infiltration (loams, silt loams), or covers a wide area, it may be prudent to design the reservoir to drain within 48 hours.

- **MINIMUM DRAINING TIME:**
  Care should be taken in spacing the underdrain network in partial exfiltration systems. If perforated underdrains are spaced too close together, runoff may be collected too efficiently to provide the exfiltration needed for high pollutant removal. As a general design rule, a minimum residence time of 12 hours (as determined by the modified TR-20 procedure for infiltration facilities) should be a target for the design event.

- **OBSERVATION WELLS:**
  An observation well, consisting of a well-anchored, vertical perforated PVC pipe with a lockable aboveground cap, should be installed on the downslope end of the porous pavement area to monitor runoff clearance rates. The well should be checked several times in the first few months after construction. Water depth in the well should be measured at 0, 24 and 48 hour intervals after a storm. Clearance rates are calculated by dividing the drop in water level (in) by the time elapsed (hrs) from the end of the storm. A series of clearance rate measurements taken over the years provides a useful tool for tracking any clogging problems within the stone reservoir.

- **POSTING:**
  The porous pavement site should be posted with signs indicating the nature of the surface, and warning against resurfacing the site with conventional pavement, using abrasives (such as sand or ash) for snow removal, or parking of heavy construction equipment.

- **EROSION CONTROL:**
  Sediment must be kept completely away from a porous pavement site before, during and after construction. Diversion berms should be used to divert stormwater and sediment around the planned porous pavement site. Porous pavement construction should never begin until all contributing upland areas have been completely stabilized. Soil excavated during construction should be placed well away from the perimeter of the site to prevent it from washing back into the stone reservoir.

- **PRETREATMENT OF RUNOFF:**
  If the porous pavement site receives runoff from off-site areas, a pretreatment facility should be constructed to remove oil, grit and sediments before they can enter the stone reservoir and possibly clog it. Sand filters, water quality inlets, short trenches or barrel inlets (rooftop runoff only) can be used for this purpose.

- **VACUUM SWEEPING/JET HOSING:**
  The pavement surface should be vacuum swept at least four times per year to remove any grit or sediment trapped in the pores of the open-graded asphalt. This treatment should be immediately followed by high pressure jet hosing to wash off any remaining fine particles. Evidence of a regular service contract for performing this important maintenance activity should be required before any bonds are released on a project.

- **INSPECTIONS:**
  Each site should be inspected annually during wet weather to check the clearance rate of the stone reservoir, and to inspect the condition of buffer strips, pretreatment facilities, and any evidence of surface clogging.

- **CLOGGING/REPAIRS:**
  Potholes, cracks and other pavement defects can be patched with conventional paving mixes, as long as the cumulative total area repaired is less than 10% of the total area. If the regular vacuum sweeping/hosing routine does not relieve surface clogging, half-inch diameter holes can be drilled through the asphalt course into the stone reservoir to facilitate drainage. If the stone reservoir or subsoil becomes clogged, the structure may have to be replaced, unless a backup system of underdrains is provided.

Figure 7.6: Design Schematic for Porous Pavement

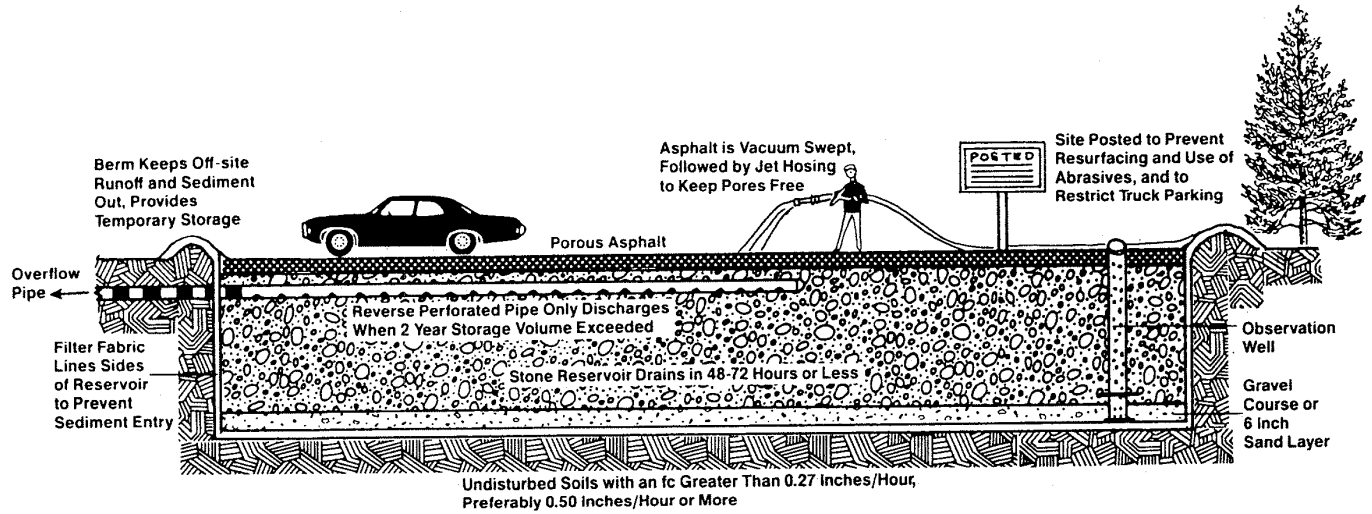

CHAPTER 8: WATER QUALITY INLETS

Water quality inlets (also known as oil/grit separators) are designed to remove sediment and hydrocarbon loadings from parking lot runoff before they are conveyed to the storm drain network or to an infiltration BMP. Under current designs, water quality inlets only store a small fraction of the two year design storm volume, and because of their limited capacity, inlets play no role in modifying the post development peak discharge rate. The pollutant removal capability of these inlets has never been monitored in the field. However, since runoff is only briefly retained in the inlets, only moderate removal of coarse sediment, oil/grease, and debris can be expected. Even more limited removal is likely for fine-grained particulate pollutants such as silt, clay and associated trace metals and nutrients. Soluble pollutants probably pass through inlets without modification. Water quality inlets typically serve parking lots one acre or less in size, and are particularly appropriate for sites that are expected to receive a great deal of vehicular traffic or petroleum inputs (e.g, gas stations, roads, loading areas). Installation costs of standard sized water quality inlets are on the order of $5000-15,000. Routine maintenance costs are high since the inlets must be cleaned out at least twice a year to permanently dispose of trapped pollutants and to ensure proper inlet function.

Figure 8.1: Schematic of a Water Quality Inlet, Montgomery County, MD. Three Chamber Design

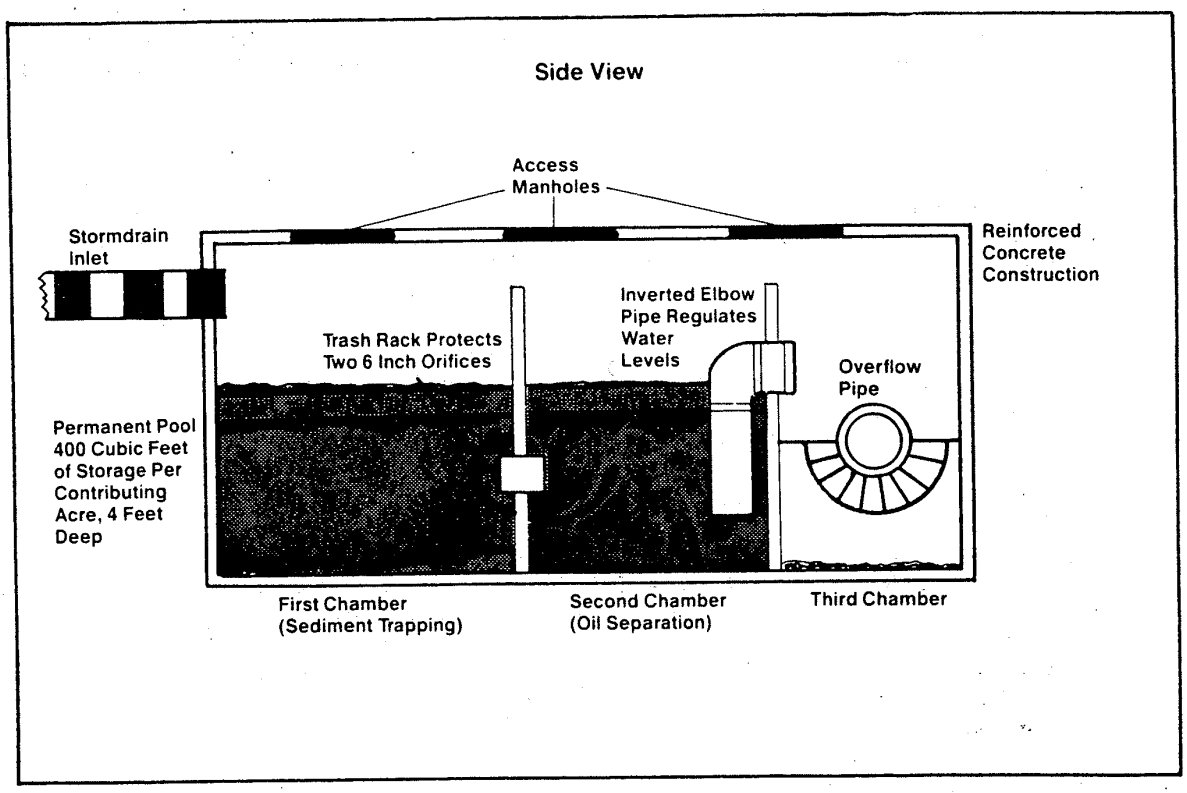

Advantages of the water quality inlets lie in their unobtrusiveness, compatibility with the storm drain network, easy access, and capability to pretreat runoff before it enters infiltration BMPs. Disadvantages include their limited stormwater and pollutant removal capabilities, the need for frequent clean-outs (which cannot always be assured), and possible difficulties in disposing of accumulated sediments.

INLET DESIGN VARIATIONS

Montgomery County Design

A typical three chamber design for a water quality inlet, developed in Montgomery County, Maryland (MCDEP, 1984b), is shown in Figure 8.1. Basically, the inlet is a long rectangular concrete chamber connected to the storm drain system. Runoff passes through three chambers that are specially modified to separate out sediment, grit and oil before exiting through a storm drain pipe.

The first chamber in the inlet contains a permanent pool of water that is three to four feet deep, and is connected to the second chamber by a pair of well-screened six inch holes. The first chamber is used for gravity settling of grit and sediments, and can also trap floatable debris, such as leaves and litter.

The second chamber also holds a permanent pool of water. An inverted pipe elbow leads to the third chamber which regulates water levels in the inlet. Runoff must pass through the bottom opening of the inverted pipe, and then travel upward several feet before it enters the third chamber. This design feature discourages clogging, and more importantly, traps oil and gas films floating on the surface in the second chamber. Oil and gas films remain in the second chamber until they are gradually adsorbed by sediment particles, and settle out.

The third chamber contains a brick cradle that forms an opening to a storm drain outlet pipe. If the cradle is elevated from the floor of the chamber, a third permanent pool is created that may become an additional site for settling. Otherwise, the third chamber has little value in pollutant removal.

Water quality inlets are sized to provide 400 cubic feet of wet storage per contributing acre, and a pool at least four feet deep (MCDEP, 1984b). Additional dry storage must also be provided to pass the design storm. Access to each chamber for inspections and regular clean outs is provided by a separate manhole cover and step rungs.

Rockville Design

An alternative design for the three chamber inlet has been developed by the City of Rockville, Maryland (1984b). Runoff from a curb and gutter is directed into the first chamber of the inlet (Figure 8.2). However, unlike the Montgomery County design, the first and second chamber do not have a permanent pool. Instead, runoff drains through a series of screened six-inch weep holes situated on the floor of each chamber, then through a layer of stone aggregate, and eventually exfiltrates into the subsoil. Thus, the first and second chamber fill up only temporarily during storms, and then should drain completely. Pollutant removal is enhanced due to the

exfiltration. However, since the weep holes are situated near the floor of the chamber, there are concerns about how long they can remain free of clogging from sediment deposits. In the event that the inlet does clog, it would then operate in the same manner as the conventional three-chamber inlet (i.e., a quasi-permanent pool would be formed in each chamber).

Figure 8.2: Schematic of a Water Quality Inlet, Rockville Percolating Inlet Design

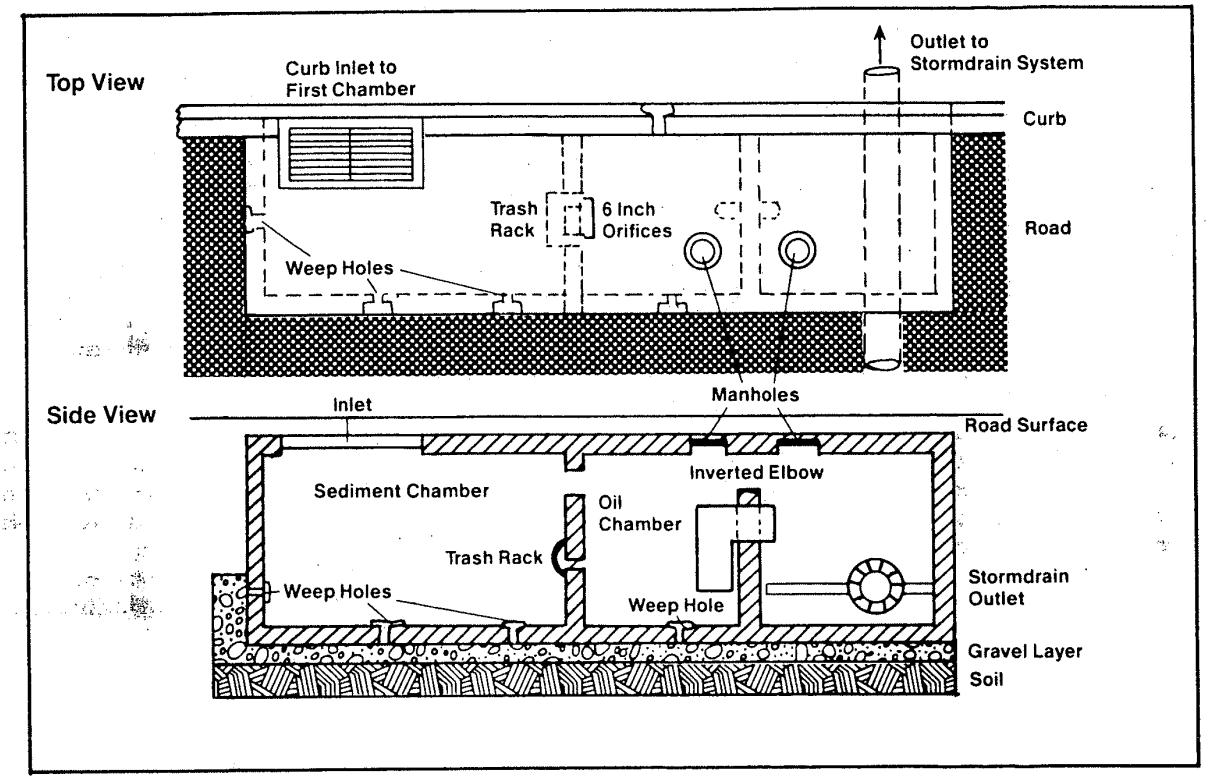

Source: City of Rockville (1984b)

EFFECTIVENESS IN STORMWATER CONTROL

Because of their limited storage capacity, water quality inlets provide only marginal stormwater management benefits. In most instances, inlets are used to pretreat runoff before it is conveyed through the storm drain network, or into an infiltration trench or porous pavement facility. In very exceptional cases, water quality inlet design features can be incorporated into larger underground detention chambers to provide peak discharge control for a site.

Peak Discharge Control

Water quality inlets provide little or no control of post-development peak discharges, because of their limited storage capacity. Standard water quality inlets only have about 200 cubic feet of dry storage capacity per impervious acre. By way of contrast, the runoff volume needed to adequately control the two year design storm for the same impervious acre is over three times greater. As shown in Figure 8.3, standard sized water quality inlets provide only minimal storage of the design storm, and, consequently, should not greatly attenuate the peak discharge rate.

Figure 8.3: Size of Inlet Storage Compared to a Two Year Design Storm

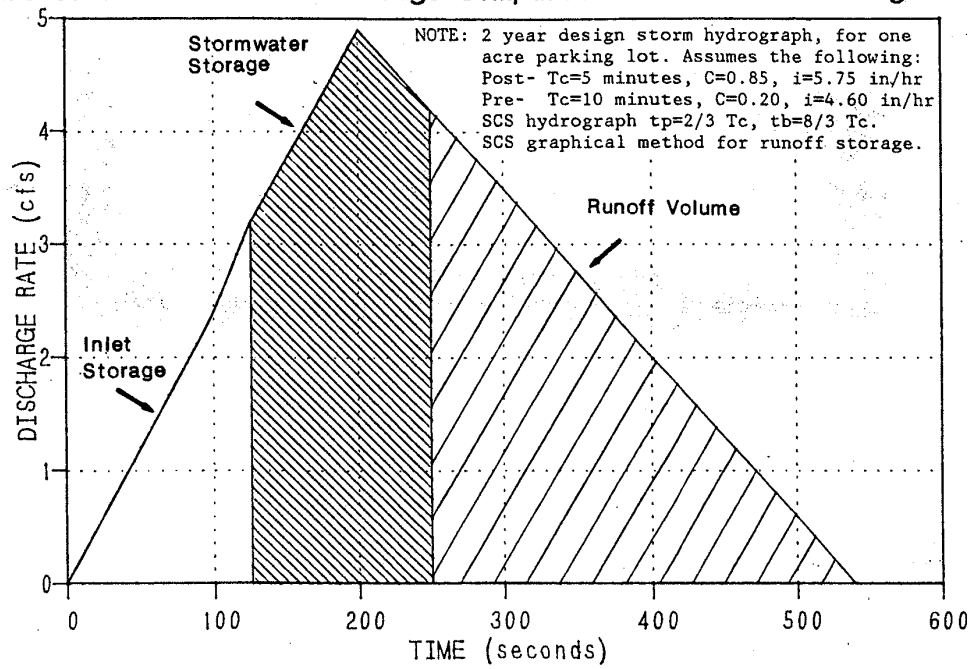

Other Stormwater Benefits

For many of the same reasons noted above, the Montgomery County water quality inlet design will not provide significant groundwater recharge, low flow augmentation, runoff volume or streambank erosion control. The modest level of exfiltration that might be achieved by the modified Rockville inlet design may provide a marginal amount of groundwater recharge and volume control, if weep holes remain free from clogging.

POLLUTANT REMOVAL

The pollutant removal capability of water quality inlets has never been tested in the field, so their efficiency is largely a matter of speculation. Nonetheless, some general estimates as to their capabilities can be inferred from studies on similar structures (such as catchbasins and oil/water separators), as well as research on the settling behavior of sediment and hydrocarbons. However, field monitoring of this increasingly popular practice is badly needed.

A number of factors inherent in the three-chamber design serve to limit pollutant removal.

1. The limited amount of wet storage provided by the inlets. A standard sized three-chamber inlet has about 0.12 inches of runoff per acre in the permanent pool of the first and second chambers. By way of contrast, one-half inch of runoff storage per impervious acre is customarily recommended for pollutant removal of the first flush for other BMPs. In more concrete terms, the permanent pool is only about one-quarter of the size of the average storm in the Washington, D.C. area (approximately 0.45 inches of rainfall).

2. Since inlets serve such small areas, and have such a small capacity, runoff passes through them very quickly. The average detention time of runoff in an inlet during most storms will seldom exceed an hour, and in many cases, may be measured in minutes (see Figure 8.3).

3. Pollutants deposited within a chamber can only be permanently removed during clean-outs. Sediment deposited during smaller storms may be resuspended and scoured out during the next large storm (Pitt, 1985). Sediment tracer studies in catch basins (Pitt, 1985) indicate that only coarse-grained particles (such as grit, sand , some silt and debris) are likely to remain deposited for long periods. Pitt estimated that catch basins could removing about 10-25% of sediment and trace metals, and less than 10% of the nutrients in urban runoff if regularly cleaned. Field observations of accumulated sediments in three-chamber inlets (Galli, personal communication) suggest that inlets may also trap silt-sized particles, but it is not known whether they are prone to resuspension.

Despite these design limitations, there is reason to believe that inlets can help to remove coarse-grained sediments from urban runoff. For example, settling column studies (Grizzard et al., 1986) indicate that initial settlement of urban sediment is quite rapid, with about 20-40% dropping out within the first hour, depending on the initial sediment concentration (Figure 8.4).

Also, the design of water quality inlets should provide moderate removal of hydrocarbons. Since oil and gas are less dense than water, they initially float on the water surface. However, since oil and gas have a strong affinity for sediment, they rapidly adsorb to particles in the water column, and can then settle out.

DESIGN TIPS FOR ENHANCING POLLUTANT REMOVAL

Since the performance of water quality inlets has not been monitored, at this point, any discussion about enhancing pollutant removal is somewhat speculative. With this in mind, however, the following design tips are offered.

1. The wet pool volume in the first and second chambers of the inlet should be maximized. When feasible, use the third chamber as a permanent pool as well.

2. The orifice connecting the first chamber with the second should be protected from clogging by a trash rack welded to end plates fastened to the concrete sidewall. A typical design is presented in Figure 8.5.

3. The inverted elbow pipe connecting the second and third chambers should extend at least three feet down into the permanent pool to adequately separate out oil. A typical design is shown in Figure 8.5.

4. Resuspension of previously deposited sediment can be alleviated by installing baffle plates from the side walls to prevent the upward migration of sediments. In addition, the floor of each chamber should be slightly sloped away from the outlet to the next chamber, to help trap sediment.

5. Finally, as noted earlier, the only means of permanently removing pollutants from a water inlet is through regular clean-outs. As a general rule, the inlet should be cleaned out at least twice per year.

Figure 8.4: Sediment Settling Behavior for Urban Runoff

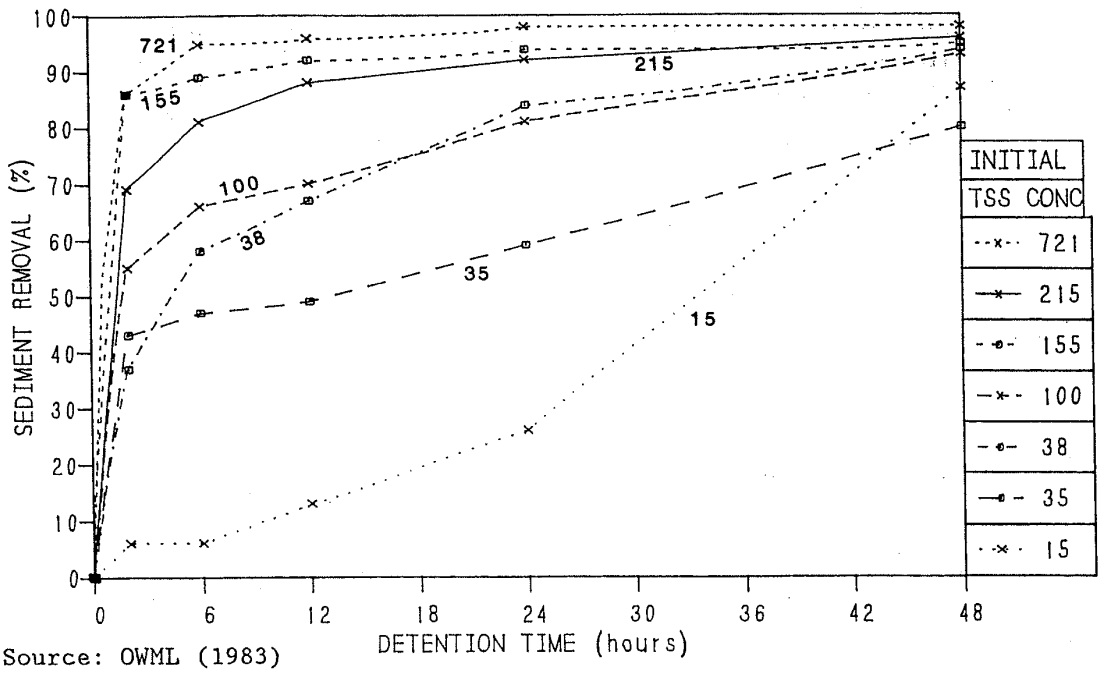

Source: OWML (1983)

PHYSICAL SUITABILITY AT THE SITE LEVEL

Water quality inlets are an adaptable practice for small sites, subject to the following constraints:

1. Either the inlet or the outlet from the water quality inlet must be connected to a storm drain network.

2. Individual inlets can normally only serve from a few tenths of an acre up to an acre each. As larger areas are served, the dimensions of the inlet, and consequently, installation costs, begin to climb rapidly.

3. If the Rockville percolating inlet design is being considered for use, the same factors used to evaluate the feasibility of infiltration trenches (soil permeability rates, depth to water table, proximity to foundations, etc.) should be checked prior to installation.

Figure 8.5: Detail on Trash Rack and Drawdown Pipe

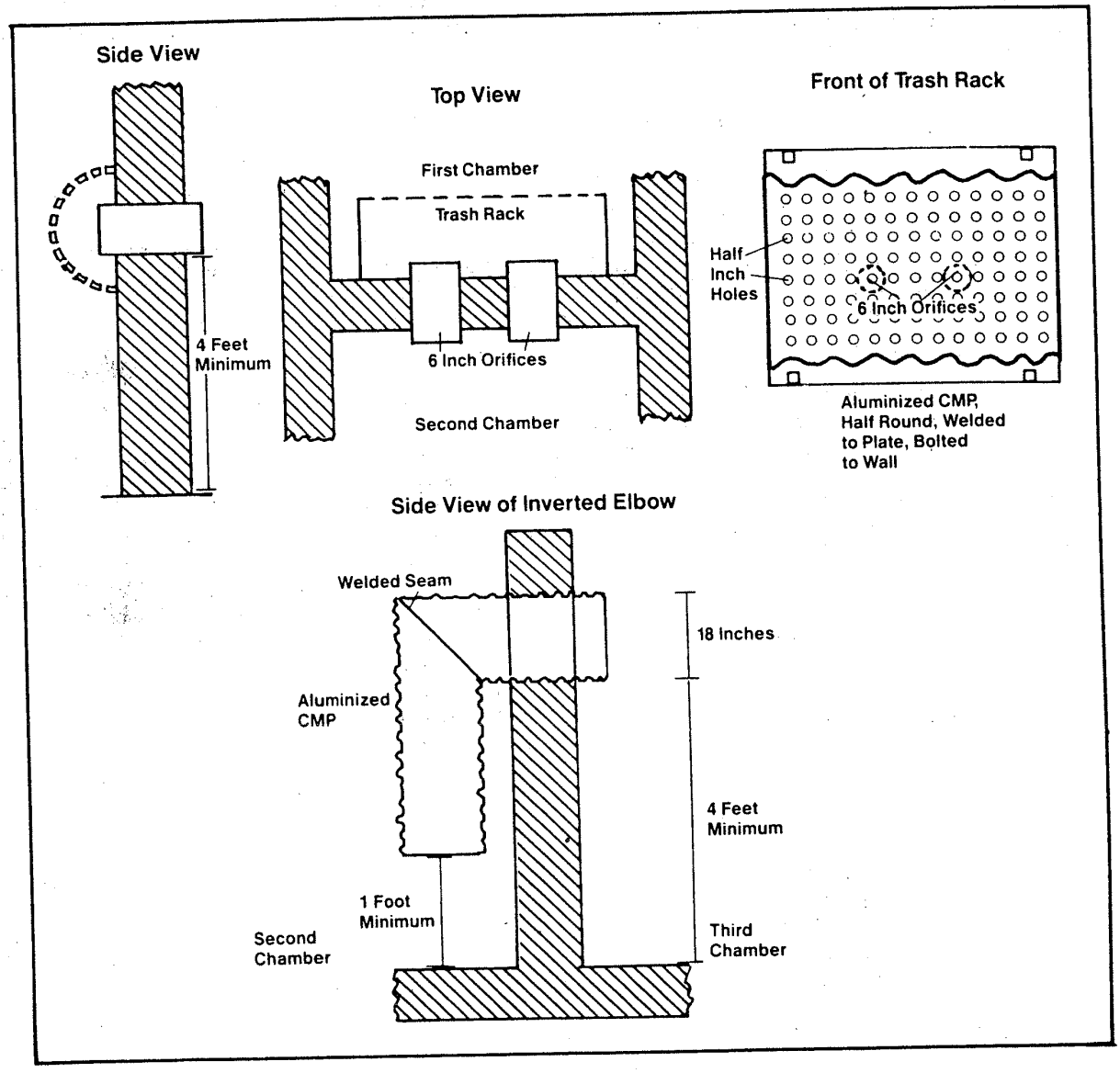

Sources: WSSC (1986) and MCDEP (1984b)

WATER QUALITY INLET COSTS

The construction cost for a standard sized, three-chamber inlet design ranges between $5000-15,000 and averages about $7000-8000 (Galli, 1986b). The cost per inlet may drop sharply when pre-cast versions become available on the market.

The three-chamber design can also be incorporated into larger underground detention storage vaults that are sometimes used in development sites with little or no available land. As noted in Wiegand et al. (1986), underground detention chambers tend to be the most expensive BMP in the Washington region, in terms of cost per volume stored.

MAINTENANCE REQUIREMENTS

Water quality inlets must be cleaned out at least twice a year to accomplish any pollutant removal. The normal method used to clean out the Montgomery County design is topump out the contents of each chamber. The turbulence of the vacuum pump in the chamber produces a slurry of water and sediment that can then be transfered to a tank truck In some areas, the truck then disposes of the slurry into a sanitary sewer trunk line, where it travels to a treatment plant (MCDEP, 1984b).

An alternative disposal method is to carefully siphon out each chamber (without creating a slurry) and allow it to infiltrate over a nearby grass area. The remaining grit and sediments can then be removed manually, and trucked to a landfill for final disposal. Both disposal methods have significant drawbacks. Pumping of the inlets can be costly, and there is a risk of groundwater contamination associated with on-site siphoning.

In most cases, the public sector would be responsible for regular clean-outs and inlet inspections. Often this responsibility will fall to local public works departments, which have the equipment and manpower to perform the work, and which are already responsible for the maintenance of the storm drain network. Once inlets have been installed however, it would be important to keep centralized, up-to-date records on the location and status of each inlet in order to track maintenance and clean-out schedules.

RELEVANT DESIGN GUIDANCE

The following agencies can provide detailed plan specifications for water quality inlets:

Montgomery County Department of Environmental Protection, Stormwater Management Division, Rockville, Maryland.

Washington Suburban Sanitary Commission, Stormwater Management Planning Division, Laurel, Maryland.

City of Rockville, Public Works Department, Rockville, Maryland.

DESIGN SUMMARY: WATER QUALITY INLETS

- **AREA SERVED:**
  Inlets typically serve impervious areas of less than one acre.

- **PERMANENT POOL:**
  The volume of the permanent pool should be maximized. At least 400 cubic feet of wet storage per impervious acre is suggested as an initial sizing rule. The permanent pool in each chamber of the inlet should be at least four feet deep.

- **CLEAN-OUT SCHEDULE:**
  Accumulated sediment should be cleaned out from inlets at least twice per year. This can be done by vacuum pumping or siphoning of the permanent pool, and manually removing sediment deposits.

- **DISPOSAL METHODS:**
  Accumulated sediment deposits should be landfilled. Runoff in the inlet can be siphoned over to an adjacent grass filter strip, or transported to a sanitary sewer line and routed to a treatment plant.

- **PREVENTING RESUSPENSION:**
  Resuspension of deposited pollutants can be a problem in inlets. The use of vertical baffle plates on chamber floors may help alleviate this problem. Also, the floor of each chamber should slope slightly away from the outlet to the next chamber.

- **INVERTED ELBOW:**
  An inverted pipe with a 90 degree elbow should connect the second and third chambers of the inlet. The elbow can be formed by welding two cut sections of aluminized CMP, and the vertical portion should extend to one foot from the bottom of the inlet.

- **USE WITH UNDERGROUND INFILTRATION:**
  Inlets can be used to pretreat runoff before it enters an underground infiltration facility (e.g., porous pavement or an infiltration trench).

- **CLOGGING:**
  The two six-inch orifices that lead from the first to second chamber should be screened by a half round of aluminized CMP, in which half-inch holes have been drilled.

- **ACCESS:**
  To facilitate clean-outs, access to each chamber should be provided by means of a separate manhole and step rings.

- **LAND USE:**
  Water quality inlets are particularly appropriate for small redevelopment areas that generate high loads of sediment and hydrocarbons, such as service stations, convenience stores, and roads.

- **HYDRAULIC DESIGN:**
  The inlet should be designed to pass the two year design storm without hydraulic interference. This is normally done by placing a weir at least one foot above the water level in each chamber, and with at least a one foot gap to the top of the chamber.

CHAPTER 9: VEGETATIVE BMPs

This section reviews a diverse series of landscaping practices that can be applied to portions of the urban drainage system, including:

- Grassed Swales
- Filter Strips
- Urban Forestry
- Basin Landscaping
- Shallow Marsh Creation

Figure 9.1: Vegetative BMPs for a Site

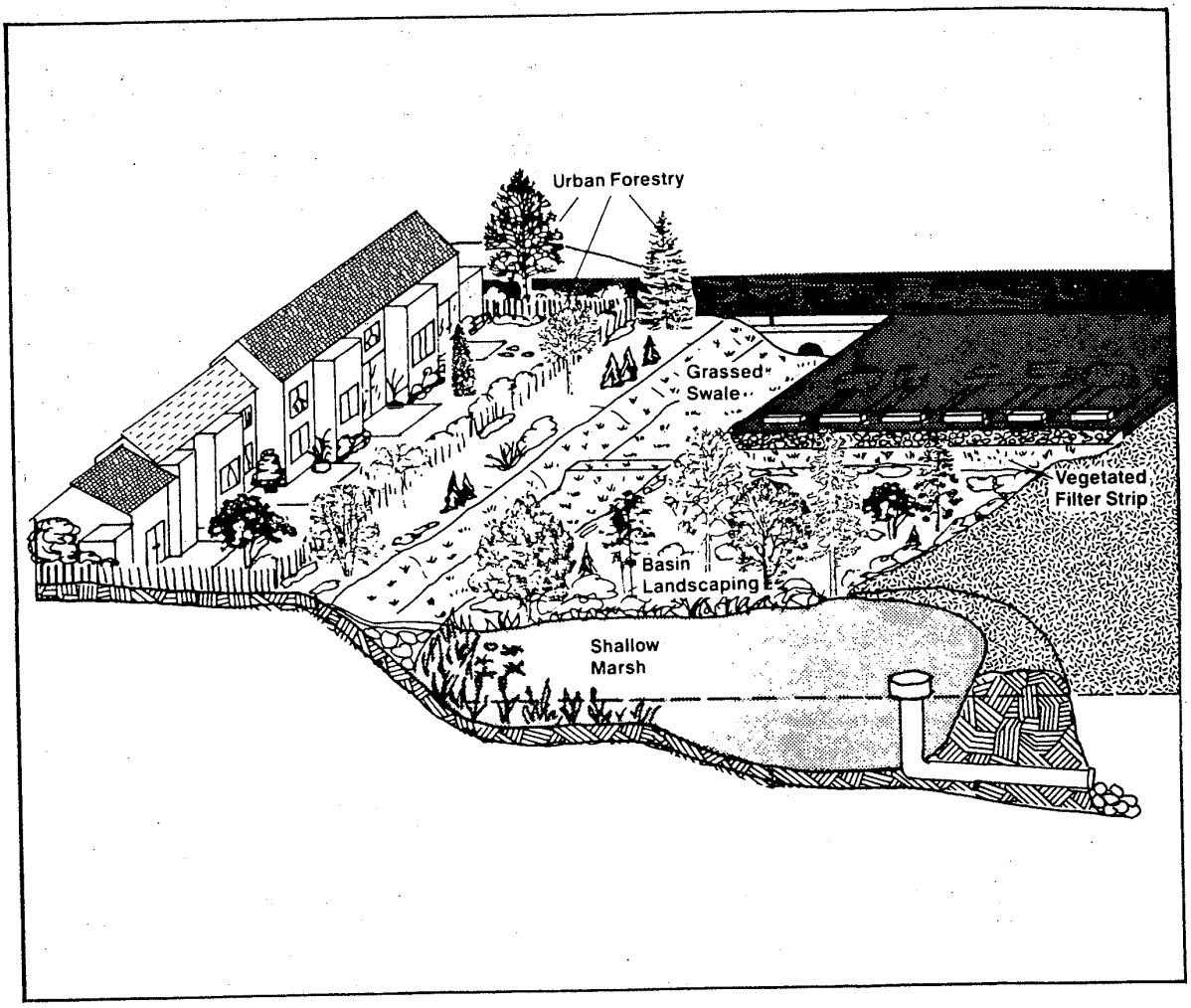

All of these practices rely on various forms of vegetation to enhance the pollutant removal, habitat value, or appearance of a development site. While each practice by itself is not generally capable of entirely controlling the increased runoff and pollutant export from a site, they can improve the performance and amenity value of other BMPs, and should be considered as an integral part of every site plan. Typically, the costs for vegetative BMPs are very small in relation to those incurred when constructing ponds and basins. Also, vegetative BMPs can usually be applied during any stage of development, and in some instances, are attractive retrofit candidates.

Each of the vegetative practices is briefly reviewed in the following section; more detailed design guidance is provided by reference. The section concludes with a general landscaping guide for stormwater management areas.

GRASSED SWALES

General

Grassed swales are typically applied in single family residential developments and highway medians as an alternative to curb and gutter drainage systems (Figure 9.2). Swales have a limited capacity to accept runoff from large design storms, and often must lead into storm drain inlets to prevent large, concentrated flows from gullying/eroding the swale. If check dams are placed across the flow path, swales can provide some stormwater management for small design storms (Md WRA, 1984) by infiltration and flow attenuation. In most cases, however, swales must be used in combination with other BMPs downstream to meet stormwater management requirements.

Some modeling efforts and field studies indicate that swales can filter out particulate pollutants, under certain site conditions. However, swales are not generally capable of removing soluble pollutants, such as nutrients. In some cases, trace metals leached from swale culverts and nutrients leached from intensive lawn fertilization may actually increase the export of these pollutants. Grassed swales are usually less expensive than the curb and gutter alternative. Swale maintenance is performed by adjacent homeowners, and basically involves normal lawn activities such as mowing, watering, and chemical applications.

Stormwater Benefits

Swales act to control peak discharges in two ways. First, the grass reduces runoff velocity, depending on the length and slope of the swale. This, in turn, lengthens the watershed time of concentration (i.e., the time needed for runoff to reach the desired control point), and can, at least partially, attenuate the post-development peak discharge rate.

Second, a portion of the stormwater runoff volume passing through the swale infiltrates into the soil and does not appear at the downstream control point. However, as Wong and McCuen (1982) note, the volume of runoff that infiltrates into a swale is limited, seldom exceeding a few tenths of an inch, again depending on soils and slope. Runoff normally has a very short contact time in the swale (5-20 minutes) which does not give runoff much chance of infiltrating into the soil. Also, swale soils adjacent to roads are often heavily compacted to achieve desired slopes and load bearing

strength, and as a result, have less infiltration capacity than undisturbed soils. In addition, the same rain that supplies runoff to a swale often has previously saturated the soils of the swale. Consequently, infiltration rates in a swale will almost always be near the minimum rates for the local soil type.

The hydrologic performance of swales can be improved if check dams are used to temporarily pond runoff. Appropriate design techniques are provided in Md WRA (1984).

Figure 9.2: Schematic of a Grassed Swale

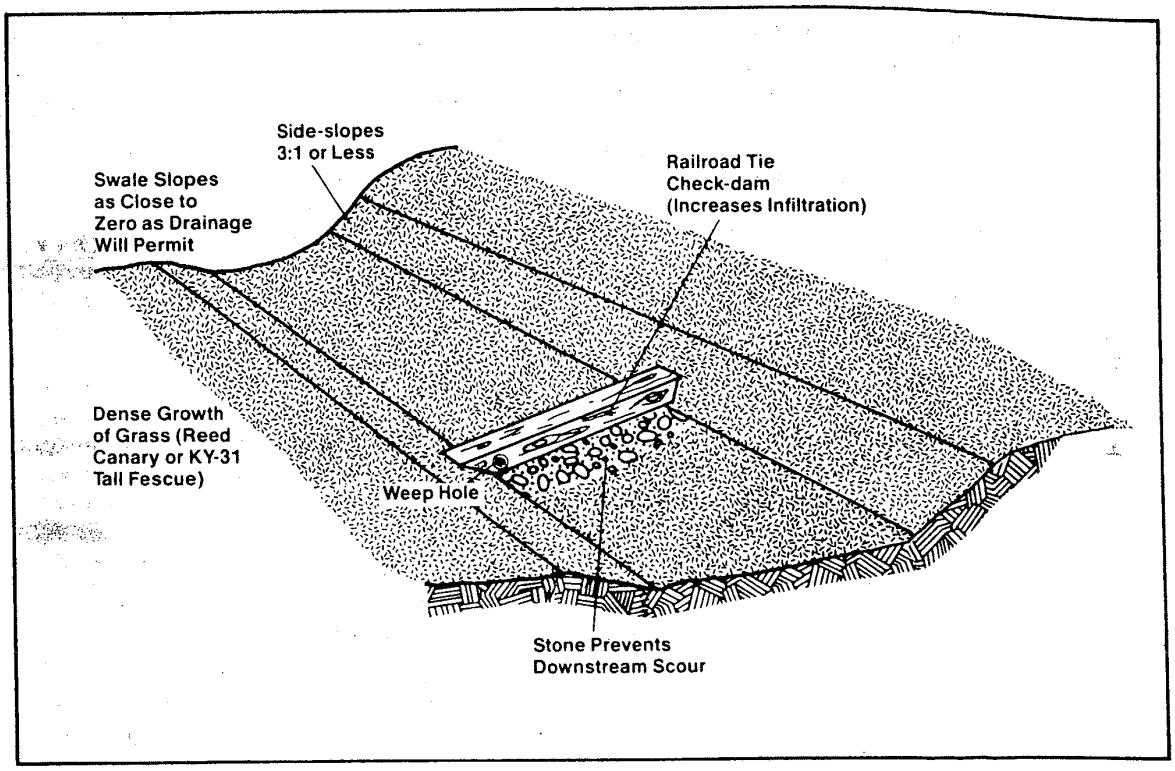

Pollutant Removal

Pollutants are removed by the filtering action of the grass, deposition in low velocity areas, or by infiltration into the subsoil. Field monitoring has provided mixed results as to the extent of pollutant removal performed by swales. Kercher et al. (1983) and Yousef et al. (1985) reported moderate to high removal of particulate pollutants in low gradient, densely vegetated swales in Florida. In contrast, Oakland (1983) found low to moderate removal of particulate pollutants and negligible removal of soluble pollutants in a low-gradient swale, underlain by relatively impermeable soils in New Hampshire.

No statistically significant difference in runoff quality was observed at three residential, high gradient (2-5%) lawn swales monitored in the Washington, D.C. suburbs, when compared to curb and gutter controls (NVPDC, 1983). An alternative analysis of the same data by OWML (1983) provided some evidence that the swales may have slightly increased nutrient and trace metal export. Wigginton et al. (1986) examined trace metal enrichment patterns in soils of the same Washington area sites and found no evidence that metals had accumulated in the swales as a result of stormwater runoff. In fact, Wigginton and his colleagues discovered that metals were being leached from the roadway culverts that connected successive swales, perhaps as a result of the acidic nature of local rainfall. The mediocre performance of the Washington area swales was attributed to the rapid passage of runoff through the swales, soil compaction, high slopes, and short grass height.

Given the ambiguous nature of these studies, it is hard to propose specific estimates for swale pollutant removal efficiency. However, at least moderate removal of particulate pollutants can probably be expected during small storms, if a swale conforms to the following design considerations:

1. Swale slopes need to be graded as close to zero as drainage will permit. Side-slopes of the swale should be no greater than 3:1 (h:v).

2. A dense cover of a water tolerant, erosion resistant grass must be established. Reed canary grass is recommended for this purpose. Swale grasses should never be mowed close to the ground, as this impedes the filtering and hydraulic functions of the swale. Also, if a swale is adjacent to a roadway, sensitive species with a low salt tolerance (e.g., bluegrass) should be avoided.

3. Underlying soils need to have a high permeability (fc > 0.5 inches/hour). The swale should be tilled before the grass cover is established to restore infiltration capacity lost as a result of prior construction activities.

4. Check dams can be installed in swales to promote additional infiltration. The best method is to sink a railroad tie halfway into the swale, and place stone on the downstream side of the tie to prevent a scour hole from forming. Earthen check dams are not strongly recommended as they tend to erode on the downstream side (which may lead to the eventual wash out of the dam). It is also quite difficult to establish and maintain grass on earthen check dams. If a check dam is used, the designer should make sure that the maximum ponding time of runoff backed up behind the check dam is less than 24 hours (Md WRA, 1984).

Suitability

Many local jurisdictions prevent the use of grassed swales if peak discharges are expected to exceed 5 cfs, or if expected runoff velocities (computed using the Manning formula) are greater than 3 fps (Md WRA, 1984).

Swales are not likely to confer many stormwater or water quality benefits if constructed on slopes greater than 5%, or if groundwater extends to within two feet of the bottom of the swale.

Table 9.1: Comparative Costs For Vegetative Establishment

ESTABLISHMENT METHOD		AVERAGE COST PER ACRE 0-2 ac.	2-5 ac.	5+ ac.	NOTES
HYDROSEEDING:		$1,975	$1,750	$1,450	Permanent, guaranteed establishment, includes seedbed prep, mulch, anchoring, fertilizer, one post germination watering (Md WRA, 1985a)
CONVENTIONAL SEEDING:	(1)	$1,800	$1,650	$1,450	As above (Md WRA, 1985a)
	(2)	$8,475	--	--	For highly erodible areas that need a blanket or net during germination
SODDING:		$10,900	--	--	For Ky-31 Tall Fescue, Field Sod less costly; Bluegrass more costly
SWALES:					Excavation/shaping plus:
For a 15 ft wide, 3:1 sideslope swale	(1)	$4.50/linear foot:			Seeding/straw mulching
	(2)	$8.25/linear foot:			Seeding/net anchoring
	(3)	$7.75/linear foot:			Sodding/stapling
FORESTRY:	(1)	$100/acre (conifers)			Manual planting of seedlings, plus weed suppression
	(2)	$200/acre (deciduous)			
	(3)	$1000-5000/acre (variable)			Manual planting of nursery stock, depends on species, stock size
MARSH PLANTING:	(1)	$1000-3000/acre (estimated)			Rhizomes, plugs or small pots, and labor

Maintenance

Swale maintenance is largley aimed at keeping the grass cover dense and vigorous. This primarily involves periodic mowing, occasional spot reseeding, and weed control. Watering may also be necessary in times of drought, particularly in the first few months after establishment. Private homeowners are usually responsible for swale maintenance. Unfortunately, overzealous lawn maintenance on the part of homeowners can present some problems. For example, mowing the swale too close to the ground, and excessive application of fertilizers and pesticides, would all detrimentally affect the performance of the swale.

Costs

A strong advantage of grassed swales is that they are more economical than the curb and gutter drainage systems they replace (APWA, 1981). The comparative costs of establishing a permanent grass cover by various seeding methods have been documented by Md WRA (1985a), and these are detailed in Table 9.1

Environmental Attributes

Residential swales are essentially an extension of a front lawn, and have little wildlife or ecological value. Roadside and backyard swales, on the other hand, can be managed as a natural area. Over time, swales might be colonized by wetland plants and other shrubs that provide wildlife habitat and a more pleasing appearance. This process may be enhanced by intentional landscape plantings (see Landscaping Guide for appropriate species). However, a natural swale should never be confused with a neglected swale. A minimum level of maintenance (specifically, seasonal mowing) is still needed on any swale to prevent nuisance problems from developing, such mosquitos, ragweed, dumping, and erosion.

FILTER STRIPS

General

Filter strips are similar in many respects to grassed swales (Figure 9.3), except that they are designed to only accept overland sheet flow. Runoff from an adjacent impervious area must be evenly distributed across the filter strips. This is not an easy task, as runoff has a strong tendency to concentrate and form a channel. Once a channel is formed, the filter strip is effectively "short-circuited" and will not perform as designed. Such short-circuiting is a common problem. For example, over 60% of agricultural filter strips installed in Virginia were reported to have been short-circuited (Dilhalla et al., 1986).

To work properly, a filter strip must be 1) equipped with some sort of level spreading device, 2) densely vegetated with a mix of erosion resistant plant species that effectively bind the soil, 3) graded to a uniform, even, and relatively low slope, and 4) be at least as long as the contributing runoff area. Modeling studies indicate that filter strips built to these exacting specifications can remove a high percentage of particulate pollutants (Wong and McCuen, 1982). Much less is known about the capability of filter strips in removing soluble pollutants. Filter strips are relatively inexpensive to establish, and cost almost nothing if preserved before the site is developed. A creatively landscaped filter strip can

become a valuable community amenity, providing wildlife habitat, screening, and stream protection. Grass filter strips are also extensively used to protect surface infiltration trenches from clogging by sediment.

Figure 9.3: Schematic of a Filter Strip

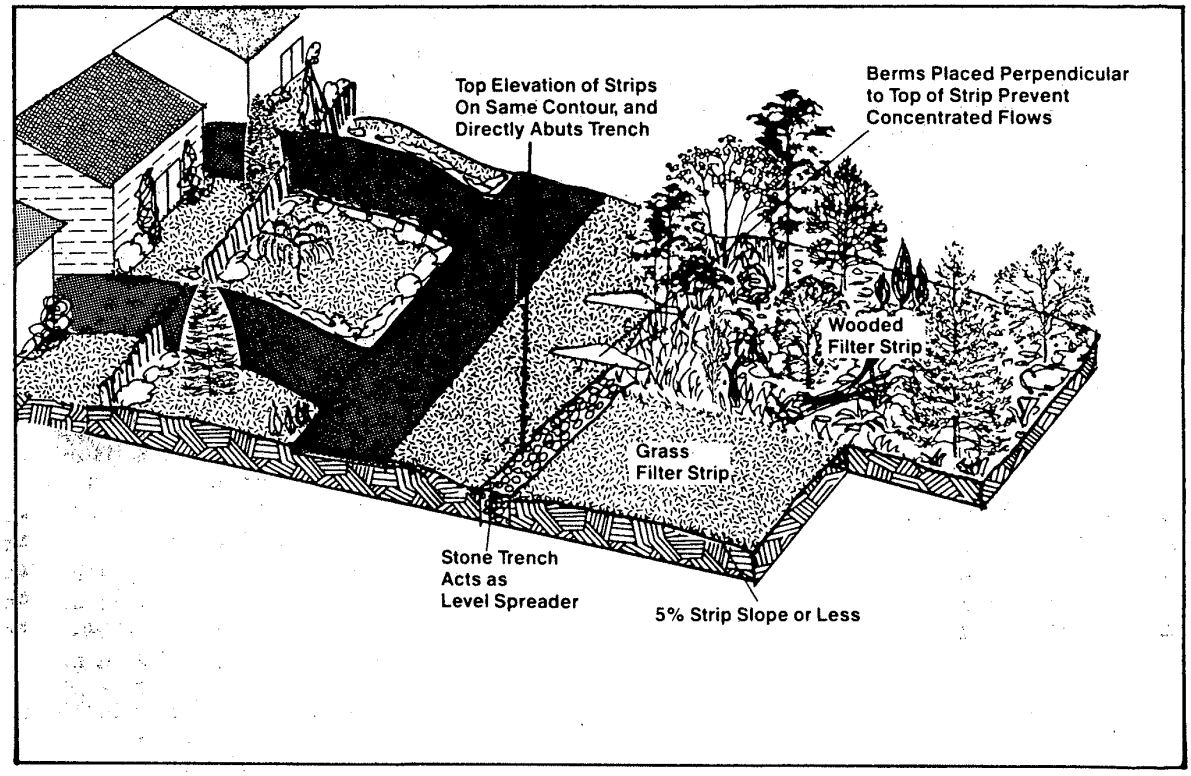

Stormwater Benefits

Filter strips do not provide enough storage or infiltration to effectively reduce peak discharges to predevelopment levels for design storms (Wong and McCuen, 1982). Typically, filter strips are viewed as one component in an integrated stormwater management system. Thus, the strips can lower runoff velocity (and, consequently, the watershed time of concentration), slightly reduce both runoff volume and watershed imperviousness, and contribute to groundwater recharge. At some sites, filter strips may help to reduce the size and cost of downstream control facilities. Filter strips are also of great value in preserving the riparian zone and stabilizing streambanks.

Pollutant Removal

Pollutant removal mechanisms in filter strips are similar to those discussed for grass swales. Results from some small test plots (Barfield et al., 1977) and several independent modeling studies (Wong and McCuen, 1982; Pitt, 1986, Overcash et al., 1981; Tollner et al., 1982) all suggest that filter strips are effective in removing particulate pollutants such as sediment, organic material and many trace metals. The rate of removal appears to be a function of the length, slope and soil permeability of the strip, the size of the contributing runoff area, and the runoff velocity.

From a design standpoint, the only variables that can be effectively manipulated are the length and slope of the strip. Md WRA (1984) suggest a minimum strip length of 20 feet; however, strips ranging in size from 100-300 feet are probably needed for adequate removal of the smaller sized sediment particles found in urban runoff (OWML, 1983). Wong and McCuen (1982) provide a useful and easily used model for sizing a filter strip, based on slope and channel parameters.

Removal of soluble pollutants in filter strips is accomplished when the pollutants infiltrate into the soil and are subsequently taken up by rooted vegetation. The efficiency of soluble pollutant removal in strips is probably not great since only a modest portion of the incoming runoff will be infiltrated (Wong and McCuen, 1982).

Forested filter strips appear to have greater pollutant removal capability than grassed filter strips, according to recent reports (Lowrance et al, 1984; Gilliam and Skaggs, 1983). A major reason cited for their efficiency is the greater uptake and long-term retention of nutrients in forest biomass (Brinson et al., 1981). However, because vegetative cover in forested strips is not as great as grass strips, they should probably be at least two times longer than a grass strip to achieve optimal removal.

As a final note, it should be remembered that the filter strip removal rates cited above are based on ideal conditions that may not always occur in the field (e.g., evenly distributed sheet flow, and uniform, dense and vigorous vegetation). If, for some reason, flow is allowed to concentrate before it reaches the filter strip, or as it crosses over it, removal rates will be significantly reduced. In severe cases, gully erosion within the filter strip may result in the strip becoming a net sediment source. The following design tips can help to prevent concentrated, erosive flows from forming in a strip:

1. The top edge of the filter strip should follow across the same elevational contour. If a section of the top edge of the strip dips below the contour, it is likely that runoff will eventually form a channel toward the low spot.

2. A shallow stone trench can be used as a level spreader at the top of the strip to distribute flow evenly. This also serves to protect the strip from man-made damage.

3. The top edge of the filter strip should directly abut the contributing impervious area. Otherwise, runoff may travel along the top of the filter strip, rather than through it. Dilhalla et al. (1986) suggest that berms be placed at 50-100 foot intervals perpendicular to the top edge of the strip to prevent runoff from bypassing the strip.

4. The appropriate length for filter strips is still the subject of some debate. As an absolute minimum, a grass strip should be at least 20 feet wide. Better performance can be achieved if the strip is 50-75 feet long, plus an additional four feet per each one percent of slope at the site (particularly if it is a forested strip).

5. Wooded filter strips are preferred to grassed strips. If an existing wooded belt cannot be preserved at the site, the grassed strip should be managed to gradually become wooded by intentional plantings.

6. If a filter strip has been used as a sediment control measure during the construction phase, it is advisable to regrade and reseed the top edge of the strip. Otherwise, the sediment trapped in the filter strip may affect the flow patterns across the strip, thereby reducing its effectiveness.

Suitability

Filter strips will not function as intended on slopes greater than 15%. These steeper slopes should still be vegetated but off-site runoff should be diverted around rather than through them. Filter strip performance is best on slopes with a grade of 5% or less. When the minimum length, twenty foot filter strips are used (for example, to protect a surface infiltration trench), slopes should be graded as close to zero as drainage permits.

To prevent concentrated flows from forming, it is advisable to have each filter strip serve a contributing area of five acres or less.

Maintenance

The maintenance required for a filter strip depends on whether or not natural vegetative succession is allowed to proceed. Under most conditions, the gradual transformation from grass to meadow to second growth forest will enhance rather than detract from the performance of longer filter strips. This process, which may be largely completed in a few decades, can be enhanced by intentional landscape plantings. Maintenance tasks and costs are both sharply reduced for these "natural" filter strips. However, corrective maintenance is still needed around the edge of the strip to prevent concentrated flows from forming.

Shorter filter strips must be managed as a lawn or short grass meadow. These strips should be mowed 2-3 times a year to suppress weeds and interrupt natural succession. Periodic spot repairs, watering and fertilization may be required to maintain a dense, vigorous growth of vegetation. Accumulated sediments deposited near the top of the strip will need to be manually removed over time to keep the original grade.

All filter strips should be inspected on an annual basis. Strips should be examined for damage by foot or vehicular traffic, encroachment, gully erosion, density of vegetation, and evidence of concentrated flows through or around the strip. Extra strip maintenance must be devoted in the first few months and years to make sure the strip becomes adequately established. This may involve extra watering, fertilization and reseeding.

Costs

The costs of establishing a filter strip are relatively low. Table 9.1 details the range in cost for permanent grass stabilization for several common seeding techniques (Md WRA, 1985a). Costs are negligible when an existing grass or meadow area is reserved at the site before development begins. Further savings can be realized if the filter strip is used as an on-site erosion control practice during the construction phase of development.

Environmental Attributes

Natural filter strips can provide excellent urban wildlife habitat, particularly for "edge" species of songbirds and mammals. Judicious planting

of selected native trees, shrubs and grasses can be used to enhance the quality of food and cover (see Landscaping Guide at the end of the Chapter for a listing of appropriate species). Generally, much larger widths are needed for wildlife habitat purposes than for water quality purposes. For example, Stauffer and Best (1980) suggest that a 600 foot strip may be needed to support a full diversity of songbirds (although narrower strips will support a modest level of diversity). Even wider strips are needed to maintain species diversity for mammals and other terrestrial fauna (Brinson et al., 1981). The primary reason for wider strips is the well documented "island effect" on species diversity; i.e., the number and diversity of species present in a habitat is a function of the area of that habitat. From the human standpoint, a minimum 1000 foot wide strip has often been recommended for screening purposes and preservation of scenery. This roughly corresponds to the dimensions of existing stream valley parks in the Washington Area.

Relevant Design Guidance

Maryland Soil Conservation Service, 1983. Standards and Specifications For Soil Erosion and Sediment Control. Maryland Water Resources Administration, Annapolis, Maryland.

Maryland Department of Natural Resources, 1984. Standards and Specifications For Stormwater Management Infiltration Practices. Water Resources Administration, Annapolis, Maryland.

Virginia Department of Soil and Water Conservation, 1972. Best Management Practices Handbook: Agriculture. Planning Bulletin No. 316. Virginia State Water Control Board, Richmond, Virginia.

URBAN FORESTRY

General

Urban forestry involves either preserving trees during construction, planting them after the site has been cleared, or homeowner landscaping after the site has been fully developed. With careful landscape design, as much as 50% of a residential lot can be converted into an attractive natural setting of trees, shrubs and ground covers. The amount of runoff generated from these landscaped areas is often 30-50% less than that produced from turf or lawns. Pollutant removal through urban forestry, on the other hand, is limited (with the notable exception of forested buffer strips). The cost and maintenance requirements for most urban forestry practices are quite low, yet the environmental amenity value is often very high.

Stormwater Benefits

Trees, shrubs and ground covers provide many stormwater management benefits. When mature, these plants form a canopy that intercepts much rainfall before it reaches the ground. Rainfall that does reach the ground is more likely to be infiltrated in the spongy layer of organic matter that accumulates underneath the plants. Consequently, both the volume and peak rate of stormwater runoff are reduced. Pitt et al. (1986) suggest that forested areas may produce 30-50% less runoff than grassed lawns.

Pollutant Removal

Urban forestry can help remove pollutants in a number of ways: by plant uptake and storage, by reducing the volume of storm runoff (and associated pollutants) delivered from the site, and by preventing soil erosion. However, the actual impact of urban forestry in reducing pollutant export from the site is probably limited for two reasons. First, as noted in Chapter 1, the bulk of the pollutant load from urban areas is generated from impervious areas, and not the pervious lawn areas that are the focus of urban forestry. Second, if a tree does extend over an impervious surface, it may become a potential source of pollutants, either by deposition of nutrient rich pollen, leaching of soluble nutrients from the canopy leaves, or during autumn leaf fall.

Suitability

Reforestation or forest preservation measures can and should be applied to all development areas, both existing and planned. The trick involves selecting the proper species and mix of trees and shrubs that are best suited to the unique growing conditions at the site. Factors such as the soil pH, texture, moisture and fertility need to be taken into account, as well as the current and expected level of exposure and sunlight. Trees that grow well in wet and moist soils are indicated in the Stormwater Landscaping Guide (Table 9.2). State foresters, cooperative extension agents, and nurserymen can help select the species which are best adapted for the site, and can suggest appropriate soil testing procedures.

Reforestation measures should not be considered for areas expected to receive a great deal of foot traffic, such as playgrounds or walkways. Only grass turf is resilient enough to withstand frequent traffic; use of natural ground covers in these areas will quickly result in barren patches that may erode.

Maintenance

Urban forestry measures require very little concerted maintenance, except perhaps during the first few years after establishment, where weed suppression, rodent protection, watering, or staking may be needed to increase survival rates. Thereafter, maintenance requirements are minimal.

Costs

The costs of urban forestry measures are variable. Costs are essentially nonexistent if trees are preserved during the land clearing phase, although some nominal costs may be incurred in selecting the trees to be kept, and more importantly, keeping heavy equipment from damaging their trunks and roots during construction. The most economical (and least rapid) means of reforestation is to plant seedlings. These can be readily obtained from state tree nurseries, and range in cost from $20 to $120 per thousand, depending on the species selected. As a rule of thumb, to attain maximum crown closure, about 700 deciduous seedlings are needed per acre (8'x 8'spacing); whereas about 1200 seedlings/acre are needed for conifer species (6'x 6' spacing)(Meckley et al., 1986). Manual planting costs, including weed suppression, generally run about $100-200 per acre planted.

A more common and more rapid means of reforestation in the region involves planting saplings or nursery stock. This approach is more costly, due to the greater expense of nursery stock and the labor required to prepare and

plant each site. Although landscaping costs will vary significantly depending on size and species selected, total costs on the order of $1000-5000 per acre are not uncommon.

Urban forestry confers several environmental amenities that can help to offset the initial planting costs. These include the well documented effect of landscaping on property values, reduced heating and cooling bills for the home, and reduced effort and expense needed to maintain lawns (Pitt et al., 1986).

Environmental Attributes

Urban forestry improves the quality of the natural environment in a number of ways, most notably, in the provision of food, cover and nesting sites for wildlife. Shade trees planted next to low flow channels or streams can help keep water temperatures cool and thus protect aquatic habitat. Trees planted in the riparian zone can also stabilize streambanks to minimize erosion.

Urban forestry has beneficial impacts on the human environment as well. Trees can help to absorb noise, provide shade, screen scenery, break the wind, moderate local air temperatures and improve the landscaping value of a site.

Relevant Design Guidance

Additional guidance on urban forestry can be obtained through the local offices of the State Forester or the Cooperative Extension Agent.

BASIN LANDSCAPING

General

Landscaping is a critical element in the design of stormwater basins, whether they are dry ponds, extended detention ponds, infiltration basins or wet ponds. Every basin design should be accompanied by a landscaping plan, as the form and species of plants used to stabilize a basin has a profound influence on its pollutant removal performance, appearance, habitat value and maintenance requirements well into the future.

Due to differences in the frequency and depth of inundation during storms, a wide gradient in soil moisture conditions is formed around a pond. Each plant species has a rather narrow tolerance with respect to soil moisture, and consequently,species tend to cluster in areas that best meet their special growth requirements. As shown in Figure 9.4, as many as six distinct vegetative zones may be present in a single pond. Plant species selected for each zone can fulfill specific functional design objectives. These are described below.

Figure 9.4: Landscaping Zones Around a Stormwater Basin

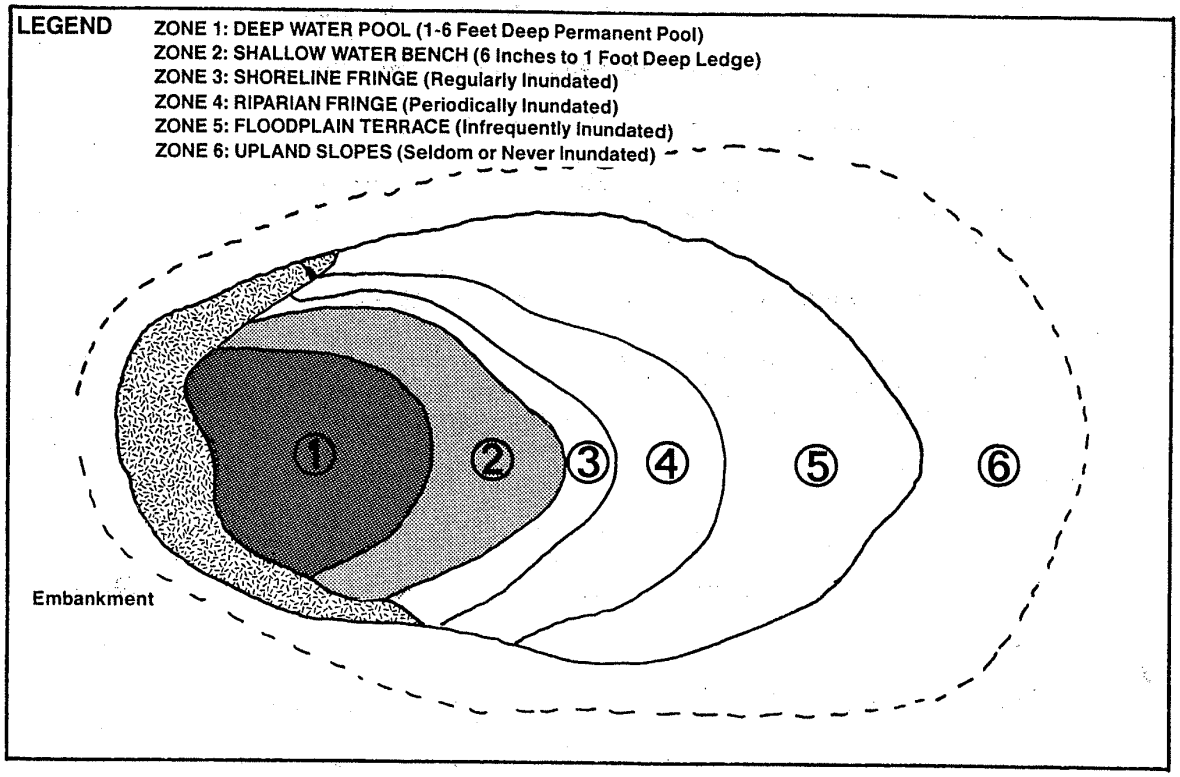

Zone 1: Deep Water Areas (wet ponds only)

The permanent pool can be planted with submerged aquatic plants to enhance pollutant uptake and provide food for waterfowl. However, artificial establishment of submerged plants in wet ponds has not been routinely practiced in the region because submerged plants are not easy to obtain, may be difficult to establish, and could potentially pose a clogging problem. Some species that might be used are duckweed, wild celery, sago pondweed and redhead grass (Barnard, personal communication). As the names suggest, these species have a high food value for waterfowl.

Zone 2: Shallow Water Areas (wet ponds and shallow marshes)

The shallow aquatic bench around a wet pond, with an average depth of a foot or less, favors the growth of emergent aquatic vegetation. This fringe of vegetation can perform a wide variety of design functions:

1. Enhance nutrient uptake within the wet pond.

2. Reduce water velocities and increase local sediment deposition rates.

3. Stabilize bottom sediments and reduce wind induced sediment resuspension.

4. Provide valuable food and cover for wildlife, particularly waterfowl and shorebirds.

5. Form a diverse habitat for predatory insects that act as a natural check on unwelcome mosquitos.

6. Conceal trash and floating objects blown toward shore.

7. Absorb wave impacts and thus reduce shoreline erosion.

8. Disguise unaesthetic changes in water level.

The use of emergent vegetation should be seriously considered in wet pond designs. Additional guidance can be found in the section on shallow marsh establishment.

Zone 3: Pond Shoreline (wet pond and shallow marsh)

Plants growing along the shoreline of a pond can be expected to be routinely inundated during most storms and on windy days. However, the plants must also be capable of withstanding periodic drying during extended pond drawdowns in the summer months. Plants selected for this zone can accomplish the following design objectives:

1. Stabilize the shoreline from erosion.

2. Conceal changes in water levels.

3. Prevent or limit access to the pond.

4. Provide cover, nesting and loafing areas for waterfowl.

5. Provide food for waterfowl, songbirds, and terrestrial wildlife.

6. Shade the surface of the pond to mitigate pond warming.

Zone 4: Riparian Fringe Area (lower stage of extended detention ponds, infiltration basins and dry ponds)

Plants in this zone must be able to tolerate wet soil conditions most of the time and can expect to be inundated for brief periods during most storms. A variety of trees, shrubs and ground covers can be utilized to achieve the following design objectives:

1. Stabilize the floor of the basin to prevent erosion.

2. Bind up newly deposited sediments to prevent their resuspension.

3. Reduce local water velocities to induce better settling characteristics within the pond.

4. Conceal and trap trash, debris and other floating objects washed into the pond.

5. Create habitat and food for wildlife.

6. Keep the soils of the basin floor drier by increased plant transpiration.

7. Maintain soil infiltration capacity in infiltration basins through root penetration.

Zone 5: Floodplain Terrace (upper stage of all basins and along stream channels).

This zone is subject to periodic inundation, but only during infrequent large storms. Plants that grow in this zone can tolerate infrequent inundation, but prefer only moist or slightly wet soil conditions most of the year. This zone roughly corresponds to the area of the pond between the one and five year water surface elevation. Plant species native to floodplains usually grow very well in this zone. Since the zone encompasses much of the embankment and side-slopes of a basin, plant selection and siting should be oriented toward:

1. Ground covers that can prevent erosion on steep slopes, and need not be mowed often.

2. Strategic placement of trees and shrubs to break up the engineered contours of the basin.

3. Plants that do not conflict with the intended use of the open space (e.g., visual appeal, recreation, wildlife habitat, access regulation, and foot traffic).

4. Species that tolerate exposure, compacted soils and have minimal maintenance requirements.

Zone 6: Upland Areas (buffer areas for all basins).

The unifying feature of plants that grow in this zone is that they are seldom, if ever, inundated. However, the environmental conditions and management strategy for the pond buffer will differ at each development site. Appropriate plant species selected for the buffer will depend on local soil conditions, exposure levels and the intended use of the open space.

The stormwater management landscaping guide presented in the last section provides a list of suitable plant species keyed to each of the major vegetative zones around a basin.

Basin Landscaping Tips

Stormwater management basins are often a harsh environment for establishing vegetation. The following landscaping procedures should enhance survival rates.

1. Trees with rootballs greater than 30 inches should never be planted on the pond embankments (Md SCS, 1976). The root systems of large trees can threaten the structural integrity of the embankment.

2. Embankments and basin side-slopes are often compacted during construction to ensure structural stability. The density of compacted soils normally prevents extensive root penetration. Therefore, larger holes must be dug and backfilled with uncompacted soil to accommodate the root systems of trees and shrubs (Wittans and Wiess, 1985).

3. Most newly constructed stormwater management basins will be fully exposed for a number of years. Thus, plant species that require shade, are susceptible to winterkill, or are prone to wind damage should be avoided.

4. The use of regionally native plant species is recommended. These plants are better adapted to local climate and soil conditions, and are thus more likely to survive. Native plants also tend to need less maintenance than exotic or ornamental plants. Some sources of native plants seeds and nursery stock are provided in the next section.

5. The first few years after planting are critical. Extra maintenance (watering, support, fertilizing, mulching, weed suppression) is required to nurture the plants through this difficult phase.

Sources of Plant Materials

Soil Conservation Society of America. 1982. Sources of Native Seeds and Plants. 7515 Northeast Ankeny Road, Ankeny, Iowa. (272 retail and wholesale outlets listed by State and plant specialty; $3.00).

Environmental Concern, Inc. P.O. Box P, 210 West Chew Avenue, St. Michaels, Maryland 21663. (Catalogs available upon request, specializes in aquatic plants, also carries native trees and shrubs).

National Arboretum. 3501 New York Avenue, N.E. Washington, D.C. 20002. (List of 30 wholesale/retail outlets that propagate native plants).

Lilypons Water Garden. 6800 Lilypons Road, Lilypons, MD 21717. (Catalog of primarily aquatic plants).

Restoration and Management Notes. 114 N. Murray Street, Madison, WI 53715 (Quarterly journal covers developments in wetland and meadow management, numerous native plant nurseries advertise in each issue).

Wildlife Nurseries, P.O. Box 2724, Oshkosh, WI. 54903. (Source for submerged aquatic plant seeds).

SHALLOW MARSH CREATION

General

Wetland or shallow marsh creation is basically a form of basin landscaping. It is given special treatment here due to its important role in pollutant removal and the need for careful design. Wetlands can be established around the perimeter of a wet pond, the lower stage of an extended detention pond, or in a sediment forebay. The many benefits of wetlands have been summarized in earlier sections. Athanas (1986), Lakatos and McNemar (1986), and Md SCS (1986) have compiled design guidance for successful wetland establishment, which have been abstracted below:

Plant Propagation Methods

While emergent plants may eventually colonize a basin from upstream wetland areas or by waterfowl, the most reliable means of establishing a marsh is to transplant live plants or dormant rhizomes from nursery stock. Transplantation from existing wetlands is not as effective and can result in serious impacts to the source marsh. Seeding, while cheaper, is also not a reliable means of propagating wetland plants due to their tricky germination

requirements. A number of commercial outlets carry wetland plant stock, some reliable sources are provided on the previous page.

Water Depth Requirements

Most wetland species have very specific water depth requirements. In general, most species thrive in shallow water conditions less than a foot deep (six inches is probably optimal). To achieve these depths over a wide area, sites will often have to be regraded. Also, potential sites for wetland establishment must have sufficient baseflow to maintain a relatively constant water level. Otherwise, severe seasonal drawdowns will occur at the site that will adversely affect the growth and colonization rate of wetland plants.

Aquatic Bench/Sediment Forebay

The perimeter of a wet pond should be graded to form a 10 to 20 foot wide shallow bench for aquatic emergents. It is recommended that the bench extend around at least half of the pond's perimeter. Also, the pond can be excavated to provide a shallow area for marsh establishment (and sediment deposition) near the inflow channel.

Marsh Surface Area

Optimal nutrient removal performance is achieved by shallow marshes when the surface area of the marsh is maximized. As a general guideline, the surface area of the marsh should constitute about 2 to 3% of the total area of the contributing watershed. Alternately, the nutrient mass loading method described in Example 3.2 of Chapter 3 can be used to determine the acceptable area for the marsh.

Planting Strategies

At least two primary wetland species, which are hardy and rapid colonizers, should be planted over about 30% of the total shallow water area. Each primary species should be planted in three or four monospecific stands, with individual plants about 2 to 3 feet apart. Up to three secondary wetland species, that are not as aggressive in colonizing a pond, should be randomly distributed in clumps around the perimeter of the marsh. Primary and secondary wetland species are listed in the landscaping guide, and a schematic of the planting strategy is shown in Figure 9.5. This planting strategy is designed to take advantage of natural propagation to fill out the rest of the marsh. Also, since a diverse number of wetland species are utilized, the strategy minimizes the risk that the marsh will not become successfully established.

Open Water Areas

If a basin is exclusively designed to act as a shallow marsh, at least 25% of the total surface area of the inundated area should be reserved for open water areas that are two or more feet deep. This combination of marsh and open water provides ideal habitat for waterfowl and marshbirds (Md SCS, 1986) and is more visually appealing.

Design Guidance

Athanas, C., 1986. Wetland Basins for Stormwater Treatment. Horn Point Environmental Labs, University of Maryland. prepared for Md DNR, Annapolis, Maryland.

Maryland DNR, 1987. Design Guidelines For Shallow Marshes. Maryland Water Resources Administration, Annapolis, Maryland.

Soil Conservation Service. 1986. Technical Guide For Wetland Management. Maryland Field Office.

Figure 9.5: Examples of Shallow Marsh Planting Strategies

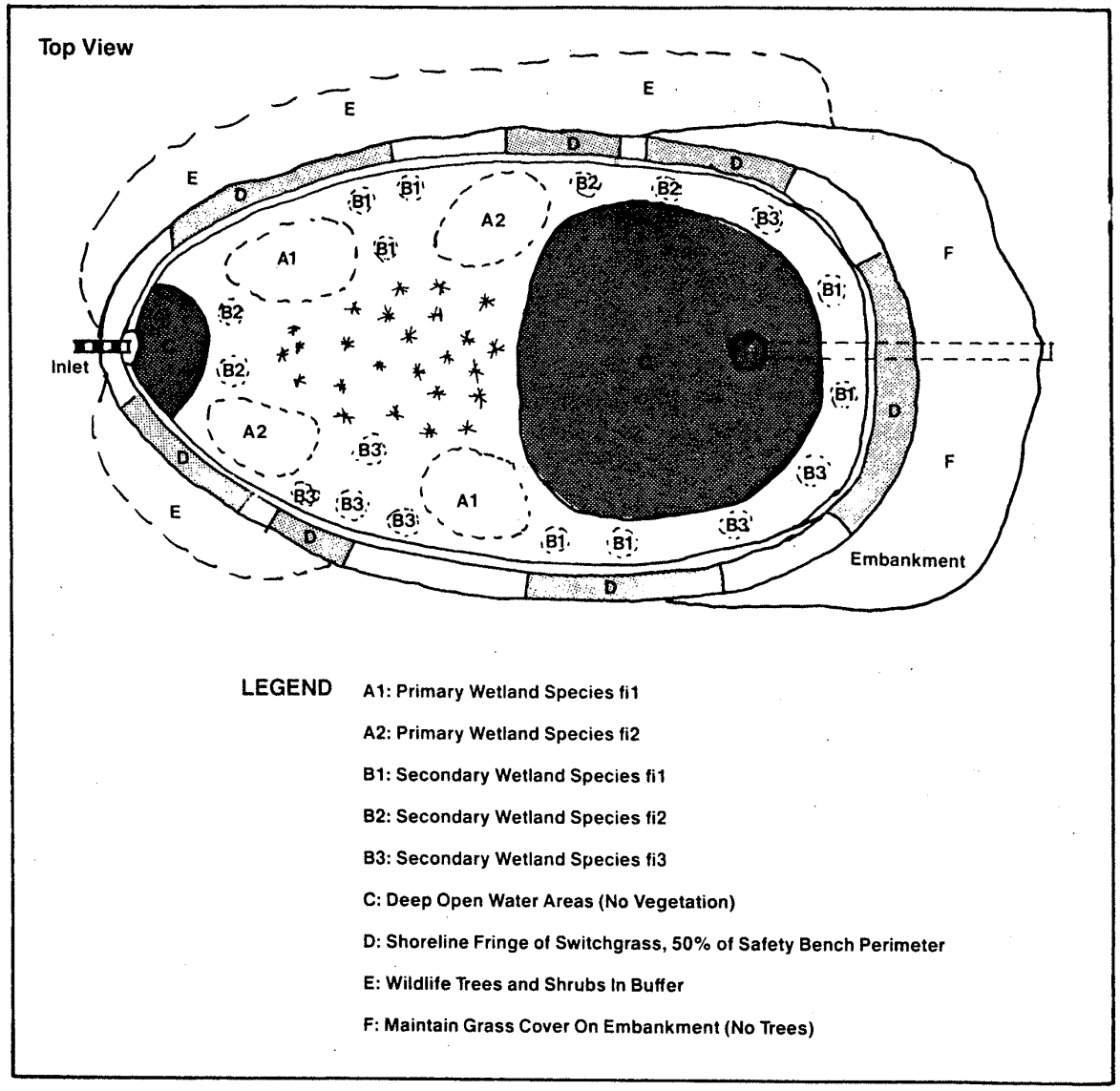

Adapted From Athanas, (1986).

A GUIDE TO URBAN LANDSCAPING

As noted earlier, differences in soil moisture and the frequency of inundation create several distinct vegetative zones around a pond (Figure 9.6). Species of trees, shrubs ground covers and aquatic plants that are suited to each of these zones are provided in Table 9.2. The plant list, which has been compiled from a number of sources, indicates the common and Latin names of each plant, as well as information on its form, height, commercial availability, capability to withstand inundation, wildlife value, and special growth requirements. The list only includes a few plant species that grow best on drier or better drained soils; these species are treated in detail in more conventional landscaping guides.

Finally, Table 9.2 is intended to only provide general guidance on plant selection. The advice of qualified landscape architects, nurserymen, or extension agents should be consulted to select the best plants for specific applications.

Figure 9.6: Key to Landscaping Zones in Stormwater Areas

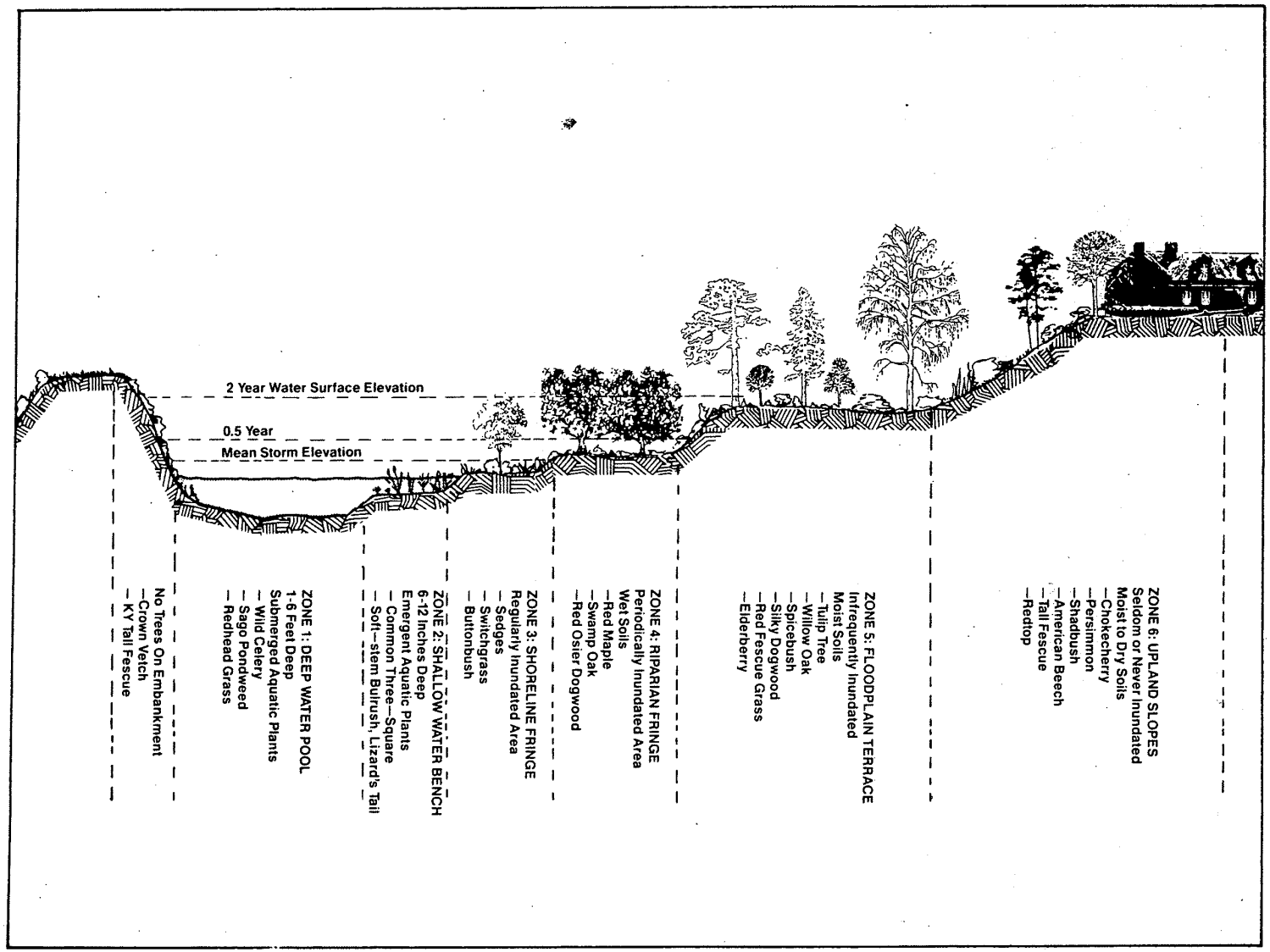

Adapted from Wittans and Weiss, 1985

Table 9.2: Landscaping Guide for Stormwater Management Areas

Plant Name Common (Latin)	Zone	Form	Avail-ability	Tolerance for Periodic Inundation	Native Plant	Wildlife Value	Special Requirements	Notes
TREES AND SHRUBS:								
Alder (Alnus glutinosa)	5,6	Decid. Tree up to 50'	No	Yes	No			Rapid growing, stabilizes stream banks
American Beech (Fagus grandifolia)	5,6	Decid. tree	Yes	No	Yes	High, mammals, birds	Prefers shade, rich, well-drained loam soils	
American Holly (Ilex opaca)	5,6	Decid. Shrub to 40-50'	Yes	No	Yes	Yes, songbirds, food, nesting	Prefers shade, tolerates periodic drought	Ornamental
Autumn Olive (Elaeagnus umbellata)	6	Decid. Shrub 10-20'	Yes	No	No	High, food and cover rapid growing	Full sun, well-drained soil	Useful in hedgerows/ aggressive
Blackgum (Nyssa sylvatica)	4,5,6	Decid. Tree 30-60'	Yes	Yes	Yes	High, songbirds	Prefers sun	Can be used as ornamental
Black Willow (Salix nigra)	3,4,5	Decid. Tree 30-50'	Yes	Yes	Yes	Low, some browsing and cavity nesters	Full sun	Rapid growth, stabilizes streambanks, weak
Buttonbush (Cephalanthus occidentalis)	2,3,4,5	Decid. Shrub 6-9'	Yes	Yes	Yes	High, ducks and shorebirds	Full sun to partial shade	
Chokecherry (Prunus virginiana)	5,6	Decid. Shrub 6-20'	Yes	No	Yes	High, birds and mammals	Well-drained to moist soils	
Elderberry (Sambucus canadensis)	4,5,6	Decid. Shrub 3-12'	Yes	Yes	Yes	Extremely high for food and cover	Full sun to partial shade	
Fringe Tree (Chionanthus virginicus)	3,4,5	Decid. Tree 10-20'	Yes	Probably	Yes	Unknown	" "	Ornamental
Green Ash, Red Ash (Fraxinus pensylvanica)	4,5	Decid. Tree 30-80'	Yes	Yes	Yes	Moderate, songbirds	Full sun	Rapid growing streambank stabilizer
Honey Locust (Gleditisia triacanthos)	4,5,6	Decid. Tree 70-80'	Yes	No	No	Low	Full sun	
High Bush Cranberry (Viburnum trilobum)	4,5,6	Decid. Shrub 10'	Difficult	Yes	No	Moderate, emergency winter food	Full sun	Acidic soils only
Larch/Tamarack (Larix laricina)	3,4	Conifer. Tree 20-40'	Only as L. decidua	Yes	Yes	Low	Full sun, acidic boggy soils	Rapid initial growth

(Table 9.2 cont.)

Plant Name Common (Latin)	Zone	Form	Avail-ability	Tolerance for Periodic Inundation	Native Plant	Wildlife Value	Special Requirements	Notes
Mountain Laurel (Kalmia latifolia)	6	Conifer. Shrub 5-10'	Yes	No	Yes	Low	Partial shade, acidic soils	Ornamental
Persimmon (Diospyros virginiana)	4,5,6	Decid. Tree 30'	Yes	No	Yes	Extremely high, birds, mammals	Well-drained soils	Not shade tolerant
Red Chokeberry (Pyrus arbutifolia)	3,4,5	Decid. Shrub 2-8'	Yes	Yes	Yes	Moderate, song-birds	Partial sun	
Red Maple (Acer rubrum)	4,5,6	Decid. Tree 40-70'	Yes	Yes	Yes	High, seeds and browse		Rapid growth
Red Osier Dogwood (Cornus Stolonifera)	3,4,5	Decid. Shrub 4-8'	Yes	Yes	No	Moderate, song-birds	Shade tolerant	Bank stabilizer
Rhodendron spp.	4,5,6	Conifer. shrub 5-12'	Yes	Only as R. viscosum	Yes	Low	Acid soil, shade	Ornamental
River Birch (Betula nigra)	3,4	Decid. tree 20-40', to 90'	Yes	Yes	Yes	Low, but good for cavity nesters		Bank erosion control
Shadbush, Common Serviceberry (Amelanchier arborea)	5,6	Decid. shrub 15-20'	Yes	Yes	Yes	High, birds, mammals	Prefers shade	
Silky Dogwood (Cornus amomum)	5,6	Decid. shrub 4-10'	Yes	Yes	Yes	Moderate, song-birds	Shade, drought tolerant	
Silver Maple (Acer saccharinum)	4,5,6	Decid. tree 60-80'	Yes	Yes	Yes	Moderate, song-birds		Ornamental, weak wood
Southern Arrowwood (Viburnum dentatum)	4,5	Decid. Shrub to 10'	Yes	No	Yes	Yes, songbirds	Partial sun	
Spice bush (Lindera benzoin)	5,6	Decid. shrub 12-25'	Yes	No	Yes	Moderate, song-birds	Shade, rich soils	
Swamp Magnolia or Sweetbay (Magnolia virginiana)	3,4	Conifer. Tree 20'	Yes	Yes	Yes	Low	Shade	Ornamental
Swamp Oak (Quercus bicolor)	4,5	Decid. tree 60'	No	Yes	Yes	High, mast		
Sweetgum (Liquidambar styraciflua)	4,5,6	Decid. tree 50-70'	Yes	Yes	Yes	Moderate, song-birds		Tolerates acid or clay soils
Sycamore (Platanus occidentalis)	4,5,6	Decid. tree 80'	Yes	Yes	Yes	Low		Rapid growth

(Table 9.2 cont.)

Plant Name Common (Latin)	Zone	Form	Avail-ability	Tolerance for Periodic Inundation	Native Plant	Wildlife Value	Special Requirements	Notes
Tulip Tree (Liriodendron tulipifera)	5	Decid. tree 70'	Yes	No	Yes	Moderate, birds, mammals		Rapid growth
Tupelo (Nyssa sylvatica vari biflora)	3,4,5	Decid. tree 35'	Yes	Yes	Yes	High, seeds, cavity nesters		Ornamental
Weeping Birch (Betula pendulata)	4,5,6	Decid. tree 25'	Yes	Yes	No	Moderate		Ornamental
Willow Oak/Pin Oak (Quercus phellos/ palustris)	4,5,6	Decid. tree 50-90'	Yes	No - phellos Yes - palustrus	Yes	High, mast		
Winterberry (Ilex laevigata)	4,5	Decid. Shrub 8-10'	Yes	No	Yes	Moderate, song-birds		
Witch Hazel (Hamamelis virginiana)	4,5	Decid. shrub 10'	Yes	No	Yes	Low	Shade	Ornamental
WETLAND PLANTS:								
Arrow Arum/Duck Corn (Peltandra virginica)	2	Emergent	Yes	to @ 1 ft. depth	Yes	Low, except for wood ducks		Slow colonizer
Arrowhead/Duck Potato (Saggitaria latifolia)	2	Emergent	Yes	to @ 1-1.5 ft. depth	Yes	Moderate, ducks		Aggressive colonizer
Buttonbush (Cephalanthus occidentalis)	2,3	Emergent	Yes	to @ 2 ft. depth	Yes	High, ducks and and shorebirds	Full sun	
Broomsedge (Andropogon virginianus)	2,3	Perimeter	Yes	to @ 3 in. depth	Yes	Moderate, song-birds, browsers	tolerates fluctuating water levels	
Cattail (Typha spp.)	2,3	Emergent	Yes	to 1 ft. depth	Yes	Low, except as cover		Volunteer, aggressive colonizer
Coontail (Ceratophyllum demersum)	1	Submergent	No	1-6 ft. deep	Yes	Low		
Common Three-Square (Scirpus americanus)	2,	Emergent	Yes	to 6 in. deep	Yes	High, waterfowl, song-birds	Fast colonizer, tolerates fluc-tuating water levels	
Lizard's Tail	2	Emergent	Yes	to 1 ft.	Yes	Low	Rapid growing,	

(Table 9.2 cont.)

Plant Name Common (Latin)	Zone	Form	Avail-ability	Tolerance for Periodic Inundation	Native Plant	Wildlife Value	Special Requirements	Notes
Marsh Hibiscus (Hibiscus moscheutos)	2,3	Emergent	Yes	to 3 in.	Yes	Low		
Pickerelweed (Pontederia cordata)	2,3	Emergent	Yes	to 0.5-1.0 ft.	Yes	Low, ducks		
Pond Weed (Potamegaton)	2,3	Submergent	No	1.5-3.0 ft. deep	Yes	High, waterfowl, marsh and shore birds		
Rice Cutgrass (Leersia oryzoides)	2,3	Emergent	Yes	to 3 in. deep	Yes	Moderate, ducks, song-birds	Shade tolerant	
Sedges (Cyperus spp.)	2,3	Emergent	No	to 3 in. deep	Yes	Moderate, Waterfowl, song-birds		
Soft-stem Bulrush (Scirpus validus)	2,3	Emergent up to 10'	Yes	to 1.0 ft.	Yes	Moderate, good cover	Aggressive colonizer	
Smartweed (Polygonum spp.)	2	Emergent	Yes	to 1 ft. deep	Yes	High, waterfowl, song-birds	Fast colonizer	
Spatterdock (Nuphar luteum)	2	Emergent	No	to 1.5 ft. deep	Yes	Moderate, food, high cover	Fast colonizer, deals with fluctuating water levels	
Switchgrass (Panicum virgatum)	2,3,4 5,6	Perimeter emergent	Yes	to 3 in. deep	Yes	High, waterfowl, song-birds, game-birds	Tolerates wet/ dry conditions	
Sweet Flag (Acorus calamus)	2,3	Perimeter emergent 2-5'	Yes	to 3 in. deep	Yes	Low, for most spp., high for muskrat/beaver	Slow colonizer, tolerates drying	
Water Iris (Iris pseudoacorus)	2,3	Perimeter	Yes	to 3 in. deep	No	Low	Attractive, ornamental	
Water Cress (Nasturtium officinale)	Flowing water		No	to 6 in. deep	Yes	Moderate		
GRASSES/GROUND COVER:								
Bermudagrass (Cynodon dactylon)	4,5,6	Grass	Yes	Yes	No	Low	Erosion control, swales, useful for lawns, moderate maintenance	
Bristlegrass (fox tails) (Setaria spp.)	4,5,6	Grass	Yes	?	Some sp.	High		
Chewnings Red Fescue (Festuca comutata)	4,5,6	Grass	Yes	Yes	No	Moderate, ground feeding,	Erosion control, lawns, swales, shade tolerant, low to moderate	

(Table 9.2 cont.)

Plant Name Common (Latin)	Zone	Form	Avail-ability	Tolerance for Periodic Inundation	Native Plant	Wildlife Value	Special Requirements	Notes
						song-birds, browsers	maintenance	
Crownvetch (Coronilla varia)	6		Yes	No	No	Low	Excellent for stabilizing steep slopes, embankments, low or no maintenance, drought tolerant, erosion control, rapid growth, needs liming	
Kentucky Bluegrass (Pao pratensis)	5,6	Grass	Yes	Yes	No	Moderate	Lawns, swale, erosion control, handles traffic, moderate to high maintenance	
Kentucky "31" Tall Fescue (Festuca arundinacea)	4,5,6	Grass	Yes	Yes	No	Moderate	Low maintenance, lawns, swales, shade tolerant, rapid germination, erosion control	
Redtop (Agrostis alba)	3,4,5,6	Grass	Yes?	Yes	No?		Low to moderate maintenance, swales, shade intolerant, erosion control, wet soils	
Reed Canary Grass (Phalaria arundinacea)	3,4,5,6	Grass	Yes	Yes	No?	Low	Erosion control, swales, shade intolerant, not recommended for lawns, foot traffic	
Ryegrass, perrenial (Lolium perrene)	5,6	Grass	Yes	Yes	No?	Low	Erosion control, shade intolerant, lawns, moderate to high maintenance	
Switchgrass (Panicum virgatum)	5,6	Grass	Yes	Yes	No?	High		

SOURCES:

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APPENDIX A

TECHNICAL DOCUMENTATION OF A SIMPLE METHOD FOR ESTIMATING URBAN STORM POLLUTANT EXPORT

This appendix describes the development of a Simple Method for estimating storm pollutant export delivered from urban development sites. The method was developed to provide an easy yet reasonably accurate means of predicting the change in pollutant loadings in response to development. This information is needed by planners and engineers to make rational nonpoint pollution decisions at the site level. The Appendix is organized as follows. In the first section, the Simple Method is derived in a step by step manner. Subsequent sections detail the technical analysis supporting each step.

1. Calculation of Storm Pollutant Export from the Site

The simple method is empirical in nature, and involves a two-step procedure. First, the mean concentration of the desired urban pollutant is obtained from Table A.1. Next, the runoff depth (R, in acre-feet) for the site is computed using the formula:

(EQ A.1): $R = [(P)(Pj)(Rv)/12]\ (A)$

where P = rainfall depth over the interval (inches)
Pj = fraction of rainfall events that produces runoff
Rv = mean runoff coefficient (i.e., proportion of rainfall converted to direct runoff)
A = watershed area (acres)
12 = conversion factor (inches to feet)

The computed runoff depth (R, in acre-feet) can be converted to an equivalent daily discharge (Q, in cubic feet/second/day), by:

(EQ A.2): $Q = (R)\ (43{,}560 \text{ sq ft})(\text{day}/24 \text{ hour})(\text{hr}/60 \text{ min})(\text{min}/60 \text{ sec})$

or, $Q = (R)(0.504)$

Given the mean concentration for a pollutant (C, mg/l or ppm) and the discharge rate (Q), the load over any interval (L, in pounds) is given by:

(EQ A.3): $L = (C)(Q)(5.39)$

where 5.39 is a conversion factor

By combining terms, the general equation for estimating urban runoff loads (expressed in pounds/acre/interval) is provided by:

(EQ A.4): $L = [(P)(Pj)(Rv)/12]\ (0.504)(C)(5.39)$

or more simply,

(EQ A.5): $L = [(P)(Pj)(Rv)/12]\ (C)(2.72)$

The user need only supply two parameters to estimate loads for any development site or condition; 1) the rainfall depth (P), and 2) site imperviousness (I, expressed as the fraction impervious area/total area). Pj, the fraction of precipitation (P) that produces any surface runoff is assumed to be a constant (0.9; see Section 7). The runoff coefficient, Rv, is assumed to be a linear function of percent imperviousness (I), specifically:

(EQ A.6): $Rv = 0.05 + 0.9\ (I)$

Flow-weighted mean concentrations (C) for each pollutant of interest can be found in Table A.1.

Table A.1: Average C Values For Stabilized Urban Sites

	TP	TSP	OP	TN	TKN	NH3	NO3	COD	BOD	ZN	PB
POLLUTANT "C" VALUE (mg/l)	0.26	0.16	0.12	2.0	1.5	0.26	0.5	35.6	5.1	0.04	0.02

2. Calculating Expected Pollutant Concentrations from the Site

The Simple Method can also provide the expected level of an urban pollutant for a specified frequency of occurrence or return interval. Estimates of this nature may be required to examine the frequency with which the runoff from an urban site might cause violations of a water quality standard for a receiving water. Because urban runoff data typically follows a log-normal probability distribution (EPA, 1983), the frequency that at which an urban pollutant exceeds a given concentration threshold can be calculated using the relationship:

(EQ A.7): $Cx = \exp\ [\ln X + (Zo)(\ln S).]$

where Cx = expected concentration at a given frequency of occurrence
lnX = mean of log-transformed data
Zo = the standard normal probability
lnS = standard deviation of the log-transformed data

Table A.2 summarizes urban pollutant levels for a series of common exceedance frequencies computed using EQ A.7 and the Washington area NURP dataset. Note that the exceedance frequency refers to the number of storms in which a given threshold level is exceeded. Based on the 1980-1985 National Airport record, approximately 65 storms generate measurable storm runoff in the Washington region each year.

Table A.2: Exceedance Frequency For Selected Urban Pollutants

POLLUTANT CONCENTRATION (mg/l)	PERCENT OF STORMS IN WHICH GIVEN CONCENTRATION VALUE IS EQUALLED OR EXCEEDED				
	50%	25%	10%	5%	1%
Sediment	31.	71.	151.	235.	545.
Total Phosphorus	0.27	0.43	0.65	0.82	1.31
Total Nitrogen	2.2	3.2	4.5	5.6	8.2
COD	42.	61.	84.	103.	149.
Lead	0.02	0.04	0.08	0.11	0.15
Copper	0.01	0.02	0.04	0.06	0.11
Zinc	0.06	0.10	0.16	0.22	0.36

3. Derivation of Mean Urban Runoff Concentrations-(C)

Over 300 storm runoff events were sampled at eight sites dispersed throughout the Washington metropolitan area during the 1980-1981 NURP study (MWCOG, 1983b). The sites included a wide range of soils, slopes and land uses, and ranged from 10 to 90% impervious cover. Automated samplers collected a composite sample during each runoff event that effectively represented the average pollutant concentration. Statistical studies on both the local and national NURP data have indicated that urban runoff and pollutant levels follow a log-normal distribution, which greatly facilitates the analysis of highly variable data (Driscoll,1986; NVPDC, 1983).

The procedure followed in this study was as follows: 1) Log-transformed event mean concentration values (EMC) were calculated for each storm at each site; 2) The EMC's at each site were weighted by the corresponding depth of runoff volume for the storm event (in inches/acre), and 3) relevant statistics (means, medians and standard deviations) were computed for flow-weighted EMCs for both individual sites and all sites lumped together.

F-tests were used to establish whether the variance for individual sites was significantly different from the variance of the entire group. With the exception of two sites, the variances were found to be statistically similar. The exceptions occurred at the sites with the smallest number of storms sampled. Therefore, it was concluded that the individual site sample populations could be compared with each other and with the entire lumped population.

A Students t-test was then applied to test whether the site means and the grand mean were significantly different (alpha = 0.05, two-tailed test). The results of the t-test analysis are shown in Table A.3. For most of the parameters of interest, there was no statistically significant difference between the individual site means and the grand mean, although some exceptions to this rule were evident at a few sites and for suspended sediment. Taken as a whole, the analysis indicates that the average pollutant concentration (EMC) of all the Washington NURP sites is a reasonably reliable predictor of the levels encountered at any individual site. Moreover, these results suggest that there were no consistent relationship between pollutant concentrations and land use. Other statistical analyses of national urban and highway runoff datasets (EPA, 1983; Shelley and Garboury,1986) also failed to find consistent trends between pollutant concentration levels and watershed land-use (or imperviousness). These findings imply that differences in pollutant loads among urban land-uses is due primarily to greater storm runoff volume than to enhanced pollutant concentrations (Athayde,1986).

Table A.3: Statistical Comparison of Urban EMCs at Washington NURP Sites

STORM EMC (mg/l)	Metro Washington NURP Sites								ALL SITES
	BURKE (n=60)	DUFEF (n=8)	FARDGE (n=50)	FAIROK (n=11)	LAKER (n=49)	STED (n=47)	STRAT (n=32)	WEST (n=41)	(n=298)
TOTAL N	1.81	2.39	2.84*	1.55	2.13	2.02	2.07	1.97	2.00
NO3	0.51	0.41	0.73*	0.34	0.63	0.54	0.30	0.48	0.48
NH3	0.21	0.25	0.43*	0.14	0.27	0.28	0.26	0.23	0.26
Org-N	1.06	1.73	1.69*	1.07	1.22	1.20	1.51	1.16	1.25
TOTAL P	0.19	0.51	0.38	0.20	0.33	0.31	0.30	0.30	0.26
OP	0.09	0.24	0.19*	0.03	0.07*	0.15	0.16	0.14	0.12
TSP	0.13	0.38	0.26*	0.07	0.08*	0.20	0.21	0.19	0.16
Org-P	0.06*	0.13	0.12	0.13	0.21*	0.11	0.09	0.11	0.10
COD	25.0*	54.5	49.4	37.6	53.5*	33.7	41.3	40.3	35.6
BOD-5	3.6	7.8	7.0	5.4	7.6	4.8	6.0	5.8	5.0
BOD-20	5.0	10.9	9.9	7.3	10.6	6.7	8.2	8.1	7.3
TSS	10.9*	29.7	13.*	81.*	162.*	37.8*	39.0*	44.0*	25.8
Lead (ug/l)	11.4	5.6	6.2	29.	51.*	32.	20.	21.	18.0
Zinc (ug/l)	29.	146.*	77.*	80.	77.*	66.*	59.	30.	37.

NOTES: (*) denotes a significant difference between the individual site mean and the grand mean, using a two-tailed Students t-test and a 95% level of significance.

(a) COD:BOD-20 and COD:BOD-5 rations of 5:1 and 7:1, respectively, were assumed from data in US EPA (1983).

Further, the national NURP data analysis demonstrated that urban pollutant concentrations were not significantly correlated with either storm event runoff volume or storm intensity at over two-thirds of the sites examined (US EPA,1983). Had stronger correlations between runoff volume and pollutant concentrations been observed (i.e, if C was related to runoff volume), then the use of a mean C value would introduce serious bias to the Simple Method (which assumes that runoff volume and pollutant concentration are independent of each other). The minor bias that does exist in the Washington NURP data (primarily as a result of dilution at high flows) was partially mitigated by flow-weighting individual storm EMCs (i.e., small storm events contributed proportionally less to the mean C value than large storms events, that deliver the greatest proportion of the annual load).

4. Predicting Suspended Sediment Levels

Suspended sediment was the only major urban pollutant which departed from these general statistical properties. Individual site means and variances were significantly different from each other and the grand mean for nearly every site (Table A.3). Further, no significant correlations between sediment concentration and runoff volume or watershed imperviousness were found at the Washington sites, and very few were found in the national NURP data (US EPA, 1983). Due to its highly variable behavior from storm to storm and site to site, sediment loads cannot be predicted on the basis of a grand mean EMC. The only quasi-predictive behavior associated with suspended sediment in urban areas is that it appears to be generally related to watershed size. As shown in Figure A.1, mean storm sediment concentrations tend to increase with drainage area in 25 urban watersheds in the Washington region, ranging from 5 to over 100,000 acres in area (data sources: OWML, 1983, Hickman, 1984, MWCOG, 1983b, NVPDC, 1978).

The higher storm sediment levels observed in larger urban watersheds is primarily due to bank and channel erosion, rather than erosion of pervious areas by overland flow, or washoff of sediments from impervious areas within the watersheds. Under this theory, as watershed size becomes larger, the length of the stream channel network and the susceptibility to channel erosion increases markedly. Most small headwater streams in the Washington area have abundant supplies of sediment in storage, which has been gradually deposited by previous centuries of agricultural erosion, or more recently, by construction-related erosion (Meade,1982: Costa, 1975; Wolman and Schick, 1967). The large quantities of sediment in channel storage are gradually resuspended and transported out of the watershed, by the increased peak and frequency of floods which follow urbanization.

Channel erosion appears to be the most feasible source of sediment, since alternative sources of sediment (i.e., pervious area erosion and/or impervious area washoff) do not appear adequate to sustain high sediment levels observed during storms. Erosion of pervious areas in most stabilized urban sites is minimized by the extensive cover of lawns and open space, and washoff from impervious areas is limited by the atmospheric supply of solids, which amounts to less than a tenth of a ton per year (see Table 7.2). Both sources appear sufficient to maintain the base level of suspended sediment concentrations of about 15-25 mg/l in storm runoff.

The relationship between mean storm sediment levels and drainage area is offered as a a first-cut estimate of the expected storm sediment concentrations for specific development situations. It is recognized that this semi-log approach has limited predictive capability, and it is hoped

that better, more deterministic models of urban erosion and sediment transport can be developed to replace it.

A rather wide envelope has been drawn around the sediment EMC values in Figure A.1 to reflect the considerable variation observed in the field. The choice of a high, moderate or low value curve is a matter of subjective interpretation, but the following criteria are offered as guidance:

Table A.4 Watershed Channel Network Conditions

	LOW EMC	MODERATE EMC	HIGH EMC
Stability condition of channel	Vegetated swales or storm sewers	Intermediate	Open channel, cut banks alternating w/channel sandbars, fallen trees
Channel sediment storage	Small deposits in storm drains, stabilized land use	"	Large silt or clay deposits evidence of recent or ongoing construction. Water becomes murky after disturbing bottom
Stream velocity	Low slope, low imperviousness	"	High slope, high imperviousness

Figure A.1: Storm Sediment EMC's As a Function of Watershed Size

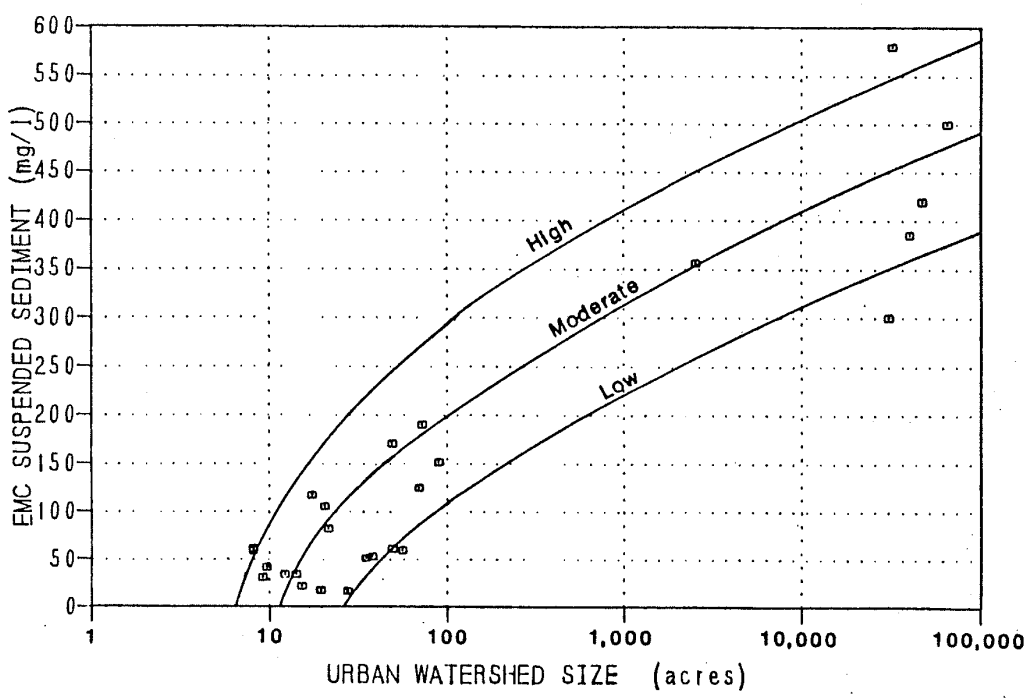

5. Urban Pollutant Concentrations for Use in Special Conditions

The mean urban pollutant levels derived in the Washington NURP study (Table A.1) may not always be appropriate for every development situation. The Washington NURP sites were located in stabilized, recently suburbanized areas, and should generally represent the pollutant levels emanating from new development sites in the region.

However, older, poorly maintained urban neighborhoods generate significantly higher urban pollutant levels. The average pollutant levels for five older residential catchments monitored in downtown Baltimore, Maryland (BRPC, 1986) are provided in Table A.5. As can be seen, the log-mean EMCs for downtown Baltimore are from 2 to 5 times higher than those reported for suburban Washington. The higher pollutant levels reported at the Baltimore sites were attributed to poor urban "housekeeping" (e.g., poor trash removal, accumulation of debris, deteriorating housing stock, high traffic volumes, poor upkeep of lawns, and more mature vegetation). If older residential areas are being evaluated, it is recommended that the Baltimore data should be used instead of the Washington data.

Similarly, pollutant levels measured in highly imperviousness central business districts (CBDs) are often higher than suburban residential areas. This is due in part to greater traffic volume and/or higher atmospheric loading rates (MWCOG, 1983b). Pollutant levels monitored in the central business corridor of downtown Washington, DC are provided in Table A.5. Nutrient, BOD and trace metal levels measured during 27 storms at two sites were often higher than other residential or commercial suburban sites monitored in the Washington NURP study (NVPDC, 1981;MWCOG, 1983b).

For comparative purposes, flow-weighted EMCs for forested areas are also provided in Table A.5. These values were derived from a two year monitoring study of several small forested watersheds in the Occoquan basin during 1980-81 (OWML, 1982), and can be used to roughly estimate "natural" background loadings contributed by undeveloped areas. Although these forest C values may not always hold for all pre-development conditions, they serve as a reference point to quantify the increase in pollutant export following urban development activity.

Highway runoff has been monitored by the Federal Highway Administration for nearly 300 storm events at eight urban highway sites across the nation (Shelley and Gaboury, 1986). Pollutant EMCs tend to be higher than most typical urban areas, particularly for metals and orthophosphate, which is thought to be due to vehicular emissions.

Finally, Table A.5 includes the national NURP event mean concentrations which were obtained from over 2300 storms monitored at 22 project sites across the nation (US EPA, 1983). Since most of the C values in Table A.5 are specific to the Baltimore-Washington area, it is recommended that the national NURP C values be used for areas outside of the Mid-Atlantic states. When the mean values from the local and national NURP studies are compared, it is evident that Washington area urban runoff has slightly lower urban pollutant concentrations (US EPA,1983).

The Simple Method has been designed such that any urban storm monitoring dataset can be used as a basis for generating loads. Thus, if a future monitoring effort indicates that mean pollutant levels have changed, or are different in a specific development situation, the simple method can be easily modified.

Table A.5: Urban 'C' Values For Use Special Conditions (mg/l)

POLLUTANT	NEW SUBURBAN NURP SITES (Wash.,DC)	OLDER URBAN AREAS (Baltimore)	CENTRAL BUSINESS DISTRICT (Wash.,DC)	NATIONAL NURP STUDY AVERAGE	HARDWOOD FOREST (Northern Virginia)	NATIONAL URBAN HIGHWAY RUNOFF
PHOSPHORUS						
Total	0.26	1.08	-	0.46	0.15	-
Ortho	0.12	0.26	1.01	-	0.02	-
Soluble	0.16	-	-	0.16	0.04	0.59
Organic	0.10	0.82	-	0.13	0.11	-
NITROGEN						
Total	2.00	13.6	2.17	3.31	0.78	-
Nitrate	0.48	8.9	0.84	0.96	0.17	-
Ammonia	0.26	1.1	-	-	0.07	-
Organic	1.25	-	-	-	0.54	-
TKN	1.51	7.2	1.49	2.35	0.61	2.72
COD	35.6	163.0	-	90.8	>40.0	124
BOD (5-day)	5.1	-	36.0	11.9	-	-
METALS						
Zinc	0.037	0.397	0.250	0.176	-	0.380
Lead	0.018	0.389	0.370	0.180	-	0.550
Copper	-	0.105	-	0.047	-	-

6. Derivation of the Runoff Coefficient (Rv)

The runoff coefficient (Rv) is a useful measure of site response to rainfall events, and is simply calculated as:

(EQ A.8): $Rv = r/p$

where r and p are the volume of runoff and rainfall, respectively, expressed in watershed inches

The dimensionless number represent the extent to which rainfall is translated into surface runoff, and varies according to watershed soils, slopes, cover and urbanization. Driscoll (1983) has computed mean and median Rv's at over 50 sites monitored in 16 NURP projects around the nation, and found that most of the variation in mean Rv among sites can be attributed to differences in the level of urbanization, and in particular, to the extent of site imperviousness. Rv's were found to be relatively consistent at individual sites, and were only weakly correlated with storm-related variables such as precipitation volume, intensity and duration. Driscoll concluded that the runoff coefficient could serve as a reliable estimator of runoff volumes, given an initial estimate of rainfall volume.

A summary of the mean and median Rv's for 44 small watershed sites is provided in Table A.6. The table includes Rv's for four Washington NURP sites not included in Driscoll's original analysis. Seven sites were omitted

from further analysis due to small sample size. Linear regression analysis was conducted, using the site mean Rv as the dependent variable and watershed imperviousness (I) as the independent variable. The resulting equation was:

(EQ A.9) $Rv = 0.05 + .009\ (I)$ (adj. $r2 = 0.71$)

It should be clearly noted that Equation A.9 only predicts storm runoff volumes. It does not predict the baseflow component of annual runoff volume. For most urban sites, this distinction is not important. However, in large, low density residential watersheds, baseflow can be an important component of the annual runoff volume. Figure A.2 shows the difference in the value of the storm and annual runoff Rv's as a function of watershed imperviousness. As can be seen, baseflow dominates the water balance for a site when total imperviousness is less than 10%. As a practical matter, however, baseflow does not often appear in most small developments (i.e., less than 25 acres). Therefore, its contribution to annual runoff volume can usually be ignored. In addition, local research has shown that pollutant levels found in urban baseflow can seldom be distinguished from normal "background" levels (NVPDC,1979). This suggests that urban baseflow will not deliver extra pollutant loadings to receiving waters.

If for some reason, however, it is necessary to compute an annual mass balance of runoff or pollutants from a site, the additional flow and pollutant loads carried in baseflow can be easily calculated, given a knowledge of baseflow quantity and quality. Baseflow quantity can be determined from either an analysis of USGS dry weather discharge records for the watershed, or by the difference between the annual and storm runoff coefficients shown in Figure A.2. Baseflow pollutant concentrations can be inferred from regional or local dry-weather water quality monitoring data. The baseflow pollutant load can then be calculated as:

(EQ A.10) $L = [(P)(Rva) - (P)(Pj)(Rv)]/12\ [(Cb)(A)(2.72)]$

where Rva= Annual runoff coefficient (From Figure A.2)
Cb = average dry-weather pollutant concentration (mg/l)
and all other parameters as defined previously

Correction for baseflow discharge/concentrations should provide acceptable loading estimates, provided no other pollutant sources exist in the watershed (e.g., municipal sewage treatment discharges, livestock operations, or agricultural activities).

7. Derivation of Correction Factor (Pj)

The Rv obtained using equation A.9 needs to be adjusted to eliminate the portion of annual rainfall which does not produce any direct runoff. As Figure A.3 shows, over 50% of all storm events recorded at the National Airport weather station between 1981 and 1985 had less than 0.2 inches of total rainfall. The rainfall from minor storms may be entirely stored in surface depressions and eventually lost by evaporation or infiltration. As a result, no runoff is produced.

The extent of these losses was evaluated by double mass curve analysis, in which the cumulative volume of rainfall in selected intensity classes were compared for the National Airport and the Washington NURP rainfall gages. Since the NURP rainfall data was only stored if there was a corresponding runoff event for the site, the mass curve analysis indicates whether any

rainfall intensity classes were under-represented in comparison to the National Airport data. The corresponding volume of "missing" rainfall at the NURP gage was assumed to represent the rainfall events that produced no appreciable runoff. While the distribution of rainfall in the higher rainfall intensity classes was similar for both the National Airport and the NURP rainfall gages, smaller intensity events were distinctly underrepresented at the NURP gages. The amount of "missing" rainfall calculated by difference is shown in Figure A.4. Based on this analysis, it is suggested that about 10% of the annual rainfall volume is so slight that no appreciable runoff is produced, therefore the value of Pj in Equation A.1 can be set to 0.9.

Figure A.2: Difference Between Storm Rv and Annual Runoff Rv

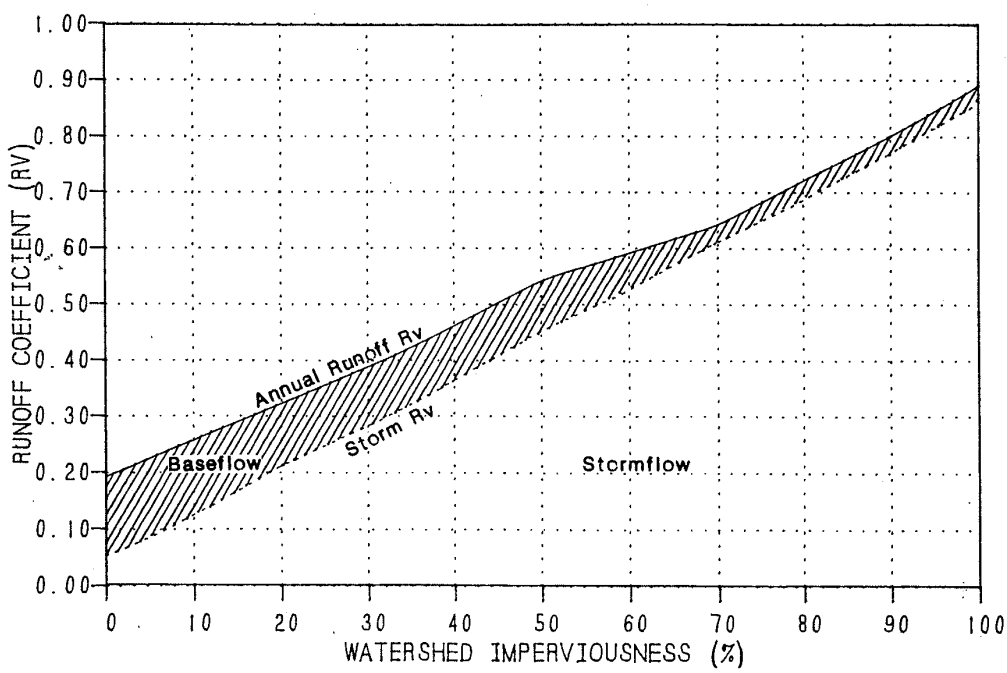

Table A.6: Calculated Storm Rv's For 44 Small Urban Catchments

OBS	NURP PROJECT	SITE NAME	PERCENT IMPERVIOUS	MEAN Rv (a)	MEDIAN Rv	COEFFICIENT OF VARIATION
1	CO1	Big Dry	41.	0.35	0.32	0.46
2	CO2	Cherry	38.	0.18	0.16	0.45
3	CO3	Claude	24.	0.16	0.15	0.40
4	DC1	Burke	33.	0.46 (b)	0.53	.
5	DC2	Laker	33.	0.25	0.18	.
6	IL1	John N	19.	0.19	0.15	0.73
7	MD1	Homewd	29.	0.47	0.38	0.73
8	MD2	Mt Wash	29.	0.24	0.12	1.76
9	MD3	Res Hill	76.	0.56	0.49	0.54
10	NY1	Carrol R	20.	0.24	0.20	0.65
11	NY2	Cranston	22.	0.17	0.16	0.33
12	NY3	E Roch	38.	0.22	0.20	0.42
13	WA1	Surrey	29.	0.20	0.17	0.63
14	WI1	Burbank	50.	0.37	0.27	0.92
15	WI2	Lincoln	57.	0.43	0.38	0.55
16	DC3	Westlgh	21.	0.17	0.13	.
17	IL2	John S	18.	0.18	0.16	0.47
18	WA2	Lakehill	37.	0.24	0.20	0.62
19	IL3	Mattis S	37.	0.37	0.30	0.73
20	CO4	Asbury	22.	0.99	0.19	0.97
21	IL5	Comb Inl	17.	0.19	0.17	0.48
22	NC1	1023	27.	0.11	0.09	0.69
23	MA1	Jordan	21.	0.26	0.22	0.65
24	DC4	Stedwk	34.	0.28	0.20	.
25	IL6	Mattis N.	58.	0.73	0.63	0.57
26	WI3	Wood Ctr.	81.	0.82	0.76	0.42
27	MA4	Rt 9	23.	0.28	0.20	0.99
28	NY4	Cedar	5.	0.11	0.08	1.05
29	MA7	Tilley Br	6.	0.02	0.01	1.17
30	MA8	Addison	69.	0.65	0.58	0.53
31	CA2	Comml	99.	0.98	0.98	0.04
32	CO4	Villa 1	91.	0.99	0.93	0.45
33	NC2	1013	69.	0.90	0.84	0.38
34	NY7	South GTE	21.	0.21	0.20	0.28
35	WI5	Post Off	99.	0.92	0.90	0.19
36	NH1	Pkg Lot	90.	0.74	0.66	0.50
37	NY10	Thornell	4.	0.08	0.06	0.93
38	NY12	West Br.	1.	0.12	0.07	1.44
39	NY13	Thomas	11.	0.05	0.04	0.56
40	NY14	Sherrif	7.	0.08	0.05	1.25
41	DC5	Dandrg	55.*	0.57	0.52	.
42	DC6	Fairrdge	34.*	0.47	0.37	.
43	DC7	Fairoak	90.*	0.75	0.81	.
44	DC8	Stratwd	22.*	0.42	0.38	.

Notes: (*) new sites not in Driscoll (1983)
(a) mean Rvs calculated as: (median) [SQRT (1 +Cv**2).]
(b) Burke recomputed to exclude baseflow interference

Figure A.3: Rainfall Frequency Distribution at National Airport-1980 to 1985

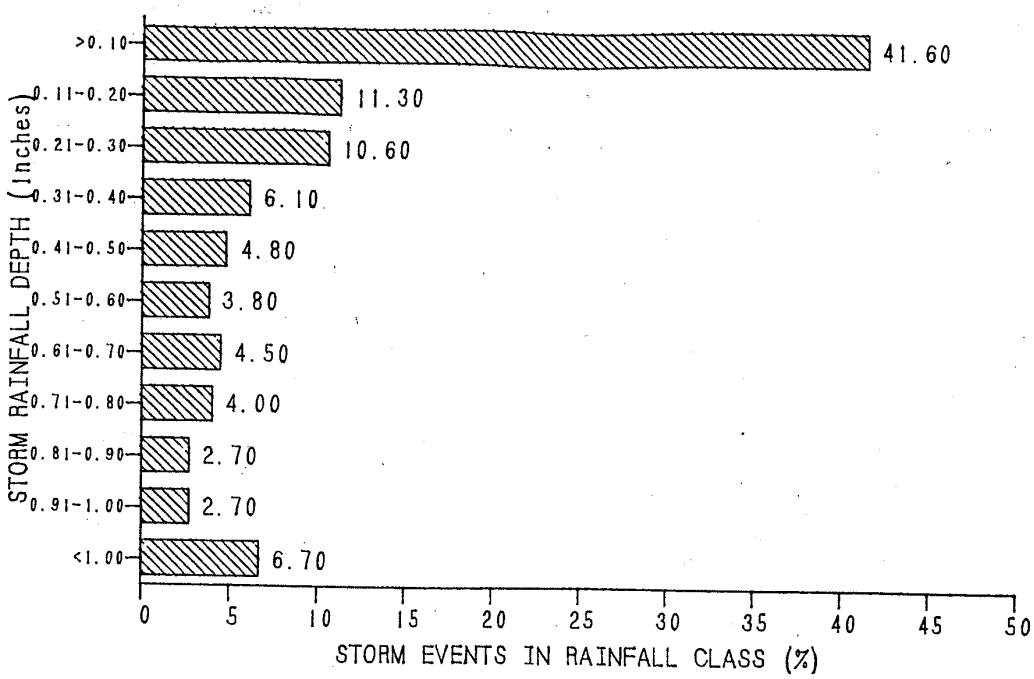

Figure A.4: Fraction of Annual Rainfall Events That Produce No Runoff

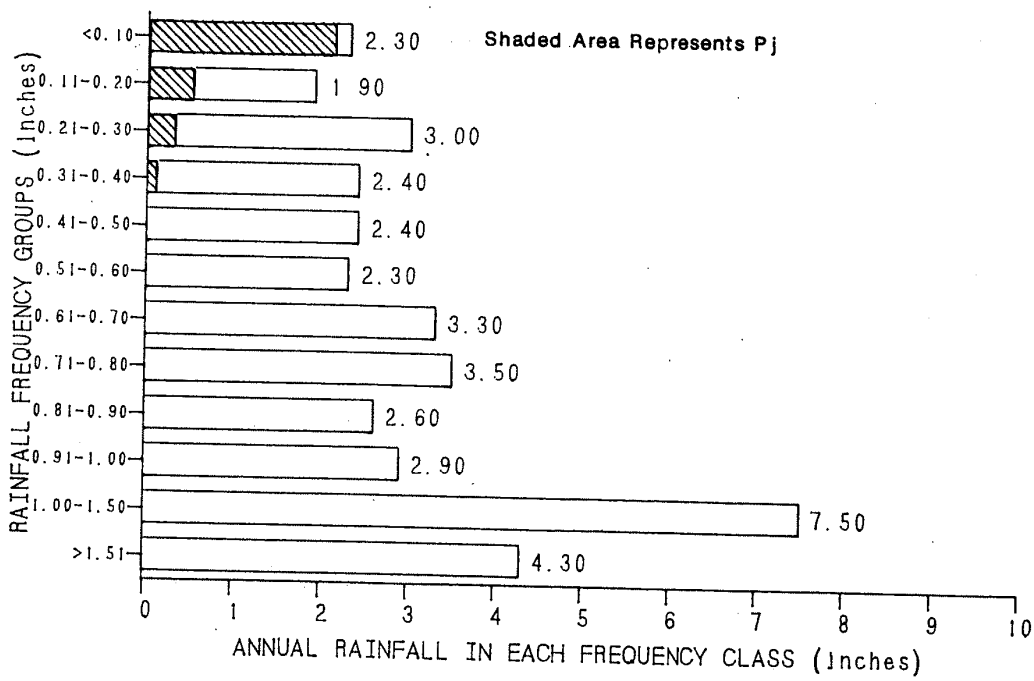

NOTE: Frequency of annual rainfall in each depth class; Five year running average at National Airport, Arlington, Virginia.

APPENDIX B: BANKFULL FLOODING FREQUENCY ANALYSIS

General Approach

It is generally acknowledged that the 1.5 to 2 year return frequency storm controls the shape and form of natural channels (Leopold et al.,1964; Anderson, 1970). This finding has been incorporated into local SWM policies by requiring the post-development increase in the magnitude of the two year or bankfull flood be controlled to pre-development rates. However, by itself, this policy is insufficient to adequately control downstream bank erosion. This is because watershed development tends to increase the frequency of bankfull flooding, in addition to increasing the magnitude of flooding. The increased number of bankfull floods, which are an erosive condition, raises in turn, the potential for increased streambank and channel erosion.

For example, conventional detention ponds designed to keep post-development discharge within the banks (i.e., the pre-development two year flood level) may still experience two to ten bankfull floods each year, instead of one every other year. Consequently, the abundant quantity of sediment stored in the channel and banks is subject to a longer interval of erosive conditions during the year. To reduce the potential for erosion, pond designs should attempt to control runoff so that the natural frequency of the pre-development bankfull flooding is preserved (i.e., store enough runoff volume to maintain the post-development bankfull flooding frequency to approximately one event every two years, on average).

This appendix describes a preliminary analysis of the effect of watershed development on bankfull flooding frequency in small watersheds. Next, it explores the question of how much extended storage is needed to mimic the pre-development bankfull flooding frequency. Both analyses utilize relatively simple hydrologic models and require several simplifying assumptions. Thus, the results should be viewed with some caution, until they have been corroborated with field data.

Methodology

To perform a frequency analysis of bankfull flooding events, the following hydrological variables must be predicted over an extended rainfall time-series.

1. The natural pre-development peak discharge rate (Qp) and associated runoff volume (Qvp) for the two year design storm, for different sized watersheds (denoted by the watershed time of concentration:Tc)

2. Post-development peak discharge rates (Qpd) and associated runoff volumes (Qvd) under expected levels of watershed development (expressed in terms of percent imperviousness).

3. The frequency that post-development peak discharge rates (Qpd) equal or exceed the pre-development peak discharge rate (Qp) as a function of I, for a specified Tc.

4. The sizing rules used to define extended detention runoff storage. This requires the use of a runoff volume coefficient (C').

5. The uncontrolled runoff volume (Xvol) which is not removed from the post-development storm hydrograph by extended detention storage (Xst). Xvol is then compared to the pre-development bankfull flood runoff volume (Qvp) to assess whether or not Xst is sufficient to control bankfull flooding.

6. The change in frequency in bankfull flooding that can be attributed to extended detention storage, in comparison to an uncontrolled situation.

The Rational method was used to calculate peak discharge rates (Qp and Qpd), as it appears to be more reliable than current SCS methods for predicting peak discharge rates in small watersheds for relatively small storms (which are the major focus of this analysis). Pre-development peak discharge rates (Qp) were computed using regional rainfall intensity data and using a runoff coefficient for forested conditions. Post-development peak discharge rates (Qpd) were then computed with the Rational Formula, after calculating an adjusted peak runoff coefficient (C), based on the degree of watershed imperviousness (5% increments). A six-year record of short-term maximum monthly rainfall intensity values (Greenbelt, Maryland NWS weather station) provided input values for rainfall intensity. The time-series of storms was assumed to be representative of the normal distribution of storms expected in the Washington area.

The Rational formula was then solved for each of the 72 storms in the rainfall intensity record to create a corresponding time-series of estimated post-development peak discharge rates (Qpd). To extend the results, the analysis was performed for watershed concentration times (Tc) ranging from 15 minutes to two hours. The Qpd rates computed over the six year record were then compared to the reference pre-development peak discharge rate (Qp). If a Qpd rate equalled or exceeded the pre-development Qp rate, it was considered to be a bankfull flood. The frequency of post-development bankfull flooding was then tabulated for 5% increments of watershed imperviousness.

To evaluate the impact of extended detention storage on the frequency of the pre-development bankfull flood, the same analysis was repeated, except that a fixed volume of extended detention storage (Xst) was specified (0.25 to 3.00 inches of rainfall*C'), and subtracted from the total runoff volume (Qvd) generated from each storm. This reflects the fact that extended detention storage will be discharged well after the peak of the initial storm event, and is in practical terms, removed from storm hydrograph.

If the remaining storm runoff volume (Xvol) was less than 60% of the runoff volume generated by the pre-development two-year storm, then the storm was considered to be adequately controlled. If not, the storm was not effectively controlled. Graphs were then constructed that compared the frequency of the pre development 2 year flood under each extended detention rule, and without any extra detention at all. The details and assumptions of the analysis are described step by step below:

STEP 1. Compute Pre-Development Peak Discharge Rate and Runoff Volume

The Rational formula computes peak discharge (Qp) as:

(EQ B.1): $Qp = (C)(i)(A)$

where Qp= instantaneous peak discharge, in cfs
C = runoff coefficient

i = rainfall intensity for a duration equal to the watershed time of concentration, in/hr
A = watershed area, acres

Values for i were obtained from the Baltimore intensity-duration-frequency (idf) curve for the two-year return storm, for watershed time of concentrations of 15, 30 and 45 minutes, and 1 and 2 hours. Area (A) is the same for both pre- and post-development conditions, and therefore was ignored (i.e., Qp is for a unit area). A pre-development, natural condition runoff coefficient (C) of 0.15 was taken from an expanded table of C values supplied by McCuen (1986), which corresponds to a forest situated on moderately sloping B soils.

The runoff volume for the pre-development storm was computed as:

(EQ B.2): Qvp= 0.9*Tc*Qp

where: Qvp= runoff volume in cfs/hr
Tc= watershed time of concentration (hrs)
Qp= two-year peak discharge calculated above (cfs)

The SCS triangular hydrograph was assumed to reasonably portray runoff volumes. It has a time-base equivalent to 1.8 times the watershed time of concentration. Given the peak discharge (Qp), the total runoff volume is equal to 1/2 (base)(height), as shown in Figure B.1 below:

Figure B.1: Relationship Among Hydrological Variables in the SCS Triangular Unit Hydrograph

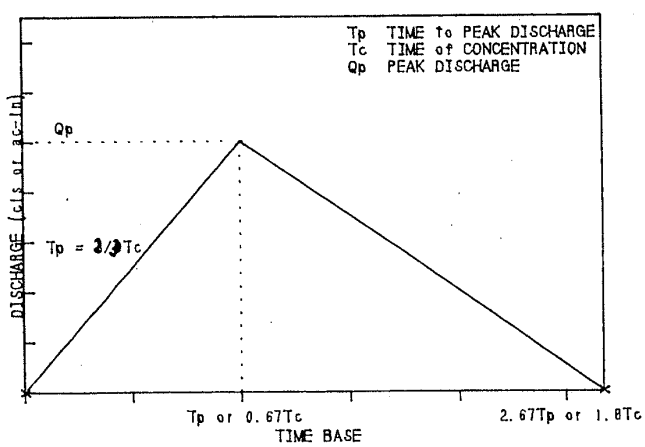

It can also be shown that for Qvp (and Qvd), the units of cfs-hr and watershed inches are interchangeable, when A is held constant.

one acre-inch = (0.083 ft/inch)(43,560 ft2/acre)/(60 min/hr)(60sec/min)

= 1.0083 (ft3)(hr)/sec , or approximately

(EQ B.3): ac-in = cfs-hr = Qv

STEP 2. Compute Post-Development Peak Discharge Rate/Runoff Volume

The analysis in STEP 1 was repeated using values of C based on watershed imperviousness in increments of 5%. This was done by developing an equation that computes post-development C as a function of imperviousness:

(EQ B.4): $C = (I)(X1) + (P)(X2)$

where: I= percent watershed imperviousness
P= percent watershed perviousness (1-I)
X1= runoff coefficient for impervious areas
X2= runoff coefficient for pervious areas

Constant values of X1 and X2 were obtained from an expanded table of runoff coefficients developed by McCuen (1986). X1 was set to 0.87, which corresponds to a completely impervious surface (such as a parking lot), and X2 was set to 0.15 (corresponding to a forest situated on moderately sloping B soils). C values were then computed in 5% increments from 0 to 100% imperviousness using EQ. B.4. Post-development peak discharge (Qpd) could then be calculated using EQ. B.1. It should be noted that equation B.4. is quite simplistic in that it does not explicitly consider variations in soil, slope and antecedent moisture conditions, nor does it vary in response to different rainfall intensities.

A second runoff coefficient is needed to estimate post-development runoff volume (Qvp) associated with the rainfall time-series. This coefficient (C') can be defined as follows:

(EQ B.5): $C' = r/p$

where: r = runoff depth (inches)
p = rainfall depth (inches)

By previous definition, it can be shown that:

(EQ B.6): $r = Qv$

(EQ B.7): $p = (Tc)(i)$

Thus, by combining equations B.1 and B.2: under the assumption of unit area:

$Qv = (0.9)(tc)(C)(i)$ and substituting r and p terms,

$r = (0.9)(p)(C)$ dividing both sides by p,

$r/p = 0.9*C$ and since $r/p = C'$, then:

(EQ B.8): $C' = 0.9*C$

Figure B.2 shows the relationship between the Rational or peak discharge C and the storm runoff volume C', as a function of percent I.

Figure B.2: Relationship between Peak Discharge and Storm Runoff Coefficients

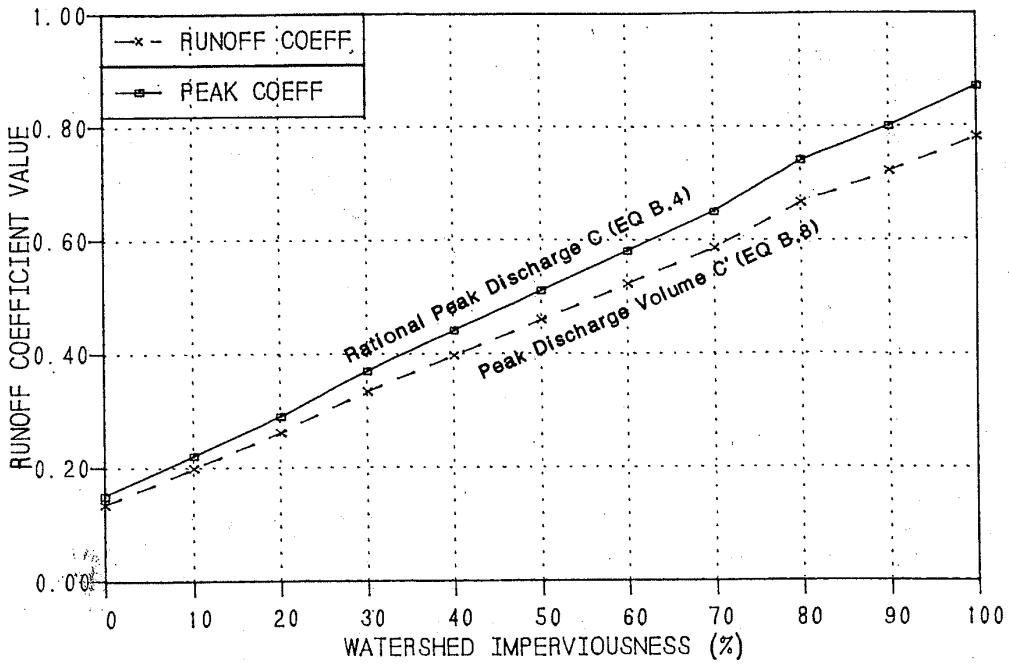

Step 3: Compute Increased Frequency of Bankfull Pre-development Floods

The frequency of bankfull flooding as a function of watershed imperviousness (I) was estimated using a six-year time series of monthly maximum precipitation values from Greenbelt, Md. contained in the NWS publication Hourly Precipitation Data for Maryland. This station was selected because of its close proximity to the metropolitan area and the fact that it records maximum rainfall intensity in relatively short time increments (15, 30, 45, 60 and 120 minutes) A monthly maximum rainfall intensity is reported for each time increment over a 72 month period. This record was used to approximate the actual or expected rainfall intensity over a long time interval.

A computer program was developed (Brown, 1987) that computes the peak discharge (Qpd) for each of the 72 maximum monthly rainfall intensity values, as a function of both different levels of development (0 to 100% imperviousness, in 5% increments), and different watershed times of concentration (15 minutes to 2 hours). If the post-development peak discharge rate (Qpd: computed in Step 2) was equal to or greater than the pre-development bankfull flood (Qp: obtained in Step 1), then the rainfall event was flagged as a bankfull flood (since it is assumed a flood greater than the pre-development bankfull flood would be controlled by the 2 year orifice/weir in a conventional detention pond). Annual bankfull frequency values as a function of watershed development are shown in Figure B.3. Since only moderate variation in frequency was observed for different times of concentration, a single curve, averaged for all times of concentration, was drawn to relate flooding frequency to watershed development.

Figure B.3: Frequency of Bankfull Flooding As a Function of I

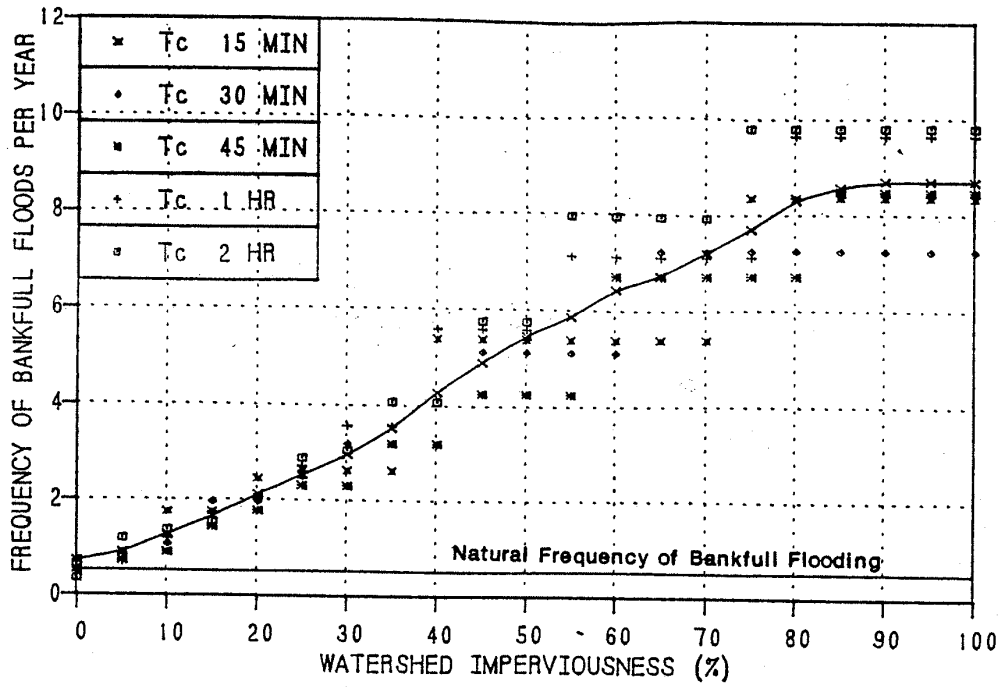

Step 4: Define Storage Rules For Extended Detention

Eight different extended detention sizing rules were evaluated to determine their impact on bankfull flooding frequency under different levels of watershed imperviousness. The eight rules called for extended detention storage equivalent to the runoff volume generated from 0.25, 0.50, 0.75, 1.00, 1.25, 1.50, 2.00 and 3.00 inches of rainfall over the specified watershed time of concentration. These rainfall depths were multiplied by the runoff volume coefficient (C'), derived from equation B.8, to obtain a storage volume for each increment of I. The storage volume specified under each sizing rule as a function of I are given below in Table B.1.

Table B.1: Extended Detention Storage Volume For Selected Sizing Rules

SIZING RULE Runoff Volume in inches for rainfall depth of:	VOLUME OF EXTENDED DETENTION STORAGE (inches) <---- degree of watershed imperviousness (percent) --->										
	0	10	20	30	40	50	60	70	80	90	100
0.25 inch	.03	.05	.07	.08	.10	.11	.13	.15	.16	.18	.20
0.50 "	.07	.10	.13	.16	.20	.23	.26	.29	.33	.36	.39
0.75 "	.10	.15	.20	.25	.30	.34	.39	.44	.49	.54	.59
1.00 "	.13	.20	.26	.33	.39	.46	.52	.59	.65	.72	.78
1.25 "	.17	.25	.33	.41	.49	.57	.65	.74	.82	.90	.98
1.50 "	.20	.30	.40	.49	.59	.69	.79	.88	.98	1.08	1.17
2.00 "	.27	.40	.53	.66	.79	.92	1.05	1.18	1.31	1.44	1.57
3.00 "	.40	.60	.79	.99	1.18	1.38	1.57	1.77	1.96	2.15	2.35

Two assumptions had to be made about the nature extended detention storage volume; the storage is considered to be "dead", i.e., the storage is in addition to that provided for control of the design storm, and 2) the storage volume has detention time well in excess of the time to peak of the post-development storm. (e.g, 24 to 40 hours of detention as compared to a time to peak of an hour or less: see Figure B.1)

Step 5: Subtract Storage From Post-Development Runoff Volumes

The net effect of extended detention storage is to store a fraction of the incoming runoff volume and release it later so that it does not materially influence the uncontrolled post-development hydrograph. In the analysis here, the peak discharge occurs within 10 to 80 minutes after the storm, whereas extended detention volumes are stored and released over an interval of 24 hours or more. Thus, it is possible to subtract out the extended detention storage volume (in inches) from the total storm runoff volume (in inches) for an event to determine if the storage is sufficient to prevent a pre-development bankfull flood. Thus, for each recorded rainfall event;

(EQ B.10): $Xvol = Qvp - Xst$

where Xvol= Uncontrolled post development runoff volume (in)
Qvp = Initial post-development runoff volume (in)
Xst = Extended detention storage volume (in)

The next step involved applying equation B.10 to the time series of uncontrolled bankfull floods identified in Step 3 for each of the eight storage rules. Three operating rules were used to evaluate the Xvol for each bankfull flooding event.

1. If Xvol was negative for a particular storm, this meant that the entire storm runoff volume was subject to extended detention, and no flood (NF) occurred.

2. If Xvol was positive, but was less than 60% of the pre-development bankfull runoff volume (Qvp), the storm was considered a small flood (SF). For storm events in this range, enough extended detention storage (Xst) was provided so that most of the post-development runoff volume (Qvd) was delayed until well after the original pre-development bankfull flood peak (Qp). The effect of the storage is to reduce the the peak discharge below the pre-development bankfull flood (Qp). The 60% rule is used as an approximation of the typical storage volume needed to control the predevelopment bankfull flood, based on experience with storage routing models (Harrington, personal communication). Ideally, storage routing should be performed on each hydrograph in the bankfull flooding time series to get a more accurate measure of the effect of Xst on Qp. However, the slightly less accurate 60% cut-off rule was used to reduce the number of computations needed in the program.

3. If Xvol was positive, and greater than 60% of Qvp, then the storm event still produced a bankfull flood (BF), and erosive conditions were presumed to still occur downstream.

Step 6: Compute New Frequency of Bankfull Floods After Storage

The number of bankfull floods (BF) recorded after extended detention storage was provided (Operating Rule 3, above) was then tabulated in a three-way matrix (for each increment of watershed time of concentration, watershed imperviousness, and extended detention storage). These values in the matrix were then compared to the original, uncontrolled bankfull flooding frequency curve for all storm events (derived in Step 3), to examine the change in bankfull flooding frequency which could be attributed to extended detention storage. The results, again averaged over all watershed times of concentration is shown in Figure B.4, below.

Figure B.4: Effect of Extended Detention on Post-development Bankfull Flooding Frequency

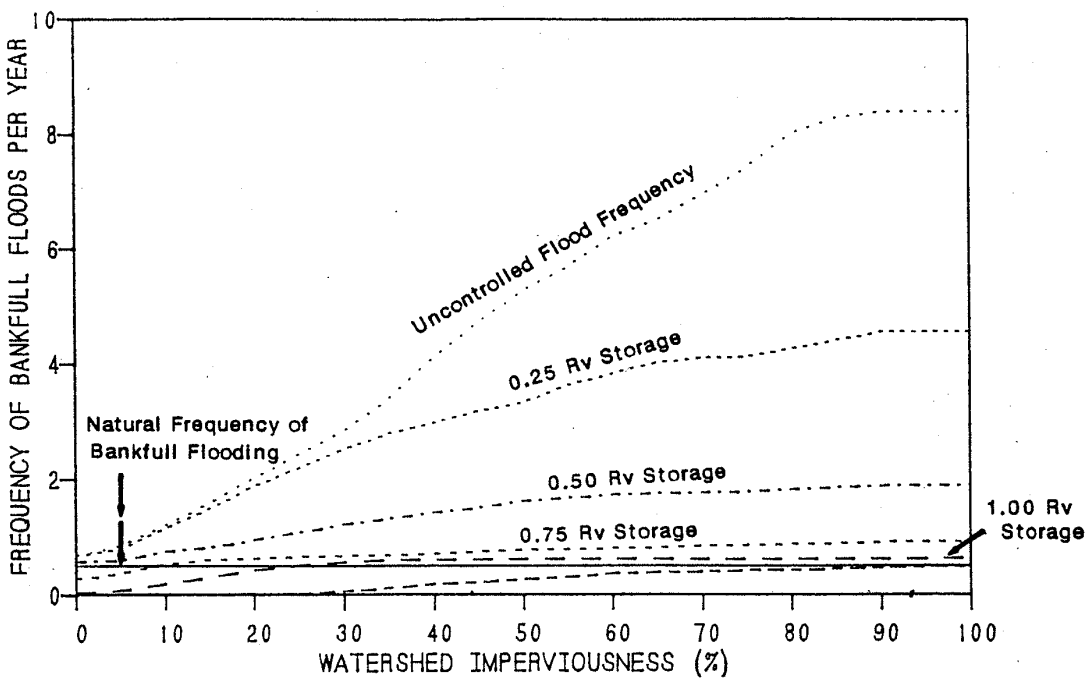

NOTE: Extended detention storage (STOR) equals the volume equivalent to the given rainfall depth times the runoff coefficient.

Discussion

The curves shown in Figure B.4 suggest that extended detention storage equivalent to the runoff produced by a 0.75 to 1.00 inch storm should be capable of reproducing the natural, pre-development frequency of the bankfull floods. However, a slightly more generous storage rule should be used for design purposes (1.0 to 1.5 storm*C') to account for some of the conservative assumptions used in the analysis. Specifically, two assumptions were made that probably underestimate the frequency of post-development bankfull flooding, and consequently, overestimate the effectiveness of extended detention storage in reducing the frequency. They are:

1. The assumption that watershed time of concentration (Tc) does not change as a result of development. Clearly, Tc will be reduced after drainage

patterns and cover are changed in the watershed. From EQ B.1, it is also evident that this effect should lead to an increase in the frequency of of post-development bankfull flooding. However, because change in Tc as a result of development is unique to each site, it is not possible to derive a systematic relationship relating the change in Tc to I (or any other measure of watershed development).

2. The assumption that the rainfall record used in the analysis includes all storm events that could produce a bankfull flood, for all increments of I. The NWS record only recorded the monthly maximum rainfall intensity for each time of concentration. It is entirely possible, and probably quite likely, that more than one storm event a month is intense enough to produce a bankfull flood, particularly during the summer months when thunderstorms are common. Ideally, the entire analysis should be performed on a continuous and longer record of rainfall intensity to get the most accurate frequency curve.

In conclusion, the analysis presented here is a preliminary attempt to provide a quantitative framework for examining bankfull flooding frequency in small streams. The results should be viewed with some caution, as the method has not yet been tested with actual runoff data for streams.

GLOSSARY

aggregate
Term for the stone or rock gravel needed to fill in an infiltration BMP, such as a trench or porous pavement.

anti-seep collar
A plate, attached to the barrel running through an embankment of a pond, that prevents seepage of water around the pipe.

Austin Triangle
Sediment control device consisting of a long triangular pipe frame, enclosed in heavy gage fencing material, and wrapped in filter fabric.

background load
Naturally occurring levels of pollutants in a stream prior to watershed development.

bankfull discharge
A flow condition where streamflow completely fills the stream channel up to the top of the bank. In undisturbed watersheds, the discharge condition occurs on average every 1.5 to 2 years and controls the shape and form of natural channels.

barrel
The concrete or corrugated metal pipe that passes runoff from the riser through the embankment, and finally discharges to the pond's outfall.

baseflow
The portion of stream flow that is not due to storm runoff, and is supported by groundwater seepage into a channel.

bedload
The sediment in a stream channel that mainly moves by jumping, sliding or rolling on or very near the bottom.

benthic organisms
Organisms living in or on bottom substrates in aquatic habitats.

berm, earthen
An earthen mound used to direct the flow of runoff around or through a BMP.

best management practice (BMP)
Structural devices that temporarily store or treat urban stormwater runoff to reduce flooding, remove pollutants, and provide other amenities.

bioassay
Laboratory tests used to determine the response of organisms to specified conditions relating to the natural environment (e.g., water quality).

biochemical oxygen demand (BOD)
The quantity of oxygen consumed during the biochemical oxidation of matter over a specified period of time (see also COD).

borings
Cylindrical samples of a soil profile used to determine infiltration capacity.

channel erosion
The widening, deepening, and headward cutting of small channels and waterways, due to erosion caused by moderate to large floods.

check dam
(a) A log or gabion structure placed perpendicular to a stream to enhance aquatic habitat. (b) An earthen or log structure, used in grass swales to reduce water velocities, promote sediment deposition, and enhance infiltration.

chemical oxygen demand (COD)
A monitoring test that measures all the oxidizable matter found in a runoff sample, a portion of which could deplete dissolved oxygen in receiving waters.

clay lens
A naturally occurring, localized area of clay that acts as an impermeable layer to runoff infiltration.

dead storage
The portion of a pond or infiltration BMP which is below the elevation of the lowest outlet of the structure.

denitrification
A biological process in which nitrate (NO3), a compound of nitrogen often found in sewage or water, is turned into nitrogen gas, which can dissipate into the atmosphere.

design storm
A rainfall event of specified size and return frequency (e.g., a storm that occurs only once every 2 years) that is used to calculate the runoff volume and peak discharge rate to a BMP.

detention
The temporary storage of storm runoff in a BMP, which is used to control the peak discharge rates, and which provides gravity settling of pollutants.

detention time
The amount of time a parcel of water actually is present in a BMP. Theoretical detention time for a runoff event is the average time parcels of water reside in the basin over the period of release from the BMP.

downstream seepage
The horizontal movement of runoff through the soil layer, which may cause damage to nearby building foundations.

drawdown
The gradual reduction in water level in a pond BMP due to the combined effect of infiltration and evaporation.

dryfall
The deposition of atmospheric pollutants on the land surface.

emergent plants
Aquatic plants that are rooted in the sediment but whose leaves are at or above the water surface. These wetland plants often have high habitat value for wildlife and waterfowl, and can aid in pollutant uptake.

eutrophication
The process of over-enrichment of water bodies by nutrients often typified by the presence of algal blooms.

event mean concentration (EMC)
The average concentration of an urban pollutant measured during a storm runoff event. The EMC is calculated by flow-weighting each pollutant sample measured during a storm event.

exfiltration
The downward movement of runoff through the bottom of an infiltration BMP into the soil layer.

fecal coliform bacteria
Minute living organisms associated with human or animal feces that are used as an indirect indicator of the presence of other disease causing bacteria.

filter fabric
Textile of relatively small mesh or pore size that is used to (a) allow water to pass through while keeping sediment out (permeable), or (b) prevent both runoff and sediment from passing through (impermeable).

first flush
The delivery of a disproportionately large load of pollutants during the early part of storms due to the rapid runoff of accumulated pollutants. The first flush of runoff has been defined several ways (e.g., one-half inch per impervious acre).

flood frequency
The frequency with which the maximum flood may be expected to occur at a site in any average interval of years. Frequency analysis defines the "n-year flood" as being the flood that will, over a long period of time, be equaled or exceeded on the average once every "n" years.

flood plain
For a given flood event, that area of land adjoining a continuous watercourse which has been covered temporarily by water.

flow-weighting
A statistical technique used to adjust a series of pollutant concentration measurements for the effect of flow.

forebay
An extra storage area provided near an inlet of a BMP to trap incoming sediments before they accumulate in a pond BMP.

freeboard
The space from the top of an embankment to the highest water elevation expected for the largest design storm stored. The space is required as a safety margin in a pond or basin.

frost-heave
The upward movement of soil surface due to the expansion of ice stored between particles in the first few feet of the soil profile. May cause surface fracturing of asphalt or concrete.

gabion
A large rectangular box of heavy gage wire mesh which holds large cobbles and boulders. Used in streams and ponds to change flow patterns, stabilize banks, or prevent erosion.

hardness
A measure of the concentration of dissolved calcium carbonate in water. Hardwater has high levels, and causes scaling in pipes that increases frictional resistance to flow.

headwater stream
A stream forming the source of another and larger stream.

hydrograph
A graph showing variation in the water depth or discharge in a stream or channel, over time, at a specified point of interest.

impervious area
Impermeable surfaces, such as pavement or rooftops, which prevent the infiltration of water into the soil.

infiltration
(a) The downward movement of water from the surface to the subsoil. (b) The infiltration capacity is expressed in terms of inches/hour.

invert elevation
The vertical elevation of a pipe or orifice in a pond which defines the water level.

level-spreader
A device used to spread out stormwater runoff uniformly over the ground surface as sheet flow (i.e., not through channels). The purpose of level spreaders are to prevent concentrated, erosive flows from occurring, and to enhance infiltration.

low flow channel
An incised or paved channel from inlet to outlet in a dry basin which is designed to carry low runoff flows and/or baseflow, directly to the outlet without detention.

overflow rate
Detention basin release rate divided by the surface area of the basin. It can be thought of as an average flow rate through the basin.

peak discharge
The maximum instantaneous rate of flow during a storm, usually in reference to a specific design storm event.

peak-shaving
Controlling post-development peak discharge rates to pre-development levels by providing temporary detention in a BMP.

pilot channel
A riprap or paved channel that routes runoff through a BMP to prevent erosion of the surface.

plug flow
A flow value used to describe a constant hydrologic condition. Often used in the context of describing a plug flow model, or a model that is not applied with time variable flow conditions.

Rational formula
A simple technique, developed in the 1900's, for estimating peak discharge rates for very small developments, based on the rainfall intensity, watershed time of concentration, and a runoff coefficient.

release rate
The rate of discharge in volume per unit time from a detention facility.

retention
The holding of runoff in a basin without release except by means of evaporation, infiltration, or emergency bypass.

retrofit
To install a new BMP or improve an existing BMP in a previously developed area.

return interval
A statistical term for the average time of expected interval that an event of some kind will equal or exceed given conditions (e.g., a stormwater flow that occurs every 2 years).

riparian
A relatively narrow strip of land that borders a stream or river, often coincides with the maximum water surface elevation of the 100 year storm.

riprap
A combination of large stone, cobbles and boulders used to line channels, stabilize banks, reduce runoff velocities, or filter out sediment.

riser
A vertical pipe extending from the bottom of a pond BMP that is used to control the discharge rate from a BMP for a specified design storm.

senescence
The annual die-back of aquatic plants at the end of the growing season.

sheetflow
Runoff which flows over the ground surface as a thin, even layer, not concentrated in a channel.

short circuiting
The passage of runoff through a BMP in less than the theoretical or design treatment time.

softwater
Water with low concentrations of calcium ($CaCO_3$) ions.

soil group, hydrologic
A classification of soils by the Soil Conservation Service into four runoff potential groups. The groups range from A soils, which are very permeable and produce little runoff, to D soils, which are not very permeable and produce much more runoff.

soil strata
The various horizontal layers of sedimentary rock (soil).

sorption
The physical or chemical binding of pollutants to sediment or organic particles.

spillway
A depression in the embankment of a pond or basin which is used to pass peak discharges greater than the maximum design storm controlled by the pond.

Stokes Law Type I Sedimentation
A model for the settling characteristics of particulate materials in bodies of water; whereby, coarser materials are deposited first, followed by finer-sized fractions.

stormflow
The portion of flow which reaches the stream shortly after a storm event.

storm pulse
A high concentration of urban pollutants found in a stream for a short period of time, following a rainstorm.

streamflow
Water flowing in a natural channel, above ground.

subgrade
A layer of stone or soil used as the underlying base for a BMP.

substrate
The natural soil base underlying a BMP.

swale
A natural depression or wide shallow ditch used to temporarily store, route, or filter runoff.

test well
A device installed in an infiltration BMP to monitor infiltration rates.

time of concentration
The time required for surface runoff from the most remote part of a drainage basin to reach the basin outlet.

TR-20
A watershed hydrology model developed by the Soil Conservation Service act that is used to route a design storm hydrograph through a pond.

underdrain
Plastic pipes with holes drilled through the top, installed on the bottom of an infiltration BMP, or sand filter, which are used to collect and remove excess runoff.

water quality BMP
A BMP specifically designed for pollutant removal.

water table
The upper surface or top of the saturated portion of the soil or bedrock layer, indicates the uppermost extent of groundwater.

wetfall
The deposition of atmospheric pollutants on the land surface that are washed out by precipitation.

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STATE WATER RESOURCES CONTROL BOARD
RESOLUTION NO. 88-63
(as revised by Resolution No. 2006-0008)

ADOPTION OF POLICY ENTITLED
"SOURCES OF DRINKING WATER"

WHEREAS

1 California Water Code section 13140 provides that the State Board shall formulate and adopt State Policy for Water Quality Control; and,

2. California Water Code section 13240 provides that Water Quality Plans "shall conform" to any State Policy for Water Quality Control; and,

3. The Regional Boards can conform the Water Quality Control Plans to this policy by amending the plans to incorporate the policy; and,

4. The State Board must approve any conforming amendments pursuant to Water Code section 13245; and,

5. "Sources of drinking water" shall be defined in the Water Quality Control Plans as those water bodies with beneficial uses designated as suitable, or potentially suitable, for municipal or domestic water supply (MUN); and,

6. The Water Quality Control Plans do not provide sufficient detail in the description of water bodies designated MUN to judge clearly what is, or is not, a source of drinking water for various purposes.

7. On February 1, 2006, the State Board adopted Resolution No. 2006-0008, which amended this policy to establish a site-specific exception for Old Alamo Creek.

THEREFORE BE IT RESOLVED:

All surface and ground waters of the State are considered to be suitable, or potentially suitable, for municipal or domestic water supply and should be so designated by the Regional Boards[1] with the exception[2] of:

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[1] This policy does not affect any determination of what is a potential source of drinking water for the limited purposes of maintaining a surface impoundment after June 30, 1988, pursuant to Section 25208.4 of the Health and Safety Code.

[2] This policy contains general categories for exceptions from the policy. On February 1, 2006, the State Board adopted Resolution No. 2006-0008, which established a site-specific exception from the policy for Old Alamo Creek. The rationale for the site-specific exception is contained in the resolution and in State Board Order WQO 2002-0015, II.A.2.d.

1. Surface and ground waters where:

   a. The total dissolved solids (TDS) exceed 3,000 mg/L (5,000 uS/cm, electrical conductivity) and it is not reasonably expected by Regional Boards to supply a public water system, or

   b. There is contamination, either by natural processes or by human activity (unrelated to the specific pollution incident), that cannot reasonably be treated for domestic use using either Best Management Practices or best economically achievable treatment practices, or

   c. The water source does not provide sufficient water to supply a single well capable of producing an average, sustained yield of 200 gallons per day.

2 Surface Waters Where:

   a. The water is in systems designed or modified to collect or treat municipal or industrial wastewaters, process waters, mining wastewaters, or storm water runoff, provided that the discharge from such systems is monitored to assure compliance with all relevant water quality objectives as required by the Regional Boards; or,

   b. The water is in systems designed or modified for the primary purpose of conveying or holding agricultural drainage waters, provided that the discharge from such systems is monitored to assure compliance with all relevant water quality objectives as required by the Regional Boards.

3. Ground water where:

The aquifer is regulated as a geothermal energy producing source or has been exempted administratively pursuant to 40 Code of Federal Regulations, section 146.4 for the purpose of underground injection of fluids associated with the production of hydrocarbon or geothermal energy, provided that these fluids do not constitute a hazardous waste under 40 CFR, section 261.3.

4. Regional Board Authority to Amend Use Designations:

Any body of water which has a current specific designation previously assigned to it by a Regional Board in Water Quality Control Plans may retain that designation at the Regional Board's discretion. Where a body of water is not currently designated as MUN but, in the opinion of a Regional Board, is presently or potentially suitable for MUN, the Regional Board shall include MUN in the beneficial use designation.

The Regional Boards shall also assure that the beneficial uses of municipal and domestic supply are designated for protection wherever those uses are presently being attained, and assure that any changes in beneficial use designations for waters of the State are

consistent with all applicable regulations adopted by the Environmental Protection Agency.

The Regional Boards shall review and revise the Water Quality Control Plans to incorporate this policy.

CERTIFICATION

The undersigned, Acting Clerk to the Board, does hereby certify that the foregoing is a full, true, and correct copy of a policy duly and regularly adopted at a meeting of the State Water Resources Control Board held on May 19, 1988, and amended on February 1, 2006.

Selica Potter
Acting Clerk to the Board

California Regional Water Quality Control Board
San Diego Region

ORDER NO. 90-38
NPDES No. CA 0108740
Waste Discharge Requirements
for
Stormwater and Urban Runoff
from the
County of Orange
the
Orange County Flood Control District
and the
Incorporated Cities of Orange County Within the San Diego Region

The California Regional Water Quality Control Board, San Diego Region (hereinafter Regional Board), finds that:

1. On March 15, 1990, the County of Orange and the Orange County Flood Control District, anticipating cooperation from the incorporated cities of Dana Point, Laguna Beach, Laguna Niguel, Mission Viejo, San Clemente, and San Juan Capistrano, submitted a letter in application for a National Pollutant Discharge Elimination System (NPDES) permit for stormwater and urban runoff discharges to waters within the jurisdiction of the San Diego Regional Board. Shortly thereafter, the aforementioned cities submitted letters notifying the Regional Board of the cities' intent to become co-applicants and subsequently co-permittees subject to the terms and conditions of this Order.

2. Section 405 of the Water Quality Act (WQA) of 1987 added Section 402(p) to the Clean Water Act (CWA). Pursuant to Section 402(p)(4) of the CWA, the EPA is required to promulgate regulations for NPDES permit applications for stormwater discharges associated municipal separate stormwater conveyance systems serving a population of 100,000 or more. Section 402 (p)(4) of the CWA also requires dischargers of stormwater associated with industrial activities and municipal separate stormwater conveyance systems serving a population of 250,000 or more to file stormwater permit applications by February 4, 1990.

3. On December 7, 1988, the EPA published its proposed regulations in the Federal Register to solicit public comments. Final regulations are tentatively scheduled to be promulgated on July 20, 1990. In the absence of final stormwater regulations, this Order governing municipal stormwater discharges meets both the statutory requirements of Section 402 (p)(3)(B) and all requirements applicable to an NPDES permit issued under this Regional Board's discretionary authority.

4. Water quality studies in many urban areas have shown that urban runoff typically contains significant quantities of pollutants. Water quality may be adversely impacted by stormwater discharges and urban runoff. A comprehensive stormwater and urban runoff management and regulation program is essential for the protection of water resources. The County of Orange/Orange County Flood Control District and the incorporated cities in Orange County are developing a comprehensive stormwater/urban runoff management program. This Order requires the County of Orange/Orange County Flood Control District and the incorporated cities to submit documentation on existing runoff pollution control programs and specifies additional requirements towards achieving the water quality objectives for surface waters in Orange County. The intent of this permit is to improve water quality of receiving waters under the jurisdiction of the Regional Board.

5. The discharges consist of surface runoff generated from various land uses and activities in all the hydrologic drainage areas which discharge into receiving waters in Orange County within the area of jurisdiction of the Regional Board. The quality of these discharges varies considerably and is affected by land use, basin hydrology and geology, season, the frequency and duration of storm events, the presence of illicit connections and discharges, and waste management and disposal practices. The parameters and pollutants of potential concern and significance in these discharges may include, but are not limited to, pH, fecal coliform, fecal streptococcus, enterococcus, volatile organic carbon (VOC), surfactants (MBAS), oil and grease, petroleum hydrocarbons, total suspended and settleable solids, total organic carbon, biochemical oxygen demand (BOD), chemical oxygen demand (COD), lead, copper, chromium, cadmium, silver, nickel, zinc, cyanides, phenols, nutrients (e.g., nitrogen, nitrate, phosphate, etc.), and biocides. Since stormwater and urban runoff contains "waste", as defined in California Water Code (CWC) Section 13050, stormwater and urban runoff discharges constitute discharges of waste. Consequently such discharges are subject to CWC Section 13260 et seq., as well as Section 402 of the Clean Water Act, as amended.

6. The County of Orange has jurisdiction over a large portion of the flood control facilities and has agreed to be the major responsible party in implementing the provisions of this Order. The incorporated cities within the county have also agreed to cooperate with the County of Orange in controlling and improving the quality of

urban runoff from their respective areas. This Order names the County of Orange the "principal permittee" and the Orange County Flood Control District and incorporated cities as the "co-permittees". Collectively the principal permittee and co-permittees are referred to as "permittees." Attachment A lists the permittees and their 1990 estimated populations.

7. The County of Orange obtains its authority to control pollutants in stormwater discharges, prohibit illegal discharges and control spills, and require compliance and carry out inspections of the drainage facilities in Orange County from the Orange County Flood Control Act (Act 5682) and various county ordinances which address industrial wastes and waste discharges within the unincorporated areas of Orange County and contract cities. "Co-permittees" have various forms of legal authority in place, such as charters, State Code provisions for General Law cities, city ordinances and applicable portions of Municipal Codes and the State Water Code, to regulate stormwater/urban runoff discharges.

8. The County of Orange, as the "principal permittee", will obtain the cooperation of all entities in implementing the provisions of this Order. The permittees have tentatively agreed upon the responsibilities as outlined in a draft Implementation Agreement submitted to the Regional Board. In general, the "principal permittee", will be responsible for preparing operating budgets, preparing and monitoring the implementation programs, and coordinating and submitting reports to the Regional Board. The "co-permittees" will develop site-specific compliance requirements, perform compliance monitoring and inspections, submit storm drain maps and compliance reports to the County of Orange, and demonstrate and exercise enforcement authority for achieving compliance with the terms and conditions of this Order.

9. This Order requires the permittees to develop and implement programs to ensure that entities discharging stormwater/urban runoff into stormwater conveyance systems take steps to control/reduce discharges of pollutants to waters of the United States. The Regional Board has the discretion and authority to require non-cooperating entities to participate in this area-wide permit or obtain individual waste discharge requirements if it is determined that discharges from such entities cause or contribute to a violation of a water quality standard or are significant contributors of pollutants to waters of the United States.

10. The total area of Orange County is approximately 786 square miles. Water quality in 252 square miles of Orange County is under the jurisdiction of this Regional Board. The Santa Ana Regional Water Quality Control Board has jurisdiction over the remaining area. Stormwater and urban runoff discharges in areas under the jurisdiction of the Santa Ana Regional Water Quality Control Board are regulated under Santa Ana Regional Board Order No. 90-71 (NPDES No. CA 8000180), Waste Discharge Requirements for the County of Orange and the Orange County Flood Control District and the Incorporated Cities of Orange County Within the Santa Ana Region, Area-wide Urban Stormwater Runoff, Orange County. The requirements contained in this Order are patterned after Order No. 90-71 to ensure consistent regulation, pollution control practices, and monitoring and reporting requirements throughout Orange County.

11. Stormwater discharges in the Orange County portion of the San Diego region are tributary to various receiving waters. Receiving waters identified in the permittees' application are as follows:

Inland Surface Streams

a. San Juan Creek
b. Aliso Creek
c. Sulphur Creek
d. Trabuco Creek
e. Oso Creek
f. Segundo Descheca Creek

Bays

a. Dana Point Harbor

Ocean Waters

a. The Pacific Ocean between the boundary of the San Diego and Santa Ana Regional Water Quality Control Boards to the north, and the San Diego/Orange County boundary to the south.

12. The County of Orange has an active surface water quality monitoring program. Runoff samples obtained during dry weather are analyzed for nutrients and selected trace metals (chromium, copper, lead, and zinc). When water quality sampling stations exhibit higher than average watershed pollution concentrations, sediment samples are also collected and analyzed for constituents of concern

(those which were higher than average in the water column).

The monitoring program is composed of 7 water quality monitoring stations, 5 flow monitoring stations, and 8 precipitation stations. Most of the water quality monitoring stations are located in drainage areas in which land uses and activities have been identified which may significantly impact beneficial uses of receiving waters. These areas have been characterized as agricultural, commercial, residential, and areas of discharge from publicly owned treatment works.

13. The State Water Resources Control Board (hereinafter State Board) adopted a Water Quality Control Policy for Enclosed Bays and Estuaries of California (Bays and Estuaries Policy) on May 16, 1974. The policy established water quality principles, guidelines, effluent quality requirements and prohibitions to govern the disposal of wastes in the enclosed bays and estuaries of California. Dana Point Harbor is, by the definition contained in the Bays and Estuaries Policy, an enclosed bay. The Bays and Estuaries Policy contains the following prohibition specific to land runoff to Dana Point Harbor:

> "The direct or indirect discharge of silt, sand, soil, clay, or other earthen materials from onshore operations including mining, construction, agriculture, and lumbering, in quantities which unreasonably affect or threaten to affect beneficial uses shall be prohibited."

14. The State Water Resources Control Board adopted a revised Water Quality Control Plan for Ocean Waters of California (Ocean Plan) on March 22, 1990. The Ocean Plan identifies the following beneficial uses of state ocean waters to be protected:

a. Industrial water supply;
b. Navigation;
c. Aesthetic enjoyment;
d. Water contact recreation;
e. Non-contact water recreation;
f. Ocean commercial and sport fishing;
g. Mariculture;
h. Preservation and enhancement of areas of special biological significance;
i. Preservation and enhancement of rare and endangered species;
j. Marine habitat;

k. Fish migration;
l. Fish spawning; and
m. Shellfish harvesting.

In order to protect the above beneficial uses, the Ocean Plan established water quality objectives (for bacteriological, physical, chemical, and biological characteristics, and for radioactivity), general requirements for management of waste discharged to the ocean, quality requirements for waste discharges, discharge prohibitions, and general provisions.

15. The Comprehensive Water Quality Control Plan Report, San Diego Basin (9), (Basin Plan) was adopted by this Regional Board on March 17, 1975 and subsequently approved by the State Water Resources Control Board (State Board). Subsequent revisions to the Basin Plan have also been adopted by the Regional Board and approved by the State Board.

16. The Basin Plan identifies the following beneficial uses of inland surface waters in Orange County:

a. Industrial service supply;
b. Agriculture supply;
c. Water contact recreation;
d. Non-contact water recreation;
e. Warm fresh-water habitat;
f. Preservation of rare and endangered species; and
g. Wildlife habitat.

17. The Basin Plan contains the following prohibitions, applicable to discharges, for inland surface waters:

"Discharge of treated or untreated sewage or industrial wastes to a natural watercourse upstream of surface storage or diversion facilities used for municipal supply is prohibited."

"Discharge of treated or untreated sewage or industrial wastewater, exclusive of cooling water or other waters which are chemically unchanged, to a watercourse, is prohibited except in cases where the quality of said discharge complies with the receiving body's water quality objectives."

"The dumping or deposition of oil, garbage, trash, or other solid municipal, industrial, or agricultural waste directly into inland waters or watercourses or adjacent to the water courses in

any manner which may permit its being washed into the watercourse is prohibited."

"Land grading and similar operations causing soil disturbance which do not contain provisions to minimize soil erosion and limit suspended matter in area runoff are prohibited."

18. The Basin Plan identifies the following beneficial uses of state ocean waters to be protected:

a. Industrial service supply;
b. Navigation;
c. Water contact recreation;
d. Noncontact water recreation;
e. Ocean commercial and sport fishing;
f. Preservation of Areas of Special Biological Significance;
g. Preservation of rare and endangered species;
h. Marine habitat;
i. Fish migration; and
j. Shellfish harvesting.

The Basin Plan relies primarily on requirements of the Ocean Plan for protection of those beneficial uses. However, the Basin Plan establishes additional water quality objectives for dissolved oxygen and pH.

19. Although the Basin Plan relies primarily on the Ocean Plan for the protection of marine waters, the Basin Plan contains the following prohibitions, applicable to discharges, for waters subject to tidal action:

" The dumping or deposition from shore or from vessels of oil, garbage, trash or other solid municipal, industrial or agricultural waste directly into waters subject to tidal action or adjacent to waters subject to tidal action in any manner which may permit it to be washed into the waters subject to tidal action is prohibited."

" Discharge of industrial wastewaters exclusive of cooling water, clear brine or other waters which are essentially chemically unchanged, into waters subject to tidal action is prohibited."

" The dumping or deposition of chemical wastes, chemical agents or explosives

into waters subject to tidal action is prohibited."

20. The requirements contained in this Order are necessary to implement the objectives of the Ocean Plan, Bays and Estuaries Policy, and the Basin Plan for receiving waters within the region.

21. Numerical and narrative water quality standards exist for the receiving waters in the region. Due to the enormous variability in stormwater quality and quantity and the complexity of urban runoff, this Order does not contain numerical limitations for any constituents. The impact of stormwater and urban runoff discharges on water quality of receiving waters has not been fully determined. Extensive water quality monitoring and analysis of the data are essential to make that determination. This Order requires the permittees to continue to monitor the discharges and to analyze the data. This Order also requires the development and implementation of best management practices (BMPs). "BMPs" are defined in 40 CFR 122.2 as "schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the pollution of waters of the United States. BMPs also include treatment requirements, operating procedures, and practices to control plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage." For purposes of this Order, BMPs for the control of pollutants in stormwater and urban runoff may include the use of non-structural (e.g. public education, regulatory powers, urban planning, etc.) and structural (e.g. detention basins, grass swales, runoff infiltration devices, etc.) controls which may be applied to a particular site or throughout a region (e.g., a city or throughout an area served by a stormwater conveyance system).

22. Pursuant to 40 CFR 131.12 and State Board Resolution No. 68-16, Statement of Policy with Respect to Maintaining High Quality of Waters in California (collectively "antidegradation policies"), the Regional Board shall ensure that any increase in pollutant loading to a receiving water meets the requirements stated in the foregoing policies. At a minimum, permitting actions shall be consistent with the following:

    a. Existing instream water uses and the level of water quality necessary to protect existing beneficial uses shall be maintained and protected;

b. Where the quality of the waters exceed levels necessary to support propagation of fish, shellfish, and wildlife and recreation in and on the water, the quality shall be maintained and protected unless the State finds, after full satisfaction of the intergovernmental coordination and public participation provisions of the State's continuing planning process, that allowing lower water quality is necessary to accommodate important economic or social development in the area in which the waters are located;

c. Where high quality waters constitute an outstanding national resource, such as waters of National and State parks and wildlife refuges and waters of exceptional recreational or ecological significance, that water quality shall be maintained and protected; and

d. In those cases where potential water quality impairment associated with a thermal discharge is involved, the antidegradation policy and implementing method shall be consistent with Section 316 of the Clean Water Act.

23. The Regional Board, in establishing the requirements contained herein, has taken into consideration the requirements of the State and Federal "antidegradation" policies and has determined that:

a. The conditions and requirements established in this order for discharges of stormwater/urban runoff to waters of the United States ensure that the existing beneficial uses and quality of receiving waters will be protected and improved through the implementation of best management practices for the control of pollutants in stormwater and urban runoff;

b. Discharges of urban runoff to waters of the United States will continue regardless of the issuance of this Order. The issuance of this Order is necessary to ensure achievement and maintenance of the goals and objectives of the water quality control plans adopted by the State and will result in improvement in water quality through implementation of stormwater management programs for the control of pollutants in urban runoff;

c. No receiving waters covered under the terms and conditions of this Order have been designated an

outstanding national resource water. However, Heisler Park Ecological Reserve, located in coastal waters near the City of Laguna Beach, has been designated an Area of Special Biological Significance (ASBS) by the State Water Resources Control Board. The City of Laguna Beach and the surrounding areas are subject to the terms and conditions of this Order. Implementation of BMPs for the control of pollutants in stormwater and urban runoff from the Laguna Beach area will further protect and improve water quality in this ASBS; and

d. Thermal discharges potentially impairing water quality are not authorized under the terms and conditions of this Order, thus, Section 316 of the Clean Water Act is not applicable.

24. Pursuant to Section 402 of the CWA, and amendments thereto, and pursuant to Section 13260, et seq. of the California Water Code, this Order shall serve as an NPDES permit and waste discharge requirements for the discharge of stormwater and urban runoff to surface waters of Orange County in the area under the jurisdiction of the Regional Board.

25. The Regional Board, in establishing the requirements contained herein, considered factors including, but not limited to, the following:

a. Beneficial uses to be protected and the water quality objectives reasonably required for that purpose;

b. Other waste discharges;

c. The need to prevent nuisance;

d. Past, present, and probable future beneficial uses of the waters under consideration;

e. Environmental characteristics of the waters under consideration;

f. Water quality conditions that could reasonably be achieved through the coordinated control of all factors which affect water quality in the area;

g. Economic considerations; and

h. The need for developing housing within the region.

26. The issuance of this permit for the discharge of stormwater runoff and urban runoff is exempt from the requirement for preparation of environmental documents under the California Environmental Quality Act (Public Resources Code, Division 13, Chapter 3, Section 21000 et seq.) in accordance with the California Water Code, Section 13389.

27. The Regional Board has considered all water resource related environmental factors associated with the discharge of stormwater and urban runoff.

28. The Regional Board has notified all known interested parties of its intent to issue an NPDES permit for the discharge of stormwater and urban runoff.

29. The Regional Board has, at a public meeting, heard and considered all comments pertaining to the discharge of stormwater and urban runoff.

IT IS HEREBY ORDERED that the permittees, in order to meet the provisions contained in Division 7 of the California Water Code and regulations adopted thereunder, and the provisions of the Clean Water Act as amended and regulations and guidelines adopted thereunder, shall comply with the following:

I. RESPONSIBILITIES OF PRINCIPAL PERMITTEE

A. The principal permittee (the County of Orange) shall be responsible for the overall program management, including the following:

1. Administer the Orange County Water Pollution Ordinance.
2. Conduct water quality and hydrographic monitoring of the stormwater conveyance systems as agreed upon by the Executive Officer.
3. Develop uniform criteria for stormwater conveyance system inspections.
4. Conduct inspections of the stormwater conveyance systems within its jurisdiction.
5. Prepare and submit to the Regional Board all the reports, plans, and programs as required in this Order.
6. Monitor the implementation of the plans and programs and determine their effectiveness in attaining water quality objectives.
7. Coordinate all the activities with the Regional Board.
8. Enact legislation and ordinances as necessary to establish legal authority.

9. Solicit, and respond to, public input[1] for proposed monitoring, reconnaissance, management, and implementation plans.
10. Pursue enforcement actions as necessary to ensure compliance with stormwater management programs and implementation plans.
11. Ensure adequate response to emergency situations such as accidental spills, leaks, illicit discharges, etc.
12. Abide by the terms of the Implementation Agreement.

II. RESPONSIBILITIES OF THE CO-PERMITTEES

A. The co-permittees (the Orange County Flood Control District and the incorporated cities within Orange County) shall be responsible for the management of stormwater conveyance systems within their jurisdictions, including the following:

1. Conduct stormwater conveyance system inspections in accordance with the uniform criteria developed by the principal permittee.
2. Conduct and coordinate with the principal permittee any surveys and characterizations needed to identify the pollutant sources and drainage areas.
3. Review and approve management programs, monitoring programs, and implementation plans.
4. Implement management programs, monitoring programs, and implementation plans as required by this Order.
5. Submit stormwater conveyance system maps with periodic revisions as necessary.
6. Prepare and submit all reports to the principal permittee in a timely manner.
7. Enact legislation and ordinances as necessary to ensure compliance with the stormwater management programs and the implementation plans.
8. Pursue enforcement actions as necessary to ensure compliance with the stormwater management programs and the implementation plans.
9. Ensure adequate response to emergency situations such as accidental spills, leaks, illicit discharges, etc.
10. Abide by the terms of the Implementation Agreement.

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[1] Solicitation, and response to, public input may be demonstrated by: (1) disseminating the notice of availability of plans for review and comment to the public at large, environmental groups, federal, state and local agencies and other interested parties; and, (2) addressing concerns expressed by the public.

III. GENERAL REQUIREMENTS

A. The permittees shall prohibit illicit/illegal discharges from entering into stormwater conveyance systems. Discharges conditionally allowed to enter stormwater conveyance systems are specified in Item V. C.

B. The permittees shall develop and implement best management practices (BMPs), including management practices, control techniques, and system design and engineering methods, and such other provisions as the Executive Officer determines appropriate for the control of pollutants, to control/reduce the discharge of pollutants to waters of the United States to the maximum extent practicable. The BMPs so developed, along with a time schedule for implementation, shall be submitted for the approval and/or modification by the Executive Officer of the Regional Board. In developing the best management practices, the permittees shall consider the water quality objectives of all the receiving water bodies.

C. The permittees shall ensure that BMPs are implemented for entities discharging stormwater and urban runoff to stormwater conveyance systems within their area of jurisdiction.

IV. COMPILATION AND SUBMITTAL OF EXISTING DATA

A. Runoff Quality/Quantity

1. The permittees shall collectively submit all quantitative information, generated since 1980, on stormwater discharges to the stormwater conveyance systems. Historical averages and extremes of the collected data shall also be submitted. This information will be used to facilitate the identification of sources of pollutants present in the stormwater discharges and to develop an effective discharge monitoring program for this Order. Information to be submitted shall include the following:

a. Analytical and flow data for stormwater samples collected from the stormwater conveyance system outfalls, and within any waters of the United States;
b. Precipitation data from the precipitation stations and the duration of the storm events (if available);

c. Discharge data from the stormwater conveyance systems as determined from the gauging stations;

d. Analysis of the data and the major pollutants identified in the stormwater discharges from each drainage area to each receiving water and a determination whether the identified pollutants came from non-point source or point-source discharges.

B. System/Drainage Area Characterization

1. The permittees shall submit information to the Regional Board for identification and characterization of the sources of pollutants in the stormwater discharges. Descriptive information, such as land use in Orange County, and an overall map of the drainage system showing major features shall be submitted. In addition, the following information shall be provided:

a. Identification of the drainage areas more than 50 acres in size, that discharge stormwater and urban runoff to the stormwater conveyance systems and of those drainage areas that discharge to stormwater conveyance systems with pipe diameters greater than 36 inches;

b. The sizes of these drainage areas (acreage) and the sizes (pipe diameters or approximate dimensions of the stormwater conveyance systems) and physical characteristics of the stormwater conveyance systems. These physical characteristics shall include, but not be limited to, whether the stormwater conveyance system is lined or unlined and whether it has intermittent or continuous flow;

c. The names, locations, and Standard Industrial Codes (SIC) of specific industrial sources and principal land use activities in each drainage area, identified in IV B.1.a. above, discharging to the stormwater conveyance systems. An estimate of the runoff coefficient for these drainage areas shall also be provided;

d. The locations of present stormwater conveyance systems discharging to waters of the United States. The name of each receiving water shall be reported and the location of each

outfall shall be indicated on a map; and

e. The locations of major structural controls for stormwater discharge (e.g. retention basins, detention basins, etc).

C. Illegal Connections

1. The permittees shall provide a list of dischargers (permitted and unpermitted) known to exist currently who discharge process or non-process wastewater to the stormwater conveyance systems and any existing information pertaining to illegal dumping of pollutants in stormwater conveyance systems. The permittees shall also provide any existing procedures used for detecting illegal connections to the stormwater conveyance systems, the rationale for the procedures, and the drainage areas (or cities) in which these programs are practiced; and

2. A description of the present and historical use of ordinances or other controls to prohibit and/or limit the non-stormwater discharges to stormwater conveyance systems.

D. Stormwater Management Program

1. A description of existing stormwater/urban runoff management programs and structural and non-structural BMPs implemented by the permittees.

E. Stormwater/Urban Runoff Monitoring Program

1. A description of the existing monitoring programs and the rationale for their selection.

F. Pollutant Information

1. The permittees shall provide information regarding the discharge of any pollutant required under 40 CFR 122.21(g)(7)(iii) and (iv).

G. Other Pertinent Existing Information

1. The permittees shall provide to the Regional Board any other existing information that is pertinent to this permit.

V. RECONNAISSANCE SURVEY

A. The permittees shall submit information from a reconnaissance survey to be conducted at the stormwater conveyance systems. The purpose of the survey is to identify illegal/illicit non-stormwater discharges to the stormwater conveyance system, illicit disposal practices, or other practices which impair water quality as a result of stormwater/urban runoff discharges to receiving waters. The reconnaissance survey field manual and implementation plan developed for prosecuting violators and eliminating illegal discharges, along with time schedules for implementation, shall be submitted for the approval of the Executive Officer of the Regional Board. The information shall include, but need not be limited to, the following:

1. By January 31, 1991, a proposed reconnaissance survey field manual;

2. By July 31, 1991, the permittees shall submit a progress report towards compliance with the implementation of a reconnaissance survey in accordance with the field manual;

3. By January 31, 1992, the following information shall be submitted:

   a. Results of the reconnaissance survey including an analysis of the results;

   b. Additional information that would lead to isolating and identifying sources of illegal connections and discharges to the stormwater conveyance systems. Such information should include, but is not limited to, visual observations (e.g. color, turbidity, odor, etc), major land use activities in the surrounding drainage areas; seasonal change of flow, the surrounding hydrogeologic formation, etc.;

   c. A listing of any identified or suspected illegal non-stormwater dischargers including the names, locations, and types of the facilities and the names of the stormwater conveyance systems and receiving waters the illegal non-stormwater discharges are discharged to;

d. A listing of large industrial facilities (with more than 100 employees) where hazardous/toxic substances are stored and/or used, landfills, hazardous waste disposal, treatment, and/or recovery facilities, and any known spills, leaks or other problems in the area;

e. A proposed implementation plan, including a tentative time schedule, to prosecute violators and eliminate such discharges to the stormwater conveyance systems; and

f. Legal authorities cited to prosecute violators and eliminate or control illicit disposal practices and illegal discharges to the stormwater conveyance system.

B. By January 31 of every year, the permittees shall submit a progress report showing evidence of plan implementation to detect and eliminate illegal discharges to the stormwater conveyance systems and the resulting reduction in loadings of pollutants to waters of the United States. The first progress report is due January 31, 1993.

C. The permittees shall effectively eliminate all identified illegal/illicit discharges in the shortest time practicable, and in no case later July 16, 1995. Those identified after July 16, 1995 shall be eliminated in the shortest time practicable. The following discharges shall not be considered illegal/illicit discharges provided the discharges do not cause or contribute to violations of water quality standards and are not significant contributors of pollutants to waters of the United States: discharges composed entirely of stormwater, discharges covered under an NPDES permit, discharges to storm water conveyance systems from potable water line flushing, fire fighting, landscape irrigation, diverted stream flows, rising groundwaters (not including active dewatering systems), groundwater infiltration as defined at 40 CFR 35.2005(20), discharges from potable water sources, passive foundation drains (not including active groundwater dewatering), air conditioning condensation, irrigation water, water from crawl space pumps, passive footing drains (not including active groundwater dewatering systems), lawn watering, individual residential vehicle washing, flows from riparian habitats and wetlands, dechlorinated swimming pool discharges, street wash

waters related to cleaning and maintenance by permittees, or waters not otherwise containing wastes as defined in California Water Code Section 13050(d). If it is determined that any of the preceding discharges cause or contribute to violations of water quality standards or are significant contributors of pollutants to waters of the United States, the discharges shall be prohibited from entering stormwater conveyance systems.

VI. DRAINAGE AREA MANAGEMENT PROGRAM

A. The permittees shall develop and implement best management practices (BMPs) to control the discharge of pollutants to waters of the United States. The permittees shall submit information pertaining to the proposed management programs for control of pollutants in stormwater and urban runoff discharges. The information shall include, but not be limited to, the following:

1. A brief description of the existing BMPs and stormwater management programs;

2. Proposed modifications to the existing BMPs and stormwater/urban runoff management programs to reduce pollutants in stormwater and urban runoff discharges from industrial, commercial, and residential properties to the maximum extent practicable. At a minimum, the following should be considered in developing the BMPs:

Structural Controls

a. Structural controls such as first flush diversion, detention/retention basins, infiltration trenches/basins, porous pavement, oil/grease separators, grass swales, etc. Engineering and design modification of the existing structures should also be considered.

Non-structural Controls

a. Education programs to educate the public on proper disposal of hazardous/toxic wastes. These may include public workshops, meetings, notifications by mail, collection programs for household hazardous wastes, etc.;

b. Management practices such as street sweeping, proper maintenance of streambanks, erosion control structures, etc.;

c. Regulatory approaches such as county and local ordinances, permitting of construction sites, etc.;

d. An enforcement program, established by the county and cities, responses to both emergency incidents and field inspections; and

e. The ongoing program required in Item No. V. above for the detection and elimination of illicit connections and controlling/eliminating illegal dumping of pollutants into storm drain systems.

3. Implementation plans for site-specific BMPs which are required to reduce pollutants in the stormwater discharges from residential, commercial and industrial areas, and construction sites;

a. New Construction Sites

A full range of structural and non-structural BMPs shall be required at new construction sites. All industrial /commercial construction operations that result in a disturbance of one acre or more of total land area (or a smaller parcel of land which is a part of a larger common development) and residential construction sites that result in a disturbance of five acres or more of total land area (or a smaller parcel of land which is a part of a larger common development) shall be required to develop and implement BMPs to control erosion/siltation and contaminated runoff from the construction site.

b. Residential and Commercial/Industrial Sites

To prevent the increase of pollutants in the stormwater discharge, all new developments and existing facilities with significant redevelopment, after the construction is completed, are required to develop individual long-term comprehensive stormwater management plans.

4. A description of the legal authorities for implementing the programs, and a proposed time schedule for obtaining such legal authorities, if necessary;

5. A description of staff, equipment, and funds available to implement the programs;

B. By July 31, 1991, the BMPs so developed, along with a time schedule for implementation, shall be submitted for the approval of and modification by the Executive Officer of the Regional Board;

C. By July 31 of every year, the permittees shall submit a progress report assessing the reduction of pollutants discharged to waters of the United States and to evaluate the effectiveness of the BMPs developed for stormwater and urban runoff discharges. The permittees shall also include recommended BMPs modifications, with a time schedule for implementation, to achieve compliance with any water quality objective not attained. The first progress report is due July 31, 1992.

VII. STORMWATER RUNOFF MONITORING PROGRAM

The permittees shall develop and implement (after approval of the plan by the Executive Officer) a stormwater/urban runoff monitoring program. Proposed monitoring programs and time schedules for their implementation shall be subject to the approval of the Executive Officer. Proposed monitoring programs, time schedules, and implementation reports shall be submitted to the principal permittee in sufficient time to submit a collated report to the Regional Board as follows:

STORMWATER/RUNOFF MONITORING

TASK	REPORT DATE
Submittal of Proposed Stormwater Monitoring Programs and Implementation Time Schedules	11/30/90
Progress Report on the Implementation of the Stormwater Monitoring Programs	11/30/91*

* and annually thereafter

VIII. RECEIVING WATER MONITORING PROGRAM

The permittees shall develop and implement (after approval of the plan by the Executive Officer) a receiving water monitoring program. Proposed monitoring programs and time

schedules for their implementation shall be subject to the approval of the Executive Officer. Proposed monitoring programs, time schedules, and implementation reports shall be submitted to the principal permittee in sufficient time to submit a collated report to the Regional Board as follows:

RECEIVING WATER MONITORING

TASK	REPORT DATE
Submittal of Proposed Receiving Water Monitoring Programs and Implementation Time Schedules	7/31/92
Progress Report on the Implementation of the Receiving Water Monitoring Programs	7/31/93*

* and annually thereafter

IX. FISCAL ANALYSIS

A. By July 31 of each year, a fiscal analysis of the capital and operation and maintenance expenditures necessary to accomplish the activities of the proposed plans and programs shall be performed and submitted to the Executive Officer of the Regional Board.

X. DATA ANALYSIS

The results of the chemical analysis and quantitative data (such as flow, precipitation, and water level data) shall be compiled for each sampling of any drainage area, storm event, and for different times during the same storm event. The mass loading rates for the pollutants of concern shall be calculated and any impact of the stormwater/urban runoff discharge on the receiving waters shall be discussed, starting with the most significantly impacted receiving waters.

XI. PROGRAM ANALYSIS

Every year, starting from January 1991, the principal permittee shall conduct an analysis of the effectiveness of the overall stormwater management program. If the water quality objectives of the receiving waters are violated as a result of stormwater/urban runoff discharges, the principal permittee shall identify proposed programs which will result in the attainment of the water quality objectives, and a time schedule to implement the new programs.

XII. IMPLEMENTATION AGREEMENT

A signed copy of the Implementation Agreement between the County of Orange and the cities shall be submitted by January 31, 1991. Any revisions to the Implementation Agreement shall be forwarded to the Executive Officer within 30 days of approval by all the permittees.

XIII. REPORTING AND SCHEDULE

A. A summary of tasks to be completed and reports submitted is as follows:

(continued on the next page)

TASK		COMPLIANCE REPORT DUE
VII.	Stormwater Monitoring Program Plan	11/30/90
XII.	Implementation Agreement	01/31/91
IV.	Existing reports and programs	01/31/91
V.A.1	Proposed Reconnaissance Survey Field Manual	01/31/91
V.A.2	Reconnaissance Progress Report	07/31/91
VI.A&B	Management Programs (BMPs) and Implementation Plan	07/31/91
V.A.3	Results of the Reconnaissance Survey	01/31/92
VIII.	Receiving Water Monitoring Program Plan	07/31/92
	Progress Reports after Plan Implementation	
V.B	Reconnaissance Survey Progress Report	01/31 of every year[2]
VI.C	Management Programs Progress Report	07/31 of every year[3]
VII.	Stormwater Monitoring Progress Report	11/30 of every year[4]
VIII.	Receiving Water Monitoring Program Progress Report	07/31 of every year[5]
IX.	Fiscal Analysis	07/31 of every year[6]
X. & XI.	Data/Program Analysis	01/31 of every year[7]

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[2] The first progress report is due by January 31, 1993.

[3] The first progress report is due by July 31, 1992.

[4] The first progress report is due by November 30, 1991.

[5] The first progress report is due by July 31, 1993.

[6] The first annual fiscal analysis is due by July 31, 1991.

[7] The first data/program analysis is due by January 31, 1991.

B. All reports and information required herein shall be submitted to the Executive Officer of the Regional Board and the Regional Director of the Environmental Protection Agency, Region IX, at the following addresses:

Executive Officer
California Regional Water Quality Control Board
San Diego Region
9771 Clairemont Mesa Blvd., Ste. B
San Diego, California 92124-1331

Environmental Protection Agency
Region IX
Permits and Compliance Branch
1235 Mission Street (Mail Code W-5)
San Francisco, California 94103

XIV. ANALYTICAL METHODS/RECORD KEEPING

A. Samples and measurements taken as required herein shall be representative of the volume and nature of the monitored discharge. Once established, monitoring points shall not be changed without notification to and the approval of the Executive Officer.

B. Monitoring must be conducted according to United States Environmental Protection Agency test procedures approved under Title 40, Code of Federal Regulations (CFR), Part 136, "Guidelines Establishing Test Procedures for Analysis of Pollutants Under the Clean Water Act" as amended, unless other test procedures have been specified by this Order or the Executive Officer.

C. All analyses shall be performed in a laboratory certified to perform such analyses by the California Department of Health Services or a laboratory approved by the Executive Officer.

D. Monitoring results must be reported on discharge monitoring report forms or in a format approved by the Executive Officer.

E. If a permittee monitors any pollutant more frequently than required by this Order, using test procedures approved under 40 CFR, Part 136, or as specified in this Order, the results of this monitoring shall be included in the calculation and reporting of the data submitted in the permittee's monitoring report. The increased frequency of monitoring shall also be reported.

F. Permittees shall retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this Order, and records of all data used to complete the application for this Order. Records shall be maintained for a minimum of five years from the date of the sample, measurement, report, or application. This period may be extended during the course of any unresolved litigation regarding this discharge or when requested by the Regional Board Executive Officer.

G. Records of monitoring information shall include:

1. The date, exact place, and time of sampling or measurements;
2. The individual(s) who performed the sampling or measurements;
3. The date(s) analyses were performed;
4. The individual(s) who performed analyses;
5. The analytical techniques or method used; and
6. The results of such analyses.

H. Calculations for all limitations which require averaging of measurements shall utilize an arithmetic mean unless otherwise specified by the Executive Officer or in this Order.

I. All monitoring instruments and devices used by a permittee to fulfill the prescribed monitoring program shall be properly maintained and calibrated as necessary to ensure their continued accuracy.

J. Permittees shall report all instances of noncompliance not reported under Standard Reporting Requirement XVI. E. of this Order at the time monitoring reports are submitted. The reports shall contain the information listed in Standard Reporting Requirement XVI. E.

K. The monitoring reports shall be signed by an authorized person as required by Standard Reporting Requirement L.

L. A composite sample is defined as a combination of at least 8 sample aliquots of at least 100 milliliters each, collected at periodic intervals during the operating hours of a facility over a 24-hour period. For volatile pollutants, aliquots must be combined in the laboratory immediately before analysis. The composite must be flow proportional; either the time interval between each aliquot or the volume of each

aliquot must be proportional to either the stream flow at the time of sampling or the total stream flow since the collection of the previous aliquot. Aliquots may be collected manually or automatically.

M. A grab sample is an individual sample of at least 100 milliliters collected at a randomly selected time over a period not exceeding 15 minutes.

XV. PROVISIONS

A. Neither the treatment nor the discharge of pollutants shall create a pollution, contamination, or nuisance as defined by Section 13050 of the California Water Code.

B. The permittees must comply with all conditions of this Order. Any permit noncompliance constitutes a violation of the Clean Water Act and the California Water Code and is grounds for enforcement action; for permit termination, revocation and reissuance, or modification; the issuance of an individual permit; or for denial of a renewal application.

C. The permittees shall take all reasonable steps to minimize or correct any adverse impact on the environment resulting from noncompliance with this Order, including such accelerated or additional monitoring as may be necessary to determine the nature and impact of the noncomplying discharge.

D. This Order may be modified, revoked and reissued, or terminated for cause including, but not limited to, the following:

1. Violation of any terms or conditions of this Order;

2. Obtaining this Order by misrepresentation or failure to disclose fully all relevant facts; or

3. A change in any condition that requires either a temporary or permanent reduction or elimination of the discharge.

The filing of a request by a permittee for modification, revocation and reissuance, or termination of this Order or a notification of planned change in or anticipated noncompliance with this Order does not stay any condition of this Order.

E. In addition to any other grounds specified herein, this Order shall be modified or revoked at any time if, on

the basis of any new data, the Executive Officer determines that continued discharges may cause unreasonable degradation of the aquatic environment.

F. This Order is not transferable to any person except after notice to the Executive Officer of this Regional Board. The Regional Board may require a new report of waste discharge to change the name of a permittee and incorporate such other requirements as may be necessary under the California Water Code and the Clean Water Act. A permittee shall submit notice of any transfer of this Order's responsibility and coverage to a new permittee as described under Standard Reporting Requirement XVI.C.

G. This Order does not convey any property rights of any sort or any exclusive privileges. The requirements prescribed herein do not authorize the commission of any act causing injury to persons or property of another, including property damage caused as a result of the discharge, nor protect the permittee from liability under federal, state, or local laws, nor create a vested right for the permittee to continue the discharge.

H. Permittees shall allow the Regional Board, or an authorized representative or any representative of the United States Environmental Protection Agency upon the presentation of credentials and other documents as may be required by law, to:

1. Enter upon the permittee's premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of this Order;

2. Have access to and copy, at reasonable times, any records that must be kept under the conditions of this Order;

3. Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices or operation regulated or required under this Order; and

4. Sample or monitor at reasonable times, for the purposes of assuring compliance with this Order or as otherwise authorized by the Clean Water Act or California Water Code, any substances or parameters at any location.

I. Permittees shall, at all times, properly operate and maintain all facilities and systems of treatment and

control (and related appurtenances) which are installed or used by a permittee to achieve compliance with the conditions of this Order. Proper operation and maintenance includes effective performance, adequate funding, adequate operator staffing and training, and adequate laboratory and process controls including appropriate quality assurance procedures. This provision requires the operation of backup or auxiliary facilities or similar systems only when necessary to achieve compliance with the conditions of this Order.

J. In an enforcement action, it shall not be a defense for a permittee that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with this Order. Upon reduction, loss, or failure of the treatment facility, the permittee shall, to the extent necessary to maintain compliance with this Order, control production or all discharges, or both, until the facility is restored or an alternative method of treatment is provided. This provision applies, for example, when the primary source of power of the treatment facility fails, is reduced or is lost.

K. The provisions of this Order are severable, and if any provision of this Order, or the application of any provision of this Order to any circumstances, is held invalid, the application of such provision to other circumstances, and the remainder of this Order, shall not be affected thereby.

L. Bypass of Treatment Facilities

1. <u>Definitions</u>

(a) "Bypass" means the intentional diversion of waste streams from any portion of the treatment facility.

(b) "Severe property damage" means substantial physical damage to property, damage to the treatment facilities which cause them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production.

2. <u>Bypass Not Exceeding Effluent Limitations</u>

A permittee may allow any bypass to occur which does not cause effluent limitations to be exceeded, but only if it also is for essential maintenance to

assure efficient operations. These bypasses are not subject to the provisions of paragraphs (3) and (4) of this section.

3. Notice of Anticipated Bypass and Unanticipated Bypass

(a) Anticipated bypass. If a permittee knows in advance of the need for a bypass, they shall submit prior notice, if possible, at least ten days before the date of the bypass.

(b) Unanticipated bypass. A permittee shall submit notice of an unanticipated bypass as described under Standard Reporting Requirement XVI. E.

4. Prohibition of Bypass

(a) Bypass is prohibited and the Regional Board may take enforcement action against a permittee for bypass, unless:

(1) Bypass was unavoidable to prevent loss of life, personal injury, or severe property damage;

(2) There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated waste, or maintenance during normal periods of equipment downtime. This condition is not satisfied if the permittee could have installed adequate backup equipment to prevent a bypass which occurred during normal periods of equipment downtime or preventive maintenance; and

(3) The permittee submitted notices as required under paragraph (3) of this section.

(b) The Executive Officer may approve an anticipated bypass, after considering its adverse effect, if the Executive Officer determines that it will meet the three conditions listed above in paragraph (1) of this section.

M. Upset Conditions

1. Definitions

"Upset" means an exceptional incident in which there is unintentional and temporary noncompliance with technology-based effluent limitations because of factors beyond the reasonable control of a permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation.

2. Effect of an Upset

An upset constitutes an affirmative defense to an action brought for noncompliance with such technology-based permit effluent limitations if the requirements of paragraph (3) of this section are met. No determination made during administrative review of claims that noncompliance was caused by upset, and before an action for noncompliance, is final administrative action subject to judicial review.

3. Conditions Necessary for a Demonstration of Upset

A permittee who wishes to establish the affirmative defense of upset shall demonstrate, through properly signed, contemporaneous operating logs, or other relevant evidence that:

(a) An upset occurred and that the permittee can identify the specific cause(s) of the upset;

(b) The permitted facility was at the time being properly operated; and

(c) The permittee submitted notice of the upset as required in Standard Reporting Requirement XVI. E.

4. Burden of Proof

In any enforcement proceeding, a permittee seeking to establish the occurrence of an upset has the

burden of proof.

XVI. STANDARD REPORTING REQUIREMENTS

A. A new Report of Waste Discharge shall be filed with the Regional Board not less than 180 days prior to the following:

1. Significant change in disposal method (e.g., change in the method of treatment which would significantly alter the nature of the waste).

2. Significant change in disposal area (e.g., moving the discharge to a disposal area significantly removed from the original area, potentially causing different water quality or nuisance problems).

3. Other circumstances which result in a material change in character, amount, or location of the waste discharge.

B. A permittee shall give advance notice to the Executive Officer of any planned changes in a permitted facility or activity which may result in noncompliance with the requirements of this Order.

C. A permittee must notify the Executive Officer, in writing, at least 30 days in advance of any proposed transfer of this Order's responsibility and coverage to a new permittee. The notice must include a written agreement between the existing and new permittee containing a specific date for the transfer of this Order's responsibility and coverage between the current permittee and the new permittee. This agreement shall include an acknowledgement that the existing permittee is liable for violations up to the transfer date and that the new permittee is liable from the transfer date on.

D. The permittees shall comply with any monitoring and reporting requirements contained in this Order and any additional monitoring requirements specified by the Executive Officer.

E. A permittee shall report any noncompliance which may endanger health or the environment. Any information shall be provided orally to the Executive Officer within 24 hours from the time the permittee becomes aware of the circumstances. A written submission shall contain a description of the noncompliance and its cause; the period of noncompliance, including exact dates and

times, and if the noncompliance has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent recurrence of the noncompliance. The Executive Officer, or an authorized representative may waive the written report on a case-by-case basis if the oral report has been received within 24 hours.

F. A permittee shall notify the Executive Officer as soon as it is known or there is reason to believe:

1. That any activity has occurred or which will occur which would result in the discharge of any toxic pollutant which is not limited in this Order, if that discharge will exceed the highest of the following "notification levels":

a. One hundred micrograms per liter (100 ug/L);

b. Two hundred micrograms per liter (200 ug/L) for acrolein and acrylonitrile; five hundred micrograms per liter (500 ug/L) for 2.4-dinitrophenol and for 2-methyl-4, 6-dinitrophenol; and one milligram per liter (1 mg/L) for antimony.

G. A permittee shall furnish to the Executive Officer, within a reasonable time, any information which the Executive Officer may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this Order or to determine compliance with this Order or other requirements established by the Executive Officer. A permittee shall also furnish to the Executive Officer, upon request, copies of records required to be kept by this Order.

H. A permittee shall provide adequate notice to the Executive Officer of the following:

1. Any new introduction of pollutants to the discharge.

2. Any substantial change in the volume or character of pollutants being introduced into the discharge.

3. For the purpose of this provision, adequate notice shall include information on (a) the quality and quantity of waste introduced into the discharge, and (2) any anticipated impact of the change on the quantity or quality of runoff to be discharged to surface waters.

I. Where a permittee becomes aware that he failed to submit any relevant facts in a Report of Waste Discharge, or submitted incorrect information in a Report of Waste Discharge, or in any report to the Regional Board, he shall promptly submit such facts or information.

J. If a need for a discharge bypass is known in advance, the permittee shall submit prior notice and, if at all possible, such notice shall be submitted at least ten days prior to the date of the bypass.

K. This Order expires on July 16, 1995. The permittees must jointly file a Report of Waste Discharge in accordance with Title 23, Chapter 3, Subchapter 9 of the California Code of Regulations not later than 180 days in advance of such expiration date as application for issuance of new waste discharge requirements. This report of waste discharge shall include as a minimum, the following:

1. Summary of the results of the monitoring program.

2. Summary of BMPs implemented and evaluations of their effectiveness.

3. Summary of procedures implemented to detect illegal discharges and illicit disposal practices and an evaluation of their effectiveness.

4. Summary of measures implemented to control pollutants in surface runoff from construction sites and an evaluation of their effectiveness.

5. Evaluation of the need for additional BMPs, source control, and/or structural control measures.

6. Proposed plan of stormwater/urban runoff quality management activities that will be undertaken during the term of the next permit.

L. All applications, reports, or information submitted to the Executive Officer of this Regional Board shall be signed and certified.

1. The Report of Waste Discharge shall be signed as follows:

a. **For a corporation** - by a principal executive officer of at least the level of vice-president.

b. **For a partnership or sole proprietorship** - by a general partner or the proprietor, respectively.

c. **For a municipality, state, federal or other public agency** - by either a principal executive officer or ranking elected official.

2. All other reports required by this Order and other information requested by the Executive Officer shall be signed by a person designated in paragraph (1) of this provision, or by a duly authorized representative of that person. An individual is a duly authorized representative only if:

a. The authorization is made in writing by a person described in paragraph (1) of this provision;

b. The authorization specified either an individual or a position having responsibility for the overall operation of the regulated facility or activity, such as the position of plant manager, operator of a well or well field, superintendent, or position of equivalent responsibility (a duly authorized representative may thus be either a named individual or any individual occupying a named position); and

c. The written authorization is submitted to the Executive Officer.

3. Any person signing a document under this Section shall make the following certification:

> "I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment."

M. Except for data determined to be confidential under Title 40, Code of Federal Regulations Part (40 CFR Part

2), all reports prepared in accordance with the terms of this Order shall be available for public inspection at the offices of the California Regional Water Quality Control Board, San Diego Region and the United States Environmental Protection Agency, Region 9. As required by the Clean Water Act, Reports of Waste Discharge, this Order, and effluent data shall not be considered confidential.

XVII. NOTIFICATIONS

A. California Water Code Section 13263(g) states:

> "No discharge of waste into the waters of the state, whether or not such discharge is made pursuant to waste discharge requirements, shall create a vested right to continue such discharge. All discharges of waste into waters of the state are privileges, not rights."

B. The Clean Water Act provides that any person who violates a condition of this Order implementing Sections 301, 302, 306, 307, 308, 318 or 405 of the Clean Water Act is subject to a civil penalty not to exceed $10,000 per day of such violations. Any person who willfully or negligently violates conditions of this Order implementing Section 301, 302, 306, 307 or 308 of the Clean Water Act is subject to a fine of not less than $2,500 nor more than $25,000 per day of violation, or by imprisonment for not more than one year, or both.

C. The Clean Water Act provides that any person who knowingly makes any false statement, representation, or certification in any record or other document submitted or required to be maintained under this Order, including monitoring reports or reports of compliance or noncompliance shall, upon conviction, be punished by a fine of not more than $10,000 per violation, or by imprisonment for not more than six months per violation, or by both.

D. Nothing in this Order shall be construed to relieve a permittee from civil or criminal penalties for noncompliance.

E. Nothing in this Order shall be construed to preclude the institution of any legal action or relieve a permittee from any responsibilities, liabilities, or penalties to which a permittee is or may be subject to under Section 311 of the Clean Water Act.

F. Nothing in this Order shall be construed to preclude institution of any legal action or relieve a permittee from any responsibilities, liabilities, or penalties established pursuant to any applicable State law or regulation under authority preserved by Section 510 of the Clean Water Act.

G. This Order shall become effective ten days after the date of its adoption, provided the Regional Administrator or Director, United States Environmental Protection Agency, has no objection. If the Regional Administrator objects to its issuance, this Order shall not become effective until such objection is withdrawn.

I, Arthur L. Coe, Executive Officer, do hereby certify the foregoing is a full, true, and correct copy of an Order adopted by the California Regional Water Quality Control Board, San Diego Region, on July 16, 1990.

ARTHUR L. COE
Executive Officer

ATTACHMENT A TO ORDER NO. 90-38

PERMITTEES IN THE ORANGE COUNTY AREA OF THE SAN DIEGO REGION AND THEIR 1990 POPULATION ESTIMATES

Dana Point	29,691
Laguna Beach	24,406
Laguna Niguel	36,787
Mission Viejo	80,791
San Clemente	38,635
San Juan Capistrano	26,429
Unincorporated Area (County of Orange)	100,145
total	336,884

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN DIEGO REGION

ADDENDUM NO. 2 TO ORDER NO. 90-38
NPDES PERMIT NO. CA0108740

AN ADDENDUM MODIFYING RESPONSIBILITY FOR
ORDER NO. 90-38 TO INCLUDE THE CITY OF LAGUNA HILLS
AS AN INCORPORATED CITY OF ORANGE COUNTY
WITHIN THE SAN DIEGO REGION

The California Regional Water Quality Control Board, San Diego Region (hereinafter Regional Board), finds that:

1. On July 16, 1990, this Regional Board adopted Order No. 90-38 (NPDES Permit No. CA0108740), **Waste Discharge Requirements for Stormwater and Urban Runoff from the County of Orange, the Orange County Flood Control District, and the Incorporated Cities of Orange County within the San Diego Region.** Order No. 90-38 prescribes requirements for the control of pollutants in stormwater/urban runoff from all incorporated cities and the unincorporated urban areas in Orange County within the jurisdiction of the Regional Board.

2. By letter dated July 23, 1992, (received May 5, 1993) Robert F. Wingard, Director of Regulation, Environmental Management Agency, County of Orange, notified the Regional Board that the City of Laguna Hills is now one of the incorporated cities of Orange County within the San Diego Region.

3. The Regional Board has notified all known interested parties of its intent to modify Order No. 90-38 to reflect the addition of the City of Laguna Hills as one of the parties responsible for complying with Order No. 90-38.

4. The Regional Board in a public hearing heard and considered all comments pertaining to the modification of Order No. 90-38.

IT IS HEREBY ORDERED THAT Order No. 90-38 is modified to reflect that the City of Laguna Hills is one of the incorporated cities of Orange County within the San Diego Region. As such, the City of Laguna Hills is one of the parties responsible for compliance with Order No. 90-38.

I, Arthur L. Coe, Executive Officer, do hereby certify the foregoing is a full, true, and correct copy of an Addendum adopted by the California Regional Water Quality Control Board, San Diego Region, on May 17, 1993.

Arthur L. Coe
Executive Officer

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN DIEGO REGION

ADDENDUM NO. 1 TO ORDER NO. 90-38
NPDES PERMIT NO. CA0108740

AN ADDENDUM MODIFYING RESPONSIBILITY FOR
ORDER NO. 90-38 TO INCLUDE THE CITY OF LAKE FOREST
AS AN INCORPORATED CITY OF ORANGE COUNTY
WITHIN THE SAN DIEGO REGION

The California Regional Water Quality Control Board, San Diego Region (hereinafter Regional Board), finds that:

1. On July 16, 1990, this Regional Board adopted Order No. 90-38 (NPDES Permit No. CA0108740), **Waste Discharge Requirements for Stormwater and Urban Runoff from the County of Orange, the Orange County Flood Control District, and the Incorporated Cities of Orange County within the San Diego Region.** Order No. 90-38 prescribes requirements for the control of pollutants resulting from stormwater/urban runoff from all incorporated cities and the unincorporated urban areas in Orange County within the jurisdiction of the Regional Board.

2. By letter dated May 7, 1992, Robert F. Wingard, Director of Regulation, Environmental Management Agency, County of Orange, notified the Regional Board that the City of Lake Forest is now one of the incorporated cities of Orange County within the San Diego Region.

3. The Regional Board has notified all known interested parties of its intent to modify Order No. 90-38 to reflect the addition of the City of Lake Forest as one of the parties responsible for complying with Order No. 90-38.

4. The Regional Board in a public hearing heard and considered all comments pertaining to the modification of Order No. 90-38.

IT IS HEREBY ORDERED THAT Order No. 90-38 is modified to reflect that the City of Lake Forest is one of the incorporated cities of Orange County within the San Diego Region. As such, the City of Lake Forest is one of the parties responsible for compliance with Order No. 90-38.

I, Arthur L. Coe, Executive Officer, do hereby certify the foregoing is a full, true, and correct copy of an Addendum adopted by the California Regional Water Quality Control Board, San Diego Region, on September 21, 1992.

Arthur L. Coe
Executive Officer

California Regional Water Quality Control Board
San Diego Region

ORDER NO. 90-46
NPDES No. CA 0108766

Waste Discharge Requirements
for
Stormwater and Urban Runoff
from the
Riverside County Flood Control & Water Conservation District
the
County of Riverside
and the
Incorporated Cities[1] of Riverside County Within the San Diego Region

The California Regional Water Quality Control Board, San Diego Region (hereinafter Regional Board), finds that:

1. On June 8, 1990, the Riverside County Flood Control and Water Conservation District (RCFC&WCD), anticipating cooperation from the incorporated city of Temecula and the County of Riverside (hereinafter collectively referred to as "permittees"), submitted a letter in application for a National Pollutant Discharge Elimination System (NPDES) permit for stormwater discharges to waters within the jurisdiction of the San Diego Regional Board. This Order names the RCFC&WCD the "principal permittee" and the County of Riverside and the City of Temecula "co-permittees."

2. Section 405 of the Water Quality Act (WQA) of 1987 added Section 402(p) to the Clean Water Act (CWA). Pursuant to Section 402(p)(4) of the CWA, the EPA is required to promulgate regulations for NPDES permit applications for stormwater discharges associated municipal separate stormwater conveyance systems serving a population of 100,000 or more. Section 402 (p)(4) of the CWA also requires dischargers of stormwater associated with industrial activities and municipal separate stormwater conveyance systems serving a population of 250,000 or more to file stormwater permit applications by February 4, 1990.

3. On December 7, 1988, the EPA published its proposed regulations in the Federal Register to solicit public comments. Final regulations are tentatively scheduled to be promulgated on July 20, 1990. In the absence of final stormwater regulations, this Order governing municipal stormwater discharges meets both the statutory requirements of Section 402 (p)(3)(B) and all

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[1] Currently includes only the City of Temecula.

requirements applicable to an NPDES permit issued under this Regional Board's discretionary authority.

4. Water quality studies in many urban areas have shown that urban runoff typically contains significant quantities of pollutants. Water quality may be adversely impacted by stormwater discharges and urban runoff. A comprehensive stormwater and urban runoff management and regulation program is essential for the protection of water resources. The RCFC&WCD and the co-permittees will develop a comprehensive stormwater/urban runoff management program. This order requires the RCFC&WCD and the incorporated cities to submit documentation on existing runoff pollution control programs and specifies additional requirements towards achieving the water quality objectives for surface waters in the San Diego Region. The intent of this permit is to improve water quality of receiving waters under the jurisdiction of the Regional Board.

5. The discharges consist of surface runoff generated from various land uses and activities in all the hydrologic drainage areas which discharge into receiving waters within the area of jurisdiction of the Regional Board. The quality of these discharges varies considerably and is affected by land use, basin hydrology and geology, season, the frequency and duration of storm events, the presence of illicit connections and discharges, and waste management and disposal practices. The parameters and pollutants of potential concern and significance in these discharges may include, but are not limited to, pH, fecal coliform, fecal streptococcus, enterococcus, volatile organic carbon (VOC), surfactants (MBAS), oil and grease, petroleum hydrocarbons, total suspended and settleable solids, total organic carbon, biochemical oxygen demand (BOD), chemical oxygen demand (COD), lead, copper, chromium, cadmium, silver, nickel, zinc, cyanides, phenols, nutrients (e.g., nitrogen, nitrate, phosphate, etc.), and biocides. Since stormwater and urban runoff contains "waste", as defined in California Water Code (CWC) Section 13050, stormwater and urban runoff discharges constitute discharges of waste. Consequently such discharges are subject to CWC Section 13260 et seq., as well as Section 402 of the Clean Water Act, as amended.

6. The RCFC&WCD has jurisdiction over a large portion of the flood control facilities and has agreed to be the major responsible party in implementing the provisions of this Order. This Order names the RCFC&WCD the "principal permittee" and the County of Riverside and City of Temecula as the "co-permittees". Collectively the

principal permittee and co-permittees are referred to as "permittees."

7. The RCFC&WCD, as the "principal permittee", will obtain the cooperation of all entities in implementing the provisions of this Order. In general, the RCFC&WCD, the "principal permittee", will be responsible for preparing operating budgets, preparing and monitoring the implementation programs, and coordinating and submitting reports to the Regional Board. The "co-permittees" will develop site-specific compliance responsibilities, perform compliance monitoring and inspections, submit stormwater conveyance system maps and compliance reports to the RCFC&WCD, and demonstrate and exercise enforcement authority for achieving compliance with the terms and conditions of this Order.

8. This Order requires the permittees to develop and implement programs to ensure that entities discharging stormwater/urban runoff into stormwater conveyance systems take steps to control/reduce discharges of pollutants to waters of the United States. The Regional Board has the discretion and authority to require non-cooperating entities to participate in this area-wide permit or obtain individual waste discharge requirements if it is determined that discharges from such entities cause or contribute to a violation of a water quality standard or are significant contributors of pollutants to waters of the United States.

9. Approximately one-eighth (1/8) of the entire Riverside County area drains into receiving waters within this Regional Board's jurisdiction. A minor portion of these drainage areas is urbanized but experiencing rapid development and growth. Approximately 5/8 of the Riverside County drainage area is within the jurisdiction of the Colorado River Basin Regional Board and the remaining one-quarter (1/4) of the Riverside County drainage area is within the jurisdiction of the Santa Ana Regional Water Quality Control Board. The area under the jurisdiction of the Santa Ana Regional Water Quality Control board is currently regulated by Santa Ana Regional Board Order No. 90-104, NPDES No. 8000192, <u>Waste Discharge Requirements for the Riverside County Flood Control and Water Conservation District and the County of Riverside and Incorporated Cities within the Santa Ana Region, Areawide Urban Stormwater Runoff, Riverside County</u>. The requirements contained in this Order are patterned after Order No. 90-104 to ensure consistent regulation, pollution control practices, and monitoring and reporting requirements throughout Riverside County.

10. Stormwater discharges in the Riverside County portion of the San Diego region are tributary to various receiving waters. These receiving waters include:

Inland Surface Streams

a. Santa Margarita River
b. Murrieta Creek
c. Temecula Creek
d. Pechanga Creek
e. Cahuilla Creek
f. San Mateo Creek
g. San Juan Creek
h. Tucalota Creek

Lakes/Reservoirs

a. Skinner Lake
b. Vail Lake

Lagoons

a. Mouth of the Santa Margarita River

11. The Comprehensive Water Quality Control Plan Report, San Diego Basin (9), (Basin Plan) was adopted by this Regional Board on March 17, 1975 and subsequently approved by the State Water Resources Control Board (State Board). Subsequent revisions to the Basin Plan have also been adopted by the Regional Board and approved by the State Board.

12. The Basin Plan identifies the following beneficial uses of inland surface waters in Riverside County and the mouth of the Santa Margarita River:

a. Municipal and domestic supply;
b. Industrial service supply;
c. Industrial process supply;
d. Agriculture supply;
e. Water contact recreation;
f. Non-contact water recreation;
g. Warm fresh-water habitat;
h. Cold fresh-water habitat;
i. Preservation of rare and endangered species;
j. Wildlife habitat;and
k. Marine habitat.

13. The Basin Plan contains the following prohibitions, applicable to discharges, for inland surface waters:

"Discharge of treated or untreated sewage or industrial wastes to a natural watercourse upstream of surface storage or diversion facilities used for municipal supply is prohibited."

"Discharge of treated or untreated sewage or industrial wastewater, exclusive of cooling water or other waters which are chemically unchanged, to a watercourse, is prohibited except in cases where the quality of said discharge complies with the receiving body's water quality objectives."

"The dumping or deposition of oil, garbage, trash, or other solid municipal, industrial, or agricultural waste directly into inland waters or watercourses or adjacent to the water courses in any manner which may permit its being washed into the watercourse is prohibited."

"Land grading and similar operations causing soil disturbance which do not contain provisions to minimize soil erosion and limit suspended matter in area runoff are prohibited."

14. The requirements contained in this Order are necessary to implement the objectives of the Basin Plan for receiving waters within the region.

15. Numerical and narrative water quality standards exist for the receiving waters in the region. Due to the enormous variability in stormwater quality and quantity and the complexity of urban runoff, this Order does not contain numerical limitations for any constituents. The impact of stormwater and urban runoff discharges on water quality of receiving waters has not been fully determined. Extensive water quality monitoring and analysis of the data are essential to make that determination. This Order requires the permittees to continue to monitor the discharges and to analyze the data. This Order also requires the development and implementation of best management practices (BMPs). "BMPs" are defined in 40 CFR 122.2 as "schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the pollution of waters of the United States. BMPs also include treatment requirements, operating procedures, and practices to control plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage." For purposes of this Order, BMPs for the control of pollutants in stormwater and urban runoff may include the use of non-structural (e.g. public education, regulatory powers, urban planning,

etc.) and structural (e.g. detention basins, grass swales, runoff infiltration devices, etc.) controls which may be applied to a particular site or throughout a region (e.g., a city or throughout an area served by a stormwater conveyance system).

16. Pursuant to 40 CFR 131.12 and State Board Resolution No. 68-16, Statement of Policy with Respect to Maintaining High Quality of Waters in California (collectively "antidegradation policies"), the Regional Board shall ensure that any increase in pollutant loading to a receiving water meets the requirements stated in the foregoing policies. At a minimum, permitting actions shall be consistent with the following:

    a. Existing instream water uses and the level of water quality necessary to protect existing beneficial uses shall be maintained and protected;

    b. Where the quality of the waters exceed levels necessary to support propagation of fish, shellfish, and wildlife and recreation in and on the water, the quality shall be maintained and protected unless the State finds, after full satisfaction of the intergovernmental coordination and public participation provisions of the State's continuing planning process, that allowing lower water quality is necessary to accommodate important economic or social development in the area in which the waters are located;

    c. Where high quality waters constitute an outstanding national resource, such as waters of National and State parks and wildlife refuges and waters of exceptional recreational or ecological significance, that water quality shall be maintained and protected; and

    d. In those cases where potential water quality impairment associated with a thermal discharge is involved, the antidegradation policy and implementing method shall be consistent with Section 316 of the Clean Water Act.

17. The Regional Board, in establishing the requirements contained herein, has taken into consideration the requirements of the State and Federal "antidegradation" policies and has determined that:

    a. The conditions and requirements established in this order for discharges of stormwater/urban runoff to waters of the United States ensure that the existing

beneficial uses and quality of receiving waters will be protected and improved through the implementation of best management practices for the control of pollutants in stormwater and urban runoff;

b. Discharges of urban runoff to waters of the United States will continue regardless of the issuance of this Order. The issuance of this Order is necessary to ensure achievement and maintenance of the goals and objectives of the water quality control plans adopted by the State and will result in improvement in water quality through implementation of stormwater management programs for the control of pollutants in urban runoff;

c. No receiving waters covered under the terms and conditions of this Order have been designated an outstanding national resource water or an Area of Special Biological Significance (ASBS) by the State Water Resources Control Board; and

d. Thermal discharges potentially impairing water quality are not authorized under the terms and conditions of this Order, thus, Section 316 of the Clean Water Act is not applicable.

18. Pursuant to Section 402 of the CWA, and amendments thereto, and pursuant to Section 13260, et seq., of the California Water Code, this Order shall serve as an NPDES permit and waste discharge requirements for the discharge of stormwater and urban runoff to surface waters of Riverside County in the area under the jurisdiction of the Regional Board.

19. The Regional Board, in establishing the requirements contained herein, considered factors including, but not limited to, the following:

a. Beneficial uses to be protected and the water quality objectives reasonably required for that purpose;

b. Other waste discharges;

c. The need to prevent nuisance;

d. Past, present, and probable future beneficial uses of the waters under consideration;

e. Environmental characteristics of the waters under consideration;

f. Water quality conditions that could reasonably be achieved through the coordinated control of all factors which affect water quality in the area;

g. Economic considerations; and

h. The need for developing housing within the region;

20. The issuance of this permit for the discharge of stormwater runoff and urban runoff is exempt from the requirement for preparation of environmental documents under the California Environmental Quality Act (Public Resources Code, Division 13, Chapter 3, Section 21000 et seq.) in accordance with the California Water Code, Section 13389.

21. The Regional Board has considered all water resource related environmental factors associated with the discharge of stormwater and urban runoff.

22. The Regional Board has notified all known interested parties of its intent to issue an NPDES permit for the discharge of stormwater and urban runoff.

23. The Regional Board has, at a public meeting, heard and considered all comments pertaining to the discharge of stormwater and urban runoff.

IT IS HEREBY ORDERED that the permittees, in order to meet the provisions contained in Division 7 of the California Water Code and regulations adopted thereunder, and the provisions of the Clean Water Act as amended and regulations and guidelines adopted thereunder, shall comply with the following:

I. RESPONSIBILITIES OF PRINCIPAL PERMITTEE

The principal permittee shall be responsible to manage the program overall, including:

1. Administer the Riverside County Flood Control and Water Conservation District Act.
2. Conduct water quality and hydrographic monitoring of stormwater conveyance system outfalls as agreed upon by the Executive Officer.
3. Develop uniform criteria for stormwater conveyance system inspections.
4. Conduct inspections of the stormwater conveyance systems within its jurisdiction.
5. Prepare and submit to the Regional Board all the reports, plans, and programs as required in this Order.
6. Monitor the implementation of the plans and programs and determine their effectiveness in attaining water quality

objectives.

7. Coordinate all the activities with the Regional Board.
8. Enact legislation and ordinances as necessary to establish legal authority.
9. Pursue enforcement actions as necessary to ensure compliance with stormwater management programs and implementation plans.
10. Solicit, and respond to, public input[2] for proposed monitoring, reconnaissance, management, and implementation plans.
11. Ensure adequate response to emergency situations such as accidental spills, leaks, illicit discharges, etc.
12. Abide by the terms of the Implementation Agreement.

II. RESPONSIBILITIES OF THE CO-PERMITTEES

The co-permittees shall be responsible to manage the program within its jurisdiction, including:

1. Conduct stormwater conveyance system inspections in accordance with the uniform criteria developed by the principal permittee.
2. Conduct and coordinate with the principal permittee any surveys and characterizations needed to identify the pollutant sources and drainage areas.
3. Review and approve management programs, monitoring programs, and implementation plans.
4. Implement management programs, monitoring programs, and implementation plans as required by this Order.
5. Submit stormwater conveyance system maps with periodic revisions as necessary.
6. Prepare and submit all reports to the principal permittee in a timely manner.
7. Enact, and administer, legislation and ordinances as necessary to establish legal authority.
8. Pursue enforcement actions as necessary to ensure compliance with the stormwater management programs and the implementation plans.
9. Ensure adequate response to emergency situations such as accidental spills, leaks, illicit discharges, etc.
10. Abide by the terms of the Implementation Agreement.

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[2] Solicitation, and response to, public input may be demonstrated by: (1) disseminating the notice of availability of plans for review and comment to the public at large, environmental groups, federal, state and local agencies and other interested parties; and, (2) addressing concerns expressed by the public.

III. GENERAL REQUIREMENTS

1. The permittees shall prohibit illicit/illegal discharges from entering into stormwater conveyance systems. Discharges conditionally allowed to enter stormwater conveyance systems are specified in Item V. 4.

2. The permittees shall develop and implement best management practices (BMPs), including management practices, control techniques, and system design and engineering methods, and such other provisions as the Executive Officer determines appropriate for the control of pollutants, to control/reduce the discharge of pollutants to waters of the United States to the maximum extent practicable. The BMPs so developed, along with a time schedule for implementation, shall be submitted for the approval and/or modification by the Executive Officer of the Regional Board. In developing the best management practices, the permittees shall consider the water quality objectives of all the receiving water bodies.

3. The permittees shall ensure that BMPs are implemented for entities discharging stormwater and urban runoff to stormwater conveyance systems within their area of jurisdiction.

IV. COMPILATION AND SUBMITTAL OF EXISTING DATA

1. Runoff Quality/Quantity

The permittees shall collectively submit all quantitative information, generated since 1980, on stormwater discharges to stormwater conveyance systems. Historical averages and extremes of the collected data shall also be submitted. This information will be used to facilitate the identification of sources of pollutants present in the stormwater discharges and to develop an effective discharge monitoring program for this Order. Information to be submitted shall include the following:

a. Analytical and flow data for stormwater samples collected from the stormwater conveyance system outfalls, and within any tributary waters of the United States;

b. Precipitation data from the precipitation stations and the duration of the storm events (if available); and

c. Analysis of the data and the major pollutants identified in the stormwater discharges from each drainage area to each receiving water and a

determination whether the identified pollutants came from non-point source or point-source discharges.

2. System/Drainage Area Characterization

The permittees shall submit information to the Regional Board for identification and characterization of the sources of pollutants in the stormwater discharges. Descriptive information, such as land use in Riverside County, and an overall map of the drainage system showing major feature shall be submitted. The following information shall be provided:

a. An identification of the drainage areas (more than 50 acres in size) that discharge stormwater to the stormwater conveyance systems and of those drainage areas that discharge to stormwater conveyance systems with pipe diameters greater than 36 inches;

b. The sizes of these drainage areas (acreage) and the sizes (pipe diameters or approximate dimensions of the stormwater conveyance systems) and physical characteristics of the stormwater conveyance systems. These physical characteristics shall include, but not be limited to, whether the stormwater conveyance system is lined or unlined and whether it has intermittent or continuous flow;

c. The names, locations, and Standard Industrial Codes (SIC) of specific industrial sources and principal land use activities in each drainage area, identified in IV B.2. a., above, discharging to the stormwater conveyance systems. An estimation of the runoff coefficients for these drainage areas shall also be provided;

d. The locations of present stormwater conveyance system outfalls discharging to waters of the United States. The name of each receiving water shall be reported and the location of each outfall shall be indicated on a map; and

e. The locations of major structural controls for stormwater and urban runoff discharges (e.g. retention basins, detention basins, etc).

3. Illegal Connections

a. The permittees shall provide a list of dischargers (permitted and unpermitted) known to exist currently who discharge process or non-process wastewater to the stormwater conveyance systems and any existing

information pertaining to illegal dumping of pollutants in stormwater conveyance systems. The permittees shall also provide any existing procedures used for detecting illegal connections to the stormwater conveyance systems, the rationale for the procedures, and the drainage areas (or cities) in which these programs are practiced; and

b. A description of the present and historic use of ordinances or other controls to prohibit and/or limit the non-stormwater discharges to stormwater conveyance systems.

4. Stormwater Management Program

A description of the existing stormwater/urban runoff management programs and structural and non-structural BMPs implemented by the permittees.

5. Stormwater/Urban Runoff Monitoring Program

A description of the existing monitoring programs and the rationale for their selection.

6. Pollutant Information

The permittees shall provide information regarding the discharge of any pollutant required under 40 CFR 122.21(g)(7)(iii) and (iv).

7. Other Pertinent Existing Information

The permittees shall provide to the Regional Board any other existing information that is pertinent to this permit.

8. The permittees shall submit the above information, IV.1. - IV.7., for the receiving waters within the San Diego region no later than March 31, 1992.

V. RECONNAISSANCE SURVEY

1. The permittees shall submit information from a reconnaissance survey to be conducted at the stormwater conveyance systems. The purpose of the survey is to identify illegal/illicit non-stormwater discharges to the stormwater conveyance systems, illicit disposal practices, or other practices which impair water quality. The reconnaissance survey field manual and implementation plan for prosecuting violators and eliminating illegal discharges so developed, along with time schedules for implementation, shall be submitted for the approval of

the Executive Officer of the Regional Board. The information shall include, but needed not be limited to, the following:

a. By September 30, 1992, a proposed reconnaissance survey field manual, including a time schedule shall be submitted.

b. By September 30, 1993, and every year thereafter until the completion of the survey, a progress report containing the following information shall be submitted:

i. Results of the reconnaissance survey, including an evaluation of the results;

ii. Additional information that would lead to isolating and identifying sources of illegal connections to the stormwater conveyance systems. Such information should include, but is not limited to, visual observations (e.g. color, turbidity, odor, etc), major land use activities in the surrounding drainage areas, seasonal change of flow, the surrounding hydrogeologic formation, etc.;

iii. A listing of any identified or suspected illegal non-stormwater dischargers, including the names, locations, and types of the facilities, and the names of the stormwater conveyance systems and receiving waters to which the illegal/illicit non-stormwater discharges occur;

iv. A listing of large industrial facilities (with more than 100 employees) where hazardous/toxic substances are stored and/or used, landfills, hazardous waste disposal, treatment, and/or recovery facilities, and any known spills, leaks or other problems in the area; and

v. A discussion on all activities, related to the survey, conducted for the past 12 months.

2. By March 31, 1992, the permittees shall submit a proposed implementation plan, including a tentative time schedule, to prosecute violators and eliminate illegal/illicit discharges to the stormwater conveyance systems. The proposed plan shall also include a description of the legal authorities for prosecuting violators and eliminate or control illicit disposal practices and illegal discharges to the stormwater conveyance systems, and a proposed time schedule for obtaining such legal authorities, if necessary.

3. By September 30, 1994, and every year thereafter, the permittees shall submit a progress report evaluating the effectiveness of the plan in detecting and eliminating illegal/illicit discharges to the stormwater conveyance systems.

4. The permittees shall effectively eliminate all identified illegal/illicit discharges in the shortest time practicable, and in no case later than July 16, 1995. Those identified after July 16, 1995 shall be eliminated in the shortest time practicable. The following discharges shall not be considered illegal/illicit discharges provided the discharges do not cause or contribute to violations of water quality standards and are not significant contributors of pollutants to waters of the United States: discharges composed entirely of stormwater, discharges covered under an NPDES permit, discharges to storm water conveyance systems from potable water line flushing, fire fighting, landscape irrigation, diverted stream flows, rising groundwaters (not including active dewatering systems), groundwater infiltration as defined at 40 CFR 35.2005(20), discharges from potable water sources, passive foundation drains (not including active groundwater dewatering), air conditioning condensation, irrigation water, water from crawl space pumps, passive footing drains (not including active groundwater dewatering systems), lawn watering, individual residential vehicle washing, flows from riparian habitats and wetlands, dechlorinated swimming pool discharges, street wash waters related to cleaning and maintenance by permittees, or waters not otherwise containing wastes as defined in California Water Code Section 13050(d). If it is determined that any of the preceding discharges cause or contribute to violations of water quality standards or are significant contributors of pollutants to waters of the United States, the discharges shall be prohibited from entering stormwater conveyance systems.

VI. DRAINAGE AREA MANAGEMENT PROGRAM

1. The permittees shall develop and implement best management practices (BMPs) to control the discharge of pollutants to waters of the United States. The permittees shall submit information pertaining to the proposed management programs for control of the pollutants in the stormwater discharges. The information shall include, but need not be limited to, the following:

   a. A brief description of the existing BMPs and stormwater management programs;

b. Proposed modifications to the existing BMPs and stormwater/urban runoff management programs to reduce pollutants in stormwater discharges from industrial, commercial, and residential properties to the maximum extent practicable. At a minimum, the following should be considered in developing the BMPs:

Structural Controls

i. Structural controls such as first flush diversion, detention/retention basins, infiltration trenches/basins, porous pavement, oil/grease separators, grass swales, wire concentrators, etc. Engineering and design modification of the existing structures should also be considered.

Non-Structural Controls

ii. Programs to educate the public on proper disposal of hazardous/toxic wastes. These may include public workshops, meetings, notifications by mail, collection programs for household hazardous wastes, etc.

iii. Management practices such as street sweeping, proper maintenance of streambanks, erosion control structures, etc.

iv. Regulatory approaches such as county and local ordinances, permitting of construction sites, etc.

v. Enforcement programs established by the county and cities, including field inspections and response to emergency incidents.

vi. The ongoing program required in Item No. V. above for the detection and elimination of illicit connections and controlling/eliminating illegal dumping of pollutants into storm drain systems.

c. An implementation plan for site-specific BMPs which are required to reduce pollutants in the stormwater discharges from residential, commercial and industrial areas, and construction sites. Requirements for the implementation of BMPs at these sites are described as follows:

i. New Construction Sites

All industrial/commercial construction operations that result in a disturbance of one acre or more of total land area (or a smaller parcel of land which is a part of a larger common development) and residential construction sites that result in a disturbance of five acres or more of total land area (or a smaller parcel of land which is a part of a larger common development) shall be required to develop and implement BMPs to control erosion/siltation and contaminated runoff from the construction site.

ii. Residential and Commercial/Industrial Sites

To prevent the increase of pollutants in stormwater discharges, all new developments and existing facilities with significant redevelopment must develop individual post construction long-term comprehensive stormwater management plans.

d. A description of the legal authorities for implementing the programs, and a proposed time schedule for obtaining such legal authorities, if necessary; and

e. A description of staff, equipment, and funds available to implement the programs.

2. The permittees shall submit the BMPs so developed, along with a time schedule for implementation, for the approval by the Executive Officer of the Regional Board no later than March 31, 1993.

3. By March 31, 1994 and every year thereafter, the permittees shall submit a progress report assessing the reduction of pollutants discharged to waters of the United States and evaluating the effectiveness of the BMPs developed for the stormwater and urban runoff discharges. The permittees shall also include recommended BMP modifications, with a time schedule for implementation, needed to achieve compliance with any water quality objectives not attained.

VII. STORMWATER/URBAN RUNOFF MONITORING PROGRAM

The permittees shall develop and implement (after approval of the plan by the Executive Officer) a stormwater/urban runoff monitoring program. Proposed monitoring programs and time schedules for their implementation shall be subject to the approval of the Executive Officer. Proposed monitoring

programs, time schedules, and implementation reports shall be submitted to the principal permittee in sufficient time to submit a collated report to the Regional Board as follows:

STORMWATER MONITORING

TASK	REPORT DATE
Submittal of Proposed Stormwater Monitoring Programs and Implementation Time Schedules	03/31/93
Progress Report on the Implementation of the Stormwater Monitoring Programs	03/31/94*

* and annually thereafter

VIII. RECEIVING WATER MONITORING PROGRAM

The permittees shall develop and implement (after approval of the plan by the Executive Officer) a receiving water monitoring program. Proposed monitoring programs and time schedules for their implementation shall be subject to the approval of the Executive Officer. Proposed monitoring programs, time schedules, and implementation reports shall be submitted to the principal permittee in sufficient time to submit a collated report to the Regional Board as follows:

RECEIVING WATER MONITORING

TASK	REPORT DATE
Submittal of Proposed Receiving Water Monitoring Programs and Implementation Time Schedules	03/31/93
Progress Report on the Implementation of the Receiving Water Monitoring Programs	03/31/94*

* and annually thereafter

IX. FISCAL ANALYSIS

1. By July 31, 1991 and every year thereafter, a fiscal analysis of the capital and operation and maintenance expenditures necessary to accomplish the activities of the proposed plans and programs shall be performed.

2. By August 31, 1991 and every year thereafter, a fiscal analysis of the capital and operation and maintenance expenditures shall be submitted for review by EPA and the Regional Board.

X. DATA ANALYSIS

1. The results of the chemical analysis and quantitative data (such as flow, precipitation, and discharge data)

shall be compiled for each drainage area, each storm event, and for different times during the same storm event. The mass loading rates for the pollutants of concern shall be calculated and any impact of stormwater and urban runoff discharges on the receiving waters shall be discussed, starting with the most significantly impacted receiving waters.

2. With the implementation of the receiving water monitoring program, an evaluation shall be performed for the calculated pollutant loading rates from the stormwater and urban runoff monitoring program and the receiving water monitoring program. The evaluation shall be concluded with recommendations and the corrective actions proposed for any resulting discrepancies.

3. By January 31, 1994 and every year thereafter, the analysis of all the above data shall be submitted.

XI. PROGRAM ANALYSIS

No later than January 31, 1994, and annually thereafter, the principal permittee shall conduct an analysis of the effectiveness of the overall stormwater management program. If the water quality objectives of the receiving waters are violated as a result of stormwater/urban runoff discharges, the principal permittee shall identify proposed programs which will result in the attainment of the water quality objectives, and a time schedule to implement the new programs.

XII. IMPLEMENTATION AGREEMENT

A signed copy of the Implementation Agreement between the RCFC&WCD, the County of Riverside, and the City of Temecula shall be submitted by January 31, 1991. Any revisions to the Implementation Agreement shall be forwarded to the Executive Officer within 30 days of approval by all the permittees.

XIII. REPORTING

1. A summary of tasks to be completed and reports submitted is as follows:

(continued on the following page)

TASK		COMPLIANCE REPORT DUE
XII	Implementation Agreement	01/31/91
IV.	Existing reports and programs	03/31/92
V.1.a	Proposed Reconnaissance Survey Field Manual	09/30/92
V.2	Proposed Implementation Plan for Prosecuting Illegal Dischargers	03/31/93
VI.1&2	Management Programs (BMPs) and Implementation Plan	03/31/93
VII.1&2	Stormwater Monitoring Program Plan	03/31/93
VIII.1&2	Receiving Water Monitoring Program Plan	03/31/93
	Progress Reports after Plan Implementation	
V.1.b.	Reconnaissance Survey Progress Report	09/30 of every year[3]
V.	Illegal Discharge Elimination Progress Report	09/30 of every year[4]
VI.3	Management Programs Progress Report	03/31 of every year[5]
VII.3	Stormwater Monitoring Program Progress Report	03/31 of every year[6]
VIII.3	Receiving Water Monitoring Program Progress Report	03/31 of every year[7]
IX.	Fiscal Analysis	08/31 of every year[8]
X & XI	Data/Program Analysis	01/31 of every year[9]

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[3] The first progress report is due by September 30, 1993.

[4] The first progress report is due by September 30, 1994.

[5] The first progress report is due by March 31, 1994.

[6] The first progress report is due by March 31, 1994.

[7] The first progress report is due by March 31, 1994.

[8] The first annual fiscal analysis is due by August 31, 1991.

[9] The first data/program analysis is due by January 31, 1994.

B. All reports and information required herein shall be submitted to the Executive Officer of the Regional Board and the Regional Director of the Environmental Protection Agency, Region IX, at the following addresses:

Executive Officer
California Regional Water Quality Control Board
San Diego Region
9771 Clairemont Mesa Blvd., Ste. B
San Diego, California 92124-1331

Environmental Protection Agency
Region IX
Permits and Compliance Branch
1235 Mission Street (Mail Code W-5)
San Francisco, California 94103

XIV. ANALYTICAL METHODS/RECORD KEEPING

A. Samples and measurements taken as required herein shall be representative of the volume and nature of the monitored discharge. Once established, monitoring points shall not be changed without notification to and the approval of the Executive Officer.

B. Monitoring must be conducted according to United States Environmental Protection Agency test procedures approved under Title 40, Code of Federal Regulations (CFR), Part 136, "Guidelines Establishing Test Procedures for Analysis of Pollutants Under the Clean Water Act" as amended, unless other test procedures have been specified by this Order or the Executive Officer.

C. All analyses shall be performed in a laboratory certified to perform such analyses by the California Department of Health Services or a laboratory approved by the Executive Officer.

D. Monitoring results must be reported on discharge monitoring report forms or in a format approved by the Executive Officer.

E. If a permittee monitors any pollutant more frequently than required by this Order, using test procedures approved under 40 CFR, Part 136, or as specified in this Order, the results of this monitoring shall be included in the calculation and reporting of the data submitted in the permittee's monitoring report. The increased frequency of monitoring shall also be reported.

F. Permittees shall retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all

reports required by this Order, and records of all data used to complete the application for this Order. Records shall be maintained for a minimum of five years from the date of the sample, measurement, report, or application. This period may be extended during the course of any unresolved litigation regarding this discharge or when requested by the Regional Board Executive Officer.

G. Records of monitoring information shall include:

1. The date, exact place, and time of sampling or measurements;
2. The individual(s) who performed the sampling or measurements;
3. The date(s) analyses were performed;
4. The individual(s) who performed analyses;
5. The analytical techniques or method used; and
6. The results of such analyses.

H. Calculations for all limitations which require averaging of measurements shall utilize an arithmetic mean unless otherwise specified by the Executive Officer or in this Order.

I. All monitoring instruments and devices used by a permittee to fulfill the prescribed monitoring program shall be properly maintained and calibrated as necessary to ensure their continued accuracy.

J. Permittees shall report all instances of noncompliance not reported under Standard Reporting Requirement XVI. E. of this Order at the time monitoring reports are submitted. The reports shall contain the information listed in Standard Reporting Requirement XVI. E.

K. The monitoring reports shall be signed by an authorized person as required by Standard Reporting Requirement L.

L. A composite sample is defined as a combination of at least 8 sample aliquots of at least 100 milliliters each, collected at periodic intervals during the operating hours of a facility over a 24-hour period. For volatile pollutants, aliquots must be combined in the laboratory immediately before analysis. The composite must be flow proportional; either the time interval between each aliquot or the volume of each aliquot must be proportional to either the stream flow at the time of sampling or the total stream flow since the collection of the previous aliquot. Aliquots may be collected manually or automatically.

M. A grab sample is an individual sample of at least 100 milliliters collected at a randomly selected time over a period not exceeding 15 minutes.

XV. PROVISIONS

A. Neither the treatment nor the discharge of pollutants shall create a pollution, contamination, or nuisance as defined by Section 13050 of the California Water Code.

B. The permittees must comply with all conditions of this Order. Any permit noncompliance constitutes a violation of the Clean Water Act and the California Water Code and is grounds for enforcement action; for permit termination, revocation and reissuance, or modification; the issuance of an individual permit; or for denial of a renewal application.

C. The permittees shall take all reasonable steps to minimize or correct any adverse impact on the environment resulting from noncompliance with this Order, including such accelerated or additional monitoring as may be necessary to determine the nature and impact of the noncomplying discharge.

D. This Order may be modified, revoked and reissued, or terminated for cause including, but not limited to, the following:

1. Violation of any terms or conditions of this Order;

2. Obtaining this Order by misrepresentation or failure to disclose fully all relevant facts; or

3. A change in any condition that requires either a temporary or permanent reduction or elimination of the discharge.

The filing of a request by a permittee for modification, revocation and reissuance, or termination of this Order or a notification of planned change in or anticipated noncompliance with this Order does not stay any condition of this Order.

E. In addition to any other grounds specified herein, this Order shall be modified or revoked at any time if, on the basis of any new data, the Executive Officer determines that continued discharges may cause unreasonable degradation of the aquatic environment.

F. This Order is not transferable to any person except after notice to the Executive Officer of this Regional Board. The Regional Board may require a new report of waste discharge to change the name of a permittee and incorporate such other requirements as may be necessary under the California Water Code and the Clean Water Act. A permittee shall submit notice of any transfer of this

Order's responsibility and coverage to a new permittee as described under Standard Reporting Requirement XVI.C.

G. This Order does not convey any property rights of any sort or any exclusive privileges. The requirements prescribed herein do not authorize the commission of any act causing injury to persons or property of another, including property damage caused as a result of the discharge, nor protect the permittee from liability under federal, state, or local laws, nor create a vested right for the permittee to continue the discharge.

H. Permittees shall allow the Regional Board, or an authorized representative or any representative of the United States Environmental Protection Agency upon the presentation of credentials and other documents as may be required by law, to:

1. Enter upon the permittee's premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of this Order;

2. Have access to and copy, at reasonable times, any records that must be kept under the conditions of this Order;

3. Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices or operation regulated or required under this Order; and

4. Sample or monitor at reasonable times, for the purposes of assuring compliance with this Order or as otherwise authorized by the Clean Water Act or California Water Code, any substances or parameters at any location.

I. Permittees shall, at all times, properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by a permittee to achieve compliance with the conditions of this Order. Proper operation and maintenance includes effective performance, adequate funding, adequate operator staffing and training, and adequate laboratory and process controls including appropriate quality assurance procedures. This provision requires the operation of backup or auxiliary facilities or similar systems only when necessary to achieve compliance with the conditions of this Order.

J. In an enforcement action, it shall not be a defense for a permittee that it would have been necessary to halt or reduce the permitted activity in order to maintain

compliance with this Order. Upon reduction, loss, or failure of the treatment facility, the permittee shall, to the extent necessary to maintain compliance with this Order, control production or all discharges, or both, until the facility is restored or an alternative method of treatment is provided. This provision applies, for example, when the primary source of power of the treatment facility fails, is reduced or is lost.

K. The provisions of this Order are severable, and if any provision of this Order, or the application of any provision of this Order to any circumstances, is held invalid, the application of such provision to other circumstances, and the remainder of this Order, shall not be affected thereby.

L. Bypass of Treatment Facilities

1. Definitions

(a) "Bypass" means the intentional diversion of waste streams from any portion of the treatment facility.

(b) "Severe property damage" means substantial physical damage to property, damage to the treatment facilities which cause them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production.

2. Bypass Not Exceeding Effluent Limitations

A permittee may allow any bypass to occur which does not cause effluent limitations to be exceeded, but only if it also is for essential maintenance to assure efficient operations. These bypasses are not subject to the provisions of paragraphs (3) and (4) of this section.

3. Notice of Anticipated Bypass and Unanticipated Bypass

(a) Anticipated bypass. If a permittee knows in advance of the need for a bypass, they shall submit prior notice, if possible, at least ten days before the date of the bypass.

(b) Unanticipated bypass. A permittee shall submit notice of an unanticipated bypass as described under Standard Reporting Requirement XVI. E.

4. Prohibition of Bypass

(a) Bypass is prohibited and the Regional Board may take enforcement action against a permittee for bypass, unless:

(1) Bypass was unavoidable to prevent loss of life, personal injury, or severe property damage;

(2) There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated waste, or maintenance during normal periods of equipment downtime. This condition is not satisfied if the permittee could have installed adequate backup equipment to prevent a bypass which occurred during normal periods of equipment downtime or preventive maintenance; and

(3) The permittee submitted notices as required under paragraph (3) of this section.

(b) The Executive Officer may approve an anticipated bypass, after considering its adverse effect, if the Executive Officer determines that it will meet the three conditions listed above in paragraph (1) of this section.

M. Upset Conditions

1. Definitions

"Upset" means an exceptional incident in which there is unintentional and temporary noncompliance with technology-based effluent limitations because of factors beyond the reasonable control of a permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation.

2. Effect of an Upset

An upset constitutes an affirmative defense to an action brought for noncompliance with such technology-based permit effluent limitations if the requirements of paragraph (3) of this

section are met. No determination made during administrative review of claims that noncompliance was caused by upset, and before an action for noncompliance, is final administrative action subject to judicial review.

3. Conditions Necessary for a Demonstration of Upset

A permittee who wishes to establish the affirmative defense of upset shall demonstrate, through properly signed, contemporaneous operating logs, or other relevant evidence that:

(a) An upset occurred and that the permittee can identify the specific cause(s) of the upset;

(b) The permitted facility was at the time being properly operated; and

(c) The permittee submitted notice of the upset as required in Standard Reporting Requirement XVI. E.

4. Burden of Proof

In any enforcement proceeding, a permittee seeking to establish the occurrence of an upset has the burden of proof.

XVI. STANDARD REPORTING REQUIREMENTS

A. A new Report of Waste Discharge shall be filed with the Regional Board not less than 180 days prior to the following:

1. Significant change in disposal method (e.g., change in the method of treatment which would significantly alter the nature of the waste).

2. Significant change in disposal area (e.g., moving the discharge to a disposal area significantly removed from the original area, potentially causing different water quality or nuisance problems).

3. Other circumstances which result in a material change in character, amount, or location of the waste discharge.

B. A permittee shall give advance notice to the Executive Officer of any planned changes in a permitted facility or activity which may result in noncompliance with the requirements of this Order.

C. A permittee must notify the Executive Officer, in writing, at least 30 days in advance of any proposed transfer of this Order's responsibility and coverage to a new permittee. The notice must include a written agreement between the existing and new permittee containing a specific date for the transfer of this Order's responsibility and coverage between the current permittee and the new permittee. This agreement shall include an acknowledgement that the existing permittee is liable for violations up to the transfer date and that the new permittee is liable from the transfer date on.

D. The permittees shall comply with any monitoring and reporting requirements contained in this Order and any additional monitoring requirements specified by the Executive Officer.

E. A permittee shall report any noncompliance which may endanger health or the environment. Any information shall be provided orally to the Executive Officer within 24 hours from the time the permittee becomes aware of the circumstances. A written submission shall contain a description of the noncompliance and its cause; the period of noncompliance, including exact dates and times, and if the noncompliance has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent recurrence of the noncompliance. The Executive Officer, or an authorized representative may waive the written report on a case-by-case basis if the oral report has been received within 24 hours.

F. A permittee shall notify the Executive Officer as soon as it is known or there is reason to believe:

1. That any activity has occurred or which will occur which would result in the discharge of any toxic pollutant which is not limited in this Order, if that discharge will exceed the highest of the following "notification levels":

   a. One hundred micrograms per liter (100 ug/L);

   b. Two hundred micrograms per liter (200 ug/L) for acrolein and acrylonitrile; five hundred micrograms per liter (500 ug/L) for 2.4-dinitrophenol and for 2-methyl-4, 6-dinitrophenol; and one milligram per liter (1 mg/L) for antimony.

G. A permittee shall furnish to the Executive Officer, within a reasonable time, any information which the Executive Officer may request to determine whether cause

exists for modifying, revoking and reissuing, or terminating this Order or to determine compliance with this Order or other requirements established by the Executive Officer. A permittee shall also furnish to the Executive Officer, upon request, copies of records required to be kept by this Order.

H. A permittee shall provide adequate notice to the Executive Officer of the following:

1. Any new introduction of pollutants to the discharge.

2. Any substantial change in the volume or character of pollutants being introduced into the discharge.

3. For the purpose of this provision, adequate notice shall include information on (a) the quality and quantity of waste introduced into the discharge, and (2) any anticipated impact of the change on the quantity or quality of runoff to be discharged to surface waters.

I. Where a permittee becomes aware that he failed to submit any relevant facts in a Report of Waste Discharge, or submitted incorrect information in a Report of Waste Discharge, or in any report to the Regional Board, he shall promptly submit such facts or information.

J. If a need for a discharge bypass is known in advance, the permittee shall submit prior notice and, if at all possible, such notice shall be submitted at least ten days prior to the date of the bypass.

K. This Order expires on July 16, 1995. The permittees must jointly file a Report of Waste Discharge in accordance with Title 23, Chapter 3, Subchapter 9 of the California Code of Regulations not later than 180 days in advance of such expiration date as application for issuance of new waste discharge requirements. This report of waste discharge shall include as a minimum, the following:

1. Summary of the results of the monitoring program.

2. Summary of BMPs implemented and evaluations of their effectiveness.

3. Summary of procedures implemented to detect illegal discharges and illicit disposal practices and an evaluation of their effectiveness.

4. Summary of measures implemented to control pollutants in surface runoff from construction sites and an evaluation of their effectiveness.

5. Evaluation of the need for additional BMPs, source control, and/or structural control measures.

6. Proposed plan of stormwater/urban runoff quality management activities that will be undertaken during the term of the next permit.

L. All applications, reports, or information submitted to the Executive Officer of this Regional Board shall be signed and certified.

1. The Report of Waste Discharge shall be signed as follows:

a. **For a corporation** - by a principal executive officer of at least the level of vice-president.

b. **For a partnership or sole proprietorship** - by a general partner or the proprietor, respectively.

c. **For a municipality, state, federal or other public agency** - by either a principal executive officer or ranking elected official.

2. All other reports required by this Order and other information requested by the Executive Officer shall be signed by a person designated in paragraph (1) of this provision, or by a duly authorized representative of that person. An individual is a duly authorized representative only if:

a. The authorization is made in writing by a person described in paragraph (1) of this provision;

b. The authorization specified either an individual or a position having responsibility for the overall operation of the regulated facility or activity, such as the position of plant manager, operator of a well or well field, superintendent, or position of equivalent responsibility (a duly authorized representative may thus be either a named individual or any individual occupying a named position); and

c. The written authorization is submitted to the Executive Officer.

3. Any person signing a document under this Section shall make the following certification:

> "I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment."

M. Except for data determined to be confidential under Title 40, Code of Federal Regulations Part (40 CFR Part 2), all reports prepared in accordance with the terms of this Order shall be available for public inspection at the offices of the California Regional Water Quality Control Board, San Diego Region and the United States Environmental Protection Agency, Region 9. As required by the Clean Water Act, Reports of Waste Discharge, this Order, and effluent data shall not be considered confidential.

XVII. NOTIFICATIONS

A. California Water Code Section 13263(g) states:

> "No discharge of waste into the waters of the state, whether or not such discharge is made pursuant to waste discharge requirements, shall create a vested right to continue such discharge. All discharges of waste into waters of the state are privileges, not rights."

B. The Clean Water Act provides that any person who violates a condition of this Order implementing Sections 301, 302, 306, 307, 308, 318 or 405 of the Clean Water Act is subject to a civil penalty not to exceed $10,000 per day of such violations. Any person who willfully or negligently violates conditions of this Order implementing Section 301, 302, 306, 307 or 308 of the Clean Water Act is subject to a fine of not less than $2,500 nor more than $25,000 per day of violation, or by imprisonment for not more than one year, or both.

C. The Clean Water Act provides that any person who knowingly makes any false statement, representation, or certification in any record or other document submitted or required to be maintained under this Order, including monitoring reports or reports of compliance or noncompliance shall, upon conviction, be punished by a fine of not more than $10,000 per violation, or by imprisonment for not more than six months per violation,

or by both.

D. Nothing in this Order shall be construed to relieve a permittee from civil or criminal penalties for noncompliance.

E. Nothing in this Order shall be construed to preclude the institution of any legal action or relieve a permittee from any responsibilities, liabilities, or penalties to which a permittee is or may be subject to under Section 311 of the Clean Water Act.

F. Nothing in this Order shall be construed to preclude institution of any legal action or relieve a permittee from any responsibilities, liabilities, or penalties established pursuant to any applicable State law or regulation under authority preserved by Section 510 of the Clean Water Act.

G. This Order shall become effective ten days after the date of its adoption, provided the Regional Administrator or Director, United States Environmental Protection Agency, has no objection. If the Regional Administrator objects to its issuance, this Order shall not become effective until such objection is withdrawn.

I, Arthur L. Coe, Executive Officer, do hereby certify the foregoing is a full, true, and correct copy of an Order adopted by the California Regional Water Quality Control Board, San Diego Region, on July 16, 1990.

ARTHUR L. COE
Executive Officer

California Regional Water Quality Control Board
San Diego Region
9771 Clairemont Mesa Boulevard, Suite B
San Diego, California 92124-1331

FACT SHEET
for
ORDER NO. 90-46
NPDES No. CA 0108766
Waste Discharge Requirements
for
Stormwater and Urban Runoff
from the
Riverside County Flood Control and Water Conservation District
the
County of Riverside
and the
Incorporated Cities of Riverside County Within the San Diego Region

PROJECT

Order No. 90-46, NPDES No. CA0108766, prescribes requirements for the control of pollutants resulting from stormwater/urban runoff from all incorporated cities and the unincorporated urban areas in Riverside County within the jurisdiction of the Regional Board.

A "Letter of Intent" to apply for and become a permittee to an area-wide stormwater permit has been received from the Riverside County Flood Control and Water Conservation District (RCFC&WCD). The RCFC&WCD anticipates cooperation from the County of Riverside and the City of Temecula in becoming active co-permittees subject to the terms and conditions of the permit.

PROJECT AREA

The permitted area is within the County of Riverside within the area under the jurisdiction of the San Diego Regional Water Quality Control Board.

CLEAN WATER ACT REQUIREMENTS

The Federal Clean Water Act (CWA) allows the U. S. Environmental Protection Agency (EPA) to delegate its NPDES permitting authority to states with an approved environmental regulatory program. The State of California is one of the delegated states. The Porter-Cologne Act (California Water Code) authorizes the State Board, through its Regional Boards, to regulate and control the discharge of pollutants into waters of the state and tributaries thereto.

Section 405 of the Water Quality Act (WQA) of 1987 added Section 402(p) to the CWA. Pursuant to Section 402(p)(4) of the CWA, the EPA is required to promulgate regulations for stormwater permit applications for stormwater discharges associated with municipal separate storm sewer systems serving a population of 100,000 or

more. Section 402 (p)(4) of the CWA also requires dischargers of stormwater associated with municipal separate storm sewer systems serving a population of 250,000 or more to file stormwater permit applications by February 4, 1990.

On December 7, 1988, EPA published its proposed regulations in the Federal Register to solicit public comments. Final regulations are tentatively scheduled to be promulgated on July 20, 1990. In the absence of final stormwater regulations, a permit governing municipal stormwater discharges should meet both the statutory requirements of Section 402 (p)(3)(B) and all requirements applicable to an NPDES general permit issued under the issuing authority's discretionary authority in accordance with Section 402 (a)(1)(B) of the CWA.

AREAWIDE STORMWATER PERMIT

To regulate and control stormwater/urban runoff discharges from urban areas to runoff conveyance systems and receiving waters, an areawide approach is essential. The management and control of the runoff conveyance system cannot be effectively carried out without the cooperation and efforts of all entities within Riverside County within the area under the jurisdiction of the San Diego Regional Board. The Regional Board has concluded that the best management option for the area is to issue an areawide stormwater permit incorporating all land-use regulatory agencies using the discretionary authority granted to the Regional Board. Thus, the following entities have been named in the stormwater permit: RCFC&WCD, as the principal permittee, and the County of Riverside and City of Temecula as co-permittees.

REQUIREMENTS CONTAINED IN THE PERMIT

Order No. 90-46 requires the entities named above to:

1. Enter into an agreement regarding the roles and responsibilities of all co-permittees with regard to all requirements contained in the permit.

2. Perform and submit annual fiscal analyses demonstrating availability of funds to carry out the stormwater management programs.

3. Inventory existing stormwater pollution control programs, illicit discharge detection programs, monitoring programs and data, stormwater conveyance system maps, land use maps, and existing laws, ordinances, and codes giving the dischargers the authority to implement and enforce stormwater pollution control programs in their areas of jurisdiction and where necessary, promulgate the authority to carry out all functions

of the stormwater management programs.

4. Submit reports on the adequacy of the existing data after taking into consideration any requirements of NPDES stormwater regulations promulgated by the Environmental Protection Agency or as specified by the Executive Officer of the Regional Board.

5. Develop and implement stormwater and receiving water monitoring programs to evaluate discharges of pollutants from stormwater conveyance systems to waters of the United States.

6. Develop and implement an illicit connection/illegal discharge detection program to identify and eliminate non-stormwater discharges to stormwater conveyance systems.

7. Prohibit illicit/illegal discharges from entering into stormwater conveyance systems unless the discharge is permitted by the Regional Board.

8. Develop and implement best management practices (BMPs) to control discharges of pollutants to the maximum extent practicable to waters of the United States.

9. Effectively eliminate all identified illegal/illicit discharges as soon as is practicable and not later than by July 16, 1995. Illicit/illegal discharges identified thereafter will be eliminated in the shortest time practicable.

10. Conduct an annual analysis of the effectiveness of the overall stormwater pollution control management program in their areas of jurisdiction. If the water quality objectives of the receiving waters are violated as a result of stormwater/urban runoff discharges, the dischargers shall identify proposed programs which will result in the attainment of the water quality objectives, and a time schedule to implement the new programs.

ANTIDEGRADATION ANALYSIS

The Regional Board has considered whether a complete antidegradation analysis, pursuant to 40 CFR 131.12 and State Board Resolution No. 68-16, is required for the stormwater discharges. The pollutant loading rates to the receiving waters will be reduced with the implementation of the requirements in this order. As a result, the quality of the stormwater discharges and receiving waters will be improved, thereby protecting the beneficial uses of waters of the United States. The stormwater discharges are consistent with the federal and state antidegradation requirements

and a complete antidegradation analysis is not necessary.

WORKSHOP

The San Diego Regional Water Quality Control Board held a workshop regarding Order No. 90-46 on June 4, 1990. The purpose of the workshop was to solicit comments and distribute information. Controversial input from the public was not encountered.

PUBLIC HEARING

The San Diego Regional Water Quality Control Board will consider the adoption of tentative Order No. 90-46 at its July 16, 1990 Regional Board meeting which will be held at the Encinitas City Council Chamber, 535 Encinitas Boulevard, Suite 100, Encinitas, California at 9:00 a.m. The meeting is open to the public.

Further information regarding the conduct and nature of the public hearing and these waste discharge requirements may be obtained by calling Mr. Chris Sandall at (619) 265-5114 between 8:00 a.m. and 4:00 p.m. or writing the San Diego Regional Water Quality Control Board office, located at the address listed below.

WRITTEN COMMENTS

Interested persons are invited to submit written comments on the proposed waste discharge requirements. To ensure an adequate review period, written comments should be submitted by July 6, 1990, either in person or by mail to:

Mr. Arthur L. Coe, Executive Officer
California Regional Water Quality Control Board
San Diego Region
9771 Clairemont Mesa Blvd., Ste. B
San Diego, California 92124-1331

California Regional Water Quality Control Board
San Diego Region

ORDER NO. 90-46
NPDES No. CA 0108766

Waste Discharge Requirements
for
Stormwater and Urban Runoff
from the
Riverside County Flood Control & Water Conservation District
the
County of Riverside
and the
Incorporated Cities[1] of Riverside County Within the San Diego Region

The California Regional Water Quality Control Board, San Diego Region (hereinafter Regional Board), finds that:

1. On June 8, 1990, the Riverside County Flood Control and Water Conservation District (RCFC&WCD), anticipating cooperation from the incorporated city of Temecula and the County of Riverside (hereinafter collectively referred to as "permittees"), submitted a letter in application for a National Pollutant Discharge Elimination System (NPDES) permit for stormwater discharges to waters within the jurisdiction of the San Diego Regional Board. This Order names the RCFC&WCD the "principal permittee" and the County of Riverside and the City of Temecula "co-permittees."

2. Section 405 of the Water Quality Act (WQA) of 1987 added Section 402(p) to the Clean Water Act (CWA). Pursuant to Section 402(p)(4) of the CWA, the EPA is required to promulgate regulations for NPDES permit applications for stormwater discharges associated municipal separate stormwater conveyance systems serving a population of 100,000 or more. Section 402 (p)(4) of the CWA also requires dischargers of stormwater associated with industrial activities and municipal separate stormwater conveyance systems serving a population of 250,000 or more to file stormwater permit applications by February 4, 1990.

3. On December 7, 1988, the EPA published its proposed regulations in the Federal Register to solicit public comments. Final regulations are tentatively scheduled to be promulgated on July 20, 1990. In the absence of final stormwater regulations, this Order governing municipal stormwater discharges meets both the statutory requirements of Section 402 (p)(3)(B) and all

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[1] Currently includes only the City of Temecula.

requirements applicable to an NPDES permit issued under this Regional Board's discretionary authority.

4. Water quality studies in many urban areas have shown that urban runoff typically contains significant quantities of pollutants. Water quality may be adversely impacted by stormwater discharges and urban runoff. A comprehensive stormwater and urban runoff management and regulation program is essential for the protection of water resources. The RCFC&WCD and the co-permittees will develop a comprehensive stormwater/urban runoff management program. This order requires the RCFC&WCD and the incorporated cities to submit documentation on existing runoff pollution control programs and specifies additional requirements towards achieving the water quality objectives for surface waters in the San Diego Region. The intent of this permit is to improve water quality of receiving waters under the jurisdiction of the Regional Board.

5. The discharges consist of surface runoff generated from various land uses and activities in all the hydrologic drainage areas which discharge into receiving waters within the area of jurisdiction of the Regional Board. The quality of these discharges varies considerably and is affected by land use, basin hydrology and geology, season, the frequency and duration of storm events, the presence of illicit connections and discharges, and waste management and disposal practices. The parameters and pollutants of potential concern and significance in these discharges may include, but are not limited to, pH, fecal coliform, fecal streptococcus, enterococcus, volatile organic carbon (VOC), surfactants (MBAS), oil and grease, petroleum hydrocarbons, total suspended and settleable solids, total organic carbon, biochemical oxygen demand (BOD), chemical oxygen demand (COD), lead, copper, chromium, cadmium, silver, nickel, zinc, cyanides, phenols, nutrients (e.g., nitrogen, nitrate, phosphate, etc.), and biocides. Since stormwater and urban runoff contains "waste", as defined in California Water Code (CWC) Section 13050, stormwater and urban runoff discharges constitute discharges of waste. Consequently such discharges are subject to CWC Section 13260 et seq., as well as Section 402 of the Clean Water Act, as amended.

6. The RCFC&WCD has jurisdiction over a large portion of the flood control facilities and has agreed to be the major responsible party in implementing the provisions of this Order. This Order names the RCFC&WCD the "principal permittee" and the County of Riverside and City of Temecula as the "co-permittees". Collectively the

principal permittee and co-permittees are referred to as "permittees."

7. The RCFC&WCD, as the "principal permittee", will obtain the cooperation of all entities in implementing the provisions of this Order. In general, the RCFC&WCD, the "principal permittee", will be responsible for preparing operating budgets, preparing and monitoring the implementation programs, and coordinating and submitting reports to the Regional Board. The "co-permittees" will develop site-specific compliance responsibilities, perform compliance monitoring and inspections, submit stormwater conveyance system maps and compliance reports to the RCFC&WCD, and demonstrate and exercise enforcement authority for achieving compliance with the terms and conditions of this Order.

8. This Order requires the permittees to develop and implement programs to ensure that entities discharging stormwater/urban runoff into stormwater conveyance systems take steps to control/reduce discharges of pollutants to waters of the United States. The Regional Board has the discretion and authority to require non-cooperating entities to participate in this area-wide permit or obtain individual waste discharge requirements if it is determined that discharges from such entities cause or contribute to a violation of a water quality standard or are significant contributors of pollutants to waters of the United States.

9. Approximately one-eighth (1/8) of the entire Riverside County area drains into receiving waters within this Regional Board's jurisdiction. A minor portion of these drainage areas is urbanized but experiencing rapid development and growth. Approximately 5/8 of the Riverside County drainage area is within the jurisdiction of the Colorado River Basin Regional Board and the remaining one-quarter (1/4) of the Riverside County drainage area is within the jurisdiction of the Santa Ana Regional Water Quality Control Board. The area under the jurisdiction of the Santa Ana Regional Water Quality Control board is currently regulated by Santa Ana Regional Board Order No. 90-104, NPDES No. 8000192, <u>Waste Discharge Requirements for the Riverside County Flood Control and Water Conservation District and the County of Riverside and Incorporated Cities within the Santa Ana Region, Areawide Urban Stormwater Runoff, Riverside County</u>. The requirements contained in this Order are patterned after Order No. 90-104 to ensure consistent regulation, pollution control practices, and monitoring and reporting requirements throughout Riverside County.

10. Stormwater discharges in the Riverside County portion of the San Diego region are tributary to various receiving waters. These receiving waters include:

Inland Surface Streams

a. Santa Margarita River
b. Murrieta Creek
c. Temecula Creek
d. Pechanga Creek
e. Cahuilla Creek
f. San Mateo Creek
g. San Juan Creek
h. Tucalota Creek

Lakes/Reservoirs

a. Skinner Lake
b. Vail Lake

Lagoons

a. Mouth of the Santa Margarita River

11. The Comprehensive Water Quality Control Plan Report, San Diego Basin (9), (Basin Plan) was adopted by this Regional Board on March 17, 1975 and subsequently approved by the State Water Resources Control Board (State Board). Subsequent revisions to the Basin Plan have also been adopted by the Regional Board and approved by the State Board.

12. The Basin Plan identifies the following beneficial uses of inland surface waters in Riverside County and the mouth of the Santa Margarita River:

a. Municipal and domestic supply;
b. Industrial service supply;
c. Industrial process supply;
d. Agriculture supply;
e. Water contact recreation;
f. Non-contact water recreation;
g. Warm fresh-water habitat;
h. Cold fresh-water habitat;
i. Preservation of rare and endangered species;
j. Wildlife habitat;and
k. Marine habitat.

13. The Basin Plan contains the following prohibitions, applicable to discharges, for inland surface waters:

"Discharge of treated or untreated sewage or industrial wastes to a natural watercourse upstream of surface storage or diversion facilities used for municipal supply is prohibited."

"Discharge of treated or untreated sewage or industrial wastewater, exclusive of cooling water or other waters which are chemically unchanged, to a watercourse, is prohibited except in cases where the quality of said discharge complies with the receiving body's water quality objectives."

"The dumping or deposition of oil, garbage, trash, or other solid municipal, industrial, or agricultural waste directly into inland waters or watercourses or adjacent to the water courses in any manner which may permit its being washed into the watercourse is prohibited."

"Land grading and similar operations causing soil disturbance which do not contain provisions to minimize soil erosion and limit suspended matter in area runoff are prohibited."

14. The requirements contained in this Order are necessary to implement the objectives of the Basin Plan for receiving waters within the region.

15. Numerical and narrative water quality standards exist for the receiving waters in the region. Due to the enormous variability in stormwater quality and quantity and the complexity of urban runoff, this Order does not contain numerical limitations for any constituents. The impact of stormwater and urban runoff discharges on water quality of receiving waters has not been fully determined. Extensive water quality monitoring and analysis of the data are essential to make that determination. This Order requires the permittees to continue to monitor the discharges and to analyze the data. This Order also requires the development and implementation of best management practices (BMPs). "BMPs" are defined in 40 CFR 122.2 as "schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the pollution of waters of the United States. BMPs also include treatment requirements, operating procedures, and practices to control plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage." For purposes of this Order, BMPs for the control of pollutants in stormwater and urban runoff may include the use of non-structural (e.g. public education, regulatory powers, urban planning,

etc.) and structural (e.g. detention basins, grass swales, runoff infiltration devices, etc.) controls which may be applied to a particular site or throughout a region (e.g., a city or throughout an area served by a stormwater conveyance system).

16. Pursuant to 40 CFR 131.12 and State Board Resolution No. 68-16, Statement of Policy with Respect to Maintaining High Quality of Waters in California (collectively "antidegradation policies"), the Regional Board shall ensure that any increase in pollutant loading to a receiving water meets the requirements stated in the foregoing policies. At a minimum, permitting actions shall be consistent with the following:

    a. Existing instream water uses and the level of water quality necessary to protect existing beneficial uses shall be maintained and protected;

    b. Where the quality of the waters exceed levels necessary to support propagation of fish, shellfish, and wildlife and recreation in and on the water, the quality shall be maintained and protected unless the State finds, after full satisfaction of the intergovernmental coordination and public participation provisions of the State's continuing planning process, that allowing lower water quality is necessary to accommodate important economic or social development in the area in which the waters are located;

    c. Where high quality waters constitute an outstanding national resource, such as waters of National and State parks and wildlife refuges and waters of exceptional recreational or ecological significance, that water quality shall be maintained and protected; and

    d. In those cases where potential water quality impairment associated with a thermal discharge is involved, the antidegradation policy and implementing method shall be consistent with Section 316 of the Clean Water Act.

17. The Regional Board, in establishing the requirements contained herein, has taken into consideration the requirements of the State and Federal "antidegradation" policies and has determined that:

    a. The conditions and requirements established in this order for discharges of stormwater/urban runoff to waters of the United States ensure that the existing

beneficial uses and quality of receiving waters will be protected and improved through the implementation of best management practices for the control of pollutants in stormwater and urban runoff;

b. Discharges of urban runoff to waters of the United States will continue regardless of the issuance of this Order. The issuance of this Order is necessary to ensure achievement and maintenance of the goals and objectives of the water quality control plans adopted by the State and will result in improvement in water quality through implementation of stormwater management programs for the control of pollutants in urban runoff;

c. No receiving waters covered under the terms and conditions of this Order have been designated an outstanding national resource water or an Area of Special Biological Significance (ASBS) by the State Water Resources Control Board; and

d. Thermal discharges potentially impairing water quality are not authorized under the terms and conditions of this Order, thus, Section 316 of the Clean Water Act is not applicable.

18. Pursuant to Section 402 of the CWA, and amendments thereto, and pursuant to Section 13260, et seq., of the California Water Code, this Order shall serve as an NPDES permit and waste discharge requirements for the discharge of stormwater and urban runoff to surface waters of Riverside County in the area under the jurisdiction of the Regional Board.

19. The Regional Board, in establishing the requirements contained herein, considered factors including, but not limited to, the following:

a. Beneficial uses to be protected and the water quality objectives reasonably required for that purpose;

b. Other waste discharges;

c. The need to prevent nuisance;

d. Past, present, and probable future beneficial uses of the waters under consideration;

e. Environmental characteristics of the waters under consideration;

f. Water quality conditions that could reasonably be achieved through the coordinated control of all factors which affect water quality in the area;

g. Economic considerations; and

h. The need for developing housing within the region;

20. The issuance of this permit for the discharge of stormwater runoff and urban runoff is exempt from the requirement for preparation of environmental documents under the California Environmental Quality Act (Public Resources Code, Division 13, Chapter 3, Section 21000 et seq.) in accordance with the California Water Code, Section 13389.

21. The Regional Board has considered all water resource related environmental factors associated with the discharge of stormwater and urban runoff.

22. The Regional Board has notified all known interested parties of its intent to issue an NPDES permit for the discharge of stormwater and urban runoff.

23. The Regional Board has, at a public meeting, heard and considered all comments pertaining to the discharge of stormwater and urban runoff.

IT IS HEREBY ORDERED that the permittees, in order to meet the provisions contained in Division 7 of the California Water Code and regulations adopted thereunder, and the provisions of the Clean Water Act as amended and regulations and guidelines adopted thereunder, shall comply with the following:

I. RESPONSIBILITIES OF PRINCIPAL PERMITTEE

The principal permittee shall be responsible to manage the program overall, including:

1. Administer the Riverside County Flood Control and Water Conservation District Act.
2. Conduct water quality and hydrographic monitoring of stormwater conveyance system outfalls as agreed upon by the Executive Officer.
3. Develop uniform criteria for stormwater conveyance system inspections.
4. Conduct inspections of the stormwater conveyance systems within its jurisdiction.
5. Prepare and submit to the Regional Board all the reports, plans, and programs as required in this Order.
6. Monitor the implementation of the plans and programs and determine their effectiveness in attaining water quality

objectives.

7. Coordinate all the activities with the Regional Board.
8. Enact legislation and ordinances as necessary to establish legal authority.
9. Pursue enforcement actions as necessary to ensure compliance with stormwater management programs and implementation plans.
10. Solicit, and respond to, public input[2] for proposed monitoring, reconnaissance, management, and implementation plans.
11. Ensure adequate response to emergency situations such as accidental spills, leaks, illicit discharges, etc.
12. Abide by the terms of the Implementation Agreement.

II. RESPONSIBILITIES OF THE CO-PERMITTEES

The co-permittees shall be responsible to manage the program within its jurisdiction, including:

1. Conduct stormwater conveyance system inspections in accordance with the uniform criteria developed by the principal permittee.
2. Conduct and coordinate with the principal permittee any surveys and characterizations needed to identify the pollutant sources and drainage areas.
3. Review and approve management programs, monitoring programs, and implementation plans.
4. Implement management programs, monitoring programs, and implementation plans as required by this Order.
5. Submit stormwater conveyance system maps with periodic revisions as necessary.
6. Prepare and submit all reports to the principal permittee in a timely manner.
7. Enact, and administer, legislation and ordinances as necessary to establish legal authority.
8. Pursue enforcement actions as necessary to ensure compliance with the stormwater management programs and the implementation plans.
9. Ensure adequate response to emergency situations such as accidental spills, leaks, illicit discharges, etc.
10. Abide by the terms of the Implementation Agreement.

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[2] Solicitation, and response to, public input may be demonstrated by: (1) disseminating the notice of availability of plans for review and comment to the public at large, environmental groups, federal, state and local agencies and other interested parties; and, (2) addressing concerns expressed by the public.

III. GENERAL REQUIREMENTS

1. The permittees shall prohibit illicit/illegal discharges from entering into stormwater conveyance systems. Discharges conditionally allowed to enter stormwater conveyance systems are specified in Item V. 4.

2. The permittees shall develop and implement best management practices (BMPs), including management practices, control techniques, and system design and engineering methods, and such other provisions as the Executive Officer determines appropriate for the control of pollutants, to control/reduce the discharge of pollutants to waters of the United States to the maximum extent practicable. The BMPs so developed, along with a time schedule for implementation, shall be submitted for the approval and/or modification by the Executive Officer of the Regional Board. In developing the best management practices, the permittees shall consider the water quality objectives of all the receiving water bodies.

3. The permittees shall ensure that BMPs are implemented for entities discharging stormwater and urban runoff to stormwater conveyance systems within their area of jurisdiction.

IV. COMPILATION AND SUBMITTAL OF EXISTING DATA

1. Runoff Quality/Quantity

The permittees shall collectively submit all quantitative information, generated since 1980, on stormwater discharges to stormwater conveyance systems. Historical averages and extremes of the collected data shall also be submitted. This information will be used to facilitate the identification of sources of pollutants present in the stormwater discharges and to develop an effective discharge monitoring program for this Order. Information to be submitted shall include the following:

a. Analytical and flow data for stormwater samples collected from the stormwater conveyance system outfalls, and within any tributary waters of the United States;

b. Precipitation data from the precipitation stations and the duration of the storm events (if available); and

c. Analysis of the data and the major pollutants identified in the stormwater discharges from each drainage area to each receiving water and a

determination whether the identified pollutants came from non-point source or point-source discharges.

2. System/Drainage Area Characterization

The permittees shall submit information to the Regional Board for identification and characterization of the sources of pollutants in the stormwater discharges. Descriptive information, such as land use in Riverside County, and an overall map of the drainage system showing major feature shall be submitted. The following information shall be provided:

a. An identification of the drainage areas (more than 50 acres in size) that discharge stormwater to the stormwater conveyance systems and of those drainage areas that discharge to stormwater conveyance systems with pipe diameters greater than 36 inches;

b. The sizes of these drainage areas (acreage) and the sizes (pipe diameters or approximate dimensions of the stormwater conveyance systems) and physical characteristics of the stormwater conveyance systems. These physical characteristics shall include, but not be limited to, whether the stormwater conveyance system is lined or unlined and whether it has intermittent or continuous flow;

c. The names, locations, and Standard Industrial Codes (SIC) of specific industrial sources and principal land use activities in each drainage area, identified in IV B.2. a., above, discharging to the stormwater conveyance systems. An estimation of the runoff coefficients for these drainage areas shall also be provided;

d. The locations of present stormwater conveyance system outfalls discharging to waters of the United States. The name of each receiving water shall be reported and the location of each outfall shall be indicated on a map; and

e. The locations of major structural controls for stormwater and urban runoff discharges (e.g. retention basins, detention basins, etc).

3. Illegal Connections

a. The permittees shall provide a list of dischargers (permitted and unpermitted) known to exist currently who discharge process or non-process wastewater to the stormwater conveyance systems and any existing

information pertaining to illegal dumping of pollutants in stormwater conveyance systems. The permittees shall also provide any existing procedures used for detecting illegal connections to the stormwater conveyance systems, the rationale for the procedures, and the drainage areas (or cities) in which these programs are practiced; and

b. A description of the present and historic use of ordinances or other controls to prohibit and/or limit the non-stormwater discharges to stormwater conveyance systems.

4. Stormwater Management Program

A description of the existing stormwater/urban runoff management programs and structural and non-structural BMPs implemented by the permittees.

5. Stormwater/Urban Runoff Monitoring Program

A description of the existing monitoring programs and the rationale for their selection.

6. Pollutant Information

The permittees shall provide information regarding the discharge of any pollutant required under 40 CFR 122.21(g)(7)(iii) and (iv).

7. Other Pertinent Existing Information

The permittees shall provide to the Regional Board any other existing information that is pertinent to this permit.

8. The permittees shall submit the above information, IV.1. - IV.7., for the receiving waters within the San Diego region no later than March 31, 1992.

V. RECONNAISSANCE SURVEY

1. The permittees shall submit information from a reconnaissance survey to be conducted at the stormwater conveyance systems. The purpose of the survey is to identify illegal/illicit non-stormwater discharges to the stormwater conveyance systems, illicit disposal practices, or other practices which impair water quality. The reconnaissance survey field manual and implementation plan for prosecuting violators and eliminating illegal discharges so developed, along with time schedules for implementation, shall be submitted for the approval of

the Executive Officer of the Regional Board. The information shall include, but needed not be limited to, the following:

a. By September 30, 1992, a proposed reconnaissance survey field manual, including a time schedule shall be submitted.

b. By September 30, 1993, and every year thereafter until the completion of the survey, a progress report containing the following information shall be submitted:

i. Results of the reconnaissance survey, including an evaluation of the results;

ii. Additional information that would lead to isolating and identifying sources of illegal connections to the stormwater conveyance systems. Such information should include, but is not limited to, visual observations (e.g. color, turbidity, odor, etc), major land use activities in the surrounding drainage areas, seasonal change of flow, the surrounding hydrogeologic formation, etc.;

iii. A listing of any identified or suspected illegal non-stormwater dischargers, including the names, locations, and types of the facilities, and the names of the stormwater conveyance systems and receiving waters to which the illegal/illicit non-stormwater discharges occur;

iv. A listing of large industrial facilities (with more than 100 employees) where hazardous/toxic substances are stored and/or used, landfills, hazardous waste disposal, treatment, and/or recovery facilities, and any known spills, leaks or other problems in the area; and

v. A discussion on all activities, related to the survey, conducted for the past 12 months.

2. By March 31, 1992, the permittees shall submit a proposed implementation plan, including a tentative time schedule, to prosecute violators and eliminate illegal/illicit discharges to the stormwater conveyance systems. The proposed plan shall also include a description of the legal authorities for prosecuting violators and eliminate or control illicit disposal practices and illegal discharges to the stormwater conveyance systems, and a proposed time schedule for obtaining such legal authorities, if necessary.

3. By September 30, 1994, and every year thereafter, the permittees shall submit a progress report evaluating the effectiveness of the plan in detecting and eliminating illegal/illicit discharges to the stormwater conveyance systems.

4. The permittees shall effectively eliminate all identified illegal/illicit discharges in the shortest time practicable, and in no case later than July 16, 1995. Those identified after July 16, 1995 shall be eliminated in the shortest time practicable. The following discharges shall not be considered illegal/illicit discharges provided the discharges do not cause or contribute to violations of water quality standards and are not significant contributors of pollutants to waters of the United States: discharges composed entirely of stormwater, discharges covered under an NPDES permit, discharges to storm water conveyance systems from potable water line flushing, fire fighting, landscape irrigation, diverted stream flows, rising groundwaters (not including active dewatering systems), groundwater infiltration as defined at 40 CFR 35.2005(20), discharges from potable water sources, passive foundation drains (not including active groundwater dewatering), air conditioning condensation, irrigation water, water from crawl space pumps, passive footing drains (not including active groundwater dewatering systems), lawn watering, individual residential vehicle washing, flows from riparian habitats and wetlands, dechlorinated swimming pool discharges, street wash waters related to cleaning and maintenance by permittees, or waters not otherwise containing wastes as defined in California Water Code Section 13050(d). If it is determined that any of the preceding discharges cause or contribute to violations of water quality standards or are significant contributors of pollutants to waters of the United States, the discharges shall be prohibited from entering stormwater conveyance systems.

VI. DRAINAGE AREA MANAGEMENT PROGRAM

1. The permittees shall develop and implement best management practices (BMPs) to control the discharge of pollutants to waters of the United States. The permittees shall submit information pertaining to the proposed management programs for control of the pollutants in the stormwater discharges. The information shall include, but need not be limited to, the following:

   a. A brief description of the existing BMPs and stormwater management programs;

b. Proposed modifications to the existing BMPs and stormwater/urban runoff management programs to reduce pollutants in stormwater discharges from industrial, commercial, and residential properties to the maximum extent practicable. At a minimum, the following should be considered in developing the BMPs:

Structural Controls

i. Structural controls such as first flush diversion, detention/retention basins, infiltration trenches/basins, porous pavement, oil/grease separators, grass swales, wire concentrators, etc. Engineering and design modification of the existing structures should also be considered.

Non-Structural Controls

ii. Programs to educate the public on proper disposal of hazardous/toxic wastes. These may include public workshops, meetings, notifications by mail, collection programs for household hazardous wastes, etc.

iii. Management practices such as street sweeping, proper maintenance of streambanks, erosion control structures, etc.

iv. Regulatory approaches such as county and local ordinances, permitting of construction sites, etc.

v. Enforcement programs established by the county and cities, including field inspections and response to emergency incidents.

vi. The ongoing program required in Item No. V. above for the detection and elimination of illicit connections and controlling/eliminating illegal dumping of pollutants into storm drain systems.

c. An implementation plan for site-specific BMPs which are required to reduce pollutants in the stormwater discharges from residential, commercial and industrial areas, and construction sites. Requirements for the implementation of BMPs at these sites are described as follows:

i. New Construction Sites

All industrial/commercial construction operations that result in a disturbance of one acre or more of total land area (or a smaller parcel of land which is a part of a larger common development) and residential construction sites that result in a disturbance of five acres or more of total land area (or a smaller parcel of land which is a part of a larger common development) shall be required to develop and implement BMPs to control erosion/siltation and contaminated runoff from the construction site.

ii. Residential and Commercial/Industrial Sites

To prevent the increase of pollutants in stormwater discharges, all new developments and existing facilities with significant redevelopment must develop individual post construction long-term comprehensive stormwater management plans.

d. A description of the legal authorities for implementing the programs, and a proposed time schedule for obtaining such legal authorities, if necessary; and

e. A description of staff, equipment, and funds available to implement the programs.

2. The permittees shall submit the BMPs so developed, along with a time schedule for implementation, for the approval by the Executive Officer of the Regional Board no later than March 31, 1993.

3. By March 31, 1994 and every year thereafter, the permittees shall submit a progress report assessing the reduction of pollutants discharged to waters of the United States and evaluating the effectiveness of the BMPs developed for the stormwater and urban runoff discharges. The permittees shall also include recommended BMP modifications, with a time schedule for implementation, needed to achieve compliance with any water quality objectives not attained.

VII. STORMWATER/URBAN RUNOFF MONITORING PROGRAM

The permittees shall develop and implement (after approval of the plan by the Executive Officer) a stormwater/urban runoff monitoring program. Proposed monitoring programs and time schedules for their implementation shall be subject to the approval of the Executive Officer. Proposed monitoring

programs, time schedules, and implementation reports shall be submitted to the principal permittee in sufficient time to submit a collated report to the Regional Board as follows:

STORMWATER MONITORING

TASK	REPORT DATE
Submittal of Proposed Stormwater Monitoring Programs and Implementation Time Schedules	03/31/93
Progress Report on the Implementation of the Stormwater Monitoring Programs	03/31/94*

* and annually thereafter

VIII. RECEIVING WATER MONITORING PROGRAM

The permittees shall develop and implement (after approval of the plan by the Executive Officer) a receiving water monitoring program. Proposed monitoring programs and time schedules for their implementation shall be subject to the approval of the Executive Officer. Proposed monitoring programs, time schedules, and implementation reports shall be submitted to the principal permittee in sufficient time to submit a collated report to the Regional Board as follows:

RECEIVING WATER MONITORING

TASK	REPORT DATE
Submittal of Proposed Receiving Water Monitoring Programs and Implementation Time Schedules	03/31/93
Progress Report on the Implementation of the Receiving Water Monitoring Programs	03/31/94*

* and annually thereafter

IX. FISCAL ANALYSIS

1. By July 31, 1991 and every year thereafter, a fiscal analysis of the capital and operation and maintenance expenditures necessary to accomplish the activities of the proposed plans and programs shall be performed.

2. By August 31, 1991 and every year thereafter, a fiscal analysis of the capital and operation and maintenance expenditures shall be submitted for review by EPA and the Regional Board.

X. DATA ANALYSIS

1. The results of the chemical analysis and quantitative data (such as flow, precipitation, and discharge data)

shall be compiled for each drainage area, each storm event, and for different times during the same storm event. The mass loading rates for the pollutants of concern shall be calculated and any impact of stormwater and urban runoff discharges on the receiving waters shall be discussed, starting with the most significantly impacted receiving waters.

2. With the implementation of the receiving water monitoring program, an evaluation shall be performed for the calculated pollutant loading rates from the stormwater and urban runoff monitoring program and the receiving water monitoring program. The evaluation shall be concluded with recommendations and the corrective actions proposed for any resulting discrepancies.

3. By January 31, 1994 and every year thereafter, the analysis of all the above data shall be submitted.

XI. PROGRAM ANALYSIS

No later than January 31, 1994, and annually thereafter, the principal permittee shall conduct an analysis of the effectiveness of the overall stormwater management program. If the water quality objectives of the receiving waters are violated as a result of stormwater/urban runoff discharges, the principal permittee shall identify proposed programs which will result in the attainment of the water quality objectives, and a time schedule to implement the new programs.

XII. IMPLEMENTATION AGREEMENT

A signed copy of the Implementation Agreement between the RCFC&WCD, the County of Riverside, and the City of Temecula shall be submitted by January 31, 1991. Any revisions to the Implementation Agreement shall be forwarded to the Executive Officer within 30 days of approval by all the permittees.

XIII. REPORTING

1. A summary of tasks to be completed and reports submitted is as follows:

(continued on the following page)

TASK		COMPLIANCE REPORT DUE
XII	Implementation Agreement	01/31/91
IV.	Existing reports and programs	03/31/92
V.1.a	Proposed Reconnaissance Survey Field Manual	09/30/92
V.2	Proposed Implementation Plan for Prosecuting Illegal Dischargers	03/31/93
VI.1&2	Management Programs (BMPs) and Implementation Plan	03/31/93
VII.1&2	Stormwater Monitoring Program Plan	03/31/93
VIII.1&2	Receiving Water Monitoring Program Plan	03/31/93
	Progress Reports after Plan Implementation	
V.1.b.	Reconnaissance Survey Progress Report	09/30 of every year[3]
V.	Illegal Discharge Elimination Progress Report	09/30 of every year[4]
VI.3	Management Programs Progress Report	03/31 of every year[5]
VII.3	Stormwater Monitoring Program Progress Report	03/31 of every year[6]
VIII.3	Receiving Water Monitoring Program Progress Report	03/31 of every year[7]
IX.	Fiscal Analysis	08/31 of every year[8]
X & XI	Data/Program Analysis	01/31 of every year[9]

[3] The first progress report is due by September 30, 1993.

[4] The first progress report is due by September 30, 1994.

[5] The first progress report is due by March 31, 1994.

[6] The first progress report is due by March 31, 1994.

[7] The first progress report is due by March 31, 1994.

[8] The first annual fiscal analysis is due by August 31, 1991.

[9] The first data/program analysis is due by January 31, 1994.

B. All reports and information required herein shall be submitted to the Executive Officer of the Regional Board and the Regional Director of the Environmental Protection Agency, Region IX, at the following addresses:

Executive Officer
California Regional Water Quality Control Board
San Diego Region
9771 Clairemont Mesa Blvd., Ste. B
San Diego, California 92124-1331

Environmental Protection Agency
Region IX
Permits and Compliance Branch
1235 Mission Street (Mail Code W-5)
San Francisco, California 94103

XIV. ANALYTICAL METHODS/RECORD KEEPING

A. Samples and measurements taken as required herein shall be representative of the volume and nature of the monitored discharge. Once established, monitoring points shall not be changed without notification to and the approval of the Executive Officer.

B. Monitoring must be conducted according to United States Environmental Protection Agency test procedures approved under Title 40, Code of Federal Regulations (CFR), Part 136, "Guidelines Establishing Test Procedures for Analysis of Pollutants Under the Clean Water Act" as amended, unless other test procedures have been specified by this Order or the Executive Officer.

C. All analyses shall be performed in a laboratory certified to perform such analyses by the California Department of Health Services or a laboratory approved by the Executive Officer.

D. Monitoring results must be reported on discharge monitoring report forms or in a format approved by the Executive Officer.

E. If a permittee monitors any pollutant more frequently than required by this Order, using test procedures approved under 40 CFR, Part 136, or as specified in this Order, the results of this monitoring shall be included in the calculation and reporting of the data submitted in the permittee's monitoring report. The increased frequency of monitoring shall also be reported.

F. Permittees shall retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all

reports required by this Order, and records of all data used to complete the application for this Order. Records shall be maintained for a minimum of five years from the date of the sample, measurement, report, or application. This period may be extended during the course of any unresolved litigation regarding this discharge or when requested by the Regional Board Executive Officer.

G. Records of monitoring information shall include:

1. The date, exact place, and time of sampling or measurements;
2. The individual(s) who performed the sampling or measurements;
3. The date(s) analyses were performed;
4. The individual(s) who performed analyses;
5. The analytical techniques or method used; and
6. The results of such analyses.

H. Calculations for all limitations which require averaging of measurements shall utilize an arithmetic mean unless otherwise specified by the Executive Officer or in this Order.

I. All monitoring instruments and devices used by a permittee to fulfill the prescribed monitoring program shall be properly maintained and calibrated as necessary to ensure their continued accuracy.

J. Permittees shall report all instances of noncompliance not reported under Standard Reporting Requirement XVI. E. of this Order at the time monitoring reports are submitted. The reports shall contain the information listed in Standard Reporting Requirement XVI. E.

K. The monitoring reports shall be signed by an authorized person as required by Standard Reporting Requirement L.

L. A composite sample is defined as a combination of at least 8 sample aliquots of at least 100 milliliters each, collected at periodic intervals during the operating hours of a facility over a 24-hour period. For volatile pollutants, aliquots must be combined in the laboratory immediately before analysis. The composite must be flow proportional; either the time interval between each aliquot or the volume of each aliquot must be proportional to either the stream flow at the time of sampling or the total stream flow since the collection of the previous aliquot. Aliquots may be collected manually or automatically.

M. A grab sample is an individual sample of at least 100 milliliters collected at a randomly selected time over a period not exceeding 15 minutes.

XV. PROVISIONS

A. Neither the treatment nor the discharge of pollutants shall create a pollution, contamination, or nuisance as defined by Section 13050 of the California Water Code.

B. The permittees must comply with all conditions of this Order. Any permit noncompliance constitutes a violation of the Clean Water Act and the California Water Code and is grounds for enforcement action; for permit termination, revocation and reissuance, or modification; the issuance of an individual permit; or for denial of a renewal application.

C. The permittees shall take all reasonable steps to minimize or correct any adverse impact on the environment resulting from noncompliance with this Order, including such accelerated or additional monitoring as may be necessary to determine the nature and impact of the noncomplying discharge.

D. This Order may be modified, revoked and reissued, or terminated for cause including, but not limited to, the following:

1. Violation of any terms or conditions of this Order;

2. Obtaining this Order by misrepresentation or failure to disclose fully all relevant facts; or

3. A change in any condition that requires either a temporary or permanent reduction or elimination of the discharge.

The filing of a request by a permittee for modification, revocation and reissuance, or termination of this Order or a notification of planned change in or anticipated noncompliance with this Order does not stay any condition of this Order.

E. In addition to any other grounds specified herein, this Order shall be modified or revoked at any time if, on the basis of any new data, the Executive Officer determines that continued discharges may cause unreasonable degradation of the aquatic environment.

F. This Order is not transferable to any person except after notice to the Executive Officer of this Regional Board. The Regional Board may require a new report of waste discharge to change the name of a permittee and incorporate such other requirements as may be necessary under the California Water Code and the Clean Water Act. A permittee shall submit notice of any transfer of this

Order's responsibility and coverage to a new permittee as described under Standard Reporting Requirement XVI.C.

G. This Order does not convey any property rights of any sort or any exclusive privileges. The requirements prescribed herein do not authorize the commission of any act causing injury to persons or property of another, including property damage caused as a result of the discharge, nor protect the permittee from liability under federal, state, or local laws, nor create a vested right for the permittee to continue the discharge.

H. Permittees shall allow the Regional Board, or an authorized representative or any representative of the United States Environmental Protection Agency upon the presentation of credentials and other documents as may be required by law, to:

1. Enter upon the permittee's premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of this Order;

2. Have access to and copy, at reasonable times, any records that must be kept under the conditions of this Order;

3. Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices or operation regulated or required under this Order; and

4. Sample or monitor at reasonable times, for the purposes of assuring compliance with this Order or as otherwise authorized by the Clean Water Act or California Water Code, any substances or parameters at any location.

I. Permittees shall, at all times, properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by a permittee to achieve compliance with the conditions of this Order. Proper operation and maintenance includes effective performance, adequate funding, adequate operator staffing and training, and adequate laboratory and process controls including appropriate quality assurance procedures. This provision requires the operation of backup or auxiliary facilities or similar systems only when necessary to achieve compliance with the conditions of this Order.

J. In an enforcement action, it shall not be a defense for a permittee that it would have been necessary to halt or reduce the permitted activity in order to maintain

compliance with this Order. Upon reduction, loss, or failure of the treatment facility, the permittee shall, to the extent necessary to maintain compliance with this Order, control production or all discharges, or both, until the facility is restored or an alternative method of treatment is provided. This provision applies, for example, when the primary source of power of the treatment facility fails, is reduced or is lost.

K. The provisions of this Order are severable, and if any provision of this Order, or the application of any provision of this Order to any circumstances, is held invalid, the application of such provision to other circumstances, and the remainder of this Order, shall not be affected thereby.

L. Bypass of Treatment Facilities

1. Definitions

(a) "Bypass" means the intentional diversion of waste streams from any portion of the treatment facility.

(b) "Severe property damage" means substantial physical damage to property, damage to the treatment facilities which cause them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production.

2. Bypass Not Exceeding Effluent Limitations

A permittee may allow any bypass to occur which does not cause effluent limitations to be exceeded, but only if it also is for essential maintenance to assure efficient operations. These bypasses are not subject to the provisions of paragraphs (3) and (4) of this section.

3. Notice of Anticipated Bypass and Unanticipated Bypass

(a) Anticipated bypass. If a permittee knows in advance of the need for a bypass, they shall submit prior notice, if possible, at least ten days before the date of the bypass.

(b) Unanticipated bypass. A permittee shall submit notice of an unanticipated bypass as described under Standard Reporting Requirement XVI. E.

4. Prohibition of Bypass

(a) Bypass is prohibited and the Regional Board may take enforcement action against a permittee for bypass, unless:

(1) Bypass was unavoidable to prevent loss of life, personal injury, or severe property damage;

(2) There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated waste, or maintenance during normal periods of equipment downtime. This condition is not satisfied if the permittee could have installed adequate backup equipment to prevent a bypass which occurred during normal periods of equipment downtime or preventive maintenance; and

(3) The permittee submitted notices as required under paragraph (3) of this section.

(b) The Executive Officer may approve an anticipated bypass, after considering its adverse effect, if the Executive Officer determines that it will meet the three conditions listed above in paragraph (1) of this section.

M. Upset Conditions

1. Definitions

"Upset" means an exceptional incident in which there is unintentional and temporary noncompliance with technology-based effluent limitations because of factors beyond the reasonable control of a permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation.

2. Effect of an Upset

An upset constitutes an affirmative defense to an action brought for noncompliance with such technology-based permit effluent limitations if the requirements of paragraph (3) of this

section are met. No determination made during administrative review of claims that noncompliance was caused by upset, and before an action for noncompliance, is final administrative action subject to judicial review.

3. Conditions Necessary for a Demonstration of Upset

A permittee who wishes to establish the affirmative defense of upset shall demonstrate, through properly signed, contemporaneous operating logs, or other relevant evidence that:

(a) An upset occurred and that the permittee can identify the specific cause(s) of the upset;

(b) The permitted facility was at the time being properly operated; and

(c) The permittee submitted notice of the upset as required in Standard Reporting Requirement XVI. E.

4. Burden of Proof

In any enforcement proceeding, a permittee seeking to establish the occurrence of an upset has the burden of proof.

XVI. STANDARD REPORTING REQUIREMENTS

A. A new Report of Waste Discharge shall be filed with the Regional Board not less than 180 days prior to the following:

1. Significant change in disposal method (e.g., change in the method of treatment which would significantly alter the nature of the waste).

2. Significant change in disposal area (e.g., moving the discharge to a disposal area significantly removed from the original area, potentially causing different water quality or nuisance problems).

3. Other circumstances which result in a material change in character, amount, or location of the waste discharge.

B. A permittee shall give advance notice to the Executive Officer of any planned changes in a permitted facility or activity which may result in noncompliance with the requirements of this Order.

C. A permittee must notify the Executive Officer, in writing, at least 30 days in advance of any proposed transfer of this Order's responsibility and coverage to a new permittee. The notice must include a written agreement between the existing and new permittee containing a specific date for the transfer of this Order's responsibility and coverage between the current permittee and the new permittee. This agreement shall include an acknowledgement that the existing permittee is liable for violations up to the transfer date and that the new permittee is liable from the transfer date on.

D. The permittees shall comply with any monitoring and reporting requirements contained in this Order and any additional monitoring requirements specified by the Executive Officer.

E. A permittee shall report any noncompliance which may endanger health or the environment. Any information shall be provided orally to the Executive Officer within 24 hours from the time the permittee becomes aware of the circumstances. A written submission shall contain a description of the noncompliance and its cause; the period of noncompliance, including exact dates and times, and if the noncompliance has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent recurrence of the noncompliance. The Executive Officer, or an authorized representative may waive the written report on a case-by-case basis if the oral report has been received within 24 hours.

F. A permittee shall notify the Executive Officer as soon as it is known or there is reason to believe:

1. That any activity has occurred or which will occur which would result in the discharge of any toxic pollutant which is not limited in this Order, if that discharge will exceed the highest of the following "notification levels":

   a. One hundred micrograms per liter (100 ug/L);

   b. Two hundred micrograms per liter (200 ug/L) for acrolein and acrylonitrile; five hundred micrograms per liter (500 ug/L) for 2.4-dinitrophenol and for 2-methyl-4, 6-dinitrophenol; and one milligram per liter (1 mg/L) for antimony.

G. A permittee shall furnish to the Executive Officer, within a reasonable time, any information which the Executive Officer may request to determine whether cause

exists for modifying, revoking and reissuing, or terminating this Order or to determine compliance with this Order or other requirements established by the Executive Officer. A permittee shall also furnish to the Executive Officer, upon request, copies of records required to be kept by this Order.

H. A permittee shall provide adequate notice to the Executive Officer of the following:

1. Any new introduction of pollutants to the discharge.

2. Any substantial change in the volume or character of pollutants being introduced into the discharge.

3. For the purpose of this provision, adequate notice shall include information on (a) the quality and quantity of waste introduced into the discharge, and (2) any anticipated impact of the change on the quantity or quality of runoff to be discharged to surface waters.

I. Where a permittee becomes aware that he failed to submit any relevant facts in a Report of Waste Discharge, or submitted incorrect information in a Report of Waste Discharge, or in any report to the Regional Board, he shall promptly submit such facts or information.

J. If a need for a discharge bypass is known in advance, the permittee shall submit prior notice and, if at all possible, such notice shall be submitted at least ten days prior to the date of the bypass.

K. This Order expires on July 16, 1995. The permittees must jointly file a Report of Waste Discharge in accordance with Title 23, Chapter 3, Subchapter 9 of the California Code of Regulations not later than 180 days in advance of such expiration date as application for issuance of new waste discharge requirements. This report of waste discharge shall include as a minimum, the following:

1. Summary of the results of the monitoring program.

2. Summary of BMPs implemented and evaluations of their effectiveness.

3. Summary of procedures implemented to detect illegal discharges and illicit disposal practices and an evaluation of their effectiveness.

4. Summary of measures implemented to control pollutants in surface runoff from construction sites and an evaluation of their effectiveness.

5. Evaluation of the need for additional BMPs, source control, and/or structural control measures.

6. Proposed plan of stormwater/urban runoff quality management activities that will be undertaken during the term of the next permit.

L. All applications, reports, or information submitted to the Executive Officer of this Regional Board shall be signed and certified.

1. The Report of Waste Discharge shall be signed as follows:

   a. For a corporation - by a principal executive officer of at least the level of vice-president.

   b. For a partnership or sole proprietorship - by a general partner or the proprietor, respectively.

   c. For a municipality, state, federal or other public agency - by either a principal executive officer or ranking elected official.

2. All other reports required by this Order and other information requested by the Executive Officer shall be signed by a person designated in paragraph (1) of this provision, or by a duly authorized representative of that person. An individual is a duly authorized representative only if:

   a. The authorization is made in writing by a person described in paragraph (1) of this provision;

   b. The authorization specified either an individual or a position having responsibility for the overall operation of the regulated facility or activity, such as the position of plant manager, operator of a well or well field, superintendent, or position of equivalent responsibility (a duly authorized representative may thus be either a named individual or any individual occupying a named position); and

   c. The written authorization is submitted to the Executive Officer.

3. Any person signing a document under this Section shall make the following certification:

"I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment."

M. Except for data determined to be confidential under Title 40, Code of Federal Regulations Part (40 CFR Part 2), all reports prepared in accordance with the terms of this Order shall be available for public inspection at the offices of the California Regional Water Quality Control Board, San Diego Region and the United States Environmental Protection Agency, Region 9. As required by the Clean Water Act, Reports of Waste Discharge, this Order, and effluent data shall not be considered confidential.

XVII. NOTIFICATIONS

A. California Water Code Section 13263(g) states:

"No discharge of waste into the waters of the state, whether or not such discharge is made pursuant to waste discharge requirements, shall create a vested right to continue such discharge. All discharges of waste into waters of the state are privileges, not rights."

B. The Clean Water Act provides that any person who violates a condition of this Order implementing Sections 301, 302, 306, 307, 308, 318 or 405 of the Clean Water Act is subject to a civil penalty not to exceed $10,000 per day of such violations. Any person who willfully or negligently violates conditions of this Order implementing Section 301, 302, 306, 307 or 308 of the Clean Water Act is subject to a fine of not less than $2,500 nor more than $25,000 per day of violation, or by imprisonment for not more than one year, or both.

C. The Clean Water Act provides that any person who knowingly makes any false statement, representation, or certification in any record or other document submitted or required to be maintained under this Order, including monitoring reports or reports of compliance or noncompliance shall, upon conviction, be punished by a fine of not more than $10,000 per violation, or by imprisonment for not more than six months per violation,

or by both.

D. Nothing in this Order shall be construed to relieve a permittee from civil or criminal penalties for noncompliance.

E. Nothing in this Order shall be construed to preclude the institution of any legal action or relieve a permittee from any responsibilities, liabilities, or penalties to which a permittee is or may be subject to under Section 311 of the Clean Water Act.

F. Nothing in this Order shall be construed to preclude institution of any legal action or relieve a permittee from any responsibilities, liabilities, or penalties established pursuant to any applicable State law or regulation under authority preserved by Section 510 of the Clean Water Act.

G. This Order shall become effective ten days after the date of its adoption, provided the Regional Administrator or Director, United States Environmental Protection Agency, has no objection. If the Regional Administrator objects to its issuance, this Order shall not become effective until such objection is withdrawn.

I, Arthur L. Coe, Executive Officer, do hereby certify the foregoing is a full, true, and correct copy of an Order adopted by the California Regional Water Quality Control Board, San Diego Region, on July 16, 1990.

ARTHUR L. COE
Executive Officer

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN DIEGO REGION

ADDENDUM NO. 1 TO ORDER NO. 90-46
NPDES PERMIT NO. CA0108766

AN ADDENDUM MODIFYING RESPONSIBILITY FOR
ORDER NO. 90-46 TO INCLUDE THE CITY OF MURRIETA
AS AN INCORPORATED CITY OF RIVERSIDE COUNTY
WITHIN THE SAN DIEGO REGION

The California Regional Water Quality Control Board, San Diego Region (hereinafter Regional Board), finds that:

1. On July 16, 1990, this Regional Board adopted Order No. 90-46 (NPDES Permit No. CA0108766), **Waste Discharge Requirements for Stormwater and Urban Runoff from the Riverside County Flood Control and Water Conservation District, the County of Riverside and the Incorporated Cities[1] of Riverside County within the San Diego Region.** Order No. 90-46 prescribes requirements for the control of pollutants resulting from stormwater/urban runoff from all incorporated cities and the unincorporated urban areas in Riverside County within the jurisdiction of the Regional Board.

2. By letter dated January 23, 1992, Kenneth L. Edwards, Chief Engineer, Riverside County Flood Control and Water Conservation District, notified the Regional Board that the City of Murrieta is now included in the incorporated cities of Riverside County within the San Diego Region.

3. The Regional Board has notified all known interested parties of its intent to modify Order No. 90-46 to reflect the addition of the City of Murrieta as one of the parties responsible for complying with Order No. 90-46.

4. The Regional Board in a public hearing heard and considered all comments pertaining to the modification of Order No. 90-46.

5. This facility is an existing facility and as such is exempt from the provisions of the California Environmental Quality Act, in accordance with Title 14, California Code of Regulations, Article 19, Section 15301.

[1] Currently includes only the City of Temecula.

IT IS HEREBY ORDERED THAT Order No. 90-46 is modified as follows:

1. Order No. 90-46 shall henceforth be referred to as **Waste Discharge Requirements for Stormwater and Urban Runoff from the Riverside County Flood Control and Water Conservation District, the County of Riverside and the Incorporated Cities[2] of Riverside County within the San Diego Region.**

2. The waste discharge requirements contained in Order No. 90-46 shall be applicable to the Riverside County Flood Control and Water Conservation District, the County of Riverside and the Incorporated Cities of Riverside County within the San Diego Region and shall remain in full force and effect.

3. The word discharger as it appears in Order No. 90-46 shall hereafter be construed to refer to the Riverside County Flood Control and Water Conservation District, the County of Riverside and the Incorporated Cities of Riverside County within the San Diego Region.

I, Arthur L. Coe, Executive Officer, do hereby certify the foregoing is a full, true, and correct copy of an Addendum adopted by the California Regional Water Quality Control Board, San Diego Region, on May 18, 1992.

Arthur L. Coe
Executive Officer

[2] Currently includes the City of Temecula and the City of Murrieta.

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COASTAL ZONE ACT REAUTHORIZATION AMENDMENTS OF 1990

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SELECTED PROVISIONS OF THE COASTAL ZONE ACT REAUTHORIZATION AMENDMENTS OF 1990

[As Amended Through P.L. 106–580, Dec. 29, 2000]

SECTION 1. SHORT TITLE.

This Act may be cited as the "Omnibus Budget Reconciliation Act of 1990".

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TITLE VI—ENERGY AND ENVIRONMENTAL PROGRAMS

* * * * * * *

Subtitle C—Amendments to Coastal Zone Management Act of 1972

SEC. 6201. SHORT TITLE.

This subtitle may be cited as the "Coastal Zone Act Reauthorization Amendments of 1990".

SEC. 6202. FINDINGS AND PURPOSE OF THIS SUBTITLE.

Sec. 6202

(a) FINDINGS.—Congress finds and declares the following:

(1) Our oceans, coastal waters, and estuaries constitute a unique resource. The condition of the water quality in and around the coastal areas is significantly declining. Growing human pressures on the coastal ecosystem will continue to degrade this resource until adequate actions and policies are implemented.

(2) Almost one-half of our total population now lives in coastal areas. By 2010, the coastal population will have grown from 80,000,000 in 1960 to 127,000,000 people, an increase of approximately 60 percent, and population density in coastal counties will be among the highest in the Nation.

(3) Marine resources contribute to the Nation's economic stability. Commercial and recreational fishery activities support an industry with an estimated value of $12,000,000,000 a year.

(4) Wetlands play a vital role in sustaining the coastal economy and environment. Wetlands support and nourish fishery and marine resources. They also protect the Nation's shores from storm and wave damage. Coastal wetlands contribute an estimated $5,000,000,000 to the production of fish

and shellfish in the United States coastal waters. Yet, 50 percent of the Nation's coastal wetlands have been destroyed, and more are likely to decline in the near future.

(5) Nonpoint source pollution is increasingly recognized as a significant factor in coastal water degradation. In urban areas, storm water and combined sewer overflow are linked to major coastal problems, and in rural areas, run-off from agricultural activities may add to coastal pollution.

(6) Coastal planning and development control measures are essential to protect coastal water quality, which is subject to continued ongoing stresses. Currently, not enough is being done to manage and protect our coastal resources.

(7) Global warming results from the accumulation of man-made gases, released into the atmosphere from such activities as the burning of fossil fuels, deforestation, and the production of chlorofluorocarbons, which trap solar heat in the atmosphere and raise temperatures worldwide. Global warming could result in significant global sea level rise by 2050 resulting from ocean expansion, the melting of snow and ice, and the gradual melting of the polar ice cap. Sea level rise will result in the loss of natural resources such as beaches, dunes, estuaries, and wetlands, and will contribute to the salinization of drinking water supplies. Sea level rise will also result in damage to properties, infrastructures, and public works. There is a growing need to plan for sea level rise.

(8) There is a clear link between coastal water quality and land use activities along the shore. State management programs under the Coastal Zone Management Act of 1972 (16 U.S.C. 1451 et seq.) are among the best tools for protecting coastal resources and must play a larger role, particularly in improving coastal zone water quality.

(9) All coastal States should have coastal zone management programs in place that conform to the Coastal Zone Management Act of 1972, as amended by this Act.

(b) PURPOSE.—It is the purpose of Congress in this subtitle to enhance the effectiveness of the Coastal Zone Management Act of 1972 by increasing our understanding of the coastal environment and expanding the ability of State coastal zone management programs to address coastal environmental problems.

* * * * * * *

SEC. 6217. PROTECTING COASTAL WATERS.

(a) IN GENERAL.—

(1) PROGRAM DEVELOPMENT.—Not later than 30 months after the date of the publication of final guidance under subsection (g), each State for which a management program has been approved pursuant to section 306 of the Coastal Zone Management Act of 1972 shall prepare and submit to the Secretary and the Administrator a Coastal Nonpoint Pollution Control Program for approval pursuant to this section. The purpose of the program shall be to develop and implement management measures for nonpoint source pollution to restore and protect coastal waters, working in close conjunction with other State and local authorities.

(2) PROGRAM COORDINATION.—A State program under this section shall be coordinated closely with State and local water quality plans and programs devel-oped pursuant to sections 208, 303, 319, and 320 of the Federal Water Pollution Control Act (33 U.S.C. 1288, 1313, 1329, and 1330) and with State plans developed pursuant to the Coastal Zone Management Act of 1972, as amended by this Act. The program shall serve as an update and expansion of the State nonpoint source management program developed under section 319 of the Federal Water Pollution Control Act, as the program under that section relates to land and water uses affecting coastal waters.

(b) PROGRAM CONTENTS.—Each State program under this section shall provide for the implementation, at a minimum, of management measures in conformity with the guidance published under subsection (g), to protect coastal waters generally, and shall also contain the following:

(1) IDENTIFYING LAND USES.—The identification of, and a continuing process for identifying, land uses which, individually or cumulatively, may cause or contribute significantly to a degradation of—

(A) those coastal waters where there is a failure to attain or maintain applicable water quality standards or protect designated uses, as determined by the State pursuant to its water quality planning processes; or

(B) those coastal waters that are threatened by reasonably foreseeable increases in pollution loadings from new or expanding sources.

(2) IDENTIFYING CRITICAL COASTAL AREAS.—The identification of, and a continuing process for identifying, critical coastal areas adjacent to coastal waters referred to in paragraph (1)(A) and (B), within which any new land uses or substantial expansion of existing land uses shall be subject to management measures in addition to those provided for in subsection (g).

(3) MANAGEMENT MEASURES.—The implementation and continuing revision from time to time of additional management measures applicable to the land uses and areas identified pursuant to paragraphs (1) and (2) that are necessary to achieve and maintain applicable water quality standards under section 303 of the Federal Water Pollution Control Act (33 U.S.C. 1313) and protect designated uses.

(4) TECHNICAL ASSISTANCE.—The provision of technical and other assistance to local governments and the public for implementing the measures referred to in paragraph (3), which may include assistance in developing ordinances and regulations, technical guidance, and modeling to predict and assess the effectiveness of such measures, training, financial incentives, demonstration projects, and other innovations to protect coastal water quality and designated uses.

(5) PUBLIC PARTICIPATION.—Opportunities for public participation in all aspects of the program, including the use of public notices and opportunities for comment, nomination procedures, public hearings, technical and financial assistance, public education, and other means.

(6) ADMINISTRATIVE COORDINATION.—The establishment of mechanisms to improve coordination among State agencies and between State and local officials responsible for land use programs and permitting, water quality permitting and enforcement, habitat protection, and public health and safety, through the use of joint project review, memoranda of agreement, or other mechanisms.

(7) STATE COASTAL ZONE BOUNDARY MODIFICATION.—A proposal to modify the boundaries of the State coastal zone as the coastal management agency of the State determines is necessary to implement the recommendations made pursuant to subsection (e). If the coastal management agency does not have the authority to modify such boundaries, the program shall include recommendations for such modifications to the appropriate State authority.

(c) PROGRAM SUBMISSION, APPROVAL, AND IMPLEMETATION.—

(1) REVIEW AND APPROVAL.—Within 6 months after the date of submission by a State of a program pursuant to this section, the Secretary and the Administrator shall jointly review the program. The program shall be approved if—

(A) the Secretary determines that the portions of the program under the authority of the Secretary meet the requirements of this section and the Administrator concurs with that determination; and

(B) the Administrator determines that the portions of the program under the authority of the Administrator meet the requirements of this section and the Secretary concurs with that determination.

(2) IMPLEMENTATION OF APPROVED PROGRAM.—If the program of a State is approved in accordance with paragraph (1), the State shall implement the program, including the management measures included in the program pursuant to subsection (b), through—

(A) changes to the State plan for control of nonpoint source pollution approved under section 319 of the Federal Water Pollution Control Act; and

(B) changes to the State coastal zone management program developed under section 306 of the Coastal Zone Management Act of 1972, as amended by this Act.

(3) WITHHOLDING COASTAL MANAGEMENT ASSISTANCE.—If the Secretary finds that a coastal State has failed to submit an approvable program as required by this section, the Secretary shall withhold for each fiscal year until such a program is submitted a portion of grants otherwise available to the State for the fiscal year under section 306 of the Coastal Zone Management Act of 1972, as follows:

(A) 10 percent for fiscal year 1996.

(B) 15 percent for fiscal year 1997.

(C) 20 percent for fiscal year 1998.

(D) 30 percent for fiscal year 1999 and each fiscal year thereafter.

The Secretary shall make amounts withheld under this paragraph available to coastal States having programs approved under this section.

(4) WITHHOLDING WATER POLLUTION CONTROL ASSISTANCE.—If the Administrator finds that a coastal State has failed to submit an approvable program as required by this section, the Administrator shall withhold from grants available to the State under section 319 of the Federal Water Pollution Control Act, for each fiscal year until such a program is submitted, an amount equal to a percentage of the grants awarded to the State for the preceding fiscal year under that section, as follows:

(A) For fiscal year 1996, 10 percent of the amount awarded for fiscal year 1995.

(B) For fiscal year 1997, 15 percent of the amount awarded for fiscal year 1996.

(C) For fiscal year 1998, 20 percent of the amount awarded for fiscal year 1997.

(D) For fiscal year 1999 and each fiscal year thereafter, 30 percent of the amount awarded for fiscal year 1998 or other preceding fiscal year.

The Administrator shall make amounts withheld under this paragraph available to States having programs approved pursuant to this subsection.

(d) TECHNICAL ASSISTANCE.—The Secretary and the Administrator shall provide technical assistance to coastal States and local governments in developing and implementing programs under this section. Such assistance shall include—

(1) methods for assessing water quality impacts associated with coastal land uses;

(2) methods for assessing the cumulative water quality effects of coastal development;

(3) maintaining and from time to time revising an inventory of model ordinances, and providing other assistance to coastal States and local governments in identifying, developing, and implementing pollution control measures; and

(4) methods to predict and assess the effects of coastal land use management measures on coastal water quality and designated uses.

(e) INLAND COASTAL ZONE BOUNDARIES.—

(1) REVIEW.—The Secretary, in consultation with the Administrator of the Environmental Protection Agency, shall, within 18 months after the effective date of this title, review the inland coastal zone boundary of each coastal State program which has been approved or is proposed for approval under section 306 of the Coastal Zone Management Act of 1972, and evaluate whether the State's coastal zone boundary extends inland to the extent necessary to control the land and water uses that have a significant impact on coastal waters of the State.

(2) RECOMMENDATION.—If the Secretary, in consultation with the Administrator, finds that modifications to the inland boundaries of a State's coastal zone are necessary for that State to more effectively manage land and water uses to protect coastal waters, the Secretary, in consultation with the Administrator, shall recommend appropriate modifications in writing to the affected State.

(f) FINANCIAL ASSISTANCE.—

(1) IN GENERAL.—Upon request of a State having a program approved under section 306 of the Coastal Zone Management Act of 1972, the Secretary, in consultation with the Administrator, may provide grants to the State for use for developing a State program under this section.

(2) AMOUNT.—The total amount of grants to a State under this subsection shall not exceed 50 percent of the total cost to the State of developing a program under this section.

(3) STATE SHARE.—The State share of the cost of an activity carried out with a grant under this subsection shall be paid from amounts from non-Federal sources.

(4) ALLOCATION.—Amounts available for grants under this subsection shall be allocated among States in accordance with regulations issued pursuant to section 306(c) of the Coastal Zone Management Act of 1972, except that the Secretary may use not more than 25 percent of amounts available for such grants to assist States which the Secretary, in consultation with the Administrator, determines are making exemplary progress in preparing a State program under this section or have extreme needs with respect to coastal water quality.

(g) GUIDANCE FOR COASTAL NONPOINT SOURCE POLLUTION CONTROL.—

(1) IN GENERAL.—The Administrator, in consultation with the Secretary and the Director of the United States Fish and Wildlife Service and other Federal agencies, shall publish (and periodically revise thereafter) guidance for specifying management measures for sources of nonpoint pollution in coastal waters.

(2) CONTENT.—Guidance under this subsection shall include, at a minimum—

(A) a description of a range of methods, measures, or practices, including structural and nonstructural controls and operation and maintenance procedures, that constitute each measure;

(B) a description of the categories and subcategories of activities and locations for which each measure may be suitable;

(C) an identification of the individual pollutants or categories or classes of pollutants that may be controlled by the measures and the water quality effects of the measures;

(D) quantitative estimates of the pollution reduction effects and costs of the measures;

(E) a description of the factors which should be taken into account in adapting the measures to specific sites or locations; and

(F) any necessary monitoring techniques to accompany the measures to assess over time the success of the measures in reducing pollution loads and improving water quality.

(3) PUBLICATION.—The Administrator, in consultation with the Secretary, shall publish—

(A) proposed guidance pursuant to this subsection not later than 6 months after the date of the enactment of this Act; and

(B) final guidance pursuant to this subsection not later than 18 months after such effective date.

(4) NOTICE AND COMMENT.—The Administrator shall provide to coastal States and other interested persons an opportunity to provide written comments on proposed guidance under this subsection.

(5) MANAGEMENT MEASURES.—For purposes of this subsection, the term "management measures" means economically achievable measures for the control of the addition of pollutants from existing and new categories and classes of nonpoint sources of pollution, which reflect the greatest degree of pollutant reduction achievable through the application of the best available nonpoint pollution control practices, technologies, processes, siting criteria, operating methods, or other alternatives.

(h) AUTHORIZATIONS OF APPROPRIATIONS.—

(1) ADMINISTRATOR.—There is authorized to be appropriated to the Administrator for use for carrying out this section not more than $1,000,000 for each of fiscal years 1992, 1993, and 1994.

(2) SECRETARY.—(A) Of amounts appropriated to the Secretary for a fiscal year under section 318(a)(4) of the Coastal Zone Management Act of 1972, as amended by this Act, not more than $1,000,000 shall be available for use by the Secretary for carrying out this section for that fiscal year, other than for providing in the form of grants under subsection (f).

(B) There is authorized to be appropriated to the Secretary for use for providing in the form of grants under subsection (f) not more than—

(i) $6,000,000 for fiscal year 1992;

(ii) $12,000,000 for fiscal year 1993;

(iii) $12,000,000 for fiscal year 1994; and

(iv) $12,000,000 for fiscal year 1995.

(i) DEFINITIONS.—In this section—

(1) the term "Administrator" means the Administrator of the Environmental Protection Agency;

(2) the term "coastal State" has the meaning given the term "coastal state" under section 304 of the Coastal Zone Management Act of 1972 (16 U.S.C. 1453);

(3) each of the terms "coastal waters" and "coastal zone" has the meaning that term has in the Coastal Zone Management Act of 1972;

(4) the term "coastal management agency" means a State agency designated pursuant to section 306(d)(6) of the Coastal Zone Management Act of 1972;

(5) the term "land use" includes a use of waters adjacent to coastal waters; and

(6) the term "Secretary" means the Secretary of Commerce.

* * * * * * *

State of California

STATE WATER RESOURCES CONTROL BOARD
`IFORNIA REGIONAL WATER QUALITY CONTROL BOARD

ADMINISTRATIVE PROCEDURES UPDATE

TO	SUBJECT	
REGIONAL BOARD STAFF WQ MANUAL HOLDERS WQ PROGRAM MANAGERS	ANTIDEGRADATION POLICY IMPLEMENTATION FOR NPDES PERMITTING	
	APU NUMBER 90-004	SUPERSEDES APU
APPROVED, EXECUTIVE DIRECTOR		EFFECTIVE DATE 7-2-90

INTENT

This Administrative Procedures Update provides guidance for the Regional Boards for implementing State Board Resolution No. 68-16, "Statement of Policy With Respect to Maintaining High Quality of Waters in California" (Appendix I-1), and the Federal Antidegradation Policy, as set forth in 40 CFR 131.12 (Appendix I-2), as applied to the NPDES permitting process. Additional guidance for interpreting State Board Resolution No. 68-16 and the federal antidegradation regulation may be found in Appendices I-3 (EPA's Questions and Answers on Antidegradation), I-4 (State Board legal memo entitled "Federal Antidegradation Policy") and I-5 (EPA Region 9's Guidance on Implementing the Antidegradation Provisions of 40 CFR 131.12).

WHEN IS AN ANTIDEGRADATION ANALYSIS REQUIRED

To implement the antidegradation policy, the Regional Boards must consider the need to include a finding that specifies that water quality degradation is permissible when balanced against benefit to the public of the activity in question. The determination as to whether a finding is needed must be made when issuing, reissuing, amending, or revising an NPDES permit. The Regional Board should also make this finding when an existing discharge has reduced water quality, since the facility was last permitted and the reduction is not authorized by the permit. The findings should specifically state that the Regional Board has considered antidegradation pursuant to 40 CFR 131.12 and State Board Resolution No. 68-16 and finds that the permitted discharge is consistent with those provisions. If the Regional Board finds that lowering of water quality is consistent with the conditions established in the State policy and the federal regulation, the findings should indicate:

1. The pollutants that will lower water quality;

2. The socioeconomic and public benefits that result from lowered water quality; and

3. The beneficial uses that will be affected.

   Potential beneficial uses are not protected by the federal regulation. Regional Board staff should only apply the State policy when permitting a discharge that solely impacts potential beneficial uses.

ANTIDEGRADATION FINDING NOT REQUIRED

A Regional Board may decide that an antidegradation finding is not required because the proposed discharge is prohibited under either the State or federal policies. For example, if the proposed discharge would violate water quality objectives in the receiving water, no discharge will be allowed and therefore no antidegradation analysis is required. Alternatively, if the Regional Board has no reason to believe that existing water quality will be reduced due to the proposed action, no antidegradation analysis is required.

SIMPLE ANTIDEGRADATION ANALYSIS SUFFICIENT

A Regional Board may determine that it is not necessary to do a complete antidegradation analysis. The Regional Board may reach this determination if, using its best professional judgement and all available pertinent information, the Regional Board decides that the discharge will not be adverse to the intent and purpose of the State and federal antidegradation policies.

Based on information available to the Regional Board and any other background material the Regional Board believes is necessary, a complete antidegradation analysis will not be required if:

1. A Regional Board determines that the reduction of water quality will be spatially localized or limited with respect to the waterbody; e.g., confined to the mixing zone; or

2. A Regional Board determines the reduction in water quality is temporally limited and will not result in any long-term deleterious effects on water quality; e.g., will cease after a storm event is over; or

3. A Regional Board determines the proposed action will produce minor effects which will not result in a significant reduction of water quality; e.g., a POTW has a minor increase in the volume of discharge subject to secondary treatment; or

4. The Regional Board determines that the proposed activity, which may potentially reduce water quality, has been approved in the General Plan of a political subdivision and has been adequately subjected to the environmental and economic analyses in an environmental impact report (EIR) required under the California Environmental Quality Act (CEQA). If the Regional Board finds that the EIR is inadequate, the Regional Board must supplement this information to support the decision.

The above criteria may vary with the types of pollutants. Some pollutants are believed to elicit an effect at a certain concentration (threshold pollutants). Others (non-threshold pollutants) have no safe level. Non-threshold pollutants include carcinogens, mutagens, and teratogens. Regional Boards are urged to apply stricter scrutiny to non-threshold pollutants, and to note that repeated or

multiple small changes in water quality (which would otherwise not require detailed analysis) can result in significant water quality degradation if non-threshold pollutants are involved. The Regional Boards must still make the necessary findings regardless of the nature of pollutants involved, and summarize them in the Fact Sheet for major NPDES permits or in the Statement of Basis for minor NPDES permits.

COMPLETE ANTIDEGRADATION ANALYSIS REQUIRED

The Regional Board may determine that antidegradation provisions must be evaluated in making its decision. In general, an antidegradation analysis is needed to support all regulatory actions that, in the Regional Board's judgement, will result in a significant increase in pollutant loadings. The Regional Boards must consider antidegradation effects and conduct an antidegradation analysis when the proposed activity results in:

1. A substantial increase in mass emissions of a pollutant, even if there is no other indication that the receiving waters are polluted; or

2. Mortality or significant growth or reproductive impairment of resident species.

In particular, an antidegradation finding should be made and, if necessary, an analysis should be conducted when performing the following permit activities:

1. Issuance of a permit for any new discharge, including Section 401 certifications; or

2. Material and substantial alterations to the permitted facility, such as relocation of an existing discharge; or

3. Reissuance or modification of permits which would allow a significant increase in the concentration or mass emission of any pollutant in the discharge.

IMPLEMENTATION OF ANTIDEGRADATION POLICIES

If the Regional Board finds the proposed activity does not warrant a complete antidegradation analysis; e.g., one of the criteria listed above is satisfied, such findings should be documented in the Fact Sheet of the proposed permit action or Regional Board order, along with the basis for those findings.

If the Regional Board determines that a complete antidegradation analysis is necessary to support a finding under State or federal antidegradation policies, the Regional Board shall ensure that sufficient evidence is analyzed to support this decision and that this evidence is summarized in an appropriate finding. When a discharge is included in a project requiring CEQA documentation, the antidegradation analysis should be integrated in the environmental review process. If the Regional Board is not the lead agency on a project requiring an antidegradation finding, the Regional Board should ensure that the lead agency includes the antidegradation information in the EIR. The Regional Board shall make such a request to the lead agency no later than 30 days after the Regional Board receives a Notice of Preparation from the lead agency [CEQA, Section 15096(b)(2)].

PROCEDURE FOR COMPLETE ANTIDEGRADATION ANALYSIS

When undertaking an antidegradation analysis, the Regional Board should proceed as follows:

1. Compare receiving water quality to the water quality objectives established to protect designated beneficial uses.

   The baseline quality of the receiving water determines the level of water quality protection. Baseline quality is defined as the best quality of the receiving water that has existed since 1968 when considering Resolution No. 68-16, or since 1975 under the federal policy, unless subsequent lowering was due to regulatory action consistent with State and federal antidegradation policies. If poorer water quality was permitted, the most recent water quality resulting from permitted action is the baseline water quality to be considered in any antidegradation analysis. Baseline quality is pollutant specific, not waterbody specific. Baseline quality should be determined for each constituent in the discharge which is likely to degrade water quality. The baseline water quality should be representative of the water body, accounting for temporal and spatial variability. Water quality protection depends on the baseline receiving water, as follows:

   a. If baseline water quality is equal to or less than the quality as defined by the water quality objective, water quality shall be maintained or improved to a level that achieves the objectives. Baseline water quality should be compared to all numerical and narrative objectives that protect the actual and potential beneficial uses which would be affected by the proposed discharge. The discharge may be prohibited or allowed as described under 40 CFR 130.7.

   b. If baseline water quality is better than the water quality as defined by the water quality objective, the baseline water quality shall be maintained unless poorer water quality is necessary to accommodate important economic or social development and is considered to be of maximum benefit to the people of the State.

If the receiving water has been designated as an outstanding national resource water in the Region's Basin Plan, or if it can be argued that the waterbody in question deserves the same treatment (for example a wild and scenic river, an area of special biological significance, etc.), no discharge which will lower existing water quality shall be allowed. Lake Tahoe is the only water body in the State presently designated as an outstanding national resource water.

2. Balancing the proposed action against the public interest.

   Ensure that a discharge to high quality water, which is likely to reduce water quality, is not permitted unless the reduction in water quality is offset by maximum public benefit to the people of the State. This step should be performed if a finding of reduced water quality is made. Regional Board staff shall not recommend that the activity be permitted unless all of the following conditions are met:

   a. The proposed action is necessary to accommodate important economic or social development in the area. (Factors to be considered when determining important economic or social development follow.)

b. The reduction in water quality is consistent with maximum public benefit.

c. The reduction in water quality will not unreasonably affect actual or potential beneficial uses.

d. Water quality will not fall below water quality objectives prescribed in the Basin Plan.

The severity and extent of water quality reduction should be weighed when evaluating the benefits required to compensate for that degradation. The magnitude of the proposed project and potential reduction should also determine the scope of impact assessment. The Regional Board should ensure that a systematic impact assessment is conducted.

Factors that should be considered when determining whether the discharge is necessary to accommodate social or economic development and is consistent with maximum public benefit, include:

a. Past, present, and probable beneficial uses of the water.

b. Economic and social costs, tangible and intangible, of the proposed discharge compared to benefits. The economic impacts to be considered are those incurred in order to maintain existing water quality. The financial impact analysis should focus on the ability of the facility to pay for the necessary treatment. The ability to pay depends on the facility's source of funds. In addition to demonstrating a financial impact on the publicly-or privately-owned facility, the analysis must show a significant adverse impact on the community. The long-term and short-term socioeconomic impacts of maintaining existing water quality must be considered. Examples of social and economic parameters that could be affected are employment, housing, community services, income, tax revenues, and land value. To accurately assess the impact of the proposed project, the projected baseline socioeconomic profile of the affected community without the project should be compared to the projected profile with the project.

c. The environmental aspects of the proposed discharge must be evaluated. The proposed discharge--while actually causing a reduction in water quality in a given water body--may be simultaneously causing an increase in water quality in a more environmentally sensitive body of water from which the discharge in question is being diverted; e.g., changing the location of San Francisco's outfall from the Bay to the ocean.

d. The implementation of feasible alternative control measures which might reduce, eliminate, or compensate for negative impacts of the proposed action.

The Regional Board should encourage the participation of the public and appropriate government agencies in the public interest balancing process so that the environmental, social, and economic impacts of the project are accurately assessed. EPA's Water Quality Standards Handbook (Chapter 5) provides additional guidance in assessing financial and socioeconomic impacts.

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3. Report on the antidegradation analysis.

   The Regional Board must ensure full intergovernmental coordination and public participation in the permitting process. The antidegradation analysis should be summarized in the Fact Sheet for major NPDES permits or the Statement of Basis for minor NPDES permits.

   The summary should include all the following information:

   a. The water quality parameters and beneficial uses which will be affected by the proposed action and the extent of the impact.

   b. The scientific rationale for determining that the proposed action will or will not lower water quality.

   c. A description of the alternative measures that were considered.

   d. A description of the socioeconomic evaluation.

   e. The rationale for determining that the proposed action is or is not justified by socioeconomic considerations.

The findings should specifically state that the Regional Board has considered antidegradation pursuant to 40 CFR 131.12 and State Board Resolution No. 68-16 and finds that the permitted discharge is consistent with those provisions.

cc: All Regional Board Staff
WQ Program Managers

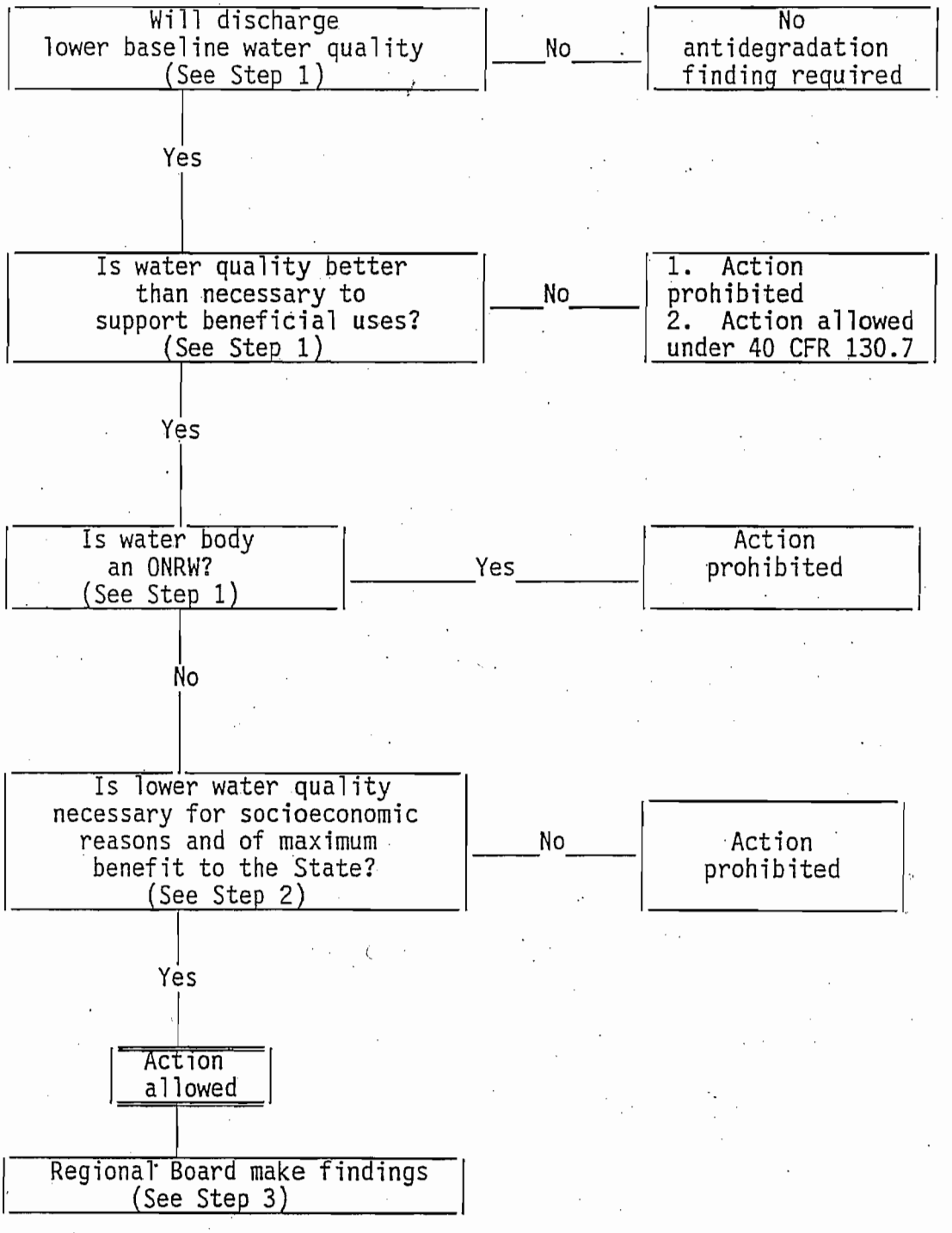

Figure 1 - Decision making flow chart.

STATE WATER RESOURCES CONTROL BOARD

RESOLUTION NO. 68-16

STATEMENT OF POLICY WITH RESPECT TO
MAINTAINING HIGH QUALITY OF WATERS IN CALIFORNIA

WHEREAS the California Legislature has declared that it is the policy of the State that the granting of permits and licenses for unappropriated water and the disposal of wastes into the water of the State shall be so regulated as to achieve highest water quality consistent with maximum benefit to the people of the State and shall be controlled so as to promote the peace, health, safety, and welfare of the people of the State; and

WHEREAS water quality control policies have been and are being adopted for waters of the State; and

WHEREAS the quality of some waters of the State is higher than that established by the adopted policies and it is the intent and purpose of this Board that such higher quality shall be maintained to the maximum extent possible consistent with the declaration of the Legislature;

NOW, THEREFORE, BE IT RESOLVED:

1. Whenever the existing quality of water is better than the quality established in policies as of the date on which such policies become effective, such existing high quality will be maintained until it has been demonstrated to the State that any change will be consistent with maximum benefit to the people of the State, will not unreasonably affect present and anticipated beneficial use of such water, and will not result in water quality less than that prescribed in the policies.

2. Any activity which produces or may produce a waste or increased volume or concentration of waste and which discharges or proposes to discharge to existing high quality waters will be required to meet waste discharge requirements which will result in the best practicable treatment or control of the discharge necessary to assure that (a) a pollution or nuisance will not occur and (b) the highest water quality consistent with maximum benefit to the people of the State will be maintained.

3. In implementing this policy, the Secretary of the Interior will be kept advised and will be provided with such information as he will need to discharge his responsibilities under the Federal Water Pollution Control Act.

BE IT FURTHER RESOLVED that a copy of this resolution be forwarded to the Secretary of the Interior as part of California's water quality control policy submission.

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CERTIFICATION

The undersigned, Executive Officer of the State Water Resources Control Board, does hereby certify that the foregoing is a full, true, and correct copy of a resolution duly and regularly adopted at a meeting of the State Water Resources Control Board held on October 24, 1968.

Dated: October 28, 1968

/s/
Kerry W. Mulligan
Executive Officer
State Water Resources
Control Board

The federal antidegradation regulation 40 CFR 131.12, initially adopted in 1975, establishes requirements for protection of high quality waters. To wit:

"Section 131.12 Antidegradation Policy.

(a) The State shall develop and adopt a statewide antidegradation policy and identify the methods for implementing such policy pursuant to this subpart. The antidegradation policy and implementation method shall, at a minimum, be consistent with the following:

(1) Existing instream water uses and the level of water quality necessary to protect the existing uses shall be maintained and protected.

(2) Where the quality of the waters exceeds levels necessary to support propagation of fish, shellfish, and wildlife and recreation in and on the water, that quality shall be maintained and protected unless the State finds, after full satisfaction of the intergovernmental coordination and public participation provisions of the State's continuing planning process, that allowing lower water quality is necessary to accommodate important economic or social development in the area in which the waters are located. In allowing such degradation or lower water quality, the State shall assure water quality adequate to protect existing uses fully. Further, the State shall assure that there shall be achieved the highest statutory and regulatory requirements for all new and existing point sources and all cost-effective and reasonable best management practices for nonpoint source control.

(3) Where high quality waters constitute an outstanding national resource, such as waters of national and State parks and wildlife refuges and waters of exceptional recreational or ecological significance, that water quality shall be maintained and protected.

(4) In those cases where potential water quality impairment associated with a thermal discharge is involved, the antidegradation policy and implementing method shall be consistent with Section 316 of the Act.1/"

1/ Section 316(a) of the Clean Water Act states that the thermal component of an effluent limitation need only be stringent enough to assure the protection and propagation of a balanced, indigenous population of shellfish, fish, and wildlife in and on the body of the receiving water. Section 316(c), in effect, allows thermal discharges from a point source to meet standards imposed by Sections 301 or 303 (balanced indigenous populations) only for a fixed period as noted in Section 316(c). The federal antidegradation regulation is a more-stringent limitation and, thus, cannot be applied to these discharges.

From: Water Quality Standards Handbook, Second Draft, USEPA, June 1989

4.9 Questions and Answers on Antidegradation

This section uses a question and answer format to present information about the origin of the policy, the meaning of various terms, and its application in both general terms and in specific examples. A number of the questions and answers are closely related; the reader is advised to consider the section in its entirety ... rather than to focus on particular answers in isolation. While this section obviously does not address every question which could arise concerning the policy, we hope that the principles it set out will aid the reader in applying the policy in other situations.

These following questions and answers are substantially the same as those in the document entitled Questions and Answers on Antidegradation, August 1985, (designated as Appendix A to Chapter 2 of the Water Quality Standards Handbook, December 1983.) The questions have been renumbered and separated into sections. Minor changes in the answers to question #2 in 4.12.1 have been made to reflect the Clean Water Act Amendments of 1987 or changes in the reference document citations.

4.9.1 General Policy Questions

4.9.1.1 WHAT IS THE ORIGIN OF THE ANTIDEGRADATION POLICY?

The basic policy was established on February 8, 1968, by the Secretary of the U.S. Department of the Interior. It was included in EPA's first water quality standards regulation (40 CFR 130.17, 40 FR 55340-41, November 28, 1975). It was slightly refined and repromulgated as part of the current program regulation published on November 8, 1983 (48 FR 51400, 40 CFR 131.12). An antidegradation policy is one of the minimum elements required to be included in a state's water quality standards.

4.9.1.2 WHERE IN THE CLEAN WATER ACT (CWA) IS THERE A REQUIREMENT FOR ANTIDEGRADATION POLICY OR SUCH A POLICY EXPRESSED?

There is no explicit requirement for such a policy in the Act. However, the policy is consistent with the spirit, intent, and goals of the Act, especially the clause "... restore and maintain the chemical, physical and biological integrity of the Nation's waters" (Section 101(a)) and arguably is covered by the provision of Section 303(a) which made water quality standard requirements under prior law the "starting point" for CWA water quality requirements. In addition, Section 303(d)(4)(B) of the Clean Water Act Amendments of 1987 explicitly refers to satisfaction of the antidegradation requirements of 40 CFR 131.12 prior to taking various actions which would lower water quality. This demonstrates that the antidegradation policy is clearly recognized by Congress and is expected to be implemented to meet the goals of the Clean Water Act.

4.9.1.3 CAN A STATE JUSTIFY NOT HAVING AN ANTIDEGRADATION POLICY IN ITS WATER QUALITY STANDARDS?

EPA's water quality standards regulation requires each state to adopt an antidegradation policy and specifies the minimum requirements for a policy. If not included in the standards regulation of a state, the policy must be specifically referenced in the water quality standards so that the functional relationship between the policy and the standards is clear. Regardless of the location of the policy, it must meet all applicable requirements.

4.9.1.4 WHAT HAPPENS IF A STATE'S ANTIDEGRADATION POLICY DOES NOT MEET THE REGULATORY REQUIREMENTS?

If this occurs either through State action to revise its policy or through revised federal requirements, the state would be given an opportunity to make its policy consistent with the regulation. If this is not done, EPA has the authority to promulgate the policy for the state pursuant to Section 303(c)(4) of the Clean Water Act.

4.9.1.5 WHAT COULD HAPPEN IF A STATE FAILED TO IMPLEMENT ITS ANTIDEGRADATION POLICY PROPERLY?

If a state issues an NPDES permit which violates the required antidegradation policy, it would be subject to a discretionary EPA veto under Section 402(d) or to a citizen challenge. In addition to actions on permits, any wasteload allocations and total maximum daily loads violating the antidegradation policy are subject to EPA disapproval and EPA promulgation of a new wasteload allocation/total maximum daily load under Section 303(d) of the Act. If a significant pattern of violation was evident, EPA could constrain the award of grants or possibly revoke any federal permitting capability that had been delegated to the state. If the state issues a Section 401 certification (for an EPA issued NPDES permit) which fails to reflect the requirements of the antidegradation policy, EPA will, on its own initiative, add any additional or more stringent effluent limitations required to ensure compliance with Section 301(b)(1)(C). If the faulty Section 401 certification related to permits issued by other federal agencies (e.g., a Corp of Engineers Section 404 permit), EPA could comment unfavorably upon permit issuance. The public, of course, could bring pressure upon the permit issuing agency.

4.9.1.6 WILL THE APPLICATION OF THE ANTIDEGRADATION POLICY ADVERSELY IMPACT ECONOMIC DEVELOPMENT?

This concern has been raised since the inception of the antidegradation policy. The answer remains the same. The policy has been carefully structured to minimize adverse effects on economic development while protecting the water quality goals of the Act. As Secretary Udall put it in 1968, the policy serves "...the dual purpose of carrying out the letter and spirit of the Act without interfering unduly with further economic development" (Secretary Udall, February, 1968). Application of the policy could affect the levels and/or kinds of waste treatment necessary or result in the use of alternate sites where the environmental impact would be less damaging. These effects could have economic implications as do all other environmental controls.

4.9.1.7 HOW MAY THE PUBLIC PARTICIPATION REQUIREMENTS BE SATISFIED?

This requirement may be satisfied in several ways. The state may obviously hold a public hearing or hearings. The state may also satisfy the requirement by providing the opportunity for the public to request a hearing. Activities which may affect several water bodies in a river basin or sub-basin may be considered in a single hearing. To ease the resource burden on both the state and public, standards issues may be combined with hearings on environmental impact statements, water management plans, or permits. However, if this is done, the public must be clearly informed that possible changes in water quality standards are being considered along with other activities. In other words, it is inconsistent with the water quality standards regulation to "back-door" changes in standards through actions on EIS's wasteload allocations, plans, or permits.

4.9.1.8 IS POLLUTION RESULTING FROM NONPOINT SOURCE ACTIVITIES SUBJECT TO PROVISIONS OF THE ANTIDEGRADATION POLICY?

Nonpoint source activities are not exempt from the provisions of the antidegradation policy. The language of Section 131.12 (a)(2) of the regulation: "Further, the state shall assure that there shall be achieved the highest statutory and regulatory requirements for all new and existing point sources and all cost-effective and reasonable best management practices for nonpoint source control" reflects statutory provisions of the Clean Water Act. While it is true that the Act does not establish a regulatory program for nonpoint sources, it clearly intends that the BMPs developed and approved under Sections 205(j), 208 and 303(e) be aggressively implemented by the states.

4.9.1.9 WHAT IS MEANT BY THE REQUIREMENT THAT WHERE A THERMAL DISCHARGE IS INCLUDED, THE ANTIDEGRADATION POLICY SHALL BE CONSISTENT WITH SECTION 316 OF THE ACT?

This requirement is contained in Section 131.12 (a)(4) of the regulation and is intended to coordinate the requirements and procedures of the antidegradation policy with those established in the Act for setting thermal discharge limitations. Regulations implementing Section 316 may be found at 40 CFR 124.66. The statutory scheme and legislative history indicate that limitations developed under Section 316 take precedence over other requirements of the Act.

4.9.1.10 WHAT IS THE RELATIONSHIP BETWEEN THE ANTIDEGRADATION POLICY, STATE WATER RIGHTS USE LAWS AND SECTION 101(g) OF THE CLEAN WATER ACT WHICH DEALS WITH STATE AUTHORITY TO ALLOCATE WATER QUANTITIES?

The exact limitations imposed by section 101(g) are unclear, however, the legislative history and the courts interpreting it do indicate that it does not nullify water quality measures authorized by CWA (such as water quality standards and their upgrading, and NPDES and 402 permits) even if such measures incidentally affect individual water rights. Those authorities also indicate that if there is a way to reconcile water quality needs and water quantity allocations, such accommodation should be pursued. In other words, where there are alternate ways

to meet the water quality requirements of the Act, the one with least disruption to water quantity allocations should be chosen. Where a planned diversion would lead to a violation of water quality standards (either the antidegradation policy or a criterion), a 404 permit associated with the diversion should be suitably conditioned if possible and/or additional nonpoint and/or point source controls should be imposed to compensate.

4.9.1.11 AFTER READING THE REGULATION, THE PREAMBLE, AND ALL THESE QUESTIONS AND ANSWERS, I STILL DON'T UNDERSTAND ANTIDEGRADATION, WHOM CAN I TALK TO?

Call Mr. Dave Sabeck at the Standards Branch at: (202) 475-7315, or Mr. Phil Woods, Water Quality Standards Coordinator, at EPA Region 9 at (415) 351-8653.

4.9.2 Protection of Existing Uses

4.9.2.1 WHAT IS THE PROPER INTERPRETATION OF THE TERM "AN EXISTING USE"?

An existing use can be established by demonstrating that fishing, swimming, or other uses have actually occurred since November 28, 1975, or that the water quality is suitable to allow such uses to occur (unless there are physical problems which prevent the use regardless of water quality). An example of the latter is an area where shellfish are propagating and surviving in a biologically suitable habitat and are available and suitable for harvesting. Such facts clearly establish that shellfish harvesting is an "existing" use, not one dependent on improvements in water quality. To argue otherwise would be to say that the only time an aquatic protection use "exists" is if someone succeeds in catching fish.

4.9.2.2 THE WATER QUALITY STANDARDS REGULATION STATES THAT "EXISTING USES AND THE LEVEL OF WATER QUALITY NECESSARY TO PROTECT THE EXISTING USES SHALL BE MAINTAINED AND PROTECTED." HOW FULLY AND AT WHAT LEVEL OF PROTECTION IS AN EXISTING USE TO BE PROTECTED IN ORDER TO SATISFY THE ABOVE REQUIREMENT?

No activity is allowable under the antidegradation policy which would partially or completely eliminate any existing use whether or not that use is designated in a state's water quality standards. The aquatic protection use is a broad category requiring further explanation. Species that are in the water body and which are consistent with the designated use (i.e., not aberrational) must be protected, even if not prevalent in number or importance. Nor can activity be allowed which would render the species unfit for maintaining the use. Water quality should be such that it results in no mortality and no significant growth or reproductive impairment of resident species. (See Section 4.9.2.9 for situation where an aberrant sensitive species may exist.) Any lowering of water quality below this full level of protection is not allowed. A state may develop subcategories of aquatic protection uses but cannot choose different levels of protection for like uses. The fact that sport or commercial fish are not present does not mean that the water may not be supporting an aquatic life protection function. An existing aquatic community composed entirely of invertebrates and plants, such as may be found in a pristine alpine tributary stream should still be protected whether or not such a stream supports a fishery. Even though the

shorthand expression "fishable/swimmable" is often used, the actual objective of the act is to "restore and maintain the chemical, physical, and biological integrity of our Nation's waters" (Section 101(a)). The term "aquatic life" would more accurately reflect the protection of the aquatic community that was intended in Section 101(a)(2) of the Act.

4.9.2.3 IS THERE ANY SITUATION WHERE AN EXISTING USE CAN BE REMOVED?

In general, no. Water quality may sometimes be affected, but an existing use, and the level of water quality to protect it must be maintained (Section 131.12(a)(1) and (2) of the regulation). However, the state may limit or not designate such a use if the reason for such action is non-water quality related. For example, a state may wish to impose a temporary shellfishing ban to prevent over-harvesting and ensure an abundant population over the long run, or may wish to restrict swimming from heavily trafficked areas. If the state chooses, for non-water quality reasons, to limit use designations, it must still adopt criteria to protect the use if there is a reasonable likelihood it will actually occur (e.g., swimming in a prohibited water). However, if the state's action is based on a recognition that water quality is likely to be lowered to the point that it no longer is sufficient to protect and maintain an existing use, then such action is inconsistent with the antidegradation policy.

4.9.2.4 HOW DOES THE REQUIREMENT THAT THE LEVEL OF WATER QUALITY NECESSARY TO PROTECT THE EXISTING USE(S) BE MAINTAINED AND PROTECTED, WHICH APPEARS IN SECTIONS 131.12(a)(1), (2), AND (3) OF THE WATER QUALITY STANDARDS REGULATION, ACTUALLY WORK?

Section 131.12(a)(1), as described in the Preamble to the regulation, provides the absolute floor of water quality in all waters of the United States. This paragraph applies a minimum level of protection to all waters, however, it is most pertinent to waters having beneficial uses that are less than the Section 101(a)(2) goals of the Act. If it can be proven, in that situation, that water quality exceeds that necessary to fully protect the existing use(s) and exceeds water quality standards but is not of sufficient quality to cause a better use to be achieved, then that water quality may be lowered to the level required to fully protect the existing use as long as existing water quality standards and downstream water quality standards are not affected. If this does not involve a change in standards, no public hearing would be required under Section 303(c). However, public participation would still be provided in connection with the issuance of an NPDES permit or amendment of a 208 plan. If, however, analysis indicates that the higher water quality does result in a better use, even if not up to the Section 101(a)(2) goals, then the water quality standards must be upgraded to reflect the uses presently being attained (Section 131.10(i)). Section 131.12(a)(2) applies to waters whose quality exceeds that necessary to protect the Section 101(a)(2) goals of the Act. In this case, water quality may not be lowered to less than the level necessary to fully protect the "fishable /swimmable" uses and other existing uses and may be lowered even to those levels only after following all the provisions described in Section 131.12(a)(2). This requirement applies to individual water quality parameters. Section 131.12(a)(3) applies to Outstanding National Resource Waters (ONRW) where the ordinary use classifications and supporting criteria are not appropriate. As described in the Preamble to the water quality standards regulation "States may allow some limited

activities which result in temporary and short-term changes in water quality," but such changes in water quality should not alter the essential character or special use which makes the water an ONRW. Any one or a combination of several activities may trigger the antidegradation policy analysis as discussed above. Such activities include a scheduled water quality standards review, the establishment of new or revised wasteload allocations NPDES permits, the demonstration of need for advanced treatment or request by private or public agencies or individuals for a special study of the water body.

4.9.2.5 WILL AN ACTIVITY WHICH WILL DEGRADE WATER QUALITY, AND PRECLUDE AN EXISTING USE IN ONLY A PORTION OF A WATER BODY (BUT ALLOW IT TO REMAIN IN OTHER PARTS OF THE WATER BODY) SATISFY THE ANTIDEGRADATION REQUIREMENT THAT EXISTING USES SHALL BE MAINTAINED AND PROTECTED?

No. Existing uses must be maintained in all parts of the water body segment in question other than in restricted mixing zones. For example, an activity which lowers water quality such that a buffer zone must be established within a previous shellfish harvesting area is inconsistent with the antidegradation policy. (However, a slightly different approach is taken for fills in wetlands, as explained in Question 4.9.2.7.)

4.9.2.6 DOES ANTIDEGRADATION APPLY TO POTENTIAL USES?

No. The focus of the antidegradation policy is on protecting existing uses. Of course, insofar as existing uses and water quality are protected and maintained by the policy, the eventual improvement of water quality and attainment of new uses may be facilitated. The use attainability requirements of Section 131.10 also help ensure that attainable potential uses are actually attained. (See also sections 4.9.2.1 and 4.9.2.4)

4.9.2.7 FILL OPERATIONS IN WETLANDS AUTOMATICALLY ELIMINATE ANY EXISTING USE IN THE FILLED AREA. HOW IS THE ANTIDEGRADATION POLICY APPLIED IN THAT SITUATION?

Since a literal interpretation of the antidegradation policy could result in preventing the issuance of any wetland fill permit under Section 404 of the Clean Water Act, and it is logical to assume that Congress intended some such permits to be granted within the framework of the Act, EPA interprets Section 131.12 (a)(1) of the antidegradation policy to be satisfied with regard to fills in wetlands if the discharge did not result in "significant degradation" to the aquatic ecosystem as defined under Section 230.10(c) of the Section 404(b)(1) guidelines. If any wetlands were found to have better water quality than "fishable/swimmable", the state would be allowed to lower water quality to the no significant degradation level as long as the requirements of Section 131.12(a)(2) were followed. As for the ONRW provision of antidegradation (131.12(a)(3)), there is no difference in the way it applies to wetlands and other water bodies.

4.9.2.9 A STREAM, DESIGNATED AS A WARM WATER FISHERY, HAS BEEN FOUND TO CONTAIN A SMALL, APPARENTLY NATURALLY OCCURRING POPULATION OF A COLD-WATER GAME FISH. THESE FISH APPEAR TO HAVE ADAPTED TO THE NATURAL WARM WATER TEMPERATURES OF THE STREAM WHICH WOULD NOT NORMALLY ALLOW THEIR GROWTH AND REPRODUCTION. WHAT IS THE EXISTING USE WHICH MUST BE PROTECTED UNDER SECTION 131.12(a)(1)?

Section 131.12(a)(1) states that "Existing instream water uses and level of water quality necessary to protect the existing uses shall be maintained and protected." While sustaining a small cold-water fish population, the stream does not support an existing use of a "cold-water fishery." The existing stream temperatures are unsuitable for a thriving cold-water fishery. The small marginal population is an artifact and should not be employed to mandate a more stringent use (true cold-water fishery) where natural conditions are not suitable for that use. A use attainability analysis or other scientific assessment should be used to determine whether the aquatic life population is in fact an artifact or is a stable population requiring water quality protection. Where species appear in areas not normally expected, some adaptation may have occurred and site specific criteria may be appropriately developed. Should the cold-water fish population consist of a threatened or endangered species, it may require protection under the Endangered Species Act. Otherwise the stream need only be protected as a warm water fishery.

4.9.2.10 HOW DOES EPA'S ANTIDEGRADATION POLICY APPLY TO A WATERBODY WHERE A CHANGE IN MAN'S ACTIVITIES IN OR AROUND THAT WATERBODY WILL PRECLUDE AN EXISTING USE FROM BEING FULLY MAINTAINED?

If a planned activity will foreseeably lower water quality to the extent that it no longer is sufficient to protect and maintain the existing uses in that waterbody, such an activity is inconsistent with EPA's antidegradation policy which requires that existing uses are to be maintained. In such a circumstance, the planned activity must be avoided or adequate mitigation or preventive measures must be taken to ensure that the existing uses and the water quality to protect them will be maintained. In addition, in "high quality waters" under Section 131.12(a)(2), before any lowering of water quality occurs, there must be: 1) a finding that it is necessary in order to accommodate important economical or social development in the area in which the waters are located, (2) full satisfaction of all intergovernmental coordination and public participation provisions, and (3) assurance that the highest statutory and regulatory requirements and best management practices for pollutant controls are achieved. This provision can normally be satisfied by the completion of Water Quality Management Plan updates or by a similar process that allows for public participation and intergovernmental coordination. This provision is intended to provide relief only in a few extraordinary circumstances where the economic and social need for the activity clearly outweighs the benefit of maintaining water quality above that required for "fishable/swimmable" water, and the two cannot both be achieved. The burden of demonstration on the individual proposing such activity will be very high. In any case, moreover, the existing use must be maintained and the activity shall not preclude the maintenance of a "fishable/swimmable" level of water quality protection.

4.9.2.11 IF A WATER BODY WITH A PUBLIC WATER SUPPLY DESIGNATED USE IS, FOR NON-WATER QUALITY REASONS, NO LONGER USED FOR DRINKING WATER MUST THE STATE RETAIN THE PUBLIC WATER SUPPLY USE AND CRITERIA IN ITS STANDARDS?

Under 40 CFR 131.10(h)(1), the state may delete the public water supply use designation and criteria if the state adds or retains other use designations for the waterbodies which have more stringent criteria. The state may also delete the use and criteria if the public water supply is not an "existing use" as defined in Section 131.3 (i.e., achieved on or after November 1975), as long as one of the Section 131.10(g) justifications for removal is met. Otherwise, the state must maintain the criteria even if it restricts the actual use on non-water quality grounds, as long as there is any possibility the water could actually be used for drinking. (This is analogous to the swimming example in the preamble.)

4.9.3 Protection of Water Quality in High Quality Waters

4.9.3.1 IN HIGH QUALITY WATERS, ARE NEW DISCHARGERS OR EXPANSION OF EXISTING FACILITIES SUBJECT TO THE PROVISIONS OF ANTIDEGRADATION?

Yes. Since such activities would presumably lower water quality, they would not be permissible unless the state finds that it is necessary to accommodate important economic or social development (Section 131.12(a)(2)). In addition the minimum technology based requirements must be met, including new source performance standards. This standard would be implemented through the wasteload and NPDES permit process for such new or expanded sources.

4.9.3.2 WHAT DOES EPA MEAN BY "...THE STATE SHALL ENSURE THAT THERE SHALL BE ACHIEVED THE HIGHEST STATUTORY AND REGULATORY REQUIREMENTS FOR ALL NEW AND EXISTING POINT SOURCES AND ALL COST EFFECTIVE AND REASONABLE BEST MANAGEMENT PRACTICES FOR NONPOINT SOURCE CONTROL" (SECTION 131.12(a)(2)?

This requirement ensures that the limited provision for lowering water quality of high quality waters down to "fishable/swimmable" levels will not be used to undercut the Clean Water Act requirements for point source and nonpoint source pollution control. Furthermore, by ensuring compliance with such statutory and regulatory controls, there is less chance that a lowering of water quality will be sought in order to accommodate new economic and social development.

4.9.3.3 WHAT DOES EPA MEAN BY "...IMPORTANT ECONOMIC OR SOCIAL DEVELOPMENT IN THE AREA IN WHICH THE WATERS ARE LOCATED" IN SECTION 131.12(a)(2)?

This phrase is simply intended to convey a general concept regarding what level of social and economic development could be used to justify a change in high quality waters. Any more exact meaning will evolve through case-by-case application under the state's continuing planning process. Although EPA has issued suggestions on what might be considered in determining economic or social impacts, the Agency has no predetermined level of activity that is defined as "important" (see Section 4.4.3.3).

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4.9.4 Wasteload Allocations

4.9.4.1 WHAT IS THE RELATIONSHIP BETWEEN WASTELOAD ALLOCATIONS, TOTAL MAXIMUM DAILY LOADS, AND THE ANTIDEGRADATION POLICY?

Wasteload allocations distribute the allowable pollutant loadings to a stream between dischargers. Such allocations also consider the contribution to pollutant loadings from nonpoint sources. Wasteload allocations must reflect applicable state water quality standards including the antidegradation policy. No wasteload allocation can be developed or NPDES permit issued that would result in a standard being violated, or, in the case of waters whose quality exceeds that necessary for the Section 101(a)(2) goals of the Act, can result in a lowering of water quality unless the applicable public participation, intergovernmental review and baseline control requirements of the antidegradation policy have been met.

4.9.4.2 DO THE INTERGOVERNMENTAL COORDINATION AND PUBLIC PARTICIPATION REQUIREMENTS WHICH ESTABLISH THE PROCEDURES FOR DETERMINING THAT WATER QUALITY WHICH EXCEEDS THAT NECESSARY TO SUPPORT THE SECTION 101(a)(2) GOAL OF THE ACT MAY BE LOWERED APPLY TO CONSIDERING ADJUSTMENTS TO THE WASTELOAD ALLOCATIONS DEVELOPED FOR THE DISCHARGERS IN THE AREA?

Yes. Section 131.12(a)(2) of the water quality standards regulation is directed towards changes in water quality per se, not just toward changes in standards. The intent is to ensure that no activity which will cause water quality to decline in existing high quality waters is undertaken without adequate public review. Therefore, if a change in wasteload allocation could alter water quality in high quality waters, the public participation and coordination requirements apply.

4.9.4.3 IS THE ANSWER TO THE ABOVE QUESTION DIFFERENT IF THE WATER QUALITY IS LESS THAN THAT NEEDED TO SUPPORT "FISHABLE/SWIMMABLE" USES?

Yes. Nothing in either the water quality standards or the wasteload allocation regulations requires the same degree of public participation or intergovernmental coordination for such waters as is required for high quality waters. However, as discussed in Section 4.9.1.7, public participation would still be provided in connection with the issuance of a NPDES permit or amendment of a 208 plan. Also, if the action which causes reconsideration of the existing wasteloads (such as dischargers withdrawing from the area) will result in an improvement in water quality which makes a better use attainable, even if not up to the "fishable/swimmable" goal, then the water quality standards must be upgraded and full public review is required for any action affecting changes in standards. Although not specifically required by the standards regulation between the triennial reviews, we recommend that the state conduct a use attainability analysis to determine if water quality improvement will result in attaining higher uses than currently designated in situations where significant changes in wasteloads are expected.

4.9.4.4 SEVERAL FACILITIES ON A STREAM SEGMENT DISCHARGE PHOSPHORUS CONTAINING WASTES. AMBIENT PHOSPHORUS CONCENTRATIONS MEET CLASS B STANDARDS, BUT BARELY. THREE DISCHARGERS ACHIEVE ELIMINATION OF DISCHARGE BY DEVELOPING A LAND TREATMENT SYSTEM. AS A RESULT, ACTUAL WATER QUALITY IMPROVES (I.E., PHOSPHORUS LEVELS DECLINE) BUT NOT QUITE TO THE LEVEL NEEDED TO MEET CLASS A (FISHABLE/S WIMMABLE) STANDARDS. CAN THE THREE REMAINING DISCHARGERS NOW INCREASE THEIR PHOSPHORUS DISCHARGE WITH THE RESULT THAT WATER QUALITY DECLINES (PHOSPHORUS LEVELS INCREASE) TO PREVIOUS LEVELS?

Nothing in the water quality standards regulation explicitly prohibits this (see Sections 4.9.2.4 and 4.9.4.3). Of course, changes in their NPDES permit limits may be subject to non-water quality constraints, such as BPT or BAT, which may restrict this.

4.9.4.5 SUPPOSE IN THE ABOVE SITUATION WATER QUALITY IMPROVES TO THE POINT THAT ACTUAL WATER QUALITY NOW MEETS CLASS A REQUIREMENTS. IS THE ANSWER DIFFERENT?

Yes. The standards must be upgraded (see Section 4.9.2.4).

4.9.4.6 AS AN ALTERNATIVE CASE, SUPPOSE PHOSPHORUS LOADINGS GO DOWN AND WATER QUALITY IMPROVES BECAUSE OF A CHANGE IN FARMING PRACTICES, E.G., INITIATION OF A SUCCESSFUL NONPOINT PROGRAM. ARE THE ABOVE ANSWERS THE SAME?

Yes. Whether the improvement results from a change in point or nonpoint source activity is immaterial to how any aspect of the standards regulation operates. Section 131.10(d) clearly indicates that uses are deemed attainable if they can be achieved by "... cost-effective and reasonable best management practices for nonpoint source control". Section 131.12(a)(2) of the antidegradation policy contains essentially the same wording.

4.9.4.7 WHEN A POLLUTANT DISCHARGE CEASES FOR ANY REASON, MAY THE WASTELOAD ALLOCATIONS FOR THE OTHER DISCHARGES IN THE AREA BE ADJUSTED TO REFLECT THE ADDITIONAL LOADING AVAILABLE?

This may be done consistent with the antidegradation policy only under two circumstances: (1) in "high quality waters" where after the full satisfaction of all public participation and intergovernmental review requirements, such adjustments are considered necessary to accommodate important economic or social development and the "threshold" level requirements are met; or (2) in less than "high quality waters", when the expected improvement in water quality will not cause a better use to be achieved, the adjusted loads still meet water quality standards, and the new wasteload allocations are at least as stringent as technology-based limitations. Of course, all applicable requirements of the Section 402 permit regulations would have to be satisfied before a permittee could increase its discharge.

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U.S. ENVIRONMENTAL PROTECTION AGENCY

Region 9

Guidance on Implementing the Antidegradation Provisions of 40 CFR 131.12

/s/
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Acting Director
Water Management Division

June 3, 1987
Date

PURPOSE

This document provides general program guidance for the States of Region 9 on the development of procedures for implementing State antidegradation policies. The focus of this guidance is on 40 CFR 131.12 of the water quality standards regulation (promulgated in 48 FR 51407, dated November 8, 1983) which sets out requirements to be met before any action is taken that would lower the quality of the nation's waters.

BACKGROUND

Section 101(a) of the Clean Water Act defines the national goal of restoring and maintaining the chemical, physical and biological integrity of the Nation's waters. Section 303(a)(4) of the Clean Water Act explicitly refers to satisfaction of the antidegradation requirements of 40 CFR 131.12 prior to taking various actions which would lower water quality. 40 CFR 131.12 requires that antidegradation provisions at least as stringent as those specified in that regulation be adopted by States as part of their water quality standards.

This guidance identifies the tasks to be performed by States to implement Section 131.12 of the water quality standards regulation. Those tasks that need the development of decision criteria by the States are identified. Such criteria are necessary to define those actions which require detailed economic or water quality impact analyses. The Agency expects States to develop and document these criteria in their antidegradation implementation procedures, for review and approval by EPA regional offices. The Agency's objective is to achieve the goals of the Act through an integrated approach to eliminating water pollution which includes the consistent application of State antidegradation policies. Figure 1 lays out the decision making process of an antidegradation analysis.

Many of the procedures identified herein are already performed by States as part of their regulatory programs. Consequently, this document primarily serves to delineate, in a consistent manner, the criteria EPA Region 9 will be using to evaluate both State and EPA decisions, for compliance with 40 CFR 131.12.

TIER III WATERS - Outstanding National Resource Waters

40 CFR 131.12(a)(3) prohibits any action which would lower water quality in waters designated as Outstanding National Resource Waters (ONRWs). Examples of such waters include, but are not limited to, waters of National and State parks and wildlife refuges, and waters of exceptional recreational or ecological significance.

TIER I WATERS

40 CFR 131.12(a)(1) prohibits any action which would lower water quality below that necessary to maintain and protect existing uses. In cases where

water quality is just adequate to support the propagation of fish, shell fish and wildlife and recreation in and on the water, such water quality must be maintained and protected. In cases where water quality is lower than necessary to support these uses, the requirements in Section 303(d) of the Act, 40 CFR 131.10 and other pertinent regulations must be satisfied. Guidance concerning actions affecting these waters has been published elsewhere and will not be repeated here.

TIER II WATERS - High Quality Waters

Applicability

40 CFR 131.12 establishes certain minimum requirements for States to adopt regulating actions which would lower water quality in high quality waters. These waters are defined as those in which water quality exceeds that necessary to support propagation of fish, shellfish and wildlife and recreation in and on the water. Any action which would result in, or which would permit, a lowering of water quality, must be addressed in State implementation procedures. Actions covered by antidegradation provisions include, but are not limited to the following:

Permit Actions

1. Issuance/Re-issuance/Modification of NPDES permits.
2. Issuance of variances (e.g. 301(h), 301(m), etc.).
3. Issuance of permits for urban runoff.
4. Issuance of Section 404 permits.
5. Adoption of or alteration of mixing zones.
6. Relocation of discharge.
7. Commencement of discharge from a new source.
8. Increases in the discharge of pollutants from point sources due to:
   a. Industrial production increases.
   b. Municipal growth.
   c. New sources.
   d. Etc.

Standards/Load Allocation Actions

1. Water quality standards revisions.
2. Revision of wasteload allocations.

3. Reallocation of abandoned loads.

4. Section 401 certifications (for example; concerning FERC licenses, Corps' actions, etc.).

5. Section 208 or Section 303(e) approvals.

6. WQM plan approvals.

"Nonpoint Source" Actions

1. Changes in BMPs.

2. Resource management plan approvals.

3. Land Management (e.g. Forest) plan adoptions, certifications or approvals.

4. Changes in regulated agricultural activities.

5. Changes in regulated silvicultural activities.

6. Changes in regulated mining activities.

7. Construction and operation of roads, dams, etc.

Other Actions

1. RCRA/CERCLA actions.

2. Construction grant activities.

3. Other "major Federal actions" (pursuant to NEPA and the Endangered Species Act).

4. Water quantity/water rights actions which affect water quality.

5. Federal actions regulated by Section 313 of the Clean Water Act.

Prior to proceeding with a detailed analysis of these or similar actions, the affected water body should be assessed to determine whether or not it falls into either Tier I or Tier III. If so, actions which would lower water quality in such waters are prohibited. Otherwise, the water body should be assessed to determine the adequacy of the beneficial uses and water quality criteria designated for that water body. Adequate water quality standards must be adopted and approved for an affected water body, pursuant to 40 CFR 131 prior to allowing any action to proceed which would lower water quality in that water body.

The first step in any antidegradation analysis is to determine whether or not the proposed action will lower water quality (see Figure 1). If the action will not lower water quality, no further analysis is needed and EPA

considers 40 CFR 131.12 to be satisfied. If the action could or will lower water quality, and the affected water is not a Tier I or Tier III water, then the steps to be followed to determine whether or not 40 CFR 131.12 is satisfied are described in the following sections of this guidance.

Both point and nonpoint sources of pollution are subject to antidegradation requirements. While point sources are generally well regulated, procedures for controlling nonpoint source pollution have not been as extensively defined. Cost-effective and reasonable best management practices for nonpoint source controls must be designed to meet water quality standards. EPA policy, first issued as SAM-32 on November 14, 1978, states that where applicable water quality standards are not met, revised or additional best management practices (BMPs) should be applied in an iterative process to improve water quality to the point that standards are attained, and that designated uses are maintained and protected. In Region 9, States generally have broad authority to regulate nonpoint sources. As part of their implementation methodologies, States must adopt procedures which adequately assure that nonpoint sources of water pollution will comply with the antidegradation requirements of 40 CFR 131.12.

Implementation Procedures

Four basic elements should be included in State implementation procedures to ensure that actions affecting water quality are consistent with the provisions of 40 CFR 131.12. They are:

- o Task A - Identify Actions that Require Detailed Water Quality and Economic Impact Analyses
- o Task B - Determine that Lower Water Quality Will Fully Protect Designated Uses
- o Task C - Determine That Lower Water Quality is Necessary to Accommodate Important Economic or Social Development in the Area in which the Waters are Located
- o Task D - Complete Intergovernmental Coordination and Public Participation

Task A - Identify Actions that Require Detailed Water Quality and Economic Impact Analyses

This task established the types of analyses required for all actions that lower water quality in Tier II waters and decision criteria that define the degree of water quality and economic analysis required.

State procedures should include three parts. First, the State should develop procedures to document the degree to which water quality exceeds that necessary to protect the uses. Ambient monitoring data can be used to provide this documentation. States must adopt procedures to assure that, where little or no data exists, adequate information will be available to determine the existing quality of the water body or bodies, which could be adversely affected by the proposed action. Such procedures should include

both an assessment of existing water quality and a determination of which water quality parameters and beneficial uses are likely to be affected. These assessments and determinations could be performed either by the State or the party proposing the action in question.

Second, the State should develop procedures that quantify the extent to which water quality will be lowered as a result of the proposed action. Simple mass balance calculations or more detailed mathematics modeling, such as that contained in wasteload allocations, can provide this information.

Third, the State should develop decision criteria to define the degree of water quality change that warrants detailed water quality and economic impact analyses. Decision criteria could be based on direct measures, such as an absolute or percent change in ambient concentrations of the affected parameter or indirect measures such as changes in primary productivity caused by nutrients or changes in diurnal dissolved oxygen fluctuations.

Repeated or multiple small changes in water quality (such as those resulting from actions which do not require detailed analyses) can result in significant water quality degradation. To prevent such cumulative adverse impacts, a baseline of water quality must be established for each potentially affected water body, prior to allowing any action which would lower the quality of that water. This baseline should remain fixed unless some action improves water quality. At such time, the baseline should be adjusted accordingly.

Proposed actions to lower water quality should then be evaluated with respect to the baseline and the resultant water quality change should be determined. This determination should include the cumulative impacts of all previous and proposed actions and reasonably foreseeable actions which would lower water quality below the established baseline. Should the cumulative impact of actions significantly degrade water quality, more detailed water quality and economic impact analyses would be necessary.

In any case, whether or not water quality is significantly lowered (thus leading to an economic analysis), the State must find that any action which would lower water quality is necessary to accommodate important economic and social development. Such a finding must include, at a minimum, the following determinations:

1. That economic and social development will occur, e.g., there will be new or increased production of goods or services by the party proposing the change, population will grow in the service area of a sewage treatment plant, etc.

2. That this economic or social development requires the lowering of water quality which cannot be mitigated through reasonable means.

3. That the lower water quality does not result from inadequate wastewater treatment facilities, less-than-optimal operation of adequate treatment facilities, or failure to implement or comply with methodologies to reduce or eliminate nonpoint source pollution.

Task B - Determine that Lower Water Quality Will Fully Maintain and Protect Designated Uses

All actions that could lower water quality in Tier II waters require a determination that existing uses will be fully maintained and protected. States should develop methodologies for making this determination.

Tier II waters, by definition, are those in which the water quality is better than necessary to support and maintain the biota and beneficial uses of the water. In most cases, specific numerical standards do not exist to protect these uses. Where such standards do exist, they are generally established to provide the minimum acceptable quality to protect the beneficial uses of the water. Often, such standards are established on a statewide or drainage basin-wide basis and thus may not adequately protect the biota or the uses of specific reaches. Consequently, comparing existing or projected water quality with adopted standards may not adequately define whether or not beneficial uses will be fully maintained and protected.

Water quality must also meet any applicable public health standards as well as maintain and protect the existing growth and reproduction of resident species. The water quality criteria guidance developed by EPA per Section 304(a) of the Clean Water Act provides a basis for this assessment. However, national water quality criteria (such as those contained in the "Gold Book") may not fully protect resident species. The criteria may not protect locally occurring species that either may not have been tested, or that have been tested, but require greater protection than the criteria provide. This determination involves a comparison of the species upon which biological testing has been completed in the criteria development documents with the species resident to the water body where water quality may be lowered. If the resident species are not adequately represented in the database, additional testing should be completed before lower water quality is allowed. Implementation methods should include procedures for making this comparison and define the circumstances (e.g., in terms of water quality change or extent of the biological testing database) that would require additional biological testing before water quality can be lowered.

Water quality criteria for dissolved oxygen or conventional and non-conventional pollutants may be subject to the same limitations and should be considered in the same way. For parameters for which no criteria guidance has been developed, biological testing or acceptable site-specific criteria may be used to determine that lower water quality will fully maintain and protect designated uses.

The lowering of water quality through the discharge of conservative or persistent pollutants merits more intensive consideration by States, due to the bioaccumulative potential of these pollutants. These pollutants, particularly carcinogens, which are considered to have no safe "threshold" concentration, should have more stringent antidegradation requirements established for their analysis.

Other methods of determining whether or not beneficial uses are being maintained and protected include biological assessments, such as the aquatic ecoregions procedure, or ambient toxicity testing using standardized species. In some cases, assessing the quality of water bodies on a pollutant-specific basis could prove costly, particularly for waters in which a number of discharges are located or for complex effluents. EPA's recently developed acute and chronic toxicity methodologies for assessing the toxicity of effluents or receiving waters could provide a more comprehensive and affordable alternative.

Task C - Determine that Lower Water Quality is Necessary to Accommodate Important Economic or Social Development

Actions which the State determines in Task A to significantly lower water quality require a determination that such actions are necessary for important economic or social development. 40 CFR 131.12(a)(2) and the August 1985 "Questions and Answers on Antidegradation", give general guidance on how to make this determination. Explicit criteria defining "important economic or social development" have purposely not been developed by EPA headquarters, because of the varying environmental, economic and social conditions of localities throughout the country. Further explication of EPA Region 9's expectation concerning these determinations is appropriate and is presented below.

The fundamental requirement of this task is to establish a strong tie between the proposed lower water quality level and "important" economic or social development. If the party seeking the change in water quality cannot demonstrate the relationship between such development and water quality, then the proposed action is prohibited.

Demonstration of important economic or social development entails two steps. First, the party should describe and analyze the current state of economic and social development in the area that would be affected. The purpose of this step is to determine the "baseline" economic and social status of the affected community, i.e., the measure against which the effect of the water quality downgrade is judged. The area's use or dependence upon the water resource affected by the proposed action should be described in the analysis. The following factors should normally be included in the baseline analysis:

- Population;
- Area employment (numbers employed, earnings, major employers);
- Area income (earnings from employment and transfer payments, if known);
- Manufacturing profile: types, value, employment, trends;
- Government fiscal base: revenues by source (employment and sales taxes, etc.).

Second, the party seeking the change in water quality should then demonstrate the extent to which the sought for level of water quality would create an incremental increase in the rate of economic or social development and why the change in water quality is necessary to achieve such development. The party should provide analysis, along with the supporting data used in its preparation, showing the extent to which the factors listed above will benefit from the change in water quality requested. The analysis should demonstrate why such economic and social development requires the lower water quality. Other alternatives or changes in the project or other mitigation measures which would prevent degradation of water quality should be identified in this analysis. The following factors may be included in the analysis of incremental effects expected to result from the degradation in water quality:

- Expected plant expansion;
- Employment growth;
- Direct and indirect income effects;
- Increases in the community tax base.

Other components of this analysis could include an assessment of the overall environmental benefits to be achieved by the proposed action and the tradeoffs to be considered among the various media. The relative costs of various alternatives to the proposed action could also be analyzed.

The requirements for a given analysis will be site-specific, depending upon factors such as data availability, conditions specific to the relevant water body, the area of impact (city, county, State-wide), etc. The economic analysis may include estimation of the treatment costs necessary to maintain existing water quality; e.g. land treatment or advanced treatment. Staff of the EPA Regional office are available to assist States in determining the exact requirements of an analysis of specific proposals to lower water quality. In addition, the Economic Analysis Branch in EPA Headquarters' Office of Water can assist State and Regional staff, when necessary.

Task D - Complete Intergovernmental Coordination and Public Participation

Public notification pursuant to 40 CFR 131.12 is required for all actions that lower water quality in Tier II waters. EPA requires that proposed actions which degrade water quality be reviewed by other appropriate agencies and that the public be given an opportunity to comment.

Documentation and public notification under antidegradation need not be a lengthy process in many cases and can be combined with other actions that require public notification. The public participation requirement may be met by holding a public hearing, e.g., as part of the adoption of an NPDES permit, as long as proper notice of a standards action is provided to the public (see WQS Handbook). Intergovernmental coordination consists of requests for review of proposed actions by affected local, State and federal agencies, such as area-wide planning agencies, fish and wildlife agencies, etc.

The following is a summary of the public notification required to comply with the antidegradation provisions of the WQS regulation:

- o A statement that the action must comply with the State's antidegradation policy and a description of the policy.
- o A determination that existing uses will be maintained and protected. This will require an assessment and documentation for public review of (a) the amount the water quality currently exceeds that necessary to protect the existing and designated uses, and (b) the amount that water quality will be lowered as a result of the proposed action (see Task A).
- o A summary of other actions, if any, that have lowered water quality and a determination of any cumulative impacts.
- o A determination that lower water quality is necessary to accommodate important economic or social development. This will require a detailed analysis or the rationale used to determine that a detailed analysis is not required (see Tasks A and C).
- o A description of the intergovernmental coordination that has taken place.
- o A determination that there has been achieved the highest statutory and regulatory requirements for all new and existing point sources and all cost-effective and reasonable best management practices for nonpoint sources.

OTHER CONSIDERATIONS

1. The decision criteria for determining that detailed water quality and economic analyses are needed may vary with the types of chemical pollutants. Some chemicals are believed to elicit an effect at a certain concentration (i.e., threshold chemicals). Other chemicals (i.e., non-threshold chemicals) have no safe level. Non-threshold chemicals include carcinogens, mutagens and teratogens. States are urged to apply more stringent review procedures to non-threshold chemicals.

2. NPDES permits do not routinely contain numerical limits for all of the substances found in a discharger's effluent. Nevertheless, all substances are subject to antidegradation policy implementation, whether or not they are specifically limited in the permit. To apply antidegradation to substances not currently limited in the permit, the State can utilize the notification procedures specified in 40 CFR 122.42, requiring dischargers to notify the State pollution control agency of any actual or anticipated change in effluent characteristics, as compared with those existing at the time the permit was issued.

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FIGURE 1

Antidegradation Flow Chart

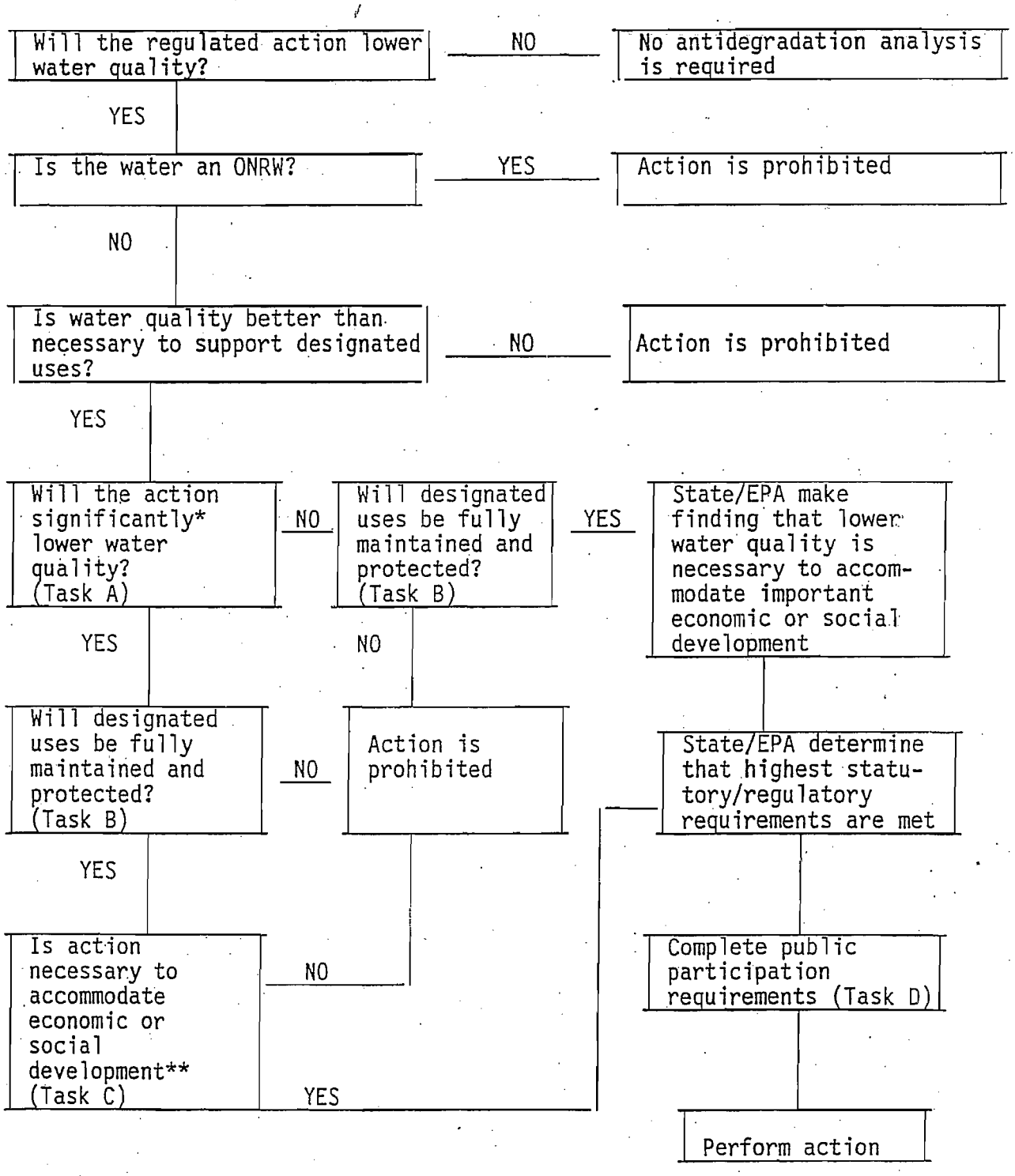

* Significance level and effect of cumulative impacts as defined by State.

** Based on criteria defined by State.

State of California

Memorandum

To : Regional Board Executive Officers
Jim Baetge
Ray Walsh

Date : OCT 07 1987

/s/ W. R. Attwater
William R. Attwater
Chief Counsel

From : STATE WATER RESOURCES CONTROL BOARD

Subject: FEDERAL ANTIDEGRADATION POLICY

This memorandum is intended to provide guidance on the application of the federal antidegradation policy to actions by the State Water Resources Control Board (State Board) and the California Regional Water Quality Control Boards (Regional Boards).

OVERVIEW

Environmental Protection Agency (EPA) Water Quality Standards regulations require that each state have an "antidegradation policy." 40 C.F.R. §§131.6(d), 131.12. Each state's policy must, at a minimum, be consistent with the principles set forth in 40 C.F.R. §131.12 (hereinafter referred to as the "federal antidegradation policy"). This regulation establishes a three-part test for determining when increases in pollutant loadings or other adverse changes in surface water quality may be permitted:

> "(1) Existing instream water uses and the level of water quality necessary to protect the existing uses shall be maintained and protected.
> (2) Where the quality of the waters exceed levels necessary to support propagation of fish, shellfish, and wildlife and recreation in and on the water, that quality shall be maintained and protected unless the State finds after full satisfaction of the intergovernmental coordination and public participation provisions of the State's continuing planning process that allowing lower water quality is necessary to accommodate important economic or social development in the area in which the waters are located. In allowing such degradation or lower water quality, the State shall assure water quality adequate to protect existing uses fully. Furtner, the State shall assure that there shall be achieved the highest statutory and

regulatory requirements for all new and existing point sources and all cost-effective and reasonable best management practices for nonpoint source control.
(3) Where high quality waters constitute an outstanding National resource, such as waters of National and State parks and wildlife refuges and waters of exceptional recreational or ecological significance, that water quality shall be maintained and protected." 40 C.F.R. §131.12(a).

State Board Resolution No. 68-16, the "Statement of Policy with Respect to Maintaining High Quality of Waters in California", satisfies the requirement that the State have a policy which, at a minimum, is consistent with the federal antidegradation policy. The State Board has interpreted State Board Resolution No. 68-16 to incorporate the federal antidegradation policy in situations where the federal antidegradation policy is applicable. State Board Order No. WQ 86-17 at 16-19. State Board Resolution No. 68-16 is part of state policy for water quality control, which guides the regulatory programs for the State and Regional Boards and is binding on all state agencies. See Cal. Water Code §13140 et seq.

The State Board has interpreted State Board Resolution No. 68-16 to incorporate the federal antidegradation policy in order to ensure consistency with federal Clean Water Act requirements. See State Board Order No. WQ 86-17 at 17-18.

Attached are copies of EPA's Questions and Answers on: Antidegradation and EPA Region 9's Guidance on Implementing the Antidegradation Provisions of 40 CFR 131.12. These documents can be used as guidance in applying the federal antidegradation policy.

Also attached is a copy of State Board Order No. WQ 86-17. The order discusses the federal antidegradation policy at pages 16-24. EPA provided comments on the proposed order, stating that EPA concurred in the State Board's analysis.

As indicated by the attached material, application of the federal antidegradation policy often will hinge on the specific facts of the case. Thus, it is not possible to provide a definitive exposition as to how the policy should be applied.

The federal antidegradation policy serves as a "catchall" water quality standard, to be applied where other water quality standards are not specific enough for a particular water body or portion of that water body, or where other water quality standards do not address a particular pollutant. The test also serves to provide guidance for standard setting and for other regulatory decisions, to determine when additional control measures should be required to maintain instream beneficial uses or to maintain high quality waters.

The federal antidegradation policy emphasizes protection of instream beneficial uses, especially protection of aquatic organisms. In most cases, where instream beneficial uses will not be impaired and no outstanding National

resource waters will be affected, the federal antidegradation policy is not an absolute bar to reductions in water quality. Rather, the policy requires that reductions in water quality be justified as necessary to accommodate important social and economic development. The outcome will often depend upon a balancing of competing interests, the decision resting in the sound judgment of the State and Regional Boards.

This memorandum provides general guidance as to where the federal antidegradation policy applies, and how the three-part test established by the antidegradation policy should be applied.

I. Applicability of the Federal Antidegradation Policy

The three-part test set forth in the federal antidegradation policy is triggered by reduction in surface water quality. The first step in analyzing the requirements of the federal antidegradation policy as applied to a particular activity is to determine if the activity will lower surface water quality; only if there is reduction in water quality must the three-part test be applied to determine if the activity may be permitted. See EPA Region 9, Guidance on Implementing the Antidegradation Provisions of 40 C.F.R. 131.12 at 4.

A. Waters of the United States

The federal antidegradation policy is part of EPA's Water Quality Standards regulations. Each State's water quality standards must include a policy consistent with the federal antidegradation policy. 40 C.F.R. §131.6(d). Thus, the State and Regional Boards must apply the federal antidegradation policy to all "waters of the United States" within the State of California. See generally Clean Water Act §§303(e)(3), 502(7), 33 U.S.C. §1313(e)(3), 1362(7); Kentucky v. Train, 9 E.R.C. 1281 (E.D. Ky. 1976).

The term "waters of the United States" is broadly defined, to include essentially all surface waters. See, e.g., Quivara Mining Co. v. United States Environmental Protection Agency, 765 F.2d 126 (10th Cir. 1985) cert. denied ___ U.S. ___, 106 S.Ct. 761 (1986). "Waters of the United States" do not include ground waters. See Exxon v. Train, 554 F.2d 1310 (5th Cir. 1977). Where only ground waters are affected, State Board Resolution No. 68-16 still applies, but does not incorporate the federal antidegradation policy; the State and Regional Boards must apply the general policies set for the State Board Resolution No. 68-16 to changes in ground water quality, but need not address the specific, three-part test established by the federal antidegradation policy. See State Board Order No. WQ 86-17 at 19.

The boundaries of the State of California extend three miles seaward from the coast line. People v. Weeren, 26 Cal.3d 654, 660-61, 607 P.2d 1279, 1281-82, 163 Cal.Rptr. 255, 257-258, cert. denied 440

U.S. 839, 101 S.Ct. 115 (1980); see id. at 622, 607 P.2d 1282-83, 183 Cal.Rptr. at 258-59 (coast line is defined as the ordinary low water mark or the seaward limit of inland waters). See generally United States v. California, 381 U.S. 139, 164, 169-70, 85 S.Ct. 1401, 1415, 1418 (1965) (establishing test for identifying inland waters, a test satisfied by Monterey Bay but not by the Santa Barbara Channel, Santa Monica Bay, or San Pedro Bay); 44 Ops.Cal.Atty.Gen. 135 (1966). Compare Cal. Water Code §13200 with Clean Water Act §502, 33 U.S.C.A. §1362 ("boundaries of the state," for purposes of defining those areas for which water quality standards are required under the Porter-Cologne Water Quality Control Act, include the waters of the "territorial sea," as defined in the Clean Water Act, but do not include waters beyond the three-mile limit, defined as waters of the "contiguous zone" and the "ocean" under the Clean Water Act).

The State may exercise authority over activities beyond its boundaries in order to protect the State's legitimate interests. People v. Weeren, 26 Cal.3d at 666, 607 P.2d at 1285, 163 Cal.Rptr. at 261; see Cal. Water Code §13260(a)(2). But the State's water quality standards, including the state policy incorporating the federal antidegradation policy, extend only to waters within the boundaries of the State. See Clean Water Act §§303(e)(3), 507(7), 507(8), 33 U.S.C. §§1313(e)(3), 1367(7), 1367(8); Cal. Water Code §§13050(e); 13200.

Thus, for offshore discharges, application of the federal antidegradation policy by the State and Regional Boards is triggered only by changes in water quality within the three-mile limit. If there is a change within the three-mile limit triggering application of the federal antidegradation policy by the State and Regional Boards, however, the State and Regional Boards should take into consideration changes in water quality beyond the three-mile limit as part of the public interest balancing required to determine if the three-part test established by the federal antidegradation policy has been satisfied. Cf. State Board Resolution No. 68-16 (requiring that changes in water quality be consistent with the "maximum benefit to the people of the State." In determining what constitutes the maximum benefit to the people of the State, when regulating activities within their jurisdiction, the State and Regional Boards may take into consideration associated impacts on water quality outside the State's boundaries, and how those changes in water quality may affect the legitimate interests of the State.)

Of course, EPA may apply the federal antidegradation policy to offshore discharges, even where there is no change in water quality within the State's boundaries triggering application of the federal antidegradation policy by the State and Regional Boards. See generally Clean Water Act §402(a), 33 U.S.C. §1342(a). When EPA issues a permit for a discharge to the contiguous zone or ocean waters, the permit must apply "the same terms, conditions, and

requirements as apply to a State permit program and permits issued thereunder...." Id. §402(a)(3), 33 U.S.C. §1342(a)(3). States assuming responsibility for the National Pollutant Discharge Elimination System (NPDES) permit program must have and apply a policy consistent with the federal antidegradation policy. See 40 C.F.R. §§122.44(d), 123.25(b), 130.5(b)(1), 130.5(b)(6), 131.6(d). Accordingly, EPA should apply the federal antidegradation policy to any change in surface water quality resulting from any EPA issued NPDES permit.

B. Changes in Water Quality

Application of the federal antidegradation policy is triggered by a lowering of surface water quality. The critical issue in determining whether the three-part test established by the policy must be applied is not the level of treatment provided, but whether receiving waters will be affected.

Thus, the federal antidegradation policy ordinarily is triggered by new discharges or expansion of existing facilities, "[s]ince such activities would presumably lower water quality." EPA, Questions & Answers on: Antidegradation, 6. But an increase in the volume of discharge would not trigger application of the federal antidegradation policy where the increased volume is offset by an increase in the level of treatment, so that there is no lowering of receiving water quality.

Similarly, application of the federal antidegradation policy would be triggered by a reduction in the level of treatment of an existing discharge. See State Board Order No. WQ 86-17 at 20-21.

Substantial relocation of an existing outfall would also trigger application of the federal antidegradation policy since, like a new discharge, water quality presumably will be lowered in the vicinity of the new outfall. See EPA Region 9, Guidance on Implementing the Antidegradation Provisions of 40 C.F.R. 131.12 at 3.

The requirement that the federal antidegradation policy be applied does not depend upon identification of any discernible impact on beneficial uses. It may be most convenient to think in terms of mass emissions. A substantial increase in mass emissions of a pollutant ordinarily triggers application of the federal antidegradation policy, even if there is no other indication that the waters are polluted. See State Board Order No. WQ 86-17 at 21.

The federal antidegradation policy was promulgated on November 28, 1975. It does not apply to reductions in water quality which occurred before that date. Thus, the federal antidegradation policy ordinarily does not apply to continuation of existing discharges, even if exceptions or variances from other applicable water quality

objectives or effluent guidelines are required to permit the discharge to continue.

The federal antidegradation policy is applicable to changes in water quality resulting from either point source or nonpoint source discharges. EPA, Questions & Answers on: Antidegradation 6.

In general, the federal antidegradation policy will also apply to changes in water quality resulting from water diversions. See id. at 11; EPA Region 9, Guidance on Implementing the Antidegradation Provisions of 40 C.F.R. 131.12 at 4. EPA guidance suggests that in the case of an irreconcilable conflict between a State's water quantity allocations and the federal antidegradation policy, the State's water rights law would prevail. But the two should be reconciled where possible. EPA, Questions & Answers on: Antidegradation 11. For example, it may be possible to offset decreases in water quality resulting from decreases in instream flows by imposing stricter controls on other factors affecting water quality. Id.

Under California water rights law, flow requirements for insteam beneficial uses and effects on water quality are considered as part of water right decisions. See Cal. Water Code §§174, 1243, 1243.5. See generally United States v. State Water Resources Control Board, 182 Cal.App.3d 82, 227 Cal.Rptr. 161 (1986). In particular, the federal antidegradation policy, which has been incorporated into the State's water quality objectives, should be considered as part of water right decisions. See Cal. Water Code §1258; State Board Order No. WQ 86-17 at 17-18 (State Board Resolution No. 68-16, which incorporates federal antidegradation policy, has been adopted as a water quality objective in all sixteen regional water quality control plans.) The public trust doctrine, with its emphasis on protection of instream beneficial uses and public interest balancing, also requires consideration of factors like those set forth in the federal antidegradation policy. See generally National Audubon Society v. Superior Court, 33 Cal.3d 419, 658 P.2d 709, 189 Cal.Rptr. 346, cert. denied, 464 U.S. 977, 104 S.Ct. 413 (1983). In some respects, the public trust doctrine may require even greater protection of instream beneficial uses than would be required to satisfy the federal antidegradation policy. The federal antidegradation policy does not apply to changes in water quality which occurred before the policy took effect in 1975; such changes in water quality can be considered in applying the public trust doctrine.

Thus, it should be possible to harmonize California water rights law and the federal antidegradation policy. State water rights law would prevail if achieving the requirements of the federal antidegradation policy would require a waste or unreasonable use of water. Cf. United States v. State Water Resources Control Board, 182 Cal.App.3d 82, 143-44, 227 Cal.Rptr. 161, 197 (1986) (State Board need not set

standards to maintain the water quality of a water body at a level sufficient for existing offstream use where substitute water supply is provided and maintaining that level of water quality in the water body would require a waste of water.) See generally Cal. Const. Art. X, §2. But California water rights law assigns a high value to protection of water quality and instream beneficial uses. See Cal. Water Code §§243, 1243.5, 1258. Indeed, a diversion may itself be unreasonable, in violation of constitutional prohibition of waste, unreasonable use, or unreasonable method of diversion, if it results in an impairment of instream beneficial uses. See Environmental Defense Fund v. East Bay Municipal Utility District, 26 Cal.3d 183, 605 P.2d 1, 161 Cal.Rptr. 466 (1983). The social and economic benefits of water development may be taken into account as part of the balancing of interests contemplated by the federal antidegradation policy. See 40 C.F.R. §130.12(a)(2).

A conflict between the federal antidegradation policy and the State's proscription of waste or unreasonable use, or between the federal policy and other requirements of California water rights law, appears unlikely. The State Board should apply the federal antidegradation policy as part of its water right decisions.

In summary, the applicability of the federal antidegradation test depends upon whether there is a change in surface water quality. If there is a lowering of water quality, the antidegradation policy applies to all factors which are affecting that water quality. On the other hand, the federal antidegradation policy has no applicability, no matter how degraded a body of water may be, absent some lowering of water quality after the effective date of the policy.

C. Proceedings

The federal antidegradation policy has the potential to be applied to virtually every kind of proceeding where water quality standards are established or where activities which affect receiving water quality are permitted. The policy may apply to either planning activities or to actions on permits for individual discharges. See EPA, Questions & Answers on: Antidegradation 4-5. The federal antidegradation policy is intended to serve both as a guideline for the preparation of water quality standards and as a general water quality standard applicable to other regulatory decisions. See State Board Order No. WQ 86-17 at 19.

1. Planning

The State and Regional Boards have followed the federal antidegradation policy in establishing water quality objectives as part of adoption or approval of water quality control plans. See, e.g., State Board, Lake Tahoe Basin Water Quality Control Plan 37 (1980).

Because the federal antidegradation policy focuses on changes in water quality, applicability of the test may not necessarily be triggered by a proposed relaxation of water quality objectives. For example, if a water quality objective adopted in 1975 has never been achieved, and a new standard is proposed based upon the highest level of water quality actually achieved since 1975, the federal antidegradation policy would not apply. No actual reduction in water quality would be authorized.

On the other hand, if water quality has declined since 1975, and a new water quality objective is based upon the existing, lower level of water quality, the federal antidegradation policy would be applicable. Applicability of the federal antidegradation policy does not depend upon the type of proceeding involved, and therefore does not depend upon whether changes in water quality are authorized beforehand or accepted after the fact.

Basin planning decisions may trigger the applicability of the federal antidegradation policy, even if no change in water quality objectives is proposed. For example, changes in discharge prohibitions or other changes in implementation measures may cause a reduction in water quality. EPA guidance on the federal antidegradation policy indicates that the requirements of the policy must be satisfied if changes in wasteload allocations would result in a lowering of water quality. EPA, Questions & Answers on: Antidegradation 8.

EPA regulations do not specify the precise method by which a state must implement the federal antidegradation policy. See 40 C.F.R. §131.12(a). The State should seek to integrate the policy into its own procedures. In California, where state law emphasizes comprehensive planning and coordination of all factors that affect water quality, the federal antidegradation policy should be considered as part of planning decisions to the extent possible. See generally, Recommended Changes in Water Quality Control, Final Report of the Study Panel to the California State Water Resources Control Board, Study Project, Water Quality Control Program 4-5 (1969). In many cases, however, it would not be possible to apply the federal antidegradation policy, except as the most general guidance, as part of basin planning decisions.

Water quality control plans must establish water quality objectives which are generally applicable to a body of water or to segments of that body of water. For large bodies of water such as the waters of the Pacific Ocean within the boundaries of the State, or for streams with numerous tributaries, it is not possible to identify, as part of water quality planning, all

areas where existing water quality may be higher than a proposed water quality objective. Moveover, the potential social and economic benefits of discharges which might reduce water quality often will be too speculative to be given consideration as part of water quality planning for large areas. The State and Regional Boards can and should focus their attention on establishing objectives for those situations where objectives are most needed to assure protection of beneficial uses, postponing until later site-specific approvals the determination whether discharges in a particular area should be allowed to reduce water quality to the level set by these objectives. For example, new objectives could be adopted for toxic pollutants that apply throughout a region, or even statewide, even though many areas will have better water quality than that required by those objectives. The new objectives would establish a floor, but water quality would not be permitted to be reduced to the level set by the new objectives without a site-specific application of the federal antidegradation policy.

If the State and Regional Boards are aware that a change in water quality standards or implementation measures would permit specific projects, the applicability of the federal antidegradation policy to the changes in water quality caused by those projects should be considered. The State and Regional Boards should pay particularly close attention to the requirements of the federal antidegradation policy when water quality control plan amendments are sought in order to permit a particular discharge, a reduced level of treatment, or development within a particular area.

2. Permitting

The federal antidegradation policy will most frequently be applied in individual permitting decisions, including issuance of waste discharge requirements and NPDES permits. A proposed waiver of waste discharge requirements would also be subject to the federal antidegradation policy if the waiver would result in a lowering of surface water quality.

For example, waste discharge requirements for new discharges or expansion of existing discharges ordinarily will require preparation of an anlysis applying the federal antidegradation policy. EPA, Questions & Answers on: Antidegradation 6. Of course, if the issures have already been analyzed in detail as part of a water quality control plan amendment, it will not be necessary to prepare a new analysis for issuance of waste discharge requirements.

The federal antidegradation policy will also apply to some cleanup and abatement orders and remedial action plans. Where

cleanup order is issued in response to changes in surface water quality, which occurred after the 1975 effective date of the federal antidegradation policy, but the board issuing the order decides not to require a return to the preexisting water quality, the decision to allow lower cleanup levels should be justified in accordance with the federal antidegradation policy. Where a cleanup order is directed towards immediate or short-term cleanup operations, postponing until later any determination of the ultimate cleanup level required, application of the federal antidegradation policy may also be postponed.

The federal antidegradation policy should also be addressed in water right proceedings, including issuance of water right permits, if the result of those proceedings would be to allow a lowering of surface water quality which existed after the 1975 effective date of the federal antidegradation policy. See EPA Region 9, Guidance on Implementing the Antidegradation Provisions of 40 C.F.R. 131.12 at 4.

3. Waivers and Exceptions

The federal antidegradation policy is also applicable to special proceedings concerning proposed waivers or exceptions from otherwise applicable water quality objectives or control measures. Examples include proposed Ocean Plan exceptions. See generally, State Board, Water Quality Control Plan, Ocean Waters of California 11 (1983).

Ordinarily, provisions of the Clean Water Act which allow for variances of treatment requirements should not be interpreted to exempt the discharge from the federal antidegradation policy. See, e.g., State Board Order No. WQ 86-17 at 19-20; EPA Region 9, Guidance on Implementing the Antidegradation Provisions of 40 C.F.R. 131.12 at 2. The only exception is for waivers of effluent limitations for thermal discharges, pursuant to Section 316(a) of the Clean Water Act. 33 U.S.C. §1326(a). EPA guidance indicates that limitations developed under Section 316 of the Clean Water Act take precedence over any requirements of the federal antidegradation policy that would otherwise apply. EPA, Questions & Answers on: Antidegradation 11; see 40 C.F.R. §131.12(a)(4).

II. The Three-Part Test

Where the federal antidegradation policy applies, it does not absolutely prohibit any changes in water quality. The policy requires that any reductions in water quality be justified consistent with the three-part test established by the policy. State Board Order No. WQ 86-17 at 20.

Whether reductions in receiving water quality may be permitted consistent with the federal antidegradation policy often will depend upon the conditions existing in the specific waters affected, and the benefits of the proposed discharge. This site-specific balancing is consistent with the scheme established under the Porter-Cologne Water Quality Control Act for setting water quality objectives in issuing waste discharge requirements, or setting cleanup levels in cleanup and abatement orders. See Cal. Water Code §§13263, 13304. "Judicious action by the regional boards, based on the facts of different cases and different areas, is the key to establishment of water quality objectives and waste discharge requirements." Recommended Changes in Water Quality Control, Final Report of the Study Panel to the California State Water Resources Control Board, Study Project, Water Quality Control Program, Appendix A at 30. Similar considerations govern when pollution is established and hence govern determination of appropriate cleanup levels. See id. (note on definition of "pollution").

A. Instream Uses

The first part of the test established by the federal antidegradation policy requires that: "Existing instream water uses, and the level of water quality necessary to protect the existing uses shall be maintained and protected." 40 C.F.R. §131.12(a)(1). This part of the test is intended to establish an "absolute requirement that uses attained must be maintained." 48 Fed. Reg. 51409 (Nov. 8, 1983).

EPA has provided more guidance on the requirement for protection of instream beneficial uses than on any other aspect of the federal antidegradation policy. See EPA, Questions & Answers on: Antidegradation 2-7. In large measure, this part of the federal antidegradation policy serves to reinforce the requirements of other applicable EPA Water Quality Standards regulations. See 40 C.F.R. §§131.2, 131.10, 131.11.

In general, the State must assure full protection of existing instream beneficial uses, including the health and diversity of aquatic life. Reductions in water quality should not be permitted if the change in water quality would seriously harm any species found in the water, other than a species whose presence is aberrational. EPA, Questions & Answers on: Antidegradation 3.

In general, the requirement that existing instream uses be protected is not satisfied if existing instream beneficial uses will be impaired, even for a portion of a water body. Id. at 5. EPA recognizes an exception for fill operations, which necessarily will preclude continued use of the filled area by aquatic species. The other two parts of the three-part test established by the federal antidegradation policy still apply to fill operations. Id. Similar considerations may require some flexibility in applying the federal antidegradation policy to areas flooded by new reservoirs. While it may be possible to protect a cold water fishery in a portion of the

reservoir, maintaining conditions for a cold water fishery throughout the reservoir, including its snallowest waters, may not be feasible. The water quality necessary to fully protect instream beneficial uses should still be protected in other portions of the waterway downstream of the reservoir.

B. Public Interest Balancing

Where water quality is higher than necessary to protect existing instream beneficial uses, the second part of the test applies. This part of the test allows reductions in water quality, so long as existing instream uses are protected, if the State finds "that allowing lower water quality is necessary to accommodate important economic or social development in the area in which the waters are located." 40 C.F.R. §131.12(a)(2).

EPA has provided relatively little guidance on how this part of the test should be applied, except to indicate that the meaning of the test "will evolve through case-by-case application" by the State. EPA, Questions & Answers on: Antidegradation 8.

This part of the federal antidegradation policy may best be viewed as a balancing test. The greater the impact on water quality, the greater the justification in terms of economic or social development necessary to justify the change. The burden of proof, to demonstrate that the change in water quality is justified, should be on the project proponent. See State Board Resolution No. 68-16; EPA Region 9, Guidance on Implementing the Antidegradation Provisions of 40 C.F.R. §131.12 at 9.

The requirement that the change be justified based upon "important economic or social development in the area" is intended to convey the level of justification required. EPA, Questions & Answers on: Antidegradation 8. Cost savings to the discharger, standing alone, absent a demonstration of how these savings are necessary to accommodate important social and economic development, are not adequate justification. State Board Order No. WQ 86-17 at 22 n. 10.

The requirement that the development accommodated by a change in water quality be important "in the area in which the waters are located" is intended to assure that development be important within the general area, not just to a small segment of the local population. The analysis used to determine whether the change in water quality is justified therefore should focus on impacts on the community; if the justification offered for a change in water quality is that it makes a particular development proposal feasible, the importance of that development within the general area should also be analyzed. The reference to economic development "in the area" should not be read to preclude consideration of important development at locations that are far away from the affected waters, so long as it

is demonstrated that the change in water quality is in fact necessary to accommodate that development.

The State has some flexibility to determine what kinds of impacts constitute "important economic or social development" that may justify changes in water quality. For example:

- Accommodating existing development may be used as a justification for changes in water quality. If major employer within the community could not afford to keep its plant in operation without a relaxation of treatment requirements, that may justify a lowering of receiving water quality.

- Important water development and water conservation projects may be considered to be important social and economic development that justify a lowering of water quality. See generally Cal. Water Code §13000.

- Environmental protection may constitute important social development, justifying a change in water quality, even if no other social or economic benefits to the community are demonstrated. If a discharge point is moved to less sensitive waters, the improvement in water quality at the original discharge point may justify the reduction in water quality at the new discharge point.

Of course, the degree to which development must be important in order to justify a change in water quality will depend on the extent to which water quality will be lowered. Thus, even where a new, expanded or relocated discharge is clearly justified, the balancing required by the second part of the federal antidegradation policy's three-part test may require a higher level of treatment than would otherwise be required by applicable Clean Water Act requirements. Conversely, relatively small changes in water quality should not require the level of justification needed for greater changes. EPA intends that the federal antidegradation policy be applied so as to require that development have a relatively high level of importance in order to justify a lowering of water quality. But the policy should not be interpreted to require that a project provide a major source of new housing or employment if only a very small discharge or a minor increase in an existing discharge is proposed.

Obviously, the information needed to apply this part of the federal antidegradation policy will vary according to the particular case. See EPA Region 9, Guidance on Implementing the Antidegradation Provisions of 40 C.F.R. 131.12 at 10. Detailed water quality and economic analyses should be required only if the degree of water quality change is significant. Id. at 6. EPA Region 9 has issued guidance indicating the information it expects to be provided in cases requiring detailed analyses, but the information requirements

will vary according to the type of project, receiving water impacts, and the nature of the social or economic development made possible by the project. Id. at 9-11. The analyses should include consideration of alternatives that would reduce water quality impacts. Id. at 10. Ordinarily, the information necessary to apply the federal antidegradation policy will be provided as part of the environmental documentation prepared for a project. See generally 14 Cal. Admin. Code §§ 15064, 15125, 15126, 15252. Where the State and Regional Boards participate in determining the scope of environmental documentation, and the federal antidegradation policy applies to a project, the Boards should seek to ensure that the requirements of the federal antidegradation policy will be analyzed. See, e.g., id. §15082(b)(1). Where changes in water quality are proposed to accommodate changes in land use, the State and Regional Boards should take into consideration the policies established under the appliable general plan, prepared by the local city or county pursuant to the State Planning and Zoning Law, Cal. Gov't Code §65000 et seq., and the plans of any regional, state or interstate agency with responsibility for land use planning in the area.

The federal antidegradation policy specifies that reductions in water quality may be permitted only after compliance with all applicable requirements for public participation and intergovernmental coordination. 40 C.F.R. §131.12(a)(2). The policy also specifies that all other applicable Clean Water Act requirements for point source discharges, and "all cost-effective and reasonable best management practices for nonpoint source control" shall be achieved. Id. These requirements are implicit in the requirement that changes in water quality must be "necessary to accommodate important economic or social development." Id. The necessity for a change in water quality has not been demonstrated to the extent that other applicable Clean Water Act requirements have not been followed. Nor has the necessity for a change in water quality been demonstrated to the extent that reductions in water quality could be avoided by reasonable and cost-effective control measures.

C. Outstanding National Resource Waters

The third part of the test established by the federal antidegradation policy requires that the water quality of waters which constitute an outstanding National resource be maintained and protected. 40 C.F.R. §131.12(a)(3). This part of the test has only limited applicability, but where it is applicable, it is very restrictive. No permanent or long-term reduction in water quality is allowable in areas given special protection as outstanding National resource waters. 48 Fed. Reg. 51402 (Nov. 8, 1983).

To date, only a small number of water bodies have been formally designated as outstanding National resource waters. The only California water so designated is Lake Tahoe. But other California waters almost certainly qualify.

Outstanding National resource waters are "waters of exceptional recreational or ecological significance." Id. The category may include waters of exceptionally high quality. 48 Fed. Reg. 51402 (Nov. 8, 1983). Outstanding National resource waters may also include:

> "water bodies which are important, unique, or sensitive ecologically, but whose water quality as measured by traditional parameters (dissolved oxygen, pH, etc.) may not be particularly high or whose character cannot be adequately described by these parameters." Id.

The most obvious candidates for designation as outstanding National resource waters are Pacific Ocean waters designated as areas of special biological significance. The Ocean Plan already sets requirements for protection of these areas that are consistent with the strict requirements for protection of outstanding National resource waters. See State Board, Water Quality Control Plan, Ocean Waters of California 9 (1983).

Other possible candidates for designation as outstanding National resource waters include state and federally designated wild and scenic rivers, and the waters of state and federal wilderness areas, parks, and wildlife refuges. Waters are not necessarily outstanding National resource waters simply because they are in one of these categories. Nor should waters outside these areas be excluded from consideration. But waters in these areas should be given special consideration to determine whether they should be designated as outstanding National resource waters.

Outstanding National resource waters may be designated as part of adoption or amendment of water quality control plans. See, e.g., State Board, Lake Tahoe Basin Water Quality Plan 37. See generally Cal. Water Code §13241(b).

Even if no formal designation has been made, individual permit decisions should not allow any lowering of water quality for waters which, because of the exceptional recreational and ecological significance, should be given the special protection assigned to outstanding National resource waters. See generally id. §13263(a) (water quality standards may be set when waste discharge requirements are issued, so long as those standards are no less stringent than any standards set by the applicable water quality control plan). Accordingly, the State and Regional Boards should consider, as part

of individual permit decisions, whether the affected waters should be designated as outstanding National resource waters.

III. Related Doctrines

The federal antidegradation policy applies in addition to any other applicable requirements of state and federal law. Even where a lower level of treatment would be consistent with the federal antidegradation policy, all other applicable regulatory requirements still must be satisfied. See, EPA, Questions & Answers on: Antidegradation 7-9.

In particular, the anti-backsliding requirements of the federal Clean Water Act often will apply in cases where the federal antidegradation policy is applicable.

State Board Resolution No. 68-16, which incorporates the federal antidegradation policy, may provide the basis for additional requirements in specific cases.

A. Anti-backsliding

"Backsliding" refers to reductions in treatment levels required by NPDES permits. EPA regulations limit the circumstances under which modified or reissued permits may set less stringent effluent limitations than required by previous permits. 40 C.F.R. §§122.44(l), 122.62. The Water Quality Act of 1987 includes provisions intended to clarify the Clean Water Act's anti-backsliding requirements. See Clean Water Act §402(o), 33 U.S.C. §1342(o).

The new anti-backsliding provisions generally prohibit relaxation of effluent limitations previously established on the basis of best professional judgment. Id. §402(o)(1), 33 U.S.C. §1342(o)(1). But the prohibition does not apply if any of five listed exceptions is applicable. Id. §402(o)(2), 33 U.S.C. §1342(o)(2).

The anti-backsliding requirements of the Clean Water Act are triggered by changes in the effluent limitations required by the discharger's NPDES permit, not by changes in the level of treatment actually achieved or by changes in receiving water quality. For example, an industrial discharger who failed to install and operate treatment systems required by the discharger's NPDES permit ordinarily could not obtain a relaxation of effluent limitations, even though the federal antidegradation policy would not apply. See id. §402(o)(2)(E), 33 U.S.C. §1342(o)(2)(E). On the other hand, new or expanded discharges ordinarily will not be subject to the anti-backsliding provisions.

The new anti-backsliding provisions also specify limitations on when water quality based effluent limitations may be relaxed. See id. §402(o), 33 U.S.C. §1342(o). If applicable water standards are not being achieved, a relaxation of water quality based effluent

limitations may be permitted if the new effluent limitations are consistent with a revised waste load allocation which will achieve water quality standards. See id. §303(d)(4)(A), 33 U.S.C. §1313(d)(4)(A). If all other applicable water quality standards are being achieved, water quality based effluent limitations may be relaxed if the relaxation is consistent with the federal antidegradation policy. Id. §303(d)(4)(B), 33 U.S.C. §1313(d)(4)(B).

B. State Board Resolution No. 68-16

State Board Resolution No. 68-16 establishes similar requirements to the federal antidegradation policy. The State Board adopted Resolution No. 68-16, as part of state policy for water quality control, in response to a 1968 Department of Interior directive calling for adoption of state policies. See generally Zener, The Federal Law of Water Pollution Control, published in E. Dolgin & T. Guilbert, Federal Environmental Law 721-23 (1974). That Interior Department directive later became the basis of the federal antidegradation policy promulgated by EPA in 1975. EPA, Questions & Answers on: Antidegradation 1.

Like the federal antidegradation policy, State Board Resolution No. 68-16 is triggered by changes in water quality. But the state policy has broader applicability. It applies to all waters of the State, not just waters of the United States. See State Board Resolution No. 68-16; State Board Order No. WQ 86-8. State Board Resolution No. 68-16 also applies to changes in water quality which occurred after its 1968 adoption date, not just to changes which occurred after the federal antidegradation policy took effect in 1975.

Where the federal antidegradation policy does not apply, the requirements of State Board Order No. 68-16 are less specific than the three-part test set by the federal antidegradation policy. See State Board Order No. WQ 86-17 at 19.

Where the federal antidegradation policy does apply, both the three-part test established by the federal antidegradation policy and the express requirements of State Board Resolution No. 68-16 should be considered. Id. at 23 n. 11. In some cases, application of the three-part test established by the federal policy may not fully satisfy the requirements of State Board Resolution No. 68-16. For example, the State's policy expressly provides for reasonable protection of potential beneficial uses; the federal antidegradation policy does not. See State Board Resolution No. 68-16; EPA, Questions & Answers on: Antidegradation 12. But cf. 40 C.F.R. §131.10(j) (requirement, independent of the federal antidegradation policy, for analysis of the attainability of instream beneficial uses). In all cases where the federal antidegradation policy is applicable, State Board Resolution No. 68-16 requires that, at a minimum, the three-part test established by the federal

antidegradation policy must be satisfied. State Board Order No. WQ 86-17 at 17-18.

Attachments

cc: Fresno, Redding and Victorville
Regional Board Offices

Dale Claypoole,
Program Control Unit

STATE OF CALIFORNIA
STATE WATER RESOURCES CONTROL BOARD

In the Matter of the Petition of RIMMON C. FAY To Review Order No. 85-56 of the California Regional Water Quality Control Board, Los Angeles Region, NPDES Permit No. CA0054097. Our File No. A-411.	ORDER NO. WQ 86-17

BY THE BOARD:

Petitioner, Rimmon C. Fay, filed a timely petition to review Order No. 85-56 of the California Regional Water Quality Control Board, Los Angeles Region (Regional Board).[1] Order No. 85-56 issues waste discharge requirements for the ocean discharge of treated effluent from the City of Oxnard's publicly owned treatment works. In issuing these waste discharge requirements, the Regional Board concurred in the issuance of a waiver of secondary treatment requirements by the Environmental Protection Agency. A waiver of secondary treatment requirements is authorized under Section 301(h) of the Clean Water Act. The petition contends that the requirements for a waiver of secondary treatment requirements have not been satisfied. The petition also contends that the waste discharge requirements are not consistent

[1] After being informed that the original petition was incomplete, the petitioner submitted an amendment to the petition. On January 13, 1986, the petitioner and interested parties were notified that the petition was complete. The petitioner has agreed in writing to extend the period for consideration of this petition to permit consideration of this order at the State Water Resources Control Board's November, 1986 workshop session and Board meeting. See 23 Cal. Admin. Code §2052(d).

with state and federal requirements for the protection of high quality waters, and state requirements intended to encourage wastewater reclamation.

I. BACKGROUND

The federal Clean Water Act establishes programs to protect water quality through the application of nationwide, technology-based effluent limitations to point source discharges to surface waters. For publicly owned treatment works, the Clean Water Act established a requirement for achievement of effluent limitations based upon secondary treatment. Clean Water Act Section 301(b)(1)(B), 33 U.S.C. §1311(b)(1)(B). Environmental Protection Agency regulations implementing this requirement include requirements that, on a 30-day average, the discharge of suspended solids shall not exceed 30 mg/l, and at least 85 percent of the suspended solids in the influent shall be removed. 40 C.F.R. §132.102(b).

The requirements of the Clean Water Act for point source discharges to surface waters are applied through National Pollutant Discharge Elimination System (NPDES) permits. In addition to applying the nationwide, technology-based effluent limitations established under the Clean Water Act, NPDES permits must apply any more stringent limitations necessary to assure compliance with receiving water standards and other applicable state and federal requirements. Clean Water Act Section 301(b)(1)(C), 33 U.S.C. §1311(b)(1)(C). The water quality standards for ocean waters include a standard set by the State's Ocean Plan, which generally requires 75 percent suspended solids removal,[2] a level

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[2] State Water Resources Control Board, Water Quality Control Plan, Ocean Waters of California (Ocean Plan) at 5 (1983). If the concentration of

(CONTINUED)

of treatment which may be referred to as "advanced primary." The Ocean Plan also sets other applicable objectives.

NPDES permits may be issued by states with adequate authority to implement Clean Water Act requirements. In California, both point and non-point sources are subject to waste discharge requirements, issued pursuant to the Porter-Cologne Water Quality Control Act (Porter-Cologne Act). Cal. Water Code §13000 et seq. In order to ensure that these requirements would be adequate for a state NPDES program, the Legislature added Chapter 5.5 (commencing with Water Code Section 13370 of the Water Code) to the Porter-Cologne Act in 1972. For point source discharges to surface waters, waste discharge requirements must apply and ensure compliance with all applicable requirements of the Clean Water Act and federal laws which amend or supplement the Clean Water Act, together with any more stringent requirements necessary to implement water quality control plans, for the protection of beneficial uses, or to prevent nuisance. Cal. Water Code §13377. California has an approved state NPDES program. NPDES permits are issued by the State Water Resources Control Board (State Board) and the nine California Regional Water Quality

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2 (FOOTNOTE CONTINUED)

suspended solids in the influent is less than 240 mg/l, 75 percent removal is not required so long as the effluent does not exceed 60 mg/l. Id. The Environmental Protection Agency approved water quality standards for ocean waters include those established by the Ocean Plan, standards established in applicable regional water quality control plans which are not inconsistent with the Ocean Plan, and the requirements of State Water Resources Control Board Resolution No. 68-16 and the State Water Resources Control Board's Water Quality Control Plan for the Control of Temperature in the Coastal and Interstate Waters and Enclosed Bays and Estuaries of California. Letter of May 2, 1984 from Judith E. Ayers, Regional Administrator, Environmental Protection Agency, Region IX, to Carole Onorato, Chairwoman, California State Water Resources Control Board.

Control Boards (Regional Boards), instead of by the federal Environmental Protection Agency.

As part of the 1977 amendments to the Clean Water Act, Congress added Section 301(h). 33 U.S.C. §1311(h). Section 301(h) authorizes a waiver of the technology-based requirement of secondary treatment, for publicly owned treatment works discharging into marine waters, if the applicant demonstrates that the following conditions are met:

> "(1) there is an applicable water quality standard specific to the pollutant for which the modification is requested, which has been identified under section 304(a)(6) of this Act;
> (2) such modified requirements will not interfere with the attainment or maintenance of that water quality which assures protection of public water supplies and the protection and propagation of a balanced, indigenous population of shellfish, fish and wildlife, and allows recreational activities, in and on the water;
> (3) the applicant has established a system for monitoring the impact of such discharge on a representative sample of aquatic biota, to the extent practicable;
> (4) such modified requirements will not result in any additional requirements on any other point or nonpoint source;
> (5) all applicable pretreatment requirements for sources introducing waste into such treatment works will be enforced;
> (6) to the extent practicable, the applicant has established a schedule of activities designed to eliminate the entrance of toxic pollutants from nonindustrial sources into such treatment works;
> (7) there will be no new or substantially increased discharges from the point source of the pollutant to which the modification applies above that volume of discharge specified in the permit." Id.

If the Environmental Protection Agency approves a waiver of secondary treatment (301(h) waiver), the discharge still must comply with all other applicable state and federal water quality requirements, including water quality standards. See id.; Clean Water Act Sections 301(b)(1)(C), 510, 33 U.S.C. §§1311(b)(1)(C), 1370.

NPDES permits incorporating 301(h) waivers are issued by the Environmental Protection Agency, with the concurrence of the state. Thus, for 301(h) waivers, the discharger needs both waste discharge requirements issued by the Regional Board and an NPDES permit issued by the Environmental Protection Agency. In issuing waste discharge requirements, the Regional Board applies all applicable requirements of the Clean Water Act, together with any more stringent requirements established under the Porter-Cologne Act. See Cal. Water Code §§13372, 13377. Waste discharge requirements authorizing a discharge at less than secondary treatment constitute the State's concurrence in the issuance of a 301(h) waiver.

The Oxnard Wastewater Treatment Plant has a design capacity of 25 million gallons per day. Average dry weather flow for 1984 was about 18.9 million gallons per day. In 1977, the Regional Board issued waste discharge requirements (serving as the City of Oxnard's NPDES permit) based upon secondary treatment. The plant, which had previously discharged primary effluent, was converted to secondary treatment in 1981. Existing secondary capacity at the Oxnard facility is 22.6 million gallons per day. The discharge was not in full compliance with secondary treatment requirements at the time the Regional Board issued Order No. 85-56. The outfall line extends approximately one mile offshore, discharging at a depth of about fifty feet.

The Ventura Regional Sanitation District, on behalf of the City of Oxnard, applied for a 301(h) waiver. The District submitted an application on August 23, 1979, and submitted a revised application on September 21, 1983. An Environmental Protection Agency 301(h) Review Team reviewed information submitted as part of the applications, retained a consultant, Tetra Tech, Inc., to prepare a Technical Review Report, and required some additional analysis by

the applicant. Based upon the 301(h) Review Team's recommendation, the Environmental Protection Agency tentatively approved the waiver on November 28, 1984.

On the basis of the Environmental Protection Agency's tentative approval of the 301(h) waiver, Regional Board staff and Environmental Protection Agency staff jointly prepared a draft permit, to serve as both the waste discharge requirements issued by the Regional Board and the NPDES permit issued by the Environmental Protection Agency. The Regional Board and the Environmental Protection Agency conducted a joint hearing on May 20, 1985. An order setting waste discharge requirements for the Oxnard Wastewater Treatment Plant was adopted by the Regional Board, as Order No. 85-56, on September 16, 1985, and by the Environmental Protection Agency, as NPDES Permit No. CA0054097, on September 27, 1985. The order waives secondary treatment requirements for two constituents of the effluent, suspended solids and biochemical oxygen demand. The effluent limitations set for these constituents are based upon the Ocean Plan standards for suspended solids and dissolved oxygen, in lieu of the limitations set by Environmental Protection Agency regulations for secondary treatment.

Regional Board Order No. 85-56 is the subject of this petition. The NPDES permit issued by the Environmental Protection Agency has been stayed pending the outcome of a separate appeal process within the Environmental Protection Agency. Any changes in the waste discharge requirements issued as Order No. 85-56 that are required by the State Board's decision upon review of this petition constitute a modification of the State's concurrence in the 301(h) waiver, and must be taken into account in the Environmental Protection Agency's final decision.

II. CONTENTIONS AND FINDINGS

1. Contention: Petitioner contends that Regional Board Order No. 85-56 will not assure the protection of a balanced, indigenous population of shellfish, fish and wildlife, and that marine waters will be degraded.

Finding: The Ocean Plan and Section 301(n) of the Clean Water Act set similar requirements for the protection of marine communities.

The Ocean Plan sets a water quality objectives requiring that:

> "Marine communities, including vertebrate, invertebrate, and plant species, shall not be degraded.
>
> . . . .
>
> Degradation shall be determined by analysis of the effects of waste discharge on species diversity, population density, contamination, growth anomalies, debility, or supplanting of normal species by undesirable plant and animal species." Ocean Plan at 3, 12.

Section 301(h) of the Clean Water Act requires that the applicant for a 301(h) waiver demonstrate to the satisfaction of the Environmental Protection Agency that the discharge will not interfere with the attainment and maintenance of a balanced, indigenous population of shellfish, fish and wildlife. 33 U.S.C. §1311(h)(2). Environmental Protection Agency regulations define a balanced indigenous population as an "ecological community" which:

> "(1) Exhibits characteristics similar to those of nearby, healthy communities existing under comparable but unpolluted environmental conditions; or
>
> (2) May reasonably be expected to become re-established in the polluted water body segment from adjacent waters if sources of pollution were removed." 40 C.F.R. §125.58(f).

For a 301(n) waiver to be granted, a balanced indigenous population must exist, with the discharge as modified by the 301(h) waiver, immediately

beyond the discharge's zone of initial dilution and in all other areas outside the zone of initial dilution potentially affected by the discharge. Id. §125.61(c).

In the context of the City of Oxnard's request for waste discharge requirements authorizing a reduction in treatment levels to advanced primary, the Ocean Plan objective and the 301(h) test establish essentially the same requirement for protection of marine communities.

Whether marine communities will be protected is a factual issue which must be decided by the Regional Board when it issues waste discharge requirements authorizing a reduction in treatment levels. See Cal. Water Code §§13263(a), 13377. This factual issue was clearly raised by the comments presented in the proceedings before the Regional Board. The Regional Board should have adopted findings setting forth the basis of its decision. See Topanga Association for a Scenic Community v. County of Los Angeles, 11 Cal.3d 506, 522 P.2d 12, 113 Cal.Rptr. 836 (1974). Regional Board Order No. 85-86 does not include any findings with respect to maintenance of marine communities. Adoption of the order, without findings applying the requirement for protection of marine communities, was improper.[3]

Where the State Board finds that a Regional Board's action was inappropriate or improper, the State Board may direct that the appropriate

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[3] Because the Ocean Plan objective and the Section 301(h) test establish essentially the same requirement, findings applying either test would have been adequate. But Order No. 85-56 contains no findings specifying whether the discharge is in compliance with the Ocean Plan objective, whether the 301(h) balanced indigenous population test has been satisfied, or otherwise setting forth a specific determination that protection of marine communities has been demonstrated.

action be taken by the Regional Board, or the State Board may take appropriate action itself. Cal. Water Code §13320(c). As set forth below, in the discussion of the 301(h) Review Team Conclusions, we are not convinced that protection of marine communities has been demonstrated. On the other hand, as set forth below in the discussion of Petitioner's Claims, we are not convinced the petitioner has demonstrated that marine communities will be degraded. Because the burden of proof is on the applicant, the Regional Board's action must be set aside, insofar as it authorizes a discharge at an advanced primary level of treatment.

Accordingly, we remand to the Regional Board, which should consider any additional evidence which may be offered. The Regional Board must issue waste discharge requirements based upon secondary treatment unless the Regional Board makes appropriate findings, based upon substantial evidence in the record, supporting a decision that the requirement for protection of marine communities has been satisfied.

a. 301(h) Review Team Conclusions

The evidence before the Regional Board concerning impacts on Marine Communities is reviewed in an analysis of the 301(h) waiver application for the Oxnard facility prepared by the Environmental Protection Agency's 301(h) Review Team.

The 301(h) Review Team analyzed potential impacts on plankton (floating microorganisms), benthic macrofauna (bottom dwelling larger than microscopic organisms), and demersal fish (bottom fish) species.

With respect to plankton, the 301(h) Review Team analysis points out that "no sampling has ever been conducted to directly evaluate discharge related effects around the outfall." (p. 19.) The analysis discusses a study

of the effects of the Hyperion outfall on Santa Monica Bay. The analysis does not indicate whether the plankton in Santa Monica Bay exhibit the characteristics of a marine community which has not been degraded. The Santa Monica Bay study shows no difference in phytoplankton (floating algae) abundance, distribution or composition related to the outfall location; zooplankton (floating microscopic animals) abundance increases near the outfall. The 301(h) Review Team analysis concludes that, taking into account the different sizes of the Oxnard and Los Angeles discharges "it appears likely that the natural plankton population will not be significantly affected" by the Oxnard discharge. In contrast, the Technical Review Report prepared for the 301(h) Review Team concludes that "it is impossible to evaluate whether a BIP [balanced indigenous population] of phytoplankton exists at the ZID [zone of initial dilution] boundary." Tetra Tech, Inc., Technical Evaluation of the Ventura Regional County Sanitation District, City of Oxnard Wastewater Treatment Plant Section 301(h) Application for Modification of Secondary Treatment Requirements for Discharge into Marine Waters [hereinafter cited as "Tetra Tech"] at 132 (1981).

The applicant performed field measurements and analyses of sediments and infauna community structure in 1984 indicating that there was no significant trend with respect to distance from the Oxnard outfall. These analyses support the 301(h) Review Team's conclusion that a balanced indigenous population exists for benthic infauna (organisms living in bottom sediments).

The applicant provided very little data with respect to demersal fish and epibenthic macroinvertibrates (larger than microscopic organisms, other than backboned animals such as fish, living on the bottom). The 301(h) Review Team concluded that there "is insufficient data upon which to directly

determine whether or not Oxnard's discharge is adversely affecting the local community of demersal fishes and epibenthic macroinvertibrates...." (page 27.)

The 301(h) Review Team also observed that "available data on bioaccumulation of toxic pollutants and pesticides by organisms in the vicinity of the Oxnard outfall are insufficient to draw definite conclusions" but concluded that the absence of water quality standards violations "suggests that adverse levels of bioaccumulation would not be expected." (p. 30.)

From the above, it appears that the protection of marine communities has been demonstrated for bentnic infauna, but not for the other communities considered. In the absence of a demonstration that these marine communities have not been degraded by the existing discharge, it has not been demonstrated that the proposed discharge, at a lower level of treatment, would not degrade marine communities.

Nevertheless, the 301(h) Review Team concludes that, if infauna are not adversely affected, one may infer that other organisms will be protected:

> "It seems likely, therefore, that a balanced indigenous population of fish, shellfish, and wildlife exists at present and should be maintained with the proposed discharge." (pp. 30-31).

We are not prepared to assume that because one community apparently has not been affected, protection of the other communities has been demonstrated. Protection of marine communities has not been demonstrated, as is required to permit the reduced level of treatment allowable under Regional Board Order No. 85-56, absent adequate data on the impacts of the Oxnard discharge on plankton, epibenthic macroinvertibrates, and demersal fish species.

b. Petitioner's Claims

The petitioner claims tnat calculations submitted as part of the petition snow that a balanced, indigenous population will not exist at the edge of the Oxnard outfall's zone of initial dilution. The calculations rely on published equations forecasting changes in benthic communities based upon suspended solids mass emissions.

As petitioner recognizes, the calculations submitted in the petition have not been verified by appropriate benthic surveys in tne vicinity of the Oxnard discnarge. The equations relied upon were based primarily on discharges of suspended solids an order of magnitude higher than the Oxnard discharge, and to much deeper waters.[4] As with the plankton study discussed in the previous section, we cannot determine the impacts of the Oxnard discnarge, based upon extrapolation of results from other significantly different discharges, absent confirming data measuring the impacts of the Oxnard discharge.

2. Contention: Petitioner contends that tne Oxnard discharge is not deep enough to permit a discharge at less than secondary treatment.

Finding: The Ocean Plan and Section 301(h) of the Clean Water Act do not set any specific minimum depth requirement, but the depth of outfall must be considered in determining whether requirements for protection of beneficial uses have been satisfied.[5]

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[4] Althougn tne study included information from the Oxnard outfall, the authors recognize tnat the equations may not accurately reflect conditions at the Oxnard outfall because differences between the Oxnard discnarge and otner discnarges studied. A. Mearns and J. Word, Forecasting Effects of Sewage Solids on Marine Benthic Communities, published in G. Mayer, ed., Ecological Stress and the New York Bignt: Science and Management at 495, 509 (1982).

[5] Section 301(h) of the Clean water Act authorizes a waiver of secondary treatment requirements for municipal discharges into "deep" offshore waters, or (CONTINUED)

Considering the depth of the Oxnard discharge, and the circulation patterns in the area, the evidence in the record indicates that a relaxation of treatment requirements may add to violations of Ocean Plan objectives for bacteriological characteristics. Absent a demonstration that the discharge will not cause or contribute to these violations, issuance of waste discharge requirements authorizing a reduction in treatment is inappropriate.

The Oxnard plume can reach the ocean surface during the fall and winter months. Tetra Tech at 40. Onshore winds tend to move this waste towards shore. Id. at 60. In the late spring and summer a portion of the plume rises to a level sufficiently shallow to be transported by wind driven currents. Only during the spring is the discharge plume trapped deep enough not to be influenced by the wind caused currents. Id. at 40.

Data collected as part of the monitoring program for the Oxnard discharge show that Ocean Plan bacteriological standards for body contact sports and shellfish harvesting have been exceeded on a number of occasions. The 301(h) Review Team suggests that: "Many of these violations may be caused by non-point source pollution and urban runoff from storm drains near the outfall." (p. 31.) In view of the seasonal shoreward transport and surfacing

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5 (FOOTNOTE CONTINUED)

into estuarine waters with specified characteristics. 33 U.S.C. §1311(n). The legislative history of Section 301(h) indicates that depth is a key factor in determining whether a waiver of secondary treatment is appropriate. S. Rep. No. 95-370, 95th Cong. 1st Sess. 45, reprinted in [1977] U.S. Code Cong. & Ad. News 4326, 4370. There is no absolute minimum depth requirement. Rather, the depth of the discharge must be taken account in determining whether protection of fish, shellfish, wildlife and recreation will be assured. See 40 Fed. Reg. 34802 (June 15, 1979); Natural Resources Defense Council, Inc. v. Environmental Protection Agency, 565 F.2d 768, 777-78 (D.C. Cir. 1981).

of the Oxnard effluent plume, however, the relative contribution of the Oxnard discharge and other sources is unclear. (p. 32.)

Order No. 85-56 would allow a substantial increase in the discharge of suspended solids, with concurrent increases in bacteria concentrations, from the Oxnard outfall. Even assuming that the Oxnard discharge is only part of the problem, this increased discharge would contribute to further violations of Ocean Plan standards.

In issuing waste discharge requirements for the Oxnard discharge, the Regional Board must assure compliance with Ocean Plan standards set for the protection of body contact sports and shellfish harvesting. Cal. Water Code §§13263, 13377; see Cal. Water Code §13142.5(a). Arguably, compliance could be achieved through stricter controls on other discharges. Absent a demonstration of the relative contribution of the Oxnard discharge, however, it has not been demonstrated that the relaxation of treatment authorized by Regional Board Order No. 85-56 would not interfere with attainment of Ocean Plan standards.[6]

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[6] This does not necessarily require that the applicant demonstrate that any existing Ocean Plan violations are completely independent of the discharge in order to permit a waiver of secondary treatment requirements. For example, it may be possible to demonstrate that the proposed discharge will meet Ocean Plan requirements if the effluent will be disinfected.

The 301(h) Review Team concluded that the requirement of Section 301(h)(2) that the discharge attain the level of water quality which allows for recreational activities has been satisfied. The basis for this conclusion is not entirely clear, but appears to be based on the absence of any beach or shellfish closures. (p. 32) We do not believe that protection of recreational activities has been adequately demonstrated unless it is demonstrated that the discharge will not interfere with attainment of Ocean Plan bacteriological objectives. Moreover, a 301(h) waiver cannot be issued unless the waiver "will not result in any additional requirements on any other point or non-point source." Clean Water Act Section 301(h)(4), 33 U.S.C. §1311(h)(4). If suspended sediment and associated bacteria from the Oxnard discharge contribute to standards violations, in combination with non-point sources and urban

(CONTINUED)

3. Contention: Petitioner contends that Order No. 85-56 fails to establish an adequate system for monitoring impacts on aquatic biota.

Finding: The monitoring program for the Oxnard discharge, adopted by Regional Board Order No. 85-56, is adequate.

The monitoring program includes analysis of adequate numbers of influent and effluent samples to determine compliance with Ocean Plan water quality objectives and to measure the effectiveness of Oxnard's pretreatment program.

The monitoring program also provides a comprehensive system to observe receiving water impacts. Chemical analyses of sediments and important organisms to assess bioaccumulation, collection of bentnic and mid-water organisms for community analysis, and measurement of coliform bacteria at several surfzone, nearshore and offshore sites will ensure that any large scale changes on the marine environment around the outfall will be observed.

The analysis of the marine community structure will be performed with adequate sample replication and representative sample locations. The sampling frequency limits the detection of short term or small impacts, but environmental changes that are substantially greater than natural variability should be observed.[7]

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[6] (FOOTNOTE CONTINUED)

runoff, allowing a 301(n) waiver would require additional controls on those other sources. In any event, the requirement for consistency with Ocean Plan standards applies independent of the statutory criteria for Section 301(h) waivers. See Clean Water Act Section 301(b)(1)(C), 33 U.S.C. §1311(b)(1)(C).

[7] The monitoring program is capable of identifying differences in communities from those at control stations if those differences are above the 95 percent (CONTINUED)

The monitoring program includes both reference sites unaffected by the Oxnard discharge and baseline monitoring, to provide comparisons that would indicate the effect of the proposed discharge.

In summary, the proposed monitoring program is sufficient to determine large scale, chronic impacts on biota. As such, it constitutes an adequate monitoring programs.

Had the monitoring program been conducted for a period before the Regional Board issued Order No. 85-56, it probably would have provided the information necessary to determine whether a balanced indigenous population of shellfish, fish and wildlife exists in the area of the Oxnard discharge. We recommend that, if the City of Oxnard chooses to continue to pursue its request for a waiver of secondary treatment requirements, the City should carry out the monitoring program established in Order No. 85-56 to help provide the Regional Board with the information necessary for the Regional Board's decision.

4. Contention: Petitioner contends that the Regional Board's action was not consistent with State Water Resources Control Board Resolution No. 68-16 and the federal "Antidegradation Policy."

Finding: The State Water Resources Control Board and the Environmental Protection Agency have adopted similar policies intended to protect the high quality of state and federal waters. The State Board has adopted Resolution No. 68-16, the "Statement of Policy with Respect to

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[7] (FOOTNOTE CONTINUED)

confidence limits of the control stations. The monitoring program should also identify any seasonal variations that might require modification of the monitoring program.

Maintaining High Quality of Waters in California," as part of state policy for water quality control. See Cal. Water Code §13140 et seq. Resolution No. 68-16 has also been adopted, as a general water quality objective, in all sixteen regional water quality control plans. The Environmental Protection Agency has adopted a federal antidegradation policy as part of the agency's water quality standards regulations. 40 C.F.R. §131.12. Before approving any reduction in water quality, or any activity that would result in a reduction in water quality, the Regional Board must first determine that the change in water quality would not be in violation of State Board Resolution No. 68-16 or the federal antidegradation policy. Because the Regional Board did not make the required determination, as part of waste discharge requirements permitting a significant increase in receiving water pollutant levels, the Regional Board's action was improper.

State Board Resolution No. 68-16 requires that:

> "...the existing quality of water...will be maintained until it is demonstrated to the State that any change will be consistent with the maximum benefit to the people of the State, will not unreasonably affect present and anticipated beneficial use of water and will not result in water quality less than that prescribed [by other applicable water quality objectives]."

In determining whether changes in water quality will be consistent with "the maximum benefit to the people of the State," the State and Regional Boards are guided by the policies of the Porter-Cologne Act. The Porter-Cologne Act evinces a policy of ensuring consistency with federal Clean Water Act requirements. To take maximum advantage of federal programs, and to avoid direct regulation by the Environmental Protection Agency of activities already subject to regulation by the State and Regional Boards, the state's standard setting and waste discharge control programs must ensure that, at a minimum,

all applicable Clean Water Act requirements are satisfied. See Cal. Water Code §§13160, 13170, 13370; Recommended Changes in Water Quality Control, Final Report of the Study Panel to the California State Water Resources Control Board, Study Project: Water Quality Control Program 31 (1969).

Clearly, it is in the maximum benefit of the people of the State that the State and Regional Boards ensure that the State's water quality programs are consistent with the federal antidegradation policy. The State and Regional Boards have routinely followed the federal antidegradation policy. See, e.g., State Water Resources Control Board, Lake Tahoe Basin Water Quality Plan 37 (1980).

The federal antidegradation policy requires that each state have a policy providing that changes in water quality will be consistent with the following three-part test:

> "(1) Existing instream water uses and the level of water quality necessary to protect the existing uses shall be maintained and protected.
> (2) Where the quality of the waters exceed levels necessary to support propogation of fish, shellfish, and wildlife and recreation in and on the water, that quality shall be maintained and protected unless the State finds...that allowing lower water quality is necessary to accommodate important economic or social development....
> (3) Where high quality waters constitute an outstanding National resource...that water quality shall be maintained and protected." 40 C.F.R. §131.12.

Where this test is applicable under federal law, State Board Resolution No. 68-16 incorporates this test in determining whether changes in water quality are consistent with the maximum benefit to the people of the State.[8]

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[8] Independent of State Board Resolution No. 68-16, the Porter-Cologne Act requires the State and Regional Boards to apply the federal antidegradation policy when they issue waste discharge requirements for point source discharges (CONTINUED)

State Board Resolution No. 68-16 clearly applies to Regional Board Order No. 85-56, which permits both an increase in the volume of discharge and a reduction in the level of treatment. But State Board Resolution No. 68-16 incorporates the test set forth in the federal antidegradation policy only as applied to situations where the federal antidegradation policy is applicable. Where the federal antidegradation policy does not apply, the State and Regional Boards have applied the general test set forth in State Board Resolution No. 68-16, without addressing the specific, three-part test established by the federal antidegradation policy. See, e.g. State Board Order No. WQ 86-8 at 30-31. Accordingly, we must determine whether the federal antidegradation policy applies to 301(h) waivers.

On its face, the federal antidegradation policy is applicable. It is clearly intended to apply to individual permit decisions, not just changes in water quality control plan objectives. See 40 C.F.R. §131.12; Environmental Protection Agency, Questions and Answers on: Antidegradation 2, 6. The Environmental Protection Agency regulation setting out the antidegradation policy singles out thermal discharges for different treatment, consistent with the procedures established for thermal discharges under Section 316 of the Clean Water Act (40 C.F.R. §131.12(a)(4)). By implication, if the Environmental Protection Agency intended to exempt 301(h) waivers from the antidegradation policy, it would have done so expressly.

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8 (FOOTNOTE CONTINUED)

to surface waters, as the policy is an applicable requirement of the federal Clean Water Act and implementing regulations. See Cal. Water Code §§13370, 13377; 23 Cal. Admin. Code §§2235.1, 2235.2. See generally Clean Water Act Section 301(b)(1)(C), 33 U.S.C. §1311(b)(1)(C); 40 C.F.R. §§123.25(b); 130.5; 131.6.

Section 301(h) of the Clean Water Act provides that treatment works which already provide secondary treatment are eligible for 301(h) waivers. 33 U.S.C. §1311(h). This provision was enacted in response to an Environmental Protection Agency regulation which would have prohibited any discharger which had already achieved secondary treatment from applying for a 301(h) waiver. H.R. Rep. No. 97-270, 97th Cong., 1st Sess. 17, reprinted in [1981] U.S. Cong. & Ad. News 2629, 2645.

We do not read this provision to exempt 301(h) waivers from the federal antidegradation policy, a policy which does not absolutely prohibit relaxation of treatment levels, but requires that any reductions in water quality be justified. Section 301(h) provides a basis for waiver of the technology-based requirements of Section 301(b)(1)(B) of the Clean Water Act. See 33 U.S.C. §§1311(b)(1)(B), 1311(h). It does not provide a basis for waiver of the water quality based requirements of Section 301(b)(1)(C). See 33 U.S.C. §1311(b)(1)(C). The federal antidegradation policy is part of the Environmental Protection Agency's water quality standards regulations, and has been incorporated into the state's water quality protection requirements. "The purpose of section [301(h)] is to permit some coastal municipal sewage treatment plants to avoid costs associated with secondary treatment so long as environmental standards can be maintained." Natural Resources Defense Council, Inc. v. Environmental Protection Agency, 656 F.2d 768, 784 (D.C. Cir. 1981). The requirements of state and federal water quality standards, including the requirements of the federal antidegradation policy and State Board Resolution No. 68-16, are among the environmental standards that must be maintained.

If the level of treatment at the Oxnard facility is reduced, as allowed by Regional Board Order No. 85-56, there will be a substantial increase

in mass emission rates of suspended solids. For the period from 1982 through 1984, the plant discharged approximately 900 metric tons per year of suspended solids. With an increase in the volume of the discharge from 18.3 to 25 million gallons per day, mass emissions would increase to approximately 1,000 metric tons per year. Regional Board Order No. 85-56 would allow this discharge to more than double, to over over 2,400 metric tons per year. This increase in suspended solids will be accompanied by an increase in associated bacteria in the receiving waters. To permit these changes in water quality, it must be demonstrated that the change is justified in accordance with the three-part test established by the federal antidegradation policy.

The Regional Board made no finding with respect to either the federal antidegradation policy or State Board Resolution No. 68-16. On the record before us, we cannot make the required findings.

As discussed earlier, it has not been demonstrated that advanced primary treatment will assure protection of marine communities. The increase in suspended solids and associated bacteria may also contribute to a violation of water quality objectives for bacteriological characteristics in an area used for body-contact sports. As such, the increase in suspended solids and associated bacteria is inconsistent with the requirement that "[e]xisting instream water uses and the level of water quality necessary to protect the existing uses shall be maintained and protected." 40 C.F.R. §131.12(a)(1).

Even assuming that instream beneficial uses will be maintained and protected, it must be demonstrated, under the second part of the federal antidegradation policy, that any reduction in water quality is "necessary to

accommodate important economic or social development." 40 C.F.R. §131.12(a)(2).[9] The record is devoid of any evidence that would support such a determination.

The record does indicate that the waiver of secondary treatment requirements will reduce treatment costs, and will therefore reduce charges for sewer service.[10] But there is no evidence as to how much, if any additional development would be attracted to the area by lower sewer service costs, or how important that development would be to the community.

The only testimony presented to the Regional Board concerning impacts on economic or social development was testimony by the Oxnard Port District that an Environmental Protection Agency grant for a utility project would not be released unless the Oxnard treatment plant achieved compliance with its requirements, either by improving its treatment or obtaining a 301(h) waiver. This testimony is insufficient to establish that the waiver is necessary to

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[9] The third part of the federal antidegradation policy, which applies only to outstanding National resource waters, is not at issue in this case.

[10] The staff report prepared for the May 20, 1985 hearing stated that current residential service charges are $13.64 per month, and that service charges at full secondary treatment would be $14.55 per month. The waiver of secondary treatment requirements would reduce service charges to $13.41 per month. There was conflicting testimony as to how much charges would be at secondary treatment. The supplemental staff report, prepared before the Regional Board adopted Order No. 85-86, estimates residential service charges at $15.61 per month will full secondary treatment and $13.41 with the 301(h) waiver. Savings for commercial and industrial users would be considerably greater. The supplemental staff report lists the impact on service fees, and the absence of an assurance that there will not be significant impacts resulting from an increase in suspended solids, as bases for the alternative of denying a 301(h) waiver. The supplemental staff report does not list the impact on service fees as a basis for granting a 301(h) waiver. We need not decide whether we would assign greater economic importance to the savings in service fees than did the supplemental staff report. Cost savings alone, absent any demonstration as to how these cost savings are necessary to accommodate important social and economic development, are not a sufficient basis for determining consistency with the federal antidegradation policy.

accommodate important economic or social development. First, there was no testimony concerning the economic or social importance of the utility project. Second, the full waiver was not necessary for the utility project. The grant would be released upon achievement of secondary treatment standards. At most, all that would be necessary was a partial waiver, to the level of treatment currently being achieved, and then only for as long as it would take to upgrade the treatment facilities to fully comply with secondary treatment requirements.

Third, we do not believe that the potential adverse economic impacts of sanctions are a valid basis for determining that a reduction in water quality is justified. The determination should be based upon the economic and social costs of achieving compliance, not on the sanctions for violation. Otherwise, the sanctions provided for under the Clean Water Act and the Porter-Cologne Act would be self-defeating; instead of ensuring compliance with applicable water quality objectives the threat of sanctions would provide a basis for their relaxation.

In summary, the record before us does not provide an adequate basis for determining whether the changes in water quality resulting from Order No. 85-56 are consistent with the federal antidegradation policy or State Board Resolution No. 68-16.[11] We also believe that the Regional Board is better situated to determine, in the first instance, whether changes in water quality

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[11] For waters subject to the federal antidegradation policy, both the requirements of the federal antidegradation policy and the express requirements of State Board Resolution No. 68-16 should be satisfied. Because we conclude that the requirements of the federal antidegradation policy have not been satisfied, we need not address what State Board Resolution No. 68-16 might require, independent of the incorporation of the federal antidegradation policy into State Board Resolution No. 68-16.

are necessary to accommodate important social and economic development in the area. We therefore conclude that, independent of the requirements of Section 301(h) of the Clean Water Act, Order No. 85-56 must be remanded to the Regional Board for the consideration of additional evidence concerning the necessity for any reduction in receiving water quality. Before approving waste discharge requirements which would result in a reduction in receiving water quality, the Regional Board must make appropriate findings applying the requirements of State Board Resolution No. 68-16 and the federal antidegradation policy.

5. Contention: Petitioner contends that the Regional Board failed to consider the alternative of wastewater reclamation.

Finding: The Regional Board did not consider potential impacts on wastewater reclamation. Water Code Section 13510 declares:

> "...that the people of the state have a primary interest in the development of facilities to reclaim water containing waste to supplement existing surface and underground water supplies and to assist in meeting the future water requirements of the state."

By reducing the level of treatment required before discharge to the ocean, a waiver of secondary treatment requirements may significantly increase the incremental cost of providing the level of treatment required for wastewater reclamation. This has the potential to reduce incentives for wastewater reclamation. Accordingly, potential impacts on wastewater reclamation should be considered when waste discharge requirements are issued based upon a waiver of secondary treatment requirements. See Cal. Water Code §§174; 13142.5(e).

On the record before us, we cannot determine what impact, if any, Regional Board Order No. 85-56 will have on wastewater reclamation. We cannot make this determination without additional information concerning the realistic

market for reclaimed water in the area and the economic feasibility of additional wastewater reclamation. See State Water Resources Control Board Order No. WQ 84-7 at 11.

Recognizing the need for the Regional Board to have sufficient information before it concerning impacts on wastewater reclamation, State Board Order No. 84-7 provides:

> "...in this case and in all cases where an applicant in a water-short area proposes a discharge of once-used wastewater to the ocean, the report of waste discharge should include an explanation as to why the effluent is not being reclaimed for further beneficial use." Id. at 11-12.

Oxnard is in a water-short area. See, e.g. State Board Resolution No. 81-17 at 11; State Board Resolution No. 78-35.

The application for a 301(h) waiver for the Oxnard discharge was pending when State Water Resources Control Board Order No. WQ 84-7 was decided. For projects which had reports of waste discharge already pending when the State Board issued Order No. 84-7 was decided, the Regional Boards should have some flexibility in determining when the discharger should be required to submit a report on wastewater reclamation. Where possible without delaying action on the project, the report on wastewater reclamation should be submitted before the Regional Board acts on waste discharge requirements.

In other cases, requiring preparation and submission of a report on wastewater reclamation, before the Regional Board issues waste discharge requirements, would delay project approval. We do not believe such delays are necessary. In appropriate cases, where the report of waste discharge was submitted before State Board Order No. 84-7, and issuance of waste discharge requirements would not result in any irreversible commitments of resources that

would hinder later efforts to promote wastewater reclamation, the Regional Boards may require submission of a report on wastewater reclamation within a reasonable period after the waste discharge requirements are issued. If the Regional Board determines, after review of the reclamation report, that the waste discharge requirements should be modified or conditions imposed to promote wastewater reclamation, the waste discharge requirements may be amended at that time.

The Oxnard facility has been previously converted to a secondary treatment facility. If secondary treatment requirements are waived for the facility, a portion of the effluent would be given secondary treatment, and blended with primary effluent, to meet the Ocean Plan objective for suspended solids. When the total discharge reaches 25 million gallons per day, which is not projected to occur until 1990, the facility would still have about 10 million gallons per day of reserve secondary treatment capacity which would not be needed to meet the Ocean Plan suspended solids objective and could be used for reclamation. Thus, it does not appear that authorizing a waiver of secondary treatment requirements at this time would result in any irreversible commitments of resources that would prevent the Regional Board from modifying treatment requirements, or imposing other conditions to promote wastewater reclamation, within a reasonable period after a 301(h) waiver is issued.

The Regional Board will be required to reissue waste discharge requirements for the Oxnard facility, to address the issues discussed in other portions of this order. If possible, the Regional Board should require submission of a report on wastewater reclamation early enough to permit the Regional Board to review the report and consider impacts on reclamation when the waste discharge requirements are reissued. If the report cannot be

completed within that period, however, the Regional Board may require submission of the report as a condition of waste discharge requirements. If such a condition is imposed, the waste discharge requirements should also specify that the waste discharge requirements may be amended, based upon information provided in the report or which becomes available as part of the Regional Board's review of the report.

In its response to the petition, the City of Oxnard states that it prepared a report on the feasibility of wastewater reclamation in 1979. This report may well provide information necessary to satisfy State Board Order No. WQ 84-7. But analyses on wastewater reclamation must be periodically updated, not just provided on a one-time basis. State Water Resources Control Board Order No. WQ 84-7 at 11. We also believe that, in the context of a proposed 301(h) waiver, the impacts of allowing a discharge at less than secondary treatment should be specifically addressed.

Although it is arguable that adequate information was available, the Regional Board did not adequately consider that information when it issued Order No. 85-56. The Regional Board did not address impacts on wastewater reclamation, or consider alternatives or mitigation measures that would avoid or reduce any impacts on reclamation. Issuing waste discharge requirements for the Oxnard discharge, without adequate consideration of wastewater reclamation alternatives, was improper. On remand, the Regional Board should require submission of the information it needs to review impacts on wastewater reclamation, and take that information into consideration as part of its decisions affecting the Oxnard discharge, consistent with the direction provided by this Order.

III. SUMMARY AND CONCLUSIONS

1. The Regional Board's issuance of waste discharge requirements authorizing a relaxation of treatment requirements to advanced primary was inappropriate and improper for the following reasons:

a. It has not been demonstrated that the modified discharge will be consistent with the Ocean Plan requirement for protection of marine communities.

b. It has not been demonstrated that the modified discharge will be consistent with Ocean Plan objectives set to protect shellfish harvesting and body-contact recreation.

c. It has not been demonstrated that changes in water quality resulting from the proposed discharge will be consistent with the federal antidegradation policy.

Unless and until the facts necessary to support issuance of waste discharge requirements authorizing a reduced level of treatment are demonstrated, the State cannot concur in the proposed waiver of secondary treatment requirements.

2. The monitoring program adopted by the Regional Board as part of the waste discharge requirements for the Oxnard facility is adequate.

3. The Regional Board should consider the potential for wastewater reclamation, based upon a report submitted by the discharger and any other information which becomes available to the Regional Board, as part of the waste discharge requirements for the Oxnard facility.

IV. ORDER

IT IS HEREBY ORDERED THAT the California Regional Water Quality Control Board, Los Angeles Region, shall issue new waste discharge require-

ments, or amend Order No. 85-56, for the Oxnard facility. The waste discharge requirements shall include effluent limitations based upon secondary treatment unless it is demonstrated, consistent with this Order, that the requirements for authorization of a reduced level of treatment have been satisfied. The Regional Board shall take into consideration potential impacts on wastewater reclamation.

IT IS FURTHER ORDERED THAT pending issuance of new waste discharge requirements or amendment of Order No. 85-56, the discharger shall comply with the previously issued waste discharge requirements for the facility, together with any more stringent requirements necessary to comply with the 1983 Ocean Plan and the pretreatment requirements adopted as part of Regional Board Order

No. 85-56. The previously issued waste discharge requirements, Regional Board Order No. 77-82, shall be deemed to have been amended by this Order to include the requirements of the 1983 Ocean Plan and the pretreatment program adopted as part of Regional Board Order No. 85-56.

CERTIFICATION

The undersigned, Administrative Assistant to the Board, does hereby certify that the foregoing is a full, true, and correct copy of an order duly and regularly adopted at a meeting of the State Water Resources Control Board held on November 20, 1986.

AYE: W.D. Maughan, Chairman
Darlene E. Ruiz, Vice Chairwoman
Eliseo M. Samaniego, Member

NO: Edwin H. Finster, Member

ABSENT: Danny Walsh, Member

ABSTAIN: None

Maureen Marche
Administrative Assistant to the Board

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federal register

Friday
November 16, 1990

Part II

Environmental Protection Agency

40 CFR Parts 122, 123, and 124
National Pollutant Discharge Elimination System Permit Application Regulations for Storm Water Discharges; Final Rule

Printed on Recycled Paper

ENVIRONMENTAL PROTECTION AGENCY

40 CFR Parts 122, 123, and 124

[FRL-3834-7]

RIN 2040-AA79

National Pollutant Discharge Elimination System Permit Application Regulations for Storm Water Discharges

AGENCY: Environmental Protection Agency (EPA).

ACTION: Final rule.

SUMMARY: Today's final rule begins to implement section 402(p) of the Clean Water Act (CWA) (added by section 405 of the Water Quality Act of 1987 (WQA)), which requires the Environmental Protection Agency (EPA) to establish regulations setting forth National Pollutant Discharge Elimination System (NPDES) permit application requirements for: storm water discharges associated with industrial activity; discharges from a municipal separate storm sewer system serving a population of 250,000 or more; and discharges from municipal separate storm sewer systems serving a population of 100,000 or more, but less than 250,000.

Today's rule also clarifies the requirements of section 401 of the WQA, which amended CWA section 402(1)(2) to provide that NPDES permits shall not be required for discharges of storm water runoff from mining operations or oil and gas exploration, production, processing, or treatment operations or transmission facilities, composed entirely of flows which are from conveyances (including but not limited to pipes, conduits, ditches, and channels) used for collecting and conveying precipitation runoff and which are not contaminated by contact with, or do not come into contact with, any overburden, raw material, intermediate product, finished product, byproduct, or waste product located on the site of such operations. This rule sets forth NPDES permit application requirements addressing storm water discharges associated with industrial activity and storm water discharges from large and medium municipal separate storm sewer systems.

DATES: This final rule becomes effective December 17, 1990. In accordance with 40 CFR 23.2, this rule shall be considered final for purposes of judicial review on November 30, 1990, at 1 p.m. eastern daylight time. The public record is located at EPA Headquarters, EPA Public Information Reference Unit, room 2402, 401 M Street SW., Washington DC 20460. A reasonable fee may be charged for copying.

FOR FURTHER INFORMATION CONTACT: For further information on the rule contact: Thomas J. Seaton, Kevin Weiss, or Michael Mitchell Office of Water Enforcement and Permits (EN-336), United States Environmental Protection Agency, 401 M Street SW., Washington, DC 20460, (202) 475-9518.

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SUPPLEMENTARY INFORMATION:

I. Background and Water Quality Concerns

The 1972 amendments to the Federal Water Pollution Control Act (referred to as the Clean Water Act or CWA), prohibit the discharge of any pollutant to navigable waters from a point source unless the discharge is authorized by an NPDES permit. Efforts to improve water quality under the NPDES program traditionally and primarily focused on reducing pollutants in discharges of industrial process wastewater and municipal sewage. This program emphasis developed for a number of reasons. At the onset of the program in 1972, many sources of industrial process wastewater and municipal sewage were not adequately controlled and represented pressing environmental problems. In addition, sewage outfalls and industrial process discharges were easily identified as responsible for poor, often drastically degraded, water quality conditions. However, as pollution control measures were initially

developed for these discharges, it became evident that more diffuse sources (occurring over a wide area) of water pollution, such as agricultural and urban runoff were also major causes of water quality problems. Some diffuse sources of water pollution, such as agricultural storm water discharges and irrigation return flows, are statutorily exempted from the NPDES program.

Since enactment of the 1972 amendments to the CWA, considering the rise of economic activity and population, significant progress in controlling water pollution has been made, particularly with regard to industrial process wastewater and municipal sewage. Expenditures by EPA, the States, and local governments to construct and upgrade sewage treatment facilities have substantially increased the population served by higher levels of treatment. Backlogs of expired permits for industrial process wastewater discharges have been reduced. Continued improvements are expected for these discharges as the NPDES program continues to place increasing emphasis on water quality-based pollution controls, especially for toxic pollutants.

Although assessments of water quality are difficult to perform and verify, several national assessments of water quality are available. For the purpose of these assessments, urban runoff was considered to be a diffuse source or nonpoint source pollution. From a legal standpoint, however, most urban runoff is discharged through conveyances such as separate storm sewers or other conveyances which are point sources under the CWA. These discharges are subject to the NPDES program. The "National Water Quality Inventory, 1988 Report to Congress" provides a general assessment of water quality based on biennial reports submitted by the States under section 305(b) of the CWA. In preparing the section 305(b) Reports, the States were asked to indicate the fraction of the States' waters that were assessed, as well as the fraction of the States' waters that were fully supporting, partly supporting, or not supporting designated uses. The Report indicates that of the rivers, lakes, and estuaries that were assessed by States (approximately one-fifth of stream miles, one-third of lake acres and one-half of estuarine waters), roughly 70% to 75% are supporting the uses for which they are designated. For waters with use impairments, States were asked to determine impacts due to diffuse sources (agricultural and urban runoff and other sources), municipal sewage, industrial process wastewaters, combined sewer overflows, and natural and other sources, then combine impacts to arrive at estimates of the relative percentage of State waters affected by each source. In this manner, the relative importance of the various sources of pollution that are causing use impairments was assessed and weighted national averages were calculated. Based on 37 States that provided information on sources of pollution, industrial process wastewaters were cited as the cause of nonsupport for 7.5% of rivers and streams, 10% of lakes, and 6% of estuaries. Municipal sewage was the cause of nonsupport for 13% of rivers and streams, 5% lakes, 48% estuaries, 41% of the Great Lake shoreline, and 11% of coastal waters. The Assessment concluded that pollution from diffuse sources, such as runoff from agricultural, urban areas, construction sites, land disposal and resource extraction, is cited by the States as the leading cause of water quality impairment. These sources appear to be increasingly important contributors of use impairment as discharges of industrial process wastewaters and municipal sewage plants come under increased control and as intensified data collection efforts provide additional information. Some examples of diffuse sources cited as causing use impairment are: for rivers and streams, 9% from separate storm sewers, 6% from construction and 13% from resource extraction; for lakes, 28% from separate storm sewers and 26% from land disposal; for the Great Lakes shoreline, 10% from separate storm sewers, 34% from resource extraction, and 82% from land disposal; for estuaries, 28% from separate storm sewers and 27% from land disposal; and for coastal areas, 20% from separate storm sewers and 29% from land disposal.

The States conducted a more comprehensive study of diffuse pollution sources under the sponsorship of the Association of State and Interstate Water Pollution Control Administrators (ASIWPCA) and EPA. The study resulted in the report "America's Clean Water—The States' Nonpoint Source Assessment, 1985" which indicated that 38 States reported urban runoff as a major cause of beneficial use impairment. In addition, 21 States reported construction site runoff as a major cause of use impairment.

To provide a better understanding of the nature of urban runoff from commercial and residential areas, from 1978 through 1983, EPA provided funding and guidance to the Nationwide Urban Runoff Program (NURP). The NURP included 28 projects across the Nation, conducted separately at the local level but centrally reviewed, coordinated, and guided.

One focus of the NURP was to characterize the water quality of discharges from separate storm sewers which drain residential, commercial, and light industrial (industrial parks) sites. The majority of samples collected in the study were analyzed for eight conventional pollutants and three metals. Data collected under the NURP indicated that on an annual loading basis, suspended solids in discharges from separate storm sewers draining runoff from residential, commercial and light industrial areas are around an order of magnitude greater than solids in discharges from municipal secondary sewage treatment plants. In addition, the study indicated that annual loadings of chemical oxygen demand (COD) are comparable in magnitude to effluent from secondary sewage treatment plants. When analyzing annual loadings associated with urban runoff, it is important to recognize that discharges of urban runoff are highly intermittent, and that the short-term loadings associated with individual events will be high and may have shockloading effects on receiving water, such as low dissolved oxygen levels. NURP data also showed that fecal coliform counts in urban runoff are typically in the tens to hundreds of thousands per 100 ml of runoff during warm weather conditions, although the study suggested that fecal coliform may not be the most appropriate indicator organism for identifying potential health risks in storm water runoff. Although NURP did not evaluate oil and grease, other studies have demonstrated that urban runoff is an extremely important source of oil pollution to receiving waters, with hydrocarbon levels in urban runoff typically being reported at a range of 2 to 15 mg/l. These hydrocarbons tend to accumulate in bottom sediments where they may persist for long periods of time and exert adverse impacts on benthic organisms.

A portion of the NURP study involved monitoring 120 priority pollutants in storm water discharges from lands used for residential, commercial and light industrial activities. Seventy-seven priority pollutants were detected in samples of storm water discharges from residential, commercial and light industrial lands taken during the NURP study, including 14 inorganic and 63 organic pollutants. Table A-1 shows the priority pollutants which were detected in at least ten percent of the discharge samples which were sampled for priority pollutants.

TABLE A-1.— PRIORITY POLLUTANTS DETECTED IN AT LEAST 10% OF NURP SAMPLES

[In percent]

	Frequency of detection
Metals and inorganics:	
Antimony	13
Arsenic	52
Beryllium	12
Cadmium	48
Chromium	58
Copper	91
Cyanides	23
Lead	94
Nickel	43
Selenium	11
Zinc	94
Pesticides:	
Alpha-hexachlorocyclohexane	20
Alpha-endosulfan	19
Chlordane	17
Lindane	15
Halogenated aliphatics:	
Methane, dichloro-	11
Phenols and cresols:	
Phenol	14
Phenol, pentachloro-	19
Phenol, 4-nitro	10
Phthalate esters:	
Phthalate, bis(2-ethylhexyl)	22
Polycyclic aromatic hydrocarbons:	
Chrysene	10
Fluoranthene	16
Phenanthrene	12
Pyrene	15

The NURP data also showed a significant number of these samples exceeded various EPA freshwater water quality criteria.

The NURP study provides insight on what can be considered background levels of pollutants for urban runoff, as the study focused primarily on monitoring runoff from residential, commercial and light industrial areas. However, NURP concluded that the quality of urban runoff can be adversely impacted by several sources of pollutants that were not directly evaluated in the study and are generally not reflected in the NURP data, including illicit connections, construction site runoff, industrial site runoff and illegal dumping.

Other studies have shown that many storm sewers contain illicit discharges of non-storm water and that large amounts of wastes, particularly used oils, are improperly disposed in storm sewers. Removal of these discharges present opportunities for dramatic improvements in the quality of storm water discharges. Storm water discharges from industrial facilities may contain toxics and conventional pollutants when material management practices allow exposure to storm water, in addition to wastes from illicit connections and improperly disposed wastes.

In some municipalities, illicit connections of sanitary, commercial and industrial discharges to storm sewer systems have had a significant impact on the water quality of receiving waters. Although the NURP study did not emphasize the identification of illicit connections to storm sewers (other than to assure that monitoring sites used in the study were free from sanitary sewage contamination), the study concluded that illicit connections can result in high bacterial counts and dangers to public health. The study also noted that removing such discharges presented opportunities for dramatic improvements in the quality of urban storm water discharges.

Studies have shown that illicit connections to storm sewers can create severe, wide-spread contamination problems. For example, the Huron River Pollution Abatement Program inspected 660 businesses, homes and other buildings located in Washtenaw County, Michigan and identified 14% of the buildings as having improper storm drain connections. Illicit discharges were detected at a higher rate of 60% for automobile related businesses, including service stations, automobile dealerships, car washes, body shops and light industrial facilities. While some of the problems discovered in this study were the result of improper plumbing or illegal connections, a majority were approved connections at the time they were built.

Intensive construction activities may result in severe localized impacts on water quality because of high unit loads of pollutants, primarily sediments. Construction sites can also generate other pollutants such as phosphorus and nitrogen from fertilizer, pesticides, petroleum products, construction chemicals and solid wastes. These materials can be toxic to aquatic organisms and degrade water for drinking and water-contact recreation. Sediment loadings rates from construction sites are typically 10 to 20 times that of agricultural lands, with runoff rates as high as 100 times that of agricultural lands, and typically 1,000 to 2,000 times that of forest lands. Even a small amount of construction may have a significant negative impact on water quality in localized areas. Over a short period of time, construction sites can contribute more sediment to streams than was previously deposited over several decades.

II. Water Quality Act of 1987

The WQA contains three provisions which specifically address storm water discharges. The central WQA provision governing storm water discharges is section 405, which adds section 402(p) to the CWA. Section 402(p)(1) provides that EPA or NPDES States cannot require a permit for certain storm water discharges until October 1, 1992, except: for storm water discharges listed under section 402(p)(2). Section 402(p)(2) lists five types of storm water discharges which are required to obtain a permit prior to October 1, 1992:

(A) A discharge with respect to which a permit has been issued prior to February 4, 1987;

(B) A discharge associated with industrial activity;

(C) A discharge from a municipal separate storm sewer system serving a population of 250,000 or more;

(D) A discharge from a municipal separate storm sewer system serving a population of 100,000 or more, but less than 250,000; or

(E) A discharge for which the Administrator or the State, as the case may be, determines that the storm water discharge contributes to a violation of a water quality standard or is a significant contributor of pollutants to the waters of the United States.

Section 402(p)(4)(A) requires EPA to promulgate final regulations governing storm water permit application requirements for storm water discharges associated with industrial activity and discharges from large municipal separate storm sewer systems (systems serving a population of 250,000 or more), "no later than two years" after the date of enactment (*i.e.*, no later than February 4, 1989). Section 402(p)(4)(B) also requires EPA to promulgate final regulations governing storm water permit application requirements for discharges from medium municipal separate storm sewer systems (systems serving a population of 100,000 or more but less than 250,000) "no later than four years" after enactment (*i.e.*, no later than February 4, 1991).

In addition, section 402(p)(4) provides that permit applications for storm water discharges associated with industrial activity and discharges from large municipal separate storm sewer systems "shall be filed no later than three years" after the date of enactment of the WQA (*i.e.*, no later than February 4, 1990). Permit applications for discharges from medium municipal systems must be filed "no later than five years" after enactment (*i.e.*, no later than February 4, 1992).

The WQA clarified and amended the requirements for permits for storm water discharges in the new CWA section 402(p)(3). The Act clarified that permits for discharges associated with industrial activity must meet all of the applicable provisions of section 402 and section 301

including technology and water quality based standards. However, the new Act makes significant changes to the permit standards for discharges from municipal storm sewers. Section 402(p)(3)(B) provides that permits for such discharges:

(i) May be issued on a system- or jurisdiction-wide basis;

(ii) Shall include a requirement to effectively prohibit non-storm water discharges into the storm sewers; and

(iii) Shall require controls to reduce the discharge of pollutants to the maximum extent practicable, including management practices, control techniques and system, design and engineering methods, and such other provisions as the Administrator or the State determines appropriate for the control of such pollutants.

These changes are discussed in more detail later in today's rule.

The EPA, in consultation with the States, is required to conduct two studies on storm water discharges that are in the class of discharges for which EPA and NPDES States cannot require permits prior to October 1, 1992. The first study will identify those storm water discharges or classes of storm water discharges for which permits are not required prior to October 1, 1992, and determine, to the maximum extent practicable, the nature and extent of pollutants in such discharges. The second study is for the purpose of establishing procedures and methods to control storm water discharges to the extent necessary to mitigate impacts on water quality. Based on the two studies the EPA, in consultation with State and local officials, is required to issue regulations no later than October 1, 1992, which designate additional storm water discharges to be regulated to protect water quality and establish a comprehensive program to regulate such designated sources. This program must, at a minimum, (A) Establish priorities, (B) establish requirements for State storm water management programs, and (C) establish expeditious deadlines. The program may include performance standards, guidelines, guidance, and management practices and treatment requirements, as appropriate.

Section 401 of the WQA amends section 402(1)(2) of the CWA to provide that the EPA shall not require a permit for discharges of storm water runoff from mining operations or oil and gas exploration, production, processing, or treatment operations or transmission facilities if the storm water discharge is not contaminated by contact with, or does not come into contact with, any overburden, raw material, intermediate product, finished product, byproduct, or waste product located on the site of such operations.

Section 503 of the WQA amends section 502(14) of the CWA to exclude agricultural storm water discharges from the definition of point source.

III. Remand of 1984 Regulations

On December 4, 1987, the United States Court of Appeals for the District of Columbia Circuit vacated 40 CFR 122.26, (as promulgated on September 26, 1984, 49 FR 37998, September 26, 1984), and remanded the regulations to EPA for further rulemaking (*NRDC* v. *EPA*, No. 80–1607). EPA had requested the remand because of significant changes made by the storm water provisions of the WQA. The effect of the decision was to invalidate the storm water discharge regulations then found at § 122.26.

Storm water discharges which had been issued an NPDES permit prior to February 4, 1987, were not affected by the Court remand or the February 12, 1988, rule implementing the court order (53 FR 4157). (*See* section 402(p)(2)(A) of the CWA.) Similarly, the remand did not affect the authority of EPA or an NPDES State to require a permit for any storm water discharge (except an agricultural storm water discharge) designated under section 402(p)(2)(E) of the CWA. The notice of the remand clarified that such designated discharges meet the regulatory definition of point source found at 40 CFR 122.2 and that EPA or an NPDES State can rely on the statutory authority and require the filing of an application (Form 1 and Form 2C) for an NPDES permit with respect to such discharges on a case-by-case basis.

IV. Codification Rule and Case-by-Case Designations

Codification Rule

On January 4, 1989, (54 FR 255), EPA published a final rule which codified numerous provisions of the WQA into EPA regulations. The codification rule included several provisions dealing with storm water discharges. The codification rule promulgated the language found at section 402(p) (1) and (2) of the amended Clean Water Act at 40 CFR 122.26(a)(1). In addition, the codification rule promulgated the language of Section 503 of the WQA which exempted agricultural storm water discharges from the definition of point source at 40 CFR 122.2, and section 401 of the WQA addressing uncontaminated storm water discharges from mining or oil and gas operations at 40 CFR 122.26(a)(2).

EPA also codified the statutory authority of section 402(p)(2)(E) of the CWA for the Administrator or the State Director, as the case may be, to designate storm water discharges for a permit on a case-by-case basis at 40 CFR 122.26(a)(1)(v).

Case by Case Designations

Section 402(p)(2)(E) of the CWA authorizes case-by-case designations of storm water discharges for immediate permitting if the Administrator or the State Director determines that the storm water discharge contributes to a violation of a water quality standard or is a significant contributor of pollutants to waters of the United States.

In determining that a storm water discharge contributes to a violation of a water quality standard or is a significant contributor of pollutants to waters of the United States for the purpose of a designation under section 402(p)(2)(E), the legislative history for the provision provides that "EPA or the State should use any available water quality or sampling data to determine whether the latter two criteria (contributes to a violation of a water quality standard or is a significant contributor of pollutants to waters of the United States) are met, and should require additional sampling as necessary to determine whether or not these criteria are met." Conference Report, *Cong. Rec.* S16443 (daily ed. October 16, 1986). In accordance with this legislative history, today's rule promulgates permit application requirements for certain storm water discharges, including discharges designated on a case-by-case basis. EPA will consider a number of factors when determining whether a storm water discharge is a significant contributor of pollution to the waters of the United States. These factors include: the location of the discharge with respect to waters of the United States; the size of the discharge; the quantity and nature of the pollutants reaching waters of the United States; and any other relevant factors. Today's rule incorporates these factors at 40 CFR 122.26(a)(1)(v).

Under today's rule, case-by-case designations are made under regulatory procedures found at 40 CFR 124.52. The procedures at 40 CFR 124.52 require that whenever the Director decides that an individual permit is required, the Director shall notify the discharger in writing that the discharge requires a permit and the reasons for the decision. In addition, an application form is sent with the notice. Section 124.52 provides a 60 day period from the date of notice for submitting a permit application. Although this 60 day period may be appropriate for many designated storm water discharges, site specific factors may dictate that the Director provide

additional time for submitting a permit application. For example, due to the complexities associated with designation of a municipal separate storm sewer system for a system- or jurisdiction-wide permit, the Director may provide the applicant with additional time to submit relevant information or may require that information be submitted in several phases.

V. Consent Decree of October 20, 1989

On April 20, 1989, EPA was served notice of intent to sue by Kathy Williams *et al*, because of the Agency's failure to promulgate final storm regulations on February 4, 1989, pursuant to Section 402(p)(4) of the CWA. A suit was filed by the same party on July 20, 1989, alleging the same cause of action, to wit: the Agency's failure to promulgate regulations under section 402(p)(4) of the CWA. On October 20, 1989, EPA entered into a consent decree with Kathy Williams *et al*, wherein the Federal District Court, District of Oregon, Southern Division, decreed that the Agency promulgate final regulations for storm water discharges identified in sections 402(p)(2) (B) and (C) of the CWA no later than July 20, 1990. *Kathy Williams et al.*, v. *William K. Reilly, Administrator, et al.*, No. 89-6265-E (D-Ore.) In July 1990, the consent degree was amended to provide for a promulgation date of October 31. Today's rule is promulgated in compliance with the terms of the consent decree as amended.

VI. Today's Final Rule and Response to Comments

A. Overview

Section 405 of the WQA alters the regulatory approach to control pollutants in storm water discharges by adopting a phased and tiered approach. The new provision phases in permit application requirements, permit issuance deadlines and compliance with permit conditions for different categories of storm water discharges. The approach is tiered in that storm water discharges associated with industrial activity must comply with sections 301 and 402 of the CWA (requiring control of the discharge of pollutants that utilize the Best Available Technology (BAT) and the Best Conventional Pollutant Control Technology (BCT) and where necessary, water quality-based controls), but permits for discharges from municipal separate storm sewer systems must require controls to reduce the discharge of pollutants to the maximum extent practicable, and where necessary water quality-based controls, and must include a requirement to effectively prohibit non-storm water discharges into the storm sewers. Furthermore, EPA in consultation with State and local officials must develop a comprehensive program to designate and regulate other storm water discharges to protect water quality.

This final regulation establishes requirements for the storm water permit application process. It also sets forth the required components of municipal storm water quality management plans, as well as a preliminary permitting strategy for industrial activities. In implementing these regulations, EPA and the States will strive to achieve environmental results in a cost effective manner by placing high priority on pollution prevention activities, and by targeting activities based on reducing risk from particularly harmful pollutants and/or from discharges to high value waters. EPA and the States will also work with applicants to avoid cross media transfers of storm water contaminants, especially through injection to shallow wells in the Class V Underground Injection Control Program.

In addition, EPA recognizes that problems associated with storm water, combined sewer overflows (CSOs) and infiltration and inflow (I&I) are all inter-related even though they are treated somewhat differently under the law. EPA believes that it is important to begin linking these programs and activities and, because of the potential cost to local governments, to investigate the use of innovative, non-traditional approaches to reducing or preventing contamination of storm water.

The application process for developing municipal storm water management plans provides an ideal opportunity between steps 1 and 2 for considering the full range of nontraditional, preventive approaches, including municipalities, public awareness/education programs, use of vegetation and/or land conservancy practices, alternative paving materials, creative ways to eliminate I&I and illegal hook-ups, and potentials for water reuse. EPA has already announced its plans to present an award for the best creative, cost effective approaches to storm water and CSOs beginning in 1991.

This rulemaking establishes permit application requirements for classes of storm water discharges that were specifically identified in section 402(p)(2). These priority storm water discharges include storm water discharges associated with industrial activity and discharges from a municipal separate storm sewer serving a population of 100,000 or more.

This rulemaking was developed after careful consideration of 450 sets of comments, comprising over 3200 pages, that were received from a variety of industries, trade associations, municipalities, State and Federal Agencies, environmental groups, and private citizens. These comments were received during a 90-day comment period which extended from December 7, 1988, to March 7, 1989. EPA received several requests for an extension of the comment period from 30-days up to 90-days. Many arguments were advanced for an extension including: the extent and complexity of the proposal, the existence of other concurrent EPA proposals, and the need for technical evaluations of the proposal. EPA considered these comments as they were received, but declined to extend the comment period beyond 90 days. The standard comment period on proposals normally range from 30 to 60 days. In light of the statutory deadline of February 4, 1989, additional time for the comment period beyond what was already a substantially lengthened comment period would have been inappropriate. The number and extent of the comments received on this proposal indicated that interested parties had substantially adequate time to review and comment on the regulation. Furthermore, the public was invited to attend six public meetings in Washington DC, Chicago, Dallas, Oakland, Jacksonville, and Boston to present questions and comments. EPA is convinced that substantial and adequate public participation was sought and received by the Agency.

Numerous commenters have also requested that the rule be reproposed due to the extent of the proposal and the number of options and issues upon which the Agency requested comments. EPA has decided against a reproposal. The December 7, 1988, notice of proposed rulemaking was extremely detailed and thoroughly identified major issues in such a manner as to allow the public clear opportunities to comment. The comments that were received were extensive, and many provided valuable information and ideas that have been incorporated into the regulation. Accordingly, the Agency is confident it has produced a workable and rational approach to the initial regulation of storm water discharges and a regulation that reflects the experience and knowledge of the public as provided in the comments, and which was developed in accordance with the

procedural requirements of the Administrative Procedures Act (APA). EPA believes that while the number of issues raised by the proposal was extensive, the number of detailed comments indicates that the public was able to understand the issues in order to comment adequately. Thus, a reproposal is unnecessary.

B. Definition of Storm Water

The December 7, 1988, notice requested comment on defining storm water as storm water runoff, surface runoff, street wash waters related to street cleaning or maintenance, infiltration (other than infiltration contaminated by seepage from sanitary sewers or by other discharges) and drainage related to storm events or snow melt. This definition is consistent with the regulatory definition of "storm sewer" at 40 CFR 35.2005(b)(47) which is used in the context of grants for construction of treatment works. This definition aids in distinguishing separate storm water sewers from sanitary sewers, combined sewers, process discharge outfalls and non-storm water, non-process discharge outfalls.

The definition of "storm water" has an important bearing on the NPDES permitting scheme under the CWA. The following discusses the interrelationship of NPDES permitting requirements for storm water discharges addressed by this rule and NPDES permitting requirements for other non-storm water discharges which may be discharged via the storm sewer as a storm water discharge. Today's rule addresses permit application requirements for storm water discharges associated with industrial activity and for discharges from municipal separate storm sewer systems serving a population of 100,000 or more. Storm water discharges associated with industrial activity are to be covered by permits which contain technology-based controls based on BAT/BCT considerations or water quality-based controls, if necessary. A permit for storm water discharges from an industrial facility may also cover other non-storm water discharges from the facility. Today's rule establishes individual (Form 1 and Form 2F) and group application requirements for storm water discharges associated with industrial activity. In addition, EPA or authorized NPDES States with authorized general permit programs may issue general permits which establish alternative application or notification requirements for storm water discharges covered by the general permit(s). Where a storm water discharge associated with industrial activity is mixed with a non-storm water discharge, both discharges must be covered by an NPDES permit (this can be in the same permit or with multiple permits). Permit application requirements for these "combination" discharges are discussed later in today's notice.

Today's rule also addresses permit application requirements for discharges from municipal separate storm sewer systems serving a population of 100,000 or more. Under today's rule, appropriate municipal owners or operators of these systems must obtain NPDES permits for discharges from these systems. These permits are to establish controls to the maximum extent practicable (MEP), effectively prohibit non-storm water discharges to the municipal separate storm sewer system and, where necessary, contain applicable water quality-based controls. Where non-storm water discharges or storm water discharges associated with industrial activity discharge through a municipal separate storm sewer system (including systems serving a population of 100,000 or more as well as other systems), which ultimately discharges to a waters of the United States, such discharges through a municipal storm sewer need to be covered by an NPDES permit that is independent of the permit issued for discharges from the municipal separate storm sewer system. Today's rule defines the term "illicit discharge" to describe any discharge through a municipal separate storm sewer that is not composed entirely of storm water and that is not covered by an NPDES permit. Such illicit discharges are not authorized under the CWA. Section 402(p)(3)(B) of the CWA requires that permits for discharges from municipal separate storm sewers require the municipality to "effectively prohibit" non-storm water discharges from the municipal separate storm sewer. As discussed in more detail below, today's rule begins to implement the "effective prohibition" by requiring municipal operators of municipal separate storm sewer systems serving a population of 100,000 or more to submit a description of a program to detect and control certain non-storm water discharges to their municipal system. Ultimately, such non-storm water discharges through a municipal separate storm sewer must either be removed from the system or become subject to an NPDES permit (other than the permit for the discharge from the municipal separate storm sewer). For reasons discussed in more detail below, in general, municipalities will not be held responsible for prohibiting some specific components of discharges or flows listed below through their municipal separate storm sewer system, even though such components may be considered non-storm water discharges, unless such discharges are specifically identified on a case-by-case basis as needing to be addressed. However, operators of such non-storm water discharges need to obtain NPDES permits for these discharges under the present framework of the CWA (rather than the municipal operator of the municipal separate storm sewer system). (Note that section 516 of the Water Quality Act of 1987 requires EPA to conduct a study of de minimis discharges of pollutants to waters of the United States and to determine the most effective and appropriate methods of regulating any such discharges.)

EPA received numerous comments on the proposed regulatory definition of storm water, many of which proposed exclusions or additions to the definition. Several commenters suggested that the definition should include or not include detention and retention reservoir releases, water line flushing, fire hydrant flushing, runoff from fire fighting, swimming pool drainage and discharge, landscape irrigation, diverted stream flows, uncontaminated pumped ground water, rising ground waters, discharges from potable water sources, uncontaminated waters from cooling towers, foundation drains, non-contact cooling water (such as HVAC or heating, ventilation and air conditioning condensation water that POTWs require to be discharged to separate storm sewers rather than sanitary sewers), irrigation water, springs, roof drains, water from crawl space pumps, footing drains, lawn watering, individual car washing, flows from riparian habitats and wetlands. Most of these comments were made with regard to the concern that these were commonly occurring discharges which did not pose significant environmental problems. It was also noted that, unless these flows are classified as storm water, permits would be required for these discharges.

In response to the comments which requested EPA to define the term "storm water" broadly to include a number of classes of discharges which are not in any way related to precipitation events, EPA believes that this rulemaking is not an appropriate forum for addressing the appropriate regulation under the NPDES program of such non-storm water discharges, even though some classes of non-storm water discharges may typically contain only minimal amounts of pollutants. Congress did not intend that the term storm water be used to describe any discharge that has a de minimis amount of pollutants, nor did it intend for section 402(p) to be used to

provide a moratorium from permitting other non-storm water discharges. Consequently, the final definition of storm water has not been expanded from what was proposed. However, as discussed in more detail later in today's notice, municipal operators of municipal separate storm sewer systems will generally not be held responsible for "effectively prohibiting" limited classes of these discharges through their municipal separate storm sewer systems.

The proposed rule included infiltration in the definition of storm water. In this context one commenter suggested that the term infiltration be defined. Infiltration is defined at 40 CFR 35.2005(b)(20) as water other than wastewater that enters a sewer system (including sewer service connections and foundation drains) from the ground through such means as defective pipes, pipe joints, connections or manholes. Infiltration does not include, and is distinguished from, inflow. Another commenter urged that ground water infiltration not be classified as storm water because the chemical characteristics and contaminants of ground water will differ from surface storm water because of a longer contact period with materials in the soil and because ground water quality will not reflect current practices at the site. In today's rule, the definition of storm water excludes infiltration since pollutants in these flows will depend on a large number of factors, including interactions with soil and past land use practices at a given site. Further infiltration flows can be contaminated by sources that are not related to precipitation events, such as seepage from sanitary sewers. Accordingly the final regulatory language does not include infiltration in the definition of storm water. Such flows may be subject to appropriate permit conditions in industrial permits. As discussed in more detail below, municipal management programs must address infiltration where identified as a source of pollutants to waters of the United States.

One commenter questioned the status of discharges from detention and retention basins used to collect storm water. This regulation covers discharges of storm water associated with industrial activity and discharges from municipal separate storm sewer systems serving a population of 100,000 or more into waters of the United States. Therefore, discharges from basins that are part of a conveyance system for a storm water discharge associated with industrial activity or part of a municipal separate storm sewer system serving a population of 100,000 or more are covered by this regulation. Flows which are channeled into basins and which do not discharge into waters of the United States are not addressed by today's rule.

Several commenters requested that the term illicit connection be replaced with a term that does not connote illegal discharges or activity, because many discharges of non-storm water to municipal separate storm sewer systems occurred prior to the establishment of the NPDES program and in accordance with local or State requirements at the time of the connection. EPA disagrees that there should be a change in this terminology. The fact that these connections were at one time legal does not confer such status now. The CWA prohibits the point source discharge of non-storm water not subject to an NPDES permit through municipal separate storm sewers to waters of the United States. Thus, classifying such discharges as illicit properly identifies such discharges as being illegal.

A commenter wanted clarification of the terms "other discharges" and "drainage" that are used in the definition of "storm water." As noted above, today's rule clarifies that infiltration is not considered storm water. Thus the portion of the definition of storm water that refers to "other discharges" has also been removed. However, the term drainage has been retained. "Drainage" does not take on any meaning other than the flow of runoff into a conveyance, as the word is commonly understood.

One commenter stated that irrigation flows combined with storm water discharges should be excluded from consideration in the storm water program. The Agency would note that irrigation return flows are excluded from regulation under the NPDES program. Section 402(l)(1) states that the Administrator or the State shall not require permits for discharges composed entirely of return flows from irrigated agriculture. The legislative history of the 1977 Clean Water Act, which enacted this language, states that the word "entirely" was intended to limit the exception to only those flows which do not contain additional discharges from activities unrelated to crop production. Congressional Record Vol. 123 (1977), pg. 4360, Senate Report No. 95-370. Accordingly, a storm water discharge component, from an industrial facility for example, included in such "joint" discharges may be regulated pursuant to an NPDES permit either at the point at which the storm water flow enters or joins the irrigation flow, or where the combined flow enters waters of the United States or a municipal separate storm sewer.

Some commenters expressed concern about including street wash waters as storm water. One commenter argued including street wash waters in the definition of storm water should not be construed to eliminate the need for management practices relating to construction activities where sediment may simply wash into storm drains. EPA agrees with these points and the concerns that storm sewers may receive material that pose environmental problems if street wash waters are included in the definition. Accordingly, such discharges are no longer in the definition as proposed, and must be addressed by municipal management programs as part of the prohibition on non-storm water discharges through municipal separate storm sewer systems.

Several commenters requested that the terms discharge and point source, in the context of permits for storm water discharge, be clarified. Several commenters stated that the EPA should clarify that storm water discharge does not include "sheet flow" off of an industrial facility. EPA interprets this as request for clarification on the status of the terms "point source" and "discharge" under these regulations. In response, this rulemaking only covers storm water discharges from point sources. A point source is defined at 40 CFR 122.2 as "any discernible, confined, and discrete conveyance, including but not limited to, any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, landfill leachate collection system, vessel or other floating craft from which pollutants are or may be discharged. This term does not include return flows from irrigated agriculture or agricultural storm water runoff." EPA agrees with one commenter that this definition is adequate for defining what discharges of storm water are covered by this rulemaking. EPA notes that this definition would encompass municipal separate storm sewers. In view of this comprehensive definition of point source, EPA need clarify in this rulemaking only that a storm water discharge subject to NPDES regulation does not include storm water that enters the waters of the United States via means other than a "point source." As further discussed below, storm water from an industrial facility which enters and is subsequently discharged through a municipal separate storm sewer is a "discharge associated with industrial

activity" which must be covered by an individual or general permit pursuant to today's rule.

EPA would also note that individual facilities have the burden of determining whether a permit application should be submitted to address a point source discharge. Those unsure of the classification of storm water flow from a facility, should file permit applications addressing the flow, or prior to submitting the application consult permitting authorities for clarification.

One commenter stated that "point source" for this rulemaking should be defined, for the purposes of achieving better water quality, as those areas where "discharges leave the municipal [separate storm sewer] system." EPA notes in response that "point source" as currently defined will address such discharges, while keeping the definition of discharge and point source within the framework of the NPDES program, and without adding potentially confusing and ambiguous additional definitions to the regulation. If this comment is asserting that the term point source should not include discharges from sources through the municipal system, EPA disagrees. As discussed in detail below, discharges through municipal separate storm sewer systems which are not connected to an operable treatment works are discharges subject to NPDES permit requirements at (40 CFR 122.3(c)), and may properly be deemed point sources.

One industry argued that the definition of "point source" should be modified for storm water discharges so as to exclude discharges from land that is not artificially graded and which has a propensity to form channels where precipitation runs off. EPA intends to embrace the broadest possible definition of point source consistent with the legislative intent of the CWA and court interpretations to include any identifiable conveyance from which pollutants might enter the waters of the United States. In most court cases interpreting the term "point source", the term has been interpreted broadly. For example, the holding in *Sierra Club* v. *Abston Construction Co., Inc.*, 620 F.2d 41 (5th Cir. 1980) indicates that changing the surface of land or establishing grading patterns on land will result in a point source where the runoff from the site is ultimately discharged to waters of the United States:

> Simple erosion over the material surface, resulting in the discharge of water and other materials into navigable waters, does not constitute a point source discharge, absent some effort to *change the surface, to direct* the water flow or otherwise impede its progress * * * Gravity flow, resulting in a discharge into a navigable body of water, may be part of a point source discharge if the (discharger) at least initially collected or channeled the water and other materials. A point source of pollution may also be present where (dischargers) design spoil piles from discarded overburden such that, during periods of precipitation, erosion of spoil pile walls results in discharges into a navigable body of water by means of ditches, gullies and similar conveyances, even if the (dischargers) have done nothing beyond the mere collection of rock and other materials * * * Nothing in the Act relieves (dischargers) from liability simply because the operators did not actually construct those conveyances, so long as they are reasonably likely to be the means by which pollutants are ultimately deposited into a navigable body of water. Conveyances of pollution formed either as a result of natural erosion or by material means, and which constitute a component of a * * * drainage system, may fit the statutory definition and thereby subject the operators to liability under the Act." 620 F.2d at 45 (emphasis added).

Under this approach, point source discharges of storm water result from structures which increase the imperviousness of the ground which acts to collect runoff, with runoff being conveyed along the resulting drainage or grading patterns.

The entire thrust of today's regulation is to control pollutants that enter receiving water from storm water conveyances. It is these conveyances that will carry the largest volume of water and higher levels of pollutants. The storm water permit application process and permit conditions will address circumstances and discharges peculiar to individual facilities.

One industry commented that the definition of waters of the State under some State NPDES programs included municipal storm sewer systems. The commenter was concerned that certain industrial facilities discharging through municipal storm sewers in these states would be required to obtain an NPDES permit, despite EPA's proposal not to require permits from such facilities generally. In response, EPA notes that section 510 of the CWA, approved States are able to have stricter requirements in their NPDES program. In approved NPDES States, the definition of waters of the State controls with regard to what constitutes a discharge to a water body. However, EPA believes that this will have little impact, since, as discussed below, all industrial dischargers, including those discharging through municipal separate storm sewer systems, will be subject to general or individual NPDES permits, regardless of any additional State requirements.

One municipality commented that neither the term "point source" nor "discharge" should be used in conjunction with industrial releases into urban storm water systems because that gives the impression that such systems are navigable waters. EPA disagrees that any confusion should result from the use of these terms in this context. In this rulemaking, EPA always addresses such discharges as "discharges through municipal separate storm sewer systems" as opposed to "discharges to waters of the United States." Nonetheless, such industrial discharges through municipal storm sewer systems are subject to the requirements of today's rule, as discussed elsewhere.

One commenter desired clarification with regard to what constituted an outfall, and if an outfall could be a pipe that connected two storm water conveyances. This rulemaking defines outfall as a point of discharge into the waters of the United States, and not a conveyance which connects to Sections of municipal separate storm sewer. In response to another comment, this rulemaking only addresses discharges to waters of United States, consequently discharges to ground waters are not covered by this rulemaking (unless there is a hydrological connection between the ground water and a nearby surface water body. *See, e.g., Exxon Corp.* v. *Train*, 554 F.2d 1310, 1312 n.1 (5th Cir. 1977); *McClellan Ecological Seepage Situation* v. *Weinberger*, 707 F.Supp. 1182, 1195–96 (E.D. Cal. 1988)).

In the WQA and other places, the term "storm water" is presented as a single word. Numerous comments were received by EPA as to the appropriate spelling. Many of these comments recommended that two words for storm water is appropriate. EPA has decided to use an approach consistent with the Government Printing Office's approved form where storm water appears as two words.

C. Responsibility for Storm Water Discharges Associated With Industrial Activity Through Municipal Separate Storm Sewers

The December 7, 1988, notice of proposed rulemaking requested comments on the appropriate permitting scheme for storm water discharges associated with industrial activity through municipal separate storm sewers. EPA proposed a permitting scheme that would define the requirement to obtain coverage under an NPDES permit for a storm water discharge associated with industrial activity through a municipal separate storm sewer in terms of the classification of the municipal separate storm sewer. EPA proposed holding municipal operators of large or medium

municipal separate storm sewer systems primarily responsible for applying for and obtaining an NPDES permit covering system discharges as well as storm water discharges (including storm water discharges associated with industrial activity) through the system. Under the proposed approach, operators of storm water discharges associated with industrial activity which discharge through a large or medium municipal separate storm sewer system would generally not be required to obtain permit coverage for their discharge (unless designated as a significant contributor of pollution pursuant to section 402(p)(2)(E)) provided the municipality was notified of: The name, location and type of facility and a certification that the discharge has been tested (if feasible) for non-storm water (including the results of any testing). The notification procedure also required the operator of the storm water discharge associated with industrial activity to determine that: The discharge is composed entirely of storm water; the discharge does not contain hazardous substances in excess of reporting quantities; and the facility is in compliance with applicable provisions of the NPDES permit issued to the municipality for storm water.

In the proposal, EPA also requested comments on whether a decision on regulatory requirements for storm water discharges associated with industrial activity through other municipal separate storm sewer systems (generally those serving a population of less than 100,000) should be postponed until completion of two studies of storm water discharges required under section 402(p)(5) of the CWA.

EPA favored these approaches because they appeared to reduce the potential administrative burden associated with preparing and processing the thousands of permit applications associated with the rulemaking and provide EPA additional flexibility in developing permitting requirements for storm water discharges associated with industrial activity. EPA also expressed its belief, based upon an analysis of ordinances controlling construction site runoff in place in certain cities, that municipalities generally possessed legal authority sufficient to control contributions of industrial storm water pollutants to their separate storm sewers to the degree necessary to implement the proposed rule. EPA commented that municipal controls on industrial sources implemented to comply with an NPDES permit issued to the municipality would likely result in a level of storm water pollution control very similar to that put directly on the industrial source through its own NPDES permit. This was to be accomplished by requiring municipal permitees, to the maximum extent practicable, to require industrial facilities in the municipality to develop and implement storm water controls based on a consideration of the same or similar factors as those used to make BAT/BCT determinations. (*See* 40 CFR 125.3 (d)(2) and (d)(3)).

The great majority of commenters on the December 7, 1988, notice addressed this aspect of the proposal. Based on consideration of the comments received on the notice, EPA has decided that it is appropriate to revise the approach in its proposed rule to require direct permit coverage for all storm water discharges associated with industrial activity, including those that discharge through municipal separate storm sewers. In response to this decision, EPA has continued to analyze the appropriate manner to respond to the large number of storm water discharges subject to this rulemaking. The development of EPA's policy regarding permitting these discharges is discussed in more detail in the section VI.D of today's preamble.

EPA notes that the status of discharges associated with industrial activity which pass through a municipal separate storm sewer system under section 402(p) raises difficult legal and policy questions. EPA believes that treating these discharges under permits separate from those issued to the municipality will most fully address both the legal and policy concerns raised in public comment.

Certain commenters supported EPA's proposal. Some commenters claimed that EPA lacked any authority to permit industrial discharges which were not discharged immediately to waters of the U.S. Other commenters agreed with EPA's statements in the proposal that its approach would result in a more manageable administrative burden for EPA and the NPDES states. However, numerous comments also were received which provided various arguments in support of revising the proposed approach. These comments addressed several areas including the definition of discharge under the CWA, the requirements and associated statutory time frames of section 402(p), as well as the resource and enforcement constraints of municipalities. EPA is persuaded by these comments and has modified its approach accordingly. The key comments on this issue are discussed below.

EPA disagrees with commenters who suggested that EPA lacks authority to permit separately industrial discharges through municipal sewers. The CWA prohibits the discharge of a pollutant except pursuant to an NPDES permit. Section 502(12)(A) of the CWA defines the "discharge of a pollutant" as "any addition of any pollutant to navigable waters from any point source." [1] There is no qualification in the statutory language regarding the source of the pollutants being discharged. Thus, pollutants from a remote location which are discharged through a point source conveyance controlled by a different entity (such as a municipal storm sewer) are nonetheless discharges for which a permit is required.

EPA's regulatory definition of the term "discharge" reflects this broad construction. EPA defines the term to include

> additions of pollutants into waters of the United States from: surface runoff which is collected or channelled by man; *discharges through pipes, sewers, or other conveyances owned by a State, municipality, or other person which does not lead to a treatment works;* and discharges through pipes, sewers, or other conveyances, leading into privately owned treatment works.

40 CFR § 122.2 (1989) (emphasis added). The only exception to this general rule is the one contemplated by section 307(b) of the CWA, *i.e.*, the introduction of pollutants into publicly-owned treatment works. EPA treats these as "indirect discharges," subject not to NPDES requirements, but to pretreatment standards under section 307(b).

In light of its construction of the term discharge, EPA has consistently maintained that a person who sends pollutants from a remote location through a point source into a water of the U.S. may be held liable for the unpermitted discharge of that pollutant. Thus, EPA asserts the authority to require a permit either from the operator of the point source conveyance, (such as a municipal storm sewer or a privately-owned treatment works), or from any person causing pollutants to be present in that conveyance and discharged through the point source, or both. *See Decision of the General Counsel (of EPA) No. 43* ("In re Friendswood Development Co.") (June 11, 1976) (operator of privately owned treatment work and dischargers to it are both subject to NPDES permit requirements). *See also*, 40 CFR 122.3(g), 122.44(m)

[1] Indeed, the DC Circuit has held, in the storm water context, that EPA may not exempt any point source discharges of pollutants from the requirement to obtain an NPDES permit. *NRDC* v. *Costle*, 569 F.2d 1369, 1377 (DC Cir. 1977).

(NPDES permit writer has discretion to permit contributors to a privately owned treatment works as direct dischargers). In other words, where pollutants are added by one person to a conveyance owned/operated by another person, and that conveyance discharges those pollutants through a point source, EPA may permit either person or both to ensure that the discharge is properly controlled. Pollutants from industrial sites discharged through a storm sewer to a point source are appropriately treated in this fashion.

Furthermore, EPA believes that storm water from an industrial plant which is discharged through a municipal storm sewer is a "discharge associated with industrial activity." Today's rule, as in the proposal, defines discharges associated with industrial activity solely in terms of the origin of the storm water runoff. There is no distinction for how the storm water reaches the waters of the U.S. In other words, pollutants in storm water from an industrial plant which are discharged are "associated with industrial activity," regardless of whether the industrial facility operates the conveyance discharging the storm water (or whether the storm water is ultimately discharged through a municipal storm sewer). Indeed, there is no distinction in the "industrial" nature of these two types of discharges. The pollutants of concern in an industrial storm water discharge are present when the storm water leaves the facility, either through an industrial or municipal storm water conveyance. EPA has no data to suggest that the pollutants in industrial storm water entering a municipal storm sewer are any different than those in storm water discharged immediately to a water of the U.S. Thus, industrial storm water in a municipal sewer is properly classified as "associated with industrial activity." Although EPA proposed not to cover these discharges by separate permit, the Agency believes that it is clearly not precluded from doing so.

Many comments also supported the proposed approach, noting that holding municipalities primarily responsible for obtaining a permit which covers industrial storm water discharges through municipal systems would reduce the administrative burden associated with preparing and processing thousands of permit applications—permit applications that would be submitted if each industrial discharger through a large or medium municipal separate storm sewer system had to apply individually (or as part of a group application).

EPA appreciates these concerns. Yet EPA also recognizes that there are also significant problems with putting the burden of controlling these sources on the municipalities (except for designated discharges) which must be balanced with the concerns about the permit application burden on industries. The industrial permitting strategy discussed in section VI.D below attempts to achieve this balance.

EPA also does not believe that the administrative burden will be nearly as significant as originally thought, for several reasons. First, as discussed in section VI.F.2 below and in response to significant public comment, EPA has significantly narrowed the scope of the definition of "associated with industrial activity" to focus in on those facilities which are most commonly considered "industrial" and thought to have the potential for the highest levels of pollutants in their storm water discharges. EPA believes this is a more appropriate way to ensure a manageable scope for the industrial storm water program in light of the statutory language of section 402(p), since it does not attempt to arbitrarily distinguish industrial facilities on the basis of the ownership of the conveyance through which a facility discharges its storm water. Second, EPA's industrial permitting strategy discussed in section VI.D is designed around aggressive use of general permits to cover the vast majority of industrial sources. These general permits will require industrial facilities to develop storm water control plans and practices similar to those that would have been required by the municipality. Yet, general permits will eliminate the need for thousands of individual or group permit applications, greatly reducing the burden on both industry EPA/States. Finally, even under the proposal, EPA believes that a large number of industrial dischargers would have been appropriate for designation for individual permitting under section 402(p)(2)(E), with the attendant individual application requirements. Today's approach will actually decrease the overall burden on these facilities; rather than filing an individual permit application upon designation, these facilities will generally be covered by a general permit.

By contrast, several commenters asserted that not only does EPA have the authority to cover these discharges by separate permit, it is required to by the language of section 402(p). As discussed above, storm water from an industrial plant which passes through a municipal storm sewer to a point source and is discharged to waters of the U.S. is a "discharge associated with industrial activity." Therefore, it is subject to the appropriate requirements of section 402(p). The operator of the discharge (or the industrial facility where the storm water originates) must apply for a permit within three years of the 1987 amendments (*i.e.*, Feb. 4, 1990);[2] EPA must issue a permit by one year later (Feb. 4, 1991); and the permit must require compliance within three years of permit issuance. That permit must ensure that the discharge is in compliance with all appropriate provisions of sections 301 and 402. Commenters asserted that EPA's proposal would violate these two requirements of the law. First, the statute requires all industrial storm water discharges to obtain a permit in the first round of permitting (*i.e.*, February 4, 1990). However, Congress established a different framework to address discharges from small municipal separate storm sewer systems. Section 402(p) requires EPA to complete two studies of storm water discharges, and based on those studies, promulgate additional regulations, including requirements for state storm water management programs by October 1, 1992. EPA is prohibited from issuing permits for storm water discharges from small municipal systems until October 1, 1992 unless the discharge is designated under section 402(p)(2)(E). Thus, industrial storm water discharges from these systems would not be covered by a permit until later than contemplated by statute. Second, permits for municipal storm sewer systems require controls on storm water discharges "to the maximum extent practicable," as opposed to the BAT/BCT requirements of section 301(b)(2). Yet, all industrial storm water discharges must comply with section 301(b)(2). Thus, covering industrial storm water under a municipal storm water permit will not ensure the legally-required level of control of industrial storm water discharges.

In addition to comments on the requirements of section 402(p), EPA received several comments questioning whether EPA's proposal to cover industrial pollutants in municipal separate storm sewers solely in the permit issued to the municipality would ensure adequate control of these pollutants due to both inadequate

[2] It should be noted that EPA did not promulgate the required storm water regulations by February, 1989, as contemplated by section 402(p)(4)(A). As discussed below, today's rule generally requires industrial storm water discharges to file a permit application in one year.

resources and enforcement. Some municipalities stated that the burdens of this responsibility would be too great with regard to source identification and general administration of the program. These commenters claimed they lacked the necessary technical and regulatory expertise to regulate such sources. Commenters also noted that additional resources to control these sources would be difficult to obtain given the restrictions on local taxation in many states and the fact that EPA will not be providing funding to local governments to implement their storm water programs.

Municipalities also expressed concerns regarding enforcement of EPA's proposed approach. Some municipalities remarked that they did not have appropriate legal authority to address these discharges. Several commenters also stated that requiring municipalities to be responsible for addressing storm water discharges associated with industrial activity through their municipal system would result in unequal treatment of industries nationwide because of different municipal requirements and enforcement procedures. Several municipal entities expressed concern with regard to their responsibility and liability for pollutants discharged to their municipal storm sewer system, and further asserted that it was unfair to require municipalities to bear the full cost of controlling such pollutants. Other municipalities suggested that overall municipal storm water control would be impaired, since municipalities would spend a disproportionate amount of resources trying to control industrial discharges through their sewers, rather than addressing other storm water problems. In a related vein, certain commenters suggested that, where industrial storm water was a significant problem in a municipal sewer, EPA's proposed approach would hamper enforcement at the federal/state level, since all enforcement measures could be directed only at the municipality, rather than at the most direct source of that problem.

In response to all of these concerns, EPA has decided to require storm water discharges associated with industrial activity which discharge through municipal separate storm sewers to obtain separate individual or general NPDES permits. EPA believes that this change will adequately address all of the key concerns raised by commenters.

The Agency was particularly influenced by concerns that many municipalities lacked the authority under state law to address industrial storm water practices. EPA had assumed that since several cities regulate construction site activities, that they could regulate other industrial operations in a similar manner. Several commenters suggested otherwise. In light of these concerns, EPA agrees with certain commenters that municipal controls on industrial facilities, in lieu of federal control, might not comply with section 402(p)(3)(A) for those facilities.[3] This calls into question whether EPA's proposed approach would have reasonably implemented Congressional intent to address industrial storm water early and stringently in the permitting process.

EPA also agrees with those commenters who argued that municipal controls on industrial storm water sources were not directly analogous to the pretreatment program under section 307(b), as EPA suggested in the preamble to the proposal. The authority of cities to control the type and volume of industrial pollutants into a POTW is generally unquestioned under the laws of most states, since sewage and industrial waste treatment is a service provided by the municipality. Thus, EPA has greater confidence that cities can and will adopt effective pretreatment programs. By contrast, many cities are limited in the types of controls they can impose on flows into storm sewers; cities are more often limited to regulations on quantity of industrial flows to prevent flooding the system. So too, the pretreatment program allows for federal enforcement of local pretreatment requirements. Enforcement against direct dischargers (including dischargers through municipal storm sewers) is possible only when the municipal requirements are contained in an NPDES permit.

Although today's rule will require industrial discharges through municipal storm sewers to be covered by separate permit, EPA still believes that municipal operators of large and medium municipal systems have an important role in source identification and the development of pollutant controls for industries that discharge storm water through municipal separate storm sewer systems is appropriate. Under the CWA, large and medium municipalities are responsible for reducing pollutants in discharges from municipal separate storm sewers to the maximum extent practicable. Because storm water from industrial facilities may be a major contributor of pollutants to municipal separate storm sewer systems, municipalities are obligated to develop controls for storm water discharges associated with industrial activity through their system in their storm water management program. (*See* section VI.H.7. of today's preamble.) The CWA provides that permits for municipal separate storm sewers shall require municipalities to reduce pollutants to the maximum extent practicable. Permits issued to municipalities for discharges from municipal separate storm sewers will reflect terms, specified controls, and programs that achieve that goal. As with all NPDES permits, responsibility and liability is determined by the discharger's compliance with the terms of the permit. A municipality's responsibility for industrial storm water discharged through their system is governed by the terms of the permit issued. If an industrial source discharges storm water through a municipal separate storm sewer in violation of requirements incorporated into a permit for the industrial facility's discharge, that industrial operator of the discharge may be subject to an enforcement action instituted by the Director of the NPDES program.

Today's rule also requires operators of storm water discharges associated with industrial activity through large and medium municipal systems to provide municipal entities of the name, location, and type of facility that is discharging to the municipal system. This information will provide municipalities with a base of information from which management plans can be devised and implemented. This requirement is in addition to any requirements contained in the industrial facility's permit. As in the proposal, the notification process will assist cities in development of their industrial control programs.

EPA intends for the NPDES program, through requirements in permits for storm water discharges associated with industrial activity, to work in concert with municipalities in the industrial component of their storm water management program efforts. EPA believes that permitting of municipal storm sewer systems and the industrial discharges through them will act in a complementary manner to fully control the pollutants in those sewer systems. This will fully implement the intent of

[3] EPA notes that the legal issue raised by commenters regarding whether industrial storm water would be controlled to BAT if covered by a municipal permit at the MEP level is primarily a theoretical issue. As explained above, the proposal assumed that cities would establish controls on industry very similar to those established in an NPDES permit using best professional judgment. EPA's key concern, rather, is whether cities can, in fact, establish such controls. Thus, today's final rule should not appreciably change the requirements to be imposed on industrial sources, only how those requirements are enforced.

Congress to control industrial as well as large and medium municipal storm water discharges as expeditiously and effectively as possible. This approach will also address the concerns of municipalities that they lack sufficient authority and resources to control all industrial contributions to their storm sewers and will be liable for discharges outside of their control.

The permit application requirements for large and medium municipal separate storm sewer systems, discussed in more detail later in today's preamble, address the responsibilities of the municipal operators of these systems to identify and control pollutants in storm water discharges associated with industrial activity. Permit applications for large and medium municipal separate storm sewer systems are to identify the location of facilities which discharge storm water associated with industrial activity to the municipal system (*see* section VI.H.7. of the preamble). In addition, municipal applicants will provide a description of a proposed management program to reduce, to the maximum extent practicable, pollutants from storm water discharges associated with industrial activity which discharge to the municipal system (*see* section VI.H.7.c of this preamble). EPA notes that each municipal program will be tailored to the conditions in that city. Differences in regional weather patterns, hydrology, water quality standards, and storm sewer systems themselves dictate that storm water management practices will vary to some degree in each municipality. Accordingly, similar industrial storm water discharges may be treated differently in terms of the requirements imposed by the municipality, depending on the municipal program. Nonetheless, any individual or general permit issued to the industrial facility must comply with section 402(p)(3)(A) of the CWA.

EPA intends to provide assistance and guidance to municipalities and permitting authorities for developing storm water management programs that achieve permit requirements. EPA intends to issue a guidance document addressing municipal permit applications in the near future.

Controls developed in management plans for municipal system permits may take a variety of forms. Where necessary, municipal permittees can pursue local remedies to develop measures to reduce pollutants or halt storm water discharges with high levels of pollutants through municipal storm sewer systems. Some local entities have already implemented ordinances or laws that are designed to reduce the discharge of pollutants to municipal separate storm sewers, while other municipalities have developed a variety of techniques to control pollutants in storm water. Alternatively, where appropriate, municipal permittees may develop end-of-pipe controls to control pollutants in these discharges such as regional wet detention ponds or diverting flow to publicly owned treatment works. Finally, municipal applicants may bring individual storm water discharges, which cannot be adequately controlled by the municipal permittees or general permit coverage, to the attention of the permitting authority. Then, at the Director's discretion, appropriate additional controls can be required in the permit for the facility generating the targeted storm water discharge.

One commenter suggested that municipal operators of municipal separate storm sewers should have control over all storm water discharges from a facility that discharges both through the municipal system and to waters of the United States. In response, under this regulatory and statutory scheme, industries that discharge storm water directly into the waters of the United States, through municipal separate storm sewer systems, or both are required to obtain permit coverage for their discharges. However, municipalities are not precluded from exercising control over such facilities through their own municipal authorities.

It is important to note that EPA has established effluent guideline limitations for storm water discharges for nine subcategories of industrial dischargers (Cement Manufacturing (40 CFR part 411), Feedlots (40 CFR part 412), Fertilizer Manufacturing (40 CFR part 418), Petroleum Refining (40 CFR part 419), Phosphate Manufacturing (40 CFR part 422), Steam Electric (40 CFR part 423), Coal Mining (40 CFR part 434), Ore Mining and Dressing (40 CFR part 440) and Asphalt (40 CFR part 441)). Most of the existing facilities in these subcategories already have individual permits for their storm water discharges. Under today's rule, facilities with existing NPDES permits for storm water discharges through a municipal storm sewer will be required to maintain these permits and apply for an individual permit, under § 122.26(c), when existing permits expire. EPA received numerous comments supporting this decision because requiring facilities that have existing permits to comply with today's requirements immediately would be inefficient and not serve improved water quality.

Sections 402(p) (1) and (2) of the CWA provide that discharges from municipal separate storm sewer systems serving a population of less than 100,000 are not required to obtain a permit prior to October 1, 1992, unless designated on a case-by-case basis under section 402(p)(2)(E). However, as discussed above, storm water discharges associated with industrial activity through such municipal systems are not excluded. Thus, under today's rule, all storm water discharges associated with industrial activity that discharge through municipal separate storm sewer systems are required to obtain NPDES permit coverage, including those which discharge through systems serving populations less than 100,000. EPA believes requiring permits will address the legal concerns raised by commenters regarding these sources. In addition, it will allow for control of these significant sources of pollution while EPA continues to study under section 402(p)(6) whether to require the development of municipal storm water management plans in these municipalities. If these municipalities do ultimately obtain NPDES permits for their municipal separate storm sewer systems, early permitting of the industrial contributions may aid those cities in their storm water management efforts.

In the December 7, 1988, proposal, EPA recognized that storm water discharges associated with industrial activity from Federal facilities through municipal separate storm sewer systems may pose unique legal and administrative situations. EPA received numerous comments on this issue, with most of these comments coming from cities and counties. The comments reflected a general concern with respect to a municipality's ability to control Federal storm water discharges through municipal separate storm sewer systems. Most municipalities stated that they do not have the legal authority to adequately enforce against problem storm water discharges from Federal facilities and that these facilities should be required to obtain separate storm water permits. Some commenters stated that they have no Constitutional authority to regulate Federal facilities or establish regulation for such facilities. Some commenters indicated that Federal facilities could not be inspected, monitored, or subjected to enforcement for national security and other jurisdictional reasons. Some commenters argued that without clearly stated legal authority for the municipality, such dischargers should be required to obtain permits. One

municipality pointed out that Federal facilities within city limits are exempted from their Erosion and Sediment Control Act and that permits for these facilities should be required.

Under today's rule, Federal facilities which discharge storm water associated with industrial activity through municipal separate storm sewer systems will be required to obtain NPDES permit coverage under Federal or State law. EPA believes this will cure the legal authority problems at the local level raised by the commenters. EPA notes that this requirement is consistent with section 313(a) of the CWA.

D. Preliminary Permitting Strategy for Storm Water Discharges Associated With Industrial Activity

Many of the comments received on the December 7, 1988, proposal focused on the difficulties that EPA Regions and authorized NPDES States, with their finite resources, will have in implementing an effective permitting program for the large number of storm water discharges associated with industrial activity. Many commenters noted that problems with implementing permit programs are caused not only by the large number of industrial facilities subject to the program, but by the difficulties associated with identifying appropriate technologies for controlling storm water at various sites and the differences in the nature and extent of storm water discharges from different types of industrial facilities.

EPA recognizes these concerns; and based on a consideration of comments from authorized NPDES States, municipalities, industrial facilities and environmental groups on the permitting framework and permit application requirements for storm water discharges associated with industrial activity, EPA is in the process of developing a preliminary strategy for permitting storm water discharges associated with industrial activity. In developing this strategy, EPA recognizes that the CWA provides flexibility in the manner in which NPDES permits are issued.[4] EPA intends to use this flexibility in designing a workable and reasonable permitting system. In accordance with these considerations, EPA intends to publish in the near future a discussion of its preliminary permitting strategy for implementing the NPDES storm water program.

The preliminary strategy is intended to establish a framework for developing permitting priorities, and includes a four tier set of priorities for issuing permits to be implemented over time:

- *Tier I—baseline permitting:* One or more general permits will be developed to initially cover the majority of storm water discharges associated with industrial activity;
- *Tier II—watershed permitting:* Facilities within watersheds shown to be adversely impacted by storm water discharges associated with industrial activity will be targeted for permitting.
- *Tier III—industry specific permitting:* Specific industry categories will be targeted for individual or industry-specific permits; and
- *Tier IV—facility specific permitting:* A variety of factors will be used to target specific facilities for individual permits.

Tier I—Baseline Permitting

EPA intends to issue general permits that initially cover the majority of storm water discharges associated with industrial activity in States without authorized NPDES programs. These permits will also serve as models for States with authorized NPDES programs.

The consolidation of many sources under one permit will greatly reduce the otherwise overwhelming administrative burden associated with permitting storm water discharges associated with industrial activity. This approach has a number of additional advantages, including:

- Requirements will be established for discharges covered by the permit;
- Facilities whose discharges are covered by the permit will have an opportunity for substantial compliance with the CWA;
- The public, including municipal operators of municipal separate storm sewers which may receive storm water discharges associated with industrial activity, will have access under section 308(b) of the CWA to monitoring data and certain other information developed by the permittee;
- EPA will have the opportunity to begin to collect and review data on storm water discharges from priority industries, thereby supporting the development of subsequent permitting activities;
- Applicable requirements of municipal storm water management programs established in permits for discharges from municipal separate storm sewer systems will be enforceable directly against non-complying industrial facilities that generate the discharges;
- The public will be given an opportunity to comment on permitting activities;
- The baseline permits will provide a basis for bringing selected enforcement actions by eliminating many issues which might otherwise arise in an enforcement proceeding; and
- Finally, the baseline permits will provide a focus for public comment on the development of subsequent phases of the permitting strategy for storm water discharges, including the development of priorities for State storm water management programs developed under section 402(p)(6) of the CWA.

Initially, the coverage of the baseline permits will be broad, but the coverage is intended to shrink as other permits are issued for storm water discharges associated with industrial activities pursuant to Tier II through IV activities.

2. Tier II—Watershed Permitting

Facilities within watersheds shown to be adversely impacted by storm water discharges associated with industrial activity will be targeted for individual and general permitting. This process can be initiated by identifying receiving waters (or segments of receiving waters) where storm water discharges associated with industrial activity have been identified as a source of use impairment or are suspected to be contributing to use impairment.

3. Tier III—Industry Specific Permitting

Specific industry categories will be targeted for individual or industry-specific general permits. These permits will allow permitting authorities to focus attention and resources on industry categories of particular concern and/or industry categories where tailored requirements are appropriate. EPA will work with the States to coordinate the development of model permits for selected classes of industrial storm water discharges. EPA is also working to identify priority industrial categories in the two reports to Congress required under section 402(p)(5) of the CWA. In addition, group applications that are received can be used to develop model permits for the appropriate industries

[4] The courts in *NRDC* v. *Train*, 396 F.Supp. 1393 (D.D.C. 1975) *aff'd. NRDC* v. *Costle*, 568 F.2d 1369 (DC Cir. 1977), have acknowledged the administrative burden placed on the Agency by requiring individual permits for a large number of storm water discharges. These courts have recognized EPA's discretion to use certain administrative devices, such as area permits or general permits to help manage its workload. In addition, the courts have recognized flexibility in the type of permit conditions that are established, including requirements for best management practices.

4. Tier IV—Facility Specific Permitting

Individual permits will be appropriate for some storm water discharges in addition to those identified under Tier II and III activities. Individual permits should be issued where warranted by: the pollution potential of the discharge; the need for individual control mechanisms; and in cases where reduced administrative burdens exist. For example, individual NPDES permits for facilities with process discharges should be expanded during the normal process of permit reissuance to cover storm water discharges from the facility.

5. Relationship of Strategy to Permit Applications Requirements

The preliminary long-term permitting strategy described above identifies several permit schemes that EPA anticipates will be used in addressing storm water discharges associated with industrial activity. One issue that arises with this strategy is determining the appropriate information needed to develop and issue permits for these discharges. The NPDES regulatory scheme provides three major options for obtaining permit coverage for storm water discharges associated with industrial activity: (1) Individual permit applications; (2) group applications; and (3) case-by-case requirements developed for general permit coverage.

a. *Individual permit application requirements.* Today's notice establishes requirements for individual permit applications for storm water discharges associated with industrial activity. These application requirements are applicable for all storm water discharges associated with industrial activity, except where the operator of the discharge is participating in a group application or a general permit is issued to cover the discharge and the general permit provides alternative means to obtain permit coverage. Information in individual applications is intended to be used in developing the site-specific conditions generally associated with individual permits.

Individual permit applications are expected to play an important role in all tiers of the Strategy, even where general permits are used. Although general permits may provide for notification requirements that operate in lieu of the requirement to submit individual permit applications, the individual permit applications may be needed under several circumstances. Examples include: where a general permit requires the submission of a permit application as the notice of intent to be covered by the permit; where the owner or operator authorized by a general permit requests to be excluded from the coverage of the general permit by applying for a permit (*see* 40 CFR 122.28(b)(2)(iii) for EPA issued general permits); and where the Director requires an owner or operator authorized by a general permit to apply for an individual permit (*see* 40 CFR 122.28(b)(2)(ii) for EPA issued general permits).

b. *Group applications.* Today's rule also promulgates requirements for group applications for storm water discharges associated with industrial activity. These applications provide participants of groups with sufficiently similar storm water discharges an alternative mechanism for applying for permit coverage.

The group application requirements are primarily intended to provide information for developing industry specific general permits. (Group applications can also be used to issue individual permits in authorized NPDES States without general permit authority or where otherwise appropriate). As such, group application requirements correlate well with the Tier III permitting activities identified in the long-term permitting Strategy.

c. *Case-by-case requirements.* 40 CFR 122.21(a) excludes persons covered by general permits from requirements to submit individual permit applications. Further, the general permit regulations at 40 CFR 122.28 do not address the issue of how a potential permittee is to apply to be covered under a general permit. Rather, conditions for notification of intent (NOI) to be covered by the general permit are established in the permits on a case-by-case basis, and operate in lieu of permit application requirements. Requirements for submitting NOIs to be covered by a general permit can range from full applications (this would be Form 1 and Form 2F for most discharges composed entirely of storm water discharges associated with industrial activity), to no notice. EPA recommends that the NOI requirements established in a general permit for storm water discharges associated with industrial activity be commensurate with the needs of the permit writer in establishing the permit and the permit program. The baseline general permit described in Tier I is intended to support the development of controls for storm water discharges associated with industrial activity that can be supported by the limited resources of the permitting Agency. In this regard, the burdens of receiving and reviewing NOI's from the large number of facilities covered by the permit should also be considered when developing NOI requirements. In addition, NOI requirements should be developed in conjunction with permit conditions establishing reporting requirements during the term of the permit.

NOI requirements in general permits can establish a mechanism which can be used to establish a clear accounting of the number of permittees covered by the general permit, the nature of operations at the facility generating the discharge, their identity and location. The NOI can be used as an initial screening tool to determine discharges where individual permits are appropriate. Also, the NOI can be used to identify classes of discharges appropriate for more specific general permits, as well as provide information needed to notify such dischargers of the issuance of a more specific general permit. In addition, the NOI can provide for the identification of the permittee to provide a basis for enforcement and compliance monitoring strategies. EPA will further address this issue in the context of specific general permits it plans to issue in the near future.

Today's rule requires that individual permit applications for storm water discharges associated with industrial activity be submitted within one year from the date of publication of this notice. EPA is considering issuing general permits for the majority of storm water discharges associated with industrial activity in those States and territories that do not have authorized State NPDES programs (MA, ME, NH, FL, LA, TX, OK, NM, SD, AZ, AK, ID, District of Columbia, the Commonwealth of Puerto Rico, Guam, American Samoa, the Commonwealth of the Northern Mariana Islands, and the Trust Territory of the Pacific Islands) before that date to enable industrial dischargers of storm water to ascertain whether they are eligible for coverage under a general permit (and subject to any alternative notification requirements established by the general permit in lieu of the individual permit application requirements of today's rule) or whether they must submit an individual permit application (or participate in a group application) before the regulatory deadlines for submitting these applications passes. Storm water application deadlines are discussed in further detail below.

E. Storm Water Discharge Sampling

Storm water discharges are intermittent by their nature, and pollutant concentrations in storm water discharges will be highly variable. Not only will variability arise between given events, but the flow and pollutant

concentrations of such discharges will vary with time during an event. This variability raises two technical problems: how best to characterize the discharge associated with a single storm event; and how best to characterize the variability between discharges of different events that may be caused by seasonal changes and changes in material management practices, for example.

Prior to today's rulemaking, 40 CFR 122.21(g)(7) required that applicants for NPDES permits submit quantitative data based on one grab sample taken every hour of the discharge for the first four hours of discharge. EPA has modified this requirement such that, instead of collecting and analyzing four grab samples individually, applicants for permits addressing storm water discharges associated with industrial activity will provide data as indicators of two sets of conditions: data collected during the first 30 minutes of discharge and flow-weighted average storm event concentrations. Large and medium municipalities will provide data on flow-weighted average storm event concentrations only.

Data describing pollutants in a grab sample taken during the first few minutes of the discharge can often be used as a screen for non-storm water discharges to separate storm sewers because such pollutants may be flushed out of the system during the initial portion of the discharge. In addition, data from the first few minutes of a discharge are useful because much of the traditional structural technology used to control storm water discharges, including detention and retention devices, may only provide controls for the first portion of the discharge, with relatively little or no control for the remainder of the discharge. Data from the first portion of the discharge will give an indication of the potential usefulness of these techniques to reduce pollutants in storm water discharges. Also, such discharges may be primarily responsible for pollutant shocks to the ecosystem in receiving waters.

Studies such as NURP have shown that flow-weighted average concentrations of storm water discharges are useful for estimating pollutant loads and for evaluating certain concentration-based water quality impacts. The use of flow-weighted composite samples are also consistent with comments raised by various industry representatives during previous Agency rulemakings that continuous monitoring of discharges from storm events is necessary to adequately characterize such discharges.

EPA requested comment on the feasibility of the proposed modification of sampling procedures at § 122.21(g)(7) and the ability to characterize pollutants in storm water discharges with an average concentration from the first portion of the discharge compared to collecting and separately analyzing four grab samples. It was proposed that an event composite sample be collected, as well as a grab sample collected during the first 20 minutes of runoff. Comments were solicited as to whether or not this sampling method would provide better definition of the storm load for runoff characterization than would the requirement to collect and separately analyze four grab samples.

Many commenters questioned the ability to obtain a 20 minute sample in the absence of automatic samplers. Some believed that pollutants measured by such a sample can be accounted for in the event composite sample. Others argued that this is an unwarranted sampling effort if municipal storm water management plans are to be geared to achieving annual pollutant load reductions. Many commenters advised that problems accessing sampling stations and mobilizing sampling crews, particularly after working hours, made sampling during the first 20 minutes impractical. These comments were made particularly with respect to municipalities, where the geographical areas could encompass several hundred square miles. Several alternatives were suggested including: the collection of a sample in the first hour, and representative grab sampling in the next three hours, one per hour; or perform time proportioned sampling for up to four hours.

Because of the logistical problems associated with collecting samples during the first few minutes of discharge from municipal systems, EPA will only require such sampling from industrial facilities. Municipal systems will be spread out over many square miles with sampling locations potentially several miles from public works departments or other responsible government agencies. Reaching such locations in order to obtain samples during the first few minutes of a storm event may prove impossible. For essentially the same reasons, the requirement has been modified to encompass the first 30 minutes of the discharge, instead of 20 minutes, for industrial discharges. The rule also clarifies that the sample should be taken during the first 30 minutes or as soon thereafter as practicable. Where appropriate, characterization of this portion of the discharge from selected outfalls or sampling points may be a condition to permits issued to municipalities. With regard to protocols for the collection of sample aliquots for flow-weighted composite samples, § 122.21(g)(7) provides that municipal applicants may collect flow-weighted composite samples using different protocols with respect to the time duration between the collection of sample aliquots, subject to the approval of the Director or Regional Administrator. In other words, the period may be extended from 15 minutes to 20 or 25 minutes between sample aliquots, or decreased from 15 to 10 or 5 minutes.

Other comments raised issues that apply both to the impact of runoff characterization and the first discharge representation. These primarily pertained to regions that have well defined wet and dry seasons. Comments questioned whether or not it is fair to assume that the initial storm or two of a wet season, which will have very high pollutant concentrations, are actually representative of the runoff concentrations for the area.

In response, EPA believes that it is important to represent the first part of the discharge either separately or as a part of the event composite samples. This loading is made up primarily of the mass of unattached fine particulates and readily soluble surface load that accumulates between storms. This load washes off of the basin's directly connected paved surfaces when the runoff velocities reach the level required for entrainment of the particulate load into the surface flow. It should be noted that for very fine particulates and solubles, this can occur very soon after the storm begins and much sooner than the peak flow. The first few minutes of discharge represents a shock load to the receiving water, in terms of concentration of pollutants, because for many constituents the highest concentrations of the event will occur during this initial period. Due to the need to properly quantify this load, it is not necessary to represent the first discharge from the upper reaches of the outfall's tributary area. In runoff characterization basins, the assumption is that the land use in the basin is homogeneous, or nearly so, and that the first discharge from the lower reaches for all intents and purposes is representative of the entire basin. If a sample is taken during the first 30 minutes of the runoff, it will be composed primarily of first discharge. If the sample is taken at the outfall an hour into the event, it may contain

discharge from the remote portions of the basin. It will not be representative of the discharge because it will also contain later washoff from the lower reaches of the basin, resulting in a low estimation of the first discharge load of most constituents. Conversely, larger suspended particulates that normally are not present in first discharge due to inadequate velocities will appear in this later sampling scenario because of the influence of higher runoff rates in the lower basin. Many commonly used management practices are designed based on their ability to treat a volume of water defined by the first discharge phenomenon. It is important to characterize the first discharge load because most management practices effectively treat only, or primarily, this load.

It should be noted that first discharge runoff is sometimes contaminated by non-storm water related pollutants. In many urban catchments, contaminants that result from illicit connections and illegal dumping may be stored in the system until "flushed" during the initial storm period. This does not negate the need for information on the characteristic first discharge load, but does indicate that the first phase field screen results for illicit connections should be used to help define those outfalls where this problem might exist.

Several methods can be used to develop an event average concentration. Either automatic or manual sampling techniques can be used that sample the entire hydrograph, or at least the first four hours of it, that will result in several discrete samples and associated flow rates that represent the various flow regimes of an event. These procedures have the potential for providing either an event average concentration, an event mean concentration, or discrete definition of the washoff process. Automatic sampling procedures are also available that collect a single composite sample, either on a time-proportioned or flow proportioned basis.

When discrete samples are collected, an event average composite sample can be produced by the manual composite of the discrete samples in equal volumes. Laboratory analysis of time proportioned composite samples will directly yield the event average concentration. Mathematical averaging of discrete sample analysis results will yield an event average concentration.

When discrete samples are collected, a flow-weighted composite sample can be produced based on the discharge record. This is done by manually flow proportioning the volumes of the individual samples. Laboratory analysis of flow weighted composite samples will directly yield an event mean concentration. Mathematical integration of the change in concentrations and mass flux of the discharge for discrete sample data can produce an event mean concentration. This procedure was used during the NURP program.

EPA wishes to emphasize that the reason for sampling the type of storm event identified in § 122.21(g)(7) is to provide information that represents local conditions that will be used to create sound storm water management plans. Based on the method to be used to generate system-wide estimates of pollutant loads, either method, discrete or event average concentrations, may be preferable to the other. If simulation models will be used to generate loading estimates, analysis of discrete samples will be more valuable so that calibration of water quality and hydrology may be performed. On the other hand, simple estimation methods based on event average or event mean concentrations may not justify the additional cost of discrete sample analysis.

EPA believes that the first discharge loading should be represented in the permit application from industrial facilities and, if appropriate, permitting authorities may require the same in the discharge characterization component of permits issued to municipalities. The first discharge load should also be represented as part of an event composite sample. This requirement will assist industries in the development of effective storm water management plans.

EPA requested comments on the appropriateness of the proposed rules and of proposed amendments to the rules regarding discharge sampling. Comments were received which addressed the appropriateness of imposing uniform national guidelines. Several commenters are concerned that uniform national guidelines may not be appropriate due to the geographic variations in meteorology, topography, and pollutant sources. While some assert that a uniform guideline will provide consistency of the sample results, others prefer a program based on regional or State guidelines that more specifically address their situation.

Several commenters, addressing industrial permit application requirements, preferred that the owner/operator be allowed to set an individual sampling protocol with approval of the permit writer. Some commenters were concerned that one event may not be sufficient to characterize runoff from a basin as this may result in gross over-estimation or underestimation of the pollutant loads. Others indicated confusion with regard to sampling procedures, lab analysis procedures, and the purpose of the program.

In response, today's regulations establish certain minimum requirements. Municipalities and industries may vary from these requirements to the extent that their implementation is at least as stringent as outlined in today's rule. EPA views today's rule as a means to provide assurance as to the quality of the data collected; and to this end, it is important that the minimum level of sampling required be well defined.

In response to EPA's proposal that the first discharge be included in "representative" storm sampling, several commenters made their concerns known about the possible equipment necessary to meet this requirement. Several commenters are concerned that in order to get a first discharge sample, automatic sampling equipment will be required. Concerns related to the need for this equipment surfaced in the comments frequently; most advised that the equipment is expensive and that the demand on sampling equipment will be too large for suppliers and manufacturers to meet. Although equipment can be leased, some commenters maintained that not enough rental equipment is available to make this a viable option in many instances.

EPA is not promoting or requiring the use of automated equipment to satisfy the sampling requirements. A community may find that in the long run it would be more convenient to have such equipment since sampling is required not only during preparation of the application, but also may be required during the term of the permit to assure that the program goals are being met. Discharge measurement is necessary in order for the sample data to have any meaning. If unattended automatic sampling is to be performed, then unattended flow measurement will be required too.

EPA realizes that equipment availability is a legitimate concern. However, there is no practical recommendation that can be made relative to the availability of equipment. If automatic sampling equipment is not available, manual sampling is an appropriate alternative.

F. Storm Water Discharges Associated With Industrial Activity

1. Permit Applicability

a. *Storm water discharges associated with industrial activity to waters of the United States.* Under today's rule dischargers of storm water associated

with industrial activity are required to apply for an NPDES permit. Permits are to be applied for in one of three ways depending on the type of facility: Through the individual permit application process; through the group application process; or through a notice of intent to be covered by general permit.

Storm water discharges associated with the industrial activities identified under § 122.26(b)(14) of today's rule may avail themselves of general permits that EPA intends to propose and promulgate in the near future. The general permit will be available to be promulgated in each non-NPDES State, following State certification, and as a model for use by NPDES States with general permit authority. It is envisioned that these general permits will provide baseline storm water management practices. For certain categories of industries, specific management practices will be prescribed in addition to the baseline management practices. As information on specific types of industrial activities is developed, other, more industry-specific general permits will be developed.

Today's rule requires facilities with existing NPDES permits for storm water discharges to apply for individual permits under the individual permit application requirements found at 122.26(c) 180 days before their current permit expires. Facilities not eligible for coverage under a general permit are required to file an individual or group permit application in accordance with today's rule. The general permits to be proposed and promulgated will indicate what facilities are eligible for coverage by the general permit.

b. *Storm water discharges through municipal storm sewers.* As discussed above, many operators of storm water discharges associated with industrial activity are not required to apply for an individual permit or participate in a group application under § 122.26(c) of today's rule if covered by a general permit. Under the December 7, 1988, proposal, dischargers through large and medium municipal separate storm sewer systems were not required, as a general rule, to apply for an individual permit or as a group applicant. Today's rule is a departure from that proposal. Today's rule requires all dischargers through municipal separate storm sewer systems to apply for an individual permit, apply as part of a group application, or seek coverage under a promulgated general permit for storm water discharges associated with industrial activity.

Municipal operators of large and medium municipal separate storm sewer systems are responsible for obtaining system-wide or area permits for their system's discharges. These permits are expected to require that controls be placed on storm water discharges associated with industrial activity which discharge through the municipal system. It is anticipated that general or individual permits covering industrial storm water dischargers to these municipal separate storm sewer systems will require industries to comply with the terms of the permit issued to the municipality, as well other terms specific to the permittee.

c. *Storm water discharges through non-municipal storm sewers.* Under today's rulemaking all operators of storm water discharges associated with industrial activity that discharge into a privately or Federally owned storm water conveyance (a storm water conveyance that is not a municipal separate storm sewer) will be required to be covered by an NPDES permit (*e.g.* an individual permit, general permit, or as a co-permittee to a permit issued to the operator of the portion of the system that directly discharges to waters of the United States). This is a departure from the "either/or" approach that EPA requested comments on in the December 7, 1988, notice. The "either/or" approach would have allowed either the system discharges to be covered by a permit issued to the owner/operator of the system segment that discharged to waters of the United States, or by an individual permit issued to each contributor to the non-municipal conveyance.

EPA requested comments on the advantages and disadvantages of retaining the "either/or" approach for non-municipal storm sewers. An abundance of comment was received by EPA on this particular part of the program. A number of industrial commenters and a smaller number of municipalities favored retaining the "either/or" approach as proposed, while most municipal entities, one industry, and one trade association favored requiring permits for each discharger.

Two commenters stated that private owners of conveyances may not have the legal authority to implement controls on discharges through their system and would not want to be held responsible for such controls. EPA agrees that this is a potential problem. Therefore, today's rule will require permit coverage for each storm water discharge associated with industrial activity.

One commenter supported the concept of requiring all the facilities that discharge to a non-municipal conveyance to be co-permittees. EPA agrees that this type of permitting scheme, along with other permit schemes such as area or general permits, is appropriate for discharges from non-municipal sewers, as long as each storm water discharge through the system is associated with industrial activity and thus currently subject to NPDES permit coverage.

One State agency commented that in the interest of uniformity, all industries that discharge to non-municipal conveyances should be required to conform to the application requirements. One industry stated that the rules must provide a way for the last discharger before the waters of the U.S. to require permits for facilities discharging into the upper portions of the system. EPA agrees with these comments. Today's rule provides that each discharger may be covered under individual permits, as co-permittees to a single permit, or by general permit rather than holding the last discharger to the waters of the United States solely responsible.

In response to one commenter, the term "non-municipal" has been clarified to explain that the term refers to non-publicly owned or Federally-owned storm sewer systems.

Some commenters supporting the approach as proposed, noted that industrial storm water dischargers into such systems can take advantage of the group application process. EPA agrees that in appropriate circumstances, such as when industrial facilities discharging storm water to the same system are sufficiently similar, group applications can be used for discharges to non-municipal conveyances. However, EPA believes that it would be inappropriate to approve group applications for those facilities whose only similarity is that they discharge storm water into the same private conveyance system. The efficacy of the group application procedures is predicated on the similarity of operations and other factors. The fact that several industries discharge storm water to the same non-municipal sewer system alone may not make these discharges sufficiently similar for group application approval.

One commenter suggested that EPA has not established any deadlines for submission of permit applications for storm water discharges associated with industrial activity through non-municipal separate storm sewer systems. EPA wants to clarify that industrial storm water dischargers into privately owned or Federally owned storm water conveyances are required to apply for permits in the same time frame as individual or group applicants (or as otherwise provided for in a general permit).

One commenter stated that the operator of the conveyance that accepts discharges into its system has control and police power over those that discharge into the system by virtue of the ability to restrict discharges into the system. This commenter stated that these facilities should be the entity required to obtain the permit in all cases. Assuming that this statement is true in all respects, the larger problem is that one's theoretical ability to restrict discharges is not necessarily tied to the reality of enforcing those restrictions or even detecting problem discharges when they exist. In a similar vein one commenter urged that a private operator will not be in any worse a position than a municipal entity to determine who is the source of pollution up-stream. EPA agrees that from a hydrological standpoint this may be true. However, from the standpoint of detection resources, police powers, enforcement remedies, and other facets of municipal power that may be brought to bear upon problem dischargers, private systems are in a far more precarious position with respect to controlling discharges from other private sources.

In light of the comments received, EPA has decided that the either/or approach as proposed is inappropriate. Operators of non-municipal systems will generally be in a poorer position to gain knowledge of pollutants in storm water discharges and to impose controls on storm water discharges from other facilities than will municipal system operators. In addition, best management practices and other site-specific controls are often most appropriate for reducing pollutants in storm water discharges associated with industrial activity and can often only be effectively addressed in a regulatory scheme that holds each industrial facility operator directly responsible. The either/or approach as proposed is not conducive to establishing these types of practices unless each discharger is discharging under a permit. Also, some non-municipal operators of storm water conveyances, which receive storm water runoff from industrial facilities, may not be generating storm water discharges associated with industrial activity themselves and, therefore, they would otherwise not need to obtain a permit prior to October 1, 1992, unless specifically designated under section 402(p)(2)(E). Accordingly, EPA disagrees with comments that dischargers to non-municipal conveyances should have the flexibility to be covered by their permit or covered by the permit issued to the operator of the outfall to waters to the United States.

2. Scope of "Associated with Industrial Activity"

The September 26, 1984, final regulation divided those discharges that met the regulatory definition of storm water point source into two groups. The term Group I storm water discharges was defined in an attempt to identify those storm water discharges which had a higher potential to contribute significantly to environmental impacts. Group I included those discharges that contained storm water drained from an industrial plant or plant associated areas. Other storm water discharges (such as those from parking lots and administrative buildings) located on lands used for industrial activity were classified as Group II discharges. The regulations defined the term "plant associated areas" by listing several examples of areas that would be associated with industrial activities. However, the resulting definition led to confusion among the regulated community regarding the distinctions between the Group I and Group II classifications.

In amending the CWA in 1987, Congress did not explicitly adopt EPA's regulatory classification of Group I and Group II discharges. Rather, Congress required EPA to address "storm water discharges associated with industrial activity" in the first round of storm water permitting. In light of the adoption of the term "associated with industrial activity" in the CWA, and the ongoing confusion surrounding the previous regulatory definition, EPA has eliminated the regulatory terms "Group I storm water discharge" and "Group II storm water discharge" pursuant to the December 7, 1987, Court remand and has not revived it. In addition, today's notice promulgates a definition of the term "storm water discharge associated with industrial activity" at § 122.26(b)(14) and clarified the scope of the term.

In describing the scope of the term "associated with industrial activity", several members of Congress explained in the legislative history that the term applied if a discharge was "directly related to manufacturing, processing or raw materials storage areas at an industrial plant." (Vol. 132 Cong. Rec. H10932, H10936 (daily ed. October 15, 1986); Vol. 133 Cong. Rec. H176 (daily ed. January 6, 1987)). Several commenters cited this language in arguing for a more expansive or less expansive definition of "associated with industrial activity." EPA believes that the legislative history supports the decision to exclude from the definition of industrial activity, at § 122.26(b)(14) of today's rule, those facilities that are generally classified under the Office of Management and Budget Standard Industrial Classifications (SIC) as wholesale, retail, service, or commercial activities.

Two commenters recommended that all commercial enterprises should be required to obtain a permit under this regulation. Another commenter recommended that all the facilities listed in the December 7, 1988, proposal, including those listed in paragraphs (xi) through (xvi) on page 49432 of the December 7, 1988, proposal, should be included. EPA disagrees since the intent of Congress was to establish a phased and tiered approach to storm water permits, and that only those facilities having discharges associated with industrial activity should be included initially. The studies to be conducted pursuant to section 402(p)(5) will examine sources of pollutants associated with commercial, retail, and other light business activity. If appropriate, additional regulations addressing these sources can be developed under section 402(p)(6) of the CWA. As further discussed below, EPA believes that the facilities identified in paragraphs (xi) through (xvi) are more properly characterized as commercial or retail facilities, rather than indutrial facilities.

Today's rule clarifies the regulatory definition of "associated with industrial activity" by adopting the language used in the legislative history and supplementing it with a description of various types of areas that are directly related to an industrial process (*e.g.*, industrial plant yards, immediate access roads and rail lines, drainage ponds, material handling sites, sites used for the application or disposal of process waters, sites used for the storage and maintenance of material handling equipment, and known sites that are presently or have been used in the past for residual treatment, storage or disposal). The agency has also incorporated some of the suggestions offered by the public in comments.

Three commenters suggested that the permit application should focus only on storm water with the potential to come into contact with industrial-related pollutant sources, rather than focusing on how plant areas are utilized. These commenters suggested that facilities that are wholly enclosed or have their operations entirely protected from the elements should not be subject to permit requirements under today's rule. EPA agrees that these comments have merit with regard to certain types of facilities. Today's rule defines the term "storm water discharge associated with

industrial activity" to include storm water discharges from facilities identified in today's rule at 40 CFR 122.21(b)(14)(xi) (facilities classified as Standard Industrial Classifications 20, 21, 22, 23, 2434, 25, 265, 267, 27, 283, 285, 30, 31 (except 311), 323, 34 (except 3441), 35, 36, 37 (except 373), 38, 39, 4221–25) only if:

areas where material handling equipment or activities, raw materials, intermediate products, final products, waste materials, by-products, or industrial machinery at these facilities are exposed to storm water. Such areas include: material handling sites; refuse sites; sites used for the application or disposal of process waste waters (as defined at 40 CFR 401); sites used for the storage and maintenance of material handling equipment; sites used for residual treatment; storage or disposal; shipping and receiving areas; manufacturing buildings; material storage areas for raw materials, and intermediate and finished products; and areas where industrial activity has taken place in the past and significant materials remain and are exposed to storm water.

The critical distinction between the facilities identified at 40 CFR 122.26(b)(14)(xi) and the facilities identified at 40 CFR 122.26(b)(14)(i)–(x) is that the former are not classified as having "storm water discharges associated with industrial activity" unless certain materials or activities are exposed to storm water. Storm water discharges from the latter set of facilities are considered to be "associated with industrial activity" regardless of the actual exposure of these same materials or activities to storm water.

EPA believes this distinction is appropriate because, when considered as a class, most of the activity at the facilities in § 122.26(b)(14)(xi) is undertaken in buildings; emissions from stacks will be minimal or non-existent; the use of unhoused manufacturing and heavy industrial equipment will be minimal; outside material storage, disposal or handling generally will not be a part of the manufacturing process; and generating significant dust or particulates would be atypical. As such, these industries are more akin or comparable to businesses, such as retail, commercial, or service industries, which Congress did not contemplate regulating before October 1, 1992, and storm water discharges from these facilities are not "associated with industrial activity." Thus, these industries will be required to obtain a permit under today's rule only when the manufacturing processes undertaken at such facilities would result in storm water contact with industrial materials associated with the facility.

Industrial categories in § 122.26(b)(14)(xi) all tend to engage in production activities in the manner described in the paragraph above. Facilities under SIC 20 process foods including meats, dairy food, fruit, and flour. Facilities classified under SIC 21 make cigarettes, cigars, chewing tobacco and related products. Under SIC 22, facilities produce yarn, etc., and/or dye and finish fabrics. Facilities under SIC 23 are in the business of producing clothing by cutting and sewing purchased woven or knitted textile products. Facilities under SIC 2434 and 25 are establishments engaged in furniture making. SIC 265 and 267 address facilities that manufacture paper board products. Facilities under SIC 27 perform services such as bookbinding, plate making, and printing. Facilities under SIC 283 manufacture pharmaceuticals and facilities under 285 manufacture paints, varnishes, lacquers, enamels, and allied products. Under SIC 30 establishments manufacture products from plastics and rubber. Those facilities under SIC 31 (except 311), 323, 34 (except 3441), 35, 36, and 37 (except 373) manufacture industrial and commercial metal products, machinery, equipment, computers, electrical equipment, and transportation equipment, and glass products made of purchased glass. Facilities under SIC 38 manufacture scientific and electrical instruments and optical equipment. Those under SIC 39 manufacture a variety of items such as jewelry, silverware, musical instruments, dolls, toys, and athletic goods. SIC 4221–25 are warehousing and storage activities.

In contrast, the facilities identified by SIC 24 (except and 2434), 26 (except 265 and 267), 28 (except 283 and 285), 29, 311, 32 (except 323), 33, 3441, 373 when taken as a group, are expected to have one or many of the following activities, processes occurring on-site: storing raw materials, intermediate products, final products, by-products, waste products, or chemicals outside; smelting; refining; producing significant emissions from stacks or air exhaust systems; loading or unloading chemical or hazardous substances; the use of unhoused manufacturing and heavy industrial equipment; and generating significant dust or particulates. Accordingly, these are classes of facilities which can be viewed as generating storm water discharges associated with industrial activity requiring a permit. Establishments identified under SIC 24 (except 2434) are engaged in operating sawmills, planing mills and other mills engaged in producing lumber and wood basic materials. SIC 26 facilities are paper mills. Under SIC 28, facilities produce basic chemical products by predominantly chemical processes. SIC 29 describes facilities that are engaged in the petroleum industry. Under SIC 311, facilities are engaged in tanning, currying, and finishing hides and skins. Such processes use chemicals such as sulfuric acid and sodium dichromate, and detergents, and a variety of raw and intermediate materials. SIC 32 manufacture glass, clay, stone and concrete products form raw materials in the form quarried and mined stone, clay, and sand. SIC 33 identifies facilities that smelt, refine ferrous and nonferrous metals from ore, pig or scrap, and manufacturing related products. SIC 3441 identifies facilities manufacturing fabricated structural metal. Facilities under SIC 373 engage in ship building and repairing. The permit application requirements for storm water discharges from facilities in these categories are unchanged from the proposal.

Today's rule clarifies that the requirement to apply for a permit applies to storm water discharges from plant areas that are no longer used for industrial activities (if significant materials remain and are exposed to storm water) as well as areas that are currently being used for industrial activities. EPA would also clarify that all discharges from these areas including those that discharge through municipal separate storm sewers are addressed by this rulemaking.

One commenter questioned the use of the word "or" instead of the word "and" to describe storm water "which is located at an industrial plant 'or' directly related to manufacturing, processing, or raw material storage areas at an industrial plant." The comment expressed the concern that discharges from areas not located at an industrial plant would be subject to permitting by this language and questioned whether this was EPA's intent. EPA agrees that this is a potential source of confusion and has modified this language to reflect the conjunctive instead of the alternative. This change has been made to provide consistency in the rule whereby some areas at industrial plants, such as administrative parking lots which do not have storm water discharges commingled with discharges from manufacturing areas, are not included under this rulemaking.

Two commenters wanted clarification of the term "or process water," in the definition of discharge associated with industrial activity at § 122.26(b)(14). This rulemaking replaces this term with the term "process waste water" which is defined at 40 CFR part 401.

One commenter took issue with the decision to include drainage ponds, refuse sites, sites for residual treatment, storage, or disposal, as areas associated with industrial activity, because it was the commenter's view that such areas are unconnected with industrial activity. EPA disagrees with this comment. If refuse and other sites are used in conjunction with manufacturing or the by-products of manufacturing they are clearly associated with industrial activity. As noted above, Congress intended to include discharges directly related to manufacturing and processing at industrial plants. EPA is convinced that wastes, refuse, and residuals are the direct result or consequence of manufacturing and processing and, when located or stored at the plant that produces them, are directly related to manufacturing and processing at that plant. Storm water drainage from such areas, especially those areas exposed to the elements (*e.g.* rainfall) has a high potential for containing pollutants from materials that were used in the manufacturing process at that facility. One commenter supported the inclusion of these areas since many toxins degrade very slowly and the mere passage of time will not eliminate their effects. EPA agrees and finalizes this part of the definition as proposed. One commenter requested clarification of the term "residual" as used in this context. Residual can generally be defined to include material that is remaining subsequent to completion of an industrial process. One commenter noted that the current owner of a facility may not know what areas or sites at a facility were used in this manner in the past. EPA has clarified the definition of discharge associated with industrial activity to include areas where industrial activity has taken place in the past and significant materials remain and are exposed to storm water. The Agency believes that the current owner will be in a position to establish these facts.

One commenter suggested including material shipping and receiving areas, waste storage and processing areas, manufacturing buildings, storage areas for raw materials, supplies, intermediates, and finished products, and material handling facilities as additional areas "associated with industrial activity." EPA agrees that this would add clarification to the definition, and has incorporated these areas into the definition at § 122.26(b)(14).

One commenter stated that the language "point source located at an industrial plant" would include outfalls located at the facility that are not owned or operated by the facility, but which are municipal storm sewers on easements granted to a municipality for the conveyance of storm water. EPA agrees that if the industry does not operate the point source then that facility is not required to obtain a permit for that discharge. A point source is a conveyance that discharges pollutants into the waters of the United States. If a facility does not operate that point source, then it would be the responsibility of the municipality to cover it under a permit issued to them. However, if contaminated storm water associated with industrial activity were introduced into that conveyance by that facility, the facility would be subject to permit application requirements as is all industrial storm water discharged through municipal sewers.

EPA disagrees with several comments that road drainage or railroad drainage within a facility should not be covered by the definition. Access roads and rail lines (even those not used for loading and unloading) are areas that are likely to accumulate extraneous material from raw materials, intermediate products and finished products that are used or transported within, or to and from, the facility. These areas will also be repositories for pollutants such as oil and grease from machinery or vehicles using these areas. As such they are related to the industrial activity at facilities. However, the language describing these areas of industrial activity has been clarified to include those access roads and rail lines that are "used or traveled by carriers of raw materials, manufactured products, waste material, or by-products used or created by the facility." For the same reasons haul roads (roads dedicated to transportation of industrial products at facilities) and similar extensions are required to be addressed in permit applications. Two industries stated that haul roads and similar extensions should be covered by permits by rule. EPA is not considering the use of a permit by rule mechanism under this regulation, however this issue will be addressed in the section 402(p)(5) reports to Congress and in general permits to be proposed and promulgated in the near future. EPA would note however that facilities with similar operations and storm water concerns that desire to limit administrative burdens associated with permit applications and obtaining permits may want to avail themselves of the group application and/or general permits.

In response to comments, EPA would also like to clarify that it intends the language "immediate access roads" (including haul roads) to refer to roads which are exclusively or primarily dedicated for use by the industrial facility. EPA does not expect facilities to submit permit applications for discharges from public access roads such as state, county, or federal roads such as highways or BLM roads which happen to be used by the facility. Also, some access roads are used to transport bulk samples of raw materials or products (such as prospecting samples from potential mines) in small-scale prior to industrial production. EPA does not intend to require permit applications for access roads to operations which are not yet industrial activities.

EPA does agree with comments made by several industries that undeveloped areas, or areas that do not encompass those described above, should generally not be addressed in the permit application, or a storm water permit, as long as the storm water discharge from these areas is segregated from the storm water discharge associated with the industrial activity at the facility.

Numerous commenters stated that maintenance facilities, if covered, should not be included in the definition. EPA disagrees with this comment. Maintenance facilities will invariably have points of access and egress, and frequently will have outside areas where parts are stored or disposed of. Such areas are locations where oil, grease, solvents and other materials associated with maintenance activities will accumulate. In response to one commenter, such areas are only regulated in the context of those facilities enumerated in the definition at § 122.26(b)(14), and not similar areas of retail or commercial facilities.

Another commenter requested that "storage areas" be more clearly defined. EPA disagrees that this term needs further clarification in the context of this section of the rule. However, in response to one comment, tank farms at industrial facilities are included. Tank farms are in existence to store products and materials created or used by the facility. Accordingly they are directly related to manufacturing processes.

Regarding storage areas, one commenter stated that the regulations should emphasize that only facilities that are not totally enclosed are required to submit permit applications. EPA does not agree with this interpretation since use of the generic term storage area indicates no exceptions for certain physical characteristics. Thus discharges from enclosed storage areas are also covered by today's rule (except as discussed above). EPA also disagrees with one

comment asserting that small outside storage areas of finished products at industrial facilities should be excluded under the definition of associated with industrial activity. EPA believes that such areas are areas associated with industrial activity which Congress intended to be regulated under the CWA. As noted above, the legislative history refers to storage areas, without reference to whether they are covered or uncovered, or of a certain size.

The same language, in the legislative history cited above, was careful to state that the term "associated with industrial activity" does not include storm water "discharges associated with parking lots and administrative and employee buildings." To accommodate legislative intent, segregated storm water discharges from these areas will not be required to obtain a permit prior to October 1, 1992. Many commenters stated that this was an appropriate method in which to limit the scope of "associated with industrial activity." However, if a storm water discharge from a parking lot at an industrial facility is mixed with a storm water discharge "associated with industrial activity," the combined discharge is subject to permit application requirements for storm water discharges associated with industrial activity. EPA disagrees with some commenters who urged that office buildings and administrative parking lots should be covered if they are located at the plant site. EPA agrees with one commenter that inclusion of storm water discharge from these areas would be overstepping Congressional intent unless such are commingled with storm water discharges from the plant site. Several commenters requested that language be incorporated into the rule which establishes that storm water discharges from parking lots and administrative areas not be included in the definition of associated with industrial activity. EPA agrees and has retained language used in the proposal which addresses this distinction.

Storm water discharges from parking lots and administrative buildings along with other discharges from industrial lands that do not meet the regulatory definition of "associated with industrial activity" and that are segregated from such discharges may be required to obtain an NPDES permit prior to October 1, 1992, under certain conditions. For example, large parking facilities, due to their impervious nature may generate large amounts of runoff which may contain significant amounts of oil and grease and heavy metals which may have adverse impacts on receiving waters. The Administrator or NPDES State has the authority under section 402(p)(2)(E) of the amended CWA to require a permit prior to October 1, 1992, by designating storm water discharges such as those from parking lots that are significant contributors of pollutants or contribute to a water quality standard violation. EPA will address storm water discharges from lands used for industrial activity which do not meet the regulatory definition of "associated with industrial activity" in the section 402(p)(5) study to determine the appropriate manner to regulate such discharges.

Several commenters requested clarification that the definition does not include sheet flow or discharged storm water from upstream adjacent facilities that enters the land or comingles with discharge from a facility submitting a permit application. EPA wishes to clarify that operators of facilities are generally responsible for its discharge in its entirety regardless of the initial source of discharge. However, where an upstream source can be identified and permitted, the liability of a downstream facility for other storm water entering that facility may be minimized. Facilities in such circumstances may be required to develop management practices or other run-on/run-off controls, which segregates or otherwise prevents outside runoff from comingling with its storm water discharge. Some commenters expressed concern about other pollutants which may arrive on a facility's premises from rainfall. This comment was made in reference to runoff with a high or low pH. If an applicant has reason to believe that pollutants in its storm water discharge are from such sources, then that needs to be addressed in the permit application and brought to the attention of the permitting authority, which can draft appropriate permit conditions to reflect these circumstances.

EPA requested comments on clarifying the types of facilities that involve industrial activities and generate storm water. EPA preferred basing the clarification, in part, on the use of Standard Industrial Classification (SIC) codes, which have been suggested in comments to prior storm water rulemakings because they are commonly used and accepted and would provide definitions of facilities involved in industrial activity. Several commenters supported the use by EPA of Standard Industrial Classifications for the same reasons identified by EPA as a generally used and understood form of classification. It was also noted that using such a classification would allow targeting for special notification and educational mailings. Three municipalities and three State authorities commented that SICs were appropriate and endorsed their use as a sound basis for determining which industries are covered.

One municipality questioned how SIC classifications will be assigned to particular industries. SICs have descriptions of the type of industrial activity that is engaged in by facilities. Industries will need to assess for themselves whether they are covered by a listed SIC and submit an application accordingly. Another commenter questioned if Federal facilities that do not have an SIC code identification are required to file a permit application. Federal facilities will be required to submit a permit application if they are engaged in an industrial activity that is described under § 122.26(b)(14). The definition of industrial activity incorporates language that requires Federal facilities to submit permit applications in such circumstances. The language has been further clarified to include State and municipal facilities.

EPA requested comments on the scope of the definition (types of facilities addressed) as well as the clarity of regulation. EPA identified the following types of facilities in the proposed regulation as those facilities that would be required to obtain permits for storm water discharges associated with industrial activity:

(i) Facilities subject to storm water effluent limitations guidelines, new source performance standards, or toxic pollutant effluent standards under 40 CFR subchapter N (except facilities with toxic pollutant effluent standards which are also identified under category (xi) of this paragraph). One commenter (a municipality) agreed with EPA that these industries should be addressed in this rulemaking. No other comments were received on this category. EPA agrees with this comment since these facilities are those that Congress has required EPA to examine and regulate under the CWA with respect to process water discharges. The industries in these categories have generally been identified by EPA as the most significant dischargers of process wastewaters in the country. As such, these facilities are likely to have storm water discharges associated with industrial activity for which permit applications should be required.

One commenter stated that because oil and gas producers are subject to effluent guidelines, EPA is disregarding the intent of Congress to exclude

facilities pursuant to section 402(1). EPA disagrees with this comment. EPA is not prohibited from requiring permit applications from industries with storm water discharge associated with industrial activity. EPA is prohibited only from requiring a permit for oil and gas exploration, production, processing, or treatment operations, or transmission facilities that discharge storm water that is not contaminated by contact with or has not come into contact with, any overburden, raw material, intermediate products, finished products, byproducts or waste products located on the site of such operations such discharges. In keeping with this requirement, EPA is requiring permit applications from oil and gas exploration, production, processing, or treatment operations, or transmission facilities that fall into a class of dischargers as described in § 122.26(c)(iii).

(ii) Facilities classified as Standard Industrial Classifications 24 (except 2434), 26 (except 265 and 267), 28 (except 283 and 285), 29, 311, 32 (except 323), 33, 3411, 373 and *(xi). Facilities classified as Standard Industrial Classifications 20, 21, 22, 23, 2434, 25, 265, 267, 27, 283, 285, 30, 31 (except 311), 323, 34 (except 3441), 35, 36, 37 (except 373), 38, 39, 4221–25.* One large municipality and one industry agreed with EPA that facilities covered by these SICs should be covered by this rulemaking. Many commenters, however, took exception to including all or some of these industries. However as noted elsewhere these facilities are appropriate for permit applications.

One commenter stated that within certain SICs industries, such as textile manufacturers use few chemicals and that there is little chance of pollutants in their storm water discharge. EPA agrees that some industries in this category are less likely than others to have storm water discharges that pose significant risks to receiving water quality. However, there are many other activities that are undertaken at these facilities that may result in polluted storm water. Further, the CWA is clear in its mandate to require permit applications for discharges associated with industrial activity. Excluding any of the facilities under these categories, except where the facility manufacturing plant more closely resembles a commercial or retail outlet would be contrary to Congressional intent.

One State questioned the inclusion of facilities identified in SIC codes 20–39 because of their temporary and transient nature or ownership. Agency disagrees that simply because a facility may transfer ownership that storm water quality concerns should be ignored. If constant ownership was a condition precedent to applying for and obtaining a permit, few if any facilities would be subject to this rulemaking.

One State estimated that the proposed definition would lead to permits for 18,000 facilities in its State. Consequently this commenter recommended that the facilities under SIC 20–39 should be limited to those facilities that have to report under section 313 of title III, Superfund Amendments and Reauthorization Act. However, as noted by another commenter, limiting permit requirements to these facilities would be contrary to Congressional intent. While use of chemicals at a facility may be a source of pollution in storm water discharges, other every day activities at an industrial site and associated pollutants such as oil and grease, also contribute to the discharge of pollutants that are to be addressed by the CWA and these regulations. While the number of permit applications may number in the thousands, EPA intends for group applications and general permits to be employed to reduce the administrative burdens as greatly as possible.

Two commenters felt the permit applications should be limited to all entities under SIC 20–39. EPA disagrees that all the industrial activities that need to be addressed fall within these SICs. Discharges from facilities under paragraphs (i) through (xi) such as POTWs, transportation facilities, and hazardous waste facilities, are of an industrial nature and clearly were intended to be addressed before October 1, 1992.

Two commenters stated that SIC 241 should be excluded in that logging is a transitory operation which may occur on a site for only 2–3 weeks once in a 20–30 year period. It was perceived that delays in obtaining permits for such operations could create problems in harvest schedule and mill demand. This commenter stated that runoff from such operations should be controlled by BMPs in effect for such industries and that such a permit would not be practical and would be cost prohibitive.

EPA agrees with the commenter that this provision needs clarification. The existing regulations at 40 CFR 122.27 currently define the scope of the NPDES program with regard to silvicultural activities. 40 CFR 122.27(b)(1) defines the term "silvicultural point source" to mean any discrete conveyance related to rock crushing, gravel washing, log sorting, or log storage facilities which are operated in connection with silvicultural activities and from which pollutants are discharged into waters of the United States. Section 122.27(b)(1) also excludes certain sources. The definition of discharge associated with industrial activity does not include activities or facilities that are currently exempt from permitting under NPDES. EPA does not intend to change the scope of 40 CFR 122.27 in this rulemaking. Accordingly, the definition of "storm water discharge associated with industrial activity" does not include sources that may be included under SIC 24, but which are excluded under 40 CFR 122.27. Further, EPA intends to examine the scope of the NPDES silvicultural regulations at 40 CFR 122.27 as it relates to storm water discharges in the course of two studies of storm water discharges required under section 402(p)(5) of the CWA.

In response to one comment, EPA intends that the list of applicable SICs will define and identify what industrial facilities are required to apply. Facilities that warehouse finished products under the same code at a different facility from the site of manufacturing are not required to file a permit application, unless otherwise covered by this rulemaking.

(iii) Facilities classified as Standard Industrial Classifications 10 through 14 (mineral industry) including active or inactive mining operations (except for areas of coal mining operations no longer meeting the definition of a reclamation area under 40 CFR 434.11(l) because the performance bond issued to the facility by the appropriate SMCRA authority has been released, or except for areas of non-coal mining operations which have been released from applicable State or Federal reclamation requirements after December 17, 1990 and oil and gas exploration, production, processing, or treatment operations, or transmission facilities that discharge storm water contaminated by contact with or that has come into contact with, any overburden, raw material, intermediate products, finished products, byproducts or waste products located on the site of such operations. Several commenters urged that Congress intended to require permits or permit applications only for the manufacturing sector of the oil and gas industry (or those activities that designated in SIC 20 through 39). EPA disagrees with this argument. The fact that Congress used the language cited above and not the appropriate the SIC definition explicitly does not indicate that a broader definition or less exclusive definition was contemplated. According to these comments, all storm water discharges from oil and gas

exploration and production facilities would be exempt from regulation. However, EPA is convinced that a facility that is engaged in finding and extracting crude oil and natural gas from subsurface formations, separating the oil and gas from formation water, and preparing that crude oil for transportation to a refinery for manufacturing and processing into refined products, will have discharges directly relating to the processing or raw material storage at an industrial plant and are therefore discharges associated with industrial activity.

For further clarification EPA is intending to focus only on those facilities that are in SIC 10–14. Furthermore, in response to several comments, this rulemaking will require permit applications for storm water discharges from currently inactive petroleum related facilities within SIC codes 10–14, if discharges from such facilities meet the requirements as described in section VI.F.7.a. and § 122.26(c)(1)(iii). Inactive facilities will have storm water associated with industrial activity irrespective of whether the activity is ongoing. Congress drew no distinction between active and inactive facilities in the statute or in the legislative history.

(iv) Hazardous waste treatment, storage, or disposal facilities that are operating under interim status or a permit under Subtitle C of the Resource, Conservation and Recovery Act. One commenter believed that all RCRA and Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) facilities should be specifically identified using SIC codes for further clarification. EPA considers this to be unnecessarily redundant, since the RCRA/CERCLA identification is sufficient.

Several industries asserted that storm water discharge from landfills, dumps, and land application sites, properly closed or otherwise subject to corrective or remedial actions under RCRA, should not be included in the definition. One commenter noted that the runoff from these areas is like runoff from undeveloped areas. One commenter also concluded that landfills, dumps, and land application sites should also be excluded if they are properly maintained under RCRA.

One commenter also rejected the idea of requiring permits from all active and inactive landfills and open dumps that have received any industrial wastes, and subtitle C facilities. This commenter felt that these facilities were already adequately covered under RCRA.

Two industry commenters felt that it would be redundant to have hazardous waste facilities regulated by RCRA and the NPDES storm water program. One felt this was especially so if there are current pretreatment standards.

The Agency disagrees that all activities that may contribute to storm water discharges at RCRA subtitle C facilities are being fully controlled and that requiring NPDES permits for storm water discharges at RCRA subtitle C facilities is redundant. First, the vast majority of permitted hazardous waste management facilities are industrial facilities involved in the manufacture or processing of products for distribution in commerce. Their hazardous waste management activities are incidental to the production-related activities. While RCRA subtitle C regulations impose controls in storm water runoff from hazardous waste management units and require cleanup of releases of hazardous wastes, they generally do not control non-systematic spills or process. These releases, from the process itself or the storage of raw materials or finished products are a potential source of storm water contamination. In addition, RCRA subtitle C (except via corrective action authority) does not address management of "non hazardous" industrial wastes, which nevertheless could also potentially contaminate storm water runoff.

Second, at commercial hazardous waste management facilities, the RCRA subtitle C permitting requirements and management standards do not control all releases of potentially toxic materials. For example, some permitted commercial treatment facilities may store and use chemicals in the treatment of RCRA hazardous wastes. Releases of these treatment chemicals from storage areas are a potential source of storm water contamination.

Finally, many RCRA subtitle C facilities have inactive Solid Waste Management Units (SWMU's) on the facility property. These SWMU's may contain areas on the land surface that are contaminated with hazardous constituents. RCRA requires that hazardous waste management facilities must investigate these areas of potential contamination, and then perform corrective action to remediate any SWMU's that are of concern. However, the corrective action process at these facilities will not be completed for a number of years due to the complexity of the cleanup decisions, and due to the fact that many hazardous waste management facilities do not yet have RCRA permits. Until corrective action has been completed at all such subtitle C facilities, SWMU's are a potential source of storm water contamination that should be addressed under the NPDES program. Finally, under section 1004(27) of RCRA, all point source discharges, including those at RCRA regulated facilities, are to be regulated by the NPDES program. Thus, there is no concern of regulatory overlap, and to the extent that the storm water regulations are effectively implemented, it will help address these units in a way that alleviates the need for expensive corrective action in the future.

(v) Landfills, land application sites, and open dumps that receive or have received industrial wastes and that are subject to regulation under subtitle D of RCRA. EPA received numerous comments supporting the regulation of municipal landfills which receive industrial waste and are subject to regulation under subtitle D of RCRA. EPA agrees with these comments. These industries have significant potential for storm water discharges that can adversely affect receiving water.

Two States argued that landfills should be addressed under the non-point source program. EPA disagrees that the non-point source program is sufficient for addressing these facilities. Further, addressing a class of facilities under the non-point source program does not exempt storm water discharges from these facilities from regulation under NPDES. The CWA requires EPA to promulgate regulations for controlling point source discharges of storm water from industrial facilities. Point sources from landfills consisting of storm water are such discharges requiring an NPDES permit. Several commenters argued that these discharges are adequately addressed by RCRA and that regulating them under this storm water rule would be redundant. However, as discussed above, RCRA expressly does not regulate point source discharges subject to NPDES permits. Given the nature of these facilities and of the material stored or disposed, EPA believes storm water permits are necessary. Similarly EPA rejects the comment that storm water discharges from these facilities are already adequately regulated by State authority. Congress has mandated that storm water discharges associated with industrial activity have an NPDES permit.

One commenter wanted EPA to define by size what landfills are covered. In response, it is the intent of these regulations to require permit applications from all landfills that receive industrial waste. Storm water discharges from such facilities are addressed because of the nature of the material with which the storm water comes in contact. The size of facility

will not dictate what type of waste is exposed to the elements.

One commenter requested that the definition of industrial wastes be clarified. For the purpose of this rule, industrial waste consists of materials delivered to the landfill for disposal and whose origin is any of the facilities described under § 122.26(b)(14) of this regulation.

(vi) Facilities involved in the recycling of materials, including metal scrapyards, battery reclaimers, salvage yards, and automobile junkyards, including but limited to those classified as Standard Industrial Classification 5015 and 5093. One commenter suggested that the recycling of materials such as paper, glass, plastics, etc., should not be classified as an industrial activity. EPA disagrees that such facilities should be excluded on that basis. These facilities may be considered industrial, as are facilities that manufacture such products absent recycling.

Other facilities exhibit traits that indicate industrial activity. In junkyards, the condition of materials and junked vehicles and the activities occurring on the yard frequently result in significant losses of fluids, which are sources of toxic metals, oil and grease and polychlorinated aromatic hydrocarbons. Weathering of plated and non-plated metal surfaces may result in contributions of toxic metals to storm water. Clearly such facilities cannot be classified as commercial or retail.

One municipality felt that "significant recycling" should be defined or clarified. EPA agrees that the proposed language is ambiguous. It has been clarified to require permit applications from facilities involved in the recycling of materials, including metal scrapyards, battery reclaimers, salvage yards, and automobile junkyards, including but limited to those classified as Standard Industrial Classification 5015 and 5093. These SIC codes describe facilities engaged in dismantling, breaking up, sorting, and wholesale distribution of motor vehicles and parts and a variety of other materials. The Agency believes these SIC codes clarify the term significant recycling.

One municipality stated that regulation of these facilities under NPDES would be duplicative if they are publicly owned facilities. One State expressed the view that automobile junkyards, salvage yards could not legitimately be considered industrial activity. As noted above, EPA disagrees with these comments. Facilities that are actively engaged in the storage and recycling of products including metals, oil, rubber, and synthetics are in the business of storing and recycling materials associated with or once used in industrial activity. These activities are not commercial or retail because they are engaged in the dismantling of motors for distribution in wholesale or retail, and the assembling, breaking up, sorting, and wholesale distribution of scrap and waste materials, which EPA views as industrial activity. Further, being a publicly owned facility does not confer non-industrial status.

(vii) Steam electric power generating facilities, including coal handling sites, and onsite and offsite ancillary transformer storage areas. Most of the comments were against requiring permit applications for onsite and offsite ancillary transformer facilities. One commenter stated that these transformers did not leak in storage and if there were leakage problems in handling transformers, such leaks were subject to Federal and State spill clean-up procedures. The same commenter suggested that if EPA required applications from such facilities that it exclude those that have regular inspections, management practices in place, or those that store 50 transformers at any one time.

EPA agrees that such facilities should not be covered by today's rule. As one commenter noted, the Toxic Substances Control Act (TSCA) addresses pollutants associated with transformers that may enter receiving water through storm water discharges. EPA has examined regulations under TSCA and agrees that regulation of storm water discharges from these facilities should be the subject of the studies being performed under section 402(p)(5), rather than regulations established by today's rule. Under TSCA, transformers are required to be stored in a manner that prevents rain water from reaching the stored PCBs or PCB items. 40 CFR 761.65(b)(1)(i). EPA considers transformer storage to be more akin to retail or other light commercial activities, where items are inventoried in buildings for prolonged periods for use or sale at some point in the future, and where there is no ongoing manufacturing or other industrial activity within the structure.

One commenter stated that this category of industries should be loosened so that all steam electric facilities are addressed—oil fired and nuclear. EPA believes that the language as proposed broadly defines the type of industrial activity addressed without specifying each mode of steam electric production. One commenter noted that the EPA has no authority under the CWA (*Train* v. *CPIR, Inc.*, 426 U.S. 1 (1976) to regulate the discharge of source, special nuclear and by-product materials which are regulated under the Atomic Energy Act. EPA agrees permit applications may not address those aspects of such facilities, however the facility in its entirety may not necessarily be exempt. A permit application will be appropriate for discharges from non-exempt categories.

(viii) Transportation facilities classified as Standard Industrial Classifications 40, 41, 42 (except 4221–25), 43, 44, 45, and 5171 which have vehicle maintenance shops, material handling facilities, equipment cleaning operations or airport deicing operations. Only those portions of the facility that are either involved in vehicle maintenance (including vehicle rehabilitation, mechanical repairs, painting, fueling, and lubrication), equipment cleaning operations, or which are identified in another subcategory of facilities under EPA's definition of storm water discharges associated with industrial activity. One commenter requested clarification of the terms "vehicle maintenance." Vehicle maintenance refers to the rehabilitation, mechanical repairing, painting, fueling, and lubricating of instrumentalities of transportation located at the described facilities. EPA is declining to write this definition into the regulation however since "vehicle maintenance" should not cause confusion as a descriptive term. One commenter wanted railroad tracks where rail cars are set aside for minor repairs excluded from regulation. In response, if the activity involves any of the above activities then a permit application is required. Train yards where repairs are undertaken are associated with industrial activity. Train yards generally have trains which, in and of themselves, can be classified as heavy industrial equipment. Trains, concentrated in train yards, are diesel fueled, lubricated, and repaired in volumes that connote industrial activity, rather than retail or commercial activity.

One commenter argued that if gasoline stations are not considered for permitting, then all transportation facilities should be exempt. EPA disagrees with the thrust of this comment. Transportation facilities such as bus depots, train yards, taxi stations, and airports are generally larger than individual repair shops, and generally engage in heavier more expansive forms of industrial activity. In keeping with Congressional intent to cover all industrial facilities, permit applications from such facilities are appropriate. In contrast, EPA views gas stations as retail commercial facilities not covered

by this regulation. It should be noted that SIC classifies gas stations as retail.

(ix) POTW lands used for land application treatment technology/ sludge disposal, handling or processing areas, and chemical handling and storage areas. One commenter wanted more clarification of the term POTW lands. Another commenter requested clarification of the terms sludge disposal, sludge handling areas, and sludge processing areas. One State recommended that a broader term than POTW should be used. EPA notes that on May 2, 1989, it promulgated NPDES Sewage Sludge Permit Regulations; State Sludge Management Program Requirements at 40 CFR part 501. This regulation identified those facilities that are subject to section 405(f) of the CWA as "treatment works treating domestic sewage."

In response to the above comments, EPA has decided to use this language to define what facilities are required to apply for a storm water permit. Under this rulemaking "treatment works treating domestic sewage," or any other sewage sludge or wastewater treatment device or system used in the storage treatment, recycling, and reclamation of municipal or domestic sewage, including land dedicated to the disposal of sewage sludge, with a design flow of 1.0 mgd or more, or facilities required to have an approved pretreatment program under 40 CFR part 403, will be required to apply for a storm water permit. However, permit applications will not be required to address land where sludge is beneficially reused such as farm lands and home gardens or lands used for sludge management that are not physically located within the confines (offsite facility) of the facility or where sludge is beneficially reused in compliance with section 405 of the Clean Water Act (proposed rules were published on February 6, 1989, at 54 FR 5746). EPA believes that such activity is not "industrial" since it is agricultural or domestic application (non-industrial) unconnected to the facility generating the material.

EPA received many comments on the necessity and appropriateness of requiring permit applications for storm water discharges from POTW lands. It was anticipated by numerous commenters that the above cited sludge regulations would adequately address storm water discharges from lands where sludge is applied. However, the sewage sludge regulations do not directly address NPDES permit requirements for storm water discharges from POTW lands and related areas to the extent required by today's rulemaking; the regulations cover only permits for use or disposal of sludge. Also, the regulations proposed on February 4, 1989, cover primarily the technical standards for the composition of sewage sludge which is to be used or disposed. They do not include detailed permitting requirements for discharges of storm water from lands where sludge has been applied to the land. To that extent, EPA is not persuaded by these commenters that POTWs and POTW lands should be excluded from these storm water permit application requirements.

Two commenters noted that some States already regulate sludge use or disposal activities substantially and that EPA should refrain from further regulation. EPA disagrees that this is a basis for excluding facilities from Federal requirements. Notwithstanding regulations in existence under State law, EPA is required by the CWA to promulgate regulations for permit application for storm water associated with industrial activity. Under the NPDES program, States are able to promulgate more rigorous requirements. However a minimum level of control is required under Federal law. One commenter also indicated that a State's sludge land application sites must follow a well defined plan to ensure there is no sludge related runoff. Notwithstanding that a State may require storm water controls for sludge land applications, as noted above, EPA is required to promulgate regulations requiring permit applications from appropriate facilities. EPA views facilities such as waste treatment plants that engage in on-site sludge composting, storage of chemicals such as ferric chloride, alum, polymers, and chlorine, and which may experience spills and bubbleovers are suitable candidates for storm water permits. Facilities using such materials are not characteristic of commercial or retail activities. Use and storage of chemicals and the production of material such as sludge, with attendant heavy metals and organics, is activity that is industrial in nature. The size and scope of activities at the facility will determine the extent to which such activities are undertaken and such materials used and produced at the facility. Accordingly, EPA believes limiting the facilities covered under this category to those of 1.0 mgd and those covered under the industrial pretreatment program is appropriate.

To the extent that permit applicants are already required to employ certain management practices regarding storm water, these may be incorporated into permits and permit conditions issued by Federal and State permitting authorities. EPA has selected facilities identified under 40 CFR part 501 (*i.e.* those with a design flow of 1.0 mgd or more or those required to have an approved pretreatment program) since these facilities will have largest contribution of industrial process discharges. Sludge from such facilities will contain higher concentrations of heavy metal and organic pollutants.

One commenter stated that sludge disposal is a public activity that should be addressed in a public facility's storm water management program under a municipal storm water management program. EPA disagrees. Industrial facilities, whether publicly owned or not, are required to apply for and obtain permits when they are designated as industrial activity.

Another comment stated that a permit should not be required for facilities that collect all runoff on site and treat it at the same POTW. EPA believes that a permit application should be required from such facilities. However, the above practice can be incorporated as a permit condition for such a facility. One commenter stated storm water from sludge and chemical handling areas can be routed through the headworks of the POTW. The agency agrees that this may be an appropriate management practice for POTWs as long as other NPDES regulatory requirements are fulfilled with regard to POTWs.

(x) Construction activities, including clearing, grading and excavation activities except operations that result in the disturbance of less than five acre total land area which are not part of a larger common plan of development or sale. EPA addresses whether these facilities should be covered by today's rule in section VI.F.8.

The December 7, 1988, proposal also requested comments on including the following other categories of discharges in the definition of industrial activities: (xii) Automotive repair shops classified as Standard Industrial Classification 751 or 753; (xiii) Gasoline service stations classified as Standard Industrial Code 5541; (xiv) Lands other than POTW lands (offsite facilities) used for sludge management; (xv) Lumber and building materials retail facilities classified as Standard Industrial Classification 5211; (xvi) Landfills, land application sites, and open dumps that do not receive industrial wastes and that are subject to regulation under subtitle D of RCRA; (xvii) Facilities classified as Standard Industrial Classification 46 (pipelines, except natural gas), and 492 (gas production and distribution); (xviii) Major electrical powerline corridors.

EPA received numerous comments on whether to require permit applications for these particular facilities. The December 7, 1988, proposal reflected EPA's intent not to require permits for these facilities, but rather to address these facilities in the two studies required by CWA sections 402(p)(5) and (6). After reviewing the comments on this issue, EPA believes that these facilities should be addressed under these sections of the CWA. Most of these facilities are classified as light commercial and retail business establishments, agricultural, facilities where residential or domestic waste is received, or land use activities where there is no manufacturing. It should be noted that although EPA is not requiring the facilities identified as categories (xii) to (xviii), in the December 7, 1988, proposal to apply for a permit application under this rulemaking, such facilities may be designated under section 402(p)(2)(E) of the CWA.

Three commenters recommended that EPA clarify that non-exempt Department of Energy and Department of Defense facilities should be covered by the storm water regulation. The regulation clearly states that Federal Facilities that are engaged in industrial activity (*i.e.* those activities in § 122.26(b)(14)(i)–(xi)) are required to submit permit applications. Those applying for permits covering Federal facilities should consult the Standard Industrial Classifications for further clarification.

One commenter questioned how EPA intended to regulate municipal facilities engaged in industrial activities. Municipal facilities that are engaged in the type of industrial activity described above and which discharge into waters of the United States or municipal separate storm sewer systems are required to apply for permits. These facilities will be covered in the same manner as other industrial facilities. The fact that they are municipally owned does not in any way exclude them from needing permit applications under this rulemaking.

One commenter suggested exempting those facilities that have total annual sales less than five million dollars or occupy less than five acres of land. Another commenter thought that all minor permittees should be exempt. EPA believes that the quality of storm water and the extent to which discharges impact receiving water is not necessarily related to the size of the facility or the dollar value of its business. What is important in this regard, is the extent to which steps are taken at facilities to curb the quantity and type of material that may pollute storm water discharges from these facilities. Therefore EPA has not excluded facilities from permitting on such a basis. This same commenter stated that the proposed rules should not address facilities with multiple functions (industrial and retail). EPA disagrees. If a facility engages in activity that is defined in paragraphs (i) through (xi) above, it is required to apply for a permit regardless of the fact that it also has a retail element. Such facilities need only submit a permit application for the industrial portion of the facility (as long as storm water from the non-industrial portion is segregated, as discussed above). This commenter also felt that more studies needed to be undertaken to determine the best way to regulate industries. EPA agrees that storm water problems need further study and for that reason EPA has devoted substantial manpower and resources to complete comprehensive studies under section 402(p)(5), while also addressing industrial sources that need immediate attention under this rulemaking.

One commenter requested that EPA give examples of storm water discharges from each of the facilities that have been designated for submitting permit applications. Agency believes that this is unnecessary and impractical since every facility, regardless of the type of industry, will have different terrain, hydrology, weather patterns, management practices and control techniques. However, EPA intends to issue guidance on filing permit applications for storm water discharges from industrial facilities which details how an industry goes about filing an industrial permit and dealing with storm water discharges.

Today's rulemaking for storm water discharges associated with industrial activity at § 122.26(c)(1)(i) includes special conditions for storm water discharges originating from mining operations, oil or gas operations (§ 122.26(c)(1)(iii)), and from the construction operations listed above (§ 122.26(c)(1)(ii)). These requirements are discussed in more detail in section VI.F.7 and section VI.F.9 of today's notice.

3. Individual Application Requirements

Today's rule establishes individual and group permit application requirements for storm water discharges associated with industrial activity. These requirements will address facilities precluded from coverage under the general permits to be proposed and promulgated by EPA in the near future. EPA considers it necessary to obtain the information required in individual permit applications from certain facilities because of the nature of their industrial activity and because of existing institutional mechanisms for issuing and tracking NPDES permits. Furthermore, some States will not have general permitting authority. Facilities located in such States will be required to submit individual applications or participate in a group application. The following response to comments received on these requirements pertains to these facilities.

Under the September 26, 1984, regulation operators of Group I storm water discharges were required to submit NPDES Form 1 and Form 2C permit applications. In response to post-regulation comments received on that rule, EPA proposed new permit application requirements (March 7, 1985, (50 FR 9362) and August 12, 1985, (50 FR 32548)) which would have decreased the analytical sampling requirements of the Form 2C and provided procedures for group applications. Passage of the WQA in 1987 gave the EPA additional time to consider the appropriate permit application requirements for storm water discharges. On December 7, 1988, application requirements were proposed and numerous comments were received. Based upon these comments, modifications and refinements have been made to the industrial storm water permit application.

Some commenters expressed the view that the permit application requirements are too burdensome, require too much paperwork, are of dubious utility, and focus too greatly on the collection of quantitative data. EPA disagrees. In comparison to prior approaches for permitting storm water discharges and other existing permitting programs, EPA has streamlined the permit application process, limited the quantitative data requirements, and required narrative information that will be used to determine permit conditions that relate to the quality of storm water discharge. To the extent that EPA needs non-quantitative information to develop appropriate permit conditions, EPA disagrees with the view of some commenters that the information required is excessive. In response to comments on earlier rulemakings and a comment received on the December 7, 1988, proposal (stressing that the emphasis should be on site management, rather than monitoring, sampling, and reporting) EPA has shifted the emphasis of the permit application requirements for storm water discharges associated with industrial activity from the existing requirements for collection of

quantitative data (sampling data) in Form 2C towards collection of less quantitative data supplemented by additional information needed for evaluation of the nature of the storm water discharges.

The permit application requirements proposed for storm water discharges reduce the amount of quantitative data required in the permit application and exempt discharges which contain entirely storm water (*i.e.* contain no other discharge that, without the storm water component, would require an NPDES permit), from certain reporting requirements of Form 2C. The proposed modifications also would exempt applicants for discharges which contain entirely storm water from several non-quantitative information collection provisions currently required in the Form 2C. The proposed modifications would rely more on descriptive information for assessing impacts of the storm water discharge. One commenter proposed that information that the applicant has submitted for other permits be incorporated by reference into the storm water permit application. EPA disagrees that incorporation by reference is appropriate. The permitting authority will need to have this information readily available for evaluating permit application and permit conditions. Furthermore, EPA feels that the applicant is in the best position to provide the information and verify its accuracy. However, if the applicant has such information and it accurately reflects current circumstances, then the applicant can rely on the information for meeting the information requirements of the application. Another commenter suggested that EPA should only require the information in § 122.26(c)(1) (A) and (B) (*i.e.*, the requirement for a topographic map indicating drainage areas and estimate of impervious areas and material management practices). As explained in greater detail below, EPA is convinced that some quantitative data and the other narrative requirements are necessary for developing appropriate permit conditions.

Form 2F addressing permit applications for storm water discharges associated with industrial activity is included in today's final rule. A complete permit application for discharges composed entirely of storm water, will be comprised of Form 2F and Form 1. Operators of discharges which are composed of both storm water and non-storm water will submit, where required, a Form 1, an entire Form 2C (or Form 2D) and Form 2F when applying. In this case, the applicant will provide quantitative data describing the discharge during a storm event in Form 2F and quantitative data describing the discharge during non-storm events in Form 2C. Non-quantitative information reported in the Form 2C will not have to be reported again in the Form 2F.

Under today's rule, Form 2F for storm water discharges associated with industrial activity would not require the submittal of all of the quantitative information required in Form 2C, but would require that quantitative data be submitted for:

- Any pollutant limited in an effluent guideline for an industrial applicant's subcategory;
- Any pollutant listed in the facility's NPDES permit for its process wastewater;
- Oil and grease, TSS, COD, pH, BOD5, total phosphorus, total Kjeldahl nitrogen; nitrate plus nitrite nitrogen; and
- Any information on the discharge required under 40 CFR 122.21(g)(7) (iii) and (iv).

In order to characterize the discharge(s) sampled, applicants need to submit information regarding the storm event(s) that generated the sampled discharge, including the date(s) the sample was taken, flow measurements or estimates of the duration of the storm event(s) sampled, rainfall measurements or estimates from the storm event(s) which generated the sampled runoff, and the duration between the storm event sampled and the end of the previous storm event. Information regarding the storm event(s) sampled is necessary to evaluate whether the discharge(s) sampled was generally representative of other discharges expected to occur during storm events and to characterize the amount and nature of runoff discharges from the site.

One commenter stated that the quantitative information should be limited to those pollutants that are expected to be known to the applicant. EPA believes this would be inappropriate since there will be no way of determining initially whether these pollutants are present despite the expectations of the applicant. Once the data is provided, permits can be drafted which address specific pollutants. This rulemaking requires that the applicant test for oil and grease, COD, pH, BOD5, TSS, total Kjeldahl nitrogen, nitrate plus nitrite nitrogen and total phosphorus. Oil and grease and TSS are a common component of storm water and can have serious impacts on receiving waters. Oxygen demand (COD and BOD5) will help the permitting authority evaluate the oxygen depletion potential of the discharge. BOD5 is the most commonly used indicator of potential oxygen demand. COD is considered a more inclusive indicator of oxygen demand, especially where metals interfere with the BOD5 test. The pH will provide the permitting authority with important information on the potential availability of metals to the receiving flora, fauna and sediment. Total Kjeldahl nitrogen, nitrate plus nitrite nitrogen and total phosphorus are measures of nutrients which can impact water quality. Because this data is useful in developing appropriate permit conditions, EPA disagrees with the argument made by one commenter that quantitative data requirements should be a permit condition and not part of the application process.

In the proposed rule, the Agency used total nitrogen as a parameter. This has been changed to total Kjeldahl nitrogen and nitrate plus nitrite nitrogen for clarity.

Today's rule defines sampling at industrial sites in terms of sampling for those parameters that have effluent limits in existing NPDES permits, as well as for any other conventional or nonconventional parameter that might be expected to be found at the outfall. Comments on the appropriateness of the defined parameters were solicited by the proposal. Numerous commenters maintained that either the parameter list be made industry specific, or that pollutant categories not detected in the initial screen be exempted from further testing. Some suggested that only conventional pollutants, inorganics, and metals be sampled unless reason for others is found.

In terms of specific water quality parameters, it was recommended that surfactants not be tested for unless foam is visible. One commenter also suggested that fecal coliform sampling is inappropriate for industrial permits applications. One commenter favored testing for TOC instead of VOC. In response, VOC has been eliminated from the list of parameters because it will not yield specific usable data. VOC is not specifically required in any sampling in today's rule, except where priority pollutant scans are required.

Some recommended that procedures be modified to facilitate quicker, less expensive lab analyses. Concern was also raised that industry might be required to collect its own rainfall data if there is no nearby observation station. Some commenters stated that EPA should not allow automatic sampling for either biological or oil and grease sampling due to the potential for contamination in sampling equipment.

In response, EPA believes that the sampling requirements for industry in today's rule are reasonable and not burdensome. These requirements address parameters that have effluent limits in existing NPDES permits, as well as for any other conventional or nonconventional parameter that might be expected to be found at the applicants outfall. Under this procedure both industry-specific and site-specific contaminants are already identified in the existing permit. Whether all these parameters need to be made a part of any discharge characterization plans, under the terms of the permit, will be a case-by-case determination for the permitting authority. EPA maintains that the test for surfactants (if in effluent guidelines or in the facility's NPDES permit for process water) is justifiable even when a foam is not obvious at the outfall. The presence of detergents in storm water may be indicated by foam, but the absence of foam does not indicate that detergents are not present.

EPA requested comments on fecal coliform as a parameter. Fecal coliform was included on the list as an indicator of the presence of sanitary sewage. In large concentrations, fecal coliform may be an effective indicator of sanitary sewage as opposed to other animal wastes. EPA believes that sanitary cross connections will also be found at industrial facilities. Furthermore, the test for fecal coliform is an inexpensive test and its inclusion or exclusion should make little impact financially on the individual application costs. Sampling for volatile organic carbon shall be accomplished when required, as it is an appropriate indicator of industrial solvents and organic wastes.

In response to comments, EPA acknowledges that there are certain pollutants that are capable of leaving residues in automatic sampling devices that will potentially contaminate subsequent samples. In these cases, such as for biological monitoring, if such a problem is perceived to exist and it is expected that the contaminant will render the subsequent samples unusable, manual grab samples may be needed. This would include grab samples for pH, temperature, cyanide, total phenols, residual chlorine, oil and grease, fecal coliform, and fecal streptococcus. EPA is not disallowing the use of automatic sampling because of possible contamination, as this type of sampling may be the best method for obtaining the necessary samples from a selected storm events.

In addition to the conventional pollutants listed above, this final rule requires applicants, when appropriate, to sample other pollutants based on a consideration of site-specific factors. These parameters account for pollutants associated with materials used for production and maintenance, finished products, waste products and non-process materials such as fertilizers and pesticides that may be present at a facility. Applicants must sample for any pollutant limited in an effluent guideline applicable to the facility or limited in the facility's NPDES permit. These pollutants will generally be associated with the facility's manufacturing process or wastes. Other process and non-process related pollutants, will be addressed by complying with the requirements of 40 CFR 122.21(g)(7) (iii) and (iv).

Section 122.21(g)(7)(iii) requires applicants to indicate whether they know or have reason to believe that any pollutant listed in Table IV (conventional and nonconventional pollutants) of appendix D to 40 CFR part 122 is discharged. If such a pollutant is either directly limited or indirectly limited by the terms of the applicant's existing NPDES permit through limitations on an indicator parameter, the applicant must report quantitative data. For pollutants that are not contained in an effluent limitations guideline, the applicant must either report quantitative data or describe the reasons the pollutant is expected to be discharged. With regard to pollutants listed in Table II (organic pollutants) or Table III (metals, cyanide and total phenol) of appendix D, the applicant must indicate whether they know or have reason to believe such pollutants are discharged from each outfall and, if they are discharged in amounts greater than 10 parts per billion (ppb), the applicant must report quantitative data. An applicant qualifying as a small business under 40 CFR 122.21(g)(8), (*e.g.*, coal mines with a probable total annual production of less than 100,000 tons per year or, for all other applicants, gross total annual sales averaging less than $100,000 per year (in second quarter 1980 dollars)), is not required to analyze for pollutants listed in Table II of appendix D (the organic toxic pollutants).

Section 122.21(g)(7)(iv) requires applicants to indicate whether they know or have reason to believe that any pollutant in Table V of appendix D to 40 CFR part 122 (certain hazardous substances) is discharged. For every pollutant expected to be discharged, the applicant must briefly describe the reasons the pollutant is expected to be discharged and report any existing quantitative data it has for the pollutant.

When collecting data for permit applications, applicants may make use of 40 CFR 122.21(g)(7), which provides that "when an applicant has two or more outfalls with substantially identical effluents, the Director may allow the applicant to test only one outfall and report that the quantitative data also applies to the substantially identical outfalls." Where the facility has availed itself of this provision, an explanation of why the untested outfalls are "substantially identical" to tested outfalls must be provided in the application. Where the amount of flow associated with the outfalls with substantially identical effluent differs, measurements or estimates of the total flow of each of the outfalls must be provided. Several commenters stated that the time and expense associated with sampling and analysis would be saved if the applicant was able to pick substantially identical outfalls without prior approval of the permitting authority. EPA disagrees that this would be an appropriate devolution of authority to the permit applicant. The permitting authority needs to ensure that these outfalls have been grouped according to appropriate criteria (for example do the outfalls serve similar drainage areas at the facility). Furthermore, EPA is not requiring that the permit applicant engage in sampling to demonstrate that the outfalls are indeed substantially identical, because that would of course defeat the purpose of § 122.21(g)(7). The procedure for establishing identical outfalls is not that onerous and provides a means for industry to save substantially on time and resources for sampling.

EPA proposed and requested comment on a requirement that the facility must sample a storm event that is typical for the area in terms of duration and severity The storm event must be greater than 0.1 inches and must be at least 96 hours from the previously measurable (greater than 0.1 inch rainfall) storm event. In general, variance of the parameters (such as the duration of the event and the total rainfall of the event) should not exceed 50 percent from the parameters of the average rainfall event in that area. EPA also requested comments on addressing snow melt events under this definition.

Commenters stated that: median or average rainfall is not an acceptable approach; the minimum depth and duration of rainfall must be specified; the allowable 50% variation is questionable; the total depth of the storm is irrelevant; and the storm should be viewed based on the average intensity of the storm. One commenter

suggested that using the median rainfall event would be a better approach than the average rainfall event.

Others insisted that "representative" or typical storms do not exist in semi-arid climates and that representative rainfall must be site-specific (regional) and seasonal. Several commenters contended that the requirement for 96 dry hours between events is not acceptable, with 48 and 72 hours identified as possible alternatives.

One commenter believed that a typical standard design storm, such as the 1-year, 24-hour, or 10-year, 1-hour, would be preferable. Another commenter felt that the storm event should be based on the rainfall required to generate a minimum discharge level. One commenter questioned whether the storm is to be sampled at all sites simultaneously.

To clarify its decision on what storm event should be sampled, EPA notes that its selection of the storm event considers both regional and seasonal variation of precipitation. This is evidenced in the rule with regard to sites in the municipal application (three events sampled), and in the requirements for industrial group applications (a minimum of two applicants, or one applicant in groups of less than 10, to be represented in each precipitation zone (*see* section VI.F.4 below).

The definition of a 0.1 inch minimum was determined by NURP and other studies to be the minimum rainfall depth capable of producing the rainfall/runoff characteristics necessary to generate a sufficient volume of runoff for meaningful sample analysis. EPA believes by requiring the average storm to be used as the basis for sampling that depth, duration, and therefore average rainfall intensity are being regionally defined. The Agency has also added the option of using the median rainfall event instead of the average. The potential for monitoring events that may not meet this specification should be minimized by allowing the proposed 50 percent variation in rainfall depth and/or duration from event statistics. However, the 50 percent variation need only be met when possible. Further, there is flexibility in the rule where the Director may allow or establish site specific requirements such as the minimum duration between the previous measurable storm event and the storm event sampled, the amount of precipitation from the storm event to be sampled, and the form of precipitation sampled (snowmelt or rainfall). If data is obtained from a rain event that does not meet the criteria above, the Director has the discretion to accept the data as valid.

The December 7, 1988, proposal called for a 96-hour period between events of measurable rainfall, here defined as 0.1 inch, which provided a four day minimum for the accumulation of pollutants on the surface of the outfalls' tributary areas. The key word in the definition is "measurable", which means that the 96-hour period did not necessarily have to be dry, only that no cleansing rainfall (*i.e.* 0.1 inch rain event) has occurred. However, after reviewing comments on this issue EPA has decided to change the period to 72 hours. Many commenters indicated that 96 hours is too restrictive and that securing a sample under such circumstances would be unnecessarily difficult. EPA agrees that the quality or representativeness of the sample would not be adversely affected by this change.

EPA does not agree with comments that the requirement of a particular "design" storm would be appropriate. Many commenters have expressed concern that they might sample an event not meeting the requirements for industrial group applications as defined. Because there is no way to know with sufficient certainty beforehand that an upcoming event will approximate a one-year, twenty-four hour storm, many events would be unnecessarily sampled before this event is realized.

EPA does not intend that a municipality or industry be required to sample all required outfalls for a single storm. This would represent a unmanageable investment in equipment and manpower In some areas, it may be necessary to sample multiple sites for a single event due to the irregularity of rainfall, but not all sites.

EPA described parameters for selecting storm events for sampling of municipal and industrial outfalls in the December 7, 1988, proposal. EPA has received several comments regarding the problems that rainfall measurement in general presents. A recurring comment relative to reporting rainfall, and in verifying that the storm itself is representative, deals with the spatial distribution of rainfall. The rainfall measured at an airport does not always represent rainfall at the site, particularly in summer months when thunderstorms are prevalent. One commenter stated that it would be easier to base the selected storm on either a minimum discharge, or on a discharge duration other than on the total precipitation, because these parameters are easily measured at the site and are not dependent on the airport gauges receiving the same rainfall as the site. A few commenters questioned how to determine typical storm characteristics. One commenter advised that NOAA rainfall reporting stations provide data that represent only daily rainfall totals, not storm event data. One commenter pointed out that the time frame of the sampling requirement does not consider that a particular region may be in the midst of a multi-year drought cycle, and that what little rainfall occurs may have uncharacteristically high levels of pollutants.

The type of rain event sampled is an important parameter in any attempt to characterize system-wide loads based on the sampling results. Rainfall gauges that report only event total depth will provide the information necessary to characterize most events, provided that a reasonable estimate of the event duration can be made. If simulation models are to be used in estimating system-wide loads, rainfall measurement based on time and depth of rainfall will be needed. If the recording stations are not believed to accurately reflect this distribution, then the data will need to be collected by the applicant at a location central to the tributary area of the outfall.

The rainfall data collected by NOAA are in most cases available in the form of hourly rainfall depths. This information can be analyzed to develop characteristic storm depths and durations. In some cases, this information has already been analyzed for many long term reporting stations by various municipalities, states, and universities. The results of these investigations should be available to the applicants.

EPA realizes that prolonged rainless periods occur for both semi-arid areas and areas experiencing droughts and that the first storm after a prolonged dry period may well not be representative of "normal" runoff conditions. In order for the appropriate system-wide characterization of loads to be made, data must be collected. With regard to the municipal permit application, today's rule states that runoff characterization data will be collected during three events at from five to ten sites. The rule gives the Director the flexibility of modifying these requirements.

EPA has defined the parameters for selecting the storm event to be sampled such that at the discretion of the Director, seasonal, including winter, sampling might be required. EPA has received several comments regarding the problems that snowmelt sampling may present. Several commenters are

opposed to monitoring of snowmelt events. The reasons cited include equipment problems and the unreasonableness of expecting this sampling, because of temperatures and the time required for personnel to be waiting for events. A few comments addressed the issues of snow pack depth, ambient temperature, and solar radiation levels, and that the snow pack may filter suspended solids or refreeze such that final melting is uncharacteristically over-polluted relative to normal conditions. Another commenter contended that it is impossible to manage the melting process and therefore unreasonable to expect controls to be implemented relative to snowmelt. In essence, it is contended that there is no first discharge unless the snow pack depth is low and melts quickly.

A few commenters favor monitoring snowmelt, for precisely the same reason that most oppose it: that the runoff from snowmelt is the most polluted runoff generated in some areas on an annual basis. Where this is the case, sampling snowmelt should be undertaken in order to accurately assess impacts to receiving streams. EPA is confident that in areas where automated sampling cannot be relied upon, grab sampling can probably be performed because the nature of the snowmelt process tends to make the timing of samples less of a problem when compared to typical rainfall events. EPA disagrees that management practices, either at industrial facilities or with regard to municipalities, cannot address snowmelt. Some areas may need to reassess their salt application procedures. In addition retention and detention devices may address snowmelt, as well as erosion controls at construction sites. Thus, obtaining samples of snowmelt is appropriate to allow development of such permit conditions.

Today's rule also modifies the Form 2C requirements by exempting applicants from the requirements at § 122.21(g)(2) (line drawings), (g)(4) (intermittent flows), (g)(7) (i), (ii), and (v) (various sampling requirements to characterize discharges) if the discharge covered by the application is composed entirely of storm water. Permit applications for discharges containing storm water associated with industrial activity would require applicants to provide other non-quantitative information which will aid permit writers to identify which storm water discharges are associated with industrial activity and to characterize the nature of the discharge.

Numerous comments were received regarding the requirement to submit a topographic map and site drainage map. Many of these comments offered alternatives to EPA's proposal. Two commenters suggested that a simple sketch of the site would be sufficient. Two commenters stated that one or the other should be adequate. One commenter believed that the drainage map was a good idea, but that the topographic map should be optional. Several commenters submitted that a topographic map was sufficient and that only SPCC plans or SARA submittals should supplement that. Another commenter argued that information relating to the location of the nearest surface water or drinking wells would be sufficient. Other commenters believed that a drainage map alone would indicate all relevant site specific information. Numerous commenters expressed concern that the drainage area map would be too detailed and that one which depicts the general direction of flow should be sufficient. Clarification was requested on whether the final rule would require the location of any drinking water wells. One commenter stated that a U.S.G.S. 7.5 quadrangle map will not illustrate drainage systems in all cases, and that therefore the requirement should be optional.

Several commenters agreed with EPA's proposal. One commenter maintained that drainage maps should be required from developments greater than three acres and from all individual applicants. Several commenters agreed with EPA's proposal that both maps should be provided, with arrows indicating site drainage and entering and leaving points. It was advised that drainage maps are useful in locating sources of storm water contamination, and it is useful to identify areas and activities which require source controls or remedial action. One commenter recommended that the map should extend far enough offsite to demonstrate how the privately owned system connects to the publicly owned system.

After considering the merits of all the comments and the reasons supporting EPA's proposal, EPA is convinced that a topographic map and a site drainage map are necessary components of the industrial application. Existing permit application regulations at 40 CFR 122.21(f)(7) require all permit applicants to submit as part of Form 1 a topographic map extending one mile beyond the property boundaries of the source depicting: the facility and each intake and discharge structure; each hazardous waste treatment, storage, or disposal facility; each well where fluids from the facility are injected underground; and those wells, springs, other surface water bodies, and drinking water wells listed in the map area in public records or otherwise known to the applicant within one-quarter mile of the facility property boundary. (*See* 47 FR 15304, April 8, 1982.) However, as indicated by the comments the information provided under § 122.21(f)(7) is generally not sufficient by itself for evaluating the nature of storm water discharges associated with industrial activity.

As stated in comments, a drainage map can provide more important site specific information for evaluating the nature of the storm water discharge in comparison to existing requirements, which require a larger map with only general information. The volume of storm water discharge and the pollutants associated with it will depend on the configuration and activities occurring at the industrial site. One commenter suggested that it would be appropriate to submit an aerial photograph of the site with all the topographic and drainage information superimposed on the photograph. EPA agrees that this may be an appropriate method of providing this information. EPA is not requiring a specific format for submitting this information.

EPA is also requiring that a narrative description be submitted to accompany the drainage map. The narrative will provide a description of on-site features including: existing structures (buildings which cover materials and other material covers; dikes; diversion ditches, etc.) and non-structural controls (employee training, visual inspections, preventive maintenance, and housekeeping measures) that are used to prevent or minimize the potential for release of toxic and hazardous pollutants; a description of significant materials that are currently or in the past have been treated, stored or disposed outside; and the method of treatment, storage or disposal used. The narrative will also include: a description of activities at materials loading and unloading areas; the location, manner and frequency in which pesticides, herbicides, soil conditioners and fertilizers are applied; a description of the soil; and a description of the areas which are predominately responsible for first flush runoff. This requirement is unchanged from the proposal.

Some commenters believed that information on pesticides, herbicides, and fertilizers and similar products is irrelevant, incidental to the facility's production activities, and should not be

addressed by this rulemaking. EPA disagrees. As these materials are applied outside and hence subject to storm events, they are significant sources of pollutants in storm water discharges whether applied in residential or industrial settings. By providing this information in the permit application the permit writer will be able to determine whether such activity is associated with industrial activity and the subject of appropriate permit conditions. Nominal or incidental application of these materials at industrial facilities and non-detects in sampling of storm water discharges for the permit application will result, in most cases, in these materials not being addressed specifically in storm water permits.

Today's rule also requires that permit applicants for storm water discharges associated with industrial activity certify that all of the outfalls covered in the permit application have been tested or evaluated for non-storm water discharges which are not covered by an NPDES permit. (The applicant need not test for nonstorm water if the certification of the plant storm water discharges can be evaluated through the use of schematics or other adequate method). Section 405 of the WQA added section 402(p)(3)(B)(ii) to the CWA to require that permits for municipal separate storm sewers effectively prohibit non-storm water discharges to the storm sewer system. As discussed in part VI.F.7.b of today's preamble, untreated non-storm water discharges to storm sewers can create severe, widespread contamination problems and removing such discharges presents opportunities for dramatic improvements in the quality of such discharges. Although section 402(p)(3)(B)(ii) specifically addresses municipal separate storm sewers, EPA believes that illicit non-storm water discharges are as likely to be mixed with storm water at a facility that discharges directly to the waters of the United States as it is at a facility that discharges to a municipal storm sewer. Accordingly, EPA feels that it is appropriate to consider potential non-storm water discharges in permit applications for storm water discharges associated with industrial activity. The certification requirement would not apply to outfalls where storm water is intentionally mixed with process waste water streams which are already identified in and covered by a permit.

This rulemaking requires applicants for individual permits to submit known information regarding the history of significant spills at the facility. Several commenters indicated that the extent to which this information is required should be modified. One commenter stated that the requirement should be limited to those spills that resulted in a complaint or enforcement action. EPA disagrees. EPA believes that significant spills at a facility should generally include releases of oil or hazardous substances in excess of reportable quantities under section 311 of the Clean Water Act (*see* 40 CFR 110.10 and 40 CFR 117.21) or section 102 of CERCLA (*see* 40 CFR 302.4). Such a requirement is consistent with these regulations and the perception that such spills are significant enough to mandate the reporting of their occurrence. Some commenters stated that industries have already submitted this information in other contexts and should not be required to have to do it again. For the same reason another commenter felt that submittal of this information represents a waste of manpower and resources. EPA disagrees that requiring this information is unduly burdensome. If this information has already been provided for another purpose it follows that it is readily available to the industrial applicant. Thus, the burden of providing this information cannot be considered undue. Furthermore, the permit authority will need to have this available in order to determine which drainage areas are likely to generate storm water discharges associated with industrial activity, evaluate pollutants of concern, and develop appropriate permit conditions. However, to keep this information requirement within reasonable limits and limited to information already available to individual facilities, EPA has declined to expand the reporting requirements to spills of other materials, such as food as one commenter has suggested. However, EPA has decided to add raw materials used in food processing or production to the list of significant materials. Materials such as these may find their way into storm water discharges in such quantities that serious water quality impacts occur. These materials may find there way into storm water from transportation vehicles carrying materials into the facility, loading docks, processing areas, storage areas, and disposal sites.

One commenter urged that any information requested should be limited to a period of three years, which is the general NPDES records retention requirement under 40 CFR 122.21(p) and 40 CFR 112.7(d)(8). EPA agrees with this comment and has limited historical information requirements to the 3 years prior to the date the application is submitted. In this manner this regulation will be consistent with records keeping practices under the NPDES and Oil Spill Prevention programs, except sludge programs.

The December 7, 1988, proposal required the applicant to submit a description of each past or present area used for outdoor storage or disposal of significant materials. One commenter felt that the definition of significant material was too imprecise. EPA disagrees that the language should be made more precise by delineating every conceivable material that may add pollutants to storm water. Rather the definition is broad, to encourage permit applicants to list those materials that have the potential to cause water quality impacts. Stating what materials are addressed in meticulous detail may result in potentially harmful materials remaining unconsidered in permits. However, EPA has decided to add "fertilizers, pesticides, and raw materials used in the production or processing of food" to the definition in response to the comment of one State authority that such materials need to be accounted for due to their potential danger to storm water discharge quality. This same commenter recommended that "hazardous chemicals" should be added. EPA agrees, and will delineate those chemicals as "hazardous substances" which are designated under section 101(14) of CERCLA. Further clarification has been added by requiring the listing of any chemical the facility is required to report pursuant to section 313 of title III of SARA.

Another commenter felt that EPA should not require information of past storage of significant materials. EPA agrees that this proposed requirement is overbroad and has limited the time frame to those materials that were stored in areas 3 years or fewer from the date of the permit application. The 3-year limit is consistent with other Agency reporting requirements as discussed above.

One commenter questioned EPA's proposal not to provide for a waiver from the requirement to submit quantitative data if the applicant can demonstrate that it is unnecessary for permit issuance. Another commenter said that a waiver is inappropriate. EPA believes relevant quantitative data are essential to the process, but in this rulemaking the number of pollutants that must be sampled and analyzed is reduced compared to previous regulations. The proposed requirements for quantitative data are limited to pollutants that are appropriate for given

site-specific operations, thereby making a waiver unnecessary.

Although the concept of a waiver is attractive because of the perceived potential reduction in burdens for applicants, EPA believes that because the storm water discharge testing requirements have already been streamlined, a waiver would not in practice provide significant reductions in burden for either applicants or permit issuing authorities. Requirements to provide and verify data demonstrating that a waiver is appropriate for a storm water discharge may prove to be more of a burden to the applicant and the permitting authorities. Establishing such a waiver procedure would be administratively complex and time-consuming for both EPA and the applicants, without any justifiable benefit. Therefore, this rulemaking does not include a waiver provision.

In response to one commenter, EPA wishes to emphasize that if a facility has zero storm water discharge because it is discharging to a detention pond only, a permit application is not required. Only those discharges to the waters of the United States or municipal systems need submit notifications, individual or group permit applications, or notices of intent where applicable. However, if the detention pond overflows or the discharger anticipates that it may overflow, then a permit application should be submitted.

Two commenters agreed with EPA's proposed requirement to have a description of past and present material management practices and controls. EPA believes that this is important information directly relating to the quality of storm water that can be expected at a particular facility and this requirement is retained in today's rule. However, as with other historical information requirements, EPA is limiting past practices to those that occurred within three years of the date that the application is submitted. One commenter argued that past practices should not be considered unless there is evidence that past practices cause current storm water quality problems. EPA anticipates that the information submitted by the applicant will be used to make this determination and that appropriate permit conditions can be developed accordingly.

One commenter requested clarification on the certification requirement that the data and information in the application is true and complete to the best of the certifying officer's knowledge. This is a fundamental and integral part of all NPDES permit applications. It essentially requires the signatory to assure the permit writer, based upon his or her personal knowledge, that the information has been submitted without a negligent, reckless, or purposeful misrepresentation. EPA intends to interpret this requirement in the same manner for storm water applications as other applications.

4. Group Applications

Today's final rule provides some industries with the option of participating in a group application, in lieu of submitting individual permits. There are several reasons for the group application. First, the group application procedure provides adequate information for issuing permits for certain classes of storm water discharges associated with industrial activity. Second, numerous commenters supported the concept of the group application as a way to reduce the costs and administrative burdens associated with storm water permit applications. Third, group applications will reduce the burden on the regulated community by requiring the submission of quantitative data from only selected members of the group. Fourth, the group application process will reduce the burden on the permit issuing authority by consolidating information for reviewing permit applications and for developing general permits suited to certain industrial groups. Where general permits are not appropriate or cannot be issued, a group application can be used to develop model individual permits, which can significantly reduce the burden of preparing individual permits.

As noted above in today's preamble, EPA intends to promulgate a general permit that will cover many types of industrial activity. Industrial dischargers eligible for such permits will generally be required to seek coverage by submittal of a notice of intent. Facilities that are ineligible for coverage under the general permit will be required to submit an individual permit application or submit a group application. The group application process promulgated today will serve as an important component to implement Tier III of EPA's industrial storm water permitting strategy discussed above. The general permit which EPA intends to promulgate in the near future shall set forth what types of facilities are eligible for coverage.

Some commenters criticized the group application procedure as an abdication of EPA's responsibility to effectively deal with pollutants in storm water discharges. One commenter stated that every facility subject to these regulations should be required to submit quantitative data. In response EPA believes, as do numerous commenters, that the group application procedure is a legitimate and effective way of dealing with a large volume of currently uncontrolled discharges. The only difference between the group application procedure and issuing individual permits based on individual applications is that the quantitative data requirements from individual facilities will be less if certain procedures are followed. EPA is convinced that marked improvements in the process of issuing permits will be achieved when these procedures are followed. Where the storm water discharge from a particular facility is identified as posing a special environmental risk, it can be required to submit individual applications and therefore separate quantitative data. It should also be noted that submittal of a group application does not exempt a facility from submitting quantitative data on its storm water discharge during the term of the permit.

The final rule refines and clarifies some of the requirements of the group application approach set forth in the December 7, 1988 proposal. Several commenters requested that EPA add a provision which would allow a facility that becomes subject to the regulations to "add on" to a group application after that group application has already been submitted. One commenter indicated that some trade associations are prohibited from engaging in an activity which would not apply to all its members, and that an "add on" provision was needed in the event such a prohibition was invoked. Another commenter noted that where a group is particularly large, for example one that consists of several thousand members, that it would be a logistical feat to ensure that all facilities eligible as members of the group are properly identified and listed on the application within the 120 day deadline for submitting part 1A of the application.

EPA believes that a group applicant should have a limited ability to add facilities to the group after part 1A has been submitted and that a provision which allows a group or group representative an unbridled ability to "add on" is impractical for a number of reasons. First, 10% of the facilities must submit quantitative data. Adding facilities after the group has been formed and approved would change the number of facilities that have to submit quantitative data on behalf of the group. This would result in an unwarranted administrative burden on the reviewing authority, which is in the position of having to examine the quantitative data and determine the appropriateness of group members (and those that are

required to submit quantitative data) within 2 months of receiving part 1 of the group application. Further, during the permit application process permitting authorities will be developing permit conditions for an identified and pre-determined group of facilities. Allowing potentially significant numbers of permit applicants to suddenly inject themselves into a group application could unnecessarily hamper or disrupt the timely development of general and model permits. In addition, if a facility were "added on" the number of facilities having to submit quantitative data may drop below 10%. Thus the facility desiring to "add on" may be put in the position of having to submit the quantitative data themselves, which would clearly defeat the purpose of being a part of the group application.

Nevertheless, EPA has added a provision to 122.26(e) which enables facilities to add on to a group application at the discretion of the EPA's Office of Water Enforcement and Permits, and upon a showing of good cause by the group applicant. For the reasons noted above, EPA anticipates this provision will be invoked only in limited cases where good cause is shown. Facilities not properly identified in the group application, and which cannot meet the good cause test will be required to submit individual permit applications. EPA will advise such facilities within 30 days of receiving the request as to whether the facility may add on.

However, the "add on" facility must meet the following requirements: The application for the additional facility is made within 15 months of the final rule; and the addition of the facility does not reduce the percentage of the facilities that are required to submit quantitative data to below 10% unless there are over 100 facilities that are submitting quantitative data. Approval to become part of a group application is obtained from the group or the trade association and is certified by a representative of the group; approval for adding on to a group is obtained from the Office of Water Enforcement and Permits.

Several commenters stated that the application requirements for groups are so burdensome that the advantages of the process are undermined. These concerns are addressed in greater detail below. Among the requirements which commenters objected are the requirements to list every group member's company by name and address. EPA is convinced that a condition precedent to approving a group application is at least identifying the members of the group. Without such information it would be impossible to determine if all the facilities are sufficiently similar. EPA disagrees that industries will be dissuaded from using the group application process because the advantages of the process are undermined. Although commenters perceived many burdens associated with individual permit applications, by far the most significant burden identified by the comments is the requirement for obtaining and submitting quantitative data. The group application significantly reduces this burden by requiring only10% of the facilities to submit quantitative data if the number in the group is over 100. If the number in the group is over 1000, then only 100 of the facilities need submit quantitative information. If group applicants develop cost sharing procedures to reduce the financial and administrative burdens of submitting quantitative data, it is evident that utilizing the group application could save industries as much as 90% on the most economically burdensome aspect of the application.

Several commenters perceived that the group application procedure did not offer them significant savings because under the proposal their particular industry would only be required to test for COD, BOD5, pH, TSS, oil and grease, nitrogen, and phosphorous. These commenters stated that sampling for these pollutants is not particularly expensive. EPA believes that even if a group is required only to submit minimal quantitative data on particular pollutants, substantial savings can accrue to a particular industry if the group has many members. This is particularly true when the number of outfalls to be sampled, the information on storm events, and flow measurements are factored into the cost analysis. An additional benefit for members of the group as well as for permit issuing agencies is that the process of developing a permit, including drafting and responding to public comments on the permit, is consolidated by the group application process. Accordingly, it is less resource intensive for the group to work with permit issuance authorities to develop well founded permit conditions.

One commenter raised a concern about the situation where one of the facilities that is designated for submitting quantitative data drops out of the group. If this happened, then another facility would have to submit quantitative data. In response, EPA notes that one approach would be for the group to have one or two more facilities submit quantitative data than needed to avoid problems from such a departure or to account for new additions to the group. Certainly this issue goes directly to the facility selection process which is a critical component of the group application; the facilities need to be carefully selected and reviewed by the group to prevent such difficulties.

Several comments indicated a confusion over what facilities are eligible to take advantage of the group application procedure. Any industry or facility that is required to submit a storm water permit application under these regulations is eligible to participate in a group application. However, whether a facility can obtain a storm water permit under a group application procedure will depend upon whether that facility is a member of the same effluent guideline subcategory, or is sufficiently similar to other members of the group to be appropriate for a general permit or individual permit issued pursuant to the group application. Accordingly, group applications are not limited to national trade associations. The agency believes that the language in § 122.26(c)(2) adequately addresses these concerns. The process does not prohibit a particular company with multiple facilities from filing a group application as long as those facilities are sufficiently similar.

One commenter expressed concern that a single company would not be able to take advantage of the group application benefits unless the company had more than ten facilities. Under such circumstances the company would have to become integrated with a larger group of facilities owned by other companies in order to take advantage of the benefits afforded by the group application procedure. In response, the Agency is providing for a group application of between four and ten members, however at least half the facilities must submit data. One commenter stated that the number of facilities required to submit quantitative data should be determined on a case by case basis. EPA believes that 10 percent for groups with over ten members will be easiest to implement for both industry and EPA, and will ensure that adequate representative quantitative data are obtained so that meaningful determinations of facility similarity can be made and appropriate permit conditions in general or model permits can be developed.

Another commenter suggested that one facility with a multitude of storm water discharge points should be able to use the group permit application to reduce the amount of quantitative data

that it is required to submit. This is an accurate observation but only to the extent that the facility combines with several other facilities to form a group, in which case only 10% of the facilities need submit quantitative data. The group application procedure in today's rule is designed for use by multiple facilities only. However, if an individual facility has 10 outfalls with ten substantially identical effluents the discharger may petition the Director to sample only one of the outfalls, with that data applying to the remaining outfalls. See § 122.21(g)(7). Thus, existing authority already allows for a "group-like" process for sampling a subset of storm water outfalls at a single facility.

Concern was expressed that the spill reporting requirement from each facility in part 1B would preclude any group from demonstrating that the facilities sampled are "representative," because the incidence of past spills is very site-specific. EPA notes that since it has dropped the part 1B requirements for other reasons discussed below, this comment is now moot.

Numerous commenters noted that if a facility is part of a group application and is subsequently rejected as a group applicant, such an entity would not have a full year to submit an individual permit application. EPA agrees that this is a significant concern. Accordingly, those facilities that apply as a member of a group application will be afforded a full year from the time they are notified of their rejection as a member of the group to file an individual application. EPA notes that it intends to act on group application requests within 60 days of receipt; thus this approach will only provide facilities that are rejected from a group application a short extension of the deadline for other individual applications.

One commenter complained that the cost of defending a group's choice of representative facilities may exceed the cost of submitting an individual permit application, thereby reducing the incentive to apply as group. The agency anticipates that the selection process will be one open to negotiation between the affected parties and one that will end in a mutually satisfactory group of facilities. It is the intent of EPA to reduce the costs of submitting a permit application as much as possible, while providing adequate information to support permitting activities.

Another commenter argued that the use of model permits will create a disincentive for participating in a group because model permits may be used by the permit issuing authority to issue individual permits for discharges from similar facilities that did not participate in the group application. EPA does not agree. The benefit of applying as a group applicant is to take advantage of reduced representative quantitative data requirements. This incentive will exist regardless of whether or how model permits are used. Further, technology transfer can occur during the development of permits based on individual applications as well as those based on group applications.

One commenter suggested moving some of the facility specific information requirements of part 1 of the group application to part 2 of the group application in order to provide more incentive to apply as a group. EPA has considered this and believes such a change would be inappropriate. Part 1 information will be used to make an informed decision about whether individual facilities are appropriate as group members and appropriate for submitting representative quantitative data. Furthermore, information burdens from providing site specific factors in part 1 is relatively minimal, and the information requirements in the proposed part 1B application have been eliminated.

One commenter suggested that trade associations develop model permits since they have the most knowledge about the characteristics of the industries they represent. As noted above, EPA expects that the industries and trade associations will have input, through the permit application process, as to how permit conditions for storm water discharges are developed. While the applicant can submit proposed permit conditions with any type of application, EPA however cannot delegate the drafting of model permits to the permittees. EPA is developing and publishing guidance in conjunction with this rulemaking for developing permit conditions.

One commenter suggested that new dischargers should be able to take advantage of general permits developed pursuant to group applications. As with other general permits, EPA anticipates that such discharges will be able to fall within the scope of a general permit based on a group application where appropriate.

One commenter stated that the group application does not benefit municipalities since there is no requirement for industrial discharges through municipal sewers to apply for a permit. As noted in a previous discussion, industrial discharges through municipal sewers must be covered by an NPDES permit. Such facilities may avail themselves of the group application procedure. Also, municipalities are not precluded from developing a group application procedure under their management plan for industries that discharge into their municipal system, in order to streamline developing controls for such industries.

One industry wanted clarification that facilities located within a municipality would be eligible to participate in a group application. All industrial activities required to submit an individual permit are entitled to submit as part of group application, except those with existing NPDES permits covering storm water. Those facilities that discharge through a municipal separate storm sewer systems required to submit an individual application (because they do not fall within a general permit) are not precluded from using the group application procedure if appropriate.

Other municipalities expressed confusion over the industrial group application concept. The following responds to these comments. First, municipalities are not eligible for participation in a group application because the group application process is designed for industrial activities. Sampling requirements for municipal permit applications are already limited to a small subset of the outfalls from the system, as discussed below. Furthermore, permits for municipal separate storm sewer systems will be issued on a system-wide or jurisdiction-wide basis, rather than individually for each outfall. Thus, today's regulation already incorporates a "grouplike" permit application process for municipalities. Furthermore, it is highly unlikely that various municipal storm sewer systems would be "substantially similar" enough to justify group treatment in the same way as industrial facilities. In response to another comment, this regulation does not directly give the municipality enforcement power over members of an industrial group who may be discharging through its system. Only the permitting authority and private citizens and organizations (including the municipality acting in such a capacity) will have enforcement power over members of the group once permits are issued to those members.

One commenter believed that the States with authorized NPDES programs rather than EPA should establish permit terms for permits based on group applications. In response to this comment, EPA wishes to clarify its role in the group application process. Group applications will be submitted to EPA headquarters where they will be reviewed and summarized. The

summaries of the group application will be distributed to authorized NPDES States. EPA wishes to emphasize that NPDES States are not bound by draft model permits developed by EPA. States may adopt model permits for use in their particular area, making adjustments for local water quality standards and other regional characteristics. Where general permit coverage is believed to be inappropriate, facilities may be required to apply for individual permits. One commenter objected to the group application procedure because it is not consistent with existing Federal permitting procedures, which will lead to confusion in the regulated community. The agency disagrees with this assessment. The group application is a departure from established NPDES program procedures. However, the comments, when viewed in their entirety, reflect widespread support from the regulated community for a group application procedure. Further, the comments reflect that those affected by this rulemaking understand the components of the group application and the procedures under which permits will be obtained pursuant to the group application.

One commenter expressed concern regarding how BAT limits for groups of similar industries will be developed. Technology based limits will be developed based on the information received from the group applicants. If the group applicants possess similar characteristics in terms of their discharge, BAT/BCT limitations and controls will be developed accordingly for those members of the group. If the discharge characteristics are not similar then applying industries are not appropriate for the group.

One commenter has suggested that the proposed group application is too complex with regard to the part 1A, part 1B, and part 2 group application requirements and that EPA should repropose these provisions. As discussed below, EPA has simplified the industrial group application requirements by eliminating the part 1B application. Thus, reproposal is unnecessary.

One commenter criticized the group application concept as not achieving any type of reduction in administrative burden for NPDES States. EPA disagrees with this assessment. If industries take advantage of the group application procedure, EPA will have an opportunity to review information describing a large number of dischargers in an organized manner. EPA will perform much of the initial review and analysis of the group application, and provide NPDES States with summaries of the applications thereby reducing the burden on the States. Furthermore, the procedure encourages a potentially large number of facilities to be covered by a general permit, which will clearly reduce the administrative burden of issuing individual permits.

The final rule establishes a regulatory procedure whereby a representative entity, such as a trade association, may submit a group application to the Office of Water Enforcement and Permits (OWEP) at EPA headquarters, in which quantitative data from certain representative members of a group of industrial facilities is supplied. Information received in the group application will be used by EPA headquarters to develop models for individual permits or general permits. These model permits are not issued permits, but rather they will be used by EPA Regions and the NPDES States to issue individual or general permits for participating facilities in the State. In developing such permits, the Region or NPDES State will, where necessary, adapt the model permits to take into account the hydrological conditions and receiving water quality in their area. One commenter expressed the view that having this procedure managed by EPA headquarters would cause delays and it should be delegated to the States and Regions. EPA disagrees that delay will ensue using this procedure. Furthermore, consistency in development of model and general permits can be achieved if application review is coordinated at EPA headquarters.

a. Facilities Covered. Under this rule the group application is submitted for only the facilities specifically listed in the application and not necessarily for an entire industry. The facilities in the group application selected to do sampling must be representative of the group, not necessarily of the industry.

Facilities that are sufficiently similar to those covered in a general permit (issued pursuant to a group application) that commence discharging after the general permit has been issued, must refer to the provisions of that general permit to determine if they are eligible for coverage. Facilities that have already been issued an individual permit for storm water discharges will not be eligible for participation in a group application. Several commenters believed that this restriction is inequitable since they have experienced the administrative burden of submitting a permit application. EPA disagrees. Industries that have already obtained a permit for storm water discharges have developed a storm water management program, engaged in the collection of quantitative data, and possess familiarity and experience with submitting storm water permit applications. The Agency sees no point to instituting an entirely new permit application process for facilities that have storm water permits issued individually. It makes little sense for these industries to be involved with submitting another permit application before their current permit expires.

As noted above, once a general permit has been issued to a group of dischargers, a new facility may request that they be covered by the general permit. The permitting authority can then examine the request in light of the general permit applicability requirements and determine whether the facility is suitable or not.

b. Scope of Group Applications. Numerous comments were received on how facilities should be evaluated as members of a group application. Several commenters stated that effluent limitation guideline subcategories are not relevant to pollutants found in storm water, but rather to the facility's everyday activities, and therefore similarity should be based on each facility's discharge or the similarity of pollutants expected to be found in a facility's discharge. Other commenters felt that similarity of operations at facilities should be the criteria. Others, believed that an examination of the facility's impact on storm water quality should be the applied criteria. Other commenters suggested that EPA provide more guidance as to how broadly groups can be defined and that a failure to do so would discourage facilities from going to the trouble and expense of entering into the group application process. Some commenters were concerned that facilities would be rejected as a group because of variations in processes and process wastewater characteristics.

EPA does not agree that effluent limitation guideline subcategories are inappropriate as a method for determining group applications. EPA guideline subcategories are functional classifications, breaking down facilities into groups, for purposes of setting effluent limitations guidelines. The use of EPA subcategories will save time for both applicants and permitting authorities in determining whether a particular group is appropriate for a group application. Furthermore, EPA believes that this method of grouping provides adequate guidance for determining what facilities are grouped together. Establishing groups on the extent to which a facility's discharge

affects storm water quality would not provide applicants with sufficient guidance as to the appropriateness of individual industries for group applications and would not provide information needed to draft appropriate model permit conditions for potentially different types of industries, industrial processes, and material management practices.

However, EPA recognizes that the subcategory designations may not always be available or an effective methodology for grouping applicants. Also, there are situations where processes that are subject to different subcategories are combined. EPA agrees that the group application option should be flexible enough to allow groups to be created where subcategories are too rigid or otherwise inappropriate for developing group applications or where facilities are integrated or overlap into other subcategories. For these reasons, this rulemaking does not limit the submission to EPA subcategories alone, but rather allows groups to be formed where facilities are similar enough to be appropriate for general permit coverage.

In determining whether a group is appropriate for general permit coverage, EPA intends that the group applicant use the factors set forth in 40 CFR 122.28(a)(2)(ii), the current regulations governing general permits, as a guide. If facilities all involve the same or similar types of operations, discharge the same types of wastes, have the same effluent limitation and same or similar monitoring requirements, where applicable, they would probably be appropriate for a group application. To that extent, facilities that attempt to form groups where the constituent makeup of its process wastewater is dissimilar may run the risk of not being accepted for purposes of a group application.

Some commenters expressed the view that categories formed using general permit factors are too broad or that the language is too vague. One commenter expressed the view that the standard is too subjective and that permit writers will be evaluating the similarity of discharge too subjectively, while other commenters felt that the criteria should be broad and flexible. Other commenters stated that the effluent guideline subcategory or general permit coverage factors are not related to storm water discharges, because much of the criteria are based upon what is occurring inside the plant, rather than activities outside of the plant. EPA believes that these criteria are reasonable for defining the scope of a group application. EPA disagrees that the procedure, which is adequate for the issuance of general permits, is inadequate for the development of a group application. EPA believes that the activities inside a facility will generally correspond to activities outside of the plant that are exposed to storm events, including stack emissions, material storage, and waste products. Furthermore, if facilities are able to demonstrate their storm water discharge has similar characteristics, that is one element in the analysis needed for establishing that the group is appropriate. EPA disagrees that the criteria are too vague. If facilities are concerned that general permit criteria is insufficient guidance, then subcategories under 40 CFR subchapter N should be used. EPA believes that the program will function best if flexibility for creating groups is maintained.

If a NPDES approved State feels that a tighter grouping of applicants is appropriate individual permit applications can be requested from those permit applicants. One commenter indicated that it was not clear whether the group application procedure could be used for all NPDES requirements. EPA would clarify that the group application is designed only to cover storm water discharges from the industrial facilities identified in § 122.26(b)(14).

As noted above, EPA wishes to clarify that facilities with existing individual NPDES permits for storm water are not eligible to participate in the group application process. From an administrative standpoint EPA is not prepared to create an entirely different mechanism for permitting industries which already have such permits.

c. Group Application Requirements. The group application, as proposed, included the following requirements in three separate parts. Part 1A of a group application included: (A) Identification of the participants in the group application by name and location; (B) a narrative description summarizing the industrial activities of participants; (C) a list of significant materials stored outside by participants; and (D) identification of 10 percent of the dischargers participating in the group application for submitting quantitative data. A proposed part 1B of the group application included the following information from each participant in the group application: (A) A site map showing topography (or indicating the outline of drainage areas served by the outfall(s) and related information; (B) an estimate of the area of impervious surfaces (including paved areas and building roofs) and the total area drained by each outfall and a narrative description of significant materials; (C) a certification that all outfalls that should contain storm water discharges associated with industrial activity have been tested for the presence of non-storm water discharges; (D) existing information regarding significant leaks or spills of toxic or hazardous pollutants at the facility; (E) a narrative description of industrial activities at the facility that are different from or that are in addition to the activities described under part 1A; and (F) a list of all constituents that are addressed in a NPDES permit issued to the facility for any of non-storm water discharge. Part 2 of a group application required quantitative data from 10 percent of the facilities identified.

Some commenters felt that spill histories, drainage maps, material management practices, and information on significant materials stored outside are too burdensome or meaningless for evaluating similarity of discharges among group applicants. Several commenters stated that such requirements where the group may consist of several thousand facilities were impractical and would not assist EPA in developing model permits. Many commenters insisted that the requirements imposed in part 1B would effectively discourage use of the group application procedure. EPA agrees in large part with these comments. After reevaluating the components of part 1B, and the entire rationale for instituting the group application procedure, EPA has decided to excise part 1B from the requirements, and rely on part 1A and part 2 for developing appropriate permit condition. Where appropriate, EPA may require facilities to submit the information, formerly in part 1B, during the term of the permit. In other cases, EPA will establish which facilities must submit individual permit applications where more site specific permits are appropriate.

Under the revised part 1 and part 2, EPA will receive information pertaining to the types of industrial activity engaged in by the group, materials used by the facilities, and representative quantitative data. EPA can use such information to develop management practices that address pollutants in storm water discharges from such facilities. For most facilities, general good housekeeping or management practices will eliminate pollutants in storm water. Such requirements can be further refined by determining the nature of a group's industrial activity and by obtaining information on material used at the facility and representative quantitative data from a

percentage of the facilities. Thus, EPA is confident that model permits and general permits can be developed from the information to be submitted under part 1 and part 2.

One commenter felt that more guidance on what makes a facility representative for sampling as part of a group is needed. In response, the Agency believes the rule as currently drafted provides adequate notice.

Another commenter asked how much sampling needed to be done and how much monitoring will transpire over the life of the permit for members of a group. This will vary from permit to permit and will be determined in permit proceedings. This rulemaking only covers the quantitative data that is to be submitted in the context of the group permit application.

One commenter indicated that because of the amount of diversity in the operations of a particular industry, obtaining a sample that could be considered representative would be extremely difficult. EPA recognizes that obtaining representative quantitative data through the group application process will prove to be difficult; however, EPA has sought to minimize these perceived problems. Under the group application concept, industries must be sufficiently similar to qualify. Industries which have significantly different operations from the rest of the group that affects the quality of their storm water discharge may be required to obtain an individual permit. Use of the nine precipitation zones will enable the data in the permit application to be more easily analyzed and patterns observed on the basis of hydrology and other regional factors. How EPA will evaluate the representativeness of the sample is discussed below.

Several commenters asked why the precipitation zone of group members is relevant to the application. The need to identify precipitation zones arises because the amount of rainfall is likely to have a significant impact on the quality of the receiving water. According to an EPA study (Methodology for Analysis of Detention Basins for Control of Urban Runoff Quality; Office of Water, Nonpoint Source Branch, Sept. 1986) the United States can be divided into nine general precipitation zones. These zones are characterized by differences in precipitation volume, precipitation intensity, precipitation duration, and precipitation intervals. Industrial facilities that seek general permits via the group application option may show significantly different loading rates as a result of these regional precipitation differences. As an example, precipitation in Seattle, Washington, located in Zone 7, approaches the mean annual storm intensity of .024 inches/hour with a mean annual storm duration of 20 hours for that Zone. In contrast, precipitation in Atlanta, Georgia, located in Zone 3 approaches the mean annual storm intensity of .102 inches/hour and a mean storm duration of 6.2 hours for that Zone. Atlanta, receives on the average four times more precipitation per hour with storms lasting one-third as long. As a result of these differences, if identical facilities within a group application were situated in each of these areas, their storm water discharges would likely exhibit different pollutant characteristics. Accordingly, data should be submitted from facilities in each zone.

One commenter felt that the EPA should abandon or modify its rainfall zone concept, because storm water quality will depend more on what materials are used at the facility than rainfall. EPA disagrees. Because storm water loading rates may differ significantly as a result of regional precipitation differences, it is necessary that for each precipitation zone containing representatives of a group application, the group must provide samples from some of those representatives. In comments to previous rulemakings it was argued that the amount of rainfall will affect the degree of impact a storm water discharge may have on the receiving stream.

One commenter stated that the precipitation zones illustrated in appendix E of the proposed rulemaking do not adequately reflect regional differences in precipitation and that in some cases the zones cut through cities where there are concentrations of industries without differences in their precipitation patterns. The rainfall zone map is a general guide to determining what areas of the country need to be addressed when determining representative rainfall events and quantitative data. When dealing with rainfall on a national scale, it is near impossible to make generalized statements with a great deal of accuracy. In the case of rainfall zones, rainfall patterns may be similar for facilities in close proximity to each other but none the less in different rainfall zones. In response, EPA has created these zones to reflect regional rainfall patterns as accurately as possible. Because of the variable nature of rainfall such circumstances are sure to arise. However, in order to obtain a degree of representativeness EPA is convinced that the use of these rainfall zones as described is appropriate for the submittal of group applications and the quantitative data therein.

The second and third requirements of part 1 of the group application instruct the applicant to describe the industrial activity (processes) and the significant materials used by the group. For the significant materials listed, the applicant is to discuss the materials management practices employed by members of the group. For example, the applicant should identify whether such materials are commonly covered, contained, or enclosed, and whether storm water runoff from materials storage areas is collected in settling ponds prior to discharge or diverted away from such areas to minimize the likelihood of contamination. Also, the approximate percentage of facilities in the group with no practices in place to minimize materials stored outside is to be identified.

EPA considers that the processes and materials used at a particular facility may have a bearing on the quality of the storm water. Thus, if there are different processes and materials used by members of the group, the application must identify those facilities utilizing the different processes and materials, with an explanation as to why these facilities should still be considered similar.

One commenter felt that a facility should be able to describe in its permit application the possibility of individual materials entering receiving waters. EPA supports the applicant adding site specific information which will assist the permit writer making an informed decision about the nature of the facility, the quality of its storm water discharge, and appropriate permit conditions.

The fourth element of part 1 of the group application is a commitment to submit quantitative data from ten percent of the facilities listed. EPA proposed that there must be a minimum of ten and a maximum of one hundred facilities within a group that submit data. Comments reflected some dissatisfaction with this requirement. Some commenters asserted that ten percent was too high a number and would discourage group applications, while one commenter suggested a lesser percentage would be appropriate where the group can certify that facilities are representative. One commenter suggested that EPA have the discretion to allow for a smaller percentage. Several commenters argued that EPA should be satisfied with fewer than ten percent because EPA often relies on data from less than ten percent of the plants in a subcategory when promulgating effuent guidelines and that EPA should rely on data collection goals

with affected groups as was done in the 1985 storm water proposal. Other commenters pointed out that an anomalous situation could arise where the group was small and facilities were scattered throughout the precipitation zones. For example, if a group consisted of 20 members where a minimum of ten facilities had to submit samples, and two or more members were in each precipitation zone; a total of 18 facilities (90% of the group) would have to submit quantitative data. EPA believes that there must be a sufficient number of facilities submitting data for any patterns and trends to be detectable. However, in light of these comments EPA has decided to modify the language in § 122.26(c) to allow 1 discharger in each precipitation zone to submit quantitative data where 10 or fewer of the group members are located in a particular precipitation zone. EPA believes, however, that one hundred facilities would in most cases be sufficient to characterize the nature of the runoff and thus 100 should remain the maximum. If the data are insufficient, EPA has the authority to request more sampling under section 308 of the CWA.

One commenter suggested that the ten facility cutoff was unreasonable, and that instead of cutting off the group at ten, allow a smaller number in the group and allow the facilities to sample ten percent of their outfalls instead. EPA agrees, in part, and will allow groups of between four and ten to submit a group application. However, the ten percent rule would not be effective in such cases. Therefore, at least half the facilities in a group of four to ten will be required to provide quantitative data from at least one outfall, with each precipitation zone represented by at least one facility.

For any group application, in addition to selecting a sufficient number of facilities from each precipitation zone, facilities selected to do the sampling should be representative of the group as a whole in terms of those characteristics identifying the group which were described in the narrative, i.e., number and range of facilities, types of processes used, and any other relevant factors. If there is some variation in the processes used by the group (40 percent of the group of food processors are canners and 60 percent are canners and freezers, for example), the different processes are to be represented. Also, samples are to be provided from facilities utilizing the materials management practices identified, including those facilities which use no materials management practices. The representation of these different factors, to the extent feasible, is to be roughly equivalent to their proportion in the group.

EPA wishes to emphasize that the provision that ten percent of the facilities need to submit quantitative data only applies to the permit application process. The general or individual permit itself may require quantitative data from each facility.

Submittal of Part 2 of the Group Application. As with part 1, part 2 of the Group Application would be submitted to the Office of Water Enforcement and Permits, in Washington, DC. If the information is incomplete, or simply is found to be an inadequate basis for establishing model permit limits, EPA has the authority under section 308 of the Clean Water Act to require that more information be submitted, which may include sampling from facilities that were part of the group application but did not provide data with the initial submission. If the group application is used by a Region or NPDES State to issue a general permit, the general permit should specify procedures for additional coverage under the permit.

If a part 2 is unacceptable or insufficient, EPA has the option to request additional information or to require that the facilities that participated in the group application submit complete individual applications (e.g. facilities that have submitted Form 1 with the group application may be required to submit Form 2F, or facilities which have submitted complete Form 1 and Form 2F information in the group application generally would not have to submit additional information).

Once the group applications are reviewed and accepted, EPA will use the information to establish draft permit terms and conditions for models for individual and general permits. NPDES approved States and EPA regional offices will continue to be the permit-issuing authority for storm water discharges. The NPDES approved States accepting the group application approach and the EPA Regions may then take the model permits and adapt them for their particular area, making adjustments for local water quality standards and other localized characteristics, and making determinations as to the need for an individual storm water permit where general permit coverage is felt to be inappropriate. Permits would be proposed by the Region or NPDES approved State in accordance with current regulations for public comment before becoming final. In NPDES States without general permit authority, or where an individual permit is deemed appropriate, the model permit can serve as the basis for issuing an individual permit.

The group application is an NPDES permit application just like any other and, as such, would be handled through normal permitting procedures, subject to the regulatory provisions applicable to permit issuance. Incomplete or otherwise inadequate submissions would be handled in the same manner as any other inadequate permit application. The permit issuing authority would retain the right to require submission of Form 1, Form 2C and Form 2F from any individual discharger it designates.

Some commenters offered other procedures for developing a group application procedure; however, these were frequently entirely different approaches or so novel that a reproposal would be required. One commenter suggested that those industries that are identified as being likely to pollute should be required to submit quantitative data. Numerous commenters contended that a generic approach for meeting the required information requirements for group applications would allow EPA to develop adequate general permits. EPA does not view these approaches as appropriate.

5. Group Application: Applicability in NPDES States

Many commenters expressed concern about how the group application procedure will work within the framework of an NPDES approved State. The relationship between EPA and the States that are authorized to administer the NPDES program, including implementation of the storm water program, is a complicated aspect of this rulemaking. Approved States (there are 38 States and one territory so approved) must have requirements that are at least as stringent as the Federal program; they may be more stringent if they choose. Authority to issue general permits is optional with NPDES States.

EPA has determined that ten percent of the facilities must provide quantitative data in the permit application as noted above. Furthermore, these applications are submitted to EPA headquarters. Consequently States, whether NPDES approved or not, are not in a position to reject or modify this requirement. Such States may determine the amount of sampling to be done pursuant to permit conditions. If they choose to issue general permits they may include such authority in their NPDES program and,

upon approval of the program by EPA, may then issue general permits. Within the context of the NPDES provisions of the CWA, if States do not have general permitting authority, then general permits are not available in those States.

In response to one comment, EPA does not have authority to issue general or individual permits to facilities in NPDES approved states. Today's rule provides a means for affected industries to be covered by general permits developed via the group application procedure as well as from general permits developed independently of the group application process. Accordingly, today's rule anticipates that most NPDES States will seek general permit issuance authority to implement the storm water program in the most efficient and economical way. Without general permit issuance authority NPDES States will be required to issue individual permits covering storm water discharges to potentially thousands of industrial facilities.

One commenter recommended that States with approved NPDES programs should be involved in determining what industries are representative for submitting quantitative data. EPA recognizes that States will have an interest in this determination and may possess insight as to the appropriateness of using some facilities. However, EPA may be managing hundreds of group applications and approving or disapproving them as expeditiously as possible. EPA believes that involving the States in this already administratively complex and time consuming undertaking would be counterproductive. In any event, NPDES approved States are not bound by the determinations of EPA as to the appropriateness of groups or the issuance of permits based on model permits or individual permits. However, States will be encouraged to use model permits that are developed by EPA. EPA will endeavor to design general and model permits that are effective while also adaptable to the concerns of different States. Again, States are able to develop more stringent standards where they deem it to be appropriate. There are currently seventeen States that have authority to issue general permits: Arkansas, Colorado, Illinois, Kentucky, Minnesota, Missouri, Montana, New Jersey, North Dakota, Oregon, Rhode Island, Utah, Washington, West Virginia and Wisconsin. As suggested in the comments, EPA is encouraging more States to develop general permit issuing authority in order to facilitate the permitting process.

One commenter advised that the rules should state that a NPDES approved State may accept a group application or require additional information. EPA has decided not to explicitly state this in the rule. However, this comment does raise some points that need to be addressed. Because the group application option is a modification of existing NPDES permit application requirements, the State is free to adopt this option, but is not required to. If the State chooses to adopt the group application and it does not have general permit authority, the group application can be used to issue individual permits. If an approved NPDES State chooses to not issue permits based on the group application, facilities that discharge storm water associated with industrial activity that are located in that State must submit individual applications to the State permitting authority. Before submitting a group application, facilities should ascertain from the State permitting authority whether that State intends to issue permits based upon a group application approved by EPA for the purpose of developing general permits. For facilities that discharge storm water associated with industrial activity which are named in a group application, the Director may require an individual facility to submit an individual application where he or she determines that general permit coverage would be inappropriate for the particular facility.

One commenter stressed that EPA should streamline the procedure for States desiring to obtain general permit coverage. EPA has, over the last year, streamlined this procedure and encourages States to take advantage of this procedure. EPA recommends that States consider obtaining general permit authority as a means to efficiently issue permits for storm water discharges. These States should contact the Office of Water Enforcement and Permits at EPA Headquarters as soon as possible.

6. Group Application: Procedural Concerns

One commenter claimed tnat the proposed group application process and procedures violated federal law. This commenter claimed that EPA was abrogating its responsibility by allowing a trade association to design a data collection plan in lieu of completing an NPDES application form designed by EPA, thus violating the Federal Advisory Committee Act. The commenter stated that EPA would be improperly influenced by special interests if trade associations were able to design their own storm water data gathering plans. The commenter further asserted that any decisions by EPA on the content of specific group applications would be rulemakings and thus subject to the provisions of the Administrative Procedure Act.

EPA disagrees with the comment that the group application violates the Federal Advisory Committee Act (FACA). FACA governs only those groups that are established or "utilized" by an agency for the purpose of obtaining "advice" or "recommendations." The group application option does not solicit or involve any "advice" or "recommendations." It simply allows submission of data by certain members of a group in accordance with specific regulatory criteria for determining which facilities are "representative" of a group. As such, the group application is merely a submission in accordance and in compliance with specific regulatory requirements and does not contain discretionary uncircumscribed "advice" or "recommendations" as to which facilities are representative of a group.

Thus, the determination of which facilities should submit testing data in accordance with regulatory criteria is little different from many other regulatory requirements where an applicant must submit information in accordance with certain criteria. For example, under 40 CFR 122.21 all outfalls must be tested except where two or more have "substantially identical" effluents. Similarly, quantitative data for certain pollutants are to be provided where the applicant knows or "has reason to believe" such pollutants are discharged. Both of these provisions allow the applicant to exercise discretion in making certain judgments but such action is circumscribed by regulatory standards. EPA further has authority to require these facilities to submit individual applications. In none of these instances are "recommendations" or "advice" involved. EPA also notes that it is questionable whether, in providing for group applications, it is "soliciting" advice or recommendations from groups or that such groups are being "utilized" by EPA as a "preferred source" of advice. See 48 FR 19324 (April 28, 1983). Furthermore, this data collection effort may be supplemented by EPA if, after review of the data, EPA determines additional data is necessary for permit issuance. Other information gathering may act as a check on the group applications received.

EPA also does not agree with this commenter's claim that the group application scheme represents an

impermissible delegation of the Administrator's function in violation of the CWA regarding data gathering. The Administrator has the broadest discretion in determining what information is needed for permit development as well as the manner in which such information will be collected. The CWA does not require every discharger required to obtain a permit to file an application. Nor does the CWA require that the Administrator obtain data on which a permit is to be based through a formal application process (see 40 CFR 122.21). For years "applications" have not been required from dischargers covered by general permits. EPA currently obtains much information beyond that provided in applications pursuant to section 308 of the CWA. This is especially true with respect to general permit and effluent limitations guidelines development. The group application option is simply another means of data gathering. The Administrator may always collect more data should he determine it necessary upon review of a groups' data submission. And, he may obtain such additional data by whatever means permissible under the Statute that he deems appropriate. Thus, it can hardly be said that by this initial data gathering effort the Administrator has delegated his data gathering responsibilities. In addition, since groups are required to select "representative" facilities, etc., in accordance with specific regulatory requirements established by the Administrator and because EPA will scrutinize part 1 of the group applications and either accept or reject the group as appropriate for a group application, no impermissible delegation has occurred. EPA will make an independent determination of the acceptability of a group application in view of the information required to be submitted by the group applicant, other information available to EPA (such as information on industrial subcategories obtained in developing effluent limitations guidelines as well as individual storm water applications received as a result of today's rule) and any further information EPA may request to supplement part 1 pursuant to section 308 of the CWA. Moreover, any concerns that a general permit may be based upon biased data can be dealt with in the public permit issuance process.

Finally, EPA also does not agree that the group application option violates the Administrative Procedures Act. Again, the group application scheme is simply a data gathering device. EPA could very well have determined to gather data informally via specific requests pursuant to section 308 of the CWA. In fact, general permit and effluent limitations guideline development proceed along these lines. It would make little sense if the latter informal data gathering process were somehow illegal simply because it is set forth in a rule that allows applicants some relief upon certain showings. In this respect, several of EPA's existing regulations similarly allow an applicant to be relieved from certain data submission requirements upon appropriate demonstrations. For example, testing for certain pollutants and or certain outfalls may be waived under certain circumstances. Most importantly, the operative action of concern that impacts on the public is individual or general permit issuance based upon data obtained. As previously stated, ample opportunity for public participation is provided in the permit issuance proceeding.

7. Permit Applicability and Applications for Oil and Gas and Mining Operations

Oil, gas and mining facilities are among those industrial sites that are likely to discharge storm water runoff that is contaminated by process wastes, toxic pollutants, hazardous substances, or oil and grease. Such contamination can include disturbed soils and process wastes containing heavy metals or suspended or dissolved solids, salts, surfactants, or solvents used or produced in oil and gas operations. Because they have the potential for serious water quality impacts, Congress recognized, throughout the development of the storm water provisions of the Water Quality Act of 1987, the need to control storm water discharges from oil, gas, and mining operations, as well as those associated with other industrial activities.

However, Congress also recognized that there are numerous situations in the mining and oil and gas industries where storm water is channeled around plants and operations through a series of ditches and other structural devices in order to prevent pollution of the storm water by harmful contaminants. From the standpoint of resource drain on both EPA as the permitting agency and potential permit applicants, the conclusion was that operators that use good management practices and make expenditures to prevent contamination must not be burdened with the requirement to obtain a permit. Hence, section 402(1)(2) creates a statutory exemption from storm water permitting requirements for uncontaminated runoff from these facilities.

To implement section 402(1)(2), EPA intends to require permits for contaminated storm water discharges from oil, gas and mining operations. Storm water discharges that are not contaminated by contact with any overburden, raw material, intermediate products, finished product, byproduct or waste products located on the site of such operations will not be required to obtain a storm water discharge permit.

The regulated discharge associated with industrial activity is the discharge from any conveyance used for collecting and conveying storm water located at an industrial plant or directly related to manufacturing, processing or raw materials storage areas at an industrial plant. Industrial plants include facilities classified as Standard Industrial Classifications (SIC) 10 through 14 (the mining industry), including oil and gas exploration, production, processing, and treatment operations, as well as transmission facilities. See 40 CFR 122.26(b)(14)(iii). This also includes plant areas that are no longer used for such activities, as well as areas that are currently being used for industrial processes.

a. Oil and Gas Operations. In determining whether storm water discharges from oil and gas facilities are "contaminated", the legislative history reflects that the EPA should consider whether oil, grease, or hazardous materials are present in storm water runoff from the sites described above in excess of reportable quantities (RQs) under section 311 of the Clean Water Act or section 102 of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA). [Vol. 132 Cong. Rec. H10574 (daily ed. October 15, 1986) Conference Report].

Many of the comments received by EPA regarding this exemption focused on the concern that EPA's test for requiring a permit is and would subject an unnecessarily large number of oil and gas facilities to permit application requirements. Specific comments made in support of this concern are addressed below.

A primary issue raised by commenters centered on how to determine when a storm water discharge from an oil or gas facility is "contaminated", and therefore subject to the permitting program under section 402 of the CWA. Many of the comments received from industry representatives objected to the Agency's intent as expressed in the proposal to use past discharges as a trigger for submitting permit applications.

The proposed rule provided that the notification requirements for releases in excess of RQs established under the CWA and CERCLA would serve as a

basis for triggering the submittal of permit applications for storm water discharges from oil and gas facilities. As described in the proposal, oil and gas operations that have been required to notify authorities of the release of either oil or a hazardous substance via a storm water route would be required to submit a permit application. In other words, any facility required to provide notification of the release of an RQ of oil or a hazardous substance in storm water in the past would be required to apply for a storm water permit under the current rule. In addition, any facility required to provide notification regarding a release occurring from the effective date of today's rule forward would be required to apply for a storm water permit.

Commenters maintained that the use of historical discharges to require permit applications is inconsistent with the language and intent of section 402(1)(2) of the CWA, and relevant legislative history, both of which focus on present contamination. Requiring storm water permits based solely on the occurrence of past contaminated discharges, even where no present contamination is evident, would go beyond the statutory requirement that EPA not issue a permit absent a finding present contamination. Commenters also noted that the proposal did not take into account the fact that past problems leading to such releases may have been corrected, and that requiring an NPDES permit may no longer be necessary. The result of such a requirement, commenters maintained, would be an excessive number of unnecessary permit applications being submitted, at significant cost and minimal benefit to both regulated facilities and regulating authorities.

Commenters also indicated that using the release of reportable quantities of oil, grease or hazardous substances as a permit trigger would identify discharges of an isolated nature, rather than the continuous discharges, which should be the focus of the NPDES permit program under section 402. Such an approach, commenters maintained, is inconsistent with existing regulations under section 311 of the CWA, and would result in permit applications from facilities that are more appropriately regulated under section 311.

Despite these criticisms, many commenters recognized that the Agency is left with the task of determining when discharges from oil and gas facilities are contaminated, in order to regulate them under section 402(1)(2). It was suggested by numerous commenters that the EPA adopt an approach similar to that used under section 311 of the CWA for Spill Prevention Control and Countermeasure (SPCC) Plans. Under SPCC, facilities that are likely to discharge oil into waters of the United States are required to maintain a SPCC plan. In the event the facility has a spill of 1,000 gallons or 2 or more reportable quantities of oil in a 12 month period, the facility is required to submit its SPCC plan to the Agency. The triggering events proposed by the commenters for storm water permits for oil and gas operations are six reportable sheens or discharges of hazardous substances (other than oil) in excess of section 311 or section 102 reportable quantities via a storm water point source route over any thirty-six month period. It was suggested that if this threshold is reached, an operator would then file a permit application (or join a group application) based upon the presumption that its current storm water discharges are contaminated.

In response to these comments, the Agency believes that past releases that are reportable quantities can be a valid indicator of the potential for present contamination of discharges. The legislative history as cited above supports this conclusion. EPA would note that the existence of a RQ release would serve only as a triggering mechanism for a permit application. Under the proposed rule, evidence of past contamination would merely require submission of a permit application and would not be used as conclusive evidence of current contamination. The determination as to whether a permit would be actually required due to current contaminated discharge would be made by the permitting authority after reviewing the permit application. The fact of a past RQ release does not necessarily imply a conclusive finding of contamination, only that sufficient potential for contamination exists to warrant a permit application or the collection of other further information. Today's rule does not change the proposed approach in this respect. Thus, EPA does not believe that today's rule exceeds the authority of section 402(1)(2).

EPA believes that there is no legal impediment to using past RQ discharges as a trigger for requiring a storm water permit application. EPA notes that, as mentioned above, even those commenters who objected to the proposed test on legal authority grounds merely offered an alternate test that requires more releases to have occurred within a shorter period of time before a permit application is required.

Therefore, the only disagreement that remains is over what constitutes a reasonable test that will identify facilities with the potential for storm water contamination. EPA notes that neither the statute nor the legislative history provides any guidance on this question. Furthermore, EPA disagrees with the commenters who suggested that 6 releases in the past 3 years or 2 releases in the past year are necessarily more valid measures of the potential for current contamination than EPA's proposed test. There is no statistical or other basis for preferring one test to the other. However, EPA does agree with those commenters that suggest that a single release in the distant past may not accurately reflect current conditions and the current potential for contamination.

EPA has therefore amended today's rule to provide that only oil and gas facilities which have had a release of an RQ of oil or hazardous substances in storm water in the past three years will be required to submit a permit application. EPA believes that limiting the permit trigger to events of the past three years will address commenters' concerns regarding the use of "stale history" in determining whether an application is required. EPA notes that the three year cutoff is consistent with the requirement for industrial facilities to report significant leaks or spills at the facility in their storm water permit applications. See 40 CFR 122.26(c)(1)(i)(D).

Commenters asserted that EPA and the States must have some reasonable basis for concluding that a storm water discharge is contaminated before requiring permit applications or permits. Commenters believed that § 122.26(c)(1)(iii)(B) as proposed implied that the Agency's authority in this respect is unrestricted. In response, EPA may collect such data by whatever appropriate means the statute allows, in order to obtain information that a permit is required. Usually, the most practical tool for doing so is the permit application itself. However, if necessary to supplement the information made available to the Agency, EPA has broad authority to obtain information necessary to determine whether or not a permit is required, under section 308 of the Clean Water Act. Given the plain language of the CWA and the Congressional intent as manifested in the legislative history, the Agency is convinced that the approach described above is appropriate. Yet, as further discussed below, EPA has also deleted as redundant § 122.26(c)(1)(iii)(B).

Regarding the types of facilities included in the storm water regulation, a number of commenters suggested that the Agency has misconstrued the meaning of facilities "associated with

industrial activity", and has proposed an overly broad definition of such facilities in the oil and gas industry. Specifically, commenters suggested that only the manufacturing sector of the oil and gas industry should be subject to storm water permit application requirements, and that exploration and production activities, gas stations, terminals, and bulk plants should all be exempted from storm water permitting requirements. Commenters maintain that this broad interpretation would subject many oil and gas facilities to the storm water permit requirements, when these were not intended by Congress to be so regulated. As a second point related to this issue, some commenters felt that transmission facilities were not intended to be regulated under the storm water provisions, and should be exempted from permit requirements. This would be consistent, it was argued, with legislative history which concluded that transmission facilities do not significantly contribute to the contamination of water.

The Agency disagrees that these facilities do not fall under the storm water permitting requirements as envisioned by Congress. SIC 13, which is relied upon by EPA to identify these oil and gas operations, describes oil and gas extraction industries as including facilities related to crude oil and natural gas, natural gas liquids, drilling oil and gas wells, oil and gas exploration and field services. Moreover, legislative history as it applies to industrial activities, and thus to oil and gas (mining) operations, expressly includes exploration, production, processing, transmission, and treatment operations within the purview of storm water permitting requirements and exemptions. EPA's intent is for storm water permit requirements (and the exemption at hand) to apply to the activities listed above (exploration, production, processing, treatment, and transmission) as they relate to the categories listed in SIC 13.

Commenters requested clarification from the Agency that storm water discharges from oil and gas facilities require a permit or the filing of a permit application only when they are contaminated at the point of discharge into waters of the United States. Commenters noted that large amounts of potentially contaminated stormwater may not enter waters of the United States, or may enter at a point once the discharge is no longer "contaminated". In these cases, it should be clear that no permit or permit application is required.

EPA agrees that oil and gas exploration, production, processing, or treatment operations or transmission facilities must only obtain a storm water permit when a discharge to waters of the U.S. (including those discharges through municipal separate storm sewers) is contaminated. A permit application will be required when any discharge in the past three years or henceforth meets the test discussed above.

Under the proposed rule, the Agency stated at § 122.26(c)(1)(iii)(B) that the Director may require on a case-by-case basis the operator of an existing or new storm water discharge from an oil or gas exploration, production, processing, or treatment operation, or transmission facility to submit an individual permit application. The Agency has removed this section since CWA section 402(1)(2), as codified in 122.26(c)(1)(iii)(A), adequately addresses every situation where a permit should be required for these facilities.

b. Use of Reportable Quantities to Determine if a Storm Water Discharge from an Oil or Gas Operation is Contaminated. Section 311(b)(5) of the CWA requires reporting of certain discharges of oil or a hazardous substance into waters of the United States (see 44 FR 50766 (August 29, 1979)). Section 304(b)(4) of the Act requires that notification levels for oil and hazardous substances be set at quantities which may be harmful to the public health or welfare of the United States, including but not limited to fish, shellfish, wildlife, and public or private property, shorelines and beaches. Facilities which discharge oil or a hazardous substance in quantities equal to or in excess of an RQ, with certain exceptions, are required to notify the National Response Center (NRC).

Section 102 of CERCLA extended the reporting requirement for releases equal to or exceeding an RQ of a hazardous substance by adding chemicals to the list of hazardous substances, and by extending the reporting requirement (with certain exceptions) to any releases to the environment, not just those to waters of the United States.

Pursuant to section 311 of the CWA, EPA determined reportable quantities for discharges by correlating aquatic animal toxicity ranges with 5 reporting quantities, i.e., 1-, 10-, 100-, 1000-, and 5000- pounds per 24 hour period levels. Reportable quantity adjustments made under CERCLA rely on a different methodology. The strategy for adjusting reportable quantities begins with an evaluation of the intrinsic physical, chemical, and toxicological properties of each designated hazardous substance. The intrinsic properties examined, called "primary criteria," are aquatic toxicity, mammalian toxicity (oral, dermal, and inhalation), ignitability, reactivity, and chronic toxicity. In addition, substances that were identified as potential carcinogens have been evaluated for their relative activity as potential carcinogens. Each intrinsic property is ranked on a five-tier scale, associating a specific range of values on each scale with a particular reportable quantity value. After the primary criteria reportable quantities are assigned, the hazardous substances are further evaluated for their susceptibility to certain extrinsic degradation processes (secondary criteria). Secondary criteria consider whether a substance degrades relatively rapidly to a less harmful compound, and can be used to raise the primary criteria reportable quantity one level.

Also pursuant to section 311, EPA has developed a reportable quantity for oil and associated reporting requirements at 40 CFR part 110. These requirements, known as the oil sheen regulation, define the RQ for oil to be the amount of oil that violates applicable water quality standards or causes a film or sheen upon or discoloration of the surface of the water or adjoining shorelines or causes a sludge or emulsion to be deposited.

Reportable quantities developed under the CWA and CERCLA were not developed as effluent guideline limitations which establish allowable limits for pollutant discharges to surface waters. Rather, a major purpose of the notification requirements is to alert government officials to releases of hazardous substances that may require rapid response to protect public health, welfare, and the environment. Notification based on reportable quantities serves as a trigger for informing the government of a release so that the need for response can be evaluated and any necessary response undertaken in a timely fashion. The reportable quantities do not themselves represent any determination that releases of a particular quantity are actually harmful to public health, welfare, or the environment.

EPA requested comment on the use of RQs for determining contamination in discharges from oil and gas facilities. As noted above numerous commenters supported the concept of using reportable quantities under certain circumstances. Comments on the measurement of oil sheens for the purpose of triggering a permit application were divided. Some commented that it is much too stringent because the amount of oil creating a

sheen may be a relatively small amount. Others viewed the test as a quick, easy, practical method that has been effective in the past.

In relying on the reporting requirements associated with releases in excess of RQs for oil or hazardous substances to trigger the submittal of permit applications for oil and gas operations, the Agency believes that the use of the reporting requirements for oil will be particularly useful. The Agency believes that the release of oil to a storm water discharge in amounts that cause an oil sheen is a good indicator of the potential for water quality impacts from storm water releases from oil and gas operations. In addition, given the extremely high number of such operations (the Agency estimates that there are over 750,000 oil wells alone in the United States), relying on the oil sheen test to determine if storm water discharges from such sites are "contaminated" will be a far easier test for operators to determine whether to file a storm water permit application than a test based on sampling. The detection of a sheen does not require sophisticated instrumentation since a sheen is easily perceived by visual observation. EPA agrees with those comments calling the oil sheen test an appropriate measure for triggering a storm water permit application. In adopting this approach, EPA recognizes, as pointed out by many commenters that an oil sheen can be created with a relatively small amount of oil.

One commenter suggested that contamination must be caused by contact with on-site material before being subject to permit application requirements. The Agency agrees with this comment. Those facilities that have had releases in excess of reportable quantities will generally have contamination from contact with on-site material as described in the CWA. Thus, use of the RQ test is an appropriate trigger. As discussed above, determination of whether contamination is present to warrant issuance of a permit will be made in the context of the permit proceeding.

One commenter believed that the use of RQs is inappropriate because "the statute intended to exempt only oil and gas runoff that is not contaminated at all." The Agency wishes to clarify that reportable quantities are being used to determine what facilities need to file permit applications and to describe what is meant by the term "contaminated." The Director may require a permit for any discharges of storm water runoff contaminated by contact with any overburden, raw material, intermediate product, finished product, by product or waste product at the site of such operations. The use of RQs is solely a mechanism for identifying the facilities most likely to need a storm water permit consistent with the legislative history of section 402(l)(2).

c. Mining Operations. The December 7, 1988 proposal would establish background levels as the standard used to define when a storm water discharge from a mining operation is contaminated. When a storm water discharge from a mining site was found to contain pollutants at levels that exceed background levels, the owner or operator of the site was required to submit a permit application for that operation. The proposal was founded upon language in the legislative history stating that the determination of whether storm water is contaminated by contact with overburden, raw material, intermediate product, finished product, byproduct, or waste products "shall take into consideration whether these materials are present in such stormwater runoff . . . above natural background levels". [Vol. 132 Cong. Rec. H10574 (daily ed. Oct. 15, 1986) Conference Report].

Comments received on this component of the rule suggested that background levels of pollutants would be very difficult to calculate due to the complex topography frequently encountered in alpine mining regions. For example, if a mine is located in a mountain valley surrounded on all sides by hills, the site will have innumerable slopes feeding flow towards it. Under such circumstances, determining how the background level is set would prove impractical. Commenters indicated that it is very difficult to measure or determine background levels at sites where mining has occurred for prolonged periods. In many instances, data on original background levels may not be available due to long-term site activity. As a result, any background level established will vary based on the type and level of previous activity. In addition, mining sites typically have background levels that are naturally distinct from the surrounding areas. This is due to the geologic characteristics that makes them valuable as mining sites to begin with. This also makes it difficult to establish accurate background levels.

Because of these concerns EPA has decided to drop the use of background levels as a measure for determining whether a permit application is required. Accordingly, a permit application will be required when discharges of storm water runoff from mining operations come into contact with any overburden, raw material, intermediate product, finished product, byproduct, or waste product located on the site. Similar to the RQ test for oil and gas operations, EPA intends to use the "contact" test solely as a permit application trigger. The determination of whether a mining operation's runoff is contaminated will be made in the context of the permit issuance proceedings.

If the owner or operator determines that no storm water runoff comes into contact with overburden, raw material, intermediate product, finished product, byproduct, or waste products, then there is no obligation to file a permit application. This framework is consistent with the statutory provisions of section 402(1)(2) and is intended to encourage each mining site to adopt the best possible management controls to prevent such contact.

Several commenters stated that EPA's use of total pollutant loadings for determining permit applicability is not consistent with the general framework of the NPDES program. Their concern is that such evaluation criteria depart from how the NPDES program has been administered in the past, based on concentration limits. In addition, commenters requested that EPA clarify that information on mass loading will be used for determining the need for a permit only. Since the analysis of natural background levels as a basis for a permit application has been dropped from this rulemaking, these issues are moot.

Commenters noted that the proposed rule did not specify what impact this rulemaking has on the storm water exemptions in 40 CFR 440.131. The commenters recommended not changing any of these provisions. Some commenters indicated that mining facilities that have NPDES permits should not be subject to additional permitting under the storm water rule. EPA does not intend that today's rule have any effect on the conditional exemptions in 40 CFR 440.131. Where a facility has an overflow or excess discharge of process-related effluent due to stormwater runoff, the conditional exemptions in 40 CFR 440.131 remain available.

Several commenters note that the term overburden, as used in the context of the proposed storm water rule, is not defined and recommended that this term should be defined to delineate the scope of the regulation. EPA agrees that the term overburden should be defined to help properly define the scope the storm water rule. In today's rule, the term

overburden has been clarified to mean any material of any nature overlying a mineral deposit that is removed to gain access to that deposit, excluding topsoil or similar naturally-occurring surface materials that are not disturbed by mining operations. This definition is patterned after the overburden definition in SMCRA, and is designed to exclude undisturbed lands from permit coverage as industrial activity. However, the definition provided in this regulation may be revised at a later date, to achieve consistency with the promulgation of RCRA Subtitle D mining waste regulations in the future.

Numerous commenters raised issues pertaining to the inclusion of inactive mining areas as subject to the stormwater rule. Some commenters indicated that including inactive mine operations in the rule would create an unreasonable hardship on the industry. EPA has included inactive mining areas in today's rule because some mining sites represent a significant source of contaminated stormwater runoff. EPA has clarified that inactive mining sites are those that are no longer being actively mined, but which have an identifiable owner/operator. The rule also clarifies that active and inactive mining sites do not include sites where mining claims are being maintained prior to disturbances associated with the extraction, beneficiation, or processing of mined materials, nor sites where minimal activities required for the sole purpose of maintaining the mining claim are undertaken. The Agency would clarify that claims on land where there has been past extraction, beneficiation, or processing of mining materials, but there is currently no active mining are considered inactive sites. However, in such cases the exclusion discussed above for uncontaminated discharges will still apply.

EPA's definition of active and inactive mining operations also excludes those areas which have been reclaimed under SMCRA or, for non-coal mining operations, under similar applicable State or Federal laws. EPA believes that, as a general matter, areas which have undergone reclamation pursuant to such laws have concluded all industrial activity in such a way as to minimize contact with overburden, mine products, etc. EPA and NPDES States, of course, retain the authority to designate particular reclaimed areas for permit coverage under section 402(p)(2)(E).

The proposed rule had included an exemption for areas which have been reclaimed under SMCRA, although the language of the proposed rule inadvertently identified the wrong universe of coal mining areas. The final rule language has been revised to clarify that areas which have been reclaimed under SMCRA (and thus are no longer subject to 40 CFR part 434 subpart E) are not subject to today's rule. Today's rule thus is consistent with the coal mining effluent guideline in its treatment of areas reclaimed under SMCRA.

In response to comments, EPA has also expanded this concept to exclude from coverage as industrial activity non-coal mines which are released from similar State or Federal reclamation requirements on or after the effective date of this rule. EPA believes it is appropriate, however, to require permit coverage for contaminated runoff from inactive non-coal mines which may have been subject to reclamation regulations, but which have been released from those requirements prior to today's rule. EPA does not have sufficient evidence to suggest that each State's previous reclamation rules and/or Federal requirements, if applicable, were necessarily effective in controlling future storm water contamination.

8. Application Requirements for Construction Activities

As discussed above, EPA has included storm water discharges from activities involving construction operations that result in the disturbance of five acres total land in the regulatory definition of storm water discharges associated with industrial activity.

This is a departure from the proposed rule which required permit applications for discharges from activities involving construction operations that result in the disturbance of less than one acre total land area and (which are not part of a larger common plan of development or sale; or operations that are for single family residential projects, including duplexes, triplexes, or quadruplexes, that result in the disturbance of less than five acre total land areas and which are not part of a larger common plan of development or sale). The reasons for this change are noted below.

Many commenters representing municipalities, States, and industry requested that clearing, grading, and excavation activities not be included in the definition of storm water discharges associated with industrial activity. It was suggested that EPA delay including construction activities until after the studies mandated in section 402(p)(5) of the CWA are completed. Other commenters felt that NPDES permits are not appropriate for construction discharges due to their short term, intermediate and seasonal nature. Another commenter felt that only the construction activities on the sites of the industrial facilities identified in the other subsections of the definition of "associated with industrial activity" should be included.

EPA believes that storm water permits are appropriate for the construction industry for several reasons. Construction activity at a high level of intensity is comparable to other activity that is traditionally viewed as industrial, such as natural resource extraction. Construction that disturbs large tracts of land will involve the use of heavy equipment such as bulldozers, cranes, and dump trucks. Construction activity frequently employs dynamite and/or other equipment to eliminate trees, bedrock, rockwork, and to fill or level land. Such activities also engage in the installation of haul roads, drainage systems, and holding ponds that are typical of the industrial activity identified in § 122.26(b)(14)(i-x). EPA cannot reasonably place such activity in the same category as light commercial or retail business.

Further, the runoff generated while construction activities are occurring has potential for serious water quality impacts and reflects an activity that is industrial in nature. Where construction activities are intensive, the localized impacts of water quality may be severe because of high unit loads of pollutants, primarily sediments. Construction sites can also generate other pollutants such as phosphorus, nitrogen and nutrients from fertilizer, pesticides, petroleum products, construction chemicals and solid wastes. These materials can be toxic to aquatic organisms and degrade water for drinking and water-contact recreation. Sediment runoff rates from construction sites are typically 10 to 20 times that of agricultural lands, with runoff rates as high as 100 times that of agricultural lands, and 1,000 to 2,000 times that of forest lands. Even small construction sites may have a significant negative impact on water quality in localized areas. Over a short period of time, construction sites can contribute more sediment to streams than was previously deposited over several decades.

EPA is convinced that because of the impacts of construction discharges that are directly to waters of the United States, such discharges should be addressed by permits issued by Federal or NPDES State permitting authorities. It is evident from numerous studies and reports submitted under section 319 of the CWA that discharges from construction sites continue to be a major source of water quality problems and water quality standard violations.

Accordingly EPA is compelled to address these source under these regulations and thereby regulate these sources under a nationally consistent program with an appropriate level of enforcement and oversight.

Techniques to prevent or control pollutants in storm water discharges from construction are well developed and understood. A primary control technique is good site planning. A combination of nonstructural and structural best management practices are typically used on construction sites. Relatively inexpensive nonstructural vegetative controls, such as seeding and mulching, are effective control techniques. In some cases, more expensive structural controls may be necessary, such as detention basins or diversions. The most efficient controls result when a comprehensive storm water management system is in place. Another reason that EPA has decided to address this class of discharges is that it is part of the Agency's recent emphasis on pollution prevention. Studies such as NURP indicate that it is much more cost effective to develop measures to prevent or reduce pollutants in storm water during new development than it is to correct there problems later on. Many of these prevention and control practices, which can take the form of grading patterns as well as other controls, generally remain in place after the construction activities are completed.

a. Permit Application Requirements. In today's rulemaking, EPA has set forth distinct permit application requirements for these construction activities, at § 122.26(c)(1)(ii), to be used where general permits to be developed and promulgated by EPA are inapplicable. Such facilities will be required to provide a map indicating the site's location and the name of the receiving water and a narrative description of:

- The nature of the construction activity;
- The total area of the site and the area of the site that is expected to undergo excavation during the life of the permit;
- Proposed measures, including best management practices, to control pollutants in storm water discharges during construction, including a description of applicable Federal requirements and State or local erosion and sediment control requirements;
- Proposed measures to control pollutants in storm water discharges that will occur after construction operations have been completed, including a description of applicable State or local requirements, and
- An estimate of the runoff coefficient (fraction of total rainfall that will appear as runoff) of the site and the increase in impervious area after the construction addressed in the permit application is completed, a description of the nature of fill material and existing data describing the soil or the quality of the discharge.

Permit application requirements for construction activities do not include the submission of quantitative data. EPA believes that the changing nature of construction activities at a site to be covered by the permit application requirements generally would not be adequately described by quantitative data. The comments received by EPA support this determination. One State commented that a program they instituted has been based on quantitative data for the past 10 years and has proven to be very awkward, even unworkable.

Twenty commenters responded to the issue of appropriate construction site application deadlines including: Three towns (<100,000 population); one medium municipality; one large municipality; one agency associated with a large municipality; three agencies associated counties; three agencies associated with States; two industries; five industrial associations; and one private organization representing industry. The commenters primarily focused on actual deadlines and permitting authority response time.

Applicants for permits to discharge storm water into the waters of the United States from a construction site would normally be required to submit permits in the same time frame as new sources and new discharges. This rulemaking requires permit applications from such sources to be submitted at least 180 days prior to the date on which the discharge is to commence. Four commenters agreed with the application deadline of 180 days prior to commencement of discharge. Three commenters felt it would be difficult to apply 180 days prior to when the discharge was to begin. Three commenters recommended shortening the time period to 90 days. Numerous other commenters were concerned over delays during the permitting authority's review of the permit application. The commenters requested that a maximum response time be set in the regulation. Suggested maximum response times were 90 and 30 days.

In response to these comments, EPA has changed the application deadline for construction permits from at least 180 days prior to discharge to at least 90 days prior to the date when construction is to commence. This change reflects EPA's recognition of the nature of construction operations in that developers/builders may not be aware of projects 180 days before they are scheduled to begin.

Numerous commenters expressed concern over who should be responsible for applying for the permit. Two commenters felt the owner should be responsible so that construction bid documents can include the storm water management requirements and to avoid confusion among multiple subcontractors. One commenter thought that either the owner/developer, or general contractor should be responsible. Another commenter suggested that the designer should obtain the permit which would allow all necessary erosion controls to be part of the project plan. Several commenters requested that the responsibility simply be more clearly defined.

In response to these comments, EPA would clarify that the operator will generally be responsible for submitting the permit application. Under existing regulations at § 122.21(b), when a facility is owned by one person but operated by another, then it is the duty of the operator to apply for the permit Due to the temporary nature of construction activities, EPA believes that the operator is the most appropriate person to be responsible for both short and long term best management practices included on the site. EPA considers the term "operator" to include a general contractor, who would generally be familiar enough with the site to prepare the application or to ensure that the site would be in compliance with the permit requirements. General contractors, in many cases, will often be on site coordinating the operation among his/her staff and any subcontractors. Furthermore, the operator/general contractor would be much more familiar with construction site operations than the owner and should be involved in the site planning from its initial stages. The application requirements in today's rule are designed to provide flexibility in developing controls to reduce pollutants in storm water discharges from construction sites. A significant aspect to this is the role of State and local authorities in control of construction storm water discharges. Sixty-three commenters addressed the question of what the role of State and local authorities should be. Most of these commenters supported local government control of construction discharges and that qualified State programs should satisfy Federal requirements.

Many commenters representing municipalities, States, and industry, felt that local government should have full control over construction storm water

discharges, either under existing programs or those required by their municipal permit. EPA agrees with these comments as far as discharges through municipal storm sewers are concerned. EPA is requiring municipalities that are required to submit municipal permit applications under this regulation to describe their program for controlling storm water discharges from construction activities into their separate storm sewers. It is envisioned that municipalities will have primary responsibility over these discharges through NPDES municipal storm water permits. However, EPA also plans to cover such discharges under general permits to be promulgated in the near future.

In response to several comments that the regulation should provide flexibility for qualified State programs to satisfy Federal requirements, the application requirements recognize that many States have implemented erosion and sediment control programs. The permit application requires a brief description of these programs. This is intended to ensure consistency between NPDES permit requirements and other State controls. Permit applicants will be in the best position to pass on this site-specific information to the permitting authority. States or Federal NPDES authorities will have the ability to exercise authority over these discharges as will other State and local authorities responsible for construction. EPA envisions NPDES permitting efforts will be coordinated with any existing programs.

The proposed rule requested comments on appropriate measures to reduce pollutants in construction site runoff. Numerous commenters representing municipalities, States, and industry responded. Some commenters recommended specific best management practices (BMPs) whereas others suggested ways in which the measures should be incorporated into the program. One commenter suggested that EPA establish design and performance standards for appropriate BMPs. One State commenter recommended requiring a schedule or sequence for use of BMPs. A municipality suggested developing guidance on erosion control at construction sites and disseminating the guidance to educate contractors and construction workers in proper erosion control techniques. The Agency is continuing to review these recommendations for the purposes of permit development and issuance.

Another commenter suggested that further research be done to determine the effectiveness of particular BMPs in reducing pollutants in construction site runoff. EPA agrees that more research and studies can be undertaken to develop methodologies for more effective storm water controls and will continue to lookat these concerns pursuant to section 402(p)(5) studies. However, EPA is convinced that enough information, technology, and proven BMP's are available to address these discharges in this regulation.

Specific BMPs suggested by the commenters include: wheel washing; locked exit roadways, street cleaning methods which exclude sheet washing; clearing and grading codes; construction standards; riparian corridors; solids retention basins; soil erosion barriers; selected excavation; adequate collection systems; vegetate disturbed areas; proper application of fertilizers; proper equipment storage; use of straw bales and filter fabrics; and use of diversions to reduce effective length of slopes. EPA is continuing to evaluate these suggestions for developing appropriate permit conditions for construction activity.

b. Administrative Burdens. Many commenters representing municipalities, States, and industry commented on the administrative burdens of individually permitting each construction site discharging to waters of the United States. The extensive use of general permits for storm water discharges from construction activities that are subject to NPDES requirements is anticipated to minimize administrative delays associated with permit issuance. Many commenters strongly endorsed extensive use of general permits. In addition the Agency will provide as much assistance as possible for developing appropriate permit conditions.

Many commenters responded to the use of acreage limits in determining which construction sites are required to submit a permit application, including several cities, counties and States. Some commenters generally supported the use of an acre limit. Many commenters suggested increasing the acreage limit. Several suggested using a five acre limit for both residential and nonresidential development. Others suggested greater acreage as the cutoff. Two commenters concurred with the proposed limit of one acre/five acres and one commenter suggested lowering the residential limit to one acre.

Other factors were suggested as a means to create a cutoff for requiring permit applications. Several commenters suggested exempting construction that would be completed with a certain time frame, such as construction of less than 12 months. EPA believes that this is inappropriate because some construction can be intensive and expansive, but nonetheless take place over a short period of time, such as a parking lot. One commenter suggested basing the limit on the quantity of soil moved, i.e., cubic yards. In response, this approach would not be particularly helpful since removal of soil will not necessarily relate to the amount of land surface disturbed and exposed to the elements. Another commenter suggested that where there is single family detached housing construction that should trigger applications as well as the proposed acreage limit. This would not be appropriate since EPA is attempting to focus only on those construction activities that resemble industrial activity. After considering these and similar comments EPA has limited the definition of "storm water discharge associated with industrial activity" by exempting from the definition those construction operations that result in the disturbance of less than five acres of total land area which are not part of a larger common plan of development or sale. In considering the appropriate scope of the definition of storm water discharge associated with industrial activity as it relates to construction activities, EPA recognized that a wide variety of factors can affect the water quality impacts associated with construction site runoff, including the quality of receiving waters, the size of the area disturbed, soil conditions, seasonal rainfall patterns, the slope of area disturbed, and the intensity of construction activities. These factors will be considered by the permit writer when issuing the permit. However, as noted above, EPA views such site-specific factors to be too difficult to define in a regulatory framework that is national in scope. For example, attempting to adjust permit application triggers based upon a myriad of regional rainfall patterns is not a practical solution. However, permit conditions adjusted for specific geographical areas may be appropriate.

Under the December 7, 1988, proposal the definition of industrial activity exempted: construction operations that resulted in the disturbance of less than one acre total land area which was not part of a larger common plan of development or sale; or operations for single family residential projects, including duplexes, triplexes, or quadruplexes, that result in the disturbance of less than five acre total land areas which were not part of a larger common plan of development or sale. EPA distinguished between single family residential development and

other commercial development because other commercial development is more likely to occur in more densely developed areas. Also, it was reasoned that other commercial development provides a more complete opportunity to develop controls that remain in place after the construction activity is completed, since continued maintenance after the permit has expired, is more feasible.

However, EPA has decided to depart from the proposal and use an unqualified five acre area in today's final rule. This limit has been selected, in part, because of administrative concerns. EPA recognizes that State and local sediment and erosion controls may address construction activities disturbing less five acres for residential development; the five acre limit in today's rule is not intended to supersede more stringent State or local sediment and erosion controls. In light of the comments, EPA is convinced that the acreage limit is appropriate for identifying sites that are amount to industrial activity. Several comments suggested higher acreage limits without giving a supporting rationale except administrative concerns. Several commenters agreed that the five acre limit is suitable, but again without specifying why they agreed. EPA is convinced, however, that the acreage limits as finalized in today's rule reflect an earth disturbance and/or removal effort that is industrial in magnitude. Disturbances on large tracts of land will employ more heavy machinery and industrial equipment for removing vegetation and bedrock.

For construction facilities that are not included in the definition of storm water discharge associated with industrial activity, EPA will consider the appropriate procedures and methods to reduce pollutants in construction site runoff under the studies authorized by section 402(p)(5) of the CWA. EPA will also consider under section 402(p)(5) appropriate procedures and methods during post-construction for maintaining structural controls developed pursuant to NPDES permits issued for storm water discharges associated with industrial activity from construction sites.

Numerous commenters requested clarification as to whether permits for storm water discharges from construction activities at an industrial facility are required. EPA is requiring permits for all storm water discharges from construction activities where the land disturbed meets the requirements established in § 122.26(b)(14)(x) and which discharge into waters of the United States. The location of the construction activity or the ultimate land use at the site does not factor into the analysis.

G. Municipal Separate Storm Sewer Systems

1. Municipal Separate Storm Sewers

Today's rule defines "municipal separate storm sewer" at § 122.26(b)(8) to include any conveyance or system of conveyances that is owned or operated by a State or local government entity and is designed for collecting and conveying storm water which is not part of a Publicly Owned Treatment Works (POTW) as defined at 40 CFR 122.2. It is important to note that today's permit application requirements for discharges from municipal separate storm sewer systems serving a population of 100,000 or more do not apply to discharges from combined sewers (systems designed as both a sanitary sewer and a storm sewer). For purposes of calculating whether a municipal separate storm sewer system meets the large or medium population criteria, a municipality may petition to have the population served by a combined sewer deducted from the total population. Section 122.26(f) of today's rule describes this procedure.

EPA requested comments on whether different language for the definition of municipal separate storm sewer would clarify responsibility under the NPDES permit system. Comments were also requested on whether the definition needed to be clarified by explicitly stating that municipal streets and roads with drainage systems (curb and gutter, ditches, etc.) are part of the municipal storm sewer system, and that the owners or operators of such roads are responsible for such discharges. Numerous comments were received by EPA on this issue. Some commenters questioned whether road culverts and road ditches were municipal separate storm sewers, while others specifically recommended that further clarifying language should be added so that owners and operators of roads and streets understand that they are covered by this regulation. In light of these comments, EPA has clarified that municipal streets, catch basins, curbs, gutters, ditches, man-made channels, or storm drains that discharge into the waters of the United States are municipal separate storm sewers. One commenter asked if "other wastes" in the proposed definition of municipal separate storm sewer (40 CFR 122.26 (b)(8)(i)) included storm water. In response, EPA has added "storm water" to this definition in order to clarify that the rule addresses such systems.

EPA requested comments on whether legal classifications such as "storm sewers that are not private (e.g. public, district or joint district sewers)" would provide a clearer definition of municipal separate storm sewer than an owner or operator criterion, especially for the purpose of determining responsibility under the NPDES program. Most commenters agreed that the owner/operator concept, and the additional language noted above, is sufficient for this purpose. EPA also requested comments on to what extent the owner/operator concept should apply to municipal governments with land-use authority over lands which contribute storm water runoff to the municipal storm sewer system, and how the responsibility should be clarified. In response to comments on this point, EPA has addressed these concerns in the context of clarifying what municipal entities are responsible for applying for a permit covering storm water discharges from municipal systems in section VI.H. below.

One commenter expressed a desire for clarification as to whether conveyances that were once used for the conveyance of storm water, but are no longer used in that manner, are covered by the definition. EPA emphasizes that this rulemaking only addresses conveyances that are part of a separate storm sewer system that discharges storm water into waters of the United States.

One commenter stated that if EPA intends to regulate roadside collection systems then EPA must repropose since these were not considered by the public. EPA disagrees with this comment since one of the options specifically addressed the inclusion of roadside drainage systems and roads in the definition of municipal separate storm sewer system. In addition, the public recognized the issue in comments on the proposal. EPA would note that several commenters specifically endorsed EPA's inclusion of these conveyances.

2. Effective Prohibition on Non-Storm Water Discharges

Section 402(p)(3)(B)(ii) of the amended CWA requires that permits for discharges from municipal storm sewers shall include a requirement to effectively prohibit non-storm water discharges into the storm sewers. Based on the legislative history of section 405 of the WQA, EPA does not interpret the effective prohibition on non-storm water discharges to municipal separate storm sewers to apply to discharges that are not composed entirely of storm water, as long as such discharge has been issued a separate NPDES permit. Rather,

an "effective prohibition" would require separate NPDES permits for non-storm water discharges to municipal storm sewers. In many cases in the past, applicants for NPDES permits for process wastewaters and other non-storm water discharges have been granted approval to discharge into municipal separate storm sewers, provided that the permit conditions for the discharge are met at the point where the discharge enters into the separate storm sewer. Permits for such discharges must meet applicable technology-based and water-quality based requirements of Sections 402 and 301 of the CWA. If the permit for a non-storm water discharge to a municipal separate storm sewer contains water-quality based limitations, then such limitations should generally be based on meeting applicable water quality standards at the boundary of a State established mixing zone (for States with mixing zones) located in the receiving waters of the United States.

All options will be considered when an applicant applies for a NPDES permit for a non-storm water discharge to a municipal separate storm sewer. In some cases, permits will be denied for discharges to storm sewers that are causing water quality problems in receiving waters. However, not all discharges present such problems; and in these cases EPA or State permit writers may allow such discharges to municipal separate storm sewers within appropriate permit limits.

Today's rule has two permit application requirements that are designed to begin implementation of the effective prohibition. The first requirement discussed in VI.H.6.a., below, addresses a screening analysis which is intended to provide sufficient information to develop priorities for a program to detect and remove illicit discharges. The second provision, discussed in VI.H.7.b., requires municipal applicants to develop a recommended site-specific management plan to detect and remove illicit discharges (or ensure they are covered by an NPDES permit) and to control improper disposal to municipal separate storm sewer systems.

Several commenters suggested that either the definition of "storm water" should include some additional classes of nonprecipitation sources, or that municipalities should not be held responsible for "effectively prohibiting" some classes of nonstorm water discharges into their municipal storm sewers. The various types of discharges addressed by these comments include detention and retention reservoir releases, water line flushing, fire hydrant flushing, runoff from fire fighting, swimming pool drainaqe and discharge, landscape irrigation, diverted stream flows, uncontaminated pumped ground water, rising ground water, discharges from potable water sources, uncontaminated waters from cooling towers, foundation drains, non-contact cooling water (such as heating, ventilation, air conditioning (HVAC) water that POTWs require to be discharged to separate storm sewers rather than sanitary sewers), irrigation water, springs, roofdrains, water from crawl space pumps, footing drains, lawn watering, individual car washing, flows from riparian habitats and wetlands. Most of these comments were made with regard to the concern that these were commonly occurring discharges which did not pose significant environmental problems.

EPA disagrees that the above described flows will not pose, in every case, significant environmental problems. At the same time, it is unlikely Congress intended to require municipalities to effectively prohibit individual car washing or discharges resulting from efforts to extinguish a building fire and other seemingly innocent flows that are characteristic of human existence in urban environments and which discharge to municipal separate storm sewers. It should be noted that the legislative history is essentially silent on this point. Accordingly, EPA is clarifying that section 402(p)(3)(B) of the CWA (which requires permits for municipal separate storm sewers to 'effectively' prohibit non-storm water discharges) does not require permits for municipalities to prohibit certain discharges or flows of nonstorm water to waters of the United States through municipal separate storm sewers in all cases. Accordingly, § 122.26(d)(2)(iv)(B)(1) states that the proposed management program shall include: "A description of a program, including inspections, to implement and enforce an ordinance, orders or similar means to prevent illicit discharges to the municipal separate storm sewer system; the program description shall address the following categories of non-storm water discharges or flows only where such discharges are identified by the municipality as sources of pollutants to waters of the United States: Water line flushing, landscape irrigation, diverted stream flows, rising ground waters, uncontaminated ground water infiltration (as defined at 40 CFR 35.2005(20)) to separate storm sewers, uncontaminated pumped ground water discharges from potable water sources, foundation drains, air conditioning condensation, irrigation water, springs, water from crawl space pumps, footing drains, lawn watering, individual residential car washing, flows from riparian habitats and wetlands, dechlorinated swimming pool discharges, and street wash waters. Program descriptions shall address discharges from fire fighting only where such discharges or flows are identified as significant sources of pollutants to waters of the United States."

However, the Director may include permit conditions that either require municipalities to prohibit or otherwise control any of these types of discharges where appropriate. In the case of fire fighting it is not the intention of these rules to prohibit in any circumstances the protection of life and public or private property through the use of water or other fire retardants that flow into separate storm sewers. However, there may be instances where specified management practices are appropriate where these flows do occur (controlled blazes are one example).

Conveyances which continue to accept other "non-storm water" discharges (e.g. discharges without an NPDES permit) with the exceptions noted above do not meet the definition of municipal separate storm sewer and are not subject to section 402(p)(3)(B) of the CWA unless the non-storm water discharges are issued separate NPDES permits. Instead, conveyances which continue to accept non-storm water discharges which have not been issued separate NPDES permits are subject to sections 301 and 402 of the CWA. For example, combined sewers which convey storm water and sanitary sewage are not separate storm sewers and must comply with permit application requirements at 40 CFR 122.21 as well as other regulatory criteria for combined sewers.

3. Site-Specific Storm Water Quality Management Programs for Municipal Systems

Section 402(p)(3)(iii) of the CWA mandates that permits for discharges from municipal separate storm sewers shall require controls to reduce the discharge of pollutants to the maximum extent practicable (MEP), including management practices, control techniques and systems, design and engineering methods, and such other provisions as the Director determines appropriate for the control of such pollutants.

When enacting this provision, Congress was aware of the difficulties in regulating discharges from municipal

separate storm sewers solely through traditional end-of-pipe treatment and intended for EPA and NPDES States to develop permit requirements that were much broader in nature than requirements which are traditionally found in NPDES permits for industrial process discharges or POTWs. The legislative history indicates, municipal storm sewer system "permits will not necessarily be like industrial discharge permits. Often, an end-of-the-pipe treatment technology is not appropriate for this type of discharge." [Vol. 132 Cong. Rec. S16425 (daily ed. Oct. 16, 1986)].

A shift towards comprehensive storm water quality management programs to reduce the discharge of pollutants from municipal separate storm sewer systems is appropriate for a number of reasons. First, discharges from municipal storm sewers are highly intermittent, and are usually characterized by very high flows occurring over relatively short time intervals. For this reason, municipal storm sewer systems are usually designed with an extremely high number of outfalls within a given municipality to reduce potential flooding. Traditional end-of-pipe controls are limited by the materials management problems that arise with high volume, intermittent flows occurring at a large number of outfalls. Second, the nature and extent of pollutants in discharges from municipal systems will depend on the activities occurring on the lands which contribute runoff to the system. Municipal separate storm sewers tend to discharge runoff drained from lands used for a wide variety of activities. Given the material management problems associated with end-of-pipe controls, management programs that are directed at pollutant sources are often more practical than relying solely on end-of-pipe controls.

In past rulemakings, much of the criticism of the concept of subjecting discharges from municipal separate storm sewers to the NPDES permit program focused on the perception that the rigid regulatory program applied to industrial process waters and effluents from publicly owned treatment works was not appropriate for the site-specific nature of the sources which are responsible for the discharge of pollutants from municipal storm sewers.

The water quality impacts of discharges from municipal separate storm sewer systems depend on a wide range of factors including: The magnitude and duration of rainfall events, the time period between events, soil conditions, the fraction of land that is impervious to rainfall, land use activities, the presence of illicit connections, and the ratio of the storm water discharge to receiving water flow. In enacting section 405 of the WQA, Congress recognized that permit requirements for municipal separate storm sewer systems should be developed in a flexible manner to allow site-specific permit conditions to reflect the wide range of impacts that can be associated with these discharges. The legislative history accompanying the provision explained that "[p]ermits for discharges from municipal separate stormwater systems * * * must include a requirement to effectively prohibit non-stormwater discharges into storm sewers and controls to reduce the discharge of pollutants to the maximum extent practicable, * * * These controls may be different in different permits. All types of controls listed in subsection [(p)(3)(C)] are not required to be incorporated into each permit" [Vol. 132 Cong. Rec. HI0576 (daily ed. October 15, 1986) Conference Report]. Consistent with the intent of Congress, this rule sets out permit application requirements that are sufficiently flexible to allow the development of site-specific permit conditions.

Several commenters agreed with this approach. One municipality recommended that there be as much flexibility as possible so that the permitting authority can work with each municipality in developing meaningful long-term goals with plans for improving storm water quality. This commenter noted that too many specific regulations that apply nationwide do not take into consideration the climatic and governmental differences within the States. EPA agrees that as much flexibility as possible should be incorporated into the program. However, flexibility should not be built into the program to such an extent that all municipalities do not face essentially the same responsibilities and commitment for achieving the goals of the CWA. EPA believes that these final regulations build in substantial flexibility in designing programs that meet particular needs, without abandoning a nationally consistent structure designed to create storm water control programs.

4. Large and Medium Municipal Storm Sewer Systems

During the 1987 reauthorization of the CWA, Congress established a framework for EPA to implement a permit program for municipal separate storm sewers and establishing phased deadlines for its implementation. The amended CWA establishes priorities for EPA to develop permit application requirements and issue permits for discharges from three classes of municipal separate storm sewer systems. The CWA requires that NPDES permits be issued for discharges from large municipal separate storm sewer systems (systems serving a population of more than 250,000) by no later than February 4, 1991. Permits for discharges from medium municipal separate storm sewer systems (systems serving a population of more than 100,000, but less than 250,000) must be issued by February 4, 1992. After October 1, 1992, the requirements of sections 301 and 402 of the CWA are restored for all other discharges from municipal separate storm sewers.

The priorities established in the Act are based on the size of the population served by the system. Municipal operators of these systems are generally thought to be more capable of initiating storm water programs and discharges from municipal separate storm sewers serving larger populations are thought to present a higher potential for contributing to adverse water quality impacts. NURP and other studies have verified that the event mean concentration of pollutants in urban runoff from residential and commercial areas remains relatively constant from one area to another, indicating that pollutant loads from urban runoff strongly depend on the total area and imperviousness of developed land, which in turn is related to population.

The term "municipal separate storm sewer system" is not defined by the Act. By not defining the term, Congress intended to provide EPA discretion to define the scope of municipal systems consistent with the objectives of developing site-specific management programs in NPDES permits. EPA considered two key issues in defining the scope of municipal separate storm sewer system: (1) What is a reasonable definition of the term "system," and (2) how to determine the number of people "served" by a storm sewer system. EPA found these two issues to be intertwined. Different approaches to defining the scope of a system allowed for greater or lesser certainty in deterining the population served by the system.

In the December 7, 1988, proposal, EPA described seven options for defining "municipal separate storm sewer system." In developing these options the EPA considered:

- The inter-jurisdiction complexities associated with municipal governments;
- The fact that many municipal storm water management programs have traditionally focused on water quantity

concerns, and have not evaluated water quality impacts of system discharges or developed measures to reduce pollutants in such discharges;

• The advantages of developing system-wide storm water management programs for municipal systems;

• The geographic basis necessary for planning of comprehensive management programs to reduce pollutants in discharges from municipal separate storm sewers to the maximum extent practicable;

• The geographic basis necessary to provide flexibility to target controls on areas where water quality impacts associated with discharges from municipal systems are the greatest and to provide an opportunity to develop cost effective controls;

• The need to establish a reasonable number of permits for municipal systems during the initial phases of program development that will provide an adequate basis for a storm water quality management program for over 13,000 municipalities after the October 1, 1992 general prohibition on storm water permits expires; and

• Congressional intent to allow the development of jurisdiction-wide, comprehensive storm water management programs with priorities given to the most heavily populated areas of the country.

a. Overview of Proposed Options and Comments. The December 7, 1988, proposal requested comment on seven options for defining large and medium municipal separate storm sewer system. With the addition of a watershed-based approach suggested by certain commenters, eight options or approaches were addressed by the over 200 commenters on this issue: Option 1—systems owned or operated by incorporated places augmented by integrated discharges; Option 2—systems owned or operated by incorporated places augmented with significant other municipal discharges; Option 3—systems owned or operated by counties; Option 4—systems owned and operated by States or State departments of transportation; Option 5—systems within the boundaries of an incorporated place; Option 6—systems within the boundaries of counties; Option 7—systems in census designated urbanized areas; and Option 8—systems defined by watershed boundaries.

Generally, these options can be classified into two categories. The first category of options, Options 1, 2 and 3, define municipal systems in terms of the municipal entity which owns or operates storm sewers within municipal boundaries of the requisite population. The second category of options would define municipal systems on a geographic basis. Under Options 4, 5, 6, 7 and 8 all municipal separate storm sewers within the specified geographic area would be part of the municipal system, regardless of which municipal entity owns or operates the storm sewer. EPA did not propose to define the scope of a municipal separate storm sewer system in engineering terms because of practical problems determining the boundaries of and the populations served by "systems" defined in such a manner. In addition an engineering approach based on physical interconnections of storm sewer pipes by itself does not provide a rational basis for developing a storm water program to improve water quality where a large number of individual storm water catchments are found within a municipality.

In the December 7, 1988, proposal, EPA favored those options that relied primarily on the municipal entity which owns or operates or otherwise has jurisdiction over storm sewers. These options were preferred because it was anticipated that the administrative complexities of developing the permit programs would be reduced by decreasing the number of affected municipal entities. However, most commenters were not satisfied that such an approach would reduce administrative burdens or complexities.

The diversity of arguments and rationales offered in comments justifying the selection of particular option, or combinations thereof, were generally a function of geographic, climatic, and institutional differences around the country. As such, there was little substantive agreement with how this program should be implemented as far as defining large and medium municipal separate storm sewer systems. Of all the options, Option 1 generally received the most favorable comment. However, the overwhelming majority of comments suggested different options or other alternatives. Having reviewed the comments at length, EPA is convinced that the definition of municipal separate storm sewers should possess elements of several of the options enumerated above and a mechanism that enables States or EPA Regions to define a system that best suits their various political and geographical conditions.

The following comments were the most pervasive, and represent those issues and concerns of greatest importance to the public: (1) The approach chosen initially must be realistic and achievable administratively; (2) the definition must be flexible enough to accommodate development of the program on a watershed basis, and incorporate elements of existing programs and frameworks and regional differences in climate, geography, and political institutions; (3) permittees must have legal authority and control over land use; (4) discharges from State highways, identified as a significant source of runoff and pollutants, should be included in the program and combined in some manner with one or more of the other options; (5) the definition should address how the inclusion of interrelated discharges into the municipal separate storm sewer system are timed, decided upon, dealt with, etc.; (6) any approach must address the major sources of pollutants; (7) development of co-permittee management plans must be coordinated or developed on a regional basis and in the same time frame—fragmented or balkanized programs must be avoided; (8) municipalities should be regulated as equitably as possible; (9) flood control districts should be addressed as a system or part of a system; (10) the definition must conform to the legal requirements of the Clean Water Act; and (11) the definition should limit the number of co-permittees as much as possible.

b. Definition of large and medium municipal separate storm sewer system. A combination of the options outlined in the 1988 proposal would address most of these concerns, while achieving a realistic and environmentally beneficial storm water program. Accordingly, EPA has adopted the following definition of large and medium municipal separate storm sewer systems. Large and medium separate storm sewer systems are municipal separate storm sewers that:

(i) Are located in an incorporated place with a population of 100,000 or more or 250,000 or more as determined by the latest Decennial Census by the Bureau of Census (see appendices F and G of part 122 for a list of these places based on the 1980 Census);

(ii) Are located within counties having areas that are designated as urbanized areas by latest decennial Bureau of Census estimates and where the population of such areas exceeds 100,000, after the population in the incorporated places, townships or towns within such counties is excluded (see appendices H and I for a listing of these counties based on the 1980 census) (incorporated places, towns, and townships within these counties are excluded from permit application requirements unless they fall under paragraph (i) or are designated under paragraph (iii)); or (iii) are owned or

operated by a municipality other than those described in paragraph (i) or (ii) that are designated by the Director as part of the large or medium municipal separate storm sewer system due to the interrelationship between the discharges of the designated storm sewer and the discharges from municipal separate storm sewers described under paragraphs (i) or (ii). In making this determination the Director may consider the following factors:

(A) Physical interconnections between the municipal separate storm sewers;

(B) The location of discharges from the designated municipal separate storm sewer relative to discharges from municipal separate storm sewers described in subparagraph (i);

(C) The quantity and nature of pollutants discharged to waters of the United States;

(D) The nature of the receiving waters; or

(E) Other relevant factors.

(iv) The Director may, upon petition, designate as a system, any municipal separate storm sewers located within the boundaries of a region defined by a storm water management regional authority based on a jurisdictional, watershed, or other appropriate basis that includes one or more of the systems described in paragraphs (i), (ii), and (iii).

Under today's rule at § 122.26(a)(3)(iii) the regional authority shall be responsible for submitting a permit application under the following guidelines: The regional authority together with co-applicants shall have authority over a storm water management program that is in existence, or shall be in existence at the time part 1 of the application is due; the permit applicant or co-applicants shall establish their ability to make a timely submission of part 1 and part 2 of the municipal application; each of the operators of municipal separate storm systems described in paragraphs 122.26(b)(4) (i), (ii), and (iii) and (7)(i), (ii), and (iii), that are under the purview of the designated regional authority, shall comply with the application requirements of § 122.26(d).

As noted above, the finalized definition of large and medium municipal separate storm sewer system is combination of the approaches as proposed. (In the following discussion "paragraph (i)" refers to §§ 122.26 (b)(4)(i) and (b)(7)(i); "paragraph (ii)" refers to §§ 122.26(b)(4)(ii) and (b)(7)(ii); "paragraph (iii)" refers to §§ 122.26 (b)(4)(iii) and (b)(7)(iii); and "paragraph (iv)" refers to §§ 122.26 (b)(4)(iv) and (b)(7)(iv)). Paragraph (i) originates from proposed Option 5 (boundaries of incorporated places); paragraph (ii) originates from Option 6 (boundaries of counties) and Option 7 (urbanized areas); paragraph (iii) originates from Options 1 and 5; and paragraph (iv) is an outgrowth of comments on all options, especially Option 4 (State owned systems/State highways) and Option 8 (watersheds).

This definition creates a system by virtue of the fact that storm sewers within defined geographical and political areas, and the owner/operators of separate storm sewers in those areas, are addressed or required to obtain permits. Although within these systems, different segments and discharges of storm water conveyances may be owned or operated by different public entities, EPA is convinced by comments that discharges from such conveyances are interrelated to such an extent that all of these conveyances may be properly considered a "system." These comments are identified and discussed in greater detail below.

c. Response to comments. Many commenters urged that the approach taken must be administratively achievable. Option 5 of the proposal (boundaries of incorporated places), which can be equated to paragraphs (i) and (iii) above, was identified by several commenters as the most workable of all the options. Many commenters stated that Option 1 (systems owned or operated by incorporated places) was inappropriate because of special districts and other owners of systems within the incorporated area; and although EPA proposed a designation provision for interrelated discharges in Option 1, commenters advised that it would be impossible to identify these systems, account for their discharges, and exclude or include them in a timely manner if Option 1 was selected (Option 1 only addresses those systems owned or operated by the incorporated place). The final rule would obviate these concerns, since all the publicly owned sewers within the boundaries of the municipality will be required to be covered by a permit.

Other commenters noted that cities sometimes have storm water conveyances owned or operated by numerous entities. One municipality commented that these problems could be more easily resolved using a unified permit/district wide approach, which the final approach outlined above can accomplish. One county stated that Option 1 of the proposal would result in a permanent balkanization of stormwater programs and that a regional approach focusing on the entire system should be established. Another municipality recommended that all the systems of conveyances within the incorporated city boundaries be issued a permit. In rejecting Option 1 of the proposal, one municipality stated that program inefficiencies would result from implementing a piecemeal program in a contiguous urban environment with different owners and operators. One State conveyed similar concerns. Using a geographical approach, as described in paragraph (i) of the final definition, will best address all of these concerns.

One commenter criticized proposed Option 1 as being contrary to the legal requirements of the WQA, and a further example of EPA's continuing attempt to minimize the scope of a national storm water program. It was noted that the legislative history regarding requirements for large and medium municipal separate storm sewer systems in section 402(p) of the CWA generally does not reference incorporated cities or towns. As a result, the commenter recommended that the term "municipal" in municipal separate storm sewer system refer to separate storm sewers operated by municipal entities meeting the definition of "municipality" in section 502 of the CWA and that the scope of the term "municipal separate storm sewer system" be defined as broadly as possible. This approach would result in defining large and medium municipal separate storm sewer systems to include all municipal separate storm sewers within the 410 counties with a population of 100,000 or more. EPA has adopted the commenter's recommendation to extend the scope of the program to the extent that today's rule covers all municipal separate storm sewers within certain areas rather than only those operated by an incorporated place. EPA disagrees however that it must define the term "system" to include sewers within any municipal boundary of sufficient population with reference to section 502(4). By not providing explicit definitions, section 402(p)(3)(B) of the CWA gives EPA discretion to define how municipal separate storm sewer systems are defined. There is no indication in the language of the CWA or the legislative history that Congress intended that the scope of "municipality" and the scope of "municipal separate storm sewer system" to be identical, particularly since the latter term is not defined in the statute. Furthermore, for the reasons discussed elsewhere in this section, EPA believes that today's definition is a reasonable accommodation of the many conflicting concerns surrounding the proper way to delineate the extent of a

municipal separate storm sewer system serving over 100,000 people.

Several commenters concluded that EPA should be flexible enough to allow the permitting authority broad discretion to establish system wide permits, with flood control districts and/or counties acting as co-permittees with the various incorporated cities within the district boundaries. Commenters expressed concern that Option 1 would not allow for such flexibility.

Arguments that were advanced by commenters in support of proposed Option 1 are equally applicable to paragraph (i), above. Like proposed Option 1, the approach outlined above targets major cities. However, it also has the advantage of addressing municipal separate storm sewer systems which may be interrelated to those owned by the city, a benefit recognized by one municipality that endorsed the selection of proposed Option 5. This will also give the permitting authority more discretion to establish co-permittee relationships.

Paragraph (ii) of the final definition also uses a geographical approach to the definition of municipal storm sewer systems to include municipal storm sewers within urbanized counties. Thus, it closely resembles Option 7 of the proposal. The counties identified in paragraph (ii) have, based on the 1980 Census, a population of 100,000 or more in urbanized,[5] unincorporated portions of the county. In the unincorporated areas of these counties (or in the 20 States where the Census recognizes minor civil divisions, unincorporated county areas outside of towns or townships), the county is the primary local government entity. In these cases, the county performs many of the same functions as incorporated cities with a population of 100,000, and is generally expected to have the necessary legal and land use authority in these areas to begin to implement storm water management programs. Due to the urbanized nature of their population, discharges from the municipal separate storm sewers in these counties will have many similarities to discharges from municipal systems in incorporated cities with a population of 100,000 or more. Addressing these counties in this fashion will not adversely affect small municipalities (incorporated places, towns and townships) within the county, as municipal separate storm sewers that are located in the small incorporated places, townships or towns within these counties are not automatically included as part of the system.

EPA has focused on the unincorporated areas because permit applications cannot be required from systems that serve a population less than 100,000, unless designated. EPA received the comment that if the sewers in incorporated places within such counties were included as part of the system for that county, there would be the potential for systems serving a population less than 100,000 to be improperly subject to permit requirements. EPA agrees with the comment, except that EPA reserves the authority to designate sewers in small incorporated places as part of the system subject to permitting, pursuant to paragraph (iii) of the final definition. Incorporated areas within the identified counties will be required to file permit applications if the population served by the municipal separate storm sewer system is 100,000 or more.

As one commenter noted, the counties addressed by the definition will generally be areas of high growth with a growing tax base that can finance a storm water management program. Numerous counties affected by paragraph (ii) commented on the proposal. Several of these indicated a preference for the county government as the permittee. Others indicated that their county had the ability to perform the functions of the permit applicant and permittee. One county brought to EPA's attention that the county had laid plans for a storm water utility scheduled to be in operation in 1989. Several of the counties supported the use of watersheds, or flexible regional approaches, as the basis for the definition of municipal separate storm sewer systems. The modified definition should satisfy these concerns.

EPA recognizes that some of the counties addressed by today's rule have, in addition to areas with high unincorporated urbanized populations, areas that are essentially rural or uninhabited and may not be the subject of planned development. While permits issued for these municipal systems will cover municipal system discharges in unincorporated portions of the county, it is the intent of EPA that management plans and other components of the programs focus on the urbanized and developing areas of the county. Undeveloped lands of the county are not expected to have many, if any, municipal separate storm sewers.

Paragraphs (i) and (ii) above will help resolve the problems associated with permittees not having adequate land use controls, the legal authority to implement controls, and the ownership of the conveyances. This factor was mentioned by numerous commenters on the proposed options, especially county governments. Under paragraphs (i) and (ii), all publicly owned separate storm sewers within the appropriate municipal boundaries will be defined as part of the municipal system. In many cases, a number of municipal operators of these storm sewers will be responsible for discharges from these systems. Since a number of co-permittees may be addressed in the permits for these discharges, problems associated with the ability to control pollutants that are contributed from interrelated discharges will be minimized. State highways or flood control districts, which may have no land use authority in incorporated cities, will be co-permittees with the city which does possess land use authority. EPA envisions that permit conditions for these systems will be written to establish duties that are commensurate with the legal authorities of a co-permittee. For example, under a permit, a flood control district may be responsible for the maintenance of drainage channels that they have jurisdiction over, while a city is responsible for implementing a sediment and erosion ordinance for construction sites which relates to discharges to the drainage channel. Confusion over ownership of conveyances or systems, at least for the purposes of determining whether they require a permit, will be minimized since all conveyances will be covered. Similarly, under paragraph (ii), the affected counties are expected to have the necessary legal and land use authority to implement programs and controls in unincorporated, urbanized areas because the county government is the primary political or governing entity in these geographical areas.

Many commenters from all levels of State and local government expressed concern about controlling pollutants from State highways. Paragraphs (i) and (ii) will result in discharges from separate storm sewers serving State highways and other highways through storm sewers that are located within incorporated places with the appropriate population or highways in unincorporated portions of specified counties being included as part of the large or medium municipal separate storm sewer system, since all municipal separate storm sewers within the boundaries of these political entities are included. Paragraph (iv) can facilitate

[5] The Bureau of Census defines urbanized areas to provide a description of high-density development. Urbanized areas are comprised of a central city (or cities) with a surrounding closely settled area. The population of the entire urbanized area must be greater than 50,000 persons, and the closely settled area outside of the city, the urban fringe, must generally have a population density greater than 1,000 persons per square mile (just over 1.5 persons per acre) to be included

the submission of a permit application for storm sewers operated as part of an entire State highway system. Paragraph (iv) would allow an entire system in a geographical region under the purview of a State agency (such as a State Department of Transportation) to be designated, where all the permit application requirements and requirements established under § 122.26(a)(iii)(C) can be met.

Paragraphs (i) and (ii) can effectively deal with many of the major sources of pollutants. One municipality noted that Option 5 (paragraph (i)) would require all systems in the incorporated boundaries to obtain permits and institute control measures, rather than just the few owned or operated by incorporated cities. Another municipality noted that this approach could deal with many of the regional variations in sources of pollution. Many commenters, including environmental groups, believed that proposed Option 3 (systems owned or operated by counties), Option 6 (systems within the boundaries of counties), and Option 7 (system in urbanized areas) were good approaches because more sources of pollution would be addressed. It was also maintained that Options 3, 6 and 7 could incorporate watershed planning which, in the view of some commenters, is the only effective way to address pollutants in storm water.

Commenters noted that addressing counties and urbanized areas would focus attention on developing areas which would otherwise be left out in the initial phases of permitting. One commenter noted that most new development in large urbanized areas occurs outside of core cities (incorporated cities with a population of 100,000 or more). Newly developing areas provide opportunities for installing pollutant controls cost effectively. EPA agrees with these comments and notes that paragraph (ii) addresses a significant number of counties with highly developed or developing areas.

However, EPA is convinced that addressing all counties or urbanized areas in the initial phases of the storm water program is ill-advised. Commenters noted that some counties have inappropriate or nonexistent governmental structures, and that a program that addressed all counties in the country with a population of 100,000 or more would be unmanageable, because too many municipal entities nationwide would be involved in the program initially. Commenters advised that defining municipal storm sewer systems solely in terms of the boundaries of census urbanized areas (Option 7) would result in systems which did not correspond to jurisdictions that are in a position to implement a storm water programs. Thus, EPA has modified Option 7 and combined it with Option 6 to create paragraph (ii) above.

Paragraph (iii) incorporates a designation authority such that municipalities that own or operate discharges from separate storm sewers systems other than those described in paragraph (i) or (ii) may be designated by the Director as part of the large or medium municipal separate storm sewer system due to the interrelationship between the other discharges of the designated storm sewer and the discharges from the large or medium municipal separate storm sewers. In making this determination the physical interconnections between the municipal separate storm sewers, the location of discharges from the designated municipal separate storm sewer relative to discharges from large or medium municipal separate storm sewers, the quantity and nature of pollutants discharged to waters of the United States, the nature of the receiving waters, or other relevant factors may be considered.

Comments indicated that the designation authority as proposed and described above should be retained. One State noted that this approach gives the most flexibility in making the case-by-case designations, while also delineating in sufficient detail what criteria are used to make the determination. This commenter was concerned about being able to regulate many of the interrelated discharges from counties surrounding incorporated cities.

Paragraph (iv) of the final definition allows the permitting authority, upon petition, to designate as a medium or large municipal separate storm sewer system, municipal separate storm sewers located within the boundaries of a region defined by a storm water management regional authority based on a jurisdictional, watershed, or other appropriate basis that includes one or more of the systems described in paragraphs (i), (ii), (iii).

Paragraph (iv) was added to the final definitions to respond to a variety of concerns of commenters. One of the prime concerns of commenters was that the definition of large and medium municipal separate storm sewer systems must be flexible enough to accommodate: Programs on a watershed basis, existing storm water programs and frameworks and regional differences in climate, geography, and political institutions. Some States were particularly expressive regarding this concern. One State maintained that an inflexible program could totally disrupt ongoing State efforts. Other commenters urged that the regulation encourage the establishment of regional storm water authorities or other mechanisms that can deal with storm water quality on a watershed basis. One State proposed defining the municipal separate storm sewer system to include all municipal separate storm sewers within a core incorporated place of 100,000 or more, and all surrounding incorporated places within the State defined watershed. One of the State water districts advised that the regulations should be flexible enough to allow regional water quality boards to apply the regulations geographically. One national association expressed concern that existing institutional arrangements for flood control and drainage would be ignored, while another warned against fostering a proliferation of inconsistent patchwork programs based on arbitrary definitions and jurisdictions which bear no relationship to water quality.

EPA is convinced that the mechanism described in paragraph (iv) provides a means whereby the mechanisms and concepts identified above can be utilized or created in appropriate circumstances. In addition, § 122.26(f)(4) provides a means for State or local government agencies to petition the Director for the designation of regional authorities responsible for a portion of the storm water program. For example, some States or counties may currently or in the near future have regional storm water management authorities that have the ability to apply for permits under today's rule and carry out the terms of the permit. Some of these authorities may encompass within their jurisdiction large or medium municipal separate storm sewer systems as defined in today's rule. EPA wishes to encourage such entities to assume the role as permittee under today's rule. That is the purpose of paragraph (iv). Such authorities may petition the Director to assume such a role.

Many commenters expressed the view that municipal management plans must be coordinated or developed among co-permittees on a regional basis and in the same timeframe. Paragraphs (i), (iii) and (iv) would bring in all appropriate municipal entities with jurisdiction over a specified geographical area in the same timeframe. Several commenters, including one State, noted proposed Option 1 would lead to fragmented, ill-coordinated programs. Paragraphs (i), (iii), and (iv) do not suffer this drawback

to the same extent since all the municipal separate storm sewers are addressed within the incorporated place, instead of only those owned or operated by the incorporated place.

Equal treatment of municipalities within a watershed or other specified area was a major subject of comment. Many commenters urged that a degree of fairness could be achieved by requiring permit applications, and the concomitant expenditure of municipal dollars and resources, from all municipalities within an entire urban area that contributes to storm water pollution, rather than from a discrete system within an arbitrary political boundary. Paragraph (i), especially when coupled with paragraphs (ii), (iii), and (iv), can best accomplish a more equitable approach, because all owners and operators of municipal separate storm sewers within a system have responsibilities. In addition, some of the areas outside the incorporated city limits which are engaged in expansive urban or suburban development will be brought into the program. Paragraph (iv) will provide a means for State or regional authorities to use existing or emerging mechanisms to set up storm water management programs, and would require multiple agencies either to become regional co-permittees or to be subject to a regional permit.

Paragraphs (i), (ii), (iii), and (iv) could also require flood control districts to be co-permittees, which was a major concern of counties and numerous cities. One municipality stated that the inclusion of flood control districts would greatly reduce the administrative burden required to prepare a single inter-city discharge agreement and would establish a common legal authority to implement the program. Numerous county agencies believed it imperative that flood control districts be brought into a system-wide permit strategy.

Paragraphs (i) and (iii) may not accommodate the concern of several commenters that the number of co-permittees be kept to a minimum. The fact that all the municipal separate storm sewers within the boundaries of the appropriate incorporated places will be addressed dictates that some permits will have several co-permittees. This is a major concern since it goes directly to achieving an effective initial storm water program. There is concern about being able to bring all the co-permittees together under intra-municipal agreements or contracts within regulatory deadlines. This problem would be resolved in the short term by selecting Option 1. However, Option 1 may still require inter-municipal agreements because of the designation authority under § 122.26 (b)(4)(ii) and (b)(7)(ii) of the proposal. In addition, such inter-jurisdictional problems will arise after October 1, 1992 when the moratorium on requiring NPDES permits for discharges from other municipal separate storm sewers ends. Under the permitting goals established by the CWA, multi-jurisdictional storm water programs and agreements cannot be avoided. Despite interest in limiting the number of co-permittees, EPA decided not to adopt Option 1 for the reasons already stated.

Section 402(p)(3)(B)(i) of the amended CWA provides that permits for municipal discharges from municipal storm sewers may be issued on a system-wide or jurisdiction-wide basis. This provision is an important mechanism for developing the comprehensive storm water management programs envisioned by the Act.

Under the permit application requirements of today's rule, if the appropriate co-applicants are identified, one permit application may be submitted for a large or medium municipal separate storm sewer system (see section VI.G.4 above). System-wide permit applications can in turn be used to issue system-wide permits which could cover all discharges in the system.

Where several municipal entities are responsible for obtaining a permit for various discharges within a single system, EPA will encourage system-wide permit applications involving the several municipal entities for a number of reasons. The system-wide approach not only provides an appropriate basis for planning activities and coordinating development, but also provides municipal entities participating in a system-wide application the means to spread the resource burden of monitoring, evaluating water quality impacts, and developing and implementing controls.

The system-wide approach provided in today's rule recognizes differences between individual municipalities with responsibilities for discharges from the municipal system. Today's application rule requires information to be submitted that enables the permit issuing authorities to develop tailored programs for each permittee with responsibility for certain components, segments, or portions of the municipal separate storm sewer system. The permit application requirements allow individual municipal entities, participating in system-wide applications, to submit site specific information regarding storm water quality management programs to reduce pollutants in system discharges as a whole, or from specific points within the system.

In some cases, it may be undesirable for all municipal entities with storm water responsibility within a municipal system to be co-permittees under one system-wide permit. The permit application requirements in today's rule allow individual municipal entities within the system to submit permit applications and obtain a permit for that portion of the storm sewer system for which they are responsible. Thus, several permits may be issued to cover various subdivisions of a single municipal system.

In summary, EPA believes that the definition of municipal storm sewer system adopted in today's rule has several distinct advantages that were identified in comments:

- The definition adopts features of several options;
- The definition targets areas that have the necessary police powers and land use authority to implement the program;
- The definition can utilize watersheds or accommodate existing administrative frameworks and storm water programs;
- The definition provides that all systems within a geographical area including highways and flood control districts will be covered, thereby avoiding fragmented and ill-coordinated programs;
- The definition has flexible designation authority; and
- The definition addresses major sources of pollutants without being overly broad.

H. Permit Application Requirements for Large and Medium Municipal Systems

1. Implementing the Permit Program

Given the differing nature of discharges from municipal separate storm sewer systems in different parts of the country and the varying water quality impacts of municipal storm sewer discharges on receiving waters, today's permit application requirements are designed to lead to the development of site-specific storm water management programs. In order to effectively implement this goal, EPA intends to retain the overall structure of the municipal permit application as proposed in the December 7, 1988, proposal.

2. Structure of the Permit Application

EPA proposed a two-part permit application designed to meet the goal of

developing site-specific storm water quality management programs in NPDES permits. In response to a request for comments on this aspect of the proposal, numerous comments were received. After reviewing these comments, EPA has decided to retain the two-part permit application. Many commenters agreed that the approach as proposed is appropriate for phasing in and developing site specific storm water management programs. One large municipality strongly endorsed the two-part application, stating that it would facilitate the identification of water quality problem areas and the development of priorities for control measures, thereby allowing for more cost-effective program development. Two State agencies expressed the same view, and noted that the two-part approach is reasonable and well structured for efficient development of programs. One large municipality noted it would allow the permit authority and the permit applicant the time needed to gain the knowledge and data to develop site-specific permits. A medium municipality expressed similar views.

Numerous commenters submitted endorsements of a proposal offered by one of the national municipal associations. This approach responded to EPA's request for comments on alternatives to a two-part application process. These comments recommended having permit applicants submit information regarding their existing legal authority, prepare source identification information, describe existing management plans, provide discharge characterization information based on existing data, and prepare a monitoring, characterization and illicit discharge and removal plan in a one-part application. The remaining requirements such as: implementing plans to remove illicit connections, obtaining legal authority, monitoring and characterization, plans for structural controls, preparation of control assessments, preparation of fiscal analysis, and management plan implementation would be part of the permit and take place during the compliance period of the permit. It was argued that this would result in a more orderly development of stormwater management programs while allowing for quick implementation of efforts to eliminate illicit discharges and initiate some BMPs.

After careful review and consideration of these comments, EPA is convinced that this approach would not meet the goals and requirements of section 402 of the Clean Water Act. Section 402(p)(3)(B) of the CWA requires that permits effectively prohibit non-storm water discharges into storm sewers and incorporate controls that reduce the discharge of pollutants to the maximum extent practicable, including management practices, control techniques, and system design and engineering methods. The above comments suggesting an alternative for achieving this goal are not entirely compatible with these requirements. In light of the language in the statute, permit conditions should do more than plan for controls during the term of the permit. A strong effort to have the necessary police powers and controls based on pollutant data should be undertaken before permits are issued. In short, the one-part application described by these comments would result in permits that would focus too much on preparation and not enough on implementing controls for pollutants.

In comparison, EPA's approach requires municipalities to submit a two-part application over a two year period. Part one of the application would require information regarding existing programs and the means available to the municipality to control pollutants in its storm water discharges. In addition, part one would require field screening of major outfalls to detect illicit connections. Part two of the permit application would require a limited amount of representative quantitative data and a description of proposed storm water management plans. The purpose of the two-part application process is to develop information, in a reasonable time frame, that would build successful municipal storm water management programs and allow the permit writer to make informed decisions with regard to developing permit conditions. This will include initiating efforts to effectively prohibit non-storm water discharges into storm sewers, and initially implementing controls that reduce the discharge of pollutants to the maximum extent practicable, including management practices and control techniques during the term of the permit. Such an approach clearly meets the statutory mandate of section 402(p)(3)(B).

a. Part 1 Application. Part 1 of the permit application is intended to provide an adequate basis for identifying sources of pollutants to the municipal storm sewer system, to preliminarily identify discharges of storm water that are appropriate for individual permits, and to formulate a strategy for characterizing the discharges from municipal separate storm sewer systems. Several commenters supported retaining these components of the application process. The components of part 1 of the permit application include:

- General information regarding the permit applicant or co-applicants (§ 122.26(d)(1)(i));
- A description of the existing legal authority of the applicant(s) to control pollutants in storm water discharges and a plan to augment legal authority where necessary (§ 122.26(d)(1)(ii));
- Source identification information including: a topographic map, description of the historic use of ordinances or other controls which limited the discharge of non-storm water discharges to municipal separate storm sewer systems, the location of known municipal separate storm sewer outfalls, projected growth, location of structural controls, and location of waste disposal facilities (§ 122.26(d)(1)(iii));
- Information characterizing the nature of system discharges including existing quantitative data, the results of a field screening analysis to detect illicit discharges and illegal dumping to the municipal system, an identification of receiving waters with known water quality impacts associated with storm water discharges, a proposed plan to characterize discharges from the municipal storm sewer system by estimating pollutant loads and the concentration of representative discharges, and a plan to obtain representative data (§ 122.26(d)(1)(iv)); and
- A description of existing structural and non-structural controls to reduce the discharge of pollutants from the municipal storm sewer (§ 122.26(d)(1)(v)).

One commenter disagreed that source identification should be made part of the permit application process beyond the identification of major municipal storm sewer outfalls. In reply, EPA is convinced that the other elements of the source identification are critical for identifying sources of pollutants and creating a base of knowledge from which informed decisions about permit conditions and further data requirements can be determined. One county stated that it already had engaged in extensive monitoring and modeling of watersheds and that its programs should be substituted for EPA's. In response, EPA anticipates that information collected under various State, county or city programs that matches the information requirements in this rulemaking may be used by the applicants in submissions under this rulemaking where the requirements of the rule are met. However, because of the divergence in data collection techniques and information collected by

these programs, EPA disagrees that it would be appropriate to accept a substitution in its entirety without tailoring such a program to today's specific information requirements. One municipality noted that municipal systems are not well documented and responsibility for them is in question. In response, EPA notes that the source identification procedure is designed, in part, to address such shortcomings.

Several municipalities suggested that legal authority could be demonstrated by providing EPA with copies of appropriate local ordinances to demonstrate their legal authority and a statement from the city attorney. EPA agrees that these methods are appropriate for making this demonstration.

Several commenters noted that there was adequate existing municipal legal authority to carry out the program requirements or such authority could be obtained by the municipality. Other commenters stated that municipalities possess some authority over certain activities but may not have authority over discharges from roads and construction. Numerous commenters, however, claimed that certain municipalities had no existing legal authority to carry out the permit requirements and that obtaining all the necessary legal authority could take several years due to cumbersome legislative and political processes. In response, part 1 of the permit application will establish a schedule for the development of legal authority that will be needed to accomplish the goals of the permit application and permits. Some municipalities will have more advanced storm water programs with appropriate legal authority or the ability to establish necessary ordinances. Providing an appropriate schedule will not present difficulties in these circumstances. EPA also notes that the definitions of large and medium municipal separate storm sewer systems finalized in today's rule will in many cases result in a number of co-applicants participating in a system wide application. It is anticipated that the development of adequate inter-jurisdictional agreements specifying the various responsibilities of the co-permittees may in some cases be very complex, thereby justifying the development of a schedule to complete the task. For example, clarifying the authority over discharges from roads may present difficulties where a number of municipal entities operate different roads in a given jurisdiction. In other limited cases, the MEP standard for municipal permits may translate into permit conditions that extend the schedule for obtaining necessary legal authority into the term of the permit. These situations will be evaluated on a case-by-case basis by permit issuing authorities.

Numerous commenters supported the field screening analysis as proposed. Comments from three municipalities noted that it would be a cost effective means of identifying problem areas. One municipality noted that illicit connections can be reliably detected by the screening method proposed. In view of these comments EPA has decided to retain this portion of the regulation. However many commenters expressed concern over how the proposed approach would work given the particular circumstances under which some municipal storm water systems are arranged. Several commenters questioned the effectiveness of dry weather monitoring for several reasons, including the shallow depth of some cities' water tables. Accordingly, an alternative approach may be utilized by the municipal permittee, and this is discussed later in section VI.H.3.

Some comments suggested that if any field screening is required that it be done during the term of the permit. EPA believes that field screening should not be done during the term of the permit exclusively. Unless a field screening is accomplished during the permit application phase there will be scant knowledge, if any, upon which illicit connection programs can be established for the term of the permits. EPA views field screening during the application process as an appropriate means of beginning to meet the CWA's requirement of effectively prohibiting non-storm water discharges into municipal separate storm sewers.

The submittal of part 1 of the permit application will allow EPA, or approved NPDES States, to adjust part 2 permit application requirements to assure flexibility for submitting information under part 2, given the site specific characteristics of each municipal storm sewer system.

EPA agrees with the concerns of commenters regarding the estimate of the reduction of pollutant loads from existing management programs. EPA agrees that sufficient data may not be available to establish meaningful estimates. Therefore this component of the proposed part 1 is not a requirement of today's rule.

b. Part 2 Application. Part 2 of the proposed permit application is designed to supplement information found in part 1 and to provide municipalities with the opportunity of proposing a comprehensive program of structural and non-structural control measures that will control the discharge of pollutants, to the maximum extent practicable, from municipal storm sewers. The components of the proposed part 2 of the permit application included:

- A demonstration that the legal authority of the permit applicant satisfies regulatory criteria (§ 122.26(d)(2)(i));
- Supplementation of the source identification information submitted in part 1 of the application to assure the identification of all major outfalls and land use activities (§ 122.26(d)(2)(ii);
- Information to characterize discharges from the municipal system;
- A proposed management program to control the discharge of pollutants to the maximum extent practicable, from municipal storm sewers (§ 122.26(d)(2)(iv));
- Assessment of the performance of proposed controls (§ 122.26(d)(2)(v));
- A financial analysis estimating the cost of implementing the proposed management programs along with identifying sources of revenue § 122.26(d)(2)(vi);
- A description of the roles and responsibilities of co-applicants (§ 122.26(d)(2)(vii)).

One municipality agreed that the assessment of the performance of controls was a critical component of establishing a viable program and one that could be accomplished within the time frame of the permit application deadlines. One commenter suggested that the applicant describe what financial resources are currently available. In response, EPA will require applicants to describe the municipality's existing budget for storm water programs in part 1 of the permit application requirements. This information will be useful to evaluate the municipality's ability to prepare and implement management plans. In response to other comments, this information will also include an overview of the municipality's financial resources and a description of the municipality's budget, including overall indebtedness and assets.

EPA has retained the financial analysis in this portion of the rule on the advice of two municipal commenters, who agreed that this was an important component of establishing a viable program and one that could be accomplished within the time frame of the permit application deadlines. Another commenter noted that this requirement is appropriate to justify a municipality's proposed management plan.

3. Major Outfalls

In past rulemakings, a controversial issue has been the appropriate sampling requirements for municipal separate storm sewer systems. Earlier storm water rulemakings have been based primarily on the principle that all discharges to waters of the United States from municipal separate storm sewers located in urban areas must be covered by an individual permit. This approach requires that individual permit applications contain quantitative data to be submitted for all such discharges. This approach was criticized because of a potentially unmanageable number of outfalls in some municipal separate storm sewer systems. Most incorporated cities with a population of 100,000 or more do not know the exact number of outfalls from their municipal systems; but based on the comments, the number ranges from 500 to 8,000 or more.

In light of the increased flexibility provided by the WQA and the development of EPA's system-wide approach for regulating municipal separate storm sewer discharges, today's rule will not require submittal of individual permit applications with quantitative data for each outfall of a municipal system. Rather today's rule will encourage system-wide permit applications to provide information suitable for developing effective storm water management programs. Under this approach, not all outfalls of the municipal system will be sampled, but rather more specific and accurate models for estimating pollutant loads and discharge concentrations will be used. The use of these models will require the identification of sources which are responsible for discharging pollutants into municipal separate storm sewers and will not require as much data to calibrate due to the source-specific nature of the model. A number of standard and localized models have been developed for estimating pollutant loads from storm water discharges.

Several commenters support the use of models for developing management plans and estimating pollutant loadings and concentrations. EPA encourages their use where applicable to particular systems.

By adopting an approach that incorporates source identification measures, the amount of quantitative data required to characterize discharges from the municipal system will be reduced because of the increased accuracy of the site-specific models which can be used. Consistent with a system-wide permit application approach, EPA proposed to focus source identification measures on "major outfalls." The proposed definition of major outfalls includes any municipal separate storm sewer outfall that discharges from a pipe with a diameter of more than 36 inches or its equivalent (discharges from a drainage area of more than 50 acres), or for municipal separate storm sewers that receive storm water from lands zoned for industrial activities, an outfall that discharges from a pipe with a diameter of more than 12 inches or its equivalent (discharges from a drainage area of 2 acres or more).

Numerous entities offered comments on this definition. Several commenters concurred with this proposed definition. One commenter maintained that the data collected at such outfalls would be sufficient to estimate pollutant loads as well as concentrations using well calibrated models. Another municipality stated that 50 acres was an excellent approximation for the average drainage area served by a 36-inch storm sewer. Two States and one county supported the definition as proposed. One large municipal entity supported the definition, stating that screening major outfalls could be accomplished with available staff over a three month period. In light of these comments, EPA has decided to retain, in part, the definition as proposed.

Numerous commenters suggested alternative definitions or otherwise disagreed with the proposed definition. Most of these comments expressed concern about the number of outfalls that would have to be tested or screened if the definition was retained. For this reason EPA has decided to limit the total number of major outfalls or equivalent sampling points that have to be tested to 250 or 500 for medium or large systems respectively. This change is discussed in further detail below.

The following are examples of comments that opposed the definition of a "major outfall" as proposed. Several commenters stated that, in the southwest, 6 to 12 foot outfalls are the norm, and that smaller outfalls should not be addressed unless there is a compelling reason to suspect illicit connections. One commenter suggested a size of 54 inches and 50 acres, while another commenter suggested that 48 inches would be appropriate. One commenter suggested that the diameter for industrial pipes should be 18 inches, while another commenter suggested that 50 acres should be the only criterion.

One commenter noted that pipe size will vary according to rainfall patterns and that a single approach would not work universally. This comment, and other similar points of view as noted herein, convinces that Agency that a more flexible approach is needed to identify field screening and sampling locations. However, EPA is also convinced that a universal standard is necessary for purposes of identifying drainage areas within the municipal system and discrete areas of land use that are drained by certain sized outfalls. This information is critical since these conveyances, and lands they drain, are sources of pollutants to waters of the United States from municipal systems and are properly the subject of appropriate permit conditions.

Many commenters suggested placing a limit on the number of major outfalls addressed during the field screening phase of the permit application. Two municipalities stated that the proposed definition of major outfalls in terms to the pipe diameter was too small and that too many outfalls would be covered. One municipality stated that under the proposed definition, it would have over 4700 "major outfalls," a number viewed as being unacceptably large. Several municipalities argued that they would be penalized for over-design of their storm drain system. One municipality stated field screening of outfalls should be limited to 200 for medium cities and 500 for large cities. Some commenters suggested EPA set a percentage of major outfalls for screening, because all pipes in some municipalities meet the definition of major outfall. One commenter suggested that a sliding scale be used to determine the number of outfalls tested: those with 50 test all, those with 100–200 test 50%, etc. Other commenters suggested a flat percentage of outfalls or flat number such as 100.

4. Field Screening Program

EPA also received several comments in response to the proposed field screening methodology. Among the major concerns were: End of pipe sampling may not be practical and the more appropriate and accessible location is likely to be the nearest upstream manhole; the type of discharge should be the criterion for selecting sampling points as opposed to pipe size; a system wide evaluation is more appropriate than checking each outfall; within some systems, major outfalls or pipe size will not reflect discharges from suspect or old land use areas; efforts should be focused on locations where illicit connections are expected; sites should be determined by looking at sites within drainage basin areas based on land use within those basins; land use and hydrology of the watershed should be the criteria for selecting points;

screening should be performed at locations that will allow for the location of upstream discharges; the focus should be exclusively on drainage areas rather than pipe size, since pipe size will vary with slope; a prescribed percentage of total flow may be more appropriate; state water quality standards should be utilized along with focusing on actual quality in the reaches of a stream.

EPA is convinced by these comments that today's rule should allow applicants to either field screen all major outfalls as proposed (first procedure) or use a second procedure to provide for the strategic location of sampling points to pinpoint illicit connections. EPA agrees with comments that the size of the outfall will not always reflect the chance of uncovering illicit connections or discharges, and that field screening points should be easily accessible.

This second procedure is as follows: field screening points and/or outfalls are randomly located throughout the storm sewer system by placing a grid over a drainage system map and identifying those cells of the grid which contain a major outfall or segment of the storm sewer system. The grid shall be established using the following guidelines and criteria:

(1) A grid system consisting of perpendicular north-south and east-west lines spaced 1/4 mile apart shall be overlaid on a map of the municipal storm sewer system, creating a series of cells;

(2) All cells that contain a segment of the storm sewer system shall be identified; one field screening point shall be selected in each cell; major outfalls may be used as field screening points;

(3) Field screening points or major outfalls should be located downstream of any sources of suspected illegal or illicit activity;

(4) Field screening points shall be located to the degree practicable at the farthest manhole or other accessible location downstream in the system, within each cell; however, safety of personnel and accessibility of the location should be considered in making this determination;

(5) The assessment and selection of cells shall use the following criteria: Hydrological conditions; total drainage area of the site; population density of the site; traffic density; age of the structures or buildings in the area; history of the area; land use types;

(6) For medium municipal separate storm sewer systems, no more than 250 cells need have identified field screening points; in large municipal separate storm sewer systems, no more than 500 cells need to have identified field screening points for detecting illicit connections; cells established by the grid that contain no storm sewer segments will be eliminated from consideration; if fewer than 250 cells in medium municipal sewers are created, and fewer than 500 in large systems are created by the overlay on the municipal sewer map, then all those cells which contain a segment of the sewer system shall be subject to field screening (unless access to the separate storm sewer system is impossible);

(7) Large or medium municipal separate storm sewer systems which are unable to utilize the procedures described in paragraphs (1) through (6) above, because a sufficiently detailed map of the separate storm sewer systems is unavailable, shall field screen at least 250 or 500 major outfalls respectively using the following method: the applicant shall establish a grid system consisting of north-south and east-west lines spaced 1/4 mile apart overlaid on a map of the boundaries of a large or medium municipal entity described at § 122.26(b), thereby creating a series of cells; major outfalls in as many different cells as possible shall be selected until 500 major outfalls (large municipalities) or 250 major outfalls (medium municipalities) are selected; a field screening analysis shall be undertaken at these major outfalls.

The methodology outlined above is in response to public comments which indicated that the field screening and sampling of major outfalls as proposed would lead to insurmountable logistical problems in some municipal systems. EPA believes that the above is an effective approach to pinpointing suspected problem points along a given trunkline or segment of separate storm sewer system. Jurisdictions with no extensive or previous history of monitoring, or lack of an intensive monitoring program can utilize the methods described in establishing a program. Furthermore, the approach will allow for the prioritization of outfalls, sampling points, or areas within the municipality where there are suspected illicit connections or discharges, or other circumstances creating higher concentrations and loadings of pollutants.

Paragraph (7) enables municipalities to select major outfalls without regard to the municipal sewer system map that is required for using the procedure described in paragraphs (1) through (6). However, the applicant must still select outfalls within the cells created by overlaying a 1/4 mile grid over a map of the boundaries of the large or medium municipal entity defined under § 122.26(b), and select major outfalls within as many of those cells as possible, up to 500 (large municipal systems) or 250 (medium municipal systems). In this manner, as many different areas and land uses within the municipal system will be covered by the field screening component of the municipal application.

In order to keep the costs of the program within the anticipated limits of the proposed regulation, the number of outfalls or sampling locations using the grid system is to be limited to 500 for large municipal separate storm sewer systems and 250 for medium municipal separate storm sewer systems.

In response to several comments, EPA has clarified the definition of major outfalls with regard to the words, "pipe with an inside diameter of 36 inches or more or its equivalent" and "a pipe with an inside diameter of 12 inches or more or its equivalent." This definition has been modified to specify that single pipes or single conveyances with the appropriate diameter or equivalent are covered.

EPA's proposal required municipal permit applicants to submit a fiscal analysis of expenditures that will be required in order to implement the proposed management plans required in part 2 of the application. The description of fiscal resources should include a description of the source of the funds. Some commenters felt that a fiscal analysis should only be required during the term of the permit. In response, EPA believes that during the two years of permit application development, the permit applicant should be in a position to submit information on the ability and means for financing storm water management programs during the term of the permit. EPA views this information as an important means of evaluating the scope of program and whether the permittee will be devoting adequate resources to implementing the program before that program is mapped out in the permit itself.

5. Source Identification

The identification of sources which contribute pollutants to municipal separate storm sewers is a critical step in characterizing the nature and extent of pollutants in discharges and in developing appropriate control measures. Source identification can be useful for providing an analysis of pollutant source contribution and for identifying the relationship between pollutant sources and receiving water quality problems. In cases where end-of-pipe controls alone are not practicable, it is essential to identify the source of pollutants into the municipal storm

sewer systems to support a targeted approach to control pollutant sources.

The relative contribution of pollutants from various sources will be highly site-specific. The first step in developing a targeted approach for controlling pollutants in discharges from municipal storm sewer systems is identifying the various sources in each drainage basin that will contribute pollutants to the municipal storm sewer system.

This rulemaking phases in the source identification requirements of the permit program by establishing minimum objectives in part 1 of the application and by requiring applicants to submit a source identification plan in part 2 of the application to provide additional information during the term of the permit. The minimum source identification requirements of part 1 of the application have been designed to provide sufficient information to provide an initial characterization of pollutants in the discharges from the municipal storm sewer system. EPA realizes that with many large, complex municipal storm sewer systems, it may be difficult to identify all outfalls during the permit application process. Accordingly, EPA is requiring that known outfalls be reported in part 1 of the application. Par 1 of the application will also include: A description of procedures and a proposed program to identify additional major outfalls; the identification of the drainage area associated with known outfalls; a description of major land use classifications in each drainage area, descriptions of soils, the location of industrial facilities, open dumps, landfills or RCRA hazardous waste facilities which discharge storm water to the municipal storm sewer system; and ten year projections of population growth and development activities (population data and development projections will be useful for future predictions of loadings to receiving waters from municipal storm sewer systems, and capacities required for treatment systems). In general, population projections should reflect various scenarios of development (high, medium, low relative to recent trends).

Part 2 of the application will supplement the information reported in part 1 of the application so that, at a minimum, all major outfalls are identified.

Under today's rule, municipal or public entities responsible for applying for and obtaining an NPDES permit will be required to identify the location of an open dump, sanitary landfill, municipal incinerator or hazardous waste treatment, storage, and disposal facility under RCRA which may discharge storm water to the system as well as all facilities which discharge storm water associated with industrial activity into a large or medium municipal separate storm sewer system.

Requiring these source identification measures is supported by the legislative history of section 405 of the WQA, which instructs that "[i]n writing any permit for a municipal separate storm sewer, EPA or the State should pay particular attention to the nature and uses of the drainage area and the location of any industrial facility, open dump, landfill, or hazardous waste treatment, storage, or disposal facility which may contribute pollutants to the discharge." (emphasis added) [Vol 133 Cong. Rec. S752 (daily ed. Jan. 14, 1987].

One municipality questioned the purpose of the topographic map and commented that the scale of the topographic map is too large to indicate any of the required outfall, drainage, industrial or structural control information. In response, the purpose of the topographic map is to identify receiving waters, major storm water sewer lines that contribute discharges to these waters, and potential sources of storm water pollution. EPA disagrees that a USGS 7.5 scale map is inappropriate for identifying these features within a municipal system. The scale afforded by such a map provides sufficient detail to allow specified delineation of outfalls, while not requiring an overly burdensome map in terms of size. Numerous commenters noted the value of source identification information and generally supported submitting this information in the permit application.

Many commenters questioned the value of the source identification information for the purpose of characterizing pollutant loads and concentrations. Conversely, one commenter opined that the requirement would provide sufficient information to estimate pollutant loadings from each outfall using loading models to estimate loadings by watershed. In response, the source identification information serves several purposes. It is the first step for identifying potential sources of pollutants from which more in depth analysis can be accomplished, under the discharge characterization component of the application. Also, where appropriate, it may be used in conjunction with models to estimate loadings and concentrations. EPA has also taken note of the many comments that question or dismiss the concept of determining pollutant loads and concentrations solely from source identification. Accordingly, EPA is convinced that at least some of the sampling requirements as proposed are necessary to facilitate more accurate system specific estimates of pollutant concentrations and loadings. These are discussed below, in the discharge characterization section.

One commenter suggested that aerial photos be submitted in lieu of topographic maps. EPA agrees that an aerial photograph of the appropriate scale that communicates the same information as a topographic map may be substituted. Today's final rule reflects this flexibility.

The source identification component of the municipal application also requires that municipal applicants identify the industrial activity within the drainage area associated with each major outfall. One commenter stated that where multiple storm sewers outfalls discharge to a stream reach, municipalities should be allowed to delineate a single sewer-shed for identifying sources of industrial activity. In response, the rule does not delimit an applicant's ability to identify industries in groups according to a common series of storm sewer outfalls, if that is an easier or more appropriate methodology for that particular applicant. However, EPA would view this as appropriate only where the land use is of one type, such as industrial. Where land use is mixed within the drainage area associated with each major outfall, such differences need to be identified.

In response to comments, to the extent that EPA is requesting that applicants identify the types of industrial facilities operating within the municipality, the municipality is free to use Standard Industrial Classification (SIC) or other systems which identify the principal products or services of the facility. One commenter disagreed with EPA's decision to require a list of water bodies that are listed under CWA sections 304(1), 319(a), 314(a), and 320, because the States already have this information and that requesting it from permittees could result in "omissions, misunderstandings, and mistakes." EPA believes that these waters should be identified in the application so that appropriate permit conditions can be developed that address storm water discharges that are adversely effecting such waters. EPA believes that having this information immediately at the disposal of the municipality and the permit writer will speed the process and alert the municipality of storm water discharges to listed water bodies and potentially polluted storm water discharges to those waters.

6. Characterization of Discharges

The characterization plan and data collection required in today's rule as elements of Part-one and Part-two of the municipal permit application is comprised of several major components:

- A screening analysis to provide information to develop a program for detecting and controlling illicit connections and illegal dumping to the municipal separate storm sewer system;
- Initial quantitative data to allow the development of a representative sampling program to be incorporated as a permit condition;
- System-wide estimates of annual pollutant loadings and the mean concentration of pollutants in storm water discharges, and a schedule to provide estimates during the term of the permit for each major outfall of the seasonal pollutant loadings and the event mean concentration of pollutants in storm water discharges; and
- An identification of receiving waters with known water quality impacts associated with storm water discharges.

Several commenters noted the importance of developing and targeting management programs based on discharge characterization data and monitoring. Numerous other commenters stressed the importance of a program to identify and eliminate illicit connections and improper disposal. EPA agrees that discharge characterization is an important component of developing management programs. Most of the discharge characterization components of the municipal application procedure have been retained as proposed. However some changes and clarifications have been made, and these are noted below.

a. *Screening analysis for illicit discharges (part 1 of application).* Illicit discharges (non-storm water discharges without a NPDES permit), and illegal dumping to municipal separate storm sewer systems occur in a relatively haphazard manner. Due to the unpredictability of such discharges, today's permit applications require a field analysis for the development of priorities for detecting and controlling such discharges. A field screening approach will provide a means of detecting high levels of pollutants in dry weather flows, which is one indicator of illicit connections. Results of a field test of such discharges will provide further information about the nature of the discharge to determine if further investigation is warranted. Visual observation of dry weather flows has been shown to be one the most effective means for tracking down illicit connections and improper disposal.

As discussed in greater detail in section VI.H.7.b of today's preamble, EPA is proposing to require that municipal applicants submit a comprehensive plan to develop a program to detect and control illicit connections and illegal dumping. In order to develop appropriate priorities for these programs, applicants shall submit the results of a screening analysis to be performed on major outfalls or "field screening points" in the systems to detect the presence of illicit hookups and illegal dumping. The results of the screening analysis, referred to as the field screen, would be reported in part 1 of the permit application.

Under the requirements for a field screen, the applicant or co-applicants will submit a description of observations of dry weather discharges from major outfalls or "field screening points" identified in part 1 of the application. At a minimum, the field screen would include a description of visual observations made during a dry weather period. If any flow is observed during a dry weather period, two grab samples will be collected during a 24 hour period with a minimum period of four hours between samples. For all such samples, a description of the color, odor, turbidity, the presence of an oil sheen or surface scum as well as any other relevant observation regarding the potential presence of non-storm water discharges or illegal dumping would be provided. In addition, the applicant should provide the results of a field screen which includes on-site estimates of pH, total chlorine, total copper, total phenol, detergents (or surfacants) along with a description of the flow. EPA is not requiring analytical methods approved under 40 CFR part 136 be used exclusively in the field screen. Rather, the use of inexpensive field sampling techniques such as the use of colormetric detection methods is anticipated. Where the field screen does not involve analytical methods approved under 40 CFR part 136, the applicant is required to provide a description of the method used which includes the name of the manufacturer of the test method, including the range and accuracy of the test. Appropriate field techniques for a field screen of dry weather discharges are discussed in EPA guidance for municipal storm water discharge permit applications.

It should be clarified that data from the field screen is generally not appropriate for comprehensive evaluation of water quality impacts, or estimating pollutant loadings. Rather, the information from the field screen in part 1 of the application will be used along with other information, such as the age of development and degree of industrial activity in the drainage basin, to identify areas or outfalls which are appropriate targets for management programs and for investigations directed at identifying and controlling non-storm water discharges to separate storm sewers during the term of the permit.

In the December 7, 1988, proposal, EPA proposed a second phase of the screening analysis requiring that wet-weather and dry-weather samples be collected and analyzed in accordance with analytical methods approved under 40 CFR part 136 from designated major outfalls for a larger set of pollutants identified with illicit connections. Comments essentially viewed this proposal as too ambitious for the permit application. One commenter recommended that this procedure could best be accomplished during the term of the permit. Some comments maintained that the collection of analytical samples as a follow up to an initial field screen analysis was not the most cost-effective, practicable or efficient method for pinpointing illicit connections. EPA recognizes that several municipal programs to detect and control illicit connections and other non-storm water discharges have been successfully developed and implemented without the use of extensive analytical sampling (for example, programs in Fort Worth, TX and Washtenaw County, MI). After identifying and analyzing the comments on this aspect of the proposal EPA has withdrawn this element of the proposal from today's rule. EPA believes that a follow-up phase to the initial field screening is more appropriate during the term of the permit. Thus, EPA has dropped the field screening requirement proposed for Part 2 of the application.

b. *Representative data (Part 2 of application).* The NURP study showed that pollutant concentrations in urban runoff can exhibit significant variation. Pollutant concentrations in such discharges vary during storm events and from storm event to storm event. Given the complex, variable nature of storm water discharges from municipal systems, EPA favors a permit scheme where the collection of representative data is primarily a task that will be accomplished through monitoring programs during the term of the permit. Permit writers have the necessary flexibility to develop monitoring requirements that more accurately reflect the true nature of highly variable and complex discharges.

Today's rule provides for an initial assessment of the quality of discharges from municipal separate storm sewers based primarily on source identification measures and existing information received in the permit application. This information will be used to begin to characterize system discharges. The analysis developed under this approach will not rely soley on sampling data collected during the application process, but will also incorporate existing data bases such as the one developed under the NURP study. Today's rule requires that some quantitative data will be collected to ensure the system discharges can be appropriately represented by the various existing data bases and to provide a basis for developing a monitoring plan to be implemented as a permit condition.

Today's rule requires that quantitative data be submitted for discharges from selected storm events at between 5 and 10 outfalls or field screening points. The municipality will recommend and the Director will then designate the outfalls or field screening points as representative of the commercial, residential and industrial land use activities of the drainage area contributing to the system, on the basis of information received in part 1 of the application. The applicant will be required to collect samples of a storm discharge from three storm events occurring one month apart for each designated outfall or field screening point. This is a modification to the December 7, 1988, proposal wherein only one of the 5 to 10 outfalls was to be sampled during three storm events, and the remaining sampled only once. This requirement may be modified by the Director if the type and frequency of storm events require different sampling. The Director may require samples of discharges to be collected during snow melts or during specified seasons. The Director may also require additional testing during a single event if it is unlikely that there will be three storm events suitable for sampling during the year. Furthermore, the Director may allow exemptions to the three storm event requirement when climatic conditions create good cause for such exemptions; for example, arid regions or areas experiencing drought conditions during the period when applications are developed could be exempted.

EPA has added requirements to sample more storm events in response to comments that the sampling procedure proposed would not necessarily yield representative data. Commenters indicated that: rain events of different intensity may yield different levels and types of pollutants; a rain event after a dry spell of several months will not be representative when compared to rain events occurring closer together, due to the build up of constituents; one sample may reflect short term effects such as improper disposal rather than long term effects; and that rain events are generally too variable to rely on the limited sampling as proposed. Clearly the data collected from sampling storm water discharges has a tendency to vary greatly. The more sampling that is accomplished, the greater extent to which this variability may be accounted for and appropriate management programs developed.

In selecting the amount of data to be collected during the permit application process, EPA has attempted to balance the usefulness of this data against the economic and logistical constraints in actually obtaining it. In some cases the data obtained will support initial loading and concentration estimates obtained using various modeling techniques, from which appropriate permit conditions can be developed. Data obtained may be supplemented with further data collection during the term of the permit.

EPA believes that the requirement that selected major municipal outfalls or "field screening points" be sampled for more than one event will provide verification that the characterization of discharge is valid. Where an ongoing sampling program is defined for the term of the permit, samples taken during the first few years of this period can be used to verify the application results. If a municipality or an industry questions the conclusions drawn from the characterization sampling, it may at its discretion choose to perform additional sampling to either confirm or dispel these concerns.

All samples collected will be analyzed for all pollutants listed in Table II, (organic pollutants), and Table III, (toxic metals, cyanide and total phenol) of appendix D of 40 CFR part 122, and for the pollutants listed in Table M-1 below:

Table M-1

Total suspended solids (TSS).	Total dissolved solids.
COD	BOD_5.
Oil and grease	Fecal coliform.
Fecal streptococcus	pH.
Dissolved phosphorus	
Total ammonia plus organic nitrogen.	Total phosphorus.
Total Kjeldahl nitrogen	Nitrate plus nitrite.

A portion of the NURP program involved monitoring 120 priority pollutants in storm water discharges from lands used for residential, commercial and light industrial activities. The NURP program excluded testing for asbestos and dioxin. Results for seven other organic priority pollutants were not considered valid due to changes in, or constraints on test methods. Seventy-seven priority pollutants were detected in samples of storm water discharges from lands used for residential, commercial and light industries taken during the NURP study, including 14 inorganic and 63 organic pollutants. Table M-2 shows the priority pollutants which were detected in at least ten percent of the discharge samples which were sampled for priority pollutants.

TABLE M-2.—PRIORITY POLLUTANTS DETECTED IN AT LEAST 10% OF NURP SAMPLES

[In percent]

Metals and inorganics	Frequency of detection
Antimony	13
Arsenic	52
Beryllium	12
Cadmium	48
Chromium	58
Copper	91
Cyanides	23
Lead	94
Nickel	43
Selenium	11
Zinc	94
Pesticides:	
Alpha-hexachlorocyclohexane	20
Alpha-endosulfan	19
Chlordane	17
Lindane	15
Halogenated aliphatics:	
Methane, dichloro-	11
Phenols and cresols:	
Phenol	14
Phenol, pentachloro-	19
Phenol, 4-nitro	10
Phthalate esters:	
Phthalate, bis(2-ethylhexyl)	22
Polycyclic aromatic hydrocarbons:	
Chrysene	10
Fluoranthene	16
Phenanthrene	12
Pyrene	15

The NURP data also showed a significant number of these samples exceeded various freshwater water quality criteria. The exceedence of water quality criteria does not necessarily imply that an actual violation of standards will exist in the receiving water body in question. Rather, the enumeration of exceedences serves as a screening function to identify those constituents whose presence in urban storm water runoff may warrant high priority for further evaluation.

Members of this group represent all of the major organic chemical fractions

found in Table II of appendix D of 40 CFR part 122 (volatiles, acid compounds, base/neutrals, pesticides). Today's rule requires testing for all organic constituents in Table II rather than limiting the sampling requirements to the 24 toxic constituents found in the NURP study because they will provide a better description of the discharge at essentially the same cost. (The cost of analyzing samples for organic chemicals strongly depends on the number of major organic chemical fractions tested). The NURP study focused on characterizing storm water discharges from lands used for residential, commercial and light industrial activities. In general, the NURP study did not focus on other sources of pollutants to municipal separate storm sewer systems and, therefore, does not reflect all potential pollutants that may be present in discharges from municipal separate storm sewer systems.

The sampling requirements for the permit application address a limited number of sampling locations but require analysis for a wide range of pollutants. Sampling for a wide range of pollutants as a permit application requirement should provide permit writers with appropriate data to target more specific pollutants when developing requirements for a monitoring program during the term of the permit.

Numerous commenters stated that monitoring for all priority pollutants seemed excessive. However, EPA is convinced that it is more appropriate for permit conditions to focus on and prioritize particular pollutant problems after data covering a broad spectrum of pollutants are developed. As noted above, NURP identified 77 priority pollutants in urban runoff, but only from residential, commercial, and light industrial (*e.g.* industrial parks) areas. One municipal entity stated that this approach is a reasonable and realistic means of providing some useful baseline data, while others recommended sampling a variety of parameters that are included in Tables M-1 and M-2. Another municipal entity stated that characterization of outfall discharge quality during storm events is necessary as a means of targeting source control activities.

EPA is working with the United States Geological Survey (USGS) to evaluate the availability of USGS technical assistance to municipalities through cooperative funding programs to aid in collecting representative quantitative data of storm water discharges from municipal systems.

USGS data collection programs with municipalities typically include storm water discharge samples obtained at various times during a storm hydrograph event. Various USGS field procedures can be used to obtain discharge data for pipes, culverts, etc., typically found in urban areas. Pollutant models can be calibrated with data and long-term rainfall records to simulate the quality of system discharges and compared to other storm water models.

In addition, EPA recognizes that many municipalities have participated in studies, such as NURP, that involve sampling of urban runoff as well as other components of discharges from municipal separate storm sewer systems. All existing storm water sampling data along with relevant water quality data, sediment data, fish tissue data or biosurvey data taken over the last ten years is considered relevant and, under today's rule, must be submitted with part I of the application. Sampling data that is submitted must be accompanied with a narrative description of the drainage area served by the outfall monitored, a description of the sampling and quality control program, and the location of receiving water monitoring.

EPA requested comments on the use of existing data, such as that generated under the NURP study, to satisfy the requirement of providing representative sampling data. Commenters did not agree on the value of NURP results as an indicator of representative data. Several commenters expressed the view that existing data could be used to satisfy in whole or in part the representative sampling requirements of the storm water permit application. However, commenters generally did not offer suggested criteria that could be used to verify the validity of existing data. One commenter believed that intensive sampling over a period of ten years in 12 basins, when combined with NURP data, would be adequate.

One commenter supported the use of data, such as that obtained from the NURP study, to target sampling programs. EPA supports such a methodology and has retained this portion of the proposed discharge characterization component. EPA received strong support from an environmental group for retaining this information requirement in part 1 of the application.

In light of these comments EPA believes it is appropriate to retain the representative sampling requirements without resorting to the use of existing data exclusively. Because of the inherent variability in reliability and applicability of existing data, EPA is convinced that a nationally consistent methodology for collecting data is appropriate. This data can then be used in conjunction with other existing data and models to develop appropriate site specific management programs and more generalized management program strategies. Where existing data and data collected under today's rule varies or does not match, further sampling under the term of the permit will be accomplished to more accurately assess the discharge of pollutants.

c. Loading and Concentration Estimates (part 2 of application). The assessment of the water quality impacts of discharges from municipal separate storm sewer systems on receiving waters requires the analysis of both pollutant loadings and concentrations of pollutants in discharges.

The loading and concentration estimates in today's rule will be used to evaluate two types of water quality impacts: (1) Short-term impacts; and (2) long-term impacts. Specifically, the regulation requires estimates of the annual pollutant load of the cumulative discharges to waters of the United States from municipal outfalls and the event mean concentration of the cumulative discharges to waters of the United States municipal outfalls during a storm event for BOD_5, COD, TSS, dissolved solids, total nitrogen, total ammonia plus organic nitrogen, total phosphorus, dissolved phosphorus, cadmium, copper, lead, and zinc. Estimates shall be accompanied by a description of the procedures for estimating constituent loads and concentrations, including any modelling, data analysis, and calculation methods. Municipalities have options in the use of methodologies, including those presented in NURP for calculating loads.

Short term impacts from discharges from municipal separate storm sewers involve changes in water quality that occur during and shortly after storm events. Examples of short-term impacts that can lead to impairments include periodic dissolved oxygen depression due to the oxidation of contaminants, high bacteria levels, fish kills, acute effects of toxic pollutants, contact recreation impairments and loss of submerged macrophytes. Characterization of instream pollutant concentrations based on estimated pollutant concentrations in system discharges are important for evaluating these types of impacts.

Long-term water quality impacts from discharges from municipal separate storm sewers may be caused by contaminants associated with suspended solids that settle in receiving water sediments and by nutrients which enter receiving water systems with long

retention times. Pollutant loading data are important for evaluation of impairments such as loss of storage capacity in streams, estuaries, reservoirs, lakes and bays, lake eutrophication caused by high nutrient loadings, and destruction of benthic habitat. Other examples of the long-term water quality impacts include depressed dissolved oxygen caused by the oxidation of organics in bottom sediments and biological accumulation of toxics as a result of uptake by organisms in the food chain. An estimate of annual pollutant loading associated with discharges from municipal storm water sewer systems is necessary to evaluate the magnitude and severity of the environmental impacts of such discharges and to evaluate the effectiveness of controls which are imposed at a later time.

Municipal storm water sewer systems generally handle runoff from large drainage areas and the sources of pollution are usually very diffuse. The concentrations of many pollutants in discharges from these systems are often low relative to many industrial process and POTW discharges. The water quality impacts of low concentration pollution discharges tend to be cumulative and need to be evaluated in terms of aggregate loadings as well as pollutant concentrations. A site-specific loading analysis can be used to evaluate the relative contribution of various pollutant sources.

7. Storm Water Quality Management Plans

Today's rule facilitates the development of site-specific permit conditions by requiring large and medium municipal permit applicants to submit, along with other information, a description of existing structural and non-structural prevention and control measures on discharges of pollutants from municipal storm sewers in part I of the permit application. Section 122.26(d)(2)(iv) requires the applicant to identify in part 2 of the application, to the degree necessary to meet the MEP standard, additional prevention or control measures which will be implemented during the life of the permit. Although, in many cases, it will not be possible to identify all prevention and control measures that are appropriate as permit conditions, EPA believes that the process of identifying components of a comprehensive prevention and/or control program should begin early and that applicants should be given the opportunity to identify and propose the components of the program that they believe are appropriate for first preventing or controlling discharges of pollutants.

As noted earlier, EPA recognizes that problems associated with storm water, combined sewer overflows (CSOs) and infiltration and inflow (I&I) are all interrelated even though they are treated somewhat differently under the law. EPA believes that it is important to begin linking these programs and activities and, because of the potential cost to local governments, to investigate the use of innovative, nontraditional approaches to reducing or preventing contamination of storm water. The application process for developing municipal storm water management plans provides an ideal opportunity between steps 1 and 2 for considering the full range of nontraditional, preventive approaches.

The permit application requirements in today's rule require the applicant or co-applicants to develop management programs for four types of pollutant sources which discharge to large and medium municipal storm sewer systems. Discharges from large and medium municipal storm sewer systems are usually expected to be composed primarily of: (1) Runoff from commercial and residential areas; (2) storm water runoff from industrial areas; (3) runoff from construction sites; and (4) non-storm water discharges. Part 2 of the permit application has been designed to allow the applicant the opportunity to propose MEP control measures for each of these components of the discharge. Discharges from some municipal systems may also contain pollutants from other sources, such as runoff from land disposal activities (leaking septic tanks, landfills and land application of sewage sludge). Where other sources, such as land disposal, contribute significant amounts of pollutants to a municipal storm sewer system, appropriate control measures should be included on a site-specific basis. Proposed management programs will then be evaluated in the development of permit conditions.

There is some overlap in the manner in which these pollutant sources are characterized and their sources identified. For instance, improper disposal of oil into storm drains is often associated with do-it-yourself automobile oil changes in residential areas, or improper application or over-use of herbicides and pesticides in residential areas can also occur in industrial areas. Also, some control measures will reduce pollutant loads for multiple components of the municipal storm sewer discharge. These measures should be identified under all appropriate places in the application; as discussed below, however, double counting of pollutant removal must be avoided when the total assessment of control measures is performed.

Although many land use programs have multiple purposes, including the reduction of pollutants in discharges from municipal separate storm sewer systems, the proposed management programs in today's rule are intended to address only those controls which can be implemented by the permit applicant or co-applicants. EPA cannot abrogate its responsibilities under the CWA to implement the NPDES permit program by relying on pollution control programs that are outside the NPDES program. For example, municipal permit management programs may not rely exclusively on erosion or sediment control laws for implementing that portion of management programs that address discharges from construction sites, unless such laws implement NPDES permit program requirements entirely and that such implementation is a part of the permit.

EPA anticipates that storm water management programs will evolve and mature over time. The permits for discharges from municipal separate storm sewer systems will be written to reflect changing conditions that result from program development and implementation and corresponding improvements in water quality. The proposed permit applications will require applicants to provide a description of the range of control measures considered for implementation during the term of the permit. Flexibility in developing permit conditions will be encouraged by providing applicants an opportunity to identify in the permit application priority controls appropriate for the initial implementation of management programs. Many commenters endorsed the flexible site-specific storm water program approach as proposed as a method for addressing regional water quality control programs in a cost effective manner. To this extent, EPA agrees with one municipality that management programs should focus on more serious problems and sources of pollutants identified in the municipal system. However, EPA believes that to implement section 402(p)(3), comprehensive storm water management programs which address a number of major sources of pollutants to a system are necessary. Municipal programs should not be focused solely on a single source of pollution, such as illicit connections.

One commenter maintained that management program development

should be flexible enough to allow for consideration of what is attainable based on the area's climate, vegetation, hydrology, and land uses. EPA agrees with this comment. Some strategies for reducing pollutants in the northeast will not be practical in the southwest, such as management programs for deicing activities. The permit application process will determine what strategies are appropriate in different locations.

Several commenters supported addressing storm water pollutant problems through management practices or programs rather than end of pipe controls or treatment. EPA agrees with this comment to the extent that storm water management practices are a general theme of this rulemaking with regard to municipal permits. However, there will be cases where such discharges are best addressed through technology such as retention, detention or infiltration ponds.

One commenter reacted unfavorably to the flexible site-specific management plan approach stating that there is no hard criteria upon which to judge the adequacy of programs. Another commenter felt that there should be a BAT standard for municipal permits. Another commenter stated that the rule should contain specific BMPs that the permittee must comply with. EPA disagrees with these comments. The Clean Water Act requires municipalities to apply for permits that will reduce pollutants in discharges to the maximum extent practicable and sets out the types of controls that are contemplated to deal with storm water discharges from municipalities. The language of CWA section 402(p)(3) contemplates that, because of the fundamentally different characteristics of many municipalities, municipalities will have permits tailored to meet particular geographical, hydrological, and climatic conditions. Management practices and programs may be incorporated into the terms of the permit where appropriate. Permit conditions, which require that storm water management programs be developed and implemented or require specific practices, are enforceable in accordance with the terms of the permit. EPA disagrees with the notion that this regulation, which addressed permit application requirements, should create mandatory permit requirements which may have no legitimate application to a particular municipality. The whole point of the permit scheme for these discharges is to avoid inflexibility in the types and levels of control. Further, to the degree that such mandatory requirements may be appropriate, these requirements should be established under the authority of section 402(p)(6) of the CWA and not in this rulemaking, which addresses permit application requirements.

Some commenters suggested that management programs should be developed as part of the permit conditions and not as part of the permit application. EPA agrees that management programs and their ongoing development should be part of the permit term. However, EPA is convinced, and many commenters agree, that the permit application should contain information on what the permittee has done to date and what it proposes and plans to do during the permit term based upon its discharge characterization and source identification data. This is a reasonable and logical approach and one that meets the intent and letter of section 402(p)(3) of the CWA. As stated above, this would be an appropriate method for implementing storm water management programs that should mature and evolve over time.

Applicants will propose priorities based on a consideration of appropriate controls including, but not limited to, consideration of controls that address: reducing pollutants to municipal separate storm sewer system discharges that are associated with storm water from commercial and residential areas (§ 122.26(d)(2)(iv)(A)); illicit discharges and illegal disposal (§ 122.26(d)(2)(iv)(B)); storm water from industrial areas (§ 122.26(d)(2)(iv)(C)); and runoff from construction sites (§ 122.26(d)(2)(iv)(D)). Permits for different municipalities will place different emphasis on controlling various components of discharges from municipal storm sewers. For example, the potential for cross-connections (such as municipal sewage or industrial process wastewater discharges to a municipal separate storm sewer) is generally expected to be greater in municipalities with older developed areas. On the other hand, municipalities with larger areas of new development will have a greater opportunity to focus controls to reduce pollutants in storm water generated by the area after it is developed, discharges from construction sites, and other planning activities.

EPA requested comments on the process and methods for developing appropriate priorities in management programs proposed in applications and how the development of these priorities can be coordinated with controls on other discharges to ensure the achievement of water quality standards and the goals of the CWA.

Discharges from diffuse sources in residential areas was recognized by several commenters as a significant source of pollutants. Accordingly, these elements of the management plans have been retained. In conjunction with the importance of developing programs for illicit connections, numerous commenters stated that education programs are a priority. Another commenter emphasized that ordinances prohibiting such discharges and their enforcement is a crucial means of a successful program in this regard. EPA agrees with these comments and consequently will retain those portions of management program development that include a description of a program for educational activities such as public information for the proper disposal of oil and toxic materials and the use of herbicides, pesticides and fertilizers.

Some commenters noted that discharge characterization is necessary for development of appropriate management plans. EPA agrees with these comments and has retained the discharge characterization components in this rulemaking. However, EPA disagrees that the results of all discharge characterization procedures (*i.e.*, part 1 and part 2) are necessary to describe and propose a program as required in part 2 of the application. The application of various models is available to permit applicants, where needed, to develop appropriate management programs. All available site specific discharge characterization data should be available to the permit writer to draft appropriate conditions for the term of the permit.

One commenter noted that an important aspect of developing management plans is establishing the necessary legal authority to improve water quality. EPA agrees with this comment and has retained those aspects of the regulation which call for development and attainment of adequate legal authority in both parts of the municipal application.

One commenter stated that programs should address previously identified water quality problems in other programs that are required by section 304(1) of the CWA. EPA agrees that identified water quality problems need to be addressed by management programs, and the municipal permit application will call for an identification of these waters. However, EPA does not endorse addressing these waters to the exclusion of all others within the boundaries of the municipal separate storm sewer system. Some waters may experience substantial degradation after rain events and still not be listed under

section 304(1). Further, water quality impacts in listed waters may not be related to storm water discharges, while other non-listed waters do have water quality impacts from storm water discharges. Similarly, EPA agrees with one commenter that it may be desirable to focus attention and resources on certain problem watersheds within a municipality, and controls may be imposed and programs prioritized on that basis. However, such a focus should not be to the exclusion of other waters and watersheds that have water quality problems (although less troublesome) traceable to storm water discharges. The CWA requires that permits address discharges to waters of the United States, not just waters previously targeted under special programs.

Some commenters expressed concern that the permit application requires the design of management programs before knowing what will be in the permits. EPA disagrees with the thrust of this comment, that is that the order of requirements is inappropriate. The permit applicant will have two years to develop proposed plans which can be considered by permit writers in the development of the permit. Based upon a consideration of the management program proposed by the municipality and other relevant information, permits can be tailored for individual programs. One commenter stated that the cornerstone of management programs are inspection and enforcement programs. EPA agrees that these two elements are important components. Without inspection and enforcement mechanisms the programs will undoubtedly falter. Accordingly these requirements in the description of management programs in the permit application have been retained. In a similar vein, one commenter emphasized the importance of developing legal authority, financial capability, and administrative infrastructure. EPA agrees with this comment and has retained those aspects of the regulation that call for a description of applicants plans and resources in these areas.

One commenter stressed that control of discharges into the municipal system from industries is an important goal of municipal storm water management programs. EPA agrees with this comment and has retained the proposed description of management programs to address discharges from industrial sources. Other commenters identified industries as the principal contributors of pollutants to municipal separate storm sewer systems.

In addition, EPA will continue to evaluate procedures and methods to control storm water discharges to the extent necessary to mitigate impacts on water quality in the studies required under section 402(p)(5) of the CWA. One purpose of these studies will be to evaluate the costs and water quality benefits associated with implementing these procedures and methods. This evaluation will address a number of factors which impact the implementation costs associated with these programs, such as the extent to which similar municipal ordinances are currently being implemented, the degree to which existing municipal programs (such as flood management programs or construction site inspections) can be expanded to address water quality concerns, the resource intensiveness of the control, and whether the control program will involve public or private expenditures. This information, along with information gained during permit implementation will aid in the dynamic long-term development of municipal storm water management programs.

a. *Measures to reduce pollutants in runoff from commercial and residential areas.* The NURP program evaluated runoff from lands primarily dedicated to residential and commercial activities. The areas evaluated in the study reflect some other activities, such as light industry, which are commonly dispersed among residential and commercial areas. The NURP study selected sampling locations that were thought to be relatively free of illicit discharges and storm water from heavy industrial sites including storm water runoff from heavy construction sites. Of course, in a study such as NURP it was impossible to totally isolate various contributions to the runoff. In developing the permit application requirements in today's rule EPA has, in general, relied on the NURP definition of urban runoff—runoff from lands used for residential, commercial and light industrial activities.

NURP and numerous other studies have shown that runoff from residential and commercial areas washes a number of pollutants into receiving waters. Of equal importance is the volume of storm water runoff leaving urban areas during storm events. Large intermittent volumes of runoff can destroy aquatic habitat. As the percentage of paved surfaces increases, the volume and rate of runoff and the corresponding pollutant loads also increase. Thus, the amount of storm water runoff from commercial and residential areas and the pollutant loadings associated with storm water runoff increases as development progresses; and they remain at an elevated level for the lifetime of the development.

Proposed § 122.26(d)(2)(iv)(A) requires municipal storm sewer system applicants to provide in part 2 of the application a description of a proposed management program that will describe priorities for implementing management programs based on a consideration of appropriate controls including:

- A description of maintenance activities and a maintenance schedule for structural controls;
- A description of planning procedures including a comprehensive master plan to control after construction is completed, the discharge of pollutants from municipal separate storm sewers which receive discharges from new development and significant redevelopment after construction is completed (in response to comment this contemplates an engineering policy and procedure strategy with long term planning);
- A description of practices for operating and maintaining public highways and procedures for reducing the impact on receiving waters of such discharges from municipal storm sewer system;
- A description of procedures to assure that flood management projects assess the impacts on the water quality of receiving water bodies; and
- A description of a program to reduce to the maximum extent practicable, pollutants in discharges from municipal separate storm sewers associated with the application of pesticides, herbicides and fertilizer which will include, as appropriate, controls such as educational activities and other measures for commercial applicators and distributors, and controls for application in public right-of-ways and at municipal facilities.

Water quality problems caused by municipal storm sewer discharges will generally be most acute in heavily developed areas. Prevention measures may be desirable and cost effective. However, structural control measures may also be effective, although opportunities for implementing these measures may be limited in previously developed areas. Commonly used structural technologies include a wide variety of treatment techniques, including first flush diversion systems, detention/infiltration basins, retention basins, extended detention basins, infiltration trenches, porous pavement, oil/grit separators, grass swales, and swirl concentrators. A major problem associated with sound storm water management is the need for operating

and maintaining the system for its expected life.

The unavailability of land in highly developed areas often makes the use of structural controls infeasible for modifying many existing systems. Non-structural practices can play a more important role. Non-structural practices can include erosion control, streambank management techniques, street cleaning operations, vegetation/lawn maintenance controls, debris removal, road salt application management and public awareness programs.

As noted above, the first component of the proposed program to reduce pollutants in storm water from commercial and residential areas which discharge to municipal storm sewer systems is to describe maintenance activities and schedule. The second component of the proposed program to reduce pollutants in storm water from commercial and residential areas which discharge to municipal storm sewer systems provides that applicants describe the planning procedures and a comprehensive master plan that will assure that increases of pollutant loading associated with newly developed areas are, to the maximum extent practicable, limited. These measures should address storm water from commercial and residential areas which discharge to the municipal storm sewer that occur after the construction phase of development is completed. Controls for construction activities are addressed later in today's rule. One commenter noted the feasibility of developing management plans for newly developing areas. EPA agrees with this comment and has retained that portion of the regulation that deals with a description of controls for areas of new development. Similarly, one municipality stressed the importance and achievability of addressing storm water discharges from construction sites.

As urban development occurs, the volume of storm water and its rate of discharge increases. These increases are caused when pavement and structures cover soils and destroy vegetation which otherwise would slow and absorb runoff. Development also accelerates erosion through alteration of the land surface. Areas that are in the process of development offer the greatest potential for utilizing the full range of structural and non-structural best management practices. If these measures are to provide controls to reduce pollutant discharges after the area has been developed, comprehensive planning must be used to incorporate these measures as the area is in the process of developing. These measures offer an important opportunity to limit increases in pollutant loads.

The third component of § 122.26(d)(2)(iv)(A) provides a description of practices for operating and maintaining public roads and highways and procedures for reducing the impact on receiving waters of discharges from municipal storm sewer systems. General guidelines recommended for managing highway storm water runoff include litter control, pesticide/herbicide use management, reducing direct discharges, reducing runoff velocity, grassed channels, curb elimination, catchbasin maintenance, appropriate streetcleaning, establishing and maintaining vegetation, development of management controls for salt storage facilities, education and calibration practices for deicing application, infiltration practices, and detention/retention practices.

The fourth component of § 122.26(d)(2)(iv)(A) provides that applicants identify procedures that enable flood management agencies to consider the impact of flood management projects on the water quality of receiving streams. A well-developed storm water management program can reduce the amount of pollutants in storm water discharges as well as benefit flood control objectives. As discussed above, increased development can increase both the quantity of runoff from commercial and residential areas and the pollutant load associated with such discharges. Disturbing the land cover, altering natural drainage patterns, and increasing impervious area all increase the quantity and rate of runoff, thereby increasing both erosion and flooding potential. An integrated planning approach helps planners make the best decisions to benefit both flood control and water quality objectives.

The fifth component of § 122.26(d)(2)(iv)(A) would provide that municipal applicants submit a description of a program to reduce, to the maximum extent practicable, pollutants in discharges from municipal separate storm sewers associated with the application of pesticides, herbicides and fertilizer. Such a program may include controls such as educational activities and other measures for commercial applicators and distributors and controls for application in public rights-of-way and at municipal facilities. Discharges of these materials to municipal storm sewer systems can be controlled by proper application of these materials. Some commenters noted that insecticides used in residential areas are a probable source of pollutants in storm water discharges from residential areas, as well as salting and other de-icing activities. In response to this comment, part of a community management plan may include controls or education programs to limit the impacts of these sources of pollutants. One commenter noted that many communities already have household toxic disposal programs. Where appropriate these can be incorporated into municipal management programs.

Some commenters suggested substituting the management program description for residential and commercial areas with a simple identification of applicable management practices. EPA agrees that identification of appropriate management practices is a critical component of a program description for these areas. In essence, this is what the program description is designed to achieve. However, for the reasons discussed in greater detail above, EPA is convinced that an appropriate program must address all of the components of the management program for residential and commercial areas that are outlined in today's rule. Further, for the purposes of writing a permit with enforceable conditions, the application should identify a schedule to implement management practices. The applicant should be able to estimate the reduction in pollutant loads as a result of the development of certain management practices and programs (§ 122.26(d)(2)(v). A program may also include public education programs, which are not necessarily viewed as traditional BMPs.

b. *Measures for illicit discharges and improper disposal.* The CWA requires that NPDES permits for discharges from municipal storm sewers "shall include a requirement to effectively prohibit non-stormwater discharges into the storm sewers." In today's rule, EPA will begin to implement this statutory mandate by focusing on two types of discharges to large and medium municipal separate storm sewer systems. *See* § 122.26(d)(1)(iv)(D) and (d)(2)(iv)(B). One type of non-storm water discharges are illicit discharges which are plumbed into the system or that result from leakage of sanitary sewage system. The other class of non-storm water discharges result from the improper disposal of materials such as used oil and other toxic materials.

Illicit discharges. In some municipalities, illicit connections of sanitary, commercial and industrial discharges to storm sewer systems have had a significant impact on the water quality of receiving waters Although the

NURP study did not emphasize identifying illicit connections to storm sewers other than to assure that monitoring sites used in the study were free from sanitary sewage contamination, the study concluded that illicit connections can result in high bacterial counts and dangers to public health. The study also noted that removing such discharges presented opportunities for dramatic improvements in the quality of urban storm water discharges.

Other studies have shown that illicit connections to storm sewers can create severe, wide-spread contamination problems. For example, the Huron River Pollution Abatement Program inspected 660 businesses, homes and other buildings located in Washtenaw County, Michigan and identified 14% of the buildings as having improper storm drain connections. Illicit discharges were detected at a higher rate of 60% for automobile related businesses, including service stations, automobile dealerships, car washes, body shops and light industrial facilities. While some of the problems discovered in this study were the result of improper plumbing or illegal connections, a majority were approved connections at the time they were built. Many commenters emphasized the identification and elimination of illicit connections as a priority, including leakage from sanitary sewers. EPA agrees with these comments and intends to retain this portion of the program without modification.

A wide variety of technologies exist for detecting illicit discharges. The effectiveness of these measures largely depends upon the site-specific design of the system. Under today's rule, permit applicants would develop a description of a proposed management program, including priorities for implementing the program and a schedule to implement a program to identify illicit discharges to the municipal storm sewer system. This rulemaking will require the initial priorities for analyzing various portions of the system and the appropriate detection techniques to be used.

Improper disposal. The permit application requirements for municipal storm sewer systems include a requirement that the municipal permit applicant describe a program to assist and facilitate in the proper management of used oil and toxic materials. Improper management of used oil can lead to discharges to municipal storm sewers that in turn may have a significant impact on receiving water bodies. EPA estimates that, annually, 267 million gallons of used oil, including 135 million gallons of used oil from do-it-yourself automobile oil changes, are disposed of improperly. An additional 70 million gallons of used oil, most coming from service stations and repair shops, are used for road oiling. Many commenters emphasized the elimination of discharges composed of improperly disposed of oil and toxic material. One commenter identified motor oil as the major source of oil contamination and that EPA needs to encourage proper disposal of used oil. Several other commenters emphasized the importance of recycling programs for oil. EPA agrees with these comments and intends to retain this portion of the program without modification. One commenter identified public awareness and timely reporting of illegal dumping as critical components of this portion of the program. EPA agrees with this comment and intends for management programs to deal with this problem.

c. *Measures to reduce pollutants in storm water discharges through municipal separate storm sewers from municipal landfills, hazardous waste treatment, disposal and recovery facilities that are subject to section 313 of title III of SARA.* As discussed in section VI.C of today's preamble, industrial facilities that discharge storm water through a large or medium municipal separate storm sewer system are required to apply for a permit under § 122.26(c) or seek coverage under a promulgated general permit. Today's rule also requires the municipal storm sewer permittee to describe a program to address industrial dischargers that are covered under the municipal storm sewer permit. Today's rule requires the municipal applicant to identify such discharges (*see* source identification requirements under § 122.26(d)(2)(ii)), provide a description of a program to monitor pollutants in runoff from certain industrial facilities that discharge to the municipal separate storm sewer system, identify priorities and procedures for inspections, and establish and implement control measures for such discharges. Should a municipality suspect that an individual discharger is discharging pollutants in storm water above acceptable limits, and the owner/operator of the system has no authority over the discharge, the municipality should contact the NPDES permitting authority for appropriate action. Two example of possible action are: if the facility already has an individual permit, the permit may be reopened and further controls imposed; or if the facility is covered by a promulgated general permit, then an individual site-specific permit application may be required.

In the December 7, 1988, proposal, EPA requested comments concerning what storm water discharges from industrial facilities through municipal systems should be monitored. One of the proposed approaches was to require data on portions of the municipal system which receive storm water from facilities which are listed in the proposed regulatory definition at § 122.26(b)(14) of "storm water discharge associated with industrial activity" (with the exception of construction activities and uncontaminated storm water from oil and gas operations) which discharge through the municipal system. However, given the large number of facilities meeting this definition that discharge through municipal systems, a monitoring program that requires the submission of quantitative data regarding portions of the municipal systems receiving storm water from such facilities may not be practicable. Such a requirement could, for some systems, potentially become the most resource intensive requirements in the municipal permit. Therefore, EPA proposed various ways to develop appropriate targeting for monitoring programs.

EPA requested comments on a requirement that, at a minimum, monitoring programs address discharges from municipal separate storm sewer outfalls that contain storm water discharges from municipal landfills, hazardous waste treatment, disposal and recovery facilities, and runoff from industrial facilities that are subject to section 313 of title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA). Section 313 of title III requires that operators or certain facilities that manufacture, import, process, or otherwise use certain toxic chemicals report annually their releases of those chemicals to any environmental media. Section 313(b) of title III specifies that a facility is covered for the purposes of reporting if it meets all of the following criteria.

- The facility has ten or more full-time employees;
- The facility is in Standard Industrial Classification (SIC) codes 20 through 39;
- The facility manufactured (including quantities imported), processed, or otherwise used a listed chemical in amounts that exceed certain threshold quantities during the calendar year for which reporting is required.

Listed chemicals include 329 toxic chemicals listed at 40 CFR 372.45. After 1989, the threshold quantities of listed chemicals that the facility must manufacture, import or process (in order to trigger the submission of a release

report) is 25,000 pounds per year. The threshold for a use other than manufacturing, importing or processing of listed toxic chemicals is 10,000 pounds per year. EPA promulgated a final regulation clarifying these reporting requirements on February 16, 1988, (53 FR 4500).

EPA received numerous comments regarding limiting the types of facilities that are initially subject to monitoring and municipal management programs. Numerous municipalities agreed that focusing on the above facilities is an appropriate means for setting priorities for the development of control measures to eliminate or reduce pollutants associated with industrial facilities. Commenters agreed that the potential for toxic materials in discharges is high because of the high volume of such materials at these facilities and that information regarding discharges and material management practices will be available through section 313 of SARA. One commenter noted that building on an established program will contribute to establishing an effective storm water program. Accordingly, EPA has specified at § 122.26(d)(2)(ii)(C) that the municipal applicant must describe a program that identifies priorities and procedures for inspections and establishing and implementing control measures for these facilities.

Several commenters suggested that these facilities should not be singled out because the presence of the threshold amounts of SARA 313 chemicals does not indicate that significant quantities of those chemicals are likely to enter the facility's storm water runoff. Instead it was suggested that municipalities should monitor storm sewers as a whole to determine what chemicals are present and therefore what facilities are responsible. EPA disagrees with these comments. The object of these requirements is initially to set priorities for monitoring requirements. Then, if the situation requires, controls can be developed and instituted. If a facility is a member of this class of facilities and does not discharge excessive quantities of SARA 313 chemicals, then it may not be subjected to further monitoring and controls. As noted above, the selection of facilities is only a means of setting priorities for facilities for the development of municipal plans.

EPA agrees, however, that there will be other facilities that are significant sources of pollutants and should be addressed by municipalities as soon as possible under managemen programs. Accordingly, those industrial facilities that the municipal permit applicant determines to be contributing a substantial pollutant loading to the municipal storm sewer system shall be addressed in this portion of the municipal management program.

EPA also requested comments on monitoring programs for municipal discharges including the submission of quantitative data on the following constituents;

- Any pollutants limited in an effluent guidelines for the industry subcategories, where applicable;
- Any pollutant listed in a discharging facility's NPDES permits for process wastewater, where applicable;
- Oil and grease, pH, BOD5, COD, TSS, total phosphorus, total Kjeldahl nitrogen, and nitrate plus nitrite nitrogen;
- Any information on discharges required under 40 CFR 122.21(g)(7)(iii) and (iv).

These are the same constituents that are to be addressed in individual permit applicants for storm water discharges associated with industrial activity.

Several industries and municipalities submitted comments on this issue. Some commenters agreed that these are appropriate parameters. Some commenters advised that the ability of municipalities to implement this aspect of the program depended on industries submitting this data. Several industries provided comments suggesting that the approach should allow the permittee flexibility in determining which parameters are chosen because of the burdens of monitoring and the complexity of materials and flows in municipal systems.

In light of these comments, EPA has retained § 122.26(d)(2)(iv)(C) as proposed requiring municipalities to describe a monitoring program which utilizes the above parameters. Monitoring for these parameters provides consistency with the individual application requirements for industries, provides uniformity in municipal applications, and will narrow the parameters to conform to the types of industries discharging into the municipal systems. Monitoring programs may consist of programs undertaken by the municipality exclusively or requirements imposed on industry by the municipality, or a combination of approaches. Appropriate procedures are discussed in municipal permit application guidance.

EPA requested comments on appropriate means for municipalities to determine what facilities are contributing pollutants to municipal systems. Many commenters responded with numerous methodologies. Some of these have been addressed in guidance. Municipalities will have options in selecting the most appropriate methodology given their circumstances as described in their permit applications.

EPA initially favors establishing monitoring requirements to be applied to those outfalls that directly discharge to waters of the United States. EPA received one comment from a municipality with regard to this issue which agreed that this was the most logical approach. Monitoring of outfalls close to the point of discharge to waters of the United States is generally preferable when attempting to identify priorities for developing pollutant control programs. However, under certain circumstances, it may be preferable to monitor at the point where the runoff from the industrial facility discharges to the municipal system. For example, if many facilities discharge substantially similar storm water to a municipal system it may be more practicable to monitor discharges from representative facilities in order to characterize pollutants in the discharge.

As noted by numerous industries, if municipal characterization plans reveal problems from certain industrial dischargers, then such facilities may be required to provide further data from their own monitoring. As noted above, EPA envisions that this data could then be used to develop appropriate control practices or techniques and/or require individual permit applications if a general permit covering the facility proves inadequate.

Comments were also solicited as to whether end-of-pipe treatment generally was more appropriate than source controls for storm water from industrial facilities which discharge to municipal systems. Many commenters, including both municipalities and industries, stated that source controls are the only practical and feasible means of controlling pollutants in storm water runoff, and specifically opposed the concept of end-of-pipe treatment or other controls. Some commenters maintained that, from an economic and environmental standpoint, end-of-pipe treatment may be the only effective means. One advised that the prompt cleanup of spills, controlled wash down of process areas, covering of material loading areas, storm water runoff diversion, covered storage areas, detention basins or other such mechanisms would prevent storm water from mixing with pollutants and possibly discharging them into receiving waters. Another noted that in the urban areas, there is little potential for treatment; consequently, it would seem

that controls and/or retrofitting existing facilities would be necessary when violations are found and that citizens will be better served by source controls appropriate to the individual problem.

EPA agrees with these comments to the extent that source controls and management programs are the general thrust of these regulations. However, in some situations end-of-pipe treatment, such as holding ponds, may be the only reasonable alternative. EPA disagrees with one industrial commenter that the municipalities should be almost entirely responsible for treating municipal discharges at the end of-the-pipe without reliance on source controls by industrial dischargers. Municipal programs may require controls on industrial sources with demonstrated storm water discharge problems. One industrial association noted that its member companies already have incentive to properly handle their materials and facilities because of other environmental programs with spill and erosion controls.

Numerous commenters stated that the program addressing industrial dischargers through municipal systems needs to be clearly defined in order to eliminate, as much as possible, potential conflicts between the system operator and dischargers. EPA has provided a framework for development of management plans to control pollutants from these particular sources. However, because of the differences in municipal systems and hydrology nationwide, EPA is not convinced that program specificity is an appropriate approach. The concept of the management program is to provide flexibility to the permit applicants to develop regional site specific control programs.

One commenter suggested that required controls should be limited to a facility's proportional contribution (based on concentration) of pollutants. EPA disagrees. Most facilities discharging through a municipal separate storm sewer will need to be covered by a general or individual permit. These permits will control the introduction of pollutants from that facility through the municipal storm sewer to the waters of the U.S. Any additional controls placed on the facility by the municipality will be at the discretion of the municipality. EPA is not requiring municipalities to adopt a particular level of controls on industrial facilities as suggested by the commenter.

One commenter questioned how dischargers that discharged both into the waters of the United States and through a municipal system will be addressed and whether there is a potential for inconsistent requirements. Industries that discharge storm water associated with industrial activity into the waters of the United States are required to be covered by individual permits or general permits for such discharges. Dischargers of storm water associated with industrial activity through municipal separate storm sewer systems will be subject to municipal management programs that address such discharges as well as to an individual or general NPDES permit for those discharges. EPA does not believe there is a significant risk of inconsistent requirements, since each industrial facility must meet BAT/BCT-level controls in its NPDES permit. EPA doubts that municipalities will impose much more stringent controls.

Many commenters stated that if cities and municipalities are to be responsible for industrial storm water discharges through their system, then municipalities should have authority to make determinations as to what industries should be regulated, how they are regulated, and when enforcement actions are undertaken. In response, EPA notes that the proposal has been changed and that municipalities will not be solely responsible for industries discharging through their system. Nonetheless, municipalities will be required to meet the terms of their permits related to industrial dischargers. Municipalities may undertake programs that go beyond the threshold requirements of the permit. Some municipal entities stated that municipal permittees should be able to require permit applications from industries in the same manner that EPA does and also require permits. In response, if operators of large and medium municipal separate storm sewer systems wish to employ such a program, then this portion of the management program may incorporate such practices.

d. *Measures to reduce pollutants in runoff from construction sites into municipal systems.* Section VI.F.8 of today's rule discusses EPA's proposal to define the term "storm water discharge associated with industrial activity" to include runoff from construction sites, including preconstruction activities except operations that result in the disturbance of less than 5 acres total land area which are not part of a larger common plan of development or sale. Under today's rule, facilities that discharge runoff from construction sites that meet this definition will be required to submit permit applications unless they are to be covered by another individual or general NPDES permit Permit application requirements for such discharges are at 40 CFR 122.26(c)(1)(ii).

Section 122.26(d)(2)(iv)(D) of today's rule requires applicants for a permit for large or medium municipal separate storm sewer systems to submit a description of a proposed management program to control pollutants in construction site runoff that discharges to municipal systems. Under this provision, municipal applicants will submit a description of a program for implementing and maintaining structural and non-structural best management practices for controlling storm water runoff at construction sites. The program will address procedures for site planning, enforceable requirements for nonstructural and structural best management practices, procedures for inspecting sites and enforcing control measures, and educational and training measures. Generally, construction site ordinances are effective when they are implemented. However, in many areas, even though ordinances exist, they have limited effectiveness because they are not adequately implemented. Maintaining best management practices also presents problems. Retention and infiltration basins fill up and silt fences may break or be overtopped. Weak inspection and enforcement point to the need for more emphasis on training and education to complement regulatory programs. Permits issued to municipalities will address these concerns.

8. Assessment of Controls

EPA proposed that municipal applicants provide an initial assessment of the effectiveness of the control method for structural or non-structural controls which have been proposed in the management program. Some commenters stated that the assessment of controls should be left to the term of the permit because the effectiveness of controls will be hard to establish. EPA believes that an initial estimate or assessment is needed because the performance of appropriate management controls is highly dependent on site-specific factors. The assessment will be used in conjunction with the development of pollutant loading and concentration estimates (*see* VI.H.6.c) and the evaluation of water quality benefits associated with implementing controls. Such assessments do not have to be verified with quantitative data, but can be based on accepted engineering design practices. Further more precise assessments based upon quantitative data can be undertaken during the term of the permit.

I. Annual Reports

As discussed earlier in today's preamble, EPA has provided for proposed flexible permit application requirements to facilitate the development of site-specific programs to control the discharge of pollutants from large and medium municipal separate storm sewer systems. Many municipalities are in the early stages of the complex task of developing a program suitable for controlling pollutants in discharges under a NPDES permit, while other municipalities have relatively sophisticated programs in place. In order to ensure that such site-specific programs are developed in a timely manner, EPA proposed to require permittees of municipal separate storm sewer systems to submit status reports every year which reflect the development of their control programs.

The reports will be used by the permitting authority to aid in evaluating compliance with permit conditions and where necessary, modify permit conditions to address changed conditions. EPA requested comments on the appropriate content of the annual reports. Based on these comments EPA has added the following in these reports: an analysis of data, including monitoring data, that is accumulated throughout the year; new outfalls or discharges; annual expenditures; identification of water quality improvements or degradation on watershed basis; budget for year following each annual report; and administrative information including enforcement activities, inspections, and public education programs. EPA views this information as important for evaluating the municipal program. Annual monitoring data and identified water quality improvements are important for evaluating the success of management programs in reducing pollutants. If new outfalls come into existence during the term of the permit, these may be sources of pollutants and appropriate permit conditions will be developed. Annual reports should reflect the level of enforcement activity and inspections undertaken to ensure that the legal authority developed by the municipality is properly exercised. Many of the management programs depend upon an ongoing high level of public education. Accordingly, the undertaking of these programs on an annual basis should be documented.

J. Application Deadlines

The CWA provided a statutory time frame for implementing the storm water permit application process and issuance and compliance with permits.

The CWA requires EPA to promulgate permit application requirements for storm water discharges associated with industrial activity and for large municipal separate storm sewer systems by "no later than two years" after the date of enactment (*i.e.* no later than February 4, 1989). In conjunction with this requirement, the Act requires that permit applications for these classes of discharges be submitted within one year after the statutory date by which EPA is to promulgate permit application requirements by providing that such applications "shall be filed no later than three years" after the date of enactment of the WQA (*i.e.*, no later than February 4, 1990).

The CWA also requires EPA to promulgate final regulations governing storm water permit application requirements for discharges from municipal separate storm sewer systems serving a population of 100,000 or more but less than 250,000 by "no later than four years" after enactment (*i.e.* no later than February 4, 1991). Permit applications for medium municipal separate storm sewer systems "shall be filed no later than five years" after the date of enactment of the CWA (*i.e.*, no later than February 4, 1992). The CWA did not establish the time period between designation and permit application submittal for case-by-case designations under section 402(p)(2)(E).

Comments on earlier rulemakings involving storm water application deadlines have established that applicants need adequate time to obtain "representative" storm water samples. Many commenters have indicated that at least one full year is needed to obtain such samples. This is because many discharges are located in areas where testing during dry seasons or winter would not be feasible. The intermittent and unpredictable nature of storm water discharges can result in difficult and time-consuming data gathering. Moreover, some operators of municipal separate storm sewer systems have many storm water discharges associated with industrial activity, which can require considerable time to identify, analyze, and submit applications. This creates a tremendous practical problem for the extremely high number of unpermitted storm water discharges. The public's interest in a sound storm water program and the development of a useful storm water data base is best served by establishing an application deadline which will allow sufficient time to gather, analyze, and prepare meaningful applications. Based on a consideration of these factors, EPA proposed that individual permit applications for storm water discharges associated with industrial activity which currently are not covered by a permit and that are required to obtain a permit, be submitted one year after the final rule is promulgated.

EPA received numerous comments from industries on the one year requirement for submitting applications. Several commenters supported the proposed deadline as realistic, while others believed more time was needed to meet the information and quantitative requirement.

EPA rejects the assertion by some commenters that a year is too short a period of time to obtain the required quantitative data. Today's rule generally requires applications for storm water discharges associated with industrial activity to be submitted on or before November 18, 1991. Operators of storm water discharges associated with industrial activity which discharge through a municipal separate storm sewer are subject to the same application deadline as other storm water discharges associated with industrial activity. Since final regulation at § 122.21(g)(7) provides considerable latitude for selecting rain events for quantitative data, EPA is convinced that in most cases data can be obtained during the one year time frame. If data cannot be collected during the one year time frame because of anomalous weather (*e.g.* drought conditions), then permitting authorities may grant additional time for submitting that data on a case-by-case basis. *See* § 122.21(g)(7).

Operators of storm water discharges which are currently covered by a permit will not be required to submit a permit application until their existing permit expires. In recognition of the time required to collect storm water discharge data, EPA will allow facilities which currently have a NPDES permit for a storm water discharge and which must reapply for permit renewal during the first year following promulgation of today's permit application requirements the option of applying in accordance with existing Form 1 and Form 2C requirements (in lieu of applying in accordance with the revised application requirements).

As discussed in section VI.D.4 and section VI.F.6 of today's preamble, EPA has established a two part permit application both for both group applications for sufficiently similar facilities that discharge storm water associated with industrial activity and for operators of large or medium municipal separate storm sewer systems. The deadlines for submitting

permit applications in today's rule provide adequate time for: (1) Applicants to prepare Part 1 of the application; (2) EPA or an approved State to adequately review applications; and (3) applicants to prepare the contents of the part 2 application.

Part 1 of the group application for storm water discharges associated with industrial activity must be submitted within 120 days from the publication of these final permit application regulations. This time is necessary to form groups and for individual members of the group to prepare the non-quantitative information required in part 1 of the application. Part 1 of the group application will be submitted to EPA Headquarters in Washington, DC and reviewed within 60 days after being received. Part 2 of the application would then be submitted within one year after the part 1 application is approved. It should be noted that many facilities located in States in which general permits can be issued, will be eligible for coverage by a storm water general permit to be promulgated in the near future. Such facilities may either seek coverage under such general permits or participate in the group application.

Several comments were received by EPA that indicated that a period of 120 days was too short a period for groups to be formed. EPA disagrees with these comments. The information that EPA is requiring to be submitted by the group or group representative is information that is generally available such as the location of the facility, its industrial activity, and material management practices. EPA believes that 120 days is sufficient to gather and submit this information along with an identification of 10% of the facilities which will submit quantitative data. To ameliorate any difficulties for applicants, EPA has provided a means for late facilities to "add on" where appropriate, on a case-by-case basis, as discussed in section VI.F.4. above.

Several comments were received with regard to the requirement that new dischargers submit an application at least 180 days before the date on which the discharge is to commence. One commenter noted that it will be difficult for a facility to know when a storm water discharge is to commence since precipitation and runoff cannot be predicted to any degree of accuracy. In response, new dischargers must apply for a storm water permit application 180 days before that facility commences manufacturing, processing, or raw material storage operations which may result in the discharge of pollutants from storm water runoff, and 90 days for new construction sites.

For large municipal separate storm sewer systems (systems serving a population of more than 250,000), EPA proposed that part 1 of the permit application be submitted within one year of the date of the final regulations, with approval or disapproval by the permit issuing authority of the provisions of the part 1 permit application within 90 days after receiving part 1 of the application. The Part 2 portion of the application was to be submitted within two years of the date of promulgation.

For medium municipal separate storm sewer systems (systems serving a population of more than 100,000, but less than 250,000), EPA proposed that permit applications would be required nine months after the date of the final rule, with approval or disapproval of the provisions of the part 1 permit application within 90 days after receiving the part 1 application. The part 2 portion of the application would then be submitted no later than one year after the part 1 application has been approved.

Numerous comments were received by EPA from municipalities on these proposed deadlines. Many of these comments reflect the sentiment that the deadlines are too tight and that the required information would not be available for submission within the required time frame. Some commenters suggested deadlines that would add over three years to the permit application process. Other commenters suggested a revamped application process and a shorter deadline of 18 months. Some commenters explained that additional time would be needed to obtain adequate legal authority, while another stated that an inventory of outfalls required more time. One commenter maintained that intergovernmental agreements will require more time to prepare, and others expressed the view that more time was needed for the review of part 1 of the application by permitting authorities. Others felt more time was needed for collecting data, or hiring additional staff to accomplish the work. Most of these commenters did not provide specific details regarding what would be an appropriate amount of time and why.

After reviewing these comments EPA has decided to modify some of the deadlines as proposed. EPA is convinced that to properly achieve the goals of the CWA, the permit application requirements as discussed in previous sections are appropriate; but that the deadlines for medium municipal separate storm sewer systems should be adjusted so that the program's goals can be properly accomplished. After reviewing comments, EPA believes that medium municipalities will have fewer resources and existing institutional arrangements than large cities and therefore more time should be granted to these cities for submitting parts 1 and 2 of the application.

Accordingly EPA will require large municipal systems to submit part 1 of the permit application no later than November 18, 1991. Part 1 will be reviewed and approved or disapproved by the Director within 90 days. Part 2 of the application will then be submitted November 16, 1992. Medium municipal systems will submit part 1 of the application on May 18, 1992. Approval or disapproval by the Director will be accomplished within 90 days. Part 2 of the application will be submitted by May 17, 1993. These deadlines will give large systems two years to complete the application process, and medium systems 2 years and 6 months to submit applications. EPA is convinced that the permit application schedule is warranted and should provide adequate time to prepare the application.

In establishing these regulatory deadlines EPA is fully aware that they are not synchronized with the statutory deadlines as established by Congress. One commenter argued that the deadlines as proposed were contrary to the deadlines established by Congress and that EPA had no authority to extend these deadlines. (For large municipal separate storm sewer systems and storm water discharges associated with industrial activity, Congress established a deadline of February 4, 1990, for submission of permit applications; for medium municipal separate storm sewer systems, the deadline is February 4, 1992.) In response, this regulation provides certain deadlines for meeting the substantive requirements of this rulemaking—requirements which EPA is convinced are necessary for the development of enforceable and sound storm water permits. EPA believes it is important to give applicants sufficient time to reasonably comply with the permit application requirements set out today. EPA will therefore accept applications for storm water discharge permits up to the dates specified in today's rule. By establishing these regulatory deadlines, however, EPA is not attempting to waive or revoke the statutory deadlines established in Section 402(p) of the CWA and does not assert the authority to do so. The statutory permit application deadlines

continue to be enforceable requirements.

EPA was not able to promulgate the final application regulations for storm water discharges before the February 4, 1990, deadline for industrial and large municipal dischargers despite its best efforts. Further, as noted above, EPA is not able to waive the statutory deadline. Dischargers concerned with complying with the statutory deadline should submit a permit application as required under this rulemaking as expeditiously as possible.

Operators of storm water discharges that are not specifically required to file a permit application under today's rule may be required to obtain a permit for their discharge on the basis of a case-by-case designation by the Administrator or the NPDES State.

The Administrator or NPDES State may also designate storm water discharges (except agricultural storm water discharges), that contribute to a violation of a water quality standard or that are significant contributors of pollutants to waters of the United States for a permit. Prior to a case-by-case determination that an individual permit is required for a storm water discharge, the Administrator or NPDES State may require the operator of the discharge to submit a permit application. 40 CFR 124.52(c) requires the operator of designated storm water discharges to submit a permit application within 60 days of notice, unless permission for a later date is granted. The 60-day deadline is consistent with the procedures for designating other discharges for a NPDES permit on a case-by-case basis found at 40 CFR 124.52. The 60-day deadline recognizes that case-by-case designations often require an expedited response, however, flexibility exists to allow for case-by-case extensions.

The December 7, 1988, proposal also proposed Part 504 State Storm Water Management Programs. The Agency has not included this component in today's rule. The Agency believes this program element is appropriate for addressing in regulations promulgated under section 402(p)(6) of the CWA.

VII. Economic Impact

EPA has prepared an Information Collection Request for the purpose of estimating the information collection burden imposed on Federal, State and local governments and industry for revisions to NPDES permit application requirements for storm water discharges codified in 40 CFR part 122. EPA is promulgating these revisions in response to Section 402(p)(4) of the Clean Water Act, as amended by the Water Quality Act of 1987 (WQA). The revisions would apply to: Storm water discharges associated with industrial activity; discharges from municipal separate storm sewer systems serving a population of 250,000 or more and discharges from municipal separate storm sewer systems serving a population of 100,000 or more, but less than 250,000.

The estimated annual cost of applying for NPDES permits for discharges from municipal separate storm sewer systems is $4.2 million. EPA estimates that an average permit application for a large municipality will cost $76,681 and require 4,534 hours to prepare. The average application for a medium municipality will cost $49,249 (2,912 hours) to prepare. The annual respondent cost for NPDES permit applications, notices of intent, and notifications for facilities with discharges associated with industrial activity is estimated to be $9.5 million (271,248 hours). EPA estimates that the average preparation cost of an individual industrial permit application would be $1,007 (28.6 hours). Average Group application will cost $74.00 per facility (2.1 hours). The average cost of the notification and notice of intent to be covered by general permit is $17.00 (0.5 hours).

The annual cost to the Federal Government and approved States for administration of the program is estimated to be $588,603. The total cost for municipalities, industry, and State and Federal authorities is estimated to be $14.5 million annually.

In general, the cost estimates provided in the ICR focus primarily on the costs associated with developing, submitting and reviewing the permit applications associated with today's rule. EPA will continue to evaluate procedures and methods to control storm water discharges to the extent necessary to mitigate impacts on water quality in the studies required under section 402(p)(5) of the CWA. Executive Order 12291 requires EPA and other agencies to perform regulatory analyses of major regulations. Major rules are those which impose a cost on the economy of $100 million or more annually or have certain other economic impacts. Today's proposed amendments would generally make the NPDES permit application regulations more flexible and less burdensome for the regulated community. These regulations do not, satisfy any of the criteria specified in section 1(b) of the Executive Order and, as such, do not constitute a major rule. This regulation was submitted to the Office of Management and Budget (OMB) for review.

VIII. Paperwork Reduction Act

The information collection requirements in this rule have been submitted for approval to the Office of Management and Budget (OMB) under provision of the Paperwork Reduction Act, 44 U.S.C. 3501 *et seq.* and have been assigned OMB control number 2040-0086.

Public reporting burden for permit applications for storm water discharges associated with industrial activity (other than from construction facilities) is estimated to average 28.6 hours per individual permit application, 0.5 hours per notice of intent to be covered by general permit, and 2.1 hours per group applicant. The public reporting burden for permit applications for storm water discharges associated with industrial activity from construction activities submitting individual applications is estimated to average 4.5 hours per response. The public reporting burden for facilities which discharge storm water associated with industrial activity to municipal separate storm sewers serving a population over 100,000 to notify the operator of the municipal separate storm sewer system is estimated to average 0.5 hours per response.

The reporting burden for system-wide permit applications for discharges from municipal separate storm sewer systems serving a population of 250,000 or more is estimated to average 4,534 hours per response. The reporting burden for system-wide permit applications for discharges from municipal separate storm sewer systems serving a population of 100,000 or more, but less than 250,000 is estimated to average 2,912 hours per response. Estimates of reporting burden include time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information.

IX. Regulatory Flexibility Act

Under the Regulatory Flexibility Act, 5 U.S.C. 601 *et seq.*, EPA is required to prepare a Regulatory Flexibility Analysis to assess the impact of rules on small entities. No Regulatory Flexibility Analysis is required, however, where the head of the agency certifies that the rule will not have a significant economic impact on a substantial number of small entities.

Today's amendments to the regulations would generally make the NPDES permit applications regulations more flexible and less burdensome for permittees. Accordingly, I hereby

certify, pursuant to 5 U.S.C. 605(b), that these amendments do not, have a significant impact on a substantial number of small entities.

List of Subjects in 40 CFR Parts 122, 123, and 124

Administrative practice and procedure, Environmental protection, Reporting and recordkeeping requirements, Water pollution control.

Authority: Clean Water Act, 33 U.S.C. 1251 *et seq.*

Dated: October 31, 1990.

William K. Reilly,

Administrator.

For the reasons stated in the preamble, parts 122, 123, and 124 of title 40 of the Code of Federal Regulations are amended as follows:

PART 122—EPA ADMINISTERED PERMIT PROGRAMS; THE NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM

Subpart B—Permit Application and Special NPDES Program Requirements

1. The authority citation for part 122 continues to read as follows:

Authority: Clean Water Act, 33 U.S.C. 1251 *et seq.*

2. Section 122.1 is amended by revising paragraph (b)(2)(iv) to read as follows:

§ 122.1 Purpose and scope.

* * * * *

(b) * * *

(2) * * *

(iv) Discharges of storm water as set forth in § 122.26; and

* * * * *

3. Section 122.21 is amended by revising paragraph (c)(1), by removing the last sentence of paragraph (f)(7), by removing paragraph (f)(9), by adding two sentences at the end of paragraph (g)(3), by revising paragraph (g)(7) introductory text, by removing and reserving paragraph (g)(10) and by revising the introductory text of paragraph (k) to read as follows:

§ 122.21 Application for a permit (applicable to State programs, see § 123.25).

* * * * *

(c) *Time to apply.* (1) Any person proposing a new discharge, shall submit an application at least 180 days before the date on which the discharge is to commence, unless permission for a later date has been granted by the Director. Facilities proposing a new discharge of storm water associated with industrial activity shall submit an application 180 days before that facility commences industrial activity which may result in a discharge of storm water associated with that industrial activity. Facilities described under § 122.26(b)(14)(x) shall submit applications at least 90 days before the date on which construction is to commence. Different submittal dates may be required under the terms of applicable general permits. Persons proposing a new discharge are encouraged to submit their applications well in advance of the 90 or 180 day requirements to avoid delay. See also paragraph (k) of this section and § 122.26 (c)(1)(i)(G) and (c)(1)(ii).

* * * * *

(g) * * *

(3) * * * The average flow of point sources composed of storm water may be estimated. The basis for the rainfall event and the method of estimation must be indicated.

* * * * *

(7) *Effluent characteristics.* Information on the discharge of pollutants specified in this paragraph (except information on storm water discharges which is to be provided as specified in § 122.26). When "quantitative data" for a pollutant are required, the applicant must collect a sample of effluent and analyze it for the pollutant in accordance with analytical methods approved under 40 CFR part 136. When no analytical method is approved the applicant may use any suitable method but must provide a description of the method. When an applicant has two or more outfalls with substantially identical effluents, the Director may allow the applicant to test only one outfall and report that the quantitative data also apply to the substantially identical outfalls. The requirements in paragraphs (g)(7) (iii) and (iv) of this section that an applicant must provide quantitative data for certain pollutants known or believed to be present do not apply to pollutants present in a discharge solely as the result of their presence in intake water; however, an applicant must report such pollutants as present. Grab samples must be used for pH, temperature, cyanide, total phenols, residual chlorine, oil and grease, fecal coliform and fecal streptococcus. For all other pollutants, 24-hour composite samples must be used. However, a minimum of one grab sample may be taken for effluents from holding ponds or other impoundments with a retention period greater than 24 hours. In addition, for discharges other than storm water discharges, the Director may waive composite sampling for any outfall for which the applicant demonstrates that the use of an automatic sampler is infeasible and that the minimum of four (4) grab samples will be a representative sample of the effluent being discharged. For storm water discharges, all samples shall be collected from the discharge resulting from a storm event that is greater than 0.1 inch and at least 72 hours from the previously measurable (greater than 0.1 inch rainfall) storm event. Where feasible, the variance in the duration of the event and the total rainfall of the event should not exceed 50 percent from the average or median rainfall event in that area. For all applicants, a flow-weighted composite shall be taken for either the entire discharge or for the first three hours of the discharge. The flow-weighted composite sample for a storm water discharge may be taken with a continuous sampler or as a combination of a minimum of three sample aliquots taken in each hour of discharge for the entire discharge or for the first three hours of the discharge, with each aliquot being separated by a minimum period of fifteen minutes (applicants submitting permit applications for storm water discharges under § 122.26(d) may collect flow weighted composite samples using different protocols with respect to the time duration between the collection of sample aliquots, subject to the approval of the Director). However, a minimum of one grab sample may be taken for storm water discharges from holding ponds or other impoundments with a retention period greater than 24 hours. For a flow-weighted composite sample, only one analysis of the composite of aliquots is required. For storm water discharge samples taken from discharges associated with industrial activities, quantitative data must be reported for the grab sample taken during the first thirty minutes (or as soon thereafter as practicable) of the discharge for all pollutants specified in § 122.26(c)(1). For all storm water permit applicants taking flow-weighted composites, quantitative data must be reported for all pollutants specified in § 122.26 except pH, temperature, cyanide, total phenols, residual chlorine, oil and grease, fecal coliform, and fecal streptococcus. The Director may allow or establish appropriate site-specific sampling procedures or requirements, including sampling locations, the season in which the sampling takes place, the minimum duration between the previous measurable storm event and the storm event sampled, the minimum or maximum level of precipitation required for an appropriate storm event, the form of precipitation sampled (snow melt or rain fall), protocols for collecting samples under 40 CFR part 136, and additional time for submitting data on a

case-by-case basis. An applicant is expected to "know or have reason to believe" that a pollutant is present in an effluent based on an evaluation of the expected use, production, or storage of the pollutant, or on any previous analyses for the pollutant. (For example, any pesticide manufactured by a facility may be expected to be present in contaminated storm water runoff from the facility.)

* * * * *

(k) *Application requirements for new sources and new discharges.* New manufacturing, commercial, mining and silvicultural dischargers applying for NPDES permits (except for new discharges of facilities subject to the requirements of paragraph (h) of this section or new discharges of storm water associated with industrial activity which are subject to the requirements of § 122.26(c)(1) and this section (except as provided by § 122.26(c)(1)(ii)) shall provide the following information to the Director, using the application forms provided by the Director:

* * * * *

4. Section 122.22(b) introductory text is revised to read as follows:

§ 122.22 Signatories to permit applications and reports (applicable to State programs, see § 123.25).

* * * * *

(b) All reports required by permits, and other information requested by the Director shall be signed by a person described in paragraph (a) of this section, or by a duly authorized representative of that person. A person is a duly authorized representative only if:

* * * * *

5. Section 122.26 is revised to read as follows:

§ 122.26 Storm water discharges (applicable to State NPDES programs, see § 123.25).

(a) *Permit requirement.* (1) Prior to October 1, 1992, discharges composed entirely of storm water shall not be required to obtain a NPDES permit except:

(i) A discharge with respect to which a permit has been issued prior to February 4, 1987;

(ii) A discharge associated with industrial activity (see § 122.26(a)(4));

(iii) A discharge from a large municipal separate storm sewer system;

(iv) A discharge from a medium municipal separate storm sewer system;

(v) A discharge which the Director, or in States with approved NPDES programs, either the Director or the EPA Regional Administrator, determines to contribute to a violation of a water quality standard or is a significant contributor of pollutants to waters of the United States. This designation may include a discharge from any conveyance or system of conveyances used for collecting and conveying storm water runoff or a system of discharges from municipal separate storm sewers, except for those discharges from conveyances which do not require a permit under paragraph (a)(2) of this section or agricultural storm water runoff which is exempted from the definition of point source at § 122.2. The Director may designate discharges from municipal separate storm sewers on a system-wide or jurisdiction-wide basis. In making this determination the Director may consider the following factors:

(A) The location of the discharge with respect to waters of the United States as defined at 40 CFR 122.2.

(B) The size of the discharge;

(C) The quantity and nature of the pollutants discharged to waters of the United States; and

(D) Other relevant factors.

(2) The Director may not require a permit for discharges of storm water runoff from mining operations or oil and gas exploration, production, processing or treatment operations or transmission facilities, composed entirely of flows which are from conveyances or systems of conveyances (including but not limited to pipes, conduits, ditches, and channels) used for collecting and conveying precipitation runoff and which are not contaminated by contact with or that has not come into contact with, any overburden, raw material, intermediate products, finished product, byproduct or waste products located on the site of such operations.

(3) *Large and medium municipal separate storm sewer systems.* (i) Permits must be obtained for all discharges from large and medium municipal separate storm sewer systems.

(ii) The Director may either issue one system-wide permit covering all discharges from municipal separate storm sewers within a large or medium municipal storm sewer system or issue distinct permits for appropriate categories of discharges within a large or medium municipal separate storm sewer system including, but not limited to: all discharges owned or operated by the same municipality; located within the same jurisdiction; all discharges within a system that discharge to the same watershed; discharges within a system that are similar in nature; or for individual discharges from municipal separate storm sewers within the system.

(iii) The operator of a discharge from a municipal separate storm sewer which is part of a large or medium municipal separate storm sewer system must either:

(A) Participate in a permit application (to be a permittee or a co-permittee) with one or more other operators of discharges from the large or medium municipal storm sewer system which covers all, or a portion of all, discharges from the municipal separate storm sewer system;

(B) Submit a distinct permit application which only covers discharges from the municipal separate storm sewers for which the operator is responsible; or

(C) A regional authority may be responsible for submitting a permit application under the following guidelines:

(*1*) The regional authority together with co-applicants shall have authority over a storm water management program that is in existence, or shall be in existence at the time part 1 of the application is due;

(*2*) The permit applicant or co-applicants shall establish their ability to make a timely submission of part 1 and part 2 of the municipal application;

(*3*) Each of the operators of municipal separate storm sewers within the systems described in paragraphs (b)(4) (i), (ii), and (iii) or (b)(7) (i), (ii), and (iii) of this section, that are under the purview of the designated regional authority, shall comply with the application requirements of paragraph (d) of this section.

(iv) One permit application may be submitted for all or a portion of all municipal separate storm sewers within adjacent or interconnected large or medium municipal separate storm sewer systems. The Director may issue one system-wide permit covering all, or a portion of all municipal separate storm sewers in adjacent or interconnected large or medium municipal separate storm sewer systems.

(v) Permits for all or a portion of all discharges from large or medium municipal separate storm sewer systems that are issued on a system-wide, jurisdiction-wide, watershed or other basis may specify different conditions relating to different discharges covered by the permit, including different management programs for different drainage areas which contribute storm water to the system.

(vi) Co-permittees need only comply with permit conditions relating to discharges from the municipal separate storm sewers for which they are operators.

(4) *Discharges through large and medium municipal separate storm sewer systems.* In addition to meeting the requirements of paragraph (c) of this section, an operator of a storm water discharge associated with industrial activity which discharges through a large or medium municipal separate storm sewer system shall submit, to the operator of the municipal separate storm sewer system receiving the discharge no later than May 15, 1991, or 180 days prior to commencing such discharge: the name of the facility; a contact person and phone number; the location of the discharge; a description, including Standard Industrial Classification, which best reflects the principal products or services provided by each facility; and any existing NPDES permit number.

(5) *Other municipal separate storm sewers.* The Director may issue permits for municipal separate storm sewers that are designated under paragraph (a)(1)(v) of this section on a system-wide basis, jurisdiction-wide basis, watershed basis or other appropriate basis, or may issue permits for individual discharges.

(6) *Non-municipal separate storm sewers.* For storm water discharges associated with industrial activity from point sources which discharge through a non-municipal or non-publicly owned separate storm sewer system, the Director, in his discretion, may issue: a single NPDES permit, with each discharger a co-permittee to a permit issued to the operator of the portion of the system that discharges into waters of the United States; or, individual permits to each discharger of storm water associated with industrial activity through the non-municipal conveyance system.

(i) All storm water discharges associated with industrial activity that discharge through a storm water discharge system that is not a municipal separate storm sewer must be covered by an individual permit, or a permit issued to the operator of the portion of the system that discharges to waters of the United States, with each discharger to the non-municipal conveyance a co-permittee to that permit.

(ii) Where there is more than one operator of a single system of such conveyances, all operators of storm water discharges associated with industrial activity must submit applications.

(iii) Any permit covering more than one operator shall identify the effluent limitations, or other permit conditions, if any, that apply to each operator.

(7) *Combined sewer systems.* Conveyances that discharge storm water runoff combined with municipal sewage are point sources that must obtain NPDES permits in accordance with the procedures of § 122.21 and are not subject to the provisions of this section.

(8) Whether a discharge from a municipal separate storm sewer is or is not subject to regulation under this section shall have no bearing on whether the owner or operator of the discharge is eligible for funding under title II, title III or title VI of the Clean Water Act. *See* 40 CFR part 35, subpart I, appendix A(b)H.2.j.

(b) *Definitions.* (1) *Co-permittee* means a permittee to a NPDES permit that is only responsible for permit conditions relating to the discharge for which it is operator.

(2) *Illicit discharge* means any discharge to a municipal separate storm sewer that is not composed entirely of storm water except discharges pursuant to a NPDES permit (other than the NPDES permit for discharges from the municipal separate storm sewer) and discharges resulting from fire fighting activities.

(3) *Incorporated place* means the District of Columbia, or a city, town, township, or village that is incorporated under the laws of the State in which it is located.

(4) *Large municipal separate storm sewer system* means all municipal separate storm sewers that are either:

(i) Located in an incorporated place with a population of 250,000 or more as determined by the latest Decennial Census by the Bureau of Census (appendix F); or

(ii) Located in the counties listed in appendix H, except municipal separate storm sewers that are located in the incorporated places, townships or towns within such counties; or

(iii) Owned or operated by a municipality other than those described in paragraph (b)(4) (i) or (ii) of this section and that are designated by the Director as part of the large or medium municipal separate storm sewer system due to the interrelationship between the discharges of the designated storm sewer and the discharges from municipal separate storm sewers described under paragraph (b)(4) (i) or (ii) of this section. In making this determination the Director may consider the following factors:

(A) Physical interconnections between the municipal separate storm sewers;

(B) The location of discharges from the designated municipal separate storm sewer relative to discharges from municipal separate storm sewers described in paragraph (b)(4)(i) of this section;

(C) The quantity and nature of pollutants discharged to waters of the United States;

(D) The nature of the receiving waters; and

(E) Other relevant factors; or

(iv) The Director may, upon petition, designate as a large municipal separate storm sewer system, municipal separate storm sewers located within the boundaries of a region defined by a storm water management regional authority based on a jurisdictional, watershed, or other appropriate basis that includes one or more of the systems described in paragraph (b)(4) (i), (ii), (iii) of this section.

(5) *Major municipal separate storm sewer outfall* (or "major outfall") means a municipal separate storm sewer outfall that discharges from a single pipe with an inside diameter of 36 inches or more or its equivalent (discharge from a single conveyance other than circular pipe which is associated with a drainage area of more than 50 acres); or for municipal separate storm sewers that receive storm water from lands zoned for industrial activity (based on comprehensive zoning plans or the equivalent), an outfall that discharges from a single pipe with an inside diameter of 12 inches or more or from its equivalent (discharge from other than a circular pipe associated with a drainage area of 2 acres or more).

(6) *Major outfall* means a major municipal separate storm sewer outfall.

(7) *Medium municipal separate storm sewer system* means all municipal separate storm sewers that are either:

(i) Located in an incorporated place with a population of 100,000 or more but less than 250,000, as determined by the latest Decennial Census by the Bureau of Census (appendix G); or

(ii) Located in the counties listed in appendix I, except municipal separate storm sewers that are located in the incorporated places, townships or towns within such counties; or

(iii) Owned or operated by a municipality other than those described in paragraph (b)(4) (i) or (ii) of this section and that are designated by the Director as part of the large or medium municipal separate storm sewer system due to the interrelationship between the discharges of the designated storm sewer and the discharges from municipal separate storm sewers described under paragraph (b)(4) (i) or (ii) of this section. In making this determination the Director may consider the following factors:

(A) Physical interconnections between the municipal separate storm sewers;

(B) The location of discharges from the designated municipal separate storm sewer relative to discharges from municipal separate storm sewers described in paragraph (b)(7)(i) of this section;

(C) The quantity and nature of pollutants discharged to waters of the United States;

(D) The nature of the receiving waters; or

(E) Other relevant factors; or

(iv) The Director may, upon petition, designate as a medium municipal separate storm sewer system, municipal separate storm sewers located within the boundaries of a region defined by a storm water management regional authority based on a jurisdictional, watershed, or other appropriate basis that includes one or more of the systems described in paragraphs (b)(7) (i), (ii), (iii) of this section.

(8) *Municipal separate storm sewer* means a conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, or storm drains):

(i) Owned or operated by a State, city, town, borough, county, parish, district, association, or other public body (created by or pursuant to State law) having jurisdiction over disposal of sewage, industrial wastes, storm water, or other wastes, including special districts under State law such as a sewer district, flood control district or drainage district, or similar entity, or an Indian tribe or an authorized Indian tribal organization, or a designated and approved management agency under section 208 of the CWA that discharges to waters of the United States;

(ii) Designed or used for collecting or conveying storm water;

(iii) Which is not a combined sewer; and

(iv) Which is not part of a Publicly Owned Treatment Works (POTW) as defined at 40 CFR 122.2.

(9) *Outfall* means a *point source* as defined by 40 CFR 122.2 at the point where a municipal separate storm sewer discharges to waters of the United States and does not include open conveyances connecting two municipal separate storm sewers, or pipes, tunnels or other conveyances which connect segments of the same stream or other waters of the United States and are used to convey waters of the United States.

(10) *Overburden* means any material of any nature, consolidated or unconsolidated, that overlies a mineral deposit, excluding topsoil or similar naturally-occurring surface materials that are not disturbed by mining operations.

(11) *Runoff coefficient* means the fraction of total rainfall that will appear at a conveyance as runoff.

(12) *Significant materials* includes, but is not limited to: raw materials; fuels; materials such as solvents, detergents, and plastic pellets; finished materials such as metallic products; raw materials used in food processing or production; hazardous substances designated under section 101(14) of CERCLA; any chemical the facility is required to report pursuant to section 313 of title III of SARA; fertilizers; pesticides; and waste products such as ashes, slag and sludge that have the potential to be released with storm water discharges.

(13) *Storm water* means storm water runoff, snow melt runoff, and surface runoff and drainage.

(14) *Storm water discharge associated with industrial activity* means the discharge from any conveyance which is used for collecting and conveying storm water and which is directly related to manufacturing, processing or raw materials storage areas at an industrial plant. The term does not include discharges from facilities or activities excluded from the NPDES program under 40 CFR part 122. For the categories of industries identified in paragraphs (b)(14) (i) through (x) of this section, the term includes, but is not limited to, storm water discharges from industrial plant yards; immediate access roads and rail lines used or traveled by carriers of raw materials, manufactured products, waste material, or by-products used or created by the facility; material handling sites; refuse sites; sites used for the application or disposal of process waste waters (as defined at 40 CFR part 401); sites used for the storage and maintenance of material handling equipment; sites used for residual treatment, storage, or disposal; shipping and receiving areas; manufacturing buildings; storage areas (including tank farms) for raw materials, and intermediate and finished products; and areas where industrial activity has taken place in the past and significant materials remain and are exposed to storm water. For the categories of industries identified in paragraph (b)(14)(xi) of this section, the term includes only storm water discharges from all the areas (except access roads and rail lines) that are listed in the previous sentence where material handling equipment or activities, raw materials, intermediate products, final products, waste materials, by-products, or industrial machinery are exposed to storm water. For the purposes of this paragraph, material handling activities include the storage, loading and unloading, transportation, or conveyance of any raw material, intermediate product, finished product, by-product or waste product. The term excludes areas located on plant lands separate from the plant's industrial activities, such as office buildings and accompanying parking lots as long as the drainage from the excluded areas is not mixed with storm water drained from the above described areas. Industrial facilities (including industrial facilities that are Federally, State, or municipally owned or operated that meet the description of the facilities listed in this paragraph (b)(14)(i)–(xi) of this section) include those facilities designated under the provisions of paragraph (a)(1)(v) of this section. The following categories of facilities are considered to be engaging in "industrial activity" for purposes of this subsection:

(i) Facilities subject to storm water effluent limitations guidelines, new source performance standards, or toxic pollutant effluent standards under 40 CFR subchapter N (except facilities with toxic pollutant effluent standards which are exempted under category (xi) in paragraph (b)(14) of this section);

(ii) Facilities classified as Standard Industrial Classifications 24 (except 2434), 26 (except 265 and 267), 28 (except 283), 29, 311, 32 (except 323), 33, 3441, 373;

(iii) Facilities classified as Standard Industrial Classifications 10 through 14 (mineral industry) including active or inactive mining operations (except for areas of coal mining operations no longer meeting the definition of a reclamation area under 40 CFR 434.11(1) because the performance bond issued to the facility by the appropriate SMCRA authority has been released, or except for areas of non-coal mining operations which have been released from applicable State or Federal reclamation requirements after December 17, 1990) and oil and gas exploration, production, processing, or treatment operations, or transmission facilities that discharge storm water contaminated by contact with or that has come into contact with, any overburden, raw material, intermediate products, finished products, byproducts or waste products located on the site of such operations; (inactive mining operations are mining sites that are not being actively mined, but which have an identifiable owner/operator; inactive mining sites do not include sites where mining claims are being maintained prior to disturbances associated with the extraction, beneficiation, or processing of mined

materials, nor sites where minimal activities are undertaken for the sole purpose of maintaining a mining claim);

(iv) Hazardous waste treatment, storage, or disposal facilities, including those that are operating under interim status or a permit under subtitle C of RCRA;

(v) Landfills, land application sites, and open dumps that receive or have received any industrial wastes (waste that is received from any of the facilities described under this subsection) including those that are subject to regulation under subtitle D of RCRA;

(vi) Facilities involved in the recycling of materials, including metal scrapyards, battery reclaimers, salvage yards, and automobile junkyards, including but limited to those classified as Standard Industrial Classification 5015 and 5093;

(vii) Steam electric power generating facilities, including coal handling sites;

(viii) Transportation facilities classified as Standard Industrial Classifications 40, 41, 42 (except 4221–25), 43, 44, 45, and 5171 which have vehicle maintenance shops, equipment cleaning operations, or airport deicing operations. Only those portions of the facility that are either involved in vehicle maintenance (including vehicle rehabilitation, mechanical repairs, painting, fueling, and lubrication), equipment cleaning operations, airport deicing operations, or which are otherwise identified under paragraphs (b)(14) (i)–(vii) or (ix)–(xi) of this section are associated with industrial activity;

(ix) Treatment works treating domestic sewage or any other sewage sludge or wastewater treatment device or system, used in the storage treatment, recycling, and reclamation of municipal or domestic sewage, including land dedicated to the disposal of sewage sludge that are located within the confines of the facility, with a design flow of 1.0 mgd or more, or required to have an approved pretreatment program under 40 CFR part 403. Not included are farm lands, domestic gardens or lands used for sludge management where sludge is beneficially reused and which are not physically located in the confines of the facility, or areas that are in compliance with section 405 of the CWA;

(x) Construction activity including clearing, grading and excavation activities except: operations that result in the disturbance of less than five acres of total land area which are not part of a larger common plan of development or sale;

(xi) Facilities under Standard Industrial Classifications 20, 21, 22, 23, 2434, 25, 265, 267, 27, 283, 285, 30, 31 (except 311), 323, 34 (except 3441), 35, 36, 37 (except 373), 38, 39, 4221–25, (and which are not otherwise included within categories (ii)–(x));

(c) *Application requirements for storm water discharges associated with industrial activity*—(1) *Individual application.* Dischargers of storm water associated with industrial activity are required to apply for an individual permit, apply for a permit through a group application, or seek coverage under a promulgated storm water general permit. Facilities that are required to obtain an individual permit, or any discharge of storm water which the Director is evaluating for designation (*see* 40 CFR 124.52(c)) under paragraph (a)(1)(v) of this section and is not a municipal separate storm sewer, and which is not part of a group application described under paragraph (c)(2) of this section, shall submit an NPDES application in accordance with the requirements of § 122.21 as modified and supplemented by the provisions of the remainder of this paragraph. Applicants for discharges composed entirely of storm water shall submit Form 1 and Form 2F. Applicants for discharges composed of storm water and non-storm water shall submit Form 1, Form 2C, and Form 2F. Applicants for new sources or new discharges (as defined in § 122.2 of this part) composed of storm water and non-storm water shall submit Form 1, Form 2D, and Form 2F.

(i) Except as provided in § 122.26(c)(1)(ii)–(iv), the operator of a storm water discharge associated with industrial activity subject to this section shall provide:

(A) A site map showing topography (or indicating the outline of drainage areas served by the outfall(s) covered in the application if a topographic map is unavailable) of the facility including: each of its drainage and discharge structures; the drainage area of each storm water outfall; paved areas and buildings within the drainage area of each storm water outfall, each past or present area used for outdoor storage or disposal of significant materials, each existing structural control measure to reduce pollutants in storm water runoff, materials loading and access areas, areas where pesticides, herbicides, soil conditioners and fertilizers are applied, each of its hazardous waste treatment, storage or disposal facilities (including each area not required to have a RCRA permit which is used for accumulating hazardous waste under 40 CFR 262.34); each well where fluids from the facility are injected underground; springs, and other surface water bodies which receive storm water discharges from the facility;

(B) An estimate of the area of impervious surfaces (including paved areas and building roofs) and the total area drained by each outfall (within a mile radius of the facility) and a narrative description of the following: Significant materials that in the three years prior to the submittal of this application have been treated, stored or disposed in a manner to allow exposure to storm water; method of treatment, storage or disposal of such materials; materials management practices employed, in the three years prior to the submittal of this application, to minimize contact by these materials with storm water runoff; materials loading and access areas; the location, manner and frequency in which pesticides, herbicides, soil conditioners and fertilizers are applied; the location and a description of existing structural and non-structural control measures to reduce pollutants in storm water runoff; and a description of the treatment the storm water receives, including the ultimate disposal of any solid or fluid wastes other than by discharge;

(C) A certification that all outfalls that should contain storm water discharges associated with industrial activity have been tested or evaluated for the presence of non-storm water discharges which are not covered by a NPDES permit; tests for such non-storm water discharges may include smoke tests, fluorometric dye tests, analysis of accurate schematics, as well as other appropriate tests. The certification shall include a description of the method used, the date of any testing, and the on-site drainage points that were directly observed during a test;

(D) Existing information regarding significant leaks or spills of toxic or hazardous pollutants at the facility that have taken place within the three years prior to the submittal of this application;

(E) Quantitative data based on samples collected during storm events and collected in accordance with § 122.21 of this part from all outfalls containing a storm water discharge associated with industrial activity for the following parameters:

(1) Any pollutant limited in an effluen guideline to which the facility is subject;

(2) Any pollutant listed in the facility's NPDES permit for its process wastewater (if the facility is operating under an existing NPDES permit);

(3) Oil and grease, pH, BOD5, COD, TSS, total phosphorus, total Kjeldahl nitrogen, and nitrate plus nitrite nitrogen;

(4) Any information on the discharge required under paragraph § 122.21(g)(7)(iii) and (iv) of this part;

(5) Flow measurements or estimates of the flow rate, and the total amount of discharge for the storm event(s) sampled, and the method of flow measurement or estimation; and

(6) The date and duration (in hours) of the storm event(s) sampled, rainfall measurements or estimates of the storm event (in inches) which generated the sampled runoff and the duration between the storm event sampled and the end of the previous measurable (greater than 0.1 inch rainfall) storm event (in hours);

(F) Operators of a discharge which is composed entirely of storm water are exempt from the requirements of § 122.21 (g)(2), (g)(3), (g)(4), (g)(5), (g)(7)(i), (g)(7)(ii), and (g)(7)(v); and

(G) Operators of new sources or new discharges (as defined in § 122.2 of this part) which are composed in part or entirely of storm water must include estimates for the pollutants or parameters listed in paragraph (c)(1)(i)(E) of this section instead of actual sampling data, along with the source of each estimate. Operators of new sources or new discharges composed in part or entirely of storm water must provide quantitative data for the parameters listed in paragraph (c)(1)(i)(E) of this section within two years after commencement of discharge, unless such data has already been reported under the monitoring requirements of the NPDES permit for the discharge. Operators of a new source or new discharge which is composed entirely of storm water are exempt from the requirements of § 122.21 (k)(3)(ii), (k)(3)(iii), and (k)(5).

(ii) The operator of an existing or new storm water discharge that is associated with industrial activity solely under paragraph (b)(14)(x) of this section, is exempt from the requirements of § 122.21(g) and paragraph (c)(1)(i) of this section. Such operator shall provide a narrative description of:

(A) The location (including a map) and the nature of the construction activity;

(B) The total area of the site and the area of the site that is expected to undergo excavation during the life of the permit;

(C) Proposed measures, including best management practices, to control pollutants in storm water discharges during construction, including a brief description of applicable State and local erosion and sediment control requirements;

(D) Proposed measures to control pollutants in storm water discharges that will occur after construction operations have been completed, including a brief description of applicable State or local erosion and sediment control requirements;

(E) An estimate of the runoff coefficient of the site and the increase in impervious area after the construction addressed in the permit application is completed, the nature of fill material and existing data describing the soil or the quality of the discharge; and

(F) The name of the receiving water.

(iii) The operator of an existing or new discharge composed entirely of storm water from an oil or gas exploration, production, processing, or treatment operation, or transmission facility is not required to submit a permit application in accordance with paragraph (c)(1)(i) of this section, unless the facility:

(A) Has had a discharge of storm water resulting in the discharge of a reportable quantity for which notification is or was required pursuant to 40 CFR 117.21 or 40 CFR 302.6 at anytime since November 16, 1987; or

(B) Has had a discharge of storm water resulting in the discharge of a reportable quantity for which notification is or was required pursuant to 40 CFR 110.6 at any time since November 16, 1987; or

(C) Contributes to a violation of a water quality standard.

(iv) The operator of an existing or new discharge composed entirely of storm water from a mining operation is not required to submit a permit application unless the discharge has come into contact with, any overburden, raw material, intermediate products, finished product, byproduct or waste products located on the site of such operations.

(v) Applicants shall provide such other information the Director may reasonably require under § 122.21(g)(13) of this part to determine whether to issue a permit and may require any facility subject to paragraph (c)(1)(ii) of this section to comply with paragraph (c)(1)(i) of this section.

(2) *Group application for discharges associated with industrial activity.* In lieu of individual applications or notice of intent to be covered by a general permit for storm water discharges associated with industrial activity, a group application may be filed by an entity representing a group of applicants (except facilities that have existing individual NPDES permits for storm water) that are part of the same subcategory (*see* 40 CFR subchapter N, part 405 to 471) or, where such grouping is inapplicable, are sufficiently similar as to be appropriate for general permit coverage under § 122.28 of this part. The part 1 application shall be submitted to the Office of Water Enforcement and Permits, U.S. EPA, 401 M Street, SW., Washington, DC 20460 (EN-336) for approval. Once a part 1 application is approved, group applicants are to submit Part 2 of the group application to the Office of Water Enforcement and Permits. A group application shall consist of:

(i) *Part 1.* Part 1 of a group application shall:

(A) Identify the participants in the group application by name and location. Facilities participating in the group application shall be listed in nine subdivisions, based on the facility location relative to the nine precipitation zones indicated in appendix E to this part.

(B) Include a narrative description summarizing the industrial activities of participants of the group application and explaining why the participants, as a whole, are sufficiently similar to be a covered by a general permit;

(C) Include a list of significant materials stored exposed to precipitation by participants in the group application and materials management practices employed to diminish contact by these materials with precipitation and storm water runoff;

(D) Identify ten percent of the dischargers participating in the group application (with a minimum of 10 dischargers, and either a minimum of two dischargers from each precipitation zone indicated in appendix E of this part in which ten or more members of the group are located, or one discharger from each precipitation zone indicated in appendix E of this part in which nine or fewer members of the group are located) from which quantitative data will be submitted in part 2. If more than 1,000 facilities are identified in a group application, no more than 100 dischargers must submit quantitative data in Part 2. Groups of between four and ten dischargers may be formed. However, in groups of between four and ten, at least half the facilities must submit quantitative data, and at least one facility in each precipitation zone in which members of the group are located must submit data. A description of why the facilities selected to perform sampling and analysis are representative of the group as a whole in terms of the information provided in paragraph (c)(1) (i)(B) and (i)(C) of this section, shall accompany this section. Different factors impacting the nature of the storm water discharges, such as processes used and material management, shall be represented, to the extent feasible, in a manner roughly equivalent to their proportion in the group.

(ii) *Part 2.* Part 2 of a group application shall contain quantitative

data (NPDES Form 2F), as modified by paragraph (c)(1) of this section; so that when part 1 and part 2 of the group application are taken together, a complete NPDES application (Form 1, Form 2C, and Form 2F) can be evaluated for each discharger identified in paragraph (c)(2)(i)(D) of this section.

(d) *Application requirements for large and medium municipal separate storm sewer discharges.* The operator of a discharge from a large or medium municipal separate storm sewer or a municipal separate storm sewer that is designated by the Director under paragraph (a)(1)(v) of this section, may submit a jurisdiction-wide or system-wide permit application. Where more than one public entity owns or operates a municipal separate storm sewer within a geographic area (including adjacent or interconnected municipal separate storm sewer systems), such operators may be a coapplicant to the same application. Permit applications for discharges from large and medium municipal storm sewers or municipal storm sewers designated under paragraph (a)(1)(v) of this section shall include:

(1) *Part 1.* Part 1 of the application shall consist of:

(i) *General information.* The applicants' name, address, telephone number of contact person, ownership status and status as a State or local government entity.

(ii) *Legal authority.* A description of existing legal authority to control discharges to the municipal separate storm sewer system. When existing legal authority is not sufficient to meet the criteria provided in paragraph (d)(2)(i) of this section, the description shall list additional authorities as will be necessary to meet the criteria and shall include a schedule and commitment to seek such additional authority that will be needed to meet the criteria.

(iii) *Source identification.* (A) A description of the historic use of ordinances, guidance or other controls which limited the discharge of non-storm water discharges to any Publicly Owned Treatment Works serving the same area as the municipal separate storm sewer system.

(B) A USGS 7.5 minute topographic map (or equivalent topographic map with a scale between 1:10,000 and 1:24,000 if cost effective) extending one mile beyond the service boundaries of the municipal storm sewer system covered by the permit application. The following information shall be provided:

(*1*) The location of known municipal storm sewer system outfalls discharging to waters of the United States;

(*2*) A description of the land use activities (e.g. divisions indicating undeveloped, residential, commercial, agricultural and industrial uses) accompanied with estimates of population densities and projected growth for a ten year period within the drainage area served by the separate storm sewer. For each land use type, an estimate of an average runoff coefficient shall be provided;

(*3*) The location and a description of the activities of the facility of each currently operating or closed municipal landfill or other treatment, storage or disposal facility for municipal waste;

(*4*) The location and the permit number of any known discharge to the municipal storm sewer that has been issued a NPDES permit;

(*5*) The location of major structural controls for storm water discharge (retention basins, detention basins, major infiltration devices, etc.); and

(*6*) The identification of publicly owned parks, recreational areas, and other open lands.

(iv) *Discharge characterization.* (A) Monthly mean rain and snow fall estimates (or summary of weather bureau data) and the monthly average number of storm events.

(B) Existing quantitative data describing the volume and quality of discharges from the municipal storm sewer, including a description of the outfalls sampled, sampling procedures and analytical methods used.

(C) A list of water bodies that receive discharges from the municipal separate storm sewer system, including downstream segments, lakes and estuaries, where pollutants from the system discharges may accumulate and cause water degradation and a brief description of known water quality impacts. At a minimum, the description of impacts shall include a description of whether the water bodies receiving such discharges have been:

(*1*) Assessed and reported in section 305(b) reports submitted by the State, the basis for the assessment (evaluated or monitored), a summary of designated use support and attainment of Clean Water Act (CWA) goals (fishable and swimmable waters), and causes of nonsupport of designated uses;

(*2*) Listed under section 304(l)(1)(A)(i), section 304(l)(1)(A)(ii), or section 304(l)(1)(B) of the CWA that is not expected to meet water quality standards or water quality goals;

(*3*) Listed in State Nonpoint Source Assessments required by section 319(a) of the CWA that, without additional action to control nonpoint sources of pollution, cannot reasonably be expected to attain or maintain water quality standards due to storm sewers, construction, highway maintenance and runoff from municipal landfills and municipal sludge adding significant pollution (or contributing to a violation of water quality standards);

(*4*) Identified and classified according to eutrophic condition of publicly owned lakes listed in State reports required under section 314(a) of the CWA (include the following: A description of those publicly owned lakes for which uses are known to be impaired; a description of procedures, processes and methods to control the discharge of pollutants from municipal separate storm sewers into such lakes; and a description of methods and procedures to restore the quality of such lakes);

(*5*) Areas of concern of the Great Lakes identified by the International Joint Commission;

(*6*) Designated estuaries under the National Estuary Program under section 320 of the CWA;

(*7*) Recognized by the applicant as highly valued or sensitive waters;

(*8*) Defined by the State or U.S. Fish and Wildlife Services's National Wetlands Inventory as wetlands; and

(*9*) Found to have pollutants in bottom sediments, fish tissue or biosurvey data.

(D) *Field screening.* Results of a field screening analysis for illicit connections and illegal dumping for either selected field screening points or major outfalls covered in the permit application. At a minimum, a screening analysis shall include a narrative description, for either each field screening point or major outfall, of visual observations made during dry weather periods. If any flow is observed, two grab samples shall be collected during a 24 hour period with a minimum period of four hours between samples. For all such samples, a narrative description of the color, odor, turbidity, the presence of an oil sheen or surface scum as well as any other relevant observations regarding the potential presence of non-storm water discharges or illegal dumping shall be provided. In addition, a narrative description of the results of a field analysis using suitable methods to estimate pH, total chlorine, total copper, total phenol, and detergents (or surfactants) shall be provided along with a description of the flow rate. Where the field analysis does not involve analytical methods approved under 40 CFR part 136, the applicant shall provide a description of the method used including the name of the manufacturer of the test method along with the range and accuracy of the test. Field screening points shall be either major outfalls or other outfall points (or

any other point of access such as manholes) randomly located throughout the storm sewer system by placing a grid over a drainage system map and identifying those cells of the grid which contain a segment of the storm sewer system or major outfall. The field screening points shall be established using the following guidelines and criteria:

(*1*) A grid system consisting of perpendicular north-south and east-west lines spaced ¼ mile apart shall be overlayed on a map of the municipal storm sewer system, creating a series of cells;

(*2*) All cells that contain a segment of the storm sewer system shall be identified; one field screening point shall be selected in each cell; major outfalls may be used as field screening points;

(*3*) Field screening points should be located downstream of any sources of suspected illegal or illicit activity;

(*4*) Field screening points shall be located to the degree practicable at the farthest manhole or other accessible location downstream in the system, within each cell; however, safety of personnel and accessibility of the location should be considered in making this determination;

(*5*) Hydrological conditions; total drainage area of the site; population density of the site; traffic density; age of the structures or buildings in the area; history of the area; and land use types;

(*6*) For medium municipal separate storm sewer systems, no more than 250 cells need to have identified field screening points; in large municipal separate storm sewer systems, no more than 500 cells need to have identified field screening points; cells established by the grid that contain no storm sewer segments will be eliminated from consideration; if fewer than 250 cells in medium municipal sewers are created, and fewer than 500 in large systems are created by the overlay on the municipal sewer map, then all those cells which contain a segment of the sewer system shall be subject to field screening (unless access to the separate storm sewer system is impossible); and

(*7*) Large or medium municipal separate storm sewer systems which are unable to utilize the procedures described in paragraphs (d)(1)(iv)(D) (*1*) through (*6*) of this section, because a sufficiently detailed map of the separate storm sewer systems is unavailable, shall field screen no more than 500 or 250 major outfalls respectively (or all major outfalls in the system, if less); in such circumstances, the applicant shall establish a grid system consisting of north-south and east-west lines spaced ¼ mile apart as an overlay to the boundaries of the municipal storm sewer system, thereby creating a series of cells; the applicant will then select major outfalls in as many cells as possible until at least 500 major outfalls (large municipalities) or 250 major outfalls (medium municipalities) are selected; a field screening analysis shall be undertaken at these major outfalls.

(E) *Characterization plan.* Information and a proposed program to meet the requirements of paragraph (d)(2)(iii) of this section. Such description shall include: the location of outfalls or field screening points appropriate for representative data collection under paragraph (d)(2)(iii)(A) of this section, a description of why the outfall or field screening point is representative, the seasons during which sampling is intended, a description of the sampling equipment. The proposed location of outfalls or field screening points for such sampling should reflect water quality concerns (*see* paragraph (d)(1)(iv)(C) of this section) to the extent practicable.

(v) *Management programs.* (A) A description of the existing management programs to control pollutants from the municipal separate storm sewer system. The description shall provide information on existing structural and source controls, including operation and maintenance measures for structural controls, that are currently being implemented. Such controls may include, but are not limited to: Procedures to control pollution resulting from construction activities; floodplain management controls; wetland protection measures; best management practices for new subdivisions; and emergency spill response programs. The description may address controls established under State law as well as local requirements.

(B) A description of the existing program to identify illicit connections to the municipal storm sewer system. The description should include inspection procedures and methods for detecting and preventing illicit discharges, and describe areas where this program has been implemented.

(vi) *Fiscal resources.* (A) A description of the financial resources currently available to the municipality to complete part 2 of the permit application. A description of the municipality's budget for existing storm water programs, including an overview of the municipality's financial resources and budget, including overall indebtedness and assets, and sources of funds for storm water programs.

(2) *Part 2.* Part 2 of the application shall consist of:

(i) *Adequate legal authority.* A demonstration that the applicant can operate pursuant to legal authority established by statute, ordinance or series of contracts which authorizes or enables the applicant at a minimum to:

(A) Control through ordinance, permit, contract, order or similar means, the contribution of pollutants to the municipal storm sewer by storm water discharges associated with industrial activity and the quality of storm water discharged from sites of industrial activity;

(B) Prohibit through ordinance, order or similar means, illicit discharges to the municipal separate storm sewer;

(C) Control through ordinance, order or similar means the discharge to a municipal separate storm sewer of spills, dumping or disposal of materials other than storm water;

(D) Control through interagency agreements among coapplicants the contribution of pollutants from one portion of the municipal system to another portion of the municipal system;

(E) Require compliance with conditions in ordinances, permits, contracts or orders; and

(F) Carry out all inspection, surveillance and monitoring procedures necessary to determine compliance and noncompliance with permit conditions including the prohibition on illicit discharges to the municipal separate storm sewer.

(ii) *Source identification.* The location of any major outfall that discharges to waters of the United States that was not reported under paragraph (d)(1)(iii)(B)(*1*) of this section. Provide an inventory, organized by watershed of the name and address, and a description (such as SIC codes) which best reflects the principal products or services provided by each facility which may discharge, to the municipal separate storm sewer, storm water associated with industrial activity;

(iii) *Characterization data.* When "quantitative data" for a pollutant are required under paragraph (d)(a)(iii)(A)(*3*) of this paragraph, the applicant must collect a sample of effluent in accordance with 40 CFR 122.21(g)(7) and analyze it for the pollutant in accordance with analytical methods approved under 40 CFR part 136. When no analytical method is approved the applicant may use any suitable method but must provide a description of the method. The applicant must provide information characterizing the quality and quantity of discharges covered in the permit application, including:

(A) Quantitative data from representative outfalls designated by the Director (based on information received

in part 1 of the application, the Director shall designate between five and ten outfalls or field screening points as representative of the commercial, residential and industrial land use activities of the drainage area contributing to the system or, where there are less than five outfalls covered in the application, the Director shall designate all outfalls) developed as follows:

(*1*) For each outfall or field screening point designated under this subparagraph, samples shall be collected of storm water discharges from three storm events occurring at least one month apart in accordance with the requirements at § 122.21(g)(7) (the Director may allow exemptions to sampling three storm events when climatic conditions create good cause for such exemptions);

(*2*) A narrative description shall be provided of the date and duration of the storm event(s) sampled, rainfall estimates of the storm event which generated the sampled discharge and the duration between the storm event sampled and the end of the previous measurable (greater than 0.1 inch rainfall) storm event;

(*3*) For samples collected and described under paragraphs (d)(2)(iii)(A)(*1*) and (A)(*2*) of this section, quantitative data shall be provided for: the organic pollutants listed in Table II; the pollutants listed in Table III (toxic metals, cyanide, and total phenols) of appendix D of 40 CFR part 122, and for the following pollutants:

Total suspended solids (TSS)
Total dissolved solids (TDS)
COD
BOD_5
Oil and grease
Fecal coliform
Fecal streptococcus
pH
Total Kjeldahl nitrogen
Nitrate plus nitrite
Dissolved phosphorus
Total ammonia plus organic nitrogen
Total phosphorus

(*4*) Additional limited quantitative data required by the Director for determining permit conditions (the Director may require that quantitative data shall be provided for additional parameters, and may establish sampling conditions such as the location, season of sample collection, form of precipitation (snow melt, rainfall) and other parameters necessary to insure representativeness);

(B) Estimates of the annual pollutant load of the cumulative discharges to waters of the United States from all identified municipal outfalls and the event mean concentration of the cumulative discharges to waters of the United States from all identified municipal outfalls during a storm event (as described under § 122.21(c)(7)) for BOD_5, COD, TSS, dissolved solids, total nitrogen, total ammonia plus organic nitrogen, total phosphorus, dissolved phosphorus, cadmium, copper, lead, and zinc. Estimates shall be accompanied by a description of the procedures for estimating constituent loads and concentrations, including any modelling, data analysis, and calculation methods;

(C) A proposed schedule to provide estimates for each major outfall identified in either paragraph (d)(2)(ii) or (d)(1)(iii)(B)(*1*) of this section of the seasonal pollutant load and of the event mean concentration of a representative storm for any constituent detected in any sample required under paragraph (d)(2)(iii)(A) of this section; and

(D) A proposed monitoring program for representative data collection for the term of the permit that describes the location of outfalls or field screening points to be sampled (or the location of instream stations), why the location is representative, the frequency of sampling, parameters to be sampled, and a description of sampling equipment.

(iv) *Proposed management program.* A proposed management program covers the duration of the permit. It shall include a comprehensive planning process which involves public participation and where necessary intergovernmental coordination, to reduce the discharge of pollutants to the maximum extent practicable using management practices, control techniques and system, design and engineering methods, and such other provisions which are appropriate. The program shall also include a description of staff and equipment available to implement the program. Separate proposed programs may be submitted by each coapplicant. Proposed programs may impose controls on a systemwide basis, a watershed basis, a jurisdiction basis, or on individual outfalls. Proposed programs will be considered by the Director when developing permit conditions to reduce pollutants in discharges to the maximum extent practicable. Proposed management programs shall describe priorities for implementing controls. Such programs shall be based on:

(A) A description of structural and source control measures to reduce pollutants from runoff from commercial and residential areas that are discharged from the municipal storm sewer system that are to be implemented during the life of the permit, accompanied with an estimate of the expected reduction of pollutant loads and a proposed schedule for implementing such controls. At a minimum, the description shall include:

(*1*) A description of maintenance activities and a maintenance schedule for structural controls to reduce pollutants (including floatables) in discharges from municipal separate storm sewers;

(*2*) A description of planning procedures including a comprehensive master plan to develop, implement and enforce controls to reduce the discharge of pollutants from municipal separate storm sewers which receive discharges from areas of new development and significant redevelopment. Such plan shall address controls to reduce pollutants in discharges from municipal separate storm sewers after construction is completed. (Controls to reduce pollutants in discharges from municipal separate storm sewers containing construction site runoff are addressed in paragraph (d)(2)(iv)(D) of this section;

(*3*) A description of practices for operating and maintaining public streets, roads and highways and procedures for reducing the impact on receiving waters of discharges from municipal storm sewer systems, including pollutants discharged as a result of deicing activities;

(*4*) A description of procedures to assure that flood management projects assess the impacts on the water quality of receiving water bodies and that existing structural flood control devices have been evaluated to determine if retrofitting the device to provide additional pollutant removal from storm water is feasible;

(*5*) A description of a program to monitor pollutants in runoff from operating or closed municipal landfills or other treatment, storage or disposal facilities for municipal waste, which shall identify priorities and procedures for inspections and establishing and implementing control measures for such discharges (this program can be coordinated with the program developed under paragraph (d)(2)(iv)(C) of this section); and

(*6*) A description of a program to reduce to the maximum extent practicable, pollutants in discharges from municipal separate storm sewers associated with the application of pesticides, herbicides and fertilizer which will include, as appropriate, controls such as educational activities, permits, certifications and other measures for commercial applicators and distributors, and controls for application in public right-of-ways and at municipal facilities.

(B) A description of a program, including a schedule, to detect and remove (or require the discharger to the municipal separate storm sewer to obtain a separate NPDES permit for) illicit discharges and improper disposal into the storm sewer. The proposed program shall include:

(1) A description of a program, including inspections, to implement and enforce an ordinance, orders or similar means to prevent illicit discharges to the municipal separate storm sewer system; this program description shall address all types of illicit discharges, however the following category of non-storm water discharges or flows shall be addressed where such discharges are identified by the municipality as sources of pollutants to waters of the United States: water line flushing, landscape irrigation, diverted stream flows, rising ground waters, uncontaminated ground water infiltration (as defined at 40 CFR 35.2005(20)) to separate storm sewers, uncomtaminated pumped ground water, discharges from potable water sources, foundation drains, air conditioning condensation, irrigation water, springs, water from crawl space pumps, footing drains, lawn watering, individual residential car washing, flows from riparian habitats and wetlands, dechlorinated swimming pool discharges, and street wash water (program descriptions shall address discharges or flows from fire fighting only where such discharges or flows are identified as significant sources of pollutants to waters of the United States);

(2) A description of procedures to conduct on-going field screening activities during the life of the permit, including areas or locations that will be evaluated by such field screens;

(3) A description of procedures to be followed to investigate portions of the separate storm sewer system that, based on the results of the field screen, or other appropriate information, indicate a reasonable potential of containing illicit discharges or other sources of non-storm water (such procedures may include: sampling procedures for constituents such as fecal coliform, fecal streptococcus, surfactants (MBAS), residual chlorine, fluorides and potassium; testing with fluorometric dyes; or conducting in storm sewer inspections where safety and other considerations allow. Such description shall include the location of storm sewers that have been identified for such evaluation);

(4) A description of procedures to prevent, contain, and respond to spills that may discharge into the municipal separate storm sewer;

(5) A description of a program to promote, publicize, and facilitate public reporting of the presence of illicit discharges or water quality impacts associated with discharges from municipal separate storm sewers;

(6) A description of educational activities, public information activities, and other appropriate activities to facilitate the proper management and disposal of used oil and toxic materials; and

(7) A description of controls to limit infiltration of seepage from municipal sanitary sewers to municipal separate storm sewer systems where necessary;

(C) A description of a program to monitor and control pollutants in storm water discharges to municipal systems from municipal landfills, hazardous waste treatment, disposal and recovery facilities, industrial facilities that are subject to section 313 of title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA), and industrial facilities that the municipal permit applicant determines are contributing a substantial pollutant loading to the municipal storm sewer system. The program shall:

(1) Identify priorities and procedures for inspections and establishing and implementing control measures for such discharges;

(2) Describe a monitoring program for storm water discharges associated with the industrial facilities identified in paragraph (d)(2)(iv)(C) of this section, to be implemented during the term of the permit, including the submission of quantitative data on the following constituents: any pollutants limited in effluent guidelines subcategories, where applicable; any pollutant listed in an existing NPDES permit for a facility; oil and grease, COD, pH, BOD_5, TSS, total phosphorus, total Kjeldahl nitrogen, nitrate plus nitrite nitrogen, and any information on discharges required under 40 CFR 122.21(g)(7) (iii) and (iv).

(D) A description of a program to implement and maintain structural and non-structural best management practices to reduce pollutants in storm water runoff from construction sites to the municipal storm sewer system, which shall include:

(1) A description of procedures for site planning which incorporate consideration of potential water quality impacts;

(2) A description of requirements for nonstructural and structural best management practices;

(3) A description of procedures for identifying priorities for inspecting sites and enforcing control measures which consider the nature of the construction activity, topography, and the characteristics of soils and receiving water quality; and

(4) A description of appropriate educational and training measures for construction site operators.

(v) *Assessment of controls.* Estimated reductions in loadings of pollutants from discharges of municipal storm sewer constituents from municipal storm sewer systems expected as the result of the municipal storm water quality management program. The assessment shall also identify known impacts of storm water controls on ground water.

(vi) *Fiscal analysis.* For each fiscal year to be covered by the permit, a fiscal analysis of the necessary capital and operation and maintenance expenditures necessary to accomplish the activities of the programs under paragraphs (d)(2) (iii) and (iv) of this section. Such analysis shall include a description of the source of funds that are proposed to meet the necessary expenditures, including legal restrictions on the use of such funds.

(vii) Where more than one legal entity submits an application, the application shall contain a description of the roles and responsibilities of each legal entity and procedures to ensure effective coordination.

(viii) Where requirements under paragraph (d)(1)(iv)(E), (d)(2)(ii), (d)(2)(iii)(B) and (d)(2)(iv) of this section are not practicable or are not applicable, the Director may exclude any operator of a discharge from a municipal separate storm sewer which is designated under paragraph (a)(1)(v), (b)(4)(ii) or (b)(7)(ii) of this section from such requirements. The Director shall not exclude the operator of a discharge from a municipal separate storm sewer identified in appendix F, G, H or I of part 122, from any of the permit application requirements under this paragraph except where authorized under this section.

(e) *Application deadlines.* Any operator of a point source required to obtain a permit under paragraph (a)(1) of this section that does not have an effective NPDES permit covering its storm water outfalls shall submit an application in accordance with the following deadlines:

(1) For any storm water discharge associated with industrial activity identified in paragraph (b)(14) (i)–(xi) of this section, that is not part of a group application as described in paragraph (c)(2) of this section or which is not covered under a promulgated storm water general permit, a permit application made pursuant to paragraph (c) of this section shall be submitted to the Director by November 18, 1991;

(2) For any group application submitted in accordance with paragraph (c)(2) of this section:

(i) Part 1 of the application shall be submitted to the Director, Office of Water Enforcement and Permits by March 18, 1991;

(ii) Based on information in the part 1 application, the Director will approve or deny the members in the group application within 60 days after receiving part 1 of the group application.

(iii) Part 2 of the application shall be submitted to the Director, Office of Water Enforcement and Permits no later than 12 months after the date of approval of the part 1 application.

(iv) Facilities that are rejected as members of a group by the permitting authority shall have 12 months to file an individual permit application from the date they receive notification of their rejection.

(v) A facility listed under paragraph (b)(14) (i)–(xi) of this section may add on to a group application submitted in accordance with paragraph (e)(2)(i) of this section at the discretion of the Office of Water Enforcement and Permits, and only upon a showing of good cause by the facility and the group applicant; the request for the addition of the facility shall be made no later than February 18,1992; the addition of the facility shall not cause the percentage of the facilities that are required to submit quantitative data to be less than 10%, unless there are over 100 facilities in the group that are submitting quantitative data; approval to become part of group application must be obtained from the group or the trade association representing the individual facilities.

(3) For any discharge from a large municipal separate storm sewer system;

(i) Part 1 of the application shall be submitted to the Director by November 18, 1991;

(ii) Based on information received in the part 1 application the Director will approve or deny a sampling plan under paragraph (d)(1)(iv)(E) of this section within 90 days after receiving the part 1 application;

(iii) Part 2 of the application shall be submitted to the Director by November 16, 1992.

(4) For any discharge from a medium municipal separate storm sewer system;

(i) Part 1 of the application shall be submitted to the Director by May 18, 1992.

(ii) Based on information received in the part 1 application the Director will approve or deny a sampling plan under paragraph (d)(1)(iv)(E) of this section within 90 days after receiving the part 1 application.

(iii) Part 2 of the application shall be submitted to the Director by May 17, 1993.

(5) A permit application shall be submitted to the Director within 60 days of notice, unless permission for a later date is granted by the Director (*see* 40 CFR 124.52(c)), for:

(i) A storm water discharge which the Director, or in States with approved NPDES programs, either the Director or the EPA Regional Administrator, determines that the discharge contributes to a violation of a water quality standard or is a significant contributor of pollutants to waters of the United States (see paragraph (a)(1)(v) of this section);

(ii) A storm water discharge subject to paragraph (c)(1)(v) of this section.

(6) Facilities with existing NPDES permits for storm water discharges associated with industrial activity shall maintain existing permits. New applications shall be submitted in accordance with the requirements of 40 CFR 122.21 and 40 CFR 122.26(c) 180 days before the expiration of such permits. Facilities with expired permits or permits due to expire before May 18, 1992, shall submit applications in accordance with the deadline set forth under paragraph (e)(1) of this section.

(f) *Petitions.* (1) Any operator of a municipal separate storm sewer system may petition the Director to require a separate NPDES permit (or a permit issued under an approved NPDES State program) for any discharge into the municipal separate storm sewer system.

(2) Any person may petition the Director to require a NPDES permit for a discharge which is composed entirely of storm water which contributes to a violation of a water quality standard or is a significant contributor of pollutants to waters of the United States.

(3) The owner or operator of a municipal separate storm sewer system may petition the Director to reduce the Census estimates of the population served by such separate system to account for storm water discharged to combined sewers as defined by 40 CFR 35.2005(b)(11) that is treated in a publicly owned treatment works. In municipalities in which combined sewers are operated, the Census estimates of population may be reduced proportional to the fraction, based on estimated lengths, of the length of combined sewers over the sum of the length of combined sewers and municipal separate storm sewers where an applicant has submitted the NPDES permit number associated with each discharge point and a map indicating areas served by combined sewers and the location of any combined sewer overflow discharge point.

(4) Any person may petition the Director for the designation of a large or medium municipal separate storm sewer system as defined by paragraphs (b)(4)(iv) or (b)(7)(iv) of this section.

(5) The Director shall make a final determination on any petition received under this section within 90 days after receiving the petition.

6. Section 122.28(b)(2)(i) is revised to read as follows:

§ 122.28 General permits (applicable to State NPDES programs, see § 123.25).

* * * * *

(b) * * *

(2) *Requiring an individual permit.* (i) The Director may require any discharger authorized by a general permit to apply for and obtain an individual NPDES permit. Any interested person may petition the Director to take action under this paragraph. Cases where an individual NPDES permit may be required include the following:

(A) The discharger or "treatment works treating domestic sewage" is not in compliance with the conditions of the general NPDES permit;

(B) A change has occurred in the availability of demonstrated technology or practices for the control or abatement of pollutants applicable to the point source or treatment works treating domestic sewage;

(C) Effluent limitation guidelines are promulgated for point sources covered by the general NPDES permit;

(D) A Water Quality Management plan containing requirements applicable to such point sources is approved;

(E) Circumstances have changed since the time of the request to be covered so that the discharger is no longer appropriately controlled under the general permit, or either a temporary or permanent reduction or elimination of the authorized discharge is necessary;

(F) Standards for sewage sludge use or disposal have been promulgated for the sludge use and disposal practice covered by the general NPDES permit; or

(G) The discharge(s) is a significant contributor of pollutants. In making this determination, the Director may consider the following factors:

(*1*) The location of the discharge with respect to waters of the United States;

(*2*) The size of the discharge;

(*3*) The quantity and nature of the pollutants discharged to waters of the United States; and

(*4*) Other relevant factors;

* * * * *

7. Section 122.42 is amended by adding paragraph (c) to read as follows:

§ 122.42 Additional conditions applicable to specified categories of NPDES permits (applicable to State NPDES programs, see § 123.25).

* * * * *

(c) *Municipal separate storm sewer systems.* The operator of a large or medium municipal separate storm sewer system or a municipal separate storm sewer that has been designated by the Director under § 122.26(a)(1)(v) of this part must submit an annual report by the anniversary of the date of the issuance of the permit for such system. The report shall include:

(1) The status of implementing the components of the storm water management program that are established as permit conditions;

(2) Proposed changes to the storm water management programs that are established as permit condition. Such proposed changes shall be consistent with § 122.26(d)(2)(iii) of this part; and

(3) Revisions, if necessary, to the assessment of controls and the fiscal analysis reported in the permit application under § 122.26(d)(2)(iv) and (d)(2)(v) of this part;

(4) A summary of data, including monitoring data, that is accumulated throughout the reporting year;

(5) Annual expenditures and budget for year following each annual report;

(6) A summary describing the number and nature of enforcement actions, inspections, and public education programs;

(7) Identification of water quality improvements or degradation;

7a. Part 122 is amended by adding appendices E through I as follows:

Appendix E to Part 122—Rainfall Zones of the United States

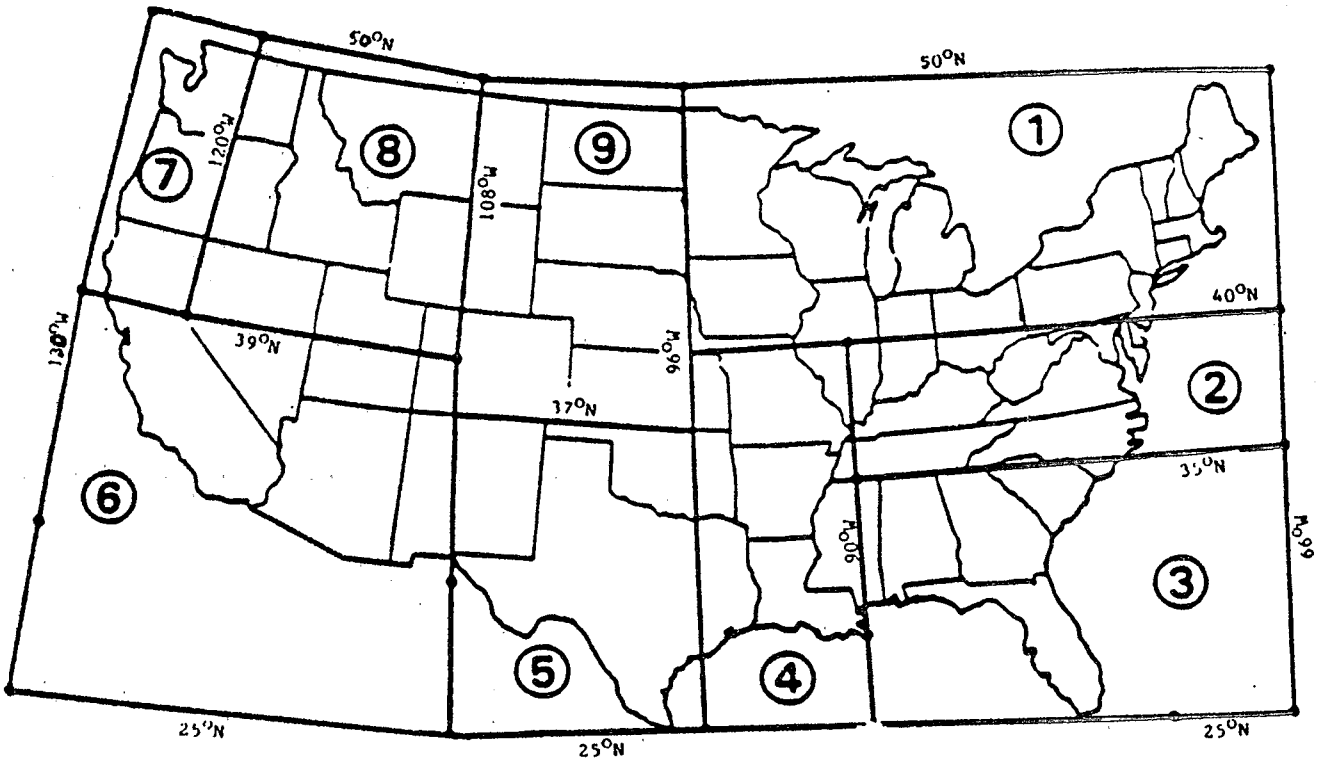

Not Shown: Alaska (Zone 7); Hawaii (Zone 7); Northern Mariana Islands (Zone 7); Guam (Zone 7); American Samoa (Zone 7); Trust Territory of the Pacific Islands (Zone 7); Puerto Rico (Zone 3) Virgin Islands (Zone 3).

Source: Methodology for Analysis of Detention Basins for Control of Urban Runoff Quality, prepared for U.S. Environmental Protection Agency, Office of Water, Nonpoint Source Division, Washington, DC, 1986.

Appendix F to Part 122—Incorporated Places With Populations Greater Than 250,000 According to Latest Decennial Census by Bureau of Census.

State	Incorporated place
Alabama	Birmingham.
Arizona	Phoenix.
	Tucson.
California	Long Beach.
	Los Angeles.
	Oakland.
	Sacramento.
	San Diego.
	San Francisco.
	San Jose.
Colorado	Denver.
District of Columbia	
Florida	Jacksonville.
	Miami.
	Tampa.
Georgia	Atlanta.
Illinois	Chicago.
Indiana	Indianapolis.
Kansas	Wichita.
Kentucky	Louisville.
Louisiana	New Orleans.
Maryland	Baltimore.
Massachusetts	Boston.
Michigan	Detroit.
Minnesota	Minneapolis
	St. Paul.

State	Incorporated place
Missouri	Kansas City.
	St. Louis.
Nebraska	Omaha.
New Jersey	Newark.
New Mexico	Albuquerque.
New York	Buffalo.
	Bronx Borough.
	Brooklyn Borough.
	Manhattan Borough.
	Queens Borough.
	Staten Island Borough.
North Carolina	Charlotte.
Ohio	Cincinnati.
	Cleveland.
	Columbus.
	Toledo.
Oklahoma	Oklahoma City.
	Tulsa.
Oregon	Portland.
Pennsylvania	Philadelphia.
	Pittsburgh.
Tennessee	Memphis.
	Nashville/Davidson.
Texas	Austin.
	Dallas.
	El Paso.
	Fort Worth.
	Houston.
	San Antonio.
Virginia	Norfolk.
	Virginia Beach.
Washington	Seattle.
Wisconsin	Milwaukee.

Appendix G to Part 122—Incorporated Places With Populations Greater Than 100,000 and Less Than 250,000 According to Latest Decennial Census by Bureau of Census

State	Incorporated place
Alabama	Huntsville.
	Mobile.
	Montgomery.
Alaska	Anchorage.
Arizona	Mesa.
	Tempe.
Arkansas	Little Rock.
California	Anaheim.
	Bakersfield.
	Berkeley.
	Concord.
	Fremont.
	Fresno.
	Fullerton.
	Garden Grove.
	Glendale.
	Huntington Beach.
	Modesto.
	Oxnard.
	Pasadena.
	Riverside.
	San Bernadino.
	Santa Ana.
	Stockton.
	Sunnyvale.
	Torrance.
Colorado	Aurora.
	Colorado Springs.
	Lakewood.
	Pueblo.
Connecticut	Bridgeport.
	Hartford.
	New Haven.
	Stamford.
	Waterbury.
Florida	Fort Lauderdale.
	Hialeah.
	Hollywood.
	Orlando.
	St. Petersburg.
Georgia	Columbus.
	Macon.
	Savannah.
Idaho	Boise City.
Illinois	Peoria.
	Rockford.
Indiana	Evansville.
	Fort Wayne.
	Gary.
	South Bend.
Iowa	Cedar Rapids.
	Davenport.
	Des Moines.
Kansas	Kansas City.
	Topeka.
Kentucky	Lexington-Fayette.
Louisiana	Baton Rouge.
	Shreveport.
Massachusetts	Springfield.
	Worcester.
Michigan	Ann Arbor.
	Flint.
	Grand Rapids
	Lansing.
	Livonia.
	Sterling Heights.
	Warren.
Mississippi	Jackson.
Missouri	Independence.
	Springfield.
Nebraska	Lincoln.
Nevada	Las Vegas.
	Reno.
New Jersey	Elizabeth.
	Jersey City.
	Paterson.
New York	Albany.
	Rochester.
	Syracuse.
	Yonkers.
North Carolina	Durham.
	Greensboro.
	Raleigh.
	Winston-Salem.
Ohio	Akron.
	Dayton.
	Youngstown
Oregon	Eugene.
Pennsylvania	Allentown.
	Erie.
Rhode Island	Providence
South Carolina	Columbia.
Tennessee	Chattanooga.
	Knoxville.
Texas	Amarillo.
	Arlington.
	Beaumont.
	Corpus Christi
	Garland.
	Irving.
	Lubbock.
	Pasadena.
	Waco.
Utah	Salt Lake City.
Virginia	Alexandria.
	Chesapeake.
	Hampton.
	Newport News.
	Portsmouth.
	Richmond.
	Roanoke.
Washington	Spokane.
	Tacoma.
Wisconsin	Madison.

Appendix H to Part 122—Counties with Unincorporated Urbanized Areas With a Population of 250,000 or More According to the Latest Decennial Census by the Bureau of Census

State	County	Unincorporated urbanized population
California	Los Angeles	912,664
	Sacramento	449,056
	San Diego	304,758
Delaware	New Castle	257,184
Florida	Dade	781,949
Georgia	DeKalb	396,379
Hawaii	Honolulu	688,178
Maryland	Anne Arundel	271,458
	Baltimore	601,308
	Montgomery	447,993
	Prince George's	450,188
Texas	Harris	409,601
Utah	Salt Lake	304,632
Virginia	Fairfax	527,178
Washington	King	336,800

Appendix I to Part 122—Counties With Unincorporated Urbanized Areas Greater Than 100,000, But Less Than 250,000 According to the Latest Decennial Census by the Bureau of Census

State	County	Unincorporated urbanized population
Alabama	Jefferson	102,917
Arizona	Pima	111,479
California	Alameda	187,474
	Contra Costa	158,452
	Kern	117,231
	Orange	210,693
	Riverside	115,719
	San Bernardino	148,644
Florida	Broward	159,370
	Escambia	147,892
	Hillsborough	238,292
	Orange	245,325
	Palm Beach	167,089
	Pinellas	194,389
	Polk	104,150
	Sarasota	110,009
Georgia	Clayton	100,742
	Cobb	204,121
	Richmond	118,529
Kentucky	Jefferson	224,958
Louisiana	Jefferson	140,836
North Carolina	Cumberland	142,727
Nevada	Clark	201,775
Oregon	Multnomah	141,100
	Washington	109,346
South Carolina	Greenville	135,398
	Richland	124,684
Virginia	Arlington	152,599
	Henrico	161,204
	Chesterfield	108,348
Washington	Snohomish	103,493
	Pierce	196,113

PART 123—STATE PROGRAM REQUIREMENTS

8. The authority citation for part 123 continues to read as follows:

Authority: Clean Water Act, 33 U.S.C. 1251 *et seq.*

9. Section 123.25 is amended by revising paragraph (a)(9) to read as follows:

§ 123.25 Requirements for permitting.

(a) * * *

(9) § 122.26—(Storm water discharges);

* * * * *

PART 124—PROCEDURES FOR DECISIONMAKING

10. The authority citation for part 124 continues to read as follows:

Authority: Resource Conservation and Recovery Act, 42 U.S.C. 6901 *et seq.*; Safe Drinking Water Act, 42 U.S.C. 300f *et seq.*; Clean Water Act, 33 U.S.C. 1251 *et seq.*; and Clean Air Act, 42 U.S.C. 1857 *et seq.*

11. Section 124.52 is revised to read as follows:

§ 124.52 Permits required on a case-by-case basis.

(a) Various sections of part 122, subpart B allow the Director to determine, on a case-by-case basis, that certain concentrated animal feeding operations (§ 122.23), concentrated aquatic animal production facilities (§ 122.24), storm water discharges (§ 122.26), and certain other facilities covered by general permits (§ 122.28) that do not generally require an individual permit may be required to obtain an individual permit because of their contributions to water pollution.

(b) Whenever the Regional Administrator decides that an individual permit is required under this section, except as provided in paragraph (c) of this section, the Regional Administrator shall notify the discharger in writing of that decision and the reasons for it, and shall send an application form with the notice. The discharger must apply for a permit under § 122.21 within 60 days of notice, unless permission for a later date is granted by the Regional Administrator. The question whether the designation was proper will remain open for consideration during the public comment period under § 124.11 or § 124.118 and in any subsequent hearing.

(c) Prior to a case-by-case determination that an individual permit is required for a storm water discharge under this section (*see* 40 CFR 122.26 (a)(1)(v) and (c)(1)(v)), the Regional Administrator may require the discharger to submit a permit application or other information regarding the discharge under section 308 of the CWA. In requiring such information, the Regional Administrator shall notify the discharger in writing and shall send an application form with the notice. The discharger must apply for a permit under § 122.26 within 60 days of notice, unless permission for a later date is granted by the Regional Administrator. The question whether the initial designation was proper will remain open for consideration during the public comment period under § 124.11 or § 124.118 and in any subsequent hearing.

Note: The following form will not appear in the Code of Federal Regulations.

BILLING CODE 6560-50-M

Please print or type in the unshaded areas only

EPA ID Number *(copy from Item 1 of Form 1)*

Form Approved. OMB No. 2040-0086
Approval expires 5/31/92

Form 2F NPDES

EPA

United States Environmental Protection Agency
Washington, DC 20460

Application for Permit To Discharge Stormwater Discharges Associated with Industrial Activity

Paperwork Reduction Act Notice

Public reporting burden for this application is estimated to average 28.6 hours per application, including time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding the burden estimate, any other aspect of this collection of information, or suggestions for improving this form, including suggestions which may increase or reduce this burden to: Chief, Information Policy Branch, PM-223, U.S. Environmental Protection Agency, 401 M St., SW, Washington, DC 20460, or Director, Office of Information and Regulatory Affairs, Office of Management and Budget, Washington, DC 20503.

I. Outfall Location

For each outfall, list the latitude and longitude of its location to the nearest 15 seconds and the name of the receiving water.

A. Outfall Number *(list)*	B. Latitude			C. Longitude			D. Receiving Water *(name)*

II. Improvements

A. Are you now required by any Federal, State, or local authority to meet any implementation schedule for the construction, upgrading or operation of wastewater treatment equipment or practices or any other environmental programs which may affect the discharges described in this application? This includes, but is not limited to, permit conditions, administrative or enforcement orders, enforcement compliance schedule letters, stipulations, court orders, and grant or loan conditions.

1. Identification of Conditions, Agreements, Etc.	2. Affected Outfalls		3. Brief Description of Project	4. Final Compliance Date	
	number	source of discharge		a. req.	b. proj.

B. You may attach additional sheets describing any additional water pollution (or other environmental projects which may affect your discharges) you now have under way or which you plan. Indicate whether each program is now under way or planned, and indicate your actual or planned schedules for construction.

III. Site Drainage Map

Attach a site map showing topography (or indicating the outline of drainage areas served by the outfall(s) covered in the application if a topographic map is unavailable) depicting the facility including: each of its intake and discharge structures; the drainage area of each storm water outfall; paved areas and buildings within the drainage area of each storm water outfall, each known past or present areas used for outdoor storage or disposal of significant materials, each existing structural control measure to reduce pollutants in storm water runoff, materials loading and access areas, areas where pesticides, herbicides, soil conditioners and fertilizers are applied; each of its hazardous waste treatment, storage or disposal units (including each area not required to have a RCRA permit which is used for accumulating hazardous waste under 40 CFR 262.34); each well where fluids from the facility are injected underground; springs, and other surface water bodies which receive storm water discharges from the facility.

 Continue on Page 2

Continued from the Front

IV. Narrative Description of Pollutant Sources

A. For each outfall, provide an estimate of the area (include units) of impervious surfaces (including paved areas and building roofs) drained to the outfall, and an estimate of the total surface area drained by the outfall.

Outfall Number	Area of Impervious Surface *(provide units)*	Total Area Drained *(provide units)*	Outfall Number	Area of Impervious Surface *(provide units)*	Total Area Drained *(provide units)*

B. Provide a narrative description of significant materials that are currently or in the past three years have been treated, stored or disposed in a manner to allow exposure to storm water; method of treatment, storage, or disposal; past and present materials management practices employed, in the last three years, to minimize contact by these materials with storm water runoff; materials loading and access areas; and the location, manner, and frequency in which pesticides, herbicides, soil conditioners, and fertilizers are applied.

C. For each outfall, provide the location and a description of existing structural and nonstructural control measures to reduce pollutants in storm water runoff; and a description of the treatment the storm water receives, including the schedule and type of maintenance for control and treatment measures and the ultimate disposal of any solid or fluid wastes other than by discharge.

Outfall Number	Treatment	List Codes from Table 2F-1

V. Nonstormwater Discharges

A. I certify under penalty of law that the outfall(s) covered by this application have been tested or evaluated for the presence of nonstormwater discharges, and that all nonstormwater discharges from these outfall(s) are identified in either an accompanying Form 2C or Form 2E application for the outfall.

Name and Official Title *(type or print)*	Signature	Date Signed

B. Provide a description of the method used, the date of any testing, and the onsite drainage points that were directly observed during a test.

VI. Significant Leaks or Spills

Provide existing information regarding the history of significant leaks or spills of toxic or hazardous pollutants at the facility in the last three years, including the approximate date and location of the spill or leak, and the type and amount of material released.

 Continue on Page 3

EPA ID Number *(copy from Item I of Form 1)*

Continued from Page 2

VII. Discharge Information

A,B,C, & D: See instructions before proceeding. Complete one set of tables for each outfall. Annotate the outfall number in the space provided. Tables VII-A, VII-B, and VII-C are included on separate sheets numbered VII-1 and VII-2.

E: Potential discharges not covered by analysis - Is any pollutant listed in Table 2F-2 a substance or a component of a substance which you currently use or manufacture as an intermediate or final product or byproduct?

☐ Yes *(list all such pollutants below)* ☐ No *(go to Section VIII)*

VIII. Biological Toxicity Testing Data

☐ Yes *(list results below)* ☐ No *(go to Section IX)*

IX. Contract Analysis Information

☐ Yes ☐ No *(go to Section X)*

A. Name	B. Address	C. Area Code & Phone No.	D. Pollutants Analyzed

X. Certification

A. Name & Official Title *(type or print)*	B. Area Code and Phone No.
C Signature	D. Date Signed

EPA ID Number *(copy from Item I of Form 1)*

Form Approved. OMB No. 2040-0086
Approval expires 5/31/92

VII. Discharge Information *(Continued from page 3 of Form 2F)*

Part A - You must provide the results of at least one analysis for every pollutant in this table. Complete one table for each outfall. See instructions for additional details.

Pollutant and CAS Number *(if available)*	Maximum Values *(include units)*		Average Values *(include units)*		Number of Storm Events Sampled	Sources of Pollutants
	Grab Sample Taken During First 30 Minutes	Flow-weighted Composite	Grab Sample Taken During First 30 Minutes	Flow-weighted Composite		
Oil nd Grease						
Biological Oxygen Demand (BOD5)						
Chemical Oxygen Demand (COD)						
Total Suspended Solids (TSS)						
Total Kjeldahl Nitrogen						
Nitrate plus Nitrite Nitrogen						
Total Phosphorus						
pH	Minimum	Maximum	Minimum	Maximum		

Part B - List each pollutant that is limited in an effluent guideline which the facility is subject to or any pollutant listed in the facility's NPDES permit for its process wastewater (if the facility is operating under an existing NPDES permit). Complete one table for each outfall. See the instructions for additional details and requirements.

Pollutant and CAS Number *(if available)*	Maximum Values *(include units)*		Average Values *(include units)*		Number of Storm Events Sampled	Sources of Pollutants
	Grab Sample Taken During First 30 Minutes	Flow-weighted Composite	Grab Sample Taken During First 30 Minutes	Flow-weighted Composite		

Continue on Reverse

Continued from the Front

Part C - List each pollutant shown in Tables 2F-2, 2F-3, and 2F-4 that you know or have reason to believe is present. See the instructions for additional details and requirements. Complete one table for each outfall.

Pollutant and CAS Number *(if available)*	Maximum Values *(include units)*		Average Values *(include units)*		Number of Storm Events Sampled	Sources of Pollutants
	Grab Sample Taken During First 30 Minutes	Flow-weighted Composite	Grab Sample Taken During First 30 Minutes	Flow-weighted Composite		

Part D - Provide data for the storm event(s) which resulted in the maximum values for the flow weighted composite sample.

1. Date of Storm Event	2. Duration of Storm *(in minutes)*	3. Total rainfall during storm event *(in inches)*	4. Number of hours between beginning of storm measured and end of previous measurable rain event	5. Maximum flow rate during rain event *(gallons/minute or specify units*	6. Total flow from rain event *(gallons or specify units)*	7. Season sample was taken	8. Form of Precipitation *(rainfall, snowmelt)*

9. Provide a description of the method of flow measurement or estimate.

Instructions - Form 2F
Application for Permit to Discharge Storm Water Associated with Industrial Activity

Who Must File Form 2F

Form 2F must be completed by operators of facilities which discharge storm water associated with industrial activity or by operators of storm water discharges that EPA is evaluating for designation as a significant contributor of pollutants to waters of the United States, or as contributing to a violation of a water quality standard.

Operators of discharges which are composed entirely of storm water must complete Form 2F (EPA Form 3510-2F) in conjunction with Form 1 (EPA Form 3510-1).

Operators of discharges of storm water which are combined with process wastewater (process wastewater is water that comes into direct contact with or results from the production or use of any raw material, intermediate product, finished product, byproduct, waste product, or wastewater) must complete and submit Form 2F, Form 1, and Form 2C (EPA Form 3510-2C).

Operators of discharges of storm water which are combined with nonprocess wastewater (nonprocess wastewater includes noncontact cooling water and sanitary wastes which are not regulated by effluent guidelines or a new source performance standard, except discharges by educational, medical, or commercial chemical laboratories) must complete Form 1, Form 2F, and Form 2E (EPA Form 3510-2E).

Operators of new sources or new discharges of storm water associated with industrial activity which will be combined with other nonstormwater new sources or new discharges must submit Form 1, Form 2F, and Form 2D (EPA Form 3510-2D).

Where to File Applications

The application forms should be sent to the EPA Regional Office which covers the State in which the facility is located. Form 2F must be used only when applying for permits in States where the NPDES permits program is administered by EPA. For facilities located in States which are approved to administer the NPDES permits program, the State environmental agency should be contacted for proper permit application forms and instructions.

Information on whether a particular program is administered by EPA or by a State agency can be obtained from your EPA Regional Office. Form 1, Table 1 of the "General Instructions" lists the addresses of EPA Regional Offices and the States within the jurisdiction of each Office.

Completeness

Your application will not be considered complete unless you answer every question on this form and on Form 1. If an item does not apply to you, enter "NA" (for not applicable) to show that you considered the question.

Public Availability of Submitted Information

You may not claim as confidential any information required by this form or Form 1, whether the information is reported on the forms or in an attachment. Section 402(j) of the Clean Water Act requires that all permit applications will be available to the public. This information will be made available to the public upon request.

Any information you submit to EPA which goes beyond that required by this form, Form 1, or Form 2C you may claim as confidential, but claims for information which are effluent data will be denied.

If you do not assert a claim of confidentiality at the time of submitting the information, EPA may make the information public without further notice to you. Claims of confidentiality will be handled in accordance with EPA's business confidentiality regulations at 40 CFR Part 2.

Definitions

All significant terms used in these instructions and in the form are defined in the glossary found in the General Instructions which accompany Form 1.

EPA ID Number

Fill in your EPA Identification Number at the top of each odd-numbered page of Form 2F. You may copy this number directly from item I of Form 1.

Item I

You may use the map you provided for item XI of Form 1 to determine the latitude and longitude of each of your outfalls and the name of the receiving water.

Item II-A

If you check "yes" to this question, complete all parts of the chart, or attach a copy of any previous submission you have made to EPA containing the same information.

Item II-B

You are not required to submit a description of future pollution control projects if you do not wish to or if none is planned.

Item III

Attach a site map showing topography (or indicating the outline of drainage areas served by the outfall(s) covered in the application if a topographic map is unavailable) depicting the facility including:

each of its drainage and discharge structures;

the drainage area of each storm water outfall;

paved areas and building within the drainage area of each storm water outfall, each known past or present areas used for outdoor storage or disposal of significant materials, each existing structural control measure to reduce pollutants in storm water runoff, materials loading and access areas, areas where pesticides, herbicides, soil conditioners and fertilizers are applied;

each of its hazardous waste treatment, storage or disposal facilities (including each area not required to have a RCRA permit which is used for accumulating hazardous waste for less than 90 days under 40 CFR 262.34);

each well where fluids from the facility are injected underground; and

springs, and other surface water bodies which receive storm water discharges from the facility;

Item IV-A

For each outfall, provide an estimate of the area drained by the outfall which is covered by impervious surfaces. For the purpose of this application, impervious surfaces are surfaces where storm water runs off at rates that are significantly higher than background rates (e.g., predevelopment levels) and include paved areas, building roofs, parking lots, and roadways. Include an estimate of the total area (including all impervious and pervious areas) drained by each outfall. The site map required under item III can be used to estimate the total area drained by each outfall.

Item IV-B

Provide a narrative description of significant materials that are currently or in the past three years have been treated, stored, or disposed in a manner to allow exposure to storm water; method of treatment, storage or disposal of these materials; past and present materials management practices employed, in the last three years, to minimize contact by these materials with storm water runoff; materials loading and access areas; and the location, manner, and frequency in which pesticides, herbicides, soil conditioners, and fertilizers are applied. Significant materials should be identified by chemical name, form (e.g., powder, liquid, etc.), and type of container or treatment unit. Indicate any materials treated, stored, or disposed of together. "Significant materials" includes, but is not limited to: raw materials; fuels; materials such as solvents, detergents, and plastic pellets; finished materials such as metallic products; raw materials used in food processing or production; hazardous substances designated under Section 101(14) of CERCLA; any chemical the facility is required to report pursuant to Section 313 of Title III of SARA; fertilizers; pesticides; and waste products such as ashes, slag and sludge that have the potential to be released with storm water discharges.

Item IV-C

For each outfall, structural controls include structures which enclose material handling or storage areas, covering materials, berms, dikes, or diversion ditches around manufacturing, production, storage or treatment units, retention ponds, etc. Nonstructural controls include practices such as spill prevention plans, employee training, visual inspections, preventive maintenance, and housekeeping measures that are used to prevent or minimize the potential for releases of pollutants.

Item V

Provide a certification that all outfalls that should contain storm water discharges associated with industrial activity have been tested or evaluated for the presence of non-storm water discharges which are not covered by an NPDES permit. Tests for such non-storm water discharges may include smoke tests, fluorometric dye tests, analysis of accurate schematics, as well as other appropriate tests. Part B must include a description of the method used, the date of any testing, and the onsite drainage points that were directly observed during a test. All non-storm water discharges must be identified in a Form 2C or Form 2E which must accompany this application (see beginning of instructions under section titled "Who Must File Form 2F" for a description of when Form 2C and Form 2E must be submitted).

Item VI

Provide a description of existing information regarding the history of significant leaks or spills of toxic or hazardous pollutants at the facility in the last three years.

Item VII-A, B, and C

These items require you to collect and report data on the pollutants discharged for each of your outfalls. Each part of this item addresses a different set of pollutants and must be completed in accordance with the specific instructions for that part. The following general instructions apply to the entire item.

General Instructions

Part A requires you to report at least one analysis for each pollutant listed. Parts B and C require you to report analytical data in two ways. For some pollutants addressed in Parts B and C, if you know or have reason to know that the pollutant is present in your discharge, you may be required to list the pollutant and test (sample and analyze) and report the levels of the pollutants in your discharge. For all other pollutants addressed in Parts B and C, you must list the pollutant if you know or have reason to know that the pollutant is present in the discharge, and either report quantitative data for the pollutant or briefly describe the reasons the pollutant is expected to be discharged. (See specific instructions on the form and below for Parts A through C.) Base your determination that a pollutant is present in or absent from your discharge on your knowledge of your raw materials, material management practices, maintenance chemicals, history of spills and releases, intermediate and final products and byproducts, and any previous analyses known to you of your effluent or similar effluent.

A. **Sampling:** The collection of the samples for the reported analyses should be supervised by a person experienced in performing sampling of industrial wastewater or storm water discharges. You may contact EPA or your State permitting authority for detailed guidance on sampling techniques and for answers to specific questions. Any specific requirements contained in the applicable analytical methods should be followed for sample containers, sample preservation, holding times, the collection of duplicate samples, etc. The time when you sample should be representative, to the extent feasible, of your treatment system operating properly with no system upsets. Samples should be collected from the center of the flow channel, where turbulence is at a maximum, at a site specified in your present permit, or at any site adequate for the collection of a representative sample.

For pH, temperature, cyanide, total phenols, residual chlorine, oil and grease, and fecal coliform, grab samples taken during the first 30 minutes (or as soon thereafter as practicable) of the discharge must be used (you are not required to analyze a flow-weighted composite for these parameters). For all other pollutants both a grab sample collected during the first 30 minutes (or as soon thereafter as practicable) of the discharge and a flow-weighted composite sample must be analyzed. However, a minimum of one grab sample may be taken for effluents from holding ponds or other impoundments with a retention period of greater than 24 hours.

All samples shall be collected from the discharge resulting from a storm event that is greater than 0.1 inches and at least 72 hours from the previously measurable (greater than 0.1 inch rainfall) storm event. Where feasible, the variance in the duration of the event and the total rainfall of the event should not exceed 50 percent from the average or median rainfall event in that area.

A grab sample shall be taken during the first thirty minutes of the discharge (or as soon thereafter as practicable), and a flow-weighted composite shall be taken for the entire event or for the first three hours of the event.

Grab and composite samples are defined as follows:

Grab sample: An individual sample of at least 100 milliliters collected during the first thirty minutes (or as soon thereafter as practicable) of the discharge. This sample is to be analyzed separately from the composite sample.

Flow-Weighted Composite sample: A flow-weighted composite sample may be taken with a continuous sampler that proportions the amount of sample collected with the flow rate or as a combination of a minimum of three sample aliquots taken in each hour of discharge for the entire event or for the first three hours of the event, with each aliquot being at least 100 milliliters and collected with a minimum period of fifteen minutes between aliquot collections. The composite must be flow proportional; either the time interval between each aliquot or the volume of each aliquot must be proportional to either the stream flow at the time of sampling or the total stream flow since the collection of the previous aliquot. Aliquots may be collected manually or automatically. Where GC/MS Volatile Organic Analysis (VOA) is required, aliquots must be combined in the laboratory immediately before analysis. Only one analysis for the composite sample is required.

Data from samples taken in the past may be used, provided that:

All data requirements are met;

Sampling was done no more than three years before submission; and

All data are representative of the present discharge.

Among the factors which would cause the data to be unrepresentative are significant changes in production level, changes in raw materials, processes, or final products, and changes in storm water treatment. When the Agency promulgates new analytical methods in 40 CFR Part 136, EPA will provide information as to when you should use the new methods to generate data on your discharges. Of course, the Director may request additional information, including current quantitative data, if they determine it to be necessary to assess your discharges. The Director may allow or establish appropriate site-specific sampling procedures or requirements, including sampling locations, the season in which the sampling takes place, the minimum duration between the previous measurable storm event and the storm event sampled, the minimum or maximum level of precipitation required for an appropriate storm event, the form of precipitation sampled (snow melt or rainfall), protocols for collecting samples under 40 CFR Part 136, and additional time for submitting data on a case-by-case basis.

B. **Reporting:** All levels must be reported as concentration and as total mass. You may report some or all of the required data by attaching separate sheets of paper instead of filling out pages VII-1 and VII-2 if the separate sheets contain all the required information in a format which is consistent with pages VII-1 and VII-2 in spacing and in identification of pollutants and columns. Use the following abbreviations in the columns headed "Units."

Concentration		Mass	
ppm	parts per million	lbs	pounds
mg/1	milligrams per liter	ton	tons (English tons)
ppb	parts per billion	mg	milligrams
ug/1	micrograms per liter	g	grams
kg	kilograms	T	tonnes (metric tons)

All reporting of values for metals must be in terms of "total recoverable metal," unless:

(1) An applicable, promulgated effluent limitation or standard specifies the limitation for the metal in dissolved, valent, or total form; or

(2) All approved analytical methods for the metal inherently measure only its dissolved form (e.g., hexavalent chromium); or

(3) The permitting authority has determined that in establishing case-by-case limitations it is necessary to express the limitations on the metal in dissolved, valent, or total form to carry out the provisions of the CWA. If you measure only one grab sample and one flow-weighted composite sample for a given outfall, complete only the "Maximum Values" columns and insert "1" into the "Number of Storm Events Sampled" column. The permitting authority may require you to conduct additional analyses to further characterize your discharges.

If you measure more than one value for a grab sample or a flow-weighted composite sample for a given outfall and those values are representative of your discharge, you must report them. You must describe your method of testing and data analysis. You also must determine the average of all values within the last year and report the concentration mass under the "Average Values" columns, and the total number of storm events sampled under the "Number of Storm Events Sampled" columns.

C. **Analysis:** You must use test methods promulgated in 40 CFR Part 136; however, if none has been promulgated for a particular pollutant, you may use any suitable method for measuring the level of the pollutant in your discharge provided that you submit a description of the method or a reference to a published method. Your description should include the sample holding time, preservation techniques, and the quality control measures which you used. If you have two or more substantially identical outfalls, you may request permission from your permitting authority to sample and analyze only one outfall and submit the results of the analysis for other substantially identical outfalls. If your request is granted by the permitting authority, on a separate sheet attached to the application form, identify which outfall you did test, and describe why the outfalls which you did not test are substantially identical to the outfall which you did test.

Part VII-A

Part VII-A must be completed by all applicants for all outfalls who must complete Form 2F.

Analyze a grab sample collected during the first thirty minutes (or as soon thereafter as practicable) of the discharge and flow-weighted composite samples for all pollutants in this Part, and report the results except use only grab samples for pH and oil and grease. See discussion in General Instructions to Item VII for definitions of grab sample collected during the first thirty minutes of discharge and flow-weighted composite sample. The "Average Values" column is not compulsory but should be filled out if data are available.

Part VII-B

List all pollutants that are limited in an effluent guideline which the facility is subject to (see 40 CFR Subchapter N to determine which pollutants are limited in effluent guidelines) or any pollutant listed in the facility's NPDES permit for its process wastewater (if the facility is operating under an existing NPDES permit). Complete one table for each outfall. See discussion in General instructions to item VII for definitions of grab sample collected during the first thirty minutes (or as soon thereafter as practicable) of discharge and flow-weighted composite sample. The "Average Values" column is not compulsory but should be filled out if data are available.

Analyze a grab sample collected during the first thirty minutes of the discharge and flow-weighted composite samples for all pollutants in this Part, and report the results, except as provided in the General Instructions.

Part VII-C

Part VII-C must be completed by all applicants for all outfalls which discharge storm water associated with industrial activity, or that EPA is evaluating for designation as a significant contributor of pollutants to waters of the United States, or as contributing to a violation of a water quality standard. Use both a grab sample and a composite sample for all pollutants you analyze for in this part except use grab samples for residual chlorine and fecal coliform. The "Average Values" column is not compulsory but should be filled out if data are available. Part C requires you to address the pollutants in Table 2F-2, 2F-3, and 2F-4 for each outfall. Pollutants in each of these Tables are addressed differently.

Table 2F-2: For each outfall, list all pollutants in Table 2F-2 that you know or have reason to believe are discharged (except pollutants previously listed in Part VII-B). If a pollutant is limited in an effluent guideline limitation which the facility is subject to (e.g., use of TSS as an indicator to control the discharge of iron and aluminum), the pollutant should be listed in Part VII-B. If a pollutant in table 2F-2 is indirectly limited by an effluent guideline limitation through an indicator, you must analyze for it and report data in Part VII-C. For other pollutants listed in Table 2F-2 (those not limited directly or indirectly by an effluent limitation guideline), that you know or have reason to believe are discharges, you must either report quantitative data or briefly describe the reasons the pollutant is expected to be discharged.

Table 2F-3: For each outfall, list all pollutants in Table 2F-3 that you know or have reason to believe are discharged. For every pollutant in Table 2F-3 expected to be discharged in concentrations of 10 ppb or greater, you must submit quantitative data. For acrolein, acrylonitrile, 2,4 dinitrophenol, and 2-methyl-4,6 dinitrophenol, you must submit quantitative data if any of these four pollutants is expected to be discharged

in concentrations of 100 ppb or greater. For every pollutant expected to be discharged in concentrations less than 10 ppb (or 100 ppb for the four pollutants listed above), then you must either submit quantitative data or briefly describe the reasons the pollutant is expected to be discharged.

Small Business Exemption - If you are a "small business," you are exempt from the reporting requirements for the organic toxic pollutants listed in Table 2F-3. There are two ways in which you can qualify as a "small business". If your facility is a coal mine, and if your probable total annual production is less than 100,000 tons per year, you may submit past production data or estimated future production (such as a schedule of estimated total production under 30 CFR 795.14(c)) instead of conducting analyses for the organic toxic pollutants. If your facility is not a coal mine, and if your gross total annual sales for the most recent three years average less than $100,000 per year (in second quarter 1980 dollars), you may submit sales data for those years instead of conducting analyses for the organic toxic pollutants. The production or sales data must be for the facility which is the source of the discharge. The data should not be limited to production or sales for the process or processes which contribute to the discharge, unless those are the only processes at your facility. For sales data, in situations involving intracorporate transfer of goods and services, the transfer price per unit should approximate market prices for those goods and services as closely as possible. Sales figures for years after 1980 should be indexed to the second quarter of 1980 by using the gross national product price deflator (second quarter of 1980=100). This index is available in National Income and Product Accounts of the United States (Department of Commerce, Bureau of Economic Analysis).

Table 2F-4: For each outfall, list any pollutant in Table 2F-4 that you know or believe to be present in the discharge and explain why you believe it to be present. No analysis is required, but if you have analytical data, you must report them. **Note:** Under 40 CFR 117.12(a)(2), certain discharges of hazardous substances (listed at 40 CFR 177.21 or 40 CFR 302.4) may be exempted from the requirements of section 311 of CWA, which establishes reporting requirements, civil penalties, and liability for cleanup costs for spills of oil and hazardous substances. A discharge of a particular substance may be exempted if the origin, source, and amount of the discharged substances are identified in the NPDES permit application or in the permit, if the permit contains a requirement for treatment of the discharge, and if the treatment is in place. To apply for an exclusion of the discharge of any hazardous substance from the requirements of section 311, attach additional sheets of paper to your form, setting forth the following information:

1. The substance and the amount of each substance which may be discharged.
2. The origin and source of the discharge of the substance.
3. The treatment which is to be provided for the discharge by:
   a. An onsite treatment system separate from any treatment system treating your normal discharge;
   b. A treatment system designed to treat your normal discharge and which is additionally capable of treating the amount of the substance identified under paragraph 1 above; or
   c. Any combination of the above.

See 40 CFR 117.12(a)(2) and (c), published on August 29, 1979, in 44 FR 50766, or contact your Regional Office (Table 1 on Form 1, Instructions), for further information on exclusions from section 311.

Part VII-D

If sampling is conducted during more than one storm event, you only need to report the information requested in Part VII-D for the storm event(s) which resulted in any maximum pollutant concentration reported in Part VII-A, VII-B, or VII-C.

Provide flow measurements or estimates of the flow rate, and the total amount of discharge for the storm event(s) sampled, the method of flow measurement, or estimation. Provide the data and duration of the storm event(s) sampled, rainfall measurements, or estimates of the storm event which generated the sampled runoff and the duration between the storm event sampled and the end of the previous measurable (greater than 0.1 inch rainfall) storm event.

Part VII-E

List any toxic pollutant listed in Tables 2F-2, 2F-3, or 2F-4 which you currently use or manufacture as an intermediate or final product or byproduct. In addition, if you know or have reason to believe that 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD) is discharged or if you use or manufacture 2,4,5-trichlorophenoxy acetic

acid (2,4,5,-T); 2-(2,4,5-trichlorophenoxy) propanoic acid (Silvex, 2,4,5,-TP); 2-(2,4,5-trichlorophenoxy) ethyl, 2,2-dichloropropionate (Erbon); O,O-dimethyl O-(2,4,5-trichlorphenyl) phosphorothioate (Ronnel); 2,4,5-trichlorophenol (TCP); or hexachlorophene (HCP); then list TCDD. The Director may waive or modify the requirement if you demonstrate that it would be unduly burdensome to identify each toxic pollutant and the Director has adequate information to issue your permit. You may not claim this information as confidential; however, you do not have to distinguish between use or production of the pollutants or list the amounts.

Item VIII

Self explanatory. The permitting authority may ask you to provide additional details after your application is received.

Item X

The Clean Water Act provides for severe penalties for submitting false information on this application form.

Section 309(c)(4) of the Clean Water Act provides that "Any person who knowingly makes any false material statement, representation, or certification in any application, . . . shall upon conviction, be punished by a fine of not more than $10,000 or by imprisonment for not more than 2 years, or by both. If a conviction of such person is for a violation committed after a first conviction of such person under this paragraph, punishment shall be by a fine of not more than $20,000 per day of violation, or by imprisonment of not more than 4 years, or by both." 40 CFR Part 122.22 requires the certification to be signed as follows:

(A) For a corporation: by a responsible corporate official. For purposes of this section, a responsible corporate official means (i) a president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy- or decision-making functions for the corporation, or (ii) the manager of one or more manufacturing, production, or operating facilities employing more than 250 persons or having gross annual sales or expenditures exceeding $25,000,000 (in second-quarter 1980 dollars), if authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures.

Note: EPA does not require specific assignments or delegation of authority to responsible corporate officers identified in 122.22(a)(1)(i). The Agency will presume that these responsible corporate officers have the requisite authority to sign permit applications unless the corporation has notified the Director to the contrary. Corporate procedures governing authority to sign permit applications may provide for assignment or delegation to applicable corporate position under 122.22(a)(1)(ii) rather than to specific individuals.

(B) For a partnership or sole proprietorship: by a general partner or the proprietor, respectively; or

(C) For a municipality, State, Federal, or other public agency: by either a principal executive officer or ranking elected official. For purposes of this section, a principal executive officer of a Federal agency includes (i) the chief executive officer of the agency, or (ii) a senior executive officer having responsibility for the overall operations of a principal geographic unit of the agency (e.g., Regional Administrators of EPA).

Table 2F-1
Codes for Treatment Units

	Physical Treatment Processes		
1-A	Ammonia Stripping	1-M	Grit Removal
1-B	Dialysis	1-N	Microstraining
1-C	Diatomaceous Earth Filtration	1-O	Mixing
1-D	Distillation	1-P	Moving Bed Filters
1-E	Electrodialysis	1-Q	Multimedia Filtration
1-F	Evaporation	1-R	Rapid Sand Filtration
1-G	Flocculation	1-S	Reverse Osmosis (Hyperfiltration)
1-H	Flotation	1-T	Screening
1-I	Foam Fractionation	1-U	Sedimentation (Setting)
1-J	Freezing	1-V	Slow Sand Filtration
1-K	Gas-Phase Separation	1-W	Solvent Extraction
1-L	Grinding (Comminutors)	1-X	Sorption
	Chemical Treatment Processes		
2-A	Carbon Adsorption	2-G	Disinfection (Ozone)
2-B	Chemical Oxidation	2-H	Disinfection (Other)
2-C	Chemical Precipitation	2-I	Electrochemical Treatment
2-D	Coagulation	2-J	Ion Exchange
2-E	Dechlorination	2-K	Neutralization
2-F	Disinfection (Chlorine)	2-L	Reduction
	Biological Treatment Processes		
3-A	Activated Sludge	3-E	Pre-Aeration
3-B	Aerated Lagoons	3-F	Spray Irrigation/Land Application
3-C	Anaerobic Treatment	3-G	Stabilization Ponds
3-D	Nitrification-Denitrification	3-H	Trickling Filtration
	Other Processes		
4-A	Discharge to Surface Water	4-C	Reuse/Recycle of Treated Effluent
4-B	Ocean Discharge Through Outfall	4-D	Underground Injection
	Sludge Treatment and Disposal Processes		
5-A	Aerobic Digestion	5-M	Heat Drying
5-B	Anaerobic Digestion	5-N	Heat Treatment
5-C	Belt Filtration	5-O	Incineration
5-D	Centrifugation	5-P	Land Application
5-E	Chemical Conditioning	5-Q	Landfill
5-F	Chlorine Treatment	5-R	Pressure Filtration
5-G	Composting	5-S	Pyrolysis
5-H	Drying Beds	5-T	Sludge Lagoons
5-I	Elutriation	5-U	Vacuum Filtration
5-J	Flotation Thickening	5-V	Vibration
5-K	Freezing	5-W	Wet Oxidation
5-L	Gravity Thickening		

Table 2F-2

Conventional and Nonconventional Pollutants Required To Be Tested by Existing Discharger if Expected To Be Present

Bromide
Chlorine, Total Residual
Color
Fecal Coliform
Fluoride
Nitrate-Nitrite
Nitrogen, Total Kjedahl
Oil and Grease
Phosphorus, Total Radioactivity
Sulfate
Sulfide
Sulfite
Surfactants
Aluminum, Total
Barium, Total
Boron, Total
Cobalt, Total
Iron, Total
Magnesium, Total
Molybdenum, Total
Magnesium, Total
Tin, Total
Titanium, Total

Table 2F-3

Toxic pollutants required to be identified by applicant if expected to be present

Toxic Pollutants and Total Phenol

Antimony, Total	Copper, Total	Silver, Total
Arsenic, Total	Lead, Total	Thallium, Total
Beryllium, Total	Mercury, Total	Zinc, Total
Cadmium, Total	Nickel, Total	Cyanide, Total
Chromium, Total	Selenium, Total	Phenols, Total

GC/MS Fraction Volatiles Compounds

Acrolein	Dichlorobromomethane	1,1,2,2,-Tetrachloroethane
Acrylonitrile	1,1-Dichloroethane	Tetrachloroethylene
Benzene	1,2-Dichloroethane	Toluene
Bromoform	1,1-Dichloroethylene	1,2-Trans-Dichloroethylene
Carbon Tetrachloride	1,2-Dichloropropane	1,1,1-Trichloroethane
Chlorobenzene	1,3-Dichloropropylene	1,1,2-Trichloroethane
Chlorodibromomethane	Ethylbenzene	Trichloroethylene
Chloroethane	Methyl Bromide	Vinyl Chloride
2-Chloroethylvinyl Ether	Methyl Chloride	
Chloroform	Methylene Chloride	

Acid Compounds

2-Chlorophenol	2,4-Dinitrophenol	Pentachlorophenol
2,4-Dichlorophenol	2-Nitrophenol	Phenol
2,4-Dimethylphenol	4-Nitrophenol	2,4,6-Trichlorophenol
4,6-Dinitro-O-Cresol	p-Chloro-M-Cresol	

Base/Neutral

Acenaphthene	2-Chloronaphthalene	Fluroranthene
Acenaphthylene	4-Chlorophenyl Phenyl Ether	Fluorene
Anthracene	Chrysene	Hexachlorobenzene
Benzidine	Dibenzo(a,h)anthracene	Hexachlorobutadiene
Benzo(a)anthracene	1,2-Dichlorobenzene	Hexachloroethane
Benzo(a)pyrene	1,3-Dichlorobenzene	Indeno(1,2,3-cd)pyrene
3,4-Benzofluoranthene	1,4-Dichlorobenzene	Isophorone
Benzo(ghi)perylene	3,3'-Dichlorobenzidine	Napthalene
Benzo(k)fluoranthene	Diethyl Phthalate	Nitrobenzene
Bis(2-chloroethoxy)methane	Dimethyl Phthalate	N-Nitrosodimethylamine
Bis(2-chloroethyl)ether	Di-N-Butyl Phthalate	N-Nitrosodi-N-Propylamine
Bis(2-chloroisopropyl)ether	2,4-Dinitrotoluene	N-Nitrosodiphenylamine
Bis(2-ethylyhexyl)phthalate	2,6-Dinitrotoluene	Phenanthrene
4-Bromophenyl Phenyl Ether	Di-N-Octylphthalate	Pyrene
Butylbenzyl Phthalate	1,2-Diphenylhydrazine (as Azobenzene)	1,2,4-Trichlorobenzene

Pesticides

Aldrin	Dieldrin	PCB-1254
Alpha-BHC	Alpha-Endosulfan	PCB-1221
Beta-BHC	Beta-Endosulfan	PCB-1232
Gamma-BHC	Endosulfan Sulfate	PCB-1248
Delta-BHC	Endrin	PCB-1260
Chlordane	Endrin Aldehyde	PCB-1016
4,4'-DDT	Heptachlor	Toxaphene
4,4'-DDE	Heptachlor Epoxide	
4,4'-DDD	PCB-1242	

Table 2F-4

Hazardous substances required to be identified by applicant if expected to be present

Toxic Pollutant

Asbestos

Hazardous Substances

Acetaldehyde	Dinitrobenzene	Napthenic acid
Allyl alcohol	Diquat	Nitrotoluene
Allyl chloride	Disulfoton	Parathion
Amyl acetate	Diuron	Phenolsulfonate
Aniline	Epichlorohydrin	Phosgene
Benzonitrile	Ethion	Propargite
Benzyl chloride	Ethylene diamine	Propylene oxide
Butyl acetate	Ethylene dibromide	Pyrethrins
Butylamine	Formaldehyde	Quinoline
Carbaryl	Furfural	Resorcinol
Carbofuran	Guthion	Stronthium
Carbon disulfide	Isoprene	Strychnine
Chlorpyrifos	Isopropanolamine	Styrene
Coumaphos	Kelthane	2,4,5-T (2,4,5-Trichlorophenoxyacetic acid)
Cresol	Kepone	TDE (Tetrachlorodiphenyl ethane)
Crotonaldehyde	Malathion	2,4,5-TP [2-(2,4,5-Trichlorophenoxy) propanoic acid]
Cyclohexane	Mercaptodimethur	Trichlorofan
2,4-D (2,4-Dichlorophenoxyacetic acid)	Methoxychlor	Triethylamine
Diazinon	Methyl mercaptan	Trimethylamine
Dicamba	Methyl methacrylate	Uranium
Dichlobenil	Methyl parathion	Vanadium
Dichlone	Mevinphos	Vinyl acetate
2,2-Dichloropropionic acid	Mexacarbate	Xylene
Dichlorvos	Monoethyl amine	Xylenol
Diethyl amine	Monomethyl amine	Zirconium
Dimethyl amine	Naled	

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EPA

Technical Support Document For Water Quality-based Toxics Control

United States
Environmental Protection
Agency

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Office of Water
Washington, DC

TECHNICAL SUPPORT DOCUMENT FOR WATER QUALITY-BASED TOXICS CONTROL

This copy represents the second printing of this document.

Changes made to this document reflect corrections of typographical errors and the following update of the interim guidance on criteria for metals: The Agency has issued "Interim Guidance Interpretation and Implementation Aquatic Life Criteria for Metals." The interim guidance supersedes criteria document statements expressing criteria in terms of a acid soluble analytical method and also the metals discussion of Section 5.7.3. The availability of this document appeared in the June 5, 1992 Federal Register (Vol. 57, No. 109, pg. 24401).

March 1991
Office of Water Enforcement and Permits
Office of Water Regulations and Standards
U.S. Environmental Protection Agency
Washington, DC 20460

FOREWORD

The U.S. Environmental Protection Agency (EPA) and the State pollution control agencies have been charged with enforcing the laws regarding pollution of the natural environment. Environmental pollution is an urgent and continuing problem and, consequently, the laws grant considerable discretion to the control authorities to define environmental goals and develop the means to attain them. Establishing environmentally protective levels and incorporating them in a decisionmaking process entails a considerable amount of scientific knowledge and judgment. One area where scientific knowledge is rapidly changing concerns the discharge of toxic pollutants to the Nation's surface waters.

This document provides technical guidance for assessing and regulating the discharge of toxic substances to the waters of the United States. It was issued in support of EPA regulations and policy initiatives involving the application of biological and chemical assessment techniques to control toxic pollution to surface waters. This document is agency guidance only. It does not establish or affect legal rights or obligations. It does not establish a binding norm and is not finally determinative of the issues addressed. Agency decisions in any particular case will be made applying the law and regulations on the basis of specific facts when permits are issued or regulations promulgated.

This document is expected to be revised periodically to reflect advances in this rapidly evolving area. Comments from users will be welcomed. Send comments to U.S. EPA, Office of Water Enforcement and Permits, 401 M Street, SW, Mailcode EN366, Washington, DC 20460.

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EXECUTIVE SUMMARY

The revised *Technical Support Document for Water Quality-based Toxics Control* (TSD) provides States and Regions with guidance on procedures for use in the water quality-based control of toxic pollutants. It presents recommendations to regulatory authorities faced with the task of controlling the point source discharge of toxic pollutants to the Nation's waters. The document provides guidance for each step in the water quality-based toxics control process from standards development to compliance monitoring. Both human health and aquatic toxicity issues are incorporated into the discussions throughout the document. The overall approach in this revised document provides additional explanations and rationales based on accumulated experience and data for the various recommendations that were made in the original TSD. The following is a brief synopsis of the guidance provided in the TSD.

Approaches to Water Quality-based Toxics Control

The Environmental Protection Agency's (EPA) surface toxics control regulation, 54 *FR* 23868, June 2, 1989, established specific requirements that the "integrated" approach be used in water quality-based toxics control. The "integrated" approach consists of whole effluent and chemical-specific approaches as a means of protecting aquatic life and human health. As techniques are made available for implementing biocriteria, they too should be integrated into the water quality-based toxics control, thus creating a triad of approaches: whole effluent, chemical-specific, and biological assessments. Each approach has its limitations and thus, exclusive use of one approach alone cannot ensure required protection of aquatic life and human health. The advantages/disadvantages of each approach and how the integrated approach creates an effective toxics control program are discussed in the text.

The whole effluent approach to toxics control involves the use of toxicity tests and water quality criteria for the parameter "toxicity" to assess and control the aggregate toxicity of effluents. New references and information in support of the whole effluent toxicity assessment and control approach have been included in Chapter 1 and associated appendices (e.g., precision data, justifications for acute-to-chronic ratio recommendations, information on analytical variability in toxicity testing). The chemical-specific approach to aquatic life toxics control relies on numeric water quality criteria in State standards and interpretations of State narrative standards to assess and control specific toxicants individually.

Water Quality Standards and Criteria

Where specific numerical criteria for a chemical or biological parameter (such as toxicity) are absent, compliance with water quality standards must be based on the general narrative criteria and on protection of the designated uses. For many pollutants, EPA's recommended criteria may be used, or criteria may be developed using data from the Integrated Risk Information System, or data on the toxicological effects of the pollutant found either in the literature or required of a discharger.

Aquatic impacts occur not only from the magnitude of a pollutant, but also from the duration and frequency with which criteria are exceeded. EPA's recommended aquatic life criteria for both individual toxicants and whole effluent toxicity are specified as two numbers: the criterion continuous concentration is applied as a 4-day average concentration; and the criterion maximum concentration is applied as an 1-hour average concentration. The frequency with which criteria are allowed to be exceeded depends on site-specific factors as explained in the text.

Strictly speaking the term "criteria" means EPA guidance formally published under the authority of Section 304(a) of the Clean Water Act. The toxicity level recommendations have not been so published. However, they represent EPA's carefully developed technical recommendation, and so are referred to in this document in the same manner as other criteria.

EPA's recommended criteria for whole effluent toxicity are as follows: to protect aquatic life against chronic effects, the ambient toxicity should not exceed 1.0 chronic toxic unit (TU_c) to the most sensitive of at least three different test species. For protection against acute effects, the ambient toxicity should not exceed 0.3 acute toxic units (TU_a) to the most sensitive of at least three different test species.

EPA has developed recommended human health criteria, which are called reference ambient concentrations (RACs). In the absence of EPA's recommended criteria, States may calculate RACs based on the equations in the text. In addition, the need for sediment and biological criteria in State water quality standards is discussed.

Effluent Characterization

This chapter contains completely revised effluent characterization discussions and recommendations. It includes streamlined procedures (as compared to the original TSD) for predicting the likely impacts of toxic effluents on aquatic life and human health. Recommendations are provided for determining, either with or without actual effluent data, whether a discharge causes, has the reasonable potential to cause, or contributes to an excursion above a State water quality standard. These effluent characterization procedures can be performed in one step and do not include initial screening followed by definitive data generation as was recommended in the original TSD.

The revised effluent characterization procedures for assessing potential human health impacts now include control of bioaccumulative chemicals.

Exposure and Wasteload Allocation

A goal of permit writers is to determine what effluent composition will protect aquatic organisms and human health. Exposure assessment includes an analysis of how much of the waterbody is subject to the exceedance of criteria, for how long, and how frequently. The first step is to evaluate the effluent plume dispersion. If mixing is not rapid and complete and if State standards allow a mixing zone, the wasteload allocation also must be based

on a mixing zone analysis. Chapter 5 describes the means to assess dilution at the edge of a mixing zone. As with the original TSD, ambient criteria to control acute toxicity to aquatic life may be met within a short distance of the outfall. However, this provision is no longer restricted to outfalls that have a high-rate diffuser.

If mixing is rapid and complete, there are several models that can be used to assess exposure. Steady-state models assume that the effluent concentration is constant and that the duration and frequency with which criteria are exceeded can be reflected entirely by selecting a design flow in the receiving water of appropriate averaging period and frequency.

Another means of modeling exposure is to use computer models that incorporate variability of the individual inputs (such as effluent flow and concentration, receiving water flow, temperature, background concentration, etc.). These models are termed dynamic models and are more accurate than steady-state models in reflecting or predicting exposure provided adequate data exist. The acceptable effluent condition derived using these models is expressed as the effluent long-term average and variance, which greatly simplifies derivation of permit limits. Three dynamic modeling approaches are described along with instructions for their use.

Permit Requirements

The requirements of a wasteload allocation (WLA) must be translated into a permit limit in the wastewater discharge permit. In many cases permit limits will be different than the WLA to reflect different assumptions and means of expressing effluent quality. Three types of WLAs are identified, and recommendations are provided for deriving permit limits to properly enforce each type of WLA. Other permit-related issues such as permit documentation and how to express limitations are discussed. In addition, guidance for requiring and conducting toxicity reduction evaluations is presented.

Compliance Monitoring

The compliance monitoring and enforcement process for water quality-based permits summarized in Chapter 6 is based on existing regulation and guidance. As with technology-based permits, any failure to meet a limit is a violation, and every violation must be reviewed to determine the appropriate response. Whole effluent toxicity monitoring and enforcement concepts embodied in the *Compliance Monitoring and Enforcement Strategy for Toxics Control* (January 19, 1989) have been added to this revision.

LIST OF ABBREVIATIONS

AA	atomic absorption
ACR	acute-to-chronic ratio
ADI	acceptable daily intake
AML	average monthly limit
ATC	acceptable tissue concentration
ATE	acute toxicity endpoint
AVS	acid volatile sulfides
BAF	bioaccumulation factor
BAT	best available technology
BCF	bioconcentration factor
BCT	best conventional technology
BMP	best management practice
BOD	biochemical oxygen demand
BPJ	best professional judgment
BPT	best practicable technology
CCC	criteria continuous concentration
CEAM	Center for Exposure Assessment Modeling (EPA)
CETTP	Complex Effluent Toxicity Testing Program
CFR	Code of Federal Regulations
CHC	chemical of highest concern
CMC	criteria maximum concentration
CTE	chronic toxicity endpoint
CV	coefficient of variation
CWA	Clean Water Act
DF	dilution factor
DMR	discharge monitoring report
DO	dissolved oxygen
EC	effect concentration
ECAO	Environmental Criteria and Assessment Office
EMS	Enforcement Management System
EP	equilibrium partitioning
EPA	Environmental Protection Agency
ERL	Environmental Research Laboratory (EPA)
FAV	final acute value
FDA	Food and Drug Administration
FM	food chain multipliers
GC/MS	gas chromatograph/mass spectrometer
HHC	human health criteria
HPLC	high-pressure liquid chromatography
IC	inhibition concentration
IRIS	Integrated Risk Information System (EPA)
LA	load allocation
LC	lethal concentration
LOAEL	lowest observed adverse effect level
LOEC	lowest observed effect concentration
LTA	long-term average
MCL	maximum contaminant levels
MDL	maximum daily limit
MERS	Monticello Ecological Research Station
ML	minimum level
NOAEL	no observed adverse effect level
NOEC	no observed effect concentration
NPDES	National Pollutant Discharge Elimination System
NTIS	National Technical Information Service
ONRW	outstanding national resource waters
PCS	Permit Compliance System
POTW	publicly owned treatment works
PQL	practical quantitation limit
q_1^*	cancer potency factor
QA/QC	quality assurance/quality control
QNCR	quarterly noncompliance report
QSAR	quantitative structure-activity relationships
RAC	reference ambient concentration
RfD	reference dose
RWC	receiving water concentration
SQC	sediment quality criteria
STORET	storage and retrieval of water quality information
TIE	toxicity identification evaluation
TMDL	total maximum daily load
TRE	toxicity reduction evaluation
TSD	technical support document
TSS	total suspended solids
TTO	total toxic organics
TU	toxic unit
TU_a	acute toxic unit
TU_c	chronic toxic unit
WQS	water quality standard
WLA	wasteload allocation

MODELING ABBREVIATIONS

ARM	agricultural runoff model
CHNTRN	Channel Transport Model
CETIS	Complex Effluent Toxicity Information System
CIS	Chemical Information System
CORMIX 1	Cornell Mixing Zone Expert System
CTAP	Chemical Transport and Analysis Program
DESCON	computer program that estimates design conditions
DFLOW	computer program that calculates biologically based design flows
DYNHYD4	hydrodynamic model
DYNTOX	dynamic toxics model
EXAMS-II	Exposure Analysis Modeling System
FCM2	WASP Food Chain Model
FETRA	Finite Element Transport Model
FGETS	Food and Gill Exchange of Toxic Substances
FLOSTAT	U.S. Geological Survey computer program that estimates the arithmetic mean flow and 7Q10 of rivers and streams
HHDFLOW	historic daily flow program
HSPF	Hydrologic Simulation Program - FORTRAN
MEXAMS	Metals Exposure Analysis Modeling System
MINTEQA2	Equilibrium Metals Speciation Model
MICH	Michigan River Model
NPS	Nonpoint Source Model for Urban and Rural Areas
PSY	steady-state, two-dimensional plume model
SARAH2	surface water assessment model for back calculating reductions in biotic hazardous wastes
SERATRA	Sediment Contaminant Transport Model
SLSA	Simplified Lake/Stream Analysis
TODAM	Transport One-Dimensional Degradation and Migration Model
TOXIWASP	Chemical Transport and Fate Model
TOXI4	a subset of WASP4
TOXIC	Toxic Organic Transport and Bioaccumulation Model
UDKHDEN	three-dimensional model used for single or multiple port diffusers
ULINE	uniform linear density flume model
UMERGE	two-dimensional model used to analyze positively buoyant discharge
UOUTPLM	cooling tower plume model adapted for marine discharges
UPLUME	numerical model that produces flux-average dilutions
WASP4	water quality analysis program
WASTOX	Estuary and Stream Quality Model
WQAB FLOW	water quality analysis system flow data subroutine

GLOSSARY

absolute toxicity is the toxicity of the effluent without considering dilution.

acute means a stimulus severe enough to rapidly induce an effect; in aquatic toxicity tests, an effect observed in 96 hours or less typically is considered acute. When referring to aquatic toxicology or human health, an acute affect is not always measured in terms of lethality.

acute-to-chronic ratio (ACR) is the ratio of the acute toxicity of an effluent or a toxicant to its chronic toxicity. It is used as a factor for estimating chronic toxicity on the basis of acute toxicity data, or for estimating acute toxicity on the basis of chronic toxicity data.

acutely toxic conditions are those acutely toxic to aquatic organisms following their short-term exposure within an affected area.

acute toxicity endpoints (ATE) are toxicity test results, such as an LC_{50} (96 hours) and EC_{50} (48 hours), which describe a stimulus severe enough to rapidly induce an effect on aquatic organisms.

additivity is the characteristic property of a mixture of toxicants that exhibits a total toxic effect equal to the arithmetic sum of the effects of the individual toxicants.

ambient toxicity is measured by a toxicity test on a sample collected from a waterbody.

antagonism is the characteristic property of a mixture of toxicants that exhibits a less-than-additive total toxic effect.

antidegradation policies are part of each State's water quality standards. These policies are designed to protect water quality and provide a method of assessing activities that may impact the integrity of the waterbody.

aquatic community is an association of interacting populations of aquatic organisms in a given waterbody or habitat.

averaging period is the period of time over which the receiving water concentration is averaged for comparison with criteria concentrations. This specification limits the duration of concentrations above the criteria.

bioaccumulation is the process by which a compound is taken up by an aquatic organism, both from water and through food.

bioaccumulation factor (BAF) is the ratio of a substance's concentration in tissue versus its concentration in ambient water, in situations where the organism and the food chain are exposed.

bioassay is a test used to evaluate the relative potency of a chemical or a mixture of chemicals by comparing its effect on a living organism with the effect of a standard preparation on the same type of organism. Bioassays frequently are used in the pharmaceutical industry to evaluate the potency of vitamins and drugs.

bioavailability is a measure of the physicochemical access that a toxicant has to the biological processes of an organism. The less the bioavailability of a toxicant, the less its toxic effect on an organism.

bioconcentration is the process by which a compound is absorbed from water through gills or epithelial tissues and is concentrated in the body.

bioconcentration factor (BCF) is the ratio of a substance's concentration in tissue versus its concentration in water, in situations where the food chain is not exposed or contaminated. For nonmetabolized substances, it represents equilibrium partitioning between water and organisms.

biological assessment is an evaluation of the biological condition of a waterbody using biological surveys and other direct measurements of resident biota in surface waters.

biological criteria, also known as **biocriteria**, are narrative expressions or numeric values of the biological characteristics of aquatic communities based on appropriate reference conditions. Biological criteria serve as an index of aquatic community health.

biological integrity is the condition of the aquatic community inhabiting unimpaired waterbodies of a specified habitat as measured by community structure and function.

biological monitoring, also known as **biomonitoring**, describes the living organisms in water quality surveillance used to indicate compliance with water quality standards or effluent limits and to document water quality trends. Methods of biological monitoring may include, but are not limited to, toxicity testing such as ambient toxicity testing or whole effluent toxicity testing.

biological survey or biosurvey is the collecting, processing, and analyzing of a representative portion of the resident aquatic community to determine its structural and/or functional characteristics.

biomagnification is the process by which the concentration of a compound increases in species occupying successive trophic levels.

cancer potency slope factor (q1*) is an indication of a chemical's human cancer-causing potential derived using animal studies or epidemiological data on human exposure. It is based on extrapolating high-dose levels over short periods of time to low-dose levels and a lifetime exposure period through the use of a linear model.

chronic means a stimulus that lingers or continues for a relatively long period of time, often one-tenth of the life span or more. Chronic should be considered a relative term depending on the life span of an organism. The measurement of a chronic effect can be reduced growth, reduced reproduction, etc., in addition to lethality.

chronic toxicity endpoints (CTE) are results, such as a no observed effect concentration, lowest observed effect concentration, effect concentration, and inhibition concentration based on observations of reduced reproduction, growth, and/or survival from life cycle, partial life cycle, and early life stage tests with aquatic animal species.

coefficient of variation (CV) is a standard statistical measure of the relative variation of a distribution or set of data, defined as the standard deviation divided by the mean.

community component is a general term that may pertain to the biotic guild (fish, invertebrates, algae), the taxonomic category (order, family, genus, species), the feeding strategy (herbivore, omnivore, predator), or the organizational level (individual, population, assemblage) of a biological entity within the aquatic community.

completely mixed condition means no measurable difference in the concentration of a pollutant exists across a transect of the waterbody (e.g., does not vary by 5 percent).

continuous simulation model is a fate and transport model that uses time series input data to predict receiving water quality concentrations in the same chronological order as that of the input variables.

criteria continuous concentration (CCC) is the EPA national water quality criteria recommendation for the highest instream concentration of a toxicant or an effluent to which organisms can be exposed indefinitely without causing unacceptable effect.

criteria maximum concentration (CMC) is the EPA national water quality criteria recommendation for the highest instream concentration of a toxicant or an effluent to which organisms can be exposed for a brief period of time without causing an acute effect.

critical life stage is the period of time in an organism's lifespan in which it is the most susceptible to adverse effects caused by exposure to toxicants, usually during early development (egg, embryo, larvae). Chronic toxicity tests are often run on critical life stages to replace long duration, life-cycle tests since the most toxic effect usually occurs during the critical life stage.

design flow is the flow used for steady-state wasteload allocation modeling.

designated uses are those uses specified in water quality standards for each waterbody or segment whether or not they are being attained.

discharge length scale is the square root of the cross-sectional area of any discharge outlet.

diversity is the number and abundance of biological taxa in a specified location.

effect concentration (EC) is a point estimate of the toxicant concentration that would cause an observable adverse effect (such as death, immobilization, or serious incapacitation) in a given percentage of the test organisms.

equilibrium partitioning (EP) is a method for generating sediment criteria that focuses on the chemical interaction between sediments and contaminants.

final acute value (FAV) is an estimate of the concentration of the toxicant corresponding to a cumulative probability of 0.05 in the acute toxicity values for all genera for which acceptable acute tests have been conducted on the toxicant.

frequency is how often criteria can be exceeded without unacceptably affecting the community.

genotoxic is the ability of a substance to damage an organism's genetic material (DNA).

harmonic mean flow is the number of daily flow measurements divided by the sum of the reciprocals of the flows. That is, it is the reciprocal of the mean of reciprocals.

inhibition concentration (IC) is a point estimate of the toxicant concentration that would cause a given percent reduction (e.g., IC_{25}) in a nonlethal biological measurement of the test organisms, such as reproduction or growth.

lethal concentration is the point estimate of the toxicant concentration that would be lethal to a given percentage of the test organisms during a specific period.

lipophilic is a high affinity for lipids (fats).

load allocations (LA) are the portion of a receiving water's total maximum daily load that is attributed either to one of its existing or future nonpoint sources of pollution or to natural background sources.

lognormal probabilistic dilution model calculates the probability distribution of receiving water quality concentrations from the lognormal probability distributions of the input variables.

log P (also expressed as log k_{ow} or as n-octanal/water partition coefficient) is the ratio, in a two-phase system of n-octanol and water at equilibrium, of the concentration of a chemical in the n-octanol phase to that in the water phase.

lowest observed adverse effect level (LOAEL) is the lowest concentration of an effluent or toxicant that results in statistically significant adverse health effects as observed in chronic or subchronic human epidemiology studies or animal exposure.

magnitude is how much af a pollutant (or pollutant parameter such as toxicity), expressed as a concentration or toxic unit is allowable.

minimum level (ML) refers to the level at which the entire analytical system gives recognizable mass spectra and acceptable calibration points when analyzing for pollutants of concern. This level corresponds to the lowest point at which the calibration curve is determined.

mixing zone is an area where an effluent discharge undergoes initial dilution and is extended to cover the secondary mixing in the ambient waterbody. A mixing zone is an allocated impact zone where water quality criteria can be exceeded as long as acutely toxic conditions are prevented.

Monte Carlo simulation is a stochastic modeling technique that involves the random selection of sets of input data for use in repetitive model runs in order to predict the probability distributions of receiving water quality concentrations.

no observed adverse effect level (NOAEL) is a tested dose of an effluent or a toxicant below which no adverse biological effects are observed, as identified from chronic or subchronic human epidemiology studies or animal exposure studies.

no observed effect concentration (NOEC) is the highest tested concentration of an effluent or a toxicant at which no adverse effects are observed on the aquatic test organisms at a specific time of observation. Determined using hypothesis testing.

nonthreshold effects are associated with exposure to chemicals that have no safe exposure levels (i.e., cancer).

permit averaging period is the duration of time over which a permit limit is calculated (days, weeks, or months).

persistent pollutant is not subject to decay, degradation, transformation, volatilization, hydrolysis, or photolysis.

priority pollutants are those pollutants listed by the Administrator under CWA Section 307(a).

probability is a number expressing the likelihood of occurrence of a specific event, such as the ratio of the number of outcomes that will produce a given event to the total number of possible outcomes.

probability distribution is a mathematical representation of the probabilities that a given variable will have various values.

practical quantitation limit (PQL) is a correction factor, sometimes arbitrarily defined, used to account for uncertainty in measurement precision.

reasonable potential is where an effluent is projected or calculated to cause an excursion above a water quality standard based on a number of factors including, as a minimum, the four factors listed in 40 *CFR* 122.44(d)(1)(ii).

receiving water concentration (RWC) is the concentration of a toxicant or the parameter toxicity in the receiving water after mixing (formerly termed "instream waste concentration" [IWC]).

recurrence interval is the average number of years within that a variable will be less than or equal to a specified value. This term is synonymous with return period.

reference ambient concentration (RAC) is the concentration of a chemical in water that will not cause adverse impacts to human health. RAC is expressed in units of mg/l.

reference tissue concentration (RTC) is the concentration of a chemical in edible fish or shellfish tissue that will not cause adverse impacts to human health when ingested. RTC is expressed in units of mg/kg.

reference dose (RfD) is an estimate of the daily exposure to human population that is likely to be without an appreciable risk of deleterious effect during a lifetime; derived from nonobserved adverse effect level or lowest observed adverse effect level.

relative toxicity is the toxicity of the effluent when it is mixed with the receiving water, or a dilution water of similar composition for toxicity testing.

slug flow sampling is a monitoring procedure that follows the same slug of wastewater throughout its transport in the receiving water. Water quality samples are collected at receiving water stations, tributary inflows, and point source discharges only when a dye slug or tracer passes that point.

steady-state model is a fate and transport model that uses constant values of input variables to predict constant values of receiving water quality concentrations.

STORET is EPA's computerized water quality data base that includes physical, chemical, and biological data measured in waterbodies throughout the United States.

sublethal means a stimulus below the level that causes death.

synergism is the characteristic property of a mixture of toxicants that exhibits a greater-than-additive total toxic effect.

threshold effects result from chemicals that have a safe level (i.e., acute, subacute, or chronic human health effects).

total maximum daily load (TMDL) is the sum of the individual wasteload allocations and load allocations. A margin of safety is included with the two types of allocations so that any additional loading, regardless of source, would not produce a violation of water quality standards.

toxicity identification evaluation (TIE) is a set of procedures to identify the specific chemicals responsible for effluent toxicity.

toxicity reduction evaluation (TRE) is a site-specific study conducted in a stepwise process designed to identify the causative agents of effluent toxicity, isolate the sources of toxicity, evaluate the effectiveness of toxicity control options, and then confirm the reduction in effluent toxicity.

toxicity test is a procedure to determine the toxicity of a chemical or an effluent using living organisms. A toxicity test measures the degree of effect on exposed test organisms of a specific chemical or effluent.

toxics are those pollutants that have a toxic effect on living organisms. The CWA Section 307(a) "priority" pollutants are a subset of this group of pollutants.

toxic pollutants are those pollutants listed by the Administrator under CWA Section 307(a).

toxic units (TUs) are a measure of toxicity in an effluent as determined by the acute toxicity units or chronic toxicity units measured.

toxic unit acute (TU_a) is the reciprocal of the effluent concentration that causes 50 percent of the organisms to die by the end of the acute exposure period (i.e., 100 LC_{50}).

toxic unit chronic (TU_c) is the reciprocal of the effluent concentration that causes no observable effect on the test organisms by the end of the chronic exposure period (i.e., 100/NOEC).

water quality assessment is an evaluation of the condition of a waterbody using biological surveys, chemical-specific analyses of pollutants in waterbodies, and toxicity tests.

wasteload allocation (WLA) is the portion of a receiving water's total maximum daily load that is allocated to one of its existing or future point sources of pollution.

water quality criteria are comprised of numeric and narrative criteria. Numeric criteria are scientifically derived ambient concentrations developed by EPA or States for various pollutants of concern to protect human health and aquatic life. Narrative criteria are statements that describe the desired water quality goal.

water quality limited characterizes a stream segment in which it is known that water does not meet applicable water quality standards, and/or is not expected to meet applicable water quality standards even after application of technology-based effluent limitations.

water quality standard is a law or regulation that consists of the beneficial designated use or uses of a waterbody, the numeric and narrative water quality criteria that are necessary to protect the use or uses of that particular waterbody, and an antidegradation statement.

whole effluent toxicity is the total toxic effect of an effluent measured directly with a toxicity test.

INTRODUCTION

Purpose

The purpose of this revised *Technical Support Document (TSD) for Water Quality-based Toxics Control* is to provide the most current procedural recommendations and guidance for identifying, analyzing, and controlling adverse water quality impacts caused by toxic discharges to the surface waters of the United States. The original TSD was published in September 1985. Since then, the Clean Water Act (CWA) was amended in 1987 with an emphasis on controlling toxic pollutants. New policies and regulations have been promulgated and a vast amount of knowledge and experienced has been gained in controlling toxic pollutants. Because of these changes, EPA revised and updated the TSD.

This guidance document is intended to support the implementation of the CWA water quality-based approach to toxics control. As such, the recommendations and guidance found in this document are not binding and should be used by regulatory authorities with discretion. The guidance in this document has been developed as the most current representation of knowledge in the field of assessment and control of toxic discharges. Some of the guidance in this document is based on ongoing research and development (bioaccumulation methods, Chapter 3) and should not be used until the procedures are finalized.

Background

The EPA surface water toxics control program, represented diagrammatically in the figure, relies on portions of the national pretreatment program, the effluent limitations guidelines program, the sludge program, the combined sewer overflow program, the stormwater management program, the 304(l) program, the water quality standards program, and the National Pollutant Discharge Elimination System (NPDES) program. States are authorized by EPA to implement certain portions of the national toxics control program, such as the NPDES program. Scientific and technical guidance is developed and published by EPA to assist the States. EPA is required by the CWA and federal regulations to play an oversight role to ensure that States authorized to implement various program requirements do so in accordance with federal regulations.

States are given discretion in the CWA to establish and implement water quality standards. As such, there may be differences in toxics control programs between States. EPA's oversight role is to ensure that each State's program is technically sound and that each State fully implements its program.

Throughout the evolution of the toxics control program, EPA has provided guidance concerning new program initiatives, statutory developments, and regulatory requirements. In 1980, EPA emphasized in its preamble to NPDES regulations (45 *FR* 33520) that NPDES permit limitations must reflect the most stringent of technology-based, water quality-based controls, or other standards required by the CWA (e.g., ocean discharge requirements under Section 403 and toxics standards or prohibition under Section 307[a]). EPA reiterated the significance of surface water toxics control in 1984 through the publication of its national policy statement entitled, "Policy for the Development of Water Quality-Based Permit Limitations for Toxic Pollutants" (49 *FR* 9016, March 9, 1984). EPA recommended the use of "biological techniques as a complement to chemical-specific analyses to assess effluent discharges and express permit limitations" (49 *FR* 9017). The preamble to additional regulations promulgated in 1984 (49 *FR* 37998) stressed the importance of establishing effluent limitations in NPDES permits to control toxic pollutants. Regulatory provisions promulgated on June 2, 1989 (54 *FR* 23868), clarify EPA's surface water toxics control program and the use of whole effluent toxicity, and implement CWA Section 304(l) concerning the identification of impaired waters and the development of individual control strategies.

The control of toxic discharges to the Nation's waters is an important objective of the CWA. To effectively accomplish this objective, EPA recommends the use of an integrated water quality-based approach for controlling toxic discharges. EPA's integrated "standards to permits" approach, illustrated in the figure, starts with water quality criteria, objectives, and standards and results in NPDES permit limits to control toxic pollutants through the use of both chemical-specific and whole effluent toxicity limitations. Limitations are essential for controlling the discharge of toxic pollutants to the Nation's water. Once NPDES permit limits are set, compliance is essential. Compliance can be ascertained by continual routine monitoring of effluent quality. Water quality-based effluent limitations when developed in accordance with the procedures in this document, will protect water quality and prevent the violation of State water quality standards.

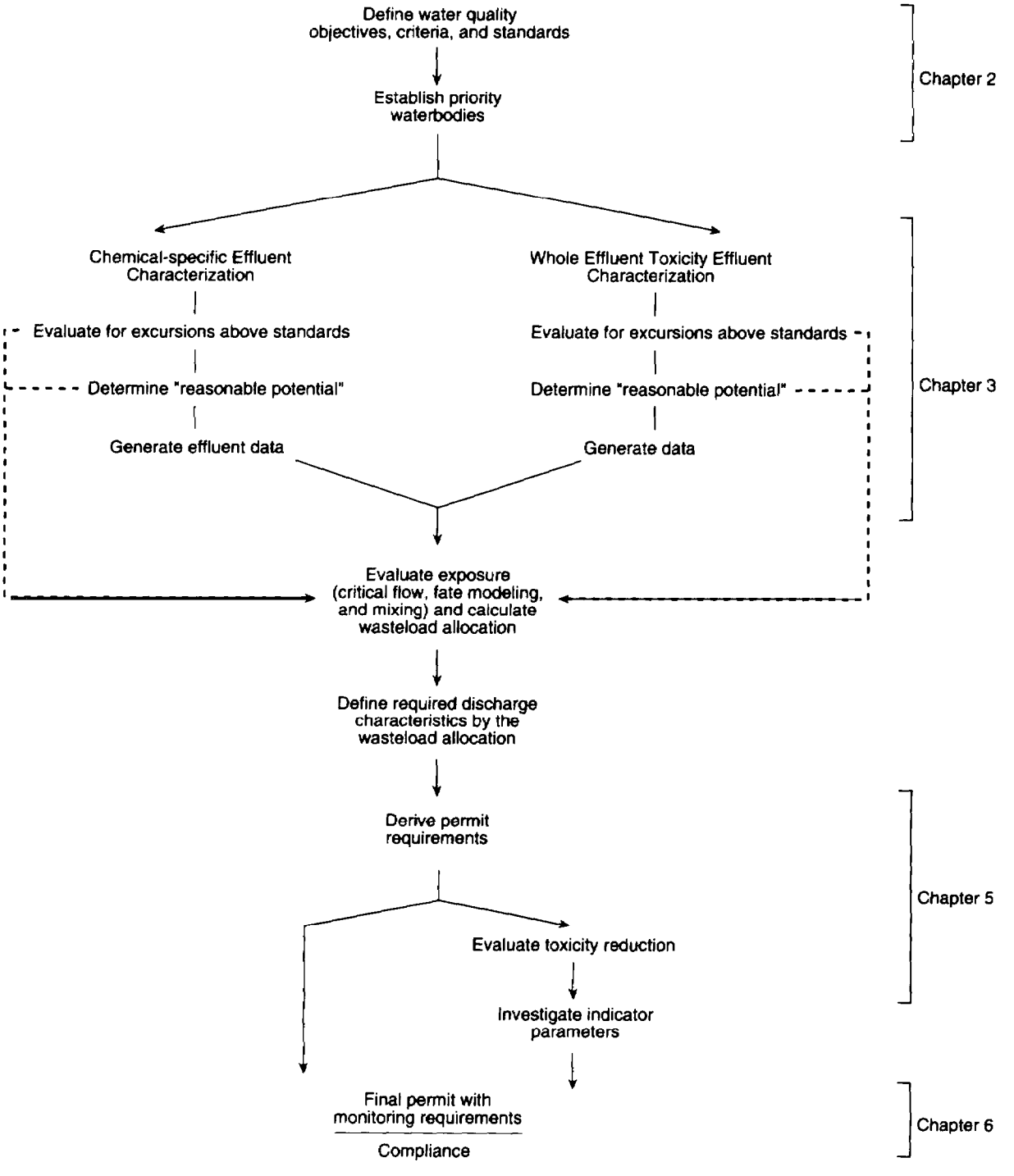

Overview of the Water Quality-based "Standards to Permits" Process for Toxics Control

1. APPROACHES TO WATER QUALITY-BASED TOXICS CONTROL

1.1 INTRODUCTION

In this chapter, basic principles are presented that cover the protection of aquatic life and the protection of human health from impacts caused by the release of toxics to the Nation's surface waters. Protection against toxic releases is called for under Section 101(a)(3) of the Clean Water Act (CWA), which states that "it is the national policy that the discharge of toxic pollutants in toxic amounts be prohibited." In addition, CWA Section 303(c) requires States to develop water quality standards to protect the public health or welfare, enhance the quality of water, and serve the purposes of the CWA. The control of the discharge of toxics is a paramount objective of the National Pollutant Discharge Elimination System (NPDES) and water quality standards programs. The CWA and Environmental Protection Agency (EPA) regulations (described in Appendices B-1 and B-4, respectively) authorize and require the use of the "integrated strategy" to achieve and maintain water quality standards. In addition, EPA policy and guidance have long advocated this approach (see Appendices B-2 and B-3). For the protection of aquatic life, the integrated strategy involves the use of three control approaches: the chemical-specific control approach, the whole effluent toxicity control approach, and the biological criteria/bioassessment and biosurvey approach. However, for the protection of human health, technical constraints do not yet allow for full reliance on an integrated strategy, and thus primarily chemical-specific assessment and control techniques should be employed.

The integrated approach to water quality-based toxics control, including the use of toxicity testing and whole effluent toxicity limits, chemical-specific testing and limits, and biological criteria using bioassessments/biosurveys, relies on the water quality standards that each State has adopted. All States have water quality standards consisting of both chemical-specific numeric criteria for individual pollutants, and narrative "free from toxics in toxic amounts" criteria. Currently, a few States have incorporated biological criteria into water quality standards.

The narrative water quality criteria in all States generally require that the State waters be free from oil, scum, floating debris, materials that will cause odors, materials that are unsightly or deleterious, materials that will cause a nuisance, or substances in concentrations that are toxic to aquatic life, wildlife, or human health. The use of toxicity testing and whole effluent toxicity limits is based upon a State's narrative water quality criterion and/or in some cases, a State numeric criterion for toxicity.

Chemical-specific numeric criteria have been adopted by each State. In many cases, States have adopted EPA-recommended water quality criteria as a part of their water quality standards [1, 2]. (See Chapter 2, Water Quality Criteria and Standards, for further information.) These State-adopted numeric chemical criteria provide the basis upon which specific chemicals can be limited in permits. Where States have not developed chemical-specific numeric criteria, States may interpret their narrative standards for specific chemicals by using EPA criteria updated with current quantitative risk values.

Biological criteria provide a direct measure of ambient aquatic life and overall biological integrity in a waterbody. Biological criteria constitute one basis for limits that will protect the biological integrity of a surface water.

The integrated approach must include the control of toxics through implementation of the narrative "no toxics" criterion and/or numeric criteria for the parameter toxicity, the control of individual pollutants for which specific chemical water quality criteria exist in a State's standards, as well as use of biological criteria. Reliance solely on the chemical-specific numeric criteria or the narrative criterion or biological criteria would result in only a partially effective State toxics control program. In the discussion that follows, each control approach is described in greater detail as well as how each of the approaches complement the other two by providing additional information for the protection of water quality.

1.2 CHEMICAL-SPECIFIC APPROACH FOR AQUATIC LIFE PROTECTION

The chemical-specific approach to toxics control for the protection of aquatic life uses specific chemical effluent limits in NPDES permits to control the discharge of toxics. These limits are developed from laboratory-derived, biologically based numeric water quality criteria adopted within a State's water quality standards. Water quality criteria are adopted by a State for the protection of the designated uses of the receiving water. Chemical-specific water quality-based limits in NPDES permits involve a site-specific evaluation of the discharge and its effect upon the receiving water. This may include collection of effluent and receiving water data and result in the development of a wasteload allocation (WLA) and a total maximum daily load (TMDL) through modeling, a mixing zone analysis, and the calculation of permit limits. Once a numeric water quality criterion is adopted, chemical-specific limits must be developed in NPDES permits to ensure that a permittee's discharge does not exceed acute or chronic water quality criteria for the pollutant in a receiving water if there is a reasonable potential for that discharge to cause or contribute to excursions of the criterion. These steps are discussed in Chapters 3, 4, and 5.

EPA water quality criteria for the protection of aquatic life are developed under the requirements of CWA Section 304(a)(1) and are published by EPA in separate criteria documents and summarized in the Quality Criteria for Water [1]. Water quality criteria are derived scientifically and attempt to consider a wide range of toxic endpoints including acute and chronic impacts and

bioaccumulation. Each criteria consists of two values—an acute and a chronic value. Criteria are developed using the latest scientific knowledge on the kind and extent of identifiable effects on organisms, such as plankton, fish, shellfish, wildlife, and plant life, which may be expected from the presence of pollutants in any body of water. Water quality criteria also reflect the concentration and dispersal of pollutants, or their byproducts, through biological, physical, and chemical processes, and the effects of pollutants on biological community diversity, productivity, and stability of the receiving water [1]. They can be used to assess and control a variety of water quality impacts. Chapter 2 provides a more detailed discussion of the derivation of numeric criteria. Recommendations for using chemical-specific data to determine which individual toxicants need to be controlled are found in Chapter 3. Legal requirements, including chemical-specific limits in permits, are found in Chapter 5.

1.2.1 Correlation of Chemical-specific Measurements to Actual Receiving Water Impacts

EPA has conducted a series of studies to determine whether its water quality criteria concentrations are protective of aquatic life in receiving water systems. The first study was conducted at Shayler Run, Ohio, to evaluate the applicability of laboratory-generated toxicity data to a natural stream artificially dosed with copper to provide steady concentrations [3]. The results of the study indicate that several characteristics of site-specific water quality affect the toxicity of copper. The results also indicate that avoidance of elevated concentration areas by instream organisms can produce observable ecological changes at concentrations below those found to be harmful in laboratory toxicity tests. No instream effects were observed at continuous exposure concentrations near EPA's current chronic criterion, applied at the water hardness of Shayler Run.

Studies performed on experimental streams at EPA's Monticello Ecological Research Station (MERS) indicate good agreement between EPA's criteria concentrations and the instream concentrations producing aquatic life effects under steady exposure conditions [4-13]. EPA's water quality criteria are not threshold levels above which definite measurable instream effects are always expected. Rather, the criteria embody conservative assumptions such that small excursions above the criteria should not result in measurable environmental impacts upon the biota. The data indicate that if the ambient water quality criteria are met, then the biota in the receiving water system will be protected from unacceptable impacts caused by the chemical of concern. The studies conducted by MERS are described in greater detail in Box 1-1 and Tables 1-1 and 1-2.

1.2.2 Chemical-specific Analytical Method Precision

Tables 1-3 to 1-5 illustrate the types of precision commonly seen in inorganic, organic, and nonmetal inorganic chemical analyses that are routinely used for determining concentrations of specific pollutants in effluents. These tables show the observed variability. The variability of chemical measurements increases as one approaches the limit of detectability for a chemical. Table 1-3 shows the interlaboratory precision of 10 metals. The coefficient of variation (CV), defined as the standard deviation divided by the mean x 100, for these analyses ranges from 18 percent to 129 percent [15]. Table 1-4 shows the interlaboratory precision

Box 1-1. Correlation of Chemical-specific Criteria to Instream Impacts

In studying the field applicability of EPA's water quality criteria in freshwater systems, MERS (Monticello Ecological Research Station) conducted studies in experimental streams [4-14] to determine the level of protection provided by the individual chemical criteria. Each of the streams was one-quarter mile long with alternating mud-bottomed pools and rocky riffles. Fish were stocked into the streams to a known population density while other plants and animals were the result of natural colonization.

The chemicals studied were ammonia, chlorine, chlorine combined with ammonia, selenium, and pentachlorophenol. Some studies were conducted during a summer (pentachlorophenol) while others continued for more than 2 years (selenium IV). Tables 1-1 and 1-2 show sample data on ammonia and ammonia combined with chlorine. In all experiments, the streams were dosed continuously with the chemical(s) being studied and the biological effects were determined statistically by a comparison to the control streams. The concentration at which biological effects occurred were then compared to the EPA criteria continuous concentration (CCC) for that compound.

With the exception of chlorine in the presence of ammonia, the data from the other experiments indicate that slight or no effects were found in the streams at the CCC. This indicates that the CCC is providing chronic protection at the recommended concentration for that particular chemical. In the case of chlorine combined with ammonia, a substantial impact was found, but only on one species, the channel catfish. Because the CCC is designed to protect most, but not all of the species all of the time (see discussion in Chapter 2 on EPA Ambient Water Quality Criteria), slight impacts may be expected under continuous exposure conditions.

Table 1-1. Effects in Streams Exposed to Ammonia [8-13]

Indicator	Effects		
	Criteria[a]	3X[b]	9X[c]
Fish			
Fathead minnow	0[d]	0	0
Bluegill	0	0	++
Channel catfish	+	++	+++
White sucker	0	0	0
Rainbow trout	0	0	++
Walleye	0	0	++
Benthic Invertebrates	0	+	++
Zooplankton	0	+	+

Notes
[a] Criteria = 0.05 mg/l unionized ammonia (NH_3) at average stream pH and temperature; 1.0 mg/l total ammonia was added to reach this concentration; concentrations of unionized ammonia varied daily and seasonally due to natural pH and temperature fluctuations.
[b] 3X = Three times criteria concentration based on input of 3 mg/l total ammonia.
[c] 9X = Nine times criteria concentration based on input of 9 mg/l total ammonia.
[d] 0 = No difference from controls; +'s represent gradation of differences from controls ranging from slight (+) to dramatic (++++).

Table 1-2. Effects in Streams Exposed to Ammonia and Chlorine [8-13]

Indicator	Effects		
	4 ug/l[a]	35 ug/l	122 ug/l
Fish			
Channel catfish	++[b]	++	+++
Bluegill	0	0	0
Benthic invertebrates	0	+	++
Zooplankton	0	0	0
Bacteria	+	++	+++
Periphyton	0	0	0
Primary production	0	0	0
Litter decomposition	+	+	++
Aquatic plants	0	0	0

Notes
[a] Average concentrations of TRC in presence of 2mg/l to 3mg/l total ammonia; national criteria for chlorine = 11 ug/l.
[b] 0 = No difference from controls; +'s represent gradation of differences from controls ranging from slight (+) to dramatic (++++).

Table 1-3. Interlaboratory Precision of Inorganic Analysis at the Low End of the Measurement Detection Range [15]

Analyte	No. of Labs	CV (%)
Aluminum	37	43
Cadmium	63	66
Chromium	72	40
Copper	86	36
Iron	78	38
Lead	64	46
Manganese	55	129
Mercury	76	79
Silver	50	18
Zinc	62	118

Table 1-4. Interlaboratory Precision Ranges for Organic Chemical Analysis

Chemical	No. Labs	CV (%)	% Data Discarded*	EPA Document Referenced
Benzene 4 Chlorobenzenes Ethyl benzene Toluene	20	31-64	10	600/S4-84-064
23 Halocarbons	20	16-29	?	600/S4-84-064
4 Halocarbons	20	40-50	?	
11 Phenols	20	20-45	20	600/S4-84-044
		38-64	?	
Benzidine 3,3-Dichlorozidine	17	38-69	?	600/S4-84-062
6 Pthalate esthers	16	?	22	600/S4-84-056
3 Nitrosamines	17	?	19	600/S4-84-051
24 Organochlorine Pesticides and PCBs	22	>12-45	?	600/S4-84-061
16 PNAs	?	16-91	?	600/S4-84-063

* Discarded as outliers.
It is important to note that in many chemical analyses a decision may be made that certain anomalous data points, or outliers, are unusable and are not reported as valid data points. This type of data evaluation is made because in chemical analyses it is routine to repeat the analysis with the same sample and reference standard until an acceptable result is obtained.

Table 1-5. Interlaboratory Precision of Nonmetal Inorganic Analyses Over the Measurement Range [15]

No. Lab	*Parameter*	*CV (%) Range*
17	Alkalinity	4.9-14
>20	Residual chlorine	13-25
16	Ammonia nitrogen	15-58
6	Kjeldahl nitrogen, total	38-41
15	NO_3 nitrogen	17-61
6	Total P	25-40
58	BOD	15-33
58	COD	6.9-34
21	TOC	4.6-70

associated with organic chemical analyses. The CVs range from 12 percent to 91 percent. Table 1-5 demonstrates the interlaboratory precision of nonmetal inorganic analyses at the lower end of the measurement range. The CVs for this type of analyses range from 4.6 percent to 61 percent [15]. The data in Tables 1-3 to 1-5 reflect testing in reagent grade water. Actual CVs from testing effluents can be higher due to matrix effects. However, in 40 *CFR* Part 136 analytical methods, matrix effects are acknowledged.

1.3 WHOLE EFFLUENT APPROACH FOR AQUATIC LIFE PROTECTION

The whole effluent approach to toxics control for the protection of aquatic life involves the use of acute and chronic toxicity tests to measure the toxicity of wastewaters. Whole effluent toxicity is a useful parameter for assessing and protecting against impacts upon water quality and designated uses caused by the aggregate toxic effect of the discharge of pollutants [16]. Whole effluent toxicity tests employ the use of standardized, surrogate freshwater or marine (depending upon the mixture of effluent and receiving water) plants, invertebrates, and vertebrates. EPA has published extensive written protocols listing numerous marine and freshwater species for toxicity testing [17, 18, 19].

An acute toxicity test is defined as a test of 96-hours or less in duration in which lethality is the measured endpoint. A chronic toxicity test is defined as a long-term test in which sublethal effects, such as fertilization, growth, and reproduction, are usually measured, in addition to lethality. Traditionally, chronic tests are full life-cycle tests or a shortened test of about 30 days known as an early life stage test. However, the duration of most of the EPA chronic toxicity tests have been shortened to 7 days by focusing on the most sensitive life-cycle stages. For this reason the EPA chronic tests are called short-term chronic tests. Box 1-2 summarizes the short-term chronic tests currently recommended by EPA. The acute and short-term chronic methods recommended by EPA are presented in three methods manuals [17, 18, 19].

In a laboratory acute toxicity test, an effluent sample is collected, diluted, and placed in test chambers with the chosen test species. After 24, 48, 72, and 96 hours, the number of live organisms remaining in each test concentration and in a control is recorded. In a laboratory chronic toxicity test, an effluent sample is collected, diluted, and placed in test chambers. An example of a dilution series used in chronic or acute tests is 100, 50, 25, 12.5, and 6.25 percent, and a control. Test organisms are placed in these test chambers for specified periods of time. At various times during the exposure period, the organisms in each chamber are observed. In the short-term chronic tests, at test termination, the lowest effluent concentration that causes a significant adverse impact on the most sensitive endpoint for that test is calculated (this endpoint can be mortality, reduced fertilization, lower fecundity, reduced growth, etc.). In the acute tests, at test termination, the number of dead organisms are recorded and an LC_{50} is calculated.

Dilution water is an important part of toxicity testing. Dilution water may either be standard laboratory water and/or the receiving water. Sometimes the receiving water is used to dilute the effluent because it more closely simulates effluent/receiving water interactions. This may be especially important in the case of saline receiving waters. The salinity of the receiving water should be matched as closely as possible to the salinity in the test chambers (within the salinity range constraints of a particular method) for the purposes of conducting the tests.

Quality control and quality assurance are an integral part of whole effluent toxicity testing. Use of a standard control water and a reference toxicant test are both recommended to ensure quality assurance in chronic testing. It is important to understand that each of the chronic tests has minimum criteria of acceptability for each endpoint that is measured in the controls (i.e., 80 percent survival and minimum criteria for growth, reproduction, and fertilization). The acute tests also have criteria of acceptability measured in the controls.

Acute toxicity endpoints (ATEs) commonly include lethal concentrations (LCs) and are described in terms of effluent concentrations. The LC is the concentration of toxicant at which a certain percentage of the test organisms die, e.g., the LC_{10} or LC_{50}. An exposure duration also is included in the endpoint such as 24, 48, 72, or 96 hours (e.g., 96-hour LC_{50}).

Commonly used chronic toxicity endpoints (CTEs) include the no observed effect concentration (NOEC), the lowest observed effect concentration (LOEC), and the effect concentration (EC). The NOEC is the highest concentration of toxicant, in terms of percent effluent, to which the test organisms are exposed that causes no observable adverse effect. The effects measured may include decreases in reproduction and growth, or lethality. The LOEC is the lowest concentration of toxicant to which the test organisms are exposed that causes an observed effect. Again, the same effects are usually observed. The EC is the toxicant concentration that would cause an adverse effect upon a certain percentage of the test organisms, (e.g., EC_{10} or EC_{50}).

In chronic toxicity tests, the exposure duration in the EPA testing protocols is almost always assumed to be the 7-day short-term period unless otherwise specified in the protocol. For example, the *Ceriodaphnia* test must be continued until at least 60 percent

Box 1-2. Short-term Chronic Toxicity Methods

Species/Common Name	Test Duration	Test Endpoints
Freshwater Species		
Ceriodaphnia dubia Cladoceran	Approximately 7 days (until 60 percent of control have 3 broods)	Survival, reproduction
Pimephales promelas Fathead minnow	7 days	Larval growth, survival
Pimephales promelas Fathead minnow	7-9 days	Embryo-larval survival, percent hatch, percent abnormality
Selenastrum capricornutum Freshwater algae	96 hours	Growth
Marine/Estuarine Species		
Arbacia punctulata Sea urchin	1.5 hours	Fertilization
Champia parvula Red macroalgae	7-9 days	Cystocarp production (fertilization)
Mysidopsis bahia Mysid	7 days	Growth, survival, fecundity
Cyprinodon variegatus Sheepshead minnow	7 days	Larval growth, survival
Cyprinodon variegatus Sheepshead minnow	7-9 days	Embryo-larval survival, percent hatch, percent abnormality
Menidia beryllina Inland silverside	7 days	Larval growth, survival

of the females produce three broods. This may require more or less than 7 days to occur.

It is useful to note that LCs and ECs are point estimates statistically derived from a mathematical model that assumes a continuous dose-response relationship. NOECs and LOECs, statistically determined using hypothesis testing, are not point estimates [18]. In order to overcome the difficulty in statistically deriving the NOEC using hypothesis testing, a new statistical procedure has been developed. This procedure, referred to as the inhibition concentration (IC), is a point estimate interpolated from the actual effluent concentrations at which measured effects occurred during a chronic test. The IC is an estimate of the toxicant concentration that would cause a given percent reduction in a biological measurement of the test organisms, including reproduction, growth, fertilization, or mortality. For example, an IC_{25} for reproduction would represent the effluent concentration at which a 25-percent reduction in reproduction occurred.

Since the IC is a point estimate, a CV can be calculated. A CV cannot be calculated if hypothesis testing is used because results are only available for the effluent concentrations used. For this

reason, estimates of test precision cannot be calculated for NOECs derived by hypothesis testing.

The IC also is not dependent upon the selection of the effluent concentrations. In contrast, NOECs calculated by hypothesis testing are dependent upon the concentrations initially selected. For example, if a chronic test is conducted using 100, 50, 25, 12.5, and 6.25 percent effluent concentrations, and the LOEC exhibited by the data is at 25 percent effluent, the NOEC calculated by hypothesis testing is estimated to be the next lowest dilution, or 12.5 percent. However, the true NOEC value may lie somewhere between 25 percent and 12.5 percent effluent.

Comparisons of both types of data indicate that an NOEC derived using the IC_{25} is approximately the analogue of an NOEC derived using hypothesis testing (see Figure 1-1). For the above reasons, if possible, the IC_{25} is the preferred statistical method for determining the NOEC.

Another important issue in conducting both acute and short-term chronic toxicity tests is the dilution series. The EPA methods manuals recommend six dilutions, including the control. The only exception to this is a toxicity test conducted on ambient receiving waters. Then, each ambient receiving water is compared statistically to the control without dilutions. It is not accurate to assume that two dilutions (the receiving water concentration [RWC] and control) are all that are ultimately necessary for determining compliance with a toxicity limit. If the toxicity tests are conducted with only the control and one effluent concentration (i.e., the RWC), the error and variability associated with this type of statistical analysis is large [20].

For the above reasons, EPA recommends the use of five effluent concentrations and a control to determine the magnitude of toxicity. When conducting compliance monitoring, an option is to choose the five concentrations that bracket the RWC (two concentrations above and two below). This would result in the determination of compliance status as well as a statistically valid estimation of the NOEC. The information provided from the full dilution series would indicate how close the test endpoints are to the permit limit and how close to violating the limit the discharger is, and, if measured over time, the variability of the effluent.

1.3.1 Toxic Units

Since toxicity involves an inverse relationship to EC (the lower the EC, the higher the toxicity of the effluent), it is more understandable to translate concentration-based toxicity measurements into toxic units (TUs). In this way, the potential confusion involving the inverse relationship is overcome and the permit limit derivation process is better served. The number of toxic units in an effluent is defined as 100 divided by the EC measured:

$$TU_a = 100/LC_{50}$$

$$TU_c = 100/NOEC.$$

For example, an effluent with an acute toxicity of an LC_{50} in 5 percent effluent is an effluent containing 20 TU_as.

A very important aspect of toxic units is that two different types are used depending on whether acute or chronic aquatic toxicity is measured. The proper expressions for toxic units are TU_a and

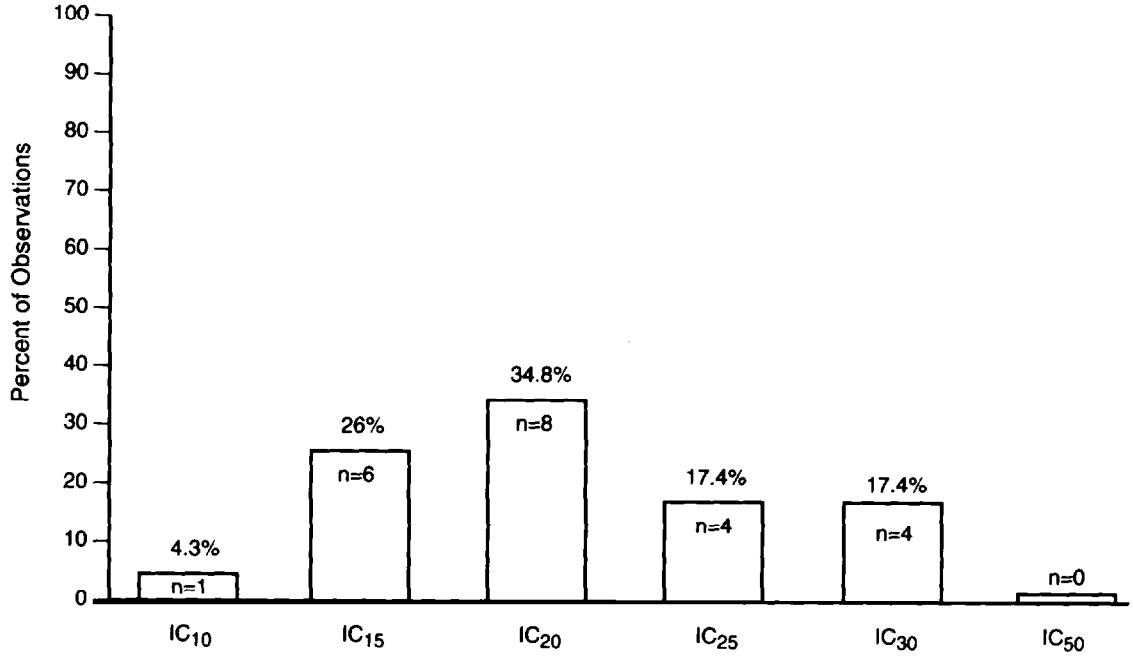

Figure 1-1. This figure represents the percentage of the time the mean NOEC was approximately equivalent to an IC_{10}, IC_{15}, IC_{20}, IC_{25}, IC_{30}, and IC_{50} for all 23 effluent and reference toxicant data sets analyzed. The data sets included short-term chronic toxicity test for *Ceriodaphnia dubia, Pimephales promelas* (fathead minnows), *Arbacia punctulata* (sea urchin), *Cyprinodon variegatus* (sheepshead minnows), and *Champia parvula* (red algae) [21].

TU_c. TU_a is the measurement of acute toxicity units and TU_c is a measurement of chronic toxicity units. (See the glossary for a definition of these terms.) They are not the same measurement and should not be used interchangeably. Acute and chronic TUs make it easy to quantify the toxicity of an effluent and to specify water quality criteria based upon toxicity. For example, an effluent sample that contains 20 TU_cs is twice as toxic as an effluent that contains 10 TU_cs.

1.3.2 Correlation of Whole Effluent Toxicity Measurements to Actual Receiving Water Impact

EPA conducted the Complex Effluent Toxicity Testing Program (CETTP) that examined sites in both freshwater and saltwater systems to investigate whether or not an evaluation of effluent toxicity, when adequately related to receiving water conditions (i.e., temperature, pH, salinity), can give a valid assessment of receiving system impacts on waters that support aquatic biota [22-25]. Summaries of these site studies are provided in Box 1-3 (freshwater) and Box 1-4 (saltwater). In addition, three other studies, presented in Box 1-3, were conducted to address this issue: a comparative investigation conducted by the University of Kentucky [26], a second study on the Trinity River in Texas conducted by the University of North Texas [27], and a third study conducted by the North Carolina Division of Environmental Management [28].

It is important to note that in these studies, different objectives were addressed. The CETTP freshwater studies attempted to correlate receiving water chronic toxicity measured by EPA toxicity tests to instream observed impacts (Figure 1-2). The CETTP saltwater studies compared effluent toxicity to ambient receiving water toxicity using dye studies to measure receiving water concentrations of effluent. The North Carolina study compared effluent toxicity to receiving water impact using *Ceriodaphnia* chronic toxicity tests and receiving stream benthic macroinvertebrates (Figure 1-3). The Kentucky study examined the relationship between effluent toxicity tests and instream ecological parameters. The Trinity River study attempted to spatially compare the biological, physical, and chemical water quality and sediment quality of Trinity River reaches above and below the Dallas/Fort Worth area (Figure 1-4).

Together, these studies comprise a large data base specifically collected to determine the validity of toxicity tests to predict receiving water community impact. In order to address the correlation of effluent and ambient toxicity tests to receiving water impacts, EPA evaluated the results of the studies discussed above [29]. The results, when linked together, clearly show that if toxicity is present after considering dilution, impact will also be present.

Parkhurst et al., were requested by representatives of industrial and municipal discharges to critique the CETTP studies [30]. One major criticism was that the EPA study sites were not selected randomly and therefore the results of the studies cannot be extended to all waters. EPA agrees that the CETTP sites were not selected to represent a statistically valid sampling of all types of waterbodies in the United States. A representative sampling of receiving water would require assessment of more sites than EPA could study in a comprehensive manner. Such a sampling was beyond the capability of EPA's resources. However, the CETTP and corresponding studies such as the Trinity River study [27] did show unequivocally that a strong correlation exists between toxicity and a biological impact.

EPA believes that it is reasonable to assume in the absence of data showing otherwise that this relationship is basically independent

Box 1-3. Correlation of Toxicity Measurements to Receiving Water Impact (Freshwater)

EPA conducted eight freshwater site studies in which ambient toxicity was compared to the receiving water biological impact. These site studies were a part of the Complex Effluent Toxicity Testing Program (CETTP). Testing was done onsite concurrent with the field surveys. Sites exhibiting biological impacts in Oklahoma, Alabama, Maryland, West Virginia, Ohio, and Connecticut were included. Organisms were exposed to samples of water from various stations and tested for toxicity. Biological surveys (quantitative field sampling of fish, invertebrate, zooplankton, and periphyton communities in the receiving water areas upstream and downstream of the discharge points) were made at these stations at the same time the toxicity was tested to see how well the measured toxicity correlated to the health of the community. These studies have been reviewed and published in the EPA publication series [23, 31-38].

Figure 1-2 illustrates the data from the CETTP studies. A robust canonical correlation analysis was performed to determine whether or not statistically significant relationships existed between the ambient toxicity tests and instream biological response variables and to identify which variables played an important role in that relationship [29]. Influential variables were then used to classify stations as either impacted or not. *Ceriodaphnia dubia* productivity and/or *Pimephales promelas* weight were used as the basis for predicting impact. Fish richness was used to classify streams as impact observed or impact not observed.

Box 1-3. Correlation of Toxicity Measurements to Receiving Water Impact (Freshwater) (continued)

Classification was based on the relative performance of the stations on each stream in the study. Percentiles of the appropriate distribution (normal for toxicity variables, and Poisson for fish richness) were used to set cutoffs for classification. Two-way contingency tables representing stations as impact predicted or not, and impact observed or not were prepared from a variety of cutoffs (percentages). The exact test for independence was performed on each contingency table.

If toxicity test results were used to classify sites as impacted or not (predicted classification) and if a strong relationship does exist between ambient toxicity and biological response, then the classification of stations according to biological response should closely match the predicted classification. Hence, the errors in misclassification should be small.

Figure 1-2, developed using a 95 percent-95 percent cutoff, shows that false positives (impact predicted but none found) occurred at 7.5 percent of the 80 stations. The probability of getting no more than 7.5 percent false positives under the null hypothesis that there is no relationship between ambient toxicity and biological response is less than p=0.001. As discussed above, this is the only definitive error that can be identified in such comparisons. The correct or noncontradictory findings (no measured toxicity but observed impacts) were 92.5 percent of the stations. A variety of other cutoff criteria combinations were evaluated and the number of false positives remained in the 7 percent to 8 percent range. Therefore, a discharger's chance of being charged incorrectly with causing instream toxicity is low if and only if dilution in the receiving water is considered.

A comparative time series study conducted on the Trinity River in Texas that used the same classification method as the CETTP studies also showed a strong relationship between ambient toxicity and instream biological response (Figure 1-2). False positives (impact predicted but not observed) had a frequency of 8.3 percent. Overall there was a 91.7-percent accuracy of prediction or noncontradictory findings [29], and the probability of a false positive (impact predicted but not observed/impact predicted) ranged from 8 percent to 11 percent in these studies.

Another study conducted by the North Carolina Division of Environmental Management indicated the high accuracy of predicting receiving water impacts from whole effluent toxicity tests. Forty-three comparisons were made between freshwater flowing streams using the *Ceriodaphnia dubia* chronic test and a qualitative macroinvertebrate sampling. Overall there was 88 percent accuracy of prediction (Figure 1-3) [28].

In addition, another comparative study was conducted in the Kentucky River Basin [26]. This study consisted of a comparative ecological and toxicological investigation of a secondary wastewater treatment plant and measured instream effects at 10 stations including reference sites. The principal objective of the study was to assess downstream persistence of aquatic contaminants, to quantify their effects on structure and function of aquatic communities, and to evaluate the fathead minnow embryo-larval test for measuring instream toxicity and estimating chronic effects on aquatic biota. The results of the study indicate a good predictive correlation between embryo-larval survival and independent ecological parameters, especially species richness of macroinvertebrates. The correlation coefficients for species richness and embryo-larval survival was 0.96, and for embryo-larval survival and diversity, it was 0.93. The estimated toxicity (LC_1) correlated closely with the actual percent instream effluent dilution observed at the first downstream station at which no ecological impact was discernable.

Using the statistical classification previously described in the CETTP and Trinity River studies, an analysis was conducted on the combined data sets of the CETTP, Trinity River, and Kentucky River Basin data. Because the North Carolina study was based on the *Ceriodaphnia dubia* chronic test and a qualitative macroinvertebrate sampling, the data were not amenable to this type of statistical analysis. This combined analysis is illustrated in Figure 1-5. The probability of getting no more than 9.4 percent false positives (impact predicted/impact not observed) when the null hypothesis (no relationship between ambient toxicity and biological response) is less than p=0.0028.

Box 1-4. Correlation of Effluent Toxicity Measurements to Receiving Water Toxicity (Saltwater)

In saltwater systems, as in freshwater systems, receiving water impact should only be seen where receiving water waste concentrations are at or above the effect concentrations. Dilution in marine and estuarine systems may be greater due to large and/or complex mixing than most freshwater systems. As a result, there is a less likely chance for receiving water impacts to be observed in saltwater systems as predicted by toxicity tests.

Figure 1-6 illustrates the comparison between predictions of saltwater receiving water toxicity and whole effluent toxicity. Toxicity test data from 79 ambient stations (four study sites) were compared to effluent toxicity test results from an isolated discharge at each site. All receiving water toxicity to effluent toxicity correlations are based on dye studies conducted at each of the four sites to determine the actual dilution.

Most of the sites were selected because the discharge was isolated from other point sources and potential impacts from other point sources was anticipated to be negligible. Two of these studies indicated near-field effects, generally within the mixing zone. One study conducted at Fernandina Beach, Florida [25], showed impacts outside the proposed mixing zone. Results of another study (East Greenwich) indicated the existence of poor water quality well beyond the influence of the East Greenwich Sewage Treatment Plant and suggests that other sources (point or nonpoint) may contribute significantly [25, 39, 40]. This condition may be typical in some of the more stressed estuaries.

In a total of 79 comparisons, 11 out of 15 (73 percent) of the receiving water samples predicted to be toxic were toxic. This constitutes 14 percent of the total comparisons. Toxicity was not predicted in the receiving water and toxicity was not seen in the receiving water 59 out of 64 times (92 percent). This constitutes 75 percent of the total comparisons.

In 5 percent of the total comparisons there was a false negative prediction, or the toxicity tests predicted no toxicity when the receiving water was toxic [24]. As previously discussed, toxicity is only one possible adverse influence. Since only toxicity is measured, a very high correlation should not be expected necessarily because receiving water biological impacts may be attributed to other sources or factors.

The results of the studies at these four sites indicates a 94 percent accuracy when using the marine and estuarine toxicity tests to predict receiving water impacts. In only 6 percent of the cases did effluent toxicity tests predict receiving water toxicity that was not present (false positive).

of waterbody type. Also, this was not the objective of the CETTP studies. The CETTP purpose was to determine if toxicity and impacts to biological communities are found concurrently in receiving waters. Therefore, EPA disagrees that this is a reason to conclude that the CETTP studies failed to show the validity of toxicity tests to predict water quality impact.

Another criticism was the studies did not investigate replication of results over time. However, toxicity results cannot be expected to be replicated over time in waters where river flow and other time-variant factors change the degree of ambient toxicity. Indeed, the Kanawa River and Five-Mile Creek data showed that ambient toxicity did not occur at high river flows whereas it was found at low flows; this was an expected result. The objective of the CETTP studies was to see if impact was present when effluent toxicity exceeds the available effluent dilution. This objective was achieved by the studies.

Another major criticism was the correlation between toxicity tests and biological impact relied extensively upon maximum impact responses and that correlation was poor when data from high flow events and lesser toxicity discharges (minimal impact responses) were added. EPA acknowledges that impact correlations will be higher where higher toxic impact occurs and lower where impacts are expected to be minimal. Such a response is expected given the complexity of ecosystems and that biological communities and species have different sensitivities to toxicants and may respond differently. Also, higher river dilution will reduce the potential instream impact from effluent toxicity. However, this observation does not disprove that the CETTP and other studies showed a statistically sound relationship to correlate toxicity to the existence of a biological ambient impact. Therefore, EPA still concludes that control of toxicity is a valid approach for protecting ambient water quality.

In addition, other studies confirm that effluent toxicity, when adequately related to ambient conditions, can give a valid assess-

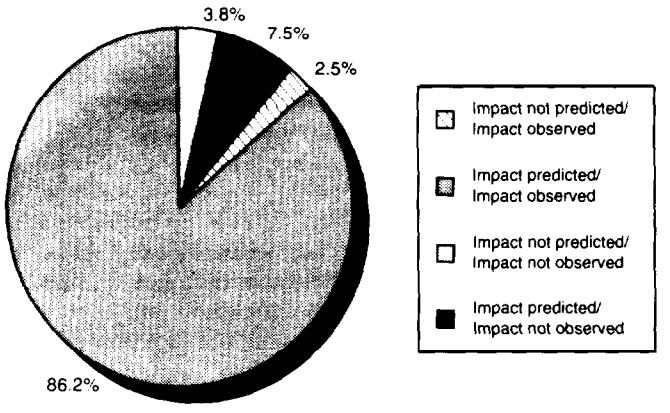

Figure 1-2. Comparison of Ambient Toxicity and Instream Impact—EPA Study [23, 31-38]

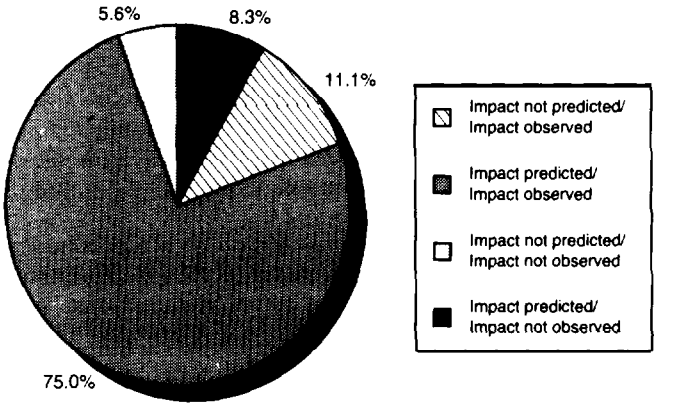

Figure 1-4. Comparison of Ambient Toxicity and Instream Impact—Trinity River [29]

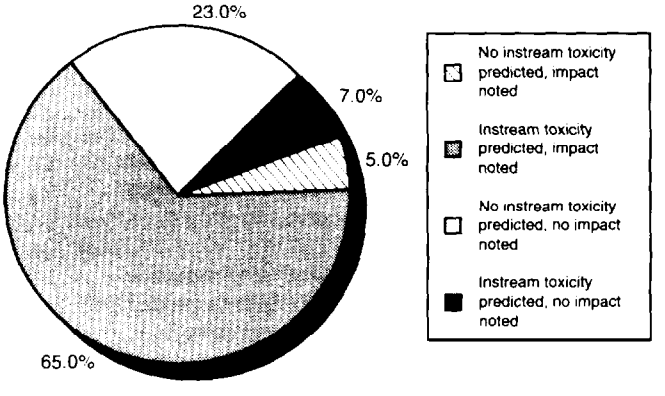

Figure 1-3. Comparison of Effluent Toxicity of Receiving Water Impact Using *Ceriodaphnia* Chronic Toxicity Tests and Freshwater Receiving Stream Benthic Invertabrates at 43 Point Source Discharging Sites in North Carolina [28]

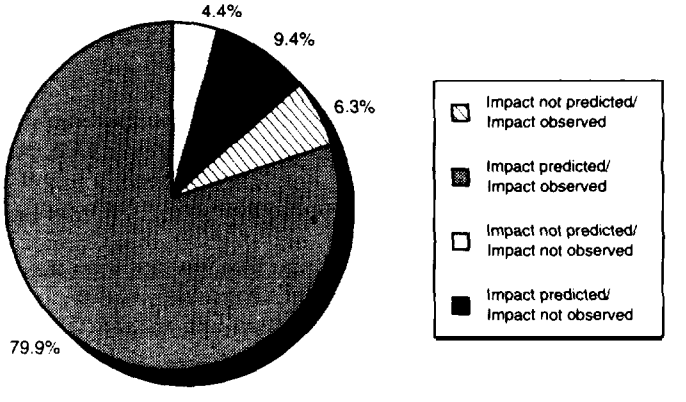

Figure 1-5. Comparison of Ambient Toxicity and Instream Impact—EPA Study, Trinity River Study, and Kentucky Study [26]

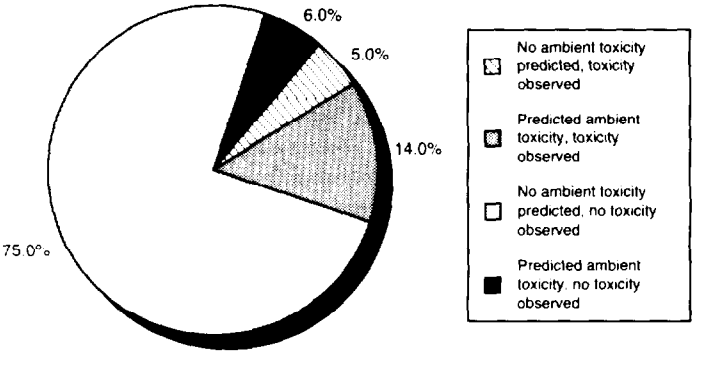

Figure 1-6. Comparison of Predictions of Receiving Water Toxicity Based on Effluent Toxicity and Ambient Receiving Water Testing in Saltwater Environments: 79 Ambient Stations and 4 Dischargers [24, 25, 39, 40]

ment of receiving water impact [3, 24, 26-29, 39, 41]. These studies tested waters other than those studied under CETTP.

It is important to recognize that toxicity caused by contaminants in the effluent, as measured by the whole effluent toxicity tests, is only one of many influences that determine the health of a biological community. **Impact from toxics would only be suspected where effluent concentrations after dilution are at or above the toxicity effect concentrations.** Influences from substrate differences and physical conditions, such as dissolved oxygen, temperature, channelization, flooding and weather cycles, also can affect the biological community adversely. These other types of influences may be better evaluated by using a bioassessment approach. However, the existence of these other factors concurrently with toxicity does not absolve a regulatory authority from controlling the discharge of toxicity if the State has established a designated use to protect aquatic biota.

The value of the toxicity test is its ability to assess the impact of discharged toxicants independent of effects from other factors. This allows regulatory authorities specifically to identify and control the portion of the impact caused by the discharge. Biological, physical, and chemical factors of the community can influence the actual effects that effluent toxicity may cause in the receiving water, and further emphasize the need for a totally integrated water quality-based approach.

1.3.3 Toxicity Test Method Precision

Like all measurements, toxicity tests exhibit variability. Toxicity test variability can be described in terms of two types of precision—"within" or intralaboratory precision, and round robin or interlaboratory precision. Intralaboratory precision is the ability of trained laboratory personnel to obtain consistent results repeatedly when performing the same test on the same species using the same toxicant. Interlaboratory precision (or round robin tests) is a measure of how reproducible a method is when conducted by a large number of laboratories using the same method, species, and toxicant or effluent. Generally, intralaboratory results are less variable than interlaboratory results.

EPA believes that several toxicity test methods have a precision profile that can be reasonable to evaluate compliance with NPDES permits. The appropriateness of a given method can be determined in a permit proceeding or, in part, by rulemaking. EPA has proposed a range of whole effluent toxicity test procedures in 40 *CFR* 136 and may promulgate these methods soon. Current data, however, show that the precision profiles of a number of whole effluent toxicity tests is similar to already approved chemical-specific methods.

Research into the precision of whole effluent toxicity methods by various groups (including EPA) has shown that toxicity test procedures exhibit variability [17-18, 19, 42-49]. In chronic toxicity tests, variability is measured close to the limit of detection because the endpoint of the test is already at the lower end of the biological method detection range (i.e., an NOEC). This is in contrast to acute toxicity tests where the test endpoint is normally calculated at midrange (i.e., LC_{50}), but is sometimes calculated at the lower end of the biological detection range (i.e., LC_1). CVs cannot be calculated for NOEC endpoints determined using an analysis of variance (hypothesis testing) because this procedure does not produce a statistical point estimate. However, CVs can be calculated for NOECs if they are determined using the IC statistical procedure, and for EC and LC endpoints because they are all statistical point estimates.

To facilitate the comparability between different NOEC calculations using the IC_{25} and the analysis of variance (hypothesis testing), Appendices A-1 and A-2 list NOEC results in terms of both. In some instances the IC_{25} could not be calculated based on statistical assumptions and available data. In addition, there are some instances where an IC_{25} cannot be calculated because there was no toxic effect. In these cases, the CV for a method and reference toxicant was calculated using only data where IC_{25}s could be calculated.

A more detailed discussion of precision can be found in Box 1-5. Tables 1-6 and 1-7 summarize the intralaboratory precision for all 10 EPA short-term chronic whole effluent toxicity tests and some acute toxicity tests. In addition, Table 1-8 summarizes the interlaboratory precision for three chronic test species and two acute test species using a variety of different compounds.

In summary, whole effluent toxicity testing methods can represent practical tests that estimate potential receiving water impacts. Permit limits that are developed correctly from whole effluent toxicity tests should protect aquatic biota if the discharged effluent meets the limits. It is important not to confuse permit limit variability with toxicity test variability. Chapter 5 discusses permit limit variability.

1.3.4 Considerations Involved When Implementing the Whole Effluent Toxicity Approach

An understanding of some basic considerations and toxicological principles is important in order to apply routinely the whole effluent approach to the assessment and control of municipal and industrial effluents. The following sections provide a more indepth discussion of each of these factors and principles. (Chapters 3 and 5 discuss specific details for characterizing an effluent and deriving permit limits.)

Onsite versus Offsite Toxicity Testing

Comparisons of toxicity data between tests conducted onsite and tests conducted offsite on samples shipped to Environmental Research Laboratory (ERL)-Duluth and (ERL)-Narragansett via airfreight have, with a few exceptions, shown little variation. For many effluents, onsite or offsite test data do not appear to be significantly different. The major consideration is cost. Cost also should be weighed against data needs to make the onsite/offsite determination.

For example, if the presence in the effluent of nonpersistent compounds (i.e., chlorine or other volatiles) is suspected or known, then the regulatory authority may want to conduct onsite testing. If it is not considered important to the analysis of toxic impact, offsite testing is as acceptable as onsite testing. In general, offsite testing would be acceptable for most effluents except those with volatiles. When conducting flow-through toxicity tests which require a continuously pumped sample, onsite testing is strongly recommended. Regardless, cost considerations should not over-

Box 1-5. Toxicity Test Method Precision

Precision can be described by the mean and relative standard deviation (percent coefficient of variation, or CV=standard deviation/mean x 100) of the calculated endpoints from the replicated toxicity tests. Several factors can affect the precision of the test, including test organism age, condition, sensitivity, temperature control, salinity, pH control, handling and feeding of the test organisms, and the training of laboratory personnel. For these reasons, it is recommended that trained laboratory personnel carefully conduct the tests in strict accordance with the test manuals for acute and chronic toxicity testing. In addition, acute and chronic toxicity testing quality assurance practices should be fully performed. Simple quality assurance procedures, which are described at the beginning of each manual, include:

- Single laboratory precision determinations, using reference toxicants, on each of the tests procedures to determine the ability of the laboratory personnel to obtain consistent, precise results. These determinations should be made before attempting to measure effluent toxicity, and routinely confirmed as long as routine whole effluent toxicity tests are being conducted.
- Use of reference toxicants to routinely evaluate the quality and sensitivity of the test organisms to be used in each test.
- Development of "control charts" should be prepared for each reference toxicant/organism/protocol combination to determine if the results are within prescribed limits. The control chart consists of successive data added with each reference toxicant test, and is the basis for evaluating data once the control chart" is established.
- The minimum criteria of test acceptability specific for each protocol.

Guidelines for recommended quality assurance practices are found in each manual [17, 18, 19].

Within-laboratory precision data are routinely calculated on a minimum of two reference toxicants as part of the EPA methods development process. These data have been established for each of the four EPA freshwater chronic methods and each of the six marine/estuarine chronic methods. Within-laboratory precision is detailed at the end of each of the methods sections in the methods manuals [17, 18, 19] and is summarized in Appendix A (Tables A-1-1 to A-1-18 for the marine/estuarine methods and Tables A-1-19 to A-1-31 for the freshwater methods) and summarized in Tables 1-6 and 1-7. Intralaboratory precision data also are presented for acute toxicity tests and are summarized in Table 1-8. Each laboratory should be establishing a reference toxicant "record," including a control chart. EPA's reference toxicant numbers are only meant to show precision of the methods within EPA laboratories and to serve as guidance for other laboratories. Each laboratory's reference toxicant data will reflect conditions unique to that facility, including dilution water, culturing, etc. However, each laboratory's reference toxicant CVs should reflect good repeatability.

The CVs may be calculated for acute LC_{50} and chronic EC_{50}, IC_{25}, and IC_{50} data. A mean and range is given for the chronic no observed effect concentration (NOEC) precision data because an NOEC is not a point estimate and is dependent on the tightness of the concentration interval employed in the reference toxicant tests (i.e., the closer the NOEC concentration range the more precise the test is for the reference toxicant). The closer the CV is to zero, the better. However, CVs should only be compared with the same test protocol/species tested against the same reference toxicant. Estimates of variability (CVs) should only be applied for specific protocols against a specific chemical using the same concentration intervals.

Reference toxicant data should be required for each of the methods stipulated by the permit authority as part of routine quality assurance/quality control (QA/QC) for checking the reliability of the tests conducted by the permittees. In addition, Criteria of Acceptability for each of the 10 chronic methods are listed in the methods manuals, and should be used as a check for whether the compliance data submitted is minimally acceptable [18, 19]. (See Table 1 of each of the 4 freshwater methods and Table 2 of each of the 10 marine/estuarine methods entitled, "Summary of Recommended Effluent Toxicity Test Conditions.")

To date, interlaboratory precision (round robin) tests have been completed for the 7-day **Fathead Minnow Larval Survival and Growth Test, the Cladoceran, *Ceriodaphnia* Survival and Reproduction Test, and the Sheepshead Minnow Larval Survival and Growth Test.** The results of these round robin studies show good reproducibility for these three methods. Results of the round robin testing will show greater variability (i.e., larger CVs) due to a larger number of variables introduced by many round robin laboratories participating. Researchers

Box 1-5. Toxicity Test Method Precision (continued)

have found that a two- to threefold increase in CV values is acceptable with biological testing [46, 50, 51]. Interlaboratory data also are presented from several acute toxicity tests [46]. The data from these round robin tests can be found in Appendix A (Tables A-1-5, A-1-23, A-1-24, A-1-27, A-1-28, and A-1-30) and are summarized in Table 1-8.

Researchers agree that the precision of these tests is acceptable. Rue, Fava, and Grothe concluded that whole effluent toxicity test methods "are comparable to accepted analytical methodologies" [50]. Another study by Grothe, Kimerle, and Malloch also concluded that when comparing "...CVs for select effluent toxicity test methods and commonly accepted analytical methods...the precision of both techniques is similar" [51]. This has led the Agency to conclude "...that toxicity test methods, where properly followed, exhibit an acceptable range of variability" (see the discussion of toxicity testing requirements for POTWs, 55 *FR* 30082 at 30112, July 24, 1990) [52].

ride the need to characterize adequately a given effluent and the factors unique to the discharge situation.

Flow-through versus Static and Renewal Toxicity Testing

Several factors should be considered in making the choice of toxicity test system. These include the type of toxicity being measured (i.e., is the effluent highly variable or not; is the discharge continuous or intermittent?); the amount of data needed (variable effluents may require more data); and, as between different systems that will provide adequate data, expense.

Two basic types of testing systems are available to measure effluent toxicity: flow-through systems and static systems. A flow-through toxicity test is conducted using a diluter system and a continuous feed of effluent and dilution water. A static toxicity test is conducted in test chambers (without a serial diluter delivery system) into which effluent and diluent are added manually. Usually, only one effluent sample is collected and used at the beginning of a static test. A variation of the static procedure is the renewal toxicity test. This test uses the same delivery system as that of a static test but the test solutions are changed, or renewed, on a predetermined schedule (i.e., every 24 hours). Fresh effluent samples generally are collected to renew the test solutions.

Online continuous flow-through testing can sample and measure "peaks" of toxicity should they occur during the testing period. In variable effluents, however, the test organisms would only be exposed to peak toxicity for periods proportional to the flow-through rate, the duration of the peak in toxicity and length of the test. Static and static renewal tests also can measure peaks in effluent toxicity depending on the type of sampling used, and if the sampling occurs at the time of the toxicity peak.

If the effluent is highly variable and continuously discharged, either a flow-through or renewal test would be appropriate. If the effluent is highly variable with an intermittent discharge, a flow-through or a renewal test also would be appropriate. However, the effluent sample collected for the renewal test should be a composite collected over the period of the discharge. If the effluent is not considered variable, such as a discharge from a 30-day retention basin, then a static or renewal test using a grab or 24-hour composite sample would be an appropriate test system. For a chronic toxicity test, a 24-hour composite effluent sample is most appropriate. For an acute test, four grab samples taken 6 hours apart or four 6-hour composite samples are most appropriate to measure the peaks of toxicity in an effluent.

Cost also is a factor. Flow-through tests are more resource intensive and require complex delivery systems. Consequently, less data can be generated per unit cost than with static or renewal testing. Where more data at less cost are desirable, static or renewal testing probably is more appropriate. Typically, more samples using renewal is preferable to fewer samples using flow-through for the same total cost since this would allow better characterization of effluent variability.

Grab Sampling versus Composite Sampling

The use of a grab sample or a composite sample is based upon the objectives of the test and an understanding of the long-term operations and schedules of the discharger. If the toxicity of the effluent is variable, grab samples collected during the peaks of effluent toxicity provide a measure of maximum toxic effect. Collection of grab samples may be necessary if there is little dispersion or mixing of the effluent in the receiving water. In these instances the peaks could persist in the receiving water. Although a grab sample has the potential of revealing the toxicity peak in an effluent, the sample has to be collected at the time of the toxicity spike. Therefore, in a variable effluent, the grab sample has a high probability of missing the toxicity peak. On the other hand, a 24-hour composite sample may more readily catch the toxicity peak(s), but the compositing process may tend to dilute the toxicity resulting in a misleading measure of the maximum toxicity of the effluent. Composited samples are, therefore, more appropriate for chronic tests where peak toxicity of short duration is of lesser concern. More detailed discussions of the type of toxicity tests and the best sampling methods are provided in the manuals for the acute and chronic, freshwater and marine toxicity testing procedures [17, 18, 19] and in Chapter 3.

Variability

There are three important sources of differences in a water quality impact analysis:

Table 1-6. Intralaboratory Precision of Chronic Whole Effluent Toxicity Test Methods

Test Method	NOEC Range	Mean IC_{25}	CV(%)	Mean IC_{50}	CV(%)	Compound	Water Used
Cyprinodon variegatus—Survival and Growth							
	>0.05 - 0.05 mg/l	0.07	41.8	0.13	40.8	Copper	AS
	0.5 - 1.0 mg/l[1]	1.5	31.4	1.9	31.8	SDS[3]	AS
	31 - 125 ug/l[2]	300.4	33.0	396.9	19.2	Copper	NS
	1.3 - 2.5 mg/l[1]	2.2	27.6	2.6	35.3	SDS	NS
Embryo larval survival and teratogenicity							
		EC_{10}		EC_{50}			
	200 - 240 ug/l[2]	202	2.8	233.5	2.5	Copper	AS
	2.0 - 4.0 mg/l[1]	1.9	35	11.7	2.9	SDS	AS
Menidia beryllina — Survival and Growth							
	31 - 125 ug/l[2]	209.9	43.7	340.8	50.7	Copper	NS
	1.3 + 0 mg/l	1.3	43.2	1.9	9.4	SDS	NS
Mysidopsis bahia —Survival, Growth, and Fecundity							
	<0.3 - 5.0 mg/l[4]	5.7	35.0	6.9	47.8	SDS	NS
	63 - 125 ug/l[1]	138.3	18.0	185.8	5.8	Copper	NS
Arbacia punctulata —Fertilization							
	5.0 - 12.5 ug/l[1]	23.5	54.6	45.7	47.9	Copper	AS
	1.2 - 3.3 mg/l[1]	1.7	29.7	2.4	23.3	SDS	AS
	<6.1 - 24.4 ug/l[2]	22.9	41.9	29.9	48.2	Copper	NS
	0.9 - 1.8 mg/l[1]	2.58	28.7	3.2	33.3	SDS	NS
Champia parvula— Reproduction							
	0.5 - 1.0 ug/l[1]	1.79	61.09	3.35	34.5	Copper	NS
	0.5 - 1.0 ug/l[1]	0.93	63	1.4	38.6	Copper	AS/NS
	0.09 - 0.48 mg/l[2]	0.31	69.0	0.36	37.0	SDS	AS/NS
	0.15 - 0.60 mg/l[2]	0.46	62.3	0.75	22.92	SDS	NS
Pimephales promelas— Survival & Growth							
	128 - 256 ug/l[1]	—[5]	—	—[5]	—	NAPCP[6]	FW
	0.011 - 0.013 mg/l[1]	—[5]	—	—[5]	—	Cadmium	FW
Embryo larval survival and teratogenicity				LC_1			
	0.011 - 0.013 mg/l	—	—	0.0068	62	Cadmium	FW
	0.011 - 0.013 mg/l	—	—	1.51	41.3	Diquat	FW
Ceriodaphnia dubia — Reproduction							
	0.10 - 0.30 mg/l[1]	0.22	41.13	0.3	27.9	NAPCP	FW
	0.25 - 1.00 mg/l	0.91	20.5	1.24	15.2	Sodium Chloride	
Selenastrum capricornutum — 96-hour Survival				LC_{50}			
	2.1 - 2.8 g/l[4]	—	—	2.4	10.2	Sodium chloride	FW

[1]Difference of one test concentration.
[2]Difference of two test concentrations.
[3]Sodium dodecyl sulfate.
[4]Difference of four test concentrations.
[5]Raw data were unavailable, so IC_{25} and IC_{50} could not be calculated.
[6]Sodium pentachlorophenol.

AS—artificial seawater.
NS—natural seawater.
FW—freshwater.
—: Data not available.
Note: Data used in this table are found in Appendix A-1.

Table 1-7. Intralaboratory Precision of Acute Whole Effluent Toxicity Test Methods

	N (number of tests)	CV(%)	Compound
*Pimephales promelas**	12	40	NAPCP
(96-hour)	9	22	SDS
	9	86	Cadmium
*Daphnia pulex**	14	36	NAPCP
(48-hour)	10	43	SDS
	9	21	Cadmium
*Daphnia magna**	13	10	NAPCP
(48-hour)	8	29	SDS
	8	72	Cadmium

*Data taken from Draft 1990 Acute Manual.

Table 1-8. Summary of Interlaboratory Variability Data for Whole Effluent Toxicity Test Methods [17, 18, 19, 46]

Test Method	NOEC Range	IC_{25} CV(%)[1]	
Chronic			
1. *Cyprinodon variegatus* 7-day growth and survival	1 - 3.2% effluent[2]	44.2	
2. *Pimephales promelas* 7-day growth and survival	<3.0 - 6.0 mg/l[2] potassium chromate	31.0	
3. *Ceriodaphnia dubia* 7-day reproduction	0.25 - 0.30 mg/l NAPCP[3]	41.1	
4. *Ceriodaphnia dubia* 7-day reproduction	6 - 12% effluent[2]	—	—
5. *Ceriodaphnia dubia* 7-day reproduction	<0.25 - 1.0 mg/l sodium chloride	29.0	
6. *Ceriodaphnia dubia* 7-day reproduction	0.25-1.0 mg/l sodium chloride	20.5	
Acute	**Toxicant**		**LC_{50} CV(%)**
7. *Cyprinodon variegatus*			
96-hour static	endosulfan		37.7
96-hour flow-through	endosulfan		46.2
96-hour static	silver nitrate		34.6
96-hour flow-through	silver nitrate		50.1
8. *Mysidopsis bahia*			
96-hour static	endosulfan		59.5
96-hour flow-through	endosulfan		51.9
96-hour static	silver nitrate		26.6
96-hour flow-through	silver nitrate		22.3

[1]CV—coefficient of variation.
[2]This represents a difference of one exposure concentration.
[3]NAPCP—Sodium pentachlorophenol.
—: Data unavailable.
Note: Data summarized in this table were taken from Appendix A-1.

- **Effluent variability** is caused by changes in the composition of the effluent. Virtually all effluents vary in composition over time.

- **Exposure variability** is caused by changes in flow rates of both effluent and receiving water. There also are variable receiving water parameters that may be independent of flow, such as background toxicant levels, pH, salinity, tides, suspended solids, hardness, dissolved oxygen, and temperature, that can be important in assessing impact.

- **Species sensitivity** differences are caused by the differences in response to toxicants between species.

Each type of variability is discussed below.

Effluent Variability

Effluent variability is an important component in overall variability of water quality impact analyses and should be addressed adequately in permitting (see Chapter 5, Permit Requirements). Effluent variability can be addressed by designing proper sampling and testing procedures. Sampling measurements should be tailored to the toxic effect of concern (i.e., acute or chronic) and the need to design testing that accounts for effluent variability. Chapter 3, Effluent Characterization, describes recommendations for a testing frequency designed to assess variable effluents. Appendix F details suggested sampling procedures.

Appendix A-2 demonstrates the types of effluent variability that may be seen in publicly owned treatment works (POTW) effluents as measured through toxicity testing of the effluents (see Appendix A-2, Tables A-2-1 to A-2-9). The CVs (effluent variability) for POTW effluents are based on acute LC_{50} data that range from 19.6 percent to 42 percent effluent, and for IC_{25} chronic data that range from 52.8 percent to 101.3 percent. Also in Appendix A-2, Tables A-2-10 to A-2-12 show acute and short-term chronic effluent variability data from oil refineries on three species, fathead minnows, *Ceriodaphnia*, and mysids. The CVs associated with this effluent variability data range from 18.7 percent to 54 percent for the acute LC_{50} data, and from 29.8 percent to 59.6 percent for the chronic NOEC data. Data on effluent variability in various types of manufacturing facilities are in Appendix A-2, Tables A-2-13 to A-2-18. Acute toxicity test results show CVs for effluent variability ranging from 20.3 percent to >53.9 percent.

Tables A-2-6 to A-2-9 in Appendix A-2 illustrate the effluent variability of a POTW effluent over the course of a year in which gradual upgrading to full secondary treatment was occurring. Four saltwater short-term chronic toxicity tests were conducted on the POTW's effluent using the sea urchin fertilization test (*Arbacia punctulata*), the red macroalga fertilization test (*Champia parvula*), the mysid 7-day growth, fecundity and survival test (*Mysidopsis bahia*), and the inland silverside 7-day larval growth and survival test (*Menidia beryllina*). The sea urchin and red macroalga tests were conducted daily during each of the four 7-day studies, and provide good examples of the daily variability of the effluent.

These results show that the effluents vary in toxicity and that any one effluent can exhibit significantly varying toxicity to different test species over time. The data also indicate that the effluents were rarely toxic below 10 percent effect concentration and were not toxic below 0.1 percent effect concentration. This information is discussed in Chapter 3, Recommendations for Testing the Toxicity of Effluents section.

Exposure Variability

Exposure variability is a complex factor that can be addressed in two ways. First, the simplest, easiest applied approach is to assume a steady state exposure condition (usually an estimate of presumed "worst case" exposure) using a critical receiving water flow or condition and a typical effluent flow.

A second method is to attempt to estimate or actually measure the variable exposure situation at the discharge site. This requires statistical analysis and some form of dynamic modeling. Chapter 4, Exposure and Wasteload Allocation, describes appropriate exposure assessment procedures for freshwater and saltwater systems.

Species Sensitivity Differences

One of the primary considerations in establishing a toxicity testing requirement for a discharger is requiring a suitable test species. Different species exhibit different sensitivities to toxicants. Often, differences of several orders of magnitude exist for a given individual toxicant between the least sensitive and the most sensitive species. This range varies greatly and can be narrow or wide depending on the individual toxicant involved.

Since the measured toxicity of an effluent will be caused by unknown toxic constituents, the relative sensitivities of various test species also will be unknown. Therefore, proper effluent toxicity analysis requires an assessment of a range of sensitivities of different test species to that effluent. A knowledge of the range is necessary so that the regulatory authority can protect aquatic organisms. The only way to assess the range of sensitivities is to test a number of different species from different taxonomic groups, as in the development of the national ambient water quality criteria.

To provide sufficient information for making permitting decisions, EPA recommends a minimum number of three species, representing three different phyla (e.g., a fish, an invertebrate, and a plant) be used to test an effluent for toxicity. However, in some cases, the optimum number of species may be fewer or more depending upon such factors as how thoroughly the effluent has been characterized, the available receiving water dilution, the use classification and existing uses of the receiving water, as well as other special considerations. For example, if an effluent has been characterized as highly consistent, with little chance of variation due to batch processes, changes in raw materials or changes in treatment efficiency, then the use of the two most sensitive species, or even the one most sensitive species, may be appropriate as determined on a case-by-case basis.

Since whole effluents are complex mixtures of toxicants, generalizations about sensitive and nonsensitive species are difficult to make. For example, one generalization is that trout are considered sensitive organisms requiring high-quality water. However, this generalization may not apply in all cases; trout are very sensitive to oxygen depletion but may be relatively insensitive to

certain toxicants. Another species, *Daphnia magna*, is very sensitive when exposed to many toxicants, but relatively insensitive when exposured to the pesticide endrin. Bluegills are very resistant to metals, particularly copper. Conversely, bluegills are a sensitive test species for organophosphate pesticides.

Figures 1-7 to 1-9 show the differences in species sensitivities to hexavalent chromium, dieldrin, and an effluent from a POTW, respectively [53]. The wide range between sensitivities for the different test species is shown. Comparing the figures shows that the fish, invertebrates, and algae shift relative sensitivities to the effluents/toxicants. The fish are less sensitive to chromium but more sensitive to dieldrin. For the cladocerans, the reverse is true. The results of whole effluent tests using five marine/estuarine short-term chronic test methods also indicate that no species or test method is always the most sensitive. In a total of 13 effluents tested onsite, *Champia parvula* was the most sensitive in 15 percent, *Arbacia punctulata* in 54 percent, mysids in 31 percent and fish in 15 percent of the cases [24].

Analysis of species sensitivity ranges found in the national ambient water quality criteria [1, 2] indicates that if tests are conducted on three particular species (*Daphnia magna, Pimephales promelas*, and *Lepomis macrochirus*), the most sensitive of the three will have an LC_{50} within one order of magnitude of the most sensitive of all species tested [54]. This was found to be true for 71 of the 73 priority pollutants tested with four or more species.

Sometimes, regulatory agencies require testing on representative resident species under the assumption that such tests are needed to assess impact to local biota. EPA considers it unnecessary to test resident species since standard test species have been shown to represent the sensitive range of all ecosystems analyzed [54]. Resident species toxicity testing is strongly discouraged unless it is required by State statute or some other legally binding factor, or it has been determined that a unique resident species would be far more protective of the receiving water than the EPA surrogate species. The use of other representative species should be subjected to strict quality assurance and quality control procedures and should follow rigorous test methodologies that are at least equivalent to EPA methods. Quality assurance procedures should account for the use of the same species, the same life stage and age of individuals, acclimation periods to avoid mortality due to collection, seasonal variations in populations, habitat requirements, health of the species cultured, as well as the use of reference toxicant tests and other standard procedures. To use a resident organism, a facility would have to develop a protocol to culture the organism and to assess intra- and interlaboratory variability. Such testing is more costly, more difficult, and potentially subject to more variability (disease, age, etc.) than standardized testing. In any case, organisms collected directly from the receiving water itself should never be used because existing impairment may mask any toxicity.

Acute-to-Chronic Ratio

The acute-to-chronic ratio (ACR) expresses the relationship between the concentration of whole effluent toxicity or a toxicant causing acute toxicity to a species (expressed as an acute toxicity endpoint such as an LC_{50}) and the concentration of whole effluent toxicity or a toxicant causing chronic toxicity to the same species (expressed as a chronic toxicity endpoint such as an

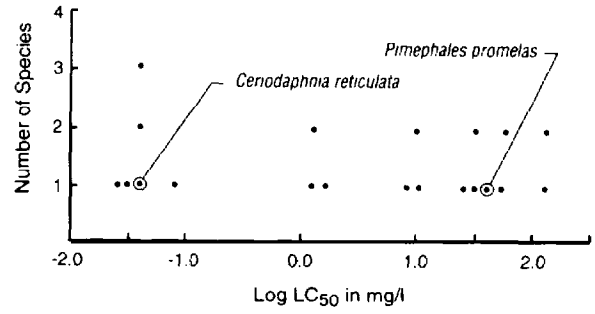

Figure 1-7. Log of LC_{50}s of Freshwater Species Exposed to Hexavalent Chromium

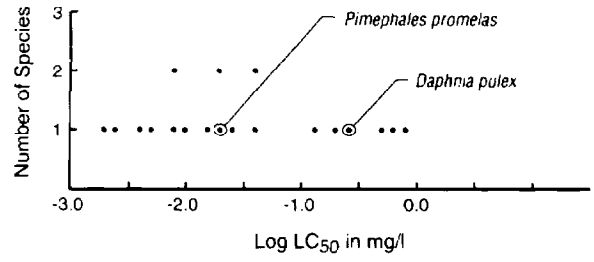

Figure 1-8. Log of LC_{50}s of Freshwater Species Exposed to Dieldrin

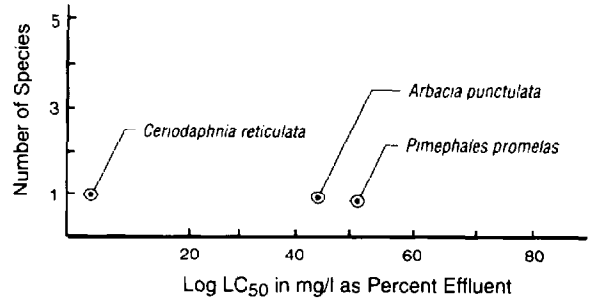

Figure 1-9. Log of LC_{50}s of Freshwater and Saltwater Species Exposed to a POTW Effluent

NOEC or its equivalent, i.e., ACR=ATE/CTE or LC_{50}/NOEC). An ACR is commonly used to extrapolate to a "chronic toxicity" concentration using exposure considerations and available acute toxicity data when chronic toxicity data for the species, chemical, or effluent of concern are unavailable. The ACR should be greater than one, since the ratio compares an acute effect concentration with a chronic effect concentration.

This parameter can be a source of uncertainty in predicting water quality impact because the ACR varies between species for a given chemical and, for any one species, between different toxicants. The latter is a reason why the ACR for a complex effluent may not be a constant. Regardless of this variability, when faced with a limited amount of chronic toxicity data, the regulatory authority

must apply some ACR to an effluent or chemical (or decide to collect more data) when converting wasteload allocations to common terms in the permit limit derivation process described in Chapter 5.

The ACR also may be used in developing chronic toxicity limits where chronic toxicity is not measured directly, in order to minimize testing costs. Likewise, if the toxicity is for the most part manifested in reproduction, growth, etc. (i.e., nonlethal) endpoints, an acute test may not be appropriate for compliance monitoring. **Where acute and chronic toxicity data are available, the ACR should be calculated directly for that specific effluent.**

Data on acute and chronic toxicity for complex effluents from different categories of dischargers (i.e., POTWs, oil refineries, and chemical manufacturers) show that ACRs for whole effluents range from <1.0 to >50.0, with the majority of ACRs falling below 20 (see Appendix A-3). Acute to chronic ratios for oil refinery data from one plant, based on three species ranged from 1.49 to >10.0. Acute to chronic ratios for a variety of chemical manufacturers, based on data from two species ranged from <1.0 to >50.0. Acute to chronic ratios for POTWs based on two species ranged from 1.4 to 16.1 (these data can be found in Appendix A-3). Interestingly, this range of ACRs virtually is identical to ACRs generated on a number of wastewater dischargers in the State of Sao Paulo, Brazil (Appendix A-3, Tables A-3-1 and A-3-2). Although the acute and chronic toxicities measured in Brazil were proportionally higher (more toxic) than those measured in the United States, the ACRs were quite similar (Appendix A-3, Tables A-3-1 to A-3-3).

EPA recommends that regulatory authorities use a measured ACR. In the absence of data to develop an ACR, EPA's data suggests that an ACR of 10 could be used (see Appendix A-3). This represents the upper 90th percentile of all the ACR data in Appendix A-3. Given the protective margin of safety inherent with the use of a critical flow for the calculation of a chronic receiving water waste concentration, an ACR of 10 should provide ample protection against chronic instream impacts.

1.4 BIOLOGICAL CRITERIA/BIOASSESSMENT AND BIOSURVEY APPROACH FOR AQUATIC LIFE PROTECTION

As illustrated in Figure 1-10, ecological integrity is attainable when chemical, physical, and biological integrity occur simultaneously [55]. Biological integrity is a good indicator of overall ecological integrity of aquatic environments because it can provide both a meaningful goal and a useful measure of environmental status that relates directly to the overall integrity of the Nation's waters. **To better protect the biological integrity of aquatic communities, EPA recommends that States begin to develop and implement biological criteria in their water quality standards.** Biological criteria, or "biocriteria," are numerical values or narrative statements that describe the reference biological integrity of aquatic communities inhabiting waters of a given designated aquatic life use. When formally adopted into State standards, biological criteria and aquatic life use designations serve as

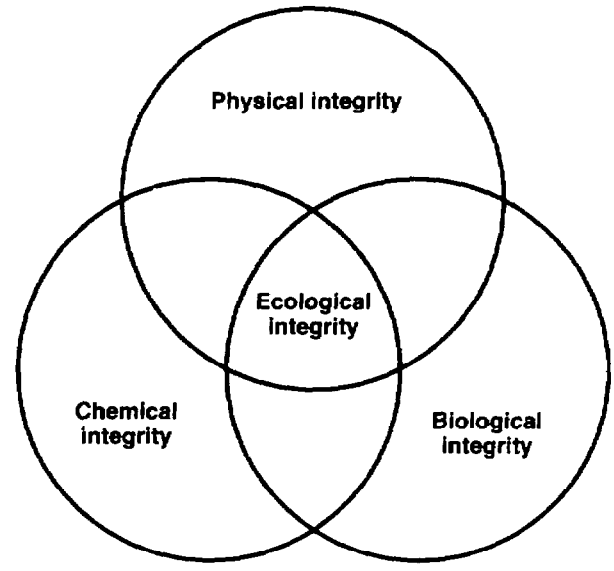

Figure 1-10. The Elements of Ecological Integrity

direct, legal endpoints for determining aquatic life use nonattainment. Per Section 131.11(b)(2) of the Water Quality Standards Regulation (40 *CFR* Part 131), biological criteria can supplement existing chemical-specific criteria and provide an alternative to chemical-specific criteria where such criteria cannot be established. Biological criteria quantitatively are developed by identifying unimpaired or least-impacted reference waters that operationally represent best attainable conditions. Once candidate references are identified, integrated biological surveys (biosurveys) are used to characterize the resident community. Because of the complexity of fully characterizing the biological integrity of an entire aquatic community, State standards should contain biological criteria that consider various components (measures of structure and/or function) of the larger aquatic community.

When biological criteria are incorporated into water quality programs, the biological integrity of surface waters may be directly evaluated and protected. Biological criteria also provide additional benefits by requiring an evaluation of physical integrity and providing a monitoring tool to assess the effectiveness of current chemically based criteria. Table 1-9 summarizes how biological criteria directly and indirectly protect the elements of ecological integrity [55].

1.4.1 Use of Biosurveys and Bioassessments in Water Quality-based Toxics Control

A biological assessment, or "bioassessment," is an evaluation of the biological condition of a waterbody using biological surveys and other direct measurements of resident biota in surface waters. A biological survey, or "biosurvey," consists of collecting, processing, and analyzing representative portions of a resident aquatic community to determine the community structure and function. Biosurveys and bioassessments can be used directly to evaluate the overall biological integrity (structure and/or functional characteristics) of an aquatic community. Deviations from the biological integrity of an aquatic community can be measured directly using bioassessments and biosurveys only when the impacted commu-

Table 1-9. Water Quality Programs That Incorporate Biological Criteria to Protect Elements of Ecological Integrity

Elements of Ecological Integrity	Directly Protects	Indirectly Protects
Chemical Integrity	Chemical-specific criteria (toxics) Whole effluent toxicity (toxics)	Biocriteria (identification of impairment)
Physical Integrity	Criteria for conventionals (pH, tempature, dissolved oxygen)	Biocriteria (habitat evaluation)
Biological Integrity	Biocriteria (biota response in surface water)	Chemical/whole effluent testing (biota response in laboratory)

nity is compared against a predetermined reference condition. Without proper quality controls (i.e., reference conditions), biosurveys tend to underestimate impairment.

Biosurveys assess or detect the aggregate effect of impacts upon an aquatic community where discharges are multiple, complex, and variable and where point, nonpoint, and stormwater discharges are all affecting the biological condition of the receiving water. The resident community integrates the effects of multiple stresses and sources on numerous interactive biological components over time. Because of this, biosurveys necessarily cannot measure the impacts of one particular effluent that is being discharged to the receiving water. Chemical-specific analyses of pollutants known to impact aquatic life and whole effluent toxicity tests are predictive water quality assessment tools used to evaluate biological integrity. At the present time, biological surveys and biological assessments cannot be used as predictive water quality assessment tools.

Biosurveys provide a useful monitor of both aggregate ecological impact and historical trends in the condition of an aquatic ecosystem. Biosurveys can detect aquatic life impacts that other available assessment methods may miss, such as impacts caused by pollutants that are difficult to identify chemically or characterize toxicologically, and impacts from complex or unanticipated exposures. Perhaps most importantly, biosurveys can detect impacts caused by habitat degradation such as channelization, sedimentation, and historical contamination that disrupt the interactive balance among community components.

Biosurvey data should be applied towards:

- Refining use classifications among different types of aquatic systems and within a given type of use category.
- Defining and protecting existing aquatic life uses under State antidegradation policies as required by the water quality standards regulation.
- Classifying outstanding national resource waters.
- Identifying where site-specific criteria modifications may be needed effectively to protect a waterbody.
- Improving use-attainability studies.
- Assessing impacts of certain nonpoint sources and, together with the chemical-specific and whole effluent toxicity approaches, assist in controlling them.
- Monitoring the ecological effects of regulatory action taken under CWA Sections 401, 402, and 301(h).
- Evaluating the effectiveness and documenting the receiving water biological benefits of pollution controls.

1.4.2 Conducting Biosurveys

As is the case with all types of water quality monitoring programs, biosurveys should have clear data quality objectives, utilize consistent laboratory and field methods, and include quality assurance and quality control. Biosurveys should be tailored to the particular type of waterbody being assessed (e.g., wetland, lake, stream, river, or estuary) and should focus on aquatic community components that are representative of the larger ecosystem and that are practical to measure. Biosurveys should be coupled routinely with basic chemical and physical measurements and an objective evaluation of habitat quality.

EPA's Office of Water and several State water quality programs have developed techniques as guidance to support biosurveys and bioassessments [56-62]. The techniques are an excellent supplementary tool to whole effluent toxicity testing and chemical-specific techniques. However, it is important that biosurveys include sampling of as many species at different trophic levels as possible to reveal accurately receiving water community impacts.

Excellent examples of biosurvey/bioassessment data collected and used in concert with ambient or effluent toxicity test data are the site studies described in Boxes 1-3 and 1-4. The toxicity test results and the ambient biosurvey data were based on the recommended minimum of three trophic levels (a fish, invertebrate, and a plant) to give a good overall picture of what was happening in

the receiving water. Recommended methodologies for conducting biosurveys are included in References 56 through 62.

1.5 INTEGRATION OF THE WHOLE EFFLUENT, CHEMICAL-SPECIFIC, AND BIOASSESSMENT APPROACHES

Section 101(a) of the CWA states: "The objective of this Act is to restore and maintain the chemical, physical and biological integrity of the Nation's waters." Taken together, chemical, physical, and biological integrity define the overall ecological integrity of an aquatic ecosystem. Regulatory agencies should strive to fully integrate all three approaches since each has its respective capabilities and limitations. Table 1-10 shows EPA guidance, State implementation, and State application of each approach [55]. The information summarized in Box 1-6, and discussed in detail below, explains how each approach complements the other and why no one of the approaches should be used alone.

A more detailed discussion of the capabilities and limitations of the three approaches is provided below.

1.5.1 Capabilities and Limitations of the Chemical-specific Approach

The principal capabilities of the chemical-specific approach are:

- At present, protection of human health only can be achieved by control of specific chemicals.
- A more complete understanding is available on the toxicology of specific chemicals. EPA acute ambient water quality criteria are based on protecting up to a minimum of eight different organisms including fish, invertebrates, and plants; a minimum of three organisms are used to develop chronic criteria. Considerable information is available in the scientific literature on toxicity caused by specific chemicals.
- Treatment systems are more easily designed to meet chemical requirements because more treatability data are available.
- More information is available on the fate of a pollutant in receiving waters so that the pollutant fate can be conveniently predicted through modeling. Persistence and degradation can be factored into the evaluation.
- Chemical analyses are sometimes less expensive than toxicity testing and biological surveys, if there are only a few toxicants present. This is more pertinent if only chlorine and ammonia are present in an effluent or ambient water.
- This approach allows prediction of ecological impacts before they occur. NPDES permit limits can therefore be developed before an actual ecological impact occurs.

The principal limitations of the chemical-specific approach are:

- All toxicants in complex wastewaters are not known and, therefore, control requirements for all toxicants cannot be set. Toxicological information on these unknown pollutants is often unavailable.
- The bioavailability of the toxicants at the discharge site are typically not assessed, and the interactions between toxicants (e.g., additivity, antagonism) are not measured or accounted for. As a result, the controls may be either under protective or overly protective.
- Direct biological receiving water impact and impairment is not typically measured. There is no way to ascertain directly if the chemical controls adequately are protecting aquatic life.
- Complete measurement of all individual toxicants, particularly where many are present in the mixture, can be expensive. Organic chemicals, in particular, can be costly to measure.

Table 1-10. Process for Implementation of Water Quality Standards

Criteria	EPA Guidance	State Implementation	State Application
Chemical-Specific	Pollutant-specific numeric criteria	State Standards -use designation -numeric criteria -antidegradation	Permit limits monitoring Best management practices Wasteload allocations
Narrative "Free Froms"	Whole effluent toxicity guidance	Water Quality Narrative -no toxic amounts translator	Permit limits monitoring Wasteload allocation Best management practices
Biological	Biosurvey minimum requirement guidance	State Standards -refined use -narrative/numeric criteria -antidegradation	Permit conditions monitoring Best management practices Wasteload allocation

Box 1-6. Components of an Integrated Approach to Water Quality-based Toxics Control

Control Approach	Capabilities	Limitations
Chemical-Specific	-Human health protection -Complete toxicology -Straightforward treatability -Fate understood -Less expensive testing if only a few toxicants are present -Prevents impacts	-Does not consider all toxics present -Bioavailability not measured -Interactions of mixtures (e.g., additivity) unaccounted for -Complete testing can be expensive -Direct biological impairment not measured
Whole effluent toxicity	-Aggregate toxicity -Unknown toxicants addressed -Bioavailability measured -Accurate toxicology -Prevents impacts	-No direct human health protection -Incomplete toxicology (few species may be tested) -No direct treatment -No persistency or sediment coverage -Conditions in ambient may be different -Incomplete knowledge of causative toxicant
Bioassessments	-Measures actual receiving water effects -Historical trend analysis -Assesses quality above standards -Total effect of all sources, including unknown sources	-Critical flow effects not always assessed -Difficult to interpret impacts -Cause of impact not identified -No differentiation of sources -Impact has already occurred -No direct human health protection

1.5.2 Capabilities and Limitations of the Whole Effluent Approach

The principal capabilities of whole effluent techniques are:

- The aggregate toxicity of all constituents in a complex effluent is measured, and toxic effect can be limited by limiting one parameter—whole effluent toxicity.
- Toxicity caused by compounds commonly not analyzed for in chemical tests is detected. Control of the toxicant(s) is not dependent upon established toxicological information that may not yet be available for some pollutants.
- The bioavailability of the toxic constituents is assessed, and the effects of interactions of constituents are measured. Additivity, synergism, and antagonism between compounds in an effluent are addressed implicitly by whole effluent toxicity.
- The toxicity of the effluent or ambient water is measured directly for the species tested.
- This approach allows prediction of ecological impacts before they occur. NPDES permit limits can therefore be developed before an actual ecological impact occurs.

The principal limitations of whole effluent techniques are:

- The approach only measures and controls toxicity to aquatic organisms. It does not protect human health from exposures through ingestion of fish. This is particularly important for carcinogens.
- EPA's water quality criteria are based on a minimum of eight different species for the acute criteria and three different species for the chronic criteria. Effluent aquatic toxicity commonly is measured with only one, two, or three species. For some toxicants a wider sensitivity range (more species) must be tested; particularly where the mode of toxicity action is specific (such as diazinon or some other pesticides).
- There is less knowledge on designing or manipulating treatment systems to treat the parameter toxicity. Investigate tools for identifying causative toxicants only have been recently developed and may not easily identify all causative toxicants. As a result, identification and proper control may be difficult and expensive.
- The whole effluent toxicity test directly measures only the immediate bioavailability of a toxicant; it cannot measure the persistence "downstream" and long-term cumulative toxicity of a compound. Thus, bioaccumulative chemicals necessarily are not assessed or limited. Toxicants can accumulate in sediment to toxic concentrations over a period of time.
- Where there are chemical/physical conditions present (pH changes, hardness changes, solids changes, salinity changes, photolysis, etc.) that act on toxicants in such a way as to

"release" toxicity away from the discharge point, such toxicity may not be measured in the effluent. The opposite of this also is possible; toxicity may degrade rapidly so there is no trace of it away from the point of discharge. For example, the actual pH and temperature in an ambient water may be sufficiently low to preclude toxicity from ammonia whereas the higher pH and temperature of the toxicity test may induce toxicity from ammonia.

- It is not always clear which compound or mixture of compounds is causing toxicity in the mixture. The causative toxicant may be difficult to identify for control.

1.5.3 Capabilities and Limitations of the Bioassessment Approach

The principal capabilities of the bioassessment approach are:

- Biological communities reflect overall ecological integrity. Biosurvey results therefore directly assess the status of a waterbody. The status of a waterbody's biological health may be of direct interest and more meaningful as a measure of a pollution-free environment.

- Biological communities integrate the effects of different pollutant stressors and thus provide a holistic measure of their aggregate impact. Biological assessments also measure stresses over long time periods and can measure historical trends and fluctuating environmental conditions.

- Biosurveys can identify previously unknown sources of impairment and may identify where site-specific chemical criteria are needed. Bioassessments can be useful in characterizing ecological impacts to a waterbody in multiple discharge situations.

- Bioassessments can characterize the ecological value of ambient waters that are in attainment of the standards. As such, bioassessments provide a means to determine compliance with State antidegradation requirements in standards.

The principal limitations of the bioassessment approach are:

- Bioassessments conducted at critical low flow conditions may be difficult to accomplish.

- Biosurvey data cannot fully characterize impairment until after suitable biocriteria are developed. Biosurvey data may not be sufficient to detect impairments without appropriate reference conditions.

- Bioassessments measure integrated impacts over long periods of time. Multiple factors can contribute to measured impacts. However, bioassessments cannot isolate the causative factor leading to the impairment nor predict future impairment.

- Bioassessments measure impact from any source and as such, the data bracketing a discharge used to assess impacts may be influenced by pollutant sources further upstream. Causes of biological impairment may not be assigned readily to any one discharger.

- Bioassessments identify water quality problems after they have occurred; they currently are not predictive of water quality problems. By design, bioassessments are limited in their ability to identify waters that are not impaired.

- The approach only measures biological impairments to aquatic organisms. It does not protect human health from exposures through ingestion of fish.

By using all three approaches, a State will more thoroughly protect aquatic life. The chemical-specific approach provides a high accuracy of analysis of the individual chemical constituents, has been used by regulatory agencies, and is generally lowest in cost because of market availability. However, the level of protection of the chemical-specific approach can be low if toxicants are present in an effluent for which no chemical-specific criteria exists. In addition, some States have adopted very few criteria as a part of their water quality standards. On the other hand, whole effluent toxicity provides a high level of protection by measuring the aggregate effect of all toxicants. It provides accurate toxicology, but it can be higher in cost and has been historically less widely used by regulatory authorities. Bioassessments also provide a coverage of many biological impacts and allow for accurate historical trend analyses. However, bioassessments cost more and data interpretation can be difficult. Therefore, the integrated approach to water quality-based toxics control is essential for a strong toxics control program.

To more fully protect aquatic habitats and provide more comprehensive assessments of aquatic life use nonattainment, **EPA recommends that States fully integrate chemical-specific, whole effluent, and bioassessment approaches into their water quality-based toxics control programs. It is EPA's position that the concept of "independent application" be applied to water quality-based situations. Since each method has unique as well as overlapping attributes, sensitivities, and program applications, no single approach for detecting impact should be considered uniformly superior to any other approach. For example, the inability to detect receiving water impacts using a biosurvey alone is insufficient evidence to waive or relax a permit limit established using either of the other methods. The most protective results from each assessment conducted should be used in the effluent characterization process (see Chapter 3). The results of one assessment technique should not be used to contradict or overrule the results of the other(s).** (For more information see Reference 55.)

Whenever there are discrepancies between the findings of the approaches, regulatory agencies may need to re-examine the findings to determine if simplifications or assumptions may have caused the difference. The State of Ohio found in 60 percent of the sites where they collected bioassessment data, a biological impact occurred when chemical-specific data predicted no impact. The reverse also can occur—biosurveys may not show any impact in a stream whereas effluent data modeled at low flow project an exceedance of a chemical-specific criterion. In this instance, the regulatory authority may need to consider a more detailed monitoring and modeling of chemical fate and transport

(which could include probabilistic modeling) to determine if simplifications in dilution calculations projected higher concentrations than would be expected using the detailed model. The authority also would need to examine concurrently the sampling approach and analysis of the biosurvey data to determine if it appropriately characterized the water. If there was still a difference, then the regulatory authority will need to use the more protective approach as the basis to determine necessary regulatory controls.

1.6 OTHER FACTORS INFLUENCING WATER QUALITY-BASED TOXICS CONTROL

An understanding of the fate and behavior of both single toxicants and whole effluent toxicity after discharge can be important in the application of water quality-based toxics controls. Evaluating the combined effects of interacting toxic discharges also may be important in multiple discharge situations. When evaluating the receiving water behavior of toxicants and toxicity, factors such as toxicity degradation or persistence, and toxicant additivity, antagonism, and synergism are important. Ambient toxicity tests can give some indication of the importance of each of these factors:

- **Toxicity Persistence**—How long and to what extent (in terms of area), does effluent toxicity or the toxicity of a single toxicant persist after discharge? It is not reasonable to assume that in all cases the persistence of both individual toxic chemicals and effluent toxicity is conservative. For two effluents of equal initial toxicity, the aquatic effects of an effluent whose toxicity degrades rapidly will be different from an effluent whose toxicity persists.

- **Additivity, Antagonism, and Synergism**—When toxicants or effluents with toxic properties mix in the receiving water, what is their combined fate and toxic effects?

- **Test Interferences**—This includes pH, temperature, salinity, hardness, and metals.

Each of these factors is discussed below.

1.6.1 Persistence

As soon as an effluent mixes with receiving water its properties begin to change. The rate of change of toxicity in that effluent is a measure of its toxicity persistence or degradation. After mixing, the level of toxicity in the receiving water may either remain relatively constant (until further diluted), increase in toxicity due to transformation, or degrade due to fate processes (photodecomposition, microbial degradation) or compartmentalization processes (particulate adsorption and sediment deposition, volatilization).

One disadvantage of the chemical-specific approach is that the bioavailability of the toxicant after discharge is not measured. Onsite toxicity testing has indicated that the individual toxicants causing toxicity measured at discharge sites tend relatively to be persistent near the point of discharge [23, 31-38]. However, persistence of individual chemicals can be modeled and the persistence of specific toxicants also can be accounted for in making impact predictions and setting controls. A procedure to determine whether or not an effluent's toxicity is persistent has been developed by EPA [63]. The procedure describes the steps required to conduct a laboratory evaluation of the degradation of toxicity in complex effluents that are released to receiving waters by simplistically simulating a water body and discharge. **EPA recommends this procedure be conducted where the interaction of sources of toxicants is critical to establishing controls.**

This simple procedure is performed in a refrigerator-sized environmental chamber in the laboratory using commonly available glassware and shipped effluent samples. Toxicity is measured using conventional acute or short-term chronic toxicity tests. The results are used to generate a toxicity degradation rate for the effluent under representative environmental conditions. The procedure has several applications, including measuring the decay of effluent toxicity in a stream or lake, and identifying the most important fate processes responsible for toxicity decay (which also may be useful in treatability or toxicity identification studies).

Mixing zones designated by State water quality standards, or developed on a case-by-case basis, are typically small enough that toxicity evaluations need only consider near field situations. Continuous discharges continually can introduce toxic pollutants into a receiving water. Although these pollutants can decay over time, this decay will occur downstream or away from the discharge. The receiving water concentrations at the point of discharge continually are being refreshed. In these instances, toxicity can be considered conservative and persistent (nondecaying) in the near field.

However, effluent toxicity can exhibit far field decay. Typical patterns of progressively decreasing downstream toxicity (similar to biochemical oxygen demand decay) have been observed in a number of freshwater situations [23, 31-38]. This is of concern when evaluating the combined toxicity of sources located far apart. If there is reason to suspect that an effluent's toxicity is not persistent, several techniques can be employed to measure changes of toxicity after discharge:

- Testing should be performed during various seasons of the year corresponding to various receiving water flow regimes. The toxicity test itself, when performed with dilution water immediately upstream or from an uncontaminated area nearby, is an analogue of the mixing and fate processes taking place in the receiving water. The types of rapid chemical reactions found in the mixing zone also can be expected to take place to a large extent when effluents and receiving waters are mixed for toxicity tests. The effects on toxicity persistence of varying physical/chemical conditions in the receiving water or in the effluent cannot, however, be accurately predicted from these results.

- Ambient toxicity testing, as detailed in Appendix C, measures the ambient interactions of effluent and receiving water and can be used to assess toxicity persistence.

Toxicity persistence may present a more serious problem in estuarine or lake receiving waters where the toxicity is not flushed away rapidly. In one study, on a POTW effluent being discharged into a small cove off of Narragansett Bay, the decay rate of the effluent was temperature-dependent and was reduced markedly during

the winter. However, persistence of the effluent in the receiving water cove in the winter did present a problem because tidal flushing did not remove the toxicity [39].

For coastal discharges, certain toxic compounds are more often found to cause impacts in marine and estuarine environments [64]. Due to the physical and chemical processes that tend to trap pollutants in estuaries (sedimentation, salinity flux, etc.), the discharge of these compounds, at very low concentrations over a long period of time, may allow them to accumulate to toxic concentrations. For many of these compounds, applicable permit limits may need to be very stringent to avoid chronic toxicity problems due to the persistence of these compounds.

1.6.2 Additivity, Antagonism, and Synergism

Where multiple toxic effluents are discharged to a receiving water, the resultant ambient toxicity is of interest. Since each effluent is composed of individual toxic substances, a mixture of the effluents in a receiving water produces a mixture of these individual pollutants (assuming conservative behavior). The overall ambient toxicity could be equal to the sum of each discharge's toxicity (additivity), less than the sum (antagonism), or greater than the sum (synergism).

Alabaster and Lloyd [65] observed from their data that the combined acutely lethal toxicity to fish and other aquatic organisms is approximately the simple addition of the proportional contribution from each toxicant. The median value of the effect on fish is 0.95 of that predicted; the collective value for sewage effluents, river waters and a few industrial wastes is 0.85. The range for effluents, river wastes, and industrial wastes is 0.4 to 2.8. (Figure 1-11 illustrates the data summary.)

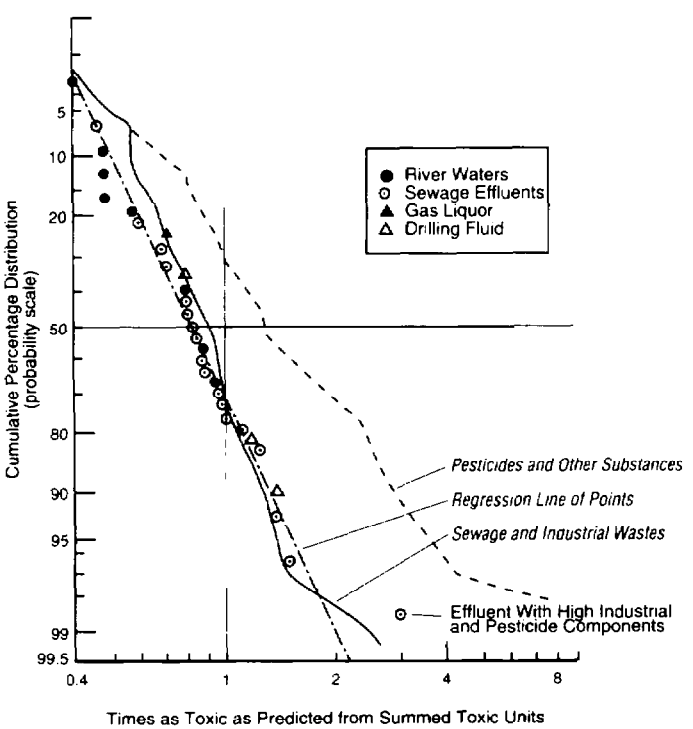

Figure 1-11. Data Summary on Additivity [65]

In relation to chronic toxicity, for the growth of fish, Alabaster and Lloyd [65] conclude:

> ...in the few studies on the growth of fish, the joint effect of toxicants has been consistently less than additive which suggests that as concentrations of toxicants are reduced towards the levels of no effect, their potential for addition is also reduced. There appear to be no marked and consistent differences between the response of species to mixtures of toxicants.

Cases in which one effluent or pollutant parameter (such as total suspended solids) ameliorated the toxicity of another effluent pollutant (antagonism) have been observed. Testing procedures can be designed to measure such interactions. A description of such a procedure is found in "Recommended Multiple-Source Toxicity Test Procedures," Box 3-3, Chapter 3.

Theoretically, under certain conditions, synergism, a greater than additive increase in toxicity upon mixing, can occur. However, field studies of effluent toxicity and laboratory experiments with specific chemicals imply that synergism would be an extremely rare phenomenon. It has not been observed during onsite effluent toxicity studies, and is not considered an important factor in the toxicological assessment of effluents.

In summary, the available information indicates that the combined effects of individual acutely toxic pollutants are from 0.4 to 2.8 times the effects predicted by adding the individual effects. The median combined effect is approximately additive. For this reason, **EPA recommends in the absence of site-specific data that regulatory authorities consider combined acute toxicity to be additive**. Since the data shows no such additivity for chronic toxicity, **EPA recommends that chronic toxicity not be considered as additive.**

1.6.3 Test Interferences

Environmental conditions such as pH, temperature, salinity, hardness, and solids concentration can influence the toxicity test. For example, higher ambient solids concentrations provide more surfaces for toxicants to be adsorbed and can tend to reduce toxicity. In addition, toxicity caused by ammonia is controlled by the ambient pH and temperature. **As a normal part of the whole effluent toxicity testing procedure, it is very important to replicate closely the "worst case" receiving water conditions in the testing conditions.**

There may be a few unusual situations where the pH, temperature, hardness, salinity, and solids requirements of the testing procedures differ greatly from the worst environmental conditions for these parameters. In these situations, the effluent toxicity tests may either over or under predict the toxicity in the ambient receiving water. An example of this is where ammonia is present and the highest expected ambient water temperature is 20°C whereas the chronic toxicity test must be conducted at 25°C. Since a higher temperature causes more ammonia toxicity, the temperature requirements of the test may induce toxicity not found in the ambient water. In such an instance, the regulatory authority must look carefully at the test protocols and all the data collected to determine if the facility is actually contributing to toxicity in the ambient water. A toxicity identification evaluation

may be necessary to make this determination. If this analysis shows a toxicity test result to be artificial due to environmental parameters, then that test should be overridden by subsequent valid toxicity tests conducted.

1.7 HUMAN HEALTH PROTECTION

Impacts on human health due to exposure to waterborne toxicants can occur through three primary exposure routes: contact recreation, drinking water, and the ingestion of contaminated fish and shellfish tissues. Contact recreation may pose potential risks due to dermal absorption and incidental ingestion. Exposure through drinking water is a significant concern but can be mitigated for specific chemicals by applying drinking water criteria. The third exposure route, human consumption of contaminated aquatic life, is of primary concern in this document due to the potentially high concentrations achieved in fish and shellfish tissues from bioconcentration, and because no NPDES permitting controls exist between tissue contamination and human exposure. For these reasons, this document focuses on prevention of contaminated aquatic life from bioconcentration as the principal way to control human exposure to waterborne toxicants.

Currently, the regulation of human health impacts typically are based only upon the control of individual chemicals. EPA human health water quality criteria protect against the consumption of contaminated water and aquatic life. There is no mechanism like the aquatic toxicity test to determine the effect of a chemical mixture like an effluent on human health. EPA is developing, however, a preliminary approach to analyzing effluents for bioaccumulation potential through the use of a whole effluent bioconcentration analysis followed by identification of individual bioconcentratable pollutants [66]. This procedure is described in Chapter 3. Once this method is reviewed (both internally and externally) and finalized, it will provide another way for regulatory authorities to assess bioconcentratable pollutants.

1.7.1 Types of Health Effects

Health effects from toxics are divided into two categories: **nonthreshold** effects, such as carcinogenicity, and threshold effects, such as acute, subacute, or chronic toxicity. Both terms are defined below.

EPA's approach to assessing the risks associated with nonthreshold human carcinogens is different from the approach for threshold toxicants due to the different mechanisms of action thought to be involved. In the case of carcinogens, the Agency assumes that a small number of molecular events can evoke changes in a single cell that can lead to uncontrolled cellular proliferation. This mechanism for carcinogenesis is referred to as "nonthreshold," since there is essentially no level of exposure for such a chemical that does not pose a small, but finite, probability of generating a carcinogenic response. Genotoxic pollutants are presumed to have no threshold level, but incremental risk levels can be determined based on the carcinogenic potency of the chemicals.

Threshold toxicants, on the other hand, are generally treated as if there is an identifiable exposure threshold (both for individuals and populations) below which effects are not observable. Threshold toxicants are chemicals that give rise to toxic endpoints other than cancer because of their effects on the function of various organ systems. Such chemicals are presumed to have safe exposure levels. This characteristic distinguishes threshold endpoints from nonthreshold endpoints. However, it should be noted that chemicals that cause cancer and mutations also commonly evoke other toxic effects (systemic toxicity). In the case of systemic toxicity, compensating and adaptive "defense" mechanisms exist that must be overcome before the toxic endpoint is manifested. For example, there could be a large number of cells performing the same or similar function whose population must be significantly altered before the effect is seen. The individual threshold hypothesis holds that a range of exposures from zero to some finite value can be tolerated by the organisms with essentially no chance of expression of the toxic effect.

Currently, the control of toxicants that bioconcentrate in edible tissues is achieved in the NPDES program by limiting such pollutants individually. There are whole effluent tests that can measure a wastewater's potential to cause carcinogenicity or mutagenicity (e.g., Ames test). However, the application of such data is experimental because of the difficulty in establishing cause/effect relationships between exposure to wastewaters and human health problems. Therefore, at this time EPA recommends regulatory authorities focus on controls for bioconcentratable toxicants on a chemical-by-chemical control basis.

The remaining information regarding regulation of human health impacts is contained in the following chapters: Chapter 2, Water Quality Standards, discusses the development and updating of human health water quality criteria. Chapter 3, Effluent Characterization, discusses the evaluation of effluents for potential human health impacts. Chapter 4, Exposure and Wasteload Allocation, contains information on design conditions and averaging periods. Finally, Chapter 5, Permit Requirements, discusses the derivation of permit limits protective against human health impacts.

CHAPTER 1

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2. WATER QUALITY CRITERIA AND STANDARDS

2.1 INTRODUCTION

The foundation of a water quality-based toxics control program consists of the State water quality standards applicable to the waterbody. The following discussion describes the regulatory and technical considerations for application of water quality standards.

2.1.1 Overview of Water Quality Standards

A water quality standard defines the water quality goals of a water body, or portion thereof, by designating the use or uses to be made of the water, by setting criteria necessary to protect the uses, and by establishing antidegradation policies and implementation procedures that serve to maintain and protect water quality. States adopt water quality standards to protect public health or welfare, enhance the quality of water, and serve the purposes of the Clean Water Act (CWA). "Serve the purposes of the Act" (as defined in Sections 101(a), 101(a)(2), and 303(c) of the Act) means that water quality standards should (1) include provisions for restoring and maintaining chemical, physical, and biological integrity of State waters; (2) provide, wherever attainable, water quality for the protection and propagation of fish, shellfish, and wildlife and recreation in and on the water ("fishable/swimmable"); and (3) consider the use and value of State waters for public water supplies, propagation of fish and wildlife, recreation, agriculture and industrial purposes, and navigation.

The CWA describes various uses of waters that are considered desirable and should be protected. These uses include public water supply, recreation, and propagation of fish and wildlife. The States are free to designate more specific uses (e.g., cold water and warm water aquatic life), or to designate uses not mentioned in the CWA, with the exception that waste transport and assimilation is not an acceptable designated use (see 40 *CFR* 131.10(a)). EPA's regulations emphasize the uses specified in CWA Section 101(a)(2), but do not preclude other beneficial uses and subcategories of uses as determined by the State.

When designating uses, States should give careful consideration to whether uses that will support the "fishable and swimmable" goal of Section 101(a)(2) are attainable. If the State does not designate uses in support of this goal, the State must perform a use attainability analysis under Section 131.10(j) of the standards regulation. States should designate uses for the waterbody that the State determines can be attained in the future. "Attainable uses" are those uses (based on the State's system of water use classification) that can be achieved when effluent limits under CWA Section 301(b)(1)(A) and (B) and Section 306 are implemented for point source discharges and when cost-effective and reasonable best management practices are implemented for nonpoint sources. The Water Quality Standards regulation specifies the conditions under which States may remove uses or establish subcategories of uses. Among these are that the State must provide opportunity for public hearing. In addition, uses that have been attained in the waterbody on or after November 28, 1975, whether or not they are included in the water quality standards, may not be removed unless a use requiring more stringent criteria is added. These uses are the "existing uses" as defined in 40 *CFR* 131.3(e). Also, uses that are attainable, as defined above, may not be removed. Removal of a "fishable/swimmable" use, or adoption of a subcategory of a "fishable/swimmable" use that requires less stringent criteria, requires the State to conduct a use attainability analysis. Technical guidance on conducting use attainability analyses is available from EPA (e.g., Chapter 3 of the *Water Quality Standards Handbook* (1983) [1], and *Technical Support Manual: Waterbody Surveys and Assessments for Conducting Use Attainability Analyses* (1983) [2].

In the Water Quality Standards regulation, Section 131.11 encourages States to adopt both numeric and narrative criteria. Aquatic life criteria should protect against both short-term (acute) and long-term (chronic) effects. Numeric criteria particularly are important where the cause of toxicity is known or for protection against pollutants with potential human health impacts or bioaccumulation potential. Numeric water quality criteria also may be the best way to address nonpoint source pollution problems. Narrative criteria can be the basis for limiting toxicity in waste discharges where a specific pollutant can be identified as causing or contributing to the toxicity but there are no numeric criteria in the State standards or where toxicity cannot be traced to a particular pollutant. Section 131.11(a)(2) requires States to develop implementation procedures that explain how the State will ensure that narrative toxics criteria are met.

EPA's water quality standards regulation requires each State to adopt, as part of its water quality standards, an antidegradation policy consistent with 40 *CFR* 131.12 and to identify the methods it will use for implementing the policy. Activities covered by the antidegradation policy and implementation methods include both point and nonpoint sources of pollution. Section 131.12 effectively sets out a three-tiered approach for the protection of water quality.

"Tier I" (40 *CFR* 131.12(a)(1)) of antidegradation maintains and protects existing uses and the water quality necessary to protect these uses. An existing use can be established by demonstrating that fishing, swimming, or other uses have actually occurred since November 28, 1975, <u>or</u> that the water quality is suitable to allow such uses to occur, whether or not such uses are designated uses for the waterbody in question. (Compare Sections 131.3(e) and 131.3(f) of the existing regulation.) For example, in an area where shellfish are propagating and surviving in a biologically suitable habitat, the shellfish use is existing, whether or not people are harvesting the shellfish. The aquatic life protection use is a broad category requiring further explanation, which may be found in the *Water Quality Standards Handbook*.

"Tier II" (Section 131.12(a)(2)) protects the water quality in waters whose quality is better than that necessary to protect "fishable/swimmable" uses of the waterbody. 40 *CFR* 131.12(a)(2) requires that certain procedures be followed and certain showings be made before lowering water quality in high-quality waters. These showings may be called an "antidegradation review." In no case may water quality on a Tier II waterbody be lowered to the level at which existing uses are impaired. The Tier II protection usually is applied on a parameter-by-parameter basis (called the definitional approach to Tier II). This approach is applied on a case-by-case basis so that, if the level of any parameter is better than water quality standards for that waterbody, then an antidegradation review will be performed for any activity that could reduce the level of that parameter.

Outstanding national resource waters (ONRWs) are provided the highest level of protection under the antidegradation policy (Tier III); no degradation is allowed. ONRWs include the highest-quality waters of the United States. However, the ONRW antidegradation classification also offers special protection for waters of "exceptional ecological significance," i.e., those waterbodies that are important, unique, or sensitive ecologically, but whose water quality, as measured by the traditional parameters such as dissolved oxygen or pH, may not be particularly high. Waters of exceptional ecological significance may also include waters whose characteristics cannot be described adequately by traditional parameters (such as wetlands and estuaries).

States may, at their discretion, adopt certain policies in their standards affecting the application and implementation of standards. For example, policies concerning mixing zones, variances, low-flow exemptions, and schedules of compliance for water quality-based permit limits may be adopted. Although these are areas of State discretion, EPA retains authority to review and approve or disapprove such policies (see 40 *CFR* 131.13). Guidance on these subjects is available from EPA's Office of Water Regulations and Standards, Criteria and Standards Division.

2.1.2 Water Quality Standards and State Toxics Control Programs

Applicable requirements for State adoption of water quality criteria for toxicants vary depending upon the toxicant. The reason for this is that the 1983 water quality standards regulation and the 1987 amendments to the CWA (Pub. L. 100-4) include more specific requirements for the particular toxicants listed in CWA Section 307(a). For regulatory purposes, EPA has translated the 65 compounds and families of compounds listed in Section 307(a) into 126 specific substances that EPA refers to as priority toxic pollutants. The 126 priority toxic pollutants are listed in Appendix A of 40 *CFR* Part 423. Because of the more specific requirements for priority toxic pollutants, it is convenient to organize the requirements applicable to State adoption of criteria for toxicants into three categories:

- Requirements applicable to priority toxic pollutants that have been the subject of CWA Section 304(a)(1) criteria guidance
- Requirements applicable to priority toxic pollutants that have not been the subject of CWA Section 304(a)(1) criteria guidance and
- Requirements applicable to all other toxicants (i.e., nonpriority toxic pollutants).

The criteria requirements applicable to priority toxic pollutants (i.e., the first two categories above), are specified in CWA Section 303(c)(2)(B). On December 2, 1988, EPA sent "Guidance for State Implementation of Water Quality Standards for CWA Section 303(c)(2)(B)" to each of its Regions and to each State water pollution control agency. The guidance contained three options for implementing the new numeric criteria requirements of the Act: (1) adopt Statewide numeric criteria in standards for all those priority toxic pollutants for which EPA has published national criteria; (2) adopt numeric criteria for only those priority toxic pollutants and those stream segments where the discharge or presence of the pollutant could reasonably be expected to interfere with designated uses; or (3) adopt a specific procedure in the standards to "translate" the State's narrative "free from toxics" standard to derived numeric criteria.

The transmittal memorandum for the Section 303(c)(2)(B) national guidance expresses the Office of Water position regarding priority toxic pollutants that may "reasonably be expected" to interfere with designated uses. That memorandum and guidance established a rebuttable presumption that <u>any</u> information indicating that such pollutants are discharged or present in surface waters (now or in the future) is sufficient justification to require adoption or derivation of numerical criteria. The goal is not just to identify pollutants that are already impacting surface waters, but rather to identify pollutants that may be impacting surface waters now, or have the potential to do so in the future. Lack of detailed or widespread monitoring data is not an acceptable basis to omit numerical (or derived numerical) criteria from water quality standards under Options 2 and 3. Even a limited amount of monitoring data indicating the discharge or presence of priority toxic pollutants in surface waters is sufficient basis to conclude that numerical (or derived numerical) criteria are necessary.

Where States select an Option 2 or 3 approach, States must include, as part of the rationale supporting the adopted standards, the information used in determining which priority toxic pollutants require criteria. Where there is uncertainty about the need for criteria for specific priority toxic pollutants, the State should adopt (or derive) criteria for such pollutants so as to err on the side of environmental protection and pollution prevention. This approach is appropriate given the general lack of monitoring data for priority toxic pollutants; it will provide maximum protection to the environment by anticipating, rather than reacting to, water quality problems.

For priority toxic pollutants for which EPA has not issued Section 304(a)(1) criteria guidance, CWA Section 303(c)(2)(B) requires States to adopt criteria based on biological monitoring or assessment methods. The phrase "biological monitoring or assessment methods" includes (1) whole effluent toxicity control methods, (2) biological criteria methods, or (3) other methods based on biological monitoring or assessment. The phrase "biological monitoring or assessment methods" in its broadest sense also includes criteria developed through translator procedures. This broad interpretation of that phrase is consistent with EPA's policy of applying chemical-specific, biological, and whole effluent toxicity methods independently in an integrated toxics control program. It also is consistent with the intent of Congress to expand

State standards programs beyond chemical-specific approaches.

Where EPA has not issued Section 304(a) criteria guidance, but available laboratory toxicity (bioassay) data are sufficient to support derivation of chemical-specific criteria, States should consider deriving and adopting numeric criteria for such priority toxic pollutants. This is particularly important where other components of a State's narrative criterion implementation procedure (e.g., whole effluent toxicity controls or biological criteria) may not ensure full protection of designated uses. For some pollutants, a combination of chemical-specific and other approaches is necessary (e.g., pollutants where bioaccumulation in fish tissue or water consumption by humans is a primary concern).

Criteria requirements applicable to toxicants that are not priority toxic pollutants (i.e., the third category above), are specified in the 1983 water quality standards regulation (see 40 *CFR* 131.11). Under these requirements, States must adopt criteria based on sound scientific rationale that cover sufficient parameters to protect designated uses. Both numeric and narrative criteria are addressed by these requirements.

Numeric criteria are required where such criteria are necessary to protect designated uses. Numeric criteria to protect aquatic life should be developed to address both short-term (acute) and long-term (chronic) effects. Saltwater species, as well as freshwater species, must adequately be protected. Adoption of numeric criteria is particularly important for toxicants known to be impairing surface waters and for toxicants with potential human health impacts (e.g., those with high bioaccumulation potential). Human health should be protected from exposure resulting from consumption of water and fish or other aquatic life (e.g., mussels, crayfish). Numeric water quality criteria also are useful in addressing nonpoint source pollution problems.

In evaluating whether chemical-specific numeric criteria for toxicants are required, States should consider whether other approaches (such as whole effluent toxicity criteria or biological controls) will ensure full protection of designated uses. As mentioned above, a combination of independent approaches may be required in some cases to support the designated uses and comply with the requirements of the water quality standards regulation (e.g., pollutants where bioaccumulation in fish tissue or water consumption by humans is a primary concern).

To supplement numeric criteria for toxicants, all States also have adopted narrative criteria for toxicants. Such narrative criteria are statements that describe the desired water quality goal, such as the following:

> All State waters must, at all times and flows, be free from substances that are toxic to humans or aquatic life.

EPA considers that the narrative criteria apply to all designated uses at all flows unless specified otherwise in a State's water quality standards. EPA also believes that no acutely toxic condition may exist in any State waters regardless of designated use (54 *FR* 23875).

Narrative criteria can be the basis for establishing chemical-specific limits for waste discharges where a specific pollutant can be identified as causing or contributing to the toxicity and the State has not adopted chemical-specific numeric criteria. Narrative criteria also can be the basis for establishing whole effluent toxicity controls required by EPA regulations at 40 *CFR* 122.44(d)(1)(v).

To ensure that narrative criteria for toxicants are attained, the water quality standards regulation requires States to develop implementation procedures (see 40 *CFR* 131.11(a)(2)). Such implementation procedures (Box 2-1) should address all mechanisms used by the State to ensure that narrative criteria are attained. Because implementation of chemical-specific numeric criteria is a key component of State toxics control programs, narrative criteria implementation procedures must describe or reference the State's procedures to implement such chemical-specific numeric criteria (e.g., procedures for establishing chemical-specific permits limits under the NPDES permitting program). Implementation procedures also must address State programs to control whole effluent toxicity and may address programs to implement biological criteria, where such programs have been developed by the State. Implementation procedures therefore serve as umbrella documents that describe how the State's various toxics control programs are integrated to ensure adequate protection for aquatic life and human health and attainment of the narrative toxics criterion. In essence, the procedure should apply the "independent application" principle, which provides for independent evaluations of attainment of a designated use based on chemical-specific, whole effluent toxicity, and biological criteria methods (see Chapter 1, Reference 56).

EPA encourages, and may ultimately require, State implementation procedures to provide for implementation of biological criteria. However, the regulatory basis for requiring whole effluent toxicity controls is clear. EPA regulations at 40 *CFR* 122.44(d)(1)(v) require NPDES permits to contain whole effluent toxicity limits where a permittee has been shown to cause, have the reasonable potential to cause, or contribute to an in-stream excursion of a narrative criterion. Implementation of chemical-specific controls also is required by EPA regulations at 40 *CFR* 122.44(d)(1). State implementation procedures should, at a minimum, specify or reference methods to be used in implementing chemical-specific and whole effluent toxicity-based controls, explain how these methods are integrated, and specify needed application criteria.

In addition to EPA's regulation at 40 *CFR* Part 131, EPA has regulations at 40 *CFR* 122.44 that cover the National Surface Water Toxics Control Program. These regulations intrinsically are linked to the requirements to achieve water quality standards, and specifically address the control of pollutants both with and without numeric criteria. For example, Section 122.44(d)(1)(vi) provides the permitting authority with several options for establishing effluent limits when a State does not have a chemical-specific numeric criteria for a pollutant present in an effluent at a concentration that causes or contributes to a violation of the State's narrative criteria.

2.2 GENERAL CONSIDERATIONS

2.2.1 Magnitude, Duration, and Frequency

As stated earlier, criteria are specifications of water quality designed to ensure protection of the designated use. EPA criteria are

Box 2-1. Components of an Ideal State Implementation Procedure

- Specific, scientifically defensible methods by which the State will implement its narrative toxics standard for all toxicants, including:
  - Methods for chemical-specific criteria, including methods for applying chemical-specific criteria in permits, developing or modifying chemical-specific criteria via a "translator procedure" (defined and discussed below), and calculating site-specific criteria based on local water chemistry or biology
  - Methods for developing and implementing whole effluent toxicity criteria and/or controls
  - Methods for developing and implementing biological criteria.
- Integration of these methods in the State's toxics control program (i.e., how the State will proceed when the specified methods produce conflicting or inconsistent results).
- Application criteria and information that are needed to apply numerical criteria, for example:
  - Methods the State will use to identify thosepollutants to be regulated in a specific discharge
  - An incremental cancer risk level for carcinogens
  - Methods for identifying compliance thresholds inpermits where calculated limits are below detection
  - Methods for selecting appropriate hardness, pH, and temperature variables for criteria expressed as functions
  - Methods or policies controlling the size and in-zone quality of mixing zones
  - Design flows to be used in translating chemical-specific numeric criteria for aquatic life and human health into permit limits
  - Other methods and information that will be needed to apply standards on a case-by-case basis.

developed as national recommendations to assist States in developing their standards and to assist in interpreting narrative standards. EPA criteria or guidance consist of three components:

- Magnitude—How much of a pollutant (or pollutant parameter such as toxicity), expressed as a concentration, is allowable.
- Duration—The period of time (averaging period) over which the instream concentration is averaged for comparison with criteria concentrations. This specification limits the duration of concentrations above the criteria.
- Frequency—How often criteria can be exceeded.

A typical aquatic life water quality criteria statement contains a concentration, averaging period, and return frequency, stated in the following format:

> The procedures described in the *Guidelines for Deriving National Water Quality Criteria for the Protection of Aquatic Organisms and Their Uses* indicate that, except possibly where a locally important species is very sensitive, (1) aquatic organisms and their uses should not be affected unacceptably if the four-day average concentration of (2) does not exceed (3) µg/L more than once every three years on the average and if the one-hour average concentration does not exceed (4) µg/L more than once every three years on the average.

In this example generic statement, the following terms are inserted at:

(1) — either "freshwater" or "saltwater"

(2) — the name of the pollutant

(3) — the lower of the chronic-effect or residue-based concentrations as the criterion continuous concentration (CCC)

(4) — the acute effect-based criterion maximum concentration (CMC).

Defining water quality criteria with an appropriate duration and frequency of excursions helps to ensure that criteria appropriately are considered in developing wasteload allocations (WLAs), which are then translated into permit requirements. Duration and frequency may be defined in the design stream flow appropriate to the criterion. However, in these cases, the State should provide an evaluation that the selected design stream flow approximates the recommended duration and frequency.

2.2.2 Mixing Zones

It is not always necessary to meet all water quality criteria within the discharge pipe to protect the integrity of the waterbody as a whole. Sometimes it is appropriate to allow for ambient concentrations above the criteria in small areas near outfalls. These areas are called mixing zones. Since these areas of impact, if disproportionately large, could potentially adversely impact the productivity of the waterbody, and have unanticipated ecological consequences, they should be carefully evaluated and appropriately limited in size. As our understanding of pollutant impacts on ecological systems evolves, there may be cases identified where no mixing zone is appropriate.

To ensure mixing zones do not impair the integrity of the waterbody, it should be determined that the mixing zone will not cause lethality to passing organisms and, considering likely pathways of exposure, that there are no significant human health risks. One means to achieve these objectives is to limit the size of the area affected by the mixing zones.

For application of two-number aquatic life criteria, there may be up to two types of mixing zones (Figure 2-1). In the zone immediately surrounding the outfall, neither the acute nor the chronic criterion is met. The acute criterion is met at the edge of this zone. In the next mixing zone, the acute, but not the chronic, criterion is met. The chronic criterion is met at the edge of the second mixing zone.

In the general case, where a State has both acute and chronic aquatic life criteria, as well as human health criteria, independently established mixing zone specifications may apply to each of the three types of criteria. The acute mixing zone may be sized to prevent lethality to passing organisms, the chronic mixing zone sized to protect the ecology of the waterbody as a whole, and the health criteria mixing zone sized to prevent significant human risks. For any particular pollutant from any particular discharge, the magnitude, duration, frequency, and mixing zone associated with each of the three types of criteria will determine which one most limits the allowable discharge.

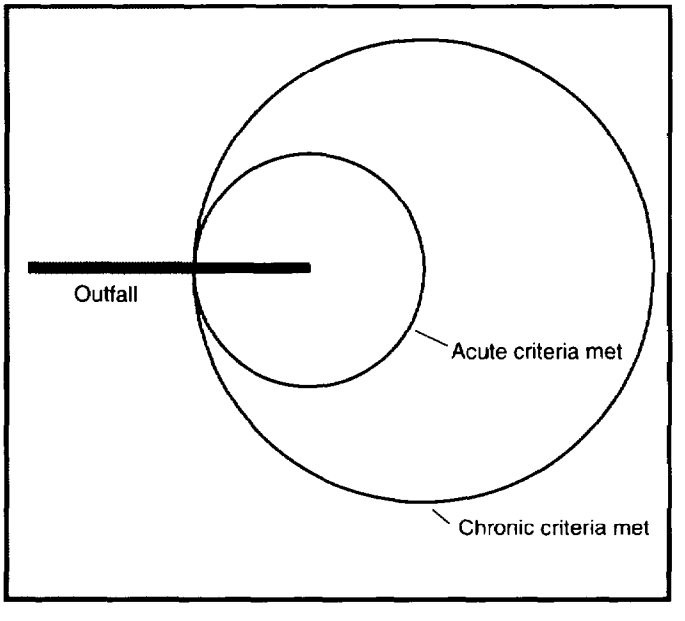

Figure 2-1. Diagram of the Two Parts of the Mixing Zone

Mixing zone allowances will increase the mass loadings of the pollutant to the waterbody, and decrease treatment requirements. They adversely impact immobile species, such as benthic communities, in the immediate vicinity of the outfall. Because of these and other factors, mixing zones must be applied carefully, so as not to impede progress toward the CWA goals of maintaining and improving water quality. EPA recommendations for allowances for mixing zones, and appropriate cautions about their use, are contained in this section.

The CWA allows mixing zones at the discretion of the State [1]. **EPA recommends that States have a definitive statement in their standards on whether or not mixing zones are allowed.** Where mixing zones provisions are part of the State standards, the State should describe the procedures for defining mixing zones.

To determine that a mixing zone is sized appropriately for aquatic life protection, water quality conditions within the mixing zone may be compared to laboratory-measured or predicted toxicity bench marks as follows:

> It is not necessary to meet chronic criteria within the mixing zone, only at the edge of the mixing zone. Conditions within the mixing zone would thus not be adequate to ensure survival, growth, and reproduction of all organisms that might otherwise attempt to reside continuously within the mixing zone.
>
> If acute criteria (CMC derived from 48- to 96-hour exposure tests) are met throughout the mixing zone, no lethality should result from temporary passage through the mixing zone. If acute criteria are exceeded no more than a few minutes in a parcel of water leaving an outfall (as assumed in deriving the Section 4.3.3 options for an outfall velocity of 3 m/sec, and a size of 50 times the discharge length scale), this likewise assures no lethality to passing organisms.
>
> If a full analysis of concentrations and hydraulic residence times within the mixing zone indicates that organisms drifting through the plume along the path of maximum exposure would not be exposed to concentrations exceeding the acute criteria when averaged over the 1-hour (or appropriate site-specific) averaging period for acute criteria, then lethality to swimming or drifting organisms ordinarily should not be expected, even for rather fast-acting toxicants. In many situations, travel time through the acute mixing zone must be less than roughly 15 minutes if a 1-hour average exposure is not to exceed the acute criterion.
>
> Where mixing zone toxicity is evaluated using the probit approach described in the water quality criteria "Bluebook" [3], or using models of toxicant accumula-

tion and action in organisms (described by Mancini [4] or Erickson et al. [5]), the phenomenon of delayed mortality should be taken into account before judging the mixing zone concentrations to be safe.

The above recommendations assume that the effluent is repulsive, such that free-swimming organisms would avoid the mixing zones. While most toxic effluents are repulsive, caution is necessary in evaluating attractive mixing zones of known effluent toxicity, and denial of such mixing zones may well be appropriate. It also is important to ensure that concentration isopleths within any plume will not extend to restrict passage of swimming organisms into tributary streams.

In all cases, the size of the mixing zone and the area within certain concentration isopleths should be evaluated for their effect on the overall biological integrity of the waterbody. If the total area affected by elevated concentrations within all mixing zones combined is small compared to the total area of a waterbody (such as a river segment), then mixing zones are likely to have little effect on the integrity of the waterbody as a whole, provided that they do not impinge on unique or critical habitats. EPA has developed a multistep procedure for evaluating the overall acceptability of mixing zones [6].

For protection of human health, the presence of mixing zones should not result in significant health risks, when evaluated using reasonable assumptions about exposure pathways. Thus, where drinking water contaminants are a concern, mixing zones should not encroach on drinking water intakes. Where fish tissue residues are a concern (either because of measured or predicted residues), mixing zones should not be projected to result in significant health risks to average consumers of fish and shellfish, after considering exposure duration of the affected aquatic organisms in the mixing zone, and the patterns of fisheries use in the area.

While fish tissue contamination tends to be a far-field problem affecting entire waterbodies rather than a narrow-scale problem confined to mixing zones, restricting or eliminating mixing zones for bioaccumulative pollutants may be appropriate under conditions such as the following:

- Mixing zones should be restricted such that they do not encroach on areas often used for fish harvesting particularly of stationary species such as shellfish.
- Mixing zones might be denied where such denial is used as a device to compensate for uncertainties in the protectiveness of the water quality criteria or uncertainties in the assimilative capacity of the waterbody.

2.3 WATER QUALITY CRITERIA FOR AQUATIC LIFE PROTECTION

2.3.1 Development Process for Criteria

The development of national numerical water quality criteria for the protection of aquatic organisms is a complex process that uses information from many areas of aquatic toxicology. (See Reference 7 for a detailed discussion of this process.) After a decision is made that a national criterion is needed for a particular material, all available information concerning toxicity to, and bioaccumulation by, aquatic organisms is collected and reviewed for acceptability. If enough acceptable data for 48- to 96-hour toxicity tests on aquatic animals are available, they are used to derive the acute criterion. If sufficient data on the ratio of acute to chronic toxicity concentrations are available, they are used to derive the chronic or long-term exposure criteria. If justified, one or both of the criteria may be related to another water quality characteristic, such as pH, temperature, or hardness. Separate criteria are developed for freshwaters and saltwaters.

The water quality standards regulation allows States to develop numerical criteria or modify EPA's recommended criteria to account for site-specific or other scientifically defensible factors. In cases where additional toxicological data are needed to modify or develop criteria, the discharger may be required to generate the data. Guidance on modifying national criteria is found in the handbook [1]. When a criterion must be developed for a chemical for which a national criterion has not been established, the regulatory authority should refer to the *Guidelines for Deriving Criteria for Aquatic Life and Human Health* (see 45 *FR* 79341, November 28, 1980, and 50 *FR* 30784, July 29, 1985).

2.3.2 Magnitude for Single Chemicals

Water quality criteria for aquatic life contain two expressions of allowable magnitude: a CMC to protect against acute (short-term) effects and a CCC to protect against chronic (long-term) effects. EPA derives acute criteria from 48- to 96-hour tests of lethality or immobilization. EPA derives chronic criteria from longer-term (often greater than 28-day) tests that measure survival, growth, reproduction, or in some cases, bioconcentration.

Most State standards include numerical criteria for a limited number of individual toxic chemicals. Therefore, evaluation and control of toxic pollutants is based on maintenance of the designated use and often relies on the narrative criterion prohibiting toxic substances in toxic amounts. The adverse effects of concern will depend on the designated use and the chemical. Bioaccumulation of chemicals in aquatic organisms, toxicity to these organisms, the potential for additivity, antagonism, synergism, and persistence of the chemicals may be important. Available information on the toxic effects of the chemical is used when standards do not include specific numerical criteria. Such information can include EPA criteria documents, published literature reports, or studies conducted by the discharger.

As mentioned in Section 2.1.2, water quality-based controls may be based directly on the State's technical determination of what concentration of a specific pollutant meets the State's narrative "free from" toxics criterion. Although EPA water quality standards regulation requires that the State's process for implementing its narrative criterion be described in the State standards, there is no requirement that this concentration be adopted as a numerical criterion in State water quality standards prior to use in developing water quality-based controls and therefore a case-by-case interpretation of the narrative criterion may be necessary.

2.3.3 Magnitude for Whole Effluent Toxicity

Criteria for toxicity in current State standards range from the narrative prohibition (e.g., no discharge of toxic chemicals in toxic amounts) to detailed requirements that specify the test species and the allowable toxicity level. At present, there are no national criteria developed under CWA Section 304(a) for whole effluent toxicity. Acute and chronic toxicity units (TUs) are a mechanism for quantifying instream toxicity using the whole effluent approach. The procedure to implement the narrative criteria using a whole effluent approach should specify the testing procedure, the duration of the tests (acute or chronic), the test species, and the frequency of testing required.

EPA's recommended magnitudes for whole effluent toxicity are as follows (again, two expressions of allowable magnitude are used): a CMC to protect against acute (short-term) effects and a CCC to protect against chronic (long-term) effects. **For acute protection, the CMC should be set at 0.3 acute toxic unit (TU_a) to the most sensitive of at least three test species.**

The selection of test species for testing the effluent is not critical provided species from ecologically diverse taxa are used (e.g., a fish, an invertebrate, and a plant). The factor of 0.3 is used to adjust the typical LC_{50} endpoint of an acute toxicity test (50 percent mortality) to an LC_1 value (virtually no mortality). Specifically, a factor of 0.3 was found to include 91 percent of observed LC_1 to LC_{50} ratios in 496 effluent toxicity tests as illustrated in Figure 2-2. This figure presents effluent toxicity data from many years of toxicity testing of both industrial and municipal effluents by the Environmental Services Division, U.S. EPA Region IV, Athens, Georgia.

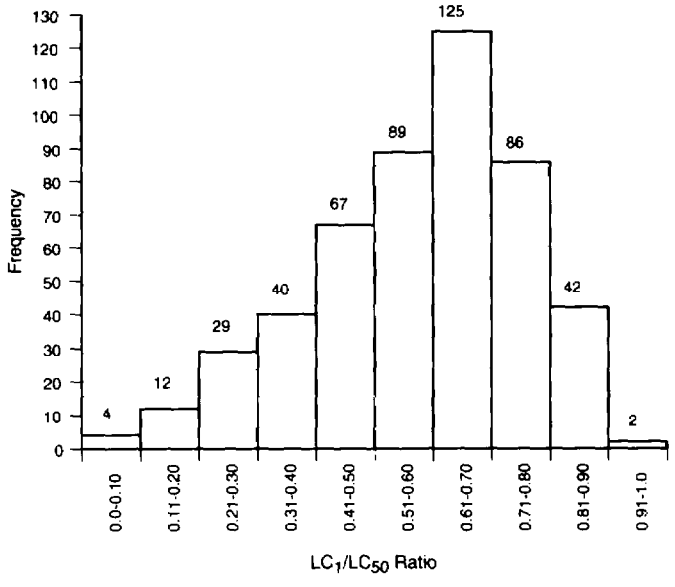

Figure 2-2. LC_1 to LC_{50} Ratios for Effluent Toxicity Tests

For chronic protection, the CCC should be set at 1.0 chronic toxic unit (TU_c) to the most sensitive of at least three test species. The selection of test organisms is as described above. A 1.0 TU_c is applied at the edge of the mixing zone to prevent any chronic toxicity in the receiving water outside the mixing zone.

2.3.4 Duration for Single Chemicals and Whole Effluent Toxicity

The quality of an ambient water typically varies in response to variations of effluent quality, stream flow, and other factors. Organisms in the receiving water are not experiencing constant, steady exposure but rather are experiencing fluctuating exposures, including periods of high concentrations, which may have adverse effects. Thus, EPA's criteria indicate a time period over which exposure is to be averaged, as well as a maximum concentration, thereby limiting the duration of exposure to elevated concentrations.

For acute criteria, EPA recommends an averaging period of 1 hour. That is, to protect against acute effects, the 1-hour average exposure should not exceed the CMC. The 1-hour acute averaging period was derived primarily from data on response time for toxicity to ammonia, a fast-acting toxicant. The 1-hour averaging period is expected to be fully protective for the fastest-acting toxicants, and even more protective for slower-acting toxicants. Scientifically justifiable alternative (site-specific) averaging periods can be derived from (1) data relating toxic response to exposure time, if coupled with considerations of delayed mortality (mortality occurring after exposure has ended), or (2) models of toxicant uptake and action, such as presented by Erickson [5] and Mancini et al. [4].

In practice, 1-day periods are the shortest periods for which WLA modelers and enforcement personnel have adequate data. Attainment of the duration criterion can be ensured by paying particular attention to short-term effluent variability and requiring measures to control variability (e.g., installation of equalization basins) when needed.

For chronic criteria, EPA recommends an averaging period of 4 days. That is, the 4-day average exposure should not exceed the CCC. Different chronic averaging periods could be derived, depending on the nature of the pollutant and the toxic endpoint of concern (e.g., the rate of uptake and accumulation, and the mode of action).

The toxicity tests used to establish the national criteria are conducted using steady exposure to toxicants usually for at least 28 days. The test concentrations do not fluctuate as much as typically occurs instream. As the period of averaging increases, so too does the period of time the exposure concentrations can be above the criterion concentration without exceeding the average. The significant consideration involved in setting duration criteria is how long the exposure concentration can be above the criterion concentration without unacceptably affecting the endpoint of the test (e.g., survival, growth, or reproduction). EPA selected the 4-day averaging period based on the shortest duration in which chronic effects are sometimes observed for certain species and toxicants, and thus should be fully protective even for the fastest-acting toxicants.

2.3.5 Frequency for Single Chemicals and Whole Effluent Toxicity

To predict or ascertain the attainment of criteria it is necessary to specify the allowable frequency for exceeding the criteria. This is because it is statistically impossible to project that criteria will never be exceeded. As ecological communities are naturally subjected to a series of stresses, the allowable frequency of pollutant stress may be set at a value that does not significantly increase the frequency or severity of all stresses combined.

EPA recommends a once in 3-year average frequency for excursions of both acute and chronic criteria. These recommendations apply to both chemical-specific and whole effluent approaches. However, the allowable frequency depends on site-specific factors. To implement alternative frequencies, site-specific factors (see Appendix D) or other data or analyses should be taken into account. In all cases, the recommended frequency applies to actual ambient concentrations, and excludes the influence of measurement imprecision.

EPA established its recommended frequency as part of its *Guidelines for Deriving Criteria,* last issued in 1985 [8]. EPA selected the 3-year return interval with the intent of providing a degree of protection roughly equivalent to a 7Q10 design flow condition, and with some consideration of rates of ecological recovery from a variety of severe stresses. Because of the nature of the ecological recovery studies available, the severity of criteria excursions could not be related rigorously to the resulting ecological impacts. Nevertheless, EPA derives its criteria intending that a single marginal criteria excursion (i.e., a slight excursion over a 1-hour period for acute or over a 4-day period for chronic) would result in little or no ecological effect and require little or no time for recovery. If the frequency of marginal criteria excursions is not high, it can be shown that the frequency of severe stresses, requiring measurable recovery periods, would be extremely small. EPA thus expects the 3-year return interval to provide a very high degree of protection.

Field studies indicate that many discharge situations are affected both by predictable and measurable discharges of toxicants and by unpredictable spills of toxic substances. In most cases, the dischargers were unaware that spills were occurring. These spills are a second source of stress for the community and decrease recovery potential. An aggressive program to minimize, contain, and treat spills should be in place at any plant where the potential for spills exists.

The concentration, duration, and frequency provisions of the criteria are implemented through the development of WLAs and water quality-based effluent limits. As discussed in Chapter 4, the duration and frequency recommendations are implemented directly if a dynamic modeling approach is used to develop WLAs and permit limits. However, if a steady-state approach is used, a design condition is needed for the calculations.

For the protection of aquatic life, the duration and frequency recommendations provided above have been used to develop recommended design flows for steady-state modeling. Chapter 4 discusses these recommended design flows.

Traditionally, most water quality-based permits for point source discharges had been tied to the 7-day, once in 10-year, low-flow conditions. The reason for this is that critical conditions for perennial point source discharges occur, in general, during the low-flow period. Currently, State laws and regulations generally state that water quality standards are applicable to the 7-day, 10-year low-flow or higher flow conditions.

It should be noted that EPA's water quality criteria for aquatic life protection are applicable at all flow conditions, low as well as high. These criteria and their specified duration and frequency, if adopted into or used to interpret State water quality standards, may be used as the basis for total maximum daily load (TMDL) after considering seasonal flow and loading scenarios. The concentration, duration, and frequency provisions of EPA's water quality criteria can be modified to account for site-specific conditions. As States have started using the new two-number water quality criteria for perennial as well as intermittent discharges such as combined sewer overflows, urban runoff, etc., their proper use in the context of the TMDL/WLA process needs to be emphasized.

2.4 WATER QUALITY CRITERIA FOR HUMAN HEALTH PROTECTION

2.4.1 Overview

There are a number of key elements of State water quality standards and implementation procedures relevant to human health protection. States must determine ambient standards for the two primary human exposure routes, fish consumption and drinking water. States must then establish whether mixing zones will apply, and, if so, determine the design conditions.

State standards or their implementation procedures often specify the risk level for carcinogens; methods for identifying compliance thresholds in permits where calculated limits are below detection; and methods for selecting appropriate hardness, pH, and temperature variables for criteria. However, if State standards do not specify these items, then the permitting authority must develop water quality-based effluent limits based upon either an interpretation of the State's water quality standards or EPA's criteria and procedures.

The purpose of the following section is to provide a review of EPA's procedures used to develop assessments of human health effects in developing water quality criteria and reference ambient concentrations. A complete human health effects discussion is included in the (draft) *Guidelines and Methodology Used in the Preparation of Health Effects Assessment Chapters of the Consent Decree Water Documents* by EPA's Environmental Criteria and Assessment Office (ECAO). The procedures contained in the ECAO document are used in the development and updating of EPA water quality criteria and may be used in developing reference ambient concentrations (RACs) for those pollutants lacking EPA human health criteria. Although the same procedures are used to develop criteria and RACs, only those values that are subjected to the regulatory process of regional, State, and public comment can be considered "criteria." RACs may be applied as site-specific interpretations of narrative standards and as a basis for permit limits under 40 *CFR* 122.44 (d)(1)(vi).

Procedures also are provided in this chapter to develop values called reference tissue concentrations (RTCs) that can be used in assessing or monitoring fish tissues for unacceptable residues.

2.4.2 Magnitude and Duration

Water quality criteria for human health contain only a single expression of allowable magnitude; a criterion concentration generally to protect against long-term (chronic) human health effects. Currently, national policy and prevailing opinion in the expert community dictate that the duration for human health criteria for carcinogens be derived assuming lifetime exposure, taken to be a 70-year time period. The duration of exposure assumed in deriving criteria for noncarcinogens is more complicated due to a wide variety of endpoints: some developmental (and thus age-specific and perhaps sex-specific), some lifetime, and some, such as organoleptic effects, not duration-related at all. Thus, appropriate durations depend on the individual noncarcinogenic pollutants and the endpoints or adverse effects being considered.

2.4.3 Human Exposure Considerations

A complete human exposure evaluation for toxic pollutants of concern for bioaccumulation would not only encompass estimates of exposures due to fish consumption, but also exposure due to background concentrations and other exposure routes, including recreational and occupational contact, dietary intake from other than fish, inhalation of air, and drinking water. However, the focus of this document is on ingestion of contaminated fish tissue, a direct human exposure route of potentially significant risk. (For the human health sections in this document the term "fish" generally is used to mean both fish and shellfish.) The consumption of contaminated fish tissue is of serious concern since the presence of even extremely low ambient concentrations of bioaccu-mulative pollutants (sublethal to aquatic life) in surface waters, can result in residue concentrations in fish tissue that can pose a human health risk. Other exposure route information should be considered and incorporated in human exposure evaluations to the extent it is available.

Levels of actual human exposures from consuming contaminated fish vary depending upon a number of case-specific consumption factors. These factors include type of fish species consumed, type of fish tissue consumed, tissue lipid content, consumption rate and pattern, and food preparation practices. In addition, depending on the spatial variability in the fishery area, the behavior of the fish species, and the point of application of the RAC or criterion, the average exposure of fish may be only a small fraction of the expected exposure at the point of application of the criterion. If an effluent attracts fish, the average exposure might be greater than the expected exposure.

With shellfish, such as oysters, snails, and mussels, whole body tissue consumption commonly occurs, whereas with fish, muscle tissue and roe are most commonly eaten. This difference in the types of tissues consumed has implications for the amount of available bioaccumulative contaminants likely to be ingested. Whole body shellfish consumption presumably means ingestion of the entire burden of bioaccumulative contaminants. However, with most fish, selective cleaning and removal of internal organs, and sometimes body fat as well, from edible tissues, may result in removal of much of the lipid material in which bioaccumulative contaminants tend to concentrate.

2.4.4 Fish Consumption Values

EPA's human health criteria have assumed a human body weight of 70 kg and the consumption of 0.0065 kg of fish and shellfish per day. Based on data collected in 1973-1974, the national per capita consumption of freshwater and estuarine fish was estimated to average 6.5 g/day. Per capita consumption of all seafood (including marine species) was estimated to average 14.3 g/day. The 95th percentile for consumption of all seafood by individuals over a period of 1 month was estimated to be 42 g/day [9]. The mean lipid content of fish tissue consumed in this study was estimated to be 3.0 percent [10].

Currently, four levels of fish consumption are provided in the EPA guidance manual, *Assessing Human Health Risk from Chemically Contaminated Fish and Shellfish.* These are:

- 6.5 g/day to represent an **estimate of average consumption of fish and shellfish from estuarine and freshwaters** by the entire U.S. population [9]. This fish consumption level is based on the average of both consumers and nonconsumers of fish.

- 20 g/day to represent an **estimate of the average consumption of fish and shellfish from marine, estuarine, and freshwaters** by the U.S. population [11]. This average fish consumption level also includes both consumers and nonconsumers of fish.

- 165 g/day to represent **consumption of fish and shellfish from marine, estuarine, and freshwaters by the 99.9th percentile of the U.S. population** consuming the most fish or seafood [12].

- 180 g/day to represent a "**reasonable worst case**" based on the assumption that some individuals would consume fish at a rate equal to the combined consumption of red meat, poultry, fish, and shellfish in the United States (EPA Risk Assessment Council assumption based on data from the U.S. Department of Agriculture Nationwide Food Consumption Survey of 1977-1978).

EPA currently is updating the national estuarine and freshwater fish and shellfish consumption default values and will provide a range of recommended national consumption values. This range will include mean values appropriate to the population at large, and values appropriate for those individuals who consume a relatively large proportion of fish in their diets (maximally exposed individuals).

Many States use the EPA's 6.5 g/day consumption value. However, some States (e.g., Wisconsin, Louisiana, Illinois, and Arizona) use the above mentioned 20 g/day value. For salt waters Delaware uses another EPA value, 37 g/day [13]. In general, EPA recommends that the consumption values used in deriving RACs from the formulas in this chapter reflect the most current relevant and/or site-specific information available.

2.4.5 Bioaccumulation Considerations for Reference Ambient Concentration Development

The ratio of the contaminant concentrations in fish tissue versus water is termed either the bioconcentration factor (BCF) or the bioaccumulation factor (BAF). Bioconcentration is defined as involving contaminant uptake from water only (not from food). Bioaccumulation is defined as involving contaminant uptake from both water and food. Under laboratory conditions, measurements of tissue/water partitioning generally are considered to involve uptake from water only. On the other hand, both process are likely to apply in the field since the entire food chain is exposed.

Table 2-1 shows the ratio of the BAF to the BCF as a function of the trophic level of the aquatic organism, and the log P (log octanol-water partition coefficient) of the chemical [14]. The BAF/BCF ratio ranges from 1 to 100, with the highest ratios applying to organisms in higher trophic levels, and to chemicals with log P close to 6.5. For chemicals with log P values greater than about 7, there is some uncertainty regarding the degree of bioaccumulation, but generally, trophic level effects appear to decrease due to slow transport kinetics of these chemicals in fish, the growth rate of the fish, and the chemical's relatively low bioavailability.

Care must be taken in assigning the trophic level since certain fish species may inhabit one source area of contaminated food for only a portion of their life. Under such conditions of migration, fish would only receive a small portion of the chemical and never come into equilibrium. In addition, trophic level for a given fish species will vary with life stage and structure of the food chain.

In this document, bioaccumulation considerations are integrated into the RAC equations in Sections 2.4.7 and 2.4.8 by using food chain multipliers (FMs) with the BCF. The bioaccumulation and bioconcentration factors for a chemical are related as follows:

$$BAF = FM \times BCF$$

By incorporating the FM and BCF terms into the RAC equations, bioaccumulation is addressed.

In this process, bioaccumulation considerations are included by incorporating the FM term with the BCF in calculating the RTCs and RACs. In Table 2-1, FM values derived from the work of Thomann [14, 15] are listed according to log P value and trophic level of the organism. **Trophic level 4 organisms are typically the most desirable species for sport fishing and therefore, FMs for trophic level 4 generally should be used in the equations for calculating RTCs and RACs.** In those very rare situations where only lower trophic level organisms are found, e.g., possibly oyster beds, an FM for a lower trophic level may be used in calculating the RTCs and RACs.

Measured BAFs (especially for those chemicals with log P values above 6.5) reported in the literature should be used when available. To use experimentally measured BAFs in calculating the RAC or RTC, the (FM x BCF) term, is replaced by the BAF in the equations in Sections 2.4.7 and 2.4.8. Relatively few BAFs have been measured accurately and reported, and their application to sites other than the specific ecosystem where they were developed is problematic and subject to uncertainty. The option also is available to develop BAFs experimentally, but this will be extremely resource intensive if done on a site-specific basis with all the necessary experimental and quality controls.

Table 2-1. Estimated Food Chain Multipliers

	Trophic Levels		
Log P	2	3	4
3.5	1.0	1.0	1.0
3.6	1.0	1.0	1.0
3.7	1.0	1.0	1.0
3.8	1.0	1.0	1.0
3.9	1.0	1.0	1.0
4.0	1.1	1.0	1.0
4.1	1.1	1.1	1.1
4.2	1.1	1.1	1.1
4.3	1.1	1.1	1.1
4.4	1.2	1.1	1.1
4.5	1.2	1.2	1.2
4.6	1.2	1.3	1.3
4.7	1.3	1.4	1.4
4.8	1.4	1.5	1.6
4.9	1.5	1.8	2.0
5.0	1.6	2.1	2.6
5.1	1.7	2.5	3.2
5.2	1.9	3.0	4.3
5.3	2.2	3.7	5.8
5.4	2.4	4.6	8.0
5.5	2.8	5.9	11
5.6	3.3	7.5	16
5.7	3.9	9.8	23
5.8	4.6	13	33
5.9	5.6	17	47
6.0	6.8	21	67
6.1	8.2	25	75
6.2	10	29	84
6.3	13	34	92
6.4	15	39	98
6.5	19	45	100
≥6.5	19.2*	45*	100*

* These recommended FMs are conservative estimates; FMs for log P values greater than 6.5 may range from the values given to as low as 0.1 for contaminants with very low bioavailability.

2.4.6 Updating Human Health Criteria and Generating RACs Using IRIS

EPA recommends using the most current risk information when updating criteria and generating RACs. The Integrated Risk Information System (IRIS) is an electronic online data base of the U.S. EPA that provides chemical-specific risk information on the relationship between chemical exposure and estimated human health effects [16]. Risk assessment information contained in the IRIS, except as specifically noted, has been reviewed and agreed upon by an interdisciplinary group of scientists representing various program offices within the Agency and represent an Agencywide consensus. Risk assessment information and values are updated monthly and are approved for Agencywide use.

The IRIS is intended to make risk assessment information readily available to those individuals who must perform risk assessments and also to increase consistency among risk assessment/risk management decisions. The IRIS is available to Federal and some State and local environmental agencies through the EPA's electronic MAIL system and also is available to the public through the Public Health Network and TOXNET. Since IRIS is designed to be a publicly available data base, interested parties may submit studies or documents for consideration by the appropriate interdisciplinary review group for chemicals currently on the IRIS or scheduled for review. Information regarding the submission of studies of chemicals may be obtained from the IRIS Information Submission Desk. In addition to chemical-specific summaries of hazard and dose-response assessments, the IRIS contains a series of sections identified by service codes that serve as a user's guide as well as provide background documentation on methodology. Additional information is available from IRIS Users Support: 513/FTS 684-7254.

The IRIS contains two types of quantitative risks values: reference dose (RfD) and the carcinogenic potency estimate or slope factor. The RfD (formerly known as the acceptable daily intake or ADI) is the human health hazard assessment for noncarcinogenic (target organ) effects. The carcinogenic potency estimate (formerly known as $q1^*$) represents the upper bound cancer causing potential resulting from lifetime exposure to a substance. The RfD or the oral carcinogenic potency estimate are used in the derivation of an RAC. Appendix H contains the supporting information for derivation of RfDs.

EPA periodically updates risk assessment information including RfDs, cancer potency estimates, and related information on contaminant effects, and reports the current information on IRIS. Since the IRIS contains the Agency's most recent quantitative risk assessment values, current IRIS values should be used in developing new RACs. **This means that the 1980 human health criteria should be updated with the latest IRIS values.** The procedure for deriving an updated human health water quality criterion would require inserting the current RfD or carcinogenic potency estimate on the IRIS into the appropriate equation in Section 2.4.7 or 2.4.8.

Figure 2-3 shows the procedure for determining an updated criterion or RAC using IRIS data. **If a chemical has both carcinogenic and noncarcinogenic effects, i.e., both a cancer potency estimate and RfD, the carcinogen RAC formula in Section 2.4.8 should be used as it will result in the more stringent RAC of the two.**

2.4.7 Calculating RACs for Noncarcinogens

The RfD is an estimate of the daily exposure to the human population that is likely to be without appreciable risk of causing

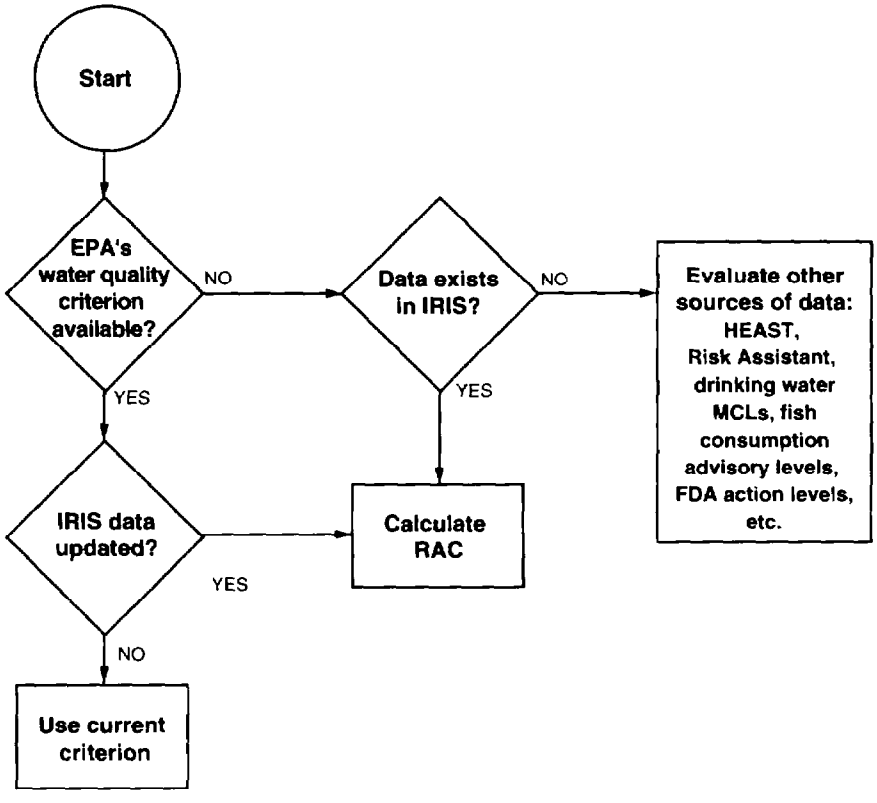

Figure 2-3. Procedure for Revising an EPA Human Health Criterion or Developing a Reference Ambient Concentration

deleterious effects during a lifetime. The RfD is expressed in units of mg toxicant per kg human body weight per day.

RfDs are derived from the "no observed adverse effect level" (NOAEL) or the "lowest observed adverse effect level" (LOAEL) identified from chronic or subchronic human epidemiology studies or animal exposure (mammal LD_{50}) studies. [Note: LOAEL and NOAEL refer to animal and human toxicology and are there fore distinct from the aquatic toxicity terms "no observed effect concentration" (NOEC) and the "lowest observed effect concentration" (LOEC)]. Uncertainty factors are then applied to the NOAEL or LOAEL to account for uncertainties in the data associated with variability among individuals, extrapolation from non-human test species to humans, data on other than long-term exposures, and the use of an LOAEL [17]. An additional uncertainty may be applied to account for significant weakness or gaps in the data base.

The RfD is a threshold below which effects are unlikely to occur. While exposures above the RfD increase the probability of adverse effects, they do not produce a certainty of adverse effects. Similarly, while exposure at or below the RfD reduces the probability, it does not guarantee the absence of effects in all persons. The RfDs contained in the IRIS are values that represent EPA's consensus (and have uncertainty spanning perhaps an order of magnitude).

For noncarcinogenic effects, an updated criterion or an RAC can be derived using the following equation:

$$C \text{ or } RAC\ (mg/l) = \frac{(RfD \times WT) - (DT + IN) \times WT}{WI + [FC \times L \times FM \times BCF]}$$

where

- C = updated water quality criterion (mg/l)
- RAC = reference ambient concentration (mg/l)
- RfD = reference dose (mg toxicant/kg human body weight/day)
- WT = weight of an average human adult (70 kg)
- DT = dietary exposure (other than fish) (mg toxicant/kg body human weight/day)
- IN = inhalation exposure (mg toxicant/kg body human weight/day)
- WI = average human adult water intake (2 liters/day)
- FC = daily fish consumption (kg fish/day)
- L = ratio of lipid fraction of fish tissue consumed to 3 percent
- FM = food chain multiplier (from Table 3-1)
- BCF = bioconcentration factor (mg toxicant/kg fish divided by mg toxicant/l water) for fish with 3 percent lipid.

If the receiving waterbody is not used as a drinking water source, the factor WI can be deleted. Where dietary and/or inhalation exposure values are unknown, these factors may be deleted from the above calculation. For identified noncarcinogenic chemicals without known RfDs, extrapolation procedures can be used to estimate the RfD (see Appendix H).

2.4.8 Calculating RACs for Carcinogens

Any human health criterion for a carcinogen is based on at least three interrelated considerations: potency, exposure, and risk characterization. States may make their own judgments on each of these factors within reasonable scientific bounds, but documentation to support their judgments must be clear and in the public record.

Maximum protection of human health from the potential effects of exposure to carcinogens via contaminated fish would require an RAC of zero. The zero level is based upon the assumption of nonthreshold effects (i.e., no safe level exists below which any increase in exposure does not result in an increase in the risk of cancer) for carcinogens. However, because safety does not require the absence of all risk, a numerical estimate of risk (in µg/l) that corresponds to a given level of risk for a population of a specified size is selected instead. A cancer risk level is defined as the number of new cancers that may result in a population of specified size due to an increase in exposure (e.g., 10^{-6} risk level = 1 additional cancer in a population of 1,000,000). Cancer risk is calculated by multiplying the experimentally derived cancer potency estimate by the concentration of the chemical in the fish and the average daily human consumption of contaminated fish. The risk for a specified population (e.g., 1,000,000 people or 10^{-6}) is then calculated by dividing the risk level by the specific cancer risk. EPA's ambient water quality criteria documents provide risk levels ranging from 10^{-5} to 10^{-7} as examples.

When the cancer potency estimate, or slope factor (formerly known as the q1*), is derived using animal studies, high-dose exposures are extrapolated to low-dose concentrations and adjusted to a lifetime exposure period through the use of a linearized multistage model. The model calculates the upper 95 percent confidence limit of the slope of a straight line that the model postulates to occur at low doses. When based on human (epidemiological) data, the slope factor is based on the observed increase in cancer risk, and is not extrapolated. For deriving RACs for carcinogens, the oral cancer potency estimates or slope factors from the IRIS are used.

It is important to note that cancer potency factors may overestimate actual risk. Such potency estimates are subject to great uncertainty due to two primary factors: (1) adequacy of the cancer data base (i.e., human versus animal data) and (2) limited information regarding the mechanism of cancer causation. The actual risk may be much lower, perhaps as low as zero, particularly for those chemicals for which human carcinogenicity information is lacking. Risk levels of 10^{-5}, 10^{-6}, and 10^{-7} are often used by States as minimal risk levels in interpreting their standards. EPA considers risks to be additive, i.e., the risk from individual chemicals is not necessarily the overall risk from exposure to water. For example, an individual risk level of 10^{-6} may yield a higher overall risk level if multiple carcinogenic chemicals are present.

For carcinogenic effects, the RAC can be determined by using the following equation:

$$C \text{ or } RAC\ (mg/l) = \frac{(RL \times WT)}{q1^* [WI + FC \times L \times (FM \times BCF)]}$$

where

C = updated water quality criterion (mg/l)
RAC = reference ambient concentration (mg/l)
RL = risk level (10^{-x})
WT = weight of an average human adult (70 kg)
q1* = carcinogenic potency factor (kg day/mg)
WI = average human adult water intake (2 liters/day)
FC = daily fish consumption (kg fish/day)
L = ratio of lipid fraction of fish tissue consumed to 3 percent
FM = food chain multiplier (from Table 3-2)
BCF = bioconcentration factor (mg toxicant/kg fish divided by mg toxicant/l water) for fish with 3 percent lipid.

If the receiving waterbody is not used as a drinking water source, the factor WI can be deleted. For identified carcinogenic chemicals without known cancer potency estimate values, extrapolation procedures can be used to estimate the cancer potency.

2.4.9 Deriving Quantitative Risk Assessments in the Absence of IRIS Values

The RfDs or cancer potency estimates comprise the existing dose factors for developing RACs. When IRIS data are unavailable, quantitative risk level information may be developed according to a State's own procedures. Some States have established their own procedures whereby dose factors can be developed based upon extrapolation of acute and/or chronic animal data to concentrations of exposure protective of fish consumption by humans. Where no procedure exists, factors may be based upon extrapolation from mammalian or other data using IRIS documentation or information available from other EPA risk data bases. Also, where no other information or procedure exists, drinking water maximum contaminant levels (MCLs) or Food and Drug Administration (FDA) action levels may be used as guidance in developing numerical estimates.

2.4.10 Deriving Reference Tissue Concentrations for Monitoring Fish Tissue

Where fish tissue evaluations have been used for assessing human health risks, or, perhaps, used for additional routine monitoring where a chemical is below analytical detection limits, the following formulas may be used to calculate an RTC. Readers also should consult EPA's *Assessing Human Health Risks from Chemically Contaminated Fish and Shellfish* [17].

The basic equations for deriving RTC (in mg/kg) use the same parameters as in equations 2.1 and 2.2, where BCF is normalized at 3.0 percent lipid:

For noncarcinogens:

$$RTC\ (mg/kg) = \frac{(RFD \times WT) - (DT + IN) \times WT}{[WI/(BCF \times FM \times L)] + FC}$$

For carcinogens:

$$RTC\ (mg/kg) = \frac{RL \times WT}{q1^* [WI/(BCF \times FM \times L) + FC]}$$

The above equations should be corrected for site-specific lipid content and bioaccumulation factors where data are available.

Again, some States have established their own procedures whereby RTCs can be developed based upon extrapolation of acute and/or chronic animal data to safe concentrations protective of fish consumption by humans. Where additional risk information is needed, an RTC could be based upon other information such as drinking water MCLs or FDA action levels.

2.5 BIOLOGICAL CRITERIA

As discussed in Chapter 1, to fully protect aquatic habitats and provide more comprehensive assessments of aquatic life use attainment/nonattainment, States are to fully integrate chemical-specific techniques, toxicity testing, biological surveys, and biocriteria into their water quality programs. In particular, the Agency's policy is that States should develop and implement biological criteria in their water quality standards (see Chapter 1, Reference 55).

2.5.1 Regulatory Bases for Biocriteria

The primary statutory basis for EPA's policy that States should develop biocriteria is found in Sections 101(a) and 303(c)(2)(B) of the Water Quality Act of 1987. Section 101(a) of the CWA gives the general authority for biological criteria. It establishes as the objective of the Act the restoration and maintenance of the chemical, physical, and biological integrity of the Nation's waters. To meet this objective, water quality criteria should address biological integrity. Section 101(a) includes the interim water quality goal for the protection and propagation of fish, shellfish, and wildlife.

Section 304 of the Act provides the legal basis for the development of informational criteria, including biological criteria. Specific directives for the development of regulatory biocriteria can be found in Section 303, which requires EPA to develop criteria based on biological assessment methods when numerical criteria are not established.

Once biocriteria formally are adopted into State standards, biocriteria and aquatic life use designations serve as direct, legal endpoints for determining a quality life use attainment/nonattainment. As stated in Section 131.11(b)(2) of the Water Quality Standards Regulation (40 *CFR* Part 131), biocriteria should be used as a supplement to existing chemical-specific criteria and as criteria where such chemical-specific criteria have not been established. States are encouraged to implement and integrate all three approaches (biosurvey, chemical-specific, and toxicity testing methods) into their water quality programs, applying them in combination or independently (providing the most protective of the three methods is used) as site-specific conditions and assessment objectives dictate.

Section 304(a) directs EPA to develop and publish water quality criteria and information on methods for measuring water quality and establishing water quality criteria for toxic pollutants on bases other than pollutant-by-pollutant, including biological monitoring and assessment methods that assess:

- The effects of pollutants on aquatic community components (". . . plankton, fish, shellfish, wildlife, plant life . . .")

and community attributes (". . . biological community diversity, productivity, and stability . . ."); in any body of water.

- Factors necessary " . . . to restore and maintain the chemical, physical, and biological integrity of all navigable waters . . ." for " . . . the protection of shellfish, fish, and wildlife for classes and categories of receiving waters . . . ."

2.5.2 Development and Implementation of Biocriteria

Biocriteria are numerical values or narrative expressions that describe the reference biological integrity of aquatic communities inhabiting unimpaired waters of a designated aquatic life use. The biological communities in these waters represent the best attainable conditions. The reference site conditions then become the basis for developing biocriteria for major surface water types (streams, rivers, lakes, wetlands, estuaries, or marine waters).

Biological criteria support designated aquatic life use classifications for application in State standards. Each State develops its own designated use classification system based on the generic uses cited in the Act (e.g., protection and propagation of fish, shellfish, and wildlife). Designated uses are intentionally general. However, States may develop subcategories within use designations to refine and clarify the use class. Clarification of the use class is particularly helpful when a variety of surface waters with distinct characteristics fit within the same use class, or do not fit well into any category.

For example, subcategories of aquatic life uses may be on the basis of attainable habitat (e.g., cold versus warmwater communities dominates by bass versus catfish). Special uses also may be designated to protect particularly unique, sensitive, or valuable aquatic species, communities, or habitats.

Resident biota integrate multiple impacts over time and can detect impairment from known and unknown causes. Biocriteria can be used to verify improvement in water quality in response to regulatory efforts and detect continuing degradation of waters. They provide a framework for developing improved best management practices for nonpoint source impacts. Numeric criteria can provide effective monitoring criteria for inclusion in permits.

The assessment of the biological integrity should include measures of the structure and function of an aquatic community of species within a specified habitat. Expert knowledge of the system is required for the selection of appropriate biological components and measurement indices. The development and implementation of biological criteria requires:

- Selecting unimpaired (minimal impact) surface waters to use as the reference condition for each designated use
- Measuring the structure and function of aquatic communities in reference surface waters to establish biological criteria
- Establishing a protocol to compare the biological criteria to biota in impacted waters to determine whether impairment has occurred.

These elements serve as an interactive network that is particularly important during early development of biological criteria where rapid accumulation of information is effective for refining both designated uses and developing biological criteria values.

2.6 SEDIMENT CRITERIA

2.6.1 Current Developments in Sediment Criteria

While ambient water quality criteria are playing an important role in assuring a healthy aquatic environment, they alone have not been sufficient to ensure appropriate levels of environmental protection. Sediment contamination, which can involve deposition of toxicants over long periods of time, is responsible for water quality impacts in some areas.

EPA has authority to pursue the development of sediment criteria in streams, lakes, and other waters of the United States under CWA Sections 104 and 304(a)(1) and (2) as follows:

- Section 104(n)(1) authorizes the Administrator to establish national programs that study the effects of pollution, including sedimentation, in estuaries on aquatic life.
- Section 304(a)(1) directs the Administrator to develop and publish criteria for water quality, including information on the factors affecting rates of organic and inorganic sedimentation for varying types of receiving waters.
- Section 304(a)(2) directs the Administrator to develop and publish information on, among other things, "the factors necessary for the protection and propagation of shellfish, fish, and wildlife for classes and categories of receiving waters..."

To the extent that sediment criteria could be developed that address the concerns of the Section 404(b)(1) guidelines for discharges of dredged or fill material under the CWA or the Marine Protection Research, and Sanctuaries Act, they also could be incorporated into those regulations.

2.6.2 Approach to Sediment Criteria Development

Over the past several years, sediment criteria development activities have centered on evaluating and developing the equilibrium partitioning approach for generating sediment criteria. The equilibrium partitioning approach focuses on predicting the chemical interaction between sediments and contaminants. Developing an understanding of the principal factors that influence the sediment/contaminant interactions will allow for predictions to be made as to what concentration of a contaminant benthic and other organisms may be exposed to. Chronic water quality criteria, or possibly other toxicological endpoints can then be used to predict potential biological effects. In addition to the development of sediment criteria, EPA also is working to develop a standardized sediment toxicity test that could be used with or independently of sediment criteria and could be used to assess chronic effects in freshwater and marine water.

Equilibrium partitioning (EqP) sediment quality criteria (SQC) are the EPA's best recommendation of the concentration of a substance in sediment that will not unacceptably affect benthic organisms or their uses.

Methodologies for deriving effects based SQC vary for different classes of compounds. For non-ionic organic chemicals the methodology requires normalization to organic carbon. A methodology for deriving effects based sediment criteria for metal contaminants is under development and is expected to require normalization to acid volatile sulfide. EqP SQC values can be derived for varying degrees of uncertainty and levels of protection thus permitting use for ecosystem protection and remedial programs.

2.6.3 Application of Sediment Criteria

SQC would provide a basis for making more informed decisions on the environmental impacts of contaminated sediments. Existing sediment assessment methodologies are limited in their ability to identify chemicals of concern, responsible parties, degree of contamination, and zones of impact. EPA believes that a comprehensive approach using SQC and biological test methods is preferred in order to make the most informed decisions.

Sediment criteria will be particularly valuable in site monitoring applications where sediment contaminant concentrations are gradually approaching a criteria over time. Sediment criteria also are valuable as a preventative tool to ensure that point and nonpoint sources of contamination are controlled to ensure uncontaminated sediments remain uncontaminated. Also, comparison of field measurements to sediment criteria will be a reliable method for providing early warning of a potential problem. An early warning would provide an opportunity to take corrective action before adverse impacts occur. For the reasons mentioned above it has been identified that SQC are essential to resolving key contaminated sediment and source control issues in the Great Lakes.

Specific Applications

Specific applications of sediment criteria are under development. The primary use of EqP-based sediment criteria will be to assess risks associated with contaminants in sediments. The various offices and programs concerned with contaminated sediment have different regulatory mandates and thus, have different needs and areas for potential application of sediment criteria. Because each regulatory need is different, EqP-based sediment quality criteria designed specifically to meet the needs of one office or program may have to be implemented in different ways to meet the needs of another office or program.

One mode of application of EqP-based numerical SQC would be in a tiered approach. In such an application, when contaminants in sediments exceed the SQC, the sediments would be considered as causing unacceptable impacts. Further testing may or may not be required depending on site-specific conditions and the degree in which a criteria has been violated. (No additional testing would be required in locations where contamination significantly exceeds a criterion. Where sediment contaminant levels are close to a criteria, additional testing may be necessary.) Contaminants in a sediment at concentrations less than the sediment criteria would not be of concern. However, in some cases the sediment could not be considered safe because they may contain other contaminants above safe levels for which no sediment criteria exist. In addition, the synergistic, antagonistic, or additive effects of several contaminants in the sediments may be of concern.

Additional testing in other tiers of an evaluation approach, such as bioassays, could be required to determine if the sediment is safe. It is likely that such testing would incorporate site-specific considerations. Examples of specific applications of sediment criteria after they are developed are as follows:

- Establish permit limits to ensure that uncontaminated sediments remain uncontaminated or sediments already contaminated have an opportunity to cleanse themselves. This would occur only after criteria and the means to tie point sources to sediment deposition are developed.
- Establish target levels for nonpoint source causes of sediment contamination.
- For remediation activities, SQC would be valuable in identifying:
  - Remediation need
  - Spatial extent of remediation area
  - Benefits derived from remediation activities
  - Responsible parties
  - Impacts of depositing contaminated sediments in water environments
  - Success of remediation activities.
- In tiered testing sediment evaluation processes, sediment criteria and biological testing procedures work very well together.

2.6.4 Sediment Criteria Status

Science Advisory Board Review

The Science Advisory Board has completed its review and issued a favorable report on the EqP for assessing sediment quality. The Subcommittee found the EqP "to have major strengths in its foundation in chemical theory, its ease of calculation, and its ability to make use of existing data... The conceptual basis of the approach is supported by the Subcommittee; however, its application at this time is limited."

The Science Advisory Board also identified the need for "a better understanding of the uncertainty around the assumptions inherent in the approach, including assumptions of equilibrium, bioavailability, and kinetics, all critical to the application of the EqP." An uncertainty analysis and a guidance document to assist in the regulatory application of developed criteria are under development and expected to be completed in 1991.

Sediment Criteria Documents and Application Guidance

EPA efforts at producing sediment criteria documents are being directed first toward phenanthrene, fluoranthene, DDT, dieldrin, acenaphthene and endrin. Efforts also are being directed to produce a guidance document, *Application of Sediment Quality Criteria for the Protection of Aquatic Life*, scheduled for release in 1991.

Methodology for Developing Sediment Criteria for Metal Contaminants

EPA is proceeding with a methodology for developing sediment criteria for metal contaminants, with key work focused on identifying and understanding the role of acid volatile sulfides (AVS) in controlling the bioavailability of metal contaminants. A variety of field and laboratory verification studies are underway to add additional support to the methodology. Standard AVS sampling and analytical procedures are under development [18]. Presentation of the metals methodology to the Science Advisory Board for review is scheduled for 1991.

CHAPTER 2
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3. EFFLUENT CHARACTERIZATION

3.1 INTRODUCTION

Once the applicable designated uses and water quality criteria for a waterbody are determined, the effluent must be characterized and the permitting authority must determine the need for permit limits to control the discharge. The purpose of effluent characterization is to determine whether the discharge causes, has the reasonable potential to cause, or contributes to an excursion of numeric or narrative water quality criteria. **Once the permitting authority determines that a discharge causes, has the reasonable potential to cause, or contributes to the excursion of water quality criteria, the permitting authority must develop permit limits that will control the discharge.** At a minimum, the permitting authority must make this determination at each permit reissuance. The effluent characterization procedures described in the following sections apply only to the water quality-based approach, not to end-of-the-pipe technology-based controls.

Although many waterbodies receive discharges from only single point sources, permitting authorities will also occasionally encounter receiving waters where several dischargers are in close proximity. In such situations, the permitting authority may find that each discharger alone does not cause, have the reasonable potential to cause, or contribute to an excursion above water quality criteria. Yet, the dischargers may collectively cause, have the reasonable potential to cause, or contribute to an excursion. **Under these circumstances, limits must be developed for each discharger to protect against collective excursions of applicable water quality standards consistent with the Environmental Protection Agency's (EPA) existing regulations in 40 *CFR* 122.44(d)(1)(ii) for controlling multiple discharges.** The terms "cause," "reasonable potential to cause," and "contribute to" are the terms used in the National Pollutant Discharge Elimination System (NPDES) regulations for conditions under which water quality-based limits are required. Permitting authorities are required to consider each of these concepts when performing effluent characterizations.

This chapter is divided into two parts: Section 3.2, Determining the Need for Permit Limits Without Effluent Data, and Section 3.3, Determining the Need for Permit Limits With Effluent Data. Section 3.3 includes effluent characterization for whole effluent toxicity and for specific chemicals (including those for human health protection) and is based on the cumulative experience gained by EPA, States, publicly owned treatment works (POTWs), and industry when implementing the water quality-based approach to toxics control. The effluent bioconcentration evaluation procedures described in the section on human health are currently draft and are subject to further validation before being used. Until the procedures are fully developed, reviewed, and finalized, permitting authorities should not use them to characterize effluents.

3.1.1 NPDES Regulation Requirements

Effluent characterization is an essential step in determining the need for an NPDES permit limit. NPDES regulations under 40 *CFR* 122.44(d)(1) specify the minimum requirements and general types of analyses necessary for establishing permit limits. Each of these regulations is described below.

40 *CFR* 122.44(d)(1)(ii)

> When determining whether a discharge causes, has the reasonable potential to cause, or contributes to an in-stream excursion above a narrative or numeric criteria within a State water quality standard, the permitting authority shall use procedures which account for existing controls on point and nonpoint sources of pollution, the variability of the pollutant or pollutant parameter in the effluent, the sensitivity of the species to toxicity testing (when evaluating whole effluent toxicity), and where appropriate, the dilution of the effluent in the receiving water.

This regulation requires at a minimum the consideration of each of these elements in determining the need for a limit.

40 *CFR* 122.44(d)(1)(iii)

> When the permitting authority determines, using the procedures in paragraph (d)(1)(ii) of this section, that a discharge causes, has the reasonable potential to cause, or contributes to an in-stream excursion above the allowable ambient concentration of a State numeric criteria within a State water quality standard for an individual pollutant, the permit must contain effluent limits for that pollutant.

Under this regulation, permitting authorities need to investigate for the existence of pollutants in effluents if there is a numeric water quality criterion for that pollutant and to implement limits for those pollutants where necessary.

40 *CFR* 122.44(d)(1)(iv)

> When the permitting authority determines, using the procedures in paragraph (d)(1)(ii) of this section, that a discharge causes, has the reasonable potential to cause, or contributes to an in-stream excursion above the numeric criterion for whole effluent toxicity, the permit must contain effluent limits for whole effluent toxicity.

Under this regulation, permitting authorities need to investigate for the existence of whole effluent toxicity in effluents if there is a numeric water quality criterion for that parameter and to implement whole effluent toxicity limits where necessary.

40 *CFR* 122.44(d)(1)(v)

> Except as provided in this subparagraph, when the permitting authority determines, using the procedures in paragraph (d)(1)(ii) of this section, toxicity testing data, or other information, that a discharge causes, has the reasonable potential to cause, or contributes to an in-stream excursion above a narrative criterion within an applicable State water quality standard, the permit must contain effluent limits for whole effluent toxicity. Limits on whole effluent toxicity are not necessary where the permitting authority demonstrates in the fact sheet or statement of basis of the NPDES permit, using the procedures in paragraph (d)(1)(ii) of this section, that chemical-specific limits for the effluent are sufficient to attain and maintain applicable numeric and narrative State water quality standards.

Under this regulation, permitting authorities need to investigate for the existence of whole effluent toxicity in effluents. If the permitting authority can demonstrate that control of specific chemicals is sufficient to control toxicity to the point of achieving compliance with the water quality criteria, then chemical-specific permit limits alone will be sufficient to comply with the regulation.

40 *CFR* 122.44(d)(1)(vi)

> Where a State has not established a water quality criterion for a specific chemical pollutant that is present in an effluent at a concentration that causes, has the reasonable potential to cause, or contributes to an excursion above a narrative criterion within an applicable State water quality standard, the permitting authority must establish effluent limits using one or more of the following [three] options: ....

Under this regulation, permitting authorities need to investigate for the existence of specific chemicals in effluents for which the State has not adopted numeric criteria, but which may be contributing to aquatic toxicity or impairment of human health. Narrative criteria apply when numeric criteria do not protect all the designated or existing uses. For example, the narrative criteria need to be used to protect human health if a State has only adopted a numeric criteria for protecting aquatic life. Conversely, the narrative criteria need to be used to protect aquatic life if a State has only adopted a numeric criteria for protecting human health. Once the permitting authority determines that one or more specific chemicals in an effluent must be controlled, the authorities can use EPA's national criteria, develop their own criteria, or control the pollutant through use of an indicator pollutant, as provided in subparagraph (d)(1)(vi). In any case, the permitting authority will need to characterize the effluent in a manner consistent with the selected approach for controlling the pollutant.

3.1.2 Background for Toxic Effects Assessments on Aquatic Life and Human Health

Aquatic toxicity effects can be characterized by conducting a general assessment of the effluent, or by measuring effluent toxicity or concentrations of individual chemicals and comparing these measurements to the expected exposure concentrations in the receiving water. The "receiving water concentration" (RWC) is the measured or projected exposure concentration of a toxicant or the parameter toxicity (when dealing with the whole effluent toxicity) in the receiving water after mixing. The RWC is calculated at the edge of a mixing zone if such a zone is allowed by a State's water quality standards.

As with aquatic life protection, there are two possible approaches to characterizing effluents for human health effects: chemical-by-chemical and whole effluent. However, only the chemical-by-chemical approach currently is practical for assessing and controlling human health impacts. Appendix G discusses developing procedures for assessing human health impacts from whole effluents.

A fundamental principle in the development of water quality-based controls is that the RWC must be less than the criteria that comprise or characterize the water quality standards. With individual toxicants (or the parameter toxicity), the potential for toxicity in the receiving water is minimized where the RWC is less than the criterion continuous concentration (CCC), the criterion maximum concentration (CMC), and the reference ambient concentration (RAC). Toxicity becomes maximized where the RWC exceeds these criteria. **Therefore, to prevent impacts to aquatic life or human health, the RWC of the parameter effluent toxicity or an individual toxicant (based on allowable dilution for the criterion) must be less than the most limiting of the applicable criterion, as indicated below.** (The RAC as used throughout this chapter incorporates EPA human health criteria and State standards as well.)

RWC < CCC (chronic aquatic life)
RWC < CMC (acute aquatic life)
RWC < RAC (human health)

The water quality analyst will use the same basic components in the above-described relationship (i.e., critical receiving water flows, ambient criteria values, measures of effluent quality) for both effluent characterization and wasteload allocation (WLA) development, albeit from different perspectives. In the case of effluent characterization, the objective is to project receiving water concentrations based upon existing effluent quality to determine whether or not an excursion above ambient criteria occurs, or has the reasonable potential to occur. In developing WLAs, on the other hand, the objective is to fix the RWC at the desired criteria level and determine an allowable effluent loading that will not cause excursions above the criteria.

Recommendations for projecting the RWC are described within this chapter. Chapter 4, Exposure Assessment and Wasteload Allocation, provides recommendations for determining allowable effluent loadings to achieve established ambient criteria and for calculating WLAs for establishing permit limits. The procedures described within Chapter 4 can also be used to calculate the dilution for analyses within Chapter 3. Chapter 5, Permit Requirements, describes the actual calculation of permit limits after effluent characterization and loadings, as well as WLAs, are complete.

3.1.3 General Considerations in Effluent Characterization

There are two possible ways to characterize an effluent to determine the need for effluent limits for the protection of aquatic life and human health. First, an assessment may be made without generating effluent data; second, an assessment may be conducted after effluent data have been generated. Regulatory authorities must determine whether a discharge causes, has the "reasonable potential" to cause, or contributes to an excursion above an applicable narrative or numeric water quality criterion. An analysis of "reasonable potential" determines an effluent's capability to cause such excursions.

In determining the need for a permit limit for whole effluent toxicity or for an individual toxicant, the regulatory authority is required to consider, at a minimum, existing controls on point and nonpoint sources of pollution, the variability of the pollutant or pollutant parameter in the effluent, the sensitivity of the involved species to toxicity testing (for whole effluent), and, where appropriate, the dilution of the effluent in the receiving water (40 *CFR* 122.44(d)(ii)).

The regulatory authority is also required by NPDES regulations to consider whether technology-based limits are sufficient to maintain State water quality standards. There are two possibilities that will need to be assessed. First, if the limits based on appropriate treatment technology have already been specified in a previous permit, and if the facility is operating at the required level, then historical effluent and receiving water information can be used. Second, if the facility has yet to achieve the required technology performance (best available technology or best conventional technology), the regulatory authority will need to assess the technology-based limit for reasonable potential for causing or contributing to an excursion above the water quality standard.

In addition, the regulatory authority should consider all other available data and information pertaining to the discharger to assist in making an informed judgment. Where both effluent testing data and important other factors exist, the regulatory authority will need to exercise discretion in the determination of the need for a limit. **The authority should employ the principle of "independent application" of the data and information that characterizes the effluent.** In other words, effluent data alone, showing toxicity at the RWC, may be adequate to demonstrate the need for a limit for toxicity or for individual toxicants. Likewise, other factors may form an adequate basis for determining that limits are necessary. For example, where available dilution is low and monitoring information shows that toxic pollutants are frequently discharged at concentrations that have caused toxicity when discharged from similar facilities, the permitting authority may reason that a whole effluent toxicity limit is necessary even without whole effluent toxicity data from the specific facility. In all cases, the decision must be based upon consideration of factors cited in 40 *CFR* 122.44(d)(1)(ii). The regulatory authority will need to prioritize, on a case-by-case basis, the importance of all data and information used in making a determination. To assist in case-by-case determinations, recommended guidelines for characterizing an effluent for the need for a permit limit for whole effluent toxicity or individual toxicants are discussed below and summarized in Boxes 3-1 through 3-3.

Box 3-1. Determining "Reasonable Potential" for Excursions Above Ambient Criteria Using Factors Other than Facility-specific Effluent Monitoring Data

When determining the "reasonable potential" of a discharge to cause an excursion above a State water quality standard, the regulatory authority must consider all the factors listed in 40 *CFR* 122.44(d)(1)(ii). Examples of the types of information relating to these factors are listed below.

Existing controls on point and nonpoint sources of pollution

- Industry type: Primary, secondary, raw materials used, products produced, best management practices, control equipment, treatment efficiency, etc.
- Publicly owned treatment work type: Pretreatment, industrial loadings, number of taps, unit processes, treatment efficiencies, chlorination/ammonia problems, etc.

Variability of the pollutant or pollutant parameter in the effluent

- Compliance history
- Existing chemical data from discharge monitoring reports and applications.

Sensitivity of the species to toxicity testing

- Adopted State water quality criteria, or EPA criteria
- Any available in-stream survey data **applied under independent application of water quality standards**
- Receiving water type and designated/existing uses

Dilution of the effluent in the receiving water

- Dilution calculations

3.2 DETERMINING THE NEED FOR PERMIT LIMITS WITHOUT EFFLUENT MONITORING DATA FOR A SPECIFIC FACILITY

If the regulatory authority so chooses, or if the circumstances dictate, the authority may decide to develop and impose a permit limit for whole effluent toxicity or for individual toxicants without facility-specific effluent monitoring data, or prior to the generation of effluent data. Water quality-based permit limits can be set for a single toxicant or for whole effluent toxicity based on the available dilution and the water quality criterion or the State standard in the absence of facility specific effluent monitoring data. However, in doing so, the regulatory authority must satisfy all the requirements of 40 *CFR* 122.44(d)(1)(ii).

When determining whether or not a discharge causes, has the reasonable potential to cause, or contributes to an excursion of a numeric or narrative water quality criterion for individual toxicants or for toxicity, the regulatory authority can use a variety of factors and information where facility-specific effluent monitoring data are unavailable. These factors also should be considered with available effluent monitoring data. Some of these factors are the following:

- **Dilution**—Toxic impact is directly related to available dilution for the effluent. Dilution is related to the receiving stream flow and the size of the discharge. The lower the available dilution, the higher the potential for toxic effect. If an effluent's concentration at the edge of a mixing zone in a receiving water is expected to reach 1 percent or higher during critical or worst-case design periods, then such an effluent may require a toxicity limit (see discussion in Section 3.3.3). Assessment of the amount of stream dilution available should be made at the conditions required by the water quality standards or, if not specified in the standards, at the harmonic mean flow and the 7Q10 flow. Figure 3-3 (Pg. 57) shows that, whereas a majority of NPDES permittees nationwide discharge to areas during annual mean flow ranging in dilution from 100 to 1,000, the majority of dischargers fall into the 1 to 10 dilution range during low-flow conditions.

- **Type of industry**—Although dischargers should be individually characterized because toxicity problems are site-specific, the primary industrial categories should be of principal toxicity concern. EPA's treatment technology data base generally suggests that secondary industrial categories may have less potential for toxicity than primary industries. However, based on experience, it is virtually impossible to generalize the toxicity of effluents with any certainty. If two plants produce the same type of product, one effluent may be toxic while the other may not be toxic due to the type and efficiency of the treatment applied, general materials handling practices, and the functional target of the compound(s) being produced.

- **Type of POTW**—POTWs with loadings from indirect dischargers (particularly primary industries) may be candidates for toxicity limits. However, absence of industrial input does not guarantee an absence of POTW discharge toxicity problems. For example, commercial pesticide applicators often discharge to POTWs, resulting in pesticide concentrations in the POTW's effluent. Household disposal of pesticides, detergents, or other toxics may have a similar effect. The types of industrial users, their product lines, their raw materials, their potential and actual discharges, and their control equipment should be evaluated. POTWs should also be characterized for the possibility of chlorine and ammonia problems.

- **Existing data on toxic pollutants**—Discharge monitoring reports (DMRs) and data from NPDES permit application forms 2C and 2A may provide some indication of the presence of toxicants. The presence or absence of the 126 "priority pollutants" may or may not be an indication of the presence or absence of toxicity. There are thousands of "nonpriority" toxicants that may cause effluent toxicity. Also, combinations of several toxicants can produce ambient toxicity where the individual toxicants would not. EPA regulations at 40 *CFR* 122.21(j) require POTWs with design flows equal to or greater than 1 MGD and POTWs with approved pretreatment programs, or POTWs required to develop a pretreatment program, to submit the results of whole effluent toxicity tests with their permit applications. These regulations also provide discretion to the permitting authority to request such data from other POTWs at the time of permit application.

- **History of compliance problems and toxic impact**—Regulatory authorities may consider particular dischargers that have had difficulty complying with limits on toxicants or that have a history of known toxicity impacts as probable priority candidates for effluent toxicity limits.

- **Type of receiving water and designated use**—Regulatory authorities may compile data on water quality. Examples of available data include fish advisories or bans, reports of fish kills, State lists of priority waterbodies, and State lists of waters that are not meeting water quality standards. Regulatory authorities should use this information as a means of identifying point sources that discharge to impaired waterbodies and that thus may be contributing to this impairment. One source of this information is the lists of waters generated by states to comply with Section 304(l) regulations at 40 *CFR* 130.10(d)(6); 50 *FR* 23897-98, June 2, 1989:

    1) Waters where fishing or shellfish bans and/or advisories are currently in effect or are anticipated;

    2) Waters where there have been repeated fish kills or where abnormalities (cancers, lesions, tumors, etc.) have been observed in fish or other aquatic life during the last ten years;

    3) Waters where there are restrictions on water sports or recreational contact;

    4) Waters identified by the state in its most recent state section 305(b) report as either "partially achieving" or "not achieving" designated uses;

5) Waters identified by the states under section 303(d) of the Clean Water Act as waters needing water quality-based controls;

6) Waters identified by the state as priority water bodies;

7) Waters where ambient data indicate potential or actual excursions of water quality criteria due to toxic pollutants from an industry classified as a primary industry in Appendix A of 40 CFR Part 122;

8) Waters for which effluent toxicity test results indicate possible or actual excursions of state water quality standards, including narrative "free from" water quality criteria or EPA water quality criteria where state criteria are not available;

9) Waters with primary industrial major dischargers where dilution analyses indicate exceedances of state narrative or numeric water quality criteria (or EPA water quality criteria where state standards are not available) fortoxic pollutants, ammonia, or chlorine;

10) Waters with POTW dischargers requiring local pretreatment programs where dilution analyses indicate exceedances of state water quality criteria (or EPA water quality criteria where state water quality criteria are not available) for toxic pollutants, ammonia, or chlorine;

11) Waters with facilities not included in the previous two categories such as major POTWs, and industrial minor dischargers where dilution analyses indicate exceedances of numeric or narrative state water quality criteria (or EPA water quality criteria where state water quality criteria are not available) for toxic pollutants, ammonia, or chlorine;

12) Water classified for uses that will not support the "fishable/swimmable" goals of the Clean Water Act;

13) Waters where ambient toxicity or adverse water quality conditions have been reported by local, state, EPA or other Federal Agencies, the private sector, public interest groups, or universities;

14) Waters identified by the state as impaired in its most recent Clean Lake Assessments conducted under 314 of the Clean Water Act; and

15) Surface waters impaired by pollutants from hazardous waste sites on the National Priority List prepared under section 105(8)(A) of CERCLA.

16) Waters judged to be impaired as a result of a bioassessment/biosurvey.

The presence of a combination of these factors, such as low available dilution, high-quality receiving water, poor compliance record, and clustered industrial and municipal discharges, could constitute a high priority for effluent limits.

Regardless, the regulatory authority, if it chooses to impose an effluent limit after conducting an effluent assessment without facility-specific monitoring data, will need to provide adequate justification for the limit in its permit development rationale or in its permit fact sheet. A clear and logical rationale for the need for the limit covering all of the regulatory points will be necessary to defend the limit should it be challenged. In justification of a limit, **EPA recommends that the more information the authority can acquire to support the limit, the better a position the authority will be in to defend the limit if necessary.** In such a case, the regulatory authority may well benefit from the collection of effluent monitoring data prior to establishing the limit.

If the regulatory authority, after evaluating all available information on the effluent, in the absence of effluent monitoring data, is not able to decide whether the discharge causes, has the reasonable potential to cause, or contributes to, an excursion above a numeric or narrative criterion for whole effluent toxicity or for individual toxicants, the authority should require whole effluent toxicity or chemical-specific testing to gather further evidence. In such a case, the regulatory authority can require the monitoring prior to permit issuance, if sufficient time exists, or it may require the testing as a condition of the issued/reissued permit.

Under these circumstances, the regulatory authority may find it protective of water quality to include a permit reopener for the imposition of an effluent limit should the effluent testing establish that the discharge causes, has the reasonable potential to cause, or contributes to excursion above a water quality criteria. A discussion of these options is provided later in this chapter.

3.3 DETERMINING THE NEED FOR PERMIT LIMITS WITH EFFLUENT MONITORING DATA

3.3.1 General Considerations

When characterizing an effluent for the need for a whole effluent toxicity limit, and/or an individual toxicant limit, the regulatory authority should use any available effluent monitoring data, together with any information like that discussed under Section 3.2 above, as the basis for a decision. The regulatory authority may already have effluent toxicity data available from previous monitoring, or it may decide to require the permittee to generate effluent monitoring data prior to permit issuance or as a condition of the issued permit. EPA regulations at 40 *CFR* 122.21(j) require POTWs with design flows equal to or greater than 1 MGD and POTWs with approved pretreatment programs, or POTWs required to develop a pretreatment program, to submit the results of whole effluent toxicity tests with their permit applications. These regulations also provide discretion to the permitting authority to request such data from additional POTWs at the time of permit application.

In the instance where the permittee is required to generate data in advance, data collection should begin 12 to 18 months in advance of permit development to allow adequate time for conducting toxicity tests and chemical analyses. The type of data, including toxicity testing data, should be specified by the regulatory authority at the outset so that decisions on permit actions will not be delayed. **EPA recommends monitoring data be generated on effluent toxicity prior to permit limit development for the following reasons: (1) the presence or absence of effluent toxicity can be more clearly established or refuted and (2) where toxicity is shown, effluent variability can be more clearly defined.** Several basic factors that should be considered in generating effluent monitoring data are discussed below.

3.3.2 Addressing Uncertainty in Effluent Characterization by Generating Effluent Monitoring Data

All toxic effects testing and exposure assessment parameters, for both effluent toxicity and individual chemicals, have some degree of uncertainty associated with them. The more limited the amount of test data available, the larger the uncertainty. The least amount of uncertainty of an effluent's impact on the receiving water exists where (1) a complete data base is available on the effects of acute and chronic toxicity on many indigenous species, (2) there is a clear understanding of ecosystem species composition and functional processes, and (3) actual measured exposure concentrations are available for all chemicals during seasonal changes and dilution situations. The uncertainty associated with such an ideal situation would be minimal. However, generation of these data can be very resource intensive.

An example of uncertainty that results from limited monitoring data is if a regulatory authority has only one piece of effluent data (e.g., an LC_{50} of 50 percent) for a facility. Effluent variability in such a case, given the range of effluent toxicity variability seen in other effluents, may range between 20 percent and 100 percent (see Appendix A). It is impossible to determine from one piece of monitoring data where in this range the effluent variability really falls. More monitoring data would need to be generated to determine the actual variability of this effluent and reduce this source of uncertainty.

To better characterize the effects of effluent variability and reduce uncertainty in the process of deciding whether to require an effluent limit, EPA has developed the statistical approach described below and in Box 3-2. This approach combines knowledge of effluent variability as estimated by a coefficient of variation with the uncertainty due to a limited number of data to project an estimated maximum concentration for the effluent. The estimated maximum concentration is calculated as the upper bound of the expected lognormal distribution of effluent concentrations at a high confidence level. The projected effluent concentration after consideration of dilution can then be compared to an appropriate water quality criterion to determine the potential for exceeding that criterion and the need for an effluent limit.

The statistical approach has two parts. The first is a characterization of the highest measured effluent concentration based on the desired confidence level. The relationship that describes this is the following:

$$p_n = (1 - \text{confidence level})^{1/n}$$

where p_n is the percentile represented by the highest concentration in the data and n is the number of samples. The following are some examples of this relationship at a 99 percent confidence level:

- The largest value of 5 samples is greater than the 40 percentile
- The largest value of 10 samples is greater than the 63 percentile
- The largest value of 20 samples is greater than the 79 percentile
- The largest value of 100 samples is greater than the 96 percentile.

The second part of the statistical approach is a relationship between the percentile described above and the selected upper bound of the lognormal effluent distribution. EPA's effluent data base suggests that the lognormal distribution well characterizes effluent concentrations (see Appendix E). For example, if five samples were collected (which represents a 40th percentile), the coefficient of variation is 0.6, and the desired upper bound of the effluent distribution is the 99th percentile, then the two percentiles can be related using the coefficient of variation (CV) as shown below:

$$\frac{C_{99}}{C_{40}} = \frac{\exp(2.326\sigma - 0.5\sigma^2)}{\exp(-0.258\sigma - 0.5\sigma^2)} = 4.2$$

where $\sigma^2 = \ln(CV^2+1)$ and 2.326 and -0.258 are the normal distribution values for the 99th and 40th percentiles, respectively. The use of the 99th percentile is for illustrative purposes here. Although it does represent a measure of the upper bound of an effluent distribution, other percentiles could be selected by a regulatory agency. The relationship shown above can be calculated for other percentiles and CVs by replacing the values in the equation.

Tables 3-1 and 3-2 show the combined effects of both parts for a 99-percent confidence level and upper bounds of the 99th and 95th percentiles, respectively. The factors shown in the tables are multiplied by the highest concentration in an effluent sample to estimate the maximum expected concentration.

This procedure can be used for both single and multiple discharges to the same receiving waterbody. This is accomplished for multiple dischargers by summing the projected RWCs for the pollutant or pollutant parameter of concern from each individual discharger, and comparing it to the water quality standard. This involves an assumption of conservative additivity of the pollutant after discharge, which may not accurately reflect the true behavior of the toxicant. To overcome this, and to further refine the proportional contribution of each discharger and the resultant limits, the permitting authority should supplement this evaluation with multiple source WLA modeling and/or ambient water concentration monitoring.

Box 3-2. Determining "Reasonable Potential" for Excursions Above Ambient Criteria Using Effluent Data Only

EPA recommends finding that a permittee has "reasonable potential" to exceed a receiving water quality standard if it cannot be demonstrated with a high confidence level that the upper bound of the lognormal distribution of effluent concentrations is below the receiving water criteria at specified low-flow conditions.

Step 1 Determine the number of total observations ("*n*") for a particular set of effluent data (concentrations or toxic units [TUs]), and determine the highest value from that data set.

Step 2 Determine the coefficient of variation for the data set. For a data set where $n<10$, the coefficient of variation (CV) is estimated to equal 0.6, or the CV is calculated from data obtained from a discharger. For a data set where $n>10$, the CV is calculated as standard deviation/mean (see Figure 3-1). For less than 10 items of data, the uncertainty in the CV is too large to calculate a standard deviation or mean with sufficient confidence.

Step 3 Determine the appropriate ratio from Table 3-1 or 3-2.

Step 4 Multiply the highest value from a data set by the value from Table 3-1 or 3-2. Use this value with the appropriate dilution to project a maximum receiving water concentration (RWC).

Step 5 Compare the projected maximum RWC to the applicable standard (criteria maximum concentration, criteria continuous concentration [CCC], or reference ambient concentration). EPA recommends that permitting authorities find reasonable potential when the projected RWC is greater than an ambient criterion.

Example

Consider the following results of toxicity measurements of an effluent that is being characterized: 5 TU_c, 2 TU_c, 9 TU_c, and 6 TU_c. Assume that the effluent is diluted to 2 percent at the edge of the mixing zone. Further assume that the CV is 0.6, the upper bound of the effluent distribution is the 99th percentile, and the confidence level is 99 percent.

Step 1 There are four samples, and the maximum value of the sample results is 9 TU_c.

Step 2 The value of the CV is 0.6.

Step 3 The value of the ratio for four pieces of data and a CV of 0.6 is 4.7.

Step 4 The value that exceeds the 99th percentile of the distribution (ratio times x_{max}) after dilution is calculated as:

$$[9\ TU_c \times 4.7 \times 0.02] = 0.85\ TU_c.$$

Step 5 0.85 TU_c is less than the ambient criteria concentration of 1.0 TU_c. There is no reasonable potential for this effluent to cause an excursion above the CCC.

3.3.3 Effluent Characterization for Whole Effluent Toxicity

Once an effluent has been selected for whole effluent toxicity characterization after consideration of the factors discussed above, the regulatory authority should require toxicity testing in accordance with appropriate site-specific considerations and the recommendations discussed below. In the past 5 years, significant additional experience has been gained in generating effluent toxicity data upon which to make decisions as to whether or not an effluent will cause toxic effects in the receiving water in both freshwater and marine environments.

General Considerations and Assumptions

EPA has revised its initial effluent toxicity data generation recommendations based on three observations made over the last 5 years:

1) Only rarely have effluents discharged by NPDES permittees been observed to have LC_{50}s less than 1.0 percent or no observed effect concentrations (NOECs) less than 0.1 percent. However, there is always a chance that an effluent could be toxic at such low effluent concentrations.

Table 3-1. Reasonable Potential Multiplying Factors: 99% Confidence Level and 99% Probability Basis

Number of Samples	Coefficient of Variation																			
	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2.0
1	1.6	2.5	3.9	6.0	9.0	13.2	18.9	26.5	36.2	48.3	63.3	81.4	102.8	128.0	157.1	190.3	227.8	269.9	316.7	368.3
2	1.4	2.0	2.9	4.0	5.5	7.4	9.8	12.7	16.1	20.2	24.9	30.3	36.3	43.0	50.4	58.4	67.2	76.6	86.7	97.5
3	1.4	1.9	2.5	3.3	4.4	5.6	7.2	8.9	11.0	13.4	16.0	19.0	22.2	25.7	29.4	33.5	37.7	42.3	47.0	52.0
4	1.3	1.7	2.3	2.9	3.8	4.7	5.9	7.2	8.7	10.3	12.2	14.2	16.3	18.6	21.0	23.6	26.3	29.1	32.1	35.1
5	1.3	1.7	2.1	2.7	3.4	4.2	5.1	6.2	7.3	8.6	10.0	11.5	13.1	14.8	16.6	18.4	20.4	22.4	24.5	26.6
6	1.3	1.6	2.0	2.5	3.1	3.8	4.6	5.5	6.4	7.5	8.6	9.8	11.1	12.4	13.8	15.3	16.8	18.3	19.9	21.5
7	1.3	1.6	2.0	2.4	2.9	3.6	4.2	5.0	5.8	6.7	7.7	8.7	9.7	10.8	12.0	13.1	14.4	15.6	16.9	18.2
8	1.2	1.5	1.9	2.3	2.8	3.3	3.9	4.6	5.3	6.1	6.9	7.8	8.7	9.6	10.6	11.6	12.6	13.6	14.7	15.8
9	1.2	1.5	1.8	2.2	2.7	3.2	3.7	4.3	5.0	5.7	6.4	7.1	7.9	8.7	9.6	10.4	11.3	12.2	13.1	14.0
10	1.2	1.5	1.8	2.2	2.6	3.0	3.5	4.1	4.7	5.3	5.9	6.6	7.3	8.0	8.8	9.5	10.3	11.0	11.8	12.6
11	1.2	1.5	1.8	2.1	2.5	2.9	3.4	3.9	4.4	5.0	5.6	6.2	6.8	7.4	8.1	8.8	9.4	10.1	10.8	11.5
12	1.2	1.4	1.7	2.0	2.4	2.8	3.2	3.7	4.2	4.7	5.2	5.8	6.4	7.0	7.5	8.1	8.8	9.4	10.0	10.6
13	1.2	1.4	1.7	2.0	2.3	2.7	3.1	3.6	4.0	4.5	5.0	5.5	6.0	6.5	7.1	7.6	8.2	8.7	9.3	9.9
14	1.2	1.4	1.7	2.0	2.3	2.6	3.0	3.4	3.9	4.3	4.8	5.2	5.7	6.2	6.7	7.2	7.7	8.2	8.7	9.2
15	1.2	1.4	1.6	1.9	2.2	2.6	2.9	3.3	3.7	4.1	4.6	5.0	5.4	5.9	6.4	6.8	7.3	7.7	8.2	8.7
16	1.2	1.4	1.6	1.9	2.2	2.5	2.9	3.2	3.6	4.0	4.4	4.8	5.2	5.6	6.1	6.5	6.9	7.3	7.8	8.2
17	1.2	1.4	1.6	1.9	2.1	2.5	2.8	3.1	3.5	3.8	4.2	4.6	5.0	5.4	5.8	6.2	6.6	7.0	7.4	7.8
18	1.2	1.4	1.6	1.8	2.1	2.4	2.7	3.0	3.4	3.7	4.1	4.4	4.8	5.2	5.6	5.9	6.3	6.7	7.0	7.4
19	1.2	1.4	1.6	1.8	2.1	2.4	2.7	3.0	3.3	3.6	4.0	4.3	4.6	5.0	5.3	5.7	6.0	6.4	6.7	7.1
20	1.2	1.3	1.6	1.8	2.0	2.3	2.6	2.9	3.2	3.5	3.8	4.2	4.5	4.8	5.2	5.5	5.8	6.1	6.5	6.8

Table 3-2. Reasonable Potential Multiplying Factors: 95% Confidence Level and 95% Probability Basis

Number of Samples	Coefficient of Variation																			
	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2.0
1	1.4	1.9	2.6	3.6	4.7	6.2	8.0	10.1	12.6	15.5	18.7	22.3	26.4	30.8	35.6	40.7	46.2	52.1	58.4	64.9
2	1.3	1.6	2.0	2.5	3.1	3.8	4.6	5.4	6.4	7.4	8.5	9.7	10.9	12.2	13.6	15.0	16.4	17.9	19.5	21.1
3	1.2	1.5	1.8	2.1	2.5	3.0	3.5	4.0	4.6	5.2	5.8	6.5	7.2	7.9	8.6	9.3	10.0	10.8	11.5	12.3
4	1.2	1.4	1.7	1.9	2.2	2.6	2.9	3.3	3.7	4.2	4.6	5.0	5.5	6.0	6.4	6.9	7.4	7.8	8.3	8.8
5	1.2	1.4	1.6	1.8	2.1	2.3	2.6	2.9	3.2	3.6	3.9	4.2	4.5	4.9	5.2	5.6	5.9	6.2	6.6	6.9
6	1.1	1.3	1.5	1.7	1.9	2.1	2.4	2.6	2.9	3.1	3.4	3.7	3.9	4.2	4.5	4.7	5.0	5.2	5.5	5.7
7	1.1	1.3	1.4	1.6	1.8	2.0	2.2	2.4	2.6	2.8	3.1	3.3	3.5	3.7	3.9	4.1	4.3	4.5	4.7	4.9
8	1.1	1.3	1.4	1.6	1.7	1.9	2.1	2.3	2.4	2.6	2.8	3.0	3.2	3.3	3.5	3.7	3.9	4.0	4.2	4.3
9	1.1	1.2	1.4	1.5	1.7	1.8	2.0	2.1	2.3	2.4	2.6	2.8	2.9	3.1	3.2	3.4	3.5	3.6	3.8	3.9
10	1.1	1.2	1.3	1.5	1.6	1.7	1.9	2.0	2.2	2.3	2.4	2.6	2.7	2.8	3.0	3.1	3.2	3.3	3.4	3.6
11	1.1	1.2	1.3	1.4	1.6	1.7	1.8	1.9	2.1	2.2	2.3	2.4	2.5	2.7	2.8	2.9	3.0	3.1	3.2	3.3
12	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.9	2.0	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	3.0	3.0
13	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2.0	2.1	2.2	2.3	2.4	2.5	2.5	2.6	2.7	2.8	2.9
14	1.1	1.2	1.3	1.4	1.4	1.5	1.6	1.7	1.8	1.9	2.0	2.1	2.2	2.3	2.3	2.4	2.5	2.6	2.6	2.7
15	1.1	1.2	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.8	1.9	2.0	2.1	2.2	2.2	2.3	2.4	2.4	2.5	2.5
16	1.1	1.1	1.2	1.3	1.4	1.5	1.6	1.6	1.7	1.8	1.9	1.9	2.0	2.1	2.1	2.2	2.3	2.3	2.4	2.4
17	1.1	1.1	1.2	1.3	1.4	1.4	1.5	1.6	1.7	1.7	1.8	1.9	1.9	2.0	2.0	2.1	2.2	2.2	2.3	2.3
18	1.1	1.1	1.2	1.3	1.3	1.4	1.5	1.6	1.6	1.7	1.7	1.8	1.9	1.9	2.0	2.0	2.1	2.1	2.2	2.2
19	1.1	1.1	1.2	1.3	1.3	1.4	1.5	1.5	1.6	1.6	1.7	1.8	1.8	1.9	1.9	2.0	2.0	2.0	2.1	2.1
20	1.1	1.1	1.2	1.2	1.3	1.4	1.4	1.5	1.5	1.6	1.7	1.7	1.8	1.8	1.8	1.9	1.9	2.0	2.0	2.0

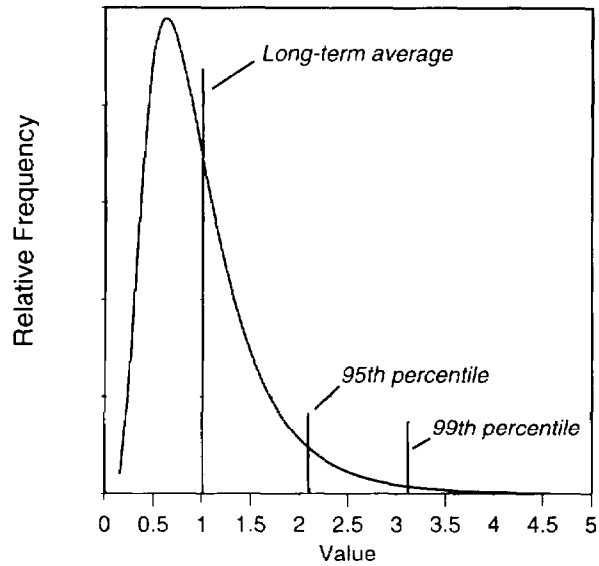

Figure 3-1a. Frequency Distribution of Values for a Lognormal Distribution with a Mean of 1.0 and a Coefficient of Variation of 0.6

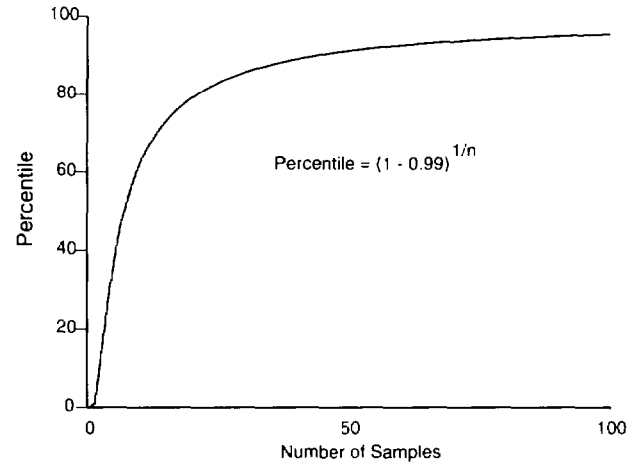

Figure 3-1c. Relationship Between the Largest Value of n Samples and the Percentile It Exceeds with 99 Percent Confidence

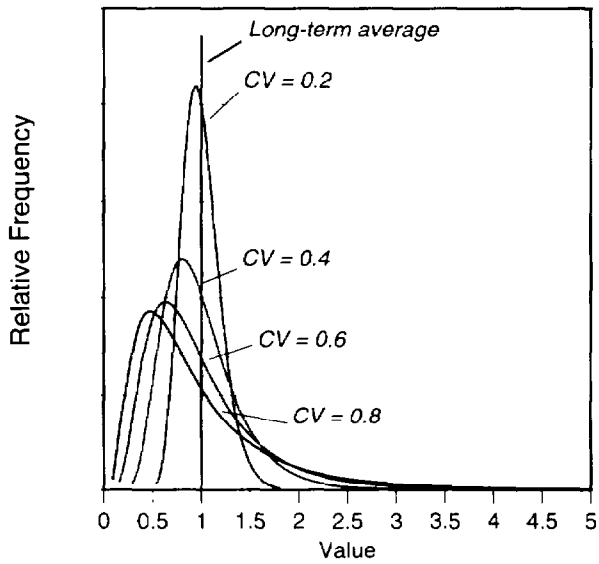

Figure 3-1b. Comparison of Relative Frequencies of Lognormal Distributions with a Mean of 1.0 for Different Coefficients of Variation

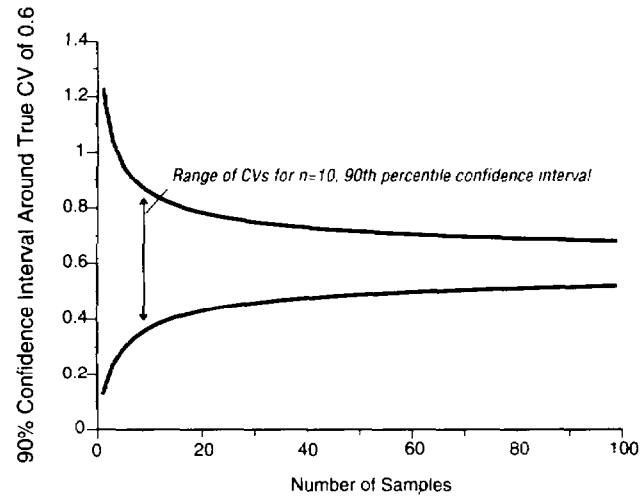

Figure 3-1d. Example of 90 Percent Confidence Intervals Around Coefficient of Variation Estimates for Numbers of Samples

2) With the exception of a small number of "outliers" for which confirmation is not possible, acute-to-chronic ratios (ACRs) above 20 for effluents discharged by NPDES permittees have not been observed by EPA. The majority of observed ACRs are very seldom above 10. However, higher ACRs may be found for selected facilities.

3) The use of the three commonly used freshwater species and of three of the five commonly used marine organisms has generally been sufficient to measure any effluent's toxicity for the purposes of projecting effluent toxicity impact and making regulatory decisions.

Figure 3-2 is a flow chart of EPA's recommendations for data generation for three different dilution scenarios. It is divided into three basic steps: determining initial dilution, developing toxicity testing procedures, and developing decision criteria for permit limit. There are certain basic assumptions built into this flow chart. The basic principle used in making decisions is to compare available dilution to known or projected toxic effect concentrations in order to place an effluent into one of three categories:

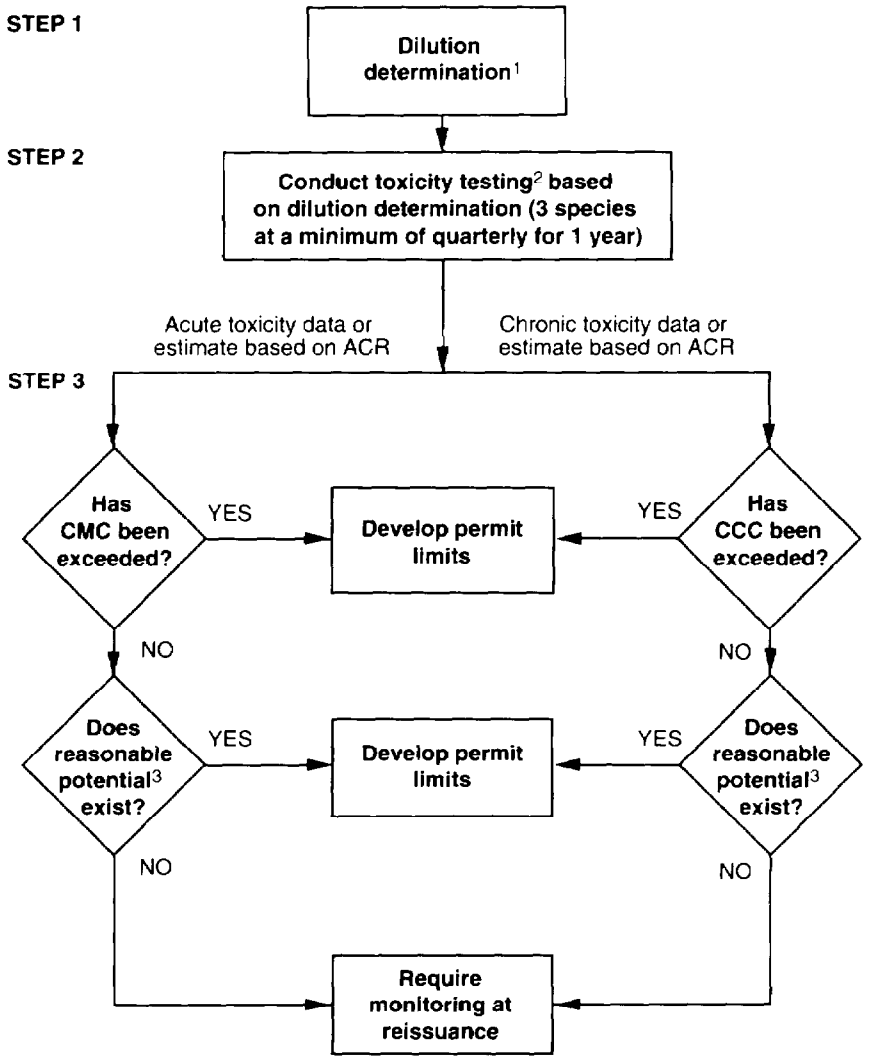

Notes:

[1]Dilution determinations should be performed for critical flows and any applicable mixing zones.

[2]Toxicity testing recommendations

a. Dilution > 1000:1: acute testing, check CMC only.

b. 100:1 < Dilution < 1000:1: acute or chronic testing, check CMC and CCC with data or ACR.

c. Dilution < 100:1: conduct chronic testing, check CCC with data and CMC using acute data or ACR.

[3]Reasonable potential: Use procedures in Box 3-3.

Figure 3-2. Effluent Characterization for Whole Effluent Toxicity

1) The effluent causes or contributes to an excursion of a numeric or narrative water quality criterion and the permit requires a limit on toxicity.

2) The effluent has a reasonable potential of causing or contributing to an excursion of a numeric or narrative water quality criterion and a limit is required.

3) The effluent has a very low probability of causing or contributing to an excursion of a water quality standard and no limit is required.

This categorization is accomplished by using dilution estimates in the first step and the results of the toxicity tests in the next steps. In addition, all these impact estimates assume discharge at critical conditions and imposition of any applicable mixing zone requirements. Therefore, a conservative assumption is used to determine whether or not an impact is projected to occur. Estimates of possible toxic impact are made assuming that the effluent is most toxic to the most sensitive species or lifestage at the time of lowest available dilution.

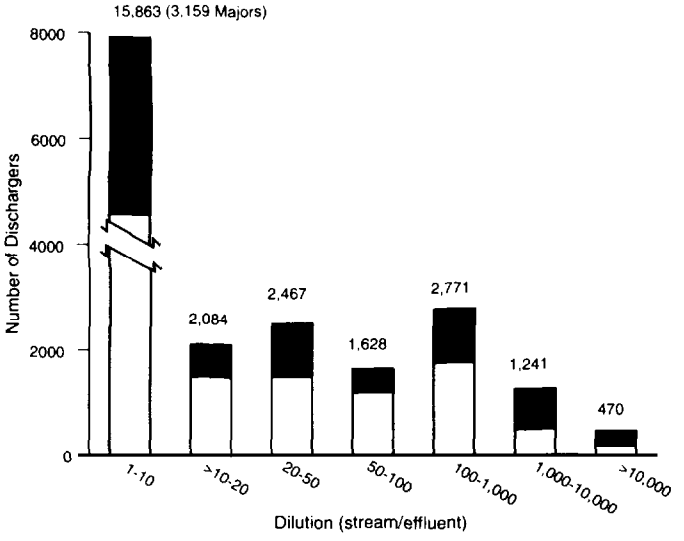

(a) At Low Flow (7Q10)

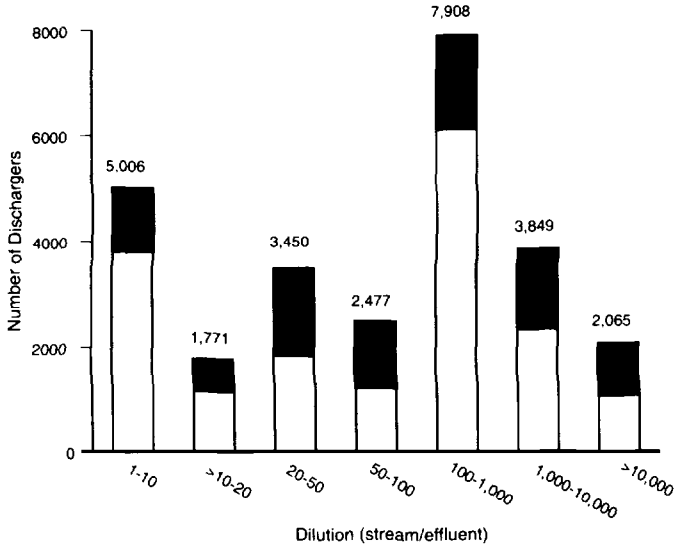

(b) At Annual Mean Flow

Figure 3-3. National Distribution of NPDES Dilution Conditions at 7Q10 and at Annual Mean Flow

The changes to the EPA's data generation recommendations eliminate the application of multiple sets of safety margins that was proposed in the 1985 version of this document. Rather, general observations on effluent toxicity described above now allow regulatory authorities to tighten the bounds of the initial dilution categorization, eliminate the species sensitivity uncertainty factor and target LC_{50}s of 1 percent and NOECs of 0.1 percent as the most extreme toxicity measurements that can normally be expected for the vast majority of effluents discharged by NPDES permittees for acute and chronic toxicity, respectively. The observation of toxicity was based on multiple dilution tests. The same observation may not hold for toxicity measured with single dilution tests (pass/fail). As reflected in Chapter 1, single dilution toxicity tests are much more variable than multiple dilution tests. **Therefore, the use of single concentration toxicity tests is strongly discouraged for this data generation process.**

Since the new data generation requirements are much less expensive than the previous requirements, tiered testing (less expensive, single-concentration, initial screening followed by increasingly expensive definitive data generation, using multiconcentration tests, as described in the September 1985 version of the technical support document) is unnecessary. However, **elimination of the requirement to conduct toxicity testing on the basis of projections using dilution alone is not recommended.** Although EPA's data review suggests that an LC_{50} of 1 percent and an NOEC of 0.1 percent are the lower bounds on effluent toxicity, there may be other effluents that are presently unmeasured that are more toxic. Testing data are always desirable for fully characterizing discharges of concern.

Steps in Whole Effluent Characterization Process

The following is a detailed description of the major steps presented in Figure 3-2 and the rationale behind each.

Step 1: Dilution Determination

The initial step is to determine the dilution of the effluent at the edge of the mixing zone, assuming the State allows mixing zones. Figure 3-4 shows a schematic representation of typical mixing zone requirements for both acute and chronic toxicity. Calculating the dilution at the edges of mixing zones for site-specific situations can be complicated. Modeling can be employed using either steady-state or dynamic approaches to calculate the dilution (see Chapter 4). However, for complex situations, such as marine and estuarine waters or lakes, dye studies (or other techniques used to assess mixing zones) may still be required.

Some State water quality standards do not allow the use of mixing in the control of acute toxicity. For these States, acute toxicity is often limited at the end of the pipe. Permit limits derived to enforce such requirements would be considered "water quality-based" because they would be based upon an ambient criterion (as opposed to an arbitrary test endpoint). Regardless, both chronic and acute toxicity must be assessed in these situations.

Step 2: Toxicity Testing Procedures

Where toxicity tests are required in order to make decisions regarding appropriate next steps in a screening protocol, **EPA recommends as a minimum that three species (for example, a vertebrate, an invertebrate, and a plant) be tested quarterly for a minimum of 1 year.** As discussed in Chapter 1, the use of three species is strongly recommended. Experience indicates that marine algae can be a highly sensitive test species for some effluents. Using a surrogate species of the plant kingdom adds another trophic level to the testing regimen. For both freshwater and marine situations, the use of three species is more protective than two species since a wider range of species sensitivity can be measured. EPA is continuing to develop toxicity test methods using additional organisms including plants. In addition, EPA has revised the test for *Selenastnum*, which has improved the test precision.

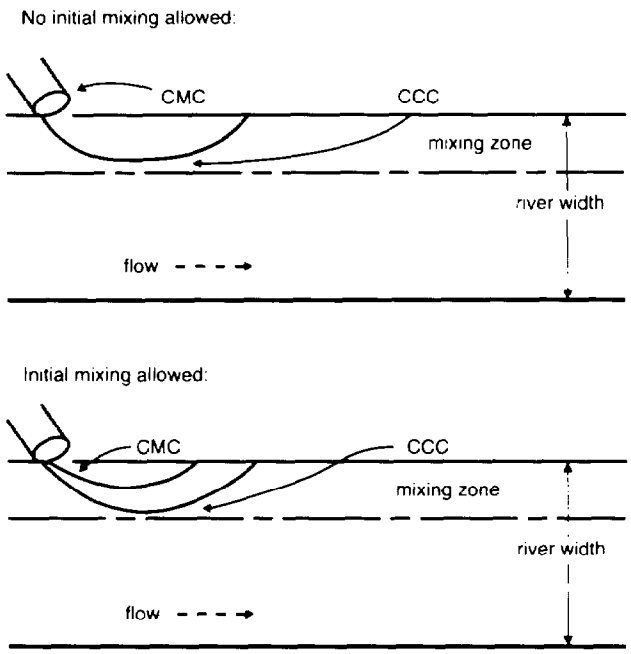

where

$CMC = 0.3\ TU_a$

$CCC = 1.0\ TU_c$

Figure 3-4. Schematic Representation of Mixing Zone Areas Where the CMC and CCC Apply

EPA recommends against selecting a "most sensitive" species for toxicity testing. For one organism to consistently be the most sensitive in a battery of toxicity tests, two conditions must occur: (1) the toxicants causing toxicity must remain the same, and (2) the ratios of the toxicants in the effluent (if more than one) must remain the same. Based on EPA's experience at the Duluth research laboratory, neither of these conditions is likely to occur. For example, the causes of effluent toxicity in POTWs can vary on a seasonal basis. Toxicity in the summer can be caused by pesticides to which invertebrates are most sensitive. However, the winter toxicity could be caused by ammonia to which fathead minnows will respond most sensitively. The most sensitive species for an effluent actually may not exist and at best is difficult to identify.

Conducting toxicity tests using three species quarterly for 1 year is recommended to adequately assess the variability of toxicity observed in effluents. Below this minimum, the chances of missing toxic events increase. The toxicity test result for the most sensitive of the tested species is considered to be the measured toxicity for a particular effluent sample.

The data generation recommendations in Figure 3-2 represent minimum testing requirements. Since uncertainty regarding whether or not an effluent causes toxic impact is reduced with more data, **EPA recommends that this test frequency be increased where necessary to adequately assess effluent variability.** If less frequent testing is required in the permit, it is preferable to use three species tested less frequently than to test the effluent more frequently with only a single species whose sensitivity to the effluent is not well characterized.

EPA recommends that a discharger conduct <u>acute</u> toxicity testing if the dilution of the effluent is greater than 1000:1 at the edge of the mixing zone [3]. Such a discharger would be considered a low priority for chronic toxicity testing. The rationale for this is that the effluent concentration would be below 0.1 percent at the edge of the mixing zone and thus incapable of causing an excursion above the CCC. A worst case NOEC of 0.1 percent translates into 1,000 TU_c, which would result in a concentration of less than 1.0 TU_c at the edge of the mixing zone for this dilution category. The test results would be compared to the CMC after consideration of any allowable mixing.

EPA recommends that a discharger conduct either <u>acute or chronic</u> toxicity testing if the dilution of the effluent falls between 100:1 and 1,000:1 at the edge of the mixing zone. Effluents have been shown to be both acutely and chronically toxic within this range of receiving water dilution. Under worst-case scenarios, LC_{50}s of 1.0 percent and ACRs of 10 will result in excursions above both the CCC and CMC at the edge of the regulatory mixing zone.

Although either acute or chronic testing can be required within this dilution range, acute testing would be more appropriate at the higher end of this dilution range (1,000:1 or 0.1 percent). At the lower end of this dilution range (100:1 or 1.0 percent), chronic tests may be more appropriate. Where other factors are equal, chronic testing may be preferable since the interim results in a chronic test gives data on acute toxicity as well. The acute endpoint data can then be used to compare directly to the CMC without the need for an ACR.

Whichever type of toxicity test (either acute or chronic) is specified, the results from that test should be compared to the criterion associated with that type of test. For example, a chronic test would be compared to the CCC. Comparisons to the other criteria can be made by using the ACR or additional data generated to convert a chronic test result to an acute endpoint and vice versa. For example, a chronic NOEC of 5 percent effluent (or 20 TU_c) represents an acute LC_{50} of 50 percent (or 2 TU_a) at an ACR of 10.

EPA recommends that a discharger conduct chronic toxicity testing if the dilution of the effluent falls below 100:1 at the edge of the mixing zone. The rationale for this recommendation is that chronic toxicity has been observed in some effluents down to the 1.0 percent effect concentration. Therefore, chronic toxicity tests, although somewhat more expensive to conduct, should be used directly in order to make decisions about toxic impact.

There is a potential for acute toxicity within this dilution range, although this is less likely as the 100:1 dilution level is approached. Thus, the recommended screening protocol shown in Figure 3-2 includes a determination of whether excursions above the CMC are projected [4]. This analysis may be performed by assuming an ACR, applying this value to the chronic toxicity testing data, and allowing for any allowable initial mixing. Alternatively, the regulatory authority may use the interim results in the chronic test to calculate the acute toxicity.

Both the chronic and acute toxicity test data would be compared to their respective criterion. The chronic test results would be compared to the CCC, and the acute results, regardless of how calculated, would be compared to the CMC.

Step 3: Decision Criteria for Permit Limit Development

Once the toxicity data have been generated for a discharger, the regulatory authority must decide whether or not the results show that the permittee causes, has the reasonable potential to cause, or contributes to an excursion of an applicable numeric or narrative water quality criterion and therefore needs to limit effluent toxicity. To do this, these data should be used to project receiving water concentrations, which are then compared to the CCC and CMC. One of four outcomes will be reached when following the screening protocol shown in Figure 3-2:

1) Excursion Above CMC or CCC—Where any one data point shows an excursion above the State's numeric or narrative criterion for the parameter toxicity, EPA regulations require a permit limit be set for whole effluent toxicity (40 *CFR* 122.44(d)(1)(iv or v)), unless limits on a specific chemical will allow the narrative water quality criterion to be attained or maintained. In the absence of a State numeric criterion for the parameter toxicity, **EPA recommends that 1.0 TU_c and 0.3 TU_a be used as the CCC and CMC, respectively.** The decision to develop permit limits based upon an excursion above either the CMC or CCC will lead to protection against both acute and chronic toxicity if the permit derivation procedures in Chapter 5 are used to set effluent limits.

2) Reasonable Potential for Excursion Above CMC or CCC—**EPA believes that "reasonable potential" is shown where an effluent is projected to cause an excursion above the CCC or CMC. This projection is based upon a statistical analysis of available data that accounts for limited sample size and effluent variability.** EPA's detailed recommendations for making a statistical determination based upon effluent monitoring data alone are shown in Box 3-2. Where a regulatory authority finds that test results alone indicate a "reasonable potential" to cause an excursion above a State water quality criterion in accordance with 40 *CFR* 122.44(d)(1)(ii), a permit limit must be developed.

   A regulatory authority may select an alternative approach for assessing reasonable potential. For example, an authority may opt to use a stochastic dilution model that incorporates both ambient dilution and effluent variability for determining reasonable potential. Such an approach is analogous to the statistical approach shown in Box 3-2. Whatever approach selected by the authority, it must use all the factors that account for all the factors listed in 40 *CFR* 122.44(d)(1)(ii).

   In some cases the statistical analysis of the effluent data may not actually project an excursion above the CMC or CCC but may be close. Under such conditions, reasonable potential determinations will include an element of judgment on the part of the regulatory authority. Other factors will need to be considered and given appropriate weight in the decisionmaking process, including value of waterbody (e.g., high-use fishery), relative proximity to the CCC or CMC, existing controls on point and nonpoint sources, information on effluent variability, compliance history of the facility, and type of treatment facility. These factors are summarized in Box 3-2 and are discussed in detail in Section 3.1. **EPA recommends regulatory authorities establish a written policy and procedure for making determinations of "reasonable potential" under these circumstances.**

3) No Reasonable Potential for Excursions Above CMC or CCC—In these situations, **EPA recommends that the toxicity tests recommended above be repeated at a frequency of at least once every 5 years as a part of the permit application.** Such testing is required for certain POTWs under 40 *CFR* 122.21(j).

4) Inadequate Information—Where a regulatory authority has inadequate information to determine reasonable potential for an excursion of a numeric or narrative water quality criterion, there may still be a basis for concern on the part of the authority. The permit should contain whole effluent toxicity monitoring requirements and a reopener clause. This clause would require reopening of the permit and establishment of a limit based upon any test results, or other new factors, which substantiate that the effluent causes, has the reasonable potential of causing, or contributes to an excursion above the CCC or CMC.

3.3.4 Use of Toxicity Testing in Multiple-source Discharge Situations

Where more than one discharge to the same receiving waterbody contributes, or has the reasonable potential to contribute to an excursion of water quality standards, permit limits must be developed for each individual discharger on that waterbody. For the regulatory authority to make this assessment, additional testing may be needed to provide the authority with the information necessary to assess the relative impact of each source. For purposes of this discussion, a multiple-source discharge situation is defined as a situation where impact zones overlap, or where ambient receiving water concentrations of a pollutant are elevated due to upstream discharges. In multiple-source discharge situations, additivity, antagonism, and persistence of toxicity can be of concern. To collect additional data, the permit authority should employ the toxicity testing procedures for multiple dischargers described in Box 3-3. In addition, ambient toxicity testing, as described below, could be used.

Assuming that screening has been conducted that reveals the need for permit limits, two options for controlling the discharges exist. The first option is for the permit authority to regulate each source separately using the procedures for individual point sources. In this option, the permitting authority would require use of upstream ambient water as a diluent in the toxicity test so as to be able to evaluate the contributions of upstream sources of toxicity. A second option is to treat each discharge as an interactive component of a whole system. In this option, the permit writer would determine a total maximum daily load for the receiving waterbody and develop individual wasteload allocations for each discharger using the procedures discussed in Chapter 4.

Box 3-3. Recommend Multiple-source Toxicity Testing Procedures

Tests

Where the combined effluents make up 1 percent or greater of the receiving waters, conduct chronic toxicity tests following the testing procedures described in Section 3.3.3.

Where the combined effluents make up less than 1 percent of the receiving waters, conduct acute toxicity tests following the testing procedures described in Section 3.3.3 (see Figure 3-2) to determine if any of the effluents are exhibiting toxicity.

An additional data requirement is the assessment of relative and absolute toxicity of each source so that appropriate permit conditions can be set for individual dischargers. The following procedure is suggested.

1) Conduct one set of toxicity tests on the effluents using a control of reconstituted or uncontaminated dilution water. The set of tests will give an absolute toxicity measurement of the effluent.

2) Run a parallel set of toxicity tests on the effluent using dilution water taken directly upstream from the point of discharge or, for estuarine waters, from an area outside of the immediate discharge impact zone (this will have to be determined by a dye study). This dilution water may be contaminated with upstream effluents or other toxicant sources. The purpose of this test is to project toxic impact of the effluent after it is mixed at its point of discharge. This is a relative effluent toxicity measurement. The relative testing procedure could result in a change in the standard concentration-effect curve generated by the testing. The dilution water for the relative toxicity test may cause significant mortality, growth, or reproductive effects at the lower effluent concentrations (including the 100 percent diluent control concentration) if the diluent from the receiving water is toxic (from an upstream discharge). Such mortality does not invalidate the test. Instead, analysis of toxicity trends resulting from the relative toxicity tests can be used to assess the effluent's toxicity in relation to other sources and ambient receiving water conditions. However, a control dilution water with no toxicity must be used for quality assurance and determination of absolute toxicity of the effluent.

3) Conduct ambient toxicity tests to (a) determine whether or not the effluent has a measurable toxicity after mixing, (b) measure persistence of toxicity from all sources contributing to receiving water toxicity, and (c) determine combined toxicity resulting from the mixing of multiple, point, and nonpoint sources of toxicity. See Appendix C for a discussion of ambient toxicity testing procedures.

The ambient testing can be required of each discharger and conducted during low-flow or worst-case design periods.

Frequency for Ambient Testing

All testing should be conducted simultaneously by each discharger, if possible. At a minimum, the tests should be conducted concurrently starting within a short time period (1 to 2 days). Repeated ambient toxicity analyses will be desirable when variable effluents are involved. Effluent toxicity data showing variability can be used to assess what frequency will be most applicable. The level of repetition for variability analysis should be similar to that used in effluent variability analyses.

Other Considerations

Dye studies of effluent dispersion for rivers, lakes, reservoirs, and estuaries are strongly recommended. This allows analysis of effluent concentration at the selected sampling stations above and below the discharge points.

The procedures suggested in this multiple source section are based on actual multiple source site investigations conducted under the Complex Effluent Toxicity Testing Program. Site reports from that study can be used to obtain further description of the toxicity testing procedures used to analyze multiple source toxic impact [1, 2].

3.3.5 Ambient Toxicity Testing

Ambient toxicity testing also is useful in screening receiving water bodies for existing toxic conditions. The procedure described in Appendix C uses short-term chronic toxicity tests to measure the toxicity of samples of receiving water taken above, at, and below outfalls. It can be used in freshwater, marine, and estuarine systems. The procedure must be conducted during an appropriate low-flow or worst-case design period.

The utility of the ambient toxicity screening approach is that actual receiving water toxicity is directly measured. No extrapolation from exposure or ACR is needed. Further, impact from multiple source discharge situations, which may not be apparent from individual discharger data, is identified. Finally, the technique can provide an assessment of the persistence of effluent toxicity.

3.3.6 Special Considerations for Discharges to Marine and Estuarine Environments

Special problems are encountered when assessing and controlling impacts of toxic pollutants discharged to marine and estuarine waterbodies. These special problems include the following:

- Determining the physical characteristics of estuaries and the complex mixing and effluent dilution situations for RWCs of effluents.
- Generating toxicity data on nonsaline effluents that discharge to brackish or saline waters and establishing cause-effect relationships on that basis.
- Assessing exposure and controlling impacts from persistent toxicants accumulating in fish and shellfish tissues and in sediments. These factors are particularly important in estuaries and near coastal waters because of high use of estuaries as breeding and fishing areas for important commercial seafood supplies and recreational fishing, and because many estuaries and near coastal waters act as sinks for pollutants that accumulate in sediments.

Where these special problems are encountered, additional information may need to be gathered to better quantify dilution, to determine metals partitioning, and to identify potential interferences in whole effluent toxicity tests.

To characterize the type of whole effluent toxicity that is most relevant for a particular discharge to marine and estuarine waters, the following questions should be considered [5]:

- What is the salinity of the receiving water, and is this important in terms of the State standards?
- What is the appropriate test organism to require for toxicity testing under differing salinity conditions?

The answers to these questions will enable the permitting authority to determine what type of toxicity testing is most suitable for effluent characterization and whole effluent toxicity control.

For most marine and estuarine discharges the choice of test species and dilution water should be made based on the characteristics of the receiving water at the critical conditions for flow, mixing, and salinity. Foremost in this determination should be the salinity of the receiving water and, to a lesser extent, the salinity of the effluent itself.

The primary objective of whole effluent toxicity tests is to identify sources of toxicity that can potentially cause an excursion of a State's narrative or numeric water quality criteria. For this reason, the toxicity tests should reflect the natural conditions of the receiving water so to be able to measure any effluent characteristic that could contribute to ambient toxicity. The marine toxicity test methods identify 1,000 mg/l as the point at which salinity begins to exert an effect on freshwater species. **As a general rule, EPA recommends that freshwater organisms be used when the receiving water salinity is less than 1,000 mg/l, and that marine organisms be used when the receiving water salinity equals or exceeds 1,000 mg/l.**

Saline Effluent Discharges to Saltwater

The dissolved salts in the effluent are pollutants. These salts may or may not be the same as those present in the receiving water. Also, the proportion of dissolved salts in the effluent may be different from that of the salts in the receiving water. In this case, the toxicity test needs to be able to determine if these salts contribute to ambient toxicity. For this reason, marine organisms are needed.

Saline Effluent Discharged to Freshwater

In this case, the dissolved salts in the effluent is a pollutant that does not exist in the receiving water. The toxicity test needs to determine whether the dissolved salts can be one of the toxicants that contribute to ambient toxicity. For this reason, freshwater organisms are needed.

Freshwater Effluent Discharged to Saltwater

In this instance, the lack of dissolved salts in the effluent can cause an apparent toxic effect to the marine organisms in the toxicity test. However, in contrast to the instances presented above, the toxicity test does not need to be able to measure this effect because a lack of salts is not a pollutant. The marine toxicity test methods account for this by requiring that the salinity of the effluent be adjusted to approximate the salinity of the receiving water. As an alternative to using a marine organism, a freshwater organism can be used if the test is being conducted only on a 100-percent effluent sample and if State water quality standards do not require that a marine organism be used.

3.3.7 Using a Chemical-specific Limit to Control Toxicity

EPA regulations at 40 *CFR* 122.44(d)(1)(v) provide that limits on whole effluent toxicity are not necessary where the permitting authority demonstrates in the fact sheet or statement of basis of the NPDES permit that chemical-specific limits for the effluent are sufficient to attain and maintain applicable numeric and narrative State water quality criteria. To make this demonstration that chemical-specific limits are sufficient, additional effluent information will be needed. **EPA recommends that the discharger conduct a toxicity identification evaluation to identify the causative agent(s) in the effluent.** Where the permitting authority determines that the demonstration required by 40 *CFR* 122.44(d)(1)(v) has been made, limits on whole effluent toxicity

need not be imposed. Effluent limits on the controlling chemical with concurrent whole effluent monitoring will be sufficient. Where subsequent whole effluent toxicity testing reveals the presence of toxicity in the effluent, the above process will need to be repeated, or alternatively a whole effluent toxicity limit will be needed. If continued toxicity testing shows that additional chemical-specific effluent limits are insufficient to control whole effluent toxicity, then toxicity limits may be the only practical way to control toxicity.

3.3.8 Effluent Characterization for Specific Chemicals

The previous section discussed effluent characterization for whole effluent toxicity. This section will describe EPA's recommendations for data generation to determine whether or not permit limits are needed to control specific chemical pollutants in effluents. While many of the same principles apply when developing chemical-specific limits, there are some differences based upon regulatory and analytical considerations.

Characterization of impacts due to specific chemicals do not require a determination of the type of testing as is required for whole effluent toxicity because there is generally only one type of test for specific chemicals. However, there are some antecedent steps that are unique to effluent characterization for specific chemicals: determination of the chemicals of concern and determination of acceptable ambient levels (RAC, CMC, or CCC) for these pollutants.

Steps for Chemical-specific Effluent Characterization Process

Figure 3-5 illustrates EPA's recommendations for determining whether or not permit limits need to be developed according to an evaluation of a limited data set. The following discussion corresponds to the various activities shown in Figure 3-5. (Refer to the human health discussion in Section 3.3.9 for additional details on procedures to characterize the bioconcentration potential of effluents.)

Step 1: Identify the Pollutants of Concern

This process should begin with an examination of existing data to determine the presence of specific toxicants for which criteria, standards, or other toxicity data are available. Sources of data include the following:

- Permit application forms, DMRs, permit compliance systems (PCS), and permit files
- Pretreatment industrial surveys
- STORET for ambient monitoring data
- SARA Title III Toxic Chemical Release Inventory
- Industrial effluent guidelines development documents
- The Treatability Manual [6]
- Effluent bioconcentration assessment (see Section 3.3.9).

Data on specific chemicals that are typically submitted with NPDES application forms will consist of a limited number of analytical test results for many of the reported parameters. Where the regulatory authority has reason to believe that additional data for key parameters of concern are needed in order to adequately characterize the effluent, this information should be requested as a part of the application or, in some cases, through the use of Section 308 letters. **It is recommended that 8 to 12 samples be analyzed for key parameters of concern.** In some cases, special analytical protocols will need to be specified in order to gather all appropriate information.

Step 2: Determine the Basis for Establishing RACs, CMCs, and CCCs for the Pollutants of Concern

The second step is to identify the appropriate water quality standard, including designated or existing use, and criteria for use. Ideally, the State water quality standards include aquatic life and human health criteria for the pollutants of concern. If a State does not have a numeric water quality criterion for the pollutant of concern, then one of three options for using the narrative criterion may be used (40 *CFR* 122.44(d)(1)(vi)) to determine whether a discharge causes, has the reasonable potential to cause, or contributes to an excursion above a narrative criteria because of an individual pollutant. Although the provisions of 40 *CFR* 122.44(d)(1)(vi) are presented in the regulation in the context of permit limit development, these same considerations should be applied in characterizing effluents in order to determine whether limits are necessary. The options available are as follows:

- **Option A** allows the regulatory authority to establish limits using a "calculated numeric water quality criterion" that the regulatory authority demonstrates will attain and maintain applicable narrative water quality criteria and fully protect the designated use. This option allows the regulatory authority to use any criterion that protects aquatic life and human health. This option also allows the use of site-specific factors, including local human consumption rates of aquatic foods, the State's determination of an appropriate risk level, and any other current data that may be available.

- **Option B** allows the regulatory authority to establish effluent limits using EPA's Water Quality Criteria guidance documents, if EPA has published a criteria document for the pollutant supplemented where necessary by other relevant information. As discussed earlier, EPA criteria documents provide a comprehensive summary of available data on the effects of a pollutant.

- **Option C** may be used to develop limits for a pollutant of concern based on an indicator parameter under limited circumstances. An example of an indicator parameter is total toxic organics (TTO); effluent limits on TTO are useful where an effluent contains organic compounds. However, use of this option must be justified to show that controls on one pollutant control one or more other pollutants to a level that will attain and maintain applicable State narrative water quality criteria and will protect aquatic life and human health (see 40 *CFR* 122.44(d)(1)(vi)(C)). Use of this option is restricted by regulation to those instances where it can be demonstrated that controls on indicator pollutants serve to control the toxicant of concern. Using Option A or Option B is a more direct and perhaps more defensible approach.

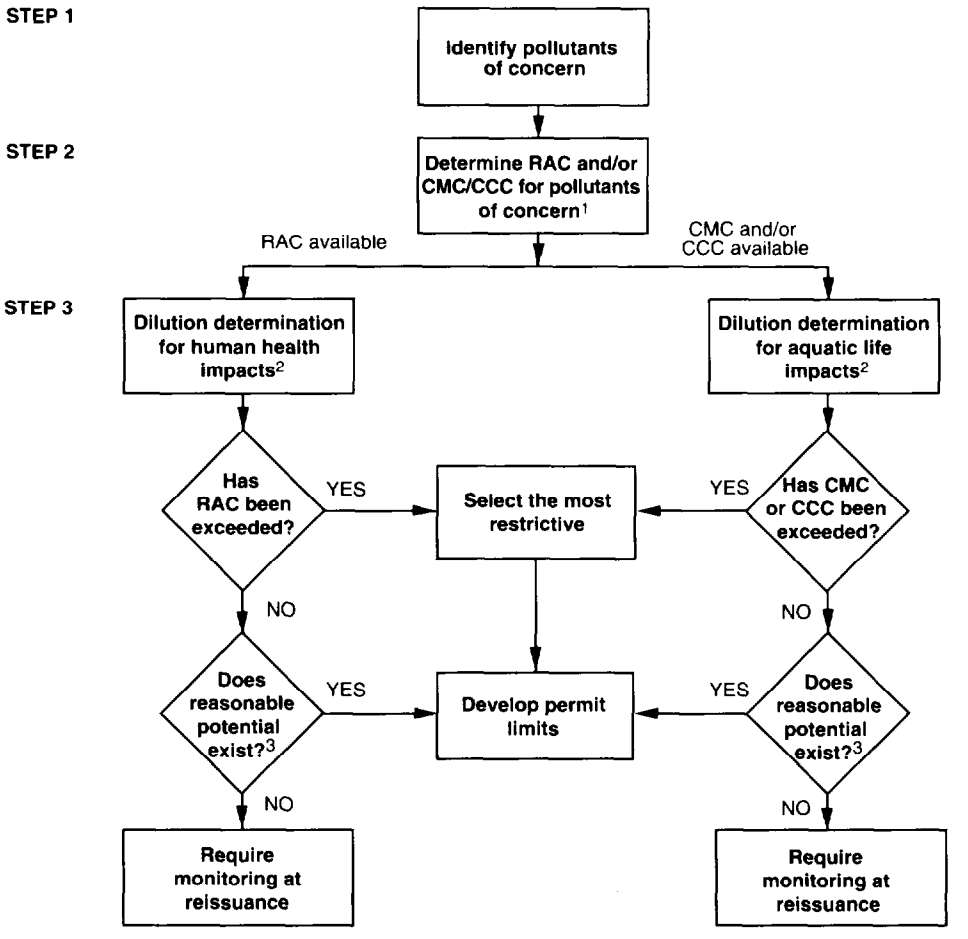

Notes:

[1] RAC and/or CMC/CCC: Use State numeric criterion or interpret State narrative criterion using one of three options specified under 40 *CFR* 122.44(d).

[2] Dilution determination: Perform for critical flow and for any applicable mixing zones for aquatic life and human health protection procedures, respectively.

[3] Reasonable potential: Use procedures in Boxes 3-2 and 3-4.

Figure 3-5. Effluent Characterization for Specific Chemicals

Step 3: Dilution Determination

The third step is to calculate the effluent dilution at the edge of the mixing zone. The pertinent factors for consideration here are the same as were previously presented for whole effluent toxicity with one difference: there are two levels of dilution analysis for chemical data. The first level is to use simple fate models based on a dilution analysis and comparison with the RAC, CMC, or CCC. The second level of analysis is to use more complex fate models, including dynamic models to estimate persistence, and may be applied to lakes, rivers, estuaries, and coastal systems using a desktop calculator or microcomputer. EPA has supported development of a second level of analysis that estimates point source wasteload allocations and nonpoint source allocations and predicts the resulting pollutant concentrations in receiving waters [7].

Step 4: Decision Criteria for Permit Limit Development

After this dilution analysis has been performed, the projected RWC is compared to the RAC, CMC, or CCC (either the State numeric criteria or an interpretation of the narrative criteria as described earlier). Whereas analysis of aquatic impacts should include evaluations with respect to both the CCC and the CMC, analysis of human health impacts will only involve comparisons with the RAC. The four possible outcomes discussed above in the triggers for permit limit development discussion in Section 3.3.3 also apply here:

- Excursion above the RAC, CMC, or CCC
- Reasonable potential for excursion above the RAC, CMC, or CCC

- No reasonable potential for excursion above the RAC, CMC, CCC
- Inadequate information.

If these evaluations project excursions or the reasonable potential to cause or contribute to an excursion above the RAC, CMC, or CCC, then a permit limit is required (40 *CFR* 122.44(d)(1)(iii)). The statistical approach shown in Box 3-2 or an analogous approach developed by a regulatory authority can be used to determine the reasonable potential. Effluents that are shown not to cause or that have a reasonable potential to cause or contribute to an excursion above an RAC, CMC, or CCC should be reevaluated at permit reissuance.

Where chemical-specific test results do not show a reasonable potential but indicate a basis for concern after consideration of the other factors discussed in Section 3.2, or if there were inadequate information to make a decision, the permit should contain chemical testing requirements and a reopener clause. This clause would require reopening of the permit and establishment of a limit based upon any test results that show effluent toxicity at levels that cause or have a reasonable potential to cause or contribute to an excursion above the RAC, CCC, or CMC.

3.3.9 Effluent Characterization for Bioconcentratable Pollutants

The previous section discussed how to characterize effects of specific chemicals, including those that may threaten human health, to determine whether or not a discharge causes, has the reasonable potential to cause, or contributes to excursions above an water quality criterion. The primary disadvantage of this approach is that it does not identify all effluent chemicals of potential concern for human health. To help address this gap, EPA is developing a procedure for identifying pollutants with the propensity to bioconcentrate in fish tissue. This procedure is presently in draft form and should not be used for establishing NPDES permit limits until EPA releases the final document on the procedure. This section describes the outline of this procedure.

The overall approach illustrated in Figure 3-6 is a seven-step procedure that starts with collecting samples and ends with developing permit effluent limits. The effluent characterization step unique to this approach lies in Step 3. There are two alternatives under this step: fish tissue residue and effluent assessment. An analytical chemistry laboratory with residue chemistry and gas chromatograph/mass spectometer (GC/MS) capability is needed to conduct the analytical methods for both alternatives. A summary of the alternatives follows:

- Tissue Residue Alternative: This alternative measures the concentrations of organic bioconcentratable chemicals in tissue samples of indigenous organisms from the receiving water. This analysis involves the collection of fish or shellfish samples, the extraction of the organic chemicals from the tissue and the analysis of these extracts with GC/MS to identify and quantify the bioconcentratable contaminants. The procedure provides recommendations to sort the results of this screening analysis in order to determine which of the contaminants pose a hazard and require regulatory action. The approach recommends that the identity of those contaminants then be confirmed prior to taking subsequent action.

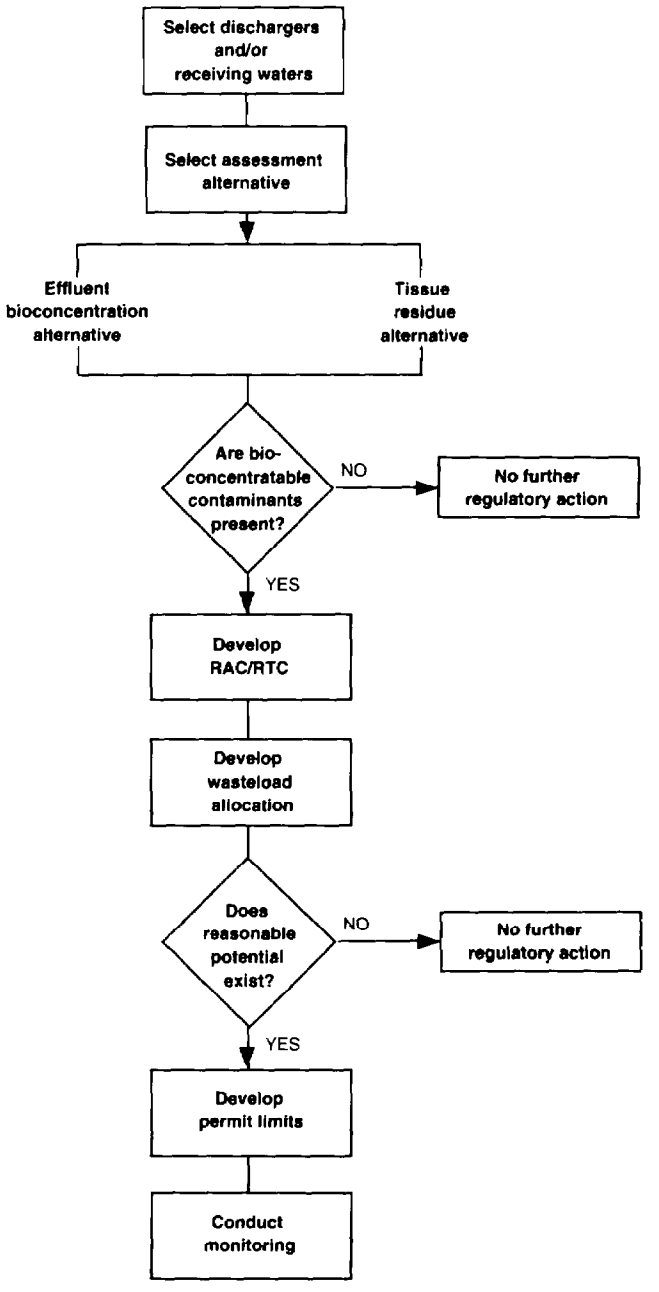

Figure 3-6. Procedure for Assessment and Control of Bioconcentratable Contaminants in Surface Waters

- Effluent Alternative: This alternative measures the concentrations of organic bioconcentratable chemicals in effluent samples from point source dischargers. This analysis involves the collection of effluent samples, the extraction of the organic chemicals from the effluent sample, and the separation of the chemicals that have characteristics known to result in bioconcentration from the other chemical components of the effluent sample. This separation is achieved by way of an analytical chemistry methodology called high-

pressure liquid chromotography (HPLC). The HPLC also separates (fractionates) an effluent sample into three subsamples or "fractions." These three fractions contain chemicals with increasing potential to bioconcentrate, with the third fraction containing those chemicals with the highest bioconcentration rates. Following HPLC fractionation, each fraction is then analyzed with GC/MS to identify and quantify the bioconcentratable contaminants. The effluent procedure also provides recommendations to sort the results of the initial screening analysis to determine which of the contaminants pose a hazard and require subsequent regulatory action. The approach then recommends that the identity of those contaminants then be confirmed prior to taking further regulatory action.

While both of the assessment alternatives described above may be used for a given discharger, generally one of these alternatives may be preferred by the regulatory authority. The regulatory authority would select the assessment approach based on the available site- and facility-specific information and the objectives of the application.

Although the approach provides a means to identify chemicals that can bioconcentrate, it does not identify all bioconcentratable chemicals. Chemicals that bioconcentrate include many organic compounds, and a small number of metals (e.g., mercury and selenium) and organometals (e.g., tributyltin). The new approach is limited to nonpolar organic chemicals that produce measurable chemical residues in aquatic organisms or that have log octanol-water partition coefficients greater than 3.5.

3.3.10 Analytical Considerations for Chemicals

Analysis of discharges for toxic substances requires special quality control procedures beyond those necessary for conventional parameters. Toxicants can occur in trace concentrations and are frequently volatile or otherwise unstable. An EPA publication entitled, *Test Methods—Technical Additions to Methods for Chemical Analysis of Water and Wastes* [8], contains sampling and handling procedures recommended by EPA for a number of toxic and conventional parameters. Additional methods for analyses for toxicants are described in Standard Methods of Water and Wastewater Analyses (ASTM, 17th edition, 1989, or most recent edition) and 40 CFR Part 136. Chapter 5 discusses detection limits and sampling requirements.

CHAPTER 3
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4. EXPOSURE AND WASTELOAD ALLOCATION

4.1 INTRODUCTION

At this point in the toxics control process, a water quality problem has been identified. Screening analyses may have been done to assess the extent of toxicity, or a wasteload allocation (WLA) based on an existing total maximum daily load (TMDL) may already have been established. A TMDL is the sum of the individual WLAs for point sources and load allocations (LAs) for nonpoint sources of pollution and natural background sources, tributaries, or adjacent segments. WLAs represent that portion of a TMDL that is established to limit the amount of pollutants from existing and future point sources so that surface water quality is protected at all flow conditions.

The TMDL process uses water quality analyses to predict water quality conditions and pollutant concentrations. Limits on wastewater pollutant loads are set and nonpoint source allocations are established so that predicted receiving water concentrations do not exceed water quality criteria. TMDLs and WLAs/LAs should be established at levels necessary to attain and maintain the applicable narrative and numerical water quality standards, with seasonal variations and a margin of safety that takes into account any lack of knowledge concerning the relationship between point and nonpoint source loadings and water quality. Determination of WLAs/LAs and TMDLs should take into account critical conditions for stream flow, loading, and water quality parameters. Conditions that will protect the receiving water have been determined from State numeric or narrative water quality criteria.

This chapter is divided into sections that explain the steps that precede establishment of a WLA and then the methods and tools (models) that can be used to determine the WLA. Section 4.2 briefly discusses TMDLs and how they relate to waters identified as requiring a water quality-based approach for toxics control. The section also discusses different WLA schemes. Sections 4.3 and 4.4 discuss mixing zones, areas described as allocated impact zones where acute and chronic water quality criteria may be exceeded. Section 4.3 provides background information on mixing zones and discusses EPA's mixing zone policy and how this policy affects the allowable toxic load that can be discharged from a point source. State mixing zone dimensions and the determination of mixing zone boundaries are also discussed.

Section 4.4 discusses mixing zone analyses for situations in which the discharge does not mix completely with the receiving water within a short distance. Included in Section 4.4 are discussions of outfall designs that maximize initial dilution in the mixing zone, critical design periods for mixing zone analyses, and methods to analyze and model near-field and far-field mixing.

Section 4.5 discusses the calculations of the WLA and LA and the types of EPA-recommended mathematical models available to determine WLAs in completely mixed situations for both aquatic life and human health. The WLA models listed in Section 4.5 can be used to predict ambient concentrations and to calculate the effluent quality required to meet the criteria and protect designated and existing uses of the receiving water. The data requirements of each of these models are also described so that the effluent characterization procedures described in Chapter 3 can be designed to support the specific types of WLA modeling selected by the regulator. Section 4.6 discusses human health considerations and how to determine WLAs for human health toxicants.

EPA is currently working on methods to develop sediment criteria. Once developed, point source discharges could be further limited to prevent accumulation of pollutants in the bed sediment; such accumulation impairs beneficial uses. Although the criteria are not yet available for this document, they will be addressed in future documents. In the meantime, some of the models discussed in Section 4.5 are capable of simulating interactions between the water column and sediment and between toxic transport and transformation in the sediment. EPA is encouraging the States to consider the role of sediments in WLA.

4.2 TOTAL MAXIMUM DAILY LOADS AND WASTELOAD ALLOCATIONS

4.2.1 Total Maximum Daily Loads

The Federal Clean Water Act (CWA), under Section 303(d), requires the establishment of TMDLs for "water quality limited" stream segments. In such segments, water quality does not meet applicable water quality standards and/or is not expected to meet applicable water quality standards even after the application of the technology-based effluent limitations. A TMDL includes a determination of the amount of a pollutant, or property of a pollutant, from point, nonpoint, and natural background sources, including a margin of safety, that may be discharged to a water quality-limited waterbody. Any loading above this loading capacity risks violating water quality standards. TMDLs can be expressed in terms of chemical mass per unit of time, by toxicity, or by other appropriate measures. Permits should be issued based on TMDLs where available.

The establishment of a TMDL for a particular waterbody is dependent on the location of point sources, available dilution, water quality standards, nonpoint source contributions, background conditions, and instream pollutant reactions and effluent toxicity. All of these factors can affect the allowable mass of the pollutant in the waterbody. Thus, two issues must be determined in conjunction with the establishment of the TMDL: (1) the definition of upstream and downstream boundaries of the waterbody for which the TMDL is being determined, and (2) the definition of critical conditions. For the following discussion, the waterbody boundaries are delineated as the portion of the waterbody be-

tween the pollutant source (whether point source or nonpoint source) that is farthest upstream and the downstream point at which water quality has recovered to the background quality found above the pollutant source that is farthest upstream. The delineation of critical conditions for stream flow, loading, and water quality parameters may be specific to the type of waterbody and is discussed in Section 4.4.

TMDLs are established based on water quality criteria pertinent to the designated and existing uses for the waterbody in question. TMDLs are traditionally calculated using State water quality standards as applied to a specific waterbody. Such a fitting of the TMDL to desired water quality criteria requires information concerning the distribution of loadings within the waterbody, namely, the locations and relative contributions of pollutant-specific loadings from point, nonpoint, and background sources during all flow conditions (40 *CFR* 130.2(f)). Low-flow TMDLs, by themselves, will not be adequate in situations where nonpoint source loadings (LAs) during high or intermediate flow conditions cause excursions above water quality standards (40 *CFR* 130.2(f)).

The loading capacity of TMDLs have been determined in many ways, but the most common method is to find the pollutant loading that will attain and maintain applicable water quality criteria. For example, in the Tualatin River Basin in Oregon, loading capacity was determined by multiplying stream flow in critical flow periods by the pollutant water quality standard [1]. Another method of determining a loading capacity is by quantifying instream toxicity. This method was used in developing a TMDL for the Amelia River in Florida [2].

The allowable TMDL is defined as the sum of the individual WLAs and LAs; a margin of safety can be included with the two types of allocations to ensure that allocated loads, regardless of source, would not produce an excursion above water quality standards. The WLAs are those portions of the TMDL assigned to point sources; the LAs are those portions of the TMDL assigned to the sum of all nonpoint sources and background sources (40 *CFR* 130.2(f)). The background sources represent loadings to the specified waterbody or stream segment that come from sources outside the defined segment. For example, loadings from regions upstream of the segment and estimated atmospheric deposition of the pollutant would constitute background sources. Sediments that are highly contaminated from upstream discharges or historical discharges might also act as a source of toxicants and contribute to the background levels; these sediments also may be part of the nonpoint sources.

The TMDL represents a mass loading that may occur over a given time period to attain and maintain water quality standards. As a result, the design flows under which the TMDL is determined can significantly alter its value. This phenomenon results in a somewhat unusual dichotomy. The design flows for aquatic life protection most applicable to point source loadings (WLAs) usually involve low-flow events (e.g., 7Q10) because the volumes associated with the point sources generally do not decrease with decreased stream flow. As a result, the highest concentrations associated with specific point source loads would be expected under low flow conditions. Conversely, elevated nonpoint source pollutant loadings (i.e., urban, agricultural) generally correspond to storm events. In fact, agricultural and urban runoff are often minimal or nonexistent in the absence of precipitation (i.e., nonexistent under low-flow drought conditions).

The TMDL is a composite of the allowable loads associated with point sources and nonpoint sources within the defined boundaries of the waterbody segment and the background loadings to that segment from upstream and from in-place sediments. Therefore, the TMDL should be evaluated under conditions that reflect worst-case (critical) conditions for both point and nonpoint source loadings (i.e., low-flow drought and high flow conditions). Determination of the TMDL under these two scenarios would identify the lower of the two loading capacities of the waterbody. This lower capacity is necessary to protect the waterbody in question.

In the case of design flows for human health protection, the harmonic mean flow is recommended as the basis for TMDLs for carcinogens. Design flows for human health protection should consider worst-case conditions for both point and nonpoint source loadings under this flow condition (see Section 4.6).

In many cases, LAs for nonpoint sources are difficult to assess because the information needed to describe the runoff associated with the high-flow storm events does not exist. This lack of information is due to the high variability of the events. Because of the importance of estimating the nonpoint contributions to the waterbody, site-specific models may be required to estimate nonpoint source loadings. Even then, detailed models are difficult to calibrate with accuracy without intensive monitoring studies, and simplistic correlations between loadings and rainfall can be, by their statistical nature, unreliable for estimating low-frequency events (e.g., worst 10-year storm). The uncertainties associated with nonpoint source loadings and background sources require that the TMDL be determined with a sufficient margin of safety to allow for significant variability in nonpoint source loadings.

CWA Section 303(d) and EPA regulations (40 *CFR* Parts 35 and 130, January 11, 1985) require that TMDLs contain a margin of safety "which takes into account any lack of knowledge concerning the relationship between effluent limitations and water quality." The margin of safety is to take into account any uncertainties related to development of the water quality-based control, including any uncertainties in pollutant loadings, ambient conditions, and the model analysis. The size of the required margin of safety can, of course, be reduced by collecting additional information, which reduces the amount of uncertainty. The margin of safety can be provided for in the TMDL process by one of the following:

- Reserving a portion of the loading capacity to a separate margin of safety.
- Including a margin of safety within the individual WLAs for point sources and within the LAs for nonpoint sources and background sources.

Most TMDLs are developed using the second approach, most often through the use of conservative design conditions.

In addition, all WLAs, LAs, and TMDLs must meet the State antidegradation provisions developed prusuant to the Water Quality Standards Regulation (Section 131.12 of 40 *CFR* Part 131,

November 8, 1983). This regulation establishes explicit procedures that must be followed prior to lowering existing water quality to a level that still supports the Section 101(a)(2) "fishable/swimmable" goal of the Act. WLAs, LAs, and TMDLs that allow such a decline in water quality cannot be established unless the applicable public participation and intergovern-mental review requirements of the antigradation provisions have been met and all existing uses are fully maintained and protected.

4.2.2 Wasteload Allocation Schemes

WLAs for water quality-based toxics permits must be set in accordance with EPA regulations [3, 4]. EPA has developed a number of WLA guidance documents to assist regulatory authorities in developing TMDLs and WLAs. The EPA Office of Water Regulations and Standards, Assessment and Watershed Protection Division, maintains the latest listing of all WLA guidance documents. Toxic WLA guidance documents are currently available for rivers and streams [5], lakes and reservoirs [6], and estuaries [7]. Guidance for the determination of critical design conditions for steady-state modeling of rivers and streams also is available [8].

Table 4-1 lists 19 allocation schemes that may be used by the States to develop WLAs. This is not intended to be a complete list of approaches; regulatory authorities may use any reasonable allocation scheme that meets the antidegradation provisions and other requirements of State water quality standards [3].

The most commonly used allocation methods have been equal percent removal, equal effluent concentrations, and a hybrid method. The equal percent removal approach can be applied in two ways: the overall removal efficiencies of each pollutant source must be equal, or the incremental removal efficiencies must be equal. The equal effluent concentration approach also can be applied in two acceptable ways—equal final concentrations or equal incremental concentration reductions. This method is similar to the equal percent removal method if influent concentrations at all sources are approximately the same. However, if one point source has substantially higher influent levels, requiring equal effluent concentrations will result in higher overall treatment levels for that source than the equal percent removal approach.

The final commonly used method of allocating wasteloads is a hybrid method in which the criteria for waste reduction may not be the same for each point source. One facility may be allowed to operate unchanged, while another may be required to provide the entire load reduction. More often, a proportionality rule that requires the percent removal to be proportional to the input loading can be assigned. In these cases, larger sources would be required to achieve higher overall removals.

4.3 INCOMPLETELY MIXED, DISCHARGE RECEIVING WATER SITUATIONS

Mixing zones are areas where an effluent discharge undergoes initial dilution and are extended to cover the secondary mixing in the ambient waterbody. A mixing zone is an allocated impact zone where acute and chronic water quality criteria can be exceeded as long as a number of protections are maintained, including freedom from the following:

- Materials in concentrations that settle to form objectionable deposits
- Floating debris, oil, scum, and other matter in concentrations that form nuisances

Table 4-1. Wasteload Allocation Methods [9]

1. Equal percent removal (equal percent treatment)
2. Equal effluent concentrations
3. Equal total mass discharge per day
4. Equal mass discharge per capita per day
5. Equal reduction of raw load (pounds per day)
6. Equal ambient mean annual quality (mg/l)
7. Equal cost per pound of pollutant removed
8. Equal treatment cost per unit of production
9. Equal mass discharged per unit of raw material used
10. Equal mass discharged per unit of production

11a. Percent removal proportional to raw load per day

11b. Larger facilities to achieve higher removal rates

12. Percent removal proportional to community effective income

13a. Effluent charges (dollars per pound, etc.)

13b. Effluent charge above some load limit

14. Seasonal limits based on cost-effectiveness analysis
15. Minimum total treatment cost
16. Best availability technology (BAT) (industry) plus some level for municipal inputs
17. Assimilative capacity divided to require an "equal effort among all dischargers"

18a. Municipal: treatment level proportional to plant size

18b. Industrial: equal percent between best practicable technology (BPT) and BAT, i.e., Allowable wasteload allocation:

$$(WLA) = BPT - \frac{x}{100}(BPT - BAT)$$

19. Industrial discharges given different treatment levels for different stream flows and seasons. For example, a plant might not be allowed to discharge when stream flow is below a certain value, but below another value, the plant would be required to use a higher level of treatment than BPT. Finally, when stream flow is above an upper value, the plant would be required to treat to a level comparable to BPT.

- Substances in concentrations that produce objectionable color, odor, taste, or turbidity

- Substances in concentrations that produce undesirable aquatic life or result in a dominance of nuisance species.

Acutely toxic conditions are defined as those lethal to aquatic organisms that may pass through the mixing zone. As discussed in Chapter 2, the underlying assumption for allowing a mixing zone is that a small area of concentrations in excess of acute and chronic criteria, but below acutely toxic releases, can exist without causing adverse effects to the overall waterbody. The State regulatory agency can decide to allow or deny a mixing zone on a site-specific basis. For a mixing zone to be permitted, the discharger should prove to the State regulatory agency that all State requirements for a mixing zone are met.

When wastewater is discharged into a waterbody, its transport may be divided into two stages with distinctive mixing characteristics. Mixing and dilution in the first stage are determined by the initial momentum and buoyancy of the discharge. This initial contact with the receiving water is where the concentration of the effluent will be its greatest in the water column. The design of the discharge outfall should provide ample momentum to dilute the concentrations in the immediate contact area as quickly as possible.

The second stage of mixing covers a more extensive area in which the effect of initial momentum and buoyancy is diminished and the waste is mixed primarily by ambient turbulence. In large rivers or estuaries, this second-stage mixing area may extend for miles before uniformly mixed conditions are attained. In some instances, such as larger lakes or coastal bays, completely mixed conditions are never reached in the waterbody. The general definition for a completely mixed condition is when no measurable difference in the concentration of the pollutant (e.g., does not vary by more than 5 percent) exists across any transect of the waterbody.

This section provides background information on the policy of mixing zones and the means to characterize them for use in WLAs (Section 4.5). The first subsection discusses the concerns that must be addressed when the boundaries and restrictions of a mixing zone are determined. The second subsection discusses the guidelines for preventing lethal conditions in the mixing zone.

4.3.1 Determination of Mixing Zone Boundaries

Allowable mixing zone characteristics should be established to ensure the following:

- Mixing zones do not impair the integrity of the waterbody as a whole.

- There is no lethality to organisms passing through the mixing zone.

- There are no significant health risks, considering likely pathways of exposure (see Section 2.2.2).

The Water Quality Criteria—1972 [10] recommends that mixing zone characteristics be defined on a case-by-case basis after it has been determined that the assimilative capacity of the receiving system can safely accommodate the discharge. This assessment should take into consideration the physical, chemical, and biological characteristics of the discharge and the receiving system; the life history and behavior of organisms in the receiving system; and the desired uses of the waters. Nearly all States require such an analysis before they allow a mixing zone [11]. Further, mixing zones should not be permitted where they may endanger critical areas (e.g., drinking water supplies, recreational areas, breeding grounds, areas with sensitive biota).

EPA has developed a holistic approach to determine whether a mixing zone is tolerable [12]. The method considers all the impacts to the waterbody and all the impacts that the drop in water quality will have on the surrounding ecosystem and waterbody uses. It is a multistep data collection and analysis procedure that is particularly sensitive to overlapping mixing zones. It includes the identification of all upstream and downstream waterbodies and the ecological and cultural data pertaining to them; the collection of data on all present and future discharges to the waterbody; the assessment of relative environmental value and level of protection needed for the waterbody; and, finally, the allocation of environmental impact for a discharge applicant. Because of the difficulty in collecting the data necessary for this procedure and the general lack of agreement concerning relative values, this method will be difficult to implement in full. However, the method does serve as a guide on how to proceed in allocating a mixing zone.

Most States allow mixing zones as a policy issue, but provide spatial dimensions to limit the areal extent of the mixing zones. The mixing zones are then allowed (or not allowed) after case-by-case determinations. State regulations dealing with streams and rivers generally limit mixing zone widths, cross-sectional areas, and flow volumes and allow lengths to be determined on a case-by-case basis. For lakes, estuaries, and coastal waters, dimensions are usually specified by surface area, width, cross-sectional area, and volume.

Where a mixing zone is allowed, water quality standards are met at the edge of that regulatory mixing zone during design flow conditions and generally, (1) provide a continuous zone of passage that meets water quality criteria for free-swimming and drifting organisms and (2) prevent impairment of critical resource areas. Individual State mixing zone dimensions are designed to limit the impact of a mixing zone on the waterbody. Furthermore, EPA's review of State WLAs should evaluate whether assumptions of complete or incomplete mixing are appropriate based on available data.

In river systems, reservoirs, lakes, estuaries, and coastal waters, zones of passage are defined as continuous water routes of such volume, area, and quality as to allow passage of free-swimming and drifting organisms so that no significant effects are produced on their populations. Transport of a variety of organisms in river water and by tidal movements in estuaries is biologically important in a number of ways: food is carried to the sessile filter

feeders and other nonmobile organisms, spatial distribution of organisms and reinforcement of weakened populations are enhanced, and embryos and larvae of some fish species develop while drifting [11]. Anadromous and catadromous species must be able to reach suitable spawning areas. Their young (and in some cases the adults) must be assured a return route to their growing and living areas. Many species make migrations for spawning and other purposes. Barriers or blocks that prevent or interfere with these types of essential transport and movement can be created by water with inadequate chemical or physical quality.

As explained above, a State regulatory agency may decide to deny a mixing zone in a site-specific case. For example, denial should be considered when bioaccumulative pollutants are in the discharge. The potential for a pollutant to bioaccumulate in living organisms is measured by (1) the bioconcentration factor (BCF), which is chemical-specific and describes the degree to which an organism or tissue can acquire a higher contaminant concentration than its environment (e.g., surface water); (2) the duration of exposure; and (3) the concentration of the chemical of interest. While any BCF value greater than 1 indicates that bioaccumulation potential exists, bioaccumulation potential is generally not considered to be significant unless the BCF exceeds 100 or more. Thus, a chemical that is discharged to a receiving stream, resulting in low concentrations, and that has a low BCF value will not create a bioaccumulation hazard. Conversely, a chemical that is discharged to a receiving stream, resulting in a low concentration but having a high BCF value, may cause in a bioaccumulation hazard. Also, some chemicals of relatively low toxicity, such as zinc, will bioconcentrate in fish without harmful effects resulting from human consumption.

Another example of when a regulator should consider prohibiting a mixing zone is in situations where an effluent is known to attract biota. In such cases, provision of a continuous zone of passage around the mixing area will not serve the purpose of protecting aquatic life. A review of the technical literature on avoidance/attraction behavior revealed that the majority of toxicants elicited an avoidance or neutral response at low concentrations [13]. However, some chemicals did elicit an attractive response, but the data were not sufficient to support any predictive methods. Temperature can be an attractive force and may counter an avoidance response to a pollutant, resulting in attraction to the toxicant discharge. Innate behavior such as migration may also supersede an avoidance response and cause fish to incur a significant exposure.

4.3.2 Minimizing the Size of Mixing Zones

Concentrations above the chronic criteria are likely to prevent sensitive taxa from taking up long-term residence in the mixing zone. In this regard, benthic organisms and territorial organisms are likely to be of greatest concern. The higher the concentrations occurring within an isopleth, the more taxa are likely to be excluded, thereby affecting the structure and function of the ecological community. It is thus important to minimize the overall size of the mixing zone and the size of elevated concentration isopleths within the mixing zone.

4.3.3 Prevention of Lethality to Passing Organisms

The *Water Quality Standards Handbook* [14] indicates that whether to establish a mixing zone policy is a matter of State discretion, but that any State policy allowing for mixing zones must be consistent with the CWA and is subject to approval of the Regional Administrator. The handbook provides additional discussion regarding the basis for a State mixing zone policy.

Lethality is a function of the magnitude of pollutant concentrations and the duration an organism is exposed to those concentrations. Requirements for wastewater plumes that tend to attract aquatic life should incorporate measures to reduce the toxicity (e.g., via pretreatment, dilution) to minimize lethality or any irreversible toxic effects on aquatic life.

EPA's water quality criteria provide guidance on the magnitude and duration of pollutant concentrations causing lethality. The criterion maximum concentration (CMC) is used as a means to prevent lethality or other acute effects. As explained in Appendix D, the CMC is a toxicity level and should not be confused with an LC_{50} level. The CMC is defined as one-half of the final acute value for specific toxicants and 0.3 acute toxic unit (TU_a) for effluent toxicity (see Chapter 2). The CMC describes the condition under which lethality will not occur if the duration of the exposure to the CMC level is less than 1 hour. The CMC for whole effluent toxicity is intended to prevent lethality or acute effects in the aquatic biota. The CMC for individual toxicants prevents acute effects in all but a small percentage of the tested species. Thus, the areal extent and concentration isopleths of the mixing zone must be such that the 1-hour average exposure of organisms passing through the mixing zone is less than the CMC. The organism must be able to pass through quickly or flee the high-concentration area. The objective of developing water quality recommendations for mixing zones is to provide time-exposure histories that produce negligible or no measurable effects on populations of critical species in the receiving system.

Lethality to passing organisms can be prevented in the mixing zone in one of four ways. The first method is to prohibit concentrations in excess of the CMC in the pipe itself, as measured directly at the end of the pipe. As an example, the CMC should be met in the pipe whenever a continuous discharge is made to an intermittent stream. The second approach is to require that the CMC be met within a very short distance from the outfall during chronic design-flow conditions for receiving waters (see Section 4.4.2).

If the second alternative is selected, hydraulic investigations and calculations indicate that the use of a high-velocity discharge with an initial velocity of 3 meters per second, or more, together with a mixing zone spatial limitation of 50 times the discharge length scale in any direction, should ensure that the CMC is met within a few minutes under practically all conditions. The discharge length scale is defined as the square root of the cross-sectional area of any discharge pipe.

A third alternative (applicable to any waterbody) is not to use a high-velocity discharge. Rather the discharger should provide

data to the State regulatory agency showing that the most restrictive of the following conditions are met for each outfall:

- The CMC should be met within 10 percent of the distance from the edge of the outfall structure to the edge of the regulatory mixing zone in any spatial direction.

- The CMC should be met within a distance of 50 times the discharge length scale in any spatial direction. In the case of a multiport diffuser, this requirement must be met for each port using the appropriate discharge length scale of that port. This restriction will ensure a dilution factor of at least 10 within this distance under all possible circumstances, including situations of severe bottom interaction, surface interaction, or lateral merging.

- The CMC should be met within a distance of five times the local water depth in any horizontal direction from any discharge outlet. The local water depth is defined as the natural water depth (existing prior to the installation of the discharge outlet) prevailing under mixing zone design conditions (e.g., low flow for rivers). This restriction will prevent locating the discharge in very shallow environments or very close to shore, which would result in significant surface and bottom concentrations.

A fourth alternative (applicable to any waterbody) is for the discharger to provide data to the State regulatory agency showing that a drifting organism would not be exposed to 1-hour average concentrations exceeding the CMC, or would not receive harmful exposure when evaluated by other valid toxicological analysis, as discussed in Section 2.2.2. Such data should be collected during environmental conditions that replicate critical conditions.

For the third and fourth alternatives, examples of such data include monitoring studies, except for those situations where collecting chemical samples to develop monitoring data would be impractical, such as at deep outfalls in oceans, lakes, or embayments. Other types of data could include field tracer studies using dye, current meters, other tracer materials, or detailed analytical calculations, such as modeling estimations of concentration or dilution isopleths.

The Water Quality Criteria—1972 [11] outlines a method, applicable to the fourth alternative, to determine whether a mixing zone is tolerable for a free-swimming or drifting organism. The method incorporates mortality rates (based on toxicity studies for the pollutant of concern and a representative organism) along with the concentration isopleths of the mixing zone and the length of time the organism may spend in each isopleth. The intent of the method is to prevent the actual time of exposure from exceeding the exposure time required to elicit an effect [10]:

$$\Sigma \frac{T(n)}{ET(X) \text{ at } C(n)} \leq 1$$

where T(n) is the exposure time an organism is in isopleth n, and ET(X) is the "effect time." That is, ET(X) is the exposure time required to produce an effect (including a delayed effect) in X percent of organisms exposed to a concentration equal to C(n), the concentration in isopleth n. ET(X) is experimentally determined; the effect is usually mortality. If the summation of ratios of exposure time to effect time is less than 1, then the percent effect will not occur.

4.3.4 Prevention of Bioaccumulation Problems for Human Health

States are not required to allow mixing zones. Where unsafe fish tissue levels or other evidence indicates a lack of assimilative capacity in a particular waterbody for a bioaccumulative pollutant, care should be taken in calculating discharge limits for this pollutant or the additivity of multiple pollutants. In particular, relaxing discharge limits because of the provision of a mixing zone may not be appropriate in this situation.

4.4 MIXING ZONE ANALYSES

Proper design of a mixing zone study for a particular waterbody requires estimation of the distance from the outfall to the point where the effluent mixes completely with the receiving water. The boundary is usually defined as the location where the concentrations across a transect of the waterbody differ by less than 5 percent. The boundary can be determined based on the results of a tracer study or the use of mixing zone models. Both procedures, along with simple order-of-magnitude dilution calculations, are discussed in the following subsections.

If the distance to complete mixing is insignificant, then mixing zone modeling is not necessary and the fate and transport models described in Section 4.5 can be used to perform the WLA. **It is important to remember that the assumption of complete mixing is not a conservative assumption for toxic discharges; an assumption of minimal mixing is the conservative approach.** If completely mixed conditions do not occur within a short distance of the outfall, the WLA study should rely on mixing zone monitoring and modeling. Just as in the case of completely mixed models, mixing zone analysis can be performed using both steady-state and dynamic techniques. State requirements regarding the mixing zone will determine how water quality criteria are used in the TMDL.

This section is divided into five subsections. The first discusses recommendations for outfall designs and means to maximize initial dilution. The second provides a brief description of the four major waterbody types and the critical design period when mixing zone analysis should be performed for each. The third provides a brief description of tracer studies and how they may be used to define a mixing zone. The fourth and fifth subsections discuss simplified methods and sophisticated models to predict the two stages of mixing (i.e., discharge-induced and ambient-induced mixing). For a detailed explanation of the mechanisms involved in estimating both stages of mixing, two references are recommended, Holley and Jirka [15] and Fischer et al. [16]. Although the models presented in Sections 4.4.4 and 4.4.5 simplify the mixing process, the assessor should have an understanding of the basic physical concepts governing mixing to use these

models appropriately. (The U.S. EPA Center for Exposure Assessment Modeling [CEAM] in Athens, Georgia, provides an overview course that teaches the basics of mixing and how the basics should be used for water quality management.)

It is important to note that the mixing zone models presented here attempt to predict the dispersion and dilution of the effluent plume. They do not attempt to predict any removal or transformation of the pollutants. In the near field, dispersion and dilution caused by discharge-induced mixing and then ambient-induced mixing will be the major cause of toxicity reduction. If incomplete mixing persists downstream (such as in the case of shore hugging plumes), then some far-field processes will become important. Some of the models described in Section 4.5 that have sophisticated hydrodynamic simulation routines coupled with fate simulation routines may be used for these far-field, incomplete mixing analyses.

4.4.1 General Recommendations for Outfall Design

An important factor in maximizing the initial dilution of an effluent is the design of the effluent outfall. There are three major types of outfall designs: surface discharge from free flows in a pipe or canal, single-port submerged discharge, and multiport submerged discharge. The last type is often referred to as multiport diffusers. Of the three, the surface discharge type is the least favorable for toxic discharges since it offers the least initial mixing. In particular, surface discharges at the shoreline of a waterbody usually have an impact along the shoreline when there is significant cross-flow and thus yield high surface concentrations.

Submerged discharges offer more flexibility in meeting the design goals for toxic discharges. Submerged discharges may be in the form of a single pipe outlet or of multiport discharges (diffusers) giving rise to one or several submerged discharge jets. A typical diffuser section is illustrated in Figure 4-1. Submerged discharges allow the effluent to be directed at different angles to the ambient flow to maximize the initial dilution. Diffusers are particularly effective in counteracting the buoyancy of the effluent. However, submerged multiport discharges are only feasible in waterbodies that are of sufficient depth and are not subjected to periodic dredging or to considerable scour or deposition.

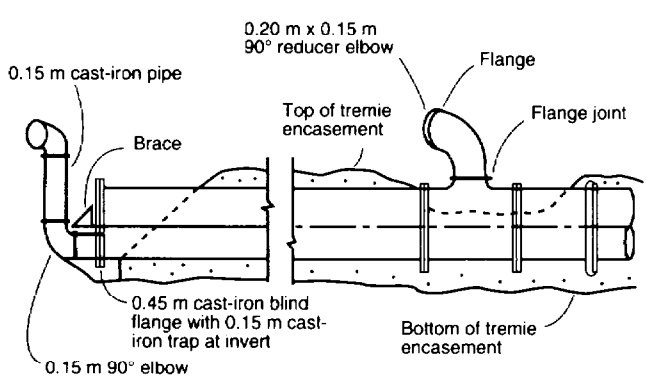

Figure 4-1. A Typical Diffuser Section [17]

Many of the complexities of submerged diffusers have been summarized by Jirka [18], Holley and Jirka [15], and Roberts et al. [19, 20, 21]. Submerged discharges should be designed to avoid direct surface impingement and bottom attachment of the submerged jet or jets. Surface and bottom impacts should be evaluated at critical design conditions (low flow or high stratification) and at off-design conditions (higher flow or lower stratification) to ensure the best placement and design of the diffuser. Diffusers provide more dilution than single outlets, but the alignment of the diffuser with the receiving water flow direction influences how much dilution will be provided. If the outlet structure is directed parallel to the direction of flow, dilution under high ambient velocities (off-design conditions) may be lower than under low velocities (critical design conditions).

In rivers, the preferred arrangement for a submerged discharge is to direct the outlet into the current flow direction or vertically upward. To deal with the reversing currents of estuaries and coastal bays, the preferred arrangements for offshore discharges are parallel diffuser alignment (tee diffuser) and perpendicular diffuser alignment (staged diffuser) [18]. In lakes and reservoirs, the preferred arrangement for a negatively buoyant discharge is to direct the diffuser vertically upward. A positively buoyant, vertically directed jet could penetrate stratification, so the preference for this type of discharge is to orient the diffuser at a slight angle above the horizontal. For ocean outfalls, initial dilution is improved by longer (perpendicular to the shoreline) and deeper diffusers. Further, the ports of the diffuser should be sufficiently separated to minimize merging of the separate plumes [22].

4.4.2 Critical Design Periods for Waterbodies

This section provides a brief description of the four major waterbody types and defines the critical design periods that should be used when performing mixing zone analyses in each of these waterbody types. Appendix D provides a further discussion on the appropriate selection of design periods.

1) Rivers and Run-of-River Reservoirs

Rivers and run-of-river reservoirs are waterbodies that have a persistent throughflow in the downstream direction and do not exhibit significant natural density stratification. Recommendations for hydrologically based and biologically based design flows for completely mixed, steady-state modeling of rivers are described in Appendix D of this document. The biologically based design flows are determined using the averaging periods and frequencies specified in water quality criteria [8]. Also, the hydrologically based flows 1Q10 and 7Q10 for the CMC and CCC, respectively, have been used traditionally and may continue to be used for steady-state modeling. Run-of-river reservoirs with residence times less than 20 days at critical conditions also should be analyzed using biologically or hydrologically based design flows (see below). Regulated rivers may have a minimum flow in excess of these toxicological flows. In such cases, the minimum flow should be used in TMDL modeling.

2) Lakes and Reservoirs

This receiving water category encompasses lakes and reservoirs with residence times in excess of 20 days at critical conditions

[23]. Seasonal variations in the water level, wind speed and direction, and seasonal solar radiation should be determined to define the critical period [23]. In the case of long and narrow reservoirs, areas above the plunge point (i.e., areas where no stream-like flow is present and waters are mixed or stratified by density) can be analyzed as rivers. The areas below can be analyzed as reservoirs. Since effluent density relative to the ambient water can vary over seasons, no one season or stratification condition can be selected as the most critical dilution situation for all cases. In general, all four seasons should be analyzed to determine the most critical periods for mixing zone analyses. All seasonal analyses should assume an ambient velocity of zero unless persistent currents have been documented. Special attention should be given to periods of rising water level since pollutants can move back into coves and accumulate under these conditions. Location of discharges in coves and dead-end embayments should be prevented whenever possible.

3) Estuaries and Coastal Bays

This receiving water category encompasses estuaries, which are defined as having a main channel reversing flow, and coastal bays, which are defined as having significant two-dimensional flow in the horizontal directions. For both waterbodies, the critical design conditions recommended here are based on astronomical, not meteorological, tides.

Determining the nature and extent of the discharge plume is complicated in marine systems by such conditions as differences in tides, riverine input, wind intensity and direction, and thermal and saline stratification. Because of the tidal nature of the estuaries and coastal systems and their complex circulation patterns, dilution of discharges cannot be determined simply by calculating the discharge rate and the rate of receiving water flow (i.e., the design flow). For example, tidal frequency and amplitude vary significantly in different coastal regions of the United States. Furthermore, tidal influences at any specific location have daily and monthly cycles. These and additional factors require that direct, empirical steps be taken to ensure that basic dilution characteristics of a discharge to salt water are determined.

In estuaries without stratification, the critical dilution condition includes a combination of low-water slack at spring tide for the estuary and design low flow for riverine inflow. In estuaries with stratification, a site-specific analysis of a period of minimum stratification and a period of maximum stratification, both at low-water slack, should be made to evaluate which one results in the lowest dilution. In general, minimum stratification is associated with low river inflows and large tidal ranges (spring tide), whereas maximum stratification is associated with high river inflows and low tidal ranges (neap tide).

After either stratified or unstratified estuaries are evaluated at critical design conditions, an off-design condition should be checked. The off-design condition (e.g., higher flow or lower stratification) recommended for both cases is the period of maximum velocity during a tidal cycle. This off-design condition results in greater dilution than the design condition, but it causes the maximal extension of the plume. Extension of the plume into critical resource areas may cause more water quality problems than the high-concentration, low-dilution situation.

Recommendations for a critical design for coastal bays are the same as for stratified estuaries. The period of maximum stratification must be compared with the period of minimum stratification in order to select the worst case. The off-design condition of maximum tidal velocity should also be evaluated to predict the worst-case extent of the plume.

4) Oceans

Critical design periods for ocean analyses are described in two separate documents, the Section 301(h) *Technical Support Document* [22] and the Section 301(h) document, *Initial Mixing Characteristics of Municipal Ocean Discharges* [24]. The following subsection contains a summary from these documents. Like discharges to estuaries, discharges to ocean waters are subject to two-dimensional horizontal flows. Oceanic critical design periods must include periods with maximum thermal stratification, or density stratification. These periods shorten the distance of vertical diffusion that occurs in the zone of initial dilution. Thus, during these periods it is difficult to achieve the recommended 100-to-1 dilution that is to occur before the plume begins a predominantly horizontal flow as compared to vertical flow. Periods when discharge characteristics, oceanographic conditions (spring tide and neap tide currents), wet and dry weather periods, biological conditions, or water quality conditions that indicate that water quality standards are likely to be exceeded should also be noted. The 10th percentile value from the cumulative frequency of each parameter should be used to define the period of minimal dilution.

4.4.3 General Recommendations for Tracer Studies

A tracer or dye study can be used to determine the areal extent of mixing in a waterbody, the boundary where the effluent has completely mixed with the ambient water, and the dilution that results from the mixing. Analysis of the mixing zone with a dye study that is supplemented with modeling should be performed at flow conditions that approach critical flow. Some of those design conditions are summarized above in the subsections dealing with specific waterbodies. Once the critical design condition has been selected for a waterbody, dye studies can be performed to provide data on the dimensions and dilution of the wastewater plume during this critical period. Tracer studies other than dye studies (e.g., chloride, lithium) can be performed for cases in which the receiving water is amenable to such tests.

For WLA studies in which a discharge is already in operation, tracer studies can be used to determine specific concentration isopleths in the mixing zone that reflect both discharge-induced and ambient-induced mixing. The isopleth concentrations, with effluent toxic concentrations, should be superimposed over a map of the various resource zones of the waterbody. The map will illustrate whether the State's mixing zone dimensions are exceeded, whether the required zone of passage is provided, and whether the plume avoids critical resource areas. The WLA can then be calculated to provide the appropriate zone of passage and to prevent detrimental impacts on spawning grounds, nurseries, water supply intakes, bathing areas, and other important resource areas.

Obviously, if the outfall is not yet in operation, it is impossible to determine discharge-induced mixing by tracer studies. Tracer

studies can be used in these situations to determine characteristics of the ambient mixing. For ambient mixing studies, the tracer release can be either instantaneous or continuous. Instantaneous releases are used frequently to measure longitudinal dispersion, but can also be used to determine lateral mixing in rivers [15] and lateral and vertical mixing in estuaries, bays, reservoirs, and lakes. For waterbodies with significant flow velocities, continuous releases of tracer are normally used to determine lateral and vertical mixing coefficients. Continuous releases can also be used to determine three-dimensional concentration isopleths for steady-state conditions. The tracer study must be made at critical design conditions in order to use the results directly for WLAs. If a tracer study for ambient mixing is conducted at near-to-design conditions, the observed data can be used to determine dimensionless mixing coefficients. These coefficients can then be extrapolated to critical conditions using hydraulic parameters [15]. A tracer study at near-to-critical conditions also can be used to determine the computer model required to predict critical-condition mixing and provide the coefficients needed for that TMDL model.

A number of references provide information concerning the design, conduct, and analysis of tracer studies for mixing analyses. *Techniques of Water-Resources Investigations of the USGS* provides the best overview of how to conduct tracer studies [25, 26, 27]. The fluorescent dyes (usually Rhodamine WT), measuring equipment, fluorometers, field and laboratory procedures, and calculation methods are all discussed. The procedures essentially consist of adding dye to the waterbody and recording concentrations of the dye at various stations at specific time intervals. Examples of tracer studies for river systems are presented in Fischer [28]; Kisiel [29]; Holley and Jirka [15]; and Yotsukura, Fisher, and Sayre [30]. Examples of tracer studies in tidal systems are presented in Wilson, Cobb, and Yotsukura [31] and Hetling and O'Connell [32], both of which are studies of the Potomac River estuary; Baily [33], a study of Suisun Bay in California; Fischer [34], a study of Bolinas Lagoon, a coastal bay in Marin County, California; and Crocker et al. [35], a study of Corpus Christi Bay, Texas. Methods to perform a tracer study in a reservoir are provided in Johnson [36].

The dye study recommended for obtaining a quick saltwater dilution assessment is one in which Rhodamine WT dye is administered to a discharge and monitored in the receiving waters for not less than 24 hours. The basic goal of this study is to determine the near-field nature of the effluent dilution, not the steady-state or far-field dilution. The environmental and discharge conditions selected for the study should be those that would elicit "worst-case" conditions (i.e., highest ambient concentrations in the receiving water). These include low wind, neap tide (tide of minimum range occurring during the 1st and 3rd quarters of the moon), plume trapping by density stratification, low rainfall and low riverine input, and, if possible, high effluent discharge.

The dye should be administered to the effluent before discharge to the receiving water in proportion to effluent flow rate. Dye should be maintained at a concentration in the effluent sufficient to permit detection of the dilution ratio of interest when the amount and variability of background fluorescence in the receiving water are taken into account. Measurements of dye concentration are made using a fluorometer and should be corrected for water temperature.

A survey of background fluorescence and its variability in the anticipated mixing zone must be conducted just prior to the beginning of the study in order to permit correction of fluorescence data and to determine the dye concentration required in the effluent. Since Rhodamine WT dye is bleached by free chlorine, a preliminary study of the degree of dye bleaching by the effluent should precede the study for chlorinated discharges to avoid underestimation of the extent of the mixing zone. Dye concentrations should be surveyed for two successive slack tides, and for any other conditions that could lead to concentration maxima. Surveys should extend from the point of discharge to a distance at which the effluent dilution ratio of interest is attained. The dye fluorescence at this point should be at least twice the variability in background fluorescence.

EPA has completed two TMDL studies to test the procedures outlined in the previous version of this document. Both studies used dye to determine the mixing zone and the dilution within it. The first study was performed on the Amelia River, an estuarine system in Florida [2]; the second was performed on the Greenwich Cove, an embayment of Narragansett Bay in Rhode Island [37]. In both studies, Rhodamine WT dye was introduced continuously into the effluent and numerous stations were set up to measure the spatial and temporal distribution of the dye. Both studies are good examples of how to perform a dye study in complex tidal systems.

4.4.4 Discharge-induced Mixing

The first stage of mixing is controlled by discharge jet momentum and buoyancy of the effluent (see Figure 4-2). This stage generally covers most of the regulatory or near-field mixing zone. It is particularly important in lakes and reservoirs and slow moving rivers since ambient mixing in those waterbodies is minimal.

In shallow environments, it is important to determine whether near-field instabilities occur. These instabilities, associated with surface and bottom interaction and localized recirculation cells extending over the entire water depth, can cause buildup of effluent concentrations by obstructing the effluent jet flow. There are no simple means to estimate dilution in these cases. Criteria for these instabilities and specialized predictive models have been developed to address these problems [13].

In the absence of near-field instabilities, horizontal or nearly horizontal discharges will create a clearly defined jet in the water column that will initially occupy only a small fraction of the available water depth. The following equations and models are designed to describe mixing under stable near-field conditions.

1) Use of a Simplistic Screening Equation

A minimum estimate of the initial dilution available in the vicinity of a discharge can be made using the following equation derived from information in Holley and Jirka (1986) [15]:

$$S = 0.3 \frac{x}{d}$$

where

S = flux-averaged dilution
x = distance from outlet
d = diameter of outlet.

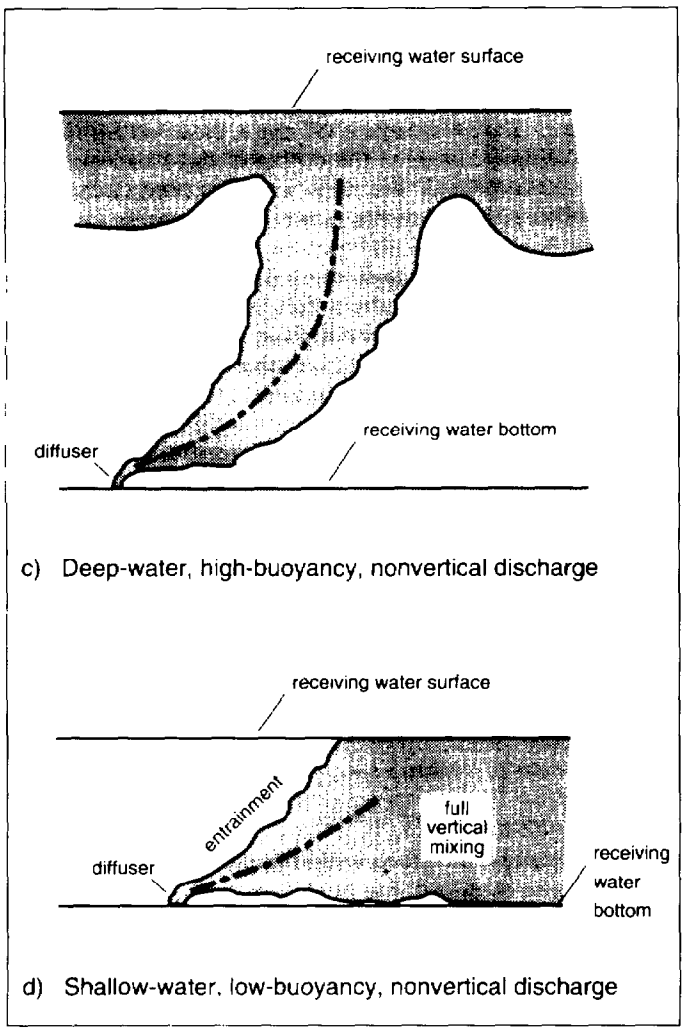

Figure 4-2. Example of Discharge-Induced Mixing [7]

The coefficient 0.3 represents the average of two values derived from the literature, 0.28 [16] and 0.32 [38].

The equation provides a minimum estimate of mixing because it is based on the assumptions that outlet velocity is zero and the discharge is neutrally buoyant. Dilution may be underestimated for partially full pipes because the equation assumes a fully flowing pipe. The equation can be used in inverse form to solve for the discharge x at which a desired solution—for example, that corresponding to the CMC—has been achieved. The equation is valid only close to the discharge, up to a distance corresponding to several (two to three) water depths. At longer distances, other factors are of increasing importance in jet mixing and must be included.

Mixing graphs that include the effects of discharge buoyancy, ambient velocity, and stratification can be found in Holley and Jirka [15], Fischer et al. [16], and Wright [39]. They are useful to account for these other initial dilution factors and can aid in determining whether criteria will be met at the edge of the regulatory mixing zone.

2) Use of Detailed Computer Models

More detailed design data for the mixing zone can be obtained from the use of computer models based on integral jet techniques. It is important to note that most models represent an idealization of actual field conditions and must be used with caution to ensure that the underlying model assumptions hold for the site-specific situation being modeled. In general, these buoyant jet models require the following input data: discharge depth, effluent flow rates, density of effluent, density gradients in receiving water, ambient current speed and direction, and outfall characteristics (port size, spacing, and orientation). Model output includes the dimensions of the plume at each integration step, time of travel to points along the plume centerline, and the average dilution at each point.

Described below are six mixing zone models that are available through EPA. All of the models require a user who is well versed in mixing concepts and the data necessary to run the models. The first model, CORMIX [40, 41], may be the most useful to regulators since it is an expert system that guides the user in selecting an appropriate modeling strategy for rivers or estuaries. It is available from the National Technical Information Service (NTIS), and user support is available from the U.S. EPA CEAM. The other models were developed and designed for ocean discharges. All but one can be used on rivers, lakes, and estuaries with appropriate input modifications; UPLUME is restricted to stagnant water environments where the ambient water current velocity is zero (e.g., lakes, reservoirs).

These five models were designed for submerged discharges in oceans. They all report dilution, and all terminate execution when the vertical ascent of the plume is zero (e.g., when the plume reaches the surface or when plume density is equal to ambient density in some stratified systems). With the exception of CORMIX1, they all assume that there is a "deep" receiving stream (i.e., no bottom interference). They too are available from NTIS, and user support is provided by the U.S. EPA Hatfield Marine Science Center in Newport, Oregon [24]. These five models have been modified such that the user inputs the data into a universal data format that allows the user to apply any of the five models with only minor input changes.

- CORMIX is a series of software elements for the analysis and design of a submerged buoyant or nonbuoyant discharge containing conventional or toxic pollutants and entering into stratified or unstratified watercourses, with emphasis on the geometry and dilution characteristics of the initial mixing zone. Subsystem CORMIX1 deals with single-port discharges, and subsystem CORMIX2 addresses multiport diffusers. The system operates on microcomputers with the MS-DOS operating system. CORMIX1 can summarize dilution characteristics of the proposed design, flag undesirable designs, give dilution characteristics at specified boundaries (i.e., legal and toxic mixing zones) and recommend design alterations to improve dilution characteristics. The CORMIX1 program guides the user, based on the user's input, to

appropriate analyses of design conditions and mixing zone dimensions.

- UPLUME is an initial dilution model that can be used for stagnant waterbodies, such as lakes and reservoirs, where the ambient currents can be assumed to be zero. The model simulates a submerged single-port discharge. The bouyancy between the effluent and ambient water can be accounted for, and the discharge can be given a vertical angle. UPLUME calculates flux-averaged dilutions and, for one output option, a centerline dilution.

- UOUTPLM can be used in flowing and stagnant waterbodies. The user specifies the current speed of the ambient water, and this speed is assumed to be constant with depth. The model simulates a submerged single-port discharge. Buoyancy between the effluent and ambient water can be modeled, as well as the discharge vertical angle. The ambient current is assumed to be perpendicular to the diffuser.

- UMERGE is a model that can also be used for both flowing and stagnant waters. It has capabilities that UOUTPLM does not have: it considers multiple submerged ports, and the user can specify arbitrary ambient current speed variations with depth. The ports are assumed to be equally spaced. The model accounts for adjacent plume interferences over the course of the plume trajectory and in the subsequent dilution calculation. Positive buoyancy is accounted for, and the discharge vertical angle can be modified. The ambient current is assumed to be perpendicular to the diffuser.

- UDKHDEN is a three-dimensional model that can be used for flowing and stagnant waterbodies. It has all the capabilities of UMERGE plus the ability to simulate instances where the ambient current flow is not perpendicular to the diffuser.

- ULINE models a vertical slot jet discharge into a flowing waterbody. The discharge angle is assumed to be perpendicular to ambient current. The ambient current may vary with depth, and the axis of the diffuser may range from parallel to perpendicular to the ambient current. The buoyancy of the effluent can also be modeled.

An evaluation and comparison of all these models can be found in the *Technical Guidance Manual for Performing Wasteload Allocations—Book 3, Estuaries* [7].

4.4.5 Ambient-Induced Mixing

The equations for discharge-induced mixing can be used to predict concentrations in the regulatory mixing zone where strong jet mixing predominates over ambient mixing. Beyond this point, the mixing is controlled by ambient turbulence. Thus, ambient mixing models must be used to predict the pollutant concentration distributions up to the stage of complete lateral mixing to provide boundary conditions for the completely mixed fate and transport models described in Section 4.5. This information also may be needed to estimate concentrations encountered at important resource areas or at subsequent downstream dischargers.

If there is no discharge-induced vertical mixing associated with the jet action of the discharge, then mixing over the depth of the waterbody must be accomplished by ambient mixing. For a neutrally buoyant, soluble effluent discharged with low velocity at the surface or at the bed of a stream, the flow distance required to achieve complete vertical mixing is on the order of 50 to 100 times the depth of water in that portion of the channel where the effluent is discharged [42]. For a discharge that is either lighter (positively buoyant) or heavier (negatively buoyant) than the ambient water, but still has no excess momentum, the flow distance for mixing over the depth will be greater. In the normal case with a high-velocity jet designed to prevent lethality in the mixing zone, mixing over the depth will be accomplished primarily by jet action, and the distance required for this vertical mixing will be much shorter.

In general, ambient mixing must also accomplish mixing over the width of a waterbody to bring the effluent to the completely mixed condition. For situations where the width of the zone that is mixed by the discharge-induced mixing is much smaller than the width of the river, the flow distance (X_m) required to achieve the completely mixed condition may be estimated from an equation of the form [16]:

$$X_m = \frac{mW^2u}{D_y}$$

where

W = width of the river
u = flow velocity for the critical design flow
D_y = lateral dispersion coefficient as discussed below
m = a parameter whose value depends on the degree of uniformity used to define "complete mixing" and on the transverse location of the outfall in the stream.

If completely mixed conditions are defined as a 5-percent variation in concentration across the stream width, the value of m would be approximately 0.1 for a discharge near the center of river flow (not the center of river width) and approximately 0.4 for a discharge near the edge of the river. If, because of other uncertainties, a 25-percent variation across the width is accepted as being completely mixed, then the corresponding values for m would be approximately 0.06 for a discharge near the center of river flow and approximately 0.24 for a discharge near the edge of the river. For a very small stream, X_m may be only a few hundred feet; for medium and large streams, X_m is normally several miles to several tens of miles.

The lateral dispersion coefficient (D_y) for most rivers can be calculated with the following equation [16]:

$$D_y = 0.6\ du^* \pm 50\%$$

where

d = water depth at design flow
u^* = shear velocity.

The coefficient (0.6) can vary from 0.3 to above 1.0 depending on the type and degree of irregularity of the channel cross-sections. The more straight and uniform the flow, the lower the

value; the more irregular the flow (resulting from curves, sidewall interference, etc.), the higher the value. Values approaching and exceeding 1.0 are normally associated with significant channel meandering [42]. The following equation for shear velocity should be used [16]:

$$u^* = (gds)^{1/2}$$

where

- g = acceleration due to gravity
- s = slope of the channel
- d = water depth.

For diffusers that initially spread the discharge across a significant part of the river width or for cases where the discharge-induced mixing causes mixing across a significant part of the river width, the values of m and X_m can be smaller than the ones indicated here. For distances greater than X_m, the models for completely mixed effluents discussed in Section 4.5 can be used to calculate concentrations at these distances. For shorter distances, maximum concentrations can be much greater than those predicted by "completely mixed" models and should be estimated using the following equation:

$$C_x = \frac{C_e Q_e W}{Q_s(\pi D_y X/u)^{1/2}}$$

where

- C_x = maximum pollutant concentration distance x from the outlet
- C_e = effluent concentration
- Q_e = design effluent flow
- Q_s = design stream flow
- D_y = lateral dispersion coefficient
- X = distance from the outlet
- W = stream width
- u = flow velocity for the design flow.

It should be noted that this estimate of C_x is a worst-case prediction since the equation assumes no significant discharge-induced mixing and a neutrally buoyant effluent. A more accurate way to predict concentrations within this second stage of mixing is to use the methods of Yotsukura and Sayre [42]. To use this approach, however, the value of D_y and pollutant concentrations after discharge-induced mixing must be known from tracer studies and/or from the use of one of the discharge-induced models.

The PSY model can be used to predict ambient mixing in shallow, freshwater streams where water depth is small in proportion to the width. PSY is a steady-state, two-dimensional plume model that predicts dilution of a surface discharge into a shallow receiving water where the plume attaches to both bottom and nearshore [43]. Uniform vertical mixing is assumed to occur at the point of discharge.

Ambient mixing is minor for lakes and reservoirs because flow velocity is assumed to be minimal and mixing is accomplished by means of the discharge momentum and buoyancy. For estuaries that are completely mixed with regard to salinity, the equations presented above can be used to estimate concentrations between the outlet and the point of complete mixing with a slight modification of shear velocity. The above equations will be applicable to only unstratified estuaries since the time required to mix across the estuary must be significantly less than the time required for the effluent to pass out of the unstratified part of the estuary, the time required for the effluent to pass into a segment of greatly changed cross-section, or the time required for the substance to decay. When the above equations for estuaries are used, the velocity of the design flow should include the velocity associated with the inflow of freshwater as well as the tidal velocity; thus u_t, which is based on an average total velocity; is substituted for u in the equations and shear velocity becomes

$$u^* = 0.10\ u_t.$$

The CORMIX expert system model can also be used to obtain predictions for the ambient-induced mixing. In addition to the routines for discharge-induced mixing, this model also includes predictive elements that apply to ambient mixing in riverine, lake, or coastal situations.

4.5 COMPLETELY MIXED DISCHARGE RECEIVING WATER SITUATIONS

At the present time, most States and EPA Regions use steady-state models that assume the wastewater is completely mixed with the receiving waters in order to calculate WLAs for contaminants. This approach is appropriate for conventional contaminants where critical environmental effects are expected to occur far downstream from the source. WLAs for toxic chemicals require a different approach, however, because critical environmental conditions occur near the discharge before complete mixing with the receiving water occurs. Consequently, mixing analyses should be performed because many of these toxicants can exert maximal toxicity in a variety of regions spanning from the discharge point to significant distances downstream.

If complete mixing occurs near the discharge point, such as in effluent-dominated receiving streams, then steady-state models may be used to calculate TMDLs. Recent EPA developments in the identification of critical design flows based on toxicological concerns provide for better use of steady-state models in calculating toxic WLAs. However, if complete mixing does not occur near the discharge point and the effluent plume is discernible downriver, then modeling techniques that can simulate and predict mixing conditions are more appropriate. The mixing zone models presented in the previous section may be used to define the mixing zone. However, they only determine the dispersion and dilution of the effluent and do not account for chemical or biological processes in the mixing zone. TMDL models are available that can simulate mixing processes and predict areas of maximal concentrations in the receiving stream based on chemical, biological, and physical processes.

4.5.1 Wasteload Modeling Techniques

1) Steady-State Modeling Techniques

A steady-state model requires single, constant inputs for effluent flow, effluent concentration, background receiving water concentration (RWC), receiving water flow, and meteorological conditions (e.g., temperature). The frequency and duration of ambient concentrations predicted with a steady-state model must be assumed to equal the frequency and duration of the critical receiv-

ing water conditions used in the model. The variability in effluent flows and concentrations also affects RWCs, but these effects cannot be predicted with constant inputs. Steady-state models can be improved for toxic WLAs by means of the following:

- Using design flows that will ensure criteria compliance at the appropriate duration and frequency.
- Calculating both acute and chronic WLAs.

EPA is encouraging the States to adopt two-number aquatic life water quality criteria and is using them in WLA studies. Ambient water quality criteria have been established for numerous toxic pollutants. These criteria specify an acute concentration (CMC) and a chronic concentration (criteria continuous concentration, or CCC) for each toxicant, as well as durations and frequencies of exposure for the two concentration levels. The design flows used in steady-state modeling should be reflective of the CCC and CMC durations and frequencies. The duration of the design flow is based on the maximum exposure time that will prevent acute and chronic effects. The duration of flow is assumed to apply to the duration of the allowable effluent concentration or load. For example, if the flow used is a 7-day average value, the allowable load is considered to be a 7-day average. The return frequency is based on the number of years required for biological population recovery after criteria have been exceeded. Appendix D describes the toxicological basis for selecting receiving stream design flows for steady-state modeling and recommends specific design flows for CCC and CMC calculation of TMDLs for rivers and streams.

In summary, there are two types of design flows, hydrologically based and biologically based. The hydrologically based design flows are those traditionally used by the States, in which the 7Q10 flow is used as the CCC design flow and the 1Q10 is used as the CMC design flow. The biologically based method uses the 1-day, 3-year duration-frequency for determining the CMC design flow and the 4-day, 3-year duration-frequency for determining the CCC design flow. Consequently, the biologically based design flows are based on specific toxicological effects of a pollutant and biological recovery times from localized stresses [6]. The advantages of both types, as well as how they may be calculated, also are described in Appendix D.

A 4-day, 3-year biological design flow does not equate to a 4Q3 hydrological design flow. EPA has determined that a 4Q3 design flow would result in an excessive number of water quality criteria exceedances. As explained in Appendix D, a hydrologically based 7Q10 will, for most streams, be similar to a biologically based 4-day, 3-year design flow.

At the present time, there are no recommended toxicological flows for steady-state modeling of lakes, reservoirs, or estuaries. The design conditions recommended for these waterbodies in Section 4.4.2 are based on hydrological and meteorological conditions rather than on toxicological duration and frequency data. These conditions should be used until further guidance is provided.

Another improvement in steady-state toxics modeling can be realized by performing two separate WLAs, one for the CMC and one for the CCC. Steady-state WLA models should be used to calculate the allowable effluent load that will meet the CMC at the acute design flow and the allowable load that will meet the CCC at the chronic design flow. Calculation of these values will enable the permit writer to calculate the more limiting long-term average (LTA) for the treatment system and develop permit limits protective of both WLAs (see Chapter 5).

In addition to stream design flow, steady-state models require design temperature, pH, alkalinity, and hardness, depending on the pollutants modeled at site-specific conditions. To determine stream design temperature, pH, alkalinity, and hardness, a program called DESCON was developed. (See Appendix D for additional information.) DESCON is a computer program that estimates design conditions for WLA modeling. These conditions are based on maintaining a desired limit on the frequency of water quality excursions in a receiving water. DESCON considers the effect that daily fluctuations in stream flow and water quality conditions, such as temperature and pH, have on the variability of the capability of a receiving water to accept pollutant loadings. It specifically accounts for the within-year correlations observed between such variables as stream flow, temperature, pH, alkalinity, hardness, and dissolved oxygen. DESCON determines design conditions using a four-step process (see Figure 4-3):

1) A long-term record of observed stream flows and pertinent water quality data are assembled or synthesized.

2) The maximum allowable pollutant load that the receiving water can accept without causing a water quality excursion is computed for each day of this record.

3) This synthesized record of allowable loads is searched for the critical load, i.e., the load whose frequency of not being exceeded matches the desired water quality excursion frequency.

4) Design conditions are then derived from receiving water conditions realized during the period of record when the computed allowable load was closest to the critical load.

DESCON provides the same advantages as continuous simulation by considering the joint occurrences of stream flow and other water quality parameters as observed in the historical record. In addition, it is more computationally efficient; it contains a facility for extracting and analyzing flow and water quality data from STORET; it can use both the extreme value and the biologically based methods of calculating of water quality excursions; and it is specifically designed to handle such pollutants as ammonia, heavy metals, pentachlorophenol, and biochemical oxygen demand (BOD) for which water quality criteria are functions of such design condition variables as temperature, pH, alkalinity, hardness, and dissolved oxygen. The main limitations of DESCON are that it requires at least 10 years of historical daily flow data and it can only analyze a single discharger, edge-of-mixing zone situations (or a simplified Streeter-Phelps dissolved oxygen response for BOD).

2) Dynamic Modeling Techniques

Steady-state modeling considers only a single condition; effluent flow and loading are assumed to be constant. The impact of receiving water flow variability on the duration for which and frequency with which criteria are exceeded is implicitly included

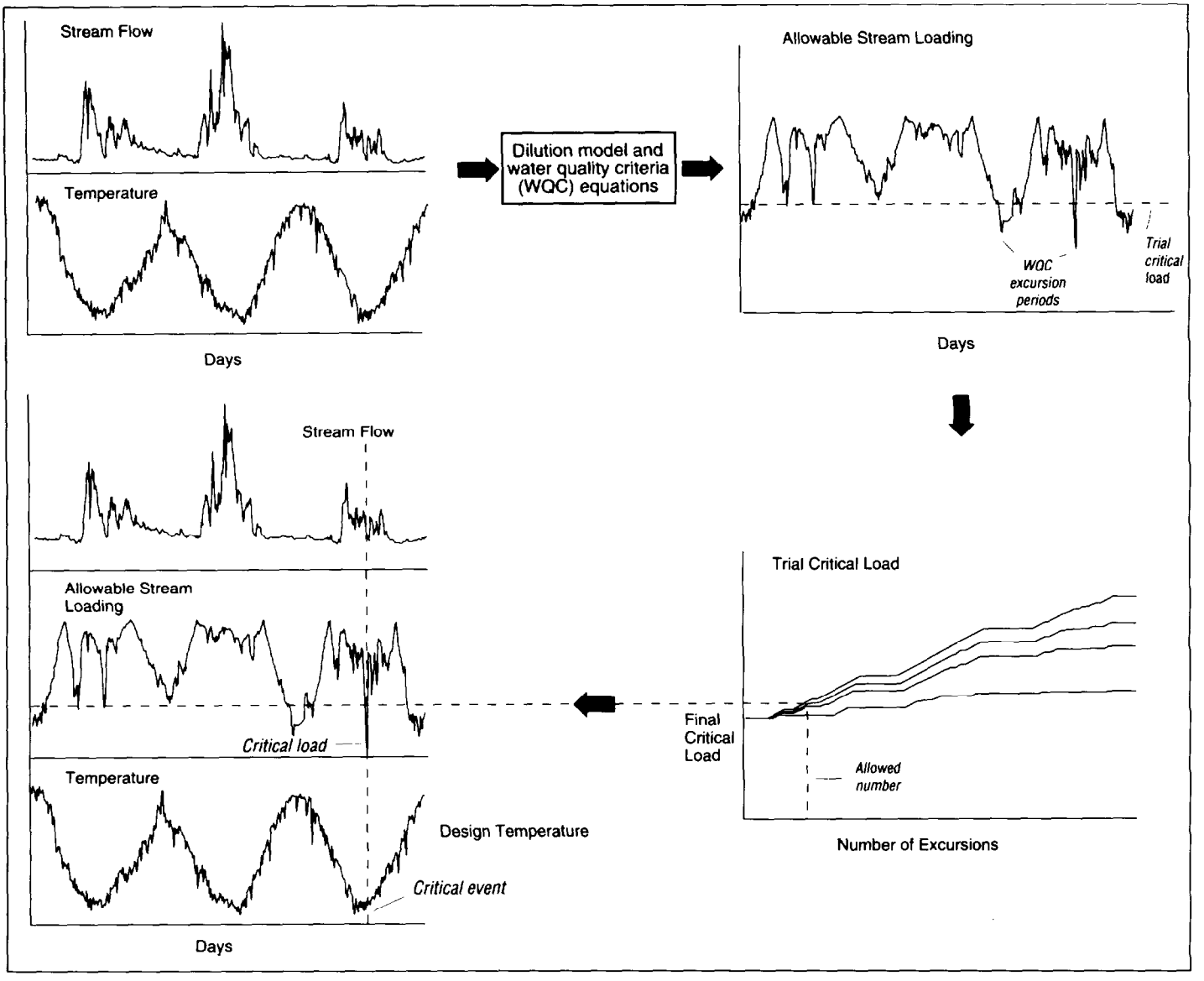

Figure 4-3. Computational Scheme for Deriving Design Conditions

in the design conditions if these conditions reflect the desired toxicological effects regime. Dynamic modeling techniques explicitly predict the effects of receiving water and effluent flow and of concentration variability. The three dynamic modeling techniques recommended by EPA for WLAs are continuous simulation, Monte Carlo simulation, and lognormal probability modeling. These methods calculate a probability distribution for RWCs rather than a single, worst-case concentration based on critical conditions. Prediction of complete probability distributions allows the risk inherent in alternative treatment strategies to be directly quantified.

The use of probability distributions in place of worst-case conditions has been accepted practice for years in water resource engineering, where it was found to produce more cost-effective design of bridge openings, channel capacities, floodplain zoning, and water supply systems. The same cost-effectiveness can be realized for pollution controls if probability analyses are used.

The dynamic modeling techniques have an additional advantage over steady-state modeling in that they determine the entire effluent concentration frequency distribution required to produce the desired frequency of criteria compliance. Maximum daily and monthly average permit limits can be obtained directly from the effluent LTA concentration and coefficient of variation (CV) that characterize this distribution. Generally, steady-state modeling has been used to calculate only a chronic WLA. Steady-state modeling generates a single allowable effluent value and no information about effluent variability. If the steady-state model is used to calculate both acute and chronic wasteloads, limited information will be provided and the entire effluent distribution will not be predicted. Steady-state WLA values can be more difficult to use in permits and enforcement because of the variable nature of the receiving waterbody and the effluent. The outcome of probabilistic modeling can be used to ensure that permit limits are determined based on best probability estimates of RWCs rather than a single, worst-case condition. As a result, maximum daily and monthly average permit limits, based on compliance

with water quality criteria over a 3-year period, can be obtained directly from the probability distribution.

Continuous Simulation Models. As shown in Figure 4-4, a continuous simulation model uses daily effluent flows (Q_e) and concentration data (C_e) with daily receiving water flow (Q_s) and background concentration data (C_s) to calculate downstream RWCs [44]. The model predicts these concentrations in chronological order with the same time sequence as the input variables (C_b versus time). The daily RWCs can then be ranked from the lowest to the highest without regard to time sequence. A probability plot can be constructed from these ranked values, and the occurrence frequency of any 1-day concentration of interest can be determined (C_b versus frequency). Running average concentrations for 4 days (i.e., the chronic design flow), or for any other averaging period, also can be computed from the daily concentrations (Figure 4-5).

The probability plot generated by the continuous simulation model using existing effluent data will indicate whether criteria are predicted to be exceeded more frequently than desired. Appendix D discusses how to select the appropriate allowed frequency of excursions based on the biological recovery period required for a specific waterbody. If recurrence intervals of 10 or 20 years are desired, at least 30 years of flow data should be available to provide a sufficient record to estimate the probability of such rare events. Of the 30 years of required flow data, at least 20 to 25 years should be continuous daily data, with the remaining years represented with only intermittent data. The data should be examined to verify that the receiving stream has not undergone significant hydrological modification. The data also should be examined to determine if there were any long-term changes due to technology-based treatment or periodic changes due to industrial or municipal plant closings or expansions. The same data requirements are also true for the lognormal probabilistic and Monte Carlo methods. However, except for the continuous simulation models, other nonsteady-state models in this section

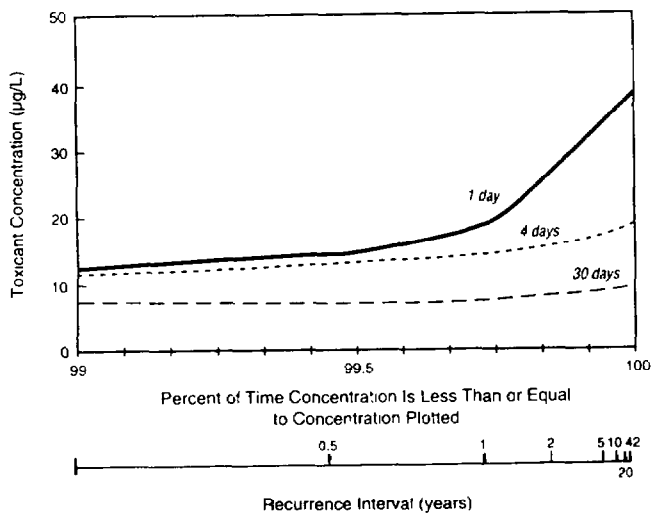

Figure 4-4. Frequency of Occurrence of Concentrations in Receiving Waters and Recurrence Intervals Generated by a Continuous Simulation Model

cannot be used to account for the duration and frequency provision of the two-number water quality criteria. Users are cautioned about the specific limitations of some of the dynamic models included here. Continuous simulation models have the following advantages compared to steady-state formulations:

- The frequency and duration of toxicant concentrations in a receiving water can be predicted.
- The cross-correlation and interaction of time-varying pH, flow, temperature, pollutant discharges, and other parameters are incorporated.
- The effect that the serial correlation of daily flows and other parameters has on the persistence of criteria excursions is incorporated.
- Long-term stream flow records for ungauged rivers using precipitation and evapotranspiration data can be synthesized.
- Long simulation times can prevent the initial conditions used in the model from affecting the calibration of fate and transport processes.

Unlike steady-state models, continuous simulation models require significantly more data to apply, to calibrate, and/or to verify a specific problem and require that input information for the application of the model be time-series data. Also, the model results need manipulation to calculate the effluent LTA concentration and CV for use in developing effluent limits.

Monte Carlo Simulation Models. Monte Carlo simulation combines probabilistic and deterministic analyses since it uses a fate and transport mathematical model with statistically described inputs. Monte Carlo simulations have been the most frequently used approach in stochastic water quality studies [45-51]. The probability distributions of effluent flow, effluent concentration, and other model input must be defined using the appropriate duration for comparison to the CMC and CCC. If 1-day average RWCs must be predicted for CMC comparisons, probability distributions of daily model input data are needed for Monte Carlo simulation. If 4-day average concentrations must be predicted for CCC comparisons, the probability distributions of 4-day average input data are required. The computer selects input values from these distributions using a random generating function. The fate and transport model is repetitively run for a large number of randomly selected input data sets. The result is a simulated sequence of RWCs. These concentrations do not follow the temporal sequence that is calculated with the continuous simulation model, but they can be ranked in order of magnitude and used to form a frequency distribution. Monte Carlo analyses can be used with steady-state or continuous simulation models [52].

The approach for calculating the allowable pollutant load distribution using Monte Carlo simulation is the same as that described for the continuous simulation model. The advantages of Monte Carlo simulation are the following:

- It can predict the frequency and duration of toxicant concentrations in a receiving water.

- It can be used with steady-state or continuous simulation models that include fate processes for specific pollutants.
- It can be used with steady-state or continuous simulation models that include transport processes for rivers, lakes, and estuaries.
- It can be used with steady-state or continuous simulation models that are designed for single or multiple pollutant source analyses.
- It does not require time series data.
- It does not require model input data to follow a specific statistical distribution or function.
- It can incorporate the cross-correlation and interaction of time-varying pH, flow, temperature, pollutant discharges, and other parameters if the analysis is developed separately for each season and the results are combined.

The primary disadvantages of Monte Carlo simulation are that it requires more input, calibration, and verification data than do steady-state models, and the model results need manipulation to calculate the effluent LTA concentration and CV to develop effluent limits.

Lognormal Probabilistic Dilution Model. Without resorting to the continuous simulation method of computing RWCs in temporal sequence, this probabilistic method uses the lognormal probability distributions of the input variables to calculate probability distributions of output variables [53]. As a result, the method requires only the relevant statistical parameters of the input variables (medians and coefficients of variation) rather than the actual time series data needed for continuous simulation. If 1-day average RWCs must be predicted for comparisons with the CMC, lognormal probability distributions of daily input data are needed. If 4-day average concentrations must be predicted, the lognormal probability distributions of 4-day average input data are required. Because this probabilistic model cannot, as yet, incorporate fate and transport processes, it can be used to predict the concentration of a substance only after complete mixing and before degradation or transformation significantly alters the concentration.

The lognormal probabilistic dilution model has the following advantages:

- It can predict the frequency and duration of toxicant concentrations in riverine environments.
- It does not require time series data.
- It can incorporate the cross-correlation and interaction of time-varying pH, flow, temperature, pollutant discharges, and other parameters if the analysis is developed separately for each season and the results are combined.

The lognormal probability dilution model has the following disadvantages:

- It requires more input than a steady-state model.

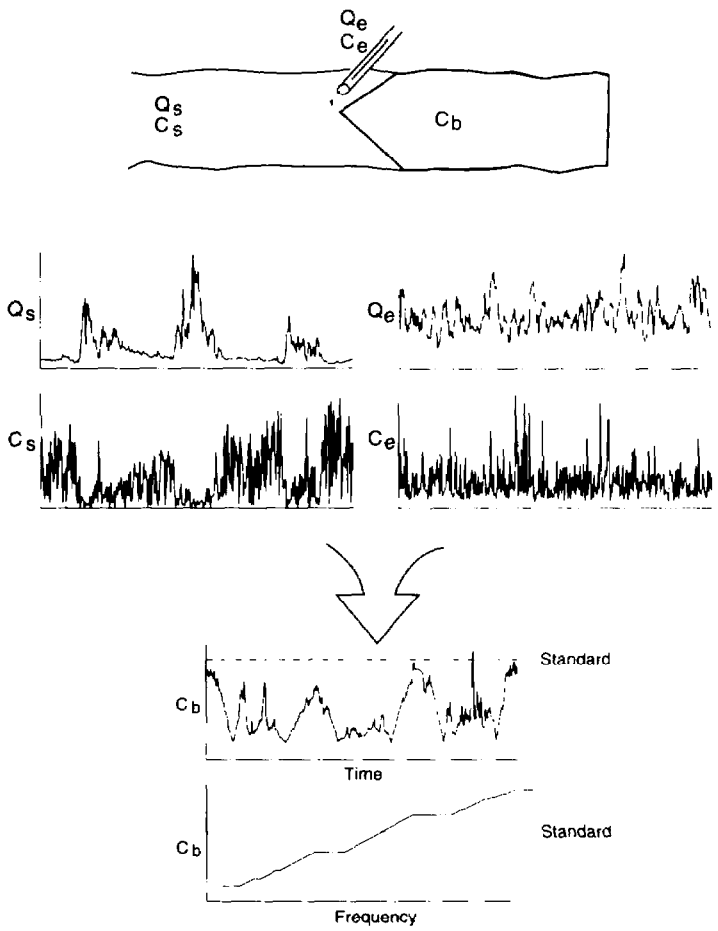

Figure 4-5. Concentration Frequency Curves

- It does not include instream fate processes.
- It applies only to rivers and streams.
- It analyzes multiple pollutant sources inaccurately.
- It requires model input data to be lognormally distributed.

4.5.2 Calculating the Allowable Effluent Concentration Distribution and the Return Period

Information concerning effluent concentration means and variabilities can be obtained from data bases on existing treatment plants and from development documents for specific industrial point source categories. This information is available from the Industrial Technology Division of the Office of Water Regulations and Standards. These effluent data can be used with dynamic models to determine what the effluent concentration distribution must be to meet water quality standards. Two possible approaches can be taken to determine this distribution regardless of the type of dynamic modeling technique (i.e., continuous, Monte Carlo, or lognormal probabilistic). One approach is based on the simplifying assumption that treatment will change only the mag-

nitude of effluent concentrations; no changes are assumed to occur in effluent flows or in the relative variability of effluent concentrations. With these assumptions, no additional model runs are needed to determine the allowable distribution for effluent concentrations. The other approach assumes that the required effluent concentration distribution is the same as the existing distribution except that it is reduced in magnitude by whichever is greater—the percentage necessary for the 1-day average concentrations to meet the CMC, or the 4-day average concentrations to meet the CCC at the desired recurrence interval. Chapter 5 includes details on how permit limits are derived from the mean and coefficient of variation of effluent concentrations determined from this analysis.

The second approach for determining the allowable effluent concentration distribution is based on the assumption that effluent concentrations after treatment will not have the same CV as concentrations before treatment. Studies have documented that advanced secondary treatment increases the CV of BOD and total suspended solids concentrations compared to secondary treatment. Where feasible, investigations should be conducted to evaluate how treatment processes for heavy metals, organic chemicals, and effluent toxicity will change the variability of these constituents. The development documents mentioned above also provide some variability data for treatment processes. To account for a change in variability, an alternative approach should be used to determine the allowable effluent distribution. Iterative model runs can be performed using different concentration means with the effluent "future treatment" variance until a mean is found that meets the criteria at the desired recurrence intervals. These iterative model runs require stochastic generation of effluent input data since daily effluent concentrations will not be available for the hypothetical treatment schemes. The required "future treatment" mean and CV of effluent concentration can then be used to set permit limits (see Chapter 5).

EPA's Office of Water Regulations and Standards developed an interactive preprocessor for DYNTOX that automatically creates input for continuous simulation models, randomly selects the sets of input data required for Monte Carlo simulations, and performs the numerical integration calculation for the lognormal probabilistic model. DYNTOX is available from the EPA CEAM, Environmental Research Laboratory (ERL) [54]. If the observed data base is fairly complete but missing a few points, a linear interpolation scheme is used to fill in the missing data. If data are scarce, a lag-one Markov method is used to generate daily data stochastically. The lag-one Markov method uses the mean, standard deviation, and daily correlation coefficient of the observed data to create random sequences of data having the same statistical properties. The interactive program is written in FORTRAN and is available for use on mainframe or IBM PC-compatible computers.

Two common methods exist to calculate the return period for a given concentration from probabilistic modeling: the **percentile method** and the **extrema method**. The percentile method used by DYNTOX ranks a listing of all individual daily concentrations. The return period for a concentration is then calculated based on the percentile occurrence. In the extrema method, only annual extrema values are used in the ranking. The return periods calculated from these two methods are equally valid statistical representations. When using the percentile method, results express an average return period and multiple occurrences within any year. The extrema method describes the return period for an annual extreme and includes only the extreme of multiple occurrences within a year.

4.5.3 General Recommendations for Model Selection

The reliability of the predictions from any of the modeling techniques depends on the accuracy of the data used in the analysis. The minimum data required for model input include receiving water flow, effluent flow, effluent concentrations, and background concentrations. In many locations, stream flow data should be sufficient for both steady-state and dynamic models. At least 30 years of flow data should be available if excursions of the CMC and CCC must be evaluated at rare frequency of once in 10 or 20 years. Measurements of effluent toxicity or individual toxicity can be much more limited.

If only a few toxicant or effluent toxicity measurements are available, steady-state assessments should be used. Modeling also should be limited to steady-state procedures if a daily receiving water flow record is not available; however, in effluent-dominated situations, critical flow may be used to characterize the receiving stream. Appendix D describes how to select appropriate design flows if State regulations do not require a specific design flow for river WLAs. Fate and transport models or dilution calculations can be used for individual toxicants. At the present time, only dilution calculations or first-order decay equations are recommended for effluent toxicity analyses. Chapter 1 discusses the conservative/additive assumption for toxicity.

If adequate receiving water flow and effluent concentration data are available to estimate frequency distributions, one of the dynamic modeling techniques should be used to develop more cost-effective treatment requirements. If the effluent data exhibit significant seasonal differences or batch process trends, the continuous simulation approach may be the easiest dynamic modeling method to use. The best results will, of course, be obtained if daily effluent flows and concentrations are available for model input for an entire year. The lag-one Markov technique can be used to generate daily effluent data for the entire simulation as long as adequate measurements for the site-specific facility (or a similar one) are available to estimate a day-to-day correlation coefficient and to determine when seasonal or batch process changes in effluent quality occur.

If adequate receiving water flow and effluent concentration data are available and if effluent data exhibit no seasonal or batch process trends, lognormal and Monte Carlo methods may be easier and require less computer time than the continuous simulation approach.

4.5.4 Specific Model Recommendations

The following section recommends models for toxicity and individual toxicants for each type of receiving water—rivers, lakes, and estuaries. Detailed guidelines on the use of fate and transport models of individual toxicants are included in the toxic TMDL guidance available from the Monitoring Branch of EPA's Office of Water Regulations and Standards [5, 6, 7] and Office of Research and Development [55]. These manuals describe in detail the

transport and transformation processes involved in water quality modeling. Transport processes include the dispersion and advection of a contaminant once it enters the receiving stream; its volatilization from the water; and its sorption to suspended sediment, eventual settling, and possible resuspension and diffusion from the sediment. Transformation processes include the oxidation, hydrolysis, photolysis, biodegradation, and bioaccumulation of the chemical.

Most water quality models were developed with an emphasis on the dynamics in the water column and the eventual water column concentrations. Several models, including some of those listed below (EXAMS-II, WASP4) are now capable of simulating water column-sediment interactions (resuspension, settling, and diffusion), however, additional work needs to be completed on the mechanisms of sediment-water column exchange before the models can be validated for predictive applications involving sediments. With the advent of sediment criteria in the next few years, it will be necessary to use models that predict concentrations in both receiving water and bed sediment. This will be of particular importance in areas where the sediments are contaminated to the point at which they act as the source of a pollutant to the water column. Table 4-2 lists and summarizes models that may be used for predicting the fate and transport of toxicants and that are supported by the EPA CEAM [56]. All the models, plus two bioaccumulation models, briefly are described below.

- DYNTOX [54] is a WLA model that uses a probabilistic dilution technique to estimate receiving water chemical concentrations or whole effluent toxicity fractions. The model considers dilution and net first-order loss, but not sorption and benthic exchange. The net loss rate must be determined empirically on a case-by-case basis and cannot be extrapolated to different conditions of flow, temperature, solids, pH, or light.

- EXAMS-II [57] is a compartment model that can be used as either a steady-state or quasi-dynamic model designed for evaluation of the behavior of synthetic organic chemicals in aquatic ecosystems. It simulates a toxic chemical and its transformation products using second-order kinetics for all significant organic chemical reactions. EXAMS-II does not simulate the solids with which the chemical interacts. The concentration of solids must be user-specified for each compartment. The model accounts for sorbed chemical transport based on solids concentrations and specified transport fields. Sediment exchanges with the water column include pore-water advection, pore-water diffusion, and solids mixing. The last describes a net steady-state exchange associated with solids that is proportional to pore-water diffusion.

- WASP4 [58] is a generalized modeling framework for contaminant fate in surface waters. Based on the flexible compartment modeling approach, WASP4 can be applied in one, two, or three dimensions, given the transport of fluxes between segments. WASP4 can read output files from the link-node hydrodynamic model DYNHYD4, which predicts unsteady flow rates in unstratified rivers and estuaries, given variable tides, wind, and inflow. TOXI4, a subset of WASP4, simulates up to three interacting toxic chemicals and up to three sediment size fractions in the bed and overlying waters. First- or second-order kinetics can be used for all significant organic chemical reactions. Sediment exchanges include pore-water advection, pore-water diffusion, and deposition/scour. Net sedimentation and burial rates can be specified or calculated. The output can be used with the two bioaccumulation models FGETS and FCM2, which are described below.

- HSPF [59] simulates watershed hydrology and water quality for both conventional and toxic organic pollutants. HSPF incorporates the watershed-scale ARM and NPS models into a basin-scale analysis framework that includes transport and transformation in one-dimensional stream channels. The simulation provides a time history of the runoff flow rate, sediment load, and nutrient and pesticide concentrations, along with a time history of water quantity and quality at any point in a watershed. HSPF simulates three sediment types (sand, silt, and clay) in addition to specific

Table 4-2. Toxicant Fate and Transport Models

Model	Environment	Time Domain	Spatial Domain	Chemical
DYNTOX	river	dynamic	far field, 1-dimensional	organic, metal
EXAMS-II	lake, river, estuary	steady-state, quasi-dynamic	far field, 3-dimensional	organic
WASP4	lake, river, estuary	steady-state, dynamic	far field, 3-dimensional	organic, metal
HSPF	river	dynamic	far field 1-dimensional	organic, metal
SARAH2	river	steady-state	treatment plant, near field, 2-dimensional	organic
MINTEQA2	lake, river, estuary	steady-state	—	metal

organic chemicals and transformation products of those chemicals. The reaction and transfer processes included are hydrolysis, oxidation, photolysis, biodegradation, volatilization, and sorption. Sorption is modeled as a first-order kinetic process in which a desorption rate and an equilibrium partition coefficient for each of the three solid types must be specified. Resuspension and settling of silts and clays (cohesive solids) are defined in terms of shear stress at the sediment-water interface. For sands, the system's capacity to transport sand at a particular flow is calculated and resuspension or settling is defined by the difference between the sand in suspension and the calculated capacity. Sediment exchanges with surficial benthic sediments are modeled as sorption/desorption and deposition/scour. Underlying sediment and pore water are not modeled.

- SARAH2 [60] is a steady-state, near-field model for calculating acceptable concentrations of hazardous organic chemicals discharged to land disposal or wastewater treatment facilities. Acceptable leachate or treated industrial waste discharge constituent concentrations are estimated by a "back calculation" procedure starting from chemical safety criteria in surface water, drinking water, or fish. For steady or batch waste streams, SARAH2 considers the following concentration reductions: dilution and loss during treatment, initial Gaussian mixing at the edge of a stream, lateral and longitudinal diffusion in the mixing zone, sorption, volatilization, hydrolysis, and bioaccumulation in fish. The user must specify appropriate concentrations for protection of the aquatic community and of humans exposed through consumption of fish and water. The benthic community is not presently considered. Treatment loss is handled empirically. SARAH2 contains data sets for three disposal-watershed scenarios that can be easily modified and employed. The model is designed for screening analysis and contains numerous assumptions that should be verified before the model is used in actual cases.

- MINTEQA2 is an equilibrium metals speciation model for dilute aqueous systems [61]. It does not have any transport and transformation processes and must be run with one of the above models. It can be used to calculate the mass distribution at equilibrium among dissolved, absorbed, and solid phases and the species distribution within each phase. MINTEQA2 contains a chemical component data set for major ions commonly found in aqueous systems (e.g., Ca, Fe, and S), trace metals/metalloids of pollution interest (e.g., Cd, Cr, Ni, Pb, and Zn), and organic ligands of significant affinity for metal complexation. The model can be used to calculate the concentrations of adsorbed metals via any of seven different adsorption algorithms.

- FGETS is a toxicokinetic model that simulates the bioaccumulation of nonpolar organic chemicals by fish from both water and food [62]. Both of these routes of exchange are modeled as diffusion processes that depend upon physicochemical properties of the pollutant and morphological/physiological characteristics of the fish. FGETS contains a moderately sized data base of allometric relationships for gill morphology with which it can simulate the direct gill/water exchange of organic chemicals for essentially any fish species, assuming certain default values. FGETS also contains a limited data base of physiological/morphological relationships that are used to set parameters for food exchange. In addition to simulating bioaccumulation of organic toxicants, FGETS can calculate time to death from chemicals whose mode of action is narcosis. This calculation is based on the existence of a single, lethal, internal chemical activity for such chemicals. The concentrations of toxic chemical to which the food chain is exposed may be specified by the user or may be taken directly from the values calculated by the exposure concentration model WASP4. Thus FGETS may be executed as a separate model or as a postprocessor to WASP4.

- FCM2 is a generalized model of the uptake and elimination of toxic chemicals by aquatic organisms [63]. It generates a mass balance calculation in which the rates of uptake and elimination are related to the bioenergetic parameters of the species. A linear food chain or a food web may be specified. Fish tissue concentrations are calculated as a function of time and age for each species included. Exposure to the toxic chemical in food is based on a consumption rate and predator-prey relationships that are specified as a function of age. Exposure to the toxic chemical in water is functionally related to the respiration rate. Steady-state concentrations also may be calculated. The concentrations of the toxic chemical to which the food chain is exposed may be specified by the user or may be taken directly from the values calculated by the exposure concentration model WASP4. Thus FCM2 may be executed as a separate model or as a postprocessor to WASP4. Migratory species, as well as nonmigratory species, may be considered. Separate nonmigratory food chains may be specified, and the migratory species is exposed sequentially to each food chain based on its seasonal movements.

4.5.5 Effluent Toxicity Modeling

To apply the steady-state, continuous simulation, or probabilistic methods to effluent toxicity modeling, the percent effluent measurements should be converted to toxic units (TUs). As discussed in Chapters 1, 2, and 3, it is necessary to convert toxicity to units that can be directly related to mass. When comparing toxicity among chemicals, the relationship between toxicity and concentration is inverse; chemicals that have toxic effects at low concentrations have a greater "toxicity" than chemicals that have toxic effects at higher concentrations. The modeling of toxic effluents is based on mass balance principles; therefore, toxicity needs to be in units that increase when the percent of the effluent of the receiving stream increases. Thus, a TU is the reciprocal of the dilution that produces the test endpoint, i.e., acute toxicity endpoint (ATE) or chronic toxicity endpoint (CTE). An acute toxic unit (TU_a) is the reciprocal of an ATE. A chronic toxic unit (TU_c) is the reciprocal of a CTE. The TMDL must ensure that the CMC and the CCC are met in the receiving water at the desired duration and frequency. The CMC for toxicity is recommended as 0.3 TU_a. This is a value that should prevent lethality unless the duration of exposure exceeds 1 hour.

The CCC for toxicity measured with chronic tests is recommended as the following:

$$CCC = 1.0\ TU_c.$$

The first step in the TMDL process is to calculate the allowable acute effluent toxicity that meets the CMC in the receiving water at the duration and frequency discussed in Appendix D.

The next step in the TMDL process is to calculate the allowable chronic effluent toxicity that meets the CCC in the receiving water at the duration and frequency discussed in Appendix D. To compare the allowable acute toxicity value to the allowable chronic toxicity value, the numbers must be converted to the same units as follows:

$$TU_a = (ACR)(TU_c)$$

where the acute-to-chronic ratio (ACR) is determined from tests on the effluent. It is important that the ACR used for TMDL purposes be based on actual data and not be assumed to be 10 or 20, as in the screening procedure (Chapter 3). The value of this ratio will influence whether the acute or chronic TMDL is more stringent and is used to calculate the permit limit using the methods described in Chapter 5.

At the present time, the fate of effluent toxicity in a receiving water is not fully understood. Even if a decay rate for toxicity can be measured on a given day in a site-specific situation, there is no way as yet to know how this rate is affected by temperature, pH, or other environmental conditions. There is also no way to know how this rate may change when new treatment is installed. Instream measurements of toxicity should be made at least once per season to identify any time-varying trends in site-specific fate processes. These monitored decay rates can then be used in steady-state or continuous simulation fate and transport models to predict receiving water toxicity, assuming that the rates will not change with future treatment.

Without specific information concerning the persistence of toxicity, it is recommended that effluent toxicity be limited to dilution estimates and that toxicity be assumed to be additive and conservative. Toxicity is expected to be additive even when the toxicity of one effluent affects selected biota while the toxicity of a downstream discharge affects different biota. For rivers and run-of-river reservoirs with a detention time of less than 20 days, the following dilution equation should be used, assuming completely mixed conditions:

$$C = \frac{C_s Q_s + C_e Q_e}{Q_e + Q_s}$$

where

- C = downstream concentration (TU_c or TU_a)
- C_s = upstream concentration (TU_c or TU_a)
- Q_s = upstream flow (cfs)
- C_e = effluent concentration (TU_c or TU_a) and
- Q_e = effluent flow (cfs).

For multiple dischargers, this equation must be applied sequentially to find the concentration as a function of distance downstream. The equation can be used for a steady-state analysis if Q_s is set equal to the design flow, Q_e is set equal to the historical plant flow, and C_e is calculated to meet the CMC and CCC. This equation can also be used with the continuous simulation, lognormal probabilistic, or Monte Carlo methods. For these dynamic analyses, a series of C_e, Q_e, C_s, and Q_s values would be used.

If instream toxicity measurements are available and a first-order decay rate for toxicity can be estimated, the following equation should be used:

$$C = C_o e^{-K(x/u)}$$

where

- C = downstream concentration (TU_c or TU_a)
- C_o = concentration after the point source discharge has mixed completely with the river (TU_c or TU_a)
- x = distance downstream of complete mix point
- u = velocity of river
- K = measured decay rate.

Additional statistical approaches are available that might provide better statistical fits to the available data. However, these models are somewhat more limited than the example provided above.

The same equations used for toxicity analyses in **rivers** can also be used in steady-state, continuous simulation, or probabilistic analysis of long, narrow, shallow impoundments with high inflow velocities. **Wider, deeper lakes** require more complicated analyses since prolonged detention times (>20 days) and stratification exert a significant impact on water quality. The prolonged detention times make it essential that receiving water measurements of toxicity be available to estimate decay factors. These measurements should be made at least once per season to identify any time-varying trends in toxicity fate processes. Steady-state or continuous simulation fate and transport models for lakes can then be run with monitored decay rates for toxicity. A simple steady-state analysis can be performed using the following equations [64]:

$$T_w = V/Q$$
$$C = C_{in}/(1+T_w K)$$

where

- T_w = mean hydraulic residence time
- V = lake volume at design conditions
- Q = mean total inflow rate at design conditions
- C = steady-state lake concentration (TU_c or TU_a)
- C_{in} = steady-state inflow concentration (TU_c or TU_a)
- K = first-order decay rate.

If effluent is discharged into a stratified lake and mixes only with the hypolimnion or epilimnion, the volume of the layer should be used only to calculate mean hydraulic residence time (T_w). The mean total inflow rate (Q) and the inflow concentration (C_{in}) should be calculated as the sum of all sources to the lake, including point source, nonpoint source, and tributary inputs.

Dilution calculations for effluent toxicity discharges to an **estuary** are complicated by the oscillatory motion of the tides and possible stratification of the estuary. The prolonged detention times make it essential that field measurements of toxicity be available to estimate decay factors. These measurements should be made at least once per season to identify any time-varying trends in toxicity rate processes. Steady-state or continuous simulation fate and transport models for estuaries can then be run with monitored decay rates for toxicity. A simple steady-state analysis can be performed using the following equations for each nonconservative pollutant entering from the river at the head of an estuary [64]:

$$C_i = C_{i-1} \frac{(f_i)}{(f_{i-1})} B_i$$

where

$$B_i = \frac{r_i}{1 - (1-r_i)e^{-kt}}$$

r_i = exchange ratio for segment i as defined by modified tidal prism method
t = flushing time
f_i = fraction of freshwater in segment i
C_i = nonconservative pollutant concentration in segment i (TU_a or TU_c)
k = decay rate of pollutant.

The following equations should be used for each nonconservative pollutant entering along the side of an estuary:

For segments downstream of outfall:

$$C_i = C_o \prod_{i=1}^{n} \frac{f_i}{f_o} \frac{r_i}{1 - (1-r_i)e^{-kt}}$$

For segments upstream of outfall:

$$C_i = C_o \prod_{i=1}^{n} \frac{S_i}{S_o} \frac{r_i}{1 - (1-r_i)e^{-kt}}$$

where

C_i = nonconservative pollutant mean concentration in segment i (TU_c or TU_a)
C_o = nonconservative pollutant mean concentration in segment of discharge
r_i = exchange ratio for segment i as defined by the modified tidal prism method
n = number of segment away from outfall
f_i = fraction of freshwater in segment i
f_o = fraction of freshwater in segment with discharge
S_i = salinity in segment i
S_o = salinity in segment of discharge
k = decay rate
t = flushing time.

The details of how to calculate exchange ratios and flushing times for estuaries are included in Part 2 of EPA's water quality assessment manual [64]. This manual also describes how to perform these calculations for stratified estuaries using a two-dimensional box model analysis.

4.6 HUMAN HEALTH

4.6.1 Human Health Considerations

Human exposure to pollutants should be evaluated as completely as available information will allow. Exposure information is used in calculating the human health reference ambient concentration (RAC) from the formulas in Chapter 2, Water Quality Standards. This information should be used to estimate exposures due to fish consumption and drinking water ingestion, background concentrations, and other exposure routes, such as recreational, occupational, drinking water, dietary (other than fish), and inhalation. Factors in the formulas for which information is not available can be omitted from the calculation. If States choose, bioaccumulation factors also can be modified.

4.6.2 Determining the TMDL Based on Human Health Toxicants

TMDLs are typically necessary only where mixing is allowed. Mixing zones are used at the discretion of the States. If a State does not allow a mixing zone or the assumption of complete mixing, then the RAC is applied at the end of pipe and no TMDL determination is typically necessary.

With persistent or bioconcentratable pollutants, special mixing zone considerations apply. Bioconcentratable pollutant criteria exceedances within the mixing zone can potentially result in tissue contamination of organisms directly or indirectly through contamination of bed sediments with subsequent incorporation into the food chain. For discharge situations with incomplete mixing (e.g., large rivers, lakes, estuaries, oceans), States need to carefully consider whether mixing zones for persistent or bioconcentratable pollutants are appropriate. Where a mixing zone is allowed, one TMDL should be calculated to achieve the RAC or criterion selected above [65]. Because most human health criteria are chronic only, a TMDL to protect against acute effects will usually not be needed, although EPA's Office of Drinking Water does have acute criteria for some pollutants.

For the purpose of the following discussion, use of simple, steady-state dilution models is assumed. However, these models may be inappropriate for certain situations where sediments serve as a sink for bioconcentratable pollutants and where additional factors need to be considered. Dynamic models, where available, are useful tools for accounting for an array of variables that may have an impact on the fate of bioconcentratable pollutants in the food chain. These models may be used by States for surface waters in appropriate instances.

In simple situations, the TMDL is determined from the RAC and the design flow of the receiving water. In more complicated situations, e.g., where mixing is not rapid or where lakes or estuaries are involved, a spatial averaging scale must be chosen. Selection of the spatial scale must be consistent with reasonable assumptions about the behavior of aquatic organisms and the target human population.

In some cases, it may be necessary to apply the chronic human health criterion within a mixing zone if it is reasonable to assume that the bioconcentrating aquatic organisms have little mobility, thus spending most of their time within the mixing zone; and the target human population consistently consumes fish from the mixing zone (over a 70-year lifetime, for carcinogenic risks).

The procedure for developing TMDLs/WLAs generally requires determining values for the following parameters, based upon water quality considerations: (1) the duration of the averaging period applicable to the WLA; (2) design considerations, e.g., flow; (3) the discharge (WLA) concentration that will result in meeting the ambient water quality criterion during the design condition; and (4) the allowable probability (or frequency) of the discharge's exceeding the WLA, averaged over the appropriate

duration. The technical basis for setting these values is discussed in the following sections.

1) Averaging Periods

The duration of the averaging period for the WLA should be selected to be consistent with the assumptions used to derive the water quality criteria. Two categories of pollutants should be recognized: carcinogens and noncarcinogens.

The human health criteria for carcinogens are derived assuming lifetime exposure. The upper-bound risk is directly proportional to the lifetime arithmetic mean dose. The criteria thus apply to the ambient water concentrations averaged over a 70-year period.

The duration of exposure assumed in deriving criteria for noncarcinogens may be ambiguous, particularly where a criterion is derived from animal studies. Furthermore, the duration may be highly variable, ranging as high as 20 to 30 years for cadmium.

2) Dilution Design Conditions

a) Carcinogens: River and Stream Discharge Situations

In well-mixed situations, the RWC, C, is determined by the pollutant load, W (mass/time), and the combined receiving water plus effluent flow, Q, such that, C = W/Q.

The long-term harmonic mean flow is recommended as the design flow for carcinogens. The recommendation of long-term harmonic mean flow has been derived from the definition of the human health criteria (HHC) for carcinogenic pollutants. The adverse impact of carcinogenic pollutants is estimated in terms of receptors (human) lifetime intakes. To be within the acceptable level of life-time body-burden of any carcinogen, such intakes should not exceed the HHC during the average life-time of the receptor. A life-time for exposure to carcinogenic pollutants is defined as 70 years, or approximately 365 (days/year) multiplied by 70 years.

The HHC for carcinogenic pollutants can be numerically expressed as:

$$HHC = C\ (design) = (C_1 + C_2 + C_3 + \text{-----} + C_n)/n$$

where
n = (365 days/year) x 70 years
C = concentrations

Based on an assumption of a constant daily load from a treatment facility, the fully mixed instream concentration will go up or down inversely with the ups and downs of receiving water flows. Therefore, instream concentration is a function of, and inversely proportional to, the streamflow downstream of the discharge. Using this concept, 1/Q can be substituted for C, as follows:

$$1/Q\ (design) = (1/Q_1 + 1/Q_2 + 1/Q_3 + \text{-----} + 1/Q_n)/n.$$

The stream design flow (Q design) can then be shown as follows:

$$Q\ (design) = n/(1/Q_1 + 1/Q_2 + 1/Q_3 + \text{-----} + 1/Q_n)$$

The harmonic mean is expressed as follows:

$$Q\ (design) = n/\sum_{i=1}^{n} (1/Q_i)$$

where
n = the number of recorded flows.

The harmonic mean is always less than the arithmetic mean. The harmonic mean is the appropriate design flow for determining long-term exposures using steady-state modeling of effluents. The arithmetic mean flow is not appropriate as the design flow since it overstates the dilution available. Extreme value statistics (such as 7Q10 or 30Q5) are also not appropriate since they have no consistent relationship with the long-term mean dilution. However, for situations involving seasonably variable effluent discharge rates, hold-and-release treatment systems, and effluent-dominated sites, the harmonic mean may not be appropriate. In these cases, the effluent load and downstream flow are not independent (i.e., they are correlated). Modeling techniques that can calculate an average daily concentration over a long period of time are more appropriate to determine the long-term exposure in these cases.

The harmonic mean flow may be estimated by any of several methods [8], assuming that flows are approximately lognormally distributed:

$$Q_{hm} = \frac{Q_{gm}^2}{Q_{am}}$$

where
Q_{gm} is the geometric mean flow
Q_{am} is the arithmetic mean flow.

For U.S. Geological Survey flow records, summaries of the statistical parameters needed to estimate the harmonic mean can be quickly obtained from STORET, through a user-friendly procedure for permit writers, as described in Appendix D.

WQAB DFLOW is a software package available for computation of harmonic mean flow. The DFLOW program (as discussed below and described in Appendix D) should be used with data that are not lognormally distributed.

To develop some quantitative sense of how a long-term harmonic mean flow of any stream compares with its 7Q10 flow, the Assessment and Watershed Protection Division and the Risk Reduction Engineering Laboratory at Cincinnati, Ohio, analyzed flow records of 60 streams selected at random throughout the United States. These are the same stream flow records that had been analyzed for stream design flow condition for aquatic life protection as listed in EPA guidance [8]. Based on the long-term harmonic flow and 7-day, 10-year low-flow estimates for these 60 streams, the long-term harmonic mean flows of all 60 streams were equal to or greater than two times the 7Q10 low flow. Fifty-four of the streams' harmonic mean flows were equal to or greater than 2.5 times their 7Q10 low flows. Finally, 40 of the 60 streams' harmonic mean flows were equal to or greater than 3.5 times the 7Q10.

Based on the above observations, permit authorities may choose a multiplication factor of 3 x 7Q10 to estimate stream design flow for human health protection for carcinogenic pollutants. How-

ever, it is recommended that the harmonic mean flow be calculated directly from the historical daily flow record, if possible. Alternatively, the following equation might be used to estimate harmonic mean flow [66]:

$$Q_{hm} = [1.194 * (Q_{am})^{0.473}] * [(7Q10)^{0.552}],\ r^2 = 0.99.$$

In this equation, Q_{am} and 7Q10 are estimated using the U.S. Geological Survey computer program, FLOSTAT.

b) Noncarcinogens: River and Stream Discharge Situations

The choice of average period represents a level-of-protection consideration inherent in the risk management decision to be made by the permitting agency. If a short-term duration of exposure is chosen (i.e., 90 days or less), design flows may be appropriately based on extreme value statistics. Because the effects from noncarcinogens are more often associated with shortened exposures, EPA suggests the use of 30Q5. However, in the comparisons of flows for smaller rivers (i.e., low flow of 50 cfs), the 30Q5 flow was, on the average, only 1.1 times that of the 7Q10. For larger rivers (i.e., low flow of 600 cfs), the factor was, on the average, 1.4 times. **If the effects from certain noncarcinogens are manifested after a lifetime of exposure, then a harmonic mean flow may be appropriate.**

3) Point of Application of the Criteria

The point at which the chronic criteria are to be met in the receiving water may be fixed by existing State standards or may be determined by considerations for managing individual and aggregate risks. The several possibilities include the following:

- Where State standards allow no mixing zone and no spatial averaging, the criterion would be met at the end of the pipe.
- Where State standards specify that the criterion must be met at the end of the mixing zone, the criterion would be applied at that point.
- Where State standards allow consideration of spatial averaging, the criterion may be met as an average within a specified area, as appropriate for the individual and aggregate risk scenarios underlying the application.

CHAPTER 4

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5. PERMIT REQUIREMENTS

5.1 INTRODUCTION

As the final step in the "standards-to-permits" process, development of permit requirements is often the culmination of the activities discussed in the preceding chapters. This chapter describes the basic principles of effluent variability and permit limit derivation and provides recommendations for deriving limits from various types of wasteload allocation outputs such that water quality standards are protected. It also addresses important considerations in the expression of limits and other types of permit requirements, including toxicity reduction evaluations. The first portion of the chapter deals principally with aquatic life protection. Permitting for protection of human health is found in Section 5.4.4.

5.1.1 Regulatory Requirements

There are both mandatory and discretionary elements associated with the development of water quality-based permit limits to control toxic pollutants and toxicity. The mandatory elements are described in the revisions to the National Pollutant Discharge Elimination System (NPDES) Surface Water Toxics Control Program regulations (54 *FR* 23868, June 2, 1989). The regulations at 40 *CFR* 122.44(d)(1) require that regulatory authorities first determine whether a discharge causes, has the reasonable potential to cause, or contributes to an excursion above water quality standards (narrative or numeric). In making these determinations, regulatory authorities must use a procedure that accounts for effluent variability, existing controls on point and nonpoint sources of pollution, available dilution, and (when using toxicity testing) species sensitivity. Each of these regulations were previously discussed in Chapter 3.

There is a degree of flexibility in the specific procedures a regulatory authority uses in determining whether an excursion occurs or is reasonably expected to occur and in the weight given to the various factors in conducting the evaluation of a specific discharger. The Environmental Protection Agency's (EPA) guidance for making these determinations is contained in the recommendations in Chapter 3.

There are also several EPA policies that reflect these regulatory requirements, including the "National Policy for the Development of Water Quality-Based Limits for Toxic Pollutants" (Appendix B-2) and EPA's "Whole Effluent Toxicity Permitting Principles and Enforcement Strategy," (Appendix B-4). This strategy states that "all major permits and minors of concern must be evaluated for potential or known toxicity (chronic or acute if more limiting)." In addition, the strategy states that "[f]inal whole effluent toxicity limits must be included in permits where necessary to ensure that State Water Quality Standards are met. These limits must properly account for effluent variability, available dilution, and species sensitivity."

There is an element of judgment inherent in the specific permit limit derivation procedures used for an individual discharger once a decision has been made to develop a specific type of limit. Case-specific considerations will usually dictate the most appropriate approach to be taken in individual situations. Nevertheless, the various assumptions used in the permit limit development process should be consistent with the assumptions and principles inherent in the effluent characterization and exposure assessment steps preceding permit limit development. **The permit limit derivation procedure used by the permitting authority should be fully enforceable and should adequately account for effluent variability, consider available receiving water dilution, protect against acute and chronic impacts, account for compliance monitoring sampling frequency, and protect the wasteload allocation (WLA) and ultimately water quality standards. To accomplish these objectives, EPA recommends that permitting authorities use the statistical permit limit derivation procedure discussed in Section 5.4 with the outputs from either steady state or the dynamic wasteload allocation modeling.**

5.2 BASIC PRINCIPLES OF EFFLUENT VARIABILITY

An understanding of the basic principles of effluent variability is central to water quality-based permitting. Many of the concepts are the same as those considered in the development of technology-based limits. However, the process for applying the principles is substantially different, as explained below.

5.2.1 Variations in Effluent Quality

Effluent quality and quantity vary over time in terms of volumes discharged and constituent concentrations. Variations occur due to a number of factors, including changes in human activity over a 24-hour period for publicly owned treatment works (POTWs), changes in production cycles for industries, variation in responses of wastewater treatment systems to influent changes, variation in treatment system performance, and changes in climate. Very few effluents remain constant over long periods of time. Even in industries that operate continuous processes, variations in the quality of raw materials and activities, such as back-washing of filters, cause peaks in effluent constituent concentrations and volumes.

If effluent data for a particular pollutant or pollutant parameter for a typical POTW are plotted against time, the daily concentration variations can be seen (see Figure 5-1, left-hand graphs). This behavior can be described by constructing frequency-concentration plots of the same data (see Figure 5-1, right-hand graphs).

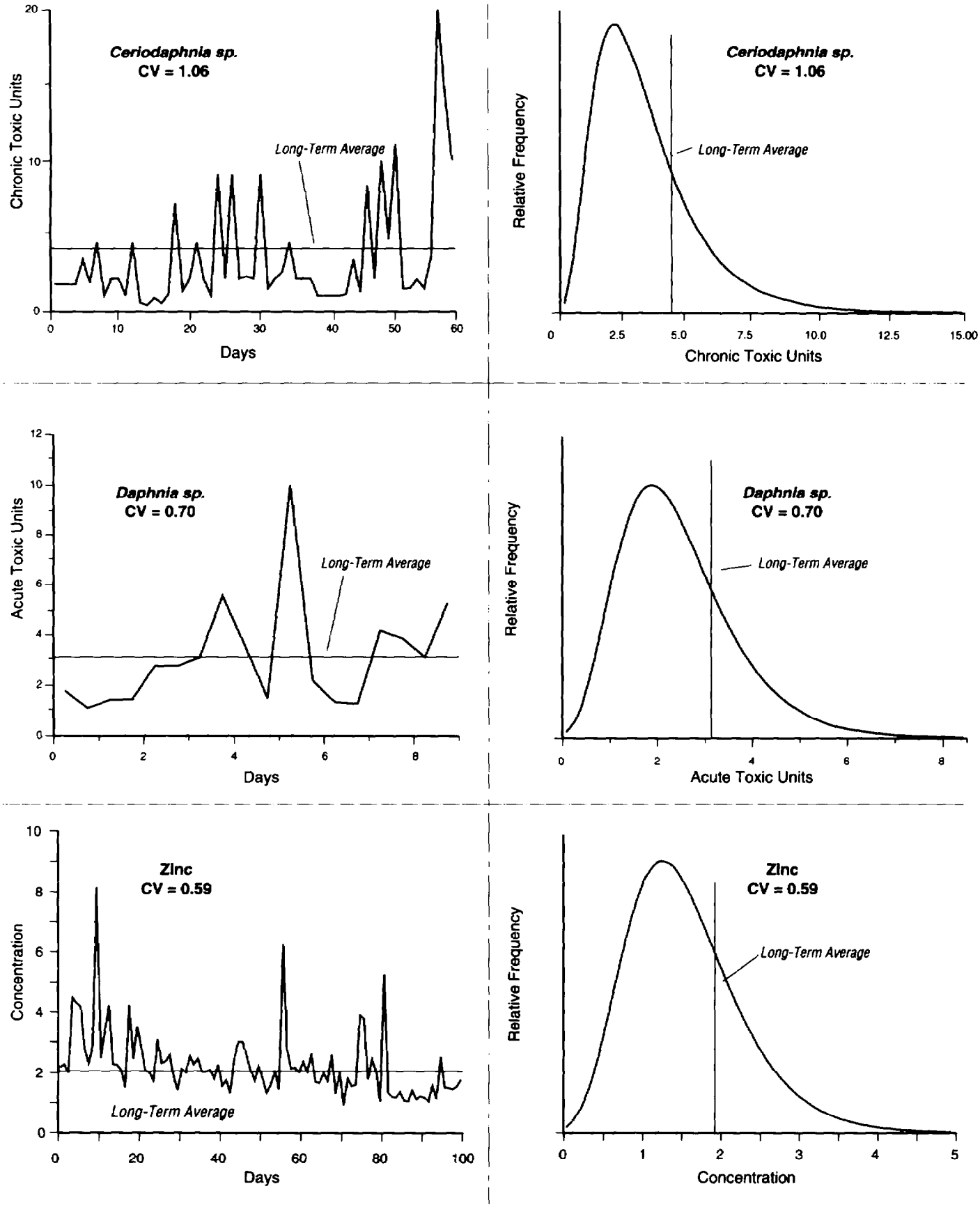

Figure 5-1. Data Relative Frequency Distributions for *Ceriodaphnia* Toxicity, *Daphnia* Toxicity, and Zinc Concentrations for Three Different Effluents

5.2.2 Statistical Parameters and Relationship to Permit Limits

Based upon the shape of the curve of a frequency-concentration plot, the data can be described in terms of a particular type of statistical distribution. The choices for statistical distributions include normal (bell-shaped), lognormal (positively skewed), or other variations on the lognormal distribution. From the vast amount of data that EPA has examined, it is reasonable to assume (unless specific data show otherwise) that treated effluent data follow a **lognormal** distribution. This is because effluent values are non-negative and treatment efficiency at the low end of the concentration scale is limited, while effluent concentrations may vary widely at the high end of the scale, reflecting various degrees of treatment system performance and loadings. These factors combine to produce the characteristically positively skewed appearance of the lognormal curve when data are plotted in a frequency histogram. Appendix E discusses the basis for concluding that effluent data are typically lognormally distributed, as well as recommendations for handling data sets from treatment plants that follow some other type of distribution.

Effluent data from any treatment system may be described using standard descriptive statistics, such as the mean concentration of the pollutant or pollutant parameter (i.e., the long-term average [LTA] and the coefficient of variation [CV]). The CV is a standard statistical measure of the relative variations of a distribution or set of data, defined as the ratio of the standard deviation to the mean. Using a statistical model, such as the lognormal, an entire distribution of values can be projected from limited data, and limits can be set at a specified probability of occurrence. Figure 5-1 shows the frequency-concentration curve and the relative positions of the concentrations corresponding to the mean for the data.

All permit limits, whether technology-based or water quality-based, are set at the upper bounds of acceptable performance. The purpose of a permit limit is to specify an upper bound of acceptable effluent quality. For technology-based requirements, the limits are based on proper operation of a treatment system. For water quality-based requirements, the limits are based on maintaining the effluent quality at a level that will comply with water quality standards, even during critical conditions in the receiving water. These requirements are determined by the WLA. The WLA dictates the required effluent quality which defines the desired level of treatment plant performance or target LTA.

In the development of technology-based effluent limits guidelines, the operating records of various wastewater treatment facilities for a particular category of discharger are examined. Based on the effluent data for the treatment facilities, a composite mean or LTA value for the parameter is determined. This LTA value, with relevant estimates of variability, is then used to derive effluent limit guidelines, which lead directly to permit limits.

In contrast, the process operates in reverse for water quality-based permit limits. The WLA, determined from water quality standards, defines the appropriate discharge level, which in turn determines the requisite target LTA for the treatment facility in order to meet that WLA. Permit limits may then be derived from this targeted LTA and CV. Figure 5-2 illustrates the relationship among the various statistical parameters. As these figures show, highly variable effluents require a much lower targeted LTA to meet the WLA and account for the variability that occurs in effluent concentration above the LTA.

It is extremely important to recognize that the various statistical principles and relationships discussed above operate in any dis-

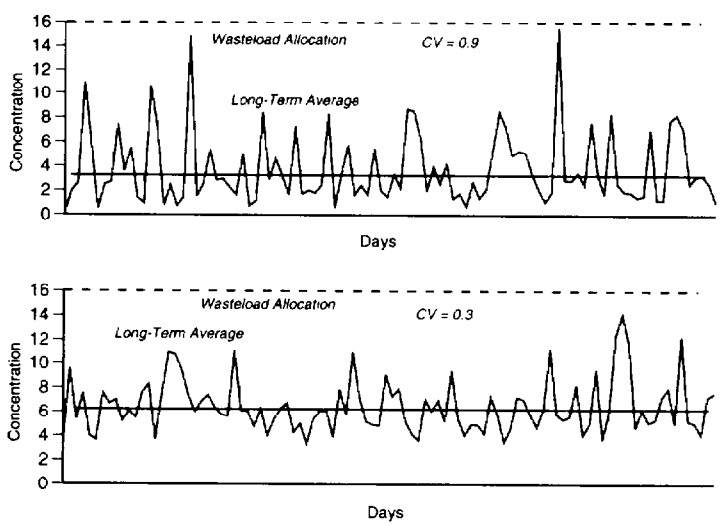

Figure 5-2a. Relationship Between a Single Wasteload Allocation and Two Long-Term Averages for Different Coefficients of Variation

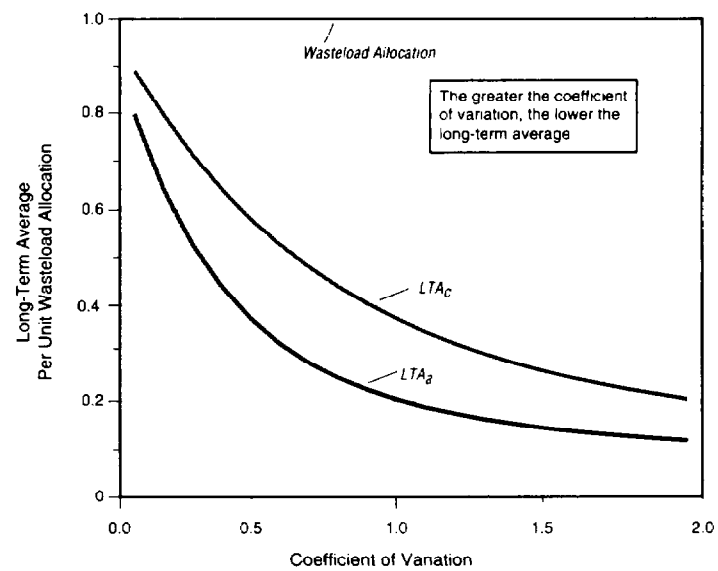

Figure 5-2b. Long-Term Average Per Unit Wasteload Allocation as a Function of the Coefficient of Variation

charge situation—whether or not they are specifically recognized or accounted for. Where a permit limit derivation procedure does not address these principles specifically, the permit writer will be implicitly assuming that there are enough conservative assumptions built into other steps in the process (e.g., water quality models, "buffer" between permit limits and actual operating conditions) to ensure that there will be no reasonable potential for excursions above water quality standards.

5.2.3 Expression of Permit Limits

The NPDES regulations at 40 *CFR* 122.45(d) require that all permit limits be expressed, unless impracticable, as both average monthly and maximum daily values for all discharges other than POTWs and as average weekly and average monthly limits for POTWs. The **maximum daily** permit limit (MDL) is the highest allowable discharge measured during a calendar day or 24-hour period representing a calendar day. The **average monthly** permit limit (AML) is the highest allowable value for the average of daily discharges obtained over a calendar month. The **average weekly** permit limit (AWL) is the highest allowable value for the average of daily discharges obtained over a calendar week.

EPA believes that a maximum daily permit limit can be directly used to express an effluent limit for all toxic pollutants or pollutant parameters except chronic whole effluent toxicity. The typical toxicity test used to measure chronic toxicity consists of samples collected from at least 3 different days over a 7-day period. Therefore, the test does not measure toxicity in any given 24-hour period or calendar day, but rather measures toxicity over a 7-day period. The toxicity could be caused by any one sample or a combination of samples. To address this situation, **EPA recommends that the permit contain a notation indicating that when chronic toxicity tests are required in a permit, the MDL should be interpreted as signifying the maximum test result for the month.**

Additionally, in lieu of an AWL for POTWs, EPA recommends establishing an MDL (or a maximum test result for chronic toxicity) for toxic pollutants and pollutant parameters in water quality permitting. This is appropriate for at least two reasons. First, the basis for the 7-day average for POTWs derives from the secondary treatment requirements. This basis is not related to the need for assuring achievement of water quality standards. Second, a 7-day average, which could comprise up to seven or more daily samples, could average out peak toxic concentrations and therefore the discharge's potential for causing acute toxic effects would be missed. A MDL, which is measured by a grab sample, would be toxicologically protective of potential acute toxicity impacts.

5.3 ENSURING CONSISTENCY WITH THE WASTELOAD ALLOCATION

The WLA provides a definition of effluent quality that is necessary to meet the water quality standards of the receiving water. The WLA is based on ambient criteria and the exposure of the resident aquatic community or humans to toxic conditions. Once a WLA has been developed, accounting for all appropriate considerations, a water quality-based permit limit may be derived to enforce the WLA. The method used to derive the permit limits must be consistent with the nature of the WLA.

The WLA addresses variability in effluent quality. For example, a WLA for human health pollutants is typically expressed as a single level of receiving water quality necessary to provide protection against long-term or chronic effects. On the other hand, a WLA for toxic pollutants affecting aquatic life (with corresponding duration and frequency requirements) should describe levels necessary to provide protection against both short-term and long-term effects.

5.3.1 Statistical Considerations of WLAs

Direct use of a WLA as a permit limit creates a significant risk that the WLA will be enforced incorrectly, since effluent variability and the probability basis for the limit are not considered specifically. For example, the use of a steady state WLA typically establishes a level of effluent quality with the assumption that it is a value never to be exceeded. The same value used directly as a permit limit could allow the WLA to be exceeded without observing permit violations if compliance monitoring was infrequent. Confusion can also result in translating a longer duration WLA requirement (e.g., for chronic protection) into maximum daily and average monthly permit limits. The permit writer must ensure that permit limits are derived to implement a WLA requirement correctly. Potential problem areas are as follows:

- The WLA must be enforced in a regulatory context by translating it into MDLs and AMLs; then and only then, will compliance monitoring associated with permit limits allow the regulatory authority to determine whether or not such permit limits are violated.
- The WLA that assumes that the discharge is steady state (i.e., not changing over time) requires a limit derivation assumption regarding how the effluent may vary.
- MDLs and AMLs average monthly limits must be developed so that they are consistent with each other and mandate the required level of wastewater treatment facility performance.
- If the acute WLA is used alone directly as the MDL, the limit will not necessarily be protective against chronic effects. If the acute WLA is used alone directly as the AML, the limit can allow excursions above the WLA within each month.
- If the chronic WLA is used alone as an MDL, the limit will be protective against acute and chronic effects but at the expense of being overly stringent. If the chronic WLA is used alone as the AML, the limit may be protective against acute and chronic effects depending upon effluent variability.

The objective is to establish permit limits that result in the effluent meeting the WLA under normal operating conditions virtually all the time. It is not possible to guarantee, through permit limits, that a WLA will never be exceeded. It is possible, however, using the recommended permit limit derivation procedures, to account for extreme values and to establish low probabilities of exceedence

of the WLA in conformance with the duration and frequency requirements of the water quality standards. This is not to suggest that permit writers should assume a probability of exceedence of the WLA, but rather, that they should develop limits that will make an exceedance a very small likelihood.

Since effluents are variable and permit limits are developed based on a low probability of exceedence, the permit limits should consider effluent variability and ensure that the requisite loading from the WLA is not exceeded under normal conditions. In effect then, the limits must "force" treatment plant performance, which, after considering acceptable effluent variability, will only have a low statistical probability of exceeding the WLA and will achieve the desired loadings.

Figure 5-3 shows a number of important aspects of the relationships among the various statistical parameters. In this illustration, the most limiting LTA (after comparing the LTAs derived from both acute and chronic WLAs) has been chosen for the chronic limiting condition. The more restrictive LTA will automatically meet both WLA requirements. If the effluent "fingerprint" for this LTA (and associated CV) is projected, it can be seen that the distribution of daily effluent values will not exceed the acute or chronic wasteload allocations for unacceptable periods of time. The duration and frequency requirements of the acute and chronic criteria for the pollutant or pollutant parameter will not be exceeded. This figure also illustrates permit limits derived from the more limiting LTA. (Note that for the scenario depicted in Figure 5-3, the MDL is lower than the acute WLA and the average monthly limit is lower than the chronic WLA. This scenario will occur when a 99-percent probability basis is used to calculate the LTA and a 95-percent probability basis is used to calculate the permit limits from the lower of the acute and chronic LTA. For other probability assumptions, these relationships will differ.)

5.3.2 Types of Water Quality Models and Model Outputs

Each of the two major types of water quality models, steady-state and dynamic, and their WLA outputs have specific implications

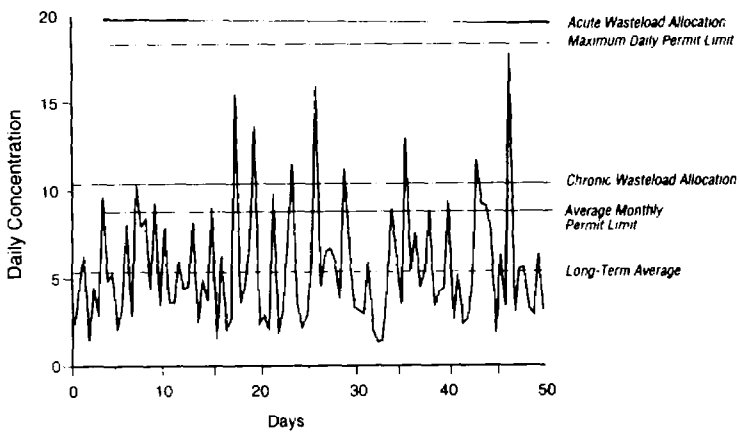

Figure 5-3. Relationship Between Daily Concnetrations, Long-Term Average, Wasteload Allocations, and Permit Limits

for the subsequent permit limit development process. These implications are discussed in detail below. **EPA recommends that steady-state WLA analyses generally be used by permitting authorities in most cases and especially where few or no whole effluent toxicity or specific chemical measurements are available, or where daily receiving water flow records are not available.** Two-value, steady-state models, although potentially more protective than necessary, can provide toxicologically protective results and are relatively simple to use. **If adequate receiving water flow and effluent concentration data are available to estimate frequency distributions, EPA recommends that one of the dynamic WLA modeling techniques be used to derive WLAs that will more exactly maintain water quality standards.**

Steady-State Modeling

Traditional single-value or two-value steady-state WLA models calculate WLAs at critical conditions, which are usually combinations of worst-case assumptions of flow, effluent, and environmental effects. For example, a steady-state model for ammonia considers the maximum effluent discharge to occur on the day of lowest river flow, highest upstream concentration, highest pH, and highest temperature. Each condition by itself has a low probability of occurrence; the combination of conditions may rarely or never occur. Permit limits derived from a steady-state WLA model will be protective of water quality standards at the critical conditions and for all environmental conditions less than critical. However, such permit limits may be more stringent than necessary to meet the return frequency requirements of the water quality criterion for the pollutant of concern.

On the other hand, a steady-state model approach may involve simplifying assumptions for other factors, such as ambient background concentrations of a toxicant, multiple source discharges of a toxicant, number of pollutants causing toxicity, incorrect effluent variability assumptions, and infrequent compliance monitoring. The effect of these types of factors, especially if unaccounted for in the WLA determination, can reduce the level of protectiveness provided by the critical condition assumptions of the steady-state model approach. Therefore, when using a steady-state WLA model, the permitting authority should be aware of the different assumptions and factors involved and should consider these assumptions and factors adequately consideration when developing permit limits.

In general, steady-state analyses tend to be more conservative than dynamic models because they rely on worst case assumptions. Thus, permit limits derived from these outputs will generally be lower than limits derived from dynamic models.

a) Single Value From a Steady-State Analysis

Some single-value, steady-state modeling has been used to calculate only chronic WLAs. These models produce a single effluent loading value and no information about effluent variability. Single value WLAs are typically based upon older State water quality standards that do not specify levels for both acute and chronic protection but only include one level of protection. Such outputs also would be found where a model is based upon protection of human health, since only a single long-term ambient value is of concern.

b) Two Values from Steady-State Analysis

Steady-state modeling for protection of aquatic life can specify two sets of calculations—one for protection against acute effects and one for protection against chronic effects. These models must use water quality criteria specifying two levels of protection. In addition, these models include considerations of mixing zones when developing WLAs to afford two levels of protection. Like the single-value, steady-state models, these models do not produce any information about acceptable effluent variability and may require additional calculations to be translated into permit limits.

For complex discharge situations (i.e., multiple dischargers or complex environmental factors needing consideration), water quality models and associated WLAs are typically developed by specialized water quality analysts in the regulatory authority. However, the permit writer is often required to develop a water quality model and WLA prior to permit limit derivation. In the latter situation, water quality modeling usually consists of simple steady-state dilution models using worst-case assumptions.

Dynamic Modeling

Dynamic models use estimates of effluent variability and the variability of receiving water assimilation factors to develop effluent requirements in terms of concentration and variability. The outputs from dynamic models can be used to base permit limits on probability estimates of receiving water concentrations rather than worst-case conditions. The advantages and disadvantages of various types of dynamic models are provided in Chapter 4.

In general, dynamic models account for the daily variations of and relationships between flow, effluent, and environmental conditions and therefore directly determine the actual probability that a water quality standards exceedence will occur. Because of this, dynamic models can be used to develop WLAs that maintain the water quality standards exactly at the return frequency requirements of the standards. Since this return frequency is usually one event in 3 years, WLAs developed by dynamic models are typically higher than those developed by steady-state models.

A targeted long-term average performance level and coefficient of variation can be derived from each type of dynamic model output, but some of the outputs require some additional manipulation of the data to develop the LTA and the CV. These parameters are also the starting point for the statistical permit limit derivation procedures discussed in the next section. **Continuous Simulation** models offer an array of effluent data that require further manipulation to develop an LTA and a CV. Both **Monte Carlo** and **Lognormal Probabilistic** models produce an LTA and CV, which can be used directly in developing permit limits. Chapter 4 details the different dynamic models. Specific instructions for the use of dynamic models are available in the references listed at the end of Chapter 4.

5.4 PERMIT LIMIT DERIVATION

There are a number of different approaches currently being used by permitting authorities to develop water quality-based limits for toxic pollutants and toxicity. Differences in approaches are often attributable to the need for consistency between permit limit derivation procedures and the assumptions inherent in various types of water quality models and WLA outputs. In addition, permitting authorities also are constrained by legal requirements and policy decisions that may apply to a given permitting situation. In some instances, however, permitting procedures have been adopted without careful consideration of the toxicological principles involved or the advantages and disadvantages of the procedure.

To avoid this problem, EPA recommends that the statistical permit limit derivation procedure described in this chapter be used for the derivation of both chemical-specific and whole effluent toxicity limits for NPDES permits. The type of WLA chosen from which to derive the limits is a matter of case-by-case application, as determined by the permitting authority. Although there are advantages and disadvantages associated with each of the procedures, EPA believes that the statistical derivation procedures will result in the most defensible and protective water quality-based permit limits for both specific chemicals and whole effluent toxicity.

The following section explains EPA's recommended permitting procedures and highlights advantages and disadvantages of various other approaches. With this information, permitting authorities will be better informed when deciding on the most appropriate permit limit derivation approach. For example, permitting authorities may decide to derive water quality-based permit limits for all dischargers using a steady-state WLA model as a baseline limit determination. If time and resources are available or if the discharger itself takes the initiative (after approval by the regulatory authority), dynamic modeling could be conducted to further refine the WLA from which final permit limits would be derived. Box 5-1 presents example permit limit calculations for each of the principal types of WLA outputs discussed in Section 5.4.1. Permit limits derived from dynamic modeling are usually higher than those based upon steady-state modeling. The difference is reflected in Box 5-1 and has been observed in actual applications [1, 2, 3]. In addition, the case studies in Chapter 7 illustrate how water quality-based permit limits are derived and compare the results of limits derived from steady state and dynamic wasteload allocations.

5.4.1 EPA Recommendations for Permitting for Aquatic Life Protection

Permit Limit Derivation from Two-Value, Steady-State Outputs for Acute and Chronic Protection

A number of WLAs have two results: acute and chronic requirements. These types of allocations will be developed more often as States begin to adopt water quality standards that provide both acute and chronic protection for aquatic life. These WLA outputs need to be translated into MDLs and AMLs. The following methodology is designed to derive permit limits for specific chemicals as well as whole effluent toxicity to achieve these WLAs.

- A treatment performance level (LTA and CV) that will allow the effluent to meet the WLA requirement is calculated.

Box 5-1. Sample Calculations of Permit Limits for Whole Effluent Toxicity from Different Wasteload Allocation Data

Available Data	Two Value wasteload allocation	Dynamic model output	Single wasteload allocation
Wasteload Allocation (WLA)	----	----	14.3
Acute Wasteload Allocation (WLAa)	2.60	----	----
Chronic Wasteload Allocation (WLAc)	14.3	----	----
Acute-Chronic Ratio	4.62	----	----
Coefficient of Variation (CV)	0.8	0.8	0.8
Number of Samples per Month (n)	4	4	4
Long Term Average (LTA)	----	9.44	----

From two-value steady state wasteload allocation

$WLA_{a,c} = WLA_a \bullet ACR = 2.60 \bullet 4.62 = 12.0$

$LTA_c = WLA_c \bullet e\,[0.5\sigma_4^2 - 2.326\sigma_4] = 14.3 \bullet 0.440$ (from Table 5-1) $= 6.29$

$LTA_{a,c} = WLA_{a,c} \bullet e\,[0.5\sigma^2 - 2.326\sigma] = 12.0 \bullet 0.249$

(from Table 5-1) $= 2.99$

$MDL = LTA_{a,c} \bullet e\,[2.326\sigma - 0.5\sigma^2] = 2.99 \bullet 4.01$ (from Table 5-2) $= 12.0$

$AML = LTA_{a,c} \bullet e\,[2.326\sigma_n - 0.5\sigma_n^2] = 2.99 \bullet 2.27$ (from Table 5-2) $= 6.79$

From dynamic model output

$MDL = LTA_c \bullet e\,[2.326\sigma - 0.5\sigma^2] = 9.44 \bullet 4.01$ (from Table 5-2) $= 37.9$

$AML = LTA_c \bullet e\,[2.326\sigma_n - 0.5\sigma_n^2] = 9.44 \bullet 2.27$ (from Table 5-2) $= 21.4$

From single wasteload allocation

Option 1

$LTA = WLA \bullet e\,[0.5\sigma^2 - 2.326\sigma] = 14.3 \bullet 0.440$ (from Table 5-1) $= 6.29$

$MDL = LTA \bullet e\,[2.326\sigma - 0.5\sigma^2] = 6.29 \bullet 4.01$ (from Table 5-2) $= 25.2$

$AML = LTA \bullet e\,[2.326\sigma_n - 0.5\sigma_n^2] = 6.29 \bullet 2.27$ (from Table 5-2) $= 14.3$

Option 2

$MDL = WLA = 14.3$

$AML = MDL/2 = 7.15$

Note: All calculations use the 99th percentile z statistic for calculation of long-term averages and permit limits.

Where two requirements are specified based on different duration periods, two performance levels are calculated (Box 5-2, Step 2).

- For whole effluent toxicity only, the acute WLA is converted into an equivalent chronic WLA by multiplying the acute WLA by an acute-to-chronic ratio (ACR). This ratio should optimally be based on effluent data, but also can be estimated as 10, based on the information presented in Chapter 1 and Appendix A.
- Permit limits are then derived directly from whichever performance level is more protective (Box 5-2, Steps 3 and 4).

Figure 5-4 presents a flow chart summarizing the various steps in this procedure. In addition, the equations used in Box 5-2 are based on the lognormal distribution, which is explained in more detail in Appendix E. The principal advantages of this procedure are described below.

- This procedure provides a mechanism for setting permit limits that will be toxicologically protective. A steady-state WLA uses a single value to reflect the effluent loading and thus is an inherent assumption that the actual effluent will not exceed the calculated loading value. If the WLA is simply adopted as the permit limit, the possibility exists for exceedance of the WLA due to effluent variability. Clearly, however, effluents are variable. Therefore, permit limits are established using a value corresponding to a percentile of the selected probability distribution of the effluent (e.g., 95th or 99th percentile).
- It allows comparison of two independent WLAs (acute and chronic) to determine which is more limiting for a discharge. The WLA output provides two numbers for protection against two types of toxic effects, each based upon different mixing conditions for different durations. Acute effects are limited based upon 1-hour exposures at critical conditions, close to the point of discharge, or where necessary, at the end of the pipe. Chronic effects are limited based on 4-day exposures after mixing at critical conditions. These requirements yield different effluent treatment requirements that cannot be compared to each other without calculating the LTA performance level the plant would need to maintain in order to meet each requirement. Without this comparison (or in the absence of procedures that address this comparison), the WLA representing the more critical condition cannot be determined. A treatment system will only need to be designed to meet one level of

Box 5-2. Calculating Permit Limits Based on Two-Value Wasteload Allocation

To set maximum daily and average monthly permit limits based on acute and chronic wasteload allocations, use the following four steps:

1. Convert the acute wasteload allocation to chronic toxic units. Skip to Step 2 for chemical-specific limits.
2. Calculate the long-term average wasteload that will satisfy the acute and chronic wasteload allocations.
3. Determine the lower (more limiting) of the two long-term averages.
4. Calculate the maximum daily and average monthly permit limits using the lower (more limiting) long-term average.

Term	Meaning
CV	Coefficient of variation
σ	Standard deviation
$WLA_{a,c}$	Acute wasteload allocation in chronic toxic units
WLA_a	Acute wasteload allocation in acute toxic units
WLA_c	Chronic wasteload allocation in chronic toxic units
LTA_{ac}	Acute long-term average wasteload in chronic units
LTA_c	Chronic long-term average wasteload
TU_a	Acute toxic units
TU_c	Chronic toxic units
ACR	Acute-to-chronic ratio
MDL	Maximum daily limit
AML	Average monthly limit
z	z statistic

Step 1 *(for whole effluent toxicity only)*

$$WLA_{ac}\ (in\ TU_c) = WLA_a\ (in\ TU_a) \bullet ACR$$

Step 2 *(start here for chemical specific limits)*

$$LTA_{a,c} = WLA_{a,c} \bullet e^{[0.5\sigma^2 - z\sigma]}$$

where $\sigma^2 = \ln(CV^2+1)$
z = 1.645 for 95th percentile probability basis, and
z = 2.326 for 99th percentile probability basis

$$LTA_c = WLA_c \bullet e^{[0.5\sigma_4^2 - z\sigma_4]}$$

where $\sigma_4^2 = \ln(CV^2/4 + 1)$
z = 1.645 for 95th percentile probability basis, and
z = 2.326 for 99th percentile probability basis

Step 3

$$LTA = \min(LTA_c, LTA_{a,c})$$

Step 4

$$MDL = LTA \bullet e^{[z\sigma - 0.5\sigma^2]}$$

where $\sigma^2 = \ln(CV^2+1)$
z = 1.645 for 95th percentile probability basis, and
z = 2.326 for 99th percentile probability basis

$$AML = LTA \bullet e^{[z\sigma_n - 0.5\sigma_n^2]}$$

where $\sigma_n^2 = \ln(CV^2/n + 1)$
z = 1.645 for 95th percentile probability basis, and
z = 2.326 for 99th percentile probability basis

*Full details of this procedure are found in Appendix E.

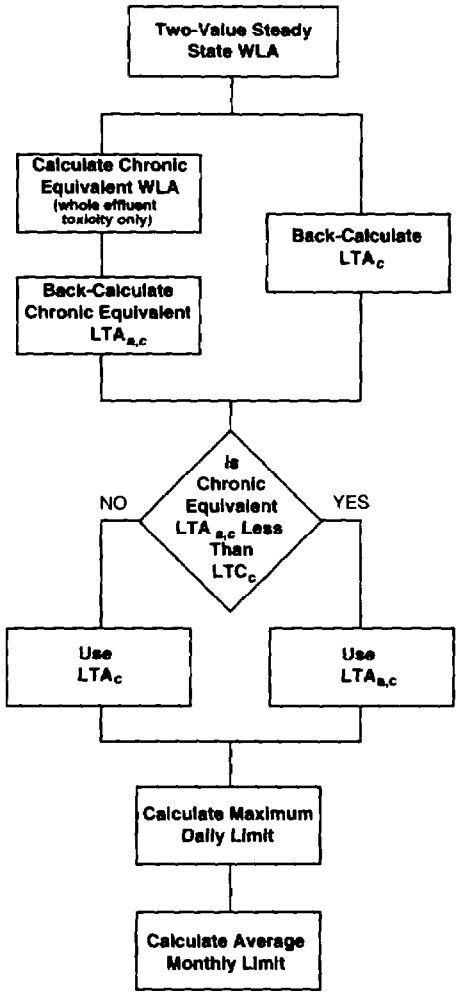

Figure 5-4. Flowchart for Calculating Permit Limits From Two-Value, Steady-State Wasteload Allocation for Aquatic Life Protection

treatment for effluent toxicity—treatment needed to control the most limiting toxic effect.

- The actual number of samples can be factored into permit limit derivation procedures. The procedure provides the means to accurately determine the AML based on the number of observations that will be taken.

The principal disadvantages of this approach are:

- Some permit writers have indicated that additional mathematical calculations associated with these procedures increase the burden for the permit writer and add what is perceived to be an unnecessary step.
- The use of a steady-state WLA may result in permit limits that are more conservative due to the assumption of critical conditions. However, these limits are still protective of water quality criteria. The level of conservatism may be necessary in those instances where limited data prevent a more precise evaluation of a WLA.

This procedure provides a toxicologically sound approach. To help the permit writer, EPA has developed tables (see Tables 5-1 and 5-2) to be used to quickly determine the necessary values. In addition, some permit authorities have developed their own computer programs to readily compute the necessary information from the appropriate inputs.

Permit Limit Derivation From Dynamic Model Outputs

The least ambiguous and most exact way that a WLA for specific chemicals or for whole effluent toxicity can be specified by using dynamic modeling from which the WLA is expressed as a required effluent performance in terms of the LTA and CV of the daily values. When a WLA is expressed as such, there is no confusion about assumptions used and the translation to permit limits. A permit writer can readily design permit limits to achieve the WLA objectives. The types of dynamic exposure analyses that yield a WLA in terms of required performance are the continuous simulation, Monte Carlo, and lognormal probabilities analyses. Chapter 4 provides a general discussion of these models. Guidance manuals for developing WLAs are listed in the references at the end of Chapter 4. Once the WLA is determined, the permit limit derivation procedure which can be used for both whole effluent toxicity and specific chemicals, is as follows:

- The WLA is first developed by iteratively running the dynamic model with successively lower LTAs until the model shows compliance with the water quality standards.
- The effluent LTA and CV must then be calculated from the model effluent inputs used to show compliance with the water quality standards. This step is only necessary for the Monte Carlo and continuous simulation methods.
- The permit limit derivation procedures described in Box 5-2, Step 4 are used to derive MDLs and AMLs from the required effluent LTA and CV. Unlike these procedures for steady-state WLAs, there is only a single LTA that provides both acute and chronic protection, and, therefore, the comparison step indicated in Figure 5-4 and Box 5-2 is unnecessary.

The principal advantages of this procedure are:

- It provides a mechanism for computing permit limits that are toxicologically protective. As with the procedure summarized below for two-value, steady-state WLA outputs, the permit limit derivation procedures used with this type of output consider effluent variability and derive permit limits from a single limiting LTA and CV.
- Actual number of samples is factored into permit limit derivation procedures. This procedure has the same elements as discussed for the statistical procedures in Option 2 below.
- Dynamic modeling determines an LTA that will be adequately protective of the WLA, which relies on actual flow data thereby reducing the need to rely on worst case critical flow condition assumptions.

Table 5-1. Back Calculations of Long-Term Average

CV	WLA Multipliers $e^{[0.5\,\sigma^2 - z\sigma]}$ 95th Percentile	99th Percentile
0.1	0.853	0.797
0.2	0.736	0.643
0.3	0.644	0.527
0.4	0.571	0.440
0.5	0.514	0.373
0.6	0.468	0.321
0.7	0.432	0.281
0.8	0.403	0.249
0.9	0.379	0.224
1.0	0.360	0.204
1.1	0.344	0.187
1.2	0.330	0.174
1.3	0.319	0.162
1.4	0.310	0.153
1.5	0.302	0.144
1.6	0.296	0.137
1.7	0.290	0.131
1.8	0.285	0.126
1.9	0.281	0.121
2.0	0.277	0.117

Acute

$$LTA_{a,c} = WLA_{a,c} \cdot e^{[0.5\,\sigma^2 - z\sigma]}$$

where $\sigma^2 = \ln[CV^2 + 1]$,
z = 1.645 for 95th percentile occurrence probability, and
z = 2.326 for 99th percentile occurrence probability

Chronic
(4-day average)

$$LTA_c = WLA_c \cdot e^{[0.5\,\sigma_4^2 - z\sigma_4]}$$

where $\sigma_4^2 = \ln[CV^2/4 + 1]$,
z = 1.645 for 95th percentile occurrence probability, and
z = 2.326 for 99th percentile occurrence probability

CV	WLA Multipliers $e^{[0.5\,\sigma_4^2 - z\sigma_4]}$ 95th Percentile	99th Percentile
0.1	0.922	0.891
0.2	0.853	0.797
0.3	0.791	0.715
0.4	0.736	0.643
0.5	0.687	0.581
0.6	0.644	0.527
0.7	0.606	0.481
0.8	0.571	0.440
0.9	0.541	0.404
1.0	0.514	0.373
1.1	0.490	0.345
1.2	0.468	0.321
1.3	0.449	0.300
1.4	0.432	0.281
1.5	0.417	0.264
1.6	0.403	0.249
1.7	0.390	0.236
1.8	0.379	0.224
1.9	0.369	0.214
2.0	0.360	0.204

The principal disadvantages of this procedure are:

- Necessary data for effluent variability and receiving water flows may be unavailable, which prevents the use of this approach.
- The amount of staff resources needed to explain how the limits were developed and to conduct the WLA also is a concern. The permit documentation (i.e., fact sheet) will need to clearly explain the basis for the LTA and CV and this can be resource intensive.

Permit Limit Derivation From Single, Steady-State Model Output

Some State water quality criteria and the corresponding WLAs are reported as a single value from which to define an acceptable level of effluent quality. For example, "copper concentration must not exceed 0.75 milligrams per liter (mg/l) instream." Steady-state analyses assume that the effluent is constant and, therefore, the WLA value will never be exceeded. This presents a problem in deriving permit limits because permit limits need to consider effluent variability.

Table 5-2. Calculation of Permit Limits

CV	LTA multipliers $e^{[z\sigma - 0.5\sigma^2]}$ 95th Percentile	LTA multipliers $e^{[z\sigma - 0.5\sigma^2]}$ 99th Percentile
0.1	1.17	1.25
0.2	1.36	1.55
0.3	1.55	1.90
0.4	1.75	2.27
0.5	1.95	2.68
0.6	2.13	3.11
0.7	2.31	3.56
0.8	2.48	4.01
0.9	2.64	4.46
1.0	2.78	4.90
1.1	2.91	5.34
1.2	3.03	5.76
1.3	3.13	6.17
1.4	3.23	6.56
1.5	3.31	6.93
1.6	3.38	7.29
1.7	3.45	7.63
1.8	3.51	7.95
1.9	3.56	8.26
2.0	3.60	8.55

Maximum Daily Limit

$$MDL = LTA \bullet e^{[z\sigma - 0.5\sigma^2]}$$

where $\sigma^2 = ln[CV^2 + 1]$,
z = 1.645 for 95th percentile occurrence probability, and
z = 2.326 for 99th percentile occurrence probability

Average Monthly Limit

$$AML = LTA \bullet e^{[z\sigma_n - 0.5\sigma_n^2]}$$

where $\sigma_n^2 = ln[CV^2/n + 1]$,
z = 1.645 for 95th percentile,
z = 2.326 for 99th percentile, and
n = number of samples/month

CV	LTA Multipliers $e^{[z\sigma_n - 0.5\sigma_n^2]}$ 95th Percentile n=1	n=2	n=4	n=10	n=30	99th Percentile n=1	n=2	n=4	n=10	n=30
0.1	1.17	1.12	1.08	1.06	1.03	1.25	1.18	1.12	1.08	1.04
0.2	1.36	1.25	1.17	1.12	1.06	1.55	1.37	1.25	1.16	1.09
0.3	1.55	1.38	1.26	1.18	1.09	1.90	1.59	1.40	1.24	1.13
0.4	1.75	1.52	1.36	1.25	1.12	2.27	1.83	1.55	1.33	1.18
0.5	1.95	1.66	1.45	1.31	1.16	2.68	2.09	1.72	1.42	1.23
0.6	2.13	1.80	1.55	1.38	1.19	3.11	2.37	1.90	1.52	1.28
0.7	2.31	1.94	1.65	1.45	1.22	3.56	2.66	2.08	1.62	1.33
0.8	2.48	2.07	1.75	1.52	1.26	4.01	2.96	2.27	1.73	1.39
0.9	2.64	2.20	1.85	1.59	1.29	4.46	3.28	2.48	1.84	1.44
1.0	2.78	2.33	1.95	1.66	1.33	4.90	3.59	2.68	1.96	1.50
1.1	2.91	2.45	2.04	1.73	1.36	5.34	3.91	2.90	2.07	1.56
1.2	3.03	2.56	2.13	1.80	1.39	5.76	4.23	3.11	2.19	1.62
1.3	3.13	2.67	2.23	1.87	1.43	6.17	4.55	3.34	2.32	1.68
1.4	3.23	2.77	2.31	1.94	1.47	6.56	4.86	3.56	2.45	1.74
1.5	3.31	2.86	2.40	2.00	1.50	6.93	5.17	3.78	2.58	1.80
1.6	3.38	2.95	2.48	2.07	1.54	7.29	5.47	4.01	2.71	1.87
1.7	3.45	3.03	2.56	2.14	1.57	7.63	5.77	4.23	2.84	1.93
1.8	3.51	3.10	2.64	2.20	1.61	7.95	6.06	4.46	2.98	2.00
1.9	3.56	3.17	2.71	2.27	1.64	8.26	6.34	4.68	3.12	2.07
2.0	3.60	3.23	2.78	2.33	1.68	8.55	6.61	4.90	3.26	2.14

The proper enforcement of this type of WLA depends on the parameter limited. For nutrients and biochemical oxygen demand (BOD), the WLA value generally has been used as the average daily permit limit. However, the impact associated with toxic pollutants is more time dependent, as reflected in the 4-day average duration for the criteria continuous concentration (CCC) (see Chapter 2). Where there is only one water quality criterion and therefore only one WLA, permit limits can be developed using the following procedure:

- Consider the single WLA to be the chronic WLA and derive an chronic LTA for this WLA using the procedures in Box 5-2 (Step 2, Part 2).
- Derive MDLs and AMLs using the procedures in Box 5-2 (Step 4).

The principal advantages and disadvantages of this procedure are similar to those for the two-value permit limit derivation method discussed previously except that it does not examine two WLAs.

5.4.2 Other Approaches to Permitting for Aquatic Life

Other approaches for translating WLA outputs into permit limits have been used by some permitting authorities. These methods may combine elements of the statistical procedures discussed earlier with specific technical and policy requirements of the permitting authority to derive limits that may be protective of water quality and consistent with the requirements of the WLA. Such approaches may use simplified statistical procedures.

For example, some permitting authorities assume a value for the CV and an acute to chronic ratio above which the chronic WLA will always be more limiting. Where such simplifying assumptions are used, the need to compare LTAs derived from acute and chronic steady-state models is unnecessary. Similarly, for assumed values for n, CV, and exceedence probability, the various equations shown in Box 5-2 can be simplified further, such that the AML will always be a constant fraction of the MDL.

These approaches allow the permit writer to rapidly and easily translate the results of WLAs into permit limits. However, the permit writer clearly should understand the underlying procedures and carefully explain the basis for the chosen assumption. Appropriate State or regional guidance documents also should be referenced.

Another approach used by some permit authorities involves the direct use of the WLA as a permit limit. This approach sometimes involves the following steps:

- The WLA value for toxic pollutants is used as the MDL.
- In the absence of other information, permit writers typically divide the MDL by 1.5 or 2.0 to derive an AML (depending on the expected range of variability).

The principal advantage of this approach is that it is very straightforward to implement and requires minimal resources. The disadvantage of this option is that the average monthly limits must be derived without any information about the variability of the effluent parameter; therefore, the permit writer cannot be sure that these procedures are protective of water quality criteria. Conversely, limits derived from this approach may be overly stringent and subject to challenge.

The direct application of both the acute and chronic WLAs as permit limits is another approach that has been used. The WLA developed for protection against chronic effects becomes the average monthly limit and the acute WLA becomes the MDL. **EPA discourages the use of this approach.** Since effluent variability has not been specifically addressed with this approach, compliance with the monthly average (30-day) effluent limit during critical conditions could exceed the chronic (4-day) WLA. Whether standards are violated with excessive frequency under such conditions would depend upon whether the conditions represented by the worst-case assumptions of the model also were occurring at the same time. By contrast, compliance with limits that were developed using statistical procedures have a low chance of leading to WLA excursions before effluent variability is accounted for in deriving the limits (see Figure 5-3).

Another permitting approach is to use a narrative "no toxicity" limit that is measured using a toxicity testing method that employs only a control and a single exposure at the receiving water concentration (RWC). This is sometimes referred to as a "pass/fail" toxicity test. Although these tests can be less expensive than full dilution series testing, they provide no knowledge as to the extent of toxicity present during the test and therefore no data concerning the seriousness of the impact or the amount of toxicity reduction necessary. The death of a single test animal can occur at any concentration level beyond the lethality threshold for the test organism; therefore, such a test is much less powerful from a statistical standpoint. In addition, it is not possible to determine dose-response relationships for the test organisms without using multiple effluent concentrations. Dose-response curves are useful in determining quality assurance of the tests and in defining threshold dosages for regulatory purposes. Because the drawbacks of the approach generally outweigh the benefits, **EPA recommends that whole effluent toxicity limits be established using a statistical derivation procedure that adequately accounts for effluent variability and that monitoring for compliance with whole effluent toxicity limits be conducted using a full dilution series.**

When setting a whole effluent toxicity limit to protect against acute effects, some permitting authorities use an end-of-pipe approach. Typically, these limits are established as an LC_{50}>100-percent effluent at the end of the pipe. These limits are routinely set without any consideration as to the fate of the effluent and the concentrations of toxicant(s) after the discharge enters the receiving water. Limits derived in this way are not water quality-based limits and suffer from significant deficiencies since the toxicity of a pollutant depends mostly upon concentration, duration of exposure, and repetitiveness of the exposure. This is especially true in effluent dominated waters. For example, an effluent that has an LC_{50}=100 percent contains enough toxicity to be lethal to up to 50 percent of the test organisms. If the effluent is discharged to a low-flow receiving waterbody that provides no more than a threefold dilution at the critical flow, significant mortality can occur in the receiving water. Furthermore, such a limit could not assure protection against chronic effects in the receiving waterbody. Chronic effects could occur if the dilution in the receiving water multiplied by the acute to chronic ratio is greater than 100 percent. Therefore, in effluent dominated situations, limits set using this approach may be severely underprotective. In contrast, whole effluent toxicity limits set using this approach in very high receiving water flow conditions may be overly restrictive. **Because of these problems, EPA recommends that all whole effluent toxicity limits be set as water quality-based limits and that to do so, the statistical permit limit derivation procedures discussed in Section 5.4.1 be followed.**

5.4.3 Special Permitting Requirements

Water quality-based permit limit development for discharges to marine and estuarine waters follows the same basic steps as the water quality-based approach for freshwater discharges. There are some differences in the water quality criteria used as the basis for protection, the designation of mixing zones, and the water quality models used to develop WLAs; however these differences are addressed in the WLA. (See discussions of these elements in previous chapters.) In addition, there are some special regulatory considerations associated with these types of dischargers, including special reviews of permits with such programs as the Coastal Zone Management Program. Some discharges also require an Ocean Discharge Criteria Evaluation under Section 403(c) of the Clean Water Act (CWA).

5.4.4 EPA Recommendations for Permitting for Human Health Protection

Permit development to protect against certain routes of exposure is another key consideration. Ingesting contaminated fish and shellfish is a toxic chemical exposure route of serious potential

human health concern for which there is no intervening treatment process, unlike the drinking water route of exposure. Effluent limits designed to meet aquatic life criteria for individual toxicants and whole effluent toxicity are not necessarily protective of toxic pollutant residue formation in fish or shellfish tissue.

Developing permit limits for pollutants affecting human health is somewhat different from setting limits for other pollutants because the exposure period is generally longer than 1 month, and can be up to 70 years, and the average exposure rather than the maximum exposure is usually of concern. Because compliance with permit limits is normally determined on a daily or monthly basis, it is necessary to set human health permit limits that meet a given WLA for every month. If the procedures described previously for aquatic life protection were used for developing permit limits for human health pollutants, both MDLs and AMLs would exceed the WLA necessary to meet criteria concentrations. Thus, even if a facility was discharging in compliance with permit limits calculated using these procedures, it would be possible to constantly exceed the WLA. This approach clearly is unacceptable. In addition, the statistical derivation procedure is not applicable to exposure periods more than 30 days. Therefore, the recommended approach for setting water quality-based limits for human health protection with statistical procedures is as follows:

- Set the AML equal to the WLA
- Calculate the MDL based on effluent variability and the number of samples per month using the multipliers provided in Table 5-3.

This approach ensures that the instream criteria will be met over the long-term and provides a defensible method for calculating a MDL. Both an MDL (weekly average limit for POTWs) and a monthly average limit are required by EPA regulations, unless impracticable (40 *CFR* 122.45(d)) and are applicable for human health protection. The MDL sets an upper bound on effluent values used to determine the monthly average and provides a measure of effluent compliance during operational periods between monthly sampling.

5.5 SPECIAL CONSIDERATIONS IN USE OF STATISTICAL PERMIT LIMIT DERIVATION TECHNIQUES

The following discussion summarizes the effect of changes in the various statistical parameters on the permit limits that are derived. An understanding of these relationships is important for the permit writer. Additional considerations of each of these parameters with respect to the statistical methods for permit limit derivation also are discussed below.

5.5.1 Effect of Changes of Statistical Parameters on Permit Limits

- **Effect of changes in CV on derivation of LTA from WLA:** As the CV increases, the LTA decreases; and conversely, as the CV decreases, the LTA increases (see Figure 5-5).

  Reason: The LTA must be lower relative to the WLA to account for the extreme values observed with high CVs. An LTA with a zero CV equals the WLA.

- **Effect of changes in CV on derivation of permit limits for a fixed probability basis:** As the CV increases, the permit limits increase (become less stringent); and conversely, as the CV decreases, the permit limits decrease (become more stringent; see Figure 5-6).

  Reason: A higher value for the permit limit is produced for the same LTAs as the CV increases in order to allow for fluctuations about the mean. Following the steps in Box 5-2 to derive the LTA will account for such fluctuations.

- **Effect of changes in number of monthly samples on permit limits:** As the value for "n" (number of observations) increases in the average monthly permit limit derivation equations, the average monthly permit limit decreases to a certain point. The effect on the average monthly limit is minimal for values of n greater than approximately 10. Conversely, as the value for "n" decreases, the AML increases until n=1, at which point the AML equals the MDL (see Figure 5-7).

  Reason: As n increases, the probability distribution of the n-day average values becomes less variable (narrower) around the LTA. Therefore, the 95th or 99th percentile value for an n-day average decreases in absolute value as n increases. (See additional discussion in Section 5.5.3.)

- Effect **of changes in probability basis for permit limits:** As the probability basis for the permit limits expressed in percentiles (e.g., 95 percent and 99 percent) increases, the value for the permit limits increases (becomes less stringent). The converse is true as the probability basis decreases (see Figure 5-6).

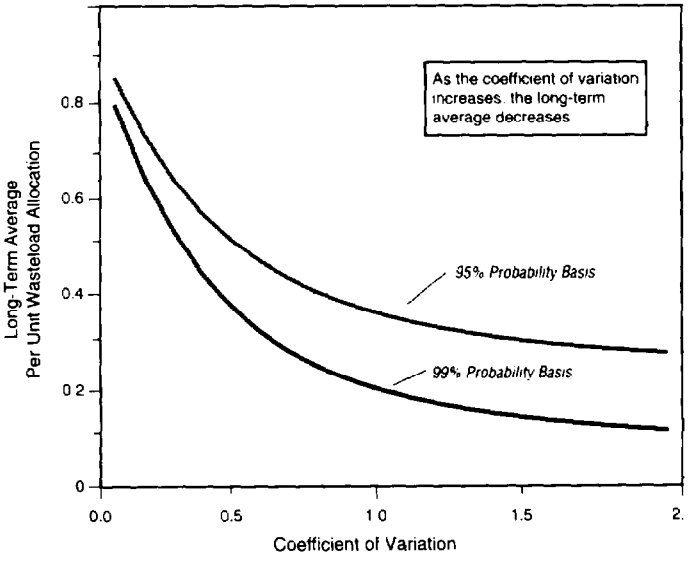

Figure 5-5. Long-Term Average as a Function of the Coefficient of Variation

Reason: There is a higher probability that any randomly chosen effluent sample will be in compliance with its permit limits, if those limits are statistically designed to be greater than a high percentage (e.g., 99 percent) of all possible values for a given LTA and CV.

The overall combination of the coefficient of variation, number of samples, and the assumed probability basis for calculating the LTA from the WLA, and the most limiting LTA, has different effects on the derived limits depending upon the selection made for each. To help illustrate the combined effect of these factors, Figure 5-8 illustrates how the CV, number of samples and probability basis affect the derivation of the AML. Figure 5-9 illustrates the combined effect of the CV and the probability basis on the derivation of the MDL.

5.5.2 Coefficient of Variation

Use of the statistical method of permit limit derivation requires an estimate of the CV of the distribution of the daily measurements of the parameter after the plant complies with the requirements.

Table 5-3. Multipliers for Calculating Maximum Daily Permit Limits From Average Monthly Permit Limits

To obtain the maximum daily permit limit (MDL) for a bioconcentratable pollutant, multiply the average monthly permit limit (AML) (the wasteload allocation) by the appropriate value in the following table.

Each value in the table is the ratio of the MDL to the AML as calculated by the following relationship derived from Step 4 of the statistically based permit limit calculation procedure.

$$\frac{MDL}{AML} = \frac{\exp\,[z_m\sigma - 0.5\sigma^2]}{\exp\,[z_a\sigma_n - 0.5\sigma_n^2]}$$

where

$\sigma_n^2 = \ln(CV^2/n + 1)$
$\sigma^2 = \ln(CV^2 + 1)$
CV = the coefficient of variation of the effluent concentration
n = the number of samples per month
z_m = the percentile exceedance probability for the MDL
z_a = the percentile exceedance probability for the AML.

Ratio Between Maximum Daily and Average Monthly Permit Limits

	Maximum = 99th percentile Average = 95th percentile					Maximum = 99th percentile Average = 99th percentile				
CV	n=1	n=2	n=4	n=8	n=30	n=1	n=2	n=4	n=8	n=30
0.1	1.07	1.13	1.16	1.18	1.22	1.00	1.07	1.12	1.16	1.20
0.2	1.14	1.25	1.33	1.39	1.46	1.00	1.13	1.24	1.32	1.43
0.3	1.22	1.37	1.50	1.60	1.74	1.00	1.19	1.36	1.49	1.67
0.4	1.30	1.50	1.67	1.82	2.02	1.00	1.24	1.46	1.66	1.92
0.5	1.38	1.622	1.84	2.04	2.32	1.00	1.28	1.56	1.81	2.18
0.6	1.46	1.73	2.01	2.25	2.62	1.00	1.31	1.64	1.95	2.43
0.7	1.54	1.84	2.16	2.45	2.91	1.00	1.34	1.71	2.08	2.67
0.8	1.61	1.94	2.29	2.64	3.19	1.00	1.35	1.76	2.19	2.89
0.9	1.69	2.03	2.41	2.81	3.45	1.00	1.36	1.80	2.27	3.09
1.0	1.76	2.11	2.52	2.96	3.70	1.00	1.37	1.83	2.34	3.27
1.1	1.83	2.18	2.62	3.09	3.93	1.00	1.37	1.84	2.39	3.43
1.2	1.90	2.25	2.70	3.20	4.13	1.00	1.36	1.85	2.43	3.56
1.3	1.97	2.31	2.77	3.30	4.31	1.00	1.36	1.85	2.45	3.68
1.4	2.03	2.37	2.83	3.39	4.47	1.00	1.35	1.84	2.46	3.77
1.5	2.09	2.42	2.89	3.46	4.62	1.00	1.34	1.83	2.46	3.84
1.6	2.15	2.42	2.89	3.46	4.62	1.00	1.33	1.82	2.46	3.90
1.7	2.21	2.52	2.98	3.57	4.85	1.00	1.32	1.80	2.45	3.94
1.8	2.27	2.56	3.01	3.61	4.94	1.00	1.31	1.78	2.43	3.97
1.9	2.32	2.60	3.05	3.65	5.02	1.00	1.30	1.76	2.41	3.99
2.0	2.37	2.64	3.07	3.67	5.09	1.00	1.29	1.74	2.38	4.00

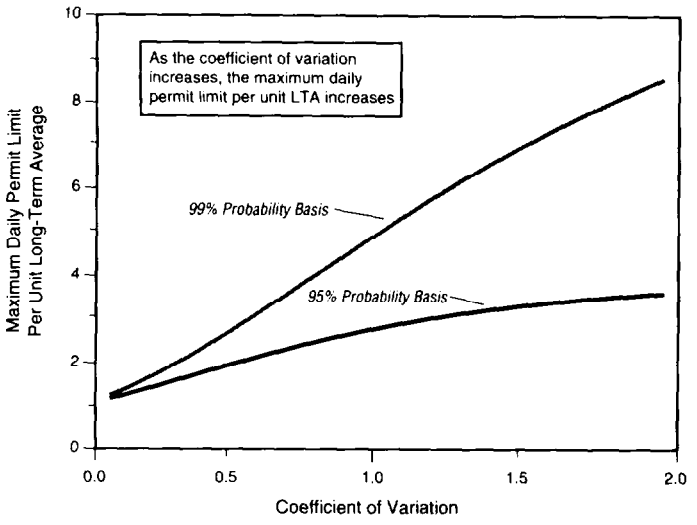

Figure 5-6. Maximum Daily Permit Limit as a Function of the Coefficient of Variation

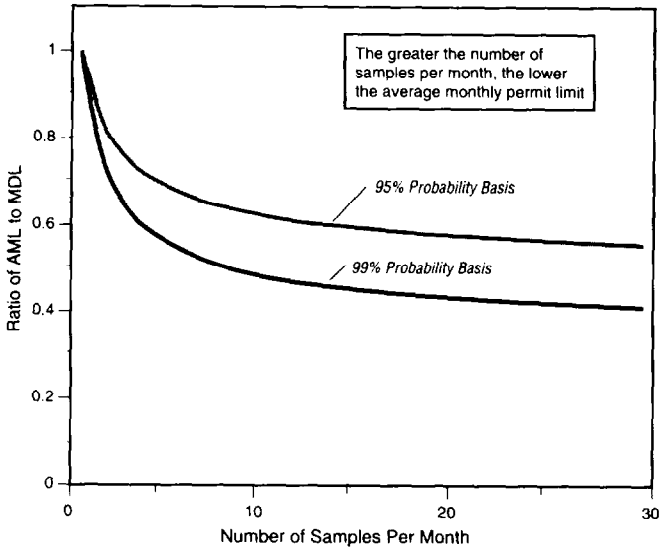

Figure 5-7. Relationship Between Average Monthly Permit Limits and Number of Samples Per Month

If variability is mostly related to production, current data may be used to estimate the CV. If future variability is expected to be substantially different, the CV must be estimated. Discharges of toxic pollutants are generally more variable than discharges of conventional pollutants. It is important to use the best estimate of the CV that can be reasonably achieved. As explained in Chapter 3, EPA's review of the uncertainty associated with effluent variability suggests that a minimum of 10 samples is needed to reasonably quantify the CV.

One concern with respect to using an appropriate CV in the statistical limit derivation procedures is that CVs of regulated systems may be quite different from nonregulated systems. In other words, after permit limits are in place and the permittee is operating to achieve the requisite limits, the variability associated with the parameter of concern may change considerably. Where the permit writer has reason to believe that the CV of the regulated system may behave differently from the nonregulated system (e.g., where changes in the treatment facility are planned), information concerning effluent concentration means and variability can be obtained from effluent guideline documents for individual chemical parameters.

Variability associated with effluent levels of both individual chemicals and whole effluent toxicity is difficult to predict for any individual situation. However, it is important to recognize that failure to assign any CV to an individual toxicant or the parameter toxicity involves an implicit assumption that there is no effluent variability present. Based upon analyses of a wide variety of data from various types of plants, **EPA recommends a value of 0.6 as a default CV, if the regulatory authority does not have more accurate information on the CV for the pollutant or pollutant parameter.** Permit limits are usually not extremely sensitive to small changes in the CV. The value of 0.6 is typical of the range of variability of effluents measured by EPA (see Appendix A) and represents a reasonable degree of relative variability. However, wherever possible, it is recommended that data on effluent variability for the pollutant of concern be collected to define a CV rather than selecting a default value.

5.5.3 Number of Samples

The statistically based method for permit limit derivation results in an MDL that does not depend on monitoring frequency. However, the AML decreases as the monitoring frequency increases, and a greater number for "n" is inserted in the relevant equations. Some permit writers are concerned with this outcome because facilities with more frequent sampling requirements appear to receive more stringent permit limits than those with less frequent monthly sampling requirements.

The AML decreases as the number of monthly samples increases because an average of 10 samples, for example, is closer to the LTA than an average based on 4 samples. This phenomenon makes AMLs based on 10 samples appear to be more stringent than the monthly limit based on 4 samples. However, the stringency of these procedures is constant across monitoring frequencies because the probability basis and the targeted LTA performance are the same regardless of the number of samples taken. Thus, a permittee performing according to the LTA and variability associated with the wasteload allocation will, in fact, meet either of these AMLs when taking the corresponding number of monthly samples.

For water quality-based permitting, effluent quality is determined by the underlying distribution of daily values, which is determined by the LTA associated with a particular WLA and by the CV of the effluent concentrations. Increasing or decreasing monitoring frequency does not affect this underlying distribution or treatment performance, which should, at a minimum, be targeted to comply with the values dictated by the WLA. **Therefore, it is recommended that the actual planned frequency of monitoring normally be used to determine the value of n for calculating the AML. However, in situations where monitoring frequency is once per month or less, a higher value for n must be assumed for AML derivation purposes.** This is particularly applicable for addressing situations such as where a single criterion is applied at the end of the pipe and a single monthly sample

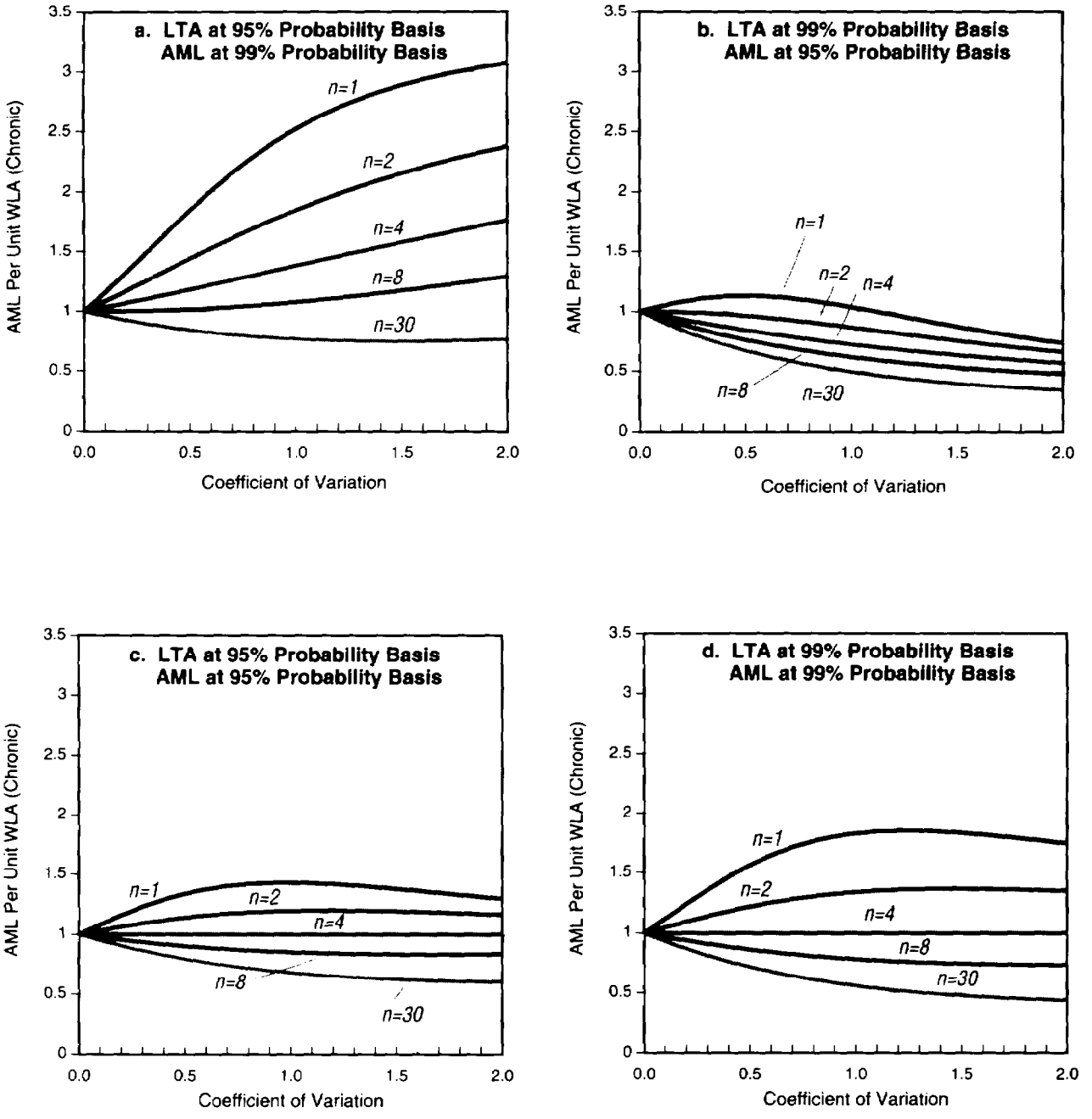

Figure 5-8. Effect of Coefficient of Variation on Average Monthly Limits

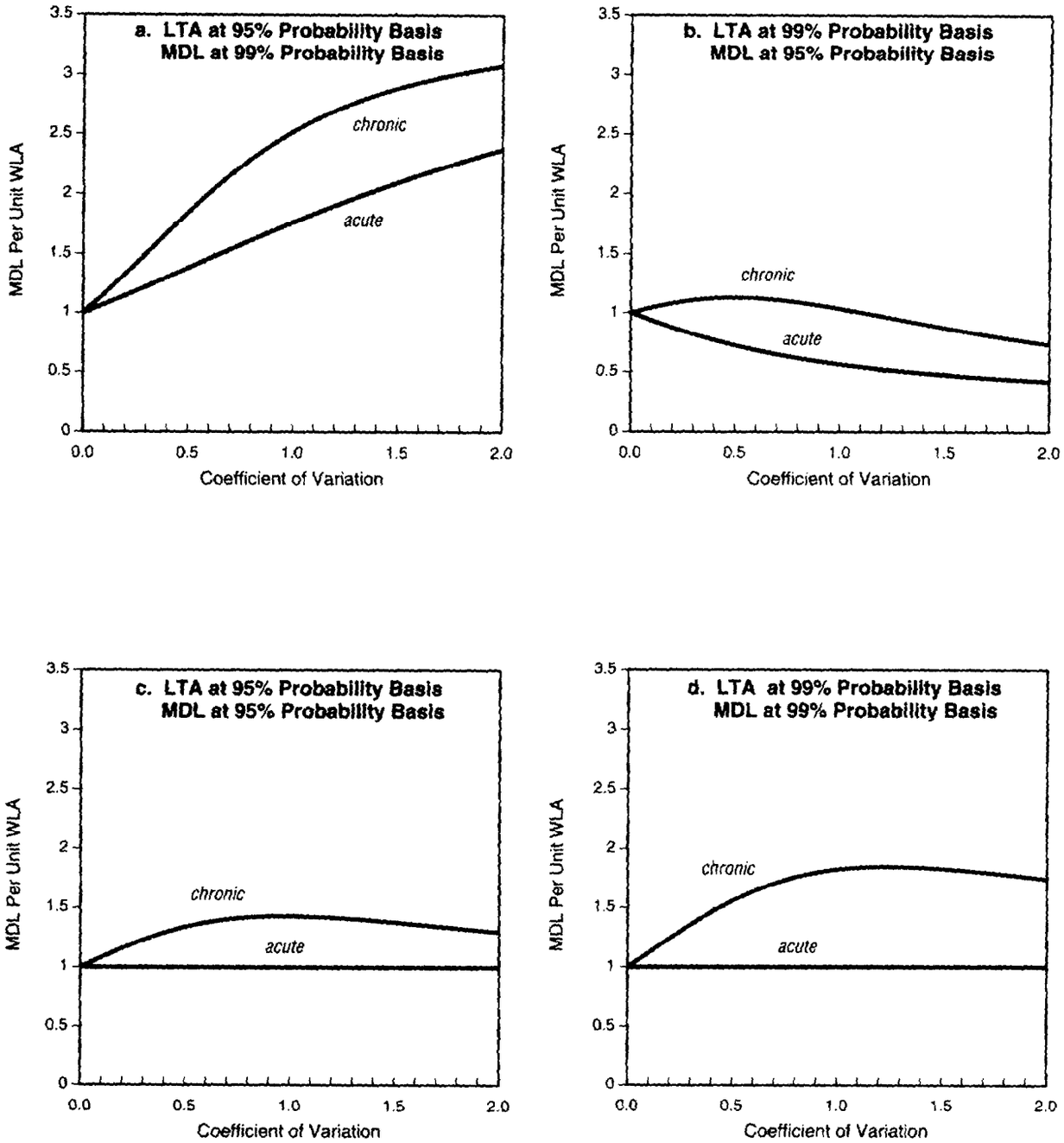

Figure 5-9. Effect of Coefficient of Variation on Maximum Daily Limits

is contemplated for compliance monitoring purposes, or where monitoring frequency is only quarterly. In this case, both the average monthly and the MDL would exceed the criterion. (For example, for a CCC of 1.0 chronic toxic unit [TU_C] applied as a WLA at the end of the pipe, both the MDL and AML would be 1.6 TU_C; assuming CV=0.6, n=1, and a 99-percent probability basis.) A discharger could thus comply with the permit limit but routinely exceed the criterion. **Under these circumstances, the statistical procedure should be employed using an assumed number of samples of at least <u>four</u> for the AML derivation.**

5.5.4 Probability Basis

Selection of the probability basis for use in the equations in Boxes 5-1 and 5-2 is a permitting authority decision necessary for establishing statistically derived permit limits. **Where a permitting authority does not have specific guidance for the probability basis, EPA recommends the following:**

For calculation of the LTAs from the WLAs (Box 5-2):

- Both acute and chronic WLA—.01 probability (99th percentile level).

For calculation of permit limits from the most limiting LTA (Box 5-1):

- MDL—.01 probability basis (99th percentile level)
- AML—.05 probability basis (95th percentile level).

The probability levels for deriving permit limits have been used historically in connection with development of the effluent limits guidelines and have been upheld in legal challenges to the guidelines [4]. It is important to note that these levels are statistical probabilities used as the basis for developing limits. The goal in establishing these levels is to allow the regulatory agency to distinguish between adequately operated wastewater treatment plants with normal variability from poorly operated treatment plants and to protect water quality criteria.

The level for the calculation of the LTA from the WLA is based upon EPA's interpretation of the steady state model used to develop the WLA. EPA considers the WLA to produce an effluent condition that should never be exceeded whenever the critical design conditions occur. To characterize this effluent condition, EPA uses the 99th percentile concentration from the upper tail of the effluent probabilistic distribution curve. The selection of this value is one which can have a significant influence on the level of conservatism in the permit limits. Permit authorities should consider Figures 5-8 and 5-9 to understand the effect of this decision along with other decisions on the AMLs and MDLs.

5.6 PERMIT DOCUMENTATION

The fact sheet and supporting documentation accompanying the permit must clearly explain the basis and the rationale for the permit limits. When the permit is in the draft stage, the supporting documentation will serve to explain the rationale and assumptions used in deriving the limits to the permittee and the general public in order to allow public comment on the draft permit. When the permit is issued, the administrative record for the facility (particularly the fact sheet) will be the primary support for defending the permit in administrative appeals including evidentiary hearings. This information also will serve to alert compliance/enforcement personnel to any special considerations that were addressed at the time of permit issuance. In addition, the accompanying documentation will be extremely important during permit reissuance and will assist the permit writer in developing a revised permit.

In 40 *CFR* Part 124.56, a fact sheet containing "[a]ny calculations or other necessary explanation of the derivation of specific effluent limitations" for many draft permits is required. Accordingly, the WLAs along with the required LTA and CV used and the calculations deriving them must be included or referenced in the fact sheet. The permit limit derivation method used must also be explained in the permit documentation. Where a permitting authority develops a standardized and simplified method for permit limit development as discussed in Section 5.4.2, the permitting authority may not need to document all of the underlying assumptions in the fact sheet, provided that the fact sheet references a written permit limit development protocol. Any other guidance used must also be cited.

5.7 EXPRESSING LIMITS AND DEVELOPING MONITORING REQUIREMENTS

Limits must be expressed clearly in the NPDES permit so that they clearly are enforceable and unambiguous. Chapter 6 discusses compliance monitoring and enforcement problems that can result from improperly expressed limits. All limits, both chemical-specific and whole effluent, should appear in Part 1 of the permit. Special considerations in the use of both chemical-specific and whole effluent toxicity limits are discussed below.

5.7.1 Mass-based Effluent Limits

Mass-based effluent limits are required by NPDES regulations at 40 *CFR* 122.45(f). The regulation requires that all pollutants limited in NPDES permits have limits, standards, or prohibitions expressed in terms of mass with three exceptions, including one for pollutants that cannot be expressed appropriately by mass. Examples of such pollutants are pH, temperature, radiation, and whole effluent toxicity. Mass limitations in terms of pounds per day or kilograms per day can be calculated for all chemical-specific toxics such as chlorine or chromium. Mass-based limits should be calculated using concentration limits at critical flows. For example, a permit limit of 10 mg/l of cadmium discharged at an average rate of 1 million gallons per day also would contain a limit of 38 kilograms/day of cadmium.

Mass-based limits are particularly important for control of bioconcentratable pollutants. Concentration-based limits will not adequately control discharges of these pollutants if the effluent concentrations are below detection levels. For these pollutants, controlling mass loadings to the receiving water is critical for preventing adverse environmental impacts.

However, mass-based effluent limits alone may not assure attainment of water quality standards in waters with low dilution. In

these waters, the quantity of effluent discharged has a strong effect on the instream dilution and therefore upon the RWC. At the extreme case of a stream that is 100 percent effluent, it is the effluent concentration rather than the effluent mass discharge that dictates the instream concentration. Therefore, **EPA recommends that permit limits on both mass and concentration be specified for effluents discharging into waters with less than 100 fold dilution to ensure attainment of water quality standards.**

5.7.2 Energy Conservation

Water quality-based permit limits by themselves do not provide any incentive to dischargers to reduce wastewater flows. The reverse is true; a more dilute effluent means water quality-based limits are more easily achieved. However, increased flow translates into increased power consumption for treatment facilities. Significant power usage stems from pumping and mixing of volumes of wastewater in treatment systems. If the volume of wastewater can be reduced, power consumption can be reduced and less fossil fuel burned. Such reductions can be expected to result in concomitant decreases in air pollution.

Therefore, EPA recommends that flow reductions and energy savings be specifically encouraged where appropriate (usually in dilutions greater than 100:1) by allowing water quality-based permit limits to be mass-based and by allowing concentration-based limits to vary in accordance with flow reduction requirements. The permit also could include an energy savings analysis subject to approval by the permitting authority.

5.7.3 Considerations in the Use of Chemical-specific Limits

Metals

Another common problem encountered in expressing permit limits occurs for metals. Some water quality standards express numeric criteria for metals in terms of the dissolved or acid soluble phase of the metal. NPDES regulations at 40 *CFR* 122.45(c) require permit limitations for metals to be expressed in terms of total recoverable metal unless (1) an effluent guideline requires the use of another form, (2) technology-based limits are established on a case-by-case basis, or (3) the approved analytical method measures only the dissolved form.

Where State water quality standards are expressed directly as total or total recoverable metals, the permit limit can be established directly. Where the water quality standards are expressed as dissolved or acid soluble metal, the permit writer will need to reconcile the different expressions of metals when establishing the permit limits. Some State water quality standards implementation policies or procedures provide the requirements for this conversion. In instances where a State has no policy or procedure, the permit writer can take one of four approaches. First, the permit writer could assume no difference between the dissolved or acid soluble phases and the total recoverable phase. This is the most stringent approach and would be most appropriate in waters with low solids, where the discharged form of the metal was mostly in the dissolved phase, or where data to use the other options are unavailable. Second, the permit writer could develop a site-specific relationship between the phases of metals by developing a relationship through review of information on instream metal concentrations. This approach requires concurrent sampling of both metal phases during periods reflective of the environmental conditions used to determine the WLA. Third, the permit writer could use a relationship developed by EPA from national data; this relationship is described in the national guidance for determining WLAs for toxic metals in rivers. This relationship requires knowledge of instream concentrations of total suspended solids at the environmental conditions used to determine the WLA. Fourth, the permit writer could use a geochemical model, such as the equilibrium metal speciation model MINTEQA2 (see Chapter 4). However, the input data requirement of this model are equivalent to collecting site-specific data under Option 2. These options will be expressed in more detail in subsequent guidance issued by EPA.

Update: The Agency has issued "Interim Guidance on Interpretation and Implementation Aquatic Life Criteria for Metals." See the update notice in front of this document for availability.

Detection Level Limits

A commonly encountered problem is the expression of calculated limits for specific chemicals where the concentration of the limit is below the analytical detection level for the pollutant of concern. This is particularly true for pollutants that are toxic in extremely low concentrations or that bioaccumulate.

The recommended approach for these situations is to include in Part 1 of the permit the appropriate permit limit derived from the water quality model and the WLA for the parameter of concern, regardless of the proximity of the limit to the analytical detection level. The limit also should contain an accompanying requirement indicating the specific analytical method that should be used for purposes of compliance monitoring. The requirement should indicate that any sample is analyzed in accordance with the specified method and found to be below the compliance level will be deemed to be in compliance with the permit limit unless other monitoring information (as discussed below) indicates a violation. Sample results reported at or above the compliance level should be reported as observed whereas samples below the compliance level should be reported as less than this level.

The level of compliance cited in the permit must be clearly defined and quantified. **For most NPDES permitting situations, EPA recommends that the compliance level be defined in the permit as the minimum level (ML). The ML is the level at which the entire analytical system gives recognizable mass spectra and acceptable calibration points.** This level corresponds to the lowest point at which the calibration curve is determined based on analyses for the pollutant of concern in a reagent water. The ML has been applied in determinations of pollutant measurements by gas chromatography combined with mass spectrometry. The concept of a minimum level recently was used in developing the Organic Chemicals, Plastics, and Synthetic Fibers effluent guidelines [5].

The minimum level is not equivalent to the method detection level, which is defined in 40 *CFR* Part 136 Appendix B as the minimum concentration of a substance that can be measured and reported with 99-percent confidence that the analyte concentration is greater than zero and is determined from the analysis of a sample in a given matrix containing the analyte. EPA is not recommending use of the method detection level because quantitation at the method detection level is not as precise as at

the ML. It is not similar to the practical quantitation limit (PQL), which is typically set as a specific (and sometimes arbitrary) multiple of the method detection level. Because the PQL has no one definition, EPA is not recommending its use in NPDES permitting. Nor is it similar to other terms such as the limit of detection, limit of quantitation, estimated quantitation limit , or instrument detection limit.

The permitting authority may choose to specify another level at which compliance determinations are made. Where the permitting authority so chooses, the authority must be assured that the level is quantifiable, defensible, and close as possible to the permit level.

Where water quality-based limits below analytical detection levels are placed in permits, EPA recommends that special conditions also be included in the permit to help ensure that the limits are being met and that excursions above water quality standards are not occurring. Examples of such special conditions include fish tissue collection and analyses, limits and/or monitoring requirements on internal waste streams, and limits and/or monitoring for surrogate parameters. This information can be used to help support reopening the permit to establish more stringent effluent limits if necessary.

5.7.4 Considerations in the Use of Whole Effluent Toxicity Limits

Test Methods

NPDES regulations at 40 *CFR* 122.44(i)(1)(iv) require that methods approved under 40 *CFR* Part 136 be used for compliance monitoring, and in the absence of an approved method, the permit must specify the method to be used. The permit should also carefully consider any other case-specific aspects of the whole effluent toxicity test method that should be designated in the permit. Such aspects as the dilutions at which testing will be conducted, the different species to be used, the specific endpoints, the statistical procedures for analyzing the data, quality assurance, and other factors should be clearly stated as a permit condition to assure that the whole effluent toxicity testing that is performed to ascertain compliance with a limit or monitoring requirement is the test procedure the regulatory authority desires. In some instances, promulgated methodologies allow significant flexibility and choice in how the method is actually conducted. A simple reference to the methodology in the permit may not result in the test being conducted as intended.

Units of Expression and Detection Levels

The permit limit for toxicity itself and the detection levels, or sensitivity levels, associated with the various types of toxicity tests determine the type of monitoring requirement, which should be specified with the limit. It is a misconception to think, for example, that only acute toxicity tests should be used where the WLA for acute protection is used to derive the more limiting LTA or should always be used to monitor for the MDL. It is a similar misconception to think that only chronic tests should be used where chronic LTA is limiting or should always be used to monitor for the average monthly limit. The MDLs and AMLs are derived from the more limiting of the two LTAs. Therefore, either acute or chronic tests might apply to a given situation depending upon the test detection levels or test sensitivity.

For example, a limit of 5 TU_c (no observed effect concentration [NOEC] of 20 percent or greater) would require chronic toxicity testing where the ACR is 20 for that effluent. An acute test would not be sensitive enough to measure effluent toxicity in this instance, since 5 TU_c would be equivalent to 0.25 TU_a. Conversely, if the ACR was 2, then an acute test could be used because 5 TU_c would be equal to 2.5 TUa. Generally, there is no reason to mix two types of monitoring requirements for the same limit when limits are derived from the most limiting LTA. Doing so will confuse the results and complicate assessments of average monthly limits where sampling frequency is greater than once per month.

The acute toxicity test, when using an LC_{50} as the test endpoint, has an upper sensitivity level of 100-percent effluent, or 1.0 TU_a. If less than 50 percent of the test organisms die at 100-percent effluent an LC_{50} cannot be determined from the test data, and the true LC_{50} value for the effluent cannot be measured. In this situation, an acute test could still be used for compliance monitoring purposes but the endpoint would need to be changed to a greater level of sensitivity. The endpoint could be specified in terms of "no statistically significant difference in acute toxicity between 100 percent effluent sample and the control." This is the most sensitive application of an acute test and could be used for monitoring compliance with a limit that, because of lack of available dilution, applies the EPA recommended acute criterion of 0.3 TU_a at the end of the pipe.

However, these tests would not accurately quantify any level of chronic toxicity present. For chronic testing, an effluent with an NOEC of greater than 100 percent presents a similar test sensitivity problem. An effluent with an NOEC of greater than 100 percent contains less than 1.0 TU_c and would meet the EPA recommended chronic criterion for toxicity at the edge of the mixing zone, if dilution were available, as well as at the end of the pipe if no dilution were available.

Description of Limits

When toxicity limits are used, additional description of the limit is required. The limit should be stated in Part 1 as "effluent toxicity" in the parameter column with "maximum TUs," "minimum ATE [acute toxicity endpoint]," or "minimum NOEC" in parentheses underneath. The numerical values should be placed in the appropriate concentration column followed by TU or a percent sign. A footnote should direct the reader to Part 3 for specific requirements on how to conduct the tests. The description in Part 3 should accomplish the following:

- Explain how the limit is expressed (e.g., the limit is the minimum ATE expressed as percent effluent or the limit is the maximum TU_a)
- Specify the test species and the test methods for compliance monitoring purposes
- Describe any special reporting or followup requirements (e.g., requirements to conduct a toxicity reduction evaluation).

The language in Part 3 should be modified as needed to suit the situation. The following example language is provided only for purposes of illustration:

- "The effluent toxicity limit contained in Part 1 is the allowable chronic toxicity to the most sensitive of three test species. It is expressed as the allowable NOEC in percent effluent. The required test species and the procedures to follow are described in *Short Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms*, EPA/600/4-89/001, March 1989."
- "The permittee shall conduct monitoring of effluent toxicity once per month. One 24-hour composite sample shall be collected and tested within 24 hours of collection. Results shall be reported as the NOEC. Any test that does not meet quality control requirements as described in the above referenced methods shall be repeated using a freshly collected sample as soon as practicable."

5.7.5 Selection of Monitoring Frequencies

There is no fixed guidance on establishment of monitoring frequencies. The decision on the monitoring frequency is case-specific and needs to consider a number of factors, including those listed below:

- Type of treatment process, including retention time
- Environmental significance and nature of the pollutant or pollutant parameter
- Cost of monitoring relative to the discharger's capabilities and benefit obtained
- Compliance history
- Number of monthly samples used in developing the permit limit
- Effluent variability.

Based upon an array of data analyzed for both individual chemicals and whole effluent toxicity, and independent of other considerations, EPA has observed that ideally 10 or more samples per month provides the greatest statistical likelihood that the average of the various monthly values will approach the true monthly LTA value. In practice, however, selection of monitoring frequencies will need to consider the previously mentioned factors and arrive at a reasonable compromise of the appropriate considerations.

5.7.6 Analytical Variability

Permits require monitoring to establish whether a facility is discharging at a level that complies with the permit limits. All monitoring includes analytical variability. The true concentration in a sample can be higher or lower than the measured one due to this variability; however, there is no way to predict which way it will go.

Historically, EPA has not directly considered analytical variability from monitoring methods when establishing permit limits. If the upper bound of the analytical variability was added to the limit, there would be a higher potential that the permit limit would fail to protect the wasteload allocation. This would not be consistent with 40 *CFR* 122.44(d)(1). On the other hand, if the lower bound of the analytical uncertainty was subtracted from the limit, there would be better assurance that the limit achieved the WLA. This approach could be overly conservative given the other factors used to develop permit limits. EPA believes that its recommended approach provides a balance between these two extremes.

5.7.7 Antibacksliding

CWA Section 402(o) establishes express statutory language prohibiting the relaxation of permit limits based on water quality. Under the statute, relaxation of water quality-based limits is permissible only if either the requirements of Sections 402(o)(2) or 303(d)(4) are met. These two provisions constitute independent exceptions to the prohibition against relaxation of permit limits. If either is met, relaxation is permissible.

Relaxation of Water Quality-based Limits Under Section303(d)(4)

Section 402(o)(1) prohibits the establishment of less stringent water quality-based effluent limitations "except in compliance with Section 303(d)(4)." Section 303(d)(4) has two parts: Paragraph (A), which applies to "nonattainment waters" and Paragraph (B), which applies to "attainment waters."

- Nonattainment waters: Section 303(d)(4)(A) allows establishment of less stringent water quality-based effluent limitations in a permit for discharge into a nonattainment water only if (1) the existing permit limitation must have been based on a total maximum daily load (TMDL) or other WLA established under Section 303, and (2) attainment of water quality standards must be assured.
- Attainment waters: Section 303(d)(4)(B) allows establishment of less stringent water quality-based effluent limitations in a permit for discharge into an attained water as long as the revised permit limit is consistent with a State's antidegradation policy. This is not restricted to limits based on a TMDL or WLA.

Relaxation of Water Quality-based Limits Under Section 402

Section 402(o)(2) also outlines exceptions to the general prohibition against establishment of less stringent water quality-based permit limits in a permit. Under Section 402(o)(2), the establishment of less stringent limits based on water quality may be allowed where:

1) There have been material and substantial alterations or additions to the permitted facility which justify this relaxation.
2) Good cause exists due to events beyond the permittee's control (e.g., acts of God) and for which there is no reasonably available remedy.
3) The permittee has installed and properly operated and maintained required treatment facilities but still has been unable to meet the permit limitations (relaxation may only be allowed to the treatment levels actually achieved).

4) New information (other than revised regulations, guidance, or test methods) justifies relaxation of water quality-based permit limitations.

   This last exception applies to water quality-based permit limitations only where the revised limitations result in a net reduction in pollutant loadings and are not the result of another discharger's elimination or substantial reduction of its discharge for reasons unrelated to water quality (e.g., operation termination).

Although Paragraph 402(o)(2) lists two additional exceptions, one for technical mistakes and mistakes of law and one for permit modifications or variances, the statute provides that these exceptions do not apply to water quality-based effluent limitations. As a result, these exceptions do not provide a basis for relaxing water quality-based limitations.

Relaxation of Water Quality-Based Permit Conditions or Standards

The provisions in Section 402(o) discussed previously only address the relaxation of effluent limits based on water quality. The relaxation of other permit conditions or standards based on water quality are governed by EPA's existing antibacksliding regulations at 40 *CFR* 122.44(l)(1). Under these regulations when a permit is renewed or reissued, interim effluent limitations, standards, or conditions must be at least as stringent as the final effluent limitations, standards, or conditions in the previous permit "unless the circumstances on which the previous permit was based have materially and substantially changed since the time the permit was issued and would constitute cause for permit modification...". In other words, unless cause for permit modification is present, relaxed conditions or standards are not permissible. EPA regulations setting forth cause for permit modification can be found at 40 *CFR* 122.62.

Restrictions of Backsliding

Even if any of the backsliding exceptions outlined in the statute or regulations are applicable and met, Section 402(o)(3) acts as a floor and restricts the extent to which water quality-based permit limitations may be relaxed. Paragraph (o)(3) prohibits the relaxation of water quality-based permit limitations in all cases if there will be a violation of applicable effluent limitation guidelines or water quality standards, including antidegradation requirements. This requirement affirms existing provisions of the CWA that require permit limits, standards, and conditions to ensure compliance with applicable technology-based limits and water quality standards.

5.8 TOXICITY REDUCTION EVALUATIONS

Where monitoring indicates unacceptable effluent toxicity, one principal mechanism for bringing a discharger into compliance with a water quality-based whole effluent toxicity requirement is a toxicity reduction evaluation (TRE) [6]. The purpose of a TRE is to investigate the causes and to identify corrective actions for difficult effluent toxicity problems. The permitting authority may require that the permittee conduct a TRE in those cases where the discharger is unable to explain adequately and immediately correct exceedances of a whole effluent toxicity permit limit or requirement.

A TRE is a site-specific study conducted in a stepwise process to narrow the search for effective control measures for effluent toxicity. TREs are designed to identify the causative agents of effluent toxicity, isolate the sources of the toxicity, evaluate the effectiveness of toxicity control options, and then confirm the reduction in effluent toxicity. The ultimate objective of a TRE is for the discharger to achieve the limits or permit requirements for effluent toxicity contained in the permit and thereby attain the water quality standards for receiving waters.

The requirement for a permittee to conduct a TRE may be written into the special conditions section of a permit, which contains whole effluent toxicity limits. In some cases, the permit issuing authority may also use other legally binding mechanisms, including Section 308 letters, Administrative Orders, or Consent Decrees, to require a TRE.

5.8.1 TRE Guidance Documents

To assist permittees in conducting TREs and achieving compliance with whole effluent toxicity limits, EPA has developed a series of three guidance documents [6, 7, 8]:

1) *Generalized Methodology for Conducting Industrial Toxicity Reduction Evaluations* (EPA/600/2-88/070)
2) *Toxicity Reduction Evaluation Protocol for Municipal Wastewater Treatment Plants* (EPA/600/2-88/062)
3) *Methods for Aquatic Toxicity Identification Evaluations:*

   Phase 1 Toxicity Characterization Procedures (EPA/600/3-88/034)

   Phase 2 Toxicity Identification Procedures (EPA/600/3-88/035)

   Phase 3 Toxicity Confirmation Procedures (EPA/600/3-88/036).

These guidance documents describe the methods and procedures for conducting TREs and Toxicity Identification Evaluations (TIEs). They are based on the results of EPA's continuing efforts in TRE methods research and case study applications. Separate TRE guidance has been developed for industrial dischargers and municipal wastewater treatment plants to better address the circumstances of each type of facility. Procedures for the characterization, identification, and confirmation of the causative agents of effluent acute toxicity have been developed and are described in a three-phased TIE methods manual. These TIE methods are applicable to both industrial and municipal effluents and are an integral part of the protocols for TREs described in the industrial and municipal TRE guidance documents. TIE methods using chronic toxicity tests for identifying toxicants will soon be developed and available in a draft guidance document.

5.8.2 Recommended Approach for Conducting TREs

To ensure the successful completion of a TRE, the guidance documents recommend a systematic, stepwise approach that

eliminates the possible causes or sources of toxicity until a solution or control method is determined. The guidance documents discourage "playing hunches" or implementing extensive control measures solely on the basis of unsubstantiated conclusions (e.g., selecting and implementing a treatment plant upgrade without adequate information). Experience shows that unnecessary delays and expenditures in achieving the objective of the evaluation are avoided by building a sound scientific and engineering basis for selection of a control method. This can best be done by the logical interpretation of the information and data collected in a systematic approach to a TRE. The causes or control methods identified should then go through a confirmation stage. This is especially important in cases where the control method selected requires the construction of additional treatment. A flow chart, generalized from the guidance documents, for this approach to TREs is presented in Figure 5-10. The steps in this flow chart are summarized in the following discussion.

Determination of TRE Objectives and Development of the TRE Plan

Obviously, the success of any study is dependent on a clear understanding of what is to be achieved and how these objectives are to be demonstrated and measured. Typically, TRE objectives are set by the regulatory authority in terms of a toxicity test endpoint (ATE or chronic toxicity endpoint [CTE]) in order to meet a limit or permit condition. TRE plans should be submitted by the discharger as soon as possible. In some cases, this could be 30 to 60 days following notification that a TRE is required. In other instances, this period could be longer. These plans are important for ensuring that the TRE objectives are well understood and that the TRE to be conducted is thorough and represents a reasonable effort to achieve the required reduction in effluent toxicity. An implementation schedule should also be developed describing the timeframe for completion of the specific components of the TRE plan by the required TRE completion date. This schedule should be submitted for review in conjunction with the TRE plan. **EPA recommends that the TRE schedule should be set or approved by the regulatory agency**. Approval of the schedule and the completion date should not imply approval of the TRE plan itself or the procedures and methods outlined in the plan. Instead, the TRE plan should only be reviewed and any comments provided to the permittee as needed.

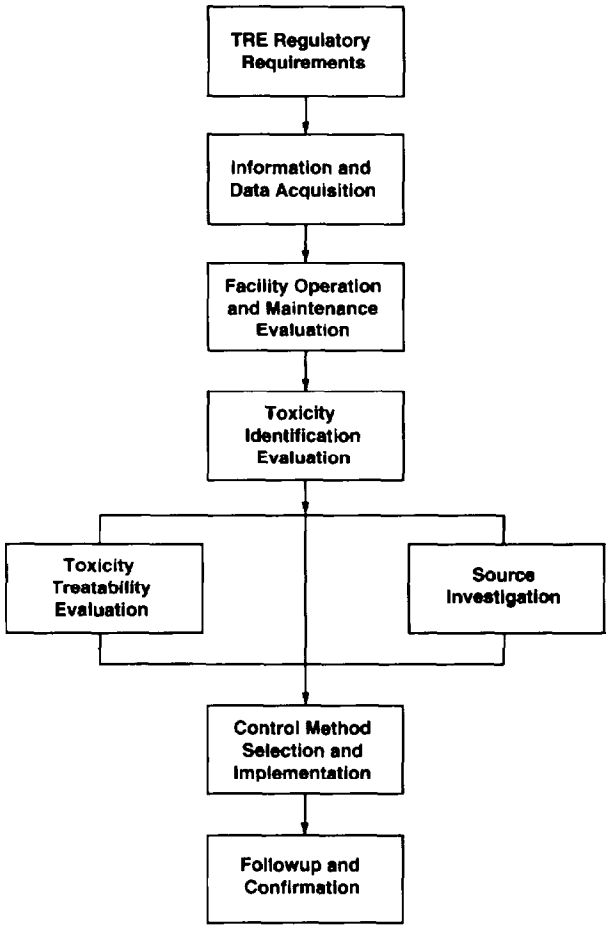

Figure 5-10. Generalized TRE Flow Chart

To assist in this review, Box 5-3 provides evaluation criteria for TRE plans. The permitting authority should review the TRE plan and inform the discharger of any apparent shortcomings or potential problems. The TRE should not be delayed pending completion of the review of the plan. The specified completion date for the TRE must still be met and the permittee should be expected to begin steps to investigate and alleviate the effluent toxicity as soon as possible following notification that a TRE is required. During the course of the TRE, the regulatory agency should provide oversight, as time permits, to make the TRE as effective as possible.

Evaluation of Existing Site-specific Information

The next step involves the collection of any information and analytical data relevant to the effluent toxicity. The permittee should begin collecting and evaluating this information as soon as possible following notification that a TRE is required. In some cases, this step may be conducted concurrently with accelerated toxicity testing as part of the development of a TRE plan. For an industrial discharger, this part of the evaluation would include information such as plant and process information, influent and effluent physical and chemical monitoring data, effluent toxicity data, and material use. For a POTW, additional information, such as industrial waste survey applications, local limits compliance reports, and monitoring data, should be collected. This information is used to supplement the data generated in the later steps of the TRE and may be useful at that stage to point to potential sources or treatment options.

Evaluation of Facility Operations and Maintenance Practices

This part of the evaluation is performed in order to ascertain whether the facility is consistently well operated and whether the effluent toxicity is the result of periodic treatment plant upsets, bypass, or some other operational deficiency that may be causing or contributing to the effluent toxicity. This part of the TRE should be initiated immediately after notification that a TRE is required. Alternatively, the permittee may begin to conduct this step at the same time that any accelerated toxicity testing is required. At both municipal and industrial facilities, this step would involve the evaluation of "housekeeping," treatment system operation, and chemical use. In some cases, best management practices (BMPs)

may be identified, which would improve operations and effluent quality. However, the effectiveness of BMPs in reducing effluent toxicity should be carefully confirmed, and it will usually be necessary to test a number of samples and perhaps to conduct Phase 1 of the TIE to develop this level of certainty. The results of this evaluation may lead to preliminary strategies for source reduction and pollution prevention, including spill or leak prevention, improvements in material handling and disposal practices, or substitution or re-use of a compound known to be highly toxic.

Toxicity Identification Evaluation

TIE procedures are performed in three phases: characterization, identification, and confirmation [7]. In each phase, aquatic organism toxicity tests are used to track toxicity at each step of the procedure. In most cases, these are abbreviated or shortened toxicity tests. In the toxicity characterization phase, the general nature of the causative agents of effluent toxicity or toxicants is determined. This is done by conducting a battery of tests to characterize the physical/chemical characteristics of the toxicity: solubility, volatility, decomposability, complexibility, filterability, and sorbability. This information can then be used to decide which chemical analytical methods will to use in Phase 2 or it can be used to design treatability studies.

The results of Phase 1 also may be used to provide additional confirmation of the effectiveness of any BMP that was implemented in the previous step of the TRE to reduce the effluent toxicity. This would require conducting at least one Phase 1 analysis prior to implementation of the BMP (i.e., any source control method implemented as a result of the evaluation of facility operation and maintenance). The results of this analysis would then be compared with Phase 1 results from samples taken after BMP implementation.

Box 5-3. Evaluation Criteria for TRE Plans

- Are the objectives or targets of the TRE stated clearly and accurately?
- Are the schedule and milestones for accomplishing the tasks described in the study plan?
- Are the final TRE report, progress reports, and meetings with the regulatory authority included as part of the schedule?
- Are the approaches or methods to be used described to the extent possible prior to beginning the TRE?
- Has available EPA guidance been used in designing the TRE and developing the TRE plan (or if other methods are proposed, are these sufficiently documented)?
- Does the TRE plan specify what results and data are to be included in the interim and final reports?
- Does the TRE plan provide for arrangements for any inspections or visits to the facility or laboratory that are determined to be necessary by the regulatory authority?
- Are the toxicity test methods and endpoints to be used described or referenced?
- Does the approach described build on previous results and proceed by narrowing down the possibilities in a logical progression?
- Does the plan provide for all test results to be analyzed and used to focus on the most effective approach for any subsequent source investigations, treatability studies, and control method evaluations?
- Are optimization of existing plant/treatment operations and spill control programs part of the initial steps of the TRE?
- Does the TRE plan allow a sufficient amount of time and appropriate level of effort for each of the components of the study plan?
- Does the TIE use broad characterization steps and consider quantitative and qualitative effluent variability?
- Is toxicity tracked with aquatic organism toxicity tests throughout the analyses?
- Is the choice of toxicity tests for the TRE logical and will correlations be conducted if the species used are different from those used for routine biomonitoring?
- Is the laboratory analytical capability and the expertise of the investigator broad enough to conduct the various components of the evaluation?

In Phase 2 of the TIE, the results of Phase 1 are built upon, and the TIE proceeds to chemical analyses designed to identify the specific chemicals causing effluent toxicity. In Phase 3, the identified toxicants are confirmed using a number of procedures, including correlation of toxicity with chemical concentration, spiking experiments, toxicity mass balance, and additional test species and their symptoms.

The current version of the TIE methods uses acute toxicity tests to characterize and identify the toxicants. In some cases, these methods may also be used for TREs where the objective is to reduce chronic toxicity. In order for these methods to be applicable, however, there must be some measurable acute toxicity in the effluent samples that are to be characterized in Phase 1 and analyzed in Phase 2. If this approach is used, the appropriate chronic toxicity test, as specified in the TRE objectives and permit requirements, should then be used in the Phase 3 confirmation procedures. This will confirm that the toxicant(s) identified using acute tests in Phases 1 and 2, are indeed causing the whole effluent chronic toxicity, which must be reduced.

It is possible to use the methods and procedures described in the other components of the overall TRE with either acute or chronic toxicity tests. The fact that the previous version of the EPA TIE methods use acute toxicity tests should not be construed to mean that TREs cannot be required or conducted for the reduction of chronic toxicity. These methods provide additional tools to assist permittees in the reduction of whole effluent chronic toxicity. Phase 1 procedures that use chronic toxicity tests will soon be available in draft EPA guidance. These TIE methods are applicable to freshwater discharges to either saltwater or freshwater receiving waters. The use of these methods for saltwater receiving waters may require their adaption for use with marine test species or, preferably, an initial correlation of the recommended freshwater TIE test species to the marine species used for monitoring.

Source Investigation

Based on the results of the TIE, a decision is made on whether to conduct treatability studies on the final effluent and/or conduct a source investigation. A source investigation is most readily performed when the specific toxicants have been identified and influent samples can be analyzed for the presence of these compounds or when potential source streams can be selected for chemical analysis (based on the results of the initial data acquisition step). However, in some cases where the specific causative agents of effluent toxicity have not been identified in the TIE, it may be possible to conduct a source investigation by "treating" influent samples in bench-scale models of the facility treatment plant, measuring the toxicity of the treated sample and then tracking this toxicity to its source.

Source investigations will lead to control methods, such as chemical substitution, process modification, treatment of process or influent streams (pretreatment), and possible elimination of the process. For POTWs, source investigations may lead to the development of local limits or to the requirement that an indirect discharger evaluate and control their effluent so as to reduce its toxicity and prevent passthrough at the POTW. The implementation of source control methods can effectively reduce effluent toxicity and also can avoid any cross-media transfer of pollutants to air or sludge, which may occur as a result of end of pipe treatment. Types of source control methods that have proven to be effective in reducing effluent toxicity are improvements in facility housekeeping, chemical substitution, process optimization, reclamation/re-use, and pretreatment.

Toxicity Treatability Evaluation

Toxicity treatability evaluations are conducted to identify possible treatment methods that can effectively reduce effluent toxicity and may involve modifications or additions to the existing system. Treatability studies generally use the same type of information on the nature of the chemicals to be removed as is generated by Phase 1 of the TIE. These treatability tests should be conducted on a bench-scale initially and then a pilot scale prior to construction of additional treatment or substantial modification of the existing plant. The use of these bench- and pilot-scale tests, coupled with aquatic organism toxicity tests, should be used to confirm the effectiveness of the treatment option. Confirmation of the results of treatability studies is equally important as it is for the TIE. Skipping this confirmation step is an invitation for unwarranted expense.

Toxicity Control Method Selection and Implementation

After the investigative steps of the TRE are completed, it is not unusual for a number of possible control options to have been identified. At this point, a site specific selection must be made by the discharger based on the technical and economic feasibility of the various alternatives. Following this selection, the toxicity control method is implemented or a compliance plan is submitted if construction of additional treatment requires a substantial amount of time.

Followup and Confirmation

After the control method is implemented and the final TRE report is submitted, the permitting agency should direct the permittee to conduct followup monitoring to confirm that the reduction in effluent toxicity is attained and maintained. Normally, this monitoring should follow an accelerated schedule, weekly or biweekly toxicity tests, for a period of 2 to 3 months to confirm the effectiveness of the controls implemented and the continued attainment of the TRE objective. This followup monitoring should use the same species as were specified for routine toxicity testing in the permit. The test endpoints of these toxicity tests should be the same as those which were calculated by the water quality-based permit limit derivation procedure used when the permit was issued. Once the discharger has demonstrated the successful completion of the TRE, the permitting agency should direct the discharger to return to the routine permit monitoring schedule.

5.8.3 Circumstances Warranting a TRE

It is the responsibility of the permitting authority to determine if the permit limits and/or the State water quality criteria have been threatened or violated and to notify the permittee if a TRE is required. It is appropriate for the permitting authority to require additional toxicity testing following the initial exceedance or violation. This additional testing may precede notification that a TRE will be required or it may be considered as the initial part of the

TRE and be conducted simultaneously with TRE plan development and the evaluation of other existing site-specific information.

It is important to recognize that the purpose of this additional toxicity testing is to determine the continued presence or absence of effluent toxicity and the magnitude of that toxicity. This information can then be used to determine the continued compliance or noncompliance with the limit or permit conditions for effluent toxicity. These tests do not serve to verify or confirm the initial test results from an earlier sample. Instead, the permit authority shall use the results of these tests to determine if a TRE or some other action is the appropriate response to the initial occurrence of toxicity.

If the permit has a limit for whole effluent toxicity, then generally, the permit should not include any specific conditions for accelerated toxicity testing or for triggering a TRE or some other action (e.g., exceedances in two consecutive tests or exceedances in any three out of five tests). CWA Section 309 requires that any single violation of a permit limit may be subject to enforcement. The EPA *Compliance Monitoring and Enforcement Strategy for Toxics Control* (January 19, 1989, Appendix B-4) states that, "Each exceedance of a directly enforceable whole effluent toxicity limit is of concern to the regulatory agency and therefore qualifies as meeting the VRAC [violation review action criterion] requiring professional review." Accelerated monitoring should only be used to assist in this professional review to determine what, if any, enforcement response is necessary, including the need for the permittee to conduct a TRE. It will be necessary for the Region or State regulatory authority to determine this on a case-by-case basis. This must be done in a manner consistent with the priorities established in their respective toxics control strategies and permitting procedures.

In situations where it is determined that accelerated testing is appropriate, a maximum of weekly tests for a minimum period of 2 months is recommended. This would result in eight tests, plus the routine monitoring toxicity test that initially indicated the exceedence or violation, for a total of nine tests in the series. As a practical approach for determining if a TRE is an appropriate response, **EPA recommends if toxicity is repeatedly or periodically present at levels above the effluent limits more than 20 percent of the time, a TRE should be required.** With toxicity present at this rate, the TRE protocols will be useful.

In most cases, any one additional exceedance (beyond the initial routine monitoring toxicity test result) in the accelerated toxicity tests could result in notification of the permittee that a TRE is required. Exceptions to this guideline might include cases where the permittee is able to adequately demonstrate that the cause of the exceedances is known and corrective actions have been immediately implemented or cases where additional test quality assurance/quality control (QA/QC) is necessary or desirable. The submittal of QC fact sheets for self-biomonitoring (e.g., Appendix B-2) should always be recommended to avoid QA/QC problems.

If the test results indicate that toxicity is not consistently or repeatedly present in the test series, previous discharge monitoring reports (DMRs) should be examined to ascertain if a recurrent problem exists. If the problem is recurrent, a TRE should be required, and the TRE plan should explain how the design of the evaluation will address this periodic or recurrent effluent toxicity problem. In these cases, more elaborate sampling design and influent or process stream monitoring may be needed. It should be expected that TREs conducted under these circumstances will probably require a more flexible schedule and perhaps additional time before the required completion date.

If the accelerated testing and previous DMRs show the continued absence of effluent toxicity, then the initial exceedance would be considered an episodic event and a TRE should not be required. A TRE is not an appropriate response to a single, episodic effluent toxicity event (e.g., a spill or a plant upset). By conducting accelerated testing following a violation or exceedance of a permit condition, unnecessary TREs can be avoided. Similarly, conducting accelerated testing as part of the initial steps of a TRE will allow for the TRE to be ended in its very early stages if the toxicity is immediately controlled or determined to be episodic or nonrecurrent. By following the TRE guidance and incorporating accelerated testing into the TRE, unnecessary analyses and expense can be avoided.

It also is important to note that for the practical purposes of conducting a TRE (as opposed to the purpose of determining if a TRE should be required or not), the magnitude of the effluent toxicity needed to conduct a TRE may be less than the magnitude or level set as the permit limit or permit monitoring condition. This is because if the limit or monitoring condition is water quality-based then some amount of dilution will usually be incorporated in determining the unacceptable level of effluent toxicity. In some cases, it may be possible for the TRE procedures to be carried out even if the toxicity does not actually exceed this permitted level. This will be the case as long as the effluent toxicity is periodically or consistently present in measurable amounts in samples of 100-percent effluent.

It also is reasonable for a discharger to initiate a TRE prior to the establishment of a permit limit for toxicity if unacceptable levels of toxicity are found in the effluent through routine monitoring or through inspection and compliance sampling by the regulatory authority. Under these circumstances the regulatory authority will need to identify what constitutes unacceptable levels of toxicity since this will not be defined by a permit limit (see Chapter 3 on determining the reasonable potential for excursions of water quality standards). It also is not unreasonable for the discharger to voluntarily initiate a TRE under these circumstances.

5.8.4 Mechanisms for Requiring TREs

There are a number of mechanisms that can be used to require a TRE. In most cases, the TRE should be required by a Section 308 letter or by an enforcement action, such as a Section 309 Administrative Order or a Consent Decree. The permittee should receive notification from the permit authority of what response is required. This enables the permit authority to assess whether a TRE is the appropriate action to pursue. If effluent toxicity reappears following the successful completion of a TRE, then the permit authority should be able to review this type of situation to determine if an additional TRE is appropriate or if some other action is required. In general, when the permit is issued with whole effluent toxicity limits in Part 1 of the permit, TRE requirements should be used where necessary to bring the permittee into compliance with those limits. Box 5-4 provides example lan-

guage for effluent toxicity limits, developed as part of the Whole Effluent Toxicity Basic Permitting Principles and Enforcement Strategy (Appendix B-4).

Box 5-5 presents sample language for use in requiring TREs by a Section 308 letter or a Section 309 Order. This sample language, especially the reporting dates, should be tailored to fit the specific permittee. The completion date should be specified on a case-by-case basis. Factors to consider in setting this completion date include the type of facility, the variability of the effluent, and the previous compliance history. In order to conduct a TRE, reasonable timeframes are 6 to 18 months for an industrial discharger and 12 to 24 months for a municipal wastewater treatment plant. For POTWs, it may take longer to conduct a TRE due to lengthy government contracting procedures, large sewer collection systems, and less influent constituent control. It should be recognized that extensions to these initial timeframes may be granted if the progress reports demonstrate that this is warranted. In situations where reductions in chemical concentrations to meet chemical-specific limits are needed as well as reductions in effluent toxicity, the timeframes may be adjusted to enable those efforts to proceed simultaneously.

Box 5-4. Model Permit Language for Effluent Toxicity Limits

Part 1.A. Final Effluent Limits and Monitoring Requirements

During the period beginning on the effective date of this permit and lasting until the expiration date, the permittee is authorized to discharge in accordance with the following limits and monitoring requirements from the following outfall(s): 001.

Effluent Characteristic		Discharge Limit Concentration		Monitoring Requirement	
Reporting Code/Units	Parameter	Daily Maximum	Monthly Average	Measurement Frequency	Sample Type
—TU_c	Toxicity	10.0	5.0	x/month	composite

The permittee shall use the toxicity testing and data assessment procedures described in Part 3.B of this permit.

Box 5-5. Example Language for Requiring Toxicity Reduction Evaluations

The discharger shall demonstrate that effluent toxicity-based permit limits described in Part 1.A. of the permit are being attained and maintained through the application of all reasonable treatment and/or source control measures. Upon identifying noncompliance with those limits the discharger shall initiate corrective actions according to the following schedule:

	Task	Deadline
1.	Take all reasonable measures necessary to reduce toxicity immediately.	Within 24 hours
2.	Submit a plan and schedule to attain continued compliance with the effluent toxicity-based permit limits in Part I.A.,where source of toxicity is known, if immediate compliance is not attained.	Within 30 days
3.	Submit a TRE study plan detailing the toxicity eduction procedures to be employed where source is unknown and toxicity cannot be immediately controlled through operational changes. EPA's Toxicity Reduction Procedures, Phases 1, 2, and 3 (EPA-600/3-88/034, 035, and 036) and TRE protocol for POTWs (EPA-600/2-88/062) shall be the basis for this plan and schedule.	Within 45 days

Box 5-5. Example Language for Requiring Toxicity Reduction Evaluations (continued)

4.	Initiate TRE plan.	Within 45 days
5.	Comply with approved TRE schedule.	Immediately upon approval
6.	Submit results of the TRE, including summary of findings, corrective actions required, and data generated.	Per approved schedule
7.	Implement TRE controls as described in the final report.	On due date of final report per approved schedule
8.	Complete TRE implementation to meet permit limits and conditions.	Per approved schedule, but in no case later than XX months from initial noncompliance.

CHAPTER 5
REFERENCES

1. Marr, J.K., and R.P. Canale. 1988. Load Allocation for Toxics Using Monte Carlo Techniques. *Journal WPCF* 60(5):659-66.
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4. Shell Chemical Company NPDES Permit Nos. LA0005762, LA0050962, TX00048663, Appeal No. 85-14, 85-15, 85-16 before the Administrator, U.S. EPA. U.S. EPA Judicial Officer decision, October 20, 1987.
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7. U.S. EPA. 1988. *Methods for Aquatic Toxicity Identification Evaluations*: Phase 1, Toxicity Characterization Procedures (EPA/600/3-88/034); *Phase 2, Toxicity Identification Procedures* (EPA/600/3-88/035); and *Phase 3, Toxicity Confirmation Procedures* (EPA/600/3-88/0360.
8. U.S. EPA. 1988. *Generalized Methodology for Conducting Industrial Toxicity Reduction Evaluations.* EPA/600/2-88/070.

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6. COMPLIANCE MONITORING AND ENFORCEMENT

6.1 INTRODUCTION

Once a water quality-based permit containing limitations and conditions to control effluent quality is issued, the permittee is responsible for attaining, monitoring, and maintaining compliance with the requirements of that National Pollutant Discharge Elimination System (NPDES) permit. Failure to comply with any requirements stated in the permit is a violation of the Clean Water Act (CWA).

The Environmental Protection Agency (EPA) and authorized State agencies are responsible for tracking compliance with and enforcing NPDES permit requirements in the enforcement of the CWA. Section 308 of the CWA and equivalent State statutes enable the regulatory agency to verify compliance with permit conditions (including water quality-based toxics limitations and compliance schedules) by authorizing the agency to impose on permittees requirements for sampling and analysis, record-keeping, and reporting. Section 308 also authorizes access by EPA or State agencies to facilities and records for verifying compliance with permit conditions. All records associated with monitoring must be maintained by the facility and available for a 3-year inspection period in conformance with 40 *CFR* Part 122.41.

The CWA establishes the authority to enforce water quality-based permit conditions. The ability to enforce water quality-based permit conditions, however, relies on well-written, clearly stated permits. The enforcement official must be familiar with the process by which permit requirements were derived, including the procedures used to determine the wasteload allocation based on applicable water quality standards and the procedures used to derive limitations from the wasteload allocation.

6.2 PERMIT REQUIREMENTS

The conditions that are to be included in NPDES permits are described in 40 *CFR* Part 122 Subpart C. In general, permits include effluent limitations, schedules of compliance, and accompanying reporting requirements. Permits should prescribe the self-monitoring procedures, frequency of analysis, sampling location and procedures, acceptable or required analytical techniques, and frequency of reporting. Permits often require that analytical methods referenced in 40 *CFR* 136 be used for analysis, but may specify methodology not included in Part 136 for pollutants with no approved methods or where the approved method is inappropriate for a particular permit limitation. Permits should define any effluent limitations and explain specific procedures for calculating averages of data if different from arithmetic averaging. Permits should identify what information must be retained by the permittee, and what data must be submitted to EPA or the State. Results from self-monitoring required by the permit are reported on discharge monitoring reports (DMRs) that generally are submitted monthly. Sampling and analysis that is done more frequently than required by the permit must be included in the DMR.

6.3 COMPLIANCE MONITORING

Since most of the routine information gathered in compliance monitoring results from permittee self-monitoring, quality assurance (QA) is as important as compliance with limits. It is essential that permittees develop and adhere to a QA plan consistent with the required monitoring and analyses. The permittee is responsible for maintaining data to demonstrate compliance with QA procedures established in the test methodology or as specified in the permit.

The regulatory agency generally has three ways of determining compliance with an NPDES permit and assuring adequate QA: self-monitoring reports, DMR/QA results, and inspections. Each of these methods is discussed below.

6.3.1 Self-monitoring Reports

Self-monitoring reports provide much of the compliance data used by the regulatory authority in the review of permittee compliance. These reports include DMRs and reports of progress on compliance schedules. DMRs contain information on the sampling method, frequency and location, and analytical results of permittee self-monitoring. These data and data from progress reports on major schedule milestones must be entered into the Permit Compliance System (PCS), a computerized data base, by the State or EPA [1]. When the required data are entered into the system, PCS will automatically "flag" violations of permit limitations, compliance schedules, and reporting requirements.

In order to detect any problems with the quality of the sample analysis, it is often desirable to obtain QA information with the self-monitoring data. For this reason, several States and Regions have developed additional QA forms to accompany permittee self-monitoring reports. This additional information may be required through the permit or through a Section 308 order. The QA data are compared to a reference QA data sheet that can be completed by the regulatory authority to indicate acceptable ranges of values for the required protocol. Appendix B-5 provides an example of a reference QA data sheet for a whole effluent toxicity test. Once completed, this QA data sheet can be included in the compliance file for quick reference by compliance personnel.

It is important to note that poor QA is a violation if the permit explicitly specifies adequate QA or references an acceptable protocol with corresponding QA procedures. It also is important to note that the signatory's certification of effluent data certifies

compliance with the specified protocols. Any problems with QA should be reported at the time of DMR submission and the testing repeated.

6.3.2 Discharge Monitoring Report/Quality Assurance (DMR/QA)

The DMR/QA program evaluates a permittee's ability to analyze and report accurate data. This program is intended to improve overall laboratory analytical performance for self-monitoring data. Authority for requiring participation is granted in CWA Section 308. In the DMR/QA program, permittees are required to analyze "blind" samples with constituents and concentrations that can be found in their industrial or municipal wastewaters. The permittees' results are compared to the known content of the sample, and an evaluation of the reported data is sent to the permittees. Permittees are expected to use the same personnel and methods employed for reporting NPDES data to analyze the samples. Permittees are required to follow the instructions for reporting results and include a signed certification statement in accordance with 40 CFR 122.22.

Regulatory agencies conduct followup investigations to address poor or incomplete DMR/QA results, failure to participate, or late submittal of DMR/QA results. DMR/QA performance results are compiled annually.

In the past, only chemical-specific analyses were tested in the DMR/QA program. The Environmental Monitoring and Support Laboratory (EMSL) in Cincinnati has developed a reference toxicant DMR/QA sample for permittees with whole effluent toxicity monitoring requirements. National implementation is occurring in 1991.

6.3.3 Inspections

Inspections are conducted by the regulatory authority or its contractors to address specific violations or problems and to verify permittee compliance with permit conditions and QA procedures. Inspections may include reviewing records, inspecting treatment facilities, assessing progress with compliance schedules, evaluating laboratory facilities and performance, and collecting samples for analysis or "splitting" samples taken by the permittee for concurrent analyses. EPA has defined several types of inspections based on the tasks that are included in the *NPDES Compliance Inspection Manual* [2]. Because regulatory authorities are expected to inspect all major permittees annually regardless of compliance status, nonsampling inspections (which are generally less resource-intensive) are encouraged for routine evaluation of permittee performance. However, sampling inspections are still encouraged to address permitting and enforcement priorities. For that reason, the regulatory agency must have the full capability to assess effluent compliance through inhouse resources or contract support.

Inspections that focus on toxics control can provide useful information for water quality assessment and permit reissuance in addition to compliance data. Procedures for inspecting facilities with toxicity testing requirements and measuring effluent toxicity are detailed in the *NPDES Compliance Inspection Manual,* Chapter 7 [2].

6.4 VIOLATION REVIEW

Review of permittee self-monitoring data to determine appropriate enforcement response generally involves a two-tiered review. The first tier is a preliminary review for timely, complete data that indicates compliance with permit requirements. Minor violations of requirements are often handled through informal phone calls or warning letters that do not require extensive review or oversight. As violations increase in magnitude, duration, or frequency, they generally are assigned to personnel who are responsible for the second-tier review (determining what enforcement action, if any, is appropriate). The guidelines for this process are presented in the Enforcement Management System (EMS) [3], but the basic concepts of responsible compliance tracking of water quality-based requirements are discussed below. Section 6.5 discusses the enforcement decision process.

When the initial review of effluent monitoring data indicates that unacceptable analytical methods were used by a permittee or its contract laboratory, the results should be assigned for review by personnel qualified to determine the significance of the results. If the monitoring is insufficient to determine compliance with effluent limitations, a warning letter or Section 308 letter requiring that the tests be repeated using acceptable procedures would be an appropriate response.

Tracking a permit or Section 308 letter that contains "monitor only" requirements requires both a compliance review (e.g., to determine if results of acceptable quality were submitted on time), and an action review (e.g., to determine if the permit should be modified or re-issued to include a limitation). This second review should be assigned to personnel who are qualified to make this regulatory decision.

In addition to the guidelines for reviewing monitoring data in the absence of a specific effluent limitation, EPA also has recommended a criterion for determining which effluent violations must be assigned for review by a professional who will determine if a formal enforcement action is needed, or if a phone call, warning letter, or Section 308 letter is more appropriate. These criteria are known as the Violation Review Action Criteria and are listed in the EMS.

In the case of a whole effluent toxicity limitation, any violation must be reviewed by a qualified professional responsible for the enforcement decision. EPA makes this recommendation to ensure that adequate attention is given to QA and to ensure that additional testing is required if permitted testing frequency is less than once per month.

In the case of a violation of a chemical-specific permit limitation, EPA recommends that monthly average limitation violations be reviewed by a professional for potential enforcement response whenever two or more violations occur in a 6-month period. Seven-day average and daily maximum violations should likewise be reviewed if a minimum of two or four, respectively, occur during the course of 1 month. Although there is no delineation between technology-based versus water quality-based limitations in these Violation Review Action Criteria, Regions and States may wish to adopt a criteria of "any violation" for all water quality-

based, chemical-specific limitations as these criteria are solely to determine the level of review and do not prescribe enforcement action.

6.5 ENFORCEMENT

Effective enforcement of toxic controls depends upon clearly expressed requirements in NPDES permits. These controls are generally in the form of numeric limits on specific toxic chemicals or whole effluent toxicity and schedules to initiate construction or other compliance measures.

Exceeding a permit limitation is a violation subject to enforcement. Some members of the regulated community have expressed concerns that single violations of stringent water quality-based limitations will result in unreasonable enforcement actions. EPA's guidance outlines a systematic review of all violations to determine the appropriate level of response. This guidance generally suggests an informal response for minor or infrequent violations, escalating to formal enforcement and perhaps penalties for more frequent and environmentally harmful violations.

In evaluating appropriate response to violations, EPA's "Enforcement Response Guide" of the EMS should be used for guidelines on the minimum acceptable response [3].

Further guidance on addressing violations of whole effluent toxicity limitations in particular is presented in the Compliance Monitoring and Enforcement Strategy for Toxics Control [4] (see Appendix B-4). This strategy expects that all available avenues to compliance will be explored by the permittee, that the treatment facility is designed, constructed, maintained, and operated to achieve all water quality-based, chemical-specific or best available technology/secondary treatment limitations, that chemical or process substitutions have been attempted and pretreatment explored, and that, in the case of publicly owned treatment works (POTWs), pretreatment program requirements and local limits have been established and enforced. The strategy further expects that the permittee will pursue a Toxicity Reduction Evaluation (TRE) as discussed in Chapter 5 in compliance with enforcement requirements or under its own initiative. If all of these expectations have been met and the facility is unsuccessful in identifying the cause, source, or treatability of toxicity despite making good-faith efforts to do so, the strategy allows for relief from civil penalties. The underlying responsibility to achieve compliance with the permit limitation remains in effect.

Some members of the regulated community have requested EPA and several State agencies to define more clearly enforcement discretion with respect to violations of whole effluent toxicity limitations. To define enforcement discretion would in effect make it no longer discretionary. Furthermore, the purpose of such guidance would be questionable as individual enforcement responses by EPA and the States are open to review by the public and the courts. In lieu of such additional guidance on enforcement discretion, it is recommended that Regions and States adhere to the principles presented in the EMS, the strategy, and in this document.

EPA also has developed a policy [5] on the assessment of appropriate civil penalties in both administrative and civil judicial actions in response to any CWA violation. This policy bases the penalty amount on the seriousness of the violation, the economic benefit enjoyed as a result of delayed compliance, any history of such violations, any good-faith efforts to comply, and the violator's ability to pay. In no instance can this calculated penalty exceed the statutory maximum penalties defined in CWA Section 309.

If any violation occurs, the permittee has the responsibility of informing the regulatory agency. If the violation potentially endangers health or the environment, the violation must be verbally reported to the regulated agency within 24 hours and the permittee must submit a noncompliance report within 5 days of violation detection. If there is no danger to health or the environment, the written report must be submitted at the time monitoring reports are submitted. These reports must include a description of the violation, its cause, the period of noncompliance, and if the noncompliance has not been corrected, the anticipated time when compliance will be achieved.

As with other NPDES permit limitation violations, violation of a water quality-based toxics limit should prompt immediate action on the part of the permittee. Permittee response should include evaluation of the cause of the violation, correction of operational deficiencies or improvement of treatment efficiency, and any other initial steps necessary to resolve the violation and mitigate the environmental effects. These immediate investigatory and corrective steps also should provide information that may be used in developing a compliance schedule if the violation is not resolved quickly.

When a water quality-based toxicity limit is violated, the regulatory agency may require additional monitoring to determine the frequency and duration of the violation. If the permit limit is not met quickly through improved housekeeping, operation, or raw waste control (e.g., POTW enforcement of pretreatment requirements, or chemical substitution by industries), requiring a TRE as discussed in Chapter 5 may be appropriate. Where toxicity-based limitations are in effect, the enforcement response must require expeditious compliance with the limit.

Available enforcement mechanisms include Section 308 orders, Section 309 Administrative Orders, Administrative Penalty Orders with Administrative Orders, or judicial action. Enforcement action must be tailored to the specific violation and type of remedial action required. Enforcement actions must be worded carefully so that they clearly are understood, easily tracked, and expeditiously enforced.

Violating limitations of pollutants at concentrations that pose a threat to human health should receive immediate enforcement attention to prompt rapid resolution of the noncompliance. The regulatory agency should consider the pollutant concentration, exposure route, and whether or not the pollutant exhibits a threshold response in determining if a schedule may be allowed. Immediate injunctive relief (such as a temporary restraining order or preliminary injunction) should be sought when necessary to protect public water supplies and fish and shellfish areas from imminent or substantial impairment.

6.6 REPORTING OF VIOLATIONS

The regulatory authority is responsible for reporting to the public on permittees in violation. Reporting requirements for the Quarterly Noncompliance Report (QNCR) of major permittees in violation of their NPDES permits are established in 40 *CFR* 123.45. Reporting of violations of water quality-based monitoring, limitations, schedules, and reporting requirements by major facilities must be consistent with 40 *CFR* 123.45. Violations of permit or enforcement order conditions by major permittees must be reported as follows [6]:

- Effluent violations (chemical-specific and whole effluent toxicity) must be reported on the QNCR if the violation has the potential to have caused a water quality problem (40 *CFR* 123.45(a)(2)(iii)(A)(1)).

- Chemical-specific toxic permit limit violations must be reported on the QNCR if two or more monthly average measurements in a 6-month period exceed the limit by a factor of 1.2 for a Group I parameter or 1.4 for a Group II parameter as defined in the Regulation, or if four or more monthly average measurements in a 6-month period exceed the limit by any amount (40 *CFR* 123.45(a)(2)(ii)(C)). Any violation during the quarter of an interim monthly average chemical-specific toxic limit established in an administrative order or court order/consent decree must be reported on the QNCR (40 *CFR* 123.45(a)(2)(ii)(A)). (Note: Whole effluent toxicity is not characterized as a Group I or Group II parameter, and as such, must be evaluated on a professional judgement basis under 40 *CFR* 123.45(a)(2)(iii)(A)(1).)

- Compliance schedule milestones that are not met within 90 days of the scheduled date must be reported on the QNCR (40 *CFR* 123.45(a)(2)(ii)(B)).

- Failure to submit a report within 30 days of the due date must be reported on the QNCR (40 *CFR* 123.45(a)(2)(ii)(D)).

CHAPTER 6
REFERENCES

1. Jensen, L.J. *Permit Compliance System (PCS) Policy Statement.*
2. *NPDES Compliance Inspection Manual,* May 1988.
3. Enforcement Management System for the National Pollutant Discharge Elimination System, September 1986.
4. Hanmer, R.W. 1989. *Whole Effluent Toxicity Basic Permitting Principles and Enforcement Strategy.*
5. Jensen, L.J. 1986. *Clean Water Act Penalty Policy for Civil Settlement Negotiations.*
6. Hanmer, R.W. 1986. *Guidance for Preparation of Quarterly and Semi-Annual Noncompliance Reports.*

7. CASE EXAMPLES

7.1 INTRODUCTION

This chapter presents examples of the development of water quality-based discharge limits to illustrate the integration of the guidance of the previous chapters. There are three examples: an industrial discharge with ample dilution, a publicly owned treatment works (POTW) with moderate dilution, and the combination of an industrial facility and a POTW discharge to the same reach.

7.2 CASE 1: INDUSTRIAL DISCHARGE

The first example is the Jaybird Corporation, a metal finishing firm. The NPDES permit for the facility is about to expire, and the corporation has submitted an application for a new permit. The example shows the steps that a permitting authority would take to determine if a water quality-based effluent limit is necessary and then to establish such a limit. The example also illustrates when best available technology (BAT) limits are applied instead of water quality-based limits, the use of human health criteria, and the variations in the limits derived by different wasteload allocation methods.

7.2.1 General Site Description and Information

The Jaybird Corporation facility discharges into the Locapunct River. The river is approximately 60 miles long and its banks are occupied by small towns separated by woodland and farmland. The river is classified by the State in the water quality standards as having designated uses of a fish habitat, primary contact recreation, and a drinking water supply. For these uses, the State has adopted the federal water quality criteria into the water quality standards to protect aquatic life and human health. The State standards also includes a narrative criterion of "no toxics in toxic amounts" for other toxic materials.

Water quality monitoring indicates some infrequent excursions above water quality criterion for copper and nickel. These pollutants have been found in measurable quantities in the effluents of several facilities.

The Jaybird Corporation is a metal finishing facility that specializes in copper plating of lead shells for a nearby military installation. As a metal finisher, the Jaybird Corporation is relatively small with a discharge of 0.034 cfs (0.022 mgd). The effluent at the Jaybird Corporation is treated by precipitation and settles before discharge through a multiport diffuser. The corporation is subject to BAT and best practicable technology (BPT) effluent limits for the metal finishing industry.

7.2.2 Effluent Characterization for Specific Chemicals

The permitting authority has adopted a procedure in which pollutants concentrations in each facility are evaluated for the potential to cause, have the reasonable potential to cause, or contribute to an excursion of the water quality standards. The authority used the effluent characterization process for specific chemicals described in Chapter 3 in this evaluation. In general, the procedures are designed to determine which pollutants are of concern and which require effluent limits.

Step 1: Identify Pollutants of Concern

Data were obtained from a number of sources to identify and quantify the pollutants of concern in the Jaybird Corporation effluent:

- Effluent chemical concentrations were taken from the Permit Application Form 2C, Discharge Monitoring Reports (DMRs), EPA's Permit Compliance System (PCS), and permit files.
- EPA's STORET data base was used to obtain U.S. Geological Survey flow data and ambient monitoring data for the river.
- BAT limits for the metal finishing industry were obtained from 40 *CFR* 433 Subpart A.

The permitting authority noticed in review of these data that the information in Form 2C replicated the information in the DMRs, and therefore decided to use the DMR data as the primary basis for characterizing the effluent. These data for toxicants DMRs are shown in Table 7-1. For those parameters currently not covered by the permit, Form 2C data indicated that pollutant concentrations were below detection limits. The permitting authority requested information from the facility showing the detection levels used; these levels were consistent with the detection levels listed in the National Pollutant Discharge Elimination System (NPDES) regulations at 40 *CFR* 136.

The effluent from the Jaybird Corporation is regulated by the Metal Finishing Point Source Category effluent guidelines at 40 *CFR* 433 Subpart A. These guidelines regulate the following toxic pollutants: cadmium, chromium, copper, cyanide, lead, nickel, silver, zinc, and total toxic organics.

Although these parameters were regulated at the Jaybird Corporation, the only toxic pollutants evident in the discharge were lead, copper, and nickel. The facility's treatment system reduced concentrations of other pollutants to below detection.

Step 2: Determine the RAC, CMC, and CCC for Pollutants of Concern

The State has adopted numeric water quality criteria for acute toxicity (criterion maximum concentration [CMC]), chronic toxicity (criterion continuous concentration [CCC]), and protection of human health (reference ambient concentration [RAC]). The water quality standards present the CMC and CCC criteria as equations based on ambient hardness concentrations. The standards require that the 85th percentile lowest hardness be used. This value is 100 mg/l as $CaCO_3$ for the Locapunct River.

Table 7-1. Effluent Data for the Jaybird Corporation

n	Copper µg/l	Lead µg/l	Nickel µg/l	Toxicity TU_c
1	1,317	187	223	5
2	1,092	230	261	10
3	1,073	258	464	5
4	1,059	423	341	20
5	1,072	227	369	
6	1,677	275	1,058	
7	2,664	364	199	
8	1,058	170	259	
9	3,439	259	437	
10	6,596	264	773	
11	1,211	267	300	
12	1,082	175	356	
Mean	1,945	258	420	10
SD	1,650	74	252	7.1
CV	0.8	0.3	0.6	0.7
Max	6,596	423	1,058	20
Min	1,058	170	199	5
N	12	12	12	4

Source: DMR data for chemicals; 308 request for whole effluent toxicity.
Notes:
Metals reported as total recoverable metals; toxicity reported in chronic toxic units (100/NOEC).
The permittee did not use a geometric dilution series for the toxicity tests. The results are the highest toxic units for any of the test organisms used.

The aquatic toxicity criteria for metals in the standards are expressed as the acid soluble form of the metal. The State has adopted a ratio to express the acid soluble form of metals as the total recoverable form for the purposes of developing NPDES permit limits. This ratio is based on historical data that the State has collected for rivers in the basin where the Locapunct lies. The values of the ratio are 0.35 for lead, 0.70 for copper, and 0.85 for nickel. The standards consider the criteria for human health protection to be in the total recoverable form of the metal.

Based on the hardness and acid soluble-to-total recoverable ratios, the applicable state water quality criteria are the following:

Pollutant	CCC (µg/l)	CMC (µg/l)	RAC (µg/l)
Lead	9.1	235	50
Copper	17.1	25.7	NA
Nickel	188	1,647	13.4

Step 3: Determine Dilution for Aquatic Life and Human Health Impacts

The State water quality standards require that compliance with water quality criteria be achieved at the edge of the mixing zone. The standards specify the minimum dilution at which the criteria apply. These are the 7Q10 flow for the CCC, the 1Q10 flow for the CMC, and the harmonic mean flow for human health criteria (RAC). The U.S. Geological Survey operates a gaging station on the river; the flow statistics were calculated using the data from this station:

- Harmonic mean flow = 38.0 cfs
- 7Q10 flow = 13.0 cfs
- 1Q10 flow = 10.1 cfs.

The facility provided a study of the outfall that showed that the multiport diffuser quickly achieved complete mixing across the width of the river. Dilution at the edge of the mixing zone could therefore be characterized by the complete mixing equation:

$$C = (C_{em}Q_e + C_sQ_s)/(Q_e + Q_s)$$

where

C = the receiving water concentration

C_{em} = the maximum effluent concentration

Q_e = the effluent flow

C_s = the receiving water background concentration

Q_s = the appropriate receiving water flow.

Step 4: Determine Reasonable Potential for Excursions

To determine if the facility discharge was expected to cause or have the reasonable potential to cause the CMC, CCC, or RAC to be exceeded in the receiving water, the maximum receiving water concentration of each pollutant was first compared to the appropriate receiving water criterion. If the criteria were exceeded, then this was considered evidence that a water quality-based limitation must be developed.

Maximum expected concentrations were calculated using the average effluent flow, maximum effluent concentrations, background receiving water concentrations, and the relevant receiving water flow: the 1Q10 for the CMC, the 7Q10 for the CCC, or the harmonic mean for the RAC. The background receiving water concentrations for total recoverable metals were obtained from STORET data:

Lead	1.6 µg/l
Copper	4.8 µg/l
Nickel	13.2 µg/l

The maximum effluent concentration was estimated using the statistical approach in Chapter 3. There were 12 concentrations of each metal reported in the DMRs. For lead, these concentrations had a maximum value of 423 µg/l, an arithmetic mean of 258 µg/l, an arithmetic standard deviation of 74, and an arithmetic coefficient of variation of 74/258, or 0.3. This coefficient of variation and the number of observations determined which multiplier was selected from Table 3-1. In this case, the multiplier value for 12 observations and a CV of 0.3 was interpolated from the values for 12 observations and CVs of 0.2 and 0.4. The 99th percentile multiplier was estimated to be 1.7. Similar calculations were conducted for copper (multiplier of 2.8) and nickel (multiplier of 3.7).

The receiving water concentration for lead for comparison with the CCC was calculated using data from Table 7-1:

$$C = \frac{[(1.7 \times 423\ \mu g/l \times 0.034\ cfs) + (1.6\ \mu g/l \times 13\ cfs)]}{(0.034\ cfs + 13\ cfs)}$$

$$= 3.5\ \mu g/l$$

where

13 cfs	=	the receiving water flow at 7Q10
0.034 cfs	=	the mean effluent flow
423 µg/l	=	the maximum effluent concentration
1.7	=	the statistical effluent multiplier to estimate the 99th percentile concentration
1.6 µg/l	=	the background receiving water concentration.

The value of the calculated receiving water concentration, 3.5 µg/l, was less than the chronic water quality standard of 9.1 µg/l for lead, and therefore there is no reasonable potential for the CCC to be exceeded.

Using the effluent data presented in Table 7-1, the receiving water concentration is compared to the CMC as:

$$C = \frac{[(1.7 \times 423\ \mu g/l \times 0.034\ cfs) + (1.6\ \mu g/l \times 10.1\ cfs)]}{(0.034\ cfs + 10.1\ cfs)}$$

$$= 4.0\ \mu g/l$$

where 10.1 is the receiving water 1Q10 flow and the other values are identical to those for the CCC comparison. The resulting concentration of 4.0 µg/l was less than the acute standard of 234 µg/l for lead. There is no reasonable potential for the CMC to be exceeded.

For human health criterion evaluation, the receiving water concentration for compared to the RAC was calculated as:

$$C = \frac{[(1.7 \times 423\ \mu g/l \times 0.034\ cfs) + (1.6\ \mu g/l \times 38\ cfs)]}{(0.034\ cfs + 38\ cfs)}$$

$$= 2.2\ \mu g/l$$

where 38 cfs is the harmonic mean flow and other values are the same as above. This value was less than the human heath criteria value of 50 µg/l for lead, so there is no reasonable potential for the RAC to be exceeded.

Similar calculations were done for copper and nickel:

	Criterion (µg/l)	Receiving Water Concentration (µg/l)
Copper		
CCC	17.1	22.0
CMC	25.7	26.9
Nickel		
CCC	188	15.9
CMC	1,647	16.6
RAC	13.4	14.1

The effluent characterization showed the reasonable potential for excursions above the CCC for copper and above the RAC for nickel. Therefore, permit limits are necessary for these two pollutants.

7.2.3 Effluent Characterization for Whole Effluent Toxicity

Whole effluent toxicity also was evaluated since there was a potential for excursions above the narrative water quality criterion due to the combination of effluent toxicants with other toxicants in the receiving water and in the effluent but below the detection level. The procedures used below follow those presented schematically in Figure 3-2, Chapter 3.

Step 1: Dilution Determination

The initial dilution determination was used to establish the types of toxicity tests that are conducted to characterize the effluent. The dilution at the low-flow characteristics for the facility is the following:

At the 7Q10, dilution = (0.034 cfs + 13 cfs)/0.034 cfs
= 383

At the 1Q10, dilution = (0.034 cfs + 10.1 cfs)/0.034 cfs
= 298.

Step 2: Conduct Toxicity Testing

EPA recommends that a discharger having a dilution between 100 and 1,000 be required to conduct either chronic or acute toxicity testing. The permitting authority decided to require chronic testing but required the permittee to report the test results at the 48-hour endpoint so that acute toxicity could be measured. One year before the permit was due to expire, the permitting authority requested, under the authority of the Clean Water Act (CWA) Section 308, that the permittee test his effluent for toxicity to provide effluent information in order to write the next NPDES permit. In this case, the permitting authority specified that the discharger submit quarterly chronic toxicity data for 1 year using the EPA toxicity tests for *Selenastrum, Ceriodaphnia,* and *Pimephales*. The permitting authority also specified that upstream ambient water be used as the diluent in the tests so as to allow the tests to measure additive effects from ambient toxics. In response to the Section 308 request, the discharger submitted the whole effluent toxicity data shown in Table 7-1.

Step 3: Determine Reasonable Potential for Excursions

The State interprets its narrative criteria for whole effluent toxicity to require that the technical support document recommendations of 0.3 TU_a and 1.0 TU_c be used as numeric values for acute and chronic toxicity, respectively. In accordance with the State standards, the CMC applies under the 1Q10 flow and the CCC applies under the 7Q10 flow.

The determination of exceedance of the CMC or the CCC was simplified by the way in which the tests were conducted. Since the upstream ambient water was used as a diluent, the test results

already include an assessment of contributions from background toxicity. Therefore, the upstream receiving water concentration was set to zero.

The maximum effluent concentration was again estimated by using the statistical approach in Chapter 3. As shown in Table 7-1, there were four observations of whole effluent toxicity. Based on the guidance of Box 3-4, these are insufficient to determine the CV accurately; therefore, the default CV of 0.6 was used. The effluent multiplier of 4.7 was obtained from Table 3-1 using the number of observations, the CV, and the 99-percent probability basis.

The receiving water concentration for chronic toxicity for comparison with the CCC was calculated using data from Table 7-1:

$$C = \frac{(4.7 \times 20\ TU_c \times 0.034\ cfs) + (0\ TU_c \times 13\ cfs)]}{(0.034\ cfs + 13\ cfs)}$$
$$= 0.25\ TU_c$$

where

13 cfs	=	the receiving water flow at 7Q10
0.034 cfs	=	the mean effluent flow
4.7	=	the statistical effluent multiplier
20 TU_c	=	the maximum effluent concentration.

The value of the calculated receiving water concentration, 0.25 TU_c, was less than the chronic water quality standard of 1.0 TU_c, and therefore there is no reasonable potential for the CCC to be exceeded.

To calculate the receiving water concentration for acute toxicity, the permitting authority first converted the chronic toxicity data into equivalent acute toxicity units by applying the acute-to-chronic ratio (ACR) of 5 obtained from the monitoring data. The receiving water concentration for acute toxicity was then calculated:

$$C = \frac{[(4.7 \times 20\ TU_c / 5\ ACR \times 0.034\ cfs) + (0\ TU_c \times 10.1\ cfs)]}{(0.034\ cfs + 10.1\ cfs)}$$
$$= 0.06\ TU_a$$

where 10.1 cfs is the receiving water flow at 1Q10, 5 is the acute to chronic ratio, and the other values are the same as above. The calculated value of 0.06 TU_a is below the criterion of 0.3 TU_a; therefore, there is no reasonable potential for the CMC to be exceeded. Since there was no reasonable potential for exceedances above either the acute or chronic criterion, permit limits were not developed for whole effluent toxicity.

7.2.4 Determine Wasteload Allocations

The wasteload allocation (WLA) was used to determine the level of effluent concentration that would comply with water quality standards in the receiving waters. A WLA will only be determined for those parameters that have a reasonable potential to cause exceedances of water quality standards. Therefore, WLAs were determined for copper and nickel. Since there was no reasonable potential for excursions above the CMC or CCC for nickel, only the WLA for human health was calculated.

To determine WLAs, the numeric criteria in the water quality standards and background concentrations were used to calculate effluent concentrations that would result in compliance with those standards. The calculation of WLAs used receiving water flows that were appropriate to each standard: chronic WLAs were calculated using the 7Q10 flow, acute WLAs were calculated using the 1Q10 flow, and human health WLAs were calculated using the harmonic mean flow. Since the effluent was mixed rapidly by the multiport diffuser, the complete mix equation was used:

$$WLA = [WQC \times (Q_e + Q_s) - Q_s C_s]/Q_e$$

where

Q_e	=	the effluent flow
Q_s	=	the receiving water flow
C_s	=	the background receiving water concentration
WQC	=	the water quality criterion.

The chronic and acute WLA for copper were calculated at the 7Q10 and 1Q10 flows, respectively:

$$WLA_c = [17.1\ \mu g/l \times (0.034\ cfs + 13\ cfs) - 13\ cfs \times 4.8\ \mu g/l] / 0.034\ cfs$$
$$= 4{,}720\ \mu g/l$$

$$WLA_a = [25.7\ \mu g/l \times (0.034\ cfs + 10.1\ cfs) - 10.1\ cfs \times 4.8\ \mu g/l] / 0.034\ cfs$$
$$= 6{,}234\ \mu g/l.$$

The human health WLA for nickel was calculated at the harmonic mean flow:

$$WLA_h = [13.4\ \mu g/l \times (0.034\ cfs + 38\ cfs) - 38\ cfs \times 13.2\ \mu g/l / 0.034\ cfs$$
$$= 237\ \mu g/l.$$

7.2.5 Develop Permit Limits

Permit limits were developed using a steady-state, two-value WLA model as described in Box 5-2, Chapter 5. Values for constants were obtained from Table 5-2, Chapter 5.

Step 1: Calculate LTA (note: this is Step 2 in Box 5-2)

The chronic long-term average (LTA) for copper was calculated using the following formula:

$$LTA_c = WLA \times \exp[0.5\,\sigma^2 - z\,\sigma]$$
$$= 4{,}720\ \mu g/l \times 0.440$$
$$= 2{,}077\ \mu g/l$$

where values of $\exp[0.5\,\sigma^2 - z\,\sigma\sigma]$ are presented in Table 5-1 (see Chapter 5). The CV of 0.8 was used, and following the

guidance of Section 5.5.4, the z value for the 99th occurrence probability was used.

The acute LTA for copper was calculated, again using the 99th percentile occurrence probability values from Table 5-1 as the multiplier:

$$LTA_a = 6{,}234\ \mu g/l \times 0.249$$
$$= 1{,}552\ \mu g/l.$$

The LTA for nickel human health permitting is considered to be the same as the WLA because the 70-year averaging period is used for human health evaluations (see Section 5.4.4). The LTA is calculated as:

$$LTA_h = WLA_h$$
$$= 237\ \mu g/l.$$

Step 2: Determine the More Limiting LTA

The limiting LTA for each pollutant was the minimum of the chronic, acute and human health LTA. The limiting LTA value was used in the next step to calculate maximum daily limits and average monthly limits. The limiting LTA for copper was found to be the acute LTA (1,552 µg/l) and the limiting LTA for nickel was found to be the human health LTA (237 µg/l).

Step 3: Calculate Maximum Daily and Average Monthly Limits

The maximum daily limit (MDL) for copper was calculated using the expression:

$$MDL = LTA \times \exp[z\sigma - 0.5\sigma^2]$$
$$= 1{,}552\ \mu g/l \times 4.01$$
$$= 6{,}224\ \mu g/l$$

where the appropriate value for $\exp[z\sigma - 0.5\sigma^2]$ was taken from Table 5-2 using the row with the CV for copper (0.8) and the column for the 99th percentile probability basis.

The average monthly limit (AML) for copper was calculated using the expression:

$$AML = LTA \times \exp[z\sigma_n - 0.5\sigma_n^2]$$
$$= 1{,}552\ \mu g/l \times 1.75$$
$$= 2{,}716\ \mu g/l$$

where the value for $\exp[z\sigma_n - 0.5\sigma_n^2]$ was taken from Table 5-2 and, for this case, the number of samples per month was four. Following the recommendations in Section 5.5.4, the z value for the 95th percentile probability basis was used.

The effluent limits for nickel were determined by using the recommendations in Section 5.4.4, Chapter 5. The AML was considered to be identical to the WLA_h whereas the MDL was calculated from the AML by using the appropriate multiplier factor in Table 5-3. With a CV of 0.6, four samples per month for sampling, and a 99th percentile used for the MDL, the factor is 1.64:

$$MDL = AML \times 1.64$$
$$= 237\ \mu g/l \times 1.64$$
$$= 389\ \mu g/l.$$

7.2.6 Determining and Expressing the Controlling Effluent Limits

The NPDES regulations require that effluent limits require treatment characteristic of the appropriate treatment technology and also achieve water quality standards. If water quality-based limits are more stringent than BAT limits, then the water quality-based limits become the basis for the effluent limits. Conversely, if the treatment technology (BAT) limits are more stringent, then they become the basis of the limits.

The comparison between the water quality-based and technology-based effluent limits are shown below. The more stringent limits are different for different pollutants: for nickel, water quality-based limits are more stringent whereas for copper, the BAT limits are the more stringent.

		Copper	Nickel
Water quality	MDL	6,224	389
	AML	2,716	237
BAT	MDL	3,380	3,980
	AML	2,070	2,380
Limit to use	MDL	3,380	389
	AML	2,070	237

In accordance with NPDES regulations, the effluent limits were expressed in the permit as mass (pounds per day) by multiplying the concentrations above by the effluent flow of 0.034 cfs and the conversion factor of 5.394:

	Copper (lb/d)	Nickel (lb/d)
MDL	0.62	0.071
AML	0.38	0.043

7.2.7 Comparing Different Limit Development Methods

Permit limits for copper also were developed using a Monte Carlo simulation in order to compare the results to the permit limits derived from the two-value, steady-state model. A Monte Carlo simulation was used to generate receiving water concentrations to determine the effluent LTA for each of the pollutants such that the water criteria are achieved at the required frequency in the water quality standards.

Monte Carlo simulation used the same completely mixed dilution equation as was used for the steady state calculation:

$$C = (Q_eC_e + Q_sC_s)/(Q_e + Q_s)$$

where C is the receiving water concentration (in µg/l); C_e and C_s are the effluent concentration and the background concentration of the receiving water, respectively (in µg/l); and Q_e and Q_s and effluent and receiving water flows, respectively (in cfs). Effluent flows were held constant at the mean effluent flow, and river flows were read from a computer file containing 60 years of daily flow data provided by the U.S. Geological Survey. The effluent concentrations were characterized by a lognormally distributed random variate. The random variate had a coefficient of variation that matched the CV of the pollutant in the effluent.

The Monte Carlo simulation was run using 22,276 iterations. Once 22,276 receiving water concentrations had been calculated, receiving water concentrations were sorted, highest first. The 20th value (corresponding to the maximum concentration expected for 1 day in 3 years) was compared with the appropriate criterion. The 1-day in 3-year return frequency is recommended by EPA for criteria (see Chapter 2). If this value was higher than the criterion, the effluent LTA was reduced, and a new set of 22,276 numbers was generated. When the receiving water concentration of the 20th value was just under the water quality criterion (and the 19th value was just over the same value), then the LTA effluent concentration generating these results was sufficient to achieve the water quality criterion; this LTA was then used in permit limit determinations.

For chronic criteria, 4-day average concentrations were generated by taking the 4-day running average of modeled daily concentrations. The recurrence concentration was calculated in the same way as the 1-day calculations described in the previous paragraph. Calculations were not made for the human health criterion.

The permit limits were calculated according to the procedures given in Box 5-3. Each LTA was multiplied by the 99th percentile multiplier from Table 5-3 for the MDL, and by the 95th percentile multiplier from Table 5-3 for the AML. For the AML, the same number of samples were used for the steady state and Monte Carlo permit limits (n=4). Thus, the resulting permit limits are directly comparable. The results of the Monte Carlo simulation for copper compared to the steady state calculations in units of micrograms/liter are shown below:

	Maximum Daily	Average Monthly
Monte Carlo	8,618	3,761
Steady State	6,224	2,716

7.3 CASE 2: POTW DISCHARGE

The second example is of a fictitious POTW that discharges to the same reach as the Jaybird Corporation. The NPDES permit for this facility also is up for reissuance. The example highlights the use of background receiving water concentrations, and demonstrates the differences between industrial and POTW permit limits. In developing permit limits for the POTW in this example, the potential impacts from the Jaybird Corporation discharge were considered in the use of background receiving water concentrations. The interrelationships between the two facilities are discussed explicitly in Section 7.4.

7.3.1 General Site Description and Information

The Locapunct River receives discharges from a POTW serving the city of Auburn, a small city of about 10,000 people. The POTW treats a mixture of household and industrial waste with an activated sludge process. The mean effluent flow from the POTW is 1.23 cfs. The POTW has no pretreatment program, but the municipality generally is aware of the small industries that are indirect dischargers because of research conducted by a local university. Generally, the plant is well operated.

7.3.2 Effluent Characterization for Specific Chemicals

The permitting authority's approach for determining which pollutants cause, have the reasonable potential to cause, or contribute to excursions above water quality standards applies to POTWs as well as industries. The authority used the procedures described for the Jaybird Corporation in the evaluation of the Auburn POTW.

Step 1: Identify Pollutants of Concern

At the time of the last permit issuance, there was evidence of a number of toxic pollutants in the POTW's effluent, including copper, chlorine, and ammonia. These pollutants had monitoring requirements in the previous permit. Because there were metals in the effluent and, due to the industries discharging into the POTW sewer system, the permitting authority requested the POTW to conduct a complete priority pollutant scan of the effluent. The data received following the Section 308 letter request indicated that the concentrations of all priority pollutants except copper were below detection limits. The POTW's primary toxic pollutants of concern were copper, chlorine, and ammonia (see Table 7-2).

Step 2: Determine RAC, CMC, or CCC for Pollutants of Concern

As described in the example of the industrial discharge, the water quality standards include numeric criteria for copper. The State also has adopted a numeric criterion for ammonia that is a function of the river 85th percentile pH and temperature; these values are 8.25°C and 25°C, respectively. Finally, the State interprets its narrative criterion of "no toxics in toxic amounts" to require use of the federal water quality criteria in the absence of a numeric state criterion. As a result, the permitting authority uses the federal criteria for chlorine. The applicable water quality criteria for the river are as follows:

	CCC (µg/l)	CMC (µg/l)
Copper	17.1	25.7
Chlorine	11	19
Ammonia	540	4,000

Table 7-2. Effluent Data for the Auburn POTW

n	Copper µg/l	Chlorine µg/l	Ammonia µg/l	Toxicity TU_c
1	268	185	11,009	2
2	115	301	13,025	1
3	228	881	12,201	1
4	59	372	24,548	2
5	53	245	9,700	
6	213	244	15,645	
7	68	123	21,358	
8	200	343	3,976	
9	262	153	22,307	
10	519	448	7,427	
11	53	1,022	11,834	
12	474	347	8,430	
13	115	130	4,382	
14	259	128	9,330	
15	404	271	6,137	
16	57	451	6,448	
17	101	701	37,772	
18	187	582	14,307	
19	103	178	16,848	
20	76	436	28,205	
21	198	347	12,119	
22	265	475	11,778	
23	60	153	3,109	
24	112	268	4,474	
Mean	185	366	13,182	1.5
SD	133	235	8,491	0.6
CV	0.7	0.6	0.6	0.4
Max	519	1,022	37,772	2
Min	52.6	123	3,109	1

Source: DMR data for chemicals; 308 request for whole effluent toxicity.
Notes:
Metals as total recoverable; toxicity in toxic units (100/NOEC).
The results are the highest toxic units for any of the test organisms used.

Step 3: Determine Dilution for Aquatic Life and Human Health Impacts

The State water quality standards requires that compliance with water quality criteria be achieved at the edge of the mixing zone. The standards specify the minimum dilution at which the criteria apply. These are the 7Q10 flow for the CCC, the 1Q10 flow for the CMC, and the harmonic mean flow for human health criteria (RAC). The U.S. Geological Survey operates a gaging station on the river. The flow statistics were calculated using the data from this station:

- Harmonic mean flow = 38.0 cfs
- 7Q10 flow = 13.0 cfs
- 1Q10 flow = 10.1 cfs.

The POTW is located at a bend of the river where mixing is rapid. Therefore, the permitting authority used the complete mixing equation to calculate the receiving water concentrations. This is the same equation used for the industrial example.

Step 4: Determine Reasonable Potential for Excursions

The determination of possible exceedances in the CMC or CCC was based on a calculation of the maximum receiving water concentration of each pollutant, followed by a comparison to the appropriate receiving water criterion. The calculation of the maximum receiving water concentrations were made using the statistical estimate of the 99th percentile concentration of each pollutant in the effluent, the same flow used in the industrial example, and considered background receiving water concentrations of:

Copper	4.8 µg/l
Chlorine	0 µg/l
Ammonia	120 µg/l.

The maximum effluent concentration was estimated using the statistical approach in Chapter 3. There were 24 concentrations of each chemical reported in the DMRs. For copper, these concentrations had a maximum value of 519 µg/l, an arithmetic mean of 185 µg/l, an arithmetic standard deviation of 133, and an arithmetic coefficient of variation of 133/185, or 0.7. The multiplier was calculated to be 2.4 based on the CV of 0.7, 24 observations, and a 99-percent confidence level (see Section 3.3.2). Similar calculations were conducted for chlorine (multiplier of 2.2) and ammonia (multiplier of 2.2).

The receiving water concentrations for each pollutant were calculated. An example calculation for the comparison of copper to the CCC is shown below:

$$C = \frac{[(2.4 \times 519\ \mu g/l \times 1.23\ cfs) + (4.8\ \mu g/l \times 13\ cfs)]}{(1.23\ cfs + 13\ cfs)}$$

$$= 112\ \mu g/l$$

where

519 µg/l	=	the maximum measured effluent concentration
2.4	=	the statistical multiplier
1.23 cfs	=	the average effluent flow
4.8 µg/l	=	the upstream receiving water concentration
13 cfs	=	the 7Q10 flow.

The maximum receiving water concentrations for comparison to applicable standards for all pollutants were calculated to be:

	Criterion (µg/l)	Receiving Water Concentration (µg/l)
Copper		
CCC	17.1	112
CMC	25.7	140
Chlorine		
CCC	11	194
CMC	19	244
Ammonia		
CCC	540	7,292
CMC	4,000	9,128

The effluent characterization showed the reasonable potential for excursions above the CCC and CMC for copper, chlorine, and ammonia. Therefore, permit limits were developed for these pollutants.

7.3.3 Effluent Characterization for Whole Effluent Toxicity

Step 1: Dilution Determination

The initial dilution determination was used to establish the types of toxicity tests that must be conducted to characterize the effluent. The dilution at the low flow characteristics for the facility is the following:

At the 7Q10, dilution = (1.23 cfs + 13 cfs)/1.23 cfs
= 11.6

At the 1Q10, dilution = (1.23 cfs + 10.1 cfs)/1.23 cfs
= 9.2.

Step 2: Conduct Toxicity Testing

EPA recommends that a discharger having a dilution less than 100 be required to conduct chronic testing. The permitting authority requested through a Section 308 letter that the POTW provide quarterly chronic toxicity data for the year prior to permit reissuance. Tests using *Selenastrum, Ceriodaphnia,* and *Pimephales* were required. The permitting authority also required the permittee to report the test results at the 48-hour endpoint so that acute toxicity also could be measured. Table 7-2 summarizes the results of the whole effluent toxicity testing.

Step 3: Determine Reasonable Potential for Excursions

As explained in the industrial example, the State interprets its narrative criteria for whole effluent toxicity to require that the technical support document recommendations of 0.3 TU_a and 1.0 TU_c be used as numeric values for acute and chronic toxicity, respectively. In accordance with the State standards, the CMC applies under the 1Q10 flow and the CCC applies under the 7Q10 flow.

The reasonable potential determination of exceedance of the CMC or the CCC was conducted in the same way as described in the industrial example. Upstream ambient water was used as a diluent to assess contributions directly from background toxicity; therefore, the upstream receiving water concentration was set to zero. The maximum effluent concentration was again estimated by using the statistical approach in Chapter 3. For the same reasons as were expressed in the industrial example, a multiplier of 4.7 was used.

The receiving water concentration for chronic toxicity for comparison with the CCC was calculated using data from Table 7-2:

$$C = \frac{(4.7 \times 2\ TU_c \times 1.23\ cfs) + (0\ TU_c \times 13\ cfs)}{(1.23\ cfs + 13\ cfs)}$$
$$= 0.8\ TU_c$$

where

13 cfs = the receiving water flow at 7Q10
1.23 cfs = the mean effluent flow
4.7 = the statistical effluent multiplier
4 TU_c = the maximum effluent concentration.

The value of the calculated receiving water concentration, 0.8 TU_c, is less than the chronic water quality standard of 1.0 TU_c, and therefore there is no reasonable potential for the CCC to be exceeded.

To calculate the receiving water concentration for acute toxicity, the permitting authority first converted the chronic toxicity data into equivalent acute toxicity units by applying the ACR of 2 obtained from the monitoring data. The receiving water concentration for acute toxicity was then calculated:

$$C = \frac{[(4.7 \times 2\ TU_c / 2\ ACR \times 1.23\ cfs) + (0\ TU_c \times 10.1\ cfs)]}{(1.23\ cfs + 10.1\ cfs)}$$
$$= 0.5\ TU_a$$

where 10.1 cfs is the receiving water flow at 1Q10, 2 is the acute to chronic ratio, and the other values are the same as above. The calculated value of 0.5 TU_a is greater than the criterion of 0.3 TU_a. Therefore, there is reasonable potential for the CMC to be exceeded and permit limits were developed for whole effluent toxicity.

7.3.4 Determine Wasteload Allocations

WLAs for chemicals and whole effluent toxicity were determined using information on the available dilution at the edge of the mixing zone. The calculation of WLA using the steady-state model was described in Section 7.2.4. The WLAs for the POTW using the equation discussed in Section 7.2.4 are:

	Toxicity (TU)	Copper (µg/l)	Chlorine (µg/l)	Ammonia (µg/l)
WLA_a	2.8	197	175	35,860
WLA_c	11.6	147	127	4,979

7.3.5 Develop Permit Limits

The permit limit development process described in Box 5-2, Chapter 5 was applied to all pollutants. This process is identical to that explained in Section 7.2.5 except that (1) the WLA for acute toxicity needs to be expressed in equivalent chronic toxic units by multiplying by the ACR of 2, and (2) daily sampling of chlorine is required in the permit. The calculated LTA and permit limits are:

	Toxicity TU_c	Copper (µg/l)	Chlorine (µg/l)	Ammonia (µg/l)
LTA_a	1.8	55.4	56.2	11,511
LTA_c	6.1	70.7	66.9	2,625
MDL	5.6	197	175	8,162
AML	2.8	91	87	4,067

7.3.6 Determining and Expressing the Controlling Effluent Limit

The treatment technology for POTWs is secondary treatment and is characterized by effluent limits for biochemical oxygen demand, total suspended solids, and pH. There are no BAT limits for toxics for POTWs, so there was no need to compare these water quality-based limits with other limits to determine which were more stringent.

The permitting authority decided to use acute toxicity tests rather than chronic tests to measure compliance with the toxicity effluent limits. The appropriate effluent limits in terms of TU_a were calculated by dividing the above calculation for TU_c by the ACR of 2 that was obtained from effluent monitoring.

In accordance with NPDES regulations, the effluent limits for chemicals were expressed in the permit as mass (pounds per day) by multiplying the concentrations above by the effluent flow of 1.23 cfs and the conversion factor of 5.394. Because there is no equivalent mass based unit for toxicity, toxicity mass limits are impractical under the regulation.

	Toxicity TU_a	Copper (lb/d)	Chlorine (lb/d)	Ammonia (lb/d)
MDL	2.8	1.31	1.16	54.2
AML	1.4	0.64	0.58	27.0

7.3.7 Comparing Different Limit Development Methods

Permit limits also were developed using a Monte Carlo simulation to compare the results to the steady-state permit limits. A Monte Carlo simulation was used to generate receiving water concentrations for determining the appropriate LTA for each of the pollutants. The methodology for the Monte Carlo simulation is presented in Section 7.2.7. The results for this case are presented below.

MDLs in TU_a and µg/l

	Toxicity	Copper	Chlorine	Ammonia
Monte Carlo	3.9	264	249	9,657
Steady State	2.8	197	175	8,162

AMLs in TU_a and µg/l

	Toxicity	Copper	Chlorine	Ammonia
Monte Carlo	2.7	171	170	6,614
Steady State	1.4	91	87	4,067

7.4 CASE 3: MULTIPLE DISCHARGES INTO THE SAME REACH

Permit development for water quality-based toxics control has been illustrated for two single dischargers. This process increases in complexity in cases of multiple dischargers into a reach. The development of permit limits for multiple dischargers is based on the degradation in water quality resulting from the combined discharges, the development of total maximum daily loads (TMDLs) for the river reach before generating WLAs, and the allocation of discharges to each discharger. The following example describes the permit development process when two dischargers release effluent into the same reach of a river. The dischargers are the Jaybird manufacturing plant described in Case 1 and the Auburn POTW described in Case 2. These facilities discharge into the Locapunct River, whose flow characteristics previously were described.

7.4.1 Effluent Characterization

The major differences in the effluent characterization for one facility and for multiple facilities is to identify those pollutants that are common to more than one facility, and to determine whether the combined discharges cause or are likely to cause water quality standards excursions.

Step 1: Identify Pollutants of Concern

Based on the data in Form 2C, the DMRs from the Jaybird Corporation and the data in the DMRs and Section 308 request from the Auburn POTW, the permitting authority found two contaminants common to both discharges: copper and whole effluent toxicity. Lead and nickel were found to be a problem at the Jaybird Corporation, but since there were no complicating discharges from the POTW, it was dealt with as a pollutant only at the metal finishing facility. Similarly, chlorine and ammonia were discharged solely by the POTW, so it was not necessary to provide effluent limits for the metal finishing facility for these chemicals.

Step 2: Determine the CMC and CCC for Pollutants of Concern

The numerical standards adopted by the State already have been presented. The relevant values for copper and whole effluent toxicity are:

	CCC	CMC
Copper	17.1 µg/l	25.7 µg/l
Toxicity	1.0 TU_c	0.3 TU_a

Step 3: Determine Dilution for Aquatic Life and Human Health Impacts

Since this example is concerned with potential excursions above standards resulting from the collective discharge of two dischargers, the calculation of dilution includes the combined effluent flow from both facilities. The combined dilution can be characterized by the complete mixing equation:

$$C = (C_{e1}Q_{e1} + C_{e2}Q_{e2} + C_sQ_s)/(Q_{e1} + Q_{e2} + Q_s)$$

where

Q_{e1} and Q_{e2} = the flows of the two facilities
C_{e1} and C_{e2} = the effluent concentrations of the two facilities
C_s = the upstream receiving water concentration
Q_s = the receiving water flow.

Step 4: Determine Reasonable Potential for Excursions

To determine if the CMC or CCC were exceeded as a result of the combined discharges into the river, the receiving water concentration of each pollutant was calculated and compared to the appropriate criterion. The receiving water concentration calculation was based on the maximum value of the effluent concentrations (obtained from effluent data and multiplied by the appropriate statistical factor), average effluent flows, background receiving water concentrations, and appropriate river flows. All this information has been presented previously in the separate examples. The following results were obtained:

	Criterion (µg/l)	Receiving Water Concentration (µg/l)
Copper		
CCC	17.1	156
CMC	25.7	194
Toxicity		
CCC	1.0	0.57
CMC	0.3	0.45

These calculations demonstrated exceedances of the copper CCC and CMC criteria and the toxicity CMC criterion. Permit limits were required.

7.4.2 TMDLs and WLAs

WLAs were calculated to develop permit limits. WLAs for each discharger and chemical were based on calculated TMDLs, the total load to the Locapunct River that would not result in water quality standards exceedances. TMDLs are comprised of a load allocation for nonpoint sources, WLAs for point sources, and, if required by the State, a reserve capacity. TMDLs are further described in Section 4.2, Chapter 4.

Step 1: Calculate TMDL

The first step in developing individual WLAs for the two dischargers was to develop TMDLs for each pollutant of concern. TMDLs were developed in the same way as an individual WLA with the total load of a pollutant from the two dischargers being considered as a single discharge.

The calculation of TMDLs used the following formula:

$$TMDL = WQS \times (Q_t + Q_s)$$

where

WQS = the water quality standard

Q_t = the combined flow of both effluents

Q_s = the appropriate receiving water flow.

The acute copper TMDL was calculated by using the data presented in the previous two examples as:

$$TMDL = 25.7\ \mu g/l \times (0.034\ cfs + 1.23\ cfs + 10.1\ cfs)$$
$$= 292\ \mu g\text{-}cfs/l$$

where

25.7 µg/l = the CMC

0.034 cfs and

1.23 cfs = the average effluent flows

10.1 = the 1Q10.

Similar calculations were made for chronic copper and acute toxicity. A TMDL was not calculated for chronic toxicity because the information presented in Chapter 1 indicates that chronic toxicity does not demonstrate additivity. The results are summarized below.

	Total Maximum Daily Loads	
	Chronic	Acute
Copper (µg-cfs/l)	244	292
Toxicity (TU_a-cfs/l)	NA	3.4

Step 2: Develop WLAs

The State had adopted an approach into the water quality management plan that described how WLAs were to be calculated. The approach required that existing upstream concentrations be used to determine the load allocation part of the TMDL and that 10 percent of the TMDL had to be reserved and unavailable for allocation. The remainder of the TMDL could be apportioned to point sources in the WLA.

The permitting authority decided to allocate the wasteloads based on the proportion of the existing load of each parameter that was attributed to each of the existing discharges. Based on the information shown in Tables 7-1 and 7-2 and the average effluent flows, the pollutant loads from each facility are shown below.

	Auburn POTW		Jaybird Corporation	
Parameter	Load	Proportion	Load	Proportion
Copper (µg-cfs/l)	227.6	0.77	66.1	0.23
Toxicity (TU_a-cfs)	1.23	0.90	0.14	0.10

Individual WLAs were then determined using the following equation:

$$WLA = (TMDL - LA - 10\%\ TMDL) \times proportion/Q_e$$

where the chronic TMDL was used to determine the chronic WLA, and the acute TMDL was used to determine the acute WLA for each facility. The WLAs for each pollutant and for each facility are presented on the following page.

Jaybird	Acute WLA		Chronic WLA	
Copper (µg/l)	134	1,450	98.4	1,063
Toxicity (TU_a)	2.2	9.0	NA	NA

7.4.3 Permit Limit Development

Once the WLAs had been determined, permit limit development proceeded as in the previous examples. LTAs were calculated from the WLAs, and the limiting LTA was selected for calculating permit limits. For the metal finisher, where BAT limits were more restrictive than the water quality-based limits, the BAT limits applied. For the POTW, permit limits for toxic materials were required only to prevent exceedances of water quality standards. This process is summarized below.

Step 1: Calculate LTAs

The LTA was calculated for each discharger and pollutant as described in Step 2, Box 5-2, Chapter 5; the LTAs are shown below.

	Acute LTA		Chronic LTA	
Parameter	POTW	Jaybird	POTW	Jaybird
Copper (µg/l)	37.7	361	47.3	468
Toxicity (TU_a)	0.71	2.9	NA	NA

Step 2: Determine the More Lmiting LTA

The minimum LTA was used to calculate MDLs and AMLs. The acute LTA was the lower LTA for both pollutants.

Step 3: Calculate the Maximum Daily and Average Monthly Limits

The MDL and AML were calculated as described in Box 5-2, Chapter 5:

	Average Monthly Limit		Maximum Daily Limit	
Parameter	POTW	Jaybird	POTW	Jaybird
Copper (µg/l)	62	632	134	1,448
Toxicity (TU_a)	1.1	4.5	2.2	9.0

Step 4: Express the Limits

The final step is to compare the water quality-based limits to the BAT limits to ensure that the more restrictive of the two are used, and to express the copper limits in terms of mass. The copper water quality-based limits for Jaybird Corporation are lower than the BAT ones (see Section 7.2.6). Therefore, the water quality-based limits are required by the permit. In addition, the limits are lower than those calculated when only one of the facilities were considered. The final permit limits are listed below.

	Average Monthly Limit		Maximum Daily Limit	
Parameter	POTW	Jaybird	POTW	Jaybird
Copper (lb/d)	0.41	0.12	0.89	0.27
Toxicity (TU_a)	1.1	4.5	2.2	9.0

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APPENDIX A-1

TOXICITY TEST PRECISION DATA

Marine/Estuarine Short-Term Chronic Toxicity Tests

SHEEPSHEAD MINNOW (*Cyprinodon variegatus*)

Seven-day Larval Survival and Growth Test
Single Laboratory Precision Data

Table A-1-1. Single laboratory precision of test performed in 40 fathoms artificial seawater, using larvae from fish maintained and spawned in 40 fathoms artificial seawater, using copper as the reference toxicant [1].

Test Number	NOEC (mg/l)	IC_{25} (mg/l)	IC_{50} (mg/l)	Most Sensitive Endpoint
1	0.05	0.1133	0.1523	S
2	<0.05*	0.0543	0.0975	G
3	<0.05*	0.0418	0.0714	G
4	0.05	0.0632	0.0908	S
5	<0.05*	0.0577	0.0998	S
6	0.05	0.0483	0.1325	G
7	0.05	0.0796	0.1597	G
8	0.05	0.1235	0.2364	G
n:	5	8	8	
Mean:	0.05	0.0727	0.1300	
CV(%):	NA	41.82	40.77	

* The lowest concentration tested was 0.05 mg./l

NOEC Range: >0.05* - 0.05 mg/l.

Copper concentrations in Tests 1-6 were 0.050, 0.10, 0.20, 0.40, and 0.80 mg/l and Tests 7-8 were 0.025, 0.050, 0.10, 0.20, and 0.40 mg/l.

Prepared by Florence Kessler, TAI, Cincinnati, OH, January 11, 1990 (ICp Program, version 1.1b).

Table A-1-2. Single laboratory precision of test performed in 40 fathoms artificial seawater, using larvae from fish maintained and spawned in 40 fathoms artificial seawater, using sodium dodecyl sulfate (SDS) as the reference toxicant [1].

Test Number	NOEC (mg/l)	IC_{25} (mg/l)	IC_{50} (mg/l)	Most Sensitive Endpoint
1	1.0	1.2799	1.5598	S
2	1.0	1.4087	1.8835	S
3	1.0	2.3051	2.8367	S
4	0.5	1.9855	2.6237	G
5	1.0	1.1901	1.4267	S
6	0.5	1.1041	1.4264	G
n:	6	6	6	
Mean:	0.8	1.5456	1.9595	
CV(%):	NA	31.44	31.82	

NOEC Range: 0.5 - 1.0 mg/l (this represents a difference of one exposure concentration).

SDS concentrations in Tests 1-2 were 1.0, 1.9, 3.9, 7.7, and 15.5 mg/l and in Tests 3-6 were 0.20, 0.50, 1.0, 1.9, and 3.9 mg/l.

Prepared by Florence Kessler, TAI, Cincinnati, OH, January 11, 1990 (ICp Program, version 1.1b).

Table A-1-3. Single laboratory precision of test performed in natural seawater, using larvae from fish maintained and spawned in natural seawater, using copper as the reference toxicant [1].

Test Number	NOEC (mg/l)	IC_{25} (mg/l)	IC_{50} (mg/l)	Most Sensitive Endpoint
1	125	320.3	437.5	S
2	31	182.3	323.0	G
3	125	333.4	483.4	S
4	125	228.4	343.8	S
5	125	437.5	NC*	S
n:	5	5	4	
Mean:	106.2	300.4	396.9	
CV(%):	NA	33.0	19.2	

* No linear interpolation estimate could be calculated from the data, since none of the group response means were less than 50 percent of the control response mean.

NOEC Range: 31 - 125 mg/l (this represents a difference of two exposure concentrations).

Prepared by Elise Torello, SAIC, Narragansett, RI, and Margarete Heber, EPA, Washington, DC, February 1990 (ICp Program, version 1.1b).

Table A-1-4. Single laboratory precision of test performed in natural seawater, using larvae from fish maintained and spawned in natural seawater, using sodium dodecyl sulfate (SDS) as the reference toxicant [1].

Test Number	NOEC (mg/l)	IC_{25} (mg/l)	IC_{50} (mg/l)	Most Sensitive Endpoint
1	2.5	2.9	3.6	S
2	1.3	NC[1]	NC[2]	G
3	1.3	1.9	2.4	S
4	1.3	2.4	NC[2]	G
5	1.3	1.5	1.8	S
n:	5	4	3	
Mean:	1.5	2.2	2.6	
CV(%):	NA	27.6	35.3	

NOEC Range: 1.3 - 2.5 mg/l (this represents a difference of one exposure concentration).

[1] No linear interpolation estimate could be calculated from the data, since none of the group response means were less than 75 percent of the control response mean.

[2] No linear interpolation estimate could be calculated from the data, since none of the group response means were less than 50 percent of the control response mean.

Prepared by Elise Torello, SAIC, Narragansett, RI, and Margarete Heber, EPA, and Washington, DC, February 1990 (ICp Program, version 1.1b).

SHEEPSHEAD MINNOW (*Cyprinodon variegatus*)

Seven-day Larval Survival and Growth Test
Interlaboratory Precision Data

Table A-1-5. Interlaboratory precision of test using an industrial effluent as the reference toxicant [1].

	Test Number	Most Sensitive Endpoint NOEC (%)	IC_{25} (%)	IC_{50} (%)
Laboratory A				
	1	3.2 (S,G)	7.4 (S)	7.4 (G)
	2	3.2 (S,G)	7.6 (S)	14.3 (G)
Laboratory B				
	1	3.2 (S,G)	5.7 (G)	9.7 (G)
	2	3.2 (S,G)	5.7 (G)	8.8 (G)
Laboratory C				
	1	1.0 (S)	4.7 (S)	7.2 (S)
Laboratory D				
	1	3.2 (S,G)	7.4 (G)	24.7 (G)
	2	1.0 (G)	5.2 (S)	7.2 (S)
n:		7	7	7
Mean:		2.6	5.5	11.3
CV(%):		NA	44.2	56.9

NOEC Range: 1.0 - 3.2 percent (this represents a difference of one exposure concentration).

Prepared by Elise Torello, SAIC, Narragansett, RI, and Margarete Heber, EPA, and Washington, DC, February (ICp Program, version 1.1b).

SHEEPSHEAD MINNOW (*Cyprinodon variegatus*)

Embryo-larval Survival and Teratogenicity Test
Single Laboratory Precision Data

Table A-1-6. Single laboratory precision of test performed in HW Marinemix artificial seawater, using embryos from fish maintained and spawned in HW Marinemix artificial seawater, using copper as the reference toxicant [1].

Test Number	EC_1 (ug/l)	EC_5 (ug/l)	EC_{10} (ug/l)	EC_{50} (ug/l)	NOEC (ug/l)
1	173	189	198	234	240
2	*	*	*	*	240
3	*	*	*	*	240
4	182	197	206	240	240
5	171	187	197	234	240
6	*	*	*	*	<200
	*	*	*	*	220
	195	203	208	226	220
n:	4	4	4	4	7
Mean:	180	194	202	233	234
CV(%):	6.1	3.8	2.8	2.5	NA

* Data do not fit the Probit model.

NOEC Range: 200 - 240 (this represents a difference of two exposure concentrations).

SHEEPSHEAD MINNOW (*Cyprinodon variegatus*) (continued)

Embryo-larval Survival and Teratogenicity Test
Single Laboratory Precision Data

Table A-1-7. Single laboratory precision of test performed in HW Marinemix artificial seawater, using embryos from fish maintained and spawned in HW Marinemix artificial seawater, using sodium dodecyl sulfate (SDS) as the reference toxicant [1].

Test Number	EC_1 (mg/l)	EC_5 (mg/l)	EC_{10} (mg/l)	EC_{50} (mg/l)	NOEC (mg/l)
1	1.7	2.0	2.2	3.1	2.0
2	*	*	*	*	4.0
3	0.4	0.7	0.9	2.5	2.0
4	1.9	2.2	2.4	3.3	2.0
5	1.3	1.7	1.9	3.0	2.0
n:	4	4	4	4	5
Mean:	1.3	1.6	1.9	2.9	2.4
CV(%):	51.2	41.6	35.0	11.7	NA

* Data do not fit the Probit model.

NOEC Range: 2.0 - 4.0 ug/l (this represents a difference of one exposure concentration).

INLAND SILVERSIDE (*Menidia beryllina*)

Seven-day Larval Survival and Growth Test Single Laboratory Precision Data

Table A-1-8. Single laboratory precision of the inland silverside (*Menidia beryllina*) larval survival and growth test performed in natural seawater, using larvae from fish maintained and spawned in natural seawater, using copper as the reference toxicant [1].

Test Number	NOEC (ug/l)	IC_{25} (ug/l)	IC_{50} (ug/l)	Most Sensitive Endpoint
1	63	96.2	148.6	S
2	125	207.2	NC*	S
3	63	218.9	493.4	G
4	125	177.5	241.4	S
5	31	350.1	479.8	G
n:	5	5	4	
Mean:	81.4	209.9	340.8	
CV(%):	NA	43.7	50.7	

* No linear interpolation estimate could be calculated from the data, since none of the group response means were less than 50 percent of the control response mean.

NOEC Range: 31 - 125 ug/l (this represents a difference of two exposure concentrations).

Prepared by Elise Torello, SAIC, Narragansett, RI, and Margarete Heber, EPA, and Washington, DC, February 1990 (ICp Program, version 1.1b).

Table A-1-9. Single laboratory precision of the inland silverside (*Menidia beryllina*) larval survival and growth test performed in natural seawater, using larvae from fish maintained and spawned in natural seawater, using sodium dodecyl sulfate (SDS) as the reference toxicant [1].

Test Number	NOEC (mg/l)	IC_{25} (mg/l)	IC_{50} (mg/l)	Most Sensitive Endpoint
1	1.3	0.3	1.7	S
2	1.3	1.6	1.9	S
3	1.3	1.5	1.9	S
4	1.3	1.5	1.9	S
5	1.3	1.6	2.2	S
n:	5	5	5	
Mean:	1.3	1.3	1.9	
CV(%):	NA	43.2	9.4	

NOEC Range: 1.3 mg/l.

Prepared by Elise Torello, SAIC, Narragansett, RI, and Margarete Heber, EPA, and Washington, DC, February 1990 (ICp Program, version 1.1b).

MYSID (*Mysidopsis bahia*)

Seven-day Survival, Growth, and Fedundity Test Single Laboratory Precision Data

Table A-1-10. Single laboratory precision of the mysid (*Mysidopsis bahia*) survival, growth and fecundity test performed in natural seawater, using juveniles from mysids cultured and maintained in natural seawater, using copper as the reference toxicant [1].

Test Number	NOEC (ug/l)	IC_{25} (ug/l)	IC_{50} (ug/l)	Most Sensitive Endpoint
1	63	96.1	NC*	S
2	125	138.3	175.5	S
3	125	156.3	187.5	S
4	125	143.0	179.9	S
5	125	157.7	200.3	S
n:	5	5	4	
Mean:	112.6	138.3	185.8	
CV(%):	NA	18.0	5.8	

* No linear interpolation estimate could be calculated from the data, since none of the group response means were less than 50 percent of the control response mean.

NOEC Range: 63 - 125 ug/l (this represents a difference of two exposure concentrations).

Prepared by Elise Torello, SAIC, Narragansett, RI, and Margarete Heber, EPA, and Washington, DC, February 1990 (ICp Program, version 1.1b).

Table A-1-11. Single laboratory precision of the mysid (*Mysidopsis bahia*) survival, growth, and fecundity test performed in natural seawater, using juveniles from mysids cultured and maintained in natural seawater, using sodium dodecyl sulfate (SDS) as the reference toxicant [1].

Test Number	NOEC (mg/l)	IC_{25} (mg/l)	IC_{50} (mg/l)	Most Sensitive Endpoint
1	2.5	4.5	NC[2]	S
2	<0.3	NC[1]	NC[2]	S
3	<0.6	NC[1]	NC[2]	S
4	5.0	7.8	NC[2]	S
5	2.5	3.6	4.6	S
6	5.0	7.0	9.3	S
n:	4	4	2	
Mean:	3.8	5.7	6.9	
CV(%):	NA	35.0	47.8	

[1]No linear interpolation estimate could be calculated from the data, since none of the group response means were less than 75 percent of the control response mean.

[2]No linear interpolation estimate could be calculated from the data, since none of the group response means were less than 50 percent of the control response mean.

NOEC Range: <0.3 - 5.0 mg/l (this represents a difference of four exposure concentrations).

Prepared by Elise Torello, SAIC, Narragansett, RI, and Margarete Heber, EPA, and Washington, DC, February 1990 (ICp Program, version 1.1b).

SEA URCHIN (*Arbacia punctulata*)

Fertilization Test Single Laboratory Precision Data

Table A-1-12. Single laboratory precision of the sea urchin (*Arbacia punctulata*) fertilization test performed in natural seawater, using gametes from sea urchins maintained and spawned in artificial seawater (40 Fathoms), using copper as the reference toxicant [1].

Test Number	NOEC (ug/l)	IC_{25} (ug/l)	IC_{50} (ug/l)
1	5.0	8.92	29.07
2	12.5	26.35	38.96
3	<6.2	11.30	23.93
4	6.2	34.28	61.75
5	12.5	36.67	75.14
n:	4	5	5
Mean:	9.0	23.51	45.77
CV(%):	NA	54.60	47.87

NOEC Range: <5.0 - 12.5 ug/l (this represents a difference of one exposure concentration).

Copper concentrations in Test 1 were 2.5, 5.0, 10.0, 20.0, and 40.0 ug/l and in Tests 2-5 were 6.25, 12.5, 25.0, 50.0, and 100.0 ug/l.

Prepared by Florence Kessler, TAI, Cincinnati, OH, January 11, 1990 (ICp Program, version 1.1b).

Table A-1-13. Single laboratory precision of the sea urchin (*Arbacia punctulata*) fertilization test performed in natural seawater, using gametes from sea urchins maintained and spawned in artificial seawater (40 Fathoms), using sodium dodecyl sulfate (SDS) as the reference toxicant [1].

Test Number	NOEC (mg/l)	IC_{25} (mg/l)	IC_{50} (mg/l)
1	<0.9	1.11	1.76
2	0.9	1.27	1.79
3	1.8	2.26	2.87
4	0.9	1.90	2.69
5	1.8	2.11	2.78
n:	4	5	5
Mean:	1.4	1.73	2.38
CV(%):	NA	29.7	23.3

NOEC Range: 1.2 - 3.3 mg/l (this represents a difference of one exposure concentration).

SDS concentrations for all tests were 0.9, 1.8, 3.6, 7.2, and 14.4 mg/l.

Prepared by Florence Kessler, TAI, Cincinnati, OH, January 11, 1990 (ICp Program, version 1.1b).

Table A-1-14. Single laboratory precision of the sea urchin (*Arbacia punctulata*) fertilization test performed in natural seawater, using gametes from sea urchins maintained and spawned in natural seawater, using copper as the reference toxicant [1].

Test Number	NOEC (ug/l)	IC_{25} (ug/l)	IC_{50} (ug/l)
1	12.2	14.2	18.4
2	12.2	32.4	50.8
3	24.4	30.3	46.3
4	<6.1	26.2	34.1
5	6.1	11.2	17.2
n:	4	5	5
Mean:	13.7	22.8	29.9
CV(%):	NA	41.9	48.2

NOEC Range: <6.1 - 24.4 ug/l (this represents a difference of two exposure concentrations).

Prepared by Elise Torello, SAIC, Narragansett, RI, and Margarete Heber, EPA, and Washington, DC, February 1990 (ICp Program, version 1.1b).

Table A-1-15. Single laboratory precision of the sea urchin (*Arbacia punctulata*) fertilization test performed in natural seawater, using gametes from sea urchins maintained and spawned in natural seawater, using sodium dodecyl sulfate (SDS) as the reference toxicant [1].

Test Number	NOEC (ug/l)	IC_{25} (ug/l)	IC_{50} (ug/l)
1	1.8	2.3	2.7
2	1.8	3.9	5.1
3	1.8	2.3	2.9
4	0.9	2.1	2.6
5	1.8	2.3	2.7
n:	5	5	5
Mean:	1.6	2.58	3.2
CV(%):	NA	28.7	33.3

NOEC Range: 0.9 - 1.8 mg/l (this represents a difference of one exposure concentration).

Prepared by Elise Torello, SAIC, Narragansett, RI, and Margarete Heber, EPA, and Washington, DC, February 1990 (ICp Program, version 1.1b).

RED MACROALGAE (*Champia parvula*)

Reproduction Test Single Laboratory Precision Data

Table A-1-16. Single laboratory precision of the red macroalga (*Champia parvula*) reproduction test performed in 50/50 natural seawater and GP-2 artificial seawater. Copper is the reference toxicant [1].

Test Number	NOEC (ug/l)	IC_{25} (ug/l)	IC_{50} (ug/l)
1	1.0	1.67	2.35
2	1.0	1.50	1.99
3	1.0	0.69	1.53
4	1.0	0.98	1.78
5	0.5	0.38	0.76
6	0.5	0.38	0.75
n:	6	6	6
Mean:	0.83	0.93	1.5
CV(%):	NA	59.6	43.7

NOEC Range: 0.5 - 1.0 ug/l (this represents a difference of one exposure concentration).

Prepared by Elise Torello, SAIC, Narragansett, RI, and Margarete Heber, EPA, and Washington, DC, February 1990 (ICp Program, version 1.1b).

Table A-1-17. Single laboratory precision of the red macroalga (*Champia parvula*) reproduction test performed in 50/50 natural seawater and GP-2 artificial seawater. Sodium dodecyl sulfate (SDS) is the reference toxicant [1] (personal communication with G. Thursby, SAIC, Narragansett, RI).

Test Number	NOEC (mg/l)	IC_{25} (mg/l)	IC_{50} (mg/l)
1	<0.80	0.6	0.3
2	0.48	0.7	0.6
3	<0.48	0.4	0.2
4	<0.48	0.2	0.4
5	0.26	0.2	0.5
6	0.09	0.1	0.3
7	0.16	0.2	0.3
8	0.09	0.1	0.2
9	<0.29	0.3	0.4
n:	5	9	9
Mean:	0.22	0.31	0.36
CV(%):	NA	69.0	37.0

NOEC Range: 0.09 - 0.48 mg/l (this represents a difference of two exposure concentrations).

Prepared by Elise Torello, SAIC, Narragansett, RI, and Margarete Heber, EPA, and Washington, DC, February 1990 (ICp Program, version 1.1b).

Table A-1-18. Single laboratory precision testing of the red macroalga (*Champia parvula*) reproduction test in natural seawater (30 $^{o}/_{oo}$ salinity). The reference toxicants used were copper sulfate (Cu)[1,2] and sodium dodecyl sulfate (SDS)[2,3] [7].

	Cu (ug/l)			SDS (mg/l)		
Test	NOEC	IC_{25}	IC_{50}	NOEC	IC_{25}	IC_{50}
1	1.00	2.62	4.02	0.60	0.05	0.50
2	0.50	0.71	1.66	0.60	0.48	0.81
3	0.50	2.83	3.55	0.30	0.69	0.89
4	0.50	0.99	4.15	0.15	0.60	0.81
n:	4	4	4	4	4	4
Mean:	0.63	1.79	3.35	0.41	0.46	0.75
CV(%):	NA	61.09	34.45	NA	62.29	22.92

[1]Copper concentrations were 0.5, 1.0, 2.5, 5.0, 7.5, and 10 ug/l. Concentrations of Cu were made from a 100 ug/ml $CuSO_4$ standard obtained from Inorganic Ventures, Inc., Brick, NJ.

[2]All tests were conducted at 23 ± 1°C in natural seawater with irradiance set at 40 $uE/m^2/s$.

[3]SDS concentrations were 0.0375, 0.075, 0.15, 0.30, 0.60, and 1.20 mg/l. Concentrations of SDS were made from a 44.64 ± 3.33 mg/ml standard obtained from U.S. EPA-EMSL, Cincinnati, OH.

Prepared by Steven H. Ward and Glen Thursby, EPA, Narragansett, RI (ICp Program, version 1.1b).

Fresh Water Short-Term Chronic Toxicity Tests

FATHEAD MINNOW (*Pimephales promelas*)

Seven-day Larval Survival and Growth Test and Embryo-larval Survival and Teratogenicity Test Single Laboratory Precision Data

Table A-1-19. Single laboratory precision of the fathead minnow (*Pimephales promelas*) embryo-larval survival and teratogenicity test performed in using Diquat as the reference toxicant [2].

Test Number	LC_1 (mg/l)
1	0.58
2	2.31
3	1.50
4	1.71
5	1.43
n:	5
Mean:	1.51
CV(%):	41.3

Table A-1-20. Single laboratory precision of the fathead minnow (*Pimephales promelas*) embryo-larval survival and teratogenicity test performed in using cadmium chloride as the reference toxicant [2].

Test Number	LC_1 (mg/l)	NOEC (mg/l)
1	0.014	0.012
2	0.006	0.012
3	0.005	0.013
4	0.003	0.011
5	0.006	0.012
n:	5	5
Mean:	0.0068	0.012
CV(%):	62	NA

NOEC Range: 0.011 - 0.013 mg/l (this represents a difference of one exposure concentration).

FATHEAD MINNOW (*Pimephales promelas*)

Seven-day Larval Survival and Growth Test
Single Laboratory Precision Data

Table A-1-21. Single laboratory precision of the fathead minnow (*Pimephales promelas*) larval survival and growth test performed in using NAPCP as the reference toxicant [2].

Test Number	NOEC* (ug/l)
1	256
2	128
3	256
4	128
5	128
n:	5
Mean:	179.2
CV(%):	NA

*Raw data unavailable, IC_{25} and IC_{50} values could not be calculated.

NOEC Range: 128 - 256 ug/l (this represents a difference of one exposure concentration).

Table A-1-22. Results of the performance evaluation for contract laboratories conducted for the California Regional Water Quality Control Board. All tests were conducted using potassium chromate (expressed as Cr^{+6}) and testing the fathead minnow (*Pimephales promelas*) in the 7-day subchronic tests [3].

Lab	Water	Food	Age	X Control Weight	Ctrl. n	IC_{25} (CI) (mg/l as Cr^{+6})	NOEC Endpoint	IC_{50} (CI) (mg/l as Cr^{+6})
1	Tap[1]	2X	≤24	0.590	3	3.7 (2.3-4.7)	3 G	5.4 (4.5-8.3)
2	MHRW	2X	≤24	0.623	3[2]	1.6[3] (1.4-2.0)	<3 G	3.3 (2.8-4.0)
3	MHRW	3X	≤24	0.274[4]	4	2.2[3] (1.7-3.1)	<3 G	4.7 (3.9-5.6)
4	Tap[5]	3X	≤24	0.670	2	4.1 (2.3-5.0)	6 G	6.6 (5.0-8.4)
5	MHRW	--[6]	≤24	0.773	4	1.3[3] (1.2-1.5)	<3 G	.6[3] (2.5-3.3)
6	MHRW	3X	y≤24	0.635	2	7.1 (2.0-8.2)	6 G	9.9 (8.5-11)
7	MHRW	3X	≤24	0.390	3	4.5 (3.5-5.4)	3 G	7.4 (6.6-8.1)
8	Well[7]	2X	≤24	0.346	5	2.5[3] (1.9-3.3)	<3 G	8.1 (6.4-15)
9	MHRW	3X	≤24	0.415	4	6.6 (5.3-7.6)	6 G	9.2 (8.4-10)
10	MHRW	3X	≤24	0.255	2	4.6 (4.1-5.9)	3 G	7.8[8] (5.2-12)
Mean:						5.1		6.9
CV (%):						27		31

[1] Moderately hard tap water.

[2] Control with three replicates and all concentrations with two replicates.

[3] Value is extrapolated and is not included in coefficient of variation calculation.

[4] Weight measurements made with questionable techniques.

[5] Dechlorinated Lake Ontario tap water.

[6] Not reported.

[7] Well water mixed with spring water, moderately hard.

[8] Value may be skewed as middle concentration had 45 percent survival but no weights reported.

Seven-day Larval Survival and Growth Test

Interlaboratory Precision Data

Table A-1-23. Interlaboratory precision data of the fathead minnow (*Pimephales promelas*) 7-day larval survival and growth test. Combined frequency distribution for survival NOECs for all participating laboratories [2].

	NOEC Frequency (%) Distribution					
	Tests with 2 Reps			Tests with 4 Reps		
Sample	Median	±1(a)	>2(b)	Median	± 1(a)	>2(b)
Sodium Pentachlorophenate [1]	35	53	12	57	29	14
Sodium Pentachlorophenate [2]	42	42	16	56	44	0
Potassium Dichromate [1]	47	47	6	75	25	0
Potassium Dichromate [2]	41	41	18	50	50	0
Refinery Effluent 301	26	68	6	78	22	0
Refinery Effluent 401	37	53	10	56	44	0
Utility Waste 501	56	33	11	56	33	11

[1] Percent of values with one concentration intervals of the median.

[2] Percent of values within two or more concentrations intervals of the median.

Table A-1-24. Interlaboratory precision data of the fathead minnow (*Pimephales promelas*) 7-day larval survival and growth test. Combined frequency distribution for weight NOECs for all participating laboratories [2].

	NOEC Frequency (%) Distribution					
	Tests with 2 Reps			Tests with 4 Reps		
Sample	Median	±1(a)	>2(b)	Median	± 1(a)	>2(b)
Sodium Pentachlorophenate [1]	59	41	0	57	43	0
Sodium Pentachlorophenate [2]	37	63	0	22	45	33
Potassium Dichromate [1]	35	47	18	88	0	12
Potassium Dichromate [2]	12	47	41	63	25	12
Refinery Effluent 301	35	53	12	75	25	0
Refinery Effluent 401	37	47	16	33	56	11
Utility Waste 501	11	61	28	33	56	11

[1] Percent of values with one concentration intervals of the median.

[2] Percent of values within two or more concentrations intervals of the median.

CERIODAPHNIA (*Ceriodaphnia dubia*)

Seven-day Reproduction Test

Single Laboratory Precision Data

Table A-1-25. Single laboratory precision of (*Ceriodaphnia dubia*) reproduction test performed in using sodium pentachlorophenol as the reference toxicant [2].

Test Number	NOEC (mg/l)	IC_{25} (mg/l)	IC_{50} (mg/l)
19	0.30	0.3754	0.4508
46A	0.20	0.0938	0.2608
46B	0.20	0.2213	0.2897
49	0.20	0.2303	0.2912
55	0.20	0.2306	0.3177
56	0.10	0.1345	0.1744
57	0.20	0.2241	0.2827
n:	7	7	7
Mean:	0.20	0.2157	0.2953
CV(%):	NA	41.1	27.9

NOEC Range: 0.25 - 0.30 mg/l (these values all fell within the same concentration range).
Prepared by Florence Kessler, TAI, Cincinnati, OH, January 11, 1990 (ICp Program, version 1.1b).

Table A-1-26. Single laboratory precision, from six discrete laboratories, of the (*Ceriodaphnia dubia*) reproduction test performed using sodium chloride (NaCl) as the reference toxicant. Tests were conducted in 1989 [4].

Laboratory	Test Number	NOEC (mg/l)	IC_{25} (mg/l)	IC_{50} (mg/l)
A	1	0.50^R	0.61	0.77
	2	1.00^S	1.00	1.34
	3	1.00^R	0.81	1.32
	4	1.00^R	0.67	1.28
	5	1.00^R	1.19	1.47
	6	0.50^R	1.06	1.38
n:		6	6	6
Mean:		0.83	0.89	1.26
CV(%):		NA	25.83	19.73
B	1	1.00^R	1.28	1.63
	2	1.00^S	1.01	1.51
	3	0.50^S	0.69	0.88
	4	0.50^S	0.81	1.16
	5	1.00^R	1.31	1.84
	6	1.00^R	1.12	1.57
n:		6	6	6
Mean:		0.83	1.04	1.43
CV(%):		NA	24.11	24.37
C	1	1.00^S	1.23	1.49
	2	0.50^S	0.46	1.02
	3	1.00^S	1.25	1.50
	4	0.50^R	1.13	1.44
	5	1.00^S	1.22	1.49
	6	1.00^S	1.21	1.51
n:		6	6	6
Mean:		0.83	1.13	1.41
CV(%):		NA	16.54	13.62
D	1	0.50^R	0.58	0.84
	2	0.25^R	0.30	0.60
	3	1.00^S	0.84	1.22
	4	1.00^S	1.04	1.38
	5	1.00^S	1.04	1.37
	6	0.50^R	0.76	1.14
n:		6	6	6
Mean:		0.71	0.76	1.08
CV(%):		NA	37.55	28.56
E	1	1.00^S	0.44	0.74
	2	1.00^S	1.04	1.37
	3	1.00^S	1.06	1.37
	4	1.00^S	1.13	1.42
	5	1.00^S	1.13	1.42
	6	1.00^S	1.19	1.46
n:		6	6	6
Mean:		1.00	1.00	1.30
CV(%):		NA	27.96	21.20
F	1	0.50^R	0.61	1.13
	2	0.50^R	0.63	1.20
	3	0.50^S	0.66	0.83
	4	0.50^S	0.65	0.81
	5	0.50^R	0.74	1.04
	6	0.50^R	0.50	0.73
n:		6	6	6
Mean:		0.50	0.63	0.95
CV(%):		NA	12.40	19.32

R = Reproduction was the most sensitive endpoint.
S = Survival was the most sensitive endpoint.
Prepared by William Peltier, EPA, Region IV, November 28, 1990 (ICp Program, version 1.1b).

CERIODAPHNIA (*Ceriodaphnia dubia*)

Seven-day Larval Reproduction Test Interlaboratory Precision Data

Table A-1-27. Interlaboratory precision of (*Ceriodaphnia dubia*) reproduction test, using sodium chloride (NaCl) as the reference toxicant. The single lab precision data are presented in the preceding table [4].

Laboratory	NOEC (mg/l)	IC_{25} (mg/l)	IC_{50} (mg/l)
A	0.83	0.89	1.26
B	0.83	1.04	1.43
C	0.83	1.13	1.41
D	0.71	0.76	1.09
E	1.00	1.00	1.30
F	0.50	0.63	0.95
n:	6	6	6
Mean:	0.80	0.91	1.24
CV(%):	NA	20.53	15.17

Prepared by William Peltier, EPA, Region IV, November 28, 1990 (ICp Program, version 1.1b).

Table A-1-28 Interlaboratory precision of (*Ceriodaphnia dubia*) reproduction test, using an industrial effluent as the reference toxicant and sodium chloride (NaCl) as a reference toxicant. Tests were conducted in May 1987 [3].

Lab	Effluent		Reference Toxicant	
	IC_{50} (%)	IC_{25} (%)	IC_{50} (%)l	IC_{25} (%)
A	6.20	4.9	33.0	21.8
B	8.40	6.2	38.8	30.8
D	7.69	5.8	36.3	29.4
E	6.34	5.0	36.6	28.0
F	4.00	1.2	8.1*	1.21*
J	2.84	1.9	35.1	25.2
K	6.89	5.3	18.4	13.2
M	5.70	1.9	38.1	31.0
N	7.43	5.9	27.8	10.4
O	0.04*	0.02*	35.1	27.3
n:	9	9	9	9
Mean:	6.17	3.4	32.8	24.1
CV(%):	29	67	21	31

*Values were excluded from mean calculations because they fell outside of ± 2 standard deviations. For this reason, these values are considered statistical outliers and, according to EPA's toxicity methods guidance [2] on reference toxicant control charts, are excluded.

Table A-1-29. Results of the performance evaluation for contract laboratories conducted for the California Regional Water Quality Control Board. All tests were conducted using sodium chloride and testing *Ceriodaphnia dubia* in the 7-day chronic tests [3].

Lab	Water	Food	Age	X Young/ Control	IC_{25} (Cl) (g/l NaCl)	NOEC Endpt
1	Tap[1]	YCT/Algae	0-4;<24	17.80.20[2]	(0.14-0.35)	<0.25 R
2	Hard W[3]	TF/Algae	0-4	26.51.3	(0.78-1.7)	1.0 R
3	DMW[4]	YCT/Algae	0-6	24.90.21[2]	(0.17-0.54)	<0.25 R
4	Tap[5]	YCT	0-4	17.20.49	(0.35-1.0)	0.5 R
5	HRW	YCT	0-4;<24	19.80.42	(0.20-1.1)	0.5 R
6	Surface[6]	YCT/Algae	0-6	14.80.90	(0.66-1.1)	0.25 R
7	MHRW	YCT/Algae	4-8	17.20.56	(0.24-0.64)	0.25 R
8	MHRW	YCT	<24	16.80.21[2]	(0.11-0.32)	0.25 R
9	MHRW	YCT	0-4	12.80.71	(0.56-0.81)	0.50 R
10	DMW[4]	YAT/Algae	0-4	31.50.91	(0.45-1.1)	1.0 R
Mean:				0.76		
CV(%):				40		

[1] Moderately hard tap water.
[2] Dose response curve limited.
[3] Hard well water.
[4] Ten percent diluted mineral water.
[5] Dechlorinated Lake Ontario tap water.
[6] Briones reservoir water.
R = Reproductive endpoint

MHRW = Moderately hard reconstituted water
HRW = Hard reconstituted water
WW = Well water
YCT = Yeast-Cerophyl-Trout chow
YAT = Yeast-Alfalfa-Trout chow
TF = Trout food suspension
Algae = *Selenastrum capricornutum*

CERIODAPHNIA (*Ceriodaphnia dubia*) (continued)

Seven-day Larval Reproduction Test Interlaboratory Precision Data

Table A-1-30. Interlaboratory precision data for *Ceriodaphnia dubia* summarized for eight materials, including reference toxicants and effluents [5].

	Test Material	Mean IC_{50}	CV %	Mean IC_{25}	CV %
1	Sodium chloride	1.34	29.9	1.00	34.3
2	Industrial	3.6	83.3	3.2	78.1
3	Sodium chloride	0.96	57.4	0.90	44.4
4	Pulp & Paper	60.0	28.3	47.3	27.0
5	Potassium dichromate	35.8	30.8	23.4	32.7
6	Pulp & Paper	70.2	7.5	55.7	12.2
7	Potassium dichromate	53.2	25.9	29.3	46.8
8	Industrial	69.8	37.0	67.3	36.7
n:			8		8
Mean:			37.5		39.0
Standard Deviation:			23.0		19.1

SELENASTRUM CAPRICORNUTUM

Growth Test

Single Laboratory Precision Data

Table A-1-31. Single laboratory precision of (*Selenastrum capricornutum*) growth test performed in using cadmium as the reference toxicant [2].

Test Number	EC_{50} (g/l)	Control Variation (%CV)
1	2.3	4.8
2	2.4	9.6
3	2.3	5.5
4	2.8	13.3
5	2.6	4.4
6	2.1	8.2
7	2.1	14.4
8	2.1	7.1
9	2.6	11.9
10	2.4	5.0
11	2.7	36.4*
12	2.4	77.8*
n=10		
Mean:	2.37	8.42
CV(%):	10.2	44.1

*Outlier values are excluded from mean because they fell outside of a QA control table for these reference toxicants.

Note: Sodium chloride concentrations were 1, 2, 4, 8, and 16 g/l in all tests.

Prepared by Dr. Cornelius Weber, EPA, Cincinatti, OH, March 15, 1991.

APPENDIX A-2

EFFLUENT VARIABILITY DATA

Table A-2-1. Percent mortality in 100 percent collected 1989 by grab method (personal communication W. Peltier, EPA, Athens, GA). Results indicate variability over 24 hours and differences in species sensitivity over time. Tests were conducted according to methods described in Reference 6.

Date	Time	% Mortality in 100% Effluent		
		P. promelas	*D. pulex*	*C. dubia*
3/07/89	1230	0	15	100
3/07/89	1830	0	85	100
3/08/89	0030	0	65	100
3/08/89	0630	0	30	80
3/20/89	1230	0	0	100
3/20/89	1830	0	100	100
3/21/89	0030	0	95	100
3/21/89	0630	0	70	100
6/19/89	1230	0	5	100
6/19/89	1830	0	40	100
6/20/89	0030	0	100	100
6/20/89	0630	0	100	100
7/25/89	1230	0	0	100
7/25/89	1830	0	100	100
7/26/89	0030	0	100	100
7/26/89	0630	0	55	100

Table A-2-2. LC_{50}s for a POTW effluent over 17 months. All tests were conducted using *Ceriodaphnia dubia* and tests were run for 48 hours. All tests were conducted according to the methods described in Reference 6. Dates with roman numeral notation mean that more than one sample was collected at different times over a short interval (1 to 2 days). (Data source: [8].)

Sample Date	48 hours LC_{50} (%)
08/23/86-I	71
03/09/87-I	71
05/02/87-I	35
05/03/87-I	65
05/04/87-I	71
05/23/87-I	71
05/23/87-II	71
05/23/87-III	61
06/27/87-I	36
06/27/87-II	41
06/27/87-III	18
09/22/87-I	71
12/18/87-I	87
01/05/88-I	68
01/05/88-II	63
Mean LC_{50} :	60.0
CV (%):	31.1
n:	15

Table A-2-3. LC_{50}s for a POTW effluent over 7 months. All tests were conducted using *Ceriodaphnia dubia* and tests were run for 48 hours. All tests were conducted according to the methods described in Reference 6. Dates with roman numeral notation mean that more than one sample was collected at different times over a short interval (1 to 2 days). (Data source: [8].)

Sample Date	48 hours LC_{50} (%)
10/06/87-I	71
10/06/87-II	71
10/06/87-III	71
10/30/87-I	87
12/03/87-I	61
12/03/87-II	35
01/12/88-I	61
01/13/88-I	58
02/03/88-IX	50
02/03/88-X	50
03/03/88-III	87
03/03/88-IV	81
03/23/88-I	25
03/23/88-II	35
04/28/88-I	50
04/28/88-II	55
05/17/88-I	61
05/17/88-II	35
Mean LC_{50} :	58.0
CV (%):	31.4
n:	18

Table A-2-4. LC_{50}s for a POTW effluent over 12 months. Tests were conducted using either *Ceriodaphnia dubia* or fathead minnows or both. *Ceriodaphnia* tests were conducted for 48 hours while fathead minnow tests were 96 hours. Both the 48-hour and 96-hour fathead minnow results are shown in order to evaluate how the LC_{50}s for the two species compare. All tests were conducted according to the methods described in Reference 6. Dates with roman numeral notation mean that more than one sample was collected at different times over a short interval (1 to 2 days). (Data source: [8].)

Sample Date	LC_{50} (%)		
	C. dubia	*P. promelas*	
	48 hours	48 hours	96 hours
03/16/88-I	62	35	25
06/09/88-I	18	–*	–*
09/08/88-I	68	>100	>100
10/04/88-I	61	–*	–*
10/04/88-II	63	–*	–*
12/14/88-I	70	58	34
12/14/88-II	17	60	41
02/17/89-I	35	61	39
02/17/89-II	35	61	37
03/22/89-I	35	81	64
03/22/89-II	47	61	40
Mean LC_{50}:	46	59.6	40.0
CV (%):	42	22.4	29.7
n:	11	7	7

* Data not available.

Note: Greater than (>) values were excluded from the mean LC_{50} calculation.

Table A-2-5. LC_{50}s for a POTW effluent over 4 months. Tests were conducted using either *Ceriodaphnia dubia* or fathead minnows or both. *Ceriodaphnia* tests were conducted for 48 hours while fathead minnow tests were 96 hours. Both the 48-hour and 96-hour fathead minnow results are shown in order to evaluate how the LC_{50}s for the two species compare. All tests were conducted according to the methods described in Reference 6. Dates with roman numeral notation mean that more than one sample was collected at different times over a short interval (1 to 2 days). (Data source: [8].)

Sample Date	LC_{50} (%)		
	C. dubia	*P. promelas*	
	48 hours	48 hours	96 hours
09/01/88-I	2.1	>100	77
11/15/88-I	92	67	37
11/16/88-I	61	>100	100
11/30/88-II	>100	>100	33
11/30/88-III	95	>100	>100
12/08/88-I	100	87	54
12/08/88-II	>100	87	53
12/13/88-I	90	>100	77
12/13/88-II	87	85	51
01/10/89-I	75	58	–*
01/10/89-II	61	41	–*
01/19/89-I	100	88	68
01/19/89-II	87	84	69
01/25/89-I	>100	87	64
01/25/89-II	95	85	56
01/31/89-I	90	70	60
01/31/89-II	63	70	60
Mean:	78.4	75.8	61.3
CV (%):	33.1	19.6	27.7
n:	14	12	14

*Not obtained.

Note: Greater than (>) values were not included in the mean LC_{50} calculation.

Table A-2-6. NOECs for a POTW effluent conducted 20 times over 1 year. All tests were conducted using *Champia parvula* according to methods described in Reference 1. All effluent samples were 24-hour composites collected post-chlorination. (personnal communication—Glen Thursby, SAIC, Narragansett, RI).

Test Date	% Effluent		
	IC_{25}	IC_{50}	NOEC
12/09/85	0.65	1.23	1.25
12/10/85	0.38	0.76	1.25
12/11/85	0.69	1.50	2.50
12/12/85	0.41	0.82	1.25
12/13/85	3.09	4.12	5.00
12/15/85	2.16	4.09	5.00
07/16/86	2.99	4.33	5.00
07/17/86	3.59	4.68	5.00
07/18/86	.44	4.76	5.00
07/19/86	.47	3.41	5.00
07/20/86	.24	3.98	7.50
07/21/86	.11	3.20	5.00
07/22/86	.84	5.19	5.00
9/09/86	.07	3.02	2.50
09/10/86	.17	4.13	7.50
09/11/86	.73	3.62	7.50
09/12/86	.57	1.89	1.25
09/14/86	.25	1.76	2.50
n:	18	18	18
Mean:	2.2	3.1	4.2
CV (%):	52.8	46.8	NA

Table A-2-8. NOECs for a POTW effluent over 1 year. All tests used *Mysidopsis bahia* according to methods described in Reference 1. All effluent samples were 24-hour composites collected post-chlorination. (Data source: ERL-Narragansett, RI.)

Test Date	% Effluent		
	IC_{25}	IC_{50}	NOEC
12/09 - 12/16/85	1.78(G)	2.93(G)	1.0
07/16 - 07/23/86	2.75(R)	6.3(S)	3.2
09/09 - 09/16/86	0.69(R)	20.1(S)	10.0
11/11 - 11/18/86	0.66(R)	0.99(R)	3.2
Mean:	1.47	7.58	4.4
CV (%):	68.0	113.8	NA
n:	4	4	4

R-Reproductive endpoint

S-Survival endpoint

G-Growth endpoint

Table A-2-7. NOECs for a POTW effluent over 1 year. All tests used *Arbacia punctulata* according to methods described in Reference 1. All effluent samples were 24-hour composites collected post-chlorination. (Data source: ERL-Narragansett, RI.)

Test Date	% Effluent		
	IC_{25}	IC_{50}	NOEC
12/09/85	1.09	1.71	0.65
12/10/85	1.41	2.84	0.65
12/11/85	0.75	1.09	0.65
12/12/85	3.28	4.06	1.30
12/13/85	2.65	5.32	2.50
12/14/85	1.11	1.60	0.65
12/15/85	1.29	1.84	0.65
07/16/86	0.17	0.35	<0.30
07/17/86	0.21	0.46	<0.30
07/18/86	0.63	0.86	<0.30
07/19/86	1.09	1.68	<0.30
07/20/86	0.54	1.13	<0.30
07/21/86	0.40	0.58	<0.30
07/22/86	0.40	0.56	<0.30
09/09/86	0.31	0.41	<0.30
09/11/86	0.47	0.79	<0.60
09/12/86	0.21	0.48	<0.20
09/13/86	3.30	5.42	1.30
09/14/86	0.23	0.35	<0.20
09/15/86	0.10	0.15	<0.20
11/11/86	0.27	0.54	1.30
11/13/86	0.88	1.48	0.30
11/14/86	0.82	1.61	0.60
11/15/86	0.34	0.56	<0.30
Mean:	0.91	1.49	0.95
CV (%):	101.3	96.9	NA
n:	24	24	11

Note: Less than (<) values were excluded from CV and mean NOEC calculations.

Table A-2-9. NOECs for a POTW effluent over 1 year. All tests used *Menidia beryllina* according to methods described in Reference 1. All effluent samples were 24-hour composites collected post-chlorination. (Data source: ERL-Narragansett, RI.)

Test Date	% Effluent		
	IC_{25}	IC_{50}	NOEC
12/09 - 12/16/85	15.4	21.3	10.0
07/16 - 07/23/86	15.2	21.0	10.0
09/09 - 09/16/86	14.2	20.1	10.0
11/11 - 11/18/86	NC	NC	10.0
Mean:	14.9	20.8	10.0
CV (%):	4.3	3.0	NA
n:	3	3	4

NC - Value is not calculable.

Table A-2-10. LC_{50}s for a refinery effluent over 14 months. Tests were conducted using either *Ceriodaphnia dubia* or fathead minnows *Pimephales promelas* or both. *Ceriodaphnia* tests were conducted for 48 hours while fathead minnow tests were 96 hours. Both the 48-hour and 96-hour fathead minnow results are shown in order to evaluate how the LC_{50}s for the two species compare. All tests were conducted according to the methods described in Reference 6. Dates with roman numeral notation mean that more than one sample was collected at different times over a short interval (1 to 2 days). (Data source: [8].)

Sample Date	LC_{50} (%)		
	C. dubia	*P. promelas*	
	48 hours	48 hours	96 hours
12/01/87	15	35	16
01/05/88	35	36	19
02/09/88-I	35	35	<12
02/09/88-I	35	35	<12
03/02/88-I	17	–*	–*
03/02/88-II	<12	38	–*
03/24/88-I	35	35	–*
05/06/88-I	35	–*	–*
07/14/88-I	55	61	25
07/28/88-I	37	35	22
07/28/88-II	28	31	<25
09/29/88-I	41	39	25
12/01/88-I	75	56	34
12/07/88-I	18	67	13
01/27/89-I	100	61	37
01/27/89-II	71	60	25
03/23/89-I	58	54	20
Mean LC_{50}:	43	45	24
CV (%):	54	28	32
n:	16	15	10

* Data not available.

Note: Less than values excluded from mean LC_{50} calculations.

Table A-2-11. LC_{50}s for a refinery effluent conducted over 6 months using fathead minnows (*Pimephales promelas*), *Ceriodaphnia dubia*, and mysids (*Mysidopsis bahia*), according to methods described in Reference 6. (Data source: Dorn, 1989.)

Test Date	LC_{50} (% Effluent)		
	C. dubia	*P. promelas*	*M. bahia*
1/24/86	–	26.6	–
2/26/86	65.0	24.5	–
3/05/86	50.9	–	–
3/12/86	39.3	36.6	–
3/19/86	66.5	40.5	–
4/02/86	65.4	32.8	–
4/09/86	69.8	34.2	–
4/17/86	71.2	37.2	–
4/23/86	71.8	35.9	38.0
5/14/86	82.0	38.7	35.8
5/28/86	65.4	22.0	–
6/11/86	82.0	–	24.7
Mean NOEC:	66.3	32.9	32.8
CV (%):	18.7	19.5	21.6
n:	11	10	3

Table A-2-12. NOECs for a refinery effluent conducted over 6 months using fathead minnows (*Pimephales promelas*), *Ceriodaphnia dubia*, and mysids (*Mysidopsis bahia*), according to methods described in References 1 and 2. (Data source: Dorn, 1989.)

Test Date	LC_{50} (% Effluent)		
	C. dubia	*P. promelas*	*M. bahia*
1/24/86	–	14.1	–
2/26/86	10.1	7.1	–
3/05/86	5.6	–	–
3/12/86	10.1	14.1	–
3/19/86	10.1	14.1	–
4/02/86	18.0	14.1	–
4/09/86	10.1	14.1	–
4/17/86	10.1	7.1	–
4/23/86	10.1	7.1	24.0
5/14/86	31.7	14.1	24.0
5/28/86	18.0	7.1	–
6/11/86	31.7	–	13.4
Mean NOEC:	15.1	11.3	20.5
CV (%):	59.6	31.9	29.8
n:	11	10	3

Table A-2-13. LC_{50}s for a manufacturing effluent conducted over 2 ears. All tests were conducted using *Daphnia magna* according to methods described in Reference 6. (Data source: [8].)

Test Date	LC_{50} (% Effluent)
1982 (1st quarter)	56
1982 (4th quarter)	90
1982 (4th quarter)	70
1983 (3rd quarter)	69
1983 (3rd quarter)	36
1983 (3rd quarter)	36
1983 (3rd quarter)	32
1983 (3rd quarter)	< 18
1983 (3rd quarter)	28
1983 (3rd quarter)	67
1983 (3rd quarter)	< 10
1983 (4th quarter)	46
1983 (4th quarter)	75
1983 (4th quarter)	78
1983 (4th quarter)	24
1983 (4th quarter)	26
1983 (4th quarter)	32
1983 (4th quarter)	19
Mean LC_{50}:	45.1 ± 24.3
CV (%):	53.9
n:	18

Note: Less than (<) values were excluded from the mean LC_{50} calculations.

Table A-2-14. LC_{50}s for a manufacturing effluent conducted over 8 years. All tests were conducted using *Pimephales promelas* according to methods described in Reference 6. (Data source: [8].)

Test Date	LC_{50} (% Effluent)
1979 (1st quarter)	72.0
1979 (1st quarter)	62.0
1979 (1st quarter)	52.0
1979 (3rd quarter)	39.0
1981 (2nd quarter)	64.0
1981 (4th quarter)	70.0
1982 (2nd quarter)	44.0
1982 (2nd quarter)	66.0
1985 (1st quarter)	59.6
1985 (4th quarter)	>100.0
1986 (2nd quarter)	49.2
1986 (2nd quarter)	63.8
1986 (2nd quarter)	50.0
1986 (3rd quarter)	75.7
1986 (3rd quarter)	80.0
1986 (3rd quarter)	79.0
1986 (4th quarter)	71.0
Mean LC_{50}:	64.5 ± 15.1
CV (%):	23.5
n:	17

Note: Greater than (>) values were excluded from the mean LC_{50} calculations.

Table A-2-15. LC_{50}s for a manufacturing effluent conducted over 5 years. All tests were conducted using *Pimephales promelas* according to methods described in Reference 6. (Data source: [8].)

Test Date	LC_{50} (% Effluent)
1980 (1st quarter)	18.0
1980 (2nd quarter)	11.0
1980 (3rd quarter)	32.0
1980 (4th quarter)	16.0
1981 (1st quarter)	32.0
1981 (2nd quarter)	23.0
1981 (3rd quarter)	17.0
1981 (4th quarter)	46.0
1982 (1st quarter)	9.0
1982 (2nd quarter)	32.0
1982 (3rd quarter)	28.0
1982 (4th quarter)	52.0
1983 (1st quarter)	34.0
1983 (2nd quarter)	33.0
1983 (3rd quarter)	20.0
1983 (4th quarter)	43.0
1984 (1st quarter)	45.0
1984 (2nd quarter)	19.0
1984 (3rd quarter)	61.0
1984 (4th quarter)	20.0
Mean LC_{50}:	29.6 ± 14.2
CV (%):	47.9
n:	20

Table A-2-16. LC_{50}s for a manufacturing effluent conducted over 5 years. All tests were conducted using *Daphnia magna* according to methods described in Reference 6. (Data source: [8].)

Test Date	LC_{50} (% Effluent)
1981 (2nd quarter)	100.0
1981 (3rd quarter)	>100.0
1982 (3rd quarter)	>100.0
1984 (4th quarter)	80.0
1985 (1st quarter)	75.0
1986 (1st quarter)	25.0
1986 (2nd quarter)	82.0
1987 (1st quarter)	75.0
1987 (1st quarter)	24.0
1987 (1st quarter)	>100.0
1987 (1st quarter)	>100.0
Mean LC_{50}:	65.9 ± 29.5
CV (%):	44.8
n:	11

Note: Greater than (>) values were excluded from the mean LC_{50} calculations.

Table A-2-17. LC_{50}s for a manufacturing effluent conducted over 7 years. All tests were conducted using *Daphnia pulex* according to methods described in Reference 6. (Data source: [8].)

Test Date	LC_{50} (% Effluent)
1980 (1st quarter)	55.0
1980 (4th quarter)	33.0
1981 (1st quarter)	60.0
1981 (1st quarter)	24.0
1981 (1st quarter)	>100.0
1981 (2nd quarter)	>100.0
1981 (3rd quarter)	>100.0
1982 (3rd quarter)	>100.0
1986 (3rd quarter)	>100.0
1986 (3rd quarter)	>100.0
Mean LC_{50}:	43.0 ± 17.3
CV (%):	40.2
n:	10

Note: Greater than (>) values were excluded from the mean LC_{50} calculations.

Table A-2-18. LC_{50}s for a manufacturing effluent conducted over 3 months. All tests were conducted using *Daphnia magna* according to methods described in Reference 6. (Data source: [8].)

Test Date	LC_{50} (% Effluent)
1982 (4th quarter)	>100.0
1982 (4th quarter)	81.0
1982 (4th quarter)	57.0
1982 (4th quarter)	61.0
1982 (4th quarter)	87.0
1982 (4th quarter)	90.0
1982 (4th quarter)	90.0
1982 (4th quarter)	>100.0
1982 (4th quarter)	>100.0
1982 (4th quarter)	54.0
1982 (4th quarter)	74.0
1982 (4th quarter)	>100.0
Mean LC_{50}:	74.3 ± 15.1
CV (%):	20.3
n:	12

Note: Greater than (>) values were excluded from the mean LC_{50} calculations.

APPENDIX A-3

ACUTE-TO-CHRONIC RATIO DATA

Table A-3-1. Example of Acute-to-Chronic Ratios

Oil Refinery[1]

	Fathead Minnow	*Ceriodaphnia*	*Mysids*
	1.89	9.09	1.58
	3.47	3.89	1.49
	2.60	6.58	1.84
	2.87	3.63	
	2.33	6.91	
	2.43	7.05	
	5.26	7.11	
	5.08	3.63	
	2.74	2.59	
	3.11	5.5	
	5.1	4.4	
		>10.0	
		> 7.1	
		> 3.3	
		> 2.0	
		> 3.0	
		2.8	
		5.4[2]	
Mean ACR:	3.3	5.3	1.64
n:	11	13	3
Range:	1.89-5.26	2.59->10.0	1.49-1.84

[1] Personal communication P. Dorn.

[2] Personal communication M.L.C. Ramos and E. Bertoletti (Sao Paulo, Brazil).

Note: Greater than (>) values were excluded from mean calculations.

Table A-3-2. Examples of Acute-to-Chronic Ratios

Chemical Manufacturers

	Fathead Minnow	*Ceriodaphnia*
	0.17	> 1.0
	0.07	> 1.0
	8.4	>10.0
	7.6	>50.0
	>3.0	> 2.9
	3.9	> 1.4
	>3.0	1.4
	1.8	1.4
		3.9
		2.8
		> 2.0
		> 4.0
		4.0
		1.4
		5.5
		1.8
		> 3.3
		> 3.3
		> 3.3
		1.4
		> 2.0
		5.5
		1.5
		1.4
		5.0
		>10.0
		> 2.0
		> 3.3
		3.1[1]
		14.0[1]
		4.3[1]
		2.5[1]
		1.8[1]
		5.5[1]
		5.4[1]
Mean ACR:	3.7	3.7[2]
n:	6	20
Range:	0.07 - 8.4	1.4 - >50

[1] Personal communication M.L.L.C. and E. Bertoletti (Sao Paulo, Brazil).

[2] Greater than (>) values were excluded from the mean calculation.

Table A-3-3. Example of Acute-to-Chronic Ratios

POTWs

	Fathead Minnow	*Ceriodaphnia*
	2.9	1.4
	6.1	5.5
	1.5	> 1.0
	13.0	> 1.0
	1.8	> 1.0
	2.6	1.8
	9.3	1.4
	> 1.0	2.0
	> 3.0	2.4
	5.3	3.0
	3.3	3.0
	5.4	5.5
	> 3.0	4.9
	3.0	> 2.0
		> 8.0
		> 2.0
		> 1.0
		> 3.3
		> 2.0
		4.4
		16.1
		> 4.0
		> 3.3
		>10.0
		2.6
		5.7
		2.8
		>10.0
		> 2.0
		1.4
		2.6
		> 3.3
		1.8
		5.5
		1.5
		> 3.3
		5.5
Mean ACR:	4.9	3.8*
n:	11	21
Range:	1.5 - 9.3	1.4 - 16.1

* Greater than (>) values were excluded from mean calculations.

APPENDIX A

REFERENCES

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6. Peltier, W., and C.I. Weber. 1985. Methods for Measuring the Acute Toxicity of Effluents to Aquatic Organisms, 3d ed. EPA 600/4-85/013. Office of Research and Development, Cincinnati, OH.

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8. Norberg-King, T.J. May 4, 1989. Memorandum: Additional Data for the Technical Support Document for Water Quality-based Toxics Control, Chapters 2 and 3. U.S. EPA, Environmental Research Laboratory, Duluth, MN, to M.A. Heber, U.S. EPA, Enforcement Division, Washington, DC.

APPENDIX B-1

SUMMARY OF CLEAN WATER ACT PROVISIONS

CLEAN WATER ACT (33 U.S.C. 1251 SEQ.)

Statutory Authority for the Use of Toxicity Testing and Whole Effluent Toxicity Limitations in NPDES Permits:

Over the years, a developmental process has occurred regarding the use of biological techniques to assess effluent discharges and set permit limits. The acquisition of data and the development of new techniques has contributed to the refinement of toxicity testing methods, thus enabling EPA to more fully act in accordance with its mandates to implement statutory requirements relating to the attainment and maintenance of water quality.

Toxicity testing of Whole Effluents and Whole Effluent toxicity limitations in National Pollutant Discharge Elimination System (NPDES) permits are essential components in the control of the discharge of toxic pollutants to the nation's waters. The use of toxicity testing and Whole Effluent toxicity limitation in the NPDES program is clearly authorized by the Clean Water Act (CWA).

Relevant provision of the CWA that provide the statutory authority for using toxicity testing and Whole Effluent toxicity limitations include the following:

- Section 101(a) sets forth not only the goal of restoring and maintaining the "chemical, physical, and biological integrity of the Nation's waters" (emphasis added), but also in Section 101(a)(3) the national policy of prohibiting the "discharge of toxic pollutants in toxic amounts" (emphasis added).
- As defined at Section 502(15), biological monitoring means that "determination of the effects on aquatic life, including accumulation of pollutants in tissue, in receiving waters due to the discharge of pollutants (A) by techniques and procedures, including sampling of organisms representative of appropriate levels of the food chain appropriate to the volume and the physical, chemical, and biological characteristics of the effluent, and (B) at appropriate frequencies and locations."
- Section 304(a)(8) requires EPA to develop information on methods, including biological monitoring and assessment methods, to establish and measure water quality criteria for toxic pollutants on bases other than pollutant by pollutant criteria.
- Section 303(c)(2)(B) states, "Nothing in this section shall be construed to limit or delay the use of effluent limitations or other permit conditions based on or involving biological monitoring or assessment methods..." (emphasis added).
- Section 302(a) provides the authority to establish water quality-based effluent limitations on discharges that interfere with the attainment or maintenance of that water quality which shall assure protection of public health, public water supplies, and the protection and propagation of a balance population of shellfish, fish and wildlife, among other uses. The effluent limitations established must reasonably be expected to contribute to attainment or maintenance of such water quality.
- Under Section 301(b)(1)(C) and Section 402, all NPDES permits must comply with any more stringent limitations necessary to meet applicable water quality standards, whether numeric or narrative.
- CWA Section 308(a) and Section 402 provide authority to EPA or the Sate to require that NPDES permittees/applicants use biological monitoring methods and provide chemical, toxicity, and instream biological data when necessary for the establishment of effluent limits, the detection of violations, or the assurance of compliance with water quality standards.
- Section 510 provides the authority for states to adopt or enforce any standards or effluent limitations for the discharge of pollutants only on the condition that such limitations or standards are no less stringent than those in effect under the CWA.

APPENDIX B-2

POLICIES FOR TOXICS CONTROL

[OW-FRL-2533-1]

Development of Water Quality-Based Permit Limitations for Toxic Pollutants; National Policy

AGENCY: Environmental Protection Agency (EPA).

ACTION: Notice.

SUMMARY: EPA has issued a national policy statement entitled "Policy for the Development of Water Quality-Based Permit Limitations for Toxic Pollutants." This policy addresses the technical approach for assessing and controlling the discharge of toxic substances to the Nation's waters through the National Pollutant Discharge Elimination System (NPDES) permit program.

FOR FURTHER INFORMATION CONTACT: Bruce Newton or Rick Brandes, Permits Division (EN-336), Office of Water Enforcement and Permits, U.S. Environmental Protection Agency, Washington, D.C. 20460, 426-7010.

SUPPLEMENTARY INFORMATION: As the water pollution control effort in the United States progresses and the "traditional" pollutants (oxygen demanding and eutrophying materials) become sufficiently treated to protect water quality, attention is shifting towards pollutants that impact water quality through toxic effects. Compared with the traditional pollutants, regulation of toxic pollutants is considerably more difficult. The difficulties include (1) the great number of toxic chemicals that may potentially be discharged to receiving waters and the difficulties in their analysis; (2) the changes in the toxic effects of a chemical resulting from reactions with the matrix of constituents in which it exists; and (3) the inability to predict the effects of exposure to combinations of chemicals.

To overcome some of these problems, EPA and the States have begun to use aquatic toxicity tests and various human health assessment techniques to complement chemical analyses of effluents and receiving water samples. Because these techniques or their application to effluent testing are new, EPA and the States have been cautious in their use. Based on EPA's evaluation of these techniques and the experiences of several States, EPA is now recommeding the use of biological techniques as a complement to chemical-specific analyses to assess effluent discharges and express permit limitations. EPA has issued these recommendations through a statement of policy and is developing a technical guidance document to help implement the policy.

The complete test of the national policy statement follows:

Policy for the Development of Water Quality-Based Permit Limitations for Toxic Pollutants

Statement of policy

To control pollutants beyond Best Available Technology Economically Achievable (BAT), secondary treatment, and other Clean Water Act technology-based requirements in order to meet water quality standards, the Environmental Protection Agency (EPA) will use an integrated strategy consisting of both biological and chemical methods to address toxic and nonconventional pollutants from industrial and municipal sources. Where State standards contain numerical criteria for toxic pollutants, National Pollutant Discharge Elimination System (NPDES) permits will contain limits as necessary to assure compliance with these standards. In addition to enforcing specific numerical criteria, EPA and the States will use biological techniques and available data on chemical effects to assess toxicity impacts and human health hazards based on the general standard of "no toxic materials in toxic amounts."

EPA, in its oversight role, will work with States to ensure that these techniques are used wherever appropriate. Under section 308 and section 402 of the Clean Water Act (the Act), EPA or the State may require NPDES permit applicants to provide chemical, toxicity, and instream biological data necessary to assure compliance with standards. Data requirements may be determined on a case-by-case basis in consultation with the State and the discharger.

Where violations of water quality standards are identified or projected, the State will be expected to develop water quality-based effluent limits for inclusion in any issued permit. Where necessary, EPA will develop these limits in consultation with the State. Where there is a significant likelihood of toxic effects to biota in the receiving water, EPA and the States may impose permit limits on effluent toxicity and may require an NPDES permittee to conduct a toxicity reduction evaluation. Where toxic effects are present but there is a significant likelihood that compliance with technology-based requirements will sufficiently mitigate the effects, EPA and the States may require chemical and toxicity testing after installation of treatment and may reopen the permit to incorporate additional limitations if needed to meet water quality standards. (Toxicity data, which are considered "new information" in accordance with 40 CFR 122.62(a)(2), could constitute cause for permit modification where necessary.)

To carry out this policy, EPA Regional Administrators will assure that each Region has the capability to conduct water quality assessments using both biological and chemical methods and provide technical assistance to the States.

Background

The Clean Water Act establishes two principal bases for effluent limitations. First, existing dischargers are required to meet technology-based effluent limitations that reflect the best controls available considering economic impacts. New source dischargers must meet the best demonstrated technology-based controls. Second, where necessary, additional requirements are imposed to assure attainment and maintenance of water quality standards established by the States and approved by EPA. In establishing or reviewing NPDES permit limits, EPA must ensure that the limits will result in the attainment of water quality standards and protect designated water uses, including an adequate margin of safety.

For toxic and nonconventional pollutants it may be difficult in some situations to determine attainment or nonattainment of water quality standards and set appropriate limits because of complex chemical interactions which affect the fate and ultimate impact of toxic substances in the receiving water. In many cases, all potentially toxic pollutants cannot be identified by chemical methods. In such situations, it is more feasible to examine the whole effluent toxicity and instream impacts using biological methods rather than attempt to identify all toxic pollutants, determine the effects of each pollutant individually, and then attempt to assess their collective effect.

The scientific basis for using biological techniques has advanced significantly in recent years. There is now a general consensus that an evaluation of effluent toxicity, when adequately related to instream conditions, can provide a valid indication of receiving system impacts. This information can be useful in developing regulatory requirements to protect aquatic life, especially when data from toxicity testing are analyzed in conjunction with chemical and ecological data. Generic human health effects methods, such as the Ames mutagenicity test, and structure-activity relationship techniques are showing promise and should be used to identify potential hazards. However, pollutant-specific techniques are the best way to evaluate and control human health hazards at this time.

Biological testing of effluents is an important aspect of the water quality-based approach for controlling toxic pollutants. Effluent toxicity data in conjunction with other data can be used to establish control priorities, assess compliance with State water quality standards, and set permit limitations to achieve those standards. All States have water quality standards which include narrative statements prohibiting the discharge of toxic materials in toxic amounts. A few State standards have criteria more specific than narrative criteria (for example, numerical criteria for specific toxic pollutants or a toxicity criterion to achieve designated uses). In States where numerical criteria are not specified, a judgment by the regulatory authority is required to set quantitative water quality-based limits on chemicals and effluent toxicity to assure

compliance with water quality standards.

Note.—Section 308 of the Act and corresponding State statutes authorize EPA and the States to require of the owner/operator any information reasonably required to determine permit limits and to determine compliance with standards or permit limits. Biological methods are specifically mentioned. Toxicity permit limits are authorized under Section 301 and 402 and supported by Section 101.

Application

This policy applies to EPA and the States. The policy addresses the use of chemical and biological methods for assuring that effluent discharges are regulated in accordance with Federal and State requirements. This policy was prepared, in part, in response to concerns raised by litigants to the Consolidated Permit Regulations (see FR 52079, November 18, 1982). Use of these methods for developing water quality standards and trend monitoring are discussed elsewhere (see 48 FR 51400, November 8, 1983 and *Basic Water Monitoring Program* EPA-440/9-76-025). This policy is part of EPA's water quality-based control program and does not supersede other regulations, policy, and guidance regarding use attainability, site-specific criteria modification, wasteload allocation, and water quality management.

Implementation

State Role

The control of toxic substances to protect water quality must be done in the context of the Federal-State partnership. EPA will work cooperatively with the States in identifying potential water quality standards violations, assembling relevant data, developing appropriate testing requirements, determining whether standards are being violated, and defining appropriate permit limits.

Note.—Under sections 303 and 401 of the Act, States are given primary responsibility for developing water quality standards and limits to meet those standards. EPA's role is to review the State standards and limits and develop revised or additional standards or limits as needed to meet the requirements of the Act.

Integration of Approaches

The type of testing that is most appropriate for assessing water quality impacts depends on the type of effluent and discharge situation. EPA recommends that an integrated approach, including both biological and chemical techniques, be used to assess and control water quality. The principal advantages of chemical-specific techniques are that (1) chemical analyses are usually less expensive than biological measurements in simple cases; (2) treatment systems are more easily designed to meet chemical requirements than toxicity requirements; and (3) human health hazards and bioaccumulative pollutants can best be addressed at this time by chemical-specific analysis. The principal advantages of biological techniques are that (1) the effects of complex discharges of many known and unknown constituents can be measured only by biological analyses; (2) bioavailability of pollutants after discharge is best measured by toxicity testing; and (3) pollutants for which there are inadequate chemical analytical methods or criteria can be addressed.

Pollutant-specific chemical analysis techniques should be used where discharges contain few, well-quantified pollutants and the interactions and effects of the pollutants are known. In addition, pollutant-specific techniques should be used where health hazards are a concern or bioaccumulation is suspected. Biological techniques should be used where effluents are complex or where the combined effects of multiple discharges are of concern. EPA recognizes that in many cases both types of analysis must be used.

Testing Requirements

Requirements for dischargers to collect information to assess attainment or nonattainment of State water quality standards will be imposed only in selected cases where the potential for nonattainment of water quality standards exists. Where water quality problems are suspected but there is a strong indication that complying with BCT/BAT will sufficiently mitigate the impacts, EPA recommends that applicable permits include testing requirements effective after BCT/BAT compliance and reopener clauses allowing reevaluation of the discharge.

The chemical, physical, and biological testing to be conducted by individual dischargers should be determined on a case-by-case basis. In making this determination, many factors must be considered, including the degree of impact, the complexity and variability of the discharge, the water body type and hydrology, the potential for human health impact, the amount of existing data, the level of certainty desired in the water quality assessment, other sources of pollutants, and the ecology of the receiving water. The specific data needed to measure the effect that a discharger has on the receiving water will vary according to these and other factors.

An assessment of water quality should, to the extent practicable, include other point and nonpoint sources of pollutants if the sources may be contributing to the impacts. Special attention should be focused on Publicly Owned Treatment Works (POTW's) with a significant contribution of industrial waste-water. Recent studies have indicated that such POTW's are often significant sources of toxic materials. When developing monitoring requirements, interpreting data, and determining limitations, permit engineers should work closely with water quality staff at both the State and Federal levels.

A discharger may be required to provide data upon request under section 308 of the Act, or such a requirement may be included in its NPDES permit. The development of a final assessment may require several iterations of data collection. Where potential problems are identified, EPA or the State may require monitoring to determine whether more information is needed concerning water quality effects.

Use of Data

Chemical, physical, and biological data will be used to determine whether, after compliance with BCT/BAT requirements, there will be violations of State water quality standards resulting from the discharge(s). The narrative prohibition of toxic materials in toxic amounts contained in all State standards is the basis for this determination taking into account the designated use for the receiving water. For example, discharges to waters classified for propagation of cold water fish should be evaluated in relation to acute and chronic effects on cold water organisms, potential spawning areas, and effluent dispersion.

Setting Permit Limitations

Where violations of water quality standards exist or are projected, the State and EPA will determine pollution control requirements that will attain the receiving water designated use. Where effluent toxicity is an appropriate control parameter, permit limits on effluent toxicity should be developed. In such cases, EPA may also require a permittee to conduct a toxicity reduction evaluation. A toxicity reduction evaluation is an investigation conducted within a plant or municipal system to isolate the sources of effluent toxicity, specific causative pollutants if possible, and determine the effectiveness of pollution control options in reducing the effluent toxicity. If specific chemicals are identified as the cause of the water

quality standards violation, these individual pollutants should be limited. If a toxicity reduction evaluation demonstrates that limiting an indicator parameter will ensure attainment of the water quality-based effluent toxicity requirement, limits on the indicator parameter should be considered in lieu of limits on effluent toxicity. Such indicator limits are not limits on causative pollutants but limits demonstrated to result in a specific toxicity reduction.

Monitoring

Where pollution control requirements are expressed in terms of a chemical or toxicological parameter, compliance monitoring must include monitoring for that parameter. If an indicator parameter is used based on the results of a toxicity reduction evaluation, periodic toxicity testing may be required to confirm the adequacy of the indicator. Where biological data were used to develop a water quality assessment or where the potential for water quality standards violations exist, biological monitoring (including instream monitoring) may be required to ensure continuing compliance with water quality standards.

EPA believes that the intelligent application of an integrated strategy using both biological and chemical techniques for water quality assessment will facilitate the development of appropriate controls and the attainment of water quality standards. EPA looks forward to working with the States in a spirit of cooperation to further refine these techniques.

Policy signed February 3, 1984 by Jack E. Ravan, Assistant administrator for Water.

Dated: February 16, 1984.

Jack E. Ravan,

Assistant Administrator for Water

[FR Doc. 84-6445 Filed 3-8-84; 8:45 am]

BILLING CODE 6560-50-M

Appendix B-3

Regulations for Toxics Control

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

AUG 21 1989

OFFICE OF WATER

MEMORANDUM

SUBJECT: New Regulations Governing Water Quality-Based Permitting in the NPDES Permitting Program

FROM: James R. Elder, Director
Office of Water Enforcement and Permits

TO: Water Management Division Directors
Regions I - X

On May 26, 1989 the Deputy Administrator signed regulations that implement section 304(l) of the CWA. The regulations became effective upon his signature and were published in the Federal Register on June 2, 1989 (54 Fed. Reg. 23868). This rulemaking also clarified and reinforced EPA's existing regulations governing water quality-based permitting. The purpose of this memorandum is to describe the significance of these clarifications to EPA's baseline water quality-based permitting regulations.

CHANGES TO 40 C.F.R. PART 122

Section 122.44 covers the establishment of limitations, standards, and other permit conditions in NPDES permits. Subsection (d) covers water quality standards and state requirements. Prior to the promulgation of these new regulations the subsection was non-specific, requiring only that NPDES permits be issued with requirements more stringent than promulgated effluent guidelines as necessary to achieve water quality standards. We have strengthened considerably the requirements of §122.44(d). The new language is very specific and requires water quality-based permit limits for specific toxicants and whole effluent toxicity where necessary to achieve state water quality standards. The following is a section-by-section description of the new requirements.

1. §122.44(d)(1)(i)

This new paragraph provides that all pollutants that cause, have the reasonable potential to cause, or contribute to an excursion above a water quality standard must be controlled to achieve all applicable water quality standards, including narrative water quality criteria. We added this paragraph so that our regulations would reflect EPA's approach to water quality-based permitting.

2. §122.44(d)(1)(ii)

Subparagraph (ii) of the new regulations requires the states to use valid procedures to determine whether a discharge causes, has the reasonable potential to cause, or contributes to an excursion above a water quality standard. These procedures must account for existing controls on point and nonpoint sources of pollution, the variability of the pollutant in the effluent, the sensitivity of the test species (when evaluating whole effluent toxicity), and where allowed by state water quality standards, the dilution of the effluent in the receiving water. The purpose of this new regulation is to require the states to use technically valid procedures when determining whether a discharge is exceeding a numeric or narrative water quality criterion. When the permitting authority determines, using these procedures, that a discharge causes, has the reasonable potential to cause, or contributes to an excursion above a water quality criterion, that permit must include one or more water quality-based effluent limits established under subparagraphs (iii) - (vi). Subparagraphs (iii) and (iv) deal with water quality-based limitations where the state has numeric water quality criteria; subparagraphs (v) and (vi) deal with a state's narrative water quaity criteria.

3. §122.44(d)(1)(iii)

This paragraph requires NPDES permits to include effluent limitations for every individual pollutant that causes, has the reasonable potential to cause, or contributes to an excursion above a numeric water quality criterion. Thus, when a state has adopted a water quality criterion for an individual pollutant and the state determines under subparagraph (ii) that an effluent limit is necessary, subparagraph (iii) requires an effluent limit for that individual pollutant.

4. §122.44(d)(1)(iv)

Subparagraph (iv) requires effluent limitations on whole effluent toxicity when a discharge is exceeding a state numeric criteria for whole effluent toxicity. This paragraph is applied

where a state has adopted a numeric criterion for whole effluent toxicity (e.g. a discharge must achieve an LC50 of 50% or higher).

5. §122.44(d)(1)(v)

When the state determines that a discharge exceeds a narrative water quality criterion, subparagraph (v) requires effluent limitations on whole effluent toxicity. If, however, chemical-specific effluent limitations are demonstrated to be sufficient to achieve all applicable water quality standards, then subparagraph (v) allows the permitting authority to forego a limitation on whole effluent toxicity. It may be necessary for you to work with an individual state to ensure that they have the necessary protocols to support whole effluent toxicity limits.

6. §122.44(d)(1)(vi)

Where an actual or projected excursion above a narrative water quality criterion is attributable to a particular pollutant, but the state has not adopted a water quality criterion for the pollutant of concern, this new regulation requires water quality-based effluent limitations which will control the pollutant of concern. Subparagraph (vi) establishes three options for developing such limitations. Under these options, a state may: 1) calculate a numeric criterion for the pollutant; 2) use EPA's water quality criterion for the pollutant of concern; or 3) establish effluent limits on an indicator parameter.

By an indicator parameter we mean a pollutant or pollutant parameter for which control of this indicator will result in control of the pollutant of concern. For example, it may be shown that a more stringent control on total suspended solids will reduce discharge of a metal to a level which achieves the water quality standard. Subparagraph (vi) also sets out four provisions which must be met to allow the use of an indicator:

1) The permit must identify which pollutants are intended to be controlled by a limit on the indicator parameter.

2) The fact sheet must set forth the basis for the limit, including a finding that compliance with the limit will result in controls on the pollutant of concern that are sufficient to achieve the water quality standard.

3) The permit must require all monitoring necessary to show continued compliance with water quality standards.

4) The permit must contain a reopener clause allowing for changes in the permit as needed to achieve water quality standards.

A state's narrative water quality criterion serves as the legal basis for establishing such effluent limits.

7. §122.44(d)(1)(vii)

Subparagraph (vii) requires that all water quality-based effluent limitations adhere to two fundamental principles: 1) the effluent limitations must be derived from and comply with all applicable water quality standards; and 2) the effluent limitations are consistent with the assumptions and requirements of an applicable wasteload allocation (WLA) if a WLA is available for the pollutant.

CHANGES TO 40 C.F.R. PART 123

We amended the permit objection regulations at 40 C.F.R. §123.44 to reflect the amendments to §122.44(d)(1). Under §123.44(c)(8) EPA may now object to a state-issued permit if the permit does not meet the requirements of §122.44(d)(1). Thus, if a state does not use technically sound procedures for evaluating the need for water quality-based effluent limitations then EPA may object to the permit. Also, if a state fails to include chemical-specific or whole effluent toxicity limitations in a permit as required by paragraphs (iii) - (vi), then EPA may object to the permit. Finally, if a water quality based effluent limitation is not derived according to the principles in subparagraph (vii) then EPA may object to the permit.

If a state's surface water toxics control program is not adequate to implement these requirements, the new regulations at 40 C.F.R. §123.63 expand EPA's criteria for withdrawing a state's NPDES program. Under the new regulations (§123.63(a)(5)), EPA may withdraw a state's NPDES program if the state fails to develop an adequate regulatory program for developing water quality-based effluent limitations. In November 1987, Headquarters provided procedural and technical guidance to the Regions on conducting state toxics control program reviews to assess the adequacy of state water quality-based control programs. This guidance sets guidelines for assessing whether or not a state's regulations, policies, and technical guidance constitute an adequate program.

The significance of these additions to Part 123 is twofold. First, the Regions must issue permits which comply with these requirements and must work with the NPDES states to insure they also issue permits which comply with these regulations. If the states do not issue permits consistent with Part 123, the Region must veto insufficient permits and work with the states to

reissue the permits with water quality-based effluent limitations which achieve water quality standards. The specific requirements in §122.44(d) are structured in a way that implements EPA's Policy for the Development of Water Quality-Based Permit Limitations for Toxic Pollutants (49 Fed. Reg. 9016 March 9, 1984). Second, Regions will need to look closely at each state's surface water toxics control program to ensure that the state's regulations, policies and technical guidance result in the consistent and comprehensive development of NPDES permits which achieve the state's water quality standards. Where this does not occur, each Region should work with the state to rectify the problem and, after these negotiations and where necessary, investigate the possibility of withdrawing the NPDES program.

I hope these regulations will assist you in developing water quality-based effluent limits and will support your efforts to implement surface water toxics control programs. If you have questions or need more information about these requirements, please contact Cynthia Dougherty at FTS 475-9545 or have your staff contact Rick Brandes at FTS 475-9537.

cc: Permits Branch Chiefs, Regions I - X
Martha Prothro, OWRS

ENVIRONMENTAL PROTECTION AGENCY

[FRL-3557-6]

40 CFR Parts 122, 123 and 130

National Pollutant Discharge Elimination System; Surface Water Toxics Control Program

AGENCY: Environmental Protection Agency.

ACTION: Final Rule.

SUMMARY: Today's action amends Parts 122, 123, and 130 of EPA's regulations. The regulations clarify EPA's surface water toxics control program, and incorporate section 308(a) of the Water Quality Act of 1987 into EPA's toxics control program. Section 308(a) of the Water Quality Act added section 304(l) to the Clean Water Act (hereafter referred to as section 304(l)). Section 304(l) requires the states to identify those waters that are adversely affected by toxic, conventional, and nonconventional pollutants, and requires the states to prepare individual control strategies that will control point source discharges of toxic pollutants. The states must submit lists of waters and individual control strategies to EPA for review, and if EPA disapproves a state's decision with respect to a list or an individual control strategy, then EPA must implement the requirements of section 304(l) in cooperation with the state. EPA and the states must accomplish the tasks in section 304(l) according to an ambitious series of deadlines. Today's regulations will strengthen State and Federal controls over discharges to toxic pollutants, and will assist EPA and the states in satisfying the requirements of section 304(l) of the CWA.

EFFECTIVE DATE: These regulations shall be effective on May 26, 1989 at 1:00 p.m. Eastern Daylight Savings Time. In accordance with 40 CFR 23.2, EPA hereby specifies that these regulations shall be considered final agency action for purposes of judicial review at 1:00 p.m. Eastern Daylight Savings Time on May 26, 1989.

FOR FURTHER INFORMATION CONTACT: Paul Connor, Program Development Branch, Office of Water Enforcement and Permits, (EN-336), U.S. Environmental Protection Agency, 401 M Street, SW., Washington, DC 20460, (202) 475-9537, or Judith Leckrone, Assessment and Watershed Protection Division, Office of Water Regulations and Standards, (WH-553), U.S. Environmental Protection Agency, 401 M Street SW., Washington, DC 20460, (202) 382-7056. The Public record for this regulation is available at the EPA library, M2904, U.S. Environmental Protection Agency, 401 M Street SW., Washington, DC 20460.

PART 122—EPA ADMINISTERED PERMIT PROGRAMS: THE NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM

1. The authority citation for Part 122 continues to read as follows:

Authority: The Clean Water Act, 33 U.S.C. 1251 *et seq.*

2. Section 122.2 is amended by adding in alphabetical order a new definition as follows:

§ 122.2 Definitions.

* * * * *

Whole effluent toxicity means the aggregate toxic effect of an effluent measured directly by a toxicity test.

3. Paragraph (d)(1) of § 122.44 is revised to read as follows:

§ 122.44 Establishing limitations, standards, and other permit conditions (applicable to State NPDES programs, see § 123.25).

* * * * *

(d) * * *

(1) Achieve water quality standards established under section 303 of the CWA, including State narrative criteria for water quality.

(i) Limitations must control all pollutants or pollutant parameters (either conventional, nonconventional, or toxic pollutants) which the Director determines are or may be discharged at a level which will cause, have the reasonable potential to cause, or contribute to an excursion above any State water quality standard, including State narrative criteria for water quality.

(ii) When determining whether a discharge causes, has the reasonable potential to cause, or contributes to an in-stream excursion above a narrative or numeric criteria within a State water quality standard, the permitting authority shall use procedures which account for existing controls on point and nonpoint sources of pollution, the variability of the pollutant or pollutant parameter in the effluent, the sensitivity of the species to toxicity testing (when evaluating whole effluent toxicity), and where appropriate, the dilution of the effluent in the receiving water.

(iii) When the permitting authority determines, using the procedures in paragraph (d)(1)(ii) of this section, that a discharge causes, has the reasonable potential to cause, or contributes to an in-stream excursion above the allowable ambient concentration of a State numeric criteria within a State water quality standard for an individual pollutant, the permit must contain effluent limits for that pollutant.

(iv) When the permitting authority determines, using the procedures in paragraph (d)(1)(ii) of this section, that a discharge causes, has the reasonable potential to cause, or contributes to an in-stream excursion above the numeric criterion for whole effluent toxicity, the permit must contain effluent limits for whole effluent toxicity.

(v) Except as provided in this subparagraph, when the permitting authority determines, using the procedures in paragraph (d)(1)(ii) of this section, toxicity testing data, or other information, that a discharge causes, has the reasonable potential to cause, or contributes to an in-stream excursion above a narrative criterion within an applicable State water quality standard, the permit must contain effluent limits for whole effluent toxicity. Limits on whole effluent toxicity are not necessary where the permitting authority demonstrates in the fact sheet or statement of basis of the NPDES permit, using the procedures in paragraph (d)(1)(ii) of this section, that chemical-specific limits for the effluent are sufficient to attain and maintain applicable numeric and narrative State water quality standards.

(vi) Where a State has not established a water quality criterion for a specific chemical pollutant that is present in an effluent at a concentration that causes, has the reasonable potential to cause, or contributes to an excursion above a narrative criterion within an applicable State water quality standard, the permitting authority must establish effluent limits using one or more of the following options:

(A) Establish effluent limits using a calculated numeric water quality criterion for the pollutant which the permitting authority demonstrates will attain and maintain applicable narrative water quality criteria and will fully protect the designated use. Such a criterion may be derived using a proposed State criterion, or an explicit State policy or regulation interpreting its narrative water quality criterion, supplemented with other relevant information which may include: EPA's Water Quality Standards Handbook, October 1983, risk assessment data, exposure data, information about the pollutant from the Food and Drug Administration, and current EPA criteria documents; or

(B) Establish effluent limits on a case-by-case basis, using EPA's water quality criteria, published under section 307(a) of the CWA, supplemented where necessary by other relevant information; or

(C) Establish effluent limitations on an indicator parameter for the pollutant of concern, provided:

(*1*) The permit identifies which pollutants are intended to be controlled by the use of the effluent limitation;

(*2*) The fact sheet required by § 124.56 sets forth the basis for the limit, including a finding that compliance with the effluent limit on the indicator parameter will result in controls on the pollutant of concern which are sufficient to attain and maintain applicable water quality standards;

(*3*) The permit requires all effluent and ambient monitoring necessary to show that during the term of the permit the limit on the indicator parameter continues to attain and maintain applicable water quality standards; and

(*4*) The permit contains a reopener clause allowing the permitting authority to modify or revoke and reissue the permit if the limits on the indicator parameter no longer attain and maintain applicable water quality standards.

(vii) When developing water quality-based effluent limits under this paragraph the permitting authority shall ensure that:

(A) The level of water quality to be achieved by limits on point sources established under this paragraph is derived from, and complies with all applicable water quality standards; and

(B) Effluent limits developed to protect a narrative water quality criterion, a numeric water quality criterion, or both, are consistent with the assumptions and requirements of any available wasteload allocation for the

discharge prepared by the State and approved by EPA pursuant to 40 CFR 130.7.

* * * * *

4. The title of paragraph (e) of § 122.44 is revised to read as follows:

* * * * *

(e) *Technology-based controls for toxic pollutants.* * * *

PART 123—STATE PROGRAM REQUIREMENTS

1. The authority citation for Part 123 continues to read as follows:

Authority: Clean Water Act, 33 U.S.C. 1251 *et seq.*

2. Section 123.44 is amended by adding paragraph (c)(8) to read as follows:

§ 123.44 EPA review of and objections to State permits.

* * * * *

(c) * * *

(8) The effluent limits of a permit fail to satisfy the requirements of 40 CFR 122.44(d).

* * * * *

3. In § 123.46 paragraph (a) is revised and paragraphs (c), (d), (e) and (f) are added, as follows:

§ 123.46 Individual control strategies.

(a) Not later than February 4, 1989, each State shall submit to the Regional Administrator for review, approval, and implementation an individual control strategy for each point source identified by the State pursuant to section 304(l)(1)(C) of the Act which will produce a reduction in the discharge of toxic pollutants from the point sources identified under section 304(l)(1)(C) through the establishment of effluent limitations under section 402 of the CWA and water quality standards under section 303(c)(2)(B) of the CWA, which reduction is sufficient, in combination with existing controls on point and nonpoint sources of pollution, to achieve the applicable water quality standard as soon as possible, but not later than three years after the date of the establishment of such strategy.

* * * * *

(c) For the purposes of this section the term individual control strategy, as set forth in section 304(l) of the CWA, means a final NPDES permit with supporting documentation showing that effluent limits are consistent with an approved wasteload allocation, or other documentation which shows that applicable water quality standards will be met not later than three years after the individual control strategy is established. Where a State is unable to issue a final permit on or before February 4, 1989, an individual control strategy may be a draft permit with an attached schedule (provided the State meets the schedule for issuing the final permit) indicating that the permit will be issued on or before February 4, 1990. If a point source is subject to section 304(l)(1)(C) of the CWA and is also subject to an on-site response action under sections 104 or 106 of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), (42 U.S.C. 9601 et seq.), an individual control strategy may be the decision document (which incorporates the applicable or relevant and appropriate requirements under the CWA) prepared under sections 104 or 106 of CERCLA to address the release or threatened release of hazardous substances to the environment.

(d) A petition submitted pursuant to section 304(l)(3) of the CWA must be submitted to the appropriate Regional Administrator. Petitions must identify a waterbody in sufficient detail so that EPA is able to determine the location and boundaries of the waterbody. The petition must also identify the list or lists for which the waterbody qualifies, and the petition must explain why the waterbody satisfies the criteria for listing under CWA section 304(l) and 40 CFR 130.10(d)(6).

(e) If the Regional Administrator disapproves one or more individual control strategies, or if a State fails to provide adequate public notice and an opportunity to comment on the ICSs, then, not later than June 4, 1989, the Regional Administrator shall give a notice of approval or disapproval of the individual control strategies submitted by each State pursuant to this section as follows:

(1) The notice of approval or disapproval given under this paragraph shall include the following:

(i) The name and address of the EPA office that reviews the State's submittals.

(ii) A brief description of the section 304(l) process.

(iii) A list of ICSs disapproved under this section and a finding that the ICSs will not meet all applicable review criteria under this section and section 304(l) of the CWA.

(iv) If the Regional Administrator determines that a State did not provide adequate public notice and an opportunity to comment on the waters, point sources, or ICSs prepared pursuant to section 304(l), or if the Regional Administrator chooses to exercise his or her discretion, a list of the ICSs approved under this section, and a finding that the ICSs satisfy all applicable review criteria.

(v) The location where interested persons may examine EPA's records of *approval and disapproval.*

(vi) The name, address, and telephone number of the person at the Regional Office from whom interested persons may obtain more information.

(vii) Notice that written petitions or comments are due within 120 days.

(2) The Regional Administrator shall provide the notice of approval or disapproval given under this paragraph to the appropriate State Director. The Regional Administrator shall publish a notice of availability, in a daily or weekly newspaper with State-wide *circulation or in the Federal Register, for* the notice of approval or disapproval. The Regional Administrator shall also provide written notice to each discharger identified under section 304(l)(1)(C), that EPA has listed the discharger under section 304(l)(1)(C).

(3) As soon as practicable but not later than June 4, 1990, the Regional Offices shall issue a response to petitions or comments received under section 304(l). The response to comments shall be given in the same manner as the notice described in paragraph (e) of this section except for the following changes:

(i) The lists of ICSs reflecting any changes made pursuant to comments or petitions received.

(ii) A brief description of the subsequent steps in the section 304(l) process.

(f) EPA shall review, and approve or disapprove, the individual control strategies prepared under section 304(l) of the CWA, using the applicable criteria set forth in section 304(l) of the CWA, and in 40 CFR Part 122, including § 122.44(d). At any time after the Regional Administrator disapproves an ICS (or conditionally aproves a draft permit as an ICS), the Regional Office may submit a written notification to the State that the Regional Office intends to issue the ICS. Upon mailing the notification, and notwithstanding any other regulation, exclusive authority to issue the permit passes to EPA.

4. Section 123.63 is amended by adding paragraph (a)(5) to read as follows:

§ 123.63 Criteria for withdrawal of state programs.

(a) * * *

(5) Where the State fails to develop an adequate regulatory program for developing water quality-based effluent limits in NPDES permits.

APPENDIX B-4

WHOLE EFFLUENT TOXICITY PERMITTING PRINCIPLES AND ENFORCEMENT STRATEGY

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460
January 25, 1989

OFFICE OF WATER

MEMORANDUM

SUBJECT: Whole Effluent Toxicity Basic Permitting Principles and Enforcement Strategy

Rebecca Hanmer

FROM: Rebecca W. Hanmer, Acting Assistant Administrator
Office of Water

TO: Regional Administrators

Since the issuance of the "Policy for the Development of Water Quality-based Permit Limitations for Toxic Pollutants" in March of 1984, the Agency has been moving forward to provide technical documentation to support the integrated approach of using both chemical and biological methods to ensure the protection of water quality. The Technical Support Document for Water Quality-based Toxics Control (September, 1985) and the Permit Writer's Guide to Water Quality-based Permitting for Toxic Pollutants (July, 1987) have been instrumental in the initial implementation of the Policy. The Policy and supporting documents, however, did not result in consistent approaches to permitting and enforcement of toxicity controls nationally. When the 1984 Policy was issued, the Agency did not have a great deal of experience in the use of whole effluent toxicity limitations and testing to ensure protection of water quality. We now have more than four years of experience and are ready to effectively use this experience in order to improve national consistency in permitting and enforcement.

In order to increase consistency in water quality-based toxicity permitting, I am issuing the attached Basic Permitting Principles for Whole Effluent Toxicity (Attachment 1) as a standard with which water quality-based permits should conform. A workgroup of Regional and State permitting, enforcement, and legal representatives developed these minimum acceptable requirements for toxicity permitting based upon national experience. These principles are consistent with the toxics control approach addressed in the proposed Section 304(l) regulation. Regions should use these principles when reviewing draft State permits. If the final Section 304(l) regulations include changes in this area, we will update these principles as necessary. Expanded guidance on the use of these principles will be sent out shortly by James Elder, Director of the Office of

Water Enforcement and Permits. This expanded guidance will include sample permit language and permitting/enforcement scenarios.

Concurrent with this issuance of the Basic Permitting Principles, I am issuing the Compliance Monitoring and Enforcement Strategy for Toxics Control (Attachment 2). This Strategy was developed by a workgroup of Regional and State enforcement representatives and has undergone an extensive comment period. The Strategy presents the Agency's position on the integration of toxicity control into the existing National Pollutant Discharge Elimination System (NPDES) compliance and enforcement program. It delineates the responsibilities of the permitted community and the regulatory authority. The Strategy describes our current efforts in compliance tracking and quality assurance of self-monitoring data from the permittees. It defines criteria for review and reporting of toxicity violations and describes the types of enforcement options available for the resolution of permit violations.

In order to assist you in the management of whole effluent toxicity permitting, the items discussed above will join the 1984 Policy as Appendices to the revised Technical Support Document for Water Quality-based Toxics Control. To summarize, these materials are the Basic Permitting Principles, sample permit language, the concepts illustrated through the permitting and enforcement scenarios, and the Enforcement Strategy. I hope these additions will provide the needed framework to integrate the control of toxicity into the overall NPDES permitting program.

I encourage you and your staff to discuss these documents and the 1984 Policy with your States to further their efforts in the implementation of EPA's toxics control initiative.

If you have any questions on the attached materials, please contact James Elder, Director of the Office of Water Enforcement and Permits, at (FTS/202) 475-8488.

Attachments

cc: ASWIPCA
Water Management Division Directors

BASIC PERMITTING PRINCIPLES FOR WHOLE EFFLUENT TOXICITY

1. Permits must be protective of water quality.

   a. At a minimum, all major permits and minors of concern must be evaluated for potential or known toxicity (chronic or acute if more limiting).

   b. Final whole effluent toxicity limits must be included in permits where necessary to ensure that State Water Quality Standards are met. These limits must properly account for effluent variability, available dilution, and species sensitivity.

2. Permits must be written to avoid ambiguity and ensure enforceability.

   a. Whole effluent toxicity limits must appear in Part I of the permit with other effluent limitations.

   b. Permits contain generic re-opener clauses which are sufficient to provide permitting authorities the means to re-open, modify, or reissue the permit where necessary. Re-opener clauses covering effluent toxicity will not be included in the Special Conditions section of the permit where they imply that limit revision will occur based on permittee inability to meet the limit. Only schedules or other special requirements will be added to the permit.

   c. If the permit includes provisions to increase monitoring frequency subsequent to a violation, it must be clear that the additional tests only determine the continued compliance status with the limit; they are <u>not</u> to verify the original test results.

   d. Toxicity testing species and protocols will be accurately referenced/cited in the permit.

3. Where not in compliance with a whole effluent toxicity limit, permittees must be compelled to come into compliance with the limit as soon as possible.

   a. Compliance dates must be specified.

   b. Permits can contain requirements for corrective actions, such as Toxicity Reduction Evaluations (TREs), but corrective actions cannot be delayed pending EPA/State approval of a plan for the corrective actions, unless State regulations require prior approval. Automatic corrective actions subsequent to the effective date of a final whole-effluent toxicity limit will not be included in the permit.

ATTACHMENT 1

Explanation of the Basic Permitting Principles

The Basic Permitting Principles present the minimum acceptable requirements for whole-effluent toxicity permitting. They begin with a statement of the goal of whole-effluent toxicity limitations and requirements: the protection of water quality as established through State numeric and narrative Water Quality Standards. The first principle builds on the Technical Support Document procedures and the draft Section 304(l) rule requirements for determining potential to violate Water Quality Standards. It requires the same factors be considered in setting whole-effluent toxicity based permits limits as are used to determine potential Water Quality Standards violations. It defines the universe of permittees that should be evaluated for potential violation of Water Quality Standards, and therefore possible whole-effluent limits, as all majors and minors of concern.

The second permitting principle provides basic guidelines for avoiding ambiguities that may surface in permits. Whole-effluent toxicity limits should be listed in Part I of the permit and should be derived and expressed in the same manner as any other water quality-based limitations (i.e., Maximum Daily and Average Monthly limits as required by Section 122.45(d)).

In addition, special re-opener clauses are generally not necessary, and may mistakenly imply that permits may be re-opened to revise whole-effluent limits that are violated. This is not to imply that special re-opener clauses are never appropriate. They may be appropriate in permits issued to facilities that currently have no known potential to violate a Water Quality Standard; in these cases, the permitting authority may wish to stress its authority to re-open the permit to add a whole-effluent limit in the event monitoring detects toxicity.

Several permittees have mistakenly proposed to conduct additional monitoring subsequent to a violation to "verify" their results. It is not possible to verify results with a subsequent test whether a new sample or a split-sample which has been stored (and therefore contains fewer volatiles) is used. For this reason, any additional monitoring required in response to a violation must be clearly identified as establishing continuing compliance status, not verification of the original violation.

The second principle also deals with the specification of test species and protocol. Clearly setting out the requirements for toxicity testing and analysis is best done by accurately referencing EPA's most recent test methods and approved equivalent State methods. In this way, requirements which have been published can be required in full, and further advances in technology and science may be incorporated without lengthy permit revisions.

The third and final permitting principle reinforces the responsibility of the permittee to seek timely compliance with the requirements of its NPDES permit. Once corrective actions have been identified in a TRE, permittees cannot be allowed to delay corrective actions necessary to comply with water quality-based whole effluent toxicity limitations pending Agency review and approval of voluminous reports or plans. Any delay on the part of the permittee or its contractors/agents is the responsibility of the permittee.

The final principle was written in recognition of the fact that a full-blown TRE may not be necessary to return a permittee to compliance in all cases, particularly subsequent to an initial TRE. As a permittee gains experience and knowledge of the operational influences on toxicity, TREs will become less important in the day to day control of toxicity and will only be required when necessary on a case-specific basis.

ATTACHMENT 2

Background to the Compliance Monitoring and Enforcement Strategy for Toxics Control

The Compliance Monitoring and Enforcement Strategy for Toxics Control sets forth the Agency's strategy for tracking compliance with and enforcing whole-effluent toxicity monitoring requirements, limitations, schedules and reporting requirements.

The Strategy delineates the respective responsibilities of permittees and permitting authorities to protect water quality through the control of whole-effluent toxicity. It establishes criteria for the review of compliance data and the quarterly reporting of violations to Headquarters and the public. The Strategy discusses the integration of whole-effluent toxicity control into our existing inspection and quality assurance efforts. It provides guidelines on the enforcement of whole-effluent toxicity requirements.

The Strategy also addresses the concern many permittees share as they face the prospect of new requirements in their permit - the fear of indiscriminate penalty assessment for violations that they are unable to control. The Strategy recognizes enforcement discretion as a means of dealing fairly with permittees that are doing everything feasible to protect water quality. As indicated in the Strategy, this discretion deals solely with the assessment of civil penalties, however, and is not an alternative to existing procedures for establishing relief from State Water Quality Standards. The Strategy focuses on the responsibility of the Agency and authorized States to require compliance with Water Quality Standards and thereby ensure protection of existing water resources.

01/19/89

COMPLIANCE MONITORING AND ENFORCEMENT STRATEGY FOR TOXICS CONTROL

I. Background

Issuance of NPDES permits now emphasizes the control of toxic pollutants, by integrating technology and water quality-based permit limitations, best management practices for toxic discharges, sludge requirements, and revisions to the pretreatment implementation requirements. These requirements affect all major permittees and those minor permittees whose discharges may contribute to impairment of the designated use for the receiving stream. The goal of permitting is to eliminate toxicity in receiving waters that results from industrial and municipal discharges.

Major industrial and municipal permits will routinely contain water quality-based limits for toxic pollutants and in many cases whole effluent toxicity derived from numerical and narrative water quality standards. The quality standards to establish NPDES permit limits are discussed in the "Policy for the Development of Water Quality-based Permit Limits for Toxic Pollutants," 49FR 9016, March 9, 1984. The Technical Support Document for Water Quality-based Toxics Control, EPA #440/44-85032, September, 1985 and the Permit Writer's Guide to Water Quality-based Permitting for Toxic Pollutants, Office of Water, May, 1987, provide guidance for interpreting numerical and narrative standards and developing permit limits.

The Water Quality Act (WQA) of 1987 (PL 100-4, February 4, 1987) further directs EPA and the States to identify waters that require controls for toxic pollutants and develop individual control strategies including permit limits to achieve control of toxics. The WQA established deadlines, for individual control strategies (February 4, 1989) and for compliance with the toxic control permit requirements (February 4, 1992). This Strategy will support the additional compliance monitoring, tracking, evaluation, and enforcement of the whole effluent toxicity controls that will be needed to meet the requirements of the WQA and EPA's policy for water quality-based permitting.

It is the goal of the Strategy to assure compliance with permit toxicity limits and conditions through compliance inspections, compliance reviews, and enforcement. Water quality-based limits may include both chemical specific and whole effluent toxicity limits. Previous enforcement guidance (e.g., Enforcement Management System for the National Pollutant Discharge Elimination System, September, 1986; National Guidance for Oversight of NPDES Programs, May, 1987; Guidance for Preparation of Quarterly and Semi-Annual Noncompliance Reports, March, 1986) has dealt with

chemical-specific water quality-based limits. This Strategy will focus on whole effluent toxicity limits. Such toxicity limits may appear in permits, administrative orders, or judicial orders.

II. Strategy Principles

This strategy is based on four principles:

1) Permittees are responsible for attaining, monitoring, and maintaining permit compliance and for the quality of their data.

2) Regulators will evaluate self-monitoring data quality to ensure program integrity.

3) Regulators will assess compliance through inspections, audits, discharger data reviews, and other independent monitoring or review activities.

4) Regulators will enforce effluent limits and compliance schedules to eliminate toxicity.

III. Primary Implementation Activities

In order to implement this Strategy fully, the following activities are being initiated:

A. Immediate development

1. The NPDES Compliance Inspection Manual was revised in May 1988 to include procedures for performing chronic toxicity tests and evaluating toxicity reduction evaluations. An inspector training module was also developed in August 1988 to support inspections for whole effluent toxicity.

2. The Permit Compliance System (the national NPDES data base) was modified to allow inclusion of toxicity limitations and compliance schedules associated with toxicity reduction evaluations. The PCS Steering Committee will review standard data elements and determine if further modifications are necessary.

3. Compliance review factors (e.g., Technical Review Criteria and significant noncompliance definitions) are being proposed to evaluate violations and appropriate response.

4. A Quality Assurance Fact Sheet has been developed (Attached) to review the quality of toxicity test results submitted by permittees.

5. The Enforcement Response Guide in the Enforcement Management System will be revised to cover the use of administrative penalties and other responses to violations of toxicity controls in permits. At least four types of permit conditions are being examined: (1) whole-effluent toxicity monitoring (sampling and analysis), (2) whole effluent toxicity-based permit limits, (3) schedules to conduct a TRE and achieve compliance with water quality-based limits, and (4) reporting requirments.

B. Begin development in Spring 1989

With the assistance of the Office of Enforcement and Compliance Monitoring (OECM), special remedies and model forms will be developed to address violations of toxicity permit limits (i.e., model consent decrees, model complaints, revised penalty policy, model litigation reports, etc.)

IV. <u>Scope and Implementation of Strategy</u>

A. Compliance Tracking and Review

1. Compliance Tracking

The Permits Compliance System (PCS) will be used as the primary system for tracking limits and monitoring compliance with the conditions in NPDES permits. Many new codes for toxicity testing have already been entered into PCS. During FY 89, headquarters will provide additional guidance to Regions and States on PCS coding to update existing documentation. The Water Enforcement Data Base (WENDB) requirements as described in the PCS Policy Statement already require States and Regions to begin incorporating toxicity limits and monitoring information into PCS.

In addition to guidance on the use of PCS, Headquarters has prepared guidance in the form of Basic Permitting Principles for Regions and States that will provide greater uniformity nationally on approaches to toxicity permitting. One of the major problems in the tracking and enforcement of toxicity limits is that they differ greatly from State-to-State and Region-to-Region. The Permits Division and Enforcement Division in cooperation with the PCS Steering Committee will establish standard codes for permit limits and procedures for reporting toxicity results based on this guidance.

Whole effluent toxicity self-monitoring data should undergo an appropriate quality review. (See attached checklist for suggested toxicity review factors.) All violations of permit limits for toxics control should be reviewed by a professional qualified to assess the noncompliance. Regions and States should designate appropriate staff.

2. Compliance Review

Any violation of a whole effluent toxicity limit is of concern to the regulatory agency and should receive an immediate professional review. In terms of the Enforcement Management System (EMS), any whole effluent violation will have a violation review action criterion (VRAC) of 1.0. However, the appropriate initial enforcement response may be to require additional monitoring and then rapidly escalate the response to formal enforcement if the noncompliance persists. Where whole effluent toxicity is based on a pass-fail permit limitation, any failure should be immediately targeted for compliance inspection. In some instances, assessment of the compliance status will be required through issuance of Section 308 letters and 309(a) orders to require further toxicity testing.

Monitoring data which is submitted to fulfill a toxicity monitoring requirement in permits that do not contain an independently enforceable whole-effluent toxicity limitation should also receive immediate professional review.

The burden for testing and biomonitoring is on the permittee; however, in some instances, Regions and States may choose to respond to violations through sampling or performance audit inspections. When an inspection conducted in response to a violation identifies noncompliance, the Region or State should initiate a formal enforcement action with a compliance schedule, unless remedial action is already required in the permit.

B. Inspections

EPA/State compliance inspections of all major permittees on an annual basis will be maintained. For all facilities with water quality-based toxic limits, such inspections should include an appropriate toxic component (numerical and/or whole effluent review). Overall the NPDES inspection and data quality activities for toxics control should receive greater emphasis than in the present inspection strategy.

1. Regional/State Capability

The EPA's "Policy for the Development of Water Quality-based Permit Limits for Toxic Pollutants" (March 9, 1984 Federal Register) states that EPA Regional Administrators will assure that each Region has the full capability to conduct water quality assessments using both biological and chemical methods and provide technical assistance to the States. Such capability should also be maintained for compliance biomonitoring inspections and toxics sampling inspections. This capability should include both inspection and laboratory capability.

2. Use of Nonsampling Inspections

Nonsampling inspections as either compliance evaluations (CEIs) or performance audits (PAIs) can be used to assess permittee self-monitoring data involving whole effluent toxicity limits, TREs, and for prioritization of sampling inspections.* As resources permit, PAIs should be used to verify biomonitoring capabilities of permittees and contractors that provide toxicity testing self-monitoring data.

3. Quality Assurance

All States are encouraged to develop the capability for acute and chronic toxicity tests with at least one fish and one invertebrate species for freshwater and saltwater if appropriate. NPDES States should develop the full capability to assess compliance with the permit conditions they establish.

EPA and NPDES States will assess permittee data quality and require that permittees develop quality assurance plans. Quality assurance plans must be available for examination. The plan should include methods and procedures for toxicity testing and chemical analysis; collection, culture, maintenance, and disease control procedures for test organisms; and quality assurance practices. The

* Due to resource considerations, it is expected that sampling inspections will be limited to Regional/State priorities in enforcement and permitting. Routine use of CEIs and PAIs should provide the required coverage.

permittee should also have available quality control charts, calibration records, raw test data, and culture records.

In conjunction with the QA plans, EPA will evaluate permittee laboratory performance on EPA and/or State approved methods. This evaluation is an essential part of the laboratory audit process. EPA will rely on inspections and other quality assurance measures to maintain data quality. However, States may prefer to implement a laboratory certification program consistent with their regulatory authorities. Predetermined limits of data acceptability will need to be established for each test condition (acute/chronic), species-by-species.

C. Toxicity Reduction Evaluations (TREs)

TREs are systematic investigations required of permittees which combine whole effluent and/or chemical specific testing for toxicity identification and characterization in a planned sequence to expeditiously locate the source(s) of toxicity and evaluate the effectiveness of pollution control actions and/or inplant modifications toward attaining compliance with a permit limit. The requirement for a TRE is usually based on a finding of whole effluent toxicity as defined in the permit. A plan with an implementation schedule is then developed to achieve compliance. Investigative approaches include causative agent identification and toxicity treatability.

1. Requiring TRE Plans

TRE's can be triggered: 1) whenever there is a violation of a toxicity limit that prompts enforcement action or 2) from a permit condition that calls for a toxicity elimination plan within a specified time whenever toxicity is found. The enforcement action such as a 309(a) administrative order or State equivalent, or judicial action then directs the permittee to take prescribed steps according to a compliance schedule to eliminate the toxicity. This schedule should be incorporated into the permit, an administrative order, or judicial order and compliance with the schedule should be tracked through PCS.

2. Compliance Determination Followup

Compliance status must be assessed following the accomplishment of a TRE plan using the most efficient and effective methods available. These methods include site visits, self-monitoring, and inspections.

Careful attention to quality assurance will assist in minimizing the regulatory burden. The method of compliance assessment should be determined on a case-by-case basis.

D. Enforcing Toxic Control Permit Conditions

Enforcement of toxic controls in permits depends upon a clear requirement and the process to resolve the noncompliance. In addition to directly enforceable whole effluent limits (acute and chronic, including absolute pass-fail limits), permits have contained several other types of toxic control conditions: 1) "free from" provisions, 2) schedules to initiate corrective actions (such as TREs) when toxicity is present, and/or 3) schedules to achieve compliance where a limit is not currently attained. Additional requirements or schedules may be developed through 308 letters, but the specific milestones should be incorporated into the permit, administrative order or State equivalent mechanism, or judicial order to ensure they are enforceable.

1. The Quarterly Noncompliance Report (QNCR)

Violations of permit conditions are tracked and reported as follows:

a. Effluent Violations

Each exceedance of a directly enforceable whole effluent toxicity limit is of concern to the regulatory agency and, therefore, qualifies as meeting the VRAC requiring professional review (see section IV.A.2.).

These violations must be reported on the QNCR if the violation is determined through professional review to have the potential to have caused a water quality impact.

All QNCR-reportable permit effluent violations are considered significant noncompliance (SNC).

b. Schedule Violations

Compliance schedules to meet new toxic controls should be expeditious. Milestones should be established to evaluate progress routinely and minimize delays. These milestones should be tracked and any slippage of 90 days or more must be reported on the QNCR.

The following milestones are considered SNC when 90 days or more overdue: submit plan/schedule to conduct TRE, initiate TRE, submit test results, submit implementation plan/schedule (if appropriate), start construction, end construction, and attain compliance with permit.

c. Reporting/Other Violations

Violation of other toxic control requirements (including reports) will be reported using criteria that are applied to comparable NPDES permit conditions. For example, failure to submit a report within 30 days after the due date or submittal of an inaccurate or inadequate report will be reportable noncompliance (on the QNCR).

Only failure to submit toxicity limit self-monitoring reports or final TRE progress reports indicating compliance will be SNC when 30 days or more overdue.

Resolution (bringing into compliance) of all three types of permit violations (effluent, schedule, and reporting/other) will be through timely and appropriate enforcement that is consistent with EPA Oversight Guidance. Administering agencies are expected to bring violators back into compliance or take formal enforcement action against facilities that appear on the QNCR and are in SNC; otherwise, after two or more quarters the facility must be listed on the Exceptions List.

2. Approaches to Enforcement of Effluent Limitations

In the case of noncompliance with whole effluent toxicity limitations, any formal enforcement action will be tailored to the specific violation and remedial actions required. In some instances, a Toxicity Reduction Evaluation (TRE) may be appropriate. However, where directly enforceable toxicity-based limits are used, the TRE is <u>not</u> an acceptable enforcement response to toxicity noncompliance if it requires only additional monitoring without a requirement to determine appropriate remedial actions and ultimately compliance with the limit.

If the Regions or States use administrative enforcement for violations of toxic requirements, such actions should require compliance by a date certain, according to a set schedule, and an

administrative penalty should be considered.[1] Failure to comply with an Administrative Order schedule within 90 days indicates a schedule delay that may affect the final compliance date and a judicial referral is the normal response. In instances where toxicity has been measured in areas with potential impacts on human health (e.g., public water supplies, fish/shellfish areas, etc.), regions and states should presume in favor of judicial action and seek immediate injunctive relief (such as temporary restraining order or preliminary injunction).

In a few highly unusual cases where the permittee has implemented an exhaustive TRE plan[2], applied appropriate influent and effluent controls[3], maintained continued compliance with all other effluent limits, compliance schedules, monitoring, and other permit requirements, but is still unable to attain or maintain compliance with the toxicity-based limits, special technical evaluation may be warranted and civil penalty relief granted. Solutions in these cases could be pursued jointly with expertise from EPA and/or the States as well as the permittee.

Some permittees may be required to perform a second TRE subsequent to implementation of remedial action. An example of the appropriate use of a subsequent TRE is for the correction of new violations of whole effluent limitations following a period of

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[1]Federal Administrative penalty orders must be linked to violations of underlying permit requirements and schedules.

[2]See Methods for Aquatic Toxicity Identification Evaluations, Phase I, Toxicity Characterization Procedures, EPA-600/3-88/035, Table 1. An exhaustive TRE plan covers three areas: causative agent identification/toxicity treatability; influent/effluent control; and attainment of continued compliance. A listing of EPA protocols for TREs can be found in Section V (pages 11 and 12).

[3]For industrial permittees, the facility must be well-operated to achieve all water quality-based, chemical specific, or BAT limits, exhibit proper O & M and effective BMPs, and control toxics through appropriate chemical substitution and treatment. For POTW permittees, the facility must be well-operated to achieve all water quality-based, chemical specific, or secondary limits as appropriate, adequately implement its approved pretreatment program, develop local limits to control toxicity, and implement additional treatment.

sustained compliance (6 months or greater in duration) indicating a different problem from that addressed in the initial TRE.

3. Enforcement of Compliance Schedule and Reporting Requirements

In a number of instances, the primary requirements in the permits to address toxicity will be schedules for adoption and implementation of biomonitoring plans, or submission of reports verifying TREs or other similar reporting requirements. Regions and States should consider any failure (1) to conduct self-monitoring according to EPA and State requirements, (2) to meet TRE schedules within 90 days, or (3) to submit reports within 30 days of the specified deadline as SNC. Such violations should receive equivalent enforcement follow-up as outlined above.

4. Use of Administrative Orders With Penalties

In addition to the formal enforcement actions to require remedial actions, Regions and States should presume that penalty AO's or State equivalents can be issued for underlying permit violations in which a formal enforcement action is appropriate. Headquarters will also provide Regions and States with guidance and examples as to how the current CWA penalty policy can be adjusted.

5. Enforcement Models and Special Remedies

OWEP and OECM will develop standard pleadings and language for remedial activities and compliance milestones to assist Regions and States in addressing violations of toxicity or water quality-based permit limits. Products will include model litigation reports, model complaints and consent decrees, and revised penalty policy or penalty algorithm and should be completed in early FY 1989.

V. Summary of Principal Activities and Products

A. Compliance Tracking and Review guidance

1. PCS Coding Guidance - May, 1987; revision 2nd Quarter 1989

2. Review Criteria for Self-monitoring Data (draft attached)

B. Inspections and Quality Assurance

1. Revised NPDES Compliance Inspection Manual - May 1988.

2. Quality Assurance Guidance - 3rd Quarter FY 1989.

3. Biomonitoring Inspection Training Module - August 1988.

4. Additions of a reference toxicant to DMRQA program - (to be determined)

C. Toxics Enforcement

1. Administrative and Civil Penalty Guidance - 4th Quarter FY 1989

2. Model Pleadings and Complaints - 2nd Quarter 1989

3. EMS Revision - 2nd Quarter FY 1989

D. Permitting Consistency

1. Basic Permitting Principles - 2nd Quarter FY 1989

E. Toxicity Reduction Evaluations

1. Generalized Methology for Conducting Industrial Toxicity Reduction Evaluations - 2nd Quarter FY 1989

2. Toxicity Reduction Evaluation Protocol for Municipal Wastewater Treatment Plants - 2nd Quarter FY 1989

3. Methods for Aquatic Toxicity Indentification Evaluations

   a. Phase I. Toxicity Characterization Procedures, EPA-600/3-88/034- September 1988

   b. Phase II. Toxicity Identification Procedures, EPA-600/3-88/035- 2nd Quarter 1989

   c. Phase III. Toxicity Confirmation Procedures- EPA-600/3-88/036 - 2nd Quarter FY 1989

APPENDIX B-5

QUALITY CONTROL FACT SHEETS

Attachment

Quality Control Fact Sheet for Self-Biomonitoring Acute/Chronic Toxicity Test Data

Permit No._____

Facility Name _____

Facility Location _____

Laboratory Investigator _____

Permit Requirements

Sampling Location _____ Type of Sample _____

Limit _____ Test Duration _____

Type of Test _____ Test Organism Age _____

Test Results

$LC_{50}/EC_{50}/NOEC/IC_{25}$ _____ 95 Percent Confidence Interval _____

Quality Control Summary

Date of Sample _____ Dates of Test _____

Control Mortality _____% Control Mean Dry Weight _____

Temperature maintained within ±2°C of test temperature? Yes _____ No _____

Dissolved oxygen levels always greater than 40 percent saturation? Yes _____ No _____

Loading factor for all exposure chambers less than or equal to maximum allowed for the test type and temperature? Yes _____ No _____

Do the test results indicate a direct relationship between effluent concentration and response of the test organism (i.e., more deaths occur at the highest effluent concentrations)? Yes _____ No _____

APPENDIX B-6

CASE DECISIONS ON WHOLE EFFLUENT TOXICITY

CASE SUMMARY

Natural Resources Defense Council, Inc. v. EPA, 859 F.2d 156 (D.C. Cir. 1988).

This consolidated case, which arose from EPA's promulgation of various National Pollutant Discharge Elimination System regulations, addresses a multitude of issues. The following paragraphs note issues particularly relevant to this document.

- The Court held that EPA has the authority to express permit limitations in terms of toxicity as long as the limits reflect the appropriate requirements of the Clean Water Act (CWA), as provided in 40 *CFR* 125.3(c)(4). The Court concluded that although toxicity appears to be an attribute of pollutants rather than a pollutant itself, the CWA (by means of the broad definition of "pollutant" in section 502(6)) authorizes the use of toxicity to regulate effluents.
- Industry asked the Court to address several other issues related to setting toxicity limitations (whether EPA failed to demonstrate the existence of a reliable methodology for setting toxicity limits and whether EPA's use of toxicity to set water quality-based limitations to meet "narrative" State water quality standards represents an impermissible trespass on the State's right to set water quality standards). However, the Court did not regard these issues to be adequately developed ("ripe") for review in this case.
- The Court disagreed with industry's assertions that EPA's 1984 policy statement ("Development of Water Quality-Based Permit Limitations for Toxic Pollutants: National Policy," 49 *Federal Register* 9016 [March 9, 1984]) and draft Technical Support Document ("TSD") were "rules" requiring notice and comment under the Administrative Procedure Act, 5 USC 553. The Court noted that informal rulemaking regarding 40 *CFR* 125.3(c)(4), which was pending between 1980 and 1984, did not limit Agency information gathering to the issuance of new or revised notices of proposed rulemaking, and the two documents did not have independent legal value. (In other words, the EPA national policy and the TSD were not binding norms but general statements of policy/guidance.)
- Industry also challenged EPA's refusal to provide an affirmative upset defense to noncompliance with water quality-based limits. The Court indicated that the CWA does not expressly allow such an upset defense, and, upon considering the Act's structure and legislative history, it could discern no congressional intent to provide for the defense in water quality permitting. Significantly, in reaching this position, the Court relied heavily upon the language and legislative history of CWA Section 301(b)(1)(C), by which Congress clearly did not relate compliance with water quality-based limitations to the capabilities of technology. In the Court's view, "Congress had a deep respect for the sanctity of water quality standards and a firm conviction of the need for technology-forcing measures." 895 F.2d at 208-09. However, the Court concluded that EPA had acted arbitrarily in dismissing the defense as impracticable, and directed EPA to conduct further proceedings on the issue.
- Finally, the Court rejected challenges to EPA's regulations governing State public participation requirements and penalty levels. In deciding these issues, the Court noted Congressional desire for nationally uniform effluent limitations as reflected in the legislative history of the 1972 CWA. The Court stated:

  Uniformity is indeed a recurrent theme in the Act, a direct manifestation of concern that the permit program be standardized to avoid the "industrial equivalent of forum shopping" and the creation of "pollution havens" by migration of dischargers to areas having lower pollution standards (859 F.2d at 174 [footnotes omitted] and see accompanying footnotes 17-20 citing various provisions of the legislative history of the 1972 CWA).

Appendix C

Ambient Toxicity Testing and Data Analysis

Ambient Toxicity Analysis

Ambient toxicity testing procedures are useful where measurement of toxicity levels after discharge is important in the assessment of toxic effluent impact. This is particularly true where impact is caused by the presence of multiple point sources. The purpose of this testing is to provide an analysis of toxicity levels instream from whatever sources of toxicity are affecting the receiving water.

Procedures

The basic ambient toxicity testing procedure is to expose test organisms to receiving water samples taken from selected sampling stations above, at, and below the discharge point(s). Since effluent concentrations after discharge are often relatively low, chronic toxicity tests should be conducted so that the tests are sensitive enough for the purpose.

The methods available for chronic testing of sufficiently short duration are limited. Two organisms for which short-term chronic toxicity tests are available are *Pimephales promelas* and *Ceriodaphnia* sp.

The following procedures are used:

- Select instream sampling stations based on the mixing characteristics involved in the specific discharge situation.
- Collect a daily grab sample or a daily composite sample of receiving water from each station.
- Use a renewal testing method to expose test organisms to the daily samples collected at each station. Use an appropriate number of replicates (10 for *Ceriodaphnia*) for each sampling station. No dilution series is required where screening is the primary goal.
- Conduct testing at a low-flow period, although it is not necessary to conduct the tests at the critical low-flow period. Testing is best when relatively stable flow occurs during the test period.
- Record the results of the testing in the format shown in Table C-1. The survival of the test organisms and the effect on their growth or reproduction are used as endpoints. Figure C-1 plots the results in graphic form so that the pattern of ambient toxicity can be observed.

Table C-1. Young Production and Percent Survival of *Ceriodaphnia* in Ambient Toxicity Tests at Ottawa River, Lima, Ohio

Station	Station Description	River Mile	Young Female	SD	Final Survival	Daily Survival 1	2	3	4	5	6	7
1	Above Lima	46.0	15.5	8.0	90	100	100	100	90	90	90	90
2	Above STP	37.7	14.1	2.1	0	100	100	100	100	90	10	0
3	Below STP	37.4	0	-	0	100	100	10	0	0	0	0
3A	Midway between STP and refinery	37.3	0	-	0	100	100	10	0	0	0	0
3B	Above refinery	37.1	0.4	-	0	90	90	40	0	0	0	0
4	Above chemical plant	36.9	7.5	3.6	10	100	100	100	100	100	50	10
4A	Below chemical plant	36.3	11.1	4.6	30	100	100	100	100	100	40	30
5	Shawnee Bridge	36.4	5.7	4.0	0	90	90	90	90	90	60	0
6	Route 117	32.5	12.6	3.8	10	100	100	100	100	100	100	10
7	Allentown	28.8	16.8	6.1	100	100	100	100	100	100	100	100
8	Rimer	16.0	17.4	9.5	100	90	90	90	90	90	80	80
8A	"Boonie" Station	8.0	25.0	3.3	100	100	100	100	100	100	100	100
9	Kalida	1.0	25.6	5.5	100	100	100	100	100	100	100	100

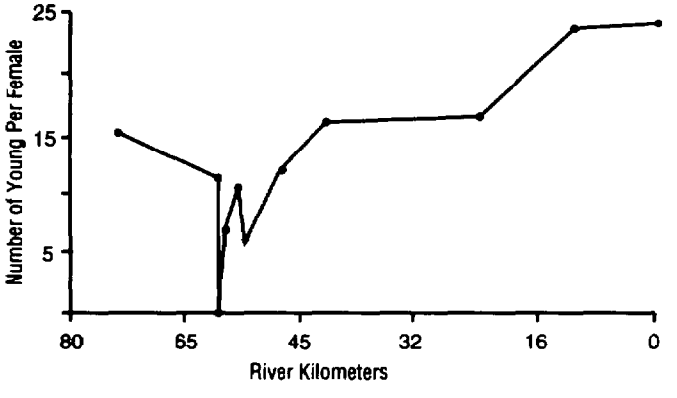

Figure C-1. *Ceriodaphnia* Young Production in Water from Various Stream Stations on the Ottawa River, Lima, Ohio

Selecting Sampling Stations

The selection of sampling stations is determined by the characteristics of the site. When determining stations, consider the following factors:

- Mixing and flow—The mixing characteristics of the discharge site are useful to determine the placement of sampling stations. Knowledge of concentration isopleths allows the regulatory authority to place stations at locations instream that correspond to concentrations measured in the dilution series in the effluent tests. For example, where effluent testing shows the effluent no observed effect concentration is 10 percent, an instream station should be placed where dilution is estimated to create a 10-percent instream waste concentration. In this way, the size of a toxic plume can be measured. Sampling stations should be placed where the effluents exist at relatively constant and relatively specific concentrations. Test at specific low-flow conditions, if possible. Presence of tributaries or other sources of dilution will influence positions and numbers of stations. Where smaller tributaries have several point sources on them, treat the tributary as a point source. Obvious nonpoint source areas also should be used to set stations.
- Existing biological data—Where biosurvey data are available, sampling station location should be influenced by the more obvious trends in impact. In particular, control stations and recovery stations can be determined by biosurvey data.
- Single point sources—Single point source situations should be bracketed with an above station, an immediate mixing station, several intermediate stations corresponding to different instream concentrations, and a recovery station. Of course, a control station should be established.
- Presence of other point sources—Multiple point source situations require the placement of more stations between discharge points. Each source should be bracketed by sampling stations.

There are four areas or zones that can be recognized when establishing the sampling stations for ambient toxicity testing:

Zone 1—An upstream zone before the effluent enters

Zone 2—A zone of mixing

Zone 3—A zone after mixing and before additional dilution water enters

Zone 4—A zone where additional dilution occurs either from effluents or tributaries.

All possible combinations of occurrences are not practical to discuss but must be sorted out for each site. Some generalizations are important to mention:

- Any upstream sources of contaminants, such as other discharges, will confound the individual effects of a downstream discharge. For example, Zone 3 of the downstream discharge may occur in Zone 4 of an upstream discharge. This does not invalidate the measurement of ambient toxicity. It only makes it difficult to attribute amounts of response to each individual discharge. Response to the instream mixture is what is measured.
- Careful location of sampling stations in Zone 3 is critical. Zone 3 is the only place where toxicity decay rates of any one discharger can be measured and then only if there are no upstream discharges, or if there are, only if that upstream effluent is stable in that reach.
- In Zone 4, not only is degradation of the effluent toxicity occurring, but there is dilution of it by other effluents and tributaries. Depending on the site circumstances, one may not be able to learn anything about the ambient toxicity characteristics of the effluent of concern in this zone.
- To emphasize, what can be measured in each zone depends on the above considerations. In the more complex situation, only an estimate of ambient toxicity at each station can be obtained. No information about one effluent's toxicity decay rate will be available where several toxic effluents mix. In the most simple situation of one discharge and no dilution downstream for a long distance, Zone 3 will be large enough to get a good measure of toxicity decay.

Analysis of Ambient Toxicity Measurement

- When used in screening, the ambient toxicity data can identify areas in receiving waters where ambient toxicity exists instream. Attributing such impact to specific point sources (particularly where several sources discharge) may require effluent toxicity testing.
- Except when used for screening purposes, ambient toxicity measurements must be interpreted with effluent toxicity test data if conclusions are to be drawn concerning changes in toxic effect after discharge. The same species must be used in both the ambient and the effluent toxicity tests.
- When analyzing the data, the performance of the animals at each station downstream is compared to that of the animals exposed to receiving water without the effluent of concern in it but containing all other upstream additions. The result is an integration of effects from all contaminants and components and represents not only the toxicity of the effluent of concern but also the interactions of it with other effluents.
- Where the downstream stations show toxic effect at the concentrations measured as toxic in the effluent toxicity tests, effluent toxicity can be considered to be occurring instream, after discharge.
- Where the toxic effect decreases from station to station downstream in the absence of further dilution, the effluent toxicity is degrading. If the decay rate is rapid (e.g., no toxicity at the closest instream station to the discharge point), the effluent has a nonpersistent toxicity. Where the decay rate is more gradual, toxicity is more persistent. The rate of decay of toxicity together with mixing data allows the regulatory authority to approximate a receiving water toxicity impact area. That impact area can then be compared to the appropriate State water quality standards when establishing control requirements.
- In some cases, ambient toxicity may increase in relation to effluent toxicity measurements. Either upstream sources of toxicity exist or some factor in the receiving water is reacting with the effluent to increase its toxicity. Again, the pattern and magnitude of change in toxicity should be analyzed. Differences in toxicity levels between stations will reveal what is happening to the effluent as it is mixed instream and interacts with the constituents of the receiving water.
- Trend analysis in the raw test data is important when interpreting ambient toxicity data. As used in this context, trend analysis means observing toxic effect as it occurs in the test itself and relating it to what is occurring instream (plug flow, intermittent discharge, peak toxicity of effluents). Using time-of-travel data or receiving water flow rates and patterns, observe effects on the test organisms from day to day. There may be a pattern of mortality that can be linked to discharge events. For example, in the table the data indicate late mortality at downstream stations on Days 6 and 7. Flow rates for the river in this example correlated this mortality to the downstream movement of a toxic slug illegally discharged upstream.

APPENDIX D

DURATION AND FREQUENCY

DURATION AND FREQUENCY

As discussed on pages 7 through 13 of the *Guidelines for Deriving Numerical National Water Quality Criteria for the Protection of Aquatic Organisms and Their Uses* [1], the format used to express water quality criteria for aquatic life should take into account toxicological and practical realities. Because of variation in the flows of the effluent and the upstream receiving water as well as variation in the concentrations of pollutants in the effluent and in the upstream receiving water, a simple format, such as specifying a concentration that must not be exceeded at any time or place, is not realistic. Furthermore, such a simple format does not take into account the fact that aquatic organisms can tolerate higher concentrations of pollutants for short periods of time than they can tolerate throughout a complete life cycle. The format that was selected for expressing water quality criteria for aquatic life consists of recommendations concerning concentrations, durations of averaging periods, and average frequencies of allowed excursions. Use of this concentration-duration-frequency format allows water quality criteria for aquatic life to be adequately protective without being as overprotective as would be necessary if criteria were expressed using a simpler format. In addition, this format can be applied directly to hydrological data and to the flow of, and concentrations of pollutants in, effluents using both dynamic and steady-state modeling [2, 3].

In aquatic life criteria for both individual chemicals and Whole Effluents, the recommended concentrations are the criterion maximum concentration (CMC) and the criterion continuous concentration (CCC). For individual chemicals the CMC and CCC are derived using the procedures described by Stephan et al. [1]. As described in Chapter 3 of this TSD, the CMC and CCC for Whole Effluents can be specified generically in terms of toxic units. Alternatively, for a particular effluent the CMC is specified in terms of an acute toxicity endpoint (ATE), which is either an LC_{50} or an EC_{50}, and the CCC is specified in terms of a chronic toxicity endpoint (CTE), which is either a no observed effect concentration (NOEC) or an IC_{xx}, if the LC_{50}, EC_{50}, NOEC, and IC_{xx}, were obtained from appropriate toxicity tests conducted on the effluent with sensitive species.

The CCC is intended to be the highest concentration that could be maintained indefinitely in a receiving water without causing an unacceptable effect on the aquatic community or its uses. Any concentration above the CCC, if maintained indefinitely, is expected to cause an unacceptable effect. Due to the four sources of variation mentioned above, the concentration in the receiving water will not be constant. Because organisms can tolerate higher concentrations for short periods of time, it is expected that the concentration of a pollutant in a body of water can exceed the CCC without causing an unacceptable effect if (a) the magnitudes and the durations of exceedances are appropriately limited and (b) there are compensating periods of time during which the concentration is below the CCC. These goals are accomplished by specifying a duration of an averaging period over which the average concentration should not exceed the CCC. For example, if the concentration is twice the CCC for one-half the specified averaging period, it must be zero for the rest of the averaging period if the average concentration is not to exceed the CCC. Thus, both the magnitude and duration of an exceedance are limited and there must be a compensating period of time during the averaging period when the concentration is below the CCC. Because exceedences are defined to be due to usual variation, most exceedences will be small, with larger exceedances becoming increasingly rare [1, 2].

Although an exceedance is defined to occur whenever the instantaneous concentration is above the CCC, an excursion is defined to occur only when the average concentration over the duration of the averaging period is above the CCC. It is expected that excursions can occur without causing unacceptable effects if (a) the frequency of such excursions is appropriately limited and (b) all other average concentrations are below the CCC. The recommended average frequency of allowed excursions is intended to appropriately limit the frequency of excursions. Because excursions are the highest average concentrations that occurred due to usual variation, all other average concentrations will be less than the CCC. As for exceedances, excursions that are defined to be due to usual variation will be small, with larger excursions becoming increasingly rare. The duration of the averaging period is intended to limit the impact of exceedances, whereas the average frequency of allowed excursions is intended to limit the impact of excursions. (Note: The words "exceedance" and "excursion" are used slightly differently here than in References 1 and 2.)

Although spills can impact aquatic communities, they are not considered exceedances or excursions because they are not part of the usual variation in the concentrations of pollutants in receiving water. In the Complex Effluent Toxicity Testing Program, eight field studies were conducted to evaluate the use of toxicity tests to diagnose the cause of biological impact. Ambient toxicity measurements were taken over a 7-day period.

During two of these studies [4, 5] spills of pollutants resulted in acute toxicity. This suggests that the impacts caused by spills might be as important as impacts caused by variation in the compositions and flows of the effluent and the receiving water.

The primary purpose of this appendix is to present the rationale for the recommendations of the U.S. EPA concerning duration and frequency in national water quality criteria for aquatic life. The recommended duration is based on data from laboratory toxicity tests, whereas the recommended frequency is based on field data. With the concurrence of the U.S. EPA, States may adopt site-specific criteria, rather than national criteria, in their State standards. Such site-specific criteria may include not only site-specific concentrations, but also site-specific, and possibly pollutant-specific, durations of averaging periods and average frequencies of allowed excursions. If adequate justification is provided, site-specific and/or pollutant-specific concentrations, durations, and frequencies may be higher or lower than those given in national water quality criteria for aquatic life. A secondary purpose of this appendix is to discuss rationales that might be used as a basis for selecting alternative durations of averaging periods and average frequencies of allowed excursions.

Duration

In order for this concentration-duration-frequency format to allow water quality criteria for aquatic life to be adequately protective without being unnecessarily overprotective, the duration of the averaging period must allow some exceedances above the CCC without allowing unacceptable effects. Thus, the averaging period must appropriately limit the magnitude and duration of exceedances and provide compensating periods of time during which the concentration is below the CCC.

Even though only a few tests have compared the effects of a constant concentration with the effects of the same average concentration resulting from a fluctuating concentration, nearly all the available comparisons have shown that substantial fluctuations result in increased adverse effects [6-16]. Thus, the duration of the averaging period must be shorter than the duration of the chronic tests on which the CCC is based so that the averaging period does not allow substantially more adverse effect than would have been caused by a continuous exposure to the same average concentration. Life-cycle tests with species such as mysids and daphnids and early life-stage tests with warmwater fishes usually last for 20 to 30 days, whereas life-cycle tests with *Ceriodaphnids* usually last for 7 days. If the duration of the averaging period is too short, however, it will not allow any meaningful exceedances and will, in effect, defeat the purpose of the concept of the averaging period. For example, because few effluents are monitored more often than once a day, an averaging period of 24 hours would effectively mean that for most effluents each individual sample that was above the CCC would be considered an excursion.

For the following reasons, a 4-day averaging period is recommended for application of the CCC in aquatic-life criteria for both individual pollutants and Whole Effluents:

- It is substantially shorter than the 20- to 30-day duration of most chronic tests and is somewhat shorter than the 7-day duration of the *Ceriodaphnia* life-cycle test.
- The results of some chronic tests apparently are due to an acute effect on a sensitive life stage that occurs at some time during the test, rather than being caused by either long-term stress or long-term accumulation of the test material in the organisms. Horning and Neiheisel [17] documented one such situation, and others are probably the cause of at least some of the acute-chronic ratios that are not much greater than unity.
- For both endrin and fenvalerate, Jarvinen et al. [18] found that a 72-hour exposure caused about the same amount of effect on the growth of fathead minnows in early life-stage tests as did a 30-day exposure to the same concentration.
- In some life-cycle tests on effluents with Ceriodaphnids, concentrations of effluents that were a factor of 1.8 greater than the CCC caused unacceptable effects in 4 or 5 days [5, 19, 20].
- It is not so short as to effectively defeat the purpose of the concept of the averaging period.

As discussed below, other averaging periods might be acceptable on a site-specific or pollutant-specific basis.

Just as the concept of exceedances can be applied to the CCC, it also can be applied to the CMC. As with the CCC, the CMC averaging period should be substantially less than the lengths of the tests on which the CMC is based, i.e., substantially less than 48 to 96 hours. Because 4- to 8-hour LC_{50}s are about the same as the 96-hour LC_{50} for some materials [21-27], the duration of the averaging period for the CMC should be less than 4 hours. One hour is probably an appropriate duration of the averaging period for the CMC because concentrations of some materials that are only a factor of two higher than the 96-hour LC_{50} cause death in one to three hours [25]. Even when organisms do not die within the first hour or so, it is not known how many organisms might have died due to the delayed effects of the short exposure [28-31]. If the 1-hour average does not exceed the CMC, it is unlikely that the concentration of the pollutant in the receiving water can fluctuate rapidly enough during the hour to cause additional adverse effect. Thus, it seems inappropriate to apply the CMC to instantaneous concentrations.

With adequate justification, the CMC and/or CCC averaging periods may be increased or decreased on a site-specific or pollutant-specific basis. A possible site-specific justification for increasing the duration of the CCC averaging period would be that the variation in the concentration of the pollutant in the receiving water is low. Where variation is demonstrated to be consistently low, a longer CMC averaging would be acceptable because the magnitudes and durations of exceedances above the CCC would be limited. A possible pollutant-specific justification for a longer averaging period would be that the LC_{50} decreases substantially as the length of the exposure increases. For example, an 8-hour averaging period might be justified for the CMC if it were shown that 24-hour exposures of a variety of sensitive species resulted in 96-hour LC_{50}s that were substantially above the 96-hour LC_{50}s obtained from continuous exposure to a constant concentration for 96 hours.

In some situations the duration of the averaging period does not have to be stated explicitly because one can be implicitly defined using an uptake rate and a depuration rate. For example, if it is known that a specific concentration of a pollutant in the whole body or in a particular tissue of an important aquatic species will result in an unacceptable effect on the survival, growth, and/or reproduction of that species, and if applicable that species or tissue, the only additional information needed to allow calculation of an excessively high estimate of the total maximum daily load from the record of daily flows is the allowed frequency of exceedances of the concentration in the aquatic species. Thus, this approach can be used whenever the following are available:

- A record of daily flows of the body of water, preferably for more than 10 years
- A maximum acceptable concentration in the whole body or in a particular tissue of an aquatic species
- Uptake and depuration rates that are applicable to that pollutant in the whole body or tissue of that species
- An allowed frequency of exceedances of the maximum acceptable concentration.

This approach is likely to be especially useful when an exposure causes delayed effects that are considered unacceptable. For example, it might be found in a test that no fish die during a 2-day exposure of rainbow trout to a pollutant but 50 percent of the fish die within 4 weeks of being transferred to clean water, whereas no comparable control fish die. If values are available for the concentration of the pollutant in the fish at the end of the 2-day exposure and for the uptake and depuration rates, these data could be used with a flow record for a river to determine how often a specified constant daily input of the pollutant to the river would have resulted in exceedances of this concentration and therefore the death of rainbow trout.

Regardless of what averaging periods are used, exact calculation of the number of excursions would require continuous monitoring of the concentration in the receiving water, which is not feasible in most cases. A valid alternative would be to use a statistically designed monitoring program and a statistical interpretation of the measured concentrations. The 1-hour averaging period for the CMC would imply that the samples analyzed should be 1-hour composites; the 4-day averaging period would imply that concentrations in all samples obtained within any 4-day period should be averaged, preferably using a time-weighted average. If information is available concerning the discharge pattern of a particular effluent, it might be possible to design a monitoring program that is specifically appropriate for that effluent.

Unless critical species are especially sensitive to particular toxicants, most excursions of criteria should have minor impacts on aquatic communities. However, whereas excursions above the CCC will probably reduce growth and reproduction, excursions above the CMC will probably cause death and other severe acute effects. In addition, special care should be exercised when many outfalls exist in a small segment of a receiving water, because if low flow causes an excursion for one discharge, that same low flow will probably also cause excursions for other discharges at the same time. Several "minor" excursions might thus add up to a "major" one.

Frequency

The purpose of the average frequency of allowed excursions is to provide an appropriate average period of time during which the aquatic community can recover from the effect of an excursion and then function normally for a period of time before the next excursion. The average frequency is intended to ensure that the community is not constantly recovering from effects caused by excursions of aquatic-life criteria. Because most regulated discharges are to flowing water (lotic) systems, this discussion will emphasize discharges to rivers and streams rather than to lakes, ponds, reservoirs, and estuaries.

General Considerations for Setting Frequency with Which Excursions of Criteria May Occur

Not long ago ecological communities were thought to be largely in equilibrium and their structure and function determined primarily by internal interactions between species, such as competition and predation. Communities were considered to be analogous to "super-organisms," with close parallels to organisms in their response to stress and in "health." Current understanding is that external factors, including disturbances, often play a major role in the structure of communities [32, 33]. The frequency of disturbance affects a community not only by decreasing the fitness of component species, but also by causing a natural selection of species or phenotypes having characteristics that allow them to tolerate or even thrive under the disturbance regime. Natural disturbances such as floods and droughts are common in lotic systems [32] and vary in intensity not only between headwater streams and large rivers, but also between similar sized lotic communities in different climatic regions. Rather than requiring more time to recover from the effects of additional anthropogenic disturbances, lotic communities with high natural background disturbance frequencies are actually predisposed to recover more rapidly because only species that are able to recolonize and reproduce quickly, or perhaps to avoid disturbances, can persist there [34-37]. This does not imply that they also are more resistant to novel anthropogenic disturbances with which they have had no previous evolutionary experience; it only implies that they are predisposed to recover quickly once the disturbance is gone. The question then is how frequently can aquatic communities experience these additional disturbances (excursions of criteria) without being unacceptably affected.

In an extensive review of the published literature, Niemi et al. [38] reviewed the published literature and identified more than 150 case studies of freshwater systems in which some aspect of recovery from the impact of a disturbance was reported. A case study was used only if the disturbance caused a death or displacement of organisms. This restriction was necessary because it was rarely possible to determine if an event was outside the normal intensity range (a common alternate definition of disturbance), mainly because it is usually difficult to define the normal intensity range. It also permitted the inclusion of natural as well as anthropogenic events. Approximately 80 percent of these systems were lotic, and the remainder were lentic (lakes and ponds). The impacts were due to such disturbances as persistent and nonpersistent chemicals, logging, flooding, channelization, dredging, and drought. Reported endpoints for recovery were sparse for phytoplankton, periphyton, and macrophytes, but were numerous for macroinvertebrates and fishes. Because more than one recovery endpoint was reported for most studies, the number of endpoints greatly exceeded the number of case studies. For short-term (nonpersistent) disturbances, approximately 85 percent of all macroinvertebrate endpoints indicated recovery in less than 2 years. Macroinvertebrate biomass, density, and taxonomic richness recovered in less than 1 year for approximately 95 percent of reported endpoints. Dipterans (flies, mosquitos, midges, etc.), which generally have short generation times or high dispersal ability, recovered most rapidly, whereas stoneflies and caddisflies recovered least rapidly. Fishes recovered in 2 years or less for over 85 percent of reported endpoints. However, as discussed below, important exceptions did occur.

Most excursions of criteria will be minor and their impacts will therefore be difficult to detect. Although most disturbances in the above case studies caused more severe impacts than most criteria excursions are expected to

cause, CMC excursions will result in death of some organisms. These data indicate that as a general rule, the purpose of the average frequency of allowed excursions will be achieved if the frequency is set at once every 3 years on the average. Excursions of the CCC are more difficult to evaluate because nonlethal excursions could not be evaluated from the data used by Niemi et al. [38]. It is reasonable to expect, however, that cumulative effects from too frequent excursion of the CCC also will result in unacceptable degradation of lotic communities.

Considerations for Proposing Site-specific Increases or Decreases in the Average Frequency of Allowed Excursions

Although an average frequency of one criterion excursion every 3 years should usually be protective of lotic communities, more frequent excursions might be acceptable in certain situations. Sedell et al. [39] have shown that lotic systems with refugia (areas of refuge) such as well-developed riparian zones, connected flood plains and meanders, snags, etc., recover more rapidly from disturbances than segments without such refugia, because organisms are better able to avoid disturbances and return or repopulate. However, many of these refugia are likely to be most restricted and vulnerable during the low-flow periods when criteria excursions also are most likely to occur. Evidence of action to preserve refugia, particularly during low-flow periods, or to create or restore them, might be grounds for demonstrating that an excursion frequency of more than once every 3 years on the average is acceptable. Schlosser [36] found that lower-order (i.e., headwater) streams, because of their natural high variability, contain communities consisting of species that have short life cycles and/or high dispersal ability and can recover from major disturbances in a year or even less. Thus, many lower-order streams, particularly those for which refugia are available, may be able to tolerate somewhat higher excursion frequencies, unless other considerations are important. For example, discharges to lower-order streams sometimes constitute a large fraction of the stream flow for most of the year.

Although lower-order streams are naturally highly variable and can therefore tolerate higher disturbance frequencies, the converse is true for higher-order lotic streams for at least two partially related reasons: (1) segments with tributaries draining a large watershed will be buffered from the effects of localized droughts in a portion of the watershed, and will therefore experience a less severe natural disturbance regime, and (2) organisms inhabiting these segments will therefore not be adapted to disturbances that are as frequent or severe as those in lower-order segments. Fish in particular will be larger and have longer generation times in larger streams and rivers. Consequently, it will take longer for these populations to reproduce and regain predisturbance densities and size class distributions. Schlosser [36] suggests that, based on such life-history characteristics, fish communities in larger rivers might take 20 to 25 years to re-establish the predisturbance age and size structure of their component populations after a severe disturbance such as a major drought or spill.

Extreme cases in which recovery has taken much longer than 3 years usually involve spills of persistent chemicals or severe habitat modification, such as stream channelization or clear-cutting of a watershed [38]. If the chemical contaminant is not widespread, recovery is limited primarily by the rate of disappearance of the chemical rather than by strictly ecological processes. Widespread contamination can affect recovery by increasing the distance over which recolonizers must travel. Watershed clear-cutting reduces the input of organic matter that provides the food base of streams in forested watersheds and also provides woody debris and snags that serve as refugia. Channelization and dredging reduce the in-stream habitat diversity and thereby decrease refugia. In addition to these anthropogenic disturbances, multiple excursions during a drought, due to low-flow conditions, can result in a severe cumulative impact on sensitive species even if the individual excursions are small. Special measures, such as plant shutdowns, might be required in extreme cases. Finally, severe chemical spills, which cannot be regulated but which will occur in any highly industrialized river segment, will affect aquatic life over a large area. If maintenance of long-lived fish species in these segments is desired, recovery periods up to 25 years may be necessary.

Based on the above considerations, recovery periods longer than 3 years may be necessary after multiple minor excursions or after a single major excursion or spill during a low-flow period in medium-to-large rivers, and up to 25 years where long-lived fish species are to be protected. Even longer times may be necessary as the size of the affected area or the persistence of the pollutant increases.

Calculation of Design Conditions

The use of aquatic-life criteria for developing water quality-based permit limits and for designing waste treatment facilities requires the selection of an appropriate wasteload allocation model. Dynamic models are preferred for the application of aquatic-life criteria in order to make best use of the specified concentrations, durations, and frequencies. If dynamic models cannot be used, then an alternative is steady-state modeling. Because steady-state modeling is based on various simplifying assumptions, it is less complex, and might be less realistic, than dynamic modeling.

An important step in the application of steady-state modeling to streams is calculating the design flow. The procedures outlined in the EPA document *Technical Guidance Manual for Performing Waste Load Allocation, Book 6, Design Conditions: Chapter 1, Steam Design Flow for Steady-State Modeling.* (U.S. EPA 1986) are recommended for calculating design flows for rivers and streams. States may use other methods so long as the methods are technically defensible. The document discusses and recommends two methods for determining design flows, the hydrologically based method and the biologically based method, and the flows that should be used for the CCC and CMC for both methods.

The hydrologically based design flow method is presently used by many States. It is based on selecting and identifying an extreme value, e.g., the 7Q10 flow. The underlying assumption of this method is that the design flow will occur X number of times in Y years. Thus, this method limits the number of years in which one or more excursions below the design flow can occur. The method has two advantages: (1) the log-Pearson Type III flow estimating technique or other extreme value analytical techniques that are used to calculate flow statistics from daily flow data are consistent with past engineering and statistical practice, and (2) the U.S. Geological Survey provides technical support for this method. The disadvantage of this method is that it is essentially independent of biological considerations. Design flows calculated using this method might allow more or fewer excursions than once every 3 years on the average. In addition, it is difficult to use site-specific durations and frequencies with this method. For toxic wasteload allocation studies in which the hydrologically based method is used, EPA recommends the use of the 1Q10 flow as the design flow for the CMC and the 7Q10 as the design flow for the CCC.

The biologically based design flow method was developed by the U.S. EPA Office of Research and Development and directly uses the averaging periods and frequencies specified in the aquatic-life water quality criteria for individual pollutants and Whole Effluents for determining design flows. The method is an empirical iterative convergence procedure that includes the calculation of harmonic means of the flow to determine the total number of excursions. The method makes exact use of whatever duration and frequency are specified for the CMC and CCC. These might be 1 day and 3 years for the CMC and 4 days and 3 years for the CCC or site-specific durations and frequencies.

The two methods were used on approximately 60 different rivers to compare the hydrologically based 1Q10 and 7Q10 design flows with the biologically based 1-day/3-year and 4-day/3-year design flows. For most of the rivers the hydrologically based design flows resulted in more than the allowed number of excursions. For some of the rivers, the 1Q10 and 7Q10 allowed substantially more or fewer excursions than the intended number of excursions. Because the biologically based method calculates the design flow directly from the national or site-specific duration and frequency, it always provides the maximum allowed number of excursions and never provides more excursions than allowed.

EPA provides software tools to calculate both types of design flows via the STORET environment on its NCC-IBM mainframe. Biologically based design flows can be calculated using the program DFLOW [40]. The hydrologically based design flows can be calculated using FLOSTAT or DFLOW; the latter uses a simplified version of the log-Pearson Type III method. Both programs access the STORET Flow file that contains daily flow records for U.S. Geological Survey gaging stations. They are easy to use and the user simply needs to know

the identification number of the gaging station. To obtain further information on the STORET environment and the programs, contact:

Mr. Thomas Pandolfi
U.S. Environmental Protection Agency
Office of Water Regulations and Standards (WH-553)
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The methods described above use daily flow data to determine design flow, but they do not consider any other physical or chemical condition that might affect toxicity. EPA has prepared a supplementary method and a software tool named DESCON that incorporate such supplemental water quality parameters as temperature, pH, alkalinity, hardness, and dissolved oxygen to determine design conditions. Note that DESCON takes into account such things as effluent variability, which DFLOW does not take into account. The method and software are described in two documents available from the Assessment and Watershed Protection Division of the Office of Water Regulations and Standards—*Technical Guidance on Supplementary Stream Design Conditions for Steady State Modeling* [3] and *DESCON Users Manual* [40].

The supplementary method is consistent with the hydrologically and biologically based methods described above. It simply extends them to include other conditions besides streamflow. The advantage of considering multiple conditions is that the worst-case conditions necessary to protect water quality criteria might not occur when the streamflow is low; e.g., low DO or high temperatures might occur at times other than when the flow is low.

This supplementary method can be used for five pollutant categories with the physical-chemical parameters described above. The pollutant categories are general toxicant, ammonia, heavy metals (Cd, Cr^{+3}, Cu, Pb, Ni, Zn), pentachlorophenol, and ultimate oxygen demand.

The software tool to facilitate this method is called DESCON. It is on EPA's IBM mainframe and is available through the STORET environment. DESCON accesses the STORET flow file for the daily flow record and the water quality file for data on the physical-chemical parameters. Options are available to the user if the area of concern has no flow record or if no water quality data are available.

APPENDIX D
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Appendix E

Lognormal Distribution and Permit Limit Derivations

LOGNORMAL DISTRIBUTION AND PERMIT LIMIT DERIVATIONS

Introduction

This appendix provides supporting information for the statistical methodology used in permit limit calculations. The methodology described in this appendix applies to many types of data including data that are used to develop both technology-based and water quality-based permit limits. The appendix is divided into two sections. The first section gives an overview of permit limits: the derivation of water quality-based limits and the consistency among different permit limits. The second section describes the statistical methodology for the normal distribution, the lognormal distribution, the delta-lognormal distribution, methods of checking distributional assumptions, and correlation. This section also provides guidance on the application of each distribution to permit limits. Tables E-1, E-2, and E-3 at the end of the appendix summarize the permit limit calculations. This appendix describes the statistical methodology for three distributions that are often used in determining permit limits. Other distributions can be used, and this topic is discussed in the subsection, Other Distributions.

Section 1: Overview of Permit Limits

Two types of permit limits are contained in the effluent guidelines regulations: daily maximum limits and monthly average limits. The daily maximum permit limit is the maximum allowable value for any daily sample. The daily maximum limits are usually based on the 99th percentile of the distribution of daily measurements. The monthly average permit limit is the maximum allowable value for the average of all daily samples obtained during 1 month. Monthly average limits are in most cases based on the 95th percentile of the distribution of averages of daily values.

The following two subsections discuss the derivation of water quality-based limits and the consistency among different permit limits.

Derivation of Water Quality-based Limits

Water quality-based limits are derived from the required treatment system performance necessary to comply with the wasteload allocation (WLA). Technology-based effluent limits are derived from treatment system performance. The mathematical expressions for water quality-based limits are the same as those for technology-based effluent limits; the major difference is that the means and standard deviations in those expressions are derived from the WLA. This topic is discussed in Chapter 5.

Consistency Among Different Permit Limits

The current Technical Support Document for Water Quality-based Toxics Control (TSD) procedures provide consistency among different permit limits. The stringency of permit limits is independent of monitoring frequency and is determined entirely by the WLA and permit limit derivation procedures. The daily maximum limit is constant regardless of monitoring frequency. The numerical value of the monthly average limit decreases as monitoring frequency increases only because averages become less variable as the number of values included in the average increases. For example, an average based on 10 samples is less variable than an average based on 4 samples. This phenomenon makes monthly average permit limits based on 10 samples **appear** to be more stringent than the monthly limit based on 4 samples. A permittee performing according to the WLA specifications will in fact be equally capable of meeting either of these monthly average limits when taking the corresponding number of samples. The stringency of the TSD procedures, accordingly, is **constant** across monitoring frequencies.

Section 2: Statistical Methodology

The statistical procedures that are used in permit limit development involve fitting distributions to effluent data. The estimated upper percentiles of the distributions form the basis of the limits. This section describes the statistical methodology applied to permit limits in the following subsections: the normal distribution, the lognormal distribution, the delta-lognormal distribution, methods of checking distributional assumptions, and correlation. Before discussing these topics several definitions are made for notation, assumptions, coefficients of variation, and variability factors.

Notation

In the calculations in this appendix, natural logarithms (i.e., logarithms to the base e), denoted by ln(x), are used. The calculations can be modified to use logarithms to the base 10 by replacing $\log_{10}(x)$ for ln(x) in the formulas.

Assumptions

The distribution fitting methods assume that the daily measurements are independent, uncorrelated observations.

The fundamental assumptions underlying the discussion on calculating limits are:

- Daily pollutant measurements are approximately lognormally distributed for values above the detection limit
- Maximum n-day monthly averages for $n \leq 10$ are approximately lognormally distributed above the detection limit
- Maximum n-day monthly averages for $n > 10$ are normally distributed.

Recommendation of the use of the lognormal distribution for daily pollutant measurements is based on practical rather than theoretical consideration. Usually environmental data sets possess the basic lognormal characteristics of positive values and positive skewness. In addition, the lognormal distribution is flexible enough to model a range of nearly symmetric data. Furthermore, in comparison to other positive valued, positively skewed distributions that could be used to model environmental data, the lognormal is relatively easy to use.

When lognormal data are log transformed, the properties of the normal distribution apply to the transformed data. The section on statistical methodology describes the properties of the normal distribution and its relationship to the lognormal distribution. The delta-lognormal distribution is a generalization of the lognormal distribution and may be used to model data that are a mixture of non-detect measurements with measurements that are lognormally distributed. In delta-lognormal procedures, nondetect values are weighted in proportion to their occurrence in the data.

In determining permit limits based on averages (e.g., monthly average permit limits), a distribution should be used that approximates the distribution of an average of pollutant measurements. The lognormal distribution can be used for approximating the distribution of averages for small sample sizes where the individual measurements are approximately lognormally distributed. For larger sample sizes, a powerful statistical result, called the Central Limit Theorem, provides theoretical support for determining limits based on averages of individual measurements. According to the Central Limit Theorem, when the sample size n is large enough, the average of the n sample values will be approximately normally distributed regardless of the distribution of the individual measurements. The section on statistical methodology provides procedures and guidance for calculating averages for both small and large samples sizes where the individual measurements are lognormally distributed.

The shape of the observed data is the key factor in evaluating a distributional model. For environmental data the lognormal distribution is usually appropriate. The critical question in a given situation is how well a particular distribution models the shape of observed data. Although the lognormal does not provide an exact fit in all cases, it usually provides an appropriate and functional fit to observed environmental data. Graphical displays and goodness-of-fit tests, as described in the subsection, Other Distributions, may be used as a guide in verifying assumptions and selecting a distribution.

Coefficients of Variation

The coefficient of variation (denoted by "CV") is the ratio of the standard deviation to the mean. Thus, the CV is a dimensionless measure of the relative variability of a distribution. Estimates of the CV can be used when the actual CV cannot be calculated or if the available data sets for calculating the CV are small. In such cases, different values for the CV should be used in the permit calculations to assess the effect of the CV on the final permit limit. Typical values of the CV for effluent data usually range from 0.2 to 1.2. The CV is a measure of the relative variation in observed data. In many cases, changes in the CV will have little impact on the final permit limit. In assessing the sensitivity of the permit limit to the CV, the calculations may include CV = 0.6 as a conservative estimate (assumes relatively high variability). If the final permit values vary greatly with different CV values either of two approaches may be used. The first approach is to use a conservative estimate of the CV that assumes relatively high variability (e.g., CV = 0.6) in the final permit limit. The second approach is to collect additional data to obtain a more definitive value for the CV.

Variability Factors

An important component of the process used by the Environmental Protection Agency (EPA) for developing technology-based limits are variability factors. The variability factor is the ratio of a large concentration level of a pollutant to the average level determined from that particular plant. The ratio expresses the relationship between the average treatment performance level and large values that would be expected to occur only on rare occasions in a well-designed and operated treatment system. Such factors are useful in situations where little data are available to characterize the long-term performance of a plant.

In cases where only a small number of observations are available from a plant, EPA has been reluctant to estimate a variability factor. In the Organic Chemicals, Plastics, and Synthetic Fibers (OCPSF) rulemaking [1], a minimum of seven daily observations from a plant, with at least three of the seven above the detection limit, was established for calculation of a plant level priority pollutant variability factor. However, EPA has not established a minimum number of observations required for calculating variability factors for all pollutants in all industries.

The calculations for variability factors for the daily maximum and the monthly average are included in the discussion of the different distributions below.

Normal Distribution

The normal distribution plays a central role in the methods described in this appendix. In most cases, the normal distribution is not an appropriate model for individual pollutant measurements; however, the normal distribution is related to the lognormal distribution that is used to establish many permit limits. In most cases, the simple logarithmic transformation of effluent and water quality data results in data distributions that are normally distributed. Such data are referred to as being lognormally distributed. When lognormal data are log transformed, the properties of the normal distribution apply to the transformed data. Since the normal and lognormal distributions are related in a straightforward manner, the methods of analysis for normal and lognormal data also are easily related. The normal distribution is described below and is followed by a discussion of the lognormal distribution and its relationship to the normal distribution.

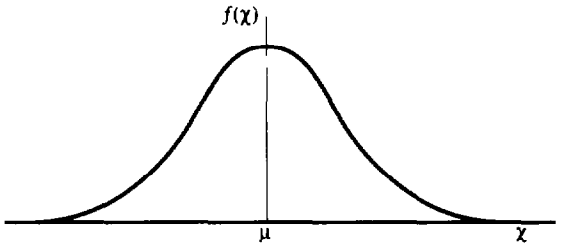

Figure E-1. Normal Probability Distribution

The normal probability distribution is encountered in a number of applications. The bell-shaped curve of the normal distribution is shown above in Figure E-1. Excellent introductions and reviews of the normal distribution are found in numerous statistical, engineering, and scientific texts, as for example in Reference 2. Only a brief review is given here.

A sample of independent observations, denoted by $x_1, x_2, \ldots, x_k$, from a normally distributed population can be used to estimate the mean, μ, and variance, σ^2, according to the formulas below:

$$\begin{aligned}
\hat{\mu} &= \text{estimated mean} \\
&= \Sigma[x_i] / k,\ 1 \le i \le k \\
\hat{\sigma}^2 &= \text{estimated variance} \\
&= \Sigma[(x_i - \hat{\mu})^2] / (k - 1),\ 1 \le i \le k \\
\hat{\sigma} &= \text{estimated standard deviation} \\
&= (\hat{\sigma}^2)^{1/2} \\
\hat{cv} &= \text{estimated coefficient of variation} \\
&= \hat{\sigma} / \hat{\mu}
\end{aligned}$$

The characteristics of the normal distribution are the range is defined for positive and negative values, and the frequency curve is bell-shaped and symmetric about the mean. In most cases, the normal distribution is not an appropriate model for the distribution of individual pollutant measurements. Environmental data rarely are symmetric, which is a fundamental property of the normal distribution. In addition, the normal distribution is defined over a range that includes negative values while pollutant measurements are restricted to nonnegative values. Thus, fitting a data set to a normal distribution allows for the possibility, however small, of observing negative values. The lognormal distribution, or any positive valued distribution, is not defined for negative values and thus avoids assigning any probability to negative values.

Daily Maximum Permit Limits Based on the Normal Distribution

For data sets which have the characteristics of the normal distribution, the daily maximum permit limits can be calculated. The upper percentile daily maximum permit limits for the normal distribution are calculated using the quantity z_p, the standardized Z-score for the pth percentile of the standardized normal distribution (i.e., normal distribution with mean = 0, and variance = 1). For example, the Z-score for the 95th percentile is 1.645. Z-scores are listed in tables for the normal distribution (in most statistical textbooks and references). The pth percentile daily maximum limit is estimated by:

$$\begin{aligned}
\hat{X}_{.p} &= \text{pth percentile daily maximum limit} \\
&= \hat{\mu} + z_p\,\hat{\sigma}.
\end{aligned}$$

For example:

$\hat{X}_{.95}$ = 95th percentile daily maximum limit
= $\hat{\mu} + 1.645\ \hat{\sigma}$
$\hat{X}_{.99}$ = 99th percentile daily maximum limit
= $\hat{\mu} + 2.326\ \hat{\sigma}$

Note:

$Z_{95} = 1.645$
$Z_{99} = 2.326$

The daily variability factors (denoted by VF_1) are estimated by:

Daily maximum 95th percentile $VF_1 = \hat{X}_{.95} / \hat{\mu}$

Daily maximum 99th percentile $VF_1 = \hat{X}_{.99} / \hat{\mu}$

Monthly Average Permit Limits Based on the Normal Distribution

The normal distribution can be used to model the averages of the individual measurements for a wide range of circumstances. Although the normal distribution usually is not an appropriate model for individual pollutant measurements, the averages of those individual measurements can often be modeled by the normal distribution. This subsection explains the theory behind using the normal distribution for averages and provides the general formulas.

A powerful statistical result, called the Central Limit Theorem, provides theoretical support for determining limits based on averages of individual measurements. According to the Central Limit Theorem, when the sample size n is large enough, the average of the n sample values will be approximately normally distributed regardless of the distribution of the individual measurements. In determining permit limits, the calculations incorporate the number of samples that will be required for monitoring purposes during the specified time period (usually a month). For the purposes of permit writing, monitoring sample sizes greater than 10 are recommended to be sufficiently "large enough" to assume the sample average is approximately normally distributed. The above formulas can be modified for finding the estimated mean and variance for the average from a sample of size n (e.g., for 14-day monthly average, n = 14 samples during the month for monitoring purposes). The parameters μ_n and σ_n^2 denote the mean and variance, respectively, of the distribution of the average of n values. The estimates of the n-day average and the variance of the n-day average are denoted by $\hat{\mu}_n$ and $\hat{\sigma}_n^2$, respectively.

$\hat{\mu}$ = estimated mean of distribution of X
$\hat{\sigma}^2$ = estimated variance of distribution of X
$\hat{\mu}_n$ = mean of distribution of the n-day monthly average
= $\hat{\mu}$
$\hat{\sigma}_n^2$ = variance of distribution of the n-day monthly average
= $\hat{\sigma}^2 / n$
$\hat{\sigma}_n$ = standard deviation
= $(\hat{\sigma}_n^2)^{1/2}$
$\hat{cv}_n$ = coefficient of variation
= $\hat{\sigma}_n / \hat{\mu}_n$.

The upper percentile limits are:

$$\hat{X}_{.p} = \text{pth percentile n-day monthly average limit}$$
$$= \hat{\mu}_n + z_p \hat{\sigma}_n$$

where z_p is the pth percentage point of the standard normal distribution.

For example:

$$\hat{X}_{.95} = \text{95th percentile n-day monthly average limit}$$
$$= \hat{\mu}_n + 1.645\ \hat{\sigma}_n$$
$$\hat{X}_{.99} = \text{99th percentile n-day monthly average limit}$$
$$= \hat{\mu}_n + 2.326\ \hat{\sigma}_n$$

Note:

$$Z_{95} = 1.645$$
$$Z_{99} = 2.326.$$

The monthly average variability factors (denoted by VF_n) are estimated by:

Monthly average 95th percentile $VF_n = \hat{X}_{.95} / \hat{\mu}$

Monthly average 99th percentile $VF_n = \hat{X}_{.99} / \hat{\mu}$

The above discussion of the normal distribution can be modified for data from the lognormal distribution. The next subsection explains the modifications.

Lognormal Distribution

Experience has shown that daily pollutant discharges are generally lognormally distributed. The distributional fit of the data varies somewhat from application to application, but not enough to alter the conclusion that effluent pollutant discharges are generally lognormally distributed. Ambient water quality data also are often lognormally distributed. Figure E-2 displays the positively skewed shape of the lognormal distribution.

The distribution fitting methods assume that the daily measurements are independent, uncorrelated observations. Although, in general, this assumption is not satisfied exactly, the lognormal distribution has been used in the effluent guidelines program primarily because it consistently provides a reasonably good fit to observed effluent data distributions. Figure E-3 shows the lognormal distribution applied to data used in the development of the OCPSF effluent guidelines regulation [1].

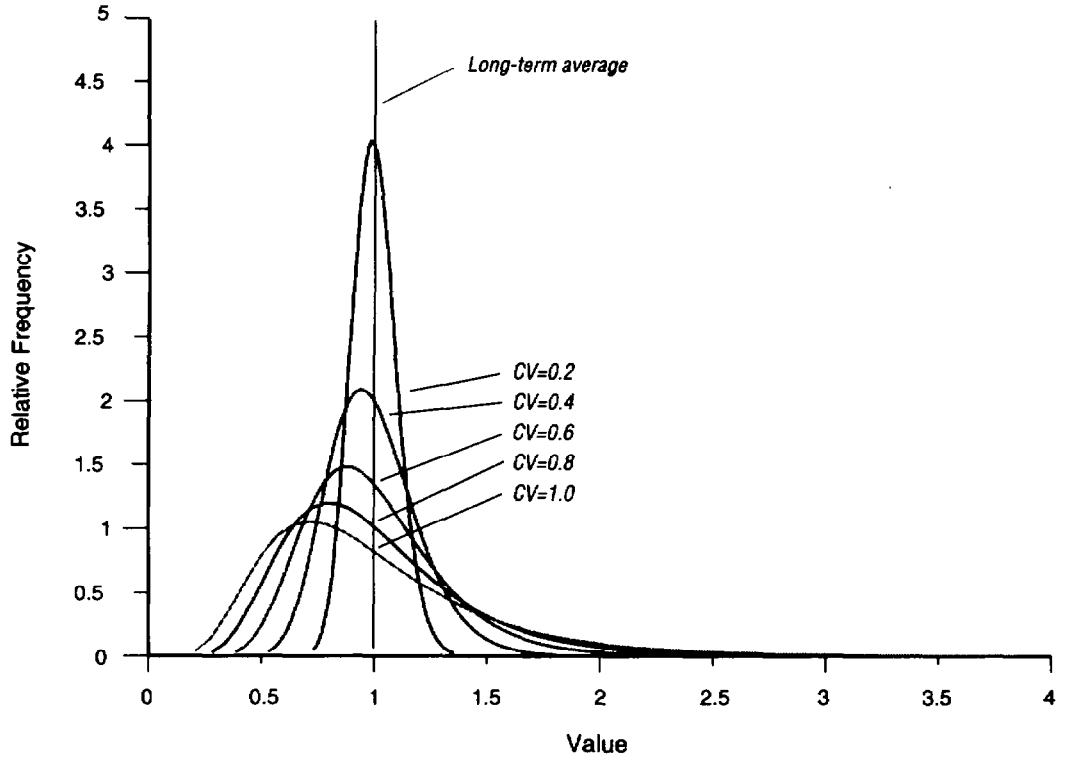

Figure E-2. Examples of Lognormal Densities

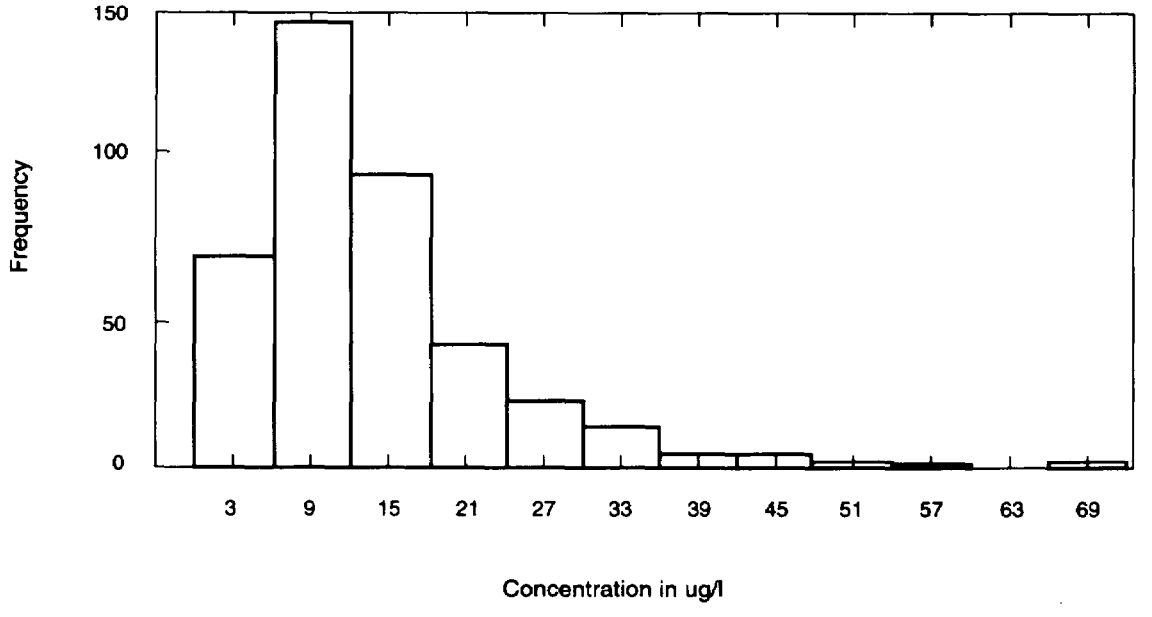

Figure E-3. BOD Frequency Distribution - Plant C

The logarithmic transformation of the random variable X, Y = ln(X) results in a random variable Y that is normally distributed. Therefore, the analysis procedures for analyzing lognormal data are similar to those for the normal distribution. The mean and variance from the normal distribution of the random variable Y are σ_y, and $\hat{\sigma}_y^2$ respectively. These parameters can be estimated by:

$$\hat{\mu}_y = \Sigma(y_i) / k$$

and

$$\hat{\sigma}_y^2 = \Sigma[(y_i - \hat{\mu})^2] / (k - 1), \text{ respectively}$$

where

$$y_i = \ln(x_i) \text{ for } i=1,2,\ldots k.$$

When data are lognormally distributed, these values from the normal distribution can then be used to calculate the mean, variance, and coefficient of variation for the random variable X that is lognormally distributed. The mean, variance, and coefficient of variation of the random variable X may be estimated by $\hat{E}(X)$, $\hat{V}(X)$, and $c\hat{v}(X)$, respectively.

$$\begin{aligned}
\hat{E}(X) &= \text{daily average} \\
&= \exp(\hat{\mu}_y + \hat{\sigma}_y^2 / 2) \\
\hat{V}(X) &= \text{variance} \\
&= \exp(2\hat{\mu}_y + \hat{\sigma}_y^2)[\exp(\hat{\sigma}_y^2) - 1] \\
c\hat{v}(X) &= \text{coefficient of variation} \\
&= [\exp(\hat{\sigma}_y^2) - 1]^{1/2}.
\end{aligned}$$

Daily Maximum Permit Limits Based on the Lognormal Distribution

The upper percentile limits for the random variable X (which is lognormally distributed) are:

$$\begin{aligned}
\hat{X}_{.p} &= \text{pth percentile daily maximum limit} \\
&= \exp[\hat{\mu}_y + z_p \hat{\sigma}_y^2]
\end{aligned}$$

where z_p is the pth percentage point of the standard normal distribution.

For example:

$$\begin{aligned}
\hat{X}_{.95} &= \text{95th percentile daily maximum limit} \\
&= \exp[\hat{\mu}_y + 1.645\,\hat{\sigma}_y] \\
\hat{X}_{.99} &= \text{99th percentile daily maximum limit} \\
&= \exp[\hat{\mu}_y + 2.326\,\hat{\sigma}_y].
\end{aligned}$$

Note:

$$\begin{aligned}
Z_{95} &= 1.645 \\
Z_{99} &= 2.326.
\end{aligned}$$

The daily maximum variability factors (denoted by VF_1) are estimated by:

Daily maximum 95th percentile $VF_1 = \hat{X}_{.95} / \hat{E}(X)$

Daily maximum 99th percentile $VF_1 = \hat{X}_{.99} / \hat{E}(X)$.

Monthly Average Permit Limits Based on the Lognormal Distribution

This subsection contains the formulas required to approximate the distribution of the average of a small number of lognormally distributed values with another lognormal distribution. Although, the Central Limit Theorem holds that the average of a sample of independent measurements is normally distributed provided that the number of measurements, n, is sufficiently large, the minimum value for n required in specific cases may vary considerably. In cases where the individual values are lognormally distributed, the minimum required for the average to be normally distributed may be quite large. As a consequence, the distribution of the average of a small number of lognormally distributed values may be better approximated by another, related lognormal distribution [3]. For sample sizes larger than 10 when the data are lognormally distributed, it is recommended that the calculations given in Table E-3 should be used. For the purposes of permit writing, monitoring sample sizes of 10 or less are recommended to be "small enough" to assume the sample average is approximately lognormally distributed. The mean, variance, and coefficient of variation of the distribution of the average of n daily values are $\hat{\mu}_n$, $\hat{\sigma}_n^2$, and $\hat{cv}$, estimated by:

$$\hat{\sigma}_n^2 = \text{variance}$$
$$= \ln\{\hat{V}(X) / [n[\hat{E}(X)]^2] + 1\}$$
$$\hat{\mu}_n = \text{n-day monthly average}$$
$$= \ln(\hat{E}(X)) - 0.5\,\hat{\sigma}_n^2$$
$$\hat{\sigma}_n = \text{standard deviation}$$
$$= (\hat{\sigma}_n^2)^{1/2}$$
$$\hat{cv}_n = \text{coefficient of variation}$$
$$= [\exp(\hat{\sigma}_n^2) - 1]^{1/2}$$

where

$$\hat{E}(X) = \exp(\hat{\mu}_y + \hat{\sigma}_y^2 / 2)$$
$$\hat{V}(X) = \exp(2\,\hat{\mu}_y + \hat{\sigma}_y^2)\,[\exp(\hat{\sigma}_y^2) - 1].$$

The upper percentile limits of the maximum n-day monthly average are:

$$\hat{X}_{.p} = \text{pth percentile n-day monthly average limit}$$
$$= \exp[\hat{\mu}_n + z_p\,\hat{\sigma}_n]$$

where z_p is the pth percentage point of the standard normal distribution.

For example:

$$\hat{X}_{.95} = \text{95th percentile n-day monthly average limit}$$
$$= \exp[\hat{\mu}_n + 1.645\,\hat{\sigma}_n]$$
$$\hat{X}_{.99} = \text{99th percentile n-day monthly average limit}$$
$$= \exp[\hat{\mu}_n + 2.326\,\hat{\sigma}_n]$$

Note:

$Z_{95} = 1.645$
$Z_{99} = 2.326.$

The variability factors are:

Monthly average 95th percentile $VF_n = \hat{X}_{.95} / \hat{\mu}_n$
Monthly average 99th percentile $VF_n = \hat{X}_{.99} / \hat{\mu}_n$.

Delta-Lognormal Distribution

The delta-lognormal distribution is a generalization of the lognormal distribution. The delta-lognormal distribution may be used when the data contain a mixture of nondetect values and values above the detection limit and can be used to model nondetects in water quality-based limits. In delta-lognormal procedures, nondetect values are weighted in proportion to their occurrence in the data. The values above the detection limit are assumed to be lognormally distributed values. The delta-lognormal distribution can be used in setting daily maximum limits and for setting limits on monthly averages with the recommended number of monitoring samples being 10 or less.

The delta-lognormal distribution models data as the combination of two distributions: the lognormal distribution and a distribution with discrete probability of obtaining observations at or below the detection limit. The lognormal distribution models the observations above the detection limit. The nondetect values are modeled by the distribution with discrete probability of obtaining observations at or below the detection limit. The organic priority pollutant data set shown in Figure E-4 contains a number of observations that were reported as "nondetect." These detection limit measurements are observations that are censored at the detection limit and are represented by the left-most bar in the histogram. Data sets of this form are fairly typical of organic chemicals in wastewater. The delta-lognormal distribution often provides an appropriate and computationally convenient model for analyzing such data.

The estimation procedure for the delta-lognormal distribution assumes that a certain proportion, δ, of values are at the detection limit, which is denoted by D. (The estimation procedure when D = 0 is detailed in Reference 4. These values set to D are observations that can only by quantified as nondetect (ND) at some minimum level. This minimum level is the detection limit as established by the laboratory performing the chemical analysis.

Let $x_1, x_2, \ldots, x_r, x_{r+1}, \ldots, x_k$ denote a random sample of size k, with r observations recorded as nondetects, and k-r observations greater than the detection limit. The k-r positive observations are assumed to follow a lognormal distribution. The entire data set is assumed to follow the delta-lognormal distribution with censoring point equal to the detection limit D. Let $\hat{\mu}_y$ and $\hat{\sigma}_y^2$ be the sample mean and variance of the distribution of the logarithmic transformation Y = ln(X) of the observations greater than the detection limit. Let $\hat{\delta}$ be the sample proportion of nondetects. Then the estimates of the mean and variance of the delta-lognormal distribution are estimated by:

$$\hat{E}(X^*) = \text{daily average}$$
$$= \hat{\delta} D + (1 - \hat{\delta}) \exp(\hat{\mu}_y + 0.5\, \hat{\sigma}_y^2)$$
$$\hat{V}(X^*) = \text{variance}$$
$$= (1 - \hat{\delta}) \exp(2\, \hat{\mu}_y + \hat{\sigma}_y^2) [\exp(\hat{\sigma}_y^2) - (1 - \hat{\delta})] + \hat{\delta} (1 - \hat{\delta}) D [D - 2 \exp(\hat{\mu}_y + 0.5\, \hat{\sigma}_y^2)]$$
$$\hat{cv}(X^*) = \text{coefficient of variation}$$
$$= [\hat{V}(X^*)]^{1/2} / \hat{E}(X^*)$$

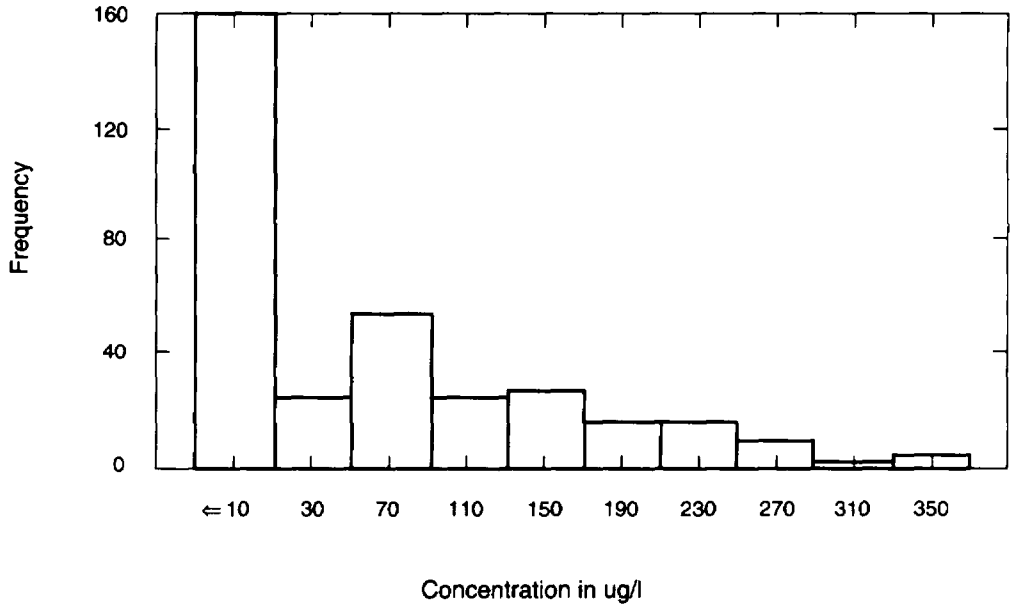

Figure E-4. Organic Priority Pollutant Frequency Distribution—Plant B

where

k = number of samples
D = detection limit
r = number of nondetect values in sample
$k\text{-}r$ = number of values greater than the detection limit
$y_i = \ln(x_i)$ $\quad r+1 \le i \le k, \quad r < k$
$\hat{\mu}_y = \Sigma(y_i) / (k - r)$ $\quad r+1 \le i \le k, \quad r < k$
$\hat{\sigma}_y^2 = \Sigma(y_i - \hat{\mu}_y)^2 / (k - r - 1)$ $\quad r+1 \le i \le k, \quad r < k$
$\delta = r / k$

Daily Maximum Permit Limits Based on the Delta-Lognormal Distribution

The 95th and 99th upper percentile limits for the random variable X (which is delta-lognormally distributed) are given by the following formulas:

The estimated 95th percentile daily maximum limit is:

$$\hat{X}_{.95*} = \begin{cases} D & \delta \ge 0.95 \\ \max\left[D, \exp(\hat{\mu}_y + z^* \hat{\sigma}_y^2\right] & \delta < 0.95 \end{cases}$$

where

$$z^* = \Phi^{-1}[(0.99 - \delta) / (1 - \delta)].$$

The estimated 99th percentile daily maximum limit is:

$$\hat{X}_{.99*} = \begin{cases} D & \delta \ge 0.99 \\ \max\left[D, \exp(\hat{\mu}_y + z^* \hat{\sigma}_y)\right] & \delta < 0.99 \end{cases}$$

where

$$z^* = \Phi^{-1}[(0.99 - \delta) / (1 - \delta)].$$

$\Phi^{-1}[\ ]$ is the mathematical notation for Z-scores. For example, when $\delta = 0$, then the corresponding value is

$\Phi^{-1}[.99] = Z_{99} = 2.326$. Values of $\Phi^{-1}[\ ]$ are available from tables of the normal distribution (available in most statistical textbooks and references).

The variability factors (denoted by VF) are estimated by:

Daily maximum 95th percentile VF = $\hat{X}_{.95} / \hat{E}(X)$
Daily maximum 99th percentile VF = $\hat{X}_{.99} / \hat{E}(X)$.

Delta-Lognormal Distribution of Averages

The derivation of the formulas for the averages computationally is difficult and beyond the scope of this appendix. However, the formulas for n-day averages are included in Table E-2. The derivation of 4-day monthly averages using the delta-lognormal distribution is available in Appendix VII-F of the Development Document for the OCPSF regulation [1]. For the purpose of permit writing, it is recommended that data sets of greater than 10 samples be assumed to fit the normal distribution and the averages be calculated using the formulas given in Table E-3.

Checking Distributional Assumptions

Two methods of checking distributional assumptions are goodness-of-fit and probability plots. When checking distributional assumptions, the sample size must be large enough. Small sample sizes may lead to erroneous conclusions.

Goodness-of-Fit Tests

In some cases, statistical goodness-of-fit tests may indicate that a particular distribution provides a reasonable fit to a data set of pollutant measurements. Such cases should be evaluated carefully to verify that the frequency curve for the data also show the shape characteristic of the distribution.

Probability Plots

Use of probability plots is one method of determining whether a normal distribution is appropriate for modeling a population using only a limited set of measurements. The set of measurements should have at least 20 observations [5]. Consider an independent sample of size k, labeled $x_1, x_2, \ldots, x_k$. Let $u_1, u_2, \ldots, u_k$ be the ordered sample of x-values in ascending order in which $u_1 \leq u_2 \leq, \ldots, \leq u_k$. Now for each u_i, find z_i from the normal table (in any statistical reference or textbook) such that $P[Z \leq z_i] = i/(k+1)$ and plot each pair (z_i, u_i) on linear graph paper (or use a computer graphics software package). If the data are from a normal distribution, they will fall approximately along a straight line.

This same method can be adapted to check the assumption of lognormality. Log-probability plots are similar to probability plots used for the normal distribution. To construct a log-probability plot, set $y_i = \ln(x_i)$ for $i=1,2,\ldots,k$ and then prepare a probability plot for the y_i, first by ordering the data as described in the previous section. If the data are from a lognormal distribution, they will fall approximately along a straight line, as illustrated by Figure E-5.

Other Distributions

If the probability plots or the log-probability plots show serious deviation from straight lines, other distributions should be considered. Nonparametric methods, which do not require the assumption that the data follow a particular distributional form, are often useful for this type of data. Further details are available in many statistical references (e.g., Reference 6).

Correlation

Up to this point, we have assumed that all the observed pollutant levels are independent, i.e., uncorrelated with one another. This subsection is not intended to address correlation between observed pollutant levels and plant operating factors that influence and control treatment performance.

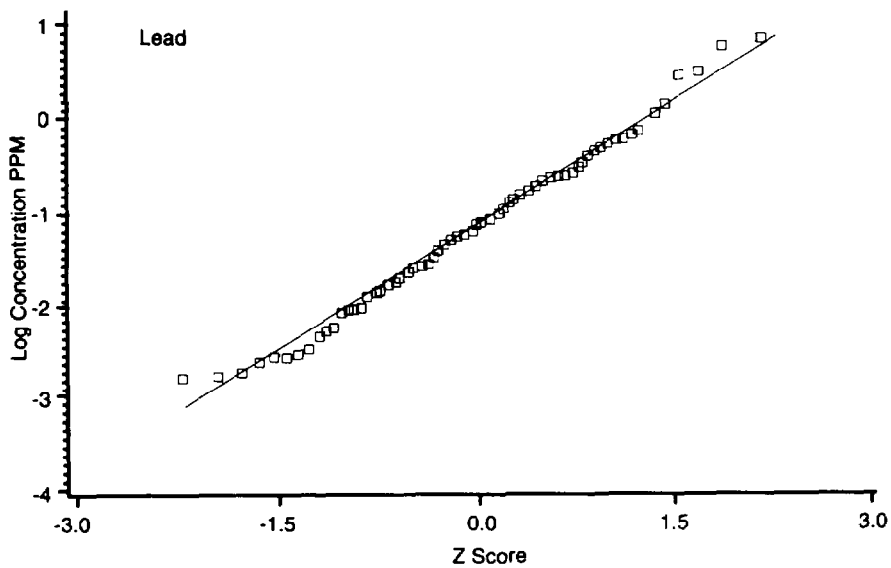

Figure E-5. Example of a Log-Probability Plot with a Normal Distribution

In the case of the monthly average limit derivation, the assumption that observed pollutant levels are independent can be quite important. If the effluent levels are correlated, the actual monthly average limit can be substantially higher than that derived from the analysis based on the independence assumption. However, correlation has essentially no effect on the calculated daily permit limits. This sub-section provides guidance on determining when levels may be correlated, and adjusting the sample size.

A major factor that determines whether effluent levels are highly correlated is the retention time of the wastewater treatment system. If the retention time is large relative to the time between effluent samples, then those samples will tend to be correlated with each other in most cases. In municipal systems, for example, the retention time is frequently a matter of days, and sampling is often conducted on a daily basis. The effluent levels, consequently, may be substantially correlated. However, in many industrial systems, for instance a physical/chemical treatment system for electroplating wastewaters, the treatment system retention time is relatively short 4 to 8 hours. Daily effluent levels from these kinds of systems are generally uncorrelated, i.e., statistically independent. These general patterns are the same irrespective of the kind of pollutant in question. Significant correlation between observed pollutant levels, when present, should be factored into monthly average permit limits.

Several different methods can be used to account for correlation in determining limits. One general approach involves time series modeling. Another possible approach is to use a direct computation of the covariance among the observed data to adjust the variance of the average used in determining the limit. Help in adjusting the sample size for correlation is available from the OW Statistics Section (phone number [202] 382-5397).

Table E-1. Daily Maximum Permit Limit Calculations

The daily maximum permit limit is usually the 99th upper percentile value of the pollutant distribution. In certain cases the 95th percentile value may be allowable. The following gives the formulas:

<u>WITH ALL MEASUREMENTS > DETECTION LIMIT</u> (based on lognormal distribution)

$\hat{X}_{.95}$ = 95th percentile daily maximum limit

$= \exp[\hat{\mu}_y + 1.645\ \hat{\sigma}_y]$

$\hat{X}_{.99}$ = 99th percentile daily maximum limit

$= \exp[\hat{\mu}_y + 2.326\ \hat{\sigma}_y]$

where

x_i = daily pollutant measurement i

y_i = $\ln(x_i)$

k = sample size of data set

$\hat{\mu}_y = \Sigma(y_i) / k \qquad 1 \le i \le k$

$\hat{\sigma}_y^2 = \Sigma[(y_i - \hat{\mu}_y)^2] / (k - 1) \quad 1 \le i \le k$

$\hat{E}(X) = \exp(\hat{\mu}_y + 0.5\ \hat{\sigma}_y^2)$

$\hat{V}(X) = \exp(2\ \hat{\mu}_y + \hat{\sigma}_y^2)\ [\exp(\hat{\sigma}_y^2) - 1]$

$\hat{cv}(X) = [\exp(\hat{\sigma}_y^2) - 1]^{1/2}$

Table E-1. Daily Maximum Permit Limit Calculations (continued)

WITH SOME MEASUREMENTS < DETECTION LIMIT (based on delta-lognormal distribution)

$\hat{X}_{.95}$ = 95th percentile daily maximum limit

$$\hat{X}_{.95} = \begin{cases} D & \delta \geq 0.95 \\ \max[D, \exp(\hat{\mu}_y + z^* \hat{\sigma}_y)] & \delta < 0.95 \end{cases}$$

with $z^* = \Phi^{-1}[(0.95 - \delta) / (1 - \delta)]$

$\hat{X}_{.99}$ = 99th percentile daily maximum limit

$$\hat{X}_{.99} = \begin{cases} D & \delta \geq 0.99 \\ \max[D, \exp(\hat{\mu}_y + z^* \hat{\sigma}_y)] & \delta < 0.99 \end{cases}$$

with $z^* = \Phi^{-1}[(0.99 - \delta) / (1 - \delta)]$

where

x_i	=	daily pollutant measurement i	
k	=	sample size of data set	
D	=	detection limit (as established by the laboratory)	
r	=	number of nondetects	($x_1, x_2, \ldots, x_r$ are $\leq D$)
$k - r$	=	number of detects	($x_{r+1}, x_{r+2}, \ldots, x_k$ are $> D$)
y_i	=	$\ln(x_i)$	for $r+1 \leq i \leq k$
δ	=	r / k	
$\hat{\mu}_y$	=	$\Sigma(y_i) / (k - r)$	$r+1 \leq i \leq k$ (exclude values $\leq D$ from sum)
$\hat{\sigma}_y^2$	=	$\Sigma[(y_i - \hat{\mu}_y)^2] / (k - r - 1)$	$r+1 \leq i \leq k$

$$\hat{E}(X^*) = \delta D + (1 - \delta) \exp(\hat{\mu}_y + 0.5\, \hat{\sigma}_y^2)$$

$$\hat{V}(X^*) = (1 - \delta)\exp(2\, \hat{\mu}_y + \hat{\sigma}_y^2)\, [\exp(\hat{\sigma}_y^2) - (1 - \delta)] + \delta\, (1 - \delta) D[D - 2 \exp(\hat{\mu}_y + 0.5\, \hat{\sigma}_y^2)]$$

Table E-2. Monthly Average Permit Limit Calculations for Ten Samples or Less

The monthly average permit limit is usually based on the estimates of the 95th percentile of the distribution of the average of the daily effluent values. For sample sizes less than or equal to 10, the data are assumed to be lognormally distributed (or delta-lognormally distributed if the data includes nondetects).

<u>ALL MEASUREMENTS > DETECTION LIMIT</u> (based on lognormal distribution)

$\hat{X}_{.95}$ = 95th percentile n-day monthly average limit

$= \exp[\hat{\mu}_n + 1.645\ \hat{\sigma}_n]$

$\hat{X}_{.99}$ = 99th percentile n-day monthly average limit

$= \exp[\hat{\mu}_n + 2.326\ \hat{\sigma}_n]$

where

x_i = daily pollutant measurement i

$y_i = \ln(x_i)$

k = sample size of data set

$\hat{\mu}_y = \Sigma(y_i) / k \qquad 1 \le i \le k$

$\hat{\sigma}_y^2 = \Sigma[(y_i - \hat{\mu}_y)^2] / (k - 1) \qquad 1 \le i \le k$

$\hat{E}(X) = \exp(\hat{\mu}_y + 0.5\ \hat{\sigma}_y^2)$

$\hat{V}(X) = \exp(2\ \hat{\mu}_y + \hat{\sigma}_y^2)[\exp(\hat{\sigma}_y^2) - 1]$

$\hat{\sigma}_n^2 = \ln\{\hat{V}(X) / (n[\hat{E}(X)]^2) + 1\}$

$\hat{\mu}_n = \ln(\hat{E}(X)) - 0.5\ \hat{\sigma}_n^2$

$\hat{cv}_n = [\exp(\hat{\sigma}_n^2) - 1]^{1/2}$

Table E-2. Monthly Average Permit Limit Calculations for Ten Samples or Less (continued)

SOME MEASUREMENTS < DETECTION LIMIT (based on delta-lognormal distribution)

$\hat{X}_{.95}$ = 95th percentile n-day monthly average limit

$$\hat{X}_{.95} = \begin{cases} D & \hat{\delta} \geq 0.95 \\ \max[D, \exp(\hat{\mu}_n + z^* \hat{\sigma}_n)] & \hat{\delta} < 0.95 \end{cases}$$

with $z^* = \Phi^{-1}[(0.95 - \hat{\delta}) / (1 - \hat{\delta})]$.

$\hat{X}_{.99}$ = 99th percentile n-day monthly average limit

$$\hat{X}_{.99} = \begin{cases} D & \hat{\delta} \geq 0.99 \\ \max[D, \exp(\hat{\mu}_n + z^* \hat{\sigma}_n)] & \hat{\delta} < 0.99 \end{cases}$$

with $z^* = \Phi^{-1}[(0.99 - \hat{\delta}) / (1 - \hat{\delta})]$

where

x_i	=	daily pollutant measurement i	
k	=	sample size of data set	
D	=	detection limit (as established by the laboratory)	
r	=	number of nondetects	($x_1, x_2, \ldots, x_r$ are $\leq D$)
$k - r$	=	number of detects	($x_{r+1}, x_{r+2}, \ldots, x_k$ are $> D$)
y_i	=	$\ln(x_i)$	for $r+1 \leq i \leq k$
$\hat{\delta}$	=	r / k	
$\hat{\mu}_y$	=	$\Sigma(y_i) / (k - r)$	$r+1 \leq i \leq k$ (exclude values $\leq D$ from sum)
$\hat{\sigma}_y^2$	=	$\Sigma[(y_i - \hat{\mu}_y)^2] / (k - r - 1)$	$r+1 \leq i \leq k$

$$\hat{E}(X^*) = \hat{\delta} D + (1 - \hat{\delta}) \exp(\hat{\mu}_y + 0.5\hat{\sigma}_y^2)$$

$$\hat{V}(X^*) = (1 - \hat{\delta}) \exp(2 \hat{\mu}_y + \hat{\sigma}_y^2) [\exp(\hat{\sigma}_y^2) - (1 - \hat{\delta})] + \hat{\delta} (1 - \hat{\delta}) D[D - 2 \exp(\hat{\mu}_y + 0.5 \hat{\sigma}_y^2)]$$

$$\hat{\sigma}_n^2 = \ln\{(1 - \hat{\delta}^n) [1 + A + B + C]\}$$

with

$$A = \hat{V}(X^*) / [n(\hat{E}(X^*) - \hat{\delta}^n D)^2]$$

$$B = -[\hat{\delta}^n D^2 (1 - \hat{\delta}^n)] / (\hat{E}(X^*) - \hat{\delta}^n D)^2$$

$$C = (2 \hat{\delta}^n D) / (\hat{E}(X^*) - \hat{\delta}^n D)$$

$$\hat{\mu}_n = \ln[(\hat{E}(X^*) - \hat{\delta}^n D) / (1 - \hat{\delta}^n)] - 0.5 \hat{\sigma}_n^2$$

Table E-3. Monthly Average Permit Limit Calculations for More Than Ten Samples

The monthly average permit limit usually is based on the estimates of the 95th percentile of the distribution of the average of the daily effluent values. These daily values are assumed to be lognormally distributed. For sample sizes larger than 10, the averages (represented by the random variable X_n) are assumed to be normally distributed.

$\hat{X}_{.95}$ = 95th percentile n-day monthly average limit

$= \hat{E}(X_n) + 1.645\,[\hat{V}(X_n)]^{1/2}$

$\hat{X}_{.99}$ = 99th percentile n-day monthly average limit

$= \hat{E}(X_n) + 2.326\,[\hat{V}(X_n)]^{1/2}$

where

x_i = daily pollutant measurement i

y_i = $\ln\,(x_i)$

k = sample size of data set

$\hat{\mu}y = \Sigma(y_i) / k, \qquad 1 \le i \le k$

$\hat{\sigma}_y^2 = \Sigma[(y_i - \hat{\mu}_y)^2] / (k - 1) \qquad 1 \le i \le k$

$\hat{E}(X) = \exp(\hat{\mu}_y + 0.5\,\hat{\sigma}_y^2)$

$\hat{V}(X) = \exp(2\,\hat{\mu}_y + \hat{\sigma}_y^2)\,[\exp(\hat{\sigma}_y^2) - 1]$

$\hat{E}(X_n) = E(X)$

$\hat{V}(X_n) = \hat{V}(X) / n$

$c\hat{v}(X_n) = \hat{V}(X_n)^{1/2} / (X_n)$

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APPENDIX F

SAMPLING

SAMPLING

The objective of an effluent or instream sampling program is to obtain a sample (or samples) from which a representative measure of the parameters of interest can be obtained. Unfortunately, many of the industrial and municipal National Pollutant Discharge Elimination System sampling protocols presently in use are carryovers from schemes used for calculating loadings of nutrients and oxygen-demanding substances, or were developed to evaluate treatment plant operational efficiency. Sampling for individual toxicants and particularly for effluent toxicity can require more specific (and thus different) sampling procedures.

Wastewater variability is an important consideration in selecting the method and frequency of sampling for both chemical analysis and toxicity testing. Industrial waste characteristics have been shown to vary in frequency, intensity, and duration [1]. As noted by Bender [2], the sources of effluent variability include both random and systematic components that influence both daily and annual characteristics of waste discharges. Although toxic pollutant loading may be of primary concern in assessing human health impact or bioaccumulation, loading may be of lesser importance in toxicity assessment than frequency, intensity, and duration of peak toxic discharge. Sampling must be tailored to measure the type of toxicity of importance for that discharge: either long-term (chronic) impact, which is a more constant effect, or short-term (acute) impact, which is more variable and subject to peaks of intensity.

There are several chemical parameters for which continuous analysis is possible. These include pH, temperature, dissolved oxygen, and other parameters involving instantaneous measurement. All other types of measurement involve some time period over which the analysis is conducted. Toxicity tests require an exposure period. Chemical tests require sample preparation and analysis. There is no continuous analysis method for toxicity.

It should be noted that although it is difficult to design a representative sampling program for toxicity analysis, the problems are of no greater magnitude than similar problems associated with obtaining a representative sample for conventional pollutants.

Sampling Methods

Continuous Flow Samples

For toxicity testing, the test organisms may be exposed to serial dilutions of a sample continuously pumped from the effluent pipe or ditch. In the case of effluents, if optimum accuracy is desired, then the ratio of effluent flow to test chamber volume can be scaled to simulate the time-varying concentration at the mixing zone boundary.

Although flowthrough methods can provide a realistic simulation of time-varying exposure, they are relatively expensive and are usually conducted on site. Therefore, flowthrough methods may only be practical where the goals of the analysis of impact require this type of testing or where treatment costs are sufficiently high that this type of analysis can be required. A flowthrough exposure method is not a continuous analysis because only one result or data point is obtained at the end of the test. However, the continuous exposure does provide some measure of time-varying exposure effects.

Discrete Samples

Grab or flow composited sampling provide a discrete sample for chemical analysis or toxicity testing. Static or renewal toxicity tests using discrete samples result in exposure of test organisms to a constant effluent composition over the period of the tests, or for the period between renewals.

If discrete samples are collected during peaks of effluent toxicity then constant concentration exposure static tests provide a measure of maximum effect.

Depending on the duration of a peak and the compositing period, composited samples may not be useful for examining toxicity peaks because the compositing process tends to dilute the peaks. Composited samples are

usually appropriate for chronic tests where peak toxicity of short duration is of less concern. The averaging effect of compositing may be misleading when testing for acute toxicity.

Grab samples must be collected at sufficiently frequent intervals to provide a high probability of sampling daily peaks. Fortunately static toxicity tests are relatively inexpensive and can be done on shipped samples; thus, it may be cost effective to conduct individual tests on a series of grab samples collected over a 24-hour period.

Sampling Frequency

Nonrandom effluent variability, resulting from batch processing, variable loadings, etc., is often known or can be determined. Therefore, the first step in designing a sampling program for chemical analysis or toxicity testing is to select the annual sampling frequency based on available site-specific operational information. This is important in selecting sampling periods for both continuous flow and discrete sampling methods.

If discrete sampling methods (grabs or composites) are used, then random variations between and within days for each sampling period must be considered. It is important to recognize the tradeoff between the long-term (between days) frequency and short-term (within days) frequency of sample collection and analysis for toxics. At present, the permit requirements for sampling and analyzing chemical parameters are site specific and generally involve a single grab or 24-hour composite sample collected at daily, weekly, or monthly intervals. Unfortunately, a sampling scheme involving a single daily grab or a 24-hour composite sample can conceal the presence of those daily extreme values that may be of importance. To optimize sampling cost and effectiveness, it may be desirable to reduce long-term frequency so that daily frequency can be increased.

For example, a weekly grab or composite involves 52 analyses per year. It may be more efficient to reduce the annual frequency to monthly or bimonthly, but collect and analyze four or eight grabs daily. Either scheme (12 x 4 or 6 x 8) would involve 48 analyses per year versus 52 for the weekly single sample approach. Assuming that daily toxic events of environmentally significant intensity and duration would not be masked by short-term composites, it might be more efficient to collect eight samples each composited over a 3-hour interval.

If costs or other constraints prohibit satisfactory daily and annual replication of sampling, then a level of uncertainty must be introduced into the calculations used to evaluate waste toxicity (see Section 3, Table 3-1).

Box F-1 presents EPA's recommendations on sampling methods.

Box F-1. Recommendations

The initial sampling design step should involve stratification of sampling periods to account for nonrandom sources of variation (e.g., batch processing). The second step includes selection of the frequency and the method of sampling to be conducted within each sampling period. Depending on site-specific considerations, several options are available.

- Flowthrough Methods — Ideally, for both acute and chronic effluent toxicity tests, the exposure of biota should simulate the time-varying concentration at a predetermined point in the receiving water. For regulatory purposes, the critical point is often the edge of the mixing zone where the waste should exhibit neither acute nor chronic toxicity. Therefore, if warranted by site-specific factors, it is recommended that test biota be exposed to a continuously collected flowthrough sample of serially diluted effluent. If no systematic annual variations (e.g., batch processing) are known or suspected, flowthrough testing can be conducted at a minimum of quarterly intervals for at least 1 year.
- Grab Sample Methods — Grab samples are recommended for chemical analyses and for acute and chronic toxicity tests where site conditions (such as wastewaters that are known to have relatively constant composition) do not require use of continuous flow methods. Grab samples of effluent or receiving water may be used for static or renewal acute toxicity tests, which may be conducted onsite or at a remote lab. The design of a toxics grab-sampling program must take into account the tradeoff between long-term and short-term sampling intensity. Where there is no ponding of wastes or retention time is insufficient for thorough mixing, it is important to collect or analyze a sufficient number of samples to provide a measure of daily spikes. Therefore, to minimize analytical costs where daily fluctuations are known or suspected, the annual sampling frequency should be reduced in favor of more intensive daily sampling. It is recommended that on an annual cycle, grab sampling and analysis include a minimum of four to six daily grabs collected monthly. An option could include the use of short-term (4-hour) composites rather than grabs. If site-specific data are available to indicate that treatment system retention time is adequate to minimize daily variations, then the daily replicates may be omitted in favor of more frequent annual sampling (e.g., weekly or semimonthly rather than monthly). If, to minimize costs in screening tests, only single samples are collected at infrequent intervals (e.g., quarterly) an uncertainty factor for variability should be used in the toxicity evaluation (see Section 3).
- Composite Sample Methods — If static or renewal methods are used for evaluation of toxicity, it is recommended that 24-hour, continuous-flow composite samples be collected. Considerations of annual frequency are the same as those for grab samples.

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APPENDIX G

THE DEVELOPMENT OF A BIOLOGICAL INDICATOR APPROACH TO WATER QUALITY-BASED HUMAN HEALTH TOXICS CONTROL

THE DEVELOPMENT OF A BIOLOGICAL INDICATOR APPROACH TO WATER QUALITY-BASED HUMAN HEALTH TOXICS CONTROL

Current Approach

With one exception (New Jersey), the chemical-specific approach to protecting human health is currently the only method used to regulate human health toxicants in effluents. The chemical-specific approach identifies the individual chemicals in an effluent and regulates them based upon health risk assessment information for each individual chemical. Where data are available for such human health toxicants, the chemical-specific approach can be used to develop permit limits.

However, the complex characteristics of effluent mixtures limit the effectiveness of the single-chemical approach. When used as the sole basis for identifying effluents of human health concern, the chemical-specific approach can overlook wastewaters potentially toxic to humans for the following reasons:

1. Analytical methods may not be sensitive enough to detect extremely small quantities of chemicals which may exert their effects on human health after a long latency period.
2. Human health data are limited or lacking for many of the §307(a) "priority" pollutants. Moreover, the number of human health toxicants discharged far exceeds the "priority" pollutants list.
3. The various chemical constituents of an effluent may resulting in synergistic, additive or antagonistic chemical effects.

As a result of these limitations, biological indicator tests have been developed for human health impact effluent screening, including both in vitro and in vivo tests. Though not yet widely implemented, biological indicator test results can be important supplements to a chemical-by-chemical effluent characterization.

Short-term biological indicator tests for human health impact screening are based on cellular-level responses, indicating whether the substances being tested are biologically active, and providing some measure of that activity. While these tests do not quantify the degree of toxicity to humans, they can be used to identify effluents with potential human health impacts, and regulatory priority-setting and targeting of dischargers for further chemical-specific analyses. Research is currently underway within EPA and in the private sector to evaluate various biological indicator test batteries for whole effluent analysis.

Biological Indicator Tests

Biological indicator tests include in vitro (test tube) and in vivo (whole animal) tests which can help form the first tiers of a single chemical evaluation process. A battery of simple biological tests can be used to test for the major types of effects which are underlying causes of potential health impact, since each biological test measures a different type of response. The results of these tests can be used to decide whether more definitive (and more resource-intensive) testing is needed to identify actual problem pollutants.

Test results can serve as triggers to additional chemical-specific analysis or more sophisticated definitive biological tests. Where results of these screening tools indicate potential health hazards, further characterization of the effluents, and regulation based upon toxicological data and/or chemical structure-activity relationships can proceed. If an effluent is extremely variable in other parameters, screening assays should be repeated periodically to ensure that potentially hazardous discharges are detected. Two types of biological indicator tests are discussed below: tests for non-threshold (no safe level exists) chemicals and tests for threshold (a safe level is presumed to exist) chemicals.

Genotoxicity Tests for Non-Threshold Chemicals

Genotoxicity is the ability of a substance to damage an organism's genetic material (its DNA). Certain positively-charged compounds tend to bind to DNA and may lead to permanent changes in the genetic information. Such damage to the DNA of reproductive (germ) cells can impair reproductive ability or can produce a change in the DNA structure that could be passed on to offspring as a heritable mutation. Alterations in the DNA of somatic cells can result in cancer or other diseases.

Interpretation of genotoxicity test results assumes that DNA damage in nonhuman cells may be predictive of latent diseases in humans such as genetic disorders, birth defects, and cancer. EPA believes that genotoxicity tests for point mutations, numerical and structural chromosome aberrations, DNA damage/repair and in vitro transformation provide supportive evidence of carcinogenicity [U.S. EPA, 1979 and 1987c]. In addition, wastewater mutagenicity tests could be used to detect genotoxic activity which can adversely affect aquatic biota [Black, et. al., 1980]. Several short-term assays have been developed which can assess genotoxic effects (discussed below).

For example, a correlation has been established between animal carcinogens and positive mutagenic responses in the Ames Test. The Ames test is often used to assess point mutation effects. The original correlation study revealed that 90% of tested carcinogens were detected as mutagens, while 87% of noncarcinogens were identified as nonmutagens. Other studies have determined that between 77% and 91% of tested carcinogens produce positive responses in the Ames test. The Ames Test has been used in over 2,000 laboratories worldwide for drug and food additive screening, product development, and environmental testing [New Jersey DEP, 1983].

To assess clastogenic effects (chromosomal breakage) either the mammalian sister chromatid exchange test or a mammalian cell chromosomal aberrations test can be conducted. Both of these tests typically use Chinese hamster ovary cell cultures and involve cytologic examination after exposure to determine if chromosomal effects are evident. The Organization of Economic Cooperation Development (OECD) test methodology is recommended [OECD]. EPA's Office of Toxic Substances and Office of Pesticides Programs also have published test methods [U.S. EPA 1982a and 1982b] that are consistent with the OECD tests.

Most effluent samples need special preparation (for example, concentration) to produce a measurable biological indicator test response for human health effects. When samples are concentrated, the response is calculated in terms of the pre-concentration sample. In addition, for genotoxicity tests, because many chemicals are not actively mutagenic in humans until they enter the body and are metabolized, many in vitro tests are supplemented with extracts from mammalian livers which act as a source of enzymes. The extract enzymes act to mimic metabolic activation of procarcinogens and promutagens in humans, providing a more realistic picture of potential effects [U.S. EPA, 1979].

A number of genetic toxicity assay batteries have been suggested in order to address the many potential effects produced by nonthreshold chemicals (for which no safe level exists) [U.S. EPA, 1979; Lave and Omenn; Environment Canada]. In addition to providing assays that detect different endpoints, a battery of tests can also be structured to minimize effort at the screening level while supplying more definitive data for samples failing the initial tier of testing. Positive results can lead to further effluent characterization, including priority and other pollutant chemical analyses, or mutagenicity testing of specific processes or effluent fractions. Another approach would be to evaluate the effects of various treatment or waste segregation techniques on mutagenicity [McGeorge, et. al., 1985].

Many of the proposed test batteries utilize the Ames Assay as a screening level test because of its relatively high degree of sensitivity (i.e. a high percentage of carcinogens are Ames positive) and specificity (i.e. a high percentage of noncarcinogens are Ames negative) [Tennant, et. al., 1987]. One study of 28 selected industrial discharges revealed that 11 of the 28, or 39%, produced positive results using the Ames Test (described below). Other test endpoints frequently covered in the initial tier of testing include mammalian cell chromosomal effects, mammalian gene mutation and microbial and mammalian cell DNA damage.

Results of a recent National Toxicology Program project suggest that combinations of four of the most commonly used short-term tests covering these endpoints did not show significant differences in individual

concordance with rodent carcinogenicity results for pure chemicals [Tennant, et. al., 1987]. This suggests that if a sample causes only one type of endpoint as measured by several screening level tests, its potential to cause human health effects should not be disregarded.

To assess the potential carcinogen hazard, subsequent tests focusing on effluent-induced malignant changes in mammalian cells in vitro can be conducted. Higher levels of testing may include in vivo rodent testing or the Medaka (fish) tumor assay, for example. It should be noted that under existing guidelines, in vivo mammalian tumor assays are necessary to establish a material as a possible human carcinogen. Results from short term tests alone are considered as inadequate to establish human carcinogenicity [U.S. EPA, 1986c]. Guidelines for risk assessment of individual compounds are covered in U.S. EPA, 1986b and 1987c.

In vivo tests on complex mixtures are extremely complicated and expensive given the variability intrinsic to effluents. As a result, it is recommended that after each tier of biological indicator testing, the cost of further refining the weight of evidence for carcinogenesis or mutagenesis be balanced against the cost of conducting a causative agent identification evaluation. Given the identity of the substance leading to positive results in short term in vitro tests, it should not be necessary to generate in vivo dose-response data for risk characterization if these data are already available in the literature for the specific chemical.

In addition, causative agent identification studies may be unnecessary if information on the physical and/or chemical characteristics of the toxicant is obtained. Such information may provide clues to appropriate effluent treatment technologies needed to reduce effluent mutagenicity.

In weighing the need for more definitive biological assays against causative agent evaluation, the frequency (i.e., how often the effluent tests positive) and intensity (e.g., revertants/liter) of the effluent's mutagenicity must be considered. As a default assumption, a high dose of a carcinogen received over a short period of time is equivalent to a low dose spread over a life-time [U.S. EPA, 1986c]. While effluents which are highly variable in their mutagenicity are of concern, they will be more difficult and costly to deal with in subsequent phases of study.

Accordingly, the initial tier of qualitative tests for human health effects assessment can be relatively inexpensive, rapid, and have a low rate of false negative results. Subsequent tests can be designed to increase confidence in the predictive nature of the results. Additional levels of testing may also provide diagnostic information on the characteristics of the causative agent(s) in the effluent.

Subsequent tiers of testing should focus on a more concise assessment of risk. Such an assessment can be used to delineate hazard type; in effect, to separate germ cell mutations (heritable genetic risk) from carcinogen risk. Thus, to assess heritable mutation, subsequent testing should focus on mammalian germ cells, ultimately tested in vivo [U.S. EPA, 1986b]. To assess potential carcinogen hazard, subsequent tests focusing on effluent-induced malignant changes in in vitro mammalian systems should be conducted. Ultimately, testing must result in a dose-response assessment to be used with an exposure assessment in characterizing risk [U.S. EPA, 1987a].

EPA's Region V (Chicago), New Jersey, and Environment Canada have been conducting mutagenicity testing at selected facilities. In Region V Ames test results are used to suggest the need for more intensive chemical-specific analyses of the effluent. New Jersey has incorporated a prohibition against discharging mutagenic compounds in amounts that are mutagenic into its "New Jersey Administrative Code" [N.J.S.A. Section 7:9-4.5 (a)4, May 1985].

For both types of endpoints (genotoxicity and carcinogenesis), hazard identification should be followed by quantitative risk assessment which includes assessment of dose response (requiring in vivo data) and human exposure. Human exposure assessment typically considers the composition and size of the population exposed and the types, magnitude, frequency and duration of exposures [U.S. EPA, 1986d].

Evaluation of Effluent Genotoxicity Screening Results

Control of human health hazards depends upon assessment of both the toxicological properties of the pollutants and the level of exposure. The permit authority should review the results of a human health toxicant

effluent screening program and establish the actions triggered by each level of potential risk indicated. For example, a discharger with either a high exposure risk or a high effects risk might automatically be required to conduct a detailed assessment or institute controls. A medium risk in both exposure and effects might require further review of the data and a case-specific decision about whether to require additional assessment. A medium effects risk and a low exposure risk might indicate the need for limited testing to ensure that the low is really indicative of the risk. Low risk in both exposure and effects should receive low priority for further assessment. The bioconcentration evaluation procedures can be used to aid in defining exposure risk, as well as determining receiving water concentration.

One possible tool for evaluating results of biological indicator effluent screening is the "relative potency approach," a concept used rather widely in radiation biology and chemical pharmacology. The relative potency of an effluent is the dose of a reference agent needed to produce an effect of a given magnitude in a particular bioassay, divided by the dose of the effluent needed to produce the same magnitude of the same effect in the same bioassay. A predictive battery of several short-term biological tests, when standardized to a reference agent, could provide a rank or comparative estimate of the hazard posed by an effluent in the context of measures of other known hazards [Glass, 1988]. It should be recognized that this approach does not consider exposure through bioaccumulation.

When screening has indicated a high potential for health hazard, further assessment should be required. A chemical-specific approach is recommended to evaluate and regulate the discharge constituents. The first half of this process involves characterizing the composition of the effluent. Typically, only a small fraction of the total organic carbon (TOC) can be accounted for as individual chemicals. Therefore, effort should be placed on identifying constituents through means other than chemical analysis, such as through a detailed process evaluation and/or toxicant characterization evaluation.

A process evaluation is a study in which components in the wastewater are determined from an analysis of feedstocks, manufacturing processes, products, by-products, and pollution control in place. The result is a list of compounds or classes of compounds with a high probability of being present in the wastewater. Chemical analysis can also be conducted for not only the priority pollutants but also nonpriority pollutant peaks and bioconcentratable chemicals [EPA/600/XX-XX]. IRIS and SAR can be used to determine the likelihood that a given compound is causing positive results in the bioassay. The toxicant characterization evaluation can provide information on the physical/chemical nature of the chemical producing positive bioassay results.

Summary of Current Biological Indicator Tests for Non-Threshold Human Health Toxicants

The following tests are currently in use or under development for assessing carcinogenicity or mutagenicity:

- Salmonella typhimurium Assay (Ames Test) [U.S. EPA, 1985 and 1983]

  Background: Strains of Salmonella requiring the amino acid, histidine, are exposed to a solvent extract of the effluent. Tests are performed with and without added rat liver enzyme for activation of indirect mutagens. The bacteria are grown on histidine-free medium; colony formation indicates the effluent contains mutagenic compounds capable of genetically altering the bacteria.

  Endpoint: Gene mutation; response measured in revertant colonies/L effluent.

  Advantages: Test is rapid, relatively inexpensive. The Ames Test has been shown to have broad application for the assessment of the mutagenic activity of a diversity of industrial effluent types [McGeorge, et. al., 1985]. Test sensitivity and specificity are documented [Ashby and Tennant, 1988].

Disadvantages: Requires metabolic activation and several different strains of Salmonella to detect a broad range of compounds, requires extrapolation from prokaryot, use of effluent extract may exclude certain types of compounds, epigenetic carcinogens not detected.

Cost: Approximately $1200 [Lave and Omenn, 1986]

- Escherichia coli SOS Assay (SOS Chromotest) [Quillardet, et.al., 1985].

  Background: All cells contain an "SOS" enzymatic system for detecting and correcting errors in their genetic material. A strain of E. coli has been genetically engineered so that DNA damage ultimately results in production of an enzyme which reacts with test reagents to form a blue color. Bacteria are exposed to effluent or an extract of the effluent, with or without added rat liver enzyme for activation indirect mutagens. The intensity of color produced indicates the extent to which the effluent contains mutagenic compounds capable of damaging bacterial DNA.

  Endpoint: DNA damage; response measured as the change in optical density.

  Advantages: Simple kit commercially available, test requires <8 hrs to perform, relatively inexpensive. Test sensitivity, specificity documented [Quillardet, et.al., 1985].

  Disadvantages: Requires metabolic activation, extrapolation from prokaryot, use of effluent extract may exclude certain types of compounds, epigenetic carcinogens not detected, measurement of effect must be referenced to known genotoxic compound.

  Cost: ??

- Sister-Chromatid Exchange Assay (SCE) [Eckl, et. al., 1987]

  Background: Sister chromatid exchange occurs when damaged DNA is replicated during cell division. Recent advances allow the use of cultured rat hepatocytes in detecting SCE formation, thus precluding the need to add rat liver enzyme for metabolic activation. Hepatocyte exposure to the sample is effected by using filter sterilized effluent in preparing the cell culture medium. Exposed cells are lysed and genetic material fixed in order to count SCEs.

  Endpoint: DNA damage; response measured in SCE per chromosome/L effluent.

  Advantages: Test is rapid, relatively inexpensive, does not require metabolic activation (therefore more realistic). Uses mammalian cells, therefore results more readily applicable to humans.

  Disadvantages: Sensitivity, specificity not well documented, test more complex relative to prokaryotic systems, filter sterilization may remove some genotoxic compounds from the sample, epigenetic carcinogens not detected.

  Cost: $5000 [Jirtle, 1989]

- HGPRT Assay with Chinese Hamster Ovary Cells (HGPRT/CHO) [Hsie, et. al., 1981]

  Background: Strains of Chinese Hamster Ovary cells in culture are exposed to the effluent or an extract of the effluent, with or without added rat liver enzyme. Mutagen interactions with certain sections of the DNA make the cell resistant to toxicants like 6-thioguanine. Cell survival is used to indicate both cytotoxicity (cell death) and genetic mutations resulting from effluent components.

  Endpoint: Gene mutation; response measured in % survival/L.

  Advantages: Test is rapid and uses a mammalian system.

  Disadvantages: Sensitivity, specificity not well documented, use of effluent extract may exclude certain types of compounds, epigenetic carcinogens not detected, requires metabolic activation.

  Cost: $6500

- Medaka Tumor Assay [U.S. EPA, 1988; U.S. EPA, 1989b.]

  Background: Larval fish are exposed to nonlethal concentrations of effluent for one month, this period is followed by a 5-month grow out period in clean water. At six months, fish are sacrificed and submitted for histopathological studies.

  Endpoint: Tumor formation, response measured in frequency of tumors at a given site/effluent concentration.

  Advantages: Use of whole effluent, whole organism, oncogenic endpoint

Disadvantages: Carcinogen levels in unconcentrated effluent may not be high enough to produce tumors at a detectable frequency in exposed populations, effluent must not be toxic to Medaka, requires extrapolation from non-mammalian system, relatively expensive, length of test, endpoint requires pathologist experienced in fish cancers, method still in developmental stages.

Cost: $20,000 [Johnson, 1989].

Other Human Health Effects

Toxicants present in effluents may produce a variety of effects in humans besides genotoxicity or carcinogenicity via exposure through ingestion of water and/or contaminated fish and shellfish. Potential health effects could include suppression of the immune system, neurotoxicity, specific organ toxicity, or developmental toxicity. These effects occur after exposure above a presumed safe (threshold) level and are referred to as "systemic."

Formerly, the only means to assess systemic effects was by using subchronic toxicity procedures designed to determine the effects that may occur with repeated exposure over a part of the average life span of an experimental animal. However, such studies are expensive ($100,000 and over) and beyond the cost constraints for most effluent analyses. As an alternative, a number of short-term in vitro tests utilizing mammalian cells have been developed [U.S. EPA, 1978; Wilson, 1978; Kimmel, et. al., 1982; Brown and Fabro, 1982; Borenfreund and Puerner, 1985]. Test endpoints include cytotoxicity, effects on cell growth, division, structure, metabolism and function, alterations in enzyme activities, and metabolite formation.

As with the nonthreshhold assays previously discussed, these in vitro assays only serve to qualify potential human health hazards. In the case of positive in vitro results, tests on intact mammals can be pursued in order to confirm screening test findings and establish a dose-response relationship. Alternatively, causative agent evaluations resulting in either the identity of the toxicant or toxicity treatability data may be pursued.

Current Limitations of the Biological Regulatory Approach

At present, the use of biological indicator tests as a regulatory tool is limited for a number of reasons. First, biological indicator information must be linked to human exposure to wastewater components. To date, no definitive mechanism exists for interpreting the human health hazard implications of the biological test results. While many in vitro (i.e. test tube) human health assays provide data about cellular changes relative to the dose delivered to the target tissue, they do not provide the information necessary to correlate environmental exposure to target tissue dose or cellular change to ultimate human health effects (e.g., cancer). The higher animal testing necessary to quantify the dose-response relationship (or "potency" of the effluent) would be extremely costly.

Second, as with aquatic organism toxicity tests, a human health hazard test must be capable of dealing with intra- and interspecies sensitivity variability. This concern is particularly relevant for those effluents containing chemicals which only become carcinogenic upon metabolism by mammalian systems (i.e. procarcinogens). The use of cultured human liver cells (hepatocytes), currently being tested, would eliminate the need for interspecies extrapolation.

Finally, whole effluent testing to assess potential human health impacts presents several unique practical problems such as the continual change in composition typical for most effluents, the need to concentrate samples to obtain a dose-response curve, and the need to compensate for or eliminate interferences from cytotoxic (toxic to cells) components of the effluent. Only those components which occur in the relatively nonvolatile, nonpolar organic fraction of the effluent sample are conventionally measured. [Anderson-Carnahan, article in preparation].

Until additional research resolves these difficulties, biological indicator tests will be most useful as screening tools, with actual regulation of effluents posing potential health hazards likely to remain on a chemical-by-chemical basis.

APPENDIX G

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Appendix H

Reference Dose (RfD): Description and Use in Health Risk Assessments

Reference Dose (RfD) Description and Use in Health Risk Assessments (Revised 02/10/88)

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Reference Dose (RfD): Description and Use in Health Risk Assessments

Introduction

This concept paper describes the U.S. Environmental Protection Agency's (U.S. EPA) principal approach to and rationale for assessing risk for health effects other than cancer and gene mutations from chronic chemical exposure. By outlining principles and concepts that guide EPA risk assessment for such systemic effects the paper complements the new risk assessment guidelines (U.S. EPA, 1987), which describe the Agency's approach to risk assessment in other areas, specifically carcinogenicity, mutagenicity, developmental toxicity, exposure, and chemical mixtures. (In this document the term "systemic toxicity" refers to an effect other than carcinogenicity or mutagenicity induced by a toxic chemical.)

Background and Summary

Chemicals that give rise to toxic endpoints other than cancer and gene mutations are often referred to as "systemic toxicants" because of their effects on the function of various organ systems. In addition, chemicals that cause cancer and gene mutations also commonly evoke other toxic effects (i.e., systemic toxicity). Based on our understanding of homeostatic and adaptive mechanisms, systemic toxicity is treated as if there is an identifiable exposure threshold (both for the individual and for populations) below which there are no observable adverse effects. This characteristic distinguishes systemic endpoints from carcinogenic and mutagenic endpoints, which are often treated as nonthreshold processes.

Systemic effects have traditionally been evaluated using such terms as "acceptable daily intake (ADI)," "safety factor (SF)," and "margin of safety (MOS)," concepts that are associated with certain limitations described below. The U.S. EPA established the Reference Dose (RfD) Work Group to address these concerns.

In preparing this report, the RfD Work Group has drawn on traditional report on risk assessment (NRC, 1983), to more fully articulate the use of noncancer, nonmutagenic experimental data in reaching regulatory decisions about the significance of exposures to chemicals. In the process, the Work Group has coined less value-laden terminology -- "reference dose (RfD)," "uncertainty factor (UF)"; "margin of exposure (MOE)"; and "regulatory dose (RgD)" -- to clarify and distinguish between aspects of risk assessment and risk management. These concepts are currently in general use in many parts of U.S. EPA.

Traditional Approach to Assessing Systemic Toxicity

The U.S. EPA's approach to assessing the risks associated with systemic toxicity is different from its approach to assessing the risks associated with carcinogenicity, because of the different mechanisms of action thought to be involved in the two cases. In the case of carcinogens, the Agency assumes that a small number of molecular events can evoke changes in a single cell that can lead to uncontrolled cellular proliferation. This mechanism for carcinogenesis is referred to as "nonthreshold," since there is theoretically no level of exposure for such a chemical that does not pose a small, but finite, probability of generating a carcinogenic response. In the case of systemic toxicity, however, organic homeostatic, compensating, and adaptive mechanisms exist that must be overcome before a toxic endpoint is manifested. For example, there could be a large number of cells performing the same or similar function whose population must be significantly depleted before the effect is seen.

The threshold concept is important in the regulatory context. The individual threshold hypothesis holds that a range of exposures from zero to some finite value can be tolerated by the organism with essentially no chance of expression of the toxic effect. Further, it is often prudent to focus on the most sensitive members of the population; therefore, regulatory efforts are generally made to keep exposures below the population threshold, which is defined as the lowest of the thresholds of the individuals within a population.

Description of the Traditional Approach

In many cases, risk decisions on systemic toxicity have been made by the Agency using the concept of the "acceptable daily intake (ADI)" derived from an experimentally determined "no-observed-adverse-effect level (NOAEL)." The ADI is commonly defined as the amount of a chemical to which a person can be exposed on a daily basis over an extended period of time (usually a lifetime) without suffering a deleterious effect. The ADI concept has often been used as a tool in reaching risk management decisions (e.g., establishing allowable levels of contaminants in foodstuffs and water.)

A NOAEL is an experimentally determined dose at which there was no statistically or biologically significant indication of the toxic effect of concern. In an experiment with several NOAELs, the regulatory focus is normally on the highest one, leading to the common usage of the term NOAEL as the highest experimentally determined dose without a statistically or biologically significant adverse effect. The NOAEL for the critical toxic effect is sometimes referred to simply as the NOEL. This usage, however, invites ambiguity in that there may be observable effects that are not of toxicological significance (i.e., they are not "adverse"). For the sake of precision, this document uses the term NOAEL to mean the highest NOAEL in an experiment. In cases in which a NOAEL has not been demonstrated experimentally, the term "lowest-observed-adverse-effect level (LOAEL)" is used.

Once the critical study demonstrating the toxic effect of concern has been identified, the selection of the NOAEL results from an objective examination of the data available on the chemical in question. The ADI is then derived by dividing the appropriate NOAEL by a safety factor (SF), as follows:

$$\text{ADI (human dose)} = \text{NOAEL (experimental dose)}/\text{SF} \qquad \text{(Equation 1)}$$

Generally, the SF consists of multiples of 10, each factor representing a specific area of uncertainty inherent in the available data. For example, a factor of 10 may be introduced to account for the possible differences in responsiveness between humans and animals in prolonged exposure studies. A second factor of 10 may be used to account for variation in susceptibility among individuals in the human population. The resultant SF of 100 has been judged to be appropriate for many chemicals. For other chemicals, with databases that are less complete (for example, those for which only the results of subchronic studies are available), an additional factor of 10 (leading to a SF of 1000) might be judged to be more appropriate. For certain other chemicals, based on well-characterized responses in sensitive humans (as in the effect of fluoride on human teeth), an SF as small as 1 might be selected.

While the original selection of SFs appears to have been rather arbitrary (Lehman and Fitzhugh, 1954), subsequent analysis of data (Dourson and Stara, 1983) lends theoretical (and in some instances experimental) support for their selection. Further, some scientists, but not all, within the EPA interpret the absence of widespread effects in the exposed human populations as evidence of the adequacy of the SFs traditionally employed.

Some Difficulties in Utilizing the Traditional Approach

Scientific Issues

While the traditional approach has performed well over the years and the Agency has sought to be consistent in its application, observers have identified scientific shortcomings of the approach. Examples include the following:

a. Too narrow a focus on the NOAEL means that information on the shape of the dose-response curve is ignored. Such data could be important in estimating levels of concern for public safety.

b. As scientific knowledge increases and the correlation of precursor effects (e.g., enzyme induction) with toxicity becomes known, questions about the selection of the appropriate "adverse effect" arise.

c. Guidelines have not been developed to take into account the fact that some studies have used larger (smaller) numbers of animals and, hence, are generally more (less) reliable than other studies.

These and other "scientific issues" are not susceptible to immediate resolution, since the database needed is not yet sufficiently developed or analyzed. U.S. EPA work groups are presently considering these issues.

Management-related Issues

The use of the term "safety factor" - The term "safety factor" suggests, perhaps inadvertently, the notion of absolute safety (i.e., absence of risk). While there is a conceptual basis for believing in the existence of a threshold and "absolute safety" associated with certain chemicals, in the majority of cases a firm experimental basis for this notion does not exist.

The implication that any exposure in excess of the ADI is "unacceptable" and that any exposure less than the ADI is "acceptable" or "safe" - In practice, the ADI is viewed by many (including risk managers) as an "acceptable" level of exposure, and, by inference, any exposure greater than the ADI is seen as "unacceptable." This strict demarcation between what is "acceptable" and what is "unacceptable" is contrary to the views of most toxicologists, who typically interpret the ADI as a relatively crude estimate of a level of chronic exposure which is not likely to result in adverse effects to humans. The ADI is generally viewed by risk assessors as a "soft" estimate, whose bounds of uncertainty can span an order of magnitude. That is, within reasonable limits, while exposures somewhat higher than the ADI are associated with increased probability of adverse effects, that probability is not a certainty. Similarly, while the ADI is seen as a level at which the probability of adverse effects is low, the absence of all risk to all people cannot be assured at this level.

Possible limitations imposed on risk management decisions - Awareness of the "softness" of the ADI estimate, as discussed above, argues for careful case-by-case consideration of the toxicological implications of individual situation, so that ADIs are not given a degree of significance that is scientifically unwarranted. In addition, the ADI is only one factor in a risk management decision and should not be used to the exclusion of other relevant factors.

Development of different ADIs by different programs - In addition to occasionally selecting different critical toxic effects, Agency scientists have reflected their best scientific judgments in the final ADI by adopting factors different from the standard factors listed in Table 1. For example, if the toxic endpoint for a chemical in experimental animals is the same as that which has been established for a related chemical in humans at similar doses, one could argue for an SF of less than the traditional 100. On the other hand, if the total toxicologic data base is incomplete, one could argue that an additional SF should be included, both as a matter of prudent public policy and as an incentive to others to generate the appropriate data.

Such practices, as employed by a number of scientists in different programs/agencies, exercising their best scientific judgment, have in some cases resulted in different ADIs for the same chemical. The fact that different ADIs were generated (for example, by adopting different SFs) can be a source of considerable confusion when the ADIs are used exclusively in risk management decisionmaking. The existence of different ADIs need not imply that any of them is more "wrong"--or "right"--than the rest. It is more nearly a reflection of the honest difference in scientific judgment.

However, on occasion, these differences in judgment of the scientific data, can be interpreted as differences in the management of the risk. As a result, scientists may be inappropriately impugned, and/or perfectly justifiable risk management decisions may be tainted by charges of "tampering with the science." This unfortunate state of affairs arises, at least in part, from treating the ADI as an absolute measure of safety.

EPA Assessment of Risks Associated with Systemic Toxicity

The U.S. EPA approach to analyzing systemic toxicity data follow the general format set forth by NRC in its description of the risk assessment process (NRC, 1983). The determination of the presence of risk and its potential magnitude is made during the risk assessment process, which consists of hazard identification, dose-response assessment, exposure assessment, and risk characterization. Having been apprised by the risk assessor that a potential risk exists, the risk manager considers control options available under existing statutes and other relevant non-risk factors (e.g., benefits to be gained and costs to be incurred). All of these considerations go into the determination of the regulatory decision (Figure 1).

Table 1. Guidelines for the Use of Uncertainty Factors in Deriving Reference Doses and Modifying Factors

Standard Uncertainty Factors (UFs):

Use a 10-fold factor when extrapolating from valid experimental results in studies using prolonged exposure to average healthy humans. This factor is intended to account for the variation in sensitivity among the members of the human population and is referenced as "10H".

Use an additional 10-fold factor when extrapolating from valid results of long-term studies on experimental animals when results of studies of human exposure are not available or are inadequate. This factor is intended to account for the uncertainty involved in extrapolating from animal data to humans and is referenced as "10A".

Use an additional 10-fold factor when extrapolating from less than chronic results on experimental animals when there are no useful long-term human data. This factor is intended to account for the uncertainty involved in extrapolating from less than chronic NOAELs to chronic NOAELs and is referenced as "10S".

Use an additional 10-fold factor when deriving an RfD from a LOAEL, instead of a NOAEL. This factor is intended to account for the uncertainty involved in extrapolating from LOAELs to NOAELs and is referenced as "10L".

Modifying Factor (MF):

Use professional judgment to determine the MF, which is an additional uncertainty factor that is greater than zero and less than or equal to 10. The magnitude of the MF depends upon the professional assessment of scientific uncertainties of the study and data base not explicitly treated above; e.g., the completeness of the overall data base and the number of species tested. The default value for the MF is 1.

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*Source: Adapted from Dourson and Stara, 1983

Hazard Identification

Evidence

Type of effect - Exposure to a given chemical, depending on the dose employed, may result in a variety of toxic effects. These may range from gross effects, such as death, to more subtle biochemical, physiologic, or pathologic changes. In assessments of the risk posed by a chemical, the toxic endpoints from all available studies are considered, although primary attention usually is given to the effect (the "critical effect") exhibiting the lowest NOAEL. In the case of chemicals with limited data bases, additional toxicity testing may be necessary before an assessment can be made.

Principal studies - Principal studies are those that contribute most significantly to the qualitative assessment of whether or not a particular chemical is potentially a systemic toxicant in humans. In addition, they may be

Figure 1.

Conceptual Framework for Risk Assessment and Risk Management*

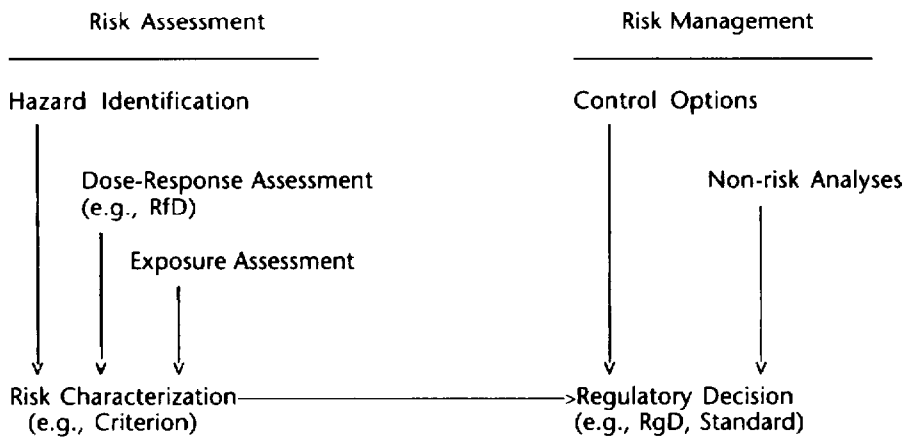

*Source: Adapted from NRC, 1983

used in the quantitative dose-response assessment phase of the risk assessment. These studies are of two types: studies of human populations (epidemiologic investigations) and studies using laboratory animals.

1. Epidemiologic studies - Human data are often useful in qualitatively establishing the presence of an adverse effect in exposed human populations. When there is information on the exposure level associated with an appropriate endpoint, epidemiologic studies can also provide the basis for a quantitative dose-response assessment. The presence of such data obviates the necessity of extrapolating from animals to humans; therefore, human studies, when available, are given first priority, with animal toxicity studies serving to complement them.

   In epidemiologic studies, confounding factors that are recognized can be controlled and measured, within limits. Case reports and acute exposures resulting in severe effects provide support for the choice of critical toxic effect, but they are often of limited utility in establishing a quantitative relationship between environmental exposures and anticipated effects. Available human studies on ingestion are usually of this nature. Cohort studies and clinical studies may contain exposure-response information that can be used in estimating effect levels, but the method of establishing exposure must be evaluated for validity and applicability.

2. Animal studies - For most chemicals, there is a lack of appropriate information on effects in humans. In such cases, the principal studies are drawn from experiments conducted on nonhuman mammals, most often the rat, mouse, rabbit, guinea pig, hamster, dog, or monkey.

Supporting studies - These studies provide supportive, rather than definitive, information and can include data from a wide variety of sources. For example, metabolic and other pharmacokinetics studies can provide insights into the mechanism of action of a particular compound. By comparing the metabolism of the chemical exhibiting the toxic effect in the animal with the metabolism found in humans, it may be possible to assess the potential for toxicity in humans or to estimate the equitoxic dose in humans.

Similarly, in vitro studies can provide insights into the chemical's potential for biological activity; and under certain circumstances, consideration of structure-activity relationships between a chemical and other

structurally related compounds can provide clues to the test chemical's possible toxicity. More reliable in vitro tests are presently being developed to minimize the need for live-animal testing. There is also increased emphasis on generating mechanism-of-action and pharmacokinetics information as a means of increasing understanding of toxic processes in humans and nonhumans.

Route of exposure - The U.S. EPA often approaches the investigation of a chemical with a particular route of exposure in mind (e.g., an oral exposure for a drinking water contaminant or an inhalation exposure for an air contaminant). In most cases, the toxicologic data base does not include detailed testing on all possible routes of administration, with their possibly significant differences in factors such as mechanism-of-action and bioavailability. In general, the U.S. EPA's position is that the potential for toxicity manifested via one route of exposure is relevant to considerations of any other route of exposure, unless convincing evidence exists to the contrary. Consideration is given to potential differences in absorption or metabolism resulting from different routes of exposure, and whenever appropriate data (e.g., comparative metabolism studies) are available, the quantitative impacts of these differences on the risk assessment are delineated.

Length of exposure - The U.S. EPA is concerned about the potential toxic effects in humans associated with all possible exposures to chemicals. The magnitude, frequency, and duration of exposure may vary considerably in different situations. Animal studies are conducted using a variety of exposure durations (e.g., acute, subchronic, and chronic) and schedules (e.g., single, intermittent, or continuous dosing). Information from all these studies is useful in the hazard identification phase of risk assessment. For example, overt neurological problems identified in high-dose acute studies tend to reinforce the observation of subtle neurological changes seen in low-dose chronic studies. Special attention is given to studies involving low-dose, chronic exposures, since such exposures can elicit effects absent in higher dose, shorter exposures, through mechanisms such as accumulation of toxicants in the organisms.

Quality of the study - Evaluation of individual studies in humans and animals requires the consideration of several factors associated with a study's hypothesis, design, execution, and interpretation. An ideal study addresses a clearly delineated hypothesis, follows a carefully prescribed protocol, and includes sufficient subsequent analysis to support its conclusions convincingly.

In evaluating the results from such studies, consideration is given to many other factors, including chemical characterization of the compound(s) under study, the type of test species, similarities and differences between the test species and humans (e.g., chemical absorption and metabolism), the number of individuals in the study groups, the number of study groups, the spacing and choice of dose levels tested, the types of observations and methods of analysis, the nature of pathologic changes, the alteration in metabolic responses, the sex and age of test animals, and the route and duration of exposure.

Weight-of-Evidence Determination

As the culmination of the hazard identification step, a discussion of the weight-of-evidence summarizes the highlights of the information gleaned from the principal and supportive studies. Emphasis is given to examining the results from different studies to determine the extent to which a consistent, plausible picture of toxicity emerges. For example, the following factors add to the weight of the evidence that the chemical poses a hazard to humans: similar results in replicated animal studies by different investigators; similar effects across sex, strain, species, and route of exposure; clear evidence of a dose-response relationship; a plausible relation between data on metabolism, postulated mechanism-of-action, and the effect of concern; similar toxicity exhibited by structurally related compounds; and some link between the chemical and evidence of the effect of concern in humans.

Dose-Response Assessment

Concepts and Problems

Empirical observations have generally revealed that as the dosage of a toxicant is increased, the toxic response (in terms of severity and/or incidence of effect) also increases. This dose-response relationship is well- founded in the theory and practice of toxicology and pharmacology. Such behavior is observed in the following instances: in quantal responses, in which the proportion of responding individuals in a population increases with dose; in graded responses, in which the severity of the toxic response within an individual increases

with dose; and in continuous responses, in which changes in a biological parameter (e.g., body or organ weight) vary with dose.

In evaluating a dose-response relationship, certain difficulties arise. For example, one must decide on the critical endpoint to measure as the "response." One must also decide on the correct measure of "dose." In addition to the interspecies extrapolation aspects of the question of the appropriate units for dose, the more fundamental question of administered dose versus absorbed dose versus target organ dose should be considered. These questions are the subject of much current research.

Selection of the Critical Data

Critical study - Data from experimental studies in laboratory animals are often selected as the governing information when performing quantitative risk assessments, since available human data are usually insufficient for this purpose. These animal studies typically reflect situations in which exposure to the toxicant has been carefully controlled and the problems of heterogeneity of the exposed population and concurrent exposures to other toxicants have been minimized. In evaluating animal data, a series of professional judgments are made which involve, among others, consideration of the scientific quality of the studies. Presented with data from several animal studies, the risk assessor first seeks to identify the animal model that is most relevant to humans, based on the most defensible biological rationale (e.g., for instance using comparative pharmacokinetics data). In the absence of a clearly most relevant species, the most sensitive species (i.e., the species showing a toxic effect at the lowest administered dose) is used by risk assessors at U.S. EPA, since there is no assurance that humans are not at least as innately sensitive as the most sensitive species tested. This selection process is more difficult when the routes of exposure in the animal tests are different from those involved in the human situation under investigation. In order to use data from controlled studies of genetically homogeneous animals, the risk assessor must also extrapolate from animals to humans and from high experimental doses to comparatively low environmental exposures, and must account for human heterogeneity and possible concurrent human exposures to other chemicals.

Although for most chemicals there is a lack of well-controlled cohort studies investigating noncancer endpoints, in some cases an epidemiologic study may be selected as the critical data (e.g., in cases of cholinesterase inhibition). Risk assessments based on human data have the advantage of avoiding the problems inherent in interspecies extrapolation. In many instances, use of such studies, as is the case with animal investigations, involves extrapolation from relatively high doses (such as those found in occupational settings) to the low doses found in the environmental situations to which the general population is more likely to be exposed. In some cases, a well-designed and well-conducted epidemiologic study that shows no association between known exposures and toxicity can be used to directly project an RfD (as has been done in the case of fluoride).

Critical data - In the simplest terms, an experimental exposure level is selected from the critical study that represents the highest level tested in which "no adverse effect" was demonstrated. This "no-observed-adverse-effect-level" (NOAEL) is the key datum gleaned from the study of the dose-response relationship and, traditionally, is the primary basis for the scientific evaluation of the risk posed to humans by systemic toxicants. This approach is based on the assumption that if the critical toxic effect is prevented, then all toxic effects are prevented.

More formally, the NOAEL is defined in this discussion as the highest experimental dose of a chemical at which there is no statistically or biologically significant increase in frequency or severity of an adverse effect in individuals in an exposed group when compared with individuals in an appropriate control group. As noted above, there may be sound professional differences of opinion in judging whether or not a particular response is adverse. In addition, the NOAEL is a function of the size of the population under study. Studies with a small number of subjects are less likely to detect low-dose effects than studies using larger numbers of subjects. Also, if the interval between doses in an experiment is large, it is possible that the experimentally determined NOAEL is lower than that which would be observed in a study using intervening doses.

Critical endpoint - As noted under "Traditional Approach to Assessing Systemic Toxicity", a chemical may elicit more than one toxic effect (endpoint), even in one test animal, or in tests of the same or different duration (acute, subchronic, and chronic exposure studies). In general, NOAELs for these effects will differ. The critical endpoint used in the dose- response assessment is the effect exhibiting the lowest NOAEL.

Reference Dose (RfD)

The reference dose (RfD) and uncertainty factor (UF) concepts have been developed by the RfD Work Group in response to many of the problems associated with ADIs and SFs, as outlined under "Traditional Approach to Assessing Systemic Toxicity" above. The RfD is a benchmark dose operationally derived from the NOAEL by consistent application of generally order-of-magnitude uncertainty factors (UFs) that reflect various types of data sets used to estimate RfDs. For example, a valid chronic animal NOAEL is normally divided by an UF of 100. In addition, a modifying factor (MF), is sometimes used which is based on a professional judgment of the entire data base of the chemical. These factors and their rationales are presented in Table 1.

The RfD is determined by use of the following equation:

$$RfD = NOAEL / (UF \times MF)$$

which is the functional equivalent of Equation 1. In general, the RfD is an estimate (with uncertainty spanning perhaps an order-of-magnitude) of a daily exposure to the human population (including sensitive subgroups) that is likely to be without an appreciable risk of deleterious effects during a lifetime. The RfD is generally expressed in units of milligrams per kilogram of body weight per day (mg/kg/day).

The RfD is useful as a reference point from which to gauge the potential effects of the chemical at other doses. Usually, doses less than the RfD are not likely to be associated with adverse health risks, and are therefore less likely to be of regulatory concern. As the frequency and/or magnitude of the exposures exceeding the RfD increase, the probability of adverse effects in a human population increases. However, it should not be categorically concluded that all doses below the RfD are "acceptable" (or will be risk-free) and that all doses in excess of the RfD are "unacceptable" (or will result in adverse effects).

The U.S. EPA is attempting to standardize its approach to determining RfDs. The RfD Work Group has developed a systematic approach to summarizing its evaluations, conclusions, and reservations regarding RfDs in a "cover sheet" of a few pages in length. The cover sheet includes a statement on the confidence (high, medium, or low) the evaluators have in the stability of the RfD. High confidence indicates the judgment that the RfD is unlikely to change in the future because there is consistency among the toxic responses observed in different sexes, species, study designs, or in dose-response relationships, or that the reasons for existing differences are well understood. High confidence is often given to RfDs that are based on human data for the exposure route of concern, since in such cases the problems of interspecies extrapolation have been avoided. Low confidence indicates the judgment that the data supporting the RfD may be of limited quality and/or quantity and that additional information could result in a change in the RfD.

Exposure Assessment

The third step in the risk assessment process focuses on exposure issues. For a full discussion of exposure assessment, consult U.S. EPA's guidelines on the subject (U.S. EPA, 1987). In brief, the exposure assessment includes consideration of the size and nature of the populations exposed and the magnitude, frequency, duration and routes of exposure, as well as evaluation of the nature of the exposed populations.

Risk Characterization

Risk characterization is the final step in the risk assessment process and the first input to the risk management (regulatory action) process. The purpose of risk characterization is to present the risk manager with a synopsis and synthesis of all the data that should contribute to a conclusion with regard to the nature and extent of the risk, including:

a. The qualitative ("weight-of-evidence") conclusions as to the likelihood that the chemical may pose a hazard to human health.

b. A discussion of the dose-response information considered in deriving the RfD, including the UFs and MFs used.

c. Data on the shapes and slopes of the dose-response curves for the various toxic endpoints, toxicodynamics (absorption and metabolism), structure-activity correlations, and the nature and severity of the observed effects.

d. Estimates of the nature and extent of the exposure and the number and types of people exposed.

e. Discussion of the overall uncertainty in the analysis, including the major assumptions made, scientific judgments employed, and an estimate of the degree of conservatism involved.

In the risk characterization process, a comparison is made between the RfD and the estimated (calculated or measured) exposure dose (EED). The EED should include all sources and routes of exposure involved. If the EED is less than the RfD, the need for regulatory concern is likely to be small.

An alternative measure that may be useful to some risk managers is the margin of exposure (MOE), which is the magnitude by which the NOAEL of the critical toxic effect exceeds the estimated exposure dose (EED), where both are expressed in the same units:

MOE = NOAEL (experimental dose) / EED (human dose).

When the MOE is equal to or greater than UF x MF, the need for regulatory concern is likely to be small.

"Hypothetical, Simplified Example of Determining and Using RfD" contains an example of the use of the concepts of NOAEL, UF, MF, RfD, EED, and MOE.

Application in Risk Management

Once the risk characterization is completed, the focus turns to risk management. In reaching decisions, the risk manager utilizes the results of risk assessment, other technological factors, and legal, economic and social considerations in reaching a regulatory decision. These additional factors include efficiency, timeliness, equity, administrative simplicity, consistency, public acceptability, technological feasibility, and nature of the legislative mandate.

Because of the way these risk management factors may impact different cases, consistent -- but not necessarily identical -- risk management decisions must be made on a case-by-case basis. For example, the Clean Water Act calls for decisions with "an ample margin of safety"; the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA) calls for "an ample margin of safety," taking benefits into account; and the Safe Drinking Water Act (SDWA) calls for standards which protect the public "to the extent feasible." Consequently, it is entirely possible and appropriate that a chemical with a specific RfD may be regulated under different statutes and situations through the use of different "regulatory doses (RgDs)."

That is, after carefully considering the various risk and nonrisk factors, regulatory options, and statutory mandates in a given case (i), the risk manager selects the appropriate statutory alternative for arriving at an "ample" or "adequate" margin of exposure [MOE(i)]. As shown in Equation 2 below, this procedure establishes the regulatory dose, RgD(i) (e.g., a tolerance under FIFRA or a maximum contaminant level under SDWA), applicable to the case in question:

$$RgD(i) = NOAEL / MOE(i) \qquad \text{(Equation 2)}$$

Note that different RgDs are possible for a given chemical with a single RfD. Note also that comparing the RfD to a particular RgD(i) is equivalent to comparing the MOE(i) with the UF x MF:

$$RfD/RgD(i) = MOE(i) / (UF \times MF).$$

In assessing the significance of a case in which the RgD is greater (or less) than the RfD, the risk manager should carefully consider the case- specific data compiled by the risk assessors, as discussed under "Risk Characterization". In some cases, additional explanation and interpretation may be required from the risk assessors in order to arrive at a responsible and clearly articulated final decision on the RgD.

It is generally useful to the risk manager to have information regarding the contribution to the RfD from various environmental media (e.g., air, water and food). Such information can provide insights that are helpful in

choosing among available control options. However, in cases in which site-specific criteria are being considered, local exposures through various media can often be determined more accurately than exposure estimates based upon generic approaches. In such cases, the exposure assessor's role is particularly important. For instance, at a given site, consumption of fish may clearly dominate the local exposure routes, while, on a national basis, fish consumption may play a minor role compared to ingestion of treated crops.

Work is underway in the U.S. EPA to apportion the RfD among the various environmental media. For example, consider the case of a food-use pesticide which is a contaminant in drinking water. In selecting among risk management actions under the Safe Drinking Water Act, it might be prudent to assume an RfD for drinking water purposes which is some fraction of the total RfD. Such an apportionment would explicitly acknowledge the possible additional exposure from ingestion of treated crops. The apportionment of the RfD would, in general, provide additional guidance for risk managers of the various media- specific programs.

Other Directions

In addition to the development of reference doses, the U.S. EPA is pursuing other lines of investigation for systemic toxicity. For example, the Office of Air Quality Planning and Standards is using probabilistic risk assessment procedures for criteria pollutants. In this procedure, the population at risk is characterized, and the likelihood of the occurrence of various effects is predicted through the use of available scientific literature and of scientific experts' rendering their judgments concerning dose-response relationships. This dose-response information is then combined with the results of the exposure analysis to generate population risk estimates for alternative standards. Through the use of these procedures, decisionmakers are presented with ranges of risk estimates in which uncertainties associated with both the toxicity and exposure information are explicitly considered. The Office of Policy, Planning and Evaluation is investigating similar procedures in order to balance health risk and cost. In addition, scientists in the Office of Research and Development have initiated a series of studies designed to increase the reliability of risk assessments. They are investigating the use of extrapolation models as a means of estimating RfDs, taking into account the statistical variability of the NOAEL and underlying UFs. ORD is also exploring procedures for conducting health risk assessments that involve less- than-lifetime exposures. Finally, they are working on approaches to ranking the severity of different toxic effects.

Hypothetical, Simplified Example of Determining and Using RfD

Experimental Results

Suppose the U.S. EPA had a sound 90-day subchronic gavage study in rats with the data in Table 2.

Analysis

Determination of the Reference Dose (RfD)

Using the NOAEL - Because the study is on animals and of subchronic duration,

UF = 10H x 10A x 10S = 1000 (Table 1)

In addition, there is a subjective adjustment (MF) based on the high number of animals (250) per dose group: MF = 0.8. These factors then give UF x MF = 800, so that

RfD = NOAEL/(UF x MF) = 5/800 = 0.006 (mg/kg/day).

Table 2. Hypothetical Data to Illustrate the Reference Dose Concept

Dose mg/kg/day	Observation	Effect Level
0	Control—no adverse effects observed	–
1	No statistically or biologically significant differences between treated and control animals	NOEL
5	% decrease* in body weight gain (not considered to be of biological significance); increased ratio of liver weight to body weight; histopathology indistinguishable from controls; evaluated liver enzyme levels	NOAEL
25	20% decrease* in body weight gain; increased* ratio of liver weight to body weight; enlarged, fatty liver with vacuole formation; increased* liver enzyme levels	LOAEL

*Statistically significant compared to controls.

Using the LOAEL - If the NOAEL is not available, and if 25 mg/kg/day had been the lowest dose tested that showed adverse effects,

UF = 10H x 10A x 10S x 10L = 10,000 (Table 1).

Using again the subjective adjustment of MF = 0.8, one obtains

RfD = LOAEL/(UF x MF) = 25/8000 = 0.003 (mg/kg/day).

Risk Characterization Considerations

Suppose the estimated exposure dose (EED) for humans exposed to the chemical under the proposed use pattern were 0.01 mg/kg/day (i.e., the EED is greater than the RfD). Viewed alternatively, the MOE is:

MOE = NOAEL/EED = 5 (mg/kg/day) / 0.01 (mg/kg/day) = 500.

Because the EED exceeds the RfD (and the MOE is less than the UF x MF), the risk manager will need to look carefully at the data set, the assumptions for both the RfD and the exposure estimates, and the comments of the risk assessors. In addition, the risk manager will need to weigh the benefits associated with the case, and other non-risk factors, in reaching a decision on the regulatory dose (RgD).

APPENDIX H

REFERENCES

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3. NRC (National Research Council). 1983. Risk Assessment in the Federal Government: Managing the Process. NAS Press, Washington, DC.
4. U.S. EPA. 1987. The Risk Assessment Guidelines of 1986. Office of Health and Environmental Assessment, Washington, DC. EPA/600/8-87/045.

Appendix I

Chemicals Available in IRIS

USE ONLY FOR SCREENING Values from IRIS 9/1/90
Consult IRIS for Update and Whenever Possible, Site Specific
Lipid, Consumption and Bioaccumulation Factors Should be
Used in Application of RAC in Regulatory Action.

CAS number	Chemical Name	RfD mg/kg/day	q1* /mg/kg/day	Estimated BCF 3% Lipid	RAC (mg/l) RL: 10E-6 0.0065 kg/day Consumption	RAC (mg/l) RL: 10E-6 0.020 kg/day Consumption
50000	Formaldehyde	0.2	**			
50293	p,p'-DDT	0.0005		40000	0.0001	0.00004
50328	Benzo[a]pyrene	**	**	10960		
51285	2,4-Dinitrophenol	0.002		5.2	4	1
55185	N-Nitrosodiethylamine	**	150	0.40	0.0002	0.00006
56235	Carbon tetrachloride	0.0007	0.13	29.72	0.003	0.0009
56359	Tributyltin oxide	0.00003				
56382	Parathion	**	**	87.6		
57125	Cyanide, free	0.02				
57249	Strychnine	0.0003		0.4	8	3
57749	Chlordane	0.00006	1.3	3804	0.000002	0.0000007
58899	gamma-Hexachlorocyclohexane	0.0003		146.8	0.00002	0.000007
58902	2,3,4,6-Tetrachlorophenol	0.03		416	0.8	0.3
60297	Ethyl ether	0.2		0.77	3000	900
60515	Dimethoate	0.0002		0.4	6	2
60571	Dieldrin	0.00005	16	32.04	0.00002	0.000007
62384	Phenylmercuric acetate	0.00008		0.58	2	0.5
62533	Aniline	**	0.0057	0.84	2	0.7
62737	Dichlorvos	0.0008	0.29	0.4	0.1	0.3
62759	N-Nitrosodimethylamine	**	51	0.4	0.0005	0.0002
63252	Carbaryl	0.1		12.2	90	30
64186	Formic acid	2				
65850	Benzoic acid	4		4.92	9000	3000
67561	Methanol	0.5		0.4	14000	4000
67641	Acetone	0.1	**	0.4		
67663	Chloroform	0.01		5.56	20	6
67721	Hexachloroethane	0.001	0.014	700	0.001	0.0004
70304	Hexachlorophene	0.0003		40000	0.00008	0.00002
71363	n-Butanol	0.1		0.71	2000	500

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CAS number	Chemical Name	RfD mg/kg/day	q1* /mg/kg/day	Estimated BCF 3% Lipid	RAC (mg/l) RL: 10E-6 0.0065 kg/day Consumption	RAC (mg/l) RL: 10E-6 0.020 kg/day Consumption
71432	Benzene	**	0.029	7.84	0.05	0.01
71556	1,1,1-Trichloroethane	0.09		14.52	70	20
72208	Endrin	0.0003	**	32.04	0.1	0.03
72435	Methoxychlor	0.005	**	2564	0.02	0.007
72548	p,p'-DDD	**	0.24	12840	0.000004	0.000001
72559	p,p'-DDE	**	0.34	40000	0.0000008	0.0000002
74839	Bromomethane	0.0014		1.13	10	4
74908	Hydrogen cyanide	0.02				
75058	Acetonitrile	0.006		0.4	200	50
75070	Acetaldehyde	**	**	0.4		
75092	Dichloromethane	0.06	0.0075	1.54	0.9	0.3
75150	Carbon disulfide	0.1				
75252	Bromoform	0.02	0.0079	11.92	0.1	0.04
75274	Bromodichloromethane	0.02		7.16	30	10
75354	1,1-Dichloroethylene	0.009	0.6	7.44	0.002	0.0008
75694	Trichloromonofluoromethane	0.3		13.36	200	80
75718	Dichlorodifluoromethane	0.2		6	400	100
75876	Chloral	0.002		3.23	7	2
75990	Dalapon, sodium salt	0.03		2.31	100	50
76131	CFC-113	30		63.2	5000	2000
76448	Heptachlor	0.0005	4.5	692	0.000004	0.000001
77474	Hexachlorocyclopentadiene	0.007	**	744	0.1	0.03
77781	Dimethyl sulfate	**	**	0.4		
78002	Tetraethyl lead	0.0000001				
78488	Merphos oxide	0.00003				
78591	Isophorone	0.2	0.0041	9	0.3	0.09
78831	Isobutyl alcohol	0.3		0.56	6000	2000
78864	2-Chlorobutane	**	**	15.5		
78933	Methyl ethyl ketone	0.05	**	0.4	1000	400

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79005	1,1,2-Trichloroethane	0.004	0.057	6.64	0.03	0.009
79016	Trichloroethylene	**	0.011	9.84	0.1	0.03
79061	Acrylamide	0.0002	4.5	0.4	0.006	0.002
79107	Acrylic acid	0.08		0.4	2000	700
79221	Methyl chlorocarbonate	**				
79345	1,1,2,2-Tetrachloroethane	**	0.20	19.52	0.003	0.0009
80057	Bishpenol A.	0.05		166.8	3	1
81812	Warfarin	0.0003		4.76	0.7	0.2
82688	Pentachloronitrobenzene	0.003		1160	0.03	0.009
83794	Rotenone	0.004		91.2	0.5	0.2
84662	Diethyl phthalate	0.8	**	17.2	500	200
84720	Ethylphthalyl ethylglycolate	3		7.92	4000	1000
84742	Dibutyl phthalate	0.1	**	808	1	0.4
85007	Diquat	0.0022				
85449	Phthalic anhydride	2				
85687	Butyl benzyl phthalate	0.2	**	1120	2	0.6
85701	Butylphthalyl butylglycolate	1		372.4	30	9
86306	N-Nitrosodiphenylamine	**	0.0049	50	0.04	0.01
87683	Hexachlorobutadiene	0.002	0.078	397.2	0.0004	0.0001
87821	Hexabromobenzene	0.002		4560	0.005	0.002
87865	Pentachlorophenol	0.03		1568	0.2	0.07
88062	2,4,6-Trichlorophenol	**	**	106		
88857	Dinoseb	0.001		239.2	0.05	0.01
91941	3,3'-dichlorobenzidine	**	0.45	117	0.0002	0.00007
92524	1,1-Biphenyl	0.05		243.2	2	0.7
92875	Benzidine	0.002	230	2.8	0.00002	0.000005
93652	MCPP	0.003		48	0.7	0.2
93721	2,4,5-TP	0.008	**	143.2	0.6	0.2
93765	2,4,5-Trichlorophenoxyacetic acid	0.01		81.6	1	0.4

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94746	MCPA	0.0005		27.32	0.2	0.06
94757	2,4-Dichlorophenoxyacetic acid	0.01		20.96	5	2
94815	MCPB	0.01		50.4	2	0.7
94826	4-(2,4-Dichlorophenoxybutyric acid	0.008		38.56	2	0.7
95487	o-Cresol	0.05	**	7.6	70	20
95498	o-Chlorotoluene	0.02		88	2	0.8
95501	1,2-Dichlorobenzene	0.09	**	103	9	3
95578	2-Chlorophenol	0.005		8.8	6	2
95658	3,4-Dimethylphenol	0.001		24.72	0.4	0.1
95943	1,2,4,5-Tetrachlorobenzene	0.0003		1404	0.002	0.0007
95954	2,4,5-Trichlorophenol	0.1		176.4	6	2
96184	1,2,3-Trichloropropane	0.006		5.84	10	4
98011	Furfural	0.003		0.54	60	20
98077	Benzotrichloride	**	**	283		
98828	Cumene	0.04		138	3	1
98862	Acetophenone	0.1		2.82	400	100
98953	Nitrobenzene	0.0005		4.92	1	0.4
99354	1,3,5-Trinitrobenzene	0.00005		1.93	0.3	0.09
99650	m-Dinitrobenzene	0.0001		3.08	0.4	0.1
100414	Ethylbenzene	0.1	**	66.8	20	5
100425	Styrene	0.2		29.24	80	20
100447	Benzyl chloride	**	0.17	21.5	0.003	0.001
100527	Benzaldehyde	0.1		2.42	500	100
101213	Chlorpropham (CIPC)	0.2		96.4	20	7
101553	p-Bromodiphenyl ether	**	**	2179		
101611	44'Methylenebis(NN'dimethyl)aniline	**	0.046	888	0.0003	0.00009
103231	Di-(2-ethylhexyl)adipate	0.7		40000	0.2	0.06
103333	Azobenzene	**	0.11	175.2	0.0006	0.0002
105602	Caprolactam	0.5		0.4	10000	4000

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106376	1,4-Dibromobenzene	0.01		181.2	0.6	0.2
106445	p-Cresol	0.05	**	7.6	70	20
106478	p-Chloroaniline	0.004		5.32	8	2
106898	Epichlorohydrin	0.002	0.0099	0.4	3	0.9
106934	1,2-Dibromoethane	**	85	3.76	0.00003	0.00001
106990	1,3-Butadiene	**		5.08		
107028	Acrolein	**	**	0.4		
107051	Allyl chloride	**	**	2.20		
107062	1,2-Dichloroethane	**	910	2.26	0.000005	0.000002
107131	Acrylonitrile	**	0.54	0.4	0.05	0.02
107186	Allyl alcohol	0.005		0.4	100	40
107211	Ethylene glycol	2		0.4	60000	20000
107302	Chloromethyl methyl ether	**	**	0.4		
108101	Methyl isobutyl ketone	0.05		1.38	400	100
108316	Maleic anhydride	0.1				
108394	m-Cresol	0.05	**	7.6	70	20
108452	m-Phenylenediamine	0.006		0.4	200	50
108883	Toluene	0.2	**	25.52	80	30
108907	Chlorobenzene	0.02	**	28	8	3
108918	Cyclohexylamine	0.2		1.92	1000	400
108941	Cyclohexanone	5		0.69	80000	30000
108952	Phenol	0.6		2.33	3000	900
109693	1-Chlorobutane	**	**	15.5		
110009	Furan	0.001		1.75	6	2
110543	n-Hexane	**	**	179		
110861	Pyridine	0.001		0.53	20	7
111444	Bis(chloroethyl)ether	**	1.1	0.98	0.01	0.003
114261	Baygon	0.004		2.81	20	5
115297	Endosulfan	0.00005				

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115322	Dicofol	**	0.44	9680	0.000003	0.0000008
116063	Aldicarb	**	**	1.21		
117817	Bis(2-ethylhexyl)phthalate	0.02	0.014	40000	0.00002	0.000006
118741	Hexachlorobenzene	0.0008		18800	0.0005	0.0001
118967	2,4,6-Trinitrotoluene	0.0005		2.27	2	0.8
120127	Anthracene	0.3	**	550	6	2
120616	Dimethyl terephthalate	0.1		11.56	100	30
120821	1,2,4-Trichlorobenzene	**	**	383.6		
120832	2,4-Dichlorophenol	0.003		42	0.8	0.3
121142	2,4/2,6-Dinitrotoluene mixture	**	0.68	5.96	0.002	0.0009
121697	N-N-Dimethylaniline	0.002		11.16	2	0.6
121755	Malathion	0.02		3.83	60	20
121824	RDX	0.003	0.11			
122349	Simazine	0.002	**	15.36	1	0.5
122394	Diphenylamine	0.025		115.2	2	0.8
122429	Propham	0.02		18	10	4
122667	1,2-Diphenylhydrazine	**	0.80	35.36	0.0004	0.0001
123331	Maleic hydrazide	0.5		0.4	10000	4000
123911	1,4-Dioxane	**	0.011	0.4	3	0.8
124403	Dimethylamine	**	**	0.4		
124481	Dibromochloromethane	0.02		9.24	20	8
126987	Methacrylonitrile	0.0001		0.42	3	0.8
127184	Tetrachloroethylene	0.01		38.72	3	0.9
129000	Pyrene	0.03	**	1280	0.3	0.08
131113	Dimethyl phthalate	**	**	2.51		
131895	4,6-Dinitro-o-cyclohexyl phenol	0.002		800	0.03	0.009
133062	Captan	0.013				
133073	Folpet	0.1	0.0035			
133904	Chloramben	0.015		8.24	20	6

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137268	Thiram	0.005				
139402	Propazine	0.02		47.2	5	1
141662	Bidrin	0.0001		0.4	3	0.9
141786	Ethyl acetate	0.9		0.54	20000	6000
143339	Sodium cyanide	0.04				
145733	Endothall	0.02		0.4	600	200
148185	Sodium diethyldithiocarbamate	0.03				
150505	Merphos	0.00003				
151508	Potassium cyanide	0.05				
156605	trans-1,2-Dichloroethylene	0.02		2.5	90	30
206440	Fluoranthene	0.04	**	1280	0.3	0.1
298000	Methyl parathion	0.00025		25.48	0.1	0.03
298044	Disulfoton	0.00004		60	0.007	0.002
300765	Naled	0.002		65.9	0.3	0.1
302012	Hydrazine/Hydrazine sulfate	**	3.0			
309002	Aldrin	0.00003	17	1638	0.0000004	0.0000001
319846	alpha-Hexachlorocyclohexane	**	6.3	146.8	0.00001	0.000004
319857	beta-Hexachlorocyclohexane	**	1.8	146.8	0.00004	0.00001
319868	delta-Hexachlorocyclohexane	**	**	146.8		
330541	Diuron	0.002		23.56	0.9	0.3
330552	Linuron	0.002	**	51.6	0.4	0.1
460195	Cyanogen	0.04				
504245	4-Aminopyridine	**	**	0.4		
506616	Potassium silver cyanide	0.2				
506649	Silver cyanide	0.1				
506683	Cyanogen bromide	0.09				
506774	Chlorine cyanide	0.05				
507200	t-Butylchloride	**	**	12.2		
510156	Chlorobenzilate	0.02		434	0.5	0.2

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541731	1,3-Dichlorobenzene	**	**	103		
542621	Barium cyanide	0.07				
542756	1,3-Dichloropropene	0.0003	**	2.94	1	0.4
542881	Bis(chloromethyl)ether	**	220	1.05	0.00005	0.00002
544923	Copper cyanide	0.005				
556887	Nitroguanidine	0.1				
556887	Nitroguanidine	0.1	**			
557211	Zinc cyanide	0.05				
563122	Ethion	0.0005		191	0.03	0.009
563688	Thallium acetate	0.00009	**			
576261	2,6-Dimethylphenol	0.0006		24.72	0.3	0.08
592018	Calcium Cyanide	0.04				
598776	1,1,2-Trichloropropane	0.005		17.4	3	1
608731	tech-Hexachlorocyclohexane	0.003	1.8	146.8	0.00004	0.00001
608935	Pentachlorobenzene	0.0008		5120	0.002	0.0005
615543	1,2,4-Tribromobenzene	0.005		524	0.1	0.03
621647	N-Nitrosodi-N-propylamine	**	7.0	1.85	0.0009	0.0003
630104	Selenourea	0.005				
630206	1,1,1,2-Tetrachloroethane	0.03		39.72	8	3
709988	Propanil	0.005		105.2	0.5	0.2
732116	Phosmet	0.02		15.2	10	4
759944	S-Ethyl dipropylthiocarbamate	0.025		68.4	4	1
765344	Glycidyaldehyde	0.0004				
834128	Ametryn	0.009		40.4	2	0.8
886500	Terbutryn	0.001		83.6	0.1	0.04
924163	N-Nitroso-di-n-butylamine	**	5.4	12.68	0.0002	0.00005
930552	N-Nitrosopyrrolidine	**	2.1	0.4	0.01	0.004
944229	Fonofos	0.002		193.6	0.1	0.04
950378	Methidathion	0.001				

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957517	Diphenamid	0.03		10.72	30	10
961115	Tetrachlorovinphos	0.03		64.8	5	2
1024573	Heptachlor epoxide	0.000013	9.1	13.72	0.00009	0.00003
1071836	Glyphosate	0.1	**			
1116547	N-Nitrosodiethanolamine	**	2.8	0.4	0.01	0.003
1163195	Decabromodiphenyl ether	0.01	**	40000	0.003	0.0009
1314325	Thallic oxide	**	**			
1314621	Vanadium pentoxide	0.009				
1314847	Zinc phosphide	0.0003				
1330207	Xylenes	2	**			
1332214	Asbestos	**	**			
1336363	Polychlorinated biphenyls	**	7.7			
1445756	Diisopropyl methyl phosphonate	0.08		0.4	2000	700
1563662	Carbofuran	0.005		14.32	4	1
1582098	Trifluralin	0.0075	0.0077	1784	0.0008	0.0003
1596845	Alar	0.15		0.4	4000	1000
1610180	Prometon	0.015		40.8	4	1
1646884	Aldicarb sulfone	0.0003		0.4	8	3
1689845	Bromoxynil	0.02		36.36	6	2
1689992	Bromoxynil octanoate	0.02		5800	0.04	0.01
1861321	Dacthal	0.5		327.6	20	5
1861401	Benefin	0.3		1784	2	0.6
1897456	Chlorothalonil	0.015		178.4	0.9	0.3
1910425	Paraquat	0.0045				
1912249	Atrazine	0.005	**	26.96	2	0.6
1918009	Dicamba	0.03		14.08	20	7
1918021	Picloram	0.07		11.56	70	20
1918167	Propachlor	0.013		16.72	9	3
1929777	Vernam	0.001		179.2	0.06	0.02

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1929824	Nitrapyrin	0.0015		79.2	0.2	0.07
2008415	Butylate	0.1		292	4	1
2050477	p,p'-Dibromodiphenyl ether	**	**	11882		
2104645	EPN	0.00001		648	0.0002	0.00005
2164172	Fluometuron	0.013		10.08	10	5
2212671	Molinate	0.002		35.28	0.6	0.2
2303175	Triallate	0.013		388	0.4	0.1
2310170	Phosalone	0.0025				
2312358	Propargite	0.02				
2385855	Mirex	0.000002		752	0.00003	0.000009
2425061	Captafol	0.002				
2439103	Dodine	0.004				
2691410	Octahydro-1,3,5,7-tetranitro-1,3,5,	0.05				
2921882	Chlorpyrifos	0.003		800	0.04	0.01
3337711	Asulam	0.05		0.4	1000	500
3689245	Tetraethyldithiopyrophosphate	0.0005				
5234684	Carboxin	0.1		3.37	300	100
5902512	Terbacil	0.013		5.4	30	8
6108107	epsilon-Hexachlorocyclohexane	**	**	146.8		
6533739	Thallium carbonate	0.00008	**			
7287196	Prometryn	0.004		71.2	0.6	0.2
7439921	Lead and compounds	**	**			
7439965	Manganese	0.1	**			
7439976	Mercury, (inorganic)	**				
7440020	Nickel, soluble salts	0.02	**			
7440144	Radium 226 and 228	**	**			
7440144	Radium 228 (and 226)	**	2.6E-5/pCi/L			
7440224	Silver	0.003				
7440360	Antimony	0.0004				

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7440382	Arsenic, inorganic	**	**			
7440393	Barium	0.07				
7440417	Beryllium	0.005	4.3			
7440428	Boron (Boron and Borates only)	0.09				
7440439	Cadmium	**	**			
7440473	Chromium(VI)	0.005	**			
7440508	Copper	**	**			
7440611	Uranium, natural	**	**			
7446186	Thallium(I) sulfate	0.00008	**			
7723140	White phosphorus	0.00002	**			
7773060	Ammonium sulfamate	0.25				
7782414	Fluorine (soluble fluoride)	0.06				
7783008	Selenious acid	0.003				
7783064	Hydrogen sulfide	0.003				
7791120	Thallium chloride	0.00008	**			
7803512	Phosphine	0.0003				
8001352	Toxaphene	**	1.1	414	0.00002	0.000008
8001589	Creosote	**	**			
8007452	Coke oven emissions	**				
8065483	Demeton	0.00004				
10102439	Nitric oxide	0.1				
10102440	Nitrogen dioxide	1				
10102451	Thallium nitrate	0.00009	**			
10265926	Methamidophos	0.00005		0.4	1	0.4
10453868	Resmethrin	0.03		11900	0.03	0.009
10595956	N-Nitroso-N-methylethylamine	**	22	0.4	0.001	0.0004
12035722	Nickel subsulfide	**	**			
12039520	Thallium selenite	0.00009	**			
12122677	Zineb	0.05				

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12427382	Maneb	0.005				
13463393	Nickel carbonyl	**	**			
13593038	Quinalphos	0.0005		42.8	0.1	0.04
13684634	Phenmedipham	0.25		124	20	7
14797558	Nitrate	**				
14797650	Nitrite	0.1				
14859677	Radon 222	**	1.8E-6/pCi/L			
15299997	Napropamide	0.1		156	7	2
15972608	Alachlor	0.01		226	0.5	0.2
16065831	Chromium(III)	1				
16672870	Ethephon	0.005				
16752775	Methomyl	0.025				
17804352	Benomyl	0.05				
19044883	Oryzalin	**		31.1		
19408743	Hexachlorodibenzo-p-dioxin mixture	**	6200			
19666309	Oxadiazon	0.005				
20859738	Aluminum Phosphide	0.0004				
21087649	Metribuzin	0.025				
21725462	Cyanazine	0.002		3.64	6	2
22224926	Fenamiphos	0.00025		21.5	0.1	0.04
22967926	Methyl mercury	0.0003				
23135220	Oxamyl	0.025				
23564058	Thiophanate-methyl	0.08		2.92	300	100
23950585	Pronamide	0.075		33.92	20	8
24307264	Mepiquat chloride	0.03				
25057890	Bentazon	0.0025				
25329355	Pentachlorocyclopentadiene	**	**			
26628228	Sodium azide	0.004				
27314132	Norflurazon	0.04				

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28249776	Thiobencarb	0.01		71.6	2	0.5
29232937	Pirimiphos-methyl	0.01		66.7	2	0.5
30560191	Acephate	**	0.0087	0.4	3	1
32534819	Pentabromodiphenyl ether	0.002	**			
32536520	Octabromodiphenyl ether	0.003	**			
33089611	Amitraz	0.0025				
33820530	Isopropalin	0.015		5520	0.03	0.01
34014181	Tebuthiuron	0.07		0.4	2000	600
35367385	Diflubenzuron	0.02		44.8	5	2
35554440	Imazalil	0.013		19.84	7	2
36483600	Hexabromodiphenyl ether	**	**			
36734197	Iprodione (Rovral)	0.04				
39148248	Fosetyl-al	3	**			
39515418	Danitol	0.0005		5170	0.001	0.0003
39638329	Bis(2-chloroisopropyl) ether	0.04		21.9	20	6
40088479	Tetrabromodiphenyl ether	**	**			
40487421	Pendimethalin (Prowl)	0.04		3416	0.1	0.04
41851507	Chlorocyclopentadiene	**	**			
42874033	Oxyfluorfen	0.003		11040	0.003	0.001
43121433	Bayleton	0.03		39.28	8	3
43222486	Difenzoquat	0.08				
49690940	Tribromodiphenyl ether	**	**			
50471448	Vinclozolin	0.025				
51218452	Metolachlor	0.1	**	252.4	4	1
51235042	Hexazinone	0.033		348.4	1	0.3
51630581	Pydrin	0.025		35200	0.008	0.002
52315078	Cypermethrin	0.01		10320	0.01	0.003
52645531	Permethrin	0.05		40000	0.01	0.004
55285148	Carbosulfan	0.01				

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55290647	Dimethipin	0.02	**			
57837191	Metalaxyl	0.06		24.1	30	9
58138082	Tridiphane	0.003				
59756604	Fluridone	0.08		1856	0.5	0.2
60207901	Propiconazole	0.013				
60568050	Furmecyclox	**	0.030			
62476599	Sodium acifluorfen	0.013				
63936561	Nonabromodiphenyl ether	**	**			
64902723	Chlorsulfuron	0.05		19.0	30	9
65195553	Avermectin B1	0.004				
66215278	Cyromazine	0.0075		0.54	200	50
66332965	Flutolanil	0.06				
66841256	Tralomethrin	0.0075		40000	0.002	0.0007
67485294	Amdro	0.0003				
67747095	Prochloraz	0.009	0.15			
68085858	Cyhalothrin/Karate	0.005		10700	0.005	0.002
68359375	Baythroid	0.025		40000	0.007	0.002
69409945	Fluvalinate	0.01		40000	0.003	0.0009
69806402	Haloxyfop-methyl	0.00005				
72128020	Fomesafen	**	0.19			
72128020	Fomesafen	**	0.19			
74051802	Sethoxydim	0.09				
74115245	Apollo	0.013				
74223646	Ally	0.25				
76578148	Assure	0.009				
76738620	Paclobutrazol	0.013				
77182822	Glufosinate-ammonium	0.0004				
77323843	Trichlorocyclopentadiene	**	**			
77323854	Tetrachlorocyclopentadiene	**	**			

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77501634	Lactofen	0.002				
78587050	Savey	0.025				
79277273	Harmony	0.013				
81335377	Imazaquin	0.25				
81335775	Pursuit	0.25	**			
82558507	Isoxaben	0.05				
82657043	Biphenthrin	0.015		40000	0.004	0.001
83055996	Londax	0.2				
85509199	NuStar	0.0007				
88671890	Systhane	0.025				
90982324	Chlorimuron-ethyl	0.02				
101200480	Express	0.008				

United States
Environmental Protection
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Office Of Water

001144

EPA

Technical Support Document For Water Quality-based Toxics Control

RESPONSIVENESS SUMMARY

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RESPONSIVENESS SUMMARY

General

1. **The TSD needs to be peer reviewed.**

   EPA Response: We feel EPA has provided ample opportunity for review of the TSD. The Williamsburg workgroup met in December, 1988, and was composed of a diverse group of people from EPA Regions, States, environmental groups, trade associations, academia, private industry, and municipalities. This group was formed to determine what changes were needed in the document. Based on the workgroup's inputs, EPA produced a first draft TSD in November, 1990. This draft was sent out to workgroup members, and anyone else upon request, for review and comment. EPA considered each comment and made changes to the document. A second revised draft TSD was noticed in the Federal Register on May 11, 1990. Over 2500 copies of the new draft were sent out. Between the two drafts, we received 120 comments from a diverse group of people. EPA considered each individual comment and made changes to the document where necessary.

2. **The TSD doesn't apply to CSO discharges.**

   EPA Response: We acknowledge that the TSD was written with continuous discharges in mind. However, there is no reason why the general concepts and some of the recommendations of the TSD cannot be extended to CSO or other rainfall related discharges. The dynamic model applications in the TSD have been used over the last 10 years to address water quality problems related to CSOs. EPA believes that this model can also be applied to address toxic problems with CSOs.

Chapter 1: Approaches to Water Quality-based Toxics Control

Overview: Added more information and clarification to support EPA's position with regard to the major issues addressed in the comments.

1. **The cause and effect relationship between effluent toxicity and instream impacts is not adequately documented, and other factors that may cause instream impacts have not been addressed. EPA's use of the CETTP studies was criticized.**
   EPA Response: The revised draft TSD has been changed to include more documentation to support our position on the cause and effect relationship between effluent toxicity and instream impacts. Supporting information on a study conducted on the Trinity River in Texas was added as well as more

detailed explanation of the CETTP studies. EPA evaluated the results of the CETTP studies, the North Carolina studies, and the Trinity River study and found that if toxicity is present after considering dilution, instream impact will also be present. EPA's finding is now clearly stated in the TSD and referenced. The TSD now includes a discussion of Parkhurst's major criticisms of the CETTP studies and why EPA feels those criticisms are unfounded. The TSD also acknowledges that biological, physical, and chemical factors of the community can influence the actual effects that effluent toxicity may cause in the receiving water.

2. **Toxicity test method precision is too variable to be used in NPDES permits.**

EPA Response: The revised draft includes all available precision data for both acute and chronic toxicity tests; this includes intralaboratory and all available interlaboratory test results. Raw precision data is presented in table form in Appendix A and discussed within the chapter. EPA evaluations, as well as published literature reviews which include estimates of whole effluent precision data are presented. EPA is comfortable with the conclusion that whole effluent toxicity tests are no more variable than chemical analytical methods and therefore stands behind the recommendation that toxicity test methods be used in NPDES permits.

The same data contained in the TSD has been used by EPA in proposing adoption of the toxicity methods into EPA's regulations at 40 CFR 136. The toxicity methods were proposed for adoption on December 4, 1989. Comments were received and will be answered upon notice of EPA's decision regarding these methods. The decision is expected in April 1991.

3. **The biological criteria/bioassessment approach is not yet part of EPA's water quality regulations and should not yet be used in the regulatory process. For the best assessment of sources and causes, EPA should use a "weight-of-evidence approach."**

EPA Response: As previously stated in the TSD (per section 131.11(b)(2) of the Water Quality Standards Regulation), biological criteria can supplement existing chemical-specific criteria and provide an alternative to chemical-specific criteria where such criteria cannot be established. To acknowledge the current evolving status of the use of biocriteria, EPA's statement in the TSD has been revised to read: "To better protect the biological integrity of aquatic communities, EPA recommends that States <u>begin to</u> develop and implement biological criteria in their water quality standards."

EPA does not agree with use of the "weight-of-evidence" approach in this context because biosurveys are too complex to override the other two methods (i.e., chemical-specific and whole effluent toxicity). The TSD now explains EPA's position that the concept of "independent application" be applied to water quality-based situations. Since each method has unique as well as overlapping attributes, sensitivities, and program applications, no single approach for detecting impact should be considered uniformly superior to any other approach. For example, the inability to detect receiving water impacts using a biosurvey alone is insufficient evidence to waive or relax a permit limit established using either of the other methods. The most protective results from each assessment conducted should be used in the effluent characterization process (Chapter 3). The results of one assessment technique should not be used to contradict or overrule the results of the other(s).

However, EPA recognizes that there are instances when the whole effluent, chemical specific, and biological criteria approaches will give disparate results. The TSD was revised to recommend that permitting authorities use a more complex way to assess excursions beyond standards and establishing permit limits to provide assurance that simplifying assumptions are not the cause of the apparent discrepancy. The TSD also now includes examples of where the whole effluent toxicity test protocols may conflict with critical environmental parameters to lead to an apparent disparity between the whole effluent toxicity and chemical specific approaches.

4. **The problem of false positives (i.e., instream impact predicted by toxicity test where none exists) is not addressed.**

EPA Response: The revised draft TSD now addresses the problem of toxicity test interferences caused by environmental parameters and explains that there may be a few unusual situations where the pH, temperature, hardness, salinity, and solids requirements of the testing procedures differ greatly from the worst environmental conditions for these parameters. In these situations, the effluent toxicity tests may either over or under predict the toxicity in the ambient receiving water. An example of this is where ammonia is present and the highest expected ambient water temperature is 20°C whereas the chronic toxicity test must be conducted at 25°C. Since a higher temperature causes more ammonia toxicity, the temperature requirements of the test may induce toxicity not found in the ambient water. In such an instance, the regulatory authority must carefully look at the test protocols and all the data collected to determine if the facility is actually contributing to toxicity in the ambient water. A toxicity identification evaluation (TIE) may be necessary to

make this determination. If this analysis shows a toxicity test result to be artificial due to environmental parameters, then that test should be overridden by subsequent toxicity tests conducted.

5. **Current standard algal toxicity test methods lack the ability to provide useful data on the ecological impact of a discharge and should not be recommended as a test species. EPA should recommend three species representing two different phyla be used for toxicity testing. EPA's recommendation to use surrogate (rather than resident) species in toxicity testing as being more protective seems contrary to the site specific nature of the permitting process.**

   EPA Response: To address concerns with the algal test and to allow more flexibility in testing, the recommendation in the TSD has been changed to "fish, invertebrate, and plant." EPA will not modify its recommendation to include only 2 phyla. EPA's objective in requiring 3 species from 3 different phyla is to be predictively protective.

   The TSD's discussion of the use of surrogate species was expanded to explain that to use a resident organism, a facility would have to develop a protocol to culture the organism and to assess intra- and inter-laboratory variability. Such testing is more costly, more difficult, and potentially subject to more variability (disease, age, etc.) than standardized testing. In any case, organisms collected directly from the receiving water itself should never be used because their health cannot be assured.

6. **More documentation is needed for the statement that the "IC25 is approximately the analogue of an NOEC." Before EPA makes such a broad ranging recommendation, there must be sufficient data to establish an overall relationship.**

   EPA Response: The language in the revised draft has been clarified to better explain what an IC25 is and how it is calculated. EPA believes that there is sufficient data to support the statement that the "IC25 is approximately the analogue of an NOEC." The data in Appendix A is presented so that both hypothesis testing and IC25 calculations of an NOEC can be compared. A statistical analysis using minimum significant differences is graphically presented in Figure 1-1. Figure 1-1 shows that an NOEC calculated using the IC25 is comparable to an NOEC calculated using hypothesis testing, and that the relationship is statistically sound.

7. **The data in the TSD shows that whole effluent toxicity is not additive.**

   EPA Response: The cited article in the TSD and the TIE data were reviewed. These data support EPA's position that acute toxicity is additive. However, the data do not support additivity of chronic toxicity. Therefore, the TSD was changed to reflect this.

8. **There are insufficient chemical-specific field data to support that exceedances of the criteria cause instream impacts.**
   EPA Response: The field studies referenced in Chapter 1 for chemical specific criteria investigations were conducted over twenty years ago. The field investigators dosed a stream with toxicants to measure the response. This approach is not possible today because it would violate the States water quality standards. Since that time, EPA has developed a method of using laboratory toxicity data on specific chemicals to derive data.

Chapter 2: Water Quality Criteria and Standards

Overview: Revised introduction to summarize key regulatory requirements; reorganized into clearly defined aquatic life and human health discussions; added more information on what should be considered when allowing mixing zones; added more in-depth discussion of criteria for human health protection.

1. **Water quality criteria are not reliable due to data gaps or errors in derivation. Site-specific criteria should not be limited to being more stringent than the national criteria.**

   EPA Response: Changing the general procedure for deriving WQ criteria is not within the scope of the TSD. In the near future EPA expects to re-examine the general procedures for deriving aquatic life criteria, and will request public comment thereon. While EPA requests public comment on all WQ criteria documents before publishing them in final form, EPA accepts comment on criteria at any time and can correct errors through criteria summary documents that it distributes from time to time. Finally, there is no Agency policy, set forth in the TSD or elsewhere, that prevents state-wide or site-specific criteria from being less stringent than the national criteria.

2. **Provide more clarity on how to prohibit lethality within the mixing zones?**

   EPA Response: The TSD has been amended to clarify the goals of EPA's recommendations on mixing zones. It now states that mixing zone conditions should not be lethal to organisms

passing through it. Survival of organisms that might wish to reside permanently in a mixing zone is not assured by past or current policy.

Because the chronic criteria may be exceeded at the end of the pipe there is a potential for lethality to sensitive organisms that attempt to reside permanently in the mixing zone. Part of the intent of the recommendations of the 1985 TSD and 1991 TSD is to protect the survival of organisms passing through the mixing zone. In all cases, exposures to concentrations above the CCC and CMC cannot be correctly interpreted without accounting for the duration of exposure.

3. **The TSD is flawed because it assumes that mixing zones exist. The Great Lakes Water Quality Agreement precludes use of flow augmentation as a substitute for adequate treatment.**
EPA Response: The TSD recommendations in no way authorize mixing zones where otherwise prohibited. In addition, the recommendations on mixing zones do not advocate management of reservoirs for flow augmentation.

4. **TSD should at a minimum be against mixing zones for persistent and bioacccumulative toxicants, and the burden of justifying mixing zones for non-persistent and non-bioacccumulative toxicants should be on the discharger. The Great Lakes Water Quality Agreement calls for zero discharge of pollutants and elimination of persistent and bioaccumulative toxicants. The Clean Water Act also has a goal of zero discharge of pollutants.**

EPA Response: The TSD continues to note that EPA regulations allow mixing zones at the discretion of the State. The TSD also discusses options that should be considered when determining whether to allow mixing zones for aquatic life and human health protection. For protection of aquatic life, a mixing zone may be permitted as long as its size is sufficiently limited that it does not significantly impair the integrity of the water body as a whole, and it does not cause lethality to organisms passing through the mixing zone. For protection of human health, mixing zones should be restricted such that they do not encroach on areas often used by the public for fishing, and particularly where stationary species such as shellfish are harvested; mixing zones may also be restricted to compensate for uncertainties in the protectiveness of the water quality criteria or uncertainties in the assimilative capacity (TMDL) of the water body.

Bioaccumulative pollutant problems are not fundamentally caused by mixing zones. Bioaccumulation is generally a system-wide problem that occurs when the appropriate TMDL for a water body as a whole is exceeded. Consequently, EPA does not consider mixing zone restrictions to be the best mechanism

for addressing such problems. However, eliminating mixing zones can be used as a device to further reduce the loading below the TMDL, although the results are not as predictable as a direct reduction of the TMDL would be. Chapter 2 has been now been modified to state the factors that should be considered in judging whether a mixing zone causes significant health or ecological risks.

It should be noted that the TSD deals with WQ based effluent limits (i.e., those needed to protect aquatic life and human health), implemented primarily under the specific requirements of Sections 301, 303, and 304 of the CWA. Under this framework, zero discharge of pollutants is generally required where the water quality standard or the Total Maximum Daily Load is set at zero.

5. **The TSD should allow mixing zones for all toxicants including bioaccumulative pollutants. Furthermore, fate processes (such as sedimentation or decay) that occur within mixing zones should be taken into consideration.**

   EPA Response: The TSD now sets forth specific conditions under which denial of mixing zones would be appropriate. EPA regulations also allow (while neither encouraging nor discouraging) States to use mixing zones. The recommendations of the TSD implicitly discourage consideration of fate processes such as sedimentation or decay. Mixing zones are an allowance for variations in concentration due to incomplete mixing, over small spatial scales, usually too small for fate processes to significantly reduce concentrations.

6. **Limiting all dischargers to 0.3 TUa is akin to a technology based approach such as a 30 mg/L BOD or suspended solids limit. The TSD should consider the resulting instream water quality.**

   EPA Response: The mixing zone discussion has been modified to provide different alternatives for assuring that instream goals and standards are met. Not exceeding 0.3 TUa at the end of the pipe is one of the recommended ways to assure survival of organisms passing through the mixing zone. Nevertheless, the discussion has been modified to de-emphasize the technological requirements and emphasize the attainment of instream goals.

7. **EPA should provided more information on the tests it used to arrive at an LC50/LC1 ratio of 0.3. According to the data presented in the TSD, the 0.3 ratio is overly conservative in most cases.**

   EPA Response: The magnitude of the acute WET criterion is based on data collected from a number of facilities in EPA

Region 4. These data show that 90% of the facilities exhibited an LC1 which was no less than 0.3 times the LC50. This is different from the 0.5 factor used to derive a chemical specific acute criterion.

8. **The acute toxicity criterion of 0.3 TUa is below detection. How would it be implemented?**

EPA Response: The implementation of this criterion would be identical to that used for specific chemicals. This implementation is expressed in Chapter 5.

9. **The 1-hour averaging period for the acute criteria (CMC) is overly restrictive, does not correspond to the 48-96 hour toxicity tests, and cannot be modeled with existing EPA WQ models. Elsewhere in the document, EPA indicates that 24 hours is an appropriate averaging period for modeling purposes. Both concentration and exposure time are important, since for many toxicants the 96-hour LC50 is dramatically higher than the 1-hour LC50. The 1-hour averaging period is technically unsupported by the limited information presented. EPA appears to have edited the data presented in Appendix D to include only those data that support the 1-hour averaging period. EPA should present all available data on the effect of exposure duration on toxicity.**

EPA Response: EPA agrees that both concentration and exposure time are important. The TSD has now been modified to note that the 1-hour averaging period is based on ammonia, a fast-acting toxicant. As the 1-hour averaging period was intended to be protective even for the fastest acting toxicants, it may be overly conservative for many pollutants. Consequently, the TSD recommends allowance for site-specific (or chemical-specific) modification of the averaging periods. Alternative averaging periods can be developed from data on the time course of mortality in acute toxicity tests.

EPA expects that for many pollutants, such site-specific or state-wide alternative averaging periods, if developed using adequate data, may be greater than the period recommended for national criteria. Furthermore, EPA recognizes that a 24-hour acute averaging period may be appropriate in some modeling contexts, where concentrations do not change rapidly over short time periods.

While Appendix D of the TSD presents some examples of pollutants for which a short averaging period, on the order of hours, might be appropriate, the TSD was not intended as the mechanism by which EPA would develop a rationale for the acute averaging period. The averaging periods were set forth in 1985 in the "Guidelines for Deriving...National Criteria". In the near future EPA intends to review and perhaps modify

the Guidelines, and may at that time consider the feasibility of different acute averaging periods for different chemicals.

10. **The rationale for the 4-day averaging period is weak. Chronic toxicity tests for most species require much longer than four days. The field studies presented in Chapter 1 indicate that longer term excursions are needed to produce ecological effects. EPA inappropriately picked examples of pollutants with low acute-chronic ratios to justify the 4-day averaging period. A 30-day averaging period (per the freshwater ammonia criteria document) should be acceptable, particularly in cases where concentrations do not change rapidly.**

    EPA Response: The TSD has been modified to note that EPA selected the 4-day chronic averaging period based on the shortest period that chronic effects may be observed for certain chemicals.

    As the 4-day period was selected for provide adequate protection in all cases, EPA recognizes that longer averaging periods may be appropriate for many pollutants, and recommends using site-specific or state-wide pollutant-specific alternative averaging periods, where scientifically supported. EPA believes that selection of an appropriate chronic averaging period is technically difficult, with less applicable data than is available for selecting the acute averaging period. EPA agrees that the acute-chronic ratio is a confounding influence in interpreting the duration needed to produce a chronic effect endpoint. Where an appropriate acute criterion is in force, the chronic averaging period need not be shortened simply because the acute-chronic ratio is low.

    The TSD does not supersede the freshwater ammonia criteria document, and thus EPA still recommends an averaging period of as long as 30 days for ammonia, where concentrations do not vary excessively.

11. **EPA's recommended once in three year return frequency for criteria excursions is overly conservative. Appendix D presents time periods needed for ecological recovery from severe or catastrophic stresses, not slight stresses caused by marginal criteria excursions. The frequency of significant criteria excursions, comparable to those that caused the measurable ecological impacts set forth in Chapter 1, would be much less than for marginal criteria excursions. EPA should present data on the ecological differences between sites with different excursion frequencies. EPA should develop guidance on how to establish site-specific allowable frequencies.**

EPA Response: EPA has used Appendix D to set forth information on time periods needed for ecological recovery from severe or catastrophic stresses. EPA's recommended 3-year return interval was set forth in the 1985 "Guidelines for Deriving Numeric National Criteria...", and a review or revision of this recommended frequency was not within the scope of the TSD. Nevertheless, EPA intends to address the excursion frequency during the upcoming revision of the Guidelines.

EPA expects that criteria exceedances can cause adverse effects and that the magnitude of the effect will depend on many things including the magnitude and duration of the exceedance. EPA believes that all adverse effects are not necessarily unacceptable, but that pollution should not be allowed to subject aquatic communities to long-term or regular short-term adverse effects. All dramatic adverse effects are certainly unacceptable.

EPA believes that the 3-year return interval can be justified by the Appendix D data if one makes the assumption that the type of ecological impact shown in Appendix D could be caused by fairly small criteria excursions. The concentrations causing the Appendix D impacts were in fact not known. EPA recognizes that the chemical and ecological field data summarized in Chapter 1 suggest that successive excursions well above the criteria would be needed to cause severe impacts. EPA also recognizes that the probability of large excursions can be calculated to be extremely small compared to the probability of marginal excursions.

EPA does not have information to allow direct comparisons of ecological quality versus criteria excursion frequency, except possibly as could be inferred from the field data shown in Chapter 1. EPA does not intend at this time to set forth guidance on developing site-specific allowable frequencies.

Nevertheless, in general, EPA recommends that ecosystems not spend a substantial portion of time in a state of recovery from pollution stresses, and that pollution stresses not significantly increase the total stress experienced by organisms in the ecosystem. If the criteria are set appropriately, a marginal excursion might be expected to have little or no measurable impact, and little or no time period needed for recovery. The probability of a marginal criteria excursion nevertheless has a calculable relationship with the probabilities of severe criteria excursions. Consequently, a scientifically justified site-specific or state-wide frequency could be developed by considering (a) the probability (estimated by simulation or by statistical calculation) of a range of excursions of differing severity, coupled with (b) the estimated ecological recovery period for

the corresponding different degrees of impact. Based on the total period of recovery from a full range of possible events, compared with the sum of return intervals for such events, the allowable frequency for the marginal criteria excursion could be established.

12. **The once in three year excursion frequency does not take into consideration the likelihood of apparent excursions caused by the inherent variability of the analytical tests.**

EPA Response: The allowable frequency for criteria excursions should refer to true excursions of the criteria, not to spurious excursions caused by analytical variability or error. In evaluating data on chemical concentrations or toxicity units, it is desirable to subtract the analytical error log variance from the observed log variance in order to arrive at the true log variance contributing to criteria excursions.

13. **The IRIS (Integrated Risk Information System) data base should be peer reviewed before it is used to update and generate RACs. The TSD should not imply that a State can update its standards simply by inserting the latest IRIS information into the equation used to calculate the criteria.**

EPA Response: EPA's IRIS data base reflects the latest information about the Agency's health assessments for specific chemicals. While the material in the data base is internally reviewed, the Agency does not plan to have it undergo external peer review. Use of IRIS information for developing state water quality standards or discharge permits in no way relieves the State of applicable requirements for public notice and comment.

14. **The fish consumption rates used to derive residue-based criteria and RACs are unrealistically high for many waters.**

EPA Response: EPA recommends using site-specific fish consumption rates whenever such information can be obtained.

15. **The harmonic mean is not an appropriate design flow. The arithmetic mean flow should be used.**

EPA Response: For carcinogens it is appropriate to determine the long-term arithmetic mean exposure concentration. Because flow is not normally distributed, using the arithmetic mean flow for design purposes will underestimate the mean concentration.

Using the downstream harmonic mean flow will result in closely estimating the mean concentration, providing that the streamflow is not dominated by the effluent flow, and provided that the effluent input is not correlated to the streamflow.

16. **Discussion of sediment criteria and biological criteria is premature. The TSD should not advocate that states and regions implement regulatory controls based on such criteria.**

EPA Response: The biological criteria and sediment criteria sections have been modified. EPA has undertaken development of biological criteria and sediment criteria with the intent that they would, after development, have regulatory applications.

EPA does not intend to imply that these approaches can or should necessarily be used at this time to implement controls. Nevertheless, EPA believes that the states, the regulated community, and the interested general public need to know how EPA is proceeding with these criteria, and what the future regulatory implications may be. EPA is not advocating that sediment criteria, by themselves, be used to establish remediation target levels. EPA also recognizes that sediment criteria cannot be used for setting discharge limits without first developing a scientifically sound basis for predicting the effect of effluent quality on sediment quality. EPA is not suggesting that sediment quality concerns would necessarily be more limiting on dischargers than water quality concerns.

17. **Aquatic life protection as measured by whole effluent toxicity and chemical specific criteria are not applicable to waters without aquatic life designated uses.**

EPA Response: The TSD explains that numeric water quality criteria are developed by States to protect the designated uses within the water quality standards. However, the TSD also reiterated EPA's position, as expressed in the June 2, 1989, Federal Register preamble on the 304(l) promulgation was added, that the narrative criteria apply to all waters to prohibit acute toxicity.

18. **The food chain multiplier factors in the RAC calculation should be deleted because it is contrary to measured levels and BCF estimations.**

EPA Response: The differences between bioconcentration and bioaccumulation have been recognized in the scientific literature for a number of years. Data published by Thomann in Environmental Science and Technology (June 1989) show that bioaccumulation can be over 100 times higher than bioconcentration. Published critiques on EPA's dioxin criterion have also expressed that bioaccumulation is more important than bioconcentration for pollutants with log water octanol partition coefficients greater than 6. EPA believes

that consideration of bioaccumulation through use of the food chain multiplier is consistent with the existing knowledge of bioconcentration factors.

Chapter 3: Effluent Characterization

Overview: Simplified the chapter organization; cited regulatory requirements (40 CFR 122.44(d)); revised the discussion on effluent bioconcentration evaluation to conform with the new draft document.

1. **Determining the need for an effluent limit in the absence of effluent monitoring data does not address the required factors of 40 CFR § 122.44(d)(1)(ii).**

   EPA Response: EPA maintains the position that regulatory authorities may make a finding of reasonable potential even where effluent monitoring data is not available. EPA disagrees with the commenter on the issue of whether the required factors can be addressed in the absence of effluent monitoring data. Box 3-1 of the TSD was revised to illustrate how the recommended procedure for making reasonable potential determinations in the absence of effluent monitoring data will address each of the 4 required factors.

2. **Including bioconcentration and bioaccumulation recommendations in the TSD is premature. Approaches to this problem require much more peer review, input and development.**
   EPA Response: EPA agrees with this comment. The draft bioconcentration guidance that was referenced in the draft chapter 3 has not yet been released for public comment and does require additional peer review. The majority of the chapter 3 discussion on the specifics of this guidance was removed; the remaining sections specifically state that the procedures in the draft guidance should not be used by regulatory authorities until the guidance is finalized by EPA.

3. **In determining reasonable potential, the cumulative effluent discharge to a receiving water should be considered instead of single discharges.**

   EPA Response: EPA agrees with this comment. The draft of chapter 3 did not draw a clear enough distinction between the terms "cause" and "contributes to" in the context of the reasonable potential determination. Chapter 3 now states that where multiple discharges collectively are causing or show the reasonable potential to cause or contribute to an excursion of water quality standards, limits must be developed for each discharger to protect against such collective excursions. This is underscored by adding the exact regulatory language of 122.44(d). Finally, the document now has recommendations on the use of toxicity testing in multiple discharge situations.

4. **Guidance is needed on how to demonstrate that chemical-specific limits alone are sufficient to achieve applicable water quality standards, thus obviating the need for a WET limit.**

   EPA Response: EPA agrees with this comment. Regulations at 122.44(d)(1)(v) provide that WET limits are not necessary where the permitting authority demonstrates that chemical-specific limits are sufficient to protect water quality standards. The draft of chapter 3 did not clearly recognize this point and provided no guidance on how to make this demonstration. Chapter 3 now reiterates this regulatory provision with a new section entitled "Using a Chemical-specific Limit to Control Toxicity." This new section recommends that the discharger conduct a TIE to identify causative toxicants. Where the causative toxicants are controlled by chemical-specific limits, the permitting authority may make the determination that WET limits are not necessary.

5. **The multiple conservative assumptions in the effluent characterization methodology (the effluent is most toxic to the most sensitive life stage at the time of lowest stream flow and peak design flow) are overkill.**

   EPA Response: EPA does not agree that multiple conservative assumptions amount to overkill. This comment implies that EPA recommends establishing effluent limits to protect against toxic impacts that are never projected to occur. In truth, EPA only recommends establishing effluent limits where toxic impacts are projected to occur. Estimates of toxic impact should be made assuming that the effluent is most toxic to the most sensitive species or lifestage at the time of lowest available dilution because these are conditions that can be expected to occur. For the most part chapter 3 remains unchanged as a result of this comment. However, EPA has added a short discussion that suggests that the regulatory authority may choose to assess reasonable potential using a stochastic dilution model which incorporates both ambient dilution and effluent variability to project toxic impact.

6. **EPA should not recommend a 3 species minimum. The algae test and the marine tests are not sufficiently studied.**
   EPA Response: Chapter 3 continues to recommend as a minimum that 3 species be tested quarterly for a minimum of 1 year where toxicity tests are used to make decisions regarding the need for WET limits. Experience indicates that algal tests can be a highly sensitive test species for some pollutants. Furthermore, using a plant adds another trophic level to the test regimen. EPA rejects the assertion that the algal tests are not sufficiently studied. For both freshwater and marine

waters, the use of 3 species is more protective than 2 species since a wider range of species sensitivity can be measured.

7. **EPA should not recommend that ambient toxicity tests be conducted at worst case low flow conditions.**

   EPA Response: EPA disagrees with this comment. Chapter 3 continues to recommend that ambient toxicity testing be conducted during appropriate low flow or worst case design periods. In order for the results of ambient toxicity tests to form the basis for decisions about whether toxicity controls are needed, the test must reflect the conditions that such controls would be designed to protect. If a regulatory authority's policy is to protect at the 7Q10 flow, than the ambient tests must be conducted at flows that are very near the 7Q10. Otherwise, the regulatory authority will learn very little from the ambient test about whether toxicity limits are necessary for a particular discharge.

8. **Reasonable potential determinations should not be based on whole effluent toxicity data alone. Toxicity data and instream survey data should be used together in a weight of evidence approach.**

   EPA Response: We disagree. As discussed in the response to comment no. 2 in Chapter 1, EPA considers that water quality standards apply independently of each other. Whole effluent toxicity measures a different biological endpoint than do instream survey data.

9. **One piece of effluent data projecting an excursion above a water quality standard is insufficient to justify setting an effluent limit.**

   EPA Response: EPA disagrees. EPA's position is that where even one data point shows that an excursion of a state water quality standard is projected, the Director may determine that permit limits for whole effluent toxicity or for specific chemicals are necessary. In making such a determination, NPDES regulations requires that the Director also account for existing controls on point and nonpoint sources, the variability of the pollutant parameter in the effluent, the sensitivity of the species to toxicity testing (for whole effluent), and where appropriate the dilution of the effluent in the receiving water. In addition, the Director should consider all other available information pertaining to the discharger to assist in making an informed judgement.

Chapter 4: Exposure Assessment and Wasteload Allocation

Overview: Clarified terminology for mixing zone and design flow conditions.

1. **Clarify or reevaluate Agency's position with respect to key mixing zone issues: including how to establish geographical boundaries of mixing zones and point of application of criterion for persistent bioaccumulative pollutants, and how to prevent lethality in the mixing zone.**

   EPA Response: The revised TSD states as it did in previous drafts that the mixing zone size should be minimized and the dimensions should be based on the site-specific conditions. As previously stated, site-specific evaluations should also be conducted by the permitting agency to determine whether to allow a mixing zone for discharge of bioaccumulative pollutants. The TSD was revised to expand the three approaches for preventing lethality in the mixing zone to four approaches. The new approach includes submission of actual data to show that a drifting organism would not be exposed to 1-hour average concentrations exceeding the CMC. In addition, clarification was provided on the approach not requiring the use of a high velocity discharge to show that the CMC is met. Approaches for preventing lethality in the mixing zone conform with the position taken in Chapter 2.

2. **Clarify or reevaluate Agency's position on appropriate critical flows for toxicants which have potential human health impacts and/or aquatic life impacts.**

   EPA Response: It was determined that the harmonic mean flow was appropriate for evaluation of human health impacts that are of concern due to long-term exposures (e.g., cancer). The TSD was revised to clarify the use of harmonic mean flow and its appropriateness for use in water quality modeling to evaluate human health impacts (e.g., a step-by-step calculation procedure was added). Additional clarification was provided for the use of hydrologically-based 7Q10 and 1Q10 flows for the evaluation of "worst case" scenarios for determining potential aquatic life impacts.

3. **EPA should present <u>all</u> valid modeling approaches and determine the best water quality model for each water quality condition.**

   EPA Response: The models described in the text were those EPA considers to be comprehensive to evaluate most water quality conditions. Because of all the potential site-specific scenarios, it is beyond the scope of the document to present <u>all</u> of the valid approaches that could be used for

water quality modeling. The permitting authority needs to evaluate the data available for the site and select the water quality model that is best for calculating the receiving water concentrations and the TMDLs.

4. **Specific caveats should be added to the model descriptions.**

   EPA Response: It is beyond the scope of the document to provide all of the caveats that are applicable for each of the models. Although the commenters presented specific caveats for a model, they were not incorporated since it was beyond the scope of revising the document to determine all the cases that the caveat could apply.

5. **Commenters want additional explanation or justification for the assumptions and applications for the equations presented in the TSD.**

   EPA Response: The TSD already contained a sufficient explanation or referenced the documents which contained the rationale.

6. **The water quality model "DYNTOX" and the software program HHD FLOW are not available.**

   EPA Response: DYNTOX is not currently available but should be accessible by early 1991. HHD FLOW is not available, but DFLOW is available, and the TSD has been changed to reference this software package.

7. **Guidance on regulating nonpoint sources should be included in the TSD.**

   EPA Response: It is beyond the scope of the document to include information on regulating non-point sources.

8. **Guidance should be given in the discussion on design flow for persistent pollutants.**

   EPA Response: Persistent pollutants should be assessed in the same way as bioaccumulative pollutants.

9. **The human health section does not provide direction regarding the percentage of fish that are taken from a given area.**

   EPA Response: The percentage of fish should be determined based on site-conditions. The WLA criteria are conservative estimates based on heavy consumption of fish or a potentially large contaminated area.

10. **The TSDs discussion on mixing zones' contribution to human health is overemphasized.**

    EPA Response: The TSDs discussion on mixing zones has been revised and does not overemphasize the contributions to human health.

11. **EPA should revise its discussion of modeling WLAs for human health toxicants because it is misleading since it suggests that the method should be used whether the applicable criterion is a drinking water standard intended to prevent acute effects on humans or criterion established for Deriving Numerical National Water Quality Criteria.**

    EPA Response: The TSD does not discuss acute human health effects; therefore, it was determined that the discussion is not misleading.

Chapter 5: Permit Requirements

Overview: Added clarifications and examples to support the existing text; gave equal weight to developing limits based on a dynamic and steady state wasteload allocations; added discussion on metals, average and maximum permit limits, single dilution tests, variability, and mass-based limits.

1. **The two value, steady-state model approach to permit limit derivation is overly conservative with too many built-in safety factors. As a result the limits derived are too stringent.**

   EPA Response: EPA has revised Chapter 5 of the TSD to emphasize the development of permit limits that are as exact as possible to attain and maitain water quality standards. Chapter 5 now recommends the use of the statistical limit derivation procedure which provides for two options. The first option uses a steady state model approach for development of the wasteload allocation (WLA) and long term average (LTA). Since this approach relies on critical condition assumptions regarding effluent characteristics and receiving water characteristics, this approach may derive limits that are more restrictive than the second option. The effluent characteristics of importance are pollutant concentrations, pollutant concentration variation, and effluent flow. The receiving water characteristics of importance are pollutant concentrations and receiving water flow.

   Where a discharger or permitting authority believes that the steady state model approach results in overly restrictive permit limits, under the revised TSD the discharger or permitting authority has the alternative of using a dynamic

model approach. Under the dynamic model approach worst case assumptions are minimized and more accurate receiving water concentrations of a pollutant can be calculated. In general, dynamic models account for the daily variations of and relationships between flow, effluent and environmental conditions and therefore directly determine the probability that a water quality standards exceedance will occur. Because of this, dynamic models can be used to develop wasteload allocations which more exactly maintain the water quality standards at the return frequency requirements of the standards. The WLA is first developed by iteratively running the dynamic model with successively lower LTAs until the model shows compliance with the water quality standards. With this approach now a recommended option in the TSD, this major issue is resolved. A disadvantage of using dynamic model outputs to develop permit limits is the lack of necessary data for effluent variability and receiving water flows.

2. **The discussion of below detection levels is confusing. EPA should not be setting water quality-based limits below detection levels, especially since variability of a test method is greater the closer the results are to the detection level.**

   EPA Response: The discussion of below detection level limits in the draft TSD was unclear. Since the time of the draft TSD, EPA issued its guidance on setting permit limits below the detection level for dioxin. This guidance uses a minimum level (ML) to ascertain compliance with limits set below detection levels. The TSD was revised to follow the dioxin guidance (May 21, 1990 Memorandum from LaJuana Wilcher, "Strategy for the Regulation of Discharges of PHDDs and PHDFs from Pulp and Paper Mills to Waters of the United States"). Specific values for the minimum level are found in the description of methods 1624 and 1625 for some organic compounds. (See the appendix to 40 CFR 136.)

3. **EPA's criteria recommend that limits be derived for toxicant in the soluble form or biologically available form, yet many permit limits are being written and compliance being based upon the total recoverable form of metals. The TSD should address this issue and give guidance on developing limits only for bioavailable forms of pollutants.**

   EPA Response: The TSD has been revised to cite the regulatory requirements at 40 CFR 122.45(c) and to provide three options for use where a state has not developed a method for determining total recoverable permit limits based on a dissolved or acid soluble water quality criterion. The three options are 1) assume complete availability of the total recoverable metal, 2) use the method in the EPA wasteload allocation guidance manual for toxics in rivers to relate the

two, and 3) use site specific data to develop a relationship.

4. **EPA's regulations do not allow permit limits based on one day maximum concentrations for POTWs.**

EPA Response: The NPDES regulation at 40 CFR 122.45(d) require the use of a 7-day average unless impractical. The discussion on the expression of permit limits now states that EPA considers the 7-day average limit for POTWs to be impractical for the purposes of controlling the discharge of toxics. The reason for this statement is that control of the 7-day average in lieu of control of the 1-day maximum will allow for unmeasured short-term excursions of an acute water quality standard.

5. **TREs should not be required as a permit condition to respond to a violation of a whole effluent toxicity limit. The proper response by the permitting authority is through use of enforcement mechanisms.**

EPA Response: The discussion on TREs was changed to <u>not</u> recommend that the TRE or accelerated monitoring be included in the permit to respond to permit limit violations but rather be part of the enforcement response. This was done to help distinguish between monitoring only provisions and enforcement of permit limits. This should reduce confusion about the difference between enforcement on a single event violation of a limit and the need for multiple violations before a TRE is warranted.

6. **Permit limits should be increased to consider analytical variability. EPA should consider using the approach it proposed in the Amelia River study.**

EPA Response: EPA disagrees with the proposal. A discussion was added to explain how EPA considers analytical variability in developing permit limits. The discussion states that since this variability is an intrinsic part of all data collection (effluent monitoring, wasteload allocation development, and water quality standards development), and that the variability can go both ways (higher or lower), that EPA does not separate it out from all other variability factors. EPA's Amelia River study is not final; the approach cited may not be included in the final report.

Although difficult, it may be possible to determine what proportion of the observed variability can be attributed to sampling error, and what proportion can be attributed to the method of measurement. Regardless, the TSD makes use of a coefficient of variation that includes both sources of variability. This is not unreasonable since sampling for monitoring purposes also results in the inclusion of these

two sources of variability. Any consideration of upstream concentrations in the WLA will also include analytical variability. There is no "true" calculation in the process of developing permit limits because there is analytical uncertainty throughout the process. Instead, LTAs should be calculated from the WLAs using the same CV that is also used to calculate permit limits from the most limiting LTA. It is unimportant exactly what CV is used because the most restrictive LTA itself is used only for determining the desired treatment performance level. However, this procedure assures (99 or 95% confident) that the permit limits will be less than or equal to the more limiting LTA.

7. **Since permit limits were derived based on 95th and 99th percentile probabilities, that occasional exceedances of permit limits should be allowed on the same basis.**
EPA Response: In statistics, the selection of an acceptable probability level reflects the level of confidence that is desired of the results. As such, an acceptable level must be defined prior to performing any statistical procedure. As stated in the TSD, the probability basis of 0.99 for the daily maximum limit, and 0.95 for the average monthly limit have been used historically in connection with development of the effluent guideline limitations and have been well accepted upheld in legal challenges to the guidelines. These values are tied to monitoring frequencies that are required for each limit. There is no mixing of two probability bases since they are distinct and separate limits. The goal in establishing these levels is to allow the regulatory agency to distinguish between adequately operated wastewater treatment plants with normal variability from poorly operated treatment plants.

8. **Permit limits should vary with flow conditions in the receiving waters since exposure is based on dilution with receiving water flow.**

EPA Response: EPA partially agrees but only to the extent that the limits are seasonally based. The seasonal approach has been used by permitting authorities for setting permit limits to protect against excursions of dissolved oxygen and ammonia standards. However, seasonal limits are different than limits which vary daily based on river flow. EPA is not convinced that a daily variable approach would be universally practical given wastewater treatment response and performance; for this reason EPA has not included procedures for this approach. In addition, the discharger has the option of using dynamic modeling to develop permit limits. Since dynamic modeling considers all receiving water flows, this option would provide the discharger a less restrictive permit limit than would be obtained by using steady state modeling.

9. **If limits were derived that were overly stringent due to the worst case assumption of the steady state model, and if in the future the permittee conducted dynamic modeling which resulted in less stringent limits, permittees would be bound to the previous limits due to the anti-backsliding requirements.**

EPA Response: There is no absolute prohibition. EPA's September 1989 guidance document on antibacksliding contains EPA's interpretation of the Clean Water Act provisions in §402(o) and §303(d)(4). This guidance also does not contain an absolute prohibition. It is EPA's position that the CWA's anti-backsliding provision and EPA's existing regulations do not uniformly prohibit the incorporation into a permit of less stringent limits, standards, or conditions. In certain situations (i.e., under Sections 402(o) and 303(d)(4) of the CWA), less stringent limits or conditions may be permissible.

Section 402(o)(1) provides that backsliding from water quality-based limits is prohibited except in compliance with Section 303(d)(4). Section 303(d)(4)(A) only allows establishment of less stringent limits in a permit for discharge into a non-attainment water only if two conditions are met: 1) the existing permit limit must have been based on a TMDL or other WLA established under Section 303, and 2) attainment of water quality standards must be assured. Section 303(d)(4)(B) allows establishment of less stringent limits in a permit for discharge into an attained water only where relaxation is consistent with a State's antidegradation policy.

Section 402(o)(2) also outlines exceptions to the general prohibition against backsliding from water quality-based permit limitations. Under Section 402(o)(3), backsliding may be allowed: 1) where there have been material and substantial alterations or additions to the facility; 2) where good cause exists due to events beyond the permittee's control and for which there is no reasonably available remedy; 3) where the permittee has installed and properly operated and maintained required treatment facilities; and 4) where new information justifies backsliding from water quality-based permit limitations and other Section 301(b)(1)(C) limitations.

10. **EPA does not have guidance on how to conduct a chronic TRE and therefore limits should not be derived based upon chronic endpoints.**

EPA Response: EPA is aware of the need for guidance on conducting TREs for chronic toxicity. EPA's Duluth laboratory is near completion of a draft guidance document. The guidance document will be widely available when finished. Regardless, the lack of a finished guidance document is not

a valid reason to allow for excursions above a narrative standard as measured by chronic whole effluent toxicity. Some dischargers have been able to comply with chronic toxicity limits and identify and control sources of chronic toxicity. EPA experience has shown that portions of the published TRE procedures for solving incidences of acute toxicity (EPA/600/2-88/070, EPA/600/2-88/062, EPA/600/3-88/034) can be used for resolving incidences of chronic toxicity.

11. **EPA should allow adequate time for facilities to come into compliance with water quality-based permit limits.**
EPA Response: EPA is aware that facilities may need time to comply with newly established effluent limits. This has been accomplished in the past in NPDES permits by allowing compliance schedules within the permit. Regulatory agencies use of compliance schedules for water quality-based effluent limits are governed by recent decisions regarding the Star-Kist Caribe ruling by EPA's Chief Judicial Officer (CJO). On March 8, 1989, in review of the evidentiary hearing request by Star-Kist Caribe, the CJO ruled that compliance schedules for water quality-based effluent limits may not be included in NPDES permits unless explicitly authorized by the State in its water quality standards or implementation regulations. The ruling was based on an interpretation of section 301(b)(1)(C) of the Clean Water Act. Later, on Septermber 4, 1990, the CJO granted a stay of the ruling to allow EPA and States to use compliance schedules for water quality-based limits where such schedules are consistent with State policy. In any case, the allowance for compliance schedules is a State decision which may ultimately need to be expressed in water quality standards.

12. **Effluent limits should be set within the ability of treatment technology.**

EPA Response: EPA is aware that there may be a number of water quality-based permit limits for toxics which may be presently unachievable with existing wastewater treatment technology. However, the NPDES regulations at 40 CFR 122.44(d) require that effluent limits more stringent than those established based on a treatment technology basis must be set to achieve water quality standards.

13. **The limit derivation procedures for human health should use the same statistical procedures as used for deriving limits for aquatic life. Permit limits should be derived from the harmonic mean effluent concentration.**

EPA Response: Since compliance with permit limitations is by regulation determined on a daily and monthly basis, it is necessary to set permit limitations expressed in these

contexts that meet a given WLA every month. The statistical procedures for permit limit derivation in the TSD are designed to accomplish this for aquatic life protection where the use of shorter term averaging periods is consistent with two number aquatic life criteria.

However, if the TSD procedures were directly used for setting permit limits on bioconcentratable pollutants, both maximum daily and average monthly permit limits could exceed the wasteload allocation necessary to meet the criterion. These two permit limits would assure that the long term average effluent discharge would comply with the human health derived WLA only if the assessment of the effluent variability was precise. With bioconcentratable pollutants where exposure duration ranges up to 70 years, EPA believes that effluent variability cannot be reliably estimated from existing data for exposure periods a year. If the effluent variability was over-estimated when establishing the permit limits, then a facility could be discharging in compliance with the permit limits but would be exceeding the wasteload allocation for human health protection. This approach is clearly unacceptable.

This problem does not arise when using the TSD statistical procedure for setting permit limits for protecting against aquatic toxicity. In this case, the monthly average and daily maximum permit limits are more closely related to the four day average and one hour maximum used as exposure periods for the criteria. Any imprecision in assessing effluent variability would therefore not have as great an effect on the permit limits.

14. **Effluents may not always demonstrate a log-normal distribution. The TSD should present procedures for using other distributions.**

EPA Response: EPA believes, after reviewing the database used to establish effluent guidelines, that the log-normal distribution best characterizes effluents. EPA's analysis of these data are provided in Appendix E. The general characteristics of the lognormal distribution (it is only positive and is skewed towards extreme high values) make it an appropriate distribution for dealing with effluent concentrations. According to Gilbert (1987), the lognormal distribution is the only available 2-parametric distribution that can routinely be applied to environmental data. Since the Agency is not providing derivation procedures for alternate data distributions, it is not necessary to test for lognormality of effluent data. Permitting authorities can develop their own methods using other probabilistic distributions.

Chapter 6: Enforcement

Overview: No major changes made in recommendations; added clarifications and explanations.

1. **One effluent test failure should not equal a violation; provisions should be made to delay punitive enforcement action where legitimate efforts are being made; permittees should not be held in violation of their toxicity limit while conducting a TRE.**

   EPA Response: The current draft still emphasizes the principle that any single exceedance is a violation and is subject to a full range of enforcement responses. However, the draft has been caveated with discussion on EPA's guidance which outlines a systematic review of all violations to determine the appropriate level of enforcement. EPA's enforcement guidance is included in an appendix.

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County of Fresno v. State of California (1991)

[No. S015637. Apr 22, 1991.]

COUNTY OF FRESNO, Plaintiff and Appellant, v. THE STATE OF CALIFORNIA et al., Defendants and Respondents.

(Superior Court of Fresno County, No. 379518-4, Gary S. Austin, Judge.)

(Opinion by Mosk, J., with Lucas, C. J., Broussard, **[53 Cal. 3d 483]** Panelli, Kennard, JJ., and Best (Hollis G.), J.,fn. * concurring. Separate concurring opinion by Arabian, J.)

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OPINION

MOSK, J.

We granted review in this proceeding to decide whether section 17556, subdivision (d), of the Government Code (section 17556(d)) is facially valid under article XIII B, section 6, of the California Constitution (article XIII B, section 6).

Article XIII B, section 6, provides: "Whenever the Legislature or any state agency mandates a new program or higher level of service on any local government, the state shall provide a subvention of funds to reimburse such local government for the costs of such program or

increased level of service, except that the Legislature may, but need not, provide such subvention of funds for the following mandates: [¶] (a) Legislative mandates requested by the local agency affected; [¶] (b) Legislation defining a new crime or changing an existing definition of a crime; or [¶] (c) Legislative mandates enacted prior to January 1, 1975, or executive orders or regulations initially implementing legislation enacted prior to January 1, 1975."

The Legislature enacted Government Code sections 17500 through 17630 to implement article XIII B, section 6. (Gov. Code, § 17500.) It created a "quasi-judicial body" (ibid.) called the Commission on State Mandates (commission) (id., § 17525) to "hear and decide upon [any] claim" by a local government that the local government "is entitled to be reimbursed by the state for costs" as required by article XIII B, section 6. (Gov. Code, § 17551, subd. (a).) It defined "costs" as "costs mandated by the state"- "any increased costs" that the local government "is required to incur ... as a result of any statute ..., or any executive order implementing any statute ..., which mandates a new program or higher level of service of any existing program" within the meaning of article XIII B, section 6. (Gov. Code, § 17514.) Finally, in section 17556(d) it declared that "The commission shall not find costs mandated by the state ... if, after a hearing, the commission finds that" the local government "has the authority to levy service charges, fees, or assessments sufficient to pay for the mandated program or increased level of service."

For the reasons discussed below, we conclude that section 17556(d) is facially constitutional under article XIII B, section 6. **[53 Cal. 3d 485]**

I. Facts and Procedural History

The present proceeding arose after the Legislature enacted the Hazardous Materials Release Response Plans and Inventory Act (Act). (Health & Saf. Code, § 25500 et seq.) The Act establishes minimum statewide standards for business and area plans relating to the handling and release or threatened release of hazardous materials. (Id., § 25500.) It requires local governments to implement its provisions. (Id., § 25502.) To cover the costs they may incur, it authorizes them to collect fees from those who handle hazardous materials. (Id., § 25513.)

The County of Fresno (County) implemented the Act but chose not to impose the authorized fees. Instead, it filed a so-called "test" or initial claim with the commission (Gov. Code, § 17521) seeking reimbursement from the State of California (State) under article XIII B, section 6. After a hearing, the commission rejected the claim. In its statement of decision, the commission made the following findings, among others: the Act constituted a "new

program"; the County did indeed incur increased costs; but because it had authority under the Act to levy fees sufficient to cover such costs, section 17556(d) prohibited a finding of reimbursable costs.

The County then filed a petition for writ of mandate and complaint for declaratory relief against the State, the commission, and others, seeking vacation of the commission's decision and a declaration that section 17556(d) is unconstitutional under article XIII B, section 6. While the matter was pending, the commission amended its statement of decision to include another basis for denial of the test claim: the Act did not constitute a "program" under the rationale of County of Los Angeles v. State of California (1987) 43 Cal. 3d 46 [233 Cal. Rptr. 38, 729 P.2d 202] (County of Los Angeles), because it did not impose unique requirements on local governments.

After a hearing, the trial court denied the petition and effectively dismissed the complaint. It determined, inter alia, that mandate under Code of Civil Procedure section 1094.5 was the County's sole remedy, and that the commission was the sole properly named respondent. It also determined that section 17556(d) is constitutional under article XIII B, section 6. It did not address the question whether the Act constituted a "program" under County of Los Angeles. Judgment was entered accordingly.

The Court of Appeal affirmed. It held the Act did indeed constitute a "program" under County of Los Angeles, supra, 43 Cal. 3d 46. It also held section 17556(d) is constitutional under article XIII B, section 6. **[53 Cal. 3d 486]**

[1] We granted review to decide a single issue, i.e., whether section 17556(d) is facially constitutional under article XIII B, section 6.

II. Discussion

We begin our analysis with the California Constitution. At the June 6, 1978, Primary Election, article XIII A was added to the Constitution through the adoption of Proposition 13, an initiative measure aimed at controlling ad valorem property taxes and the imposition of new "special taxes." (Amador Valley Joint Union High Sch. Dist. v. State Bd. of Equalization (1978) 22 Cal. 3d 208, 231-232 [149 Cal. Rptr. 239, 583 P.2d 1281].) The constitutional provision imposes a limit on the power of state and local governments to adopt and levy taxes. (City of Sacramento v. State of California (1990) 50 Cal. 3d 51, 59, fn. 1 [266 Cal. Rptr. 139, 785 P.2d 522] (City of Sacramento).)

At the November 6, 1979, Special Statewide Election, article XIII B was added to the Constitution through the adoption of Proposition 4, another initiative measure. That

measure places limitations on the ability of both state and local governments to appropriate funds for expenditures.

"Articles XIII A and XIII B work in tandem, together restricting California governments' power both to levy and to spend [taxes] for public purposes." (City of Sacramento, supra, 50 Cal.3d at p. 59, fn. 1.)

Article XIII B of the Constitution was intended to apply to taxation-specifically, to provide "permanent protection for taxpayers from excessive taxation" and "a reasonable way to provide discipline in tax spending at state and local levels." (See County of Placer v. Corin (1980) 113 Cal. App. 3d 443, 446 [170 Cal. Rptr. 232], quoting and following Ballot Pamp., Proposed Stats. and Amends. to Cal. Const. with arguments to voters, Special Statewide Elec. (Nov. 6, 1979), argument in favor of Prop. 4, p. 18.) To this end, it establishes an "appropriations limit" for both state and local governments (Cal. Const., art. XIII B, § 8, subd. (h)) and allows no "appropriations subject to limitation" in excess thereof (id., § 2). (See County of Placer v. Corin, supra, 113 Cal.App.3d at p. 446.) It defines the relevant "appropriations subject to limitation" as "any authorization to expend during a fiscal year the proceeds of taxes ...." (Cal. Const., art. XIII B, § 8, subd. (b).) It defines "proceeds of taxes" as including "all tax revenues and the proceeds to ... government from," inter alia, "regulatory licenses, user charges, and user fees to the extent that such proceeds exceed the costs reasonably borne by [government] in providing the regulation, product, or service ...." (Cal. Const., art. XIII B, § 8, subd. (c), italics added.) Such "excess" proceeds from "licenses," "charges," and "fees" "are but **[53 Cal. 3d 487]** taxes" for purposes here. (County of Placer v. Corin, supra, 113 Cal.App.3d at p. 451, italics in original.)

Article XIII B of the Constitution, however, was not intended to reach beyond taxation. That fact is apparent from the language of the measure. It is confirmed by its history. In his analysis, the Legislative Analyst declared that Proposition 4 "would not restrict the growth in appropriations financed from other [i.e., nontax] sources of revenue, including federal funds, bond funds, traffic fines, user fees based on reasonable costs, and income from gifts." (Ballot Pamp., Proposed Stats. and Amends. to Cal. Const. with arguments to voters, Special Statewide Elec. (Nov. 6, 1979), analysis by Legislative Analyst, p. 16.)

Section 6 was included in article XIII B in recognition that article XIII A of the Constitution severely restricted the taxing powers of local governments. (See County of Los Angeles, supra, 43 Cal.3d at p. 61.) The provision was intended to preclude the state from shifting financial responsibility for carrying out governmental functions onto local entities that were ill equipped to handle the task. (Ibid.; see Lucia Mar Unified School Dist. v. Honig (1988) 44 Cal. 3d 830, 836, fn. 6 [244 Cal. Rptr. 677, 750 P.2d 318].) Specifically, it was designed to

protect the tax revenues of local governments from state mandates that would require expenditure of such revenues. Thus, although its language broadly declares that the "state shall provide a subvention of funds to reimburse ... local government for the costs [of a state-mandated new] program or higher level of service," read in its textual and historical context section 6 of article XIII B requires subvention only when the costs in question can be recovered solely from tax revenues.

In view of the foregoing analysis, the question of the facial constitutionality of section 17556 (d) under article XIII B, section 6, can be readily resolved. As noted, the statute provides that "The commission shall not find costs mandated by the state ... if, after a hearing, the commission finds that" the local government "has the authority to levy service charges, fees, or assessments sufficient to pay for the mandated program or increased level of service." Considered within its context, the section effectively construes the term "costs" in the constitutional provision as excluding expenses that are recoverable from sources other than taxes. Such a construction is altogether sound. As the discussion makes clear, the Constitution requires reimbursement only for those expenses that are recoverable solely from taxes. It follows that section 17556(d) is facially constitutional under article XIII B, section 6.

The County argues to the contrary. It maintains that section 17556(d) in essence creates a new exception to the reimbursement requirement of article **[53 Cal. 3d 488]** XIII B, section 6, for self-financing programs and that the Legislature cannot create exceptions to the reimbursement requirement beyond those enumerated in the Constitution.

We do not agree that in enacting section 17556(d) the Legislature created a new exception to the reimbursement requirement of article XIII B, section 6. As explained, the Legislature effectively-and properly-construed the term "costs" as excluding expenses that are recoverable from sources other than taxes. In a word, such expenses are outside of the scope of the requirement. Therefore, they need not be explicitly excepted from its reach.

The County nevertheless argues that no matter how characterized, section 17556(d) is indeed inconsistent with article XIII B, section 6. Its contention is in substance as follows: the source of section 17556(d) is former Revenue and Taxation Code section 2253.2; at the time of Proposition 4, subdivision (b)(4) of that former section stated that the State Board of Control shall not allow a claim for reimbursement of costs mandated by the state if the legislation contains a self-financing authority; the drafters of Proposition 4 incorporated some of the provisions of former Revenue and Taxation Code section 2253.2 into article XIII B, section 6, but did not incorporate former subdivision (b)(4); their failure to do so reveals an intent to treat as immaterial the presence or absence of a "self-financing" provision; and

such an intent is confirmed by the "legislative history" set out at page 55 in Spirit of 13, Inc., Summary of Proposed Implementing Legislation and Drafters' Intent: "the state may not arbitrarily declare that it is not going to comply with Section 6 ... if the state provides new compensating revenues."

In our view, the County's argument is unpersuasive. Even if we assume arguendo that the intent of those who drafted Proposition 4 is as claimed, what is crucial here is the intent of those who voted for the measure. (See County of Los Angeles, supra, 43 Cal. 3d 46, 56.) There is no substantial evidence that the voters sought what the County assumes the drafters desired. Moreover, the "legislative history" cited above cannot be considered relevant; it was written and circulated after the passage of Proposition 4. As such, it could not have affected the voters in any way.

To avoid this result, the County advances one final argument: "Based on the authority of [section 17556(d)], the Commission on State Mandates refuses to hear mandates on the merits once it finds that the authority to charge fees is given by the Legislature. This position is taken whether or not fees can actually or legally be charged to recover the entire costs of the program." **[53 Cal. 3d 489]**

The County appears to be making one or both of the following arguments: (1) the commission applies section 17556(d) in an unconstitutional manner; or (2) the Act's self-financing authority is somehow lacking. Such contentions, however, miss the designated mark. They raise questions bearing on the constitutionality of section 17556(d) as applied and the legal efficacy of the authority conferred by the Act. The sole issue on review, however, is the facial constitutionality of section 17556(d).

III. Conclusion

For the reasons set forth above, we conclude that section 17556(d) is facially constitutional under article XIII B, section 6.

The judgment of the Court of Appeal is affirmed.

Lucas, C. J., Broussard, J., Panelli, J., Kennard, J., and Best (Hollis G.), J.,fn. * concurred.

ARABIAN, J.,

Concurring.

I concur in the determination that Government Code section 17556, subdivision (d)fn. 1 (section 17556(d)), does not offend article XIII B, section 6, of the California Constitution

(article XIII B, section 6). In my estimation, however, the constitutional measure of the issue before us warrants fuller examination than the majority allow. A literalistic analysis begs the question of whether the Legislature had the authority to act statutorily upon a subject matter the electorate has spoken to constitutionally through the initiative process.

Article XIII B, section 6, unequivocally commands that "the state shall provide a subvention of funds to reimburse ... local government for the costs of [a new] program or increased level of service" except as specified therein. Article XIII B does not define this reference to "costs." (See Cal. Const., art. XIII B, § 8.) Rather, the Legislature assumed the task of explicating the related concept of "costs mandated by the state" when it created the Commission on State Mandates and enacted procedures intended to implement article XIII B, section 6, more effectively. (See § 17500 et seq.) As part of this statutory scheme, it exempted the state from its constitutionally imposed subvention obligation under certain enumerated circumstances. Some of these exemptions the electorate expressly contemplated in approving article XIII B, section 6 (§ 17556, subds. (a), (c), & (g); see § 17514), while others are strictly of legislative formulation and derive from **[53 Cal. 3d 490]** former Revenue and Taxation Code section 2253.2. (§ 17556, subds. (b), (d), (e), & (f).)

The majority find section 17556 valid notwithstanding the mandatory language of article XIII B, section 6, based on the circular and conclusory rationale that "the Legislature effectively-and properly-construed the term 'costs' as excluding expenses that are recoverable from sources other than taxes. In a word, such expenses are outside of the scope of the [subvention] requirement. Therefore, they need not be explicitly excepted from its reach." (Maj. opn., ante, at p. 488.) In my view, excluding or otherwise removing something from the purview of a law is tantamount to creating an exception thereto. When an exclusionary implication is clear from the import or effect of the statutory language, use of the word "except" should not be necessary to construe the result for what it clearly is. In this circumstance, "I would invoke the folk wisdom that if an object looks like a duck, walks like a duck and quacks like a duck, it is likely to be a duck." (In re Deborah C. (1981) 30 Cal. 3d 125, 141 [177 Cal. Rptr. 852, 635 P.2d 446] (conc. opn. by Mosk, J.).)

Of at least equal importance, section 17500 et seq. constitutes a legislative implementation of article XIII B, section 6. As such, the overall statutory scheme must comport with the express constitutional language it was designed to effectuate as well as the implicit electoral intent. Eschewing semantics, I would squarely and forthrightly address the fundamental and substantial question of whether the Legislature could lawfully enlarge upon the scope of article XIII B, section 6, to include exceptions not originally designated in the initiative.

I do not hereby seek to undermine the majority holding but rather to set it on a firmer constitutional footing. "[S]tatutes must be given a reasonable interpretation, one which will carry out the intent of the legislators and render them valid and operative rather than defeat them. In so doing, sections of the Constitution, as well as the codes, will be harmonized where reasonably possible, in order that all may stand." (Rose v. State of California (1942) 19 Cal. 2d 713, 723 [123 P.2d 505]; see also County of Los Angeles v. State of California (1987) 43 Cal. 3d 46, 58 [233 Cal. Rptr. 38, 729 P.2d 202].) To this end, it is a fundamental premise of our form of government that "the Constitution of this State is not to be considered as a grant of power, but rather as a restriction upon the powers of the Legislature; and ... it is competent for the Legislature to exercise all powers not forbidden ...." (People v. Coleman (1854) 4 Cal. 46, 49.) "Two important consequences flow from this fact. First, the entire law-making authority of the state, except the people's right of initiative and referendum, is vested in the **[53 Cal. 3d 491]** Legislature, and that body may exercise any and all legislative powers which are not expressly or by necessary implication denied to it by the Constitution. [Citations.] In other words, 'we do not look to the Constitution to determine whether the legislature is authorized to do an act, but only to see if it is prohibited.' [Citation.] [¶] Secondly, all intendments favor the exercise of the Legislature's plenary authority: 'If there is any doubt as to the Legislature's power to act in any given case, the doubt should be resolved in favor of the Legislature's action. Such restrictions and limitations [imposed by the Constitution] are to be construed strictly, and are not to be extended to include matters not covered by the language used.' [Citations.]" (Methodist Hosp. of Sacramento v. Saylor (1971) 5 Cal. 3d 685, 691 [97 Cal. Rptr. 1, 488 P.2d 161], italics added.) "Specifically, the express enumeration of legislative powers is not an exclusion of others not named unless accompanied by negative terms. [Citations.]" (Dean v. Kuchel (1951) 37 Cal. 2d 97, 100 [230 P.2d 811].)

As the majority opinion impliedly recognizes, neither the language nor the intent of article XIII B conflicts with the exercise of legislative prerogative we review today. Of paramount significance, neither section 6 nor any other provision of article XIII B prohibits statutory delineation of additional circumstances obviating reimbursement for state mandated programs. (See Dean v. Kuchel, supra, 37 Cal.2d at p. 101; Roth Drugs, Inc. v. Johnson (1936) 13 Cal. App. 2d 720, 729 [57 P.2d 1022]; see also Kehrlein v. City of Oakland (1981) 116 Cal. App. 3d 332, 338 [172 Cal. Rptr. 111].)

Furthermore, the initiative was "[b]illed as a flexible way to provide discipline in government spending" by creating appropriations limits to restrict the amount of such expenditures. (County of Placer v. Corin (1980) 113 Cal. App. 3d 443, 447 [170 Cal. Rptr. 232]; see Cal. Const., art. XIII B, § 1.) By their nature, user fees do not affect the equation of

local government spending: While they facilitate implementation of newly mandated state programs or increased levels of service, they are excluded from the "appropriations subject to limitations" calculation and its attendant budgetary constraints. (See Cal. Const., art. XIII B, § 8; see also City Council v. South (1983) 146 Cal. App. 3d 320, 334 [194 Cal. Rptr. 110]; County of Placer v. Corin, supra, 113 Cal.App.3d at pp. 448-449; Cal. Const., art. XIII B, § 3, subd. (b); cf. Russ Bldg. Partnership v. City and County of San Francisco (1987) 199 Cal. App. 3d 1496, 1505 [246 Cal. Rptr. 21] [" 'fees not exceeding the reasonable cost of providing the service or regulatory activity for which the fee is charged and which are not levied for general revenue purposes, have been considered outside the realm of "special taxes" [limited by California Constitution, article XIII A]' "]; Terminal Plaza Corp. v. City **[53 Cal. 3d 492]** and County of San Francisco (1986) 177 Cal. App. 3d 892, 906 [223 Cal. Rptr. 379] [same].)

This conclusion fully accommodates the intent of the voters in adopting article XIII B, as reflected in the ballot materials accompanying the proposition. (See Amador Valley Joint Union High Sch. Dist. v. State Bd. of Equalization (1978) 22 Cal. 3d 208, 245-246 [149 Cal. Rptr. 239, 583 P.2d 1281].) In general, these materials convey that "[t]he goals of article XIII B, of which section 6 is a part, were to protect residents from excessive taxation and government spending." (County of Los Angeles v. State of California, supra, 43 Cal.3d at p. 61; Huntington Park Redevelopment Agency v. Martin (1985) 38 Cal. 3d 100, 109- 110 [211 Cal. Rptr. 133, 695 P.2d 220].) To the extent user fees are not borne by the general public or applied to the general revenues, they do not bear upon this purpose. Moreover, by imputation, voter approval contemplated the continued imposition of reasonable user fees outside the scope of article XIII B. (Ballot Pamp., Proposed Amends. to Cal. Const. with arguments to voters, Limitation of Government Appropriations, Special Statewide Elec. (Nov. 6, 1979), arguments in favor of and against Prop. 4, p. 18 [initiative "Will curb excessive user fees imposed by local government" but "will Not eliminate user fees ..."]; see County of Placer v. Corin, supra, 113 Cal.App.3d at p. 452.)

"The concern which prompted the inclusion of section 6 in article XIII B was the perceived attempt by the state to enact legislation or adopt administrative orders creating programs to be administered by local agencies, thereby transferring to those agencies the fiscal responsibility for providing services which the state believed should be extended to the public." (County of Los Angeles v. State of California, supra, 43 Cal.3d at p. 56; see City of Sacramento v. State of California (1990) 50 Cal. 3d 51, 66 [266 Cal. Rptr. 139, 785 P.2d 522].) "Section 6 had the additional purpose of precluding a shift of financial responsibility for carrying out governmental functions from the state to local agencies which had had their taxing powers restricted by the enactment of article XIII A in the preceding year and were ill equipped to take responsibility for any new programs." (County of Los Angeles v. State of

California, supra, 43 Cal.3d at p. 61.) An exemption from reimbursement for state mandated programs for which local governments are authorized to charge offsetting user fees does not frustrate or compromise these goals or otherwise disturb the balance of local government financing and expenditure.fn. 2 (See County of Placer v. Corin, supra, 113 **[53 Cal. 3d 493]** Cal.App.3d at p. 452, fn. 7.) Article XIII B, section 8, subdivision (c), specifically includes regulatory licenses, user charges, and user fees in the appropriations limitation equation only "to the extent that those proceeds exceed the costs reasonably borne by [the governmental] entity in providing the regulation, product, or service ...."

The self-executing nature of article XIII B does not alter this analysis. "It has been uniformly held that the legislature has the power to enact statutes providing for reasonable regulation and control of rights granted under constitutional provisions. [Citations.]" (Chesney v. Byram (1940) 15 Cal. 2d 460, 465 [101 P.2d 1106].) " ' "Legislation may be desirable, by way of providing convenient remedies for the protection of the right secured, or of regulating the claim of the right so that its exact limits may be known and understood; but all such legislation must be subordinate to the constitutional provision, and in furtherance of its purpose, and must not in any particular attempt to narrow or embarrass it." [Citations.]' " (Id., at pp. 463-464; see also County of Contra Costa v. State of California (1986) 177 Cal. App. 3d 62, 75 [222 Cal. Rptr. 750].) Section 17556(d) is not "merely [a] transparent attempt [] to do indirectly that which cannot lawfully be done directly." (Carmel Valley Fire Protection Dist. v. State of California (1987) 190 Cal. App. 3d 521, 541 [234 Cal. Rptr. 795].) On the contrary, it creates no conflict with the constitutional directive it subserves. Hence, rather than pursue an interpretive expedient, this court should expressly declare that it operates as a valid legislative implementation thereof.

"[Initiative] provisions of the Constitution and of charters and statutes should, as a general rule, be liberally construed in favor of the reserved power. [Citations.] As opposed to that principle, however, 'in examining and ascertaining the intention of the people with respect to the scope and nature of those ... powers, it is proper and important to consider what the consequences of applying it to a particular act of legislation would be, and if upon such consideration it be found that by so applying it the inevitable effect would be greatly to impair or wholly destroy the efficacy of some other governmental power, the practical application of which is essential and, perhaps, ... indispensable, to the convenience, comfort, and well-being of the inhabitants of certain legally established districts or subdivisions of the state or of the whole state, then in such case the courts may and should assume that the people intended no such result to flow from the application of those powers and that they do not so apply.' [Citation.]" (Hunt v. Mayor & Council of Riverside (1948) 31 Cal. 2d 619, 628-629 [191 P.2d 426].) **[53 Cal. 3d 494]**

This court is not infrequently called upon to resolve the tension of apparent or actual conflicts in the express will of the people.fn. 3 Whether that expression emanates directly from the ballot or indirectly through legislative implementation, each deserves our fullest estimation and effectuation. Given the historical and abiding role of government by initiative, I decline to circumvent that responsibility and accept uncritically the Legislature's self-validating statutory scheme as the basis for approving the exercise of its prerogative. It is not enough to say a broader constitutional analysis yields the same result and therefore is unnecessary. We provide a higher quality of justice harmonizing rather than ignoring the divers voices of the people, for such is the nature of our office.

FN *. Presiding Justice, Court of Appeal, Fifth Appellate District, assigned by the Chairperson of the Judicial Council.

FN *. Presiding Justice, Court of Appeal, Fifth Appellate District, assigned by the Chairperson of the Judicial Council.

FN 1. Unless otherwise indicated, all further statutory references are to the Government Code.

FN 2. This conclusion also accords with the traditional and historical role of user fees in promoting the multifarious functions of local government by imposing on those receiving a service the cost of providing it. (Cf. County of Placer v. Corin, supra, 113 Cal.App.3d at p. 454 ["Special assessments, being levied only for improvements that benefit particular parcels of land, and not to raise general revenues, are simply not the type of exaction that can be used as a mechanism for circumventing these tax relief provisions. [Citation.]"].)

FN 3. See, e.g., Zumwalt v. Superior Court (1989) 49 Cal. 3d 167 [260 Cal. Rptr. 545, 776 P.2d 247]; Los Angeles County Transportation Com. v. Richmond (1982) 31 Cal. 3d 197 [182 Cal. Rptr. 324, 643 P.2d 941]; California Housing Finance Agency v. Patitucci (1978) 22 Cal. 3d 171 [148 Cal. Rptr. 875, 583 P.2d 729]; California Housing Finance Agency v. Elliott (1976) 17 Cal. 3d 575 [131 Cal. Rptr. 361, 551 P.2d 1193]; Blotter v. Farrell (1954) 42 Cal. 2d 804 [270 P.2d 481]; Dean v. Kuchel, supra, 37 Cal. 2d 97; Hunt v. Mayor & Council of Riverside, supra, 31 Cal. 2d 619.

STATE OF CALIFORNIA
STATE WATER RESOURCES CONTROL BOARD

In the Matter of the Petition of CITIZENS FOR A BETTER ENVIRONMENT, SAVE SAN FRANCISCO BAY ASSOCIATION, AND SANTA CLARA VALLEY AUDUBON SOCIETY For Review of Waste Discharge Requirements Order No. 90-094 of the California Regional Water Quality Control Board, San Francisco Bay Region. Our File No. A-695.	**ORDER NO. WQ 91-03**

BY THE BOARD:

On July 23, 1990, the State Water Resources Control Board (State Board) received a petition from Citizens for a Better Environment, Save San Francisco Bay Association and Santa Clara Valley Audubon Society (petitioners). The petition sought review of waste discharge requirements adopted by the Regional Water Quality Control Board, San Francisco Bay Region (Regional Board) in Order No. 90-094, regulating discharges of storm water[1] from municipal separate storm sewers throughout the Santa Clara Valley. The storm drains discharge to creeks and streams which are tributary to South San Francisco Bay (South Bay).

The issues raised in the petition are complex, and concern two major federal regulatory programs--storm water

1 There are variant spellings of "storm water" and "stormwater" found in the relevant statutes, regulations, and case law. We will adopt "storm water", but quoted materials using "stormwater" will also appear in this Order.

regulation and regulation of water bodies which do not attain water quality standards. Given the complexity of these issues, we will review the background and requirements of these programs, and the application of these programs to municipal storm water discharges throughout the Santa Clara Valley.

We note that the Regional Water Quality Control Board, Los Angeles Region, issued a separate permit regulating storm water discharges from municipalities in the Los Angeles area, which we have also reviewed. Order No. WQ 91-04, which is also being issued today, explores many of the same issues as this Order. In preparing this Order, we have reviewed the documents submitted by persons interested in the Los Angeles petition.

I. BACKGROUND

A. The Need for a Storm Water Regulatory Program

Through the natural hydrologic cycle, precipitation condenses from clouds and falls on land surfaces where it disperses in several ways. Water may be temporarily captured in the soil so plants may use and then transpire it. Rain or snowfall may also quickly evaporate or may infiltrate the surface soil to replenish ground water. Rain water and snow melt flow over land areas and replenish creeks, streams, rivers and lakes. But this runoff accumulates a variety of pollutants including minerals, nutrients, bacteria, suspended material, heavy metals and debris as it flows through the natural environment. Surface runoff also becomes degraded as plants and animals use it. Though gravitational flow eventually returns water to the ocean

and evaporation again transforms this water on a broad scale, the accumulation of pollutants in runoff water may substantially diminish water quality in a microcosm and thereby alter the balance of important natural cycles.

In addition to the pollutants which accumulate in storm water runoff, pollutants also enter surface waters during dry weather through storm drain systems. Pollutants may be transported by wet weather flows or even by direct discharge to the storm drains, and later released to surface waters, even during times when there is no rainfall or snow melt. Examples of these dry-weather pollutant discharges include water line flushing, landscape irrigation, diverted stream flows, rising ground waters, foundation drains, air conditioning condensation, irrigation water, springs, water from crawl space pumps, footing drains, lawn watering, and individual residential car washing.

While there is some confusion in the terminology which is used in the regulatory documents, the former type of discharge, which occurs as a direct result of storm events, is usually referred to as "storm water discharge," while the latter form of dry weather discharge is referred to as "urban runoff." Together, we shall most commonly refer to the phenomenon as "storm water discharge."[2] Storm water discharges may be significant contributors of pollutants to surface waters.

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2 In regulations, the Environmental Protection Agency (EPA) adopted recently, "storm water" is defined as "storm water runoff, snow melt runoff, and surface runoff and drainage". 40 CFR Section 122.26(a)(13). While "storm water" thus includes urban runoff, it must be noted that discharges which are not composed of "storm water" (such as illicit discharges to the municipal system from industrial facilities) are prohibited by the regulations. Thus, many forms of urban runoff may in fact be prohibited.

B. Municipal Separate Storm Sewer Systems

Municipal separate storm sewer systems essentially act as conduits for pollutants from diffuse sources throughout the urban environment and from discrete point sources associated with industrial activities. The systems to which we shall refer in this Order are owned or operated by public agencies, are designed or used for collecting or conveying storm water, and are not a combined sewer.[3] While separate storm sewer systems are legally characterized as point sources within the meaning of the Clean Water Act, as discussed hereinafter, the waste which they discharge mostly originates as nonpoint, diffuse waste flows from urban development and activities (including residences, streets and commercial establishments). Municipal separate storm sewer systems are somewhat analogous to municipal sanitary sewer systems where those systems convey industrial wastewaters along with domestic sewage. The sanitary sewers simply transport industrial wastes to the treatment facility and then to the receiving water. However, storm water discharges, and the pollutants therein, are also highly variable, being affected greatly by such factors as storm events, land uses and receiving water conditions, and thus present even greater challenges for their regulation and control.

3 40 CFR Section 122.26(b)(8).

C. Early Attempts to Regulate Storm Water Discharges

In 1972, Congress adopted the Federal Water Pollution Control Act Amendments of 1972,[4] which created a comprehensive program to protect surface waters. The Clean Water Act emphasizes the control, treatment and elimination of all pollutant sources in order to protect vital uses of the nation's waters. Because scant information about runoff existed in 1972, the Clean Water Act mandated further assessment of runoff, its constituent pollutants, the consequent water quality effects, and applicable control measures. Section 105 of the Act specified that the development and application of "waste management methods" to prevent, reduce, or eliminate pollutants from storm water runoff would be a national priority.[5]

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4 Public Law 92-500 (86 Stat. 816, enacted October 18, 1972); 33 USC Section 1151 et seq. Although characterized in the official title as "amendments", the 1972 FWPCA essentially rewrote the pre-1972 Federal Water Pollution Control Act. The 1972 amendments are commonly referred to as the Clean Water Act, and we will follow that practice. We shall use the enumeration of Clean Water Act sections, rather than the comparable United States Code designations.

5 The pertinent portions of Section 105 state:

> *"(a) The Administrator [of the Environmental Protection Agency] is authorized to conduct in the Environmental Protection Agency and to make grants to any state, municipality, or intermunicipal or interstate agency for the purpose of assisting in the development of (1) any project which will demonstrate a new or improved method of preventing, reducing, and eliminating the discharge into any waters of pollutants from sewers which carry storm water or both storm water and pollutants...."*
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> * * *
>
> *(d) In carrying out the provisions of this section, the Administrator shall conduct, on a priority basis, an accelerated effort to develop, refine, and achieve practical application of:*
> *(1) waste management methods applicable to point and nonpoint sources of pollutants to eliminate the discharge of pollutants, including, but not limited to, elimination of runoff of pollutants and the effects of pollutants from inplace or accumulated sources...."*

The Clean Water Act also included a major new regulatory program intended to implement the Act's stated goal of eliminating the discharge of pollutants into surface waters by 1985. Section 301 of the Act prohibits the discharge of any pollutant to navigable waters from a "point source"[6] unless the discharge is authorized by a national pollutant discharge elimination system (NPDES) permit. The provisions for adoption of NPDES permits are contained in Section 402 of the Clean Water Act.[7]

In 1973, EPA issued regulations which exempted certain categories of point sources of pollution from the permit requirements of Section 402.[8] One of the categories of discharges exempted by the 1973 regulations was separate storm sewers containing only storm runoff uncontaminated by any industrial or commercial activity. In Natural Resources Defense Council v. Costle (D.C.Cir. 1977) 568 F.2d 1369, the court held

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6 A "point source" is defined in Section 502(14) as "any discernible, confined, and discrete conveyance, including but not limited to any pipe, ditch channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, or vessel or other floating craft, from which pollutants are or may be discharged." It is important to note that, while the discharge of storm water to surface waters is a discharge from a point source from a legal standpoint, these discharges have often been referred to in official documents as "nonpoint" discharges, in recognition of the manner in which they travel over land to the point of discharge.

7 Section 402 authorizes states to administer the NPDES program within their boundaries. EPA has approved California's NPDES program. Pursuant to the provisions of the Porter-Cologne Water Quality Control Act (California Water Code Section 13000 et seq.), NPDES permits are issued by the Regional Water Quality Control Boards in California.

8 See 38 Fed. Reg. 18000 (1973).

that the Clean Water Act required NPDES permits for all discharges of pollutants from point sources, specifically including the discharge of storm water. In that opinion, the court encouraged the use of general permits and "alternative" permit conditions for storm water permits. It was not until 1990, after several aborted attempts, that EPA finally issued regulations for the issuance of storm water permits.[9]

D. Basin Planning Activities by the Regional Board

In 1975, the Regional Board adopted its Water Quality Control Plan for the San Francisco Bay Region (1975 Basin Plan).[10] The 1975 Basin Plan broadly characterized suspected constituents in runoff and roughly estimated pollutant mass loadings from runoff throughout the region. These estimates were derived from several earlier, but limited runoff emission studies. In the 1975 Basin Plan, the Regional Board acknowledged the necessity to obtain further knowledge about storm water runoff and to undertake regulatory actions. Four fundamental control strategies were described for urban runoff: (1) Prevent contaminants from reaching urban land surfaces; (2) Improve street cleaning and cleansing of other public areas;

9 40 CFR Parts 122, 123, and 124. See 55 Fed. Reg. 47990 (November 16, 1990).

10 The 1975 Basin Plan was approved by the State Board in Resolution No. 75-28.

(3) Treat runoff prior to discharge to receiving waters; and (4) New controls on land use and development.[11]

The 1975 Basin Plan concluded that until more definitive research and study about runoff control strategies was conducted, the prudent regulatory path was to adopt and maintain reasonable source control measures and comprehensive monitoring programs. In approving the 1975 Basin Plan, the State Board stipulated that various actions in the Plan, including the urban runoff strategies, constituted recommendations which the State Board, the Regional Board and other agencies should consider further.[12]

The 1975 Basin Plan identified beneficial uses for specified water bodies and listed water quality objectives to protect such uses. Among the water quality objectives listed in the 1975 Basin Plan was a narrative toxicity objective.[13] Compliance with the narrative toxicity objective was to be determined by bioassays. The Basin Plan further specified "limiting concentrations" for inorganic chemical constituents (primarily heavy metals) in waters used as domestic and municipal supply.[14]

The 1975 Basin Plan did not specify numeric water quality objectives for the South Bay. It instead prohibited

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11 1975 Basin Plan, Chapter 5, "Nonpoint Source Measures", pages 5-39 through 5-41.

12 State Board Resolution No. 75-28.

13 The objective requires that all waters be maintained free of toxic substances in toxic amounts. 1975 Basin Plan, page 4-11.

14 1975 Basin Plan, at page 4-18.

continued wastewater discharges to the South Bay, with specified exceptions to this prohibition.[15] The Basin Plan also referred to various plans and policies of the State Board, including the "Water Quality Control Policy for the Enclosed Bays and Estuaries of California."[16] However, the 1975 Basin Plan explicitly stated that this policy does not apply to wastes from "land runoff".[17]

After approval of the Basin Plan by the State Board, the beneficial uses and water quality objectives contained therein were approved by EPA as water quality standards within the meaning of the Clean Water Act. Thus, in 1976 there were no numeric water quality objectives for the South Bay, and there was a general prohibition against discharges thereto, which did not apply to storm water discharges.

In 1986, the Regional Board made substantial revisions to the Basin Plan.[18] The 1986 Basin Plan included numeric objectives for specific toxic pollutants (primarily heavy metals) in some of the surface waters in the Region. For surface waters

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15 1975 Basin Plan, pages 5-6 through 5-12 and 5-47.

16 The "Bays and Estuaries Policy", as this document is commonly known, was adopted on May 16, 1974.

17 1975 Basin Plan, "Bays and Estuaries Policy", section at page 4-11. In the Bays and Estuaries Policy, the State Board had prohibited continued wstewater discharges to the South Bay, based on limited assimilative capacity, generally shallow depth and hydrodynamic circumstances restricting free movement and wide dispersion.

18 The Regional Board amended the Basin Plan in Resolution No. 86-14, on December 17, 1986. This document will be referred to as "1986 Basin Plan". The State Board approved the revisions on May 21, 1987.

downstream from Carquinez Straits, the Regional Board adopted water quality objectives in Table III-2A, which were to be included in NPDES permits.

The 1986 Basin Plan reiterated the necessity of site-specific, numeric water quality objectives for the South Bay, and did not apply the Table III-2A objectives there. The 1986 Basin Plan explained:

> "The South Bay below the Dumbarton Bridge is a unique, water quality limited, hydrodynamic and biological environment which merits continued special attention by the Board. Site specific water quality objectives are absolutely necessary in this area for two reasons. First, its unique hydrodynamic environment dramatically affects the environmental fate of pollutants. Second, potentially costly nonpoint source pollution control measures must be implemented to attain any objectives in this area. The costs of those measures must be factored into economic impact considerations by the Board in adopting any objectives for this area. Nowhere else in the Region will nonpoint source economic considerations have such an impact on the attainability of objectives. Therefore, for this area, the objectives contained in Tables III-2A and III-2B will be considered guidance only, and should be used as part of the basis for site specific objectives. Programs described in Chapter IV will be used to develop site specific objectives for it. Ambient conditions shall be maintained until site specific objectives are developed."[19]

The 1986 Basin Plan identified existing and potential beneficial uses for the South Bay and its tributary surface waters. Uses for the South Bay include industrial service supply, navigation, body contact and non-contact recreation, commercial and sport fishing, wildlife and rare and endangered species habitat, fish migration and spawning, shellfish

19 1986 Basin Plan, page III-5.

harvesting and estuarine habitat.[20] For the numerous surface water bodies tributary to the South Bay, the beneficial uses typically include municipal supply, agricultural supply, ground water recharge, body contact and non-contract recreation, cold and warm freshwater habitat, wildlife habitat, and fish migration and spawning.

In order to protect beneficial uses, the 1986 Basin Plan contained a four-part implementation plan. The plan included point source control measures, nonpoint source control measures, estuarine management actions, and continued planning actions. While the plan for point sources included either specific effluent limitations to be included in NPDES permits or alternative limits based on site-specific water quality objectives, the plan for nonpoint sources did not contain such specific controls. It was noted in the 1986 Basin Plan that wastes from diffuse sources such as agricultural operations, onsite treatment and disposal systems, construction activities, urban runoff, spills and dredging had not been thoroughly investigated.[21]

While the 1986 Basin Plan did not call for the immediate regulation of storm water runoff, the Plan did

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20 1986 Basin Plan, Table 2-1.

21 As was noted earlier, while storm water runoff is legally a point source and must be regulated as such, many historical documents describe such discharges as nonpoint sources. Regardless of the nomenclature, such documents must be read in context. Where, as here, the Regional Board distinguished between point sources and nonpoint sources including storm water or urban runoff, we must interpret its intent to exclude storm water runoff from the rules for other point sources. In the Basin Plan, it is obvious that the Regional Board considered both storm water and urban runoff as nonpoint sources.

summarize the findings of several local and national studies concerning urban and storm water runoff.[22] Collectively, these studies indicated that runoff varies considerably, but likely contributes significant quantities of pollutants, especially heavy metals, to the surface waters. The 1986 Basin Plan instituted actions to identify more thoroughly local runoff problems, to evaluate existing control measures, and to develop specific additional measures. Local governmental agencies and owners or operators of storm drain systems in the South Bay were required to submit detailed information and to identify and implement runoff control measures.

E. Preliminary Control Activities in the Santa Clara Valley Storm Water System

The information required by the 1986 Basin Plan provided some data regarding operation of the municipal separate storm sewer system in the Santa Clara Valley. Throughout the Valley, a relatively flat region spanning approximately 700 square miles between the Santa Cruz Mountains and the Diablo Range, a complex network of storm sewers and natural drainage courses collect and transport intermittent urban runoff and storm waters from urban, industrial, residential and undeveloped areas. The County of Santa Clara, the Santa Clara Valley Water District, and 13 cities[23] own, operate, or maintain the municipal separate

22 1986 Basin Plan, pages IV-39 through IV-41.

23 The cities and towns are Campbell, Cupertino, Los Altos, Los Altos Hills, Los Gatos, Milpitas, Monte Sereno, Mountain View, Palo Alto, San Jose, Santa Clara, Saratoga and Sunnyvale. They are sometimes referred to in the record as "Santa Clara Valley Nonpoint Source Agencies".

storm sewers within the system. The collected flows are conveyed and discharged into numerous creeks, streams, rivers and other surface water bodies which comprise the Santa Clara hydrologic unit of the San Francisco hydrologic basin, and which are ultimately tributary to the South Bay.[24]

In response to the 1986 Basin Plan requirements, the local agencies which discharge storm water runoff from their storm drain systems into Santa Clara Valley drainage courses developed an action plan to initiate a storm water runoff control program.[25] The program consisted of three principal phases: (1) Dry- and wet-weather investigation and monitoring of pollutants in runoff flows and in receiving waters; (2) Identification and evaluation of alternative pollutant control measures; and (3) Development of an implementation plan. The local agencies and their consultants prepared and submitted reports when they completed each phase of the program. The "Implementation Program", the final phase, was completed in March 1990. This report described numerous individual and jurisdiction-wide runoff pollutant control measures and the institutional arrangement to implement them.

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24 The eleven principal drainages or "watersheds" of the Santa Clara Valleys include: Calabazas Creek, Coyote Creek and its tributaries, Guadalupe River and its tributaries, San Tomas Aquinos Creek, Saratoga Creek, Sunnyvale East drainage, Sunnyvale West drainage, Stevens Creek, Permanente Creek, San Francisquito Creek, and Adobe, Matadro, and Barron Creeks.

25 Santa Clara Valley Nonpoint Source Discharge Evaluation Action Plan (July 1987).

F. Water Quality Act of 1987

1. Storm Water Provisions

In 1987, the federal Clean Water Act was amended[26] to add provisions specifically requiring a regulatory program for storm water discharges. Section 402 of the Clean Water Act was amended to add subsection 402(p), which establishes NPDES permit application requirements for municipal storm water discharges and for storm water discharges associated with industrial activities.[27]

Section 402(p)(1) provides that prior to October 1, 1992, NPDES permits shall not be required for discharges composed entirely of storm water. Exceptions to this prohibition include discharges from municipal separate storm sewer systems serving a population of 250,000 or more (Section 402(p)(2)(C)) and where the "stormwater discharge contributes to a violation of a water quality standard or is a significant contributor of pollutants to waters of the United States". Section 204(p)(2)(E). Regarding municipal discharges, Section 402(p)(3)(B) provides:

> "Permits for discharges from municipal storm sewers--(i) may be issued on a system- or jurisdiction-wide basis; (ii) shall include a requirement to effectively prohibit non-stormwater discharges into the storm sewers; and (iii) shall require controls to reduce the discharge of pollutants to the maximum extent practicable, including management practices, control techniques and system, design and

26 The amendments are entitled Water Quality Act of 1987, Public Law 100-4 (February 4, 1987).

27 Section 405(p) of the Water Quality Act of 1987.

> engineering methods, and such other provisions as the [EPA] Administrator or the State determines appropriate for the control of such pollutants." (Emphasis added.)

The issues raised in this petition concern the portions of Section 402(p) addressing municipal discharges, especially the meaning of the requirement that municipalities must control and reduce pollutant discharges to the "maximum extent practicable". These issues will be discussed in detail hereafter.

On December 7, 1988, EPA issued draft regulations intended to implement Section 402(p). However, despite the statutory requirement that EPA promulgate regulations by February 4, 1989, the final regulations were not promulgated until November 16, 1990,[28] after the Regional Board had issued the permit which we are reviewing.

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28 55 Fed. Reg. 47990.

2. Section 304(l)

The Water Quality Act of 1987 also added Subsection 304(l) to the Clean Water Act.[29] Section 304(l) generally requires states to identify those surface waters which are adversely affected by toxic, conventional, and nonconventional pollutants. The surface waters may be included on any of three lists which must be prepared. The list which we shall discuss herein includes waters which are not expected to meet applicable standards, "due entirely or substantially to discharges from

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29 Section 308(a) of the Water Quality Act of 1987 added Section 304(l)(1), which states:

"Not later than 2 years after February 4, 1987, each State shall submit to the Administrator for review, approval, and implementation under this subsection--

(A) a list of those waters within the State which after the application of effluent limitations required under section 1311(b)(2) of this title cannot reasonably be anticipated to attain or maintain (i) water quality standards for such waters reviewed, revised, or adopted in accordance with section 1313(c)(2)(b) of the title, due to toxic pollutants, or (ii) that water quality which shall assure protection of public health, public water supplies, agricultural and industrial uses, and the protection and propagation of a balanced population of shellfish, fish and wildlife, and allow recreational activities in and on the water,

(B) a list of all navigable waters in such State for which the State does not expect the applicable standard under section 1313 of this title will be achieved after the requirements of sections 1311(b), 1316, and 1317(b) of this title are met, due entirely or substantially to discharges from point sources of any toxic pollutants listed pursuant to section 1317(a) of this title;

(C) for each segment of the navigable waters included on such lists, a determination of the specific point sources discharging any such toxic pollutant which is believed to be preventing or impairing such water quality and the amount of each such toxic pollutant discharged by each such source; and;

(D) for each such segment, an individual control strategy which the State determines will produce a reduction in the discharge of toxic pollutants from point sources identified by the State under this paragraph through the establishment of effluent limitations under section 1342 of this title and water quality standards under section 1313(c)(2)(B) of this title, which reduction is sufficient, in combination with existing controls on point and nonpoint sources of pollution, to achieve the applicable water quality standard as soon as possible, but not later than 3 years after the date of the establishment of such strategy."

point sources". Section 304(l)(1)(B). The list is commonly known as the "B list".

Section 304(l) also requires states to prepare "individual control strategies" ("ICS") to control toxic pollutant discharges. To implement Section 304(l), EPA promulgated regulations on June 2, 1989.[30] The regulations interpret an "individual control strategy" to mean "a final NPDES permit with supporting documentation showing that effluent limits are consistent with an approved wasteload allocation, or other documentation which shows that the applicable water quality standards will be met not later than three years after an individual control strategy is established."[31]

The ICS or permit must reduce toxic pollutant discharges from identified point sources "in combination with existing controls on point and nonpoint sources of pollutants".[32] The regulations require ICS's for surface waters on the B list, i.e. for waters which do not or are not expected to achieve applicable water quality standards "due

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30 54 Fed. Reg. 23896.

31 40 CFR Section 123.46(c).

32 40 CFR Section 123.46(a).

entirely or substantially to discharges from point sources" of toxic pollutants.[33]

On February 3, 1989, the State Board sent EPA its B list of impaired waters and contributing point sources. The South Bay was included on this list because conditions violated the narrative receiving water quality objective for toxicity. Point sources which were identified as contributing to the violation of standards included three municipal wastewater treatment plants,[34] and "stormdrains." The list identified seven toxic pollutants (cadmium, copper, lead, mercury, nickel, selenium and silver) as causing the impairment.

G. Adoption of the Permit

In an attempt to fulfill the numerous requirements of the 1986 Basin Plan amendments, the provisions of state law regarding adoption of waste discharge requirements,[35] the Clean Water Act provisions regarding storm water permits and

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33 40 CFR Section 130.10(d). The regulations only require ICS's for those surface waters identified on the B list. 40 CFR Section 123.46(a). In a recent court decision, it was held that this interpretation was too narrow, and the regulations were remanded to EPA for reconsideration. Natural Resources Defenses Council v. Environmental Protection Agency (9th Cir. 1990) 915 F.2d 1314. The other lists required under Section 304(l) are the "A(i) list" of surface waters not expected to attain water quality standards due to toxic pollutants (Section 304(l)(1)(A)(i)) and the "A(ii) list" of surface waters which will not attain water quality which "assure[s] protection of public health, public water supplies, agricultural and industrial uses, and the protection and propagation of a balanced population of shellfish, fish and wildlife, and allow recretional activities in and on the water". Section 304(l)(1)(ii).

34 See our earlier order regarding these plants, Order No. WQ 90-5.

35 California Water Code Section 13000 et seq.

Section 304(l), and the federal regulations regarding Section 304(l), the Regional Board issued a draft NPDES permit for the Santa Clara Valley Nonpoint Sources Agencies' (the dischargers) storm water discharges throughout Santa Clara Valley. Public hearings were held by the Regional Board on May 16 and on June 20, 1990, and on the latter date the Regional Board adopted the NPDES permit (NPDES permit CA0029718; Regional Board Order No. 90-094). Subsequently, the petitioners filed a timely petition for review of the NPDES permit. On September 28, 1990, EPA approved the permit as an ICS.[36]

II. CONTENTIONS AND FINDINGS

The petition raises a number of contentions which all address whether the permit must include numeric, water quality-based effluent limitations. The petitioners argue that, both as an NPDES permit regulating storm water discharges and as an ICS, the permit must prescribe numeric effluent limitations for toxic pollutants (specifically cadmium, copper, lead, mercury, nickel, selenium, silver and "toxic organic pollutants") in regulated storm water discharges.

The petitioners' arguments contend that numeric effluent limitations are required both pursuant to the legal

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36 The document transmitting EPA's approval constituted EPA's final agency action and is entitled, "Decision of the United States Environmental Protection Agency on Listings under Section 304(l) of the Clean Water Act Regarding the State of California." This Decision will be referred to as "304(l) Decision." On page 20, EPA states: "EPA approves NPDES permit CA0029718 as the individual control strategy for the South San Francisco Bay Stormdrains. The permit requires attainment of water quality standards in South San Francisco Bay."

requirements for NPDES permits generally and for ICS's specifically. The petitioners generally contend that the dischargers are causing pollutants to enter the South Bay and to violate water quality standards there, and that the only acceptable means to control this impact is to place numeric limitations on the dischargers' effluent. The petitioners also contend that the permit does not comply with statutory deadlines in the Clean Water Act. Finally, the petitioners seek inclusion of specified measures to reduce pollutants from transportation facilities and practices.

In order to address the various arguments made by the petitioners, we must discuss some of the factual assumptions which the petitioners have made, along with the legal contentions. Our order of presentation varies somewhat from the petitioners', but all of the major points are covered.[37]

A. Location of the Storm Water Discharges in the Santa Clara Valley

The petitioners' arguments are based on the premise that the dischargers' municipal separate storm sewer system discharges pollutants to the South Bay and that these discharges are significantly impairing its beneficial uses. The petitioners contend that these beneficial uses are jeopardized by the failure of the permit to contain numeric effluent limitations. As we shall explain, the petitioners' broad assertions vastly oversimplify the complex nature of the dischargers' flood control

37 Any issue not specifically discussed herein is dismissed for failure to raise substantial issues appropriate for review. 23 Calif. Code of Regulations, Section 2052(a)(1).

and drainage facilities, imply that the storm sewer system discharges only into the South Bay, and misconstrue ambient water quality criteria, receiving water quality standards and effluent limitations.

The storm drains are generally point sources,[38] which discharge upstream from the South Bay.[39] While pollutants may be transported from the storm drains to the South Bay, the process of this transportation and the amounts of pollutants reaching the South Bay are unknown.

The documents and reports required by the 1986 Basin Plan, and which accompanied the permit application, describe the dischargers' municipal separate storm sewer system. This system, a vast network of catchments, street gutters, conduits, pipes and channels, collects urban runoff flows and storm water flows from eleven distinct watersheds and a land area greater than 700 square miles. Numerous outfalls (point sources) exist throughout the entire Santa Clara Valley, which discharge urban runoff and storm water flows into nearby natural surface waters. The permit

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38 The term "point source" is defined in the Clean Water Act as:

> *"...any discernible, confined, and discrete conveyance, including but not limited to any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock concentrated animal feeding operation, or vessel or other floating craft, from which pollutants are or may be discharged..." Section 502(14).*

39 The documents prepared by the State Board and EPA pursuant to Section 304(l) speak only vaguely of "stormdrains" and do not specify to which specific stormdrains they refer. We do acknowledge that the petitioners may have read these documents to mean that a determination had been made that storm water discharges are known to contribute significant pollutants directly to the South Bay. However, as we will explain infra, the decision to list "stormdrains" as a point source on the B list was based on minimal information and a reading of Section 304(l) requiring listing under the circumstances.

covers the dischargers' entire jurisdiction. Many of the surface waters are separately identified in the Basin Plan, and water quality standards are established, as described above. The surface waters then flow into the South Bay.

While the precise location of each outfall is not apparent in the record (and may not be known at this time), the dischargers' storm sewers generally convey waste to specific, identified receiving waters other than the South Bay. The permit contains a finding regarding the point of discharge:

> "Discharge consists of the surface runoff generated from various land uses in all the hydrologic subbasins in the basin which discharge into watercourses which in turn flow into South San Francisco Bay."[40]

The natural water courses to which the storm sewers discharge are not in themselves part of the dischargers' municipal separate storm sewer system. The EPA regulations define the term "municipal separate storm sewer" as "a conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, manmade channels, or storm drains)...."[41] In the Santa Clara Valley, the storm sewer outfalls discharge to the water courses upstream

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40 Permit, Finding Number 3.

41 40 CFR Section 122.26(b)(8).

from the South Bay These water courses are themselves waters of the United States.[42]

Storm water discharge, which originates as a diffuse, nonpoint source flow, becomes a "point source" addition of pollutants at the discrete intersection of the conveyance (outfall) and waters of the United States. While there may be cases where it is difficult to distinguish waters of the United States from the dischargers' conveyance systems, where the outfall leads to a natural stream with designated beneficial uses and water quality objectives, the outfall is the point source. The mouth of the river or creek at the South Bay is not a point source. The dischargers' storm sewer system conveys waste, though numerous point source outfalls, to Santa Clara Valley's creeks, streams and rivers. Few storm sewers discharge directly into South San Francisco Bay.

B. Conditions of the Receiving Waters

Both the South Bay and the water courses which receive the storm water discharges have beneficial uses. However, the uses of the streams, creeks, and rivers in the Santa Clara Valley are not the same as the uses of the South Bay. (This point is obvious since the upstream waters are fresh and the Bay is

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42 The EPA regulations provide:

> *"'Outfall' means a 'point source' as defined by 40 CFR 122.2 at the point where a municipal separate storm sewer discharges to waters of the United States and does not include open conveyances connecting two municipal separate storm sewers, or pipes, tunnels or other conveyances which connect segments of the same stream or other waters of the United States and are used to convey waters of the United States." 40 CFR Section 122.26(b)(9).*

estuarine.) The Valley surface waters are chiefly used for municipal supply, agricultural supply, ground water recharge, body contact and non-contact recreation, cold and warm freshwater habitat, wildlife habitat, and fish migration and spawning, and, in some cases, for freshwater replenishment, navigation, and rare and endangered species habitat.[43]

As described above, the objectives contained in Table III-2A of the 1986 Basin Plan are not applicable to the South Bay.[44] Even though the Basin Plan appears to state that these objectives may apply to the Santa Clara Valley surface waters, the marine water criteria which are enumerated in Table III-2A clearly do not. Criteria intended to protect marine or estuarine water uses, especially aquatic habitat, cannot simply be interpolated for freshwater uses such as drinking water supply, since the bases for the criteria are different.

A better reading of the 1986 Basin Plan is that EPA's ambient fresh water criteria, which are also the water quality objectives in Table III-2B, apply to the upstream water courses. Table III-2A states that EPA fresh water criteria[45] "can be applied seasonally, where appropriate."[46] It appears that the Regional Board intended that such fresh water criteria may be

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43 1986 Basin Plan.

44 In Order No. WQ 90-5, we recently directed the Regional Board to adopt numeric water quality objectives for toxic pollutants in the South Bay.

45 EPA's most recent compilation of water quality criteria is the "Gold Book", entitled Quality Criteria for Water 1986 (EPA 440/5-86-001). These criteria have not been adopted as rules or regulations.

46 1986 Basin Plan, Table III-2A, footnote b.

applied to such water courses as the Santa Clara Valley surface waters. We reach this conclusion because ambient criteria for protection of uses in freshwater are clearly more appropriate than the estuarine or marine water criteria. The record indicates that the water courses upstream of the South Bay may be impaired or threatened by a variety of pollutant sources, including storm drains and nonpoint sources, such as abandoned mines. However, none of the upstream water bodies was included on the Section 304(l) "B" list.

The petitioners argue that by including "stormdrains" as contributors to impairment of the South Bay on the B list, "[t]oxic pollutants and toxicity known to be present in the dischargers' (sic) discharges are known to violate water quality standards and impair uses."[47] We find, instead, that the decision to list storm drains as a point source on the B list was based on the available evidence at the time, and a broad reading of the types of pollutant sources to the South Bay which should be listed. In making the findings for the listing, we stated:

> "Our review of the data, therefore, concerning the relative metals loadings from point and nonpoint sources indicates that impairments of water quality in the South Bay cannot be attributed to one or the other category of source. Rather, any regulatory strategy to improve the water quality and protect beneficial uses in the South Bay must take both categories or sources into account."[48]

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47 *See Exhibit 2 to Petition, page 11.*

48 *State Board Order No. WQ 90-5 at page 55.*

On April 11, 1991, we adopted the Statewide Water Quality Control Plans for Inland Surface Waters of California (Inland Plan) and for Enclosed Bays and Estuaries of California (Bays and Estuaries Plan), which include numeric water quality objectives which will apply to the surface waters of Santa Clara Valley and to the South Bay. The plans provide five years for the Regional Board to determine what actions are appropriate to ensure that storm water discharges are in compliance with the numeric objectives. The Plans further provide: "All dischargers shall be given a maximum of 10 years from the date of adoption of this plan to come into compliance with the numerical objectives in this plan." See, March 26, 1991 Draft, at page A-28.

C. Storm Water Discharge Characteristics

Pursuant to the 1986 Basin Plan requirements, the dischargers conducted dry- and wet-weather monitoring to characterize urban runoff and storm water flows from the municipal separate storm sewer system. From these investigations, cadmium, chromium, copper, lead, nickel and zinc were found in detectable concentrations in residential, commercial and industrial land use runoff and in the Santa Clara Valley surface waters. Arsenic, mercury, selenium and silver were seldom detected.[49] Further, significant differences were recorded between dry-weather and wet-weather stream concentrations, and runoff pollutant concentrations varied

49 *Santa Clara Valley Nonpoint Source Study, Volume I: Loads Assessment Report*.

considerably between storms and between locations. The evidence suggests that storm water and urban runoff transport heavy metals which are then deposited with sediments in the Santa Clara Valley creeks and streams. The physical aspects of runoff (that is, the erosion and scour of these sediments in the receiving waters) resuspends pollutants during storm events. Wet weather flow in the natural water courses likely transports resuspended pollutants to the South Bay.

In comparing storm water runoff and receiving water concentrations to EPA's criteria, heavy metals concentrations were typically less than the chronic toxicity criteria during dry-weather periods. Copper and, to a lesser extent, zinc, lead and cadmium, exceeded the acute toxicity criteria values during wet-weather. Laboratory tests were also performed to study toxicity using undiluted, static-renewal effluent samples for both dry-and wet-weather periods. The dry-weather test results were inconsistent and inconclusive. In the dischargers' wet-weather laboratory samples, approximately 75 percent of these samples significantly affected Ceriodaphnia test organisms. Even though a few heavy metals did exceed acute toxicity criteria in the same samples, the lethal effects could not be definitively correlated to the presence of particular heavy metals alone. Test results suggest the presence of other, unmeasured chemical agents or factors.

The results of the characterization studies indicate that the nature and effects of storm water discharges are

complicated. While we are concerned about the effects of the dischargers' storm water discharges on aquatic life and other beneficial uses, we also note that the various point sources and nonpoint sources affect these uses in a complicated and little-understood fashion. In attempting to solve the problems of the South Bay we must ensure that the Regional Board uses its authority to control both point and nonpoint sources in the most effective manner possible.

D. The Regional Board's Pollution Control Strategy

As we have discussed above, the dischargers' municipal separate storm sewer system generally discharges waste into numerous receiving waters, and not directly into the South Bay. The characterization studies which have been performed do suggest that potential threats exist and warrant appropriate control. Following the requirements of the 1986 Basin Plan and Clean Water Act Section 402(p), the Regional Board adopted the NPDES permit as an initial element of its storm water control strategy for protecting the surface waters of the Santa Clara Valley.

The NPDES permit employs a two-fold strategy; it prohibits non-storm water discharges and illicit connections, and it requires a comprehensive series of regulatory, governmental, and educational control measures. The first element effectively prohibits unpermitted industrial discharges into the storm sewer

system, and should also prohibit most dry-weather "urban runoff" discharges.[50]

The second element prescribes area-wide and community-specific source reduction, hydraulic, and treatment-based control measures. For example, some of the regulatory measures include local ordinances to prohibit litter and hazardous waste disposal, regulations governing oil and grease disposal, provisions for construction site drainage, and increased use of permeable landscaping and surfaces. Public agency control measures include intensified street sweeping, bimonthly community cleanup days, illegal dumping investigations, and detention and infiltration projects. As potential contaminants in storm sewer flows substantially originate from human activities, the permit requires extensive educational and outreach programs geared toward residents and small businesses.

The method by which the specific control activities will be implemented is that the dischargers must submit a Management Plan for approval by the Regional Board, and then must implement the Plan. Thus, the permit lists some, but not all of the management practices which will be undertaken. The dischargers have already identified a list of practices from which the individual entities will select. The specific

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50 "Illicit discharge" is defined in EPA's regulation as "any discharge to a municipal separate storm sewer that is not composed entirely of storm water except discharges pursuant to a NPDES permit (other than the NPDES permit for dischages from the municipal separate storm sewer) and discharges resulting from fire fighting activities." 40 CFR Section 122.26(b)(2). While this regulation was adopted subsequent to issuance of the permit, it is assumed that this definition will apply.

practices will be selected over a two-year period starting with adoption of the NPDES permit.

In addition to the basin-wide and community-specific "best management practices" required by the permit and the prohibitions against discharging non-storm water, the permit also prohibits discharges of storm water which cause or contribute to violation of receiving water limitations. The receiving water limitations disallow the creation of conditions of pollution or nuisance in the receiving waters. In addition, the discharge may not cause a violation of "any applicable water quality objective for receiving waters."[51]

The permit does not include specific, numeric effluent limitations which would be measured at the outfalls. This omission is the crux of the petitioners' complaints.

E. Legal Requirements of Clean Water Act Sections 301 and 402(p)

The petitioners contend that the Clean Water Act, and regulations and court decisions interpreting the Act, require the inclusion of numeric effluent limitations in NPDES permits for the discharge of storm water from a municipal separate storm sewer system. We have reviewed these authorities, and also opinions we have received from EPA, and conclude that numeric effluent limitations are not legally required. Further, we have determined that the program of prohibitions, source control

51 *Permit, Receiving Water Limitation B.2.*

measures and "best management practices" set forth in the permit constitutes effluent limitations as required by law.

First and foremost, the petitioners contend that by virtue of the absence of numeric effluent limitations, the permit contains no "effluent limitations" or "water quality-based effluent limitations."[52] The petitioners assert that effluent limitations can only be numeric concentration values for individual constituents. Our review of the relevant law reveals that the permit's scheme of prohibitions, source control measures and best management practices constitutes valid effluent limitations consistent with requirements of "maximum extent practicable" controls and water quality standards.

Before we address the acceptability of practices as "effluent limitations" we shall review the mandate contained in the Clean Water Act that NPDES permits in general must contain effluent limitations, and we shall decide whether that mandate applies to permits regulating municipal discharges of storm water in particular.

Section 301 of the Clean Water Act prohibits the discharge of any pollutant,[53] unless pursuant to a NPDES permit

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52 Indeed, even among Regional Board staff and the dischargers there appeared to be confusion regarding the term "effluent limitation". See e.g., transcript from May 16, 1990 Regional Board hearing, at page 11. All parties to the permit appeared to be under the impression that the permit did not contain effluent limitations. As we will explain, however, our determination that best management practices may constitute effluent limitations is certainly not novel.

53 "Discharge of a pollutant" is defined to include "any addition of any pollutant to navigable waters from any point source." Clean Water Act Section 502(12).

(or other method in compliance with the Act). Section 301(b) further requires point sources to be in compliance with effluent limitations which require the application of "best practicable control technology currently available," and which are necessary to meet water quality standards established under state law, by July 1, 1977.[54] Section 301 also requires compliance with any more stringent effluent limitations which are necessary to protect water quality standards. The former effluent limitations are generally referred to as technology-based, while the latter are referred to as water quality-based.

Thus, the general rule in Section 301 is that point sources must comply with effluent limitations. These effluent limitations are contained in NPDES permits, for which standards are set out in Clean Water Act Section 402. Section 402(a)(1) provides that permits may allow the discharge of pollutants, so long as the permit requires compliance with applicable requirements including Section 301.

Subsection (p) was added to Section 402 in order to clarify the specific requirements relating to discharges of storm water. Section 402(p)(3) specifies the permit requirements for industrial and municipal discharges:

> "(A) Permits for discharges associated with industrial activity shall meet all applicable provisions of this section and section 1311 [Section 301] of this title.
>
> "(B) Permits for discharges from municipal storm sewers--

54 For certain pollutants, effluent limitations which require "best available technology economically achievable" must be met by March 31, 1989. As will be explained infra, the deadlines contained in Section 301(b) are clearly not applicable to municipal dischargers of storm water.

> "(i) may be issued on a system-or jurisdiction-wide basis;
>
> "(ii) shall include a requirement to effectively prohibit non-stormwater discharges into the storm sewers; and
>
> "(iii) shall require controls to reduce the discharge of pollutants to the maximum extent practicable, including management practices, control techniques and system, design and engineering methods, and such other provisions as the Administrator or the State determines appropriate for the control of such pollutants."[55]

While the permit requirements for industrial discharges require compliance with all applicable provisions of Section 402 and with Section 301, Section 402(p)(3)(B) is ambiguous as to whether municipal storm water discharges must comply with these general requirements (including effluent limitations). The requirements specified for municipal discharges are only a prohibition against non-storm water discharges and "controls to reduce the discharge of pollutants to the maximum extent practicable."[56] Thus, the first issue which arises is whether the requirements of Section 301 and of Section 402, other than subsection 402(p), apply to municipal storm water discharges.

The petitioners claim that Section 402(p) requires the inclusion of effluent limitations in permits, and specifically effluent limitations necessary to meet water quality standards.

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55 It is clear that the time limitations in Section 301 do not apply to either type of discharge. Industrial and large municipal discharges are given three years after issuance to comply with permit terms. Section 402(p)(4)(A).

56 The third provision in the municipal requirements, issuance on a system- or jurisdiction-wide basis, is couched in permissive rather than mandatory terms.

The dischargers, along with many interested municipalities throughout the State, claim that the only standards which they must meet are the reduction of pollutants to the "maximum extent practicable" ("MEP") and the prohibition against non-storm water discharges.

In reviewing the terms of Section 402(p), we find that the meaning of the statute on its face is not clear. On the one hand, there is nothing in Section 402(p) which states that the general provisions of Sections 301 and 402 do not apply to municipal storm water discharges. This would lead us to conclude that these general provisions do apply. On the other hand, the subsection applying to industrial discharges specifies that those general provisions apply, while the subsection referring to municipal storm water discharges is silent on this point. Because the meaning of the statute is ambiguous, we will look to other sources to determine the legislative intent.[57]

The legislative history is generally silent on the meaning of the MEP standard and the distinction between industrial and municipal discharges.[58] However, we have obtained an interpretation from EPA, and that interpretation must be accepted as a valid interpretation of the federal law, unless

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57 See Cal. Jur. III, Vol. 58, Statutes, page 453.

58 1987 U.S. Code Cong. and Adm. News, pages 38-39. Senator Durenberger is quoted as saying that MEP includes such controls as "management practices, control techniques and systems, [and] design and engineering methods." Volume 132, No. 143 Congressional Record, S16443 (October 16, 1986).

it is manifestly unreasonable. National Wildlife Federation v. Gorsuch (D.C. Cir. 1982) 693 F.2d 156. In a memorandum from its Assistant Administrator and General Counsel,[59] EPA proceeds to consider two plausible interpretations: (1) Congress intended to waive all Section 301 requirements for municipal discharges in favor of the MEP standard, or (2) the MEP statutory requirement modified only the technology-based requirements contained in Section 301, and left in place the need for water quality-based requirements, even if those requirements would be more stringent than MEP. EPA concluded by adopting the latter interpretation.

EPA gave two reasons for its conclusion that municipal storm water discharges do not need to meet technology-based standards contained in Section 301, but that they must meet water quality-based standards. First, a contrary reading would require the conclusion that Congress implicitly repealed Section 301 as applied to these discharges. Such a conclusion would generally be disfavored by courts. Second, such a reading would interpret the Water Quality Act of 1987 as weakening the standards of the Clean Water Act, whereas the available legislative history indicates a desire to strengthen its provisions.

In reviewing EPA's interpretation, we cannot conclude that it is wholly unreasonable. Further, we have an interest as a state agency in supporting this rationale. It is the state-adopted water quality standards which EPA claims must be met by provisions of the permit. We must conclude that it is in the

59 Memorandum from E. Donald Elliot to Nancy J. Marvel, Regional Counsel, EPA Region IX, regarding "Compliance with Water Quality Standards in NPDES Permits Issued to Municipal Separate Storm Sewer Systems", dated January 9, 1991.

interest of the State to be able to enforce its standards in the provisions of NPDES permits. See, Clean Water Act Section 510. Further, since the State has the authority to adopt the water quality standards, we believe that we can incorporate into these standards the necessary flexibility to allow realistic opportunity for compliance.[60] We have used this flexibility in our recently-adopted Inland Plan and Bays and Estuaries Plan. These provide ten years for storm water dischargers to come into compliance with numeric water quality objectives. In addition, the Plans emphasize source reduction of toxic pollutants and development of best management practices before costly end-of-the-pipe treatment is required. See, California Inland Surface Waters Plan, at page A-24.

We therefore conclude that permits for municipal separate storm sewer systems issued pursuant to Clean Water Act Section 402(p) must contain effluent limitations based on water quality standards. As we discussed earlier, the applicable water quality standards in this matter are those established for the creeks and streams which are predominantly the receiving waters of the storm water discharges. These standards appear generally to be EPA's fresh water criteria. The Inland Plan also contains applicable water quality objectives which will be submitted to EPA for approval as water quality standards. Dischargers of storm water are given a maximum of ten years to come into

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60 The Regional Board adopts water quality objectives pursuant to its authority in Water Code Section 13240 and following. This Board may also adopt water quality objectives pursuant to Water Code Section 13170.

complaince with the numeric objectives contained in the Inland Plan. We will now consider whether "best management practices" constitute acceptable effluent limitations, or whether numeric effluent limitations based on numeric water quality standards are required.[61]

While the petitioners have correctly pointed to the absence of numeric effluent limitations, the permit prohibits non-storm water discharges, and includes receiving water limitations and a requirement that the discharge not cause the violation of any water quality objectives. The permit does, therefore require compliance with water quality standards. The major issue is whether numeric effluent limitations are also required.

As we stated above, the Regional Board and the dischargers assumed that the permit did not include effluent limitations. However, in its response to the petition, Region IX of EPA concludes that effluent limitations need not be numeric, and may instead constitute any measures to reduce pollutants in the discharge including "best management practices."[62] This response is also consistent with EPA's 304(l) Decision, in which

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61 A point which is not directly at issue here is what sort of effluent limitations are required to meet the MEP standard set forth in Section 402(p). While the question of what actions are required to achieve MEP may indeed be a source of substantial controversy, it is clear that the inclusion of best management practices in a permit (rather than numeric effluent limitations) is an acceptable means of complying with the MEP requirement. See, Vol. 132, Congressional Record, S16443 (October 16, 1986).

62 See letter from Harry Seraydarian, Director, Water Management Division, to Elizabeth Miller Jennings, Senior Staff Counsel, State Water Resources Control Board, dated October 24, 1990.

it approved the permit as an ICS pursuant to Clean Water Act Section 304(l). Because EPA undertook a final action in the 304(l) Decision, approving the permit with best management practices rather than numeric effluent limitations, we assume that EPA's formal agency position is that expressed in the response from Region IX. Therefore, we shall follow this interpretation unless it is manifestly incorrect.

The statutory definition of "effluent limitation" is broad and supports EPA's contention that a numeric limit is not required:

> "The term 'effluent limitation' means any restriction established by a State or the Administrator on quantities, rates, and concentrations of chemical, physical, biological, and other constituents which are discharged from point sources into navigable water, the waters of the contiguous zone or the ocean, including schedules of compliance." Clean Water Act Section 502(11).

The definition of "effluent limitation" contained in EPA's regulations is similarly broad:

> "Effluent limitation means any restriction imposed by the Director [or a State] on quantities, discharge rates, and concentrations of 'pollutants' which are 'discharged' from 'point sources' into 'waters of the United States,' the waters of the 'continguous zone,' or the ocean." 40 CFR Section 122.2.

In a decision by a federal court of appeals, the court stated that it did not agree with the premise that effluent limitations must be articulated "in terms of a numeric effluent standard." Natural Resources Defense Council v. Costle (D.C. Cir. 1977) 568 F.2d 1369. Rather, the court stated that

Section 402 "gives EPA considerable flexibility in framing the permit to achieve a desired reduction in pollutant discharges. The permit may proscribe industry practices that aggravate the problem of point source pollution." 586 F.2d at 1380. (Emphasis added.) Costle concerned whether specific discharges, including storm water, must be regulated by NPDES permits. EPA had assumed that numeric effluent limitations were required, and argued that these would be infeasible. Instead, the court clarified that specific practices could be required, especially in cases such as storm water regulations, where numeric permit limitations would be difficult to enforce.

Following the Costle case, and several attempts by EPA to establish a regulatory program for storm water permits, the Clean Water Act was amended to incorporate Subsection 402(p). Given this background in the development of storm water regulations, it appears reasonable to assume that in adopting subsection 402(p), Congress intended to allow EPA to regulate "practices" as suggested by the court.

In a more recent decision by the Ninth Circuit court of appeals, it was held that numeric, technology-based effluent limitations may not always be appropriate, and that EPA must include in permits it adopts whatever effluent limitations are necessary to achieve state water quality standards. Trustees for Alaska v. Environmental Protection Agency (9th Cir. 1984) 749 F.2d 549. Section 302 of the Clean Water Act describes the use of effluent limitations to protect beneficial uses of water where

the application of technology-based standards is inadequate.[63] This section states that water quality-based effluent limitations may include "alternative effluent control strategies." Clean Water Act Section 302(a). Plainly, the term "alternative effluent control strategies" encompasses the types of control measures prescribed in the NPDES permit.[64] Costle, supra, at note 21.

Finally, EPA's storm water regulations, while not specifically addressing the contents of municipal permits, clearly emphasize a "best management practices" approach. The information which municipalities must submit in their applications concerns establishment of a control program with specific structural and non-structural controls. There is nothing in the storm water regulations which would indicate an approach which mandates numeric effluent limitations.

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63 Section 302(a) provides:

> *"Whenever, in the judgment of the Administrator or as identified under section [304(l)] of this title, discharges of pollutants from a point source or group of point sources, with the application of effluent limitations required under section [301(b)(2)] of this title, would interfere with the attainment or maintenance of that water quality in a specific portion of the navigable waters which shall assure protection of public health, public water supplies, agricultural and industrial uses, and the protection and propagation of a balanced population of shellfish, fish and wildlife, and allow recreational activities in and on the water, effluent limitation (including alternative effluent control strategies) for such point source or sources shall be established which can reasonably be expected to contribute to the attainment or maintenance of such water quality." (Emphasis added.)*

64 EPA has also adopted regulations regarding the establishment of water quality-based effluent limitations. These regulations are discussed in the next section.

In conclusion, we agree with EPA that Sections 301 and 402 must be read to require municipal storm water discharges to meet MEP and also to achieve compliance with water quality standards. The most reasonable way of blending these two sections together is to write permits which seek implementation of water quality standards through the controls which constitute MEP. In other words, Section 402(p) should be read to require permits to include actions which constitute MEP for the first three years, and then an evaluation of further actions which must be taken if water quality standards are not protected. We do not believe this reading is inconsistent with EPA's requirement that standards be met within three years, since MEP will be the most effective method of achieving reductions in pollutants contained in storm water, as discussed below. Region IX of EPA expressed this policy well in their response to the petition:

> "Region 9 believes that it would be premature for a municipal storm water permit to include numerical effluent limitations. Storm drains raise unique problems and differ from other types of point source discharges in that only limited information is currently available concerning the sources and loadings of the pollutants and the effectiveness of many of the control measures. While NPDES permits have been issued since the mid-1970s for industrial dischargers and POTWs, permitting of municipal storm drains is still in its infancy and additional information is necessary to determine the best means for achieving compliance with water quality standards."

As a final point, we note that the provisions contained in the permit also comply with the state law requirements for

adoption of waste discharge requirements. Water Code Section 13263 provides that requirements:

> "...shall implement relevant water quality control plans, if any have been adopted, and shall take into consideration the beneficial uses to be protected, [and] the water quality objectives reasonably required for that purpose...."

We find that the permit includes a comprehensive and stringent program for reducing pollutants in storm water discharge, and that it will implement the Basin Plan, including the protection of beneficial uses.

F. Legal Requirements of Clean Water Act Section 304(l)

The NPDES permit was issued pursuant to both Clean Water Act Sections 402(p) and 304(l). Thus, the permit must be adequate not only as a NPDES permit regulating storm water under Section 402(p), but it must also meet the requirements of Section 304(l) and the regulations adopted thereunder.[65]

Section 304(l)(1)(B) required this Board to compile a list of surface waters for which we do not expect water quality standards will be achieved after requirements of Section 301 and other applicable sections are met, "due entirely or substantially to discharges from point sources" of specified toxic pollutants. In addition, for each segment of waters included on the B list, we were required to determine the "specific point sources

65 The Section 304(l) regulations concerning water quality-based effluent limitations, which we shall discuss in this section, are applicable whenever permits must require compliance with water quality standards, and not just where Section 304(l) is applicable. Therefore, these regulations would also have to be satisfied even if these storm drains had not appeared on the 304(l) B list.

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based limits on one or more point sources would result in the achievement of an applicable water quality standard for a toxic pollutant; or

"(ii) The discharge of a toxic pollutant from one or more point sources, regardless of any nonpoint source contribution of the same pollutant, is sufficient to cause or is expected to cause an excursion above the applicable water quality standard for the toxic pollutant." 40 CFR Section 130.10(d)(5).

It should be noted that waters must be listed where, notwithstanding the impacts of nonpoint sources, the contribution of the point source "is expected to cause" the water body to

66 54 Federal Register 23868-23899.

exceed water quality standards. Section 130.10(d)(5)(ii). This means that waters may be put on the B list even where the nonpoint sources are the more significant contributors to the violation of water quality standards. Moreover, in its preamble to the 304(l) regulations, EPA noted two points especially relevant here. First, EPA noted the difficulty of developing ICS's for storm water outfalls. 54 Federal Register 23884 (1989). Second, EPA discussed the lack of available data to make the determinations required by Section 304(l) and the short time schedule available. Nonetheless, EPA directed the states to "rely on existing and readily available data" and discussed what it considered to be "the minimum existing and readily available water quality data and information that a state and EPA can reasonably attain." 54 Federal Register 23884 (1989).

Taking together 40 CFR 130.10(d)(5)(ii) and EPA's comments concerning storm water outfalls and scant available data, it is clear that there may be situations where point sources are included on the B list where at the time of listing, their proportionate wasteload contribution to the excursion of water quality standards is unknown, where regulation through traditional methods available for point sources is not feasible, and where any provisions requiring a reduction in the discharge of pollutants from these point sources may not be adequate to allow the receiving water to achieve water quality standards (in light of continuing contributions from nonpoint sources).

It appears that the instant matters includes all of these variables. As was discussed above, while the

dischargers' storm drains are point sources, they do not generally discharge directly to the South Bay, and their relative contribution, via riverine transport, to the South Bay's impairment is still unknown.[67] In short, given the available data, we do not believe that any restraints--that is, numeric effluent limitations--which could be imposed on the discharge of pollutants through the storm drain system would alone attain water quality standards in the South Bay.

We do note that EPA's definition of ICS may be read to require that ICS's be set so as to ensure that receiving waters will achieve water quality standards. In 40 CFR Section 123.46, EPA set forth the requirements of ICS. The term ICS is defined as: "a final NPDES permit with supporting documentation showing that effluent limits are consistent with an approved wasteload allocation, or other documentation which shows that applicable water quality standards will be met not later than three years after the [ICS] is established." Section 123.46(c). However, a recent court decision has brought this requirement into question. In Natural Resources Defense Council v. Environmental Protection Agency (9th Cir. 1990) 915 F.2d 1314, the court disapproved of one portion of EPA's Section 304(l) regulations, and remanded the

67 In EPA's response to comments regarding its final decision regarding lists of waters, sources and pollutants under Section 304(l), it conceded the lack of scientific data available concerning South San Francisco Bay. EPA concluded "that narrative standards for toxicity are being exceeded in South San Francisco Bay and that the exceedance is due substantially to POTW and storm drain point source discharges of toxic pollutants." To support this conclusion, EPA pointed to a final Staff Report of the State Board, supporting our Order No. WQ 90-5, wherein it is stated that "the State Board agrees that the relative contribution of point and nonpoint sources to ambient water conditions has not been established." 304(l) Decision.

regulations to EPA for reconsideration. The court determined that EPA must list point sources for all water bodies which appear on any of the Section 304(l) lists, not just the B list.[68] It did not reach the question whether ICS's are required for all listed point sources, or only for those related to B lists. This is the issue which was remanded to EPA. In reading this court decision, it is apparent that it is not expected that all point sources which are designated under Section 304(l) are capable of limiting pollutants to an extent that water quality standards will be met in the receiving water. Further, it is certainly questionable whether an ICS will be able to ensure that the receiving waters will achieve water quality standards.

The regulations themselves raise questions as to whether it will always be feasible to assure compliance with water quality standards simply through adoption of an ICS. The pollutants associated with storm water discharges are apparently bound up in sediments in dry weather periods and are resuspended and transported in storm events. The Preamble to the Section 304(l) regulations states that water quality impairments due to sediments contaminated and deposited by active point sources (such as storm drains) must be included on the B list.

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68 The other two lists are known as the "(A)(i) list" and the "(A)(ii) list." Section 304(l)(1)(A)(i) requires a list of water bodies in which water quality standards are not expected to be achieved after the application of effluent limitations to point sources. The list required by Section 304(l)(1)(A)(ii) must include waters which, after application of effluent limitations to point sources, are not expected to "assure protection of public health, public water supplies, agricultural and industrial uses, and the protection and propagation of a balanced population of shellfish, fish and wildlife, and allow recreational activities in and on the water."

Nevertheless, NPDES permits do not apply to the sediments. 54 Federal Register 23883. Given the complicated and little understood process of transportation and resuspension of sediments, it is not possible to calculate numeric effluent limitations which would apply to storm drain outfalls and would be based upon water quality standards in downstream waters such as the South Bay.

Notwithstanding the ambiguities raised in interpreting Section 304(l), we must still address whether the effluent limitations contained in the permit are adequate as water quality-based effluent limitations pursuant to EPA's regulations. EPA adopted regulations at 40 CFR 122.44(d) which set forth requirements for water quality-based limitations. These regulations were adopted to comply with Section 304(l). See, 54 Federal Register 23870.

EPA's regulations concerning the establishment of limitations, standards, and other permit conditions, including effluent limitations, appear in 40 CFR 122.44. Section 122.44(d)(1) requires the inclusion of requirements in

NPDES permits necessary to achieve water quality standards.[69] That subsection requires the inclusion of effluent limitations for specific pollutants where those pollutants cause, have the reasonable potential to cause, or contribute to an in-stream excursion above narrative or numeric criteria within an ambient water quality standard.

The petitioners point to Section 122.44(d)(1) in claiming that numeric effluent limitations are required. However, the term "numeric" effluent limitation does not appear in Section 122.44(d)(1). Concededly, in most cases, the easiest and most effective chemical-specific limitation would be numeric.[70] However, there is no legal requirement that effluent limitations be numeric.

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69 Section 122.44(d)(1) provides, in relevant part, that NPDES permits must include:

> *"any requirements...necessary to...[a]chieve water quality standards....*
>
> *"(i) Limitations must control all pollutants or pollutant parameters (either conventional, nonconventional, or toxic pollutants) which the Director determines are or may be discharged at a level which will cause, have the reasonable potential to cause, or contribute to an excursion above any State water quality standard....*
>
> * * *
>
> *"(iii) When the permitting authority determines...that a discharge causes, has the reasonable potential to cause, or contributes to an in-stream excursion above the allowable ambient concentration of a State numeric criteria within a State water quality standard for an individual pollutant, the permit must contain effluent limits for that pollutant.*
>
> * * *
>
> *"(v) ...[W]hen the permitting authority determines...that a discharge causes, has the reasonable potential to cause, or contributes to an instream excursion above a narrative criterion within a applicable State water quality standard, the permit must contain effluent limits for whole effluent toxicity."*

70 In fact, in our order regarding discharges from POTW's to the South Bay, we found that numeric effluent limitations were appropriate and feasible.

Even in Section 122.44 there is specific provision for best management practices in lieu of numeric effluent limitations. Section 122.44(k) states that NPDES permits should include "...best management practices to control or abate the discharge of pollutants when: ...(2) Numeric effluent limitations are infeasible...." As we shall describe below, we conclude that numeric effluent limitations are infeasible as a means of reducing pollutants in municipal storm water discharges, at least at this time. EPA Guidance allows further monitoring in lieu of immediate permit limitations. In EPA's Permit Writer's Guide to Water Quality-Based Permitting for Toxic Pollutants, numeric limits are not required.[71] Additionally, the Inland Plan provides up to ten years for storm water discharges to comply with numeric objectives and specifically endorses source reduction and best management practices to reduce pollutants.[72]

Finally, EPA has formally approved the permit as an ICS. In its 304(l) Decision, EPA stated:

> "EPA approves NPDES permit CA0029718 as the individual control strategy for the South San Francisco Bay Stormdrains. The permit requires attainment of water quality standards in South San Francisco Bay." (304(l) Decision, page 20.

This final agency action is entitled to great deference, as it is a determination by the administrative agency authorized to carry

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71 EPA Office of Water, July 1987 (EPA 440/4-87-005), Section 3.1.

72 We note here that there is certainly a lack of adequate information in the record concerning the specifics of the storm water system and its impacts. We point out, however, that regardless of how Section 122.44 is interpreted, municipal storm water dischargers have three years to come into compliance with permit terms, and the Regional Board incorporated a broad reopener provision into the permit, allowing the inclusion of more stringent effluent limitations as required.

out the program, and which adopted the regulations which we are now attempting to interpret. Clearly, EPA found that the effluent limitations contained in the permit were adequate to protect water quality standards and to comply with 40 CFR Section 122.44.

As a final point, we take note of the broad authority the Regional Board possesses to regulate nonpoint sources which contribute to degradation of the South Bay. While the permit program under the Clean Water Act is limited to point sources, the Porter-Cologne Water Quality Control Act allows the Regional Board to regulate directly all discharges to state waters, including nonpoint sources and impacts from existing sediments. When this broad authority to ensure compliance with water quality standards is considered, it is clear that this permit, along with other actions the Regional Board will take (as contemplated in the 1986 Basin Plan) provides adequate protection of the impaired waters. We conclude that the permit does comply with the requirements of Section 304(l) of the Clean Water Act.

G. <u>The Appropriateness and Propriety of the Permit</u>

Our review of the permit does not end with the conclusion that the permit is legally defensible. Water Code Section 13320 provides that this Board must determine whether the Regional Board's action was appropriate and proper. Even though numeric effluent limitations are not legally required, we will consider whether numeric effluent limitations would result in more effective regulation of the dischargers' storm water

discharges. We note, of course, that the Regional Board clearly left open the possibility of including numeric effluent limitations at a later date. The critical question before us, then, is whether it is appropriate and proper for numeric effluent limitations to be applied at this time at each outfall to receiving waters.

In order to obtain a realistic chance of compliance with numeric effluent limitations, dischargers would have to install some kind of end-of-pipe treatment technology. However, few such technologies have been investigated or developed for discharges of storm water and urban runoff. Available treatment technologies are limited because storm waters involve high volume, intermittent flows from a large number of outfalls. Physical treatment works generally necessitate interception and transport of storm sewer flows to central locations and require extensive land area for gravitational settling basins. The pollutant removal efficiencies of wet- and dry-detention basins were briefly examined in a national study conducted by EPA. For metals (the runoff constituents of most concern here), these physical treatment works varied in effectiveness. In the best cases, wet-detention basins removed 90 percent of the lead but only about 50 percent of the copper and zinc found in influent runoff. Consequently, conventional end-of-pipe treatment technologies have limited effectiveness.

Treatment techniques such as wet-detention basins also require large land areas to contain high volume, variable storm

flows. These techniques therefore result in extremely high costs. The County of Sacramento has submitted evidence to us estimating that its capital costs to build conveyance and wet detention treatment facilities would exceed $2 billion. Clearly, the potential costs for end-of-pipe treatment would be substantial, while the benefit to the receiving water would be difficult to predict accurately and reasonably. The impacts of holding large amounts of storm water for treatment may also pose potential adverse environmental impacts.

The inherent variability of storm water discharges also make numeric effluent limitations and end-of-pipe treatment impractical. The frequency, duration and magnitude of storm events and the constituents, concentrations, mechanisms, persistence and effects of runoff are poorly understood. As the current drought exemplifies, precipitation is highly variable temporally and spatially. The specific pollutants in runoff flows and their concentrations change dramatically from storm to storm and from location to location. The dischargers' monitoring investigation studies illustrate the variability of pollutants in the dischargers' runoff and possible receiving water effects. Similar regional and national studies of storm water and urban runoff discharges also reveal wide variability. The relative contribution and bioavailability of the potentially toxic trace metals in storm water remain uncertain. The mechanisms, nature, and potential threat of pollutant accumulation in sediments must be examined further.

The intermittent, irregular discharges of storm water also make it exceedingly difficult to formulate an appropriate numeric effluent limitation which would bear a reasonable relationship to established ambient water quality standards and criteria. The regulatory authority must minimally know the effluent flow rate (or the volume and duration), the receiving water flow and available dilution in order to establish numeric limitations. Without the necessary technical tools and a fundamental understanding of runoff variability, numeric effluent limitations cannot be legitimately developed or applied at this time.

In considering the anticipated effectiveness of the permit's best management practices approach, we consider that the discharges, while conveyed through point sources, are by nature more comparable to nonpoint sources. They derive from a vast variety of sources, including streets, residences, commercial areas, construction sites and industrial facilities. Source reduction and pollution prevention measures are, presently, the only practical means of controlling the truly nonpoint, diffuse waste flows from urban development. It is therefore apparent to us that a comprehensive and coordinated basin-wide approach, which stresses source reduction and elimination, will be most effective. This strategy focuses on the preventable causes rather than quantifying the tolerable effects of pollutants in runoff discharges.

At least at this preliminary point in the regulatory program for storm water discharges, it appears that an approach which implements "best management practices" to reduce sources and control pollutants is desirable. The Regional Board has taken this approach, but also has not foreclosed adding numeric, water quality-based effluent limits to the permit if it determines such limits are also necessary after receiving further monitoring data or after completion of a wasteload allocation for the South Bay.

We note also the probable impacts on the South Bay of mine drainage and resuspension of sediments. Just as we will rely on practices to reduce pollutants from storm water discharges, impacts from mine drainage and sediment resuspension must also be addressed if the South Bay is to achieve water quality standards and protection of beneficial uses. As we have stated, our interpretation of Section 304(l) of the Clean Water Act implies a coordination of activities intended to reduce impacts from all sources. The activities which the Regional Board has undertaken since 1986 are consistent with that approach. This is also the direction given this Board by the court in United States of America v. State Water Resources Control Board (1986) 182 Cal.App.3d 82, that we must assume a "global perspective" in water quality planning activities. In establishing objectives, we must consider all available remedial activities, and not just those which may be more readily regulated, such as point sources.

In summary, given the lack of clear evidence linking discharges of storm water in the Santa Clara Valley drainage courses to actual impacts in the South Bay, the difficulty of establishing numeric effluent limitations which have a rational basis, the lack of technology available to treat storm water discharges at the end of the pipe, the huge expenses such treatment would entail, and the level of pollutant reduction which we anticipate from the Regional Board's regulatory program, we conclude that the permit is proper and appropriate.

H. Transportation Control Measures

The petitioners contend that the permit must include specified transportation system control measures, or alternatively must name state and federal transportation entities as co-permittees, in order to regulate effectively runoff from streets, roads and highways. In support of these arguments, the petitioners contend that automobiles are the largest source of toxic pollutants in urban runoff and storm water discharges to the surface waters of the Santa Clara Valley. The specific control measures sought include extending regional transit systems, establishing inter-regional rail service, limiting further highway expansion, and enactment of "balanced growth" ordinances.

While runoff from highways and other transportation facilities undoubtedly contributes pollutants to the dischargers' municipal separate storm sewer system, for a number of reasons we decline to comply with the petitioners' requests.

First, while the permit was issued prior to promulgation of EPA's storm water regulations, the Regional Board proceeded in a manner consistent with those regulations in issuing the permit to municipalities with control over the municipal separate sewer system. Permits for municipal systems are to name only those municipal entities. Industrial discharges (and other discharges which contain other than storm water) are to be regulated both through the permits issued to the municipalities and through separate permits issued to industrial facilities.[73] Thus, it was not improper for the Regional Board to fail to name transportation authorities as dischargers.

Regarding the specified transportation measures requested by the petitioners, we find that the Regional Board's approach of requiring the municipalities to prepare a plan with proposed control measures for approval by the Regional Board preferable to specifying all such measures in the permit.[74] The permit does specifically require the dischargers to implement control measures focussing on transportation-related runoff.[75]

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73 In Finding 5, the permit states the Regional Board's intent to issue separate NPDES permits to state or federal agencies including the California Department of Transportation.

74 We note that this approach is consistent with EPA's regulations, even though the procedure differs. The regulations require submission of a plan containing control measures as part of the application process. The final permit envisioned in the permit will presumably contain the specified control measures. In contrast, the instant permit was issued long before permits will be issued to large municipal dischargers under EPA's regulations, but development of the control program is a part of the permit's provisions. The result in both cases will be that a mandatory control program will be developed after review of the municipality's proposal. The final program will be developed at an earlier date under the instant permit than under EPA's regulations.

75 See Provision C.9. of the permit.

I. Time Schedule for Compliance

The petitioners contend that the permit violates the Clean Water Act by not requiring timely compliance with water quality standards. Both Clean Water Act Sections 304(l) and 402(p) require compliance with permit conditions within three years of issuance of the permit. We find that the permit contains provisions requiring such compliance.

Clean Water Act Section 304(l)(1)(D) provides that an ICS must "produce a reduction in the discharges of toxic pollutants from point sources identified," in order "to achieve the applicable water quality standard as soon as possible, but not later than 3 years after the date of the establishment of such strategy." EPA has interpreted this provision to mean "that Congress recognized that permittees will need a reasonable amount of time, not to exceed three years, to comply with new effluent limits that are necessary to achieve new water quality standards, or re-interpretations of existing water quality standards."[76]

Similarly, Clean Water Act Section 402(p)(4) requires compliance with all permit conditions by large and medium municipal storm water dischargers no later than three years from the date of issuance. EPA has interpreted this provision similarly to its interpretation of Section 304(l)(1)(D), as applying to all permit conditions, including the requirement of water quality-based effluent limitations.[77]

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76 *54 Federal Register 23889 (June 2, 1989).*

77 *General Counsel Memorandum.*

In reviewing the permit, we find that its provisions do require compliance with water quality standards and that all practices necessary to achieve such compliance must be in place within three years of adoption of the permit. Therefore, the permit complies with the time schedule requirements of the Clean Water Act. We note further that the permit specifically provides that it may be reopened for the inclusion of more stringent effluent limitations, including numeric effluent limitations if necessary. If it appears within the three-year period after issuance that new permit limitations are required, the Regional Board may proceed under the reopener provisions.[78]

III. CONCLUSIONS

After review of the record and consideration of the contentions of the petitioners, and for the reasons discussed above, we conclude:

1. Impacts of storm water discharges on South San Francisco Bay are complicated and, at this time, it would be infeasible to establish numeric effluent limitations on discharges to storm drains in the Santa Clara Valley which are validly associated with impacts on the South Bay.

2. Pollutants associated with these storm water discharges alone do not substantially impair or threaten the beneficial uses of South San Francisco Bay.

3. The permit adopted by the Regional Board requires implementation of specific source control measures and contains

78 See Permit, Finding 17 and Provision 12.

general prohibitions against discharge of non-storm water and violation of water quality standards.

4. The provisions in the Clean Water Act regulating municipal storm water discharges require effluent limitations and achievement of water quality standards, but the limitations may consist of source control measures, rather than numeric effluent limitations.

5. The provisions in the Clean Water Act concerning impaired water bodies also allow the inclusion of source control measures rather than numeric effluent limitations in permits for point sources.

6. It is appropriate and proper to issue a permit regulating municipal separate storm sewer systems which requires specific practices, rather than containing numeric effluent limitations.

7. The specific transportation control measures requested by petitioners should be considered by the Regional Board when approval of the dischargers' control plan is sought, rather than by this Board.

8. The permit complies with the time schedule requirements of the Clean Water Act.

IV. ORDER

IT IS ORDERED that the petition is denied.

CERTIFICATION

The undersigned, Administrative Assistant to the Board, does hereby certify that the foregoing is a full, true, and correct copy of an order duly and regularly adopted at a meeting of the State Water Resources Control Board held on May 16, 1991.

AYE: W. Don Maughan
Edwin H. Finster
Eliseo M. Samaniego
John Caffrey

NO: None

ABSENT: None

ABSTAIN: None

Maureen Marché
Administrative Assistant to the Board

STATE OF CALIFORNIA
STATE WATER RESOURCES CONTROL BOARD

In the Matter of the Petition of NATURAL RESOURCES DEFENSE COUNCIL, INC. For Review of Waste Discharge Requirements Order No. 90-079 of the California Regional Water Quality Control Board, Los Angeles Region for Los Angeles County and Co-Permittees. NPDES Permit No. CA0061654. Our File No. A-693.	**ORDER NO. WQ 91-04**

BY THE BOARD:

On July 18, 1990, the State Water Resources Control Board (State Board) received a petition from Natural Resources Defense Council, Inc. (petitioner), seeking review of waste discharge requirements which the California Regional Water Quality Control Board, Los Angeles Region (Regional Board) adopted in Order No. 90-079, regulating discharges of storm water from municipal separate storm sewers throughout Los Angeles County.

Many of the issues raised by the petitioner are discussed in great detail in Order No. WQ 91-03, which we are also issuing today, and which concerns a permit issued by the Regional Water Quality Control Board, San Francisco Bay Region (San Francisco Bay Regional Board) regulating discharges of storm water from municipalities in the Santa Clara Valley. Given the similarity of these issues, we will discuss most of the

petitioner's contentions in only a summary manner, and will refer to our determinations in Order No. WQ 91-03.[1] In adopting that Order, we did consider the petitioner's arguments, and also those of the Regional Board, the dischargers, and interested persons.

I. BACKGROUND

As we discussed in Order No. WQ 91-03, over the last twenty years, the Environmental Protection Agency (EPA), has developed a program to regulate discharges of storm water and urban runoff through the National Pollutant Discharge Elimination System (NPDES) of permits. The requirements for this program are contained in Clean Water Act Section 402(p). In this case, as in the case of the San Francisco Bay Regional Board, the Regional Board adopted its permit regulating discharges from municipal separate storm sewer systems prior to EPA's promulgation of regulations implementing Section 402(p).

As did the San Francisco Bay Regional Board, the Los Angeles Regional Board also proceeded to take earlier steps to study and control storm water discharges while EPA's program development was delayed. In 1975, the Regional Board adopted its Water Quality Control Plan (Basin Plan).[2] The Basin Plan characterized constituents commonly found in runoff and roughly estimated runoff wasteloads through the Los Angeles River and

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1 A major portion of our other Order involved discussion of Clean Water Act Section 304(l). That section does not apply here. However, the discussion concerning the regulations which EPA adopted to implement Section 304(l), i.e. 40 CFR Section 122.44(d), is also relevant to this matter.

2 Water Quality Plan Report, Santa Clara River Basin (4A) and Los Angeles River Basin (4B) (March 1975). The Basin Plan was approved by the State Board in Resolution No. 75-21.

Santa Clara River sub-basins.[3] The Basin Plan also compared local runoff data with the results of several investigations conducted elsewhere in the nation.

The Basin Plan identified beneficial uses of the surface waters within the region, established water quality objectives to protect and enhance these uses, and described a detailed "Implementation Plan" to achieve those objectives. The beneficial uses of the surfaces waters typically include ground water recharge (replenishment), contact and non-contact recreation and wildlife habitat.[4] A few creeks also support warm and cold water habitat, fish migration and fish spawning uses. Some reservoirs also provide municipal, industrial supply and industrial process water uses.[5] Rare and endangered habitat and agricultural supply were identified as existing beneficial uses of several surface waters also.[6] The Basin Plan listed marine habitat, contact and non-contact recreation, commercial and sport fishing, navigation, and shellfish harvesting as the beneficial uses of the Pacific Ocean.

The Basin Plan also established water quality objectives. First, it referred to several state policies for water quality control and statewide plans. These include the "Water Quality Control Policy for the Enclosed Bays and Estuaries

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3 The 1975 Basin Plan divided its region into two sub-basins: the Santa Clara River Basin ("4A") and the Los Angeles River Basin ("4B").

4 1975 Basin Plan, Table 2-3.

5 Id.

6 Id.

of California"[7] and the "Water Quality Control Plan for Ocean Waters of California".[8] The Basin Plan stated that the Ocean Plan and the Bays and Estuaries Policies established effluent quality requirements for certain discharges. "Land runoff", however, was specifically excluded from the effluent requirements.[9]

The receiving water quality objectives set forth in the Basin Plan included several general requirements and narrative objectives. For inland surface waters, enclosed bays, and estuaries in the Los Angeles River sub-basin, narrative receiving water quality objectives were specified for tastes and odors, floating material, suspended material, settleable material, oil and grease, sediment, turbidity, bacteria, and several other pollutants.[10] The narrative toxicity objective required that all waters be maintained free of "toxic substances in concentrations that are toxic to, or produce detrimental physiological responses in human, plant, animal, or aquatic life."[11] The Basin Plan

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7 The "Bays and Estuaries Policy", as this document is know, was adopted on May 16, 1974.

8 The State Board first adopted this plan, commonly known as the "Ocean Plan", on July 6, 1972. The State Board approved amendments to the Ocean Plan on March 22, 1990 by Resolution No. 90-27.

9 The 1975 Basin Plan states:

> *"This policy does not apply to wastes from vessels or land runoff except as specifically indicated for siltation and combined sewer flows." See page I-4-5.*

10 1975 Basin Plan, pages I-4-6 through I-4-8.

11 Ibid., at page I-4-8.

further specified "limiting concentrations" for inorganic chemical constituents (primarily heavy metals) in waters used as domestic and municipal supply.[12] It also prescribed "mean mineral quality objectives" for the Los Angeles River, the San Gabriel River and their "tributaries".[13]

The Basin Plan also contained an "Implementation Plan" to reduce wasteloads from various pollutant sources and their effects on the basin's waters. For urban runoff and storm water discharges, the Basin Plan indicated that the pollutants found in runoff discharges varied considerably and exhibited a seasonal nature. More specifically, the Plan stated that the "bulk of these mass emissions is normally experienced in only a few days of wet weather during the rainy season."[14] Although certain beneficial uses, such as groundwater recharge and recreational uses, may be temporarily impaired during storm flow conditions, the Basin Plan noted few traditional "end-of-pipe" controls existed for runoff flows. It explained:

> "...there is little, if anything, that can be done to mitigate the effects of such runoff except for improved air pollution control practices, improved urban housekeeping, and improved environmental levels of performance for automotive equipment."[15]

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12 *Ibid., at page I-4-9.*

13 *Ibid., at Table 4-1 and pages 1-4-11 and I-4-12.*

14 *1975 Basin Plan, "Impact of Runoff Waste Loads", page II-15-94.*

15 *Id.*

Although much runoff data was included in the Basin Plan, limited information about the significance or effects of runoff discharges on receiving water quality existed.

The Basin Plan specified requirements and controls for "traditional" point sources,[16] but storm water discharges were not covered, based on the difficulty of their regulation:

> "...no practical and economical means has yet been developed for containment and treatment of urban runoff wastes for reduction of pollutants prior to downstream release, nor are standards for such measures presently in existence or contemplated for the foreseeable future, at least on a widespread basis....There are presently no generally applicable effluent limits nor water pollution control facilities in connection with urban runoff that appear practical or economical. The emphasis for water quality control from this standpoint should be public education, public cooperation in improved (outdoor) housekeeping, and continued search of solutions to the air pollution problems."[17] (Emphasis added)

The Regional Board has not amended the portions of its Basin Plan relating to storm water and urban runoff since 1975. Therefore, we conclude that the Basin Plan does not address controls on such discharges, except for the few practices listed above. Clearly, the effluent limitations listed for other point sources are not meant to apply. In addition, there are no

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16 As was explained in Order No. WQ 91-03, throughout the years many documents have treated storm water discharge as a nonpoint source, even though it is legally a point source. This has led to some confusion in terminology. However, it is often obvious from statements in the document that decision makers have sought to exclude storm water from requirements otherwise applicable to point sources.

17 Ibid., at pages I-5-87 and I-5-88.

numeric water quality standards which have yet been developed.[18] On April 11, 1991, the State Board adopted the Water Quality Control Plan for Inland Surface Waters (Inland Plan) which is applicable here. The Inland Plan establishes numeric water quality objectives but allows dischargers of storm water a maximum of ten years to achieve compliance.

As was discussed in Order No. WQ 91-03, in 1987 the federal Clean Water Act was amended[19] to add provisions specifically requiring a regulatory program for storm water discharges. Section 402 of the Clean Water Act was amended to add subsection 402(p), which establishes NPDES permit application requirements for municipal storm water discharges and for storm water discharges associated with industrial activities.[20]

Section 402(p) includes the following requirements for municipal discharges of storm water:

> "Permits for discharges from municipal storm sewers--(i) may be issued on a system- or jurisdiction-wide basis; (ii) shall include a requirement to effectively prohibit non-stormwater discharges into the storm sewers; and (iii) shall require controls to reduce the discharge of pollutants to the <u>maximum extent practicable</u>, including management practices, control techniques and system, design and engineering methods, and such other provisions as the [EPA] Administrator or the State determines appropriate for the control of such pollutants." (Emphasis added.)

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18 The petitioner contends that numerical objectives contained in the Ocean Plan apply to discharges of storm water. We shall discuss that contention <u>infra</u>.

19 The amendments are entitled, <u>Water Quality Act of 1987</u>, Public Law 100-4 (February 4, 1987).

20 Section 405(p) of the Water Quality Act of 1987.

The Water Quality Act of 1987 also added Section 320 to the Clean Water Act. This amendment created the National Estuaries Program, an effort to develop and implement comprehensive conservation and management plans for estuaries of national importance. In December 1987, a federal appropriations act formally included Santa Monica Bay in EPA's National Estuaries Program.[21] The State of California then organized the Santa Monica Bay Restoration Project to coordinate local, state, and federal activities to develop the required plan which would improve the condition of Santa Monica Bay. The nomination document for this project indicated that urban runoff and storm water discharges may contain heavy metals, organic constituents, pathogens, and other pollutants that threaten or may impair the beneficial uses of Santa Monica Bay.[22] As a part of this project, the Los Angeles Regional Board--and the numerous local and regional governments and environmental interest groups that also participate in the project--began a more thorough investigation of runoff discharges to Santa Monica Bay. Because existing runoff data was incomplete or inconsistent, the Santa Monica Bay Restoration Project initiated detailed monitoring studies to identify pollutants in runoff flow, especially pathogens, and to assess their effects on the bay. This monitoring work is now in progress.

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21 National Estuary Program, The Nomination of Santa Monica Bay, Environmental Affairs Agency, May 1988.

22 Ibid., see "Executive Summary", page viii, and "Storm Drains and Runoff", page 41.

The permit which we are reviewing here was the result of a cooperative effort of the "Storm Water Permit Work Group," which was established to fulfill part of the objectives of the Santa Monica Bay Restoration Project. The Work Group assisted in drafting the permit.

In order to implement the Basin Plan, the provisions of state law regarding adoption of waste discharge requirements,[23] and the Clean Water Act provisions regarding storm water permits, the Regional Board issued a draft NPDES permit to regulate urban runoff and storm water discharged throughout Los Angeles County. The revised draft permit designated the County of Los Angeles as the "Principal Permittee" and 16 cities as "Co-permittees" (the dischargers). A workshop was held by the Regional Board on April 23, 1990, and a public hearing was held on June 18, 1990, and on the latter date the Regional Board adopted the NPDES permit (NPDES permit CA-0061654; Regional Board Order No. 90-079). Subsequently, the petitioner filed a timely petition for review of the NPDES permit.

II. CONTENTIONS AND FINDINGS

The petition raises a number of contentions which all address whether the permit must include numeric, water quality-based effluent limitations. The petitioner argues that the Clean Water Act requires permits regulating municipal discharges of storm water to prescribe numeric effluent limitations for toxic pollutants. The petitioner also contends that the permit does

23 *California Water Code Section 13000 et seq.*

not require controls which reduce pollutants to the "maximum extent practicable". Finally, the petitioner argues that the permit does not comply with the three-year time schedule required in Clean Water Act Section 402(p).

A. The Need for Numeric Effluent Limitations

The petitioners' arguments are based on the premise that the dischargers' municipal separate storm sewer system discharges pollutants to Santa Monica Bay, and that these discharges violate numeric water quality standards in the bay. The numeric standards which the petitioner relies upon are found in the Ocean Plan. As we shall explain, the petitioner's broad assertions vastly oversimplify the complex nature of the dischargers' flood control and drainage facilities, imply that the storm sewer system discharges only into Santa Monica Bay, and misconstrue ambient water quality criteria, receiving water quality standards and effluent limitations.

The County of Los Angeles, Department of Public Works' municipal separate storm sewer system serves a geographic area greater than 4,000 square miles[24] and includes more than 87 overlapping local governmental jurisdictions. This system, a vast network of catchments, street gutters, conduits, pipes, and channels that were designed for drainage and flood control purposes, collects urban runoff flows and storm water flows from throughout Los Angeles County. The County's Department of Public Works and 87 cities own, operate, or maintain this enormous

24 *See Regional Board's Response to Petition, page 10.*

municipal separate storm sewer system. More than 5,000 outfalls or "point sources" discharge these runoff flows into both constructed works and the natural streams, rivers, and other surface water bodies that comprise the Los Angeles River hydrologic unit.

As we discussed in Order No. WQ 91-03, the specific location at which the storm water outfall intersects receiving waters is where the "point source" discharge occurs. While the precise location of each of the several thousand outfalls in Los Angeles County is understandably omitted from the record, the substantial majority of these outfalls discharge urban runoff and storm water flows to surface waters--such as Ballona Creek, Coyote Creek, and San Antonia Creek, the Los Angeles River and the San Gabriel River, Rio Hondo, and other water bodies--throughout the hydrologic basin.[25]

Obviously, not all of the dischargers' 5,000 municipal separate storm sewer system outfalls actually discharge directly to Santa Monica Bay. Although the numerous natural water courses which receive storm water generally are ultimately tributary to Santa Monica Bay, they are the receiving waters. As such, these natural water courses cannot be considered elements of the dischargers' municipal separate storm sewer system. In fact, many of these surface waters are clearly identified in the Los Angeles Regional Board's Basin Plan.

25 The nomination document for the Santa Monica Bay Restoration Project stated that "over 60 storm drains" empty into the Bay.

In the Los Angeles Basin, the storm sewer outfalls generally discharge to the water courses upstream from Santa Monica Bay. Both Santa Monica Bay and the water courses which receive the storm water discharges have beneficial uses. However, the uses of the streams, creeks, reservoirs and rivers in the Los Angeles River Basin are not the same as the uses of Santa Monica Bay. The upstream waters support fresh water uses, while Santa Monica Bay sustains marine water uses.

As was described above, while the Basin Plan does include narrative water quality objectives for the upstream surface waters, the Regional Board has not yet developed numeric objectives for all of the pollutants the petitioner enumerates. Although the Inland Plan does contain numeric objectives, up to ten years is allowed for compliance. The Ocean Plan also includes numeric standards, but these do not apply to discharges of storm water.

The Ocean Plan states that all parts are applicable to point source discharges to the ocean. Narrative water quality objectives and toxic materials limitations (Table B) do apply to nonpoint sources, but compliance is determined by direct measurement in receiving waters. The petitioner requests that the storm water discharges be subject to Table B, and also to Table A (which is meant only to apply to publicly-owned treatment works).

While on its face, Table B may appear to apply to storm water discharges, it is clear from reading the Functional

Equivalent Document,[26] which was adopted by the State Board at the same time as the Ocean Plan, that neither Table A nor Table B are meant to apply to storm water discharges:

> "The attainability analysis did not include stormwater discharges because there are few data available on pollutant concentrations in stormdrains. EPA's proposed regulations for stormwater discharges do not use water quality-based effluent limits for stormdrains.[27] Instead, an approach based on Best Management Practices is proposed, following an initial period of characterization.
>
> "We do not propose to apply water quality-based effluent limits such as Table B to stormdrains at this time. Technology-based standards will not be based on Table A, but on Best Management Practices. Since the Table B objectives represent levels of pollutants that are protective of beneficial uses they may be applied to stormdrains at some future date. We do not anticipate that this would occur until adequate characterization data are available so that attainability can be assessed and implementation measures established."

Following the above statement, the Functional Equivalent Document states that the Plan explains how to apply Table B objectives to <u>nonpoint sources</u>. From this statement, it is clear that in drafting the Ocean Plan the State Board was viewing storm water discharges as nonpoint sources. This characterization is understandable. Storm water discharges,

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26 Functional Equivalent Document, Amendment of the Water Quality Control Plan for Ocean Waters of California, California Ocean Plan (March 1990), at pages 33 and 34.

27 It appears that the reference here was to <u>numeric</u> water quality-based limitations, since such limitations are required in Table B. As we explained in Order No. WQ 91-03, water quality-based limitations need not always be numeric.

while ultimately flowing through a point source to receiving waters, are by nature more akin to nonpoint sources as they flow from diffuse sources over land surfaces. This point is discussed in the Preamble to EPA's storm water regulations:

> "For the purpose of [national assessments of water quality], urban runoff was considered to be a diffuse source or nonpoint source pollution. From a legal standpoint, however, most urban runoff is discharged through conveyances such as separate storm sewers or other conveyances which are point sources under the [Clean Water Act]." 55 Federal Register 47991.

We therefore conclude that the petitioner has misinterpreted appropriate criteria and the applicability of Ocean Plan provisions to storm water. There are no numeric objectives or numeric effluent limits required at this time, either in the Basin Plan or in any statewide plan that apply to storm water discharges. This absence, however, will not in any way diminish the permit's enforceability or its ability to reduce pollutants in storm water discharges substantially. While numeric objectives are contained in the Inland Plan, these need not be achieved for up to ten years. In addition, the Plan endorses the application of "best management practices" rather than numeric limitations as a means of reducing the level of pollutants in storm water discharges.

The permit which the Regional Board adopted is very similar to that reviewed in Order No. WQ 91-03. The NPDES permit employs a two-fold strategy: It effectively prohibits non-storm

water discharges and illicit connections; and, it requires a comprehensive series of regulatory, governmental, and educational control measures.

As in the case of the permit issued by the San Francisco Bay Regional Board, the method by which the specific control activities will be implemented is that the dischargers must submit an Implementation Plan for approval by the Regional Board's Executive Officer, and then must implement the Plan. Thus, the permit lists some, but certainly not all of the management practices which will be undertaken. The remaining specific practices will be developed over a two-year period starting with adoption of the NPDES permit. In addition, the "co-participant" cities, which have not yet been added to the permit, are also being required to select appropriate control measures.

Although the permit does not make specific reference to violation of water quality standards, the permit will be read so as to require the implementation of practices which will achieve compliance with applicable standards. Such a requirement is implicit in the issuance of an NPDES permit, since that is a minimum requirement of a permit, as we discussed in Order No. WQ 91-03. The requirement is also a part of the California Water Code. Water Code Section 13263. The permit does provide that the Regional Board may, in the future adopt numeric water quality objectives and limitations.[28]

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28 Permit, Finding 19.

We concluded in Order No. WQ 91-03 that permits for municipal separate storm sewer systems issued pursuant to Clean Water Act Section 402(p) must contain effluent limitations based on water quality standards. In addition, the applicable water quality standards are those established for the receiving waters of the storm water discharges. We further concluded there that even if such effluent limitations are intended to require compliance with water quality standards, "best management practices" constitute legally acceptable effluent limitations. We find here, as we did in Order No. WQ 91-03, that the permit includes a comprehensive and stringent program for reducing pollutants in storm water discharge, and that it will implement the Basin Plan, including the protection of beneficial uses.

We note that the dischargers argued in their response that the fact that the permit was derived from a cooperative effort, prior to the promulgation of regulations by EPA, had relevance to its enforceability. While we are certainly pleased that the dischargers and the Regional Board have been able to work together in a cooperative and positive manner, the permit which was adopted is a lawfully adopted NPDES permit, and is fully enforceable as such. The fact that it was adopted prior to the deadline for adoption of such permits, and prior to promulgation of the regulations, has no relevance to its enforceability. The prohibitions and practices contained in the

permit must be obeyed, and those prohibitions and practices must result in compliance with any applicable water quality standards.

Just as in our review of the San Francisco Bay Regional Board's permit, we have reviewed the appropriateness and propriety of this permit. We find here also that the approach of the Regional Board, requiring the dischargers to implement a program of best management practices which will reduce pollutants in runoff, and prohibiting non-storm water discharges, is appropriate and proper. We base our conclusion on the difficulty of establishing numeric effluent limitations which have a rational basis, the lack of technology available to treat storm water discharges at the end of the pipe, the huge expense such treatment would entail, and the level of pollutant reduction which we anticipate from the Regional Board's regulatory program. We feel compelled to note here our agreement with the Regional Board that this permit does truly represent a massive undertaking. No other permit in the State, and perhaps in the nation, will control the number of outfalls in a metropolitan area as this permit undertakes to regulate.

B. The Maximum Extent Practicable Standard

The petitioners contend that the permit must include specified management practices in order to comply with the requirement in Clean Water Act Section 402(p) of reducing pollutants in municipal separate storm sewer discharges to the maximum extent practicable (MEP). The petitioner states that MEP means, "what can be done now, must be done now." As we stated in

Order No. WQ 91-03, however, we find that the Regional Board's approach of requiring the dischargers to prepare a plan with proposed control measures for approval by the Regional Board is preferable to specifying all such measures in the permit. The petitioner gives as an example a requirement for catch basin cleaning, which it claims would reduce pollutants. However, an effective and cost-effective storm water program requires an analysis of the specific area subject to regulation, and should not involve a simple listing of practices that all municipalities must follow. As EPA stated in its Preamble to the draft storm water regulations:

> "A wide variety of control measures to reduce the discharge of pollutants from municipal storm sewer systems are currently available. The performance of appropriate control measures is highly dependent on site-specific factors. It is therefore not practicable to define one standard set of controls which will control all pollutants in all municipalities." 53 Federal Register 49456[29]

We also note that, while we share the petitioner's goal of rapid achievement of an effective practices program, the Clean Water Act does not require implementation of all measures <u>now</u>, but rather has set forth a three-year time schedule for compliance. We shall discuss this point further in the next section.

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29 This point was also made in the preamble to EPA's final regulations. 55 Fed. Reg. 48038. There a reference to the legislative history of Clean Water Act Section 402(p) makes clear that Congress' intent was not to dictate specific practices.

C. Time Schedule for Compliance

The petitioner contends that the permit violates the Clean Water Act by not requiring timely compliance with water quality standards. We addressed this point in Order No. WQ 91-03. Here, also, we find that the permit contains provisions requiring such compliance.

The permit includes a very aggressive and comprehensive program of developing and implementing best management practices over a three-year period. The permit does require a program aimed at compliance with applicable water quality standards and all practices necessary to achieve such compliance must be in place within three years of adoption of the permit. Therefore, the permit complies with the time schedule requirements of the Clean Water Act. The permit also specifically provides that the Regional Board may include more stringent effluent limitations, including numeric effluent limitations if necessary.

III. CONCLUSIONS

After review of the record and consideration of the contentions of the petitioners, and for the reasons discussed above, and in Order No. WQ 91-03, we conclude:

1. Impacts of storm water discharges on receiving waters and Santa Monica Bay are complicated, and at this time, it would be infeasible to establish numeric effluent limitations on

discharges to storm drains in the Los Angeles River Basin, which are validly associated with impacts in Santa Monica Bay.

2. The permit adopted by the Regional Board requires implementation of specific source control measures and effectively prohibits discharges of non-storm water and violation of water quality standards.

3. The provisions in the Clean Water Act regulating municipal storm water discharges require effluent limitations and achievement of water quality standards, but the limitations may consist of source control measures, rather than numeric effluent limitations.

4. It is appropriate and proper to issue a permit regulating municipal separate storm sewer systems which requires specific practices, rather than containing numeric effluent limitations.

5. The specific control measures requested by the petitioner should be considered by the Regional Board when approval of the dischargers' control plan is sought, rather than by this Board.

6. The permit complies with the time schedule requirements of the Clean Water Act.

IV. ORDER

IT IS ORDERED that the petition is denied.

CERTIFICATION

The undersigned, Administrative Assistant to the Board, does hereby certify that the foregoing is a full, true, and correct copy of an order duly and regularly adopted at a meeting of the State Water Resources Control Board held on May 16, 1991.

AYE: W. Don Maughan
Edwin H. Finster
Eliseo M. Samaniego
John Caffrey

NO: None

ABSENT: None

ABSTAIN: None

Maureen Marché
Administrative Assistant to the Board

FOR PUBLICATION

UNITED STATES COURT OF APPEALS FOR THE NINTH CIRCUIT

NATURAL RESOURCES DEFENSE COUNCIL, *Petitioner*, v. U.S. ENVIRONMENTAL PROTECTION AGENCY, *Respondent.*	No. 15-72308
CENTER FOR FOOD SAFETY; INTERNATIONAL CENTER FOR TECHNOLOGY ASSESSMENT, *Petitioners*, v. U.S. ENVIRONMENTAL PROTECTION AGENCY; SCOTT PRUITT,* in his official capacity as Administrator of the Environmental Protection Agency, *Respondents.*	No. 15-72312 OPINION

* Scott Pruitt, Administrator of the Environmental Protection Agency, is substituted for his predecessor, Gina McCarthy. Fed. R. App. P. 43(c)(2).

On Petition for Review of an Order of the
Environmental Protection Agency

Argued and Submitted November 17, 2016
San Francisco, California

Filed May 30, 2017

Before: Michael J. Melloy,** Richard R. Clifton,
and Paul J. Watford, Circuit Judges.

Opinion by Judge Melloy

SUMMARY***

Pesticides / EPA

The panel vacated the United States Environmental Protection Agency's ("EPA") conditional registration of the pesticide NSPW-L30SWS – an antimicrobial materials preservative that uses nanosilver as its active ingredient – because the EPA failed to support its requisite finding that NSPW was in the public interest under 7 U.S.C. § 136a(c)(7)(C).

** The Honorable Michael J. Melloy, United States Circuit Judge for the U.S. Court of Appeals for the Eighth Circuit, sitting by designation.

*** This summary constitutes no part of the opinion of the court. It has been prepared by court staff for the convenience of the reader.

The Federal Insecticide, Fungicide, and Rodenticide Act governs the sale, use, and distribution of pesticides, and the Act requires that pesticides generally must be registered with the EPA before being sold or distributed. The EPA may grant a temporary, conditional registration if it first determines that use of a pesticide was in the public interest.

The panel held that substantial evidence supported the EPA's findings that NPSW has lower application and mobility rates than conventional-silver pesticides.

The panel held, however, that substantial evidence did not support the EPA's finding that use of NPSW was in the public interest because it had the "potential" to reduce the amount of silver released into the environment. The panel held that the EPA's finding was based on two unsubstantiated assumptions: first, that current users of conventional-silver pesticides would replace those pesticides with NSPW; and second, that NSPW would not be incorporated into new products to the extent that such incorporation would actually *increase* the amount of silver released into the environment. The panel concluded that without evidence in the record to support the assumptions, it could not find that the EPA's public-interest finding was supported by substantial evidence as required by the Act.

COUNSEL

Jaclyn H. Prange (argued), San Francisco, California; Aaron Colangelo, Washington, D.C.; as and for Petitioner Natural Resources Defense Council.

George A. Kimbrell and Sylvia Wu, Center for Food Safety, San Francisco, California, for Petitioners Center for Food Safety and International Center for Technology Assessment.

Sue Chen (argued), Attorney, and John C. Cruden, Assistant Attorney General, Environmental Defense Section, Environment & Natural Resources Division, United States Department of Justice, Washington, D.C.; Amber Aranda, Of Counsel, Office of General Counsel, United States Environmental Protection Agency, Washington, D.C.; for Respondent.

OPINION

MELLOY, Circuit Judge:

The Federal Insecticide, Fungicide, and Rodenticide Act ("FIFRA"), 7 U.S.C. §§ 136–136y, governs the sale, use, and distribution of pesticides. Under FIFRA, a pesticide generally must be registered with the Environmental Protection Agency ("EPA") before it is sold or distributed. *Id.* § 136a(a). In order to obtain pesticide registration, an applicant must submit sufficient data "concerning the product's health, safety, and environmental effects." *Pollinator Stewardship Council v. EPA*, 806 F.3d 520, 523 (9th Cir. 2015). The registration requirement thus enables the EPA to prohibit pesticides that will cause "unreasonable adverse effects on the environment." *Id.* (quoting 7 U.S.C. § 136a(c)(5)). Sometimes, however, the EPA may receive sufficient data to determine that short-term use of a pesticide is reasonable, but not enough data regarding its long-term use. *See* 7 U.S.C. § 136a(c)(7)(C). If the EPA lacks this data "because a period reasonably sufficient for generation of the

data has not elapsed since the [EPA] first imposed the data requirement," the EPA may grant a temporary, conditional registration. *Id.* But, to issue the conditional registration, the EPA must first determine "that use of the pesticide is in the public interest." *Id.*

This case involves the pesticide NSPW-L30SS ("NSPW"). Manufactured by Nanosilva LLC, NSPW is an antimicrobial materials preservative that uses nanosilver as its active ingredient. Petitioners—the Natural Resources Defense Council, the Center for Food Safety, and the International Center for Technology Assessment—opposed the EPA's conditional registration of NSPW during public notice and comment. Petitioners argued the EPA failed to support its findings that (1) use of NPSW is in the public interest; and (2) Nanosilva LLC had insufficient time to submit the required data. The EPA, nonetheless, conditionally registered NSPW in May 2015. Petitioners filed a timely petition for review and now renew their arguments before this Court. We have jurisdiction for direct review of the agency action pursuant to 7 U.S.C. § 136n(b).

After reviewing the conditional registration for substantial evidence, we conclude the EPA failed to support its finding that NSPW is in the public interest. We therefore vacate the registration in whole and need not reach Petitioners' insufficient-time arguments.

I

NSPW is a materials preservative incorporated into plastic and textile products. When so incorporated, the EPA explains, NSPW can help "suppress the growth of bacteria, algae, fungus, mold[,] and mildew, which cause odors,

discoloration, stains, and deterioration."[1] NSPW may be used in products such as trash cans, mops, window blinds, furniture, baseboards, light switches, plastic decking, carpet, toilet seats, shower curtains, tubs, cell phones, computers, plastic components in humidifiers, vacuums, combs, brushes, electric razors, blow dryers, beds, wall coverings, wheelchairs, linens, golf bags, exercise equipment, life preservers, sportswear, nursing uniforms, watch bands, restaurant uniforms, litter boxes, swimming pool equipment, ink pens, portable toilets, office supplies, and luggage. NSPW may not be used, however, in products designed for food contact, food packaging, or drinking water.

The active ingredient in NSPW is nanosilver. Simply put, nanosilver is a version of "conventional" silver that is engineered to have a much smaller particle size. Conventional silver has long been recognized as an antimicrobial agent and is the active ingredient in a number of currently registered pesticides used as materials preservatives. Nanosilver, due to its much smaller particle size, can have significantly different properties than conventional silver. These different properties provide new benefits and opportunities to industry.

But with these new benefits come new risks. After companies seeking to market nanosilver and other nanomaterials began approaching the EPA for pesticide

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[1] Under FIFRA, pesticides include "any substance or mixture of substances intended for preventing, destroying, repelling, or mitigating any pest." 7 U.S.C. § 136(u). Pests include, with some exceptions, "(1) any insect, rodent, nematode, fungus, weed, or (2) any other form of terrestrial or aquatic plant or animal life or virus, bacteria, or other micro-organism." *Id.* § 136(t).

registration, the EPA convened a meeting of the FIFRA Scientific Advisory Panel ("the Panel") in November 2009 to discuss potential hazards. In part, the Panel summarized its meeting as follows:

> The Panel was not aware of any information that suggested that silver ions released from silver nanomaterials would behave differently than silver ions generated by any other source. However, the Panel believed that the rate of silver ion production, as well as the distribution of silver in [biological] tissue, may differ substantially between silver nanomaterials and other forms of silver. Nanomaterials can deliver ions directly to specific tissues, cell membranes or inside cells. The biological effects of silver nanomaterials (including temporal pattern for ion delivery), as well as their environmental fate, can be affected by other materials present in the preparation (*e.g.*, surfactants). Nanosilver can also potentially act as a carrier for other toxic chemicals. These issues led the Panel to suggest that the hazard profile of silver nanomaterials may differ from other forms of silver.

The Panel thus recommended that the "EPA treat nanosilver differently from its conventional silver counterpart." The Panel also "cautioned about extrapolating from one nanosilver formulation to another when assessing hazards."

After the Panel convened, the EPA evaluated and conditionally registered two pesticides containing a form of

nanosilver: AGS-20 and NSPW. Like NSPW, AGS-20 is a nanosilver-based antimicrobial pesticide used as a materials preservative. However, unlike NSPW, which is a liquid suspension incorporated into plastics and textiles, AGS-20 is a powder which may be used as a surface coating or by incorporation with textiles only. The nanosilver in AGS-20 also "has different size range and surface coatings than the nanosilver in NSPW[ ]." The EPA conditionally registered AGS-20 in December 2011, approximately three years after its manufacturer submitted its application for registration.[2]

Granting conditional registration to NSPW, however, took longer. While Nanosilva LLC submitted an application to register NSPW in 2009, the EPA did not conditionally register NSPW until May 2015. This conditional registration is for a four-year period.

In granting conditional registration, the EPA found, as required by 7 U.S.C. § 136a(c)(7)(C), that NSPW contained a new active ingredient and would not cause unreasonable adverse effects on the environment. The EPA also made two findings relevant to Petitioners' arguments in the present case. The EPA, first, found that granting conditional registration was in the public interest. Specifically, it found that NSPW had a lower application rate (*i.e.*, it uses less silver) and a lower mobility rate (*i.e.*, it is less likely to release silver into the environment in detectable quantities) when compared to conventional-silver pesticides. Therefore, the EPA reasoned, using NSPW has the "potential" to reduce

[2] This Court partially vacated the conditional registration of AGS-20 because the EPA did not satisfy its own rule for determining particular risk concerns requiring mitigation. *Nat. Res. Def. Council v. EPA (NRDC)*, 735 F.3d 873, 886–87 (9th Cir. 2013).

"environmental loading" and risk caused by silver release. Second, the EPA found that Nanosilva LLC had insufficient time to generate the data required for unconditional registration.

Petitioners, who had opposed the conditional registration of NSPW during public notice and comment, filed a timely petition for review in this Court. They argue the EPA failed to support its public-interest and insufficient-time findings.[3]

II

The following principles guide our review of the EPA's conditional registration of NSPW. First, we must sustain the conditional registration "if it is supported by substantial evidence when considered on the record as a whole." 7 U.S.C. § 136n(b). "Substantial evidence means more than a mere scintilla but less than a preponderance; it is such relevant evidence as a reasonable mind might accept as adequate to support a conclusion." *NRDC*, 735 F.3d at 877 (quoting *Vasquez v. Astrue*, 572 F.3d 586, 591 (9th Cir. 2009)). "Under the substantial evidence standard, we must affirm the [EPA's] finding 'where there is "such relevant evidence as a reasonable mind might accept as adequate to support a conclusion" even if it is possible to draw two inconsistent conclusions from the evidence.'" *Id.* (quoting *Nw. Food Processors Ass'n v. Reilly*, 886 F.2d 1075, 1079–80 (9th Cir. 1989)). "When, as in this case, the agency 'is making predictions, within its area of special expertise, at

[3] Petitioners do not directly challenge the EPA's no-adverse-effects finding (*i.e.*, that NSPW will not have any unreasonable adverse effect on the environment during the conditional-registration period), but Petitioners do not concede that NSPW is "safe."

the frontiers of science . . . a reviewing court must generally be at its most deferential.'" *Id.* (alteration in original) (quoting *Balt. Gas & Elec. Co. v. NRDC*, 462 U.S. 87, 103 (1983)). But, "[a]lthough we must give due deference to EPA's findings, '[i]t is well-established that an agency's action must be upheld, if at all, on the basis articulated by the agency itself.'" *Id.* (quoting *Motor Vehicle Mfrs. Ass'n of the U.S., Inc. v. State Farm Mut. Auto. Ins. Co.*, 463 U.S. 29, 50 (1983)).

Second, "[w]hen interpreting a statute, we are guided by the fundamental canons of statutory construction and begin with the statutory text." *United States v. Neal*, 776 F.3d 645, 652 (9th Cir. 2015). "The words of a statute should be accorded their plain meaning, as considered in light of 'the particular statutory language at issue, as well as the language and design of the statute as a whole.'" *Preap v. Johnson*, 831 F.3d 1193, 1200 (9th Cir. 2016) (quoting *K Mart Corp. v. Cartier, Inc.*, 486 U.S. 281, 291 (1988)). And, where a statute is ambiguous, "we may turn to legislative history for guidance." *United States v. Thomsen*, 830 F.3d 1049, 1058 (9th Cir. 2016).

III

We are unaware of any prior decision considering the public-interest requirement under 7 U.S.C. § 136a(c)(7)(C). Accordingly, to illuminate the requirement's role in FIFRA's regulatory scheme, we begin with the statutory background. We then turn to whether the EPA supported its public-interest finding in the present case with substantial evidence.

A

Generally, "no person . . . may distribute or sell to any person any pesticide that is not registered" with the EPA. 7 U.S.C. § 136a(a). In order for the EPA to evaluate an application for pesticide registration, an application must "describ[e] how the pesticide will be used, the claims made of its benefits, the ingredients, and a description of all tests and studies done and the results thereof, concerning the product's health, safety, and environmental effects." *Pollinator Stewardship Council*, 806 F.3d at 523. The EPA "shall publish guidelines specifying the kinds of information which will be required to support the registration of a pesticide and shall revise such guidelines from time to time." 7 U.S.C. § 136a(c)(2)(A).

After an applicant submits sufficient data for pesticide registration, the EPA may grant "unconditional registration" under § 136a(c)(5). "Unconditional registration necessarily requires sufficient data to evaluate the environmental risks." *Pollinator Stewardship Council*, 806 F.3d at 523; *see also* 7 U.S.C. § 136a(c)(5) (listing the findings required for unconditional registration). If an applicant has not submitted sufficient data to support unconditional registration, however, the EPA may conditionally register the pesticide under limited circumstances. *See* 7 U.S.C. § 136a(c)(7). As relevant here,

> [t]he [EPA] may conditionally register a pesticide containing an active ingredient not contained in any currently registered pesticide for a period reasonably sufficient for the generation and submission of required data (which are lacking because a period

> reasonably sufficient for generation of the data has not elapsed since the [EPA] first imposed the data requirement) on the condition that by the end of such period the [EPA] receives such data and the data do not meet or exceed risk criteria enumerated in regulations issued under this subchapter, and on such other conditions as the [EPA] may prescribe. A conditional registration under this subparagraph shall be granted only if the [EPA] determines that use of the pesticide during such period will not cause any unreasonable adverse effect on the environment, and *that use of the pesticide is in the public interest.*

Id. § 136a(c)(7)(C) (emphasis added).

The public-interest requirement reflects an important distinction between conditional registration and unconditional registration. Conditional registration under § 136a(c)(7)(C) does not require all the risk data that unconditional registration requires. *Cf.* 7 U.S.C. § 136a(c)(5). Instead, § 136a(c)(7)(C) allows the EPA to temporarily register a pesticide with less-than-complete risk data so long as the EPA, among other additional requirements, determines "that use of the pesticide is in the public interest."

The statute does not further define the public-interest requirement, but the legislative history of conditional registration provides some insight. For example, a report by the Senate Committee on Agriculture, Nutrition, and Forestry, stated:

> No new-chemical conditional registration [under § 136a(c)(7)(C)] could be issued unless the [EPA] determined that use of the pesticide during the period required to complete the testing would not cause any unreasonable adverse effect on the environment, and that use of the pesticide was required in the public interest, as for example, in a situation in which there is a significant pest control problem which cannot satisfactorily be handled by use of products which have been fully registered.

S. Rep. No. 95-334, at 21 (1977).

On the Senate floor, Senator Leahy, who sponsored the bill that created the conditional registration provision, stated that the Senate committee carefully considered the statutory requirements so conditional registration "would be reserved to the truly exceptional case." 123 Cong. Rec. 25,706 (1977). The public-interest requirement, he stated, was "a more stringent test" than that required for unconditional registration. *Id.* ("[A]s with all other registrations, the [EPA] has to find the pesticide would not have an unreasonable adverse effect on the environment. Finally, *a more stringent test* also applies. The [EPA] must be shown evidence sufficient to find that this confidential [*sic*] registration is 'in the public interest.'" (emphasis added)). Senator Leahy continued:

> Suppose we have a serious pest problem for which this new pesticide would be an alternative to other chemicals. The [EPA] is

> sure that this pesticide is as safe as any pesticide already registered for that use. . . .
>
> . . . However, in the best case there may be gaps in the safety data which supports the registration. . . . Clearly the objectives of the Act are best served with the added flexibility to permit a new product to be used which will meet the stringent test of being "in the public interest."

Id.

The EPA Administrator, while testifying before the Senate committee, made statements to similar effect. *See* S. Rep. No. 95-334, at 74 (Statement of Douglas Costle, Adm'r, Environmental Protection Agency) ("[T]here may be a real need for use of the pesticide to avoid pest outbreaks. It is our opinion that in some of these cases it would be proper to allow conditional registration . . . if the public interest would be served by issuance of a conditional registration, bearing in mind the benefits as well as the likely scope of the risk. Although we think that the exercise of this conditional registration authority for new chemicals would be rare, we feel that it should be available in appropriate cases.").

B

In the present case, the EPA found that use of NSPW is in the public interest because it has the "potential" to reduce the amount of silver released into the environment. Petitioners do not dispute that reducing the amount of silver in the environment is in the public interest. Rather, Petitioners dispute the factual premises underlying the EPA's public-

interest finding: (1) that NSPW has a lower application rate (*i.e.*, it uses less silver) than conventional-silver pesticides; (2) that NSPW has a lower mobility rate (*i.e.*, it is less likely to release silver into the environment in detectable quantities); and (3) that current users of conventional-silver pesticides will switch to NSPW and/or that NSPW will not be incorporated into new products. Although we conclude that the first two premises are supported by substantial evidence, we hold that the third premise impermissibly relies on unsubstantiated assumptions.[4]

1

The EPA found that NSPW has a lower application rate than conventional-silver pesticides. Petitioners make several arguments as to why this finding is not supported by substantial evidence. First, Petitioners argue that the increased toxicity of nanosilver[5] outweighs any benefits that may be gained from its lower application rate. We conclude, however, that the EPA presented substantial evidence to support its conclusion regarding these toxicity risks. In its response to public comments, the EPA agreed that the evidence suggests "nano-scale silver can potentially be more toxic than ionic silver alone." But the EPA also concluded that the evidence suggests nanosilver would not be

[4] The EPA argues that Petitioners waived their arguments regarding EPA's assumptions. After reviewing Petitioners' comments, however, we conclude Petitioners more than adequately raised the issue during the public notice-and-comment period. *See Portland Gen. Elec. Co. v. Bonneville Power Admin.*, 501 F.3d 1009, 1023–24 (9th Cir. 2007).

[5] For ease of reference and at the risk of conflating different formulations of nanosilver, our references to "nanosilver" from this point forward pertain only to the formulation in NSPW.

"sufficiently more toxic to raise risk concerns when taking into account leaching rates for the proposed uses." For NSPW incorporated into plastics, the EPA specifically concluded that nanosilver would have to be "on the order of 5 to 53 times more toxic" than conventional silver to raise concerns. And for textiles, the EPA concluded that nanosilver would need to be "on the order of 19 to 190 times more toxic."

Petitioners appear to attack these conclusions as too probabilistic. Nevertheless, on substantial evidence review, the EPA need not present evidence to support an outcome with certainty; it only needs to present "such relevant evidence as a reasonable mind might accept as adequate to support a conclusion." *NRDC*, 735 F.3d. at 877 (quoting *Vasquez*, 572 F.3d at 591). We defer to the EPA on this matter as it "is making predictions, within its area of special expertise, at the frontiers of science." *Id.* (quoting *Balt. Gas & Elec. Co.*, 462 U.S. at 103).

Second, Petitioners argue the EPA failed to explain why, given the different risks that nanosilver poses, total mass of silver applied (*i.e.*, the application rate) is a relevant point of comparison. We disagree. The EPA acknowledged in its response to public comments that there was an "ongoing debate within the scientific community that metrics other than mass (such as particle number or surface area) may be more suitable for assessing nanosilver risks." But the EPA also considered its use of mass in light of NSPW's "low release[ ] [levels], the available toxicity data, use of multiple risk uncertainty factors . . . [,] and required risk-mitigation measures on the product label." Under these circumstances, we conclude that the EPA's qualified use of application rate

is supported by substantial evidence and defer to the EPA's expertise.

Finally, Petitioners argue that the EPA failed to support its finding that conventional-silver pesticides have higher application rates than NSPW. While the EPA did not list every conventional-silver pesticide's application rate, the EPA listed 16 different conventional-silver pesticides and their application rates in its response to public comments. These rates are many times higher than the permitted application rate of NSPW. As a result, we cannot say the EPA's lower-application rate finding is unsupported by substantial evidence.

2

The EPA next found that the nanosilver in NSPW has a lower mobility rate than conventional-silver pesticides. Petitioners argue this finding relied on a plastic-leaching study the EPA had previously found deficient. But the EPA's finding does not rely solely on the plastic-leaching study. The EPA also relied on an undisputed textile-leaching study which also demonstrated low release levels. Further, the EPA noted, the nanosilver in NSPW "is complexed to a larger particle that is then embedded into a polymer. The submitted leaching studies show that nanosilver is unlikely to be released in quantities above the detection limit from this polymer. Absent release from the polymer, the mobility of nanosilver in [NSPW] is greatly reduced." The EPA then compared this structure to "silver salts," which are in "most silver-based pesticide products" and "immediate[ly] dissol[ve]." We therefore cannot say the EPA's lower-mobility finding is unsupported by substantial evidence.

3

Our inquiry cannot end with the EPA's findings that NSPW has lower application and mobility rates than conventional-silver pesticides. The EPA ultimately found that, based on these comparatively lower rates, use of NSPW is in the public interest because it has the "potential" to reduce the amount of silver released into the environment. This finding, however, also requires two interrelated and unstated assumptions. It assumes, first, that current users of conventional-silver pesticides will replace those pesticides with NSPW ("the substitution assumption"). It also assumes that NSPW will not be incorporated into new products to the extent that such incorporation would actually *increase* the amount of silver released into the environment ("the no-new-products assumption").[6] Because the substitution and no-new-products assumptions are unsubstantiated, Petitioners argue that the EPA's public-interest finding is not supported by substantial evidence. We agree.

The EPA cites no evidence in the record to support its substitution assumption. In briefing before this Court, the EPA contends that substitution will occur as a "logical matter." To support this proposition, the EPA cites a 1983 entry in the Federal Register, stating that "the pesticide market in general is finite, relatively 'saturated' and inelastic" and that increased competition may "shift the user's purchase

[6] New "products" should not be confused with new "use pattern." When referring to new products, we refer to new incorporations of NSPW *within* current registered use patterns. In other words, we base our analysis on the understanding that NSPW is not registered for use in a greater range of products than conventional-silver pesticides. We provide an example below of how NSPW may be used in new products.

from one company to another." *See* Regulations for the Enforcement of FIFRA; Conditional Registration, 48 Fed. Reg. 34000, 34003 (July 26, 1983). We cannot, however, "accept appellate counsel's post-hoc rationalizations for agency action." *Hernandez-Cruz v. Holder*, 651 F.3d 1094, 1109 (9th Cir. 2011) (quoting *Nw. Envtl. Def. Ctr. v. Bonneville Power Admin.*, 477 F.3d 668, 688 (9th Cir. 2007)). And even if we did consider the general description of the pesticide market as it existed in 1983, we have no way of knowing from the record whether that description is applicable to the current and narrower markets for silver-based pesticides and materials preservatives.

The lack of evidence supporting the substitution assumption may not be inherently problematic: if no manufacturer adopts NSPW, then NSPW will not present any environmental risk through those manufacturers' products. The substitution assumption is certainly problematic, however, in light of the no-new-products assumption, which the EPA also fails to support. In response, the EPA argues that there is no evidence to suggest that NSPW *will* be incorporated into new products. It also contends that it need not prove a negative proposition. But, as a logical matter, the EPA's no-new-products assumption must be weighed against its substitution assumption. On the one hand, the EPA assumes that current users of conventional-silver pesticides will switch to NSPW. On the other hand, however, it assumes that the benefits of NSPW will not also invite manufacturers to incorporate NSPW into new products. The EPA assumes, moreover, that the costs of switching to NSPW are not prohibitive, while it also assumes that the costs of adding NSPW will discourage new incorporations during the conditional-registration period.

We do not foreclose the possibility that the EPA could have proved these assumptions. Nevertheless, without evidence in the record to support the assumptions, we cannot find that the EPA's public-interest finding is supported by substantial evidence as required by FIFRA. Requiring substantial evidence for public-interest findings, moreover, is not just a statutory technicality as this case demonstrates. Here, if the EPA's substitution and no-new-products assumptions are incorrect, NSPW may *increase* the amount of silver released into the environment and contravene the identified public interest. For example, the EPA permits NSPW and conventional-silver pesticides to be incorporated into certain plastic furniture under their current registrations. That does not mean, however, that every plastic furniture product actually incorporates a silver-based pesticide. Furniture A may use a conventional-silver pesticide as a materials preservative, but Furniture B may not. If NSPW is added to Furniture B, but Furniture A continues to use the conventional-silver pesticide, there would be a net increase in the amount of silver incorporated into Furniture A and B.

The EPA argues that its public-interest finding allows for the possibility that NSPW could be added to new products. It points out, again, that the maximum application rate for the nanosilver in NSPW "is a fraction of what is permitted in pesticides containing conventional silver." The EPA also states that it used "worst-case scenarios" when assessing how much nanosilver from NSPW will leach from products and end up in the environment. The maximum-application-rate argument, however, still requires the assumption that a new product would have used a conventional-silver pesticide if NSPW was not available or that there will be an offsetting switch from conventional-silver pesticides to NSPW in other products. Regardless of whether the NSPW in new products

only releases a minimal amount of silver in the "worst-case scenario," the public interest that the EPA identified—reducing silver in the environment—will not be met unless one of these two conditions occurs. In short, these arguments do nothing to address the core flaw in the EPA's public-interest finding: it assumed, without citing evidence, that NSPW would be used enough by some, but not too much by others, to reduce the amount of silver released into the environment.

The EPA is capable of evaluating the kind of evidence that would have substantiated these assumptions. In its own guidance document, the EPA listed several factors it may consider in determining whether a pesticide is in the public interest. *See* Pesticide Programs; Conditional Registration of New Pesticides, 51 Fed. Reg. 7628-02, 7632–33 (Mar. 5, 1986).[7] These include economic factors, such as the "[c]omparative estimated costs and savings if the new pesticide is used instead of equivalent registered pesticides or alternative non-pesticide methods." *Id.* at 7633. NSPW, moreover, is not the first registered nanosilver-based materials preservative on the market—it is the second. While there are important differences between AGS-20 and NSPW, we have to imagine that at least *some* data about AGS-20's use and adoption were ascertainable and would have been useful in evaluating the EPA's assumptions.

[7] We acknowledge that the EPA is not bound to follow this guidance document and do not base our decision on the EPA's failure to follow this guidance. The guidance is only relevant to the extent it illustrates the EPA's capability to evaluate and consider the kind of evidence that would have supported its public-interest finding in the present case.

To be clear, the EPA need not "ferret out every possible alternative" scenario that may occur when determining that a conditional registration is in the public interest. *Vermont Yankee Nuclear Power Corp. v. Nat. Res. Def. Council*, 435 U.S. 519, 551 (1978). Nor is the EPA required to support a public-interest finding with "scientific certainty." *ASARCO, Inc. v. Occupational Safety & Health Admin.*, 746 F.2d 483, 490 (9th Cir. 1984) (citation omitted). But the EPA must support its predicted public-interest scenario with "substantial evidence when considered on the record as a whole." *See* 7 U.S.C. § 136n(b). Further, § 136a(c)(7)(C) does not presume, as the EPA argues, that the EPA may collect missing data related to its public-interest finding after granting a conditional registration. To the contrary, § 136a(c)(7)(C) only presumes the EPA needs more data to make a risk determination regarding use of the pesticide beyond the conditional-registration period. The statute instead requires the EPA to find, *before* granting conditional registration, "that use of the pesticide *is* in the public interest." 7 U.S.C. § 136a(c)(7)(C) (emphasis added).

In sum, the public-interest requirement of § 136a(c)(7)(C) is an additional, "more stringent test" that distinguishes conditional registration from unconditional registration. *See* 123 Cong. Rec. at 25,706; *see also Preap*, 831 F.3d at 1200 (stating that a statute's words must be considered in light of the "design of the statute as a whole" (citation omitted)). To pass this test, the EPA must support its finding with substantial evidence. The EPA may not satisfy the requirement by simply finding that a pesticide has the "potential" to be in the public interest—especially where the pesticide also has the "potential" to contravene the public interest. Accordingly, where an essential premise of a public-interest finding is only supported by bare assumptions, as in

the present case, we will find substantial evidence lacking. *See Pollinator Stewardship Council*, 806 F.3d at 538 (N.R. Smith, J., concurring in judgment) ("Although the EPA certainly has authority to rely on its well-founded beliefs, scientifically-derived knowledge, and experience-driven professional judgment, it must support the beliefs, knowledge, and judgment with evidence.").

IV

The public-interest finding is an essential prerequisite to conditional registration under § 136a(c)(7)(C). With respect to NSPW, the EPA failed to support that finding with substantial evidence. We therefore vacate the conditional registration in whole, *see* 7 U.S.C. § 136n(b), and need not reach the remaining grounds for vacatur raised by Petitioners, *see Pollinator Stewardship Council*, 806 F.3d at 532–33.

VACATED and **REMANDED**.

Costs are awarded to the Petitioners.

United States
Environmental Protection
Agency

Office Of Water
(EN-336)

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EPA

NPDES Storm Water Sampling Guidance Document

DISCLAIMER

This document was issued in support of EPA regulations and policy initiatives involving the development and implementation of a national storm water program. This document is agency guidance only. It does not establish or affect legal rights or obligations. Agency decisions in any particular case will be made applying the laws and regulations on the basis of specific facts when permits are issued or regulations promulgated. Mention of trade names or commercial products does not constitute endorsement or recommendation for use.

FOREWORD

Pollutants in storm water discharges from many sources are largely uncontrolled. The National Water Quality Inventory, 1990 Report to Congress provides a general assessment of water quality based on biennial reports submitted by the States under Section 305(b) of the Clean Water Act. The report indicates that roughly 30% of identified cases of water quality impairment reported by the States are attributable to storm water discharges.

Sampling data from storm water discharges is an important tool which provides information on the types and amounts of pollutants present. This data can then be used to identify pollutant sources and to develop storm water pollution prevention plans and best management practices priorities to control these sources.

This manual is for operators of facilities that discharge storm water associated with industrial activity and operators of large and medium municipal separate storm sewer systems. This manual describes the basic sampling requirements for NPDES storm water discharge permit applications and provides procedural guidance on how to conduct sampling. Many of the concepts in this guidance may also be applicable to sampling requirements contained in NPDES storm water permits.

This document was issued in support of EPA regulations and policy initiatives involving the development and implementation of a national storm water program. This document is agency guidance only. It does not establish or affect legal rights or obligations. Agency decisions in any particular case will be made applying the laws and regulations on the basis of specific facts when permits are issued or regulations promulgated.

This document is expected to be revised periodically to reflect advances in this rapidly evolving area. Comments from users are welcomed. Send comments to the U.S. Environmental Protection Agency, Office of Wastewater Enforcement and Compliance, 401 M Street, SW, Mailcode EN-336, Washington, DC 20460.

Michael Cook,
Director
Office of Wastewater Enforcement
and Compliance

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NPDES STORM WATER SAMPLING GUIDANCE DOCUMENT

1. INTRODUCTION

The 1972 Federal Water Pollution Control Act [(FWPCA), also referred to as the Clean Water Act (CWA)] prohibits the discharge of any pollutant to waters of the U.S. from a point source unless the discharge is authorized by a National Pollutant Discharge Elimination System (NPDES) permit. Efforts to improve water quality under the NPDES program have focused traditionally on reducing pollutants in industrial process wastewater discharges and from municipal sewage treatment plants. Past efforts to address storm water discharges, in particular through the NPDES program, have generally been limited to certain industrial categories, using effluent limitations for storm water as a permit condition.

Recognizing the need for more comprehensive control of storm waters discharges, Congress amended the CWA in 1987 and established a two-phase program. In Phase I, Congress required the U.S. Environmental Protection Agency (EPA) to establish NPDES requirements for certain classes of storm water discharges.

- A storm water discharge for which a permit has been issued prior to February 4, 1987
- A storm water discharge associated with industrial activity
- A storm water discharge from a municipal separate storm sewer system serving a population of 250,000 or more (large system)
- A storm water discharge from a municipal separate storm sewer system serving a population of 100,000 or more, but less than 250,000 (medium system)
- A discharge for which the Administrator or the State determines that the storm water discharge contributes to a violation of a water quality standard or is a significant contributor of pollutants to the waters of the United States.

To implement these requirements, EPA published on November 16, 1990 (55 Fed. Reg. 47990), permit application requirements that include storm water sampling. EPA and the States will subsequently issue NPDES storm water permits based on these applications, and many of these

permits will require storm water sampling. Congress intended for EPA to address all other point source discharges of storm water in Phase II of the program.

1.1 PURPOSE OF THIS MANUAL

This manual is for operators of facilities that discharge storm water associated with industrial activity and operators of large and medium municipal separate storm sewer systems. Storm water sampling is sometimes difficult due to the unpredictability of storm events and the variable nature of storm water discharges. This manual is primarily designed to assist operators/owners in planning for and fulfilling the NPDES storm water discharge sampling requirements for permit applications as well as for other storm water sampling needs.

It is assumed that applicants already have a basic understanding of the storm water permit application requirements. This document is designed to supplement existing storm water application guidance by focusing on the technical aspects of sampling. Since many industrial storm water permits and all municipal storm water permits will require regular storm water sampling, many of the concepts in this guidance may be applicable to sampling requirements contained in NPDES storm water permits.

The information in this manual pertains specifically to individual industrial storm water applications, group storm water applications (Part 2), and municipal Part 2 storm water permit applications for storm water discharges. For information on other storm water application requirements for industrial facilities and large and medium municipal separate storm sewer systems, see EPA's Guidance Manual for the Preparation of NPDES Permit Applications for Storm Water Discharges Associated with Industrial Activity (EPA-505/8-91-002, NTIS # PB-92-199058, April 1991), and EPA's Guidance Manual for the Preparation of Part 1 of the NPDES Permit Applications for Discharges from Municipal Separate Storm Sewer Systems (EPA-505/8-91-003A, NTIS # PB-92-114578, April 1991), respectively. These manuals can be requested by calling the National Technical Information Service (NTIS) **[(703) 487-4650]**. Additional background documents for further information are listed in Technical Appendix D.

1.2 ORGANIZATION OF THIS MANUAL

This manual explains the basic requirements of storm water sampling and provides procedural guidance on sampling for permit applications. Chapter 2 discusses background information (i.e., a

summary of permit application requirements, who must sample, when and where to sample, and staffing considerations). Chapter 3 presents the fundamentals of sampling (i.e., types of sampling, obtaining flow data, handling samples, and sending them to the laboratory). Chapter 4 presents analytical considerations, including the storm water pollutants that must be analyzed under the regulations. Chapter 5 discusses regulatory flexibility with respect to storm water sampling, and Chapter 6 includes health and safety considerations.

Technical Appendices provide information as follows:

- Technical Appendix A—Forms 2F and 1
- Technical Appendix B—NOAA Weather Radio Information
- Technical Appendix C—Required Containers, Preservation Techniques, Holding Times and 40 Code of Federal Regulations (CFR) Part 136
- Technical Appendix D—References
- Technical Appendix E—Glossary
- Technical Appendix F—Acronyms.

2. BACKGROUND FOR STORM WATER SAMPLING

This chapter presents background information, definitions, and a description of the fundamentals of sampling. Specifically, it covers the following areas:

- The benefits of sampling
- A summary of storm water application regulations
- Who must sample
- When sampling is required
- Where to sample
- Staffing considerations

In response to the 1987 Water Quality Act amendments to the CWA, EPA published the storm water final rule on November 16, 1990. In this rule, EPA established the initial scope of the storm water program by defining the phrase "storm water discharge associated with industrial activity" in terms of 11 categories of industrial activity and the phrase "large and medium municipal separate storm sewer systems" to include municipal systems serving a population greater than 100,000. These terms are discussed in greater detail in Section 2.6, "Who Must Sample."

In addition to defining the initial scope of the storm water program, the final rule established permit application requirements, including requirements for storm water sampling. Sampling data gathered for the application will be used to characterize storm water discharges, and will serve as a basis for establishing requirements in NPDES storm water permits. It is important to note that the applicant must report data that are representative of the storm water discharge, and that the intentional misrepresentation of discharge characteristics is unlawful.

2.1 BENEFITS OF SAMPLING

Data that characterize storm water discharges are valuable to permitting authorities and permittees for several reasons. First, storm water sampling provides a means for evaluating the environmental risk of the storm water discharge by identifying the types and amounts of pollutants present. Evaluating these data helps to determine the relative potential for the storm water discharge to contribute to water quality impacts or water quality standard violations. And, storm water sampling

data can be used to identify potential sources of pollutants. These sources can then be either eliminated or controlled more specifically by the permit.

2.2 INDUSTRIAL FACILITY APPLICATION REQUIREMENTS

The storm water permit application regulations provide operators of facilities (including those owned by the government) that have storm water discharges associated with industrial activity with three application options: (1) submit an individual application; (2) participate in a group application (a two-part application); or (3) submit a Notice of Intent (NOI) to be covered by a general permit where general permits are available. This guidance focuses on sampling requirements for individual applications and Part 2 of group applications. Sampling data generally will not be required for an NOI, however, the general permit may require sampling during the term of the permit. State permitting authorities may also require sampling information for an NOI at their discretion, and should, therefore, be consulted prior to submittal.

Industrial facilities submitting individual applications must submit sampling data on a completed application Form 2F (entitled "Application for Permit to Discharge Storm Water Discharges Associated with Industrial Activity"). Facilities selected to be part of the sampling subgroup for a group application must submit sampling data with Part 2 of the application. Members of the sampling subgroup must complete only the quantitative data portions of Form 2F, including Sections VII, VIII, IX, and the certification in Section X. Exhibit 2-1 details the types of information required for each section of Form 2F. Exhibit 2-2 describes what sampling information must be provided in Part 2 of the group application. It should be noted that States may require the use of different forms and submittal of additional documentation.

Form 1 must also be submitted with Form 2F by applicants submitting individual permit applications. General information about the facility is provided on Form 1 (i.e., addresses, operators, etc.); it does not request sampling data. Forms 1 and 2F are reproduced in Technical Appendix A.

Facilities with unpermitted combined discharges of storm water and process or nonprocess wastewater must submit Form 2C or 2E, respectively, in addition to Forms 1 and 2F. Facilities with storm water discharges combined with new sources or new discharges of process wastewater must submit Form 2D as well as Forms 1 and 2F.

EXHIBIT 2-1. FORM 2F APPLICATION REQUIREMENTS	
Section	**Requirement**
2F-I	Outfall location(s), including longitude and latitude and receiving water(s)
2F-II	Facility improvements which may affect the discharges described in the application
2F-III	Site drainage map
2F-IVA	Estimates of impervious area within each outfall drainage area
2F-IVB	A narrative description of pollutant sources (i.e., onsite materials which may come in contact with storm water runoff)
2F-IVC	Location and description of existing structural and nonstructural pollutant control measures
2F-VA	Certification that outfalls have been tested or evaluated for non-storm water discharges
2F-VB	Description of method used for testing/evaluating presence of non-storm water discharges
2F-VI	History of significant leaks or spills of toxic or hazardous pollutants at the facility within the last 3 years
2F-VII	Discharge characterization for all required pollutants
2F-VIII	Statement of whether biological testing for acute or chronic toxicity was performed and list of pollutants it was performed for
2F-IX	Information on contract laboratories or consulting firms
2F-X	Certification that information supplied is accurate and complete
Note: See Form 2F and the instructions for more detail on application requirements.	

2.3 MUNICIPALITIES' APPLICATION REQUIREMENTS

Operators of large and medium municipal separate storm sewer systems are required to submit a two-part application. Both parts contain sampling requirements: Part 1 requires information characterizing discharges from the separate storm sewer system, including field screening sample data for identifying illicit/illegal connections; Part 2 requires sampling at representative locations and estimates of pollutant loadings for those sites. These sampling data are to be used to design a long-term storm water monitoring plan that will be implemented during the term of the permit. The sampling data that must be submitted in Parts 1 and 2 of municipal applications are listed in Exhibit 2-3. There is no standard application form for municipalities.

EXHIBIT 2-2. PART 2 GROUP APPLICATION SAMPLING REQUIREMENTS

Quantitative Testing Data

- For groups with 4 to 20 members, 50 percent of the facilities must submit data; for groups with 21 to 99 members, a minimum of 10 dischargers must submit quantitative data; for groups with 100 to 1,000 members, a minimum of 10 percent of the facilities must submit data; for groups with greater than 1,000 members, no more than 100 facilities must submit data; there must be 2 dischargers from each precipitation zone in which 10 or more members of the group are located, or 1 discharger from each precipitation zone in which 9 or fewer members are located.

- Sampling and analysis requirements are described in 40 Code of Federal Regulations (CFR) 122.26(c)(1)(i)(E) and 40 CFR 122.21(g)(7). Pollutants to be analyzed depend on the type(s) of industries applying as a group.

- Sampling subgroup must provide all quantitative discharge information required in Form 2F Sections VII-IX plus the certification in Section X.

- The group application sampling subgroup must collect grab samples during the first 30 minutes of the storm event and flow-weighted composite samples as required in 40 CFR 122.21(g)(7).

2.4 APPLICATION SUBMITTAL DEADLINES

Deadlines for submitting permit applications and associated sampling requirements are presented in Exhibit 2-4 for individual and group industrial applications and for municipal applications.

2.5 WHERE TO SUBMIT APPLICATIONS

Storm water discharge permit applications are generally submitted directly to the permit-issuing authority. The appropriate authority is the State, where the State has been granted the authority to issue NPDES permits, or the EPA Regional office, where the State does not have NPDES authorization. Exhibit 2-5 indicates which States have approved NPDES permitting programs. It also provides contact names and addresses where applications should be submitted for each State or EPA Regional Office (depending on who the permitting authority is in each case). It should be noted, however, that both parts of a group application must instead be submitted to EPA Headquarters. Group applications must be sent to: Director, Office of Wastewater Enforcement and Compliance, Attention Mr. William Swietlik, U.S. EPA, EN-336, 401 M Street, SW, Washington, DC 20640.

EXHIBIT 2-3. MUNICIPAL APPLICATION SAMPLING REQUIREMENTS

Part 1

- Monthly mean rainfall and snowfall estimates
- Existing quantitative data on the depth and quality of storm water discharges
- A list of receiving water bodies and existing information concerning known water quality impacts
- Field screening analysis for illicit connections and illegal dumping
- Identification of representative outfalls for further sampling in Part 2

Part 2

- Quantitative data from 5 to 10 representative locations in approved sampling plans
- Estimates of the annual pollutant load and event mean concentration (EMC) of system discharges
- Proposed schedule to provide estimates of seasonal pollutant loads and the EMC for certain detected constituents in a representative storm event during the term of the permit
- Proposed monitoring program for representative data collection during the term of the permit

Applications submitted by industrial facilities must be certified by a responsible corporate officer as described in 40 CFR 122.22 (e.g., president, secretary, treasurer, vice president of the corporation in charge of a principal business function). Applications submitted by municipalities must be certified by a principal executive officer or ranking elected official as described in 40 CFR 122.22.

2.6 WHO MUST SAMPLE

Operators of facilities that have storm water discharges associated with industrial activity and operators of large and medium municipalities are required to conduct storm water sampling as part of their NPDES permit applications. Specifically, the following types of industries and municipalities must sample storm water discharges:

EXHIBIT 2-4. PERMIT APPLICATION SUBMISSION DEADLINES		
	Date	**Sampling Requirement**
Industrial		
Individual	October 1, 1992	Sampling data due
Group		
• Part 1	September 30, 1991	Sampling subgroup identified
• Part 2	October 1, 1992	Sampling data due
Municipal		
Large Municipalities		
• Part 1	November 18, 1991	Illicit connection screening due and identification of sampling points
• Part 2	November 16, 1992	Effluent characterization due Monitoring management program identified
Medium Municipalities		
• Part 1	May 18, 1992	Illicit connection screening due and identification of sampling points
• Part 2	May 17, 1993	Effluent characterization due Monitoring management program identified
*NOI under a general permit is due on October 1, 1992 or the date specified in the permit, whichever comes first.		

- Storm Water Discharges Associated With Industrial Activities - Under Phase I, the storm water permit application regulations identify, by Standard Industrial Classification (SIC) code and narrative description, 11 categories of facilities considered to be "engaging in industrial activity" for the purposes of storm water permit application requirements. Those facilities included in 40 CFR 122.26(b)(14)(i) through (xi) of the storm water permit application regulations with storm water point source discharges to waters of the U.S. or separate storm sewers and those designated under Section 402(p)(2)(E) of the CWA are required to apply for storm water permit coverage by October 1, 1992. Industrial facilities include those that are Federally, State, or municipally owned or operated. Exhibit 2-6 lists these industrial facilities. The Transportation Act of 1991 provides an exemption from storm water permitting requirements for certain industrial activities owned or operated by municipalities with a population of less than 100,000. Such municipalities must submit storm water discharge permit applications for only airports, power plants, and uncontrolled sanitary landfills that they own or operate, unless a permit is otherwise required by the permitting authority.

- Municipal Separate Storm Sewer Systems - Under Phase I, those municipalities with separate storm sewer systems serving 100,000 people or more are required to submit an application for discharges from the system. (Only the part of the population served by municipal separate storm sewers is to be included in the 100,000 count, not the part served by combined sewers.) Regulated municipalities are listed in Appendices F through I in the November 16, 1990, final rule or have been designated by their permitting authority.

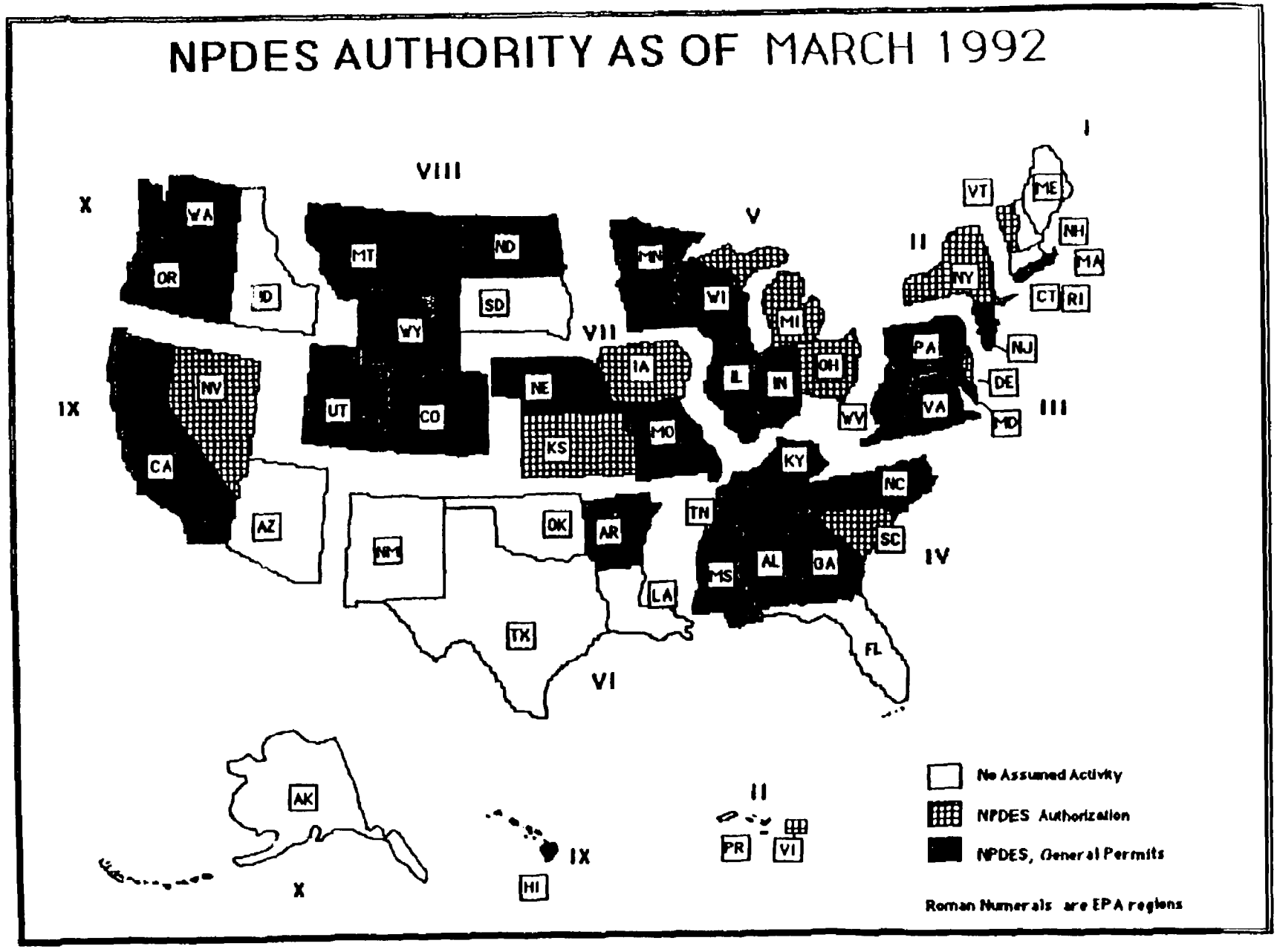
NPDES AUTHORITY AS OF MARCH 1992
I
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AR
OK
TX
LA
FL
VT
ME
NH
MA
CT
RI
NJ
DE
MD
AK
HI
PR
VI
No Assumed Activity
NPDES Authorization
NPDES, General Permits
Roman Numerals are EPA regions

EXHIBIT 2-5. NPDES STORM WATER PROGRAM PERMITTING AUTHORITIES (Continued)

State	Permitting Authority	Contact	State	Permitting Authority	Contact
Alabama	yes	Aubrey White Water Division 1751 Dickinson Dr. Montgomery, AL 36130 (205) 271-7811	Alaska	no	Steve Bubnick U.S. EPA Region 10 1200 6th Ave. WD-134 Seattle, WA 98101 (206) 553-8399
Arizona	no	Eugene Bromley U.S. EPA Region 9 75 Hawthorne St. W-5-1 San Francisco, CA 94105 (415) 744-1906	Arkansas	yes	Marynia Jastrzebski 8001 National Dr. P.O. Box 8913 Little Rock, AR 72219-8913 (501) 562-7444
California	yes	Archie Matthews Storm Water Research Control Board Water Quality 901 P St. Sacramento, CA 95814 (916) 657-1110	Colorado	yes	Patricia Nelson Dept. of Health Water Quality Control 4210 E. 11th Ave. Denver, CO 80220 (303) 331-4590
Connecticut	yes	Dick Mason Dept. of Environmental Protection Water Management Bureau Water Discharge Management 165 Capitol Ave. Hartford, CT 06106 (203) 566-7167	Delaware	yes	Sarah Cooksey Dept. of Natural Resources Surface Water Management 89 Kings Highway P.O. Box 1401 Dover, DE 19903 (302) 739-5731
Florida	no	Chris Thomas U.S. EPA Region 4 345 Courtland St. N.E. 4WM-FP Atlanta, GA 30365 (404) 347-3633	Georgia	yes	Mike Creason Dept. of Natural Resources Environmental Protection 205 Butler St. S.E. Room 1070 Atlanta, GA 30334 (404) 656-4887
Hawaii	yes	Steve Chang Dept. of Health Clean Water Branch Five Water Front Plaza #500 Ala-Moana Blvd. Honolulu, HI 96813 (808) 586-4309	Idaho	no	Steve Bubnick U.S. EPA Region 10 1200 6th Ave. WD-134 Seattle, WA 98101 (206) 553-8399
Illinois	yes	Tim Kluge EPA Water Pollution Control 2200 Churchill Rd. P.O. Box 19276 Springfield, IL 62794-9276 (217) 782-0610	Indiana	yes	Lonnie Brumfield Dept. of Environmental Management NPDES Permits Group 105 S. Meridian St. P.O. Box 6015 Indianapolis, IN 46206 (317) 232-8705
Iowa	yes	Monica Wnuk Department of Natural Resources Wallace State Building 900 E. Grand St. Des Moines, IA 50319-0034 (515) 281-7017	Kansas	yes	Don Carlson Dept. of Environment Water Bureau Forbes Field, Building 740 Topeka, KS 66620 (913) 296-5555

EXHIBIT 2-5. NPDES STORM WATER PROGRAM PERMITTING AUTHORITIES (Continued)

State	Permitting Authority	Contact	State	Permitting Authority	Contact
Kentucky	yes	Douglas Allgeier Dept. of Environmental Protection Water Division 18 Reilly Road Frankfort, KY 40601 (502) 564-3410	Louisiana	no	Brent Larson U.S. EPA Region 6 1455 Ross Ave. 6W-PM Dallas, TX 75202 (214) 655-7175
Maine	no	Shelley Puleo U.S. EPA Region 1 U.S. EPA/JFK Building/WCP Boston, MA 02203 (617) 565-3525	Maryland	yes	Edward Gertler MD Dept. of Environment Industrial Discharge Program 2500 Broening Highway Baltimore, MD 21224 (410) 631-3323
Massachusetts	no	Shelley Puleo U.S. EPA Region 1 U.S. EPA/JFK Building/WCP Boston, MA 02203 (617) 565-3525	Michigan	yes	Gary Boersen Dept. of Natural Resources Surface Water Division P.O. Box 30028 Lansing, MI 48909 (517) 373-1982
Minnesota	yes	Scott Thompson Pollution Control Agency 520 Lafayette Rd. St. Paul, MN 55155-3898 (612) 296-7203	Mississippi	yes	Jerry Cain Dept. of Environmental Quality Office of Pollution Control Industrial Waste Water Branch P.O. Box 10385 Jackson, MS 39289-0385 (601) 961-5171
Missouri	yes	Bob Hentges Dept. of Natural Resources Water Pollution Control Program 205 Jefferson St. P.O. Box 176 Jefferson City, MO 65102 (314) 751-6825	Montana	yes	Fred Shewman Water Quality Bureau Cogswell Building Helena, MT 59620 (406) 444-2406
Nebraska	yes	Clark Smith Environmental Control Water Quality Division P.O. Box 98922 Lincoln, NE 68509 (402) 471-4239	Nevada	yes	Rob Saunders Conservation and Natural Resources Environmental Protection 123 W. Nye Lane Carson City, NV 89710 (702) 687-4670
New Hampshire	no	Shelley Puleo U.S. EPA Region 1 U.S. EPA/JFK Building/WCP Boston, MA 02203 (617) 565-3525	New Jersey	yes	Sarina Cohen NJ DEPE Office of Regulatory Policy CN029 Trenton, NJ 08625-0029 NJ Hotline: (609) 633-7021
New Mexico	no	Brent Larson U.S. EPA Region 6 1445 Ross Ave. 6W-PM Dallas, TX 75202 (214) 655-7175	New York	yes	Ken Stevens Wastewater Facilities Design NY State DEC 50 Wolf Road Albany, NY 12233 (518) 457-1157

EXHIBIT 2-5. NPDES STORM WATER PROGRAM PERMITTING AUTHORITIES (Continued)

State	Permitting Authority	Contact	State	Permitting Authority	Contact
North Carolina	yes	Coleen Sullins Environmental Management Water Quality Planning P.O. Box 29535 Raleigh, NC 27626-0535 (919) 733-5083	North Dakota	yes	Sheila McClenathan Dept. of Health Water Quality Division 1200 Missouri Ave. P.O. Box 5520 Bismarck, ND 58502-5520 (701) 221-5210
Ohio	yes	Bob Phelps OEPA Water Pollution Control P.O. Box 1049 1800 Watermark Columbus, OH 43266 (614) 644-2034	Oklahoma	no	Brent Larson U.S. EPA Region 6 1445 Ross Ave. 6W-PM Dallas, TX 75202 (214) 655-7175
Oregon	yes	Ranei Nomura DEQ-Water Quality 811 SW 6th St. Portland, OR 97204 (503) 229-5256	Pennsylvania	yes	R.B. Patel Environmental Resources Water Quality Management P.O. Box 2063 Harrisburg, PA 17120 (717) 787-8184
Puerto Rico	no	José Rivera U.S. EPA Region 2 Water Permits & Compliance Branch 26 Federal Plaza, Room 845 New York, NY 10278 (212) 264-2911	Rhode Island	yes	Angela Liberti Division of Water Resources 291 Promenade St. Providence, RI 02908 (401) 277-6519
South Carolina	yes	Birgot McDade Dept. of Health & Env. Ctrl. Industry and Agriculture Waste Water Division 2600 Bull St. Columbia, SC 29201 (803) 734-5241	South Dakota	no	Vern Berry U.S. EPA Region 8 999 18th St. 8-WM-C Denver, CO 80202-2466 (303) 293-1630
Tennessee	yes	Robert Haley Dept. of Environment Water Pollution Control 150 9th Ave. N., 4th Floor Nashville, TN 37243-1534 (615) 741-2275	Texas	no	Brent Larson U.S. EPA Region 6 1445 Ross Ave. 6W-PM Dallas, TX 75202 (214) 655-7175
Utah	yes	Harry Campbell Dept. of Environmental Quality P.O. Box 16690 Salt Lake City, UT 84116 (801) 538-6146	Vermont	yes	Brian Koiker Environmental Conservation Permits and Compliance 103 S. Main St. Annex Building Waterbury, VT 05671-0405 (802) 244-5674

EXHIBIT 2-5. NPDES STORM WATER PROGRAM PERMITTING AUTHORITIES (Continued)

State	Permitting Authority	Contact	State	Permitting Authority	Contact
Virgin Islands	yes	Marc Pacifico Dept. of Planning & Natural Resources 1118 Watergut Project Christiansted St. Croix, VI 00820-5065 (809) 773-0565	Virginia	yes	Burton Tuxford Water Control Board Permits Section P.O. Box 11143 Richmond, VA 23230-1143 (804) 527-5083
Washington	yes	Gary Kruger Dept. of Ecology Water Quality Division P.O. Box 47600 Olympia, WA 98504-7600 (206) 438-7529	Washington D.C.	no	Kevin Magerr U.S. EPA Region 3 841 Chestnut Bldg. 3WM53 Philadelphia, PA 19107 (215) 597-1651
West Virginia	yes	Jerry Ray Division of Water Resources 1201 Greenbriar St. Charleston, WV 25311 (304) 348-0375	Wisconsin	yes	Anne Maurel Dept. of Natural Resources Wastewater Management P.O. Box 7921 Madison, WI 53707 (608) 267-7364
Wyoming	yes	John Wagner Dept. of Environmental Quality Herschler Building, 4th Floor Cheyenne, WY 82002 (307) 777-7082			

2.7 WHEN SAMPLING IS REQUIRED

Industrial individual and group applicants must include sampling data from at least one representative storm event. Operators of large or medium municipal separate storm sewer systems must submit sampling data from three different representative storm events. How to determine "representativeness" and other considerations for when to sample are presented below.

2.7.1 STORM EVENT CRITERIA

Storm water discharge permit application requirements establish specific criteria for the type of storm event that must be sampled:

- The depth of the storm must be greater than 0.1 inch accumulation
- The storm must be preceded by at least 72 hours of dry weather
- Where feasible, the depth of rain and duration of the event should not vary by more than 50 percent from the average depth and duration.

EXHIBIT 2-6 INDUSTRIAL FACILITIES WHICH MUST SUBMIT APPLICATIONS FOR STORM WATER PERMITS	
40 CFR 122.26(b)(14) Subpart	**Description**
(i)	Facilities subject to storm water effluent limitations guidelines, new source performance standards, or toxic pollutants effluent standards under 40 CFR, Subchapter N [except facilities which are exempt under category (xi)].
(ii)	Facilities classified as: SIC 24 (except 2434) . . . . . Lumber and Wood Products SIC 26 (except 265 and 267) . Paper and Allied Products SIC 28 (except 283 and 285) . Chemicals and Allied Products SIC 29 . . . . . Petroleum and Coal Products SIC 311 . . . . . Leather Tanning and Finishing SIC 32 (except 323) . . . . . Stone, Clay and Glass Products SIC 33 . . . . . Primary Metal Industries SIC 3441 . . . . . Fabricated Structural Metal SIC 373 . . . . . Ship and Boat Building and Repairing
(iii)	Facilities classified as SIC 10 through 14, including active or inactive mining operations and oil and gas exploration, production, processing, or treatment operations, or transmission facilities that discharge storm water contaminated by contact with, or that has come into contact with, any overburden, raw material, intermediate products, finished products, byproducts, or waste products located on the site of such operations. SIC 10 . . . . . Metal Mining SIC 11 . . . . . Anthracite Mining SIC 12 . . . . . Coal Mining SIC 13 . . . . . Oil and Gas Extraction SIC 14 . . . . . Nonmetallic Minerals, except Fuels
(iv)	Hazardous waste treatment, storage, or disposal facilities, including those that are operating under interim status or a permit under Subtitle C of the Resource Conservation and Recovery Act (RCRA).
(v)	Landfills, land application sites, and open dumps that receive or have received any industrial wastes including those that are subject to regulation under subtitle D or RCRA.
(vi)	Facilities involved in the recycling of material, including metal scrapyards, battery reclaimers, salvage yards, and automobile junkyards, including but limited to those classified as: SIC 5015 . . . . . Motor Vehicle Parts, Used SIC 5093 . . . . . Scrap and Waste Materials
(vii)	Steam electric power generating facilities, including coal handling sites.
(viii)	Transportation facilities which have vehicle maintenance shops, equipment cleaning operations, or airport de-icing operations. Only those portions of the facility that are either involved in vehicle maintenance (including vehicle rehabilitation, mechanical repairs, painting, fuelling, and lubrication), equipment cleaning operations, or airport de-icing operations, or which are otherwise listed in another category, are included. SIC 40 . . . . . Railroad Transportation SIC 41 . . . . . Local and Suburban Transit SIC 42 (except 4221-25) . . . . Motor Freight and Warehousing SIC 43 . . . . . U.S. Postal Service SIC 44 . . . . . Water Transportation SIC 45 . . . . . Transportation by Air SIC 5171 . . . . . Petroleum Bulk Stations and Terminals

EXHIBIT 2-6. INDUSTRIAL FACILITIES WHICH MUST SUBMIT APPLICATIONS FOR STORM WATER PERMITS (Continued)

40 CFR 122.26(b)(14) Subpart	Description
(ix)	Treatment works treating domestic sewage or any other sewage sludge or wastewater treatment device or system, used in the storage, treatment, recycling, and reclamation of municipal or domestic sewage, including lands dedicated to the disposal of the sewage sludge that are located within the confines of the facility, with a design flow of 1.0 million gallons per day or more, or required to have an approved pretreatment program under 40 CFR Part 403. Not included are farm lands, domestic gardens, or lands used for sludge management where sludge is beneficially reused and which are not physically located in the confines of the facility, or areas that are in compliance with Section 405 of the CWA.
(x)	Construction activity including clearing, grading, and excavation activities except operations that result in the disturbance of less than 5 acres of total land area and those that are not part of a larger common plan of development or sale.*
(xi)	Facilities under the following SICs [which are not otherwise included in categories (ii)-(x)], including only storm water discharges where material handling equipment or activities, raw materials, intermediate products, final products, waste materials, byproducts, or industrial machinery are exposed to storm water.* SIC 20 . . . . . Food and Kindred Products SIC 21 . . . . . Tobacco Products SIC 22 . . . . . Textile Mill Products SIC 23 . . . . . Apparel and Other Textile Products SIC 2434 . . . . . Wood Kitchen Cabinets SIC 25 . . . . . Furniture and Fixtures SIC 265 . . . . . Paperboard Containers and Boxes SIC 267 . . . . . Converted Paper and Paper Board Products (except containers and boxes) SIC 27 . . . . . Printing and Publishing SIC 283 . . . . . Drugs SIC 285 . . . . . Paints, Varnishes, Lacquer, Enamels SIC 30 . . . . . Rubber and Misc. Plastics Products SIC 31 (except 311) . . . . . Leather and Leather Products SIC 323 . . . . . Products of Purchased Glass SIC 34 (except 3441) . . . . . Fabricated Metal Products SIC 35 . . . . . Industrial Machinery and Equipment, except Electrical SIC 36 . . . . . Electronic and Other Electric Equipment SIC 37 (except 373) . . . . . Transportation Equipment SIC 38 . . . . . Instruments and Related Products SIC 39 . . . . . Miscellaneous Manufacturing Industries SIC 4221 . . . . . Farm Products Warehousing and Storage SIC 4222 . . . . . Refrigerated Warehousing and Storage SIC 4225 . . . . . General Warehousing and Storage

Source: Federal Register, Vol. 55, No. 222, p. 48065, November 16, 1990.
*On June 11, 1992, the U.S. Court of Appeals for the Ninth Circuit remanded the exemption for construction sites of less than five acres in category (x) and for manufacturing facilities in category (xi) which do not have materials or activities exposed to storm water to the EPA for further rulemaking. (Nos. 90-70671 & 91-70200).

These criteria were established to: (1) ensure that adequate flow would be discharged; (2) allow some build-up of pollutants during the dry weather intervals; and (3) ensure that the storm would be "representative," (i.e., typical for the area in terms of intensity, depth, and duration).

Collection of samples during a storm event meeting these criteria ensures that the resulting data will accurately portray the most common conditions for each site. However, the permitting authority is authorized to approve modifications of this definition (especially for applicants in arid areas where there are few representative events). Section 5.1 of Chapter 5 discusses general protocol for requesting modifications to application requirements, including the definition of "representative storm."

In determining whether a storm is representative, there are two important steps to take. First, data on local weather patterns should be collected and analyzed to determine the range of representative storms for a particular area. Second, these results should be compared to measurements of duration, intensity, and depth to ensure that the storm to be sampled fits the representativeness criteria.

2.7.2 OBTAINING RAINFALL DATA

Several sources provide accurate local weather information for both: (1) determining what a representative storm event is for a particular area; and (2) assessing expected storm events to determine whether a predicted rainfall will be "representative," and thus, meet the requirements for storm water sampling. The National Oceanic and Atmospheric Administration (NOAA) National Climatic Data Center's (NCDC's) Climate Services Branch is responsible for collecting precipitation data. Data on hourly, daily, and monthly precipitation for each measuring station (with latitude and longitude) are available to the public on computer diskette, microfiche, or hard copy. Orders can be placed by calling **(704) 259-0682**, by fax at **(704) 259-0876**, or by writing to NCDC, Climate Services Branch, The Federal Building, Asheville, North Carolina 28071-2733.

The National Weather Service (NWS) of NOAA can also provide information on historic, current, and future weather conditions. Local NWS telephone numbers can be obtained from the NWS Public Affairs Office at **(301) 713-0622**. Telephone numbers are also usually in local phone directory listings under "National Weather Service" or "Weather." In addition, NOAA runs the NOAA NWS

Weather Radio, which provides continuous broadcasts of the most current weather information. This broadcast can be accessed with a radio that has a weather band feature. Approximately 90 percent of the United States population is within listening range of the 380 NWS stations. Technical Appendix B presents additional information on NOAA Weather Radio, including radio frequencies for specific locations and a listing of weather band radio manufacturers. Telephone recordings of weather conditions are also provided by most NWS offices.

Cable TV weather stations and local airports can also provide weather information. Weather information provided by the local newspaper or TV stations should be used only if more accurate data (as described above) are unavailable, since weather forecasts can change drastically within several hours.

Someone should be designated at the facility to follow current weather conditions by listening to NOAA Weather Radio, calling the local NWS offices, and watching cable TV weather news. Exhibit 2-7 presents a storm water sampling decision chart for mobilizing field personnel for a probable storm event.

Annual rainfall statistics can also be used to evaluate representativeness of storm events. For example, Exhibit 2-8 presents fifteen rain zones in the United States and related storm event statistics. (These rain zones are not those shown in 40 CFR Part 122 Appendix E.) To determine typical values of annual storm events for a particular facility, identify the zone in which the facility is located. The tabulated information lists the annual average number of storms and precipitation as well as the average duration, intensity, and depth of independent storm events for each zone. Care must be taken, however, in using annual rainfall statistics for determining representativeness of storm events, since the annual rainfall statistic may not be representative of seasonal rainfall events. If rainfall data is available at or close to a particular facility, it is preferable to use this data for determining average storm event statistics.

Rainfall data tabulated from NOAA precipitation data indicate for Alaska (not shown in Exhibit 2-8) that average storm events last from 14 to 24 hours in duration and are 0.6 to 1.05 inches in depth. Average storm event data for Hawaii are 9 to 11 hours in duration and from 0.6 to 1.6 inches in depth.

EXHIBIT 2-7. DECISION CHART FOR STORM WATER SAMPLING

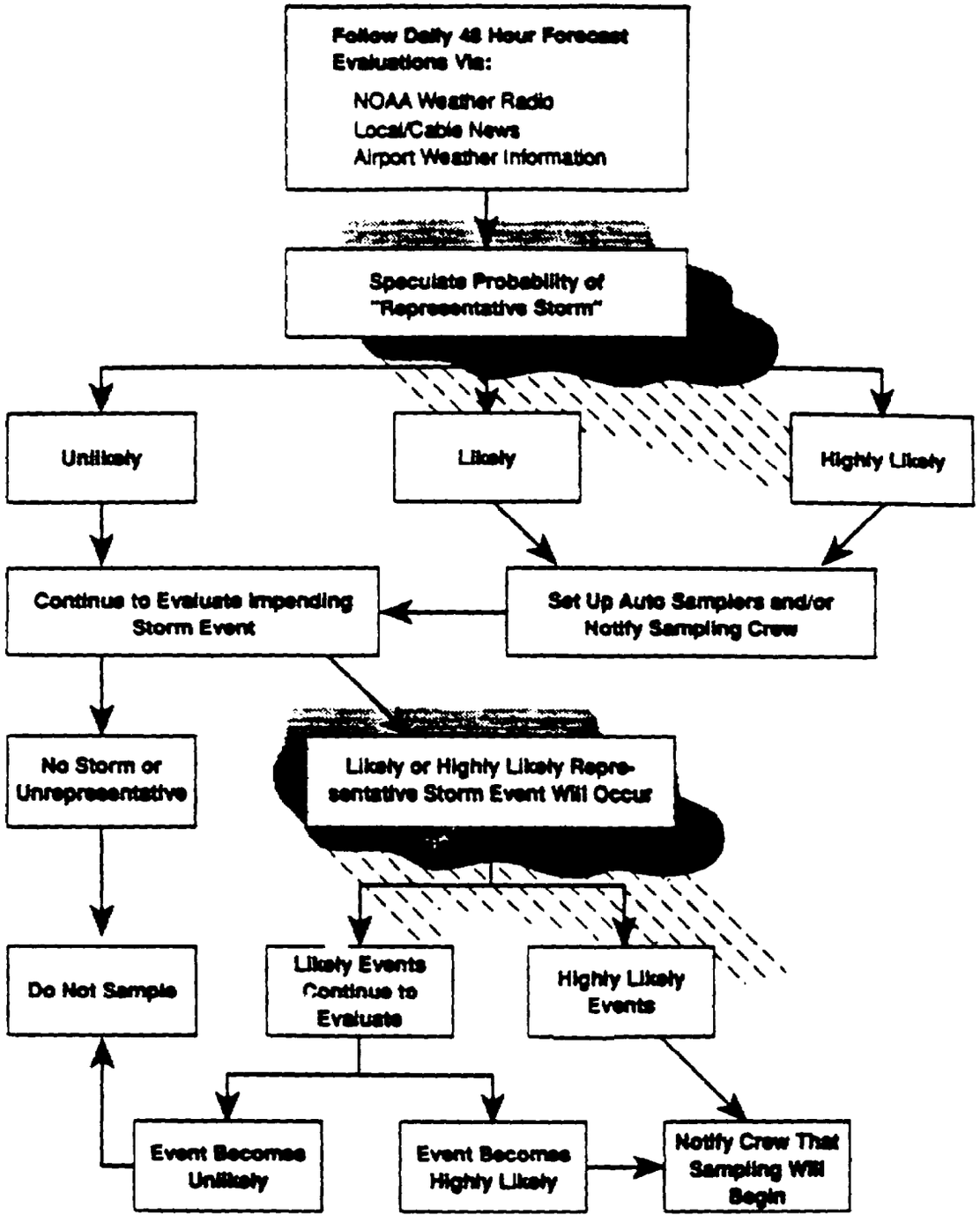

EXHIBIT 2-8. RAIN ZONES OF THE UNITED STATES

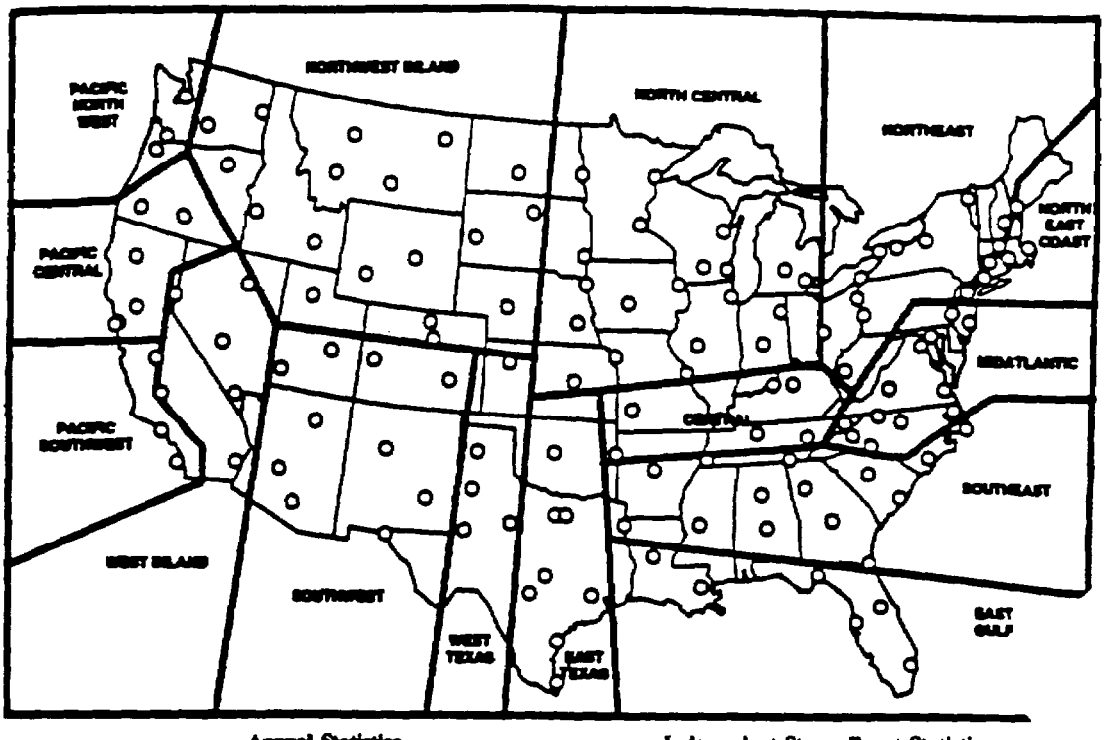

RAIN ZONE	Annual Statistics: No. of Storms Avg	No. of Storms COV	Precip. Avg (in)	Precip. COV	Independent Storm Event Statistics: Duration Avg (hr)	Duration COV	Intensity Avg (in/hr)	Intensity COV	Volume Avg (in)	Volume COV	DELTA Avg (hr)	DELTA COV
NORTH EAST	70	0.13	34.6	0.18	11.2	0.81	0.067	1.23	0.50	0.95	126	0.94
NORTH EAST—COASTAL	63	0.12	41.4	0.21	11.7	0.77	0.071	1.05	0.66	1.03	140	0.87
MIDATLANTIC	62	0.13	39.5	0.18	10.1	0.84	0.092	1.20	0.64	1.01	143	0.97
CENTRAL	68	0.14	41.9	0.19	9.2	0.85	0.097	1.09	0.62	1.00	133	0.99
NORTH CENTRAL	55	0.16	29.8	0.22	9.5	0.83	0.087	1.20	0.55	1.01	167	1.17
SOUTHEAST	65	0.15	49.0	0.20	8.7	0.92	0.122	1.09	0.75	1.10	136	1.03
EAST GULF	68	0.17	53.7	0.23	6.4	1.05	0.178	1.03	0.80	1.19	130	1.25
EAST TEXAS	41	0.22	31.2	0.29	8.0	0.97	0.137	1.08	0.76	1.18	213	1.28
WEST TEXAS	30	0.27	17.3	0.33	7.4	0.98	0.121	1.13	0.57	1.07	302	1.53
SOUTHWEST	20	0.30	7.4	0.37	7.8	0.88	0.079	1.16	0.37	0.88	473	1.46
WEST INLAND	14	0.38	4.9	0.43	9.4	0.75	0.055	1.06	0.36	0.87	786	1.54
PACIFIC SOUTH	19	0.36	10.2	0.42	11.6	0.78	0.054	0.76	0.54	0.98	476	2.09
NORTHWEST INLAND	31	0.23	11.5	0.29	10.4	0.82	0.057	1.20	0.37	0.93	304	1.43
PACIFIC CENTRAL	32	0.25	18.4	0.33	13.7	0.80	0.048	0.85	0.58	1.05	265	2.00
PACIFIC NORTHWEST	71	0.15	35.7	0.19	15.9	0.80	0.035	0.73	0.50	1.09	123	1.50

COV = Coefficient of Variation = Standard Deviation/Mean
DELTA = Interval Between Storm Midpoints
o = Rain Gauge Stations
Source: Urban Targeting and BMP Selection, U.S. EPA Region 5, November 1990.

The NWS should be consulted for proper procedures for collecting and interpolating rainfall data if the applicant elects to collect the data rather than use existing data.

2.7.3 DETERMINING REPRESENTATIVENESS

An example of how to determine whether a rainfall event varies by more than 50 percent (i.e., is not representative) is shown in Exhibit 2-9.

EXHIBIT 2-9. EXAMPLE OF 50 PERCENT VARIANCE FROM AVERAGE RAINFALL

Event Type	Duration (hrs.)	Depth (in.)
Average event	5.2	0.43
50 percent average event	2.6	0.22
150 percent average event	7.8	0.65

Once the information on an average duration and depth storm event is obtained for a specific location, multiply these numbers by 0.5 to get the 50 percent average event numbers and multiply by 1.5 to get the 150 percent average event numbers.

A representative storm in both duration and depth for a specific area will fall between the shaded numbers above (i.e., between 2.6 and 7.8 hours in duration and 0.22 and 0.65 inches in depth).

Snowmelt creates runoff which may result in point source discharges very similar to that from other storm events. Pollutants accumulate in snow, and when a thaw occurs, the pollutants will be discharged to receiving waters much like during a rain storm event. Snowmelt may be sampled as long as the applicant works closely with the permitting authority to determine the proper sampling strategy, i.e., sampling procedures, techniques, and pollutant analyses.

For snowmelt, the sampling strategy should be developed depending on the drainage area being monitored for storm flow. The strategy should consider (1) snow removal or clearing practices, e.g., direct dumping into water bodies, plowing, and the creation of snow mounds (whether in a line along a roadway or in piles on parking lots, etc.), and (2) the melting process.

It is also important to consider what happens to snowmounds as they melt and evaporate, which can alter the pollutant concentration in the resulting runoff. In addition, pollutants from the surrounding

air and pavement can build up on snow mound surfaces in a crust or cake-like manner eventually leaving a residue (including previously dissolved solids that become a remaining solids residue) which is later left to be washed off by rainfall, manual flushing or other mechanisms.

The sampling of snow mounds, undisturbed snow itself, and hard pack requires a carefully thought out strategy. Given the complexities associated with snowmelt sampling, applicants should have proposed sampling strategies reviewed by the permitting authority before attempting to conduct sampling.

2.7.4 LOGISTICAL PROBLEMS WITH WHEN TO SAMPLE

Applicants may encounter weather conditions that may not meet minimum "representative" storm criteria; these conditions may prevent adequate collection of storm water samples prior to application submission deadlines. For instance, sampling may be problematic in parts of the country that experience drought or near-drought conditions or areas that are under adverse weather conditions such as freezing and flooding. Events with false starts and events with stop/start rains can also cause problems. Solutions for sampling under these circumstances are discussed below.

Where the timing of storm event sampling poses a problem, it may be appropriate for the applicant to petition the permitting authority for a sampling protocol/procedure modification either prior to sampling or after sampling is conducted (if the storm event is not acceptable). When the applicant requests a sampling protocol/procedure modification, a narrative justification should be attached. This justification should be certified by a corporate official (for industrial facilities) or the principle executive officer or ranking official (for municipalities), as per 40 CFR 122.22. Section 5.1 of Chapter 5 discusses protocol/procedure modifications.

<u>Arid Areas</u>

For arid or drought-stricken areas where a storm event does not occur prior to the time the applicant must sample and submit data with the application form, the applicant should submit the application, complete to the extent possible, with a detailed explanation of why sampling data are not provided and an appraisal of when sampling will be conducted. This explanation must be certified by the appropriate party (as described above). The applicant should also contact the permitting authority

for further direction. Where the applicant can anticipate such problems, approval for an extension to submit sampling data should be acquired prior to the deadline.

Adverse Weather Conditions

The applicant should never conduct storm water sampling during unsafe conditions. It is likely that, in areas that experience flooding, lightening storms, high winds, etc., another representative storm event will occur for which sampling conditions will be much safer. (For further information on safety issues, see Chapter 6.) If no other storm event occurs, the applicant should submit a justification as to why the event was not sampled. This information should be certified by the appropriate official.

False Starts and Stop/Start Rains

False start and stop/start rains can also cause problems. False starts may occur when weather conditions are unpredictable and it appears that a storm event may be representative, collection begins, and then the rain stops before an adequate sample volume is obtained. (Necessary sample volumes are discussed in Section 3.6.) Some latitude may be given for the 0.1-inch rainfall requirement as long as the sample volume is adequate; the permitting authority may accept the results with applicant justification and certification. Again, see Chapter 5 for information on requesting protocol/procedure modifications to storm water sampling requirements.

During stop/start rains (those in which rainfall is intermittent), samples should be taken until an adequate sample volume is obtained. Exhibit 2-10 summarizes logistical problems of storm water sampling and presents solutions to the problems identified.

2.7.5 WHEN INDUSTRIAL FACILITIES MUST SAMPLE

Industrial applicants must generally collect two types of storm water samples: (1) grab samples collected during the first 30 minutes of discharge; and (2) flow-weighted composite samples collected during the first 3 hours of discharge (or the entire discharge, if it is less than 3 hours). Information from both types of samples is critical to fully evaluate the types and concentrations of pollutants present in the storm water discharge.

EXHIBIT 2-10. LOGISTICAL PROBLEMS OF STORM WATER SAMPLING	
Problem:	Arid/drought areas
Solution:	Submit a petition requesting a modification to the protocol if problems are anticipated and, if it is approved, submit the application without sampling data by the application due date with a certified explanation. Provide sampling data to the permitting authority as soon as possible.
Problem:	Adverse weather conditions such as freezing, flooding, winds, tornadoes, electrical storms, and gully washes
Solution:	Sample another, less hazardous event or submit a certified justification of why the event was not sampled. Provide sampling data to the permitting authority as soon as possible.
Problem:	False starts
Solution:	Discard the sample if the volume is inadequate. If the volume is adequate, submit the sampling data with a certified explanation that the sample is from a non-representative event. Continue to monitor weather conditions and attempt to resample as soon as possible.
Problem:	Stop/start rains
Solution:	Continue to sample in case the storm event turns out to be representative and adequate sample volumes are obtained. If sample volumes are inadequate, continue to monitor weather conditions and attempt to resample as soon as possible.

The grab samples taken during the first 30 minutes of a storm event will generally contain higher concentrations of pollutants, since they pick up pollutants that have accumulated on drainage surfaces since the last storm event.

Composite samples characterize the average quality of the entire storm water discharge. Flow-weighted composite samples provide for the most accurate determination of mass load. The flow-weighted composite sample must be taken for either the first 3 hours or for the entire discharge (if the event is less than 3 hours long). Additional information on how to collect grab and composite samples is presented in Sections 3.3 and 3.4, respectively.

Industrial applicants are required at a minimum to sample only one storm event. However, if samples from more than one storm are analyzed and the results are representative of the discharge, the data representing each event must be reported. The facility must provide a description of each storm event tested. The average of all values within the last year must be determined and the

concentration, mass, and total number of storm events sampled must be reported on Form 2F. Furthermore, sampling should be conducted during normal operating procedures (day or night), and, not when the facility has been closed for a period of time.

Industrial applicants must certify, as a separate requirement, that all outfalls have been tested or evaluated to determine whether non-storm water discharges are present (e.g., process wastewater, sanitary wastes, cooling water, or rinse water) or whether illegal/illicit connections are occurring in the system. This testing should be conducted during dry weather to avoid any flows of storm water through the conveyance.

A checklist that can be used to conduct dry weather evaluations is provided in Exhibit 2-11. A narrative description of the method used to conduct dry weather evaluations and the date and the drainage points must be included in Section V.A of Form 2F. This statement must be certified by the appropriate party as described in Section 2.7.4.

A dry weather visual inspection is the simplest way to screen for illicit discharges. If one or more of the items on the checklist in Exhibit 2-11 are answered affirmatively, or if there are other reasons to believe that illicit connections exist, more detailed investigations (such as dye tests, smoke tests, evaluation of piping designs, and TV line monitoring) may be necessary. Dye testing involves releasing fluorescent, nontoxic dye into the suspected source of non-storm water, (e.g., a drain, sink, toilet, or pipe) and checking to see whether the dye shows up in the storm water outfall. Smoke testing involves pumping smoke into a storm sewer and viewing the facility to see if smoke escapes through unknown openings or storm sewer inlets. The presence of smoke indicates that storm water may enter the sewer through these openings or inlets. However, smoke testing may prove ineffective at finding non-storm water discharges to separate storm sewers. Smoke passage may be blocked due to line traps that are intended to block sewer gas.

TV line monitoring is a technique whereby a small video camera is placed in the storm sewer and a video image of the sewer is viewed on a monitor at the surface to identify illicit connections. The camera can be moved through the sewer by remote control. For more information on smoke and dye testing and TV line monitoring, consult EPA's Guidance Manual for the Preparation of NPDES

EXHIBIT 2-11. CHECKLIST FOR CONDUCTING DRY WEATHER EVALUATIONS

1. Date of inspection:_____
2. Facility name and address:_____
3. Date of last rain event:_____
4. Inspector name:_____
5. Type of outfall

☐ Concrete ☐ Pipe ☐ Grassed ☐ Rock ☐ Other _____

6. Is there visible flow from the pipe? ☐ Yes ☐ No
If yes, check all that apply. If no, go to number 7.

☐ Colored water (describe)_____
☐ Odor* (describe)_____
☐ Murky
☐ Floating objects (describe)_____
☐ Absence of plant life surrounding conveyance
☐ Scum
☐ Oily sheen
☐ Sludge present
☐ Clear water
☐ Stains on conveyance
☐ Notable difference in plant life surrounding conveyance
☐ Suds ☐ Other:_____

*e.g., rotten eggs, earthy, chemical, chlorine, soap, putrescence, gasoline, musty, etc.

Estimate the flow either visually or by describing the width, height, and shape of the conveyance and the approximate percentage of the conveyance where flow is present or the approximate depth of the flow. Describe your estimate.

7. Is there standing water present? ☐ Yes ☐ No
If yes, check all that apply. If no, go to number 8.

☐ Colored water (describe)_____
☐ Odor* (describe)_____
☐ Murky
☐ Floating objects (describe)_____
☐ Absence of plant life surrounding conveyance
☐ Suds
☐ Oily sheen
☐ Sludge present
☐ Clear water
☐ Stains on conveyance
☐ Notable difference in plant life surrounding conveyance
☐ Scum ☐ Other:_____
☐ Absence of plant life surrounding conveyance

*e.g., rotten eggs, earthy, chemical, chlorine, soap, putrescence, gasoline, musty, etc.

8. From the inspection locations, can you see any unusual piping or ditches that drain to the storm water conveyance? ☐ Yes ☐ No
9. Is there any overland flow visible from the discharge location? ☐ Yes ☐ No
10. Are there dead animals present? ☐ Yes ☐ No

Signature:

Permit Applications for Storm Water Discharges Associated with Industrial Activity (EPA-505/8-91-002, April 1991).

A problem with the dry weather evaluation process is that the presence of a dry weather/non-storm water discharge may be caused by infiltration of ground or surface waters through cracks in the storm water drainage system. In this situation, all other possible sources of the non-storm water discharge should be examined and ruled out. If no sources are found, the physical structure of the conveyance system should be inspected for deterioration.

The applicant should make every attempt to halt non-storm water discharges to the storm sewer system unless the discharge is covered by an NPDES permit. If it is not feasible to halt the discharge of non-storm water to the storm sewer system, and the discharge is not authorized by a process wastewater or storm water permit, the applicant must submit either Form 2C (for a process water discharge) or Form 2E (for a nonprocess water discharge), and check with state officials to see if alternate forms are required.

2.7.6 WHEN MUNICIPAL FACILITIES MUST SAMPLE

Municipal applicants are required to conduct sampling for both Parts 1 and 2 of their applications. In Part 1, municipalities must conduct a field screening analysis to detect illicit connections and illegal dumping into their storm sewer system. Where flow is observed during dry weather, two grab samples must be collected during a 24-hour period with a minimum of 4 hours between samples. These samples must be analyzed for pH, total chlorine, total copper, total phenol, and detergents (surfactants). Note that these are dry weather samples, rather than storm water samples. EPA's Guidance Manual for the Preparation of Part 1 of the NPDES Permit Applications for Discharges from Municipal Separate Storm Sewer Systems presents a description of conducting field screening sampling and provides a data sheet.

For Part 2 of the application, municipalities must submit grab (for certain pollutants) and flow-weighted sampling data from selected sites (5 to 10 outfalls) for 3 representative storm events at least 1 month apart. The flow-weighted composite sample must be taken for either the entire discharge or the first 3 hours (if the event lasts longer than 3 hours). Municipal facilities are not required to collect grab samples within the first 30 minutes of a storm event.

In addition to submitting quantitative data for the application, municipalities must also develop programs for future sampling activities that specify sampling locations, frequency, pollutants to be analyzed, and sampling equipment. Where necessary (as determined by the municipality or if required by the permitting authority), responsibilities may also include monitoring industries connected to the municipality's storm sewers for compliance with their facility-specific NPDES permits. Refer to EPA's Guidance Manual for the Preparation of Part 1 of the NPDES Permit Applications for Discharges from Municipal Separate Storm Sewer Systems for information on how to develop municipal sampling programs.

2.7.7 USE OF HISTORICAL DATA

Data from storm water samples analyzed in the past can be submitted with applications in lieu of new sampling data if:

- All data requirements in Form 2F are met
- Sampling was performed no longer than 3 years prior to submission of the permit application
- All water quality data are representative of the present discharge.

The historical data may be unacceptable if there have been significant changes since the time of that storm event in production level, raw materials, processes, or final products. Significant changes which may also impact storm water runoff include construction or installation of treatment or sedimentation/erosion control devices, buildings, roadways, or parking lots. Applicants should assess any such changes to determine whether they altered storm water runoff since the time of the storm event chosen for use in the permit application. Historical data can be used only in applications. Historical data cannot be used for fulfilling permit requirements.

2.8 WHERE TO SAMPLE STORM WATER DISCHARGES

Storm water samples should be taken at a storm water point source. A "point source" is defined as any discernible, confined, and discrete conveyance, including (but not limited to) any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, landfill leachate collection system, vessel, or other floating craft from which pollutants are or may be discharged (as per 40 CFR 122.2). Included in the definition of storm water "point

sources" is storm water from an industrial facility that enters, and is discharged through, a municipal separate storm sewer. In short, most storm water discharges can be defined as "point source" discharges, since they ultimately flow into some kind of conveyance (e.g., a channel or swale).

2.8.1 INDUSTRIAL FACILITIES

Industrial applicants submitting individual applications must collect and analyze a grab sample taken within the first 30 minutes of the storm event and flow-weighted composite samples from each of the industrial storm water "point source" outfalls identified on the site drainage map submitted for Section III of Form 2F. Applicants submitting quantitative data for Part 2 of the group application must also collect samples for each outfall discharging storm water associated with industrial activity. All outfalls should be sampled during the same representative storm event if possible. If this is not feasible, outfalls may be sampled during different representative storm events upon approval by the permitting authority. Descriptions of each storm event and which outfalls were sampled during each event must be included in the application. Storm water runoff from employee parking lots, administration buildings, and landscaped areas that is not mixed with storm water associated with industrial activity, or storm water discharges to municipal sanitary sewers, do not need to be sampled.

Outfalls With Substantially Identical Effluents—Industrial Facilities

If an applicant has two or more outfalls with "substantially identical effluents," the facility may petition the permitting authority to sample and analyze only one of the identical outfalls and submit the results as representative of the other. "Substantially identical effluents" are defined as discharges from drainage areas undergoing similar activities where the discharges are expected to be of similar quantity and quality, and indistinguishable in expected composition. Chapter 5 presents an example of a petition for substantially identical effluents and discusses this process in more detail.

2.8.2 MUNICIPALITIES

Large and medium municipalities are required to sample storm water discharges from 5 to 10 outfalls or field screening points that were proposed in Part 1 of the application. The final decision on the number and location of sampling points will be determined by the permitting authority and will

depend on site-specific conditions such as land use or drainage area and results of data collected during the field screening analysis process for Part 1 of the application.

2.8.3 LOGISTICS OF WHERE TO SAMPLE

The ideal sampling location would be the lowest point in the drainage area where a conveyance discharges storm water to waters of the U.S. or to a municipal separate storm sewer system. A sample point also should be easily accessible on foot in a location that will not cause hazardous sampling conditions. Ideally, the sampling site should be on the applicant's property or within the municipality's easement; if not, the field personnel should obtain permission from the owner of the property where the discharge outfall is located. Typical sampling locations may include the discharge at the end of a pipe, a ditch, or a channel.

However, logistical problems with sample locations may arise (e.g., nonpoint discharges, inaccessibility of discharge point, etc.). Logistical problems with sample locations and suggested solutions are described in Exhibit 2-12. In many cases, it may be necessary to locate a sampling point further upstream of the discharge point (e.g., in a manhole or inlet). If the storm water at a selected location is not representative of a facility's total runoff, the facility may have to sample at several locations to best characterize the total runoff from the site. In situations where discharge points are difficult to sample for various reasons, the applicant should take the best sample possible and explain the conditions in the application. A discussion on sampling at retention ponds appears in Section 3.1.2.

2.9 STAFFING CONSIDERATIONS

Staffing needs for sampling must be determined by the applicant. Factors in making the determination include the number of sample locations, the size of the area to be sampled, how far apart the locations are, the type of sampling required, the technique to be used, the number of samples to be taken (depending on how many parameters must be analyzed), and safety considerations.

Training sampling personnel is important to the success of storm water discharge characterization. Training can be done using this manual. Sampling conducted by untrained personnel may result in

EXHIBIT 2-12. SOLUTIONS TO SAMPLE LOCATION PROBLEMS	
Problem:	Sampling where storm water commingles with process or non-process water
Solution:	Attempt to sample the storm water discharge before it mixes with the non-storm water discharge. If this is impossible, sample the discharge both during dry and wet weather and present both sets of data to the permitting authority. This will provide an indication of the contribution of pollutants from each source.
Problem:	Numerous small point discharges
Solution:	Impound channel or join together flow by building a weir or digging a ditch to collect discharge at a low point for sampling purposes. This artificial collection point should be lined with plastic to prevent infiltration and/or high levels of sediment. Or, sample at several locations to represent total site runoff.
Problem:	Inaccessible discharge point [examples include underwater discharges or unreachable discharges (e.g., out of a cliff)]
Solution:	Go up the pipe to sample (i.e., to the nearest manhole or inspection point). If these are not available, tap into the pipe or sample at several locations to best represent total site runoff.
Problem:	Managing multiple sampling sites to collect grab samples during the first 30 minutes (industrial facilities only)
Solution:	Have a sampling crew ready for mobilization when forecasts indicate that a representative storm will occur or sample several different representative events. Also, for most parameters, automatic samplers may be used to collect samples within the first 30 minutes triggered by the amount of rainfall, the depth of flow, flow volume or time.
Problem:	Commingling of parking lot runoff with discharge associated with industrial activity
Solution:	The combined runoff must be sampled at the discharge point as near as possible to the receiving water or the parking lot drain inlet if there is one.
Problem:	Sampling in manholes
Solution:	Sample in manholes only when necessary. See Chapter 6 for safety information Sampling in manholes requires training on confined space entry.
Problem:	Runon from other property
Solution:	If possible, estimate the volume of offsite runon contributions and offsite runon sources of pollutants to perform a mass balance calculation. Include this information in the permit application. If this estimation is not possible, provide a narrative discussion of the upstream site (e.g., is it developed, if so the type of facility, the types of pollutants that may be present on the site, etc.).

data that is unrepresentative of the facility's storm water discharge. This data might be rejected by the permitting authority, who would then require another sampling effort.

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3. FUNDAMENTALS OF SAMPLING

Because of the variable nature of storm water flows during a rainfall event and different analytical considerations for certain pollutants, the storm water regulations establish specific requirements for sample collection techniques. The quality of storm water discharges and logistical needs for sampling will be different for industrial applicants and municipal applicants. Therefore, specific sampling requirements vary. After a brief review of sampling fundamentals and special sampling requirements for storm water permit applications, the following sections are intended to teach applicants how to sample to meet these requirements.

The applicant should carefully plan his/her sampling strategy prior to the actual sampling event, e.g., walk the site to determine appropriate sampling locations, become familiarized with local rainfall patterns, train sampling staff in procedures and safety, consult with laboratory, and collect supplies.

3.1 TYPES AND TECHNIQUES OF SAMPLING

There are three basic aspects of sampling:

- Sample type (i.e., grab versus composite)
- Sample technique (i.e., manual versus automatic)
- Flow measurement methods.

These topics will be discussed in relation to requirements of an NPDES storm water discharge permit application. Once these aspects are addressed, step-by-step instructions on sampling procedures are presented. The sections below define and describe the types of storm water samples that must be collected and methods or techniques for collecting them. In addition, special sampling requirements for cert... pollutants are discussed.

3.1.1 SAMPLE TYPE VERSUS SAMPLE TECHNIQUE

It is important to understand the difference between sample type and technique. "Sample type" refers to the kind of sample that must be collected -- either a grab or a composite. "Sample technique" refers to the method by which a grab or composite sample is actually collected -- either manually or by automatic sampler. A generalized relationship between sample type and sample technique is presented in Exhibit 3-1. Sections 3.1.2 and 3.1.3 further explain the significance of these terms as they relate to storm water sampling requirements.

EXHIBIT 3-1. SAMPLE TYPE vs. SAMPLE TECHNIQUE

Sample Type	Sample Technique
Grab	Manual Automatic sampling system
Composite	Manual with manual compositing Automatic system or automatic sampling with manual compositing

3.1.2 SAMPLE TYPE: GRAB AND COMPOSITE SAMPLES

To comply with storm water application requirements, the sample type (grab or composite) must be collected in accordance with 40 CFR 122.21(g)(7) and 40 CFR Part 136. The storm water application requirements clearly specify which pollutants must be analyzed by grab sample, and which by composite sample. Although the requirements in 40 CFR 122.21(g)(7) do not explicitly specify either manual or automatic sampling techniques, the approved analytical methods contained in 40 CFR Part 136 direct that grab samples must be collected manually for certain pollutants. Sections 3.3 and 3.4 clarify which pollutants must be grabbed, which ones must be grabbed manually, and which ones must be flow-weighted composites.

The two types of storm water samples required by the regulations, grab and composite samples, are described below.

Grab Samples

A grab sample is a discrete, individual sample taken within a short period of time (usually less than 15 minutes). Analysis of grab samples characterizes the quality of a storm water discharge at a given time of the discharge.

Composite Samples

A composite sample is a mixed or combined sample that is formed by combining a series of individual and discrete samples of specific volumes at specified intervals. Although these intervals can be time-weighted or flow-weighted, the storm water regulations require the collection of flow-weighted composite samples. This means that discrete aliquots, or samples, are collected and combined in proportion to flow rather than time. Composite samples characterize the quality of a storm water discharge over a longer period of time, such as the duration of a storm event.

Application Requirements

Both types of samples must be collected and analyzed for storm water discharge permit applications. Grab samples must be collected for the following conditions:

- For storm water discharges associated with industrial activity, a grab sample must be obtained during the first 30 minutes of a discharge. This requirement is in addition to the composite sampling requirements. These samples are intended to characterize the maximum concentration of a pollutant that may occur in the discharge and/or may indicate intermingling of non-storm water discharges.

- For storm water discharges from large and medium municipal separate storm sewers, grab samples are required for Part 1 of the application if a discharge is noted during dry weather field screening. Two grab samples must be collected during a 24-hour period with a minimum of 4 hours between samples. These samples are intended to assist in the identification of illicit connections or illegal dumping. In Part 2, grab samples may be required for the analysis of certain pollutants for which municipalities are required to sample.

Flow-weighted composite samples must be collected during the first 3 hours of discharge or the entire discharge (if it is less than 3 hours) for both industrial and municipal applicants.

Pollutant-specific Requirements

The regulations at 40 CFR 122.21(g)(7) identify certain pollutants for which grab sampling is required:

- Monitoring by grab sample must be conducted for pH, temperature, cyanide, total phenols, residual chlorine, oil and grease (O&G), fecal coliform, and fecal streptococcus. Composite samples are not appropriate for these parameters due to their tendency to transform to different substances or change in concentration after a short period of time. Such transformations may be particularly likely in the presence of other reactive pollutants.

Sampling At Retention Ponds

Retention ponds with greater than a 24-hour holding time for a representative storm event may be sampled by grab sample. Composite sampling is not necessary. The rationale for this is that, because the water is held for at least 24 hours, a thorough mixing occurs within the pond. Therefore, a single grab sample of the effluent from the discharge point of the pond accurately represents a composite of the storm water contained in the pond. If the pond does not thoroughly mix the discharge, thereby compositing the sample, then a regular grab and composite sample should be taken at the inflow to the pond. Since each pond may vary in its capability to "composite" a sample, applicants must carefully evaluate whether the pond is thoroughly mixing the discharge. Such factors as pond design and maintenance are important in making this evaluation. Poor pond design, for example, where the outfall and inflow points are too closely situated, may cause short-circuiting and inadequate mixing. In addition, poor maintenance may lead to excessive re-suspension of any deposited silt and sediment during heavy inflows. Because of factors such as these, the applicant should determine the best location to sample the pond (e.g., at the outfall, at the outfall structure, in the pond) to ensure that a representative composite sample is taken. If adequate compositing is not occurring within the pond, the applicant should conduct routine grab and flow-weighted composite sampling.

A grab sample and a flow-weighted sample must be taken for storm water discharges collected in holding ponds with less than a 24-hour retention period. The applicant must sample the discharge in the same manner as for any storm water discharge [as described in 40 CFR 122.21(g)(7)]. In

effect, the applicant must take one grab sample within the first 30 minutes of discharge, or as soon as possible. The applicant must also collect a flow-weighted composite sample for at least the first 3 hours of the discharge, or for the event's entire duration (if it is less than 3 hours). The flow-weighted composite sample may be taken using a continuous sampler or as a combination of at least three sample aliquots taken during each hour of the discharge, with a minimum of 15 minutes between each aliquot. If the applicant does not know what retention period the pond is designed for, the design engineer of the pond should be consulted.

3.1.3 SAMPLE TECHNIQUE: MANUAL VERSUS AUTOMATIC SAMPLING

As previously discussed, manual and automatic sampling techniques are methods by which both grab and composite samples can be collected. Manual samples are simply samples collected by hand. Automatic samplers are powered devices that collect samples according to preprogrammed criteria. A typical automatic sampler configuration is shown in Exhibit 3-2.

For most pollutants, either manual or automatic sample collection will conform with 40 CFR Part 136. However, one case in which automatic samplers cannot be used is for the collection of volatile organic compound (VOC) samples because VOCs will likely volatilize as a result of agitation during automatic sampler collection. Samples collected for VOC analysis should be filled until a reverse meniscus is found over the top of the collection bottle and capped immediately to leave no air space. Automatic samplers do not perform this function. Special requirements for VOC sampling are discussed in Section 3.5.2.

Although both collection techniques are available, several other pollutants may not be amenable to collection by an automatic sampler, for example fecal streptococcus, fecal coliform and chlorine have very short holding times (i.e., 6 hours), pH and temperature need to be analyzed immediately and oil and grease requires teflon coated equipment to prevent adherence to the sampling equipment.

Other restrictions on sample collection techniques (such as container type and preservation) should be determined by consulting the approved analytical methods listed in 40 CFR Part 136. Section 3.5 and Technical Appendix C provide additional information on sample handling, holding times, and preservation methods.

EXHIBIT 3-2. AUTOMATIC SAMPLER

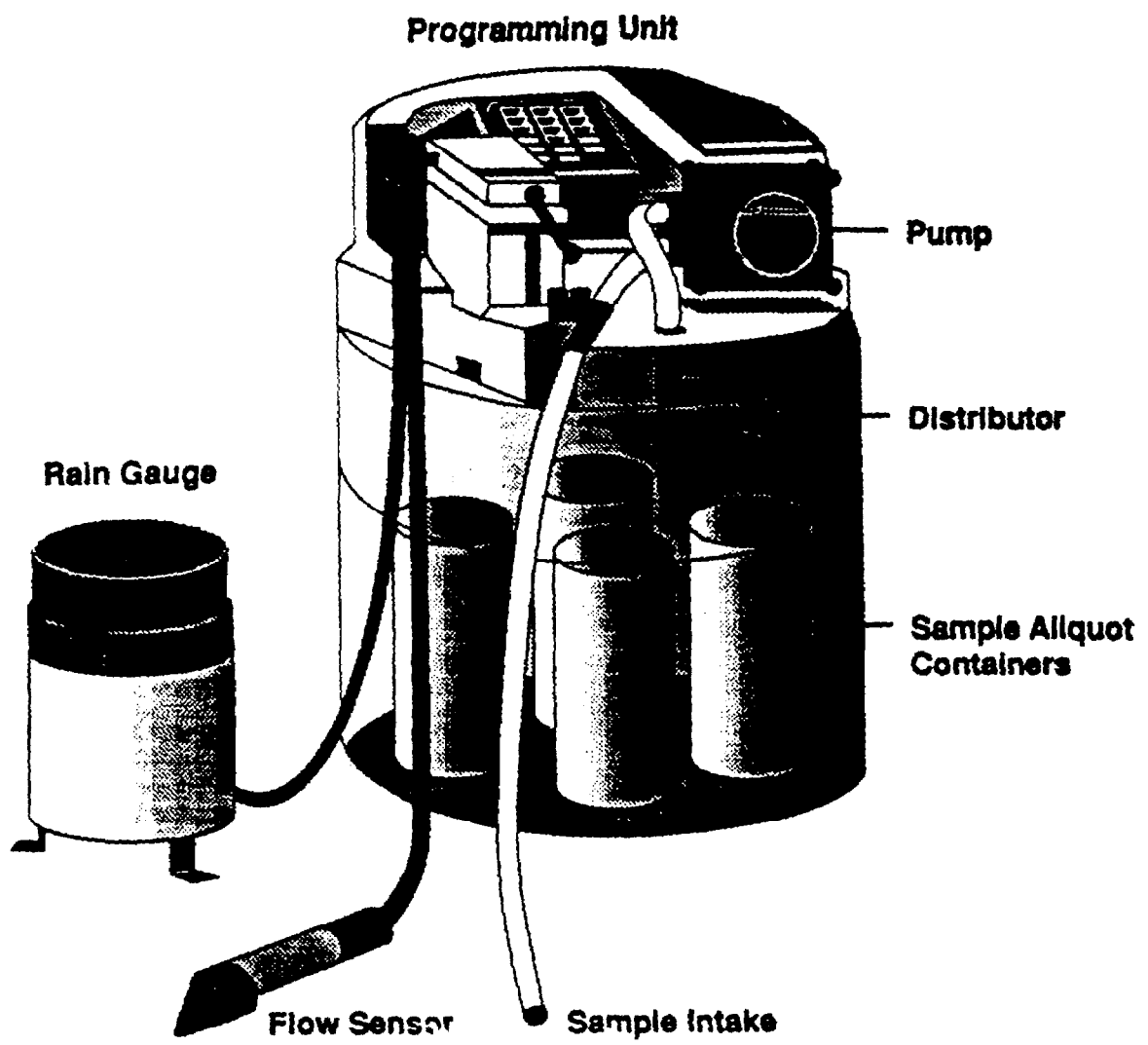

Manual and automatic techniques have advantages and disadvantages that the applicant should consider in relation to the sampling program. The main advantage of manual sampling is that it can be less costly than purchasing or renting automatic samplers. Automatic samplers, however, can be often more convenient. Exhibit 3-3 presents a matrix of advantages and disadvantages associated with each technique. Ultimately, the best technique to use will depend on each applicant's situation.

3.2 OBTAINING FLOW DATA

In addition to collecting samples of storm water discharges, applicants must collect data characterizing the flow rate and flow volume for each storm water discharge sampled. Flow rate is the quantity of storm water discharged from an outfall per unit of time. Total flow is a measure of the total volume of storm water runoff discharged during a rain event. Flow rates and volumes can either be measured specifically or can be estimated (based on rainfall measurements, velocities, and depth of flows). To collect flow-weighted composite samples, flow rate data is necessary to combine proportional volumes of individually collected aliquots. Applicants must also report the mass of pollutants contained in storm water discharges (see Section 3.2.5). To determine mass loadings of pollutants, applicants must measure both discharge flow rate and pollutant concentration. This section presents methods for obtaining flow data.

3.2.1 MEASURING FLOW RATES

Flow rates for storm water discharges are most accurately measured using either primary or secondary flow measurement devices. Facilities should use these devices to characterize their discharge as precisely as possible. Where flow measurement devices are not already installed, portable devices should be considered. There are many permanent and portable types of flow measurement devices available. This discussion is limited to the most common flow measurement devices. To purchase flow measurement devices and rain gauges, pertinent engineering journals can be consulted for equipment vendor listings. Proper analysis of site discharge conditions must be conducted prior to purchase and installment of flow measurement devices.

<u>Primary Flow Measurement Devices</u>

A primary flow measurement device is a man-made flow control structure which, when inserted into an open channel, creates a geometric relationship between the depth of the flow and the rate of the

EXHIBIT 3-3. COMPARISON OF MANUAL AND AUTOMATIC SAMPLING TECHNIQUES		
Sample Method	**Advantages**	**Disadvantages**
Manual Grabs	• Appropriate for all pollutants • Minimum equipment required	• Labor-intensive • Environment possibly dangerous to field personnel • May be difficult to get personnel and equipment to the storm water outfall within the 30 minute requirement • Possible human error
Manual Flow-Weighted Composites (multiple grabs)	• Appropriate for all pollutants • Minimum equipment required	• Labor-intensive • Environment possibly dangerous to field personnel • Human error may have significant impact on sample representativeness • Requires flow measurements taken during sampling
Automatic Grabs	• Minimizes labor requirements • Low risk of human error • Reduced personnel exposure to unsafe conditions • Sampling may be triggered remotely or initiated according to present conditions	• Samples collected for O&G may not be representative • Automatic samplers cannot properly collect samples for VOCs analysis • Costly if numerous sampling sites require the purchase of equipment • Requires equipment installation and maintenance • Requires operator training • May not be appropriate for pH and temperature • May not be appropriate for parameters with short holding times (e.g., fecal streptococcus, fecal coliform, chlorine) • Cross-contamination of aliquot if tubing/bottles not washed
Automatic Flow-Weighted Composites	• Minimizes labor requirements • Low risk of human error • Reduced personnel exposure to unsafe conditions • May eliminate the need for manual compositing of aliquots • Sampling may be triggered remotely or initiated according to on-site conditions	• Not acceptable for VOCs sampling • Costly if numerous sampling sites require the purchase of equipment • Requires equipment installation and maintenance, may malfunction • Requires initial operator training • Requires accurate flow measurement equipment tied to sampler • Cross-contamination of aliquot if tubing/bottles not washed

flow. The depth of the flow, referred to as the head (H), can then be measured at the respective reference point/area with a ruler or other staff gauge. When substituted into a formula, which mathematically describes the relationship between depth and discharge for the primary devices, the head measurement can be used to calculate a flow rate (Q). The most common primary flow measurement devices are weirs and flumes. Weirs and flumes are flow structures designed to provide a known, repeatable relationship between flow and depth.

Weirs

Weirs consist of a crest located across the width of an open channel (at a right angle to the direction of the flow). The flow of water is impeded, causing water to overflow the crest. Diagrams and formulas of some typically found weirs are provided in Exhibit 3-4. Weirs are inexpensive and particularly valuable in measuring flow in natural or man-made swales because they are easily installed in irregularly shaped channels.

Weirs can only provide accurate flow measurements when head measurements are appropriately taken. When flow exceeds the capacity of the weir and water overtops the weir crest, flow depth actually diminishes as the water approaches the weir, as shown in Exhibit 3-5. Therefore, measuring the depth at the weir crest will result in an inaccurate measurement of the actual head. Under these circumstances, the head should be measured upstream, at a point determined by the type of weir and the estimated amount of flow. A staff gauge can be installed at a nonturbulent point upstream of the weir crest to provide accurate and convenient measurements.

Flumes

Flumes are structures which force water through a narrow channel. They consist of a converging section, a throat, and a diverging section. Exhibit 3-6 portrays the most common type of flume, the Parshall flume, and also provides formulas for calculating appropriate flow rates.

Parshall flumes have fixed specifications relating to geometric shape. They vary only in throat width. Due to these geometric constraints, Parshall flumes may be expensive to install. They are typically used in permanent flow measurement points and are most commonly placed in concrete-lined channels. However, Parshall flumes can also be used in temporary points. Parshall flumes provide accurate measurements for a relatively wide range of flow rates. The flow rate through the Parshall flume (see Exhibit 3-6) is calculated from the depth (H_a) of flow measured in the converging

EXHIBIT 3-4. WEIRS

V-Notch

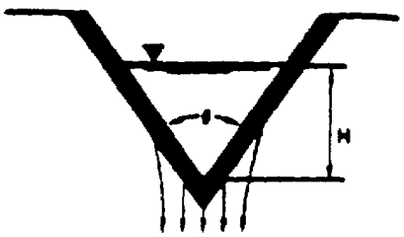

$Q = 2.5\ H^{2.5}$ (90°)
$Q = 1.443\ H^{2.5}$ (60°)
$Q = 1.035\ H^{2.5}$ (45°)
$Q = 0.676\ H^{2.5}$ (30°)
$Q = 0.497\ H^{2.5}$ (22½°)

Q = Flow Rate

H = Depth of flow (Head)

Rectangular (without contractions)

$Q = 3.33\ L\ H^{1.5}$

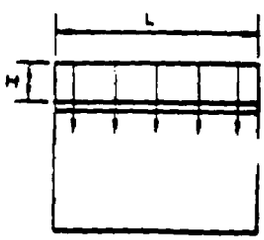

Rectangular (with contractions)

$Q = 3.33\ (L - 0.2\ H)^{1.5}$

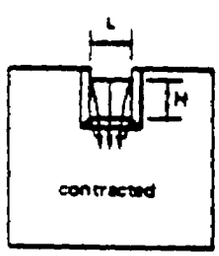

Cipolleti (trapezoidal)

$Q = 3.367\ b\ H^{1.5}$

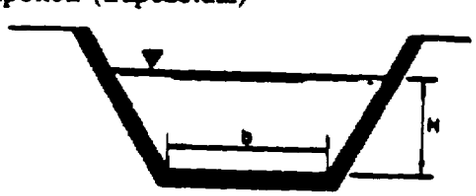

Source: Civil Engineering Reference Manual, 5th Edition, by Michael R. Lindeburg, PE, with permission from the publisher, Professional Publications, Inc., Belmont, California, 1989.

EXHIBIT 3-5. SUPPRESSED FLOW OVER THE WEIR CREST

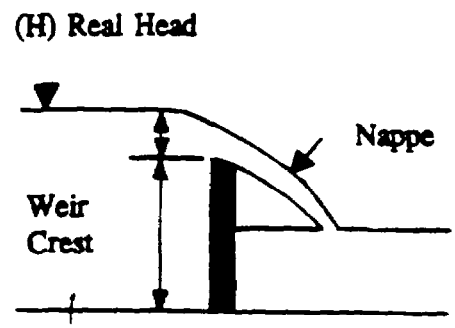

Source: Civil Engineering Reference Manual, 5th Edition, by Michael R. Lindeburg, PE, with permission from the publisher, Professional Publications, Inc., Belmont, California, 1989.

section of the flume. The exact location of the depth measurement depends on the specific design of the Parshall flume. Exhibit 3-6 indicates the equations used to calculate flow rate through a typical Parshall flume. These equations are accurate only when the submergence ratio (H_b/H_a) is greater than 0.7. The manufacturers' information should be consulted for the flow rate equation and measuring points for a specific Parshall flume.

Palmer-Bowlus flumes, shown in Exhibit 3-7, are also used at some facilities. Palmer-Bowlus flumes are designed to be installed in an existing circular channel (such as a manhole channel) and are available as portable measurement devices. While Palmer-Bowlus flumes are inexpensive, self cleaning, and easy to install, they can only measure flow rates accurately over a narrow range of flow.

The flow from a Palmer-Bowlus flume is calculated using the height between the floor of the flume portion and the water level, not the total head of the water level. Head measurements are taken at

EXHIBIT 3-6. FLUMES

Parshall Flume

$Q = 0.338\ H^{1.55}$	(1 inch)
$Q = 0.676\ H^{1.55}$	(2 inches)
$Q = 0.992\ H^{1.547}$	(3 inches)
$Q = 2.09\ H^{1.58}$	(6 inches)
$Q = 3.07\ H^{1.55}$	(9 inches)
$Q = 4\ W\ H^{1.522}\ W^{0.26}$	(1-8 feet)
$Q = (3.6875\ W + 2.5)H^{1.6}$	(10-50 feet)

Q = Flow rate

H = Depth of flow (Head)

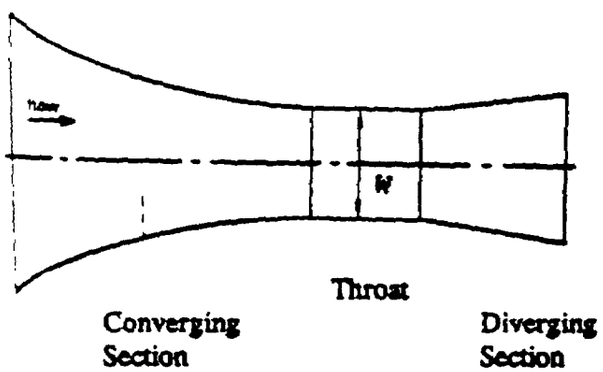

Top View

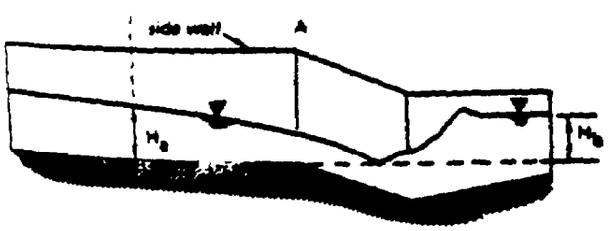

Side View

Source: Civil Engineering Reference Manual, 5th Edition, by Michael R. Lindeburg, PE, with permission from the publisher, Professional Publications, Inc., Belmont, California, 1989.

EXHIBIT 3-7. PALMER-BOWLUS FLUME

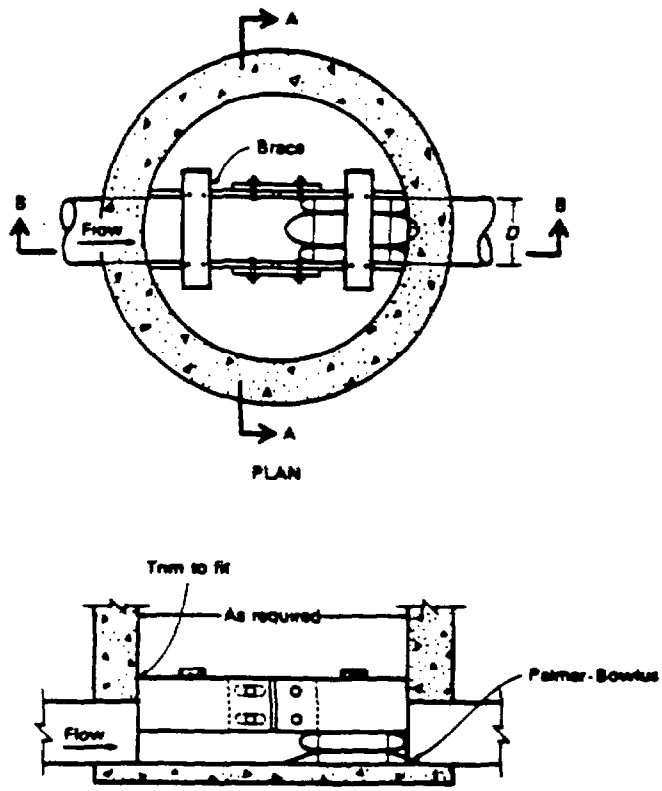

Source: Wastewater Engineering: Treatment, Disposal, Reuse, 2nd Edition, Metcalf & Eddy, Inc., with permission from the publisher, McGraw-Hill Book Co., New York, 1979.

a distance from the throat equal to one half the width of the flume. The dimensions of a Palmer-Bowlus flume have been standardized in a generic sense, but the flume shape may vary. Therefore, there are no formulas that can be applied to all Palmer-Bowlus flumes. Device-specific head-flow relationships for each device should be obtained from the manufacturer

There are a number of other, less common, flow measurement devices available which will not be discussed (see Appendix D for additional references).

Secondary Flow Measurement Devices

Secondary flow measurement devices are automated forms of flow rate and volume measurement. Typically, a secondary device is used in conjunction with a primary device to automatically measure the flow depth or head. This value is then processed, using established mathematical relationships to relate the depth measurement to a corresponding flow rate. The device also may have the capacity to convert this flow rate to a volume. Secondary flow measurement devices include floats, ultrasonic transducers, pressure transducers, and bubblers. The output of the secondary device is transmitted to a display, recorder, and/or totalizer to provide flow rate and volume information. The user manuals for these devices should be consulted for proper usage.

Evaluation of Flow Measurement Devices

To ensure accurate results, facilities should evaluate, via visual observation and routine checks, the design, installation, and operation of flow measurement devices. When evaluating design, select a device which:

- Is accurate over the entire range of expected flow rates
- Can be installed in the channel to be monitored
- Is appropriate to the sampling location (i.e., power setup, submersible, etc.).

When evaluating the installation of flow measurement devices, ensure that:

- There are no leaks and/or bypasses of flow around the measuring device
- The primary device is level and squarely installed
- The secondary device is calibrated.

When evaluating the operation of flow measurement devices, look for:

- Excessive flows which submerge the measuring device
- Flows outside the accuracy range of the device
- Leaks and/or bypasses around the measuring device

- Turbulent flow through the measuring device
- Corrosion, scaling, or solids accumulation within the measuring device
- Obstructions to the measuring device
- Use of the correct factor or formula to convert head readings to actual flow rate.

Other than ensuring appropriate design and installation, accuracy checks are difficult to accomplish for primary flow measurement devices. Secondary flow measurement devices, on the other hand, may require evaluation of design, installation, and calibration. Applicants should examine the secondary recording devices and their readouts after installation to ensure that they are operating properly. Unusual fluctuations or breaks in flow indicate operational or design flaws.

3.2.2 ESTIMATING FLOW RATES

There are a variety of techniques for estimating flow rates. These methods are not as accurate as the methods described in Section 3.2.1 above, but are suitable for those discharges where primary or secondary devices are not practical or economically feasible. Each of the following methods is suitable for certain types of flow situations, as indicated. For each, the procedure for collecting flow rate data will be given along with a sample calculation.

Float Methods

Float methods can be used for any discharge where the flow is exposed and/or easily accessible. It is particularly useful for overland flows, gutter flows, and open drain or channel flows. The flow rate is calculated in each of the float methods by estimating the velocity of the flow and the cross-sectional area of the discharge and using the standard flow rate equation:

$$\textit{Flow Rate (cfm)} = \textit{Velocity (ft/min)} \times \textit{Area (ft}^2\textit{)}$$

The velocity is estimated by measuring the time it takes a float to travel between two points (point A and point B) along the flow path. For most accurate results, the two points should be at least 5 feet apart. The cross-sectional area is estimated by measuring the depth of the water and the width of the flow, and multiplying the depth by the width. This assumes a uniform cross-section in the flow path and a geometric cross-section shape. The float method can also be used for any accessible pipe or ditch where the movement of the float can be traced downstream for at least 5 feet. Subsurface storm water flows can be measured with the float method where there are two accessible manholes.

If the flow is overland, the water will need to be directed into a narrow channel or ditch so that the measurements can be taken. The initial preparation for this method requires that a shallow channel or ditch be dug that is 6 feet long or longer and 4 to 12 inches wide. The channel or ditch should be shallow enough to easily obtain flow depths but should be deep enough to carry the flow that will be diverted to it. Boards or other barriers should be placed on the ground above the channel (so that the flow is diverted into the channel) and along the edges of the channel or ditch (flush with the ground surface so that flow does not seep under them).

The procedure for measuring the flow rate by the float method involves measuring the length of the channel between chosen points A and B (which must be 5 feet apart or more). The depth of the water at point B, in the middle of the channel, must be determined, and the width of the water flow must be measured at point B. A float is then placed in the water and timed as it moves from point A to point B. Exhibit 3-8 provides an example of estimating the flow rate using the float method.

For runoff flows from many directions into a drain in a low or flat area where ponding is evident, the float method can also be used. The total flow rate is calculated by measuring flow rates for several points into the drain and adding these values together. Exhibit 3-9 provides an example of estimating the flow rate using the float method in this situation.

Bucket and Stopwatch Method

The bucket and stopwatch method of estimating flow rate is the easiest of all the flow rate estimation procedures. However, it can only be used under certain conditions. The flow or discharge to be measured must be flowing from a small pipe or ditch, and it must be free-flowing. In other words,

EXHIBIT 3-8. EXAMPLE CALCULATION OF FLOAT METHOD FOR UNIMPEDED OPEN CHANNEL FLOW

Step 1: When each sample or aliquot is taken, record the data for the time the sample was taken and the length between points A and B (at least 5 feet apart). See columns A, B, and C.

EXAMPLE DATA:

A	B	C	D	E	F	G
Sample Number	Time in Minutes	Distance Between Points A & B (feet)	Time of Travel (A to B) (min)	Depth of Water at Point B (feet)	Width of Flow at Point B (feet)	Calculated Flow Rate (cfm)
1	0	5.0	0.17	0.12	0.5	1.8
2	20	5.0	0.18	0.25	0.5	3.5
3	40	5.0	0.20	0.29	0.5	3.6
4	60	5.0	0.21	0.33	0.5	3.9
5	80	5.0	0.18	0.29	0.5	4.0
6	100	5.0	0.17	0.25	0.5	3.7
7	120	5.0	0.17	0.12	0.5	1.8
8	140	5.0	0.16	0.12	0.5	1.9
9	160	5.0	0.18	0.12	0.5	1.7

Step 2: Place a float in the water flow at point A and time it as it moves from point A to point B. Record the time in minutes. See column D.

Step 3: Measure the depth of the water and the width of the flow at point B. See columns E and F.

Step 4: Calculate the flow rate for each sample time using the common flow rate formula. See column G.

Formulas:

$$Velocity\ (V) = \frac{Length\ from\ A\ to\ B}{Time\ of\ Travel}$$

$$Area\ (A) = Water\ Depth \times Width\ of\ Flow$$

$$Flow\ Rate\ (Q) = (V) \times (A)$$

Example: For Sample 1

$$V = \frac{5.0\ ft}{0.17\ min} = 29.4\ ft/min$$

$$A = 0.12\ ft \times 0.5\ ft = 0.06\ ft^2$$

$$Q = 29.4\ ft/min \times 0.06\ ft^2 = 1.8\ cfm$$

EXHIBIT 3-9. EXAMPLE CALCULATION OF FLOAT METHOD FOR ESTIMATING DRAIN FLOW RATES

Step 1: When each sample or aliquot is taken, record the data for the time the sample was taken. Measure the outer perimeter or edge of the drain where the water flows in. See columns B and C.

Step 2: Designate three evenly spaced points surrounding the drain approximately 3 to 5 feet from the drain. These points will be referred to as points A, B, and C. Record the distance from each point to the edge of the drain. See column D.

EXAMPLE DATA: Assume the drain dimensions are 1 ft x 1 ft square, and flow surrounds drain.

A	B	C	D			E			F			G
Sample Number	Sample Time (min)	Drainage Perimeter (feet)	Distance of Point to Drain (feet)			Time of Travel to Drain (min)			Depth of Water (feet)			Calculated Flow Rate (cfm)
			Pt. A	Pt. B	Pt. C	Pt. A	Pt. B	Pt. C	Pt. A	Pt. B	Pt. C	
1	0	4	3	4	5	0.2	0.3	0.5	0.08	0.08	0.08	4 cfm
2	20	4	3	4	5	0.3	0.4	0.5	0.11	0.12	0.14	5 cfm
3	40	4	3	4	5	0.3	0.4	0.5	0.11	0.12	0.14	5 cfm
4	60	4	3	4	5	0.4	0.5	0.6	0.16	0.17	0.20	6 cfm
5	80	4	3	4	5	0.3	0.4	0.5	0.11	0.12	0.14	5 cfm
6	100	4	3	4	5	0.3	0.4	0.5	0.11	0.12	0.14	5 cfm
7	120	4	3	4	5	0.3	0.4	0.5	0.11	0.12	0.14	5 cfm
8	140	4	3	4	5	0.3	0.4	0.5	0.11	0.12	0.14	5 cfm
9	160	4	3	4	5	0.2	0.3	0.5	0.08	0.08	0.08	4 cfm

Step 3: Place a float at each of the three points and measure the time it takes to reach the drain. Record the times in minutes. See column E.

Step 4: Determine the depth of flow at each place where the float enters the drain from points A, B, and C. Record the depth in feet. See column F.

Step 5: Calculate the flow rate by adding the individual flow rates for points A, B, and C. Record the data in column G.

Formulas:

$$Velocity\ (V) = \frac{Distance\ of\ Point\ from\ Drain}{Time\ of\ Travel}$$

$$Area\ (A) = Water\ Depth \times Drainage\ Perimeter$$

$$Flow\ Rate\ (Q) = 1/n\Sigma A_n V_n \text{ where } n \text{ equals points A, B, and C}$$

Example: For Sample 1

$$V_A = \frac{3\ Feet}{0.2\ Min} = 15\ ft/min$$

$$A_A = 0.08\ ft \times 4\ ft = 0.32\ ft^2$$

EXHIBIT 3-9. EXAMPLE CALCULATION OF FLOAT METHOD FOR ESTIMATING DRAIN FLOW RATES (Continued)

$$Q_{TOTAL} = \frac{1}{3}(V_A A_A + V_B A_B + V_C A_C)$$

$$= \frac{1}{3}[(15\ ft/min)(0.32\ ft^2) + (13\ ft/min)(0.32\ ft^2) + (10\ ft/min)(0.32\ ft^2)]$$

$$= 4\ cfm$$

the pipe or ditch must be raised above the ground. Also, the flow must be small enough to be captured by a bucket or other suitable container without overflowing. If these conditions are not present, another method must be used. The procedure involves recording the time that each sample is taken, the time it takes for the container to be filled, and the volume of discharge collected. The flow rate is then calculated in gallons per minute (gpm) or in cubic feet per minute (cfm). The basis for the bucket and stopwatch method is the collection of a measured amount of flow over a measured amount of time to determine flow per unit of time (or flow rate) as per the formula below.

$$Flow\ Rate\ Q\ (gpm) = \frac{Volume\ of\ Bucket\ (gal)}{Time\ to\ Fill\ (sec)} \times \frac{60\ sec}{1\ min}$$

Exhibit 3-10 provides an example of estimating flow rates with the bucket and stopwatch method.

Slope and Depth Method

The slope and depth method is also a relatively easy method for estimating flow rates in pipes and ditches. This procedure requires that the slope of the pipe or ditch be known. A survey or engineering design data such as sewer or grading plans may provide the slope or grade of the pipe or ditch. In addition, the flow or effluent to be measured should not fully fill the pipe or ditch from which it is flowing. To measure the depth of the flow at the center of the pipe or ditch at the outfall, the outfall should be accessible. If these conditions are not present, another method should be used. The procedure involves recording the time that each sample is taken and measuring the depth of the flow in the middle of the pipe or ditch. If the flow is coming from a pipe, the inside diameter of the pipe should be recorded. If the effluent is coming from a ditch, the width of the flow in the ditch should be measured. Also, the modified slope of the ditch should be calculated. The flow rate is calculated in cfm using the same formulas for both pipes and ditches. Exhibit 3-11 provides an example of estimating the flow rate with the slope and depth method.

EXHIBIT 3-10. EXAMPLE CALCULATION OF BUCKET AND STOPWATCH METHOD FOR ESTIMATING FLOWS

Step 1: When each sample or aliquot is taken, record the data for the time the sample was taken. See column B.

EXAMPLE DATA:

A	B	C	D	E	F
Sample Number	Time (minutes)	Time to Fill Bucket (seconds)	Volume of Bucket (gallons)	Calculated Flow Rate (gpm)	Calculated Flow Rate in (cfm)
1	0	40.0	2.0	3.0	0.4
2	20	26.0	2.0	4.6	0.6
3	40	24.0	2.0	5.0	0.7
4	60	32.0	2.0	3.7	0.5
5	80	45.0	2.0	2.7	0.4
6	100	31.0	2.0	3.9	0.5
7	120	50.0	2.0	2.4	0.3
8	140	21.0	2.0	5.7	0.8
9	160	28.0	2.0	4.3	0.6

Step 2: Put a bucket beneath the flow, while measuring with a stopwatch the time it takes to fill the bucket to a certain level. If the water spills over the sides, the process must be redone. Record the time it took to fill the volume of water. See columns C and D.

Step 3: Calculate the flow rate in gpm and cfm.

Formulas:

$$\textit{Flow Rate, } Q(gpm) = \frac{\textit{Volume of bucket (gal)}}{\textit{Time to fill (sec)}} \times \frac{60\ sec}{1\ min}$$

$$Q(cfm) = Q(gpm) \times 0.1337\ ft^3/gal$$

Example: For Sample 1

$$Q\ (gpm) = \frac{2\ gal}{40.0\ sec} \times \frac{60\ sec}{1\ min} = 3.0\ gpm$$

$$Q\ (cfm) = 3.0\ gpm \times 0.1337\ ft^3/gal = 0.4\ cfm$$

EXHIBIT 3-11. EXAMPLE CALCULATION OF SLOPE AND DEPTH METHOD FOR ESTIMATING FLOW RATES

Step 1: Obtain the pipe or ditch channel percent slope from engineering data. Determine the inside diameter if the flow is from a pipe.

EXAMPLE DATA: For purposes of this example, a ditch with a 2 percent slope is assumed.

Step 2: When each sample or aliquot is taken, record the data for the time the sample was taken. See column B.

EXAMPLE DATA:

A	B	C	D	E	F	G
Sample Number	Time (minutes)	Depth of Water (in)	Width of Flow (ditch only) (feet)	"M" Modified Slope (ditch only)	Calculated Flow Rate (cfm Pipe only)	Calculated Flow Rate (cfm ditch only)
1	0	3.6	2.2	3.7	-	246.1
2	20	6.0	3.2	3.2	-	713.6
3	40	7.2	4.0	3.3	-	1,237.3
4	60	8.4	4.2	3.0	-	1,532.9
5	80	7.2	4.0	3.3	-	1,237.3
6	100	6.0	3.2	3.2	-	713.6
7	120	6.0	3.0	3.0	-	624.2
8	140	6.0	2.9	2.9	-	581.8
9	160	4.6	2.5	3.3	-	374.1

Step 3: Measure the depth of the water in the center of the pipe or ditch. Record the data in feet. See column C.

Step 4: Measure the width of the flow only if the flow is in a ditch. Record the data in feet. See column D.

Step 5: Calculate the modified side slope only if the flow is in a ditch (leave column E blank if the flow is in a pipe).

Formula:

$$\text{Modified slope } (M) = \frac{12.0 \text{ in/ft} \times \text{flow width (ft)}}{2.0 \times \text{water depth (in)}}$$

Example: Sample 1:

$$M = \frac{12.0 \text{ in/ft} \times 2.2 \text{ ft}}{2.0 \times 3.6 \text{ in}} = 3.7$$

Step 6: For pipes, calculate the flow rate and record the data in column F.

$$\text{Flow Rate } (Q) = 0.004 \times (I.D.)^{1.67} \times D \times \sqrt{S}$$

where Q = flow rate in pipe (cfm), I.D. = inside diameter of pipe (in), D = water depth (in), S = pipe slope (%)

Step 7: For ditches or channels, calculate the flow rate in cfm. Record the flow rate in column G.

Formula:

$$\text{Flow Rate } (Q) = \frac{0.42M \times (M)^{1.67} \times (D)^{2.67} \times \sqrt{S}}{(M^2 + 1)^{0.33}}$$

where Q = flow rate in ditch (cfm), M = modified slope, D = water depth (in), S = ditch slope (%)

Example: For Sample 1:

$$Q_1 = \frac{0.42\,(3.7) \times (3.7)^{1.67} \times (3.6)^{2.67} \times \sqrt{2}}{[(3.7)^2 + 1]^{0.33}}$$

$$Q = 246.1 \text{ cfm}$$

Runoff Coefficient Methods

Runoff coefficient methods are the least accurate of all the flow rate estimation methods. These methods should only be used for composite flow-weighted samples if all of the other methods are inappropriate for the site. Although the least accurate, runoff coefficients are the simplest method of estimating runoff rates.

Runoff coefficients represent the fraction of total rainfall that will be transmitted as runoff from the drainage area that flows into the facility outfall. Runoff coefficients consider the ground surface or cover material and determine the amount of storm water flow which may infiltrate or runoff as a discharge. A simple estimate of runoff volume assumes that paved areas and other impervious structures such as roofs have a runoff coefficient of 0.90 (i.e., 90 percent of the rainfall leaves the area as runoff). For unpaved surfaces, a runoff coefficient of 0.50 is normally assumed. A more accurate estimate can be made by using more specific runoff coefficients for different areas of the facility, based on the specific type of ground cover. Commonly used runoff coefficients are listed in Exhibit 3-12.

The average runoff coefficient can be estimated for drainage areas that have both paved and unpaved areas by weighting the coefficients based on their proportion of the total area. An equation for this would be:

$$\textit{Estimated Average Runoff Coef.} = \frac{(\textit{Area A})(\textit{Runoff Coef. A}) + (\textit{Area B})(\textit{Runoff Coef. B})}{\textit{Area A} + \textit{Area B}}$$

The area of the drainage basin can generally be obtained from land surveys conducted at the time of facility purchase or site surveys taken from design documents developed as part of construction planning. If these are not available, the applicant may estimate the drainage areas from a topographic map of the area. The areas used in this calculation should include only those areas drained by the sampled outfall. When determining the basin area that drains through the outfall, some special considerations should be noted: (1) storm water from sources outside an industrial facility's property boundary may contribute to the discharge; and (2) storm water not associated with industrial activity may contribute to the flow volume. Where these conditions occur, the facility should accurately quantify and appropriately address these contributions.

EXHIBIT 3-12. TYPICAL "c" COEFFICIENTS FOR 5- TO 10-YEAR FREQUENCY DESIGN STORMS

Description of Area	Runoff Coefficients
Business	
• Downtown areas	0.70-0.95
• Neighborhood areas	0.50-0.70
Residential	
• Single-family areas	0.30-0.50
• Multiunits (detached)	0.40-0.60
• Multiunits (attached)	0.60-0.75
Residential (suburban)	0.25-0.40
Apartment dwelling areas	0.50-0.70
Industrial	
• Light areas	0.50-0.80
• Heavy areas	0.60-0.90
Parks and cemeteries	0.10-0.25
Playgrounds	0.20-0.35
Railroad yard areas	0.20-0.40
Unimproved areas	0.10-0.30
Streets	
• Asphalt	0.70-0.95
• Concrete	0.80-0.95
• Brick	0.70-0.85
Drives and walks	0.75-0.85
Roofs	0.75-0.95
Lawns - course textured soil (greater than 85 percent sand)	
• Slope: Flat (2 percent)	0.05-0.10
Average (2-7 percent)	0.10-0.15
Steep (7 percent)	0.15-0.20
Lawns - fine textured soil (greater than 40 percent clay)	
• Slope: Flat (2 percent)	0.13-0.17
Average (2-7 percent)	0.18-0.22
Steep (7 percent)	0.25-0.35

Source: *Design and Construction of Sanitary and Storm Sewers*, with permission from the publisher, American Society of Civil Engineers, *Manual of Practice*, page 37, New York, 1960.

There are two specific methods to estimate flow rate using runoff coefficients. The first method uses depth of flow in a pipe or ditch and an average runoff rate to estimate each of the sample flow rates where the slope/pitch of the pipe or ditch is unknown. Exhibit 3-13 provides an example calculation of estimating flow rates based on depth and runoff coefficients. The second method uses only rainfall accumulation and runoff coefficients to estimate a flow associated with the time the sample was taken. No actual flows or flow depths are measured. Exhibit 3-14 provides an example of estimating the flow rate based on rainfall depth and runoff coefficients.

3.2.3 MEASURING TOTAL FLOW VOLUMES FOR THE SAMPLED RAIN EVENT

Similar to measuring flow rates, flow volumes may be measured using automatic flowmeters or primary/secondary devices as discussed in Section 3.2.1. Measurement of flow volume with these devices provides a reasonably accurate determination of the total flow volume for the entire storm water discharge. In many cases, however, primary or secondary devices have not been installed for storm water flow measurement. Portable flow measurement devices are often expensive. Many of the automatic samplers that are currently on the market can measure flow volumes as well as perform sampling. Where available and when economically feasible, measuring devices should be used to generate data for calculating flow.

3.2.4 ESTIMATING TOTAL FLOW VOLUMES FOR THE SAMPLED RAIN EVENT

Since accurate measurement of total flow volumes is often impracticable due to lack of equipment, total flow volumes are more commonly estimated. The two methods provided in this section require only simple estimated measurements. The first method is based on rainfall depths and runoff coefficients and the second is based on flow rates that can be either measured or estimated.

Runoff Coefficients Methods

Discharge volumes are most easily estimated using the area of the drainage basin contributing to the outfall, the rainfall accumulation, and a runoff coefficient. The total volume of discharge can be estimated using a simple equation that relates the amount of rainfall to the volume of discharge that will leave the site as runoff. The equation is as follows:

EXHIBIT 3-13. EXAMPLE CALCULATION OF RUNOFF COEFFICIENT/FLOW DEPTH METHOD FOR ESTIMATING FLOW RATES

Step 1: Estimate the runoff coefficient for the drainage area that contributes flow to the sampled outfall (see Section 3.2.2).

EXAMPLE: Assume the drainage area to the outfall is 3 acres. Two of those acres are paved with a runoff coefficient of .90, and 1 is unpaved with a runoff coefficient of .50. Using the equation for estimated runoff coefficient from the text in Section 2.2.2.2:

$$\textit{Est. Run. Coef.} = \frac{(2\ Ac)\ (0.90) + (1\ Ac)\ (0.50)}{2\ Ac + 1\ Ac} = 0.77$$

The runoff coefficient for the entire drainage area is 0.77.

Step 2: Measure the rainfall depth. Record the total rainfall of the storm or the rainfall that occurred in the first 3 hours (if it lasted more than 3 hours). Also record the duration of the rain event.

EXAMPLE: Assume the rainfall depth to be 1.0 inches in 3 hours.

Step 3: Calculate an average runoff rate.

Formula:

$$\textit{Average Runoff Rate} = \frac{\textit{Drainage Area} \times \textit{Runoff Coef.} \times \textit{Rainfall Depth}}{\textit{Rainfall Duration}}$$

Example:

$$\textit{Average Runoff Rate} = \frac{3\ Ac \times .77 \times 1\ in}{3\ hrs} \times \frac{43{,}560\ ft^2}{Ac} \times \frac{ft}{12\ in} \times \frac{hr}{60\ min} = 47\ cfm$$

When each sample or aliquot is taken, record the data for the time the samples were taken and the depth of the water in the center of the ditch or pipe. Record the data in columns B and C.

EXAMPLE DATA:

A	B	C	D	E
Sample Numbers	Time (minutes)	Channel or Ditch Water Depth (feet)	Calculated Depth-Weighted Flow Factor	Flow Rate (cfm)
1	0	1.0	0.82	39
2	20	1.1	0.90	42
3	40	1.2	0.98	46
4	60	1.25	1.02	48
5	80	1.3	1.06	50
6	100	1.25	1.02	48
7	120	1.2	0.98	46
8	140	1.7	1.39	65
9	160	1.0	0.82	39

Step 4: Sum up all the water depths for each sample taken as indicated above in column C.

Sum = 11.0 feet

EXHIBIT 3-13. EXAMPLE CALCULATION OF RUNOFF COEFFICIENT/FLOW DEPTH METHOD FOR ESTIMATING FLOW RATES (Continued)

Step 5: Calculate a depth-weight flow factor and record the data in column D.

Formula:

$$Factor = \frac{Measured\ Water\ Depth \times Number\ of\ Flow\ Measurements}{Sum\ of\ all\ Water\ Depths}$$

Example: For Sample 1

$$Factor = \frac{(1\ ft) \times 9}{11.0} = 0.82$$

Step 6: Calculate the flow rate. Record the data in column E.

Formula:

$$Flow\ Rate,\ Q\ (cfm) = Average\ Runoff\ Rate \times Depth\ Factor$$

Example: For Sample 1

$$Q = 47\ cfm \times 0.82 = 39\ cfm$$

$$V_t = R_t \times [(A_{paved} \times C_{runoff}) + (A_{unpaved} \times C_{runoff})]$$

where: V_t = the total runoff volume in cubic feet
R_t = the total rainfall measured in feet
A_{paved} = the area (sq ft) within the drainage basin that is paved or roofed
$A_{unpaved}$ = the area (sq ft) within the drainage basin that is unpaved
C_{runoff} = a specific runoff coefficient (no units) for the drainage area ground cover

Exhibit 3-15 provides an example calculation of total runoff volume from rainfall data.

Discharge Volumes Estimated Based on Measured Flow Rates

Another method of estimating the total volume of a discharge uses a series of measured or estimated flow rates. The total volume of discharge can be estimated by first multiplying each of the flow rates by the time interval in between flow measurements. This time period represents the portion of the total storm duration that can be associated with the flow rate measurement. Adding all such partial volumes results in a total flow volume. A procedure for calculating the total runoff volume from a set of discrete measurements of flow depth and velocity in a ditch during a storm runoff event is presented in Exhibit 3-16.

EXHIBIT 3-14. EXAMPLE CALCULATION OF RUNOFF COEFFICIENT RAINFALL DEPTH METHOD FOR ESTIMATING FLOW RATES

Step 1: Estimate the runoff coefficient for the drainage area that contributes flows to the sampled outfall.

EXAMPLE: See Step 1 in Exhibit 3-14. The site for this example will be similar so a coefficient of .77 will be used for the same 3-acre drainage area.

Step 2: When each sample or aliquot is taken, record the data for the time the sample was taken. Record the data in column B.

EXAMPLE DATA:

A	B	C	D	E	F
Sample Number	Time (minutes)	Total Rainfall Depth (inches)	Time Since Last Sample	Incremental Rainfall (inches) per 20 minutes	Calculated Flow Rate (cfm)
1	0	0.0	0	0.0	–
2	20	0.2	20	0.2	84
3	40	0.3	20	0.1	42
4	60	0.5	20	0.2	84
5	80	0.6	20	0.1	42
6	100	0.8	20	0.2	84
7	120	0.9	20	0.1	42
8	140	1.0	20	0.1	42
9	160	1.1	20	0.1	42

Step 3: Using a rainfall gauge, measure the total rainfall depth (in inches) and record the data in column C.

EXAMPLE: See sample data above.

Step 4: Calculate the incremental time since the last flow measurement and record the data in column D.

EXAMPLE: Samples were taken 20 minutes apart so this increment will be 20 minutes for every sample.

Step 5: Calculate the additional or incremental rainfall that has occurred since the last measurement. Record the data in column E.

Formula:

$$\textit{Incremental Rainfall} = \textit{Total Rainfall Sample 2} - \textit{Total Rainfall Sample 1}$$

Example: For Sample 2

$$\textit{Incremental Rainfall} = .2 - 0 = .2 \textit{ inches}$$

Step 6: Calculate the flow rate. Record the data in column F

Formula:

$$\textit{Flow Rate (cfm)} = \frac{(\textit{Drainage area})(\textit{Runoff coefficient})(\textit{Incremental rainfall})}{(\textit{Incremental time})}$$

Example:

$$\textit{Flow Rate} = \frac{(3\ Ac)(0.77)(0.2\ in)}{20\ min} \times \frac{(43{,}560\ ft^2)}{Ac} \times \frac{1\ ft}{12\ in} = 84\ cfm$$

EXHIBIT 3-15. EXAMPLE CALCULATION OF TOTAL RUNOFF VOLUME FROM RAINFALL DATA

Step 1: Determine the area of drainage contributing to the runoff volume at the outfall and convert it to square feet.

Example: Using a land survey, a facility has determined its site encompasses 0.3 acres (13,068 square feet). The entire site is used for industrial activities, and therefore, any storm water discharges from the site will be associated with industrial activity. A berm surrounds the entire site limiting the drainage area to the site itself and preventing any dilution or contamination from other discharges. (Note: To convert acres to square feet, multiply the number of acres by 43,560, which is the conversion factor).

Step 2: Determine the rainfall depth during the event that was sampled to the nearest one-hundredth of an inch and convert it to feet.

Example: From the rain gauge, the rainfall accumulation is measured at 0.6 inches or 0.05 feet (ft). (Note: To convert inches to feet, divide the inches by 12, which is the conversion factor).

Step 3: Determine the runoff coefficients for each area.

Example: The facility has estimated that ⅓ of the site, or 4,356 square feet, is covered by impervious surfaces (i.e., roofs or paved roadways) and ⅔ of the site, or 8,712 square feet, is unpaved.

Step 4: Calculate the volume of flow using the following formula and convert the volume to liters.

Formula: ***Total runoff volume in cubic feet (cu ft) = total rainfall (ft) x [facility paved area (sq ft) x 0.90 + facility unpaved area (sq ft) x 0.50]***

Example: ***Total runoff volume (cu ft) = 0.05 x [4,356 x 0.90 + 8,712 x 0.50]***

Total runoff volume = 413.8 cu ft or 11,720 liters

(Note: To convert cubic feet to liters, multiply cubic feet by 28.32, which is the conversion factor).

EXHIBIT 3-16. EXAMPLE CALCULATION OF TOTAL RUNOFF VOLUME FROM FLOW RATE DATA

Step 1: Measure and tabulate flow depths and velocities every 20 minutes (at the same time that the sample is collected) during at least the first 3 hours of the runoff event.

EXAMPLE DATA:

A	B	C	D	E	F
Sample Number	**Time (minutes)**	**Flow Velocity (feet per minute)**	**Flow Depth (feet)**	**Width (feet)**	**Calculated Flow Rate (cfm)**
1	0	-	-	-	-
2	20	4	0.2	5	4
3	40	8	0.4	5	16
4	60	12	0.4	5	24
5	80	8	0.4	5	16
6	100	4	0.2	5	4
7	120	8	0.2	5	8
8	140	4	0.2	5	4
9	160	4	0.2	5	4

EXHIBIT 3-16. EXAMPLE CALCULATION OF TOTAL RUNOFF VOLUME FROM FLOW RATE DATA (Continued)

Step 2: Calculate and tabulate the cross-sectional area of flow for each of the flow depths measured. Calculate the flow rate for each discrete set of measurements.

Formula:

$$\textit{Flow Rate } Q \textit{ (cfm)} = \textit{Velocity (ft/min)} \times \textit{Area (sq ft)}$$
$$\textit{Area} = \textit{Depth} \times \textit{Width}$$

Example: For Sample 1

$$\textit{Area} = 0.2\ ft \times 5\ ft = 1\ sq\ ft$$
$$\textit{Flow Rate} = 4\ ft/min \times 1\ sq\ ft = 4\ cfm$$

Step 3: Plot the flow rate, Q, versus time. Also, assume that flow drops uniformly from the last calculated flow rate (Q_9) to zero at the time when Q_{10} would have been taken.

Example: The flow rates calculated in Step 3 are plotted against the time between samples.

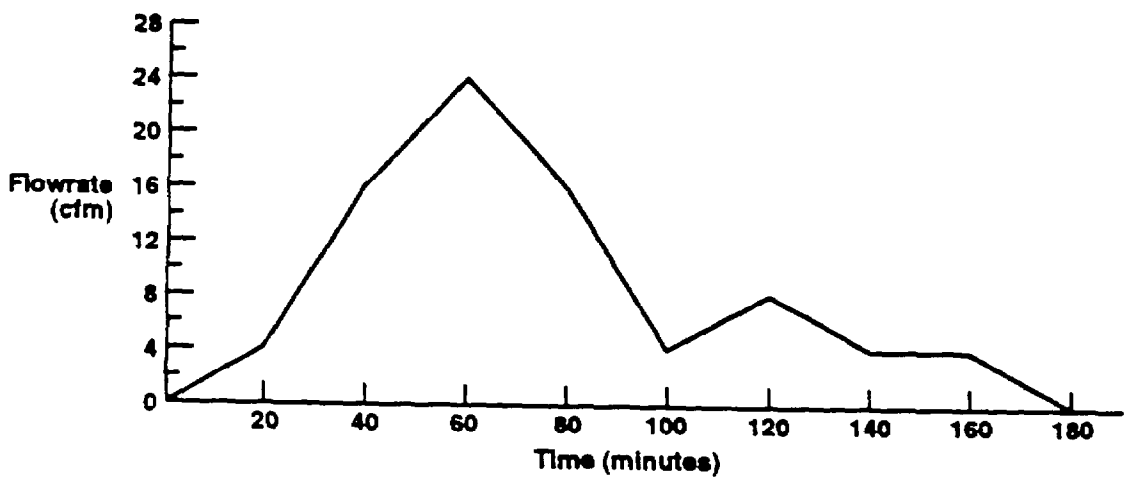

EXHIBIT 3-16. EXAMPLE CALCULATION OF TOTAL RUNOFF VOLUME FROM FLOW RATE DATA (Continued)

Step 4: The total flow volume (V_t) can be calculated by geometrically determining the area under the curve. The summation of the individual volumes per increment of time (V_1 through V_9) is the total flow volume of the event.

Example:

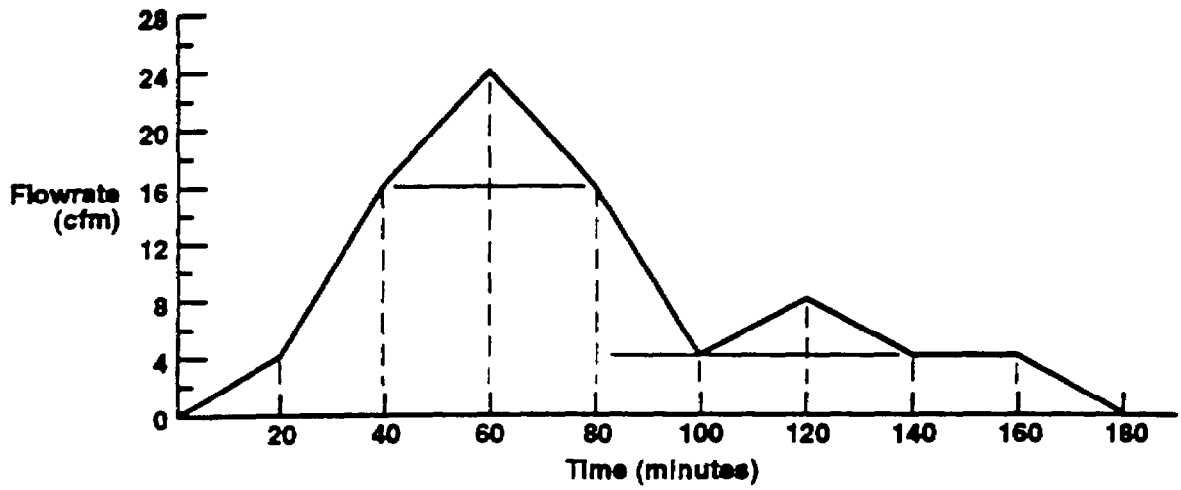

Step 5: Compute the flow volume associated with each observation (V_1, V_2, ..., V_9) by multiplying the measured flow rate by the duration (in this case, 20 minutes). Be sure the units are consistent. For example, if durations are in minutes and flow velocities are in cubic feet per second (cfs), convert the durations to seconds or the velocities to feet per minute.

Example:

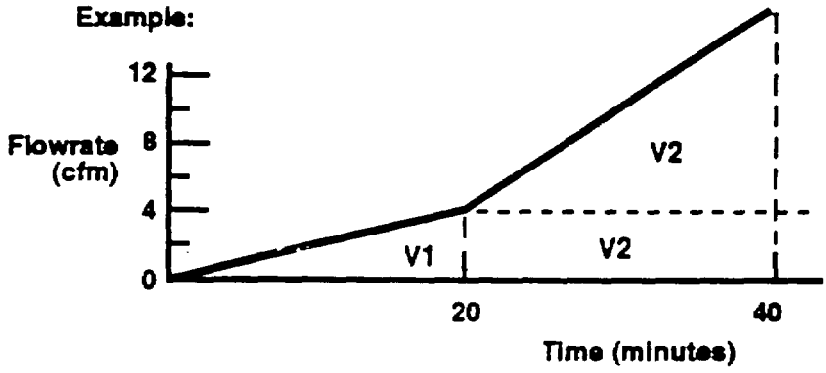

EXHIBIT 3-16. EXAMPLE CALCULATION OF TOTAL RUNOFF VOLUME FROM FLOW RATE DATA (Continued)

Formula: ***Volume (V) = Flow Rate (cfm) x Duration (minutes)***

Example:

$$V_1 = \frac{1}{2}(Q_1 - Q_0)(t_1 - t_0) = \frac{1}{2}(4-0)(20-0) = 40\ ft^3$$

$$V_2 = \frac{1}{2}(Q_2 - Q_1)(t_2 - t_1) + Q_1(t_2 - t_1)$$

$$= \frac{1}{2}(16-4)(40-20) + 4(20)$$

$$= 120 + 80 = 200\ ft^3$$

$V_1 = 40\ ft^3$
$V_2 = 200\ ft^3$
$V_3 = 400\ ft^3$
$V_4 = 400\ ft^3$
$V_5 = 200\ ft^3$
$V_6 = 120\ ft^3$
$V_7 = 120\ ft^3$
$V_8 = 80\ ft^3$
$V_9 = 40\ ft^3$

Step 6: Total the individual volumes calculated in Step 5 to obtain the total runoff volume.

Example:

Total Storm Runoff = 1,600 ft³

3.2.5 REPORTING STORM WATER DISCHARGE FLOW RATES AND VOLUMES

Form 2F requires applicants to provide quantitative data (reported both as concentration and as total mass) based on flow-weighted samples collected during storm events. In addition, applicants are required to provide flow estimates or flow measurements, as well as an estimate of the total volume of the discharge. The method of flow estimation or measurement must be described in the application. Although EPA only requires flow estimates in Form 2F, accurate flow measurement is necessary for collecting representative flow-weighted composite samples and reporting pollutant mass loadings.

3.2.6 MEASURING RAINFALL

Many types of instruments have been developed to measure the amount and intensity of precipitation. All forms of precipitation are measured on the basis of the depth of the water that would accumulate on a level surface if precipitation remained where it fell. There are two types of rain gauges -- standard and recording gauges. A standard rain gauge collects the rainfall so that the amount of rain can be easily measured. The standard gauge for the NWS has a collector which is 8 inches in diameter. Rain flows from the collector into a cylindrical measuring tube inside the overflow can. The measuring tube has a cross-sectional area one tenth the size of the collector so that 0.1 inch of rainfall will fill 1 inch of the measuring tube. While this standard gauge is both accurate and easy to use, any open receptacle with vertical sides can be an effective rain gauge. Standard rain gauges are simple and inexpensive; however, with a standard gauge, there is no way to record changes in the intensity of the rainfall without making frequent observations of the gauge during the storm.

The second type of gauge is the recording rain gauge, which provides a permanent record of the amount of rainfall which accumulates over time. Three common types of recording gauges are:

- Tipping Bucket Gauge - Water caught in a collector is funneled into a two-compartment bucket; a known quantity of rain fills one compartment, overbalancing the bucket and emptying it into a reservoir. This moves the second bucket into place beneath the funnel. The tipping of the bucket engages an electric circuit, which records the event.

- Weighing Type Gauge - Water is weighed when it falls into a bucket placed on the platform of a spring or lever balance. The weight of the contents is recorded on a chart, showing the accumulation of precipitation.

- Float Recording Gauge - Water is measured by the rise of a float that is placed in the receiver. These gauges may be self-siphoning, or may need to be emptied periodically by hand.

Recording rain gauges provide a permanent record of rainfall, and they can be used to determine variations in rainfall intensity over time without making frequent observations during the storm. But recording gauges are more complicated mechanically than standard gauges, making them more costly, less durable, and more difficult to operate.

Although all gauges are subject to error, most errors can be minimized. To minimize errors, the gauge should be placed on a level surface that is not windswept and is away from trees or buildings that might interfere with the path of rainfall. When taking measurements, other factors contributing to error should also be considered: mistakes in reading the scale, dents in the collector rim (which changes the receiving area), measuring sticks that may retain some of the water, and water lost to evaporation. In the case of tipping bucket gauges, water may not be collected while the bucket is still tipping. The most common source of inaccuracy is changes in data that are attributable to wind. It is possible to assess wind errors by comparing measurements of gauges that are protected from the wind with those that are not.

3.3 GRAB SAMPLE COLLECTION

Section 3.1.2 discussed both the parameters that must be monitored by grab sample and the conditions under which grab sampling is required. This section explains how to collect grab samples. The entire sample is collected at an uninterrupted interval (i.e., grabbed at one time). A grab sample provides information on the characterization of storm water at a given time and may be collected either manually or automatically as discussed below.

3.3.1 HOW TO MANUALLY COLLECT GRAB SAMPLES

A manual grab is collected by inserting a container under or downcurrent of a discharge with the container opening facing upstream. Generally, simplified equipment and procedures can be used. In most cases, the sample container itself may be used to collect the sample. Less accessible outfalls may require the use of poles and buckets to collect grab samples. To ensure that manual grab samples are representative of the storm water discharged, the procedures set forth in Exhibit 3-17 should be followed.

EXHIBIT 3-17. RECOMMENDED OPERATING PROCEDURES FOR TAKING GRAB SAMPLES

- Label sample containers before sampling event
- Take a cooler with ice to the sampling point
- Take the grab from the horizontal and vertical center of the channel
- Avoid stirring up bottom sediments in the channel
- Hold the container so the opening faces upstream
- Avoid touching the inside of the container to prevent contamination
- Keep the sample free from uncharacteristic floating debris
- Transfer samples into proper containers (e.g., from bucket to sample container), however, fecal coliform, fecal streptococcus, phenols and O&G should remain in original containers
- If taking numerous grabs, keep the samples separate and labelled clearly
- Use safety precautions (see Chapter 6)

Specialized equipment and procedures may be needed, particularly in situations where storm water discharges are inaccessible or where certain parameters are monitored. For example:

- When sampling for O&G and VOCs, equipment that safely and securely houses O&G bottles or VOC vials should be used. This may be necessary because: (1) O&G will adhere to containers and thus should not be transferred from one container to another; and (2) excessive aeration during sampling may result in the partial escape of VOCs.
- Since facilities sometimes use sample bottles that already contain preservatives (as provided by contract laboratories), extreme care should be taken when filling them to avoid spills, splatters, or washout of the preservatives.

All equipment and containers that come into contact with the sample must be clean to avoid contamination. Additionally, sample collection equipment and container materials should be totally unreactive to prevent leaching of pollutants. Cleaning procedures are discussed in detail in Section 3.5.

3.3.2 HOW TO COLLECT GRAB SAMPLES BY AUTOMATIC SAMPLER

Grab samples can also be collected using programmed automatic samplers. Automatic samplers come equipped with computers that can be programmed to collect grab samples. Programming for grabs is specific to the type of automatic sampler. Some samplers are portable and have been developed specifically to sample for storm water discharges. These samplers are frequently attached to a rain gauge and/or a flow sensor. Such samplers can be programmed to initiate sample collection by one or more of the following conditions: (1) depth of flow in a channel; (2) rainfall in inches; (3) flow rate; (4) time; (5) external signal; and (6) combinations of the first three conditions. For example, an automatic sampler could be used to collect a sample at 15-minute intervals after its sensors indicate that rainfall has begun.

When using an automatic sampler, planning is very important. First, all equipment must be properly cleaned, particularly the tubing and the sample containers. There are several different types of tubing available, including rubber and Tygon tubing. Tygon tubing is commonly used since it generally does not leach contaminants. Deionized water should be drawn through the sampler to remove any remaining pollutant residuals prior to taking samples. Tubing should also be replaced periodically to avoid algae or bacterial growth.

Sampling personnel should also use adequate and appropriate containers and ensure they are properly cleaned. Section 3.5 contains information on cleaning procedures which should be followed for all equipment. Additionally, the utilization of blanks (a control used to verify the accuracy of analytical results) is recommended to determine if cross-contamination of sampling equipment has occurred. Samplers should also be programmed, set up, and supplied with a source of power. Properly charged batteries should be readily available for portable samplers in advance of a storm event and, as a backup power supply in case of power failure. Finally, although automatic samplers may be useful in some situations, several parameters are not amenable to collection by automatic sampler. These pollutants include fecal streptococcus, fecal coliforms, oil and grease and VOCs which should be collected manually, not automatically, as discussed in Section 3.1.2.

3.4 FLOW-WEIGHTED COMPOSITE SAMPLE COLLECTION

Composite samples are samples simply comprised of a series of individual sample aliquots that have been combined to reflect average pollutant concentrations of the storm water discharge during the

sampling period. Composite samples can be developed based on time or flow rate. There are four different types of composite samples, as follows:

- Constant Time - Constant Volume - Samples of equal volume are taken at equal increments of time and composited to make an average sample (similar to Exhibit 3-18). This method is not acceptable for samples taken for compliance with the storm water permit application regulations.
- Constant Time - Volume Proportional to Flow Increment - Samples are taken at equal increments of time and are composited proportional to the volume of flow since the last sample was taken (see Exhibit 3-19).
- Constant Time - Volume Proportional to Flow Rate - Samples are taken at equal increments of time and are composited proportional to the flow rate at the time each sample was taken (see Exhibit 3-20).
- Constant Volume - Time Proportional to Flow Volume Increment - Samples of equal volume are taken at equal increments of flow volume and composited (see Exhibit 3-21).

Generally, flow-weighted composite samples must be collected for most parameters. The methods for generating flow-weighted composite samples are discussed in the following sections.

For storm water discharge permit applications, the aliquots for flow-weighted composite samples must be collected during a representative storm for the first 3 hours, or for the duration of the storm event if it is less than 3 hours long. The storm water application regulations allow for flow-weighted composite samples to be collected manually or automatically. For both methods, equal volume aliquots may be collected at the time of sampling and then flow-proportioned and composited in the laboratory, or the aliquot may be collected based on the flow rate at the time of sample collection and composited in the field. When composite samples are collected, the regulations require that each aliquot collection be separated by a minimum of 15 minutes and that a minimum of three sample aliquots be taken within each hour of the discharge. See Exhibit 3-22 for an example of how this requirement may be fulfilled.

The provisions set forth in 40 CFR 122.21(g)(7) for collecting flow-weighted composite samples establish specific requirements for minimum time duration between sample aliquots. Where these conditions cannot be met, the permitting authority may allow alternate protocols with respect to the time duration between sample aliquots (see Chapter 5). However, permission from the permitting

EXHIBIT 3-18. CONSTANT TIME - CONSTANT VOLUME

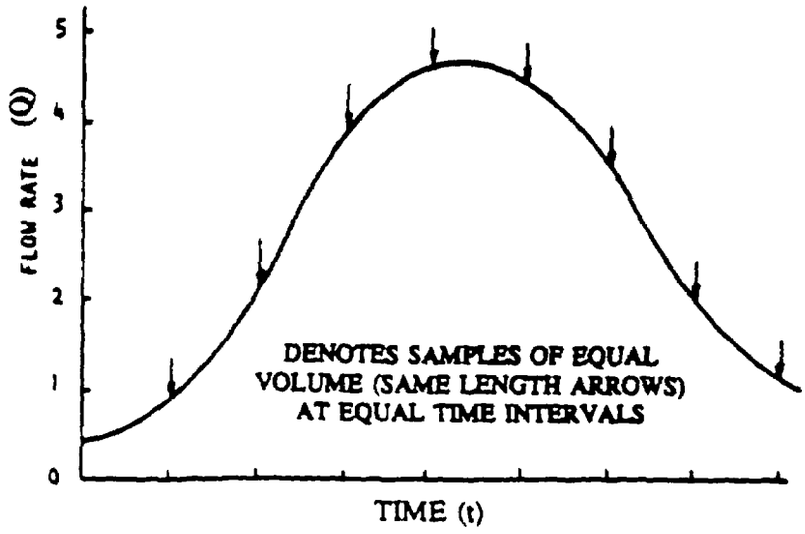

Method of compositing samples on a fixed volume-fixed time interval basis

Source: Methodology for the Study of Urban Storm Generated Pollution and Control, U.S. EPA 600/2-76-145, August 1976.

EXHIBIT 3-19. CONSTANT TIME - VOLUME PROPORTIONAL TO FLOW INCREMENT

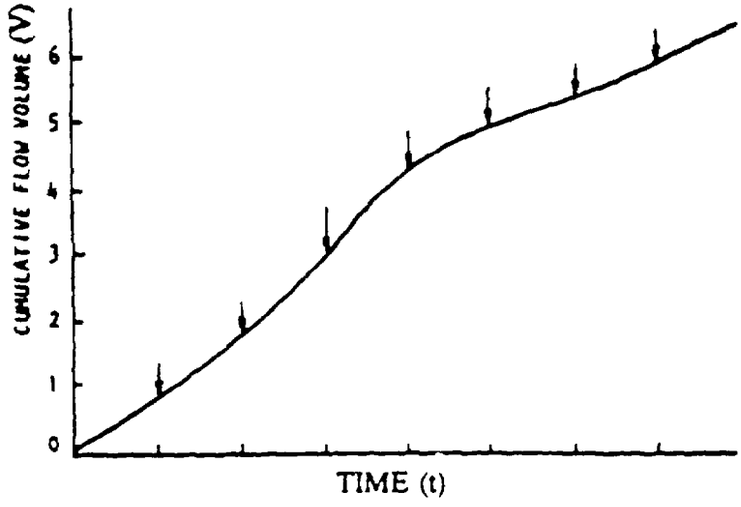

Method of compositing samples proportional to flow volume at constant time interval

Source: Methodology for the Study of Urban Storm Generated Pollution and Control, U.S. EPA 600/2-76-145, August 1976.

EXHIBIT 3-20. CONSTANT TIME - VOLUME PROPORTIONAL TO FLOW RATE

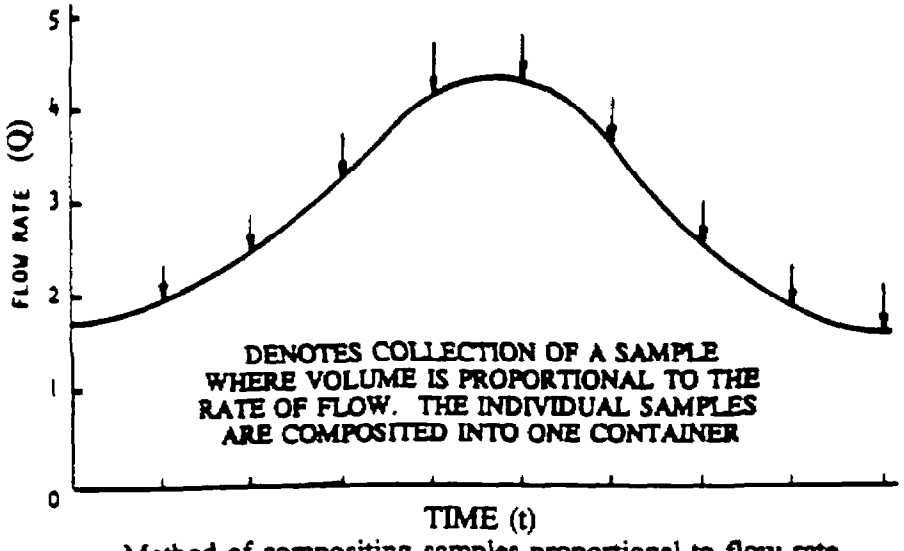

Method of compositing samples proportional to flow rate

Source: Methodology for the Study of Urban Storm Generated Pollution and Control, U.S. EPA 600/2-76-145, August 1976.

EXHIBIT 3-21. CONSTANT VOLUME - TIME PROPORTIONAL TO FLOW VOLUME INCREMENT

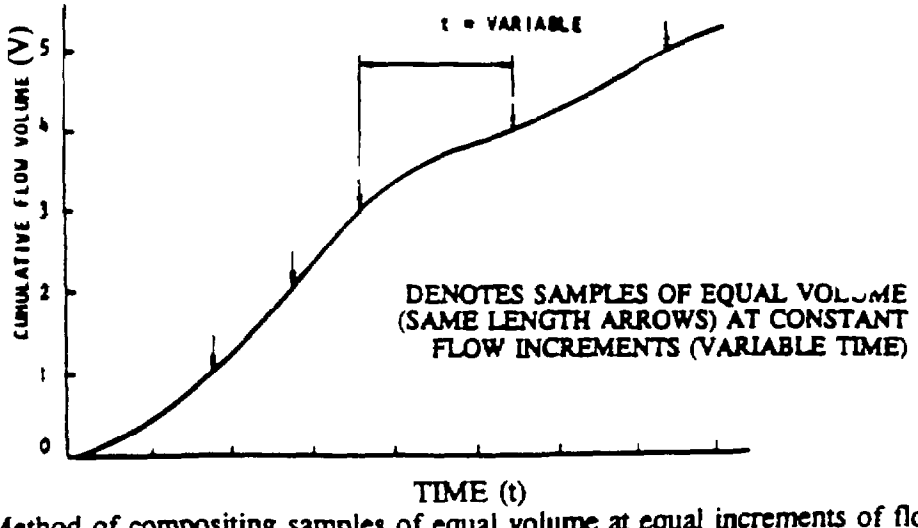

Method of compositing samples of equal volume at equal increments of flow

Source: Methodology for the Study of Urban Storm Generated Pollution and Control, U.S. EPA 600/2-76-145, August 1976.

EXHIBIT 3-22. EXAMPLE OF SAMPLING INTERVALS

Suppose that a storm water discharge began at 2:15 p.m. and lasted until 5:15 p.m. on a Friday. The field staff person wants to collect the samples at regular intervals, so s/he plans to collect an aliquot with a volume that is proportional to the flow every 20 minutes. After the third hour of collection, the field staff person must deliver the samples to the laboratory (which is 10 minutes away). The laboratory closes at 5:00 p.m. So, s/he should take the last sample at 4:45 p.m. One way of doing this would be to collect samples (in hour three) at 4:15, 4:30, and 4:45 p.m. This would comply with the three-sample minimum in hour three (4:15-5:15 p.m.) and the required 15-minute minimum interval between collections. It would also allow the field staff person to get the samples to the lab before it closes for the weekend. On the other hand, if s/he missed the sample collection at 4:15 p.m. and instead, collected the sample at 4:20 p.m., then s/he would have to collect the next sample at 4:35 p.m. and the last sample at 4:50 p.m., and the field staff person would not be able to deliver the sample until Monday (by which time the required maximum holding time would be exceeded), and the sampling would need to be repeated.

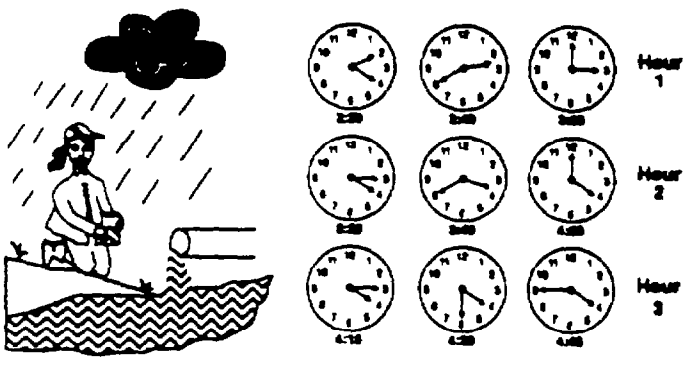

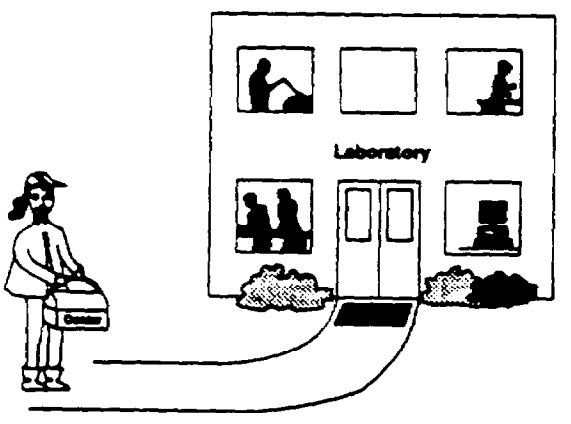

authority must be obtained before changes are initiated. Considerations applicable to the collection of flow-weighted composites by automatic and manual techniques are discussed in the following sections.

3.4.1 HOW TO MANUALLY COLLECT FLOW-WEIGHTED COMPOSITE SAMPLES

Manually collected, flow-weighted composite samples may be appropriate for a facility that prefers not to invest in automatic equipment. This technique is cost-effective for short-term monitoring programs and for facilities where few outfalls are being sampled. The fundamental requirement for facilities that use these methodologies is that they should have personnel available to perform the sampling when needed. Those facilities where VOCs analysis of storm water discharges are required should manually collect composite samples since these parameters may not be amenable to sampling by automatic samplers. Compositing of VOC samples should be conducted in the laboratory as discussed in Section 3.5.2.

The manual collection of a flow-weighted sample is performed in the same manner as taking manual grab samples (see Section 3.3.1). The only difference is that a series of samples (or aliquots) will be collected. As discussed in the previous section, there are two ways to manually collect and combine the aliquots for a flow-weighted sample:

- Collect sample aliquot volumes based on the flow at the time of sampling which can immediately be combined to make the composite sample in the field (see Exhibit 3-23)
- Collect equal volume sample aliquots at the time of sampling and then flow-proportion and composite the aliquots in the laboratory (see Exhibit 3-24).

When uniform time intervals are used between the collection of the sample aliquots, the volumes of each aliquot used in the composite sample can be determined based on either volumes of flow or the flow rate, as they will result in similar proportions. However, when there are different time intervals between the sample aliquots, the individual sample aliquot volumes should be based on the runoff volume (calculated from the individual flow rates and durations) associated with each sample aliquot.

Generally, 1,000 ml for each aliquot collected should provide enough sample volume, when composited, for pollutant analyses of the required parameters contained in Section VII.A of Form 2F (see Section 3.6). More aliquot volume may be required if sampling is conducted for additional parameters. The laboratory conducting the analyses should always be contacted prior to a sampling event to determine how much sample volume they will require.

EXHIBIT 3-23. EXAMPLE OF HOW TO COLLECT SAMPLE ALIQUOT VOLUMES BASED ON FLOW, AND PROPORTION AND COMPOSITE IN THE FIELD

Step 1: Determine the necessary volume for compositing purposes.

Example: To fulfill analyses for all parameters in Section VII.A of Form 2F for which composite samples are required [Biochemical Oxygen Demand (BOD_5), Chemical Oxygen Demand (COD), Total Suspended Solids (TSS), Total Kjeldahl Nitrogen (TKN), nitrate plus nitrite, and phosphorous] a total composite sample volume of 5,000 ml is needed by the contract laboratory.

Step 2: Determine an appropriate interval for collection of samples.

Example: Manually collected flow-weighted composite samples must consist of at least three sample aliquots collected per hour and must be gathered at least 15 minutes apart. For this example, sample aliquots will be collected exactly 20 minutes apart.

Step 3: Estimate or measure the volume of discharge for each sampling event.

Example: A discharge flow volume of 4.8 cubic feet will be used here.

Step 4: Convert the discharge flow volume to liters.

Example: To convert cubic feet to liters, use the conversion factor of 28.32 liters per 1 cubic foot as set forth in the following formula:

$$\textit{Volume (liters)} = \textit{Volume (cubic feet)} \times \frac{28.32 \text{ liters}}{1 \text{ cubic foot}}$$

$$\textit{Volume} = 4.8 \text{ cubic feet} \times \frac{28.32 \text{ liters}}{1 \text{ cubic foot}} = 136 \text{ liters}$$

Step 5: Using Steps 3 and 4, volumes that have been discharged between the collection of each aliquot can be calculated.

(Note that the discharge volumes provided for aliquot numbers 2-9 have already been given for the purposes of this exhibit.)

Example: The procedures set forth in Section 3.2 may be used to calculate discharge volumes. The following table presents aliquot numbers, time of aliquot collection, and discharge volumes.

Aliquot Number	Time of Aliquot Collection	Discharged Volume
1	2:15 p.m.	136 liters
2	2:35 p.m.	200 liters
3	2:55 p.m.	122 liters
4	3:15 p.m.	178 liters
5	3:35 p.m.	156 liters
6	3:55 p.m.	117 liters
7	4:15 p.m.	94 liters
8	4:30 p.m.	21 liters
9	4:45 p.m.	12 liters

EXHIBIT 3-23. EXAMPLE OF HOW TO COLLECT SAMPLE ALIQUOT VOLUMES BASED ON FLOW, AND PROPORTION AND COMPOSITE IN THE FIELD (Continued)

Step 6: Determine the appropriate minimum aliquot volume as the basis for collecting other aliquot samples which together will provide adequate volume to fulfill the analytic requirements.

Example: In Step 1, it was determined that at least 5,000 ml of sample were required for flow-weighted composite sample analytical testing. As discussed in Section 3.4.1, basing the sample collection on a minimum aliquot volume of 1,000 ml gathered every interval (i.e., every 15 minutes) should result in adequate sample volume.

Step 7: Calculate the volume of the sample aliquot which must be collected during each aliquot sample period using the following formula:

$$\textit{Aliquot volume (ml)} = \textit{Minimum aliquot volume (ml)} \times \frac{\textit{Aliquot's discharge volume (liters)}}{\textit{Initial discharge volume (liters)}}$$

Step 6 shows that the minimum aliquot volume is 1,000 ml.

$$\textit{Aliquot \#1 volume (ml)} = 1{,}000 \text{ ml} \times \frac{136 \text{ liters}}{136 \text{ liters}} = 1{,}000 \text{ ml}$$

$$\textit{Aliquot \#2 volume (ml)} = 1{,}000 \text{ ml} \times \frac{200 \text{ liters}}{136 \text{ liters}} = 1471 \text{ ml}$$

$$\textit{Aliquot \#3 volume (ml)} = 1{,}000 \text{ ml} \times \frac{122 \text{ liters}}{136 \text{ liters}} = 897 \text{ ml}$$

$$\textit{Aliquot \#4 volume (ml)} = 1{,}000 \text{ ml} \times \frac{178 \text{ liters}}{136 \text{ liters}} = 1{,}309 \text{ ml}$$

$$\textit{Aliquot \#5 volume (ml)} = 1{,}000 \text{ ml} \times \frac{156 \text{ liters}}{136 \text{ liters}} = 1{,}147 \text{ ml}$$

$$\textit{Aliquot \#6 volume (ml)} = 1{,}000 \text{ ml} \times \frac{117 \text{ liters}}{136 \text{ liters}} = 860 \text{ ml}$$

$$\textit{Aliquot \#7 volume (ml)} = 1{,}000 \text{ ml} \times \frac{94 \text{ liters}}{136 \text{ liters}} = 691 \text{ ml}$$

$$\textit{Aliquot \#8 volume (ml)} = 1{,}000 \text{ ml} \times \frac{21 \text{ liters}}{136 \text{ liters}} = 154 \text{ ml}$$

$$\textit{Aliquot \#9 volume (ml)} = 1{,}000 \text{ ml} \times \frac{12 \text{ liters}}{136 \text{ liters}} = 88 \text{ ml}$$

A table of these calculations follows:

Aliquot Number	Discharged Volume	Aliquot Volume
1	136 liters	1,000 ml
2	200 liters	1,471 ml
3	122 liters	897 ml
4	178 liters	1,309 ml
5	156 liters	1,147 ml
6	117 liters	860 ml
7	94 liters	691 ml
8	21 liters	154 ml
9	12 liters	88 ml

In conclusion, a combination of the above sample aliquots result in a composite of 7,617 ml.

EXHIBIT 3-24. EXAMPLE OF HOW TO MANUALLY COLLECT EQUAL SAMPLE ALIQUOTS WHICH ARE LATER FLOW-PROPORTIONED AND COMPOSITED IN THE LABORATORY

Step 1: Determine the necessary volume for compositing purposes.

Example: To fulfill analyses for all parameters in Section VII.A of Form 2F for which composite samples are required (BOD_5, COD, TSS, TKN, nitrate plus nitrite, and phosphorous) a total composite sample volume of 5,000 ml is needed by the contract laboratory.

Step 2: Determine an appropriate interval for collection of samples.

Example: Manually collected flow-weighted composite samples must consist of at least nine sample aliquots and must be gathered at least 15 minutes apart; only three or four samples per hour may be taken. For convenience, the minimum number of three is chosen. Sample aliquots will be collected every 20 minutes.

Step 3: Determine the aliquot which should be taken during each sampling event.

Example: At least 5,000 ml of sample is required for flow-weighted composite sample analytical testing. As discussed in Section 3.4.1, a minimum aliquot volume of 1,000 ml gathered every interval (i.e., every 15 minutes) should result in adequate sample volume to be used for later flow-weighted compositing.

Step 4: Estimate or measure the volume of discharge for each sampling event while collecting a discrete 1,000-ml aliquot, as discussed in Step 3, for later compositing.

Example: Section 3.2 discusses methods to calculate total discharge volumes. A discharge flow volume of 4.8 cubic feet will be used here.

Step 5: Convert the discharge flow volume to liters.

Example: To convert cubic feet to liters, use the conversion factor of 28.32 liters per 1 cubic foot as set forth in the following formula:

$$\textit{Volume (liters)} = \textit{Volume (cubic feet)} \times \frac{28.32 \text{ liters}}{1 \text{ cubic foot}}$$

$$\textit{Volume} = 4.8 \text{ cubic feet} \times \frac{28.32 \text{ liters}}{1 \text{ cubic foot}} = 136 \text{ liters}$$

EXHIBIT 3-24. EXAMPLE OF HOW TO MANUALLY COLLECT EQUAL SAMPLE ALIQUOTS WHICH ARE LATER FLOW-PROPORTIONED AND COMPOSITED IN THE LABORATORY (Continued)

Step 6: Using Steps 3 and 4, calculate the volumes that have been discharged between the collection of each aliquot.

Example: The procedures set forth in Section 3.2 may be used to calculate discharge volumes. The following table presents aliquot numbers, time of aliquot collection, and discharge volumes (note that the discharge volumes provided for aliquot numbers 2-9 were chosen for purposes of this exhibit).

Aliquot Number	Time of Aliquot Collection	Discharged Volume
1	2:15 p.m.	136 liters
2	2:35 p.m.	200 liters
3	2:55 p.m.	122 liters
4	3:15 p.m.	178 liters
5	3:35 p.m.	156 liters
6	3:55 p.m.	117 liters
7	4:15 p.m.	94 liters
8	4:30 p.m.	21 liters
9	4:45 p.m.	12 liters

Step 7: Determine the aliquot sample which is associated with the greatest discharge volume.

Example: Aliquot number 2 was taken when the volume was 200 liters. This is the largest discharge volume.

Step 8: Calculate the volume of sample aliquot which must be used subsequent to the sample event to comprise a flow-weighted composite sample. The following formula should be used:

$$\textit{Aliquot volume (ml)} = \textit{Minimum aliquot volume (ml)} \times \frac{\textit{Aliquot's discharge volume (liters)}}{\textit{Largest discharge volume (liters)}}$$

Step 3 shows that the minimum aliquot volume is 1,000 ml. Using this value and the data determined as part of Steps 6 and 7, the following can be calculated:

$$\textit{Aliquot \#1 volume (ml)} = 1{,}000 \text{ ml} \times \frac{136 \text{ liters}}{200 \text{ liters}} = 680 \text{ ml}$$

$$\textit{Aliquot \#2 volume (ml)} = 1{,}000 \text{ ml} \times \frac{200 \text{ liters}}{200 \text{ liters}} = 1{,}000 \text{ ml}$$

$$\textit{Aliquot \#3 volume (ml)} = 1{,}000 \text{ ml} \times \frac{122 \text{ liters}}{200 \text{ liters}} = 610 \text{ ml}$$

$$\textit{Aliquot \#4 volume (ml)} = 1{,}000 \text{ ml} \times \frac{178 \text{ liters}}{200 \text{ liters}} = 890 \text{ ml}$$

$$\textit{Aliquot \#5 volume (ml)} = 1{,}000 \text{ ml} \times \frac{156 \text{ liters}}{200 \text{ liters}} = 780 \text{ ml}$$

$$\textit{Aliquot \#6 volume (ml)} = 1{,}000 \text{ ml} \times \frac{117 \text{ liters}}{200 \text{ liters}} = 585 \text{ ml}$$

EXHIBIT 3-24. EXAMPLE OF HOW TO MANUALLY COLLECT EQUAL SAMPLE ALIQUOTS WHICH ARE LATER FLOW-PROPORTIONED AND COMPOSITED IN THE LABORATORY (Continued)

Aliquot #7 volume (ml) = 1,000 ml x $\frac{\text{94 liters}}{\text{200 liters}}$ *= 470 ml*

Aliquot #8 volume (ml) = 1,000 ml x $\frac{\text{21 liters}}{\text{200 liters}}$ *= 105 ml*

Aliquot #9 volume (ml) = 1,000 ml x $\frac{\text{12 liters}}{\text{200 liters}}$ *= 60 ml*

A table of these calculations follows

Aliquot Number	Discharged Volume	Aliquot Volume
1	136 liters	680 ml
2	200 liters	1,000 ml
3	122 liters	610 ml
4	178 liters	890 ml
5	156 liters	780 ml
6	117 liters	585 ml
7	94 liters	470 ml
8	21 liters	105 ml
9	12 liters	60 ml

In conclusion, a combination of the above sample aliquots results in a composite sample of **5,100 ml.**

Manually collected flow-weighted composite samples can also be prepared by collecting sample aliquots of equal volume where the collection times are related to the volume of discharge which has passed since the last sample aliquot collection. However, this method is subject to fluctuating flow rates and volumes which may dictate that samples be taken prior to the 15-minute interval required by the regulations. In that case, the alternative sampling protocol would have to be approved by the permitting authority.

3.4.2 HOW TO COLLECT FLOW-WEIGHTED COMPOSITE SAMPLES BY AUTOMATIC SAMPLER

The typical automatic sampler collects sample aliquots after a specific interval. These aliquots can be flow-weight composited by the automatic sampler; or by hand in the laboratory. The automatic

sampler may be programmed in one of three ways: (1) to collect a sample at equal time intervals and varying aliquot volumes commensurate with the flow (either rate or volume) that has passed; (2) to collect equal volume aliquots at varying time intervals commensurate with the flow volume that has passed; or (3) to collect equal volume aliquots of sample at equal time intervals.

The first two methods automatically composite the sample but require that the sampler be connected to a flow meter such that the sampler determines either the flow rate or the amount of volume that passes. Since these methods automatically composite samples, one main sample container may be used to receive all aliquots. The third method automatically collects the sample aliquots but does not automatically flow-weight composite the sample. As such, discrete sample containers must be used, and manual flow-weighted compositing must be conducted after the aliquots are collected. Exhibits 3-23 and 3-24 in Section 3.4.1 describe the manual compositing procedures that should be followed.

Manufacturers' instructions for the use of an automatic sampler provide the best explanation of programming options and should be consulted for information on programming samplers for storm water collection. Some of the points regarding automatic samplers discussed in Section 3.3.2 should also be considered.

3.5 SAMPLE HANDLING AND PRESERVATION

Samples must be handled and preserved in accordance with 40 CFR Part 136. This section describes acceptable analytical methods, including requirements regarding sample holding times, containers, sizes, and preservation requirements. For each pollutant or parameter that may have to be analyzed, 40 CFR Part 136 includes information on:

- Container types to be used to store the samples after collection
- Procedures to correctly preserve the samples
- The maximum holding time allowed for each parameter.

The following sections present a detailed discussion of preservation techniques and sample handling procedures. Technical Appendix C presents a matrix of required containers, preservation techniques,

and holding times for each parameter. Most laboratories can provide clean sample containers, preservatives, sealing, chain-of-custody forms and can advise further on sample handling and preservation.

3.5.1 DECONTAMINATION OF SAMPLE EQUIPMENT CONTAINERS

Storm water sample containers should be cleaned and prepared for field use according to the procedures set forth in 40 CFR Part 136. A summary of the procedures is presented below for plastic containers, any or all of which may be performed by the laboratory or container distributor:

- Nonphosphate detergent and tap water wash
- Tap water rinse
- 10 percent nitric acid rinse (only if the sample is to be analyzed for metals)
- Distilled/deionized water rinse
- Total air dry.

To clean glass containers, the same steps should be taken; but, after the distilled/deionized water rinse, the containers should be rinsed with solvent if appropriate prior to total air drying. After the decontamination procedures have been accomplished, the sample containers should be capped or sealed with foil, and the sampling device should be protected and kept clean. It is a good idea to label sample containers after cleaning. The laboratory should keep a record of the technician performing the cleaning procedure as well as the date and time. This begins the required chain-of-custody procedure for legal custody (see Section 3.10 for more information). A chain-of-custody record accompanies each sample to track all personnel handling the sample. This record is essential to trace the sample integrity in the event that quality control checks reveal problems. For this reason, as well as to avoid problems if contamination issues arise, it is suggested that the laboratory performing the analysis perform the cleaning.

3.5.2 SAMPLE PRESERVATION AND HOLDING TIMES

Preservation techniques ensure that the sample remains representative of the storm water discharge at the time of collection. Since many pollutants in the samples collected are unstable (at least to some extent), the sample should be analyzed immediately or preserved or fixed to minimize changes between the time of collection and analysis. Because immediate analysis is not always possible, most samples are preserved regardless of the time of analysis.

Problems may be encountered when flow-weighted composite samples are collected. Since sample deterioration can take place during the compositing process, it is necessary to preserve or stabilize the samples during compositing in addition to preserving aggregate samples before shipment to the laboratory. Preservation techniques vary depending on the pollutant parameter to be measured; therefore, familiarity with 40 CFR Part 136 (see Technical Appendix C) is essential to ensure effective preservation. It is important to verify that the preservation techniques for one parameter do not affect the analytical results of another in the same sample. If this is the case, two discrete samples should be collected and preserved accordingly.

Sample preservation techniques consist of refrigeration, pH adjustment, and chemical fixation. pH adjustment is necessary to stabilize the target analyte (e.g., addition of NaOH stabilizes cyanide); acidification of total metal samples ensures that metal salts do not precipitate. Refrigeration is the most widely used technique because it has no detrimental effect on the sample composition (i.e., it does not alter the chemistry of the sample), and it does not interfere with most analytical methods. Refrigeration requires the sample to be quickly chilled to a temperature of 4°C. This technique is used at the beginning of sample collection in the field, and is continued during sample shipment, and while the sample is in the laboratory. Even though samples taken for compositing purposes are taken over time each individual sample must be refrigerated. If taken manually, the samples can be placed in an ice box. If taken by a automatic sampler, the sampler unit should have refrigeration capabilities. The analytical laboratory may provide chemicals necessary for fixation, or may tell sampling personnel where they can be purchased.

In addition to preservation techniques, 40 CFR Part 136 indicates maximum holding times. A detailed list of holding times appears in Technical Appendix C. The holding time is the maximum

amount of time that samples may be held before analysis and still be considered valid. Samples exceeding these holding times are considered suspect and sample collection may have to be repeated.

Although Technical Appendix C provides required sample containers, preservation techniques, and holding times, some of the more commonly monitored parameters warrant additional discussion. The following provides a more detailed discussion of considerations pertaining to cyanide, VOCs, organics and pesticides, O&G, pH, total residual chlorine, fecal coliform, fecal streptococcus, and 5-day Biochemical Oxygen Demand (BOD_5).

Cyanide

Cyanide is very reactive and unstable. If the sample cannot be analyzed immediately, it must be preserved by pH adjustment after collection. However, prior to pH adjustment, procedures to eliminate residual chlorine and sulfides must be followed immediately.

Where chlorine has the possibility of being present, the sample should be tested for residual chlorine by using potassium iodide-starch test paper previously moistened with acetate buffer. If the sample contains residual chlorine (a blue color indicates the need for treatment), ascorbic acid must be added 0.6 gram (g) at a time until the tests produce a negative result; then, an additional 0.6 g of ascorbic acid should be added to the sample.

Samples containing sulfides may be removed, in which case the holding time is extended to 14 days. Sulfides must be removed as follows:

- Use lead acetate paper moistened with an acetic acid buffer solution to test for the presence of sulfide. Darkening of the lead acetate paper indicates sulfide is present in the sample.
- Add cadmium nitrate to be added to the sample in a manner similar to the ascorbic acid until the test is negative.
- Filter with a 0.45 micrometer (μm) filter and prefilter combination immediately after.

After chlorine and sulfide residuals have been eliminated, the pH must be adjusted to greater than 12.0 standard units (s.u.) and chilled to 4°C.

If cyanide is suspected to be present, the sampling personnel should bring all materials mentioned above to the sampling location.

VOCs

Sampling for VOCs requires the use of a glass vial. The vial should contain a teflon-coated septum seal. Volatiles will escape from the water to the air if any air is entrapped in the container. Therefore, the sample should be collected so that there are no air bubbles in the container after the screw cap and septum seal are applied. To ensure that air bubbles are not trapped in the vial, the following procedures should be followed:

- Fill the vial until a reverse meniscus forms above the top of the vial
- Screw on the cap (the excess sample will overflow)
- Invert the vial to check for the presence of air bubbles
- If air bubbles are observed, the vial should be opened, emptied, then completely refilled, and the first three actions should be repeated.

VOC samples should not be composited in the field. To composite a sample, the sampling personnel would have to mix it thoroughly. This mixing action would aerate the sample and cause volatiles to be lost. Therefore, VOC samples should be sent to the laboratory where they can be immediately, and carefully, composited and analyzed with minimal volatilization as per method Nos. 502.1, 502.2, 524.1, and 524.2 as described at 40 CFR 141.24(f)(14)(iv) and (v). There are two ways flow-weighted compositing of VOCs can be accomplished—mathematical compositing or procedural compositing as discussed below.

Mathematical Compositing

In this method, the grab samples are analyzed separately. The sampling personnel collect the requisite number of samples and send them to the laboratory. The laboratory performs the individual analyses on each sample. Five ml (or 25 ml if greater sensitivity is required) of each grab sample are placed into the purge vessel of the GC or GC/MS for analysis. Special precautions must be made to maintain zero headspace in the syringe used to transfer the VOC sample into the purge vessel of the GC or GC/MS. These analytical results are mathematically flow-weight composited

using the calculation in Exhibit 3-24. The concentrations (C) should be adjusted by using the following formula:

$$\textit{Adjusted Concentration} = \frac{\textit{Individual Aliquot Volume}}{\textit{Total Composite Sample}} \times C$$

Each sample concentration should be adjusted, and all adjusted concentrations added, to obtain the flow-weighted VOC composite using this method.

Procedural Compositing

For the second method, sampling personnel collect the requisite number of samples and provide the laboratory with flow-weighted values for each sample using the calculation in Exhibit 3-24. The laboratory technician then draws the necessary volume from each aliquot into an adequately sized syringe, physically combining the samples to result in a flow-weighted composite sample for VOC analysis. Necessary volumes are drawn into the syringe with a volume control fitting. The samples are thus composited directly in the syringe and then placed in the purge vessel of the GC or GC/MS. The advantage of this procedure is that only one analysis on the GC or GC/MS has to be performed.

Although the applicant is required to report only flow-weighted composite concentrations, the mathematical compositing method may provide more information, as it will indicate the concentrations of each separate grab sample. For example, if the procedural compositing method is employed and one of the samples has a high concentration and the other three have non-detectable concentrations, the result will be an average which does not represent the concentration in any of the separate grab samples. In certain cases it may be important to know the concentration of each grab as well as the composite concentration. The mathematical compositing method would be the most appropriate compositing method in these cases.

Organics and Pesticides

The procedures affecting organics and pesticides [base/neutral/acids and pesticide polychlorinated biphenyls (PCBs)] are less complex than VOC procedures. Glass containers must be used for sample collection purposes, amber glass should be used to eliminate the potential for reactivity caused by light. These samples should be maintained at 4°C during storage and shipment. A preservative in

the form of 0.008 percent sodium thiosulfate ($Na_2S_2O_3$) must be added to organic samples if residual chlorine is present. To determine if chlorine is present, a small color indicator test kit can be used. Eighty ml of $Na_2S_2O_3$ per liter of sample must then be added and mixed well until chlorine tests indicate a negative result as per methods 604 and 625 of 40 CFR Part 136 Appendix A. The pH of pesticide samples must be adjusted to between 5 and 9 s.u.

Oil and Grease

O&G tends to adhere to the surfaces that it contacts. Therefore, it should not be transferred from one container to another; rather, a 1-liter container should be used to take the sample. The container used for O&G must be made of glass. A teflon insert should be included in the glass container's lid. However, if teflon is not available, aluminum foil extending out from under the lid may be used. Samples for O&G must be preserved by adding sulfuric acid (H_2SO_4) or hydrochloric acid (HC1) to a pH of less than 2 s.u. and then stored at 4°C.

Additional Considerations

Some pollutants have specific analysis requirements due to short holding times that the applicant must consider. For example:

- Requirements to analyze immediately (pH, total residual chlorine, temperature, sulfite, and dissolved oxygen)
- Requirements to preserve immediately and analyze within 6 hours (fecal coliform and fecal streptococcus)
- Requirements to analyze within 48 hours (BOD_5).

Because of these requirements, field testing equipment may need to be purchased, borrowed, or rented for those parameters that may require field analysis. If the laboratory is located nearby, analysis in the field may not be required.

Laboratories do not always operate in the evenings or on weekends. As a result, holding times for samples taken in the late afternoon or on a Friday may be exceeded. To prevent this from occurring, close coordination with laboratories is necessary. The latest date and time of delivery should be

established to avoid taking samples, only to discover they cannot be accepted by the laboratory and analyzed in accordance with 40 CFR Part 136 requirements.

3.6 SAMPLE VOLUMES

Exhibit 3-25 presents minimal suggested sample volumes for specific parameters. This exhibit should be consulted so that the proper volume is collected for analysis of each pollutant of concern. This exhibit may not include all parameters; if a particular parameter is not listed, refer to 40 CFR Part 136.

3.7 SAMPLE DOCUMENTATION

Information should be submitted to the laboratory with the sample to ensure proper handling by the laboratory. Exhibit 3-26 is an example form which can be used to document the following information.

- Unique Sample or Log Number - All samples should be assigned a unique identification number. If there is a serial number on the transportation case, the sampling personnel should add this number to the field records.

- Date and Time of Sample Collection - Date and time of sample collection (including notation of a.m. or p.m.) must be recorded. In the case of composite samples, the sequence of times and aliquot size should be noted.

- Source of Sample, Including Facility Name and Address - Use the outfall identification number from the site map with a narrative description; a diagram referring to the particular site where the sample was taken should be included.

- Name of Sampling Personnel - The names and initials of the persons taking the sample must be indicated. For a composite sample, the names of the persons installing the sampler and the names of the persons retrieving the sample should be included.

- Sample Type - Each sample should indicate whether it is a grab or composite sample. If the sample is a composite, the volume and frequency of individual aliquots should be noted.

- Preservation Used - Any preservatives (and the amount) added to the sample should be recorded. The method of preservation (e.g., refrigeration at 4°C) should be indicated.

- Analysis Required - All parameters for which the sample must be analyzed at the laboratory should be specified.

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EXHIBIT 3-25. VOLUME OF SAMPLE REQUIRED FOR DETERMINATION OF THE VARIOUS CONSTITUENTS OF INDUSTRIAL WASTEWATER

Tests	Volume of Sample, ml*
Physical	
Color and odor**	100 to 500
Corrosivity**	flowing sample
Electrical conductivity**	100
pH, electrometric**	100
Radioactivity	100 to 1,000
Specific gravity**	100
Temperature**	flowing sample
Toxicity**	1,000 to 20,000
Turbidity**	100 to 1,000
Chemical	
VOCs	100
Dissolved Gases	
Ammonia,*** NH_3	500
Carbon Dioxide,*** free CO_2	200
Chlorine,*** free Cl_2	200
Hydrogen,*** H_2	1,000
Hydrogen sulfide,*** H_2S	500
Oxygen,*** O_2	500 to 1,000
Sulfur dioxide,*** free SO_2	100
Miscellaneous	
Acidity and alkalinity	100
Bacteria (fecal coliform)	500
Bacteria (fecal streptococcus)	100
Biochemical oxygen demand (BOD)	100 to 500
Carbon dioxide, total CO_2 (including CO_3^{--}, HCO_3^-, and free)	200
Chemical oxygen demand (dichromate)	50 to 100
Chlorine requirement	2,000 to 4,000
Chlorine, total residual Cl_2 (including OCl^-, HOCl, NH_2Cl, $NHCl_2$, and free)	200
Chloroform-extractable matter	1,000
Detergents	100 to 200
Hardness	50 to 100
Hydrazine	50 to 100

EXHIBIT 3-25. VOLUME OF SAMPLE REQUIRED FOR DETERMINATION OF THE VARIOUS CONSTITUENTS OF INDUSTRIAL WASTEWATER (Continued)

Tests	Volume of Sample, ml*
Miscellaneous (Continued)	
Micro-organisms	100 to 200
Volatile and filming amines	500 to 1,000
Oily matter	3,000 to 5,000
Organic nitrogen	500 to 1,000
Phenolic compounds	800 to 4,000
Polyphosphates	100 to 200
Silica	50 to 100
Solids, dissolved	100 to 20,000
Solids, suspended	50 to 1,000
Tannin and lignin	100 to 200
Cations	
Aluminum, Al+++	100 to 1,000
Ammonium,*** NH_4+	500
Antimony, Sb+++ to Sb+++++	100 to 1,000
Arsenic, As+++ to As+++++	100 to 1,000
Barium, Ba++	100 to 1,000
Cadmium, Cd++	100 to 1,000
Calcium, Ca++	100 to 1,000
Chromium, Cr+++ to Cr++++++	100 to 1,000
Copper, Cu++	200 to 4,000
Iron,*** Fe++ and Fe+++	100 to 1,000
Lead, Pb++	100 to 4,000
Magnesium, Mg++	100 to 1,000
Manganese, Mn++ to Mn+++++++	100 to 1,000
Mercury, Hg+ and Hg++	100 to 1,000
Potassium, Ni++	100 to 1,000
Nickel, Ni++	100 to 1,000
Silver, Ag+	100 to 1,000
Sodium, NA+	100 to 1,000
Strontium, Sr++	100 to 1,000
Tin, Sn++ and Sn++++	100 to 1,000
Zinc, Zn++	100 to 1,000

EXHIBIT 3-25. VOLUME OF SAMPLE REQUIRED FOR DETERMINATION OF THE VARIOUS CONSTITUENTS OF INDUSTRIAL WASTEWATER *(Continued)*

Tests	Volume of Sample, ml*
Anions	
Bicarbonate, HCO_3	100 to 200
Bromide, Br^-	100
Carbonate, CO_3^{--}	100 to 200
Chloride, Cl^-	25 to 100
Cyanide, Cn^-	25 to 100
Fluoride, Fl^-	200
Hydroxide, OH^-	50 to 100
Iodide, I^-	100
Nitrate, NO_3^-	10 to 100
Nitrite, NO_2^-	50 to 100
Phosphate, Ortho, PO_4^{--}, HPO_4^{--}, $H_2PO_4^-$	50 to 100
Sulfate, SO_4^{--}, HSO_4^-	100 to 1,000
Sulfide, S^{--}, HS^-	100 to 500
Sulfite, SO_3^{--}, HSO_3^-	50 to 100

*Volumes specified in this table should be considered as guides for the approximate quantity of sample necessary for a particular analysis. The exact quantity used should be consistent with the volume prescribed in the standard method of analysis, whenever a volume is specified.
**Aliquot may be used for other determinations.
***Samples for unstable constituents must be obtained in separate containers, preserved as prescribed, completely filled, and sealed against all exposure.

Source: Associated Water and Air Resource Engineers, Inc., 1973, *Handbook for Monitoring Industrial Wastewater*, EPA Technology Transfer.

- Flow - If flow is measured at the time of sampling, the measurement must be recorded and accompanied by a description of the flow measurement method and calculations.

- Date, Time, and Documentation of Sample Shipment - The shipment method (e.g., air, rail, or bus) as well as the shipping papers or manifest number should be noted.

- Comments - All relevant information pertaining to the sample or the sampling site should be recorded. Such comments could include the condition of the sample site, observed characteristics of the sample, environmental conditions that may affect the sample, and problems encountered during sampling.

EXHIBIT 3-26. FIELD SHEET FOR SAMPLE DOCUMENTATION		
Sample Source	Sample ID #	Date: XX/XX/XX
Facility Name		Time: XX:XX a.m./p.m.
Address	Person Performing Sampling	
Outfall ID #	Signature	
Description	Preservation Method	
Diagram of Site	Comments	
Flow Description	Ship Via: Stable Shipping Paper/Manifest	
Flow Calculations	Analysis Required	

3.8 SAMPLE IDENTIFICATION AND LABELING

Prior to collection of the sample, a waterproof, gummed sample identification label or tag should be attached to the sample container. This label should contain relevant information for sample analysis, such as:

- Facility name
- Name of the sample collector
- Sample identification number
- Date and time of sample collection
- Type of analysis required
- Location of sample collection
- Preservatives used
- Type of sample (grab or composite).

Sample lids should be used to protect the sample's integrity from the time it is collected to the time it is opened in the laboratory. The lid should contain the collector's name, the date and time the sample was collected, and a sample identification number. Information on the seal must be identical to the information on the label. In addition, the lid should be taped shut so that the seal must be broken to open the sample container. Caution should be taken to ensure that glue from tape and label tag wires do not contaminate samples, particularly those containing volatile organics and metals. Also, waterproof ink should be used to avoid smearing on the label from melted ice used for cooling.

3.9 SAMPLE PACKAGING AND SHIPPING

If the samples are not hand-delivered to the laboratory or analyzed in an onsite laboratory, they should be placed in a transportation case (e.g., a cooler) along with the chain-of-custody record form, pertinent field records, and analysis request forms, and shipped to the laboratory. Glass bottles should be wrapped in foam rubber, plastic bubble wrap, or other material to prevent breakage during shipment. The wrapping can be secured around the bottle with tape. The container lid should also be sealed with tape. Samples should be placed in ice or a synthetic ice substitute that

will maintain the sample temperature at 4°C throughout shipment. Ice should be placed in double-wrapped watertight bags so the water will not leak from the shipping case. Metal or heavy plastic ice chests make good sample transportation cases. Filament tape wrapped around each end of the ice chest ensures that it will not open during transport. Sampling records (preferably laminated or waterproof) can be placed in a waterproof envelope and taped to the inside of the transportation case to avoid getting them wet in case a sample container or an ice bag leaks. Shipping containers should also be sealed to prevent tampering. A copy of all sampling records should be kept onsite in case they are requested by the permitting authority.

Most samples will not require any special transportation precautions except careful packaging to prevent breakage and/or spillage. If the sample is shipped by common carrier or sent through the U.S. mail, it must comply with Department of Transportation Hazardous Materials Regulations (49 CFR Parts 171-177). Air shipment of hazardous materials samples may also be covered by requirements of the International Air Transport Association (IATA). Before shipping a sample, the facility should be aware of, and follow, any special shipping requirements. Special packing and shipping rules apply to substances considered hazardous materials as defined by IATA rules. Storm water samples are not generally considered hazardous materials, but in the event of a spill, leakage, etc., at the collection site hazardous materials may be present in the samples. Be aware, before sampling, of what hazardous materials may be in the discharge drainage area. If the presence of hazardous materials is suspected, do not sample unless properly trained.

3.10 CHAIN-OF-CUSTODY PROCEDURES

Once samples have been obtained and collection procedures are properly documented, a written record of the chain of custody of that sample should be made. This is recommended so the applicant can be confident that the samples have not been tampered with and that the sample once analyzed is representative of the storm water discharge. "Chain-of-custody" refers to the documented account of changes in possession that occur for a particular sample or set of samples. The chain-of-custody record allows an accurate step-by-step recreation of the sampling path, from origin through analysis. Information necessary in chain-of-custody is:

- Name of the persons collecting the sample
- Sample ID numbers

- Date and time of sample collection
- Location of sample collection
- Names and signatures of all persons handling the samples in the field and in the laboratory.

To ensure that all necessary information is documented, a chain-of-custody form should be developed. An example of such a form is found in Exhibit 3-27. Chain-of-custody forms should be printed on carbonless, multipart paper so all personnel handling the sample receive a copy. All sample shipments should be accompanied by the chain-of-custody record and a copy of these forms should be retained by the originator. In addition, all receipts associated with the shipment should be retained. Carriers typically will not sign for samples; therefore, seals must be used to verify that tampering has not occurred during shipment.

When transferring possession of samples, the transferee should sign and record the date and time on the chain-of-custody record. In general, custody transfers are made for each sample, although samples may be transferred as a group. Each person who takes custody should fill in the appropriate section of the chain-of-custody record.

EXHIBIT 3-27. EXAMPLE OF CHAIN-OF-CUSTODY FORM

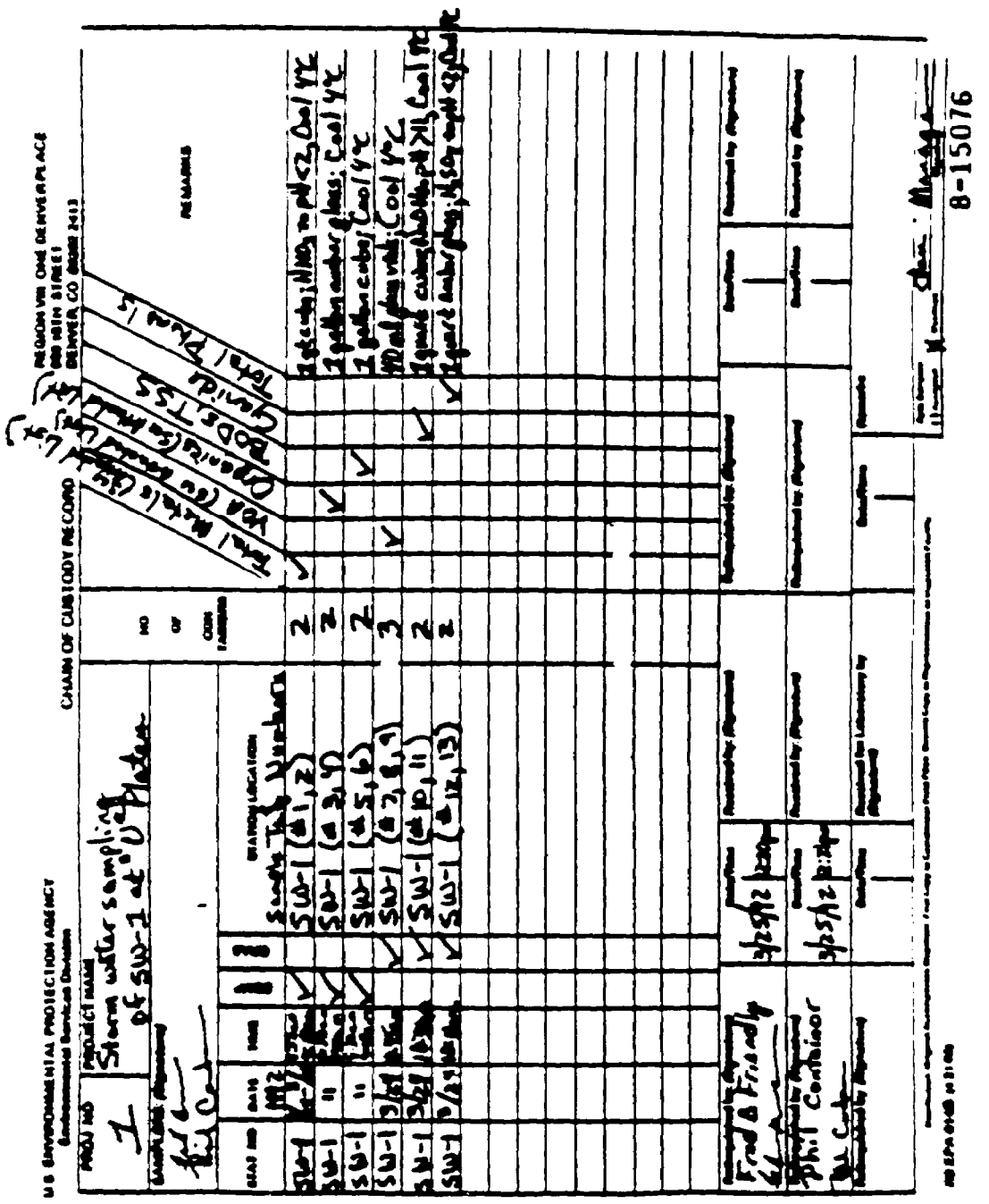

Source: U.S. EPA, Region 8

4. ANALYTICAL CONSIDERATIONS

All storm water discharges must be sampled and analyzed in accordance with the test procedures provided in 40 CFR Part 136. This section discusses pollutant parameters which must be analyzed by storm water permit applicants. If the applicant wants to use an alternative test method, the facility must apply for approval (by submitting a description of the method to the permitting authority for approval) prior to application submission [see 40 CFR 136.4(d)(3)]. Section 5.4 elaborates on how to obtain approval for an analytical method for a parameter that is not included in 40 CFR Part 136. EPA-approved analytical methods at 40 CFR 136.3, Tables IB and IC are shown in Appendix C of this document.

When choosing the appropriate 40 CFR Part 136 analytical method, the applicant should consider sample interferences and potential field sampling error. Most method detection levels are established under ideal sample conditions (e.g., with little or no sample matrix interferences or sampling error). Thus, for storm water samples, the method chosen should account for sampling error and interferences.

4.1 INDUSTRIAL REQUIREMENTS

Industrial dischargers must provide information on the following parameters, as required in 40 CFR 122.26(c)(1)(i)(E):

- Any pollutant limited in an effluent guideline to which the facility is subject
- Any pollutant listed in the facility's NPDES permit for its process wastewater (if the facility has an existing NPDES permit)
- O&G, pH, BOD_5, COD, TSS, total phosphorus, TKN, and nitrate plus nitrite nitrogen
- Any pollutant known or believed to be present [as required in 40 CFR 122.21(g)(7)]
- Flow measurements or estimates of the flow rate, the total amount of discharge for the storm events sampled, and the method of flow measurement or estimation
- The date and duration (in hours) of the storm events sampled, rainfall measurements or estimates of the storm event (in inches) which generated the sampled runoff, and the time between the storm event sampled and the end of the previous measurable (greater than 0.1 inch rainfall) storm event (in hours).

4.1.1 INDIVIDUAL APPLICANTS

Industrial facilities submitting an individual permit application must provide sampling data in three parts of the Form 2F application form as discussed below. (Form 2F restates requirements listed in 40 CFR 122.21 and 122.26).

Section VII.A Parameters

Section VII.A of Form 2F requires the facility to sample (grab and flow-weighted samples) for O&G, BOD_5, COD, TSS, TKN, nitrate plus nitrite nitrogen, total phosphorus, and pH. These parameters are to be monitored by every facility applying for a storm water discharge permit, regardless of the type of operations that exist at the site. Sampling for additional parameters may be required, depending on the type of facility applying for the permit or the pollutants expected to be present in the discharge. These additional requirements are discussed in detail below.

Section VII.B Parameters

Section VII-B of Form 2F requires the applicant to identify all pollutants that are limited in an effluent guideline to which the facility is subject, as well as other toxic and nonconventional pollutants listed in the facility's NPDES permit for its process wastewater. EPA interprets that for pollutants listed in NPDES process wastewater permits, at a minimum, facilities must sample their storm water discharge for those pollutants specifically limited in their process wastewater permit. States can be more stringent, however, and may interpret this requirement to mean all pollutants listed in the permit. Once these parameters are identified, the applicant will be required to sample for these parameters by both grab and flow-weighted composite samples, except for the specified pollutants which must be grab sampled only. Form 2F requires the applicant to submit maximum values. The average values column is not compulsory, but should be completed if data are available. Applicable effluent guidelines appear in 40 CFR Parts 405-471. A listing of the Subchapter N—Effluent Guidelines and Standards by which the applicant may be regulated appears in Exhibit 4-1. The applicant must refer to the effluent guidelines and standards for the particular industry, and should determine which guidelines apply and which parameters should be listed in Section VII.B of Form 2F.

EXHIBIT 4-1. SUBCHAPTER N-EFFLUENT GUIDELINES AND STANDARDS			
Part	**Effluent Guidelines and Standards**	**Part**	**Effluent Guidelines and Standards**
405	Dairy Products Processing Point Source Category	431	Builder's Paper and Board Mills Point Source Category
406	Grain Mils Point Source Category	432	Meat Products Point Source Category
407	Canned and Preserved Fruits and Vegetables Point Source Category	433	Metal Finishing Point Source Category
408	Canned and Preserved Seafood Point Source Category	434	Coal Mining Point Source Category
409	Sugar Processing Point Source Category	435	Oil and Gas Extraction Point Source Category
410	Textile Mills Point Source Category	436	Mineral Mining and Processing Point Source Category
411	Cement Manufacturing Point Source Category	439	Pharmaceutical Manufacturing Point Source Category
412	Feedlots Point Source Category	440	Ore Mining and Dressing Point Source Category
413	Electroplating Point Source Category	443	Paving and Roofing Point Source Category
414	Organic Chemicals, Plastics, and Synthetic Fibers Point Source Category	446	Paint Formulating Point Source Category
415	Inorganic Chemicals Manufacturing Point Source Category	447	Ink Formulating Point Source Category
416	(Reserved)	454	Gum and Wood Chemicals Manufacturing Point Source Category
417	Soap and Detergent Manufacturing Point Source Category	455	Pesticide Chemicals Manufacturing Point Source Category
418	Fertilizer Manufacturing Point Source Category	457	Explosives Manufacturing Point Source Category
419	Petroleum Refining Manufacturing Point Source Category	458	Carbon Black Manufacturing Point Source Category
420	Iron and Steel Manufacturing Point Source Category	459	Photographic Point Source Category
421	Nonferrous Metals Manufacturing Point Source Category	460	Hospital Point Source Category
422	Phosphate Manufacturing Point Source Category	461	Battery Manufacturing Point Source Category
423	Steam Electric Power Generating Point Source Category	463	Plastics Molding and Forming Point Source Category
424	Ferroalloy Manufacturing Point Source Category	464	Metal Molding and Casting Point Source Category
425	Leather Tanning and Finishing Point Source Category	465	Coil Coating Point Source Category
426	Glass Manufacturing Point Source Category	466	Porcelain Enameling Point Source Category
427	Asbestos Manufacturing Point Source Category	467	Aluminum Forming Point Source Category
428	Rubber Manufacturing Point Source Category	468	Copper Forming Point Source Category
429	Timber Products Processing Point Source Category	469	Electrical and Electronic Components Point Source Category
430	Pulp, Paper and Paperboard Point Source Category	471	Nonferrous Metals Forming and Metal Powders Point Source Category

Section VII.C Parameters

Section VII.C requires the applicant to list, for each outfall, each pollutant described in 40 CFR Part 122, Appendix D, Tables II, III, IV, and V (Tables 2F-2, 2F-3, and 2F-4 of application Form 2F) that it knows, or has reason to believe, may be present in the storm water discharge. These pollutants consist of conventional and nonconventional pollutants, toxic pollutants and total phenol, Gas Chromatography/Mass Spectrometry (GC/MS) fraction volatile compounds, acid compounds, base/neutral compounds, pesticides, and hazardous substances. These tables are also provided on the back of Form 2F. Tables II and III of 40 CFR Part 122 Appendix D have been combined in Table 2F-3 of application Form 2F. Table IV of 40 CFR Part 122 Appendix D is listed as Table 2F-2 of application Form 2F and Table V of 40 CFR Part 122 Appendix D is listed as Table 2F-4 of application Form 2F. There are specific requirements associated with each table. If pollutants in Table IV of 40 CFR Part 122 Appendix D (Table 2F-2 of application Form 2F), are directly or indirectly limited by an effluent guideline limitation, the applicant must analyze for it and report the data. For other pollutants listed in Table IV of 40 CFR Part 122 Appendix D (Table 2F-2 of the application form), the applicant must either report quantitative data, if available, or briefly describe the reasons the pollutant is expected to be in the discharge.

For every pollutant in Tables II and III of 40 CFR Part 122 Appendix D (Table 2F-3 of application Form 2F) expected to be discharged in concentrations of 10 parts per billion (ppb) or greater, the applicant must submit quantitative data. For acrolein, acrylonitrile, 2,4-dinitrophenol, and 2-methyl-4,6-dinitrophenol, the applicant must submit quantitative data if any of these four pollutants is expected to be discharged in concentrations of 100 ppb or greater. For every pollutant expected to be discharged with a concentration less than 10 ppb (or 100 ppb for the four parameters mentioned above), the applicant must either submit quantitative data or briefly explain why the pollutant is expected to be discharged.

For the parameters identified in Table V of 40 CFR Part 122 Appendix D (Table 2F-4 of application Form 2F) that the applicant believes to be present in the discharge, no sampling is required. If previous analyses of these parameters were conducted, the results must be reported. Otherwise, the applicant is required to explain why these pollutants are believed to be present.

Small Business Exemption

Small businesses are exempted from the reporting requirements for the organic toxic pollutants presented in 40 CFR Part 122, Table II of Appendix D. Applicants can claim a small business exemption if:

- The facility is a coal mine and the probable annual production is less than 100,000 tons per year. The applicant may submit past production data or estimate future production data instead of conducting analyses for the organic toxic pollutants listed in Table 2F-3 of application Form 2F.
- The facility is not a coal mine, and the gross total annual sales for the most recent 3 years is, on average, less than $100,000 per year (reflected in second quarter 1980 dollars). The applicant may submit sales data for those years instead of conducting analyses for the organic toxic pollutants listed in Table 2F-3 of application Form 2F.

Section VIII

Section VIII of Form 2F requires the applicant to provide biological toxicity testing data for storm water discharges associated with industrial activity. Applicants are required to perform biological toxicity testing for the storm water application if the facility's NPDES permit for its process wastewater lists biological toxicity (EPA interprets "listed" as limited). For example, if a facility's NPDES process wastewater permit has an acute toxicity limit of a lethal concentration (LC_{50}), equal to 75 percent effluent using ceriodaphnia, then that facility must also test its storm water discharges associated with industrial activity and report the results of the tests in Section VIII of Form 2F.

Until whole effluent toxicity methods are promulgated by EPA in 40 CFR Part 136, toxicity testing should be conducted using the most appropriate methods and species as determined by the permitting authority. In the absence of State acute toxicity testing protocols, EPA recommends using the methods described in Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Fresh Water and Marine Organisms. EPA/600/4-90-027 (Rev. September 1991)

4.1.2 GROUP APPLICANTS

Industrial facilities submitting a group application must also provide sampling data (from the sampling subgroup) which is required to be submitted in Sections VII, VIII, and IX along with the certification in Section X of Form 2F. At a minimum, these parameters include O&G, BOD_5, COD,

TSS, TKN, nitrate plus nitrite nitrogen, total phosphorous, and pH. Furthermore, all pollutants listed in an effluent guideline or limited in an NPDES permit applicable to the sampling facilities within the group must be sampled, as well as pollutants suspected of being present based on significant materials and industrial activities present onsite.

4.2 MUNICIPAL REQUIREMENTS

For Part 1 of the municipal permit application, municipalities must submit samples from the field screening effort for pH, total chlorine, total copper, phenol, and detergents (or surfactants). A narrative description of the color, odor, turbidity, and presence of oil sheen and surface scum must be included. For Part 2 of the permit application, municipalities must provide quantitative data for the organic pollutants listed in Table II of 40 CFR Part 122 Appendix D, and the pollutants listed in 40 CFR Part 122, Appendix D, Table III, as well as some additional pollutants. These pollutants are listed in Exhibit 4-2.

Furthermore, 40 CFR 122.26(d)(2)(iii)(A)(5) requires that estimates be provided of the annual pollutant load of the cumulative discharges to waters of the U.S. from all identified municipal outfalls, and the event mean concentration of the cumulative discharges to waters of the U.S. from all identified municipal outfalls during storm events for the parameters listed in Exhibit 4-2. Estimates of the parameters must be accompanied by a description of the procedures for estimating constituent loads and concentrations, including any modelling, data analysis, and calculation methods.

EXHIBIT 4.2. PARAMETERS WHICH MUST BE ANALYZED BY MUNICIPAL APPLICANTS

Pollutants Contained in Table III of 40 CFR Part 122, Appendix D				
Total antimony	Total cadmium	Total lead	Total selenium	Total zinc
Total arsenic	Total chromium	Total mercury	Total silver	Total cyanide
Total beryllium	Total copper	Total nickel	Total thallium	Total phenols
Pollutants Contained in Table II of 40 CFR Part 122, Appendix D				
Acrolein	Toluene	Benzo(a)pyrene	2,6-dinitrotoluene	Gamma-BHC
Acrylonitrile	1,2-trans-dichloroethylene	3,4-benzofluoranthene	Di-n-octyl phthalate	Delta-BHC
Benzene	1,1,1-trichloroethane	Benzo(ghi)perylene	1,2-diphenylhydrazine	Chlordane
Bromoform	1,1,2-trichloroethane	Benzo(k)fluoranthene	Fluoranthene	4,4'-DDT
Carbon Tetrachloride	Trichloroethylene	Bis(2-chloroethoxy)methane	Fluorene	4,4'-DDE
Chlorobenzene	Vinyl chloride	Bis(2-chloroethyl)ether	Hexachlorobenzene	4,4'-DDD
Chlorodibromo-methane	2-chlorophenol	Bis(2-chloroisopropyl)ether	Hexachlorobutadiene	Dieldrin
Chloroethane	2,4-dichlorophenol	Bis(2-ethylhexyl)phthalate	Hexachlorocyclopen-tadiene	Alpha-endosulfan
2-Chloroethylvinyl ether	2,4-dimethylphenol	4-bromophenyl phenyl ether	Hexachloroethane	Beta-endosulfan
Chloroform	4,6-dinitro-o-cresol	Butylbenzyl phthalate	Indeno(1,2,3-cd)pyrene	Endosulfan sulfate
Dichlorobromo-methane	2,4-dinitrophenol	2-chloronaphthalene	Isophorone	Endrin
1,1-dichloroethane	2-nitrophenol	4-chlorophenyl phenyl ether	Naphthalene	Endrin aldehyde
1,2-dichloroethane	4-nitrophenol	Chrysene	Nitrobenzene	Heptachlor
1,1-dichloroethylene	p-chloro-m-cresol	Dibenzo(a,h)anthracene	N-nitrosodimethylamine	Heptachlor epoxide
1,2-dichloropropane	Pentachlorophenol	1,2-dichlorobenzene	N-nitrosodi-n-propylamine	PCB-1242
1,3-dichloropropylene	Phenol	1,3-dichlorobenzene	N-nitrosodiphenylamine	PCB-1254
Ethylbenzene	2,4,6-trichlorophenol	1,4-dichlorobenzene	Phenanthrene	PCB-1221
Methyl bromide	Acenaphthene	3,3-dichlorobenzidine	Pyrene	PCB-1232
Methyl chloride	Acenaphthylene	Diethyl phthalate	1,2,4-trichlorobenzene	PCB-1248
Methylene chloride	Anthracene	Dimethyl phthalate	Aldrin	PCB-1260
1,1,2,2-tetrachloroethane	Benzidine	Di-n-butyl phthalate	Alpha-BHC	PCB-1016
Tetrachloroethylene	Benzo(a)anthracene	2,4-dinitrotoluene	Beta-BHC	Toxaphene

Additional Pollutants Which Must be Analyzed		
TSS	O&G	TKN
TDS	Fecal coliform	Nitrate plus nitrite nitrogen
COD	Fecal streptococcus	Total and dissolved phosphorus
BOD_5	pH	
	Total residual chlorine	

Source: 40 CFR Part 122, Appendix D

5. FLEXIBILITY IN SAMPLING

The requirements for storm water sampling for permit applications offer some flexibility by the permitting authority. The areas of flexibility are discussed below.

5.1 PROTOCOL MODIFICATIONS

The permitting authority may allow sampling protocol modifications for specific requirements on a case-by-case basis. For example, the permitting authority may accept application forms with incomplete sampling data if there was no rainfall at the applicant's facility prior to the submission deadline. However, the permitting authority will require that sampling data be submitted as soon as possible. The reason for not submitting data must be certified by a corporate official (for industrial facilities) or the principal executive officer or ranking official (for municipalities).

Another area where permitting authorities may allow flexibility in storm water sampling is acceptance of quantitative data from a storm event that does not meet the representative rainfall criteria of within 50 percent of the volume and duration for the average storm event for the area. The permitting authority may decide that the discharge data provided is better than no data at all.

In addition, the permitting authority may establish appropriate site-specific sampling procedures or requirements, including sampling locations; the season in which the sampling takes place; the minimum duration between the previous measurable storm event and the storm event sampled; the minimum or maximum level of precipitation required for an appropriate storm event; the form of precipitation sampled (snow melt or rainfall); protocols for collecting samples under 40 CFR Part 136; and additional time for submitting data on a case-by-case basis. The permitting authority should be contacted for preapproval of any necessary protocol modifications. In the case of group applications, EPA Headquarters should be contacted.

5.2 PETITION FOR SUBSTITUTING SUBSTANTIALLY IDENTICAL EFFLUENTS

As described at 40 CFR 122.21(g)(7), when an industrial applicant has two or more outfalls with substantially identical effluents, the permitting authority may allow the applicant to test only one outfall and to report that the quantitative data also apply to the substantially identical outfalls. In the case of group applications, the petition must be submitted to EPA Headquarters.

For facilities seeking to demonstrate that storm water outfalls are substantially identical, a variety of methods can be used as determined by the permitting authority. Three possible petition options are discussed here: (1) submission of a narrative description and a site map; (2) submission of matrices; or (3) submission of model matrices. Detailed guidance on each of the three options for demonstrating substantially identical outfalls is provided below. An owner/operator certification should be submitted with each option. See Section 5.2.3 for an example of this certification.

5.2.1 OPTION ONE: NARRATIVE DESCRIPTION/SITE MAP

Facilities demonstrating that storm water outfalls are substantially identical may submit a narrative description of the facility and a site map to the permitting authority . The narrative portion must include a description of why the outfalls are substantially identical. Petitioners may demonstrate that these outfalls contain storm water discharges associated with:

- Substantially identical industrial activities and processes;
- Substantially identical significant materials that may be exposed to storm water [including, but not limited to, raw materials, fuels, materials such as solvents, detergents, and plastic pellets; finished materials such as metallic products; raw materials used in food processing or production; hazardous substances designated under Section 101(14) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA); any chemical the facility is required to report pursuant to Section 313 of Title III of the Superfund Amendments and Reauthorization Act (SARA); fertilizers; pesticides; and waste products such as ashes, slag, and sludge that have the potential to be released with storm water discharges as per 40 CFR 122.26(b)(12)];
- Substantially identical storm water management practices (such as retention ponds, enclosed areas, diversion dikes, gutters, and swales) and material management practices (such as protective coverings and secondary containment); and
- Substantially identical flows, as determined by the estimated runoff coefficient and approximate drainage area at each outfall.

The site map should include an indication of the facility's topography; each of the drainage and discharge structures; the drainage area of each storm water outfall; paved areas and buildings within the drainage area for each storm water outfall; all past or present areas used for outdoor storage or disposal of significant materials; identification of the significant materials in each drainage area; and identification of each existing structural control measures used to reduce pollutants in storm water

runoff, materials loading and access areas, and areas where pesticides, herbicides, soil conditioners, and fertilizers are applied.

Exhibit 5-1 offers an example of a narrative description/site map petition that sufficiently demonstrates identical outfalls. A demonstration of how to determine runoff coefficient estimates was presented in Section 3.2.2. Exhibit 5-2 presents an example of a site map to be included with the narrative description.

5.2.2 OPTION TWO: USE OF MATRICES TO INDICATE IDENTICAL OUTFALLS

Facilities attempting to demonstrate that storm water outfalls are substantially identical may submit matrices and an owner/operator certification describing specific information associated with each outfall to the permitting authority. Matrix information is required only for those outfalls that the permit applicant is attempting to demonstrate are identical, not for all outfalls. Petitioners must demonstrate, using the matrices, that the outfalls have storm water discharges that meet the criteria listed in Section 5.2.1. Refer to Exhibit 5-3 for examples of matrices that demonstrate substantially identical outfalls and Section 3.2.2 for guidance on determining runoff coefficient estimates.

5.2.3 OPTION THREE: MODEL MATRICES

Facilities attempting to demonstrate that storm water outfalls are substantially identical may submit model matrices and an owner/operator certification to the permitting authority. This option is particularly appropriate for facilities with a large number of storm water outfalls and the potential for numerous groupings of identical outfalls. In addition, this option may be useful in group applications that have a large sampling subgroup.

Model matrices should contain information for <u>one grouping of substantially identical outfalls</u>. For example, if a facility has 150 outfalls and several groupings of identical outfalls, the facility would <u>choose one</u> of the groupings of identical outfalls to provide information in the model matrices. The petitioner must demonstrate, using these matrices, that all outfalls within this grouping have storm water discharges that meet the criteria listed in Section 5.2.1.

The facility should provide an owner certification that all other groupings of outfalls have been examined and certified as substantially identical outfalls according to the criteria established in the

EXHIBIT 5-1. PETITION TO SAMPLE SUBSTANTIALLY IDENTICAL OUTFALLS (NARRATIVE DESCRIPTION/SITE MAP)

Examples

I. The Pepper Company of Philadelphia, Pennsylvania, is primarily engaged in manufacturing paperboard, including paperboard coated on the paperboard machine (from wood pulp and other fiber pulp). This establishment is classified under SIC code 2631. Pursuant to the November 16, 1990, NPDES storm water permit application regulations, this facility is considered to be "engaging in industrial activity" for the purposes of storm water permit application requirements in 40 CFR 122.26(b)(14)(i) and (ii).

II. "When an applicant has two or more outfalls with substantially identical effluents, the Director may allow the applicant to test only one outfall and report that the quantitative data also apply to the substantially identical outfalls." [40 CFR 122.21(g)(7)]

In accordance with 40 CFR 122.21(g)(7) of the NPDES regulations, The Pepper Company hereby petitions the State of Pennsylvania (the permitting authority) for approval to sample certain representative storm water outfalls in groupings of storm water outfalls that are substantially identical. The Pepper Company will demonstrate that of the ten (10) outfalls discharging storm water from our paperboard manufacturing plant, there are two pairs of substantially identical outfalls. Outfalls 3 and 4 are substantially identical and should be grouped together. Outfalls 8 and 9 are substantially identical and should be grouped together. Outfalls 1, 2, 5, 6, 7, and 10 have distinct characteristics and, therefore, will not be grouped together with other outfalls for the purposes of storm water discharge sampling.

III. The Pepper Company will demonstrate that the substantially identical outfalls that have been grouped together contain storm water discharges associated with: (1) substantially identical industrial activities and processes that are occurring outdoors; (2) substantially identical significant materials (including raw materials, fuels, finished materials, waste products, and material handling equipment) that may be exposed to storm water; (3) substantially identical material management practices (such as runoff diversions, gutters and swales, protective coverings, and structural enclosures); and (4) substantially identical flows, as determined by the estimated runoff coefficient and approximate drainage area at each outfall.

EXHIBIT 5-1. PETITION TO SAMPLE SUBSTANTIALLY IDENTICAL OUTFALLS (NARRATIVE DESCRIPTION/SITE MAP) (Continued)

1. Industrial Activities

A. Description of Industrial Activities at the Pepper Company

The Pepper Company receives wastepaper in bales. This baled wastepaper is sent through a hydropulper and converted to pulp. The fiber material is concentrated, stored, and then drawn through refiners to the paper machines. Wires, plastics, and miscellaneous material are removed during the pulping.

Three systems are used to produce top liner, back paper, and filler. The highest quality fiber is used for the top liner, the medium quality is used for the back paper, and the poorest quality is used for the filler paper. Wireforming or conventional boxboard processes are employed to produce clay-coated boxboard, using a water-based clay-coating material. Additional materials may be used as binders. These are stored indoors and are not exposed to precipitation. Ammonia is used in the clay-coating process. Off-grade fiber and trim material are ground up and returned to the liquid process stream. Slime control agents, consisting of bactericides, are used in association with this process. These agents are organic materials used to prevent souring of mill operations. They are received in drums and stored indoors. Empty drums are returned to the supplier to reuse. In addition, the Pepper Company operates an onsite landfill for the disposal of miscellaneous waste materials removed during pulping and paper cuttings operations.

B. Demonstration of Why Outfalls Are Substantially Identical in Terms of Industrial Activities Conducted Outdoors.

Outfalls 3 and 4

Outfalls 3 and 4 are substantially identical in terms of industrial activities conducted outdoors. Both outfalls contain storm water discharges associated with the outdoor storage of baled wastepaper. The wastepaper, which consists of old corrugated containers, mixed paper, and other types of wastepaper, is received weekly and stored for up to 3 weeks in Storage Areas #1 and #2. These uncovered storage areas are enclosed by chain-link fencing.

Outfalls 8 and 9

Outfalls 8 and 9 drain storm water runoff from areas where all industrial activities occur indoors. The industrial activities occurring under roof cover at these two outfalls include hydropulping, storage of concentrated fiber material, refining, and paperboard production. These industrial processes have no potential for contact with precipitation.

EXHIBIT 5-1 PETITION TO SAMPLE SUBSTANTIALLY IDENTICAL OUTFALLS (NARRATIVE DESCRIPTION/SITE MAP) (Continued)

2. Significant Materials

A. Description of Significant Materials at the Pepper Company

The significant materials listed below are used by the Pepper Company to manufacture paperboard. These materials are stored indoors, unless otherwise indicated.

(i) Raw materials, including baled wastepaper (off-spec damaged paper stock or recycled paper) **[wastepaper is stored outdoors at Storage Areas #1 and #2]**; clays, ammonias, sizings, and slime control agents (chlorine dioxide); caustic; ammonia, which is stored in two tanks. **[See Storage Area #3]**.

(ii) Waste Materials, including miscellaneous materials removed during pulping and paper cuttings (such as staples, rubber bands, styrofoam, etc.). These waste materials are stored indoors in open dumpsters. However, prior to disposing of the waste in the onsite landfill, these dumpsters are moved outdoors where they are potentially exposed to precipitation for 12 hours or less. **[See Storage Area #3]**.

(iii) Finished Products, including paperboard and molded fiber products. These are always stored indoors.

(iv) Others, including wood pallets (which are used to transport and haul raw materials, waste materials, and finished products) are stored both indoors and outdoors. **[See Storage Area #3]**. The Pepper Company has an above-ground fuel tank with a pump. **[See Storage Area #3]**.

B. Demonstration of Why Outfalls are Substantially Identical in Terms of Significant Materials that Potentially May be Exposed to Storm Water

Outfalls 3 and 4

Outfalls 3 and 4 are substantially identical in terms of significant materials that may be exposed to storm water. Both outfalls contain storm water discharges associated with the outdoor storage of baled wastepaper. The wastepaper, which consists of old corrugated containers, mixed paper, and other types of wastepaper, is received weekly and stored for up to 3 weeks in Storage Areas #1 and #2. These uncovered storage areas are enclosed by chain-link fencing.

Outfalls 8 and 9

Outfalls 8 and 9 are substantially identical in terms of significant materials. Both outfalls contain storm water runoff from areas that have no significant materials potentially exposed to storm water. All industrial activities occurring in the areas drained by Outfalls 8 and 9 occur completely indoors.

EXHIBIT 5-1. PETITION TO SAMPLE SUBSTANTIALLY IDENTICAL OUTFALLS (NARRATIVE DESCRIPTION/SITE MAP) (Continued)

3. Material Management Practices

A. Description of Material Management Practices at the Pepper Company

The Pepper Company uses a wide range of storm water management practices and material management practices to limit the contact of significant materials with precipitation. Non-structural storm water management practices include employee training, spill reporting and clean-up, and spill prevention techniques. Structural storm water management practices include:

(i) Diversion Devices (both above-ground trenches and subterranean drains) are used to divert surface water from entering a potentially contaminated area.

(ii) Gutters/Swales (constructed of concrete or grass) channel storm water runoff to drainage systems leading to separate storm sewers.

(iv) Overland Flow (which is the flow of storm water over vegetative areas prior to entrance into a storm water conveyance) allows much of the storm water to infiltrate into the ground. The remainder is naturally filtered prior to reaching the storm water conveyance. This is not considered sheet flow since natural drainage channels may be carved out during a heavy storm event.

B. Demonstration of Why Outfalls Are Substantially Identical in Terms of Storm Water Management Practices Used

Outfalls 3 and 4

Outfalls 3 and 4 are substantially identical in terms of storm water management practices used. Both outfalls contain storm water discharges associated with the outdoor storage of baled wastepaper, located in Storage Areas #1 and #2. Concrete gutters at both sites channel storm water away from the storage areas down to the respective outfalls.

Outfalls 8 and 9

Outfalls 8 and 9 are substantially identical in terms of storm water management practices used. Both outfalls contain storm water runoff from areas that have no significant materials potentially exposed to storm water. All industrial activities occurring in the areas drained by Outfalls 8 and 9 occur completely indoors. Both outfalls receive overland flow storm water. From roof drains, the storm water in both drainage areas is then conveyed over similarly graded vegetative areas prior to entrance into the respective outfalls.

EXHIBIT 5-1. PETITION TO SAMPLE SUBSTANTIALLY IDENTICAL OUTFALLS (NARRATIVE DESCRIPTION/SITE MAP) (Continued)

4. Flow Characteristics

A. Demonstration of Why Outfalls Are Substantially Identical in Terms of Flow, as Determined by The Estimated Runoff Coefficient and Approximate Drainage Area at Each Outfall

Outfalls 3 and 4

Outfalls 3 and 4 are substantially identical in terms of flow. Both drainage areas have a 2 to 7 percent grade and contain fine textured soil (greater than 40 percent clay) with a vegetative cover. The estimated runoff coefficient for both outfalls is .2. The approximate drainage area for each outfall is similar. Outfall 3 has an approximate drainage area of 3,500 square feet. Outfall 4 has an approximate drainage area of 2,900 square feet.

Outfalls 8 and 9

Outfalls 8 and 9 are substantially identical in terms of flow. Both drainage areas have a 2 to 7 percent grade and contain fine textured soil (greater than 40 percent clay) with a vegetative cover. The estimated runoff coefficient for both outfalls is .2. The approximate drainage area for each outfall is similar. Outfall 8 has an approximate drainage area of 7,600 square feet. Outfall 9 has an approximate drainage area of 8,700 square feet.

EXHIBIT 5-2. SITE MAP

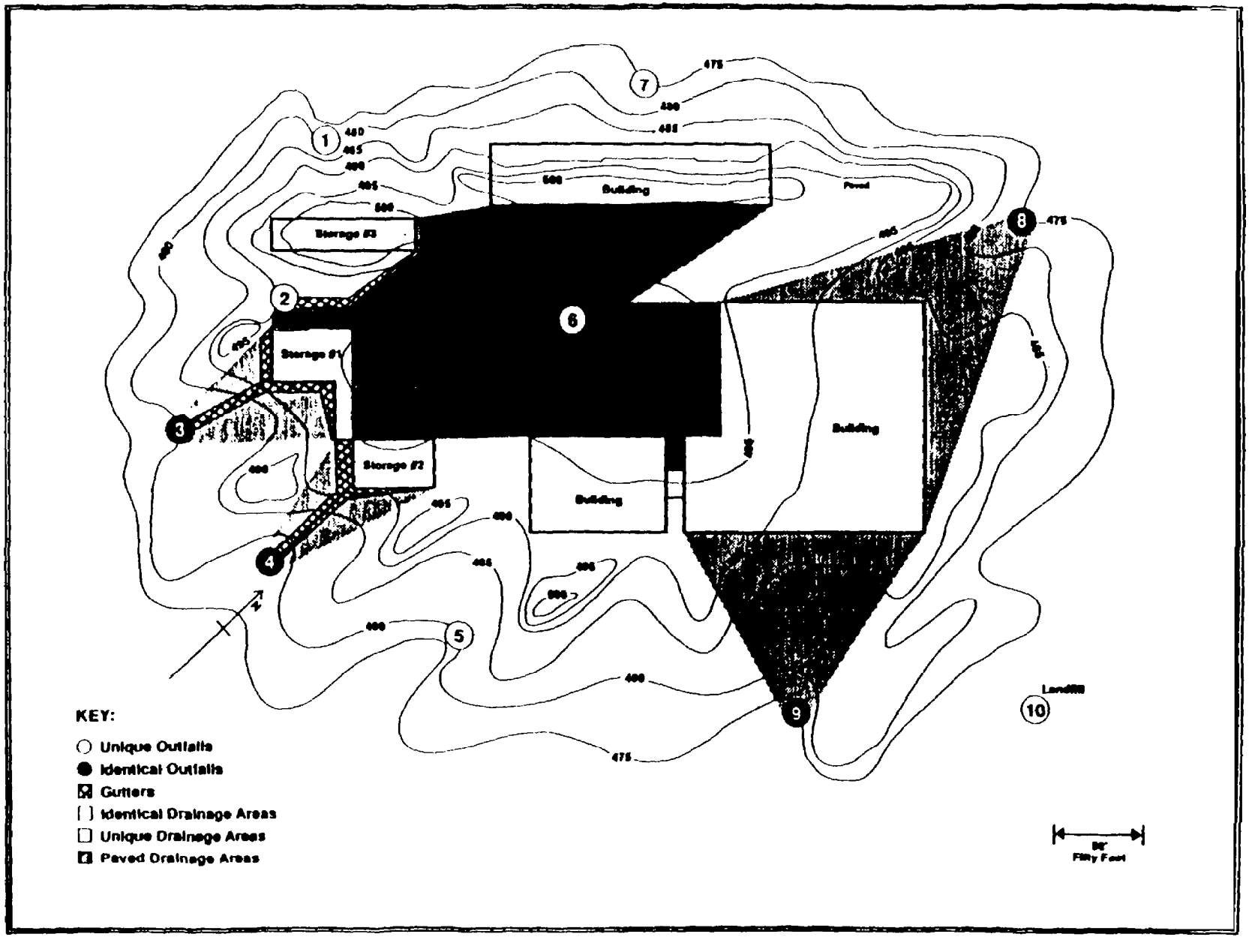

EXHIBIT 5.3 MATRICES DEMONSTRATING SUBSTANTIALLY IDENTICAL OUTFALLS

Industrial Activities

OUTFALL	A	B	C	D	E
3	X	–	–	X	–
4	X	–	–	X	–
8	–	–	–	–	–
9	–	–	–	–	–

Key:

A = Outdoor storage of raw materials and material-handling equipment
B = Fueling
C = Waste materials storage (dumpster)
D = Loading/unloading of raw materials, intermediate products, and final products
E = Landfill activity

Significant Materials That May Be Exposed to Storm Water

OUTFALL	A	B	C	D	E	F
3	-	–	–	–	X	–
4	–	–	–	–	X	–
8	–	–	–	–	–	–
9	–	–	–	–	–	–

Key:

A = Outdoor ammonia tank
B = Wood pallets
C = Above ground gas tank
D = Waste materials
E = Baled wastepaper
F = Finished products

EXHIBIT 5.3 MATRICES DEMONSTRATING SUBSTANTIALLY IDENTICAL OUTFALLS (Continued)

Storm Water Management Practices

OUTFALL	A	B	C
3	–	X	–
4	–	X	–
8	–	–	X
9	–	–	X

Key:

A = Runoff diversions
B = Gutters/swales
C = Overland flow (not sheet flow; flow through vegetative areas)

Flow Characteristics

OUTFALL	A	B
3	0.2	3,500
4	0.2	2,900
8	0.2	7,600
9	0.2	8,700

Key:

A = Estimated runoff coefficient
B = Approximate drainage area of outfall (square feet)

model matrices described in Exhibit 5-3. The owner/operator who signs documents in this section should include the following certification:

> "I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations" [as per 40 CFR 122.22(d)].

5.3 ALTERNATE 40 CFR PART 136 METHOD

As required in 40 CFR 136.4, the applicant must request the approval of an alternate test procedure in writing (in triplicate) prior to testing. The request must be submitted to the Regional Administrator through the Director of the State agency responsible for issuing NPDES permits. The applicant must:

- Provide the name and address of the responsible person or firm making the discharge (if not the applicant), the applicable identification number of the existing or pending permit, the issuing agency, the type of permit for which the alternate test procedure is requested, and the discharge serial number;
- Identify the pollutant or parameter for which approval of an alternate testing procedure is being requested;
- Provide justification for using testing procedures other than those specified in 40 CFR Part 136;
- Provide a detailed description of the proposed alternate test procedure, together with references to published studies of the applicability of the alternate test procedure to the effluents in question;
- Provide comparability data (for applicants applying for nation wide approval of an alternative test procedures).

The permitting authority will notify the applicant within 90 days regarding the approval of the alternate method.

5.4 LACK OF METHOD IN 40 CFR PART 136

If a specific pollutant that must be tested does not have a corresponding analytical method listed in 40 CFR Part 136, the applicant must submit information on an appropriate method to be used. The permitting authority must approve its use prior to collection and analysis of sampling data. The laboratory should be consulted for suggestions and information about analytical methods that can be used. All information justifying the alternative method should be sent to the permitting authority prior to use.

6. HEALTH AND SAFETY

Storm water sampling activities may occur when the sampling environment and/or storm water discharges create hazardous conditions. Hazardous conditions associated with sampling include:

- Hazardous weather conditions (e.g., wind, lightning, flooding, etc.)
- Sampling in confined spaces (e.g., manholes)
- Hazards associated with chemicals
- Biological hazards (e.g., rodents and snakes)
- Physical hazards (e.g., traffic, falling objects, sharp edges, slippery footing, and the potential for lifting injuries from opening or removing access panels and manhole covers, etc.)

It is essential that sampling personnel be aware of these hazards. Sampling personnel should be trained to evaluate potentially hazardous situations and develop ways for handling them. Since sampling hazards can be life threatening, safety must be the highest priority for all personnel. This chapter outlines general health and safety issues and concerns. Additional references discussed below should be consulted for more specific guidance to avoid adverse health and safety situations.

6.1 GENERAL TRAINING REQUIREMENTS

Preparation and training of all sampling personnel should be completed before beginning any sampling task. Extreme care should be taken to allow for safety precautions including proper equipment and appropriate operational techniques, sufficient time to accomplish the task, training on potential hazards, and emergency procedures. EPA's Order 1440.2 sets out the policy, responsibilities, and mandatory requirements for the safety of personnel who are involved in sampling activities. This order, which is found within the EPA NPDES Compliance Monitoring Inspector Training: Sampling manual, provides further guidance to applicants' storm water sampling personnel. Basic emergency precautions include having access to both local emergency phone numbers and communication equipment (i.e., phones or radios), and ensuring that personnel are trained in first aid and carry first aid equipment.

6.2 NECESSARY SAFETY EQUIPMENT

Exhibit 6-1 contains a list of safety equipment that may be appropriate depending on the characteristics of the sampling site.

EXHIBIT 6-1. LIST OF SAFETY EQUIPMENT	
Flashlight	18-inch traffic cones
Meters (for oxygen, explosivity, toxic gases)	Insect/rodent repellant
Ladder	Ventilation equipment
Safety harness	50 feet of 1/2-inch nylon rope
Hard hat	Safety shoes
Safety goggles	Rain wear
Coveralls	Gloves (rubber)
Respirator	First aid kit
Reflective vests	Self-contained breathing apparatus
Source: Adapted from NPDES Compliance Monitoring Inspector Training: Sampling, U.S. EPA, August 1990.	

6.3 HAZARDOUS WEATHER CONDITIONS

Common sense should dictate whether sampling be conducted during adverse weather conditions. No sampling personnel should place themselves in danger during high winds, lightning storms, or flooding conditions which might be unsafe. Under extreme conditions, a less hazardous storm event should be sampled.

6.4 SAMPLING IN CONFINED SPACES

Confined spaces encountered by storm water sampling personnel typically include manholes and deep, unventilated ditches. A confined space is generally defined as a space that is somewhat enclosed with limited access and inadequate ventilation.

The National Institute of Occupational Safety and Health (NIOSH) has developed a manual entitled "Working in Confined Spaces" which should be consulted prior to confined space entry. Also, several States have developed specific procedures which should also be consulted. Unless they have been trained for confined space entry, sampling personnel should avoid entry under all circumstances.

6.4.1 HAZARDOUS CONDITIONS IN CONFINED SPACES

Confined spaces pose a safety threat to sampling personnel because of low oxygen, explosivity, and toxic gases. When entering a confined space, a qualified person should ensure that the atmosphere is safe by sampling to test for oxygen levels, potential flammable hazards, and toxic materials known or suspected to be present. If atmospheric conditions are detected, the confined space should be ventilated or sampling personnel should use a self-contained air supply and wear a life line. At least one person should remain outside of the confined space in the event that problems arise. If atmospheric testing has not been properly conducted, the confined space should not be entered. Manholes can also pose a threat to safety because of the small confined area, slippery surfaces, sharp objects, unsafe ladders, etc.

6.4.2 SPECIAL TRAINING REQUIREMENTS

Personnel should not enter into a confined space unless trained in confined space entry techniques. Such training covers hazard recognition, the use of respiratory equipment and atmospheric testing devices, use of special equipment and tools, and emergency and rescue procedures. In addition, at least one member of the sampling crew should be certified in basic first aid and Cardiopulmonary Resuscitation (CPR). Sampling personnel should, on an annual basis, practice confined space rescues.

6.4.3 PERMIT SYSTEM

If entry into a confined space is necessary, an entry permit system should be developed which includes a written procedure. This permit should include, at a minimum:

- Description of type of work to be done
- Hazards that may be encountered

- Location and description of the confined space
- Information on atmospheric conditions at confined space
- Personnel training and emergency procedures
- Names of sampling personnel.

The manual developed by NIOSH discusses this permit system in more detail. Furthermore, the Occupational Safety and Health Administration (OSHA) proposed a rule on June 5, 1989 (54 FR 24080) that would implement a permit system. The rule is expected to be finalized and published late in 1992.

6.5 CHEMICAL HAZARDS

Sampling personnel can also be at risk of exposure to hazardous chemicals—either chemicals in the actual storm water discharge or the chemicals that have been placed in the sample collection containers for sample preservation. Therefore, direct contact with the preservatives and the storm water (if hazardous chemicals are suspected to be present) should be avoided. Sampling personnel should wear gloves and safety glasses to avoid skin and eye exposure to harmful chemicals. Sampling personnel should be trained to avoid exposure and instructed as to what to do if exposure occurs (e.g., flush the eyes, rinse the skin, ventilate the area, etc.).

6.6 BIOLOGICAL HAZARDS

Storm water sampling personnel may also encounter biological hazards such as rodents, snakes, and insects. The sampling crew should remain alert to these hazards. As mentioned in Section 6.2, necessary sampling equipment, for certain locations, should include insect/rodent repellant and a first aid kit.

6.7 PHYSICAL HAZARDS

The sampling crew should be aware of a number of physical hazards that could cause accidents at the sampling site. These hazards include traffic hazards, sharp edges, falling objects, slippery footing, and lifting injuries from removing manhole covers. Sampling personnel should pay close attention in order to prevent these safety hazards at all times.

If the sample point is in a manhole, a street gutter, or ditch near the street, particular attention must be given to marking off the work area to warn oncoming traffic of the presence of the sampling crew. Traffic cones, warning signs, and barricades should be placed in appropriate places around the sampling point.

TECHNICAL APPENDIX A

FORMS 2F AND 1

Please print or type in the unshaded areas only

EPA ID Number (copy from item I of Form 1)

Form Approved. OMB No. 2040-0086
Approval expires 5-31-92

Form 2F NPDES

EPA

United States Environmental Protection Agency
Washington, DC 20460

Application for Permit to Discharge Storm Water Discharges Associated with Industrial Activity

Paperwork Reduction Act Notice

Public reporting burden for this application is estimated to average 26.6 hours per application, including time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding the burden estimate, any other aspect of this collection of information, or suggestions for improving this form, including suggestions which may increase or reduce this burden to: Chief, Information Policy Branch, PM-223, U.S. Environmental Protection Agency, 401 M St., SW, Washington, DC 20460, or Director, Office of Information and Regulatory Affairs, Office of Management and Budget, Washington, DC 20503.

I. Outfall Location

For each outfall, list the latitude and longitude of its location to the nearest 15 seconds and the name of the receiving water.

A. Outfall Number (list)	B. Latitude		C. Longitude		D. Receiving Water (name)

II. Improvements

A. Are you now required by any Federal, State, or local authority to meet any implementation schedule for the construction, upgrading or operation of wastewater treatment equipment or practices or any other environmental programs which may affect the discharges described in this application? This includes, but is not limited to, permit conditions, administrative or enforcement orders, enforcement compliance schedule letters, stipulations, court orders, and grant or loan conditions.

1. Identification of Conditions, Agreements, Etc.	2. Affected Outfalls		3. Brief Description of Project	4. Final Compliance Date	
	number	source of discharge		a. req.	b. proj.

B. You may attach additional sheets describing any additional water pollution (or other environmental projects which may affect your discharges) you now have under way or which you plan. Indicate whether each program is now under way or planned, and indicate your actual or planned schedules for construction.

III. Site Drainage Map

Attach a site map showing topography (or indicating the outline of drainage areas served by the outfall(s) covered in the application if a topographic map is unavailable) depicting the facility including: each of its intake and discharge structures; the drainage area of each storm water outfall; paved areas and buildings within the drainage area of each storm water outfall, each known past or present areas used for outdoor storage or disposal of significant materials, each existing structural control measure to reduce pollutants in storm water runoff, materials loading and access areas, areas where pesticides, herbicides, soil conditioners and fertilizers are applied; each of its hazardous waste treatment, storage or disposal units (including each area not required to have a RCRA permit which is used for accumulating hazardous waste under 40 CFR 262.34); each well where fluids from the facility are injected underground, springs, and other surface water bodies which receive storm water discharges from the facility.

 Continue on Page 2

TECHNICAL APPENDIX A

Continued from the Front

IV. Narrative Description of Pollutant Sources

A. For each outfall, provide an estimate of the area (include units) of impervious surfaces (including paved areas and building roofs) drained to the outfall, and an estimate of the total surface area drained by the outfall.

Outfall Number	Area of Impervious Surface (provide units)	Total Area Drained (provide units)	Outfall Number	Area of Impervious Surface (provide units)	Total Area Drained (provide units)

B. Provide a narrative description of significant materials that are currently or in the past three years have been treated, stored or disposed in a manner to allow exposure to storm water; method of treatment, storage, or disposal; past and present materials management practices employed to minimize contact by these materials with storm water runoff; materials loading and access areas; and the location, manner, and frequency in which pesticides, herbicides, soil conditioners, and fertilizers are applied.

C. For each outfall, provide the location and a description of existing structural and nonstructural control measures to reduce pollutants in storm water runoff; and a description of the treatment the storm water receives, including the schedule and type of maintenance for control and treatment measures and the ultimate disposal of any solid or fluid wastes other than by discharge.

Outfall Number	Treatment	List Codes from Table 2F-1

V. Nonstormwater Discharges

A. I certify under penalty of law that the outfall(s) covered by this application have been tested or evaluated for the presence of nonstormwater discharges, and that all nonstormwater discharges from these outfall(s) are identified in either an accompanying Form 2C or Form 2E application for the outfall.

Name and Official Title (type or print)	Signature	Date Signed

B. Provide a description of the method used, the date of any testing, and the onsite drainage points that were directly observed during a test.

VI. Significant Leaks or Spills

Provide existing information regarding the history of significant leaks or spills of toxic or hazardous pollutants at the facility in the last three years, including the approximate date and location of the spill or leak, and the type and amount of material released.

 Continue on Page 3

EPA ID Number (copy from item I of Form 1)

Continued from Page 2

VII. Discharge Information

A,B,C, & D: See instructions before proceeding. Complete one set of tables for each outfall. Annotate the outfall number in the space provided. Tables VII-A, VII-B, and VII-C are included on separate sheets numbered VII-1 and VII-2.

E. Potential discharges not covered by analysis - is any toxic pollutant listed in table 2F-2, 2F-3 or 2F-4, a substance or a component of a substance which you currently use or manufacture as an intermediate or final product or byproduct?

☐ Yes (list all such pollutants below) ☐ No (go to Section IX)

VIII. Biological Toxicity Testing Data

Do you have any knowledge or reason to believe that any biological test for acute or chronic toxicity has been made on any of your discharges or on a receiving water in relation to your discharge within the last 3 years?

☐ Yes (list all such pollutants below) ☐ No (go to Section IX)

IX. Contract Analysis Information

Were any of the analyses reported in item VII performed by a contract laboratory or consulting firm?

☐ Yes (list the name, address, and telephone number of, and pollutants analyzed by, each such laboratory or firm below) ☐ No (go to Section X)

A. Name	B. Address	C. Area Code & Phone No.	D. Pollutants Analyzed

X. Certification

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

A. Name & Official Title (type or print)	B. Area Code and Phone No.
C. Signature	D. Date Signed

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EPA ID number (copy from item 1 of Form 1)

Form Approved. OMB No. 2040-0086
Approval expires 5-31-92

VII. Discharge Information (Continued from page 3 of Form 2F)

Part A - You must provide the results of at least one analysis for every pollutant in this table. Complete one table for each outfall. See instructions for additional details.

Pollutant and CAS Number (if available)	Maximum Values (include units)		Average Values (include units)		Number of Storm Events Sampled	Sources of Pollutant
	Grab Samples Taken During First 30 Minutes	Flow-weighted Composite	Grab Samples Taken During First 30 Minutes	Flow-weighted Composite		
Oil and Grease						
Biological Oxygen Demand (BOD5)						
Chemical Oxygen Demand (COD)						
Total Suspended Solids (TSS)						
Total Kjeldahl Nitrogen						
Nitrate plus Nitrite Nitrogen						
Total Phosphorus						
pH	Minimum	Maximum	Minimum	Maximum		

Part B - List each pollutant that is limited in an effluent guideline which the facility is subject to or any pollutant listed in the facility's NPDES permit for its discharge wastewater or the facility is expecting under an existing NPDES permit. Complete one table for each outfall. See the instructions for additional details and requirements.

Pollutant and CAS Number (if available)	Maximum Values (include units)		Average Values (include units)		Number of Storm Events Sampled	Sources of Pollutant
	Grab Samples Taken During First 30 Minutes	Flow-weighted Composite	Grab Samples Taken During First 30 Minutes	Flow-weighted Composite		

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Continued from the Front

Part C - List each pollutant shown in Tables 2F-2, 2F-3, and 2F-4 that you know or have reason to believe is present. See the instructions for additional details and requirements. Complete one table for each outfall.

Pollutant and CAS Number (if available)	Maximum Values (include units)		Average Values (include units)		Number of Storm Events Sampled	Sources of Pollutants
	Grab Sample Taken During First 30 Minutes	Flow-weighted Composite	Grab Sample Taken During First 30 Minutes	Flow-weighted Composite		

Part D - Provide data for the storm event(s) which resulted in the maximum values for the flow weighted composite sample.

1. Date of Storm Event	2. Duration of Storm Event (in minutes)	3. Total rainfall during storm event (in inches)	4. Number of hours between beginning of storm measured and end of previous measurable rain event	5. Maximum flow rate during rain event (gallons/minute or specify units	6. Total flow from rain event (gallons or specify units)

7. Provide a description of the method of flow measurement or estimate.

Instructions - Form 2F
Application for Permit to Discharge Storm Water Associated with Industrial Activity

Who Must File Form 2F

Form 2F must be completed by operators of facilities which discharge storm water associated with industrial activity or by operators of storm water discharges that EPA is evaluating for designation as a significant contributor of pollutants to waters of the United States, or as contributing to a violation of a water quality standard.

Operators of discharges which are composed entirely of storm water must complete Form 2F (EPA Form 3510-2F) in conjunction with Form 1 (EPA Form 3510-1).

Operators of discharges of storm water which are combined with process wastewater (process wastewater is water that comes into direct contact with or results from the production or use of any raw material, intermediate product, finished product, byproduct, waste product, or wastewater) must complete and submit Form 2F, Form 1, and Form 2C (EPA Form 3510-2C).

Operators of discharges of storm water which are combined with nonprocess wastewater (nonprocess wastewater includes noncontact cooling water and sanitary wastes which are not regulated by effluent guidelines or a new source performance standard, except discharges by educational, medical, or commercial chemical laboratories) must complete Form 1, Form 2F, and Form 2E (EPA Form 3510-2E).

Operators of new sources or new discharges of storm water associated with industrial activity which will be combined with other nonstormwater new sources or new discharges must submit Form 1, Form 2F, and Form 2D (EPA Form 3510-2D).

Where to File Applications

The application forms should be sent to the EPA Regional Office which covers the State in which the facility is located. Form 2F must be used only when applying for permits in States where the NPDES permits program is administered by EPA. For facilities located in States which are approved to administer the NPDES permits program, the State environmental agency should be contacted for proper permit application forms and instructions.

Information on whether a particular program is administered by EPA or by a State agency can be obtained from your EPA Regional Office. Form 1, Table 1 of the "General Instructions" lists the addresses of EPA Regional Offices and the States within the jurisdiction of each Office.

Completeness

Your application will not be considered complete unless you answer every question on this form and on Form 1. If an item does not apply to you, enter "NA" (for not applicable) to show that you considered the question

Public Availability of Submitted Information

You may not claim as confidential any information required by this form or Form 1, whether the information is reported on the forms or in an attachment. Section 402(j) of the Clean Water Act requires that all permit applications will be available to the public. This information will be made available to the public upon request

Any information you submit to EPA which goes beyond that required by this form, Form 1, or Form 2C you may claim as confidential, but claims for information which are effluent data will be denied.

If you do not assert a claim of confidentiality at the time of submitting the information, EPA may make the information public without further notice to you. Claims of confidentiality will be handled in accordance with EPA's business confidentiality regulations at 40 CFR Part 2.

Definitions

All significant terms used in these instructions and in the form are defined in the glossary found in the General Instructions which accompany Form 1.

EPA ID Number

Fill in your EPA Identification Number at the top of each odd-numbered page of Form 2F You may copy this number directly from item I of Form 1.

Item I

You may use the map you provided for item XI of Form 1 to determine the latitude and longitude of each of your outfalls and the name of the receiving water.

Item II-A

If you check "yes" to this question, complete all parts of the chart, or attach a copy of any previous submission you have made to EPA containing the same information.

Item II-B

You are not required to submit a description of future pollution control projects if you do not wish to or if none is planned.

Item III

Attach a site map showing topography (or indicating the outline of drainage areas served by the outfall(s) covered in the application if a topographic map is unavailable) depicting the facility including:

each of its drainage and discharge structures;

the drainage area of each storm water outfall;

paved areas and building within the drainage area of each storm water outfall, each known past or present areas used for outdoor storage or disposal of significant materials, each existing structural control measure to reduce pollutants in storm water runoff, materials loading and access areas, areas where pesticides, herbicides, soil conditioners and fertilizers are applied;

each of its hazardous waste treatment, storage or disposal facilities (including each area not required to have a RCRA permit which is used for accumulating hazardous waste for less than 90 days under 40 CFR 262.34);

each well where fluids from the facility are injected underground; and

springs, and other surface water bodies which receive storm water discharges from the facility.

Item IV-A

For each outfall, provide an estimate of the area drained by the outfall which is covered by impervious surfaces. For the purpose of this application, impervious surfaces are surfaces where storm water runs off at rates that are *significantly higher than background rates (e.g., predevelopment levels)* and include paved areas, building roofs, parking lots, and roadways. Include an estimate of the total area (including all impervious and pervious areas) drained by each outfall. The site map required under item III can be used to estimate the total area drained by each outfall.

Item IV-B

Provide a narrative description of significant materials that are currently or in the past three years have been treated, stored, or disposed in a manner to allow exposure to storm water; method of treatment, storage or disposal of these materials; past and present materials management practices employed, in the last three years, to minimize contact by these materials with storm water runoff; materials loading and access areas and the location, manner, and frequency in which pesticides, herbicides, soil conditioners, and fertilizers are applied. Significant materials should be identified by chemical name; form (e.g., powder, liquid, etc.), and type of container or treatment unit. Indicate any materials treated, stored, or disposed of together. "Significant materials" includes, but is not limited to: raw materials; fuels; materials such as solvents, detergents, and plastic pellets; finished materials such as metallic products; raw materials used in food processing or production; hazardous substances designated under Section 101(14) of CERCLA; any chemical the facility is required to report pursuant to Section 313 of Title III of SARA; fertilizers; pesticides; and waste products such as ashes, slag and sludge that have the potential to be released with storm water discharges.

Item IV-C

For each outfall, structural controls include structures which enclose material handling or storage areas, covering materials, berms, dikes, or diversion ditches around manufacturing, production, storage or treatment units, retention ponds, etc. Nonstructural controls include practices such as spill prevention plans employee training, visual inspections, preventive maintenance, and housekeeping measures that are used to prevent or minimize the potential for releases of pollutants.

Item V

Provide a certification that all outfalls that should contain storm water discharges associated with industrial activity have been tested or evaluated for the presence of non-storm water discharges which are not covered by an NPDES permit. Tests for such non-storm water discharges may include smoke tests, fluorometric dye tests, analysis of accurate schematics, as well as other appropriate tests. Part B must include a description of the method used, the date of any testing, and the onsite drainage points that were directly observed during a test. All non-storm water discharges must be identified in a Form 2C or Form 2E which must accompany this application (see beginning of instructions under section titled "Who Must File Form 2F" for a description of when Form 2C and Form 2E must be submitted).

Item VI

Provide a description of existing information regarding the history of significant leaks or spills of toxic or hazardous pollutants at the facility in the last three years.

Item VII-A, B, and C

These items require you to collect and report data on the pollutants discharged for each of your outfalls. Each part of this item addresses a different set of pollutants and must be completed in accordance with the specific instructions for that part. The following general instructions apply to the entire item.

General Instructions

Part A requires you to report at least one analysis for each pollutant listed. Parts B and C require you to report analytical data in two ways. For some pollutants addressed in Parts B and C, if you know or have reason to know that the pollutant is present in your discharge, you may be required to list the pollutant and test (sample and analyze) and report the levels of the pollutants in your discharge. For all other pollutants addressed in Parts B and C, you must list the pollutant if you know or have reason to know that the pollutant is present in the discharge, and either report quantitative data for the pollutant or briefly describe the reasons the pollutant is expected to be discharged. (See specific instructions on the form and below for Parts A through C.) Base your determination that a pollutant is present in or absent from your discharge on your knowledge of your raw materials, material management practices, maintenance chemicals, history of spills and releases, intermediate and final products and byproducts, and any previous analyses known to you of your effluent or similar effluent.

A. **Sampling:** The collection of the samples for the reported analyses should be supervised by a person experienced in performing sampling of industrial wastewater or storm water discharges. You may contact EPA or your State permitting authority for detailed guidance on sampling techniques and for answers to specific questions. Any specific requirements contained in the applicable analytical methods should be followed for sample containers, sample preservation, holding times, the collection of duplicate samples, etc. The time when you sample should be representative, to the extent feasible, of your treatment system operating properly with no system upsets. Samples should be collected from the center of the flow channel, where turbulence is at a maximum, at a site specified in your present permit, or at any site adequate for the collection of a representative sample.

   For pH, temperature, cyanide, total phenols, residual chlorine, oil and grease, and fecal coliform, grab samples taken during the first 30 minutes (or as soon thereafter as practicable) of the discharge must be used (you are not required to analyze a flow-weighted composite for these parameters). For all other pollutants both a grab sample collected during the first 30 minutes (or as soon thereafter as practicable) of the discharge and a flow-weighted composite sample must be analyzed. However, a minimum of one grab sample may be taken for effluents from holding ponds or other impoundments with a retention period of greater than 24 hours.

   All samples shall be collected from the discharge resulting from a storm event that is greater than 0.1 inches and at least 72 hours from the previously measurable (greater than 0.1 inch rainfall) storm event. Where feasible, the variance in the duration of the event and the total rainfall of the event should not exceed 50 percent from the average or median rainfall event in that area.

   A grab sample shall be taken during the first thirty minutes of the discharge (or as soon thereafter as practicable), and a flow-weighted composite shall be taken for the entire event or for the first three hours of the event.

   Grab and composite samples are defined as follows:

Grab sample: An individual sample of at least 100 milliliters collected during the first thirty minutes (or as soon thereafter as practicable) of the discharge. This sample is to be analyzed separately from the composite sample.

Flow-Weighted Composite sample: A flow-weighted composite sample may be taken with a continuous sampler that proportions the amount of sample collected with the flow rate or as a combination of a minimum of three sample aliquots taken in each hour of discharge for the entire event or for the first three hours of the event, with each aliquot being at least 100 milliliters and collected with a minimum period of fifteen minutes between aliquot collections. The composite must be flow proportional; either the time interval between each aliquot or the volume of each aliquot must be proportional to either the stream flow at the time of sampling or the total stream flow since the collection of the previous aliquot. Aliquots may be collected manually or automatically. Where GC/MS Volatile Organic Analysis (VOA) is required, aliquots must be combined in the laboratory immediately before analysis. Only one analysis for the composite sample is required.

Data from samples taken in the past may be used, provided that:

All data requirements are met;

Sampling was done no more than three years before submission; and

All data are representative of the present discharge.

Among the factors which would cause the data to be unrepresentative are significant changes in production level, changes in raw materials, processes, or final products, and changes in storm water treatment. When the Agency promulgates new analytical methods in 40 CFR Part 136, EPA will provide information as to when you should use the new methods to generate data on your discharges. Of course, the Director may request additional information, including current quantitative data, if they determine it to be necessary to assess your discharges. The Director may allow or establish appropriate site-specific sampling procedures or requirements, including sampling locations, the season in which the sampling takes place, the minimum duration between the previous measurable storm event and the storm event sampled, the minimum or maximum level of precipitation required for an appropriate storm event, the form of precipitation sampled (snow melt or rainfall), protocols for collecting samples under 40 CFR Part 136, and additional time for submitting data on a case-by-case basis.

B. **Reporting:** All levels must be reported as concentration and mass (note: grab samples are reported in terms of concentration). You may report some or all of the required data by attaching separate sheets of paper instead of filling out pages VII-1 and VII-2 if the separate sheets contain all the required information in a format which is consistant with pages VII-1 and VII-2 in spacing and identification of pollutants and columns. Use the following abbreviations in the columns headed "Units."

Concentration		Mass	
ppm	parts per million	lbs	pounds
mg/1	milligrams per liter	ton	tons (English tons)
ppb	parts per billion	mg	milligrams
ug/1	micrograms per liter	g	grams
kg	kilograms	T	tonnes (metric tons)

All reporting of values for metals must be in terms of "total recoverable metal," unless:

(1) An applicable, promulgated effluent limitation or standard specifies the limitation for the metal in dissolved, valent, or total form; or

(2) All approved analytical methods for the metal inherently measure only its dissolved form (e.g., hexavalent chromium); or

(3) The permitting authority has determined that in establishing case-by-case limitations it is necessary to express the limitations on the metal in dissolved, valent, or total form to carry out the provisions of the CWA. If you measure only one grab sample and one flow-weighted composite sample for a given outfall, complete only the "Maximum Values" columns and insert "1" into the "Number of Storm Events Sampled" column. The permitting authority may require you to conduct additional analyses to further characterize your discharges.

If you measure more than one value for a grab sample or a flow-weighted composite sample for a given outfall and those values are representative of your discharge, you must report them. You must describe your method of testing and data analysis. You also must determine the average of all values within the last year and report the concentration and mass under the "Average Values" columns, and the total number of storm events sampled under the "Number of Storm Events Sampled" columns.

C. **Analysis:** You must use test methods promulgated in 40 CFR Part 136; however, if none has been promulgated for a particular pollutant, you may use any suitable method for measuring the level of the pollutant in your discharge provided that you submit a description of the method or a reference to a published method. Your description should include the sample holding time, preservation techniques, and the quality control measures which you used. If you have two or more substantially identical outfalls, you may request permission from your permitting authority to sample and analyze only one outfall and submit the results of the analysis for other substantially identical outfalls. If your request is granted by the permitting authority, on a separate sheet attached to the application form, identify which outfall you did test, and describe why the outfalls which you did not test are substantially identical to the outfall which you did test.

Part VII-A

Part VII-A must be completed by all applicants for all outfalls who must complete Form 2F.

Analyze a grab sample collected during the first thirty minutes (or as soon thereafter as practicable) of the discharge and flow-weighted composite samples for all pollutants in this Part, and report the results except use only grab samples for pH and oil and grease. See discussion in General Instructions to Item VII for definitions of grab sample collected during the first thirty minutes of discharge and flow-weighted composite sample. The "Average Values" column is not compulsory but should be filled out if data are available.

Part VII-B

List all pollutants that are limited in an effluent guideline which the facility is subject to (see 40 CFR Subchapter N to determine which pollutants are limited in effluent guidelines) or any pollutant listed in the facility's NPDES permit for its process wastewater (if the facility is operating under an existing NPDES permit). Complete one table for each outfall. See discussion in General instructions to item VII for definitions of grab sample collected during the first thirty minutes (or as soon thereafter as practicable) of discharge and flow-weighted composite sample. The "Average Values" column is not compulsory but should be filled out if data are available.

Analyze a grab sample collected during the first thirty minutes of the discharge and flow-weighted composite samples for all pollutants in this Part, and report the results, except as provided in the General Instructions

Part VII-C

Part VII-C must be completed by all applicants for all outfalls which discharge storm water associated with industrial activity, or that EPA is evaluating for designation as a significant contributor of pollutants to waters of the United States, or as contributing to a violation of a water quality standard. Use both a grab sample and a composite sample for all pollutants you analyze for in this part except use grab samples for residual chlorine and fecal coliform. The "Average Values" column is not compulsory but should be filled out if data are available. Part C requires you to address the pollutants in Table 2F-2, 2F-3, and 2F-4 for each outfall. Pollutants in each of these Tables are addressed differently.

Table 2F-2: For each outfall, list all pollutants in Table 2F-2 that you know or have reason to believe are discharged (except pollutants previously listed in Part VII-B). If a pollutant is limited in an effluent guideline limitation which the facility is subject to, the pollutant must be analyzed and reported in Part VII-B. If a pollutant in Table 2F-2 is indirectly limited by an effluent guideline limitation through an indicator (e.g., use of TSS as an indicator to control the discharge of iron and aluminum), you must analyze for it and report the data in Part VII-B. For other pollutants listed in Table 2F-2 (those not limited directly or indirectly by an effluent limitation guideline), that you know or have reason to believe are discharged, you must either report quantitative data or briefly describe the reasons the pollutant is expected to be discharged.

Table 2F-3: For each outfall, list all pollutants in Table 2F-3 that you know or have reason to believe are discharged. For every pollutant in Table 2F-3 expected to be discharged in concentrations of 10 ppb or greater, you must submit quantitative data. For acrolein, acrylonitrile, 2,4 dinitrophenol, and 2-methyl-4 6 dinitrophenol, you must submit quantitative data if any of these four pollutants is expected to be discharged

in concentrations of 100 ppb or greater. For every pollutant expected to be discharged in concentrations less than 10 ppb (or 100 ppb for the four pollutants listed above), then you must either submit quantitative data or briefly describe the reasons the pollutant is expected to be discharged.

Small Business Exemption - If you are a "small business," you are exempt from the reporting requirements for the organic toxic pollutants listed in Table 2F-3. There are two ways in which you can qualify as a "small business". If your facility is a coal mine, and if your probable total annual production is less than 100,000 tons per year, you may submit past production data or estimated future production (such as a schedule of estimated total production under 30 CFR 795.14(c)) instead of conducting analyses for the organic toxic pollutants. If your facility is not a coal mine, and if your gross total annual sales for the most recent three years average less than $100,000 per year (in second quarter 1980 dollars), you may submit sales data for those years instead of conducting analyses for the organic toxic pollutants. The production or sales data must be for the facility which is the source of the discharge. The data should not be limited to production or sales for the process or processes which contribute to the discharge, unless those are the only processes at your facility. For sales data, in situations involving intracorporate transfer of goods and services, the transfer price per unit should approximate market prices for those goods and services as closely as possible. Sales figures for years after 1980 should be indexed to the second quarter of 1980 by using the gross national product price deflator (second quarter of 1980 = 100). This index is available in National Income and Product Accounts of the United States (Department of Commerce, Bureau of Economic Analysis).

Table 2F-4: For each outfall, list any pollutant in Table 2F-4 that you know or believe to be present in the discharge and explain why you believe it to be present. No analysis is required, but if you have analytical data, you must report them. **Note:** Under 40 CFR 117.12(a)(2), certain discharges of hazardous substances (listed at 40 CFR 177.21 or 40 CFR 302.4) may be exempted from the requirements of section 311 of CWA, which establishes reporting requirements, civil penalties, and liability for cleanup costs for spills of oil and hazardous substances. A discharge of a particular substance may be exempted if the origin, source, and amount of the discharged substances are identified in the NPDES permit application or in the permit, if the permit contains a requirement for treatment of the discharge, and if the treatment is in place. To apply for an exclusion of the discharge of any hazardous substance from the requirements of section 311, attach additional sheets of paper to your form, setting forth the following information:

1. The substance and the amount of each substance which may be discharged.
2. The origin and source of the discharge of the substance.
3. The treatment which is to be provided for the discharge by:
   a. An onsite treatment system separate from any treatment system treating your normal discharge;
   b. A treatment system designed to treat your normal discharge and which is additionally capable of treating the amount of the substance identified under paragraph 1 above; or
   c. Any combination of the above.

See 40 CFR 117.12(a)(2) and (c), published on August 29, 1979, in 44 FR 50766, or contact your Regional Office (Table 1 on Form 1, Instructions), for further information on exclusions from section 311.

Part VII-D

If sampling is conducted during more than one storm event, you only need to report the information requested in Part VII-D for the storm event(s) which resulted in any maximum pollutant concentration reported in Part VII-A, VII-B, or VII-C.

Provide flow measurements or estimates of the flow rate, and the total amount of discharge for the storm event(s) sampled, the method of flow measurement, or estimation. Provide the data and duration of the storm event(s) sampled, rainfall measurements, or estimates of the storm event which generated the sampled runoff and the duration between the storm event sampled and the end of the previous measurable (greater than 0.1 inch rainfall) storm event.

Part VII-E

List any toxic pollutant listed in Tables 2F-2, 2F-3, or 2F-4 which you currently use or manufacture as an intermediate or final product or byproduct. In addition, if you know or have reason to believe that 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD) is discharged or if you use or manufacture 2,4,5-trichlorophenoxy acetic

acid (2,4,5,-T); 2-(2,4,5-trichlorophenoxy) propanoic acid (Silvex, 2,4,5,-TP); 2-(2,4,5-trichlorophenoxy) ethyl 2,2-dichloropropionate (Erbon); O,O-dimethyl O-(2,4,5-trichlorphenyl) phosphorothioate (Ronnel); 2,4,5-trichlorophenol (TCP); or hexachlorophene (HCP); then list TCDD. The Director may waive or modify the requirement if you demonstrate that it would be unduly burdensome to identify each toxic pollutant and the Director has adequate information to issue your permit. You may not claim this information as confidential; however, you do not have to distinguish between use or production of the pollutants or list the amounts.

Item VIII

Self explanatory. The permitting authority may ask you to provide additional details after your application is received.

Item X

The Clean Water Act provides for severe penalties for submitting false information on this application form

Section 309(c)(4) of the Clean Water Act provides that "Any person who knowingly makes any false material statement, representation, or certification in any application, . . . shall upon conviction, be punished by a fine of not more than $10,000 or by imprisonment for not more than 2 years, or by both. If a conviction of such person is for a violation committed after a first conviction of such person under this paragraph, punishment shall be by a fine of not more than $20,000 per day of violation, or by imprisonment of not more than 4 years, or by both." 40 CFR Part 122.22 requires the certification to be signed as follows:

(A) **For a corporation:** by a responsible corporate official. For purposes of this section, a responsible corporate official means (i) a president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy- or decision-making functions for the corporation, or (ii) the manager of one or more manufacturing, production, or operating facilities employing more than 250 persons or having gross annual sales or expenditures exceeding $25,000,000 (in second-quarter 1980 dollars), if authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures.

Note: EPA does not require specific assignments or delegation of authority to responsible corporate officers identified in 122.22(a)(1)(i). The Agency will presume that these responsible corporate officers have the requisite authority to sign permit applications unless the corporation has notified the Director to the contrary. Corporate procedures governing authority to sign permit applications may provide for assignment or delegation to applicable corporate position under 122.22(a)(1)(ii) rather than to specific individuals.

(B) **For a partnership or sole proprietorship:** by a general partner or the proprietor, respectively, or

(C) **For a municipality, State, Federal, or other public agency:** by either a principal executive officer or ranking elected official. For purposes of this section, a principal executive officer of a Federal agency includes (i) the chief executive officer of the agency, or (ii) a senior executive officer having responsibility for the overall operations of a principal geographic unit of the agency (e.g., Regional Administrators of EPA).

Table 2F-1
Codes for Treatment Units

	Physical Treatment Processes		
1-A	Ammonia Stripping	1-M	Grit Removal
1-B	Dialysis	1-N	Microstraining
1-C	Diatomaceous Earth Filtration	1-O	Mixing
1-D	Distillation	1-P	Moving Bed Filters
1-E	Electrodialysis	1-Q	Multimedia Filtration
1-F	Evaporation	1-R	Rapid Sand Filtration
1-G	Flocculation	1-S	Reverse Osmosis (Hyperfiltration)
1-H	Flotation	1-T	Screening
1-I	Foam Fractionation	1-U	Sedimentation (Settling)
1-J	Freezing	1-V	Slow Sand Filtration
1-K	Gas-Phase Separation	1-W	Solvent Extraction
1-L	Grinding (Comminutors)	1-X	Sorption
	Chemical Treatment Processes		
2-A	Carbon Adsorption	2-G	Disinfection (Ozone)
2-B	Chemical Oxidation	2-H	Disinfection (Other)
2-C	Chemical Precipitation	2-I	Electrochemical Treatment
2-D	Coagulation	2-J	Ion Exchange
2-E	Dechlorination	2-K	Neutralization
2-F	Disinfection (Chlorine)	2-L	Reduction
	Biological Treatment Processes		
3-A	Activated Sludge	3-E	Pre-Aeration
3-B	Aerated Lagoons	3-F	Spray Irrigation/Land Application
3-C	Anaerobic Treatment	3-G	Stabilization Ponds
3-D	Nitrification-Denitrification	3-H	Trickling Filtration
	Other Processes		
4-A	Discharge to Surface Water	4-C	Reuse/Recycle of Treated Effluent
4-B	Ocean Discharge Through Outfall	4-D	Underground Injection
	Sludge Treatment and Disposal Processes		
5-A	Aerobic Digestion	5-M	Heat Drying
5-B	Anaerobic Digestion	5-N	Heat Treatment
5-C	Belt Filtration	5-O	Incineration
5-D	Centrifugation	5-P	Land Application
5-E	Chemical Conditioning	5-Q	Landfill
5-F	Chlorine Treatment	5-R	Pressure Filtration
5-G	Composting	5-S	Pyrolysis
5-H	Drying Beds	5-T	Sludge Lagoons
5-I	Elutriation	5-U	Vacuum Filtration
5-J	Flotation Thickening	5-V	Vibration
5-K	Freezing	5-W	Wet Oxidation
5-L	Gravity Thickening		

Table 2F-2

Conventional and Nonconventional Pollutants

Bromide
Chlorine, Total Residual
Color
Fecal Coliform
Fluoride
Nitrate-Nitrite
Nitrogen, Total Organic
Oil and Grease
Phosphorus, Total
Radioactivity
Sulfate
Sulfite
Surfactants
Aluminum, Total
Barium, Total
Boron, Total
Cobalt, Total
Iron, Total
Magnesium, Total
Molybdenum, Total
Manganese, Total
Tin, Total
Titanium, Total

Table 2F-3

Toxic Pollutants

Toxic Pollutants and Total Phenol

Antimony, Total	Copper, Total	Silver, Total
Arsenic, Total	Lead, Total	Thallium, Total
Beryllium, Total	Mercury, Total	Zinc, Total
Cadmium, Total	Nickel, Total	Cyanide, Total
Chromium, Total	Selenium, Total	Phenols, Total

GC/MS Fraction Volatiles Compounds

Acrolein	Dichlorobromomethane	1,1,2,2,-Tetrachloroethane
Acrylonitrile	1,1-Dichloroethane	Tetrachloroethylene
Benzene	1,2-Dichloroethane	Toluene
Bromoform	1,1-Dichloroethylene	1,2-Trans-Dichloroethylene
Carbon Tetrachloride	1,2-Dichloropropane	1,1,1-Trichloroethane
Chlorobenzene	1,3-Dichloropropylene	1,1,2-Trichloroethane
Chlorodibromomethane	Ethylbenzene	Trichloroethylene
Chloroethane	Methyl Bromide	Vinyl Chloride
2-Chloroethylvinyl Ether	Methyl Chloride	
Chloroform	Methylene Chloride	

Acid Compounds

2-Chlorophenol	2,4-Dinitrophenol	Pentachlorophenol
2,4-Dichlorophenol	2-Nitrophenol	Phenol
2,4-Dimethylphenol	4-Nitrophenol	2,4,6-Trichlorophenol
4,6-Dinitro-O-Cresol	p-Chloro-M-Cresol	2-methyl-4,6 dinitrophenol

Base/Neutral

Acenaphthene	2-Chloronaphthalene	Fluroranthene
Acenaphthylene	4-Chlorophenyl Phenyl Ether	Fluorene
Anthracene	Chrysene	Hexachlorobenzene
Benzidine	Dibenzo(a,h)anthracene	Hexachlorobutadiene
Benzo(a)anthracene	1,2-Dichlorobenzene	Hexachloroethane
Benzo(a)pyrene	1,3-Dichlorobenzene	Indeno(1,2,3-cd)pyrene
3,4-Benzofluoranthene	1,4-Dichlorobenzene	Isophorone
Benzo(ghi)perylene	3,3'-Dichlorobenzidine	Napthalene
Benzo(k)fluoranthene	Diethyl Phthalate	Nitrobenzene
Bis(2-chloroethoxy)methane	Dimethyl Phthalate	N-Nitrosodimethylamine
Bis(2-chloroethyl)ether	Di-N-Butyl Phthalate	N-Nitrosodi-N-Propylamine
Bis(2-chloroisopropyl)ether	2,4-Dinitrotoluene	N-Nitrosodiphenylamine
Bis(2-ethylhexyl)phthalate	2,6-Dinitrotoluene	Phenanthrene
4-Bromophenyl Phenyl Ether	Di-N-Octylphthalate	Pyrene
Butylbenzyl Phthalate	1,2-Diphenylhydrazine (as Azobenzene)	1,2,4-Trichlorobenzene

Pesticides

Aldrin	Dieldrin	PCB-1254
Alpha-BHC	Alpha-Endosulfan	PCB-1221
Beta-BHC	Beta-Endosulfan	PCB-1232
Gamma-BHC	Endosulfan Sulfate	PCB-1248
Delta-BHC	Endrin	PCB-1260
Chlordane	Endrin Aldehyde	PCB-1016
4,4'-DDT	Heptachlor	Toxaphene
4,4'-DDE	Heptachlor Epoxide	
4,4'-DDD	PCB-1242	

Table 2F-4
Hazardous Substances

Toxic Pollutant

Asbestos

Hazardous Substances

Acetaldehyde	Dinitrobenzene	Napthenic acid
Allyl alcohol	Diquat	Nitrotoluene
Allyl chloride	Disulfoton	Parathion
Amyl acetate	Diuron	Phenolsulfonate
Aniline	Epichlorohydrin	Phosgene
Benzonitrile	Ethion	Propargite
Benzyl chloride	Ethylene diamine	Propylene oxide
Butyl acetate	Ethylene dibromide	Pyrethrins
Butylamine	Formaldehyde	Quinoline
Carbaryl	Furfural	Resorcinol
Carbofuran	Guthion	Strontium
Carbon disulfide	Isoprene	Strychnine
Chlorpyrifos	Isopropanolamine	Styrene
Coumaphos	Kelthane	2,4,5-T (2,4,5-Trichlorophenoxyacetic acid)
Cresol	Kepone	TDE (Tetrachlorodiphenyl ethane)
Crotonaldehyde	Malathion	2,4,5-TP [2-(2,4,5-Trichlorophenoxy) propanoic acid]
Cyclohexane	Mercaptodimethur	Trichlorofan
2,4-D (2,4-Dichlorophenoxyacetic acid)	Methoxychlor	Triethylamine
Diazinon	Methyl mercaptan	Trimethylamine
Dicamba	Methyl methacrylate	Uranium
Dichlobenil	Methyl parathion	Vanadium
Dichlone	Mevinphos	Vinyl acetate
2,2-Dichloropropionic acid	Mexacarbate	Xylene
Dichlorvos	Monoethyl amine	Xylenol
Diethyl amine	Monomethyl amine	Zirconium
Dimethyl amine	Naled	

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Form Approved OMB No 2040-0086 Approval expires 5-31-92

FORM 1 GENERAL

EPA

U.S. ENVIRONMENTAL PROTECTION AGENCY

GENERAL INFORMATION

Consolidated Permits Program

(Read the "General Instructions" before starting.)

I. EPA I.D. NUMBER

F | D

I. EPA I.D. NUMBER

III. FACILITY NAME

V. FACILITY MAILING ADDRESS

VI. FACILITY LOCATION

PLEASE PLACE LABEL IN THIS SPACE

GENERAL INSTRUCTIONS

If a preprinted label has been provided, affix it in the designated space. Review the information carefully; if any of it is incorrect, cross through it and enter the correct data in the appropriate fill-in area below. Also, if any of the preprinted data is absent (the area to the left of the label space lists the information that should appear), please provide it in the proper fill-in areas below. If the label is complete and correct, you need not complete Items I, III, V, and VI (except VI-B which must be completed regardless). Complete all items if no label has been provided. Refer to the instructions for detailed item descriptions and for the legal authorizations under which this data is collected.

II. POLLUTANT CHARACTERISTICS

INSTRUCTIONS. Complete A through J to determine whether you need to submit any permit application forms to the EPA. If you answer "yes" to any questions, you must submit this form and the supplemental form listed in the parentheses following the question. Mark "X" in the box in the third column if the supplemental form is attached. If you answer "no" to each question, you need not submit any of these forms. You may answer "no" if your activity is excluded from permit requirements; see Section C of the instructions. See also, Section D of the instructions for definitions of bold-faced terms.

SPECIFIC QUESTIONS	MARK "X" YES	NO	FORM ATTACHED
A. Is this facility a **publicly owned treatment works** which results in a **discharge** to **waters of the U.S.**? (FORM 2A)			
B. Does or will this facility (either existing or proposed) include a concentrated animal feeding operation or aquatic animal production facility which results in a discharge to waters of the U.S.? (FORM 2B)			
C. Is this a facility which currently results in discharges to waters of the U.S. other than those described in A or B above? (FORM 2C)			
D. Is this a proposed facility (other than those described in A or B above) which will result in a discharge to waters of the U.S.? (FORM 2D)			
E. Does or will this facility treat, store, or dispose of **hazardous wastes**? (FORM 3)			
F. Do you or will you inject at this facility industrial or municipal effluent below the lowermost stratum containing, within one quarter mile of the well bore, underground sources of drinking water? (FORM 4)			
G. Do you or will you inject at this facility any produced water or other fluids which are brought to the surface in connection with conventional oil or natural gas production, inject fluids used for enhanced recovery of oil or natural gas, or inject fluids for storage of liquid hydrocarbons? (FORM 4)			
H. Do you or will you inject at this facility fluids for special processes such as mining of sulfur by the Frasch process, solution mining of minerals, in situ combustion of fossil fuel, or recovery of geothermal energy? (FORM 4)			
I. Is this facility a proposed **stationary source** which is one of the 28 industrial categories listed in the instructions and which will potentially emit 100 tons per year of any air pollutant regulated under the Clean Air Act, and may affect or be located in an attainment area? (FORM 5)			
J. Is this facility a proposed **stationary source** which is NOT one of the 28 industrial categories listed in the instructions and which will potentially emit 250 tons per year of any air pollutant regulated under the Clean Air Act and may affect or be located in an attainment area? (FORM 5)			

III. NAME OF FACILITY

1 SKIP

IV. FACILITY CONTACT

A. NAME & TITLE (last, first, & title) | B. PHONE (area code & no.)

2

V. FACILITY MAILING ADDRESS

A. STREET OR P.O. BOX

3

B. CITY OR TOWN | C. STATE | D. ZIP CODE

4

VI. FACILITY LOCATION

A. STREET, ROUTE NO. OR OTHER SPECIFIC IDENTIFIER

5

B. COUNTY NAME

C. CITY OR TOWN | D. STATE | E. ZIP CODE | F. COUNTY CODE (if applicable)

6

EPA Form 3510-1 (8-80)

CONTINUE ON REVERSE

CONTINUED FROM THE FRONT

VII SIC CODES (4 digit, in order of priority)

A FIRST | B SECOND

C THIRD | D FOURTH

VIII OPERATOR INFORMATION

A NAME

B Is the name listed in Item VIII-A also the owner? YES NO

C STATUS OF OPERATOR (Enter the appropriate letter into the answer box; if "Other", specify.)
F = FEDERAL
S = STATE
P = PRIVATE
M = PUBLIC (other than federal or state)
O = OTHER (specify)

D PHONE (area code & no.)

E STREET OR P.O. BOX

F CITY OR TOWN | G STATE | H ZIP CODE

IX. INDIAN LAND
Is the facility located on Indian lands? YES NO

X EXISTING ENVIRONMENTAL PERMITS

A NPDES (Discharges to Surface Water) | D PSD (Air Emissions from Proposed Sources)

B UIC (Underground Injection of Fluids) | E OTHER (specify)

C RCRA (Hazardous Wastes) | E OTHER (specify)

XI MAP

Attach to this application a topographic map of the area extending to at least one mile beyond property boundaries. The map must show the outline of the facility, the location of each of its existing and proposed intake and discharge structures, each of its hazardous waste treatment, storage, or disposal facilities, and each well where it injects fluids underground. Include all springs, rivers and other surface water bodies in the map area. See instructions for precise requirements.

XII NATURE OF BUSINESS (provide a brief description)

XIII CERTIFICATION (see instructions)

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those persons immediately responsible for obtaining the information contained in the application, I believe that the information is true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

A NAME & OFFICIAL TITLE (type or print) | B SIGNATURE | C DATE SIGNED

COMMENTS FOR OFFICIAL USE ONLY

EPA Form 3510-1 (8-90)

APPENDIX B

NOAA WEATHER RADIO INFORMATION

NOAA WEATHER RADIO MANUFACTURERS LIST	
RADIO SHACK Weather Radio 2617 West Seventh St. Fort Worth, TX 76107 (817) 390-3011	✓ ●
GENERAL ELECTRIC Model 7-2934 (800) 626-2000	✓ ●
UNIDEN BEARCAT Bearcat Weather Alert 6345 Castleway Court Indianapolis, IN 46250 (800) 722-6637	■
ELECTROLERT Weatheralert Forecaster 4949 South 25A Tipp City, OH 45371 (513) 667-2461	✓ ● ■
SPRINGFIELD INSTRUMENTS Talking Weather Center/Station 76 Paccaic St. Wood-Ridge, NJ 07075 (201) 777-2900	■
WOODSON ELECTRONICS Plectron 505 Lincoln St. Overton, NE 68863 (308) 987-2404	X
GORMAN - REDLICH MANUFACTURING James T. Gorman 257 West Union St. Athens, OH 45701 (617) 593-3150	X

PRICE RANGE:

✓ Under $50
■ $50 to $100
X Over $100
● Features AM/FM model radios with weather band

PLEASE NOTE, THIS LIST IS NOT ALL-INCLUSIVE, AND INCLUSION ON THIS LIST DOES NOT CONSTITUTE ENDORSEMENT OF ANY COMPANY BY EPA OR THE U.S. GOVERNMENT.

TECHNICAL APPENDIX B

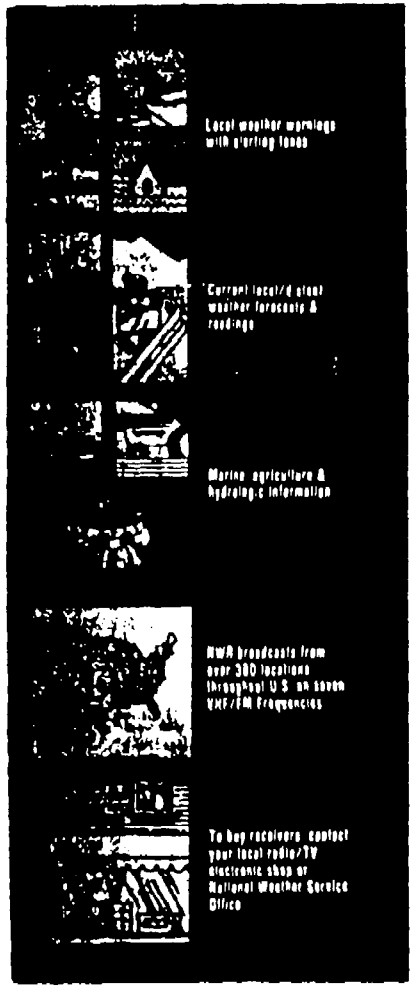

NOAA WEATHER RADIO IS A SERVICE...

of the National Oceanic and Atmospheric Administration (NOAA) of the U.S. Department of Commerce. As the "Voice of the National Weather Service," it provides continuous broadcasts of the latest weather information directly from National Weather Service offices. Taped weather messages are repeated every four to six minutes and are routinely revised every one to three hours, or more frequently if needed. Most of the stations operate 24 hours daily.

During severe weather, National Weather Service forecasters can interrupt the routine weather broadcasts and substitute special warning messages. The forecasters can also activate specially designed warning receivers. Such receivers either sound an alarm indicating that an emergency exists, alerting the listener to turn the receiver up to an audible volume, or, when operated in a muted mode, are automatically turned on so that the warning message is heard. "Warning alarm" receivers are especially valuable for schools, hospitals, public-safety agencies, and news media offices.

Under a January 1975 White House policy statement, NOAA Weather Radio was designated the sole Government-operated radio system to provide direct warnings into private homes for both natural disasters and nuclear attack. This capability is to supplement warnings by sirens and by commercial radio and TV.

The broadcasts are tailored to weather information needs of people within the receiving area. For example, stations along the sea coasts and Great Lakes provide weather information for boaters, fishers, and others engaged in marine activities as well as general weather information.

NOAA Weather Radio broadcasts are made on one of seven high-band FM frequencies ranging from 162.40 to 162.55 megahertz (MHz). These frequencies are not found on the average home radio now in use. However, a number of radio manufacturers offer special weather radios to operate on these frequencies, with or without the emergency warning alarm. Also, there are now many radios on the market which offer standard AM/FM frequencies plus the so-called "weather band" as an added feature.

NOAA Weather Radio broadcasts can usually be heard as far as 40 miles from the antenna site, sometimes more. The effective range depends on many factors, particularly the height of the broadcasting antenna, terrain, quality of the receiver, and type of receiving antenna. As a general rule, listeners close to or perhaps beyond the 40 mile range should have a good quality receiver system if they expect reliable reception. Also, an outside antenna may be required in these fringe areas. If practicable, a receiver should be tried at its place of intended use before making a final purchase.

The National Weather Service operates about 380 stations. Approximately 80 percent of the Nation's population is within listening range of a NOAA Weather Radio broadcast.

A similar network of about 15 stations using the same frequencies broadcasts continuous weather information across much of southern Canada.

If you have a question concerning NOAA Weather Radio or wish to receive a listing of NOAA Weather Radio receiver manufacturers, please contact your nearest National Weather Service Office, or write to National Weather Service (Attn: W/OM11), National Oceanic and Atmospheric Administration, Silver Spring, MD. 20910.

NOAA/PA 78015
Rev. July 1980

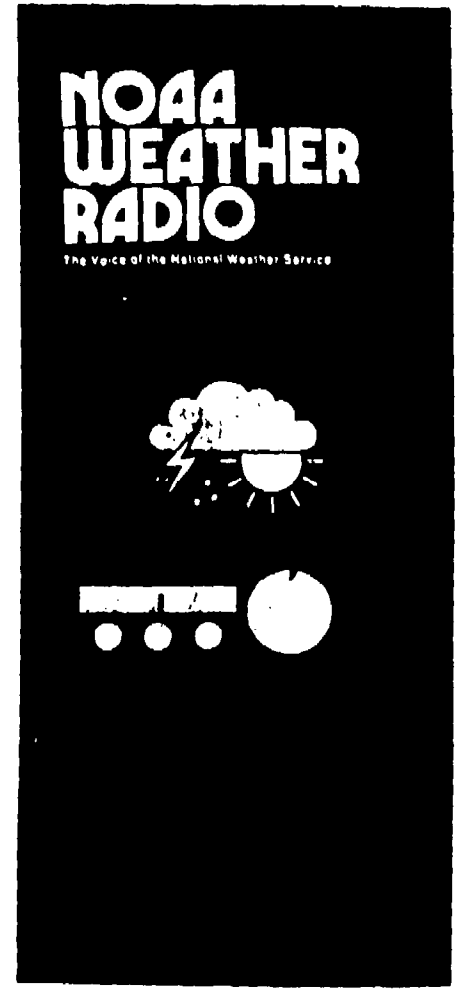

TECHNICAL APPENDIX B

NOAA WEATHER RADIO NETWORK

Legend: Frequencies are identified as follows:

1) [illegible] MHz
2) [illegible] MHz
3) [illegible] MHz
4) [illegible] MHz
5) [illegible] MHz
6) [illegible] MHz
7) [illegible] MHz

Location	Frequency
Alabama	
Anniston	3
Birmingham	1
Dothan	3
Decatur	1
Florence	3
Huntsville	2
Louisville	3
Mobile	1
Montgomery	2
Tuscaloosa	2
Alaska	
Anchorage	1
Cordova	1
Fairbanks	1
Homer	2
Juneau	1
Ketchikan	1
Kodiak	1
Nome	1
Haines	1
Seward	1
Sitka	1
Valdez	1
Wrangell	2
Yakutat	2
Arizona	
Flagstaff	2
Lake Powell	1
Phoenix	1
Tucson	2
Yuma	1
Arkansas	
Fayetteville	3
Fort Smith	2
Gurdon	3
Jonesboro	1
Little Rock	1
Mountain Home	2
Pine Bluff	2
Texarkana	1
California	
Bakersfield (P)	1
Coachella (P)	2
Eureka	2
Fresno	2
Los Angeles	1
Lindsay	6
California (continued)	
Monterey	2
Point Arena	1
Redding (P)	1
Sacramento	1
San Diego	2
San Francisco	2
San Luis Obispo	1
Santa Barbara	2
Colorado	
Alamosa (P)	3
Colorado Springs	3
Denver	1
Fort Collins	6
Grand Junction	1
Greeley	3
Longmont	1
Pueblo	2
Sterling	2
Connecticut	
Hartford	3
Meriden	2
New London	1
Delaware	
Lewes	1
District of Columbia	
Washington, D.C.	1
Florida	
Bell Glade	2
Daytona Beach	2
Fort Myers	3
Gainesville	3
Jacksonville	1
Key West	2
Melbourne	1
Miami	1
Orlando	3
Panama City	1
Pensacola	2
Tallahassee	2
Tampa	1
West Palm Beach	3
Georgia	
Athens	2
Atlanta	1
Augusta	1
Bowley	7
Georgia (continued)	
Chattooga	2
Columbus	2
Macon	3
Pulaski	1
Savannah	2
Valdosta	6
Waycross	3
Waynesboro	4
Hawaii	
Hilo	1
Honolulu	1
Kailua	2
Mt. Haleakala	2
Waimanalo (P)	2
Idaho	
Boise	1
Lewiston (P)	1
Pocatello	1
Twin Falls	2
Illinois	
Champaign	1
Chicago	1
Marion	2
Moline	1
Peoria	3
Rockford	3
Springfield	2
Indiana	
Bloomington	3
Evansville	1
Fort Wayne	1
Indianapolis	1
Lafayette	3
Marion	6
South Bend	2
Terre Haute	2
Iowa	
Cedar Rapids	3
Des Moines	1
Dubuque (P)	2
Sioux City	2
Waterloo	1
Kansas	
Chanute	2
Colby	3
Concordia	1
Kansas (continued)	
Dodge City	3
Ellsworth	2
Topeka	3
Wichita	1
Kentucky	
Ashland	1
Bowling Green	2
Covington	1
Elizabethtown (P)	2
Hazard	2
Lexington	2
Louisville	3
Mayfield	3
Pikeville (P)	2
Somerset	1
Louisiana	
Alexandria	3
Baton Rouge	2
Bunkie	3
Lafayette	1
Lake Charles	2
Monroe	3
Morgan City	2
New Orleans	3
Shreveport	2
Maine	
Caribou	1
Houlton	3
Ellsworth	2
Portland	1
Maryland	
Baltimore	2
Hagerstown	3
Salisbury	2
Massachusetts	
Boston	3
Hyannis	1
Worcester	1
Michigan	
Alpena	1
Detroit	1
Flint	2
Grand Rapids	1
Houghton	2
Marquette	1
Michigan (continued)	
Muskegon	2
Traverse City	2
Minnesota	
Duluth	3
International Falls	1
Mankato	2
Minneapolis	1
Rochester	3
Saint Cloud (P)	3
Thief River Falls	1
Willmar (P)	2
Mississippi	
Columbus	3
Greenville	1
Gulfport	1
Hattiesburg	3
Meridian	1
Oxford	2
Missouri	
Columbia	2
Cape Girardeau	1
Springfield	3
Joplin/Carthage	1
Kansas City	1
St. Joseph	2
St. Louis	1
Sikeston	2
Springfield	2
Montana	
Billings	1
Butte	1
Glasgow	1
Great Falls	1
Havre (P)	2
Helena	2
Kalispell	1
Miles City	2
Missoula	2
Nebraska	
Bassett	2
Grand Island	2
Holdrege	3
Lincoln	3
Merriman	2
Norfolk	1
North Platte	1
Omaha	2
Scottsbluff	1
Nevada	
Elko	1
Ely	2
Las Vegas	1
Reno	1
Winnemucca	2
New Hampshire	
Concord	2
New Jersey	
Atlantic City	2
New Mexico	
Albuquerque	3
Clovis	3
New Mexico (continued)	
Las Cruces	2
Ruidoso	1
Santa Fe	1
New York	
Albany	1
Binghamton	3
Buffalo	1
Elmira	2
Kingston	3
New York City	1
Rochester	3
Rochester	2
Syracuse	1
North Carolina	
Asheville	2
Cape Hatteras	3
Charlotte	3
Fayetteville	3
New Bern	2
Raleigh/Durham	1
Rocky Mount	2
Wilmington	1
Winston-Salem	2
North Dakota	
Bismarck	2
Dickinson	2
Fargo	3
Jamestown	2
Minot	2
Petersburg	2
Williston	2
Ohio	
Akron	2
Cambridge	3
Cleveland	1
Columbus	1
Dayton	3
Lima	2
Sandusky	2
Toledo	1
Oklahoma	
Clinton	3
Enid	3
Lawton	2
McAlester	3
Oklahoma City	2
Tulsa	1
Oregon	
Astoria	2
Brookings	2
Coos Bay	2
Eugene	2
Klamath Falls	1
Medford	2
Newport	2
Pendleton	2
Portland	1
Roseburg	2
Salem	3
Pennsylvania	
Allentown	2
Oberlin	2
Erie	2
Harrisburg	1
Johnstown	2
Pennsylvania (continued)	
Philadelphia	3
Pittsburgh	1
Scotts Corners	3
Towanda	3
Wellsboro	1
Wilkes-Barre	2
Williamsport	2
Puerto Rico	
Mayaguez	1
San Juan	2
Rhode Island	
Providence	2
South Carolina	
Beaufort	3
Charleston	1
Columbia	3
Greer	3
Florence	1
Greenville	2
Myrtle Beach	2
Sumter (P)	3
South Dakota	
Aberdeen	3
Huron	1
Pierre	2
Rapid City	1
Sioux Falls	2
Tennessee	
Bristol	1
Chattanooga	1
Crossville	2
Jackson	2
Knoxville	1
Memphis	3
Nashville	2
Shelbyville	3
Winchester	2
Texas	
Abilene	2
Amarillo	1
Austin	2
Beaumont	3
Big Spring	2
Brownsville	1
Bryan	1
Corpus Christi	1
Dallas	2
Del Rio (P)	2
El Paso	3
Fort Worth	1
Galveston	1
Houston	3
Laredo	1
Lubbock	2
Lufkin	1
Midland	2
Texas (continued)	
Paris	1
Pecos	1
San Angelo	1
San Antonio	1
Sherman	2
Tyler	2
Victoria	2
Waco	2
Wichita Falls	2
U.S. Virgin Islands	
St. Thomas	2
Utah	
Logan	2
Cedar City	2
Vernal	2
Salt Lake City	1
Vermont	
Burlington	2
Marlboro	2
Windsor	2
Virginia	
Charlottesville	2
Lynchburg	1
Norfolk	2
Richmond	2
Roanoke	2
Washington	
Walla Walla	2
Olympia	2
Seattle	1
Spokane	2
Wenatchee	2
Yakima	1
West Virginia	
Beckley	6
Charleston	2
Clarksburg	1
Gilbert	2
Hinton	2
Moundsville	1
Spencer	6
Sutton	6
Wisconsin	
La Crosse (P)	1
Green Bay	1
Madison	2
Manitowoc	2
Milwaukee	2
Park Falls	6
Wausau	3
Wyoming	
Casper	1
Cheyenne	2
Lander	3
Sheridan (P)	3

Notes: 1. Stations marked with an asterisk (*) are located in private [illegible]

2. Stations marked (P) are low powered experimental repeaters [illegible]

3. Stations marked (P) operate less than 24 hours/day. [illegible]

4. Occasionally the frequency of an existing or planned station [illegible]

[illegible]

July, 1992

TECHNICAL APPENDIX C

REQUIRED CONTAINERS, PRESERVATION TECHNIQUES, HOLDING TIMES AND 40 CODE OF FEDERAL REGULATIONS (CFR) PART 136

REQUIRED CONTAINERS, PRESERVATION TECHNIQUES, AND HOLDING TIMES			
Parameter	**Container(1)**	**Preservative (2), (3)**	**Maximum Holding Time (4)**
Bacterial Tests			
Coliform, fecal and total	P, G	Cool, 4°C 0.008% $Na_2S_2O_3$ (5)	6 hours
Fecal streptococci	P, G	Cool, 4°C 0.008% $Na_2S_2O_3$ (5)	6 hours
Inorganic Tests			
Acidity	P, G	Cool, 4°C	14 days
Alkalinity	P, G	Cool, 4°C	14 days
Ammonia	P, G	Cool, 4°C H_2SO_4 to pH<2	28 days
Biochemical oxygen demand	P, G	Cool, 4°C	48 hours
Biochemical oxygen demand, carbonaceous	P, G	Cool, 4°C	48 hours
Bromide	P, G	None required	28 days
Chemical oxygen demand	P, G	Cool, 4°C H_2SO_4 to pH<2	28 days
Chloride	P, G	None required	28 days
Chlorine, total residual	P, G	None required	Analyze immediately
Color	P, G	Cool, 4°C	48 hours
Cyanide, total and amenable to chlorination	P, G	Cool, 4°C NaOH to pH>12 0.6g ascorbic acid (5)	14 days (6)
Fluoride	P	None required	28 days
Hardness	P, G	HNO_3 to pH<2 H_2SO_4 to pH<2	6 months
Hydrogen ion (pH)	P, G	None required	Analyze immediately
Kjeldahl and organic Nitrogen	P, G	Cool, 4°C H_2SO_4 to pH<2	28 days
Metals (7)			
Chromium VI	P, G	Cool, 4°C	28 hours
Mercury	P, G	HNO_3 to pH<2	28 hours
Metals, except above	P, G	HNO_3 to pH<2	6 months
Nitrate	P, G	Cool, 4°C	48 hours

REQUIRED CONTAINERS, PRESERVATION TECHNIQUES, AND HOLDING TIMES			
Parameter	**Container(1)**	**Preservative (2), (3)**	**Maximum Holding Time (4)**
Nitrate-nitrite	P, G	Cool, 4°C H_2SO_4 to pH<2	28 days
Nitrite	P, G	Cool, 4°C	48 hours
O&G	G	Cool, 4°C H_2SO_4 or HCl to pH<2	28 days
Organic carbon	P, G	Cool, 4°C HCl or H_2SO_4 to pH<2	28 days
Orthophosphate	P, G	Filter immediately Cool, 4°C	48 hours
Oxygen, Dissolved Probe	G bottle and top	None required	Analyze immediately
Dissolved oxygen, Winkler method	G bottle and top	Fix on site and store in dark	8 hours
Phenols	G only	Cool, 4°C H_2SO_4 to pH<2	28 days
Phosphorus (elemental)	G	Cool, 4°C	48 hours
Phosphorus, total	P, G	Cool, 4°C H_2SO_4 to pH<2	28 days
Residue, total	P, G	Cool, 4°C	7 days
Residue, filterable	P, G	Cool, 4°C	7 days
Residue, nonfilterable (TSS)	P, G	Cool, 4°C	7 days
Residue, settleable	P, G	Cool, 4°C	48 hours
Residue, volatile	P, G	Cool, 4°C	7 days
Silica	P	Cool, 4°C	28 days
Specific conductance	P, G	Cool, 4°C	28 days
Sulfate	P, G	Cool, 4°C	28 days
Sulfide	P, G	Cool, 4°C, add zinc acetate plus sodium hydroxide to pH>9	7 days
Sulfite	P, G	None required	Analyze immediately
Surfactants	P, G	Cool, 4°C	48 hours
Temperature	P, G	None required	Analyze
Turbidity	P, G	Cool, 4°C	48 hours

REQUIRED CONTAINERS, PRESERVATION TECHNIQUES, AND HOLDING TIMES			
Parameter	**Container(1)**	**Preservative (2), (3)**	**Maximum Holding Time (4)**
Organic Tests (8)			
Purgeable halocarbons	G, Teflon-lined septum	Cool, 4°C 0.008% $Na_2S_2O_3$ (5)	14 days
Purgeable aromatics	G, Teflon-lined septum	Cool, 4°C 0.008% $Na_2S_2O_3$ (5) HCl to pH<2 (9)	14 days
Acrolein and acrylonitrile	G, Teflon-lined septum	Cool, 4°C 0.008% $Na_2S_2O_3$ (5) Adjust pH to 4-5 (10)	14 days
Phenols (11)	G, Teflon-lined cap	Cool, 4°C 0.008% $Na_2S_2O_3$ (5)	7 days until extraction, 40 days after extraction
Benzidines (11)	G, Teflon-lined cap	Cool, 4°C 0.008% $Na_2S_2O_3$ (5)	7 days until extraction (13)
Phthalate esters (11)	G, Teflon-lined cap	Cool, 4°C	7 days until extraction, 40 days after extraction
Nitrosamines (11), (14)	G, Teflon-lined cap	Cool, 4°C store in dark 0.008% $Na_2S_2O_3$	7 days until extraction, 40 days after extraction
PCBs (11) acrylonitrite	G, Teflon-lined cap	Cool, 4°C	7 days until extraction, 40 days after extraction
Nitroaromatics and isophorone (11)	G, Teflon-lined cap	Cool, 4°C store in dark 0.008% $NA_2S_2O_3$ (5)	7 days until extraction, 40 days after extraction
Polynuclear aromatic hydrocarbons (11)	G, Teflon-lined cap	Cool, 4°C store in dark 0.008% $Na_2S_2O_3$ (5)	7 days until extraction, 40 days after extraction
Haloethers (11)	G, Teflon-lined cap	Cool, 4°C 0.008% $Na_2S_2O_3$ (5)	7 days until extraction, 40 days after extraction
Chlorinated hydrocarbons (11)	G, Teflon-lined cap	Cool, 4°C	7 days until extraction, 40 days after extraction
TCDD (11)	G, Teflon-lined cap	Cool, 4°C 0.008% $Na_2S_2O_3$ (5)	7 days until extraction, 40 days after extraction
Pesticides Tests			
Pesticides (11)	G, Teflon-lined cap	Cool, 4°C pH 5-9 (15)	7 days until extraction, 40 days after extraction
Radiological Tests			
Alpha, beta, and radium	P, G	HNO_3 to pH<2	6 months

40 CFR 136.3 TABLE II NOTES

(1) Polyethylene (P) or Glass (G).

(2) Sample preservation should be performed immediately upon sample collection. For composite chemical samples each aliquot should be preserved at the time of collection. When use of an automated sampler makes it impossible to preserve each aliquot, then chemical samples may be preserved by maintaining at 4°C until compositing and sample splitting is completed.

(3) When any sample is to be shipped by common carrier or sent through the United States Mails, it must comply with the Department of Transportation Hazardous Materials Regulations (49 CFR Part 172). The person offering such material for transportation is responsible for ensuring such compliance. For the preservation requirements of Table II, the Office of Hazardous Materials, Materials Transportation Bureau, Department of Transportation has determined that the Hazardous Materials Regulations do not apply to the following materials: Hydrochloric acid (HCl) in water solutions at concentrations of 0.04% by weight or less (pH about 1.96 or greater); Nitric acid (HNO_3) in water solutions at concentrations of 0.15% by weight or less (pH about 1.62 or greater); Sulfuric acid (H_2SO_4) in water solutions at concentrations of 0.35% by weight or less (pH about 1.15 or greater); and Sodium hydroxide (NaOH) in water solutions at concentrations of 0.080% by weights or less (pH about 12.30 or less).

(4) Samples should be analyzed as soon as possible after collection. The times listed are the maximum times that samples may be held before analysis and still be considered valid. Samples may be held for longer periods only if the permittee, or monitoring laboratory, has data on file to show that the specific types of samples under study are stable for the longer time, and has received a variance from the Regional Administrator under § 136.3(e). Some samples may not be stable for the maximum time period given in the table. A permittee, or monitoring laboratory, is obligated to hold the sample for a shorter time if knowledge exists to show that this is necessary to maintain sample stability. See § 136.3(e) for details.

(5) Should only be used in the presence of residual chlorine.

(6) Maximum holding time is 24 hours when sulfide is present. Optionally all samples may be tested with lead acetate paper before pH adjustments in order to determine if sulfide is present. If sulfide is present, it can be removed by the addition of cadmium nitrate powder until a negative spot test is obtained. The sample is filtered and then NaOH is added to pH 12.

(7) Samples should be filtered immediately on-site before adding preservative for dissolved metals.

(8) Guidance applies to samples to be analyzed by GC, LC, or GC/MS for specific compounds.

(9) Sample receiving no pH adjustment must be analyzed within seven days of sampling.

(10) The pH adjustment is not required if acrolein will not be measured. Samples for acrolein receiving no pH adjustment must be analyzed within 3 days of sampling.

40 CFR 136.3 TABLE II NOTES

(11) When the extractable analytes of concern fall within a single chemical category, the specified preservative and maximum holding times should be observed for optimum safeguard of sample integrity. When the analytes of concern fall within two or more chemical categories, the sample may be preserved by cooling to 4°C, reducing residual chlorine with 0.008% sodium thiosulfate, storing in the dark,and adjusting the pH to 6-9; samples preserved in this manner may be held for seven days before extraction and for forty days after extraction. Exceptions to this optional preservation and holding time procedure are noted in footnote 5 (re the requirement for thiosulfate reduction of residual chlorine), and footnotes 12, 13 (re the analysis of benzidine).

(12) If 1,2-diphenylhydrazine is likely to be present, adjust the pH of the sample to 4.0 $\pm$ 0.2 to prevent rearrangement to benzidine.

(13) Extracts may be stored up to 7 days before analysis if storage is conducted under an inert (oxidant-free) atmosphere.

(14) For the analysis of diphenylnitrosamine, add 0.008% $Na_2S_2O_3$ and adjust pH to 7-10 with NaOH within 24 hours of sampling.

(15) The pH adjustment may be performed upon receipt at the laboratory and may be omitted if the samples are extracted within 72 hours of collection. For the analysis of aldrin, add 0.008% $Na_2S_2O^3$.

Source: 40 CFR 136.3 Table II

TABLE IA—LIST OF APPROVED BIOLOGICAL TEST PROCEDURES

Parameter and units	Method [1]	EPA [2]	Reference (Method Number or Page)		
			Standard Methods 16th Ed.	ASTM	USGS
Bacteria:					
1. Coliform (fecal) number per 100 ml.	MPN, 5 tubes, 3 dilution; or, membrane filter (MF)[4]; single step.	Page 132.	908C		
2. Coliform (fecal) in presence of chlorine number per 100 ml.	MPN, 5 tubes, 3 dilution; or, MF[4]; single step.[4a]	p. 124	909		B-0050-77.
3. Coliform (total, number per 100 ml.	MPN, 5 tube, 3 dilution; or, MF[4] single step or two step.	p. 114	908A		
		p. 108	908A		B-0055-77.
4. Coliform (total) in presence of chlorine, number per 100 ml.	MPN, 5 tube, dilution; or MF[4] with enrichment.	p. 114	908A		
		p. 111	908 (A+A.5c)		
5. Fecal streptococci, number per 100 ml.	MPN, 5 tube, 3 dilution; MF[4]; or, plate count.	p. 139	910A		
	p. 136		910B		B0055-77.[5]
	p. 143		910C		

Table IA Notes

[1] The method used must be specified when results are reported.

[2] "Microbiological Methods for Monitoring the Environment, Water and Waste, 1978", EPA-600/8-78-017, U.S. Environmental Protection Agency.

[3] Greeson, P.E., *et al.*, "Methods for Collection and Analysis of Aquatic Biological and Microbiological Samples," U.S. Geological Survey, Techniques of Water-Resources Investigations, Book 5, Chapter A4, Laboratory Analysis, 1977.

[4] 0.45 µm membrane filter or other pore size certified by the manufacturer to fully retain organisms to be cultivated, and free of extractables which could interfere with their growth and development.

[4a] Since the membrane filter technique usually yields low and variable recovery from chlorinated wastewaters, the MPN method will be required to resolve any controversies.

[5] Approved only if dissolution of the KF Streptococcus Agar (Section 5.1, USGS Method B-0055-77) is made in a boiling water bath to avoid scorching of the medium.

TABLE IB—LIST OF APPROVED INORGANIC TEST PROCEDURES

Parameter, units and method	Reference (method No. or page)				
	EPA 1979 [24]	Std. methods 16th ED	ASTM	USGS [1]	Other
1. Acidity, as $CaCO_3$ mg/L: Electrometric end point or phenolphthalein end point.	305.1	402(4.a)	1067-82(E)		
2. Alkalinity, as $CaCO_3$ mg/L:					
Electrometric or colorimetric titration to pH 4.5, manual, or.	310.1	403	D1067-82(B)	I-1030-84	33.014[3].
Automated	310.2			I-2030-84	
3. Aluminum—Total,[8] mg/L: Digestion[9] followed by:					
AA direct aspiration	202.1	303C		I-3051-85	
AA furnace	202.2	304			
Inductively coupled plasma (ICP)					200.7.[4]
Direct current plasma (DCP) or					Note 33.
Colorimetric (Eriochrome cyanine R)		308B			
4. Ammonia (as N), mg/L: Manual distillation (at pH 9.5)[6] followed by:	350.2	417A			33.057[3]
Nesslerization	350.2	417B	D1426-79(A)	I-3520-84	33.057[3]
Titration	350.2	417D			
Electrode	350.3	417 E or F	D1426-79(D)		
Automated phenate or	350.1	417G	D1426-79(C)	I-4523-84	
Automated electrode					Note 6.
5. Antimony—Total[8], mg/L: Digestion[9] followed by:					
AA direct aspiration	204.1	303A			
AA furnace, or	204.2	304			
Inductively coupled plasma					200.7.[4]
6. Arsenic—Total[8], mg/L: Digestion[9] followed by	206.5				
AA gaseous hydride	206.3	303E	D2972-84(B)	I-3062-84	
AA furnace	206.2	304			
Inductively coupled plasma, or					200.7.[4]
Colorimetric (SDDC)	206.4	307B	D2972-84(A)	I-3060-84	
7. Barium—Total,[8] mg/L: Digestion[9] followed by:					
AA direct aspiration	208.1	303C		I-3084-85	
AA furnace	208.2	304			
ICP, or					200.7.[4]
DCP					Note 33.
8. Beryllium—Total,[8] mg/L: Digestion[9] followed by:					
AA direct aspiration	210.1	303C	D3645-84(A)	I-3095-85	
AA furnace	210.2	304			

TABLE IB—LIST OF APPROVED INORGANIC TEST PROCEDURES—Continued

Parameter, units and method	Reference (method No. or page)				
	EPA 1979 [44]	Std. methods 18th ED	ASTM	USGS [1]	Other
35. Mercury—Total [8], mg/L:					
Cold vapor, manual or	245.1	303F	D3223-80	I-3462-84	33.086 [1]
Automated	245.2				
36. Molybdenum—Total,[8] mg/L. Digestion [5] followed by:					
AA direct aspiration	246.1	303C		I-3490-85	
AA furnace	246.2	304			
ICP, or					200.7 [4]
DCP					Note 33.
37. Nickel—Total,[8] mg/L: Digestion [5] followed by:					
AA direct aspiration	249.1	303 A or B	D1886-84 (C or D).	I-3499-85	
AA furnace	249.2	304			
ICP					200.7 [4]
DCP, or					Note 33.
Colorimetric (Heptoxime)		321B			
38. Nitrate (as N), mg/L: Colorimetric (Brucine sulfate), or Nitrate-nitrite N minus Nitrite N (See parameters 39 and 40).	352.1		D992-71		33.083 [1], 419D [14], p. 28.[5]
39. Nitrate-nitrite (as N), mg/L: Cadmium reduction, Manual or	353.3	418C	D3867-85(B)		
Automated, or	353.2	418F	D3867-85(A)	I-4545-84	
Automated hydrazine	353.1				
40. Nitrite (as N), mg/L: Spectrophotometric:					
Manual or	354.1	419	D1254-67		Note 24.
Automated (Diazotization)				I-4540-84	
41. Oil and grease—Total recoverable, mg/L: Gravimetric (extraction).	413.1	503A			
42. Organic carbon—Total (TOC), mg/L: Combustion or oxidation.	415.1	505	D2579-85 (A or B).		33.044 [1], p. 4 [55]
43. Organic nitrogen (as N) mg/L: Total Kjeldahl N (Parameter 31) minus ammonia N (Parameter 4).					
44. Orthophosphate (as P), mg/L: Ascorbic acid method:					
Automated or	365.1	424G		I-4601-84	33.118. [5]
Manual single reagent	365.2	424F	D515-82(A)		33.111. [5]
or Manual two reagent	365.3				
45. Osmium—Total [8], mg/L: Digestion [5] followed by:					
AA direct aspiration, or	252.1	303C			
AA furnace	252.2	304			
46. Oxygen dissolved, mg/L: Winkler (Azide modification), or	360.2	421B	D888-81(C)	I-1575-78 [7]	33.028. [5]
Electrode	360.1	421F		I-1576-78 [7]	
47. Palladium—Total,[8] mg/L: Digestion [5] followed by:					
AA direct aspiration	253.1				p. 527.[5]
AA furnace	253.2				p. 528.[5]
DCP					Note 33.
48. Phenols, mg/L:					
Manual distillation [55]	420.1		D1783-80 (A or B).		Note 26.
Followed by:					
Colorimetric (4AAP) manual, or	420.1				Note 26.
Automated [10]	420.2				
49. Phosphorus (elemental) mg/L: Gas-liquid chromatography.					Note 27
50. Phosphorus—Total, mg/L: Persulfate digestion followed by	365.2	424C(III)			33.111.[5]
Manual or	365.2 or 365.3.	424F	D515-82(A)		
Automated ascorbic acid reduction, or	365.1	424G		I-4600-84	33.116.[5]
Semi-automated block digester	365.4				
51. Platinum—Total,[8] mg/L: Digestion [5] followed by:					
AA direct aspiration	255.1	303A			
AA furnace	255.2	304			
DCP					Note 33.
52. Potassium—total [8], mg/L: Digestion followed by:					
AA direct aspiration	258.1	303A		I-3630-84	33.103.[5]
Inductively coupled plasma					200.7 [4]
Flame photometric, or		322B	D1428-82(A)		
Colorimetric (Cobaltinitrite)					317B. [14]
53. Residue—Total, mg/L: Gravimetric, 103–105°C.	160.3	208A		I-3750-84	
54. Residue—filterable, mg/L: Gravimetric, 180°C.	160.1	208B		I-1750-84	
55. Residue—nonfilterable (TSS), mg/L: Gravimetric, 103–105°C post washing of residue.	160.2	208C		I-3765-84	

TABLE IB—LIST OF APPROVED INORGANIC TEST PROCEDURES—Continued

Parameter, units and method	Reference (method No. or page)				
	EPA 1978 [44]	Std. methods 16th ED	ASTM	USGS [1]	Other
56. Residue—settleable, mg/L: Volumetric, (Imhoff cone) or gravimetric.	160.5	209E		1	
57. Residue—Volatile, mg/L: Gravimetric, 550°C.	160.4	209D		I-3753-84	
58. Rhodium—Total [6], mg/L: Digestion [5] followed by:.					
AA direct aspiration, or	265.1	303A			
AA furnace	265.2	304			
59. Ruthenium—Total [6], mg/L: Digestion [5] followed by:					
AA direct aspiration, or	267.1	303A			
AA furnace	267.2	304			
60. Selenium—Total [6], mg/L: Digestion [5] followed by:					
AA furnace	270.2	304			
Inductively coupled plasma, or					200.7[4]
AA gaseous hydride	270.3	303E	D3859-84(A)	I-3667-84	
61. Silica—Dissolved, mg/L: 0.45 micron filtration followed by:					
Colorimetric, Manual or	370.1	425C	D859-80(B)	I-1700-84	
Automated (Molybdosilicate), or				I-2700-84	
Inductively coupled plasma					200.7.[4]
62. Silver—Total,[6] mg/L: Digestion [5] followed by:					
AA direct aspiration	272.1	303 A or B		I-3720-85	33.089.[3] p. 37.[9]
AA furnace	272.2	304			
Colorimetric (Dithizone)					3198.[16]
ICP, or					200.7.[4]
DCP					Note 33.
63. Sodium—Total,[6] mg/L: Digestion [5] followed by:					
AA direct aspiration	273.1	303A		I-3735-85	33.107.[3]
ICP					200.7.[4]
DCP, or					Note 33.
Flame photometric		3258	D1428-82(A)		
64. Specific conductance, micromhos/cm at 25°C. Wheatstone bridge	120.1	205	D1125-82(A)	I-1780-84	33.002.[3]
65. Sulfate (as SO_4), mg/L:					
Automated colorimetric (barium chloranilate).	375.1				
Gravimetric, or	375.3	426 A or B	D516-82(A)		33.124.[3]
Turbidimetric	375.4		D516-82(B)		426C.[10]
66. Sulfide (as S), mg/L:					
Titrimetric (iodine) or	376.1	427D		I-3640-84	228A.[10]
Colorimetric (methylene blue)	376.2	427C			
67. Sulfite (as SO_3), mg/L: Titrimetric (iodine-iodate).	377.1	428A	D1339-84(C)		
68. Surfactants, mg/L: Colorimetric (methylene blue).	425.1	512B	D2330-82(A)		
69. Temperature, °C.: Thermometric	170.1	212			Note 31.
70. Thallium—Total [6], mg/L: Digestion [5] followed by:					
AA direct aspiration	279.1	303A			
AA furnace, or	279.2	304			
Inductively coupled plasma					200.7.[4]
71. Tin—Total [6], mg/L: Digestion [5] followed by:					
AA direct aspiration, or	282.1	303A		I-3850-78 [7]	
AA furnace,	282.2	304			
72. Titanium—Total,[6] mg/L: Digestion [5] followed by:					
AA direct aspiration	283.1	303C			
AA furnace	283.2	304			
DCP					Note 33.
73. Turbidity, NTU: Nephelometric	180.1	214A	D1889-81	I-3860-84	
74. Vanadium—Total,[6] mg/L: Digestion [5] followed by:					
AA direct aspiration	286.1	303C			
AA furnace	286.2	304			
ICP					200.7.[4]
DCP, or					Note 33.
Colorimetric (Gallic acid)		3278	D3373-84(A)		
75. Zinc—Total,[6] mg/L: Digestion [5] followed by:					
AA direct aspiration	289.1	303 A or B	D1691-84 (C or D).	I-3900-85	33.089.[3] p. 37.[9]
AA furnace	289.2	304			
ICP					200.7.[4]
DCP, or					Note 33.
Colorimetric (Dithizone) or		329C			
(Zincon)					Note 32.

TABLE IB—LIST OF APPROVED INORGANIC TEST PROCEDURES—Continued

[1] "Methods for Analyses of Inorganic Substances in Water and Fluvial Sediments," U.S. Department of the Interior, U.S. Geological Survey, Open-File Report 85-495, 1986, unless otherwise stated.

[2] "Official Methods of Analyses of the Association of Official Analytical Chemists," methods manual, 14th ed. (1984).

[3] For the determination of total metals the sample is not filtered before processing. A digestion procedure is required to solubilize suspended material and to destroy possible organic-metal complexes. Two digestion procedures are given in "Methods for Chemical Analyses of Water and Wastes, 1979." One (section 4.1.3), is a vigorous digestion using nitric acid. A less vigorous digestion using nitric and hydrochloric acids (section 4.1.4) is preferred; however, the analyst should be cautioned that this mild digestion may not suffice for all sample types. Particularly, if a colorimetric procedure is to be employed, it is necessary to ensure that all organo-metallic bonds be broken so that the metal is in a reactive state. In those situations, the vigorous digestion is to be preferred making certain that at no time does the sample go to dryness. Samples containing large amounts of organic materials would also benefit by this vigorous digestion. Use of the graphite furnace technique, inductively coupled plasma, as well as determinations for certain elements such as arsenic, the noble metals, mercury, selenium, and titanium require a modified digestion and in all cases the method write-up should be consulted for specific instruction and/or cautions.

NOTE: If the digestion included in one of the other approved references is different than the above, the EPA procedure must be used.

Dissolved metals are defined as those constituents which will pass through a 0.45 micron membrane filter. Following filtration of the sample, the referenced procedure for total metals must be followed. Sample digestion for dissolved metals may be omitted for AA (direct aspiration or graphite furnace) and ICP analyses provided the sample solution to be analyzed meets the following criteria:

a. has a low COD (<20)

b. is visibly transparent with a turbidity measurement of 1 NTU or less,

c. is colorless with no perceptable odor, and

d. is of one liquid phase and free of particulate or suspended matter following acidification.

[4] The full text of Method 200.7, "Inductively Coupled Plasma Atomic Emission Spectrometric Method for Trace Element Analysis of Water and Wastes," is given at Appendix C of this Part 136.

[5] Manual distillation is not required if comparability data on representative effluent samples are on company file to show that this preliminary distillation step is not necessary; however, manual distillation will be required to resolve any controversies.

[6] Ammonia, Automated Electrode Method, Industrial Method Number 379-75 WE, dated February 19, 1976, Technicon AutoAnalyzer II, Technicon Industrial Systems, Tarrytown, NY 10591.

[7] The approved method is that cited in "Methods for Determination of Inorganic Substances in Water and Fluvial Sediments", USGS TWRI, Book 5, Chapter A1 (1979).

[8] American National Standard on Photographic Processing Effluents, Apr. 2, 1975. Available from ANSI, 1430 Broadway, New York, NY 10018.

[9] "Selected Analytical Methods Approved and Cited by the United States Environmental Protection Agency," Supplement to the Fifteenth Edition of *Standard Methods for the Examination of Water and Wastewater* (1981).

[10] The use of normal and differential pulse voltage ramps to increase sensitivity and resolution is acceptable.

[11] Carbonaceous biochemical oxygen demand ($CBOD_5$) must not be confused with the traditional BOD_5 test which measures "total BOD." The addition of the nitrification inhibitor is not a procedural option, but must be included to report the $CBOD_5$ parameter. A discharger whose permit requires reporting the traditional BOD_5 may not use a nitrification inhibitor in the procedure for reporting the results. Only when a discharger's permit specifically states $CBOD_5$ is required, can the permittee report data using the nitrification inhibitor.

[12] OIC Chemical Oxygen Demand Method, Oceanography International Corporation, 512 West Loop, P.O. Box 2980, College Station, TX 77840.

[13] Chemical Oxygen Demand, Method 8000, Hach Handbook of Water Analysis, 1979, Hach Chemical Company, P.O. Box 389, Loveland, CO 80537.

[14] The back titration method will be used to resolve controversy.

[15] Orion Research Instruction Manual, Residual Chlorine Electrode Model 97-70, 1977, Orion Research Incorporated, 840 Memorial Drive, Cambridge, MA 02139.

[16] The approved method is that cited in *Standard Methods for the Examination of Water and Wastewater*, 14th Edition, 1976.

[17] National Council of the Paper Industry for Air and Stream Improvement, (Inc.) Technical Bulletin 253, December 1971.

[18] Copper, Bicinchoninate Method, Method 8506, Hach Handbook of Water Analysis, 1979, Hach Chemical Company, P.O. Box 389, Loveland, CO 80537.

[19] After the manual distillation is completed, the autoanalyzer manifolds in EPA Methods 335.3 (cyanide) or 420.2 (phenols) are simplified by connecting the re-sample line directly to the sampler. When using the manifold setup shown in Method 335.3, the buffer 6.2 should be replaced with the buffer 7.6 found in Method 335.2.

[20] Hydrogen ion (pH) Automated Electrode Method, Industrial Method Number 378-75WA, October 1976, Technicon AutoAnalyzer II, Technicon Industrial Systems, Tarrytown, NY 10591.

[21] Iron, 1,10-Phenanthroline Method, Method 8008, 1980, Hach Chemical Company, P.O. Box 389, Loveland, CO 80537.

[22] Manganese, Periodate Oxidation Method, Method 8034, Hach Handbook of Wastewater Analysis, 1979, pages 2-113 and 2-117, Hach Chemical Company, Loveland, CO 80537.

[23] Goerlitz, D., Brown, E., "Methods for Analyses of Organic Substances in Water," U.S. Geological Survey Techniques of Water-Resources Inv., book 5, ch. A3, page 4 (1972).

[24] Nitrogen, Nitrite, Method 8507, Hach Chemical Company, P.O. Box 389, Loveland, CO 80537.

[25] Just prior to distillation, adjust the sulfuric-acid-preserved sample to pH 4 with 1 + 9 NaOH.

[26] The approved method is that cited in *Standard Methods for the Examination of Water and Wastewater*, 14th Edition. The colorimetric reaction is conducted at a pH of 10.0±0.2. The approved methods are given on pp. 576-81 of the 14th Edition: Method 510A for distillation, Method 510B for the manual colorimetric procedure, or Method 510C for the manual spectrophotometric procedure.

[27] R. F. Addison and R. G. Ackman, "Direct Determination of Elemental Phosphorus by Gas-Liquid Chromatography," *Journal of Chromatography*, vol. 47, No. 3, pp. 421-426, 1970.

[28] Approved methods for the analysis of silver in industrial wastewaters at concentrations of 1 mg/L and above are inadequate where silver exists as an inorganic halide. Silver halides such as the bromide and chloride are relatively insoluble in reagents such as nitric acid but are readily soluble in an aqueous buffer of sodium thiosulfate and sodium hydroxide to a pH of 12. Therefore, for levels of silver above 1 mg/L, 20 mL of sample should be diluted to 100 mL by adding 40 mL each of 2 M $Na_2S_2O_3$ and 2M NaOH. Standards should be prepared in the same manner. For levels of silver below 1 mg/L the approved method is satisfactory.

[29] The approved method is that cited in *Standard Methods for the Examination of Water and Wastewater*, 15th Edition.

[30] The approved method is that cited in *Standard Methods for the Examination of Water and Wastewater*, 13th Edition.

[31] Stevens, H. H., Ficke, J. F., and Smoot, G. F., "Water Temperature—Influential Factors, Field Measurement and Data Presentation," U.S. Geological Survey, Techniques of Water Resources Investigations, Book 1, Chapter D1, 1975.

[32] Zinc, Zincon Method, Method 8009, Hach Handbook of Water Analysis, 1979, pages 2-231 and 2-333, Hach Chemical Company, Loveland, CO 80537.

[33] "Direct Current Plasma (DCP) Optical Emission Spectrometric Method for Trace Elemental Analysis of Water and Wastes, Method AES0029," 1986, Applied Research Laboratories, Inc., 24911 Avenue Stanford, Valencia, CA 91355.

[34] Precision and recovery statements for the atomic absorption direct aspiration and graphite furnace methods, and for the spectrophotometric SDDC method for arsenic are provided in appendix D of this part titled, "Precision and Recovery Statements for Methods for Measuring Metals".

TABLE IC—LIST OF APPROVED TEST PROCEDURES FOR NON-PESTICIDE ORGANIC COMPOUNDS

Parameter [1]	EPA Method Number [2] [3]			Other
	GC	GC/MS	HPLC	
1. Acenaphthene	610	625, 1625	610	
2. Acenaphthylene	610	625, 1625	610	
3. Acrolein	603	[4]624, 1624		

TABLE IC—LIST OF APPROVED TEST PROCEDURES FOR NON-PESTICIDE ORGANIC COMPOUNDS—Continued

Parameter [1]	EPA Method Number [2, 7]			Other
	GC	GC/MS	HPLC	
4. Acrylonitrile	603	[1]624, 1624		
5. Anthracene	610	625, 1625	610	
6. Benzene	602	624, 1624		
7. Benzidine		[1]625, 1625	605	Note 3, p. 1;
8. Benzo(a)anthracene	610	625, 1625	610	
9. Benzo(a)pyrene	610	625, 1625	610	
10. Benzo(b)fluoranthene	610	625, 1625	610	
11. Benzo(g,h,i)perylene	610	625, 1625	610	
12. Benzo(k)fluoranthene	610	625, 1625	610	
13. Benzyl chloride				Note 3, p. 130; Note 6, p. S102.
14. Benzyl butyl phthalate	606	625, 1625		
15. Bis(2-chloroethoxy) methane	611	625, 1625		
16. Bis(2-chloroethyl) ether	611	625, 1625		
17. Bis(2-ethylhexyl) phthalate	606	625, 1625		
18. Bromodichloromethane	601	624, 1624		
19. Bromoform	601	624, 1624		
20. Bromomethane	601	624, 1624		
21. 4-Bromophenylphenyl ether	611	625, 1625		
22. Carbon tetrachloride	601	624, 1624		Note 3, p. 130;
23. 4-Chloro-3-methylphenol	604	625, 1625		
24. Chlorobenzene	601, 602	624, 1624		Note 3, p. 130;
25. Chloroethane	601	624, 1624		
26. 2-Chloroethylvinyl ether	601	624, 1624		
27. Chloroform	601	624, 1624		Note 3, p. 130;
28. Chloromethane	601	624, 1624		
29. 2-Chloronaphthalene	612	625, 1625		
30. 2-Chlorophenol	604	625, 1625		
31. 4-Chlorophenylphenyl ether	611	625, 1625		
32. Chrysene	610	625, 1625	610	
33. Dibenzo(a,h)anthracene	610	625, 1625	610	
34. Dibromochloromethane	601	624, 1624		
35. 1,2-Dichlorobenzene	601, 602, 612	624, 625, 1625		
36. 1,3-Dichlorobenzene	601, 602, 612	624, 625, 1625		
37. 1,4-Dichlorobenzene	601, 602, 612	625, 1624, 1625		
38. 3,3'-Dichlorobenzidine		625, 1625	605	
39. Dichlorodifluoromethane	601			
40. 1,1-Dichloroethane	601	624, 1624		
41. 1,2-Dichloroethane	601	624, 1624		
42. 1,1-Dichloroethene	601	624, 1624		
43. trans-1,2-Dichloroethene	601	624, 1624		
44. 2,4-Dichlorophenol	604	625, 1625		
45. 1,2-Dichloropropane	601	624, 1624		
46. cis-1,3-Dichloropropene	601	624, 1624		
47. trans-1,3-Dichloropropene	601	624, 1624		
48. Diethyl phthalate	606	625, 1625		
49. 2,4-Dimethylphenol	604	625, 1625		
50. Dimethyl phthalate	606	625, 1625		
51. Di-n-butyl phthalate	606	625, 1625		
52. Di-n-octyl phthalate	606	625, 1625		
53. 2,4-Dinitrophenol	604	625, 1625		
54. 2,4-Dinitrotoluene	609	625, 1625		
55. 2,6-Dinitrotoluene	609	625, 1625		
56. Epichlorohydrin				Note 3, p. 130; Note 6, p. S102.
57. Ethylbenzene	602	624, 1624		
58. Fluoranthene	610	625, 1625	610	
59. Fluorene	610	625, 1625	610	
60. Hexachlorobenzene	612	625, 1625		
61. Hexachlorobutadiene	612	625, 1625		
62. Hexachlorocyclopentadiene	612	[1]625, 1625		
63. Hexachloroethane	612	625, 1625		
64. Indeno(1,2,3-cd)pyrene	610	625, 1625	610	
65. Isophorone	609	625, 1625		
66. Methylene chloride	601	624, 1624		Note 3, p. 130;
67. 2-Methyl-4,6-dinitrophenol	604	[illegible], 1625		
68. Naphthalene	610	625, 1625	610	
69. Nitrobenzene	609	625, 1625		
70. 2-Nitrophenol	604	625, 1625		
71. 4-Nitrophenol	604	625, 1625		
72. N-Nitrosodimethylamine	607	625, 1625		
73. N-Nitrosodi-n-propylamine	607	[1]625, 1625		
74. N-Nitrosodiphenylamine	607	[1]625, 1625		
75. 2,2'-Oxybis(1-chloropropane)	611	625, 1625		
76. PCB-1016	608	625		Note 3, p. 43;
77. PCB-1221	608	625		Note 3, p. 43;
78. PCB-1232	608	625		Note 3, p. 43;
79. PCB-1242	608	625		Note 3, p. 43;
80. PCB-1248	608	625		Note 3, p. 43;
81. PCB-1254	608	625		Note 3, p. 43;
82. PCB-1260	608	625		Note 3, p. 43;
83. Pentachlorophenol	604	625, 1625		Note 3, p. 140;
84. Phenanthrene	610	625, 1625	610	
85. Phenol	604	625, 1625		
86. Pyrene	610	625, 1625	610	

TABLE IC—LIST OF APPROVED TEST PROCEDURES FOR NON-PESTICIDE ORGANIC COMPOUNDS—Continued

Parameter [1]	EPA Method Number [2, 7]			Other
	GC	GC/MS	HPLC	
87. 2,3,7,8-Tetrachlorodibenzo-p-dioxin		[4] 613		
88. 1,1,2,2-Tetrachloroethane	601	624, 1624		Note 3, p. 130;
89. Tetrachloroethene	601	624, 1624		Note 3, p. 130;
90. Toluene	602	624, 1624		
91. 1,2,4-Trichlorobenzene	612	625, 1625		Note 3, p. 130;
92. 1,1,1-Trichloroethane	601	624, 1624		
93. 1,1,2-Trichloroethane	601	624, 1624		Note 3, p. 130;
94. Trichloroethene	601	624, 1624		
95. Trichlorofluoromethane	601	624		
96. 2,4,6-Trichlorophenol	604	625, 1625		
97. Vinyl chloride	601	624, 1624		

Table IC Notes

[1] All parameters are expressed in micrograms per liter (µg/L).

[2] The full text of Methods 601-613, 624, 625, 1624, and 1625, are given at Appendix A, "Test Procedures for Analysis of Organic Pollutants," of this Part 136. The standardized test procedure to be used to determine the method detection limit (MDL) for these test procedures is given at Appendix B, "Definition and Procedure for the Determination of the Method Detection Limit," of this Part 136.

[3] "Methods for Benzidine; Chlorinated Organic Compounds, Pentachlorophenol and Pesticides in Water and Wastewater," U.S. Environmental Protection Agency, September, 1978.

[4] Method 624 may be extended to screen samples for Acrolein and Acrylonitrile. However, when they are known to be present, the preferred method for these two compounds is Method 603 or Method 1624.

[5] Method 625 may be extended to include benzidine, hexachlorocyclopentadiene, N-nitrosodimethylamine, and N-nitrosodiphenylamine. However, when they are known to be present, Methods 605, 607, and 612, or Method 1625, are preferred methods for these compounds.

[6] 625, Screening only.

[7] "Selected Analytical Methods Approved and Cited by the United States Environmental Protection Agency," Supplement to the Fifteenth Edition of *Standard Methods for the Examination of Water and Wastewater* (1981).

[8] Each analyst must make an initial, one-time, demonstration of their ability to generate acceptable precision and accuracy with Methods 601-613, 624, 625, 1624, and 1625 (See Appendix A of this Part 136) in accordance with procedures each in section 8.2 of each of these Methods. Additionally, each laboratory, on an on-going basis must spike and analyze 10% (5% for Methods 624 and 625 and 100% for methods 1624, and 1625) of all samples to monitor and evaluate laboratory data quality in accordance with sections 8.3 and 8.4 of these Methods. When the recovery of any parameter falls outside the warning limits, the analytical results for that parameter in the unspiked sample are suspect and cannot be reported to demonstrate regulatory compliance.

NOTE: These warning limits are promulgated as an "interim final action with a request for comments."

TABLE ID—LIST OF APPROVED TEST PROCEDURES FOR PESTICIDES [1]

Parameter µg/L)	Method	EPA [2, 3]	Standard Methods 15th Ed	ASTM	Other
1. Aldrin	GC	608	508A	D3086	Note 3, p. 7; Note 4, p. 30.
	GC/MS	625			
2. Ametryn	GC				Note 3, p. 83; Note 6, p. 868.
3. Aminocarb	TLC				Note 3, p. 84; Note 6, p. 816.
4. Atrazine	GC				Note 3, p. 83; Note 6, p. 868.
5. Aziprotine	GC				Note 3, p. 83; Note 6, p. 868.
6. Azinphos methyl	GC				Note 3, p. 25; Note 6, p. 851.
7. Barban	TLC				Note 3, p. 104; Note 6, p. 864.
8. α-BHC	GC	608	508A	D3086	Note 3, p. 7.
	GC/MS	[5] 625			
9. β-BHC	GC	608		D3086	
	GC/MS	625			
10. δ-BHC	GC	608		D3086	
	GC/MS	[5] 625			
11. γ-BHC (Lindane)	GC	608	508A	D3086	Note 3, p. 7; Note 4, p. 30.
	GC/MS	625			
12. Captan	GC		508A		Note 3, p. 7.
13. Carbaryl	TLC				Note 3, p. 94; Note 6, p. 860.
14. Carbophenothion	GC				Note 4, p. 30; Note 6, p. 873.
15. Chlordane	GC	608	508A	D3086	Note 3, p. 7.
	GC-MS	625			
16. Chloropropham	TLC				Note 3, p. 104; Note 6, p. 864.
17. 2,4-D	GC		508B		Note 3, p. 115; Note 4, p. 36.
18. 4,4'-DDD	GC	608	508A	D3086	Note 3, p. 7; Note 4, p. 30.
	GC-MS	625			
19. 4,4'-DDE	GC	608	508A	D3086	Note 3, p. 7; Note 4, p. 30.
	GC/MS	625			
20. 4,4'-DDT	GC	608	508A	D3086	Note 3, p. 7; Note 4, p. 30.
	GC/MS	625			
21. Demeton-O	GC				Note 3, p. 25; Note 6, p. 851.
22. Demeton-S	GC				Note 3, p. 25; Note 6, p. 851.
23. Diazinon	GC				Note 3, p. 25; Note 4, p 30; Note 6, p. 851.
24. Dicamba	GC				Note 3, p. 115.
25. Dichlofenthion	GC				Note 4, p. 30; Note 6, p. 873.
26. Dichloran	GC		508A		Note 3, p. 7.
27. Dicofol	GC			D3086	
28. Dieldrin	GC	608	508A		Note 3, p. 7; Note 4, p. 30.
	GC/MS	625			
29. Dimethoate	GC				Note 4, p. 30; Note 6, p. 873.
30. Disulfoton	GC				Note 3, p. ; Note 6, p. 851.
31. Diuron	TLC				Note 3, p. 104; Note 6, p. 864.
32. Endosulfan I	GC	608	508A	D3086	Note 3, p. 7.
	GC/MS	[5] 625			

TABLE ID—LIST OF APPROVED TEST PROCEDURES FOR PESTICIDES [1]—Continued

Parameter (µg/L)	Method	EPA [2,3]	Standard Methods 18th Ed	ASTM	Other
33. Endosulfan II	GC	608	509A	D3086	Note 3, p. 7.
	GC/MS	[4] 625			
34. Endosulfan sulfate	GC	608			
	GC/MS	625			
35. Endrin	GC	608	509A	D3086	Note 3, p. 7; Note 4, p. 30.
	GC/MS	[4] 625			
36. Endrin aldehyde	GC	608			
	GC/MS	625			
37. Ethion	GC				Note 4, p. 30; Note 6, p. 573.
38. Fenuron	TLC				Note 3, p. 104; Note 6, p. 564.
39. Fenuron-TCA	TLC				Note 3, p. 104; Note 6, p. 564.
40. Heptachlor	GC	608	509A	D3086	Note 3, p. 7; Note 4, p. 30.
	GC/MS	625			
41. Heptachlor epoxide	GC	608	509A	D3086	Note 3, p. 7; Note 4, p. 30; Note 6, p. 573.
	GC/MS	625			
42. Isodrin	GC				Note 4, p. 30; Note 6, p. 573.
43. Linuron	TLC				Note 3, p. 104; Note 6, p. 564.
44. Malathion	GC		509A		Note 3, p. 25; Note 4, p. 30; Note 6, p. 551.
45. Methiocarb	TLC				Note 3, p. 94; Note 6, p. 560.
46. Methoxychlor	GC		509A	D3086	Note 3, p. 7; Note 4, p. 30.
47. Mexacarbate	TLC				Note 3, p. 94; Note 6, p. 560.
48. Mirex	GC		509A		Note 3, p. 7.
49. Monuron	TLC				Note 3, p. 104; Note 6, p. 564.
50. Monuron-TCA	TLC				Note 3, p. 104; Note 6, p. 564.
51. Neburon	TLC				Note 3, p. 104; Note 6, p. 564.
52. Parathion methyl	GC		509A		Note 3, p. 25; Note 4, p. 30.
53. Parathion ethyl	GC		509A		Note 3, p. 25.
54. PCNB	GC		509A		Note 3, p. 7.
55. Perthane	GC			D3086	
56. Prometon	GC				Note 3, p. 83; Note 6, p. 569.
57. Prometryn	GC				Note 3, p. 83; Note 6, p. 569.
58. Propazine	GC				Note 3, p. 83; Note 6, p. 569.
59. Propham	TLC				Note 3, p. 104; Note 6, p. 564.
60. Propoxur	TLC				Note 3, p. 94; Note 6, p. 560.
61. Secbumeton	TLC				Note 3, p. 83; Note 6, p. 569.
62. Siduron	TLC				Note 3, p. 104; Note 6, p. 564.
63. Simazine	GC				Note 3, p. 83; Note 6, p. 569.
64. Strobane	GC		509A		Note 3, p. 7.
65. Swep	TLC				Note 3, p. 104; Note 6, p. 564.
66. 2,4,5-T	GC		509B		Note 3, p. 116; Note 4, p. 35.
67. 2,4,5-TP (Silvex)	GC		509B		Note 3, p. 116.
68. Terbuthylazine	GC				Note 3, p. 83; Note 6, p. 569.
69. Toxaphene	GC	608	509A	D3086	Note 3, p. 7; Note 4, p. 30.
	GC/MS	625			
70. Trifluralin	GC		509A		Note 3, p. 7

Table ID Notes

[1] Pesticides are listed in this table by common name for the convenience of the reader. Additional pesticides may be found under Table IC, where entries are listed by chemical name.

[2] The full text of methods 608 and 625 are given at Appendix A, "Test Procedures for Analyses of Organic Pollutants," of this Part 136. The standardized test procedure to be used to determine the method detection limit (MDL) for these test procedures is given at Appendix B, "Definition and Procedure for the Determination of the Method Detection Limit", of this Part 136.

[3] "Methods for Benzidine, Chlorinated Organic Compounds, Pentachlorophenol and Pesticides in Water and Wastewater," U.S. Environmental Protection Agency, September, 1978. This EPA publication includes thin-layer chromatography (TLC) methods.

[4] "Methods for Analysis of Organic Substances in Water," U.S. Geological Survey, Techniques of Water-Resources Investigations, Book 5, Chapter A3 (1972).

[5] The method may be extended to include α-BHC, β-BHC, endosulfan I, endosulfan II, and endrin. However, when they are known to exist, Method 608 is the preferred method.

[6] "Selected Analytical Methods Approved and Cited by the United States Environmental Protection Agency," Supplement to the Fifteenth Edition of *Standard Methods for the Examination of Water and Wastewater* (1981).

[7] Each analyst must make an initial, one-time, demonstration of their ability to generate acceptable precision and accuracy with Methods 608 and 625 (See Appendix A of this Part 136) in accordance with procedures given in section 8.2 of each of these methods. Additionally, each laboratory, on an on-going basis, must spike and analyze 10% of all samples analyzed with Method 608 or 5% of all samples analyzed with Method 625 to monitor and evaluate laboratory data quality in accordance with Sections 8.3 and 8.4 of these methods. When the recovery of any parameter falls outside the warning limits, the analytical results for that parameter in the unspiked sample are suspect and cannot be reported to demonstrate regulatory compliance.

NOTE: These warning limits are promulgated as an "interim final action with a request for comments."

TABLE IE—LIST OF APPROVED RADIOLOGICAL TEST PROCEDURES

Parameter and units	Methods	EPA [1]	Reference (method No. or page)		
			Standard methods 18th ed.	ASTM	USGS [2]
1. Alpha-Total, pCi per liter	Proportional or scintillation counter.	900.0	703	D1943-81	pp. 75 and 78. [3]
2. Alpha-Counting error, pCi per liter.	Proportional or scintillation counter.	Appendix B	703	D1943-81	p. 78.
3. Beta-Total, pCi per liter	Proportional counter	900.0	703	D1890-81	pp. 75 and 78. [3]
4. Beta-Counting error, pCi	Proportional counter	Appendix B	703	D1890-81	p. 78.
5. (a) Radium-Total, pCi per liter.	Proportional counter	903.0	705	D2460-70	
(b) ^{226}Ra, pCi per liter	Scintillation counter	903.1	706	D3454-79	p. 81.

TABLE IE NOTES:
[1] "Prescribed Procedures for Measurement of Radioactivity in Drinking Water," EPA-600/4-80-032 (1980 update), U.S. Environmental Protection Agency, August 1980.
[2] Fishman, M.J. and Brown, Eugene, "Selected Methods of the U.S. Geological Survey of Analysis of Wastewaters," U.S. Geological Survey, Open-File Report 76-177 (1976).
[3] The method found on p. 75 measures only the dissolved portion while the method on p. 78 measures only the suspended portion. Therefore, the two results must be added to obtain the "total."

TECHNICAL APPENDIX D

REFERENCES

REFERENCES

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U.S. EPA, Region V, "Urban Targeting and BMP Selection," November 1990.

Woodward-Clyde Consultants and Ted Friel Associates, "Guide for Industrial Storm Water Sampling," January 1992.

TECHNICAL APPENDIX E

GLOSSARY

GLOSSARY

Aliquot: A discrete sample used for analysis.

Biochemical Oxygen Demand (BOD): The quantity of oxygen consumed during the biochemical oxidation of matter over a specified period of time, usually 5 days (BOD_5).

Chain-of-Custody: Procedures used to minimize the possibility of tampering with samples.

Chemical Oxygen Demand (COD): Measurement of all the oxidizable matter found in a runoff sample, a portion of which could deplete dissolved oxygen in receiving waters.

Composite Sample: Used to determine "average" loadings or concentrations of pollutants, such samples are collected at regular time intervals, and pooled into one large sample, can be developed on time or flow rate.

Confined Space: Enclosed space that an employee can bodily enter and perform assigned work, that has limited means of exit and entry, that is not designed for continuous employee occupancy, and has one of the following characteristics:

- Contains or has a known potential to contain a hazardous atmosphere
- Contains a material with the potential for engulfment of an entrant
- Has an internal configuration such that an entrant could be trapped or asphyxiated by inwardly converging walls or a floor that slopes downward and tapers to a smaller cross section
- Contains any other recognized serious safety or health hazard.

Conveyance: A channel or passage which conducts or carries water including any pipe, ditch, channel, tunnel, conduit, well, or container.

Detention Ponds: A surface water impoundment constructed to hold and manage storm water runoff.

Discharge: Any addition of any pollutant to waters of the U.S. from any conveyance.

Effluent: Any discharge flowing from a conveyance.

Flumes: A specially shaped open channel flow section providing a change in the channel area and/or slope which results in an increased velocity and change in the level of the liquid flowing through the flume. A flume normally consists of three sections: (1) a converging section; (2) a throat section; and (3) a diverging section. The flow rate through the flume is a function of the liquid level at some point in the flume.

Flow-Weighted Composite Sample: Means a composite sample consisting of a mixture of aliquots collected at a constant time interval, where the volume of each aliquot is proportional to the flow rate of the discharge.

Flow-Proportional Composite Sample: Combines discrete aliquots of a sample collected over time, based on the flow of the wastestream being sampled. There are two methods used to collect this type of sample. One collects a constant sample volume at time intervals which vary based on stream flow. The other collects aliquots at varying volumes based on stream flow, at constant time intervals.

First Flush: Individual sample taken during the first 30 minutes of a storm event. The pollutants in this sample can often be used as a screen for non-storm water discharges since such pollutants are flushed out of the system during the initial portion of the discharge.

Grab Sample: A discrete sample which is taken from a wastestream on a one-time basis with no regard to flow or time; instantaneous sample that is analyzed separately.

Head of Liquid: Depth of flow.

Illicit Discharge: Any discharge to a municipal separate storm sewer that is not composed entirely of storm water except discharges pursuant to an NPDES permit and discharges from fire fighting activities.

Materials Management Practices: Practices used to limit the contact between significant materials and precipitation. These may include structural or nonstructural controls such as dikes, berms, sedimentation ponds, vegetation strips, spill response plans, etc.

Municipal Separate Storm Sewer Systems: A conveyance or system of conveyances including roads with drainage systems, storm drains, gutters, ditches under the jurisdiction of a city, town, borough, county, parish, or other public body.

Outfall: Point source where an effluent is discharged into receiving waters.

Point Source: Any discernible, confined, and discrete conveyance from which pollutants are or may be discharged. This term does not include return flows from irrigated agriculture or agricultural storm water runoff (see 40 CFR 122.3).

Reverse Meniscus: The curved upper surface of a liquid in a container.

Runoff Coefficient: Means the fraction of total rainfall that will appear at the conveyance as runoff.

Significant Materials: Include, but are not limited to, raw materials, fuels, solvents, detergents, metallic products, CERCLA hazardous substances, fertilizers, pesticides, and wastes such as ashes, slag, and sludge that have potential for release with storm water discharges [see 40 CFR 122.26(b)(12)].

Storm Water: Storm water runoff, snow melt runoff, and surface runoff, and drainage.

Storm Water Discharge Associated with Industrial Activity: Discharge from any conveyance which is used for collecting and conveying storm water which is directly related to manufacturing processing or raw materials storage areas at an industrial plant [see 40 CFR 122.26(b)(14)].

Time Composite Sample: Prepared by collecting fixed volume aliquots at specified time intervals and combining into a single sample for analysis.

Turbidity: Describes the capability of light to pass through water.

Weir: A device used to gauge the flow rate of liquid through a channel; is essentially a dam built across an open channel over which the liquid flows, usually through some type of notch.

TECHNICAL APPENDIX F

ACRONYMS

ACRONYMS

BOD_5	Biochemical Oxygen Demand (5-day)
CERCLA	Comprehensive Environmental Response Compensation and Liability Act
cfm	cubic feet per minute
CFR	Code of Federal Regulations
cfs	cubic feet per second
COD	Chemical Oxygen Demand
COV	Coefficient of Variation
CPR	Cardiopulmonary Resuscitation
CWA	Clean Water Act
DOT	Department of Transportation
ECD	Electron Capture Detector
EMC	Event Mean Concentration
EPA	Environmental Protection Agency
ESE	Environmental Science & Engineering, Inc.
FWPCA	Federal Water Pollution Control Act
FID	Flame Ionization Detector
FR	Federal Register
GC/MS	Gas Chromatography/Mass Spectometry
gpm	gallons per minute
H	Head
HCl	Hydrochloric Acid
HNO_3	Nitric Acid
HPLC	High Pressure Liquid Chromatography
H_2SO_4	Sulfuric Acid
IATA	International Air Transport Association
LC_{50}	Lethal Concentration
NaOH	Sodium Hydroxide
$Na_2S_2O_3$	Sodium Thiosulfate
NCDC	National Climate Data Center
NIOSH	National Institute of Occupational Safety and Health
NOAA	National Oceanic and Atmospheric Agency
NOI	Notice of Intent
NPDES	National Pollutant Discharge Elimination System
NWS	National Weather Service
O&G	Oil and Grease
OSHA	Occupational Safety and Health Administration
PCB	Polychlorinated Biphenyl
PE	Professional Engineer
ppb	parts per billion
Q	Flow Rate
RCRA	Resource Conservation and Recovery Act
SARA	Superfund Amendments and Reauthorization Act
SIC	Standard Industrial Classification
s.u.	standard units
TKN	Total Kjeldahl Nitrogen
TSS	Total Suspended Solids
VOC	Volatile Organic Compound

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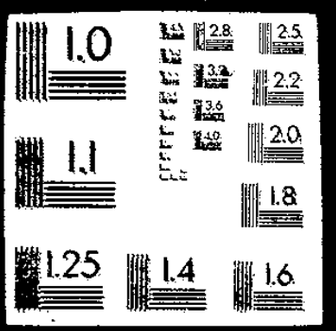

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Estimating Water Quality Benefits
Theoretical and Methodological Issues

(U.S.) Economic Research Service, Washington, DC

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Estimating Water Quality Benefits

Theoretical and Methodological Issues

Marc O. Ribaudo
Daniel Hellerstein

Introduction

Knowledge of benefits and costs to water users is required in any complete assessment of policies to create incentives for water-quality improving changes in agricultural production practices. Estimating the economic effects of changes in water quality on water users is complicated by the lack of organized markets for environmental quality. There are no observed prices with which to measure value. Instead, economic effects are measured through observed changes in the behavior of water users. The types of water uses affected by changes in water quality include recreation, commercial fisheries, navigation, municipal water treatment and use, and reservoirs.

Benefits or costs of water quality changes are measured through changes in economic welfare, represented by consumer and producer surpluses. A number of methods exist for deriving these measures, including revealed preference, contingent valuation and averting behavior for consumer surplus, and changes in production costs for producer surplus. Each of these methods is reviewed, including theoretical framework, application, and data requirements.

Benefit Estimation Procedures

To gauge the importance of the effects of agriculture on water quality, one needs to measure the benefits and costs to society of programs and policies designed to improve environmental quality. These measures are properly expressed in terms of changes in social welfare, defined as net changes in consumer and producer surpluses. Different programs will affect these components of social welfare to different degrees. For example, pesticide regulation may increase consumer surplus (say, by permitting larger fish populations) at the expense of producer surplus, while cost-sharing of best management practices could enhance both producer and consumer surpluses, excluding consideration of government budgets.

In what follows, we consider both the components of social welfare and the techniques by which they can be measured.

Changes in Consumer Surplus

Environmental quality (EQ) can appear in an individual's utility function either directly or indirectly. Direct effects occur when an improvement in environmental quality increases utility (environmental quality appears separately in the utility function). Indirect effects occur when the personal production function for goods, such as recreation, is affected by environmental quality.

Regardless of how EQ influences utility, the economic benefit of improvements in EQ is best measured as the reduction in income that would keep utility at the original level before the environmental improvement. This measure is known as a compensating surplus, and can be found by computing the area beneath the compensated demand curve for environmental quality.[1] In cases where an environmental change is forgone, equivalent surplus is the relevant measure. This is the amount of income required to move an individual to a new utility level in lieu of achieving that level through an environmental improvement.

These measures are described in figure 1 through the use of an indifference map. The map is defined for environmental quality (X1) and a numeraire good representing all other consumption (X2). The individual is initially at point a on the indifference curve representing utility level U1, consuming X1' units of environmental quality. Suppose that through a policy change, environmental quality increases to X1". The individual is now at point b, consuming X1" of X1 and enjoying a higher level of utility. (The individual has no choice but to consume X1".) Compensating surplus is equal to bd, the amount of income (in the form of X2) that must be forgone to move back to the original utility level U1 while consuming X1". Equivalent surplus is equal to ca, or the amount of income that must be received to move to utility level U2 while still consuming X1'.[2]

In practice, benefits are often approximated by the area beneath the ordinary demand curve. This is the consumer surplus measure. Although formal economic theory dictates the use of a compensated (or equivalent) measure, in most cases the consumer surplus is an adequate

---

[1]Compensating surplus and compensating variation are two measures of welfare based on the compensated (Hicksian) demand curve. Compensating surplus is used when the quantity of a good is given or restricted (in this case, environmental quantity) and not the choice of the individual. Compensating variation is used when the price of a good changes, and the individual can choose any quantity of the good.

Akin to the compensating surplus and compensating variation are the equivalent surplus and equivalent variation. The difference between the two pairs of measures is due to the base utility level: compensating measures based on the level of utility obtainable prior to the change, and equivalent measures based on the level of utility obtainable after the change.

In actual practice, benefits are often approximated by the area beneath the ordinary demand curve (Willig). This is the consumer surplus measure. The consumer surplus measure is generally easier to estimate because an ordinary demand curve can be estimated with data on observed behavior.

[2]The ES and CS are formally expressed as changes in the expenditure function given a change in the price and level of environmental quality. For example, $CS = E(P_1,Q_1,U_1) - E(P_1,Q_1,U_o)$; where U_o is the base utility, $U_o = V(P_o,Q_o,Y_o)$, and P_o, Q_o, and Y_o are the original price, quality, and income.

Figure 1
Equivalent and compensating surplus

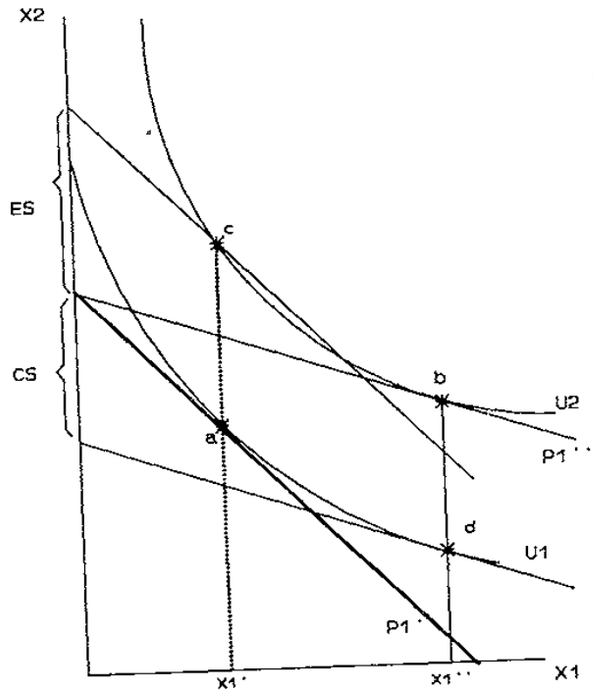

approximation (Willig). Since the consumer surplus measure can be estimated by using data on observed behavior, in this report we often use consumer surplus, or the change in consumer surplus, as a welfare measure.

The problem with estimating demand for environmental quality is that it is not a market good, and its demand cannot be estimated from direct observation of transactions for environmental quality. Instead, there are several general approaches for obtaining demand or benefit information on environmental quality. One approach is to study an individual's behavior in averting the consequences of poor environmental quality, such as expenditures made to prevent household damages from salinity. A second approach is to exploit the relationship between private goods and environmental quality (when it exists) to draw inferences about the demand for environmental quality. A third approach is to ask individuals to reveal directly their willingness to pay (compensating variation) for changes in environmental quality.

Defensive Expenditures

For many water quality problems associated with agriculture, a variety of averting or defensive expenditures can be made by individuals to reduce or completely negate the pollution damage. Purchasing water softeners and bottled water are two examples. Change in defensive expenditure has been shown to be a lower bound estimate of benefits from a reduction in pollution (Bartik; Courant and Porter). The theory from the standpoint of an individual consumer can be shown using the arguments presented by Bartik:

The problem for the consumer is to maximize

$$U = U(X,Q) \tag{1}$$

with respect to X and Q, such that:

$$X + D(Q,P) = Y,$$

where:

X = numeraire commodity,
Q = quality of personal environment,
P = pollution level,
D( ) = defensive expenditure function, and
Y = income.

An example of Q might be the level of cleanliness in a home, where P is particulate pollution and D( ) is the act of dusting. The first-order conditions reduce to:

$$U_Q/U_X = D_Q. \tag{2}$$

The household chooses X and Q to equate marginal value of environmental quality to the marginal cost of maintaining that level of personal quality.

The benefits from a reduction in pollution are equal to the income required to keep the household at the original level of utility, given the change in pollution. The indirect utility function expresses utility as a function of income and pollution, the two exogenous variables in the model. As shown in Bartik, the household's maximum attainable utility, v, is equal to the household's utility maximization problem when X and Q are optimally chosen:

$$V = V(P,Y) = U(X^*,Q^*) + \lambda(Y - X^* - D(Q^*,P)), \tag{3}$$

where X^* and Q^* are the optimal quantities of X and Q (given pollution P and income Y).

The benefit of a change in P while V, Q, and X remain fixed is:

$$\frac{\partial Y}{\partial P}\Big|_v = -V_P/V_Y = D_P. \tag{4}$$

The benefit from a small reduction in pollution is D_P, the saving in defensive expenditures needed to maintain the original level of personal environmental quality Q* (and utility) (also shown by Courant and Porter; Harford). The results are similar for nonmarginal changes in P (Bartik).

Actually estimating D_P is not straightforward, since the data requirements for estimating the household demand for personal environmental quality are forbidding (Bartik). The observed change in defensive expenditure given an actual change in environmental quality is not equivalent to D_P. Actual change in defensive expenditure can be expressed as:

$$D(Q_0,P_0) - D(Q_1,P_1). \tag{5}$$

This measure is an underestimate of true benefits (Freeman). In the case of household dusting, the consumer's desired level of personal environmental quality is higher than previously because of the generally cleaner air, and changes in dusting activity partially reflect the new goal.

A lower bound estimate of D_P that requires information only on the defensive expenditure function (D(Q,P)) and household choices before and after the pollution reduction is expressed as:

$$D(Q_0,P_0) - D(Q_0,P_1) \equiv DS. \tag{6}$$

DS is a measure of the change in costs to maintain the initial level of household cleanliness (not utility, as in the ideal measure D_P). Bartik shows that DS is analogous to a Laspeyres measure of the benefits of a price reduction and gives a better estimate than the actual change in defensive expenditures. (DS and D_P are exactly the same if the defensive expenditure function is linear.)

Revealed Preference

Water quality is an important factor in many water-based recreation activities. For these "goods," demand for quality (a nonmarket good) can be ascertained through differences in demand for recreation. It is possible to relate variations in quality to changes in demand by making use of the weak complementarity between recreation and site quality (Maler).

Suppose there exists a utility function where utility depends on the consumption of private market goods and environmental quality E:

$$U = U(X_1, ..., X_j, E). \tag{7}$$

If there exists a commodity X_i such that U is independent of E, and if that commodity is not consumed, then that commodity and E are said to be weak complements. This can be shown as

$$U_E(0,X_2, ..., X_j, E) = 0, \tag{8}$$

where U_E is marginal utility with respect to E. In this expression, X_1 and E are weak complements.

When weak complementarity exists, demand models can abstract from E, and assume that utility flows from the consumption of X_i. In a sense, X_i is a proxy for E. Even though human well-being may not be influenced by X_i, since the consumption of X_i is systematically related to the consumption of E, for estimating a willingness to pay for E, one can use the "demand" for X_i instead of the harder to measure "demand" for E.

In figure 2, X1 and environmental quality are weak complements. At the base level of quality, the demand curve for X1 is DQ, and X1' is consumed at price A. An improvement in environmental quality to Q* shifts demand out to DQ*. X1" is now consumed at price A. The area between DQ and DQ* above the price line, defined by CBDE, is the willingness to pay for the increase in environmental quality, or, equivalently, the area beneath the demand curve for environmental quality.

Figure 2
Weak complementarity and revealed preference.

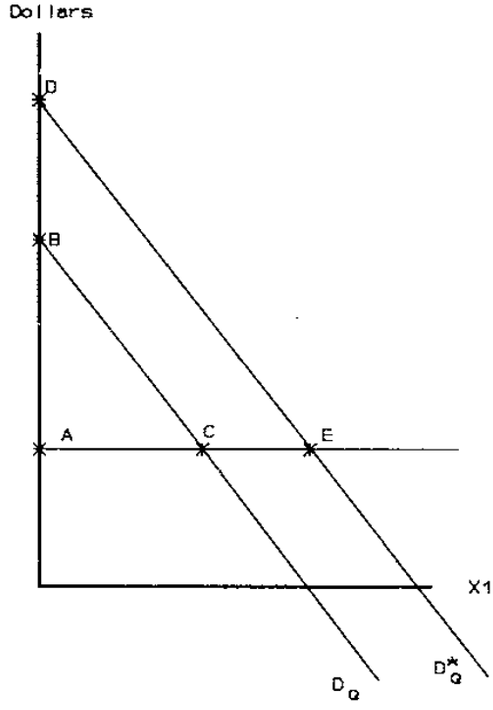

Transportation to a recreation site and the environmental quality at that site appear to fit this definition of weak complements. One is indifferent to the quality of the environment at that site unless a trip is made (assuming no option or existence value). The travel cost (TC) method is the best known revealed preference technique for recreation valuation. TC analysis correlates the cost of accessing an outdoor recreation site (the travel cost) with the decision to visit sites. A demand curve is typically generated by regressing the number of visits to the site on travel cost and other exogenous variables (presumably, higher travel costs lead to a diminished visitation, other things being equal). Consumer surplus values can be generated from this demand curve for "access to the recreation site."

Consider, for example, the linear travel cost model, where an individual (i) has a demand for trips (T_i) that is modeled as:

$$T_i = \alpha + P_i \beta, \tag{9}$$

with P_i the individual's travel cost, and β the price coefficient. Integrating between P_i and the

cutoff price (the price where demand drops to zero) yields the consumer surplus, which in this case can be shown to equal $-Y_{i2}/2\beta$.[3]

While originally constructed to provide the full value of a single site, the travel cost model can be extended to recognize the contribution of particular characteristics of a site to individual welfare. A number of these extensions are considered later in this report, all based on the insight that if a number of sites exist in a region and environmental quality varies across sites, the demand for quality should be reflected in the relative intensity of use of the sites. Furthermore, with extensive data on the recreation activities of the population, this demand can be quantified and used to ascertain the marginal and infra-marginal contribution of improvements in environmental quality.

In addition to influencing consumers' decisions on recreational trips, environmental quality can also influence the decision on where to live. For example, houses adjacent to pristine waterways are probably more attractive than otherwise similar houses located next to polluted waterways. The "amenity value" of a locale's environmental quality can be measured using the property value of homes in the locale (Freeman). If environmental quality decreases, say from increased soil erosion, the value of living in this locale will also fall. This value can then be captured (Lind) by measuring net change in the value of properties in this locale.

Since there are many factors that affect property values, a hedonic property model is often used.[4] The hedonic property model ascribes the value of a house to its characteristics, such as number of bedrooms, size of kitchen, and ambient environmental quality. Formally, the value of a property, i, is: $V_i = f(C_i, E_i, \varepsilon_i)$, where C_i are house-specific characteristics, E is environmental quality, and ε is a random term. The marginal value of E can then be determined as the derivative of f with respect to E, df/dE. This marginal value can then be used as a measure of the benefit of differences in environmental quality.

Contingent Valuation

Another approach is to ask individuals directly their willingness to pay for a general improvement in water quality. Contingent valuation methods can handle a wide variety of situations, such as cases where the emphasis is not on a particular site or groups of sites, making this approach a very flexible tool.

The goal of the contingent valuation method is very straightforward: to induce people to reveal directly their willingness to pay (WTP) for the provision of a nonmarket good such as environmental quality, or their willingness to accept payment (WTA) to sacrifice the nonmarket good. This involves asking people, in a survey or experimental setting, to reveal their personal valuations ("willingness to pay") for changes in the availability of nonmarket goods by using contingent markets (Randall and others).

The analyst is interested in evaluating the effect on welfare as a good q (say, environmental

---

[3]See Bockstael and others (1990) or Hellerstein, for discussion of consumer surplus calculation in linear demand models.

[4]An "open city" assumption (Polinsky and Rubinfeld) is often made, which requires that environmental quality varies across the region, and that movement within the region is unconstrained (there are sufficient numbers of buyers).

quality) changes from a level of q_0 to q_1. A willingness-to-pay measure, in this case the compensating surplus, can be represented as:

$$WTP^{*} = e(p_0, q_0, U_0) - e(p_0, q_1, U_0), \tag{10}$$

where e is the expenditure function, p_0 is the vector of prices for market goods, q_0 and q_1 are the initial and final quantities of the nonmarket good (environmental quality), and U_0 is utility.[5] In contrast to revealed-preference techniques, which impute a value for WTP^{*} based on indirectly related measurement, the contingent valuation framework attempts to induce people to reveal WTP^{*} directly. Highly structured contingent (hypothetical) markets are proposed (in an ideal framework), so that all respondents are confronted with the same, clearly defined situation. There has been a long and continuing debate as to whether the contingent valuation method actually generates meaningful results, but over time and after much study, the method has received greater acceptance (Bishop and Heberlein; Brookshire, Eubanks, and Sorg; Mitchell and Carson).

Contingent valuation, revealed preference, and averting behavior are means by which changes in consumer surplus can be ascertained.

Changes in Production Costs

Environmental quality can be a factor in the production of a market good. In these situations, environmental quality affects the production and supply of a marketable good, and the benefits of changes in quality can be inferred from changes in variables associated with the production of the market good (Freeman). There are two avenues through which benefits can be obtained. The first is through changes in the price of the marketable good to consumers. The second is through changes in incomes received by owners of factor inputs.

Estimating the net effects to producers and consumers from a change in production requires knowledge of the effects of quality on the costs of production, the supply conditions for output, and the ordinary demand curve for the market good (Freeman). In the case of a single-product firm, calculating the welfare effects from a change in environmental quality is rather straightforward. The net welfare gain to society (change in consumer surplus plus change in quasi-rent) is the value of the marginal product of environmental quality (Q) in the aggregate production function for the industry (Freeman and Harrington). Alternatively, net welfare gains are equal to the change in cost with respect to the change in quality. This is the dual of the previous measure.

For the multiproduct firm, the gain in welfare for an increase in environmental quality is also measured by the change in consumer's surplus in the markets for all affected products plus the aggregate change in quasi-rents to the affected firms (Freeman and Harrington). However, measurement of changes in quasi-rents is complicated by jointness of production technology that characterizes multiproduct firms.

There are two special circumstances where extensive information on demand for, and supply of, a good are not required. The first is when environmental quality is a perfect substitute for a purchased input. In this case, improvement in quality results in a decrease of the purchased

[5] U_0 is the utility obtained at initial prices, income, and q: $V(P_0, Q_0, Y_0)$.

input. When the change in total cost does not affect marginal cost and output, the cost saving is a true measure of the benefits of the change in quality (Freeman). An example could be the reduction in chlorine needed to treat water for drinking as ambient bacterial levels are reduced.

When quality is not a perfect substitute, benefits can sometimes be measured by the change in net returns. If the firm is small relative to the output and factor markets, it can be assumed that product and variable factor prices will remain fixed after the change in quality. The increased productivity is expressed as increased profit calculated from farm budget analysis.

Applications to Water Quality

Measuring the economic benefits from agricultural policies related to water quality presents some daunting problems. Agricultural policies affect large geographic areas, presenting problems for any analysis. A substantial number of water bodies (streams, rivers, lakes, reservoirs, estuaries, etc.) can be simultaneously affected. As a result, the value of improved water quality is spread across a wide population of water users, both individuals and business. This spatial dispersion complicates analysis, since environmental data are not collected in a manner to represent large regions. The issue becomes one of how to estimate aggregate benefits: estimate benefits for a sample of water users using detailed quality and economic information about individual sites or water users (such as a travel cost demand equation for a site) and make inferences about the total user population; or use aggregate regional data to estimate regional demands for water quality.

Recreation

The national recreation benefit of a program to improve water quality is the sum of individuals' willingness to pay for the change in water quality. Measurement of these benefits will not be straightforward, since the effects are spread across a large range of sites. Specifically, how will the regions' lakes, reservoirs, streams, rivers, and wetlands be affected by such a policy. Furthermore, in the broadest sense, how are the affected resources used by individuals?[6] The combination of physical impact on water resources and society's uses of these resources determines what sorts of data need to be gathered. These data needs are enumerated in the following material.

Use of Unique Water Bodies

Sites recognized as having unique recreational features, such as State parks, should be examined separately. Either an onsite survey, a survey of a pre-identified user population, or a general population survey that inquires as to the use of these sites can be used to estimate willingness to pay. The choice between these approaches is in large part a function of cost, with relatively minor sites requiring large (hence, expensive) general population surveys before adequate visitation data can be obtained. However, general population surveys are more easily estimated, and are less prone to a number of econometric biases.[7]

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[6]A related issue is what new activities would become possible given an improvement in water quality.

[7]Specifically, onsite surveys are prone to bias from truncation, endogenous stratification, and other forms of sample selection error. While techniques exist to control for these biases (Shaw), they often impose statistical restrictions not required when general population data are available.

Water quality considerations can be incorporated in several manners, such as:

(1) Site choice models (often using discrete choice techniques) which include water quality as an argument in a utility function, with variations in water quality influencing the probability of which site a user selects (Bockstael and others, 1987),

(2) Hedonic travel cost analysis, which regresses the choice of water quality on the incremental costs of accessing sites with better water quality (for example Brown and Mendelsohn; Smith and Kaoru, 1987), and

(3) Generalized travel cost analysis (also known as the varying parameters models), a two-stage model that regresses travel cost coefficients on site characteristics (Vaughan and Russell).

Discussion of site choice models. Site choice models examine the choice of site made by an individual, where at each choice opportunity the individual is faced with many different sites and must choose which site to visit. The individual will presumably choose the site that yields the greatest utility, given the site's environmental quality and cost of access. Information on this "discrete choice," when combined with knowledge of the characteristics (including the environmental quality) of the site, can be used to infer the value of those site characteristics.

For example, suppose that on day t an individual faces a set of J sites, and chooses a site j (j=1,..,J) such that utility (V_t) is maximized:

$$V_t^* = \underset{j \in J}{\text{Max}}\ V(P_j, EQ_j, v_{jt}), \tag{11}$$

where P_j is the cost of accessing site j (the travel cost), EQ_j is a vector of characteristics describing the environmental quality at site j, and v_{jt} is a random component that incorporates unobservable factors that influence the individual's enjoyment of site j on day t. Since v_{jt} varies across both site and time, the choice of site is not deterministic. Instead, it is a function of realization of all the v_{jt} (j=1,..,J).

If the distribution of v_j and the utility function are known, it is possible to compute the marginal value of each element of EQ. For example, it is often assumed that V has the following form:

$$V = \alpha P_j + \beta EQ_j + v_j, \tag{12}$$

where α and β are coefficient vectors to be estimated, and v_j is an independent and identically distributed type I extreme valued random variable. In this case, given information on the outcome of many choice opportunities, a multinomial logit model can be used to estimate α and β (Maddala). Marginal values of site characteristics can then be obtained by comparing β to α.

Variations of this approach, which generalize the above model, have been widely used. For example, Bockstael and others (1987) generalize the distribution of v and add a preliminary stage that predicts the number of choice opportunities. The question of "the number of choice opportunities" is critical when infra-marginal analysis is attempted, since the discrete choice analysis abstracts from the individual's decision about whether to "visit a site" or to engage in some other activity, such as staying home and watching TV (Morey and others).

Discussion of hedonic travel cost models. In hedonic travel cost models, the individual is presumed to derive utility directly from the site characteristics (including environmental quality). In this model, the actual sites are merely particular bundles of site characteristics and otherwise are not unique. If a sufficient number of these "bundles" exist, demand curves can be identified for each of these characteristics. In other words, for each characteristic, the individual can consume a quantity up to the point where the marginal cost of increasing consumption of the characteristics is greater than its marginal value.

A simple example of a hedonic travel cost model uses a two-stage zonal approach. In the first stage, total trip costs are regressed on several site characteristics to calculate the implicit price of each characteristic. Formally, consider an individual i who has M sites to choose from. For each available site m (m=1,..M), the price of access, P_{im} (for example, individual i's travel cost to site m), is regressed against a K x 1 vector of characteristics of the site, EQ_m: $P_{im} = f(EQ_m, \varepsilon_m)$, where ε_m is a random error term.[8] An underlying presumption of this technical (nonbehavioral) model of implicit prices is that better sites (say, with increasing water clarity) can be obtained by traveling farther. The derivative of f with respect to EQ, dP_m/dEQ_k can then be used as an implicit hedonic price for an additional unit of each of the (K) components of EQ.[9]

The second stage requires that the first-stage regression be performed in many different geographic zones (such as counties). Under the likely case that the distribution of sites varies over space, with individuals living in some zones being close to good quality sites while individuals living in other zones are adjacent to lower quality sites, the hedonic price vector for each zone will also vary. An inverse demand curve for each characteristic (k) can then be formed by regressing, across all individuals (i) in all zones, the hedonic prices (dP_m/dEQ_k) of the characteristic against the quantity of the characteristic demanded (EQ_{ik}): $dP_m/dEQ_k = g(EQ_{ik})$. These demand curves can then be used for infra-marginal valuation (Englin and Mendelsohn).[10]

Discussion of generalized travel cost analysis. Generalized travel cost starts with simple travel cost models, and then correlates the estimated results with measurable site characteristics. Thus, environmental quality affects consumers by modifying the price, income, and other coefficients of the individual's demand curve for the site. In contrast to hedonic models, it is not postulated that consumers explicitly demand a known level of a site characteristic. In this sense, generalized travel cost models are similar to discrete choice models. However, unlike discrete choice models, the total quantity of trips is explicitly modeled, while the choice of "which site to visit, given we are going to take a trip" is not defined.

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[8]"Available" means that the site is not dominated by some other site, with domination occurring when one can obtain the same quantity of characteristics from a site which has a lower price. The (zone-specific) available sites are usually proxied by a list of all sites actually visited by individuals from the zone; nonvisited sites are assumed to be dominated.

[9]If f is linear, then the derivative for each characteristic equals the estimated coefficient. For nonlinear hedonic price equations, additional assumptions may be required (Mendelsohn).

[10]As with discrete choice models, hedonic models focus on a single choice occasion and do not explicitly model the number of times an individual chooses to "visit one of several sites." If the total number of site visits changes substantially when site quality improves (degrades), these infra-marginal values will be biased downward (upward).

Formally, the basic generalized travel cost starts with a set of individual demand curves for m=1,..,M sites:

$$
\begin{aligned}
Y_{i1} &= \alpha_1 + P_{i1}\beta_1 + \varepsilon_{i1} \\
Y_{i2} &= \alpha_2 + P_{i2}\beta_2 + \varepsilon_{i2} \\
&\ldots \\
Y_{iM} &= \alpha_M + P_{iM}\beta_M + \varepsilon_{iM} ,
\end{aligned}
\tag{13}
$$

where Y_{im} is observed number of trips taken by individual i to site m, P_{im} is the price (travel cost) of accessing site m, ε_{im} is a random variable, and β_m is the price responsiveness for site m (assumed to be the same for all individuals). Each of these individual demand curves is estimated separately, and estimates of β_m, b_m are derived.

The next step is to regress the estimated price coefficient, b_m, against observed site characteristics:

$$
\begin{aligned}
b_1 &= \gamma_0 + Z_1\gamma_1 + EQ_1\gamma_2 + v_1 \\
b_2 &= \gamma_0 + Z_2\gamma_1 + EQ_2\gamma_2 + v_2 \\
&\ldots \\
b_m &= \gamma_0 + Z_m\gamma_1 + EQ_m\gamma_2 + v_m
\end{aligned}
\tag{14}
$$

where Z and EQ are measures of site characteristics.[11] γ_2 is interpreted as the extent to which price responsiveness changes as these EQ change. Valuation of changes in EQ can be generated by computing the price coefficient, b, at the before and after level of EQ. The difference of the consumer surplus values, with each value derived using a different value of the computed price coefficient (b), will yield an infra-marginal measure of the value of the change in EQ.[12]

While appealing in its simplicity, the generalized travel cost model suffers from a severe problem: the treatment of substitute sites is not internally consistent. The problem, as pointed out by Mendelsohn and Brown, can be seen by noting that the two stages can be collapsed into a single model with $Y_m = g(P_m, EQ_m)$, a model that does not include substitute price. For single-site demand curves, exclusion of substitute sites will lead to a missing-variables problem, resulting in a biased estimate of site demand at any given price (Caulkins and others). For the generalized travel cost models, the consequences are worsened since exclusion of substitute prices is tantamount to assuming that the characteristics of other sites do not affect the demand for a given site. However, if site characteristics are not important in the first stage, characteristics cannot suddenly be the crucial determinant in the second stage.

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[11]Equation 14 differentiates between Z and EQ for heuristic reasons: where Z variables may consist of nonenvironmental variables (say, number of picnic tables in the campground) that may be of lesser interest to the analyst.

[12]This simple model can be expanded, such as by modeling the correlation between the error terms (permitting the joint estimation of both stages) or by using censored demand curves (Smith and Desvousges).

The generalized travel cost technique is basically most useful when applied to a set of unique sites, where each site has no close substitutes, and where each site serves a unique market (no individual ever visits two of the sites).[13]

Use of Nonunique Water Bodies

The use of sites that provide recreation to individuals, but are not distinguished by unique features, should also be examined. For example, a given streamside may be used for a number of purposes (fishing, canoeing), but it has many substitutes; should it disappear, the users can readily find an alternative location that provides nearly the same services. Given the dispersed, low-level usage of these sites, gathering data on visitation would be difficult: any one site will yield only small numbers of visits even in an extensive population survey, while a complete set of onsite surveys would be expensive due to the sheer number of sites and the need for a lengthy survey period to collect sufficient observations. On the other hand, when a complete set of data exists, the sheer volume of information may encumber analysis.

Given these difficulties, some sort of generalization from a subset of sites is necessary. One approach is to use a general population survey to find the visits to all sites, without attempting to obtain thorough coverage of any one site. The sites listed by respondents can then be classified by site characteristics, such as degree of water quality change. Several analytic techniques can be applied to these data, including:

(1) Discrete choice models, which use assumptions about the consumer's utility function to permit discrete choice modeling with randomly drawn alternatives (Parsons and Kealy), and

(2) Multiple-site travel cost analysis, which estimates a demand system where each equation in the system represents a different category of site. Evaluation of changes in water quality can be accomplished by shifting sites between categories, recomputing prices, and using coefficients from the original data to predict changes in demand (Burt and Brewer).

A potential problem with using these approaches is obtaining information on site characteristics, such as water quality. Often, given the myriad of sites, this information will not be readily available. One could measure the characteristics of a subset of these sites, making sure to include sites mentioned by survey respondents, or one could ask survey respondents to describe the visited sites. Another way is to estimate the quality of the sites, given information on average environmental quality of the locale in which the site is located (and perhaps other information obtained from the user).

Description of the discrete choice model using randomly drawn alternatives. The estimation of discrete choice models when full information is not available is relatively simple. The standard discrete choice model is basically modified by using a subset of the sites, instead of using all possible sites. This subset includes the chosen site, and a number (M) of sites randomly drawn from the list of all sites. These M + 1 sites are then used in a discrete choice model,

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[13]An ad hoc method of dealing with this problem is to include a substitute price in a pooled (single) equation version of the generalized travel cost model (Vaughan and Russell). However, this does not address the fundamental problem of incorporating the characteristics of alternative sites in a demand model.

where the M + 1 sites vary across observations. As long as the independence of irrelevant alternatives assumption holds,[14] the use of these subsets will not bias the results (Parsons and Kealy).

Note that knowledge of the characteristics of all sites is required, since inclusion of a site implies inclusion of its characteristics in a discrete choice model. In other words, if information is available on only a fraction of the sites that an individual might visit, this technique is inapplicable. Hence, the advantage of this technique is that it greatly facilitates estimation, especially when the full choice set consists of hundreds of sites (with each site represented by a vector of characteristics, and each characteristic akin to a single variable in a standard regression model).

Description of multiple-site travel cost. Multiple-site travel cost models extend the single-site model by classifying sites into a finite number of classes, with each class having similar site characteristics. For example, one class could consist of clear-water lakes, another class of murky-water lakes, and another of clear-water lakes that have periodic algal blooms. Each class of site is then viewed as a separate good. Instead of the demand for trips to a site, the choice variable is the demand for trips to sites of a specific class. The advantage to this approach is that the finite number of classes can be treated as a demand system, with each equation representing demand for trips to sites of a particular class.

Formally, individual i's demand for visits to M different types of sites ($Y_{i1},\ldots,Y_{iM}$) is modeled as:

$$\begin{aligned} Y_{i1} &= f_1(P_{i1},P_{i2},\ldots,P_{iM},\varepsilon_{i1}) \\ Y_{i2} &= f_2(P_{i1},P_{i2},\ldots,P_{iM},\varepsilon_{i2}) \\ &\ldots \\ Y_{iM} &= f_M(P_{i1},P_{i2},\ldots,P_{iM},\varepsilon_{iM}), \end{aligned} \tag{15}$$

where $P_{i1},\ldots,P_{iM}$ are the prices that individual i faces for each class of site m.[15] The vector of prices is often constructed by measuring the cost of traveling to each type of site for all sampled individuals. Thus, the price vector will vary across individuals, with those who live near (far from) a site of class m having a low (high) P_{im}.[16] After estimating the system, the value of changes in environmental quality can be derived by computing consumer surplus under the pre-existing condition, then reclassifying affected sites given the change in EQ, and recomputing consumer surplus for this new set of sites (Cicchetti and others).

The key to the multiple-site method is the ability to classify sites, permitting the inclusion of substitute prices in the demand system. If each site is unique, sharing little in common with any other site, this may not be possible. However, if there are many sites, and each site tends to have several close substitutes, then this technique can be valuable.

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[14]This assumption states that the ratio of the probabilities of choosing any two sites is independent of any third alternative; that the relative probability of choosing between two sites is not affected by the availability of a third site (McFadden).

[15]For example, the price of class j is the cost of accessing the closest site that falls into site j.

[16]Note that in contrast to the generalized travel cost model, the multiple site model explicitly controls for substitute sites.

Another important issue, especially germane when valuing infra-marginal changes using changes in consumer surplus, is the treatment of cross-price elasticities. If symmetry can be imposed on the demand system (which implies no income effects), then cases where there are multiple price changes (as when a number of sites are reclassified) can be readily valued (Hof and King). However, if this Hicksian condition cannot be imposed, then the value of the consumer surplus cannot be uniquely assigned in the case of multiple price changes.

Hedonic Property Analysis

Hedonic property analysis is similar to hedonic travel cost analysis in that the analyst regresses observed prices against observed characteristics including environmental quality. A linear model is typically used, such as $V_i = \beta_o + \beta_z Z_i + \beta_e E$, with V_i the price of the property, Z the house's characteristics, and E a measure of environmental quality. For example, Young and Teti regressed housing prices on Lake Champlain in Vermont against several house characteristics (such as lot size) and a water quality index. The derivative of V with respect to E (equal to β_e in this simple model) is then interpreted as the marginal value of E. Observed changes, or differences, in environmental quality (ΔE) can be approximated by multiplying this implicit marginal value (price) by ΔE.

Since it may be difficult to gather a complete set of data on house characteristics, one can use data on repeat sales of many different properties (if available), thereby avoiding the requirement for detailed (house-specific) information (Palmquist; Mendelsohn and others, 1992). If house characteristics are likely to have been constant over time, and if environmental quality has changed over time, panel estimation techniques can be used to control for the frequently unobservable house characteristics, thereby improving the quality of inference concerning the influence of environmental quality.

For example, consider a simple extension of the linear model. If Z is constant over time and E has changed, the model becomes: $V_{i,t} = \beta_o + \beta_z Z_i + \beta_e E_{i,t} + \varepsilon_{i,t}$. Further assuming that two (or more) observations are available for a set of properties, the simple first-differencing panel model can be used, where:

$$V_{i,t} - V_{i,t-1} = (\beta_o - \beta_o) + \beta_z(Z_i - Z_i) + \beta_e(E_{it} - E_{i,t-1}) + (\varepsilon_{i,t} - \varepsilon_{i,t-1}). \qquad (16)$$

Note that Z_i cancels out; it is treated as an unobservable "fixed effect." Thus, the change in V is seen to be strictly a function of the change in E.

While hedonic property models can be useful when measuring the value of recreational resources, it should be noted that hedonic property models and trip demand models often measure the same thing and that double counting may result if the results of a trip demand model and of a hedonic property model are added together (McConnell).

Contingent Valuation Apart from Water Bodies

As discussed earlier in this report, methods for estimating benefits from water quality changes that rely on site data present a number of difficulties. First, identifying a set of water bodies representative of all water resources affected by a policy is difficult. Second, unless the substitution possibilities between sites are adequately accounted for, independently derived site benefit estimates cannot be aggregated to obtain "true" national benefits (Hoehn and Randall). Contingent valuation is a way to get around these problems since it does not depend on a particular site or sites. Mitchell and Carson have demonstrated that individuals can value water quality in a general sense, given the proper experimental design. The public's

willingness to pay for boatable, fishable, and swimmable water quality is an example. In addition, contingent valuation enables one to estimate non-use values, such as option value and existence value.

An advantage of the contingent valuation (CV) is that expansion of the results from a study to a larger population is easier than for methods that are dependent on individual sites. To evaluate the economic benefits from a national policy, a CV survey could be designed to cover the entire country. Such an approach would be very costly, however.

The results of a much smaller scale CV study could be expanded to the entire population in two basic ways: (1) apply an unadjusted willingness-to-pay (WTP) average to the entire population, and (2) apply an econometrically estimated WTP function to the entire population. The former is appropriate in the unlikely event that the sample population is representative of the national population in all socioeconomic categories. A better approach is to estimate an equation that expresses WTP as a function of the socioeconomic characteristics of the sample population (Loomis). Weighted least squares should be used if sample proportions for certain socioeconomic strata do not match population proportions of the same strata (Loomis).

Example: Valuing the Recreational Benefits from the CRP Program

An example of estimating changes in recreation behavior from a change in water quality is the sequential decision model used in the evaluation of the Conservation Reserve Program (Ribaudo and Piper). Recreational freshwater fishing was defined as a two-part decision by an individual: whether or not to fish in a given year (participation model); if yes, how much to fish (intensity model). Each decision was modeled at the national level as a function of socioeconomic variables, supply of surface water, and water quality.

This approach was possible because of the availability of a national survey on outdoor recreation, the U.S. Fish and Wildlife Service's 1980 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation. The survey consisted of two parts: a screening survey of the general population and a survey of those participating in outdoor recreation. The participation model was estimated with data from the screening survey, while the intensity model was estimated with data from those who actually fished. Water quality data from the U.S. Geological Survey's National Stream Quality Assessment Network system were used to calculate average "regional" levels of suspended sediment, nitrogen, and phosphorus.

The participation model was estimated as a logit, and used to estimate the change in the number of people that would participate in recreational fishing given a change in water quality in the regions closest to their homes. The intensity model was based on a travel cost model and used to estimate the change in the number of visits, given a change in water quality. Together, the two models are used to predict the change in regional and national recreational fishing visits given regional changes in water quality. This is accomplished without any information about particular sites.

Navigation

Sedimentation of river channels and harbors can cause delays in shipping and even the loss of vessels. State authorities and the U.S. Army Corps of Engineers share the cost of keeping channels open. Since agriculture is a major source of sediment in many parts of the country, especially in the Missouri and Mississippi watersheds, reductions in cropland erosion could reduce the need to dredge. For a particular harbor or stretch of river, the benefits from

reduced erosion would be equal to the net increase in producers' and consumers' surpluses from reduced shipping costs and reduced dredging costs. Under the assumption that reduced sediment and dredging are perfect substitutes, and that dredging prior to the erosion reduction was optimal given the level of sedimentation and the demand for navigation, then the only effect of the reduced erosion is reduced dredging costs. Benefits are equal to the reduced dredging costs.

Estimating benefits from reduced dredging requires data on dredging and shipping activity in each watershed. While such data could be collected through a survey, a simpler approach is to use secondary data. Data on dredging costs and amounts of sediment removed from channels and harbors are available from the Corps of Engineers at the Corps Division level of aggregation. Ribaudo used those data to estimate the removal costs per ton of sediment for each farm production region in an evaluation of the Conservation Reserve Program. Assuming a linear cost function and optimal dredging, one can convert reduced sediment discharge to reduced dredging costs.

Sediment loadings to rivers can be calculated on a regional basis using data from a number of sources. Erosion on various types of land can be estimated with the National Resources Inventory at any number of levels of regional aggregation. There are advantages to using the aggregated sub-area (ASA) or production area in national policy analyses for two reasons. These regions approximate watersheds, and they follow county boundaries. It is therefore relatively easy to create ASA-level data from county-level databases, a number of which exist.

The amount of sediment reaching waterways in an ASA (loadings) can be estimated by multiplying erosion by a sediment delivery ratio (SDR). Resources for the Future (RFF) has calculated SDR's at the Major Land Resource Area level and used these to estimate annual loadings for ASA's. We estimated aggregated sub-area SDR's by dividing the RFF sediment loadings by total erosion.

Since ASA's are connected hydrologically, in that water flowing out of one watershed can enter another, some of the loadings will be carried downstream. The amount of sediment deposited in each ASA can be estimated from the Soil Conservation Service's estimates of inter-ASA delivery ratios.

Reservoirs

Reservoirs make excellent sediment traps. Flowing water can carry large loads of sediment in suspension. When a river's flow is checked by a reservoir, the carrying capacity of the river is greatly reduced, and sediment settles out into the storage basin. Without removal and with a continuous inflow of sediment-laden water, the reservoir will eventually fill with sediment.

A reservoir can provide one or more services such as flood control, drinking water supply, hydroelectric generation, and recreation. The economic costs from sedimentation take three forms: effects on the services provided by the reservoir (such as boating and irrigation), costs of remediation (dredging), and damage to the reservoir structure itself (turbines, pumps) (Southgate and Macke). Benefits from reduced sedimentation are the reverse of the above adverse effects.

Benefits can be expressed as:

$$B = \sum_{t=0}^{T} [P_{1t}\Delta Q_{1t} + P_{2t}\Delta Q_{2t} - \Delta C_{ot}](1+r)^{-t} + \sum_{t=T+1}^{T'} [P_{1t}\Delta Q_{1t} + P_{2t}\Delta Q_{2t} - \Delta C_{ot}](1+r)^{-t} , \qquad (17)$$

where:

P_i, Q_i = price and quantity of service flow i,
C_{ot} = operating cost,
r = the discount rate,
T = the economic lifespan of the reservoir given "before" sedimentation rate,
T'= the economic lifespan of the reservoir given reduced sedimentation rate.

The first summation expresses the change in net value of services produced during the without-treatment lifetime of the reservoir. The second summation indicates the net benefits of extending that lifetime. The greater the initial sedimentation rate, the greater the benefits from extending the lifespan of the structure, since T will be small and the effects of discounting will be reduced. Benefits should be estimated for each reservoir affected.

The economic life of a reservoir ends when the incremental benefits from continued use no longer exceed the incremental costs of operation. The economic lifespan of a reservoir can never exceed the physical life. Under ideal conditions (minimal sedimentation) the economic life of a reservoir can be assumed to be long enough so that its capital and operating costs can be amortized as a perpetuity (Lee and Guntermann). Sedimentation shortens the economic life of a reservoir to a finite period, shortening the time over which costs can be amortized and, therefore, increasing annual costs. The excess of annual costs above a perpetuity is a simple measure of sedimentation damages (Lee and Guntermann), assuming no reduction in service flows until the economic lifespan is reached. This definition of damages precludes the need to estimate specifically the demand functions for services supplied.

Most reservoirs have a sediment pool, constructed to trap sediment. No damage from sedimentation occurs until after the sediment pool is filled. Assume that the economic lifespan of a reservoir is equal to the years it takes for the sediment pool to become filled, plus the years for the remaining capacity to become half filled with sediment. Also assume that the flow of services will not be disrupted until the economic lifespan is reached, at which point all services cease. The lifespan of the sediment pool (N_1) can be estimated as follows:

$$N_1 = \frac{kC_{RS}}{G_s A_n DT} . \qquad (18)$$

The physical lifespan of the reservoir can be estimated as:

$$N_2 = \frac{kC_{RT}}{G_s A_n DT} , \qquad (19)$$

where:

C_{RS} = sediment pool capacity (acre-feet),
C_{RT} = total reservoir capacity, including sediment pool (acre-feet),
k = conversion factor for acre-feet to tons of sediment,
G_o = erosion rate in drainage area (tons/year),
A_n = net drainage area (total area - reservoir surface area),
D = sediment delivery ratio, and
T = reservoir trap efficiency.

Since economic lifespan is assumed to be equal to the years it takes to fill the sediment pool plus half the remaining capacity, economic lifespan can be expressed as the mean of equations 18 and 19:

$$\overline{N} = \frac{N_1+N_2}{2} = \frac{k(C_{RS}+C_{RT})}{2G_oA_nDT} = \frac{\overline{C}}{G_oL}, \tag{20}$$

where:

C = average of sediment pool and total capacity (in tons of sediment), and
L = product of A_n, D, and T (a constant).

From Lee and Guntermann, the annualized damages from reservoir sedimentation can be expressed as:

$$DS = C_c\left(\frac{r}{1-(1+r)^{-\overline{N}}} - \frac{r}{1-(1+r)^{\infty}}\right), \tag{21}$$

where:

DS = damages from sediment,
C_c = construction costs, and
r = discount rate.

This equation assumes that annual operation and maintenance costs are independent of the sedimentation rate. The marginal damage with respect to erosion can be defined as:

$$\frac{\partial DS}{\partial G_o} = \frac{\partial DS}{\partial \overline{N}}\frac{\partial \overline{N}}{\partial G_o}. \tag{22}$$

From equation 21, we get the following:

$$\frac{\partial DS}{\partial \overline{N}} = C_c\left(\frac{-r(1+r)^{-\overline{N}}\ln(1+r)}{(1-(1+r)^{-\overline{N}})^2}\right). \tag{23}$$

From equation 20, we get the following:

$$\frac{\partial \overline{N}}{\partial G_o} = \frac{-\overline{C}}{G_o^2L}. \tag{24}$$

The marginal benefits from a reduction in erosion in the drainage area of a reservoir are the product of equations 23 and 24.

To include the costs of reservoir sedimentation in an analysis of a national soil conservation program, data on individual reservoir location, size, sediment inflow, and operation and maintenance costs are required. Data on all except operation and maintenance costs are available from sedimentation surveys conducted for the Soil Conservation Service (Dendy and Champion). Operation and maintenance costs are available from a reservoir database maintained by the Soil Conservation Service.

Municipal Water Treatment

Rivers and reservoirs provide drinking water to over 112 million U.S. residents (Solley and others). Water treatment processes are affected by the quality of the source water. Conventional treatment can consist of flocculation, sedimentation, filtration, and disinfection. Intake water with low levels of suspended sediment may be treated by direct filtration, which eliminates the need for sedimentation and, sometimes, flocculation. Cost savings from the use of direct filtration include lower capital costs and lower costs associated with lower chemical coagulant doses and decreased sludge production and disposal. Low turbidity levels also simplify the disinfection process, thus making it less costly. Agriculture is a major source of sediment, thus turbidity, in many parts of the country.

The change in water production cost induced by changes in sediment load is a measure of the welfare effects from soil conservation. For a single-product firm (such as supplier of municipal drinking water), Freeman and Harrington show that the marginal welfare change from an improvement in environmental quality is:

$$W'(Q) = -C_Q(Y^*,Q), \tag{25}$$

where:

W = producer plus consumer surplus,
Y = output, and
$C(Y^*(Q),Q)$ = production cost as a function of equilibrium output Y^* and environmental quality.

If the supply and quality of the output (drinking water) remain unchanged given the change in quality of untreated input water, then consumer surplus remains unchanged and benefits are equal solely to the change in producer surplus (Freeman).

Holmes, using data from 600 of the largest water suppliers, estimated a hedonic model for water treatment costs. A hedonic cost function refers to a cost function that embodies attributes of the production process not typically considered by neoclassical models (Holmes). The quality of untreated intake water is such a variable. The form of his model was:

$$C_j = C_0 Y_j^{a1} Q_j^{a2} (\prod_i R_{ij}^{ai+2}) , \tag{26}$$

where:

C_j = expenditure of firm j
C_0 = intercept,
Y_j = water production of firm j,
Q_j = intake water quality of firm j,

R_{ij} = price of input i to firm j, and
ai = model coefficient.

Expenditures were defined as operating costs, including treatment plant costs, water acquisition costs, and distribution costs. Water quality was represented by the turbidity of intake water. Two input prices were included: pipefitter wage and electricity cost index.

With the estimated treatment cost function, estimating regional or national changes in treatment costs from specific changes in turbidity (suspended sediment) is rather straightforward. For a particular region, average change in treatment cost per gallon of water treated can be estimated from data on treatment plants in that region. Costs for all treated water can then be calculated with data from the U.S. Geological Survey on total treated water. This approach is appropriate given the assumption that the change in water quality does not affect price, quantity, or quality of treated water.

Drainage Ditches

When soil is eroded from a field, it can be deposited in roadside ditches, which line many rural roadways. Sedimentation in culverts and ditches reduces the capacity and the effectiveness of the structures, increasing the likelihood of road flooding during storms.

The costs from ditch sedimentation are the maintenance costs of removing sediment plus the damage from road flooding. Optimal cleaning can be defined as that level of maintenance that just prevents road flooding (Freeman). If ditch cleaning is optimal, then the benefits from reduced erosion are equal to the reduction in maintenance costs. If ditch cleaning is not successful in preventing flooding, then reductions in maintenance costs underestimate benefits, in that the damages from flooding will also be reduced by the reduced erosion.

Damages from ditch sedimentation were included in several local studies of the costs of soil erosion (Forster and Abrahim; Moore and McCarl; State of Indiana; Clark and others; Lee and Guntermann). We estimated a national model of ditch-cleaning costs with data from 33 States. Annual sediment removal costs were specified as a function of the cost of removing a cubic yard of sediment and the estimated total sediment discharge along the roads treated by the State. The latter variable provides the link between soil erosion and sediment removal costs. This variable is defined as percentage of rural roads treated multiplied by total discharge of sediment to streams in the State (Gianessi and others). The estimated equation was:

$$Y = 6974 DIS^{.49} UNIT^{.74} , \qquad (27)$$

where:

Y = annual sediment removal costs for State roads,
DIS = sediment discharge along roads treated by State, and
UNIT = unit cost of removing a cubic yard of sediment.

All variables were significant at the 5-percent level.

Although the approach is rather crude, it enables a rough-and-ready method of estimating a lower bound of benefits from reduced ditch maintenance costs. The estimate is a lower bound because ditch maintenance usually occurs after the ditch becomes clogged with sediment, and flooding problems have occurred.

Municipal Water Use

The quality of water consumed by households has an influence on longrun costs of maintaining water-using appliances. High levels of total dissolved solids (TDS) or hardness can damage water-using appliances and pipes, increase the use of detergents, and deteriorate clothing and other textiles. Irrigated agriculture has been shown to be a factor in TDS levels in the Colorado River Basin, and possibly elsewhere. Agricultural policies or other policies that affect the TDS levels of large storage reservoirs, such as those in the West and Southwest, could affect the water supplies for major population areas.

Benefits from reduced TDS levels take two forms: increased appliance lifespan for those who take no defensive action and reduced defensive expenditures for those who do (purchase water softeners or bottled water, for example). Most studies have concentrated on the former benefits, including those by Black and Veatch, Metcalf and Eddy, DeBoer and Larson, Tihansky, d'Arge and Eubanks, Patterson and Banker, Lohman and others, Gardner and Young.

Directly estimating households' demand or expenditure function for water quality is not generally possible, since households cannot directly purchase water of varying quality. The approach used most often in the literature is to estimate physical damage in terms of expected appliance lifetimes, assuming that the household would be willing to pay up to the economic value of those physical damages to avoid them (d'Arge and Eubanks, p. 256).

A number of authors report regression equations relating appliance lifespan to TDS levels (Lohman and others, d'Arge and Eubanks, Tihansky). Any of these can be used to estimate household benefits from reductions in TDS levels. The lifespan X_a of each appliance in the study area can be computed for the initial TDS level. Assuming a lifespan X_h of the house, the number of times the appliance must be replaced over the lifespan of the house is X_h/X_a. Assuming that replacement costs are realized at the time of replacement, a cost stream over the lifespan of the house can be constructed, and a present value calculated. A decrease in TDS will increase the lifespan of the appliance and reduce the number of times replacement is necessary. The difference in present value between the two cost streams is the benefits from better quality (for example, less saline) water. Census data on the number of households and the types and numbers of appliances per household allow one to develop an aggregate estimate of benefits for a metropolitan area influenced by improved household water quality.

Conclusions

Evaluation of policies that address the effect of agricultural activities on environmental quality will require two types of information: information on the cost of implementing the required changes in agricultural practices and information on the benefit to society of the resulting improvements in environmental quality. This report reviews a variety of methodologies that can be used to compute these benefits. It particularly focuses on benefits related to improvements in water quality.

These benefits can be broadly classified into two categories: those that accrue to consumers, and those that accrue to producers. To quantify these benefits, we estimate changes in consumer and producer surplus. From a theoretical standpoint, the appropriate welfare measure for each type of water quality effect is clear. However, estimating benefits is complicated by several factors.

In particular, the nonmarket nature of improvements in environmental quality makes estimation of welfare effects difficult. Nonmarket goods, by definition, cannot be obtained through market transactions. Therefore, traditional demand and supply analysis will often be impossible since observations on market behavior are lacking. Given the lack of market data, computation of consumer and producer surplus measures is performed using a variety of indirect methods. For consumer surplus measures, we reviewed three broad classes of techniques that accomplish this indirect measurement: techniques that examine averting behavior, techniques based on consumption of complementary market goods, and techniques that use contingent valuation. Each of these classes has strengths and weaknesses. Averting behavior has limited applicability, but can be directly tied to environmental damage. Revealed preference is based on actual behavior, but requires a number of statistical assumptions that are often of a heuristic (as opposed to a strongly theoretic) nature. Contingent valuation obtains a direct measure of the benefit, but is based on intended rather than actual behavior.

For producer surplus methods, we review two broad indirect methods: defensive expenditures and changes in production costs. Defensive expenditures are relatively easy to measure, but the method depends on the assumption that defensive activities are performed in an economically efficient manner. This assumption is probably a poor one. In many cases, defensive services are provided by public authorities, and the level of activity reflects budget and bureaucratic realities more than actual needs.

Measures of change in production costs and/or economic profits may be the closest to the ideal measure of all the procedures reviewed. Inputs and outputs of the production process are generally priced in the market, and one can assume that the production process itself is efficient. For a given change in environmental quality, the measure of benefits should approach the ideal.

In addition to broad strengths and weaknesses, the data requirements of these techniques must be considered. For example, demand analysis is often best accomplished through a general population survey. However, when time and expense prevent the collection of such data, one is often forced to second-best solutions. These solutions include surveys of pre-identified users, or surveys conducted on-site. In such cases, zonal aggregates can be used to extend the range of the data, or sophisticated statistical techniques can be used to reduce the biases introduced by less than optimal sample design. However, these methods usually entail a worsening of model accuracy, and a reduction in the robustness of the model to misspecification. In other words, the poorer the quality of data, the greater the dependence on statistical fixes.

Benefit assessments face another complication besides the lack of market data, namely a lack of cause-effect information necessary for a priori evaluations. In particular, in order to model how changes in environmental quality affect consumer and producer well-being, knowledge of how consumers and producers use environmental services is required, as well as the ability to predict how a policy will affect the relevant environmental variables. The links between on-field agricultural activities and environmental quality are known in a qualitative sense, but fate and transport models that enable prediction of, say, the change in the quality of water entering a particular water treatment plant are lacking, especially in the context of a national policy. In such cases, a second-best solution is to use aggregate, zonal measures of environmental characteristics, or to predict relevant environmental characteristics from secondary data sources. While such techniques provide some insight into the relationships among agricultural production, the level of environmental characteristics, and human behavior, they risk serious misspecification, especially when the environment is very heterogeneous (when intra-zone variability is high).

A related issue is how to conduct a national analysis when the available data are of a very local nature. Even if a number of site studies have been conducted with the optimal data, the problem still exists of aggregating the results to a regional scale that is relevant to policymakers. In this area, research may contribute the greatest improvements in the quality of policy analyses. One benefit transfer approach is metamodeling. A metamodel is a statistical model of a simulation or other estimated model that enables the model results to be transferred from the situation where it was developed to a new application or population (Smith and Kaoru, 1990).

A prerequisite for any type of benefits transfer exercise is the availability of a national database of the supply of water resources (quantity and quality) and the demand for water resources by individuals and industry. A detailed database on a watershed basis (such as the aggregated sub-area) needs to be developed and maintained so that the basic environmental and demand data necessary for any national analysis are available.

In summary, the tools for estimating micro-level benefits have been developed and, for the most part, have received extensive professional application and review. Marginal improvements are likely to be made, but methods are available for most, if not all, types of benefits. The greatest challenge lies in the area of national-scale benefit estimates. An analyst has the choice of either collecting enough data at the national level to minimize the need for assumptions or statistical fixes, or to use less intensive data and find ways of extending micro-study results. Research is needed in both these areas.

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Guidance Manual For The Preparation Of Part 2 Of The NPDES Permit Applications For Discharges From Municipal Separate Storm Sewer Systems

FOREWORD

This manual provides detailed guidance on the development of Part 2 permit applications for municipal separate storm sewer systems. It provides technical assistance and support for all municipal separate storm sewer systems subject to regulatory requirements under the National Pollutant Discharge Elimination System (NPDES) program for storm water point source discharges. This manual also emphasizes the application of pollution prevention measures and implementation of Best Management Practices (BMPs) to reduce pollutant loadings and improve water quality.

The control of pollution from urban and industrial storm water discharges is critical in maintaining and improving the quality of the Nation's waters. Pollutants in storm water discharges from many sources are largely uncontrolled. The *National Water Quality Inventory, 1990 Report to Congress*, provides a general assessment of water quality based on biennial reports submitted by the States under Section 305(b) of the Clean Water Act (CWA). The report indicates that roughly one third of the impairment in assessed waters is due to storm water runoff.

This document was issued in support of Environmental Protection Agency (EPA) regulations and policy initiatives involving the development and implementation of a national storm water program. This document is Agency guidance only. It does not establish or affect legal rights or obligations. Agency decisions in any particular case will be made applying the laws and regulations on the basis of specific facts when permits are issued or regulations promulgated.

This document will be revised and expanded periodically to reflect additional guidance. Comments from users are welcomed. Send comments to U.S. EPA, Office of Wastewater Enforcement and Compliance, 401 M Street, SW, Mail Code EN-336, Washington, D.C. 20460.

Michael B. Cook,
Director
Office of Wastewater Enforcement
and Compliance

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CHAPTER 1
INTRODUCTION

1.0 INTRODUCTION

1.1 OVERVIEW

Control of pollution from urban and industrial storm water discharges is an important factor in maintaining and improving the quality of the Nation's waters. To help improve the quality of storm water discharges, Congress passed the Water Quality Act (WQA) in 1987. The WQA added to the Clean Water Act (CWA) a provision [Section 402(p)] that directed the U.S. Environmental Protection Agency (EPA) to establish final regulations governing storm water discharges under the National Pollutant Discharge Elimination System (NPDES) program.

In response, EPA published regulations in the November 16, 1990, Federal Register (55 FR 47990) that established NPDES permit application requirements for storm water point source discharges As part of these regulations, municipal separate storm sewer systems (MS4s) that serve populations greater than 250,000 ("large MS4s"), MS4s that serve populations between 100,000 and 250,000 ("medium MS4s"), and other MS4s identified by the permitting authority must be covered by NPDES permits. The regulations establish a two-part application process for these MS4s In April 1991, EPA issued guidance on the preparation of Part 1 of the NPDES permit application for discharges from MS4s (EPA, 1991b). The present manual provides guidance on the preparation of Part 2 applications. The information in this manual should help municipalities focus their efforts on activities that meet the application requirements.

1.2 SUMMARY OF THE CLEAN WATER ACT REQUIREMENTS

Section 402 of the CWA prohibits the discharge of any pollutant to waters of the United States from a point source, unless that discharge is authorized by a NPDES permit. Efforts to improve water quality under the NPDES program have traditionally focused on reducing pollutants in discharges of industrial process wastewater and municipal sewage. As pollution control measures have been implemented for these discharges, it has become evident that diffuse sources of water pollution (those occurring over a wide area) are also major contributors to water quality degradation. Recent studies, including the Nationwide Urban Runoff Program (NURP) study (EPA, 1983), have shown that storm water runoff from urban and industrial areas typically contains the same general types of pollutants that are often found in wastewater in industrial discharges. Pollutants commonly found in storm water runoff include heavy metals, pesticides, herbicides, and synthetic organic compounds such as fuels, waste oils, solvents, lubricants, and grease. These compounds can have damaging effect on both human health and aquatic ecosystems. In addition to pollutants, the high volumes of storm water discharged from MS4s in areas of rapid urbanization have had significant impacts on aquatic ecosystems due to physical modifications such as bank erosion and widening of channels.

The statutory provisions governing discharges from MS4s are contained in CWA Section 402(p)(3)(B). In general, Congress provided that permits for discharges from MS4s:

- May be issued on either a system- or jurisdiction-wide basis;
- Shall effectively prohibit non-storm water discharges into the MS4, and
- Shall require controls to reduce the discharge of pollutants to the maximum extent practicable (MEP).

Under the storm water program, the initial round of NPDES permits will emphasize the use of Best Management Practices (BMPs) to reduce pollutant loadings from MS4s. These BMPs include pollution prevention measures, management practices, control techniques, and design and engineering practices. As with any discharger subject to the NPDES program, MS4s must meet technology-based requirements [in this case, the "maximum extent practicable" standard of Section 402(p)] as well as applicable water quality standards.

1.3 THE PERMIT APPLICATION PROCESS

The goal of the NPDES program for municipal storm water is the reduction and elimination of pollutants in storm water discharges from large and medium MS4s. The permit application process in 40 CFR 122.26(d) is designed to meet this goal by developing site-specific NPDES permits containing storm water management programs for individual MS4s. Site-specific permitting is crucial given the differing nature of discharges from MS4s in different parts of the country and the varying impacts of these discharges on receiving waters. To facilitate this process, the regulations specify a two-part permit application.

Part 1 of the permit application initiates the process through which municipalities began to identify sources of pollutants to the municipal storm sewer system. Part 1 also requires municipalities to propose strategies to characterize storm water discharges from their municipal separate storm sewer systems. *Guidance for the Preparation of Part 1 of The NPDES Permit Applications for Discharges From Municipal Separate Storm Sewer Systems* was issued in April 1991, and is available through EPA's Storm Water Hotline [(703) 821-4823].

The present manual describes how to meet the Part 2 permit application requirements for storm water discharges from large and medium MS4s Part 2 of the permit application builds upon the foundation established in Part 1 and provides for the development of comprehensive storm water management programs. Part 2 requires particular information that MS4s must have developed to have an effective storm water control plan. However, each applicant is given flexibility on how to present and organize this information in a way which best suits the MS4's needs and is most consistent with its overall storm water management strategy. This guidance presents examples which illustrate some alternative ways to present information that will fulfill the Part 2 permit application requirements.

1.4 WHO MUST SUBMIT A PART 2 APPLICATION

Municipalities, incorporated places, and counties with unincorporated urban areas that own or operate a large or medium MS4 that discharges to waters of the United States are required to obtain a NPDES storm water permit. In addition, small MS4s (less than 100,000) that are owned or operated by a municipality other than those identified in the NPDES regulation can be designated by the permitting authority as part of the large or medium municipal separate storm sewer system due to the interrelationship between the discharges of the designated storm sewer and the discharges from municipal separate storm sewers.

Under EPA's definition of MS4, "large" MS4s serve populations greater than 250,000, and "medium" MS4s serve populations of at least 100,000, but less than 250,000. Population is determined by the most recent Decennial Census by the Bureau of the Census. A list of large and medium municipalities identified in the November 16, 1990, rule is contained in Exhibit 1-1, in which population was based on the 1980 Census. **After the publication of the November 16, 1990, rule, the Bureau of the Census released data for 1990, and, as a result, some additional municipalities may be required to submit applications, while others may fall below 100,000. These changes are not reflected in Exhibit 1-1.**

Exhibit 1-1: Large and Medium MS4s (Based on 1980 Census Data)

Municipalities, Counties, and Incorporated Areas With Populations greater than 250,000 which Must Submit NPDES Storm Water Applications

State	Entity
Alabama	Birmingham
Arizona	Phoenix
	Tucson
California	Long Beach
	Los Angeles
	Los Angeles County
	Oakland
	Sacramento
	Sacramento County
	San Diego
	San Diego County
	San Francisco
	San Jose
Colorado	Denver
Delaware	New Castle County
District of Columbia	
Florida	Dade County
	Jacksonville
	Miami
	Tampa
Georgia	Atlanta
	DeKalb County
Hawaii	Honolulu County
Illinois	Chicago
Indiana	Indianapolis
Kansas	Wichita
Kentucky	Louisville
Louisiana	New Orleans
Maryland	Anne Arundel County
	Baltimore County
	Baltimore
	Montgomery County
	Prince George's County
Massachusetts	Boston
Michigan	Detroit
Minnesota	Minneapolis
	St Paul
Missouri	Kansas City
	St. Louis
Nebraska	Omaha
New Jersey	Newark
New Mexico	Albuquerque
New York	Buffalo
	Bronx Borough
	Brooklyn Borough
	Manhattan Borough
	Queens Borough
	Staten Island Borough
North Carolina	Charlotte
Ohio	Cincinnati
	Cleveland
	Columbus
	Toledo
Oklahoma	Oklahoma City
	Tulsa
Oregon	Portland
Pennsylvania	Philadelphia
	Pittsburgh
Tennessee	Memphis
	Nashville/Davidson
Texas	Austin
	Dallas
	El Paso
	Fort Worth
	Harris County
	Houston
	San Antonio
Utah	Salt Lake County
Virginia	Fairfax County
	Norfolk
	Virginia Beach
Washington	King County
	Seattle
Wisconsin	Milwaukee

Municipalities, Counties, and Incorporated Areas with Populations between 100,000 and 250,000 which Must Submit NPDES Storm Water Applications.

State	Entity
Alabama	Huntsville
	Jefferson County
	Mobile
	Montgomery
Alaska	Anchorage
Arizona	Mesa
	Pima County
	Tempe
Arkansas	Little Rock
California	Alameda County
	Anaheim
	Bakersfield
	Berkeley
	Concord
	Contra Costa County
	Fremont
	Fresno
	Fullerton
	Garden Grove
	Glendale
	Huntington Beach
	Kern County
	Modesto
California, cont	Orange County
	Oxnard
	Pasadena
	Riverside
	Riverside County
	San Bernardino
	San Bernardino County
	Santa Ana
	Stockton
	Sunnyvale
	Torrance
Colorado	Aurora
	Colorado Springs
	Lakewood
	Pueblo
Connecticut	Bridgeport
	Hartford
	New Haven
	Stamford
	Waterbury
Florida	Broward County
	Escambia County
	Fort Lauderdale
	Hialeah
	Hillsborough County
	Hollywood
	Orange County
	Orlando
	Palm Beach County
	Pinellas County
	Polk County
	Sarasota County
	St Petersburg
Georgia	Clayton County
	Cobb County
	Columbus
	Macon
	Richmond County
	Savannah
Idaho	Boise City
Illinois	Peoria
	Rockford
Indiana	Evansville
	Fort Wayne
	Gary
	South Bend
Iowa	Cedar Rapids
	Davenport
	Des Moines
Kansas	Kansas City
	Topeka
Kentucky	Jefferson County
	Lexington-Fayette
Louisiana	Baton Rouge
	Jefferson Parish
	Shreveport

(continued)

Exhibit 1-1: Large and Medium MS4s (cont.)
(Based on 1980 Census Data)

Massachusetts	Springfield	North Carolina	Durham	Texas, cont'd	Corpus Christi
	Worcester		Greensboro		Garland
Michigan	Ann Arbor		Raleigh		Irving
	Flint		Winston-Salem		Lubbock
	Grand Rapids		Cumberland County		Pasadena
	Lansing	Ohio	Akron		Waco
	Livonia		Dayton	Utah	Salt Lake City
	Sterling Heights		Youngstown	Virginia	Alexandria
	Warren	Oregon	Eugene		Arlington County
Mississippi	Jackson		Multnomah County		Chesapeake
Missouri	Independence		Washington County		Chesterfield County
	Springfield	Pennsylvania	Allentown		Hampton
Nebraska	Lincoln		Erie		Henrico County
Nevada	Clark County	Rhode Island	Providence		Newport News
	Las Vegas	South Carolina	Columbia		Portsmouth
	Reno		Greenville County		Richmond
New Jersey	Elizabeth		Richland County		Roanoke
	Jersey City	Tennessee	Chattanooga	Washington	Snohomish County
	Paterson		Knoxville		Spokane
New York	Albany	Texas	Amarillo		Pierce County
	Rochester		Arlington		Tacoma
	Syracuse		Beaumont	Wisconsin	Madison
	Yonkers				

Source. 55 FR 48073, November 16, 1990.

The definition of MS4 excludes those conveyances that are designed to discharge storm water runoff combined with municipal sanitary sewers ("combined sewer systems"). Therefore, municipalities that own or operate combined sewer systems may petition to have their population, based on Bureau of the Census figures, reduced by the number of people served by the combined sewer system. If the total population served by the separate storm sewer system alone is less than 100,000, the municipality may be eligible for an exemption from NPDES storm water permit requirements. Municipalities should contact their permitting authority for additional information. **Exhibit 1-1 does not reflect any modifications in the application requirements for cities with combined sewer systems.**

1.5 SUBMITTING THE PART 2 APPLICATION

Completed Part 2 applications should be submitted to the appropriate permitting authority listed in Exhibit 1-2. For municipalities in States with authorized NPDES programs, the permitting authority is the State office listed in Exhibit 1-2. Because some of these States may have application requirements in addition to EPA's, municipalities in States with authorized NPDES programs should contact their States for guidance. For municipalities in States without approved NPDES programs, the permitting authority is the EPA Regional Office listed in Exhibit 1-2.

Municipalities with populations greater than 250,000 (large MS4s) were to submit their Part 2 applications by November 16, 1992. Municipalities with populations greater than 100,000, but less than 250,000 (medium MS4s), must submit Part 2 applications by May 17, 1993. Inquiries regarding Part 2 applications or the permitting process should be directed to the appropriate permitting authority.

Exhibit 1-2: NPDES Storm Water Program Permitting Authorities

State	Permit Auth	Contact
Alabama	State	Aubrey White Water Division 1751 Dickinson Dr Montgomery, AL 36130 (205) 271-7811
Alaska	EPA	Steve Bubnick U S EPA Region 10 WD-134 1200 6th Ave. Seattle, WA 98101 (206) 553-8399
Arizona	EPA	Eugene Bromley U S EPA Region 9 W-5-1 75 Hawthorne St. San Francisco, CA 94105 (415) 744-1906
Arkansas	State	Mark Bradley Permitting Section Chief 8001 National Dr. P O Box 8913 Little Rock, AR 72219-8913
California	State	Archie Matthews Div of Water Qual Control Dept. of State Water Res Bd. Mail Code G8 901 P Street Sacramento, CA 95814 (916) 657-0525
Colorado	State	Patricia Nelson Dept. of Health Water Quality Control Div WPCD-PE-B2 4300 Cherry Drive South Denver, CO 80222-1530 (303) 692-3590
Connecticut	State	Permit Coordinator Dept of Envir Protection Water Management Bureau 165 Capitol Ave. Hartford, CT 06106 (203) 566-7167
Delaware	State	Chuck Schadel Dept of Natural Resources Surface Water Management 89 Kings Hwy, P O Box 1401 Dover, DE 19903 (302) 739-5731
District of Columbia	EPA	Kevin Magerr U S EPA Region 3 3WM53 841 Chestnut Bldg Philadelphia, PA 19107 (215) 597-1651
Florida	EPA	Chris Thomas U.S. EPA Region 4 4WM-FP 345 Courtland St. N E. Atlanta, GA 30365 (404) 347-2391
Georgia	State	Allen Hallum Municipal Permitting Prog Ga. Env Protection Div 4244 International Pkwy Suite 110 Atlanta, GA 30354 (404) 362-2680
Hawaii	State	Steve Chang Dept of Health Clean Water Branch Five Water Front Plaza #500 Ala Moana Blvd. Honolulu, HI 96813 (808) 586-4309
Idaho	EPA	Steve Bubnick U S EPA Region 10 WD-134 1200 6th Avenue Seattle, WA 98101 (206) 553-8399
Illinois	State	Sue Epperson EPA Water Poll. Control Permits Section #15 P O Box 19276 Springfield, IL 62794-9276 (217) 782-0610
Indiana	State	Catherine Hess Dept. of Env Mgmt. NPDES Permits Group Room #718 105 S Meridian St. P O Box 6015 Indianapolis, IN 46206-6015 (317) 232-8704

(Continued)

Exhibit 1-2: NPDES Storm Water Program Permitting Authorities (cont.)

State	Permit Auth	Contact
Iowa	State	Monica Wnuck Dept of Natural Resources Wallace State Building 900 E Grand Street Des Moines, IA 50319-0034 (515) 281-7017
Kansas	State	Don Carlson Dept. of Health and Env Bureau of Water Ind. or Mun. Progs. Section Forbes Field, Building 740 Topeka, KS 66620 (913) 296-5555
Kentucky	State	Douglas Allgeier Dept. of Env Protection Water Division 14 Reilly Road Frankfort, KY 40601 (502) 564-3410
Louisiana	EPA	Brent Larsen U S EPA Region 6 6W-PM 1455 Ross Ave Dallas, TX 75202 (214) 655-7175
Maine	EPA	Shelley Puleo U S EPA Region 1 JFK Building/WCP Boston, MA 02203 (617) 565-3525
Maryland	State	Brian Clevenger MD Dept. of Environment Sed. & Storm Water Admin. 2500 Broening Hwy Baltimore, MD 21224 (410) 631-3545
Mass-achusetts	EPA	Shelley Puleo U S EPA Region 1 WCP JFK Building Boston, MA 02203 (617) 565-3525
Michigan	State	Gary Boersen Dept of Natural Resources Surf Wtr Qual Div -Permits P O Box 30028 Lansing, MI 48909 (517) 373-1982
Minnesota	State	Scott Thompson Pollution Control Agency 520 Lafayette Rd St. Paul, MN 55155-3898 (612) 296-7203
Miss-issippi	State	Louis Lavalee Dept. of Env Quality Office of Pollution Control Ind. Wastewater Branch P O Box 10385 Jackson, MS 39289-0385 (601) 961-5074
Missouri	State	Karl Fett Dept. of Natural Resources Water Poll Control Program 205 Jefferson St P O Box 176 Jefferson City, MO 65102 (314) 526-2928
Montana	State	Fred Shewman Water Quality Bureau Cogswell Building Helena, MT 59620 (406) 444-2406
Nebraska	State	Clark Smith Environmental Quality P O Box 98922 Lincoln, NE 68509 (402) 471-4239
Nevada	State	Rob Saunders Conserv & Natural Res Environmental Protection 333 W Nye Lane Carson City, NV 89710 (702) 687-5870
New Hampshire	EPA	Shelley Puleo U S EPA Region 1 WCP JFK Building Boston, MA 02203 (617) 565-3525
New Jersey	State	Barry Chalofsky NJ DEPE Office of Regulatory Policy CN423 Trenton, NJ 08625-0423 (609) 633-7021

(Continued)

Exhibit 1-2: NPDES Storm Water Program Permitting Authorities (cont.)

State	Permit Auth	Contact
New Mexico	EPA	Brent Larsen U S EPA Region 6 6W-PM 1445 Ross Ave Dallas, TX 75202 (214) 655-7175
New York	State	Ken Stevens Wastewater Facilities Design NY State Dept. of Env Cons 50 Wolf Road Albany, NY 12233 (518) 457-1157
North Carolina	State	Colleen Sullins Environmental Management Water Permits & Eng P O Box 29535 Raleigh, NC 27626-0535 (919) 733-5083
North Dakota	State	Shelia McClenathan Dept of Health Water Quality Div 1200 Missouri Ave. P O Box 5520 Bismarck ND 585202-5520 (701) 221-5210
Ohio	State	John Morrison OEPA Water Pollution Control 1800 Watermark P O Box 1049 Columbus, OH 43266 (614) 644-2017
Oklahoma	EPA	Brent Larsen U S EPA Region 6 6W-PM 1445 Ross Avenue Dallas, TX 75202 (214) 655-7175
		Ted Williamson Discharge Permits Division Oklahoma Dept of Health 1000 N E. 10th Oklahoma City, OK 73117
Oregon	State	Ranei Nomura DEQ-Water Quality 811 SW 6th Ave Portland, OR 97204 (503) 229 5256
Pennsylvania	State	R B Patel Environmental Resources Water Quality Management P O Box 2063 Harrisburg, PA 17120 (717) 787-8184
Puerto Rico	EPA	Jose Rivera U S EPA Region 2 Wtr Permits & Compl. Br 26 Federal Plaza, Room 845 New York, NY 10278 (212) 264-2911
Rhode Island	State	Peter Duhamel Division of Water Resources 291 Promenade St Providence, RI 02908 (401) 277-6519
South Carolina	State	Arturo Ovalles DHEC Industry and Agriculture Wastewater Division 2600 Bull St Columbia, SC 29201 (803) 734-5241
South Dakota	EPA	Vern Berry U S EPA Region 8 8-WM-C Suite 500 999 18th St Denver, CO 80202 2466 (303) 293-1630
Tennessee	State	Robert Haley Dept of Env Wtr Poll Ctrl 401 Church St 6th Floor L & C Annex Nashville, TN 37243-1534 (615) 532 0625
Texas	EPA	Brent Larsen U S EPA Region 6 6W-PM 1445 Ross Ave. Dallas, TX 37243-1534
Utah	State	Harry Campbell Div of Water Qual P O Box 144870 Salt Lake City, UT 84114-4870 (801) 538-6146

(Continued)

Exhibit 1-2: NPDES Storm Water Program Permitting Authorities (cont.)

State	Permit Auth	Contact
Vermont	State	Brian Kooker Env Conserv Permits Compliance & Protection 103 S Main St. Annex Building Waterbury, VT 05671-0405 (802) 244-5674
Virgin Islands	State	Marc Pacifico Dept. of Planning & Nat Resources Div of Env Protection 1118 Watergut Project Box 1118 Christiansted St. Croix, VI 00820-5065 (809) 773-0565
Virginia	State	Burton Tuxford VA Water Control Board 4900 Cox Road Glen Allen, VA 23060 (804) 527-5000
Wash-ington	State	Ed O'Brien Dept. of Ecology Industrial Storm Water Unit Water Quality Div P O. Box 47696 Olympia, WA 98504-7696 (206) 438-7614
West Virginia	State	Jerry Ray Office of Water Resources 1201 Greenbriar St. Charleston, WV 25311 1088 (304) 558-0375
Wisconsin	State	Anne Manuel Dept. of Natural Resources Wastewater Management P.O Box 7921 Madison, WI 53707 (608) 267-7694
Wyoming	State	John Wagner Dept. of Envir Quality Herschler Building 4th Floor Cheyenne, WY 82002 (307) 777-7082

Source Poll of Regional and State offices

1.6 USE OF INFORMATION IN PART 1 AND PART 2 APPLICATIONS

The information submitted in the Part 1 and Part 2 permit applications provides applicants with a starting point for developing comprehensive storm water management programs. For example, the field screening data submitted with the Part 1 application provides a basis for a program to control illicit discharges. Also, the application information may assist in prioritizing controls and in long-term tracking of program effectiveness.

Permitting authorities will use the information from each municipality's Part 1 and 2 applications as the basis for establishing conditions in that municipality's NPDES storm water permit. For example, if a municipality submits a satisfactory application, all or part of its proposed storm water management program is likely to become an integral part of its permit

1.7 ORGANIZATION OF THIS MANUAL

Chapter 1, *Introduction*, provides a brief overview of the Part 2 permit application process It discusses who must submit a Part 2 application and how the information in the applications will be used It also contains a summary of the statutory and regulatory basis for the NPDES storm water program.

Chapter 2, *The Part 2 Application*, describes the statutory and regulatory requirements of municipal NPDES storm water permit applications in more detail. Chapter 2 outlines the specific requirements of the Part 1 and Part 2 applications, explains how Part 2 builds on the Part 1 application, and describes the interconnection among the various components of the Part 2 application.

Chapter 3, *Adequate Legal Authority*, describes how municipalities must demonstrate that they have adequate legal authority to carry out the program requirements [§122.26(d)(2)(i)]

Chapter 4, *Source Identification*, provides guidance on identifying major outfalls and inventorying dischargers to the MS4 [§122 26(d)(2)(ii)]

Chapter 5, *Discharge Characterization*, provides guidance for submitting quantitative data on the MS4 and developing a proposed monitoring program [§122 26(d)(2)(iii)].

Chapter 6, *Proposed Management Program*, describes the steps municipalities must take when they develop site-specific storm water management programs [§122.26(d)(2)(iv)]. These plans are the heart of the municipal permit application, and the permitting authority will probably incorporate all or part of the municipality's proposed management program into their NPDES storm water permit. In their proposed management programs, municipalities must describe management practices, control techniques and systems, design and engineering methods, and other provisions that are aimed at reducing the discharge of pollutants to the "maximum extent practicable "

Chapter 7, *Assessment of Controls*, explains how a municipality can assess the effectiveness of its storm water management program and target priorities through the use of direct and indirect measures [§122 26(d)(2)(v)]

Chapter 8, *Fiscal Analysis*, provides guidance on estimating necessary capital and operation and maintenance expenditures, and financing these expenditures [§122 26(d)(2)(vi)].

1.8 OTHER GUIDANCE AVAILABLE

Municipalities should use this guidance document together with the Part 1 guidance (EPA, 1991b). Exhibit 1-3 lists other sources of guidance available from EPA's Storm Water Hotline [(703) 821-4823] In addition, applicants may wish to obtain further information from the documents identified in the bibliography at the end of this guidance (Appendix A).

Exhibit 1-3
Documents Available from the EPA Storm Water Hotline*
[(703) 821-4823]

November 16, 1990, Federal Register - 55 FR 47990 National Pollutant Discharge Elimination System (NPDES) Permit Application Requirements for Storm Water Discharges - Final Rule

March 21, 1991, Federal Register - 56 FR 12098 Application Deadline for Group Applications Final Rule; Application Deadline for Individual Applications - Proposed Rule

August 16, 1991, Federal Register - 56 FR 40948 NPDES General Permits and Reporting Requirements for Storm Water Discharges Associated with Industrial Activity - Proposed Rule

November 5, 1991, Federal Register - 56 FR 50548 Application Deadlines, Final Rule and Proposed Rule

April 2, 1992, Federal Register - 57 FR 11394 Application Deadlines, General Permit Requirements and Reporting Requirements, Final Rule

Summary of November 16, 1990, Storm Water Application Rule

Summary of August 16, 1991, Proposed Storm Water Implementation Rule

August 16, 1991, Proposed Storm Water Implementation Rule Package Fact Sheet

April 2, 1992, Storm Water Program Rule Fact Sheet

Guidance Manual for the Preparation of NPDES Permit Applications for Storm Water Discharges Associated with Industrial Activity (EPA 505/8-91-002, April 1991)

Guidance Manual for the Preparation of Part 1 of the NPDES Permit Applications for Discharges From Municipal Separate Storm Water Systems (EPA 505/8-91-003A, April 1991)

Typical Values of Annual Storm Events Statistics for Rain Zones of the United States ("Urban Targeting and BMP Selection", EPA Region V, November 1990)

List of EPCRA (SARA Title III) Section 313 Water Priority Chemicals (Draft)

List of State and EPA Regional Storm Water Contacts

State NPDES Program Status

Question and Answer Document

List of Reportable Quantities for Hazardous Substances Under CERCLA

NPDES Storm Water Sampling Guidance Document (EPA 833-B-92-001, July 1992)

(Continued)

Exhibit 1-3
Documents Available from the Storm Water Hotline (cont.)

September 9, 1992, Federal Register - 57 FR 41176 Final NPDES General Permits for Storm Water Discharges from Construction Sites - Notice
September 9, 1992, Federal Register - 57 FR 41236 Final NPDES General Permits for Storm Water Discharges Associated with Industrial Activity - Notice
September 9, 1992 Federal Register - 57 FR 41344 National Pollutant Discharge Elimination System, Request for Comment on Alternative Approaches for Phase II Storm Water Program - Proposed Rule

* The following documents are available from the National Technical Information Service (NTIS) (1) *Storm Water Management for Industrial Activities, Developing Pollution Prevention Plans and Best Management Practices* (EPA 832-R-92-006, September 1992), (2) *Storm Water Management for Construction Activities, Developing Pollution Prevention Plans and Best Management Practices* (EPA 832-R-92-005, September 1992)

CHAPTER 2
THE PART 2 APPLICATION

2.0 THE PART 2 APPLICATION

2.1 BACKGROUND

The NPDES permit application requirements for MS4s [40 CFR 122.26(d)] establish a two-part application designed to meet the goal of developing comprehensive site-specific storm water quality management programs for MS4s.

The purpose of the two-part application process is to develop information, in a reasonable time frame, that will build successful storm water management programs and allow permitting authorities to make informed decisions about permit conditions. The application process is designed to focus the efforts of municipalities in two areas: prohibiting non-storm water discharges into storm sewers, and implementing controls that reduce the discharge of pollutants from MS4s to the maximum extent practicable.

Part 1 of the application requires information on existing programs and legal authority. In addition, Part 1 requires the results from field screening of major outfalls to detect illicit connections. The **Part 2** application requirements are intended to build upon the information submitted with the Part 1 application Each part has virtually the same major areas of concern, but the Part 2 application requires a greater level of detail. Part 2 of the permit application requires a demonstration of adequate legal authority, additional information on pollutant sources and outfalls, a limited amount of representative quantitative sampling data, a proposed monitoring program, a proposed storm water management program, an estimate of the effectiveness of storm water controls, and a fiscal analysis. The requirements for the Part 1 and Part 2 applications are summarized briefly in Exhibit 2-1, and described in more detail in Section 2 2 The storm water regulations underlying this guidance can be found in Appendix B

Before applicants proceed with the detailed development of their permit applications; they should recognize the fundamental requirements:

- Who or what are the primary contributors of pollutants in storm water discharges from MS4s?
- Where are these sources of pollutants located in relation to receiving water resources?
- What is the magnitude of these pollutant sources and their potential impact on receiving waters?
- How does the municipality plan to reduce or eliminate the contribution of pollutants in storm water discharges or prevent the damaging influences of these discharges?
- Why did the municipality select the activities or best management practices (BMPs) it proposes?
- When will the municipality implement its proposed program?
- How will the applicant assess the effectiveness of the program? What criteria or measures will apply?
- How will the municipality fund proposed program activities?

Wherever appropriate, the applicant must also show that it has adequate legal authority to implement, enforce, or mandate compliance with applicable ordinances, statutes, contracts, or other similar vehicles as required by the storm water regulation.

Exhibit 2-1: Part 1 and Part 2 Storm Water Application Requirements.

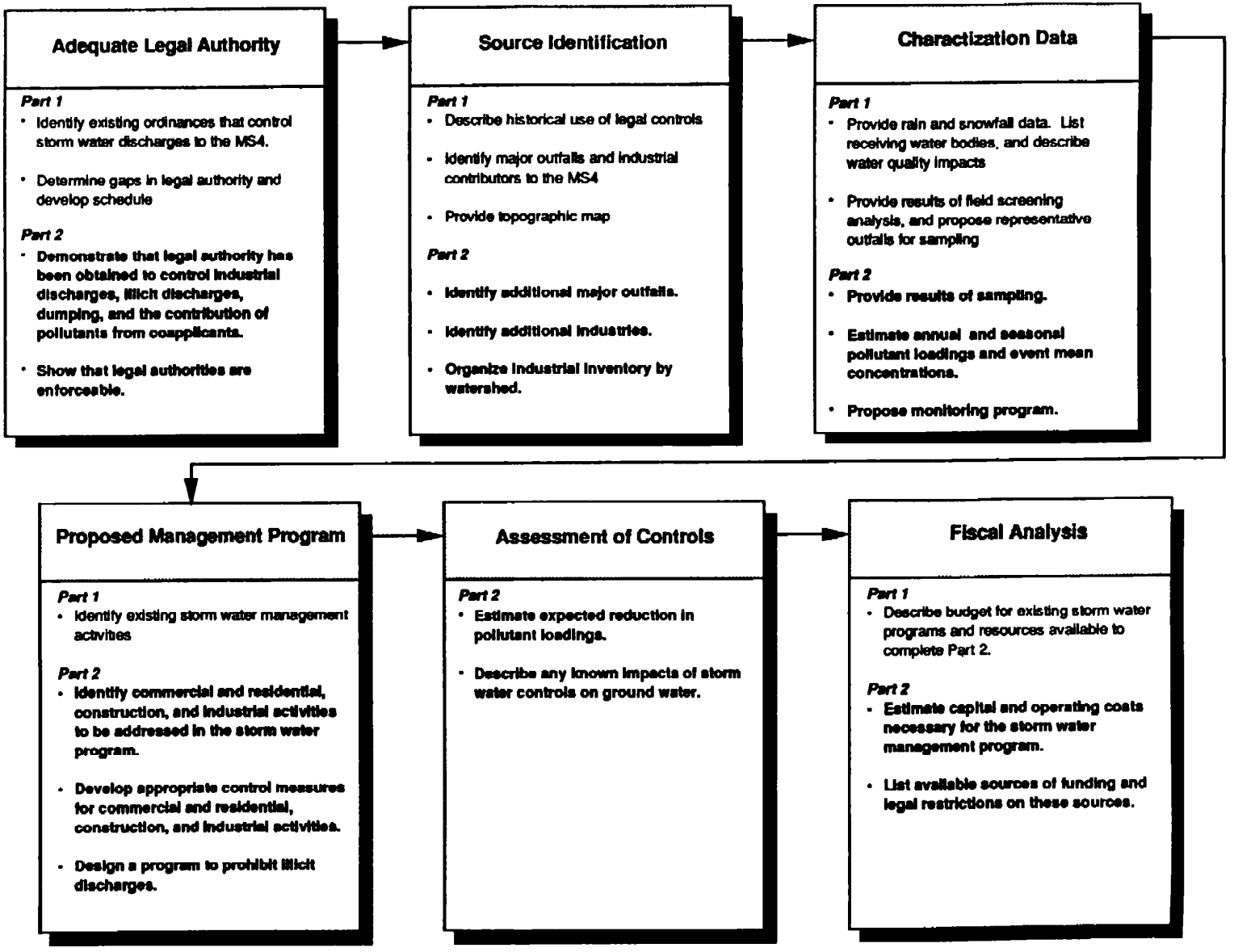

These questions (described above) that an applicant must address follow a natural progression or development. For example, before applicants can identify how they will reduce the contribution of pollutants in storm water discharges (the fourth bullet point above), they must identify pollutant sources and estimate the magnitude of pollutant loads (bullet points 1-3 above).

2.2 PART 1 APPLICATIONS

Sections 2.2.1 and 2 2 2 provide overviews of the regulatory requirements of §122 26(d). Section 2 2 3 describes the relationship among the various application provisions.

2.2.1 Overview of the Part 1 Application

Part 1 applications consist of the following six elements

- **General information.** The applicant's name, address, telephone number of contact person, ownership status and status as a State or local government entity

- **Legal authority.** A description of existing legal authority to control discharges to the MS4, and if this authority does not meet the required criteria, a list of additional authority needed and a schedule and commitment to seek such authority.

- **Source identification.** A description of the historic use of ordinances, guidance, or other controls that limit non-storm water discharges to any publicly owned treatment works (POTW), and a topographic map covering an area one mile beyond the service boundaries of the MS4 showing:

  - the location of known municipal sewer system outfalls;

  - a description of all land use activities;

  - the location and activities of landfills;

  - the location and permit number of any known discharge to the MS4;

  - the location of major structural controls for storm water discharges (such as retention basins, or major infiltration devices); and

  - identification of publicly owned parks, recreational areas, and other open lands.

- **Discharge characterization.** A summary of the types and characteristics of storm water discharges, including:

  - monthly mean rain and snowfall estimates and the average number of storm events per month;

  - existing quantitative data describing the volume and quality of discharges from the MS4, including a description of the outfalls and sampling methods used;

  - a list of "downstream" water bodies receiving discharge from the MS4, and a description of the impact of outfall upon them;

  - the results of field screening analysis for illicit discharges at either selected field screening points or major outfalls covered in the permit application; and

  - a proposed characterization plan for conducting sampling and obtaining the quantitative data necessary to complete Part 2 of the application.

- **Management programs.** A description of existing management programs to control pollutants from the municipal separate storm sewer system. For example, what procedures are in place to control pollution from construction activities, and how do they work? What is the program (such as investigation procedures and how they operate) for identifying illicit connections to the municipal storm sewer system?

- **Fiscal resources** A presentation of the municipality's budget for existing storm water programs and for completing Part 2 of the permit application.

2.2.2 Overview of the Part 2 Application

The Part 2 application must include the following elements:

- **Adequate legal authority.** A demonstration that the municipality can operate according to the legal authority established by ordinance, statute, or series of contracts. The municipality also must demonstrate that its authority is enforceable. A discussion of how adequate legal authority may be demonstrated appears in Chapter 3 of this guidance.

- **Source identification.** An inventory, organized by watershed, of the facilities that may discharge storm water associated with industrial activity to the MS4. The applicant also must identify the location of any major outfall that discharges to waters of the United States that was not reported in Part 1. A discussion of the information to be submitted for each such facility in the inventory appears in Chapter 4 of this guidance.

- **Characterization data.** Sampling results for 5-10 outfalls designated by the permitting authority, estimates of cumulative annual pollutant loadings and event mean concentrations, and a proposed schedule to submit estimates of seasonal pollutant loadings and event mean concentrations for each major outfall identified in the source identification sections of Part 1 and 2. The *Characterization Data* provision of the Part 2 application also requires the development of an on-going monitoring program covering the term of the permit. Procedures for meeting the requirements of this section appear in Chapter 5.

- **Proposed management program.** A program that shows the municipality's comprehensive planning process for the reduction and control of pollutants, the staff and equipment available to implement the program, and a full description of how controls will be implemented to reduce pollutants from all sources of storm water. Municipalities must also describe how the program will be implemented and maintained. The Part 2 requirements for a proposed management program are described in Chapter 6.

- **Assessment of controls.** An estimate of the projected effectiveness of the municipal storm water management program, and an identification of the known impacts of storm water controls on ground water. The assessment of controls is discussed in Chapter 7.

- **Fiscal analysis.** A fiscal analysis of the capital and operation and maintenance expenditures needed to accomplish the activities (including implementation) required by the characterization data and proposed management program sections of the Part 2 application. This fiscal analysis must include projected expenses for each fiscal year of the permit term. A discussion of the fiscal analysis is included in Chapter 8.

2.2.3 Relationship Among Application Requirements

The required elements of the Part 2 application are related to each other. As a result, this guidance addresses how the application elements are related, and how information gathered for one requirement will assist the applicant in meeting other requirements. For example, the information gathered for the *Industrial Source Identification* provision of the Part 2 application will assist the municipality in.

- Targeting monitoring goals to potential pollutant sources, which may include selecting monitoring locations and chemical specific sampling frequencies (a requirement of the *Characterization Data* provision);

- Identifying illicit discharges (a requirement of the *Proposed Management Program's* illicit connection provision);

- Identifying facilities with the greatest potential for degrading receiving water quality (a requirement of the *Proposed Management Program's* industrial program provision), and

- Targeting sites that handle, store, or transport toxic or hazardous materials for on-site inspections (another requirement of the *Proposed Management Program's* industrial program provision).

As another example, the information that the applicant must prepare for the *Characterization Data* provision (e.g., the results of the sampling requirement and the estimated event mean concentrations and annual pollutant loads) may help the municipality:

- Evaluate the contribution of pollutants in storm water discharges from individual sources and determine which sources may require inspections or controls (a requirement of the *Proposed Management Program's* industrial program provision);

- Predict the impact of storm water discharges on receiving waters known to be impacted. (In the *Proposed Management Program*, additional controls may be warranted for construction sites or other industrial activities that discharge to these waters); and

- Determine what BMPs may be appropriate for given areas (another requirement of the *Proposed Management Program*)

Exhibit 2-2 summarizes some of these key interrelationships, although many other interrelationships exist. A more detailed discussion of specific information requirements and interrelationships among provisions is provided in subsequent chapters As municipalities prepare their permit applications, they should coordinate all program requirements.

Exhibit 2-2
Examples of Relationship Among Part 2 Requirements

					Fiscal Analysis
				Assessment of Controls	Cost/benefit analysis identifies the most cost-effective BMPs
			Proposed Management Program	Estimates of reductions in pollutant loadings predicts impact of storm water management activities	Fiscal analysis considers costs of controls, maintenance, and capital improvements Management program may include feasibility analyses that consider cost.
		Characterization Data	Annual pollutant loads help prioritize areas for BMPS On-going monitoring indicates success of BMPs and need to re-prioritize	On-going monitoring program verifies program effectiveness. Instream monitoring verifies biological recovery.	Fiscal analysis considers cost of on-going monitoring
	Source Identification	Land use information and organization of industry by watershed defines representative sampling points	Inventory of industrial users helps the city target facilities for inspections and control measures	Estimates of pollutant load reductions depend on land use	Industrial inventory identifies potential sources of storm water utility fees
Adequate Legal Authority	Some sources or outfalls may be outside a city's jurisdiction. Interjurisdictional agreements may be necessary.	Authority to require sampling and obtain information for industries and dischargers outside of the MS4's jurisdiction at sampling points	Legal authority needed to implement BMPS, control and inspect industry, and prohibit dumping and illicit discharge	Need information gathering and inspection authority where it is necessary to inspect, monitor, and enter the facility or the site	Legal authority is required for some financing plans, such as a storm water utility

2.3 ADDITIONAL FACTORS TO BE CONSIDERED IN DEVELOPING THE PART 2 APPLICATION

As discussed in the previous section, the various provisions of the Part 2 application process are interconnected

All municipalities covered by §122 26(d) must submit a Part 2 permit application that meets the requirements of the storm water permit application regulations. However, each MS4 is unique, and each Part 2 submission will be different. Municipal separate storm sewer systems differ in many ways, including population served, geologic and climatologic settings, density of development, and form of government These underlying factors make each applicant unique

The major factors that applicants should consider are

- Population and projected growth rate;
- Zoning and existing land use patterns;
- Nature of watershed and receiving waters;
- Climatic conditions, soil types, and watershed delineations,
- Existing municipal functions and municipal lands,
- Other environmental impacts;
- Public involvement; and
- Intergovernmental coordination.

In addition, municipalities must implement their storm water management programs in a manner that is consistent with other applicable Federal, State, and local environmental laws.

Population and Projected Growth Rates

Some storm water BMPs are more appropriate for densely developed areas, while other methods may be more useful in developing areas Consequently, defining current population densities and projecting future areas of population growth provides the basic information that can assist in the evaluation and prioritization of appropriate storm water control strategies

Zoning and Existing Land Use Patterns

Through ordinances, permits, or contracts, municipalities may mandate storm water controls for new residential, commercial, or industrial developments in order to improve or assure maintenance of the quality of receiving waters at or near pre-development levels. The Nationwide Urban Runoff Program (NURP) study (EPA, 1983), pointed out that some of the best opportunities for implementing cost effective measures to prevent or reduce pollutants in storm water occur during new development. These measures may include structural controls, such as storm water detention basins or constructed storm water wetlands, or nonstructural alternatives such as cluster development and buffer zones Sections 122.26(d)(1)(iii)(B)(2) and 122 26(d)(2)(ii) require the municipality to establish comprehensive management plans for new development (see Chapter 6)

Nature of Watershed and Receiving Waters

The types of storm water controls appropriate for a MS4 depend on the nature of the watershed and the receiving waters. This includes geologic and hydrologic features such as slope drainage patterns and stream size For example, roadside swales may not be practical in areas with steep terrain, but can be very useful in flat areas In addition, structural BMPs or other management measures that control the volume and timing of release are appropriate where uncontrolled storm water may cause physical impacts to receiving waters (especially small streams, rivers, and wetlands).

Information on the watershed and the receiving waters is required in the Part 1 permit application [§122 26(d)(1)(iv)(C)]. In Part 1, applicants are required to list water bodies that receive discharges from the MS4. The list of water bodies includes downstream segments, lakes, and estuaries where pollutants from the system discharges may accumulate and result in non-attainment of State water quality standards Part 1 also requires a description of known water quality impacts. Applicants must include a discussion of water bodies that were cited in:

- State reports required by CWA Sections 305(b), 304(l), and 314(a);
- The State Nonpoint Source Report; and
- Other reports identifying sensitive watersheds

Part 1 applicants should also include in this discussion a description of impacts caused by dissolved oxygen depression, bioaccumulation of toxics, excessive sedimentation, hydrologic modification, habitat destruction, etc.

Municipalities are expected to give priority consideration to those classes of pollutant sources that contribute significant loadings or pose a significant impact on receiving waters. Applicants must consider control methods that address storm water discharges from commercial and residential areas; illicit discharges and illegal disposal, storm water discharges from industrial areas; and storm water runoff from construction sites. Municipalities' permits will differ substantially in the emphasis placed on controlling various sources of pollutants in discharges from the MS4. Permits for older municipalities may emphasize control of cross-connections, while permits for municipalities with large areas of new development may emphasize the installation of permanent structural controls during construction

The Part 2 storm water permit application requires descriptions of management programs to address sources of pollutants discharged to separate storm sewer systems. For management strategies to be effective, municipalities must give prior consideration to the nature (e g., physical and biological parameters) and the designated uses of receiving waters such as streams, tributaries, and natural wetlands For example, a storm water management program for a newly developing area with an existing shallow, slow-moving stream could include provisions to ensure that the post-development peak discharge flow rate for the stream is held to a certain percentage of its historical or pre-development peak discharge flow rate

Climatic Conditions, Soil Types, and Watershed Delineations

Seasonal variations in precipitation can have a significant impact on storm water quality For example, extended dry seasons in areas such as the southwestern United States result in pollutant loads distinctly higher than in other parts of the country during the first several storms of the wet season. Areas with more frequent rain and snowfall throughout the year may have more storm water discharges, but the discharges may have consistently lower pollutant concentrations than those in the Southwest. In addition, areas with significant snowfall may experience a peak in storm water discharge volume and pollutant concentration during the spring thaw.

Natural soil conditions affect the potential for storm water to recharge ground water. Porosity and permeability are properties of the soil that govern the size and number of the interstitial spaces through which water may flow. Compaction (e.g , compression of the soil by heavy machinery) will reduce the amount of void space in the soil and thereby reduce the amount of rainfall that infiltrates through the soil to ground water. Natural soil conditions are very important when siting structures designed for storm water infiltration. In addition, identifying such sites must take into consideration potential ground water impacts

that may result whenever infiltration is part of the storm water management program

Existing Municipal Functions and Municipal Lands

The Part 2 application affords municipalities the opportunity to discuss alternatives in the *Proposed Storm Water Management Program*. When considering the wide range of municipal functions, applicants need to establish which agencies will be responsible for implementing each portion of a storm water management program. (This could be outlined in the *Adequate Legal Authority* chapter of the Part 2 application, as discussed in Chapter 3 of this guidance.) Many of these agencies, will have primary missions other than dealing with storm water or water quality. Expansion of the established charter of an agency to include an element of storm water control may require legislative action, moderately expanding the scope of other municipal agencies' missions to include storm water concerns can be much more cost effective than the initiation of entirely new programs.

Applicants should identify existing municipal functions that impact the quality of storm water discharges. These functions may include snow removal activities such as road deicing, vehicle maintenance operations, and herbicide, pesticide, and fertilizer application to public lands. Municipalities can modify these activities to improve storm water quality through oversight of future land development, modifications to flood management structures, changes in materials used or in material handling or application practices, maintenance of roads, and installation of structures such as retention basins

The municipal agency (or agencies) responsible for storm water runoff control should also consider the extent to which municipal lands and activities contribute pollutants to runoff. The same BMPs recommended for private lands may also be incorporated into the development and maintenance of a municipality's own lands and activities. For example, reduced use of pesticides and fertilizers on park land and open spaces usually decreases the contribution of these contaminants to storm water runoff. Implementing BMPs on municipal lands also shows the municipality's commitment to an effective storm water management program BMPs are discussed in greater detail in Section 6.4 of this guidance.

Other Environmental Impacts

Municipalities should consider those activities that can directly or indirectly alter the natural hydrograph of a stream and potentially degrade an otherwise stable aquatic habitat. These factors are particularly important when considering impacts to wetlands, riparian areas, ground water, small rivers, and streams. In addition, the installation of detention or rapid infiltration ponds may have negative impacts on ground water. The installation of culverts or concrete drainage channels and other such structures typically increases the volume and velocity of runoff, which can lead to increased erosion, siltation, and sedimentation in receiving waters. Therefore, installation of these structures can contribute to the degradation of a neighboring habitat.

Public Involvement

Municipal applicants must ensure that they provide adequate public education and ample opportunities for public participation. Public participation should focus on spreading awareness of program objectives and components. Education and public involvement programs must be defined as part of the *Proposed Storm Water Management Program* [§122.26(d)(2)(iv)]. Generally, the public should be involved as early as possible in storm water management initiatives.

Conflict and confusion can be minimized if the program includes a schedule for initial public contact and milestones for public involvement throughout the development and implementation phases. Public education programs are expected to target specific

audiences, including those regulated or affected by the storm water management program (e.g , developers, building contractors, and industrial operators) and those that can assist with program implementation (e g., volunteers and citizens). For example, one large municipal applicant (Seattle) described an existing public participation program in its Part 1 Application submission. Elements of this program may be instructive to municipalities completing Part 2 of the application because it has generic components that are likely to be applicable to other large (and perhaps medium) municipalities. Excerpts from Seattle's public involvement program are provided in Exhibit 2-3 for reference.

Elements of this municipality's program that are particularly important to consider include of the role of an advisory and outreach group and its relationship to the entire process. Effective public participation programs clearly identify the role of the public

The potential exists for a considerable range in the level of participation the public may actually have in the decision-making process. Generally, the municipal authority is going to make the decisions. However, the authority can choose to use the "participation" process to simply inform the public of decisions, or to allow the views of the public to be registered prior to decision milestones In other cases, although uncommon, the public may have an actual voice or vote in making decisions.

The timing and frequency of meetings and the duration of the groups established for public participation will usually be dictated by the nature of the issues being addressed For example, an ad hoc group established to address a single issue may discover that the issue cannot be effectively addressed without consideration of a broader range of issues that the municipality may also be considering In this instance it may be appropriate for the group to expand its scope, hold regular meetings, and actively participate in the authority's decision making process Therefore, applicants should outline in their Part 2 applications how such coordination will be accomplished

Intergovernmental Coordination

If a number of municipal entities (e g , multiple cities or a city and a county) are participating in the permit application process as coapplicants, various mechanisms can be used to improve intergovernmental coordination to ensure that the roles and responsibilities of each entity are well defined. Each entity must fulfill its responsibilities to implement applicable program measures. Examples of some of the appropriate coordination techniques and their benefits include:

- **Memoranda of agreement · (MOA).** MOAs can define specific municipal roles, responsibilities, and points of coordination that help minimize duplication of effort and ensure accountability;

- **Cross-training of staff.** This allows for the identification of gaps in staffing (e g., neglected areas of responsibility or insufficient staff levels) as well as providing the benefits of increased versatility and opportunities for learning from others;

- **Interagency advisory committees.** Their objective is to arm decision makers with a comprehensive understanding of the implications of proposed activities or decisions; and

- **Regularly scheduled intermunicipal staff meetings.** These can facilitate an open and thorough exchange of information and solidify new lines of communication

Exhibit 2-3
Excerpts from a Public Involvement Program

The public involvement program [of the City of Seattle] has been designed to assist in developing an acceptable city-wide plan for addressing drainage and water quality problems. Acceptable is defined as a plan that is both technically sound and sensitive to the needs and interests of the citizens. The involvement program has two major elements: a Citizen Advisory Committee (CAC) and a community outreach effort The initial role of the CAC was to provide guidance to City staff and consultants preparing various sections of a Comprehensive Drainage Plan Until the adoption of the Comprehensive Drainage Plan by the City Council, the CAC provided direction on drainage policy issues, assisted with the public review of the draft plan and environmental impact statement (EIS), and helped coordinate comments sent to the city from the public during the review period. Following council adoption of the plan, the CAC was reconstituted into a Drainage and Wastewater Advisory Committee which serves as an on-going sounding board to the Drainage and Wastewater Utility, the mayor, and the City Council on both sewer and drainage matters.

The community outreach effort was established for two purposes. The first was to ensure adequate public review and support of the Comprehensive Drainage Plan and EIS Comments received during the review were used by the Drainage and Wastewater Utility, the mayor, and the City Council in making decisions about the Drainage Plan and the City's on-going drainage program. The second purpose was to begin educating residents and business people about the importance of their role in solving flooding, landslide, and water quality problems throughout the city. This community outreach/education role remains an on-going effort of the Drainage and Wastewater Utility.

Source City of Seattle, *NPDES Storm Water Permit Application, Part 1*, City of Seattle, November 1991 37

Single municipalities with separate governing functions may face the same challenges as coapplicants when they prepare their Part 2 applications. Many of the same coordination steps may be necessary within a single municipal jurisdiction. The need for *intra*governmental coordination may be most crucial in large municipalities that have functions that impact storm water quality spread throughout the organizational structure of the municipality. For example, a planning department may be in charge of implementing a stream buffer policy, while a public works department may plan, site, and construct storm water BMPs Still other agencies may be responsible for implementing erosion and sediment control requirements, and permitting and inspection functions. Storm water-related responsibilities within governmental organizations may be allocated in this manner due to the relatively recent emergence of storm water quality as an important issue. Nonetheless, effective coordination within the government of a single municipality may be as critical to the success of the storm water management program as is intergovernmental coordination for coapplicants Therefore, applicants should outline in their Part 2 applications how such coordination will be accomplished.

CHAPTER 3
ADEQUATE LEGAL AUTHORITY

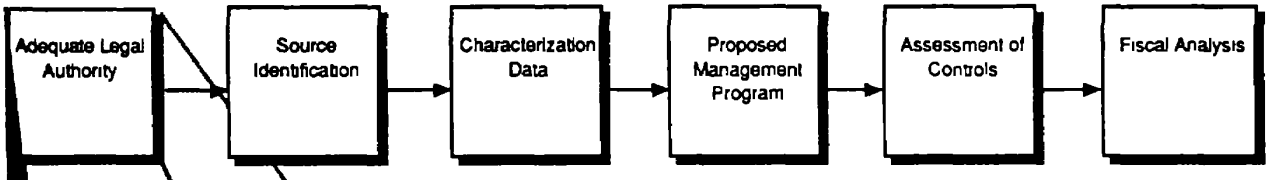

Adequate Legal Authority

Part 1

- Identify existing ordinances that control storm water discharges to the MS4
- Determine gaps in legal authority and develop schedule

Part 2

- **Demonstrate that legal authority has been obtained to control industrial discharges, illicit discharges, dumping, and contributions of pollutants from coapplicants.**
- **Show that legal authorities are enforceable.**

3.0 ADEQUATE LEGAL AUTHORITY

3.1 BACKGROUND

A crucial requirement of the NPDES storm water regulation is that a municipality must demonstrate that it has adequate legal authority to control the contribution of pollutants in storm water discharged to its MS4. This guidance manual and the storm water program emphasize development and implementation of storm water management programs as described in Chapter 6. In order to have an effective municipal storm water management program, a municipality must have adequate legal authority to control the contribution of pollutants discharged to the MS4.

Part 1 of the permit application requires applicants to describe their existing legal authority to control the discharge of pollutants from MS4s and evaluate the adequacy of these ordinances. Where existing ordinances were lacking, a proposed schedule to obtain the necessary authority was included with the Part 1 application. In Part 2 of the application, municipal applicants must demonstrate that they now possess adequate legal authority to.

- Control construction site and other industrial discharges to the MS4;
- Prohibit illicit discharges and control spills and dumping;
- Control potential sources of pollutants from discharges to or from coapplicants' MS4s, or MS4s that are interconnected or shared with other entities;
- Require compliance with all regulations and statutes, and
- Carry out inspection, surveillance, and monitoring procedures

Section 3.2 reviews each of these regulatory requirements. Section 3.3 describes specific procedures a municipality may use to demonstrate adequate legal authority.

3.2 SUMMARY OF REGULATORY REQUIREMENTS

3.2.1 Control Construction Site and Other Industrial Discharges to the MS4.

> §122.26(d)(2)(i)(A) [The applicant must demonstrate that it can control] through ordinance, permit, contract, order or similar means, the contribution of pollutants to the municipal storm sewer by storm water discharges associated with industrial activity and the quality of storm water discharged from sites of industrial activity.

The municipality, as a permittee, is responsible for compliance with its permit and must have the authority to implement the conditions in its permit. To comply with its permit, a municipality must have the authority to hold dischargers accountable for their contributions to separate storm sewers.

"Control," in this context, means not only to require disclosure of information, but also to limit, discourage, or terminate a storm water discharge to the MS4. For example, construction sites (of 5 or more acres) and other industrial activities that discharge storm water through MS4s are required to obtain individual NPDES permits or coverage under general NPDES permits from EPA or an authorized NPDES State. These permits require compliance with applicable Federal and State regulations. However a municipality, to satisfy its permit conditions may need to impose additional requirements on discharges

from permitted industrial facilities, as well as discharges from industrial facilities and construction sites not required to obtain permits. Therefore, a municipality should develop a mechanism to assure that all industrial facilities and constructions sites that discharge to the MS4 know their obligation to comply with the applicable terms of the municipality's storm water ordinances.

3.2.2 Prohibit Illicit Discharges and Control Spills and Dumping

> §122.26(d)(2)(i)(B) [The applicant must demonstrate that it can prohibit] through ordinance, order or similar means, illicit discharges to the municipal separate storm sewer
>
> §122.26(d)(2)(i)(C) [The applicant must demonstrate that it can control] through ordinance, order or similar means the discharge to a municipal separate storm sewer of spills, dumping or disposal of materials other than storm water

To demonstrate that it possesses adequate legal authority to control storm water discharges, a municipality must be able to effectively prohibit illicit discharges and illegal dumping An illicit discharge is "any discharge that is not composed entirely of storm water except discharges pursuant to a NPDES permit . . . and discharges resulting from fire fighting activities" [40 CFR 122.26(b)(2)].

3.2.3 Control Contributions of Coapplicants

> §122 26(d)(2)(i)(D) [The applicant must demonstrate that it can control] through inter-agency agreements among coapplicants the contribution of pollutants from one portion of the municipal system to another portion of the municipal system

An operator of a MS4 may participate in an application with one or more other operators, or may submit an individual application for the separate storm sewer it operates. As indicated in the box above, the operator of a discharge from a large or medium MS4 may submit, through the use of interjurisdictional agreements, a system-wide permit application. The system-wide application can accommodate existing storm water programs, on a watershed basis, as well as programs which must take into account regional differences in climate, geography, and political institutions. Such an application should cover issues of liability, financial contributions, access to records, enforcement responsibilities, and any other applicable areas of mutual concern.

When two or more municipalities submit a joint application, each coapplicant must demonstrate that it individually possesses adequate legal authority over the entire municipal system it operates or owns. A coapplicant need not fulfill every component of legal authority specified in the regulations, as long as the combined legal authority of all coapplicants satisfies the regulatory criteria for every segment of the MS4 (including authority over all sources that discharge to the MS4).

As coapplicants, for example, a county and a flood control district within that county may together possess adequate legal authority. The flood control district may have legal authority to build, operate, and maintain structures associated with major drainage channels within the county. The county itself may have legal authority to control pollutants in discharges from privately owned lands to the MS4s and legal authority to build, operate, and maintain structures associated with minor drainage channels that tie into major drainage channels. In this situation, the combined legal authority of the coapplicants may be adequate for the system, provided that the only discharge to major drainage channels comes from the county's separate storm sewer system. As another example, a department of transportation or flood control district with no land use authority could be a co-permittee with

a city that does possess land use authority over the entire jurisdiction.

Coapplicants also may use interjurisdictional agreements to show adequate legal authority and to ensure planning, coordination, and the sharing of the resource burden of permit compliance When more than one entity is submitting an application for a MS4 (either as coapplicants or as individual applicants for different parts of a system), the role of each party must be well defined. Each applicant or coapplicant must show the ability to fulfill its responsibilities, including legal authority for the separate storm sewers it owns or operates.

Applicants and coapplicants may use the procedures outlined in Section 3 3 to demonstrate adequate legal authority in their Part 2 permit applications. These procedures are guidelines, however, and are not intended to be the only possible approaches that applicants may follow.

3.2.4 Require Compliance with all Regulations and Statutes

To meet the requirements of §122 26(d)(2)(i)(E), the applicant must show that it has adequate authority to enforce its ordinances.

> §122 26(d)(2)(i)(E) [The applicant must demonstrate that it can require] compliance with conditions in ordinances, permits, contracts or orders

One acceptable way to support a declaration of adequate legal authority, including the ability to enforce appropriate ordinances, is for the municipality to provide a certification from the Municipal General Counsel or equivalent The certification should state that the applicant has the legal authority to apply and enforce the requirements of §122 26(d)(2)(i)(A)-(F) in State or local courts The certification would, therefore, cite specific ordinances and the reasons why they are enforceable. The statement should discuss what the municipality can do to ensure full compliance with §122.26(d)(2)(i).

In a Part 2 application, through a statement from the Municipal General Counsel or through some other method, a municipality should identify the administrative and legal procedures available to mandate compliance with appropriate ordinances, and, therefore, with permit conditions. Applications should contain descriptions of how ordinances are implemented and appealed In particular, a municipality should indicate if it can issue administrative orders and injunctions or if it must go through the court system for enforcement actions

3.2.5 Carry Out Inspection, Surveillance, and Monitoring Procedures

In their Part 2 applications, municipalities must propose programs to control the contributions of pollutants from industrial facilities and prohibit illicit discharges For both of these activities, municipalities must have the legal authority to carry out inspection, surveillance, and monitoring procedures necessary to determine compliance.

> §122.26(d)(2)(i)(F). [The applicant must demonstrate that it can carry] out all inspection, surveillance and monitoring procedures necessary to determine compliance and noncompliance with permit conditions including the prohibition on illicit discharges to the municipal separate storm sewer.

To meet this requirement, municipalities may wish to consider establishing ordinances that require industrial facilities to perform inspections and report the results to the city. In many municipalities, these facilities may perform similar inspections under a pretreatment program. In their Part 2 applications, municipalities should provide

documentation of their authority to enter, sample, inspect, review, and copy records, etc , as well as demonstrate their authority to require regular reports

3.3 PROCEDURES FOR DEMONSTRATING ADEQUATE LEGAL AUTHORITY

The Part 2 application requires the applicant or coapplicants to cite and describe specific ordinances currently in effect and demonstrate that the jurisdiction for these ordinances covers the entire area served by the MS4 In addition, the applicant may elect to discuss specific changes in ordinances passed since the submission of the Part 1 permit application to illustrate how legal authority has evolved to meet the regulatory requirements in §122 26(d)(2)(i) One method by which an applicant can partially demonstrate that it has adequate legal authority is to develop a matrix that compares, in a side-by-side format, the regulatory requirements in §122 26(d)(2)(i)(A)-(F) and the municipality's legal authority Once completed, the matrix would indicate whether an adequate legal framework exists to address all key regulatory requirements identified in §122 26(d)(2)(i)(A)-(F). Furthermore, the matrix could also illustrate where the authority to mandate compliance is vested.

In order to support an assertion of adequate legal authority, applicants should include the complete text of the applicable portions of the ordinances or other such provisions in the application The applicant should also provide a specific explanation of why and how the language of a particular ordinance or other authority meets Federal regulatory requirements The application should indicate to whom the ordinance applies and how it will operate to control, prevent, or stop discharges that violate permit conditions. For example, the municipality may describe and provide an excerpt from a city ordinance that prohibits non-storm water discharges to the MS4.

Appendix C illustrates one way to detail the existence of ordinances that establish the legal authority required in §122 26(d)(2)(i) A narrative discussion of the historical use of these ordinances to control pollutants in storm water discharges also may be included The example in Appendix C shows what the applicant may do to satisfy §122.26(d)(2)(i)

Substantial effort should be devoted to obtaining the necessary legal authority before the Part 2 application is submitted However, some municipalities may find that the two-year application process does not allow enough time to secure adequate legal authority as described in this section. This may be due to the need for State statutory or legislative changes In this instance, the Part 2 application must include a detailed description of what changes are needed and a schedule of when they will be accomplished. The schedule must include timetables for drafting proposed changes, public comment periods, and final authorizations

CHAPTER 4
SOURCE IDENTIFICATION

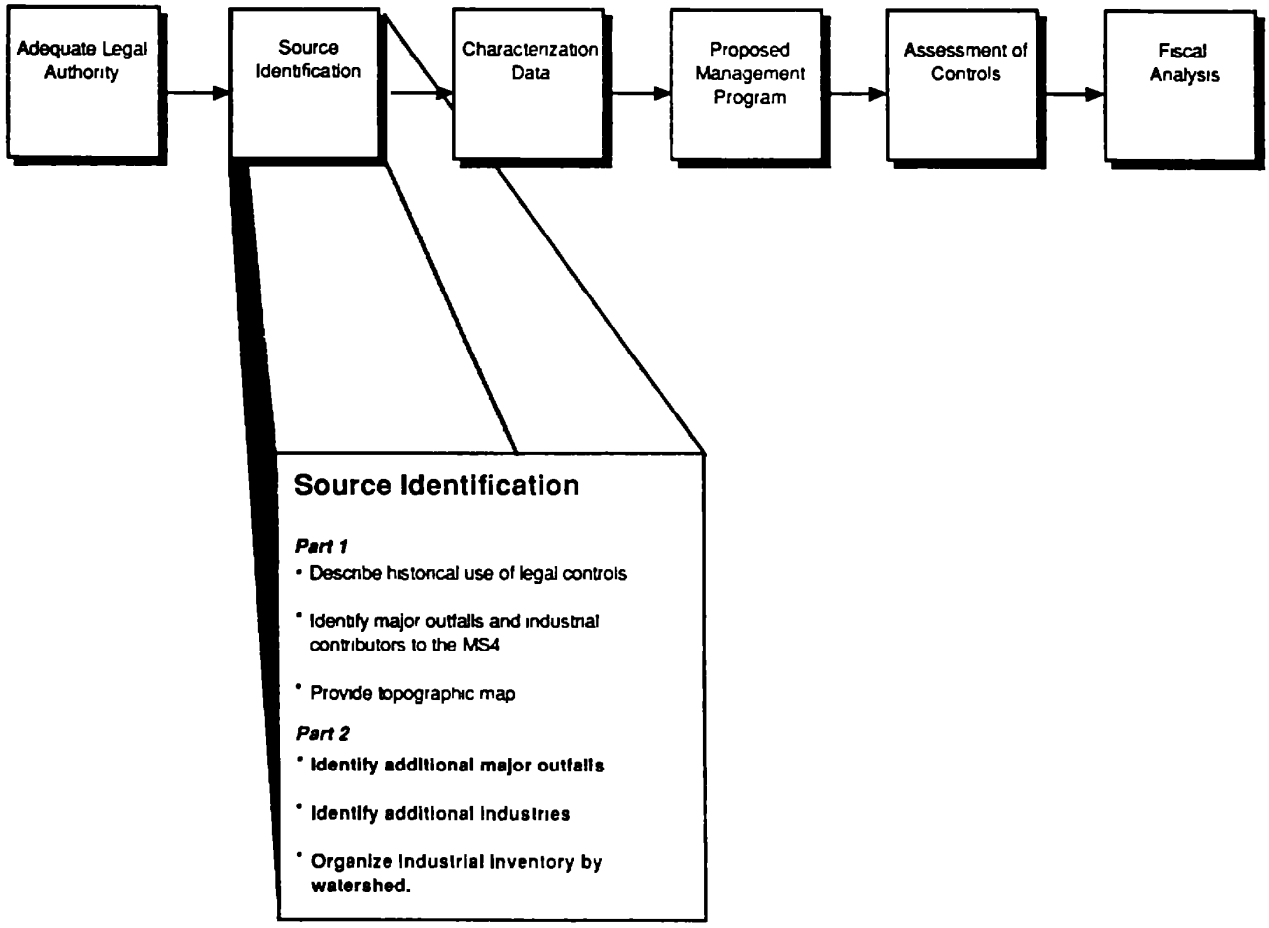

4.0 SOURCE IDENTIFICATION

4.1 BACKGROUND

In Part 1 of the NPDES storm water permit application, applicants are required to identify the location of known major outfalls discharging to waters of the United States from MS4s. Applicants also are required to provide information and data on existing land use activities. The identification of outfalls and land use activities is the first step in the process of:

- Identifying the sources of pollutants in storm water runoff;
- Linking the sources of pollutants in runoff to specific water quality impacts and other impacts that may result in degradation of aquatic resources;
- Identifying those activities or physical factors that have the most significant impact on water quality;
- Defining control measures that yield improvements in storm water quality; and
- Developing methodologies by which engineers, urban planners, and managers can make long term decisions that not only provide for economic growth, but also have discernible environmental benefits through imposed storm water controls.

The source identification requirements in the Part 2 permit application reflect three basic steps. First, municipalities must identify any major outfalls that were not already identified in the Part 1 application. Second, applicants must compile an inventory of industrial activities that may discharge storm water to a MS4 Third and finally, applicants must organize the inventory of industrial activities on a watershed basis.

Organizing the inventory by watershed allows the municipality to focus on activities within discrete areas that may contribute pollutants in storm water discharges to waters of the United States For example, combining outfall data with the industrial inventory organized by watershed may help the municipality to identify probable areas of illicit connections. This information will also be useful for municipalities when they develop specific strategies [e.g., best management practices (BMPs)] as part of their proposed storm water management programs The following sections discuss regulatory requirements and procedures for completing the source identification section of the Part 2 permit application. Section 4 2 provides guidance on identifying major outfalls, Section 4.3 provides guidance on compiling an inventory of industrial dischargers, and Section 4.4 provides guidance on organizing the inventory of industrial discharges by watershed

4.2 MAJOR OUTFALLS

The first portion of the Part 2 Source Identification provision states·

> §122.26(d)(2)(ii) *Source Identification.* [The applicant must provide the] location of any major outfall that discharges to waters of the United States that was not reported [in Part 1 of the application]

4.2.1 Definition of a Major Outfall

According to 40 CFR 122 26(b)(5), a major outfall is a MS4 outfall that discharges from a single pipe with an inside diameter of at least 36 inches The term also includes discharges from a single conveyance other than a circular pipe serving a drainage area of more than 50 acres.

For those municipal separate storm sewer systems that receive storm water runoff from lands zoned for industrial activity, major outfalls also include outfalls that discharge from a single pipe with an inside diameter of 12 inches or more, or discharge from other than a circular pipe associated with a drainage area of 2 acres or more. This definition also applies to outfalls of drainage areas that have both industrial and non-industrial activity. For example, if a three acre drainage area is zoned half woodland and half industrial, the discharges from that area would still be considered a major outfall. Because the definition of major outfall includes consideration of drainage area, municipalities may need to consider conveyances such as ditches and swales when identifying major outfalls

4.2.2 Identifying Major Outfalls

The first step in this section of the Part 2 application is the identification of major outfalls not identified in the Part 1 application [§122.26(d)(2)(ii), cited in box above]. When identifying these major outfalls, municipalities should build upon the approach used in the Part 1 application. One way to identify major outfalls is a review of sewer system maps. These maps can provide information on sewer system type (e g , separate storm versus combined sewer), pipe size, and outfall location However, depending upon the age of the sewer system maps, they may not provide complete information about newly developed areas or improvements to older areas Often, interviews with sewer system maintenance personnel can provide information on the most recent changes to the sewer system The municipality should also consider conducting field surveys (e g., visual inspection of the banks of receiving waters) to locate major outfalls

When submitting a Part 2 permit application, municipalities should include a brief description of how additional major outfalls were identified This description is not intended to be a lengthy list of each sewer system employee interviewed, but rather an outline of the methods employed

4.3 INVENTORY OF INDUSTRIAL DISCHARGERS

The second step in this portion of the Part 2 application is assembling an inventory of industrial storm water dischargers

> **§122 26(d)(2)(ii)** *Source Identification*
> Provide an inventory, organized by watershed of the name and address, and a description (such as SIC codes) which best reflects the principal products or services provided by each facility which may discharge, to the municipal separate storm sewer, storm water associated with industrial activity

This section describes how municipalities may develop the inventory of industrial facilities Section 4.4, below, provides guidance on organizing these facilities by watershed.

4.3.1 Facilities that must be Included in the Inventory

As stated above, applicants must provide an inventory of each facility that may discharge to the MS4 storm water associated with industrial activity. Industrial storm water dischargers that must be included in this inventory fall into 11 classes of industrial activities as defined in the November 1990

regulations Six of these classes were defined in a narrative format and five were defined by Standard Industrial Classification (SIC) codes. Specific categories of industries are identified in §122.26(b)(14)(i)-(xi). Exhibit 4-1 provides a list of the SIC codes and industry categories cited in the regulatory definition.

4.3.2 Identifying the Industrial Facilities

As a first step in developing a comprehensive industrial storm water inventory, the applicant must review **facility notifications**. Industrial facilities were required to notify municipalities by May 15, 1991, of their intent to discharge storm water to the municipal storm sewer system [§122.26(a)(vi)(4)]. Each facility should have submitted to the municipality information including facility name, facility location, and facility type (such as SIC code or other industry categorization).

In addition, municipalities should explore other sources of information on industrial facilities to help identify gaps in inventory. One specific source of information a municipality should review is **facility information submitted under other programs**. For example, SIC codes are often required for air pollution permit applications, hazardous materials management permits, pretreatment program applications, building permits, business licenses, or local tax rolls. A municipality may take the list of SIC codes provided in Exhibit 4-1 and compare it with existing information on SIC codes or industrial categories which has been submitted by industrial facilities under other programs.

Under 40 CFR 122.28, facilities that discharge storm water associated with industrial activity must submit an individual permit application, participate in a storm water group permit application, or file a **Notice of Intent (NOI)** to be covered by a general permit. These applications and NOIs are another source of information on industrial dischargers. For existing facilities, applications or NOIs were to be submitted by October 1, 1992; for new facilities, they must be submitted prior to the commencement of industrial activity However, in the Intermodel Surface Transportation Efficiency Act of 1991, Congress provided that permit application requirements be reserved for industrial activities owned or operated by municipalities with a population of less than 100,000, with the exception of airports, power plants, and uncontrolled sanitary landfills If EPA is the permitting authority in a State, applications and NOIs should be submitted to EPA, if a State has NPDES authority, they should be submitted to the State. Section 308 of the CWA provides the legal authority for any individual (including a municipality) to obtain information from the NPDES permitting authority. A municipality may be able to obtain a list of the facilities in its jurisdiction that have applied for coverage under a general or individual permit or that have applied for coverage as a member of a group

Additional sources of information on industrial facilities may include **zoning maps** showing industrial parks, manufacturing and industrial listings in **telephone books, trade association listings, pretreatment industrial waste surveys, the Chamber of Commerce Manufacturing Directory, and Dunn and Bradstreet.**

In the Part 2 application, a municipality should provide a brief description of the sources it reviewed in identifying the industrial dischargers. As part of the proposed storm water management program, which is described in Chapter 6, municipalities should describe a plan for collecting new or updated information on industrial dischargers throughout the life of the permit.

Exhibit 4-1
Industry Categories Cited in the
Definition of Storm Water Associated with Industrial Activity

1. Facilities subject to storm water effluent limitations guidelines, new source performance standards, or toxic pollutant effluent standards under 40 CFR Subchapter N (except facilities with toxic pollutant effluent standards which are exempted under category 11 below.

2 Facilities described by SIC 24 (except 2434), 26 (except 265 and 267), 28 (except 283), 29, 311, 32 (except 323), 33, 3441, 373 *

3. Facilities described by SIC 10 through 14 (mineral industry), including:

   - active or inactive mining operations, except for areas of coal mining operations no longer meeting the definition of a reclamation area under 40 CFR 434 11(1) because the performance bond issued to the facility by the appropriate SMCRA authority has been released, or areas of non-coal mining operations which have been released from applicable State or Federal reclamation requirements after December 17, 1990, and

   - oil and gas exploration, production, processing, or treatment operations, or transmission facilities that discharge storm water contaminated by contact with or that has come into contact with, any overburden, raw material, intermediate products, finished products, by-products, or waste products located on the site of such operations

4 Hazardous waste treatment, storage, or disposal facilities, including those that are operating under interim status or a permit under Subtitle C of RCRA.

5. Landfills, land application sites, and open dumps that receive or have received any industrial wastes (waste that is received from any of the facilities described under this subsection) including those that are subject to regulation under Subtitle D of RCRA.

6. Facilities involved in the recycling of materials (metal scrapyards, battery reclaimers, salvage yards, and automobile junkyards) including but not limited to SIC 5015 and 5093

7. Steam electric power generating facilities, including coal handling sites.

8. Transportation facilities described by SIC 40, 41, 42 (except 4221-25), 43, 44, 45, and 5171, which have vehicle maintenance shops, equipment cleaning operations, or airport deicing operations. Only those portions of the facility that are either involved in vehicle maintenance (including vehicle rehabilitation, mechanical repairs, painting, fueling, and lubrication), equipment cleaning operations, airport deicing operations, or which are otherwise identified under 1 - 7 or 9 - 11 are associated with industrial activity.

(Continued)

Exhibit 4-1 (continued)

9. Treatment works treating domestic sewage or any other sewage sludge or wastewater treatment device or system, used in the storage treatment, recycling, and reclamation of municipal or domestic sewage, including land dedicated to the disposal of sewage sludge that is located within the confines of the facility, with a design flow of 1.0 mgd or more, or required to have an approved pretreatment program under 40 CFR Part 403. Not included are farm lands, domestic gardens, or lands used for sludge management where sludge is beneficially reused and which are not located within the facility, or areas that are in compliance with Section 405 of the CWA.

10 Construction activity including clearing, grading, and excavation activities except operations that result in the disturbance of less than five acres of total land area which are not part of a larger common plan of development or sale **

11 Facilities described by SIC 20, 21, 22, 23, 2434, 25, 265, 267, 27, 283, 285, 30, 31 (except 311), 323, 34 (except 3441), 35, 36, 37 (except 373), 38, 39, 4221-25, (and which are not otherwise included within categories 2 - 10).*

Source 55 FR 48065, November 16, 1990

*Please note the SIC 285 is covered under Category 11 Also note that for the industries identified in Category 11, the term includes only storm water discharges from all areas (except access roads and rail lines) where material handling equipment or activities, raw materials, intermediate products, final products, waste materials, by-products, or industrial machinery are exposed to storm water

**On June 4, 1992, the United States Court of Appeals for the Ninth Circuit found that EPA's rationale for exempting construction sites of less than five acres and certain uncontaminated storm water discharges from Category 11 light industrial facilities from Phase I of the storm water program to be invalid and has remanded these exemptions for further proceedings (see *Natural Resources Defense Council* v *EPA* No 91-70176)

4.4 ORGANIZING THE INDUSTRIAL INVENTORY BY WATERSHED

Once the industrial inventory is complete, the applicant must organize the inventory by watershed, or drainage area. The main objective of this requirement is to associate discrete discharges with specific watersheds, which may help the municipality identify relationships between pollutant sources and receiving water quality problems To help organize the industrial inventory by watershed, municipalities should consider the long-term benefits of using automated database systems to help organize and update information on

- Locations of major outfalls or system modifications;
- Land use designations and composition;
- Dischargers of storm water associated with industrial activity,
- Other NPDES permit holders,
- Location/inventory of structural controls, and
- Locations of illicit connections

This information can help satisfy the requirement that discharges of storm water associated with industrial activity be organized by watershed Using an automated database system or the map submitted in the Part 1 application may be helpful in satisfying this requirement However, the regulations do not require Part 2 applicants to use a particular database or submit certain information, and municipalities may elect to use other methods.

The following procedure is provided as an example of one way to organize industrial dischargers by watershed:

1. Create a transparent overlay of tax maps covering the entire area served by the MS4.

2 Indicate on the maps the location of each industrial activity according to its address with an appropriate symbol or code.

3 Produce an overlay of existing watersheds from a topographical map, for example, United States Geological Survey (USGS) maps, covering the area that the MS4 supports Previously performed hydrological surveys may be helpful in delineating the boundaries of existing watersheds Municipalities may elect to sub-divide existing watersheds into smaller units if this will assist in management planning.

4 Align the tax map and watershed overlay so that industrial activity locations can be transposed to the watershed overlay.

A number of PC-based tools can be used to organize information on facilities and outfalls. For example, computer-aided design (CAD) packages, in conjunction with third-party software packages, are specifically designed to present information on separate transparent layers that can be "turned off and on" when necessary One layer could contain information on watershed topography and another could contain the locations of industrial storm water dischargers. Additional layers might contain information on the layout of the municipal system, locations of structural source controls and outfalls, and land-use patterns (both present and future)

A CAD-based system can be useful, not only in presenting information easily and graphically, but also in its ability to transfer spatial data, such as XYZ coordinates, to commonly available PC-based database applications This spatial data can be merged with other databases containing more generic information including facility name, address, and SIC codes However, one potential drawback to CAD systems is that most of them cannot store "real-world" (e g., latitude-longitude) coordinates and are not generally designed for spatial analyses

Information stored in a CAD format may also be input into a Geographic Information System (GIS) With some conversion, the CAD system coordinates may be transformed into the "real-world" coordinates typically employed by GIS GIS are integrated database management systems designed for the input, storage, retrieval, analysis, output, and display of geographically or spatially indexed data

The key attribute of GIS is the relational database capabilities that make these systems powerful tools for conducting spatial analyses. Using GIS, a municipality could overlay several layers of data and derive new information from this existing information. For example, using GIS, an applicant could overlay a map showing the 100-year flood plain with a map showing locations of industrial facilities The GIS could then calculate the amount of industrial area within the 100-year flood plain and plot this data on a new overlay This type of spatial analysis might be a powerful tool in the design of the municipality's storm water management program.

Another benefit of GIS is the ability for common data to be shared efficiently among several agencies. For example, the flood management agency, department of transportation, and storm water control agency could all contribute data to and use analyses from the same GIS. On the other hand, one potential drawback to GIS is their relatively high cost. Often, developing accurate, appropriate base maps is one of the most resource intensive parts of the system.

The techniques presented in this section to organize industrial dischargers by watershed are not the only methods that the applicant can use For example, municipalities may elect to present the information in tabular form. Using a CAD, GIS, or other automated system is entirely up to the municipality There is no requirement that municipalities use these systems in the development of either the Part 1 or Part 2 NPDES permit applications Each applicant will have to examine its existing resources (including computer systems, personnel, and budget) and projected needs before deciding which method will be the most efficient and most useful in the long term

A discussion of maintaining and/or updating the industrial inventory is provided in Section 6.3.3.2 of this guidance.

Exhibit 4-2 illustrates an example of the procedure discussed in Sections 4.3 and 4 4

Exhibit 4-2
Example of a Map Organizing Industry by Watershed

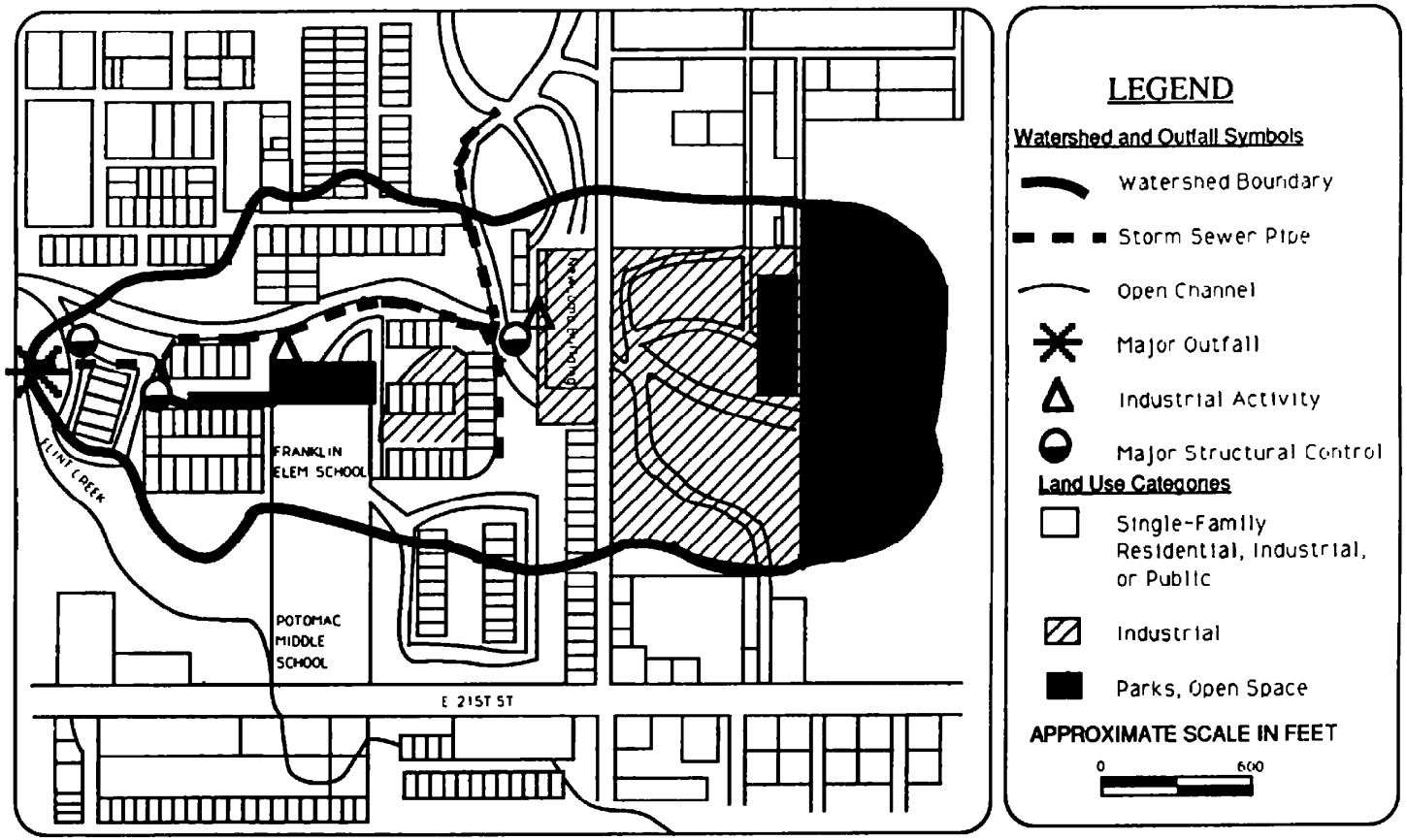

CHAPTER 5
CHARACTERIZATION DATA

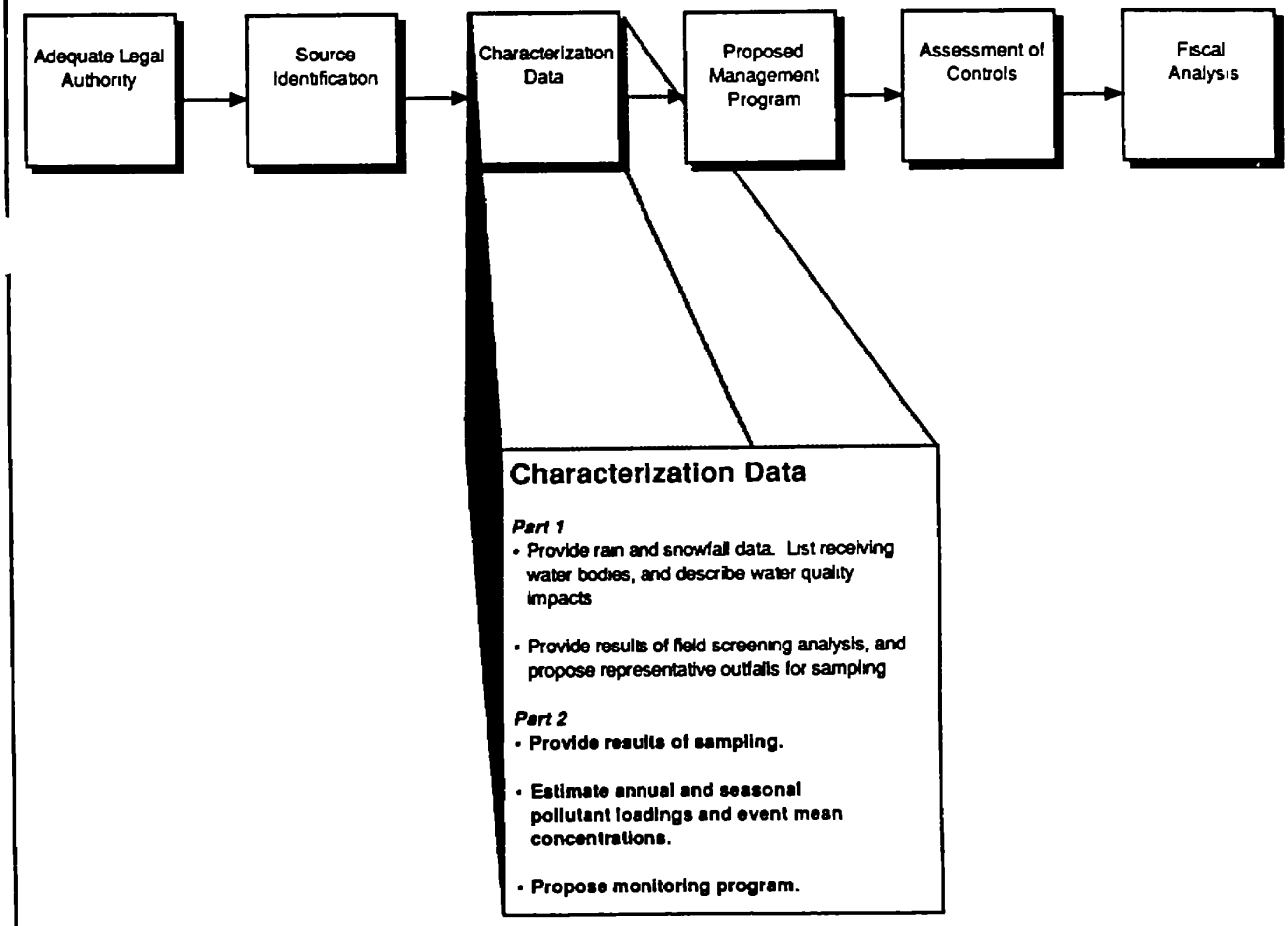

5.0 CHARACTERIZATION DATA

5.1 BACKGROUND

5.1.1 Objective of this Section

This section addresses the requirements for reporting the physical and chemical characteristics of municipal storm water runoff as specified by 40 CFR 122 26(d)(2)(iii). These requirements describe the minimum quantitative and descriptive data necessary to begin characterizing storm water discharges.

The applicant is encouraged to provide additional information, if available, which may provide a basis for a more effective storm water management program. The additional information may also help the permitting authority make more informed decisions regarding the specifications of the permit to be issued.

The NPDES permit application regulations require the applicant to identify all major outfalls that are part of the MS4 [§122.26(d)(1)(iii) and 126(d)(2)(ii)]. Part 1 requires the municipality to propose a sampling plan that identifies 5-10 outfalls that would be appropriate for representative data collection under Part 2 of the application [§122.26(d)(1)(iv)(E)]. The next step is to collect and analyze samples from these outfalls (or others designated by the permitting authority) for a variety of pollutant parameters from 3 representative storm events.

5.1.2 Potential Impacts of Storm Water Runoff

The Nationwide Urban Runoff Program (NURP) study showed that discharges from MS4s contribute to the degradation of water quality in the Nation's waters (EPA, 1983). The NURP study also concluded that the effects of urban runoff on receiving water quality are very site specific The effects depend on the types, size, and hydrology of the water body, the designated beneficial use, the pollutants which affect that use, the urban runoff quality characteristics, and the amounts of urban runoff dictated by local rainfall patterns and land use. *The National Water Quality Inventory, 1990 Report to Congress* as required by Section 305(b) of the Clean Water Act, stated that one-third of the impairment in assessed waters is due to storm water runoff (EPA, 1990d)

Quantity Impacts

Urbanization often increases the quantity and reduces the quality of storm water runoff For example, vegetated or forested areas with pervious surfaces are often replaced with impervious surfaces (e g , concrete and asphalt) that prevent or minimize the amount of rainfall available for ground water recharge This increases the volume and velocity of storm water runoff.

Vegetated areas play a crucial role in ground water recharge and in the maintenance of stream baseflow This is especially true during extended dry periods, when ground water is often the only source that preserves stream baseflow In highly urbanized areas, ground water recharge may be so severely reduced that ground water flow to perennial streams during dry periods is not sufficient. Further, the natural hydrology of a watershed is often altered by urbanization, because developing areas often provide drainage appurtenances that rapidly conduct storm water runoff away from these areas Such drainage may also affect the geometry of natural streams, especially where natural streams have been modified through the installation of man-made channels Ultimately, reduced perviousness due to urbanization increases the magnitude and the frequency of localized flooding which can have the long term effect of substantially increasing the width of natural streams through erosion and scouring

Increases in peak discharge velocity and runoff volume can also result in substantial erosion of natural streambanks and the washout of benthic habitats. Since streambeds often consist of unconsolidated silt and sediment, they may be stripped away substantially by excessive discharge velocities Increased discharge velocities can also lead to undercutting and destabilization of streambanks, which may cause erosion that extends beyond the natural boundary of the streambank

Further, silt and sediment can increase the turbidity of the receiving water, thus interfering with the growth of aquatic plants which depend on photosynthesis. Increased turbidity can also interfere with aquatic feeding, eliminate spawning areas for fish, and cause abrasion and clogging of fish gills. Also, because silt and sediment may remain in the watershed, they can blanket benthic habitats and severely reduce streamflow capacity

In the presence of excessive volumes of storm water runoff and discharge velocities, the net impact on receiving waters can be almost indistinguishable from impacts commonly associated with the discharge of toxics (e g , increased mortality, reduced biodiversity, and reduced reproduction)

Deposition and Resuspension of Toxicants

Research is currently on-going to examine the impact of the deposition and resuspension of toxicants as a result of wet weather events Questions about the survivability of benthic habitats when exposed to toxicants in deposited sediments still remain. The impact of resuspended toxicants from the sediments is not well known since toxics are often bound to sediment particles that may reduce the concentrations available for biological uptake and subsequent bioaccumulation The applicant should also be aware that different metal contaminants in sediments can exhibit different solubilities Under varying conditions of pH and temperatures, metals deposited in sediment can become soluble again and be reintroduced into the water column

Excessive Bacterial Levels

The NURP study final report concluded that "coliform bacteria are present at high levels in urban runoff and can be expected to exceed EPA water quality criteria during and immediately after storm events." This is of significant concern, particularly in swimming and shellfish areas.

Dissolved Oxygen Depression

The presence of oxygen-consuming pollutants in receiving waters can lead to severe dissolved oxygen depression Factors that can cause dissolved oxygen depression include the resuspension of biodegradable organic material (which can occur in the presence of high flow velocities) or the discharge of organic pollutants in storm water discharges. The NURP study demonstrated that storm water discharges exhibit biochemical oxygen demand (BOD) levels in excess of levels commonly associated with secondary treated effluent from publicly owned treatment works (POTWs). Severe dissolved oxygen depression could contribute to fish kills, which are one of the most readily observable impacts of pollution on receiving waters.

Eutrophication

Eutrophication, or the aging of a water body, can be accelerated by excessive nutrient loadings from storm water. Advanced stages of eutrophication are often associated with substantial variations in dissolved oxygen concentration. Nutrients of concern are nitrogen and phosphorus. Phosphorus is typically the growth-limiting nutrient for plants in fresh water systems. Storm water discharges routinely contain excess concentrations of these nutrients, which can lead to excessive algal growth, commonly referred to as algal blooms. Excessive concentrations of algae can cause odor and taste problems in drinking water and can result in aesthetically unpleasant

environments. In addition, the eventual decomposition of large concentrations of algae can depress dissolved oxygen in the water body to levels where fish kills occur. In nature, the process of eutrophication occurs over a substantial period of time, however, storm water discharges can rapidly accelerate this process.

Exceedance of Chronic Toxicity Criterion

Long-term exposure to toxics in excess of chronic toxicity criteria can cause sublethal effects on aquatic life. Indicators of chronic toxicity include reduced fertility, reproduction, and growth rates and a decline in the diversity of aquatic organisms The NURP study clearly indicated that storm water discharges contain concentrations of trace metals, such as lead, cadmium, zinc, and copper in amounts that exceed the chronic toxicity criteria. Prolonged exposure to chronic concentration levels of toxics can also be lethal to aquatic organisms, primarily from the bioaccumulation of toxics within the cell tissue of the organism over a extended period of time

Thermal Impacts

The temperature of storm water runoff may become significantly elevated via conductive and convective heat transfer with impervious, man-made surfaces In the case of contact with impervious surfaces, the resulting temperature elevation of storm water runoff can be substantial. For example, the surface temperature of parking lots during summer months may exceed 100 degrees Fahrenheit. Consequently, storm water runoff from these parking lots will be elevated in temperature. Many aquatic organisms are extremely sensitive to changes in water temperature. Increased water temperature also reduces dissolved oxygen in streams, rivers, lakes, and wetlands Therefore, significant discharges of storm water at elevated temperatures can, over the long term, lead to the alteration of aquatic populations.

5.1.3 Use of the Characterization Data

The NURP study analyzed storm water discharge from 28 sites representing 12 major river basins of the United States NURP detected 77 EPA priority pollutants present in the storm water discharges sampled, including samples with concentrations that exceeded water quality criteria for certain pollutants. Those pollutants detected in at least 10 percent of the samples studied in NURP are identified in Exhibit 5-1.

The data gathered for storm water discharge characterization can be used to create a baseline measurement of pollutant concentration and loadings The data also can be used to evaluate the effectiveness of best management practices (BMPs) as well as help identify storm water control priorities. In addition, it can be used to help identify the sources of pollutants in storm water runoff, to help establish an effective monitoring program for the life of the permit, and to help predict the impact of storm water runoff on receiving waters that are known to be impaired.

5.1.4 Storm Water Sampling and Analysis Procedures

The regulation requires that the process of collecting quantitative data for storm water characterization follow certain guidelines

> §122.26(d)(2)(iii) *Characterization data* When "quantitative data" for a pollutant are required under paragraph (d)(1)(iii)(A)(3) of this paragraph, the applicant must collect a sample of effluent in accordance with 40 CFR 122.21(g)(7) and analyze it for the pollutant in accordance with analytical methods approved under 40 CFR part 136 When no analytical method is approved the applicant may use any suitable method but must provide a description of the method

Exhibit 5-1. Priority Pollutants Detected in at Least 10% of NURP Samples.

PARAMETERS	FREQUENCY OF DETECTION (%)
Metals and Inorganics	
Antimony	13
Arsenic	52
Beryllium	12
Cadmium	48
Chromium	58
Copper	91
Cyanides	23
Lead	94
Nickel	43
Selenium	11
Zinc	94
Pesticides	
Alpha hexachlorocyclohexane (alpha-BHC)	20
Alpha endosulfan	19
Chlordane	17
Lindane (gamma BHC)	15
Halogenated aliphatics	
Methane, dichloro-	11
Phenols and cresols	
Phenol	14
Phenol, pentachloro-	19
Phenol, 4-nitro	10
Phthalate esters	
Phthalate, bis(2-ethylhexyl)	22
Polycyclic aromatic hydrocarbons	
Chrysene	10
Fluoranthene	16
Phenanthrene	12
Pyrene	15

Source: U.S. Environmental Protection Agency, *Results of the Nationwide Urban Runoff Program*. EPA Planning Division (National Technical Information Service (NTIS) Accession No. PB84-8552). December 1983.

The data collection procedures must follow the guidelines for storm water sampling outlined in §122 21(g)(7), *Effluent Characteristics* This portion of the NPDES regulation describes the conditions under which a storm water discharge will be sampled, and which collection procedure (grab sample versus flow-weighted composite sample) is required for the water quality parameter being analyzed. These guidelines are discussed in more detail in Sections 5.3.2 and 5.3 4 of this guidance manual In addition, EPA has available a *Storm Water Sampling Guidance Document* that describes in detail the methods used for storm water discharge sampling (EPA, 1992a).

The methods for the chemical analyses of storm water discharge samples must be conducted in accordance with 40 CFR Part 136, *Guidelines for Establishing Test Procedures for the Analysis of Pollutants* These guidelines refer the applicant to EPA-approved methods and cite the source of the approved methods (e g., Standard Methods for the Examination of Water and Wastewater, ASTM methods, etc.) Note that alternative methods (i e , those not included in Part 136) may be used under certain circumstances (see Section 5.3 4) as described in 40 CFR Part 136, and reiterated in the Characterization Data section of Part 2 of the storm water discharge NPDES permit

The specific constituent pollutants and water quality parameters that must be analyzed in the storm water samples are presented in Section 5 3 4.

5.2 SUMMARY OF REGULATORY REQUIREMENTS

The following is a summary of the characterization data requirements for the Part 2 application

- Quantitative data on physical and chemical characteristics of the discharge taken from at least 5 to 10 representative outfalls chosen by the permitting authority (Section 5 3),
- Estimates of both the annual pollutant load and event mean concentration of the cumulative discharges from all municipal outfalls during a storm event (Section 5 4),
- A proposed schedule to provide estimates for each major outfall of the seasonal pollutant load and the event mean concentration for constituents detected in required sampling (Section 5.5); and
- A proposed monitoring program for the life of the permit that meets specific requirements established in the regulations (Section 5 6).

5.3 QUANTITATIVE AND QUALITATIVE DATA REQUIREMENTS

5.3.1 Selection of Representative Sampling Sites

In the Part 1 application, the municipality is required to describe a plan for obtaining characterization data [§122.26(d)(1)(iv)(E)] The plan should reflect the requirements of §122 26(d)(2)(iii)

Different types and intensities of land use activities influence, in part, the types of pollutants and the pollutant concentrations in municipal storm water runoff. Therefore, Part 1 of the permit application [§122.26(d)(1)(iii)(B)(2)] requires the applicant to describe the land use activity within the area to be covered by the permit. In Part 1, the applicant also must select a subset of all the major outfalls (see Section 4.2.1 for definition of major outfall) identified that represented surface runoff discharge of the various land use activities described In some cases, a municipality preparing a Part 2 application may want to supplement its sampling program by collecting and analyzing samples from major outfalls that were not identified in the Part 1 application or designated by the permitting authority. This additional sampling may provide the

municipality with data that better characterizes its MS4 discharges

5.3.2 Criteria for Storm Water Discharge Sampling

Land use activities are not the only factors that affect the pollutant composition of storm water runoff Storm water composition also varies according to the nature of the storm event (e.g, duration, volume), and the composition may vary throughout the duration of a single storm event (i.e., the initial discharge, or "first flush," tends to have higher pollutant loads). In order to obtain data that represents an "average" storm event, EPA requires samples from three separate storm events to characterize the surface water runoff; however, the permitting authority may allow exemptions

> §122.26(d)(2)(iii)(A)(1) For each outfall or field screening point designated under this subparagraph, samples shall be collected of storm water discharges from three storm events occurring at least one month apart in accordance with the requirements at §122 21(g)(7) (the Director may allow exemptions to sampling three storm events when climatic conditions create good cause for such exemptions),

The criteria for sampling storm water discharge are detailed in §122.21(g)(7), *Effluent Characterization* EPA's *Storm Water Sampling Guidance Document* addresses these criteria. For the purpose of this discussion, a brief synopsis of these criteria follows:

- For each outfall or field screening point selected, samples must be collected from three separate storm events.
- The three storm events must be at least one month apart
- Each sampled storm event must have a rainfall of at least 0 1 inch in the drainage area
- There must be no storm event in excess of 0 1 inch in the drainage area for at least 72 hours prior to the sampled storm event
- The rainfall event should not vary by plus or minus 50 percent from the average or median per storm volume and duration for the region.

EPA understands that climatic conditions may make it difficult for some municipalities to sample storm events meeting these criteria. For example, storm events may be so infrequent in arid and semi-arid areas that sufficient samples cannot be obtained by the application deadline. In other areas, storms may be so frequent that it may not be possible to wait the required 72 hours between storm events. In such cases, the applicant should confer with the permitting authority in advance. In instances where representative storm events do not occur prior to the application due date, the municipality should submit its application with as much information as possible. It should include an explanation [certified by a principal executive officer or ranking elected official in accordance with §122.22(a)(3)] as to why sampling data were unavailable.

The municipality may need to perform some initial research and calculation to meet the requirements listed above In order to determine what constitutes an average storm event for the area, the applicant should contact the National Weather Service or National Oceanographic and Atmospheric Administration's National Climate Center Weather data is also available commercially and from airports. The applicant may also refer to the information provided in the *Storm Water Sampling Guidance Document.*

5.3.3 Narrative Description of Storm Event

> **§122.26(d)(2)(iii)(A)(2)** A narrative description shall be provided of the date and duration of the storm event(s) sampled, rainfall estimates of the storm event which generated the sampled discharge and the duration between the storm event sampled and the end of the previous measurable (greater than 0 1 inch rainfall) storm event;

Under §122 26(d)(2)(iii)(A)(2), the municipality must provide a narrative description of each storm that produced the discharge to be chemically and physically characterized Such a narrative description must include

- The date and duration of the rainfall event that produced the discharge sampled Measurements describing the peak intensity of the storm, if available, should also be reported,
- The amount of rainfall Rainfall conditions may vary significantly across large drainage areas, so rainfall characteristics should be spatially averaged over the drainage area, if possible If more than one rain gauge is used, averages should be reported. Rain gauges operated near the drainage area by the National Weather Service may be used, or the discharger may collect this information,
- The time elapsed since the last rainfall event greater than 0.1 inches. Historical rainfall data from rainfall gauges can be used to provide this information. If a gauge records only daily data, municipal field personnel could be asked to provide information on times during the day a rainfall event began or ended

5.3.4 Chemicals/Water Quality Parameters to be Measured

The storm water discharge samples must be analyzed for a number of pollutant parameters

> **§122.26(d)(2)(iii)(A)(3)** For samples collected and described under paragraphs (d)(2)(iii)(A)(1) and (A)(2) of this section, quantitative data shall be provided for the organic pollutants listed in Table II, the pollutants listed in Table III (toxic metals, cyanide, and total phenols) of appendix D of 40 CFR part 122, and for the following pollutants
>
> Total suspended solids (TSS)
> Total dissolved solids (TDS)
> COD
> BOD_5
> Oil and grease
> Fecal coliform
> Fecal streptococcus
> Ph
> Total Kjeldahl nitrogen
> Nitrate plus nitrite
> Dissolved phosphorus
> Total ammonia plus organic nitrogen
> Total phosphorus
>
> *[Note that total kjeldahl nitrogen is actually a substitute for total ammonia plus organic nitrogen]*

The complete list of chemicals is provided in Exhibits 5-2, 5-3, and 5-4. Exhibits 5-2 and 5-3 are derived from 40 CFR Part 122, Appendix D, Tables II and III, respectively. Exhibit 5-4 comes from the text of the regulation (see box above) The EPA-approved analysis procedure for the pollutants in Exhibits 5-2 and 5-3 can be found in 40 CFR Part 136. If a municipality is seeking approval to use an alternative method of analysis, then a request should be made according to procedures outlined in 40 CFR 136 4

Exhibit 5-2: Pollutants Listed in Table II in Appendix D of 40 CFR Part 122

Pollutant		Pollutant	
Volatiles		**Acid Compounds**	
Acrolein	1 2 Dichloropropane	2 Chlorophenol	
Acrylonitrile	1,3-Dichloropropylene	2,4-Dichlorophenol	
Benzene	Ethylbenzene	2,4-Dimethylphenol	
Bromoform	Methyl bromide	4,6-Dinitro-o-cresol	
Carbon tetrachloride	Methyl chloride	2,4-Dinitrophenol	
Chlorobenzene	Methylene chloride	2-Nitrophenol	
Chlorodibromomethane	1,1,2,2-Tetrachloroethane	4-Nitrophenol	
Chloroethane	Tetrachloroethylene	p-Chloro-m-cresol	
2 Chloroethlyvinyl ether	Toluene	Pentachlorophenol	
Chloroform	1,2-trans-Dichloroethylene	Phenol	
Dichlorobromomethane	1,1,1-Trichloroethane	2,4,6-Trichlorophenol	
1,1 Dichloroethane	1,1,2-Trichloroethane		
1,2 Dichloroethane	Trichloroethylene		
1 1-Dichloroethylene	Vinyl chloride		
Base/Neutral		**Pesticides**	
Acenaphthene	Diethyl phthalate	Aldrin	Endrin
Acenaphthylene	Dimethyl phthalate	Alpha BHC	Endrin aldehyde
Anthracene	Di n-butyl phthalate	Beta BHC	Heptachlor
Benzidine	2 4-Dinitrotoluene	Gamma BHC	Heptachlor epoxide
Benzo(a)anthracene	2,6-dinitrotoluene	Delta-BHC	PCB-1242
Benzo(a)pyrene	Di-n-octyl phthalate	Chlordane	PCB-1254
3,4-Benzofluoranthene	1,2-diphenylhydrazine (as	4 4'-DDT	PCB-1221
Benzo(ghi)perylene	azobenzene)	4 4 DDE	PCB-1232
Benzo(k)fluoranthene	Fluoranthene	4,4'-DDD	PCB-1248
Bis(2 chloroethoxy)methane	Fluorene	Dieldrin	PCB-1260
Bis(2-chloroethyl)ether	Hexachlorobenzene	Alpha-endosulfan	PCB 1016
Bis(2-chloroisopropyl)ether	Hexachlorobutadiene	Beta-endosulfan	Toxaphene
Bis(2-ethylhexyl)phthalate	Hexachlorocyclopentadiene	Endosulfan sulfate	
4-bromophenyl phenyl ether	Hexachloroethane		
Butylbenzyl phthalate	Indeno(1,2,3-cd)pyrene		
2-Chloronaphthalene	Isophorone		
4-Chlorophenyl phenyl ether	Naphthalene		
Chrysene	Nitrobenzene		
Dibenzo(a h)anthracene	N-nitrosodimethylamine		
1,2 Dichlorobenzene	N nitrosodi-n-propylamine		
1,3-Dichlorobenzene	N-nitrosodiphenylamine		
1,4-Dichlorobenzene	Phenanthrene		
3,3 -Dichlorobenzidine	Pyrene		
	1,2,4-trichlorobenzene		

Source 40 CFR Part 122 Appendix D

Exhibit 5-3: Pollutants Listed in Table III in Appendix D of 40 CFR Part 122

Pollutant	Pollutant	Pollutant
Antimony, total	Copper, total	Silver, total
Arsenic, total	Lead, total	Thallium, total
Beryllium, total	Mercury, total	Zinc, total
Cadmium, total	Nickel, total	Cyanide, total
Chromium, total	Selenium, total	Phenols, total

Source 40 CFR Part 122, Appendix D

Exhibit 5-4. Conventional Pollutants Listed in Section 122.26(d)(2)(iii)(A)(3)

Pollutant	Pollutant
Total suspended solids (TSS)	pH
Total dissolved solids (TDS)	Total Kjeldahl nitrogen (TKN)*
COD	Nitrate plus nitrite
BOD_5	Dissolved phosphorus
Oil and grease	Total ammonia plus organic nitrogen
Fecal coliform	Total phosphorus
Fecal streptococcus	

* Total ammonia plus organic nitrogen is interchangeable with TKN

Source 40 CFR 122 26(d)(2)(iii)(A)(3)

Section 122 21(g)(7) specifies that certain pollutant parameters will be analyzed on grab samples taken from the outfall, whereas the remainder of the pollutant parameters require that composite samples be taken from the outfall These types of sampling procedures are differentiated as follows:

Grab samples: discrete, individual samples taken within a short period of time (usually less than 15 minutes). Analysis of grab samples characterizes the quality of a storm water discharge at a given time of the discharge. The following measurements must be made from grab samples:

- pH
- Temperature
- Cyanide
- Total phenols
- Residual chlorine
- Oil and grease
- Fecal coliform
- Fecal streptococcus

Note that measurements of temperature and pH must be taken in the field to avoid time-dependent changes that may occur between sampling time and actual analyses

Flow-weighted composite samples: single unit volumes composed of a mixture of samples collected proportional to flow throughout the entire runoff event or at least for the first three hours of the storm water event, if it lasts more than three hours. The flow-weighted composite sample must consist of at least three discrete aliquots per hour from the storm water discharge, or a continuous sampler may be used.

All parameters (see Exhibits 5-2, 5-3, 5-4) not listed under the description of grab samples above must be analyzed from flow-

weighted composite samples Details on taking flow-weighted composite samples may be found in the EPA *Storm Water Sampling Guidance Document*.

5.3.5 Additional Quantitative Data

Section 122 26(d)(2)(iii)(A) concludes with a provision that allows the permitting authority to request additional quantitative data if necessary to determine permit conditions.

> **§122 26 (d)(2)(iii)(A)(4)** Additional limited quantitative data required by the Director for determining permit conditions (the Director may require that quantitative data shall be provided for additional parameters, and may establish sampling conditions such as the location, season of sample collection, form of precipitation (snow melt, rainfall) and other parameters necessary to insure representativeness),

To ensure the storm water discharge system is accurately represented, the permitting authority may require that quantitative data include additional parameters and may establish specific sampling conditions, such as:

- Location where the sample is taken;
- Season of sample collection;
- Form of precipitation (snowmelt, rainfall);
- Evidence of impact to aquatic ecosystems, or
- Other parameters necessary to ensure the system is accurately characterized.

The data generated from the qualitative and quantitative analyses described under §122.26 (d)(2)(iii)(A) will be used to calculate the annual pollutant loads and event mean concentrations for each pollutant as described in subsequent parts of this section Estimates of annual pollutant loads and event mean concentrations would then be used to assist in establishing storm water management priorities and selecting BMPs

5.4 ESTIMATION OF SYSTEM-WIDE EVENT MEAN CONCENTRATIONS AND ANNUAL POLLUTANT LOADS

The applicant must submit estimates of the event mean concentration and annual pollutant load of the cumulative discharges to waters of the United States from all identified municipal outfalls.

> **§122.26(d)(2)(iii)(B)** Estimates of the annual pollutant load of the cumulative discharges to waters of the United States from all identified municipal outfalls and the event mean concentration of the cumulative discharges to waters of the United States from all identified municipal outfalls during a storm event (as described under §122 21(g)(7)) for BOD_5, COD, TSS, dissolved solids, total nitrogen, total ammonia plus organic nitrogen, total phosphorus, dissolved phosphorus, cadmium, copper, lead, and zinc Estimates shall be accompanied by a description of the procedures for estimating constituent loads and concentrations, including any modelling, data analysis, and calculation methods,

Estimates of annual pollutant loads will be somewhat imprecise; however, municipalities should exercise best professional judgement in deriving these estimates A description of what assumptions were made to derive pollutant loadings must be included.

Under §122.26(d)(2)(iii)(B) (see box above) applicants must provide the following:

- Estimates for the event mean concentration for pollutants listed in Exhibit 5-5 below, which can be used to estimate the annual pollutant load associated with all municipal outfalls identified under §122 26(d)(1)(iii) and (d)(2)(ii);

- A description of the procedures for estimating constituent loads and concentrations, and
- Details on data analysis, models used, and calculation methods

Data sources and procedures that municipal applicants may use to estimate event mean concentrations and annual pollutant loads of the cumulative discharges are discussed below.

The primary purpose for estimating annual pollutant loads and event mean concentrations is to assign priorities for implementing BMPs. Municipalities should consider the magnitude of individual pollutant loadings when assigning priorities to resources to reduce these loadings The areas receiving the highest priority for implementation of BMPs will be those portions of the MS4 that appear to contribute the largest load of pollutants to the system Therefore, it is the relative value of these calculations that is of importance within this regulation, not the absolute value

Over time the accuracy of the available methods to calculate loads and concentrations will improve and the use of these estimates may assume a larger role in determining permit conditions and estimating the success of the comprehensive municipal storm water management program The emphasis for now, however, is on the application of the most practicable methods to reasonably estimate annual loads and event mean concentrations.

5.4.1 Data Sources

The Part 1 application requires municipalities to submit all existing storm water sampling data, along with all relevant water quality data, sediment data, fish tissue or other biosurvey data taken over the past 10 years. All historical data must accompanied by a narrative description of the watershed served by the outfall from which the data are obtained, a description of the sampling and quality control program, and the monitoring location of the receiving water

To estimate an annual pollutant load for a given pollutant, a value must be derived for the average concentration, or event mean concentration, of that pollutant. To derive this value, applicants may use either site-specific data, or data from a national or regional study, such as NURP.

Municipalities with adequate historical data may choose to use these data to estimate annual pollutant loads in the Part 2 application. However, many applicants may not have enough site-specific data to develop valid estimates These applicants may choose to use generic data (e.g., from regional and national studies), such as the data provided in the NURP study. The NURP study's estimated range of detected concentration for specific pollutants is summarized in Exhibit 5-6.

Exhibit 5-5: Pollutants for which Event Mean Concentrations and Annual Pollutant Loads Must be Calculated

Pollutant	Pollutant
BOD_5	Total phosphorus
COD	Dissolved phosphorus
TSS	Cadmium
Dissolved solids	Copper
Total nitrogen	Lead
Total ammonia plus organic nitrogen	Zinc

Source 40 CFR 122 26(d)(2)(iii)(B) (55 FR 48070, November 16, 1990)

Exhibit 5-6. NURP Study Range of Detected Concentration for Specific Pollutants

Parameter	Concentrations µg/L
Metals and inorganics:	
Antimony	2.6 - 23
Arsenic	1 - 50.5
Beryllium	1 - 49
Cadmium	1 - 14
Chromium	1 - 90
Copper	1 - 100
Cyanides	2 - 300
Lead	4 - 23,000
Nickel	1 - 182
Selenium	0.2 - 0.8
Zinc	10 - 2400
Pesticides:	
Alpha-hexachlorocyclohexane (alpha-BHC)	0.027 - 0.10
Alpha-endosulfan	0.008 - 0.20
Chlordane	n/a
Lindane (gamma-BHC)	0.007 - 0.1
Halogenated aliphatics:	
Methane, dichloro-	5 - 14.5
Phenols and cresols:	
Phenol	1 - 13
Phenol, pentachloro-	1 - 115
Phenol, 4-nitro	1 - 37
Phthalate esters:	
Phthalate, bis(2-ethylhexyl)	4 - 62
Polycyclic aromatic hydrocarbons:	
Chrysene	0.6 - 10
Fluoranthene	0.3 - 2
Phenanthrene	0.3 - 10
Pyrene	0.3 - 16

Source. U.S. Environmental Protection Agency, *Results of the Nationwide Urban Runoff Program*, EPA Planning Division (National Technical Information Service (NTIS) Accession No. PB84-8552). December 1983

The applicant should be aware of limitations associated with data from national and regional studies before deciding on methods to estimate pollutant loadings In some cases, it may be more appropriate to use any available site-specific data rather than data from national or regional studies. For example, the NURP study did not collect pollutant concentration data from industrial areas. In this instance, even limited site specific concentration data from industrial areas may be more meaningful.

EPA encourages applicants to seek data from a variety of sources to better characterize the quality of their storm water discharges. Regardless of the data source, a description of the procedures for estimating constituent loads and concentrations, including any modeling, data analysis, and calculation methods, must be included

There will be a degree of uncertainty associated with estimating pollutant loadings in the Part 2 application The requirement to calculate pollutant loadings and concentrations is intended to be a planning and screening effort to assign program priorities, and not necessarily to determine absolute values.

5.4.2 Event Mean Concentrations

Event mean concentrations (C, in Equation 1 on page 5-16) are determined from analyses of flow-weighted composite samples collected from each of the designated field screening points. Section 2 2 4 of the *Storm Water Sampling Guidance Document* describes procedures for collecting flow-weighted composite samples (EPA, 1992a). Concentration values must be reported in the applicant's Part 2 Permit Application for each representative storm event sampled. The applicant should report the average of these results as the event mean concentration for each parameter measured Municipalities are encouraged to present data in a tabular format However, the applicant has flexibility to present the data in other ways, provided the data is clearly presented.

As stated previously, applicants must sample storm events for at least three hours, or for the entire storm event if it lasts less than three hours If a storm event lasts more than three hours, the applicant may choose among three approaches for calculating the event mean concentration of the storm First, the applicant may report the event mean concentration for the first three hours of the event (or longer, if the applicant monitored more than three hours). Second, if the applicant has data available on the correlation between flow and concentration which allows it to be more specific about the event mean concentration, an estimation technique may be used to derive the event mean concentration. If the applicant uses such an estimation technique, the methodology must be explained Third and finally, the applicant may monitor the entire storm event and report the actual event mean concentration.

Whichever approach the applicant uses, the same method should be used to derive event mean concentrations in the future. This will assist the applicant in identifying meaningful trends in changes in event mean concentrations over time.

5.4.3 Annual Pollutant Loadings

Municipalities may choose from a variety of acceptable procedures for estimating the annual pollutant loads of the cumulative discharge. This guidance contains an example of calculating the annual pollutant loads using the "simple method," which is adapted from Schueler (1987). The guidance also discusses some dynamic models that applicants may wish to employ.

Regardless of which method applicants choose, they must describe and document the specific technique used. The description should include (but is not limited to) the key equations used to calculate reported values, such as.

- Assumptions for selecting site-specific parameters (e g., runoff coefficients),

- References to any source documentation (e g , previously completed studies or reference textbooks), and

- Justification for any assumed parameter values

The Simple Method

The following method of computing pollutant loadings is referred to as the "simple method" and is adapted from Schueler (1987). For purposes of satisfying Part 2 application requirements, the simple method provides a quick and reasonable estimate of pollutant loadings with a minimal amount of data required Although the regulations require a system wide (cumulative) annual pollutant load calculation for each of the pollutants listed in Exhibit 5-5 (above), the single pollutant load values provide limited insights into potential problem areas and what BMPs might yield the best results. Consequently, the municipality may want to consider using the simple method to estimate "individual" pollutant loadings from drainage areas The individual pollutant loadings can be aggregated to derive a cumulative annual pollutant loading for the entire MS4 In the procedure below, for example, Step 1 computes the annual loading for each outfall of the MS4 Then in Step 2, the resulting pollutant loadings are summed to derive annual pollutant loads on a per-watershed basis In Step 3, the annual pollutants loads for each watershed are summed to derive a system-wide annual pollutant load.

As stated above, this procedure is only one example of how a municipality could calculate a system-wide annual pollutant load. Estimates of annual pollutant loads for individual outfalls, watersheds, or other discrete areas are not specifically required by the regulations However, municipalities will find such estimates helpful in making relative comparisons among different areas of the MS4 Ultimately, these estimates could assist the municipality with selecting BMPs and assigning priorities to potential problem areas

Step 1: Use the Simple Method to Calculate Annual Pollutant Loads on a Per-Outfall Basis

The first step in this example is to calculate annual pollutant loads for individual outfalls. However, the applicant may choose to begin by calculating annual pollutant loads for each watershed or other discrete area. As stated above, this example uses the simple method, which is given by the following equation:

EQUATION 1:

$$L_i = \left[\frac{(P)(CF)(Rv_i)}{12}\right](C_i)(A_i)(2.72)$$

where: L_i = Annual pollutant load (lb/outfall/yr)
P = Annual precipitation (in/yr)
CF = Correction factor that adjusts for storms where no runoff occurs (a value of 0 9 is typically used)
Rv_i = Weighted-average runoff coefficient for the area served by the outfall (the calculation of runoff coefficients is discussed below)
C_i = Event mean concentration of pollutant (mg/L)
A_i = Catchment area (acres)

The numbers 12 and 2.72 are conversion factors that account for unit conversions.

Each of the parameters in Equation 1 is defined below:

- **Annual pollutant load** is the total amount of a specific pollutant discharged in pounds per time period (in this case, per year) for the particular segment of the MS4 being modeled (in this case for each outfall) Pollutant loads may also be expressed for alternative time periods, or on a system-wide or watershed basis

- **Annual precipitation** is the total inches of rainfall occurring in a single year plus the contribution of snowmelt Estimates of the annual rainfall can be based on the rainfall data provided in Part 1 of the application

- **Correction factor** is an adjustment factor for the number of storm events that do not actually produce any runoff (i.e., the percentage of storm events that have a total accumulation greater than a specific threshold value). This value will vary by region. Without this adjustment factor, the municipality would be assuming that all storm events produce runoff, which may or may not be the case. A typical value for this correction factor is 0.9 (90%). However, this value can vary between climatic regions. Municipalities should review historical rainfall data to estimate the percentage of storm events that produce runoff versus the number of storm events per year.

- **Weighted-average runoff coefficient** is a relative measure of imperviousness or the percentage of rainfall that becomes surface runoff Runoff coefficients are a function of the type of surface, intensity of the rainfall, the degree of soil saturation and storativity (storage capacity) of the soil. To determine runoff coefficients, the municipality may use Equations 2 or 3 (which follow). Alternatively, the municipality may use actual field measurements, relevant hydrologic studies, average values published in civil engineering reference manuals, or default values provided in Exhibit 3-12 of EPA's *NPDES Storm Water Sampling Guidance Document*

- **Event mean concentration of pollutant** is the event mean concentration value for the specific pollutant determined from the analysis of flow-weighted composite samples. Equation 1 requires a value for each pollutant concentration As discussed previously, the applicant may use site-specific concentration data (e g , storm water sampling data) or generic (e g , NURP) data to derive event mean concentrations In other words, the applicant should use best professional judgement to decide which of the following concentration values to use

  - a mean concentration value from the NURP study;

    OR

  - an average of all event mean concentrations from all samples over three representative storm events;

    OR

  - an event mean concentration attributable to a specific land use activity

  The applicant will have to consider the extent of the variability of the data when selecting an appropriate concentration value. NURP or other regional studies used to estimate pollutant concentrations can be compared to existing site-specific data in order to assess the uncertainty associated with generic approaches.

- **Catchment area** is the size of the drainage area for the particular segment of the MS4 being modeled (in this case, the outfall drainage area). Areas that are served by combined sewers or that are not otherwise served by the MS4 should not be included

Weighted-average runoff coefficient. Runoff coefficients can be based on flow measurements or estimated from land use characteristics. In order to determine an average runoff coefficient for an area with a diversity of land

use activities, the following equation should be used to estimate a weighted-average runoff coefficient

EQUATION 2

$$Rv_i = \frac{(\sum A_i R_v)}{\sum A_i}$$

where. Rv_i = Weighted-average runoff coefficient
A_i = Catchment area (acres)
R_v = Catchment runoff coefficient

As an alternative to Equation 2, Equation 3 can be used to estimate weighted-average runoff coefficients from percent imperviousness data (Shelley, 1986)

EQUATION 3

$$Rv_i = 0.05 + 0.009 * I$$

where. Rv_i = Weighted-average runoff coefficient
I = Percent imperviousness

The percent imperviousness can be estimated from land use data Residential land can be assumed to be 24% impervious, commercial land 75% impervious; industrial land 55% impervious; and open space 15% impervious The percent imperviousness of residential land was estimated from the following empirical equation of NURP and USGS data, which relates population density to percent imperviousness

EQUATION 4

$$I = 9 * D^{0.5}$$

where I = Percent imperviousness
D = Population density (persons/acre)

Similar to Equation 1, individual parameters for Equations 2, 3, and 4 can be used on a system-wide basis, or modified to reflect more realistic conditions within smaller or discrete segments (e g , individual watersheds or outfalls).

Step 2. Use the Per-Outfall Annual Pollutant Loads to Calculate Per-Watershed Annual Pollutant Loads

If the simple method is used to compute the annual loading on a per-outfall basis, Equation 5 may be used to estimate annual pollutant loadings on a per watershed basis. The approach of computing pollutant loadings on a watershed basis is used by some counties where larger watersheds are segregated into smaller watersheds or drainage areas on the basis of similar land use designations One county uses this method in conjunction with forecasts of future development within the county to develop preliminary estimates of future pollutant loadings This approach minimizes the possibility of computing an annual pollutant loading that is too conservative.

EQUATION 5

$$L_w = \sum L_i$$

where: L_w = Annual pollutant load for a particular watershed
ΣL_i = Summation of individual annual pollutant loadings from all major outfalls within a specific watershed

Step 3: Use the Watershed-Based Annual Pollutant Loads to Calculate System-Wide Annual Pollutant Loads

To calculate the annual loadings system-wide, use the following equation

EQUATION 6

$$L_n = \sum L_w$$

where L_n = Annual pollutant load for an entire MS4

ΣL_w = Summation of individual annual pollutant loadings from all watersheds within a municipal separate storm sewer system

Dynamic Models

In instances where a municipality has a significant amount of historical data for the drainage areas serviced by storm sewer outfalls, including historical precipitation data and receiving water concentration and flow data, the MS4 may elect to use dynamic models to derive pollutant loads and to analyze the effects of MS4 discharges on receiving waters.

Dynamic models are designed to calculate a complete probability distribution for the output being modeled Therefore, dynamic models take into consideration the inherent variability of data associated with MS4 discharges, such as variations in concentration, flow rate, and runoff volume

One benefit of using a dynamic model is that the calculation of a complete probability distribution allows the modeler to consider a multitude of "what-if" scenarios. For example, when sufficient historical data is available, the modeler could consider the benefits and risks associated with alternative BMP strategies.

Dynamic models have one additional benefit over steady-state models in that dynamic models determine the entire discharge concentration frequency distribution. Consequently, this would enable the modeler to examine the effects of storm water discharges on receiving water quality in terms of the frequency by which water quality standards may be exceeded For purposes of computing pollutant loadings, a number of models are available including EPA's Stormwater Management Model (SWMM) and Hydrologic Simulation Program (HSPF), U S Army Corps of Engineers' Storage, Treatment, Overflow, Runoff Model (STORM), and Illinois State Water Survey's Model QILLUDAS (or Auto-QI).

Regardless of the method employed, the applicant must document how pollutant loadings are derived Applicants must provide estimates of annual pollutant loads and event mean concentrations for each outfall with their Part 2 applications. However, some outfalls will need to be more completely characterized, and conditions will change after the permit is approved. This is one reason why, as described in Section 5.4, data collection will continue throughout the term of the permit. Estimates of the individual contribution of pollutant loadings for each watershed or major outfall will help the applicant select priorities for specific watersheds.

5.5 PROPOSED SCHEDULE FOR SEASONAL LOADS AND REPRESENTATIVE EVENT MEAN CONCENTRATIONS OF MAJOR OUTFALLS

§122.26(d)(2)(iii)(C) A proposed schedule to provide estimates for each major outfall identified in either paragraph (d)(2)(ii) or (d)(1)(iii)(B)(1) of this section of the seasonal pollutant load and of the event mean concentration of a representative storm for any constituent detected in any sample required under paragraph (d)(2)(ii)(A) of this section;

Seasonal pollutant loads are important because they are a more accurate representation of loadings that may occur during a short time interval. To further refine the annual pollutant load estimates, Part 2 requires the applicant to propose a schedule to estimate seasonal

pollutant loadings and event mean concentrations for each major outfall

The quality of the data available when the Part 2 application is prepared will affect the accuracy and usefulness of the initial estimates of pollutant loadings and average concentrations These estimates can be improved as more site-specific data are collected during the term of the permit. A long-term site specific monitoring program will capture the variability in data that is essential to estimate more accurate pollutant loadings over time. Therefore, the impacts associated with these loadings can also be estimated with greater certainty. In addition, a site specific record collected over a longer time frame allows the effectiveness of the comprehensive municipal storm water management program to be evaluated

Estimates must be submitted for any contaminant detected in any sample required under the Part 2 sampling effort [§122.26(d)(2)(iii)(B)]. Seasonal pollutant load estimates are required for any pollutants listed in Exhibits 5-2, 5-3, and 5-4 that were detected during the sampling procedure described in Section 5 3.4. Therefore, the analyses required for seasonal pollutant loads will potentially be more comprehensive than the analyses of annual pollutant loads This results from the possibility that additional pollutants will be detected as part of the storm water characterization studies.

In some regions, precipitation patterns vary significantly from season to season, resulting in significantly different pollutant loadings throughout the year. In arid and semi-arid parts of the country, pollutants accumulate during dry spells, resulting in significantly higher pollutant concentrations in storm water discharges after extended dry weather Because of the buildup of accumulated pollutants, pollutant concentrations in discharges from MS4s are typically highest during the "first flush," or initial discharge

In other regions, pollutants that accumulate in snow may lead to high pollutant concentrations in runoff from the spring thaw Therefore, using an annual average pollutant loading might disguise the impact of shock loadings (discharges that occur within a very short time period and which often exceed acute toxicity criteria) of certain pollutants. Numerous factors contribute to the total volume of snowmelt runoff including shortwave and longwave radiation, condensation or vaporization, convected heat transfer by wind, heat content of rain water, and conductive heat transfer from the ground. Therefore, for regions with significant snowfall, pollutant loading estimates need to be adjusted to account for the additional volume of runoff attributable to snowmelt.

Since snowmelt runoff can occur in either the presence or absence of a storm event, the computation of seasonal pollutant loadings becomes significantly more complex The determination of total snowmelt runoff, however, is beyond the scope of this manual. Affected municipalities are encouraged to contact the U.S. Geological Survey or the Army Corps of Engineers for historical data on snowmelt runoff.

The effects of pollutant load can also vary by season Nutrient pollutant loads from storm water discharges can promote algal blooms in receiving waters during the spring and summer, but they may be of little consequence during winter in surface waters with good flushing characteristics. Quantifying seasonal variations in pollutant loads may aid the development of more cost-effective storm water management programs.

Pollutant loads also may vary significantly from one outfall to another. Within a drainage area, the type of land use, the percent of surface that is impervious, and the extent of exposure of storm water to contaminants affect the pollutant load from an outfall. Procedures for estimating seasonal pollutant loadings must be proposed for major outfalls only

Under §122.26(d)(2)(iii)(C) the regulation requires a schedule to provide estimates of:

- The seasonal pollutant load for each identified major outfall.
- The event mean concentration of a representative storm for any constituent detected in any sample required.

The following steps can be taken to develop a proposed schedule for estimating seasonal loadings at major outfalls:

1. Use historical or long-term hydrologic data to define seasons.
2. Describe the procedure to be used to estimate seasonal loads. This could be an adaption of the simple method or another mathematical model used for annual loads (e.g., instead of using a total annual rainfall accumulation, use an average rainfall accumulation associated with a specific season). If the simple method is used, the municipality could still use Equation 1. However, the amount of rainfall (P) would no longer be an annual value. Instead, it would be the amount of rainfall associated with a particular season defined by the municipality. In addition, the applicant may have to adjust the average runoff coefficient to reflect seasonal changes (e.g., frozen ground can behave like an impervious surface and substantially increase the amount of runoff). Lastly, substantial differences in the frequency and duration of seasonal storm events may increase or decrease the correction factor CF (e.g., during a dry season, the number of storms that actually produce runoff may be substantially lower than during a wet weather season).
3. Identify data elements that need to be refined. In cases where there is substantial seasonal variation, revised runoff coefficient values may be necessary For example, during rainy seasons, ground surfaces are more saturated than during the dry season As a result, the same amount of rainfall in the wet season will lead to a greater volume of storm water runoff than in the dry season.
4. Proposed procedures for collecting the appropriate data or otherwise improving estimates.
5. Provide an approximate time frame for data collection and submission of seasonal load estimates.

Proposed procedures for estimating seasonal pollutant loadings and event mean concentrations should explain when and how data used for the estimates will be obtained. The data can be based on site-specific information, or they can be obtained from municipal systems with similar characteristics (such as Regional NURP data).

5.6 COLLECTION OF REPRESENTATIVE DATA FOR PROPOSED MONITORING PROGRAM FOR THE TERM OF THE PERMIT

Under §122.26(d)(2)(iii)(D), applicants are given the opportunity to propose monitoring programs to be carried out during the term of the permit.

> §122.26(d)(2)(iii)(D) A proposed monitoring program for representative data collection for the term of the permit that describes the location of outfalls or field screening points to be sampled (or the location of instream stations), why the location is representative, the frequency of sampling, parameters to be sampled, and a description of sampling equipment.

Applicants should consider their specific needs and identify priorities for the proposed

monitoring program After receiving the Part 2 application, the permitting authority will review proposed monitoring programs and make appropriate adjustments when establishing permit conditions

The applicant must propose a monitoring program for representative data collection for the term of the permit that describes·

- The location of outfalls or field screening points to be sampled (or the location of instream stations);
- Why the location is representative;
- The frequency of sampling;
- Parameters to be sampled, and
- A description of sampling equipment.

Municipalities must submit sampling data over the life of a permit so that changes in storm water quality can be assessed Like initial sampling data, the data from an ongoing monitoring program can be used by the municipality to allocate resources to achieve reduction in pollutants The monitoring data will also serve as an environmental indicator of the success of the storm water management program. Many municipalities may require an extended period of time (possibly the entire permit term) and substantial data to definitively evaluate the effectiveness of a storm water management program. Therefore, a plan for data collection must be proposed by the municipality for the five-year term of the permit. During the permit term, the results of the monitoring program will be submitted in the municipality's annual report [§122.42(c)(4), discussed in Section 7.3 of this guidance].

5.6.1 Goals of a Monitoring Program

The first and most important step in developing a proposed monitoring program is to define the program's objectives as clearly as possible Development of monitoring program goals should be closely coordinated with development of the proposed storm water management program Applicants are required to propose monitoring programs as part of their proposed management programs to reduce pollutants from industrial site runoff. The monitoring plan is part of *Characterization Data* [§122 26(d)(2)(iii)]. The storm water management program is discussed in Section 6.

A comprehensive monitoring program should be designed to support specific goals, including·

- Characterizing discharges;
- Evaluating the source of specific pollutants,
- Evaluating the performance of specific source controls; and
- Identifying the full range of chemical, physical, and biological water quality impacts.

5.6.1.1 Characterizing Discharges

Monitoring pollutants in discharges from MS4s serves several purposes. Quantitative data on specific pollutants in storm water runoff can support estimates of annual and seasonal pollutant loadings and modelling efforts to identify the magnitude of water quality impacts. Over the long term, monitoring data may suggest that new outfalls should be selected for sampling As municipalities gain experience in storm water sampling, they likely will target BMPs that achieve the greatest improvements in storm water quality.

5.6.1.2 Evaluating the Source(s) of Specific Pollutants

Some sources of storm water (e.g., industrial sources that must be covered by NPDES permits, highways with heavy traffic flows, and large parking lots) are expected to generate significantly higher concentrations of pollutants than typical urban runoff. Monitoring efforts to quantify sources of

priority pollutants can provide support for resource allocations to address pollutant sources posing the greatest environmental risk How proposed monitoring efforts will be structured to identify and quantify pollutant sources should be discussed in proposed storm water management programs.

The monitoring program may also include procedures to conduct dry-weather monitoring over the term of the permit to help detect illicit discharges and improper dumping. This can include recording visual observations and odors observed in dry weather flows.

5.6.1.3 Evaluating the Performance of Specific Controls

Pollutant removal efficiencies are fairly well known for certain structural BMPs. However, sampling may still be necessary to ensure that the BMP is meeting original design expectations The expected pollutant removal efficiency for a structural control must take into account site-specific conditions For example, an infiltration basin has a certain expected pollutant removal efficiency, but actual field efficiency is affected by subsurface soil conditions and the extent and frequency of maintenance

The efficiency of a particular structural control will be affected by many factors, such as detention time. However, efforts to determine the efficiency of structural controls must include consideration of pollutant concentrations and flow volumes into and out of the control. The efficiency of nonstructural source controls can be characterized by comparing discharges at a given location before and after the control measures are implemented. Over time, sufficient monitoring data may be gathered to draw substantive conclusions about the effectiveness of certain BMPs. Alternatively, discharges from a sampling site with source controls can be compared with discharges from a similar site that lacks source controls Efforts to monitor the effectiveness of controls should be closely coordinated with the assessment of control efficiencies discussed in Chapter 7

5.6.1.4 Identifying the Full Range of Chemical, Physical, and Biological Water Quality Impacts

Characterizing the effect of storm water discharges on water quality is complicated by a number of factors. EPA recommends an integrated approach to assessing water quality impacts associated with discharges from MS4s Monitoring procedures that help assess water quality impacts include:

- Discharge and receiving water monitoring to support water quality models and to identify hydraulic impacts of increased peak flows and to identify parameters of concern, and
- In-stream monitoring of water chemistry;
- Bioassessments and biosurveys; and
- Sediment sampling

<u>Discharge and Receiving Water Monitoring to Support Water Quality Models</u>

As discussed above, when there is sufficient historical data available from monitoring, these data may be used as inputs to models that predict or validate the effects of pollutant loadings from MS4s on receiving water quality characteristics. In addition to monitoring data, data on receiving water quality characteristics are also necessary to calibrate a particular model.

Once the model has been calibrated to reflect site-specific conditions, future monitoring data could be used to validate long term reductions in pollutant loadings, the effectiveness of nonstructural BMPs, and/or pollutant removal efficiencies of existing structural controls

The information gathered from this approach may also help define those BMPs that which appear to be the most effective. For example, in developing areas, monitoring data could eventually support future planning efforts that would seek to minimize the impact of future development on local receiving waters.

In-stream Monitoring

Using models to estimate pollutant concentrations in receiving waters can be inaccurate In-stream monitoring can directly measure pollutant concentrations. General designs for in-stream monitoring are:

- **Monitoring above and below a set location** This method is generally more useful for evaluating control effectiveness than documenting the severity of a diffuse source of pollutants

- **Monitoring at different times** Monitoring at different times and seasons can provide valuable information on seasonal variations in pollutant concentrations Dry weather in-stream monitoring can be compared with in-stream monitoring during storm events

- **Paired watersheds.** Evaluating similar water bodies can document management program improvements by controlling for meteorologic and hydrologic variability. This approach can also be used to compare receiving waters to background conditions associated with undeveloped watersheds

Detailed guidance on applying these approaches is provided in the draft *Nonpoint Source Monitoring and Evaluation Guide*, February 26, 1988. Nonpoint Source Branch, U S EPA

Bioassessments and Biosurveys

A biological assessment, or "bioassessment," is an evaluation of the biological condition of a water body using biological surveys and other direct measurements of resident biota in surface waters. A biological survey or "biosurvey," consists of collecting, processing, and analyzing representative portions of a resident aquatic community to determine the community structure and function Biosurveys and bioassessments can be used directly to evaluate the overall biological integrity (structure and/or functional characteristics) of an aquatic community Deviations from the biological integrity can be measured directly using biosurveys only when the impacted community is compared against a predetermined reference condition. Without the proper reference conditions, biosurveys may underestimate the extent of impairment.

Biosurveys are useful in that they can assess or detect the aggregate effect of impacts upon an aquatic community where discharges are multiple, complex, and variable, and where point, nonpoint, and storm water discharges are all affecting the biological condition of the receiving water Because of this, biosurveys cannot measure the impacts of one particular discharge or effluent being discharged to receiving waters. Currently, biosurveys cannot be used as a predictive water quality assessment tools.

Biosurveys provide a useful monitor of both aggregate ecological impact and historical trends in the condition of an aquatic ecosystem They can also detect impacts that other assessment methods may miss. More importantly, biosurveys can detect impacts caused by habitat degradation such as channelization, sedimentation, and historical contamination that disrupt the interactive balance of the components of the aquatic community

Sediment Sampling

Pollutants, both organic and inorganic, associated with storm water discharges may become physically or chemically bound with sediment particles Depending upon the size distribution of the sediment particles, a portion of the contaminated sediment particles will settle out of the water column Consequently, the potential exists for a buildup of contaminated sediment over time. The effects of heavily contaminated sediments on both benthic habitat and water quality have been documented to the extent that EPA is developing sediment quality criteria (SQC) that will allow assessments of the toxicological effects of contaminated sediments on varying types of receiving waters.

The amount of sediment material found in storm water discharges suggests that applying sediment quality criteria could be a useful component of a monitoring program. For example, sediment quality criteria could be a valuable preventative tool to ensure that point source discharges of storm water do not cause or contribute to the contamination of sediments

In addition, a MS4 could make comparisons of field measurements to sediment quality criteria as a means of providing an early warning of a potential problem. Consequently, an early warning could provide an opportunity to take corrective action to prevent further contamination For long term planning, consideration could also be given to the feasibility of establishing target levels or goals that would ensure that point sources discharges of storm water do not contribute to sediment contamination

5.6.2 Monitoring Procedures

Monitoring procedures will depend on the objectives of the monitoring effort To a large extent, the type of receiving water will be an important factor in developing monitoring procedures and techniques. For example, grab samples may be appropriate for monitoring discharges from a retention pond, while composite samples may be appropriate for monitoring flows into the pond The following information, at a minimum, should be included for each sampling site.

- The criteria for storm selection,
- Whether grab, composite, continuous, or other sampling techniques are to be used,
- The criteria on when to begin and end sample collection;
- The basis for selecting the time interval between sequentially collected samples,
- How seasonal factors affect the selection of monitoring frequencies,
- The method of estimating rates or volumes of flow passing the sampling point, and
- The analytical methods used for analyzing pollutant parameters and their detection limits

Location of Monitoring Sites and Description of Drainage Basins

The selection of monitoring sites should depend on the goals of the monitoring program. Applicants should identify the location of each proposed monitoring site and the boundary of its drainage basin. They should describe the estimated size and land use characteristics of the drainage basin for each sampling location The applicant also should explain why the sampling sites are representative or will otherwise provide information to support a monitoring program goal. Other monitoring sites can be selected to evaluate unique conditions in the drainage area that have significant or unusual potential for generating pollutants in storm water discharges

Samples should be analyzed in accordance with the analytical methods approved under 40 CFR Part 136

Parameters to be Analyzed

The applicant must list all parameters to be analyzed, which should depend on the objective of the sampling effort. For example, it may only be necessary to monitor several indicator parameters (such as TSS, settleable solids, nutrient, and a metal) to characterize the pollutant removal efficiency of a wet pond.

Sampling Equipment

The applicant must describe the equipment to be used in the proposed sampling program. Only the primary pieces of equipment need be identified. Descriptions can be made by reference to equipment supplied by a vendor or manufacturer if distinctive enough to be readily identified.

CHAPTER 6
PROPOSED MANAGEMENT PROGRAM

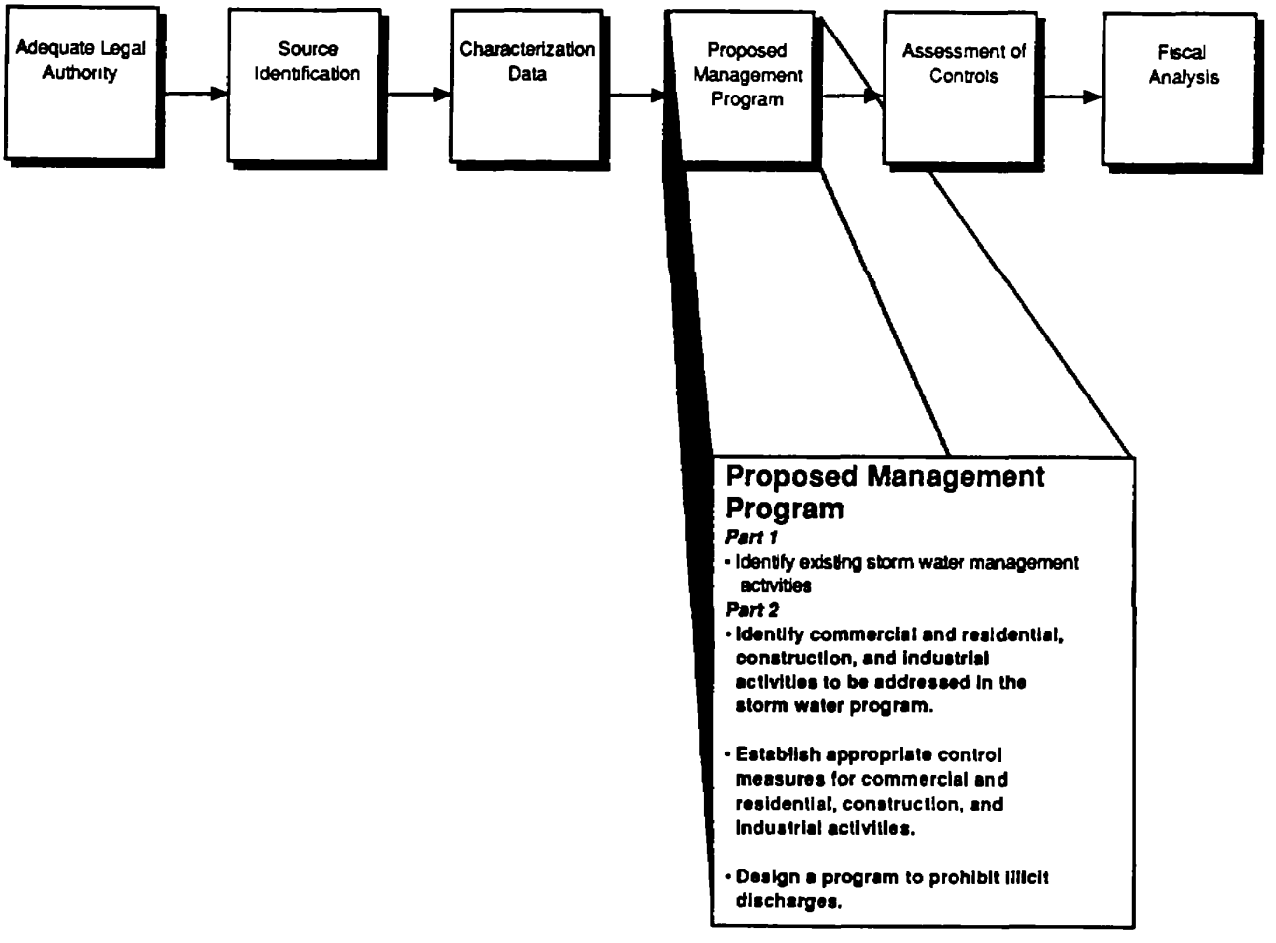

6.0 PROPOSED MANAGEMENT PROGRAM

6.1 BACKGROUND

Under the Part 2 application requirements, municipalities must propose site-specific storm water management programs. This is the most important aspect of the permit application. The Part 2 application requirements provide each MS4 with the flexibility to design a program that best suits its site-specific factors and priorities.

The regulations require the applicant to provide a description of the range of control measures considered for implementation during the term of the permit. Applicants must meet all the requirements of the Part 2 application regulation. However, flexibility in developing permit conditions is encouraged by allowing municipalities to emphasize the controls that best apply to their MS4. For example, a municipality that expects significant new development may focus more on requirements for new development and construction, while a municipality that does not expect significant new development may focus more on a program to prohibit illicit discharges or control industrial contributions. In any case, a satisfactory proposed management program will address· management practices; control techniques and systems; design and engineering methods, and other measures to ensure the reduction of pollutants to the "maximum extent practicable (MEP)."

If the municipality proposes a thorough and complete program, the permitting authority is likely to incorporate all or part of the proposed management program into the NPDES storm water permit written for that municipality Therefore, the proposed programs provide municipalities with the opportunity to have substantial input into their NPDES permit conditions.

This section of the guidance manual describes the minimum information requirements for proposed storm water management programs. Examples of how the program elements should be addressed are provided. These examples illustrate minimum information requirements for the program elements, and occasions when municipalities may opt to go beyond minimum requirements in order to meet the MEP standard

6.2 SUMMARY OF REGULATORY REQUIREMENTS

The municipality must develop and submit a proposed management program that covers the duration of the permit The program must integrate the information and actions described in the Part 1 application and portions of the Part 2 application (see Chapters 3, 4, and 5 of this guidance). The regulatory requirements for the proposed management program are in 40 CFR 122.26(d)(2)(iv)

At a minimum, the proposed management program must include:

- A comprehensive planning process that involves both public participation and intergovernmental coordination;
- A description of management practices, control techniques, and system design and engineering methods to reduce the discharge of pollutants to the MEP; and
- A description of staff and equipment available to set up and assess the storm water management program.

Additional provisions under §122 26(d)(2)(iv)(A) require applicants to include:

- Programs to control storm water runoff from commercial and residential areas, construction sites, and industrial

facilities (including waste handling sites), (Section 6 3),

- Identification of structural control measures to be included in these proposed programs, such as detention controls, infiltration controls, and filtration controls that the municipality plans to apply to the activities addressed in its storm water management program (Section 6.4); and

- Programs to detect and remove illicit discharges, and to control and prevent improper disposal into the MS4 of materials such as used oil or seepage from municipal sanitary sewers (Section 6.5).

6.3 PROGRAMS TO CONTROL STORM WATER RUNOFF FROM COMMERCIAL AND RESIDENTIAL AREAS, CONSTRUCTION SITES, AND INDUSTRIAL FACILITIES

A proposed management program must identify the activities or areas that require controls to reduce pollutants in storm water runoff Specifically, a proposed management program must address storm water runoff from **commercial and residential areas** (Section 6.3.1), **construction sites** (Section 6.3.2), and **industrial facilities** (Section 6.3 3). Also, areas where illicit connections or illegal discharges may occur must be identified (Section 6.5).

In addition to the requirements of the proposed storm water management program, other provisions of the Part 1 and Part 2 applications require information that will help enable the municipality to focus on identifying activities and areas that may need control measures Examples of these provisions include

- Identification of sources [Part 1, §122 2(d)(1)(iii)(B)(3)-(4), and Part 2, §122 26(d)(2)(ii)];

- Identification of water bodies that may be adversely affected by storm water runoff [Part 1, §122 26(d)(1)(iv)(C)],

- Organization of sources by watershed [Part 2, §122 26(d)(2)(ii)],

- Description of land use activities [Part 1, §122 26(d)(1)(iii)(B)(2)];

- Results of field screening analysis [Part 1, §122 26(d)(1)(iv)(D)];

- Results of the sampling program [Part 2, §122 26(d)(2)(iii)(A)(3)],

- Estimates of annual pollutant loads and event mean concentrations, and schedules to submit seasonal pollutant loads and event mean concentrations [Part 2, §122.26(d)(2)(iii)(B) and (C)], and

- Findings from an on-going monitoring program [Part 2, §122 26(d)(2)(iii)(D)].

6.3.1 Commercial and Residential Activities

Under §122.26(d)(2)(iv)(A), applicants must propose structural and source control measures to reduce pollutants from commercial and residential areas.

> **§122.26(d)(2)(iv)(A)** [The proposed management program must include a] description of structural and source control measures to reduce pollutants from runoff from commercial and residential areas that are discharged from the municipal storm sewer system that are to be implemented during the life of the permit, accompanied with an estimate of the expected reduction of pollutant loads and a proposed schedule for implementing such controls

To ensure that proposed control measures are effective, the applicant should study how storm water runoff from pollutant sources affects the existing municipal system, how the proposed

control measures will enhance the existing system, and what impact the proposed measures will have on receiving waters The control measures should recognize and emphasize the interaction between pollutant sources and the physical attributes of the municipal system and receiving waters.

Specific commercial and residential activities that must be addressed include maintenance activities and a maintenance schedule for structural controls to reduce pollutants in storm water runoff. This provision is discussed in Section 6.4.2. Other activities to be addressed include:

- Post-construction controls to reduce pollutants in discharges to MS4s resulting from new development and significant redevelopment (Section 6 3 1 1),
- Practices for maintaining and operating public streets, roads, and highways that will reduce the impact on receiving waters from storm water runoff discharges (Section 6 3 1 2);
- Procedures to assure that the impacts on receiving waters from flood management projects are assessed, and that existing structural control devices have been evaluated to determine if retrofit controls are feasible (Section 6 3.1.3);
- A program to monitor pollutants in runoff from operating or closed municipal landfills that identifies priorities and procedures for inspections and establishing and implementing control measures (Section 6.3 1.4); and
- A program to reduce to the maximum extent practicable, pollutants in storm water runoff associated with the application of pesticides, herbicides, and fertilizer (Section 6 3.1.5).

To reduce pollutants in storm water runoff from commercial and residential activities, a proposed management program might include the use of infiltration devices, detention and retention basins, vegetated swales, water quality inlets (which may include oil and water or oil/grit separators), screens, channel stabilization/riparian habitat enhancement efforts, wetland restoration and preservation projects, as well as various source control strategies and other nonstructural control measures

6.3.1.1 New Development and Significant Redevelopment

Summary of Regulatory Requirement

New development or redevelopment often increases impervious land surfaces, which usually leads to increased pollutant levels in storm water runoff Chemical and thermal changes in storm water runoff are commonly associated with new development and can adversely affect the quality of receiving waters In addition, urbanization results in an increase in the volume of storm water discharges.

The Nationwide Urban Runoff Program (NURP) study (EPA, 1983) and more recent investigations indicate that controlling the contribution of pollutants in storm water discharges at the onset of land development is the most cost-effective approach to storm water quality management Mitigating problems caused by pollutants after they have entered a MS4 is often more expensive and less efficient than preventing or reducing the discharge of pollutants at the source Therefore, a satisfactory proposed management program will propose structural and nonstructural measures to reduce pollutants in storm water discharges from areas of new development and redevelopment Examples of such measures are discussed below

> §122.26(d)(2)(iv)(A)(2) [The applicant must include a] description of planning procedures including a comprehensive master plan to develop, implement and enforce controls to reduce the discharge of pollutants from municipal separate storm sewers which receive discharges from areas of new development and significant redevelopment Such plan shall address controls to reduce pollutants in discharges from municipal separate storm sewers after construction is completed

Provisions under §122.26(d)(2)(iv)(A)(2) focus on the reduction of pollutants in storm water runoff after construction in areas where new development or redevelopment is completed Controls that are required during construction are discussed in Section 6.3 2 of this guidance

Post-Construction Controls

Proposed storm water management programs should include planning procedures for both during and after construction to implement control measures to ensure that pollution is reduced to the maximum extent practicable in areas of new development and redevelopment. Design criteria and performance standards may be used to assist in meeting this objective

Further, storm water management program goals should be reviewed during planning processes that guide development to appropriate locations and steer intensive land uses away from sensitive environmental areas A municipality may, for example, include provisions in the planning process that ensure that all new development in targeted areas or zones provides for a certain percentage of undisturbed area to assist in preserving post-development runoff quality and velocity as similar as possible to pre-development conditions In its Part 2 application, a municipality should describe how it plans to implement the proposed standards (e g, through an ordinance requiring approval of storm water management programs, a review and approval process, and adequate enforcement)

The proposed storm water management program should identify and include **planning procedures and control measures** that will be used in the municipality.

Planning Procedures

Comprehensive planning procedures typically involve incorporation of land use goals and objectives into a plan document or a plan map. These plans are often called Master Plans, Comprehensive Land Use Plans, or Comprehensive Zoning Plans

Comprehensive or master plans are often non-binding. They provide support and direction to local officials that have the authority to make land use decisions

While applicants do not need to submit a complete comprehensive or master plan with the Part 2 application, they should detail the planning process employed by the municipality. They must thoroughly describe how the municipality's comprehensive plan is compatible with the storm water regulations The description should clearly

- Identify management objectives for streams, wetlands, and other receiving waters;
- Identify areas where urban development is likely to occur and areas that are sensitive to the effects of urbanization. Consideration should be given to receiving waters, topography, soil types, ground water uses and potential impacts, and other relevant factors;
- Describe standards such as design criteria and performance standards for storm water controls for new developments, such as buffer zones,

open space preservation, erosion and sediment controls, etc.;

- Describe other measures to minimize the effects of new development on storm water quality (these may include local code and ordinance requirements); and

- Identify or discuss the site development review process for the evaluation and approval of storm drainage or storm water management programs. Requirements in drainage or storm water management programs can be coordinated with review of other related plans such as those for site grading or landscaping.

There will be great variation among municipalities in their sophistication of land use planning If the municipality has recently updated its land use plan, it may detail storm water quality issues In other instances, there may be no policy to include storm water quality considerations in land use decisions. In such cases, the applicant must describe how consideration of those activities that affect storm water quality are to be incorporated into the municipality's comprehensive or master plan and its approval process for construction projects

Control Measures

Most traditional storm water control measures focus on efficient collection and conveyance of storm water runoff to an offsite location This approach can increase downstream property damage due to increased storm water runoff quantity and flow velocity. Corrective action often involves expensive public works projects, such as enlarging and reinforcing channels or constructing swales to provide an adequate outfall from affected or damaged areas The traditional approach has typically involved downstream channel stabilization projects However, these projects may also result in increased storm water runoff quantity and flow velocity.

Some recent approaches to storm water management include preserving the natural features of a watershed by maintaining vegetative cover and establishing buffer zones and open space or green areas. The benefit of employing this approach is the protection afforded to riparian areas and wetlands, as well as the preservation of a stable watershed. One additional benefit from this approach includes maintaining ground water recharge through infiltration. These approaches to storm water management minimize the impact of erosion, flooding, and other damage to natural drainage features such as streams, wetlands, and lakes. Preservation of natural habitat can be achieved through effective storm water quality control measures More recent approaches use storm water to:

- Recharge ground water sources with runoff from impervious areas;

- Preserve baseflows of surface water bodies;

- Augment water supplies used for street cleaning and other municipal functions, such as watering public lawns,

- Increase recreational opportunities including swimming, fishing, and boating; and

- Sometimes, augment drinking water supplies if it is treated and in compliance with all applicable drinking water standards.

The municipality should consider storm water controls and structural concerns in planning, zoning, and site or subdivision plan approval. An example of effective structural control is described in Exhibit 6-1. Non-structural control measures are highly recommended for new development. They can be included during the planning, site-selection, and development stages. Examples of non-structural controls include street sweeping, buffer strip preservation, and public education.

Exhibit 6-1
Storm Water Programs in Delaware and Florida

Delaware requirements for on-site measures include water quality ponds with permanent pools Ponds must be designed to release the equivalent volume of runoff from the first 1/2 inch of runoff from the site over a 24-hour period and have a storage volume designed to accommodate at least 1/2 inch of runoff from the site Water quality ponds without permanent pools may also be used in Delaware's program. These pools are to be designed to release the first inch of runoff from the site over a 24-hour period.

Developers are instructed to consider infiltration practices only after ponds are eliminated for engineering or hardship reasons. Infiltration structures must be designed to accept at least the first inch of runoff from all streets, roadways, and parking lots Other practices may be acceptable if they meet the equivalent removal efficiency of 80 percent for suspended solids. More stringent requirements may be established on a case-by-case basis.

The 80 percent removal efficiency for suspended solids that Delaware requires takes into account pollutant settling. The 24-hour detention period allows for substantial settling where most of the pollutant removal occurs. In addition, the requirement that the first inch of runoff be released over a period of no less than 24 hours reduces downstream erosion

Source Schueler, 1987

For significant redevelopment, municipalities can incorporate both structural and nonstructural storm water controls However, there are generally far more constraints and limitations on the control opportunities available at redevelopment sites One of the primary constraints is the availability of sufficient open area to accommodate structural controls such as detention ponds. In instances where redevelopment is occurring in densely urbanized areas, storm water runoff volumes may be so large that sufficient storage capacity can not be provided without further compounding problems associated with siting and retrofitting existing storm water conveyance systems In such cases, the municipality should consider nonstructural control measures such as traffic flow control, the use of porous construction materials for roads and parking lots, revisions to street sweeping or deicing policies, or public education programs

6.3.1.2 Public Streets, Roads, and Highways

Summary of Regulatory Requirement

Public streets, roads, and highways can be significant sources of pollutants in discharges from MS4s Therefore, proposed management programs must include a description of practices for operation and maintenance of public streets, roads, and highways, and procedures for reducing the impact of runoff from these areas on receiving waters.

§122.26(d)(2)(iv)(A)(3) [The application must include a] description of practices for operating and maintaining public streets, roads and highways and procedures for reducing the impact on receiving waters of discharges from municipal storm sewer systems, including pollutants discharged as a result of deicing activities

Road maintenance practices, especially snow management and road repair, and traffic are significant sources of pollutants in storm water discharges Measures to reduce the pollutants in storm water runoff from these sources should be addressed in the proposed management program

Snow Management

Deicing salts are the main source of pollutants in runoff of urban snowmelt. Municipalities can reduce these pollutants by calibrating equipment, educating equipment operators, using alternative deicing materials, and properly storing deicing materials. As alternatives to deicing salts, the Federal Highway Administration is considering many materials that may be less polluting. However, most of these deicers contain sodium or chloride ions that are harmful to roadside trees, shrubs, and soils. One deicer, calcium magnesium acetate (CMA) may be the best option for environmentally sensitive areas (Chollar, 1990) In salt storage facilities, salt piles should be completely covered, storage and handling areas should have impervious surfaces, and contaminated runoff should be contained

Road Repair

Road maintenance and repair activities may contribute pollutants through erosion caused by the elimination of stabilizing vegetation from roadside shoulders and ditches. Maintenance crews can decrease the potential for erosion by disturbing only the area under repair. Graded areas should also be limited in size so that repairs can be completed the same day and graded areas stabilized by the end of the workday. Other measures to reduce pollutants in storm water include scheduling potential pollutant-causing repair work during dry seasons, when possible

Municipal equipment yards and maintenance shops that support road maintenance activities can also be significant sources of pollutants Therefore, municipalities should consider instituting procedures that address spill prevention, material management practices, and good housekeeping

Traffic

Oil and grease and metals from traffic are the pollutants of most concern with respect to aquatic toxicity and their ability to "wash off" roadways and enter a MS4

In almost all instances, the pollutant concentrations in initial storm water discharge from heavily travelled streets is significant When the initial runoff reaches the velocity needed to entrain particulates, highly soluble pollutants that have accumulated between storms are transported to the storm sewer system. Therefore, shortly after a storm event begins, the pollutant loading in the initial flow to a MS4 is often the greatest

Pollutants from traffic can be minimized by using nonstructural controls (e.g, traffic reduction and improved traffic management), structural controls (e g, traditional and innovative BMPs), and changing maintenance activities. Traditional structural controls to reduce pollutants in road runoff include vegetated swales, infiltration devices and detention/retention basins Highways often afford opportunities for using structural controls such as detention basins on entrance or exit ramps and upstream or downstream of culvert crossings (Steward, 1992). Smaller roads may also have low-cost structural control opportunities available at culvert crossings such as vegetated swales Many structural controls can also be placed on public or private land that is outside the right-of-way, but still may be proximate enough to capture road runoff. Any time controls are placed at culvert crossings, potential wetland impacts and instream treatment issues need to be considered

Maintenance activities that can reduce pollutants in storm water discharges include catch basin cleaning, litter control, and targeted street sweeping For municipalities that have

developed transportation plans under the Clean Air Act, applicants should describe how they will review the plan, and amend it where appropriate, to address water quality concerns Potential locations for installing new structural controls to reduce pollutants from road and highway runoff should be identified by applicants.

6.3.1.3 Flood Management Projects

Summary of Regulatory Requirement

The traditional focus of storm water management in many communities has been water quantity (i e., flood) control. The proposed management program must demonstrate that flood management projects take into account the effects on the water quality of receiving water bodies, and the program must discuss whether existing structural flood control devices can be retrofitted to control water quality.

> §122.26(d)(2)(iv)(A)(4) [The application must include a] description of procedures to assure that flood management projects assess the impacts on the water quality of receiving water bodies and that existing structural flood control devices have been evaluated to determine if retrofitting the device to provide additional pollutant removal from storm water is feasible

Opportunities for pollutant reduction should be considered when determining specific controls to be proposed as the MEP standard in the storm water management program.

Control Measures

Storm water management devices and structures that focus solely on water quantity are usually not designed to remove pollutants, and may sometimes harm aquatic habitat and aesthetic values. For example, channels that are completely lined with concrete typically do not provide for aquatic habitat and tend to increase potentially erosive velocities and elevate ambient water temperatures, resulting in downstream channel enlargement and increased pollutant loadings However, this condition can be mitigated through alternative stabilization methods.

Channel management measures that can enhance streams and their ecological values include corridor preservation, biological bank treatment, and, where necessary, geomorphic restoration (Ferguson, 1991). The municipality may also install structural devices to dampen the hydraulic energy of the flow and minimize downstream erosion. As another example, willow saplings could be planted between rip-rap, timbers, and other stabilization structures that are anchored into terraces on the side of the streambank.

Flood-control projects can be built or subsequently modified to address water quantity and water quality concerns. Sometimes existing flood control structures can be retrofitted to provide water quality benefits as well as water quantity control (EPA, 1989b). Basin retrofits are a common example. For such a retrofit, dry flood control or detention basins can be converted to wet basins by modifying outlet orifices Additional storage can be obtained by raising the elevation of the basin embankment.

Dry retention basins, or extended dry or wet retention basins can be used to improve water quality. Dry retention basins are not as efficient or as effective in improving water quality as extended dry or wet retention basins, but dry retention basins are generally less costly to design and maintain. The decision to use dry retention or extended dry or wet retention basins should consider all these factors.

Optimally, such measures should be considered in the planning process (discussed previously). However, they can also be implemented later in the land development

process (e g , site review or public facilities requirements stage)

If a flood control authority is responsible for a portion of the MS4, the applicant should take the lead in coordinating efforts to incorporate pollutant reduction considerations in flood control projects EPA recommends the use of Memoranda of Agreement and Memoranda of Understanding to clarify roles and responsibilities between two or more political entities.

6.3.1.4 Municipal Waste Facilities

Applicants must describe programs that identify measures to monitor and reduce pollutants in storm water discharges from facilities that handle municipal waste, including sewage sludge.

> §122.26(d)(2)(iv)(A)(5) [The application must include a] description of a program to monitor pollutants in runoff from operating or closed municipal landfills or other treatment, storage or disposal facilities for municipal waste which shall identify priorities and procedures for inspections and establishing and implementing control measures for such discharges

The first step is to identify facilities that handle municipal waste and summarize their operations The types of facilities that should be included are

- Active or closed municipal waste landfills,
- Publicly owned treatment works, including water and wastewater treatment plants,
- Incinerators,
- Municipal solid waste transfer facilities
- Land application sites,
- Uncontrolled sanitary landfills,
- Maintenance and storage yards for waste transportation fleets and equipment,
- Sites for disposing or treating sludge from municipal treatment works; and
- Other treatment, storage, or disposal facilities for municipal waste.

Applicants may combine this part of the proposed management program with the program established under §122 26(d)(2)(iv)(C), which sets standards for monitoring and controlling pollutants from similar types of solid waste facilities (e.g , those with hazardous wastes, or subject to the requirements of SARA Title III—Section 313 of the Emergency Protection and Community Right-to-Know Act). Monitoring should include all the parameters listed in §122 26(d)(2)(iv)(C) and any additional parameters listed in an effluent guideline. Procedures to evaluate, inspect, monitor, and establish control measures for municipal waste sites over the term of the NPDES permit should be described For example, after one year of monitoring each waste handling facility category listed above, the municipality may have collected enough data to decide which facilities or types of facilities should receive a higher priority for pollutant reduction More attention could then be focused on the high-priority sites

6.3.1.5 Pesticides, Herbicides, and Fertilizers

The proposed management program must include a description of procedures to reduce the contribution of pollutants associated with pesticides, herbicides, and fertilizers discharged to the MS4.

> §122 26(d)(2)(iv)(A)(6) [The application must include a] description of a program to reduce to the maximum extent practicable, pollutants in discharges from municipal separate storm sewers associated with the application of pesticides, herbicides and fertilizer which will include, as appropriate, controls such as educational activities, permits, certifications and other measures for commercial applicators and distributors, and controls for application in public right-of-ways and at municipal facilities

The proposed program should include educational measures for the public and commercial applicators, and should include integrated pest management measures that rely on non-chemical solutions to pest control. The program should also describe how educational materials will be developed and distributed Applicants are encouraged to consider providing information for the collection and proper disposal of unused pesticides, herbicides, and fertilizers, or to establish their own program An effective and safe program would include

- Development of an inventory of products that may be accepted under the program, and collection of the Material Safety Data Sheets (MSDSs) for these products,
- Identification of transportation, storage, and disposal requirements,
- A shelf-life program to dispose of expired products,
- Applicator training or certification (the pretreatment program may be helpful as a source of industry-specific information or as a model approach for obtaining and tracking information on chemical applicators and distributors), and
- Safety training

Any certification/training program for the collection and disposal of pesticides, herbicides, and fertilizers must be in compliance with Federal, State, and local laws such as the Resource Conservation and Recovery Act, the Federal Insecticide, Fungicide, and Rodenticide Act, the Department of Transportation's hazardous materials regulations, and State and local ordinances.

In addition, applicants must include a discussion of controls for the application of pesticides, herbicides, and fertilizers in public-rights-of-way and at municipal facilities Planting low-maintenance vegetation, such as perennial ground covers, reduces pesticide and herbicide use. Native vegetation is often preferable because there is less need to apply fertilizers and herbicides, and to perform other forms of maintenance, such as mowing (Horner, 1988).

If herbicides are used, a herbicide-use plan must be proposed as part of the storm water management program The plan might include

- A list of selected herbicides and their specific uses,
- Information about the formulations of various products, including how to recognize the chemical constituents from the label, and directions and precautions for applicators that explain if products should be diluted, mixed, or only used alone,
- Application methods and estimated quantities to be used,
- Equipment use and maintenance,
- Training in safe use, storage, and disposal of pesticides (safety requirements for individual products are listed on the products' MSDSs),
- Inspection and monitoring procedures, and

- Recordkeeping and public notice procedures

6.3.2 Construction Sites

As specified in §122 26(d)(2)(iv)(D), applicants must describe proposed regulatory programs to reduce pollutants in storm water runoff from construction sites to the MS4.

> **§122.26(d)(2)(iv)(D)** [The application must include a] description of a program to implement and maintain structural and nonstructural best management practices to reduce pollutants in storm water runoff from construction sites to the municipal storm sewer system

This part of the proposed management program must address

- Implementation of BMPs,
- Procedures for reviewing site plans to ensure that they are consistent with local sediment and erosion control plans,
- Inspection of construction sites; and
- Enforcement measures and educational activities for construction site developers and operators

EPA encourages municipalities to (1) coordinate requirements to reduce pollutants in construction site runoff with management programs to reduce pollutants from new development, and (2) maintain, to the degree possible, pre-construction hydrologic conditions (Section 6 3 1 1) Applicants are encouraged to describe these two proposed management program components together Implementation of this program component will rely on the establishment and maintenance of both structural and nonstructural BMPs This requirement extends to all construction activity within the municipality

All construction sites, regardless of size, must be addressed by the municipality To begin to identify these sites, the applicant should obtain lists of construction site operators that are covered by general or individual storm water NPDES permits from the NPDES permitting authority However, construction sites not covered by a storm water discharge permit also need to be addressed by the municipality. The best way to identify these construction sites and implement an effective BMP program to reduce pollutants in their runoff is through the site planning process (see Section 6.3.2.1).

The BMPs envisioned for construction site runoff are generally well established technologies and practices They rely predominantly on erosion and sediment controls and other measures applicable to construction sites (e.g , control of solid wastes, and prohibitions on discharging concrete truck washing runoff into storm drains) The technologies proposed should be referenced, and a description of when and how the controls will be used should be included Municipality-specific technical guidance for construction site operators, such as handbooks and inspection checklists, are examples of suitable reference sources If an applicant chooses to develop such handbooks and checklists, they should be referenced and described in the application

The major requirements of this program component include

- Site planning that considers the potential impacts on water quality,
- Nonstructural and structural best management practices,
- Procedures that consider physical site characteristics when identifying priorities for inspection and enforcement, and
- Educational and training measures for construction site operators

Each of these requirements, and the reasons that they are important elements of a proposed storm water management program, is described in more detail below

6.3.2.1 Site Planning

Sediment runoff rates from construction sites are typically 10 to 20 times greater than those of agricultural lands, and 1,000 to 2,000 times those of forest lands. Over a short period, construction sites can contribute more sediment to streams than had been deposited over several decades Runoff from construction sites can also include other pollutants such as phosphorus and nitrogen from fertilizer, pesticides, petroleum derivatives, construction chemicals, and solid wastes

To address these problems, the proposed management program should describe procedures for site planning that consider potential water quality impacts

> §122 26(d)(2)(iv)(D)(1) [The program for construction sites must include a] description of procedures for site planning which incorporate consideration of potential water quality impacts

The objective is for the municipality and the developer to address storm water discharges from construction activity early in the project design process so that potential water quality impacts can be eliminated or minimized and consequences to the aquatic environment assessed Nonstructural approaches to minimize the generation of runoff from the construction site will also need to be considered These measures may include phasing development to coincide with seasonal dry periods, minimizing areas that are cleared and graded to only the portion of the site that is necessary for construction, exposing areas for the briefest period possible, and stabilizing and reseeding disturbed areas rapidly after construction activity is completed

It is often easier and more effective to incorporate storm water quality controls during the site plan review process or earlier The process typically culminates with the developer of the construction site submitting detailed engineering plans to the municipality for review and approval

Upon completion of the site plan review stage, the developer and the municipality have invested considerable time and money into the project If storm water quality issues are considered only after significant detailed engineering has gone into the project, municipal site reviewers may only address minor drainage issues. In recent years, however, many municipalities have developed separate teams of site inspectors to implement erosion and sediment control measures in the field. In these municipalities, site inspectors should be part of the site review team (if they are not already) in order to incorporate their expertise on the appropriate erosion and sediment controls for the given circumstances

The above discussion reinforces the importance of site planning, as described in the section on site planning for new development (Section 6.3 1) In general, the sooner planners consider storm water quality issues, the better the opportunity for efficient and effective pollutant reduction In some cases storm water issues should be considered in the conceptual stage of planning (e g , as a planning or zoning function)

Some municipalities include a final step in the planning process that requires a developer to provide a far greater level of design detail than earlier conceptual design approvals This step may be required as a condition of the final approval for certain zoning categories Municipalities with such a step in the development process can consider potential storm water quality issues in detail at this stage Municipalities that do not currently require such detailed plans should consider adopting this procedure as part of their storm water management program

6.3.2.2 Nonstructural and Structural BMPs for Construction Activities

This component of the proposed management program should describe requirements for nonstructural and structural BMPs that operators of construction activities that discharge to MS4s must meet

> **§122.26(d)(2)(iv)(D)(2)** [The program for construction sites must include a] description of requirements for nonstructural and structural best management practices

As indicated above, applicants must propose site review and approval procedures that address sediment and erosion controls, storm water management, and other appropriate measures Approvals should be clearly tied to commitments to implement structural and nonstructural BMPs during the construction process Appropriate structural and nonstructural control requirements will vary by project Project type, size, and duration, as well as soil composition, site slope, and proximity to sensitive receiving waters will determine the appropriate structural and nonstructural BMPs Municipalities should acquire the authority to require operators to install and maintain applicable erosion and sediment control plans Exhibit 6-2 summarizes common construction-site BMPs

A description of the local erosion and sediment control law or ordinance is needed to satisfy this program requirement The description should include information that links the enforcement of the law or ordinance to the legal authority of the applicant, as discussed in Section 3 of this manual

While many municipalities have erosion and sediment control ordinances in place, their effectiveness is often limited because they are not adequately implemented and enforced Examples include silt fencing that is not maintained or excavated soils that are placed directly on top of the silt fencing Therefore, construction sites covered under NPDES permit regulations must indicate whether they are in compliance with State and local sediment and erosion control plans Site inspections are expected to be the primary enforcement mechanism by which erosion and sediment controls are maintained

To ensure that developers are in compliance with erosion and sediment control plans, applicants may wish to consider expanding the use of performance bonds. This approach might depart from a traditional site bonding approach For example, the size of bonds could be based on the amount of earth disturbed, the slope of the site, changes in grades, soil type, proximity to surface waters, sensitivity of surrounding area, and other relevant factors. In addition, the bond could clearly specify the storm water quality controls that must be included in the development. Appropriate maintenance and site cleanup could be tied to the bond-release process

6.3.2 3 Site Inspections and Enforcement of Controls For Construction Sites

Storm water BMPs associated with construction activities are highly susceptible to damage due to the intensity of activities commonly associated with construction Consequently, inspections are crucial to the effective operation of storm water BMPs Therefore, the proposed management program should describe construction site inspection and enforcement procedures The procedures should be flexible so that they can be tailored to specific construction activities and physical characteristics of the construction site

> **§122 26(d)(2)(iv)(D)(3)** [The program for construction sites must include a] description of procedures for identifying priorities for inspecting sites and enforcing control measures which consider the nature of the construction activity, topography, and the characteristics of soils and receiving water quality

Exhibit 6-2
Construction Site Controls and Their Applicability

Control Type	Slope Protection	Waterway Protection	Surface Drainage	Enclosed Drainage	Large Flat Areas	Borrow Areas	Adjacent Properties
Non-structural (cover)							
temporary seeding	●		●		●	●	●
mulching & matting	●				●	●	
plastic covering	●					●	
retain natural vegetation	●	●	●	●	●	●	●
buffer zones	●	●	●	●	●	●	●
seeding & planting	●				●	●	
sodding	●		●		●	●	●
topsoiling					●	●	
Structural-erosion control							
gravel entry/truck wash			●		●		
road stabilization			●				
dust control							
pipe slope drains					●	●	●
subsurface drains	●						
surface roughening	●				●		
gradient terraces	●					●	
bioengineered slopes	●					●	
level spreader			●				
interceptor dikes/swales	●					●	●
check dams			●				●
outlet protection		●	●				
riprap	●	●	●				
vegetative streambank stabilization		●					
bioengineered streambank stabilization		●					
structural streambank stabilization		●					
Structural-sediment retention							
filter fence		●		●			●
gravel filter berm	●	●			●		●
storm drain inlet protection	●			●			●
sediment trap or sump		●	●		●	●	●
sediment pond or basin		●	●	●	●	●	●

Source: Modified from WDOE *Public Review Draft - Stormwater Management Manual for the Puget Sound Basin*, Washington State Department of Ecology, Publication #90-73, June 1991

Effective inspection and enforcement requires adequate staff, systematic inspection procedures, penalties to deter infractions, and intervention by the municipal authority to correct violations. Enforcement mechanisms, such as the ability to require additional storm water controls, administrative penalties (e.g., stop work orders) and injunctive relief (via citizen suits) also must be described. In addition, the applicant should describe who has the authority to require compliance.

Proposed procedures for inspecting construction sites may include minimum frequencies and an inspector's checklist. For example, the State of Delaware requires a minimum of one inspection every two weeks for sites over 50,000 square feet.

The proposed program should also specify the minimum number of inspectors that will be employed during the permit term and how they will be trained. For example, some erosion and sediment control programs require that certified private inspectors be used. In such case, procedures for inspector training and certification must also be described.

In formulating procedures to identify priorities for inspecting sites and enforcing control measures, applicants are encouraged to begin early in the process (i.e., at the site planning stage, as discussed previously) and continue throughout all ground disturbing activities. Once the nature of the construction activity has been established or perhaps modified during the site plan review process, the physical site constraints can be evaluated so that effective controls can be implemented.

For example, if the controls specified in the site plan prove to be ineffective, or if changes occur that were not anticipated during the planning process, site inspection and enforcement mechanisms can be required to mitigate the potential for pollutants to enter a downstream MS4. In this instance, a perimeter barrier, such as a temporary diversion dike, could be used to divert the concentrated runoff to a pipe slope drain terminating with a level spreader. The spreader would dissipate the erosive velocity of the runoff and release it into an undisturbed area beyond the limits of the clearing and grading at the toe of the slope.

The proximity and sensitivity of the receiving water to which the construction site discharges is an important consideration. For construction sites that discharge to receiving waters that do not support their designated use or other waters of special concern, additional construction site controls are probably warranted and should be strongly considered. These receiving waters are identified in the Part 1 municipal NPDES storm water permit application [§122.26(d)(1)(i)(C)].

6.3.2.4 Educational Measures for Construction Site Operators

Construction site operators often need training and education about the sources, control, and impacts of pollutants in runoff from construction sites (see Virginia, 1988). Therefore, applicants must describe examples of informational materials and activities to be used in education programs.

> §122.26(d)(2)(iv)(D)(4). [The program for construction sites must include a] description of appropriate educational and training measures for construction site operators.

Implementation and enforcement of erosion and sediment controls have historically been major problems even with many programs that may be otherwise exemplary. Therefore, technical information on how to incorporate storm water management with erosion and sediment control and other BMP training courses are recommended for municipal employees and construction site operators. Training on the available alternatives will help operators recognize and correct problems promptly. Tools for such training include videos, workshops, seminars, and demonstrations or field trips

An acceptable program must include a training program, which should be supplemented by a certification program for all construction site operators (contractors and developers) plan reviewers, and inspectors that work on sites that discharge to a MS4. For example, one NPDES State has a certification program based on adequate training and minimum-competency level testing of all private individuals involved in the preparation and implementation of erosion and sediment control plans.

6.3.3 Program to Control Pollutants in Storm Water Discharges from Waste Handling Sites and from Industrial Facilities

> §122.26(d)(2)(iv)(C) [The application must include a] description of a program to monitor and control pollutants in storm water discharges to municipal systems from municipal landfills, hazardous waste treatment, disposal and recovery facilities, industrial facilities that are subject to Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA), and industrial facilities that the municipal permit applicant determines are contributing a substantial pollutant loading to the municipal storm sewer system.

The storm water regulations envision that NPDES permitting authorities and municipal operators will cooperate to develop programs to monitor and control pollutants in storm water discharges to municipal systems from various sites that handle waste and certain industrial facilities.

Operators responsible for storm water discharges associated with industrial activity must obtain NPDES permits from EPA or an authorized NPDES State. These industrial storm water permits will establish requirements such as controls, practices, and monitoring for storm water discharges from the industrial facilities to the MS4. The industrial storm water permits will also provide a basis for enforcement actions directly against the industrial owner or operator.

NPDES permits for MS4s will establish responsibilities for municipal system operators to control pollutants from industrial storm water discharged through their system. Proposed storm water management programs must address the reduction of pollutants in storm water discharges from municipal landfills; hazardous waste treatment, storage and disposal facilities; facilities subject to SARA Title III; and other priority industrial facilities, as determined by the applicant. Municipalities should consider the information gathered for the Part 1 application and other parts of the Part 2 application (particularly the Source Identification and Characterization Data components) when prioritizing storm water discharges from these sites. In addition, Appendix B contains a list of pollutants commonly associated with various industries.

In the Part 2 application, the Source Identification component (see Section 4 of this guidance manual) requires the applicant to provide an inventory of pollutant sources, organized by watershed. This inventory identifies and describes the products and services of each industrial facility that may discharge storm water to the MS4. The *Source Identification* component suggests applicants use standard industrial classification (SIC) codes for this description. EPA strongly recommends this information be used to identify priority waste handling sites and industrial facilities. A similar technique could be developed for sites that do not meet the regulatory definition of "storm water discharge associated with industrial activity" (i.e. not included in the *Source Identification* and *Discharge Characterization* components), but are identified as a high priority under the proposed management program. Applicants can obtain information on how SIC codes are used to describe the industrial facilities located within their jurisdictions from their NPDES permitting authority.

Characterization data should also be evaluated. Applicants should analyze quantitative data from representative outfalls to establish a monitoring and control program.

An integral part of this requirement is the adequacy of the applicant's legal authority. If a municipality believes that a discharge of storm water associated with industrial activity violates the industrial facility's NPDES permit limits, but the municipality does not have authority over the discharge, the municipality should contact the NPDES permitting authority for appropriate action. Examples of possible actions by the NPDES permitting authority are·

- For a facility that already has a NPDES individual permit, the permit may be reopened and further controls imposed,
- For a facility covered by a NPDES general permit, an individual site-specific permit application may be required, or
- For a facility not covered by a NPDES storm water permit, a permit may be required

The municipality is ultimately responsible for discharges from their MS4. Consequently, the proposed storm water management program should describe how the municipality will help EPA and authorized NPDES States

- Identify priority industries discharging to their systems,
- Review and evaluate storm water pollution prevention plans and other procedures that industrial facilities must develop under general or individual permits;
- Establish and implement BMPs to reduce pollutants from these industrial facilities (or require industry to implement them), and
- Inspect and monitor industrial facilities to verify that the industries discharging storm water to the municipal systems are in compliance with their NPDES storm water permit, if required

6.3.3.1 Identifying Priorities

Proposed management programs must clearly identify priority industrial facilities.

> **§122.26(d)(2)(iv)(C)(1). [The applicant must] identify priorities and procedures for inspections and establishing and implementing control measures for such discharges**

This section discusses how applicants might identify priority facilities Section 6.3.3.2 discusses how municipalities might develop procedures for inspections and implementation of control measures

At a minimum, priority facilities include:

- Operating and closed municipal landfills;
- Hazardous waste treatment, disposal or recovery facilities, and
- Facilities subject to SARA Title III

Municipalities must identify these and other priority industrial facilities and describe the criteria used to identify them For example, information from the Toxics Release Inventory is one source a municipality could use to identify industrial facilities subject to SARA Title III. Other sources may include CWA Section 205 or 208 use-attainability studies, other studies that indicate a site-specific beneficial use impairment immediately downstream of a storm water outfall, or records of industrial pretreatment programs or other permit programs that identify facilities that may be the source of a use impairment or

a major contribution of pollutants The program should also describe procedures for modifying the inventory of priority industries based on additional evaluation that occurs throughout the permit term

Applicants may initially focus their implementation efforts on known pollution sources The municipality may have previously identified these sources, or they may be identified through existing information compiled during the permit application process However, the initial management program implementation strategy should be based on information gathered while completing the *Adequate Legal Authority, Source Identification,* and *Discharge Characterization* sections of the permit application (See Chapters 3, 4, and 5, respectively)

During the term of the permit, as additional information becomes available, the municipality should target and set priorities for other program elements that emerge. For example, if the municipality has incomplete characterization data about waste handling sites identified in this program component because the inventory of dischargers to the MS4 has not been completed, the municipality could propose to direct monitoring programs to those areas Upon acquiring sufficient characterization data, the priority of the sites discharging to these portions of the MS4 can be either determined or modified

As noted above, when identifying priority sites, applicants must consider all the facilities listed in §122 26(d)(2)(iv)(C)(*1*). When municipalities develop criteria for identifying additional priority industrial facilities, they are advised to consider, at a minimum:

- The type of industrial activity (SIC codes can help characterize the type of industrial activity),
- The use and management of chemicals or raw products at the facility and the likelihood that storm water discharge from the site will be contaminated; and
- The size and location of the facility in relation to sensitive watersheds

6.3.3.2 Developing Procedures

This program component should describe the specific steps that the municipality will take if it identifies a waste handling site or priority industrial facility when preparing the Part 2 application or during the permit term [§122.26(d)(2)(iv)(C)(*1*), printed in the box above]. The proposed management program must include procedures for inspecting priority industrial sites. The results of inspection may be used as a basis for requiring storm water management controls and enhanced pollution prevention measures. It should also establish an inspection schedule for each priority facility at the time it is identified

Applicants may want to consider establishing prior notification procedures The applicant will need to evaluate the legal authority it has over priority facilities to determine if prior notification is required This is another example of how EPA expects the different components of the application process to be linked In this instance, the Adequate Legal Authority section is tied directly to the prior notification procedure of the inspection and evaluation component of the proposed management plan

Applicants also should consider developing inspection documents such as standard forms or checklists for recording observations Forms and checklists can be used to identify high risk areas of priority facilities and to make comparisons among sites When characterization data or baseline estimates are factored into the evaluation process, the effectiveness of pollution prevention activities at a particular site could be quantified and compared to similar sites Other procedures that applicants should describe to effectively incorporate inspections as well as establish and implement control measures for these types of discharges can be derived from monitoring data

Applicants also should describe a procedure for conducting follow-up inspections, where necessary, as part of this program component For example, follow-up inspections might be needed to verify the installation of a specific control or implementation of a practice specified in a negotiated agreement between the municipality and the industrial site A system-wide approach to establishing priorities for inspection procedures is recommended. The system-wide approach should begin with the evaluation of existing information, followed by the identification and evaluation of new information during the permit term. Therefore, applicants should link these procedures with information from the *Source Identification* and *Discharge Characterization* components

6.3.3.3 Establishing and Implementing Controls

A municipality must consider if it should place more stringent controls on discharges associated with industrial activity than are required in an industrial facility's existing NPDES storm water permit [§122 26(d)(2)(iv)(C)(1) printed in box above] Usually, the municipality will not need to impose controls beyond those required in the industrial facility's NPDES storm water permit (for more information on appropriate controls, refer to *Storm Water Management for Industrial Activities, Developing Pollution Prevention Plans and Best Management Practices*, EPA 832-R-92-006, September, 1992)

However, nothing in the Federal regulations would prohibit the municipality from requiring additional controls beyond the permit requirements for industrial activities For this reason, EPA recommends that municipal applicants incorporate a provision in the proposed storm water management program that allows the municipality to require priority industrial facilities to implement the controls necessary for the municipality to meet its permit responsibilities

Finally, the applicant should suggest procedures for requiring pollutant control measures in runoff from priority industrial facilities Applicants should provide information to the industrial facilities that discharge to the MS4s and industry-specific guidance on appropriate control measures that industries discharging to their systems should follow (WDOE, 1991).

Priority industrial facilities should focus on controlling activities such as the use, storage, and handling of toxic chemicals Standard methods for implementing control measures at different types of facilities should be described To facilitate this, municipalities should obtain copies of the pollution prevention plans developed by industrial permittees Control measures that the municipality may suggest include preventing exposure of pollutant sources to precipitation, on-site pretreatment, and oil/water separators Applicants should provide a schedule for setting up this program component at priority industrial facilities. The schedule should include educational services for industrial site operators and technical BMP guidance, training courses, videos, workshops, and seminars for plan reviewers, inspectors, contractors, and developers

6.3.3.4 Inspection and Monitoring

The proposed management program should describe the inspection procedures that will be followed Storm water inspections can be coupled with inspections for other purposes (e.g., pretreatment programs, fire and safety) Proposed management programs should address minimum frequency for routine inspections. For example, how often, how much of the site, and how long an inspection may take are appropriate to explain in this proposed management program component Applicants should also describe procedures for conducting inspections and provide an inspector's checklist

In addition these inspection procedures should identify the minimum number of inspectors that will be employed and describe

the programs to train them For example, if the number of inspectors is expected to increase over the term of the permit, it should be noted in the proposed management program. Also, if storm water inspections are combined with other program inspections, means of cross-training inspectors and coordinating schedules should be outlined

Municipalities are urged to evaluate pollution prevention plans and discharge monitoring data collected by the industrial facility to ensure that the facility is in compliance with its NPDES storm water permit Site inspections should include (1) an evaluation of the pollution prevention plan and any other pertinent documents, and (2) an on-site visual inspection of the facility to evaluate the potential for discharges of contaminated storm water from the site and to assess the effectiveness of the pollution prevention plan. A municipality could begin the inspection process with information from the facility's notification to the municipality, which should have been submitted by May 15, 1991. Industrial facilities must also submit an individual NPDES permit application, participate in a group storm water permit application, or file a Notice of Intent (NOI) to be covered by a general permit to the NPDES permitting authority Section 308 of the CWA provides the legal authority for any individual (including a municipality) to obtain information from the NPDES permitting authority

The proposed management program also must include a description of a monitoring program for storm water discharges associated with industrial facilities [§122.26(d)(2)(iv)(C)(2)]

The monitoring program should describe the framework and rationale for selecting monitoring sites Sites that may be appropriate for monitoring include locations with several upstream industrial facilities, industrial facilities that are representative of a significant number of similar facilities, and priority industrial sites with significant potential for high levels of pollutants in their storm water discharges The description of the proposed

> §122.26(d)(2)(iv)(C)(2) [The application must describe] a monitoring program for storm water discharges associated with the industrial facilities identified in paragraph (d)(2)(iv)(C) of this section, to be implemented during the term of the permit, including the submission of qualitative data on the following constituents any pollutants limited in effluent guidelines subcategories, where applicable; any pollutant listed in an existing NPDES permit for a facility; oil and grease, COD, pH, BOD_5, TSS, total phosphorus, total Kjeldahl nitrogen, nitrate plus nitrite nitrogen, and any information on discharges required under 40 CFR 122.21(g)(7)(iii) and (iv).

monitoring program should address how the monitoring data will be used and what the frequency of the monitoring will be.

Identifying who will actually conduct the monitoring (e g , industry or municipality) is appropriate to include in the program description. Linking this element of the monitoring program to the Adequate Legal Authority section of the permit application is vital The legal authority to require monitoring should prescribe the specific monitoring protocols required elsewhere in the regulation [§122 26(d)(2)(i)(F)]. Applicants should describe proposed procedures for monitoring industrial facilities, including methods for determining parameters to be sampled throughout the term of the permit **At a minimum, parameters that must be considered for monitoring include**

- Any pollutant limited in effluent limitations guidelines for the subcategory of industry;
- Any pollutant that is controlled in a NPDES permit for the process discharge from an industrial site,
- Oil and grease, COD, pH, BOD_5, TSS, total phosphorus, total Kjeldahl nitrogen, nitrate plus nitrite nitrogen; and

- Certain pollutant(s) known or suspected to be in the discharge, based on §122 21(g)(7)(ii) and (iv) (Section 5 3).

If a municipality believes (based on the results of monitoring and inspections) that an industrial facility is not meeting its NPDES permit requirements, the municipality should petition the NPDES authority to either require the facility to change its pollution prevention plan or institute an enforcement action. Municipalities may also file citizen suits under CWA Section 505 to enforce the conditions of the NPDES permit.

6.4 STRUCTURAL CONTROLS

6.4.1 Description of Structural Controls

Applicants are required to identify the location of major structural controls for storm water (retention basins, detention basins, major infiltration devices, etc) in Part 1 of the application [§122 26(d)(1)(iii)(B)(5)] In Part 2, applicants must describe additional controls that they plan to implement [§122 26(d)(2)(iv)] The controls must address the activities described in Section 6 3 In addition, the applicant must describe maintenance procedures [§122 26(d)(2)(iv)(A)(1), discussed in Section 6 4 2] Later, when the municipality submits its annual report, it will have to report on its progress in implementing these controls [§122 42(c)(1), discussed in Section 7.3 of this guidance]

The matrix in Exhibit 6-3 provides information on commonly used structural and source control BMPs. Structural practices to control urban storm water runoff rely on three basic mechanisms **detention, infiltration,** and filtration More detailed technical information about source controls (particularly in the selection of structural BMPs) is available in the technical BMP manuals (MWCOG, 1991, Schueler, 1987, WDOE 1991; and EPA 1990c) The following summary of structural and source control BMPs draws extensively from those manuals

Applicants should note that CWA Section 404 permits may be required for some structural controls, including any control projects that involve the discharge of dredged or fill material into waters of the United States, including wetlands. States may also require permits that address water quality and quantity. To the extent possible, municipalities should avoid locating structural controls in natural wetlands. Before considering siting of controls in a natural wetland, the municipality should demonstrate that it is not possible or practicable to construct them in sites that do not contain natural wetlands, and that the use of other nonstructural or source controls are not practicable or as effective. In addition, impacts to wetlands should be minimized by identifying those wetlands that are severely degraded or that depend on runoff as the primary water source. Moreover, natural wetlands should only be used in conjunction with other practices, so that the wetland serves a "final polishing" function (usually targeting reduction of primary nutrients and sediments). Finally, practices should be used that settle solids, regulate flow, and remove contaminants prior to discharging storm water into a wetland

Another concern for siting controls is the possible adverse effect that infiltration and detention controls may have on ground water. This issue is addressed in more detail in Section 7.2.3

Exhibit 6-3
Structural Controls Matrix

CONTROL AND MAINTENANCE REQUIREMENTS	ADVANTAGES	DISADVANTAGES
Extended Detention Dry Basin • Periodic mowing • Regular debris removal • Sediment removal annually	• Provides peak flow control • Possible to provide good particulates removal • Can serve large development • Requires less capital cost and land area when compared to wet basin • Does not usually release warmed or oxygen-depleted water downstream • Protects against downstream channel erosion • Can create valuable wetland and meadow habitat when properly landscaped	• Low removal rates for soluble pollutants • Generally not feasible for drainage areas less than 10 acres • If not adequately maintained, can become a nuisance; (becomes unsightly, breeds mosquitos, and creates undesirable odors) • Periodic mowing and maintenance can be detrimental to nesting birds or other animals inhabiting the area
Vegetative Filter Strip • Inspection • Fertilizer use if necessary to maintain stable vegetation	• Low maintenance requirements • Can be used as part of the runoff conveyance system to provide pretreatment • Can reduce particulate pollutant levels in areas where runoff velocity is low to moderate • Enhances urban wildlife habitat diversity • Economical	• May concentrate water, significantly reducing effectiveness • Soluble pollutant removal highly variable • Limited feasibility in highly urbanized areas where runoff velocities are high and flow is concentrated • Requires periodic repair, regrading, and sediment removal to prevent channelization • Maintenance can be detrimental to nesting birds or other animals inhabiting the area • Fertilizer use can lead to higher nutrient loadings in storm water runoff
Grassed Swale • Periodic mowing • Fertilizer use if necessary to maintain stable vegetation	• Requires minimal land area • Can be used as part of the runoff conveyance system to provide pretreatment • Can provide sufficient runoff control to replace curb and gutter in single-family residential subdivisions and on highway medians • Economical and aesthetically pleasing	• Low pollutant removal rates • Leaching from culverts and fertilized lawns may actually increase the presence of trace metals and nutrients • Fertilizer use can lead to higher nutrient loadings in storm water runoff

Exhibit 6-3 (continued)
Structural Controls Matrix

CONTROL AND MAINTENANCE REQUIREMENTS	ADVANTAGES	DISADVANTAGES
Porous Pavement • Routine removal of fine particles from surface • May need weight limit of traffic imposed for protection	• Provides ground water recharge • Provides water quality control without additional consumption of land • Can provide peak flow control • High removal rates for sediment, nutrients, organic matter, and trace metals • When operating properly can replicate pre-development hydrologic conditions • Eliminates the need for storm water drainage, conveyance, and treatment systems off-site	• Requires regular maintenance • Possible risks of ground water contamination • Only feasible where soil is permeable, of sufficient depth to bedrock and water table, and gentle slopes are present • Not suitable for areas with high traffic volume or heavy vehicles • Need extensive feasibility tests, inspections, and very high level of construction workmanship • High failure rate due to clogging • Not suitable to serve large offsite pervious areas • Limited use in snowy climates where sanding and salting operations occur
Concrete Grid Pavement • Periodic mowing, if planted	• Provides peak flow control • Provides ground water recharge • Provides water quality control without additional consumption of land	• Requires regular maintenance • Not suitable for area with high traffic volume • Possible risk of contaminating ground water • Only feasible where soil is permeable, of sufficient depth to bedrock and water table, and gentle slopes are present
Filtration Basin • Periodic vacuuming and power washing	• Ability to accommodate moderately large-sized development (3-80 acres) • Flexibility to provide or not provide ground water recharge • Can provide peak volume control	• Requires pretreatment of storm water through sedimentation to prevent filter media from premature clogging

Exhibit 6-3 (continued)
Structural Controls Matrix

CONTROL AND MAINTENANCE REQUIREMENTS	ADVANTAGES	DISADVANTAGES
Wet Retention Basin • Periodic dredging, preferably from forebay area, if properly designed • Mowing of impoundment to prevent successional growth	• Provides peak flow control • Can serve large developments; most effective for large, intensively developed sites • Enhances species diversity, aesthetics, and provides recreational benefits • Little ground water discharge • Permanent pool in wet ponds helps prevent scour and resuspension of sediments • Provides moderate to high removal of both particulate and soluble pollutants	• Generally not feasible for drainage area less than 10 acres • Potential for safety and liability issues if not properly built and maintained • If not adequately maintained, can become a nuisance; (becomes unsightly, breeds mosquitos, and creates undesirable odors) • Requires considerable space, which limits use in densely urbanized areas with expensive land and property values • Not suitable for hydrologic soil groups "A" and "B" (SCS classification) • Potential for thermal discharge and oxygen depletion, which may severely impact downstream aquatic life
Extended Detention Wet Basin • Periodic dredging of sediment forebay	• Provides peak flow control • Can serve large developments; most effective for large, intensively developed sites • Enhances species diversity, aesthetics, and provides recreational benefits • Permanent pool in wet ponds helps prevent scour and resuspension of sediments • Provides better nutrient removal than traditional wet basin	• Not feasible for drainage area less than 10 acres • Potential for safety and liability issues if not properly built and maintained • If not adequately maintained, can become a nuisance; (becomes unsightly, breeds mosquitoes, and creates undesirable odors) • Requires considerable space, which limits use in densely urbanized areas with expensive land and property values • Not suitable for hydrologic soil groups "A" and "B" (SCS classification) • Potential for thermal discharge and oxygen depletion, which may severely impact downstream aquatic life

Sources Modified from MWCOG, 1991, Schueler 1987, and WDOE, 1991

6.4.1.1 Detention Controls

Detention controls temporarily store storm water runoff to control peak runoff rates and provide a reduction in pollutant concentrations by the gravitational settling of suspended solids and associated contaminants Except for incidental losses due to evaporation or percolation, essentially all the detained water is subsequently discharged to a surface water conveyance (e.g., a stream or MS4). The most common examples of detention practices are extended detention basins and wet (retention) basins

Variations on these basic detention controls include constructed storm water wetlands and multiple pond systems These types of controls also rely on detaining flows (leading to sedimentation) as the primary means of pollutant removal Recent investigations suggest that wetlands vegetation within a detention control can also reduce nutrient loads and certain other pollutants by incorporating them into plant tissue

If properly designed, detention controls can protect downstream channels by reducing the frequency of bankfull flood events and associated erosion Reduction in velocity and sediment load is also important for minimizing the adverse impacts of discharges to MS4s Detention facilities also can provide terrestrial and aquatic wildlife habitat if they are landscaped and planted appropriately

When considering detention controls, the municipality should consider the potential negative effects of downstream warming that may be caused by the shallowness of the water in the control The municipality should also consider negative impacts of detention controls, such as reduced baseflow; bacterial contamination due to waterfowl, and potential impacts to wildlife from concentrated contaminants, waterfowl diseases, and maintenance practices Safety and liability issues and nuisance factors, such as mosquitoes and odor, also should be considered. Setting detention controls in sensitive floodplains or in existing wetlands should generally be avoided. The flooding effect of impounding and detaining water is a particular concern if the upstream watershed drains more than 250 acres, because the volume of runoff and required detention times can cause inundation of upstream channels to occur.

Detention controls incorporating multiple pond systems and/or constructed storm water wetlands also treat runoff through the processes of absorption, filtration, biological uptake, volatilization, precipitation, and microbial decomposition. Recent investigations by the Metropolitan Washington Council of Governments suggest that multiple pond systems, in particular, have shown potential to provide higher and more consistent levels of treatment than traditional detention controls The redundancy afforded by the multiple pond system generally increases the reliability of the control. However, the potential concerns and drawbacks affecting retention basins also apply to these systems Many of these systems are currently being designed to include vegetative buffers and deep water areas to enhance wildlife habitat and to improve the appearance of the facility If a municipality selects one of these more innovative designs, it should recognize that periodic maintenance is necessary The effectiveness of these controls, like most controls, depends on proper operation, maintenance, and monitoring of the entire system

Wet (Retention) Basins

Wet (retention) basins are designed to maintain a permanent pool of water and temporarily store storm water runoff until it is released at a controlled rate Unlike extended detention ponds, wet basins cannot detain runoff for long times, because most of their storage capacity is needed for holding the permanent pool Enhanced designs include a forebay to trap incoming sediment where it can be easily removed A fringe wetland also can be established around the perimeter of the basin Similar to detention controls, locating

retention basins in sensitive floodplains or existing wetlands should be avoided if possible

Extended Detention Basins

Extended detention basins temporarily detain a portion of storm water runoff for 24 to 48 hours after a storm, gradually releasing the stored water through a fixed opening to allow urban pollutants to settle out. The basins normally return to a "dry" condition between storm events and do not have any permanent standing water. These basins are typically composed of two stages: an upper stage, which remains dry except during larger storms, and a lower stage, which is designed for typical storms. Pollutant removal from extended detention basins can be enhanced if they are equipped with plunge pools near the inlet, a micropool at the outlet, and an adjustable reverse-sloped pipe as the extended detention control device.

Water Quality Inlets

Water quality inlets (also referred to as catch basins) are small underground systems that, like retention basins, rely on settling to remove pollutants before discharging water to the MS4. Several designs of water quality inlets exist. In their simplest form, catch basins are single-chambered storm water inlets with the bottom lowered to provide 2 to 4 feet of additional space between the outlet pipe and the bottom of the structure for collection of trash and sediment. Some water quality inlets include a second chamber with a sand filter to provide additional removal by filtration The first chamber provides effective removal of coarse particles and helps prevent premature clogging of the filter media.

Water quality inlets may include an oil/grit separator. There are 3 basic types of oil/grit separators the spill control (SC), the coalescing plate interceptor (CPI), and a design credited to the American Petroleum Institute (API). Most of the oil/grit separators that are promoted for use in reducing hydrocarbon loads in storm water are a modification of the API design, although there are appropriate applications for all three separator designs. Oil/grit separators based on the API design consist of three chambers. The first chamber removes coarse material and debris. The second chamber provides separation of oil, grease, and gasoline from the storm water runoff; and the third chamber provides a safety relief should a blockage occur.

Recent experiences have shown that, because of their volume limitations, oil/grit separators have limited pollutant removal effectiveness. They are perhaps the best example of a structural control that is only effective with frequent maintenance. Proper disposal of the standing water, trapped sediments, and floating hydrocarbons are problems in the few locations that have been studied.

Constructed Storm Water Wetlands

Constructed storm water wetlands are a hybrid, drawing on elements of detention and retention basins. Constructed storm water wetlands are shallow pools and are often designed to simulate the pollutant removal functions of natural wetlands. Enhanced designs may include a sediment forebay, carefully contoured topography, and multiple species of wetland plants. Constructed storm water wetlands, while a promising technology for pollutant removal from storm water, may not replicate all the ecological functions of natural wetlands.

6.4.1.2 Infiltration Controls

Infiltration controls rely chiefly on absorption to treat storm water discharges. In the ideal case, storm water percolates through a porous medium and into native soils where filtration and biological action remove pollutants Typical controls of this type include infiltration trenches, infiltration basins, filtration basins, porous pavement, and concrete or block pavers. Systems that rely on soil absorption work best in deep, highly permeable soils that

are at least four feet away from the seasonal ground-water table.

The Soil Conservation Service (SCS) classifies soils into four major soil groups A-D. The soil groups are as follows:

Group A: Sand, loamy sand
Group B: Sandy loam, loam
Group C: Silt loam, sandy clay loam
Group D: Clay loam, silty clay loam, sandy clay, silty clay, and clay

Soils in Group A provide the highest infiltration rate while soils in Group D provide the lowest Suitable soils for infiltration-type controls typically fall in soil groups A and B. Other types of soils may be suitable, provided the clay content does not exceed 30 percent (clay has very low hydraulic conductivity). The clay content of soil may be determined from the SCS soil textural triangle, which can be found in many civil engineering references texts

If suitable soils are available, the widespread use of infiltration in a watershed can be useful in helping to maintain, restore, or replicate pre-development hydrology. Specific benefits of infiltration often include increased dry-weather baseflow in streams and a reduction in the frequency of bankfull floods. However, infiltration systems are not recommended unless soil conditions warrant. Also, infiltration should not be used where ground water requires protection. For example, the use of infiltration-type controls may not be appropriate in areas that recharge sole source aquifers.

Infiltration Basins

Infiltration basins are areas that intercept incoming storm water runoff and temporarily store it until it gradually infiltrates into the soil surrounding the basin. Infiltration basins should be designed to control drainage areas ranging from about 5 to 50 acres. They also should drain within 48 to 72 hours to maintain aerobic conditions favoring bacteria that aid in pollutant removal, and to ensure that the basin is ready to receive the next storm The runoff entering the basin is usually pretreated to remove coarse sediment that may clog the surface soil pores on the basin floor. Concentrated runoff may flow through a sediment trap or by sheet flow (vegetative filter strip).

Infiltration Trenches

Infiltration trenches are shallow (e.g., 2 to 10 feet deep) excavated ditches or vaults that have been backfilled with a coarse stone aggregate. The aggregate forms an underground reservoir that has approximately 40 percent void space. Storm water runoff diverted into the trench gradually infiltrates from the bottom of the trench into the subsoil and eventually into the ground water. Variations in the design of infiltration trenches include dry wells and percolation pits that are designed to control small volumes of runoff, such as the runoff from a rooftop A more complex variation is the enhanced infiltration trench, which is equipped with filter fabric or a more extensive pretreatment system to remove sediment and oil. Depending on the quality of the runoff, pretreatment may be necessary to lower the failure rate of the trench. Infiltration trenches are generally best suited for drainage areas of less than 10 acres They are particularly applicable for use on residential lots, small commercial areas, down slope from parking lots, and under drainage swales.

Grassed Swales

A grassed swale is an infiltration method that is usually used as a form of pretreatment before discharging runoff to another storm water control device (e.g., a detention basin) However, the grassed swale itself is a control that can remove significant amounts of pollutants through sediment entrainment A grassed swale is a shallow, vegetated, man-made ditch with the bottom elevation above the water table to allow runoff to infiltrate into the ground water. The vegetation helps to

prevent erosion, filters sediment, and allows for some uptake of nutrients.

Porous Pavement

Porous pavement, which is basically traditional asphalt aggregate without the fine particles, is an alternative to conventional pavement. Proper design and application of this control can reduce or eliminate the need for curbs and gutters, storm drains and sewers, and offside controls. Instead, runoff is diverted through a porous asphalt layer into an underground stone reservoir. The stored runoff gradually exfiltrates out of the stone reservoir into the subsoil. Soil considerations are important when evaluating the appropriateness of this control. Generally, grades should be gentle, and subsoil should be at least 3 feet thick (to bedrock) and moderately permeable (capable of infiltrating about one half inch per hour). Because porous pavement tends to clog with fine sediments and because it loses its effectiveness under heavy loads, its application should generally be limited to low-traffic areas (e g., overflow parking areas) and areas that are not exposed to large bearing loads caused by heavy vehicles

Concrete Grid Pavement

Concrete grid pavement has concrete blocks with regularly interdispersed void areas that are filled with pervious materials, such as gravel, sand, or grass The blocks are typically placed on a sand or gravel base. They are usually designed to provide a load-bearing surface adequate for supporting vehicles, while allowing infiltration of surface water into the underlying soil

6.4.1.3 Filtration Controls

Filtration controls treat storm water flows by using vegetation or sand to filter and settle pollutants Generally, these controls are most effective before the flows become concentrated (e g sheet flow) In certain instances, infiltration and treatment in the subsoil also may occur through the processes of absorption and adsorption After passing through the filtration media, the treated water is usually directed to a stream or MS4, although it may be evaporated or percolated into the ground Filtration controls include filter strips, grass swales, and sand filters Sand filters are particularly useful for ground water protection Applicants must consider the influence of climate when they select vegetative systems

Vegetative Filter Strips

Vegetative filter strips (also called bio-filters) are vegetated sections of land designed to accept runoff as overland sheet flow from upstream development They may adopt any natural vegetated form, from grassy meadow to small forest. The dense vegetative cover facilitates sediment reduction and pollutant removal Filter strips cannot treat high-velocity flows Therefore, these strips generally have been recommended for use in agriculture and low-density development and other situations where runoff does not tend to be concentrated Unlike grassed swales, filter strips are effective only for overland sheet flow, as opposed to concentrated flow Grading and level spreaders can be used to reduce the energy of concentrated flows and distribute the runoff evenly across the filter strip Vegetative filter strips are often used as pretreatment for other structural practices, such as infiltration trenches Leaving a buffer of natural vegetation along an urban stream valley is an example of a vegetative filter strip and also an example of a nonstructural control

Filtration Basins

Filtration basins are usually small impoundments lined with filter media, such as sand or gravel Storm water drains through the filter media and perforated pipes into the subsoil For optimal pollutant removal, recommended detention times range from 24 to 48 hours with a maximum drainage area of about 50 acres Grassed swales or other structural controls can be used to filter coarse sediments and thereby minimize clogging of the filter medium

6.4.2 Maintenance Activities

After summarizing the location of major structural storm water controls, applicants must submit a description of maintenance activities and a maintenance schedule for structural controls to reduce pollutants.

> §122.26(d)(2)(iv)(A)(1) [The application must include a] description of maintenance activities and a maintenance schedule for structural controls to reduce pollutants (including floatables) in discharges from municipal separate storm sewers.

Typical maintenance requirements include:

- Inspection of basins and ponds after every major storm for the first few months after construction and annually thereafter,
- Mowing of grass filter strips and swales at the frequency necessary to prevent woody growth and promote dense vegetation,
- Regular removal of litter and debris from dry ponds, forebays, and water quality inlets,
- Periodic stabilization and revegetation of eroded areas,
- Periodic removal and replacement of filter media from infiltration trenches and filtration ponds,
- Deep tilling of infiltration basins to maintain infiltrative capability, and
- Frequent vacuuming or jet hosing of porous pavement or concrete grid pavements

Lack of maintenance often limits the effectiveness of storm water structural controls such as detention/retention basins and infiltration devices. Maintenance programs should address measures for catch basins and drainage channels in addition to major structural controls

The proposed program should provide for maintenance logs and identify specific maintenance activities for each class of control, such as removing sediment from retention ponds every five years, cleaning catch basins annually, and removing litter from channels twice a year. If maintenance activities are scheduled infrequently, inspections must be scheduled to ensure that the control is operating adequately. In cases where scheduled maintenance is not appropriate, maintenance should be based on inspections of the control structure or frequency of storm events If maintenance depends on the results of inspections or if it occurs infrequently, the applicant must provide an inspection schedule. The applicant should also identify the municipal department(s) responsible for the maintenance program.

Municipalities should use caution in adopting controls that do not have sufficient history of use for their performance characteristics and maintenance requirements to be adequately evaluated A good example is the oil/grit separator used on small commercial or retail sites Some municipalities have required the use of these technologies, but due to poor performance, municipalities have often rescinded the requirement. In these cases, it is not clear whether the control technology was ineffective or the maintenance program was flawed

Because maintenance is critical to successful program implementation, it must be considered throughout the term of the permit Applicants may wish to develop a matrix that identifies maintenance tasks on a timeline indicating criteria for inspection, repair, and replacement PERT charts, GANT charts, or other critical path analyses (available for personal computers) can help organize a maintenance program and schedule. For a summarized

listing of appropriate maintenance activities and schedules refer to the matrix in Exhibit 6-3.

6.4.3 Considerations for Planning and Siting Controls

The storm water management program should describe the criteria used to identify that a particular structural control is warranted and the circumstances under which it will be required. The possibilities for new control sites should be evaluated for their storm water quality control potential. Guidelines and performance standards that identify specific structural controls for new development should be proposed in the procedures for new development. From this evaluation, priorities based on the feasibility of implementing a particular control at a given location can be determined.

6.4.3.1 Use of Municipal Lands

Applicants should discuss existing major structural controls and sites that have the potential for new structural controls which could be installed on municipal lands and other major rights-of-way (e g , major roads and highways) Note that existing controls are identified in Part 1 applications [(§122 26(d)(1)(iii)(B)(5)] The location of publicly owned parks, recreational areas, and other open areas are also identified [§122 26(d)(1)(iii)(6)]

To determine what storm water quality controls are necessary for public lands and facilities, current activities and functions that may affect the quality of storm water discharges should be identified Such activities and functions include parks, trails, and other recreational land uses, road maintenance and snow management, and storage and repair yards/shops for municipal vehicles An inventory of public land uses may be necessary to help make determinations of what controls are needed An effective inventory should involve coordination among all of the local departments and agencies that have authority over the use of public lands and facilities

Opportunities for controlling storm water quality problems that are identified through the inventory process can be evaluated on a site-specific basis and included in the proposed management program

There are several benefits to the establishment of structural controls on municipal lands:

- Municipal lands often provide greater retrofit opportunities because they typically do not require additional property purchases;
- Municipal lands ensure opportunities to provide future maintenance and security in preservation of the retrofit control,
- Applicants may be able to adapt existing municipal functions (such as industrial pretreatment program implementation, fire-safety inspections, and flood-control activities) to address storm water quality concerns (Expanding their mission to address storm water concerns may be more cost-effective than initiating entirely new programs.),
- Applicants may be able to adapt functions of development on municipal lands (such as planning, zoning, and construction oversight functions), and
- After considering controls on municipal lands, the applicant will be in a better position to address the private land under its jurisdiction

As a precaution, however, applicants need to consider potential conflicts arising over the multiple use of public lands Criteria other than land ownership (e g , locating controls downstream of developed areas) also should be considered when deciding where to locate storm water runoff controls

6.4.3.2 Use of Private Lands

A municipality also may incorporate storm water quality controls into its land use plan to indicate controls that may be necessary for new development Some of the best opportunities to prevent pollution and to implement effective storm water quality controls occur during development Local governments typically play a strong role in overseeing new development and have, or can adapt, administrative infrastructure to address storm water quality concerns.

The storm water management process should begin with land use planning and zoning and continue through the development and redevelopment processes. Municipalities generally can obtain commitments from land developers more easily prior to relinquishing jurisdictional leverage over the parcel where the potential control is to be located Leverage can be achieved through plan approval or zoning changes The negotiation process for the dedication, condemnation, or other acquisition of land and the process for getting the land developer to construct or otherwise implement controls will vary dramatically among municipalities, particularly among those in different States

Source and structural controls are most cost-effective when development is planned with storm water quality controls in mind However, it is probably more appropriate for the municipality to propose a flexible plan that specifies a variety of program objectives through the development process rather than identifying a certain priority and rigid schedule Other benefits of early and flexible planning include ecological diversity, wetlands preservation, and the creation of controls that also function as amenities Comprehensive land use plans zoning ordinances, and subdivision ordinances are important mechanisms to implement these controls early in the development process Consideration of storm water quality during pre-development is one of the most effective ways to implement controls This is because the maximum flexibility (and opportunity) to incorporate BMPs exists prior to final land use decisions and construction activities (see Section 6.3 1 1)

6.4.3.3 Siting Considerations

Imperviousness

The degree of imperviousness affects the concentration of pollutants in storm water, which in turn affects the type of structural controls that may be necessary. As the imperviousness of an area increases, the runoff volume and the pollutant loading increase. Studies show that runoff from industrial areas, which generally have a high degree of imperviousness, can have a wider variety and greater concentration of pollutants than runoff from other land uses Recent studies also indicate that the degree of imperviousness can be inferred from the level of degradation in urban receiving streams (For example, see Schueler 1991 and Klien 1979) Population projections will not indicate the degree to which industrial land use will increase unless planning and zoning information is also considered

Soil Conditions

Controls designed to infiltrate storm water will be affected by site specific soil conditions For example, clay content of the soil and the antecedent moisture content (degree of soil saturation at the time of a given storm event) will strongly influence the effectiveness, and therefore the applicability, of infiltration controls for a given location

6.5 PROGRAM AND SCHEDULE TO DETECT AND REMOVE ILLICIT DISCHARGES AND IMPROPER DISPOSAL

NPDES permits for discharges from MS4s require effective detection and removal from the MS4 of illicit or improper discharges and disposal

> §122 26(d)(2)(iv)(B) [The application must include a] description of a program, including a schedule, to detect and remove (or require the discharger to the municipal separate storm sewer to obtain a separate NPDES permit for) illicit discharges and improper disposal into the storm sewer

The NURP study concluded that the quality of urban runoff can be adversely impacted by illicit connections and illegal dumping. Often, large amounts of wastes, particularly used oils, are improperly disposed of in storm sewers. Elimination of these sources of pollutants would result in a dramatic improvement in the quality of storm water discharges from MS4s. Procedures to eliminate such discharges should be an important part of the proposed management program.

The regulatory requirement cited above is intended to directly implement the mandate of Section 402(p)(3)(B)(ii) of the CWA, which requires permits for MS4s to effectively prohibit non-storm water discharges into storm sewers In certain instances, the most appropriate action will be for the municipality to ensure that illicit discharges become covered by a NPDES permit However, in most cases, elimination of illicit discharges or improper dumping is the appropriate focus of this program component The quality of storm water runoff from inner-city core areas, particularly in older parts of the country, would benefit most from this component

The applicant should propose a schedule for implementing this program component throughout the initial permit term This schedule should reflect the priorities identified by the municipality during the application process and be based on the problems particular to the specific MS4

6.5.1 Prohibiting Illicit Discharges

The proposed management program must include a description of inspection procedures, orders, ordinances, and other legal authorities necessary to prevent illicit discharges to the MS4.

> §122.26(d)(2)(iv)(B)(1) [The application must include a] description of a program, including inspections, to implement and enforce an ordinance, orders or similar means to prevent illicit discharges to the municipal separate storm sewer system; this program description shall address all types of illicit discharges, however the following category of non-storm water discharges or flows shall be addressed where such discharges are identified by the municipality as sources of pollutants to waters of the United States . . . . *[these sources are listed in the guidance].*

This proposed management program component also should describe how the prohibition on illicit discharges will be implemented and enforced. The description should include a schedule and allocation of staff and resources A direct linkage should exist between this program component and the adequate legal authority requirements for the ordinances and orders to effectively implement the prohibition of illicit discharges

While this program component is required to prohibit all types of illicit discharges, the following categories of non-storm water discharges need only be prohibited by the MS4 when they are identified by the MS4 as sources of pollutants to waters of the United States:

- Water line flushing
- Landscape irrigation
- Diverted stream flows
- Rising ground waters
- Uncontaminated ground water infiltration [as defined at 40 CFR 35.2005(20)] to separate storm sewers
- Uncontaminated pumped ground water
- Discharges from potable water sources
- Foundation drains
- Air conditioning condensation
- Irrigation water

- Springs
- Water from crawl space pumps
- Footing drains
- Lawn watering
- Individual residential car washing
- Flows from riparian habitats and wetlands
- Dechlorinated swimming pool discharges
- Street wash water

While EPA does not consider these flows to be innocuous, they are only regulated by the storm water program to the extent that they may be identified as significant sources of pollutants to waters of the United States under certain circumstances. If an applicant knows, for example, that landscape irrigation water from a particular site flows through and picks up pesticides or excess nutrients from fertilizer applications, there may be a reasonable potential for a storm water discharge to result in a water quality impact. In such an event, the applicant should contact the NPDES permitting authority to request that the authority order the discharger to the MS4 to obtain a separate NPDES permit (or in this case, the discharge could be controlled through the storm water management program of the MS4)

The applicant should consider the specific land use, age, and stage of development in this program component. For example, one study in an established metropolitan area found that 60 percent of automobile-related businesses had improper storm drain connections. While some of the problems discovered in this study were the result of improper plumbing or illegal connections to storm drains, the majority of the connections were approved by the municipality when they were built

For problem identification and problem-solving, a municipality may elect to implement a follow-up study that traces identified pollution incidents to their source (e.g , up the system) A variety of pollutant-tracing techniques and field screening can be used to identify illicit discharges

6.5.2 Field Screening

Part 1 of the application requires applicants to submit the results of field screening studies to evaluate the possible occurrence of illicit connections and improper dumping [§122 26(d)(1)(iv)(D)]. Dry weather flows that were encountered during the initial field screening were sampled and analyzed. The analysis was intended to provide information about illicit connections and improper dumping.

In Part 2, applicants are required to propose procedures for continued field screening during the term of the permit.

> §122 26(d)(2)(iv)(B)(2) [The application must include a] description of procedures to conduct on-going field screening activities during the life of the permit, including areas or locations that will be evaluated by such field screens

Applicants can propose to use procedures similar to those used for field screening required in Part 1 of the application or they can propose alternative procedures and techniques. The Part 1 field screening requirements are found in §122.26(d)(1)(iv)(D) and are explained in the Part 1 guidance manual

The Part 2 proposed field screening program component should describe areas of the system where the continuation of the field screening program will be conducted and the rationale for selecting these areas For example, the rationale for continuing field screening at a given location might be that a wide variation in results was obtained during the initial screens In addition, the applicant should propose field screening for a portion of any recently-identified major outfalls that were not known to the applicant when it prepared its Part 1 application, provided sampling of these outfalls is safe and practicable

The potential for illicit discharges and improper disposal is generally higher for areas of older development, areas with many automobile-related industries, and areas with significant numbers of heavy industrial facilities Therefore, in most cases applicants should include these areas in the proposed field screening program.

The description of the field screening component should provide a detailed summary of the departmental responsibility for field activities, frequency of inspections, procedures and equipment to be used, and the procedures for documenting field activities, both in the field and in the office. Generally, the Part 2 field screening program should reflect a continuously narrowing process to trace illicit and improper sources.

6.5.3 Investigation of Potential Illicit Discharges

In order to submit a comprehensive proposed management program, applicants are required to describe procedures for investigating portions of the municipal system where field screening or other information indicates a reasonable potential for illicit discharges

> §122 26(d)(2)(iv)(B)(3). [The application must include a] description of procedures to be followed to investigate portions of the separate storm sewer system that, based on the results of the field screen, or other appropriate information, indicate a reasonable potential of containing illicit discharges or other sources of non-storm water (such procedures may include sampling procedures for constituents such as fecal coliform, fecal streptococcus, surfactants (MBAS), residual chlorine, fluorides and potassium, testing with fluorometric dyes, or conducting in storm sewer inspections where safety and other considerations allow Such description shall include the location of storm sewers that have been identified for such evaluation)

Applicants should propose criteria to identify portions of the system where follow-up investigations are appropriate For example, calculating a frequency distribution of dry weather flows at each screening site could aid in establishing criteria to identify where follow-up investigations are appropriate.

Procedures to investigate priority locations for illicit connections include inspection of the storm sewer system, use of remote-control cameras, on-site inspections and dye-testing at priority or suspect facilities, and additional discharge monitoring to pinpoint pollutant sources. In some cases, these investigations may be coordinated with pretreatment program inspections. Such approaches are summarized in Exhibit 6-4. Coordinating inspections can be a very effective use of resources. For example, portions of the sanitary sewer system that need evaluation to detect illicit discharge may already be undergoing inspection by operators of the municipal treatment plant.

A checklist should be developed for inspectors to use to detect illicit connections. The checklist should be structured to ensure a comprehensive evaluation of the problem and stipulate the use of the easiest and least expensive detection methods first

Regardless of the format in which information is compiled (e.g., table, list, text description), EPA suggests that the applicant prepare a map identifying the location of suspected problem areas. The map should be provided as part of the Part 2 application.

The proposed program component description should describe a step-by-step process to investigate, identify, and prohibit illicit discharges If field screening leads to positive tests of fecal coliform, fecal streptococcus, surfactants, residual chlorine, fluorides, or potassium, a municipality should reconsider whether any of the non-storm water discharges described in Section 6.5.1 are the source (see previous section)

Exhibit 6-4
Sample Illicit Discharge Investigation Procedures Options

Results of Initial Field Screen	Procedures for Detailed Analysis	Comments
Plumbing unidentifiable	Cameras	Effective for identifying deterioration
Uncertain use of facility	On-site inspections	May be combined with other inspections
Several facilities or complex plumbing	Dye-testing	Simple and accurate if system not interconnected
Unusual pollutants	Monitoring	Particularly useful for fingerprinting

6.5.4 Spill Response and Prevention

The proposed management program must describe procedures that the municipality will implement during the term of the permit to prevent contain, and respond to spills that may discharge into the MS4

> §122 26(d)(2)(iv)(B)(4) [The application must include a] description of procedures to prevent, contain, and respond to spills that may discharge into the municipal separate storm sewer

The municipality and the property owners (and/or operators) of sites where spills may occur need to implement procedures to prevent, contain and respond to spills One way to implement these procedures is to modify the land use planning process and ordinance enforcement Such modifications would require notification and emergency preparedness procedures for any land use activity that could lead to leaks and spills Another method is to coordinate with on-going programs in other regulated areas where detection of spills is important, such as pretreatment and hazardous materials management. The goal of a spill-prevention program is to reduce the frequency and extent of spills of hazardous materials, oils, and other materials which can cause water quality impairment. Spill-containment programs may establish minimum chemical storage and handling requirements, require users to submit prevention and control plans, and ensure site inspections The content of the descriptions that should be submitted with the Part 2 application for each of these program elements is discussed in more detail below

Spill-response programs are intended to reduce risk to the public and the environment Although these programs tend to focus on issues of public health and safety, such as exposure to toxic materials, fires, or explosions, spill-response teams should attempt to prevent or minimize contamination of surface water, ground water, and soil. Spill-response programs often require a coordinated response from a number of municipal departments (e.g., fire, police, health, and public works). Municipalities should describe how response procedures within these programs attempt to mitigate potential pollutant discharges to surface waters

For example, some industrial pretreatment programs specifically require that leaks or spills be routed to the storm sewer rather than the sanitary sewer generally to protect worker health and safety and to protect biological treatment capabilities This issue serves to reinforce the need for coordination between the various municipal programs that are related in some way to storm water.

The proposed program should identify the municipal departments responsible for implementing the program, and also should address employee training, reporting procedures, containment of spills, storage and disposal activities, documentation, and follow-up procedures Generally, the proposed program for spill response and prevention should focus on good housekeeping and materials management practices, which are discussed in more detail below.

One of the initial elements in the development of a successful spill response and prevention program is to assess the potential of various sources at a particular property to contribute pollutants to the storm water discharges from the site This assessment should inventory the land use, types of materials handled, and the location and types of materials management activities. Factors to consider when evaluating the pollution potential of runoff from various portions of a site include those that are likely to lead to the identification of specific structural or nonstructural controls to address problems

Other factors to consider are the toxicity and quantity of any chemicals used, produced, stored, or discharged from the site, the history of any NPDES permit violations from a site, history of significant leaks or spills of toxic or hazardous pollutants, and the designated uses of the receiving waters

This program element should also include a description of storm water management controls that are appropriate for the site that would control or allow for the mitigation of any leak or spill and a proposal to implement such controls. The priorities developed in the implementation proposal should reflect the nature of identified sources of pollutants at the site

The description of spill response and prevention activities should include the steps a municipality will take to prevent, and when necessary, adequately respond to spills discharged to its MS4. The MS4 might identify special training requirements for municipal employees in order to respond to spills of hazardous chemicals from a particular facility into the storm sewer system.

Sources with the greatest potential for spills to occur (or cause the most severe damage) should be identified in the proposed storm water management program If appropriate, specific materials handling procedures and storage requirements should be identified for these sources Requirements for these sources could be modeled after the Spill Prevention, Control, and Countermeasure (SPCC) Plans that are required for certain facilities under Section 311 of the CWA

Under the SPCC program, for example, personnel are trained and given responsibility for inspecting the facility for leaks and spills. These inspections include equipment and materials handling areas, which need to be investigated for evidence of, or the potential for, pollutants entering the drainage system Procedures to ensure the availability of appropriate personnel and equipment for cleaning up spills must be identified A system to ensure that appropriate corrective action has occurred in response to inadequacies identified during the inspection is also established under the program.

Not all of the SPCC program elements may be necessary for municipal applicants However, EPA recommends that the proposed storm water management program describe how the records of inspections will be maintained and made available for investigations of causal factors and program effectiveness Incidents of leaks, spills, and

improper dumping, along with other information describing the quality and quantity of storm water discharges should be included in the records Inspections and maintenance activities, such as containment berm integrity testing or the cleaning of oil/water separators should be documented and recorded in a maintenance log

6.5.5 Public Awareness and Reporting Program

Applicants must propose a management program component that promotes, publicizes, and facilitates public reporting of illicit discharges or water quality impacts associated with discharges from MS4s

> §122 26(d)(2)(iv)(B)(5) [The application must include a] description of a program to promote, publicize, and facilitate public reporting of the presence of illicit discharges or water quality impacts associated with discharges from municipal separate storm sewers

Timely reporting by the public of improper disposal and illicit discharges are critical components of programs to control such sources.

To enhance public awareness, programs may include setting up a public information hotline number, educating school students, establishing community and volunteer "watchdog" groups (e g , "Adopt-a-Stream Program"), using inserts into utility bills; and newspaper, television and radio announcements to inform the public about what to look for and how to report incidents The public awareness efforts should clarify to the public that they are the ultimate beneficiaries of a successful storm water management program

6.5.6 Proper Management of Used Oil and Toxics

EPA estimates that annually, 267 million gallons of used oil, including 135 million gallons of used oil from do-it-yourself automobile oil changes, are disposed of improperly An additional 70 million gallons of used oil, most coming from service stations and repair shops, are used for road oiling (55 FR 48056, November 16, 1990). If private individuals find the proper disposal of used oil or toxic materials difficult, incidents of improper disposal increase For example, when a large fraction of service stations do not accept do-it-yourself used oil, improper disposal into the municipal storm sewer rises. Therefore, applicants are required to propose a program component that will facilitate the proper disposal of used oil and toxics from households by establishing municipally operated collection sites, or ensuring that privately-operated collection sites are available.

> §122.26(d)(2)(iv)(B)(6) [The application must include a] description of educational activities, public information activities, and other appropriate activities to facilitate the proper management and disposal of used oil and toxic materials

The proposed program should describe outreach plans to handlers of used oil and to the public, and operating plans for oil and household waste collection programs.

Examples of effective public outreach for these types of programs include dedicated municipal phone numbers (e.g , a used oil/toxic materials hotline), pamphlets, and requirements that oil retailers post the location of the nearest used oil collection facility. Programs can also inform the public about alternatives to toxic materials. Catch basin/storm sewer inlet stenciling programs can also be proposed as part of the program to increase public awareness of the connection between storm sewers and local water resources

6.5.7 Infiltration of Seepage

In order to effectively complete this portion of a proposed management plan, the applicant must describe controls to limit infiltration of seepage from municipal sanitary sewers to MS4s, if necessary.

> §122.26(d)(2)(iv)(B)(7). [The application must include a] description of controls to limit infiltration of seepage from municipal sanitary sewers to municipal separate storm sewer systems where necessary.

Raw sewage can seep from sanitary sewage collection systems through leaks and cracks in aging pipes, poorly constructed manholes and joints, and main breaks. Sewage from a leaky sanitary system can flow to storm sewers or contaminate ground water supplies. Interaction between sanitary sewers and separate storm sewers may occur at manholes and where sanitary sewer laterals and storm sewer trenches cross. Separate storm sewers and sanitary sewers may share the same trench, which is generally filled with very porous material such as gravel.

One indication of seepage from a sewage collection system may be infiltration of water. Often, the rate of exfiltration (seepage) from sanitary collection systems is significantly greater than the rate of infiltration into the system. An EPA study on sewer exfiltration found significant ratios of the rate of exfiltration of sewage to the rate of infiltration of ground water or storm water into sanitary sewers. Field and laboratory results found this ratio to vary between 1.5 to 1 and 14 to 1.

In some cases, preventive maintenance surveys or on-going infiltration and inflow (I&I) programs to determine where water is entering a sanitary sewer system may be modified to locate the source and fate of exfiltration from the system

Identifying infiltration of seepage into a MS4 is a good example of the need for various municipal functions to be effectively coordinated. Proposed storm water management programs might discuss how personnel responsible for inspections of the sanitary sewer system could inspect for sources of exfiltration during I&I inspections, and pass any findings to personnel responsible for maintaining the MS4. If seepage is believed to be a problem, a coordinated effort with the maintenance department of the municipal sanitary sewer system is recommended.

The proposed storm water management program also should include provisions to address the discovery of previously unknown problems. There should be procedures to enact a coordinated program between the operators of the storm sewer and sanitary sewer (which in many cases will be within the same municipal agency or department).

EPA recommends that the proposed storm water management program describe controls that will be used to address seepage from malfunctioning septic systems in areas not served by a sewage treatment works. Malfunctioning septic systems may lead to more significant surface runoff pollution problems than ground water problems. A malfunctioning septic system is less likely to cause ground water contamination where an impervious bacterial mat in the soil retards the downward movement of wastewater. (Poorly located septic systems that are operating properly are the greatest threat to ground water).

Surface malfunctions of septic systems are caused by clogged or impermeable soils, or when stopped up or collapsed pipes force untreated wastewater to the surface. Surface malfunctions can vary in degree from occasional damp patches on the surface to constant pooling or runoff of wastewater to a storm sewer. An improper remedy for a surface malfunction is to install a pipe or trench over soil absorption systems to route untreated overflow away from the septic

system. This results in direct discharges to drainage ditches, empty lots, or surface waters

Proper controls range from prescribing maximum intervals between tank pump-out to the installation of sand filters. Discharge from sand filters to surface waters may require a separate NPDES permit, because such discharge is not storm water.

Additional information about the most appropriate controls for use in correcting malfunctioning septic systems is probably best obtained from local or regional sources. Organizations such as extension services, soil and water conservation districts, and planning agencies may be good sources of information about methods that have been successful (and also those that have failed).

By obtaining this type of information, the applicant can determine what control techniques have been successful in correcting malfunctioning septic systems in similar types of soils The value of this approach is that the applicant will know that a certain control technique has been used to correct a malfunctioning septic system in the same types of soils that occur in the municipality. Where only part of the MS4 drainage area is served by septic systems, proposed programs should address setting and maintenance of septic systems, including draft requirements and implementation procedures.

6.6 SIGNATORY AND CERTIFICATION REQUIREMENTS

Under the Federal NPDES regulations [§122 22(a)], all NPDES permit applications (including municipal storm water permit applications) must be signed by an authorized person, as defined in the regulations Permit applications submitted by a municipality, State, Federal, or other public agency must be signed by either a principal executive officer or ranking elected official [§122 22(a)(3)] To fulfill the signatory requirements, the person signing the municipal application must provide his or her name (printed or typed), title, and date signed In addition, the applicant should provide the name, address, and telephone number of the person signing the application or another point of contact that can answer questions about the application.

In addition, §122.22(d) states that any person signing a permit application must make the following certification:

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations"

6.7 IMPLEMENTATION OF THE STORM WATER PROGRAM

EPA anticipates that municipal storm water management programs will mature over time to reflect advances in technology, additional data collection, changing conditions, program development, stage of implementation, and improvements in water quality. Therefore, applicants may emphasize different program components to reflect implementation priorities. The proposed management program should clearly identify each of the program components and include a schedule for implementation. Each component of the Part 2 application should be classified as: full implementation, phased implementation, pilot study, or feasibility analysis In annual reports on the progress of storm water management programs, municipalities must report on the status of implementing program provisions [§122 42(c)(1), or Section 7.3 of the guidance].

- **Full Implementation.** Fully implemented components should be proposed when the municipality is

prepared to begin or continue full implementation after its permit is issued and it expects to continue the component throughout the life of the permit. Full implementation of a program component is generally the preferred way of demonstrating the required level of control.

- **Phased Implementation.** Phased implementation should be proposed when the level of effort to implement the component will vary during the term of the permit. Phased implementation may be appropriate when additional data must be collected or technical guidance, training materials, or appropriate ordinances must be developed prior to full implementation. A schedule that includes milestones should be part of the description.

- **Pilot Studies.** Although the municipality must implement and comply with *each* provision of the municipal storm water permit, the municipality may choose to carry out pilot studies that involve limited experimental implementation of a program component. In some cases, pilot studies may be authorized by the permit. Used to evaluate the effectiveness of a program component, pilot studies may be appropriate when a technology is unproven or when data must be collected to develop operating standards or procedures. A schedule including milestones should be included in the description of a pilot study. This schedule should provide options for phased implementation of the program component, showing alternatives based on various possible results of the pilot study.

CHAPTER 7
ASSESSMENT OF CONTROLS

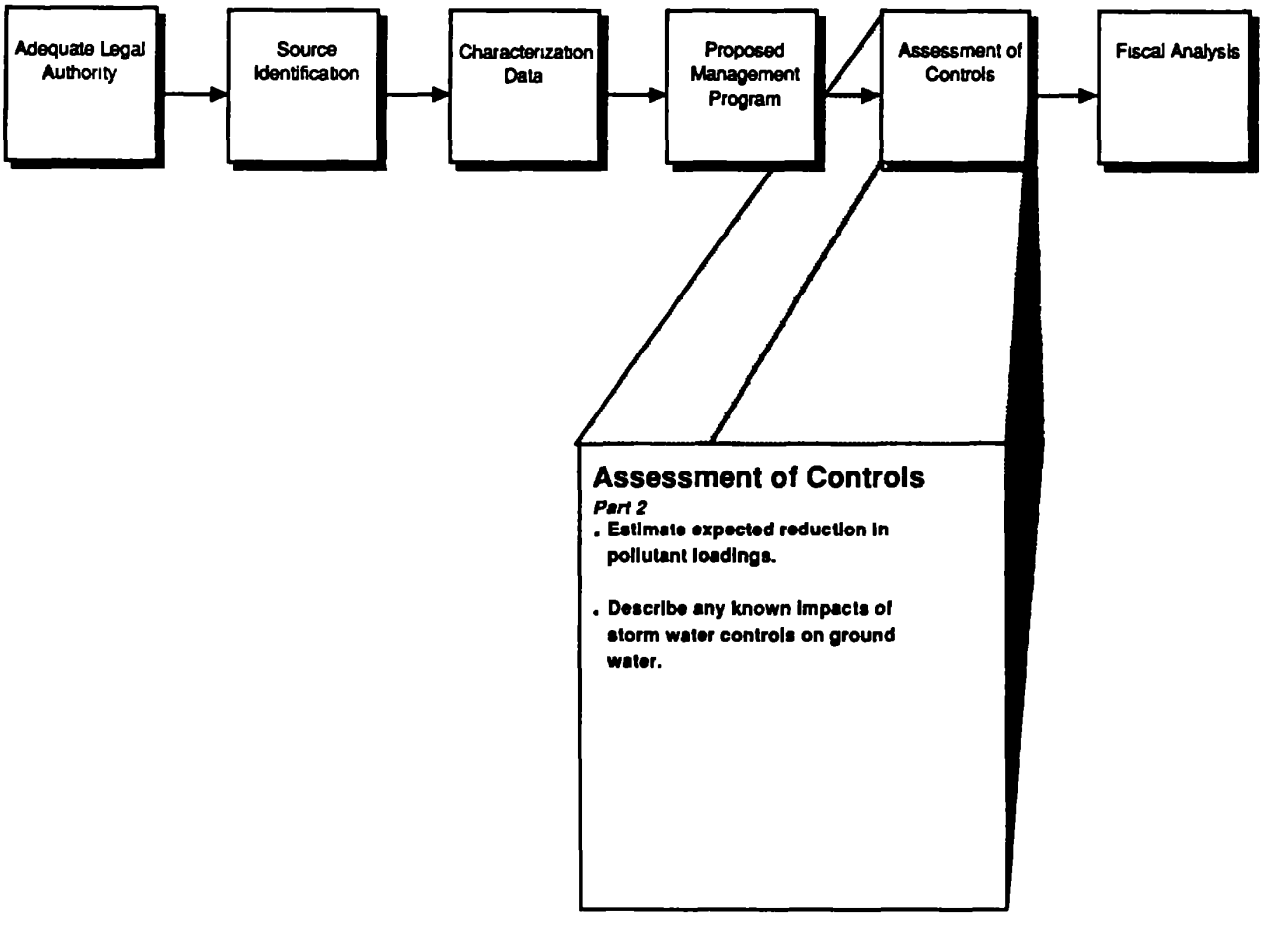

7.0 ASSESSMENT OF CONTROLS

7.1 BACKGROUND

Part 2 applications require that municipalities estimate the effectiveness of their proposed storm water quality management programs The regulations require an initial estimate or assessment because the performance of appropriate management controls is highly dependent on site-specific factors Program effectiveness can be estimated through both direct measurements (such as reductions in annual pollutant loads) and indirect measurements (such as measurements that demonstrate increased public awareness of storm water quality issues) At a minimum, applicants must submit estimated reductions in pollutant loads expected to result from implemented controls and describe known impacts of storm water controls on ground water

> 122 26(d)(2)(v) *Assessment of controls* [The application must include] estimated reductions in loadings of pollutants for discharges of municipal storm sewer constituents from municipal storm sewer systems expected as the result of the municipal storm water quality management program The assessment shall also identify known impacts of storm water controls on ground water

Reductions in pollutant loads due to the implementation and maintenance of structural controls provide direct measurements of the effectiveness of the storm water management program In addition, EPA encourages applicants to go beyond the minimum requirement and assess the effectiveness of their storm water management program through other direct measurements as well as indirect measurements As discussed below, indirect measurements provide surrogate estimates of qualitative factors, such as increased public awareness of storm water quality issues

Estimates of the effectiveness of the storm water management program will assist the municipality and the permit writer in:

- Determining whether the most cost-effective best management practices (BMPs) are included in the storm water management program;
- Ensuring that the storm water management program includes adequate public participation programs and intergovernmental coordination,
- Establishing on-going monitoring inspection and surveillance programs that help refine estimates of program effectiveness, and
- Developing a strategy to evaluate progress toward achieving water quality goals

7.2 ASSESSMENT OF STORM WATER MANAGEMENT PROGRAM

For some components of a proposed storm water management program, such as structural controls (e g , vegetative streambank stabilization, sediment pond or basin, etc.), the effect on pollution in storm water runoff is observable, and pollutant removal efficiencies can be estimated directly For other components, pollutant reductions may be difficult to quantify Applicants may need to use indirect estimates. For example, a program component may address source controls such as changing the behavior of citizens in the community, or improving the municipal control of industrial or commercial runoff For

components of the proposed management program where pollutant removal efficiency cannot be reasonably estimated, applicants are strongly encouraged to identify some indirect measurement that can be used to evaluate the success of the practice

7.2.1 Direct Measurements of Program Effectiveness

As discussed above, 40 CFR 122.26(d)(2)(v) requires that applicants submit estimates of expected pollutant load reductions with their Part 2 applications To supplement these estimates, applicants could provide estimates of other direct measurements of program effectiveness including

- Removal efficiencies of BMPs that control storm water quality,
- Reductions in the volume of storm water discharged,
- Reductions in event mean concentrations or
- Reductions in seasonal pollutant loadings

Such direct estimates do not have to be verified with quantitative data, but can be based on accepted engineering design practices However the applicant should describe its procedures for estimating the effectiveness of the control Applicants should present estimates of pollutant load reductions or other measurements separately for each component of the proposed management program Applicants should provide estimated reductions on a watershed basis and system-wide basis

Reductions in pollutant loadings can be estimated by first estimating the pollutant loading (based on concentrations and flows) that would result without the control measure The value should then be multiplied by the efficiency of the control expressed in terms of a fraction or percentage. Estimated control efficiencies can be obtained from published sources, such as Schueler (1987) (see bibliography in Appendix A) Note that for most control measures, the pollutant removal efficiency differs for different classes of pollutants

After the municipality's storm water management program is implemented, the municipality can work to refine its initial assessment of the program. For example, the permit will require applicants to submit estimates of event mean concentrations and estimates of annual pollutant loadings for each outfall in the system [§122.26(d)(2)(iii)(C), discussed in Section 5.5 of this guidance]. These estimates can be compared with the applicant's initial estimates

In addition, the estimated removal efficiencies can be refined through the monitoring program required by §122.26(d)(2)(iii)(D) (discussed in Section 5.6 of this guidance) To refine these estimates, the monitoring program should include measurements at the inflow and outflow points of the control Throughout the permit term, the municipality must submit refinements to its assessment or additional direct measurements of program effectiveness in its annual report (Section 7 3)

The applicant should use direct measurements of program effectiveness as it begins to assess its long-term progress in improving water quality through storm water management practices Direct measurements of program effectiveness may not provide meaningful conclusions on trends in water quality improvements for a couple of permit terms. However, applicants are encouraged to use direct measurements of program effectiveness, such as annual pollutant loads, event mean concentrations, and seasonal pollutant loadings, to begin to estimate long-term trends Several statistical methods that rely on linear regression have been developed

to model these measurements to determine if trends exist

7.2.2 Indirect Measurements of Program Effectiveness

When pollutant reductions cannot be estimated through direct measurement, appropriate indirect measurements may be used. These may include the estimated level of increased enforcement activity, increased public awareness, or reduction in number of illegal dumping incidents For example, a field screening program to identify illicit connections and improper dumping in Fort Worth, Texas, used reductions in observations of indicator pollutants as a measure of the success of the program (Fort Worth, 1988).

Other possible indirect measurements include.

- Gallons of used oil recycled,
- Amount of household hazardous waste collected,
- Number of educational brochures on storm water quality distributed;
- Number of public hearings on storm water and attendance at these hearings,
- Circulation of an annual report or periodic newsletters on progress in meeting storm water quality goals,
- Number of reports of illicit discharges or illegal dumping
- Number of spill clean-ups,
- Number of sewer inlets stenciled,
- Acres of open space,
- Number of construction and erosion and sediment control plans submitted and approved

Many of these indirect measurements will help to indicate whether the storm water management program includes adequate public participation and intergovernmental coordination.

7.2.3 Impacts of Storm Water Controls on Ground Water

Structural BMPs may have an impact on other media. Therefore, the Part 2 application requires that applicants discuss known impacts of storm water controls on ground water. Impacts should be identified separately for each component of the proposed management program. These controls may increase the quantity of ground water (such as infiltration leading to recharge), but degrade the quality of the ground water For example, in arid parts of the Southwest, imported water is often used for irrigation. This increases the quantity of ground water, but, because of high levels of nutrients and total suspended and dissolved solids in the irrigation water, also results in impacts on ground water quality

In addition, the applicant should evaluate whether structural controls for storm water impact other media, such as wetlands

7.3. ANNUAL REPORTS ON THE EFFECTIVENESS OF THE STORM WATER MANAGEMENT PROGRAM

Under §122.42(c), applicants must provide annual reports on the progress of their storm water management programs. These reports, which are due on the anniversaries of permit issuance, must include

- The status of implementing the components of the storm water management program that are required by the permit,
- Proposed changes to the storm water management programs that are established as permit conditions,

- Revisions, if necessary, to the assessment of controls and the fiscal analysis reported in the permit application;
- Summary of data, including monitoring data, that are accumulated throughout the reporting year,
- Projected annual expenditures and budget for the year following each annual report;
- A summary describing the number and nature of enforcement actions, inspections, and public education programs; and
- Identification of water quality improvements or degradation

Applicants should refer to the specific regulatory language in §122 42(c) for a more complete discussion of annual reporting requirements

Although the Part 2 application requirements do not specifically address annual reporting requirements, applicants should consider their strategy for preparing annual reports when they complete their Part 2 applications. A municipality may develop a strategy to assess the progress of its storm water management program throughout the term of the permit in addition to providing a baseline assessment of its program. To develop the strategy, applicants should

- Identify the direct or indirect measurements that will be used to track the long-term progress of the applicant's program towards achieving improvements in storm water quality (the results of this assessment would appear in the municipality's annual report);
- Discuss the role of monitoring data in substantiating or refining their assessment of the progress of their program towards established objectives and goals; and
- Discuss how future additions or revisions to the assessment measurements or strategy will be implemented by the municipality (e.g , what roles and responsibilities will participating municipal agencies and/or organizations have in this area)

It is anticipated that many municipalities will use the same criteria or measurements that were used in the baseline assessment to develop their long-term assessment strategy. This is an acceptable approach provided that the municipality delineates how their program provides for a longer term assessment of the progress of their storm water management program The municipality is encouraged to consider in advance the information requirements for annual reporting that are identified above when developing their long-term assessment strategy

CHAPTER 8
FISCAL ANALYSIS

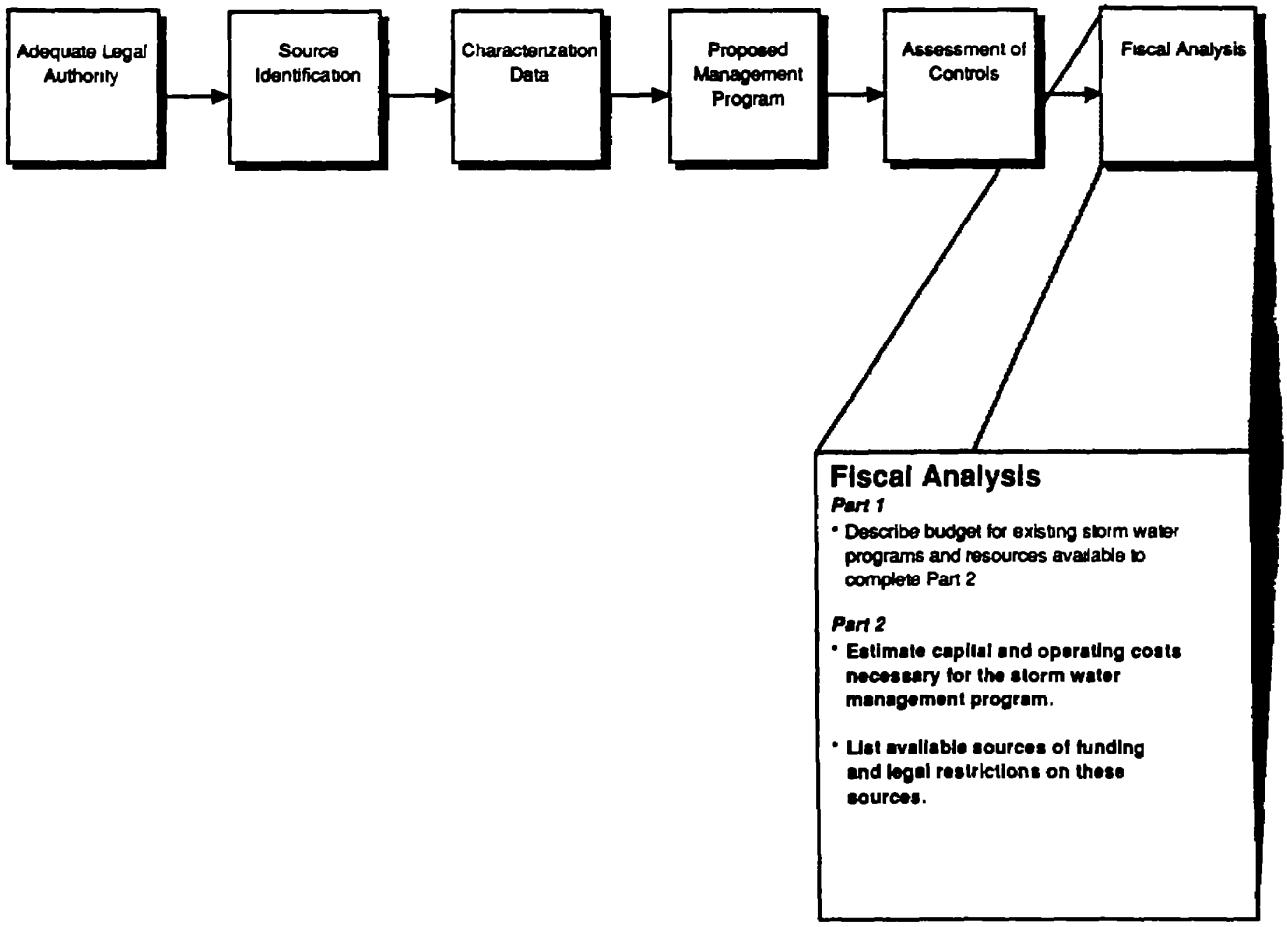

8.0 FISCAL ANALYSIS

8.1 BACKGROUND

NPDES permits for discharges from MS4s will require municipal permittees to implement management programs, conduct long term storm water monitoring, and provide other information Because these activities will result in expense to the municipality, a fiscal analysis is required in the Part 2 application

Applicants must provide yearly cost estimates for these programs. Applicants also must provide a schedule indicating when funds will be available Examining the levels of proposed spending and funding allows the permitting authority to gauge the ability of the applicant to implement the program and predict its effectiveness The fiscal analysis also will help the permit writer determine whether the applicant has met the statutory requirement of reducing the discharge of pollutant to the MS4 to the maximum extent practicable Finally, the estimates help the applicant evaluate the feasibility and cost-effectiveness of its program A municipality must update its fiscal analysis each year for the annual report on the progress in implementing their storm water management program [40 CFR 122 42(c)(3) and (5), discussed in Section 7.3 of this guidance]

8.2 PROCEDURE FOR CONDUCTING A FISCAL ANALYSIS

Under §122 26(d)(2)(vi), each applicant must demonstrate sufficient financial resources to implement the conditions of the permit

Adequate resources may be demonstrated by performing a fiscal analysis of the estimated capital and operation and maintenance expenditures required to complete the activities required by the regulations This fiscal analysis must be performed for each fiscal year to be covered by the permit (5 years, in most cases). The analysis must describe the source of the funds used to meet the necessary expenditures, including any legal restrictions on the appropriated funds

> §122.26(d)(2)(vi) [The application must include] for each fiscal year to be covered by the permit, a fiscal analysis of the necessary capital and operation and maintenance expenditures necessary to accomplish the activities of the programs under paragraphs (d)(2)(iii) and (iv) of this section. Such analysis shall include a description of the source of funds that are proposed to meet the necessary expenditures, including legal restrictions on the use of such funds

The following procedure is an example of a method of conducting the necessary fiscal analysis

Step 1. Identify the major tasks for each component covered by this application requirement, including

- Elements of the proposed management program,
- Estimates of seasonal loads and event mean concentrations for each major outfall covered by the permit, and
- Proposed monitoring program.

Step 2. Develop a schedule outlining when each of the tasks identified in Step 1 will be undertaken Some tasks may be performed just once, others may be on-going For example, the schedule should include, among other things·

- The installation of any new control measures identified in the proposed

management program [§122 26(d)(2)(iv), discussed in Section 6 4],

- A maintenance schedule for structural best management practices (BMPs) [§122 26(d)(2)(iv)(A)(1), discussed in Section 6 4.3];

- Development of seasonal pollutant loadings and event mean concentrations of a representative storm [§122.26(d)(2)(iii)(C), discussed in Section 5.5];

- Monitoring program for representative data collection for the term of the permit [§122.26(d)(2)(iii)(D), discussed in Section 5 6],

- Monitoring program for industrial facilities [§122 26(d)(2)(iv)(C)(2), discussed in Section 6.3.3];

- On-going field screening program for illicit discharges [§122.26(d)(2)(iv)(B), discussed in Section 6 5],

- Development of certification programs for construction workers or pesticide applicators, if appropriate [§122 26(d)(2)(iv), discussed in Sections 6.3.1 and 6 3 2], and

- Implementation schedules for other components of the storm water application that have not been fully implemented at the time of application, such as additional legal authority or comprehensive development plans

Step 3. Estimate the capital expenses necessary to accomplish the tasks identified in Step 1 and determine a schedule for purchase Applicants may elect to define categories of capital expenditures such as "monitoring equipment," "miscellaneous monitoring supplies," "personal protective equipment," etc

Step 4. Estimate other non-capital costs to implement the tasks identified in Step 1. Use the schedule developed in Step 2 to spread costs over the term of the permit Costs should be presented as a total annual cost for each proposed program component In addition, estimates of the total annual costs and annual per capita costs should be provided. Per capita costs can be compared with the per capita costs of other programs, such as sewage treatment programs.

These costs may include items such as :

- Newspaper ads announcing new programs or recycling centers;

- Holding public meetings or hearings, and

- Labor for department personnel to speak to citizens groups

Step 5. Identify funding to be applied. Applicants must describe the sources of funding and any legal restrictions on that funding Sources may include general revenues, storm water utilities, plan review fees, permit fees, industrial/commercial user fees, special assessment district funds, and revenue bonds Some funding sources, such as general revenues based on property taxes, are generally unrestricted, but can be allocated by local officials annually In a few cases, a local property tax may be dedicated to finance a storm water management program For example, one county finances its storm water management program through a dedicated property tax of $0.135 per $100 assessed valuation Other municipalities add special assessments to property tax bills.

A storm water utility is another source of funding dedicated to financing storm water management activities The storm water utility offers the advantage of a stable and predictable source of funds. Other advantages of storm water utilities over general revenues are that utility charges can be more equitably based on

the user's contribution to local storm water problems, and a utility provides a mechanism to incorporate incentives for on-site storm water management

In many cases, municipalities will evaluate sources of funds that are not currently available, such as a new storm water utility. In these cases, applicants must include a schedule of when funds will be available. For example, it usually takes a municipality 18 to 24 months of planning before local elected officials authorize a storm water utility, and another 6 to 12 months to implement the utility (Lindsey, 1988) Key milestones for planning and implementing the funding mechanism must be identified in the schedule The following components have been found to be important in establishing storm water utilities

- Determining the most appropriate administrative structure for implementing a storm water management program,
- Adopting a storm water utility ordinance,
- Estimating revenue needs and planning for cost recovery,
- Establishing a utility rate structure and billing system,
- Establishing a system for developer contributions, and
- Implementing a public information program

Step 6. Compare the funding sources with the funding needs. As a last step in this process, the municipality must ensure that adequate funding is available to cover the cost of implementing the storm water management program If adequate funding is not available, the municipality must consider alternate sources of funding such as a storm water utility

APPENDIX A: BIBLIOGRAPHY

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WDOE, *Public Review Draft - Stormwater Management Manual for the Puget Sound Basin*, Washington State Department of Ecology Publication #90-73 June 1991

Wetlands Their Use and Regulation, U.S. Congress, Office of Technology Assessment, OTA-00-206 March 1984

* For additional sources of information, applicants may wish to consult the documents listed in the bibliography of Urban Drainage & Flood Control District, *Urban Storm Drainage Criteria Manual, Vol III*, Urban Drainage and Flood Control District, Denver CO September 1, 1992

APPENDIX B:
PART 2 APPLICATION REQUIREMENTS

certify, pursuant to 5 U S.C 605(b) that these amendments do not, have a significant impact on a substantial number of small entities.

List of Subjects in 40 CFR Parts 122, 123, and 124

Administrative practice and procedure Environmental protection, Reporting and recordkeeping requirements, Water pollution control

Authority: Clean Water Act, 33 U S C 1251 *et seq*

Dated October 31, 1990

William K. Reilly,

Administrator

For the reasons stated in the preamble, parts 122, 123, and 124 of title 40 of the Code of Federal Regulations are amended as follows

PART 122—EPA ADMINISTERED PERMIT PROGRAMS; THE NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM

Subpart B—Permit Application and Special NPDES Program Requirements

1 The authority citation for part 122 continues to read as follows

Authority Clean Water Act 33 U S C 1251 *et seq*

2 Section 122 1 is amended by revising paragraph (b)(2)(iv) to read as follows

§ 122.1 Purpose and scope

* * * * *

(b) * * *

(2) * * *

(iv) Discharges of storm water as set forth in § 122 26, and

* * * * *

3 Section 122 21 is amended by revising paragraph (c)(1) by removing the last sentence of paragraph (f)(7), by removing paragraph (f)(9) by adding two sentences at the end of paragraph (g)(3) by revising paragraph (g)(7) introductory text by removing and reserving paragraph (g)(10) and by revising the introductory text of paragraph (k) to read as follows

§ 122 21 Application for a permit (applicable to State programs, see § 123 25)

* * * * *

(c) *Time to apply* (1) Any person proposing a new discharge, shall submit an application at least 180 days before the date on which the discharge is to commence unless permission for a later date has been granted by the Director Facilities proposing a new discharge of storm water associated with industrial activity shall submit an application 180 days before that facility commences industrial activity which may result in a discharge of storm water associated with that industrial activity Facilities described under § 122.26(b)(14)(x) shall submit applications at least 90 days before the date on which construction is to commence. Different submittal dates may be required under the terms of applicable general permits Persons proposing a new discharge are encouraged to submit their applications well in advance of the 90 or 180 day requirements to avoid delay. See also paragraph (k) of this section and § 122.26 (c)(1)(i)(G) and (c)(1)(ii).

* * * * *

(g) * * *

(3) * * * The average flow of point sources composed of storm water may be estimated. The basis for the rainfall event and the method of estimation must be indicated.

* * * * *

(7) *Effluent characteristics.* Information on the discharge of pollutants specified in this paragraph (except information on storm water discharges which is to be provided as specified in § 122 26) When "quantitative data" for a pollutant are required, the applicant must collect a sample of effluent and analyze it for the pollutant in accordance with analytical methods approved under 40 CFR part 136 When no analytical method is approved the applicant may use any suitable method but must provide a description of the method When an applicant has two or more outfalls with substantially identical effluents the Director may allow the applicant to test only one outfall and report that the quantitative data also apply to the substantially identical outfalls The requirements in paragraphs (g)(7) (iii) and (iv) of this section that an applicant must provide quantitative data for certain pollutants known or believed to be present do not apply to pollutants present in a discharge solely as the result of their presence in intake water, however, an applicant must report such pollutants as present Grab samples must be used for pH, temperature, cyanide total phenols, residual chlorine, oil and grease, fecal coliform and fecal streptococcus For all other pollutants 24-hour composite samples must be used However, a minimum of one grab sample may be taken for effluents from holding ponds or other impoundments with a retention period greater than 24 hours In addition, for discharges other than storm water discharges, the Director may waive composite sampling for any outfall for which the applicant demonstrates that the use of an automatic sampler is infeasible and that the minimum of four (4) grab samples will be a representative sample of the effluent being discharged For storm water discharges, all samples shall be collected from the discharge resulting from a storm event that is greater than 0 1 inch and at least 72 hours from the previously measurable (greater than 0.1 inch rainfall) storm event Where feasible, the variance in the duration of the event and the total rainfall of the event should not exceed 50 percent from the average or median rainfall event in that area For all applicants, a flow-weighted composite shall be taken for either the entire discharge or for the first three hours of the discharge. The flow-weighted composite sample for a storm water discharge may be taken with a continuous sampler or as a combination of a minimum of three sample aliquots taken in each hour of discharge for the entire discharge or for the first three hours of the discharge, with each aliquot being separated by a minimum period of fifteen minutes (applicants submitting permit applications for storm water discharges under § 122 26(d) may collect flow weighted composite samples using different protocols with respect to the time duration between the collection of sample aliquots, subject to the approval of the Director) However, a minimum of one grab sample may be taken for storm water discharges from holding ponds or other impoundments with a retention period greater than 24 hours For a flow-weighted composite sample, only one analysis of the composite of aliquots is required For storm water discharge samples taken from discharges associated with industrial activities, quantitative data must be reported for the grab sample taken during the first thirty minutes (or as soon thereafter as practicable) of the discharge for all pollutants specified in § 122 26(c)(1) For all storm water permit applicants taking flow-weighted composites quantitative data must be reported for all pollutants specified in § 122 26 except pH temperature, cyanide total phenols residual chlorine, oil and grease fecal coliform, and fecal streptococcus, The Director may allow or establish appropriate site-specific sampling procedures or requirements including sampling locations, the season in which the sampling takes place the minimum duration between the previous measurable storm event and the storm event sampled the minimum or maximum level of precipitation required for an appropriate storm event, the form of precipitation sampled (snow melt or rain fall) protocols for collecting samples under 40 CFR part 136 and additional time for submitting data on a

case-by-case basis. An applicant is expected to "know or have reason to believe" that a pollutant is present in an effluent based on an evaluation of the expected use, production, or storage of the pollutant, or on any previous analyses for the pollutant. (For example, any pesticide manufactured by a facility may be expected to be present in contaminated storm water runoff from the facility.)

* * * * *

(k) *Application requirements for new sources and new discharges.* New manufacturing, commercial, mining and silvicultural dischargers applying for NPDES permits (except for new discharges of facilities subject to the requirements of paragraph (h) of this section or new discharges of storm water associated with industrial activity which are subject to the requirements of § 122.26(c)(1) and this section (except as provided by § 122.26(c)(1)(ii)) shall provide the following information to the Director, using the application forms provided by the Director:

* * * * *

4. Section 122.22(b) introductory text is revised to read as follows:

§ 122.22 Signatories to permit applications and reports (applicable to State programs, see § 123.25).

* * * * *

(b) All reports required by permits, and other information requested by the Director shall be signed by a person described in paragraph (a) of this section, or by a duly authorized representative of that person. A person is a duly authorized representative only if:

* * * * *

5. Section 122.26 is revised to read as follows:

§ 122.26 Storm water discharges (applicable to State NPDES programs, see § 123.25).

(a) *Permit requirement.* (1) Prior to October 1, 1992, discharges composed entirely of storm water shall not be required to obtain a NPDES permit except:

(i) A discharge with respect to which a permit has been issued prior to February 4, 1987;

(ii) A discharge associated with industrial activity (see § 122.26(a)(4));

(iii) A discharge from a large municipal separate storm sewer system;

(iv) A discharge from a medium municipal separate storm sewer system;

(v) A discharge which the Director, or in States with approved NPDES programs either the Director or the EPA Regional Administrator, determines to contribute to a violation of a water quality standard or is a significant contributor of pollutants to waters of the United States. This designation may include a discharge from any conveyance or system of conveyances used for collecting and conveying storm water runoff or a system of discharges from municipal separate storm sewers, except for those discharges from conveyances which do not require a permit under paragraph (a)(2) of this section or agricultural storm water runoff which is exempted from the definition of point source at § 122.2. The Director may designate discharges from municipal separate storm sewers on a system-wide or jurisdiction-wide basis. In making this determination the Director may consider the following factors:

(A) The location of the discharge with respect to waters of the United States as defined at 40 CFR 122.2;

(B) The size of the discharge;

(C) The quantity and nature of the pollutants discharged to waters of the United States; and

(D) Other relevant factors.

(2) The Director may not require a permit for discharges of storm water runoff from mining operations or oil and gas exploration, production, processing or treatment operations or transmission facilities, composed entirely of flows which are from conveyances or systems of conveyances (including but not limited to pipes, conduits, ditches, and channels) used for collecting and conveying precipitation runoff and which are not contaminated by contact with or that has not come into contact with, any overburden, raw material, intermediate products, finished product, byproduct or waste products located on the site of such operations.

(3) *Large and medium municipal separate storm sewer systems.* (i) Permits must be obtained for all discharges from large and medium municipal separate storm sewer systems.

(ii) The Director may either issue one system-wide permit covering all discharges from municipal separate storm sewers within a large or medium municipal storm sewer system or issue distinct permits for appropriate categories of discharges within a large or medium municipal separate storm sewer system including, but not limited to: all discharges owned or operated by the same municipality, located within the same jurisdiction; all discharges within a system that discharge to the same watershed; discharges within a system that are similar in nature, or for individual discharges from municipal separate storm sewers within the system.

(iii) The operator of a discharge from a municipal separate storm sewer which is part of a large or medium municipal separate storm sewer system must either:

(A) Participate in a permit application (to be a permittee or a co-permittee) with one or more other operators of discharges from the large or medium municipal storm sewer system which covers all, or a portion of all, discharges from the municipal separate storm sewer system;

(B) Submit a distinct permit application which only covers discharges from the municipal separate storm sewers for which the operator is responsible; or

(C) A regional authority may be responsible for submitting a permit application under the following guidelines:

(1) The regional authority together with co-applicants shall have authority over a storm water management program that is in existence, or shall be in existence at the time part 1 of the application is due;

(2) The permit applicant or co-applicants shall establish their ability to make a timely submission of part 1 and part 2 of the municipal application;

(3) Each of the operators of municipal separate storm sewers within the systems described in paragraphs (b)(4)(i), (ii), and (iii) or (b)(7)(i), (ii), and (iii) of this section, that are under the purview of the designated regional authority, shall comply with the application requirements of paragraph (d) of this section.

(iv) One permit application may be submitted for all or a portion of all municipal separate storm sewers within adjacent or interconnected large or medium municipal separate storm sewer systems. The Director may issue one system-wide permit covering all or a portion of all municipal separate storm sewers in adjacent or interconnected large or medium municipal separate storm sewer systems.

(v) Permits for all or a portion of all discharges from large or medium municipal separate storm sewer systems that are issued on a system-wide, jurisdiction-wide, watershed or other basis may specify different conditions relating to different discharges covered by the permit, including different management programs for different drainage areas which contribute storm water to the system.

(vi) Co-permittees need only comply with permit conditions relating to discharges from the municipal separate storm sewers for which they are operators.

(4) *Discharges through large and medium municipal separate storm sewer systems* In addition to meeting the requirements of paragraph (c) of this section, an operator of a storm water discharge associated with industrial activity which discharges through a large or medium municipal separate storm sewer system shall submit, to the operator of the municipal separate storm sewer system receiving the discharge no later than May 15, 1991, or 180 days prior to commencing such discharge: the name of the facility; a contact person and phone number; the location of the discharge; a description, including Standard Industrial Classification, which best reflects the principal products or services provided by each facility; and any existing NPDES permit number.

(5) *Other municipal separate storm sewers.* The Director may issue permits for municipal separate storm sewers that are designated under paragraph (a)(1)(v) of this section on a system-wide basis, jurisdiction-wide basis, watershed basis or other appropriate basis, or may issue permits for individual discharges

(6) *Non-municipal separate storm sewers* For storm water discharges associated with industrial activity from point sources which discharge through a non-municipal or non-publicly owned separate storm sewer system, the Director, in his discretion, may issue a single NPDES permit, with each discharger a co-permittee to a permit issued to the operator of the portion of the system that discharges into waters of the United States; or, individual permits to each discharger of storm water associated with industrial activity through the non-municipal conveyance system

(i) All storm water discharges associated with industrial activity that discharge through a storm water discharge system that is not a municipal separate storm sewer must be covered by an individual permit, or a permit issued to the operator of the portion of the system that discharges to waters of the United States, with each discharger to the non-municipal conveyance a co-permittee to that permit

(ii) Where there is more than one operator of a single system of such conveyances, all operators of storm water discharges associated with industrial activity must submit applications

(iii) Any permit covering more than one operator shall identify the effluent limitations or other permit conditions, if any that apply to each operator

(7) *Combined sewer systems* Conveyances that discharge storm water runoff combined with municipal sewage are point sources that must obtain NPDES permits in accordance with the procedures of § 122.21 and are not subject to the provisions of this section.

(8) Whether a discharge from a municipal separate storm sewer is or is not subject to regulation under this section shall have no bearing on whether the owner or operator of the discharge is eligible for funding under title II, title III or title VI of the Clean Water Act. *See* 40 CFR part 35, subpart I, appendix A(b)H.2.j.

(b) *Definitions.* (1) *Co-permittee* means a permittee to a NPDES permit that is only responsible for permit conditions relating to the discharge for which it is operator.

(2) *Illicit discharge* means any discharge to a municipal separate storm sewer that is not composed entirely of storm water except discharges pursuant to a NPDES permit (other than the NPDES permit for discharges from the municipal separate storm sewer) and discharges resulting from fire fighting activities.

(3) *Incorporated place* means the District of Columbia, or a city, town, township, or village that is incorporated under the laws of the State in which it is located.

(4) *Large municipal separate storm sewer system* means all municipal separate storm sewers that are either:

(i) Located in an incorporated place with a population of 250,000 or more as determined by the latest Decennial Census by the Bureau of Census (appendix F); or

(ii) Located in the counties listed in appendix H, except municipal separate storm sewers that are located in the incorporated places, townships or towns within such counties; or

(iii) Owned or operated by a municipality other than those described in paragraph (b)(4) (i) or (ii) of this section and that are designated by the Director as part of the large or medium municipal separate storm sewer system due to the interrelationship between the discharges of the designated storm sewer and the discharges from municipal separate storm sewers described under paragraph (b)(4) (i) or (ii) of this section. In making this determination the Director may consider the following factors:

(A) Physical interconnections between the municipal separate storm sewers,

(B) The location of discharges from the designated municipal separate storm sewer relative to discharges from municipal separate storm sewers described in paragraph (b)(4)(i) of th section;

(C) The quantity and nature of pollutants discharged to waters of the United States;

(D) The nature of the receiving waters, and

(E) Other relevant factors, or

(iv) The Director may, upon petition, designate as a large municipal separate storm sewer system, municipal separate storm sewers located within the boundaries of a region defined by a storm water management regional authority based on a jurisdictional, watershed, or other appropriate basis that includes one or more of the systems described in paragraph (b)(4) (i), (ii), (iii) of this section.

(5) *Major municipal separate storm sewer outfall* (or "major outfall") means a municipal separate storm sewer outfall that discharges from a single pipe with an inside diameter of 36 inches or more or its equivalent (discharge from a single conveyance other than circular pipe which is associated with a drainage area of more than 50 acres), or for municipal separate storm sewers that receive storm water from lands zoned for industrial activity (based on comprehensive zoning plans or the equivalent), an outfall that discharg from a single pipe with an inside diameter of 12 inches or more or from its equivalent (discharge from other than a circular pipe associated with a drainage area of 2 acres or more)

(6) *Major outfall* means a major municipal separate storm sewer outfall.

(7) *Medium municipal separate storm sewer system* means all municipal separate storm sewers that are either:

(i) Located in an incorporated place with a population of 100,000 or more but less than 250,000, as determined by the latest Decennial Census by the Bureau of Census (appendix G), or

(ii) Located in the counties listed in appendix I, except municipal separate storm sewers that are located in the incorporated places, townships or towns within such counties, or

(iii) Owned or operated by a municipality other than those described in paragraph (b)(4) (i) or (ii) of this section and that are designated by the Director as part of the large or medium municipal separate storm sewer system due to the interrelationship between the discharges of the designated storm sewer and the discharges from municipal separate storm sewers described under paragraph (b)(4) (i) or (ii) of this section In making this determination the Director may cons the following factors

(A) Physical interconnections between the municipal separate storm sewers;

(B) The location of discharges from the designated municipal separate storm sewer relative to discharges from municipal separate storm sewers described in paragraph (b)(7)(i) of this section;

(C) The quantity and nature of pollutants discharged to waters of the United States;

(D) The nature of the receiving waters, or

(E) Other relevant factors; or

(iv) The Director may, upon petition, designate as a medium municipal separate storm sewer system, municipal separate storm sewers located within the boundaries of a region defined by a storm water management regional authority based on a jurisdictional, watershed, or other appropriate basis that includes one or more of the systems described in paragraphs (b)(7) (i), (ii), (iii) of this section.

(8) *Municipal separate storm sewer* means a conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, or storm drains)

(i) Owned or operated by a State, city, town, borough, county, parish, district, association, or other public body (created by or pursuant to State law) having jurisdiction over disposal of sewage, industrial wastes, storm water, or other wastes, including special districts under State law such as a sewer district, flood control district or drainage district, or similar entity, or an Indian tribe or an authorized Indian tribal organization, or a designated and approved management agency under section 208 of the CWA that discharges to waters of the United States,

(ii) Designed or used for collecting or conveying storm water;

(iii) Which is not a combined sewer; and

(iv) Which is not part of a Publicly Owned Treatment Works (POTW) as defined at 40 CFR 122 2

(9) *Outfall* means a *point source* as defined by 40 CFR 122 2 at the point where a municipal separate storm sewer discharges to waters of the United States and does not include open conveyances connecting two municipal separate storm sewers or pipes, tunnels or other conveyances which connect segments of the same stream or other waters of the United States and are used to convey waters of the United States.

(10) *Overburden* means any material of any nature, consolidated or inconsolidated, that overlies a mineral deposit excluding topsoil or similar naturally-occurring surface materials that are not disturbed by mining operations.

(11) *Runoff coefficient* means the fraction of total rainfall that will appear at a conveyance as runoff.

(12) *Significant materials* includes, but is not limited to: raw materials; fuels, materials such as solvents, detergents, and plastic pellets; finished materials such as metallic products; raw materials used in food processing or production; hazardous substances designated under section 101(14) of CERCLA; any chemical the facility is required to report pursuant to section 313 of title III of SARA; fertilizers; pesticides; and waste products such as ashes, slag and sludge that have the potential to be released with storm water discharges.

(13) *Storm water* means storm water runoff, snow melt runoff, and surface runoff and drainage.

(14) *Storm water discharge associated with industrial activity* means the discharge from any conveyance which is used for collecting and conveying storm water and which is directly related to manufacturing, processing or raw materials storage areas at an industrial plant. The term does not include discharges from facilities or activities excluded from the NPDES program under 40 CFR part 122. For the categories of industries identified in paragraphs (b)(14) (i) through (x) of this section, the term includes, but is not limited to, storm water discharges from industrial plant yards; immediate access roads and rail lines used or traveled by carriers of raw materials, manufactured products, waste material, or by-products used or created by the facility; material handling sites; refuse sites; sites used for the application or disposal of process waste waters (as defined at 40 CFR part 401); sites used for the storage and maintenance of material handling equipment, sites used for residual treatment, storage, or disposal; shipping and receiving areas; manufacturing buildings; storage areas (including tank farms) for raw materials, and intermediate and finished products; and areas where industrial activity has taken place in the past and significant materials remain and are exposed to storm water For the categories of industries identified in paragraph (b)(14)(xi) of this section, the term includes only storm water discharges from all the areas (except access roads and rail lines) that are listed in the previous sentence where material handling equipment or activities, raw materials, intermediate products, final products, waste materials, by-products, or industrial machinery are exposed to storm water. For the purposes of this paragraph, material handling activities include the storage, loading and unloading, transportation, or conveyance of any raw material, intermediate product, finished product, by-product or waste product. The term excludes areas located on plant lands separate from the plant's industrial activities, such as office buildings and accompanying parking lots as long as the drainage from the excluded areas is not mixed with storm water drained from the above described areas. Industrial facilities (including industrial facilities that are Federally, State, or municipally owned or operated that meet the description of the facilities listed in this paragraph (b)(14)(i)–(xi) of this section) include those facilities designated under the provisions of paragraph (a)(1)(v) of this section. The following categories of facilities are considered to be engaging in "industrial activity" for purposes of this subsection.

(i) Facilities subject to storm water effluent limitations guidelines, new source performance standards, or toxic pollutant effluent standards under 40 CFR subchapter N (except facilities with toxic pollutant effluent standards which are exempted under category (xi) in paragraph (b)(14) of this section);

(ii) Facilities classified as Standard Industrial Classifications 24 (except 2434), 26 (except 265 and 267), 28 (except 283), 29, 311, 32 (except 323), 33, 3441, 373;

(iii) Facilities classified as Standard Industrial Classifications 10 through 14 (mineral industry) including active or inactive mining operations (except for areas of coal mining operations no longer meeting the definition of a reclamation area under 40 CFR 434 11(1) because the performance bond issued to the facility by the appropriate SMCRA authority has been released, or except for areas of non-coal mining operations which have been released from applicable State or Federal reclamation requirements after December 17, 1990) and oil and gas exploration, production, processing, or treatment operations, or transmission facilities that discharge storm water contaminated by contact with or that has come into contact with, any overburden, raw material, intermediate products, finished products, byproducts or waste products located on the site of such operations. (inactive mining operations are mining sites that are not being actively mined but which have an identifiable owner/operator; inactive mining sites do not include sites where mining claims are being maintained prior to disturbances associated with the extraction, beneficiation, or processing of mined

materials, nor sites where minimal activities are undertaken for the sole purpose of maintaining a mining claim);

(iv) Hazardous waste treatment, storage, or disposal facilities, including those that are operating under interim status or a permit under subtitle C of RCRA;

(v) Landfills, land application sites, and open dumps that receive or have received any industrial wastes (waste that is received from any of the facilities described under this subsection) including those that are subject to regulation under subtitle D of RCRA.

(vi) Facilities involved in the recycling of materials, including metal scrapyards, battery reclaimers, salvage yards, and automobile junkyards, including but limited to those classified as Standard Industrial Classification 5015 and 5093.

(vii) Steam electric power generating facilities, including coal handling sites.

(viii) Transportation facilities classified as Standard Industrial Classifications 40, 41, 42 (except 4221-25), 43, 44, 45, and 5171 which have vehicle maintenance shops, equipment cleaning operations, or airport deicing operations. Only those portions of the facility that are either involved in vehicle maintenance (including vehicle rehabilitation, mechanical repairs, painting, fueling, and lubrication), equipment cleaning operations, airport deicing operations, or which are otherwise identified under paragraphs (b)(14) (i)-(vii) or (ix)-(xi) of this section are associated with industrial activity;

(ix) Treatment works treating domestic sewage or any other sewage sludge or wastewater treatment device or system, used in the storage treatment, recycling and reclamation of municipal or domestic sewage including land dedicated to the disposal of sewage sludge that are located within the confines of the facility with a design flow of 1.0 mgd or more or required to have an approved pretreatment program under 40 CFR part 403. Not included are farm lands, domestic gardens or lands used for sludge management where sludge is beneficially reused and which are not physically located in the confines of the facility, or areas that are in compliance with section 405 of the CWA.

(x) Construction activity including clearing, grading and excavation activities except operations that result in the disturbance of less than five acres of total land area which are not part of a larger common plan of development or sale.

(xi) Facilities under Standard Industrial Classifications 20, 21, 22, 23, 2434, 25, 265, 267, 27, 283, 285, 30, 31 (except 311), 323, 34 (except 3441), 35, 36, 37 (except 373), 38, 39, 4221-25, (and which are not otherwise included within categories (ii)-(x)).

(c) *Application requirements for storm water discharges associated with industrial activity*—(1) *Individual application.* Dischargers of storm water associated with industrial activity are required to apply for an individual permit, apply for a permit through a group application, or seek coverage under a promulgated storm water general permit. Facilities that are required to obtain an individual permit, or any discharge of storm water which the Director is evaluating for designation (*see* 40 CFR 124.52(c)) under paragraph (a)(1)(v) of this section and is not a municipal separate storm sewer, and which is not part of a group application described under paragraph (c)(2) of this section, shall submit an NPDES application in accordance with the requirements of § 122.21 as modified and supplemented by the provisions of the remainder of this paragraph. Applicants for discharges composed entirely of storm water shall submit Form 1 and Form 2F. Applicants for discharges composed of storm water and non-storm water shall submit Form 1, Form 2C, and Form 2F. Applicants for new sources or new discharges (as defined in § 122.2 of this part) composed of storm water and non-storm water shall submit Form 1, Form 2D, and Form 2F.

(i) Except as provided in § 122.26(c)(1)(ii)-(iv), the operator of a storm water discharge associated with industrial activity subject to this section shall provide:

(A) A site map showing topography (or indicating the outline of drainage areas served by the outfall(s) covered in the application if a topographic map is unavailable) of the facility including each of its drainage and discharge structures, the drainage area of each storm water outfall, paved areas and buildings within the drainage area of each storm water outfall, each past or present area used for outdoor storage or disposal of significant materials, each existing structural control measure to reduce pollutants in storm water runoff, materials loading and access areas, areas where pesticides, herbicides, soil conditioners and fertilizers are applied, each of its hazardous waste treatment, storage or disposal facilities (including each area not required to have a RCRA permit which is used for accumulating hazardous waste under 40 CFR 262.34), each well where fluids from the facility are injected underground; springs, and other surface water bodies which receive storm water discharges from the facility;

(B) An estimate of the area of impervious surfaces (including paved areas and building roofs) and the total area drained by each outfall (within a mile radius of the facility) and a narrative description of the following: Significant materials that in the three years prior to the submittal of this application have been treated, stored or disposed in a manner to allow exposure to storm water; method of treatment, storage or disposal of such materials; materials management practices employed, in the three years prior to the submittal of this application, to minimize contact by these materials with storm water runoff; materials loading and access areas; the location, manner and frequency in which pesticides, herbicides, soil conditioners and fertilizers are applied; the location and a description of existing structural and non-structural control measures to reduce pollutants in storm water runoff and a description of the treatment the storm water receives, including the ultimate disposal of any solid or fluid wastes other than by discharge;

(C) A certification that all outfalls that should contain storm water discharges associated with industrial activity have been tested or evaluated for the presence of non-storm water discharges which are not covered by a NPDES permit; tests for such non-storm water discharges may include smoke tests, fluorometric dye tests, analysis of accurate schematics, as well as other appropriate tests. The certification shall include a description of the method used, the date of any testing, and the on-site drainage points that were directly observed during a test.

(D) Existing information regarding significant leaks or spills of toxic or hazardous pollutants at the facility that have taken place within the three years prior to the submittal of this application.

(E) Quantitative data based on samples collected during storm events and collected in accordance with § 122.21 of this part from all outfalls containing a storm water discharge associated with industrial activity for the following parameters:

(*1*) Any pollutant limited in an effluent guideline to which the facility is subject.

(*2*) Any pollutant listed in the facility's NPDES permit for its process wastewater (if the facility is operating under an existing NPDES permit);

(*3*) Oil and grease, pH, BOD5, COD, TSS, total phosphorus, total Kjeldahl nitrogen, and nitrate plus nitrite nitrogen.

(*4*) Any information on the discharge required under paragraph § 122.21(g)(7)(iii) and (iv) of this part;

(5) Flow measurements or estimates of the flow rate and the total amount of discharge for the storm event(s) sampled, and the method of flow measurement or estimation; and

(6) The date and duration (in hours) of the storm event(s) sampled, rainfall measurements or estimates of the storm event (in inches) which generated the sampled runoff and the duration between the storm event sampled and the end of the previous measurable (greater than 0.1 inch rainfall) storm event (in hours);

(F) Operators of a discharge which is composed entirely of storm water are exempt from the requirements of § 122.21 (g)(2), (g)(3), (g)(4), (g)(5), (g)(7)(i), (g)(7)(ii), and (g)(7)(v); and

(G) Operators of new sources or new discharges (as defined in § 122.2 of this part) which are composed in part or entirely of storm water must include estimates for the pollutants or parameters listed in paragraph (c)(1)(i)(E) of this section instead of actual sampling data, along with the source of each estimate. Operators of new sources or new discharges composed in part or entirely of storm water must provide quantitative data for the parameters listed in paragraph (c)(1)(i)(E) of this section within two years after commencement of discharge, unless such data has already been reported under the monitoring requirements of the NPDES permit for the discharge. Operators of a new source or new discharge which is composed entirely of storm water are exempt from the requirements of § 122.21 (k)(3)(ii), (k)(3)(iii), and (k)(5).

(ii) The operator of an existing or new storm water discharge that is associated with industrial activity solely under paragraph (b)(14)(x) of this section, is exempt from the requirements of § 122.21(g) and paragraph (c)(1)(i) of this section. Such operator shall provide a narrative description of:

(A) The location (including a map) and the nature of the construction activity;

(B) The total area of the site and the area of the site that is expected to undergo excavation during the life of the permit;

(C) Proposed measures, including best management practices, to control pollutants in storm water discharges during construction, including a brief description of applicable State and local erosion and sediment control requirements;

(D) Proposed measures to control pollutants in storm water discharges that will occur after construction operations have been completed, including a brief description of applicable State or local erosion and sediment control requirements;

(E) An estimate of the runoff coefficient of the site and the increase in impervious area after the construction addressed in the permit application is completed, the nature of fill material and existing data describing the soil or the quality of the discharge, and

(F) The name of the receiving water.

(iii) The operator of an existing or new discharge composed entirely of storm water from an oil or gas exploration, production, processing, or treatment operation, or transmission facility is not required to submit a permit application in accordance with paragraph (c)(1)(i) of this section, unless the facility:

(A) Has had a discharge of storm water resulting in the discharge of a reportable quantity for which notification is or was required pursuant to 40 CFR 117.21 or 40 CFR 302.6 at anytime since November 16, 1987, or

(B) Has had a discharge of storm water resulting in the discharge of a reportable quantity for which notification is or was required pursuant to 40 CFR 110.6 at any time since November 16, 1987; or

(C) Contributes to a violation of a water quality standard.

(iv) The operator of an existing or new discharge composed entirely of storm water from a mining operation is not required to submit a permit application unless the discharge has come into contact with, any overburden, raw material, intermediate products, finished product, byproduct or waste products located on the site of such operations.

(v) Applicants shall provide such other information the Director may reasonably require under § 122.21(g)(13) of this part to determine whether to issue a permit and may require any facility subject to paragraph (c)(1)(ii) of this section to comply with paragraph (c)(1)(i) of this section.

(2) *Group application for discharges associated with industrial activity.* In lieu of individual applications or notice of intent to be covered by a general permit for storm water discharges associated with industrial activity, a group application may be filed by an entity representing a group of applicants (except facilities that have existing individual NPDES permits for storm water) that are part of the same subcategory (*see* 40 CFR subchapter N, part 405 to 471) or, where such grouping is inapplicable, are sufficiently similar as to be appropriate for general permit coverage under § 122.28 of this part. The part 1 application shall be submitted to the Office of Water Enforcement and Permits, U.S. EPA, 401 M Street, SW., Washington, DC 20460 (EN-336) for approval. Once a part 1 application is approved, group applicants are to submit Part 2 of the group application to the Office of Water Enforcement and Permits. A group application shall consist of:

(i) *Part 1.* Part 1 of a group application shall:

(A) Identify the participants in the group application by name and location. Facilities participating in the group application shall be listed in nine subdivisions, based on the facility location relative to the nine precipitation zones indicated in appendix E to this part.

(B) Include a narrative description summarizing the industrial activities of participants of the group application and explaining why the participants, as a whole, are sufficiently similar to be a covered by a general permit.

(C) Include a list of significant materials stored exposed to precipitation by participants in the group application and materials management practices employed to diminish contact by these materials with precipitation and storm water runoff.

(D) Identify ten percent of the dischargers participating in the group application (with a minimum of 10 dischargers, and either a minimum of two dischargers from each precipitation zone indicated in appendix E of this part in which ten or more members of the group are located, or one discharger from each precipitation zone indicated in appendix E of this part in which nine or fewer members of the group are located) from which quantitative data will be submitted in part 2. If more than 1,000 facilities are identified in a group application, no more than 100 dischargers must submit quantitative data in Part 2. Groups of between four and ten dischargers may be formed. However, in groups of between four and ten, at least half the facilities must submit quantitative data and at least one facility in each precipitation zone in which members of the group are located must submit data. A description of why the facilities selected to perform sampling and analysis are representative of the group as a whole in terms of the information provided in paragraph (c)(1)(i)(B) and (i)(C) of this section, shall accompany this section. Different factors impacting the nature of the storm water discharges such as processes used and material management shall be represented to the extent feasible in a manner roughly equivalent to their proportion in the group.

(ii) *Part 2.* Part 2 of a group application shall contain quantitative

data (NPDES Form 2F), as modified by paragraph (c)(1) of this section, so that when part 1 and part 2 of the group application are taken together, a complete NPDES application (Form 1, Form 2C, and Form 2F) can be evaluated for each discharger identified in paragraph (c)(2)(i)(D) of this section.

(d) *Application requirements for large and medium municipal separate storm sewer discharges.* The operator of a discharge from a large or medium municipal separate storm sewer or a municipal separate storm sewer that is designated by the Director under paragraph (a)(1)(v) of this section, may submit a jurisdiction-wide or system-wide permit application. Where more than one public entity owns or operates a municipal separate storm sewer within a geographic area (including adjacent or interconnected municipal separate storm sewer systems), such operators may be a coapplicant to the same application. Permit applications for discharges from large and medium municipal storm sewers or municipal storm sewers designated under paragraph (a)(1)(v) of this section shall include.

(1) *Part 1* Part 1 of the application shall consist of.

(i) *General information* The applicants' name, address, telephone number of contact person, ownership status and status as a State or local government entity.

(ii) *Legal authority* A description of existing legal authority to control discharges to the municipal separate storm sewer system. When existing legal authority is not sufficient to meet the criteria provided in paragraph (d)(2)(i) of this section, the description shall list additional authorities as will be necessary to meet the criteria and shall include a schedule and commitment to seek such additional authority that will be needed to meet the criteria

(iii) *Source identification* (A) A description of the historic use of ordinances, guidance or other controls which limited the discharge of non-storm water discharges to any Publicly Owned Treatment Works serving the same area as the municipal separate storm sewer system.

(B) A USGS 7.5 minute topographic map (or equivalent topographic map with a scale between 1 10,000 and 1 24,000 if cost effective) extending one mile beyond the service boundaries of the municipal storm sewer system covered by the permit application. The following information shall be provided:

(1) The location of known municipal storm sewer system outfalls discharging to waters of the United States;

(2) A description of the land use activities (e.g divisions indicating undeveloped, residential, commercial, agricultural and industrial uses) accompanied with estimates of population densities and projected growth for a ten year period within the drainage area served by the separate storm sewer. For each land use type, an estimate of an average runoff coefficient shall be provided;

(3) The location and a description of the activities of the facility of each currently operating or closed municipal landfill or other treatment, storage or disposal facility for municipal waste;

(4) The location and the permit number of any known discharge to the municipal storm sewer that has been issued a NPDES permit;

(5) The location of major structural controls for storm water discharge (retention basins, detention basins, major infiltration devices, etc.); and

(6) The identification of publicly owned parks, recreational areas, and other open lands.

(iv) *Discharge characterization* (A) Monthly mean rain and snow fall estimates (or summary of weather bureau data) and the monthly average number of storm events

(B) Existing quantitative data describing the volume and quality of discharges from the municipal storm sewer, including a description of the outfalls sampled, sampling procedures and analytical methods used.

(C) A list of water bodies that receive discharges from the municipal separate storm sewer system, including downstream segments, lakes and estuaries, where pollutants from the system discharges may accumulate and cause water degradation and a brief description of known water quality impacts At a minimum, the description of impacts shall include a description of whether the water bodies receiving such discharges have been:

(1) Assessed and reported in section 305(b) reports submitted by the State, the basis for the assessment (evaluated or monitored), a summary of designated use support and attainment of Clean Water Act (CWA) goals (fishable and swimmable waters), and causes of nonsupport of designated uses.

(2) Listed under section 304(l)(1)(A)(i), section 304(l)(1)(A)(ii), or section 304(l)(1)(B) of the CWA that is not expected to meet water quality standards or water quality goals.

(3) Listed in State Nonpoint Source Assessments required by section 319(a) of the CWA that, without additional action to control nonpoint sources of pollution, cannot reasonably be expected to attain or maintain water quality standards due to storm sewer construction, highway maintenance and runoff from municipal landfills and municipal sludge adding significant pollution (or contributing to a violation of water quality standards);

(4) Identified and classified according to eutrophic condition of publicly owned lakes listed in State reports required under section 314(a) of the CWA (include the following: A description of those publicly owned lakes for which uses are known to be impaired; a description of procedures, processes and methods to control the discharge of pollutants from municipal separate storm sewers into such lakes; and a description of methods and procedures to restore the quality of such lakes);

(5) Areas of concern of the Great Lakes identified by the International Joint Commission;

(6) Designated estuaries under the National Estuary Program under section 320 of the CWA;

(7) Recognized by the applicant as highly valued or sensitive waters;

(8) Defined by the State or U.S. Fish and Wildlife Services's National Wetlands Inventory as wetlands; and

(9) Found to have pollutants in bottom sediments, fish tissue or biosurvey data.

(D) *Field screening.* Results of a field screening analysis for illicit connections and illegal dumping for either selected field screening points or major outfalls covered in the permit application. At a minimum, a screening analysis shall include a narrative description, for either each field screening point or major outfall, of visual observations made during dry weather periods. If any flow is observed, two grab samples shall be collected during a 24 hour period with a minimum period of four hours between samples. For all such samples, a narrative description of the color, odor, turbidity, the presence of an oil sheen or surface scum as well as any other relevant observations regarding the potential presence of non-storm water discharges or illegal dumping shall be provided In addition, a narrative description of the results of a field analysis using suitable methods to estimate pH, total chlorine, total copper, total phenol, and detergents (or surfactants) shall be provided along with a description of the flow rate. Where the field analysis does not involve analytical methods approved under 40 CFR part 136, the applicant shall provide a description of the method used including the name of the manufacturer of the test method along with the range and accuracy of the ' Field screening points shall be either major outfalls or other outfall points (or

any other point of access such as manholes) randomly located throughout the storm sewer system by placing a grid over a drainage system map and identifying those cells of the grid which contain a segment of the storm sewer system or major outfall. The field screening points shall be established using the following guidelines and criteria:

(1) A grid system consisting of perpendicular north-south and east-west lines spaced ¼ mile apart shall be overlayed on a map of the municipal storm sewer system, creating a series of cells;

(2) All cells that contain a segment of the storm sewer system shall be identified; one field screening point shall be selected in each cell; major outfalls may be used as field screening points;

(3) Field screening points should be located downstream of any sources of suspected illegal or illicit activity;

(4) Field screening points shall be located to the degree practicable at the farthest manhole or other accessible location downstream in the system, within each cell, however, safety of personnel and accessibility of the location should be considered in making this determination;

(5) Hydrological conditions; total drainage area of the site; population density of the site, traffic density; age of the structures or buildings in the area; history of the area; and land use types;

(6) For medium municipal separate storm sewer systems, no more than 250 cells need to have identified field screening points, in large municipal separate storm sewer systems, no more than 500 cells need to have identified field screening points, cells established by the grid that contain no storm sewer segments will be eliminated from consideration, if fewer than 250 cells in medium municipal sewers are created, and fewer than 500 in large systems are created by the overlay on the municipal sewer map then all those cells which contain a segment of the sewer system shall be subject to field screening (unless access to the separate storm sewer system is impossible), and

(7) Large or medium municipal separate storm sewer systems which are unable to utilize the procedures described in paragraphs (d)(1)(iv)(D) (1) through (6) of this section, because a sufficiently detailed map of the separate storm sewer systems is unavailable, shall field screen no more than 500 or 250 major outfalls respectively (or all major outfalls in the system, if less). In such circumstances, the applicant shall establish a grid system consisting of north-south and east-west lines spaced ¼ mile apart as an overlay to the boundaries of the municipal storm sewer system, thereby creating a series of cells; the applicant will then select major outfalls in as many cells as possible until at least 500 major outfalls (large municipalities) or 250 major outfalls (medium municipalities) are selected; a field screening analysis shall be undertaken at these major outfalls.

(E) *Characterization plan.* Information and a proposed program to meet the requirements of paragraph (d)(2)(iii) of this section. Such description shall include: the location of outfalls or field screening points appropriate for representative data collection under paragraph (d)(2)(iii)(A) of this section, a description of why the outfall or field screening point is representative, the seasons during which sampling is intended, a description of the sampling equipment. The proposed location of outfalls or field screening points for such sampling should reflect water quality concerns (*see* paragraph (d)(1)(iv)(C) of this section) to the extent practicable.

(v) *Management programs.* (A) A description of the existing management programs to control pollutants from the municipal separate storm sewer system. The description shall provide information on existing structural and source controls, including operation and maintenance measures for structural controls, that are currently being implemented. Such controls may include, but are not limited to. Procedures to control pollution resulting from construction activities; floodplain management controls; wetland protection measures; best management practices for new subdivisions, and emergency spill response programs. The description may address controls established under State law as well as local requirements.

(B) A description of the existing program to identify illicit connections to the municipal storm sewer system. The description should include inspection procedures and methods for detecting and preventing illicit discharges, and describe areas where this program has been implemented.

(vi) *Fiscal resources.* (A) A description of the financial resources currently available to the municipality to complete part 2 of the permit application. A description of the municipality's budget for existing storm water programs, including an overview of the municipality's financial resources and budget, including overall indebtedness and assets, and sources of funds for storm water programs.

(2) *Part 2.* Part 2 of the application shall consist of.

(i) *Adequate legal authority.* A demonstration that the applicant can operate pursuant to legal authority established by statute, ordinance or series of contracts which authorizes or enables the applicant at a minimum to.

(A) Control through ordinance, permit, contract, order or similar means, the contribution of pollutants to the municipal storm sewer by storm water discharges associated with industrial activity and the quality of storm water discharged from sites of industrial activity;

(B) Prohibit through ordinance, order or similar means, illicit discharges to the municipal separate storm sewer;

(C) Control through ordinance, order or similar means the discharge to a municipal separate storm sewer of spills, dumping or disposal of materials other than storm water;

(D) Control through interagency agreements among coapplicants the contribution of pollutants from one portion of the municipal system to another portion of the municipal system;

(E) Require compliance with conditions in ordinances, permits, contracts or orders; and

(F) Carry out all inspection, surveillance and monitoring procedures necessary to determine compliance and noncompliance with permit conditions including the prohibition on illicit discharges to the municipal separate storm sewer.

(ii) *Source identification* The location of any major outfall that discharges to waters of the United States that was not reported under paragraph (d)(1)(iii)(B)(1) of this section Provide an inventory, organized by watershed of the name and address, and a description (such as SIC codes) which best reflects the principal products or services provided by each facility which may discharge, to the municipal separate storm sewer, storm water associated with industrial activity;

(iii) *Characterization data* When "quantitative data" for a pollutant are required under paragraph (d)(a)(iii)(A)(3) of this paragraph, the applicant must collect a sample of effluent in accordance with 40 CFR 122.21(g)(7) and analyze it for the pollutant in accordance with analytical methods approved under 40 CFR part 136. When no analytical method is approved the applicant may use any suitable method but must provide a description of the method. The applicant must provide information characterizing the quality and quantity of discharges covered in the permit application, including:

(A) Quantitative data from representative outfalls designated by the Director (based on information received

in part 1 of the application, the Director shall designate between five and ten outfalls or field screening points as representative of the commercial, residential and industrial land use activities of the drainage area contributing to the system or, where there are less than five outfalls covered in the application, the Director shall designate all outfalls) developed as follows

(1) For each outfall or field screening point designated under this subparagraph, samples shall be collected of storm water discharges from three storm events occurring at least one month apart in accordance with the requirements at § 122.21(g)(7) (the Director may allow exemptions to sampling three storm events when climatic conditions create good cause for such exemptions).

(2) A narrative description shall be provided of the date and duration of the storm event(s) sampled, rainfall estimates of the storm event which generated the sampled discharge and the duration between the storm event sampled and the end of the previous measurable (greater than 0 1 inch rainfall) storm event.

(3) For samples collected and described under paragraphs (d)(2)(iii)(A)(1) and (A)(2) of this section, quantitative data shall be provided for the organic pollutants listed in Table II, the pollutants listed in Table III (toxic metals, cyanide and total phenols) of appendix D of 40 CFR part 122, and for the following pollutants

Total suspended solids (TSS)
Total dissolved solids (TDS)
COD
BOD_5
Oil and grease
Fecal coliform
Fecal streptococcus
pH
Total Kjeldahl nitrogen
Nitrate plus nitrite
Dissolved phosphorus
Total ammonia plus organic nitrogen
Total phosphorus

(4) Additional limited quantitative data required by the Director for determining permit conditions (the Director may require that quantitative data shall be provided for additional parameters, and may establish sampling conditions such as the location, season of sample collection, form of precipitation (snow melt, rainfall) and other parameters necessary to insure representativeness)

(B) Estimates of the annual pollutant load of the cumulative discharges to waters of the United States from all identified municipal outfalls and the event mean concentration of the cumulative discharges to waters of the United States from all identified municipal outfalls during a storm event (as described under § 122.21(c)(7)) for BOD_5, COD, TSS, dissolved solids, total nitrogen, total ammonia plus organic nitrogen, total phosphorus, dissolved phosphorus, cadmium, copper, lead, and zinc. Estimates shall be accompanied by a description of the procedures for estimating constituent loads and concentrations, including any modelling, data analysis, and calculation methods;

(C) A proposed schedule to provide estimates for each major outfall identified in either paragraph (d)(2)(ii) or (d)(1)(iii)(B)(1) of this section of the seasonal pollutant load and of the event mean concentration of a representative storm for any constituent detected in any sample required under paragraph (d)(2)(iii)(A) of this section; and

(D) A proposed monitoring program for representative data collection for the term of the permit that describes the location of outfalls or field screening points to be sampled (or the location of instream stations), why the location is representative, the frequency of sampling, parameters to be sampled, and a description of sampling equipment

(iv) *Proposed management program* A proposed management program covers the duration of the permit It shall include a comprehensive planning process which involves public participation and where necessary intergovernmental coordination, to reduce the discharge of pollutants to the maximum extent practicable using management practices, control techniques and system, design and engineering methods, and such other provisions which are appropriate. The program shall also include a description of staff and equipment available to implement the program Separate proposed programs may be submitted by each coapplicant. Proposed programs may impose controls on a systemwide basis, a watershed basis, a jurisdiction basis, or on individual outfalls. Proposed programs will be considered by the Director when developing permit conditions to reduce pollutants in discharges to the maximum extent practicable Proposed management programs shall describe priorities for implementing controls Such programs shall be based on.

(A) A description of structural and source control measures to reduce pollutants from runoff from commercial and residential areas that are discharged from the municipal storm sewer system that are to be implemented during the life of the permit accompanied with an estimate of the expected reduction of pollutant loads and a proposed schedule for implementing such controls At a minimum, the description shall include.

(1) A description of maintenance activities and a maintenance schedule for structural controls to reduce pollutants (including floatables) in discharges from municipal separate storm sewers;

(2) A description of planning procedures including a comprehensive master plan to develop, implement and enforce controls to reduce the discharge of pollutants from municipal separate storm sewers which receive discharges from areas of new development and significant redevelopment. Such plan shall address controls to reduce pollutants in discharges from municipal separate storm sewers after construction is completed. (Controls to reduce pollutants in discharges from municipal separate storm sewers containing construction site runoff are addressed in paragraph (d)(2)(iv)(D) of this section.

(3) A description of practices for operating and maintaining public streets, roads and highways and procedures for reducing the impact on receiving waters of discharges from municipal storm sewer systems, including pollutants discharged as a result of deicing activities.

(4) A description of procedures to assure that flood management projects assess the impacts on the water quality of receiving water bodies and that existing structural flood control devices have been evaluated to determine if retrofitting the device to provide additional pollutant removal from storm water is feasible.

(5) A description of a program to monitor pollutants in runoff from operating or closed municipal landfills or other treatment, storage or disposal facilities for municipal waste, which shall identify priorities and procedures for inspections and establishing and implementing control measures for such discharges (this program can be coordinated with the program developed under paragraph (d)(2)(iv)(C) of this section), and

(6) A description of a program to reduce to the maximum extent practicable, pollutants in discharges from municipal separate storm sewers associated with the application of pesticides, herbicides and fertilizer which will include, as appropriate, controls such as educational activities, permits, certifications and other measures for commercial applicators and distributors, and controls for application in public right-of-ways and at municipal facilities

(B) A description of a program, including a schedule, to detect and remove (or require the discharger to the municipal separate storm sewer to obtain a separate NPDES permit for) illicit discharges and improper disposal into the storm sewer. The proposed program shall include:

(1) A description of a program, including inspections, to implement and enforce an ordinance, orders or similar means to prevent illicit discharges to the municipal separate storm sewer system; this program description shall address all types of illicit discharges, however the following category of non-storm water discharges or flows shall be addressed where such discharges are identified by the municipality as sources of pollutants to waters of the United States: water line flushing, landscape irrigation, diverted stream flows, rising ground waters, uncontaminated ground water infiltration (as defined at 40 CFR 35.2005(20)) to separate storm sewers, uncontaminated pumped ground water, discharges from potable water sources, foundation drains, air conditioning condensation, irrigation water, springs, water from crawl space pumps, footing drains, lawn watering, individual residential car washing, flows from riparian habitats and wetlands, dechlorinated swimming pool discharges, and street wash water (program descriptions shall address discharges or flows from fire fighting only where such discharges or flows are identified as significant sources of pollutants to waters of the United States).

(2) A description of procedures to conduct on-going field screening activities during the life of the permit, including areas or locations that will be evaluated by such field screens.

(3) A description of procedures to be followed to investigate portions of the separate storm sewer system that, based on the results of the field screen, or other appropriate information, indicate a reasonable potential of containing illicit discharges or other sources of non-storm water (such procedures may include sampling procedures for constituents such as fecal coliform, fecal streptococcus, surfactants (MBAS), residual chlorine, fluorides and potassium, testing with fluorometric dyes, or conducting in storm sewer inspections where safety and other considerations allow. Such description shall include the location of storm sewers that have been identified for such evaluation).

(4) A description of procedures to prevent contain, and respond to spills that may discharge into the municipal separate storm sewer;

(5) A description of a program to promote, publicize, and facilitate public reporting of the presence of illicit discharges or water quality impacts associated with discharges from municipal separate storm sewers;

(6) A description of educational activities, public information activities, and other appropriate activities to facilitate the proper management and disposal of used oil and toxic materials; and

(7) A description of controls to limit infiltration of seepage from municipal sanitary sewers to municipal separate storm sewer systems where necessary;

(C) A description of a program to monitor and control pollutants in storm water discharges to municipal systems from municipal landfills, hazardous waste treatment, disposal and recovery facilities, industrial facilities that are subject to section 313 of title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA), and industrial facilities that the municipal permit applicant determines are contributing a substantial pollutant loading to the municipal storm sewer system. The program shall:

(1) Identify priorities and procedures for inspections and establishing and implementing control measures for such discharges;

(2) Describe a monitoring program for storm water discharges associated with the industrial facilities identified in paragraph (d)(2)(iv)(C) of this section, to be implemented during the term of the permit, including the submission of quantitative data on the following constituents: any pollutants limited in effluent guidelines subcategories, where applicable; any pollutant listed in an existing NPDES permit for a facility; oil and grease, COD, pH, BOD_5, TSS, total phosphorus, total Kjeldahl nitrogen, nitrate plus nitrite nitrogen, and any information on discharges required under 40 CFR 122.21(g)(7) (iii) and (iv)

(D) A description of a program to implement and maintain structural and non-structural best management practices to reduce pollutants in storm water runoff from construction sites to the municipal storm sewer system, which shall include:

(1) A description of procedures for site planning which incorporate consideration of potential water quality impacts;

(2) A description of requirements for nonstructural and structural best management practices;

(3) A description of procedures for identifying priorities for inspecting sites and enforcing control measures which consider the nature of the construction activity, topography, and the characteristics of soils and receiving water quality; and

(4) A description of appropriate educational and training measures for construction site operators.

(v) *Assessment of controls.* Estimated reductions in loadings of pollutants from discharges of municipal storm sewer constituents from municipal storm sewer systems expected as the result of the municipal storm water quality management program. The assessment shall also identify known impacts of storm water controls on ground water.

(vi) *Fiscal analysis.* For each fiscal year to be covered by the permit, a fiscal analysis of the necessary capital and operation and maintenance expenditures necessary to accomplish the activities of the programs under paragraphs (d)(2) (iii) and (iv) of this section. Such analysis shall include a description of the source of funds that are proposed to meet the necessary expenditures, including legal restrictions on the use of such funds.

(vii) Where more than one legal entity submits an application, the application shall contain a description of the roles and responsibilities of each legal entity and procedures to ensure effective coordination.

(viii) Where requirements under paragraph (d)(1)(iv)(E), (d)(2)(ii), (d)(2)(iii)(B) and (d)(2)(iv) of this section are not practicable or are not applicable, the Director may exclude any operator of a discharge from a municipal separate storm sewer which is designated under paragraph (a)(1)(v), (b)(4)(ii) or (b)(7)(ii) of this section from such requirements. The Director shall not exclude the operator of a discharge from a municipal separate storm sewer identified in appendix F, G, H or I of part 122, from any of the permit application requirements under this paragraph except where authorized under this section

(e) *Application deadlines* Any operator of a point source required to obtain a permit under paragraph (a)(1) of this section that does not have an effective NPDES permit covering its storm water outfalls shall submit an application in accordance with the following deadlines

(1) For any storm water discharge associated with industrial activity identified in paragraph (b)(14) (i)–(xi) of this section, that is not part of a group application as described in paragraph (c)(2) of this section or which is not covered under a promulgated storm water general permit, a permit application made pursuant to paragraph (c) of this section shall be submitted to the Director by November 18, 1991.

(2) For any group application submitted in accordance with paragraph (c)(2) of this section:

(i) Part 1 of the application shall be submitted to the Director, Office of Water Enforcement and Permits by March 18, 1991:

(ii) Based on information in the part 1 application, the Director will approve or deny the members in the group application within 60 days after receiving part 1 of the group application.

(iii) Part 2 of the application shall be submitted to the Director, Office of Water Enforcement and Permits no later than 12 months after the date of approval of the part 1 application.

(iv) Facilities that are rejected as members of a group by the permitting authority shall have 12 months to file an individual permit application from the date they receive notification of their rejection

(v) A facility listed under paragraph (b)(14) (i)–(xi) of this section may add on to a group application submitted in accordance with paragraph (e)(2)(i) of this section at the discretion of the Office of Water Enforcement and Permits, and only upon a showing of good cause by the facility and the group applicant, the request for the addition of the facility shall be made no later than February 18,1992; the addition of the facility shall not cause the percentage of the facilities that are required to submit quantitative data to be less than 10%, unless there are over 100 facilities in the group that are submitting quantitative data. approval to become part of group application must be obtained from the group or the trade association representing the individual facilities.

(3) For any discharge from a large municipal separate storm sewer system:

(i) Part 1 of the application shall be submitted to the Director by November 18, 1991.

(ii) Based on information received in the part 1 application the Director will approve or deny a sampling plan under paragraph (d)(1)(iv)(E) of this section within 90 days after receiving the part 1 application.

(iii) Part 2 of the application shall be submitted to the Director by November 16, 1992.

(4) For any discharge from a medium municipal separate storm sewer system.

(i) Part 1 of the application shall be submitted to the Director by May 18, 1992

(ii) Based on information received in the part 1 application the Director will approve or deny a sampling plan under paragraph (d)(1)(iv)(E) of this section within 90 days after receiving the part 1 application

(iii) Part 2 of the application shall be submitted to the Director by May 17, 1993.

(5) A permit application shall be submitted to the Director within 60 days of notice, unless permission for a later date is granted by the Director (*see* 40 CFR 124.52(c)), for:

(i) A storm water discharge which the Director, or in States with approved NPDES programs, either the Director or the EPA Regional Administrator, determines that the discharge contributes to a violation of a water quality standard or is a significant contributor of pollutants to waters of the United States (see paragraph (a)(1)(v) of this section);

(ii) A storm water discharge subject to paragraph (c)(1)(v) of this section.

(6) Facilities with existing NPDES permits for storm water discharges associated with industrial activity shall maintain existing permits. New applications shall be submitted in accordance with the requirements of 40 CFR 122.21 and 40 CFR 122.26(c) 180 days before the expiration of such permits. Facilities with expired permits or permits due to expire before May 18, 1992, shall submit applications in accordance with the deadline set forth under paragraph (c)(1) of this section.

(f) *Petitions.* (1) Any operator of a municipal separate storm sewer system may petition the Director to require a separate NPDES permit (or a permit issued under an approved NPDES State program) for any discharge into the municipal separate storm sewer system.

(2) Any person may petition the Director to require a NPDES permit for a discharge which is composed entirely of storm water which contributes to a violation of a water quality standard or is a significant contributor of pollutants to waters of the United States.

(3) The owner or operator of a municipal separate storm sewer system may petition the Director to reduce the Census estimates of the population served by such separate system to account for storm water discharged to combined sewers as defined by 40 CFR 35 2005(b)(11) that is treated in a publicly owned treatment works In municipalities in which combined sewers are operated, the Census estimates of population may be reduced proportional to the fraction, based on estimated lengths, of the length of combined sewers over the sum of the length of combined sewers and municipal separate storm sewers where an applicant has submitted the NPDES permit number associated with each discharge point and a map indicating areas served by combined sewers and the location of any combined sewer overflow discharge point.

(4) Any person may petition the Director for the designation of a large or medium municipal separate storm sewer system as defined by paragraphs (b)(4)(iv) or (b)(7)(iv) of this section.

(5) The Director shall make a final determination on any petition received under this section within 90 days after receiving the petition.

6. Section 122.28(b)(2)(i) is revised to read as follows:

§ 122.28 General permits (applicable to State NPDES programs, see § 123.25).

* * * * *

(b) * * *

(2) *Requiring an individual permit.* (i) The Director may require any discharger authorized by a general permit to apply for and obtain an individual NPDES permit. Any interested person may petition the Director to take action under this paragraph. Cases where an individual NPDES permit may be required include the following:

(A) The discharger or "treatment works treating domestic sewage" is not in compliance with the conditions of the general NPDES permit,

(B) A change has occurred in the availability of demonstrated techno or practices for the control or abate of pollutants applicable to the point source or treatment works treating domestic sewage.

(C) Effluent limitation guidelines are promulgated for point sources covered by the general NPDES permit,

(D) A Water Quality Management plan containing requirements applicable to such point sources is approved,

(E) Circumstances have changed since the time of the request to be covered so that the discharger is no longer appropriately controlled under the general permit, or either a temporary or permanent reduction or elimination of the authorized discharge is necessary;

(F) Standards for sewage sludge use or disposal have been promulgated for the sludge use and disposal practice covered by the general NPDES permit, or

(G) The discharge(s) is a significant contributor of pollutants. In making this determination, the Director may consider the following factors:

(*1*) The location of the discharge with respect to waters of the United States,

(*2*) The size of the discharge;

(*3*) The quantity and nature of the pollutants discharged to waters of the United States, and

(*4*) Other relevant factors.

* * * * *

7. Section 122.42 is amended by adding paragraph (c) to read as follows.

§ 122.42 Additional conditions applicable to specified categories of NPDES permits (applicable to State NPDES programs, see § 123.25).

* * * * *

(c) *Municipal separate storm sewer systems.* The operator of a large or medium municipal separate storm sewer system or a municipal separate storm sewer that has been designated by the Director under § 122.26(a)(1)(v) of this part must submit an annual report by the anniversary of the date of the issuance of the permit for such system The report shall include

(1) The status of implementing the components of the storm water management program that are established as permit conditions.

(2) Proposed changes to the storm water management programs that are established as permit condition Such proposed changes shall be consistent with § 122.26(d)(2)(iii) of this part; and

(3) Revisions, if necessary, to the assessment of controls and the fiscal analysis reported in the permit application under § 122 26(d)(2)(iv) and (d)(2)(v) of this part.

(4) A summary of data including monitoring data, that is accumulated throughout the reporting year;

(5) Annual expenditures and budget for year following each annual report;

(6) A summary describing the number and nature of enforcement actions, inspections, and public education programs;

(7) Identification of water quality improvements or degradation;

7a. Part 122 is amended by adding appendices E through I as follows:

Appendix E to Part 122—Rainfall Zones of the United States

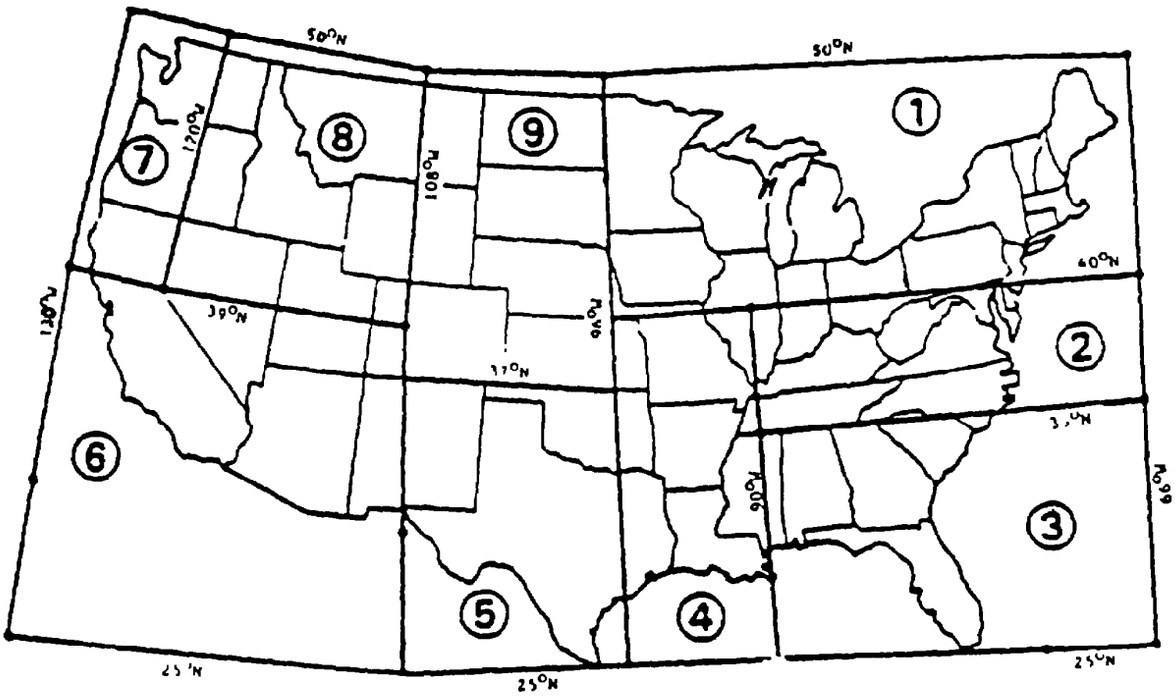

Not Shown Alaska (Zone 7), Hawaii (Zone 7), Northern Mariana Islands (Zone 7) Guam (Zone 7), American Samoa (Zone 7), Trust Territory of the Pacific Islands (Zone 7) Puerto Rico (Zone 3) Virgin Islands (Zone 3)

Source Methodology for Analysis of Detention Basins for Control of Urban Runoff Quality prepared for U S Environmental Protection Agency, Office of Water, Nonpoint Source Division Washington DC. 1986

Appendix F to Part 122—Incorporated Places With Populations Greater Than 250,000 According to Latest Decennial Census by Bureau of Census.

State	Incorporated place
Alabama	Birmingham.
Arizona	Phoenix.
	Tucson
California	Long Beach.
	Los Angeles
	Oakland
	Sacramento.
	San Diego
	San Francisco
	San Jose
Colorado	Denver
District of Columbia	
Florida	Jacksonville
	Miami.
	Tampa.
Georgia	Atlanta.
Illinois	Chicago.
Indiana	Indianapolis
Kansas	Wichita
Kentucky	Louisville
Louisiana	New Orleans.
Maryland	Baltimore.
Massachusetts	Boston.
Michigan	Detroit.
Minnesota	Minneapolis
	St. Paul

State	Incorporated place
Missouri	Kansas City
	St. Louis.
Nebraska	Omaha.
New Jersey	Newark.
New Mexico	Albuquerque
New York	Buffalo.
	Bronx Borough.
	Brooklyn Borough.
	Manhattan Borough.
	Queens Borough.
	Staten Island Borough
North Carolina	Charlotte
Ohio	Cincinnati
	Cleveland.
	Columbus.
	Toledo
Oklahoma	Oklahoma City
	Tulsa.
Oregon	Portland.
Pennsylvania	Philadelphia
	Pittsburgh
Tennessee	Memphis.
	Nashville/Davidson.
Texas	Austin.
	Dallas
	El Paso
	Fort Worth
	Houston.
	San Antonio
Virginia	Norfolk.
	Virginia Beach
Washington	Seattle.
Wisconsin	Milwaukee

Appendix G to Part 122—Incorporated Places With Populations Greater Than 100,000 and Less Than 250,000 According to Latest Decennial Census by Bureau of Census

State	Incorporated place
Alabama	Huntsville
	Mobile
	Montgomery
Alaska	Anchorage
Arizona	Mesa.
	Tempe
Arkansas	Little Rock
California	Anaheim
	Bakersfield
	Berkeley
	Concord
	Fremont.
	Fresno
	Fullerton
	Garden Grove
	Glendale
	Huntington Beach
	Modesto
	Oxnard.
	Pasadena
	Riverside
	San Bernardino
	Santa Ana.
	Stockton.
	Sunnyvale
	Torrance
Colorado	Aurora.
	Colorado Springs.
	Lakewood
	Pueblo
Connecticut	Bridgeport.
	Hartford.
	New Haven.
	Stamford.
	Waterbury
Florida	Fort Lauderdale
	Hialeah.
	Hollywood.
	Orlando.
	St. Petersburg
Georgia	Columbus.
	Macon.
	Savannah.
Idaho	Boise City
Illinois	Peoria.
	Rockford.
Indiana	Evansville.
	Fort Wayne.
	Gary
	South Bend.
Iowa	Cedar Rapids.
	Davenport.
	Des Moines.
Kansas	Kansas City
	Topeka.
Kentucky	Lexington-Fayette
Louisiana	Baton Rouge
	Shreveport.
Massachusetts	Springfield
	Worcester
Michigan	Ann Arbor
	Flint.
	Grand Rapids
	Lansing
	Livonia.
	Sterling Heights.
	Warren
Mississippi	Jackson
Missouri	Independence
	Springfield.
Nebraska	Lincoln
Nevada	Las Vegas
	Reno
New Jersey	Elizabeth.
	Jersey City
	Paterson.
New York	Albany
	Rochester
	Syracuse.
	Yonkers.
North Carolina	Durham.
	Greensboro
	Raleigh
	Winston-Salem
Ohio	Akron.
	Dayton
	Youngstown
Oregon	Eugene
Pennsylvania	Allentown
	Erie
Rhode Island	Providence
South Carolina	Columbia.
Tennessee	Chattanooga
	Knoxville
Texas	Amarillo
	Arlington
	Beaumont
	Corpus Christi
	Garland
	Irving.
	Lubbock.
	Pasadena.
	Waco
Utah	Salt Lake City
Virginia	Alexandria.
	Chesapeake
	Hampton.
	Newport News
	Portsmouth.
	Richmond
	Roanoke
Washington	Spokane.
	Tacoma.
Wisconsin	Madison.

Appendix H to Part 122—Counties with Unincorporated Urbanized Areas With a *Population of 250,000 or More According* to the Latest Decennial Census by the Bureau of Census

State	County	Unincorporated urbanized population
California	Los Angeles	812,864
	Sacramento	449,856
	San Diego	304,758
Delaware	New Castle	257,184
Florida	Dade	781,949
Georgia	DeKalb	386,379
Hawaii	Honolulu	688,178
Maryland	Anne Arundel	271,458
	Baltimore	801,308
	Montgomery	447,993
	Prince George's	450,188
Texas	Harris	409,801
Utah	Salt Lake	304,832
Virginia	Fairfax	527,178
Washington	King	336,800

Appendix I to Part 122—Counties With Unincorporated Urbanized Areas Greater Than 100,000, But Less Than 250,000 According to the Latest Decennial Census by the Bureau of Census

State	County	Unincorporated urbanized population
Alabama	Jefferson	102,917
Arizona	Pima	111,479
California	Alameda	187,474
	Contra Costa	158,452
	Kern	117,231
	Orange	210,893
	Riverside	115,719
	San Bernardino	148,844
Florida	Broward	150,370
	Escambia	147,892
	Hillsborough	238,292
	Orange	245,325
	Palm Beach	167,089
	Pinellas	194,389
	Polk	104,150
	Sarasota	110,009
Georgia	Clayton	100,742
	Cobb	204,121
	Richmond	118,529
Kentucky	Jefferson	224,958
Louisiana	Jefferson	140,836
North Carolina	Cumberland	142,727
Nevada	Clark	201,775
Oregon	Multnomah	141,100
	Washington	109,348
South Carolina	Greenville	135,398
	Richland	124,684
Virginia	Arlington	152,599
	Henrico	161,204
	Chesterfield	108,348
Washington	Snohomish	103,493
	Pierce	186,113

PART 123—STATE PROGRAM REQUIREMENTS

8 The authority citation for part 123 continues to read as follows

Authority: Clean Water Act, 33 U.S.C. 1251 *et seq.*

9. Section 123.25 is amended by revising paragraph (a)(9) to read as follows:

§ 123.25 Requirements for permitting.

(a) * * *

(9) § 122.26—(Storm water discharges);

* * * * *

PART 124—PROCEDURES FOR DECISIONMAKING

10. The authority citation for part 124 continues to read as follows:

Authority: Resource Conservation and Recovery Act, 42 U.S.C. 6901 *et seq.*; Safe Drinking Water Act, 42 U.S.C. 300f *et seq.*, Clean Water Act, 33 U.S.C. 1251 *et seq.*; and Clean Air Act, 42 U.S.C. 1857 *et seq.*

11. Section 124.52 is revised to read as follows.

§ 124.52 Permits required on a case-by-case basis.

(a) Various sections of part 122, subpart B allow the Director to determine, on a case-by-case basis, that certain concentrated animal feeding operations (§ 122.23), concentrated aquatic animal production facilities (§ 122.24), storm water discharges (§ 122.26), and certain other facilities covered by general permits (§ 122.28) that do not generally require an individual permit may be required to obtain an individual permit because of their contributions to water pollution.

(b) Whenever the Regional Administrator decides that an individual permit is required under this section, except as provided in paragraph (c) of this section, the Regional Administrator shall notify the discharger in writing of that decision and the reasons for it, and shall send an application form with the notice. The discharger must apply for a permit under § 122.21 within 60 days of notice, unless permission for a later date is granted by the Regional Administrator. The question whether the designation was proper will remain open for consideration during the public comment period under § 124.11 or § 124.118 and in any subsequent hearing.

(c) Prior to a case-by-case determination that an individual permit is required for a storm water discharge under this section (*see* 40 CFR 122.26 (a)(1)(v) and (c)(1)(v)), the Regional Administrator may require the discharger to submit a permit application or other information regarding the discharge under section 308 of the CWA. In requiring such information, the Regional Administrator shall notify the discharger in writing and shall send an application form with the notice. The discharger must apply for a permit under § 122.26 within 60 days of notice, unless permission for a later date is granted by the Regional Administrator. The question whether the initial designation was proper will remain open for consideration during the public comment period under § 124.11 or § 124.118 and in any subsequent hearing.

Note: The following form will not appear in the Code of Federal Regulations.

BILLING CODE 6560-50-M

APPENDIX C: ADEQUATE LEGAL AUTHORITY

contrivance for the elimination or destruction of human waste, within those portions of the watershed of the city contiguous to the intake of the city's water supply, as hereinafter described, or by placing any foul or putrescible substance, whether solid or liquid, and whether the same be buried or not, within the limits of the portion of the watershed so described.

Sec. 49-6. Application for permit.

(a) Any person who desires to use or develop any vegetated wetland and on and after January 1, 1983, any nonvegetated wetland, within this city, other than for those activities specified in section 49-3 above, shall first file an application for a permit with the wetlands board.

Sec. 49-22. Application for permit.

(a) Any person who desires to use or alter any coastal primary sand dune within this city, other than for those activities specified in section 49-20 above, shall first file an application for a permit with the wetlands board.

1.6 Authority to Meet Part 2 Permit Requirements

The NPDES stormwater permit application regulations require an assessment of whether existing legal authority is sufficient to meet the criteria for Part 2 of the permit application provided in *40 CFR 122.26(d)(2)(i)* as follows:

40 CFR 122.26(d)(2)(i)

A demonstration that the applicant can operate pursuant to legal authority established by statute, ordinance or series of contracts which authorizes or enables the applicant at a minimum to:

(A) Control through ordinance, permit, contract, order or similar means, the contribution of pollutants to the municipal storm sewer system by storm water discharges associated with industrial activity and the quality of storm water discharged from sites of industrial activity;

(B) Prohibit through ordinance, order or similar means, illicit discharges to the municipal separate storm sewer;

(C) Control through ordinance, order or similar means the discharge to a municipal separate storm sewer of spills, dumping or disposal of materials other than storm water;

(D) Control through interagency agreements among coapplicants the contribution of pollutants from one portion of the municipal system to another portion of the municipal system;

(E) Require compliance with conditions in ordinances, permits, contracts or order; and

(F) Carry out all inspection, surveillance and monitoring procedures necessary to determine compliance and noncompliance with permit conditions including the prohibition on illicit discharges to the municipal separate storm sewer.

The City Code sections identified above are referenced in an assessment of the individual Part 2 legal authority criteria.

(A) Control through ordinance, permit, contract, order or similar means, the contribution of pollutants to the municipal storm sewer system by storm water discharges associated with industrial activity and the quality of storm water discharged from sites of industrial activity. Section 39.1-19 of the City Code prohibits the discharge of sanitary sewer flow to the storm sewer system. Section 39.2-5 of the City Code prohibits the discharge of any sewage from a private sewage disposal facility on any public or private property in the City. Section 41.1-4 of the City Code prohibits pollutants to be discharged to the storm sewer system including the discharge of industrial process water, wash water, or other unpermitted industrial discharges in Section 41.1-4(c). Section 41.1-5 of the City Code provides the City with authority to order the correction of drainage problems on any site in the City. Sections 9-10, 30-69, 41-16, and 41-17 of the City Code prohibit pollution of waters of the City and littering. Sections 42-20.1 and 42-20.2 of the City Code prohibit the obstruction of drains or drainage areas. Sections 42-24, 42-25, and 42-46 of the City Code establish regulations for protecting the City from spills or deposits of liquid wastes. Section 46-28 of the City Code prohibits pollution of the City's water supply.

For development or redevelopment of industrial sites, the City's Zoning Ordinance establishes lot size, yard size, and maximum lot coverage requirements for industrial activity. Chapter 15 of the City Code establishes erosion and sedimentation control regulations If development or redevelopment of industrial sites occurs within a Chesapeake Bay Preservation Area, Section 494 of the City's Zoning Ordinance and Chapter 32.2 of the City Code establish stringent criteria for stormwater management, protection of water quality, and use of Best Management Practices. Chapter 49 of the City Code protects development within wetlands or coastal primary sand dunes by requiring a permit application with the wetlands board.

Enforcement provisions and penalties for violations of the referenced sections of City Code are also provided in specific chapters. Chapter 27 of the City Code provides additional authority for the abatement of nuisances.

(B) Prohibit through ordinance, order or similar means, illicit discharges to the municipal separate storm sewer. Section 39.1-19 of the City Code prohibits the discharge of sanitary sewer flow to the storm sewer system. Section 39.2-5 of the City Code prohibits the discharge of any sewage from a private sewage disposal facility on any public or private property in the City. Section 41.1-4 of the City Code prohibits pollutants to be discharged to the storm sewer system. Section 41.1-5 of the City Code provides the City with authority to order the correction of drainage problems on any site in the City. Sections 9-10, 30-69, 41-16, and 41-17 of the City Code prohibit pollution of waters of the City and littering. Sections 42-20.1 and 42-20.2 of the City Code prohibit the obstruction of drains or drainage areas. Sections 42-24, 42-25, and 42-46 of the City Code establish regulations for protecting the City from spills or deposits of liquid wastes. Section 46-28 of the City Code prohibits pollution of the City's water supply.

Enforcement provisions and penalties for violations of the referenced sections of City Code are also provided in specific chapters. Chapter 27 of the City Code provides additional authority for the abatement of nuisances.

(C) Control through ordinance, order or similar means the discharge to a municipal separate storm sewer of spills, dumping or disposal of materials other than storm water. Section 39.1-19 of the City Code prohibits the discharge of sanitary sewer flow to the storm sewer system. Section 39.2-5 of the City Code prohibits the discharge of any sewage from a private sewage disposal facility on any public or private property in the City. Section 41.1-4 of the City Code prohibits pollutants to be discharged to the storm sewer system. Sections 9-10, 30-69, 41-16, and 41-17 of the City Code prohibit pollution of waters of the City and littering. Sections 42-24, 42-25, and 42-46 of the City Code establish regulations for protecting the City from spills or deposits of liquid wastes. Section 46-28 of the City Code prohibits pollution of the City's water supply.

Enforcement provisions and penalties for violations of the referenced sections of City Code are also provided in specific chapters. Chapter 27 of the City Code provides additional authority for the abatement of nuisances.

(D) Control through interagency agreements among coapplicants the contribution of pollutants from one portion of the municipal system to another portion of the municipal system. The City of Norfolk owns the entire separate storm water system and is an individual NPDES permit applicant.

The City of Norfolk relies on its In-Town Reservoir System as a vital part of the water supply system. To protect water quality within the In-Town Reservoir System, the City of Norfolk will seek an intermunicipal agreement with the City of Virginia Beach to control nonpoint source pollution for the areas of the In-Town Reservoir System bordering and located within the jurisdiction of the City of Virginia Beach. After approval of Part 1 of the application by the EPA, the City of Norfolk will meet with the City of Virginia Beach to discuss the development of an agreement before submittal of Part 2 of the application on November 16, 1992.

(E) Require compliance with conditions in ordinances, permits, contracts or order. Enforcement provisions and penalties for violations of the referenced sections of City Code are provided in specific chapters. Chapter 27 of the City Codes provides additional authority for the abatement of nuisances.

(F) Carry out all inspection, surveillance and monitoring procedures necessary to determine compliance and noncompliance with permit conditions including the prohibition on illicit discharges to the municipal separate storm sewer. Chapter 41.1, entitled "Storm Water Management", provides authority for the City's Director of Public Works to establish procedures and enforce regulations pertaining to the storm water system in Section 41.1-3. Authority to prohibit and inspect for illicit connections to the storm sewer system is provided to the Department of City Planning and Codes Administration in Section 39.1-19. Authority to enforce violations of private sewage disposal regulations is provided to the Department of Health in Section 39.2-1 of the City Code. For development and redevelopment, the Department of City Planning and Codes Administration has authority over erosion and sediment control plans, the site review process, and stormwater management regulations required for activity within the Chesapeake Bay Preservation Area. Additional authority for enforcement of erosion and sediment control regulations and stormwater management is being established for the Department of Public Works in an ordinance currently under review by the state. Authority to enforce regulations and permits of the City's Tree Ordinance is provided in Section 30-23 of the City Code

1.7 Legal Authority Overview

Overall, the City of Norfolk has the existing legal authority, or is in the process of modifying existing City Code with ordinances, to control discharges to the municipal storm sewer system and meet the legal authority requirements of *40 CFR 122 26(d)(2)(i)*.

United States
Environmental Protection
Agency

Water Planning Division
WH-554
Washington, DC 20460

December 1983

Water

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EPA

Results of the Nationwide Urban Runoff Program

Volume I - Final Report

RESULTS

OF THE

NATIONWIDE URBAN RUNOFF PROGRAM

December, 1983

VOLUME I - FINAL REPORT

Water Planning Division

U.S. Environmental Protection Agency

Washington, D.C. 20460

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DISCLAIMER

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FOREWORD

The U.S. Environmental Protection Agency was created because of increasing public and government concern about environmental quality. The complexity of our environment and the interplay among its components require concentrated and integrated approaches to pollution problems.

The possible deleterious water quality effects of nonpoint sources in general, and urban runoff in particular, were recognized by the Water Pollution Control Act Amendments of 1972. Because of uncertainties about the true significance of urban runoff as a contributor to receiving water quality problems, Congress made treatment of separate stormwater discharges ineligible for Federal funding when it enacted the Clean Water Act in 1977. To obtain information that would help resolve these uncertainties, the Agency established the Nationwide Urban Runoff Program (NURP) in 1978. This five-year program was designed to examine such issues as:

- The quality characteristics of urban runoff, and similarities or differences at different urban locations;

- The extent to which urban runoff is a significant contributor to water quality problems across the nation; and

- The performance characteristics and the overall effectiveness and utility of management practices for the control of pollutant loads from urban runoff.

The interim NURP report, published in March 1982, presented preliminary findings of the program. This document is the final report covering the overall NURP program. Several specialized technical reports are published under separate cover.

PREFACE

The Nationwide Urban Runoff Program (NURP) was conducted by the EPA and many cooperating federal, state, regional, and local agencies, distributed widely across the United States. The individual project studies, which were conducted over the past five years, were designed and overseen using a common technical team from EPA headquarters. This approach was taken to assure a desired level of commonality and consistency in the overall program, while allowing each individual project to specially tailor its effort to focus on local concerns.

The program has yielded a great deal of information which will be useful for a broad spectrum of planning activities for many years. Furthermore, it has fostered valuable cooperative relationships among planning and regulatory agencies. The most tangible products of the program are this report, the reports of various grantees (available under separate cover), and several technical reports which focus on specialized aspects of the program, its techniques, and its findings. In addition, a considerable number of individual articles drawing on information developed under the NURP program have already appeared in the technical literature and address specific technical or planning aspects of urban runoff.

At the time of publication of this Final Report, the main technical effort of the NURP program is complete; the field studies and the analysis of most of the resultant data are complete enough that the findings reported herein can be taken with confidence. However, there is still some work in progress to make certain details of the program available for future use. The products of this on-going work include:

- A summary database which is being compiled to make all technical information from the 28 projects available for review and use (DECEMBER 1985);

- A technical report which focuses on the program's studies and findings relative to detention and recharge devices (MAY 1984);

- A technical report on urban runoff effects on the water quality of rivers and streams (MARCH 1984); and

- A technical report on the effectiveness of street sweeping as a potential "best management practice" for water pollution control (MAY 1984).

This report and the supplementary technical documents identified above, supersedes the earlier NURP publication, "Preliminary Results of the Nationwide Urban Runoff Program," March 1982. Information presented there has been expanded, updated, and in some cases revised.

ACKNOWLEDGEMENTS

The Nationwide Urban Runoff Program was unusual in its large scale, covering a broad spectrum of technical and planning issues at many geographic locations. Because the program placed such emphasis on tailoring the results to support the planning process, it involved many participants - some from EPA, some from other federal agencies, and many from state, regional, and local planning agencies and other consultants.

The program was developed, implemented, and managed by the Water Planning Division, Office of Water, at EPA Headquarters, Washington, D.C. Principal contributors were: Dennis N. Athayde, Program Manager; and Patrice M. Bubar, Norman A. Whalen, Stuart S. Tuller, and Phillip H. Graham, all of whom served as Project Officers. Additional contributions from EPA personnel came from Rod E. Frederick and Richard P. Healy (Monitoring and Data Support Division), Richard Field (Storm and Combined Sewer Section, EPA Office of Research and Development), and many project staff in the various EPA Regional Offices.

As described elsewhere, much of the field work, water quality analysis, and data analysis was performed by the U.S. Geological Survey (USGS), under a Memorandum of Agreement with EPA. Both District Offices and National Headquarters participated actively. The contributions of Messrs. Ernest Cobb and David Lystrom are especially acknowledged.

Members of the project team which provided essential strategic, technical, and management assistance to the EPA Water Planning Division through a contract with Woodward-Clyde Consultants were: Gail B. Boyd, David Gaboury, Peter Mangarella, and James D. Sartor (Woodward-Clyde Consultants); Eugene D. Driscoll (E. D. Driscoll and Associates); Philip E. Shelley (EG&G Washington Analytical Services Center, Inc.); John L. Mancini (Mancini and DiToro Consultants); Robert E. Pitt (private consultant); Alan Plummer (Alan Plummer and Associates); and James P. Heaney and Wayne C. Huber (University of Florida).

The principal writers of this report were Dennis N. Athayde (EPA), Philip E. Shelley (EG&G Washington Analytical Services Center, Inc.), Eugene D. Driscoll (E. D. Driscoll & Associates), and David Gaboury and Gail B. Boyd (Woodward-Clyde Consultants).

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CHAPTER 1
INTRODUCTION

Rain falling on an urban area results in both benefits and problems. The benefits range from watering vegetation to area cleansing. Many of the problems are associated with urban runoff, that portion of rainfall which drains from the urban surfaces and flows via natural or man-made drainage systems into receiving waters.

The historical concern with urban runoff has been focused primarily on flooding. Urban development has the general effect of reducing pervious land surface area and increasing the impervious area (such as roof tops, streets, and sidewalks) where water cannot infiltrate. In comparison with an undeveloped area (for a given storm event), an urban area will yield more runoff, and it will occur more quickly. Such increases in the rate of flow and total volume often have a decided effect on erosion rates and flooding. It is not surprising, therefore, that at the local level the quantity aspect continues to be a principal concern.

In recent years, however, concern with urban runoff as a contributor to receiving water quality problems has been expressed. Section 62 of the Water Quality Act of 1965 (P.L. 89-234) authorized the Federal government to make grants for the purpose of "assisting in the development of any project which will demonstrate a new or improved method of controlling the discharge into any water of untreated or inadequately treated sewage or other waste from sewerage which carry storm water or both storm water and sewage or other waste ..." The Federal Water Pollution Control Act Amendments of 1972 (P.L. 92-500) signaled a heightened national awareness of the degraded state of the nation's surface waters and a Congressional intent that national water quality goals be pursued. The scarcely two-year old Environmental Protection Agency built upon its predecessors' activities by taking up the challenge and implementing this far reaching legislation.

As a result of Section 208 of The Act, State and local water quality management agencies were designated to integrate water quality activities. As point source discharges were increasingly brought under control and funds for the construction and upgrading of municipal sewage treatment plants were granted, the awareness of nonpoint sources (including urban runoff) as potential contributors to water quality degradation was heightened. Uncertainties associated with the local nature and extent of urban runoff water quality problems, the effectiveness of possible management and control measures, and their affordability in terms of benefits to be derived mounted as water quality management plans were developed. The unknowns were so great and certain control cost estimates were so high that the Clean Water Act of 1977 (P.L. 95-217) deleted Federal funding for the treatment of separate stormwater discharges. The Congress stated that there was simply not enough

known about urban runoff loads, impacts, and controls to warrant making major investments in physical control systems.

In 1978, EPA Headquarters reviewed the results of work on urban runoff by the technical community and the various 208 Areawide Agencies and determined that additional, consistent data were needed. The NURP program was implemented to build upon pertinent prior work and to provide practical information and insights to guide the planning process, including policy and program development and implementation. The NURP program included 28 projects, conducted separately at the local level, but centrally reviewed, coordinated, and guided. While these projects were separate and distinct, most share certain commonalities. All were involved with one or more of the following elements: characterizing pollutant types, loads, and effects on receiving water quality; determining the need for control; and evaluating various alternatives for the control of stormwater pollution. Their emphasis was on answering the basic questions underlying the NURP program and providing practical information needed for planning.

CHAPTER 2
BACKGROUND

EARLY PERCEPTIONS

As noted earlier, drainage is perhaps the single most important factor of the urban hydrologic cycle. Nuisance flooding, more than anything else, gives Public Works directors concern, as complaints are received from unhappy motorists, residents, and business. Drainage has typically been considered a local responsibility, usually that of the City or County Public Works Department. Rarely does this responsibility go to the State or Federal level, except in cases of catastrophic flooding involving risk to human life and extensive property damage.

By 1964, the U.S. Public Health Service had begun to be concerned about identified pollutants in urban runoff and concluded that there may be significant water quality problems associated with stormwater runoff. In 1969, the Urban Water Resources Research Committee of the American Society of Civil Engineers (directed by M. B. McPherson and sponsored by the U.S. Geological Survey) recognized the potential threat of pollution from urban runoff and described a research program intended to obtain needed information to characterize urban stormwater quality.

In the late 1960's, the Federal Water Quality Administration (FWQA) conducted a study in an area of Tulsa, Oklahoma which was served by separate storm sewers. This first attempt at using regression analysis on urban runoff indicated that there was only a very poor correlation between stormwater runoff quantity and water quality constituents (except for suspended solids). Comparing the concentrations of various pollutants examined by this study (separate storm sewers) with previous data on combined sewer overflows indicated that storm runoff from areas having separate sewers had much lower values for BOD, fecal coliform, and most other pollutant concentrations. The study concluded that the largest portion of pollutants resulted from (1) washoff of material from impervious surfaces and (2) the erosion of drainage channels (caused by high volumes of runoff from the impervious surfaces). Control of urban runoff was recommended to reduce both runoff volume and rates.

Atlanta, Georgia is an example of a city that has both a combined sewer system and a separate system. In 1971, EPA conducted a study which compared the contribution of various sources of pollutants. It was concluded that, on an annual basis, 64 percent of the BOD load came from separate storm sewers, and 19 percent came from combined sewers, the balance coming from treatment plants.

In 1971, EPA also conducted a study in Oakland and Berkeley, California, to assess the infiltration of stormwater into sanitary sewers. While only four

percent of the study area had combined sewerage and the remaining 96 percent separate, the study made it clear that infiltration can cause a separate system to function as though it were combined.

Studies in Sacramento, California, which has both combined and separate storm sewers, indicated that the stormwater was comparable to the average strength of domestic wastewater. However, the concentrations for BOD were found to be so unrealistically high, that contamination of the runoff by raw sanitary sewage was considered to be a distinct possibility.

In 1973, the Council on Environmental Quality published a report titled, "Total Urban Pollutant Loads: Sources and Abatement Strategies." The primary conclusion was that much pollution was coming from urban runoff and that, unless it was taken care of, the goals of the Act would not be met.

CONCLUSIONS FROM SECTION 208 EFFORTS

EPA guidance for conducting the early 208 planning efforts designated 17 topic areas (including urban runoff) that were to be addressed by all Water Quality Management agencies in developing their 208-funded plans. Although all topic areas were to be covered, the degree of emphasis to place on each was left to the individual agencies to decide. As a result, the amount of the 208 efforts spent in the area of urban runoff varied greatly (but was rarely a major portion).

Many of the 208 agencies began their studies with the assumption that urban runoff was an important cause of water quality problems. Although the studies developed much information on runoff and receiving waters, not enough basic information was known to assess urban runoff's role as a major cause of problems. This was partly because of interferences by other sources and complex relationships within the receiving waters. It was also due to the difficulties in deciding what constitutes a "problem." In some cases, "problems" were synonymous with criteria violations; in others, "problems" were synonymous with an impairment or denial of beneficial uses. In many cases, "problems" were concluded to exist, simply on the basis of the possible presence of certain contaminants in urban runoff, based solely on values taken from literature regarding studies conducted elsewhere. The practical implication of these differences (which were differences in viewpoints rather than differences in physical conditions, in many cases) was that local agencies were very reluctant to commit to implementing urban runoff controls in the absence of a clear problem definition.

Furthermore, in the early years of the 208 program, EPA's guidance on how to address urban runoff was vague. As a result, local agencies took a wait-and-see attitude on the stormwater portion of their plans. They simply did not know what EPA would eventually do on the issue of stormwater control.

Another major obstacle to implementation resulted from the uncertainties regarding the effectiveness of controls. Many of the measures proposed for controlling urban runoff are either new or special applications of conventional practices developed for other purposes. Little was known about how

well they would work in urban runoff applications. Engineers, planners, public works personnel, and other decision makers have been understandably reluctant to invest large amounts of time and money in controls which may not perform as hoped.

Another obstacle to implementation of controls was a lack of basic data on sources, transport mechanisms, and receiving water characteristics (hydrologic and water quality aspects). Some of the more important topic areas where knowledge was lacking are summarized below:

- Sources - Not enough was known about where pollutants originate. Major sources certainly include vehicles, vegetation, erosion, fertilizer and pesticide application, litter, animals, and air pollution. However, a better understanding of source contributions could enhance control opportunities.

- Washoff/transport mechanisms - Not enough was known about how pollutants get from the sources to the receiving waters. Models could be better used for simulating runoff in problem definition and control evaluation, if they more accurately reflected washoff and transport mechanisms.

- Impacts - It was difficult to go beyond speculation in assigning urban runoff its proper share of responsibility for problems in cases where several pollutant sources contribute. In cases where other sources create obvious problems, it was difficult to determine the appropriate degree to which urban runoff should be controlled.

- Relative benefits - Planners had difficulty deciding whether the various benefits of controlling urban runoff quality justify the costs involved. There was considerable controversy over the present dry weather standards' relationship to beneficial uses, given the time and space scales of storm events and their intermittent nature. Many plans failed to be implemented because of uncertainties regarding: How much control is enough? Who benefits? Who should pay? Who should decide?

- Controls - Both cost and effectiveness data on full-scale control programs were lacking. Some of the control measures cited for typical 208 plans were plausible candidates, but their application for the purpose of urban runoff pollution control had not been studied quantitatively.

EPA'S ORD EFFORT

During the past 15 years, EPA's Office of Research and Development (ORD) has conducted over 250 studies on the characterization and control of stormwater discharges and combined sewer overflows, with particular emphasis on the latter due to their greater pollution potential. Consistent with overall Agency policies, ORD has deemphasized studies on receiving water impacts and effects (although it has done some such work). Rather, ORD has focussed principally on multi-purpose analyses and controls, because it is nearly

impossible to segregate benefits and strategies of urban stormwater runoff pollution control from drainage, flood, and erosion control. Many significant results have been obtained by ORD's effort, which has dramatically increased the technical literature in the area.

Data from ORD studies indicate the high variability of pollutant concentrations in urban runoff. Based on loading projections, it is safe to conclude that urban stormwater can contribute significant pollutant loads to receiving waters, in many cases having pollutant concentrations on the order of secondary treatment plant effluent for some constituents. Nonetheless, in its efforts to find direct urban runoff generated receiving water impacts (using the conventional dissolved oxygen parameter as the indicator) ORD has been only partly successful. However, this was only one study and was not intended to be the final word. Nonetheless, based on the size of the load coming from urban runoff, a significant pollution potential is there for at least some types of receiving waters. For example, a small urban lake could receive nutrient loads sufficient to increase algal productivity and accelerate the eutrophication process. The existence of heavy metals and certain organics (mostly of petroleum origin) in urban runoff have also been documented by the ORD program.

In addition to studying urban runoff loads, the ORD program has investigated a number of management and control approaches. This effort has been very successful, and many innovative techniques have been proposed and tested. The results of such research, development, and demonstrations have been presented in reports which document many of these potential controls, thereby allowing the technology to be utilized in other programs and at other locations. Included have been such control measures as on-site (upstream) storage; porous pavement; the swirl concentrator, helical bend, tube settler, and fine mesh screens for grit and settleable solids removal; street sweeping; disinfection; and high rate filtration, dissolved air flotation, and microscreening for suspended solids and BOD removal. Most of these controls were developed principally to deal with combined sewer overflow problems. However, some may also have application in urban runoff control, once their effectiveness has been conclusively demonstrated and initial and operating cost data are available to allow the necessary trade-off studies to be made.

The ORD program's reports constitute an invaluable source of data and information that was used to design and guide the development of the emerging NURP program. Also, three of the NURP projects were joint efforts with ORD (i.e., West Roxbury, Massachusetts, Bellevue, Washington, and Lansing, Michigan).

OTHER PRIOR/ONGOING EFFORTS

The Clean Water Act requires EPA to provide Congress with a needs assessment every two years in the six categories of the construction grant funds program. In 1974, the Needs Survey for Separate Storm Sewer Discharges (Category VI) was done by each state. Using the goals of the Act as the criteria to be met, they identified a cost of about $235 billion (June 1973 dollars). One state alone identified $80 billion in needs to control separate storm sewer discharges. In 1976, the Needs Survey was conducted by the Agency, and it was found that Category VI would require $66 billion to meet the goals of

the Act. This survey broke the goals into three categories or levels of pollution abatement; (1) aesthetics, (2) fish and wildlife, and (3) recreation. Costs to meet each category were determined.

As noted previously, the ASCE defined a program in 1969 to identify the causes and effects of urban stormwater pollution. The recommendations were not followed, so in 1974 at the Rindge, New Hampshire, Engineering Foundation Conference (jointly sponsored with ASCE's Urban Water Resources Research Council), a similar program was again recommended. A similar scenario occurred at the Easton, Maryland, conference of 1976 sponsored by the same group.

DISCUSSION

In the past (ca 1890), dilution was considered to be the appropriate way to control combined sewer overflows, since the primary concern was odor and related nuisances. Between 1890 and 1960 little concern was shown for stormwater pollution. Stormwater concerns were primarily related to drainage problems. As time progressed, water quality began to be considered, and workers began to characterize problems in terms of concentrations of certain pollutants and loads of these pollutants. In the 1970's, problems were being defined in terms of pounds of pollutants needing to be removed from overflows, in the interest of preventing pollution.

Past work, reported by EPA and published in professional journals, tended to focus on determining (a) the type and amount of pollutants involved and/or (b) methods to reduce the loads. However, such reports and articles did not consider either the level of improvement attainable or the need to improve quality of the receiving water body associated with the study. A conclusion common to all such reports was that not enough was known about stormwater to adequately understand cause and effect relationships. Also common to such reports were recommendations for further study and more data. A tangible result of the lack of belief and uncertain attitude in this area is the fact that stormwater controls for water quality have been implemented in so few places throughout the nation. Thus, there has been a critical need to objectively examine the situation.

Many factors led to the development of NURP, one being a legally-mandated necessity. As implementation of P.L. 92-500 moved into full swing, the lack of progress in the area of urban runoff was becoming apparent. In 1974 EPA lost a court case, which led to the decision that EPA should issue permits for separate storm sewer discharges. In 1976 EPA requested that the Areawide Waste Management Planning Program focus on the three or four most important of the 17 items required by the regulations. Many of the 208 Areawide Agencies cited urban runoff as an important item.

Two years later, EPA reviewed ninety-three 208 Areawide Agencies' work plans to assess their basis for having identified urban runoff as an element upon which they would focus. Review of these projects' methods and findings did not provide much to further our understanding of the pollution aspects of urban runoff. If one reason can be identified, it was the lack of site-specific data to define the local conditions.

As mentioned earlier, the Rindge Conference recommended a candidate program for obtaining the data necessary to provide a good understanding of storm-water pollution (EFC/ASCE, 1974). It is not coincidental that the NURP program is quite similar in design to those recommendations.

THE NATIONWIDE URBAN RUNOFF PROGRAM

Program Design

NURP was not intended to be a research program, per se, and was not designed as such. Rather, the program was intended to be a support function which would provide information and methodologies for water quality planning efforts. Therefore, wherever possible, the projects selected were ones where the work undertaken would complete the urban runoff elements of formal water quality management plans and the results were likely to be incorporated in future plan updates and lead to implementation of management recommendations. Conduct of the program provided direction and assistance to 28 separate and distinct planning projects, whose locations are shown in Figure 2-1 and listed in Table 2-1, but the results will be of value to many other planning efforts. NURP also acted as a clearinghouse and, in that capacity, provided a common communication link to and among the 28 projects.

The NURP effort began with a careful review of what was known about urban runoff mechanisms, problems, and controls, and then built upon this base. The twin objectives of the program were to provide credible information on which Federal, State, and local decision makers could base future urban runoff management decisions and to support both planning and implementation efforts at the 28 project locations.

An early step in implementing the NURP program involved identifying a limited number of locations where intensive data gathering and study could be done. Candidate locations were assessed relative to three basic selection criteria:

- Meeting program objectives;
- Developing implementation plans for those areas; and
- Demonstrating transferability, so that solutions and knowledge gained in the study area could be applied in other areas, without need for intensive, duplicative data gathering efforts.

The program design used for NURP included providing a full range of technical and management assistance to each project as the needs arose. Several forums for the communication of experience and sharing of data were provided through semi-annual meetings involving participants from all projects. The roles and responsibilities of the various State, local, and regional agencies and participating Federal agencies were clearly defined and communicated at the outset. These were reviewed and revised where warranted as the projects progressed.

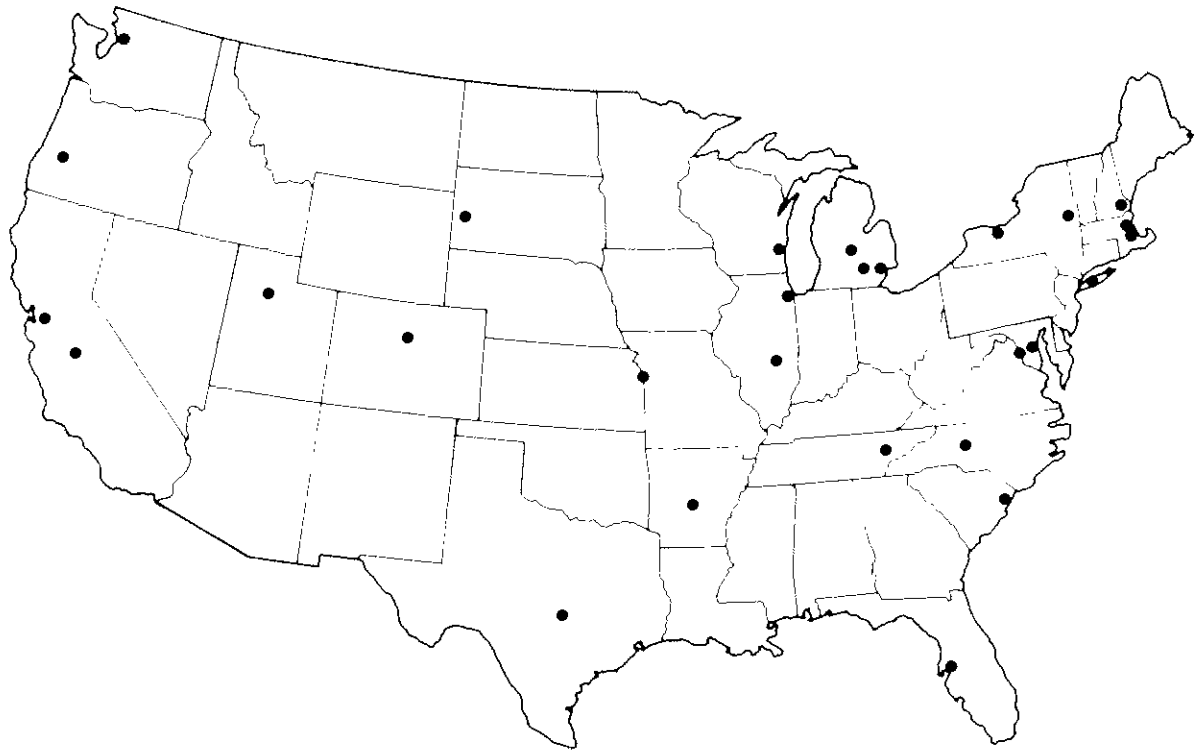

Figure 2-1. Locations of the 28 NURP Projects

TABLE 2-1. NURP PROJECT LOCATIONS

EPA Region	NURP Code	Project Name/Location	EPA Region	NURP Code	Project Name/Location
I	MA1	Lake Quinsigamond (Boston Area)	V	IL1	Champaign-Urbana, Illinois
	MA2	Upper Mystic (Boston Area)		IL2	Lake Ellyn (Chicago Area)
	NH1	Durham, New Hampshire		MI1	Lansing, Michigan
II	NY1	Long Island (Nassau and Suffolk Counties)		MI2	SEMCOG (Detroit Area)
	NY2	Lake George		MI3	Ann Arbor, Michigan
	NY3	Irondequoit Bay (Rochester Area)		WI1	Milwaukee, Wisconsin
III	DC1	WASHCOG (Washington, D.C. Metropolitan Area)	VI	AR1	Little Rock, Arkansas
	MD1	Baltimore, Maryland		TX1	Austin, Texas
IV	FL1	Tampa, Florida	VII	KS1	Kansas City
	NC1	Winston-Salem, North Carolina	VIII	CO1	Denver, Colorado
	SC1	Myrtle Beach, South Carolina		SD1	Rapid City, South Dakota
	TN1	Knoxville, Tennessee		UT1	Salt Lake City, Utah
			IX	CA1	Coyote Creek (San Francisco Area)
				CA2	Fresno, California
			X	OR1	Springfield-Eugene, Oregon
				WA1	Bellevue (Seattle Area)

The 28 NURP projects were managed by designated State, county, city, or regional governmental associations. The U.S. Geological Survey (USGS) was involved with EPA as a cooperator, through an inter-agency agreement, on 11 of the NURP projects. The Tennessee Valley Authority was also involved in one project.

A major objective of the program was the acquisition of data. Because these data will be used for several years to characterize problems, evaluate receiving water impacts from urban runoff, and evaluate management practices, consistent methods of data collection had to be developed and rigorously employed.

Project Selection

Projects were selected from among the 93 Areawide Agencies that had identified urban runoff as one of their significant problems. The intention was to build upon what these agencies had already accomplished in their earlier programs. Also, projects that would be a part of this program were screened to be sure that they represented a broad range of certain characteristics (e.g., hydrologic regimes, land uses, populations, drainage system types). Actual selection of projects was a joint effort among the States, local governments, and Regional EPA offices. The five major criteria used to screen candidate projects were as follows:

1. Problem Identified. Had a problem relative to urban runoff actually been identified? Could that problem be directly related to separate storm sewer discharges? What pollutant or pollutants were thought to be causing the problem? Using the NURP problem identification categories, what was the "problem" (i.e., denying a beneficial use, violating a State water quality standard, or public concern)?

2. Type of Receiving Water. The effects of stormwater runoff on receiving water quality were the NURP program's ultimate concern. Because flowing streams, tidal rivers, estuaries, oceans, impoundments, and lakes all have different hydrologic and water quality responses, the types of receiving waters associated with each candidate project had to be examined to ensure that an appropriately representative mix was included in the overall NURP program.

3. Hydrologic Characteristics. The pattern of rainfall in the study area is perhaps the single most important factor in studying urban runoff phenomena, because it provides the means of conveyance of pollutants from their source to the receiving water. For this reason, projects in locations having in different hydrologic regimes were chosen for the program.

4. Urban Characteristics. Characteristics such as population density, age of community, and land use were considered as

possible indicators of the waste loads and ultimately the rainfall-runoff water quality relationship. The type of sewerage system was another factor considered (e.g., whether it is combined, separate, or mixed; how severe the infiltration and inflow problems may be). Such factors have different effects on the quantity and quality of storm runoff, and were balanced as well as possible in selecting projects.

5. Beneficial Use of Receiving Water. Because this factor greatly affects the type of control measure that would be appropriate, attempts were made to include a wide range in selecting projects.

Although these were the primary criteria used to identify potential projects, other factors also had to be considered (e.g., the applicant agencies' willingness to participate, the State's acceptance of the project, the experience of the proposed project teams). Because the NURP program used planning grants (not research funds) a major consideration was the anticipated working relationships with local public agencies and the applicants' ability to raise local matching funds.

Program Assistance

Technical expertise and resources available for urban runoff planning varied among the various projects participating in NURP. Therefore, the program strategy called for providing a broad spectrum of technical assistance to each project as needed and for intercommunication of experiences and sharing of data in a timely manner.

Assistance was also provided to the applicants in developing their final work plans. This was done to ensure that there would be consistency among methods, especially in the collection of data. If there were to be differences in data from city to city, they must be due to the characteristics of each city and not a result of how the data were obtained.

Assistance with instrumentation was provided during the program in the form of information on available equipment, installation, calibration, etc. Because one of the more important elements of a data collection program is the "goodness" or quality of the data themselves, questionable data would be of little use. Accordingly, a quality assurance and quality control element was required in the plans for each project.

Periodic visits were made to each project site to ensure that the participants were provided opportunities to discuss any problems, technical or administrative. The visiting team typically included an EPA Regional Office representative, an EPA Headquarters representative, and one or two experienced consultants. All interested parties, including representatives from State or local governments, were requested to attend those visits.

As the projects moved farther into their planned activities and the time for data analysis approached, each project was required to describe how they were going to analyze their data. No single method was recommended for each project, because it was believed that a broad diversity of available methods

would be suitable, if used properly. Guidance on proper use was provided as a part of technical assistance through project visits and special workshops for this purpose.

Communication

It was intended that the entire group of NURP participants function as a single team. Accordingly, a communication program was developed. National meetings were conducted semi-annually so that key personnel from the individual projects would have an opportunity to discuss their experiences and findings.

Reports were required of each project quarterly. EPA Headquarters also provided composite quarterly reports summarizing the status of each project and discussing problems encountered and solutions found.

CHAPTER 3
URBAN RUNOFF PERSPECTIVES

In evaluating the impacts of urban runoff, one's perspective may be influenced by one's concerns and priorities - and what one defines to be a "problem". Recognizing this, the following discussion covers several such perspectives, including concerns over runoff quantity, water quality, and control possibilities.

RUNOFF QUANTITY

The following discussion covers a major cause and two major effects of runoff problems related to "quantity" (i.e., increased urbanization as a cause; flooding and erosion/sedimentation as effects).

Flooding Problems

As noted earlier, drainage has historically been the principal local-level concern regarding urban runoff. Concerns over quantity can be divided into two basic categories: nuisance flooding and major flooding. Nuisance flooding (e.g., temporary ponding of water on streets, road closings, minor basement flooding), although hardly tolerable to those immediately affected, rarely affects an entire urban populance. Nonetheless, the concerns of the (often vocal) minority of affected citizens commonly reach the point where local action is taken to minimize the recurrence of such events. Such mitigation activities are usually locally determined, funded, and implemented because both the affected public and government decision makers perceive and concur that such flooding constitutes a "problem".

Catastrophic flood events, on the other hand, have to be thought about differently for several reasons:

- They typically affect the majority of the urban populace.

- Mitigation measures often involve engineering improvements extending well beyond local jurisdictions.

- Mitigation measures often cost more than the local community could afford. Historically, the Federal government has become involved, in major flood control efforts through a number of related programs. In such cases, water quantity problems are relatively easy to define because the extent of flooding is readily observable, the degree of damage is easily determined, and the benefits of proposed flood control projects can be estimated. Thus, decision makers face a relatively low risk in prescribing courses of action and justifying the associated

costs in light of benefits. As will be discussed later, decision making in the case of water quality concerns is less straightforward.

Erosion and Sedimentation Problems

Erosion results from rainfall and runoff when soil and other particles are removed from the land surface and transported into conveyance systems and water bodies. Since land surface erosion is the principle source of stream sediment, the type of soil, land cover, and hydrologic conditions are major factors in determining the severity and extent of sedimentation problems. Although erosion is a natural process, it is frequently exacerbated by the activities of man, in both urban and rural environments.

When addressing the broad spectrum of receiving water problems which result from sedimentation, it is convenient to divide cases into two categories; (1) those that respond to control measures directed at nuisance flood prevention, and (2) those that are not controlled by such measures. When natural loads are discharged into receiving waters, the effects are primarily physical and only secondarily chemical (because the mineral constituents which make up the primary sediment load are relatively benign in most cases). Among the physical problems imposed upon the receiving waters are:

- Excess turbidity reduces light penetration, thereby interfering with sight feeding and photosynthesis;

- Particulate matter clogs gills and filter systems in aquatic organisms, resulting, for example, in retarded growth, systemic disfunction, or asphyxiation in extreme cases; and

- Benthal deposition can bury bottom dwelling organisms, reduce habitat for juveniles, and interfere with egg deposition and hatching.

Although sedimentation is storm-event related, its resultant problems are not exclusively either "quantity" problems or water "quality" problems. Being hybrid problems, sedimentation control has received a mixed approach. The organizations involved range widely, from Federal agencies (e.g., the Army Corps of Engineers, the Soil Conservation Service) to local drainage and sedimentation control officials, frequently with involvement from State and county governmental agencies.

Urbanization as a Cause of Problems

Urbanization accelerates erosion through alteration of the land surface. Disturbing the land cover, altering natural drainage patterns, and increasing impervious area all increase the quantity and rate of runoff, thereby increasing both erosion and flooding potential. Also, the sedimentation products which result from urban activities are generally not as benign as the natural mineral sediments which result from soil erosion. Atmospheric deposition (associated with industrial, energy, and agricultural production activities) and added surface particulates (resulting from tire wear, auto

exhaust, and road surface decomposition) fall in this latter category. Their effects on receiving waters tend to be more "chemical" than "physical". They may contain toxic substances and/or other compounds which can have adverse impacts upon receiving water quality and the associated ecological communities.

WATER QUALITY CONCERNS

The notion that urban runoff can be a significant contributor to the impairment or degradation of the quality of receiving waters has formed only recently and is not universally shared. It is the totality of receiving water characteristics (e.g., flow rate, size or volume, and physical and chemical characteristics) that determines its use, although some characteristics are more important than others (e.g., there must be present an appropriate rate of flow and/or volume in the receiving water to support the desired use).

In addressing the water quality needed to support a designated use, one must consider specific requisite characteristics. For example, in the case of swimming, total dissolved solids and dissolved oxygen levels are far less important than pathogenic organisms. For irrigation, the biochemical oxygen demand of the water is of little concern to the farmer, whereas the total dissolved solids level is of immense concern (to minimize salt buildup). Although high nutrient levels may be detrimental to the quality of impounded waters (by hastening eutrophication processes), a farmer may welcome nutrients in irrigation water.

It is also important to note that it is the concentration, rather than the mere presence of a water quality constituent, that affects use. The relationship between pollutant concentration and resultant impacts on receiving water use are quite non-linear, with plateau effects not uncommon. For example, consider dissolved oxygen and its effect upon fin fish. Down to a certain level below saturation, there are virtually no important effects (upon a given species). As dissolved oxygen levels fall below this threshold, the more sensitive members of the species begin to be affected. As levels continue to fall, the affected percentage of the population will increase until a level is reached at which the entire population can no longer survive. Obviously, any further reduction of dissolved oxygen level would have no further effect upon the community, since it no longer exists. It is important to keep this plateau effect in mind when considering the practical impacts of increased pollution and the practical value of remedial measures to restore beneficial uses, since limited removal of a polluting substance may do nothing to alleviate the problem. In the example given above, if one were to somehow reduce the input of oxygen demanding substances to the receiving water, the result might be that the dissolved oxygen level of the receiving water would rise from 1.0 mg/l to 3 mg/l. If the species of concern were trout, they still could not survive. Even though polluting substances were removed and money was spent, the desired benefit would not be achieved.

WATER QUANTITY AND QUALITY CONTROL

There is no question that excessive urban runoff causes problems. Remedial costs may be high, but the benefits are obvious. Currently, there is a growing national awareness that, if steps are taken during the planning phase

of development, excessive stormwater discharges can be prevented, at least from typical events (large infrequent storms will always present a greater threat).

Past And Current Work

During the past two decades attention has been focused on reducing runoff rates and volumes and reducing flood damage. During the early 1970's, a manual of practices was prepared under grants from the Office of Water Research and Technology sponsored by the American Public Works Association stressing detention (Poertner, 1974). The University of Delaware also issued a manual of practices on methods to control rates and volumes of urban runoff (Toubier and Westmacott, 1974).

Work done by the ASCE Urban Water Resources Research Council during the sixties stressed the concept of natural easements for drainage, observing that there were two drainage ways; major routes for large events and minor routes for smaller more frequent events (Jones, 1968). It was claimed that money could be saved by using natural channels, swales, etc., thus reducing the need for more expensive concrete conveyances.

The idea of intentionally using natural runoff courses, green belts, and the like was new to engineers who had long been trying to control runoff through more artificial conveyances. In 1970, EPA's Office of Research and Development initiated work on a development known as the Woodlands project in Texas near Houston. Studies were conducted to determine how storm flows could be managed and water quality could be protected or improved by the use of natural drainage ways, detention facilities, porous pavements, increased infiltration rates, and a decrease in runoff rates (Characklis, 1979).

Federal Involvement

As part of its national effort to control erosion from agricultural lands, the Soil Conservation Service (SCS) (Department of Agriculture) provides technical assistance in developing erosion control plans. During the past decade or so, the methods they have developed have been applied much more widely than just to agricultural situations. SCS has become increasingly involved in erosion control in urban areas and has produced a useful document for assessing urban hydrology in small watersheds (SCS, 1975).

Other Federal agencies that have an interest in urban runoff and its control include the U.S. Geological Survey, the Federal Highway Administration, the Federal Housing Administration, the Tennessee Valley Authority, and others too numerous to mention.

State And Local Involvement

Although some 27 states have adopted floodplain management legislation to protect property, the control of urban drainage has traditionally been a local matter. Some states have some form of erosion control laws in force; however few states have runoff rate/quantity legislation. This situation has begun to change over the last decade, and Maryland is one example where the statewide legislation for stormwater management is implemented at the county level.

The methods used tend to be preventive, wherein erosion is controlled by prescribing certain proven design practices and conventions. Many local agencies are developing control plans along these lines, so this report will not cover this aspect of control.

PROBLEM DEFINITION

As pointed out earlier, water quantity problems are relatively easy to identify and describe. Water quality problems, on the other hand, tend to be more elusive because their definition often involves some subjective considerations, including experiential aspects and expectations of the populace. They are not immediately obvious and are usually less dramatic than, for example, floods. They also tend to vary markedly with locality and geographic regions within the country. For example, a northwestern resident may want to upgrade stream quality to support some highly-prized species of game fish, while a northeastern resident contemplating the river flowing by the local factory might be grateful to see any game fish at all. Thus, a methodological approach to the determination of water quality problems is essential if one is to consider the relative role of urban runoff as a contributor. An important finding of the work conducted during this NURP program has been to learn to avoid the following simplistic logic train: (a) water quality problems are caused by pollutants, (b) there are pollutants in urban runoff, therefore, (c) urban runoff causes "problems". The unspoken implication is that a "problem" by definition requires action, and any type of "problem" warrants equally vigorous action. It becomes clear that a more fundamental and more precise definition of a water quality "problem" from urban runoff is necessary. For this purpose, the NURP has adopted the following three-level definition:

- Impairment or denial of beneficial uses;
- Water quality criterion violation; and
- Local public perception.

The first of these levels refers to cases of impairment or denial of a designated use. An example would be a case where a determination has been made that some specific beneficial use should be attained; however, present water quality characteristics are such that attainment of the use cannot be fully realized.

The second level of problem definition refers to violations of a designated water quality criterion. An example would be a case where some measure or measures of water quality characteristics have been found to violate recommended or mandatory levels for the receiving water classification. Some of the subtle distinctions between this and the preceding problem definition arise in the fact that receiving water classification may not be appropriate, the beneficial use may not be impaired or denied, and the water quality criteria associated with that classification may or may not be overly conservative or directly related to the desired use.

The third level of problem definition involves public perception. This may be expressed in a number of ways, such as telephone calls to public officials

complaining about receiving water color, odor, or general aesthetic appearance. Public perception of receiving water body problems is highly variable also. Some people enjoy fishing for carp or gar, children will play in almost any creek, and so on. This level of problem definition can also include one concept of anti-degradation. Here the thought is that no polluting substances of any kind in any quantity should be discharged into the receiving water regardless of its natural assimilative capacity. This concern has its ultimate expression in the "zero discharge" concept. EPA's concept of anti-degradation, on the other hand, refers to degradation of use; a subtle but essential difference.

The foregoing levels of problem definition provide an essential framework within which to discuss water quality problems associated with urban runoff. However, it is important to understand that when one is dealing at a local level all three elements are typically present. Thus, it is up to the local decision makers, influenced by other levels of support and concern, to carefully weigh each, prior to making a final decision about the existence and extent of a problem and how it is to be defined. It follows that, if this step of problem definition is done carelessly, it will be difficult, if not impossible, to plan an effective control strategy and establish a means for assessing its effectiveness.

CHAPTER 4
STORMWATER MANAGEMENT

INTRODUCTION

This chapter is included for those who wish to know more about how to plan and implement stormwater management programs. Most of the information contained herein was developed through several related programs that were proceeding in parallel with the NURP program.

- The Southeast Michigan Council of Governments (SEMCOG), a NURP grantee, was developing stormwater management procedures.
- The Midwest Research Institute (MRI) was collecting cost information on control practices from selected NURP projects.
- A related EPA Water Planning Division program, the Financial Management Assistance Program (FMAP), was developing financial and institutional planning procedures designed to be helpful in the implementation of stormwater management plans.

STORMWATER MANAGEMENT PLANNING[1]

Stormwater management planning develops policies, regulations, and programs for the control of runoff from the land. Stormwater management planning is normally directed toward either or both of two primary goals: the reduction of local flooding and/or the protection of water quality. However, stormwater management planning is also generally used to insure that stormwater programs and regulations provide multiple benefits to the affected communities and do so in a way that does not create additional problems.

Stormwater management planning need not involve expensive technical studies. Available data and maps, the experience of other communities, and advice from experts can be used to develop an effective planning program. Detailed technical studies can then be targeted toward specific issues and problems. Effective local planning can alleviate the need for costly remedial public works projects.

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[1] The material in this section of the chapter is largely from Technical Bulletin No. 1: Stormwater Management Planning: Cost-Saving Methods for Program Development, the first of a seven-part bulletin series on water quality management prepared by the Southeast Michigan Council of Governments and available from Information Service, SEMCOG, 8th Floor, Book Building, Detroit, Michigan 48226.

The Need

Stormwater runoff cannot be ignored in developing communities. As urban development occurs, the volume of stormwater and its rate of discharge increase. These increases are caused when pavement and structures cover soils and destroy vegetation which otherwise would slow and absorb runoff. Pollutants, washed from the land surface and carried by runoff into lakes and streams, may add to existing water quality problems.

Figure 4-1 illustrates the effects of paved surfaces on stormwater runoff volumes. When natural ground cover is present over the entire site, normally less than 10 percent of the stormwater runs off the land into nearby creeks, rivers, and lakes. When paved surfaces cover 10 to 30 percent of the site area, approximately 20 percent of the stormwater can be expected to run off. As paved surfaces increase, both the volume and the rate of runoff increase. Furthermore, paved surfaces prevent natural infiltration of stormwater into the ground, and increased runoff volumes and rates increase soil erosion and pollutant runoff. Stormwater management planning can be used to develop programs to reduce adverse affects and even to provide community benefits.

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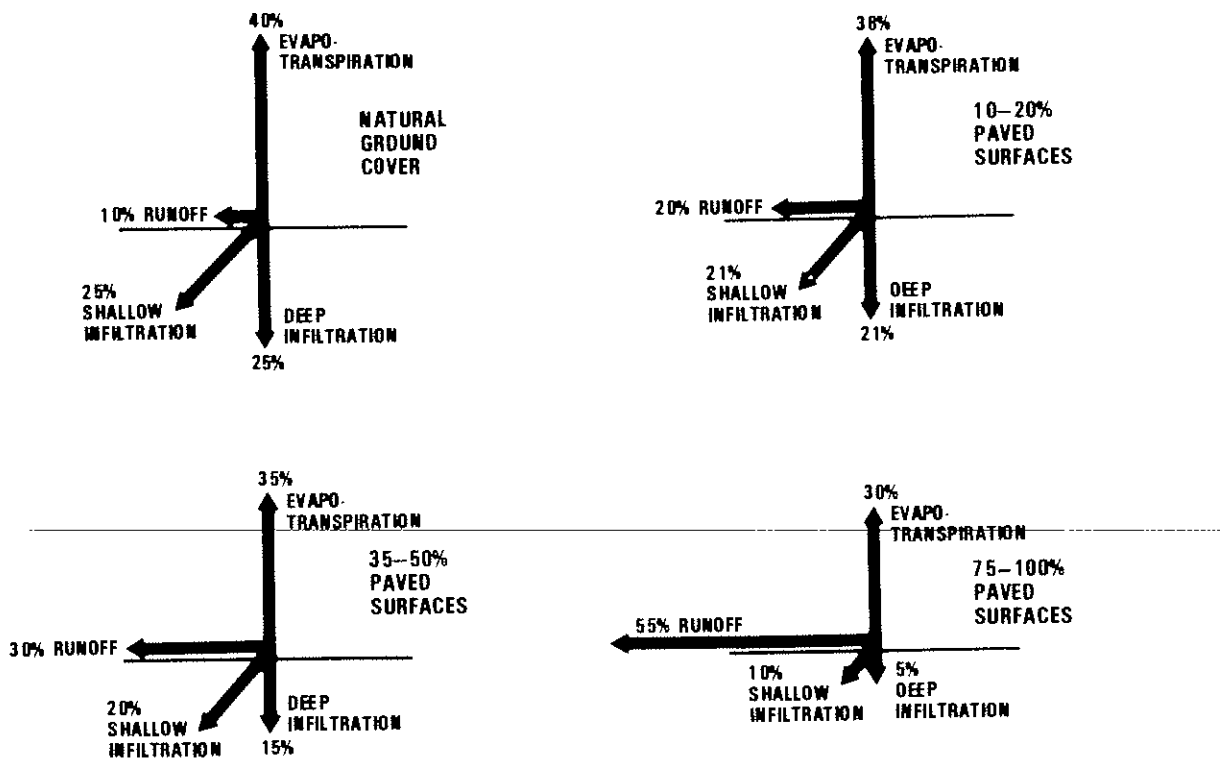

Source: J.T. Tourbier and R. Westmacott, *Water Resources Protection Technology: A Handbook of Measures to Protect Water Resources in Land Development*, p. 3.

Figure 4-1. Typical Changes in Runoff Flows Resulting from Paved Surfaces

Stormwater management can and should be directed toward two goals: the control of runoff flows (i.e., volumes and rates) and the control of pollutants in stormwater. Control measures which emphasize the storage of runoff rather than the immediate conveyance from the site and from the community often provide benefits which meet both goals. Stormwater storage and conveyance measures, however, affect the community in a variety of ways. Through stormwater management planning the effects of alternative policies, programs, control measures, and financing schemes can be evaluated.

Stormwater management planning is directed toward basic policy questions, such as:

- What should be done with runoff from the land?
- Is the temporary (detention) or permanent (retention) storage of stormwater runoff desirable?
- Under the circumstances, should retention basins, detention basins, natural infiltration areas, or dished parking lots be used to store runoff?
- What requirements should be placed on new developments?
- Do stormwater runoff problems in developed areas warrant special attention?
- Should communal retention or detention facilities be provided by the local jurisdiction? If so, how can such areas be financed?
- Who should pay for retention and detention facilities on private property?
- Are the local jurisdictions already carrying out programs (such as parkland acquisition programs or wetlands regulation) which affect stormwater runoff? Can programs and/or regulations be coordinated to achieve multiple purposes?
- Should enclosed drains or natural channels be used to convey stormwater to and from storage areas?
- Can routing and storage be provided for major storms (e.g., 100-year frequency) as well as minor storms (e.g., 10-year frequency)?
- Who should be responsible for facility maintenance?

The specific questions to be addressed in a local government planning program will vary among local jurisdictions, reflecting varying problems and community objectives. The answers to these questions may take the form of policy statements, changes in regulations or engineering design standards, technical assistance materials for landowners or consulting engineers, revisions to existing programs, or a written plan document.

Because stormwater management planning for quantity and quality control is relatively new, and because community stormwater concerns differ, there are no easy formulas for preparing stormwater management plans.

Stormwater Runoff as a Community Resource

Although, stormwater management programs are typically undertaken to avoid problems (e.g., flooding, pollution, lawsuits), effective planning can also be used to pursue potential community benefits. When effectively managed, stormwater can provide benefits such as:

- Recharge of groundwater supplies;
- Water quality enhancement;
- Recreational opportunities (e.g., use of large retention areas for boating, fishing, or nature study);
- Replenishment of wetlands which serve as wildlife habitats, absorb peak floods, and naturally break down certain pollutants;
- Maintenance of summertime lake levels and stream flows; and
- Enhancement of community appearance and image when facilities are attractively designed.

The Role of Local Governments

In some cases, the institutional systems for stormwater management may need to be complex, largely because State, county, and local agencies' policies, regulations, and procedures may all affect stormwater control within a particular development. For example, in Michigan, the following roles apply:

- County drain commissioners construct and manage county drains and also review subdivision plans to assure adequate drainage.
- County highway departments affect drainage in new developments by regulating connections to roadside drains and ditches.
- The State Department of Natural Resources regulates wetlands, dam construction, and floodplain alterations.
- The State Water Resource Commission issues permits for certain stormwater discharges when known water quality problems can be linked with a particular activity, (e.g., certain storm drains, animal feeding operations, industrial parking lots).
- Both the State Department of Public Health and county drain commissioners regulate drainage in proposed mobile home parks.
- County agencies and certain local governments issue erosion and sediment control permits for certain development sites.

Furthermore, there has been increasing emphasis upon the consideration of environmental factors in land use decisions. Recent amendments to the City or Village Zoning Act and the Township Rural Zoning Act have clarified the legal authority of local governments to complete site plan reviews for environmental management purposes. Standards for the review of land uses must be included in local ordinances and take natural resource preservation into account. The Michigan Environmental Protection Act (MEPA) (Act 127, P.A. of 1970) places a duty on all government agencies to prevent or minimize water pollution and other environmental problems while carrying on regular activities. Section 5(2) of MEPA addresses the actions of local officials in the following terms:

> In any ... administrative, licensing or other proceedings, and in any judicial review thereof, any alleged pollution impairment or destruction of the air, water or other natural resources or the public trust therein, shall be determined, and no conduct shall be authorized or approved which does, or is likely to have such effect so long as there is a feasible and prudent alternative consistent with the reasonable requirements of the public health, safety and welfare.

Environmental aspects of stormwater runoff may be addressed by local officials in response to MEPA.

None of the above laws specifically require local governments to undertake stormwater management programs. Instead, local governments have a wide range of possible roles available to them. Stormwater management planning programs can be directed toward the review of existing State and county programs affecting stormwater runoff and toward the evaluation of alternative roles for the local government.

Possible roles for local governments in stormwater management include the following:

- Planning - The term "stormwater management planning" refers to the process of developing policies, programs, regulations, and other recommendations to chart the future course of the community in terms of stormwater management. Such planning can address existing problems or help to avoid future problems and community expenses.

- Regulations - Stormwater runoff control for each site plan and subdivision plan can be reviewed and approved by the local government.

- Design and Construction - Storm drainage facilities (e.g., pipes, basins, areas for retention) can be designed and constructed by the local government. Purchase of lands to serve as community stormwater retention areas may also be undertaken.

- Inspection and Maintenance - Requirements for regular inspection and maintenance of stormwater facilities, including drains and retention or detention basins, may be enforced by

local governments. Requirements for easements are usually part of maintenance programs. Local governments may choose to undertake maintenance as a community service (such as a utility) or may require maintenance through contractual agreements with property owners.

The types of programs developed and the role assumed by a local government should, of course, reflect available financing options as well as program needs and management gaps.

FINANCIAL AND INSTITUTIONAL CONSIDERATIONS[2]

The traditional planning approach would ideally culminate in the successful implementation of a detailed design. In many cases, however, this objective is not accomplished due to financial and institutional constraints. Often a study team will fail to adequately consider such institutional and financial issues as who will manage the system and how will it be financed, thus creating a gap between technical planning and implementation. This omission is illustrated in Figure 4-2.

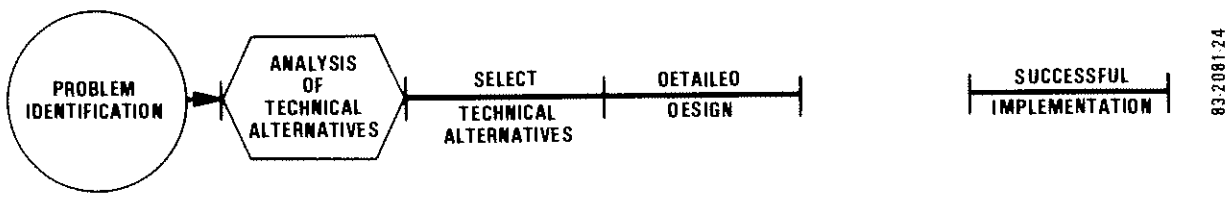

Figure 4-2. Incomplete Water Quality Planning

The implementation gap that results from the traditional planning approach has occurred all too often in attempts to control urban runoff.

As an illustration of the need to integrate financial and technical planning, consider the traditional process for developing a program to control construction runoff. A typical outcome of the process is a new ordinance. To reach this outcome, some of the issues that are normally considered from the technical perspective include:

- What are the technical construction requirements to be set out in the ordinance?
- What control measures will be required?
- How will compliance be monitored?

[2] This material is largely from the draft document, Planning for Urban Runoff Control: Financial and Institutional Issues, December 1981, prepared for FMAP by the Government Finance Research Center of the Municipal Finance Officers Association, Washington, D.C.

To balance the planning process, this technical analysis should be expanded to include financial and institutional issues such as:

- Does the city have legal authority to implement each requirement in an ordinance?

- How much will each cost, and who will pay for implementation of the control measures?

- Who will conduct compliance review, and who will pay for the reviews?

Numerous additional factors increase the need for financial and institutional analysis in all water quality management planning. Examples might include:

- Implementation of control programs occurs at the local level, and local budgets are being tightened as water quality expenditures compete with other local demands.

- Benefits from water quality projects are difficult to quantify and often accrue to people living downstream.

- It is becoming more difficult to obtain municipal funds through the bond market because of high interest rates.

- The cost of pollution controls is often sizable and difficult to allocate to specific polluters or beneficiaries.

These problems affect most areas of water quality management, but they are especially important in identifying and implementing solutions to urban runoff pollution.

Integrated Approach

An integrated planning approach helps water quality planners make the best control decisions in light of many complex issues. This approach takes the traditional planning process and adds to it financial and institutional elements at each step along the way. This integration is shown in Figure 4-3, with the traditional approach illustrated along the upper track and the financial and institutional elements added along the lower track.

During the early planning stages, financial and institutional issues are reviewed on a preliminary basis. This information becomes more detailed and refined as planning proceeds. Ultimately, the information forms the basis for a financial and institutional plan that supports the detailed design of a control alternative.

When very complex problems are being evaluated, it may be advisable to use a preliminary matrix early in the evaluation process for screening-out unacceptable alternatives. This approach permits a more detailed evaluation of issues surrounding the two or three best alternatives before a final selection is made. An example of a preliminary matrix is given in Figure 4-4.

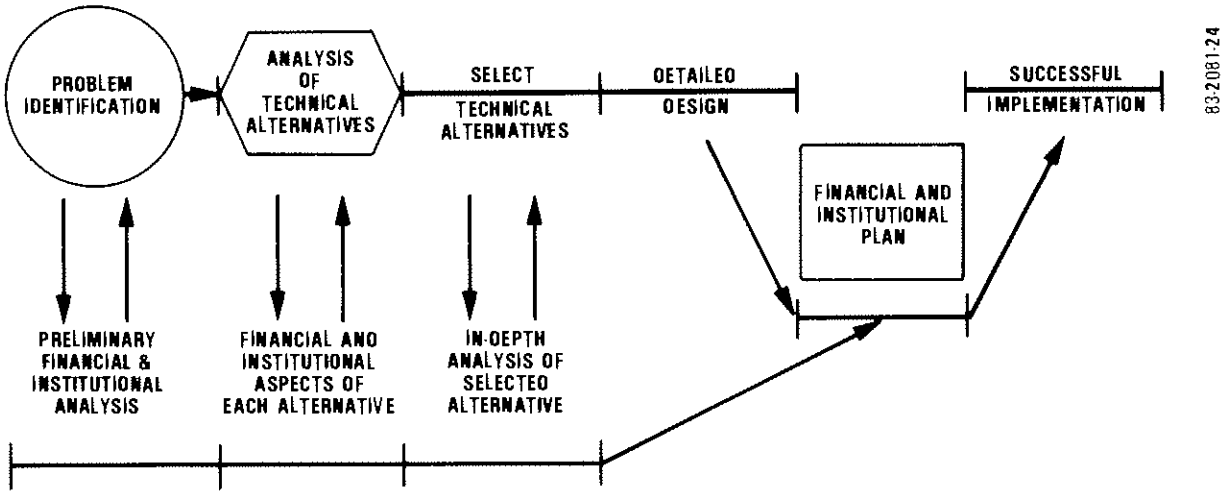

Figure 4-3. Integrated Water Quality Planning

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CONTROL APPROACH	TECHNICAL DESCRIPTION	EFFECTIVENESS IN CONTROLLING POLLUTION	FINANCIAL ISSUES		INSTITUTIONAL ISSUES
			NET PRESENT VALUE	ABILITY TO PAY	
• SEPARATE SEWERS	CONSTRUCT NEW STORM SEWERS IN COMBINED AREAS	100% EFFECTIVE IN ELIMINATING CSOs	$1 BILLION	EXCEEDS CITY'S BONDING CAPACITY	EXISTING INSTITUTIONS COULD HANDLE THE PROJECT
• SELECTIVE EXPANSION OF UNDERSIZED TRUNK SEWERS	REMOVE BOTTLENECKS, REDUCE NUMBER OF OVERFLOW EVENTS	50% EFFECTIVE	$200 MILLION	IF STAGED OVER 10 YEARS, COULD BE FINANCED BUT WOULD RESTRICT OTHER PROGRAMS	EXISTING INSTITUTIONS COULD HANDLE THE PROJECT
• CONSTRUCTION OF DETENTION BASINS	CONSTRUCT 10 DETENTION BASINS SIZED TO HOLD THE FIRST FLUSH FROM A STORM	30% EFFECTIVE	$50 MILLION	IF STAGED OVER 5 YEARS, COULD BE FINANCED; COULD RESTRICT OTHER PROGRAMS	NEW ORGANIZATION MIGHT BE NEEDED TO MAINTAIN AND AND OPERATE BASINS

Figure 4-4. Preliminary Matrix for Selection of a Control Approach (Combined Sewer Overflows)

Once a control approach is selected, a detailed design and a financial and institutional plan can be prepared. Figure 4-5 illustrates the major features of a financial and institutional plan. Key features of the detailed analysis required to prepare this plan are discussed in the following section.

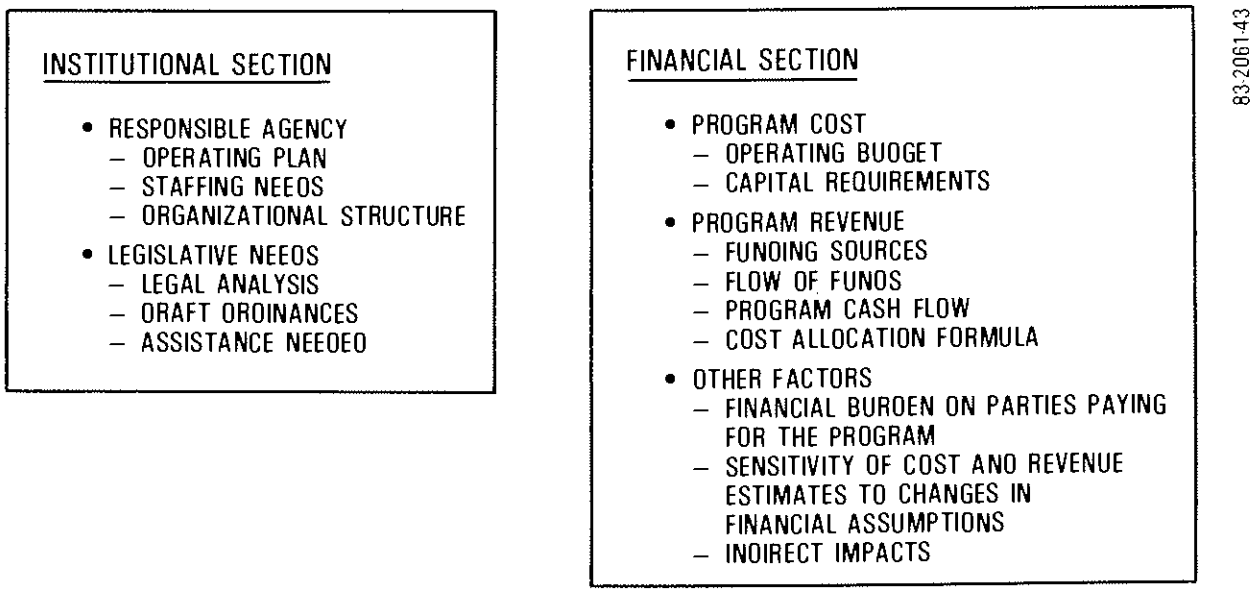

Figure 4-5. Major Components of a Financial and Institutional Plan

Key Financial and Institutional Elements

There are six essential elements[3] of financial and institutional analysis which provide a structure for the integrated planning process;

- institutional assessment,
- cost analysis,
- revenue analysis,
- ability-to-pay analysis,
- sensitivity analysis, and
- indirect impact analysis.

[3] These elements were first defined in Planning for Clean Water Programs: The Role of Financial Analysis, U.S. EPA's Financial Management Assistance Program by the Government Finance Research Center of the Municipal Finance Officers Association, September 1981.

Each of these elements threads through the planning process and becomes more definitive as the process proceeds. The following discussion defines each element and identifies its major features.

Institutional Assessment

The institutional assessment identifies the organizations or participating agencies that would be affected or involved in implementing a particular control program. The role of each entity in a program is evaluated with respect to its interest in solving the problem and its planning, management, operating, and regulatory capabilities. If the study team identifies an urban runoff problem, a preliminary institutional analysis can provide insight into capabilities of agencies that may be asked to play a role in the implementation and can, in some cases, aid in determining the types of technical alternatives that are analyzed.

The key factors to consider in evaluating an agency's capabilities are its statutory authority and organizational ability. In order to control urban runoff, an agency must have or be able to obtain the authority to implement a control measure. The authority of an agency can be assessed by thoroughly reviewing applicable federal, state, and local legislation. This review helps to determine which agency can best manage a given problem and highlights areas where additional legislation or local ordinances are needed.

Cost Analysis[4]

A cost analysis is performed to identify the additional capital, operational, maintenance, and administrative costs of each activity that is part of a control program. These costs are estimated for each agency responsible for an activity. Cost estimates are prepared in uninflated dollars (using today's cost for all projections into the future) and brought back to their present value (or present worth) for comparison among alternatives. The interest rate to be used in the present value analysis is the agency's current interest rate for borrowing funds minus the expected rate of inflation.[5]

Cost analysis of control alternatives is included in increasing detail in each step of the planning process. It begins with "ball park" estimates in early stages which are refined as the process progresses and finalized in the detailed financial plan.

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[4] A substantial part of this material is from a report, Collection of Economic Data from Nationwide Urban Runoff Program Projects, prepared for EPA by the Midwest Research Institute, 425 Volker Boulevard, Kansas City, MO 64110.

[5] For a further discussion of present value analysis, see pp 36 to 42 of Facilities Planning 1981, U.S. Environmental Protection Agency, FRD-20, 1981.

Cost estimates cannot be static. They are prepared on a preliminary basis when an alternative is first considered and detail is added as an alternative becomes more feasible. As the planning process progresses, estimates are updated on a regular basis to account for changing costs.

To update and improve available data on the costs of specific urban runoff BMPs, EPA conducted a program to guide, assist, and coordinate the efforts of selected NURP projects in gathering cost data on the BMPs and BMP systems which they were evaluating as part of the NURP national workplan. A report[6] was prepared to summarize the preliminary economic data submitted by the NURP projects. Economic data were submitted for street sweeping, detention basins, catch basin cleaning, ocean discharge control systems, and a public education/information program by nine projects. The data must be considered preliminary and subject to change, particularly annual operating cost data. Most of the capital cost data are well documented and represent the actual cost of the BMP control and will not change. The annual operating cost data, however, range from detailed analyses to estimates, and some of the data reported are incomplete. Since most of the projects were still in progress, incomplete operating cost data were to be expected.

The capital costs of street sweepers varied from $21,988 (in 1975) to $40,000 in 1981. The annual operating costs of street sweeping programs varied from $53,445 to $1,138,097. The unit cost varied from $16.80 to $45.45 per hour of operation, and from $5.95 to $23.36 per curb-mile swept. This wide range indicates that many variables affect the actual cost of operating a street sweeper.

The installed capital costs of recharge basins in Fresno, California, ranged from $933,750 to $5,587,000. BMP modifications to three detention basins in Oakland County, Michigan, cost $2,345 to $8,442. The installed capital cost of the modifications to the wet pond in the Lansing, Michigan project was $50,149. Construction of the wet pond in the Salt Lake County, Utah project cost $41,138; modifications to the dry pond included placing aluminum plates in an existing underdrain and installing a redwood outlet skimmer at a nominal cost of $371.

The annual operating costs of the Fresno, California, basins range from $1,625 to $7,975. The annual cost for the basin in Lansing, Michigan is incomplete and includes only the interest cost on a 7 percent, $38,500 bond used to help finance the project. The annual operating costs for the ponds in the Salt Lake County, Utah project were estimated at $560 for the wet pond and $200 for the dry pond.

The costs of the structural control alternatives to control discharge to the ocean in Myrtle Beach, South Carolina, were presented in detail and are valid estimates of the costs that will be incurred if one of them is constructed.

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6 Collection of Economic Data From Nationwide Urban Runoff Program Projects - Final Report, April 7, 1982, EPA Contract No. 68-01-5052. Detailed cost data provided by the projects are included in the appendices of this Report to show how the various projects prepared the data for submission.

The 1980 construction cost estimates ranged from $32,849,200 to $50,973,500, and the annual operating cost estimates ranged from $3,735,400 to $5,301,900. The cost of the public education program at Salt Lake County, Utah, was estimated at $1,550. The project will report the actual cost of the program upon its completion.

Revenue Analysis

The revenue analysis identifies the funding sources needed to match the estimated cost for control activities by participating agencies. This analysis is important because it ensures adequate funding to implement the technical solution to an urban runoff problem.

There are three categories of funding that are typically used to pay for runoff control: Federal and State funds, local public funds, and private funds. These sources include a variety of different financing mechanisms, each with advantages and disadvantages. The use of any or a combination of these sources requires consideration regarding:

- Revenue adequacy - Will funds be available in the long- and short-term?

- Equity - Are the beneficiaries of the control program paying their full share?

- Economic efficiency - Is the charge that is assessed equal to the social cost of the program?

- Administrative simplicity - Can the funds be managed and directed to the control program without significant administrative problems?

Ability-to-Pay Analysis

The ability-to-pay analysis evaluates the implementing agencies' and the individual user's ability to pay for the proposed program by determining how reasonable a proposed revenue program is in terms of its overall impact on the community as a whole as well as on individual residents.

For a given revenue source, the additional burden of the program is expressed as a percentage of the base costs. For example, if the proposed program is to be financed by property taxes and it adds $.50 to a $1,000 tax bill, the additional tax burden is .05 percent. In this instance, it would appear that the homeowner's ability to pay is quite high.

An important factor to remember is that programs to control urban runoff are not the only programs that are placing a burden on the people or institutions who must support them. Hence, the cost of a control program may not be excessive but cannot be imposed because ability to pay has already been exceeded due to other projects.

Sensitivity Analysis

The sensitivity analysis identifies the extent to which local ability to pay varies with changes in the assumptions used to estimate costs and revenues. Major assumptions that influence costs and revenues are: phasing of capital improvement, anticipated local funding requirements, rate of inflation, growth rate, and local fee policies.

The first step in this analysis is to determine a range of values for key cost and revenue assumptions that could occur during the program. (For example, inflation may vary between 5 percent and 15 percent.) The ability-to-pay analysis is then repeated using the high and low values for these assumptions. The final step is to evaluate the changes in burden with "best-" and "worst-" case situations in comparison with burden under the "most likely" assumption.

The purpose of this analysis is to identify control programs that are least vulnerable to changing conditions. It also helps to make the planner aware of best- and worst-case scenarios so that contingency plans can be developed to cope with such events.

Indirect Impact Analysis

The indirect impact analysis is an assessment of the costs and benefits that are not directly attributable to a proposed program. These costs and benefits can be economic, social, and/or environmental. Quantifying the indirect impacts of a program is usually quite difficult, so the planner generally resorts to qualitative measurement.

An Example: Planning an Educational Program

To illustrate further the process of identifying and resolving the financial and institutional issues connected with implementation of an urban runoff control program, the following spells out the steps involved in evaluating one control approach applicable in already developed areas. The example chosen is an educational program to inform citizens, industry, and public agencies of the problems caused by runoff-borne lawn and garden chemicals, oil and chemical residuals from industrial yards, and pesticides, herbicides, and fertilizer from parks and golf courses.

In this example, the activities would include: development of an informational brochure, including printing and distribution, and maintenance of an information center. In Figure 4-6, the institutional characteristics needed to accomplish these activities are compared with the capabilities of existing agencies. The matrix shows that the County Department of Pollution Control could provide the technical input to the Public Information Center to write the brochure. The Council of Governments might coordinate the effort and assume overall responsibilities for getting the job done.

INSTITUTIONAL CHARACTERISTICS NEEDED	AGENCIES					
	STATE	COUNCIL OF GOVERNMENTS	DEPARTMENT OF POLLUTION CONTROL	DEPARTMENT OF PLANNING	PUBLIC INFORMATION CENTER	CHAMBER OF COMMERCE
• COMMITMENT TO PROGRAM GOALS	*	*	*	*	*	*
• WORKING KNOWLEDGE OF EACH WASTE CONTRIBUTION TO THE RUNOFF PROBLEM	*	*	*	*		
• ABILITY TO WRITE CLEAR AND CONCISE INFORMATION FOR THE PUBLIC					*	
• ABILITY TO PRINT AND AND DISTRIBUTE BROCHURE				*		* DISTRIBUTE TO INDUSTRY
• STAFF TO RECEIVE FOLLOWUP CALLS		*				
• ABILITY TO ACCEPT FUNDS FROM SEVERAL AGENCIES TO PAY FOR THE PROGRAM		*				

83-2061-44

Figure 4-6. Institutional Assessment for Educational Program to Control Chemical Substances

Cost Analysis. Cost analysis determines the additional funds needed to implement a control alternative, including capital improvements and operation and maintenance. Additional administrative costs are less significant because most of these projects are undertaken by a public agency that is already performing the function to some extent.

Capital cost estimates are best prepared by the water quality planner with the assistance of the municipal engineer and in some cases his/her outside engineering advisor. These estimates identify all costs related to the purchase of a new facility or piece of equipment for a project and may require some research into vendor prices and bids on similar projects around the country. For programs which require changes to existing practices (street sweeping, etc.), the cost attributable to the water quality program is the incremental cost of the program.

Ultimately, the cost analysis is used to identify the least-cost method(s) for reducing pollution problems. It is important to remember that all costs associated with a given program must be considered. It is incorrect to assume that educational efforts, for example, are provided at no additional cost.

As an example of a cost analysis, a possible budget sheet for the educational program for the current year is presented in Figure 4-7.

ACTIVITIES	AGENCIES					
	STATE	COUNCIL OF GOVERNMENTS	DEPARTMENT OF POLLUTION CONTROL	DEPARTMENT OF PLANNING	PUBLIC INFORMATION CENTER	TOTAL
1. DEVELOP BROCHURE					$13,000	$13,000
2. PRINT BROCHURE				$1,500		$ 1,500
3. DISTRIBUTE BROCHURE				$ 800		$ 800
4. CONDUCT INFORMATIONAL MEETINGS	$2,000	$ 5,500	$2,000			$ 9,500
5. STAFF FOLLOWUP FOR PROGRAM		$24,000				$24,000
TOTAL	$2,000	$29,500	$2,000	$2,300	$13,000	$48,800

83-2061-45

Figure 4-7. Cost Analysis for Educational Program to Control Chemical, Herbicide, Fertilizer and Pesticide Runoff

Revenue Analysis. After the program cost estimate is prepared, the potential sources of revenue are analyzed. There are several critical factors in analyzing revenue for urban runoff programs including:

- Cost/Revenue Balance - Will the revenues be sufficient to cover the costs on an annual basis?

- Equitable Allocation of Costs to Different Groups - Do those who contribute to the problem pay their fair share? Do those who benefit from the program pay their fair share?

- Revenue Agreement - Do groups understand their participation in a program and its revenue formula? Have written agreements which define the cost allocation procedure been prepared ?

Revenue analysis will vary with the type of control approach selected. The critical factor in the revenue analysis is the identification of each entity that will provide revenues and the development of an understanding by that entity of the problem, the control approach, and its share of the cost.

Ability-to-Pay Analysis. Most of the costs to control runoff from developed areas are imposed on the general public or the benefiting population as a new and additional governmental expense. The ability-to-pay analysis evaluates this increased burden on the local community as a percentage of property taxes, average income, property evaluation, or other appropriate measures.

Figure 4-8 illustrates an ability-to-pay analysis for the educational program example. The key parameters to determine homeowners' ability to pay in this case are the cost of the program per household, cost as a percentage of average annual household income, and cost as a percentage of property taxes.

A. TOTAL PROGRAM COST (ONE-YEAR PROGRAM)	$48,000	
B. NUMBER OF HOUSEHOLOS AFFECTEO	19,000	
C. COST PER HOUSEHOLO (A OIVIOEO BY B)		$2.57
O. MEOIAN HOUSEHOLO INCOME	$14,700	
E. COST AS A % OF MEOIAN HOUSEHOLO INCOME (C OIVIOEO BY O TIMES 100)		.02%
F. AVERAGE ANNUAL PROPERTY TAXES	$ 1,200	
G. COST AS A % OF PROPERTY TAXES (C OIVIOEO BY F TIMES 100)		.21%

CONCLUSION: PROGRAM APPEARS TO NOT PLACE EXCESSIVE BUROEN ON LOCAL HOMEOWNERS

83-2061-46

Figure 4-8. Ability to Pay Analysis for Educational Program to Control Chemical, Herbicide, Fertilizer and Pesticide Runoff

Sensitivity Analysis. The sensitivity analysis will vary depending upon the revenue mechanism and program selected for implementing a proposed program. The most common revenue mechanisms for programs controlling runoff from developed areas are general funds and fees. Analyzing the sensitivity of general revenues requires a review of past collections relative to key parameters--inflation, housing starts, collection rates, capital improvements, and so on. Collections are then projected for worst and best case scenarios.

An additional consideration in the sensitivity analysis is revenue requirements. This relates to phasing a program, either handling capital improvements or starting a program on a limited basis with expansion to come in later years. For any one program, numerous options exist for staggering cash flows, and different scenarios should be developed to assess their impact on the program as part of the sensitivity analysis.

Indirect Impact. The indirect impact of a runoff control program for developed areas are extremely difficult to quantify. Educational programs will raise community awareness regarding the impacts of local activities on water pollution. Other indirect impacts from control programs may relate to recreational benefits, local improvements in quality of life, and increased tourism.

RELATIONSHIP BETWEEN NURP AND WQM PLANS

Of the locations selected for projects under the NURP effort, some 80 percent had state-approved (i.e., certified by the Governor) water quality management (WQM) plans with elements which addressed urban runoff. For 5 of these locations, the NURP project constituted the urban runoff element of the plan. For the other locations, however, the original 208 effort was unable to develop the necessary information on either water quality effects or performance of best management practices (BMPs) to justify structuring formal implementation plans for urban runoff control. Consequently, the typical WQM plan elements dealing with urban runoff identified the need for further study, usually specifying problem assessment and BMP performance evaluation. These elements became the focal points of the activities funded by NURP.

The WQM plans for the remaining 20 percent of the locations which participated in the NURP program did not contain a specific urban runoff element. Presumably this was due to time and resource constraints in relation to other issues which were assigned higher priorities in planning efforts. In these cases, the NURP projects provided the opportunity to address a water quality issue not adequately addressed in the original 208 planning studies.

Over two-thirds of the NURP project locations reported that NURP findings and recommendations have or will be incorporated in the next annual update of their formal WQM plans. The remainder generally indicate that they expect the planning issues to be addressed at the local level or that NURP results will support planning and implementation activities, even though they do not anticipate formal incorporation in WQM plans at this time.

Over half of the NURP project locations report either active or planned implementation efforts based on the results of NURP. Thirty percent indicated that no implementation is being planned because the need for or value of urban runoff control was not demonstrated. The balance (20 percent) of the NURP locations suggest that while implementation activities are not currently planned, they expect NURP results to influence future deliberations on this issue.

CHAPTER 5
METHODS OF ANALYSIS

INTRODUCTION

This chapter identifies and briefly discusses the methods adopted to assemble and analyze the large data base developed by the NURP projects and also provides the methods employed to develop and interpret results. The chapter is structured according to the three prime areas of program emphasis; (1) characteristics of pollutants in urban runoff, (2) water quality effects of urban runoff discharges including water quality criteria/standards violations and impairment or denial of beneficial uses of receiving water bodies, and (3) the effectiveness of control measures to reduce pollutant loads.

The procedures employed in this assessment were designed to provide generalized results and findings about urban runoff issues of interest for nationwide use. This national perspective, and the need to consider the fundamental variability of urban runoff processes, has prompted some significant advancements in the application of statistical methods and models. The basic methods used were, however, largely developed under different EPA efforts, many under the sponsorship of the Office of Research and Development, or other programs. In some cases, similar or equivalent procedures were applied in individual NURP projects; in other cases, methods adopted by individual projects in response to local needs and interests were different. Where possible, comparisons have been made between either detailed results, or conclusions drawn from such results, as derived from both local and national perspectives.

The descriptions provided in this chapter are brief and intended to communicate the technical framework upon which the results and conclusions are based. More detailed information on the methods and techniques are contained in other documents developed by NURP. Pertinent NURP reports cover, in separate volumes, probabilistic methods for analyzing water quality effects, detention and recharge basins for control of urban stormwater quality, and street sweeping for control of urban stormwater quality. The Data Management Procedures Manual, another of the project documents, is an additional source of information on details of the analysis methods utilized.

Because field measurements and sampling formed one of the most important information sources, it was essential that the monitoring and analysis programs produce consistent and sound data. Accordingly, NURP required that all projects adopt Quality Assurance/Quality Control elements as integral parts of their work plans. Key components of these plans include the following:

- Program Coordination. Projects were required to designate a QA/QC coordinator, responsible for the entire QA/QC effort.

- Field Quality Assurance. Guidance was provided to the projects for all key aspects of the data collection process.

- Laboratory Quality Assurance. A manual prepared by EPA's Environmental Monitoring and Support Laboratory was provided to all projects and contained analytical quality control information.

- Data Management. A manual entitled "Data Management Procedures" was provided to all projects and covered such topics as data formatting, data reduction, and some analysis.

- Data Analysis. To encourage innovative approaches and responsiveness to local conditions, uniform methods of data analysis were not stressed. Technical guidance and mandatory review of analytical procedures were provided.

I RUNOFF POLLUTANT CHARACTERISTICS

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stantial component of the individual NURP projects was the acquisition subsequent analysis) of a data base for a number of storm events, con- ng of precipitation and the resulting quantity and quality of runoff a number of local urban catchments. One of the principal EPA objectives e analysis of these data has been to develop a concise summary of the cteristics of urban runoff. There are a number of questions concerning runoff characteristics which need to be addressed for water quality ing purposes, including what are the appropriate measures of the statis- characteristics of urban runoff (e.g., population distribution, central icy, variability, etc.)? Do distinct subpopulations exist and what are characteristics? Are there significant differences in data sets ed according to locations around the county (geographic zones), land season, rainfall amount, etc.? How may these variations be recognized? s the most appropriate manner in which to extrapolate the existing data to locations for which there are no or limited measurements? Though questions cannot be fully answered given the current state of knowledge ning urban runoff, these are the types of issues addressed by the ls described in this chapter and the results presented in Chapter 6.

rincipal thrust of the individual NURP projects, and thus this nation- assessment report, was the characterization of what has been adopted as lard Pollutants" of primary concern in urban runoff. These include , oxygen consuming constituents, nutrients, and a number of the more ly encountered heavy metals. The methods used to characterize these rd pollutants are described under a separate heading below.

roximately two-thirds of the NURP projects the occurrence of compounds s list of "Priority Pollutants" was investigated. This program element so described under a separate heading below. A number of additional have also been addressed in the program. These are briefly discussed

below because they relate closely to the general issue of pollutant characteristics. These include the following:

- Soluble vs Particulate Pollutant Forms. The distribution of soluble and particulate forms of a pollutant in urban runoff (particularly metals and nutrients) was examined in both the standard conventional pollutant and priority pollutant aspects of the study because certain beneficial use effects depend strongly on the form in which the contaminant is present. The priority pollutant program additionally determined "Total Recoverable" fractions, corresponding to contaminant forms used in EPA's published toxic criteria guidelines.

- Coliform Bacteria. Fecal coliform bacteria counts (and in some cases total coliform and fecal streptococcus as well) in urban runoff were monitored during a significant number of storms by seven of the NURP projects. Though the data base for bacteria is restricted, useful results are provided in Chapter 6.

- Wetfall/Dryfall. As part of program elements designed to examine sources of pollutants in urban runoff, a number of projects operated atmospheric monitoring stations for characterizing pollutant contributions from precipitation (wetfall) and from dry weather deposition (dryfall). Results of this work are reported in individual project reports and not included herein.

Standard Pollutants

The following constituents were adopted as standard pollutants characterizing urban runoff:

TSS - Total Suspended Solids
BOD - Biochemical Oxygen Demand
COD - Chemical Oxygen Demand
TP - Total Phosphorus (as P)
SP - Soluble Phosphorus (as P)
TKN - Total Kjeldahl Nitrogen (as N)
NO_{2+3}-N - Nitrite + Nitrate (as N)
Cu - Total Copper
Pb - Total Lead
Zn - Total Zinc

The list includes pollutants of general interest which are usually examined in both point and nonpoint source studies and includes representatives of important categories of pollutants--namely solids, oxygen consuming constituents, nutrients, and heavy metals.

The pollutant concentrations found in urban runoff vary considerably, both during a storm event, as well as from event to event at a given site and from site to site within a given city and across the country. This variability is the natural result of high variations in rainfall intensity and occurrence,

geographic features that affect runoff quantity and quality, and so on. Considering this situation, a measure of the magnitude of the urban runoff pollution level and methods for characterizing its variability were needed. The event mean concentration (EMC), defined as the total constituent mass discharge divided by the total runoff volume, was chosen as the primary measure of the pollutant load. The rationale for adopting the EMC for characterizing urban runoff is discussed in the receiving water effects section of this chapter as well as in subsequent chapters. Event mean concentrations were calculated for each event at each site in the accessible data base. If a flow-weighted composite sample was taken, its concentration was used to represent the event mean concentration. Where sequential discrete samples were taken over the hydrograph, the event mean concentration was determined by calculating the area under the loadograph (the curve of concentration times discharge rate over time) and dividing it by the area under the hydrograph (the curve of runoff volume over time). Details of the calculation procedure have been described in the Data Management Procedures Manual. For the purpose of determining event mean concentrations, rainfall events were defined to be separate precipitation events when there was an intervening time period of at least six hours without rain.

A statistical approach was adopted for characterizing the properties of EMCs for standard pollutants. Standard statistical procedures were used to define the probability distribution, central tendency (a mean or median) and spread (standard deviation or coefficient of variation) of EMC data. EMC data for each pollutant from all storms and monitoring sites were complied in a central data base management system at the National Computer Center. The SAS computer statistical routines and other standard statistical methods were used to explore and characterize the data. The statistical methods used are, for the most part, not explained in this report since these are readily available in the literature. Nor are the operations of the SAS routines, which are available at most computer centers.

The underlying probability distribution of the EMC data was examined and tested by both visual and statistical methods. With relatively few isolated exceptions, the probability distribution of EMCs at individual sites can be characterized by lognormal distributions. Given this, concise characterization of the variable urban runoff characteristics at each of the sites is defined by only two values, the mean or median and the coefficient of variation (standard deviation divided by mean). Because the underlying distributions are lognormal, the appropriate statistic to employ for comparisons between individual sites or groups of sites is the median value, because it is less influenced by the small number of large values typical of lognormal distributions and, hence, is a more robust measure of central tendency. However, for comparisons with other published data which usually report average values and for certain computations and analyses (e.g., annual mass loads), the mean value is more appropriate.

Relationships among a number of statistical properties of interest are easily determined when distributions are lognormal. Figure 5-1 illustrates some relationships for lognormal distributions. In (a) the frequency distributions of two variable data sets which are log-normal and have the same median are shown. The log transforms of the data result in normal bell

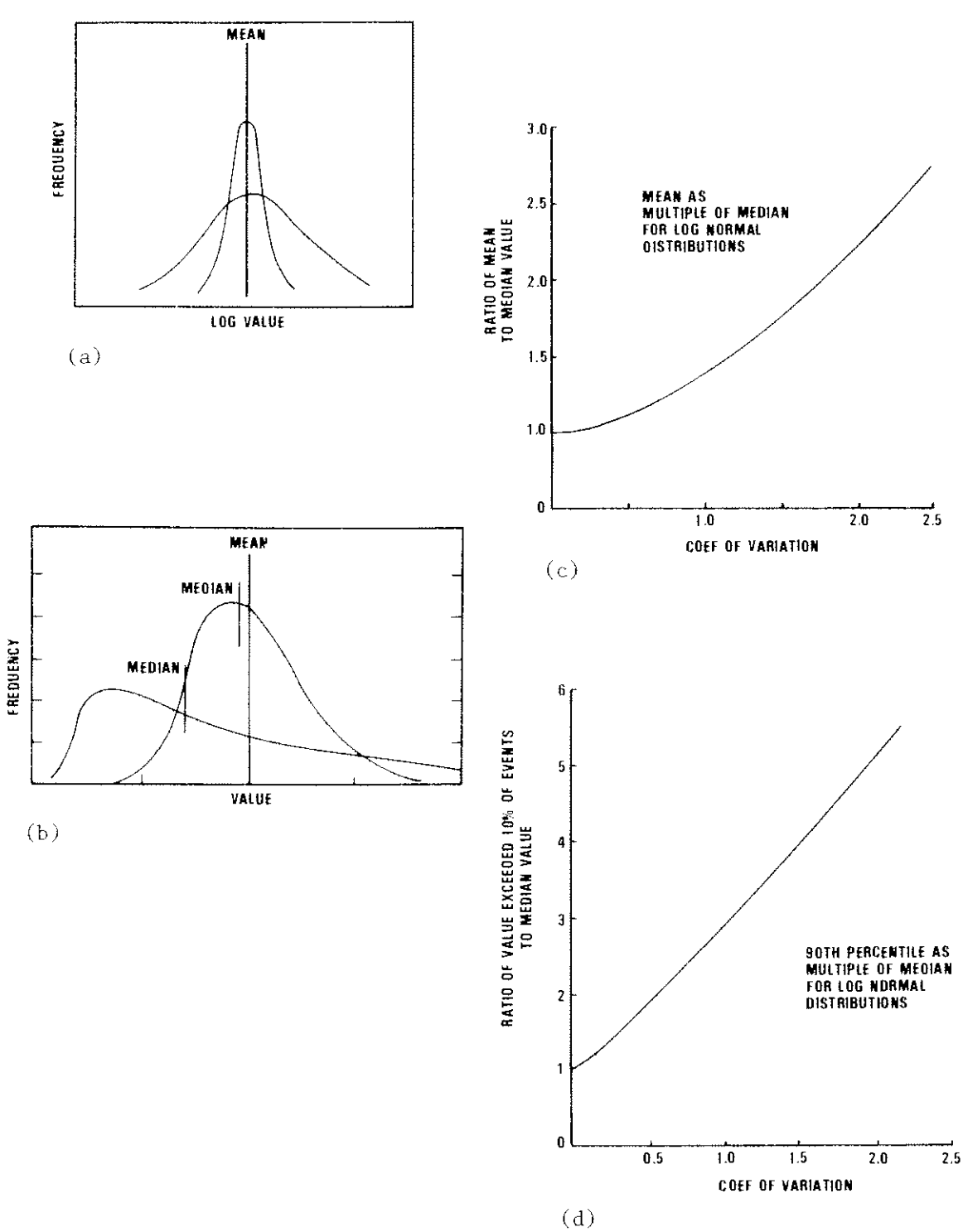

Figure 5-1. Lognormal Distribution Relationships

shaped distributions; more variable data (higher coefficient of variation) result in a greater spread. Frequency histograms prepared using untransformed data values produce skewed distributions, as shown by (b) which illustrates two data sets which have the same arithmetic mean. The effect of coefficient of variation is shown as well as the relation between mean and median for lognormal distributions. An established relationship exists between median and mean, as shown by (c) and described by:

$$\frac{\text{Mean}}{\text{Median}} = \sqrt{1 + (\text{Coef Var})^2}$$

When a distribution is known to be lognormal the best estimate of the population mean is that derived from the lognormal relationships. For small samples it can be expected to be different than the result of a straight arithmetic averaging of sample data; the two estimates of the mean will give similar values when the number of samples is very large.

In addition, the expected value at any probability or frequency of occurrence (X_α) can be determined by:

$$X_\alpha = \exp\ (\mu_{lnx} + Z_\alpha\ \sigma_{lnx})$$

where:

Z_α = the standard normal probability

μ_{lnx} = mean of log-transformed data

σ_{lnx} = standard deviation of log-transformed data

X_α can be expressed as a ratio to the median value by the following equation which defines the ratio in terms of the coefficient of variation

$$\frac{X_\alpha}{\text{Median}} = \exp\ (Z_\alpha \sqrt{\ln\ (1 + (\text{Coef Var})^2)}).$$

This relationship is shown by (d) for 90th percentile values (10 percent exceedance, $Z_\alpha = 1.2817$).

The establishment of the fundamental distribution as lognormal, and the availability of a sufficiently large sample population of EMCs to provide reliable derived statistics, has a number of benefits:

- Concise summaries of highly variable data can be developed.
- Comparisons of results from different sites, events, etc., are convenient and are more easily understood.

- Statements can be made concerning frequency of occurrence. One can express how often values will exceed various magnitudes of interest.

- A more useful method of reporting data than the use of ranges is provided; one which is less subject to misinterpretation.

- A framework is provided for examining "transferability" of data in a quantitative manner.

Priority Pollutants

In cooperation with EPA's Monitoring and Data Support Division (MDSD), a special study element was built into two-thirds of the NURP projects (20 of 28) to identify which of the compounds on EPA's list of "Priority Pollutants" are found in urban runoff, and the concentrations at which they occur. The base effort collected 121 samples of urban runoff which were analyzed for priority pollutants. A supplementary special metals study secured 147 samples. Methods utilized in this study element are described in the following report which covers this activity:

> "NURP Priority Pollutant Monitoring Project: Summary of Findings", December 1983; EPA Monitoring and Data Support Division, Office of Water Regulations and Standards, Washington, D.C.

In addition to the above special study, as previously mentioned, most NURP projects monitored selected heavy metals (principally total copper, total lead, and total zinc) in their routine monitoring programs. Summaries of these data are presented in Chapter 6.

Hydrometeorological Statistics

Consistent with the adoption of a storm "event" as the fundamental time scale used in the analysis of data and the interpretation of effects, rainfall data were analyzed to define "event" statistics for a significant number of locations throughout the country. The SYNOP program was employed for developing the statistical parameters of rainfall intensity, duration, volume, and interval between storm events. This program has been detailed in the NURP "Data Management Procedures Manual."

In addition to rainfall, rainfall-runoff relationships were characterized for monitored storm events. The runoff coefficient, defined as the ratio of runoff volume to rainfall volume, was computed, and effects of such catchment characteristics as land use and imperviousness were investigated. Long-term streamflow records for numerous stations across the country were also analyzed to characterize regional trends.

RECEIVING WATER QUALITY EFFECTS

General

A number of individual NURP projects examined the site-specific impacts of urban runoff on water quality for a variety of beneficial uses and receiving

water types. These results provide important information on the extent to which urban runoff constitutes a "problem" as well as "ground truth" measurements against which more generalized techniques can be compared. Methodologies employed in these local studies vary and are described in the individual project reports. Relevant site-specific project results are cited in Chapter 9.

Receiving water impact analyses cannot be readily generalized because there is a high degree of site-specificity to the important factors. The type of beneficial use dictates the pollutants which are of principal concern; the type of water body (e.g., stream, lake, estuary) determines how receiving water quality responds to loads; and physical characteristics (e.g., size, geometry, flows) have a major influence on the magnitude of response to a particular load.

Despite the inherent limitations of a set of generalized receiving water impact analyses, a screening level analysis was considered a necessary element for a nationwide assessment of the general significance of urban runoff in terms of water quality problems, especially adverse effects on beneficial uses. Accordingly, a set of analysis methodologies were adopted and utilized as screening techniques for characterizing water quality effects of urban runoff loads on receiving water bodies. A key requirement was to delineate the severity of water quality problems by quantifying the magnitude, and in the case of intermittent loads, the frequency of occurrence of water quality impacts of significance. These procedures are identified and described briefly below. Significant technical aspects are detailed further in the supplementary NURP report which addresses the receiving water impact analysis methodology.

It was not possible to perform a "National Assessment" in the usual sense of the term. NURP has determined that it is not realistic (if the basis is effect on beneficial use of a water body) to estimate the total number of water quality problem situations in the nation which result from urban stormwater runoff or the cost of control which would ultimately result. The available analysis methods do permit an assessment of a different kind. NURP applied the analysis procedures as a screening type analysis to define the conditions under which problems of different types are likely or unlikely to occur. From the results of these screening analyses, NURP has drawn inferences and made general statements (Chapters 7 and 9) on the significance of urban runoff. Where it has been possible or practical to do so, these general screening analyses were applied to local situations which exist within certain of the individual NURP projects. Comparisons were made between specific water quality effects or broader conclusions relative to problems derived from both local analysis and general screening methods.

Time Scales of Water Quality Impacts

There are three types of water quality impacts associated with urban runoff. The first type is characterized by rapid, short-term changes in water quality during and shortly after storm events. Examples of this water quality impact include periodic dissolved oxygen depressions due to oxidation of contaminants, or short-term increases in the receiving water concentrations of one

or more toxic contaminants. These short-term effects are believed to be an important concern and were the prime focus of the NURP analysis.

Long-term water quality impacts, on the other hand, may be caused by contaminants associated with suspended solids that settle in receiving waters and by nutrients which enter receiving water systems with long retention times. In both instances, long-term water quality impacts are caused by increased residence times of pollutants in receiving waters. Other examples of the long-term water quality impacts include depressed dissolved oxygen caused by the oxidation of organics in bottom sediments, biological accumulation of toxics as a result of up-take by organisms in the food chain, and increased lake entrophication as a result of the recycling of nutrients contributed by urban runoff discharges. The long-term water quality impacts of urban runoff are manifested during critical periods normally considered in point source pollution studies, such as summer, low stream flow conditions, and/or during sensitive life cycle stages of organisms. Since long-term water quality impacts occur during normal critical periods, it is necessary to distinguish between the relative contribution of urban runoff and the contribution from other sources, such as treatment plant discharges and other nonpoint sources. A site-specific analysis is required to determine the impact of various types of pollutants during critical periods, and this aspect of urban runoff effects was not addressed in detail in NURP.

A third type of receiving water impact is related to the quantity or physical aspects of flow and includes short-term water quality effects caused by scour and resuspension of pollutants previously deposited in the sediments. This category of impact was not addressed by NURP, in general, although one project provides some information.

As indicated previously, the first type of change in water quality associated with discharges from urban runoff is characterized by short-term degradation during and shortly after storm events. The rainfall process is highly variable in both time and space. The intensity of rainfall at a location can vary from minute to minute and from location to location. Phenomena which are driven by rainfall such as urban runoff and associated pollutant loadings are at least as variable. Short term measurements, on a time scale of minutes, to define rainfall, the runoff flow hydrograph, and concentrations of contaminants (pollutographs) feasibly can be taken at only a rather limited number of locations. These measurements have usually been employed in an attempt to refine or calibrate calculation procedures for estimating runoff flows and loads. Most urban areas contain a network of drainage systems which collect and discharge urban runoff into one or more receiving water bodies. Since the rainfall, runoff, and pollutant loads vary in both time and space, it is impossible to determine by calculation or measurement the very short time scale (minute-to-minute) changes in water quality of a receiving water and assign the changes to specific sources of runoff. Although very short duration exposures (on the order of minutes) to very high concentrations of toxics can produce environmental damage (mortality or sublethal effects) to aquatic organisms, it is likely that exposures on the order of hours have the highest possibility of causing adverse environmental impacts. This results, in part, from the smoothing obtained by mixing numerous sources which have high frequency (short-term) variability.

In view of the above discussion, the time scale used by NURP for analysis of short-term receiving water impacts is the rainfall event time scale which is on the order of hours. To represent the average concentration of pollutants in urban runoff produced during such an event, NURP used the event mean concentration.

Criteria/Standards and Beneficial Use Effects

As discussed in previous chapters, three definitions have been adopted to assess receiving water problems associated with urban runoff; (1) impairment or denial of beneficial use, (2) violation of numerical criteria/standards, and (3) local perception of a problem. The procedures and methods employed in the NURP assessment focus on the first two problem definitions. A framework for identifying target receiving water concentrations associated with the criteria standards and beneficial use problems are provided below. The third problem type, local perception of a problem and degree of concern cannot be addressed by these quantitative procedures.

The analysis methods employed make it possible to project water quality effects caused by intermittent, short-term urban runoff discharges. Where appropriate, these effects are expressed in terms of the frequency at which a pollutant concentration in the water body is equalled or exceeded. However, if the basis for determining the significance of such water quality impacts (and hence the need for control) is taken to be the effect such receiving water concentrations have on the impairment or denial of a specific beneficial use, then it is necessary to go one step further. A basis is required for judging the degree to which a particular water quality impact constitutes an impairment of a beneficial use. With intermittent pollutant discharges, effects are variable and are best expressed in terms of a probability distribution from which estimates can be made of the frequency with which effects of various magnitude occur.

There is a rather broad consensus that existing water quality criteria, and water uses based on such criteria, are most relevant when considered in terms of continuous exposures (ambient conditions). Even where continuous discharges are involved, there has been discussion and debate as to whether a particular criterion should be interpreted as some appropriate "average" condition or a "never-to-exceed" limit. The basic issue is whether the more liberal interpretation will provide acceptable protection to the beneficial use for which the criterion in question has been developed. The only reason such distinctions become an issue is because the practical feasibility or relative economics, or both, are sufficiently different that one is encouraged to question whether the more restrictive interpretation is overly (or even excessively) conservative in terms of providing protection for the associated beneficial use.

The issue (i.e., whether traditional ambient criteria are excessively conservative measures of conditions which provide reasonable assurances of protection for a beneficial use when exceeded only intermittently) is particularly appropriate in the case of urban storm runoff. Analysis of rainfall records for a wide distribution of locations in the nation indicates that, even in the wetter parts of the country, urban runoff events occur only

about 10 percent of the time. There are regional and seasonal differenc but typical values for annual average storm characteristics in the east half of the United States are:

	Average (Hours)	Median (Hours)	90th Percentile (Hours)
Storm Duration	6	4.5	15
Interval Between Storm Mid-Points	80	60	200

These estimates are based on results from an analysis of long-term rainfa records for 40 cities throughout the country. Median and 90th percenti values are derived from data mean and variance based on a gamma distributic which has been shown to characterize the underlying distribution of stc event parameters quite well.

In the semi-arid regions of the western half of the country, average stc durations tend to be comparable to the above, but average intervals betwe successive storms increase substantially (two to four fold) and are high seasonal. With urban storm runoff, therefore, one is dealing with polluta discharges which occur over a period of a few hours every several days more or after long dry periods. In advective rivers and streams, the wat mass influenced by urban runoff tends to move downstream in relatively di crete pulses. Because of the variability in the magnitude of the pollute loads from different storm events, only a small percentage of these puls have high pollutant concentrations.

There are currently no formal "wet weather" criteria and, thus, no general accepted way intermittent exposures having time scale characteristics typic of urban runoff can be related to use impairment. In the belief that would be inappropriate to ignore such considerations in a general evaluati of urban runoff, NURP has developed estimates for concentration levels whi result in adverse impacts on beneficial use when exposures occur intermi tently at intervals/durations typical of urban runoff. These "effec levels" were used to interpret the significance of the variable, intermitte water quality impacts of urban runoff. It should be understood that the effects levels do not represent any formal position taken by EPA, but a simply the most reasonable yardsticks available to meet the immediate nee of the evaluation of urban runoff. As used in the screening analysis proc dures, alternative values for "effects levels" may be readily substitut when either more accurate estimates can be made, or more (or less) conserv tive approaches are indicated in view of the importance of a particular wat body or beneficial use.

Table 5-1 summarizes information on water quality criteria for a number contaminants routinely found in urban storm runoff. The data present include:

- Water quality criteria for substances on EPA's priority pollutant list (45 FR No. 79318, 11/28/80). These criteria provide

TABLE 5-1. SUMMARY OF RECEIVING WATER TARGET CONCENTRATIONS USED IN SCREENING ANALYSIS - TOXIC SUBSTANCES
(ALL CONCENTRATIONS IN MICROGRAMS/LITER, µg/ℓ)

Contaminant	Water Hardness mg/l (as Ca CO_3)	Freshwater Aquatic Life		Saltwater Aquatic Life		Human Ingestion	Estimated Effect Level For Intermittent Exposure	
		24 Hour	Max	24 Hour	Max	(1)	Thresh-hold	Significant Mortality
Copper	50	5.6	12	4.0	23	NP	20	50 - 90
	100	5.6	22	4.0	23		35	90 - 150
	200	5.6	42	4.0	23		80	120 - 350
	300	5.6	62	4.0	23		115	265 - 500
Zinc	50	47	180	58	170	NP	380	870 - 3,200
	100	47	321	58	170		680	1,550 - 4,500
	200	47	520	58	170		1,200	2,750 - 8,000
	300	47	800	58	170		1,700	3,850 - 11,000
Lead	50	0.75	74				150	350 - 3,200
	100	3.8	172	(25)	(670)	50.0	360	820 - 7,500
	200	12.5	400				850	1,950 - 17,850
	300	50.0	660	(C)	(A)		1,400	3,100 - 29,000
Chrome (+3)	50		2,200					
	100	(44)	4,700	N.P.	(10,300)	170.00	8,650	
	300	(C)	15,000		(A)			
Chrome (+6)	-	0.29	21.0	18	1260	50.0		
Cadmium	50	0.01	1.5				3	7 - 160
	100	0.02	3.0	4.5	59.0	10	6.6	15 - 350
	300	0.06	9.6				20	45 - 1,070
Nickel	50	56	1,090					
	100	96	1,800	7.1	140.0	13.4		
	300	220	4,250					

NOTES:

- NP = No criteria proposed.
- Some toxic criteria are related to Total Hardness of receiving water. Where this applies, several values are shown. Other values may be calculated from equations presented in EPA's Criteria Document (Federal Register, 45,231, November 28, 1980). Where a single value is shown, water hardness does not influence toxic criteria.
- Concentration values shown within parentheses ( ) are not formal criteria values. They reflect either chronic (C) or acute (A) toxicity concentrations which the EPA toxic criteria document indicated have been observed. Values of this type were reported where the data base was insufficient (according to the formally adopted guidelines which were used in developing the criteria) for EPA to develop 24 hour and Max values.
- Note (1): The "Human Ingestion" criteria developed by the EPA Toxic Criteria documents are indicated to relate to ambient receiving water quality. The Drinking Water Criteria relate to finished water quality at the point of delivery for consumption.
- Estimated Effects levels reflect estimates of the concertration levels which would impair beneficial uses under the kind of exposure conditions which would be produced by Urban Runoff. They are an estimate of the relationship between continuous exposure and intermittent, short duration exposures (several hours once every several days). Threshold concentrations are those estimated to cause mortality of the most sensitive individual of the most sensitive species.

  Significant Mortality concentrations are shown as a range which reflects 50 percent of the most sensitive species and mortality of the most sensitive individual of the 25th percentile species sensitivity.

an extensive set of numerical values derived from bioassay studies.

- Estimates of "effects levels" which are suggested by NURP analysis to be relevant for the intermittent exposures characteristic of urban runoff.

By incorporating the numerical values for EPA's ambient water quality criteria and the concentration levels suggested by NURP for intermittent effects in the same table (or on the same graph in Chapter 7), a convenient, concise comparison is provided of the practical implications of applying one or the other as the yardstick for judging the protection or impairment of water use. The two sets of numerical values thus provide measures for two of the three options for defining a problem: violation of criteria or actual impairment of a beneficial use.

Comparison of the pollutant concentrations in urban runoff showing the frequency and magnitude of exceedance of ambient criteria and intermittent effects levels provides a qualitative sense of the control requirements (and implications regarding costs) attendant on the adoption of either problem definition as the operative one.

Rivers and Streams

The approach adopted to quantify the water quality effects of urban runoff for rivers and streams focuses on the inherent variability of the runoff process. What occurs during an individual storm event is considered secondary to the overall effect of a continuous spectrum of storms from very small to very large. Of basic concern is the probability of occurrence of water quality effects of some relevant magnitude.

To consider the intermittent and variable nature of urban runoff, a stochastic approach was adopted. The method involves a direct calculation of receiving water quality statistics using the statistical properties of the urban runoff quality and other relevant variables. The approach uses a relatively simple model of the physical behavior of the stream or river (as compared to many of the deterministic simulation models). The results are therefore an approximation, but appropriate as a screening tool.

The theoretical basis of the technique is quite powerful as it permits the stochastic nature of runoff process to be explicitly considered. Application is relatively straightforward, and the procedure is relevant to a wide variety of cases. These attributes are particularly advantageous given the national scope of the NURP assessment. The details of the stochastic method are summarized and presented below.

Figure 5-2 contains an idealized representation of urban runoff discharges entering a stream. The discharges usually enter the stream at several locations but are considered here to be adequately represented by an equivalent discharge flow which enters the system at a single point.

Receiving water concentration (CO) is the resulting concentration after complete mixing of the runoff and stream flows and is interpreted as the mean

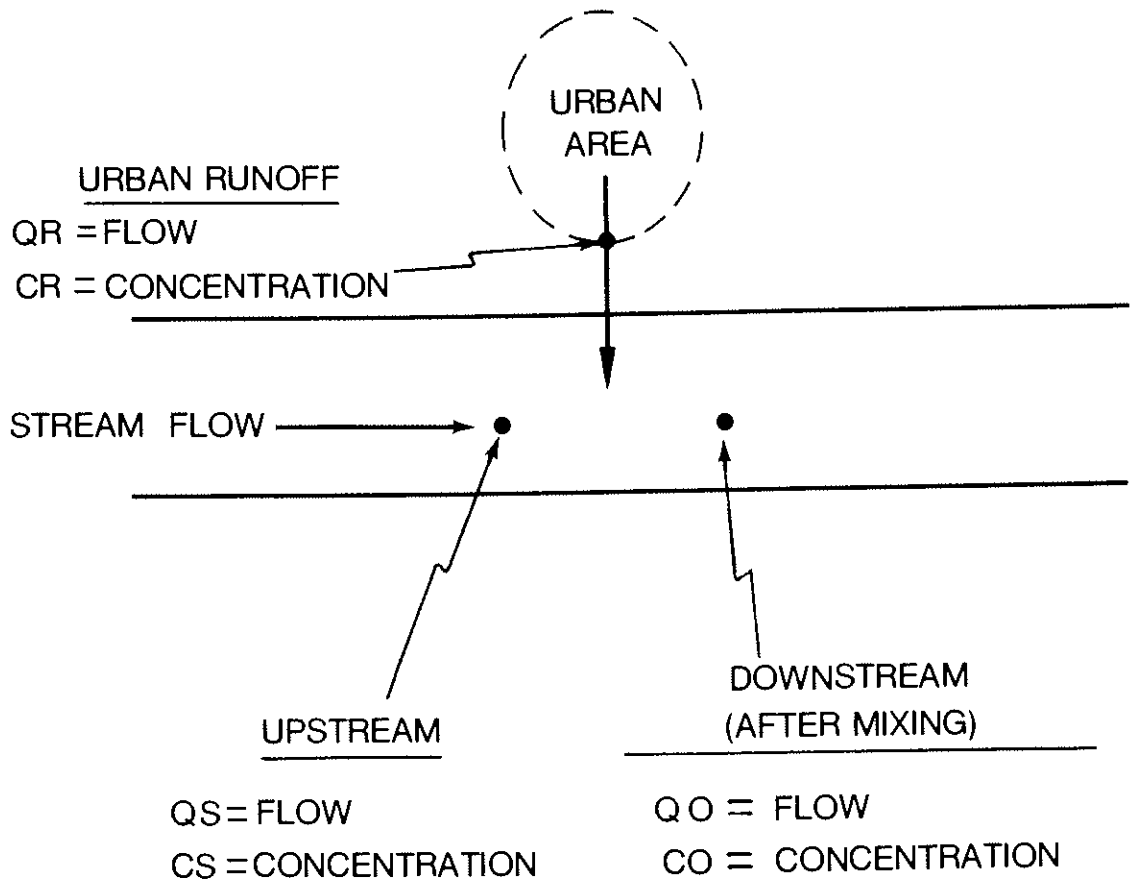

Figure 5-2. Idealized Representation of Urban Runoff Discharges Entering a Stream

stream concentration just downstream of all of the discharges as shown in Figure 5-2. The four input variables considered are:

- Urban runoff flow (QR)
- Urban runoff concentration (CR)
- Stream flow (QS)
- Stream concentration (CS)

Each is considered to be a stochastic random variable, which together combine to determine downstream flow and concentration. In addition, all variables are assumed to be independent, except urban runoff flow and streamflow where correlation effects can be incorporated as warranted.

An essential condition of the current computational structure is that each of the four variables which contribute to downstream receiving water quality can be adequately represented by a lognormal probability distribution; from analysis of data or other estimating procedures, the statistical properties of each of the input parameter distributions are defined. Examination of a reasonably broad cross-section of data indicates that lognormal probability distributions can adequately represent discharges from the rainfall/runoff process, the concentration of contaminants in the discharge, and the daily flow record of many rivers and streams, particularly for a national scale screening approach. It should be noted, however, that modifications of the computation techniques could be made to accommodate the use of other distributions (e.g., gamma, exponential) for some or all of the parameters.

The analysis procedure is described in more detail in the supplementary NURP report cited earlier. It essentially operates as follows:

- Downstream Concentrations. Stream concentrations of a pollutant are considered to result from the combination of upstream flow at background concentration and runoff flow at its concentration. Variations in stream concentrations below the urban runoff discharge result from variations in each of these inputs; the most significant source of variation being whether or not an event is occurring (i.e., whether runoff flows and loads are present). Stream flows must be considered because of the major effect of dilution on the resulting concentrations. Upstream concentrations can, however, be set at zero for the calculations; in which case, the result obtained is the exclusive effect of urban runoff discharges, and not the overall expected stream concentration. Effects of urban runoff can be evaluated by considering only the periods during which runoff occurs.

- Parameter Estimates. Estimates for runoff flows and concentrations are developed from information derived from the NURP monitoring programs. Information on stream flow can be obtained from analysis of local stream gage records. Upstream concentrations tend to be very site-specific; for this reason, the screening analysis calculated only the effect of urban runoff discharges.

- Statistical Calculations. From the statistical properties (specifically, the means and standard deviations) of the flows and concentrations, properties of the dilution ratio can be defined, and the statistical properties of the resulting in-stream concentrations are calculated directly. The frequency with which any particular target concentration is exceeded during wet weather can be calculated from the statistical properties of stream concentration, using formulas or scaled directly from a standard plot of cumulative (lognormal) probability distributions.

  The frequency with which the target concentration is exceeded during all periods -- wet and dry -- is simply the product of

the wet weather frequency and the probability (frequency) that it is raining. The probability that it is raining at any time is defined by the ratio of mean storm duration to mean inter-storm period, derived from the rainfall statistics.

$$\frac{D = \text{mean duration of storms}}{\Delta = \text{mean interval between storm midpoints}} = \text{fraction of time it is wet}$$

- Mean Recurrence Interval. In the presentation of results in Chapter 7, the probability distribution of event mean stream concentrations of an urban runoff pollutant during runoff periods is converted to a Mean Recurrence Interval (MRI) as a device to assist in the interpretation of results. The recurrence interval is defined as the reciprocal of probability. Because the basic calculation is based on storm events, this definition yields the overall average number of storms between specific event occurrences. Event recurrence is converted to what is believed to be a more meaningful time recurrence by dividing by the average number of storms per year, which is developed from analysis of rainfall records and defined as

$$\frac{\text{Hours/year} = 8760}{\text{Average interval between storm midpoints}} = \text{average \# storms per year}$$

As an example of the MRI calculations consider a stream concentration which has an exceedance probability of 1.0 percent (Pr = 0.01)

$$\text{Recurrence Interval} = 1/Pr = 1/0.01 = 100$$

The analysis is in terms of storm events, not time. Therefore this result is interpreted as one storm in every 100 events on average, will produce concentrations greater than the selected value. For an area where rainfall patterns produce an average of 100 storms per year, the average recurrence interval expressed in time units rather than events, is:

$$\text{Recurrence Interval (time)} = \frac{\text{event recurrence}}{\text{\# events/year}} = \frac{100 \text{ events}}{100 \text{ events/year}} = 1 \text{ year}$$

Currently, the primary use of the above procedure is as a screening tool in which approximate results and relative values are of interest. In this regard, NURP believes the Mean Recurrence Interval is a very useful definition. It should be interpreted as the long-term average interval between occurrences.

When results of this nature are interpreted, the following factors should be noted. The recurrence intervals of most interest relate to very low probabilities of occurrence. The tails of distributions may have appreciable uncertainty, and in the natural water systems, distributions may be lognormal

over the bulk of the range but may deviate from the assigned distribution at the extremes. Computed stream concentrations at long recurrence intervals are likely to be conservative, that is, overstated because there are likely to be practical upper limits for runoff concentrations and lower limits to stream flow.

It also should be noted that serial correlations of streamflows or the tendency of wet and dry years to occur in clusters, though not a general behavior, may be significant in some cases. This situation would cause the average one year condition, for example, not to repeat itself every year but rather to occur several times per year, at intervals greater than one year.

Other Receiving Waters

Other receiving waters of general interest in assessing urban runoff effects include lakes, estuaries, embayments, and coastal zones. The methods adopted for lakes are briefly described below. The other receiving waters generally require site-specific and often complex analysis techniques (numerical methods, multi-dimensional modeling, etc.). Given this, a generalized screening-level assessment was not believed to be appropriate for this report. A number of the individual NURP projects consider these coastal water bodies and report on the specific methods adopted and results obtained.

For lake eutrophication problems, the time scale for analysis is considerably longer than the short (event scale) periods necessary for estuaries and rivers. For this case, annual average loads were used in a steady-state analysis performed using the type of empirical model advanced by Vollenweider and others. The EMC data developed from NURP monitoring programs can be readily converted to annual loads directly from annual flows or indirectly based on annual rainfall.

For total phosphorus, typically the limiting nutrient of concern, average concentrations are calculated using the following formula:

$$P = \frac{W'}{H/\tau \cdot \upsilon_s} \cdot 1000$$

The input values include pollutant mass loading (W'), lake physical characteristics of depth (H) and residence time (τ) and reaction rate coefficients (υ_s). The relative contribution of all load sources to lake total P concentrations can be defined by solving this equation for each of the sources. By comparing results in terms of lake concentrations for initial conditions (no control), and then modifying loads to reflect various levels of control, alternative control operations can be compared directly to effect on lake water quality.

Some judgement is involved in defining acceptable lake water quality concentrations, which depend in part on water use and on regional norms and expectations.

EVALUATION OF CONTROLS

General

The evaluation of controls has two elements: (a) characterizing the controls' performance capabilities and (b) defining costs. For this report, only the characterization of performance is emphasized; cost relationships are addressed to a more limited extent. EPA's Economic Analyses Staff, Office of Analysis and Evaluation, has prepared the following report under contract:

> "Collection of Economic Data from Nationwide Urban Runoff Program Projects," EPA Office of Water Regulations and Standards, April 7, 1982.

This report, issued at an early stage in the NURP program, assembled and analyzed cost information on potential control measures. Useful cost information for detention basins was developed by the Washington, D.C. area NURP project and is discussed further in Chapter 8.

Detention Basins

There are a number of procedures which can be adopted for evaluation of detention basin control devices. Procedures adopted by individual NURP projects are described in project reports. The procedure adopted by NURP to generalize the analysis of detention basins, and provide a planning level basis for estimating capabilities and requirements, is detailed in a detention basin handbook being issued by NURP as a supplementary report.

Results presented in Chapter 8 provide a summary of observed performance characteristics of the detention devices monitored under the NURP program and a projection of long-term performance expected on the basis of basin size and regional rainfall characteristics. The latter result is based on the probabalistic analysis methodology described in the supplementary report. Planning level cost estimates for control of urban runoff using this technique are also presented.

Street Sweeping

A number of the individual NURP projects adopted street sweeping as a principal subject of investigation. Procedures and results are described in individual project reports and are consolidated and summarized in Chapter 8. The adopted procedure and detailed results are presented in the supplementary NURP report, which was cited earlier.

Recharge Devices

Recharge devices include impoundments or other structures such as pits, trenches, retention basins, percolating catch basins, in-line percolation chambers or perforated pipes, which function by intercepting some portion of storm runoff and allowing it to percolate into the ground.

One of the basic questions which arises when controls of this type are considered is whether the percolation encouraged will produce undesirable degradation of groundwater quality. This aspect was examined by two NURP projects, and is discussed in Chapter 7 of this report.

Evaluation of percolating basins of any size is readily accomplished using the standard storage/treatment routines of stormwater models such as STORM or SWMM. In such cases the local soil permeability (the percolation rate) is applied as the treatment rate. In addition, statistical analysis procedures described in "A Statistical Method for the Assessment of Urban Stormwater" (EPA 440/3-79-023, May 1979) have been developed. A probabalistic analysis methodology adapted from the latter approach has been used by NURP to provide estimates of performance capabilities of recharge devices, which are presented in Chapter 8. A detailed discussion of the methodology is provided in the supplementary NURP report on detention/recharge devices cited earlier.

CHAPTER 6
CHARACTERISTICS OF URBAN RUNOFF

INTRODUCTION

This chapter presents a condensed summary of data developed by the individual NURP projects together with analysis results and interpretations based on the aggregated data from all projects.

Both the format for the summaries and the evaluations performed were selected to best serve the NURP objective of developing a national perspective. The results presented do not exhaust the useful information and insights which can be derived from the extensive data base that has been assembled. Individual project reports and a substantial number of articles published in a variety of technical journals independently examine specific aspects of urban runoff, often from the perspective of local issues.

Comprehensive tabulations of NURP data have been assembled and will be made available to interested parties for use in local planning or continuing research or engineering activities. As noted below, only a portion of the entire data base generated by the 28 NURP projects has been made generally accessible at this time. Under an ongoing effort, the entire data base is being subjected to final quality assurance checks and placed into a separate file, copies of which will be made available to interested parties upon request. In addition, a summary of the event averaged data, used for the analyses presented in this chapter, is reproduced in a Data Appendix issued with this report.

Field monitoring was conducted to characterize urban runoff flows and pollutant concentrations and mass loadings. This was done for a variety of pollutants at a substantial number of sites distributed throughout the country. The resultant data represent a cross-section of regional climatology, land use types, slopes, and soil conditions and thereby provide a basis for identifying patterns of similarities or differences and testing for their significance. To meet the objective of maximizing the degree of transferability of urban runoff data, the NURP approach involved covering a spectrum of regional and land use characteristics, requiring consistent quality assurance programs among all projects, and encouraging each of the projects to obtain data for a statistically significant number of storm events at a site.

The portion of the NURP data base used in the characterization of urban runoff presented in this section excludes monitoring sites which are downstream of devices which modify runoff (e.g., detention basins). The data base of acceptable "loading sites" consists of 81 sites in 22 different cities, and includes more than 2300 separate storm events. The actual number of events

for specific pollutants varies, and is somewhat smaller than the total number of storms monitored because all pollutants were not measured for all storms at all sites.

Data summaries and analyses were performed using storm event average values; within-event fluctuations are not considered. An event mean concentration (EMC) for pollutants of interest has been determined for each monitored storm. Preliminary results presented in an earlier NURP report were based on analysis of "pooled" EMCs which were available at the time regardless of site. This provided a useful start, a reference for individual NURP project activities, and established the order of magnitude of concentrations of various pollutants in urban runoff. With the substantially larger data set now available, a more useful approach is possible. For the analyses and comparisons presented in this chapter, the storm event average data were aggregated by site to describe site characteristics. Site mean values were then aggregated or compared.

Summaries, comparisons, and evaluations were restricted to concentrations and runoff-rainfall ratios. Although loading data (Kg/Ha) are also available for all monitored storms, they have not been used in comparisons for the following reason. Mass load is very strongly influenced by the size (volume) of the monitored storm event. Monitored events usually represent a very small sample of all storms for an area, are generally biased toward larger events, and are different from site to site. Therefore comparisons between sites or locations using loading data derived from monitored storms are quite likely to present a distorted picture.

Event mean concentrations, on the other hand, have been determined to be essentially uncorrelated with runoff volume, as discussed further later in this chapter. Site comparisons can be made with high confidence levels using concentration data, and the most meaningful load comparisons would be those developed by using concentrations, area rainfall volumes, and runoff-rainfall relationships.

Separate summaries of results are provided below for standard pollutants, coliform bacteria, pollutant loads, and priority pollutants.

LOGNORMALITY

As was pointed out in Chapter 5, the key to the mathematical tractability of the NURP methodologies is that the data can be well represented by a known probability density function (pdf). There are actually two issues involved; (1) the adequacy of the assumed pdf in terms of representing the essential characteristics of the data set in question, and (2) the estimation of the parameters of the population pdf that the observed data set is presumed to represent. These will be discussed in turn.

Adequacy of Representation

One can fit a polynomial of order (n-1) exactly to any data set of n numerical items, but its utility in predicting the probability of realizing a given value on a subsequent trial (either within or outside the original data set,

i.e., the interpolation or extrapolation problem) is likely to be very limited. The number of parameters involved and the need to investigate its properties on an individual basis are further deterrents to such a practice. There is no dearth of pdf's that have been the subject of intensive investigation. However, the selection of a pdf is an objective choice that is best made based on professional knowledge of the processes deemed important to the desired probability model and the use to be made of it. For example, if the data are known to result from the product of many small effects, their logs will be the sum of the logs of these effects. By appeal to the central limit theorem, it is known that this sum is asymptotically normal and, therefore, that the data will be lognormally distributed. Based upon such natural expectations and prior experience (of a growing body of other workers in the field as well), the lognormal pdf was chosen. The fact that the variables of interest can assume only positive values with a finite mean and a finite nonzero lower bound (even in a standardized form) leads to the rejection of any pdf defined over the entire real domain, such as the normal distribution for instance.

There are a number of statistical procedures for evaluating the normality of a complete sample; at least nine can be found in the current literature. Some are origin and scale invariant (e.g., the Shapiro-Wilk, standard third moment, standard fourth moment, and studentized range) and thus are appropriate for testing the composite hypothesis of normality. Others require the complete specification of the null distribution (e.g., Kolmogorov-Smirnoff, Cramer-Von Mises, weighted Cramer-Von Mises, modified Kolmogorov-Smirnoff-D, and chi-squared), and typically, the mean and variance of the specified normal hypothesis are taken to be the known mean and variance of the complete sample. Some procedures (e.g., chi-squared) utilize the specified theoretical pdf, while others (e.g., the modified Kolmogorov-Smirnoff D-test) utilize the cumulative frequency distribution.

In testing for normality (in the logorithmic domain in our case), one specifies the level of significance (α), i.e., the probability of rejecting the null hypothesis when it is in fact true (Type I error). The choice of α requires tempered judgement, however. The power of a test (β) is the probability of rejecting the null hypothesis when it is in fact false. The probability of accepting the null hypothesis when it is in fact false (Type II error) is $1-\beta$. For a given sample size and test, fixing a value for α also determines a value for β (i.e., they are not independent). The smaller the α level, the less powerful the test. Thus one is forced to make a trade-off between the consequences of a Type I or II error when selecting an α value.

The median EMC values for each constituent at each site were calculated, and these sample sets were examined for lognormality using the Kolmogorov-Smirnoff D test. The α levels for TSS, Total P, TKN, Total Pb, and Total Zn were all greater than 0.15, indicating a high power level. In other words, these sample sets are extremely well represented by a lognormal distribution. For COD and nitrate + nitrite the α levels were 0.059 and 0.057 respectively, indicating a lower power level but suggesting that even for these constituents the lognormal distribution quite well describes the data. Because BOD, Soluble P, and Total Cu were measured at fewer than half of the project

sites, the D-test could not meaningfully be used (i.e., n is too small). Stated another way, at the $\alpha = 0.05$ level, the hypothesis that the samples were drawn from a population with a lognormal distribution cannot be rejected for any of the constituents examined.

Turning to the individual sites, there were very few instances where n was large enough to support the meaningful use of the D-test, and so a different approach for examining the appropriateness of the lognormal distribution was used. Essentially it consisted of examining the cumulative frequency distributions (in log space) and third and fourth moment based statistics for adequacy of representation. Taking into account detection limit phenomenon, uncertainties associated with sampling and analytical determination errors (especially at low concentration levels), and an occasional outlier, well over 90 percent of the constituent distribution at all NURP sites were quite well represented by the lognormal distribution. For the few remaining data sets, the lognormal distribution, although not perfect, was adequate for our purposes.

Estimation of Parameters

As noted in Chapter 5, the lognormal distribution is completely specified by two parameters, the mean and the coefficient of variation. The values of these two parameters as calculated from the sample data set are the best estimates of the parameters of the underlying population in the maximum likelihood sense. For this reason, they were used in the NURP analysis. However, due to the existence of detection limit problems and sampling/analytical determination errors, the reasonableness of this decision was examined in general for all constituents and in great detail for Total Cu, the results of which will be described below.

For each of the 49 NURP sites where at least five Total Cu determinations were made, data were plotted (in logarithmic form) on probability paper. A line of best fit was drawn in, using professional judgement where detection limit or outlier problems existed, and the values of the median and standard deviation were read from the plot and converted into arithmetic space. These were then compared with those values calculated from the data themselves. One example is given in Figure 6-1 (the 116th and Claude Street site in Denver). Here the median and coefficient of variation from the plot (20 µg/l and 0.75) compare very well with those calculated directly from the data (22 µg/l and 0.74).

An example of an outlier plot is given in Figure 6-2 (the strip commercial site in Knoxville, TN). The one very low value (1 µg/l) is one-twentieth the typical detection limit (20 µg/l) and clearly does not belong to the same distribution that the other values do. Ignoring it, a very good fit exists and the parameters of the plot are 30 µg/l and 0.37 for the median and coefficient of variation as compared with the 25 µg/l and 1.35 values calculated from the data. The difference in medians is not too great, but the difference in coefficients of variation is quite large (over a factor of 3.5). This means that the upper end of the tail of the pdf is quite overestimated by the parameters estimated from the data and, consequently, that

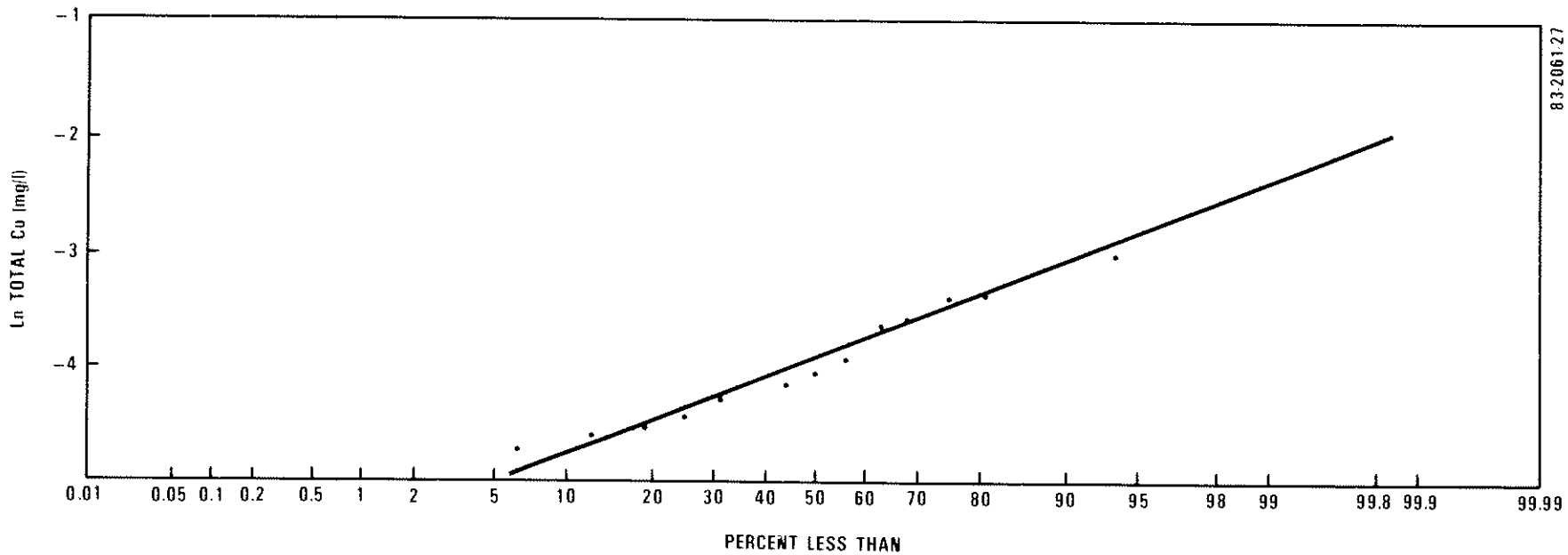

Figure 6-1. Cumulative Probability Distribution of Total Cu at CO1 116 and Claude Site

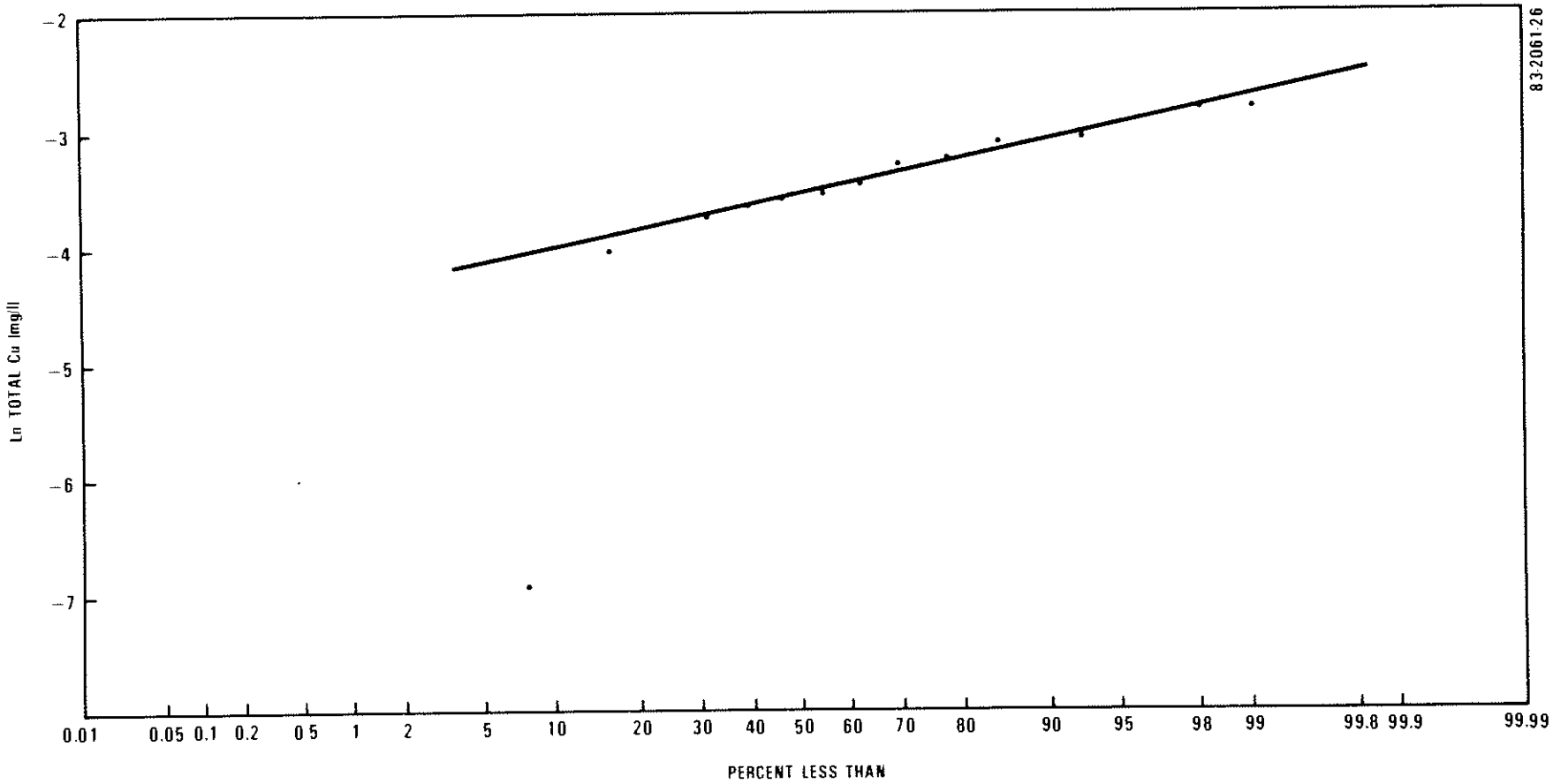

Figure 6-2. Cumulative Probability Distribution of Total Cu at TN1 SC Site

subsequent analyses will be extremely conservative, i.e., higher values of copper concentrations will occur less often than predicted. In general, the effect of an outlier is to increase or decrease the estimate of the median, depending upon whether the outlier is high or low, and to increase the estimate of the coefficient of variation as compared to those obtained from the remainder of the data.

An example of a detection limit problem is given in Figure 6-3, the plot of copper data of the Durham, NH parking lot site. Although only four points appear on the plot, actually n = 31, meaning that 27 points are represented by the first plotting position (90.6 percent). These values (all reported at 100 µg/l) are presumably the detection limit of the analytical laboratory. Of course in reality not all 27 values are 100 µg/l; they are simply equal to or less than this value. Fitting a line to the remaining four data points merely assigns appropriate plotting positions to these "less than" values. The estimates of the median and coefficient of variation from the plot are 63 µg/l and 0.36 respectively, as compared to the estimates from the data of 103 µg/l and 0.13. In this case, the latter significantly overestimates the median and significantly underestimates the coefficient of variation, and this is the general effect when a detection limit problem is present. In terms of the effect on prediction of rare occurrences of high copper levels (the upper tail of the pdf) these effects are somewhat counterbalancing. To the extent that the increase in the coefficient of variation dominates, the results of subsequent analyses will not be conservative, since larger concentrations will occur somewhat more frequently than would be predicted.

When the results of this exercise are compared for all 49 sites, the median as estimated from the plot was found to be higher than that estimated from all the data at only six sites, was equal at five sites, and was less at 38 sites. However, at only three sites was the change greater than 10 µg/l. Considering the population of all copper sites, the average median is 47 µg/l and the coefficient of variation is 0.84 when the estimates are based on all the data. If the estimates are based upon the plots, the respective values are 42 µg/l and 0.24 respectively. The significant reduction in the coefficient of variation in this latter case deserves comment, because it suggests that much of the apparent variability from site to site is due to data artifacts such as detection limit phenomena, outliers, and/or sampling/analytical errors. Similar comparisons of the coefficients of variation for each site showed increases at 21 sites, 6 unchanged, and decreases at 22 sites. Considering all sites, the average coefficient of variation is essentially unchanged (0.61 vs 0.63) as is its variability (0.47 vs 0.49).

Based on the results of the analyses which have been performed, the NURP findings are as follows:

- Lognormal distributions adequately represent both the storm-to-storm variations in pollutant EMC's at an urban site, and site-to-site variations in the median EMC's which characterize individual sites.

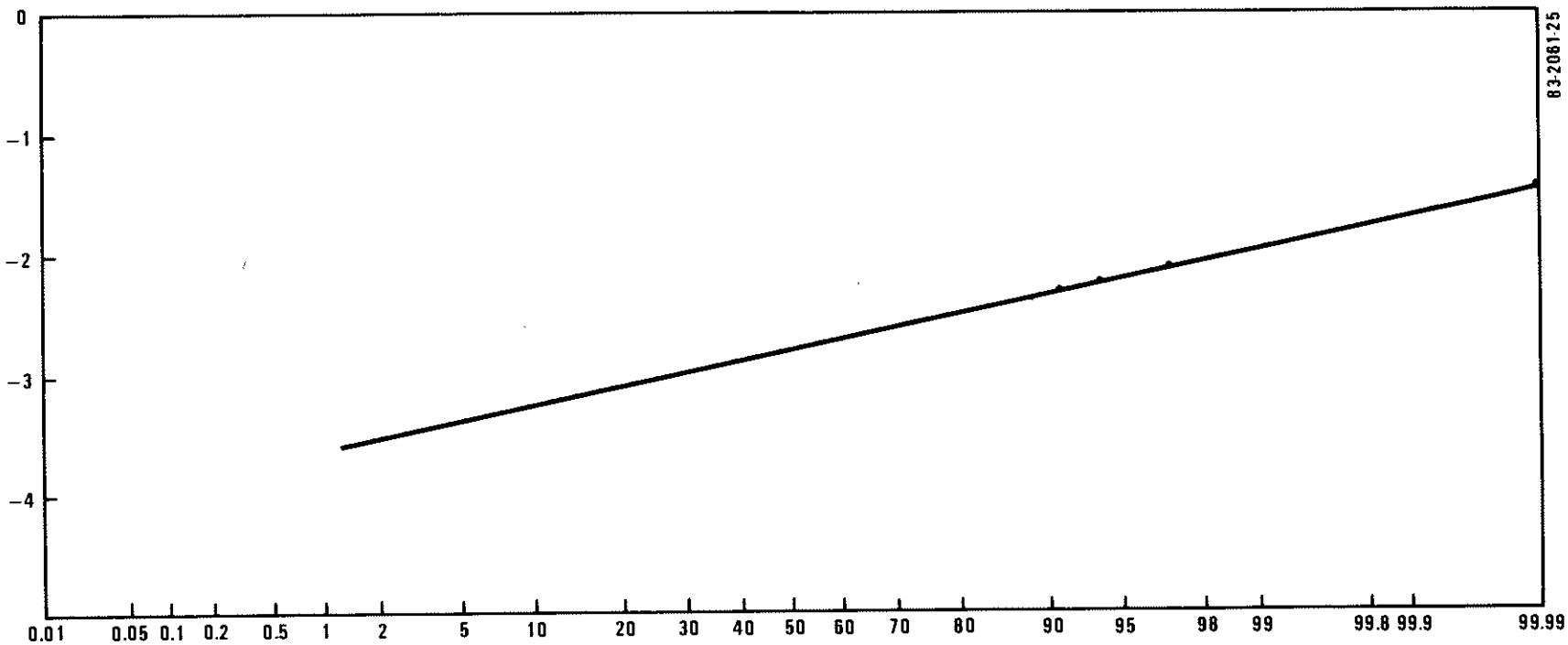

Figure 6-3. Cumulative Probability Distribution of Total Cu at NH1 Pkg. Site

- More detailed analysis to compensate for sampling errors (e.g., outliers and detection limit problems) would result in some adjustments in the statistical parameters tabulated later on in this chapter. The data summaries presented are based on statistics computed directly from the log transforms of the data.

- Such adjustments would not have any significant effect on overall results nor on the general conclusions reached. However, at a small percentage of sites, the parameter estimates for some pollutants would change significantly.

- In general, estimates of the site median EMC would be least affected; estimates of variability more so. It is likely that the very high or very low values for coefficient of variation (storm-to-storm variability) would be adjusted to more central values.

STANDARD POLLUTANTS

This grouping includes the following pollutants:

TSS - Total Suspended Solids
BOD - Biochemical Oxygen Demand
COD - Chemical Oxygen Demand
TP - Total Phosphorus (as P)
SP - Soluble Phosphorus (as P)
TKN - Total Kjeldahl Nitrogen (as N)
NO_{2+3}-N - Nitrite + Nitrate (as N)
Cu - Total Copper
Pb - Total Lead
Zn - Total Zinc

It includes pollutants of general interest which are usually examined in other studies (both point and nonpoint sources) and includes representatives of important categories of pollutants, namely solids, oxygen consuming constituents, nutrients, and heavy metals.

Condensed Data Summary

Tables 6-1 through 6-10 summarize the NURP results for these pollutants. Monitoring sites are grouped in each of the tables according to dominant land use. Broad categories have been used; residential, commercial, industrial, urban open/nonurban (other), and mixed, this latter category being used for sites which had no predominant land use. It should be noted that the industrial category does not include heavy industry sites, but more typically reflects an industrial park type of use. As a result, most of these sites are more closely related to a commercial use than to the typical image called up by the term industrial site. For subsequent comparisons, the data shown in Tables 6-1 through 6-10 for the commercial and industrial sites, are combined and designated as commercial land use.

TABLE 6-1. SITE MEAN TSS EMCs (mg/ℓ)

Residential

	Site	Land Use %	Area (A)	Pop. Den (#/A)	% IMP.	No. of OBS	TSS Mean	TSS COV	TSS Median	TSS 90% Confidence Limits
1	CO1 Big Dry Cr	100	11	17	81	14	333	1.04	265	182-385
2	CO1 Cherry	100	57	24	18	14	160	.98	120	87-190
3	CO1 116 & Lupton	100	167	14	20	16	165	1.17	232	154-344
4	DC1 Duffer	100	13	-	-	8	46	1.02	39	51-74
5	DC1 Carriage	100	68	21	37	49	175	1.47	98	76-127
6	DC1 Stratton	100	8	-	-	31	54	1.01	38	30-49
7	IL1 Joan N	100	54	18	19	51	215	1.36	127	96-155
8	KS1 Overland	100	58	8	38	15	2216	1.47	1243	166-2037
9	MA2 Hemlock	100	59	5	18	5	78	2.49	29	8-111
10	MD1 Balton Hill	100	14	10	51	18	74	1.32	45	30-68
11	MD1 Homeland	100	23	9	29	13	50	1.65	26	15-46
12	MD1 Nt Wash	100	17	12	29	20	95	1.17	62	84-89
13	MD1 Pos Hill	100	10	55	76	13	123	1.05	85	57-135
14	NY1 Farill's 9.	100	31	13	20	23	42	.85	32	25-47
15	NY1 Hugue	100	-	-	-	8	65	.53	57	41-81
16	NY1 Franilon	100	160	5	22	30	114	1.15	98	57-150
17	NY1 T. Rach.	100	546	18	18	7	294	1.12	195	101-380
18	TX1 Fallingwood	100	60	3	21	9	227	1.13	150	85-761
19	WA1 Sareey	100	95	9	29	117	111	.51	101	94-108
20	WI1 Durbank	100	61	15	50	45	266	.44	247	219-270
21	WI1 Hastings	100	13	17	51	35	170	.68	141	117-169
22	FL1 Payne Apts	100	9	-	6	17	51	1.23	34	21-56
23	TX1 Hart	99	378	9	30	35	155	1.51	82	49-137
24	WI1 Lincoln	97	36	18	57	23	251	.89	206	165-258
25	TN1 R2	96	29	4	13	11	61	1.13	42	25-68
26	DC1 Westleigh	93	41	3	21	41	75	1.45	43	35-57
27	CS1 IC - 92nd	92	63	-	27	11	156	.84	119	83-171
28	IL1 John S.	91	39	19	18	44	248	1.50	178	106-378
29	IN1 F1	91	19	21	33	11	611	.72	492	345-704
30	WA1 Lake Hills	91	102	12	37	126	127	.80	100	90-110
31	IL1 Maffly S.	90	28	22	13	59	111	1.08	211	174-256
32	FL1 Charter Hdq	89	42	-	16	12	31	1.76	10	9-10
33	DC1 Fairidge	88	19	-	14	47	25	1.55	14	18-18
34	CO1 Asbury	88	127	9	22	9	493	.62	380	344-593
35	IL2 Comb Inlets	85	538	8	17	27	250	.75	200	161-249
36	MA1 Locust	85	164	11	16	6	257	1.75	128	48-339
37	NC1 #1031	84	374	6	27	66	291	1.92	115	164-174
38	MA1 Jordon	79	110	10	21	9	79	1.74	39	19-81
39	DC1 Sledwick	78	27	15	34	47	54	1.02	38	11-43

Urban Open and Nonurban

	Site	Land Use % Open	Area (A)	Pop. Den (#/A)	% IMP.	No. of OBS	TSS Mean	TSS COV	TSS Median	TSS 90% Confidence Limits
1	CA1 Seaview	100	632	-	-	11	238	.63	551	185-188
2	CO1 Rooney Gulch	100	405	0	3	7	411	.60	341	223-921
3	MY2 Thurnell	100	28,416	-	4	11	154	.92	111	74-113
4	NY2 English Br	98	5,748	-	1	29	17	2.45	6	4-10
5	NY2 West Br	97	6,538	-	3	28	64	2.77	22	14-35
6	NY3 Thomas Cr	91	17,728	1	11	9	63	.74	51	14-77
7	NY3 Fraser Cr	90	2,103	-	6	5	13	.37	26	14-50
8	NY2 Sherrill Dach	80	582	-	7	32	178	2.35	149	09-224

Mixed

	Site	Land Use %	Area (A)	Pop. Den (#/A)	% IMP.	No. of OBS	TSS Mean	TSS COV	TSS Median	TSS 90% Confidence Limits
1	KS1 Nolana	-	30	2	64	16	290	.91	208	145-[illegible]
2	MD1 Northdon	-	12	40	72	20	52	1.62	43	29-[illegible]
3	IL1 Hazlit N	-	12	2	58	52	284	1.01	179	165-219
4	MI1 Waverly	-	10	11	68	15	85	1.36	52	39-69
5	IN1 SC	-	187	3	45	12	71	1.07	45	31-74
6	WI1 Wood Clr	-	45	12	51	37	353	.78	202	255-351
7	MA1 Rt 9	-	328	7	25	7	151	2.05	154	80-375
8	MA1 Concord	-	180	1	33	8	59	1.43	30	18-43
9	MI1 Grand P Gt	-	453	5	38	21	159	1.26	98	45-190
10	MI2 Pitt AA-S	-	2001	7	21	6	46	.17	43	35-49
11	NJ7 Cedar	-	76	-	5	27	293	1.92	139	99-202
12	MA1 Anna	-	601	9	12	6	150	2.45	18	18-156
13	MI1 Pitt AA-H	-	2871	7	26	6	68	.47	51	32-65
14	MI1 Grace M	-	164	5	25	23	172	.95	143	121-171
15	MI3 Swift Run	-	1707	2	4	5	50	.93	59	25-174
16	SO1 Meade	-	2036	-	-	15	1041	1.39	1804	1126-2897
17	CA1 Xanx	-	1542	12	-	19	283	1.12	141	115-255
18	FL1 N. Jalui	-	30	-	13	15	83	1.39	23	11-39
19	FL1 Wilger	-	194	-	97	19	33	.71	27	29-37
20	CO1 North Ave	-	69	9	50	32	492	.96	354	278-451

Commercial

	Site	Land Use % Coml	Area (A)	Pop. Den (#/A)	% IMP.	No. of OBS	TSS Mean	TSS COV	TSS Median	TSS 90% Confidence Limits
1	CO1 Villa Italia	100	74	0	91	27	266	1.89	122	61-183
2	NC1 1013 (CBD)	100	23	0	69	60	163	1.15	117	68-111
3	NJ3 Southgate	100	179	7	21	12	141	.76	119	79-160
4	WI1 Post Office	100	12	0	100	58	212	.90	161	131-192
5	NH1 Pkg Lot	100	1	0	90	12	74	1.68	18	27-54
6	IN1 CBD	100	26	0	89	15	121	.72	99	74-133
7	WI1 Rustler	100	12	0	100	42	202	.68	167	142-196
8	KS1 IC Metcalf	96	58	-	97	32	80	2.12	34	21-55
9	FL1 Norma Pk	91	47	-	35	17	22	1.13	14	9-23
10	WI1 State Fair	74	29	10	77	29	412	.97	296	279-362

Industrial

	Site	Land Use %	Area (A)	Pop. Den (#/A)	% IMP.	No. of OBS	TSS Mean	TSS COV	TSS Median	TSS 90% Confidence Limits
1	MA2 Addition	100	19	0	69	5	48	.81	14	14-73
2	MI1 Indus Drain	100	63	0	64	18	90	.87	71	53-95
3	KS1 Lenexa	56	23	-	34	18	102	1.33	63	40-92
4	MI1 Grace S.	52	15	5	10	20	186	.94	137	101-186

TABLE 6-2. SITE MEAN BOD EMCs (mg/ℓ)

Residential

	Site	Land Use %	Area (A)	Pop. Den (#/A)	% IMP.	No. of OBS	BOD Mean	BOD CO%	BOD Median	BOD 90% Confidence Limits
1	CO1 Big Dry Cr	100	31	19	41	8	-	-	-	-
2	CO1 Cherry	100	57	24	38	0	-	-	-	-
3	CO1 116th/Claude	100	167	14	24	0	-	-	-	-
4	DC1 Hartof	100	12	-	-	0	-	-	-	-
5	DC1 Lakeridge	100	68	21	33	0	-	-	-	-
6	DC1 Littleton	100	8	-	-	4	-	-	-	-
7	IL1 John N	100	54	18	19	0	-	-	-	-
8	KS1 Overlon	100	58	8	38	5	12	.59	11	6-18
9	MA2 Nonlock	100	50	5	16	0	-	-	-	-
10	MO1 Bolman Hill	100	14	10	53	0	-	-	-	-
11	MO1 Moreland	100	23	9	29	0	-	-	-	-
12	MO1 Mt Wash	100	17	12	39	0	-	-	-	-
13	MO1 Rec Hill	100	10	55	76	0	-	-	-	-
14	NJ1 Capitol P.	100	11	13	20	0	-	-	-	-
15	NJ1 Lingua	100	-	-	-	0	-	-	-	-
16	NJ3 Cranston	100	106	5	22	0	-	-	-	-
17	NJ1 C. Park	100	146	18	38	0	-	-	-	-
18	TX1 Rollingwood	100	60	3	21	0	-	-	-	-
19	WA1 Surrey	100	95	9	29	0	-	-	-	-
20	WI1 Burbank	100	61	15	50	28	1	.64	0	5-1
21	WI1 Mastingl	100	13	17	51	20	9	.62	8	6-10
22	IL1 Young Acres	100	9	-	6	12	16	1.10	11	1-12
23	TX1 Park	99	328	0	40	4	-	-	-	-
24	WI1 Lincoln	91	16	18	67	11	18	1.21	17	7-20
25	IN1 R2	96	96	4	13	10	9	.66	7	5-10
26	DC1 Weijleigh	93	41	3	21	3	-	-	-	-
27	TX1 IC - 92nd	92	63	-	17	5	29	.60	23	11-41
28	IL1 John S.	92	39	18	18	0	-	-	-	-
29	IN1 R1	91	69	13	33	9	14	.87	11	7-18
30	WA1 Lake Hills	91	192	12	32	0	-	-	-	-
31	IL1 Mallis S.	90	18	29	37	0	-	-	-	-
32	IL1 Chamber Nou	89	42	-	16	12	11	1.24	8	5-13
33	DC1 Lakeridge	88	19	-	34	6	5	.68	4	2-7
34	CO1 Ashury	86	171	9	22	0	-	-	-	-
35	IL2 Cook Inlwtr	85	524	8	17	0	-	-	-	-
36	MO1 Locust	85	154	11	16	0	-	-	-	-
37	KS1 ATLR3	84	314	6	27	2	11	.13	10	6-35
38	MO1 Jordan	79	110	11	23	0	-	-	-	-
39	OC1 Spedwick	78	22	15	34	0	-	-	-	-

Urban Open and Nonurban

	Site	Land Use % Open	Area (A)	Pop. Den (#/A)	% IMP.	No. of OBS	BOD Mean	BOD CO%	BOD Median	BOD 90% Confidence Limits
1	LA1 Seavew	100	173	-	-	0	-	-	-	-
2	CO1 Rainey Gulch	100	405	0	1	8	-	-	-	-
3	NJ1 Thornell	100	28,415	-	4	0	-	-	-	-
4	NJ1 English Br	99	5,249	-	1	0	-	-	-	-
5	NJ1 Lesl Br	97	5,338	-	1	0	-	-	-	-
6	NJ3 Thomas Cr	91	17,718	1	11	9	-	-	-	-
7	NJ3 Lower Cr	90	7,304	-	6	5	3	.41	2	-
8	NJ2 Thorell Duck	89	552	-	7	0	-	-	-	-

Mixed

	Site	Land Use %	Area (A)	Pop. Den (#/A)	% IMP.	No. of OBS	BOD Mean	BOD CO%	BOD Median	BOD 90% Confidence Limits
1	KS1 Ogland	-	36	3	68	5	-	-	-	-
2	MD1 Nampden	-	11	40	32	0	-	-	-	-
3	IL1 Mallis N	-	17	3	58	0	-	-	-	-
4	NJ1 Waverly	-	10	31	68	21	9	.64	7	6-9
5	TN1 SC	-	187	3	43	32	14	.87	11	7-16
6	WI1 Wood Dr	-	46	12	81	31	14	.64	11	11-15
7	MA1 Al 9	-	139	1	21	0	-	-	-	-
8	MA1 Chevenl	-	100	3	33	0	-	-	-	-
9	MO1 Grand A Ot	-	453	5	38	13	8	.61	7	5-8
10	MO3 Pitt AA-S	-	2401	2	21	6	5	.49	5	3-7
11	NY2 Cedar	-	76	-	5	0	-	-	-	-
12	MA1 Anna	-	601	9	12	0	-	-	-	-
13	MO3 Pitt AA-N	-	2871	1	26	6	6	.76	5	3-9
14	MO1 Grace N	-	364	5	28	11	8	.78	7	5-12
15	MO3 Swift Run	-	1207	2	4	6	3	.41	3	2-4
16	SO1 Meade	-	2030	-	-	14	19	.75	15	11-24
17	CA1 Knox	-	1542	13	-	0	-	-	-	-
18	FL1 M. Jesuit	-	30	-	13	15	16	.95	12	9-17
19	FL1 Wilder	-	194	-	97	15	15	1.18	14	9-14
20	CO1 North Ave	-	69	9	60	32	-	-	-	-

Commercial

	Site	Land Use % Coml	Area (A)	Pop. Den (#/A)	% IMP.	No. of OBS	BOD Mean	BOD CO%	BOD Median	BOD 90% Confidence Limits
1	CO1 Villa Italia	100	34	0	93	0	-	-	-	-
2	MO1 1011 (CBD)	100	21	0	69	23	18	.80	13	10-27
3	NY1 Southgate	100	170	2	21	0	-	-	-	-
4	WI1 Post Office	100	12	0	100	36	9	.50	8	7-9
5	NN1 Pkg Lot	100	1	6	40	11	17	.86	13	10-16
6	IN1 CBD	100	26	8	99	21	13	.48	13	10-15
7	WI1 Austler	100	12	4	-	27	13	.39	10	8-13
8	KS1 10 Metcalf	96	58	-	92	13	8	.48	7	6-9
9	FL1 Norma St	93	47	-	45	12	12	.88	9	6-13
10	WI1 State Jair	44	29	10	73	15	19	.73	15	11-20

Industrial

	Site	Land Use %	Area (A)	Pop. Den (#/A)	% IMP.	No. of OBS	BOD Mean	BOD CO%	BOD Median	BOD 90% Confidence Limits
1	MA1 Addison	100	18	0	65	0	-	-	-	-
2	MI1 Lucas Drain	100	61	0	64	9	10	.58	9	6-13
3	KS1 Lenexa	56	13	-	44	8	14	.77	11	7-17
4	MI1 Grace S.	61	15	5	39	9	5	.34	5	4-6

	Site	Land Use %	Area (A)	Pop. Den (P/A)	% IMP.	No. of OBS	COD Mean	COD COV	COD Median	COD 90% Confidence Limits
1	IO1 Big Dry Cr	100	33	19	43	16	129	.72	105	19-139
2	CO1 Cherry	100	57	14	38	18	122	.60	102	73-136
3	CA1 Little Plaude	100	163	14	24	15	137	.14	100	16-159
4	MI1 Miller	100	32	-	-	7	54	.26	62	51-74
5	OH1 Lakeridge	100	68	21	13	44	60	.56	50	43-58
6	MO1 Ellisville	100	8	-	-	31	51	.55	45	35-63
7	MI1 Mill N	100	44	18	10	31	126	.80	94	79-122
8	KS1 Overlub	100	58	8	18	14	162	.67	135	101-180
9	MA2 Meadow	100	50	5	10	11	-	-	-	-
10	MI1 Bo*ch Hill	100	14	30	51	19	218	1.36	128	85-193
11	MO1 Maplank	100	43	9	29	13	172	.13	139	101-192
12	MO1 Mt Wash	100	17	12	29	10	160	.85	136	96-170
13	MI1 Pes Hill	100	10	55	76	13	271	.85	115	94-194
14	MI1 Carlis A.	100	73	33	20	8	-	-	-	-
15	MI1 Indiana	100	-	-	-	0	-	-	-	-
16	MI3 Oralston	100	166	5	22	8	33	.43	31	24-41
17	NY3 E. Roch	100	346	18	36	7	86	.11	82	66-102
18	IA1 Allingwood	100	50	3	31	9	70	.45	64	44-84
19	MI1 Sterer	100	95	9	49	118	46	.54	42	39-46
20	WI1 Eurband	100	53	15	50	27	39	.29	30	24-38
21	WI1 Hawlins	100	33	17	51	29	41	.55	36	30-44
22	FL1 Lubbig Apts	100	9	-	0	12	73	.96	52	34-79
23	IL1 Karl	90	238	9	40	11	83	.83	61	40-94
24	WI1 Lawald	80	30	15	52	16	91	.95	66	46-94
25	IN1 PC	90	89	4	13	11	45	.39	42	34-53
26	OC1 Mesillagll	93	41	3	21	39	51	.41	46	41-52
27	IS1 U. - 92nd	92	53	-	37	11	176	.98	126	80-147
30	IL1 John S.	91	39	16	19	29	111	.80	87	69-108
29	IN1 A1	91	69	11	33	11	120	.96	87	66-135
30	WA1 Lake Hills	91	107	12	37	127	44	.54	38	35-41
31	IL1 Mallis S.	90	28	22	37	10	180	.72	140	119-178
32	FL1 Charter Ridg	89	42	-	16	12	56	.64	47	35-64
33	OC1 Lakeridge	88	19	-	14	48	53	.46	47	42-52
34	CO1 Aubrey	86	127	9	32	9	234	1.12	155	49-273
35	IL1 Comb Inlets	85	524	8	17	24	138	.90	102	78-134
36	MO1 Lesuv E	85	154	11	16	6	104	.45	95	67-115
37	MI1 IIDES	84	324	4	30	34	90	.97	64	51-82
38	MA1 Jordan	79	110	10	21	9	79	.53	70	51-95
39	OC1 Bloodwell	28	27	14	34	45	45	.60	19	34-45

	Site	Land Use %	Area (A)	Pop. Den (P/A)	% IMP.	No. of OBS	COD Mean	COD COV	COD Median	COD 90% Confidence Limits
1	KS1 Holland	-	16	3	66	12	108	.56	89	65-126
2	MO1 Wampden	-	12	40	72	30	111	.33	99	80-115
3	MI1 Mattis M	-	17	5	55	35	155	.56	154	130-156
4	MI1 Hairly	-	30	11	68	27	64	.30	60	40-81
5	OH1 SC	-	147	3	41	13	40	.70	49	16-67
6	MI1 Woda Ctr	-	45	12	81	39	52	.57	90	40-12
7	MA1 Ai 9	-	318	7	23	6	107	.62	98	51-146
8	MA1 Convert	-	100	1	73	8	72	.62	61	40-89
9	MI1 Oralkr & 01	-	453	5	38	16	71	.47	65	55-16
10	MI1 Pitt AA-S	-	2001	2	21	4	-	-	-	-
11	NY2 Cedah	-	76	-	5	0	-	-	-	-
12	MA1 Anna	-	601	9	12	6	98	.61	76	53-116
13	MI1 Pitt 6A-N	-	2871	2	26	3	-	-	-	-
14	MI1 Grare N	-	164	5	28	17	72	.80	68	55-79
15	MI3 Jewel Rud	-	1307	2	4	5	39	.10	39	28-73
16	SO1 Meade	-	2030	-	-	14	179	.39	167	149-209
17	CA1 Knob	-	1543	12	-	21	93	.60	80	85-99
18	FL1 N. Inlust	-	30	-	13	15	54	1.18	33	22-50
19	FL1 Wilder	-	194	-	97	13	51	.38	48	41-57
20	CO1 Mo CH Ave	-	50	9	50	33	280	.74	275	190-275

Commercial

	Site	Land Use (%)	Area (A)	Pop. Den (P/A)	% IMP.	No. of OBS	COD Mean	COD COV	COD Median	COD 90% Confidence Limits
1	CO1 Villa Italia	100	14	0	91	27	164	.67	139	109-178
2	NC1 Still Green	100	21	0	69	40	120	.79	84	58-113
3	MI3 SouLMgate	100	179	2	21	9	41	.34	38	31-43
4	MI1 Post Office	100	12	0	100	41	57	.12	48	41-55
5	MN1 Pkg Lot	100	3	0	90	33	95	.70	19	75-95
6	IN1 FAO	100	26	0	90	15	71	.52	55	53-81
7	WI1 Whistler	100	10	0	-	26	59	.76	47	37-64
8	LS1 IC Metcalf	96	59	-	97	36	75	.86	41	11-55
9	FL1 Norma Pl	91	47	-	45	12	41	.43	17	39-47
10	WI3 State Fair	34	29	10	33	21	113	.96	94	84-117

Industrial

	Site	Land Use % Ind	Area (A)	Pop. Den (P/A)	% IMP.	No. of OBS	COD Mean	COD COV	COD Median	COD 90% Confidence Limits
1	MA2 Addison	100	18	0	68	0	-	-	-	-
2	MI1 Indus Drain	100	53	0	64	12	61	.45	53	43-77
3	KS1 Lenexa	96	72	-	44	16	58	.61	51	39-64
4	MI1 Grace S.	52	75	5	39	11	61	.79	47	33-64

Light Ugrn and Manufban

	Site	Land Use % Open	Area (A)	Pop. Den (P/A)	% IMP.	No. of OBS	COD Mean	COD COV	COD Median	COD 90% Confidence Limits
1	OH1 Shaview	100	631	-	-	12	111	.43	102	90-123
2	CO1 Peony Gulch	100	415	0	1	3	73	.33	69	54-83
3	NY1 Cornell	100	25,416	-	4	8	25	.10	21	18-24
4	NY2 Colglisn B1	98	5,248	-	1	11	-	-	-	-
5	NY2 West Br	97	5,138	-	1	0	-	-	-	-
6	NY2 Tyburas Cr	91	17,728	1	11	6	26	.20	25	21-32
7	MI3 Liver Cr	90	2,103	-	6	5	25	.16	25	21-30
8	NY2 Shellit Cont	90	552	-	7	0	-	-	-	-

TABLE 6-4. SITE MEAN TOTAL P EMCs (μg/ℓ)

Residential

	Site	Land Use % Res	Area (Ac)	Pop. Den (P/Ac)	% IMP.	No. of OBS	Total P Mean	COV	Median	90% Confidence Limits
1	CO1 Big Dry Cr	100	31	19	41	16	693	.94	508	356-716
2	CO1 Cherry	100	57	24	18	14	479	.54	332	293-479
3	CO1 Cir Claude	100	107	14	24	18	630	.65	513	392-672
4	MO1 Dufief	100	12	-	-	5	499	.12	435	353-640
5	WI1 Lakeridge	100	68	21	13	48	323	.18	256	217-302
6	OR1 Stratton	100	8	-	-	28	340	.54	300	258-351
7	IL1 John N	100	54	18	19	13	750	.62	616	518-753
8	CS1 Overton	100	58	8	78	8	1636	.91	1207	717-2031
9	MA2 Hemlock	100	50	8	16	5	314	1.05	236	95-491
10	MO1 Bolton Hill	100	34	30	53	19	912	1.15	613	425-883
11	MO1 Homeland	100	23	9	29	13	421	.20	345	263-471
12	MO1 Mt Wash	100	11	12	29	20	856	.83	428	324-566
13	MO1 Pks Hill	100	10	58	76	13	4090	1.05	2825	1845-4326
14	NY1 Lahill's R.	100	73	13	20	24	221	.54	195	163-233
15	NY1 Unqua	100	-	-	-	8	229	.61	196	134-285
16	NY1 Longston	100	166	5	22	13	301	.54	265	206-340
17	NY1 E. Poch.	100	346	18	18	8	448	.47	405	300-546
18	TX1 Rollingwood	100	60	3	21	9	268	.56	231	169-322
19	WA1 Surrey	100	95	9	29	118	239	.83	184	164-205
20	WI1 Burbank	100	63	16	10	45	229	.45	209	188-231
21	WI1 Hastings	100	31	17	51	15	258	.51	230	203-264
22	IL1 Young Apts	100	9	-	6	12	333	.65	279	205-380
23	TX1 Hill	99	178	9	40	14	333	.80	260	189-349
24	WI1 Lincoln	97	36	18	57	23	483	.69	373	298-466
25	TN1 RI	98	81	4	11	11	246	.41	222	183-287
26	IL1 Westleigh	93	41	3	21	41	397	.75	319	268-380
27	KS1 18 - 62nd	92	63	-	37	10	1799	1.11	782	441-1405
28	IL1 John L.	91	33	18	38	32	532	.65	604	502-727
29	TN1 P1	93	69	11	33	11	705	.15	665	552-801
30	WA1 Pine Hills	91	102	18	37	127	264	.81	204	184-227
31	IL1 Mallis S.	90	28	22	37	32	587	.69	483	401-582
32	IL1 Charter Nbg	89	42	-	16	37	395	1.61	208	116-114
33	OR1 Fairidge	98	19	-	34	37	151	.13	254	242-234
34	CO1 Ashby	66	177	9	23	9	1125	.71	834	561-1239
35	IL2 Comb Inlett	85	524	8	13	26	506	.19	293	314-511
36	MA1 Locust	85	154	31	16	6	1228	.19	961	545-1713
37	NC1 11023	84	124	6	27	57	529	.99	175	117-444
38	MA1 Jordan	79	110	10	21	8	448	.95	324	190-555
39	OH1 Stedwell	71	21	15	34	44	388	.65	326	281-379

Mixed

	Site	Land Use %	Area (Ac)	Pop. Den (P/Ac)	% IMP.	No. of OBS	Total P Mean	COV	Median	90% Confidence Limits
1	LS1 Noland	-	16	3	68	7	568	.34	528	413-673
2	MO1 Hampden	-	17	40	72	20	750	1.41	426	243-652
3	IL1 Mallis N	-	12	3	58	26	998	.56	431	370-503
4	MI1 Waverly	-	30	11	68	15	196	.64	167	141-197
5	IN3 SC	-	187	3	43	13	352	.64	296	[illegible]
6	WI1 Wong Lin	-	45	12	81	47	280	.59	240	230-284
7	MA1 Rt 9	-	339	7	23	5	1176	.65	905	[illegible]
8	MA1 Convena	-	100	1	31	8	859	1.99	505	52-4[illegible]
9	MI1 Grand R St	-	453	5	38	22	459	.35	184	[illegible]
10	MI3 Pill AA-S	-	2001	2	21	6	103	.50	91	[illegible]
11	NI2 Cedar	-	76	-	5	12	163	1.90	231	176-101
12	MA1 Roma	-	601	9	13	5	534	.63	407	[illegible]
13	MI3 Pitt 4A-N	-	2871	7	26	6	768	.47	243	[illegible]
14	MI1 Grace N	-	184	5	38	23	394	.64	313	325-410
15	MI3 Swift Run	-	1207	2	4	5	134	.56	137	21-193
16	SO3 Meade	-	2030	-	-	15	1685	1.29	1153	743-1621
17	CP1 Knox	-	3542	12	-	19	418	.50	374	314-451
18	FL1 N. Detuit	-	30	-	13	15	196	.71	151	120-214
19	FL1 Wilder	-	194	-	97	15	229	.52	204	153-255
20	CO1 North Ave	-	59	9	50	32	784	.69	673	570-795

Commercial

	Site	Land Use % Coml	Area (Ac)	Pop. Den (P/Ac)	% IMP.	No. of OBS	Total P Mean	COV	Median	90% Confidence Limits
1	CO1 Villa Italia	100	24	0	91	27	704	1.25	436	316-601
2	NC1 1513 (080)	100	13	0	69	51	395	.56	342	304-323
3	NI3 Southgate	100	173	3	21	12	216	.26	219	153-239
4	WI1 Post Office	100	12	0	100	10	118	.56	94	84-108
5	NM1 Pkg Lot	100	1	0	46	27	173	1.21	114	137-208
6	IN1 C&B	100	26	0	99	15	212	.43	145	162-235
7	WI1 Rustler	100	12	0	-	44	105	.79	81	69-98
8	KS1 U. Metcalf	96	68	-	97	20	246	.98	176	126-241
9	FL1 Norma Ek	91	47	-	45	12	151	.50	135	106-[illegible]
10	WI1 State Fair	79	14	10	[illegible]	19	513	1.19	300	245-443

Urban Open and Nonurban

	Site	Land Use % Oppn	Area (Ac)	Pop. Den (P/Ac)	% IMP.	No. of OBS	Total P Mean	COV	Median	90% Confidence Limits
1	MA1 Spencer	100	633	-	-	13	490	.82	455	319-849
2	IO1 Bridge Gulch	100	405	0	1	7	420	.43	380	274-528
3	NY1 Thurwell	100	28,416	-	4	33	141	.46	125	141-217
4	NY2 English Br	95	5,248	-	1	30	27	1.10	13	13-43
5	NY2 West Br	97	5,138	-	1	31	52	1.27	32	24-41
6	NY3 Tenaqua Cr	91	17,228	3	11	17	195	.42	177	140-271
7	NY1 Traver Cr	90	2,303	-	6	5	91	.36	85	50-171
8	NY2 Sheritt Cool	80	551	-	7	12	264	1.01	186	145-338

Industrial

	Site	Land Use % Ind	Area (Ac)	Pop. Den (P/Ac)	% IMP.	No. of OBS	Total P Mean	COV	Median	90% Confidence Limits
1	MA2 Addison	100	18	3	69	5	114	.89	85	41-176
2	IL1 Indes Drain	100	63	0	64	18	541	.59	472	376-589
3	KS1 Lenexa	98	72	-	44	16	591	.87	452	365-616
4	NC1 Grove St.	62	26	5	19	37	438	.11	365	271-465

Residential

	Site	Land Use % Res	Area (A)	Pop. Den (#/A)	% IMP.	No. of OBS	SOL P Mean	SOL P COV	SOL P Median	SOL P 90% Confidence Limits
1	CO1 Big Dry Cr	100	33	19	41	15	193	.64	163	125-213
2	CO1 Cherry	100	57	24	38	14	212	.47	192	155-237
3	CO1 116/Clauge	100	167	14	24	16	196	.35	179	154-208
4	DC1 Duflef	100	12	-	-	6	448	.55	392	257-598
5	DC1 takerlage	100	68	21	33	47	69	.62	59	51-68
6	DC1 Siration	100	8	-	-	27	251	.65	210	173-256
7	IL1 John N	100	54	18	19	0	-	-	-	-
8	IS1 Overton	100	58	8	38	8	313	41	290	223-378
9	MA2 Nemloct	100	50	5	16	5	167	.89	120	58-249
10	MD1 Bnlton Hill	100	14	30	51	1	-	-	-	-
11	MD1 Nomeranl	100	23	9	29	0	-	-	-	-
12	MD1 Mt Wasn	100	17	12	29	0	-	-	-	-
13	MD1 Pes Hill	100	10	55	76	0	-	-	-	-
14	NY1 Carll's R.	100	73	13	20	0	-	-	-	-
15	NT1 Unqua	100	-	-	-	0	-	-	-	-
16	NT3 Cranston	100	166	5	22	0	-	-	-	-
17	NY1 E. Roch.	100	346	18	38	0	-	-	-	-
18	TX1 Rollingwood	100	60	3	21	0	-	-	-	-
19	WA1 Surrey	100	95	9	29	0	-	-	-	-
20	WI1 Burbant	100	63	15	50	0	-	-	-	-
21	WI1 Haslings	100	33	17	51	0	-	-	-	-
22	FL1 Young Apls	100	9	-	6	0	-	-	-	-
23	TX1 Hart	99	178	9	40	0	-	-	-	-
24	WI1 Lincoln	97	36	18	57	0	-	-	-	-
25	TN1 P2	96	89	4	13	11	132	.63	112	82-154
26	DC1 Westleigh	93	41	3	21	41	223	.71	182	154-215
27	KS1 IC - 92nd	92	63	-	37	10	241	.62	205	147-285
28	IL1 John S.	91	19	18	18	0	-	-	-	-
29	TN1 R1	91	69	11	33	11	136	.94	99	64-153
30	WA1 Lake Hills	91	102	12	37	0	-	-	-	-
31	IL1 Mattis S.	90	28	22	37	0	-	-	-	-
32	FL1 Charler Mdg	89	42	-	16	0	-	-	-	-
33	DC1 Falridge	88	19	-	34	46	297	.87	224	186-270
34	CO1 Xsbury	86	127	9	22	9	212	.22	207	181-232
35	IL2 Comb Inlets	85	524	8	17	24	98	1.21	63	95-88
36	NJ1 Locust	85	154	11	16	6	184	.42*	169	121-235
37	NY1 #1123	84	374	6	22	0	-	-	-	-
38	MA1 Jordan	79	110	10	21	7	202	1.11	136	70-262
39	DC1 Stedwick	78	22	15	34	41	251	.70	206	174-243

Urban Open and Nonurban

	Site	Land Use % Open	Area (A)	Pop. Den (#/A)	% IMP.	No. of OBS	SOL P Mean	SOL P COV	SOL P Median	SOL P 90% Confidence Limits
1	CA1 Sraview	100	633	-	-	12	145	1.20	93	55-150
2	CO1 Paoney Gulch	100	405	0	1	7	137	.46	124	90-171
3	NY3 Thornell	100	28,416	-	4	0	-	-	-	-
4	NY2 English Br	98	5,248	-	1	18	5	.35	5	4-6
5	NY2 West Br	93	5,138	-	1	26	8	.56	7	6-8
6	NY1 Thomas Cr	91	17,728	1	11	0	-	-	-	-
7	MI3 Travel Cr	90	2,301	-	6	5	31	.55	29	18-47
8	NY2 Sheriff Duck	80	552	-	7	12	39	1.11	25	20-14

Mixed

	Site	Land Use %	Area (A)	Pop. Den (#/A)	% IMP.	No. of OBS	SOL P Mean	SOL P COV	SOL P Median	SOL P 90% Confidence Limits
1	KS1 Noland	-	36	3	68	8	165	.52	146	105-203
2	MD1 Hampden	-	17	40	72	0	-	-	-	-
3	IL1 Mattis N	-	17	3	58	0	-	-	-	-
4	MI1 Waverly	-	10	11	68	32	43	.76	34	28-42
5	TN1 SC	-	187	3	43	13	192	1.17	128	81-203
6	WI1 Wood Ctr	-	45	12	81	0	-	-	-	-
7	MA1 Rt 9	-	338	7	23	5	160	.38	150	106-213
8	MA1 Convent	-	100	1	33	6	106	1.83	51	19-138
9	MI1 Graden R Ot	-	453	5	38	20	68	.68	56	44-71
10	MI3 Pitt AA-S	-	2001	2	21	6	13	.32	13	10-17
11	NY2 Cedar	-	76	-	5	26	49	1.16	32	23-44
12	MA1 Anna	-	601	9	12	4	-	-	-	-
13	MI3 Pitt AA-N	-	2871	7	26	6	59	.88	44	24-82
14	MI1 Grece N	-	164	5	28	21	47	.47	42	35-50
15	MI3 Swift Run	-	1207	2	4	5	39	.46	35	23-53
16	SD1 Meade	-	2030	-	-	14	87	.61	74	57-97
17	CA1 Knox	-	1542	12	-	18	169	.99	120	85-168
18	FL1 N. Jesuit	-	30	-	13	0	-	-	-	-
19	FL1 Wilder	-	194	-	97	0	-	-	-	-
20	CO1 North Ave	-	69	9	50	30	228	.95	165	129-212

Commercial

	Site	Land Use % Coml	Area (A)	Pop. Den (#/A)	% IMP.	No. of OBS	SOL P Mean	SOL P COV	SOL P Median	SOL P 90% Confidence Limits
1	CO1 Villa Italia	100	24	0	91	26	293	1.09	198	147-266
2	NC1 1013 (CBD)	100	23	0	69	0	-	-	-	-
3	NY3 Southgate	100	179	2	21	0	-	-	-	-
4	WI1 Post Office	100	12	0	100	0	-	-	-	-
5	NH1 Pkg Lot	100	1	0	90	0	-	-	-	-
6	TN1 CBD	100	26	0	99	15	46	.72	17	28-50
7	WI1 Rustler	100	12	0	-	0	-	-	-	-
8	KS1 IC Metcalf	96	58	-	97	21	116	1.06	80	58-111
9	FL1 Norma Pt	91	42	-	45	0	-	-	-	-
10	WI1 State Fair	74	29	10	77	31	-	-	-	-

Industrial

	Site	Land Use % Ind	Area (A)	Pop. Den (#/A)	% IMP.	No. of OBS	SOL P Mean	SOL P COV	SOL P Median	SOL P 90% Confidence Limits
1	MA2 Addison	100	18	0	69	5	75	.92	55	26-116
2	MI2 Indus Drain	100	63	0	64	14	127	.72	103	76-140
3	KS1 Lenexa	56	72	-	44	16	346	1.66	179	108-296
4	MI1 Grace S.	52	75	5	39	16	59	1.74	37	24-56

TABLE 6-6. SITE MEAN TKN EMCs (μg/ℓ)

Residential

	Site	Land Use % Res	Area (A)	Pop. Den (#/A)	% IMP.	No. of OBS	TKN Mean	TKN COV	TKN Median	TKN 90% Confidence Limits
1	CO1 Big Dry Cr	100	31	19	41	16	2,169	.58	2041	1617-2584
2	CO1 Cherry	100	57	24	38	14	2,609	.39	2430	2014-2904
3	CO1 116/Claude	100	167	14	74	19	2,891	.51	2501	2010-1112
4	OC1 Dufief	100	17	-	-	6	2,066	.11	2048	1841-2278
5	OE1 Lakeridge	100	68	21	33	48	1,774	.64	1450	1259-1670
6	OC1 Stratten	100	8	-	-	28	1,811	.34	1686	1494-1904
7	IL1 John N	100	54	18	19	13	1,994	.81	1107	7520-3811
8	LS1 Overton	100	58	8	38	5	-	-	-	-
9	MA2 Hemlock	100	50	5	16	5	1,679	.55	1217	1971-5252
10	MD1 Bolton Mill	100	14	30	51	18	6,067	.17	4815	1640-6170
11	MD1 Homeland	100	21	9	79	13	6,505	.40	6044	4996-7112
12	MD1 Mt Wash	100	17	12	29	20	6,915	.41	6408	5502-7461
13	MD1 Res Hill	100	10	55	76	13	10,803	.41	9915	8089-12154
14	NJ1 Carll's R.	100	71	11	20	24	1,487	.71	1201	955-1509
15	NY1 Unqua	100	-	-	-	8	1,408	.26	1161	1148-1618
16	NJ1 Cranston	100	166	5	77	11	1,492	.45	1358	1098-1679
17	NE3 E. Rock.	100	346	18	18	7	3,246	.90	7411	1369-4245
18	IL1 Rollingwood	100	60	1	71	9	5,004	2.37	1942	828-4554
19	WA1 Surrey	100	95	9	29	118	1,007	.62	857	785-915
20	WI1 Burbank	100	61	15	50		1,260	.50	1125	908-1195
21	WI1 Hastings	100	13	17	51	15	1,102	.54	969	801-1173
22	FL1 Young Apts	100	9	-	6	12	1,139	.70	1097	791-1522
23	FX1 Mart	99	178	9	40	11	1,016	.75	2412	1674-3474
24	WI1 Lincoln	37	16	18	52	1	-	-	-	-
25	TN1 P2	96	84	4	11	11	476	.11	452	379-519
26	OE1 WestleigN	93	41	3	21	41	1,901	.56	1660	1447-1904
27	KS1 IC - 47nd	92	61	-	17	8	4,187	.94	3051	1790-5200
28	IL1 John S.	41	19	18	18	12	1,527	1.04	2441	1888-1155
29	FN1 Pi	91	69	11	11	11	1,131	.14	1071	894-1281
30	WP1 Lake Mills	91	102	12	37	127	1,056	.71	852	774-438
31	IL1 Mattis S.	90	28	77	37	37	1,440	.69	2825	2343-3406
32	FL1 Charter Hdg	89	42	-	16	12	1,704	.83	1309	899-1905
33	OC1 Fairidge	88	19	-	34	46	2,712	.51	1958	1711-2215
34	CO1 Pasbury	86	177	9	72	1	3,735	.56	3761	2774-4788
35	IL2 Comb Intets	85	524	6	17	0	-	-	-	-
36	WP1 Locust	85	154	11	16	6	2,695	.38	2522	1864-3412
37	NC1 #1021	84	324	F	73	67	1,498	.94	1086	921-1277
38	WA1 Jordan	79	110	10	21	9	1,191	.60	1194	845-1681
39	DC1 Stedwict	78	27	15	34	43	1,895	.57	1543	1435-1881

Urban Open and Nonurban

	Site	Land Use % Open	Area (A)	Pop. Den (#/A)	% IMP.	No. of OBS	TKN Mean	TKN COV	TKN Median	TKN 90% Confidence Limits
1	FA1 Seaview	100	613	-	-	13	3674	.59	1159	7413-4139
2	CO1 Rooney GulcN	105	405	0	1	7	7954	.57	7615	1813-3768
3	NY1 INorrell	100	28,416	-	4	11	1099	.50	482	778-1240
4	NY2 EnglisN Br	98	5,248	-	1	15	340	.50	305	246-128
5	NJ2 West Br	97	5,338	-	1	24	392	.67	147	792-412
6	NJ1 ZNomas Br	91	17,728	1	11	10	1111	.16	1045	854-1279
7	NJ3 Fraser Cr	90	2,101	-	6	5	889	.11	883	796-981
8	NY7 SNeriff Dock	80	552	-	7	13	963	.76	765	628-937

Mixed

	Site	Land Use %	Area (A)	Pop. Den (#/A)	% IMP.	No. of OBS	TKN Mean	TKN COV	TKN Median	TKN 90% Confidence Limits
1	KS1 Noland	-	36	3	68	0	-	-	-	-
2	MD1 HAmpden	-	37	40	72	19	6994	.55	6140	5004-7531
3	IL1 Mattis N	-	17	3	58	15	2872	.64	2172	7006-7805
4	WI1 Waverly	-	10	11	68	15	1490	.51	1116	1142-1516
5	ZN1 SC	-	187	1	41	11	623	.50	558	442-705
6	WI1 Wood Ctr	-	45	12	81	16	1452	.35	1369	1180-1589
7	MA1 Rt 9	-	338	7	23	5	2446	.50	2188	1194-1412
8	MA1 Consent	-	100	1	33	8	1080	.64	910	615-1147
9	WI1 Geagd R Ot	-	451	5	18	21	1631	.47	1506	1104-1740
10	WI1 Pttt AA-5	-	7001	2	21	6	845	.79	811	647-1025
11	NY2 Cedar	-	76	-	5	21	1237	.81	951	724-1749
12	MA1 Anna	-	601	9	12	6	1888	.70	1547	920-7601
13	WI3 Pttt AA-N	-	2891	7	76	6	1056	.22	1011	887-1215
14	WI1 Grace N	-	164	5	28	21	1988	.47	1807	1536-2115
15	NI3 Swift Run	-	1707	2	4	5	1116	.15	1104	958-1773
16	SO1 Meade	-	2010	-	-	11	4741	.50	1807	3010-4807
17	CA1 Knox	-	1542	17	-	70	2770	.75	1775	1171-2298
18	FL1 M. Jesutt	-	30	-	11	15	1388	.49	1244	1011-1542
19	FL1 Wilder	-	194	-	47	15	1107	.11	1056	970-1212
20	CO1 NortN Aue	-	69	4	50	71	4196	.65	1522	2847-4166

Commercial

	Site	Land Use % Comm	Area (A)	Pop. Den (A/P)	% IMP.	No. of OBS	TKN Mean	TKN COV	TKN Median	TKN 90% Confidence Limits
1	CO1 Villa Italia	100	74	0	91	77	1657	.85	2785	2186-3548
2	NC1 1011 (CR01	100	71	0	64	61	1611	.10	1118	1152-1609
3	NY1 SoutNgate	100	174	2	21	13	1256	.45	1144	975-1414
4	WI1 Post Office	100	12	0	100	27	1021	.44	916	915-1035
5	NM1 Pkg Lot	100	1	0	47	18	7110	.66	1761	1116-2754
6	TN1 EBO	100	26	0	99	15	646	.41	597	499-714
7	WI1 Rustler	100	12	0	-	75	1073	.61	916	754-1110
8	KS1 IC Metcalf	96	58	-	47	17	1175	.71	949	720-1252
9	FL1 Nomo Pk	91	47	-	45	12	876	.84	633	437-925
10	WI1 State Fatr	74	29	10	77	8	1656	.65	1189	913-2068

Industrial

	Site	Land Use % Ind	Area (A)	Pop. Den (A/A)	% IMP.	No. of OBS	TKN Mean	TKN COV	TKN Median	TKN 90% Confidence Limits
1	MA2 Addison	100	18	0	69	5	2042	.49	1879	1277-2474
2	WI1 Indus Drain	100	63	0	64	18	1274	.57	1107	891-1376
3	KS1 Lenaka	56	72	-	44	17	1385	.71	1117	796-1568
4	WI1 Grace S.	52	75	5	39	18	1711	.56	1491	1205-1850

TABLE 6-7. SITE MEAN NITRITE PLUS NITRATE EMCs (μg/ℓ)

Residential

	Site	Land Use % Res	Area (A)	Pop. Den (#/A)	% IMP.	No. of OBS	NO_{2+3}-N Mean	COV	Median	90% Confidence Limits
1	CO1 Big Dry Cr	100	33	19	41	15	527	.34	499	429-580
2	CO2 Cherry	100	57	24	38	14	709	.40	657	542-288
3	CO1 116/Claude	100	167	14	24	16	670	.51	529	469-715
4	OC5 Duffer	100	12	-	-	8	420	.35	445	354-558
5	OC1 Lakeridge	100	68	21	33	49	246	.62	633	552-725
6	DC1 Stratton	100	8	-	-	33	418	.86	312	254-395
7	IL1 John K	100	54	18	14	-	-	-	-	-
8	KS1 Overlon	100	58	8	38	-	-	-	-	-
9	MA2 Hemlock	100	50	5	16	4	-	-	-	-
10	MD1 Bolton Hill	100	14	10	52	19	9535	1.59	5073	3246-7930
11	MD1 Homeland	100	23	9	29	13	6343	4.56	1358	570-3234
12	MD1 Mt Wash	100	17	12	29	20	7822	1.56	4229	2253-6492
13	MD1 Res Mill	100	10	55	26	13	6938	1.08	4207	1048-2269
14	NY1 Carill's P.	100	73	13	20	24	230	1.38	442	31E-627
15	NY1 Pnqua	100	-	-	-	8	1593	-	-	1020-1872
16	NY3 Cranston	100	166	5	22	0	-	-	-	-
12	NY3 E. Roch.	100	346	18	38	0	-	-	-	-
18	TY1 Rollingwood	100	60	3	21	9	829	.51	283	581-1055
19	WA1 Surrey	100	95	9	79	0	-	-	-	-
20	WI1 Burbank	100	63	15	50	18	275	.48	699	580-843
21	WI1 Naslings	100	13	17	51	24	625	.39	582	510-664
22	FL1 Young Apls	100	9	-	6	12	311	.64	262	193-355
23	TX1 Harl	99	328	9	40	10	1625	.54	1430	1062-1912
24	WS1 Lincoln	97	36	18	57	3	-	-	-	-
25	IW1 R2	96	89	4	19	11	997	1.34	232	136-412
26	DC1 Westleigh	93	41	9	71	41	202	.59	606	525-700
22	KS1 IC - 92rd	92	63	-	37	0	-	-	-	-
28	IL1 John S.	91	39	28	18	0	-	-	-	-
29	IN1 R1	91	69	11	33	21	578	.72	458	315-665
30	WA1 Lake Hills	91	102	12	37	0	-	-	-	-
31	IL1 Malibs S.	90	28	22	37	0	-	-	-	-
32	FL1 Charler Mdg	89	42	-	16	12	610	.77	483	139-688
33	DC1 Fairidge	88	19	-	34	48	927	.66	772	667-893
34	CO1 Asbury	86	122	9	22	9	881	.21	862	258-980
35	IL2 Comb Inlecs	85	524	8	12	21	296	.55	699	526-848
36	MA1 Locust	85	154	11	16	5	1705	.69	1406	726-2549
37	NC1 41023	84	324	6	27	67	716	.68	591	521-620
18	MA1 Jordnr	79	110	10	21	9	1747	.55	1094	795-1505
39	DC1 Sledwick	78	27	15	34	47	835	.70	686	588-800

Urban Open and Nonurban

	Site	Land Use % Open	Area (A)	Pop. Den (#/A)	% IMP.	No. of OBS	NO_{2+3}-N Mean	COV	Median	90% Confidence Limits
1	CA1 Seaview	105	611	-	-	12	1542	.49	1381	1087-1759
2	OH1 Rooney Gulch	100	405	51	1	7	581	1.03	405	717-756
3	NY3 Thorbell	100	28,416	-	4	5	-	-	-	-
4	NY2 English Br	98	5,248	-	1	30	240	.60	206	173-245
5	NY2 West Br	97	5,338	-	1	11	862	.53	761	656-888
6	NY3 Thomas Cr	91	17,278	5	11	0	-	-	-	-
7	MI3 Trayer Cr	90	2,303	-	6	5	1108	.17	1092	930-1283
8	NY2 Sherrill Bucy	85	552	-	7	33	283	1.02	268	209-143

Mixed

	Site	Land Use %	Area (A)	Pop. Den (#/A)	% IMP.	No. of OBS	NO_{2+3}-N Mean	COV	Median	90% Confidence Limits
1	KS1 Noland	-	36	3	68	0	-	-	-	-
2	MD1 Hampden	-	17	40	72	20	11,529	4.00	2293	1457-5355
1	IL1 Mallis N	-	17	3	58	0	-	-	-	-
4	MI1 Wayerly	-	30	11	68	35	725	.49	696	610-794
5	TN1 SC	-	187	3	43	13	582	1.49	327	192-558
6	WI1 Wood Clr	-	45	12	81	17	251	.69	618	474-805
2	MA1 R1 9	-	338	7	23	5	1,789	.48	1613	1045-2490
8	MA1 Conyenl	-	100	1	13	6	960	.39	894	656-1218
9	MI1 Grand R Ot	-	453	5	38	23	883	.44	807	694-938
10	WI3 P111 AA-S	-	2001	2	21	6	284	.48	256	176-322
11	NY2 Cedar	-	26	-	5	32	248	.72	201	-
12	MA1 Anna	-	601	9	52	6	1,268	.60	1086	688-1214
13	WI3 P111 AA-N	-	2821	7	26	5	469	.24	456	364-571
14	WI1 Grace N	-	164	5	28	21	825	.43	803	693-931
15	WI3 Swifl Run	-	1202	7	4	5	1,033	.26	821	431-1563
16	SO1 Meade	-	2030	-	-	15	616	.40	521	429-680
12	CA1 Knoa	-	1542	12	-	17	1,111	.36	1044	901-1210
18	FL1 W. Jasoll	-	30	-	13	14	126	.54	392	261-422
19	FL1 Willder	-	194	-	92	15	456	.42	412	336-505
20	CO1 Norlh Ave	-	69	9	50	32	1,744	.92	1286	1012-1626

Commercial

	Site	Land Use % Coml	Area (A)	Pop. Den (#/A)	% IMP.	No. of OBS	NO_{2+3}-N Mean	COV	Median	90% Confidence Limits
1	CO1 Villa Italia	100	74	0	91	27	1180	.86	895	708-1143
2	NC1 1013 (CBD)	100	23	0	69	61	1518	.55	980	878-1098
3	NY3 Southgate	100	129	2	21	0	-	-	-	-
4	WS1 Post Office	100	12	0	100	28	708	.68	584	479-712
5	NH1 Pkg Lot	100	15	0	90	28	801	.84	615	486-778
6	TN1 TBD	100	26	0	99	15	662	.62	562	434-778
7	WI1 Rosiier	100	12	0	-	25	781	.69	642	527-791
8	KS1 IC Melcolf	96	58	-	95	0	-	-	-	-
9	FL1 Norma Pk	91	42	-	45	12	356	.46	323	257-405
10	WI1 Slale Fair	74	29	10	72	12	781	.50	702	540-897

Industrial

	Site	Land Use % Ind	Area (A)	Pop. Den (#/A)	% IMP.	No. of OBS	NO_{2+3}-N Mean	COV	Median	90% Confidence Limits
1	MA2 Addison	100	18	5	69	5	1355	.79	1301	997-1706
2	MI1 Indus Drain	100	63	0	64	18	686	.40	637	544-746
3	KS1 Tenaaa	56	72	-	44	0	-	-	-	-
4	MI1 Grace S.	52	75	5	39	12	742	.52	657	534-808

TABLE 6-8. SITE MEAN TOTAL COPPER EMCs (μg/ℓ)

Residential

	Site	Land Use % Res	Area (A)	Pop. Den (#/A)	% IMP.	No. of OBS	Total Copper Mean	COV	Median	90% Confidence Limits
1	CO1 Big Dry Cr	100	33	19	41	16	32	.82	25	18-34
2	CO1 Cherry	100	57	24	38	14	35	1.48	20	12-33
3	CO1 116/Tlaude	100	167	14	24	16	28	.74	22	16-29
4	OC1 Buffef	100	12	-	-	21	-	-	-	-
5	OC1 Laterldgr	100	68	21	33	14	18	.55	33	26-42
6	OE1 Strairon	100	8	-	-	10	28	.30	21	23-32
7	IL1 Jonn N	100	54	18	19	36	83	.85	63	51-78
8	KS1 Drerton	100	58	8	38	12	91	.50	81	43-103
9	MA1 Hemlock	100	60	5	16	0	-	-	-	-
10	MN1 Bolton Hill	100	14	10	51	19	107	.70	88	68-112
11	MO1 Nixelaun	100	23	9	79	13	112	.14	296	252-349
12	MO1 Mt Wash	100	12	12	29	20	26	.78	20	15-26
13	MA1 Yes Hill	100	10	65	76	13	42	.69	30	25-46
14	NY1 Carll's R.	100	71	11	20	0	-	-	-	-
15	NY1 Indua	100	-	-	-	0	-	-	-	-
16	NJ3 Cranston	100	166	5	22	0	-	-	-	-
17	NJ3 E. Aprn.	100	246	18	38	0	-	-	-	-
18	TX1 Rollinawood	100	60	3	21	0	-	-	-	-
19	WA1 Surrey	100	95	9	29	0	-	-	-	-
20	WI1 Burbank	100	61	35	60	0	-	-	-	-
21	WI1 Maximus	100	31	17	51	0	-	-	-	-
22	FL1 Young Apts	100	9	-	6	12	6	.36	6	6-7
23	TX1 Marl	99	378	9	40	0	-	-	-	-
24	WI1 Lincoln	93	16	18	53	0	-	-	-	-
25	TN1 P2	96	89	4	13	11	48	1.54	15	8-22
26	MO1 Westleigh	93	41	3	21	6	31	.43	34	26-40
27	KS1 IL - 9Fna	92	61	-	17	3	-	-	-	-
28	IL1 John S.	91	39	18	18	16	43	.84	33	26-40
29	TN1 P1	91	69	11	13	11	61	.60	52	30-70
30	WA1 Lake Mills	91	102	12	37	3	22	.34	21	15-29
31	OH1 Mallas S.	90	28	22	10	36	45	.76	36	30-44
32	OH1 Chapine Rdg	89	42	-	16	12	10	.94	7	6-11
33	IN1 Fairville	88	10	-	34	9	26	.39	26	19-31
34	CO1 Asbury	86	127	9	22	9	59	.84	45	29-71
35	IL1 Comb Inlets	85	124	8	17	26	49	.53	43	36-51
36	MA1 Locust	85	154	11	16	6	107	.21	104	80-135
37	NE1 #1081	84	104	6	27	66	39	.60	33	29-39
38	MA1 Jordin	79	110	10	31	8	74	.24	72	-
39	OC1 Stagecrl	78	27	15	34	9	61	.15	25	23-26

Mixed

	Site	Land Use %	Area (A)	Pop. Den (#/A)	% IMP.	No. of OBS	Total Copper Mean	COV	Median	90% Confidence Limits
1	XS1 Naland	-	36	1	68	9	48	.38	45	16-57
2	MO1 Hampden	-	13	40	78	30	81	.96	61	45-92
3	IL1 Mattis N	-	17	3	58	17	48	.81	17	31-45
4	MI1 Waverly	-	30	13	69	16	15	.50	13	10-16
5	TN1 SC	-	181	3	41	13	42	1.15	25	14-41
6	WI1 Wood Crr	-	45	12	81	11	-	-	-	-
7	MA1 Pi 9	-	119	7	23	7	112	.49	100	71-141
8	MA1 Tenrrhi	-	180	1	31	7	205	.41	96	71-170
9	MO1 Grand R Dr	-	450	5	38	13	101	.53	76	20-35
10	MI3 Pitc AA-5	-	2001	2	41	0	-	-	-	-
11	NY2 Cedar	-	76	-	5	0	-	-	-	-
12	MA1 Anna	-	601	9	12	5	54	.91	46	30-76
13	MI3 Pitt AA-N	-	2811	7	26	0	-	-	-	-
14	MI1 Grand N	-	164	5	28	9	14	.31	13	11-16
15	MI3 Swift Ann	-	1203	2	4	0	-	-	-	-
16	SO1 Meade	-	2030	-	-	0	-	-	-	-
17	CA1 Knox	-	1542	12	-	17	95	1.14	65	44-96
18	FL1 N. Jesuit	-	30	-	13	15	7	.51	5	5-7
19	FL1 Wilder	-	194	-	67	19	5	.84	5	4-7
20	CO1 North Ave	-	69	9	57	12	71	.83	54	47-74

Commercial

	Site	Land Use % TJxml	Area (A)	Pop. Den (#/A)	% IMP.	No. of OBS	Total Copper Mean	COV	Median	90% Confidence Limits
1	CO1 Villa Italia	100	74	0	91	27	31	.87	25	20-32
2	NC1 TO11 (CBD)	100	23	0	49	61	70	.54	61	52-69
3	NJ3 Sunlogate	100	179	0	21	0	-	-	-	-
4	WI1 Post Office	100	12	2	100	0	-	-	-	-
5	NM1 Pkg int	100	3	0	99	11	166	.13	161	-
6	TX1 CBD	100	26	0	99	15	42	.60	36	28-46
7	WI1 Rustler	100	12	0	-	0	-	-	-	-
8	KS1 11 Metcalf	96	58	-	97	6	81	.33	79	10-51
9	IL1 Norma 2k	93	48	-	65	12	11	.42	10	8-13
10	WI1 State Fair	74	24	10	77	0	-	-	-	-

Urban Uben and Nonurban

	Site	Land Use % Open	Area (A)	Pop. Den (#/A)	% IMP.	No. of OBS	Total Copper Mean	COV	Median	90% Confidence Limits
1	LA1 Seashore	100	633	-	-	12	59	.33	55	46-65
2	CO1 Rooney Gulch	100	405	0	1	9	37	1.09	25	17-48
3	NJ3 Thornell	100	28,416	-	4	0	-	-	-	-
4	NY2 Ingleish Cr	98	6,248	-	1	0	-	-	-	-
5	NY2 West Cr	97	5,538	-	1	0	-	-	-	-
6	NJ3 Indian Cr	91	17,725	1	11	0	-	-	-	-
7	NJ3 Tegue Cr	90	7,303	-	6	0	-	-	-	-
8	NJ3 Sherrill Lake	90	552	-	7	0	-	-	-	-

Industrial

	Site	Land Use % Ind	Area (A)	Pop. Den (#/A)	% IMP.	No. of OBS	Total Copper Mean	COV	Median	90% Confidence Limits
1	MO2 Mariscu	100	18	0	49	0	-	-	-	-
2	MI1 Innus Drain	100	63	0	64	6	30	.53	37	25-43
3	KS1 Kenoma	96	72	-	44	5	49	.24	36	28-41
4	MI1 Grove St	96	15	0	37	7	25	.05	21	14-27

TABLE 6-9. SITE MEAN TOTAL LEAD EMCs (μg/ℓ)

Residential

	Site	Land Use % Res	Area (A)	Pop. Den (#/A)	% IMP.	No. of OBS	Total lead Mean	COV	Median	90% Confidence Limits
1	CO1 Big Dry Cr	100	13	19	41	16	183	.88	117	98-191
2	CO1 Cherry	100	51	24	18	14	194	.92	143	99-207
3	CO1 Glen Glade	100	167	14	24	16	292	.87	210	151-292
4	DC1 Dufief	101	12	-	-	1	-	-	-	-
5	DL1 Lakeridge	100	68	21	33	18	227	.54	201	164-245
6	DC1 Stratton	100	8	-	-	0	-	-	-	-
7	IL1 John N	100	84	18	19	16	717	.71	191	158-211
8	IS1 Overton	100	58	8	16	11	118	.19	128	104-157
9	MA2 Hemlock	100	55	5	16	0	-	-	-	-
10	MD1 Rolling Hill	100	14	30	51	19	2745	4.53	592	295-1188
11	MD1 Moneland	100	21	9	29	10	76	.48	69	56-86
12	MD1 Mt Wash	100	17	12	29	20	86	.48	77	65-92
13	MD1 Res Mill	100	10	55	76	17	461	1.86	218	119-399
14	NJ1 Carll's P	100	71	13	20	0	-	-	-	-
15	NY1 Tenqua	100	-	-	-	8	88	1.16	52	26-103
16	NY1 Cranstun	100	166	5	22	31	34	.77	27	19-38
17	NY3 E. Roch.	100	146	18	38	8	191	.89	144	86-240
18	NJ1 Rollingwood	100	60	3	21	0	-	-	-	-
19	WA1 Surrey	100	99	9	29	118	152	.51	136	126-146
20	WI1 Bimbank	101	63	15	51	44	95	.72	77	65-91
21	WI1 Hastings	100	33	17	51	15	108	.67	90	75-107
22	IL1 Young Apts	101	9	-	6	12	76	1.03	51	14-82
23	NJ1 Mart	99	178	9	40	0	-	-	-	-
24	WI1 Lincoln	91	16	18	57	22	303	1.29	200	141-280
25	TN1 42	96	89	4	13	11	111	.41	121	99-151
26	OC1 Westleigh	97	41	1	21	5	186	.37	184	157-216
27	IS1 IL - 82nd	92	61	-	37	1	-	-	-	-
28	IL1 John S.	91	39	18	18	13	217	.80	169	138-208
29	TN1 41	91	69	11	11	11	440	.61	376	277-511
30	WA1 Lake Wills	91	102	17	37	126	192	.67	159	140-174
31	IL1 Mallis S.	98	28	21	17	37	595	1.12	196	308-508
32	IL1 Charter Hdg	89	92	-	16	12	44	1.60	26	14-47
33	OC1 Fairridge	68	19	-	14	1	-	-	-	-
34	LB1 Asbury	86	127	9	28	9	431	.12	151	151-524
35	IL2 Comb Inlets	95	524	6	17	24	122	1.01	217	169-304
36	MA1 Locust	85	154	11	14	6	213	.67	225	116-171
37	MP1 #1023	94	129	6	27	66	254	.98	182	151-215
38	MA1 Jordan	79	110	10	21	9	168	.12	160	112-194
39	OC1 Stydwick	78	27	15	34	11	141	.41	110	105-161

Mixed

	Site	Land Use 1	Area (A)	Pop. Den (#/A)	% IMP.	No. of OBS	Total lead Mean	COV	Median	90% Confidence Limits
1	KS1 Noland	-	36	1	68	9	164	.49	147	110-196
2	MD1 Hampden	-	17	40	32	20	227	.82	176	131-232
3	IL1 Mattis N	-	17	3	58	41	554	1.06	180	103-478
4	MI1 Waverly	-	30	11	68	24	311	1.09	75	55-102
5	TN1 SC	-	187	1	43	13	237	.31	227	195-264
6	WI1 Wood Ctr	-	95	12	81	45	582	.94	424	348-517
7	MA1 Rt 9	-	338	7	11	7	419	1.02	167	165-471
8	MA1 Convent	-	100	1	13	7	196	.94	143	80-257
9	MI1 Grand R Ot	-	451	5	38	18	122	.90	91	66-125
10	MI3 Pitt AA-S	-	2001	2	21	6	21	1.63	11	4-28
11	NY2 Cedar	-	76	-	5	28	75	1.25	41	34-69
12	MA1 Anna	-	601	9	12	4	-	-	-	-
13	MI3 Pitt AA-M	-	2871	7	26	5	61	.71	50	27-93
14	MI1 Grace A	-	164	5	28	18	170	1.79	99	65-151
15	MI3 Swift Run	-	1207	2	4	4	-	-	-	-
16	SO1 Meade	-	2000	-	-	24	381	1.13	254	165-390
17	CA1 Knox	-	1542	12	-	22	495	.99	351	259-475
18	FL1 N. Jesult	-	10	-	13	15	56	1.22	35	13-54
19	FL1 Wilder	-	194	-	97	15	86	.85	55	48-91
20	CO1 North Ave	-	69	9	50	11	158	.81	278	226-343

Commercial

	Site	Land Use % Coml	Area (A)	Pop. Den (#/A)	% IMP.	No. of OBS	Total lead Mean	COV	Median	90% Confidence Limits
1	CO1 Villa Italia	100	24	6	91	27	262	1.21	187	172-224
2	MO1 1011 (CBD)	100	27	0	69	61	387	.81	296	254-349
3	NY3 Southgate	100	179	0	21	13	47	.50	42	31-53
4	WI1 Post Office	100	12	3	100	59	191	.93	146	128-173
5	MN1 Pkg Lot	100	1	0	90	11	208	.93	162	121-197
6	TN1 CBD	100	26	5	99	15	158	.52	140	117-175
7	WI1 Rustler	100	12	0	-	44	323	.70	98	83-115
8	RS1 IC Metcalf	96	58	-	97	7	-	-	-	-
9	FL1 Marma Fk	91	47	-	46	12	46	1.01	37	21-49
10	WI1 State Fair	24	29	10	37	27	409	.86	310	243-396

Urban Open and Nonurban

	Site	Land Use % Open	Area (A)	Pop. Den (#/A)	% IMP.	No. of OBS	Total lead Mean	COV	Median	90% Confidence Limits
1	FN1 Sawmill	100	62	-	-	7	214	.59	159	91-279
2	CO1 Bonner Gulch	100	355	1	1	7	52	.41	39	22-69
3	NY3 Thornell	100	34,416	-	4	10	12	.42	11	9-14
4	NY2 Endrich Br	98	5,242	-	1	21	4	.69	8	6-10
5	NY2 West Br	97	1,378	-	1	25	78	1.40	22	15-31
6	NY3 Thomas Cr	91	33,126	1	11	22	75	1.65	18	10-31
7	NY3 Beaver Cr	96	2,303	-	6	9	-	-	-	-
8	NY2 Sherrill Ducr	90	557	-	7	17	132	1.09	91	73-117

Industrial

	Site	Land Use % Ind	Area (A)	Pop. Den (#/A)	% IMP.	No. of OBS	Total lead Mean	COV	Median	90% Confidence Limits
1	MA2 Madison	100	18	0	69	0	-	-	-	-
2	MI1 Maus Sprain	100	63	0	64	13	110	.77	93	65-124
3	KS1 Lenexa	56	72	-	44	6	-	-	-	-
4	MI1 Grace S.	52	15	5	39	13	117	.76	92	66-128

TABLE 6-10. SITE MEAN TOTAL ZINC EMCs (μg/ℓ)

Residential

	Site	Land Use Res	Area (A)	Pop. Den (#/A)	% IMP.	No. of OBS	Total Zinc Mean	CoV	Median	90% Confidence Limits
1	CO1 Eng Dry Cr	100	37	19	41	15	198	.80	151	110-208
2	CO1 Cherry	100	57	24	38	19	195	.61	155	126-217
3	CO1 116 Clayde	100	167	14	24	13	195	.66	158	121-208
4	MI1 Duffel	100	22	-	-	8	156	.26	151	127-179
5	MI1 Lexington	100	58	27	31	48	129	.70	106	91-121
6	NC1 Stratton	100	8	-	-	28	84	.42	76	66-88
7	TC1 John M	100	34	18	19	0	-	-	-	-
8	AL1 Cherise	100	58	8	18	33	831	.97	590	399-891
9	MA2 Fenlace	100	50	5	16	0	-	-	-	-
10	MD1 Hollow Hill	100	14	10	52	19	1188	2.21	573	117-971
11	MD1 Homeland	100	31	6	29	33	120	.15	113	96-114
12	MD1 Mt Wash	100	17	12	39	29	97	.58	91	67-98
13	MD1 Pen Hill	100	10	55	76	11	521	1.20	140	211-542
14	MD1 Carrollc C	100	71	11	20	0	-	-	-	-
15	MD1 Ohuus	100	-	-	-	0	-	-	-	-
16	MD3 Grantsge	100	160	5	22	9	415	.88	117	195-499
17	MD1 L. Foch	100	346	18	39	8	988	1.10	127	180-594
18	TX1 Rollingwood	100	80	1	21	0	-	-	-	-
19	WA1 Sunney	100	91	9	29	118	174	.42	114	107-121
20	WI1 Burbank	100	63	15	50	18	106	1.14	62	42-95
21	WI1 Hastings	100	33	17	51	21	106	1.20	69	49-99
22	WI1 Young Apts	100	9	-	6	12	60	.45	55	44-69
23	TX1 Hart	99	276	0	40	8	-	-	-	-
24	WI1 Lincoln	97	36	18	57	0	-	-	-	-
25	TN1 RZ	96	89	4	37	11	91	.52	81	61-109
26	OC1 Hessleign	93	41	1	21	14	67	.96	48	38-61
27	KS1 IC - 92nd	92	63	-	17	3	-	-	-	-
28	IL1 John S.	91	39	18	18	1	-	-	-	-
29	SM1 R1	91	69	11	11	11	412	.59	754	261-421
30	WA1 Lake Mills	91	102	32	17	126	120	.51	107	99-115
31	IL1 Malhis S.	90	28	22	17	0	-	-	-	-
32	FL1 Charcar Nag	89	47	-	16	12	54	1.02	38	35-59
33	OC1 Fairidge	88	19	-	10	44	86	.52	76	67-86
34	OC1 Asbury	86	127	9	22	9	149	.61	295	206-422
35	IL2 Comb Inlets	85	524	8	12	27	210	.69	189	154-212
36	MA1 Locust	85	154	11	16	6	247	.11	216	184-301
37	NC1 #1073	84	324	6	27	66	178	.81	118	119-160
38	MA1 Jordan	79	110	10	21	9	218	.28	210	177-249
39	OC1 Sledwick	78	27	15	14	45	91	.70	75	64-86

Mixed

	Site	Land Use	Area (A)	Pop. Den (#/A)	% IMP.	No. of OBS	Total Zinc Mean	CoV	Median	90% Confidence Limits
1	VS1 Holland	-	35	3	68	9	[illegible]	[illegible]	525	[illegible]
2	MD1 Hampden	-	13	40	72	17	318	.95	112	[illegible]
3	IL1 Mottis N	-	17	3	96	0	-	-	-	-
4	MI1 Waverly	-	30	11	56	17	121	95	110	[illegible]
5	TN1 SC	-	197	3	83	12	146	48	134	[illegible]
6	WI1 Wego Clr	-	45	17	61	22	476	1.21	305	[illegible]
7	MA1 Rl y	-	738	3	[illegible]	0	284	39	225	[illegible]
8	MA1 Convent	-	100	1	33	7	217	60	174	[illegible]
9	MI1 Grand Rill	-	457	6	38	14	745	[illegible]	60	[illegible]
10	WI1 Pirl AA-S	-	2901	2	21	4	-	-	-	-
11	FX2 Cedar	-	76	-	5	0	-	-	-	-
12	MA1 Anna	-	601	9	13	5	176	1.50	99	[illegible]
13	MI3 Prir 4A-h	-	2871	7	26	4	-	-	-	-
14	MI1 Grale M	-	154	5	28	9	149	35	140	[illegible]
15	MI3 Sweet Bul	-	1207	2	4	7	-	-	-	-
16	SD1 Meade	-	2610	-	-	0	-	-	-	-
17	CA1 Knox	-	1542	12	-	21	203	.55	31	[illegible]
18	FL1 N. Jesuit	-	30	-	11	15	94	68	79	[illegible]
19	FL1 Wilder	-	194	-	97	15	51	.95	27	[illegible]
20	CO1 North Ave	-	69	9	50	13	541	.82	471	[illegible]

Commercial

	Site	Land Use Comm	Area (A)	Pop. Den (#/A)	% IMP.	No. of OBS	Total Zinc Mean	CoV	Median	90% Confidence Limits
1	CO1 Pello Hallta	100	74	0	41	27	120	.92	397	145-113
2	NC1 1911 (CBD)	100	21	0	10	60	521	.51	478	428-526
3	MI1 Soulnqale	100	179	2	21	9	1418	1.56	517	214-1247
4	WI1 Prsl Office	100	32	0	110	22	146	1.16	44	71-124
5	MN1 Plg Lal	100	1	0	97	31	511	.65	410	361-517
6	TN1 CBD	100	26	0	99	15	115	.41	289	240-249
7	WI1 Bustler	100	12	0	-	19	156	.75	175	96-161
8	KS1 IC Melrglr	96	58	-	97	7	465	.79	168	272-511
9	FL1 Norma Pk	91	47	-	45	12	17	.88	29	19-41
10	WI1 Llale Fare	74	29	10	77	7	180	.65	234	150-163

Urban Open and Minurban

	Site	Land Use Open	Area (A)	Pop. Den (#/A)	% IMP.	No. of OBS	Total Zinc Mean	CoV	Median	90% Confidence Limits
1	CO1 Seaview	100	633	-	-	17	190	.69	160	125-205
2	CO1 Bogner Gulch	100	425	0	1	7	115	.56	91	61-136
3	NY3 Tbgrnd1	100	15,415	-	4	9	292	2.39	306	110-720
4	NY3 English Pr	99	5,248	-	1	0	-	-	-	-
5	NY3 Fest Br	97	5,138	-	1	17	-	-	-	-
6	NY3 Thomas Cr	91	17,724	1	11	9	1067	3.14	327	124-839
7	MI3 Prsvec Cr	90	2,967	-	6	2	-	-	-	-
8	MI3 Sheriff Gncl	80	552	-	7	9	-	-	-	-

Industrial

	Site	Land Use Ind	Area (A)	Pop. Den (#/A)	% IMP.	No. of OBS	Total Zinc Mean	CoV	Median	90% Confidence Limits
1	MA2 Addison	100	10	0	69	8	-	-	-	-
2	MI1 Ladys Drain	100	62	0	64	7	244	.42	225	167-303
3	KS1 Lenexa	56	22	-	44	6	2721	2.29	791	217-2854
4	MI1 Grace S.	52	75	5	39	7	233	.54	196	135-254

* All observations below detection limit.

These tables (one for each pollutant) list each of the appropriate sites in the data base, grouped according to general land use category. Some pertinent site characteristics are identified: drainage area, population density, and the percentage of the total area covered by impervious surfaces. The number of monitored storms at each site is tabulated. Urban runoff quality is summarized by the mean and median EMC for all storms monitored at the site, the storm-to-storm variability of EMC's (defined by the coefficient of variation), and the 90 percent confidence limits for the site median EMC.

Transferability of Data

The urban runoff loading site EMC data were carefully examined in an effort to determine whether specific groupings of results would suggest the presence of consistent patterns of similarities and/or differences that could be used to support estimates of urban runoff characteristics at unmonitored locations and sites.

Variability of EMCs at a Site. Inspection and analysis of the individual site coefficient of variation entries in Tables 6-1 through 6-10 shows that with very few exceptions (usually associated with constituents that were monitored in fewer than 10 storm events) the coefficients of variation fall in the range of 0.5 to 1.0. This applies to all constituents except TSS, for which the range in coefficients of variation is more like 1 to 2.

The frequency of occurrence of any EMC of interest can be estimated readily from the coefficient of variation by using the procedures outlined in Chapter 5. Thus, for TSS, 90 percent of the individual storm events at a given site will have EMCs that do not exceed a value of roughly 3 to 5 times the median EMC value for that site. For the other constituents, 90 percent of the individual storm events at a site will have EMCs less than about 2 to 3 times the median EMC value for that site. More refined estimates and values for other exceedance probabilities can be readily computed using the relationships presented in Chapter 5.

Effect of Geographic Location. Figures 6-4 through 6-13 indicate the range of median EMC's at individual sites, grouped by project. The land use category of the site is indicated by the letter R for residential, M for mixed, and C for commercial/industrial, and the plotting position is the median value as given by the data in Tables 6-1 through 6-10. The ends of the bars for each project are the highest and lowest 90 percent confidence limits for site median EMCs at the project for the constituent in question. Inspection of Figures 6-4 through 6-13 indicates that, for any given constituent, each project can be put into one of three rather general categories: (1) low EMCs and tightly grouped; (2) average characteristics; and (3) wide range and high EMCs. Using the numbers 1, 2, and 3 as shorthand, project categories for each constituent are summarized in Table 6-11. Although no site is category consistent for all constituents, WASHCOG (DC1), Tampa (FL1), Lansing (MI1), and Ann Arbor (MI3) tend to have lower and more tightly grouped EMCs than the others while Kansas City (KS1), Lake Quinsigamond (MA1), and Baltimore (MD1) tend to have a wider range and higher EMCs than the others. Thus we can conclude that some projects represented in the database appear, from the monitoring sites selected, to tend towards somewhat higher or lower EMC median values and ranges than the bulk of the projects. However, there are no distinct geographical patterns revealed.

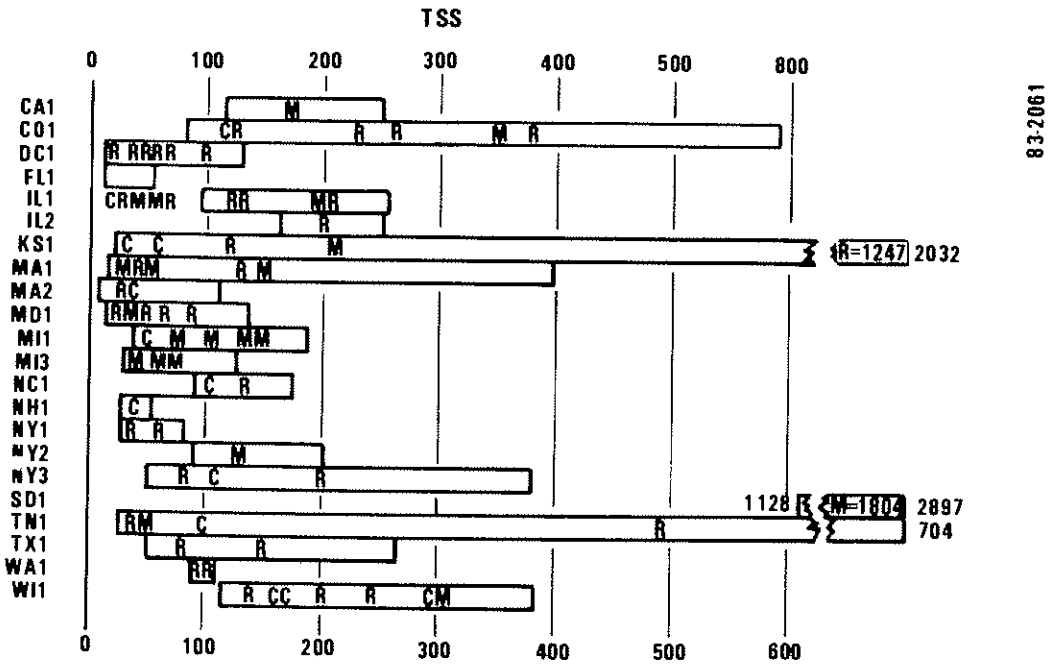

Figure 6-4. Range of TSS EMC Medians (mg/l) by Project

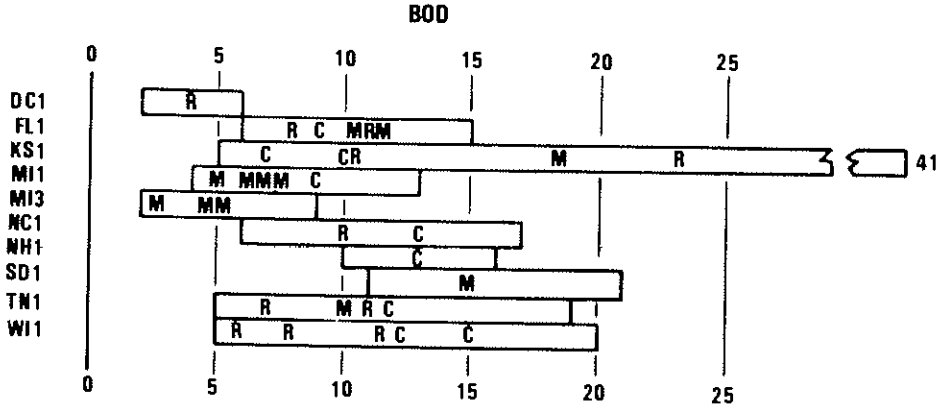

Figure 6-5. Range of BOD EMC Medians (mg/l) by Project

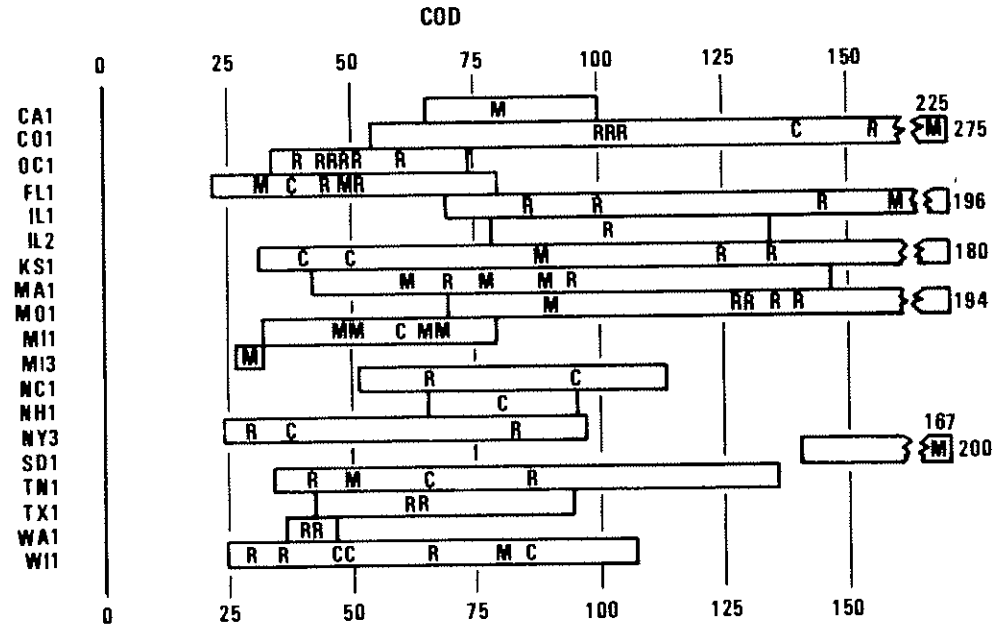

Figure 6-6. Range of COD EMC Medians (mg/l) by Project

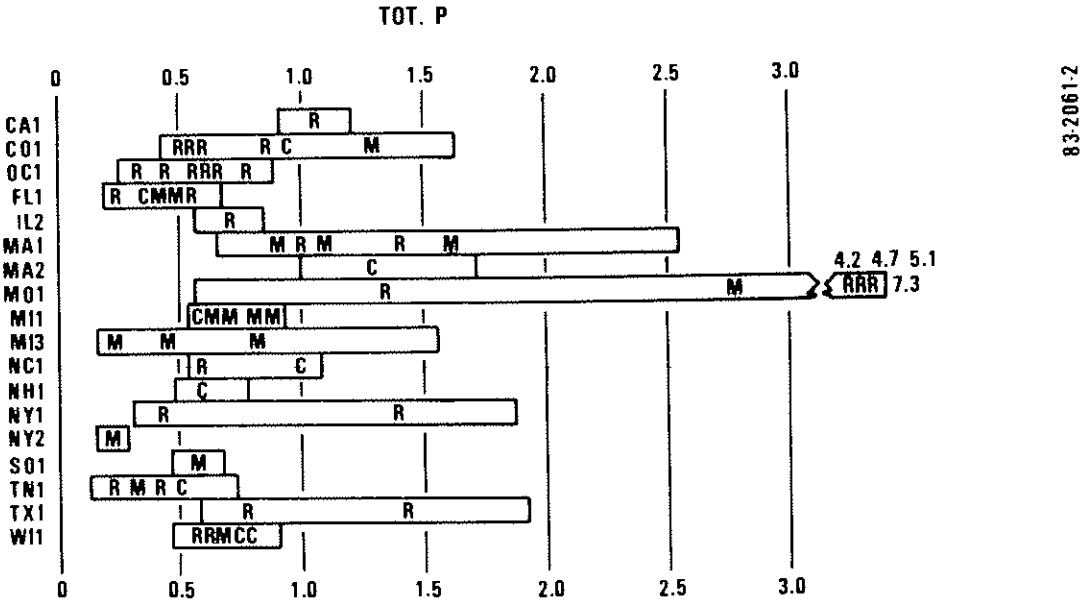

Figure 6-7. Range of Total P EMC Medians (mg/l) by Project

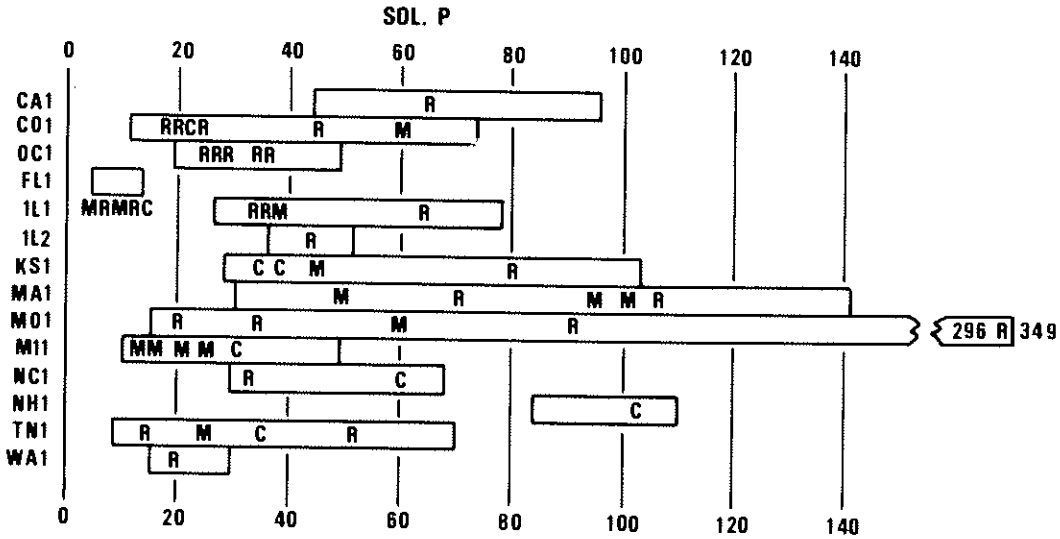

Figure 6-8. Range of Soluble P EMC Medians (mg/l) by Project

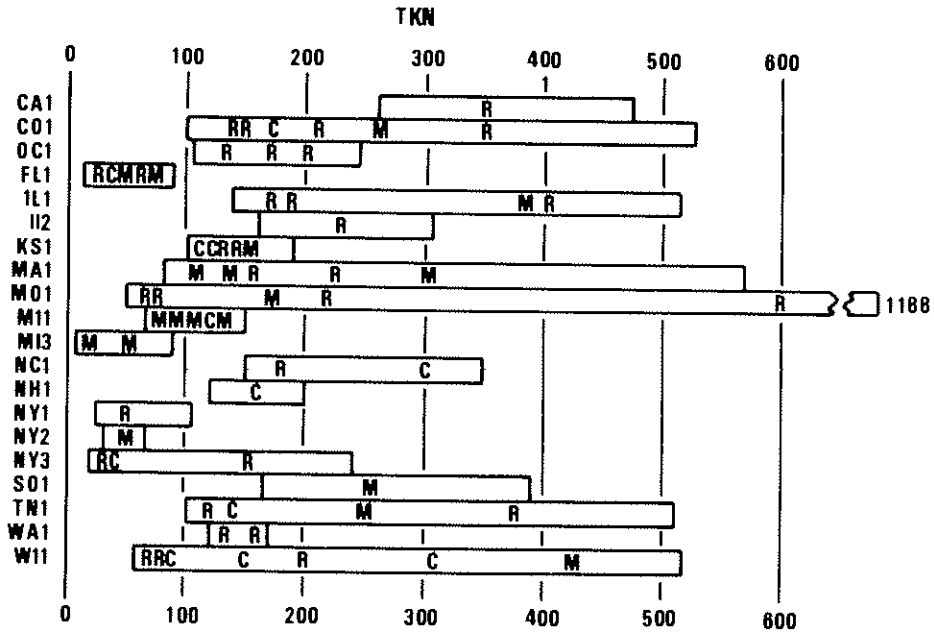

Figure 6-9. Range of TKN EMC Medians (mg/l) by Project

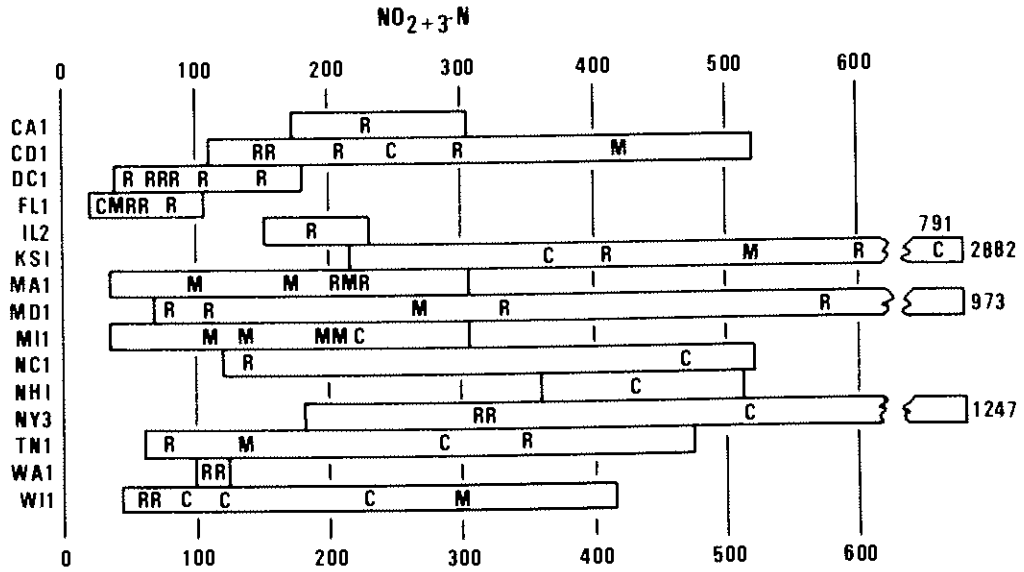

Figure 6-10. Range of NO_{2+3}-N EMC Medians (mg/l) by Project

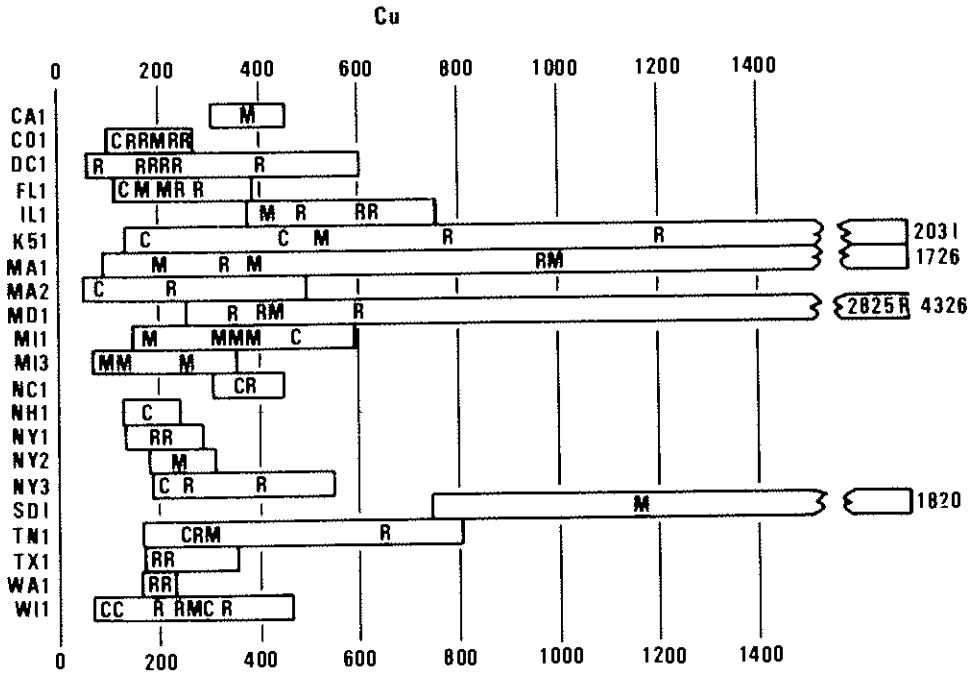

Figure 6-11. Range of Total Cu EMC Medians (µg/l) by Project

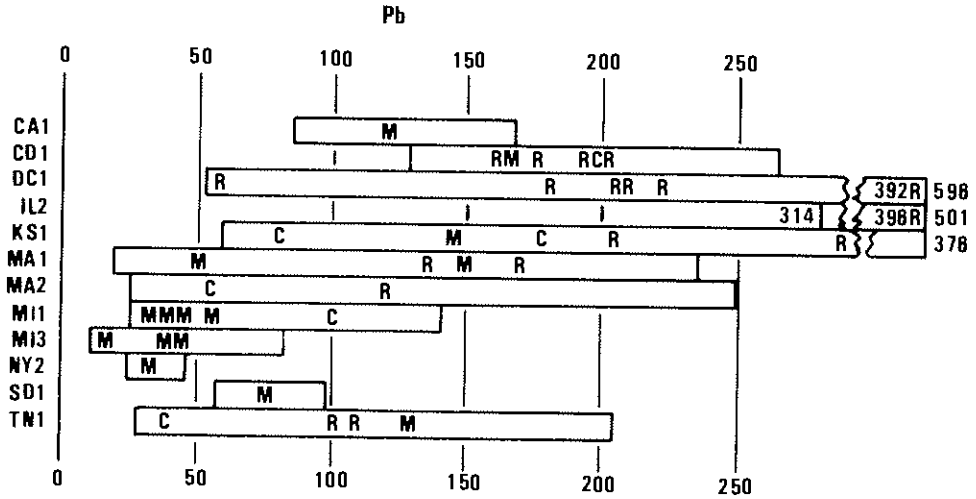

Figure 6-12. Range of Total Pb EMC Medians (µg/l) by Project

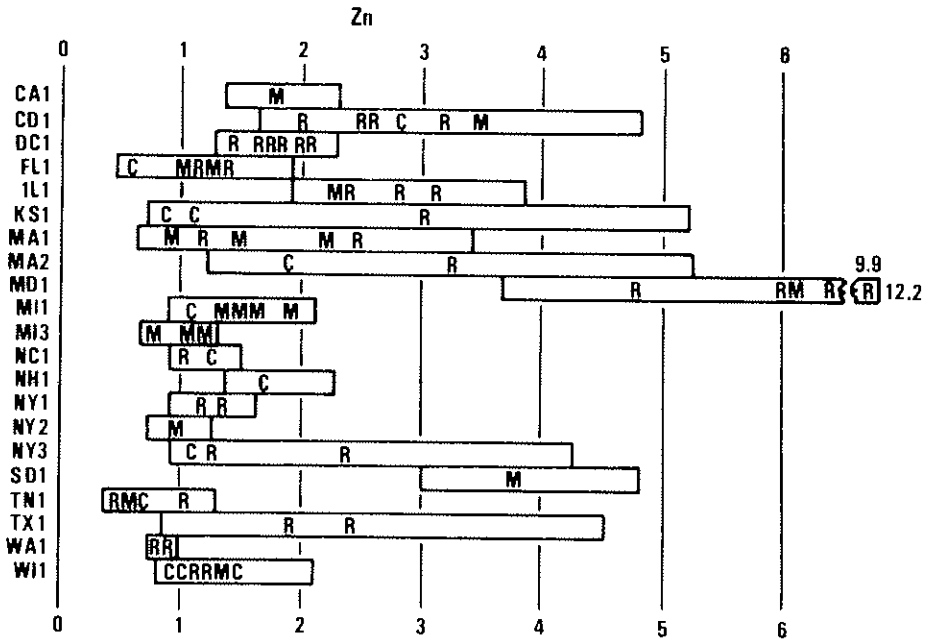

Figure 6-13. Range of Total Zn EMC Medians (µg/l) by Project

TABLE 6-11. PROJECT CATEGORY SUMMARIZED BY CONSTITUENT

	CO1	DC1	FL1	IL1	KS1	MA1	MD1	MI1	MI3	NY3	TN1	WI1
TSS	3	1	1	2	3	3	1	1	1	2	3	2
BOD	-	-	2	-	3	-	-	2	1	-	2	2
COD	3	1	1	3	3	2	3	1	-	1	2	2
Tot. P.	1	2	1	2	3	3	3	2	1	2	2	2
Sol. P.	2	3	-	-	3	2	-	2	1	-	2	-
TKN	2	1	1	2	2	2	3	1	1	2	1	1
NO_{2+3}-N	2	1	1	-	-	3	3	1	2	-	1	1
Tot. Cu	2	1	1	2	2	3	3	1	-	-	2	-
Tot. b	2	1	1	2	1	2	3	1	-	1	2	2
Tot. Zn	2	1	1	-	3	2	3	2	-	3	2	2

It must also be realized that had any particular project monitored other local sites (or additional sites) its categorization could well change. This can be seen qualitatively by perusing Figures 6-4 through 6-13 and mentally dropping the highest or lowest site from each grouping. Although some locations, such as Tampa, will undoubtably and appropriately be influenced by the relatively low EMCs and tight groupings found there in estimating probable values for other urban sites in the area, there is little to warrant attributing similar characteristics to other locations in the same geographical region. For the other locations it would appear that individual site differences eclipse any possible geographic ones.

Effect of Land Use Category. The data in Tables 6-1 through 6-10 were presented by land use category; residential, mixed, commercial, industrial, and open/non-urban. The question to be addressed here is the extent to which such site categorization can be used to assist in predicting EMC parameters for unmonitored sites. Two approaches were used. In the first, the site data for each project with more than three sites were normalized by dividing the site median and its upper and lower 90 percent confidence limits by the average project median value for the constituent in question. This procedure simply allows all constituents to be viewed on a common scale that is centered at unity. An example of the result is given in Figure 6-14. A legend is provided in Figure 6-14(a) showing the lower 90 percent confidence limit, the upper 90 percent confidence limit, and the location of the point estimate of the median within this confidence interval for a hypothetical constituent. Sites that fall to the right of the unity line have higher EMCs than average for this location, while sites that fall to the left of the unity line have lower EMCs than average. Thus, the interpretation is that for this location, Site #1 is the "dirtiest" (has the highest EMC value), Site #3 is the "cleanest", and Site #2 is in between, being somewhat "dirtier" than average. Since the 90 percent confidence limits for these three sites no not overlap, we know that this difference is statistically significant.

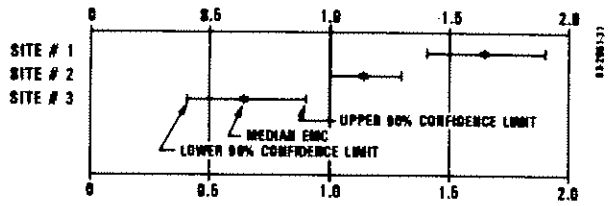

(a) Significantly Different Sites

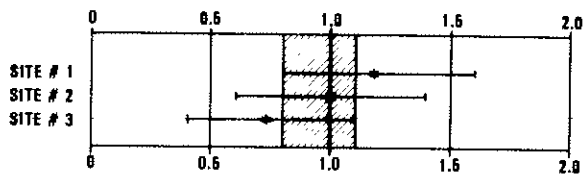

(b) Sites with No Significant Difference

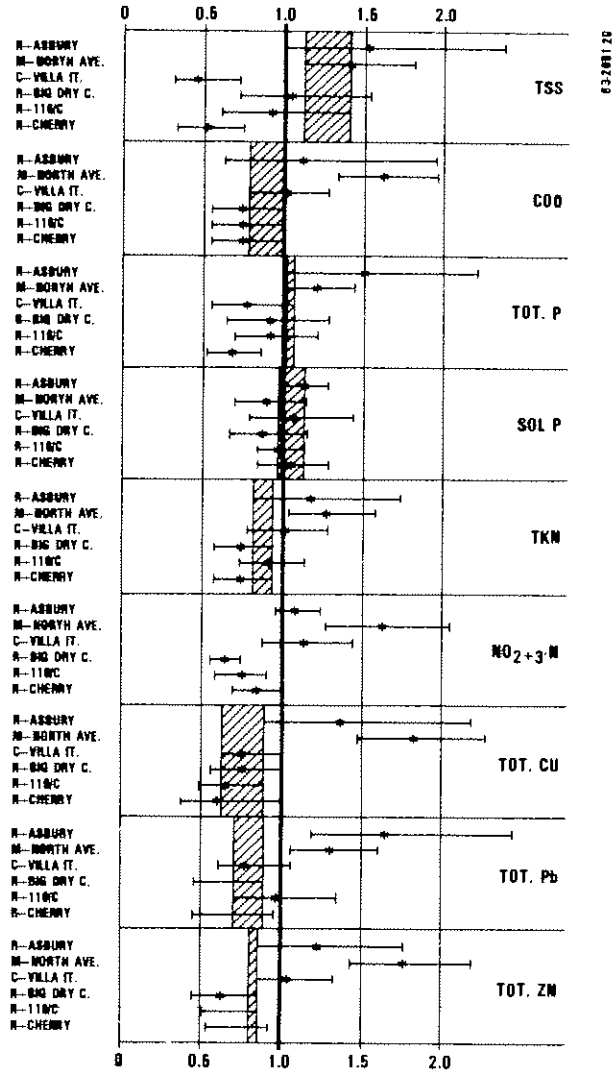

(c) EMC Data from Denver (CO1)

Figure 6-14. Range of Normalized EMC Medians at Denver (CO1)

The actual data for the Denver (CO1) project are presented in Figure 6-14(c). With the exception of nitrate + nitrite, there is little to no statistically significant difference among the majority of the sites for each constituent examined. The lack of consistency among the sites over the various constituents is apparent. One can observe that the Cherry site (residential) tends to plot at the lowest position for all constituents, suggesting that it is the "cleanest," the Asbury site (also residential) tends to plot at the highest position, suggesting that it is the "dirtiest." The Big Dry Cottonwood site, which is also residential, tends to fall between these two. Careful examination of other site data does not provide any evidence to explain this difference in response for sites in the same land use category at the same location. Thus, based on the information presented in Figure 6-14(c), one is forced to conclude that land use category does not provide a useful basis for predicting differences in site EMC values, at least for this project.

When the foregoing type of analysis was applied to the other applicable NURP projects, the results were the same. As another example, the range of normalized EMC medians at Tampa (FL1) and WASHCOG (DC1) are shown in Figure 6-15. These are essentially similar to the Denver results just discussed.

The WASHCOG data presented in Figure 6-15(b) suggest that there is little consistent difference among residential land use sites at that project. The data from Champaign/Urbana (IL1) presented in Figure 6-16 suggest just the opposite. As a part of this project's experimental design, two site pairs were selected. The sites of each pair were expected to respond in a similar fashion. That they do and that the responses of the two pairs are different from each other for most constituents is apparent in Figure 6-16. However, there is no consistency in the pair responses. For example, the Mattis pair has significantly higher EMC values for TSS, COD, and Total Pb, while the John Pair is higher in Total P. The residential land use category for these sites provides no explanation of these differences in response.

Based upon the foregoing approach, we can conclude that, while there can be differences in the responses of different sites at a given location, significant differences do not appear to be widespread, and where they occur, the site land use category is virtually useless in trying to understand or predict them.

The second approach to examining the effect of land use category on the EMC parameters of a site makes use of the observation, discussed earlier, that geographic location has no discernible effect on site response. Since site to site variability was shown to be very well represented by the lognormal distribution, analysis procedures similar to those described previously for characterizing an individual site were applied. Table 6-12 lists the median EMCs for all sites within each land use category. The coefficient of variation quantifies the variability of site characteristics within the land use category. To the extent that the sites included in this database provide a "representative" sample of the land use classifications, then the information summarized by Table 6-12 indicates the effect of land use on urban storm runoff pollutant discharges.

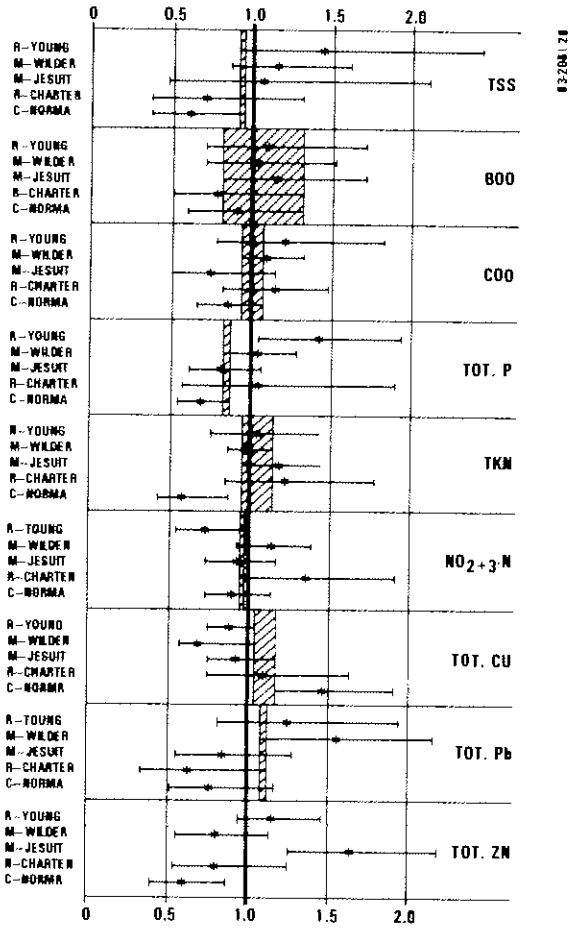

(a) Tampa Sites

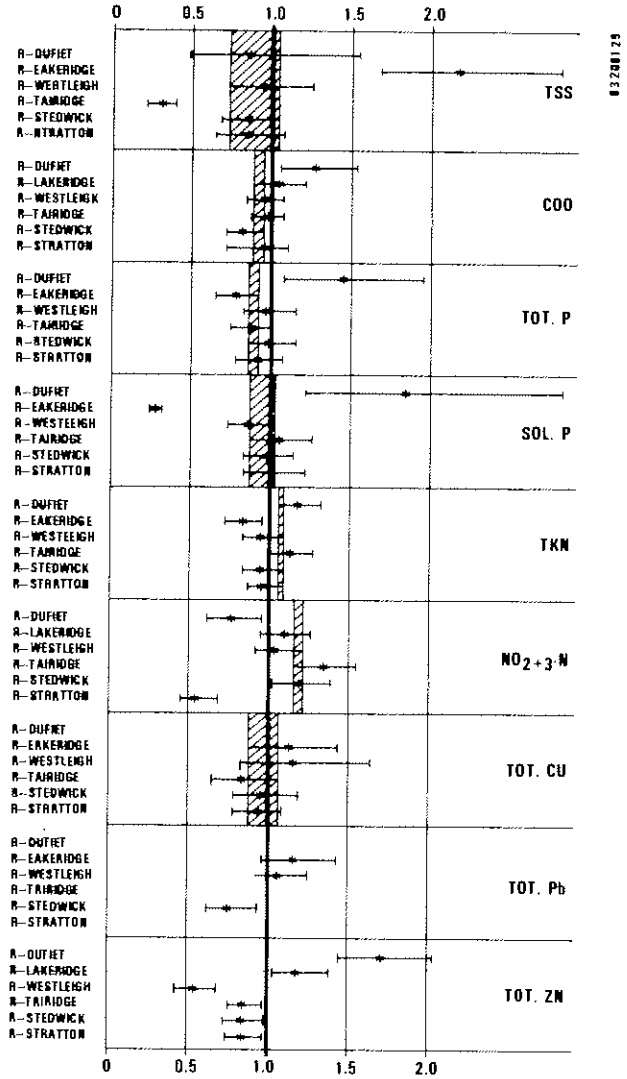

(b) WASHCOG Sites

Figure 6-15. Range of Normalized EMC Medians at FL1 and DC1

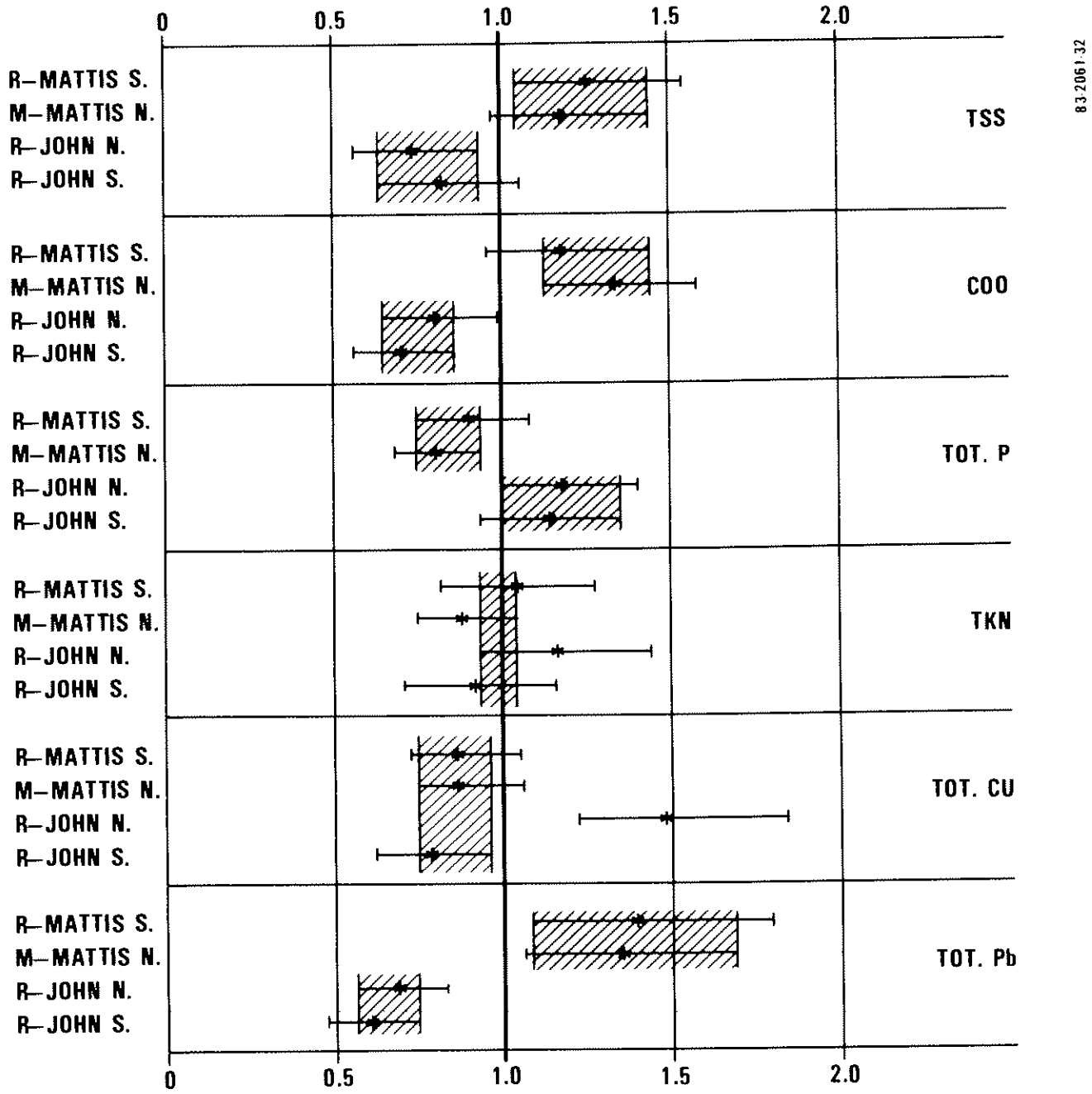

Figure 6-16. Range of Normalized EMC Medians at IL1

TABLE 6-12. MEDIAN EMCs FOR ALL SITES BY LAND USE CATEGORY

Pollutant		Residential		Mixed		Commercial		Open/Nonurban	
		Median	CV	Median	CV	Median	CV	Median	CV
BOD	mg/ℓ	10.0	0.41	7.8	0.52	9.3	0.31	-	-
COD	mg/ℓ	73	0.55	65	0.58	57	0.39	40	0.78
TSS	mg/ℓ	101	0.96	67	1.14	69	0.85	70	2.92
Total Lead	µg/ℓ	144	0.75	114	1.35	104	0.68	30	1.52
Total Copper	µg/ℓ	33	0.99	27	1.32	29	0.81	-	-
Total Zinc	µg/ℓ	135	0.84	154	0.78	226	1.07	195	0.66
Total Kjeldahl Nitrogen	µg/ℓ	1900	0.73	1288	0.50	1179	0.43	965	1.00
NO_2 -N + NO_3 -N	µg/ℓ	736	0.83	558	0.67	572	0.48	543	0.91
Total P	µg/ℓ	383	0.69	263	0.75	201	0.67	121	1.66
Soluble P	µg/ℓ	143	0.46	56	0.75	80	0.71	26	2.11

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Some caution in the interpretation of the information presented in Table 6-12 is in order since statistical confidence limits are not given. These are indicated in Figure 6-17 (a through k), which illustrates land use differences graphically, with additional statistical detail derived from the basic parameters listed in Table 6-11, to assist in interpretation and comparisons. The box plots which compare characteristics of all sites within a land use category identify the land use, median EMC, its 90 percent confidence limits, and the 10, 25, 75 and 90 percent quantities for the sites. Careful perusal of these box plots leads one to the conclusion that only the open/non-urban land use category appears to be significantly different overall. Responses of the other land use categories are varied and inconsistent among constituents. This may be seen in a somewhat different way by observing the plotting positions of the land use categories presented in Figures 6-4 through 6-13. Here also, there are no consistent tendencies. There are undeniably some trends. For example, in Figure 6-7 commercial sites occupy the lowest plotting position at each project for total phosphorus (MI1 and one WI1 site are exceptions), which certainly suggests that there might be a land use category difference for this constituent.

Review of Figure 6-17(j), however, suggests that while a trend to lower total phosphorus EMC values is apparent as one goes from residential, to mixed, to commercial land uses, the statistical significance may not be great. The actual site median total phosphorus EMC probability density functions for each land use are presented in Figure 6-18. Here it can be seen that although three different pdfs can be drawn for residential, mixed, and commercial land use categories, their degree of overlap is so great that there is little statistical significance to the apparent difference. Since this was the strongest tendency towards land use effect, we must conclude that using this approach there is again no truly discernible and consistent effect of land use on the quality of urban runoff.

The one exception is the open/non-urban category which, as its name suggests, includes atypical sites. The data in Table 6-12 and the box plots of Figure 6-12 suggest that the pdfs for this land use category are quite different from those of the other land use categories, and this is in fact the case. Figure 6-18 shows it dramatically for total phosphorus.

Thus, regardless of the analytical approach taken, we are forced to conclude that, if land use category effects are present, they are eclipsed by the storm to storm variabilities and that, therefore, land use category is of little general use to aid in predicting urban runoff quality at unmonitored sites or in explaining site to site differences where monitoring data exist.

Correlation Between EMCs and Runoff Volume. To examine the possible relationship between the event mean concentration of a particular constituent and the runoff volume, linear correlation coefficients (r) were calculated. The null hypothesis that the two variables are linearly unrelated was tested at both the 90 and 95 percent confidence levels. Since it is possible for correlation to be either positive or negative, the two-tailed test was used. Failure to reject the null hypothesis is interpreted as meaning that linear dependency between the two variables in the population has not been shown.

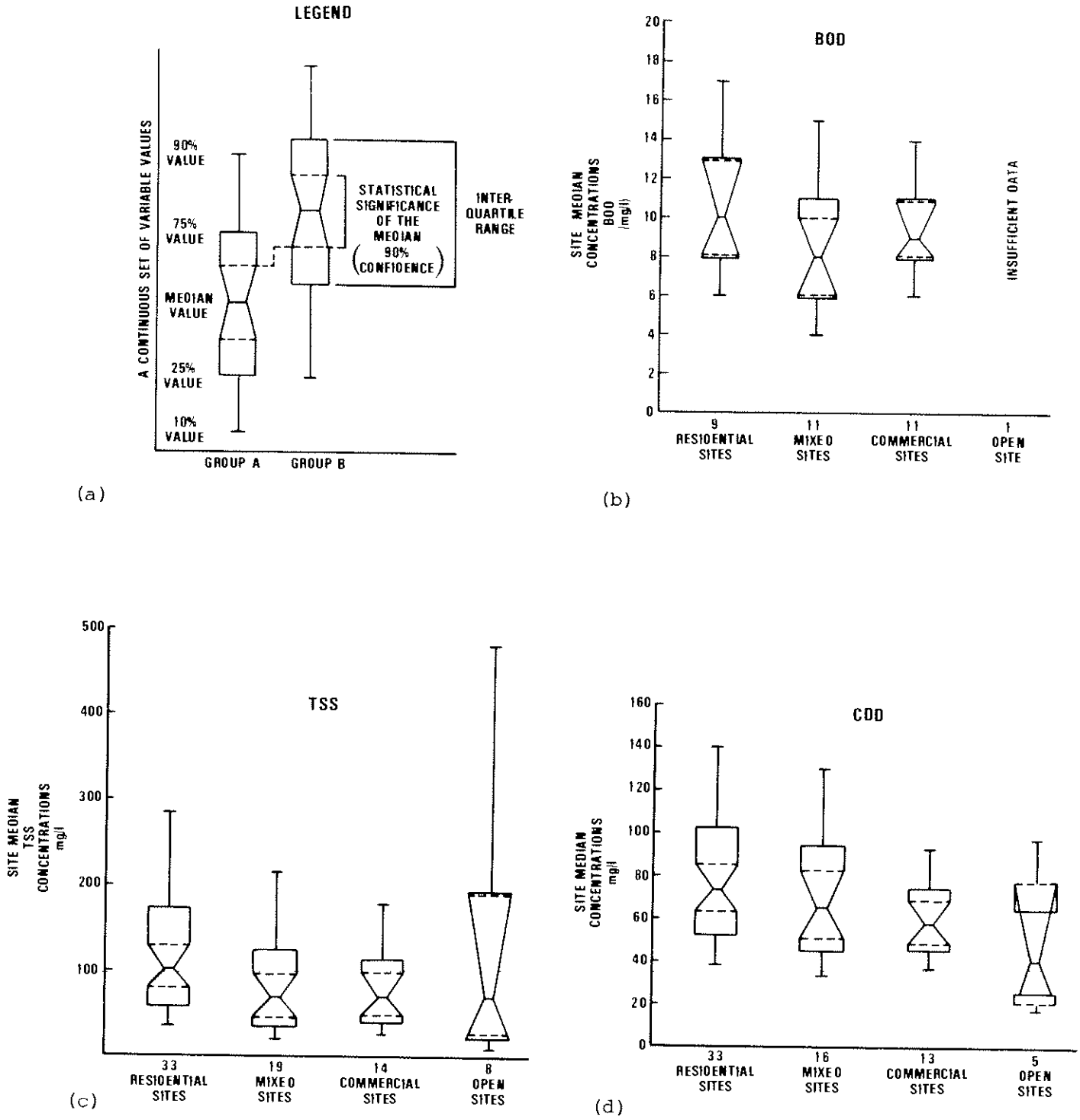

Figure 6-17. Box Plots of Pollutant EMCs for Different Land Uses

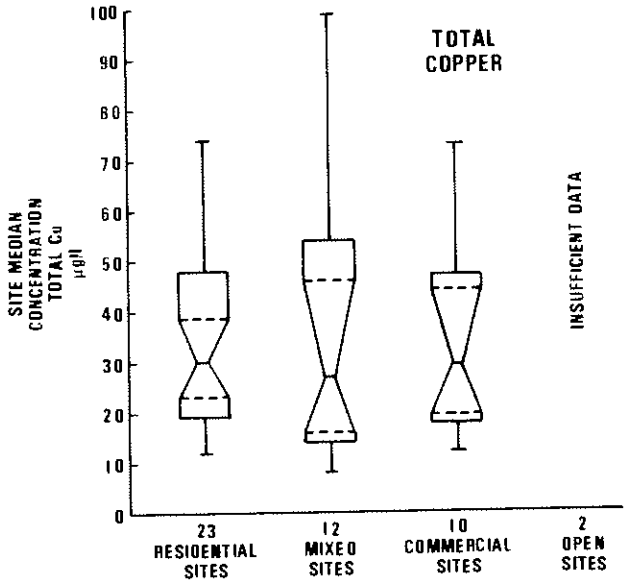

(e)

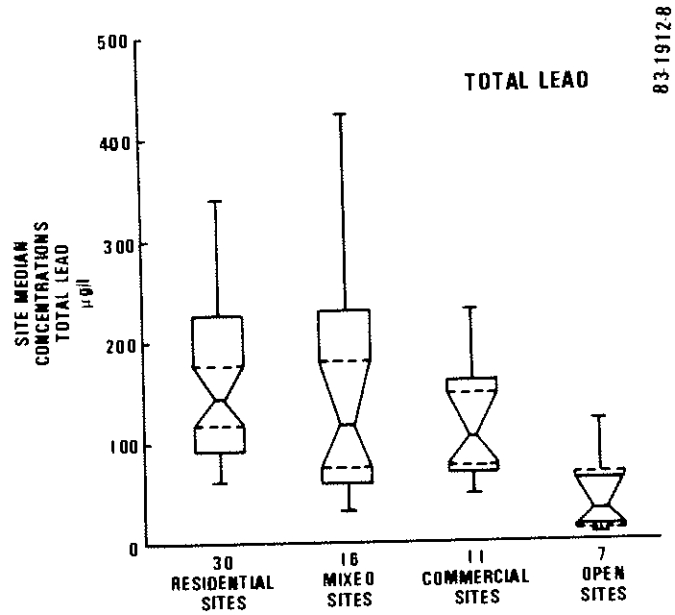

(f)

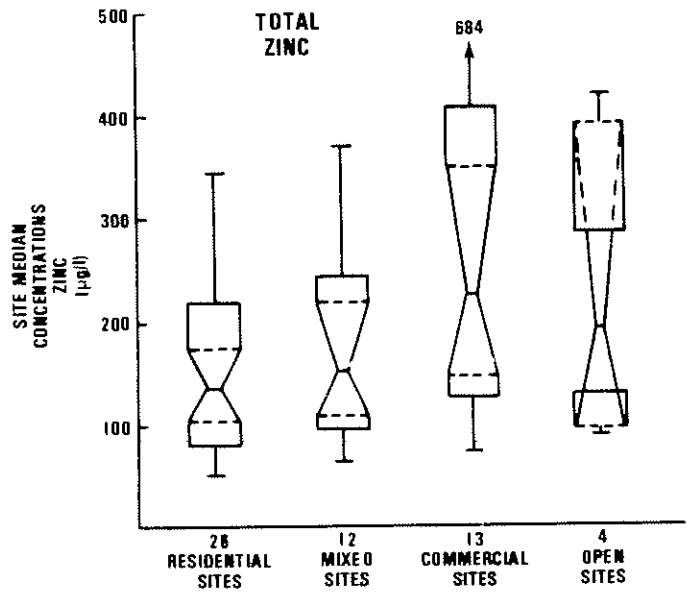

(g)

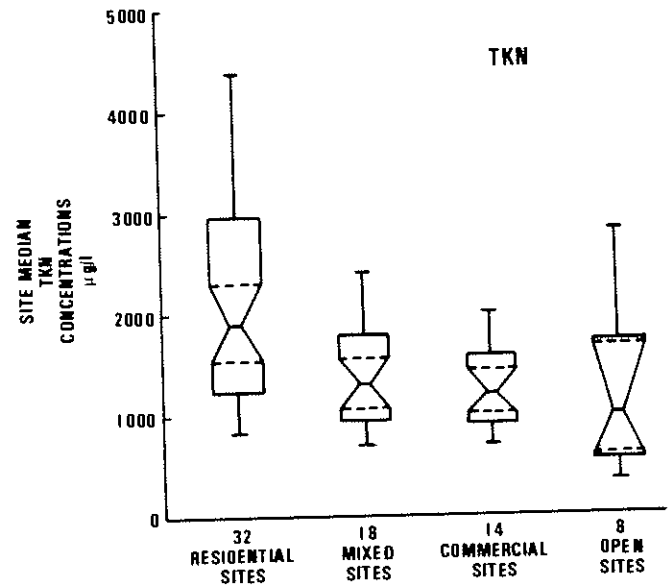

(h)

Figure 6-17. Box Plots of Pollutant EMCs for Different Land Uses (Cont'd)

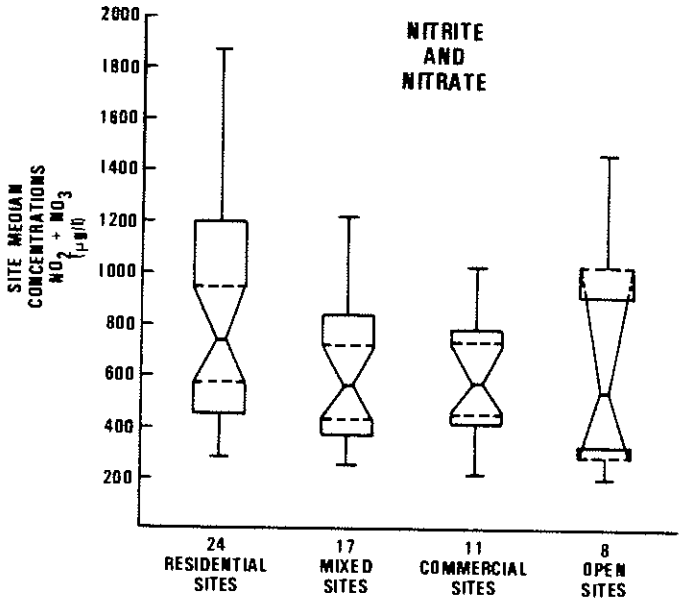

(i)

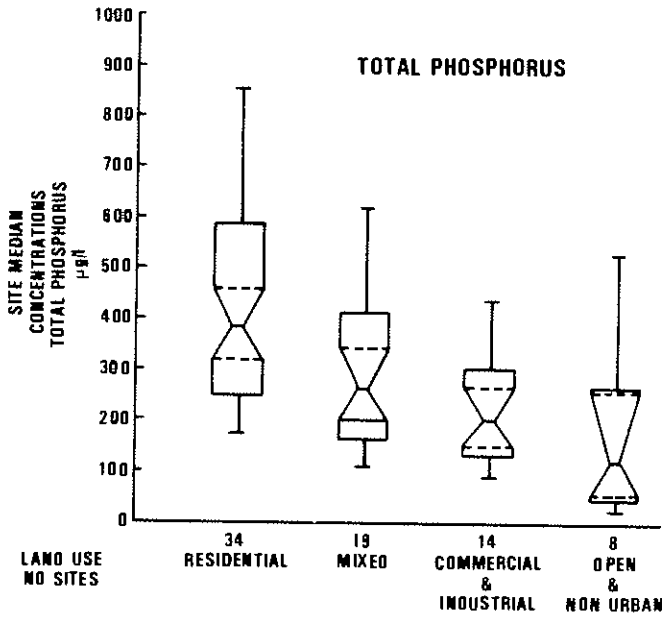

(j)

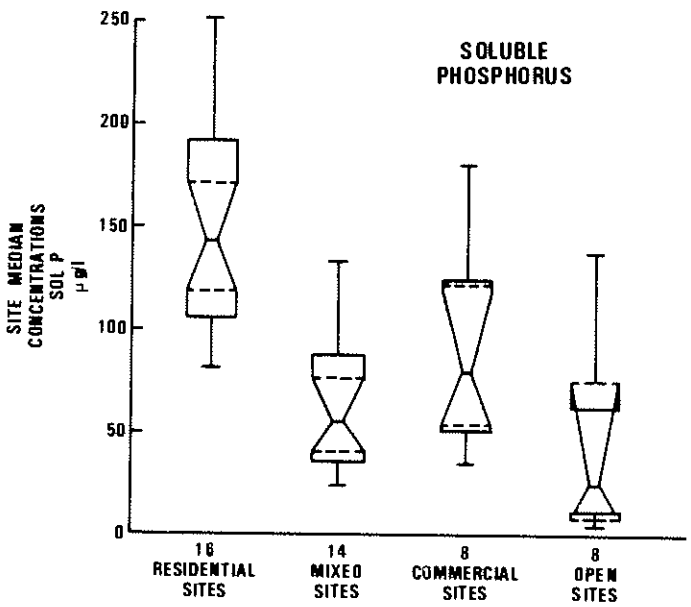

(k)

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Figure 6-17. Box Plots of Pollutant EMCs for Different Land Uses (Cont'd)

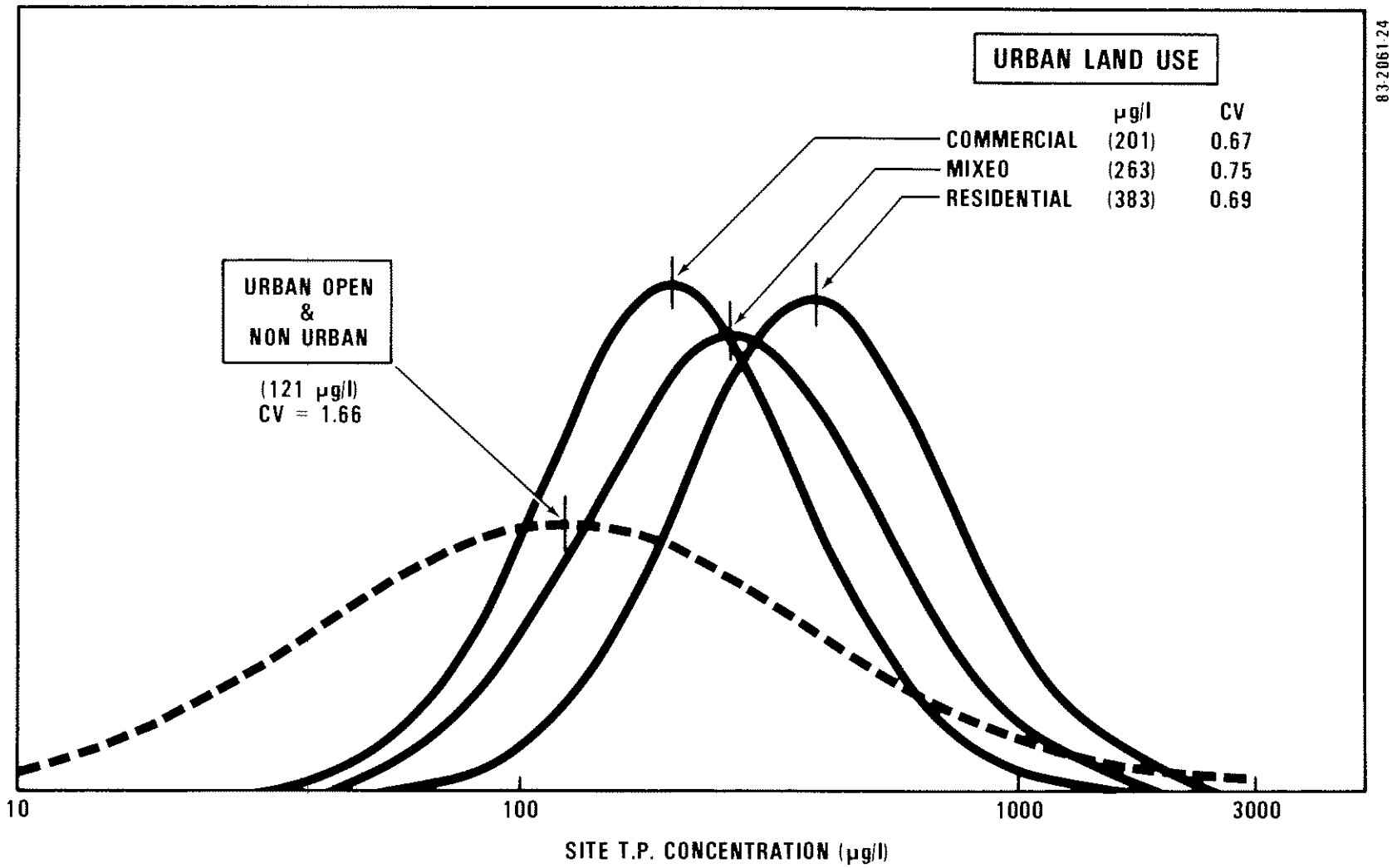

Figure 6-18. Site Median Total P EMC Probability Density Functions for Different Land Uses

The rejection of the null hypothesis means that there is evidence of a linear dependency between the two variables in the population, but it does not mean that a cause-and-effect relationship has been established.

General guidelines for the use of this test suggest that it be used with caution for values of n less than ten due to the high uncertainties associated with estimates of population variance with small samples. Furthermore, when n is 2 a perfect correlation will result but is meaningless. To include as many sites as possible in this examination, all constituents for which n was 5 or greater were included. At the other extreme, when n is very large, say over 100, correlation coefficients are almost always significant but can be so weak that they are meaningless. For n = 100 the critical value of r at the 90 percent confidence level is 0.164, meaning that the correlation explains less than 3 percent of the concentration variability.

A total of 67 sites from 20 of the NURP projects were examined for possible correlation for nine constituents. Of the 517 linear correlation coefficients calculated (not all constituents were measured at all sites), 116 (22 percent) were significant at the 95 percent confidence level and 154 (30 percent) were significant at the 90 percent confidence level. Of the r values that were significant, 83 and 87 percent were negative at the 90 and 95 percent confidence levels respectively. When sites with fewer than 10 events were dropped, the foregoing was essentially unchanged. Greater detail in terms of the number of significant linear correlation by constituent is provided in Table 6-13. There it can be seen that the greatest tendency for positive values of r occurs with TSS, followed by soluble phosphorus. The correlation coefficients for the other 7 constituents all strongly tend to be negative.

When the results are examined by sites, however, a clearer picture emerges. Although it can be correctly argued that unless a correlation coefficient is statistically significant the number is meaningless, it also follows that in such a case they are as likely to be positive as negative. On the other hand, if all the correlation coefficients (whether significant or not) have the same sign, it suggests a tendency for that site. The sign of the correlation coefficient (if greater than 0.1) for each site and constituent examined is given in Table 6-14. Giving appropriate weight to significant r values but considering others as well, some 37 of the sites tend to have negative correlations, 13 tend to be positive, and the remaining 17 tend to be mixed. Perusal of Table 6-14 reveals that this tendency for sites to have either positive or negative correlation coefficients is quite strong, especially for sites with a large number of significant correlations. Sites where erosion, scour, system lag, and such are present could be expected to exhibit a tendency towards positive correlations. Sites lacking such effects could be expected to have negative correlation due to dilution associated with larger runoff events.

The magnitude of the correlation coefficients is indicated in Table 6-15. Two points stand out in particular. First, the r values are not very large, averaging around 0.55. This means that the correlation is only able to explain about 30 percent of the concentration variability. The few high values are always associated with very few observations ($n<10$) for which the

TABLE 6-13. NUMBER OF SIGNIFICANT LINEAR CORRELATIONS BY CONSTITUENT

POLLUTANT	TOTAL # OF SITES	90% SIGNIFICANT CORRELATION			95% SIGNIFICANT CORRELATION		
		TOTAL #	# NEG.	# POS.	TOTAL #	# NEG.	# POS.
(a) ALL SITES							
TSS	67	13 (19%)	4	9	7 (10%)	3	4
COD	64	24 (38%)	23	1	19 (30%)	19	0
TOT. P	67	20 (30%)	16	4	15 (22%)	12	3
SOL. P	34	10 (29%)	6	4	7 (21%)	4	3
TKN	64	19 (30%)	18	1	14 (22%)	14	0
NO_{2+3}-N	57	17 (30%)	15	2	13 (23%)	11	2
TOT. Cu	49	17 (35%)	15	2	13 (27%)	12	1
TOT. Pb	59	15 (25%)	13	2	12 (20%)	11	1
TOT. Zn	56	19 (34%)	18	1	16 (29%)	15	1
TOTAL	517	154	128	26	116	101	15
PERCENT		30%	83%	17%	22%	87%	13%
(b) SITES WITH n ≥ 10							
TSS	56	9 (16%)	4	5	7 (12%)	3	4
COD	52	21 (40%)	20	1	16 (31%)	16	0
TOT. P	53	17 (32%)	15	2	12 (23%)	11	1
SOL. P	23	8 (35%)	5	3	6 (26%)	4	2
TKN	50	17 (34%)	16	1	12 (24%)	12	0
NO_{2+3}-N	41	14 (34%)	12	2	12 (29%)	10	2
TOT. Cu	31	13 (42%)	12	1	12 (39%)	11	1
TOT. Pb	45	13 (29%)	12	1	11 (24%)	10	1
TOT. Zn	37	14 (38%)	13	1	11 (30%)	10	1
TOTAL	388	126	109	17	99	87	12
PERCENT		32%	87%	13%	26%	88%	12%

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TABLE 6-14. SIGN OF CORRELATION COEFFICIENTS BY SITES

	TSS	COD	TOT. P	SOL. P	TKN	NO_{2+3}-N	TOT. CU	TOT. Pb	TOT. ZN
CA1 KNOX	+	−	+	⊕		⊕	−	−	
S. VIEW.	⊕	+			⊕		+	−	+
CO1 ASBURY	⊕	+	⊕	+	+	−	⊕	+	+
B. DRY C.		−	−	−	⊖	−	−		−
CHERRY			+	⊕		−	+		
N. AVE.		⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖
ROONEY	−	⊖	−	−	−	−	−	−	⊖
VILLA IT.	−	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖
116/C	+	−	⊕			−	+		+
DC1 DUFIEF	−	⊖	+	−	−	−			−
FAIRIDGE		+	+	+	+				+
LAKERIDGE	+		+	⊕		⊖		−	⊖
STEDWICK		−		+		⊖	+	−	⊖
STRATTON	+	−			+		−		−
WESTLEIGH		⊖			−	⊖	⊖	−	⊖
FL1 CHARTER/H	−	⊖	⊖		⊖	−	⊖	⊖	⊖
YOUNG		−	−			−	+		
NORMA P.	+	+				+			−
IL1 JOHN N.	+	⊖	⊖		⊖		−	−	
JOHN S.	+	⊖	⊖		−		−		
MATTIS N.		⊖	⊖		⊖		⊖	⊖	
MATTIS S.	−	⊖	⊖		⊖		⊖	⊖	
KS1 92nd	−	+	−	+	+				

	TSS	COD	TOT P.	SOL P	TKN	NO_{2+3}-N	TOT. CU	TOT. Pb	TOT. ZN
KS1 LENAXA	+	⊖	⊖	−	−		⊖		
METCALF		−	−	−	−		−		−
NOLAND		⊖	−	⊖			+	−	−
OVERTON	+		+				−	−	⊖
MA1 ANNA	+		+		+	−		−	+
CONVENT	−	+		+	−	−	+		+
JORDAN			+	+	−	⊖	−		⊖
LOCUST	⊕	+	⊕	+	+	⊖	+	⊕	
RT. 9	+			+	−	⊖	+	+	
MA2 ADDISON	⊕		−	−	+	−			
HEMLOCK	⊕		+	⊕	+	−			
MD1 BOLTON	⊕	−	+		−	−	⊖	+	−
HAMPDEN		−	⊖				⊖		−
HOMELAND	+	+	+		−	+	−	+	+
MT. WASH.	⊕	−	−		−	−	+	−	−
RES. HILL	+	⊖			⊖		⊖	−	−
MI1 GRACE S.	+	−	−		−	−	⊖	−	−
GRACE N.	+	−		+					⊖
GRAND		−	−		−		−	−	⊖
IND. DR.	+		+	+		−	−	−	−
WAVERLY		−	−	−	−	−	−		−
NC1 1013		⊖	⊖		⊖	⊖	⊖	⊖	⊖
1023	⊕		+			−	+		
NH1 PKG.	−	⊖	−		⊖	⊖	⊖	⊖	⊖

	TSS	COD	TOT. P	SOL. P	TKN	NO_{2+3}-N	TOT. CU	TOT. Pb	TOT. ZN
NY1 CARLL R.	+					⊖			
NY2 CEDAR				+		⊕		+	
NY3 CRANSTON	+	+	+		−			−	−
E. ROCH.	−	⊖	⊖		⊖			⊖	⊖
SOUTHGATE	+	−	+	−					−
TN1 CBD	⊖	−	⊖	⊖	⊖	−	⊖	⊖	⊖
R1	⊕	+	+	⊖	+	−	⊕	⊕	⊕
R2	+	−	−	−	⊖	−			−
SC	+		−	⊖	−	⊖		+	
TX1 HART	+	⊕			+	+			
R'WOOD.	−	+			⊖				
WA1 LAKE H.	−	⊖	−		⊖		+	⊖	⊖
SURREY D.	−	⊖	⊖		⊖			⊖	⊖
WI1 BURBANK		−	⊕						+
HASTINGS		⊖	−		+	+		⊖	−
LINCOLN		−	−			−		+	
POST D.	⊖	⊖	⊖		⊖	⊖		⊖	−
RUSTLER	⊖	⊖	−		⊖	⊖			−
STATE F.	⊖	⊖	⊖		−	⊖		−	+
WOOD C.					−	−			+

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+ INDICATES A POSITIVE R VALUE
− INDICATES A NEGATIVE R VALUE
◯ INDICATES A SIGNIFICANT R VALUE
BLANK INDICATES EITHER R LESS THAN 0.1 OR NO DATA

TABLE 6-15. CORRELATION COEFFICIENT VALUES BY SITE

	TSS	COD	TOT. P	SOL. P	TKN	NO_{2+3}-N	TOT. CU	TOT. Pb	TOT. ZN
CA1 KNOX				.43		.70			
S. VIEW.	.57				.49				
CO1 ASBURY	.58		.84				.58		
B. ORY C.					-.47				
CHERRY				.10					
N. AVE.		.58	.47	.42	.72	.52	.47	.42	.41
ROONEY		.78							.75
VILLA IT.		.70	.58	.67	.69	.44	.46	.55	.61
I16/C			.85						
OC1 OUFIEF		.76							
FAIRIDGE									
LAKERIDGE				.42		.28			.41
STEOWICK						-.28			-.26
STRATTON					-.2				
WESTLEIGH		.32				-.38	.94		.44
FL1 CHARTER/H		.82	.54	U	.68		-.54	.67	.58
YOUNG				U					
NORMA P.				U					
IL1 JOHN N.		-.31	.39	U	-.29	U			U
JOHN S.		.36	.42	U		U			U
MATTIS N.		.84	.58	U	.48	U	.40	.46	U
MATTIS S.		.81	.56	U	.53	U	.34	.46	U
KS1 92nd				U		U			

	TSS	COD	TOT P.	SOL P	TKN	NO_{2+3}-N	TOT. CU	TOT. Pb	TOT. ZN
KS1 LENAXA		.70	.51	U		U	-.80		
METCALF		.40	-.40	U		U			
NOLANO		.77		.82	U	U			
OVERTON					U	U			.57
MA1 ANNA									
CONVENT									
JORDAN						.68			.74
LOCUST	.80		.91			-.82		.78	
RT. 9						-.87			
MA2 ADDISON	.83	U							
HEMLOCK	.85	U		.94					
MO1 BOLTON	.50			U			.47		
HAMPDEN			.42	U			.61		
HOMELAND				U					
MT. WASH.	.42			U					
RES. HILL		.79		U	.58		.55		
MI1 GRACE S.							.70		
GRACE N.									.80
GRAND									-.51
IND. DR.									
WAVERLY									
NC1 1013		.58	.49	U	.57	.67	.32	.29	.64
1023	.32			U					
NH1 PKG.		.58		U	.48	.46	.50	.41	.58

	TSS	COD	TOT. P	SOL. P	TKN	NO_{2+3}-N	TOT. CU	TOT. Pb	TOT. ZN
NY1 CARLL R.		U		U		.70	U		
NY2 CEDAR		U				.42	U		
NY3 CRANSTON				U		U	U		
E. ROCH.		.79	.84	U	.70	U	U	.72	.72
SOUTHGATE				U		U	U		
TN1 CBO	.48		.82	-.47	.56		.51	.51	.85
R1	.82			.62			.72	.85	.82
R2					.81				
SC				.49		.85			
TX1 HART		.57		U			U		
R'WOOD.				U	.77		U		
WA1 LAKE H.		.33		U	.34			.29	.37
SURREY O.		.38	.30	U	.21		U	.18	.23
WI1 BURBANK			.26	U			U		
HASTINGS		.49		U			U	.32	
LINCOLN				U	U		U		U
POST O.	.39	.28	.24	U	.48	.53	U	.23	
RUSTLER	.37	.55		U	.39	.37	U		
STATE F.	.47	.48	.47	U		.72	U		
WOOD C.				U			U		

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◯ INDICATES 95% LEVEL OF SIGNIFICANCE, OTHERS ARE AT THE 90% LEVEL
U INDICATES AN UNMEASURED CONSTITUENT
BLANK INDICATES NO SIGNIFICANT CORRELATION

test is suspect since one or two events may dominate the correlation or otherwise cause it to be overstated due to uncertainties in parameter estimation. Second, only 25 percent of the sites account for over two-thirds of the significant correlations. In fact, 33 of the 67 sites had at most one significant correlation, 16 had 2 or 3, and 18 had 4 or more significant r values.

Data for the sites with many significant correlations are presented in Table 6-16. It can be noted that the r values for all constituents are around 0.55. Thus, there is no overall tendency to have strong correlations for some constituents and weak correlations for others. On a site by site basis, the strength of the apparent correlation varies inversely with n as does the significance requirement. Discounting the sites with very low or high values of n, however, the r values for the remainder are again around 0.55, which is the average for all 19 of these sites. Turning to land use, it is significant that half of the sites with many significant correlations have a large commercial/industrial component. Discounting sites with a small number of observations ($n \leq 12$), the sites in Table 6-16 are smaller (average size is 41 acres vs 126 acres for all sites), more impervious (average of 65 percent vs 40 percent for all sites), and have higher runoff coefficients (0.5 vs 0.3 for all sites). Thus, one could conjecture that their responses might tend to be somewhat less random and more ameanable to deterministic analysis (i.e., with conventional modeling approaches). Since they represent only around 25 percent of the total number of sites, however, and the correlations are rather weak, any effect of EMC correlation with runoff volume can be ignored without serious overall error.

This finding of no significant linear correlation between EMCs and runoff volumes is important for several reasons. First, in stormwater monitoring programs there is a natural and appropriate bias that favors emphasizing resource allocation to larger storm events. This was generally the case with the NURP projects as well. However, because of differences in local meteorological conditions, degree of site imperviousness, and other factors, there are appreciable differences in the average sizes of storms monitored by site in the NURP database. Since no significant linear correlation was found, such biases and differences are not expected to influence EMC comparisons to any appreciable extent.

Secondly, the probabilistic methodologies for examining receiving water impacts identified in Chapter 5 assume, as they are now structured, that concentration and runoff volume are independent (i.e., that there is no significant correlation). Although the methods can be modified to account for such correlations if they exist, the finding of no significant correlation indicates that such refinement is not warranted at this time.

Other Factors. We have not exhaustively analyzed all potential effects of other factors that might influence and hence modify our interpretations and conclusions regarding site differences. Factors such as slope, population density, soil type, seasonal bias in monitored events, and precipitation characteristics (average rainfall intensity, peak rainfall intensity, rainfall duration, time since last storm event, etc.) all have a potential

TABLE 6-16. SITES WITH MANY SIGNIFICANT CORRELATIONS

		TSS	COD	TOT. P	SOL. P	TKN	NO_{2+3}-N	Cu	Pb	Zn	AVG r^2	AVG r	$\bar{n}$	LAND USE	% IMPERVIOUS	RUNOFF COEFFICIENT
CO1	NORTH AVE.	–	–.58	–.47	–.42	–.72	–.52	–.47	–.42	–.46	.28	52	32	30%C	50%	.239
	VILLA IT.	–	–.70	–.58	–.67	–.69	–.44	–.46	–.55	–.65	.35	.59	27	100%C	91%	.927
OC1	WESTLEIGH	–	–.32	–	–	–	–.39	–.84	–	–.44	.29	.54	35	93%R	21%	.119
FL1	CHARTER/H	–	–.62	–.54	U	–.68	–	–.54	–.67	–.56	.37	.60	12	89%R	16%	.153
IL1	MATTIS N.	–	–.64	–.59	U	–.48	U	–.40	–.46	U	.27	.52	35	50%C	58%	.639
	MATTIS S.	–	–.61	–.55	U	–.53	U	–.34	–.46	U	.26	.51	33	90%R	37%	.330
KS1	LENAXA	–	–.70	–.51	U	–	U	–.80	–	–	.46	.68	16	50%I	44%	.540
MA 1	LOCUST	.80	–	.91	–	–	–.82	–	.78	–	.69	.83	6	85%R	16%	.209
MO 1	RES. HILL	–	–.79	–	U	–.58	–	–.55	–	–	.42	.65	13	100%R	76%	.486
NC1	1013 (CBO)	–	–.58	–.46	U	–.57	–.67	–.32	–.29	–.54	.26	.51	61	100%C	69%	.791
NH1	PKG.	–	–.58	–	U	–.49	–.46	–.50	–.41	–.58	.26	.51	33	100%C	90%	.658
NY3	E. ROCHESTER	–	–.79	–.84	U	–.70	U	U	–.72	–.72	.57	.76	8	100%R	38%	.195
TN1	CBO	–.48	–	–.62	–.47	–.56	–	–.51	–.51	–.65	.30	.55	15	100%C	99%	.206
	R1	.82	–	–	–.62	–	–	.72	.85	.82	.57	.77	11	91%R	33%	.032
WA 1	LAKE H.	–	–.33	–	U	–.34	U	U	–.29	–.37	.11	.33	126	91%R	37%	.199
	SURREY O.	–	–.34	–.30	U	–.21	U	U	–.18	–.23	.07	.26	118	100%R	29%	.177
WI1	P.O.	–.39	–.28	–.24	U	–.46	–.53	U	–.23	–	.14	.37	40	100%C	95%	.899
	RUSTLER	–.37	–.55	–	U	–.39	–.37	U	–	–	.18	.43	20	100%C	95%	.793
	STATE FAIR	–.47	–.48	–.47	U	–	–.72	U	–	–	.30	.55	25	74%C	77%	.622
	AVERAGE r^2	.34	.33	.29	.31	.30	.30	.31	.28	.32						
	AVERAGE r	.58	.58	.53	.55	.55	.55	.56	.53	.57						

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influence on the median and variability of pollutant concentrations at a site.

On the basis of limited screening, however, we have concluded that such factors do not appear to have any real consistent significance in explaining observed similarities or differences among individual sites. Therefore, although more detailed and rigorous analysis and evaluation of the NURP database may well provide additional useful insight and understanding of the influence of such other factors, we do not believe that the basic findings and conclusions presented in this report will be significantly altered by the results of such efforts. Furthermore, the value of any such insights as may be developed are likely to have limited influence on general decisions on control of urban runoff. For example, the finding of a strong seasonal effect on EMC values would have little influence on a decision to require detention basins in all newly developing urban areas, nor would it be likely to influence their design.

Urban Runoff Characteristics

Having determined, as discussed in the preceding section, that geographic location, land use category, or other factors appear to be of little utility in explaining overall site-to-site variability or predicting the characteristics of unmonitored sites, the best general characterization of urban runoff can be obtained by pooling the site data for all sites (other than the open/non-urban ones). This approach is appropriate, given the need for a nationwide assessment and the general planning thrust of this report. Recognizing that there tend to be exceptions to any generalization, however realistic and appropriate, in the absence of better information the data given in Table 6-17 are recommended for planning level purposes as the best description of the characteristics of urban runoff.

TABLE 6-17. WATER QUALITY CHARACTERISTICS OF URBAN RUNOFF

Constituent	Event to Event Variability in EMC's (Coef Var)	Site Median EMC	
		For Median Urban Site	For 90th Percentile Urban Site
TSS (mg/l)	1-2	100	300
BOD (mg/l)	0.5-1.0	9	15
COD (mg/l)	0.5-1.0	65	140
Tot. P (mg/l)	0.5-1.0	0.33	0.70
Sol. P (mg/l)	0.5-1.0	0.12	0.21
TKN (mg/l)	0.5-1.0	1.50	3.30
NO_{2+3}-N (mg/l)	0.5-1.0	0.68	1.75
Tot. Cu (μg/l)	0.5-1.0	34	93
Tot. Pb (μg/l)	0.5-1.0	144	350
Tot. Zn (μg/l)	0.5-1.0	160	500

Coliform Bacteria

Coliform bacteria counts in urban runoff were monitored for a significant number of storm events by seven of the NURP projects at 17 different sites. Data were collected at twelve of these sites for more than five and up to 20 storm events. Data on either Fecal Coliform or both Fecal and Total Coliform counts are available for a total of 156 separate storm events. Although the data base for bacteria is thus considerably more restricted than for other pollutants, useful results have been obtained.

Table 6-18 summarizes the results of an analysis of these data. Some variability exists from site to site, and data are too limited to identify any land use distinctions. However, results from the different sites and projects are consistent in showing a very dramatic seasonal effect. Coliform counts in urban runoff during the warmer periods of the year are approximately 20 times greater than those in urban runoff that occurs during colder periods.

The substantial seasonal differences which are observed do not correspond with comparable variations in urban activities. This suggests that seasonal temperature effects and sources of coliform unrelated to those traditionally associated with human health risk may be significant.

In addition to the summarized data presented here, special study reports prepared by the Long Island and Baltimore projects address the issue of animal and other sources of coliform bacteria using information derived from field monitoring and the technical literature. The Baltimore NURP project also conducted small scale site studies which simulated washoff by storms and identified that quite substantial differences in coliform levels can result from the general cleanliness of an area, which they associate with the socio-economic strata of the neighborhood. A special study by the Long Island NURP project examined salmonella counts in urban runoff and in an adjacent shellfish area influenced by urban runoff. The Knoxville, TN project also conducted a special study on Salmonella. These project reports may be obtained through NTIS.

Other issues related to bacteria as a health risk were raised and warrant further investigation. A better understanding is needed of the contribution of domestic animals or such wildlife as may be expected in urban areas to observed coliform levels.

Though high levels of indicator microorganisms were found in urban runoff, the analysis as well as current literature suggests that indicators such as fecal coliform may not be useful in identifying health risks from urban runoff pollutions.

PRIORITY POLLUTANTS

'ackground

he NURP priority pollutant monitoring project was conducted to evaluate the resence, concentration, and potential water quality impacts of priority pollutants in urban runoff. A total of 121 urban runoff samples were collected

TABLE 6-18. FECAL COLIFORM CONCENTRATIONS IN URBAN RUNOFF

Project and Site		Warm Weather			Cold Weather		
		Site No. Obs	Median EMC (1000/ 100 ml)	C.V.	Site No. Obs	Median EMC (1000/ 100 ml)	C.V.
DC1	Burke	1	4.6	-	1	0.02	-
	Westleigh	1	46	-	2	0.35	-
	Stedwick	2	10	-	1	0.2	-
MD1	Homeland	7	11	1.8	-	-	-
	Mt Wash	1	130	-	1	3.3	-
	Res Hill	1	281	-	1	330	-
NC1	(CBD) 1013	11	15	1.6	8	1.0	0.6
	Res 1023	2	23	-	4	2.6	1.1
NH1	Pkg Lot	20	0.3	0.5	-	-	-
NY1	Carll	12	24	0.9	15	1.4	1.5
	Unqua	7	11	1.6	4	0.9	14
SD1	Meade	9	57	0.7	-	-	-
TN1	CBD	7	54	1.5	7	1.0	1.4
	R1	6	56	2.0	4	1.6	1.9
	R2	6	19	6.2	4	0.5	2.4
	SC	7	12	2.8	4	0.9	1.7
		76 Events			52 Events		
All Sites*		11	21	0.8	9	1	0.7

Notes:

* For general characterization of urban runoff, exclude the following sites:

- NH1 - A small (0.9A) Parking Lot; concentrations low and atypical.

- Four sites with only one observation for season; variability is too high for any confidence in representativeness of a single value.

at 61 sites (two storm events per site) in 20 of the NURP projects that participated in this phase of the program. These sites were predominantly in the residential, mixed, or commercial land use areas as defined earlier. Thus, the results of this effort cannot be attributed to runoff from industrial facilities or complexes. Furthermore, an especially exhaustive quality control component, over and above the standard NURP QA/QC effort, was imposed on the priority pollutant portion of the program, resulting in the rejection of nearly 14 percent of the data. Therefore, there is a high level of confidence in the results of this project.

Since only two samples were collected at each site, no meaningful site statistic could be calculated. Therefore the data were pooled for analysis. In view of the discussion in the preceding section, however, this approach seems to be justified.

A detailed compilation of NURP priority pollutant analytical results including city and site where the sample was collected, date of collection; discrete or composite sample, pH, and pollutant concentration can be found in the final report on the NURP Priority Pollutant Monitoring Program soon to be issued by the Monitoring and Data Support Division of the agency. A summary of the findings taken from the December 5, 1983 draft of that report follows.

Pollutants Not Included in NURP. Asbestos and dioxin were excluded from the NURP program. However, standard laboratory methods will reveal the presence of dioxin at concentrations of 1 to 10 µg/l, and most laboratories did scan their chromatograms for the possible presence of this pollutant. All such scans were negative, and on this basis dioxin is included as "not detected".

Results Not Valid. The NURP results for seven priority pollutants cannot be considered valid. Recent EPA investigation has revealed that standard methods are not appropriate for the measurement of hexachlorocyclopentadiene, dimethyl nitrosamine, diphenyl nitrosamine, benzidine, and 1,2-diphenylhydrazine. Two other pollutants, acrolein and acrylonitrile, must be analyzed within three days of sample collection. Such a time constraint was an impractical one for the NURP program.

Pollutants Detected in Runoff

Seventy-seven priority pollutants were detected in the NURP urban runoff samples. This group includes 14 inorganic and 63 organic pollutants (Table 6-19).

Inorganic Pollutants. As a group, the toxic metals are by far the most prevalent priority pollutant constituents of urban runoff. All 14 inorganics (13 metals, plus cyanides; asbestos excluded) were detected, and all but three at frequencies of detection greater than 10 percent. Most often detected among the metals were copper, lead, and zinc, all of which were found in at least 91 percent of the samples. Their concentrations were also among the highest for any pollutant, and reached a maximum of 100, 460, and 2,400 µg/l, respectively. Other frequently detected inorganics included arsenic, chromium, cadmium, nickel, and cyanide (Table 6-20). Twelve of the thirteen toxic metals (antimony excluded) were also sampled in the special

TABLE 6-19. SUMMARY OF ANALYTICAL CHEMISTRY FINDINGS FROM NURP PRIORITY POLLUTANT SAMPLES[1]

(Includes information received through September 30, 1983)

Pollutant	Cities Where Detected[2]	Frequency of Detection[3]	Range of Detected Concentrations (µg/ℓ)[4]
I. PESTICIDES			
1. Acrolein	Holding times exceeded		
2. Aldrin	4,7,26	6	0.002T-0.1M
3. α-Hexachlorocyclohexane (α-BHC) (Alpha)	7,8,22,26	20	0.002T-0.1M
4. β-Hexachlorocyclohexane (β-BHC) (Beta)	7,8	5	0.018-0.1M
5. γ-Hexachlorocyclohexane (γ-BHC) (Gamma) (Lindane)	7,8,22,26	15	0.007-0.1M
6. δ-Hexachlorocyclohexane (δ-BHC) (Delta)	7,26	6	0.004-0.1M
7. Chlordane	2,8,21,26	17	0.01T-10
8. DDD	Not detected		
9. DDE	26	6	0.007-0.02T
10. DDT	7	1	0.1M
11. Dieldrin	26,27	6	0.007-0.1
12. α-Endosulfan (Alpha)	7,26,27	19	0.008-0.2
13. β-Endosulfan (Beta)	Not detected		
14. Endosulfan sulfate	Not detected		
15. Endrin	Not detected		
16. Endrin aldehyde	Not detected		
17. Heptachlor	7,8,27	6	0.01-0.1M
18. Heptachlor epoxide	7,26	2	0.003T-0.1M
19. Isophorone	7	3	10M
20. TCDD (2,3,7,8-tetrachlorodibenzo-p-dioxin)	Not included in NURP program		
21. Toxaphene	Not detected		
II. METALS AND INORGANICS			
22. Antimony	7,24,26	13	2.6-23A
23. Arsenic	2,3,7,12,19,20,21,22,26,27	52	1-50.5
24. Asbestos	Not included in NURP program		
25. Beryllium	7,12,20,21	12	1-49
26. Cadmium	1,2,3,7,12,20,21,27	48	0.1M-14
27. Chromium	1,2,7,8,12,17,19,20,21,22,26, 27,28	58	1-190
28. Copper	1,2,3,4,7,8,12,17,19,20,21,22, 23,26,27,28	91	1L-100
29. Cyanides	4,8,19,22,26,27	22	2-300
30. Lead	1,2,3,4,7,8,12,17,19,20,21,22, 26,28	94	6-460
31. Mercury	7,20,28	9	0.6-1.2
32. Nickel	2,3,7,12,20,21,26,27	43	1-182
33. Selenium	7,19,23	11	2-77
34. Silver	3,17,27	7	0.2M-0.8
35. Thallium	7	6	1-14
36. Zinc	1,2,3,7,12,17,19,20,21,22, 23,27,28	94	10-2400
III. PCBs AND RELATED COMPOUNDS			
37. PCB-1016 (Aroclor 1016)	Not detected		
38. PCB-1221 (Aroclor 1221)	Not detected		
39. PCB-1232 (Aroclor 1232)	Not detected		
40. PCB-1242 (Aroclor 1242)	Not detected		
41. PCB-1248 (Aroclor 1248)	Not detected		
42. PCB-1254 (Aroclor 1254)	Not detected		
43. PCB-1260 (Aroclor 1260)	2	1	0.03
44. 2-Chloronaphthalene	Not detected		

TABLE 6-19. SUMMARY OF ANALYTICAL CHEMISTRY FINDINGS FROM NURP PRIORITY POLLUTANT SAMPLES[1] (Cont'd)

(Includes information received through September 30, 1983)

Pollutant	Cities Where Detected	Frequency of Detection[2]	Range of Detected Concentrations (ug/L)[3]
IV. HALOGENATED ALIPHATICS			
45. Methane, bromo- (methyl bromide)	Not detected		
46. Methane, chloro- (methyl chloride)	Not detected		
47. Methane, dichloro- (methylene chloride)	4,17,22	11	5-14.4A
48. Methane, chlorodibromo-	28	1	2
49. Methane, dichlorobromo-	28	1	2
50. Methane, tribromo - (bromoform)	28	1	1
51. Methane, trichloro- (chloroform)	4,17,20,22,23,27,28	9	0.2T-12E
52. Methane, tetrachloro- (carbon tetrachloride)	4,28	3	1-2
53. Methane, trichlorofluoro-[4]	2,4,24,28	5	0.61-27
54. Methane, dichlorodifluoro- (Freon-12)[5]	Not detected		
55. Ethane, chloro-	Not detected		
56. Ethane, 1,1-dichloro-	4,28	4	1.5A-3
57. Ethane, 1,2-dichloro-	28	1	4
58. Ethane, 1,1,1-trichloro-	4,2,7,22,24	6	1.6-10M
59. Ethane, 1,1,2-trichloro-	28	2	2-3
60. Ethane, 1,1,2,2-tetrachloro-	4	2	2U-3
61. Ethane, hexachloro-	Not detected		
62. Ethene, chloro- (vinyl chloride)	Not detected		
63. Ethene, 1,1-dichloro-	28	2	1.5-4
64. Ethene, 1,2-trans-dichloro-	20,28	4	1-3
65. Ethene, trichloro-	2,4,8,24,28	6	0.3T-12
66. Ethene, tetrachloro-	8,17,22,28	5	14-43
67. Propane, 1,2-dichloro-	28	1	3
68. Propene, 1,3-dichloro-	28	2	1-2
69. Butadiene, hexachloro-	Not detected		
70. Cyclopentadiene, hexachloro-	Standard methods inappropriate		
V. ETHERS			
71. Ether, bis(chloromethyl)[6]	Not detected		
72. Ether, bis(2-chloroethyl)	Not detected		
73. Ether, bis(2-chloroisopropyl)	Not detected		
74. Ether, 2-chloroethyl vinyl	Not detected		
75. Ether, 4-bromophenyl phenyl	Not detected		
76. Ether, 4-chlorophenyl phenyl	Not detected		
77. Bis(2-chloroethoxy) methane	Not detected		
VI. MONOCYCLIC AROMATICS (EXCLUDING PHENOLS, CRESOLS, PHTHALATES)			
78. Benzene	4,17,27	5	1-13
79. Benzene, chloro-	7,20,26,28	5	10-10M
80. Benzene, 1,2-dichloro-	Not detected		
81. Benzene, 1,3-dichloro-	Not detected		
82. Benzene, 1,4-dichloro-	Not detected		
83. Benzene, 1,2,4-trichloro-	Not detected		
84. Benzene, hexachloro-	Not detected		
85. Benzene, ethyl-	4,8,17,20,26,28	6	1-7
86. Benzene, nitro-	Not detected		
87. Toluene	4,17	2	2-9
88. Toluene, 2,4-dinitro-	Not detected		
89. Toluene, 2,6-dinitro	Not detected		

TABLE 6-19. SUMMARY OF ANALYTICAL CHEMISTRY FINDINGS FROM NURP PRIORITY POLLUTANT SAMPLES[1] (Cont'd)

(Includes information received through September 30, 1983)

Pollutant	Cities Where Detected[4]	Frequency of Detection[3]	Range of Detected Concentrations (µg/l)[5]
VII. PHENOLS AND CRESOLS			
90. Phenol	4,7,26	14	1T-15T
91. Phenol, 2-chloro-	28	1	2
92. Phenol, 2,4-dichloro-	Not detected		
93. Phenol, 2,4,6-trichloro-	Not detected		
94. Phenol, pentachloro-	4,8,19,20,26,27,28	19	1T-115
95. Phenol, 2-nitro-	8	1	1M
96. Phenol, 4-nitro-	4,7,8,20,26,28	16	1T-37
97. Phenol, 2,4-dinitro-	Not detected		
98. Phenol, 2,4-dimethyl-	4,7,8,26	8	1T-10M
99. m-Cresol, p-chloro-	4	1	1.5A
100. o-Cresol 4,6-dinitro-	Not detected		
VIII. PHTHALATE ESTERS			
101. Phthalate, dimethyl	8	1	1L
102. Phthalate, diethyl	3,4,17,20,21	6	1-10M
103. Phthalate, di-n-butyl	4,22,24	6	0.5T-11
104. Phthalate, di-n-octyl	8,20,26,27,28	6	0.4T-26
105. Phthalate, bis(2-ethylhexyl)	4,12,14,22,23,26	22	4T-62
106. Phthalate, butyl benzyl	2,8,26	6	1-10M
IX. POLYCYCLIC AROMATIC HYDROCARBONS			
107. Acenaphthene	Not detected		
108. Acenaphthylene	Not detected		
109. Anthracene	2,17,20,21,26,28	7	1-10M
110. Benzo (a) anthracene	2,21,27	4	1-10M
111. Benzo (b) fluoranthene	26,27	5	1-5
112. Benzo (k) fluoranthene	2,21,27	3	4-14
113. Benzo (g,h,i) perylene	21	1	5
114. Benzo (a) pyrene	2,21,26,27	6	1-10M
115. Chrysene	2,7,17,21,26,27	10	0.6T-10M
116. Dibenzo (a,h) anthracene	21	1	1T
117. Fluorathene	2,8,12,17,21,26,27,28	16	0.3T-21
118. Chrysene	28	1	1
119. Indeno (1,2,3-c,d) pyrene	21	1	4
120. Naphthalene	4,24,26,28	9	0.8T-2.3
121. Phenanthrene	2,2,17,20,21,26,27,28	12	0.3T-10M
122. Pyrene	2,3,8,12,17,21,26,27,28	15	0.3T-16

TABLE 6-19. SUMMARY OF ANALYTICAL CHEMISTRY FINDINGS FROM NURP PRIORITY POLLUTANT SAMPLES[1] (Cont'd)

(Includes information received through September 30, 1983)

Pollutant	Cities Where Detected[2]	Frequency of Detection[3]	Range of Detected Concentrations (µg/ℓ)[4]
X. NITROSAMINES AND OTHER NITROGEN-CONTAINING COMPOUNDS			
123. Nitrosamine, dimethyl (DMN)	Standard methods inappropriate		
124. Nitrosamine, diphenyl	Standard methods inappropriate		
125. Nitrosamine, di-n-propyl	Not detected		
126. Benzidine	Standard methods inappropriate		
127. Benzidine, 3,3'-dichloro-	Not detected		
128. Hydrazine, 1,2-diphenyl-	Standard methods inappropriate		
129. Acrylonitrile	Holding times exceeded		

[1] Based on 121 sample results received as of 9/30/83, adjusted for quality control review.

[2] Cities from which data are available:

1. Durham, NH
2. Lake Quinsigamond, MA
3. Mystic River, MA
4. Long Island, NY
7. Washington, DC
8. Baltimore, MD
12. Knoxville, TN
17. Glen Ellyn, IL
19. Austin, TX
20. Little Rock, AR
21. Kansas City, KS
22. Denver, CO
23. Salt Lake City, UT
24. Rapid City, SD
26. Fresno, CA
27. Bellevue, WA
28. Eugene, OR

Numbering of cities conforms to NURP convention.

[3] Percentages rounded to nearest whole number.

[4] Some reported concentrations are qualified by STORET quality control remark codes, to wit: A = Value reported is the mean of two or more determinations; G = Value reported is the maximum of two or more determinations; I = Actual value is known to be greater than value given; M = Presence of material verified but not quantified; T = Value reported is less than criteria of detection. One value in this column indicates one positive observation or that all observations were equal.

[5] No longer included as a priority pollutant.

TABLE 6-20. MOST FREQUENTLY DETECTED PRIORITY POLLUTANTS IN NURP URBAN RUNOFF SAMPLES[1]

Priority Pollutants Detected in 75 Percent or More of the NURP Samples

Inorganics	Organics
30. Lead (94%)	None
36. Zinc (94%)	
28. Copper (91%)	

Priority Pollutants Detected in 50 percent to 74 percent of the NURP Samples

Inorganics	Organics
27. Chrominum (58%)	None
23. Arsenic (52%)	

Priority Pollutants Detected in 20 percent to 49 percent of the NURP Samples

Inorganics	Organics
26. Cadmium (48%)	105. Bis(2-ethylhexyl) phthalate (22%)
32. Nickel (43%)	3. α-Hexachlorocyclohexane (20%)
29. Cyanides (23%)	

Priority Pollutants Detected in 10 percent to 19 percent of the NURP Samples

Inorganics	Organics
22. Antimony (13%)	12. α-Endosulfan (19%)
25. Beryllium (12%)	94. Pentachlorophenol (19%)
33. Selenium (11%)	7. Chlordane (17%)
	5. γ-Hexachlorocyclohexane (Lindane) (15%)
	122. Pyrene (15%)
	90. Phenol (14%)
	121. Phenanthrene (12%)
	47. Dichloromethane (methylene chloride) (11%)
	96. 4-Nitrophenol (10%)
	115. Chrysene (10%)
	117. Fluoranthene (16%)

[1] Based on 121 sample results received as of September 30, 1983, adjusted for quality control review. Does not include special metals samples.

metals project in order to determine the relationships among dissolved, total, and total recoverable concentrations. The discussion and result of this separate effort are in a subsequent section of this chapter.

A comparison of individual urban runoff sample concentrations undiluted by stream flow (i.e., end of pipe concentrations) with EPA water quality criteria and drinking water standards reveals numerous exceedances of these levels, as shown in Table 6-21. Freshwater acute criteria were exceeded by copper concentrations in 47 percent of the samples and by lead in 23 percent. Freshwater chronic exceedances were common for lead (94 percent), copper (82 percent), zinc (77 percent), and cadmium (48 percent). One organ oleptic (taste and odor) criteria exceedance was observed. Regarding human toxicity, the most significant pollutant was lead. Lead concentrations violated drinking water criteria in 73 percent of the observations.

Whenever an exceedance is noted above, it does not necessarily imply that an actual violation of criteria did or will take place in receiving waters. Rather, the enumeration of exceedances is used as a screening procedure to make a preliminary identification of those pollutants for which their presence in urban runoff requires highest priority for further evaluation. Exceedances of freshwater chronic criteria levels may not persist for a full 24-hour period, for example. However, many small urban streams probably carry only slightly diluted runoff following storms, and acute criteria or other exceedances may in fact be real in such circumstances.

Among the inorganics, the most frequently detected pollutants are also those which are found at the highest concentrations, which most frequently exceed water quality criteria and which are the most geographically well-distributed. One additional observation can be made concerning the samples from Washington, D.C. These samples accounted for a preponderance of the detections of many of the less frequently detected inorganics, including antimony, beryllium, mercury, nickel, selenium, and thallium. No sampling or analytical irregularities have been identified which explain this result.

Organic Pollutants. In general, the organic pollutants were detected less frequently and at lower concentrations than the inorganic pollutants. Sixty-three of a possible 106 organics were detected. The most commonly found organic was the plasticizer bis (2-ethylhexyl) phthalate (22 percent) followed by the pesticide α-hexachlorocyclohexane (α-BHC) (20 percent). An additional 11 organic pollutants were reported with detection frequencies between 10 and 20 percent; 3 pesticides, 3 phenols, 4 polycyclic aromatics, and a single haloginated aliphatic (Table 6-20).

Criteria exceedances were less frequently observed among the organics than the inorganics. One unusually high pentachlorophenol concentration of 115 μg/l resulted in the only exceedance of the organoleptic criteria (Table 6-21). This observation and one for the chlordane exceeded the freshwater acute criteria. Freshwater chronic criteria exceedances were observed for pentochlorophenol, bis (2-ethylhexyl) phthalate, γ-hexachlorocyclohexane (Lindane), α-endosulfan, and chlordane. All other organic exceedances were in the human carcinogen category and were most serious for α-hexachlorocyclohexane (α-BHC), γ-hexachlorocyclohexane (γ-BHC or Lindane), chlordane, phenanthrene, pyrene, and chrysene.

TABLE 6-21. SUMMARY OF WATER QUALITY CRITERIA EXCEEDANCES FOR POLLUTANTS DETECTED IN AT LEAST 10 PERCENT OF NURP SAMPLES: PERCENTAGE OF SAMPLES IN WHICH POLLUTANT CONCENTRATIONS EXCEED CRITERIA[1]

Pollutant	Frequency of Detection (%)	Detections/ Samples[2]	Criteria Exceedances (%)						
			None	FA	FC	Ot	HH	HF[b]	OW
I. PESTICIDES									
3. α-Hexachlorocyclohexane	20	21/106						8,18,20	
5. γ-Hexachlorocyclohexane (lindane)	15	15/100			8			0,10,15	
7. Chlordane	17	7/42		2	17			17,17,17	
12. α-Endosulfan	19	9/49			10				
II. METALS AND INORGANICS									
22. Antimony	13	14/106	X						
23. Arsenic	52	45/87						52,52,52	1
25. Beryllium	12	11/94			6*			12,12,12	
26. Cadmium[5]	48	44/91		8	48		1		1
27. Chromium[5,6]	58	47/81			1*				1
28. Copper[5]	91	79/87		47	82				
29. Cyanides	23	16/71		3	22		4		
30. Lead[5]	94	75/80		23	94		23		73
32. Nickel[5]	43	39/91			5		21		
33. Selenium	11	10/88			5		10		10
36. Zinc[5]	94	88/94		14	17				
IV. HALOGENATED ALIPHATICS									
47. Methane, dichloro-	11	3/28						0,0,11	
VII. PHENOLS AND CRESOLS									
90. Phenol	14	13/91	X						
94. Phenol, pentachloro-	19	21/111		1*	11*	1			
96. Phenol, 4-nitro-	10	11/107	X						
VIII. PHTHALATE ESTERS									
105. Phthalate, bis(2-ethylhexyl)	22	15/69			22*				
IX. POLYCYCLIC AROMATIC HYDROCARBONS									
115. Chrysene	10	11/109						10,10,10	
117. Fluoranthene	16	17/109	X						
121. Phenanthrene	12	13/110						12,12,12	
122. Pyrene	15	16/110						15,15,15	

* Indicates FTA or FTC value substituted where FA or FC criterion not available (see below).

[1] Based on 121 sample results received as of September 30, 1983, adjusted for quality control review.

[2] Number of times detected/number of acceptable samples.

[3] FA = Freshwater ambient 24-hour instantaneous maximum criterion ("acute" criterion).
FC = Freshwater ambient 24-hour average criterion ("chronic" criterion).
FTA = Lowest reported freshwater acute toxic concentration. (Used only when FA is not available.)
FTC = Lowest reported freshwater chronic toxic concentration. (Used only when FC is not available.)
Ot = Taste and odor (organoleptic) criterion.
HH = Non-Carcinogenic human health criterion for ingestion of contaminated water and organisms.
HF = Protection of human health from carcinogenic effects for ingestion of contaminated water and organisms.
OW = Primary drinking water criterion.

[4] Entries in this column indicate exceedances of the human carcinogen value at the 10^{-5}, 10^{-6}, and 10^{-7} risk level, respectively. The numbers are cumulative, i.e., all 10^{-5} exceedances are included in 10^{-6} exceedances, and all 10^{-6} exceedances are included in 10^{-7} exceedances.

[5] Where hardness dependent, hardness of 100 mg/l $CaCO_3$ equivalent assumed.

[6] Different criteria are written for the trivalent and hexavalent forms of chromium. For purposes of this analysis, all chromium is assumed to be in the less toxic trivalent form.

An additional 50 organic pollutants were found in one to nine percent of the samples. These frequencies of detection are low, and the pollutant is noted in Table 6-22.

Among the PCB group, there was only a single detection of one PCB type among all the samples. Approximately two-thirds of the halogenated aliphatic compounds were detected. Among those cities reporting these compounds, the city of Eugene, Oregon, figured prominently. For example, eight pollutants from this group were found in Eugene only. None of the pollutants in the ethers group were detected.

Monocyclic aromatics were rarely detected in the samples. However, many reported detections of benzene and toluene, two commonly reported pollutants, had to be withdrawn due to contamination problems.

Of the 11 phenolics, four have not been reported in urban runoff, while three have been observed only once. The remaining four have been found fairly frequently but at low concentrations. Exceedances of criteria were noted only for pentachlorophenol.

All the phthalate esters were detected at least once in the NURP program, with bis (2-ethylhexyl) found most frequently. Several times the reported concentration exceeded the lowest observed freshwater acute toxic concentration for this pollutant. Given the significant blank contamination problems with the phthalates, however, these findings must be interpreted with caution.

Only two of the polycyclic aromatic hydrocarbons were not detected in at least one sample. Crysene, phenanthrene, pyrene, and fluoranthene were each found at least 10 percent of the time. All the observed concentrations for the first three of these pollutants exceeded the criteria for the protection of human health from carcinogenic effects (there are no such criteria for fluoranthene). Results for the polycyclic aromatics were generally free from quality control problems.

There were no detections of nitrosamines or other nitrogen-containing compounds. Due to methodological and holding time problems, however, results for only two compounds can be used. Moreover, for one of these compounds, 3,3-dichlorobenzidine, performance evaluation results were unacceptable in several cases.

Pollutants Not Detected In Urban Runoff

Some 43 priority pollutants were not detected in any acceptable runoff samples (Table 6-22). All of these pollutants are organics. This group of substances should be considered to pose a minimal threat to the quality of surface waters from runoff contamination.

While the priority pollutants which were not detected are of less immediate concern than those pollutants found often, they cannot safely be eliminated from all future consideration. Many of these pollutants have associated water quality criteria which are below the limits of detection of routine

TABLE 6-22. INFREQUENTLY DETECTED ORGANIC PRIORITY POLLUTANTS IN NURP URBAN RUNOFF SAMPLES[1]

Priority Pollutants Detected in 1 percent to 9 percent of the NURP Samples

51. Trichloromethane (9%)
120. Naphthalene (9%)
98. 2,4-Dimethyl phenol (8%)
109. Anthracene (7%)
2. Aldrin (6%)
6. δ-Hexachlorocyclohexane (6%)
9. DDE (6%)
11. Dieldrin (6%)
17. Heptachlor (6%)
58. 1,1,1-Trichloroethane (6%)
65. Trichloroethene (6%)
85. Ethylbenzene (6%)
102. Diethyl phthalate (6%)
103. Di-n-butyl phthalate (6%)
104. Di-n-octyl phthalate (6%)
106. Butyl benzyl phthalate (6%)*
114. Benzo(a)pyrene (6%)
4. β-Hexachlorocyclohexane (5%)
53. Trichlorofluoromethane (5%)[2]
66. Tetrachloroethene (5%)
78. Benzene (5%)
79. Chlorobenzene (5%)
111. Benzo(b)fluoranthene (5%)*
64. 1,2-trans-dichloroethene (4%)
110. Benzo(a)anthracene (4%)
19. Isophorone (3%)
52. Tetrachloromethane (carbon tetrachloride) (3%)
56. 1,1-Dichloroethane (3%)
87. Toluene (3%)
112. Benzo(k)fluoranthene (3%)
18. Heptachlor epoxide (2%)*
59. 1,1,2-Trichloroethane (2%)*
60. 1,1,2,2-Tetrachloroethane (2%)*
63. 1,1-Dichloroethene (2%)
68. 1,3-Dichloropropene (2%)*
113. Benzo(g,h,i)perylene (2%)
10. DDT (1%)*
43. PCB-1260 (1%)*
48. Chlorodibromomethane (1%)*
49. Dichlorobromomethane (1%)*
50. Tribromomethane (bromoform) (1%)*
57. 1,2-Dichloroethane (1%)*
67. 1,2-Dichloropropane (1%)*
91. 2-Chlorophenol (1%)*
95. 2-Nitrophenol (1%)*
99. p-Chloro-m-creosol (1%)*
101. Dimethyl phthalate (1%)*
116. Dibenzo(a,h)anthracene (1%)*
118. Fluorene (1%)*
119. Indeno(1,2,3-cd)pyrene (1%)*

TABLE 6-22. INFREQUENTLY DETECTED ORGANIC PRIORITY POLLUTANTS IN NURP URBAN RUNOFF SAMPLES[1] (Cont'd)

Priority Pollutants Not Detected in NURP Samples

8. DDD
13. β-Endosulfan
14. Endosulfan sulfate
15. Endrin
16. Endrin aldehyde
21. Toxaphene
37. PCB-1016
38. PCB-1221
39. PCP-1232
40. PCB-1242
41. PCB-1248
42. PCB-1254
44. 2-Chloronaphthalene
45. Bromomethane (methyl bromide)
46. Chloromethane (methyl chloride)
54. Dichlorodifluoromethane (Freon-12)[2]
55. Chloroethane
61. Hexachloroethane
62. Chloroethene (vinyl chloride)
69. Hexachlorobutadiene
71. Bis(chloromethyl) ether[2]
72. Bis(chloroethyl) ether
73. Bis(chloroisopropyl) ether
74. 2-Chloroethyl vinyl ether
75. 4-Bromophenyl phenyl ether
76. 4-Chlorophenyl phenyl ether
77. Bis(2-chloroethoxy) methane
80. 1,2-Dichlorobenzene
81. 1,3-Dichlorobenzene
82. 1,4-Dichlorobenzene
83. 1,2,4-Trichlorobenzene
84. Hexachlorobenzene
86. Nitrobenzene
88. 2,4-Dinitrotoluene
89. 2,6-Dinitrotoluene
92. 2,4-Dichlorophenol
93. 2,4,6-Trichlorophenol
97. 2,4-Dinitrophenol
100. 4,6-Dinitro-o-cresol
107. Acenaphthene
108. Acenaphthylene
125. Di-n-propyl nitrosamine
127. 3,3'-Dichlorobenzidine

TABLE 6-22. INFREQUENTLY DETECTED ORGANIC PRIORITY POLLUTANTS IN NURP URBAN RUNOFF SAMPLES[1] (Cont'd)

Priority Pollutants Not Analyzed for or Withdrawn for Methodological Reasons or Holding Time Violations

1. Acrolein
20. TCDD (Dioxin)
24. Asbestos
70. Hexachlorocyclopentadiene
123. Dimethyl nitrosamine (DMN)
124. Diphenyl nitrosamine
126. Benzidine
128. 1,2-Diphenyl hydrazine
129. Acrylonitrile

* Detected in only one or two samples.

[1] Based on 121 sample results received as of September 30, 1983, adjusted for quality control review.

[2] No longer on the priority pollutant list.

analytical methods. Some of these substances may in fact have been present in the NURP samples. Four priority pollutants not detected in runoff were found in street dust sweepings from Bellevue, Washington, suggesting that further urban runoff samplings can be expected to detect more priority pollutants. More sensitive analytical methodologies must be used and dilution effects considered before it can be said with assurance that these pollutants are not found in urban stormwater runoff at levels which, without dilution, pose a threat to human health or aquatic life.

DDD, chloromethane, 1,2-dichlorobenzene, and 2,4-dichlorophenol were detected in runoff samples at least once, but these observations had to be withdrawn for quality control reasons. Therefore, among the not detected pollutants, these four can be considered to have a slightly elevated possibility of actually being present in the runoff samples.

RUNOFF-RAINFALL RELATIONSHIPS

A runoff coefficient (Rv), defined as the ratio of runoff volume to rainfall volume, has been determined for each of the monitored storm events. As with the EMCs, the runoff coefficient values at a particular site are, with relatively few exceptions, well characterized by a lognormal distribution. Table 6-23 summarizes the statistical properties of Rv's at the loading sites in the data base.

Figure 6-19 illustrates the relationship between percent impervious area and the median runoff coefficient for the site. Sites which monitored fewer than 5 storms are excluded. The upper plot (a) groups the results from 16 of the

TABLE 6-23. RUNOFF COEFFICIENTS FOR LAND USE SITES

Residential

	Site	Land Use (%)	No. of Events	Drainage Area (Acs)	Population Density (Pers/Acre)	Impervious	Runoff Coef (%) Median	Runoff Coef (%) Coef Var
1	CA1 Big Bear	100	16	33	19	3[illegible]	[illegible]	.37
2	CA1 Cherry	100	15	65	24	3[illegible]	[illegible]	.45
3	CO1 Glendale	100	20	167	34	[illegible]	[illegible]	.4
4	CO1 Gulley	100	63	17	9	19	[illegible]	[illegible]
5	CO1 Lakeridge	100	83	86	3	[illegible]	.13	[illegible]
6	CO1 Stratton	100	31	2	[illegible]	[illegible]	[illegible]	.37
7	FL1 Indian Rock	100	17	3	-	-	[illegible]	.45
8	IL1 Urbana	100	43	63	16	19	.13	[illegible]
9	IL1 Riverside	100	11	58	9	18	.38	.11
10	MA2 Sudbury	100	6	50	5	16	.15	.16
11	MD1 Antietam Arch	100	19	14	30	11	.44	[illegible]
12	MD1 Hometown	100	15	20	9	29	.41	.26
13	MD1 Mt Wash	100	20	17	12	29	.14	1.25
14	MD1 Pee Hill	100	11	16	55	26	.41	.54
15	MI1 Carll's W.	100	26	23	13	20	.21	.41
16	MI1 Grinslow	100	11	166	5	23	.16	.15
17	MI1 Eriqch.	100	9	146	18	35	.30	.43
18	NJ1 Rollinswood	100	9	60	3	27	.02	.29
19	WA1 Surrey	100	139	95	9	29	14	.56
20	WI1 Bulbank	100	44	13	15	50	.17	.97
21	WI1 Washings	100	33	33	17	51	.27	.37
22	IL1 Park	95	24	175	4	40	.09	.36
23	WI1 Lincoln	93	29	37	16	57	.21	.55
24	TN1 [illegible]	76	21	89	4	13	.01	.67
25	FL1 Wellington	93	12	41	3	21	.12	1.15
26	KS1 [illegible] - Blvd	92	14	61	-	22	.25	1.09
27	IL1 John [illegible]	91	29	39	12	12	.17	.54
28	TN1 [illegible]	91	9	49	11	52	.01	.92
29	WA1 Lake Wells	91	1,1	102	12	17	.20	.41
30	FL1 Martin S	90	20	25	22	27	.13	.16
31	FL1 Charter M.	90	11	42	-	36	.15	4.56
32	GL1 Lakeridge	90	14	13	-	34	.35	1.37
33	CO1 Ashley	86	16	127	9	[illegible]	.19	.92
34	IL1 Cook Inlets	86	29	574	8	51	.17	.48
35	MO1 Locust	85	6	158	11	35	.21	.33
36	NC1 [illegible]	84	63	3x4	1[illegible]	[illegible]	[illegible]	[illegible]
37	MA1 Jordan	79	9	1111	10	71	[illegible]	.65
38	OC1 Sledwick	75	45	[illegible]	15	74	.20	[illegible]

Mixed

	Site	Land Use	No. of Events	Drainage Area (Acs)	Population Density (Pers/Acre)	Impervy	Runoff Coef (%) Median	Runoff Coef (%) Coef Var
1	AZ1 Winfield	-	25	38	3	16	.09	1.04
2	CA1 Demoiler	-	22	7	40	72	.29	.51
3	IL1 Marrio N	-	26	17	7	56	.64	.52
4	MI1 Waverly	-	25	32	11	68	.06	.25
5	TN1 [illegible]	-	12	157	3	43	.14	.46
6	WI1 [illegible]	-	44	45	16	51	.26	.42
7	MA1 [illegible]	-	[illegible]	55[illegible]	[illegible]	11	.20	.99
8	MA1 Concord	-	6	100	1	37	.50	.36
9	MI1 Grand W Ut	-	23	453	5	36	.31	.60
10	IL1 Wilmer	-	15	194	-	-	.41	1.12
11	MI1 Pots 6A-5	-	6	2001	-	11	.29	.41
12	NJ1 Cedar	-	12	76	-	5	.06	1.05
13	IL1 Desbit	-	15	30	-	12	.32	1.03
14	MA1 Ames	-	5	601	9	12	.17	1.68
15	MI1 Ill 6A-N	-	6	2671	7	26	.10	.41
16	MI1 Grove h	-	24	104	5	26	.11	.41
17	IL1 Swift Tur	-	5	1107	1	4	21	.18
18	SD1 Meade	-	16	2000	-	-	10	.57
19	CA1 Kobo	-	42	1690	12	-	.26	.71
20	CO1 Nilth Ave	-	33	19	1	50	.24	.59

Commercial

	Site	Land Use (%)	No. of Events	Drainage Area (Acs)	Population Density (Pers/Acre)	Impervy	Runoff Coef (%) Median	Runoff Coef (%) Coef Var
1	IN1 Little Italy	100	23	14	0	91	.93	.45
2	NC1 1012 (CBD)	100	112	21	1	69	.79	.49
3	NJ1 Southgate	100	13	179	2	21	.20	.28
4	WI1 Lost Office	100	50	12	0	100	.90	.19
5	WI1 Rustler	100	39	12	0	100	.79	.19
6	NM1 Oxnard	100	14	1	1[illegible]	90	.6[illegible]	.50
7	TN1 CBD	100	14	31	0	99	.22	.41
8	IL1 SC Meitplt	96	21	62	-	47	.46	.55
9	FL1 Normed Park	93	12	47	-	45	.48	.86
10	WI1 State Fair	73	21	29	10	77	.62	.20

Industrial

	Site	Land Use (%)	No. of Events	Drainage Area (Acs)	Population Density (Pers/Acre)	Impervy	Runoff Coef (%) Median	Runoff Coef (%) Coef Var
1	MD1 Albrison	100	6	15	0	69	57	.53
2	MI1 Indus Drive	100	18	61	1	64	.16	.71
3	AZ1 Central	50	10	32	-	44	.54	.37
4	MI1 Grove 2	50	10	5	5	19	.12	.41

Undeveloped Open and Mountain

	Site	Land Use (%)	No. of Events	Drainage Area (Acs)	Population Density (Pers/Acre)	Impervy	Runoff Coef (%) Median	Runoff Coef (%) Coef Var
	TN1 Sewanee	100	[illegible]	633	-	1	.03	[illegible]
	[illegible] Power Outlet	[illegible]		1,15	-	1	.14	[illegible]
	[illegible]	100	13	[illegible]	-	1	.06	[illegible]
1	[illegible]	95	[illegible]	1,[illegible]	-	1	[illegible]	1.[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-	1	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]

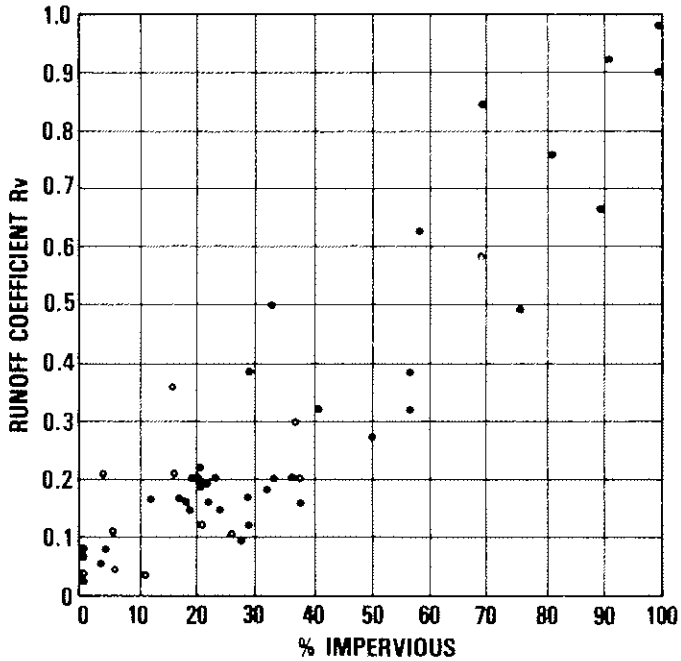

(a) 16 Projects

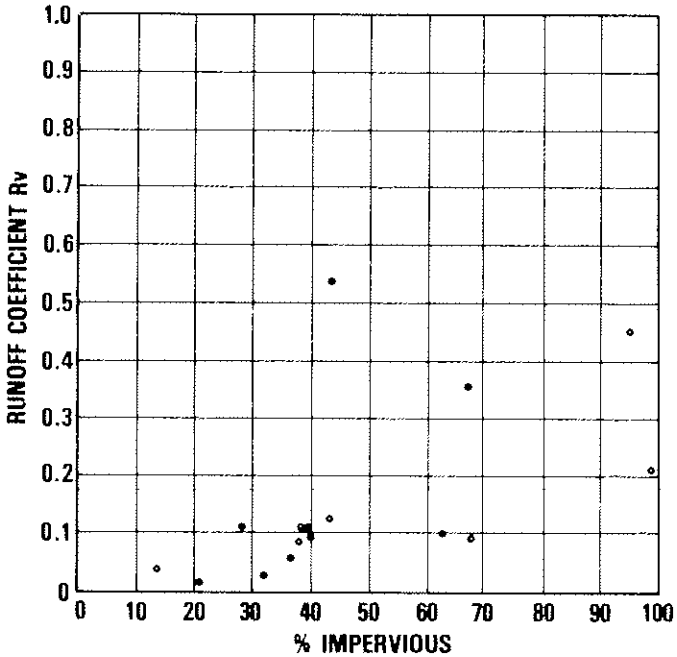

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(b) 4 Projects (KS1, MI1, TN1, TX1)

Figure 6-19. Relationship Between Percent Impervious Area and Median Runoff Coefficient

20 projects investigated. The lower plot (b) groups results from the remaining four projects (KS1, MI1, TN1, TX1). The reason for the difference is unexplained. However, the separate grouping is based on the fact that the relationship for these sites is internally consistent and significantly different than the bulk of the project results.

Figure 6-20 illustrates the same impervious area/runoff coefficient relationship, but shows the 90 percent confidence limits for median Rv's.

POLLUTANT LOADS

Although the EMC median concentration values are appropriate for many applications (e.g., assessing water quality impacts in rivers and streams), when cumulative effects such as water quality impacts in lakes and comparisons with other sources on a long-term basis (e.g., annual or seasonal loads) are to be examined, the EMC mean concentration values should be used. Taking the EMC median and coefficient of variation values given in Table 6-17, we have converted them into mean values using the relationship given in Chapter 5. These EMC mean concentrations and the values used in the load comparison to follow are listed in Table 6-24.

The range shown for site mean concentrations for both the median and 90th percentile urban sites reflects the difference in means depending on whether the higher or lower value of coefficient of variation listed in Table 6-17 is used to describe event-to-event variability of EMC's at urban sites. The range in values shown for use in the load comparisons below reflects the median and 90th percentile site mean concentrations, using the average of the range caused by coefficient of variation effects.

TABLE 6-24. EMC MEAN VALUES USED IN LOAD COMPARISON

Constituent	Site Mean EMC		
	Median Urban Site	90th Percentile Urban Site	Values Used in Load Comparison
TSS (mg/l)	141 - 224	424 - 671	180 - 548
BOD (mg/l)	10 - 13	17 - 21	12 - 19
COD (mg/l)	73 - 92	157 - 198	82 - 178
Tot. P (mg/l)	0.37 - 0.47	0.78 - 0.99	0.42 - 0.88
Sol. P (mg/l)	0.13 - 0.17	0.23 - 0.30	0.15 - 0.28
TKN (mg/l)	1.68 - 2.12	3.69 - 4.67	1.90 - 4.18
NO_{2+3}-N (mg/l)	0.76 - 0.96	1.96 - 2.47	0.86 - 2.21
Tot. Cu (ug/l)	38 - 48	104 - 132	43 - 118
Tot. Pb (ug/l)	161 - 204	391 - 495	182 - 443
Tot. Zn (ug/l)	179 - 226	559 - 707	202 - 633

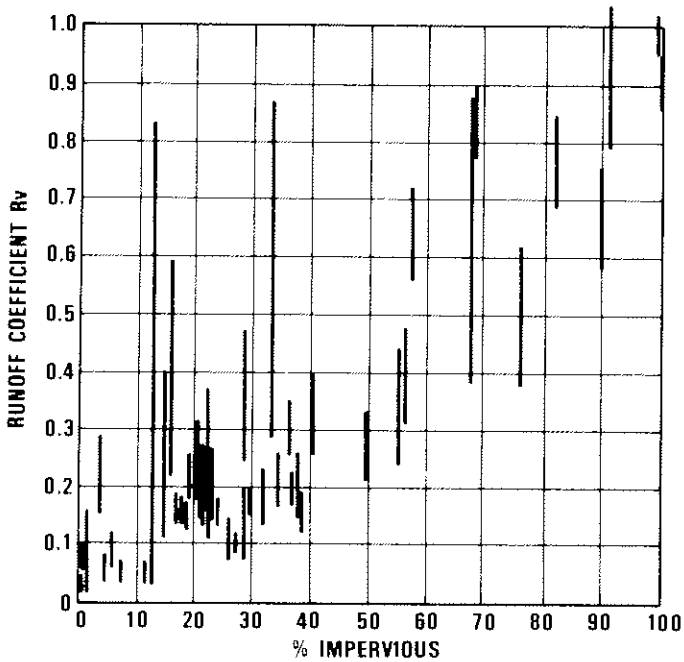

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(a) 16 Projects

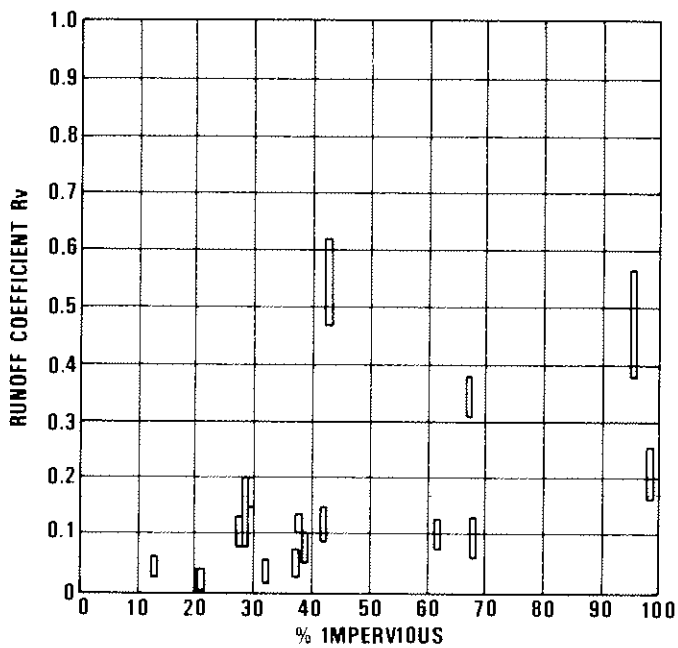

(b) 4 Projects (KS1, MI1, TN1, TK1)

Figure 6-20. 90 Percent Confidence Limits for Median Runoff Coefficients

It is a straightforward procedure to calculate mean annual load estimates for urban runoff constituents on a Kg/Ha basis by assigning appropriate rainfall and runoff coefficient values and selecting EMC mean concentration values from Table 6-24. In and of themselves, however, such estimates seem to be of little utility. Therefore, it was decided to do a comparison of the mean annual loads from urban runoff with those of a "well run" secondary treatment plant. We chose to use TSS = 25 mg/l, BOD = 15 mg/l, and Tot. P = 8 mg/l for the effluents from such plants for the purposes of this order of magnitude comparison. For a meaningful comparison for a specific situation, locally appropriate values should be used. Based upon Table 6-24, the corresponding urban runoff mean concentrations used were TSS = 180 mg/l, BOD = 12 mg/l, and Total P = 0.4 mg/l as typical and TSS = 548 ug/l, BOD = 19 mg/l, and Tot. P = 0.88 mg/l as a "worst case" for comparison purposes.

The value of 0.35 was selected as a typical mean runoff coefficient. It is the median of the NURP mean runoff coefficient database for the twenty projects discussed earlier; their average is 0.42, but we believe that this number is overly weighted by the disproportionate number of highly impervious sites in the database. Assuming an average population density of 10 persons per acre (the average of the NURP sites) and a mean annual rainfall of 40 inches per year, urban runoff averages 104 gallons per day per capita. This is also a reasonable estimate of sewage generation in an urban area. Therefore, as a first cut, the ratio of mean pollutant concentrations of urban runoff and POTW effluents will also be the ratio of their annual loads. Thus, we have;

$$\text{TSS} = \frac{180}{25} \approx 7 \ ; \ \text{BOD} = \frac{12}{15} \approx 0.8 \ ; \ \text{Tot. P} = \frac{0.4}{8} \approx 0.05$$

using typical urban runoff values, and;

$$\text{TSS} = \frac{548}{25} \approx 22 \ ; \ \text{BOD} = \frac{19}{15} \approx 1.3 \ ; \ \text{Tot. P} = \frac{0.88}{8} \approx 0.1$$

using the "worst case" values. These numbers suggest that annual loads from urban runoff are approximately one order of magnitude higher than those from a well run secondary treatment plant for TSS, the same order of magnitude for BOD, and an order of magnitude less for Tot. P.

If the hypothetical urban area just described were to go to advanced waste treatment and achieve an effluent quality of TSS = 10 mg/l, BOD = 5 mg/l, and Total P = 1 mg/l and no urban runoff controls were instituted, the mean annual load reductions to the receiving water would be:

$$\text{TSS} = \frac{25 - 10}{180 + 25} \approx 7\% \ ; \ \text{BOD} = \frac{15 - 5}{12 + 15} \approx 37\% \ ; \ \text{Tot. P} = \frac{8 - 1}{0.4 + 8} \approx 83\%$$

for our typical case, and;

$$\text{TSS} = \frac{25 - 10}{548 + 25} \approx 3\% \ ; \ \text{BOD} = \frac{15 - 5}{19 + 15} \approx 29\% \ ; \ \text{Tot. P} = \frac{8 - 1}{0.88 + 8} \approx 79\%$$

for our "worst case." On the other hand, if urban runoff controls that reduced TSS by 90 percent, BOD by 60 percent, and Total P by 50 percent were instituted, (typical results from a well-designed detention basin), the mean annual load reductions to the receiving water would be:

$$\text{TSS} = \frac{180 - 18}{180 + 25} \approx 79\% \ ; \ \text{BOD} = \frac{12 - 7}{12 + 15} \approx 19\% \ ; \ \text{Total P} = \frac{0.4 - 0.2}{0.4 + 8} \approx 2\%$$

for our typical case, and;

$$\text{TSS} = \frac{548 - 55}{548 + 25} \approx 86\% \ ; \ \text{BOD} = \frac{19 - 8}{19 + 15} \approx 32\% \ ; \ \text{Total P} = \frac{0.88 - 0.44}{0.58 + 8} \approx 5\%$$

Thus, if these pollutants are causing receiving water quality problems, consideration of urban runoff control appears warranted for TSS, both urban runoff control and AWT might be considered for BOD, and only AWT would be effective for Total P.

The foregoing should be viewed as illustrative of a preliminary screening for trade-off studies that can be performed using appropriate values for a specific urban area, rather than as description of any particular real-world case. They are, however, believed useful in providing order of magnitude comparisons. Local values for annual rainfall, runoff coefficient, or point source characteristics that are different than those used in the illustration will of course change the results shown; although in most cases the changes would not be expected to cause a significant change in the general relationship.

As a final perspective on urban runoff loads, Table 6-25 presents an estimate of annual urban runoff loads, expressed as Kg/Ha/year, for comparison with other data summaries of nonpoint source loads which state results in this manner. Load computations are based on site mean pollutant concentrations for the median urban site and on the specified values for annual rainfall and runoff coefficient. Typical values for mean runoff coefficient (based on NURP data) have been assigned for residential land use (Rv = 0.3), commercial land use (Rv = 0.8), and for an aggregate urban area which is assumed to have representative fractions of the total area in residential, commercial, and open uses (Rv = 0.35).

Several useful observations can be made. The annual load estimates which results are comparable to values and ranges reported in the literature. Although the findings presented earlier in this chapter indicated that the land use category does not have a significant influence on site concentrations of pollutants, on a unit area basis total pollutant loads are significantly higher for commercial areas because of the higher degree of imperviousness typical of such areas. For broad urban areas, however, the relatively small fraction of land with this use considerably mitigates such an effect.

Finally, the annual loads shown by Table 6-25 have been computed on the basis of a 40 inch annual rainfall volume. For urban areas in regions with higher

TABLE 6-25. ANNUAL URBAN RUNOFF LOADS KG/HA/YEAR

Constituent	Site Mean Con.mg/l	Residential	Commercial	All Urban
Assumed Rv		0.3	0.8	0.35
TSS	180	550	1460	640
BOD	12	36	98	43
COD	82	250	666	292
Total P	0.42	1.3	3.4	1.5
Sol. P	0.15	0.5	1.2	0.5
TKN	1.90	5.8	15.4	6.6
NO_{2+3}-N	0.86	2.6	7.0	3.6
Tot. Cu	0.043	0.13	0.35	0.15
Tot. Pb	0.182	0.55	1.48	0.65
Tot. Zn	0.202	0.62	1.64	0.72

NOTE. Assumes 40 inches/year rainfall as a long-term average.

or lower rainfall, these load estimates must be adjusted. The results presented earlier suggest that pollutant concentrations are not sensitive to runoff volume; however, total loads (the product of concentration and volume) are strongly influenced by the volume of runoff. For estimates using equivalent site conditions (Rv), loads for areas with other rainfall amounts are obtained by factoring by the ratio of local rainfall volume to the 40 inch volume used for the table. Planners who believe that the average annual runoff coefficients in their local areas are substantially different from those used in the table can make similar adjustments.

CHAPTER 7
RECEIVING WATER QUALITY EFFECTS OF URBAN RUNOFF

INTRODUCTION

The effects of urban runoff on receiving water quality are very site specific. They depend on the type, size, and hydrology of the water body, the designated beneficial use and the pollutants which affect that use, the urban runoff (URO) quality characteristics, and the amounts of URO dictated by local rainfall patterns and land use.

A number of the NURP projects examined receiving water impacts in some detail, others less rigorously. Because of the uniqueness of URO water quality impacts, individual project results are considered best used for confirmation and support, rather than as a basis for broad generalizations.

Accordingly, this chapter is structured to address each of the principal categories of receiving water bodies separately; streams and rivers, lakes, estuaries and embayments, and groundwater aquifers. Some can be addressed more thoroughly than others at this time. The approach taken to develop a general, national scale screening assessment of the significance of URO pollutant discharges is to compute anticipated effects using analysis methodologies identified in Chapter 5, where these are appropriate and to compare anticipated effects indicated by such generalizations to specific experiences and conclusions drawn by relevant individual NURP projects.

As with any generalization, there will be exceptions. Specific local situations can be expected which are either more or less favorable than the general case. The results presented herein should therefore be interpreted as representative estimates of a substantial percentage of urban runoff sites, but not all of them.

Receiving waters have distinctive general characteristics which depend on the water body type (e.g., stream, lake, estuary) and relatively unique individual characteristics which depend on geometry and hydrology. Given a minimum acceptable amount of data on water bodies and their setting, it appears possible to make useful generalizations regarding the quantitative effects of urban runoff on concentrations of various pollutants in the receiving waters and to draw inferences concerning the influence urban runoff may have on the beneficial uses of the water bodies. However extending the results of such an analysis to an assessment of the prevalence of urban runoff induced "problems" on a national scale cannot be accomplished in a way would provide an acceptable level of confidence in any conclusions drawn therefrom. In addition to the importance of local hydrology, meteorology, and urban characteristics, the emphasis placed on each of the three elements that influence problem definition;

(1) Denial or serious impairment of beneficial use;

(2) Violation of ambient water quality standards; and

(3) Local perception;

will result in a high degree of site-specificity to the determination of the existence of a problem.

RIVERS AND STREAMS

General

Flowing streams carry pollutant discharges downstream with the stream flow. For intermittent stormwater discharges, a specific stream location and the biota associated with it are exposed to a sequence of discrete pulses contaminated by the pollutants which enter with urban runoff. Because of the inherent variability of urban runoff (URO), the average concentrations in such pulses vary, as do their duration and the interval between successive pulses. Table 7-1 summarizes average values for storm duration and intervals between storm events for selected locations in the U.S., based on analysis of long term rainfall records using a methodology (SYNOP) presented in an earlier NURP document (the NURP Data Management Procedures Manual). The information presented provides a sense of the temporal aspects of such intermittent pulses and, by inference, the intermittent exposure patterns to which stream biota are subjected. For many locations, storm pulses are produced for about six hours every three days or more, on average.

A probabalistic methodology has been used to examine the concentration characteristics of the storm pulses produced in streams, given the variability of the relevant processes which are directly involved. Stream flow rates, runoff flow rates, and concentrations vary and result in variable stream concentrations. For streams, it is not the runoff volume per se that is important. The combination of stream and runoff flow rates (together with runoff concentration) determine the pollutant concentration in the stream pulse. The duration of the runoff event and the stream velocity dictate the spatial extent of the storm pulse in the stream. The analysis presented in this section addresses the frequency and magnitude of pollutant concentrations in the instream storm pulses which are produced.

Runoff and Stream Flow Rates

The local combination of stream and runoff flow rates for an urban location are, as indicated, important determinants of the stream concentrations which will result. For long-range projections, the most appropriate data sources for characterizing these parameters are long-term stream flow gauging records (USGS) and long-term rainfall records (USWS).

Figure 7-1(a) illustrates the regional variation of average daily stream flows expressed as cfs/sq mile of drainage area, based on long-term (50 years or more) gauging records at over 1000 stations. Figure 7-1(b) presents a somewhat simplified regional pattern for average rainfall intensity. The data base for this plot is considerably smaller, consisting of rainfall records (usually 10 to 30 years of record) for approximately 40 cities. Localized peturbations exist, but are smoothed out by contours presented.

TABLE 7-1. AVERAGE STORM AND TIME BETWEEN STORMS FOR SELECTED LOCATIONS IN THE UNITED STATES

Location	Average Annual Values in Hours	
	Storm Duration	Time Between Storm Midpoints
Atlanta, GA	8.0	94
Birmingham, AL	7.2	85
Boston, MA	6.1	68
Caribou, ME	5.8	55
Champaign-Urbana, IL	6.1	80
Chicago, IL	5.7	72
Columbia, SC	4.5	68
Davenport, IA	6.6	98
Detroit, MI	4.4	57
Gainesville, FL	7.6	106
Greensboro, SC	5.0	70
Kingston, NY	7.0	80
Louisville, KY	6.7	76
Memphis, TN	6.9	89
Mineola, NY	5.8	89
Minneapolis, MN	6.0	87
New Orleans, LA	6.9	89
New York City, NY	6.7	77
Steubenville, OH	7.0	79
Tampa, FL	3.6	93
Toledo, OH	5.0	62
Washington, DC	5.9	80
Zanesville, OH	6.1	77
Mean	6.1	81
Denver, CO	9.1	144
Oakland, CA	4.3	320
Phoenix, AZ	3.2	286
Rapid City, SD	8.0	127
Salt Lake City, UT	7.8	133
Mean	6.5	202
Portland, OR	15.5	83
Seattle, WA	21.5	101
Mean	18.5	92

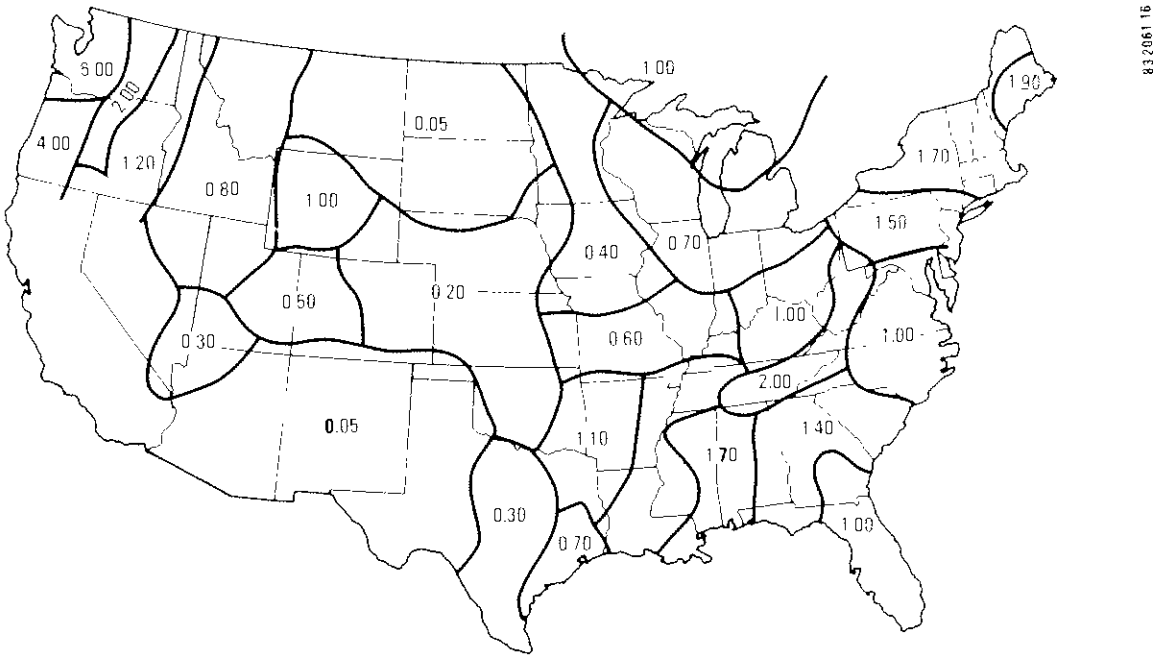

Figure 7-1(a). Regional Value of Average Annual Streamflow (cfs/sq mi)

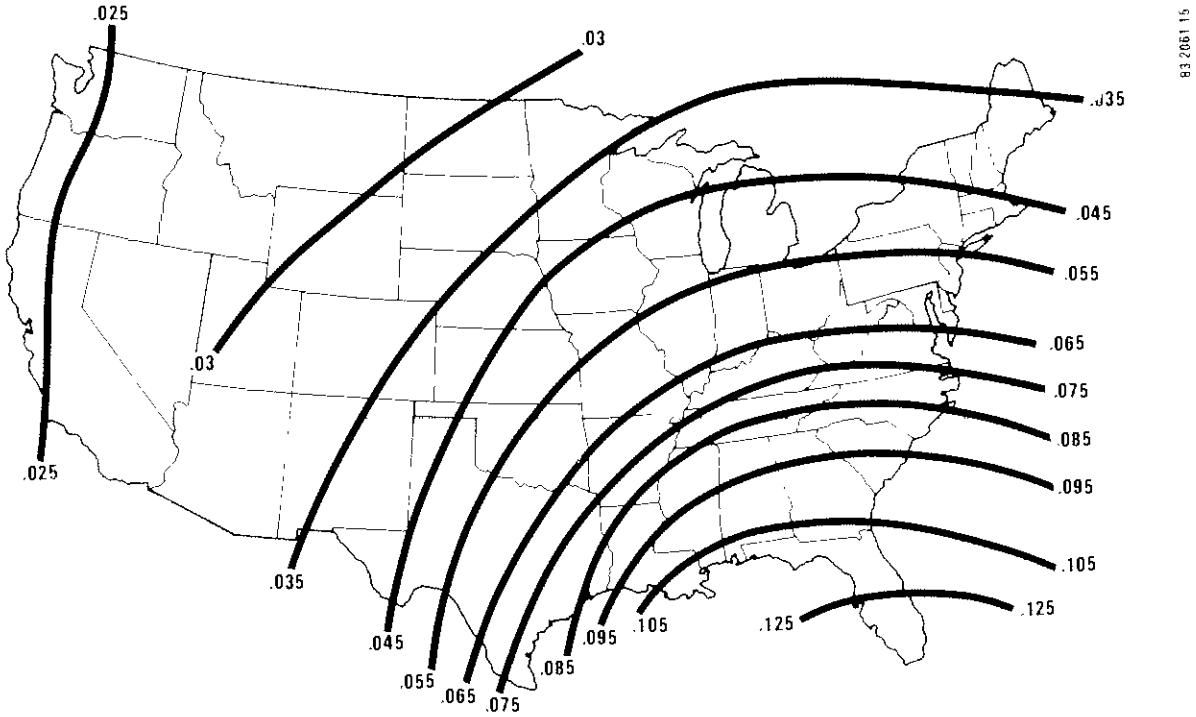

Figure 7-1(b). Regional Value of Average Storm Event Intensity (inch/hr)

Variability of daily stream flows was determined for a smaller sample (about 150 sites) of the stream sites. Variability of storm event average intensities was determined for all of the rain gauge locations in the current data base. These results are summarized in Table 7-2.

Total Hardness of Receiving Streams

Where the beneficial use of principal concern is the protection of aquatic life, the URO pollutants of major concern appear to be heavy metals, particularly copper, lead and zinc. The potential toxicity of these pollutants are strongly influenced by total hardness, as indicated by Table 5-1 in Chapter 5. Other beneficial uses deal with pollutants and effects that are not influenced by total hardness or (as with drinking water supplies) do not modify the assigned significance of heavy metal concentrations on the basis of total hardness.

As with stream flow and precipitation, distinct regional patterns also exist for receiving water total hardness concentrations. Figure 7-2 delineates the national pattern of regional differences. These patterns impose an additional regional influence on the potential of urban runoff to create problem conditions in streams and rivers.

Technical Approach To Screening Analysis

The magnitude and frequency of occurrence of intermittent stream concentrations of pollutants of interest, that result from urban runoff, has been computed using the probabilistic methodology discussed in Chapter 5.

The input data required for application of the methodology includes representative values for the mean and variability of stream flow, runoff flow, and runoff pollutant concentrations. The material presented earlier in this chapter provides the basis for assigning values for the flows; the results summarized in Chapter 6 provide the basis for specifying pollutant concentration inputs. In order to translate the probability distribution of stream concentrations (which is the basic output of the analysis methodology) to an average recurrence interval, which is considered to provide a more understandable basis for comparisons, the average number of storms per year is also required. This is estimated directly from the average interval between storm midpoints generated by the statistical analysis of hourly rainfall records.

For a general screening on a national scale, an estimate of typical values for a selected geographic location must be made. This has been done, and the set of input values considered to be typical of geographical location are described and summarized below. The values used should be considered reasonably representative of the majority of sites in the area, but it should be recognized that not all potential sites will have conditions either as favorable or unfavorable as those listed.

We have worked with a limited sample in assigning typical values. A greater data base on rainfall and stream flow would permit greater spatial definition

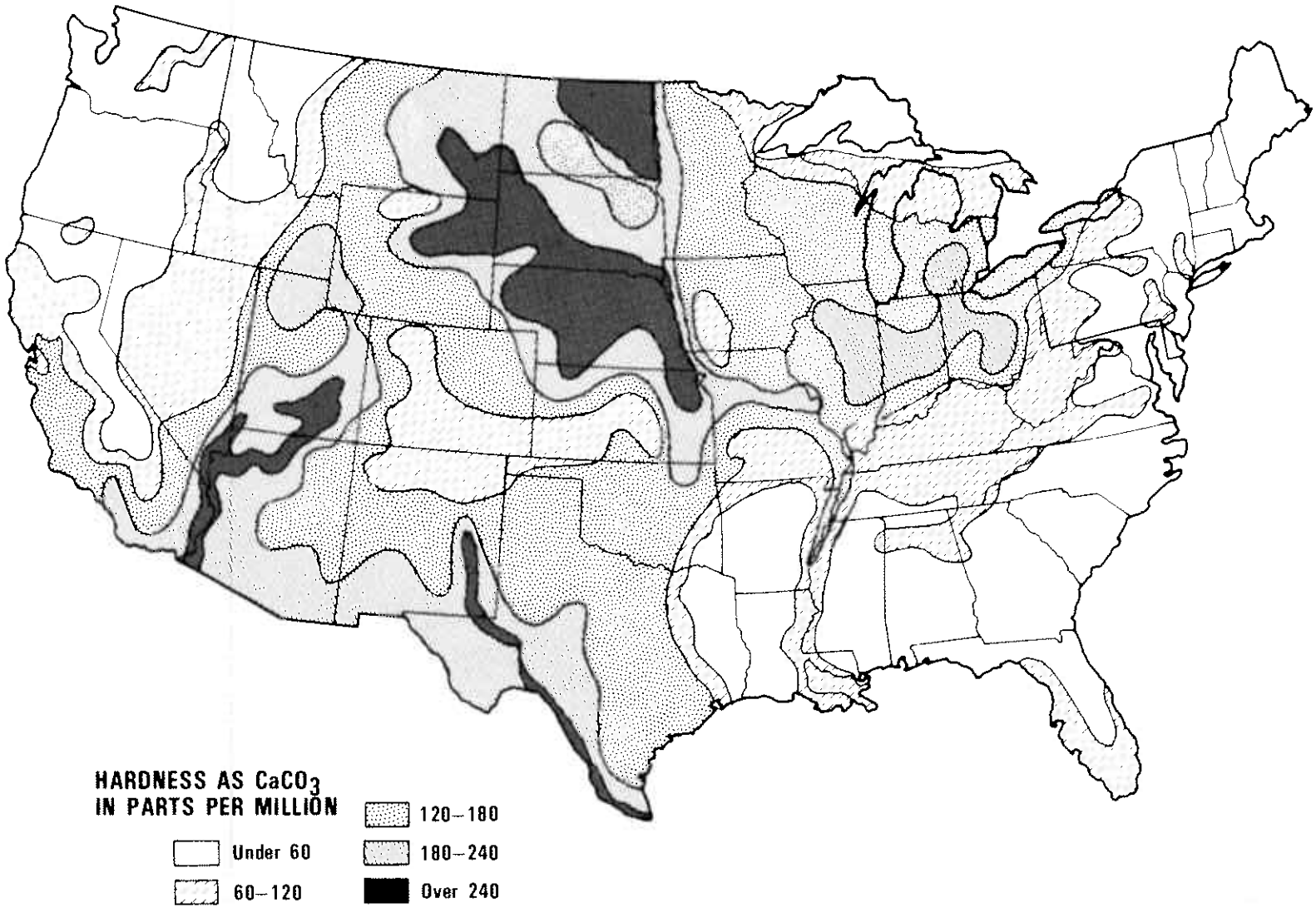

Figure 7-2. Regional Values for Surface Water Hardness

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than shown in the results. Specific regions or states could, with development of a more detailed spatial definition of stream flows and rainfall, extend the analysis presented to provide a considerably more comprehensive assessment of problem potential for local areas. This would involve the development of input parameters (rainfall and streamflow) readily derived from available long term USGS stream flow records and USWS rainfall records and their use in the methodology with quality parameters based either on the NURP analysis presented in Chapter 6, or on local monitoring activities.

The analysis methodology presently available permits computation of the probability distribution of instream concentrations, incorporating the effect of upstream (background) concentrations of the pollutant of interest. The results presented here assume upstream concentrations of zero, principally because of our inability at present to make reliable estimates of typical values for the magnitude and variability for pollutants of interest, especially on the broad national scale being examined. As a result, the summaries will show the effects of urban runoff contributions only. In cases where the background is small relative to the URO contribution, the summaries will represent actual conditions quite closely. However, where background is high and has appreciable variability, the implications of the URO contribution will be overstated, particularly the inferred improvement which could result from control of URO.

In order to perform a national screening of regional influences on urban runoff impacts, eight geographical regions illustrated by Figure 7-3 have been delineated. Using the information summarized by Figures 7-1 and 7-2, typical values for the pertinent rainfall/runoff and stream parameters have been assigned for each of the regions. Table 7-2 summarizes the values for these parameters which are used in the screening analysis.

TABLE 7-2. TYPICAL REGIONAL VALUES

Area	Event Average Rainfall Intensity		Average Number of Events/year	Average Runoff Flow Rate		Stream Flow Rate (Daily Avg Flows)		Stream Total Hardness (mg/l)
	Mean (in/hr)	c.v.		Mean Event (cfs/sq mi)	c.v.	Mean (cfs/sq mi)	c.v.	
1	0.04	1.00	110	5	0.85	1.75	1.25	50
2	0.10	1.35	100	12	1.15	1.25	1.25	50
3	0.08	1.35	90	10	1.15	1.00	1.25	50
4	0.055	1.25	110	2	1.05	0.75	1.25	200
5	0.04	1.10	63	5	0.95	0.35	1.25	200
6	0.03	1.10	70	4	0.95	0.05	1.25	300
7	0.045	1.20	30	5	1.00	0.05	1.25	200
8	0.025	0.85	80	3	0.75	4.50	1.25	50

Average stream flow and rainfall intensity were taken from the plots, which are based on sources previously described. The estimate for variability of daily stream flows (coefficient of variation) is based on computed values for a sample of about 150 perennial streams. Results for a number of regional

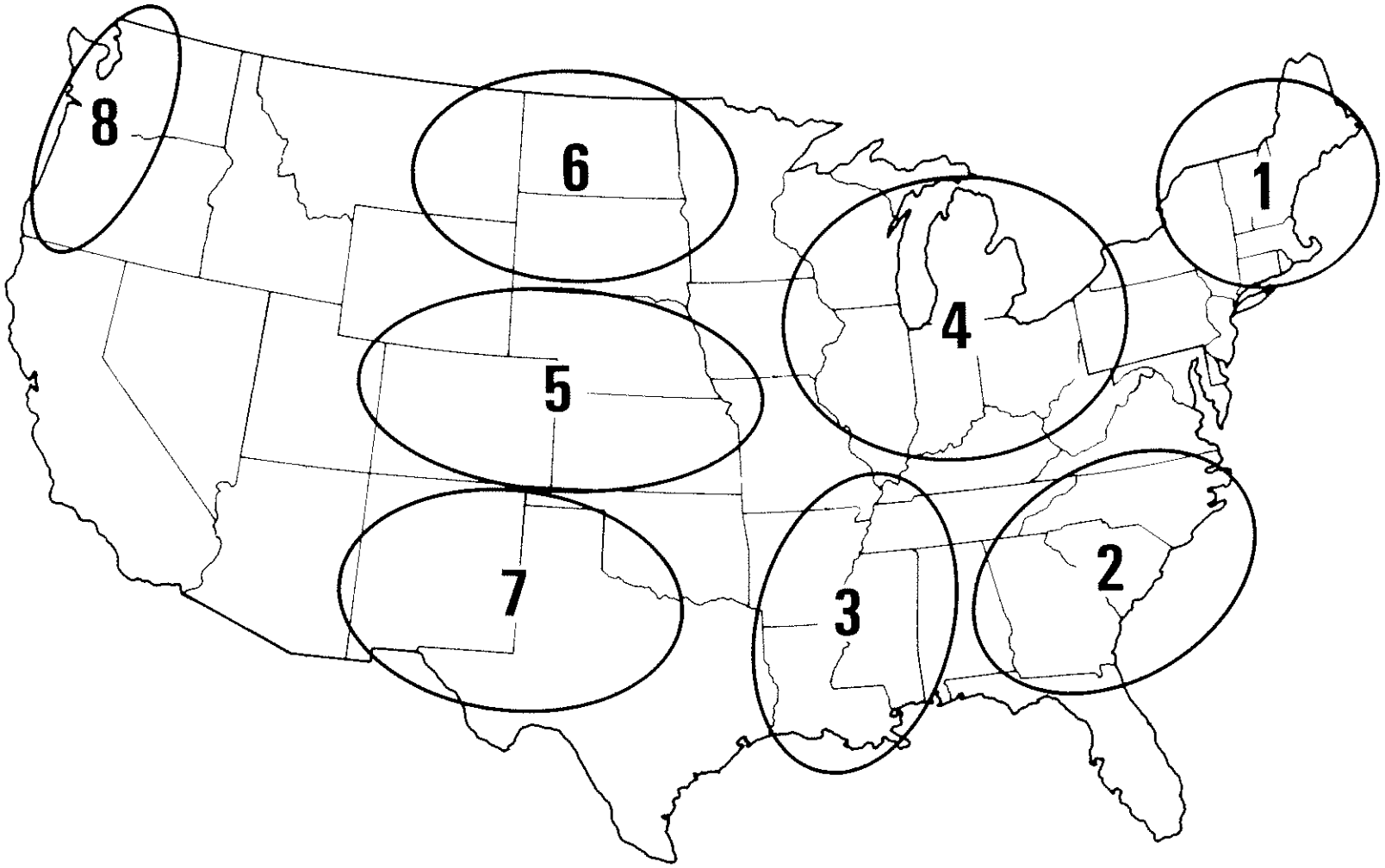

Figure 7-3. Geographic Regions Selected for Screening Analysis

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groupings indicated median values for coefficient of variation to fall between approximately 1 and 1.5. Since there were no clear regional patterns apparent, a uniform value for coefficient of variation of stream flows of 1.25 was assigned.

The coefficient of variation of rainfall intensities was taken directly from the statistical analysis of the rainfall records examined. This was reduced by 15 percent to provide estimates of the coefficient of variation of runoff flow rates, based on a recent published report, "Comparison of Basin Performance Modeling Techniques", Goforth, Heaney and Huber, ASCE JEED, November 1983, using the SWMM model on a long-term rainfall record.

The quality characteristics of urban runoff used in the screening analysis are listed in Table 7-3, and are based on the results summarized in Chapter 6. The analysis results have been rounded in the selection of representative site median EMCs and are interpreted as being representative of an array of urban sites discharging into the receiving stream being analyzed.

Average site conditions are based on the 50th percentile of all urban sites. Since the data analysis indicated that sites at some locations tend to cluster at either the higher or lower ends of the range for all sites, high range and low range site conditions were also selected for use in the screening analysis. High range site conditions are nominally based on the 90th percentile of all site median concentrations; the low range on the 10th percentile site. The variability of EMCs from storm to storm at any site is based on the median of the coefficients of variation of EMCs at sites monitored by NURP. This value was used for the low range and average site condition and was increased nominally for the high range site condition.

TABLE 7-3. URBAN RUNOFF QUALITY CHARACTERISTICS
USED IN STREAM IMPACT ANALYSIS
(Concentrations in μg/l)

	COPPER		LEAD		ZINC	
	Site Median EMC	Coef Var	Site Median EMC	Coef Var	Site Median EMC	Coef Var
Low Range of Site Conditions	15	0.6	50	0.75	75	0.7
Average Site Conditions	35	0.6	135	0.75	165	0.7
High Range of Site Conditions	90	0.7	350	0.85	450	0.8

An illustrative example of a site-specific application of the probabilistic analysis methodology employed is presented in order to:

1. Illustrate the nature of the computational results produced;

2. Assist in the interpretation of the tabulations presented later which summarize results of the national scale screening analysis;

3. Indicate how magnitude/frequency of instream concentrations may be interpreted for inferences concerning the absence or presence of a "problem" and where a problem is concluded to exist, its degree of severity; and

4. Demonstrate how alternative URO control options may be evaluated in terms of their expected impact on water quality and potential effect on problem severity.

From selected representative values for mean and variability of stream and runoff conditions, the probability distribution of resulting instream concentrations during storm events can be computed. Figure 7-4 illustrates a plot of such an output. Uncertainty in estimates for specific inputs can be accommodated by sensitivity analyses which incorporate upper and lower bounds for specific parameter values. Results are then presented as a band rather than a specific projection. The probabilities which are the basic output of the analysis may be converted to average recurrence intervals to provide what is believed to be a more understandable basis for interpreting and evaluating results.

Figure 7-5 presents results converted to the average recurrence interval at which specific stream concentrations will be produced during storm runoff periods.

The significance of a particular magnitude/frequency pattern of stream concentrations caused by urban runoff can be evaluated by comparing them with concentrations which are significant for the beneficial use of the water body. In the example presented, we have excluded comparisons with drinking water criteria on the basis that urban streams are not generally used as domestic water sources, and in any event, the criteria relate to finished water, and surface water supplies almost invariably receive treatment.

Protection of aquatic life is selected for the screening analysis of the impact of urban runoff because it is believed to be the predominant potential beneficial use for urban streams on a national scale. The concentrations which result from urban runoff are compared with stream target concentrations associated with different degrees of adverse impact, as discussed and tabulated in Chapter 5.

In the site specific situation illustrated, the stream concentrations of copper caused by untreated urban runoff discharges exceed the "EPA Maximum" criterion more than ten times per year on average. The concentration level suggested by the NURP analysis to be the Threshold level of adverse biological impacts is exceeded an average of five times per year (recurrence interval 0.2 year), and significant mortality of more sensitive biological species occurs about once every three years on average. Although this stress level may not be great enough to result in a total denial of the use, there are many who would argue that it represents an unacceptably severe degree of impairment of this beneficial use.

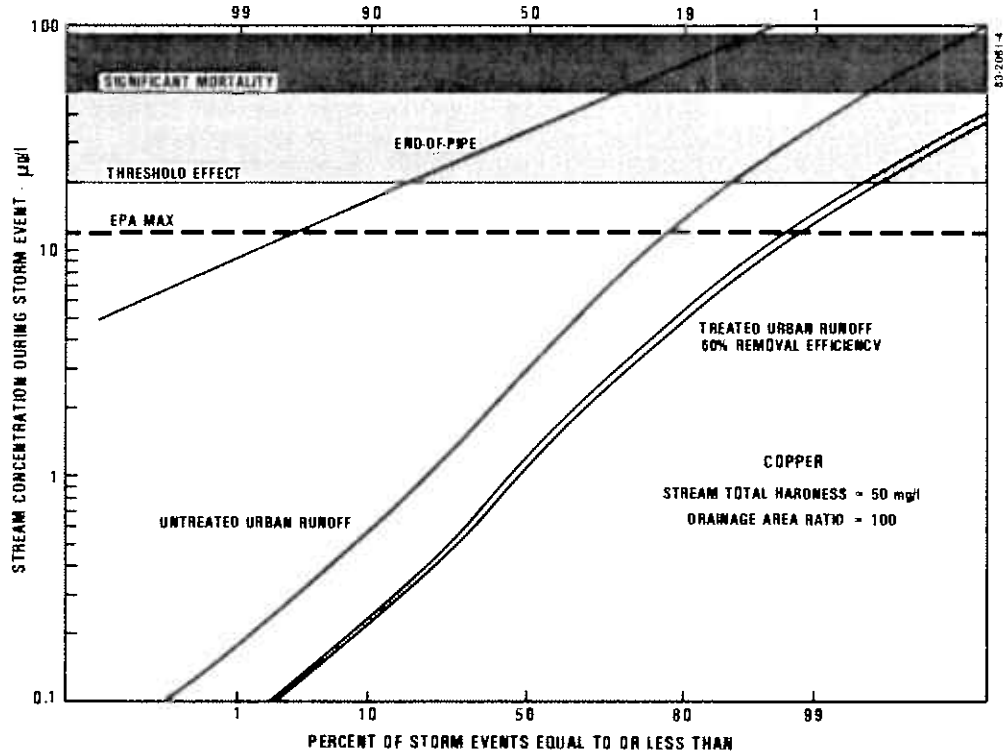

Figure 7-4. Probability Distributions of Pollutant Concentrations During Storm Runoff Periods

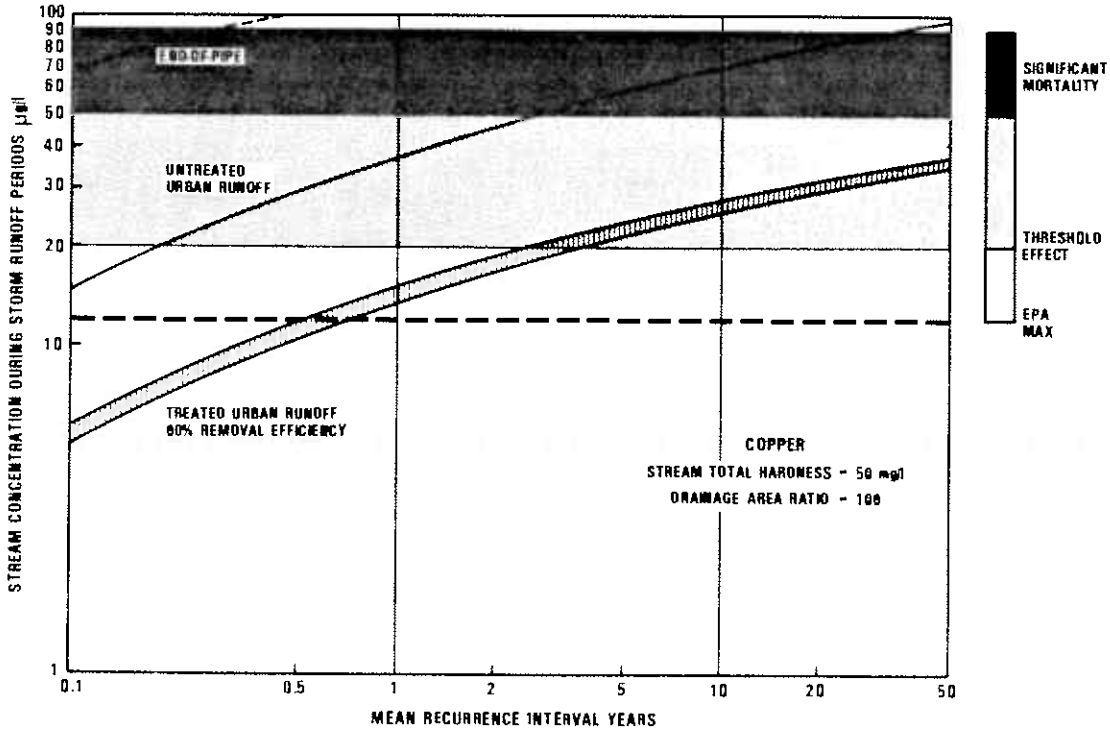

Figure 7-5. Recurrence Intervals for Pollutant Concentrations

The projection labeled "treated urban runoff" may be taken to represent the in-stream result for either the originally considered discharge following the application of controls which effect a 60 percent reduction, or of an uncontrolled urban runoff site with lower levels of copper in the runoff. In this case, threshold levels are reached only once every 3 or 4 years on average, and significant mortality levels are virtually never reached. Even though the ambient "EPA MAX" criterion is exceeded once or twice a year on average, one might conclude that the implied degree of stress is tolerable and is not interpreted to represent a significant degree of impairment of the use.

The Threshold and Significant Mortality levels are estimates, which have been explained earlier. In addition, the "acceptable" frequency at which specific adverse effects can be tolerated is subjective at this time, since there are no formal guidelines. However, an approach of this nature must be taken in any evaluation of the significance of urban runoff and the importance of applying control measures. There are two reasons why this is necessary. First, because of the stochastic nature of the system we are dealing with, virtually any target concentration we elect to specify will be exceeded at some frequency, however rare. Secondly, from a practical point of view, there are limits to the capabilities of controls, however rigorously applied. In the illustration presented, the untreated urban runoff site assigned urban runoff copper concentrations equivalent to the average urban site. Since NURP analysis data indicate that the copper in urban runoff has a soluble fraction of about 40 percent, the level of removal used in the example reflects a control efficiency approaching the practical limit. Receiving water impacts are significantly reduced, but not totally eliminated.

Results of Screening Analysis

A projection of stream water quality responses has been made for each of the eight geographical areas shown by Figure 7-3. The rainfall, runoff, and stream flow estimates used in the computations are those summarized in Table 7-2. The urban runoff quality characteristics used are those presented in Table 7-3.

To consolidate screening analysis results for easier comparison, results are not presented as continuous concentration/frequency curves as used in the illustrative example presented above. Instead, the comparison plots which follow show only the recurrence interval at which specified biological effects levels are exceeded. The concentrations which correspond with these effects are strongly influenced by stream total hardness, and hence vary regionally. Table 7-4, based on information presented in Chapter 5, summarizes the stream target concentrations used in the screening analysis summary.

Analysis results are presented for Copper (Figure 7-6), Lead (Figure 7-7) and Zinc (Figure 7-8). Each individual bar represents a different geographical region, and the analysis is performed for two drainage area ratios. Since regional stream flow differences are based on unit flows (cfs/sq mile of drainage area), actual flow in a receiving stream at a particular location is

TABLE 7-4. REGIONAL DIFFERENCES IN TOXIC CONCENTRATION LEVELS
(Concentrations in μg/l)

Pollutant	Stream Total Hardness μg/l	Geo-graphic Regions	EPA MAX	Suggested Values For		
				Threshold Effects[1]	Significant (a)	Mortality[2] (b)
Copper	50	1,2,3,8	12	20	50	90
	200	4,5,7	42	80	180	350
	300	6	62	115	265	500
Lead	50	1,2,3,8	74	150	350	3200
	200	4,5,7	400	850	1950	17,850
	300	6	660	1400	3100	29,000
Zinc	50	1,2,3,8	180	380	870	3200
	200	4,5,7	570	1200	2750	8000
	300	6	800	1700	3850	11,000

[1] Threshold Effects - mortality of the most sensitive individual of the most sensitive species.

[2] Significant Mortality

Level (a) - mortality of 50 percent of the most sensitive species.

Level (b) - mortality of the most sensitive individual of 25th percentile sensitive species.

a function of both the unit flow rate and the size of the contributing drainage area. The "drainage area ratio" (DAR) used in the analysis is

$$DAR = \frac{\text{Urban Area Contributing Runoff}}{\text{Stream Drainage Area Upstream of Urban Input}}$$

It is a measure of the location of the urban area relative to the headwaters of the receiving stream.

The shading scheme used on the bars duplicates that used earlier in the illustrative example (Figure 7-5), and identifies the recurrence interval for each of the target concentrations. For example, instream copper concentrations during storm runoff periods in geographic region 1, with average site conditions for copper concentrations in urban runoff, and a DAR = 10, are projected to be as follows (middle plot, Figure 7-6).

- EPA MAX - ambient criterion is exceeded at a frequency of 0.02 year (= 50 times/year) or about every other storm event on average.

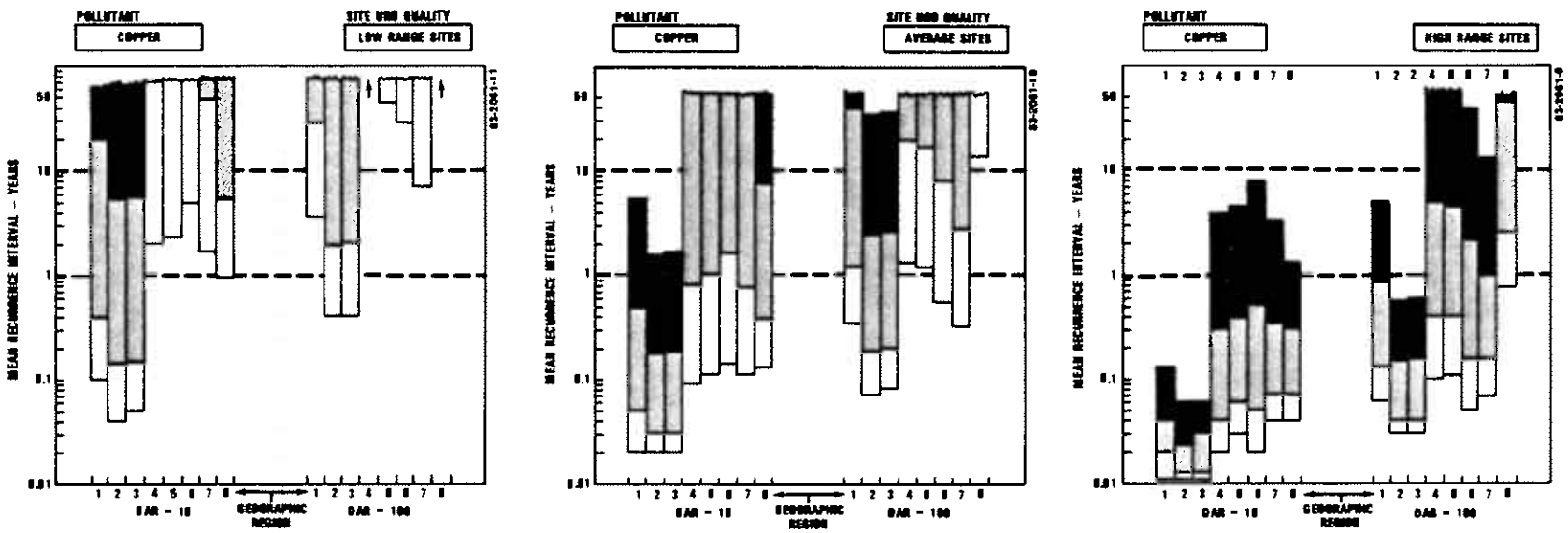

Figure 7-6. Exceedance Frequency for Stream Target Concentration
COPPER

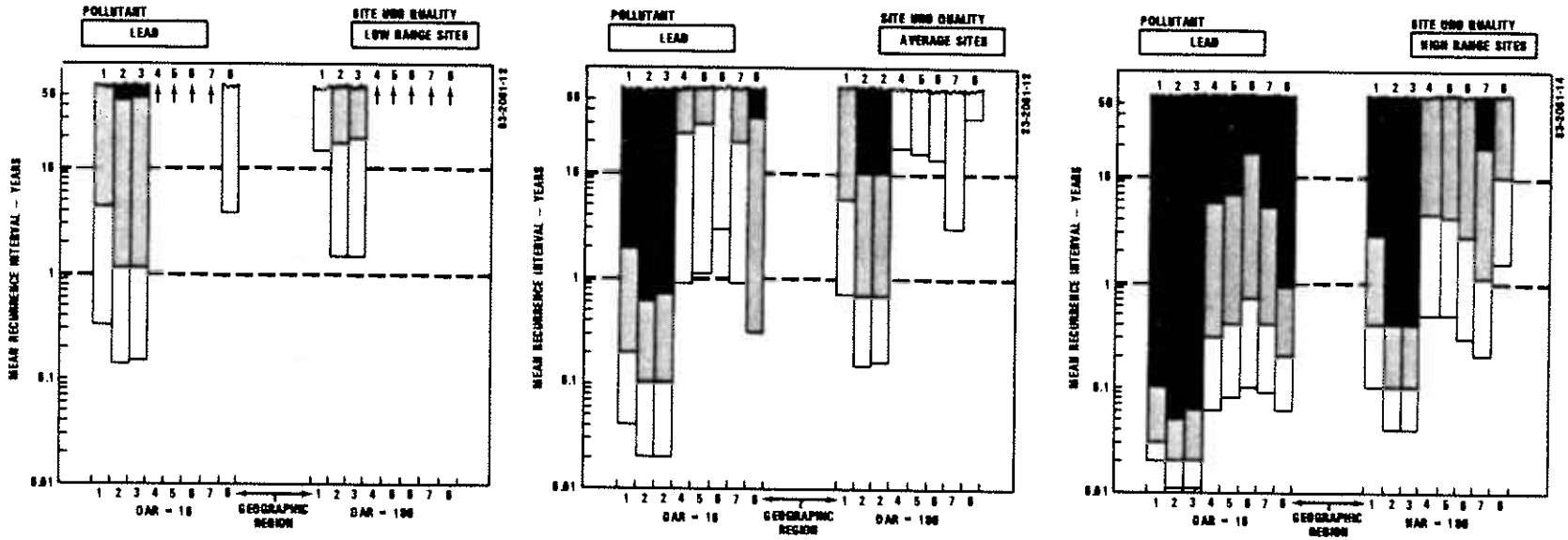

Figure 7-7. Exceedance Frequency for Stream Target Concentration
LEAD

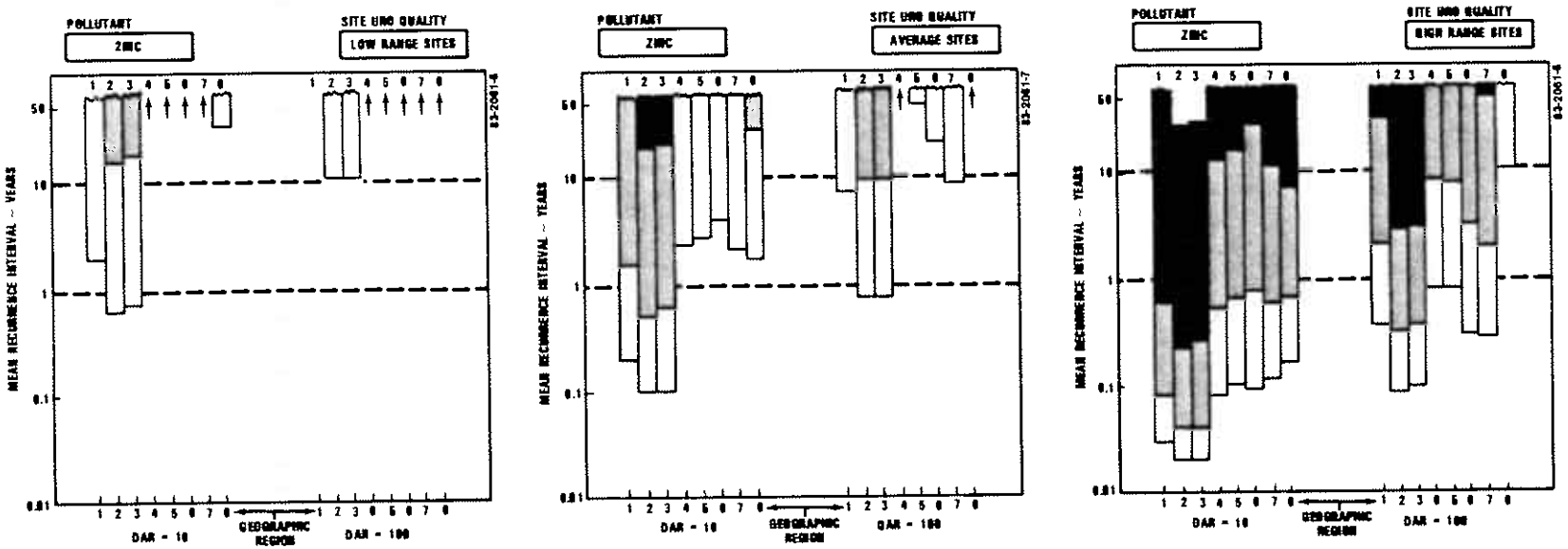

Figure 7-8. Exceedance Frequency for Stream Target Concentration
ZINC

- Threshold concentration levels at which adverse biological stress for short duration exposures is projected to occur have a recurrence interval of about 0.05 years (20 times/year).

- Significant mortality levels are exceeded at intervals of about 0.5 year (twice/year) for the less severe effect, to about once in 5.5 year for the more severe impact specified.

The plot is terminated at an upper level for recurrence interval of 50 years. Although the analysis procedure computes specific recurrence intervals in excess of this value, a realistic interpretation suggests that such conditions are for practical purposes quite unlikely to ever be reached or exceeded. At computed recurrence intervals of about 10 years or more estimates are not considered to be reliable and are very probably conservative. Therefore, indicated mean recurrence intervals in excess of 10 years probably (and 50 years certainly) should be interpreted as "unlikely" or "highly unlikely".

Discussion

An inspection of the screening analysis results (Figures 7-6 through 7-8) indicates the reason why it is unrealistic to attempt a broad generalization on whether urban runoff is, or is not a "problem" in rivers and streams. Water quality impacts can vary widely, depending on regional rainfall and stream hydrology, urban site quality characteristics, drainage area ratio (reflecting the size of the receiving stream relative to the urban area), and the total hardness of the receiving stream. While the screening analysis results provide an informative and useful perspective on the issue, it should be recognized that any specific site may differ considerably from the typical conditions used to characterize rainfall and stream flow for the area, and further, that local variations in runoff quality characteristics within the range defined by the NURP data can also have significant influence. The dominant indication of the analysis is that the problem potential for urban runoff is highly site-specific. Nevertheless some useful generalizations can be made.

Perhaps the major factor which dictates whether urban runoff discharges of copper, lead, or zinc will adversely impact aquatic life is the natural hardness of the receiving streams. As a result, the southeast and gulf coast areas are consistently indicated to be more sensitive than other areas of the country. Of the remaining soft water areas, the northeast is somewhat less sensitive; the Pacific northwest markedly less. This is attributed to significantly lower storm intensities in these areas, coupled in the northwest with appreciably higher stream flows.

Drainage area ratios have an important effect, reflecting as they do the magnitude of stream flow at the urban location. The effect is much greater for geographical regions with high unit flow (cfs/sq mile) than for lower stream flow regions.

Finally, the quality characteristics of the urban sites have a significant influence. Stream concentrations differ markedly depending on whether the local urban sites tend to cluster toward the lower or higher end of the range of site median concentrations indicated by the NURP data base.

A comparison of the relative position of the bars on Figures 7-6, 7-7 and 7-8, is sufficient to indicate the comparative sensitivity to urban runoff pollutant discharges. However, it is also desirable to decide whether a given stream effect constitutes a serious degree of impairment of an aquatic life beneficial use. There are no formal guidelines, and interpretations that are either more liberal or more restrictive than those suggested below may be preferred by others dealing with specific stream segments. For the interpretation of the national scale screening analysis, the following decision basis has been used to identify the situations in which urban runoff is likely to result in a water use "problem", (i.e., cause an unacceptable degree of use impairment):

- Threshold effects - (mortality of the most sensitive individual of the most sensitive species) occur more often than about once a year on average.

- Significant mortality - using the lower of the two levels (i.e., 50 percent mortality of the most sensitive species), occurs more often than about once every 10 years on average.

Using these guidelines for assessing the occurrence of problem situations, copper is shown to be the most significant of the three heavy metals consistently found in urban runoff at elevated concentration levels. Where site concentrations are at the high range of observed urban site conditions, problems are expected in all geographic regions at a DAR = 10, and in all geographic regions except region 8 at DARs as high as 100. When site concentrations are in the average range of observed conditions, problem situations are restricted to geographic regions 2 and 3 (plus region 1 at DAR = 10). When site copper concentrations are in the lower range of observed site conditions, problem situations are restricted to geographic regions 2 and 3 at low DARs. They are marginal (significant mortality once every 5 years) but remain a problem according to the definition adopted. The "marginal" attribution is used here, because the more severe degree of significant mortality (most sensitive individual of 25th percentile sensitive species) is indicated by the analysis virtually never to occur.

Thus, copper discharges in urban runoff are indicated to represent a significant threat to aquatic life use in regions 2 and 3 (southeast and Gulf Coast) under almost all possibilities for urban site runoff quality. In region 1 (northeast), problems would be expected at all but the lower range of site concentrations. In the hard water areas (regions 4, 5, 6, 7) problems are expected only where site runoff quality is in the high end of the range of observed site median concentrations.

It should be noted that the analysis has been based on <u>total</u> copper concentrations in urban runoff. Toxic effects are usually considered to be exerted by the soluble form of the metal, and EPA defines an "active" fraction based on a mild digestion which converts some of the inactive particulates to soluble forms, to account for transformations which may occur in the natural water systems. Copper in urban runoff has a typical soluble fraction of about 50 percent, and the active fraction would therefore fall somewhere between 50 and 100 percent of the total concentration used in the analysis. The analysis has been performed using the total fraction, since adequate

information is not available at present to reliably adjust these values. However, although the problem assessment presented above may be somewhat conservative, further refinement along these lines would not change the inferences drawn from the screening analysis results.

Zinc, like copper, has an indicated soluble fraction in the order of 50 percent, and the screening analysis indications will also be unaffected by this consideration. It is indicated to be unlikely to pose a significant threat to aquatic life in most urban runoff situations. Exceptions are restricted to soft water areas in the east and south, lower DARs, and sites with high zinc concentrations in urban runoff.

Lead results must be viewed with greater caution, because soluble fractions in urban runoff are indicated to be quite low (less than 10 percent). Problem indications are therefore likely to be reasonably conservative, i.e., overstate the problem potential. Problem situations may be expected to be restricted to soft water areas in the east and Gulf areas when urban sites have average site concentrations and DARs are low, and even at high DARs when site concentrations are in the high range. Lead is not indicated to be a threat to aquatic life in the hard water areas of the country or in the Pacific northwest, except for the combination of low DAR and high site concentration.

In performing the screening analysis, upstream concentrations were assumed to be zero; that is, the receiving stream had only a diluting effect on the urban runoff pollution. In actual cases background concentrations will be greater than zero, and in some instances upstream contributions (e.g., agricultural runoff, another city) could be significant and result in more severe conditions than those identified in the screening analysis.

On the basis of the foregoing, it appears appropriate to identify copper as the key toxic pollutant in urban runoff, for the following reasons:

- Problem situations anticipated for lead and zinc do not occur under any conditions for which copper does not show up as a problem as well - and with more severe impacts. On the other hand, copper is indicated to be a problem in situations where lead or zinc are not.

- Based on the ratios between concentrations producing increasingly severe effects, copper is suggested to be a more generic toxicant. It has an effect on a broad range of species. This is in contrast to lead and zinc for which a substantially greater degree of species selectivity is indicated. Some species are sensitive, others relatively insensitive to lead and zinc.

- From the NURP data, locations which tend to have site median concentrations in the low, average, or high end of the range have generally consistent patterns for each of the three heavy metals.

- Control measures which produce reductions in copper discharges to receiving waters could be expected to result in equivalent reductions in zinc, and greater reductions in lead, by virtue of its significantly greater particulate fraction.

Copper is accordingly suggested to be an effective indicator for all heavy metals in urban runoff relative to aquatic life. It might be used as the focus for control evaluations, site specific bioassays, monitoring activities, and the like.

It should be noted that while immediate water column impacts of lead are not as significant as those for copper, the high particulate fraction of lead would tend to result in greater accumulations in the stream bed. This aspect has not been addressed by the NURP program in sufficient detail to warrant any comment on its potential significance.

The results of the screening analysis summarized by Figures 7-6 through 7-8 are approximate, because they are influenced by the suitability of the typical values for stream and runoff flows which were assigned. This however can be refined by the use of appropriate values which can be developed from readily available data bases, and thus adjusted for local variations which are to be expected. A second issue relative to the reliability of the projections is the validity of the computations, given that the input parameters are representative. This has been confirmed by a number of validation tests, discussed in the NURP supporting document referenced earlier, which addresses the stream analysis methodology.

The remaining issue for evaluating the reliability of the indications of problem potential produced by the screening analysis is the reasonableness of the intermittent exposure concentration levels, which have been associated with various biological effects levels, and the guidelines adopted for this discussion, which determine whether or not a problem is expected. While rather tenuous at this time, the information available does provide support.

Two of the NURP projects examined aquatic life effects in streams receiving runoff from monitored sites.

- Bellevue, WA concluded that whatever adverse effects were observed were attributable to habitat impacts (stream bed scour and deposition) as opposed to chemical toxicity. For this project, heavy metal concentrations in the monitored urban runoff sites were typical of the average for all urban sites. The screening analysis results under these conditions do not indicate the expectation of a problem.

- Tampa, FL conducted extensive bioassay tests but failed to show any adverse effect of water column concentrations of pollutants in urban runoff. The screening analysis results presented in Figure 7-6 indicate marginal problem conditions at low DAR for this geographic region. At this project however, all monitored sites show heavy metal concentrations significantly lower than the low range conditions used in the screening analysis. When

the screening analysis is repeated using site concentrations representative of Tampa monitoring results, a problem situation is not predicted, even at DARs lower than is probably the case for this location.

LAKES

Because lakes provide extended residence times for pollutants, the significant time scale for evaluating urban runoff impacts is at least seasonal, and usually annual or longer, rather than the storm event scale used for streams. The screening methodology identified in Chapter 5, uses annual nutrient loads to assess the tendency for development of undesirable eutrophication effects.

Figure 7-9 illustrates the effect of urban runoff on average lake phosphorus concentration. The very significant influence of area ratio is evident. The larger the urban area which drains into a lake of a given size, the greater the annual loading, and the higher will be the lake phosphorus concentration and the eutrophication effects produced.

The phosphorus concentrations characteristic of the urban sites surrounding a particular lake are also seen to be significant. The three bands shown reflect the range of possibilities, based on the NURP data. The same basis is used to estimate the phosphorus loads from average urban sites and those at the higher and lower ends of site conditions, as was described for heavy metals in the previous section. In this case, because it is annual mass loads which are of interest, site median concentrations have been converted to site mean values for use in the computations.

Lake phosphorus concentrations are also influenced by the annual runoff volume (annual precipitation and runoff coefficient). The results illustrated are based on an annual rainfall of 30 inches and an overall average runoff coefficient of 0.2. Plotted results may be scaled up or down in proportion to the ratio between local values for these parameters and those used in the illustration.

Finally, the lake morphology and hydrology influence the outcome; specifically depth (H) and residence time (τ). This is reflected by the width of each of the bands, which are based on a range of values for H/τ (1 to 10) estimated to be fairly typical for lakes in urban settings.

If an average lake phosphorus concentration of 20 µg/l is used as a reference concentration to assess the tendency for producing undesirable levels of biostimulation, it is apparent that only lakes with rather small area ratios are likely to be unaffected by urban runoff nutrient discharges. Since the three bands represent different concentration levels of phosphorus in urban runoff, qualitative inferences may be drawn concerning the beneficial use impacts of control activities. More detailed estimates may of course be made by use of the methodology with site specific parameters.

The salient feature of the situation, as generalized by the analysis summarized by Figure 7-9, is that the problem potential of urban runoff for lakes is quite site specific. The illustration considers only urban runoff loads; in an actual situation, all nutrient sources (point and nonpoint)

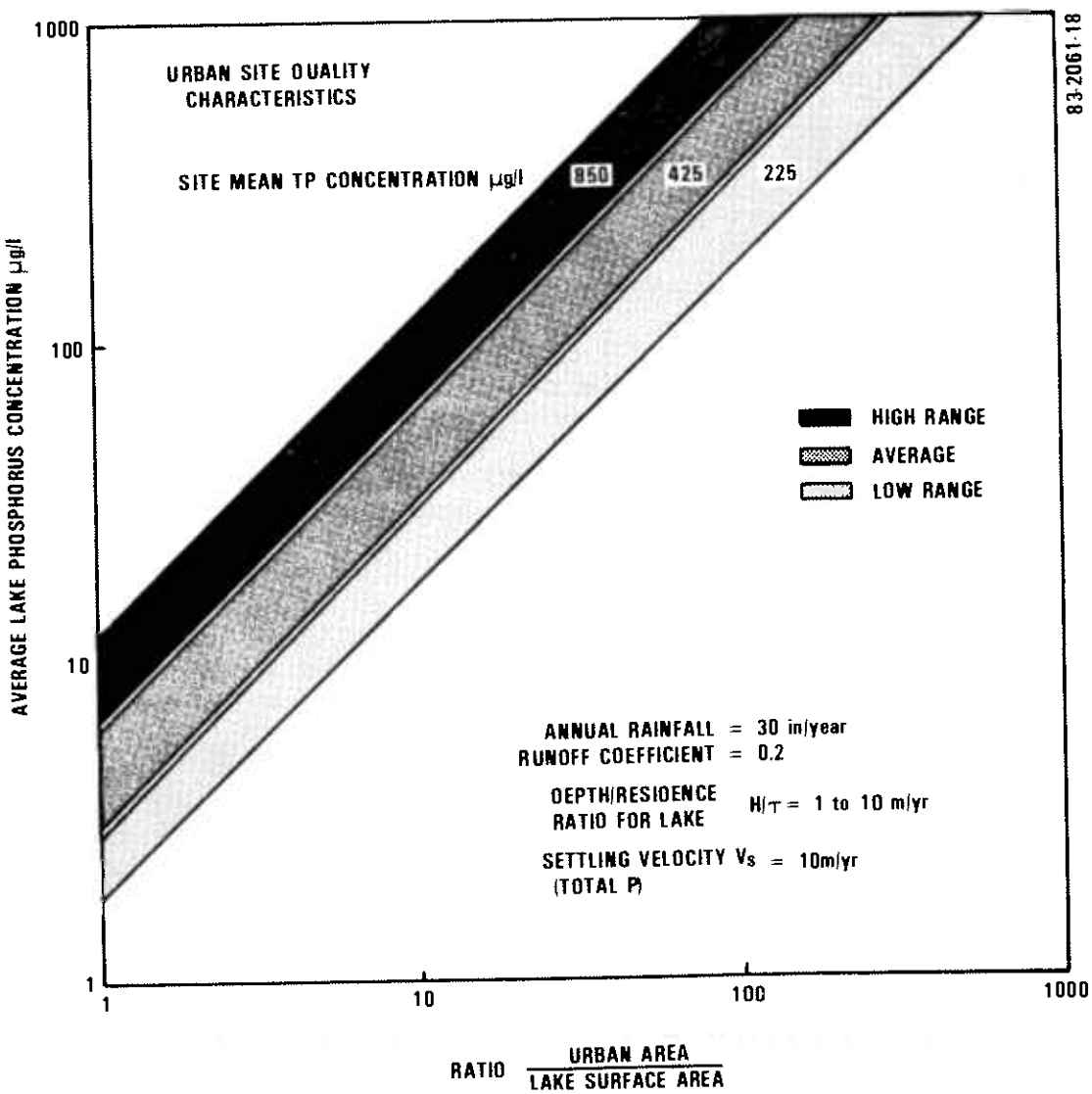

Figure 7-9. Effect of Urban Runoff on Lake Phosphorus Concentrations

would be considered, and this would tend to modify the relative significance of urban runoff on lake conditions.

Several of the NURP projects addressed impacts on lake quality in some depth. These projects include the following:

- Irondequoit Bay, NY - Lake has been highly eutrophic, due to point and nonpoint discharges. Sewage treatment plant and combined sewer overflow discharges have been removed, so that residual sources are recycle from lake sediments and nonpoint sources, including urban runoff, from the contributing drainage area. Further reductions are considered necessary to meet targets. (Area ratio is high at this location.)

- Lake George, NY - Lake is oligotrophic; the study addressed the concern that urban runoff from present and potential future development would unacceptably accelerate degradation of existing water quality. (Area ratio is low at this location.)

- Lake Quinsigamond, MA - Urban runoff was determined to be one of a number of sources preventing water quality objectives from being met. Some control of urban runoff phosphorus loads was recommended as one of the elements of an overall management plan.

Each of the above situations is sufficiently unique, and the mix of urban runoff and other load sources is sufficiently different to suggest that it is inappropriate to attempt a broad generalization. The interested reader may refer to the individual project documents which are available through NTIS for more information.

ESTUARIES AND EMBAYMENTS

These water bodies are normally of sufficient size and complexity that simple screening analyses have not been considered to be sufficiently useful or effective to justify their use.

The Long Island, NY NURP project examined and confirmed that urban runoff sources of coliform bacteria are the principal contributors to the water column concentrations that result in closure of shellfish beds in a number of embayments (principally the Great South Bay). Estimates of control activities that would allow the opening of presently closed areas were also made. The reader is referred to the project documents for further information.

The significance of urban runoff and other nonpoint source loads on eutrophic levels in the Potomac estuary is being investigated under a study which is not associated with the NURP program. However, among other objectives of the WASHCOG NURP project, estimates of urban nonpoint source loads have been developed to support this study.

Although specific situations where urban runoff is significant have been identified, no general assessment for water bodies of this type can be made at this time.

GROUNDWATER AQUIFERS

Much of the precipitation which falls on an area either percolates directly into the ground, or does so after relatively short overland flow distances. This condition is essentially uncontrollable and distinctly different from the case where urban runoff from impervious areas is deliberately collected and routed to a recharge device which causes it to percolate to groundwaters.

This type of control approach is a practical and effective technique for reducing pollutant loads which would otherwise reach surface waters as discussed in Chapter 8. The concern addressed here is with the extent to which groundwater aquifers may be contaminated by this practice.

The Long Island, NY and Fresno, CA NURP projects examined this issue through extensive tests utilizing recharge basins ranging from recent installations to others which have been in service in excess of 20 years. A somewhat simplified consolidation of the salient findings of these two projects is presented below. The interested reader is referred to the individual project report documents, available through NTIS, for the important details and qualifications.

- Most pollutants of importance in urban runoff are intercepted during the process of infiltration and quite effectively prevented from reaching the groundwater aquifers underlying recharge basins. The pollutants tested and found to behave in this manner include the heavy metals, an appreciable number of the organic priority pollutants and pesticides, and coliform bacteria.

- Chlorides, which are sometimes present in urban runoff at elevated concentrations due to road deicing practices, are not attenuated during recharge.

- Pollutants accumulate in the upper soil layers. The concentrations found are a function of the length of time a basin has been in service. Effective retention of pollutants takes place with all soil types tested, ranging from clays to sands. The depth of pollutant penetration is affected by soil type; however in no case did contaminant enrichment of soil exceed several meters depth, and highest concentrations were found near the surface.

- The limit of the ability of the soil to retain the pollutants of interest is unknown. Additional study of this aspect is appropriate. However given the long service periods of a number of the recharge basins studied, this does not appear to represent an imminent concern.

- At both of these NURP locations, groundwater surfaces were at least 20 feet, and often appreciably more, below the base of the recharge device. The indicated findings may not be applicable at locations with shallow depths to groundwater.

- No significant differences in interception/retention of pollutants is apparent for basins with bare versus vegetated recharge surfaces. However vegetation does apparently help to maintain infiltration rates normal for the soil type.

- Surface soil accumulations of priority pollutants in dual purpose installations used for both recharge and recreational use warrants further investigation to determine whether such practice creates unacceptable health risks or requires appropriately designed and conducted maintenance procedures.

CHAPTER 8
URBAN RUNOFF CONTROLS

INTRODUCTION

This chapter summarizes the information developed by the individual NURP project studies relating to performance characteristics of selected techniques for the control of urban runoff quality. The number of control practices addressed here is considerably smaller than the array of best management practices suggested in prior studies and publications. This is not intended to exclude consideration of other approaches. However, the techniques discussed in this chapter may be taken as an expression of controls considered by the agencies involved to be potentially attractive and practicable at localized planning levels. They represent the practices for which performance data were obtained under the NURP program and which can be analyzed and evaluated in this report.

Most of the NURP projects provide in their project reports a detailed analysis and evaluation of the controls that were studied. These reports are available through NTIS. In addition to this information source, an analysis was performed by EPAs NURP headquarters team, using results available from all project studies. The objective was to provide an overview and a generic description of performance characteristics in a format considered to be useful for planning activities. Thus, in addition to providing a consolidated summary of project results, this chapter presents a summary of the results of applying analysis methodologies developed under the NURP program. Further detail on the former can be obtained by reference to relevant project report documents; a more comprehensive development of the latter is provided in separate NURP documents ("Detention and Recharge Basins for Control of Urban Runoff Quality", and "Street Sweeping for Control or Urban Runoff Quality").

The types of control techniques which received attention (to a greater or lesser degree) in the NURP program can be grouped into four general categories.

- Detention Devices - These include normally dry detention basins typically designed for runoff quantity control, normally wet detention basins, dual purpose basins, over-sized drain pipes, and catchbasins.

- Recharge Devices - These include infiltration pits, trenches, and ponds; open-bottom galleries and catchbasins; and porous pavements.

- Housekeeping Practices - These are principally street sweeping, but also include sidewalk cleaning, litter containers, catchbasin cleaning, etc.

- Other - These include the so-called "living filter" approaches, grassed swales, wetlands, etc.

DETENTION DEVICES

General

Detention basins proved to be one of the most popular approaches to urban runoff quality control selected at the local level, based on the number of individual projects which elected to study them and the number of detention devices tested in the study. It is perhaps instructive to note that nearly all the detention facilities studied were either already in place, or required only modifications of outlet structures before initiation of the NURP-supported studies. In general, detention devices proved to provide a highly effective approach to control of urban runoff quality, although the design concept has a significant bearing on performance characteristics.

Table 8-1 lists the NURP projects that included detention devices as elements of their study program. Both the number of devices, and the number of storms analyzed vary considerably, as indicated in Table 8-1, depending on project priorities and other relevant activities. As a result, not all of the sites are incorporated in the summary presented below. The Washington Area Council of Governments (WASHCOG) conducted a particularly thorough and comprehensive investigation of control techniques, particularly detention basins. They have prepared several useful and informative analyses of performance results on these devices.

Dry Basins

This is a type of detention basin which is currently in fairly extensive service in various parts of the country. The performance objective of such basins is commonly called "peak shaving", that is, to limit the maximum rate of runoff to some preselected magnitude, usually a maximum pre-development rate. The purpose is to control flooding and erosion potential in areas downstream of new development. Such basins employ a bottom outlet having a hydraulic capacity restricted to the maximum allowable flow. Runoff from smaller storms flows along the bottom of the basin and is discharged without restriction. Flows in excess of design are backed up in the basin temporarily and ponding occurs only during larger storms and for relatively short periods of time. This class of retention basin is thus normally dry.

Performance of such basins, from a pollutant removal aspect, range from insignificant to quite poor. Accordingly, the limited data available are not discussed in this chapter.

Wet Basins

This designation covers detention basins which maintain a permanent pool of water. They may vary considerably in appearance, ranging from natural ponds or small lakes dedicated urban runoff control to enlarged sections in

TABLE 8-1. DETENTION BASINS MONITORED BY NURP STUDIES

Project	Site	Design Type	No. Events in/out
CO1 Denver	North Ave	Dry Basin	39/21
DC1 Washington, D.C.	Burke	Wet Basin	60/35
	Lakeridge	Dry Basin	49/41
	Stedwick	Dual-Purpose	48/34
	Westleigh	Wet Basin	41/45
IL2 N. Illinois	Lake Ellyn	Wet Basin	29/23
MI1 Lansing	Dryer Farms	Dry Basin	2/8
	Grace St. N*	Wet Basin	23/21
	Grace St. S*	Wet Basin	20/22
	Waverly Hills	Wet Basin	35/30
MI3 Ann Arbor	Pitt-AA	Wet Basin	6/6
	Traver	Wet Basin	5/5
	Swift Run	Wet Basin	5/5
NY1 Long Island	Unqua Pond	Wet Basin	8/8

* These are oversized storm drains installed below street level. Inverts of control sections are below the general grade line, so a permanent pool is maintained.

constructed drainage systems. Runoff from an individual storm displaces all or part of the prior volume, and the residual is retained until the next storm event. This pattern may or may not be modified by natural base inflows during dry weather depending on the local situation.

Detention basins utilizing this design concept have been shown by the NURP studies to be capable of highly effective performance in urban runoff applications, as summarized below. Although performance characteristics of individual basins ranged from poor to excellent, analysis shows these differences to be attributable to the size of the basin relative to the connected urban area and local storm characteristics. Performance data also indicate that in addition to removal of particulate forms or pollutants by sedimentation, some basins exhibit substantial reductions in soluble nutrients (soluble phosphorus, nitrate + nitrite nitrogen). This is attributed to biological processes which are permitted to proceed in the permanent water pool.

There are a number of ways to characterize detention basin performance. The primary basis selected by NURP for doing so is to define performance efficiency on the basis of the total pollutant mass removed over all storms. This provides a meaningful general measure for comparison, is relevant for water quality effects associated with extended time scales (e.g., nutrient load impacts on lakes), and conforms with the capabilities of the NURP analysis methodology developed to provide a planning-level basis for estimating cost/benefit differences in size or application density of this type control.

Table 8-2 tabulates performance in terms of reduction in pollutant mass loads over all monitored storm events. The analysis methodology developed under the NURP program activities suggests that performance should be expected to improve as the overflow rate (QR/A = mean runoff rate ÷ basin surface area) decreases and as the volume ratio (VB/VR = basin volume ÷ mean runoff volume) increases. The NURP basins used in the analysis are listed in increasing order of expected performance capabilities.

The wide range of relative basin sizes provided by this data base is apparent, and performance is seen to generally correspond with expectations. The poorest performance occurs in a basin with an average overflow rate during the mean storm of about six times the median settling velocity (1.5 ft/hr) of particles in urban runoff. In addition, less than 5 percent of the mean storm runoff volume remains in this basin following the event, to be susceptible to additional removal by quiescent settling during the interval between storms. The basins which exhibit high removal efficiencies, at the other end of the scale, have size relationships which result in the mean storm displacing only about 10 percent of the available volume, and producing overflow rates which are only a small fraction of the median particle settling velocity.

This rationale is described more completely in the supporting NURP document on detention basins identified earlier. The testing of the methodology against the NURP monitoring data is presented, and the basis for the performance projections illustrated below is documented.

Figure 8-1 presents a projection of removal efficiency of urban runoff detention devices as a function of basin size relative to the contributing catchment area and regional differences in typical rainfall patterns. The removal rates apply for TSS, which are all settleable, and must be factored by the particulate/soluble fraction of other pollutants which have significant soluble fractions in urban runoff. It applies for the specific basin average depth and area runoff coefficient indicated (which are fairly typical based on NURP data). However performance relationships could be different than indicated based on relevant local values for the controlling parameters.

An alternate approach for characterizing performance of detention basins concentrates on the variable characteristics of individual storm events and how these are modified by the detention device. A comparison of the mean and coefficient of variation of basin inflow and discharge concentrations provides another measure of performance of an urban runoff detention device.

TABLE 8-2. OBSERVED PERFORMANCE OF WET DETENTION BASINS
REDUCTION IN PERCENT OVERALL MASS LOAD

Project and Site	No. of Storms	Size Ratios		Average Mass Removals - All Monitored Storms (Percent)									
		QR/A	VB/VR	TSS	BOD	COD	TP	Sol.P	TKN	NO_{2+3}	T.Cu	T.Pb	T.Zn
Lansing Grace St. N.	18	8.75	0.05	(-)	14	(-)	(-)	(-)	(-)	(-)	(-)	9	(-)
Lansing Grace St. S.	18	2.37	0.17	32	3	(-)	12	23	7	1	(-)	26	(-)
Ann Arbor Pitt-AA	6	1.86	0.52	32	21	23	18	(-)	14	7	•	62	13
Ann Arbor Traver	5	0.30	1.16	5	(-)	15	34	56	20	27	•	•	5
Ann Arbor Swift Run	5	0.20	1.02	85	4	2	3	29	19	80	•	82	(-)
Long Island Unqua	8	0.08	3.07	60	(TOC=7)		45	•	(-)	(-)	•	80	•
Washington, D.C. Westleigh	32	0.05	5.31	81	•	35	54	71	27	•	•	•	26
Lansing Waverly Hills	29	0.04	7.57	91	69	69	79	70	60	66	57	95	71
NIPC Lake Ellyn	23	0.10	10.70	84	•	•	34	•	•	•	71	78	71

Notes: (-) Indicates apparent negative removals.

• Indicates pollutant was not monitored.

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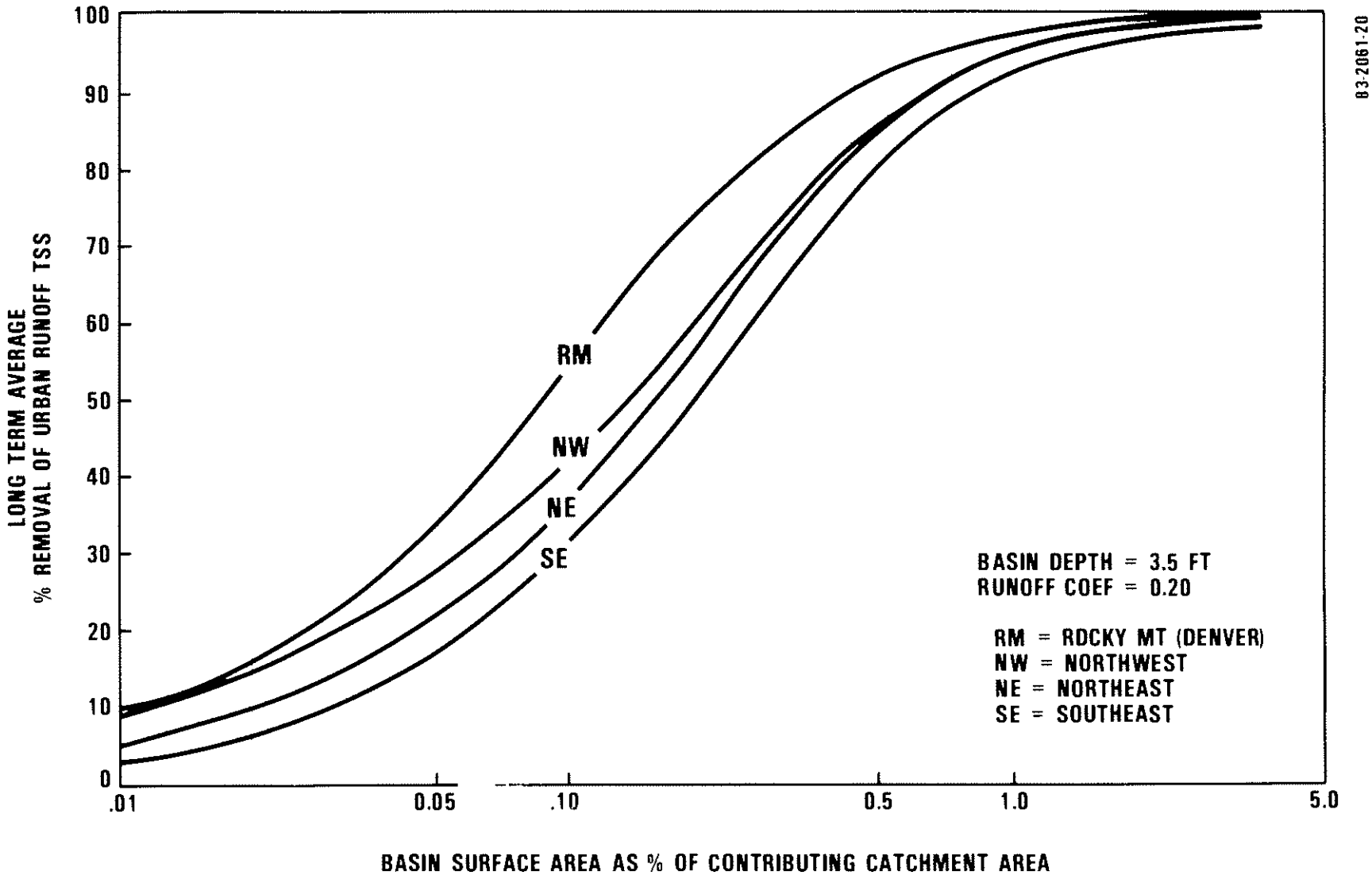

Figure 8-1. Regional Differences in Detention Basin Performance

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This approach provides more useful information for subsequently evaluating the effect of controls on water quality impacts on rivers and streams. As evident from the discussion in Chapter 6, reductions in the mean and variability of runoff concentrations (and the inferred reduction in mean and variability of runoff rates) will have a significant beneficial effect on the severity of impacts on flowing streams.

Table 8-3 summarizes detention basin performance when assessed in this manner. It should be noted that in most cases more inlet storm events were monitored than discharge events, and that some inlet events do not have a matching discharge event and vice-versa. Further, for the larger basins where storm inflow displaces only a fraction of the basin volume, it is unlikely that influent and effluent for a specific event represent the same volume of water. The tacit assumption in this analysis is that the inflow events which were monitored provide a representative sample of the total population of all influent event mean concentrations (EMCs). Similarly, the monitored effluent events are assumed to be a representative sample of all basin discharge EMCs. The appropriateness of this assumption is obviously more uncertain where the number of individual storm events monitored is small.

For each basin influent and effluent, the arithmetic mean and variance were computed based on the relationships for lognormal distributions. The percent reduction in the mean concentration and the coefficient of variation are tabulated (Table 8-3). Note that where the number of monitored events shown in this table differ from those listed in Table 8-2, it is because the mass removal computations were restricted to synoptic storms (i.e., matching influent and effluent results were available for an event).

Performance characteristics are generally consistent using either approach, even though each displays a different type of information. Performance improves with detention basin size relative to catchment size and hence the magnitude of the runoff processed. Giving greater weight to the sites monitoring large numbers of storms, indications are that for most pollutants wet ponds also generally result in a considerable reduction in the variability of pollutant concentrations.

A significant exception to this tendency to reduce variability is shown for the soluble nitrogen forms (NO_2 + NO_3). The positive removal efficiency indicated by reduction of mean concentrations must be attributed to biological processes rather than sedimentation. A substantial increase in variability is consistently indicated by the data. Among the heavy metals, lead which is nearly all in particulate form shows significant reductions in variability. Copper and zinc which have high (40 to 60 percent) soluble fractions show an ambiguous pattern with regard to changes in variability.

In a few of the cases where atypical results are indicated, unique local conditions suggest plausible explanations. For example, at the Ann Arbor (Traver) site, erosion from an unstabilized bank at the outlet of this newly constructed basin is attributed to the poor suspended solids removal observed. The poor removal characteristics at the Unqua site for TKN and nitrate may be associated with the significant wildfowl population at this site.

TABLE 8-3. OBSERVED PERFORMANCE OF WET DETENTION BASINS
(PERCENT REDUCTION IN POLLUTANT CONCENTRATIONS)

(a) Mean EMC

Project and Site	No. of Storms (1)	Percent Reduction in Mean EMC									
		TSS	BOD	COD	TP	Sol.P	TKN	NO_{2+3}	T.Cu	T.Pb	T.Zn
Lansing Grace St. N.	23/20	(6)	(26)	15	(10)	(26)	11	(1)	(9)	39	(9)
Lansing Grace St. S.	18/17	22	4	(3)	6	0	(5)	(20)	25	14	7
Ann Arbor Pitt-AA	6/6	38	17	23	28	(2)	11	8	·	59	22
Ann Arbor Traver	5/5	0	(66)	12	37	63	19	28	·	·	19
Ann Arbor Swift Run	5/5	83	11	(3)	(38)	21	25	77	·	86	·
Long Island Unqua	8/8	34	(TOC=26)		38	·	(31)	(10)	·	78	·
Washington, D.C. Westleigh	40/40	83	·	33	59	70	19	28	10	·	10
Lansing Waverly Hills	35/30	87	52	52	69	56	30	54	53	93	58
NIPC Lake Ellyn	25/20	92	·	64	61	62	·	82	88	91	87

(b) Coefficient of Variation of EMCs

Project and Site	No. of Storms (1)	Percent Reduction in Coef of Variation of EMCs									
		TSS	BOD	COD	TP	Sol.P	TKN	NO_{2+3}	T.Cu	T.Pb	T.Zn
Lansing Grace St. N.	23/20	14	49	35	(7)	(13)	30	0	0	45	(31)
Lansing Grace St. S.	18/17	(7)	(59)	39	13	0	20	21	17	18	15
Ann Arbor Pitt-AA	6/6	17	(6)	10	28	(84)	37	0	·	53	(5)
Ann Arbor Traver	5/5	14	(109)	58	(3)	42	(150)	(82)	·	·	0
Ann Arbor Swift Run	5/5	(5)	39	50	(150)	0	20	(150)	·	26	·
Long Island Unqua	8/8	(87)	(TOC=66)		47	·	19	(66)	·	65	·
Washington, D.C. Westleigh	40/40	46	·	(26)	15	20	41	(280)	0	·	(14)
Lansing Waverly Hills	35/30	38	5	69	34	26	(8)	(198)	(22)	34	(36)
NIPC Lake Ellyn	25/20	44	·	41	71	48	·	(115)	60	19	41

Notes: (1) In/Out; numbers are approximate, and vary with pollutant. Removals in parentheses indicate negative removal.

Dot (·) indicates pollutant either not monitored or number of observations is too small for reliable estimate of percent reduction.

The ability of detention basins to reduce coliform bacteria concentrations is also of considerable interest because of the significant impact these urban runoff contaminants exert on recreational or shellfish harvesting beneficial uses. Other than at the Unqua site of the Long Island NURP project, the number of observations made for indicator bacteria were too few to support a reliable assessment of the ability of detention basins to effect quality improvements. However, extensive data of this nature were secured on detention basin influent and effluent during all monitored storms at the Unqua site.

Since coliform bacteria have a high rate of die-off in natural waters, performance characteristics based on total mass reductions are not particularly meaningful. The Unqua site data were analyzed to evaluate performance in terms of reductions in concentration levels. Over eight monitored storms at this site, covering a wide range in storm size, the mean EMC (MPN/100 ml) was reduced by 94 percent for total coliform, 91 percent for fecal coliform, and 95 percent for fecal streptococcus bacteria. Variability of bacteria concentrations in the pond outlet increased, with effluent coefficients of variation ranging from about 10 to 100 percent greater than influents. Accordingly, detention basins employing permanent pools (wet ponds) are indicated to be capable of substantial reductions in indicator bacteria.

Dual Purpose Basins

In the absence of a well defined terminology, we have adopted this designation to define basins that are normally dry, and hence retain their full potential for flood control, but which have outlet designs that result in a slow release rate for detained storm flows. Detention time is extended considerably compared with that provided by dry basins employing conventional outlet designs.

One of the detention basins examined by the WASHCOG NURP project, was of this type. This project designates such designs as "Extended Detention Dry Ponds." The pond was converted from a conventional dry pond by replacing the outlet pipe with a perforated riser enclosed in a gravel jacket. The modification was designed to detain stormwater runoff for up to 24 hours, instead of the 1 to 2 hours typically observed in conventional dry ponds.

For undetermined reasons, average detention periods during the study were in the order of 4 to 8 hours, and hence considerably shorter than the design objective. Nevertheless, based on monitoring of more than 30 storm events, the removal of particulate forms of urban pollutants was typically high and comparable to the performance efficiency of wet ponds.

Observed removals for this site (Stedwick) are summarized by Table 8-4, showing percent reductions in both mass and concentration distributions. The principal differences in performance of dual purpose basins compared with wet basins are suggested by the available data to consist of the following:

- Soluble pollutants (e.g., soluble P and Nitrate/Nitrite) are not effectively reduced because of the absence of a permanent pool within which biological reactions have an opportunity to occur in addition to sedimentation.

- The variability of pollutant EMC's does not appear to be modified to the extent that this occurs in wet ponds.

TABLE 8-4. PERFORMANCE CHARACTERISTICS OF A DUAL-PURPOSE DETENTION DEVICE

(Stedwick Site - Washington Area NURP Project)

Pollutant	Percent Reduction In		
	Pollutant Mass Load Over All Monitored Storms	Pollutant EMC's Mean	Pollutant EMC's Coef Var
TSS	64	63	(31)
COD	30	41	17
Total P	< 15	11	0
Sol P	1	(4)	(13)
TKN	•	8	(11)
Organic N	30	•	•
NO_{2+3}	10	13	6
T. Cu	•	•	•
T. Pb	84	•	•
T. Zn	57	43	33

Although the performance characteristics of basins of this type are indicated to be somewhat inferior to the potential offered by wet ponds, there are a number of considerations which make dual purpose basins highly attractive candidates for quality control of urban runoff. These include the fact that flood control requirements are likely to be more economically obtained than with wet basins and that many existing stormwater management basins may be readily modified to significantly enhance their capability for improving the quality of urban runoff. In areas where ordinances requiring conventional stormwater management ponds are already in existence, the only changes required would be an alternate specification of the outlet design.

Costs

The information presented here is intended to provide an order of magnitude estimate of the cost of providing different levels of control of urban runoff pollutant discharges, when wet detention devices are used as the best management practice (BMP). The summary is based on the size versus performance relationship presented earlier in Figure 8-1 and on the size versus cost relationships presented below.

The analysis is based on cost information developed by the WASHCOG NURP project and discussed in detail in one of their project reports produced for the NURP effort. Construction cost estimates as a function of basin volume are shown by Figure 8-2, adopted from this source. This estimate compares quite favorably with a similar cost/size relationship developed previously by the Soil Conservation Service (SCS).

The cost relationship shown by this figure applies to "dry pond" designs and relates only to expected cost of construction activities. For specific cost estimates, the results derived from Figure 8-2 should be modified as appropriate, in accordance with the following:

- The highly variable capital cost of land acquisition is not included in the construction costs.

- Outlet modifications to provide a dual purpose basin design will increase construction costs by about 10 to 12 percent.

- Pond designs which meet the peak shaving requirements of conventional (dry) pond designs, but also provide a permanent pool of water may have costs up to 40 percent greater than indicated by the cost relationship shown by Figure 8-2.

- An additional allowance equal to 25 percent of construction costs is suggested to allow for planning, design, administration, and construction related contingencies.

- Operation and maintenance costs are estimated to involve an annual expenditure of approximately 3 to 5 percent of base construction cost, that is, before application of the 25 percent factor for design, planning, and administration. The total is composed of two elements: 2 to 3 percent of construction cost estimates the annual cost of routine maintenance and upkeep; an additional 1 to 2 percent of construction cost estimates the annualized cost of sediment removal operations for a 10 year clean-out cycle.

Planning agencies often distinquish between "on-site" controls, which are applied to relatively small urban catchments, often installed by the developer of an urban property, and "off-site" controls, which involve larger basins and serve substantially larger urban drainage areas. Because of the appreciable economy of scale inherent in the cost relationship defined by Figure 8-2, this factor must be taken into account in developing cost/performance summaries for urban runoff quality control using detention basins. Accordingly, the control costs presented below for wet basin designs indicate the differences based on the size of the urban catchment the basin is designed to serve.

Figure 8-3 presents a planning level approximation of both present value and annual cost of wet detention basins. Amoritization of costs is based on a 20 year basin life and an interest rate of 10 percent.

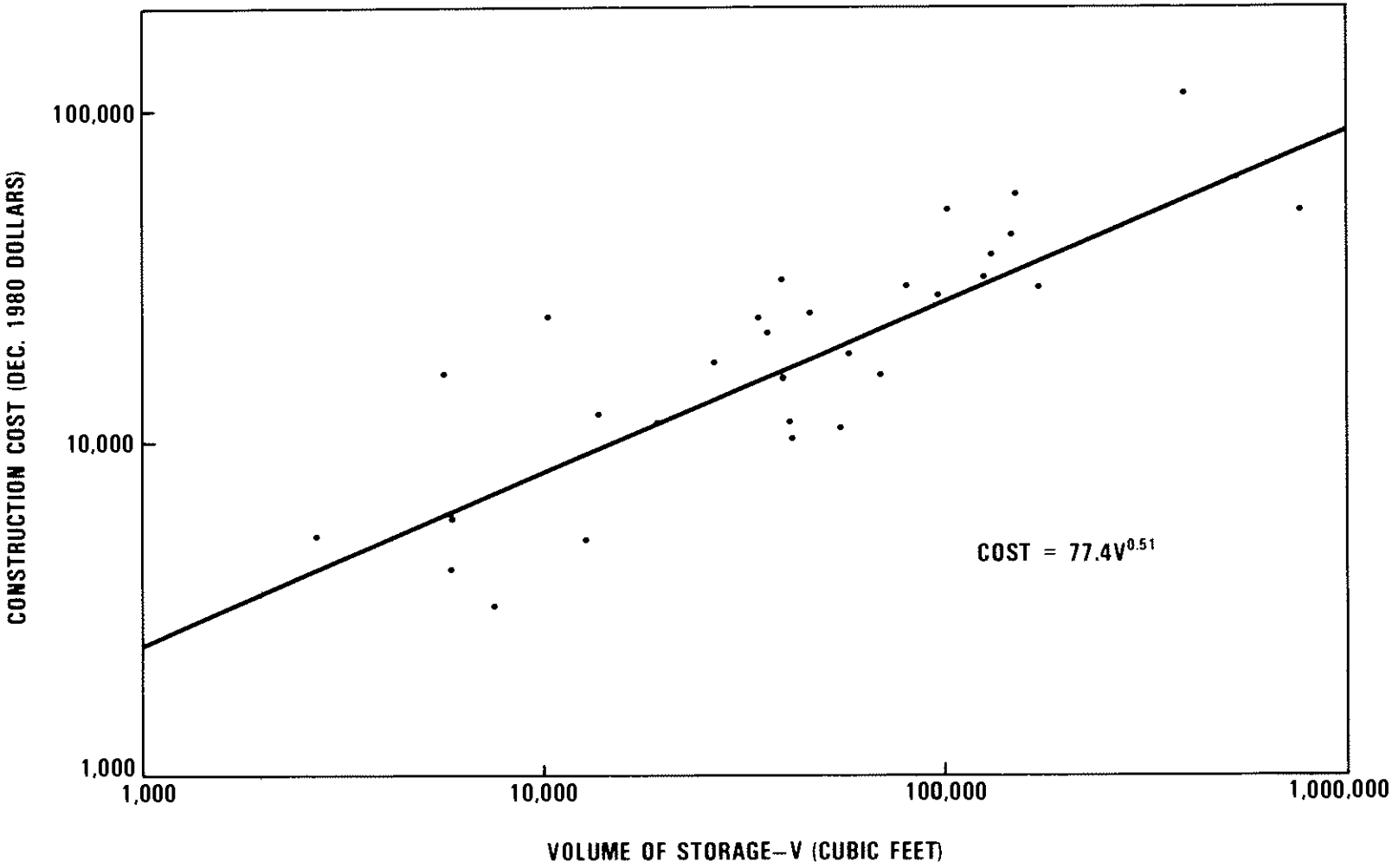

Figure 8-2. Average Stormwater Management (Dry) Pond Construction Cost Estimates Vs. Volume of Storage

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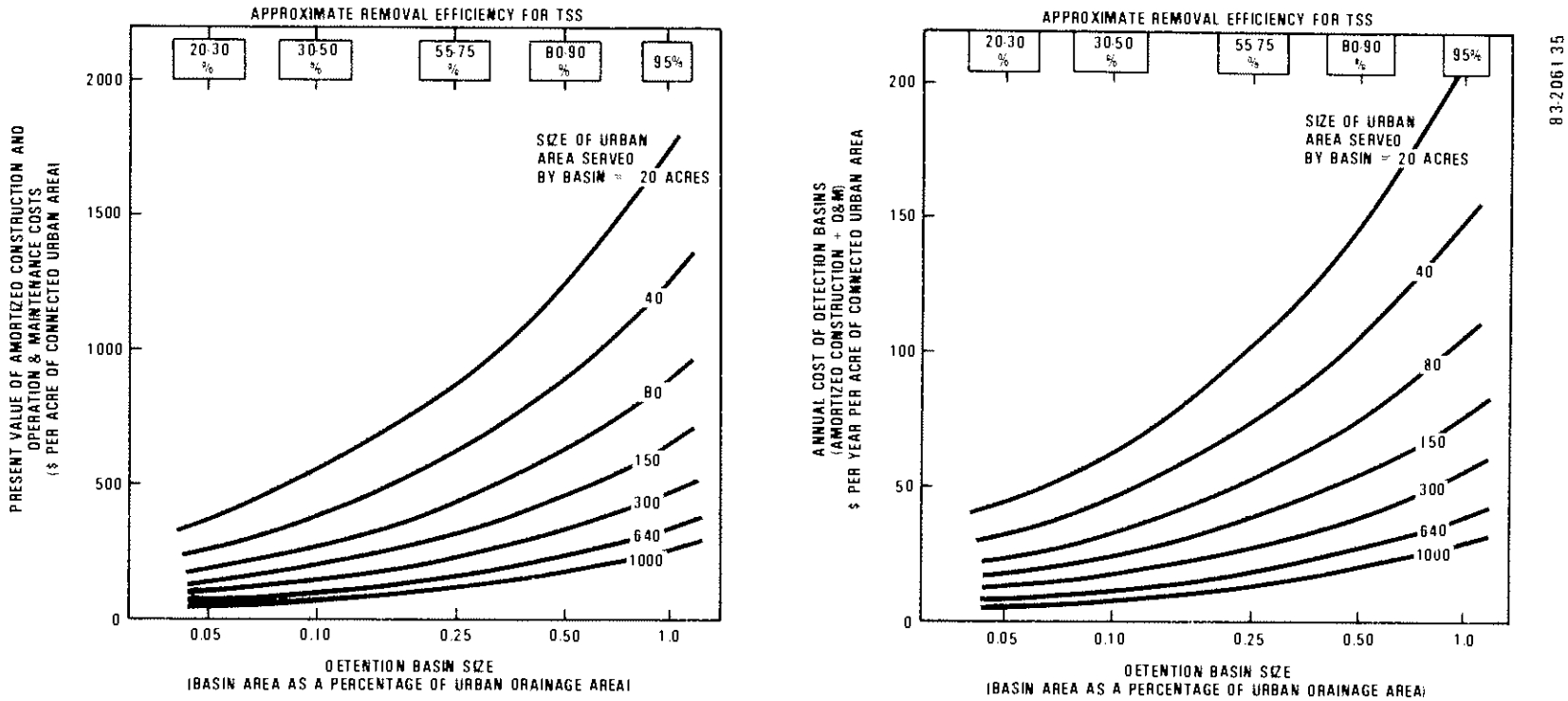

BASIS WET BASINS--CONSTRUCTION COSTS 40% GREATER THAN FIGURE B 2
ANNUAL O&M COST--5% OF BASE CONSTRUCTION COST
BASIN AVG DEPTH 3.5 FEET
INTEREST RATE 10%
BASIN LIFE 20 YEARS

Figure 8-3. Cost of Urban Runoff Control Using Wet Detention Basins

The performance levels associated with a particular basin size are shown at the top of the plots as a range for long-term average removal efficiencies for TSS. The range associated with a particular size reflects the regional differences in performance which can be expected (Figure 8-1) as a result of regional differences in storm characteristics. Approximate removal efficiencies for pollutants other than TSS can be estimated by factoring the indicated TSS removal by the particulate fraction of the pollutant of interest. The supplementary NURP document dealing with detention basins provides information to permit further refinement. A more concise local summary of cost/performance relationships can be developed using the NURP data and analysis methods, if local rainfall and land use characteristics, and design and planning preferences are utilized.

The generalized relationships shown by Figure 8-3 can be summarized as follows, if an urban catchment size of 20 to 40 acres is taken to represent a typical "on-site" control application, and an "off-site" application is reflected by detention basins serving 640 to 1000 acres.

Control Application	Approximate Level of Control (% TSS Reduction)	Cost Per Acre of Urban Area (Approximate)	
		Present Value	Annual Cost
On-site	50	$500 - $700	$60 - $80
	90	$1000 - $1500	$125 - $175
Off-site	50	$100	$10
	90	$250	$25

RECHARGE DEVICES

Control measures which enhance the infiltration of urban runoff are indicated by the NURP studies to be techniques which are practical to apply and capable of effective reductions in urban runoff quantity and quality. This finding is based on project reports and on the results of a screening analysis using a probabilistic methodology described in a supplementary NURP document on detention basins.

The issue of the potential contamination of groundwater aquifers due to enhanced infiltration of urban storm runoff has been discussed in the previous chapter dealing with receiving water impacts. The favorable findings support further consideration of this technique. At the same time, it must be emphasized that specific local conditions may make recharge inappropriate. Such conditions can include steep slopes, soil conditions, depth to groundwater, and the proximity of water supply wells. Sound planning and engineering judgement must be applied to determine the acceptability of this control approach in a local situation.

However, where local conditions premit, a wide variety of design concepts are available for use. These range from off-site applications consisting of

large retention basins, to small individual on-site units which include infiltration pits and trenches, percolating catch basins, and porous pavement. The operating principle is the same regardless of size or design concept. The important elements are the surface area provided for sub-surface percolation and the storage volume of the device. Overall performance will be related to the size of the recharge device relative to the urban catchment it serves and the permeability (infiltration rate) of the soil.

The context in which the performance capabilities of recharge devices are evaluated is the extent to which urban runoff is "captured" and prevented from discharging directly to surface waters. Pollutant removals are reduced in direct proportion to the runoff volume which is intercepted and recharged. Load reductions will be further enhanced if quality improvements occur in the portion of the runoff which is not captured. The combination of soil infiltration rate and percolating area provided determines the "treatment rate" of a specific recharge device. When storm runoff is applied to the device at rates of flow equal to or less than this rate, 100 percent of the runoff is captured during that event. At higher applied rates, the fraction of the runoff flow in excess of the treatment rate will escape and discharge to surface waters.

Most recharge devices other than porous pavement also provide storage volume. This improves performance capability because portions of the excess runoff can be retained for subsequent percolation when applied rates subside. Overflow to surface water occurs only when the available storage is exceeded.

The Long Island and Metropolitan Washington, D.C. (WASHCOG) NURP projects examined the performance of on-site recharge devices. An interconnected system of percolating catch basins in Long Island was estimated to reduce surface water discharges of storm runoff by more than 99 percent. The WASHCOG project found that a porous pavement site produced pollutant load reductions on the order of 85 to 95 percent depending on the specific pollutant considered. An infiltration trench studied by this project produced reductions in the order of 50 percent.

The NURP analysis methodology was employed in a screening analysis to assist planning evaluations by establishing the relationship between performance level and device size and soil percolation rates. Figure 8-4 presents a planning level estimate of the influence of size, soil characteristics, and regional rainfall differences on the performance of recharge devices.

The upper plot illustrates the significant effect regional differences in rainfall characteristics can have on the performance of identical recharge devices. Basin depth, soil percolation rate, and runoff coefficient for the urban catchment are the same for each case. The performance differences result from differences in the intensity and volume of the average storms in each region. Basin size is represented on the horizontal axis by expressing the percolation area that is provided as a percentage of the area of the contributing urban catchment. For example, a recharge device with a percolating surface area equal to 0.10 percent of an urban catchment represents a design which provides (43,560 sq ft/acre x 0.10/100% =) 43.5 square feet of

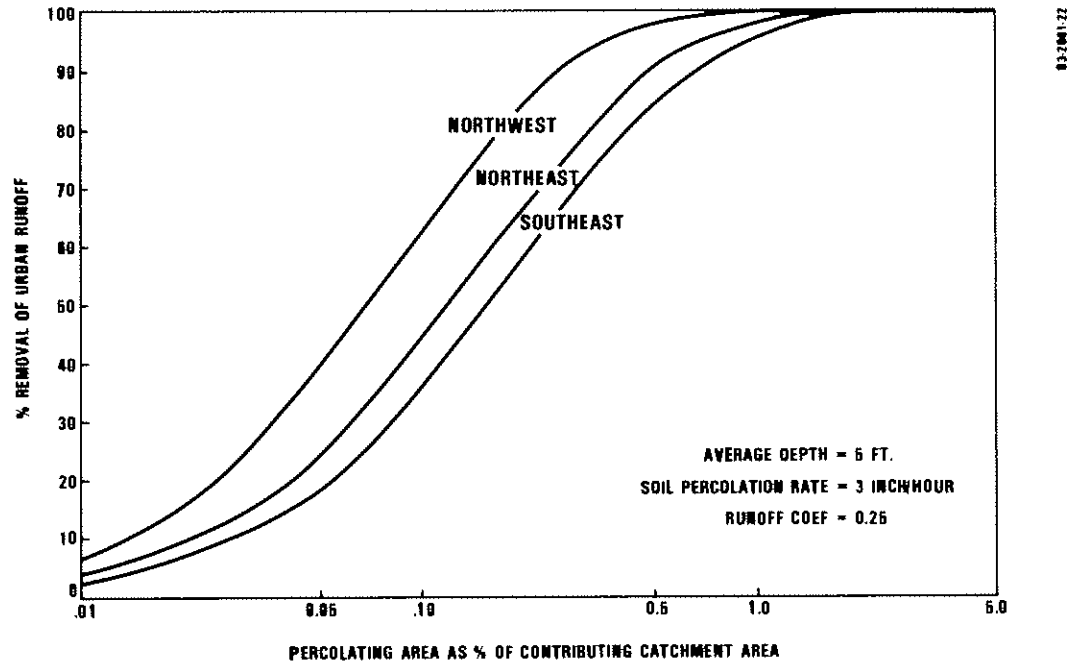

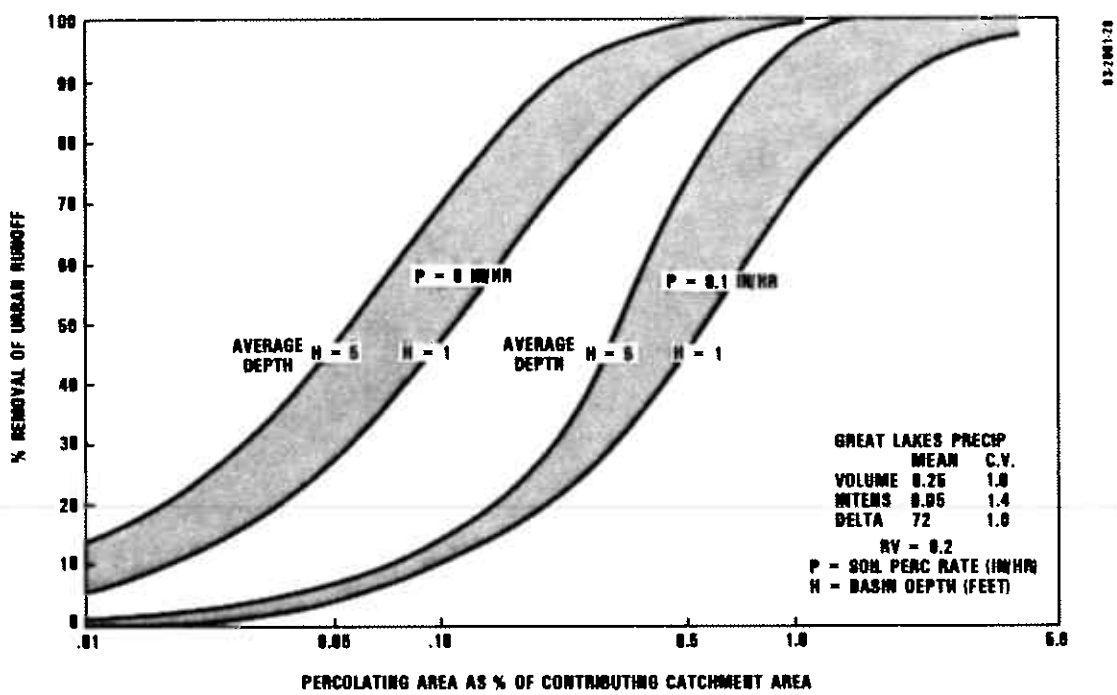

Figure 8-4. Long Term Average Performance of Recharge Devices

percolating surface area for each acre of urban catchment it serves. The long-term average reductions in urban runoff volume and pollutant load which can be expected will be approximately 35 percent in the southeast, 45 percent in the northeast and 65 percent in the Pacific northwest.

The lower plot illustrates the much more significant influence of the amount of storage volume provided (incidated by basin average depth), and the permeability of the soil through which the storm runoff must percolate. The rainfall characteristics used in this analysis are typical of the Great Lakes region of the United States and are roughly comparable to those in the northeastern part of the country. As might be expected, the permeability of the soil in which the recharge device is constructed has a dominant influence on performance capability. However significant compensation for low percolation rates can be achieved by increases in percolation area and storage volume.

When the screening analysis results are considered along with the favorable results from the NURP studies, the NURP findings indicate that with a reasonable degree of design flexibility to compensate for soils with lower percolation rates, recharge devices provide a very effective method for control of urban runoff.

STREET SWEEPING

End-of-pipe urban runoff pollutant concentrations have been commonly viewed as being a function of two prime factors -- accumulation of contaminants on street surfaces and rainfall/runoff washoff. The postulated beneficial effect of street sweeping was to reduce contaminant accumulation. Prior to NURP, emphasis of street sweeping investigations was placed on street surface mechanisms (e.g., accumulation and washoff) and sweeper equipment performance in removing street dirt. While these studies provided valuable insights into the possible benefits of street sweeping, measurements of end-of-pipe concentrations are the only direct measures of street sweeping effectiveness in water quality terms.

Recognizing this, NURP was designed to provide a large data base of urban runoff water quality concentrations for both swept and unswept conditions. In addition, the NURP street sweeping projects gathered and evaluated data on atmospheric deposition (i.e., wetfall and dryfall), street surface accumulation and washoff, and street sweeper removal rates and costs. The individual project reports look at these other issues, and the results are not repeated herein. Of prime interest and provided below is the effectiveness of street sweeping in reducing end-of-pipe urban runoff pollutant concentrations (and ultimately receiving water impacts). The findings presented below are based upon the analyses performed by the individual projects, as well as other statistical techniques, and are generally consistent with the projects' conclusions.

Five of the 28 NURP prototype projects had the evaluation of street sweeping as a central element of their work plans. These projects were as follows:

Project	Number of Sites
Castro Valley, CA	1
Milwaukee, WI	8
Champaign-Urbana, IL	4
Winston-Salem, NC	2
Bellevue, WA	2

Long Island, NY and Baltimore, MD also collected limited street sweeping data. The experimental designs of the projects varied in detail, but essentially followed either a paired basin or serial basin approach to gather test and control data, with some projects using both approaches. The general concept was that during a test period street sweeping would be more intensive (up to daily) and thorough (e.g., with operator training, parking bans, etc.) than during control periods when the streets were to be swept as usual or not at all.

In the paired basin approach, two adjacent or close-by basins were operated in a "control" or unswept mode for certain periods of time to establish a baseline comparison, and then street sweeping was performed in a "test" basin while the other remained as a control. The data provided an overall comparison between basins as well as a series of synoptic events for both basins. In the serial approach, a basin was periodically operated in either a control or test mode, with the periods adjusted so that all seasons of the year were represented in each mode. Here, rather than synoptic data pairs, one has data strings for both "swept" and "unswept" conditions.

There are no well established or prescribed procedures for evaluating the possible reduction in runoff concentrations due to street sweeping. Issues of concern include storm size and intensity effects, time since last rain, ability to select truly paired basins, seasonal effects, etc. In an attempt to sort out these issues, an exploratory data analysis was performed, and the following findings were established:

- Street sweeping has not been found to change the basic probability distribution of event mean concentrations. That is, the fundamental assumption of random, lognormal behavior is valid during sweeping operations.

- The runoff quality characteristics of a basin during swept or unswept conditions is best measured by the maximum likelihood estimator of the median EMC, with the uncertainty indicated by the 90 percent confidence interval of the median.

- There is in most cases no significant correlation (and in a few cases a weak negative correlation) between EMCs and storm runoff volume. EMCs and storm runoff intensities are also generally uncorrelated (but in isolated cases exhibit a weak positive correlation). The implication of these findings is that differences in concentrations between swept and unswept conditions will be largely unaffected by the size of the storms during the monitoring periods. Because of this independence between concentration and volume, effects of sweeping on EMCs will also indicate effects on mass pollutant loads.

- EMCs for synoptic events on paired basins are, in general, not significantly correlated or in some cases are weakly correlated; however, over the longer term (e.g., mean, frequency distribution, etc.), there are no significant differences between the distribution of EMCs of paired basins. These results show that basins are independent from storm to storm, and thus, comparisons between basins should not be attempted using synoptic events, but the basins do have similar statistical properties and thus can be considered paired.

To evaluate the effectiveness of street sweeping, a series of bivariate plots were constructed for projects using the serial basin approach. The site median EMCs for swept and unswept conditions form the data pairs of the plots. Bivariate plots are presented in Figure 8-5 for TSS, COD, TP, TKN, and Pb concentrations, respectively. Each plot contains swept or unswept conditions for multiple project sites. The assumption of the analysis is that a large enough data base was collected to negate any temporal effects such as seasonal, land use conditions, parking patterns, and other possible factors (as noted earlier, storm volume and intensity effects are not believed to be significant). Examining the bivariate plots, it is observed that, for the NURP data, the median concentrations are as likely to be increased as decreased by street sweeping. Further, street sweeping never produced a dramatic (e.g., >50 percent) reduction in concentrations (or loads).

Street sweeping performance, as measured by the percent change in the site median EMC, for selected NURP sites is graphically displayed in Figure 8-6. The results are for five constituents (TSS, COD, TP, TKN, and Pb) at 10 sites nationwide). For each site, the median EMC is based on data from between 10 and 60 events, with 30 events typical. Based on Figure 8-6 a number of important observations are evident.

- Performance as measured by change in site median EMC is highly variable.

- Where reductions occur, they generally occur for all constituents.

- Reductions never exceed 50 percent.

(TSS Concentrations)

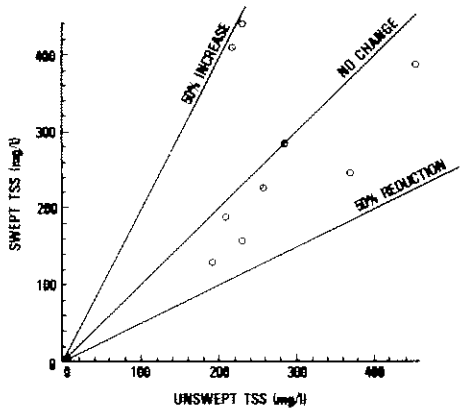

(TKN Concentrations)

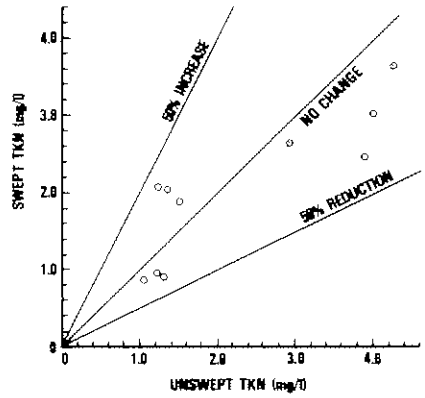

(COD Concentrations)

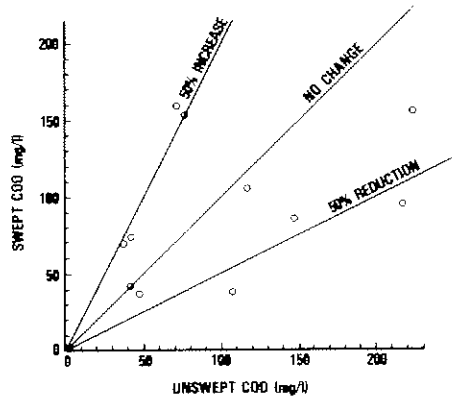

(Pb Concentrations)

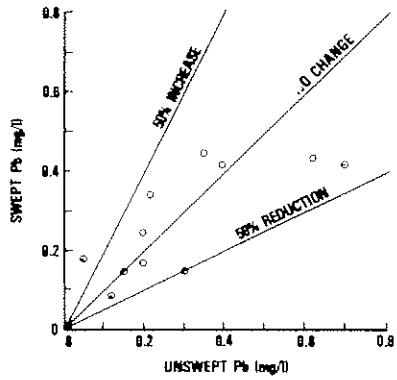

(TP Concentrations)

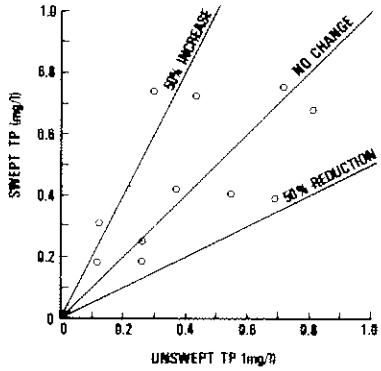

Figure 8-5. Bivariate Plots of Median EMCs for Swept and Unswept Conditions

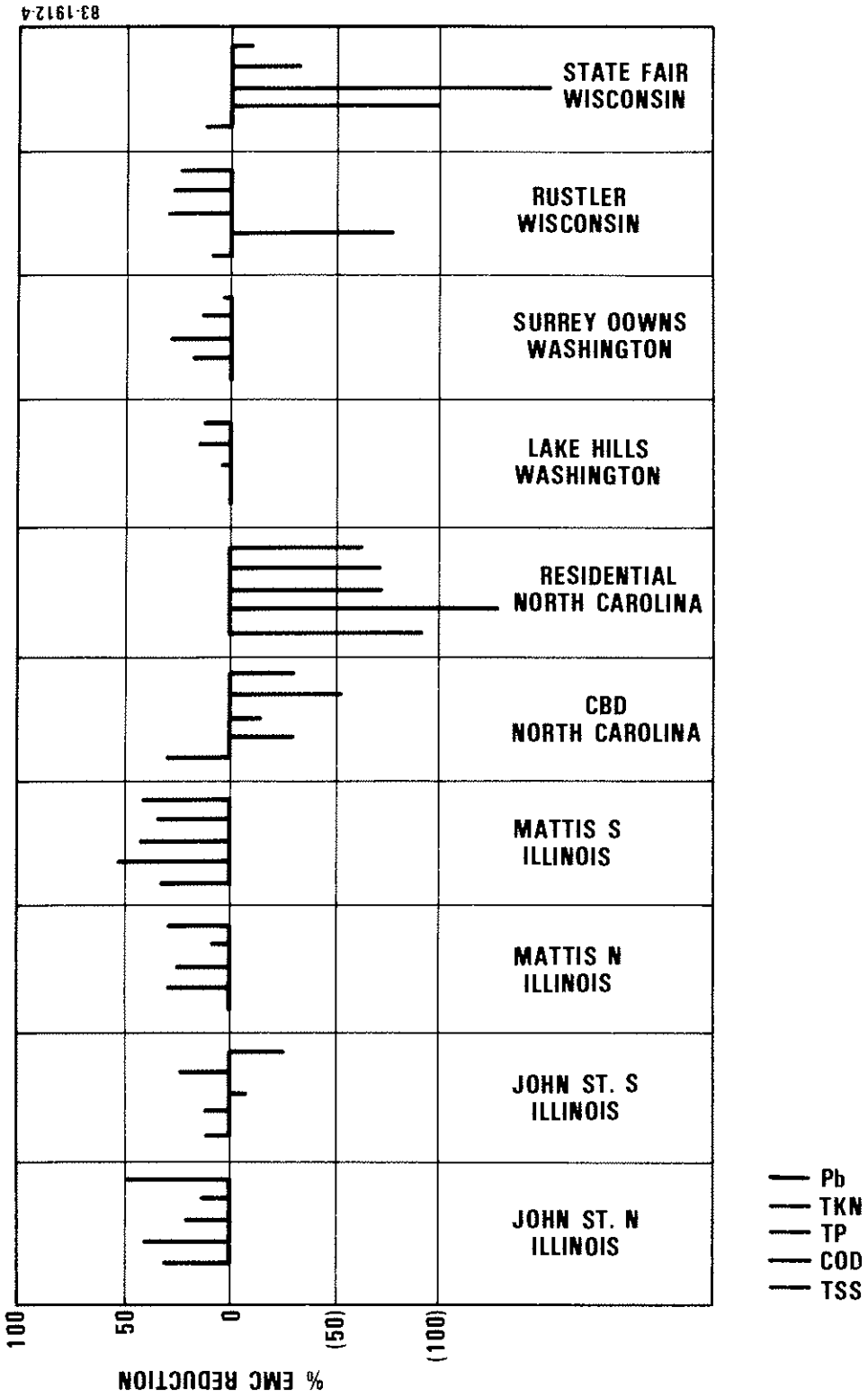

Figure 8-6. Street Sweeping Performance

In evaluating the results, it is critical that the uncertainty in the estimate of median EMCs based on limited observed data, and thus the uncertainty in performance estimates, be assessed. This is especially true for the cases of apparent increases in concentrations indicated by Figure 8-6.

For each of the 10 sites considered, the 90 percent confidence intervals of the site median EMCs were computed as indicated in Figure 8-7. This analysis indicates that there is generally no significant difference between median EMCs for swept and unswept conditions. The implications of this analysis of uncertainty are as follows:

- Based on statistical testing, no significant reductions in EMCs are realized by street sweeping.

- The indicated changes in site median EMCs (increases or decreases) are much more likely due to random sampling than actual effects of sweeping operations.

- Benefits of street sweeping (if any) are masked by the large variability of the EMCs, therefore the benefit is certainly not large (e.g., >50 percent), and an even larger site data base is required to further identify the possible effect.

- In the above context, the hypothesis that street sweeping increases EMCs is generally not shown by the data, though it could occur in isolated, site specific cases.

Urban runoff loads are the product of long term (e.g., annual) runoff volume and event mean concentration. Under this definition, statements concerning EMCs also hold for loads.

OTHER CONTROL APPROACHES

Several best management practices (BMPs) in addition to those discussed above should be identified on the basis that local planning efforts determined them to be practical to apply and to have the potential to provide significant improvements in the quality characteristics of urban runoff. They are grouped together in this section and discussed only briefly, principally because, for one reason or another, sufficient data to characterize their performance capabilities was not developed during the NURP program.

Grass Swales

Three grass swales were monitored by the Washington, D.C. area NURP project. No significant improvement is urban runoff quality was indicated for pollutants analyzed. Increases in zinc concentration which were observed were attributed to mobilization of zinc from the galvanized culverts which carried runoff under the driveways at the monitored residential sites. However the project study report concluded that modifications which would increase residence of runoff in the swales and enhance infiltration capability could make this BMP effective for control of urban runoff.

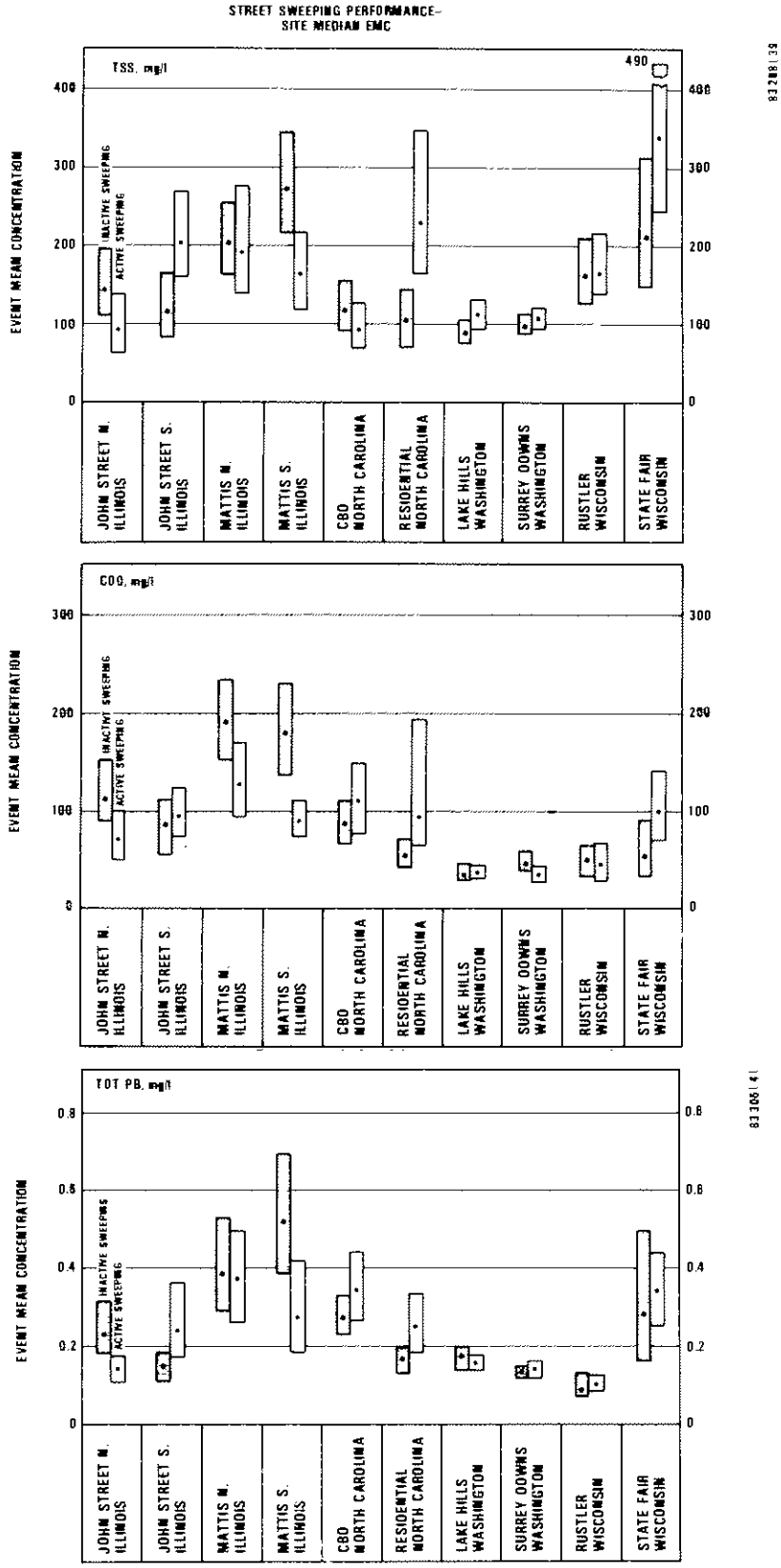

Figure 8-7. Effect of Street Sweeping on Site Median EMC Values

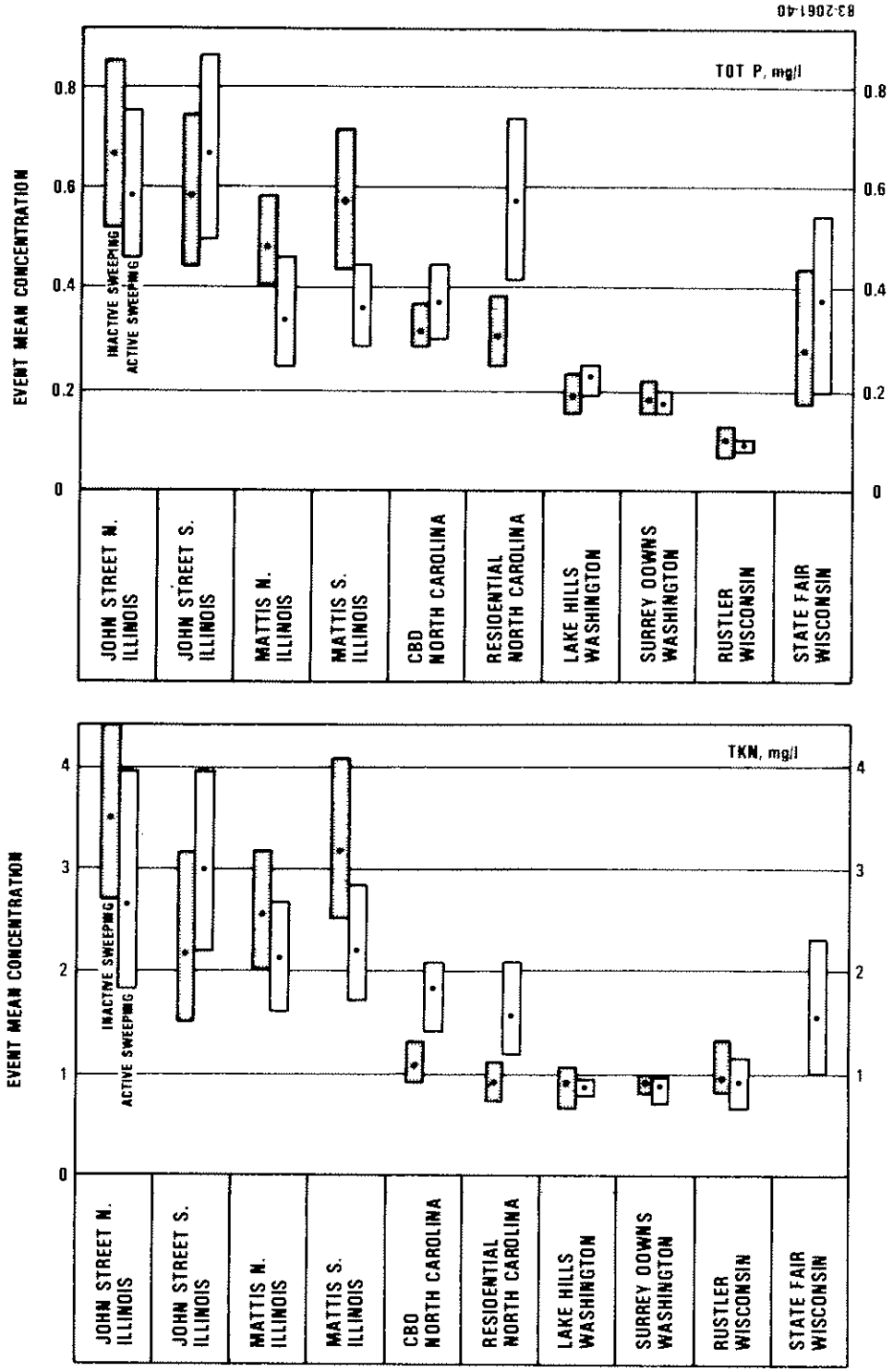

Figure 8-7. Effect of Street Sweeping on Site Median EMC Values (Cont'd)

The Durham, New Hampshire NURP project monitored performance of a carefully designed artificial swale which received runoff from a commercial parking lot. Over 11 monitored storms, both soluble and particulate fractions of heavy metals (Cu, Pb, Zn, and Cd) were reduced by approximately 50 percent. Reductions in COD, nitrate, and ammonia were on the order of 25 percent. The swale did not prove to be effective in reducing concentrations or organic nitrogen, phosphorus, or bacterial species. It should be noted that the performance capabilities indicated are based only on the concentration changes produced in the stormwater which passes completely through the swale. To the extent that infiltration of a portion of the runoff is effected by a swale, load reductions would be increased in proportion.

The NURP results suggest that grass swales represent a practical and potentially effective technique for control of urban runoff quality; that design conditions are of major significance; and that additional study is necessary to establish such parameters.

Wetlands

The potential of either natural or artificially created wetland areas to effect favorable modification of urban runoff pollutant loads (particularly sediment, nutrients, and heavy metals) has been widely suggested. The NURP experience reinforces this expectation, but has not developed the detailed performance data to permit either characterizing general performance capabilities or identifying general design principles and parameters. Additional study will be required to develop such information.

Miscellaneous

This category encompasses a variety of BMPs which were identified at the local level as techniques of quality control which appeared to be relevant for the circumstances which were operative. They are grouped under this category because (a) their applicability tends to be site-specific rather than general, and (b) while their effectiveness as a BMP may be substantial on a relatively small spatial scale, the broad-scale effect on urban runoff loads has not been possible to document.

BMPs in this category include erosion control practices and urban housekeeping practices. As an example of the former, the Little Rock, Arkansas NURP project widened and stabilized (with rip rap) a segment of an urban stream to reduce erosion potential. The Baltimore NURP project data clearly indicated the substantial difference in urban runoff quality that can result from the general level of cleanliness maintained in an urban neighborhood.

CHAPTER 9
CONCLUSIONS

INTRODUCTION

The Nationwide Urban Runoff Program has addressed such issues as quantifying the characteristic of urban runoff, assessing the water quality effects on receiving water bodies attributable to urban runoff discharges, and examining the effectiveness of control practices in removing the pollutants found in urban runoff. This chapter summarizes NURP's conclusion relating to these issues and is based on the results presented in Chapters 6, 7, and 8 of this report. Conclusions reached by the individual NURP projects are also presented to further support the results of the national level analysis.

URBAN RUNOFF CHARACTERISTICS

General

Field monitoring was conducted to characterize urban runoff flows and pollutant concentrations. This was done for a variety of pollutants at a substantial number of sites distributed throughout the country. The resultant data represent a cross-section of regional climatology, land use types, slopes, and soil conditions and thereby provide a basis for identifying patterns of similarities or differences and testing their significance.

Urban runoff flows and concentrations of contaminants are quite variable. Experience shows that substantial variations occur within a particular event and from one event to the next at a particular site. Due to the high variability of urban runoff, a large number of sites and storm events were monitored, and a statistical approach was used to analyze the data. Procedures are available for characterizing variable data without requiring knowledge of or existence of any underlying probability distribution (nonparametric statistical procedures). However, where a specific type of probability distribution is known to exist, the information content and efficiency of statistical analysis is enhanced. Standard statistical procedures allowed probability distributions or frequency of occurrence to be examined and tested. Since the underlying distributions were determined to be adequately represented by the lognormal distribution, the log (base e) transforms of all urban runoff data were used in developing the statistical characterizations.

The event mean concentration (EMC), defined as the total constituent mass discharge divided by the total runoff volume, was chosen as the primary water quality statistic. Event mean concentrations were based on flow weighted composite samples for each event at each site in the accessible data base. EMCs were chosen as the primary water quality characteristic subjected to detailed analysis, even though it is recognized that mass loading characteristics of urban runoff (e.g., pounds/acre for a specified time interval) is

ultimately the relevant factor in many situations. The reason is that, unlike EMCs, mass loadings are very strongly influenced by the amount of precipitation and runoff, and estimates of typical annual mass loads will be biased by the size of monitored storm events. The most reliable basis for characterizing annual or seasonal mass loads is on the basis of EMC and site-specific rainfall/runoff characteristics.

Establishing the fundamental distribution as lognormal and the availability of a sufficiently large population of EMCs to provide reliability to the statistics derived has yielded a number of benefits, including the ability to provide:

- Concise summaries of highly variable data
- Meaningful comparisons of results from different sites, events, etc.
- Statements concerning frequency of occurrence. One can express how often values will be expected to exceed various magnitudes of interest.
- A more useful method of reporting data than the use of ranges; one which is less subject to misinterpretation
- A framework for examining "transferability" of data in a quantitative manner

Conclusions

1. Heavy metals (especially copper, lead and zinc) are by far the most prevalent priority pollutant constituents found in urban runoff. End-of-pipe concentrations exceed EPA ambient water quality criteria and drinking water standards in many instances. Some of the metals are present often enough and in high enough concentrations to be potential threats to beneficial uses.

   All 13 metals on EPA's priority pollutant list were detected in urban runoff samples, and all but three at frequencies of detection greater than 10 percent. Most often detected among the metals were copper, lead, and zinc, all of which were found in at least 91 percent of the samples.

   Metal concentrations in end-of-pipe urban runoff samples (i.e., before dilution by receiving water) exceeded EPA's water quality criteria and drinking water standards numerous times. For example, freshwater acute criteria were exceeded by copper concentrations in 47 percent of the samples and by lead in 23 percent. Freshwater chronic exceedances were common for lead (94 percent), copper (82 percent), zinc (77 percent), and cadmium (48 percent). Regarding human toxicity, the most significant pollutants were lead and nickel, and for human carcinogenesis, arsenic and beryllium. Lead concentrations violated drinking water criteria in 73 percent of the samples.

It should be stressed that the exceedances noted above do not necessarily imply that an actual violation of standards will exist in the receiving water body in question. Rather, the enumeration of exceedances serves a screening function to identify those heavy metals whose presence in urban runoff warrants high priority for further evaluation.

Based upon the much more extensive NURP data set for total copper, lead, and zinc, the site median EMC values for the median urban site are: Cu = 34 µg/l, Pb = 144 µg/l, and Zn = 160 µg/l. For the 90th percentile urban site the values are: Cu = 93 µg/l, Pb = 350 µg/l, and Zn = 500 µg/l. These values are suggested to be appropriate for planning level screening analyses where data are not available.

Some individual NURP project sites (e.g., at DC1, MD1, NH1) found unusually high concentrations of certain heavy metals (especially copper and zinc) in urban runoff. This was attributed by the projects to the effect of acid rain on materials used for gutters, culverts, etc.

2. The organic priority pollutants were detected less frequently and at lower concentrations than the heavy metals.

Sixty-three of a possible 106 organics were detected in urban runoff samples. The most commonly found organic was the plasticizer bis (2-ethylhexl) phthalate (22 percent), followed by the pesticide α-hexachlorocyclohexane (α-BHC) (20 percent). An additional 11 organic pollutants were reported at frequencies between 10 and 20 percent; 3 pesticides, 3 phenols, 4 polycyclic aromatics, and a single halogenated aliphatic.

Criteria exceedances were less frequently observed among the organics than the heavy metals. One unusually high pentachlorophenol concentration of 115 µg/l resulted in exceedances of the freshwater acute and organoleptic criteria. This observation and one for chlordane also exceeded the freshwater acute criteria. Freshwater chronic criteria exceedances were observed for pentachlorophenol, bis (2-ethylhexyl) phthalate, gamma-BHC, chlordane, and alpha-endosulfan. All other organic exceedances were in the human carcinogen category and were most serious for alpha-hexachlorocyclohexane (alpha-BHC), gamma-hexachlorocyclohexane (gamma-BHC or Lindane), chlordane, phenanthrene, pyrene, and chrysene.

The fact that the NURP priority pollutant monitoring effort was limited to two samples at each site leaves us unable to make many generalizations about those organic pollutants which occurred only rarely. We can speculate that their occurrences tend to be very site specific as opposed to being a generally widespread phenomena, but much more data would be required to conclusively prove this point.

3. Coliform bacteria are present at high levels in urban runoff and can be expected to exceed EPA water quality criteria during and immediately after storm events in many surface waters, even those providing high degrees of dilution.

Fecal coliform counts in urban runoff are typically in the tens to hundreds of thousand per 100 ml during warm weather conditions, with the median for all sites being around 21,000/100 ml. During cold weather, fecal coliform counts are more typically in the 1,000/100 ml range, which is the median for all sites. Thus, violations of fecal coliform standards were reported by a number of NURP projects. High fecal coliform counts may not cause actual use impairments, in some instances, due to the location of the urban runoff discharges relative to swimming areas or shellfish beds and the degree of dilution/dispersal and rate of die off. The same is true of total coliform counts, which were found to exceed EPA water quality criteria in undiluted urban runoff at virtually every site every time it rained.

The substantial seasonal differences noted above do not correspond with comparable variations in urban activities. The NURP analyses as well as current literature suggest that fecal coliform may not be the most appropriate indicator organism for identifying potential health risks when the source is stormwater runoff.

4. Nutrients are generally present in urban runoff, but with a few individual site exceptions, concentrations do not appear to be high in comparison with other possible discharges to receiving water bodies.

NURP data for total phosphorus, soluble phosphorus, total kjeldahl nitrogen, and nitrate plus nitrite as nitrogen were carefully examined. Median site EMC median concentrations in urban runoff were TP = 0.33 mg/l, SP = 0.12 mg/l, TKN = 1.5 mg/l, and NO2+3 - N = 0.68 mg/l. On an annual load basis, comparison with typical monitoring data, literature values, and design objectives for discharges from a well run secondary treatment plant suggests that mean annual nutrient loads from urban runoff are around an order of magnitude less than those from a POTW.

5. Oxygen demanding substances are present in urban runoff at concentrations approximating those in secondary treatment plant discharges. If dissolved oxygen problems are present in receiving waters of interest, consideration of urban runoff controls as well as advanced waste treatment appears to be warranted.

Urban runoff median site EMC median concentrations of 9 mg/l BOD5 and 65 mg/l COD are reflected in the NURP data, with 90th percentile site EMC median values being 15 mg/l BOD5 and 140 mg/l COD. These concentrations suggest that, on an annual load basis, urban runoff is comparable in magnitude to secondary treatment plant discharges.

It can be argued that urban runoff is typically well oxygenated and provides increased stream flow and, hence, in view of relatively long travel times to the critical point, that dissolved oxygen problems attributable solely to urban runoff should not be widespread occurrences. No NURP project specifically identified a low DO condition resulting from

urban runoff. Nonetheless, there will be some situations where consideration of urban runoff controls for oxygen demanding substances in an overall water quality management strategy would seem appropriate.

6. Total suspended solids concentrations in urban runoff are fairly high in comparison with treatment plant discharges. Urban runoff control is strongly indicated where water quality problems associated with TSS, including build-up of contaminated sediments, exist.

   There are no formal water quality criteria for TSS relating to either human health or aquatic life. The nature of the suspended solids in urban runoff is different from those in treatment plant discharges, being higher in mineral and man-made products (e.g., tire and street surface wear particles) and somewhat lower in organic particulates. Also, the solids in urban runoff are more likely to have other contaminants adsorbed onto them. Thus, they cannot be simply considered as benign, nor do they only pose an aesthetic issue. NURP did not examine the problem of contaminated sediment build-up due to urban runoff, but it undeniably exists, at least at some locations.

   The suspended solids in urban runoff can also exert deleterious physical effects by sedimenting over egg deposition sites, smothering juveniles, and altering benthic communities.

   On an annual load basis, suspended solids contributions from urban runoff are around an order of magnitude or more greater than those from secondary treatment plants. Control of urban runoff, as opposed to advanced waste treatment, should be considered where TSS-associated water quality problems exist.

7. A summary characterization of urban runoff has been developed and is believed to be appropriate for use in estimating urban runoff pollutant discharges from sites where monitoring data are scant or lacking, at least for planning level purposes.

   As a result of extensive examination, it was concluded that geographic location, land use category (residential, commercial, industrial park, or mixed), or other factors (e.g., slope, population density, precipitation characteristics) appear to be of little utility in consistently explaining overall site-to-site variability in urban runoff EMCs or predicting the characteristics of urban runoff discharges from unmonitored sites. Uncertainty in site urban runoff characteristics caused by high event-to-event variability at most sites eclipsed any site-to-site variability that might have been present. The finding that EMC values are essentially not correlated with storm runoff volumes facilitates the transfer of urban runoff characteristics to unmonitored sites. Although there tend to be exceptions to any generalization, the suggested summary urban runoff characteristics given in Table 6-17 of the report are recommended for planning level purposes as the best estimates, lacking local information to the contrary.

RECEIVING WATER EFFECTS

General

The effects of urban runoff on receiving water quality are highly site-specific. They depend on the type, size, and hydrology of the water body; the urban runoff quantity and quality characteristics; the designated beneficial use; and the concentration levels of the specific pollutants that affect that use.

The conclusions which follow are based on screening analyses performed by NURP, observations and conclusions drawn by individual NURP projects that examined receiving water effects in differing levels of detail and rigor, and NURP's three levels of problem definition. Conclusions are organized on the basis of water body type: rivers and streams, lakes, estuaries and embayments, and groundwater aquifers. Site-specific exceptions should be expected, but the statements presented are believed to provide an accurate perspective on the general tendency of urban runoff to contribute significantly to water quality problems.

Rivers and Streams

1. Frequent exceedances of heavy metals ambient water quality criteria for freshwater aquatic life are produced by urban runoff.

   The Denver NURP project found that in-stream concentrations of copper, lead, zinc, and cadmium exceeded State ambient water quality standards for the South Platte River during essentially all storm events.

   NURP screening analyses suggest that frequent exceedances of both EPA 24-hour and maximum water quality criteria for heavy metals should be expected on a relatively general basis.

2. Although a significant number of problem situations could result from heavy metals in urban runoff, levels of freshwater aquatic life use impairment suggested by the magnitude and frequency of ambient criteria exceedances were not observed.

   Based upon the magnitude and frequency of freshwater aquatic life ambient criteria exceedances, one would expect to observe impairment of this beneficial use in most streams that receive urban runoff discharges. However, those NURP project studies which examined this issue did not report significant use impairment problems associated with urban runoff.

   The Bellevue, Washington NURP project concluded that toxic effects of urban runoff pollutants did not appear to be a significant factor.

   The Tampa, Florida NURP project conducted biological studies of the impact of stormwater runoff upon the biological community of the Hillsborough River. They conducted animal bioassay experiments on five sensitive species in two samples of urban runoff from the Arctic Street drainage basin. Thirty-two bioassay experiments were completed including 22 acute tests and 10 chronic tests. Neither sample of stormwater was acutely toxic to test organisms. Long-term chronic experiments were

undertaken with two species and resulted in no significant effects attributable to stormwater exposure.

NURP screening analyses suggest that the potential of urban runoff to seriously impair this beneficial use will be strongly influenced by local conditions and the frequency of occurrence of concentration levels which produce toxic effects under the intermittent, short duration exposures typically produced by urban runoff.

While the application of the screening analysis to the Bellevue and Tampa situations supports the absence of a problem situation in these cases, it also suggests that a significant number of problem situations should be expected. Therefore, although not the general, ubiquitous problem situation that criteria exceedances would suggest, there are site-specific situations in which urban runoff could be expected to cause significant impairment of freshwater aquatic life uses.

Because of the inconsistency between criteria exceedances and observed use impairments due to urban runoff, adaptation of current ambient quality criteria to better reflect use impacts where pollutant exposures are intermittent and short duration appears to be a useful area for further investigation.

3. Copper, lead and zinc appear to pose a significant threat to aquatic life uses in some areas of the country. Copper is suggested to be the most significant of the three.

Regional differences in surface water hardness, which has a strong influence on toxicity, in conjunction with regional variations in stream flow and rainfall result in significant differences in susceptibility to adverse impacts around the nation.

The southern and southeastern regions of the country are the most susceptible to aquatic life effects due to heavy metals, with the northeast also a sensitive area, although somewhat less so.

Copper is the major toxic metal in urban runoff, with lead and zinc also prevalent but a problem in more restricted cases. Copper discharges in urban runoff are, in all but the most favorable cases, a significant threat to aquatic life uses in the southeast and southern regions of the country. In the northeast, problems would be expected only in rather unfavorable conditions (large urban area contribution and high site concentrations). In the remainder of the country (and for the other metals) problems would only be expected under quite unfavorable site conditions. These statements are based on total metal concentrations.

4. Organic priority pollutants in urban runoff do not appear to pose a general threat to freshwater aquatic life.

This conclusion is based on limited data on the frequency with which organics are found in urban runoff discharges and measured end-of-pipe concentrations relative to published toxic criteria. One unusually high pentachlorophenol concentration of 115 µg/l resulted in the only exceedance of the organoleptic criteria. This observation and one for

chlordane exceeded the freshwater acute criteria. Freshwater chronic criteria exceedances were observed for pentochlorophenol, bis (2-ethylhexyl) phlhalate, γ-hexachlorocyclohexane (lindane), α-endosulfan, and chlordane.

5. The physical aspects of urban runoff, e.g., erosion and scour, can be a significant cause of habitat disruption and can affect the type of fishery present. However, this area was studied only incidentally by several of the projects under the NURP program and more concentrated study is necessary.

The Metropolitan Washington Council of Governments (MWCOG) NURP project did an analysis of fish diversity in the Seneca Creek Watershed, 20 miles northwest of Washington, D.C. In this study, specific changes in fishery diversity were identified due to urbanization in some of the sub-watersheds. Specifically, the number of fish species present are reduced and the types of species present changed dramatically, e.g., environmentally sensitive species were replaced with more tolerant species. For example, the Blacknose Dace replaced the Mottled Sculpin. MWCOG concluded that the changes in fish diversity were due to habitat deterioration caused by the physical aspects of urban runoff.

The Bellevue, Washington NURP project concluded that habitat changes (streambed scour and sedimentation) had a more significant effect than pollutant concentrations, for the changes produced by urbanization.

6. Several projects identified possible problems in the sediments because of the build-up of priority pollutants contributed wholly or in part by urban runoff. However, the NURP studies in this area were few in number and limited in scope, and the findings must be considered only indicative of the need for further study, particularly as to long-term impacts.

The Denver NURP project found significant quantities of copper, lead, zinc, and cadmium in river sediments. The Denver Regional Council of Governments is concerned that during periods of continuous low flow, lead may reach levels capable of adversely affecting fish.

The Milwaukee NURP project reported the observation of elevated levels of heavy metals, particularly lead, in the sediments of a river receiving urban runoff.

7. Coliform bacteria are present at high levels in urban runoff and can be expected to exceed EPA water quality criteria during and immediately after storm events in most rivers and streams.

Violations of the fecal coliform standard were reported by a number of NURP projects. In some instances, high fecal coliform counts may not cause actual use impairments due to the location of the urban runoff discharge relative to swimming areas and the degree of dilution or dispersal and rate of die off.

Coliform bacteria are generally accepted to be a useful indicator of the possible presence of human pathogens when the source of contamination is sanitary sewage. However, no such relationship has been demonstrated for

urban runoff. Therefore, the use of coliforms as an indicator of human health risk when the sole source of contamination is urban runoff, warrants further investigation.

8. Domestic water supply systems with intakes located on streams in close proximity to urban runoff discharges are encouraged to check for priority pollutants which have been detected in urban runoff, particularly those in the organic category.

   Sixty-three of a possible 106 organics were detected in urban runoff samples. The most commonly found organic was the plasticizer bis (2-ethylhexl) phthalate (22 percent), followed by the pesticide α-hexachlorocyclohexane (α-BHC) (20 percent). An additional 11 organic pollutants were reported at frequencies between 10 and 20 percent; 3 pesticides, 3 phenols, 4 polycyclic aromatics, and a single halogenated aliphatic.

Lakes

1. Nutrients in urban runoff may accelerate eutrophication problems and severely limit recreational uses, especially in lakes. However, NURP's lake projects indicate that the degree of beneficial use impairment varies widely, as does the significance of the urban runoff component.

   The Lake Quinsigamond NURP project in Massachusetts identified eutrophication as a major problem in the lake, with urban runoff being a prime contributor of the critical nutrient phosphorus. Point source discharges to the lake have been eliminated almost entirely. However, in spite of the abatement of point sources, survey data indicate that the lake has shown little improvement over the abatement period. In particular, the trophic status of the lake has shown no change, i.e., it is still classified as late mesotrophic-early eutrophic. Substantial growth is projected in the basin, and there is concern that Lake Quinsigamond will become more eutrophic. A proposed water quality management plan for the lake includes the objective of reducing urban runoff pollutant loads.

   The Lake George NURP project in New York State also identified increasing eutrophication as a potential problem if current development trends continue. Lake George is not classified as eutrophic, but from 1974 to 1978 algae production in the lake increased logarithmically. Lake George is a very long lake, and the limnological differences between the north and south basins provide evidence of human impact. The more developed, southern portion of the lake exhibits lower transparencies, lower hypolimnetic dissolved oxygen concentrations, higher phosphorus and chlorophyll a concentrations, and a trend toward seasonal blooms of blue-green algae. These differences in water quality indicators are associated with higher levels of cultural activities (e.g., increased sources of phosphorus) in the southern portion of the lake's watershed, and continued development will tend to accentuate the differences.

The Lake George NURP project estimated that urban runoff from developed areas currently accounts for only 13.6 percent of the annual phosphorus loadings to Lake George as a whole. In contrast, developed areas contribute 28.9 percent of the annual phosphorus load to the NURP study areas at the south end of the Lake. Since there are no point source discharges, this phosphorus loading is due solely to urban runoff. These data illustrate the significant impact of urbanization on phosphorus loads.

The NURP screening analysis suggests that lakes for which the contributions of urban runoff are significant in relation to other nonpoint sources (even in the absence of point source discharges) are indicated to be highly susceptible to eutrophication and that urban runoff control may be warranted in such situations.

2. Coliform bacteria discharges in urban runoff have a significant negative impact on the recreational uses of lakes.

As was the case with rivers and streams, coliform bacteria in urban runoff can cause violations of criteria for the recreational use of lakes. When unusually high fecal coliform counts are observed, they may be partially attributable to sanitary sewage contamination, in which case significant health risks may be involved.

The Lake Quinsigamond NURP project in Massachusetts found that bacterial pollution was widespread throughout the drainage basin. In all cases where samples were taken, fecal coliforms were in excess of 10,000 counts per 100 ml, with conditions worse in the Belmont street storm drains. This project concluded that the very high fecal coliform counts in their stormwater are at least partially due to sewage contamination apparently entering the stormwater system throughout the local catchment.

The sources of sewage contamination are leaking septic tanks, infiltration from sanitary sewers into storm sewers, and leakage at manholes. In the northern basin, the high fecal coliform counts are attributed to known sewage contamination sources on Poor Farm Brook. The data from the project suggest that it would be unwise to permit body contact recreation in the northern basin of the lake during or immediately following significant storm events. The project concluded that disinfection at selected storm drains should be considered in the future, especially if the sewage contamination cannot be eliminated.

The Mystic River NURP project in Massachusetts found various areas where fecal coliform counts were extremely high in urban stormwater. Fecal coliform levels of up to one million with an average of 178,000/100 ml were recorded in Sweetwater Brook, a tributary to Mystic River, during wet weather. These high fecal coliform levels were specifically attributed to surcharging in their sanitary sewers, which caused sanitary sewage to overflow into their storm drains via the combined manholes present in this catchment. Fecal coliform levels above the class B fecal coliform standard of 200 per 100 ml were found in approximately one-third of the samples tested in the upper and lower forebays of the Upper Mystic Lake and occasionally near the lake's outlet. In addition, Sandy Beach, a public swimming area on Upper Mystic Lake, exceeded the State fecal

coliform criteria in July of 1982, and warnings that swimming may be hazardous to public health were posted for several days. It is important to note that sewage contamination of surface waters is a major problem in the watershed. The project concluded that urban runoff contributes to the bacteria load during wet weather but, comparatively, is much less significant than the sanitary sources.

Estuaries and Embayments

1. Adverse effects of urban runoff in marine waters will be a highly specific local situation. Though estuaries and embayments were studied to a very limited extent in NURP, they are not believed to be generally threatened by urban runoff, though specific instances where use is impaired or denied can be of significant local and even regional importance. Coliform bacteria present in urban runoff is the primary pollutant of concern, causing direct impacts on shellfish harvesting and beach closures.

   The significant impact of urban runoff on shellfish harvesting has been well documented by the Long Island, New York NURP project. In this project, stormwater runoff was identified as the major source of bacterial loading to marine waters and, thus, the indirect cause of the denial of certification by the New York State Department of Conservation for about one-fourth of the shellfishing area. Much of this area is along the south shore, where the annual commercial shellfish harvest is valued at approximately $17.5 million.

   The Myrtle Beach, South Carolina NURP project found that stormwater discharges from the City of Myrtle Beach directly onto the beach showed high bacterial counts for short durations immediately after storm events. In many instances these counts violated EPA water quality criteria for aquatic life and contact recreation. The high bacteria counts, however, were associated with standing pools formed at the end of collectors for brief periods following the cessation of rainfall and before the runoff percolated into the sand. Consequently, the threat to public health was not considered great enough to warrant closure of the beach.

Groundwater Aquifers

1. Groundwater aquifers that receive deliberate recharge of urban runoff do not appear to be imminently threatened by this practice at the two locations where it was investigated.

   Two NURP projects (Long Island and Fresno) are situated over sole source acquifers. They have been practicing recharge with urban runoff for two decades or more at some sites, and extensively investigated the impact of this practice on the quality of their groundwater. They both found that soil processes are efficient in retaining urban runoff pollutants quite close to the land surface, and concluded that no change in the use of recharge basins is warranted.

   Despite the fact that some of these basins have been in service for relatively long periods of time and pollutant breakthrough of the upper soil

layers has not occurred, the ability of the soil to continue to retain pollutants is unknown. Further attention to this issue is recommended.

CONTROL EFFECTIVENESS

General

A limited number of techniques for the control of urban runoff quality were evaluated by the NURP program. The set is considerably smaller than previously published lists of potential management practices. Since the control approaches that were investigated were selected at the local level, the choices may be taken as an initial indication of local perceptions regarding practicality and feasibility from the standpoint of implementation.

Conclusions

1. There is a strong preference for detention devices, street sweeping, and recharge devices as reflected by the control measures selected at the local level for detailed investigation. Interest was also shown in grass swales and wetlands.

   Six NURP projects monitored the performance of a total of 14 detention devices. Five separate projects conducted in-depth studies of the effectiveness of street sweeping on the control of urban runoff quality. A total of 17 separate study catchments were involved in this effort. Three NURP projects examined either the potential of recharge devices to reduce discharges of urban runoff to surface waters or the potential of the practice to contaminate groundwaters. A total of 12 separate sites were covered by this effort.

   Grass swales were studied by two NURP projects. Two swales in existing residential areas, and one experimental swale constructed to serve a commercial parking lot were studied.

   A number of NURP projects indicated interest in wetlands for improving urban runoff quality at early stages of the program. Only one allocated monitoring activity to this control measure, however.

   Various other management practices were identified as having local interest by individual NURP projects, but none of them was allocated the necessary resources to be pursued to a point which allowed an evaluation of their ability to control pollution from urban runoff. Management practices in this category included urban housekeeping (e.g., litter programs, catch basin cleaning, pet ordinances) and public information programs.

2. Detention basins are capable of providing very effective removal of pollutants in urban runoff. Both the design concept and the size of the basin in relation to the urban area served have a critical influence on performance capability.

   Wet basins (designs which maintain a permanent water pool) have the greatest performance capabilities. Observed pollutant reductions varied from excellent to very poor in the basins which were monitored. However,

when basins are adequately sized, particulate removals in excess of 90 percent (TSS, lead) can be obtained. Pollutants with significant soluble fractions in urban runoff show lower reductions; on the order of 65 percent for total P and approximately 50 percent for BOD, COD, TKN, Copper, and Zinc. Results indicate that biological processes which are operative in the permanent pool produce significant reductions (50 percent or more) in soluble nutrients, nitrate and soluble phosphorus. These performance characteristics are indicated by both the NURP analysis results and conclusions reached by individual projects.

Dry basins, (conventional stormwater management basins), which are designed to attenuate peak runoff rates and hence only very briefly detain portions of flow from the larger storms, are indicated by NURP data to be essentially ineffective for reducing pollutant loads.

Dual-purpose basins (conventional dry basins with modified outlet structures which significantly extend detention time) are suggested by limited NURP data to provide effective reductions in urban runoff loads. Performance may approach that of wet ponds; however, the additional processes which reduce soluble nutrient forms do not appear to be operative in these basins. This design concept is particularly promising because it represents a cost effective approach to combining flood control and runoff quality control and because of the potential for converting existing conventional stormwater management ponds.

Approximate costs of wet pond designs are estimated to be in the order of $500 to $1500 per acre of urban area served, for on-site applications serving relatively small urban areas, and about $100 to $250 per acre of urban area for off-site applications serving relatively large urban areas. The costs reflect present value amounts which include both capital and operating costs. The difference is due to an economy of scale associated with large basin volumes. The range reflects differences in size required to produce particulate removals in the order of 50 percent or 90 percent. Annual costs per acre of urban area served are estimated at $60 to $175, and $10 to $25 respectively.

3. Recharge Devices are capable of providing very effective control of urban runoff pollutant discharges to surface waters. Although continued attention is warranted, present evidence does not indicate that significant groundwater contamination will result from this practice.

Both individual project results and NURP screening analyses indicate that adequately sized recharge devices are capable of providing high levels of reduction in direct discharges of urban runoff to surface waters. The level of performance will depend on both the size of the unit and the soil permeability.

Application will be restricted to areas where conditions are favorable. Soil type, depth to groundwater, land slopes, and proximity of water supply wells will all influence the appropriateness of this control technique.

Surface accumulations which result from the high efficiency of soils to retain pollutants, suggest further attention in applications where dual purpose recharge areas also serve as recreational fields or playground areas.

4. Street sweeping is generally ineffective as a technique for improving the quality of urban runoff.

Five NURP projects evaluated street sweeping as a management practice to control pollutants in urban runoff. Four of these projects concluded that street sweeping was not effective for this purpose. The fifth, which had pronounced wet and dry seasons, believed that sweeping just prior to the rainy season could produce some benefit in terms of reduced pollution in urban runoff.

A large data base on the quality of urban runoff from street sweeping test sites was obtained. At 10 study sites selected for detailed analysis, a total of 381 storm events were monitored under control conditions, and an additional 277 events during periods when street sweeping operations were in effect. Analysis of these data indicated that no significant reductions in pollutant concentrations in urban runoff were produced by street sweeping.

There may be special cases in which street cleaning applied at restricted locations or times of year could provide improvements in urban runoff quality. Some examples that have been suggested, though not demonstrated by the NURP program, include periods following snow melt or leaf fall, or urban neighborhoods where the general level of cleanliness could be significantly improved.

5. Grass swales can provide moderate improvements in urban runoff quality. Design conditions are important. Additional study could significantly enhance the performance capabilities of swales.

Concentration reductions of about 50 percent for heavy metals, and 25 percent for COD, nitrate, and ammonia were observed in one of the swales studied. However the swale was ineffective in reducing concentrations of organic nitrogen, phosphorus, or bacterial species. Two other swales studied failed to demonstrate any quality improvements in the urban runoff passing through them.

Evaluations by the NURP projects involved concluded, however, that this was an attractive control technique whose performance could be improved substantially by application of appropriate design considerations. Additional study to develop such information was recommended.

Design considerations cited included slope, vegetation type and maintenance, control of flow velocity and residence time, and enhancement of infiltration. The latter factor could produce load reductions greater than those inferred from concentration changes and effect reductions in those pollutant species which are not attenuated by flow through the swale.

6. Wetlands are considered to be a promising technique for control of urban runoff quality. However, neither performance characteristics nor design characteristics in relation to performance were developed by NURP.

   Although a number of projects indicated interest, only one assigned NURP monitoring activity to a wetland. This was a natural wetland, and flows passing though it were uncontrolled. Results suggest its potential to improve quality, but the investigation was not adequate to associate necessary design factors to performance capability. Additional attention to this control technique would be useful, and should include factors such as the need for maintenance harvesting to prevent constituent recycling.

ISSUES

A number of issues with respect to managing and controlling urban runoff emerge from the conclusions summarized above. In some instances they represent the need for additional data/information or for further study. In others they point to the need for follow-up activity by EPA, State, or local officials to assemble and disseminate what is already known regarding water quality problems caused by urban runoff and solutions.

Sediments

The nature and scope of the potential long-term threat posed by nutrient and toxic pollutant accumulation in the sediments of urban lakes and streams requires further study. A related issue is the safe and environmentally sound disposal of sediments collected in detention basins used to control urban runoff.

Priority Pollutants

NURP clearly demonstrated that many priority pollutants can be found in urban runoff and noted that a serious human health risk could exist when water supply intakes are in close proximity to urban stormwater discharges. However, questions related to the sources, fate, and transport mechanisms of priority pollutants borne by urban runoff and their frequencies of occurrence will require further study.

Rainfall pH Effects

The relationship between pH and heavy metal values in urban runoff has not been established and needs further study. Several NURP projects (mostly in the northeastern states) attributed high heavy metals concentrations in urban runoff to the effects of acid rain. Although it is quite plausible that acid rain increases the level of pollutants in urban runoff and may transform them to more toxic and more easily assimilated forms, further study is required to support this speculation.

Industrial Runoff

No truly industrial sites (as opposed to industrial parks) were included in any of the NURP projects. A very limited body of data suggests, however, that runoff from industrial sites may have significantly higher contaminant

levels than runoff from other urban land use sites, and this issue should be investigated further.

Central Business Districts

Data on the characteristics of urban runoff from central business districts are quite limited as opposed to other land use categories investigated by NURP. The data do suggest, however, that some sites may produce pollutant concentrations in runoff that are significantly higher than those from other sites in a given urban area. When combined with their typically high degrees of imperviousness, the pollutant loads from central business districts can be quite high indeed. The opportunities for control in central business districts are quite limited, however.

Physical Effects

Several projects concluded that the physical impacts of urban runoff upon receiving waters have received too little attention and, in some cases, are more important determinants of beneficial use attainment than chemical pollutants. This contention requires much more detailed documentation.

Synergy

NURP did not evaluate the synergistic effects that might result from pollutant concentrations experienced in stormwater runoff, in association with pH and temperature ranges that occur in the receiving waters. This type of investigation might reveal that control of a specific parameter, such as pH, would adequately reduce an adverse synergistic effect caused by the presence of other pollutants in combination and be the most cost effective solution. Further investigations should include this issue.

Opportunities for Control

Based upon the results of NURP's evaluation of the performance of urban runoff controls, opportunities for significant control of urban runoff quality are much greater for newly developing areas. Institutional considerations and availability of space are the key factors. Guidance on this issue in a form useful to States and urban planning authorities should be prepared and issued.

Wet Weather Water Quality Standards

The NURP experience suggests that EPA should evaluate the possible need to develop "wet weather" standards, criteria, or modifications to ambient criteria to reflect differences in impact due to the intermittent, short duration exposures characteristic of urban runoff and other nonpoint source discharges.

Coliform Bacteria

The appropriateness of using coliform bacteria as indicator organisms for human health risk where the source is exclusively urban runoff warrants further investigation.

Wetlands

The use of wetlands as a control measure is of great interest in many areas, but the necessary information on design performance relationships required before cost effective applications can be considered has not been adequately documented. The environmental impacts of such use upon wetlands is a critical issue which, at present, has been addressed marginally, if at all.

Swales

The use of grass swales was suggested by two NURP projects to represent a very promising control opportunity. However, their performance is very dependent upon design features about which information is lacking. Further work to address this deficiency and appropriate maintenance practices appears warranted.

Illicit Connections

A number of the NURP projects identified what appeared to be illicit connections of sanitary discharges to stormwater sewer systems, resulting in high bacterial counts and dangers to public health. The costs and complications of locating and eliminating such connections may pose a substantial problem in urban areas, but the opportunities for dramatic improvement in the quality of urban stormwater discharges certainly exist where this can be accomplished. Although not emphasized in the NURP effort, other than to assure that the selected monitoring sites were free from sanitary sewage contamination, this BMP is clearly a desirable one to pursue.

Erosion Controls

NURP did not consider conventional erosion control measures because the information base concerning them was considered to be adequate. They are effective, and their use should be encouraged.

Combined Sewer Overflows

In order to address urban runoff from separate storm sewers, NURP avoided any sites where combined sewers existed. However, in view of their relative levels of contamination, priority should be given to control of combined sewer overflows.

Implementation Guidance

The NURP studies have greatly increased our knowledge of the characteristics of urban runoff, its effects upon designated uses, and of the performance efficiencies of selected control measures. They have also confirmed earlier impressions that some States and local communities have actually begun to develop and implement stormwater management programs incorporating water quality objectives. However, such management initiatives are, at present, scattered and localized. The experience gained from such efforts is both needed and sought after by many other States and localities. Documentation,

evaluation, refinement and transfer of management and financing mechanisms/ arrangements, of simple and reliable problem assessment methodologies, and of implementation guidance which can be used by planners and officials at the State and local level are urgently needed as is a forum for the sharing of experiences by those already involved, both among themselves and with those who are about to address nonpoint source issues.

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State of California

Memorandum

To : Archie Matthews
Division of Water Quality

Date: FEB 11 1993

Elizabeth M. Jennings

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Subject: DEFINITION OF "MAXIMUM EXTENT PRACTICABLE"

ISSUE

What is the meaning of the standard "maximum extent practicable" (MEP) as used in the Clean Water Act's storm water provisions, and how can this standard be communicated to the regulated community? How can this concept be included in the draft BMP manual?

CONCLUSION

The standard "maximum extent practicable" is not specifically defined for use in the storm water program. It has been defined in other rules, however, to require taking all actions which are technically feasible. I have included draft language for the manual.

DISCUSSION

Section 402(p) of the Clean Water Act (33 U.S.C. § 1342(p)) provides that permits issued for discharges from municipal separate storm sewers must require controls to reduce the discharge of pollutants "to the maximum extent practicable". The statutory language provides that municipal permits:

> "Shall require controls to reduce the discharge of pollutants to the maximum extent practicable, including management practices, control techniques and system, design and engineering methods, and such other

> provisions as the [EPA] Administrator or the State determines appropriate for the control of such pollutants." Clean Water Act Section 402(p)(3)(B)(iii); 33 U.S.C. § 1342(p)(3)(B)(iii).

Neither Congress nor the U.S. Environmental Protection Agency (EPA) has defined the term "maximum extent practicable", and yet this is the critical standard which municipal dischargers must attain in order to comply with their permits. (The State could have spelled out the specific controls which the municipalities were required to undertake. However, such an approach would have relinquished the municipal dischargers of any flexibility in implementing their storm water programs.)

On its face, it is possible to discern some outline of the intent of Congress in establishing the MEP standard. First, the requirement is to reduce the discharge of pollutants, rather than totally prohibit such discharge. Presumably, the reason for this standard (and the difference from the more stringent standard applied to industrial dischargers in Section 402(p)(3)(A)), is the knowledge that it is not possible for municipal dischargers to prevent the discharge of all pollutants in storm water. The second point which is clearly encompassed in the standard is that it is the permitting agency, and not the discharger, which is the ultimate arbiter on whether there has been sufficient reduction of pollutants.

The most difficult issue is determining how much pollutants must be reduced, or, in other words, which best management practices (BMPs) must be employed in order to comply with the MEP standard. While the term is not defined in the Clean Water Act or the EPA regulations, the same term does appear in other federal laws and regulations, and there are some definitions or interpretations which may be useful to the storm water program.

In the Uranium Mill Tailings Radiation Control Act of 1978 (42 U.S.C. § 7901, et seq.), the Department of Energy was required to designate within one year of the Act's adoption "to the maximum extent practicable" contaminated areas within the vicinity of uranium processing sites. In addressing a lawsuit brought after the Department designated very few of the "vicinity properties", the federal court declared that MEP means "a substantial majority of the locations" should have been designated within the year. Sierra Club v. Edwards (D.C.D.C. 1983) 19 ERC 1357. Where a NEPA regulation required that "to the maximum extent practicable" environmental clearance was required for uncompleted projects which had never undergone NEPA review, a court held that the regulation "mandates a meaningful

environmental review" rather than a "perfunctory evaluation". Save the Courthouse Committee v. Lynn (S.D.N.Y. 1975) 408 F.Supp. 1323.

In an interim final regulation recently promulgated by the Department of Transportation, MEP is defined, where operators of onshore oil pipelines must have resources "to the maximum extent practicable" to remove and to mitigate or prevent worst case discharges. 49 CFR Part 194. MEP is defined to mean:

> "The limits of available technology and the practical and technical limits on an individual pipeline operator in planning the response resources required to provide the on-water recovery capability and the shoreline protection and cleanup capability to conduct response activities ...."

Finally, the term MEP is used in the Superfund legislation, wherein permanent solutions and alternative treatment technologies must be selected "to the maximum extent practicable". CERCLA, Section 121(b). The legislative history of the language indicates that the relevant factors in determining whether MEP is met include technical feasibility, cost, and state and public acceptance. 132 Cong. Rec. H 9561 (Oct. 8, 1986).

While each of the above interpretations and definitions varies, they do follow a pattern. The pattern that emerges is that there must be a serious attempt to comply, and that practical solutions may not be lightly rejected. If a municipality reviews a lengthy menu of BMPs, and chooses to select only a few of the least expensive, it is likely that MEP has not been met. On the other hand, if a municipal discharger employs all applicable BMPs except those where it can show that they are not technically feasible in the locality, or whose cost would exceed any benefit to be derived, it would have met the standard. In any case, the burden would be on the municipal discharger to show compliance.

The definitions contained in the pipeline regulation and the Superfund legislative history are most analogous to storm water regulation. The major emphasis in both of these rules are technical feasibility. Similarly, the municipal dischargers should be required to employ whatever BMPs are feasible, i.e., are likely to be effective and are not cost prohibitive. Thus, where a choice may be made between two BMPs which should provide generally comparative effectiveness, the discharger may choose the least expensive alternative and exclude the more expensive BMP. However, it would not be acceptable either to reject all BMPs which would address a pollutant source or to pick a BMP based solely on cost, which would be clearly less effective.

As you know, the BMP Guidance manual is being published by the Task Force, which is made up of dischargers, rather than by the State Water Board. As far as I know, there is no intention for the State Water Board to adopt the manual as its own guidance document. Therefore, it is important to stress in the manual, both in the section on MEP and in the front of the manual, that this manual is not a publication of the State or the Regional Water Boards, and that these Boards have not specifically endorsed the contents. Rather, the manual was assembled by a group of dischargers in the interest of assisting themselves and others to comply with the storm water permits. In the section on MEP, it should be stated that the final determination regarding whether a discharger was reduced pollutants to the maximum extent practicable can only be made by the Regional or State Water Boards, but that selection and implementation of BMPs through consideration of the listed factors should assist dischargers in achieving compliance.

The following language is suggested in order to clarify that the manual is not the product of the State Water Board:

> "This Manual was produced and published by the Storm Water Task Force, an advisory body of municipal agencies regulated by the storm water program. This Manual is not a publication of the State Water Resources Control Board or any Regional Water Quality Control Board, and none of these Boards has specifically endorsed the contents thereof. The purpose of this manual is to assist the members of the Task Force and other dischargers subject to storm water permits, in attaining compliance with such permits."

The following language is recommended in place of Insert A in the manual for municipal dischargers:

> "Although MEP is not defined by the federal regulations, use of this manual in selecting BMPs should assist municipalities in achieving MEP. In selecting BMPs which will achieve MEP, it is important to remember that municipalities will be responsible to reduce the discharge of pollutants in storm water <u>to the maximum extent practicable</u>. This means choosing effective BMPs, and rejecting applicable BMPs only where other effective BMPs will serve the same purpose, the BMPs would not be technically feasible, or the cost would be prohibitive. The following factors may be useful to consider:
>
> "1. Effectiveness: Will the BMP address a pollutant of concern?

"2. Regulatory Compliance: Is the BMP in compliance with storm water regulations as well as other environmental regulations?

"3. Public acceptance: Does the BMP have public support?

"4. Cost: Will the cost of implementing the BMP have a reasonable relationship to the pollution control benefits to be achieved?

"5. Technical Feasibility: Is the BMP technically feasible considering soils, geography, water resources, etc.?

"After selecting a menu of BMPs, it is of course the responsibility of the discharger to insure that all BMPs are implemented."

WATER QUALITY CONTROL PLAN

FOR THE SAN DIEGO BASIN (9)

SEPTEMBER 8, 1994

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD

SAN DIEGO REGION

WATER QUALITY CONTROL PLAN FOR THE SAN DIEGO BASIN (9)

Adopted by the
California Regional Water Quality Control Board
San Diego Region
on September 8, 1994

Approved by the
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on December 13, 1994
and the
Office of Administrative Law
on April 26, 1995

(Includes amendment adopted through October 13, 1994)

Cover Photograph: San Diego Bay Skyline (1989) by Greig Peters

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FOREWORD

The most basic goal of the California Regional Water Quality Control Board, San Diego Region (Regional Board) is to preserve and enhance the quality of water resources in the San Diego Region for the benefit of present and future generations. The federal Clean Water Act and the California Porter-Cologne Water Quality Control Act require that the Regional Board adopt a water quality control plan to guide and coordinate the management of water quality in the Region. The purpose of the plan is to: (1) designate beneficial uses of the Region's surface and ground waters; (2) designate water quality objectives for the reasonable protection of those uses; and (3) establish an implementation plan to achieve the objectives. In conformance with this legislative mandate, the Regional Board adopted the *Comprehensive Water Quality Control Plan for the San Diego Basin* (Basin Plan) in 1975. The Regional Board subsequently adopted numerous amendments modifying specific Basin Plan water quality standards and policies to reflect current water quality conditions and priorities.

Over twenty years have passed since the Basin Plan was published in 1975. In the ensuing years the San Diego Region population has continued to grow and approaches to water quality management have changed. Water quality management has become a complex mix of public input, environmental legislation and regulations, regulatory programs, research, and litigation. Pollution from point source discharges such as sewage treatment plants and industry has largely been controlled through stringent pollution control laws and the efforts of the Regional Board and other agencies. The focus of the Regional Board's regulatory efforts in the coming years will be surface water bottom sediment contamination, ground water contamination and nonpoint sources of pollution. These concerns are the greatest remaining threats to water quality. To address these remaining challenges, pollution prevention needs to be emphasized and the cumulative effects of pollution on entire watersheds must be considered. These changes in the complexity and emphasis of the Regional Board's water quality program have resulted in the need for a major update and rewrite of the 1975 Basin Plan.

This Basin Plan, the *Water Quality Control Plan for the San Diego Basin* (9) was adopted by the Regional Board on September 8, 1994. It supersedes the previous 1975 Basin Plan and its amendments. Public involvement was extensive in the development and adoption of this Basin Plan. The Regional Board held several public hearings and workshops to allow interested persons, organizations, and governmental agencies an opportunity to comment on the content and adequacy of the Basin Plan prior to its adoption. All comments were responded to in writing and the Regional Board carefully considered them in developing the final Basin Plan. The Regional Board appreciates the efforts of all those who contributed a substantial amount of time and effort in commenting on the earlier administrative drafts.

The six chapters of this Basin Plan together comprise the "*blueprint*" plan the Regional Board will use for water quality management and control in the San Diego Region. Chapter 1 provides a summary overview of the physical features of the San Diego Region, the functions of the State and Regional Board, and the legal basis and authority for the Basin Plan. Chapter 2 designates the beneficial uses of surface and ground waters to be protected. Chapter 3 designates the water quality objectives necessary to ensure the reasonable protection of the beneficial uses. Chapter 4 describes the implementation plan for achieving and maintaining the beneficial uses and water quality objectives. The implementation plan describes the key Regional Board regulatory programs and policies the Board uses to manage and control water quality. The implementation plan also designates certain conditions and areas where waste discharges are prohibited. Chapter 5 describes applicable statewide water quality policies and plans developed by the State Water Resources Control Board. Finally, Chapter 6 provides a summary description of the Regional Board water quality monitoring and surveillance program.

This Basin Plan is a dynamic rather than fixed document and is always subject to modification based on changing needs and circumstances. Accordingly, the Regional Board will periodically consider changes to this Basin Plan as necessary and at a minimum of every three years. The Regional Board will continue to place a high priority on keeping the Basin Plan current with respect to applicable laws, policies, technologies, water quality conditions, and priorities in the Region.

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1. INTRODUCTION

INTRODUCTION

In California, the regulation, protection and administration of water quality are carried out by the State Water Resources Control Board (State Board) and nine California Regional Water Quality Control Boards. The State Board consists of five full-time members appointed by the Governor for four year terms. In general, the State Board has overall responsibility for setting statewide policy on the administration of water rights and water quality control in California. The work of the State Board is carried out by a technical, legal, and administrative staff supervised by an executive director.

In recognition of the regional differences in water quality and quantity, the State is divided into nine regions (see Figure 1-1) for the purposes of regional administration of California's water quality control program. Each of the nine regions has a California Regional Water Quality Control Board (Regional Board) comprised of nine part-time members who are appointed by the Governor for four year terms. The regional boards are responsible for adoption and implementation of water quality control plans, issuance of waste discharge requirements, and performing other functions concerning water quality control within their respective regions, subject to State Board review or approval. The work of each regional board is carried out by a technical and administrative staff supervised by an executive officer.

Each of the nine regional boards is required to adopt a Water Quality Control Plan, or Basin Plan, which recognizes and reflects regional differences in existing water quality, the beneficial uses of the Region's ground and surface waters, and local water quality conditions and problems. This document is called the *Water Quality Control Plan for the San Diego Basin (9)*. (The terms Water Quality Control Plan and Basin Plan are used interchangeably throughout this document.)

There are two types of Water Quality Control Plans, Regional Board Basin Plans such as this document and statewide Water Quality Control Plans such as the *Ocean Plan* and *Thermal Plan*. Statewide plans are discussed in Chapter 5, *Plans and Policies*. Key terms and abbreviations used throughout this Basin Plan are included as a glossary and acronyms respectively, in Appendix A.

FUNCTION OF THE BASIN PLAN

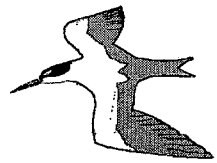

The San Diego Regional Board's Basin Plan is designed to preserve and enhance water quality and protect the beneficial uses of all regional waters. Specifically, the Basin Plan: (1) designates beneficial uses for surface and ground waters; (2) sets narrative and numerical objectives that must be attained or maintained to protect the designated beneficial uses and conform to the state's antidegradation policy; (3) describes implementation programs to protect the beneficial uses of all waters in the Region; and (4) describes surveillance and monitoring activities to evaluate the effectiveness of the Basin Plan [California Water Code §13240 - 13244, and §13050(j)]. Additionally, the Basin Plan incorporates by reference all applicable State and Regional Board plans and policies.

The goal of the Regional Board is to achieve a balance between the competing needs of mankind for water of varying quality. Often times the constituents and quality of water needed to protect various beneficial uses will be different. The Basin Plan is the Regional Board's plan for achieving the balance between competing uses of surface and ground waters in the San Diego Region. Accordingly, this Basin Plan establishes or designates beneficial uses and water quality objectives for all the ground and surface waters of the Region. Beneficial uses are the uses of water necessary for the survival and well being of man, plants and wildlife. These uses of water serve to promote the tangible and intangible economic, social, and environmental goals of mankind. Water quality objectives are the levels of water quality constituents or characteristics which must be met to protect the beneficial uses. This Basin Plan also establishes an implementation program describing the actions by the Regional Board and others that are necessary to achieve and maintain the designated beneficial uses and water quality objectives of the Region's waters.

The Regional Board regulates waste discharge and reclaimed water use to minimize and control adverse effects on the quality and beneficial uses of the Region's ground and surface waters. The Regional Board issues permits, called "*waste discharge requirements*" and "*master reclamation permits*"

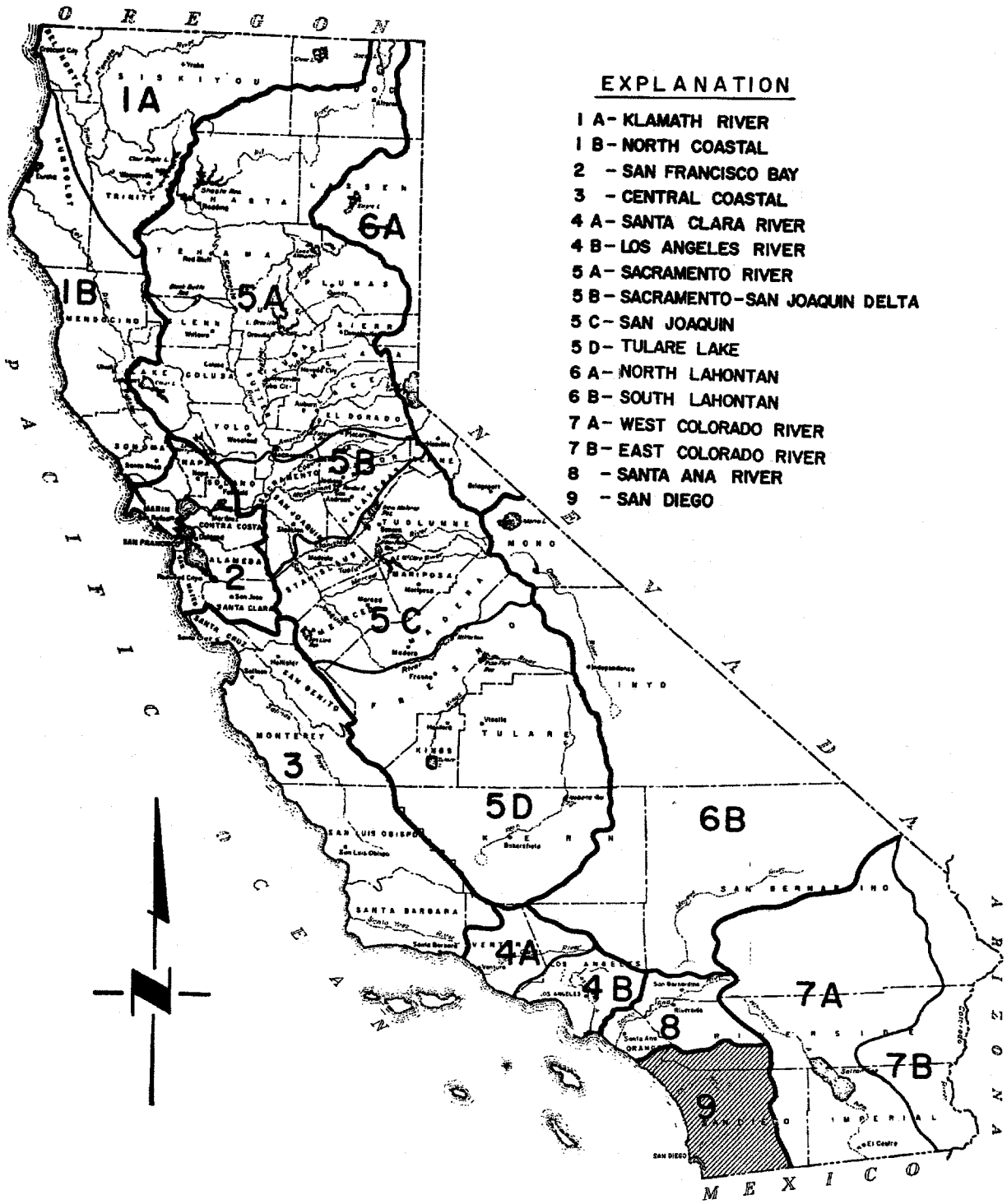

VICINITY MAP, BASIN PLANNING AREAS

Figure 1 - 1.

which require that waste and reclaimed water not be discharged in a manner that would cause an exceedance of applicable water quality objectives or adversely affect beneficial uses designated in the Basin Plan. The Regional Boards enforce these permits through a variety of administrative means.

GEOGRAPHICAL SETTING

The geographical setting of the San Diego Region results in a number of physiographic and environmental characteristics. A discussion of each of the major elements is presented in the following subsections.

PHYSIOGRAPHY

The San Diego Region occurs within the Peninsula Range Physiographic Province of California. One of the most prominent physical features in the region is the northwest-trending Peninsula Range which includes from north to south, the Santa Ana, Agua Tibia, Palomar, Volcan, Cuyamaca and Laguna mountains. The region exhibits a gently sloping dissected western surface and a steep eastern slope and is separated from the West Colorado river area (Region 7A) by abrupt fault scarps of marked relief.

The San Diego Region is divided into a coastal plain area, a central mountain-valley area, and an eastern mountain valley area. The coastal plain area comprises a series of wave cut benches covered by thin terrace deposits. This terraced surface has been deeply dissected by streams draining to the sea, and has been smoothed and rounded by local erosion. The surface of this area ranges from sea level to about 1200 ft and extends from the coast inland in a band of about 10 miles in width. The central mountain-valley area is characterized by ridges and intermontane basins which extend from the coastal plain, northeastward to the Elsinore fault zone. The basins or valleys range in elevation from 500 to about 5000 ft and are generally of fault block origin modified by erosion. The floors of the intermontane valleys are generally underlain by moderate thicknesses of alluvium and residuum; notable examples occur near El Cajon, Escondido and Ramona which range in elevation from about 500 to 1500 ft above sea level. At higher elevations plateau surfaces have been developed in the central mountain-valley area. These surfaces are probably also of erosional origin; they occur at elevations ranging from 2000 to 6000 ft near the Laguna mountains, Santa Ysabel and Valley Center.

To the northeast of the Elsinore fault zone, the region has been designated as the eastern mountain-valley area. The area contains broad, relatively flat valleys which are structurally of block fault origin. Locally, the grabens contain thick sections of alluvial deposits. These valleys generally rise to the southeast from about 1000 ft elevations near Temecula to the rolling plateaus of Glenoak, Lewis and Reed valleys which range from 3000 to 3500 ft in elevation. Surrounding mountains including Red mountain, Cahuilla mountain and Bachelor mountain, attain elevations ranging from 4000 to 7500 ft.

CLIMATE

The San Diego Region's coastal climate is generally mild. Temperatures average about 65° F and precipitation averages 10 to 13 inches. Proceeding inland, as elevations increase, average temperatures decline to 57° F in the Laguna mountain area and precipitation increases to more than 45 inches in the Palomar mountain area. Most of the precipitation falls during November through February. Temperature and rainfall intensity variations are larger in the inland portions. The maximum rainfall intensity was recorded as 11.5 inches in 90 minutes, at Campo on August 12, 1891. Precipitation occurs principally as rain, with snow common only in the high mountains. Runoff in the Region results mainly from rainfall. The melting of snowpack and surfacing ground water springs also contribute small additional amounts of runoff. The flow of surface and ground waters in the Region is in an east to west direction toward the Pacific Ocean.

LAND USE / POPULATION

Land use within the Region varies considerably. The regional growth forecast for various land uses within the Region, for the San Diego Association of Governments', and for the Southern California Association of Governments' sphere of influence are shown in Appendix B-1 and B-2, respectively. The San Diego Association of Governments' regional growth forecast by hydrologic unit is shown in Appendix B-3.

The Region is experiencing and is expected to continue to experience population growth. Table 1-1 shows population projections for San Diego, Riverside, and Orange counties.

Table 1 - 1. Population Projections for the State of California and San Diego, Riverside, and Orange Counties

Location	Year 1990	1995	2000	2005	2010	2015
San Diego County	2,421,233	2,677,058	2,915,692	3,143,155	3,373,422	3,618,554
Riverside County	1,195,400	1,493,558	1,771,276	2,076,538	2,402,889	2,759,172
Orange County	2,415,269	2,667,706	2,862,106	2,992,855	3,099,374	3,193,64
Total for California	29,777,448	32,958,921	36,214,623	39,194,880	42,178,903	45,344,961

REGIONAL BOUNDARIES

The San Diego Region forms the southwest corner of California and occupies approximately 3,900 square miles of surface area. The western boundary of the Region consists of the Pacific Ocean coastline which extends approximately 85 miles north from the United States and Mexico border. The northern boundary of the Region is formed by the hydrologic divide starting near Laguna Beach and extending inland through El Toro and easterly along the ridge of the Elsinore Mountains into the Cleveland National Forest. The eastern boundary of the Region is formed by the Laguna Mountains and other lesser known mountains located in the Cleveland National Forest. The southern boundary of the Region is formed by the United States and Mexico border.

The San Diego Region encompasses most of San Diego county, parts of southwestern Riverside county and southwestern Orange county. The Region is divided into 11 major hydrologic units[1], 54 hydrologic areas[2], and 147 hydrologic subareas[3]. The geographic boundaries and names of these hydrologic units are shown in Table 1-2 and Figure 1-2[4]. A larger scale map of these hydrologic areas is contained in the rear pocket of this Basin Plan. The boundaries were initially designated by the State Department of Water Resources (DWR) and described in the report *Names and Areal Code Numbers of Hydrologic areas in the Southern District* which was published in April, 1964. The hydrologic units, areas and subareas were subsequently enumerated by the State Board in the early 1970's. In accordance with the early DWR definitions, hydrologic units are the entire watershed of one or more streams; hydrologic areas are major tributaries and/or major groundwater basins within the hydrologic unit; and hydrologic subareas are major subdivisions of hydrologic areas including both water-bearing and nonwater-bearing formations.

San Juan Hydrologic Unit (1.00)

The San Juan Hydrologic Unit is a generally trapezoid-shaped area of 500 square miles. Laguna Beach, San Juan Capistrano, Dana Point, and San Clemente are other major population centers. Several smaller towns are scattered along the coast.

The two major natural surface water bodies of the unit are San Juan Creek and San Mateo Creek. San Juan Creek divides the unincorporated communities of Dana Point and Capistrano Beach in Orange county, and enters the Pacific Ocean at Doheny Beach State Park. The mouth of the creek is normally open to the ocean. Usually, the water at the mouth of the creek is essentially the same as that of the adjacent coastal waters. The mouth of San Mateo Creek forms a salt water tidal marsh and is entirely within the Camp Pendleton Naval Reservation.

The San Juan Hydrologic Unit is comprised of the following five hydrologic areas; the Laguna, Mission Viejo, San Clemente, San Mateo, and San Onofre Hydrologic Areas.

Santa Margarita Hydrologic Unit (2.00)

The Santa Margarita Hydrologic Unit is a rectangular area of about 750 square miles. Included in it are portions of Camp Pendleton as well as the civilian population centers of Murrieta, Temecula and part of Fallbrook.

The unit is drained largely by the Santa Margarita River, Murrieta Creek and Temecula River. The only coastal lagoon of the unit is the Santa Margarita

TABLE 1 - 2. HYDROLOGIC UNITS, AREAS (HA) AND SUBAREAS (HSA) OF THE SAN DIEGO REGION

BASIN NUMBER	HYDROLOGIC BASIN	
1.00	SAN JUAN HYDROLOGIC UNIT	
1.10	Laguna	HA
1.11	San Joaquin Hills	HSA
1.12	Laguna Beach	HSA
1.13	Aliso	HSA
1.14	Dana Point	HSA
1.20	Mission Viejo	HA
1.21	Oso	HSA
1.22	Upper Trabuco	HSA
1.23	Middle Trabuco	HSA
1.24	Gobernadora	HSA
1.25	Upper San Juan	HSA
1.26	Middle San Juan	HSA
1.27	Lower San Juan	HSA
1.28	Ortega	HSA
1.30	San Clemente	HA
1.31	Prima Deshecha	HSA
1.32	Segunda Deshecha	HSA
1.40	San Mateo Canyon	HA
1.50	San Onofre	HA
1.51	San Onofre Valley	HSA
1.52	Las Pulgas	HSA
1.53	Stuart	HSA
2.00	SANTA MARGARITA HYDROLOGIC UNIT	
2.10	Ysidora	HA
2.11	Lower Ysidora	HSA
2.12	Chappo	HSA
2.13	Upper Ysidora	HSA
2.20	DeLuz	HA
2.21	DeLuz Creek	HSA
2.22	Gavilan	HSA
2.23	Vallecitos	HSA
2.30	Murrieta	HA
2.31	Wildomar	HSA
2.32	Murrieta	HSA
2.33	French	HSA
2.34	Lower Domenigoni	HSA
2.35	Domenigoni	HSA
2.36	Diamond	HSA
2.40	Auld	HA
2.41	Bachelor Mountain	HSA
2.42	Gertrudis	HSA
2.43	Lower Tucalota	HSA
2.44	Tucalota	HSA
2.50	Pechanga	HA
2.51	Pauba	HSA
2.52	Wolf	HSA
2.60	Wilson	HA
2.61	Lancaster Valley	HSA
2.62	Lewis	HSA
2.63	Reed Valley	HSA
2.70	Cave Rocks	HA
2.71	Lower Coahuila	HSA
2.72	Upper Coahuila	HSA
2.73	Anza	HSA
2.74	Burnt	HSA
2.80	Aguanga	HA
2.81	Vail	HSA
2.82	Devils Hole	HSA
2.83	Redec	HSA
2.84	Tule Creek	HSA
2.90	Oakgrove	HA
2.91	Lower Culp	HSA
2.92	Previtt Canyon	HSA
2.93	Dodge	HSA
2.94	Chihuahua	HSA
3.00	SAN LUIS REY HYDROLOGIC UNIT	
3.10	Lower San Luis	HA
3.11	Mission	HSA
3.12	Bonsall	HSA
3.13	Moosa	HSA
3.14	Valley Center	HSA
3.15	Woods	HSA
3.16	Rincon	HSA
3.20	Monserate	HA
3.21	Pala	HSA
3.22	Pauma	HSA
3.23	La Jolla Amago	HSA
3.30	Warner Valley	HA
3.31	Warner	HSA
3.32	Combs	HSA
4.00	CARLSBAD HYDROLOGIC UNIT	
4.10	Loma Alta	HA
4.20	Buena Vista Creek	HA
4.21	El Salto	HSA
4.22	Vista	HSA
4.30	Agua Hedionda	HA
4.31	Los Monos	HSA
4.32	Buena	HSA
4.40	Encinas	HA
4.50	San Marcos	HA
4.51	Batiquitos	HSA
4.52	Richland	HSA
4.53	Twin Oaks	HSA
4.60	Escondido Creek	HA
4.61	San Elijo	HSA
4.62	Escondido	HSA
4.63	Lake Wohlford	HSA
5.00	SAN DIEGUITO HYDROLOGIC UNIT	
5.10	Solana Beach	HA
5.11	Rancho Santa Fe	HSA
5.12	La Jolla	HSA
5.20	Hodges	HA
5.21	Del Dios	HSA
5.22	Green	HSA
5.23	Felicita	HSA
5.24	Bear	HSA

TABLE 1 - 2. HYDROLOGIC UNITS, AREAS (HA) AND SUBAREAS (HSA) OF THE SAN DIEGO REGION

BASIN NUMBER	HYDROLOGIC BASIN	
5.30	San Pasqual	HA
5.31	Highland	HSA
5.32	Las Lomas Muertas	HSA
5.33	Reed	HSA
5.34	Hidden	HSA
5.35	Guejito	HSA
5.36	Vineyard	HSA
5.40	Santa Maria Valley	HA
5.41	Ramona	HSA
5.42	Lower Hatfield	HSA
5.43	Wash Hollow	HSA
5.44	Upper Hatfield	HSA
5.45	Ballena	HSA
5.46	East Santa Teresa	HSA
5.47	West Santa Teresa	HSA
5.50	Santa Ysabel	HA
5.51	Boden	HSA
5.52	Pamo	HSA
5.53	Sutherland	HSA
5.54	Witch Creek	HSA
6.00	PENASQUITOS HYDROLOGIC UNIT	
6.10	Miramar Reservoir	HA
6.20	Poway	HA
6.30	Scripps	HA
6.40	Miramar	HA
6.50	Tecolote	HA
7.00	SAN DIEGO HYDROLOGIC UNIT	
7.10	Lower San Diego	HA
7.11	Mission San Diego	HSA
7.12	Santee	HSA
7.13	El Cajon	HSA
7.14	Coches	HSA
7.15	El Monte	HSA
7.20	San Vicente	HA
7.21	Fernbrook	HSA
7.22	Kimball	HSA
7.23	Gower	HSA
7.24	Barona	HSA
7.30	El Capitan	HA
7.31	Conejos Creek	HSA
7.32	Glen Oaks	HSA
7.33	Alpine	HSA
7.40	Boulder Creek	HA
7.41	Inaja	HSA
7.42	Spencer	HSA
7.43	Cuyamaca	HSA
8.00	PUEBLO SAN DIEGO HYDROLOGIC UNIT	
8.10	Point Loma	HA
8.20	San Diego Mesa	HA
8.21	Lindbergh	HSA
8.22	Chollas	HSA
8.30	National City	HA
8.31	El Toyan	HSA
8.32	Paradise	HSA
9.00	SWEETWATER HYDROLOGIC UNIT	
9.10	Lower Sweetwater	HA
9.11	Telegraph	HSA
9.12	La Nacion	HSA
9.20	Middle Sweetwater	HA
9.21	Jamacha	HSA
9.22	Hillsdale	HSA
9.23	Dehesa	HSA
9.24	Galloway	HSA
9.25	Sequan	HSA
9.26	Alpine Heights	HSA
9.30	Upper Sweetwater	HA
9.31	Loveland	HSA
9.32	Japatul	HSA
9.33	Viejas	HSA
9.34	Descanso	HSA
9.35	Garnet	HSA
10.00	OTAY HYDROLOGIC UNIT	
10.10	Coronado	HA
10.20	Otay Valley	HA
10.30	Dulzura	HA
10.31	Savage	HSA
10.32	Proctor	HSA
10.33	Jamul	HSA
10.34	Lee	HSA
10.35	Lyon	HSA
10.36	Hollenbeck	HSA
10.37	Engineer Springs	HSA
11.00	TIJUANA HYDROLOGIC UNIT	
11.10	Tijuana Valley	HA
11.11	San Ysidro	HSA
11.12	Water Tanks	HSA
11.20	Potrero	HA
11.21	Marron	HSA
11.22	Bee Canyon	HSA
11.23	Barrett	HSA
11.24	Round Potrero	HSA
11.25	Long Potrero	HSA
11.30	Barrett Lake	HA
11.40	Monument	HA
11.41	Pine	HSA
11.42	Mount Laguna	HSA
11.50	Morena	HA
11.60	Cottonwood	HA
11.70	Cameron	HA
11.80	Campo	HA
11.81	Tecate	HSA
11.82	Canyon City	HSA
11.83	Clover Flat	HSA
11.84	Hill	HSA
11.85	Hipass	HSA

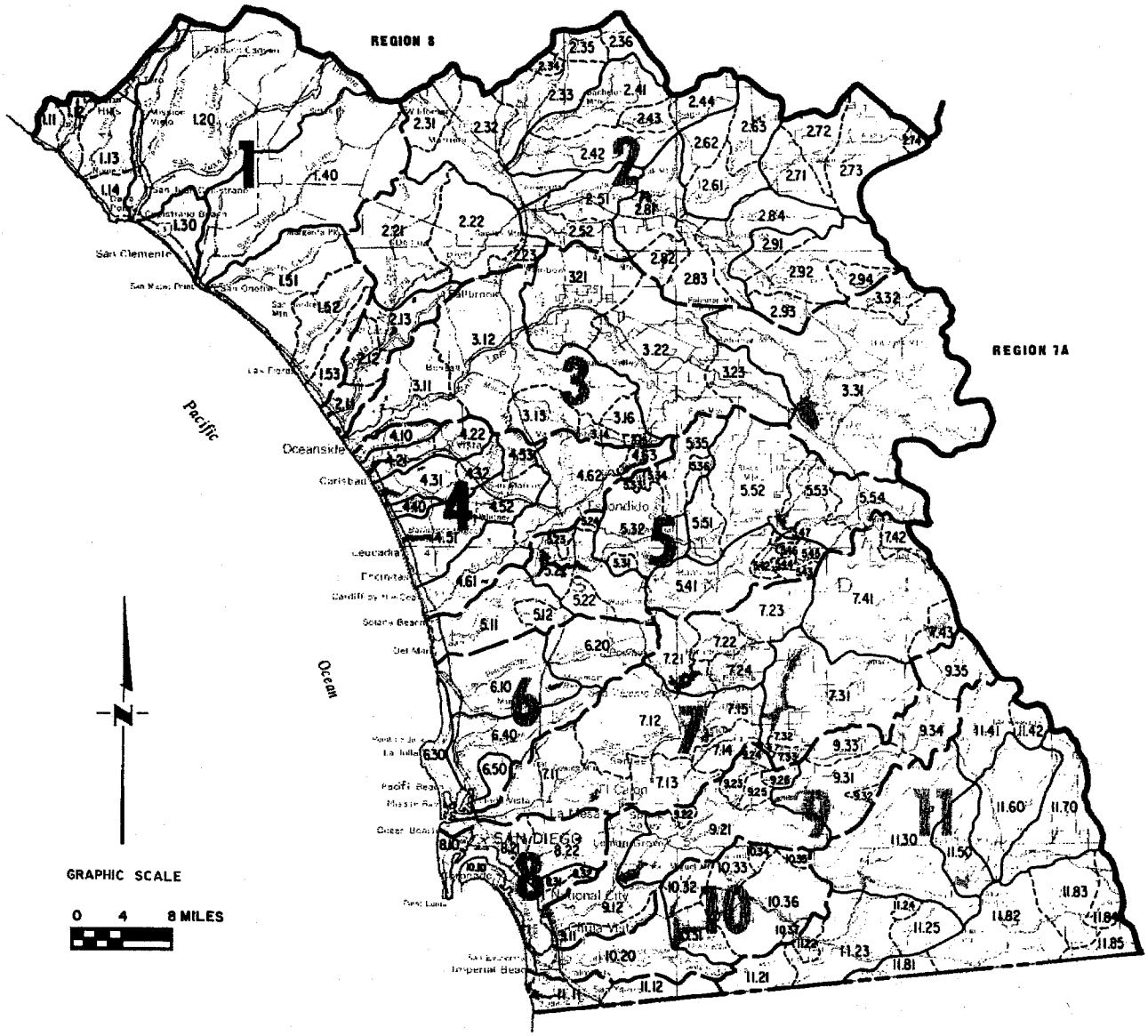

LEGEND

- DRAINAGE PROVINCE BOUNDARY
- HYDROLOGIC UNIT BOUNDARY
- HYDROLOGIC AREA BOUNDARY
- HYDROLOGIC SUBAREA BOUNDARY

FIGURE 1-2. SAN DIEGO REGION HYDROLOGIC UNITS AREAS, AND SUBAREAS

Lagoon which lies totally within the Camp Pendleton Naval Reservation of the U.S. Marine Corps. The slough at the mouth of the river is normally closed off from the ocean by a sandbar.

The major surface water storage areas are Vail Lake and O'Neill Lake. Annual precipitation ranges from less than 12 inches near the coast to more than 45 inches inland near Palomar mountain.

The San Margarita Hydrologic Unit is comprised of the following nine hydrologic areas; the Ysidora, Deluz, Murrieta, Auld, Pechanga, Wilson, Cave Rocks, Aguanga, and Oak Grove Hydrologic Areas.

San Luis Rey Hydrologic Unit (3.00)

San Luis Rey Hydrologic Unit is a rectangular area of about 565 square miles, and includes the population centers of Oceanside, and Valley Center, and portions of Fallbrook and Camp Pendleton. In addition there are several Indian reservations in the unit. The major stream system, the San Luis Rey River, is interrupted by Lake Henshaw, one of the largest water storage areas in the San Diego Region. Annual precipitation is heavier than in other units, ranging from less than 12 inches near the ocean to 45 inches near Palomar mountain.

The San Luis Rey Unit contains two coastal lagoon areas, the mouth of the San Luis Rey River and Loma Alta Slough. The mouth of the San Luis Rey River is entirely within the city of Oceanside and is adjacent to the city's northern boundary. The slough area at the mouth of the river is contiguous with Oceanside harbor. Loma Alta Slough is entirely within the city of Oceanside and is the mouth of Loma Alta Creek. The slough is normally blocked off from the ocean by a sandbar.

The San Luis Rey Hydrologic Unit is comprised of the following three hydrologic areas; the Lower San Luis, Monserate and Warner Valley Hydrologic areas.

Carlsbad Hydrologic Unit (4.00)

Carlsbad Hydrologic Unit is a roughly triangular-shaped area of about 210 square miles, extending from Lake Wohlford on the east to the Pacific ocean on the west, and from Vista on the north to Cardiff-by-the-Sea on the south. The unit includes the cities of Oceanside, Carlsbad, Leucadia, Encinitas, Cardiff-by-the-Sea, Vista, and Escondido. The area is drained by Buena Vista, Agua Hedionda, San Marcos and Escondido creeks.

The Carlsbad Unit contains four major coastal lagoons; Buena Vista, Agua Hedionda, Batiquitos and San Elijo. Buena Vista lies between the cities of Carlsbad and Oceanside, and is partially within each city. A sandbar occasionally forms across the mouth forming an ocean beach. The water level in the lagoon is maintained by an inflow of rising groundwater and return irrigation water from the area upstream on Vista Creek. A portion of the lagoon has been designated as a bird sanctuary.

Agua Hedionda Lagoon, at the mouth of Agua Hedionda Creek, is within the city of Carlsbad. The lagoon is routinely dredged to keep it open to the ocean. The lagoon serves as an integral part of a utility's power plant cooling water intake system and also provides a reserve cooling water supply. The easterly portion of the lagoon is used for water oriented recreation.

Batiquitos Lagoon, at the mouth of San Marcos Creek, enters the Pacific Ocean between the city of Carlsbad and the unincorporated community of Leucadia. San Elijo Lagoon is the tidal marsh at the mouth of Escondido Creek. The marsh is normally closed off from the ocean but is subject to tidal fluctuations.

The Carlsbad Hydrologic Unit is comprised of the following six hydrologic areas; the Loma Alta, Buena Vista Creek, Agua Hedionda, Encinas, San Marcos and Escondido Creek Hydrologic Areas.

San Dieguito Hydrologic Unit (5.00)

San Dieguito Hydrologic Unit is a rectangular-shaped area of about 350 square miles. It includes the San Dieguito River and its tributaries, along with Santa Ysabel and Santa Maria creeks.

The unit contains two major reservoirs - Lake Hodges and Sutherland, and a smaller facility, the San Dieguito Reservoir.

The unit contains one coastal lagoon, the San Dieguito Slough, located at the mouth of the San Dieguito River, which forms the northerly edge of the city of Del Mar. The lagoon is normally closed off from the ocean by a sandbar.

The San Dieguito Hydrologic Unit is divided into five hydrologic areas; the Solana Beach, Hodges, San Pasqual, Santa Maria Valley and Santa Ysabel Hydrologic Areas.

Penasquitos Hydrologic Unit (6.00)

Penasquitos Hydrologic Unit is a triangular-shaped area of about 170 square miles, extending from Poway on the east to La Jolla on the west. There are no major streams in this unit although it is drained by numerous creeks. Miramar Reservoir, a major storage facility, contains imported Colorado River water.

The unit contains two coastal lagoons, Sorrento Lagoon and Mission Bay. Sorrento Lagoon is the mouth of Penasquitos Creek and empties into the ocean near the northerly boundary of the city of San Diego. Mission Bay and the mouth of the San Diego River form a 4000 acre aquatic park. Water quality within Mission Bay generally is lower than that of the coastal ocean water due to the poor flushing characteristics of the bay and the input of nutrient material from storm runoff. Sludge from the city of San Diego's Point Loma plant is piped to an island in Mission Bay (Fiesta Island) for use as a soil conditioner and fertilizer.

Annual precipitation in the unit ranges from less than 8 inches along the ocean to 18 inches inland. Poway, and La Jolla are the major population centers.

The Penasquitos Hydrologic Unit is comprised of the following five hydrologic areas; the Miramar Reservoir, Poway, Scripps, Miramar, and Tecolote Hydrologic Areas.

San Diego Hydrologic Unit (7.00)

San Diego Hydrologic Unit is a long, triangular-shaped area of about 440 square miles drained by the San Diego River. El Capitan, San Vicente, Cuyamaca, Jennings, and Murray reservoirs are the major storage facilities. San Vicente Reservoir, Murray Reservoir, Jennings, and Murray Reservoir store mainly Colorado River water, whereas, El Capitan mainly stores local runoff and some Colorado River water. Cuyamaca Reservoir stores only local runoff.

Much of the impounded water is used to serve major population centers, including a portion of the San Diego metropolitan area and the communities of El Cajon, Santee, Lakeside, Alpine and Julian. Annual precipitation ranges from less than 11 inches at the coast to about 35 inches around Cuyamaca and El Capitan Reservoir. The San Diego Hydrologic Unit is comprised of the following four hydrologic areas; Lower San Diego, San Vicente, El Capitan and Boulder Creek Hydrologic Areas.

Pueblo San Diego Hydrologic Unit (8.00)

Pueblo San Diego Hydrologic Unit is a triangular-shaped area of about 60 square miles with no major stream system. It is bordered to the north, by the watershed of the San Diego River and on the south, in part, by that of the Sweetwater River. The major population center is the city of San Diego. The unit is relatively dry with an annual precipitation of less than 11 inches to 13 inches. The Pueblo San Diego Hydrologic Unit is comprised of the following three hydrologic areas; the Point Loma, San Diego Mesa and National City Hydrologic Areas.

San Diego Bay lies offshore of this unit. The bay is approximately 13 miles long and varies from ½ to 1½ miles in width.

Sweetwater Hydrologic Unit (9.00)

Sweetwater Hydrologic Unit is an elongated northeasterly trending strip with an area of about 230 square miles. It is traversed along its length by the Sweetwater River. The annual precipitation varies from less than 11 inches at the coast to about 35 inches inland.

The Sweetwater Hydrologic Unit is comprised of the following three hydrologic areas; the Lower Sweetwater, Middle Sweetwater, and Upper Sweetwater Hydrologic Areas.

Otay Hydrologic Unit (10.00)

Otay Hydrologic Unit is a club-shaped area of about 160 square miles. The major stream system traversing the area is the Otay River and its tributaries. The Lower Otay Reservoir is the terminus of the second San Diego Aqueduct. Major population centers include the communities of Imperial Beach in the coastal area and Dulzura inland. The annual precipitation generally increases landward from the coast and varies from less than 11 to 19 inches.

The Coronado, Otay, and Dulzura Hydrologic Areas comprise the Otay Hydrologic Unit. The Coronado Hydrologic Area is composed of the North Island Naval Air Station, the city of Coronado and the Silver Strand.

Tijuana Hydrologic Unit (11.00)

Tijuana Hydrologic Unit is a triangular-shaped area that is drained by Cottonwood and Campo creeks, which are tributaries to the Tijuana River. It covers an area of about 470 square miles and lies mainly in the mountain-valley section.

The unit's only coastal lagoon is the Tijuana Estuary which occupies approximately 2000 acres and is generally open to the ocean. Most of the area can be classified as a salt water marsh with a number of arms of open water. Water quality is generally the same as that of the sea water except during periods of runoff when a variety of wastes, which originate in Mexico, are carried into the lagoon from the surface flow in the Tijuana River.

The unit is sparsely populated with the major population centers at San Ysidro and Campo. Annual precipitation varies from less than 11 inches near the coast to more than 25 inches farther inland near Laguna mountain. Runoff is captured by Morena Reservoir and Barrett Lake on Cottonwood Creek.

The Tijuana Hydrologic Unit is comprised of the following eight hydrologic areas; the Tijuana Valley, Potrero, Barrett Lake, Monument, Morena, Cottonwood, Cameron and Campo Hydrologic Areas. The Tijuana Valley Hydrologic Area is arbitrarily divided by the United States - Mexico boundary. Surface water quality has been adversely affected by runoff coming across the border from Mexico. Ground water quality has been affected by seawater intrusion and waste discharges in both the United States and Mexico.

WATER RESOURCES

The water resources in the San Diego Region are classified as coastal waters, surface waters, ground waters, imported surface waters, and reclaimed water. Fresh water supplied within the Region is obtained from local surface and ground water development projects and imported surface water programs.

COASTAL WATERS

Coastal waters in the Region include bays, harbors, estuaries, beaches, and open ocean. Deep draft commercial harbors include San Diego Bay and Oceanside Harbor. Shallower small craft harbors include Mission Bay and Dana Point Harbor. Important estuaries are represented by coastal lagoons such as Tijuana Estuary, Sweetwater Marsh, San Diego River flood control channel, Kendall-Frost wildlife reserve, San Dieguito River Estuary, San Elijo Lagoon, Batiquitos Lagoon, Agua Hedionda Lagoon, Buena Vista Lagoon, San Luis Rey River Estuary, and Santa Margarita River Estuary.

SURFACE WATERS

The San Diego Region has thirteen principal stream systems originating in the western highlands which flow to the Pacific Ocean. From north to south these stream systems are Aliso Creek, San Juan Creek, San Mateo Creek, San Onofre Creek, Santa Margarita River, San Luis Rey River, San Marcos Creek, Escondido Creek, San Dieguito River, San Diego River, Sweetwater River, Otay River, and the Tijuana River. Most of the streams of the San Diego Region are interrupted in character having both perennial and ephemeral components due to the rainfall pattern and the development of surface water impoundments. Surface water impoundments capture flow from nearly all the Region's major surface water streams. Many of the major surface water impoundments are a blend of natural runoff and imported water.

GROUND WATERS

All major drainage basins in the San Diego Region contain ground water basins. The basins are relatively small in area and usually shallow. Although these ground water basins are limited in size, the ground water yield from the basins has been historically important to the development of the Region. A number of the larger ground water basins can be of future significance in the Region for storage of both imported waters and reclaimed wastewaters. Nearly all of the local ground waters of the Region have been intensively developed for municipal and agricultural supply purposes.

IMPORTED SURFACE WATERS

The San Diego Region receives all of its imported water supplies from the Metropolitan Water District of Southern California (MWD). The MWD was created by the California State Legislature as a special district in 1928. MWD distributes wholesale water through 27 member agencies (cities and water districts) in portions of Los Angeles, Orange, Riverside, San Bernardino, San Diego and Ventura Counties. The MWD serves more than one-half of the drinking water supply used by 16 million persons in the coastal plain of Southern California.

The MWD supplies water to the following five member agencies in the San Diego Region: (1) Coastal Municipal Water District, (2) Municipal Water District of Orange County, (3) Western Municipal Water District of Riverside County, (4) Eastern Municipal Water District and (5) San Diego County Water Authority. The San Diego County Water Authority, the largest purveyor of MWD water in the San Diego Region, allocates water supplies to member agencies in San Diego County. The MWD obtains its water supplies from the Colorado River Aqueduct and the State Water Project.

The Colorado River Aqueduct is owned and operated by the MWD. Construction of the aqueduct began in 1931 and the first deliveries of imported water to member agencies took place in 1941. This aqueduct transports water from Lake Havasu on the Colorado River, 242 miles to its terminus at Lake Matthews in Riverside County. The aqueduct has an annual maximum capacity of 1.3 million acre-feet.

In 1964, the United States Supreme Court limited California's annual diversions from the Colorado River on a dependable basis to 4.4 million acre-feet in the case Arizona vs. California. As a result of the Supreme Court's decision, MWD's annual diversions from the Colorado River were limited to approximately 550,000 acre-feet. The United States Department of the Interior has the discretion to allow California to use any water that Arizona and Nevada have available from the Colorado River, but do not use. During declarations of surplus, MWD has the highest priority of any California contractor to divert surplus waters from the Colorado River.

MWD's other primary source of water is the State Water Project (SWP). The SWP is owned by the State of California and operated by the California Department of Water Resources. SWP water originates from Lake Oroville on the Feather River and surplus flows in the Sacramento - San Joaquin Delta in northern California. The project transports water from the Sacramento-San Joaquin Delta via the 444-mile long California Aqueduct to 29 contract agencies in the State.

The MWD has an annual entitlement to SWP water of 2,011,500 acre-feet out of a total maximum contractual entitlement of 4.2 million acre-feet for the 29 contractors. The current firm yield of the SWP, 2.4 million acre-feet, falls below the total SWP contractor requests of approximately 3.6 million acre-feet. The current firm yield of the SWP is based on the average annual water supplies available if the hydrologic conditions during the years 1928 - 1934 reoccurred. The firm yield of the SWP can supply only about one-half of the contract entitlement due to the lack of sufficient SWP water conveyance facilities. The demand for SWP water is expected to increase to 4.2 million acre-feet by the year 2010. MWD water supply from the SWP will be subject to limitations unless SWP supplies are increased.

Steadily increasing demands for water have led to the need to import water from the Colorado River and the State Water Project. In November 1947, construction was completed on the first pipeline of the San Diego Aqueduct to deliver Colorado River water into the Region. The pipeline was constructed by the U.S. Navy to meet the increased demand for water caused by accelerated population and industrial growth during the World War II years of 1941 - 1945. Additional pipelines to convey imported water were constructed in subsequent years. Beginning in 1978, State Water Project water from Lake Oroville on the Feather River and surplus flows in the Sacramento - San Joaquin Delta in northern California were blended with the Colorado River water.

In the recent past the MWD water supplies consisted of approximately seventy percent from the Colorado River and thirty percent from the State Water Project. In 1993, the drought reduced the availability of State Water Project waters during the year and MWD water supplies consisted of approximately ninety-three percent from the Colorado River and seven percent from the State Water Project. The San Diego Region is highly dependent upon imported water supplies to meet the residential, industrial, commercial, agricultural, and public water demand. Imported water (i.e., Colorado River and State Water Project) supplies about ninety percent of the demand; surface runoff into local reservoirs and local ground water supplies the remaining ten percent.

The delivery of the maximum amount of SWP water benefits the Region in the following ways:

- SWP water improves the potential for conjunctive uses of water resources;
- SWP water enhances and maintains designated beneficial uses of the Region's surface and ground waters;
- SWP water improves the potential for attainment of water quality objectives;

- SWP water improves the viability of recharge of ground water basins;
- SWP water increases the potential for water reclamation.

The effective implementation of water reclamation in the Region is contingent on the availability of supply waters with relatively low salinity, or total dissolved solids concentration. The Colorado River has a high total dissolved solids concentration of 600 - 750 mg/l. When this water is used for urban needs the TDS increases by about 300 mg/l to 900 -1050 mg/l. This quality of water is, at best, marginal for agricultural and ground water recharge uses of reclaimed water. In contrast, TDS concentrations in State Water Project (SWP) waters are approximately 250 mg/l except during drought periods. The lower TDS concentrations found in State Water Project waters enables water supply agencies to blend SWP waters with Colorado River water supplies to meet drinking water quality standards and reclaimed water discharge limitations.

Water supply demand is expected to continue to increase as a result of population growth in the Region. To meet the projected water demand, water supply agencies are working to increase both the capacity and flexibility of conveyance systems and to intensify development of local water supplies through wastewater reclamation, ground water management, and desalination of seawater. The increased use of local supplies is expected to meet eighteen percent of the total water supply needed by the year 2010. The remaining eighty-two percent of the demand will have to be met by imported water.

RECLAIMED WATER

Reclaimed water is an important and growing component of the Region's water supply. Reclaimed water is obtained through extensive treatment of municipal wastewater to produce a safe and reliable water supply for non-potable uses. Reclaimed water is used to irrigate parks, agriculture, planned community greenbelt areas, golf courses and freeway landscaping. Reclaimed water use to the maximum extent feasible is important because it reduces dependence on imported water supply and leaves the Region less vulnerable to imported water supply shortages. The use of reclaimed water in the Region is expanding. For example, the San Diego County Water Authority reported that in Fiscal Year 1993, the total volume of reclaimed water used in the Authority's service area was 9,713 acre-feet; this represented a 24 percent increase in reclaimed water use over the previous year. The Authority estimates that the total reclaimed water use volume in their service area will increase to 50,000 acre-feet per year when currently planned water reclamation projects are completed in the year 2010.

REGIONAL BOARD WATER QUALITY MANAGEMENT POLICY

The five policy statements in this section form the Regional Board's Water Quality Management Policy for the San Diego Region. Following each principle policy statement are interpretations and examples of applications of the policy. In certain instances the Regional Board may find it necessary to exercise discretion in applying these policies within the interpretations presented.

★ *POLICY ONE* ★

Water quality objectives, beneficial uses, and water quality control plans and policies adopted by the State Water Resources Control Board and the Regional Water Quality Control Board shall be an integral part of the basis for water quality management.

☞ Whenever the existing water quality exceeds the water quality objectives contained in the Water Quality Control Plan for the San Diego Basin (9), such existing high quality shall be maintained until it has been demonstrated to the Regional Board that any change will be consistent with maximum benefit to the people of the State, will not unreasonably affect present and anticipated beneficial uses of such water, and will not result in water quality less than that described in the Water Quality Control Plan for the San Diego Basin (9).[5]

☞ Any waste discharged to existing high quality water will be required to meet waste discharge requirements that will result in the best practicable treatment or control of the discharge necessary to assure that pollution will not occur and the highest water quality consistent with maximum benefit to the people of the State will be maintained.[5]

★ *POLICY TWO* ★

Water shall be reclaimed and reused to the maximum extent feasible.

☞ The Regional Board will encourage and recommend funding for water reclamation projects that meet the following conditions and that do not adversely affect vested water rights, unreasonably impair instream beneficial uses, or place an unreasonable burden on present water supply systems:[6]

- ✓ Beneficial uses will be made of wastewater that would otherwise be discharged to marine or brackish receiving water or evapotranspiration ponds.
- ✓ Reclaimed water will be used to replace or supplement the use of fresh water or better quality water.
- ✓ Reclaimed water will be used to preserve, restore, or enhance instream beneficial uses that include but are not limited to, fish, wildlife, recreation, and aesthetics associated with any surface water body or wetlands.

☞ The Regional Board will encourage and promote water reclamation while taking into consideration the Regional Board's responsibility of protecting and enhancing beneficial uses and recognizing the need to protect the public health and environment.

☞ The Regional Board will require wastewater treatment facilities to provide for appropriate disposal or storage of surplus reclaimed water.

★ *POLICY THREE* ★

Point sources and nonpoint sources of pollution shall be controlled to protect designated beneficial uses of water.[7]

☞ Treatment levels at least as stringent as those defined in the federal Clean Water Act will be required of municipal and industrial point sources which are subject to regulation under the Clean Water Act.[8]

☞ Sewage collection agencies shall implement a comprehensive pretreatment program including industrial waste ordinances to control the quality and quantity of pollutants which may adversely affect the operation of a municipal wastewater treatment facility, or which may cause the effluent limitations for the facility to be exceeded, or which may pass through the treatment works or will otherwise be incompatible with such works.

☞ Nonpoint sources will be controlled in conformance with the Clean Water Act and the Coastal Zone Act Reauthorization Amendments. Nonpoint source control programs will generally be the responsibility of federal, state, and local agencies, and individuals having land management responsibilities. Such controls will be implemented preferably through best management practices[9], (BMPs). If BMPs fail, controls will be implemented through waste discharge requirements or other regulatory actions.[7]

★ *POLICY FOUR* ★

Instream beneficial uses shall be maintained, and when practical, restored, and enhanced.

☞ Coordination shall be encouraged among local agencies with regard to all aspects of planning and land use control.

☞ Plans for future development and management of the State's water resource must assure adequate protection of existing instream beneficial uses, and where feasible, include measures to enhance these uses.

☞ Instream uses for recreation, fish, wildlife, and related purposes shall be balanced with other uses.

☞ The need for water to be impounded must be demonstrated, taking full account of instream values.

☞ Reservoir operations shall involve careful consideration of instream uses, even where such uses satisfy altered or enhanced instream values.

★ *POLICY FIVE* ★

A detailed and comprehensive knowledge of the beneficial uses, water quality and activities affecting water quality throughout the Region shall be maintained.

☞ The development of a modern comprehensive information gathering, storing, and retrieval system to effectively aid in evaluating water quality throughout the Region shall be encouraged.

LEGAL BASIS AND AUTHORITY

Federal and state laws have been enacted which establish the requirements for adequate planning, implementation, management and enforcement, for the control of water quality. The principal federal and state laws pertaining to the regulation of water quality are known respectively as, the 1972 Federal Water Pollution Control Act (also known as the Clean Water Act) and Division 7 of the 1969 California Water Code (also known as the Porter-Cologne Water Quality Control Act). The laws are similar in many ways. The fundamental purpose of both laws is to protect the beneficial uses of water. An important distinction between the two is that the Porter-Cologne Water Quality Control Act addresses both ground and surface waters while the Clean Water Act addresses surface water only.

In addition, federal and state regulations and policies have been developed to augment and clarify the laws and to provide detail not included in the law.

FEDERAL LAWS AND REGULATIONS

The basic federal law dealing with surface water quality control is the Federal Water Pollution Control Act of 1972 (Clean Water Act). Certain statutory provisions in two other federal laws, the National Environmental Policy Act of 1969 and the Endangered Species Act, supplement the Clean Water Act. Federal regulations implementing the Clean Water Act provisions for water quality planning and management are contained in 40 CFR 130, *EPA Requirements for Water Quality Planning and Management* and 40 CFR 131, *EPA Procedures for Approving State Water Quality Standards*.

FEDERAL WATER POLLUTION CONTROL ACT (CLEAN WATER ACT)

The Federal Water Pollution Control Act was amended in 1972 and is commonly referred to as the Clean Water Act. The objective of the Clean Water Act is to *"restore and maintain the chemical, physical and biological integrity of the Nation's waters"* to make all surface waters "*fishable*" and "*swimmable*". The seven goals set forth in the law to achieve this objective are to:

(1) Eliminate the discharge of pollutants to navigable waters by 1985;

(2) Provide water quality which protects and fosters propagation of fish, shellfish and wildlife and allows recreation in and on the water by 1983;

(3) Prohibit discharge of toxic pollutants in toxic amounts;

(4) Provide financial assistance to construct publicly owned treatment systems;

(5) Develop and implement areawide waste treatment management plans;

(6) Develop technology necessary to carry out these goals; and

(7) Develop and implement programs for control of nonpoint sources of pollution.

In 1972, five titles were added as amendments to the Clean Water Act. Title 1 provides for research and related programs, Title 2 provides grants for construction of treatment works, Title 3 provides for standards and enforcement, Title 4 provides for permits and licenses, and Title 5 provides for general provisions.

Clean Water Act Sections 106, 205(j), 205(g), 208, 303 and 305 establish requirements for state water quality planning, management, and implementation in regard to surface waters. The Clean Water Act requires that states adopt water quality standards to protect public health or welfare, enhance the quality of water, and serve the purposes of the Clean Water Act. "*Serve the purposes of the Act*" (as defined in §101(a), §101(a)(2), and §303(c) of the Act) means that water quality standards:

- Include provisions for restoring and maintaining the chemical, physical, and biological integrity of state waters;

- Whenever attainable, achieve a level of water quality that provides for the protection and propagation of fish, shellfish, and wildlife, and recreation in and on the water ("*fishable" and "swimmable*"); and

- Consider the use and value of state waters for public water supplies, propagation of fish and wildlife, recreation, agriculture and industrial purposes, and navigation.

The states are also required to have a continuing planning process called the Triennial Review process, which includes public hearings at least once every three years to review the water quality standards and revise them if necessary.

NATIONAL ENVIRONMENTAL POLICY ACT OF 1969 (NEPA)

NEPA declares a national environmental policy and its goals. The overall objectives of NEPA are: (1) to ensure that environmental factors are considered in the decision making process of any federal action and (2) to provide full public disclosure of any federal action. Accordingly, NEPA requires that an Environmental Impact Statement (EIS) shall be "*included in every recommendation or report on proposals for legislation and other major federal actions significantly affecting the quality of the human environment*". Federal actions include the operation of programs; the construction of facilities; the provision of funding to others; and a federal agency's decision on whether to grant its required permission for activities of others, such as private businesses or state or local governments.

NEPA establishes a continuing policy for all levels of government and concerned public and private organizations to create and maintain conditions under which man and nature can exist in productive harmony and fulfill the social, economic and other requirements of present and future generations. NEPA directs an interdisciplinary approach to ensure integrated use of all talents in planning and decision making having impact on the environment (§102). Each report or recommendation must be accompanied by a detailed statement prepared by the responsible official on:

- The environmental impact of the proposed action;

- Any adverse environmental effects which cannot be avoided if the action is taken;

- Alternatives to the action;

- Relationship between local short-term uses of the environment, and maintenance and enhancement of long-term productivity; and

- Any irreversible and irretrievable commitments of resources if the proposed action is taken.

Appropriate alternatives to proposed actions must be studied and developed when conflicts in use of available resources are encountered.

NEPA directs the preservation of acceptable environments and the restoration of those that have been degraded. The spirit of the Act is also carried into the State reviews of proposed actions upon the environment. (See discussion on the California Environmental Quality Act later in this chapter).

ENDANGERED SPECIES ACT (ESA)

The federal Endangered Species Act (ESA) establishes federal policy regarding protection of endangered and threatened species. The ESA is directed specifically at projects subject to the *National Environmental Policy Act (NEPA)* which may adversely affect endangered and threatened species. Section 7 of the federal Endangered Species Act requires all federal agencies, in consultation with the Fish and Wildlife Service and the National Marine Fisheries Service, ensure that their actions do not jeopardize the existence of threatened or endangered species or result in the destruction or adverse modification of critical habitat. The definition of a federal action is very broad and covers almost every water program administered by the US EPA. All aspects of the US EPA's surface water quality criteria and standards adoption and implementation process are subject to the consultation process. The overriding goal of the consultation process is to provide for the protection and recovery of threatened and endangered species and the ecosystems on which they depend.

APPLICABLE FEDERAL REGULATIONS

The federal regulations, promulgated by the US EPA to implement the Clean Water Act provisions for water quality planning and management, are contained in 40 CFR 130, *EPA Requirements for Water Quality Planning and Management* and 40 CFR 131, *EPA Procedures for Approving State Water Quality Standards*. The regulations contained in 40 CFR 131 require states to:

- Designate appropriate beneficial uses for surface waters;
- Establish narrative and numeric criteria to protect beneficial uses;
- Establish an antidegradation policy to protect and maintain existing beneficial uses and the water quality necessary to protect those uses; and
- Hold a public hearing to review surface water quality standards at least once every three years and revise them if appropriate.

The regulations contained in 40 CFR 130 require states to also develop and follow a water quality planning and management system consisting of the following elements:

- Monitoring methods and procedures to compile and analyze data on surface waters;
- Identification of surface waters that are "*water quality limited*" or not meeting water quality standards;
- A ranking of surface water bodies based on severity of pollution and beneficial uses of the waters. The surface water body ranking must also include a determination of how best to utilize available resources to solve the water quality problems; and
- Pollutant loading allocations to ensure that water quality standards are not exceeded.

These regulations are discussed in detail in Chapters 2 and 3.

CALIFORNIA LAWS AND REGULATIONS

State of California laws that directly affect water resources planning are contained principally in the California Water Code. Certain statutory provisions in the Water Resources Code, Health and Safety Code, Public Resources Code, Fish and Game Code, Food and Agriculture Code, Government Code, Harbors and Navigation Code, California Environmental Quality Act, and the California Endangered Species Act supplement the water quality provisions of the California Water Code. The chief state regulations in the California Code of Regulations pertaining to water quality are contained in Title 22 and Title 23.

CALIFORNIA WATER CODE

The California Water Code contains provisions which control almost every consideration of water and its use. Division 2 of the Water Code provides that the State Board shall consider and act upon all applications for permits to appropriate waters. The State Board's authority includes water quality considerations in granting a water right. Division 3 deals with dams and reservoirs; Division 5 pertains to flood control; Division 6 controls conservation, development and utilization of the state water resources; Division 7, covers water quality protection and management; and Divisions 11 through 21 provide for the organization, operation, and financing of municipal, county and local, water-oriented agencies.

ADJUDICATIONS TO PROTECT THE QUALITY OF GROUND WATER (DIVISION 2 OF THE CALIFORNIA WATER CODE)

California Water Code Section 2100 provides that the State Board may make a formal determination or judgement in order to protect ground water quality. Thus, the State Board, upon a finding of existing or threatened irreparable damage, may file an action in the Superior Court to restrict pumping or to impose physical solutions, or both, to the extent necessary to prevent destruction of, or irreparable injury to, the quality of ground water. The State Board may take such action only if an affected local agency charged with this responsibility fails to take appropriate action.

PORTER-COLOGNE WATER QUALITY CONTROL ACT (DIVISION 7 OF THE CALIFORNIA WATER CODE)

Division 7 of the California Water Code is the basic water quality control law for California. This law is titled the *Porter-Cologne Water Quality Control Act* (Porter-Cologne Act). The Porter-Cologne Act establishes a regulatory program to protect water quality and to protect beneficial uses of the state waters.

The Porter-Cologne Act Section 13000 provides that:

- The quality of all waters of the state shall be protected for the use and enjoyment by the people of the state; and

- Activities and factors which may affect the quality of the waters of the state shall be regulated to attain the highest water quality that is reasonable, considering all demands being made or to be made and the total values involved, beneficial and detrimental, economic and social, tangible and intangible.

The Porter-Cologne Act establishes the State Board and the regional boards as the principle state agencies responsible for control of water quality. The State Board is responsible for:

- Issuing rights for the appropriation of surface water;
- Preventing waste and unreasonable use of water;
- Adjudicating water rights at the request of water users or the courts;
- Adopting state-wide water quality control policy;
- Reviewing actions of regional boards;
- Implementing the federal Clean Water Act; and
- Operation of a grants and loan program for the construction of sewage treatment plants.

The regional boards are responsible for:

- Issuance of waste discharge requirements to regulate the discharge of waste to surface and ground waters;
- Enforcement of the waste discharge requirements by the issuance of cease and desist orders, cleanup and abatement orders, administrative civil liability orders, and court action;
- Water quality control planning within their region; and
- Surveillance and monitoring to detect new sources of pollution and to ensure that ongoing discharges are in compliance with waste discharge requirements.

The Porter-Cologne Act empowers the regional boards to formulate and adopt, for all areas within the regions, a Water Quality Control Plan (Basin Plan) which designates beneficial uses and establishes such water quality objectives as in its judgement will ensure reasonable protection of beneficial uses. Each regional board establishes water quality objectives that will insure the reasonable protection of beneficial uses and the prevention of nuisance. The California Water Code provides flexibility for some change in water quality provided that beneficial uses are not adversely affected. The factors which are to be considered by the Regional Board in establishing water quality objectives are described in Chapter 3, *Water Quality Objectives*, (page 3-1).

The State Board may adopt water quality control plans for surface waters that overlap Regional Board boundaries, are statewide in scope, or are otherwise considered significant. Statewide plans supersede Regional Water Quality Control Plans where conflict occurs. The Regional Water Quality Control Plans are required to conform with policies of the State Board.

The California Water Code also requires that each regional board include an implementation plan in the Basin Plan. Implementation plans must include as a minimum:

- A description of the nature of the actions necessary to achieve the water quality objectives, including recommendations for appropriate actions by any entity, public or private;
- A time schedule for the actions to be taken; and
- A description of the surveillance to be undertaken to determine compliance with the water quality objectives.

CALIFORNIA ENVIRONMENTAL QUALITY ACT OF 1973 (CEQA)

The California Environmental Quality Act (CEQA) is a very important and expansive environmental protection law in California. It was enacted by the state legislature in 1973 and is contained in the Public Resources Code Sections 21000 through 21177. CEQA is the state-level equivalent of the federal National Environmental Policy Act (NEPA).

The overall objectives of both laws, NEPA and CEQA, are to provide full public disclosure of a project and to ensure that environmental factors are considered in the decision making process. CEQA requires all state agencies, boards and commissions to include in any report on any project having significant effect on the environment an

Environmental Impact Report (EIR). The EIR records the scope of the applicant's proposal and analyzes all its known environmental effects. The EIR must discuss any significant environmental effects which cannot be avoided if the proposal is implemented, proposed mitigative measures to minimize the impact of the project and alternatives to the project. Also the EIR must discuss the relationship between local short-term uses of the environment and the maintenance and enhancement of long-term productivity and the growth-inducing impacts of the proposed project. The EIR is circulated to interested agencies and members of the public who request a copy. The public has a 45 day period for review during which comments on the EIR are accepted.

State agencies cannot approve a project for which alternatives or mitigation measures exist which would significantly reduce the environmental impacts, unless overriding social and/or economic considerations apply.

Activities of the State and Regional Boards subject to CEQA include adoption of Basin Plans and amendments thereto, issuance of NPDES permits, and Waste Discharge Requirements (WDRs). The basin planning process however, has been certified by the Secretary of Resources as being exempt from CEQA's requirement for preparation of an environmental impact report (EIR) or negative declaration and initial study (California Code of Regulations (CCR) Title 14, §15251). Under the basin planning process, a plan amendment, as well as a staff report and backup materials, serve as a functional equivalent to an EIR or negative declaration and initial study. The CEQA Notice of Filing, Environmental Checklist Form, and Notice of Decision must be filed to comply with CEQA.

CALIFORNIA ENDANGERED SPECIES ACT

The California Endangered Species Act (CESA) as amended in 1987 (California Fish and Game Code, §2050 - §2098) establishes state policy regarding protection of endangered and threatened species. CESA is directed specifically at projects subject to the California Environmental Quality Act (CEQA) which may adversely affect endangered and threatened species.

Pursuant to CESA, the Regional Board must consult with the California Department of Fish and Game (DFG) to determine if the Basin Plan would jeopardize the continued existence of any endangered or threatened species or adversely affect the habitat of the species. CESA requires the DFG to issue written findings regarding whether or not Regional Board adoption of the Basin Plan will cause jeopardy to endangered or threatened species.

CESA policy requires that the Regional Board not approve a Basin Plan, which in DFG's opinion, would jeopardize endangered or threatened species. CESA also requires the Regional Board to adopt reasonable and prudent alternatives in the Basin Plan which would minimize any adverse effects identified by DFG to endangered or threatened species. If the alternatives are infeasible, the Regional Board is required to adopt reasonable mitigation and enhancement measures in the Basin Plan.

OTHER STATE STATUTES

Certain statutory provisions contained in the Health and Safety Code, Fish and Game Code, Harbors and Navigation Code, and the Food and Agriculture Code, supplement the water quality provisions of the California Water Code. The Health and Safety Code has statutory provisions providing for the regulation of hazardous waste, hazardous materials, surface impoundments containing hazardous waste, underground and aboveground storage of hazardous substances, and underground injection of toxic substances and the discharge of cancer causing chemicals to sources of drinking water. The Harbors and Navigation Code has statutory provisions to prevent the unauthorized discharges of waste from vessels to surface waters. The Food and Agriculture Code has statutory provisions providing for the prevention of pollution of ground water which may be used for drinking water supplies. The Fish and Game Code has statutory provisions to prevent unauthorized diversions of any surface water body as well as waste discharges deleterious to fish, plant, animal, or bird life. The Government Code requires the Governor to establish a state oil spill and toxic disaster contingency plans.

CALIFORNIA CODE OF REGULATIONS

The administrative procedures of the State Board and regional boards and regulations relating to many facets of water rights and water quality are contained in Title 23, (WATERS) Division 3, (Water Resources Control Board) Chapters 3, 4, 15, and 16 California Code of Regulations (CCR). Requirements for quality of water for domestic uses, wastewater reclamation criteria, and hazardous waste management are contained in Title 22, Division 4 (Environmental Health).

HISTORY OF BASIN PLANNING IN THE SAN DIEGO REGION

The Dickey Act, enacted by the State of California in 1949, established nine Regional Water Pollution Control Boards in California. Regional Water Pollution Control Boards were directed to establish water quality objectives in order to protect the quality of receiving waters from adverse impacts of discharges. During the first few years, the San Diego Regional Water Pollution Control Board only established narrative objectives for discharges. By 1952, the San Diego Regional Water Pollution Control Board began including numerical limits in requirements for discharges and adopting water quality objectives for receiving waters.

In the late 1960's the San Diego Regional Board conducted an extensive investigation to define water quality objectives for the entire San Diego Region. A report was prepared for each major hydrologic unit of the Region. These reports described the following topics for each hydrologic unit:

- Geology and land use;
- Precipitation and runoff;
- Water quality;
- Surface and ground water use;
- Imported water use;
- Waste disposal;
- Beneficial uses;
- Water quality objectives; and
- The water quality implementation program.

These early reports led to the definition and designation of beneficial uses for the surface and ground waters of the Region. The beneficial uses defined in the early reports have remained intact, for the most part, to the present day.

With the enactment of the Porter-Cologne Water Quality Act in 1969, the names of the Regional Water Pollution Control Boards were changed to Regional Water Quality Control Boards, and their authority was broadened. Furthermore, the Act required the Regional Water Quality Control Boards to initiate development of comprehensive regional Water Quality Control Plans.

In 1971, the San Diego Regional Board adopted an *Interim Water Quality Control Plan* (*Interim Plan*) which expanded the number of beneficial uses designated for inland surface waters, and coastal waters subject to tidal action. The *Interim Plan* was prepared to satisfy state and federal requirements for grant programs for sewage treatment plant construction. In addition, the *Interim Plan* satisfied the Porter-Cologne Act requirements that each regional board adopt a *Water Quality Control Plan*. As the term "*interim*" implies, the document was adopted as the first step towards development of a comprehensive fully developed *Water Quality Control Plan*. The *Interim Plan* was amended in 1972 to designate a beneficial use for clamming and shellfish harvesting at various locations in coastal waters.

In 1975, the San Diego Regional Board adopted the *Comprehensive Water Quality Control Plan Report* for the San Diego Region that compiled all of the existing beneficial uses, water quality objectives, and policies into one document and rescinded all individually-adopted objectives and policies. The 1975 Basin Plan was amended by the Regional Board on numerous occasions since 1975. A summary of Basin Plan amendments adopted by the Regional Board between 1979 and 1994 is presented in Chapter 5 (*Plans and Policies*) of this Basin Plan.

Since 1975, progress has been made toward the control of a number of water quality problems identified in the 1975 Basin Plan, including the control of point source discharges and the development of new programs to address nonpoint source pollution issues in the Region. At the same time, many new issues and areas of concern have arisen as health scientists have identified increasingly lower concentrations of toxic substances as health risks. Furthermore, advancing analytical technology enables detection of contaminants at increasingly lower concentrations. The State and Regional Board's Continuing Planning Process, based on the latest scientific information, addresses both "*old*" and "*new*" water quality issues.

CONTINUING PLANNING PROCESS

As part of the State's continuing planning process, components of the Basin Plan are reviewed as new data and information become available or as specific needs arise. Comprehensive updates of the Basin Plan occur in response to state and federal legislative requirements and as funding becomes available. In addition, State Board and other governmental entities' (federal, state, and local) plans, which can affect water quality, are incorporated into the planning process. The Basin Plan provides consistent long-term standards and program guidance for the Region.

BASIN PLAN REVIEW AND AMENDMENT PROCESS

The following discussion applies to the review and amendment process for any Water Quality Control Plan, (i.e., a Statewide Plan or a Regional Board Basin Plan).

TRIENNIAL REVIEW

Statewide plans and Regional Board Basin Plans are flexible documents which must be reviewed and revised regularly to adapt to changing conditions. A major review of both types of Plans is performed every three years as part of the update process for the "*Triennial Review*". The Triennial Review is required by the federal Clean Water Act [§303(c)(1)]. In addition, state law requires that water quality control plans be reviewed periodically (California Water Code §13240), and that the State Board review statewide plans at least every three years (California Water Code §13170 and §13170.2). These reviews are comprehensive and include a public scoping hearing to identify the issues and water quality standards to be addressed. The review identifies standards which are appropriate and, therefore, require no revisions. Information on new or existing water quality objectives comes from monitoring data, compliance inspections, discharger reports, and public complaints. Monitoring data provides information on background conditions which are used to set water quality objectives.

The State or Regional Board evaluates all available information and determines whether revisions to water quality standards are needed and the nature of any necessary revisions. A work plan is prepared which identifies appropriate revisions. These revisions, and a time schedule for implementation, are then incorporated into the Statewide Plan or Regional Board Basin Plan by way of the amendment process discussed below.

BASIN PLAN AMENDMENT PROCESS

Whenever a Statewide Plan or Regional Board Basin Plan for surface waters is to be revised, public participation requirements must be met, as called for in 40 CFR Part 25 (Public Participation in Programs Under the Resource Conservation and Recovery Act and the Clean Water Act). When water quality standards are changed, a public hearing must be held. Notice for the public hearing generally must be given 45 days prior to the hearing, and the documents to be considered at the hearing must be available to the public 30 days prior to the hearing. After the hearing, a summary of comments received and responses to those comments must be prepared before action is taken.

For Regional Board adoption of a Basin Plan amendment, a quorum of Board members must be present (five of the nine members). For State Board approval of a proposed Regional Board amendment, a quorum must also be present (three of the five members). In both cases the vote of a majority of the quorum is required to take action. If a State Board hearing is being held regarding a Statewide Plan or to review an amendment proposed by a Regional Board, one or more members of the State Board may conduct the hearing upon authorization of the State Board. In cases where such a hearing is conducted, any final action must be taken by a majority of all members of the State Board (i.e., 3 votes). Usually State Board hearings are of a controversial nature and most, if not all, Board members elect to attend. The State Board may approve a Basin Plan amendment proposed by a Regional Board or return it to the Regional Board for further consideration. Upon resubmission, the State Board may either approve or, after a public hearing in the affected region, revise and approve such plan (California Water Code §13245).

Basin planning is also influenced by several federal administrative guidance documents, such as US EPA's *Technical Support Document for Water Quality-Based Toxics Control*, the *Water Quality Standards Handbook*, and "*Gold Book*" *Quality Criteria for Water*, 1986 and waste load allocation manuals.

Basin Plan amendments are generally initiated by the appropriate Regional Board, and Statewide Plan amendments are initiated by the State Board. Amendments may also be initiated by any other interested parties. In this case, the proposed amendment submitted by the interested party is reviewed by Regional Board staff to determine if the information is adequate to support the requested change to the Basin Plan. Regional Board staff will review the technical information and may either accept it as complete or reject it as incomplete. Whenever new or revised water quality standards are proposed in a Regional Board Basin Plan

amendment, the standards must be approved by the State Board before the amendment becomes effective. A proposed standard revision to a statewide plan or Regional Board Basin Plan takes effect upon approval by the Office of Administrative Law (OAL). A standard contained in a Regional Basin Plan amendment which relates to surface waters or a standard in a statewide plan must be submitted to the United States Environmental Protection Agency (US EPA) for approval [40 CFR §131.20 (c)] following State Board review. If the standard revision is disapproved by the US EPA, the original standard remains in effect until revised by the basin planning process, or the US EPA promulgates its own rule which supersedes the standard revision [40 CFR §131.21 (c)].

BASIN PLAN AMENDMENT PROCEDURES

(1) Advance notice of plan amendments is required (California Water Code §13244) and must be advertised for hearings. For amendments that include a prohibition, a public notice must be published for three consecutive days in a newspaper of wide circulation in the area of the prohibition. For other actions, notice must be published for one day in a newspaper of wide circulation. Usually, the hearing notice must be published at least 45 days prior to the hearing (40 CFR §25.5).

A California Environmental Quality Act (CEQA) Notice of Filing must be circulated at least 45 days prior to State and Regional Board action on a proposed amendment. Where the hearing(s) process is completed and adoption is scheduled for a regularly scheduled State or Regional Board Meeting, a ten-day notice requirement for agenda items applies (Government Code §11125).

(2) For controversial and/or complex amendments, comments should be requested from interested persons prior to drafting an amendment. This step would be informal by written correspondence or in a workshop session (the public can attend such workshops, which are not "*public hearings*" and would precede the hearing notice in number 3 below). Comments received would be considered in the initial draft of the amendment and the alternatives.

(3) The hearing notice must be specific enough to allow an effective opportunity for public participation. Although it is preferable to include the draft plan amendment and staff report with the hearing notice, as indicated above, these documents can be made available at a later date that is at least 30 days before the hearing (40 CFR §25.5). The notice should include:

(a) The general area to be regulated;
(b) The specific proposed plan amendment and a statement of the availability of a staff report and backup material;
(c) Either of the following,
  (i) Alternatives to the proposal or
  (ii) A statement that additional rules, consistent with the general purpose of the plan amendment and complementary to the specific proposed rules, are under consideration.
(d) A statement as to whether action on the amendment will be taken immediately at the close of the hearing.

(4) A copy of the hearing notice should be sent to:
(a) Those who normally receive notices of plan review or those who, in the judgement of staff, would be interested in the proposed amendment(s).
(b) Those who have commented on the plan review or amendment.
(c) Those federal, state and local agencies who have jurisdiction by law or who have expertise with respect to the subject(s) of the proposed amendment(s).
(d) Specific interested parties affected by the proposed action.

(5) The State or Regional Board(s) may require that written testimony or other evidence be submitted in advance of the public hearing (Title 23 CCR §649.4). If this option is chosen, the hearing notice should specify the details. Charts, graphs, and other testimony which are presented as evidence must be left with the State or Regional Board(s) in order to be considered as part of the record.

(6) The hearing notice can state that more than one hearing is scheduled and list the dates for each in order to save processing time.

Alternatively, the notice may state that action on the amendment could take place following the close of the hearing. Some delays may also be avoided by having special hearings on dates other than regularly scheduled State or Regional Board meetings.

(7) State or Regional Board Staff must prepare written responses to comments received at least 15 days before the State or Regional Board intends to take action. Copies of responses will be available at the State or Regional Board meeting for any person to review. Late comments should be responded to at the State or Regional Board meeting. If appropriate, the Environmental Checklist Form may be revised based on a review of comments received.

(8) State or Regional Board Staff must prepare a summary report including:
(a) A brief description of the proposed activity;
(b) Reasonable alternatives to the proposed activity; and
(c) Mitigation measures to minimize any potential significant adverse environmental impacts of the proposed activity identified in the Environmental Checklist Form. Conclusions must be made as to what, if any, potential significant adverse impacts, feasible alternatives, and feasible mitigation measures exist. These conclusions must be accompanied by a statement of supporting facts. In adopting proposed amendments, the State or Regional Board must mandate those feasible alternatives or feasible mitigation measures which are within its jurisdiction. The State or Regional Board cannot approve the proposed amendment if there are feasible alternatives or feasible mitigation measures which would substantially lessen the potential significant adverse environmental impacts (Public Resource Code §21080.5).

(9) The hearing must, at a minimum, be recorded electronically (Title 23 CCR §647.4). Controversial matters usually are recorded by a stenographic reporter.

(10) At the hearing, all interested persons are given an opportunity to be heard. Reasonable limitations on public participation are appropriate and may be indicated in an opening statement (i.e., impose time limits on testimony, encourage groups to designate a spokesperson, and require witnesses to summarize written testimony). There is no right to cross-examination at the hearings. Persons wishing clarification of prior evidence or comments may request the same from the State or Regional Board.

Cross-examination must be allowed when an amendment takes on quasi-judicial features; for example, when considering a prohibition against increasing existing discharges from a relatively small number of dischargers. Cross-examination may also be allowed at the discretion of the Chairperson, if it appears that the cross-examination will assist the State or Regional Board in its deliberations.

(11) At the close of the hearing, it may be desirable to leave the record open to provide interested persons an additional opportunity to submit written comments. If the record is left open, all interested persons will be told at the hearing that they may review and respond to written comments received during the time that the record is left open. For example, the record could be left open ten days for written submittals and an additional five days for written comments in response to these submittals. Once the record is closed, no additional evidence will be received at the State or Regional Board meeting to consider adoption of the amendment; however, brief comments on the proposal will be allowed.

(12) After the close of the hearing and any comment period, the amendment may be adopted as proposed. If the draft amendment is to be modified, based on the hearing, and the notice is adequate as outlined in number 3 above, a final plan amendment may be adopted when the product is a logical outgrowth of the draft amendment or a statement in the notice. Where changes in the final draft are not a logical outgrowth of the original proposal, an additional notice, hearing, and opportunity to comment will be provided. When changes

are proposed by State or Regional Board Members or staff, the procedure is:

(a) For each proposed change, consideration is given as to whether the change is a logical outgrowth of the original proposal. If the change was (1) not contemplated in the staff report, notice, or draft amendment and (2) not discussed during the hearing(s) or in written comments received, it is not a logical outgrowth of the original proposal; and an additional notice and comment period will be provided. When the issues are complex, controversial, or confusing, an additional comment period on a new draft amendment is often allowed (even if it can be argued that the changes are a logical outgrowth of the original proposal).

(b) If the change is a logical outgrowth of the original draft amendment, it may be voted upon without an additional notice and comment period. If the vote on the amendment is delayed so that the full amendment can be retyped, etc., normal meeting notice requirements may be followed (Title 23 CCR §647.2).

(c) If the change is not a logical growth, a motion may be made to incorporate it into the draft amendment. If this motion passes, consideration of the amendment should be continued so that the revisions can be circulated for comments as provided in number 4 above.

(13) Revisions to plan amendments are based on the evidence developed at the hearing. This requirement does not preclude the State or Regional Board(s) from adopting an amendment immediately after the hearing if all evidence has been considered.

(14) If a Basin Plan amendment is quasi-judicial (focused on the rights and duties of a limited number of individuals such as in a small isolated prohibition area), the State or Regional Board resolution adopting the plan amendment will contain findings that are adequate to enable another interested person to "*bridge the analytical gap*" between the evidence the amendment itself.

(15) When a Regional Board amendment is adopted, it must then be forwarded to the State Board for approval. State Board staff will review the proposed amendment with extensive evaluation of technical, policy, and legal consistency considerations. The State Board is required to act upon submission of a water quality control plan or revision within 60 days after the Regional Board has submitted the plan, or 90 days after resubmission of the plan (California Water Code §13246). A Basin Plan revision adopted by a Regional Board is not effective until it is approved by State Board (California Water Code §13245) and the Office of Administrative Law. An amendment package to be processed for approval must include all of the following:

(a) A memorandum of transmittal including a list of all material that was part of the Regional Board record, staff contact person, and request date for State Board action. If expeditious treatment is requested, the reason for this request should be stated.

(b) A copy of the certified Regional Board resolution including adopted amendments as it will be incorporated into the appropriate Basin Plan and a copy of all documents which were considered by the Regional Board prior to adoption of the Basin Plan amendment.

(c) The Regional Board staff report with detailed rationale for changes, any technical support documentation or background information, and information regarding any relevant State Board or Regional Board actions.

(d) An environmental document and any related CEQA documents.

(e) Copies of written public comments and written Regional Board responses.

(f) A staff summary of any verbal responses to comments received after written comment deadline.

(g) A tape recording or transcript of the public hearing.

(h) Two sets of interested persons mailing lists, typed on self-adhesive address labels or pre-addressed envelopes, plus a typed interested persons list for State Board files.

(16) State Board review of a proposed plan amendment may result in approval or return to the Regional Board for consideration and resubmission. Upon resubmission, the State Board may approve, or, after a public hearing in the affected region, revise and

approve the proposed plan amendment (California Water Code §13245).

(17) Following State Board approval of the plan amendment, there is a 30-working day review period by the Office of Administrative Law. The Regional Board is responsible for preparing the administrative record (Items 15 b, c, d, e, f, and g above), a clear and concise summary, and a summary of necessity for review by the Office of Administrative Law. The summary of necessity is normally contained in the staff report. The Office of Chief Counsel at the State Board prepares a certification that the action was taken in compliance with all applicable requirements of Porter-Cologne.

(18) When the proposed Regional Board amendment has been approved by the Office of Administrative Law, the Regional Board must post a CEQA Notice of Decision with the Secretary of Resources for at least 30 days following Office of Administrative Law approval. When the State Board adopts a Statewide Plan amendment, the State Board must post the 30-day Notice of Decision.

(19) If water quality standards for surface waters are revised in the plan update, the revised plan must be submitted to the US EPA for approval, pending an US EPA determination that the standards meet the requirements of the Clean Water Act (40 CFR 130.10). The amendments must be forwarded to US EPA within 30 days of adoption by the State Board.

REFERENCES

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1. Hydrologic Unit - A classification embracing one of the following features which are defined by surface drainage divides: (1) In general, the total watershed area, including water- bearing and non - water bearing formations, such as the total drainage area of the San Diego River Valley; and (2) in coastal areas, two or more small contiguous watersheds having similar hydrologic characteristics, each watershed being directly tributary to the ocean and all watersheds emanating from one mountain body located immediately adjacent to the ocean.

2. Hydrologic Area - A major logical subdivision of a hydrologic unit which includes both water-bearing and nonwater - bearing formations. It is best typified by a major tributary of a stream, a major valley, or a plain along a stream containing one or more ground water basins and having closely related geologic, hydrologic, and topographic characteristics. Area boundaries are based primarily on surface drainage boundaries. However, where strong subsurface evidence indicates that a division of ground water exists, the area boundary may be based on subsurface characteristics.

3. Hydrologic Subarea - A major logical subdivision of a hydrologic area which includes both water-bearing and nonwater - bearing formations.

4. On February 10, 1994 the Regional Board adopted Resolution No. 94-25, A Resolution Adopting Amendments to the Comprehensive Water Quality Control Plan for the San Diego Region for the Laguna (1.10), Mission Viejo (1.20), and San Clemente (1.30), Hydrologic Areas. These hydrologic subareas are: Oso (1.21), Upper Trabuco (1.22), Middle Trabuco (1.23), Upper San Juan (1.25), Middle San Juan (1.26), Lower San Juan (1.27) and Ortega (1.28). The San Clemente Hydrologic Area (1.30) is broken into two hydrologic subareas: Prima Deshecha (1.31) and Segunda Deshecha (1.32). Figure 1-2 has not yet been updated to show the boundaries for these new hydrologic subareas.

5. State Water Resources Control Board Resolution No. 68-16, *Statement of Policy with Respect to Maintaining High Quality of Waters in California*.

6. State Water Resources Control Board Resolution No. 77-1, *Policy with Respect to Water Reclamation in California*.

7. Point sources of pollution refer to pollutants discharged to water through any discernible, confined, and discrete conveyance. Nonpoint sources of pollution refer to pollutants from diffuse sources that reach water through means other than a discernable, confined, and discrete conveyance.

8. State Board Policy for Regulating Point and Nonpoint Sources of Pollution in Accordance with the Federal Water Pollution Control Act.

9. Best Management Practices are defined as the practice, or combination of practices, that are determined to be the most effective, practicable means of preventing or reducing the amount of pollution generated by nonpoint sources to a level compatible with water quality goals (including technological, economic, and institutional considerations).

CHAPTER 2
BENEFICIAL USES

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2. BENEFICIAL USES

INTRODUCTION

The purpose of this chapter is to designate the beneficial uses for all surface and ground waters in the San Diego Region. Beneficial uses form the cornerstone of water quality protection under the Basin Plan. Once beneficial uses are designated, appropriate water quality objectives can be established and programs that maintain or enhance water quality can be implemented to ensure the protection of beneficial uses.

Beneficial uses are defined as the uses of water necessary for the survival or well being of man, plants and wildlife. These uses of water serve to promote the tangible and intangible economic, social and environmental goals of mankind. Examples include drinking, swimming, industrial and agricultural water supply, and the support of fresh and saline aquatic habitats.

Section 303 of the federal Clean Water Act (33 U.S.C. §1313) defines the term water quality standards as both the uses of the surface (navigable) waters and the water quality criteria which are applied to protect those uses. A water quality standard defines the water quality goals for a water body by designating the use or uses to be made of the water body, by setting criteria to protect the uses, and by protecting water quality through antidegradation provisions. Under the Porter-Cologne Water Quality Control Act (California Water Code, Division 7, Chapter 2 §13050), these concepts are defined separately as beneficial uses and water quality objectives. Beneficial uses and water quality objectives are required to be established for all waters of the State, both surface and ground waters. Beneficial uses of the surface and ground waters of the San Diego Region are discussed in this chapter; water quality objectives and water quality criteria are discussed in Chapter 3. Numerous key terms used throughout this chapter are defined in the Glossary which is included as Appendix A of this Basin Plan.

BENEFICIAL USES

The designation of beneficial uses must satisfy all of the applicable requirements of the California Water Code, Division 7 and the federal Clean Water Act. California Water Code, Division 7 is also known as the Porter-Cologne Water Quality Control Act. These two names are used interchangeably.

The designation of beneficial uses for the waters of the State by the Regional Board is mandated under California Water Code Section 13240. The Clean Water Act, Section 303 requires that the State adopt designated beneficial uses for surface waters. The requirements of both Acts applicable to the designation of beneficial uses are summarized below.

BENEFICIAL USE DESIGNATION UNDER THE PORTER-COLOGNE WATER QUALITY CONTROL ACT

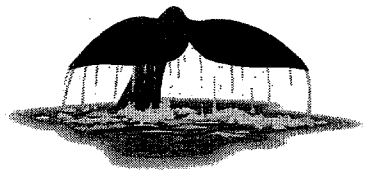

The Porter-Cologne Act establishes a comprehensive program for the protection of beneficial uses of the waters of the state. California Water Code Section 13050(f) describes the beneficial uses of surface and ground waters that may be designated by the State or Regional Board for protection as follows:

"Beneficial uses of the waters of the state that may be protected against quality degradation include, but are not necessarily limited to, domestic, municipal, agricultural and industrial supply; power generation; recreation; aesthetic enjoyment; navigation; and preservation and enhancement of fish, wildlife, and other aquatic resources or preserves."

Significant points regarding the designation of beneficial uses are:

(1) Fish, plants, and other wildlife, as well as humans, use water beneficially. Designation of beneficial uses often includes subcategories of the above beneficial uses cited in California Water Code Section 13050(f).

(2) Waste transport or waste assimilation in the state's surface and ground waters may not be designated as beneficial uses under the Porter-Cologne Act. The direction of the Act is to protect surface and ground waters against the adverse effects of waste constituents. (California Water Code §13000, §13241, and §13263). Surface or ground waters may be used for waste disposal or waste assimilation if designated beneficial uses are protected. In

authorizing the discharge of waste, the Regional Board need not authorize utilization of the full waste assimilation capacities of the receiving waters [California Water Code §13263(d)]. All discharges of waste into waters of the state are privileges not rights [California Water Code §13263(g)].

(3) Designated beneficial uses may include potential beneficial uses if existing water quality will support the use or if the necessary level of water quality can reasonably be achieved. [Water Code §13241 (a) & (c)]. Potential and existing uses are defined later in this chapter.

(4) An existing beneficial use ordinarily must be designated for protection unless another beneficial use requiring more stringent objectives is designated. The existing beneficial use designation is necessary to comply with the statutory policy in California Water Code Section 13000, which provides in part that "*...the quality of all waters in the state shall be protected for use and enjoyment by the people of the state.*"

(5) California Water Code Section 13000 provides in part that: "*The Legislature ...finds and declares that activities and factors which may affect the quality of the waters of the state shall be regulated to attain the highest possible water quality that is reasonable, considering all demands being made and to be made on those waters and the total values involved, beneficial and detrimental, economic and social, tangible and intangible.*" This policy establishes a general principal of nondegradation, with flexibility to allow some change in water quality which is in the best interests of the state. Changes in water quality are allowed only where beneficial uses are not unreasonably affected.

(6) The designation of beneficial uses must take into account the constitutional prohibition of waste and unreasonable waste of water. Designation of a beneficial use for protection should not require a waste of water pursuant to the California Constitution, Article X, Section 2.

(7) The protection and enhancement of beneficial uses require that certain quality and quantity objectives be met for surface and ground waters.

BENEFICIAL USE DESIGNATION UNDER THE CLEAN WATER ACT

Beneficial uses for surface waters are designated under the Clean Water Act Section 303 in accordance with regulations contained in 40 CFR 131. The State is required to specify appropriate water uses to be achieved and protected. The beneficial use designation of surface waters of the state must take into consideration the use and value of water for public water supplies, protection and propagation of fish, shellfish and wildlife, recreation in and on the water, agricultural, industrial and other purposes including navigation.

Significant points regarding the designation of beneficial uses under the Clean Water Act are:

(1) Existing beneficial uses are those uses actually attained in the water body on or after November 28, 1975 [40 CFR 131.3(e)].

(2) States are prohibited from adopting waste transport or waste assimilation as a designated use for surface waters [40 CFR 131.10(a)].

(3) The water quality standards of downstream waters must be considered and maintained [40 CFR 131.10(b)].

(4) States may adopt sub-categories of a use and set the appropriate criteria to reflect the varying needs of such sub-categories of uses. For example criteria should be set to differentiate between cold water and warm water fisheries [40 CFR 131.10(c)].

(5) At a minimum, uses are deemed attainable if they can be achieved by the imposition of effluent limits required under Clean Water Act, Sections 301(b) and 306 and cost effective and reasonable best management practices for nonpoint source control [40 CFR 131.10(d)].

(5) States may adopt seasonal uses as an alternative to redesignation of the beneficial uses of a water body to uses requiring less stringent water quality criteria [40 CFR 131.10(f)].

(6) States may remove a designated beneficial use or substitute sub-categories of a use only if (a) the use is not an existing use <u>and</u> (b) the state can demonstrate that attaining the designated use is not feasible for one of the following reasons [40 CFR 131.10(g)]:

- naturally occurring pollutant concentrations prevent the attainment of the use; or

- natural, ephemeral, intermittent or low flow conditions or water levels prevent the attainment of the use; or

- human caused conditions or sources of pollution prevent the attainment of the use and cannot be remedied or would cause more environmental damage to correct than to leave in place; or

- dams, diversions, or other types of hydrologic modifications preclude the attainment of the use, and it is not feasible to restore the water body to its original condition or to operate such modification in a way that would result in the attainment of the use; or

- physical conditions related to the natural features of the water body, such as the lack of a proper substrate, cover, flow, depth, pools, riffles,and the like, unrelated to water quality, preclude attainment of aquatic life protection uses; or

- controls more stringent than the controls for effluent limitations in Clean Water Act Sections 301 (b) and 306 would result in substantial and widespread economic and social impact.

(7) States may not remove designated uses if (a) they are existing uses, unless a use requiring more stringent criteria is added, or (b) such uses will be attained by implementing effluent limits under Clean Water Act Sections 301 (b) and 306 and by implementing best management practices for nonpoint source control [40 CFR 131.10(h)].

(8) If existing uses are higher than those specified in water quality standards, a state must revise its standards to reflect the uses actually being attained [40 CFR 131.10(i)].

(9) If the designated uses do not include the uses specified in Section 101(a) (2) of the Clean Water Act, or if the state wants to remove a use specified in Section 101 (a) (2), the state must conduct a "*use attainability analysis*" [40 CFR 131.10(j)]. A use attainability analysis is defined in 40 CFR 131.3(g) as a "*structured scientific assessment of the factors affecting the attainment of the use which may include physical, chemical, biological, and economic factors.*" The uses listed in Section 101 (a)(2) are protection and propagation of fish, shellfish, and wildlife, and recreation (i.e., fishable/swimmable uses).

BENEFICIAL USE DEFINITIONS

In 1972, the State Board adopted a uniform list and description of beneficial uses to be applied throughout all basins of the State. During the 1994 Basin Plan update, beneficial use definitions were revised and some new beneficial uses were added. Overall, the following twenty-three beneficial uses are now defined statewide and are designated within the San Diego Region:

Municipal and Domestic Supply (MUN) - Includes uses of water for community, military, or individual water supply systems including, but not limited to, drinking water supply.

Agricultural Supply (AGR) - Includes uses of water for farming, horticulture, or ranching including, but not limited to, irrigation, stock watering, or support of vegetation for range grazing.

Industrial Process Supply (PROC) - Includes uses of water for industrial activities that depend primarily on water quality.

Industrial Service Supply (IND) - Includes uses of water for industrial activities that do not depend primarily on water quality including, but not limited to, mining, cooling water supply, hydraulic conveyance, gravel washing, fire protection, or oil well re-pressurization.

Ground Water Recharge (GWR) - Includes uses of water for natural or artificial recharge of ground water for purposes of future extraction, maintenance of water quality, or halting of saltwater intrusion into freshwater aquifers.

Freshwater Replenishment (FRSH) - Includes uses of water for natural or artificial maintenance of surface water quantity or quality (e.g., salinity).

Navigation (NAV) - Includes uses of water for shipping, travel, or other transportation by private, military, or commercial vessels.

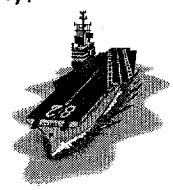

Hydropower Generation (POW) - Includes uses of water for hydropower generation.

Contact Water Recreation (REC-1) - Includes uses of water for recreational activities involving body contact with water, where ingestion of water is reasonably possible. These uses include, but are not limited to, swimming, wading, water-skiing, skin and SCUBA diving, surfing, white water activities, fishing, or use of natural hot springs.

Non-contact Water Recreation (REC-2) - Includes the uses of water for recreational activities involving proximity to water, but not normally involving body contact with water, where ingestion of water is reasonably possible. These uses include, but are not limited to, picnicking, sunbathing, hiking, beachcombing, camping, boating, tidepool and marine life study, hunting, sightseeing, or aesthetic enjoyment in conjunction with the above activities.

Commercial and Sport Fishing (COMM) - Includes the uses of water for commercial or recreational collection of fish, shellfish, or other organisms including, but not limited to, uses involving organisms intended for human consumption or bait purposes.

Aquaculture (AQUA) - Includes the uses of water for aquaculture or mariculture operations including, but not limited to, propagation, cultivation, maintenance, or harvesting of aquatic plants and animals for human consumption or bait purposes.

Warm Freshwater Habitat (WARM) - Includes uses of water that support warm water ecosystems including, but not limited to, preservation or enhancement of aquatic habitats, vegetation, fish or wildlife, including invertebrates.

Cold Freshwater Habitat (COLD) - Includes uses of water that support cold water ecosystems including, but not limited to, preservation or enhancement of aquatic habitats, vegetation, fish or wildlife, including invertebrates.

Inland Saline Water Habitat (SAL) - Includes uses of water that support inland saline water ecosystems including, but not limited to, preservation or enhancement of aquatic saline habitats, vegetation, fish, or wildlife, including invertebrates.

Estuarine Habitat (EST) - Includes uses of water that support estuarine ecosystems including, but not limited to, preservation or enhancement of estuarine habitats, vegetation, fish, shellfish, or wildlife (e.g., estuarine mammals, waterfowl, shorebirds).

Marine Habitat (MAR) - Includes uses of water that support marine ecosystems including, but not limited to, preservation or enhancement of marine habitats, vegetation such as kelp, fish, shellfish, or wildlife (e.g., marine mammals, shorebirds).

Wildlife Habitat (WILD) - Includes uses of water that support terrestrial ecosystems including, but not limited to, preservation and enhancement of terrestrial habitats, vegetation, wildlife (e.g., mammals, birds, reptiles, amphibians, invertebrates), or wildlife water and food sources.

Preservation of Biological Habitats of Special Significance (BIOL) - Includes uses of water that support designated areas or habitats, such as established refuges, parks, sanctuaries, ecological reserves, or Areas of Special Biological Significance (ASBS), where the preservation or enhancement of natural resources requires special protection.

The following coastal waters have been designated as ASBS in the San Diego Region. For detailed descriptions of their boundaries, see the discussion on ASBS in Chapter 5, Plans and Policies:

- San Diego - La Jolla Ecological Reserve, San Diego County
- Heisler Park Ecological Reserve, Orange County
- San Diego Marine Life Refuge, San Diego County

The following areas are designated Marine Life Refuges by the California legislature. A legal description of the boundaries of each marine life refuge is contained in the Fish and Game Code of California, Division 7 (Refuges), Chapter 1 (Refuges and Other Protected Areas), Article 6 (Marine Life Refuge):

- San Diego Marine Life Refuge, San Diego County
- Laguna Beach Marine Life Refuge, Orange County
- Newport Beach Marine Life Refuge, Orange County
- South Laguna Beach Marine Life Refuge, Orange County
- Dana Point Marine Life Refuge, Orange County
- Doheny Beach Marine Life Refuge, Orange County
- Niguel Marine Life Refuge, Orange County
- Irvine Coast Marine Life Refuge, Orange County
- City of Encinitas Marine Life Refuge, San Diego County

The following areas are designated Ecological Reserves by the Fish and Game Commission (California Code of Regulations, Title 14, Section

630). A legal description of the boundaries of each ecological reserve is on file at the California Department of Fish and Game headquarters, 1416 Ninth Street, Sacramento:

- Batiquitos Lagoon Ecological Reserve, San Diego County
- Blue Sky Ecological Reserve, San Diego County
- Buena Vista Lagoon Ecological Reserve, San Diego County
- Heisler Park Ecological Reserve, Orange County
- McGinty Mountain Ecological Reserve, San Diego County
- San Diego - La Jolla Ecological Reserve, San Diego County
- San Dieguito Lagoon Ecological Reserve, San Diego County
- San Elijo Lagoon Ecological Reserve, San Diego County

The following are designated Natural Preserves by the State Park and Recreation Commission (Public Resources Code, Division 5, Chapter 1, Article 1). A legal description of each natural preserve is on file at the California Department of Parks and Recreation headquarters, 1416 Ninth Street, Sacramento:

- San Mateo Creek Wetland Natural Preserve, San Diego County
- Los Penasquitos Marsh Natural Preserve, San Diego County

The following area is designated a National Estuarine Research Reserve by the National Oceanic and Atmospheric Administration (NOAA) (Coastal Zone Management Act of 1972 as amended Section 315, 16 USC 1461). A legal description of the boundaries of the national estuarine research reserve is on file at the NOAA headquarters, Office of Ocean and Coastal Resource Management, NOAA, Washington, D.C., 20235:

- Tijuana River National Estuarine Research Reserve, San Diego County

The following area is designated a National Wildlife Refuge by the U.S. Fish and Wildlife Service. A legal description of the boundaries of the national wildlife refuge is on file at the U.S. Fish and Wildlife Service headquarters, Southern California Complex, 2736 Loker Avenue West, Suite A, Carlsbad, California 92008:

- Sweetwater Marsh National Wildlife Refuge, San Diego County

Rare, Threatened, or Endangered Species (RARE) - Includes uses of water that support habitats necessary, at least in part, for the survival and successful maintenance of plant or animal species established under state or federal law as rare, threatened or endangered.

Migration of Aquatic Organisms (MIGR) - Includes uses of water that support habitats necessary for migration, acclimatization between fresh and salt water, or other temporary activities by aquatic organisms, such as anadromous fish.

Spawning, Reproduction, and/or Early Development (SPWN) - Includes uses of water that support high quality aquatic habitats suitable for reproduction and early development of fish. This use is applicable only for the protection of anadromous fish.

Shellfish Harvesting (SHELL) - Includes uses of water that support habitats suitable for the collection of filter-feeding shellfish (e.g., clams, oysters and mussels) for human consumption, commercial, or sport purposes.

EXISTING AND POTENTIAL BENEFICIAL USES

The water resources of the San Diego Region have been extensively developed over the years and today's existing beneficial uses will probably continue into the future. Since the adoption of the Basin Plan in 1975, changes in land use patterns and resultant changes in water quality have led to some subsequent modifications of beneficial use designations. Minor modifications have also been also made to clarify the definition of some of the beneficial use designations.

The beneficial use designations described in this chapter are categorized as "*existing*" or "*potential*" beneficial uses. An existing beneficial use can be established by demonstrating that:

- Fishing, swimming, or other uses have actually occurred since November 28, 1975; or

- The water quality and quantity is suitable to allow the use to be attained.

Existing beneficial uses were originally determined as part of a use survey of water resources in the Region described in Chapter 1, *History of Basin*

Planning in the San Diego Region. Beneficial use designations have also been determined using additional information gathered since 1975. Beneficial uses are designated as "*potential*" for a variety of reasons, including:

- Plans are proposed to put the water to a future use;
- Potential exists to put the water to a future use;
- The public desires to put the water to future use;
- The water is potentially suitable for municipal or domestic water supply under the terms of the *Sources of Drinking Water Policy* (State Board Resolution No. 88-63); or
- The Regional Board has designated a beneficial use as a regional water quality goal.

BENEFICIAL USES FOR SPECIFIC WATER BODIES

Designated beneficial uses are summarized in the tables at the end of this chapter as follows:

Table 2-2 Inland Surface Waters,
Table 2-3 Coastal Waters,
Table 2-4 Reservoirs and Lakes, and
Table 2-5 Ground Water.

In the tables, a "•" indicates an existing beneficial use that was actually attained in the surface or ground water on or after November 28, 1975. A "o" indicates a potential beneficial use that may develop in future years. A "+" indicates that the water body has been exempted by the Regional Board from the municipal use designation under the terms and conditions of State Board Resolution No. 88-63, *Sources of Drinking Water* Policy.

Designated beneficial uses are generally, but not always, present throughout the entire reach of a particular hydrologic unit, area, subarea, or water body. Designated beneficial uses may not be present throughout the year. Specific beneficial uses near or below discharges will be carefully evaluated by the Regional Board during the development of waste discharge requirements or enforcement orders.

Beneficial uses are designated for (a) native waters and (b) imported waters stored in a reservoir. They do not represent the use of water directly imported into the hydrologic basin, unless storage of the imported water occurs within the basin. The lack of a beneficial use listed for any given area does not rule out the possibility of existing or future beneficial uses. Existing beneficial uses which have not been formally designated in this Basin Plan are protected as well as designated uses.

DESIGNATION OF RARE BENEFICIAL USE

The RARE beneficial use designation was based, in large part, on the information contained within RareFind. RareFind is the personal computer application of the California Department of Fish and Game's Natural Diversity Data Base (NDDB). The NDDB tracks the location and condition of California's rare, threatened, endangered, and sensitive plants, animals and natural communities. The NDDB is the most complete single source of information on California's rare, endangered, threatened and sensitive species, and natural communities. However, the absence of a special animal, plant or natural community from the RareFind report does not necessarily mean that they are absent from the area in question, only that no occurrence data are currently entered in the NDDB inventory.

Under the Fish and Game Code, as well as the California Environmental Quality Act, a state lead agency is required to consult with the Department of Fish and Game to determine whether a project under consideration (e.g., the Basin Plan or a permitting process) will adversely affect any threatened or endangered species. The consultation process is important in identifying bodies of water that support threatened or endangered species. During the Basin Plan consultation process in 1994, the California Department of Fish and Game provided recent sightings of the bald eagle (*Haliaeetus leucocephalus*). The U.S. Fish and Wildlife Service provided recent surveys for the least Bell's vireo (*Vireo belli pusillus*) and southwestern willow flycatcher (*Empidonax trailli extimus*). These and other information sources are listed in the references for this chapter.

To ensure the applicability of the RareFind information, only current sightings (i.e., those sightings since November 28, 1975) were used. In addition, consideration was given to the frequency, abundance, and occurrence history for each sighting(s), and how recent the sighting was. The RARE designation has been added where there is substantial evidence that the water body supports

Table 2 - 1. Water - Dependent Threatened or Endangered Species Which Were Considered in the RARE Beneficial Use Designation

NAME	STATUS *	TYPE	HABITAT REMARKS
Blue Whale *Balaenoptera musculus*	FE	Mammal	Ocean
Western Snowy Plover *Charadrius alexandrinus nivosus* (breeding)	FE, CSC	Shore bird	Beaches, Estuarine Salt Ponds
Pacific Green Sea Turtle *Chelonia mydas*	FE	Reptile	Marine
Salt-Marsh Bird's Beak *Cordylanthus maritimus* ssp. *maritimus*	SE, FE	Plant	Salt Marsh
Southwestern Willow Flycatcher *Empidonax traillii extimus*	SE, Proposed FE	Bird	Riparian Woodland Habitat
Tidewater Goby *Eucyclogobius newberryi* (Girard)	FE	Fish	Shallow Marine Waters, and in the Lower Reaches of Streams
Bald Eagle *Haliaeetus leucocephalus*	SE, FT, CP	Bird	Lake
Humpback Whale *Megaptera novaeangliae*	FE	Mammal	Ocean
Willowy Monardella *Monardella linoides* ssp. *viminea*	SE, C2	Plant	Riparian Scrub Habitat
Belding's Savannah Sparrow *Passerculus sandwichensis beldingi*	SE, C2	Bird	Coastal Wetlands
California Brown Pelican *Pelecanus occidentalis californicus*	SE, FE	Bird	Estuarine, Marine, Subtidal, and Marine Pelagic Waters
Light-Footed Clapper Rail *Rallus longirostris levipes*	FE, CP	Bird	Coastal Marshes, Mudflats
California Least Tern *Sterna antillarum browni*	SE, FE	Bird	Marine, Coastal Area Waters
Least Bell's Vireo *Vireo bellii pusillus*	SE, FE	Bird	Riparian Woodland Habitat

Status *

Federally threatened (FT) or endangered (FE) species are defined under Section 3 of the federal Endangered Species Act of 1973 (50 CFR 17). An endangered species is any species, including subspecies and varieties, "in danger of extinction throughout all or a significant portion of its range." A threatened species is any species "likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range." Threatened and endangered species have been the subject of a proposed and final rule (or regulation) published in the Federal Register. Thus, these species are also referred to as listed species. Proposed species are species proposed for listing as a threatened or endangered species for which a proposed rule, but not a final rule, has been published in the Federal Register.

Proposed species are granted limited protection under the federal Endangered Species Act. These species must be addressed by federal agencies in biological assessments (Section 7), and are given special management consideration by regulatory agencies. Candidate species are species under consideration for listing, but have not been subject to a proposed rule. Categories for candidate species relate solely to the level of biological information available and not to the degree of threat. Candidate species are not protected under the federal Endangered Species Act.

Candidate species however, are afforded special management consideration due to their status and sensistivity. The U.S. Fish and Wildlife Service provides technical assistance to Federal, State and local agencies on the conservation and management of candidate species. Candidate species in Category 1 (C1) are those taxa that seem to conform to the State definition of threatened or endangered species and should be added to the offical list. Candidate species in Category 2 (C2) are those taxa that have populations that are low, scattered, or highly localized. Their populations have declined in abundance in recent years and so require managment to prevent them from becoming threatened species.

The definitions of state threatened (ST) or endangered (SE) species under the California Endangered Species Act are the same as under the federal Endangered Species Act. Under the State Act, all animals previously listed as Rare have been "grandfathered" into the State Act as threatened. All plants previously listed as Rare have been kept as Rare. All plants now listed under the State Act are listed as threatened or endangered.

California Species of Special Concern (CSC) are animal species that have no specific status as a state listed species, but which appear to be vulnerable to extinction because of declining populations, limited ranges, or rarity. Species of Special Concern meet the criteria for state listing and are commonly addressed under the California Environmental Quality Act. The category of California Fully Protected Species (CP) was established by the California legislature and prohibits the possession or taking of sensitive animals, or parts thereof (Sections 3511, 4700, 5050, and 5515, Fish and Game Code).

threatened or endangered species. By definition, water bodies with a RARE designation support habitats necessary, at least in part, for the survival and successful maintenance of plant or animal species established under state or federal law as rare, threatened or endangered. Those plant or animal species which were used in the designation of specific water bodies with the RARE beneficial use are shown in Table 2-1. The Regional Board can provide specific information about the sighting(s) used to designate the RARE beneficial use. However, it is the responsibility of the lead agency or project sponsor to provide adequate information as to whether a proposed project will affect fish and wildlife (including plants) and their habitats.

The RARE beneficial use is generally, but not always, present throughout the entire reach of a particular waterbody. Also, the RARE beneficial use may not be present throughout the year. The RARE designation is placed on bodies of water where the protection of a threatened or endangered species depends on the water either directly, or to support its habitat. The purpose of the RARE designation for a particular water body is to highlight the existence of the threatened or endangered species. This will ensure that, absent extraordinary circumstances, they are not placed in jeopardy by the quality of the discharges to those water bodies.

Recognition that a water body is used by threatened or endangered species (RARE designation) does not necessarily mean that any particular suite of water quality objectives will be applied to the water body. In the absence of species specific or site specific objectives, the Regional Board would rely on objectives for WARM and COLD to implement the RARE designation. The existing WARM and COLD beneficial use designations are believed to be stringent enough to protect threatened or endangered species. If these issues arise in the future, they will be decided on a case-by-case basis, considering the most recent scientific data, site-specific factors, and other beneficial uses.

DESIGNATION OF COLD FRESHWATER HABITAT BENEFICIAL USE

Water bodies with a *"Cold Freshwater Habitat"* (COLD) beneficial use designation support cold freshwater ecosystems including, but not limited to, preservation or enhancement of aquatic habitats, vegetation, fish, or wildlife, including invertebrates.

In the San Diego Region, the cold freshwater fish used for the COLD designation is the rainbow trout. The rainbow trout, *Oncorhynchus mykiss*, is native to the Region. Rainbow trout which migrate from fresh water to the ocean are known as steelhead and those which remain in fresh water are known as a resident population. In addition, hatchery stocked rainbow trout have been planted throughout the Region since the 1880's. Some of these hatchery stocked trout have developed wild populations, and some have hybridized with native trout populations. Other species of trout may have been stocked from time to time, by various mechanisms into the Region's water bodies. (One of these trout is the European brown trout, *Salmo trutta*. At the present time, the brown trout is no longer stocked due to concern for its impacts on fishery resources and the fact that it is picivorous.)

Cold fresh water bodies are usually below 70° F, contain well-oxygenated water, and contain cold freshwater aquatic habitat suitable for cold freshwater fish. Optimum temperatures for growth and for most life stages of rainbow trout are 56 to 70° F (Moyle, 1976). The temperature tolerance for rainbow trout is reported to be from about 32° F to the mid-80's depending on the oxygen content of the water, size of fish, and the degree of acclimation. To survive at the higher water temperatures, trout require a gradual acclimation and water that is saturated with oxygen. Also, smaller trout may withstand the higher temperatures better than the larger fish.

Rainbow trout prefer well-oxygenated water but can survive at very low oxygen levels, the level tending to be less at lower temperatures and longer periods of acclimation. For example, mean lethal oxygen concentrations range from 1.05 ppm at 52° F to 1.51 ppm at 68° F for rainbow trout averaging 3.8 inches in length (McAfee, 1966).

Rainbow trout do well in waters of pH from 7 to 8 and have adapted to waters of varying pH, ranging from at least 5.8 to 9.6 (Sigler, 1987).

In cold fresh water bodies, where the water body Is free-flowing, such as in a river, stream

or creek, the habitat usually supports a diversity of aquatic insects, including those aquatic insects which require a high quality of water. Typically, there is overhanging cover and shade, provided by a variety of aquatic plants, terrestrial plants, and trees. Another characteristic is that the bottom substrate usually contains structure, provided by tree root wads, logs, boulders, or gravel.

DESIGNATION OF SPAWNING, REPRODUCTION, AND/ OR EARLY DEVELOPMENT (SPWN) BENEFICIAL USE

In the San Diego Region, the SPWN beneficial use designation is assigned only to water bodies with MAR and/ or COLD beneficial uses. The marine fish used for the SPWN designation includes any marine fish. The cold freshwater fish used for the SPWN designation is the rainbow trout. Rainbow trout usually spawn in the Spring, and require spawning areas with gravel and cool, free-flowing, well-oxygenated water. Rainbow trout prefer to spawn in rivers, streams and creeks with a moderate gradient and containing riffles, however some populations of rainbow trout are also known to successfully spawn in lake inlets and outlets. The fry of rainbow trout need suitable nurseries, which allow protection from predators, such as the slow, shallow areas adjacent to riffles, with shade from bank vegetation. The fry also require an abundance of aquatic insects for forage.

SOURCES OF DRINKING WATER POLICY

In November 1986, the Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65) was approved by the California voters. Proposition 65 prohibits the discharge of toxic substances into "*sources of drinking water*". The State Board has defined the term "*sources of drinking water*" in Resolution No. 88-63, *Sources of Drinking Water* Policy. This policy specifies that, except under specifically defined conditions, all surface and ground waters of the state are to be protected as existing or potential sources of municipal and domestic water supply. The exceptions include where:

- The total dissolved solids concentration of surface and ground waters exceed 3,000 mg/l;
- The water source has a low sustainable yield of less than 200 gallons per day for a single well;
- There is contamination that cannot reasonably be treated for domestic use with either best management practices or best economically available treatment practices;
- The surface waters are in particular municipal, industrial, and agricultural conveyance and holding facilities; and
- The ground waters are regulated geothermal energy ground waters.

Resolution No. 88-63 provides that any water body designated with an existing or potential municipal and domestic supply (MUN) beneficial use is also defined as a suitable or potentially suitable source of drinking water. The policy also allows a water body to retain beneficial use designations assigned prior to the State Board's adoption of the *Sources of Drinking Water* Policy.

EXCEPTIONS TO THE "SOURCES OF DRINKING WATER" POLICY

In 1989 the Regional Board adopted Resolution No. 89-33, '*Incorporation of "Sources of Drinking Water" Policy into the Water Quality Control Plan (Basin Plan) of the San Diego Region*'. Resolution No. 89-33 incorporates the State Board's *Sources of Drinking Water* Policy into the Basin Plan. Resolution No. 89-33 also provides an initial list of surface and ground water hydrologic units, areas, and subareas which the Regional Board has previously determined do not support the MUN or "*Sources of Drinking Water*" designation. Since 1989, additional areas have also been identified as exceptions to the *Sources of Drinking Water* Policy. These ground and surface water hydrologic units, areas, and subareas are identified in Tables 2-2 and 2-5 with a "+" indicating that the water body has been exempted by the Regional Board from the municipal use designation under the terms and conditions of State Board Resolution No. 88-63, *Sources of Drinking Water* Policy.

INLAND SURFACE WATERS

Inland surface waters consist of all waters in the Region exclusive of the waters of the Pacific Ocean, enclosed bays and estuaries, coastal lagoons, and ground waters. The existing and potential beneficial uses of inland surface waters and their tributaries in the Region are presented in Table 2-2. Hydrologic unit, area, and subarea numbers are noted in Table 2-2 as a cross reference to the classification system developed by the California Department of Water Resources. For those surface water bodies that cross into other hydrologic units, such water bodies appear more than once in a table. In Table 2-2, starting from the north and proceeding towards the south within the Region, watersheds are listed by the direction of flow from the headwaters downstream to the outlet. Within a particular watershed, the mainstream water body is listed first and is placed flush left in the table, the upstream tributaries are listed below the mainstream water body and placed to the right. In most instances, surface waters are subdivided into reaches at hydrologic subarea boundaries. Those waters not specifically listed (generally smaller tributaries) are designated with the same beneficial uses as the streams, lakes, or reservoirs to which they are tributary.

Although most free flowing streams in the Region are essentially interrupted in character having both perennial and ephemeral components, several beneficial uses, including aesthetic enjoyment and habitats for fish and wildlife, are made of these surface waters. Beneficial uses of inland surface waters generally include REC-1 (swimmable) and WARM or COLD. Additionally, inland waters are usually designated as IND, PRO, REC-2, WILD, and are sometimes designated as BIOL and RARE. Inland surface waters that meet the criteria mandated by the *Sources of Drinking Water* Policy are designated MUN. Unless otherwise designated by the Regional Board, all inland surface waters in the Region are considered suitable or potentially suitable as a municipal and domestic water supply.

COASTAL WATERS

Coastal waters discussed in this section may be defined as waters subject to tidal action and include the water bodies defined below. Beneficial uses of coastal waters in the region generally include REC-1, REC-2, EST, WILD, RARE, and MAR. The Pacific Ocean and San Diego Bay also include NAV.

- ***Ocean Waters***

Ocean Waters are the territorial marine waters of the Region as defined by California law to the extent these waters are outside of enclosed bays, estuaries, and coastal lagoons.

- ***Enclosed Bays***

Enclosed bays are indentations along the coast which enclose an area of oceanic water within distinct headlands or harbor works. Enclosed bays includes all bays where the narrowest difference between the headlands or outermost harbor works is less than 75% of the greatest dimension of the enclosed portion of the bay. Enclosed bays do not include inland surface waters or ocean waters.

- ***Estuaries***

Estuaries means waters, including coastal lagoons, located at the mouths of streams which serve as areas of mixing for fresh and ocean waters. Coastal lagoons and mouths of streams which are temporarily separated from the ocean by sandbars are considered estuaries. Estuarine waters are considered to extend from a bay or the open ocean to a point upstream where there is no significant mixing of fresh water and sea water. Estuaries do not include inland surface waters or ocean waters.

Beneficial uses for these coastal waters provide habitat for marine life and are used extensively for recreation, boating, shipping, and commercial and sport fishing. Coastal waters in the San Diego Region have as many as fourteen designated beneficial uses.

All coastal lagoons of the Region are included in the category "*Coastal Waters*". The mouths of most of the rivers and creeks are continually affected by tidal action and present a relatively stable environment for wildlife and vegetation. Other coastal lagoons may be separated from tidal action by earthen deposits and thus present an environment with major seasonal variations. Such conditions result in the development of a unique biologic community highly specific to that area. Occasionally, the mouths of these coastal lagoons are opened, subjecting the lagoons to tidal flushing to enhance their value for recreational use. This action would not alter the categories of beneficial uses of the coastal lagoons.

A listing of coastal waters in the San Diego Region and the existing and potential beneficial uses of each are summarized in Table 2-3.

RESERVOIRS AND LAKES

The water resources with the greatest diversity of beneficial uses in the Region are the man-made water storage reservoirs and lakes. Located in nearly all of the Region's hydrologic units, these reservoirs and lakes intercept surface runoff and store imported water supplies. As such, the storage reservoirs serve as: (1) sources of supply for municipalities, agricultural areas, and industrial operations; (2) recreational bodies; and (3) habitats for fish and wildlife. In a few cases, such as reservoirs used primarily for drinking water, REC-1 uses can be restricted or prohibited by the entities that manage these waters. Many of these reservoirs, however, are designated as potential for REC-1, reflecting federal Clean Water Act goals.

A listing of existing and potential beneficial uses of major reservoirs and lakes in the San Diego Region is given in Table 2-4.

GROUND WATERS

Ground water is defined as subsurface water that occurs beneath the water table in soils and geologic formations that are fully saturated. Ground water bearing formations sufficiently permeable to transmit and yield significant quantities of water are called aquifers (Bouwer, 1978). A ground water basin is defined as a hydrogeologic unit containing one large aquifer or several connected and interrelated aquifers (Todd, 1980).

The principal ground water basins in the San Diego Region are small and shallow. Only a small portion of the Region is underlain by permeable geologic formations that can accept, transmit and yield appreciable quantities of ground water. In many parts of the Region, usable ground water occurs outside of the principal ground water basins. There are ground water bearing geologic formations in the Region that do not meet the definition of an aquifer. Accordingly, the term "*ground water*" for basin planning and regulatory purposes, includes all subsurface waters that occur in fully saturated zones within soils, and other geologic formations. Subsurface waters are considered ground water even if the waters do not occur in an aquifer or an identified ground water basin.

Ground waters in the San Diego Region can have as many as six designated beneficial uses including: (1) municipal and domestic; (2) agricultural; (3) industrial service supply; (4) industrial process supply; (5) ground water recharge; and (6) freshwater replenishment. Nearly all of the ground water development in the Region has been for the purpose of municipal and agricultural supply. Ground water uses in some hydrologic units have been expanded to include industrial uses, especially gravel and sand washing. The fresh water replenishment designation has been assigned to ground water basins that are utilized for supplying water to a lake or stream. The ground water recharge designation has been applied to ground water hydrologic units which are used to recharge another hydrologic unit.

Most of the ground waters in the Region have been extensively developed; the availability of potential future uses of ground water resources is limited. Further development of ground water resources would probably necessitate ground water recharge programs to maintain adequate ground water table elevations.

Ground waters that meet the criteria mandated by the *Sources of Drinking Water Policy* are designated MUN. Unless otherwise designated by the Regional Board all ground waters in the Region are considered suitable or potentially suitable as sources of drinking water.

The Regional Board has deleted beneficial use designations in portions of certain hydrologic ground water units, areas or subareas. Available information indicated that the beneficial uses in portions of these hydrologic ground water basins did not occur and were not likely to occur in the future. The Regional Board will issue waste discharge requirements and enforcement orders in these basins in conformance with the terms and conditions of State Board Resolution No. 68-16, *Statement of Policy With Respect to Maintaining High Quality of Waters in California*. It is the Regional Board's intent that water quality be maintained in conformance with the terms and conditions of Resolution No. 68-16.

A listing of the beneficial uses of the ground waters in the Region is presented in Table 2-5.

BENEFICIAL USE TABLES

Designated beneficial uses are summarized in the tables at the end of this chapter as follows:

Table 2-2 Inland Surface Waters;
Table 2-3 Coastal Waters;
Table 2-4 Reservoirs and Lakes; and
Table 2-5 Ground Water

In the tables, a "•" indicates an existing beneficial use that was actually attained in the surface or ground water on or after November 28, 1975. A "o" indicates a potential beneficial use that will probably develop in future years through the implementation of various control measures. Potential uses also include uses that have been developed in the past but have been abandoned for reasons other than water quality. A "+" indicates that the water body has been exempted by the Regional Board from the municipal use designation under the terms and conditions of State Board Resolution No. 88-63, *Sources of Drinking Water Policy*.

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Table 2-2. BENEFICIAL USES OF INLAND SURFACE WATERS

Inland Surface Waters [1,2]	Hydrologic Unit Basin Number	BENEFICIAL USE														
		MUN	AGR	IND	PROC	GWR	FRSH	POW	REC1	REC2	BIOL	WARM	COLD	WILD	RARE	SPWN
Orange County Coastal Streams																
Moro Canyon	1.11	+	●						O	●		●		●		
unnamed intermittent coastal streams	1.11	+	●						O	●		●		●		
Emerald Canyon	1.11	+	●						O	●		●		●		
Boat Canyon	1.11	+	●						O	●		●		●		
Laguna Canyon	1.12	+	●						O	●		●		●		
Blue Bird Canyon	1.12	+	●						O	●		●		●		
Rim Rock Canyon	1.12	+	●						O	●		●		●		
unnamed intermittent coastal streams	1.13	+	●						O	●		●		●		
Hobo Canyon	1.13	+	●						O	●		●		●		
Aliso Creek Watershed																
Aliso Creek	1.13	+	●						O	●		●		●		
English Canyon	1.13	+	●						O	●		●		●		
Sulphur Creek	1.13	+	●						O	●		●		●		
Wood Canyon	1.13	+	●						O	●		●		●		
Aliso Creek Mouth	1.13	See Coastal Waters - Table 2-3														

● Existing Beneficial Use

O Potential Beneficial Use

\+ Excepted From MUN (See Text)

[1] Waterbodies are listed multiple times if they cross hydrologic area or sub area boundaries.

[2] Beneficial use designations apply to all tributaries to the indicated waterbody, if not listed separately.

001913

Table 2-2. BENEFICIAL USES OF INLAND SURFACE WATERS

Inland Surface Waters [1,2]	Hydrologic Unit Basin Number	BENEFICIAL USE														
		MUN	AGR	IND	PROC	GWR	FRSH	POW	REC1	REC2	BIOL	WARM	COLD	WILD	RARE	SPWN
Dana Point Watershed																
unnamed intermittent coastal streams	1.14	+	●						O	●		●		●		
Salt Creek	1.14	+	●						O	●		●		●		
San Juan Canyon	1.14	+	●						O	●		●		●		
Arroyo Salada	1.14	+	●						O	●		●		●		
San Juan Creek Watershed																
San Juan Creek	1.25	+	●	●					●	●		●	●	●		
Morrell Canyon	1.25	+	●	●					●	●		●	●	●		
Decker Canyon	1.25	+	●	●					●	●		●	●	●		
Long Canyon	1.25	+	●	●					●	●		●	●	●		
Lion Canyon	1.25	+	●	●					●	●		●	●	●		●
Hot Spring Canyon	1.25	+	●	●					●	●		●	●	●		●
Cold Spring Canyon	1.25	+	●	●					●	●		●	●	●		
Lucas Canyon	1.25	+	●	●					●	●		●	●	●		
Aliso Canyon	1.25	+	●	●					●	●		●	●	●		
Verdugo Canyon	1.25	+	●	●					●	●		●	●	●		
Bell Canyon	1.25	+	●	●					●	●		●	●	●		
Fox Canyon	1.25	+	●	●					●	●		●	●	●		

● Existing Beneficial Use

O Potential Beneficial Use

+ Excepted From MUN (See Text)

[1] Waterbodies are listed multiple times if they cross hydrologic area or sub area boundaries.

[2] Beneficial use designations apply to all tributaries to the indicated waterbody, if not listed separately.

001914

Table 2-2. BENEFICIAL USES OF INLAND SURFACE WATERS

Inland Surface Waters [1,2]	Hydrologic Unit Basin Number	BENEFICIAL USE														
		MUN	AGR	IND	PROC	GWR	FRSH	POW	REC1	REC2	BIOL	WARM	COLD	WILD	RARE	SPWN
San Juan Creek Watershed - continued																
Dove Canyon	1.24	+	●	●					●	●		●	●	●		
Crow Canyon	1.25	+	●	●					●	●		●	●	●		
San Juan Creek	1.26	+	●	●					●	●		●	●	●		
Trampas Canyon	1.26	+	●	●					●	●		●	●	●		
Canada Gobernadora	1.24	+	●	●					●	●		●	●	●		
Canada Chiquita	1.24	+	●	●					●	●		●	●	●		
San Juan Creek	1.28	+	●	●					●	●		●	●	●		
San Juan Creek	1.27	+	●	●					●	●		●	●	●		
Horno Creek	1.27	+	●	●					●	●		●	●	●		
Arroyo Trabuco Creek	1.22	+	●	●					●	●		●	●	●		●
Holy Jim Canyon	1.22	+	●	●					●	●		●	●	●		●
Falls Canyon	1.22	+	●	●					●	●		●	●	●		
Rose Canyon	1.22	+	●	●					●	●		●	●	●		
Hickey Canyon	1.22	+	●	●					●	●		●	●	●		
Live Oak Canyon	1.22	+	●	●					●	●		●	●	●		
Arroyo Trabuco Creek	1.23	+	●	●					●	●		●	●	●		
Tijeras Canyon	1.23	+	●	●					●	●		●	●	●		

● Existing Beneficial Use

O Potential Beneficial Use

\+ Excepted From MUN (See Text)

[1] Waterbodies are listed multiple times if they cross hydrologic area or sub area boundaries.

[2] Beneficial use designations apply to all tributaries to the indicated waterbody, if not listed separately.

001915

Table 2-2. BENEFICIAL USES OF INLAND SURFACE WATERS

Inland Surface Waters [1,2]	Hydrologic Unit Basin Number	BENEFICIAL USE														
		MUN	AGR	IND	PROC	GWR	FRSH	POW	REC1	REC2	BIOL	WARM	COLD	WILD	RARE	SPWN
San Juan Creek Watershed - continued																
Arroyo Trabuco Creek	1.27	+	●	●					●	●		●	●	●		
Oso Creek	1.21	+	●	●					●	●		●	●	●		
La Paz Creek	1.21	+	●	●					●	●		●	●	●		
San Juan Creek Mouth	1.27	See Coastal Waters - Table 2-3														
Orange County Coastal Streams																
Prima Deshecha Canada	1.31	+	●						O	●		●		●		
unnamed intermittent coastal streams	1.30	+	●						O	●		●		●		
Segunda Deshecha Canada	1.32	+	●						O	●		●		●		
San Mateo Creek Watershed																
San Mateo Creek	1.40	+							O	●		●	●	●	●	●
Devil Canyon	1.40	+							O	●		●	●	●		●
Cold Spring Canyon	1.40	+							O	●		●	●	●		
San Mateo Canyon	1.40	+							O	●		●	●	●	●	●
Los Alamos Canyon	1.40	+							O	●		●	●	●		●
Wildhorse Canyon	1.40	+							O	●		●	●	●		
Tenaja Canyon	1.40	+							O	●		●	●	●		●
Bluewater Canyon	1.40	+							O	●		●	●	●		

● Existing Beneficial Use

O Potential Beneficial Use

+ Excepted From MUN (See Text)

[1] Waterbodies are listed multiple times if they cross hydrologic area or sub area boundaries.

[2] Beneficial use designations apply to all tributaries to the indicated waterbody, if not listed separately.

001916

Table 2-2. BENEFICIAL USES OF INLAND SURFACE WATERS

Inland Surface Waters [1,2]	Hydrologic Unit Basin Number	BENEFICIAL USE														
		MUN	AGR	IND	PROC	GWR	FRSH	POW	REC1	REC2	BIOL	WARM	COLD	WILD	RARE	SPWN
San Mateo Creek Watershed - continued																
Nickel Canyon	1.40	+							O	●		●	●	●		
Christianitos Creek	1.40	+							O	●		●	●	●		
Gabino Canyon	1.40	+							O	●		●	●	●		
La Paz Canyon	1.40	+							O	●		●	●	●		
Blind Canyon	1.40	+							O	●		●	●	●		
Talega Canyon	1.40	+							O	●		●	●	●		
San Mateo Creek Mouth	1.40	See Coastal Waters- Table 2-3														
San Onofre Creek Watershed																
San Onofre Creek	1.51	+	●						●	●		●	●	●		●
San Onofre Canyon North Fork	1.51	+	●						●	●		●	●	●		●
Jardine Canyon	1.51	+	●						●	●		●	●	●		
San Onofre Canyon	1.51	+	●						●	●		●	●	●		●
San Onofre Canyon South Fork	1.51	+	●						●	●		●	●	●	●	
San Onofre Creek Mouth	1.51	See Coastal Waters- Table 2-3														
unnamed intermittent coastal streams	1.51	+	●						●	●		●		●		
Foley Canyon	1.51	+	●						●	●		●		●		
Horno Canyon	1.51	+	●						●	●		●		●		
Las Flores Creek	1.52	+	●						●	●		●	●	●	●	

● Existing Beneficial Use

O Potential Beneficial Use

\+ Excepted From MUN (See Text)

[1] Waterbodies are listed multiple times if they cross hydrologic area or sub area boundaries.

[2] Beneficial use designations apply to all tributaries to the indicated waterbody, if not listed separately.

001917

Table 2-2. BENEFICIAL USES OF INLAND SURFACE WATERS

Inland Surface Waters [1,2]	Hydrologic Unit Basin Number	BENEFICIAL USE														
		MUN	AGR	IND	PROC	GWR	FRSH	POW	REC1	REC2	BIOL	WARM	COLD	WILD	RARE	SPWN
San Onofre Creek Watershed - continued																
Piedra de Lumbre Canyon	1.52	+	●						●	●		●	●	●	●	
unnamed intermittent coastal streams	1.52	+	●						●	●		●		●		
Aliso Canyon	1.53	+	●						●	●		●	●	●	●	
French Canyon	1.53	+	●						●	●		●		●	●	
Cocklebur Canyon	1.53	+	●						●	●		●		●		
Santa Margarita River Watershed																
Santa Margarita River	2.22	●	●	●					●	●		●	●	●	●	
Murrieta Creek	2.31	●	●	●	●				O	●		●		●		
Bundy Canyon	2.31	●	●	●	●				O	●		●		●		
Slaughterhouse Canyon	2.31	●	●	●	●				O	●		●		●		
Murrieta Creek	2.32	●	●	●	●				O	●		●		●		
Murrieta Creek	2.52	●	●	●	●	●			O	●		●		●		
Cole Canyon	2.32	●	●	●	●				O	●		●		●		
Miller Canyon	2.32	●	●	●	●				O	●		●		●		
Warm Springs Creek	2.36	●	●	●	●				O	●		●		●		
Diamond Valley	2.36	●	●	●	●				O	●		●		●		
Goodhart Canyon	2.36	●	●	●	●				O	●		●		●		

● Existing Beneficial Use

O Potential Beneficial Use

+ Excepted From MUN (See Text)

[1] Waterbodies are listed multiple times if they cross hydrologic area or sub area boundaries.

[2] Beneficial use designations apply to all tributaries to the indicated waterbody, if not listed separately.

001918

Table 2-2. BENEFICIAL USES OF INLAND SURFACE WATERS

Inland Surface Waters [1,2]	Hydrologic Unit Basin Number	BENEFICIAL USE														
		MUN	AGR	IND	PROC	GWR	FRSH	POW	REC1	REC2	BIOL	WARM	COLD	WILD	RARE	SPWN
Santa Margarita River Watershed - continued																
Pixley Canyon	2.36	●	●	●	●				O	●		●		●		
Warm Springs Creek	2.35	●	●	●	●				O	●		●		●		
Domenigoni Valley	2.35	●	●	●	●				O	●		●		●		
Warm Springs Creek	2.34	●	●	●	●				O	●		●		●		
Warm Springs Creek	2.33	●	●	●	●				O	●		●		●		
French Valley	2.33	●	●	●	●				O	●		●		●		
Santa Gertrudis Creek	2.42	●	●	●	●	O			●	●		●		●		
Long Valley	2.42	●	●	●	●	O			●	●		●		●		
Glenoak Valley	2.42	●	●	●	●	O			●	●		●	●	●		
Tucalota Creek	2.43	●	●	●	●	O			●	●		●	●	●		
Willow Canyon	2.44	●	●	●	●	O			●	●		●	●	●		
Lake Skinner	2.41	See Reservoirs & Lakes- Table 2-4														
Tucalota Creek	2.41	●	●	●	●	O			●	●		●		●		
Crown Valley	2.41	●	●	●	●	O			●	●		●	●	●		
Rawson Canyon	2.41	●	●	●	●	O			●	●		●	●	●		
Tucalota Creek	2.42	●	●	●	●	O			●	●		●		●		
Santa Gertrudis Creek	2.32	●	●	●	●				O	●		●		●		

● Existing Beneficial Use

O Potential Beneficial Use

[1] Waterbodies are listed multiple times if they cross hydrologic area or sub area boundaries.

[2] Beneficial use designations apply to all tributaries to the indicated waterbody, if not listed separately.

001919

Table 2-2. BENEFICIAL USES OF INLAND SURFACE WATERS

Inland Surface Waters [1,2]	Hydrologic Unit Basin Number	BENEFICIAL USE														
		MUN	AGR	IND	PROC	GWR	FRSH	POW	REC1	REC2	BIOL	WARM	COLD	WILD	RARE	SPWN
Santa Margarita River Watershed - continued																
Long Canyon	2.32	●	●	●	●				O	●		●		●		
Temecula Creek	2.93	●	●	●	●	●			O	●		●		●		
Kohler Canyon	2.93	●	●	●	●	●			O	●		●	●	●		
Rattlesnake creek	2.93	●	●	●	●	●			O	●		●	●	●		
Temecula Creek	2.92	●	●	●	●	●			O	●		●		●		
Chihuahua Creek	2.94	●	●	●	●	●			O	●		●		●		
Chihuahua Creek	2.92	●	●	●	●	●			O	●		●		●		
Cooper Canyon	2.92	●	●	●	●	●			O	●		●		●		
Iron Spring Canyon	2.92	●	●	●	●	●			O	●		●		●		
Temecula Creek	2.91	●	●	●	●	●			O	●		●		●		
Culp Valley	2.91	●	●	●	●	●			O	●		●		●		
Temecula Creek	2.84	●	●	●	●	●			●	●		●	●	●		●
Tule Creek	2.84	●	●	●	●	●			●	●		●	●	●		
Million Dollar Canyon	2.84	●	●	●	●	●			●	●		●	●	●		
Cottonwood Creek	2.84	●	●	●	●	●			●	●		●	●	●		●
Temecula Creek	2.83	●	●	●	●	●			●	●		●	●	●		●
Long Canyon	2.83	●	●	●	●	●			●	●		●	●	●		●

● Existing Beneficial Use

O Potential Beneficial Use

[1] Waterbodies are listed multiple times if they cross hydrologic area or sub area boundaries.

[2] Beneficial use designations apply to all tributaries to the indicated waterbody, if not listed separately.

001920

Table 2-2. BENEFICIAL USES OF INLAND SURFACE WATERS

Inland Surface Waters [1,2]	Hydrologic Unit Basin Number	BENEFICIAL USE														
		MUN	AGR	IND	PROC	GWR	FRSH	POW	REC1	REC2	BIOL	WARM	COLD	WILD	RARE	SPWN
Santa Margarita River Watershed - continued																
Vail Lake	2.81	See Reservoirs & Lakes- Table 2-4														
Wilson Creek	2.63	●	●	●	●	●			O	●		●		●		
Wilson Creek	2.61	●	●	●	●	●			O	●		●		●		
Cahuilla Creek	2.73	●	●	●	●	●			O	●		●		●		
Hamilton Creek	2.74	●	●	●	●	●			O	●		●		●		
Hamilton Creek	2.73	●	●	●	●	●			O	●		●		●		
Cahuilla Creek	2.72	●	●	●	●	●			O	●		●		●		
Cahuilla Creek	2.71	●	●	●	●	●			O	●		●		●		
Elder Creek	2.71	●	●	●	●	●			O	●		●		●		
Cahuilla Creek	2.61	●	●	●	●	●			O	●		●		●		
Wilson Creek	2.81	●	●	●	●	●			●	●		●	●	●		
Lewis Valley	2.62	●	●	●	●	●			O	●		●		●		
Arroyo Seco Creek	2.81	●	●	●	●	●			●	●		●	●	●		
Arroyo Seco Creek	2.82	●	●	●	●	●			●	●		●	●	●		●
Kolb Creek	2.81	●	●	●	●	●			●	●		●	●	●		
Temecula Creek	2.81	●	●	●	●	●			●	●		●	●	●		●
Temecula Creek	2.51	●	●	●	●	●			O	●		●		●		

● Existing Beneficial Use

O Potential Beneficial Use

[1] Waterbodies are listed multiple times if they cross hydrologic area or sub area boundaries.

[2] Beneficial use designations apply to all tributaries to the indicated waterbody, if not listed separately.

001921

Table 2-2. BENEFICIAL USES OF INLAND SURFACE WATERS

Inland Surface Waters [1,2]	Hydrologic Unit Basin Number	BENEFICIAL USE														
		MUN	AGR	IND	PROC	GWR	FRSH	POW	REC1	REC2	BIOL	WARM	COLD	WILD	RARE	SPWN
Santa Margarita River Watershed - continued																
Temecula Creek	2.52	●	●	●	●	●			O	●		●		●		
Pechanga Creek	2.52	●	●	●	●	●			O	●		●		●		
Rainbow Creek	2.23	●	●	●					●	●		●	●	●		●
Rainbow Creek	2.22	●	●	●					●	●		●	●	●		●
Sandia Canyon	2.22	●	●	●					●	●		●	●	●		●
Walker Basin	2.22	●	●	●					●	●		●	●	●		
Santa Margarita River	2.21	●	●	●					●	●		●	●	●	●	
DeLuz Creek	2.21	●	●	●					●	●		●	●	●	●	●
Cottonwood Creek	2.21	●	●	●					●	●		●	●	●		
Camps Creek	2.21	●	●	●					●	●		●	●	●		●
Fern Creek	2.21	●	●	●					●	●		●	●	●		●
Roblar Creek	2.21	●	●	●					●	●		●	●	●		
O'Neill Lake	2.13	See Reservoirs & Lakes- Table 2-4														
Santa Margarita River	2.13	●	●	●	●				●	●		●	●	●	●	
Wood Canyon	2.13	●	●	●	●				●	●		●		●		
Santa Margarita River	2.12	●	●	●	●				●	●		●	●	●	●	
Santa Margarita River	2.11	●	●	●	●				●	●		●	●	●	●	
Pueblitos Canyon	2.11	●	●	●	●				●	●		●		●	●	

● Existing Beneficial Use

O Potential Beneficial Use

1 Waterbodies are listed multiple times if they cross hydrologic area or sub area boundaries.

2 Beneficial use designations apply to all tributaries to the indicated waterbody, if not listed separately.

001922

Table 2-2. BENEFICIAL USES OF INLAND SURFACE WATERS

Inland Surface Waters [1,2]	Hydrologic Unit Basin Number	BENEFICIAL USE														
		MUN	AGR	IND	PROC	GWR	FRSH	POW	REC1	REC2	BIOL	WARM	COLD	WILD	RARE	SPWN
Santa Margarita River Watershed - continued																
Newton Canyon	2.11	●	●	●	●				●	●		●		●		
Santa Margarita Lagoon	2.11	See Coastal Waters- Table 2-3														
San Luis Rey River Watershed																
San Luis Rey River	3.32	●	●	●			●	●	●	●		●	●	●		
Johnson Canyon	3.32	●	●	●			●	●	●	●		●	●	●		
San Luis Rey River	3.31	●	●	●			●	●	●	●		●	●	●		
Canada Aguanga	3.31	●	●	●			●	●	●	●		●	●	●		
Dark Canyon	3.31	●	●	●			●	●	●	●		●	●	●		
Bear Canyon	3.31	●	●	●			●	●	●	●		●	●	●		
Cow Canyon	3.31	●	●	●			●	●	●	●		●	●	●		
Blue Canyon	3.31	●	●	●			●	●	●	●		●	●	●		
Rock Canyon	3.31	●	●	●			●	●	●	●		●	●	●		
Agua Caliente Creek	3.31	●	●	●			●	●	●	●		●	●	●		
unnamed Tributary	3.31	●	●	●			●	●	●	●		●	●	●		●
Canada Agua Caliente	3.31	●	●	●			●	●	●	●		●	●	●		
Canada Verde	3.31	●	●	●			●	●	●	●		●	●	●		
Ward Canyon	3.31	●	●	●			●	●	●	●		●	●	●		
Lake Henshaw	3.31	See Reservoirs & Lakes- Table 2-4														

● Existing Beneficial Use

O Potential Beneficial Use

[1] Waterbodies are listed multiple times if they cross hydrologic area or sub area boundaries.

[2] Beneficial use designations apply to all tributaries to the indicated waterbody, if not listed separately.

001923

Table 2-2. BENEFICIAL USES OF INLAND SURFACE WATERS

Inland Surface Waters [1,2]	Hydrologic Unit Basin Number	BENEFICIAL USE														
		MUN	AGR	IND	PROC	GWR	FRSH	POW	REC1	REC2	BIOL	WARM	COLD	WILD	RARE	SPWN
San Luis Rey River Watershed - continued																
West Fork San Luis Rey River	3.31	●	●	●			●	●	●	●		●	●	●		●
Fry Creek	3.31	●	●	●			●	●	●	●		●	●	●		
Iron Springs Creek	3.31	●	●	●			●	●	●	●		●	●	●		●
Buena Vista Creek	3.31	●	●	●			●	●	●	●		●	●	●		
Cherry Canyon	3.31	●	●	●			●	●	●	●		●		●		
Bertha Canyon	3.31	●	●	●			●	●	●	●		●		●		
Hoover Canyon	3.31	●	●	●			●	●	●	●		●		●		
Buck Canyon	3.31	●	●	●			●	●	●	●		●		●		
Bergstrom Canyon	3.31	●	●	●			●	●	●	●		●		●		
San Ysidro Creek	3.31	●	●	●			●	●	●	●		●		●		
Matagual Creek	3.31	●	●	●			●	●	●	●		●	●	●		
Carrizo Creek	3.31	●	●	●			●	●	●	●		●	●	●		
Carrista Creek	3.31	●	●	●			●	●	●	●		●		●		
Kumpohui Creek	3.31	●	●	●			●	●	●	●		●		●		
San Luis Rey River	3.31	●	●	●			●	●	●	●		●	●	●		
San Luis Rey River	3.23	●	●	●				●	●	●		●	●	●		●
Wigham Creek	3.23	●	●	●				●	●	●		●	●	●		

● Existing Beneficial Use

O Potential Beneficial Use

[1] Waterbodies are listed multiple times if they cross hydrologic area or sub area boundaries.

[2] Beneficial use designations apply to all tributaries to the indicated waterbody, if not listed separately.

001924

Table 2-2. BENEFICIAL USES OF INLAND SURFACE WATERS

Inland Surface Waters [1,2]	Hydrologic Unit Basin Number	BENEFICIAL USE														
		MUN	AGR	IND	PROC	GWR	FRSH	POW	REC1	REC2	BIOL	WARM	COLD	WILD	RARE	SPWN
San Luis Rey River Watershed - continued																
Prisoner Creek	3.23	●	●	●				●	●	●		●	●	●		
Lusardi Canyon	3.23	●	●	●				●	●	●		●	●	●		
Cedar Creek	3.23	●	●	●				●	●	●		●	●	●		
San Luis Rey River	3.22	●	●	●				●	●	●		●	●	●		
Bee Canyon	3.22	●	●	●				●	●	●		●	●	●		
Paradise Creek	3.22	●	●	●				●	●	●		●	●	●		
Hell Creek	3.22	●	●	●				●	●	●		●	●	●		
Horsethief Canyon	3.22	●	●	●				●	●	●		●	●	●		
Potrero Creek	3.22	●	●	●				●	●	●		●	●	●		
Plaisted Creek	3.22	●	●	●				●	●	●		●	●	●		
Yuima Creek	3.22	●	●	●				●	●	●		●	●	●		
Sycamore Canyon	3.22	●	●	●				●	●	●		●	●	●		
Pauma Creek	3.22	●	●	●				●	●	●		●	●	●		●
Doane Creek	3.22	●	●	●				●	●	●		●	●	●		●
Chimney Creek	3.22	●	●	●				●	●	●		●	●	●		
French Creek	3.22	●	●	●				●	●	●		●	●	●		●
Lion Creek	3.22	●	●	●				●	●	●		●	●	●		●

● Existing Beneficial Use

O Potential Beneficial Use

[1] Waterbodies are listed multiple times if they cross hydrologic area or sub area boundaries.

[2] Beneficial use designations apply to all tributaries to the indicated waterbody, if not listed separately.

001925

Table 2-2. BENEFICIAL USES OF INLAND SURFACE WATERS

Inland Surface Waters [1,2]	Hydrologic Unit Basin Number	BENEFICIAL USE														
		MUN	AGR	IND	PROC	GWR	FRSH	POW	REC1	REC2	BIOL	WARM	COLD	WILD	RARE	SPWN
San Luis Rey River Watershed - continued																
Harrison Canyon	3.22	●	●	●				●	●	●		●	●	●		
Jaybird Creek	3.22	●	●	●				●	●	●		●	●	●		
Frey Creek	3.22	●	●	●				●	●	●		●	●	●		
Agua Tibia Creek	3.22	●	●	●				●	●	●		●	●	●		●
San Luis Rey River	3.21	●	●	●					●	●		●	●	●		
Marion Canyon	3.21	●	●	●					●	●		●	●	●		
Magee Creek	3.21	●	●	●					●	●		●	●	●		
Castro Canyon	3.21	●	●	●					●	●		●	●	●		
Trujillo Creek	3.21	●	●	●					●	●		●	●	●		
Pala Creek	3.21	●	●	●					●	●		●	●	●		●
Gomez Creek	3.21	●	●	●					●	●		●	●	●		
Couser Canyon	3.21	●	●	●					●	●		●	●	●		
Double Canyon	3.21	●	●	●					●	●		●	●	●		
Rice Canyon	3.21	●	●	●					●	●		●	●	●		
San Luis Rey River	3.12	+	●	●					●	●		●		●	●	
Keys Creek	3.12	+	●	●					●	●		●		●		
Moosa Canyon	3.15	+	●	●					●	●		●		●		

● Existing Beneficial Use

O Potential Beneficial Use

\+ Excepted From MUN (See Text)

[1] Waterbodies are listed multiple times if they cross hydrologic area or sub area boundaries.

[2] Beneficial use designations apply to all tributaries to the indicated waterbody, if not listed separately.

001926

Table 2-2. BENEFICIAL USES OF INLAND SURFACE WATERS

Inland Surface Waters [1,2]	Hydrologic Unit Basin Number	BENEFICIAL USE														
		MUN	AGR	IND	PROC	GWR	FRSH	POW	REC1	REC2	BIOL	WARM	COLD	WILD	RARE	SPWN
San Luis Rey River Watershed - continued																
unnamed intermittent streams	3.16	+	●	●					●	●		●		●		
Moosa Canyon	3.14	+	●	●					●	●		●		●		
Moosa Canyon	3.13	+	●	●					●	●		●		●		
Turner Lake	3.13	See Reservoirs & Lakes- Table 2-4														
South Fork Moosa Canyon	3.13	+	●	●					●	●		●		●		
Moosa Canyon	3.12	+	●	●					●	●		●		●		
Gopher Canyon	3.12	+	●	●					●	●		●		●		
South Fork Gopher Canyon	3.12	+	●	●					●	●		●		●		
San Luis Rey River	3.11	+	●	●					●	●		●		●	●	
Pilgrim Creek	3.11	+	●	●					●	●		●	●	●	●	
Windmill Canyon	3.11	+	●	●					●	●		●	●	●		
Tuley Canyon	3.11	+	●	●					●	●		●		●		
Lawerence Canyon	3.11	+	●	●					●	●		●		●		
Mouth of San Luis Rey River	3.11	See Coastal Waters- Table 2-3														
San Diego County Coastal Streams																
Loma Alta Creek	4.10	+							O	●		●		●		
Loma Alta Slough	4.10	See Coastal Waters- Table 2-3														

● Existing Beneficial Use

O Potential Beneficial Use

+ Excepted From MUN (See Text)

1 Waterbodies are listed multiple times if they cross hydrologic area or sub area boundaries.

2 Beneficial use designations apply to all tributaries to the indicated waterbody, if not listed separately.

001927

Table 2-2. BENEFICIAL USES OF INLAND SURFACE WATERS

Inland Surface Waters [1,2]	Hydrologic Unit Basin Number	BENEFICIAL USE														
		MUN	AGR	IND	PROC	GWR	FRSH	POW	REC1	REC2	BIOL	WARM	COLD	WILD	RARE	SPWN
San Diego County Coastal Streams - continued																
Buena Vista Lagoon	4.21	See Coastal Waters- Table 2-3														
Buena Vista Creek	4.22	+	●	●					●	●		●		●		
Buena Vista Creek	4.21	+	●	●					●	●		●		●	●	
Agua Hedionda	4.31	See Coastal Waters- Table 2-3														
Agua Hedionda Creek	4.32	●	●	●					●	●		●		●		
Buena Creek	4.32	●	●	●					●	●		●		●		
Agua Hedionda Creek	4.31	●	●	●					●	●		●		●		
Letterbox canyon	4.31	●	●	●					●	●		●		●		
Canyon de las Encinas	4.40	+							O	●		●		●		
San Marcos Creek Watershed																
Batiquitos Lagoon	4.51	See Coastal Waters- Table 2-3														
San Marcos Creek	4.52	+	●						●	●		●		●		
unnamed intermittent streams	4.53	+	●						●	●		●		●		
San Marcos Creek Watershed																
San Marcos Creek	4.51	+	●						●	●		●		●		
Encinitas Creek	4.51	+	●						●	●		●		●		

● Existing Beneficial Use

O Potential Beneficial Use

+ Excepted From MUN (See Text)

[1] Waterbodies are listed multiple times if they cross hydrologic area or sub area boundaries.

[2] Beneficial use designations apply to all tributaries to the indicated waterbody, if not listed separately.

001928

Table 2-2. BENEFICIAL USES OF INLAND SURFACE WATERS

Inland Surface Waters [1,2]	Hydrologic Unit Basin Number	BENEFICIAL USE														
		MUN	AGR	IND	PROC	GWR	FRSH	POW	REC1	REC2	BIOL	WARM	COLD	WILD	RARE	SPWN
Escondido Creek Watershed																
San Elijo Lagoon	4.61	See Coastal Waters- Table 2-3														
Escondido Creek	4.63	●	●	O				●	●	●		●	●	●		
Lake Wohlford	4.63	See Reservoirs & Lakes- Table 2-4														
Lake Dixon	4.62	See Reservoirs & Lakes- Table 2-4														
Escondido Creek	4.62	●	●	O					●	●		●	●	●		
Reidy Canyon	4.62	●	●	O					●	●		●	●	●		
Escondido Creek	4.61	●	●	O					●	●		●	●	●		
San Dieguito River Watershed																
Santa Ysabel Creek	5.54	●	●	●	●				●	●		●	●	●		●
Dan Price Creek	5.54	●	●	●	●				●	●		●	●	●		
Santa Ysabel Creek	5.53	●	●	●	●				●	●		●	●	●		
Witch Creek	5.53	●	●	●	●				●	●		●	●	●		●
Sutherland Lake	5.53	See Reservoirs & Lakes- Table 2-4														
Bloomdale Creek	5.53	●	●	●	●				●	●		●	●	●		
Santa Ysabel Creek	5.52	●	●	●	●				●	●		●	●	●	●	
Lake Poway	5.52	See Reservoirs & Lakes- Table 2-4														
Black Canyon	5.52	●	●	●	●				●	●		●	●	●		●

● Existing Beneficial Use

O Potential Beneficial Use

[1] Waterbodies are listed multiple times if they cross hydrologic area or sub area boundaries.

[2] Beneficial use designations apply to all tributaries to the indicated waterbody, if not listed separately.

001929

Table 2-2. BENEFICIAL USES OF INLAND SURFACE WATERS

Inland Surface Waters [1,2]	Hydrologic Unit Basin Number	BENEFICIAL USE														
		MUN	AGR	IND	PROC	GWR	FRSH	POW	REC1	REC2	BIOL	WARM	COLD	WILD	RARE	SPWN
San Dieguito River Watershed - continued																
Scholder Creek	5.52	●	●	●	●				●	●		●	●	●		
Temescal Creek	5.52	●	●	●	●				●	●		●	●	●		
Bear Creek	5.52	●	●	●	●				●	●		●	●	●		
Quail Canyon	5.52	●	●	●	●				●	●		●	●	●		
Carney Canyon	5.52	●	●	●	●				●	●		●	●	●		
Santa Ysabel Creek	5.51	●	●	●	●				●	●		●	●	●		
Boden Canyon	5.51	●	●	●	●				●	●		●	●	●		
Clevenger Canyon	5.51	●	●	●	●				●	●		●	●	●		
Santa Ysabel Creek	5.32	●	●	●	●				O	●		●		●	●	
Tims Canyon	5.32	●	●	●	●				O	●		●		●		
Schoolhouse Canyon	5.32	●	●	●	●				O	●		●		●		
Rockwood Canyon	5.35	●	●	●	●				O	●		●		●		
Guejito Creek	5.35	●	●	●	●				O	●		●		●		
unnamed intermittent streams	5.36	●	●	●	●				O	●		●		●		
Rockwood Canyon	5.32	●	●	●	●				O	●		●		●		
Santa Maria Creek	5.41	●	●	●	●				●	●		●		●		
Hatfield Creek	5.45	●	●	●	●				●	●		●		●		

● Existing Beneficial Use

O Potential Beneficial Use

[1] Waterbodies are listed multiple times if they cross hydrologic area or sub area boundaries.

[2] Beneficial use designations apply to all tributaries to the indicated waterbody, if not listed separately.

001930

Table 2-2. BENEFICIAL USES OF INLAND SURFACE WATERS

Inland Surface Waters [1,2]	Hydrologic Unit Basin Number	BENEFICIAL USE														
		MUN	AGR	IND	PROC	GWR	FRSH	POW	REC1	REC2	BIOL	WARM	COLD	WILD	RARE	SPWN
San Dieguito River Watershed - continued																
Hatfield Creek	5.44	●	●	●	●				●	●		●		●		
Wash Hollow Creek	5.43	●	●	●	●				●	●		●		●		
Wash Hollow Creek	5.44	●	●	●	●				●	●		●		●		
Hatfield Creek	5.42	●	●	●	●				●	●		●		●		
Santa Teresa Valley	5.46	●	●	●	●				●	●		●		●		
unnamed intermittent streams	5.47	●	●	●	●				●	●		●		●		
Hatfield Creek	5.41	●	●	●	●				●	●		●		●		
Santa Maria Creek	5.32	●	●	●	●				O	●		●		●		
unnamed intermittent streams	5.33	●	●	●	●				O	●		●		●		
unnamed intermittent streams	5.34	●	●	●	●				O	●		●		●		
San Dieguito River	5.32	●	●	●	●				O	●		●		●	●	
unnamed Tributary	5.32	●	●	●	●				O	●		●		●	●	
San Dieguito River	5.21	●	●	●	●				●	●	●	●	●	●	●	
Highland Valley	5.31	●	●	●	●				O	●		●		●		
Lake Hodges	5.21	See Reservoirs & Lakes- Table 2-4														
San Dieguito Reservoir	5.21	See Reservoirs & Lakes- Table 2-4														
Warren Canyon	5.21	●	●	●	●				●	●		●	●	●		

● Existing Beneficial Use

O Potential Beneficial Use

[1] Waterbodies are listed multiple times if they cross hydrologic area or sub area boundaries.

[2] Beneficial use designations apply to all tributaries to the indicated waterbody, if not listed separately.

001931

Table 2-2. BENEFICIAL USES OF INLAND SURFACE WATERS

Inland Surface Waters [1,2]	Hydrologic Unit Basin Number	BENEFICIAL USE														
		MUN	AGR	IND	PROC	GWR	FRSH	POW	REC1	REC2	BIOL	WARM	COLD	WILD	RARE	SPWN
San Dieguito River Watershed - continued																
San Bernardo Valley	5.21	●	●	●	●				●	●		●		●	●	
unnamed intermittent streams	5.24	●	●	●	●				●	●		●		●		
unnamed intermittent streams	5.23	●	●	●	●				●	●		●		●		
unnamed intermittent streams	5.22	●	●	●	●				●	●		●		●		
San Dieguito River	5.11	+	O	O					●	●		●	●	●		●
Lusardi Creek	5.12	+	O	O					●	●		●		●		
Lusardi Creek	5.11	+	O	O					●	●		●		●		
La Zanja Canyon	5.11	+	O	O					●	●		●		●		
Gonzales Canyon	5.11	+	O	O					●	●		●		●		
San Dieguito Lagoon	5.11	See Coastal Waters- Table 2-3														
Los Penasquitos Creek Watershed																
Los Penasquitos Lagoon	6.10	See Coastal Waters- Table 2-3														
Soledad Canyon	6.10	+	●	●					O	●		●	●	●		
Carol Canyon	6.10	+	●	●					O	●		●	●	●	●	
Miramar Reservoir	6.10	See Reservoirs & Lakes- Table 2-4														
Los Penasquitos Creek	6.20	+	●	O					●	●		●	●	●		
Rattlesnake Creek	6.20	+	●	O					●	●		●	●	●		

● Existing Beneficial Use

O Potential Beneficial Use

+ Excepted From MUN (See Text)

[1] Waterbodies are listed multiple times if they cross hydrologic area or sub area boundaries.

[2] Beneficial use designations apply to all tributaries to the indicated waterbody, if not listed separately.

001932

Table 2-2. BENEFICIAL USES OF INLAND SURFACE WATERS

Inland Surface Waters [1,2]	Hydrologic Unit Basin Number	BENEFICIAL USE														
		MUN	AGR	IND	PROC	GWR	FRSH	POW	REC1	REC2	BIOL	WARM	COLD	WILD	RARE	SPWN
Los Penasquitos Creek Watershed - continued																
Poway Creek	6.20	+	●	O					●	●		●		●		
Beeler Creek	6.20	+	●	O					●	●		●		●		
Chicarita Creek	6.20	+	●	O					●	●		●		●		
Cypress Canyon	6.20	+	●	O					●	●		●		●		
Los Penasquitos Creek	6.10	+	●	●					O	●		●		●		
unnamed Tributary	6.10	+	●	●					O	●		●		●	●	
Carmel Valley	6.10	+	●	●					O	●		●		●		
Deer Canyon	6.10	+	●	●					O	●		●		●		
McGonigle Canyon	6.10	+	●	●					O	●		●		●		
Bell Valley	6.10	+	●	●					O	●		●		●		
Shaw Valley	6.10	+	●	●					O	●		●		●		
San Diego County Coastal Streams																
unnamed intermittent coastal streams	6.30	+							O	●		●		●		
Rose Canyon Watershed																
Rose Canyon	6.40	+		O					●	●		●		●		
San Clemente Canyon	6.40	+		O					●	●		●	●	●	●	●

● Existing Beneficial Use

O Potential Beneficial Use

+ Excepted From MUN (See Text)

[1] Waterbodies are listed multiple times if they cross hydrologic area or sub area boundaries.

[2] Beneficial use designations apply to all tributaries to the indicated waterbody, if not listed separately.

001933

Table 2-2. BENEFICIAL USES OF INLAND SURFACE WATERS

Inland Surface Waters [1,2]	Hydrologic Unit Basin Number	BENEFICIAL USE														
		MUN	AGR	IND	PROC	GWR	FRSH	POW	REC1	REC2	BIOL	WARM	COLD	WILD	RARE	SPWN
Tecolote Creek Watershed																
Tecolote Creek	6.50	+							O	●		●		●		
San Diego River Watershed																
San Diego River	7.41	●	●	●	●				●	●		●	●	●		
Coleman Creek	7.42	●	●	●	●				●	●		●	●	●		
Eastwood Creek	7.42	●	●	●	●				●	●		●	●	●		
Jim Green Creek	7.42	●	●	●	●				●	●		●	●	●		
Mariette Creek	7.42	●	●	●	●				●	●		●	●	●		
Boring Creek	7.42	●	●	●	●				●	●		●	●	●		
Bailey Creek	7.42	●	●	●	●				●	●		●	●	●		
Coleman Creek	7.41	●	●	●	●				●	●		●	●	●		
Setenec Creek	7.42	●	●	●	●				●	●		●	●	●		
Setenec Creek	7.41	●	●	●	●				●	●		●	●	●		
Temescal Creek	7.41	●	●	●	●				●	●		●	●	●		
Paine Bottom	7.41	●	●	●	●				●	●		●	●	●		
Orinoco Creek	7.41	●	●	●	●				●	●		●	●	●		
Iron Springs Canyon	7.41	●	●	●	●				●	●		●	●	●		
Dye Canyon	7.41	●	●	●	●				●	●		●	●	●		

● Existing Beneficial Use

O Potential Beneficial Use

+ Excepted From MUN (See Text)

[1] Waterbodies are listed multiple times if they cross hydrologic area or sub area boundaries.

[2] Beneficial use designations apply to all tributaries to the indicated waterbody, if not listed separately.

001934

Table 2-2. BENEFICIAL USES OF INLAND SURFACE WATERS

Inland Surface Waters [1,2]	Hydrologic Unit Basin Number	BENEFICIAL USE														
		MUN	AGR	IND	PROC	GWR	FRSH	POW	REC1	REC2	BIOL	WARM	COLD	WILD	RARE	SPWN
San Diego River Watershed - continued																
Richie Creek	7.41	●	●	●	●				●	●		●	●	●		
Cedar Creek	7.41	●	●	●	●				●	●		●	●	●		●
Sandy Creek	7.41	●	●	●	●				●	●		●	●	●		
Dehr Creek	7.41	●	●	●	●				●	●		●	●	●		●
Kelly Creek	7.41	●	●	●	●				●	●		●	●	●		
Cuyamaca Reservoir	7.43	See Reservoirs & Lakes- Table 2-4														
Little Stonewall Creek	7.43	●	●	●	●				●	●		●	●	●		●
Boulder Creek	7.41	●	●	●	●				●	●		●	●	●		●
Azalea Creek	7.41	●	●	●	●				●	●		●	●	●		
Johnson Creek	7.41	●	●	●	●				●	●		●	●	●		
Sheep Camp Creek	7.41	●	●	●	●				●	●		●	●	●		
San Diego River	7.31	●	●	●	●				●	●		●	●	●		
El Capitan Reservoir	7.31	See Reservoirs & Lakes- Table 2-4														
Isham Creek	7.31	●	●	●	●				●	●		●	●	●		
Sand Creek	7.31	●	●	●	●				●	●		●	●	●		
Conejos Creek	7.31	●	●	●	●				●	●		●	●	●		●
King Creek	7.31	●	●	●	●				●	●		●	●	●		

● Existing Beneficial Use

O Potential Beneficial Use

[1] Waterbodies are listed multiple times if they cross hydrologic area or sub area boundaries.

[2] Beneficial use designations apply to all tributaries to the indicated waterbody, if not listed separately.

001935

Table 2-2. BENEFICIAL USES OF INLAND SURFACE WATERS

Inland Surface Waters [1,2]	Hydrologic Unit Basin Number	BENEFICIAL USE														
		MUN	AGR	IND	PROC	GWR	FRSH	POW	REC1	REC2	BIOL	WARM	COLD	WILD	RARE	SPWN
San Diego River Watershed - continued																
West Fork King Creek	7.31	●	●	●	●				●	●		●	●	●		
Echo Valley	7.31	●	●	●	●				●	●		●	●	●		
Peutz Valley	7.31	●	●	●	●				●	●		●	●	●		
Chocolate Canyon	7.32	●	●	●	●				●	●		●	●	●		
Alpine Creek	7.33	●	●	●	●				●	●		●	●	●		
Chocolate Canyon	7.31	●	●	●	●				●	●		●	●	●		
San Diego River	7.15	O		●					●	●		●		●	●	
San Diego River	7.12	O		●					●	●		●		●	●	
Lake Jennings	7.12	See Reservoirs & Lakes- Table 2-4														
Quail Canyon	7.12	O		●					●	●		●		●		
Wildcat Canyon	7.12	O		●					●	●		●		●		
San Vicente Creek	7.23	●	●	●	●				●	●		●		●		
Swartz Canyon	7.23	●	●	●	●				●	●		●		●		
Klondike Creek	7.23	●	●	●	●				●	●		●		●		
San Vicente Creek	7.22	●	●	●	●				●	●		●		●		
Darney Canyon	7.22	●	●	●	●				●	●		●		●		
Longs Gulch	7.22	●	●	●	●				●	●		●		●		

● Existing Beneficial Use

O Potential Beneficial Use

[1] Waterbodies are listed multiple times if they cross hydrologic area or sub area boundaries.

[2] Beneficial use designations apply to all tributaries to the indicated waterbody, if not listed separately.

001936

Table 2-2. BENEFICIAL USES OF INLAND SURFACE WATERS

Inland Surface Waters [1,2]	Hydrologic Unit Basin Number	BENEFICIAL USE														
		MUN	AGR	IND	PROC	GWR	FRSH	POW	REC1	REC2	BIOL	WARM	COLD	WILD	RARE	SPWN
San Diego River Watershed - continued																
San Vicente Reservoir	7.21	See Reservoirs & Lakes- Table 2-4														
West Branch San Vicente Creek	7.21	●	●	●	●				●	●		●		●		
Padre Barona Creek	7.24	●	●	●	●				●	●		●		●		
Wright Canyon	7.24	●	●	●	●				●	●		●		●		
Featherstone Canyon	7.24	●	●	●	●				●	●		●		●		
Padre Barona Creek	7.12	O		●					●	●		●		●		
Foster Canyon	7.21	●	●	●	●				●	●		●		●		
San Vicente Creek	7.12	O		●					●	●		●		●		
Slaughterhouse Canyon	7.12	O		●					●	●		●		●		
Las Coches Creek	7.14	O		●					●	●		●		●		
Rios Canyon	7.14	O		●					●	●		●		●		
Los Coches Creek	7.12	O		●					●	●		●		●		
Forrester Creek	7.13	O		●					●	●		●		●		
Forrester Creek	7.12	O		●					●	●		●		●		
Sycamore Canyon	7.12	+	●	●					●	●		●		●	●	
unnamed tributary	7.12	+	●	●					●	●		●		●	●	
Clark Canyon	7.12	+	●	●					●	●		●		●	●	

● Existing Beneficial Use

O Potential Beneficial Use

+ Excepted From MUN (See Text)

[1] Waterbodies are listed multiple times if they cross hydrologic area or sub area boundaries.

[2] Beneficial use designations apply to all tributaries to the indicated waterbody, if not listed separately.

001937

Table 2-2. BENEFICIAL USES OF INLAND SURFACE WATERS

Inland Surface Waters [1,2]	Hydrologic Unit Basin Number	BENEFICIAL USE														
		MUN	AGR	IND	PROC	GWR	FRSH	POW	REC1	REC2	BIOL	WARM	COLD	WILD	RARE	SPWN
San Diego River Watershed - continued																
West Sycamore Canyon	7.12	+	●	●					●	●		●		●		
Quail Canyon	7.12	+	●	●					●	●		●		●		
Little Sycamore Canyon	7.12	+	●	●					●	●		●		●		
Spring Canyon	7.12	+	●	●					●	●		●		●	●	
Oak Canyon	7.12	+	●	●					●	●		●		●		
San Diego River	7.11	+	●	●					●	●		●		●	●	
unnamed Tributary	7.11	+	●	●					●	●		●		●	●	
Alvarado Canyon	7.11	+	●	●					●	●		●		●		
Lake Murray	7.11	See Reservoirs & Lakes- Table 2-4														
Murphy Canyon	7.11	+	●	●					●	●		●		●	●	
Shepherd Canyon	7.11	+	●	●					●	●		●		●		
Murray Canyon	7.11	+	●	●					●	●		●		●		
Mouth of San Diego River	7.11	See Coastal Waters- Table 2-3														
San Diego County Coastal Streams																
unnamed intermittent coastal streams	8.10	+							O	●		●		●		
Powerhouse Canyon	8.21	+							O	●		●		●		
Chollas Creek	8.22	+							O	●		●		●		

● Existing Beneficial Use

O Potential Beneficial Use

+ Excepted From MUN (See Text)

[1] Waterbodies are listed multiple times if they cross hydrologic area or sub area boundaries.

[2] Beneficial use designations apply to all tributaries to the indicated waterbody, if not listed separately.

001938

Table 2-2. BENEFICIAL USES OF INLAND SURFACE WATERS

Inland Surface Waters [1,2]	Hydrologic Unit Basin Number	BENEFICIAL USE														
		MUN	AGR	IND	PROC	GWR	FRSH	POW	REC1	REC2	BIOL	WARM	COLD	WILD	RARE	SPWN
San Diego County Coastal Streams - continued																
South Chollas Valley	8.22	+							O	●		●		●		
unnamed intermittent streams	8.31	+							O	●		●		●		
Paradise Creek	8.32	+							O	●		●		●		
Paradise Valley	8.32	+							O	●		●		●		
Sweetwater River Watershed																
Sweetwater River	9.35	●	●	●	●				●	●		●	●	●		●
Stonewall Creek	9.35	●	●	●	●				●	●		●	●	●		●
Harper Creek	9.35	●	●	●	●				●	●		●	●	●		●
Cold Stream	9.35	●	●	●	●				●	●		●	●	●		●
Japacha Creek	9.35	●	●	●	●				●	●		●	●	●		●
Juaquapin Creek	9.35	●	●	●	●				●	●		●	●	●		●
Arroyo Seco	9.35	●	●	●	●				●	●		●	●	●		
Sweetwater River	9.34	●	●	●	●				●	●		●	●	●		●
Descanso Creek	9.34	●	●	●	●				●	●		●	●	●		
Samagatuma Creek	9.34	●	●	●	●				●	●		●	●	●		
Sweetwater River	9.31	●	●	●	●				●	●		●	●	●		●

● Existing Beneficial Use

O Potential Beneficial Use

+ Excepted From MUN (See Text)

[1] Waterbodies are listed multiple times if they cross hydrologic area or sub area boundaries.

[2] Beneficial use designations apply to all tributaries to the indicated waterbody, if not listed separately.

001939

Table 2-2. BENEFICIAL USES OF INLAND SURFACE WATERS

Inland Surface Waters [1,2]	Hydrologic Unit Basin Number	BENEFICIAL USE														
		MUN	AGR	IND	PROC	GWR	FRSH	POW	REC1	REC2	BIOL	WARM	COLD	WILD	RARE	SPWN
Sweetwater River Watershed - continued																
Viejas Creek	9.33	●	●	●	●				●	●		●	●	●		
Viejas Creek	9.31	●	●	●	●				●	●		●	●	●		
Loveland Reservoir	9.31	See Reservoirs & Lakes- Table 2-4														
Taylor Creek	9.31	●	●	●	●				●	●		●		●		
Japatul Valley	9.32	●	●	●	●				●	●		●		●		
Sweetwater River	9.21	●	●	●	●				●	●	●	●		●	●	
unnamed tributary	9.21	●	●	●	●				●	●	●	●		●	●	
Lawson Creek	9.21	●	●	●	●				●	●		●		●		
Beaver Canyon	9.21	●	●	●	●				●	●		●		●		
Wood Valley	9.21	●	●	●	●				●	●		●		●		
Sycuan Creek	9.25	●	●	●	●				●	●		●		●		
North Fork Sycuan Creek	9.26	●	●	●	●				●	●		●		●		
North Fork Sycuan Creek	9.25	●	●	●	●				●	●		●		●		
Denesa Valley	9.23	●	●	●	●				●	●		●		●		
Harbison Canyon	9.23	●	●	●	●				●	●		●		●		
Galloway Valley	9.24	●	●	●	●				●	●		●		●		
Mexican Canyon	9.21	●	●	●	●				●	●		●		●		

● Existing Beneficial Use

O Potential Beneficial Use

[1] Waterbodies are listed multiple times if they cross hydrologic area or sub area boundaries.

[2] Beneficial use designations apply to all tributaries to the indicated waterbody, if not listed separately.

001940

Table 2-2. BENEFICIAL USES OF INLAND SURFACE WATERS

Inland Surface Waters [1,2]	Hydrologic Unit Basin Number	BENEFICIAL USE														
		MUN	AGR	IND	PROC	GWR	FRSH	POW	REC1	REC2	BIOL	WARM	COLD	WILD	RARE	SPWN
Sweetwater River Watershed - continued																
unnamed intermittent streams	9.22	●	●	●	●				●	●		●		●		
Steel Canyon	9.21	●	●	●	●				●	●		●		●		
Sweetwater Reservoir	9.21	See Reservoirs & Lakes- Table 2-4														
Coon Canyon	9.21	●	●	●	●				●	●		●		●		
Sweetwater River	9.12	+		●					O	●		●		●		
Spring Valley	9.12	+		●					O	●		●		●		
Wild Mans Canyon	9.12	+		●					O	●		●		●		
Long Canyon	9.12	+		●					O	●		●		●		
Rice Canyon	9.12	+		●					O	●		●		●		
Telegraph Canyon	9.11	+		●					O	●		●		●		
San Diego County Coastal Streams																
unnamed intermittent coastal streams	10.10	+							O			●				
Otay River Watershed																
Jamul Creek	10.34	●	●	●	●				●	●		●		●		
Jamul Creek	10.33	●	●	●	●				●	●		●		●		
Jamul Creek	10.36	●	●	●	●				●	●		●		●		
Dulzura Creek	10.37	●	●	●	●				●	●		●		●		

● Existing Beneficial Use

O Potential Beneficial Use

+ Excepted From MUN (See Text)

[1] Waterbodies are listed multiple times if they cross hydrologic area or sub area boundaries.

[2] Beneficial use designations apply to all tributaries to the indicated waterbody, if not listed separately.

001941

Table 2-2. BENEFICIAL USES OF INLAND SURFACE WATERS

Inland Surface Waters [1,2]	Hydrologic Unit Basin Number	BENEFICIAL USE														
		MUN	AGR	IND	PROC	GWR	FRSH	POW	REC1	REC2	BIOL	WARM	COLD	WILD	RARE	SPWN
Otay River Watershed - continued																
Dulzura Creek	10.36	●	●	●	●				●	●		●		●	●	
Dutchman Canyon	10.36	●	●	●	●				●	●		●		●		
Pringle Canyon	10.36	●	●	●	●				●	●		●		●		
Sycamore Canyon	10.36	●	●	●	●				●	●		●		●		
Hollenbeck Canyon	10.36	●	●	●	●				●	●		●		●		
Lyons Valley	10.35	●	●	●	●				●	●		●		●		
Cedar Canyon	10.36	●	●	●	●				●	●		●	●	●		●
Little Cedar Canyon	10.36	●	●	●	●				●	●		●	●	●		
Jamul Creek	10.31	●	●	●	●				●	●		●		●	●	
Lower Otay Reservoir	10.31	See Reservoirs & Lakes- Table 2-4														
unnamed tributary	10.31	●	●	●	●				●	●		●		●	●	
Upper Otay Reservoir	10.32	See Reservoirs & Lakes- Table 2-4														
Proctor Valley	10.32	●	●	●	●				●	●		●		●		
Otay River	10.20	+	●	O					O	●		●		●	●	
O'Neal Canyon	10.20	+	●	O					O	●		●		●		
Salt Creek	10.20	+	●	O					O	●		●		●		
Johnson Canyon	10.20	+	●	O					O	●		●		●		

● Existing Beneficial Use

O Potential Beneficial Use

+ Excepted From MUN (See Text)

[1] Waterbodies are listed multiple times if they cross hydrologic area or sub area boundaries.

[2] Beneficial use designations apply to all tributaries to the indicated waterbody, if not listed separately.

001942

Table 2-2. BENEFICIAL USES OF INLAND SURFACE WATERS

Inland Surface Waters [1,2]	Hydrologic Unit Basin Number	BENEFICIAL USE														
		MUN	AGR	IND	PROC	GWR	FRSH	POW	REC1	REC2	BIOL	WARM	COLD	WILD	RARE	SPWN
Otay River Watershed - continued																
Wolf Canyon	10.20	+	●	O					O	●		●		●		
Dennery Canyon	10.20	+	●	O					O	●		●		●		
Pogi Canyon	10.20	+	●	O					O	●		●		●		
Tijuana River Watershed																
Tijuana River	11.11	+		O					O	●		●		●	●	
Moody Canyon	11.11	+		O					O	●		●		●		
Smugglers Gulch	11.11	+		O					O	●		●		●		
Goat Canyon	11.11	+		O					O	●		●		●		
Tijuana River Estuary	11.11	See Coastal Waters- Table 2-3														
Spring Canyon	11.12	+	●	O					O	●		●		●		
Dillon Canyon	11.12	+	●	O					O	●		●		●		
Finger Canyon	11.12	+	●	O					O	●		●		●		
Wruck Canyon	11.12	+	●	O					O	●		●		●		
unnamed intermittent streams	11.12	+	●	O					O	●		●		●		
unnamed intermittent streams	11.21	+							●	●		●		●		
Tijuana River	11.21	+							●	●		●		●		
Tecate Creek	11.23	+							●	●		●		●		

● Existing Beneficial Use

O Potential Beneficial Use

\+ Excepted From MUN (See Text)

[1] Waterbodies are listed multiple times if they cross hydrologic area or sub area boundaries.

[2] Beneficial use designations apply to all tributaries to the indicated waterbody, if not listed separately.

001943

Table 2-2. BENEFICIAL USES OF INLAND SURFACE WATERS

Inland Surface Waters [1,2]	Hydrologic Unit Basin Number	BENEFICIAL USE														
		MUN	AGR	IND	PROC	GWR	FRSH	POW	REC1	REC2	BIOL	WARM	COLD	WILD	RARE	SPWN
Tijuana River Watershed - continued																
Cottonwood Creek	11.60	●	●	●	●		●		O	●		●	●	●	●	
Kitchen Creek	11.60	●	●	●	●		●		O	●		●	●	●		●
Long Canyon	11.60	●	●	●	●		●		O	●		●	●	●		●
Troy Canyon	11.60	●	●	●	●		●		O	●		●	●	●		●
Fred Canyon	11.60	●	●	●	●		●		O	●		●	●	●		
Horse Canyon	11.60	●	●	●	●		●		O	●		●	●	●		
La Posta Creek	11.70	●	●	●	●		●		●	●		●	●	●		
Simmons Canyon	11.70	●	●	●	●		●		●	●		●	●	●		
La Posta Creek	11.60	●	●	●	●		●		O	●		●	●	●		
Morena Reservoir	11.50	See Reservoirs & Lakes- Table 2-4														
Morena Creek	11.50	●	●	●	●		●		●	●		●	●	●		●
Long Valley	11.50	●	●	●	●		●		●	●		●	●	●		
Bear Valley	11.50	●	●	●	●		●		●	●		●		●		
Cottonwood Creek	11.30	●	●	●	●		●		●	●		●	●	●	●	●
Hauser Creek	11.30	●	●	●	●		●		●	●		●	●	●		●
Salazar Canyon	11.30	●	●	●	●		●		●	●		●	●	●		
Barrett Lake	11.30	See Reservoirs & Lakes- Table 2-4														

● Existing Beneficial Use

O Potential Beneficial Use

1 Waterbodies are listed multiple times if they cross hydrologic area or sub area boundaries.

2 Beneficial use designations apply to all tributaries to the indicated waterbody, if not listed separately.

001944

Table 2-2. BENEFICIAL USES OF INLAND SURFACE WATERS

Inland Surface Waters [1,2]	Hydrologic Unit Basin Number	BENEFICIAL USE														
		MUN	AGR	IND	PROC	GWR	FRSH	POW	REC1	REC2	BIOL	WARM	COLD	WILD	RARE	SPWN
Tijuana River Watershed - continued																
Boneyard Canyon	11.30	●	●	●	●		●		●	●		●	●	●		
Skye Valley	11.30	●	●	●	●		●		●	●		●	●	●		
Pine Valley Creek	11.41	●	●	●	●		●		●	●		●	●	●		●
Indian Creek	11.41	●	●	●	●		●		●	●		●	●	●		
Lucas Creek	11.41	●	●	●	●		●		●	●		●	●	●		
Noble Canyon	11.41	●	●	●	●		●		●	●		●	●	●		●
Los Rasalies Ravine	11.42	●	●	●	●		●		●	●		●	●	●		
Paloma Ravine	11.42	●	●	●	●		●		●	●		●	●	●		
Bonita Ravine	11.42	●	●	●	●		●		●	●		●	●	●		
Chico Ravine	11.42	●	●	●	●		●		●	●		●	●	●		
Madero Ravine	11.42	●	●	●	●		●		●	●		●	●	●		
Los Gatos Ravine	11.42	●	●	●	●		●		●	●		●	●	●		
Boiling Spring Ravine	11.42	●	●	●	●		●		●	●		●	●	●		
Agua Dulce Creek	11.42	●	●	●	●		●		●	●		●	●	●		
Escondido Ravine	11.42	●	●	●	●		●		●	●		●	●	●		
Scove Canyon	11.41	●	●	●	●		●		●	●		●	●	●		
Pine Valley Creek	11.30	●	●	●	●		●		●	●		●	●	●		●

● Existing Beneficial Use

O Potential Beneficial Use

[1] Waterbodies are listed multiple times if they cross hydrologic area or sub area boundaries.

[2] Beneficial use designations apply to all tributaries to the indicated waterbody, if not listed separately.

Table 2-2. BENEFICIAL USES OF INLAND SURFACE WATERS

Inland Surface Waters [1,2]	Hydrologic Unit Basin Number	BENEFICIAL USE														
		MUN	AGR	IND	PROC	GWR	FRSH	POW	REC1	REC2	BIOL	WARM	COLD	WILD	RARE	SPWN
Tijuana River Watershed - continued																
Oak Valley	11.30	●	●	●	●		●		●	●		●	●	●		●
Nelson Canyon	11.30	●	●	●	●		●		●	●		●	●	●		
Secret Canyon	11.30	●	●	●	●		●		●	●		●	●	●		
Horsethief Canyon	11.30	●	●	●	●		●		●	●		●	●	●		
Espinosa Creek	11.30	●	●	●	●		●		●	●		●	●	●		
Wilson Creek	11.30	●	●	●	●		●		●	●		●	●	●		●
Pats Canyon	11.30	●	●	●	●		●		●	●		●	●	●		
Cottonwood Creek	11.23	+							●	●		●		●		
Dry Valley	11.23	+							●	●		●		●		
BobOwens Canyon	11.23	+							●	●		●		●		
McAlmond Canyon	11.24	+							●	●		●		●		
McAlmond Canyon	11.23	+							●	●		●		●		
Rattlesnake Canyon	11.23	+							●	●		●		●		
Potrero Creek	11.25	+							●	●		●		●		
Little Potrero Creek	11.25	+							●	●		●		●		
Potrero Creek	11.23	+							●	●		●		●		
Grapevine Creek	11.23	+							●	●		●		●		

● Existing Beneficial Use

O Potential Beneficial Use

+ Excepted From MUN (See Text)

[1] Waterbodies are listed multiple times if they cross hydrologic area or sub area boundaries.

[2] Beneficial use designations apply to all tributaries to the indicated waterbody, if not listed separately.

001946

Table 2-2. BENEFICIAL USES OF INLAND SURFACE WATERS

Inland Surface Waters [1,2]	Hydrologic Unit Basin Number	BENEFICIAL USE														
		MUN	AGR	IND	PROC	GWR	FRSH	POW	REC1	REC2	BIOL	WARM	COLD	WILD	RARE	SPWN
Tijuana River Watershed - continued																
Bee Canyon	11.22	+							●	●		●		●		
Bee Creek	11.23	+							●	●		●		●		
Mine Canyon	11.21	+							●	●		●		●		
unnamed intermittent streams	11.81	+							●	●		●		●		
unnamed intermittent streams	11.82	+							●	●		●		●		
Campo Creek	11.84	+							●	●		●	●	●		
Diablo Canyon	11.84	+							●	●		●		●		
Campo Creek	11.83	+							●	●		●		●		
Miller Creek	11.83	+							●	●		●		●		
Campo Creek	11.82	+							●	●		●		●		
Smith Canyon	11.82	+							●	●		●		●		
unnamed intermittent streams	11.85	+							●	●		●		●		

● Existing Beneficial Use

O Potential Beneficial Use

+ Excepted From MUN (See Text)

[1] Waterbodies are listed multiple times if they cross hydrologic area or sub area boundaries.

[2] Beneficial use designations apply to all tributaries to the indicated waterbody, if not listed separately.

001947

Table 2-3. BENEFICIAL USES OF COASTAL WATERS

Coastal Waters	Hydrologic Unit Basin Number	BENEFICIAL USE														
		IND	NAV	REC1	REC2	COMM	BIOL	EST	WILD	RARE	MAR	AQUA	MIGR	SPWN	WARM	SHELL
Pacific Ocean		●	●	●	●	●	●		●	●	●	●	●	●		●
Dana Point Harbor		●	●	●	●	●			●	●	●		●	●		●
Del Mar Boat Basin		●	●	●	●	●			●	●	●		●	●		●
Mission Bay		●		●	●	●		●	●	●	●		●	●		●
Oceanside Harbor		●	●	●	●	●			●	●	●		●	●		●
San Diego Bay [1]		●	●	●	●	●	●	●	●	●	●		●	●		●
Coastal Lagoons																
Tijuana River Estuary	11.11			●	●	●	●	●	●	●	●		●	●		●
Mouth of San Diego River	7.11			●	●	●		●	●	●	●		●	●		●
Los Penasquitos Lagoon [2]	6.10			●	●		●	●	●	●	●		●	●		●
San Dieguito Lagoon	5.11			●	●		●	●	●	●	●		●	●		
Batiquitos Lagoon	4.51			●	●		●	●	●	●	●		●	●		
San Elijo Lagoon	5.61			●	●		●	●	●	●	●		●	●		
Aqua Hedionda Lagoon	4.31	●		●	●	●		●	●	●	●	●	●	●		●

1 Includes the tidal prisms of the Otay and Sweetwater Rivers.

2 Fishing from shore or boat permitted, but other water contact recreational (REC-1) uses are prohibited.

● Existing Beneficial Use

March 12, 1997

001948

Table 2-3. BENEFICIAL USES OF COASTAL WATERS

Coastal Waters	Hydrologic Unit Basin Number	BENEFICIAL USE														
		IND	NAV	REC1	REC2	COMM	BIOL	EST	WILD	RARE	MAR	AQUA	MIGR	SPWN	WARM	SHELL
Coastal Lagoons - continued																
Buena Vista Lagoon [2]	4.21			●	●		●	O	●	●	●				●	
Loma Alta Slough	4.10			●	●			●	●	●	●					
Mouth of San Luis Rey River	3.11			●	●				●	●	●		●			
Santa Margarita Lagoon	2.11			●	●			●	●	●	●		●	●		
Aliso Creek Mouth	1.13			●	●				●	●	●					
San Juan Creek Mouth	1.27			●	●				●	●	●		●			●
San Mateo Creek Mouth	1.40			●	●		●		●	●	●		●	●		
San Onofre Creek Mouth	1.51			●	●				●	●	●		●	●		

1 Includes the tidal prisms of the Otay and Sweetwater Rivers.
2 Fishing from shore or boat permitted, but other water contact recreational (REC-1) uses are prohibited.

● Existing Beneficial Use
O Potential Beneficial Use

March 12, 1997

001949

Table 2-4. BENEFICIAL USES OF RESERVOIRS AND LAKES

Reservoirs & Lakes	Hydrologic Unit Basin Number	BENEFICIAL USE												
		MUN	AGR	IND	PROC	GWR	FRSH	REC1	REC2	WARM	COLD	WILD	RARE	POW
O'Neill Lake	2.13	●	●	●	●			●	●	●	●	●	●	
Lake Skinner	2.42	●	●	●	●	O		● [1]	●	●		●		
Vail Lake	2.81	●	●	●	●	●		● [1]	●	●		●		
Turner Lake	3.13	●	●	●				O	●	●				
Lake Henshaw	3.31	●	●	●	●		●	● [1]	●	●		●	●	●
San Dieguito Reservoir	5.21	●	●	O				●	●	●	●	●		
Lake Dixon	4.62	●	●	O				● [1]	●	●	●	●		
Lake Wohlford	4.63	●	●	O				● [1]	●	●	●	●		●
Lake Hodges	5.21	●	●	●	●			● [1]	●	●	●	●	●	
Lake Poway	5.52	●	●	●	●			● [1]	●	●	●	●		
Sutherland Lake	5.53	●	●	●	●			● [1]	●	●	●	●	●	
Miramar Reservoir	6.10	●		●				● [1]	●	●		●		●
Lake Murray	7.11	●		●				● [1]	●	●	●	●		●
Lake Jennings	7.12	●		●				● [1]	●	●	●	●		
San Vicente Reservoir	7.21	●	●	●	●			● [1]	●	●	●	●		
El Capitan Reservoir	7.31	●	●	●	●			● [1]	●	●	●	●	●	
Cuyamaca Reservoir	7.43	●	●	●	●			● [1]	●	●	●	●	●	
Sweetwater Reservoir	9.21	●	●	●	●			●	●	●		●		
Loveland Reservoir	9.31	●	●	●	●			●	●	●	●	●		
Lower Otay Reservoir	10.31	●	●	●	●			● [1]	●	●	●	●		
Upper Otay Reservoir	10.32	●	●	●	●			●	●	●	●	●		
Lake Barrett	11.30	●	●	●	●		●	●	●	●	●	●	●	
Morena Reservoir	11.50	●	●	●	●		●	● [1]	●	●	●	●	●	

[1] Fishing from shore or boat permitted, but other water contact recreational (REC-1) uses are prohibited.

● Existing Beneficial Use

O Potenetial Beneficial Use

001950

Table 2-5. BENEFICIAL USES OF GROUND WATERS

Ground Water		Hydrologic Unit Basin Number	BENEFICIAL USE					
			MUN	AGR	IND	PROC	FRSH	GWR
SAN JUAN HYDROLOGIC UNIT		**1.00**						
Laguna	HA	1.10						
San Joaquin Hills	HSA [1]	1.11	●	●				
Laguna Beach	HSA [1]	1.12	●	●				
Aliso	HSA [2]	1.13	●	●				
Dana Point	HSA [1]	1.14	+	●				
Mission Viejo	HA	1.20						
Oso	HSA	1.21	●	●	●			
Upper Trabuco	HSA	1.22	●	●	●			
Middle Trabuco	HSA	1.23	●	●	●			
Gobernadora	HSA	1.24	●	●	●			
Upper San Juan	HSA	1.25	●	●	●			
Middle San Juan	HSA	1.26	●	●	●			

1 These beneficial uses do not apply to all lands on the coastal side of the inland boundary of the right-of-way of Pacific Coast Highway 1, and this area is excepted from the sources of drinking water policy. The beneficial uses for the remainder of HA 1.10 are as shown.

2 These beneficial uses do not apply westerly of the easterly boundary of the right-of-way of Interstate Highway 5 and this area is excepted from the sources of drinking water policy. The beneficial uses for the remainder of the hydrologic area are as shown.

● Existing Beneficial Use
O Potential Beneficial Use
+ Excepted From MUN (see text)

001951

Table 2-5. BENEFICIAL USES OF GROUND WATERS

Ground Water		Hydrologic Unit Basin Number	BENEFICIAL USE					
			MUN	AGR	IND	PROC	FRSH	GWR
Lower San Juan	HSA [3]	1.27	●	●	●			
Ortega	HSA	1.28	●	●	●			
San Clemente	HA	1.30						
Prima Deshecha	HSA [2]	1.31	●	●				
Segunda Deshecha	HSA	1.32	+					
San Mateo Canyon	HA [2]	1.40	●	●	●			
San Onofre	HA [2]	1.50	●	●				

2 These beneficial uses do not apply westerly of the easterly boundary of the right-of-way of Interstate Highway 5 and this area is excepted from the sources of drinking water policy. The beneficial uses for the remainder of the hydrologic area are as shown.

3 These beneficial uses do not apply to all lands on the coastal side of the inland boundary of the right-of-way of Pacific Coast Highway 1 west of the San Juan Creek channel and this area is excepted from the sources of drinking water policy. The beneficial uses for the remainder of HA 1.20 are as shown.

● Existing Beneficial Use

O Potential Beneficial Use

\+ Excepted From MUN (see text)

001952

Table 2-5. BENEFICIAL USES OF GROUND WATERS

Ground Water		Hydrologic Unit Basin Number	BENEFICIAL USE					
			MUN	AGR	IND	PROC	FRSH	GWR
SANTA MARGARITA HYDROLOGIC UNIT		**2.00**						
Ysidora	HA [2]	2.10	●	●	●	●		
Deluz	HA	2.20	●	●	●			
Murrieta	HA	2.30	●	●	●	●		
Alud	HA	2.40	●	●	●			
Pechanga	HA	2.50	●	●	●			
Wilson	HA	2.60	●	●	O			
Cave Rocks	HA	2.70	●	●				
Aguanga	HA	2.80	●	●	●			
Oakgrove	HA	2.90	●	●				
SAN LUIS REY HYDROLOGIC UNIT		**3.00**						
Lower San Luis	HA [2]	3.10	●	●	●			
Monserate	HA	3.20						
Pala	HSA	3.21	●	●	●			
Pauma	HSA	3.22	●	●	●			
La Jolla Amago	HSA	3.23	●	●	●	●		
Warner Valley	HA	3.30						
Warner	HSA	3.31	●	●	●		●	
Combs	HSA	3.32	●	●	●			

2 These beneficial uses do not apply westerly of the easterly boundary of the right-of-way of Interstate Highway 5 and this area is excepted from the sources of drinking water policy. The beneficial uses for the remainder of the hydrologic area are as shown.

● Existing Beneficial Use

O Potential Beneficial Use

Table 2-5. BENEFICIAL USES OF GROUND WATERS

Ground Water			Hydrologic Unit Basin Number	BENEFICIAL USE					
				MUN	AGR	IND	PROC	FRSH	GWR
CARLSBAD HYDROLOGIC UNIT			**4.00**						
Loma Alta	HA	2	4.10	+		●			
Buena Vista Creek	HA		4.20						
El Salto	HSA	2	4.21	●	●	O			
Vista	HSA		4.22	●	●	●			
Aqua Hedionda	HA		4.30						
Los Monos	HSA	2	4.31	●	●	●			
Los Monos	HSA	5	4.31	O	O	O			
Los Monos	HSA	6	4.31	O	●	O			
Buena	HSA		4.32	●	●	●			
Encinas	HA		4.40	+					

2 These beneficial uses do not apply westerly of the easterly boundary of the right-of-way of Interstate Highway 5 and this area is excepted from the sources of drinking water policy. The beneficial uses for the remainder of the hydrologic area are as shown.

5 These beneficial use designations apply to the portion of HSA 4.31 bounded on the west by the easterly boundary of Interstate Highway 5 right-of-way; on the east by the easterly boundary of El Camino Real; and on the north by a line extending along the southerly edge of Agua Hedionda Lagoon to the easterly end of the lagoon, thence in an easterly direction to Evans Point, thence easterly to El Camino Real along the ridge lines separating Letterbox Canyon and the area draining to the Marcario Canyon.

6 These beneficial use designations apply to the portion of HSA 4.31 tributary to Agua Hedionda Creek downstream from the El Camino Real crossing, except lands tributary to Marcario Canyon (located directly southerly of Evans Point), land directly south of Agua Hedionda Lagoon, and areas west of Interstate Highway 5.

● Existing Beneficial Use
O Potential Beneficial Use
\+ Excepted From MUN (see text)

001954

Table 2-5. BENEFICIAL USES OF GROUND WATERS

Ground Water			Hydrologic Unit Basin Number	BENEFICIAL USE					
				MUN	AGR	IND	PROC	FRSH	GWR
CARLSBAD HYDROLOGIC UNIT - Continued			**4.00**						
San Marcos	HA		4.50						
Batiquitos	HSA	2,7	4.51	●	●	●			
Batiquitos	HSA	8	4.51	O	O	O			
Richland	HSA	2,7	4.52	●	●	●			
Twin Oaks	HSA	2,7	4.53	●	●	●			
Escondido	HA		4.60						
San Elijo	HSA	2	4.61	O	●	●			
Escondido	HSA		4.62	●	●	●			
Lake Wohlford	HSA		4.63	●	●	●			

2 These beneficial uses do not apply westerly of the easterly boundary of the right-of-way of Interstate Highway 5 and this area is excepted from the sources of drinking water policy. The beneficial uses for the remainder of the hydrologic area are as shown.

7 These beneficial used do not apply to HSA 4.51 and HSA 4.52 between Highway 78 and El Camino Real and to all lands which drain to Moonlight Creek and to Encinitas Creek and this area is excepted from the sources of drinking water policy. The beneficial uses for the remainder of the subarea are as shown.

8 These beneficial use designations apply to the portion of HSA 4.51 bounded on the south by the north shore of Batiquitos Lagoon, on the west by the easterly boundary of the Interstate Highway 5 right-of-way, on the north by the subarea boundary and on the east by the easterly boundary of El Camino Real.

● Existing Beneficial Use

O Potential Beneficial Use

Table 2-5. BENEFICIAL USES OF GROUND WATERS

Ground Water		Hydrologic Unit Basin Number	BENEFICIAL USE					
			MUN	AGR	IND	PROC	FRSH	GWR
SAN DIEGUITO HYDROLOGIC UNIT		**5.00**						
Solana Beach	HA [2]	5.10	●	●	●			
Hodges	HA	5.20	●	●	●			
San Pasqual	HA	5.30	●	●	●			
Santa Maria Valley	HA	5.40						
Ramona	HSA	5.41	●	●	●	●		
Lower Hatfield	HSA	5.42	●	●	●			
Wash Hallow	HSA	5.43	●	●	●			
Upper Hatfield	HSA	5.44	●	●	●			
Ballena	HSA	5.45	●	●	●			
East Santa Teresa	HSA	5.46	●	●	●			
West Santa Teresa	HSA	5.47	●	●	●			
Santa Ysabel	HA	5.50	●	●				

2 These beneficial uses do not apply westerly of the easterly boundary of the right-of-way of Interstate Highway 5 and this area is excepted from the sources of drinking water policy. The beneficial uses for the remainder of the hydrologic area are as shown.

● Existing Beneficial Use

O Potential Beneficial Use

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Table 2-5. BENEFICIAL USES OF GROUND WATERS

Ground Water			Hydrologic Unit Basin Number	BENEFICIAL USE					
				MUN	AGR	IND	PROC	FRSH	GWR
PENASQUITOS HYDROLOGIC UNIT			**6.00**						
Miramar Reservoir	HA	2,9	6.10	●	●	●			
Poway	HA		6.20	●	●	O			
Scripps	HA		6.30	+					
Miramar	HA	10	6.40	+		O			
Tecolote	HA		6.50	+					
SAN DIEGO HYDROLOGIC UNIT			**7.00**						
Lower San Diego	HA		7.10						
Mission San Diego	HSA	2	7.11	O	●	●	●		
Santee	HSA		7.12	●	●	●	●		
El Cajon	HSA		7.13	●	●	O	O		
Coches	HSA		7.14	●	●	●	O		
El Monte	HSA		7.15	●	●	●	O		
San Vicente	HA		7.20	●	●				
El Capitan	HA		7.30	●	●				
Boulder Creek	HA		7.40	●	●				

2 These beneficial uses do not apply westerly of the easterly boundary of the right-of-way of Interstate Highway 5 and this area is excepted from the sources of drinking water policy. The beneficial uses for the remainder of the hydrologic area are as shown.

9 These beneficial uses do not apply to all lands which drain to Los Penasquitos Canyon from 1.5 miles west of Interstate Highway 15 and this area is excepted from the sources of drinking water policy. The beneficial uses for the remainder of the hydrologic area are as shown.

10 These beneficial uses do not apply west of Interstate Highway 15. The beneficial uses for the remainder of the hydrologic area are as shown.

● Existing Beneficial Use
O Potential Beneficial Use
\+ Excepted From MUN (see text)

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Table 2-5. BENEFICIAL USES OF GROUND WATERS

Ground Water			Hydrologic Unit Basin Number	BENEFICIAL USE					
				MUN	AGR	IND	PROC	FRSH	GWR
PUEBLO SAN DIEGO HYDROLOGIC UNIT			**8.00**						
Point Loma	HA		8.10	+					
San Diego Mesa	HA		8.20	+					
National City	HA	2	8.30	●					
SWEETWATER HYDROLOGIC UNIT			**9.00**						
Lower Sweetwater	HA		9.10						
Telegraph	HSA		9.11	O	●	O			
La Nacion	HSA		9.12	●	●	●			
Middle Sweetwater	HA		9.20	●	●	●			
Upper Sweetwater	HA		9.30	●	●				
OTAY HYDROLOGIC UNIT			**10.00**						
Coronado	HA		10.10	+					
Otay Valley	HA		10.20	●	●	●			
Otay Valley	HA	11	10.20	+		●			
Dulzura	HA		10.30	●	●	●			

2 These beneficial uses do not apply westerly of the easterly boundary of the right-of-way of Interstate Highway 5 and this area is excepted from the sources of drinking water policy. The beneficial uses for the remainder of the hydrologic area as shown.

11 This beneficial use designation applies to the portion of Otay HA (10.20), limited to lands within and tributary to Salt Creek on the east and Poggi Canyon on the west and including the several smaller drainage courses between these tributaries of the Otay River.

● Existing Beneficial Use
O Potential Beneficial Use
\+ Excepted From MUN (see text)

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Table 2-5. BENEFICIAL USES OF GROUND WATERS

Ground Water		Hydrologic Unit Basin Number	BENEFICIAL USE					
			MUN	AGR	IND	PROC	FRSH	GWR
TIJUANA HYDROLOGIC UNIT		**11.00**						
Tijuana Valley	HA	11.10						
San Ysidro	HSA [12]	11.11	●	●	●			
Water Tanks	HSA	11.12	O	O	O			
Potrero	HA	11.20	●	●	●			
Barrett Lake	HA	11.30	●	●				
Monument	HA	11.40	●	●				
Morena	HA	11.50	●	●				
Cottonwood	HA	11.60	●	●				
Cameron	HA	11.70	●	●				
Campo	HA	11.80	●	●	●			

12 These beneficial uses do not apply west of Hollister Street and this area is excepted from the sources of drinking water policy. The beneficial uses for the remainder of the hydrologic area are as shown.

● Existing Beneficial Use

O Potential Beneficial Use

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3. WATER QUALITY OBJECTIVES

INTRODUCTION

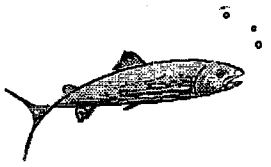

The purpose of this chapter is to designate the water quality objectives for all surface and ground waters in the Region. These water quality objectives are necessary to protect the beneficial uses designated in Chapter 2.

California Water Code Section 13050(h) defines "*water quality objectives*" as follows:

"The limits or levels of water quality constituents or characteristics which are established for the reasonable protection of beneficial uses of water or the prevention of nuisance within a specific area."

By definition, water quality objectives must protect the most sensitive of the beneficial uses which have been designated for a water body. Water quality objectives may be numerical values for water quality constituents or narrative descriptions. Water quality objectives must be based upon sound scientific water quality criteria needed to protect the most sensitive of the beneficial uses which have been designated for a water body. Water quality objectives must be as stringent or more stringent than water quality criteria. Numerous key terms used throughout this chapter are defined in the Glossary which is included as Appendix A of this Basin Plan.

WATER QUALITY OBJECTIVES

Like the designation of beneficial uses, the designation of water quality objectives must satisfy all of the applicable requirements of the California Water Code, Division 7 (Porter-Cologne Act) and the Clean Water Act. California Water Code, Section 13241 provides that each Regional Water Quality Control Board shall establish water quality objectives for the waters of the state i.e. (ground and surface waters) which, in the Regional Board's judgement, are necessary for the reasonable protection of beneficial uses and for the prevention of nuisance. The Clean Water Act Section 303 requires that the State adopt water quality objectives (called water quality criteria) for surface waters. The requirements of both Acts applicable to the designation of water quality objectives are summarized below.

WATER QUALITY OBJECTIVE DESIGNATION UNDER THE PORTER-COLOGNE WATER QUALITY CONTROL ACT

Significant points regarding the designation of water quality objectives for waters of the state under the Porter-Cologne Act are:

- Water quality objectives must ensure the reasonable protection of beneficial uses and the prevention of nuisance, recognizing that it may be possible for the quality of the water to be changed to some degree without unreasonably affecting beneficial uses. (California Water Code §13241)

- Protection of beneficial uses may not require that water quality objectives protect the existing quality of water. However, water quality objectives cannot be set at a level that would permit water quality to change to such a degree that the beneficial uses designated for protection are unreasonably affected. (California Water Code §13241)

- Water quality objectives must ensure that the water will be suitable for the beneficial uses which have been designated for protection. (California Water Code §13241)

- In establishing water quality objectives, the Regional Board must provide for the reasonable protection of all beneficial uses which are designated for protection, taking into account existing water quality, environmental and economic considerations. California Water Code Section 13241 provides that the Regional Board shall consider, but is not limited to, the following factors in establishing water quality objectives:

  - ☞ Past, present, and probable future beneficial uses of water;

  - ☞ Environmental characteristics of the hydrographic unit under consideration, including the quality of water available thereto;

- ☞ Water quality conditions that could reasonably be achieved through the coordinated control of all factors which affect water quality in the area;
- ☞ Economic considerations;
- ☞ The need for developing housing within the region; and
- ☞ The need to develop and use recycled water.

WATER QUALITY OBJECTIVE DESIGNATION UNDER THE CLEAN WATER ACT

Section 303 of the Clean Water Act requires the State to submit to the U.S. Environmental Protection Agency (US EPA) for approval, all new or revised water quality standards which are established for surface and ocean waters. Under federal terminology, water quality standards consist of the beneficial uses enumerated in Chapter 2 and the water quality objectives contained in this chapter. Significant points regarding the designation of water quality objectives for surface waters pursuant to the Clean Water Act are:

- Water quality objectives are called water quality criteria in the Clean Water Act.
- Water quality criteria (i.e., water quality objectives) are defined as constituent concentrations, levels, or narrative statements, representing a quality of water that supports a particular surface water use. Water quality criteria are qualitative or quantitative estimates of the concentration of a water constituent which, when not exceeded, will ensure water quality sufficient to protect a designated beneficial use. Water quality criteria should reflect the latest scientific knowledge on the identifiable effects of pollutants on public health and welfare, aquatic life, and recreation [40 CFR 131.3(b)].
- States must adopt water quality criteria (i.e., water quality objectives) that protect designated surface water beneficial uses. For surface waters with multiple beneficial use designations, the water quality criteria shall support the most sensitive beneficial use [40 CFR 131.11(a)(1)].
- States must adopt water quality criteria (i.e., water quality objectives) for surface waters which are based upon US EPA guidance documents or other scientifically defensible methods. Economics are not considered in the development of water quality criteria for surface waters under the Clean Water Act [40 CFR 131.11(b)].
- Water quality criteria (i.e., water quality objectives) for surface waters can be either numeric or narrative specifications for water quality based on physical, chemical and toxicological data, and scientific judgement. Where numerical specifications cannot be established, narrative criteria must be established based upon biomonitoring methods [40 CFR 131.11(b)].
- The term "*water quality criteria*" has two meanings under the federal Clean Water Act. In one context, water quality criteria is equivalent to water quality objectives. In other words, water quality criteria is the standard that a state must impose to protect a surface water beneficial use. In another context, the term "*water quality criteria*" refers to scientific information US EPA has developed on the relationship that the effect of a constituent concentration has on human health, aquatic life, or other uses of water. US EPA has published information in documents such as the "*Gold Book*" (US EPA, 1986) and in various individual criteria documents.

STATE AND FEDERAL ANTIDEGRADATION POLICIES

Water quality objectives must also conform to US EPA regulations covering antidegradation (40 CFR Section 131.12) and State Board Resolution No. 68-16, *Statement of Policy with Respect to Maintaining High Quality of Waters in California*. Application of the antidegradation provisions to the standard setting process requires supporting documentation and appropriate findings whenever a standard (water quality objective or beneficial use) is made less restrictive to accommodate the discharge of pollutants or other activities of man.

FEDERAL ANTIDEGRADATION POLICY

US EPA water quality standards regulations mandated under the Clean Water Act require that each state have an "*antidegradation*" policy for surface waters [40 CFR 131.6(d)]. Each state's policy must, at a minimum, be consistent with the following three principles (hereinafter referred to as the "*federal antidegradation policy*") set forth in 40 CFR 131.12(a):

(1) The first principle requires that all existing instream water uses shall be maintained and protected.

(2) The second principle protects waters whose quality exceeds levels necessary to support propagation of fish, shellfish, and wildlife and recreation in and on the water. For these waters, limited water quality degradation may be allowed if necessary to accommodate important economic or social development in the area in which the waters are located and if the water quality is adequate to protect existing uses fully.

(3) The third principle requires maintenance and protection of all high quality waters which constitute an outstanding national resource.

The federal antidegradation policy serves as a "*catchall*" water quality standard, to be applied where other water quality standards are not specific enough for a particular water body or where other water quality standards do not address a particular pollutant. The policy also serves to provide guidance for standard setting and for other regulatory decisions, to determine when additional control measures should be required to maintain instream beneficial uses or to maintain high quality surface waters. The federal antidegradation policy is not an absolute bar to reductions in surface water quality. Rather, the policy requires that reductions in water quality be justified as necessary to accommodate important social and economic development.

STATE ANTIDEGRADATION POLICY

Water quality objectives for waters of the state must conform to State Board Resolution No. 68-16, *Statement of Policy with Respect to Maintaining High Quality of Waters in California*. Under State Board Resolution No. 68-16, which applies to all waters of the State, the Regional Board and the State Board must have sufficient grounds to adopt findings which demonstrate that any water quality degradation will:

(1) Be consistent with the maximum benefit to the people of the State;

(2) Not unreasonably affect existing and potential beneficial uses of such water; and

(3) Not result in water quality less than described in the Basin Plan.

Resolution No. 68-16 establishes a general principle of nondegradation, with flexibility to allow some changes in water quality which is in the best interests of the State. Changes in water quality are allowed only where it is in the public interest and beneficial uses are not unreasonably affected. The State Board has interpreted Resolution No. 68-16 as incorporating the three part principles set forth in the federal antidegradation policy. The terms and conditions of Resolution No. 68-16 serve as a general narrative water quality objective in all state water quality control plans. A reprint of Resolution No. 68-16 is provided in the back of this Chapter on page 3-19.

DESIGNATED WATER QUALITY OBJECTIVES

The water quality objectives designated for the waters of the San Diego Region are listed below. These water quality objectives are necessary to protect existing and potential beneficial uses described in Chapter 2 and to protect existing high quality waters of the State.

The water quality objectives will be achieved primarily through the establishment of waste discharge requirements, and through the implementation of this water quality control plan. The Regional Board, in establishing waste discharge requirements, will consider potential effects on beneficial uses within the area of influence of the discharge, the existing quality of receiving waters, and the appropriate water quality objectives. The Regional Board will make a finding as to the beneficial uses to be protected within the area of influence of the discharge and establish waste discharge requirements to protect those uses and to meet water quality objectives.

The water quality objectives are stated in italics and arranged first by the water body type to which they apply (e.g., all waters; all ocean waters; and all

inland surface, enclosed bay and estuaries, coastal lagoons, and ground waters). Within each water body type, the water quality objectives are alphabetized by constituent.

In most cases the water quality objective is preceded by a general description of the constituent limited by the objective. The objectives vary in applicability and scope, reflecting the variety of beneficial uses of water which have been identified. Where numerical limits are specified, they represent the maximum levels of constituents that will allow the beneficial use to continue unimpaired. In other cases, an objective may tolerate natural or "*background*" levels of certain substances or characteristics but no increases over those values, or may express a limit in terms of not adversely affecting beneficial uses. An adverse effect or impact on a beneficial use occurs where there is an actual or threatened loss or impairment of that beneficial use.

GENERAL ANTIDEGRADATION OBJECTIVE

The following objective shall apply to all waters of the State within the Region.

General Antidegradation Water Quality Objective:

Wherever the existing quality of water is better than the quality of water established herein as objectives, such existing quality shall be maintained unless otherwise provided by the provisions of the State Water Resources Control Board Resolution No. 68-16, "Statement of Policy with Respect to Maintaining High Quality of Waters in California", including any revisions thereto, or the federal Antidegradation Policy, 40 CFR 131.12 (for surface waters only).

OCEAN WATERS

The following objectives shall apply to all ocean waters of the State within the Region:

OCEAN PLAN AND THERMAL PLAN

Ocean Plan and Thermal Plan Water Quality Objective:

The terms and conditions of the State Board's "Water Quality Control Plan for Ocean Waters of California" (Ocean Plan), "Water Quality Control Plan for Control of Temperature in the Coastal and Interstate Waters and Enclosed Bays and Estuaries of California" (Thermal Plan), and any revisions thereto are incorporated into this Basin Plan by reference. The terms and conditions of the Ocean Plan and Thermal Plan apply to the ocean waters within this Region.

DISSOLVED OXYGEN

Adequate dissolved oxygen is vital for aquatic life. Depression of dissolved oxygen levels can lead to fish kills and odors resulting from anaerobic decomposition. Dissolved oxygen content in water is a function of water temperature and salinity.

Water Quality Objective for Dissolved Oxygen:

The dissolved oxygen concentration in ocean waters shall not at any time be depressed more than 10 percent from that which occurs naturally, as the result of the discharge of oxygen demanding waste materials.

HYDROGEN ION CONCENTRATION (pH)

The hydrogen ion concentration of water is called "*pH*". The acidity or alkalinity of water is measured by the pH factor. The pH scale ranges from 1 to 14, with 1 to 6.9 being acid, 7.1 to 14 being alkaline, and 7.0 being neutral. Ranges (pH) of 6.5 to 9.0 are considered harmless. A change of one point on this scale represents a ten-fold increase in acidity or alkalinity. Many pollutants can alter the pH, raising or lowering it excessively. In some cases even small changes in pH can harm aquatic biota. The pH changes can alter the chemical form of certain constituents, thereby increasing their bioavailability and toxicity. For example a decrease in pH can result in an increase in dissolved metal concentrations. Ammonia, which is a major component of sewage discharges, can be completely safe at pH 7.0 and extremely toxic to fish at pH 8.5 for the same total ammonia concentration.

Water Quality Objective for pH:

The pH value shall not be changed at any time more than 0.2 pH units from that which occurs naturally.

INLAND SURFACE WATERS, ENCLOSED BAYS AND ESTUARIES, COASTAL LAGOONS AND GROUND WATERS

The following objectives apply to all inland surface waters, enclosed bays and estuaries, coastal lagoons, and ground waters of the Region as specified below.

THERMAL PLAN

Thermal Plan Water Quality Objective:

The terms and conditions of the State Board's "Water Quality Control Plan for Control of Temperature in the Coastal and Interstate Waters and Enclosed Bays and Estuaries of California" (Thermal Plan) and any revisions thereto are incorporated into this Basin Plan by reference. The terms and conditions of the Thermal Plan apply to the Inland Surface Waters, Enclosed Bays and Estuaries, and Coastal Lagoons within this Region.

AGRICULTURAL SUPPLY BENEFICIAL USE

Water Quality Objective for Agricultural Supply:

Waters designated for use as agricultural supply (AGR) shall not contain concentrations of chemical constituents in amounts that adversely affect such beneficial use.

AMMONIA, UN-IONIZED

Ammonia is a pungent, colorless, gaseous alkaline compound of nitrogen and hydrogen that is highly soluble in water. Un-ionized ammonia (NH_3) is toxic to fish and other aquatic organisms. In water, NH_3 exists in equilibrium with ammonium (NH_4^+) and hydroxide (OH^-) ions. The proportions of each change as the temperature, pH, and salinity of the water change.

Water Quality Objective for Un-ionized Ammonia:

The discharge of wastes shall not cause concentrations of un-ionized ammonia (NH_3) to exceed 0.025 mg/l (as N) in inland surface waters, enclosed bays and estuaries and coastal lagoons.

BACTERIA - TOTAL AND FECAL COLIFORM

Fecal bacteria are part of the intestinal flora of warm-blooded animals. Their presence in surface waters is an indicator of pollution. Total coliform numbers can include non-fecal bacteria, so additional testing is often done to confirm the presence and numbers of fecal coliform bacteria. Water quality objectives for numbers of total and fecal coliform vary with the uses of the water, as shown below.

(1) Waters Designated for Contact Recreation (REC-1) Beneficial Use

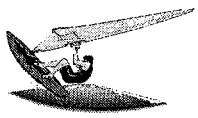

Water Quality Objective for Contact Recreation:

In waters designated for contact recreation (REC-1), the fecal coliform concentration based on a minimum of not less than five samples for any 30-day period, shall not exceed a log mean of 200/100 ml, nor shall more than 10 percent of total samples during any 30-day period exceed 400/100 ml.

(2) Waters Designated for Non-Contact Recreation (REC-2) Beneficial Use

Water Quality Objective for Non-contact Recreation:

In waters designated for non-contact recreation (REC-2) and not designated for contact recreation (REC-1), the average fecal coliform concentrations for any 30-day period, shall not exceed 2,000/100 ml nor shall more than 10 percent of samples collected during any 30-day period exceed 4,000/100 ml.

(3) Waters Where Shellfish May Be Harvested for Human Consumption (SHELL) Beneficial Use

Water Quality Objective for Shellfish Harvesting:

In waters where shellfish harvesting for human consumption, commercial or sports purposes is designated (SHELL), the median total coliform concentration throughout the water column for any 30-day period shall not exceed 70/100 ml nor shall more than 10 percent of the samples collected during any 30-day period exceed 230/100 ml for a five-tube decimal dilution test or 330/100 ml when a three-tube decimal dilution test is used.

(4) Bays and Estuaries

Water Quality Objective for Bays and Estuaries:

In bays and estuaries, the most probable number of coliform organisms in the upper 60 feet of the water column shall be less than 1,000 per 100 ml (10 per ml); provided that not more than 20 percent of the samples at any sampling station, in any 30-day period, may exceed 1,000 per 100 ml (10 per ml), and provided further that no single sample when verified by a repeat sample taken within 48 hours shall exceed 10,000 per 100 (100 per ml).

BACTERIA - E. COLI AND ENTEROCOCCI

(1) San Diego Bay

Water Quality Objective for E. Coli:

In San Diego Bay where bay waters are used for whole fish handling, the density of E. coli shall not exceed 7 per ml in more than 20 percent of any 20 daily consecutive samples of bay water.

(2) Waters Designated for Contact Recreation (REC-1) Beneficial Use

The US EPA published E. coli and enterococci bacteriological criteria applicable to waters designated for contact recreation (REC-1) in the Federal Register, Vol. 51, No. 45, Friday, March 7, 1986, 8012-8016.

Water Quality Objective for Enterococci and E. Coli:

US EPA BACTERIOLOGICAL CRITERIA FOR WATER CONTACT RECREATION[1,2] (in colonies per 100 ml)

	Freshwater		*Saltwater*
	entero-cocci	*E. Coli*	*entero-cocci*
Steady State			
(all areas)	*33*	*126*	*35*
Maximum			
(designated beach)	*61*	*235*	*104*
(moderately or lightly used area)	*108*	*406*	*276*
(infrequently used area)	*151*	*576*	*500*

[1]The criteria were published in the Federal Register, Vol. 51, No. 45/Friday, March 7, 1986/ 8012-8016. The criteria are based on:

Cabelli, V. J. 1983. Health Effects Criteria for Marine Recreational Waters. U. S. Environmental Protection Agency, EPA 600/1-80-031, Cincinnati, Ohio.

Dufour, A. P. 1984. Health Effects Criteria for Fresh Recreational Waters. U. S. Environmental Protection Agency, EPA 600/1-84-004, Cincinnati, Ohio.

[2]The EPA criteria apply to water contact recreation only. The criteria provide for a level of protection based on the frequency of usage of a given water contact recreation area. The criteria may be employed in special studies within this Region to differentiate between pollution sources or to supplement the current coliform objectives for water contact recreation.

BIOSTIMULATORY SUBSTANCES

Excessive growth of algae and/or other aquatic plants can degrade water quality. Algal blooms sometimes occur naturally; however, they are often the result of waste discharges or nonpoint source pollutants. Algal blooms depress the dissolved oxygen content of water and can result in fish kills. Algal blooms can also lead to problems with taste, odors, color, and increased turbidity. Floating algal scum and algal mats are also an aesthetically unpleasant nuisance. This general condition is known as eutrophication.

Water Quality Objectives for Biostimulatory Substances:

Inland surface waters, bays and estuaries and coastal lagoon waters shall not contain biostimulatory substances in concentrations that promote aquatic growth to the extent that such growths cause nuisance or adversely affect beneficial uses.

Concentrations of nitrogen and phosphorus, by themselves or in combination with other nutrients, shall be maintained at levels below those which stimulate algae and emergent plant growth. Threshold total phosphorus (P) concentrations shall not exceed 0.05 mg/l in any stream at the point where it enters any standing body of water, nor 0.025 mg/l in any standing body of water. A desired goal in order to prevent plant nuisance in streams and other flowing waters appears to be 0.1 mg/l total P. These values are not to be exceeded more than 10% of the time unless studies of the

specific water body in question clearly show that water quality objective changes are permissible and changes are approved by the Regional Board. Analogous threshold values have not been set for nitrogen compounds; however, natural ratios of nitrogen to phosphorus are to be determined by surveillance and monitoring and upheld. If data are lacking, a ratio of N:P = 10:1 , on a weight to weight basis shall be used.

Inland surface waters shall not contain biostimulatory substances in concentrations in excess of the numerical objectives described in Table 3-2.

Note - Certain exceptions to the above water quality objectives are described in Chapter 4 in the sections titled Discharges to Coastal Lagoons from Pilot Water Reclamation Projects and Discharges to Inland Surface Waters.

BORON

Boron occurs as sodium borate (borax) or as calcium borate (colemanite) in mineral deposits and natural waters of southern California. Boron is not considered harmful in drinking waters in concentrations up to 30 mg/l. Boron is an essential element for the growth of plants but there is no evidence that it is required by animals. Naturally occurring concentrations of boron should have no effect on aquatic life. Concentrations of boron in irrigation waters in excess of 0.75 mg/l may be deleterious to sensitive plants such as citrus. The maximum safe concentration of boron for even the most tolerant plants is about 4.0 mg/l. The United States Environmental Protection Agency (US EPA) has established a water quality criterion for boron of 0.75 mg/l for long term-term irrigation on sensitive crops. This criterion is found in *Quality Criteria for Water, 1986* - the "*Gold Book*". Additional information regarding boron concentrations in irrigation waters is presented in Table 3-1.

Water Quality Objectives for Boron:

Inland surface waters shall not contain boron in concentrations in excess of the numerical objectives described in Table 3-2.

Ground waters shall not contain boron in concentrations in excess of the numerical objectives described in Table 3-3.

CHLORIDES

Most waters contain chlorides because they are present in many rock types and are very soluble in water. Chlorides may be of natural mineral origin or derived from (a) seawater intrusion of ground water supplies, (b) salts spread on fields for agricultural purposes, (c) human or animal sewage or (d) industrial wastes. Chlorides may impart a salty taste to drinking water in concentrations between 100 - 700 mg/l. The secondary drinking water standard for chlorides is 500 mg/l. Elevated chloride concentrations in waters used for industrial process and supply can significantly increase the corrosion rate of steel and aluminum. High chloride concentrations can be toxic to plant life. A safe concentration of chloride for irrigation water is considered to be in the range of 100 - 140 mg/l. Irrigation with water containing 140 - 350 mg/l of chloride may cause slight to moderate plant injury. Additional information regarding chloride concentrations in irrigation waters is presented in Table 3-1.

Water Quality Objectives for Chlorides:

Inland surface waters shall not contain chlorides in concentrations in excess of the numerical objectives described in Table 3-2.

Ground waters shall not contain chlorides in concentrations in excess of the numerical objectives described in Table 3-3.

COLOR

Color in water may arise naturally, such as from minerals, plant matter, or algae, or may be caused by industrial pollutants. Color is primarily an aesthetic consideration, although it can discolor clothes and food. The secondary drinking water standard for color is 15 color units.

Water Quality Objectives for Color:

Waters shall be free of coloration that causes nuisance or adversely affects beneficial uses.

The natural color of fish, shellfish or other resources in inland surface waters, coastal lagoon or bay and estuary shall not be impaired.

Inland surface waters shall not contain color in concentrations in excess of the numerical objectives described in Table 3-2.

Ground waters shall not contain color in concentrations in excess of the numerical objectives described in Table 3-3.

DISSOLVED OXYGEN

Adequate dissolved oxygen levels are vital for aquatic life. Depression of dissolved oxygen levels can lead to fish kills and odors resulting from anaerobic decomposition. Dissolved oxygen content in water is a function of water temperature and salinity.

Water Quality Objective for Dissolved Oxygen:

Dissolved oxygen levels shall not be less than 5.0 mg/l in inland surface waters with designated MAR or WARM beneficial uses or less than 6.0 mg/l in waters with designated COLD beneficial uses. The annual mean dissolved oxygen concentration shall not be less than 7 mg/l more than 10% of the time.

FLOATING MATERIAL

Floating material is an aesthetic nuisance as well as a substrate for algae and insect vectors.

Water Quality Objective for Floating Material:

Waters shall not contain floating material, including solids, liquids, foams, and scum in concentrations which cause nuisance or adversely affect beneficial uses.

FLUORIDE

Fluoride does not naturally occur in high concentrations in surface waters, but may occur in detrimental concentrations in ground waters. Fluoride, in sufficient quantities, can adversely affect waters used as industrial process or supply in food, beverages, and pharmaceutical industries. The presence of optimal concentrations of fluoride in drinking water supplies can reduce dental decay, especially among children. However, fluoride concentrations in excess of approximately 1.0 mg/l can increase the risk of mottled enamel in children and dental fluorosis in adults.

Water Quality Objectives for Fluoride:

Inland surface waters shall not contain fluoride in concentrations in excess of the numerical objectives described in Table 3-2.

Ground waters shall not contain fluoride in concentrations in excess of the numerical objectives described in Table 3-3.

HYDROGEN ION CONCENTRATION (pH)

The hydrogen ion concentration of water is called "*pH*". The acidity or alkalinity of water is measured by the pH factor. The pH scale ranges from 1 to 14, with 1 to 6.9 being acid, 7.1 to 14 being alkaline, and 7.0 being neutral. Ranges (pH) of 6.5 to 9.0 are considered harmless. A change of one point on this scale represents a ten-fold increase in acidity or alkalinity. Many pollutants can alter the pH, raising or lowering it excessively. In some cases even small changes in pH can harm aquatic biota. The pH changes can alter the chemical form of certain constituents, thereby increasing their bioavailability and toxicity. For example, a decrease in pH can result in an increase in dissolved metal concentrations. Ammonia, which is a major component of sewage discharges, can be completely safe at pH 7.0 and extremely toxic to fish at pH 8.5 for the same total ammonia concentration.

Water Quality Objectives for pH:

Changes in normal ambient pH levels shall not exceed 0.2 units in waters with designated marine (MAR), or estuarine (EST), or saline (SAL) beneficial uses. Changes in normal ambient pH levels shall not exceed 0.5 units in fresh waters with designated cold freshwater habitat (COLD) or warm freshwater habitat (WARM) beneficial uses.

In bays and estuaries the pH shall not be depressed below 7.0 nor raised above 9.0.

In inland surface waters the pH shall not be depressed below 6.5 nor raised above 8.5.

INORGANIC CHEMICALS - PRIMARY STANDARDS

Water Quality Objective for Domestic or Municipal supply:

Waters designated for use as domestic or municipal supply (MUN) shall not contain concentrations of inorganic chemicals in excess of the maximum contaminant levels set forth in California Code of Regulations, Title 22, Table 64431-A of Section 64431 (Inorganic Chemicals) and Table 64431-B of Section 64431 (Fluoride) which are incorporated by reference into this plan. These incorporations by reference are prospective including future changes to

the incorporated provisions as the changes take effect. (See Tables 3-4 and 3-5.)

Table 3-4. Maximum Contaminant Levels for Inorganic Chemicals specified in Table 64431-A of Section 64431 of Title 22 of the California Code of Regulations as amended January 3, 1995.

Chemical	Maximum Contaminant Level, mg/l
Aluminum	1.
Antimony	0.006
Arsenic	0.05
Asbestos	7 MFL*
Barium	1.
Beryllium	0.004
Cadmium	0.005
Chromium	0.05
Cyanide	0.2
Mercury	0.002
Nickel	0.1
Nitrate (as NO_3)	45.
Nitrate + Nitrite(sum as nitrogen)	10.
Nitrite (as nitrogen)	1.
Selenium	0.05
Thallium	0.002

* MFL = million fibers per liter, MCL for fibers exceeding 10 um in length.

IRON

Iron may be present in water due to natural origin, corrosion of metallic iron and its alloys by water in the presence of oxygen, and industrial waste discharges containing iron. Iron is undesirable in domestic water supplies because it causes unpleasant tastes, deposits on food during cooking, stains and discolors laundry and plumbing fixtures. The secondary drinking water standard for iron is 0.3 mg/l.

Water Quality Objectives for Iron:

Inland surface waters shall not contain iron in concentrations in excess of the numerical objectives described in Table 3-2.

Ground waters shall not contain iron in concentrations in excess of the numerical objectives described in Table 3-3.

MANGANESE

Manganese is undesirable in domestic water supplies because it causes unpleasant tastes, deposits on food during cooking, stains and discolors laundry and plumbing fixtures, and fosters the growth of some microorganisms in reservoirs, filters, and distribution systems. The secondary drinking water standard for manganese is 0.05 mg/l.

Water Quality Objectives for Manganese:

Inland surface waters shall not contain manganese in concentrations in excess of the numerical objectives described in Table 3-2.

Ground waters shall not contain manganese in concentrations in excess of the numerical objectives described in Table 3-3.

METHYLENE BLUE - ACTIVATED SUBSTANCES (MBAS)

The MBAS test measures the presence of anionic surfactant (commercial detergent) in water. Positive test results can be used to indicate the presence of domestic wastewater. The secondary drinking water standard for MBAS is 0.5 mg/l.

Water Quality Objectives for MBAS:

Inland surface waters shall not contain MBAS in concentrations in excess of the numerical objectives described in Table 3-2.

Ground waters shall not contain MBAS in concentrations in excess of the numerical objectives described in Table 3-3.

Table 3-5. Limiting and Optimum Concentrations for Fluoride specified in Table 64431-B of Section 64431 of Title 22 of the California Code of Regulations as amended January 3, 1995.

Annual Average of Maximum Daily Air Temperature		Fluoride Concentration, mg/l			
Degrees Fahrenheit	Degrees Celsius	lower	optimum	upper	MCL
53.7 and below	12.0 and below	0.9	1.2	1.7	2.4
53.8 to 58.3	12.1 to 14.6	0.8	1.1	1.5	2.2
58.4 to 63.8	14.7 to 17.6	0.8	1.0	1.3	2.0
63.9 to 70.6	17.7 to 21.4	0.7	0.9	1.2	1.8
70.7 to 79.2	21.5 to 26.2	0.7	0.8	1.0	1.6
79.3 to 90.5	26.3 to 32.5	0.6	0.7	0.8	1.4

NITRATE

High nitrate concentrations in domestic water supplies can be toxic to human life. Infants are particularly susceptible and may develop methemoglobinemia (blue baby syndrome). The primary drinking water standard for nitrate as NO_3 is 45 mg/l.

Water Quality Objectives for Nitrate:

Inland surface waters shall not contain nitrate (as NO_3) in concentrations in excess of the numerical objectives described in Table 3-2.

Ground waters shall not contain nitrate (as NO_3) in concentrations in excess of the numerical objectives described in Table 3-3.

OIL AND GREASE

Oil and grease can be present in water as a result of the discharge of treated wastes and the accidental or intentional dumping of wastes into sinks and storm drains. Oils and related materials have a high surface tension and are not soluble in water, therefore forming a film on the water's surface. This film can result in nuisance conditions because of offensive odors and visual impacts. Oil and grease can coat birds and aquatic organisms, adversely affecting respiration and/or thermoregulation.

Water Quality Objective for Oils, Grease, Waxes or other Materials:

Waters shall not contain oils, greases, waxes, or other materials in concentrations which result in a visible film or coating on the surface of the water or on objects in the water, or which cause nuisance or which otherwise adversely affect beneficial uses.

ORGANIC CHEMICALS - PRIMARY STANDARDS

Water Quality Objectives:

Water designated for use as domestic or municipal supply (MUN) shall not contain concentrations of chemical constituents in excess of the maximum contaminant levels specified in California Code of Regulations, Title 22, Table 64444-A of Section 64444 (Organic Chemicals) which is incorporated by reference into this plan. This incorporation by reference is prospective including future changes to the incorporated provisions as the changes take effect. (See Table 3-6.)

Water designated for use as domestic or municipal supply (MUN) shall not contain concentrations of toluene in excess of 1 mg/l.

The United States Environmental Protection Agency established a maximum contaminant level for toluene of 1 mg/l in drinking water in *Title 40, Code of Federal Regulations, Part 141.61, (40 CFR 141.61), EPA National Primary Drinking Water Regulations (40 CFR 141.61 as revised 40 FR 59570, July 1, 1991).*

Table 3-6. Maximum Contaminant Levels for Organic Chemicals specified in Table 64444-A of Section 64444 of Title 22 of the California Code of Regulations as amended January 3, 1995.

Chemical	Maximum Contaminant Level, mg/l
(a) Volatile Organic Chemicals (VOCs)	
Benzene	0.001
Carbon Tetrachloride	0.0005
1,2-Dichlorobenzene	0.6
1,4-Dichlorobenzene	0.005
1,1-Dichloroethane	0.005
1,2-Dichloroethane	0.0005
1,1-Dichloroethylne	0.006
cis-1,2-Dichloroethylene	0.006
trans-1,2-Dichloroethylene	0.01
Dichloromethane	0.005
1,2-Dichloropropane	0.005
1,3-Dichloropropene	0.0005
Ethylbenzene	0.7
Monochlorobenzene	0.07
Styrene	0.1
1,1,2,2-Tetrachloroethane	0.001
Tetrachloroethylene	0.005
Toluene	0.15
1,2,4-Trichlorobenzene	0.07
1,1,1-Trichloroethane	0.200
1,1,2-Trichloroethane	0.005
Trichloroethylene	0.005
Trichlorofluoromethane	0.15
1,1,2-Trichloro-1,2,2-Trifluoroethane	1.2
Vinyl Chloride	0.0005
Xylenes	1.75*
(b) Non-Volatile Synthetic Organic Chemicals (SOCs)	
Alachlor	0.002
Atrazine	0.003
Bentazon	0.018

Chemical	Maximum Contaminant Level, mg/l
Benzo(a)pyrene	0.0002
Carbofuran	0.018
Chlordane	0.0001
2,4-D	0.07
Dalapon	0.2
1,2-Dibromon-3-chloropropane	0.0002
Di(2-ethylhexyl)adipate	0.4
Di(2-ethylhexl)phthalate	0.004
Dinoseb	0.007
Diquat	0.02
Endothall	0.1
Endrin	0.002
Ethylene Dibromide	0.00005
Glyphosate	0.7
Heptachlor	0.00001
Heptachlor Epoxide	0.00001
Hexachlorobenzene	0.001
Hexachlorocyclopentadiene	0.05
Lindane	0.0002
Methoxychlor	0.04
Molinate	0.02
Oxamyl	0.2
Pentachlorophenol	0.001
Picloram	0.5
Polychlorinated Biphenyls	0.0005
Simazine	0.004
Thiobencarb	0.07
Toxaphene	0.003
2,3,7,8-TCDD (Dioxin)	$3x10^{-8}$
2,4,5-TP Silvex	0.05

*MCL is for either a single isomer or the sum of the isomers.

PERCENT SODIUM AND ADJUSTED SODIUM ADSORPTION RATIO

Excess concentrations of sodium in irrigation water reduce soil permeability to water and air. The deterioration of sodium in irrigation water is cumulative and is accelerated by poor drainage.

Table 3-1 shows concentration guidelines for sodium, boron, chloride and other chemical constituents present in irrigation waters.

The specific water quality objective for sodium in the Basin Plan is expressed as percent sodium. Percent sodium is calculated as follows:

$$\% \text{ Na} = \frac{\text{Na}}{\text{Na} + \text{Ca} + \text{Mg} + \text{K}} \times 100\%$$

where sodium (Na), Calcium (Ca), Magnesium (Mg) and Potassium (K) are expressed in milliequivalent per liter (me/l).

The percent sodium objective was developed for the protection of agricultural uses from the potential hazard due to sodium in irrigation waters. The value of 60% sodium is based upon *Water Quality Criteria*, by McKee and Wolf, 1963.

McKee and Wolf note that because of all the variables involved, the classification of waters for irrigation use must be somewhat arbitrary and the limits set cannot be too rigid. The three general classifications of irrigation waters are:

CLASS	%SODIUM	DESCRIPTION
I	<30 - 60 %	Excellent to good, or suitable for most plants under most conditions.
II	30 - 75 %	Good to injurious, harmful to some plants under conditions of soil, climate and practices.
III	>70 - 75 %	Injurious to unsatisfactory, unsuitable under most conditions.

Since the publication of the percent sodium criteria, technical research has resulted in the development of more applicable criteria for addressing the potential sodium hazard in irrigation water.

The sodium adsorption ratio (SAR) and adjusted sodium adsorption ratios (Adj. SAR) are measures of the potential hazard in soils due to sodium. SAR and Adj. SAR are similar to percent sodium in that their calculated values provide an indication of a soil's potential for permeability and potential aeration problems. However, by taking into consideration the soil's sodicity and the exchange phases between Ca, Na and Mg, the SAR and Adj. SAR predict potential sodium build up in soils. The Adj. SAR calculation further takes into account the effects of carbonate and bicarbonate ion concentrations of a soil. Adj. SAR is the most common method for determining sodium hazard in irrigation water at the present time.

The calculation for SAR is as follows:

$$\text{SAR} = \frac{\text{Na}}{\sqrt{\frac{(\text{Ca} + \text{Mg})}{2}}}$$

where Na, Ca and Mg are in me/l.

The calculation for Adj. SAR is as follows:

$$\text{Adj. SAR} = \frac{\text{Na}}{\sqrt{\frac{(\text{Ca}_x + \text{Mg})}{2}}}$$

where Na and Mg are in me/l.

Ca_x is a modified Ca value, calculated using the Suarez table (Table 3-3, contained in *Irrigation with Reclaimed Municipal Wastewater, A Guidance Manual*, California State Water Resources Control Board, Report Number 84-1, July 1984). Ca_x takes into account salinity (EC_w), the HCO_3/CO_3 ratio (me/l) and the estimated partial pressure of CO_2 in the top few millimeters of the soil (P_{CO2} = 0.0007 atmospheres).

Water Quality Objectives for Sodium:

Inland surface waters shall not contain percent sodium in excess of the numerical objectives described in Table 3-2.

Ground waters shall not contain percent sodium in excess of the numerical objectives described in Table 3-3.

In some cases, adjusted sodium adsorption ratio may be a better indicator of the potential sodium hazard in irrigation water than percent sodium. The Regional Board Executive Officer may authorize the use of adjusted sodium absorption ratio instead of

percent sodium to indicate the potential sodium hazard. In such cases, the adjusted sodium adsorption ratio shall not exceed the slight to moderate range of values referenced in Table 3-1 "Guidelines for Interpretation of Water Quality for Irrigation".

PESTICIDES

Pesticides can enter surface and ground waters directly through industrial process discharges, agricultural discharge, spillage and illegal dumping. Pesticides can also enter surface and ground waters indirectly by drifting away from areas where pesticides are being sprayed, through surface runoff from treated fields, and by leaching or return flows from irrigation. Pesticides can concentrate in plant or animal tissues and many are considered to be carcinogenic to humans. Although many pesticides are designed to deteriorate rapidly when exposed to sunlight and air, they may persist for months or years in water.

California Code of Regulations, Title 22, Table 64444-A of Section 64444 (Organic Chemicals) establishes maximum contaminant levels for pesticides in drinking water. (See water quality objective for Organic Chemicals).

Water Quality Objectives for Pesticides:

No individual pesticide or combination of pesticides shall be present in the water column, sediments or biota at concentration(s) that adversely affect beneficial uses. Pesticides shall not be present at levels which will bioaccumulate in aquatic organisms to levels which are harmful to human health, wildlife or aquatic organisms.

Water designated for use as domestic or municipal supply (MUN) shall not contain concentrations of pesticides in excess of the maximum contaminant levels specified in California Code of Regulations, Title 22, Table 64444-A of Section 64444 (Organic Chemicals) which is incorporated by reference into this plan. This incorporation by reference is prospective including future changes to the incorporated provisions as the changes take effect. (See Table 3-6)

PHENOLIC COMPOUNDS

Phenolic compounds are in widespread use as industrial and agricultural chemical intermediates for the preparation of other chemicals. These organic compounds are byproducts of petroleum refining, tanning, and textile, dye, and resin manufacturing. Low concentrations cause taste and odor problems in water, higher concentrations can kill aquatic life and humans. Phenol is occasionally referred to as "*carbolic acid*".

Water Quality Objectives for Phenolic Compounds:

Water designated for use as domestic or municipal supply (MUN) shall not contain concentrations of phenolics in excess of 1.0 ug/l.

Should there be any conflict between this limit and those described under the Organic Chemicals objective the more stringent standards shall apply at all times.

RADIOACTIVITY

Water Quality Objective for Radioactivity:

Radionuclides shall not be present in concentrations that are deleterious to human, plant, animal, or aquatic life nor that result in the accumulation of radionuclides in the food web to an extent that presents a hazard to human, plant, animal or aquatic life.

Water Quality Objective for Radionuclides:

Waters designated for use as domestic or municipal supply (MUN) shall not contain concentrations of radionuclides in excess of the levels specified in Section 64441 of Title 22 of the California Code of Regulations (Natural Radioactivity) and the maximum contaminant levels specified in Table 4 of Section 64443 of Title 22 of the California Code of Regulations (Man-Made Radioactivity), which are both incorporated by reference into this plan. These incorporations by reference are prospective including future changes to the incorporated provisions as the changes take effect. (See Table 3-7.)

Table 3-7. Maximum Contaminant Levels for Radioactivity specified in Table 4 of Section 64443 of Title 22 of the California Code of Regulations as amended January 3, 1995.

Constituent	Maximum Contaminant Level, pCi/l
Combined Radium-226 and Radium-228	5
Gross Alpha Particle Activity (including Radium-226 but excluding Radon and Uranium)	15
Tritium	20,000
Strontium-90	8
Gross Beta Particle Activity	50
Uranium	20

(pCi/l = picocuries per liter = curies x 10^{-12} per liter)

SECONDARY DRINKING WATER STANDARDS

Water Quality Objective for Domestic or Municipal Supply Water:

Water designated for use as domestic or municipal supply (MUN) shall not contain concentrations of chemical constituents in excess of the maximum contaminant levels specified in Table 64449-A of Section 64449 of Title 22 of the California Code of Regulations (Secondary Maximum Contaminant Levels, Consumer Acceptance Limits) which is incorporated by reference into this plan. This incorporation by reference is prospective including future changes to the incorporated provisions as the changes take effect. (See Table 3-8.)

SEDIMENT

Suspended sediment in surface waters can cause harm to aquatic organisms by abrasion of surface membranes, interference with respiration, and sensory perception in aquatic fauna. Suspended sediment can reduce photosynthesis in and survival of aquatic flora by limiting the transmittance of light.

Table 3-8. Secondary Maximum Contaminant Levels for Consumer Acceptance Limits specified in Table 64449-A of Section 64449 of Title 22 of the California Code of Regulations as amended January 3, 1995.

Constituents	Maximum Contaminant Levels
Aluminum	0.2 mg/l
Color	15 units
Copper	1.0 mg/l
Corrosivity	Non-corrosive
Foaming Agents (MBAS)	0.5 mg/l
Iron	0.3 mg/l
Manganese	0.05 mg/l
Odor Threshold	3 units
Silver	0.1 mg/l
Thiobencarb	0.001 mg/l
Turbidity	5 units
Zinc	5.0 mg/l

Water Quality Objective for Sediment:

The suspended sediment load and suspended sediment discharge rate of surface waters shall not be altered in such a manner as to cause nuisance or adversely affect beneficial uses.

SUSPENDED AND SETTLEABLE SOLIDS

Suspended and settleable solids are deleterious to benthic organisms and may cause the formation of anaerobic conditions. They can clog fish gills and interfere with respiration in aquatic fauna. They also screen out light, hindering photosynthesis and normal aquatic plant growth and development.

Water Quality Objective for Suspended and Settleable Solids:

Waters shall not contain suspended and settleable solids in concentrations of solids that cause nuisance or adversely affect beneficial uses.

SULFATE

The most important sources of sulfate in native waters of the San Diego Region are the gypsiferous deposits and sulfide minerals associated with crystalline rocks. Excessive sulfate concentrations in drinking water can cause laxative effects to new users of the water supply. The recommended secondary drinking water standard for sulfate is 250 mg/l with a upper limit of 500 mg/l.

Water Quality Objectives for Sulphate:

Inland surface waters shall not contain sulphate in concentrations in excess of the numerical objectives described in Table 3-2.

Ground waters shall not contain sulphate in concentrations in excess of the numerical objectives described in Table 3-3.

TASTES AND ODORS

Undesirable tastes and odors in water may be a nuisance and may indicate the presence of pollutants. The secondary drinking water standard for odor (threshold) is 3 odor units.

Water Quality Objectives for Taste and Odor:

Waters shall not contain taste or odor producing substances at concentrations which cause a nuisance or adversely affect beneficial uses.

The natural taste and odor of fish, shellfish or other Regional water resources used for human consumption shall not be impaired in inland surface waters and bays and estuaries.

Inland surface waters shall not contain odors in concentrations in excess of the numerical objectives described in Table 3-2.

Ground waters shall not contain odors in concentrations in excess of the numerical objectives described in Table 3-3.

TEMPERATURE

Waste discharges can cause temperature changes in the receiving waters which adversely affect the aquatic biota. Discharges most likely to cause these temperature effects are cooling water discharges from power plants.

Water Quality Objectives for Temperature:

The natural receiving water temperature of intrastate waters shall not be altered unless it can be demonstrated to the satisfaction of the Regional Board that such alteration in temperature does not adversely affect beneficial uses.

At no time or place shall the temperature of any COLD water be increased more than 5°F above the natural receiving water temperature.

TOTAL DISSOLVED SOLIDS

Dissolved solids in natural waters may consist of carbonates, bicarbonates, chlorides, sulfates, phosphates, nitrates, magnesium, sodium, iron, manganese and other substances. The recommended secondary drinking water standard for total dissolved solids is 500 mg/l with a upper limit of 1000 mg/l due to taste considerations. High total dissolved solids concentrations in irrigation waters can be deleterious to plants directly, or indirectly through adverse effects on soil permeability. A classification of irrigation waters with respect to total dissolved solids concentration is described in Table 3-1.

Water Quality Objectives for Total Dissolved Solids:

Inland surface waters shall not contain total dissolved solids in concentrations in excess of the numerical objectives described in Table 3-2.

Ground waters shall not contain total dissolved solids in concentrations in excess of the numerical objectives described in Table 3-3.

TOXICITY

Toxicity is the adverse response of organisms to chemicals or physical agents.

Water Quality Objectives for Toxicity:

All waters shall be maintained free of toxic substances in concentrations that are toxic to, or that produce detrimental physiological responses in

human, plant, animal, or aquatic life. Compliance with this objective will be determined by use of indicator organisms, analyses of species diversity, population density, growth anomalies, bioassays of appropriate duration, or other appropriate methods as specified by the Regional Board.

The survival of aquatic life in surface waters subjected to a waste discharge or other controllable water quality factors, shall not be less than that for the same water body in areas unaffected by the waste discharge or, when necessary, for other control water that is consistent with requirements specified in US EPA, State Water Resources Control Board or other protocol authorized by the Regional Board. As a minimum, compliance with this objective as stated in the previous sentence shall be evaluated with a 96-hour acute bioassay.

In addition, effluent limits based upon acute bioassays of effluents will be prescribed where appropriate, additional numerical receiving water objectives for specific toxicants will be established as sufficient data become available, and source control of toxic substances will be encouraged.

TOXIC POLLUTANTS

Federal Register, Volume 57, Number 246 amended Title 40, Code of Federal Regulations, Part 131.36 (40 CFR 131.36) and established numeric criteria for a limited number of priority toxic pollutants for inland surface waters and estuaries in California. US EPA promulgated these criteria on December 22, 1992, to bring California into full compliance with Section 303(c)(2)(B) of the Clean Water Act. California is not currently in full compliance with Section 303(c)(2)(B) of the Clean Water Act due to the invalidation of the Water Quality Control Plan for Inland Surface Waters of California and the Water Quality Control Plan for Enclosed Bays and Estuaries of California. However, the criteria established in 57 FR 60848 (December 22, 1992) (specifically pages 60920 - 60921) are still applicable to surface waters in the Region.

Water Quality Objectives for Toxic Pollutants:

Inland surface waters, enclosed bays, and estuaries shall not contain toxic pollutants in excess of the numerical objectives applicable to California specified in 40 CFR 131.36 (§131.36 revised at 57 FR 60848, December 22, 1992).

TRIHALOMETHANES

Chlorine is the dominant chemical agent used to disinfect treated water and wastewater. Trihalomethanes are formed when chlorine reacts with aquatic organic material found in water and wastewater. Trihalomethanes are a group of light weight chlorinated hydrocarbons which are suspected carcinogens. The US EPA has established a maximum contaminant level for total trihalomethanes of 0.1 mg/l in *Title 40, Code of Federal Regulations, Part 141.12, (40 CFR 141.12), EPA National Primary Drinking Water Regulations (§141.12 revised at 57 FR 31838, July 17, 1992).* Total trihalomethanes are the sum of the concentrations of bromodichloromethane, dibromochloromethane, tribromomethane (bromoform) and trichloromethane (chloroform). The federal regulations on trihalomethanes are incorporated by reference into California Code of Regulations, Title 22, Chapter 15, Articles 4.5, Sections 64439.

Water Quality Objective for Trihalomethanes:

Waters designated for use as domestic or municipal supply (MUN) shall not contain concentrations of trihalomethanes in excess of the criteria set forth in California Code of Regulations, Title 22, Section 64439 which is incorporated by reference into this plan. This incorporation by reference is prospective including future changes to Section 64439 as the changes take effect.

TURBIDITY

The turbidity of water is attributable to suspended and colloidal matter, the effect of which is to disturb clearness and diminish the penetration of light. High turbidity levels can adversely affect the use of water for drinking. By interfering with the penetration of light, turbidity can adversely affect photosynthesis which aquatic organisms depend upon for survival. High concentrations of particulate matter that produce turbidity can be directly lethal to aquatic life.

Water Quality Objectives for Turbidity:

Waters shall be free of changes in turbidity that cause nuisance or adversely affect beneficial uses.

Inland surface waters shall not contain turbidity in excess of the numerical objectives described in Table 3-2.

Ground waters shall not contain turbidity in excess of the numerical objectives described in Table 3-3.

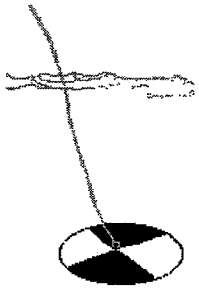

The transparency of waters in lagoons and estuaries shall not be less than 50% of the depth at locations where measurement is made by means of a standard Secchi disk, except where lesser transparency is caused by rainfall runoff from undisturbed natural areas and dredging projects conducted in conformance with waste discharge requirements of the Regional Board. With these two exceptions, increases in turbidity attributable to controllable water quality factors shall not exceed the following limits:

Natural Turbidity	***Maximum Increase***
0-50 NTU	*20% over natural turbidity level*
50-100 NTU	*10 NTU*
Greater than 100 NTU	*10% over natural turbidity level*

In addition, within San Diego Bay, the transparency of bay waters, insofar as it may be influenced by any controllable factor, either directly or through induced conditions, shall not be less than 8 feet in more than 20 percent of the readings in any zone, as measured by a standard Secchi disk. Wherever the water is less than 10 feet deep, the Secchi disk reading shall not be less than 80 percent of the depth in more than 20 percent of the readings in any zone.

WATER QUALITY OBJECTIVES OF INLAND SURFACE WATERS

Specific numerical water quality objectives for inland surface waters are presented by hydrologic area and subarea and watershed in Table 3-2.

The water quality objectives for inland surface water designations described in this table correspond with the beneficial use designations previously described in Chapter 2. Water Quality Objective variations occur in some of the hydrologic areas, subareas and stream reaches. Water quality variations from the objectives may also occur within a given hydrologic area subarea or stream reach. Such local variations will be evaluated when waste discharge requirements, NPDES permits, Cleanup and Abatement Orders, and Cease and Desist Orders are being developed for a given discharger.

The omission of mineral objectives for some areas corresponds to the lack of beneficial uses (AGR, MUN, IND) requiring such objectives.

WATER QUALITY OBJECTIVES OF GROUND WATERS

Specific numerical water quality objectives for ground waters are presented by hydrologic area and subarea in Table 3-3.

A footnote for some ground water basins is listed to show that some water quality objectives are considered tentative until detailed salt balance studies are conducted.

In 1978 the Regional Board, in Resolution No. 78-6, deleted water quality objectives and beneficial uses for certain portions of basins 1.10, 1.20, 1.30, 1.40, 1.50, 2.10, 3.10, 4.10, 4.20, 4.30, 4.40, 4.50, 4.60, 5.10, 6.10, 7.10, and 11.10. Table footnotes are included to identify these basins. The Regional Board elected to delete beneficial uses in portions of these basins, where the uses of ground water were marginal or nonexistent, to promote wastewater reclamation by sewage treatment plants. The deletion of beneficial uses in these areas was based upon a determination that the loss of ground water supplies was outweighed by the long-term increase in wastewater reclamation made possible by allowing reclaimed water discharges which are high in total dissolved solids. It is the Regional Board's intent to protect the water quality in these basins under the terms of State Board Resolution No. 68-16.

For purposes of intrusion barrier formation or ground water recharge, the water quality objective qualifications footnoted in Table 3-3 allow, with approval of the Regional Board, discharge of reclaimed water in areas of equal or poorer ground water quality. Relatively poor quality water could also be used for intrusion barrier formation along the coast.

WATER QUALITY CRITERIA

The literature contains many different water quality criteria designed to protect specific beneficial uses of water. A summary of the specific numerical water quality criteria considered by the Regional Board for designation as water quality objectives is

described in Appendix C. The water quality criteria described in Appendix C are not enforceable water quality objectives. The purpose of presenting the information summarized in these tables is to allow interested persons to compare available water quality criteria to the specific water quality objectives designated by the Regional Board described earlier in this Chapter.

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REPRINT OF RESOLUTION NO. 68-16

STATE WATER RESOURCES CONTROL BOARD
RESOLUTION NO. 68-16

STATEMENT OF POLICY WITH RESPECT TO
MAINTAINING HIGH QUALITY OF WATERS IN CALIFORNIA

WHEREAS the California Legislature has declared that it is the policy of the State that the granting of permits and licenses for unappropriated water and the disposal of wastes into the waters of the State shall be so regulated as to achieve highest water quality consistent with maximum benefit to the people of the State and shall be controlled so as to promote the peace, health, safety and welfare of the people of the State; and

WHEREAS water quality control policies have been and are being adopted for waters of the State; and

WHEREAS the quality of some waters of the State is higher than that established by the adopted policies and it is the intent and purpose of this Board that such higher quality shall be maintained to the maximum extent possible consistent with the declaration of the Legislature;

NOW, THEREFORE, BE IT RESOLVED:

1. Whenever the existing quality of water is better than the quality established in policies as of the date on which such policies become effective, such existing high quality will be maintained until it has been demonstrated to the State that any change will be consistent with maximum benefit to the people of the State, will not unreasonably affect present and anticipated beneficial use of such water and will not result in water quality less than that prescribed in the policies.

2. Any activity which produces or may produce a waste or increased volume or concentration of waste and which discharges or proposes to discharge to existing high quality waters will be required to meet waste discharge requirements which will result in the best practicable treatment or control of the discharge necessary to assure that (a) a pollution or nuisance will not occur and (b) the highest water quality consistent with maximum benefit to the people of the State will be maintained.

3. In implementing this policy, the Secretary of the Interior will be kept advised and will be provided with such information as he will need to discharge his responsibilities under the Federal Water Pollution Control Act.

BE IT FURTHER RESOLVED that a copy of this resolution be forwarded to the Secretary of the Interior as part of California's water quality control policy submission.

CERTIFICATION

The undersigned, Executive Officer of the State Water Resources Control Board, does hereby certify that the foregoing is a full, true, and correct copy of a resolution duly and regularly adopted at a meeting of the State Water Resources Control Board held on October 24, 1968.

Dated: October 28, 1968

Original signed by
Kerry W. Mulligan, Executive Officer
State Water Resources Control Board

Table 3-1. GUIDELINES FOR INTERPRETATION OF WATER QUALITY FOR IRRIGATION[a]

Potential Irrigation Problem	Units	Degree or Restriction on use		
		None	Slight to Moderate	Severe
Salinity (affects crop water availability)				
Electrical Conductivity (EC_W[b])	ds/m or mmho/cm	< 0.7	0.7 - 3.0	> 3.0
TDS	mg/l	< 450	450 - 2000	> 2000
Permeability (affects infiltration rate of water into soil. Evaluate using EC_W and Sodium Adsorption Ratio (SAR) together)[c,d]				
SAR =			**and EC_W =**	
0 - 3		> 0.7	0.7 - 0.2	< 0.2
3 - 6		> 1.2	1.2 - 0.3	< 0.3
6 - 12		> 1.9	1.9 - 0.5	< 0.5
12 - 20		> 2.9	2.9 - 1.3	< 1.3
20 - 40		> 5.0	5.0 - 2.9	< 2.9
Specified ion toxicity (affects sensitive crops)				
Sodium (Na) [e,f]				
surface irrigation	SAR	< 3	3 - 9	> 9
sprinkler irrigation	mg/l	< 70	> 70	-----
Chloride (Cl)[e,f]				
surface irrigation	mg/l	< 140	140 - 350	> 350
sprinkler irrigation	mg/l	< 100	> 100	-----
Boron (B)	mg/l	< 0.7	0.7 - 3.0	> 3.0
Miscellaneous effects (affects susceptible crops)				
Nitrogen (Total-N)[g]	mg/l	< 5	5 - 30	> 30
Bicarbonate (HCO_3) (overhead sprinkler only)	mg/l	< 90	90 - 500	> 500
pH		normal range	6.5 - 8.4	
Residual chlorine (overhead sprinkler only)	mg/l	< 1.0	1.0 - 5.0	> 5.0

ENDNOTES FOR TABLE 3-1

a Interpretations are based on possible effects of constituents on crops and/or soils. Guidelines are flexible and should be modified when warranted by local experience or special conditions of crop, soil, and method of irrigation. Table 3-1 is based on Table 3-4 contained in "*Irrigation with Reclaimed Municipal Wastewater, A Guidance Manual*", California State Water Resources Control Board, Report Number 84-1, July 1984.

b EC_w means electrical conductivity of the irrigation water, reported in mmho/cm or ds/m. TDS means total dissolved solids, reported in mg/l.

c SAR means sodium adsorbtion ratio. SAR is sometimes reported as R_{Na}. At a given SAR, infiltration rate increases as salinity (EC_w) increases. Evaluate the potential permeability problem by SAR and EC_w in combination.

Where Na, Ca, and Mg are in milliequivalents per liter.

$$SAR = \frac{Na}{\sqrt{\left(\frac{Ca+Mg}{2}\right)}}$$

d For wastewaters, it is recommended that the SAR be adjusted to include a more correct estimate of calcium in the soil water following an irrigation. The adjusted sodium adsorbtion ratio (adj R_{Na}) calculated by this product is to be substituted for the SAR value.

Where Na, Ca, and Mg are in milliequivalents per liter.

$$SAR = \frac{Na}{\sqrt{\left(\frac{Ca_x+Mg}{2}\right)}}$$

Ca_x is a modified Ca value calculated using Table 3-2, contained in "*Irrigation with Reclaimed Municipal Wastewater, A Guidance Manual*".

e Most tree crops and woody ornamentals are sensitive to sodium and chloride; use the values shown. Most annual crops are not sensitive; use the salinity tolerance tables. For boron sensitivity, refer to boron tolerance tables.

f With overhead sprinkler irrigation and low humidity (<30%), sodium or chloride greater than 70 or 100 mg/l, respectively, have resulted in excessive leaf absorption and crop damage to sensitive crops.

g Total nitrogen should include nitrate-nitrogen, ammonia-nitrogen, and organic-nitrogen. Although forms of nitrogen in wastewater vary, the plant responds to the total nitrogen.

Table 3-2. WATER QUALITY OBJECTIVES

Concentrations not to be exceeded more than 10% of the time during any one one year period.

Inland Surface Waters		Hydrologic Unit Basin Number	Constituent (mg/L or as noted)												
			TDS	Cl	SO_4	%Na	N&P	Fe	Mn	MBAS	B	ODOR	Turb NTU	Color Units	F
SAN JUAN HYDROLOGIC UNIT		**901.00**													
Laguna	HA	1.10	1000	400	500	60	a	0.3	0.05	0.5	0.75	none	20	20	1.0
Mission Viejo	HA	1.20	500	250	250	60	a	0.3	0.05	0.5	0.75	none	20	20	1.0
San Clemente	HA	1.30	500	250	250	60	a	0.3	0.05	0.5	0.75	none	20	20	1.0
San Mateo Canyon	HA	1.40	500	250	250	60	a	0.3	0.05	0.5	0.75	none	20	20	1.0
San Onofre	HA	1.50	500	250	250	60	a	0.3	0.05	0.5	0.75	none	20	20	1.0
SANTA MARGARITA HYDROLOGIC UNIT		**902.00**													
Ysidora	HA	2.10	750	300	300	60	a	0.3	0.05	0.5	0.75	none	20	20	1.0
Deluz	HA	2.20	500	250	250	60	a	0.3	0.05	0.5	0.75	none	20	20	1.0
Deluz Creek	HSA b	2.21	750	250	250	60	a	0.3	0.05	0.5	0.75	none	20	20	1.0
Gavilan	HSA b	2.22	750	250	250	60	a	0.3	0.05	0.5	0.75	none	20	20	1.0
Murrieta	HA	2.30	750	300	300	60	a	0.3	0.05	0.5	0.75	none	20	20	1.0
Auld	HA	2.40	500	250	250	60	a	0.3	0.05	0.5	0.75	none	20	20	1.0
Pechanga	HA	2.50	500	250	250	60	a	0.3	0.05	0.5	0.75	none	20	20	1.0
Wolf	HSA b	2.52	750	250	250	60	a	0.3	0.05	0.5	0.75	none	20	20	1.0
Wilson	HA	2.60	500	250	250	60	a	0.3	0.05	0.5	0.75	none	20	20	1.0
Cave Rocks	HA	2.70	750	300	300	60	a	0.3	0.05	0.5	0.75	none	20	20	1.0
Aguanga	HA	2.80	750	300	300	60	a	0.3	0.05	0.5	0.75	none	20	20	1.0
Oakgrove	HA	2.90	750	300	300	60	a	0.3	0.05	0.5	0.75	none	20	20	1.0

HA - Hydrologic Area
HSA - Hydrologic Sub Area (Lower case letters indicate endnotes following the table.)

001985

Table 3-2. WATER QUALITY OBJECTIVES

Concentrations not to be exceeded more than 10% of the time during any one one year period.

Inland Surface Waters		Hydrologic Unit Basin Number	Constituent (mg/L or as noted)												
			TDS	Cl	SO_4	%Na	N&P	Fe	Mn	MBAS	B	ODOR	Turb NTU	Color Units	F
SAN LUIS REY HYDROLOGIC UNIT		**903.00**													
Lower San Luis	HA	3.10	500	250	250	60	a	0.3	0.05	0.5	0.75	none	20	20	1.0
Monserat	HA	3.20	500	250	250	60	a	0.3	0.05	0.5	0.75	none	20	20	1.0
Warner Valley	HA	3.30	500	250	250	60	a	0.3	0.05	0.5	0.75	none	20	20	1.0
CARLSBAD HYDROLOGIC UNIT		**904.00**													
Loma Alta	HA	4.10	-	-	-	-	-	-	-	-	-	none	20	20	1.0
Buena Vista Creek	HA	4.20	500	250	250	60	a	0.3	0.05	0.5	0.75	none	20	20	1.0
Agua Hedionda	HA	4.30	500	250	250	60	a	0.3	0.05	0.5	0.75	none	20	20	1.0
Encinas	HA	4.40	-	-	-	-	-	-	-	-	-	none	20	20	1.0
San Marcos	HA	4.50	500	250	250	60	a	0.3	0.05	0.5	0.75	none	20	20	1.0
Escondido Creek	HA	4.60	500	250	250	60	a	0.3	0.05	0.5	0.75	none	20	20	1.0
SAN DIEGUITO HYDROLOGIC UNIT		**905.00**													
Solana Beach	HA	5.10	500	250	250	60	a	0.3	0.05	0.5	0.75	none	20	20	1.0
Hodges	HA	5.20	500	250	250	60	a	0.3	0.05	0.5	0.75	none	20	20	1.0
San Pasqual	HA	5.30	500	250	250	60	a	0.3	0.05	0.5	0.75	none	20	20	1.0
Santa Maria Valley	HA	5.40	500	250	250	60	a	0.3	0.05	0.5	0.75	none	20	20	1.0
Santa Ysabel	HA	5.50	500	250	250	60	a	0.3	0.05	0.5	0.75	none	20	20	1.0
PENASQUITOS HYDROLOGIC UNIT		**906.00**													
Miramar Reservoir	HA	6.10	500	250	250	60	a	0.3	0.05	0.5	0.75	none	20	20	1.0
Poway	HA	6.20	500	250	250	60	a	0.3	0.05	0.5	0.75	none	20	20	1.0

HA - Hydrologic Area
HSA - Hydrologic Sub Area (Lower case letters indicate endnotes following the table.)

001986

Table 3-2. WATER QUALITY OBJECTIVES

Concentrations not to be exceeded more than 10% of the time during any one one year period.

Inland Surface Waters		Hydrologic Unit Basin Number	Constituent (mg/L or as noted)												
			TDS	Cl	SO_4	%Na	N&P	Fe	Mn	MBAS	B	ODOR	Turb NTU	Color Units	F
Scripps	HA	6.30	-	-	-	-	a	-	-	-	-	none	20	20	-
Miramar	HA	6.40	500	250	250	60	a	0.3	0.05	0.5	0.75	none	20	20	1.0
Tecolote	HA	6.50	-	-	-	-	a	-	-	-	-	none	20	20	-
SAN DIEGO HYDROLOGIC UNIT		**907.00**													
Lower San Diego	HA	7.10	1000	400	500	60	a	0.3	0.05	0.5	1.0	none	20	20	-
Mission San Diego	HSA	7.11	1500	400	500	60	a	1.0	1.00	0.5	1.0	none	20	20	-
Santee	HSA c	7.12	1000	400	500	60	a	1.0	1.00	0.5	1.0	none	20	20	-
Santee	HSA d	7.12	1500	400	500	60	a	1.0	1.00	0.5	1.0	none	20	20	-
San Vicente	HA	7.20	300	50	65	60	a	0.3	0.05	0.5	1.0	none	20	20	1.0
El Capitan	HA	7.30	300	50	65	60	a	0.3	0.05	0.5	1.0	none	20	20	1.0
Boulder Creek	HA	7.40	300	50	65	60	a	0.3	0.05	0.5	1.0	none	20	20	1.0
PUEBLO SAN DIEGO HYDROLOGIC UNIT		**908.00**													
Point Loma	HA	8.10	-	-	-	-	-	-	-	-	-	none	20	20	-
San Diego Mesa	HA	8.20	-	-	-	-	-	-	-	-	-	none	20	20	-
National City	HA	8.30	-	-	-	-	-	-	-	-	-	none	20	20	-
SWEETWATER HYDROLOGIC UNIT		**909.00**													
Lower Sweetwater	HA	9.10	1500	500	500	60	a	0.3	0.05	0.5	0.75	none	20	20	-
Middle Sweetwater	HA	9.20	500	250	250	60	a	0.3	0.05	0.5	0.75	none	20	20	1.0
Upper Sweetwater	HA	9.30	500	250	250	60	a	0.3	0.05	0.5	0.75	none	20	20	1.0

HA - Hydrologic Area
HSA - Hydrologic Sub Area (Lower case letters indicate endnotes following the table.)

001987

Table 3-2. WATER QUALITY OBJECTIVES

Concentrations not to be exceeded more than 10% of the time during any one one year period.

Inland Surface Waters		Hydrologic Unit Basin Number	Constitiuent (mg/L or as noted)												
			TDS	Cl	SO_4	%Na	N&P	Fe	Mn	MBAS	B	ODOR	Turb NTU	Color Units	F
OTAY HYDROLOGIC UNIT		**910.00**													
Coronado	HA	10.10	-	-	-	-	-	-	-	-	-	-	-	-	-
Otay Valley	HA	10.20	1000	400	500	60	a	0.3	0.05	0.5	0.75	none	20	20	1.0
Dulzura	HA	10.30	500	250	250	60	a	0.3	0.05	0.5	0.75	none	20	20	1.0
TIJUANA HYDROLOGIC UNIT		**911.00**													
Tijuana Valley	HA	11.10	-	-	-	-	-	-	-	-	-	-	-	-	-
San Ysidro	HSA	11.11	2100	-	-	-	a	-	-	-	-	none	20	20	-
Potrero	HA	11.20	500	250	250	60	a	0.3	0.05	0.5	1.0	none	20	20	1.0
Barrett Lake	HA	11.30	500	250	250	60	a	0.3	0.05	0.5	1.0	none	20	20	1.0
Monument	HA	11.40	500	250	250	60	a	0.3	0.05	0.5	1.0	none	20	20	1.0
Morena	HA	11.50	500	250	250	60	a	0.3	0.05	0.5	1.0	none	20	20	1.0
Cottonwood	HA	11.60	500	250	250	60	a	0.3	0.05	0.5	1.0	none	20	20	1.0
Cameron	HA	11.70	500	250	250	60	a	0.3	0.05	0.5	1.0	none	20	20	1.0
Campo	HA	11.80	500	250	250	60	a	0.3	0.05	0.5	1.0	none	20	20	1.0

HA - Hydrologic Area
HSA - Hydrologic Sub Area (Lower case letters indicate endnotes following the table.)

001988

ENDNOTES FOR TABLE 3-2

a Concentrations of nitrogen and phosphorus, by themselves or in combination with other nutrients, shall be maintained at levels below those which stimulate algae and emergent plant growth. Threshold total Phosphorus (P) concentrations shall not exceed 0.05 mg/l in any stream at the point where it enters any standing body of water, nor 0.025 mg/l in any standing body of water. A desired goal in order to prevent plant nuisances in streams and other flowing waters appears to be 0.1 mg/l total P. These values are not to be exceeded more than 10% of the time unless studies of the specific body in question clearly show that water quality objective changes are permissible and changes are approved by the Regional Board. Analogous threshold values have not been set for nitrogen compounds; however, natural ratios of nitrogen to phosphorus are to be determined by surveillance and monitoring and upheld. If data are lacking, a ratio of N:P =10:1 shall be used. Note - Certain exceptions to the above water quality objectives are described in Chapter 4 in the sections titled Discharges to Coastal Lagoons from Pilot Water Reclamation Projects and Dicharges to Surface Waters.

b These objectives apply to the lower portion of Murrieta Creek in the Wolf HSA (2.52) and the Santa Margarita River from it's beginning at the confluence of Murrieta and Temecula Creeks, through the Gavilan HSA (2.22) and DeLuz HSA (2.21), to where it enters the Upper Ysidora HSA (2.13).

c Sycamore Canyon Subarea, a portion of the Santee Hydrologic Subarea, includes the watersheds of the following north-south trending canyons: Oak Creek, Spring Canyon, Little Sycamore Canyon, Quail Canyon, and Sycamore Canyon. The Sycamore Canyon subarea extends eastward from the Mission San Diego HSA to the confluence of the San Diego River and Forester Creek, immediately south of the Santee Lakes.

d These objectives apply to the Lower Sycamore Canyon portion of the Santee Hydrologic Subarea described as all of the Sycamore Canyon watershed except that part which drains north of the boundary between sections 28 and 33, Township South, Range 1 West.

001989

Table 3-3. WATER QUALITY OBJECTIVES

Concentrations not to be exceeded more than 10% of the time during any one year period.

Ground Water		Hydrologic Basin Unit Number	Constituent (mg/L or as noted)												
			TDS	Cl	SO_4	%Na	NO_3	Fe	Mn	MBAS	B	ODOR	Turb NTU	Color Units	F
SAN JUAN HYDROLOGIC UNIT		**901.00**													
Laguna	HA	1.10													
San Joaquin Hills	HSA	1.11	1200	400	500	60	10	0.3	0.05	0.5	0.75	none	5	15	1.0
Laguna Beach	HSA	1.12	1200	400	500	60	45	0.3	0.05	0.5	0.75	none	5	15	1.0
Aliso	HSA	1.13	1200	400	500	60	45	0.3	0.05	0.5	0.75	none	5	15	1.0
Dana Point	HSA	1.14	1200	400	500	60	45	0.3	0.05	0.5	0.75	none	5	15	1.0
Mission Viejo	HA	1.20													
Oso	HSA	1.21	1200	400	500	60	45	0.3	0.05	0.5	0.75	none	5	15	1.0
Upper Trabuco	HSA	1.22	500	250	250	60	45	0.3	0.05	0.5	0.75	none	5	15	1.0
Middle Trabuco	HSA	1.23	750	375	375	60	45	0.3	0.05	0.5	0.75	none	5	15	1.0
Gobernadora	HSA	1.24	1200	400	500	60	45	0.3	0.05	0.5	0.75	none	5	15	1.0
Upper San Juan	HSA	1.25	500	250	250	60	45	0.3	0.05	0.5	0.75	none	5	15	1.0
Middle San Juan	HSA	1.26	750	375	375	60	45	0.3	0.05	0.5	0.75	none	5	15	1.0
Lower San Juan	HSA	1.27	1200	400	500	60	45	0.3	0.05	0.5	0.75	none	5	15	1.0
Ortega	HSA	1.28	1100	375	450	60	45	0.3	0.05	0.5	0.75	none	5	15	1.0
San Clemente	HA	1.30													
Prima Deshecha	HSA	1.31	1200	400	500	60	10	0.3	0.05	0.5	0.75	none	5	15	1.0
Segunda Deshecha	HSA	1.32	1200	400	500	60	10	0.3	0.05	0.5	0.75	none	5	15	1.0
San Mateo Canyon	HA a	1.40	500 b	250	250 b	60	45 b	0.3 b	0.05 b	0.5	0.75 b	none	5	15	1.0
San Onofre	HA a	1.50	500 b	250	250 b	60	45 b	0.3 b	0.05 b	0.5	0.75 b	none	5	15	1.0
SANTA MARGARITA HYDROLOGIC UNIT		**902.00**													
Ysidora	HA a	2.10	750 c	300 c	300 c	60	10 c	0.3 c	0.05 c	0.5	0.75 c	none	5	15	1.0
Deluz	HA	2.20	500	250	250	60	10	0.3	0.05	0.5	0.75	none	5	15	1.0

HA - Hydrologic Area
HSA - Hydrologic Sub Area (Lower case letters indicate endnotes following the table.)

001990

Table 3-3. WATER QUALITY OBJECTIVES

Concentrations not to be exceeded more than 10% of the time during any one year period.

Ground Water		Hydrologic Basin Unit Number	Constituent (mg/L or as noted)												
			TDS	Cl	SO_4	%Na	NO_3	Fe	Mn	MBAS	B	ODOR	Turb NTU	Color Units	F
Deluz Creek	HSA [m]	2.21	750	250	250	60	10	0.3	0.05	0.5	0.75	none	5	15	1.0
Gavilan	HSA [m]	2.22	750	250	250	60	10	0.3	0.05	0.5	0.75	none	5	15	1.0
Murrieta	HA	2.30	750 [c]	300 [c]	300 [c]	60	10 [c]	0.3 [c]	0.05 [c]	0.5	0.75 [c]	none	5	15	1.0
Domenigoni	HSA	2.35	2000	-	-	-	-	-	-	-	-	-	-	-	-
Auld	HA	2.40	500	250	250	60	10	0.3	0.05	0.5	0.75	none	5	15	1.0
Pechanga	HA	2.50	500	250	250	60	10	0.3	0.05	0.5	0.75	none	5	15	1.0
Pauba	HSA [o]	2.51	750	250	250	60	10	0.3	0.05	0.5	0.75	none	5	15	1.0
Wolf	HSA [p]	2.52	750	250	250	60	10	0.3	0.05	0.5	0.75	none	5	15	1.0
Wilson	HA	2.60	500	250	250	60	10	0.3	0.05	0.5	0.75	none	5	15	1.0
Cave Rocks	HA	2.70	500	250	250	60	10	0.3	0.05	0.5	0.75	none	5	15	1.0
Aguanga	HA	2.80	500	250	250	60	10	0.3	0.05	0.5	0.75	none	5	15	1.0
Oakgrove	HA	2.90	500	250	250	60	10	0.3	0.05	0.5	0.75	none	5	15	1.0
SAN LUIS REY HYDROLOGIC UNIT		**903.00**													
Lower San Luis	HA	3.10	800 [r]	300	400	60	10	0.3	0.05	0.5	0.75	none	5	15	1.0
Mission	HSA [a]	3.11	1500 [cd]	500 [cd]	500 [cd]	60	45 [cd]	0.85 [cd]	0.15 [cd]	0.5 [d]	0.75 [cd]	none	5	15 [d]	1.0 [d]
Bonsall	HSA	3.12	1500 [cd]	500 [cd]	500 [cd]	60	45 [cd]	0.85 [cd]	0.15 [cd]	0.5 [d]	0.75 [cd]	none	5	15 [d]	1.0 [d]
Monserate	HA	3.20													
Pala	HSA	3.21	900 [c]	300 [c]	500 [c]	60	15 [c]	0.3 [c]	0.05 [c]	0.5	0.75	none	5	15	1.0
Pauma	HSA	3.22	800 [c]	300 [c]	400 [c]	60	10 [c]	0.3 [c]	0.05 [c]	0.5	0.75	none	5	15	1.0
La Jolla Amago	HSA	3.23	500	250	250	60	5	0.3	0.05	0.5	0.75	none	5	15	1.0
Warner Valley	HA	3.30	500	250	250	60	5	0.3	0.05	0.5	0.75	none	5	15	1.0
CARLSBAD HYDROLOGIC UNIT		**904.00**													
Loma Alta	HA	4.10	-	-	-	-	-	-	-	-	-	-	-	-	-

HA - Hydrologic Area
HSA - Hydrologic Sub Area (Lower case letters indicate endnotes following the table.)

001991

Table 3-3. WATER QUALITY OBJECTIVES

Concentrations not to be exceeded more than 10% of the time during any one year period.

Ground Water			Hydrologic Basin Unit Number	Constituent (mg/L or as noted)												
				TDS	Cl	SO_4	%Na	NO_3	Fe	Mn	MBAS	B	ODOR	Turb NTU	Color Units	F
Buena Vista Creek	HA		4.20													
El Salto	HSA	a	4.21	3500	800	500	60	45	0.3	0.05	0.5	2.0	none	5	15	1.0
Vista	HSA	a	4.22	1000 b	400 b	500 b	60	10 b	0.3 b	0.05 b	0.5	0.75 b	none	5	15	1.0
Agua Hedionda	HA	a	4.30	1200	500	500	60	10	0.3	0.05	0.5	0.75	none	5	15	1.0
Los Monos	HSA	aj	4.31	3500	800	500	60	45	0.3	0.05	0.5	2.0	none	5	15	1.0
Encinas	HA	a	4.40	3500 b	800 b	500 b	60	45 b	0.3 b	0.05 b	0.5	2.0 b	none	5	15	1.0
San Marcos	HA	ae	4.50	1000	400	500	60	10	0.3	0.05	0.5	0.75	none	5	15	1.0
Batiquitos	HSA	aek	4.51	3500	800	500	60	45	0.3	0.05	0.5	2.0	none	5	15	1.0
Escondido Creek	HA	a	4.60	750	300	300	60	10	0.3	0.05	0.5	0.75	none	5	15	1.0
San Elijo	HSA	a	4.61	2800	700	600	60	45	0.3	0.05	0.5	1.0	none	5	15	1.0
Escondido	HSA		4.62	1000	300	400	60	10	0.3	0.05	0.5	0.75	none	5	15	1.0
SAN DIEGUITO HYDROLOGIC UNIT			**905.00**													
Solana Beach	HA	a	5.10	1500 b	500 b	500 b	60	45 b	0.85 b	0.15 b	0.5	0.75 b	none	5	15	1.0
Hodges	HA		5.20	1000 b	400 b	500 b	60	10 b	0.3 b	0.05 b	0.5	0.75 b	none	5	15	1.0
San Pasqual	HA		5.30	1000 b	400 b	500 b	60	10 b	0.3 b	0.05 b	0.5	0.75 b	none	5	15	1.0
Santa Maria Valley	HA		5.40	1000	400	500	60	10	0.3	0.05	0.5	0.75	none	5	15	1.0
Santa Ysabel	HA		5.50	500	250	250	60	5	0.3	0.05	0.5	0.75	none	5	15	1.0
PENASQUITOS HYDROLOGIC UNIT			**906.00**													
Miramar Reservoir	HA	af	6.10	1200	500	500	60	10	0.3	0.05	0.5	0.75	none	5	15	1.0
Poway	HA		6.20	750 q	300	300	60	10	0.3	0.05	0.5	0.75	none	5	15	1.0
Scripps	HA		6.30	-	-	-	-	-	-	-	-	-	-	-	-	-
Miramar	HA	g	6.40	750	300	300	60	10	0.3	0.05	0.5	0.75	none	5	15	1.0
Tecolote	HA		6.50	-	-	-	-	-	-	-	-	-	-	-	-	-

HA - Hydrologic Area
HSA - Hydrologic Sub Area (Lower case letters indicate endnotes following the table.)

001992

Table 3-3. WATER QUALITY OBJECTIVES

Concentrations not to be exceeded more than 10% of the time during any one year period.

Ground Water		Hydrologic Basin Unit Number	Constituent (mg/L or as noted)												
			TDS	Cl	SO_4	%Na	NO_3	Fe	Mn	MBAS	B	ODOR	Turb NTU	Color Units	F
SAN DIEGO HYDROLOGIC UNIT		**907.00**													
Lower San Diego	HA	7.10													
Mission San Diego	HSA a	7.11	3000 b	800 b	600 b	60	45 b	0.3 b	0.05 b	0.5	2.0 b	none	5	15	1.0
Santee	HSA	7.12	1000 b	400 b	500 b	60	45 b	0.3 b	0.05 b	0.5	0.75 b	none	5	15	1.0
Santee (alluvial aquifer for lower Sycamore Canyon)	HSA n	7.12	2000 b	800 b	600 b	60	45 b	0.3 b	0.05 b	0.5	2.0 b	none	5	15	1.0
El Cajon	HSA	7.13	1200 b	250 b	500 b	60	45 b	0.3 b	0.05 b	0.5	0.75 b	none	5	15	1.0
Coches	HSA	7.14	600 b	250 b	250 b	60	5 b	0.3 b	0.05 b	0.5	0.75 b	none	5	15	1.0
El Monte	HSA	7.15	600 b	250 b	250 b	60	5 b	0.3 b	0.05 b	0.5	0.75 b	none	5	15	1.0
San Vicente	HA	7.20	600	250	250	60	5	0.3	0.05	0.5	0.75	none	5	15	1.0
El Capitan	HA	7.30	1000	400	500	60	45	0.3	0.05	0.5	0.75	none	5	15	1.0
Conejos Creek	HSA	7.31	350	60	60	60	5	0.3	0.05	0.5	0.75	none	5	15	1.0
Boulder Creek	HA	7.40	350	60	60	60	5	0.3	0.05	0.5	0.75	none	5	15	1.0
PUEBLO SAN DIEGO HYDROLOGIC UNIT		**908.00**													
Point Loma	HA i	8.10	-	-	-	-	-	-	-	-	-	-	-	-	-
San Diego Mesa	HA i	8.20	-	-	-	-	-	-	-	-	-	-	-	-	-
National City	HA i	8.30	750	250	250	60	10	0.3	0.05	0.5	0.75	none	5	15	1.0
SWEETWATER HYDROLOGIC UNIT		**909.00**													
Lower Sweetwater	HA	9.10													
Telegraph	HSA	9.11	3000 b	750 b	500 b	60	45 b	0.3 b	0.05 b	0.5	2.0 b	none	5	15	1.0
La Nacion	HSA	9.12	1500 b	500 b	500 b	60	45 b	0.3 b	0.15 b	0.5	0.75 b	none	5	15	1.0
Middle Sweetwater	HA	9.20	1000	400	500	60	10	0.3	0.05	0.5	0.75	none	5	15	1.0
Upper Sweetwater	HA	9.30	500	250	250	60	10	0.3	0.05	0.5	0.75	none	5	15	1.0

HA - Hydrologic Area

HSA - Hydrologic Sub Area (Lower case letters indicate endnotes following the table.)

001993

Table 3-3. WATER QUALITY OBJECTIVES

Concentrations not to be exceeded more than 10% of the time during any one year period.

Ground Water			Hydrologic Basin Unit Number	Constituent (mg/L or as noted)												
				TDS	Cl	SO_4	%Na	NO_3	Fe	Mn	MBAS	B	ODOR	Turb NTU	Color Units	F
OTAY HYDROLOGIC UNIT			**910.00**													
Coronado	HA		10.10	-	-	-	-	-	-	-	-	-	-	-	-	-
Otay Valley	HA		10.20	1500 [b]	500 [b]	500 [b]	60	10 [b]	0.3 [b]	0.05 [b]	0.5	0.75 [b]	none	5	15	1.0
Otay Valley	HA	l	10.20	-	-	-	-	-	-	-	-	-	none	-	-	-
Dulzura	HA		10.30	1000	400	500	60	10	0.3	0.05	0.5	0.75	none	5	15	1.0
TIJUANA HYDROLOGIC UNIT			**911.00**													
Tijuana Valley	HA	h	11.10	2500 [b]	550 [b]	900 [b]	70	-	-	-	-	2.0 [b]	none	-	-	-
Potrero	HA		11.20	500	250	250	60	45	0.3	0.05	0.5	1.0	none	5	15	1.0
Barrett Lake	HA		11.30	500	250	250	60	45	0.3	0.05	0.5	1.0	none	5	15	1.0
Monument	HA		11.40	500	250	250	60	45	0.3	0.05	0.5	1.0	none	5	15	1.0
Morena	HA		11.50	500	250	250	60	45	0.3	0.05	0.5	1.0	none	5	15	1.0
Cottonwood	HA		11.60	500	250	250	60	45	0.3	0.05	0.5	1.0	none	5	15	1.0
Cameron	HA		11.70	500	250	250	60	45	0.3	0.05	0.5	1.0	none	5	15	1.0
Campo	HA		11.80	500	250	250	60	45	0.3	0.05	0.5	1.0	none	5	15	1.0

HA - Hydrologic Area
HSA - Hydrologic Sub Area (Lower case letters indicate endnotes following the table.)

001994

ENDNOTES FOR TABLE 3-3

a The water quality objectives do not apply westerly of the easterly boundary of Interstate Highway 5. The objectives for the remainder of the Hydrologic Area (Subarea) are as shown.

b Detailed salt balance studies are recommended for this area to determine limiting mineral concentration levels for discharge. On the basis on existing data, the tabulated objectives would probably be maintained in most areas. Upon completion of the salt balance studies, significant water quality objective revisions may be necessary. In the interim period of time, projects of ground water recharge with water quality inferior to the tabulated numerical values may be permitted following individual review and approval by the Regional Board if such projects do not degrade existing ground water quality to the aquifers affected by the recharge.

c The recommended plan would allow for measurable degradation of ground water in this basin to permit continued agricultural land use. Point sources, however, would be controlled to achieve effluent quality corresponding to the tabulated numerical values. In future years demineralization may be used to treat ground water to the desired quality prior to use.

d A portion of the Upper Mission Basin is being considered as an underground potable water storage reservoir for treated imported water. The area is located north of Highway 76 an the boundary of hydrologic subareas 3.11 and 3.12. If this program is adopted, local objectives approaching the quality of the imported water would be set and rigorously pursued.

e The water quality objectives do not apply to hydrologic subareas 4.51 and 4.52 between Highway 78 and El Camino Real and to all lands which drain to Moonlight Creek and Encinitas Creek. The objectives for the remainder of the Hydrologic Area are as shown.

f The water quality objectives do not apply to all lands which drain to Los Penasquitos Canyon from 1.5 miles west of Interstate Highway 15. The objectives for the remainder of the Hydrologic Area are as shown.

g The water quality objectives do not apply west of Interstate Highway 15. The objectives for the remainder of the Hydrologic Area are as shown.

h The water quality objectives do not apply west of Hollister Street. The objectives for the remainder of the Hydrologic Area are as shown.

i No significant amount of ground water in this unit.

001995

ENDNOTES FOR TABLE 3-3 (continued)

j The water quality objectives apply to the portion of Subarea 4.31 bounded on the west by the easterly boundary of the Interstate 5 right-of-way and on the east by the easterly boundary of El Camino Real.

k The water quality objectives apply to the portion of Subarea 4.51 bounded on the south by the north shore of Batiquitos Lagoon, on the west by the easterly boundary of the Interstate 5 right-of-way and on the east by the easterly boundary of El Camino Real.

l The water quality objectives apply to the portion of the Otay HA 10.20 limited to lands within and tributary to Salt Creek on the east and Poggi Canyon on the west and including the several smaller drainage courses between these tributaries of the Otay River.

m These objectives apply to the alluvial ground water beneath the Santa Margarita River from the confluence of Murrieta and Temecula Creeks through the Gavilan and DeLuz HSAs to a depth of 100 feet and a lateral distance equal to the area of the floodplain covered by a 10 year flood event. These objectives do not apply to ground water in any of the basins beneath DeLuz, Sandia, and Rainbow Creeks and other unnamed creeks, which are tributaries of the Santa Margarita River.

n These objectives apply for only the alluvial aquifer in the Lower Sycamore Canyon portion of the Santee Hydrologic Subarea described as all of the Sycamore Canyon watershed except that part which drains north of the boundary between sections 28 and 33, Township 14 South, Range 1 West.

o These objectives apply to ground waters within 250 feet of the surface for the most downstream 4,200 acres of the Pauba HSA (2.51) which drain directly to the most downstream 2.7 mile segment of Temecula Creek. Excluded from this area are all lands upgradient from a point 0.5 miles east of the intersection of Butterfield Stage Road and Highway 79.

p These objectives apply to ground waters within 250 feet of the surface for the most downstream 2,800 acres of the Wolf HSA (2.52) including those portions of the HSA which drain directly to the most downstream 1.5 mile segment of Pechanga Creek. Excluded from this area are all lands of HSA 2.52 which are upgradient of the intersection of Pala Road and Via Eduardo.

q These objectives apply to ground waters of the Poway HSA (6.2) that lie east of the San Diego County Water Authority's (SDCWA) First Aqueduct. Ground water quality objectives west of the SDCWA First Aqueduct are 1000 mg/l.

r These objectives apply to the Lower San Luis Rey Hydrologic Area (903.10). The objective for the alluvial aquifer in the Moosa Hydrologic Subarea (903.13) is 1200 mg/l. The objective for the alluvial aquifer in the Valley Center Hydrologic Subarea (903.14) is 1100 mg/l.

001996

CHAPTER 4
IMPLEMENTATION

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4. IMPLEMENTATION

INTRODUCTION

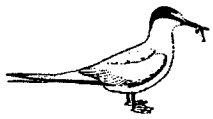

The purpose of this chapter is to describe actions that are necessary to protect the beneficial uses described in Chapter 2 and achieve the water quality objectives specified in Chapter 3. One of the elements in a Water Quality Control Plan as defined in California Water Code Section 13050(j) is the implementation program for achieving water quality objectives. This chapter describes the Regional Board's implementation program.

California Water Code Section 13242 requires that the implementation program have the following elements:

- A description of the actions which are necessary to achieve water quality objectives. (This may include recommendations for appropriate action directed to any entity, public or private);
- A time schedule for the actions to be taken; and
- A description of surveillance to be undertaken to determine compliance with the water quality objectives.

The Regional Board's mission is to achieve and maintain water quality objectives that are necessary to protect all beneficial uses of the waters in the Region. Depending on the nature of the water quality problem, several different strategies, as outlined below, are employed to accomplish this mission.

This Chapter is divided into four sections, Control of Point Source Pollutants, Control of Nonpoint Source Pollutants, Remediation of Pollution, and Other Programs as shown below. Areas of overlap between the point and nonpoint source categories are described later in this Chapter.

★ ***Control of Point Source Pollutants:*** Pollutants from point sources are discharged to waterbodies from discrete conveyance systems (e.g., pipes and channels) in controlled flows at well-defined locations. Examples of point sources include waste discharges from municipal and industrial wastewater treatment facilities. Programs that protect water quality from point source pollutants are primarily regulatory in nature. Waste discharge permitting programs such as California's Waste Discharge Requirements (WDR) and the federal National Pollutant Discharge Elimination System (NPDES) are examples of key regulatory point source control programs. Significant progress toward the control of point source pollutants has been made through these permitting programs.

★ ***Control of Nonpoint Source Pollutants:*** Pollutants from nonpoint sources are diffuse, both in terms of their origin and mode of transport to surface and ground waters. Unlike pollutants from point sources, nonpoint source pollutants often enter waters in sudden episodic surges and large quantities. This occurs as rain, irrigation, and other types of runoff mobilizes and transports contaminants into surface and ground waters. Nationwide, pollutants from nonpoint sources represent the greatest threat to water quality. Examples of nonpoint sources in southern California include lawn and garden chemicals transported by storm water or water from irrigation sprinklers; household and automotive care products dumped or drained on streets and into storm drains; fertilizers and pesticides washed from agricultural fields by rain or irrigation waters; sediment that erodes from construction sites; and various pollutants deposited by atmospheric deposition.

Nonpoint source pollutants are more difficult to control than point source pollutants, and require different control strategies. For example, traditional permitting programs are neither a practical nor effective means of water quality protection from lawn and garden chemicals. Accordingly, the Regional Board integrates non-regulatory programs with regulatory programs in order to control pollutants from nonpoint sources. Through public outreach (an example of a non-regulatory program), residents are informed of threats to the quality of the waters in their communities and are encouraged to voluntarily implement Best Management Practices (BMPs) that eliminate or reduce nonpoint sources of pollution. Emphasis is placed on pollution prevention though careful management of resources, as opposed to cleaning up the waterbody after the fact. Local governments play a key role in the control of nonpoint sources by adopting and enforcing ordinances and by supplementing the Regional Board's public outreach efforts. This flexible approach can be an effective means of

controlling pollutants from many nonpoint sources.

★ ***Remediation of Pollution:*** The Regional Board oversees remediation of both ground and surface waters through the investigation of polluted waters and enforcement of corrective actions needed to restore water quality. These activities are managed through the following programs, namely: Underground Storage Tanks; Spills, Leaks, Investigations and Cleanups (SLIC); Aboveground Petroleum Storage Tanks; National Pollutant Discharge Elimination System Program (NPDES), Chapter 15 and Non Chapter 15 Regulatory Programs; US Department of Defense (DoD) and Department of Energy (DOE) Sites; Toxic Pits Cleanup Act; and Bay Protection and Toxic Cleanup.

These programs are designed to return polluted sites to productive use by identifying and eliminating the sources of pollutants, preventing the spread of pollution, and restoring water quality.

★ ***Other Programs:*** The Regional Board is involved with the investigation, assessment and protection of water quality through other programs which are discussed in this Basin Plan. These include California's Clean Water Act Section 303(d) process and California's water quality assessment program.

CONTROL OF POINT SOURCE POLLUTANTS

DEFINITION OF POINT SOURCE

Waste loads from point sources are those that are generally associated with pollutant discharges from an identifiable location to waters of the state. A point source is any discernable, confined, and discrete conveyance, including but not limited to, any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, landfill leachate collection system, vessel or other floating craft from which pollutants are or may be discharged. Point source wastes can be generated by residential, commercial, industrial, agricultural, certain recreational and solid waste disposal activities and/or practices. Other wastes are considered under the category of nonpoint source waste loads and are discussed in appropriate sections of this chapter. Many of the water quality problems in the San Diego region have been attributable to point source discharges.

The Regional Board regulates most point source discharges of waste through the issuance of waste discharge requirements and National Pollutant Discharge Elimination System permits. Certain surface water discharges of waste described in 40 CFR 122.3 do not require NPDES permits. The need to obtain waste discharge requirements for certain categories of waste discharges to land may be waived by the Regional Board where such waiver is not against the public interest. The waste discharge requirements and the NPDES permits establish terms and conditions such as effluent limitations to ensure that point source waste discharges comply with applicable water quality objectives and ensure protection of beneficial uses.

EFFLUENT LIMITATIONS

Effluent limitations for discharge of treated point source wastes are developed for individual point sources and are included in the waste discharge requirements or NPDES permits. The effluent limitations are placed on the quality and quantity of the waste discharge or effluent and can be either numeric and/or narrative limitations. Effluent limitations are based on applicable water quality objectives, US EPA effluent guidelines and standards, beneficial uses for the area of effluent disposal, and applicable state and federal regulations and policies.

POINT SOURCE CONTROL CATEGORIES

Waste discharge requirements for waste discharges to land are issued for reclaimed water discharges, sanitary landfills, subsurface waste disposal by septic tank systems, dredge spoil disposal projects, sewage treatment plants and a variety of other activities which can affect ground water quality. NPDES permits are issued for waste discharges to surface waters from facilities such as power plants, sewage treatment plants, shipyards, boatyards, dewatering operations, ground water cleanups and a variety of other activities which can affect surface water quality.

Table 4-1 contains a summary listing of facility types regulated under waste discharge requirements and NPDES permits as of July, 1994. Table 4-2 contains examples of pollutants found in industrial

Table 4-1. NPDES Permitted Facilities in the San Diego Region (as of July 28, 1994) [1]

Facility Type	Number Regulated
Above Ground Tanks	2
Boatyards	7
Ground Water Cleanup	7
Ground Water Dewatering	9
Industrial	8
Military	13
Power Plants	7
Sewage Treatment Plants	24
Shipyards	4
Storm Water (Construction)	542
Storm Water (Industrial)	619
Storm Water (Municipal)	34
Water Softener / Brine Treatment	6
Total	**1283**

[1] The list of regulated facilities under NPDES permits is updated periodically and is available at the Regional Board office.

Table 4-1. WDR Permitted Facilities in the San Diego Region (as of July 28, 1994)[2]

Facility Type	Number Regulated
Campgrounds	59
Dairy	25
Dredging	5
Ground Water Cleanup	3
Industrial	4
Landfills	29
Miscellaneous	5
Nursery	1
Private Sewage Treatment Plants	7
Sand and Gravel	33
Sewage Treatment Plants	42
Sludge Treatment	1
Water Reclamation Requirements	16
Water Softener / Brine Treatment	1
Winery	3
Total	**234**

[2] The list of regulated facilities under WDR permits is updated periodically and is available at the Regional Board office.

Table 4-2. Examples of Industrial and Municipal Point Source Discharges to Surface and Ground Waters.

Discrete Discharge	Examples of Pollutants	Examples of Affected Waterbodies
Municipal waste water treatment plants (See table 4-4 for more information.	BOD, COD, TDS, chlorides, sulfates, nutrients, NH_3, residual chlorine, metals, organic chemicals	Most inland waters, Pacific Ocean, various ground water basins
Power generation plants	Temperature, chemical additives, minerals	San Diego Bay, Pacific Ocean
Waste water discharge from remediation or construction de-watering projects	TDS; chlorides; sulfates; VOC's; BTEX (e.g., benzene, toulene, ethylbenzene, xylene) and other petroleum hydrocarbons	Surface waters region-wide
Underground Storage Tanks	TDS; chlorides; sulfates; VOC's; BTEX (e.g., benzene, toulene, ethylbenzene, xylene) and other petroleum hydrocarbons	Ground waters region-wide
Shipyard, boatyard wastes	Oil and grease, metals (Pb, Cr, Cu and Zn), suspended solids, settleable solids, TBT, temperature, chemical additives	San Diego Bay, Mission Bay, Dana Point, Oceanside Harbor
Sand and gravel	Total dissolved solids, turbidity, sedimentation	San Diego River, Otay, River, San Luis Rey River, Temecula Creek, San Dieguito River, Aliso Creek, San Clemente Canyon Creek, San Vicente Creek, Trabuco Canyon Creek, El Toro Creek, Carroll Canyon Creek or their tributaries.
Dairies	BOD, TDS, bacteria, nutrients	Various groundwater basins
Dredging	Suspended solids, turbidity	San Diego Bay, Mission Bay, Oceanside Harbor, Dana Point
Landfills	Metals; TDS; chlorides; sulfates; VOC's; BTEX (e.g., benzene, toulene, ethylbenzene, xylene) and other petroleum hydrocarbons	Various groundwater basins
Recreational Vehicle (RV) Campgrounds	Formaldehyde, phenols, zinc, chlorides, aluminum sulfates	Various groundwater basins

and municipal point source discharges to surface and ground waters.

REGIONAL BOARD PERMITTING PROGRAMS

The Regional Board's primary means of protecting the Region's water resources is through the issuance of Waste Discharge Requirements (WDRs), Water Reclamation Requirements (WRRs), and Master Reclamation Permits (MRP) for each individual discharger. The waste discharge requirements impose conditions which protect water quality, implement the Water Quality Control Plan, and when the discharge is to waters of the United States, meet the requirements of the Clean Water Act. The waste discharge requirements impose limits on the quality and quantity of waste discharges and specify conditions to be maintained in the receiving waters. Water reclamation requirements impose conditions for all reuses of treated wastewater. In addition, because the US EPA has delegated responsibility to the State and regional boards for implementation of the federal NPDES program, WDRs for discharges to surface waters also serve as NPDES permits. These programs are the legal means to regulate controllable discharges. It is illegal to discharge wastes into any waters of the State and to reuse treated wastewater without obtaining appropriate WDRs, WRRs, or NPDES permits.

Any person who discharges or proposes to discharge wastes to waters in the Region (other than into a community sanitary sewage system) must describe the quantity and nature of the proposed discharge in a report of waste discharge (ROWD) or an NPDES permit application. The report of waste discharge must contain information required by the Regional Board. The filing of the report of waste discharge with the Regional Board is mandatory unless waived by the Board on the grounds that the waiver is not against the public interest. Such waivers are conditional and can be revoked by the Regional Board at any time. Upon review of the ROWD or NPDES permit application and all other pertinent information (including comments received at a public hearing), the Regional Board will hold a public hearing to consider issuance of waste discharge requirements containing appropriate measures and limitations to protect public health and water quality. The basic elements of waste discharge requirements or NPDES permits include:

- Effluent limitations on the quality and quantity of the waste discharge. The effluent standards or limitations are designed to implement water quality control plans, protect beneficial uses, and prevent nuisance;
- Standard terms and conditions and discharge prohibitions to ensure compliance with applicable provisions of state and federal law; and
- A monitoring and reporting program requiring the discharger to collect and analyze samples and submit monitoring reports to the Regional Board on a prescribed schedule.

California Water Code Section 13263 provides that in prescribing waste discharge requirements the Regional Board need not authorize the utilization of the waste assimilation capacities of the receiving waters. No discharge of waste into waters of the state creates a vested right to continue the discharge. All discharges of waste into waters of the state are privileges, not rights.

Waste discharges are categorized according to their threat to water quality and operational complexity (Table 4-3). Additionally, discharges to surface waters are categorized as major or minor discharges. Filing and annual fees are based on these categories. WDRs or WRRs do not have an expiration date but are reviewed periodically on a schedule based on the level of threat to water quality. NPDES permits are adopted for a five-year period.

Most waste discharge requirements and NPDES permits establish conditions tailored to specific discharges. In some cases, discharges can be regulated under general WDRs or NPDES permits (General Permits) which simplify the permit process for certain types of discharges. These General Permits are issued administratively to the discharger after a completed Notice of Intent (NOI) or appropriate application has been filed and, if necessary, the Regional Board Executive Officer has determined that the discharger meets the conditions specified in the General Permit. The Regional Board plans to increase the use of General Permits for regulating similar categories of waste discharges in the future. The use of General Permits is a step towards permit streamlining and the reduction of permitting delays. The Regional Board will use the following principles in issuing or reviewing General Permits:

- The General Permit will have a streamlined process for obtaining coverage with adequate protective measures to assure compliance.

Table 4-3. "Threat to Water Quality" and "Complexity" Definition.

CATEGORY & THREAT TO WATER QUALITY	DEFINITION	EXAMPLE
Category I (Major threat)	Those discharges which could cause the long-term loss of a designated beneficial use of the receiving water, render unusable a ground water or surface water resource used as a significant drinking water supply, require closure to an area used for contact recreation, result in long-term deleterious effects on shellfish spawning or growth areas of aquatic resources, or directly expose the public to toxic substances.	Loss of a drinking water supply
Category II (Moderate threat)	Those discharges of waste which could cause short-term violations of water quality objective, cause secondary drinking water standards to be violated, or cause a nuisance. The discharge could have a major adverse impact on receiving biota, cause aesthetic impairment to a significant human population, or render unusable a potential domestic or municipal supply.	Aesthetic impairment from nuisance from a waste treatment facility.
Category III (Minor threat)	Those discharges of waste which could degrade water quality without violating water quality objectives, or cause a minor impairment of designated beneficial uses compared with Category I and Category II.	Small pulses of water from low volume discharges.
COMPLEXITY		
Category "a"	Any major NPDES discharger, and any discharge of toxic wastes; any small volume discharge containing toxic waste or having numerous discharge points or ground water monitoring; any Class I waste management unit.	Small volume complex discharger with numerous discharge points, leak detection systems or ground water monitoring wells.
Category "b"	Any discharger not include above which has a physical, chemical, or biological treatment system (except for septic systems with subsurface disposal), or any Class II or Class III waste management unit.	Marinas with petroleum products, solid wastes or sewage pump-out facilities.
Category "c"	Any discharger for whom waste discharge requirements have been or would be prescribed pursuant to Section 13263 of the Water Code not included as a Category "a" or Category "b" as described above.	Discharges having no waste treatment systems or that must comply with best management practices, discharges having passive treatment and disposal systems, or discharges having waste storage system with land disposal such as dairy waste ponds.
NPDES		
Major	Publicly owned treatment works with a yearly average flow of over 0.5 million gallons per day (MGD) or an industrial source with a yearly average flow of over 0.1 MGD and those with lesser flows but with acute or potential adverse environmental impacts.	
Minor	All other dischargers that are not categorized as a major.	

- The General Permit will focus on constituents of environmental concern for which there is a reasonable likelihood the constituent is, or may be, present in the discharge.

- The General Permits should be flexible to the extent practicable, and should allow for different testing, monitoring, and reporting requirements recognizing various significance levels of discharges.

- Duration, volume, and dilution of discharge should be considered in determining the significance of a discharge.

WASTE DISCHARGE REQUIREMENTS

Waste discharge requirements are permits for waste discharges to land which could primarily affect ground water quality and beneficial uses. All waste discharges, whether to land or water, are subject to California Water Code Section 13263. Furthermore unless exempt, discharges to land (e.g., landfills) are also subject to Title 23, California Code of Regulations, Chapter 15. Examples of such waste discharges include:

- Sewage treatment plants with discharges to land;

- On-site disposal systems (septic tank systems);

- Sanitary landfills;

- Industrial discharges;

- Land treatment units (bioremediation);

- Dairies; and

- A variety of other activities which can affect ground water quality.

Some types of dredging operations in surface waters are also regulated under waste discharge requirements. Waste discharge requirements may also protect surface waters in those instances where surfacing ground water may adversely affect surface water quality or beneficial uses.

A standard WDR permit typically includes the following elements:

- ***Findings:*** Official description of the facility, processes, type and quantity of wastes, existing WDRs, enforcement actions, public notice and applicable Water Quality Control Plans, beneficial uses and water quality objectives;

- ***Effluent limitations:*** Narrative and numerical limits for effluent and discharge prohibitions;

- ***Receiving water limitations:*** Narrative and numerical objectives for the receiving waters;

- ***Provisions:*** Standard provisions required by the Regional Board and by state and federal law;

- ***Compliance schedules:*** Time schedules for completion of activities to achieve compliance with permit conditions;

- ***Sludge requirements:*** Sludge monitoring and control requirements, if necessary; and a

- ***Monitoring and reporting program:*** Specific locations of monitoring stations and sampling frequency for all constituents limited in the permit, including flow, and other constituents that may be required by the Board.

Any person proposing to discharge waste, other than to a community sanitary sewage system, must file a report of waste discharge (application) to obtain waste discharge requirements at least 120 days prior to commencing the discharge.

The California Water Code, Division 7, Chapter 4, Article 4 authorizes the Regional Board to issue waste discharge requirements, review self-monitoring reports submitted by the discharger, and perform independent compliance checking. The Regional Board is authorized to take a variety of enforcement actions to obtain compliance with waste discharge requirements. Enforcement of waste discharge requirements is done through the issuance of cleanup and abatement orders, cease and desist orders, administrative civil liability orders and court action. The Regional Board is also authorized to update and review waste discharge requirements periodically.

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)

National Pollutant Discharge Elimination System (NPDES) permits are issued to regulate discharges of "*pollutants*" from point sources to "*waters of the United States*" to ensure that the quality and

quantity of such discharges does not adversely affect surface water quality or beneficial uses. The phrase "*waters of the United States*" is defined in Title 40, Code of Federal Regulations, Parts 122.2, 230.3 and 232.3. The definition of "*waters of the United States*" emphasizes protection of a broad range of surface waters, including interstate and intrastate lakes, creeks, streams, wetlands, rivers, bays, and ocean waters. Ephemeral creeks, and streams are considered to be "waters of the United States" for the purpose of issuing NPDES permits. In this Basin Plan the term "*waters of the United States*" is used interchangeably with the term "*surface waters*".

NPDES permits are authorized by Section 402 of the Clean Water Act and Section 13370 of the California Water Code. Permit conditions and the issuance process are described in Title 40, Code of Federal Regulations, Part 122 (40 CFR 122) and California Code of Regulations, Title 23, Chapters 3 and 4. The responsibility for issuing NPDES permits in California has been delegated to the regional boards, subject to review and approval by the Regional Administrator (US EPA Region IX, San Francisco). NPDES permits issued by the Regional Board are also "*waste discharge requirements*" issued under the authority of the California Water Code, Chapter 5.5.

A standard NPDES permit typically includes the following elements:

- ***Findings:*** Official description of the facility, processes, type and quantity of wastes, existing NPDES permits, enforcement actions, public notice and applicable US EPA effluent guidelines and standards, Water Quality Control Plans, beneficial uses and water quality objectives;

- ***Effluent limitations:*** Narrative and numerical limits for effluent and discharge prohibitions;

- ***Receiving water limitations:*** Narrative and numerical objectives for the receiving waters;

- ***Provisions:*** Standard provisions required by the Regional Board and by state and federal law, expiration date of permit;

- ***Compliance schedules:*** Time schedules for completion of activities to achieve compliance with permit conditions;

- ***Pretreatment requirements:*** Standard pretreatment requirements for municipal facilities (see below);

- ***Sludge requirements:*** Sludge monitoring and control requirements, if necessary; and a

- ***Monitoring and reporting program:*** Specific locations of monitoring stations and sampling frequency for all constituents limited in the permit, including flow, and other constituents that may be required by the Regional Board.

The NPDES permit regulates discharges of wastes for the purpose of limiting the quantity of pollutants and volume of waste discharged to surface waters. NPDES permits contain prerequisite conditions which must be met by dischargers to ensure protection of beneficial uses of the receiving water as described in the Regional Board's Water Quality Control Plan, Statewide Water Quality Control Plans, and other water quality control policies.

Any person proposing to discharge pollutants into surface waters must submit a report of waste discharge in application for an NPDES permit at least 180 days in advance of the date on which it is desired to commence the proposed discharge. Certain discharges do not require an NPDES permit. The following discharges are exempt from the requirements for NPDES coverage pursuant to 40 CFR 122.3:

- Any discharge of sewage from vessels, effluent from properly functioning marine engines, laundry, shower, and galley sink wastes, or any other discharge incidental to the normal operation of a vessel;

- Discharges of dredged or fill material into waters of the United States which are regulated under the Clean Water Act, Section 404;

- The introduction of sewage, industrial wastes, or other pollutants into publicly owned treatment works by indirect dischargers;

- Any discharge in compliance with the instructions of an On-Scene Coordinator pursuant to 40 CFR 300 (The National Oil and Hazardous Substances Pollution Contingency Plan) or 33 CFR 153.10(e) (Pollution by Oil and Hazardous Substances);

- Any introduction of pollutants from nonpoint source agricultural and silvicultural activities, including storm water runoff from orchards, cultivated crops, pastures, range lands, and forest lands;

- Return flows from irrigated agriculture; and

- Discharges into a privately owned treatment works.

NPDES permits are issued for a term of five years or less. The terms and conditions of the permit are regularly updated as necessary. NPDES permits can be revoked for cause by the Regional Board.

The California Water Code, Division 7, Chapter 5.5, Article 6 authorizes the Regional Board to issue NPDES permits, review self-monitoring reports submitted by the discharger, and perform independent compliance checking. The Regional Board is authorized to take a variety of enforcement actions to obtain compliance with an NPDES permit. Enforcement of NPDES permits is done through the issuance of cleanup and abatement orders, cease and desist orders, administrative civil liability orders and court action.

The Regional Board will consider the establishment of mixing zones for inland surface waters and enclosed bays and estuaries on a case-by-case basis. Criteria to be established for mixing zones will be specified in the waste discharge requirements established for the discharge.

In addition to regulating discharges of wastewater to surface waters, NPDES permits also require municipal sewage treatment plants having a design capacity greater than 5 million gallons per day (MGD) to conduct pretreatment programs. Smaller municipal treatment systems may be required to conduct pretreatment programs if there are significant industrial users of their systems. Pretreatment is discussed in more detail later in this chapter.

WASTE DISCHARGE REQUIREMENT WAIVER POLICY

The Regional Board may waive issuance of waste discharge requirements for a specific discharge or types of discharge pursuant to California Water Code Section 13269 if such waiver is determined not to be against the public interest.

The waiver of adoption of waste discharge requirements is not applicable to discharges subject to NPDES permit regulation. The Clean Water Act does not provide for a waiver of the need to obtain an NPDES permit for point source discharges of pollutants to surface waters.

The waiver of waste discharge requirements is conditional and may be terminated at any time by the Regional Board. The Regional Board may delegate their power to waive waste discharge requirements to the Regional Board Executive Officer in accordance with policies adopted by the Regional Board and approved by the State Board.

The Regional Board may determine that a waiver of adoption of waste discharge requirements for a specific type of discharge would not be against the public interest under one or more of the following circumstances:

- The type of discharge is effectively regulated by other public agencies; or
- The type of discharge does not adversely affect the quality or the beneficial uses of the waters of the state; or
- The type of discharge is not readily amenable to regulation through adoption of waste discharge requirements.

On July 18, 1983, the Regional Board adopted Resolution No. 83-21, "*A Resolution Conditionally Waiving Adoption of Waste Discharge Requirements for Certain Specific Types of Discharges*" (Waste Discharge Requirement Waiver Policy). The terms and conditions of Resolution No. 83-21 are incorporated in this Basin Plan; accordingly Resolution No. 83-21 is superseded. The Regional Board conditionally waives adoption of waste discharge requirements for certain specific types of discharges described in Table 4-4. The discharges must satisfy the conditions described in Table 4-4. The waiver of adoption of waste discharge requirements is conditional and may be terminated at any time for any specific discharge or any specific type of discharge.

Table 4 - 4. Types of Discharges Identified for Conditional Waiver of Waste Discharge Requirements.

TYPE OF WASTE DISCHARGE	CONDITION(S)	REFERENCES, REMARKS, ETC.
1. Conventional septic tank/ subsurface disposal systems for residential units	Subject to the conditions set forth in the *Basin Plan, Chapter 4, (Implementation), section entitled, Guidelines for New Community and Individual Sewerage Facilities.*	*Basin Plan, Chapter 4, (Implementation)*, section entitled, *Guidelines for New Community and Individual Sewerage Facilities*
2. Conventional septic tank/ subsurface disposal systems for commercial/ industrial establishments	Subject to the conditions set forth in the *Basin Plan, Chapter 4, (Implementation)*, section entitled, *Guidelines for New Community and Individual Sewerage Facilities.*	*Basin Plan, Chapter 4, (Implementation)*, section entitled, *Guidelines for New Community and Individual Sewerage Facilities*
3. Alternative individual sewerage systems	Subject to the conditions set forth in the *Basin Plan, Chapter 4, (Implementation)*, section entitled, *Guidelines for New Community and Individual Sewerage Facilities.*	*Basin Plan, Chapter 4, (Implementation)*, section entitled, *Guidelines for New Community and Individual Sewerage Facilities*
4. Conventional septic tank/ subsurface disposal systems for campgrounds	Where no facilities are provided which would enable recreational vehicles to connect with the campground sewerage system.	-
5. Construction and test pumping of water wells	Where the well water pumped is uncontaminated; and where the well was not constructed for and is not to be used in ground water cleanup operations.	-
6. Air conditioner condensate	-	-
7. Animal feeding operations for the following: goats, swine, sheep, horses, buffalo, and poultry.	Where the animal feeding operation is not a "concentrated animal feeding operation" under United States Environmental Protection Agency regulations pertaining to the National Pollutant Discharge Elimination System.	United States Environmental Protection Agency Consolidated Permit Regulations, 40 CFR 122.54
8. Plant crop residues	Where such residues are plowed into fields (as opposed to being disposed of en masse, e.g. in a pit).	For the purposes of this document, "plant crop residues" shall be defined as waste plant crops and nonmarketable portions of plants.
9. Storm water runoff	Where no NPDES permit is required.	-
10. Sand and gravel mining operations	Where operations are not conducted in flowing streams; and where Department of Fish and Game requirements established pursuant to Fish and Game Code Sections 1600-1603 are satisfied.	This waiver does not apply to wash water or other discharges from sand and gravel processing operations.
11. Intermittent swimming pool discharges	Where pool filter backwash is not discharged.	-
12. Dredging project wastes	Where the dredging project does not involve more than 5,000 yd^3 of material.	-
13. Short-term construction dewatering operations	Where there is no discharge to surface waters.	-
14. Telephone, natural gas and electric utility vault and conduit flushing and draining	-	-
15. Discharges from flushing and draining potable water lines and tanks	-	-
16. Manure composting and soil amendment operations	Where State Water Resources Control Board *Minimal Guidelines for Protection of Water Quality from Animal Wastes* are followed.	Adopted by the State Water Resources Control Board on March 1,1973.

TYPE OF WASTE DISCHARGE	CONDITION(S)	REFERENCES, REMARKS, ETC.
17. Solid waste disposal facilities accepting only inert wastes	Where State Water Resources Control Board regulations, requirements, and guidelines for disposal of such wastes are satisfied; and Where Fish and Game Code Section 5650 is not violated	The applicable document as of the date of adoption of the Resolution is Discharges of Waste to Land (CCR Title 23, Division 3, Chapter 15)
18. Stream channel alterations	Where Department of Fish and Game requirements established pursuant to Fish and Game Code Section 1600-1603 are satisfied.	-
19. Agricultural irrigation return water	Where discharge originates from an agricultural operation in which best management practices for control of salts, nutrients, pesticides and other pollutants in irrigation return water have been implemented.	For the purposes of this document, "agriculture" shall be defined as the production of fiber and/or food (including food for animal consumption, e.g., alfalfa).
20. Nursery irrigation return water	Where there is no surface discharge from nursery property.	For the purposes of this document, a "nursery" shall be defined as a facility engaged in growing plants (shrubs, trees, vines, etc.) for sale.
21. Short-term use of reclaimed wastewater	See Appendix D.	-
22. On-site drilling mud discharge	Where discharge is to a sump with a minimum freeboard of two feet; and Where sump is not to be used for ultimate disposal of drilling mud (unless discharger demonstrates that material is nontoxic and does not contain dissolved or soluble salts in quantities which could adversely affect basin ground water quality); and Where sump site is restored to predrilling state within 60 days of completion or abandonment of well.	-
23. Timber harvesting	Where harvesting occurs on National Forest System lands managed by the United States Forest Service in accordance with the practices and procedures set forth in the document entitled Water Quality Management for National Forest System Lands in California.	Management Agency Agreement between State Water Resources Control Board and the United States Forest Service (United States Department of Agriculture.)
24. Temporary Discharge of Specified Contaminated Soils	See Appendix D.	-
25. Disposal/Reuse of Dredge Spoils in Industrial or Commercial Applications	See Appendix D.	-
26. Green Waste Composting Facilities	See Appendix D.	-
27. Incidental Discharges within a Response Area during a Spill Response	The discharge must meet the definition of "incidental discharge" as this, and related, terms are defined in the "Memorandum of Understanding Between the Department of Fish and Game's Office of Oil Spill Prevention and Response and the State Water Resources Control Board Relating to Discharges Associated with Response Activities Conducted Pursuant to Ch. 7.4, Division 1 of the Government Code."	-
28. Permanent Reclaimed Water Projects	See Appendix D.	-

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WATER RECLAMATION REQUIREMENTS

Reclaimed water is water that, as a result of treatment, is suitable for a direct beneficial use or a controlled use that would otherwise not occur. Reclaimed water uses in the Region include, but are not limited to, landscape irrigation, crop irrigation, freeway landscape irrigation, groundwater recharge, soil compaction at construction sites, and for recreational lakes.

The Regional Board may prescribe water reclamation requirements to reclaimed water producers and those governing the use of reclaimed water, which the Regional Board has determined are necessary to protect public health, safety, and welfare pursuant to California Water Code, Division 7, Chapter 7, Sections 13500-13556 "*Water Reclamation Law*". Water Reclamation Law provides that no person shall reclaim water or use reclaimed water for any purpose subject to Title 22 criteria until water reclamation requirements have been established or the Regional Board determines no requirements are necessary. The Regional Board may not deny issuance of water reclamation requirements to a project which violates only a salinity standard in the Basin Plan.

In lieu of issuing water reclamation requirements pursuant to California Water Code, Section 13523, for each user of reclaimed water, the Regional Board establishes master reclamation requirements as part of the waste discharge requirements which are issued to a supplier or distributor, or both, of reclaimed water. Reclamation requirements must include the following components:

- A requirement that the permittee comply with the uniform statewide reclamation criteria established pursuant to Section 13521. Permit conditions for a use of reclaimed water not addressed by the uniform statewide reclamation criteria shall be considered on a case-by-case basis;

- A requirement that the permittee establish and enforce rules or regulations for reclaimed water users, governing the design and construction of reclaimed water use facilities and the use of reclaimed water, in accordance with the uniform statewide reclamation criteria established pursuant to Section 13521;
- A requirement that the permittee submit a quarterly report summarizing reclaimed water use, including the total amount of reclaimed water supplied, the total number of reclaimed water use sites, and the locations of those sites, including the names of the hydrologic areas underlying the reclaimed water use sites;

- A requirement that the permittee conduct periodic inspections of the facilities of the reclaimed water users to monitor compliance by users with the uniform statewide reclamation criteria and the requirements of the master reclamation permit; and

- Any other requirements determined to be appropriate by the Regional Board.

The "*Rules and Regulations for Reclaimed Water Users*" that must be issued and enforced by the permittee govern the design and construction of reclaimed water use facilities and the use of reclaimed water. The rules and regulations must have the following elements:

- Provisions implementing Title 22, Division 4, Chapter 3, Wastewater Reclamation Criteria; and Title 17, Division 1, Chapter 5, Group 4, Articles 1 & 2, of the California Code of Regulations;

- Provisions implementing the State Department of Health Services (DOHS) "*Guidelines For Use of Reclaimed Water and Guidelines for Use of Reclaimed Water for Construction Purposes*" and measures that are deemed necessary for protection of public health, such as the "*American Water Works Association (AWWA) California/Nevada Section, Guidelines for the Distribution of Non-Potable Water*" or alternate measures, acceptable to DOHS, providing equivalent protection of public health;

- Provisions authorizing the Regional Board, the discharger/producer, or an authorized representative of these parties, upon presentation of proper credentials, to inspect the facilities of any reclaimed water user to ascertain whether the user is complying with the discharger/producer's rules and regulations;

- Provision for written notification, in a timely manner, to the discharger/producer by the reclaimed water user of any material change or proposed change in the character of the use of reclaimed water;

- Provision for submission of a preconstruction report to the discharger/producer by the reclaimed water user in order to enable the discharger/producer to determine whether the user will be in compliance with the discharger/producer's rules and regulations;

- Provision requiring reclaimed water users to designate a reclaimed water supervisor responsible for the reclaimed water system at each use area under the user's control. Reclaimed water supervisors should be responsible for the installation, operation, and maintenance of the irrigation system, enforcement of the discharger/producer's reclaimed water user rules and regulations, prevention of potential hazards, and maintenance of the reclaimed water distribution system plans in "*as built*" form;

- Provision authorizing the discharger/producer to cease supplying reclaimed water to any person who uses, transports, or stores such water in violation of the discharger/producer's rules and regulations;

- Provision requiring notification and concurrence of the State Department of Health Services and the local county health department for new reclaimed water users. The notification of the county health department shall include a site distribution plan for new and retrofit facilities and a cross-connection control inspection plan for sites containing both potable and reclaimed water distribution lines;

- Provision requiring all windblown spray and surface runoff of reclaimed water applied for irrigation onto property not owned or controlled by the discharger or reclaimed water user to be prevented by implementation of best management practices;

- Provision requiring all reclaimed water storage facilities owned and/or operated by reclaimed water users to be protected against erosion, overland runoff, and other impacts resulting from a 100-year frequency storm, 24 hour storm. This requirement may be waived if the discharger submits information demonstrating that releases from the storage facilities caused by storm events of less than 100-year frequency will not cause violation of the Basin Plan water quality standards;

- Provision requiring all reclaimed water storage facilities owned and/or operated by reclaimed water users to be protected against 100-year frequency peak stream flows as defined by the local flood control agency. However, if information is made available to the Regional Board which shows that a reclaimed water storage facility presents no potential impairment to the beneficial uses, the Regional Board may exempt requirements for 100-year flood protection on a case-by-case basis;

- Provision for notification to reclaimed water users that the Regional Board may initiate enforcement action against any reclaimed water user who discharges reclaimed water in violation of any applicable discharge prohibitions prescribed by the Regional Board or in a manner which creates, or threatens to create conditions of pollution, contamination, or nuisance, as defined in Water Code Section 13050; and

- Provision for notification to reclaimed water users that the Regional Board may initiate enforcement action against the discharger/producer, which may result in the termination of the reclaimed water supply, if any person uses, transports, or stores such water in violation of the discharger/producer's rules and regulations or in a manner which creates, or threatens to create conditions of pollution, contamination, or nuisance, as defined in Water Code Section 13050.

WASTE DISCHARGE PROHIBITIONS

California Water Code Section 13243 provides that a Regional Board, in a water quality control plan, may specify certain conditions or areas where the discharge of waste, or certain types of waste is not permitted. The following discharge prohibitions are applicable to any person, as defined by Section 13050(c) of the California Water Code, who is a citizen, domiciliary, or political agency or entity of California whose activities in California could affect the quality of waters of the state within the boundaries of the San Diego Region.

(1) The discharge of waste to waters of the state in a manner causing, or threatening to cause a condition of pollution, contamination or nuisance as defined California Water Code Section 13050, is prohibited.

(2) The discharge of waste to land, except as authorized by waste discharge requirements or the terms described in California Water Code Section 13264 is prohibited.

(3) The discharge of pollutants or dredged or fill material to waters of the United States except as authorized by an NPDES permit or a dredged or fill material permit (subject to the exemption described in California Water Code §13376) is prohibited.

(4) Discharges of recycled water to lakes or reservoirs used for municipal water supply or to inland surface water tributaries thereto are prohibited, unless this Regional Board issues a NPDES permit authorizing such a discharge; the proposed discharge has been approved by the State Department of Health Services and the operating agency of the impacted reservoir; and the discharger has an approved fail-safe long-term disposal alternative.

(5) The discharge of waste to inland surface waters, except in cases where the quality of the discharge complies with applicable receiving water quality objectives, is prohibited. Allowances for dilution may be made at the discretion of the Regional Board. Consideration would include streamflow data, the degree of treatment provided and safety measures to ensure reliability of facility performance. As an example, discharge of secondary effluent would probably be permitted if streamflow provided 100:1 dilution capability.

(6) The discharge of waste in a manner causing flow, ponding, or surfacing on lands not owned or under the control of the discharger is prohibited, unless the discharge is authorized by the Regional Board.

(7) The dumping, deposition, or discharge of waste directly into waters of the state, or adjacent to such waters in any manner which may permit its being transported into the waters, is prohibited unless authorized by the Regional Board.

(8) Any discharge to a storm water conveyance system that is not composed entirely of "*storm water*" is prohibited unless authorized by the Regional Board. [The federal regulations, 40 CFR 122.26 (b) (13), define storm water as storm water runoff, snow melt runoff, and surface runoff and drainage. 40 CFR 122.26 (b) (2) defines an illicit discharge as any discharge to a storm water conveyance system that is not composed entirely of storm water except discharges pursuant to a NPDES permit and discharges resulting from fire fighting activities.] [§122.26 amended at 56 FR 56553, November 5, 1991; 57 FR 11412, April 2, 1992].

(9) The unauthorized discharge of treated or untreated sewage to waters of the state or to a storm water conveyance system is prohibited.

(10) The discharge of industrial wastes to conventional septic tank/subsurface disposal systems, except as authorized by the terms described in California Water Code Section 13264, is prohibited.

(11) The discharge of radioactive wastes amenable to alternative methods of disposal into the waters of the state is prohibited.

(12) The discharge of any radiological, chemical, or biological warfare agent into waters of the state is prohibited.

(13) The discharge of waste into a natural or excavated site below historic water levels is prohibited unless the discharge is authorized by the Regional Board.

(14) The discharge of sand, silt, clay, or other earthen materials from any activity, including land grading and construction, in quantities which cause deleterious bottom deposits, turbidity or discoloration in waters of the state or which unreasonably affect, or threaten to affect, beneficial uses of such waters is prohibited.

(15) The discharge of treated or untreated sewage from vessels to Mission Bay, Oceanside Harbor, Dana Point Harbor, or other small boat harbors is prohibited.

(16) The discharge of untreated sewage from vessels to San Diego Bay is prohibited.

(17) The discharge of treated sewage from vessels to portions of San Diego Bay that are less than 30 feet deep at mean lower low water (MLLW) is prohibited.

(18) The discharge of treated sewage from vessels, which do not have a properly functioning US Coast Guard certified Type I or Type II marine sanitation device, to portions of San Diego Bay that are greater than 30 feet deep at mean lower low water (MLLW) is prohibited.

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WATER QUALITY CERTIFICATION (SECTION 401)

In addition to the issuance of NPDES permits or waste discharge requirements, the Regional Board acts to protect the quality of surface waters through water quality certification pursuant to Section 401 of the Clean Water Act. Section 401 requires that any person applying for a federal permit or license which may result in a discharge of pollutants into waters of the United States, must obtain a state water quality certification that the activity complies with all applicable water quality standards, limitations, and restrictions.

No license or permit may be issued by a federal agency until certification required by Section 401 has been granted or waived by the state. Further, no license or permit may be issued if certification has been denied by the state. The activity must also meet the requirements of the Coastal Nonpoint

Pollution Control Program required under the Coastal Zone Act Reauthorization Amendments (CZARA).

The following permits or licenses are subject to Section 401 of the Clean Water Act:

- NPDES permits issued by the US EPA under Section 402 of the Clean Water Act;
- Clean Water Act, Section 404 permits issued by the US Army Corps of Engineers;
- Permits issued under Sections 9 and 10 of the Rivers and Harbors Act (for activities which may affect navigation);
- Licenses for hydroelectric power plants issued by the federal Energy Regulatory Commission under the Federal Power Act; and
- Licenses issued by the Nuclear Regulatory Commission.

The Regional Board's water quality certification activities have focused on applications for permits for the discharge of dredged or fill material to surface waters. These permits are issued by the US Army Corps of Engineers (Clean Water Act, §404 permits) subject to any conditions imposed by the Regional Board pursuant to Section 401.

The Section 404 program is administered at the federal level by the US Army Corps of Engineers and the US EPA. The US Fish and Wildlife Service and the National Marine Fisheries Service have important advisory roles. The US Army Corps of Engineers has the primary responsibility for the permit program and is authorized, after notice and opportunity for a public hearing, to issue permits for the discharge of dredged or fill material. US EPA develops the regulations under which permits may be granted.

The Regional Board evaluates the projects for which Section 404 permits are requested and determines whether to deny water quality certification, issue a certification with or without conditions, or waive the certification pursuant to regulations in Article 4, Title 23. Regional Board certification is dependent upon assurance that the project will not reduce water quality below applicable standards as defined in the Clean Water Act (i.e., the water quality objectives established and the beneficial uses which have been designated for the surface waters). A certification is usually denied if the proposed activity does not meet water quality standards. If the activity may violate standards, a conditional certification is given. If the activity does not violate any standards, a Section 401 waiver may be given. The Executive Director of the State Board may issue a water quality certification after review of the application, all relevant data, and taking into consideration any recommendations from the Regional Board.

SELF MONITORING, COMPLIANCE MONITORING, AND INSPECTIONS

Compliance with NPDES permits and waste discharge requirements is generally self-monitored by each individual discharger, with oversight by the Regional Board. Dischargers are required to report and take necessary corrective actions when they discover that they are not in compliance with the permit effluent limits. The Regional Board conducts periodic inspections and compliance monitoring and, as necessary, will take enforcement actions to ensure compliance.

Self Monitoring Program: Waste discharge requirements and NPDES permits issued by the Regional Board include requirements for the discharger to collect samples of the waste discharge. In some cases, the receiving waters must also be monitored by the dischargers. The results of the "*self monitoring*" programs are reported to the Board and are used to determine compliance with the waste discharge requirements. (Additional information on this topic is presented in Chapter 6, Surveillance and Monitoring).

Compliance Monitoring and Inspections: Regional Board staff can conduct unannounced inspections (including collection of samples) to determine the status of compliance with NPDES permit or WDRs/WRRs requirements. All major dischargers are inspected at least once a year. (Additional information on this topic is presented in Chapter 6, Surveillance and Monitoring).

ENFORCEMENT

The Regional Board is committed to the maintenance of a strong and uniform enforcement program. Appropriate and timely response to instances of noncompliance with Regional Board NPDES permits, waste discharge requirements, waste discharge prohibitions and enforcement orders is necessary to ensure protection of the quality of surface and ground waters in the Region.

Regional Board response to noncompliance incidents include the establishment of a specific time frame for compliance and or correction. All dischargers are expected to correct violations in the shortest time frame possible. With the exception of special circumstances, failure to terminate, comply, or complete corrective actions on a noncompliance incident in a specified time frame will result in the escalation of the matter to a higher level enforcement action.

Regional Board responses to instances of violation correspond to the following enforcement action level sequence, unless circumstances warrant a more expeditious escalation to a higher level.

LEVEL A ENFORCEMENT ACTION

In this action level the Regional Board staff requests the discharger, by telephone or letter, to correct the problem and prevent recurrence. Regional Board staff may also request the discharger to correct the problem during routine compliance inspections.

LEVEL B ENFORCEMENT ACTION

In this action level the Regional Board Executive Officer issues a notice of violation to the discharger for failure to comply with a compliance schedule for corrective action.

LEVEL C ENFORCEMENT ACTION

In this action level the Regional Board may take a variety of formal higher level enforcement actions. The California Water Code provides the Regional Board with a number of enforcement remedies for violations of requirements. These remedies include time schedules, cease and desist orders, cleanup and abatement orders, and administrative civil liability orders.

Time Schedule Orders

When a discharge is taking place or threatening to occur that will cause a violation of a Regional or State Board requirement, a discharger may be required to submit a detailed list of specific actions the discharger will take to correct or prevent the violation. (California Water Code §13300). These schedules may also be required when the waste collection, treatment, or disposal facility of a discharger are approaching capacity. Time schedule orders are adopted by the Board after a public hearing or issued by the Executive Officer pursuant to authority delegated by the Regional Board.

Cleanup and Abatement Orders

The Regional Board may issue a cleanup and abatement order to any person who has discharged, is discharging or is threatening to discharge wastes that will result in a violation of waste discharge requirements or other order or prohibition of the State or Regional Board. The Regional Board may also issue a cleanup and abatement order to any person who discharges or has discharged waste to waters of the state and causes, or threatens to cause, a condition of pollution or nuisance. The cleanup and abatement order may require the waste discharger(s) to cleanup and abate the effects of the discharge or to take other appropriate remedial action (California Water Code §13304). A cleanup and abatement order is issued if a pollutant can actually be cleaned up or the pollutant effects abated. The Regional Board has delegated issuance of these orders to the Executive Officer. Cleanup and abatement orders do not require Board adoption, but may be brought before the Regional Board for consideration at the request of the discharger.

Cease and Desist Orders

If discharge prohibitions or requirements of the State Board or Regional Board are violated or threatened, the Regional Board may adopt a cease and desist order (California Water Code §13301) requiring the discharger to comply forthwith, to comply in accordance with a time schedule, or if the violation is threatened, to take appropriate remedial or preventive action. Cease and desist orders may restrict or prohibit the volume, type or concentration of waste added to community sewer systems, if existing or threatened violations of waste discharge requirements occur. Cease and desist orders may specify interim time schedules as well as limitations that must be complied with until full compliance is achieved. Cease and desist orders are adopted by the Regional Board after a public hearing.

Administrative Civil Liability

Administrative civil liability complaints and orders may be issued by the Regional Board for certain categories of violations. In this process the Regional Board may impose monetary penalties on dischargers. The Regional Board (or the Executive Officer) may issue Administrative Civil Liability complaints (ACLs) to persons who intentionally or

negligently violate enforcement orders of the Board, or who intentionally or negligently discharge wastes in violation of any order, prohibition, or requirement of the Board where the discharge causes conditions of pollution or nuisance (California Water Code §13350). ACLs may also be issued in cases where a person fails to submit reports requested by the Board (California Water Code §13261 and §13268) or when a person discharges waste without first having filed the appropriate Report of Waste Discharge (ROWD) (California Water Code §13265). ACLs may be issued pursuant to California Water Code Section 13385 for violations of any Regional Board prohibition or requirement implementing specified sections of the Clean Water Act, or any requirement in an approved pretreatment program. Amounts of administrative civil liability that the Board can impose range up to $10,000 per day of violation. The Water Code also provides that a superior court may impose civil liability assessments in substantially higher amounts. The Regional Board may conduct a hearing if a discharger contests the imposition of the Administrative Civil Liability.

LEVEL D ENFORCEMENT ACTION

Referral to the Attorney General or District Attorney

Judicial Civil Liability: The California Water Code provides that a Regional Board may request the State Attorney General to petition a superior court to enforce orders and complaints issued by the Board and impose civil monetary remedies. The monetary remedies may be in excess of the administrative civil liability penalties that the Regional Board is authorized to impose. The court imposed fines and or imprisonment vary depending upon the seriousness of the violation.

Injunctive Relief: The Regional Board may also request that the Attorney General seek injunctive relief in specific situations, such as violations of cease and desist orders or discharges which cause or threaten to cause a nuisance or pollution that could result in a public health emergency (California Water Code §13331 and §13340).

Criminal Penalties: The Regional Board may also refer violations to the District Attorney to seek criminal penalties by judicial action in the county where the discharge occurred. The court imposed fines and or imprisonment vary depending upon the seriousness of the violation.

SELECTION OF APPROPRIATE ENFORCEMENT ACTION

The following criteria are considered by the Regional Board in selecting the appropriate enforcement action in response to an incident of noncompliance:

- Degree of water quality impairment and/or threat to the public health including the degree of toxicity of the discharge;
- Past history of discharge violations;
- Degree of cooperation or recalcitrance shown by the discharger;
- Culpability of the discharger;
- Financial resources of the discharger;
- Whether the circumstances leading to the noncompliance have been corrected;
- Whether the discharge violations are likely to continue in the future;
- Whether the discharge can be cleaned up;
- The need to take immediate cleanup action;
- Any economic benefit realized by the discharger as a result of the noncompliance; and
- Other actions as justice may require.

STATE WATER RESOURCES CONTROL BOARD PLANS AND POLICIES

The State Board has adopted a number of plans and policies for statewide water quality management. The Regional Board implements these plans through Waste Discharge Requirements, NPDES permits, and any necessary enforcement actions. These policies are explained in more detail in Chapter 5, Plans and Policies.

HAZARDOUS WASTE SOURCE REDUCTION

The Department of Toxic Substance Control (DTSC) has adopted regulations regarding hazardous waste source reduction pursuant to the Hazardous Waste Source Reduction and Management Review Act of 1989 (Article 11.9, starting with §25244.12 of the

Health and Safety Code). These regulations are contained in Sections 67100.1 through Sections 67100.14 of Title 22 of the California Code of Regulations. These regulations require that each generator of hazardous or extremely hazardous waste within the limits set by the regulations conduct a source reduction evaluation review and plan, plan summary, hazardous waste management performance report, and report summary on or before September 1, 1991 and every four years thereafter. Every generator is required to retain a copy of the current review and plan, plan summary, report, report summary, progress report, and compliance checklist at each site, at a public library, or at a local governmental agency. The Regional Board supports these efforts of hazardous waste source reduction because any successes achieved will mean less hazardous waste which could pollute California's waters.

MUNICIPAL AND DOMESTIC WASTEWATER

Municipal wastewater in the San Diego Region consists primarily of domestic sewage and minor quantities of industrial wastes in some of the more highly urbanized and industrialized areas. Facilities to control municipal wastewater include wastewater collection systems, pumping stations, transport pipelines, treatment plants, storage ponds and ocean outfalls. These facilities are sometimes collectively referred to by the term Publicly Owned Treatment Works (POTW).

Municipal wastewater treatment in the San Diego Region is generally at the secondary treatment level. Secondary treatment results in the removal of more than 85 percent of the biochemical oxygen demand and suspended solids found in municipal wastewater. Tertiary (advanced) wastewater treatment is used at some treatment plants for additional removal of pollutants to reclaim wastewater for beneficial reuse. Effluent from the wastewater treatment plants is disposed of by various means including:

- Discharge to the Pacific Ocean via long deep ocean outfalls;
- Percolation into the soil; and
- Reclamation and reuse in conformance with uniform reclamation criteria (California Code of Regulations, Title 22, Division 4, Chapter 3).

Sludge disposal at most major municipal wastewater treatment plants in the Region consists of aerobic or anaerobic digestion and land disposal. Dried sludge is either disposed of at landfills or made available to the public as a soil conditioner. Some treatment plants, located upstream of major regional wastewater treatment plants discharge sludge to the sewage collection system for treatment at a "*downstream*" regional wastewater plant. The term municipal sewage treatment plant and Publicly Owned Treatment Works are used interchangeably in the Basin Plan.

The Regional Board regulates wastewater discharges from municipal wastewater treatment plants through either the issuance of National Pollutant Discharge Elimination System (NPDES) permits where the discharge is to surface waters or through waste discharge requirements (WDRs) where the discharge is to land.

Discharges of wastewater to surface water must meet the effluent limitations prescribed in the NPDES permit issued by the Regional Board. Effluent limitations are based on the following criteria:

- Secondary treatment effluent limitations defined by US EPA contained in 40 CFR 133, unless a waiver to the secondary treatment standards is obtained (more stringent effluent limitations than secondary treatment may be imposed by the Regional Board if necessary);
- Applicable water quality objectives and beneficial uses contained in the Basin Plan and State Board Water Quality Control Plans;
- Applicable public health protection standards for total and fecal coliform;
- Assimilative capacity of the receiving water;
- The terms and conditions of the federal Antidegradation Policy (40 CFR 131.12) and the State Antidegradation Policy (Resolution No. 68-16) (See Chapter 3);
- Anti-backsliding Provisions described in Clean Water Act Section 404; and
- Land disposal or recycling of sludge as a soil amendment.

Discharges of wastewater onto land must meet the effluent limitations in the waste discharge requirements prescribed by the Regional Board through the issuance of waste discharge

requirements. The waste discharge requirements contain effluent limitations based on the following criteria:

- The treatment capability of the treatment process employed by the dischargers;
- Applicable water quality objectives and beneficial uses contained in the Basin Plan;
- Applicable public health protection standards for total and fecal coliform;
- Assimilative capacity of the receiving water;
- The terms and conditions of the State Antidegradation Policy (Resolution No. 68-16) (See Chapter 3); and
- Land disposal or recycling of sludge as a soil amendment.

CLEAN WATER GRANTS AND LOANS

From 1972 until 1988 the State Water Resources Control Board assisted the US EPA in administering the multibillion dollar Clean Water Grants Program in California to finance the construction of municipal wastewater treatment facilities. This program ended in 1988. The Clean Water Act provides for the creation of a State Revolving Fund (SRF) Loan Program capitalized in part by federal funds. The Clean Water Act authorizes loan funding for construction of Publicly Owned Treatment Works (POTWs), for implementation of a nonpoint source pollution control management program, and for the development and implementation of an estuary conservation and management program. The State Board converted the Clean Water Grant Program to a Grants and Loans program on October 1, 1988, and ultimately replaced this completely with the State Revolving Fund Loan Program on June 30, 1989.

INDIVIDUAL DOMESTIC SUBSURFACE DISPOSAL SYSTEMS

Some areas in the Region rely on subsurface disposal systems for disposal of domestic household sewage. The most common type of subsurface disposal system is the septic tank-leach field disposal system. Seepage pits are sometimes used when site conditions are not suitable for leachfields. Occasionally, alternatives to conventional septic tank/leachfield or seepage pit systems are proposed for individual residences. Alternatives that have been proposed but not necessarily approved in the Region have included mound systems, evapotranspiration (ET), evapotranspiration/ infiltration (ETI), small in-house package treatment facilities, sand filters, and other innovative approaches.

The purpose of a septic tank system is to treat household wastes so that the discharge will readily percolate into the soil. Treatment or conditioning of the waste is achieved by the removal of solids through settling and decomposition of some of the soluble organic chemicals in the tank portion of the system. Further treatment of organic chemicals, nutrients, and bacteria occurs as the effluent released from the tank percolates through the soil. Proper construction of septic systems is imperative. Poorly designed and constructed systems will not function properly and can result in pollution of surface or ground waters. Septic tank systems used in undersized lots or unsuitable soils are subject to failure, and can lead to untreated or poorly treated sewage seeping into yards, roadside ditches, streams, lagoons, or into ground water, thus creating a public nuisance and health hazard. Even well-functioning septic systems can pollute ground water under adverse conditions.

Nitrogen compounds, which are typically present in effluent from septic systems, are highly soluble and stable in aqueous environments. When not denitrified by bacteria or assimilated into organic growth in the unsaturated zone, these nitrogen compounds are easily transported to ground water. Although there is controversy about the possible health effects of nitrate on adults, it has been shown that high levels of nitrate cause methemoglobinemia (blue-baby syndrome) in infants. Both the federal drinking water standard of 10 mg/l nitrate plus nitrite (expressed as nitrogen) and the equivalent state drinking water standard of 45 mg/l nitrate (expressed as NO_3) is based on this relationship.

The California Water Code, Chapter 4, Article 5, sets forth criteria for regulating on-site disposal systems. In the past, the Regional Board placed certain types of septic tank systems under individual waste discharge requirements. However, the regulatory process for establishing and enforcing waste discharge requirements for individual disposal systems is cumbersome and for the most part overlaps the regulatory process of local agencies. Consequently, the Regional Board has deferred regulation of most single-family dwellings and certain commercial septic tank disposal systems to the local health departments. The Regional Board

has asserted its authority with multiple-dwelling units, some larger developments in problem areas, non-domestic septic tank systems, and any situation which is creating, or has the potential to create, a water quality problem.

In the past, the Regional Board staff reviewed all proposals of individual sewerage systems for residential subdivisions involving more than five family units and for all commercial and industrial establishments. As part of this review, the Regional Board staff evaluated the adequacy of the consultants' field tests, the conformance of the design proposal with the criteria of the appropriate county regulatory agency, and in most instances, the cumulative impacts of the discharges on nitrate concentrations in the groundwater. Letters were forwarded to the appropriate local health agency approving those projects that demonstrated: (a) surfacing sewage from the proposed disposal systems will not take place either adjacent to, or within, the project boundaries; (b) the historic high groundwater and the effects of the discharge will not result in groundwater rising within 5 feet below the base of the disposal system; and (c) the cumulative impacts of the discharges will not cause nitrate concentrations in the ground water to exceed water quality standards.

Generally, project proponents have been able to address water quality issues by completing the routine field investigations required by the local health agencies. Regional Board staff review of the investigation reports often duplicated the review efforts of the local agencies. On occasion, the Regional Board staff has required further investigations to address concerns regarding the cumulative impacts of the discharges. These investigations are not part of the local agencies' normal review process and the criteria for conducting these investigations are not specified by local regulations. On these occasions, significant staff resources are expended evaluating the technical information submitted by the project proponents.

In 1990, Regional Board staff suspended review of all proposed subsurface disposal system projects in order to direct staff resources to more critical water quality issues. In lieu of reviewing individual projects, staff prepared interim screening procedures for implementation by the appropriate local agencies. The objective of the procedures is to assist the local agencies in identifying those projects with potential for causing degradation of ground water quality. Only those projects would then be referred to the Regional Board staff.

The determination by Regional Board staff to require project proponents to conduct an investigation of the cumulative impacts of the individual systems has been on a case-by-case basis. Staff considers factors such as the location of proposed project, the number of proposed lots, and the density of the development. However, without written review criteria, staff decisions requiring project proponents to conduct further investigations has been inconsistent.

GUIDELINES FOR NEW COMMUNITY AND INDIVIDUAL SEWERAGE FACILITIES

Background

The Regional Board adopted *Guidelines for New Community and Individual Sewerage Facilities* (Resolution No. 79-44) on June 25, 1979. By the mid-1980s, the Regional Board recognized the need to update the 1979 guidelines to simplify the regulatory process by providing local agencies with the necessary review criteria for addressing cumulative impacts from individual systems. Those projects complying with the criteria would not be directly subject to the Regional Board regulatory process.

As part of the Clean Water Act Section 205(j) Basin Plan update project, the Regional Board contracted a study to review the portion of the 1979 guidelines pertaining to subsurface disposal and to recommend any changes that would result in a more effective and efficient regulatory program. The contractor was directed to conduct file research and literature review regarding the impacts of subsurface disposal on ground water quality and to interview the staff of responsible regulatory agencies in San Diego, Riverside, and Orange Counties to incorporate their concerns and recommendations into a revised set of subsurface disposal guidelines. A report, entitled "*Review Of Subsurface Wastewater Disposal Policy, San Diego Regional Water Quality Control Board*" discusses phosphates, nitrate contamination, sources of nitrates in the ground water, reasons for septic systems failure, local and regional water table rises, and the implications of regulatory restrictions.

The report recommends that:

- The Regional Board should delegate the authority for review and approval of all septic systems and seepage pits to appropriate county regulatory agencies, eliminating the duplicative review function of the board staff.

- Effort currently directed toward review of subsurface disposal applications should be redirected to investigation of basin-specific limitations on subsurface disposal. These studies should be undertaken in cooperation with county regulatory agencies.

- The Regional Board should establish subsurface disposal guidelines for the county regulatory agencies at the time that authority for review is delegated. These guidelines should:

  ✓ Specify a continuation of existing design criteria for leachline length, spacing, setback, and slope requirements.

  ✓ Increase minimum unsaturated soil thickness below the leachlines to 9 feet for soils with good percolation rates, 12 feet for moderate percolation rates, and 14 feet for soils with poor percolation rates for individual systems.

  ✓ Require hydrogeological studies in areas of imported domestic water if the minimum lot size is not met, or if significant downslope accumulation of effluent is likely, or if septic systems discharge to a basin with restricted outflow.

  ✓ Restrict septic system densities to those indicated in the figure 4-1 in those areas where ground water is a significant source of drinking water.

Figure 4-1

REQUIRED RECHARGE RATES TO MAINTAIN 10 MG/L N NITRATE STANDARD

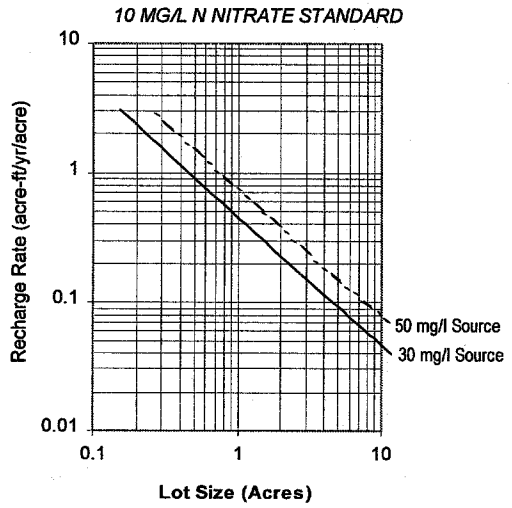

The policy described below updates and supersedes Resolution No. 79-44. The policy incorporates current practices and pertinent conclusions based upon the above recommendations to improve the efficiency of the review process, to eliminate unnecessary Regional Board regulation, and to improve protection of ground water quality.

Principles

The following management principles are designed to ensure that the goals of the Basin Plan are implemented:

- Sewerage systems must be designed, constructed, and installed so as to be capable of preventing pollution or contamination of the waters of the State or creating nuisance for the duration of the development.

- Sewerage systems must be operated, maintained and monitored so as to continually prevent pollution or contamination of the waters of the State and the creation of a nuisance.

- The responsibility for both of the above must be clearly and legally assumed by an entity with the financial and legal capability to assure that the system provides protection to the quality of the waters of the State for the duration of the development.

Purpose

The purpose of the guidelines below is to provide guidance to proponents of projects involving new discharges of wastes from community or individual sewerage facilities. However, the Regional Board may exercise discretion and approve exceptions to these guidelines if it is demonstrated that conformance with the above principles will be achieved. The Regional Board recognizes that there are certain actions which are best undertaken by local governments to minimize the potential water quality problems resulting from new community and individual sewerage systems. The guidelines are based on the assumption that it is desirable that city and county governments:

- Prohibit the use of new community and individual sewerage systems where existing community sewerage systems are reasonably available. The determination of whether or not existing systems are reasonably available should be the responsibility of the local agency or agencies having jurisdiction over the project.

- Prohibit the use of new individual disposal systems for any subdivision of land unless the

governing body having jurisdiction determines that the use of individual disposal systems will be in the best public interest.

- Assure that individual disposal systems are maintained to the satisfaction of the responsible health officer. This could be accomplished through establishment of special maintenance districts, by the amendment of existing ordinances to assure adequate maintenance documented through periodic inspections, or other alternatives as deemed appropriate by the local health officer.

- Consider the cumulative impacts of individual disposal system discharges as a part of the approval process for development.

Community Sewerage Systems

The Regional Board will regulate all discharges of wastes from community sewerage systems. The Regional Board will require a report of waste discharge to be filed for all proposed waste discharges which involve the use of new community sewerage systems. Before the Board will consider the report of waste discharge to be complete, the following requirements must be met:

- A public entity must assume legal authority and responsibility for the ownership, operation, and maintenance of the proposed wastewater treatment and disposal system. The Report of Waste Discharge must be submitted by the public entity.

- The Report of Waste Discharge must include the following:

  ✓ A final Environmental Impact Report or Negative Declaration covering the total project, unless categorically exempt, prepared and approved by the local lead agency pursuant to the California Environmental Quality Act (CEQA) of 1970 (as amended) and Chapter 3, Division 6, Title 14, of the California Code of Regulations (as amended). In the approval process the Environmental Impact Report or Negative Declaration must be circulated through the State Clearinghouse; and

  ✓ Operation, maintenance, revenue and contingency plans for the wastewater treatment and disposal facilities or a commitment by the public entity to prepare such plans and submit them to the Regional Board at least 60 days prior to the initiation of discharge.

In the absence of a satisfactory Report of Waste Discharge, the discharge will be prohibited.

Individual Sewerage Systems

Projects Involving Five Family Units or Less - Conventional Septic Tank/Subsurface Disposal

When individual sewerage systems consisting of conventional septic tanks and leach fields or seepage pits would be provided to serve each dwelling for projects of five family units or less, or to serve to dispose domestic waste from commercial or industrial projects with a design flow of equal to or less than 1200 gallons per day, the Regional Board will defer the authority to regulate the discharge of domestic wastes to the appropriate county health officer.

Projects Involving More Than Five Family Units - Conventional Septic Tank/Subsurface Disposal

The above deferral of authority to the appropriate county health officer to regulate the discharge of domestic wastes will also apply when individual sewerage systems consisting of conventional septic tanks and leach fields or seepage pits would be provided to: (1) serve dwellings involving more than five family units in a single project or (2) dispose of domestic waste from commercial or industrial projects with a design flow of more than 1200 gallons per day. The deferral will apply if the project proponent demonstrates to the satisfaction of the appropriate county health officers that the following conditions are met:

- The use of new individual subsurface disposal systems for any subdivision of land will be in the best public interest; and

- Individual disposal systems will comply with all existing county design criteria including but not limited to percolation testing, minimum required leachline length, leachline spacing, setback and slope requirements; and

- Individual disposal systems will meet the minimum unsaturated soil thickness between the bottom of leachlines or the bottom of seepage pits and the historic high ground water level. The minimum unsaturated soil thickness is 9 ft for soils with good percolation rates [less than

15 minutes per inch (mpi)], or 12 ft for soils with moderate percolation rates (15 to 40 mpi), or 14 ft for soils with poor percolation rates (greater than 40 mpi). However, exceptions to the unsaturated soil thickness criteria may be allowed by the appropriate county health officer, based upon knowledge of local site conditions; and

- The cumulative impact from proposed individual disposal system(s) or from new commercial and/or industrial development(s) will not cause adverse impacts to the beneficial uses of ground water.

If it is determined that the discharge could cause a significant water quality problem, then a Report of Waste Discharge must be filed with the Regional Board and waste discharge requirements must be obtained prior to final subdivision map recording.

For any discharge of industrial wastes a Report of Waste Discharge must be filed with the Regional Board and waste discharge requirements must be obtained prior to recording of the final map and/or issuance of a building permit.

Alternative Systems

When an evapotranspiration (ET), or an evapotranspiration/infiltration (ETI), or a mound system is proposed to serve a single residential project, Regional Board defers regulation of the discharge to the appropriate county health officers provided that the project proponents demonstrate to the satisfaction of appropriate county health officers that the following conditions are met:

- ET, or ETI, or mound systems will comply with all conditions for conventional subsurface disposal systems as noted above; and

- The design, construction, and installation of an ET or ETI system will comply with the criteria approved by this Regional Board Resolution No. 80-84 and the criteria contained in the State Water Resources Control Board, *Guidelines for Evapotranspiration Systems* dated January 1980. The design, construction, and installation of mound systems will comply with criteria contained in the State Water Resources Control Board, *Guidelines for Mound Systems* dated January 1980; and

- The ET, or ETI, or mound systems will be for domestic waste only; and

- The ET, or ETI, or mound systems will be used for single family dwelling on a single lot which has previously undergone a proper satisfactory CEQA process; and

- The ET, or ETI, or mound systems will not be used as a waste discharge method for new subdivisions; and

- The ET, or ETI, or mound systems will not be used as a group collection system; and

- The ET, or ETI, or mound systems is considered experimental, and will be monitored for at least three years.

As the counties develop and adopt standards for alternative systems, the Regional Board may, in the future, defer regulation of additional types of individual sewerage systems to the appropriate county health officer in much the same manner as is now done for conventional septic tank/subsurface disposal systems.

Report of Waste Discharge Submission

The Regional Board will review specific proposals not meeting the above criteria at the request of the appropriate county authority. For such proposals, a Report of Waste Discharge must be filed with the Regional Board and waste discharge requirements must be obtained or waived by the Regional Board prior to recordation of the final map and/or issuance of a building permit. Before the Regional Board considers the Report of Waste Discharge to be complete, the following technical information must be submitted:

- A hydrogeologic study which will, using accepted ground water hydrologic techniques and practices, assess the probable rise in the water table associated with the project, including effects of septic system recharge, landscape irrigation, and ground water pumpage. The study will additionally address the impact of the projected water table rise or fall on the operation of new and existing septic systems.

- A nitrate study which will, using an acceptable mass balance method, demonstrate that the proposed project will not cause the basin plan objective for nitrate to be exceeded.

In addition to the technical information submitted, the following conditions must be met:

- In most instances a public entity must assume legal authority and responsibility for the operation and maintenance of the proposed individual wastewater treatment and disposal systems;

- In some instances, such as commercial/industrial establishments, or projects involving only a single homesite, or special extenuating circumstances, the public entity condition may be set aside;

- A final Environmental Impact Report or Negative Declaration must be included covering the total project, unless categorically exempt, prepared and approved by the local lead agency pursuant to the California Environmental Quality Act of 1970 (as amended) and Chapter 3, Division 6, Title 14, of the California Administrative Code (as amended). In the approval process the Environmental Impact Report or Negative Declaration must be circulated through the State Clearinghouse;

- Operation, maintenance, revenue, and contingency plans must be submitted for the wastewater treatment and disposal facilities or a commitment must be made by the public entity to prepare such plans and submit them to the Regional Board at least 60 days prior to the initiation of discharge; and

- In the absence of a satisfactory Report of Waste Discharge, the discharge will be prohibited without prejudice.

WATER RECLAMATION AND REUSE

Water reclamation is a process consisting of the following elements:

- Treatment of wastewater to a level of quality suitable for reuse;

- Transportation of reclaimed water to reuse areas; and

- Application of reclaimed water to an actual use.

Reclaimed water use typically falls into the following seven broad categories:

- Agricultural irrigation;

- Landscape irrigation (including highway landscape and golf courses);

- Impoundments for landscape, recreational or wildlife uses, wetland and wildlife enhancement;

- Industrial and Construction processes (e.g., cooling water, process water, washdown water or for dust control);

- Ground water recharge.

- Flushing of toilet and urinals in non-residential buildings; and

- Stream enhancement.

The State of California has a strong interest in promoting the conservation and efficient use of water through water reclamation. The California Constitution, Article X, Section 2 provides that:

> "*...Water resources of the state be put to beneficial use to the fullest extent of which they are capable, and that waste or unreasonable use of water be prevented, and that conservation of such waters is to be exercised with a view to the reasonable and beneficial use thereof in the interest of the people and for the public welfare...*"

The State interest in the conservation and efficient use of its waters is further emphasized by California Water Code Section 13510 which deals specifically with water reclamation. Section 13510 provides that:

> "*It is hereby declared that the people of the state have a primary interest in the development of facilities to reclaim water containing waste to supplement existing surface water and underground water supplies and to assist in meeting the future water requirements of the state.*"

In addition, California Water Code Section 13241 provides that the Regional Board consider the need to develop and use reclaimed water when establishing water quality objectives.

The State Board adopted the *Policy with Respect to Water Reclamation In California and the related "Action Plan for Water Reclamation in California"* in 1977 (State Board Resolution No. 77-1). The policy directs the State Board and Regional Boards to encourage reclamation and reuse of water, and to promote water reclamation projects which preserve,

restore, or enhance instream beneficial uses. The policy also states that the State and Regional Boards recognize the need to protect public health and the environment in the implementation of reclamation projects.

The Porter-Cologne Water Quality Control Act also requires the State Department of Health Services (DHS) to establish statewide reclamation criteria (see Table 4-5) for each type of reclaimed water use to protect public health. Any person proposing to discharge reclaimed water must file a report of waste discharge containing appropriate information related to the discharge with the Regional Board. The Regional Board, after consultation with DHS, may adopt waste discharge requirements for the reclaimed water discharge.

When reviewing potential reclamation projects, the Regional Board must also consider potential impacts from reclamation on ground and surface water quality. It is common for the use of reclaimed water to cause an increase in total dissolved solids concentration in the receiving ground waters due to the effects of evapotranspiration. A variety of techniques can be employed to protect the beneficial uses of the receiving waters. Where well controlled irrigation is practiced, nitrate problems in the dry season will be controlled. Vegetative uptake will utilize soluble nitrates which could otherwise migrate into ground water. Demineralization techniques or source control of total dissolved solids may be necessary in some inland areas where ground waters have been or may be degraded. Presence of excessive salts, boron, or sodium could be the basis for rejection of proposals to irrigate cropland with effluent.

WATER RECLAMATION PROJECTS IN THE SAN DIEGO REGION

The water supply in the San Diego Region is largely dependent upon water imported from northern California and the Colorado River. Future increases from these sources may be limited due to environmental concerns, contractual agreements, and over all capital costs. In light of the limited possibilities for future water sources, the need to develop water supply alternatives is important. For many water uses, reclaimed water is a viable alternative water supply.

The status of water reclamation projects in the San Diego Region during March 1993 is shown is shown in Table 4-6. For each water reclamation agency and/or facility in the San Diego Region, the table shows the permitted flow in million gallons per day (MGD), the average effluent flow (in MGD), the average effluent flow reused (in MGD), the annual volume reused in million of gallons (MG) and acre-feet (AC-FT), the treatment process and disposal method, the type of use for the reclaimed water, the reclaimed water user and the status of the project. In the San Diego Region, a total of about 175 MGD of reclaimed water flow is permitted. About 16 MGD is reused from an average effluent flow of about 79 MGD. The annual volume reused is about 5859 MG (18597 AC-FT).

REGIONAL BOARD ACTION PLAN ON WATER RECLAMATION

The Regional Board supports water reclamation and reuse to the maximum extent feasible to help meet the growing water needs of the Region. It has long been a policy of the Regional Board to encourage and promote water reclamation while taking into consideration the need to protect beneficial uses of surface and ground waters and protect the public health.

On March 24, 1986 the Regional Board adopted Resolution No. 86-06 which amended the Basin Plan to include an action plan for water reclamation. The policy described below updates and supercedes Resolution No. 86-06:

(1) The Regional Board will consider special amendments to the Basin Plan to encourage water reclamation.

(2) The Regional Board will consider comprehensive water quality monitoring programs for confirmation of original hydrogeological predictions, and an accurate measure of adverse ground water quality effects. These monitoring programs will be considered where water reclamation is not expected to result in adverse ground water quality impacts, and where ground water quality impacts are very difficult to predict.

(3) The Regional Board will consider projects involving stream and lagoon replenishment with reclaimed water where, as a minimum, a water quality management plan would be implemented and conformance with the Department of Health Services wastewater reclamation criteria for nonrestricted recreational use would be achieved.

Table 4 - 5. Permitted Uses and California Title 22 Health Requirements for Reclaimed Water.

Permitted Use of Reclaimed Water	Summary of Title 22 (Sections 60303 et. seq.) Health Requirements
Spray irrigation of food crops	Reclaimed water used for spray irrigation of food crops shall be at all times adequately disinfected, oxidized, coagulated, clarified, filtered wastewater. The wastewater shall be considered adequately disinfected if at some location in the treatment process, the median number of coliform organisms does not exceed 23 per 100 ml in more than one sample within any 30-day period. The median value shall be determined from the bacteriological results of the last 7 days for which analyses have been completed.
Surface irrigation of food crops	Reclaimed water used for surface irrigation of food crops shall be at all times an adequately disinfected, oxidized wastewater. The wastewater shall be considered adequately disinfected if at some location in the treatment process, the median number of coliform organisms does not exceed 2.2 per 100 ml as determined from the bacteriological results of the last 7 days for which analyses have been completed. Orchards and vineyards may be surface irrigated with reclaimed water that has the quality at least equivalent to that of primary effluent provided that no fruit is harvested that has come in contact with the irrigating water or the ground. Exceptions to the quality requirements for reclaimed water used for irrigation of food crops may be considered by the State Department of Health on an individual basis where the reclaimed water is to be used to irrigate a food crop which must undergo extensive commercial, physical or chemical processing sufficient to destroy pathogenic agents before it is suitable for human consumption.
Irrigation of fodder, fiber and seed crops	Reclaimed water used for the surface or spray irrigation of fodder, fiber, and seed crops shall have a level of quality no less than that of primary effluent.
Irrigation of pasture for milking animals	Reclaimed water used for the irrigation of pasture to which milking cows or goats have access shall be at all times an adequately disinfected, oxidized wastewater. The wastewater shall be considered adequately disinfected if at some location in the treatment process the median number of coliform organisms does not exceed 23 per 100 ml, as determined from the bacteriological results of the last 7 days for which analyses have been completed.
Landscape irrigation of golf courses, cemeteries, freeway landscapes and similar areas	Reclaimed water used for the irrigation of golf courses, cemeteries, freeway landscapes, and landscapes in other areas where the public has similar access or exposure shall be at all times adequately disinfected oxidized wastewater. The wastewater shall be considered adequately disinfected if the median number of coliform organisms in the effluent does not exceed 23 per 100 ml as determined from the bacteriological results of the last 7 days for which analyses have been completed, and the number of coliform organisms does not exceed 240 per 100 ml in any two consecutive samples.

Table 4 - 5 (continued). Permitted Uses and California Title 22 Health Requirements for Reclaimed Water.

Permitted Use of Reclaimed Water	Summary of Title 22 (Sections 60303 et. seq.) Health Requirements
Irrigation of parks, playgrounds, schoolyards and similar areas	Reclaimed water used for irrigation of parks, playgrounds, schoolyards, and other areas where the public has similar access or exposure shall be at all times adequately disinfected, oxidized, coagulated, clarified, filtered wastewater or a wastewater treated by sequence of unit processes that will assure an equivalent degree of treatment and reliability. The wastewater shall be considered adequately disinfected if the median number of coliform organisms in the effluent does not exceed 2.2 per 100 ml, as determined from the bacteriological results of the last 7 days for which analyses have been completed.
Nonrestricted recreational impoundment (no limitations are imposed on body-contact sport activities)	Reclaimed water used as a source of supply in a nonrestricted recreational impoundment shall be at all times adequately disinfected, oxidized, coagulated, clarified, filtered wastewater. The wastewater shall be considered adequately disinfected if at some location in the treatment process, the median number of coliform organisms in the effluent does not exceed 23 per 100 ml in more than one sample within any 30 day period. The median value shall be determined from the bacteriological results of the last 7 days for which analyses have been completed.
Restricted recreation impoundment (recreation is limited to fishing, boating, and other non-body-contact water recreation activities)	Reclaimed water used as a source of supply in a restricted recreational impoundment shall be at all times an adequately disinfected, oxidized wastewater. The wastewater shall be considered adequately disinfected if at some location in the treatment process the median number of coliform organisms does not exceed 23 per 100 ml, as determined from the bacteriological results of the last 7 days for which analyses have been completed.
Landscape impoundment (aesthetic enjoyment or other function but no body-contact is allowed)	Reclaimed water used as a source of supply in a landscape impoundment shall be at all times an adequately disinfected, oxidized wastewater. The wastewater shall be considered adequately disinfected if at some location in the treatment process the median number of coliform organisms does not exceed 23 per 100 ml, as determined from the bacteriological results of the last 7 days for which analyses have been completed.
Groundwater recharge of domestic water supply aquifers	Recharge water requirements are made on a case-by-case basis to ensure that the water is of such quality that fully protects public health at all times. Factors considered include treatment provided, effluent quality and quantity, spreading operations, soil characteristics, hydrogeology, residence time, receiving water quality and distance to withdrawal.
Other uses (toilet flush, industrial cooling water, process water, seawater intrusion barrier)	User must demonstrate that methods of treatment and reliability features will assure an equal degree of treatment and reliability.

Table 4-6. Water Reclamation Projects as of March, 1993

NAME OF AGENCY / FACILITY	HYDRO-LOGIC UNIT	PERMIT FLOW (MGD)	AVERAGE EFFLUENT FLOW (MGD)	AVERAGE EFFLUENT FLOW REUSED (MGD)	ANNUAL VOLUME REUSED (MG)	ANNUAL VOLUME REUSED (AC-FT)	TREATMENT PROCESS AND DISPOSAL	TYPE OF USE	RECLAIMED WATER USER	STATUS
ORANGE COUNTY										
Joplin Youth Center	1.20	0.0075	0.0067	0.0067	2.45	7.50	AS,PB	Landscape Irrigation Groundwater Recharge		Operating
San Clemente, City of San Clemente WRP	1.20 1.30	7.00	3.996	0.610	222.65	683.28	AS,PS,CH, SF,OF	Golf Course Irrigation Construction	Municipal GC, Arvida Co, Talega, Pacific GC	Operating
SOUTH ORANGE COUNTY RECLAMATION AUTHORITY SERVICE AREA										
El Toro WD	1.13	5.50	0.000	0.000	0.000	0.00	AS, OF	Landscape Irrigation		Proposed
Los Alisos WD	1.13	5.50	0.000	0.000	0.00	0.00	AS, OF	Landscape Irrigation	El Toro Mat. Co.	Proposed
Moulton Niguel WD Plant 3A STP	1.20	2.40	0.484	0.484	176.66	542.15	AS,CH	Golf Course & Landscap Irrigation	Mission Viejo Country Club	Operating
Laguna Niguel (AWMA/MNWD) Joint Regional WRF	1.13 1.14	12.00	5.191	0.276	100.67	308.93	AS,F,CL, OF	Golf Course Irrigation	El Niguel Country Club	Operating
Santa Margarita WD Oso Creek STP	1.13 1.20	3.00	1.693	1.693	617.95	1896.39	AT,F,CH, OF	Landscape Irrigation	Oso Valley Asn. CALTRANS	Operating
Nicholls Institute	1.20	0.04	0.032	0.025	9.13	28.00		Property landscaping	Nichols Inst.	Operating
Chiquita WRF	1.20 1.30	3.50	2.103	0.016	5.92	18.18	CH,F	Nursery, Construction Dust Control	SeaTree Nursery Las Flores Dev. Desecha Landfill	Operating
South Coast County WD	1.12 1.13 1.14	2.61	0.738	0.738	269.19	826.10	AS,F,CH, OF	Irrigation of parks, greenbelt,golf course	AVCO Community De Ben Brown GC Orange Cnty Parks	Operating
Trabuco Canyon WD Trabuco WRP	1.13 1.20	0.25	0.459	0.561	204.77	628.40	OD,CH,PB	Golf Course Irrigation	Dove Canyon GC	Operating
RIVERSIDE COUNTY										
Eastern Municipal WD Rancho Calif. STP	2.51	5.00	4.800	1.210	441.65	1355.4	AS,PB	Irrigation sod farm	Ralph Daily Sod Farm	Operating
Rancho California WD Joaquin Ranch STP	2.31	0.60	0.575	0.376	137.24	421.2	OD,F,CH, PB	Golf Course Irrigation	Bear Creek Golf Course	Operating
Santa Rosa SBR WRF	2.51	1.00	0.345	0.345	125.93	386.4	F,CH	Groundwater Recharge		Operating

TREATMENT PROCESS: AQ=aquaculture, AS=activated sludge, CH=chlorination, EA=extended aeration, F=filtration, MS=microscreen, OD=oxidation ditch, OF=ocean outfall, OP=oxidation pond, PB=percolation pond or bed, PS=primary sedimentation, RBC=rotating biological contactor, RO=reverse osmosis, TF=trickling filter

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Table 4-6 (continued). Water Reclamation Projects as of March, 1993

NAME OF AGENCY / FACILITY	HYDRO-LOGIC UNIT	PERMIT FLOW (MGD)	AVERAGE EFFLUENT FLOW (MGD)	REUSED (MGD)	ANNUAL VOLUME REUSED (MG)	(AC-FT)	TREATMENT PROCESS AND DISPOSAL	TYPE OF USE	RECLAIMED WATER USER	STATUS
SAN DIEGO COUNTY										
Buena Sanitation Dist. Shadow Ridge WRP	4.32	1.10	0.809	0.062	22.63	69.4	MS,RBC,F, RO,CH,OF	Irrigation	Shadow Ridge Golf Course	Operating
Encina	4.40	22.50	19.000	0.001	0.37	1.1	AS,CH,OP	Landscape Irrigation	CAL TRANS	Operating
Escondido WRP	4.52 5.21	5.00	0.003	0.003	1.10	3.4	AS,CH	Internal Use Landscape Irrigation Golf Course	Escondido San Marcos	Operating
Fairbanks Ranch WRP	5.12	0.28	0.180	0.180	65.70	201.6	EA,PB	Groundwater Recharge		Operating
Fallbrook WD Plants 1 & 2	2.13	3.10	1.720	0.160	58.40	179.2	PS,EA,CH, OF	Landscape Irrigation (I-5 Freeway)	CALTRANS Nurseries	Operating
4-S Ranch 4-S Ranch WRP	9.31	0.60	0.062	0.038	13.69	42.0	CH	Compaction, Irrigation	Construction Pasture	Operating
Leucadia Water Dist. F. R. Gafner WRF	4.51	0.75	0.000	0.000	0.00	0.0	TF,PS,CH, OF	Aviara and La Costa Country Club Irrig.	La Costa & Aviara Country Clubs	Proposed
Oceanside, City of N. San Luis Rey STP	3.12	10.50	8.700	0.020	7.30	22.4	AS,CL,OF PB	Golf Course Irrigation Groundwater Recharge	Oceanside Golf Course	Operating
La Salina	4.10	0.50	0.000	0.000	0.00	0.00	EA,AS,CH	Landscape Irrigation	Oceanside	Proposed
Otay Municipal WD Ralph W Chapman WRF	9.21	1.30	0.900	0.900	328.50	1008.1	EA,F,RO, CH,OF	Landscape Irrigation	Eastlake Dev.	Operating
Otay Estates Hidden Valley Estates	9.11	0.15	0.000	0.000	0.00	0.0	AS,CH	Landscape Irrigation		Proposed
Padre Dam Municipal WD Water Reclamation Pl	7.12	1.00	0.521	0.521	190.17	583.6	AS,PS,OP, CH,OF	Recreational Lakes & Park Irrigation	Santee Lakes	Operating
Pauma Valley	4.63	0.00	0.000	0.000	0.00	0.0	EA,CH	Groundwater Recharge		Proposed
Ramona Municipal WD Santa Maria WWTP	5.41	1.00	0.600	0.600	219.00	672.1	EA,PB	Irrigation, Pasture Groundwater Recharge	Ramona WD site	Operating
San Vicente STP	7.23	0.60	0.541	0.541	197.47	606.0	OD,CH,F, RO,PB	Avocado Grove Irrig. Groundwater Recharge	Solk Ranch	Operating
Rancho Sante Fe	4.61	0.45	0.220	0.220	80.30	246.4	AS,EA,CH PB	Golf Course Irrigation	Rancho Sante Fe Golf Course	Operating
San Diego, County of Descanso STP	9.31	0.04	0.026	0.026	9.56	29.3	AS,PB	Landscape Irrigation	Descanso Facil.	Operating
Julian	7.43	0.04	0.035	0.035	12.78	39.20	OP	Irrigation (cattle feed)		Operating
Mount Woodson SD	5.11	0.08	0.000	0.000	0.00	0.0	CH	Irrigation	Golf Course	Proposed
Rancho Cielo SD	5.11	0.20	0.000	0.000	0.00	0.0		Landscape Irrigation		Proposed
Whispering Palms CSD	5.11	0.40	0.175	0.175	63.88	196.0	EA,CH,PB	Ground Water Recharge	Del Rayo Prop.	Operating
San Diego, City of Water Utilities Dept San Pasqual WAP STP	5.31	1.00	0.019	0.019	6.94	21.3	AS,CH,PB	Irrigation & Animal Stock Watering	Wild Animal Park	Operating

TREATMENT PROCESS: AQ = aquaculture, AS = activated sludge, CH = chlorination, EA = extended aeration, F = filtration, MS = microscreen, OD = oxidation ditch, OF = ocean outfall, OP = oxidation pond, PB = percolation pond or bed, PS = primary sedimentation, RBC = rotating biological contactor, RO = reverse osmosis, TF = trickling filter

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Table 4-6 (continued). Water Reclamation Projects as of March, 1993

NAME OF AGENCY / FACILITY	HYDRO-LOGIC UNIT	PERMIT FLOW (MGD)	AVERAGE EFFLUENT FLOW (MGD)	AVERAGE EFFLUENT FLOW REUSED (MGD)	ANNUAL VOLUME REUSED (MG)	ANNUAL VOLUME REUSED (AC-FT)	TREATMENT PROCESS AND DISPOSAL	TYPE OF USE	RECLAIMED WATER USER	STATUS
SAN DIEGO COUNTY CONTINUED										
Mission Valley Pilot Aquaculture Project	7.11	1.00	0.026	0.025	9.13	28.0	AQ,OF	Freeway Landscaping (I-15 & I-8)	CALTRANS	Operating
North City	6.10	30.00	0.000	0.000	0.00	0.0		Landscape Irrigation	CALTRANS	Proposed
San Elijo JPA	4.51	3.68	0.000	0.000	0.00	0.0	CH,AS	Landscape Irrigation	Encinitas, Del Mar	Proposed
US Marine Corps Base Camp Pendleton										
Plant No. 1	2.13	1.50	0.429	0.678	247.54	759.7	TF,CH,PB	Ground water recharge	Camp Pendleton	Operating
Plant No. 2	2.11	0.92	0.309	0.694	253.13	776.8	TF,CH,PB	Golf Course Irrigation	Camp Pendleton	Operating
Plant No. 3	2.12	1.10	0.492	0.753	274.66	842.9	TF,CH,PB	Ground water recharge	Camp Pendleton	Operating
Plant No. 8	1.51	0.59	0.074	0.296	107.86	331.0	TF,CH,PB	Ground water recharge	Camp Pendleton	Operating
Plant No. 9	1.52	1.10	0.142	0.357	130.34	400.0	TF,CH,PB	Ground water recharge	Camp Pendleton	Operating
Plant No. 10	1.51	0.85	0.325	0.378	138.08	423.7	TF,CH,PB	Ground water recharge	Camp Pendleton	Operating
Plant No. 11	1.51	0.85	0.836	1.088	397.01	1218.4	TF,CH,PB	Ground water recharge	Camp Pendleton	Operating
Plant No. 12	1.40	0.85	0.142	0.420	153.37	470.7	TF,CH,PB	Ground water recharge	Camp Pendleton	Operating
Plant No. 13	2.11	2.50	1.397	1.225	447.16	1372.3	TF,CH,PB	Ground water recharge	Camp Pendleton	Operating
Plant No. 16	1.53	0.03	0.008	0.008	2.74	8.4	EA,PB	Ground water recharge	Camp Pendleton	Operating
Vallecitos WD Meadowlark WRP	4.51	2.00	0.995	0.525	191.63	588.1	MS,RBC,F CH,OF	Golf Course Irrigation	La Costa GC Carlsbad City	Operating
Valley Center MWD Lower Moosa Canyon WRP	3.13	0.50	0.250	0.250	91.25	280.0	AS,CH,PB	Golf Course Irrigation Ground water recharge	Circle R GC Valley Center MWD	Operating

TREATMENT PROCESS: AQ = aquaculture, AS = activated sludge, CH = chlorination, EA = extended aeration, F = filtration, MS = microscreen, OD = oxidation ditch, OF = ocean outfall, OP = oxidation pond, PB = percolation pond or bed, PS = primary sedimentation, RBC = rotating biological contactor, RO = reverse osmosis, TF = trickling filter

SUMMARY OF SAN DIEGO REGION WATER RECLAMATION PROJECTS AS OF MARCH, 1993

COUNTY SUBTOTALS	PERMIT FLOW (MGD)	AVERAGE EFFLUENT FLOW GENER-ATED (MGD)	AVERAGE EFFLUENT FLOW REUSED (MGD)	ANNUAL VOLUME REUSED (MG)	ANNUAL VOLUME REUSED (AC-FT)
Orange	41.81	14.70	4.41	1609	4939
Riverside	35.20	25.53	2.00	729	2237
San Diego	98.05	38.94	10.20	3722	11421
REGION TOTALS	175.06	79.17	16.05	5859	18597

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(4) The Regional Board will encourage use of ephemeral streams, that are not used for domestic water supply, for the conveyance of reclaimed water for beneficial uses during periods of need.

(5) The Regional Board will consider the possibilities for the buyout of a beneficial use that is only minimally realized, and that if protected, would stand in the way of a water reclamation project.

(6) The Regional Board will continue efforts to seek the most recent and accurate environmental and technical information for the purpose of reviewing Basin Plan standards pertaining to the discharge of reclaimed water.

(7) Regional Board will require all ocean and inland dischargers, having the potential to produce reclaimed water, to develop water reclamation plans.

(8) The Regional Board will encourage economic incentives for using reclaimed water, such as rebates by the San Diego County Water Authority and the Metropolitan Water District of Southern California to water suppliers engaged in water reclamation.

(9) The Regional Board will seek funding for studies to evaluate the potential of water reclamation in various areas of the Region including streams and coastal lagoons.

(10) The Regional Board will take appropriate actions, recommend legislation, and recommend actions by other planning agencies (county, federal, etc.) in the areas of (1) planning, (2) project funding, (3) regulation and enforcement, (4) research and demonstration, and (5) public involvement and information.

(11) The Regional Board will encourage and support measures which conserve the water resources of the San Diego Region.

(12) The Regional Board will encourage other agencies to assist in implementing this policy.

(13) As mitigation against potential nuisance odors and health hazards resulting from reclaimed water use, the Regional Board will continue to adopt and enforce waste discharge requirements containing prohibitions against nuisance odors and implementing the State Department of Health Services' Wastewater Reclamation Criteria.

(14) The Regional Board will prepare Basin Plan amendments necessary for implementation of water reclamation projects in compliance with state policy for water quality control and, to the extent surface waters will be affected, with Environmental Protection Agency water quality standards regulations. Site specific environmental impacts will be evaluated in conformance with the California Environmental Quality Act (CEQA) for specific Basin Plan amendments.

FACTORING WATER SUPPLY CONSIDERATIONS INTO THE REGIONAL BOARD REGULATION OF WATER RECLAMATION PROJECTS

Conventional reclamation facilities are not designed to reduce mineral constituents. Consequently, the mineral effluent quality is dependent on the composition of the water supply plus the mineral pickup during its use. Historically, water supply Total Dissolved Solids (TDS) concentrations have varied significantly. For example, concentrations of TDS of the blended water stored in Lake Skinner ranged from below 400 mg/l to above 700 mg/l between 1985 and 1995.

Residential wastewater discharges will typically be 250 to 300 mg/l higher in TDS than their water supply source. Self-regenerating water softeners, brine from industrial dischargers, and ground water infiltration can further increase TDS concentrations in wastewater effluent. Many wastewater management agencies within the region are implementing programs to minimize the incremental pickup of minerals from these sources. These programs have had varying degrees of success.

Effective water conservation measures that are being implemented within the region may result in higher mineral and other constituent concentrations in wastewater effluent. Although the volume of wastewater is reduced by water conservation, the mineral and organic loading from its use remains nearly constant. As a result, the strength of the wastewater influent becomes stronger. In some cases, the characteristics of the wastewater influent may range briefly above the design parameters of the treatment plant.

In recognition of the variables in wastewater quality that are beyond the control of the discharger, the Regional Board authorizes the Executive Officer to suspend formal enforcement action, when a discharger submits an initial technical report with subsequent quarterly updates, that demonstrate to the satisfaction of the Executive Officer, compliance with the following conditions:

1. The discharge is not subject to regulation by means of a National Pollutant Discharge Elimination System (NPDES) Permit; and

2. The enforcement is only for violations of discharge specifications for mineral constituents, total suspended solids (TSS), biological oxygen demand (BOD) or carbonaceous biological oxygen demand (CBOD); and

3. The effluent violations are due solely to changes in the quality of the imported water supply and/or to water conservation measures being implemented within the service area tributary to the treatment plant; and

4. The discharge does not result in a mass loading of TSS, BOD and CBOD that exceeds the loading prior to implementation of water conservation measures; and

5. The discharge will not cause Basin Plan water quality objectives to be exceeded, in the long term; and

6. The discharge will not cause a violation of any applicable section from Title 22 of the California Code of Regulations or any requirement specified by either the State Department of Health Services or the appropriate county health officer for the protection of public health; and

7. The discharge does not contain a concentration of total dissolved solids (TDS) exceeding 1500 milligrams per liter (mg/l), or the concentration in the water supply plus 500 mg/l, whichever is less, with comparable adjustments for other mineral constituents; and

8. The discharger implements a program to identify major sources of the mineral constituents of concern in the discharge, including but not limited to water softener regeneration brine; and to determine the average contribution of each major source and the best available options for reducing levels in the discharge; and to identify any negative effects on the potential for water reclamation caused by the failure to control the constituents of concern in the discharge. The program should include a time schedule to reduce mineral constituents in the discharge as necessary to assure that the potential for water reclamation will be realized to the maximum extent practicable.

RECLAIMED WATER CONFORMANCE WITH WATER QUALITY OBJECTIVES

The Regional Board has established various policies concerning the compliance of reclaimed water discharges with applicable Basin Plan water quality objectives. These policies are described below:

Discharges to Coastal Lagoons from Pilot Water Reclamation Projects

The Regional Board may grant an exception to the "*Biostimulatory Substances*" water quality objective described in Chapter 3 to provide for discharges to coastal lagoons from pilot water reclamation projects. The project proponent must demonstrate that the pilot water reclamation project is consistent with the conditions described in the Principles of the State Water Resources Control Board's *Policy and Action Plan for Water Reclamation in California*. The *Policy and Action Plan for Water Reclamation in California* was adopted by the State Board in January 1977 and is summarized below. In addition, the proponent must demonstrate that the threat of eutrophication as a result of the addition of nitrogen and/or phosphorus is reduced as a consequence of one or more of the following factors:

- Waters of the coastal lagoon are highly laden with natural silts or colors which reduce the penetration of sunlight needed for photosynthesis;

- The coastal lagoon is characterized by morphometric features of steep banks, great depths, and substantial flows which have contributed to a history of no plant problems;

- The coastal lagoon is managed primarily for waterfowl or other wildlife;

- An identified element other than nitrogen or phosphorus is limiting to plant growth in the coastal lagoon, and the level and nature of the limiting element would not be expected to increase to an extent that would influence eutrophication; or

- Control of nitrogen and/or phosphorus in the coastal lagoon cannot be sufficiently effective under present technology to make phosphorus or nitrogen the limiting nutrient.

The Principles of the *Policy and Action Plan for Water Reclamation in California* provide, in part, that water reclamation projects shall be encouraged which do not adversely impact vested water rights or unreasonably impair instream beneficial uses or place an unreasonable burden on present water supply systems, and which meet the following additional conditions:

- Beneficial use will be made of wastewaters that would otherwise be discharged to marine or brackish receiving waters or evaporation ponds;

- Reclaimed water will replace or supplement the use of fresh water or better quality water; or

- Reclaimed water will be used to preserve, restore, or enhance instream beneficial uses which include, but are not limited to, fish, wildlife, recreation, and aesthetics associated with any surface water or wetlands.

Exceptions to the numerical water quality objectives will be made only when a pilot reclamation project meets the following criteria:

- Need for the reclaimed water is demonstrated;

- Alternative disposal facilities are available in the event discharge to a coastal lagoon proves unfeasible;

- Conformance with the State Water Resources Control Board's *Water Quality Control Policy for the Enclosed Bays and Estuaries of California* is demonstrated;

- Data will be generated that will be useful and timely for Regional Board review of water quality objectives for nutrients; and

- The project will include a lagoon management plan addressing the proposed methods of identifying and eliminating any pollution, contamination, or nuisance problems resulting from the proposed discharge and clearly identifying management responsibilities and capabilities.

Discharges to Inland Surface Waters

Regional Board Resolutions Nos. 90-53 and 91-23 established an alternate method of conformance with the Biostimulatory Substances Water Quality Objectives for portions of the San Diego River and Santa Margarita River. The Policy presented below supersedes Resolutions Nos. 90-53 and 91-23 and is applicable to all inland surface waters of the San Diego Region at a point downstream of lakes or reservoirs used for municipal water supply.

The Regional Board has developed an alternate method of showing compliance with the Biostimulatory Substances water quality objective contained in Chapter 3 to:

- Promote water reclamation;

- Enhance opportunities for reclaimed water discharges to inland surface waters; and

- Protect and enhance existing inland surface water beneficial uses through the greater use of reclaimed water.

The alternate method of compliance described below is applicable to reclaimed water discharges to inland surface waters at a point downstream of lakes or reservoirs used for municipal water supply. The alternate method of compliance is meant to encourage reclaimed water discharges into inland surface waters without degradation of the ambient water quality or adverse effects on beneficial uses.

Compliance Methods

The Regional Board will establish appropriate effluent limitations for nitrogen and phosphorus in waste discharge requirements for discharges of reclaimed water to surface waters using one of the following methodologies:

- The Regional Board may use the goal for phosphorus concentration in flowing water contained in the Biostimulatory Substances objective as guidance in establishing appropriate effluent limitations; or

- Alternatively, the Regional Board may determine compliance with the narrative objective based upon the following four factors:

  ✓ measurement of ambient concentrations of nitrogen and phosphorus;

  ✓ the dissolved oxygen requirements of downstream beneficial uses;

  ✓ use of best available technology (BAT) economically feasible for the removal of nutrients; and

  ✓ the development and implementation of a watercourse monitoring and management plan.

  Best Available Technology for the removal of nutrients includes biological and chemical removal. The extent to which the Regional Board may require additional removal of nutrients through chemical addition processes will be based upon an evaluation of the economic feasibility of this additional treatment in concert with an evaluation of the effectiveness of the watercourse monitoring management plan.

  The watercourse monitoring and management plan shall include:

  - A comprehensive program for chemical monitoring in receiving waters and effluent that will generate adequate data on ammonia nitrogen, nitrate nitrogen, nitrite nitrogen, organic nitrogen, total phosphate, ortho phosphate, dissolved oxygen (including vertical and diurnal dissolved oxygen profiles), pH, turbidity, biochemical oxygen demand (BOD) and other appropriate constituents and properties which may contribute to, or result from, nutrient related problems and impact beneficial uses.

  - A comprehensive program for physical and biological monitoring in the receiving waters that will generate adequate data on chlorophyll 'a', corrected chlorophyll 'a', pheophyton 'a'; temperature (including diurnal and vertical temperature profiles); acute and chronic toxicity; the diversity and numbers of microinvertebrates, macroinvertebrates, and fish; the dynamics of the aquatic flora (macroalgae, phytoplankton, and emergent vegetation) and the related dissolved oxygen regime; substrate composition; frequency of nuisance conditions; flow rate; and other appropriate constituents and properties which may contribute to nutrient related problems and impact beneficial uses.

  - A comprehensive program for physical and biological monitoring of the effluent that will generate adequate data on flow, temperature, chronic and acute toxicity, and other appropriate constituents which may contribute to nutrient related problems and impact beneficial uses.

  - A procedure for evaluating the data collected under items (1), (2), and (3) above and determining the potential for nutrient related problems that may impact beneficial uses.

  - Development and implementation of preventive and corrective actions that will ensure that a discharge containing nutrients will not adversely impact beneficial uses. These preventative and corrective actions may include, but are not limited to, the following:

    ✓ Achievement of more stringent effluent limits for nutrient constituents discharged to the watercourse, through additional chemical treatment methods at the treatment facility, to further reduce nutrient loading to the river,

    ✓ Maintenance of minimum reclaimed water flows discharged to the watercourse to prevent stagnant areas subject to nutrient related problems and to maintain the aquatic and riparian habitat beneficial uses that have been enhanced and/or created by such a discharge,

    ✓ Effective measures for the instream chemical treatment of surface waters to prevent nutrient and stagnant water related nuisance problems that can adversely impact aquatic habitat beneficial uses, where this instream treatment will not adversely impact beneficial uses,

    ✓ Effective measures for the physical management of the watercourse channel and vegetation,

- ✓ Effective source control measures to reduce the amount of nutrient constituents in the reclaimed water, and

- ✓ Other measures deemed appropriate and necessary by the Regional Board to ensure compliance with the Basin Plan narrative objective for nutrients and for the protection of beneficial uses.

Additional Mitigation

As mitigation against adverse impacts of nuisance odors and health hazards resulting from use of reclaimed water, the Regional Board will continue to adopt and enforce waste discharge requirements containing prohibitions against creation of nuisance odors and implementing the State Department of Health Services' Water Reclamation Criteria.

Additionally, as mitigation measures against degradation of ground and surface water quality resulting from an inland reclaimed water discharge, the Regional Board will require well head treatment or treatment at the point of use, or other appropriate measures acceptable to the Board, adequate to maintain the existing quality of ground and surface waters and the beneficial uses for all ground and surface waters adversely impacted by a discharge. The Regional Board will require monitoring of all ground water wells and legal direct diversions of surface water prior to permitting a discharge in order to establish the baseline quality that must be maintained.

As mitigation against any adverse effects to instream or downstream surface or ground water quality and the environment resulting from the discharge of reclaimed water, the Regional Board will require the discharger to establish and implement a comprehensive river monitoring and management program. The implementation of the watercourse monitoring and management plan will often require close coordination between many different public and private entities. The Regional Board shall recognize an agency to implement the watercourse monitoring and management plan and such recognition shall be made part of the provisions of appropriate waste discharge requirements for the discharge.

The watercourse monitoring and management plan, and all the associated requirements, shall apply to all downstream waters, including rivers, lagoons, estuaries, and bays, which may be impacted by the reclaimed water discharge. The Regional Board will regulate the volume of reclaimed water discharged into all inland surface waters to those levels which do not significantly and adversely alter the salinity regimes of downstream lagoons, estuaries, or bays. This regulation of flows will include a prohibition of fresh water flows that could result in the conversion of a lagoon, estuary, or bay from a saline environment to a fresh water environment. Salt marsh habitats are to be considered an integral part of the lagoon, estuary, or bay to which they are associated, and therefore shall be fully protected from conversion.

Implementation of Ground Water Quality Objectives for Reclaimed Water Discharges

In order to facilitate water reclamation in the Region, the Regional Board, adopted Resolution No. 90-61 on November 5, 1990. Resolution No. 90-61 established a methodology for determining reclaimed water effluent limits. The policy described below updates and supersedes Resolution No. 90-61.

The Regional Board shall regulate discharges of reclaimed water by establishing effluent limitations designed to protect beneficial uses and ensure compliance with State Water Resources Control Board Resolution No. 68-16. Use of adequately treated reclaimed water for irrigation or ground water recharge shall be encouraged in basins where reuse is clearly beneficial. Regulation of discharges of reclaimed water, where the reclaimed water displaces the use of imported water, or ground water having a quality exceeding the ground water quality objective, shall be in the following manner:

- For discharges upgradient of municipal water supply reservoirs the Regional Board shall adopt numerical effluent limitations for constituents at levels no lower than the quality of the basin's water supply but no higher than the Basin Plan ground water quality objective.

- In ground water basins not upgradient of municipal water supply reservoirs the Regional Board shall adopt numerical effluent limitations for constituents at levels no lower than the quality of the basin's water supply concentration plus an incremental increase equal to the typical incremental increase added to the water supply as a result of domestic use. The effluent limitations shall be no higher than the Basin Plan ground water quality objective.

- For discharges where the discharger has demonstrated sufficient assimilative capacity exists and ground water quality objectives will

not be exceeded, the Regional Board may consider adoption of numerical effluent limitations for constituents based on the discharge quality and assimilative capacity analysis results.

The Regional Board shall also require the implementation of effective salinity source control measures to ensure a reclaimed water quality that is suitable for long-term agricultural and landscape irrigation.

Water Reclamation Under Resolution No. 81-16

On March 23, 1981 the Regional Board adopted Resolution No. 81-16 which modified the water quality standards by relaxing the ground water objectives and modifying the beneficial use designations for portions of the Aliso Hydrologic Subarea (HSA) 1.13, Carlsbad HSA 4.21, Agua Hedionda HSA 4.31, Batiquitos HSA 4.51, and Telegraph HSA 9.11. These areas are described in Table 3-3. The terms and conditions of Resolution No. 81-16 are incorporated in this Basin Plan; accordingly Resolution No. 81-16 is superseded. The use of reclaimed water in these areas is subject to the following provisions:

- Notwithstanding the water quality objectives, the Regional Board will regulate waste discharges in the affected portions of Hydrologic Subareas 4.21 and 4.31 in a manner that will protect the waters produced by the existing operating wells. A presently existing ground water use will be considered terminated when the well has been abandoned pursuant to County of San Diego Water Well Standards.

- In applying the modified standards, the Regional Board will condition waste discharge requirements for discharges of domestic and municipal wastewater to require that the wastewater be reclaimed and reused in a manner that will displace the need for approximately equal volumes of imported potable water.

Water Reclamation as an Alternative to Ocean Disposal

The State Board in Order No. WQ 84-7 concluded that water reclamation should be carefully considered by persons proposing to discharge substantial quantities of once-used wastewater to the ocean particularly in a water short area where water is imported. Order No. WQ 84-7 directs the regional boards to require persons applying for permits to discharge once-used wastewater to the ocean in water-short areas to justify as part of each report of waste discharge why the wastewater is not being reclaimed.

The San Diego Region water supply is primarily imported water and the Region is clearly a water short area. Pursuant to State Board Order No. 84-7, the Regional Board will require persons proposing a discharge of once-used wastewater into the ocean to:

- Carefully analyze as an alternative, or partial alternative, the feasibility of reclaiming the wastewater for a beneficial use in lieu of ocean disposal.

- Submit, with the report of waste discharge in application for waste discharge requirements, sufficient information to justify why any wastewater proposed for discharge to the ocean after a single use is not being reclaimed for a beneficial use.

Reports of waste discharge which do not contain the water reclamation feasibility analysis described above, to the satisfaction of the Regional Board Executive Officer, will be considered incomplete and the Regional Board will not issue waste discharge requirements for the proposed discharge.

Reclaimed Water Storage Requirements

During the winter season, wet weather, and other periods when there is little or no demand, treatment plants continue to operate at normal flows and the excess treated effluent must either be: (1) discharged to storage facilities until such time as the irrigation demand requires the use of the stored water; (2) discharged through a fail-safe land outfall connection to an ocean outfall under the terms of an NPDES permit; or (3) discharged to inland surface waters for ground water recharge and/or stream replenishment under the terms of an NPDES permit. Theoretical water balance calculations for disposal of reclaimed water at golf courses and other reuse sites in the Region indicate that storage facilities should be sized for 84 days of storage. (1975 Comprehensive Water Quality Control Plan Report, Page II-16-32). In situations where reclaimed water storage ponds are necessary, the Regional Board will require reclaimed water producers to:

- provide 84 days of storage capacity; or

- provide storage capacity based upon water balance calculation procedures such as described in:

  US EPA. 1981. Process Design Manual for Land Treatment of Municipal Wastewater. Center for Environmental Research Information. Cincinnati, OH. EPA 625/1-81-013 (COE EM1110-1-501).

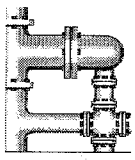

INDUSTRIAL WASTE

PRETREATMENT PROGRAM FOR INDUSTRIES

It is generally recognized that the discharge of industrial pollutants can be controlled most economically at their source. This is particularly true for industries discharging waste to municipal wastewater treatment plants (commonly called "*POTWs*" for "*publicly owned treatment works*"). On that basis US EPA has developed pretreatment requirements (40 CFR 403) for many industries and has developed minimum standards for POTW pretreatment programs. A POTW is required to implement a pretreatment program as a condition of its National Pollutant Discharge Elimination System (NPDES) Permit if its design flow is greater than five million gallons per day (MGD) or there are significant industrial users discharging to the POTW. POTWs with design flows less than 5 MGD may also be required to establish a pretreatment program if nondomestic waste causes upsets, sludge contamination, or violations of NPDES permit conditions, or if industrial users are subject to national pretreatment standards.

The goal of the US EPA's National Pretreatment Program is to protect municipal treatment plants and the environment from the adverse impact that may occur when hazardous or toxic wastes are discharged into a sewer system. This protection is achieved mainly by regulating nondomestic users of POTWs that discharge toxic wastes or unusually strong conventional wastes. Local pretreatment programs are required to fulfill the following objectives:

- Prevent the introduction of pollutants into POTWs which will interfere with the operation of a POTW, including interference with its use or disposal of municipal sludge;

- Prevent the introduction of pollutants into POTWs which will pass through the treatment works or otherwise be incompatible with such works;

- Improve opportunities to recycle and reclaim municipal and industrial wastewaters and sludges; and

- Prevent exposure of POTW personnel from chemical hazards and poisonous gases.

The general pretreatment regulations establish industrial pretreatment standards to control industrial pollutant discharges into wastewater collection systems and treatment plants. The discharge standards apply to all industrial and commercial establishments discharging waste to wastewater collection systems tributary to POTWs. The standards prohibit the discharge of pollutants that may damage the POTW's facilities, disrupt operations or expose workers to hazards. Categorical pretreatment standards are numerical effluent limits which apply to industrial and commercial discharges in 25 specific industrial categories determined to be the most significant sources of toxic pollutants. All firms regulated by a particular pretreatment standard are required to comply with these standards. One hundred and twenty-six toxic pollutants are regulated in the 25 categorical standards. Prohibited discharges into POTW plants, besides toxic substances, include:

- Substances that create a fire or explosion hazard in the plant or sewer system;

- Discharges that are corrosive (have a pH < 5.0);

- Discharges that obstruct flow in the sewer system or interfere with plant operation;

- Discharges that upset the treatment process or cause a violation of the POTW's permit;

- Discharges that increase the temperature of the wastewater entering the treatment plant to above 104 F (40°C);

- Oil based products in amounts that will cause interference or pass through;

- Substances which cause toxic gases, vapors or fumes in a quantity which may cause worker health or safety problem(s); and

- Trucked or hauled pollutants, except at discharge points designated by the POTW.

Municipalities are required to use and enforce these standards as well as locally developed standards, to control nondomestic users discharging to their wastewater collection and treatment systems. The federal regulations require all states that administer NPDES programs to POTW operators to develop local pretreatment programs. The California pretreatment program includes the same general elements which parallel the pretreatment compliance schedule activities specified in most POTWs' NPDES permits. Pretreatment programs are required to contain the following elements:

- Identification and evaluation of the nondomestic discharges to a treatment system.
- The POTW must operate under a legal authority that will enable it to apply and enforce the requirements of pretreatment regulations and other state and local rules needed to control nondomestic discharges.
- The POTW must establish local industrial effluent limits to protect treatment plant operation, receiving water quality and sludge quality.
- The POTW must develop procedures for monitoring its industrial users to determine compliance and non-compliance.
- The POTW must develop administrative procedures to implement its pretreatment program.
- The POTW must have sufficient resources (funds, equipment, personnel) to operate an effective and ongoing program.

STEAM ELECTRIC POWER PLANTS

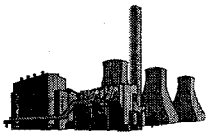

The Region has five steam electric power plants, four are operated by San Diego Gas and Electric Company (SDG&E) and one by Southern California Edison (SCE). Each of the SDG&E plants has one cooling water intake and one outfall structure. A separate NPDES permit has been issued for each SDG&E plant. The SCE plant, called the San Onofre Nuclear Generation Station (SONGS) has three power generating units, each with its own cooling water intake and outfall structure, and a separate NPDES permit has been issued for each of the three power generating units. All of these plants obtain cooling water from the ocean or San Diego Bay.

The SDG&E power plants are conventional fossil-fuel burning electrical generating facilities. The SDG&E plants are located in San Diego County, three of them are adjacent to San Diego Bay and one is adjacent to the Pacific Ocean. The San Onofre Nuclear Generating Station is located adjacent to the Pacific Ocean in northern San Diego County and consists of three nuclear fueled electrical generating units.

The cooling water discharges from the power plants are regulated under the provisions of the Thermal Plan, which incorporates provisions of Section 316(a) of the Clean Water Act. All of the plants employ a once-through cooling water system. Seawater is pumped into the facility and used to cool the condensers, which results in an increase in the cooling water temperature of approximately 20 degrees fahrenheit above the ambient seawater temperature. The cooling water is then discharged to marine waters, where the heat accumulated in the cooling water is dissipated.

The power plant NPDES permits establish effluent limitations for the discharge of cooling water and other wastes generated at the facilities. The effluent limitations are based upon applicable state water quality objectives and US EPA effluent guidelines and standards for steam electric power plants contained in 40 CFR 423. Each facility has a unique arrangement and thus a unique set of waste streams. Other wastewater discharges regulated by power plant NPDES permits, in addition to the cooling water discharge, include boiler blowdown, evaporator blowdown, floor drain discharges, chemical cleaning wastes and boiler wash.

Each power plant is required under the terms and conditions of its NPDES permit to comply with federal Clean Water Act Sections 316(a) and (b). Section 316(a) addresses the control of the thermal component of a discharge and its effects on fish population and wildlife. Section 316(b) requires that the location, design, construction, and capacity of cooling water intake structures reflect the best available technology for minimizing adverse impacts to the environment.

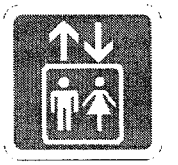

SUBSURFACE DISPOSAL FROM CAMPGROUNDS AND RECREATIONAL VEHICLE (RV) PARKS

Since the early 1970's, the Regional Board has been issuing waste discharge requirements to campgrounds/RV parks that discharge wastewater to

subsurface disposal systems. Chemical preservatives in recreational vehicle holding tanks increase the threat to ground water quality from these facilities. At one time, the waste discharge requirements specified that wastes other than domestic sewage shall be excluded from the discharge. Consequently, the requirements prohibited the discharge of water softener regeneration brine and RV holding tank waste to the septic tank and leach line systems and required the discharger to provide impervious storage tanks for RV holding tank wastes. In order to comply with the waste discharge requirements adopted by the Regional Board prior to 1978, the RV campground managers required RVs to empty their holding tank wastes into the campground's dump station if the RV would be provided with sewer hookups. Waste Discharge Requirements adopted after 1978 do not require the installation of impervious holding tanks at RV parks nor are RVs required to dispose of RV holding tank wastes to impervious tanks. Currently, most campgrounds/RV parks in the Region do not have impervious storage tanks for RV holding tank wastes.

In 1978, the Regional Board adopted Resolution No. 78-24, suspending all ground water monitoring requirements at the campgrounds until such time as a study by the State Board on RV waste disposal was completed and reviewed by the Regional Board staff. In June 1980, the Sanitary Engineering Research Laboratory at University of California, Berkeley published a report for the State Board entitled, "*Recreational Vehicle Waste Disposal in Roadside Rest Septic Tank Systems*". This report however, did not address the requirements for ground water monitoring.

The Regional Board "*Waiver Policy*" described earlier in this Chapter provides for waivers of waste discharge requirement adoption for campgrounds where no facilities are provided for recreational vehicles to connect to the campground sewerage system. Consequently, the Regional Board has deferred to the county health departments regulation of campgrounds/RV parks that do not provide sewer connections for recreational vehicles. The policy also waives Waste Discharge Requirements for residential, commercial, industrial, and individual subsurface disposal systems subject to the conditions set forth in the *Guidelines for New Community and Individual Sewerage Facilities* described earlier in this Chapter.

A common problem with community systems is that individual property owners and homeowners associations often deny responsibility for system failure and necessary repairs. Additional problems result when private entities operate community systems and do not have sufficient funds available to correct problems. Consequently, prior to approval of projects proposing community subsurface disposal systems, the Regional Board requires as part of the Report of Waste Discharge, documentation from the proponent that demonstrates that adequate funding is available to operate and maintain the disposal systems.

VESSELS (RECREATIONAL, COMMERCIAL, AND NAVAL) AND MARINAS

Vessels of all types and sizes including recreational, commercial, and Naval craft, and the marinas (or other facilities) in which they berth can have serious impacts on water quality. This section will describe the most important waste categories, pollutants, and other water quality problems associated with vessels and marinas. A description of best management practices and applicable regulations is also included. Although presented below, it should be noted that vessels and marinas are typically considered a nonpoint source category.

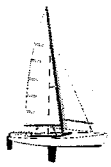

Vessels and Marinas in the San Diego Region

There are approximately 8,400 boat slips in San Diego Bay, 2,400 in Mission Bay, over 1,000 in Oceanside Harbor, and over 1,500 in Dana Point Harbor. In addition to boats with assigned slips, there are several hundred additional boats moored at a variety of "*free*" anchorages. In San Diego Bay, the San Diego Unified Port District has organized two of its free anchorages into formal anchorages which have shoreside showers, rest rooms, and docking facilities. Boat owners are required to pay fees for these services. In 1986, the San Diego Unified Port District was granted permission by the Coast Guard to establish additional formal anchorages in San Diego Bay. Because of the reluctance of some boat owners to pay fees for mooring in the bay, many have elected to move their boats to new free anchorages. Such anchorages can be especially important sources of human pathogens from vessel sewage releases. In addition to the vessels normally maintained in the water, there are several thousand additional "*trailer*" boats using San Diego's boat harbors. In total, approximately 55,000 vessels are registered in San Diego County.

Navy Vessels in the San Diego Region

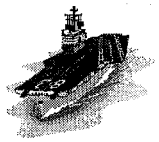

Home port to approximately one hundred US Navy vessels, San Diego Bay is one of the largest Naval ports on the west coast of the United States. As described above, Navy vessels are responsible for the same types of water quality impacts as other vessels. They are also subject to the same regulations and requirements as other vessels except that discharges from Naval vessels under certain circumstances are not subject to NPDES permits. A description of this exclusion (as found in Title 40, Code of Federal Regulations, Part 122.3) was discussed earlier in this Chapter.

If enforcement action is necessary, operators of Naval vessels are subject to all of the same enforcement mechanisms outlined previously in this Chapter with one exception; the Navy is not subject to Administrative Civil Liability.

Vessel Wastes

The most significant waste categories associated with vessels include:

- hull maintenance related wastes;
- sewage;
- marine engine related wastes; and
- trash.

Of these categories, hull maintenance related wastes, and particularly antifouling paint, is believed to pose the greatest potential threat to water quality. This is because of its high degree of toxicity. Antifouling paint, which is applied to vessel hulls, is specifically designed to prevent the growth and attachment of marine organisms by continuously releasing toxic substances into the surrounding water. Cuprous oxide and tributyltin fluoride or tributyl tin oxide (TBT) are the principal toxicants in copper-based and organotin-based paints, respectively. Although the use of TBT is now significantly limited, leaching pollutants from antifouling paints remains a widespread and serious concern especially in areas of high vessel density and low hydrologic flushing.

Antifouling paint may pose an even greater water quality threat during and after its removal from vessel hulls since the pollutants in the paint chip wastes may continue to leach into receiving waters. In most cases, because paint removal activities on ships are conducted in ship repair yards, responsibility for the paint chip wastes is transferred from the vessel owner to the shipyard. (See shipyards and boatyards discussion.) The same is generally true for recreational craft serviced at boatyards. However small craft can also obtain some hull maintenance services directly in the water by underwater hull cleaners. In addition to paint, other examples of hull maintenance wastes include strippers, cleaners, and cathodic protection products. Although a variety of pollutants can be released during hull maintenance activities, metals are the pollutants of greatest concern.

Sewage is often intentionally discharged directly into receiving waters due to the lack of pumpout stations, inconvenience or inoperation of pumpout stations, or the irresponsibility or ignorance of vessel operators. Human pathogens present in sewage include a variety of fecal bacteria and viruses. Today sewage discharges in recreational marinas are believed to be more significant than at Naval berthing areas. This is because all US Navy vessels are currently equipped to connect to pumpout facilities while in port.

Marine engine related wastes such as fuels, oils, lubricants, antifreeze, solvents, and polluted bilge water are commonly released from vessels into receiving waters. The pollutants of greatest concern for marine engine wastes are metals and petroleum hydrocarbons. Polynuclear aromatic hydrocarbons (PAHs) are a particular concern because they tend to accumulate and persist in aquatic sediments for years, poisoning benthic organisms. Garbage and trash are also discharged from vessels.

Each of the above waste categories can be, and frequently are, washed, spilled, scraped, dumped, and pumped directly into receiving waters. As a result, each of the wastes can take a major toll on water quality and beneficial uses. The marine habitat and shellfish harvesting beneficial uses are particularly sensitive to vessel wastes.

Furthermore each of the waste categories is relevant to all vessel types and sizes including recreational boats as well as commercial and Naval ships. However, because of a ship's greater size and corresponding greater magnitude, variety, and toxicity of wastes generated, ships (particularly Navy ships) are generally believed to pose a greater threat to water quality than boats. For example, Navy vessels are typically drydocked for hull maintenance only once every five or more years and spend more time in port or at anchor than underway. Fouling organisms attach more readily when a ship

is stationary. For these reasons, Navy coating systems are required to be effective for longer periods of time than those applied to commercial and recreational vessels. Accordingly, Navy vessels are blasted to "*white metal*" meaning all paint is removed to bare metal and the surface is abraded in preparation for adherence of a complete new coating system. Additionally antifouling paints used on Navy vessels contain higher levels of toxicants than those used on commercial and recreational vessels.

Nevertheless, there is a formidable set of water quality impacts associated with small craft and small craft marinas as described below.

Marinas

Marinas and other boat berthing facilities typically have high boat densities and low hydrologic flushing. As a consequence of these characteristics, the following significant water quality problems often result within marinas:

- increased pollutants in the water column;
- decreased dissolved oxygen in the water column;
- increased pollutants in aquatic sediment;
- increased toxicity in the water column and sediments;
- increased pollutants in the tissues of aquatic organisms; and
- physical alteration or destruction of aquatic habitat.

The physical disruption, or destruction of wetlands, sediment, and other aquatic habitat is an especially troublesome impact. It is a result of both the original construction of the marina, ramps, and related facilities, as well as their ongoing use, operation, and maintenance.

Although most of the water quality problems listed above arise from the direct discharge of wastes by vessels, pollutants can also be transported into marina waters by way of storm water runoff from parking lots, docks, and other impervious surfaces.

CZARA(g) Guidance for Marinas

Most of the impacts listed above can be mitigated by utilizing best possible siting and design criteria for each marina. Construction and operation and maintenance practices are also crucial to protecting water quality. Recognizing the importance of this, US EPA developed fifteen specific management measures (best management practices) to protect coastal waters from nonpoint pollution from marinas and recreational boating.

The management measures for marinas which are grouped into two broad headings, (1) siting and design; and (2) operation and maintenance, were developed pursuant to Section 6217 of the Coastal Zone Act Reauthorization Amendments of 1990 (CZARA) and are incorporated into the (g) guidance. As with all nonpoint source pollution protection measures, the key to protecting water quality in marinas is pollution prevention.

Regulation of Vessels and Marinas

Management measures related to preventing pollutants, such as sewage, fuel and oil leaks, toxics, fish wastes, and hull scrapings from entering coastal waters are primarily the responsibility of the Regional Board. The Regional Board prohibits the discharge of these wastes through a variety of Basin Plan discharge prohibitions. The Board also encourages and participates in public education/awareness campaigns. The Harbors and Navigation Code Section 151 prohibits the intentional or negligent discharge of oil to the waters of the state. Penal Code Section 374(e) as amended in 1970 provides that any person who litters or places waste matter into any bay, lagoon, channel, river, creek, slough, canal or reservoir or body of water is guilty of a misdemeanor.

Local governments have significant authority to carry out these CZARA management measures through their zoning ordinances, and by using their police, fire, or building departments to ensure implementation.

The California Department of Pesticide Regulation regulates the application of antifouling paints. Regulations for organotin-based paints have been established which limit the TBT release rate, require application by certified commercial applicators, and allow application only on vessels at least 25 meters in length and/or aluminum hulls and parts. As described earlier, tributyltin fluoride or tributyl tin oxide are the principal toxicants in organotin-based paints.

The Health and Safety Code Section 4425 prohibits a vessel with a toilet from operating upon the waters

of any lake, reservoir, or fresh water impoundment of this State unless the toilet is designed so that no human sewage can be discharged in such waters. This code section does not apply to rivers, estuaries or saltwater areas of California. Section 312 of the Clean Water Act provides that marine sanitation devices on board new or existing vessels must be designed to prevent the discharge of untreated or inadequately treated sewage into or upon the navigable waters of the United States (see discussion below on "*No Discharge Zone*"). The Marine Sanitation (Section 775) of the Harbors and Navigation Code declares that every vessel terminal shall be equipped with vessel pumpout facilities for the transfer and disposal of sewage from marine sanitation devices in order to protect water quality.

No Discharge Zone

Division 7 of the California Water Code authorizes the Regional Board to regulate any discharge of waste, including sewage, to waters of the state. The Federal Clean Water Act however partially preempts the state's authority to regulate vessel sewage discharges. Section 312 of the Clean Water Act provides that no state or local entity may adopt or enforce any laws regarding the design, manufacture, installation or use of marine sanitation devices (MSDs). Instead, US EPA must adopt federal standards of performance for MSDs which must be enforced and implemented through regulations adopted by the United States Coast Guard (USCG).

Marine sanitation devices either retain sewage or discharge treated sewage. If sewage is discharged, the effluent must meet USCG specified effluent standards described in 33 CFR 159, Coast Guard Regulations on Marine Sanitation Devices. Types I and II MSDs are flow-through systems which treat and discharge sewage. Type I MSDs produce an effluent having a fecal coliform bacteria count not greater than 1,000 per 100 milliliters and no visible floating solids. Type II MSDs produce an effluent having a fecal coliform bacteria count not greater than 200 per 100 milliliters and suspended solids not greater than 150 milligrams per liter. Type III MSDs are holding tanks only and prevent the overboard discharge of treated or untreated sewage.

There is one significant exception to the federal preemption of a state's regulation of vessel sewage discharges. Clean Water Act section 312 (f) allows states to <u>completely</u> prohibit vessel sewage discharges into waters requiring greater water quality protection, provided that US EPA determines that adequate vessel sewage pumpout facilities are available for these waters.

In 1976 the State of California petitioned US EPA, pursuant to Section 312 (f)(3) of the Clean Water Act, for a determination that adequate pump-out facilities were reasonably available for that portion of San Diego Bay that is less than 30 feet deep at mean lower low water (MLLW); and for all of Mission Bay, Oceanside Harbor, and Dana Point Harbor (41 Federal Register 21516 May 26, 1976). On August 6, 1976, US EPA made the requested determination (41 Federal Register 34453 August 6, 1976).

As a result, the discharge of all sewage, treated or untreated, from all vessels is completely prohibited in all portions of Mission Bay, Oceanside Harbor, and Dana Point Harbor (regardless of vessel size or water depth). Mission Bay, Oceanside Harbor, and Dana Point Harbor are, in their entirety, "*No Discharge Zones*". (Note that this prohibition includes discharges from a properly functioning USCG certified MSD.)

The discharge of all sewage, treated or untreated, from all vessels is completely prohibited in all portions of San Diego Bay that are less than 30 feet deep at mean lower low water (MLLW). The No Discharge Zone in San Diego Bay is defined as all portions of the bay having a depth of less than 30 feet MLLW. In the absence of the no discharge zone (i.e., in those portions of San Diego Bay having a depth of 30 feet or greater), discharge of treated sewage through a properly functioning United States Coast Guard certified Type I or II marine sanitation device is allowed. (USCG certification provides that the specified effluent limitations will be met). The discharge of untreated sewage from a Type III holding tank is not allowed under any condition in any portion of San Diego Bay (regardless of depth).

Because of dilution and circulation in San Diego Bay, it is assumed that the discharge of treated sewage into waters deeper than 30 feet from a properly functioning USCG certified Type I or II MSD will not degrade the bay's beneficial uses. Additionally, with the exception of a few recent uses (such as jet skiing and sail boarding), the REC I designated beneficial use occurs in shallow waters (i.e., in waters less than 30 feet). This supports the need for a complete prohibition in such shallow waters.

Furthermore, as a practical matter, it is not possible to regulate sewage discharges from all vessels in San Diego Bay. For example, some foreign vessels may not be equipped to use the existing pump-out

facilities. Since the no discharge designation is conditioned upon the existence of adequate pump-out facilities, it was necessary to make an allowance in the prohibition for such vessels. These vessels require berthing accommodations outside of the designated area. (All US Navy vessels are equipped to connect to pump-out barges or pier-side sewage facilities.)

Most small pleasure craft are equipped with either a Type I or II flow-through treatment device or a Type III holding tank, but rarely both. Those vessels equipped with only a flow-through treatment device must secure their device while in a No Discharge Zone in order to prevent overboard sewage discharges. Those vessels equipped with only a holding tank are required to utilize pump-out facilities at all times and may not discharge into any portion of any bay. In other words, a vessel in San Diego Bay with a holding tank may not move into water greater than 30 feet and discharge sewage from its holding tank.

A study of the levels of coliform and Enterococcus bacteria caused by vessel discharges is needed to allow the Regional Board to make decisions based on measured levels. The Regional Board could then advise the county health officer, the Port District, and the Coast Guard so appropriate actions could be taken to abate the effects of sewage discharges from vessels.

SHIPYARDS

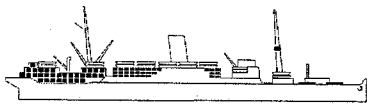

This section contains a general discussion of shipyards, their threat to water quality, and regulatory complexity. A discussion specific to San Diego Bay shipyards is included near the end of this section.

Shipyard activities may result in the discharge of wastes to receiving waters. The presence of elevated concentrations of pollutants, primarily heavy metals, in the sediment adjacent to shipyards nationwide is well documented in the literature (see references). Although there are numerous other potential threats, the single most significant threat to water quality posed by shipyards is the potential discharge of abrasive blast waste to receiving waters.

Shipyard Threat to Water Quality

From the perspective of protecting beneficial uses, a discharger's threat to water quality is critically important and plays a role in virtually all regulatory decisions. By definition, the basis of a discharger's threat to water quality is the effect the discharger would have on the receiving water if discharges occurred in violation of its NPDES permit. In other words, a discharger's threat to water quality is its potential for degrading water quality. The following six characteristics are relevant in evaluating a shipyard's threat to water quality: (1) primary activities; (2) facilities; (3) industrial processes; (4) materials used; (5) wastes generated; and (6) waste discharges to receiving waters (actual and potential). A discussion of each follows.

Primary Activities at Shipyards

The shipbuilding and repair industry is engaged in the construction, conversion, alteration, repair, and maintenance of all types of military and commercial ships and vessels. Shipbuilding and repair encompasses a large number and variety of activities and industrial processes including, but not limited to, formation and assembly of steel hulls; application of paint (coating) systems; installation and repair of a large variety of mechanical, electrical, and hydraulic systems and equipment; repair of damaged vessels; removal and replacement of expended or failed paint (coating) systems; and provision of entire utility/support systems to ships (and crew) during repair.

The list of occupations required to conduct these activities is also extensive, including sandblasters, painters, shipfitters, machinists, metalsmiths, welders/burners, blacksmiths, boilermakers, chemists, carpenters, coppersmiths, electricians, electronic technicians, joiners and patternmakers, laborers, riggers, pipefitters, and foundrymen. Not all occupations are present at all shipyards.

Shipyard Facilities

There are four major types of building/repair facilities at shipyards, which together with cranes, enable ships to be assembled, launched, or repaired. These facilities are graving docks/shipbuilding ways, floating drydocks, marine railways, and berths/piers. With the exception of berths and piers, the basic purpose of each facility is to separate the vessel from the bay and provide access to parts of the ship normally underwater.

Each facility type presents its own unique set of environmental concerns. Depending on size and capabilities, a single shipyard will generally have a combination of two or more of these facilities.

In addition to these facilities, shipyards must also conduct the wide range of support or complementary activities previously described. Many of these activities require their own facility, space, or shop; for example concrete platens (for steel fabrication), machine shop, pipe shop, electroplating shop, weld shop, sheet metal shop, electrical shop, coppersmith shop, blacksmith shop, carpentry shop, and boiler shop, etc. Not all facilities are present at all shipyards.

Shipyard Industrial Processes

The primary activities described above involve a multitude of industrial processes, many of which must be conducted over water or very close to the waterfront. Because they typically represent the greatest threat to water quality, the following discussion will focus primarily on the industrial processes conducted inside graving docks or floating drydocks.

Surface Preparation and Paint Removal: Methods of surface preparation and paint removal include dry abrasive blasting, wet abrasive or slurry blasting, hydroblasting, and chemical paint stripping. Each paint removal method has a unique purpose and poses its own set of water quality risks.

Dry abrasive blasting is the preferred method of preparing steel surfaces for application of a new paint (coating) system for saltwater immersion. It is used for most exterior hull work and virtually all interior tank work (e.g., fuel, bilge, ballast tanks etc). Dry abrasive blasting is the process in which blasting abrasive is conveyed in a medium of high pressure air, through a nozzle at velocities up to 450 feet per second resulting in very large quantities of solid waste and airborne particulates (dust). Although the most efficient of the paint removal methods, dry blasting produces the largest quantity of airborne particulates.

Wet abrasive or slurry blasting is the process in which water replaces air as the abrasive propellant. The use of water significantly reduces airborne particulate emissions but generates large quantities of wet residue and wastewater.

Hydroblasting is a process in which water under very high pressure is used instead of abrasive. Hydroblasting produces large amounts of wastewater and is primarily used at shipyards to remove marine growth, not to remove existing coatings. Chemical paint stripping is uncommon in drydocks and used primarily for removable parts.

Paint (coating) Application: After preparation, surfaces are painted. Most painting occurring in a drydock involves the ship hull and internal tanks. Painting is also conducted in other locations throughout a shipyard including piers and berths. Paint application is accomplished by way of air or airless spraying equipment.

Tank Cleaning: Tank cleaning operations utilize steam to remove dirt and sludge from internal tanks, particularly fuel tanks and bilges. Detergents, cleaners, and hot water may be injected into the steam supply hoses. Wastewater is generated.

Other Industrial Processes (graving docks/drydocks): Other industrial processes conducted inside graving docks or floating drydocks include mechanical repair, maintenance, installation; structural repair, alteration, assembly; and integrity/ hydrostatic testing. Hydrostatic or strength testing (flushing) is conducted on hull, tanks, or pipe repairs and on new systems during ship construction phases. Hydrostatic testing generates significant water flow.

Other Industrial Processes (elsewhere): Numerous other industrial processes take place at numerous other locations throughout a typical shipyard, including activities at a variety of repair and specialty shops. Examples include paint equipment cleaning; engine repair/ maintenance/ installation; pipe fitting; steel fabrication and machining; electrical repair/ maintenance/ installation; hydraulic repair/ maintenance/ installation; tank emptying; fueling; patternmaking; shipfitting; boiler cleaning; carpentry; refurbishing/ modernization/ cleaning; air conditioning/ refrigeration repair; sheet metal fabrication; fiberglass repair; electroplating/ metal finishing; blacksmithing; zinc primer application; printing; and photo processing. As a result of these processes, an assortment of wastes are generated, many of which are hazardous.

Materials Used at Shipyards

Materials commonly used at shipyards are described below beginning with those utilized during graving dock or floating drydock operations.

Abrasive Grit: Abrasive grit is typically slag from the smelting of copper ore and consists principally of iron. Trace elements such as copper, zinc and titanium may also be present in the slag. Sand, cast iron, or steel shot are also used as abrasives. Very large amounts of abrasive are needed to remove paint to bare metal. For example, removing paint from a 15,000 square foot hull can take up to 6

days and consume 87 tons of grit. Grit is needed in all dry and wet (slurry) abrasive blasting.

Fresh Paints: Fresh paints contain copper, zinc, chromium, and lead (all priority pollutants) as well as numerous hydrocarbons. The two major types of paints used on ship hulls are anticorrosive paints and antifouling paints. Anticorrosive paint (primers) include vinyl, vinyl-lead, or epoxy based coatings. Others contain zinc chromate and lead oxide. (Although newer paint formulations no longer include chromium and lead, such constituents may be present in shipyard wastes due to the removal of older coating systems.)

Antifouling paints are designed to prevent growth and attachment of marine organisms by continuously releasing toxic substances into the water. Cuprous oxide and tributyltin fluoride or tributyl tin oxide are the principal toxicants in copper-based and organotin-based paints, respectively.

Other Materials: Other materials used include oils (engine, cutting, and hydraulic); lubricants, grease; fuels; weld rod; detergents, cleaners; rust inhibitors; paint thinners; hydrocarbon and chlorinated solvents; degreasers; acids; caustics; resins; adhesives/ cement/ sealants; cyanide; zinc (e.g., zinc dust); chlorine; and mercury.

Wastes Generated at Shipyards

The major categories of wastes commonly generated by shipyard industrial processes are discussed below. Wastes resulting from graving or floating drydock operations are presented first.

Abrasive Blast Waste: Abrasive blast waste, consisting of spent grit, spent paint, marine organisms, and rust is generated in very large quantities during all dry or wet abrasive blasting procedures. The constituent of greatest concern with regard to toxicity is the spent paint, particularly the copper and tributyltin antifouling components, which are designed to be toxic and designed to continuously leach into the water column. Other priority pollutants in paint include zinc, chromium, and lead. Although the grit itself is not highly toxic, it is a major component in the large solid waste load and is settleable. As a result, its deposition can degrade the benthic community and increase the need for dredging. Abrasive blast waste can be conveyed by water flows, become airborne (especially during dry blasting), or fall directly into receiving waters. Wet abrasive blasting of a Naval DDG class destroyer (437-536 feet long; 47-67 feet wide; 15-20 feet draft) can generate up to 180 tons of solid wet abrasive waste.

Paint Losses: Paint losses, or paint which ends up somewhere other than its intended location (e.g., drydock floor, bay, worker's clothing), results from spills, drips, and overspray. Typical overspray losses are estimated at approximately 5% for air spraying and 1-2% for airless spraying.

Bilge Waste/Other Oily Wastewater: This is generated during tank emptying, leakages, and cleaning operations (bilge, ballast, fuel tanks). In addition to petroleum products (fuel, oil), tank washwater may also contain detergents or cleaners (nitrogen and phosphorus compounds) and can be generated in large quantities.

Blast Wastewater: Wet abrasive (slurry) blasting and hyroblasting generates large quantities of wastewater. Wet abrasive blasting of a Naval DDG class destroyer can generate up to 500,000 gallons of contaminated water. In addition to suspended and settleable solids (spent abrasive, paint, rust, and marine organisms) and water, blast wastewater may also contain rust inhibitors such as diammonium phosphate and sodium nitrite.

Other wastes: These include oils (engine, cutting, and hydraulic); lubricants, grease; fuels; waste paints/ sludge/ solvents/ thinners; construction/ repair wastes and trash; asbestos (from ship refurbishing/ modernization); sewage (black and grey water from vessels or docks); boiler blowdown, condensate, discard; spent hydrocarbon or chlorinated solvents; electroplating/ metal finishing wastes; acid wastes; caustic wastes; and aqueous wastes (with and without metals).

Shipyard Waste Discharges to Receiving Waters

Actual and potential waste discharges to receiving waters from typical shipyard operations are discussed below. Most are either the direct result of an industrial process (drydock, marine railway, or berth operations) or, more commonly, the result of water coming into contact with wastes, typically spent abrasive blast waste. There are numerous sources of water at a shipyard including: industrial processes; building or repair facilities (e.g., drydock); vessels under repair (e.g., cooling water); bay water (e.g., due to tidal influence or wave action); storm water; or other sources.

Actual and potential waste discharges to receiving

waters include: floating drydock deballasting (tanks); floating drydock submergence/ emergence (platform); floating drydock operations; graving dock dewatering; gate leakage; hydrostatic relief flows; shipbuilding ways dewatering/ gate leakage/ relief flows; marine railway operations; berth and pier operations; storm water; integrity/ hydrostatic testing discharge (new vessels); boiler and cogeneration feedwater; fire protection system discharge; cooling water; and miscellaneous water flows.

Shipyard Complexity

From a regulatory and environmental control standpoint, shipyards present a unique and difficult problem. Traditional NPDES dischargers generate or intake wastewater, treat it to specified effluent limits, and discharge treated effluent, often by way of a single pipe. Unlike traditional dischargers, shipyards are significantly more complex in all respects: numerous and diverse industrial processes; numerous discharge mechanisms, waste streams, and discharge points; and Best Management Practices Plan (BMP) based permits. Each is discussed below.

Numerous and Diverse Industrial Processes

As described previously, shipyards conduct a large number and broad range of industrial processes which require a wide range of facilities and substantial workforce.

Numerous Discharge Mechanisms, Waste Streams, and Discharge Points

Shipyards are complex to regulate because they have numerous discharge mechanisms, discharge points, and waste streams. A less complex discharger will typically have a single or small number of each. A discussion of abrasive blast waste with respect to discharge mechanisms, discharge points, and waste streams follows. Abrasive blast waste is discharged primarily as a result of graving dock flooding, drydock immersion, drainage, or runoff. In other words, at shipyards, the principle mechanism by which wastes are conveyed to receiving waters is via the contact of wastes with water, both of which occur in large quantities. For this reason, storm water and storm drain inlets are of particular concern at shipyards. Abrasive blast waste can also become subject to tidal or wave action. Airborne releases represent another important discharge mechanism. Because abrasive blast waste is generated in part as airborne particulates, such releases to receiving waters pose a significant threat to water quality. Furthermore, and because of their proximity to receiving waters, a third discharge mechanism exits at shipyards. Direct discharges from shipyards occur when wastes are allowed to fall directly into receiving waters (off the end drydock, edge of pier, between gratings, etc).

In summary, because abrasive blast waste can be washed, hosed, pushed, blown, become subject to tidal/wave action, and be directly or otherwise discharged, the potential for abrasive blast waste from shipyards to enter receiving waters is great. In addition to multiple discharge mechanisms, numerous waste streams, and discharge points also exist at shipyards. The discharges described above can potentially enter receiving waters from numerous shipyard worksites including graving docks, drydocks, marine railways, piers, repair/ specialty shops, as well as via storm drains and sheet flow runoff.

Best Management Practices (BMP) Based Permits

Unlike traditional NPDES discharges which are regulated by numerical effluent limits, the control of waste discharges from shipyards is accomplished by the implementation of Best Management Practices (BMP) plans. The purpose of a BMP plan is to prevent, reduce, or eliminate the spillage or illicit discharge of pollutants into receiving waters and can include any number of preventive controls or measures. Due to the types of activities and multiple discharge pathways, numerical effluent limitations are not practical at shipyards. The evaluation of the effectiveness of BMP Plans from a regulatory standpoint is more complicated and resource intensive than comparison of end-of-pipe monitoring results to numerical effluent limitations.

Long-Term Effects of Shipyard Discharges on Water Quality and Beneficial Uses

Unlike short lived pollutants (e.g., BOD and bacteria) the type of pollutants present in shipyard discharges are typically long-lasting. Shipyard pollutants, such as heavy metals and polyaromatic hydrocarbons (PAHs) are persistent in the marine environment, in part, because they can become attached to sediment particles and can accumulate to high concentrations in both sediments and in marine organisms. Once incorporated into sediment and tissues, these pollutants are very difficult to remove and may recycle in the marine system indefinitely. Because sediment cleanup projects are difficult, expensive,

and lengthy, contaminated sediment can remain in place, adversely affecting beneficial uses and water quality, for many years.

San Diego Bay Shipyards

The following discussion is specific to San Diego Bay shipyards.

NPDES Permits

There are currently four commercial shipyards in the San Diego Region, all of which are located adjacent to San Diego Bay. All of the shipyards are currently regulated under individual NPDES permits which are BMP based, rather than based on effluent limits. The shipyard permits also include standard receiving water limitations and discharge prohibitions. Additionally, all of the shipyards are also subject to the statewide General Industrial Storm Water Permit.

Threat to Water Quality and BMPs

Although the discussion above was intended as a general description of the shipyard industry as a whole, the majority of the information is applicable to the San Diego Bay shipyards. One notable exception is that wet abrasive or slurry blasting and chemical paint stripping are currently not conducted at San Diego Bay shipyards.

By definition a discharger's threat to water quality is its potential to cause damage to water quality and beneficial uses under worst case conditions, i.e., assuming all BMPs and treatment measures fail. For this reason, the general shipyard discussion on threat to water quality focuses on potential risks rather than on BMPs. As described, a shipyard's potential risks to water quality are significant in many respects. BMPs are specifically designed to reduce those risks and are therefore extremely important for shipyards. Hence, the second reason to focus on potential risks is to emphasize the need for effective BMPs at shipyards.

San Diego shipyards report strict adherence to a large number of BMPs to control water and airborne wastes during a variety of industrial processes. Such BMPs include physical and procedural controls. Physical controls isolate runoff pathways from contact with abrasive blast wastes through the use of shrouding, sealing of drains, and diversion of sump discharge pathways. Procedural control methods include dock sweeping and elimination of sources of runoff during blasting operations. The shipyards also report the effective management of their wastes including treatment, recycling, and disposal in compliance with the San Diego County Hazardous Materials Management Division, their San Diego Metropolitan Industrial Waste Program permits, and the San Diego County Air Pollution Control District.

Contaminated San Diego Bay Sediment and Mussels

Regional Board staff has reviewed the results of sediment samples collected adjacent to the shipyards in San Diego Bay. Elevated concentrations of copper, tributyltin, and zinc exist in these sediments. Copper, tributyltin and zinc are contained in both the materials used by San Diego Bay shipyards as well as in the wastes which they generate. Furthermore elevated concentrations of copper, tributyltin, and zinc have also been measured in the tissues of mussels collected from stations located adjacent to San Diego Bay shipyards.

Although this data may suggest that the BMPs employed by San Diego Bay shipyards are not effective, it may also represent historical discharges which occurred at a time when BMPs were not carefully implemented. Regional Board staff plans to investigate the matter further. The existence of contaminated sediment adjacent to the shipyards serves to further underscore the importance of shipyard BMPs.

Shipyards -- General Conclusions

In summary, shipyards typically pose a significant threat to water quality for the following reasons. Relative to other regulated dischargers, shipyards conduct a large number and wide variety of activities and industrial processes. The conduct of these industrial processes requires numerous physical facilities and a large number, amount, and variety of materials. As a result, a large number, amount, and variety of wastes are generated and are, or may be, discharged to receiving waters. Shipyard discharges have the potential to cause the long-term loss of a designated beneficial use in receiving waters.

From a regulatory perspective, shipyards are complex. Toxic pollutants are, or could be, present in wastes discharged to receiving waters from shipyards. They have numerous discharge points and are regulated by permits which do not contain numeric effluent limits. Shipyards are typically

"*major*" NPDES dischargers and require a high level of regulatory effort.

In conclusion, because shipyards pose a significant threat to water quality and are complex to regulate, the BMPs which they employ (to reduce or eliminate the discharge of wastes to receiving waters) are extremely important. It is critical that shipyard BMPs are effective and diligently implemented.

BOATYARDS

There are currently 12 boatbuilding and boat repair facilities (commonly called boatyards) adjacent to receiving waters in the San Diego Region. Most of the boatyards are located adjacent to San Diego Bay, while Mission Bay, Oceanside Harbor, and Dana Point Harbor are serviced each by a single boatyard. Additional boatyards are located in inland areas of the Region. Seven of the boatyards located adjacent to receiving waters are currently regulated under an individual NPDES permit. Eventually all of the waterfront boatyards will be regulated under an individual NPDES permit. Additionally, all of the boatyards in the Region are currently subject to the statewide General Industrial Storm Water Permit. Like the shipyard permits, boatyard permits do not contain numeric effluent limits but are based instead on best management practices (BMPs).

The most significant waste categories associated with boatyards include hull maintenance related wastes and marine engine related wastes. Hull maintenance related wastes, and particularly antifouling paints, are believed to pose the greatest threat to water quality from boatyard operations. Cuprous oxide (copper) and tributyltin fluoride or tributyltin oxide (TBT) are the principle toxicants in antifouling paint used at boatyards. Marine engine related wastes include fuels, oils, lubricants, antifreeze, solvents, and bilge water. The pollutants of concern from marine engine wastes are metals and petroleum hydrocarbons. Polynuclear aromatic hydrocarbons (PAHs) are of particular concern because they persist in the marine environment. Implementation of BMPs is the key to controlling boatyard waste discharges to receiving waters.

GROUND WATER DEWATERING

A number of dewatering operations are associated with construction projects for foundations, bridges, roads, etc. Other dewatering operations are ground water remediation projects which are required uder Cleanup and Abatement Orders issued by the Regional Board. Many of the proposed dewatering operations are located where petroleum or other pollutants plumes exist. Petroleum or other pollutants may be pumped from the ground water and discharged to a storm drain and subsequently to a water of the United States.

Since the mid-1980's, the Regional Board has regulated dewatering operations under the NPDES permit process. Two general NPDES permits have been adopted by the Regional Board which regulate discharges from ground water remediation projects and discharges from ground water dewatering operations to surface waters of the United States. New permanent dewatering discharges are prohibited in both permits.

The first permit, Order No. 91-10, NPDES CA0108804, regulates ground water remediation and dewatering waste discharges to surface waters except San Diego Bay. Order No. 91-10 was adopted January 28, 1991.

The second permit, Order No. 90-31, NPDES CA0108707, regulates ground water dewatering discharges to San Diego Bay and storm drains or other conveyance systems tributary thereto. Order No. 90-31 was adopted April 23, 1990.

The Regional Board's Order No. 90-31 was subsequently modified by the State Water Resource Control Board Order No. WQ 91-10 on September 26, 1991. State Board Order WQ 91-10 amended certain discharge specifications, reporting requirements and ground water monitoring requirements in Order No. 90-31.

In addition, the Waiver Policy described earlier in this Chapter waives WDRs for short-term construction dewatering operations where there is no discharge to surface waters.

DREDGING AND DISPOSAL OF DREDGE SPOIL

REGULATORY FRAMEWORK FOR DREDGED MATERIAL DISPOSAL

Federal Statutes and Regulation

The regulation of dredged material disposal in waters of the United States (US) on a federal level is a responsibility shared by the US EPA and the US Army Corps of Engineers (ACOE). The Marine

Protection, Research and Sanctuaries Act, also called the Ocean Dumping Act, is the primary federal environmental statute governing the discharge of dredged material to the ocean. The Clean Water Act is the primary federal statute governing the discharge of dredged and/or fill material into US waters. Material dredged from waters of the US and disposed in the territorial sea is evaluated under the Marine Protection, Research and Sanctuaries Act unless the material discharged is for the primary purpose of fill (e.g., beach replenishment, island creation, or underwater berms), in which case the disposal is evaluated under the Clean Water Act [33 CFR 336.0(b)]. Other applicable federal statutes and regulations include:

- ***The Rivers and Harbors Act of 1899:*** The Rivers and Harbors Act of 1899 (33 USC 401 *et seq.*) requires a ACOE permit for any work or structure, including fill material discharges, in navigable waters of the United States. The primary purpose of Section 10 of this act is to ensure that structures (i.e., disposal berms, piers, pipelines, bridges, wharfs) constructed in navigable waters do not adversely affect federal interstate navigation.

- ***The Fish and Wildlife Coordination Act of 1958:*** The Fish and Wildlife Coordination Act requires that, for any proposed federal project or permit that may affect a stream or other body of water, the ACOE must first consult with federal and state fish and wildlife agencies. This consultation addresses the prevention of damages to wildlife resources and provides for the development and improvement of wildlife resources.

- ***The Endangered Species Act of 1973:*** Section 7(a)(2) of the Endangered Species Act (ESA), as amended (16 USC. 1531 *et seq.*) requires federal agencies, in consultation with the Secretaries of Interior (represented by the US Fish and Wildlife Service) and Commerce (represented by the National Marine Fisheries Service), to insure that any action authorized, funded, or carried out by such agency is not likely to jeopardize the continued existence of any endangered or threatened species, or result in the destruction or adverse modification of the critical habitat of such species.

- ***The Coastal Zone Management Act of 1972:*** The Coastal Zone Management Act (16 USC. 1451*et seq.*) authorizes a federal program for the effective management, beneficial use, protection and development of the coastal zone. The act requires the ACOE to coordinate permit review and federal projects with all state level coastal zone review agencies. Under this act, coastal states are required to formulate a management program for the land and water resources of its coastal zone, which extends out to the seaward limit of the territorial sea, and submit it for approval to the Secretary of Commerce. In 1977, the California Coastal Management Program was approved.

Overview of the Clean Water Act

Section 404 of the Clean Water Act requires the US EPA, in conjunction with the ACOE, to promulgate guidelines for the discharge of dredged or other fill material to ensure that such proposed discharge will not result in unacceptable adverse environmental impacts to waters of the United States. Section 404 assigns to the ACOE the responsibility for authorizing all such proposed discharges, and requires application of the guidelines in assessing the environmental acceptability of the proposed action. The ACOE and the US EPA also have authority under Section 230.80 to specify, in advance, sites that are either suitable or unsuitable for the discharge of dredged or fill material in US waters. In addition, Clean Water Act Section 401 provides the States a certification role as to project compliance with applicable water quality standards.

Clean Water Act, Section 401 Certification State of California

The Clean Water Act, Section 401 gives the states authority to grant, deny, or waive certification for a federally permitted or licensed activity that may result in a discharge to waters of the United States. Any applicant for a federal permit which conducts any activity which may result in any discharge into the navigable waters of the State must present to the permitting agency a certification (or waiver of certification) from the State that any such discharge will comply with the applicable Clean Water Act provisions of Section 301, 302, 303, 306, and 307. The certification issued by the State should establish relevant effluent limitations, monitoring requirements, and standards or performance which become conditions of the federal permit. In California, the responsibility for Section 401 certification is assigned to the State Board and regional boards. After review of data submitted by an applicant, and any other information available as to whether the proposed activity will comply with all

applicable water quality standards, limitations and restrictions, the Regional Board may:

- waive water quality certification;
- issue waste discharge requirements; or,
- recommend approval with or without conditions, or denial of water quality certification, to the State Board.

In order to grant Section 401 certification, the State Board must certify that the proposed discharge will not result in unacceptable adverse environmental impacts to waters of the United States.

For a project to proceed, a waiver of certification or waste discharge requirements must be obtained from the Regional Board or a certification with or without conditions must be obtained from the State Board, indicating the Board's concurrence with the decision that the proposed action is not expected to cause a violation of the State's water quality standards.

State Statutes and Regulations

The State of California has several programs that parallel or overlap many of the listed Federal Acts. Relevant state statutes and regulations include the following:

- California Water Code, Division 7 (Porter-Cologne Water Quality Control Act);
- State Water Resources Control Board and Regional Water Quality Control Board Plans and Policies
- California Water Code, Division 4 (California Bay Protection and Toxic Cleanup Act);
- California Fish and Game Code;
- California Environmental Quality Act; and
- California Coastal Zone Management Act.

The primary statutory state law pertaining to the regulation of water quality and sediment control issues is the Porter-Cologne Water Quality Control Act which is contained in Division 7 of the California Water Code.

California Water Code, Division 7 (Porter-Cologne Water Quality Control Act)

Dredging and dredged material disposal is an ongoing activity at harbors within the San Diego Region. The discharge of dredged or fill material which comes within the purview of Section 404 of the federal Clean Water Act is not subject to regulation under the National Pollutant Discharge Elimination System (NPDES) permit program (Clean Water Act Section 402). However, if the project involves the discharge or potential discharge of waste (e.g. dredge spoils, dredge spoil return water, etc.) which may adversely impact water quality, then the discharge may be regulated through the issuance of waste discharge requirements (WDRs). WDRs are issued by the Regional Board pursuant to the Porter-Cologne Water Quality Control Act.

The Regional Board is concerned with turbidity, dissolved oxygen depletion, and other physical, chemical, and biological parameters in the receiving waters which are impacted by dredge/fill projects. In recent years, there has also been concern about the concentrations of chemicals in the material to be dredged. Harbor areas may contain high levels of contaminants in bottom sediments due to navigational use, and due to wastes from urban, industrial, and riverine sources. The Regional Board Waiver Policy described earlier in this chapter waives establishing WDRs for projects which involve dredging 5,000 cubic yards or less of material and are not expected to have any adverse impact on the environment. For projects involving dredging of more than 5,000 cy of material, or dredging of potentially or known contaminated material, the proponent is required to submit a Report of Waste Discharge (RWD) in application for WDRs. The RWD must include a characterization of the material to be removed to determine whether the proposed project is expected to meet all applicable water quality standards, limitations, restrictions and discharge prohibitions. The decision to issue or waive WDRs for dredging projects is made on a case-by-case basis regardless of dredge spoil volume.

Disposal of dredge material at authorized open-ocean disposal sites (e.g., LA-5 Ocean Dredged Material Disposal Site) fall under the jurisdiction of the federal Environmental Protection Agency (US EPA) and the ACOE. However, because of the potential threat to water quality due to dredging operations, the Regional Board may still issue a WDR for the actual dredging portion of the project.

Adopted WDRs typically require monitoring for dissolved oxygen, turbidity and, where

concentrations of chemicals in the sediments are high, monitoring for chemical constituents. Monitoring may be required of the receiving water at the dredge site or at the disposal site(s), and of the dredge spoil return water if applicable.

Enforcement Process for Contaminated Sediment

Dredging is often part of the remediation process for contaminated sediments in marine waters. The Regional Board under the authority of the California Water Code Section 13304 may issue a cleanup and abatement order to require an identified responsible party which caused the discharge of chemical constituent(s) present in a contaminated sediment to remediate or effect cleanup of the contaminated sediment.

Specific directives of cleanup and abatement orders issued for remediation or cleanup of contaminated sediments typically direct the responsible party to:

- Quantify the lateral and vertical extent of the contaminated sediment;
- Examine the engineering feasibility of the following alternative sediment cleanup/remediation strategies;
  - ✓ Complete removal of all contaminated sediment;
  - ✓ Removal or remediation of contaminated sediment to a level that will conform with water quality objectives and protect/restore beneficial uses; and
  - ✓ No action alternative level - The "*no action*" alternative level involves reliance upon natural processes for the remediation of contaminated sediment sites;
- Examine the cost of sediment cleanup/remediation to various cleanup/remediation levels; and
- Examine the environmental consequences of sediment cleanup/remediation to various cleanup/remediation levels.

State Water Resources Control Board and Regional Water Resources Control Board Plans and Policies

State plans and policies which affect dredging and disposal of dredge spoil include the Ocean Plan, the Water Quality Control Policy for the Enclosed Bays and Estuaries of California (Resolution No. 74-43), the Basin Plan, and any other applicable plans or policies.

Ocean Plan: The Ocean Plan establishes general requirements for waste discharges which could affect state ocean waters. For dredge/fill projects, this may include discharges associated with dredging operations, dredge spoils disposal including beach replenishment, or discharge of dredge spoil return water. The Ocean Plan requirements are incorporated into WDRs issued by the Regional Board for dredge/fill projects.

Water Quality Control Policy for the Enclosed Bays and Estuaries of California (State Board Resolution No. 74-43): This policy requires that dredge spoils to be disposed of in bay and estuarine waters must comply with federal criteria for determining the acceptability of dredged spoils to marine waters, and must be certified by the State Board or Regional Board as in compliance with state plans and policies. Dredging must also comply with applicable discharge prohibitions contained in the policy (i.e., the policy prohibits the direct or indirect discharge of silt, sand, soil, clay, or other earthen materials from onshore operations including mining, construction, agriculture, and lumbering, in quantities which unreasonably affect or threaten to affect beneficial uses).

California Bay Protection and Toxic Cleanup Act

The California Bay Protection and Toxic Cleanup Act (California Water Code, Division 4, Chapter 5.6, Sections 13390-13396) requires the Regional Board to identify and characterize toxic hot spots in bays and estuaries and ocean waters of the state and plan for cleanup or remediation of the sites. Furthermore, CWC Section 13396 states that no person shall dredge or otherwise disturb a toxic hot spot without first obtaining Clean Water Act Section 401 certification or WDRs. Dredging projects involving removal or disturbances of sediments at toxic hot spots must meet the following conditions to the satisfaction of the Regional Board:

- The polluted sediment will be removed in a manner that prevents or minimizes water quality degradation.
- Polluted dredge spoils will not be deposited in a location that may cause significant adverse effects to aquatic life, fish, shellfish, or wildlife or may harm the beneficial uses of the receiving waters, or does not create maximum benefit to the people of the state.

- The project or activity will not cause significant adverse impacts upon a federal sanctuary, recreational area, or other waters of significant national importance.

California Coastal Zone Management Act

The California Coastal Zone Management Act requires that the dredging of coastal waters and estuaries be limited where feasible to maintaining navigational depths [Section 30233(a)(2)]. Section 30233(b) further encourages the transportation of dredged material so generated and determined to be suitable for beach replenishment to appropriate beaches or into suitable long shore current systems.

California Fish and Game Code

Dredging operations and the disposal of dredge spoil and dredge spoil return water are subject to applicable sections of the California Fish and Game Code, especially those pertaining to:

- Water pollution (Division 6, Chapter 2, §5650);
- Endangered species (Division 3, Chapter 1.5, §2050 - §2098); and/ or the
- Alteration of any river, stream or lake (Division 2, Chapter 6, §1601 and §1603).

California Environmental Quality Act of 1973

The Regional Board may not adopt WDRs for a dredge/fill project until the California Environmental Quality Act (CEQA; P.R.C. 21000-21177) requirements have been satisfied. CEQA requires full public disclosure of a project and the assurance that environmental factors are considered in the decision making process. CEQA requires one of the following:

- an Environmental Impact Report;
- a Categorical Exemption; or
- a Negative Declaration.

HISTORY OF DREDGE AND FILL PROJECTS

San Diego Bay

Dredging of San Diego Bay has occurred for a variety of reasons. San Diego Bay is a major port for commercial and military vessels. In order to provide adequate water depths for navigation and berthing of vessels, dredging projects are required from time-to-time to maintain existing water depths or to increase depths to accommodate these vessels. Significant dredging first occurred within San Diego Bay in the early 1900's.

The volume of material dredged from San Diego Bay over the years is estimated to be between 180 and 190 million cubic yards (mcy)(Smith, 1977 from US Navy, Sept. 1992). About 5 to 8 mcy was disposed at ocean dumping sites, about 35 mcy was placed along Silver Strand beach, and about 147 mcy was used around the Bay as fill. Most of this material was placed prior to 1970. During 1992 and 1993, there were a total of fifteen recent, ongoing, and future dredge and fill projects in San Diego Bay for a total volume of about 3.7 mcy. The US Navy anticipates dredging an additional 13 mcy through 1998.

Other Areas

There is on-going maintenance dredging in other areas throughout the San Diego region. These areas include:

- Agua Hedionda Lagoon;
- Mission Bay; and
- Oceanside Harbor.

Additional areas which have dredging projects scheduled include the following:

- Batiquitos Lagoon;
- Murrieta Creek;
- San Marcos Creek; and
- Santa Margarita River.

DISPOSAL OF DREDGED MATERIAL

Disposal of dredged material is a necessity whenever a dredging project is undertaken. There are alternatives for disposal available within the San Diego Region, including several which can yield significant environmental benefits. However, disposal of dredged material can be a significant problem when there is toxic contamination of the dredged materials. Prior to dredging, physical, chemical, and biological testing of the sediment have been required in order to determine the appropriate alternative for disposal of the dredged material. Potential alternatives for the disposal of dredged material from San Diego Bay include:

- Beach replenishment;
- Habitat restoration/ enhancement;
- Ocean disposal;

- Incineration;
- Upland disposal without treatment;
- Upland disposal with treatment;
- Confined aquatic disposal; and
- Reuse sites such as capping.

Physical Characteristics of Dredged Material

Evaluation of the physical characteristics of sediments proposed for discharge is necessary to determine potential environmental impacts of disposal, the need for additional chemical or biological testing, as well as potential beneficial use of the dredged material. The physical characteristics of the dredged material include: particle-size distribution, water content or percent solids, specific gravity of solids, and plasticity characteristics. The sediment physical characteristics should also be evaluated from the standpoint of compatibility with different kinds of biological communities likely to develop for the disposal environments under consideration.

Chemical Characteristics of Dredged Material

The initial screening for contamination is designed to determine, based on available information, if the sediments to be dredged contain any contaminants in forms and concentrations that are likely to cause unacceptable impacts to the environment. During this screening procedure, specific contaminants of concern are identified in a site-specific sediment so that any subsequent evaluation is focused on the most pertinent contaminants.

Physical behavior of the material at the disposal site

Physical testing and assessment should focus on both the short-term and long-term physical behavior of the material. For open-water alternatives, these assessments might include an analysis of water-column dispersion, mound development, and long-term mound stability or dispersion. For confined alternatives, these assessments might include an analysis of solids retention and storage requirements during disposal and long-term consolidation behavior in the confined disposal facility.

Any contaminant testing should focus on those contaminant pathways where contaminants may be of environmental concern, and the testing should be tailored to the available disposal site. For open-water alternatives, contaminant problems may be related to either the water column or benthic environment, and the appropriate testing and assessments would include required Clean Water Act or MPRSA testing. For confined sites, potential contaminant problems may be either water quality related (return water effluent, surface runoff, and groundwater leachate), contaminant uptake related (plant or animal), or air related (gaseous release).

Traditional locations for disposal of non-contaminated dredged material have included nearshore ocean waters along Silver Strand, in-bay waters of the Naval Amphibious Base Coronado, and the LA-5 Ocean Dredged Material Disposal Site (LA-5).

Dredging permits issued during the past twenty years have allowed about 10 million cy of material to be disposed either on Silver Strand beaches or LA-5. Chemical testing data for projected future US Navy projects suggest that 92 percent of the material planned to be dredged from San Diego Bay will qualify for placement at either habitat enhancement sites, Silver Strand beaches or at LA-5.

Material which is not physically compatible with the receiving disposal site may qualify to be disposed of at LA-5. Material which cannot meet either the 404(b)(1) Guidelines or the US EPA ocean dumping criteria must be disposed in a different manner.

Beach Replenishment

Shore erosion is a major concern along the coast of the San Diego Region. Beach replenishment is usually accomplished by dredging sand from inshore or offshore locations and transporting the sand by truck, by split-hull hopper dredge, or by hydraulic pipeline to an eroding beach (e.g., Silver Strand beach). These operations may result in displacement of the substrate, changes in the topography or bathymetry of the borrow and replenishment areas, and destruction of nonmotile benthic communities. However, a well-planned beach nourishment operation can minimize these effects by taking advantage of the resiliency of the beach and nearshore environment and its associated biota, and by avoiding sensitive resources. When dredged material is used for beach replenishment it should closely match the sediment composition of the eroding beach and be low in fine sediments, organic material, and pollutants. The ACOE requires that dredged sediments proposed for placement on a beach must be:

- Particles mostly greater than 74 microns (i.e. sand, gravel or rock);

- Compatible with sediments on the receiving beach; and

- Substantially the same as the disposal site.

Generally, the disposal of clean, sandy material on beaches poses no present problem in terms of sediment quality, quantity, or feasibility. In fact, to be consistent with the California Coastal Management Plan, every effort must be made to beneficially use sandy material for beach nourishment or habitat restoration/ enhancement.

Habitat Restoration/ Enhancement

Restoration/ enhancement of wetlands is an alternative that can benefit the environment. In general, restoration of a former wetland is more likely to be successful than creation of a new wetland where none had existed previously. In selecting a site, alteration of substrate and changes in circulation and sedimentation patterns should be considered. In general, the material used for wetland restoration should remain water-saturated, reduced, and near neutral in pH. These characteristics have a great influence on the environmental activity of any chemical contaminants which may be present.

Ocean Disposal

The ocean water disposal technique involves placing the dredged sediment in open ocean waters at an US EPA approved site. The suitability of dredged sediment for open-water disposal is evaluated by effects-based testing as there are no sediment criteria.

In situations where the contaminated sediment will not meet US EPA's or the Corps of Engineers' criteria for ocean disposal, the sediment must be treated to meet those criteria by physical, chemical, biological, or thermal treatment methods.

LA-5 Ocean Dredged Material Disposal Site: LA-5 received final designation from the US EPA in 1991. This site has been used for the disposal of dredged material since the 1970's and has no capacity or dumping rate restrictions. About 4 million cy were disposed there by the ACOE between 1977 and 1987. About 2.5 million cy were deposited by the US Navy, the National Steel and Shipbuilding Corporation, and Southwest Marine, Inc. during that same period (US EPA, 1988). The LA-5 site is a non-dispersive open water disposal site. Most of the material placed here is intended to remain on the bottom following placement. This site is located 11 km (5.4 nm) southwest of Point Loma on the continental shelf in 147 to 200 m (80 to 110 fm) of water. The center coordinates of the site are 32° 36' 83" North latitude and 117° 20' 67" West longitude, with a radius of 910 m (1,000 yd).

Upland (Landfill) Disposal without treatment

Upland disposal is the process of placing dredged material into or onto a designated solid waste disposal facility or landfill, or into a structure specifically designed to accept dredged material. This upland disposal alternative is used when the dredged material does not qualify for any aquatic disposal alternative.

Upland (Landfill) Disposal with treatment

The landfill disposal with treatment technique refers to situations where the contaminated sediment will not meet state criteria for landfill disposal without the employment of physical, chemical, biological or thermal treatment methods.

Confined disposal

Confined disposal is placement of dredged material within diked nearshore or upland confined disposal facilities via pipeline or other means. Confined disposal facilities are designed and operated to provide adequate storage capacity for meeting dredging requirements and to maximize efficiency in retaining the solids. If contaminants are present in the dredged material, then control of contaminant releases is important in the design and operation of the confined disposal facility.

In most cases confined disposal facilities must be used over a period of many years, storing material dredged periodically over the design life. Long-term storage capacity of these confined disposal facilities is therefore a major factor in design and management. Once water is drained from the confined disposal facility following active disposal operations, natural drying forces begin to dewater the dredged material, adding additional storage capacity.

Reuse Sites - Capping

Capping can be done in place or through the controlled accurate placement of contaminated material at an open water disposal site. Capping in place is a type of non-removal action and refers to the placement of a clean cover material over the contaminated sediment. Capping can also be done by the accurate placement of contaminated material at an open water disposal site followed by a covering or cap of clean isolating material.

In both cases, the purpose of the cover material is to minimize or prevent the migration of contaminants from the sediment to the water column. In remedial actions involving capping, monitoring is needed to ensure that the integrity of the cap is maintained. The key elements of the monitoring program may include the monitoring of:

- Changes in cap thickness;
- Erosion around cap boundaries; and/ or
- Possible leakage of contaminants from the cap.

PROBLEMS POSED BY DREDGING SEDIMENT/CONTAMINATED SEDIMENT

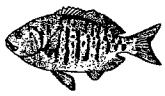

Many chemical substances discharged into marine waters tend to become attached to sediment particles and thus accumulate to high concentrations in benthic sediments. The dredging process can disturb bottom sediments leading to the release of pollutants into the water column by resuspension of contaminated sediment particles; dispersal of interstitial water in the sediment pores; and desorption of chemicals from the contaminated sediment. Common toxic constituents of many sediments include ammonia, low dissolved oxygen and hydrogen sulfide.

Environmental Threat Associated with Contaminated Sediments

Benthic marine sediments support biological communities which reside there (e.g., clams, worms, bottom feeding fish), and provide spawning habitat for many pelagic species (e.g., invertebrates and fish). Elevated concentrations of chemicals in the sediment may cause acute mortality or affect the reproductive behavior, egg hatching characteristics, and early life development of these organisms. In addition to causing acute mortality and abnormal development, contaminated sediments can also lead to the accumulation of contaminants in organisms due to the effects of bioaccumulation. In addition, biomagnification of the contaminants can occur in the food chain when small contaminated organisms are consumed by higher trophic level species including man.

The threat to the public health from contaminated sediments centers around three principal pathways of exposure:

- Consumption of fish and shellfish contaminated by chemicals in the sediment through the processes of bioaccumulation and biomagnification;
- Direct contact with contaminated sediments by people; and
- Incidental ingestion of contaminated sediment or associated waters by people.

Disposal of Contaminated Material Dredge Spoil Return Water

After removal of the contaminated material from the water, the contaminated material must be separated from the slurry to attain two distinct waste streams, the concentrated contaminated material and the dredge spoil return water. The methods for separating the material solids from the water include the use of settling basins, clarifiers, impoundment basins, screens and cyclones. The dredge spoil return water consists of a substantially liquid waste stream that may need to be subsequently treated by physical, chemical or biological methods for removal of dissolved and suspended pollutants.

DISCHARGES OF WASTE TO LAND

Discharges of solid, semi-solid, and liquid wastes to landfills, waste piles, surface impoundments, pits, trenches, tailings ponds, natural depressions and land treatment facilities (collectively called "*waste management units*") have potential to create significant pollution sources affecting water quality. Unlike surface waters, which often have capacity to assimilate waste discharges, ground waters have little or no assimilative capacity. This is due to slow contaminant migration rates, lack of aeration, minimal biological activity, and laminar flow patterns. Waste containing elevated pollutant concentrations can require containment in waste management units or active treatment for extended periods to prevent waste migration and impairment of the underlying ground water quality. The pollutants may continue to affect water quality long after the discharge has ceased, either because of continued leachate or gas discharges *from* the unit, or because pollutants have accumulated in underlying soils from which they are gradually released to ground water.

Landfills for disposal of municipal or industrial solid waste (solid waste disposal sites) are the major categories of waste management units in the Region. Surface impoundments are also used for

storage or evaporative treatment of liquid wastes, waste piles for the storage of solid wastes, and land treatment units for the biological treatment of semi-solid sludge from wastewater treatment facilities. Sumps, trenches, and soil depressions have been used in the past for liquid waste disposal. The Regional Board issues waste discharge requirements to ensure that these discharges are properly contained to protect the Region's water resources from degradation, and to ensure that dischargers undertake effective monitoring to verify continued compliance with requirements.

Waste Management Units are subject to concurrent regulation by other state and local agencies responsible for land use planning, solid waste management, and hazardous waste management. "*Local enforcement agencies*" implement the State's solid waste management laws and local ordinances governing the siting, design, and operation of solid waste disposal facilities (usually landfills) with the concurrence of the California Integrated Waste Management Board (CIWMB). The CIWMB also has direct responsibility for review and approval of plans for closure and post-closure maintenance of solid waste landfills. The Department of Toxic Substances Control (DTSC) issues permits for all hazardous waste management treatment, storage, and disposal facilities (which include incinerators, tanks, and warehouses where hazardous wastes are stored in drums as well as landfills, waste piles and surface impoundments). The State Board, regional boards, CIWMB, and DTSC have entered into a Memorandum of Understanding to coordinate their respective roles in the concurrent regulation of these discharges.

The laws and regulations governing discharges of hazardous and non-hazardous wastes have been revised and strengthened in the last few years. The discharge of municipal solid wastes to land are closely regulated and monitored; however, some water quality problems have been detected and are being addressed. Recent monitoring efforts under the State and Regional Boards' Chapter 15 and SWAT programs have revealed that discharges of municipal solid wastes to unlined landfills have resulted in ground water degradation and pollution by volatile organic constituents (VOCs) and other waste constituents. VOCs are components of many household hazardous wastes and certain industrial wastes that are present within municipal solid waste streams. VOCs can easily migrate from landfills either in leachate or by vapor-phase transport. Clay liners and natural clay formations between discharged wastes and ground waters are largely ineffective in preventing water quality impacts from municipal solid waste constituents. In a recently adopted policy for water quality control, the State Board found that "*research on liner systems for landfills indicates that (a) single clay liners will only delay, rather than preclude, the onset of leachate leakage, and (b) the use of composite liners represents the most effective approach for reliably containing leachate and landfill gas*" (State Board Resolution No. 93-62, *Policy for Regulation of Discharges of Municipal Solid Waste*).

The US EPA has adopted new regulations under Subtitle D of the Resource Conservation and Recovery Act (RCRA) which require the containment of municipal solid wastes by composite liners and leachate collection systems. Composite liners consist of a flexible synthetic membrane component placed above and in intimate contact with a compacted low-permeability soil component. This liner system enhances the effectiveness of the leachate collection and removal system and provides a barrier to vapor-phase transport of VOCs from the unit. Regional Boards and the CIWMB are implementing these new regulations in California under a policy described in State Board Resolution No. 93-62 and new regulations from CIWMB. The State Board is in the process of developing revised regulations under 23 CCR, Division 3, Chapter 15, *Discharges of Waste to Land*, to fully implement water quality-related portions of the RCRA Subtitle D federal regulations. While a single composite liner of the type that can be approved under Subtitle D regulations is a significant improvement over past municipal solid waste containment systems, it should be noted that single composite liners will not necessarily provide complete protection for ground water resources.

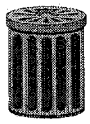

CALIFORNIA CODE OF REGULATIONS (CCR) TITLE 23, CHAPTER 15

Chapter 15 includes regulations governing discharges of waste to land for treatment, storage, or disposal. The regulations cover landfills, surface impoundments, waste piles, land treatment units, mining waste management units and confined animal facilities. In addition, actions to clean up and abate conditions of pollution or nuisance at contaminated sites are covered by relevant portions of the regulations where contaminated materials are taken off-site for treatment, storage, or disposal and, as feasible, where wastes are contained or remain on-site at the completion of cleanup actions. The regulations classify wastes according to their threat to water quality, classify waste management units

according to the degree of protection that they provide for water quality, and provide siting, construction, monitoring, corrective action, closure and post closure maintenance criteria. Chapter 15 requirements are minimum standards for proper management of each waste category. These regulations require the complete containment of wastes which, if discharged to land for treatment, storage or disposal, have the potential to degrade the quality of water resources. The Regional Board may impose more stringent requirements to accommodate regional and site-specific conditions.

Some subcategories of Chapter 15 include:

Article 2 - Waste Classification and Management;

Article 3 - Waste Management Unit Classification and Siting;

Article 4 - Construction Standards;

Article 5 - Water Quality Monitoring for Classified Waste Management Units;

Article 6 - Confined Animal facilities;

Article 7 - Mining Waste Regulations;

Article 8 - Closure and Post-Closure Maintenance; and

Article 9 - Compliance Procedures.

Chapter 15 defines waste types including hazardous wastes, designated wastes, nonhazardous wastes and inert wastes as shown in Table 4-7.

Chapter 15 requires the review and update of waste discharge requirements for all nonhazardous waste treatment, storage, and disposal sites by July 1, 1994. As of 1994 the San Diego Region has no hazardous waste disposal sites. Designated wastes, nonhazardous solid wastes and inert wastes are regulated by the Regional Board.

The regulation of nonhazardous solid waste disposal sites (Class III) has been ongoing by the Regional Board since the early 1960's. Many of the small older sites have closed, and waste is now being disposed at large regional sanitary landfills. The Board's main actions at nonhazardous solid waste facilities are the review and revision of waste discharge requirements for the active sites to assure consistency with the current regulations. These actions include defining the levels of designated wastes, the upgrading of ground water monitoring systems to identify if water quality protection standards are violated, the establishment of corrective action programs where standards are violated, and review and oversight of the development and implementation of facility closure plans.

The criteria for determining whether a nonhazardous waste is a designated waste are based on water quality objectives in the vicinity of the site, the containment features of the solid waste facility, and the solubility/mobility of the waste constituents. Therefore, all owners and operators of active nonhazardous municipal solid waste facilities in the San Diego Region who wish to receive wastes other than municipal solid waste or inert waste must propose waste constituent concentration criteria above which wastes will be considered designated waste and therefore, not suitable for disposal at their site.

In addition, waste discharge requirements are to be revised to incorporate reclassification and retrofitting requirements and a revised monitoring program. Closed, abandoned and inactive landfills and other nonhazardous solid waste disposal sites are also subject to the provisions of Chapter 15. Persons responsible for such sites may be required to develop and implement monitoring, to comply with closure and post-closure maintenance requirements, and to comply with reporting, notification, and record keeping requirements.

WASTE CLASSIFICATION

Contaminated soil and other material must be treated or properly disposed in order to minimize threat to the quality of surface or ground waters. Waste is classified in California by two separate California Environmental Protection Agency (Cal-EPA) agencies with separate regulatory authority. The California Department of Toxic Substances Control (DTSC) classifies waste as hazardous or non-hazardous based on the threat to public health. The State Board, together with the regional boards, classifies non-hazardous waste as "*designated*", "*nonhazardous*", or "*inert*" based on the threat that each poses to the beneficial uses of ground and surface waters, as required by the Porter-Cologne Water Quality Control Act and regulations, water quality control plans and policies set forth by the Regional Board.

Table 4 - 7. Landfill Classifications

Disposal Site Classification	Definitions of Waste Types (California Code of Regulations, Title 23, Division 3, Chapter 15, Sections 2521 et. seq.)	Examples
Class I - Hazardous Waste	(a) Hazardous waste is any waste which, under Section 66300 of Title 22, is required to be managed according to Chapter 30 of Division 4 of Title 22. (b) Hazardous waste shall be discharged only at Class I waste management units which comply with the applicable provisions unless wastes qualify for a variance under Section 66310 of Title 22. (c) Waste which have been designated as restricted wastes by California Department of Health Services (DHS) pursuant to Section 66900, of Title 22 shall not be discharged to waste management units after the restriction dates established by Section 66905 of Title 23 unless: (1) such discharge is for retrievable storage, and (2) DHS has determined that processes to treat or recycle substantially all of the waste are not available, or (3) DHS has granted a variance from restrictions against land disposal of the waste under Section 66930 of Title 22.	Materials that contain high concentrations of pesticides, certain solvents, and PCBs are examples of hazardous wastes.
Class II - Designated Waste	(a) Designated waste is defined as: (1) nonhazardous waste which consists of or contains pollutants which, under ambient environmental conditions at the waste management unit, could be released at concentrations in excess of applicable water quality objectives, or which could cause degradation of waters of the state. (2) hazardous waste which has been granted a variance from hazardous waste management requirements pursuant to Section 66310 of Title 22. (b) Wastes in this category shall be discharged only at Class I waste management units or at Class II waste management units which cmply with the aplicable provisions of Chapter 15 and have beeen approved for containment of the particular kind of waste to be discharged. Decomposable wastes in this category may be discharged to Class I or II land treatment waste management units.	Materials with high concentrations of BOD, hardness, or chloride. Inorganic salts and heavy metals are "manageable" hazardous wastes.
Class III - Nonhazardous Solid Waste	(a) Nonhazardous solid waste means all putrescible and nonputrescible solid, semi-solid, and liquid wastes, including garbage, trash, refuse, paper, rubbish, ashes, industrial wastes, demolition and construction wastes, abandoned vehicles and parts thereof, discarded home and industrial appliances, manure, vegetable or animal solid and semi-solid wastes and other discarded solid or semi-solid waste: provided that such wastes do not contain wastes which must be managed as hazardous wastes, or wastes which ocntain soluble polllutants in concentrations which exceed applicable water quality objectives, or could cause degradation of waters of the state (i.e., designated waste). (b) Except as provided in Subsection 2520(d) of Chapter 15, nonhazardous solid waste may be discarded at any classified landfill which is authorized to accent such waste, provided that: (1) the discharger shall demonstrate that co-disposal of nonhazardous solid waste with other waste shall not create conditions which could impair the integrity of containment features and shall not render designated waste hazardous (e.g.,by mobilizing hazardous constituents); (2) a periodic load-checking program approved by DHS and Regional Boards shall be implemented to ensure that hazardous materials are not discharged at Class III landfills. (c) Dewatered sewage or water treatment sludge may be discharged at a Class III landfill under the following conditions, unless DHS determines that the waste must be managed as a hazardous waste: (1) the landfill is equipped with a leachate collection and removal system; (2) the sludge contains at least 20 percent solids by weight if primary sludge, or at least 15 percent solids if secondary sludge, mixtures of primary and secondary sludges, or water treatment sludge; and (3) a minimum solids-to-liquid ration of 5:1 by weight shall be maintained to ensure that the co-disposal will not exceed the initial moisture-holding capacity of the nonhazardous solid wastes. The actual ratio required by the Regional Board shall be based on site-specific conditions. (d) Incinerator ash may be discharged at at Class III landfill unless DHS determines that the waste must be managed as hazardous waste.	Garbage, trash, refuse, paper, demolition and construction wastes, manure, vegetable or animal solid and semisolid wastes.
Unclassified / Inert	(a) Inert waste does not contain hazardous waste or soluble pollutants at concentrations in excess of applicable water quailty objectives. It does not contain significant quantities of decomposable waste. (b) Inert waste do not need to be discharged to classified management units. (c) Regional Boards may prescribe individual or general waste discharge requirements for discharges of inert wastes.	Concrete, rock, asphalt, plaster, brick, vehicle tires, uncontaminated soils.

As shown in Figure 4-2, the Chapter 15 regulations divide waste into four categories which in turn, determine the classes of waste management units to which their discharge is permitted for treatment, storage or disposal. Detailed criteria are contained in Title 22 of the California Code of Regulations, Division 4.5, Chapter 11, for determining whether a waste falls into the hazardous category. These criteria fall under the headings of toxicity, ignitability, reactivity, corrosivity, and listing under the Resource Conservation and Recovery Act (RCRA). Hazardous waste may be discharged only to Class I waste management units which provide both natural geologic and engineered containment features to isolate the wastes from the environment, unless a specific variance has been granted by DTSC from California's hazardous waste management requirements.

"*Nonhazardous solid waste*" (see Table 4-7) is the regulatory term for "*municipal solid waste*" or "*refuse*" and is characterized as having a significant proportion of putrescible (degradable) matter, stringent moisture limitations, and prohibitions against inclusion of "*designated*" or "*hazardous*" wastes. "*Nonhazardous solid waste*" may be discharged to Class III landfills that protect beneficial uses of nearby waters, but do not provide complete waste containment. The only threat to water quality posed by wastes in the "*inert*" category is siltation. Paving fragments and non-degradable construction debris are examples of "*inert waste*". Wastes in this category may be discharged to unclassified waste management units that are located and managed to keep the wastes from entering surface waters or drainage courses.

"*Designated waste*" is defined in the Chapter 15 regulations and is described in Table 4-7. The second part of the definition refers to those wastes granted a variance by DTSC from Class I disposal. Dischargers are required to submit an initial analysis of the material by a state-certified laboratory. If the material is deemed hazardous, the discharger is referred to the California Department of Toxic Substances Control. For non-hazardous materials, general WDRs can be issued on a case-by-case basis. All permitted treatment or disposal includes monitoring and reporting requirements.

Remediation treatment includes biodegradation (by a land treatment process) for hydrocarbon contaminated soil found on a site and a fixation process for metals contaminated soils. In-situ disposal (without treatment) can be allowed, on a case-by-case basis, for material that is not considered to be a threat to surface or ground water.

RESOURCE CONSERVATION AND RECOVERY ACT OF 1976

The Resource Conservation and Recovery Act (RCRA) is the federal law regarding the treatment, storage and disposal of hazardous waste. The State implements RCRA's Subtitle C through the Department of Toxic Substance Control (DTSC) and the Regional Boards. In August 1992, the US EPA formally delegated RCRA Subtitle C program implementation authority to DTSC. As described above, regulation of hazardous waste discharges is also included in CCR Title 23, Chapter 15 (Chapter 15). Chapter 15 monitoring requirements were amended in 1991 to be equivalent to RCRA requirements. These monitoring requirements are implemented through the adoption of waste discharge requirements (WDRs) for hazardous waste sites covered by RCRA. The discharge requirements are then a part of a state RCRA permit issued by DTSC.

Federal regulations required by the RCRA's Subtitle D have been adopted for municipal solid waste landfills (40 CFR Parts 257 & 258). The California Integrated Waste Management Board (CIWMB) is the State lead agency for Subtitle D implementation. The State Board and the CIWMB are applying to the US EPA for State program approval. It is important to note that certain federal regulatory requirements will be effective unless and until the State program is approved. Delegation of authority for the State Board to implement Subtitle I (Underground Storage Tanks) will occur after US EPA approves the State's program application.

SOLID WASTE ASSESSMENT TEST (SWAT)

The Regional Board administers the Solid Waste Assessment Test (SWAT) Program in the Region. The SWAT program requires owners of active or inactive non-hazardous solid waste disposal sites to evaluate the possible migration of hazardous waste or leachate to waters of the state. The SWAT program was initiated with the enactment of Water Code Section 13273 in 1985. In addition to requiring site evaluations, the SWAT program also:

- Provides deadlines for implementation of water quality monitoring systems at active solid waste disposal sites:

Figure 4-2. Waste Classification Process

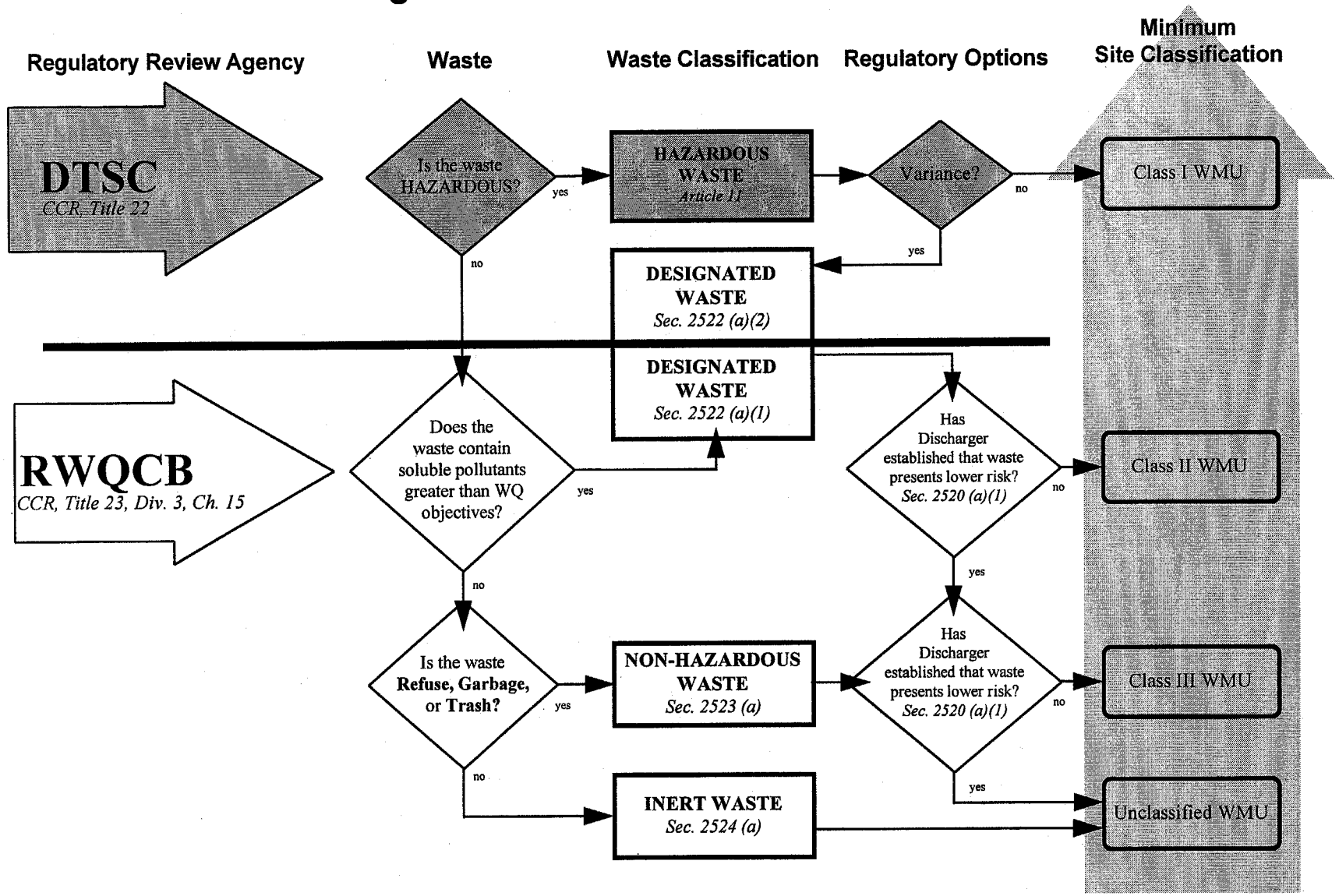

RWQCB, San Diego Region, Land Discharge Unit

002066

- Requires the State Water Resources Control Board to develop a ranked list of all solid waste disposal sites, on the basis of the threat which they may pose to water quality; and

- Requires operators of active and inactive solid waste disposal sites to implement a water quality monitoring system to verify that the solid waste disposal site has not been affected by leakage, and if there is leakage to take remedial actions under the Chapter 15 program.

Program funding was eliminated in 1991, reducing Regional Board review to SWAT sites under regulation due to higher priority work in other Regional Board programs. All sites eventually will be required to complete a SWAT and more sites will be reviewed if more program funding becomes available.

SLUDGE USE AND DISPOSAL

Sludge is a residual by-product of sewage treatment, water treatment, and certain industrial processes. The higher the degree of wastewater treatment, the larger the residue of sludge that must be handled. The treatment and disposal of sludge can be the single most complex and costly operation in a municipal wastewater treatment system. The sludge is made of materials settled from the wastewater - such as rags, sticks, and organic solids - and of solids generated in the wastewater treatment processes - such as the excess activated sludge created by aeration or the chemical sludge created by a tertiary treatment process.

The quantities of sludge involved are significant. For primary treatment the quantities of sludge may be 2,500 to 3,500 gallons per million gallons of wastewater treated. When treatment is upgraded to activated sludge, the quantities increase by 15,000 to 20,000 gallons per million gallons of wastewater treated. Use of chemicals can add another 10,000 gallons. For a typical activated sludge municipal wastewater treatment plant, the amount of sludge to be disposed of is typically about one ton per million gallons or about 20 pounds per month per home.

Raw sludge usually contains 93 to 99.5 percent water before it is treated further or dewatered. It contains organic solids and dissolved nutrients (e.g., nitrogen and phosphorus), making it useful as a supplement to chemical fertilizers and soil conditioners. Other typical constituents are inorganic ions, such as iron and zinc. While trace amounts of these inorganic ions are used by plants and organisms, some heavy metals that may be present in sewage sludge from household or commercial and industrial sources can be toxic to plants, animals, and humans. Untreated sludge also contains disease-causing organisms (e.g., bacteria, viruses, protozoa, and eggs of parasitic worms). In addition, sewage sludge may contain toxic chemicals from household, commercial, and manufacturing activities that use the sewer system to dispose of these liquid wastes.

Most wastewater treatment plants treat the sludge prior to ultimate use or disposal. Normally this treatment consists of some combination of the following processes:

- ***Conditioning:*** treatment of the sludge with chemicals or heat so that the water may be readily separated.

- ***Thickening:*** separation of as much water as possible by gravity or flotation process by subjecting the sludge to vacuum pressure, or other drying processes.

- ***Stabilization:*** stabilization of the organic solids so that they may be handled or used as soil conditioners without causing a nuisance or health hazard through processes referred to as "*digestion*".

- ***Reduction:*** reduction of solids to a stable form by wet oxidation processes or incineration.

The disposal point alternatives for municipal wastewater sludge in the San Diego Region are limited. Since treated and untreated sludge can contain high concentrations of toxic metals and significant amounts of toxic organic pollutants and pathogens, the US EPA and the Regional Board do not allow the direct discharge of sludge to the ocean or any other surface waters. Air pollution regulations have strict requirements on sludge incineration processes. Sludge disposal to land must be carefully controlled because of potential impacts on ground and surface water quality.

Sludge handling and disposal is regulated under 40 CFR Part 503 as a self-implementing program enforced by US EPA; the State does not have delegated authority for implementing the sludge program. Uses of sludge or sludge by-products and sludge disposal in the Region include:

- Sludge digester methane gas as fuel in gas boilers to generate electricity;

- Sludge as a soil amendment: composting dewatered sludge (pathogens are killed at composting temperatures);
- Sludge as a nutrient source for non-edible crops: direct application to agricultural crops not meant for direct human consumption (mixing, tilling, or injecting sludge into soil);
- Sludge disposal directly in certain landfills;
- Sludge disposal in-situ; and
- Incineration.

Prior to disposal of sludge, an initial analysis by a state certified laboratory is required to determine if there are any hazardous substances in the sludge. Nonhazardous sludge can be disposed of in the above ways, usually under WDRs. Disposal of nonhazardous sludge at Class III landfills is regulated under WDRs and must meet criteria listed in Table 4-7. Landfills are required to report the quantity and chemical composition of all accepted sludge as part of their individual WDRs.

Currently, the Regional Board can regulate handling and disposal of sludge pursuant to Chapter 15 and Department of Health Services standards. The US EPA has promulgated a policy of promoting those municipal sludge management practices that provide for the beneficial use of sludge while maintaining or improving environmental quality and protecting public health. US EPA is currently developing sludge use and disposal criteria. The US EPA has also proposed a rule which requires states to develop a program to assure compliance with the Federal criteria. The State Board will be developing a state sludge management program consistent with the US EPA policy and criteria.

AUTO SHREDDER WASTE

There is a significant volume of auto shredder waste generated in California every year. In 1985, 166,500 tons of auto shredder waste was produced. There was one producer of auto shredder waste in the San Diego Region as of February, 1994. Auto shredder waste is the material that remains after articles such as auto bodies, appliances and sheet metal are shredded and have had their metals removed. The majority of auto shredder waste is being treated to nonhazardous levels, but a significant portion of the waste must be disposed of in a hazardous waste landfill. Eight metal compounds, which include cadmium, total and hexavalent chromium, lead, copper, mercury, nickel and zinc, plus PCBs may cause auto shredder waste to be classified as hazardous. Senate Bill 976 was passed in 1985 which required Regional Boards to prepare a list of Class III, nonhazardous waste landfills as authorized to accept and dispose of auto shredder waste. There are only four landfills which currently accept auto shredder waste in California. They are West Contra Costa, Altamount, BKK landfill and Prima Deshecha.

SHREDDER WASTE POLICY (RESOLUTION NO. 85-92)

The Regional Board adopted Resolution No. 85-92, the *Designation of Class III Landfills within the San Diego Region to Accept Shredder Wastes as Required by Section 25143.6 of the Health and Safety Code* (Shredder Waste Policy) on December 16, 1985. The Shredder Waste Policy, required by Section 25143.6 of the Health and Safety Code, designates three landfills, the City of San Diego's West Miramar Solid Waste Disposal Facility, the County of San Diego's Otay Annex Sanitary Landfill, and the County of Orange's Prima Deshecha Canada Sanitary Landfill, as being authorized to dispose of shredder wastes as required by Section 25143.6 of the Health and Safety Code. These three landfills are subject to the following conditions:

The appropriate agency of the City of San Diego, the County of San Diego, and the County of Orange shall, prior to the start of such an operation, submit a report of waste discharge and obtain revised waste discharge requirements for the disposal of shredder wastes. The report of waste discharge shall contain sufficient information demonstrating conformance with Item "i" or, alternatively, Item "ii" listed below to their satisfaction of the Regional Board.

i. The report of waste discharge shall demonstrate that shredder waste will be discharged to a Class I or Class II waste management unit in accordance with the criteria stated in Chapter 15, Title 23 of the California Code of Regulations.

ii. The report of waste discharge shall demonstrate that under Section 2520 (a)(I), Chapter 15, Title 23, California Code of Regulations, the shredder waste contains a particular waste constituent or combination of constituents which present a lower risk of water quality degradation than

indicated by its classification as a designated waste.

Upon application for modification of waste discharge requirements, other landfills within the San Diego Region may be authorized by the Regional Board to accept and dispose of shredder wastes, subject to the restrictions discussed above.

CONTROL OF NONPOINT SOURCE POLLUTION

CHRONOLOGY OF NONPOINT SOURCE POLLUTION CONTROL MEASURES

To implement nonpoint source pollution control, several regulatory measures have been taken by federal, state, regional and local government. The following chronology shows the applicable regulatory measure, responsible governmental agency, and year when each measure was enacted or adopted. These regulatory measures will be discussed in the pages that follow.

Regulatory Measure	*Responsible Agency*	*Year*
RB Resolution No. 79-25	RB	1979
RB Resolution No. 87-91	RB	1987
CWA, Section 201(g)(1)(b)	US EPA	1987
CWA, Section 205(j)(5)	US EPA	1987
CWA, Section 319(h)	US EPA	1987
CWA, Section 402(p)	US EPA	1987
CWA, Section 603(c)(2)	US EPA	1987
Coastal Zone Act Re-authorization Amendments, Section 6217	US EPA	1990
RB Resolution No. 92-21	RB	1992

THE NEED FOR NONPOINT SOURCE POLLUTION CONTROL

Efforts to improve water quality under the NPDES program have traditionally focused on reducing pollutants from the major point sources, namely municipal sewage and industrial process wastewater. Point sources are defined as discrete conveyances, from which pollutants are, or may be discharged. These point sources received early emphasis because they were obvious sources of pollution and easily linked to degraded water quality conditions. However, as the permitting effort proceeded and control measures for municipal sewage and industrial wastewater were implemented, it became increasingly clear that control and reduction of nonpoint source pollution was also needed in order to restore and protect the nation's waters.

DEFINITION OF NONPOINT SOURCE POLLUTION

In contrast to point sources, nonpoint sources of water pollution are generally defined as sources which are diffuse in nature, usually associated with man's uses of land, and are not subject to the federal NPDES permitting program. Diffuse sources originate over a wide area rather than from a definable point. They often enter receiving waters in the form of surface runoff but are not conveyed by way of pipes or discrete conveyances. By definition, nonpoint sources (like discharges to ground water) are exempt from the federal NPDES permitting program which regulates point sources to surface waters.

CATEGORIES OF NONPOINT SOURCE POLLUTION

Nonpoint source pollution is primarily the result of man's uses of land such as urbanization, roads and highways, vehicles, agriculture, construction, industry, mineral extraction, physical habitat alteration (dredging/ filling), hydromodification (diversion, impoundment, channelization), silviculture (logging), and other activities which disturb land. Additional categories of nonpoint sources include agricultural return water, marinas and recreational boating, confined animal facilities, resource extraction, channel erosion, resuspension of pollutants from contaminated aquatic sediments, waste disposal sites, septic systems (onsite or subsurface disposal), atmospheric deposition, acid precipitation, seawater intrusion, and geothermal development.

OVERLAPS BETWEEN NONPOINT & POINT SOURCES

The distinction between point source and nonpoint sources is not always clear. As a result, there have always been overlaps and ambiguities between programs designed to control nonpoint sources and those designed to control point sources of pollution. The most important example of such an overlap involves urban runoff and storm water which are

clearly diffuse and nonpoint in origin, but become channelized and are ultimately discharged through discrete point source conveyance systems to receiving waters. Because it becomes channelized, urban runoff is legally considered a point source discharge. However, because it originates as nonpoint source, urban runoff and storm water are discussed in the Nonpoint Source section.

SEVERITY OF NONPOINT SOURCE PROBLEM

According to the 1988 National Water Quality Inventory, nonpoint source pollution has become the largest single factor preventing the attainment of water quality standards. The inventory reported over 40% of the nation's rivers and streams are impaired due to siltation and 25% are impaired due to nutrients (such as phosphorus and nitrogen) from nonpoint sources. Agricultural runoff was reported as the major nonpoint pollution source affecting over 50% of impaired rivers. Also, over half of the states reported threats to ground water from nonpoint pollution sources.

NONPOINT SOURCE FUNDING

Innovative ways of financing and implementing nonpoint source projects have been developed. Prior to the 1987 amendments to the Clean Water Act, states used Section 106 and 205(j) monies to fund limited nonpoint source activities. The primary federal funding for current nonpoint source program development and implementation includes Section 104(b)(3), 205(j)(5), 319(h), 201(g)(1)(b), 603(c)(2), and 604(b) monies as described below.

Section 104(b)(3): This section established grants for state water pollution control agencies and others for the purpose of conducting and promoting research and investigations related to the causes, effects, extent, prevention, reduction, and elimination of pollution. Such research and investigations are to be carried out in cooperation with federal, state, and local agencies.

Section 205(j)(5): This section established a set-aside of construction grants for the purposes of carrying out activities under Section 319, including program development and the preparation of state assessment reports and management plans. These funds were used for assessment and development activities for California's program through fiscal year 1989.

Section 319(h): Grant funds authorized by this section can be used for the implementation of nonpoint source management programs but cannot be used for assessment activities. States must have an US EPA approved Assessment and Management Plan before qualifying for these monies. This grant program funds both State and Regional Board programs and provides competitive grants for other agencies to use in implementing nonpoint source measures around the state. These grants include a "*non-federal*" match of 40 percent which illustrates the intent of Congress and US EPA to have the states make a financial commitment to implementing nonpoint source programs.

Section 201(g)(1)(b): The 1987 amendments to the Clean Water Act added this section that established a new purpose for which 201 funds could be used - "*...any purpose for which a grant can be made under Section 310(h) and (i)*". These funds can be used for either nonpoint source development or implementation projects.

Section 603(c)(2): The 1987 amendments added Title VI to the Clean Water Act establishing a State Water Pollution Control Revolving Fund Program (SRF). This program provides funding in the form of loans, refinancing, and bond insurance which can be used for (1) construction of publicly owned treatment works, (2) the implementation of state nonpoint source management programs, and (3) the development and implementation of state estuary conservation and management plans. The State and Regional Boards encourage local agencies to apply for these low-interest loans to implement nonpoint source demonstration projects and programs in the Region.

Section 604(b): States must set aside one percent of their Title VI allotments or $100,000, whichever is greater, to carry out planning programs under 205(j) and 303(e) of the Clean Water Act. These funds can be used under 205(j) planning for nonpoint source related activities. This can become an important source of funding for nonpoint source planning and assessment tasks since these types of activities cannot be carried out under Section 319.

SECTION 319 NONPOINT SOURCE MANAGEMENT PROGRAM

To address the nonpoint source pollution problem, Congress added Section 319 to the Clean Water Act in 1987. Section 319 requires each state to develop and implement a Nonpoint Source Management Program and to conduct an inventory of the water

bodies in the State which are impaired due to nonpoint source pollution. To fulfill these requirements, the State Board adopted the *Nonpoint Source Management Plan (NPSMP)* in 1988 which is discussed in Chapter 5 and the Water Quality Assessment in 1990 which is discussed later in this chapter.

The NPSMP established a statewide policy for managing nonpoint source inputs to California's waters and is incorporated by reference into this Basin Plan. The objective of the Nonpoint Source Management Program in California is to measurably improve water quality through the implementation of various Best Management Practices (BMPs).

Unlike end of pipe treatment for point sources (which is impractical and cost prohibitive for nonpoint sources), the key to managing nonpoint source pollution is pollution prevention. Pollution prevention means stopping the generation of pollution at its source by reducing the use of products containing pollutants. Once pollutants have been generated, pollution control BMPs must be employed to prevent the existing pollution from coming into contact with the waters of the State. BMPs are defined as the schedules of activities, prohibitions, procedures, or other management practices designed to prevent or reduce the discharge of pollutants into receiving waters.

The State and Regional Board(s) believe that the voluntary and widespread application of BMPs is the most effective means by which nonpoint source pollution can be reduced. Accordingly the following three general management options are adopted in the Nonpoint Source Management Plan to address nonpoint source problems. In general, the least stringent option that successfully protects or restores water quality is employed. More stringent options are only required if water quality improvements are not achieved.

(1) ***Voluntary implementation of BMPs:*** Voluntary implementation of BMPs is encouraged through financial assistance, education, training, technical assistance, and demonstration projects. Grants and loans provide incentives.

(2) ***Regulatory based encouragement of BMPs:*** Regional Boards require waste discharge requirements for nonpoint sources but waive the requirement if BMPS are effectively implemented. Regional Boards can also enter into management agency agreements (MAAs) with other agencies which specify acceptable BMPs and their implementation. The MAAs are referenced in Regional Board basin plans and become the primary basis for evaluation of compliance. (The State Board has existing MAAs with the U.S. Forest Service, the California Board of Forestry and Department of Forestry).

In either case, the Regional Board will generally refrain from imposing effluent requirements on dischargers who are implementing BMPs in accordance with a waiver of waste discharge requirements or an approved management agency agreement. In both cases, the BMPs become the primary mechanism for meeting water quality standards.

(3) ***Issuance of permits:*** Adopt and enforce waste discharge requirements which set effluent limits on the discharge of specific pollutants.

The State Board has also established four program objectives for its Nonpoint Source Management Program, each of which are being implemented in the San Diego Region as follows:

(1) ***Implementation of Nonpoint Source Management Plan:*** This includes integration of the Coastal Nonpoint Pollution Control Program (which is required under the Coastal Zone Act Reauthorization Amendments and is described below) into the NPSMP.

(2) ***Outreach Activities:*** Regional Board outreach activities primarily center around the industrial, construction, and municipal participants in the NPDES Storm Water Permit Program (described in a later section). Other activities include participation in Resource Conservation District, technical advisory and planning committee, and lagoon foundation meetings.

(3) ***Watershed Assessment Projects:*** San Diego's target watershed is Escondido Creek and San Elijo Lagoon.

(4) ***Project Tracking and Participation***: The Regional Board has two nonpoint source program contracts. The first contract is entitled the Chollas Creek Watershed Protection Plan project. The Chollas Creek contract has been completed. However, the watershed remains a high priority for the toxic substances monitoring program and for chronic and acute toxicity monitoring. These monitoring programs may identify changes in the water quality due to the education program funded by this contract. The second project involves a nitrate contamination project in the

Rainbow Creek watershed. Although the US EPA funded study has not been formally initiated, the Flynn-Rainbow Nursery has converted to a complete tailwater recovery and reuse system. This conversion resulted in a reduction of nitrate loads to the creek. The Rainbow Creek contract will be modified to study other nurseries and sources of nutrients.

ALL NONPOINT SOURCE DISCHARGES ARE CURRENTLY REGULATED

Despite the overlaps between point and nonpoint sources, all nonpoint source discharges are currently regulated under one of two relatively new statutory requirements. These requirements are the NPDES Storm Water Permitting Program required under Section 402(p) of the Clean Water Act and the Coastal Nonpoint Pollution Control Program required under Section 6217 of the Coastal Zone Act Reauthorization Amendments (CZARA).

Although the two programs are complementary and exclusive of each other (i.e., one program applies to any discharge that the other does not), their recent implementation has heightened the confusion about point source verses nonpoint source program applicability.

Both the programs are fully discussed in later sections, and a brief overview is included here. In its simplest form, the Clean Water Act Section 402(p) program, which is an NPDES permitting program, is designed to regulate storm water and urban runoff (i.e., the nonpoint source discharges that become point sources). Virtually all other nonpoint sources are subject to the Coastal Nonpoint Pollution Control Program under CZARA. Although there are a few minor complications which are also discussed later, the essential concept is that all nonpoint source discharges are currently subject to regulation under either the NPDES Storm Water Program or the Coastal Nonpoint Pollution Control Program.

NPDES STORM WATER PROGRAM

SECTION 402(P) CLEAN WATER ACT

Pursuant to the federal Clean Water Act, many municipalities and most industries in the United States are now required to obtain coverage under an NPDES permit for discharges of storm water runoff. NPDES storm water permits authorize only the discharge of storm water into storm water conveyance systems and prohibit all non-storm water discharges.

DEFINITION OF STORM WATER

The federal regulations (40 CFR 122, 123, 124, November 1990) define storm water as surface runoff from rain or snow melt, including sheet flow. This is a narrow definition which is meant to include the runoff of precipitation only. Storm water does not include water which originates from any source other than precipitation such as process wastewater, cooling waters, and wash waters. These are examples of non-storm water discharges and are not allowed in the storm water conveyance system. A non-storm water discharge is any discharge that is not composed entirely of storm water. Also unacceptable for discharge into the storm water conveyance system is precipitation runoff which has come in contact with pollutants.

THE PROBLEM

Although storm water runoff is part of the natural hydrologic cycle, human activities, particularly urbanization, can result in significant and problematic changes to the natural hydrology of an area. Under conditions of minimal urbanization, water is percolated through pervious surfaces in which soil filtration and biological action remove pollutants. During urbanization, pervious surfaces (i.e., vegetated and natural ground cover) are converted to impervious surfaces (i.e., rooftops and roads) decreasing the infiltration capacity of the soil for both water and pollutants.

As a result, when rain falls on and drains through urban freeways, industries, construction sites, and neighborhoods it picks up a multitude of pollutants. The pollutants can be dissolved in the runoff and quickly transported by gravity flow through a vast network of concrete channels and underground pipes referred to as storm water conveyance systems.

Such systems ultimately discharge the polluted runoff, without treatment, into the nation's creeks, rivers, estuaries, bays, and oceans. In short, urbanization results in a dramatic increase in the volume, velocity, and especially in the pollutant load carried by storm water runoff to receiving waters.

Pollutants typically found in urban runoff include sediment, nutrients (e.g., fertilizers), oxygen-demanding substances (e.g., decaying vegetation), bacteria, viruses, heavy metals, synthetic organics (e.g., fuels, oils, solvents, lubricants), pesticides, and other toxics. These pollutants severely degrade the beneficial uses of surface waters, and threaten the health of both humans and aquatic organisms.

In addition to the pollutants contributed by precipitation runoff, dry weather flows also cause serious degradation of receiving water quality. Dry weather flows, which can be substantial, consist of flows from illicit connections and illegal discharges to the storm water conveyance system. Common examples of the latter include illegally disposed used motor oil and antifreeze.

Studies, most notably the Nationwide Urban Runoff Program (NURP), found pollutants in urban runoff to be similar to those found in sewage and industrial wastewater discharges. Similar concentrations were also observed. Thirty-eight states report urban runoff as a major cause of impaired water quality. Locally, the closure of Southern California beaches following major storm events due to high bacteriological levels in ocean waters is a common occurrence. Clearly urban runoff is a significant water quality problem which deserves attention.

STATUTORY AUTHORITY

To address the storm water/urban runoff problem, Congress added Section 402(p) to the Clean Water Act in 1987. This section, and the federal regulations which implement it (40 CFR 122, 123, and 124; November 1990), require NPDES permits for storm water/ urban runoff discharges from municipalities and industries, including construction.

The distinction between point source and nonpoint sources of pollution begins to fade with the requirement for NPDES permits for storm water discharges. Although storm water is clearly diffuse and nonpoint source in origin, it is quickly channelized and ultimately discharged through discrete point source conveyance systems to receiving waters. Because of this, storm water is legally considered a point source discharge and as such is subject to the NPDES permitting program under Section 402(p).

MUNICIPAL, INDUSTRIAL, AND CONSTRUCTION PERMITS -- COMMON CHARACTERISTICS

As a result of the 1987 Clean Water Act amendments, there are currently three types of storm water permits in California: municipal, industrial, and construction. The municipal permits are areawide permits which were issued by the Regional Board. The industrial and construction permits are statewide general permits which were issued by the State Board. There are three important characteristics which all storm water permits have in common.

Permit Objective

The overall objective of the entire storm water program and all three types of permits is to reduce or eliminate the discharge of pollutants into the storm water conveyance system. Section 402(p) of the Clean Water Act does however establish different performance standards for municipal and industrial discharges. Municipalities must reduce pollutant discharges to the maximum extent practicable, or MEP (see discussion below). Industries (including construction) must implement Best Available Technology (BAT) and Best Conventional Pollutant Control Technology (BCT) to reduce pollutants.

Pollution Prevention

The permit objective is achieved by way of pollution prevention. To eliminate pollutants in storm water, one can either clean it up by removing pollutants or prevent it from becoming polluted in the first place. Because of the overwhelming volume of storm water and the enormous costs associated with pollutant removal, pollution prevention is the only approach that makes sense. Pollution prevention which means stopping the generation of pollution at its source by reducing the use of products containing pollutants, is in fact, the basis of the entire storm water program. Once pollutants have been generated, pollution control BMPs must be employed to prevent the existing pollution from coming into contact with the water of the State. It is important to point out that this approach is distinctly different from the conventional end-of-pipe treatment approach commonly used in water quality regulation.

Pollution prevention is accomplished by way of Best Management Practices (BMPs) which are defined as schedules of activities, prohibitions, procedures, or other management practices designed to prevent or reduce the discharge of pollutants to storm water.

Source control BMPs include practices that eliminate or reduce pollutants at their point of generation, or source, so that they can not come into contact with storm water. Source controls are non-structural, inexpensive, and can be extremely effective. Because source control BMPs are site specific, they vary widely depending on the application. For example, regulatory powers and land use planning are important BMPs for municipalities. Berming and covering storage areas are excellent BMPs at industrial facilities; reduced vegetation removal and phased development planning are effective at construction sites.

Two source control BMPs are common to all three applications (municipalities, industries, and construction), namely good housekeeping practices (cleaning up and immediately disposing of wastes properly) and most importantly, education (employee and public). Education, which ultimately results in a change in behavior and increased public awareness, is the key to pollution prevention. Many people think that street gutters are plumbed to the sanitary sewage treatment plant and do not realize that they flow instead directly to the bays and ocean without treatment. Education should be conducted in two directions: (1) prevent the discharge of pollutants and (2) reduce the use of materials which are the sources of pollution.

No Numeric Effluent Limits

None of the three types of storm water permits contain numeric effluent limits at this time. The permits are intended to be BMP based and instead contain narrative receiving water limitations.

AREAWIDE MUNICIPAL STORM WATER PERMITS

Under Section 402(p) of the Clean Water Act and the federal regulations implementing it, operators of large and medium sized municipal storm water conveyance systems are required to obtain NPDES permits for their storm water conveyance systems at this time. Large and medium sized municipal storm water conveyance systems are defined as those serving populations greater than 250,000 and 100,000, respectively. Smaller municipalities (those under serving populations less than 100,000) have until late 1994 to obtain coverage but may be required to do so earlier if it is determined that (1) they are significant contributors of pollutants to receiving waters or (2) if their storm water conveyance systems are "*interrelated*" to larger municipal systems. In the municipal permits the Regional Board made a finding that all of the smaller municipalities in the San Diego Region meet both of these criteria (Order No. 90-42). All the municipalities contribute to the condition of water quality impairment (see Table 4-8) and the storm water discharges are "*interrelated*" in that they jointly and cumulatively contribute significant pollutants to the near coastal waters of San Diego County. Consequently, in July 1990, the Regional Board adopted an areawide Municipal Storm Water Permit for each of the three counties in the Region, San Diego, Riverside, and Orange as follows:

(1) Order No. 90-42 (NPDES Permit No. CA 0108758), Waste Discharge Requirements for Storm Water and Urban Runoff from the County of San Diego and Incorporated Cities of San Diego County and the San Diego Unified Port District.

(2) Order No. 90-46 (NPDES Permit No. CA 0108766), Waste Discharge Requirements for Storm Water and Urban Runoff from the Riverside County Flood Control and Water Conservation District, the County of Riverside and the Incorporated Cities of Riverside County within the San Diego Region.

(3) Order No. 90-38 (NPDES Permit No. CA 0108740), Waste Discharge Requirements for Storm Water and Urban Runoff from the County of Orange, the Orange County Flood Control District and the Incorporated Cities of Orange County within the San Diego Region.

Included as co-permittees in the above permits are all of the land use regulatory agencies; the county, all incorporated cities within the county, and special districts. For this reason, the municipal permits are referred to as "*areawide*" permits. As it moves from inland to coastal areas, storm water does not recognize jurisdictional boundaries. Since all municipalities contribute to the cumulative storm water pollution problem, a coordinated, "*areawide*" approach to managing it is essential, more effective, and far less expensive than numerous individual efforts.

Table 4 - 8. Receiving Waters Impacted by Pollution from Stormwater and Urban Runoff (Order No. 90 - 42)

IMPACTED RECEIVING WATER	REFERENCES	PARAMETERS	MUNICIPALITIES / JURISDICTION
San Diego Bay	WQLS, NPSI	PET, TRA, SYN, COL, DEB, MET	City of San Diego, Coronado, National City, Chula Vista, Imperial Beach, La Mesa, Lemon Grove, County of San Diego, San Diego Unified Port District
Mission Bay	WQLS, NPSI	COL, MET	City of San Diego
Santa Margarita Lagoon	WQLS, NPSI	NUT	Camp Pendleton, County of San Diego, County of Riverside, Temecula
Oceanside Harbor	NPSI	TRA, SYN	Camp Pendleton, Oceanside
Buena Vista Lagoon	NPSI	NUT, SED	Oceanside, Vista, Carlsbad, County of San Diego
Agua Hedionda Lagoon	SDOHSR	COL	Carlsbad, San Marcos
Batiquitos Lagoon	WQLS, NPSI	NUT, SED	Carlsbad, Encinitas, San Marcos, County of San Diego
San Elijo Lagoon	WQLS, NPSI	NUT, SED	Encinitas, Escondido, Solana Beach, County of San Diego
San Dieguito Lagoon	NPSI, TSMP	SED, TRA	City of San Diego, Del Mar, Solana Beach, County of San Diego, Escondido
Los Penasquitos Lagoon	WQLS, NPSI	NUT, SED	City of San Diego, Del Mar, Poway, County of San Diego
Tijuana River Estuary	WQLS, NPSI	TRA, SYN, DOX, NUT	Tijuana, Mexico, City of San Diego, Imperial Beach
San Diego River	NPSI	SYN, PES, SED	City of San Diego, La Mesa, El Cajon, Santee, County of San Diego
Forester Creek	NPSI	TRA	El Cajon, Santee
Tijuana River	WQLS, NPSI	NUT, DEB, COL, DOX, SYN, PES, TRA	Tijuana, City of San Diego
Lake Hodges	NPSI	NUT, DIS	City of San Diego, Escondido, Poway

*** ABBREVIATIONS FOR TABLE 2:**

REFERENCES

- WQLS - Water Quality Limited Segment
- NPSI - Nonpoint Source Inventory Report
- SDOHSR - State Department of Health Services Report on Shellfish Contamination in Agua Hedionda Lagoon
- TSMP - Toxic Substances Monitoring Program elevated values

PARAMETERS

- COL - Coliform bacteria or other microbes
- DEB - Debris
- DIS - Dissolved Solids
- DOX - Low dissolved oxygen, except when associated with algal blooms caused by nutrients
- MET - Metals, except trace elements
- NUT - Nutrients, macro- and micro-nutrients, including algal bloom-low dissolved oxygen syndrome
- PES - Pesticides, except trace elements, including insecticides, nematocides, herbicides, and fungicides
- PET - Petroleum distillates
- SED - Sedimentation/turbidity, including habitat alteration due to sedimentation
- SYN - Synthetic organics, except herbicides and pesticides
- TRA - Trace elements: aluminum, beryllium, cadmium, chromium, copper, lead, mercury, manganese, molybdenum, nickel, selenium, silver, titanium, and zinc.

Objective

The objective of an areawide municipal storm water permit is to reduce pollutants in storm water discharges to the maximum extent practicable (MEP). This is a standard used by US EPA for municipal discharges of storm water. Although not specifically defined in the federal regulations, the intent of MEP is to reduce as much as possible the discharge of pollutants. Thus, the municipal dischargers are required to employ whatever BMPs are feasible (i.e., are likely to be effective and are not cost prohibitive). Where a choice is made between two BMPs which provide generally comparative effectiveness, the discharger may choose the least expensive alternative and exclude the more expensive BMP. However, it would not be acceptable either to reject all BMPs which address a pollutant source or to pick a BMP based solely on cost, which would be clearly less effective. In order to reduce pollutants to the MEP many factors including technical feasibility and effectiveness, as well as economic factors, must be taken into consideration.

Permit Requirements

Municipal Storm Water Permits contain the following two major requirements:

(1) Prohibit non-storm water discharges; and

(2) Develop/implement a comprehensive storm water management program. The comprehensive storm water management program must include the following five components:

- BMP program;
- Monitoring and reporting program;
- Illicit connection/ illegal discharge detection program;
- Storm water ordinance or code; and a
- Funding source.

Ultimate Responsibility for Quality of Storm Water Discharges (Municipal Regulation of Industry)

Under an areawide municipal storm water permit, municipalities are ultimately held responsible for the quality of discharges from their storm water conveyance systems, including contributions from industrial and construction activities. This provides important incentive for municipalities to regulate these activities occurring within their jurisdiction.

As called for in the federal storm water regulations, the regulation of industrial storm water discharges (including construction) into municipal storm water conveyance systems should be accomplished by a cooperative effort between the Regional Board and the local municipality. Under a municipal storm water permit, municipalities are required to adopt and enforce ordinances (including ordinances for erosion control) which prohibit the discharge of pollutants to storm water conveyance systems. In order for the municipalities to be in compliance with their municipal permit, it is essential that the municipalities rigorously enforce their ordinances and grading permits and conduct inspections for compliance with both. They are further authorized to impose additional requirements on industry as necessary to ensure compliance with their municipal permit.

GENERAL INDUSTRIAL STORM WATER PERMIT

To reduce the administrative burden of issuing individual permits to the overwhelming number of industries now subject to NPDES storm water permitting, US EPA has initiated a four-tiered strategy for regulating industries. The first tier involves the use of a small number of "*general*" permits. A general permit is a single permit under which many facilities can obtain coverage (for example, all of the industries in a given type). Under the tiered strategy, the permitting process begins general and becomes increasingly more specific and rigorous over time. Subsequent tiers target specific watersheds, industry types, and finally individual facilities.

Consistent with the tiered approach, the statewide General Industrial Storm Water Permit entitled, "*Waste Discharge Requirement (WDR) for Discharges of Storm Water Associated with Industrial Activities excluding Construction Activities, Order No. 91-13 (General Permit No. CAS 000001)*" was adopted by the State Board on November 19, 1991.

Industries Requiring Coverage

As shown below, the federal regulations identify eleven categories of industrial facilities which are required to obtain coverage under an NPDES storm water permit. Ten of the eleven categories are covered under the statewide General Industrial Storm Water Permit. Category x, construction activities, is covered under a separate permit, which will be discussed in a later section. Categories i

through ix are considered "*mandatory industries*" and are required to obtain coverage under the General Industrial Storm Water Permit whether or not they have materials and activities exposed to storm water. Category xi, "*conditional industries*", are only required to obtain coverage under the general permit if they have materials, equipment, or activities exposed to storm water. Six of the categories are defined by narrative descriptions of the industrial activity. The remaining five categories are defined by Standard Industrial Classification (SIC) codes.

(i) Facilities Listed Under 40 CFR Subchapter N
(ii) (Heavy) Manufacturing Facilities
(iii) Oil and Gas/Mining Facilities
(iv) Hazardous Waste Treatment, Storage, or Disposal Facilities
(v) Landfill, Land Application Sites, and Open Dumps
(vi) Recycling Facilities
(vii) Steam Electric Power Generation Facilities
(viii) Transportation Facilities
(ix) Sewage or Wastewater Treatment Works
(x) Construction Activities
(xi) (Light) Manufacturing Facilities (with exposure)

In addition to private industry, industrial facilities owned or operated by governmental entities (including federal, state, and municipal facilities) are also required to obtain permit coverage.

When Is Coverage Not Needed

If a facility discharges all of its storm water to a municipal sanitary sewer system or to evaporation ponds, percolation ponds, or dry wells, and if there is no discharge to surface water under any circumstances, coverage under the general permit may not be required.

Permit Requirements

The General Industrial Storm Water Permit and General Construction Storm Water Permit both contain the following three major requirements:

(1) Eliminate non-storm water discharges;

(2) Develop and implement a Storm Water Pollution Prevention Plan. A Storm Water Pollution Prevention Plan (SWPPP) is a site specific plan consisting of all Best Management Practices (BMPs) which will be implemented at a facility to reduce or eliminate the discharge of pollutants to storm water. (It is the most important requirement and the key to source controls); and

(3) Develop and implement Monitoring and Reporting program (in accordance with the general permit.)

GENERAL CONSTRUCTION STORM WATER PERMIT

Although it is one of eleven industrial categories specified in the federal regulations, construction activities are regulated under a separate general permit in California. The statewide General Construction Storm Water Permit entitled, "*Waste Discharge Requirements (WDRs) for Discharges of Storm Water Runoff Associated with Construction Activity, Order No. 92-08-DWQ (General Permit No. CAS 000002)*", was adopted by the State Board on August 20, 1992.

Definition of Construction

Construction activity includes, but is not limited to clearing, grading, and excavation, as well as building and reconstruction. Construction activity does not include routine maintenance to maintain original line and grade, hydraulic capacity, or original purpose of the facility.

Who Needs Coverage?

In California at this time, discharges of storm water associated with construction activities that result in the disturbance of five acres or more of total land are required to obtain coverage under the general permit. Construction activities disturbing less than five acres are also required to obtain coverage under the permit if they are part of a larger common plan of development or sale. Because of a recent court ruling, it is important to note that the current five acre exemption is subject to change.

Erosion - The Major Construction Concern

Natural erosion processes are greatly accelerated when protective ground cover is removed during construction activities. Studies reveal that the rate of erosion on land where construction activities are occurring is approximately 2,000 times greater than on timber land that has not been logged.

Erosion results in not only the loss of productive soil, which is essentially irreplaceable, but also in severe impacts to water quality. Twenty-one states,

including California, report construction site runoff as a major cause of water quality impairment. "*Clean sediment*" alone is by definition, a pollutant because of its ability to degrade water quality. Although there are many water quality impacts associated with clean sediment, the two most important ones include: (1) increased turbidity and corresponding decreased light transmittance (resulting in reduced biological productivity and adverse effects on aesthetic value); and (2) direct suffocation of benthic (bottom dwelling) communities due to excessive sediment deposition. In addition to these problems, sediment also provides a major transport mechanism for countless other pollutants. First priority should be placed on soil stabilization and erosion prevention, not sediment interception.

Permit Requirements

The General Construction Storm Water Permit contains the same three requirements as the General Industrial Storm Water Permit (see discussion above).

Industries/Construction Are Subject To Municipal Regulation

There is a "*double*" system of regulation for industrial storm water which is discharged through municipal conveyance systems. Such discharges are regulated by both the statewide general permit (industrial or construction) issued to the discharger and by the municipality subject to the areawide Municipal Storm Water Permit. It is the Regional Board's responsibility to enforce the general permits and the areawide Municipal Storm Water Permit. It is the responsibility of the municipality to enforce its own ordinances. The statewide general permits (industrial and construction) specifically require dischargers to comply with the lawful requirements of local agencies regarding discharges to storm water conveyance systems within their jurisdiction.

HIGHWAY RUNOFF CONTROL PROGRAM

Cars, trucks, and other vehicles are the major contributors to highway runoff pollution. Landscaping, highway maintenance, and highway construction also contribute to highway runoff pollution (see Table 4-9). An essential component of the NPDES storm water program is the implementation of practices for maintaining public highways that reduce impacts on receiving waters from highway runoff. However, cities and counties (permittees) do not have jurisdiction over public highways controlled by the California Department of Transportation (Caltrans). To comply with the requirements of the NPDES storm water program, Caltrans must either actively participate as an entity in the Area Wide storm water program, or obtain a separate NPDES permit for storm water discharges for highways under its jurisdiction. Such a program for Caltrans shall include a Storm Water Management Plan which addresses the design, construction, and maintenance of highway facilities relative to reducing pollutants in highway discharges to the maximum extent practicable. The Plan shall include:

- a characterization of Caltrans highway systems, including pollutants, highway layout, and drainage control system in the area;
- a description of existing highway runoff control measures;
- a description of additional highway runoff control measures to enhance pollutant removal; and
- a plan for monitoring the effectiveness of control measures and highway runoff water quality and pollutant loads.

The highway runoff management plan shall specifically address litter control, proper pesticide/herbicide management, reduction of direct discharges, reduction of runoff velocity, landscape over-watering, use of grassed channels, curb elimination, catch basin maintenance, appropriate street cleaning, establishing and maintaining vegetation, infiltration practices, and detention/retention practices. Caltrans shall coordinate its urban runoff program with local agencies and existing programs related to the reduction of pollutants in highway runoff.

COASTAL NONPOINT POLLUTION CONTROL PROGRAM

COASTAL ZONE ACT REAUTHORIZATION AMENDMENTS (CZARA)

In 1990, Congress amended the Coastal Zone Management Act (CZMA). The amendments are referred to as the Coastal Zone Act Reauthorization Amendments (CZARA). Section 6217, "*Protecting*

Table 4-9. Highway Runoff Constituents and their Primary Sources

CONSTITUENT	PRIMARY SOURCES
Particulates	Pavement wear, vehicles, maintenance
Nitrogen, Phosphorus	Atmosphere, roadside fertilizer application
Lead	Tire wear (lead oxide filler material, lubricating oil and grease, bearing wear)
Zinc	Tire wear (filler material), motor oil (stabilizing additive), grease
Iron	Auto body rust, steel highway structures (guard rails, bridges, etc.), moving engine parts
Copper	Metal plating, bearing and bushing wear, moving engine parts, brake lining wear, fungicides and insecticides
Cadmium	Tire wear (filler material), insecticide application
Chromium	Metal plating, moving engine parts, brake lining wear
Nickel	Diesel fuel and gasoline (exhaust), lubricating oil, metal plating, bushing wear, brake lining wear, asphalt paving
Manganese	Moving engine parts
Cyanide	Anticake compound used to keep deicing salt granular (ferric ferrocyanide, sodium ferrocyanide, yellow prussiate of soda)
Sodium, Calcium, Chloride	Deicing salts
Sulphate	Roadway beds, fuel, deicing salts
Petroleum	Spills, leaks or blow-by of motor lubricants, antifreeze and hydraulic fluids, asphalt surface leachate

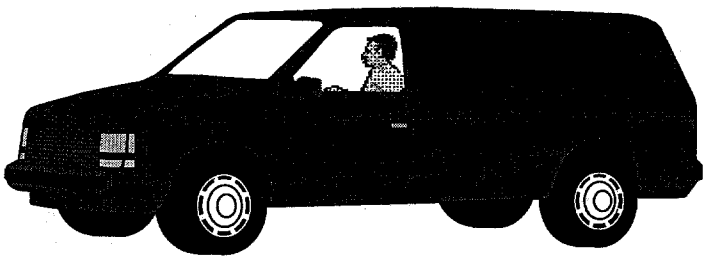

Coastal Waters", of CZARA established the Coastal Nonpoint Pollution Control Program. Section 6217 of CZARA requires US EPA to develop, and states to implement, enforceable "*management measures*" (i.e., BMPs) to control nonpoint source pollution in coastal waters. The definition of the "*coastal zone*" in California was expanded to encompass the entire state.

Like the NPDES storm water permitting program, implementation of the Coastal Nonpoint Pollution Control Program is still evolving. As of the 1994 Basin Plan update, US EPA has published management measures, which are collectively referred to as the "*(g) guidance*", pursuant to Section 6217(g) of the CZARA. There are six major categories of nonpoint sources addressed by the (g) guidance, including: agriculture sources, forestry, urban areas, marinas, hydromodification projects and wetlands.

The storm water NPDES permitting program under the Clean Water Act and the Coastal Nonpoint Pollution Control Program Section under CZARA are intended to be complimentary but exclusive of each other. In other words, the Coastal Nonpoint Pollution Control Program applies only to nonpoint sources that are not currently regulated under an NPDES storm water permit. This includes all of the traditional non-urban nonpoint sources such as agriculture and silviculture and those urban sources which are not currently subject to the NPDES storm water permitting program. Examples of the latter in 1994 include some municipalities with populations under 100,000; construction sites disturbing less than 5 acres; and storm water discharges from wholesale, retail, service, or commercial activities.

The key concept is that <u>all</u> nonpoint pollution sources, both urban and non-urban (including those that become point sources), are currently subject to regulation under either the NPDES Storm Water Permitting Program required under Section 402 (p) of the Clean Water Act or the Coastal Nonpoint Pollution Control Program required under Section 6217 of the Coastal Zone Act Reauthorization Amendments (CZARA).

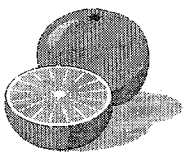

AGRICULTURE

In the San Diego Region, agriculture ranks as the forth largest industry in the economy and accounts for 1.7 percent of the Region's economy. The coastal and inland valley areas of the county possess a moderate and virtually frost-free climate able to support a variety of sub-tropical crops, making the San Diego area a unique agricultural region. The primary crops being grown for the national and international markets are avocados, citrus, cut flowers, and nursery products. To a lesser extent, local fresh market crops and livestock are produced in the area.

The San Diego County Water Authority (Authority) is the largest agricultural water consuming agency within Metropolitan Water District (MWD), requiring approximately 50 percent of MWD's total agricultural water supply each year. Agricultural water use within the Authority is concentrated mainly in north county agencies such as Rainbow MWD, Valley Center MWD, Fallbrook PUD and Yuima MWD.

Pursuant to the Coastal Zone Reauthorization Amendments (CZARA) Section 6217 (g), US EPA has identified management measures to protect coastal waters from sources of nonpoint pollution from agriculture. Specifically, the (g) Guidance for agriculture contains management measures to address erosion from cropland, applying nutrients to cropland, applying pesticides to cropland, confined animal facilities, land used for grazing, and cropland irrigation. The three most significant water quality impacts from agriculture in the San Diego Region are:

- erosion of agricultural soils;
- agricultural irrigation return water (salt loading and applied chemicals); and
- confined animal facilities.

Basic information on each impact is summarized below.

Erosion Control

Erosion is a problem, not only in terms of the loss of agricultural production, but also because it degrades important aquatic habitat. Eroded soils can bury benthic communities, cover spawning grounds, destabilize channel banks and fill sensitive wetland areas. Furthermore, other pollutants are often bound to eroded soils. Under certain conditions, these pollutants may be remobilized into the water column causing problems for human health, wildlife, and aquatic resources.

The State and Regional Boards have adopted narrative standards that prohibit the impairment of

aquatic habitat from erosion. However, no specific numeric standard limiting sediment loads has been established. Implementation of effective management practices to control erosion is typically accomplished through the combined efforts of several agencies working with landowners. Local Resource Conservation Districts, with technical assistance from the U.S. Soil Conservation Service, help landowners prevent erosion problems. The University of California, Agricultural Extension Service also assists in developing management practices and informing growers of optimum strategies for soil fertility and stabilization. Additionally, the U.S. Agricultural Stabilization and Conservation Service provides grants and low interest loans to farmers for improvements which retain valuable topsoil in cultivated areas.

Agricultural Irrigation Return Water

Agricultural irrigation return water is the wastewater which runs off or leaches through an irrigated area. The two major concerns with agricultural irrigation return water are salt loading and the release of applied chemicals.

Salt Loading

Since the water supply in the San Diego Region is generally quite high in salts and the climate is dry, irrigation with this relatively saline water causes salt accumulation in the soil. Crop roots absorb only essentially pure water while leaving dissolved salts behind. If these salts are not leached out by regularly applying more irrigation water than is needed for evapotranspiration, salts accumulate in the root zone and the land eventually becomes too salty for agriculture. However, the saline soils may be reclaimed by leaching. The percolation of the water used to leach salts from the soil can be a serious source of ground water degradation.

The actual effect of irrigation return water on ground water quality in the Region is difficult to determine without further study. The construction of irrigation return water drain tiles to collect and transport return flows is a possible remedial measure that could be implemented in certain portions of the Region. This has not been considered necessary to date and no plans for such construction are presently pending.

Applied Chemicals

Modern agriculture is based on the extensive use of applied chemicals such as fertilizers, pesticides, and herbicides to obtain high crop yields. The improper use of these applied chemicals may lead to serious degradation of both ground water and surface water quality. Some of the chemicals applied to farm land move down with deep-percolation water from crop root zones and can contaminate underlying ground water. Surface waters are primarily contaminated by the runoff of irrigated agriculture containing sediments, nutrients such as phosphorus and nitrogen, pesticides, and other pollutants.

The release of applied chemicals, into surface and ground waters can have adverse effects on the quality of those waters and the beneficial uses supported by them. Aquatic toxicity, as measured by toxicity bioassay tests, has been found in many waters within the State. The application of agricultural chemicals, in some cases, has been linked directly to this toxicity and is suspect in many other impaired water bodies. In addition to degradation of the aquatic environment, the contamination of ground and surface waters by pesticides and fertilizers is believed to also pose a threat to human health. Pesticides for example are known to bioaccumulate.

The Basin Plan contains a water quality objective requiring that all waters be maintained free of toxic substances in concentrations that are toxic to human, plant, animal, or aquatic life. The Basin Plan also contains a water quality objective for pesticides requiring that no individual pesticide or combination of pesticides be present in the water column, sediments, or biota at concentrations that adversely affect beneficial uses.

Although the Department of Pesticide Regulation (DPR) controls the application and use of agricultural pesticides, regulation of the quality of agricultural runoff waters is the responsibility of the State and regional boards. The regional boards have adopted water quality standards that apply to all surface waters of the State. Although standards for certain metals and some older pesticides have been adopted, standards for the majority of currently used agricultural chemicals do not exist. Generally, narrative standards which prohibit toxicity and degradation of water bodies apply to agricultural discharges as do specific toxicity standards. To implement these standards, the regional boards have relied on a number of voluntary efforts and a concerted effort to educate growers on the need to protect water bodies from the adverse effects of farm chemicals. The State Board also uses grant funds to support implementation of projects which demonstrate improved management practices.

In coordination with DPR, the regional boards have begun to put restrictions on the use of certain agricultural chemicals to address water quality problems. DPR has the responsibility to condition the use of any agricultural chemical to ensure its safe use. Where DPR has been convinced of the significant potential to cause environmental problems, it has established restrictions on the application, release, or timing of pesticide applications. DPR also encourages changes in formulations or in the combinations of pesticides applied in order to minimize water quality problems. An overall integrated pest management program for each agricultural site, rather than sole reliance on pesticides is needed.

There are other reasons to be concerned with the judicious use of agricultural chemicals (in addition to environmental issues). These interests are often concerned with questions of production and profit. To the extent that the application of agricultural chemicals are limited for cost control reasons, these concerns often result in benefits for water quality as well.

The narrative and/or numeric nutrient objectives presented in this Basin Plan are also applicable to irrigation return water. The State Board may require the use of pollutant control techniques to implement irrigation water management in its water rights permits or through Nonpoint Source Management Plan.

Irrigation water management may be implemented through reducing the use of fertilizers and pesticides to levels which minimize their presence in irrigation return water, as well as through the implementation of irrigation systems which reduce the volume of return water.

Irrigation Water

In 1992, two laws were passed which require agricultural water suppliers delivering more than 50,000 acre-feet of water per year to prepare water management plans (CWC, §10800 and §10904). The plans are to focus on water conservation measures, improved irrigation efficiency, and environmental enhancement. The Department of Water Resources has established an advisory committee to review and study irrigation practices for these purposes. The implementation of conservation plans will likely have a side benefit of reduced erosion as irrigation efficiency improves.

Dairies -- Confined Animal Facilities

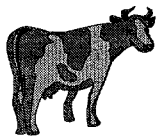

Problems associated with dairy operations in the San Diego Region include ground water mineralization, the addition of nitrates to ground water, surface runoff of biodegradable and suspended material, nuisance odors, the addition of nutrients to adjacent surface water streams and other miscellaneous problems. All dairies in the Region are regulated under waste discharge requirements. These waste discharge requirements implement the regulations for confined animal facilities contained in CCR, Title 23, Division 3, Chapter 15, Article 6, Sections 2560-2565.

The major requirements contained in waste discharge requirements for dairies are as follows:

(1) Dairies must be designed and constructed to retain all facility wastewater generated, together with all precipitation on, and drainage through manured areas during a 25-year, 24-hour storm.

(2) All precipitation and surface drainage outside of manured areas, including that collected from roofed areas, and runoff from tributary areas during the storm events described in subsection (1) of this section, shall be diverted away from manured areas, unless such drainage is fully retained.

(3) Retention ponds and manured areas at dairies must be protected from inundation or washout by overflow from any stream channel during 20-year peak stream flows. Existing facilities that are protected against 100-year peak stream flows must continue to provide such protection.

(4) New facilities shall be protected against 100-year peak stream flows.

(5) Retention ponds shall be lined with or underlain by soils which contain at least 10 percent clay and not more than 10 percent gravel or artificial materials of equivalent impermeability.

(6) Facility wastewater, collected precipitation and drainage may be discharged to properly operated use or disposal fields or to wastewater treatment facilities approved by the Regional Board.

Regional Board Dairy Waste Management Policy (Resolution No. 87-71)

The Regional Board adopted Resolution No. 87-71, *"A Resolution Adopting Amendments to the Comprehensive Water Quality Control Plan for the San Diego Region"* (Regional Board Dairy Waste Management Policy) on November 16, 1987. On March 17, 1988, the State Board adopted Resolution No. 88-35 approving the Regional Board Dairy Waste Management Policy with a few minor changes. The Regional Board Dairy policy contained in Resolution No. 87-71 is incorporated below; accordingly Resolution No. 87-71 is superseded.

The Regional Board regulatory program on dairy waste disposal is designed to be a part of the Basin Plan. The program is based upon the following principles to ensure that the goals of the Basin Plan are implemented:

(1) The Regional Board is committed to the reasonable protection of present and future beneficial uses of ground water.

(2) Coordination among state, federal, and local agricultural and regulatory agencies, the dairy industry, local planning and land-use agencies is necessary to resolve potential water quality problems associated with dairies.

(3) Cooperation between this Regional Board and the dairy industry is required when developing and implementing measures to achieve conformance with the Basin Plan ground water objectives.

(4) Comprehensive assessments of salt loading on the ground water basins in the San Diego Region are necessary to develop reasonable and cost effective water quality protection measures for all nonpoint and point sources of waste.

(5) An interim dairy wasteload regulatory program is necessary until the assessment studies noted in Principle 4 are completed. The interim program should provide a simple, region-wide approach to controlling dairy wasteloads, that may be reviewed on a case-by-case basis if necessary. The program should be easy to understand, easy to implement and enforce and provide greater protection of water quality than present practices.

As part of an overall program of dairy waste management, the following measures shall be implemented:

(1) The Regional Board shall continue to enforce all State and Federal water quality laws, and regulations regarding dairy waste treatment and disposal, including Chapter 15, Title 23 California Code of Regulations and US EPA Effluent Guidelines and Standards for feedlots point source category (40 CFR 412).

(2) The Regional Board shall continue to seek funding to conduct the necessary studies and develop computer models to provide an accurate assessment of existing and projected wasteloads in the various ground water basins.

(3) Based upon the results of the studies described in item 2, the Regional Board will revise Basin Plan ground water objectives if warranted and specify or revise wasteload limits that will be appropriate for the point and nonpoint sources of waste, including dairies if necessary.

(4) For an interim period, until the necessary ground water assimilative capacity and wasteload assessment studies are completed, the Regional Board shall limit the disposal of corral manure to dairy disposal land to no more than 3 tons dry weight or 10 cubic yards per acre per year, and to cropland where crops are grown and harvested twice annually, to no more than 12 tons dry weight per acre per year. The Regional Board shall consider manure application higher than the 12 tons per acre per year limit upon demonstration that the crops require the increased manure loadings.

(5) The U.S. Department of Agriculture, Soil Conservation Service, University of California at Riverside, the State and County Departments of Agriculture and other governmental and educational institutions are encouraged to provide dairy operators with the latest technical information regarding waste disposal practices that would result in additional water quality protection.

(6) The local land use and planning agencies are encouraged to conduct long-term planning for addressing water quality issues of new and expanded dairies in the region. The dairy industry is encouraged to provide accurate five-year projections of dairy herds at existing dairies and potential locations for new dairies to the planning agencies and to the Regional Board, so that the Board may include the required Basin Plan studies as part of the Board's triennial review process.

(7) The Regional Board will continue to obtain and review technical information regarding the hydrologic basins and to recommend the update of Basin Plan standards if warranted.

(8) The Regional Board encourages the implementation of water conservation measures at dairies, and the beneficial reuse of dairy farm wastewater that would replace the use of imported water.

EROSION AND SEDIMENT CONTROL

Currently erosion and sediment control is accomplished primarily by way of the municipal and construction storm water permits (see previous discussion).

In 1987, the San Diego Regional Water Quality Control Board implemented a policy for the control of human induced erosion and sedimentation. This policy is presented below. The Regional Board deferred the implementation of regulatory programs for erosion and sedimentation control to local government agencies. The local Resource Conservation Districts have agreements with the Regional Board regarding erosion and sediment control.

Soil erosion resulting from a wide variety of causes, including construction, hillside cultivation and other agricultural activities, non-maintained roads, and off road vehicles may result in serious water quality impacts. The goal of the policy is the protection of water quality through the reduction and prevention of accelerated (man-caused) erosion to the level necessary to restore and protect beneficial uses of receiving waters now significantly impaired or threatened by impairment due to sedimentation through the implementation of the Best Soil Management Practices (BMPs). Construction sites can contribute runoff into storm drains at rates 100 to 2,000 times greater than non-developed sites, due to the large amounts of soil that are usually uncovered. Property owners are held responsible for all activities and practices that may cause an adverse impact on water quality due to waste discharges and surface runoff from their lands.

Sediment and erosion control is particularly important in areas with, or that drain into, delicate habitats such as lagoons, floodplains and some waterways. Lagoons are particularly sensitive to influx of silts and nutrients, which may cause severe turbidity and eutrophication problems. Severe amounts of silt may cause a lagoon to eventually become infilled. Siltation also damages tributaries and riparian corridors leading to the lagoons.

Poor agricultural grading practices may cause significant erosion of the soil, causing heavy sediment, nutrient and possibly herbicide and pesticide runoff loads to be discharged into nearby surface waters.

In most cases, the adverse results of man's activities can be reduced and in some instances eliminated through the use of both structural and non-structural measures of various types that are properly employed at the appropriate time. The high cost of lost resources, resource replenishment and after-the-fact repair and maintenance make both pre-project erosion control planning and preventive maintenance necessary.

EROSION AND SEDIMENT CONTROL PROGRAM (RESOLUTION NO. 87-91)

Regional Board Resolution No. 87-91 entitled, "*A Resolution Adopting Amendments to the Comprehensive Water Quality Control Plan for the San Diego Region*" (Erosion and Sediment Control Program) was adopted on December 21, 1987. The Regional Board Erosion and Sediment Control Program contained in Resolution No. 87-91 is incorporated below; accordingly Resolution No. 87-91 is superseded.

Goal of Program

The goal of the Regional Board's erosion control program is the protection of water quality through the reduction and prevention of accelerated (man-caused) erosion to the level necessary to restore and protect beneficial uses of receiving waters now significantly impaired, or threatened by impairment, by sediment.

Management Principles

(1) Property owners are considered ultimately responsible for all activities and practices that could result in adverse affects on water quality from waste discharges and from surface runoff.

(2) Local units of government should have the lead role in controlling land use and construction activities that cause erosion and may, as necessary, impose further conditions, restrictions, or limitations on waste disposal and

other activities that might degrade the quality of waters of the State.

(3) Best Management Practices (BMPs) should be implemented to reduce erosion and sedimentation and minimize adverse affects on water quality.

Regional Board Implementation Measures

(1) Local governments shall be encouraged to develop effective erosion and sedimentation control ordinances and regulatory programs that are at least equivalent to the model ordinance in the "*Erosion and Sediment Control Handbook*" published by the California Department of Conservation, May 1981.

(2) If necessary, a Memorandum of Understanding (MOU) or Management Agreement could be adopted to more clearly define the cooperative roles between the local units of government and the Regional Board.

(3) The Regional Board may participate with other concerned agencies such as the California Department of Fish and Game, the Resource Conservation Districts, the various lagoon foundations, etc., to identify watersheds, coastal lagoons and estuaries with critical erosion and sediment problems. The Regional Board may assist in the assessment of such problems and causes, and assist in the development of alternative measures to prevent future problems.

(4) As time and resources permit, the Regional Board will review existing local grading ordinances to determine the adequacy of the ordinances to provide effective erosion control. The Regional Board may then recommend specific improvements to the ordinances for consideration by the local agencies. If necessary, the Regional Board may request a report on the implementation of the Board's recommendation.

(5) If necessary, the Regional Board may request periodic status reports of construction and grading activities from local agencies to determine the effectiveness and potential problems with the implementation of local erosion and sediment control program.

(6) The Regional Board shall encourage the Resource Conservation Districts to review and update if necessary, their erosion control ordinances in order to develop more effective programs for erosion and sediment control for agricultural activities. Local units of government are encouraged to take a more active role in addressing erosion problems from agricultural activities.

THE ELSINORE-MURRIETA-ANZA RESOURCE CONSERVATION DISTRICT SEDIMENT CONTROL ORDINANCE (RESOLUTION NO. 79-25) AND THE RESOURCE CONSERVATION DISTRICTS OF SAN DIEGO COUNTY EROSION AND SEDIMENT CONTROL POLICY (RESOLUTION NO. 92-21)

The Elsinore-Murrieta-Anza Resource Conservation District and the Resource Conservation Districts (RCDs) of San Diego County were established to provide for the conservation of soil and water resources and for the prevention and control of soil erosion and sediment damage due to agricultural and other land use activities.

The RCDs establish guidelines for land management programs by adopting Best Management Practices (BMPs) such as those presented in the Soil Conservation Service Technical Guide covering San Diego County. Currently, farmers and other land owners contact the RCDs on a voluntary basis for assistance in developing individual erosion and sediment control programs which conform to the BMPs.

In order to assure that all farmers and other land owners operate under the Resource Conservation Districts BMP guidelines, and to better address the existing and potential water pollution problems caused by agriculture and other land uses, the RCDs have adopted sediment control ordinances and policies (e.g., *Elsinore-Murrieta-Anza Resource Conservation District Sediment Control Ordinance* and the *Resource Conservation Districts of San Diego County Erosion and Sediment Control Policy*). These documents formally adopt the Soil Conservation Service's BMPs and define the existing and expanded functions and responsibilities of the RCDs. These documents also suggest means by which the California Regional Water Quality Control Board, San Diego Region, can assist the RCDs in implementation of the policy.

The Resource Conservation District Sediment Control Ordinance, and the Erosion and Sediment

Control Policy establish the duties of the Regional Board and the RCD's as outlined below. The Resource Conservation Districts will implement these documents as follows:

(1) Continue to assist farmers and other land owners in establishing management programs which comply with BMPs.

(2) Authorize any of its directors to file a formal complaint against any person who is causing or permitting any accelerated erosion and sediment damage.

(3) Take action against any person causing or permitting any accelerated erosion and sediment damage.

(a) Receive complaints from RCD directors, land occupiers, or city, state and county officials responsible for the maintenance of water quality in the jurisdictions.

(b) Conduct hearings of the Resource Conservation District Board of Directors on complaints. If the complaint is valid, the "*land disturber*" is allowed two months to develop and implement a voluntary conservation plan.

(c) Request action by the Regional Board if compliance schedules are not followed or if further noncompliance occurs, when such noncompliance results in the intentional or negligent discharge or deposition of any waste where it is, or probably will be discharged into the waters of the state or creates or threatens to create a condition of pollution or nuisance.

The Regional Board will assist the Resource Conservation Districts in implementing the Erosion and Sediment Control Policy by doing the following:

(1) Inform the appropriate RCD of instances when the staff of the Regional Board finds that accelerated erosion damage has occurred or is likely to occur as a result of violations of the BMP guidelines.

(2) Receive requests for action on complaints from the RCDs when compliance schedules have not been met or when further noncompliance has occurred, and consider appropriate enforcement action pursuant to Section 13304 (a) of the Porter-Cologne Water Quality Control Act.

RESOURCE EXTRACTION

SAND, GRAVEL AND RELATED OPERATIONS

The sand and gravel related processing industry represents one of the largest single classes of industry in the San Diego Region. Construction activities in the Region will require a continuing need for sand and gravel products. The industry can generally be classified as follows:

- Sand and gravel processing (including rock crushing);
- Concrete batching;
- Asphalt batching;
- Asphalt product manufacturing;
- Concrete product manufacturing; and
- Clay and clay product processing.

The largest volume of waste from sand and gravel processing operations results from product washing. Many of the sedimentary deposits mined for sand and gravel in the San Diego Region contain a high percentage of silt and clay. Extensive washing is required to remove the fine material. Other waste includes cement truck wash water, sediment separated from the wash water, and rejected product (broken brick, block, pipe etc).

Recycled wash waters are discharged to storage ponds and can contain high concentrations of total dissolved solids because of evaporation and leaching from product materials. The percolation of these recycled waters can adversely affect ground water quality. It is recognized that the permeability of the ponds receiving the wash waters is low because of the sealing effects of silts and clay sediments in the wash water. Sediment and wash water discharged to surface waters can adversely affect aquatic life through sediment deposition and increases in turbidity.

Many sand and gravel operations are regulated with waste discharge requirements (WDR). The waste discharge requirements prohibit the discharge of sand and gravel wash water to surface waters. The requirements also require that waste holding ponds have 100-year frequency flood protection. Resolution No. 83-21 entitled, "*A Resolution*

Conditionally Waiving Adoption of Waste Discharge Requirements for Certain Specific Types of Discharges" conditionally waives WDRs for sand and gravel mining operations not conducted in flowing streams. Sand and gravel mining operations are subject to regulation under Section 404 of the Clean Water Act. Before a Section 404 permit can be obtained, the discharger must obtain water quality certification pursuant to Section 401 of the Clean Water Act. See previous discussion of Water Quality Certification (Section 401).

Many mining operations are subject to California's Surface Mining and Reclamation Act (SMARA) of 1975 and the federal Surface Mining Control and Reclamation Act (SMCRA) of 1977. These laws, which have similar provisions, require reclamation of mined lands in order to protect public health and safety and to prevent or minimize adverse environmental effects such as water quality degradation, flooding, erosion, and sedimentation. Additionally, SMCRA requires mine operators to establish baseline hydrologic conditions; in the event that adjacent waters are contaminated, diminished, or interrupted, SMCRA further requires mine operators to replace the water supply.

Under SMARA regulations (California Public Resources Code (Section 3505, Article 1), mining operators must:

- Control soil erosion by minimizing removal of vegetation and overburden, managing stockpiles, and constructing erosion control facilities;
- Control water quality by constructing settling ponds and basins and conducting operations in such a way as to prevent siltation of ground water recharge areas;
- Protect fish and wildlife habitat by taking "*reasonable measures*"'
- Protect natural drainage ways by proper placement and control of mine waste rock and overburden piles or dumps; and
- Control erosion and drainage by grading and revegetation, and construction of basins to impound surface runoff, and protection of spillways from erosion.

FLOOD CONTROL

In a natural setting, the dynamic nature of water creates an ever changing stream channel within the floodplain. In the San Diego Region, where rainfall is extremely variable, flood plains which appear to be dry one year, may contain tremendous torrents the following year. Sometimes the dry appearance of the flood plain has made people mistakenly think flood waters do not occur there. The dry appearance of a portion of the flood plain is deceptive. Floods are a natural part of any flood plain. Flood plains cannot be fully protected against floods.

In the past, developments clustered near or within the flood plain. Flood control channels were constructed to protect these properties. Flood control channels were built to constrict the flood plain and to allow maximum development on adjacent lands. These developments increased the amount of impervious area (roads, buildings, parking lots and other structures) and increased local storm runoff. Storm water, which prior to development would have been absorbed into the soil, instead filled local storm drains. Thus, the precipitation which might at one time have caused local flooding caused intensified downstream flooding.

Today, many flood plains have been channelized to protect property. There are a variety of channel designs which have been built. Channel designs vary in range from completely natural to entirely concrete lined with concrete bottoms. Other channel types include natural channels modified to contain a low-flow channel with or without side filling or riprap or concrete; and with or without encroachment by agriculture and/or urban areas.

IMPACTS OF CHANNELIZATION

To the degree that a natural watercourse is channelized, the negative impacts to the watershed are increased. The following impacts occur with channelization:

(1) Channel modification and channelization of streams induces changes in land use practices. The resulting change in land use practices often results in detrimental changes to surface water quality.

(2) With future increases in the urbanization of an area, the impervious area increases, contributing additional storm water runoff. Flood channels were built to contain a certain design flow and the design flow can be exceeded by additional storm water runoff.

(3) As the flood plain is constricted and confined within a channel, the potential damage from storm runoff is increased.

(4) Channelization reduces ground water recharge.

(5) Impervious channels designed to remove the runoff quickly also transport pollutants down the flood control system just as quickly. Most of the surface water runoff from urban areas flows into flood control channels without any mechanism to control the input of toxics.

(6) Channelization results in the direct loss of instream habitat. Fish and other aquatic life are totally dependent upon the surface waters within floodplains.

(7) Channelization results in the loss of riparian habitat.

(8) Channelization causes an increase in ambient stream temperatures within and downstream from the channelized section. The rise in stream temperature may degrade the habitat for aquatic life.

(9) The loss of riparian areas through channelization results in the loss of wildlife. Riparian areas are the most important habitat for the majority of western wildlife species, and are essential for many wildlife species.

(10) Loss of riparian areas results in a loss of the buffering capacity of the riparian vegetation to moderate flows.

(11) Loss of the riparian areas results in a loss of the natural filtering capacity that these areas provide. The natural filtering capacity of riparian areas reduces the concentration of potentially toxic constituents in storm water runoff. Riparian areas provide an improvement in the quality of water produced from the watershed.

(12) Stream and riparian habitats are needed to provide corridors for fish and wildlife resources. A highly modified concrete channel may not allow for fish or wildlife passage. Even a limited section of concrete channel can disconnect habitats. The separation of habitats reduces the viability of fish and wildlife populations.

CONCLUSION

Channel modifications need to be evaluated for their ultimate consequences for the watershed. In California's past there was inadequate consideration towards the retention of wetlands, riparian systems, and natural flood plains. The economic assessment of flood control alternatives should consider any proposed project in its entirety. Wetlands, riparian systems and natural flood plains accommodate natural stream meandering, aggradation, degradation and overbank flow better than those lands directly encroached upon by development.

Consideration and utilization of methods to reduce storm water runoff and allow infiltration and percolation of storm waters are needed. Methods should include minimizing the further construction of flood control channels, particularly concrete channels, and the retention of riparian areas within floodplains. Riparian areas within flood plains need to be protected in order to allow the natural filtering capacity of the riparian area to improve the quality of storm water produced from the watershed; and to preserve alluvial percolation capacity and aquatic habitat values. When possible riparian areas need to be restored.

Riparian and stream habitats provide natural beauty which is appreciated and valued by people. Riparian and stream habitats, especially in urban areas, are vital to enhancing our quality of life. People are far more likely to respect and be stewards of "*natural*" reaches of streams than channelized or artificially modified reaches. Riparian lands represent a significant value to society.

FUTURE DIRECTION: WATERSHED - BASED WATER QUALITY CONTROL

The concept of comprehensive watershed level management of water resources is currently being incorporated into various elements of the State's Nonpoint Source Management Program. The watershed protection approach is an integrated strategy for more effectively protecting and restoring beneficial uses of state waters. By looking at an entire watershed, one can more clearly identify critical areas and practices which need to be targeted for pollution prevention and corrective actions. This approach not only addresses the waterbody itself, but the geographic area which drains to the watercourse. This strategy also integrates both surface and ground waters, inland

and coastal waters, and point and nonpoint sources of pollution. Point sources have received most of the regulatory attention in the past, however, significant improvements in point sources, coupled with continued water quality impairments, have necessitated that the water resources community look at a more integrated approach which considers impacts from both point and nonpoint sources of pollutants.

The Watershed Protection Approach is built on the following three main principles:

- The target watersheds should be those where pollution poses the greatest risk to human health, ecological resources, desirable uses of the water, or a combination of these;
- All parties with a stake in the specific local situation should participate in the analysis of the problems and the creation of solutions; and
- The actions undertaken should draw on the full range of methods and tools available, integrating them into a coordinated, multi-organizational attack on the problems.

Many agencies and organizations concerned with water resources have come to recognize that this type of approach can be very effective in realistically assessing cumulative impacts and formulating workable mitigation strategies. The Coastal Zone Management Act Re-authorization Amendments, US EPA guidance, and various legislative proposals clearly state the need to consider the implications of land use on water quality. US EPA program managers are re-thinking their approach to the allocation of resources (especially within the Nonpoint Source Program) and will be primarily funding studies that are part of a watershed planning and implementation effort.

The traditional approach to managing pollutant discharges into streams, lakes, and the ocean has evolved over time, often with separate programs to address various aspects of the total water quality problem. Some of these programs have different, overlapping, or conflicting priorities. Moving from the more facility-specific controls of the past to management of water quality on a watershed basis, will entail some growing pains. Many of the programs at our disposal will need to be reshaped and integrated at the watershed level. Some programs will need to be reoriented and integrated, while other programs may not be amenable to the watershed approach. Nonetheless, public agencies and private organizations concerned with water resources have come to recognize that a comprehensive evaluation of pollutant contributions on a watershed scale is the only way to realistically assess cumulative impacts and formulate workable strategies to truly protect our water resources. Both water pollution and habitat degradation problems can best be solved by following a basin-wide approach.

SAFETY FIRST
EYE PROTECTION REQUIRED

REMEDIATION OF POLLUTION

The Regional Board allocates substantial resources to the investigation of polluted waters and enforcement of corrective actions needed to restore water quality. Specific remediation programs include:

- Underground Storage Tanks Program including the Local Oversight Program;
- Spills, Leaks, Investigation and Cleanup Program (SLIC);
- Aboveground Petroleum Storage Tank Program; and
- Department of Defense Site Investigations;

The Regional Board sets cleanup goals based on the State's *Antidegradation Policy* set forth in State Board Resolution No. 68-16 and Resolution No. 92-49 *Policies and Procedures for Investigation and Cleanup and Abatement of Discharges Under Water Code Section 13304* and the Cleanup and Abatement Policy discussed later in this chapter. Under these policies, whenever the existing quality of water is better than that needed to protect present and potential beneficial uses, such existing quality will be maintained, with certain exceptions (as described in Chapter 5, *Plans and Policies*). Accordingly, the Regional Board prescribes cleanup goals that are based upon background concentrations. For those cases where dischargers have demonstrated that cleanup goals based on background concentrations cannot be attained due to technological and economic limitations, the Antidegradation Policy sets forth policy for cleanup and abatement based on the protection of beneficial uses. The Regional Board can, on a case-by-case basis, set cleanup goals as close to background as technologically and economically feasible. Such goals must at a minimum, restore and protect all designated beneficial uses of the waters.

Furthermore, such cleanup levels cannot result in water quality less than that prescribed in the Basin Plan and policies adopted by the State and Regional Board, and must be consistent with maximum benefit to the people of the State.

UNDERGROUND STORAGE TANKS

The Underground Storage Tank Program was enacted in 1983 and took effect January 1, 1984. The authority for the program is found in the Health and Safety Code, Division 20, Chapter 6.7, and the regulations for the program are found in the California Code of Regulations, Title 23, Division 3, Chapter 16. The regulations are designed to ensure the integrity of all underground storage tanks (UST), and to detect any leaks.

There are approximately 2,000 known cases of leaking underground storage tanks in the Region. Approximately 35 percent of the cases involve instances where only soil contamination is present, 35 percent involve instances where ground water contamination has been confirmed, and the remaining 30 percent are cases which have been closed. The majority of the releases from these underground storage tanks are gasoline and the constituent of most concern is benzene, a known carcinogen. A smaller percentage of the underground storage tank releases involve chlorinated industrial solvents, which are suspected carcinogens. As anticipated, the majority of the sites where these releases have occurred are automotive service stations. Tanks from industrial facilities contribute a smaller but significant minority. To date, these ground water impacts have affected only a few drinking water supply wells. The Regional Board maintains and regularly updates the Leaking Underground Storage Tank Information System (LUSTIS) database, which identifies all known underground storage tank release sites in the Region.

Implementation of the underground storage tank program includes direct Regional Board oversight of leaking underground storage tank cleanups. It also involves coordination of oversight activities with local agencies under contract with the State Board through the Local Oversight Program. Local agencies have the authority, pursuant to Section 25297.1 of the Health and Safety Code to act on behalf of the Regional Board in requiring investigations and cleanup of underground tank cases. The local agencies also implement the permitting, construction, inspections and monitoring portion of the Underground Tank Regulations. The Orange County Health Care Agency, the County of Riverside Department of Environmental Health and San Diego County Department of Health Services, Environmental Health Services handle the vast majority of the active cases in the Region.

Title 23, Division 3, Chapter 16, Article 11 provides that corrective action of releases from underground storage tanks includes one or more of the following phases:

- ***Preliminary Site Assessment Phase:*** This includes, at a minimum, initial site investigation, initial abatement actions and initial site characterization.

- ***Soil and Water Investigation Phase:*** This includes the collection and analysis of data necessary to assess the nature and vertical and lateral extent of the unauthorized release to determine a cost-effective method of cleanup.

- ***Corrective Action Plan Implementation Phase:*** This consists of carrying out the cost-effective alternative selected during the Soil and Water Investigation Phase for remediation or mitigation of the actual or potential adverse effects of the unauthorized release.

- ***Verification Monitoring Phase:*** This includes all activities required to verify implementation of the Corrective Action Plan and evaluate its effectiveness.

Cleanup levels for soil and ground water pollution resulting from leaking underground storage tanks will be established based on the Cleanup and Abatement Policy described later in this chapter.

UNDERGROUND STORAGE TANK CLEANUP FUND

The State Board, Division of Clean Water Programs, administers the Underground Storage Tank Cleanup Fund. The Cleanup Fund can be used as a mechanism to satisfy federal financial responsibility requirements and pay for corrective action and third party liability costs resulting from a leaking petroleum underground storage tank. The Fund can also pay for direct cleanup (by local agency or regional board) of underground storage tank sites requiring emergency and prompt action on abandoned or recalcitrant sites. This Fund, collected by the Board of Equalization, is supported by a 0.6 cent per gallon fee for gasoline. The Fund has been

established to provide reimbursement to tank owners or operators for costs of cleanup of the effects of unauthorized releases of petroleum. Up to one million dollars ($1,000,000) can be provided per site, with the first ten thousand dollars ($10,000) being provided by the claimant. With certain qualifications, expenditures made to remediate an unauthorized petroleum release since January 1, 1988 can be reimbursed and letters of credit can be issued for the funding of ongoing remediation activities.

Owners/ operators of petroleum USTs as defined in Section 25281(x) of the California Health and Safety Code and owners of petroleum USTs located on residential property who meet the following requirements are eligible for the fund:

- There has been an unauthorized release of petroleum from the UST reported to and confirmed by the regulatory agency.
- As a result of this unauthorized release, the owner/ operator must take corrective action as required by a regulatory agency.
- The owner/ operator must be in compliance with any applicable financial responsibility requirements and any UST requirements.

Regional boards provide technical support to both applicants who file claims against the underground storage tank Cleanup Fund and State Board staff members who verify the corrective action work that the claims cover. For claims that involve future work, the Regional Board will oversee site investigation and cleanup on cases for which they are the lead agency.

SPILLS, LEAKS, INVESTIGATION AND CLEANUP (SLIC)

Reports of unauthorized discharges, such as spills and leaks from above ground storage tanks are investigated through the Regional Board's Spills, Leaks, Investigation and Cleanup (SLIC) Program. This program is not restricted to particular pollutants or environments; rather, the program covers all types of pollutants (such as solvents, petroleum fuels, and heavy metals) and all environments (including surface and ground water, and the vadose zone). Upon confirming that an unauthorized discharge is polluting or threatens to pollute regional waterbodies, the Regional Board oversees site investigation and corrective action. Statutory authority for the program is derived from the California Water Code, Division 7, Section 13304. Guidelines for site investigation and remediation are promulgated in State Board Resolution No. 92-49 as amended on April 21, 1994 entitled "*Policies and Procedures For Investigation and Cleanup and Abatement of Discharges Under Water Code Section 13304*".

Cleanup levels for soil and ground water pollution resulting from sites investigated through the SLIC Program will be established based on the Cleanup and Abatement Policy described later in this chapter.

ABOVEGROUND PETROLEUM STORAGE TANKS

In order to prevent unauthorized discharges from aboveground petroleum storage tanks, the State of California has enacted legislation designed to lower the risk of spills and leaks. The state's Aboveground Petroleum Storage Act was enacted in 1989 and amended in 1991. The Act became effective on January 1, 1990 (Health and Safety Code, Chapter 6.67, §25270 et. seq.) The Act requires owners or operators of above ground petroleum storage tanks to file a storage statement with the State Board and implement spill prevention measures. Examples of such measures include daily visual inspections of any storage tanks containing crude oil or its fractions, the installation of secondary containment for all tanks with sufficient capacity to hold the contents of the largest tank at the facility plus sufficient volume for rainfall to avoid the overflow, and development of a "*Spill Prevention Control and Countermeasure Plan.*" In the event of an unauthorized release, the owner or operator must notify the Regional Board officials and undertake appropriate monitoring and corrective action. Additionally, annual fees are levied on tank owners. The Regional Board uses these fees to fund aboveground petroleum tank inspections and enforcement.

DEPARTMENT OF DEFENSE FACILITIES

There are twenty-two major Department of Defense (DoD) facilities in the San Diego Region. The following is a list of DoD facilities and the corresponding lead agency for the facility in the Region.

Department of Defense Facility	*Lead Agency*
United States Marine Corps Base, Camp Pendleton	US EPA
Coronado Navy Amphibious Base (NAVPHIBASE)	DTSC
Imperial Beach Auxiliary Landing Field	DTSC
Naval Air Station Miramar	DTSC
North Island Naval Aviation Depot	DTSC
Naval Air Station North Island	DTSC
San Diego Fleet Anti-Submarine Warfare Training Center (FASWTC PAC)	DTSC
San Diego Fleet Combat Training Center (FCTC PAC)	DTSC
Marine Corp Recruit Depot, San Diego	DTSC
Naval Command, Control and Ocean Surveillance Center (NCCOSC)	DTSC
San Diego Naval Computer and Telecommunications Station (NCTS)	DTSC
San Diego Naval Electronics Systems Engineering Center (NESEC)	DTSC
San Diego Naval Hospital	DTSC
32 Street Naval Station, San Diego	DTSC
Naval Submarine Base, San Diego	DTSC
Fleet Industrial Supply Center	DTSC
San Diego Naval Training Center	DTSC
San Diego Public Works Center	DTSC
San Diego Shore Intermediate Maintenance Activity	DTSC
Air Force Plant #19, San Diego	DTSC
Fallbrook Naval Weapons Station	DTSC
Search, Evade, Resist, Escape (SERE) Camp, Warner Springs	DTSC

Significant ground water contamination has been detected at a number of these facilities. Contamination is severe enough at one of these facilities to have it placed on US EPA's National Priorities List (NPL) for remediation under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA, commonly referred to as Superfund).

For the National Priority List facility (Camp Pendleton), the US EPA is the lead environmental regulatory agency for oversight of investigation and cleanup. CERCLA requires US EPA to consider applicable or relevant and appropriate state laws and regulations when establishing cleanup standards for remedial activities. To ensure that the state's concerns are properly addressed, two Cal/EPA agencies, the Regional Board and the Department of Toxic Substances Control (DTSC), also perform a significant oversight role in the investigations and cleanup of these facilities.

The US EPA, DoD, DTSC and the Regional Board have signed Federal Facility Agreements (FFA) for the National Priorities List facility. The intent of the FFA is to ensure that: (1) environmental impacts are investigated; (2) remedial actions are defined; (3) procedural framework or schedules are established; (4) cooperation among agencies is facilitated; (5) adequate assessment is performed; and (6) compromise is reached.

The US EPA is not involved in the investigation and cleanup of DoD facilities that are not on the National Priority List (DoD facilities other than Camp Pendleton). However, many of the facilities potentially have significant contamination. In these cases, the Regional Board and DTSC enter into Federal Facility Site Remediation Agreements (FFSRA) with DoD. Federal Facility Site Remediation Agreements are very similar to the above-mentioned Federal Facility Agreements, with the exception that US EPA is not a party.

In the table above showing the Department of Defense Facilities in the San Diego Region, the DTSC has been identified as the "*lead*" agency, and the Regional Board is the "*support*" agency. A Memorandum of Understanding has been signed by the State Board and DTSC which describes the roles of each agency. The Regional Board's oversight role is with regard to the investigation and cleanup of water resources that have been impacted, or are threatened, by waste discharges from the facilities. The Regional Board's responsibility also extends to source areas (landfills, contaminated soil, etc.) that currently, or may in the future, pose a threat to water quality. DTSC's role is to address all other environmental aspects including health risk assessment, air emissions, community relations, etc.

The State Board and DTSC have entered into a two-year cooperative agreement with the Department of Defense for cleanup and oversight reimbursement. All work performed by the State agencies with regard to the investigation and cleanup of environmental problems at these facilities is fully reimbursed by DoD.

Cleanup levels for soil and ground water pollution resulting from Department of Defense facilities will be established based on the Cleanup and Abatement Policy described later in this chapter.

CLEANUP AND ABATEMENT POLICY

I. CONTAMINATED SOIL AND GROUND WATER

The Regional Board has identified numerous sites where unauthorized waste discharges have resulted in soil and ground water pollution. The majority of these sites have been identified as a result of the Regional Board's implementation of the remediation programs described previously in this Chapter. The unauthorized waste discharges at many of these sites have resulted in adverse effects on water quality and beneficial uses. In some cases the polluted sites pose a threat to the public health. It is the responsibility of the Regional Board to establish cleanup and abatement goals and objectives for the protection of water quality and the beneficial uses of waters of the state in this Region which are consistent with applicable state and federal statutes and regulations.

Water Code Section 13304 authorizes the Regional Board to require cleanup and abatement of soil and ground water pollution. The Cleanup and Abatement Policy described below shall apply to all types of discharges subject to Water Code Section 13304.

II. PURPOSE OF POLICY

The purpose of this Cleanup and Abatement Policy is to provide:

A. Guidance to dischargers involved in the investigation, cleanup and abatement of soil and ground water pollution sites to ensure these activities are in conformance with applicable state and federal laws, regulations and policies;

B. Guidance to dischargers on Regional Board methodology for determining cleanup levels at soil and ground water pollution sites; and

C. Consistency and uniformity in Regional Board requirements for investigation, cleanup and abatement of analogous discharges that involve similar wastes, site characteristics, and water quality considerations.

III. CLEANUP AND ABATEMENT PRINCIPLES

A. The Cleanup and Abatement Policy is guided on the following principles, which are based on Water Code Sections 13000 and 13304, California Code of Regulations (CCR), Title 23, Division 3, Chapter 15 (hereinafter Chapter 15), CCR, Title 23, Division 3, Chapter 16 (hereinafter Chapter 16), and applicable State Water Resources Control Board (State Board) policies. The Regional Board shall require:

1. Cleanup and abatement actions to conform with the provisions of State Board Resolution No. 68-16 (*Statement of Policy with Respect to Maintaining High Quality Waters in California*) provided that under no circumstances shall these provisions be interpreted to require cleanup and abatement which achieves water quality conditions that are better than "*natural*" background conditions.

2. Cleanup and abatement actions to conform with the provisions of State Board Resolution No. 92-49, *Policies and Procedures for Investigation and Cleanup and Abatement of Discharges under Water Code Section 13304*;

3. Cleanup and abatement actions to conform with applicable or relevant provisions of Chapter 15 to the extent feasible;

4. Cleanup and abatement actions to implement the applicable provisions of Chapter 16 for investigations and cleanup of hazardous substances from underground storage tanks; and

5. Dischargers to cleanup and abate the effects of discharges in a manner that promotes attainment of either background water quality, or the best water quality which is reasonable if background levels of water quality cannot be restored, considering all demands being made and to be made on those waters and the total values involved, beneficial and detrimental, economic and social, tangible and intangible. Any alternative cleanup

levels less stringent than background shall apply Section 2550.4 of Chapter 15, or, for cleanup and abatement associated with underground storage tanks, apply Section 2725 of Chapter 16, provided that the Regional Board considers the conditions set forth in Section 2550.4 of Chapter 15 in setting alternative cleanup levels pursuant to Section 2725 of Chapter 16. Any such alternative cleanup level shall:

a. Be consistent with maximum benefit to the people of the State;

b. Not unreasonably affect present and anticipated beneficial use of such water; and

c. Not result in water quality less than prescribed in the Water Quality Control Plans and Policies adopted by the State and this Regional Board.

IV. *CLEANUP AND ABATEMENT INVESTIGATIONS*

A. The Regional Board shall apply the guidelines described in IV.B. below in overseeing investigations to determine the nature and extent of a discharge and appropriate cleanup and abatement measures. The level and complexity of the investigations, assessments, and feasibility studies of cleanup and abatement alternatives required below shall be determined by the discharge type, the extent of pollution, and any other applicable site-specific characteristic(s).

B. The Regional Board shall require dischargers to:

1. Investigate the nature and extent of the discharge or threatened discharge to ensure that adequate cleanup plans are proposed. The goal of the investigation shall be to adequately characterize the pollutants in the discharge and determine the vertical and horizontal extent of pollution in soil and ground water. The investigation shall determine where concentrations of pollutants reach background levels. The investigation shall extend off-site to any location necessary to determine the source and assess the vertical and horizontal extent of the discharge.

2. Take immediate action to remove, treat, or contain pollution source(s) to the maximum extent practicable. Sources of pollution may include:

   a. Ongoing sources of discharge from storage or distribution systems for wastes or hazardous materials;

   b. Soils or ground water which are polluted with mobile or immobile concentrations of non-aqueous phase liquids (NAPLs);

   c. Soils which are polluted with leachable concentrations of soluble pollutants;

   d. Polluted soils which are eroded and transported to storm drains, abandoned or active wells, surface waters, or lands beyond the control of the discharger.

3. Submit the following information for consideration in establishing cleanup levels in accordance with the conditions set forth in Chapter 15, Section 2550.4:

   a. An assessment of the adverse effects on ground water quality and beneficial uses;

   b. A risk assessment to determine impacts and threats to human health and the environment; and

   c. A feasibility study of cleanup alternatives which compares effectiveness, relative cost, and time to attain the following alternative cleanup levels;

      (1) background levels;

      (2) levels which meet all applicable water quality objectives and which do not pose significant risks to health or the environment, and

      (3) an alternate cleanup level in between the cleanup levels described in (1) and (2) above

which meets the requirements as specified in Section III.A.5. of this Cleanup and Abatement Policy.

4. Provide documentation that plans and reports are prepared by professionals qualified to prepare such reports, and that all investigative, and cleanup and abatement activities are conducted under the direction of appropriately qualified professionals. Professionals should be qualified, licensed where applicable, and competent and proficient in the fields pertinent to the required activities. A statement of qualifications of the responsible lead professionals shall be included in all plans and reports submitted by the discharger.

V. *APPROVAL of CLEANUP LEVELS*

A. The Regional Board shall approve soil and ground water cleanup levels through the adoption or affirmation of cleanup and abatement orders; or

B. The Executive Officer or a local agency may approve cleanup levels as appropriately delegated by the Regional Board.

VI. *GROUND WATER CLEANUP LEVELS*

A. Ground water cleanup levels shall be based on:

1. The provisions of State Board Resolution No. 68-16, *Statement of Policy with Respect to Maintaining High Quality of Waters in California*, State Board Resolution No. 88-63, *Sources of Drinking Water*, and State Board Resolution No. 92-49, *Policies and Procedures for Investigation and Cleanup and Abatement of Discharges under Water Code Section 13304*;

2. Applicable narrative and numerical water quality objectives and beneficial uses described in Chapters 2 and 3 of this Basin Plan;

3. Pollutant concentrations which do not pose a significant threat to human health or the environment. Threat to human health and the environment shall be determined through a risk assessment.

a. The Regional Board is not the lead agency for specifying risk assessment procedures. The risk assessment shall be conducted using the most current procedures authorized by the California Department of Toxic Substances Control, Office of Environmental Health Hazard Assessment or the United States Environmental Protection Agency. The Regional Board will assist the discharger, as necessary, in obtaining the appropriate, most current, procedures from these agencies.

b. In the absence of scientifically valid data to the contrary, theoretical risks from chemical constituents shall be considered additive across all media of exposure, and shall be considered additive for all chemicals having similar toxicological effects or having carcinogenic effects;

c. The Regional Board is not the lead agency for reviewing risk assessments. The Regional Board will rely on the California Department of Toxic Substances Control, Office of Environmental Health Hazard Assessment, or appropriately designated regulatory local health agencies to review and evaluate the adequacy of risk assessments.

d. The discharger shall submit the risk assessment to the Regional Board in accordance with Section IV.B.3.b. of this policy. The Regional Board will coordinate the review of the risk assessment in accordance with the following hierarchy:

(1) The Regional Board will first seek the assistance of any appropriate supporting health agency currently involved with the cleanup of the site.

(2) If unsuccessful, the Regional Board will seek the assistance of

previously uninvolved appropriate health agencies.

(3) If unsuccessful, the Regional Board will seek the assistance of the California Department of Toxic Substances Control in accordance with the terms and conditions of the MEMORANDUM OF UNDERSTANDING BETWEEN THE DEPARTMENT OF HEALTH SERVICES AND THE STATE WATER RESOURCES CONTROL BOARD, THE REGIONAL WATER QUALITY CONTROL BOARDS FOR THE CLEANUP OF HAZARDOUS WASTE SITES. AUGUST 1, 1990.

4. Applicable state and federal statutes and regulations;

5. Relevant standards, criteria, and advisories adopted by other state and federal agencies;

6. Technical and economic feasibility of attaining background concentrations and of attaining concentrations lower than defined by 2 and 3 above. Technical and economic feasibility shall be determined in accordance with the following criteria:

   a. Technical feasibility shall be determined by assessing the availability of technologies which have been shown to be effective in reducing the pollutant concentrations to the established cleanup levels. Bench-scale and/or pilot-scale studies may be necessary to make this feasibility assessment.

   b. Economic feasibility refers to the objective balancing of the incremental benefit of attaining more stringent cleanup levels compared with the incremental cost of achieving those levels. Economic feasibility does not refer to the subjective measurement of the discharger's ability to pay the costs of cleanup.

   c. Applicable factors to be considered in the establishment of cleanup levels greater than background are listed in Chapter 15, Section 2550.4.

   d. The discharger's ability to pay is one factor to be considered in determining whether the cleanup level is reasonable. However, availability of economic resources to the discharger is primarily considered in establishing reasonable schedules for compliance with cleanup levels.

B. The Regional Board shall set ground water cleanup levels to attain background water quality, unless the discharger demonstrates that it is either technically or economically infeasible to attain background water quality. If the discharger makes such a demonstration to the satisfaction of the Regional Board, cleanup levels are set between background water quality concentrations and concentrations that meet all criteria in items A.2 and A.3 above. Within this concentration range, cleanup levels will be set at the lowest concentrations that are technically and economically feasible to achieve. In no case will cleanup levels be established below natural background conditions.

C. Compliance with cleanup levels must occur at all points throughout the plume or area of contamination to protect potential beneficial uses of water resources as required by California Water Code Sections 13000 and 13244 and Health and Safety Code Section 25356.1 (c).

D. The Regional Board may consider relaxing ground water cleanup levels that were previously established at levels more stringent than applicable water quality objectives, only when a final remedial action plan has been pursued in good faith and all of the following conditions are met:

   1. Modified cleanup levels meet the conditions listed in VI.A.1., VI.A.2., and VI.A.3. above; and

   2. An approved cleanup program has been fully implemented and operated for a period of time which is adequate to understand the hydrogeology of the site,

pollutant dynamics, and the effectiveness of available cleanup technologies; and

3. Adequate source removal and/or isolation is undertaken to eliminate or significantly reduce future migration of pollutants to ground water; and

4. The discharger has demonstrated that no significant pollutant migration will occur to other underlying or adjacent aquifers; and

5. Ground water pollutant concentrations have reached asymptotic levels (i.e., pollutant concentration reductions are no longer significant) using appropriate technology; and

6. Alternative remediation techniques for achieving cleanup levels have been evaluated and are inappropriate or not economically feasible.

VII. SOIL CLEANUP LEVELS

A. Soil pollution can present a health risk and a threat to water quality. The Regional Board designates soil cleanup levels for the unsaturated zone based upon threat to water quality and risk to human health or the environment. Guidance from the US EPA, Department of Toxic Substances Control, or the Office of Health Hazard Assessment is considered in determining health and environmental risks. Cleanup levels for contaminated soils which threaten water quality, shall be established in accordance with the following criteria:

1. Concentrations of the residual leachable/mobile pollutants shall be equal to background concentrations unless background levels are technically or economically infeasible to achieve.

2. Where background levels are technically or economically infeasible to achieve, soil cleanup levels shall be established to ensure that residual leachable/mobile pollutants will not cause, or threaten to cause, exceedances of applicable ground water cleanup levels or water quality objectives, and do not pose significant risks to health or the environment.

3. Soil cleanup levels less stringent than background may be based on site specific technical evaluations of pollutant fate and transport processes, human health and environmental risk assessment methods as long as such methods are based on site specific field data, technically sound principles, and the criteria described in VII.A.2. above.

B. Where residual leachable/mobile soil pollutants which threaten water quality remain on site the discharger shall:

1. Implement measures as necessary to ensure that soils with residual pollutants are covered or otherwise managed to minimize pollution of surface waters or exposure to the public; and

2. Implement the applicable provisions of Chapter 15 to the extent that it is technologically or economically feasible to do so as described in State Board Resolution No. 92 - 49. This may include, but is not limited to, subsurface barriers or other containment systems, pollutant immobilization, toxicity reduction, and financial assurances.

C. The Regional Board shall generally require sampling to verify soil cleanup and may also require follow-up ground water monitoring. The degree of monitoring will reflect the amount of uncertainty associated with the soil cleanup level selection process. Follow-up ground water monitoring may be limited where residual concentrations of leachable/mobile pollutants in soils are not expected to adversely affect ground water quality.

VIII. TIME SCHEDULES

The Regional Board shall determine schedules for investigation, and cleanup and abatement, taking into account the following factors:

A. The degree of threat or impact of the discharge on water quality and beneficial uses;

B. The obligation to achieve timely compliance with cleanup and abatement goals and objectives that implement the applicable

Water Quality Control Plans and Policies adopted by the State and Regional Board;

C. The financial and technical resources available to the discharger; and

D. Minimizing the likelihood of imposing a burden on the people of the state with the expense of cleanup and abatement, where feasible.

OTHER PROGRAMS

CALIFORNIA WATER QUALITY ASSESSMENT (WQA)

The Water Quality Assessment (WQA) is a catalog of the State's major waterbodies and their water quality condition. Each Regional Board prepares and adopts a Regional WQA identifying and categorizing the major water bodies in each region. The California WQA is a compilation of the nine Regional WQAs which is adopted by the State Board. The WQA is updated as necessary every two years.

Water bodies are categorized as Good Quality Waters, Intermediate Quality Waters, Impaired Waters or Unknown Quality Waters. The definition of each of these categories is explained below:

Good Quality Waters: are waters that support and enhance the designated beneficial uses. Water bodies classified as good may be designated as a high priority by the Regional Board if a threat to water quality is present.

Intermediate Quality Waters: are waters that support designated beneficial uses while there is occasional degradation of water quality. For example, biological data may show minor changes in population densities and distribution; however, direct observation of the water shows the uses are supported. Intermediate quality waters also include those water bodies where there is an indication of suspected impairment but available data is inadequate to reach a definitive conclusion on the condition.

Impaired Waters: are water bodies that cannot reasonably be expected to attain or maintain applicable water quality standards. A water quality standard includes both State and Regional Board numeric and narrative water quality objectives and the beneficial use(s) the objectives are meant to protect. The interpretation that a water body is "*impaired*" may be clear when data indicate that adopted objectives are continually exceeded or that beneficial uses are not protected (e.g., health warnings are in effect). In many cases this determination will involve evaluating many sources of data to arrive at a best professional judgement by the Regional Board staff. A more detailed description of impairment for various classes of pollutants can be found in the criteria for the Clean Water Strategy.

Unknown Quality Waters: are water bodies with unknown water quality where limited or no direct observations are available.

The Water Quality Assessment serves several different purposes. The WQA provides the foundation of the State Board's Clean Water Strategy (CWS). The CWS is a management tool used to identify waterbodies of high concern and is used by the State Board to allocate resources to the highest priority water quality problems.

The WQA also satisfies several federal Clean Water Act requirements for lists and reports including those for Section 131.11, Section 303(d), Section 304(m), Section 304(s), Section 304(l), Section 314 and Section 319 lists. These federal lists are described below:

- ***Section 131.11:*** The 131.11 list describes segments which may be affected by toxic pollutants, or segments with concentrations of toxic pollutants that warrant concern.

- ***Section 303(d):*** The 303(d) list identifies those waters that do not meet water quality standards after application of technology based controls. Applicable water quality standards include the designated beneficial uses and the adopted water quality objectives.

- ***Section 304(m):*** The 304(m) list is a "*mini-list*" of waters not meeting State adopted numeric water quality objectives due to toxic sources after implementation of BAT/BCT.

- ***Section 304(s):*** The 304(s) list is a "*short-list*" of waters not achieving water quality standards due to point source discharges of toxic pollutants after implementation of BAT/BCT.

- ***Section 304(l):*** The 304(l) long list describes waters that are not meeting standards, objectives, or goals of the Clean Water Act due to point and nonpoint source discharges of any pollutants.

- ***Section 314:*** The 314 list describes lake priorities for restoration.

- ***Section 319:*** The 319 list describes impaired surface waters from nonpoint source problems due to both toxic and nontoxic pollutants.

The WQA reports to the public on the condition of the state's waterbodies in a highly summarized tabular format. It is organized by region by waterbody type. In some cases an entire watershed is included under one water quality classification. In other cases, segments of waterbodies are listed separately because of their unique differences or problems. Water quality problems for each waterbody are briefly described when known or suspected. As explained above, waterbodies are classified as good, intermediate, impaired and unknown. The size of each water body is also shown and is used to denote the extent of the waterbody listed under each water quality classification. For example, the WQA indicates that in Central Mission Bay, 1030 acres are good water quality and 10 acres are impaired. For waterbodies with water quality problems, the source is listed as point, nonpoint, or both. The WQA also indicates if a fact sheet has been prepared to further identify water quality problems and locations.

CALIFORNIA'S 303(d) PROCESS

The Clean Water Act, Section 303(d), requires the State to identify those waters that do not meet water quality standards after application of technology based controls. Applicable water quality standards include the designated beneficial uses and the adopted water quality objectives.

Waters identified under Section 303(d) are designated as Water Quality Limited Segments (WQLSs). Section 303(d) requires the establishment of a priority ranking of these WQLSs for purposes of developing Total Maximum Daily Loads (TMDLs), and establishing Waste Load Allocations (WLAs), and Load Allocations (LAs). The Total Maximum Daily Load (TMDL) is the amount of a pollutant that can be discharged into a water body and still maintain water quality standards. Pollutant loadings above the TMDL are expected to adversely affect water quality by causing receiving waters to exceed applicable water quality standards. The TMDL is the sum of waste load allocations (WLAs) for point sources of pollution, load allocations (LAs) for nonpoint sources of pollution and natural background sources, and a margin of safety. Allocations of pollutant loadings to point and nonpoint sources must be calculated to ensure that applicable water quality standards are not exceeded in the receiving water. After development of a 303(d) list and TMDLs, WLA, and LA, states are required to submit them to USEPA for review and approval.

The process that the State Board has for establishing and implementing the TMDLs as required by Section 303(d) is described in the "*California Report on Impaired Surface Waters*", dated July, 1992 [California 303(d) report]. The US EPA has endorsed the California TMDL process. The Regional Board will implement the California TMDL process as approved by US EPA to comply with Section 303(d) of the Clean Water Act.

In the California 303(d) report, the State Board identified the following four major activities needed to comply with Section 303(d): (1) the Water Quality Assessment (WQA); (2) identification of highest priority waters; (3) preparation of action plans (TMDL worksheets); and (4) a periodic review and update. The Clean Water Act dictates that appropriate revisions to Section 303(d) list be considered every 2 years.

The 303(d) list of WQLS is based on the WQA adopted by the Regional Board and State Board. The WQA is a catalog of the State's major waterbodies. The WQA process includes identifying the general condition of each waterbody and which federal lists including 303(d) list may apply. The Regional Board staff prepares the WQA based upon review of current information and public and agency input. Each Regional Board adopts its regional WQA at public meetings. These regional WQA are then compiled into the statewide WQA which is adopted by the State Board.

Action Plans (TMDL Worksheets) were requested to be prepared for three water bodies per region. The TMDL Worksheet requires a minimum of specific information which is required to address a 303(d) listed water body. The information in the TMDL Worksheet provides a summary of the problem, the location, the water quality target, and the activities intended to meet the target. The TMDL Worksheet is not intended to be a comprehensive watershed management plan. Instead the Worksheet is intended to identify projects that are on-going and actions which are required in order to reach the quantifiable target.

The TMDL Worksheets have three major sections which describe the waterbody of concern, the water quality target, and the actions required to meet the target.

The first major section of the TMDL Worksheet describes the location, areal extent, pollutants, sources, etc. This information is derived from the WQA database. The problem description provides a brief narrative to assist the reader in understanding the magnitude of the problem.

The "*Quantifiable Target*" is the second major section of the Worksheet and is the focal point for all of the actions. The term quantifiable target is intended to provide a more understandable goal instead of the Clean Water Act's use of the term Total Maximum Daily Load (TMDL). Put simply, the State's use of quantifiable target is to be considered a TMDL or a phased TMDL. The purpose of the target must be to improve, restore or protect the beneficial use identified as adversely affected. Measurable changes in the beneficial use may take years to accomplish after all of the measures are implemented.

The third major section of the TMDL Worksheet describes the implementation and monitoring strategy. The Clean Water Act uses the terms Waste Load Allocation (WLA) and Load Allocation (LA). WLAs are designated for point sources and LAs for nonpoint sources. These terms simply imply that one means to protect beneficial uses is to decide the maximum amount of a pollutant that can be added to a water body without affecting the use. Once a load has been determined these terms imply that the State simply allocates maximum loadings to various sources. This simplistic approach is not workable for most, if not all, of the water quality problems on California's 303(d) list.

The great majority of California's water quality problems are caused by nonpoint sources. Measuring, allocating, and regulating nonpoint source loads as if they were point sources is not practical. The measures that need to be implemented are more complex and require coordination of numerous activities over long periods of time. For these reasons the California 303(d) Report replaced the use of the terms WLA and LA with Implementation Strategy. The Implementation Strategy includes studies, monitoring, basin planning, permits and demonstration projects.

As noted above, this TMDL process is developmental and will be subjected to periodic review and modification every 2 years as needed. The update will include an assessment of progress made on the scheduled actions identified in the TMDL worksheets. The update will be conducted by State and Regional Board staff, as well as by US EPA representatives. The update will address the following:

(1) Water body listing and targeting procedures, criteria, and results.

(2) Minimum requirements for establishing "*Quantifiable Targets*", and Implementation Measures and how these terms meet the requirements of the Act for establishing TMDLs, WLAs, and LAs.

(3) Progress in establishing Quantifiable Targets for targeted water bodies.

(4) Adequacy of public participation.

(5) Progress in targeting US EPA funds and programs toward actions required on targeted water bodies.

(6) Ability of the State and US EPA to integrate the TMDL process into other programs such as the Coastal Nonpoint Control Program.

(7) How to integrate threatened and unknown waters into the process.

(8) How this program can assist the State in managing water quality problems on a watershed basis.

SAN DIEGO BAY TOTAL MAXIMUM DAILY LOAD (TMDL) WORKSHEETS

The first TMDL worksheets in the San Diego Region are for San Diego Bay. These worksheets describe the water quality limited segments in San Diego Bay and the sources of contaminants. They also contain an Implementation Strategy which includes a number of projects with interim deadlines. The Regional Board is committed to achieving these interim deadlines, as time and resources allow. The TMDL worksheet for San Diego Bay contains the following quantifiable targets which the Regional Board plans to achieve by January 1, 1997.

(1) Compliance with the following numerical quantifiable water quality targets for water quality limited segments in San Diego Bay:

Pollutant	Objective	Time Frame
PCBs	30 ng/l	daily average
PCBs	70 pg/l	30-day average
Copper	2.9 ug/l	1-hour average
Mercury	2.1 ug/l	1-hour average
Mercury	25 ng/l	30-day average
TBT	5.0 ng/l	30-day average

(2) Termination of all illicit waste discharges to San Diego Bay.

(3) Cleanup of sediment in Convair Lagoon by Teledyne Ryan Aeronautical to less than an action level of 10 mg/kg PCB (dry weight) as required by Cleanup and Abatement Order No. 86-92.

(4) Cleanup of contaminated sediment caused by illicit boatyard waste discharge within Commercial Basin to less than 530 mg/kg copper (dry weight) and 4.8 mg/kg mercury (dry weight) as required by Cleanup and Abatement Order Nos. 88-79, 89-31, 88-78, 89-32, and 88-86. TBT concentrations in Commercial Basin water and sediments have been greatly reduced due to natural degradation processes and recent changes in regulations mandating reduction in the use of TBT in antifouling paint for small boats. The water column TBT concentration in Commercial Basin is expected to continue to decrease to below the water quality objective.

(5) Termination of all copper ore discharges to San Diego Bay from the 24th Street Marine Terminal in accordance with Cleanup and Abatement Order 85-91.

(6) Cleanup of bay sediment adjacent to the 24th Street Marine Terminal to less than 1,000 mg/kg copper (dry weight) by in accordance with Cleanup and Abatement Order 85-91.

(7) Improvement of the assessment of water quality in San Diego Bay by establishing a bay wide sediment and water column monitoring program to determine the overall water quality of San Diego Bay.

(8) Review each year, as staff resources allow, of available water quality data and general progress towards achieving the quantifiable targets and adjustment of actions as necessary.

(9) Removal of Convair Lagoon, Commercial Basin, Shelter Island Yacht Basin, and the 24th Street Marine Terminal portions of San Diego Bay from the Clean Water Act Section 303(d) list of impaired waterbodies.

GROUND WATER MANAGEMENT

Ground water management programs can both enhance water quality and protect beneficial uses of ground water in the larger basins of the San Diego Region. These management programs consist of measures for the periodic monitoring and assessment of ground water levels and quality; the planned extraction and export of poor quality ground water with recharge of better quality water from an outside source; controls established on the use of ground water within the basin; and controls on inflow of poor quality water from outside the basin.

Because of the limited amount of natural recharge, the use of reclaimed water for ground water recharge must be considered in any effective ground water management program in the San Diego Region. For this reason, agencies involved in wastewater disposal play a vital role in the development of these programs. Several local and state agencies, as well as some private consultants have been studying ways to encourage this approach for protecting the Region's ground water basins. Proponents have noted that there are many advantages in storing water and reclaimed water in ground water aquifers as opposed to surface water reservoirs. Underground facilities are less costly than surface storage facilities and they are less land intensive than surface water reservoirs. Also, the ground water aquifers can serve as distribution systems, minimizing the need for surface water transport facilities. In addition, reclaimed water stored in ground water aquifers are not subject to evaporative losses.

Filtration through the soils in the basin can provide additional treatment of the reclaimed water, and injection of reclaimed water along the coastal strip can be used to help combat seawater intrusion.

Ninety percent of the potable water supply for the San Diego Region comes from two major sources of imported water. Water from the Colorado River is imported through the Colorado River Aqueduct and water from northern California is imported through the State Water Project. Both sources are blended to form San Diego Region's water supply. Additionally, approximately ten percent of the water supply comes from local reservoirs. The quality of

the imported water has been showing increases in mineral content, particularly boron, percent sodium and total dissolved solids (TDS). Direct use of this supply reflects the mineral content of Colorado River water. Each additional use of the water (reclaimed from this supply) for irrigation and ground water recharge incrementally increases the dissolved mineral content.

Water reclamation activities should, then, be focused on local benefits and impacts on ground water quality. Proposed projects should be examined in terms of:

- Areas with high reclaimed water demands;
- Constituent concentrations in relation to basin plan objectives;
- Assimilative capacity of receiving basins; and
- Potential for improving ground water quality in near-surface and deep aquifers.

The major basins in San Diego County that have been studied for the implementation of a ground water management plan are the San Pasqual Valley, the Lower San Luis Rey Valley, Lower San Dieguito River Valley, Santee Basin, Lower Sweetwater River Basin, Lower Tijuana River Basin, Upper Santa Margarita River Basin, and the San Juan Creek Basin. A goal of these management plans is to rejuvenate the quality of the ground water in these basins to meet basin objectives. The general plan is to pump the poor quality ground water from these basins to the ocean, and recharge the basins with reclaimed and natural run off waters, which will then be extracted for beneficial use when water quality objectives are met. The following is a description of the proposed programs.

SAN PASQUAL VALLEY

The San Pasqual ground water management plan would utilize between 5000 and 8000 acre-feet per year of reclaimed water for agricultural irrigation and ground water recharge, thus reducing the need for this amount of imported water. The reclaimed water is available from the City of Escondido Hale Avenue Wastewater treatment plant, which presently discharges directly to the ocean. The City of San Diego owns 7,436 acres of land in the San Pasqual Valley which has been set aside as an agricultural preserve. There is 38,000 acre-feet of usable ground water in the valley. The western portion of the valley has degraded ground water quality, and has been designated as the reclamation basin. There is a plan to pump this poor quality ground water to the ocean and recharge the basin with reclaimed water of higher quality, to provide a positive salt balance. When the ground water quality improves, it will be used for irrigation of parks and golf courses, the Wild Animal Park and for landscape and freeway irrigation. There is a large and continued demand for irrigation water in the area. The eastern portion of the basin is designated as potable, and efforts will be made to keep the quality of the ground water from degrading. A third part of the basin, called the Narrows, is located between the San Pasqual reclamation basin and the Hodges basin. It has a very small capacity and will be used to prevent surface and ground water flows of reclaimed water from entering Lake Hodges Reservoir, a potable storage reservoir for the City of San Diego.

LOWER SAN LUIS REY VALLEY

Imported water comprises almost the entire supply for this basin. Ground water use is limited due to deteriorated water quality. There are four operating wastewater treatment facilities in this basin that could supply over 12,000 acre-feet per year of treated wastewater that could be used for ground water recharge or other beneficial uses. At the present time reclaimed water is only being used for freeway landscape irrigation. Many springs and wells that used to be ephemeral, now flow all year long with imported irrigation return water. In many areas of this basin, reclaimed water is of higher quality than the existing ground water quality. Use of reclaimed water can be utilized to improve the conditions of the ground water quality.

LOWER SAN DIEGUITO RIVER VALLEY

The San Dieguito ground water management plan includes the utilization of approximately 2000 to 4000 acre-feet per year of recharge of reclaimed water. The reclaimed water will initially be used for irrigation, rejuvenation of non-potable ground water resources and for creating a fresh water barrier near Interstate 5. Water from the City of Escondido's Hale Avenue Reclamation Facility will be treated to tertiary treatment standards and pumped to the reclamation area in the San Dieguito Valley, where it will undergo recharge to replace poor quality water pumped to the ocean or desalted and treated to potable water standards. This reclaimed water will be used for agriculture and landscape irrigation. As the ground water quality improves, this basin could supply water to areas outside the basin, such as La

Jolla Valley and North City West for landscape irrigation. The San Dieguito Basin lacks a centralized wastewater collection system. Water services are provided by four different governmental agencies, and sewer service is provided by eight governmental agencies. There are plans to interconnect the existing and proposed treatment facilities into an integrated system which can supply reclaimed water throughout the basin. The benefits of a ground water management plan in this basin include inexpensive storage and distribution of excess reclaimed water flows available during low irrigation months. This ground water management plan will result in improved ground water quality and will provide an efficient use of available water resources.

SANTEE

The Padre Dam Municipal Water District is reviewing the feasibility of a comprehensive ground water management plan for Santee Basin. Ground water from the eastern part of the basin is used for domestic, agricultural and stock watering purposes, and generally has TDS concentrations of 260-1310 mg/l. The ground water in the main portion of the Santee basin has TDS concentrations of up to 2,990 mg/l. In times of drought, this water could supplement imported water supplies. At the present time, reclaimed water is used only for recreational purposes at Santee Lakes Campground, and Park. The Padre Dam Municipal Water Districts 1.0 MGD tertiary and 2.0 MGD secondary capacity treatment facility provides 1,200 acre feet per year of reclaimed water which is used for the Santee Lakes. Water from Lake No. 1 is used to irrigate the landscaping of the surrounding the lakes. Currently only 1 MGD of the plant's capacity is being utilized. All flows over 1 MGD are sent to the Metropolitan Sewer System. Future water reuse projects include another 1,200 acre-feet per year projected need for the Santee Town Center and city park and approximately 1,400 acre-feet per year for industrial use. High quality reclaimed water could provide a potential source for recharging the ground water basin and improve existing water quality. Careful management of the basin could mitigate impacts of a high water table to prevent resurfacing of reclaimed water.

LOWER SWEETWATER RIVER BASIN

The Sweetwater Authority completed initial ground water basin studies of the Lower Sweetwater River Basin in June, 1993. As part of the agency's water resources program, the Sweetwater Authority is reviewing the feasibility of using ground water from the Lower Sweetwater Basin to augment its potable water supply.

The Lower Sweetwater Basin extends along the Sweetwater River from the Sweetwater Reservoir Dam approximately eight miles to San Diego Bay. It consists of an alluvial aquifer and the underlying San Diego Formation aquifer. Current use of ground water within the basin is limited, with turf irrigation the predominate use. The Basin is recharged from natural runoff and water from the upstream urban runoff diversion system which, in part, surrounds the Sweetwater Reservoir and spills over the Sweetwater Dam. Water quality data indicate that the ground water is moderately saline with total dissolved solids concentrations averaging 1400 mg/l.

The Sweetwater Authority is currently evaluating the feasibility of constructing ground water extraction wells, a water treatment facility, a brackish water pipeline from each well to the treatment facility, a product water delivery pipeline and pump station, and a brine disposal pipeline. Preliminary findings indicate that extraction and treatment (to potable water standards) of 1600 to 3600 acre-feet per year of ground water from the Lower Sweetwater River Basin is feasible. Some additional production and/or ground water storage may be available in the San Diego Formation aquifer. San Diego Formation hydrogeological studies are ongoing; however preliminary findings indicate that the managed storage potential in the aquifer may be significant.

LOWER TIJUANA RIVER BASIN

The Tijuana Valley County Water District adopted a Resolution of Intention to prepare a Ground Water Management Plan in accordance with California Water Code Sections 10750 - 10755 in February, 1993. The stated goals of the District are summarized as follows:

- Protect ground water quality and quantity in the Tijuana River Basin for existing and future property owners, agricultural and recreational users;
- Develop the ground water basin into a sub-regional water supply reservoir;
- Provide water to Valley customers and sell excess ground water to customers outside the Basin;
- Implement measures for ground water recharge with surface floodwater containment and runoff

control facilities, and reclaimed water, if available; and

- Work with the City and County of San Diego and appropriate state and federal agencies, to propose a workable international floodwater and wastewater control solution for the Valley.

The District's current plans include development of ground water management alternatives for the production and treatment of approximately 2,500 acre- feet per year of potable ground water.

UPPER SANTA MARGARITA RIVER BASIN

In Riverside County, the upper Santa Margarita River Basin contains several million acre-feet of high quality ground water in the Pauba/ Temecula aquifer system. The Rancho California Water District is considering a plan that will implement the use of reclaimed water for beneficial uses and for ground water recharge. Some changes in basin plan water quality objectives are needed to develop this project. The Santa Rosa SBR Water Reclamation Facility, near Temecula, percolates reclaimed waters through highly permeable alluvium, which recharge and mix with ground water in an upper aquifer. A tentative projection calls for 5 MGD of reclaimed water production by the year 2000.

SAN JUAN CREEK

In Orange County, a management plan is underway in the San Juan Creek Basin. Ground water supplies are limited in this basin due to low recharge and poor quality. The capacity of the San Juan Creek Basin is approximately 90,000 acre-feet. With proper management of the ground water basin, approximately 50,000 acre-feet per year (AF/Y) could be utilized. The basin currently provides approximately 5,000 AF/Y of usable ground water - less than 2,000 AF/Y is used for urban supply and approximately 3,000 AF/Y is used for agricultural and irrigation purposes. The only ground water that meets drinking water standards and most agricultural requirements is found in the highlands of the northeasternmost portion of the basin. Ground water quality data indicate that the TDS concentration ranges from 300 mg/l (in the northeasternmost portion of the basin) to 1850 mg/l (in the lower and western portion of the basin). Approximately 3.0 million gallons per day (MGD) of treated wastewater is being reclaimed for irrigation of a golf course, park, greenbelt and landscaping. In addition, reuse is proposed for effluent from Moulton-Niguel Water District's Water Reclamation Plant 3A, which has been expanded from a capacity of 0.5 million gallons per day to 2.4 MGD, and for effluent from Trabuco Canyon Water District's Robinson Ranch Wastewater Reclamation Plant, which has a capacity of 0.25 MGD. The TDS concentration in secondary effluent in the basin ranges from 500 to 900 mg/l. Reclaimed water could be used to enhance surface water flows and quality or to improve ground water quality in the lower and western parts of the basin. The use of reclaimed water for urban or agricultural irrigation could help reduce demands for ground and imported water. A ground water monitoring plan for the San Juan Creek Basin has been proposed by the Department of Water Resources which would identify any basinwide changes that may occur in water quality that could affect current and potential beneficial uses. This program would provide an early warning that ground water supplies may be endangered.

SALT BALANCE

Salt balance is a theoretical concept where the total mass of dissolved minerals entering a ground water basin system from all sources is equal to the total mass of dissolved minerals leaving the system, either through extraction or natural outflow. It is preferable to have a balance of the salt inflows and outflows to maintain water quality in a basin.

Utilizing the following management measures would enhance the prospects for salt balance for ground water basins in the Region. These measures include:

- Limiting ground water extractions from basins to perennial-yield levels;
- Increasing the efficiency of irrigation practices;
- Reducing fertilizer application;
- Improving the quality of imported water used for irrigation;
- Use storm water runoff for ground water recharge, since storm water is low in total dissolved solids.
- Extract and demineralize poor quality ground water when this option becomes economically feasible.

- Utilize intrusion barriers and regulate ground water pumpage to prevent and reverse problems of salt water intrusion.

SOLE SOURCE AQUIFER PROGRAM

The Safe Drinking Water Act of 1974 provides for a sole source aquifer program. Under this program, US EPA may designate an aquifer as a sole source if it provides more than half of the drinking water for a given area, and no other affordable sources of drinking water exist. The Act provides that, when certain criteria are met, a group may petition the US EPA to designate a sole source aquifer. Thus, in May of 1993, a local citizens' group, Backcountry Against Dumps petitioned the US EPA to designate the Campo/ Cottonwood Creek aquifer as the sole source of drinking water in a 400 square-mile area. The Campo/Cottonwood aquifer is bordered by Mexico to the south, and includes within its borders reservations for the Campo, La Posta, Manzanita, and Cuyapaipe Indian tribes. The aquifer lies about 20 miles east of El Cajon, California. This designation means the US EPA may review proposed projects in the aquifer area which receive partial federal funding and which could contaminate the aquifer or endanger public health. Examples of projects potentially subject to review include construction or renovation of housing projects, airports, and highways. Projects that do not receive some federal funds would not be reviewed.

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PLANS AND POLICIES

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5. PLANS AND POLICIES

INTRODUCTION

The State Board has adopted several statewide Water Quality Control Plans that are incorporated by reference into the Regional Board Basin Plan. Additionally, both the State and Regional Boards adopt policies, separate from the plans, that provide detailed direction on the implementation of certain plan provisions. In the event that inconsistencies exist among various plans and policies, the more stringent provisions apply.

This update of the San Diego Region's Basin Plan has been revised to be consistent with all State and Regional Board plans and policies adopted to date. All of the Regional Board plans and policies which implement, interpret, or make specific the Basin Plan and which are listed later in this chapter have been incorporated in this Basin Plan and are superseded. Following are summaries of these plans and policies.

STATE BOARD PLANS AND POLICIES

ANTIDEGRADATION POLICY (STATE BOARD RESOLUTION NO. 68-16)

One of the most significant water quality control policies with respect to the protection of water quality is the *Statement of Policy with Respect to Maintaining High Quality of Waters in California* (State Board Resolution No. 68-16), also known as the State Antidegradation Policy. This policy was adopted on October 28, 1968. It satisfies the federal Clean Water Act antidegradation policy requirement (40 CFR 131.12). The State Antidegradation Policy requires that high quality waters of the state are maintained to the maximum extent possible, even where that quality is better than needed to protect beneficial uses. Specific findings must be made in order to allow any changes in water quality. Changes in water quality are allowed only if the change is consistent with maximum benefit to the people of the State, does not unreasonably affect present and anticipated beneficial uses, and does not result in water quality less than that prescribed in water quality control plans or policies.

Actions which may adversely affect surface water quality must satisfy both Resolution No. 68-16 and the federal antidegradation policy (40 CFR 131.12). The requirements of the two policies are similar: the federal policy requires that existing instream uses and the level of water quality necessary to protect them must be maintained and protected. In addition, a reduction in water quality can be allowed only if there is a demonstration that such a reduction is necessary to accommodate important economic or social development.

STATE POLICY FOR WATER QUALITY CONTROL

The *State Policy for Water Quality Control* serves as the general basis for water quality control policies and was adopted by the State Board on July 6, 1972. The policy declares the State Board's intent to protect water quality through the implementation of water resources management programs.

The policy provides that water quality control plans adopted by the State Board will include minimum requirements for effluent quality. Water quality control plans will also specifically define the maximum constituent levels acceptable for discharge to various waters of the State. However, the policy allows discretion in the application of the latest available technology for the design and operation of wastewater treatment systems. The policy states that secondary treatment systems are the minimum acceptable level of treatment and that advanced treatment systems will be required where necessary to meet water quality objectives.

The policy contains twelve general principles to implement the provisions and intent of the Porter-Cologne Act. These principles are listed below:

(1) Water rights and quality control decisions must assure protection of available fresh water and marine water resources for maximum beneficial use.

(2) Municipal, agricultural, and industrial wastewaters must be considered as a potential integral part of the total available fresh water resource.

(3) Coordinated management of water supplies and wastewaters on a regional basis must be promoted to achieve efficient utilization of water.

(4) Efficient wastewater management is dependent upon a balanced program of source control of environmentally hazardous substances, treatment of wastewaters, reuse of reclaimed water, and proper disposal of effluents and residuals.

(5) Substances not amenable to removal by treatment systems presently available or planned for the immediate future must be prevented from entering sewer systems in quantities which would be harmful to the aquatic environment, adversely affect beneficial uses of water, or affect treatment plant operation. Persons responsible for the management of waste collection, treatment, and disposal systems must actively pursue the implementation of their objective of source control for environmentally hazardous substances. Such substances must be disposed of such that environmental damage does not result.

(6) Wastewater treatment systems must provide sufficient removal of environmentally hazardous substances which cannot be controlled at the source to assure against adverse effects on beneficial uses and aquatic communities.

(7) Wastewater collection and treatment facilities must be consolidated in all cases where feasible and desirable to implement sound water quality management programs based upon long-range economic and water quality benefits to an entire basin.

(8) Institutional and financial programs for implementation of consolidated wastewater management systems must be tailored to serve each particular area in an equitable manner.

(9) Wastewater reclamation and reuse systems which assure maximum benefit from available fresh water resources shall be encouraged. Reclamation systems must be an appropriate integral part of the long-range solution to the water resource needs of an area and incorporate provisions for salinity control and disposal of nonreclaimable residues.

(10) Wastewater management systems must be designed and operated to achieve maximum long-term benefit from the funds expended.

(11) Water quality control must be based on the latest scientific findings. Criteria must be continually refined as additional knowledge becomes available.

(12) Monitoring programs must be provided to determine the effects of discharges on all beneficial water uses including effects on aquatic life and its diversity and seasonal fluctuations.

AREAS OF SPECIAL BIOLOGICAL SIGNIFICANCE (RESOLUTION NO. 74-28)

The Regional Boards were required to select areas in coastal waters which contain "*biological communities of such extraordinary, even though unquantifiable, value that no acceptable risk of change in their environments as a result of man's activities can be entertained.*" In the San Diego Region, Areas of Special Biological Significance (ASBS) include the following:

- ***San Diego - La Jolla Ecological Reserve, San Diego County:*** Ocean waters within the boundaries of the City of San Diego, County of San Diego, State of California, as follows: beginning at the most northerly point of Goldfish Point as shown on La Jolla Park Map No. 352 filed in the office of the County Recorder of said county, thence in a northerly direction to a point being the intersection of longitude 117° 16' 15" west with the easterly prolongation of the southerly line of Pueblo Lot 1298 as shown on the map of Pueblo Lands of San Diego made by James Pascoe known as miscellaneous map No. 36 filed in the office of the County Recorder as said county, thence easterly along said prolongation of the southerly line of Pueblo Lot 1298 to the intersection with the mean high tide line, thence in a generally southerly direction along said mean high tide line to the point of beginning.

- ***Heisler Park Ecological Reserve, Orange County:*** Ocean waters within a line beginning at the intersection of the line of mean high tide with the westerly boundary line of Heisler Park, as described in a deed to the City of Laguna Beach, recorded in book 1666, page 144, Official

Records Orange County, California; thence south 16° 21' west 800 feet more or less to the line of the Laguna Beach Marine Life Refuge, as per Division 7, Chapter 1, Article 2, Section 10904, State of California Fish and Game Code; thence along said marine life refuge south 73° 39' east, 2,400 feet more or less to the easterly boundary of said refuge; thence along said easterly boundary north 14° 58' west, 700 feet more or less to the line of mean high tide in a westerly direction to the point of beginning.

- ***San Diego Marine Life Refuge, San Diego County:*** Ocean waters within that portion of Fish and Game District 19 consisting of that certain strip of land lying between the westerly edge of Pueblo Lot No. 1298 of the Pueblo Lands of the City of San Diego, according to the official map of said pueblo lands as made by James Pascoe, and filed in the office of the County Recorder of said County of San Diego, and the mean high tide line opposite to and west of said pueblo lot, which said strip of land is bounded on the north by the northerly boundary line of said pueblo lot extended westerly and on the south by the southerly boundary line of said pueblo lot extended westerly; together with the state waters of the State of California adjacent thereto, being those state waters which lie between said extended northerly and southerly boundaries of said pueblo lot and extend westerly from said mean high tide line for a distance of 1,000 feet.

The impact of the adoption of "*Areas of Special Biological Significance*" on the Basin Plan is that discharges of wastewaters and/or heat must be sufficiently removed spatially from these areas to assure the maintenance of natural water quality in the area. Existing wastewater and/or heat discharges which influence the natural water quality in the designated areas must be phased out as promptly as possible. Both the Thermal and Ocean Plans recognize and refer to "*Areas of Special Biological Significance*" in coastal waters of the state.

ENCLOSED BAYS AND ESTUARIES POLICY (RESOLUTION NO. 74-43)

The *Water Quality Control Policy for Enclosed Bays and Estuaries of California* (Enclosed Bays and Estuaries Policy) was adopted by State Board Resolution No. 74-43 on May 16, 1974. This policy is designed to prevent water quality degradation and protect beneficial uses in enclosed bays and estuaries. The policy outlines water quality principles and guidelines to achieve these objectives. Decisions by the Regional Board must be consistent with the provisions designed to prevent water quality degradation.

The policy lists principles of management that include the State Board's desire to phase out all discharges of municipal wastewaters and industrial process waters (exclusive of cooling waters) to enclosed bays and estuaries as soon as practicable. Exceptions to this provision may be granted by a Regional Board only when the Regional Board finds that the wastewater in question would consistently be treated and discharged in such a manner that it would enhance the quality of the receiving waters above that which would occur in the absence of the discharge. Discharge prohibitions are placed on the following:

- New discharges of municipal wastewaters and industrial process waters (exclusive of cooling water, treated ballast water and innocuous nonmunicipal wastewater discharges, such as clear brines, wash water and pool drains) which are not consistently treated and discharged in a manner that would enhance the quality of the receiving waters as defined in the Policy;

- Municipal and industrial waste sludge and untreated sludge digester supernatant, centrate, or filtrate;

- Rubbish or refuse into surface waters or at any place where they would be eventually transported to enclosed bays and estuaries;

- Silt, sand, soil, clay, or other earthen materials from onshore operations including mining, construction, and lumbering in quantities which unreasonably affect or threaten to affect beneficial uses;

- Materials of petroleum origin in sufficient quantities to be visible or in violation of waste discharge requirements (except for scientific purposes);

- Radiological, chemical, or biological warfare agent or high-level radioactive waste; and

- Discharge or by-pass of untreated waste.

POLICY ON THE USE AND DISPOSAL OF INLAND WATERS USED FOR POWERPLANT COOLING (RESOLUTION NO. 75-58)

The *Water Quality Control Policy on the Use and Disposal of Inland Waters Used for Powerplant Cooling* (Policy on the Use and Disposal of Inland Waters Used for Powerplant Cooling) was adopted by State Board Resolution No. 75-58 on June 19, 1975. The purpose of the policy is to provide consistent statewide water quality principles and guidance for adoption of discharge requirements, and implementation actions for powerplants which depend upon inland waters for cooling. In addition, this policy is intended to protect the beneficial uses of the State's water resources by keeping the consumptive use of freshwater for powerplant cooling to a minimum. The Regional Board is responsible for the enforcement of this policy.

The policy is based on the seven principles listed below:

(1) It is the State Board's position that from a water quantity and quality standpoint the source of powerplant cooling water should come from the following sources in this order of priority depending on site specifics such as environmental, technical, and economic feasibility consideration:

- Wastewater being discharged to the ocean;

- Ocean;

- Brackish water from natural sources or irrigation return flow;

- Inland wastewaters of low TDS; and

- Other inland waters.

(2) Where the State Board has jurisdiction, use of fresh inland waters for powerplant cooling will be approved by the Board only when it is demonstrated that the use of other water supply sources or other methods of cooling would be environmentally undesirable or economically unsound.

(3) In considering issuance of a permit or license to appropriate water for powerplant cooling, the Board will consider the reasonableness of the proposed water use when compared with other present and future needs for the water source and when viewed in the context of alternative water sources that could be used for the purpose. The Board will give great weight to the results of studies made pursuant to the Warren-Alquist State Energy Resources Conservation and Development Act and carefully evaluate studies by the Department of Water Resources made pursuant to Sections 237 and 462, Division 1 of the California Water Code.

(4) The discharge of blowdown water from cooling towers or return flows from once-through cooling shall not cause a violation of water quality objectives or waste discharge requirements established by the Regional Boards.

(5) The use of unlined evaporation ponds to concentrate salts from blowdown waters will be permitted only at salt sinks approved by the Regional and State Boards. Proposals to utilize unlined evaporation ponds for final disposal of blowdown waters must include studies of alternative methods of disposal. These studies must show that the geologic strata underlying the proposed ponds or salt sink will protect usable groundwater.

(6) Studies of availability of inland waters for use in powerplant cooling facilities to be constructed in Central Valley basins, the South Coastal Basins or other areas which receive supplemental water from Central Valley streams as for all major new uses must include an analysis of the impact of such use on Delta outflow and Delta water quality objectives. The studies associated with powerplants should include an analysis of the cost and water use associated with the use of alternative cooling facilities employing dry, or wet/dry modes of operation.

(7) The State Board encourages water supply agencies and power generating utilities and agencies to study the feasibility of using wastewater for powerplant cooling. The State

Board encourages the use of wastewater for powerplant cooling where it is appropriate. Furthermore, Section 25601(d) of the Warren-Alquist Energy Resources Conservation and Development Act directs the water and other advances in powerplant cooling and Section 462 of the Waste Water Reuse Law directs the Department of Water Resources to "*...conduct studies and investigations on the availability and quality of waste water and uses of reclaimed waste water for beneficial purposes including, but not limited to ... and cooling for thermal electric powerplants.*"

In addition, the policy contains three discharge prohibitions. The prohibitions are listed below:

(1) The discharge to land disposal sites of blowdown waters from inland powerplant cooling facilities shall be prohibited except to salt sinks or to lined facilities approved by the Regional and State Boards for the reception of such wastes.

(2) The discharge of wastewaters from once-through inland powerplant cooling facilities shall be prohibited unless the discharger can show that such a practice will maintain the existing water quality and aquatic environments of the State's water resources.

(3) The Regional Boards may grant exceptions to these discharge prohibitions on a case-by-case basis in accordance with exception procedures included in the *Water Quality Control Plan for Control of Temperature In the Coastal and Interstate Waters and Enclosed Bays and Estuaries of California*.

THERMAL PLAN (RESOLUTION NO. 75-89)

The *Water Quality Control Plan for the Control of Temperature in the Coastal and Interstate Waters and Enclosed Bays and Estuaries of California* (Thermal Plan) was adopted by the State Board in 1971, revised in 1972 and revised again on September 18, 1975. The Thermal Plan specifies water quality objectives and general water quality provisions for new and existing discharges into enclosed bays, estuaries, cold interstate waters, warm interstate waters and coastal waters. The State and Regional Boards administer the plan by establishing waste discharge requirements for elevated temperature wastes. Existing and future dischargers of thermal waste are required to conduct studies to define the effect of the discharge on beneficial uses and, for existing discharges, determine design and operating changes which would be necessary to achieve compliance with the provisions of the Thermal Plan.

Existing waste discharge requirements are required to be reviewed to determine any necessary revisions, changes in monitoring programs and the need for studies of the effect of the thermal discharge on beneficial uses. Proposed thermal dischargers may be required to submit studies prior to the establishment of WDRs. Appropriate post discharge studies are also required by the Regional Board. The Thermal Plan specifies that the Regional Board shall outline the scope and design of any necessary studies to include the following as applicable:

(1) Existing conditions in the aquatic environment;

(2) Effects of the existing discharge on beneficial uses;

(3) Predicted conditions in the aquatic environment with waste discharge facilities designed and operated in compliance with the provisions of the plan;

(4) Predicted effects of the proposed discharge on beneficial uses;

(5) An analysis of costs and benefits of various design alternatives; and

(6) The extent to which intake and outfall structures are located and designed so that the intake of planktonic organisms is at a minimum, waste plumes are prevented from touching the ocean substrate or shorelines, and the waste is dispersed into an area of pronounced alongshore or offshore currents.

The Thermal Plan further specifies that WDRs adopted for discharges of thermal wastes shall be monitored in order to determine compliance with effluent or receiving water temperature requirements. For significant thermal discharges, the State or Regional Boards shall require expanded monitoring programs to assess whether the thermal discharge continues to provide adequate protection to the beneficial uses of the water. The State or Regional Board may require the discharger(s) to pay a public agency or other appropriate person an amount sufficient to carry out the expanded monitoring program if:

(1) The discharger has previously failed to carry out a monitoring program satisfactory to the State or Regional Board; or

(2) More than a single facility, under separate ownerships, may significantly affect the thermal characteristics of the body of water, and the owners of such facilities are unable to reach agreement on a cooperative program within a reasonable time period specified by the State or Regional Board.

POLICY WITH RESPECT TO WATER RECLAMATION IN CALIFORNIA (RESOLUTION NO. 77-1)

The *Policy with Respect to Water Reclamation in California* (Reclamation Policy) was adopted by the State Board on January 6, 1977. The Reclamation Policy provides that the water resources of the State be put to beneficial use to the fullest extent of which they are capable. The policy provides that water resources shall not be wasted, nor be put to an unreasonable use, nor be used in an unreasonable method.

This policy commits both the State and Regional Board to support reclamation and to undertake all possible steps to encourage the development of water reclamation facilities to reclaim water to supplement existing surface and ground water supplies. It requires the Regional Board to conduct reclamation surveys and specifies actions to be implemented by the State and Regional Board and other agencies.

The State Board adopted the four following principles in order to implement the Reclamation Policy. These principles are listed below:

(1) The State and Regional Boards shall encourage, and consider or recommend for funding, water reclamation projects which meet the conditions below and which do not adversely impact vested water rights or unreasonably impair instream beneficial uses or place a unreasonable burden on present water supply systems:

(A) Beneficial use will be made of wastewaters that would otherwise be discharged to marine or brackish receiving waters or evaporation ponds,

(B) Reclaimed water will replace or supplement the use of fresh water or better quality water,

(C) Reclaimed water will be used to preserve, restore, or enhance instream beneficial uses which include, but are not limited to, fish, wildlife, recreation, and aesthetics associated with any surface water or wetlands.

(2) The State and Regional Boards shall encourage reclamation and reuse of water in water-short areas of the State, encourage water conservation measures which further extend the water resources of the State, and encourage other agencies, in particular the Department of Water Resources, to assist in implementing this policy.

(3) The State and Regional Boards recognize the need to protect the public health including potential vector problems and the environment in the implementation of reclamation projects.

(4) In implementing these principles, the State and/or Regional Board shall take appropriate actions, recommend legislation, and recommend actions by other agencies in the areas of planning, project funding, water rights, regulation and enforcement, research and demonstration, and public involvement and information.

This resolution has been reprinted at the end of this Chapter.

POLICY ON THE DISPOSAL OF SHREDDER WASTE (RESOLUTION NO. 87-22)

The *Policy on the Disposal of Shredder Wastes* (Shredder Waste Disposal Policy) was adopted on March 19, 1987. This policy permits the disposal of shredded wastes produced by the mechanical destruction of car bodies, old appliances and similar castoffs, into certain landfills under specific conditions designated and enforced by the Regional Boards. Hazardous and nonhazardous shredder waste may be disposed of in appropriate Class III landfills where doing so would not cause water quality impairment. The policy specifies the shredder waste must not exceed PCB levels of 50 mg/kg. Also, the shredder waste must be disposed on the last and highest lift in a closed disposal cell or

in an isolated cell solely designated for the disposal of shredder waste.

SOURCES OF DRINKING WATER POLICY (RESOLUTION NO. 88-63)

The *Sources of Drinking Water Policy* was adopted by the State Board on May 19, 1988. The policy provides that all surface and ground waters of the State are considered to be suitable or potentially suitable for municipal or domestic water supply and should be so designated by the Regional Boards. Those waters excepted under the policy include the following:

(1) Surface or ground waters where the total dissolved solids exceed 3,000 mg/l and it is not reasonably expected by the Regional Boards to supply a public water system;

(2) Surface or ground waters which have been contaminated and can not be reasonably treated for domestic use using either Best Management Practices or best economically achievable treatment practices;

(3) Surface or ground waters which do not provide sufficient water for extraction of 200 gallons per day;

(4) Surface waters which are in systems designed or modified to carry municipal, industrial, agricultural or mining wastewaters, or storm water runoff.

(5) Surface waters in systems designed or modified for the primary purpose of conveying or holding agricultural drainage waters, provided that the discharge from such systems is monitored to assure compliance with all relevant water quality objectives as required by the Regional Boards.

(6) Ground waters where the aquifer is regulated as a geothermal energy producing source or has been exempted administratively pursuant to 40 Code of Federal Regulations, Section 146.4 for the purpose of underground injection of fluids associated with the production of hydrocarbon or geothermal energy, provided that these fluids do not constitute a hazardous waste under 40 CFR, Section 261.3. This resolution has been reprinted at the end of this Chapter.

NONPOINT SOURCE MANAGEMENT PLAN (RESOLUTION NO. 88-123)

The *Nonpoint Source Management Plan* was adopted by the State Board on November 15, 1988, pursuant to Section 319 of the federal Clean Water Act. Section 319 requires each state to prepare a Nonpoint Source Management Plan and to conduct an assessment of the impact nonpoint sources have on the state's waterbodies. In response to these requirements, the State Board adopted the Nonpoint Source Management Plan (NPSMP) in 1988 and the Water Quality Assessment in 1990. The NPSMP established a statewide policy for managing polluted runoff in California. The plan identifies three management approaches which are used by the State and Regional Boards to address nonpoint source problems:

(1) Voluntary implementation of best management practices;

(2) Regulatory-based encouragement of best management practices; and

(3) Effluent requirements.

The primary goal of the program is to measurably improve water quality and/or implementation of Best Management Practices by meeting several objectives specified in the plan.

The Nonpoint Source Management Plan outlines steps to initiate systematic management of nonpoint sources in California. These steps include:

(1) An explicit long-term commitment by the State and Regional Board;

(2) More effective coordination of existing State and Regional Board nonpoint-source related programs;

(3) Greater use of Regional Board regulatory authorities coupled with non-regulatory programs;

(4) Stronger links between the local, State and Federal agencies which have powers that can be used to manage nonpoint sources;

(5) Development of new funding sources; and

(6) Implementation of the requirements of the 1990 Reauthorization of the Coastal Zone Management Act (CZMA) which requires the State Board and the California Coastal Commission to develop and implement an enforceable nonpoint source program in the coastal zone.

The reauthorization of the CZMA, together with specific guidance from the US EPA and the National Oceanic & Atmospheric Administration (NOAA), requires coastal states to develop coastal nonpoint pollution control programs. These programs are to implement management measures for the control of land uses which contribute nonpoint source pollution to coastal waters. Management measures, which include specific measures for mitigating water quality impacts, are specified for the following land uses: agriculture; grazing; confined animal facilities; forestry; urban development; roads; marinas and recreational boating; hydromodification; and mines. The state's coastal program is to be considered for approval by the US EPA and NOAA in July 1995.

Revision of the State Nonpoint Source Management Plan (NPSMP) has been initiated. The State Board intends to consider the requirements of the Coastal Zone Act Reauthorization Amendments (CZARA) during the review and revision of the NPSMP. There will also be more of an emphasis placed on watershed based nonpoint source controls in the revised NPSMP. To develop these management measures, the State Board is forming Task Force Committees composed of experts in the various nonpoint source categories. The management measures developed by the Task Force Committees will be reviewed by an Oversight Committee made up of State and Regional Board staff prior to inclusion in the revised NPSMP. The anticipated date of completion of the revised NPSMP is in 1995.

The plan describes an implementation project entitled the "*Southern California Coastal Lagoon Urban Runoff Management*." This project requires land developers to incorporate low flow sand filters into project designs and to implement street sweeping programs. The performance of the filters and programs are monitored to incorporate design modifications as needed to improve performance.

Other implementation actions specified in the plan for Region 9 include the following regulatory and non-regulatory program(s):

Regulatory Programs

- ***Dairies:*** The Regional Board issues Waste Discharge Requirements which limit the amount of manure that can be applied per acre to agricultural land.

- ***Erosion Control:*** The Regional Board implements policies requiring cities and counties to adopt erosion control ordinances. Thus, the Regional Board adopted Resolution No. 92-21, *A Resolution Concerning the Agreement Between the California Regional Water Quality Control Board, San Diego Region, and the Resource Conservation Districts of San Diego County Regarding the Erosion and Sediment Control Policy* (Resource Conservation Districts of San Diego County Erosion and Sediment Control Policy). In addition, staff reviews ordinances and assists with enforcement.

- ***Subsurface Disposal Policy:*** Regional Board staff will develop criteria for minimum lot sizes for septic systems.

Non-regulatory program

- ***San Diego Bay Study:*** The Regional Board will continue a five year study to identify the sources and extent of water quality pollution in San Diego Bay. Possible nonpoint sources such as storm water runoff and past point source pollutants now bound to bottom sediments will be investigated.

CALIFORNIA OCEAN PLAN (RESOLUTION NO. 90-27)

The *Water Quality Control Plan for Ocean Waters of California* (California Ocean Plan) was adopted by the State Board in 1972, and later revised in 1978, 1983, 1988 and 1990. The revision in effect at the time of this writing is Resolution No. 90-27, which was adopted by the State Board on March 22, 1990. The California Ocean Plan is applicable to all point source discharges to the ocean.

The California Ocean Plan is designed to protect the quality of the ocean waters for use and enjoyment by the people through the control of waste discharges to the ocean. The plan sets forth water quality objectives for ocean waters which impose limits on bacteriological, physical, chemical, biological, toxic, and radioactive characteristics for ocean waters in numerical and descriptive terms to ensure the

reasonable protection of beneficial uses and the prevention of nuisance. Also, the plan describes requirements for management and design of systems discharging wastewaters to the ocean and effluent quality requirements for discharges. Systems must be designed and operated in a manner that will maintain the indigenous marine life and a healthy and diverse marine community. In addition, discharge prohibitions are placed on hazardous substances, warfare agents and high level radioactive wastes, sludge and digester supernatant, and bypassed untreated waste discharges. Furthermore, the plan states that "*Areas of Special Biological Significance*" shall be designated by the State Board. In these areas the maintenance of natural water quality conditions must be assured. Waste discharges to ASBS are prohibited unless the State Board finds that there would be no adverse impact to beneficial uses. Lastly, discharge requirements within the California Ocean Plan include the maximum allowable monthly mass emission rates for each effluent quality constituent included therein.

The California Ocean Plan declares the State Board's intent to require continual monitoring of the marine environment to assure that the California Ocean Plan reflects the latest available data and that the water quality objectives are adequate to fully protect indigenous marine species and to protect human health.

CALIFORNIA WETLANDS CONSERVATION POLICY

The California Wetlands Conservation Policy was established by the Governor on August 23, 1993. The goal of the California Wetlands Conservation Policy is to establish a policy framework and strategy that will:

- Ensure no overall net loss and achieve a long-term net gain in the quantity, quality, and permanence of wetlands acreage and values in California in a manner that fosters creativity, stewardship, and respect for private property;
- Reduce procedural complexity in the administration of State and Federal wetlands conservation programs; and
- Encourage partnerships to make landowner incentive programs and cooperative planning efforts the primary focus of wetlands conservation and restoration.

Three measures are identified to achieve these objectives, these include: (1) statewide policy initiatives; (2) regional strategies; and an (3) interagency wetlands task force.

Statewide policy initiatives: These policy initiatives include a statewide wetlands inventory, support for wetlands planning, improved administration of existing wetland's regulatory programs, development and adoption of a consistent wetlands definition for state regulatory programs, development and adoption of a state policy regarding Army Corps of Engineers nationwide permits, development and adoption of consistent wetlands standards and guidelines, enhancing efficiency of and coordination in the wetland permitting process, encouragement of regulatory flexibility in situations in which wetlands are created unintentionally or incidentally to other activities, encouragement of regulatory flexibility to allow public agencies and water districts to create wetlands but later remove them if the wetlands are found to conflict with the primary purpose to which the property is devoted, strengthened landowner incentives to protect wetlands, support for mitigation banking, development and expansion of other wetlands programs, and integration of wetlands policy and planning with other environmental and land use processes.

Regional strategies: These include three geographically based regional strategies in which wetlands programs can be implemented, refined, and combined in unique ways to achieve the goals and objectives of the wetlands policy. These three strategies are to be implemented in the Central Valley, the San Francisco Bay area, and Southern California. For Southern California, the regional strategy is to initiate better coordination and communication among diverse interests in southern California by establishing a "*Southern California Wetlands Joint Venture.*" This group would set long-term goals and priorities for the conservation of wetlands and develop a policy to achieve those goals, and would encourage a variety of demonstration projects designed to enhance the State's ability to constructively address regional wetlands issues.

Interagency wetlands task force: This task force is to be created to direct and coordinate administration and implementation of the Wetlands Policy. This task force will be advisory to the Governor and help resolve inter-agency conflicts on wetlands. The task force will appoint an advisory committee of stakeholders and may seek additional technical advice as necessary.

CLEANUP AND ABATEMENT POLICIES AND PROCEDURES (RESOLUTION NO. 92-49)

The *Policies and Procedures for Investigation and Cleanup and Abatement of Discharges Under Water Code Section 13304* (Cleanup and Abatement Policies and Procedures)(the Policy) was adopted by State Board Resolution No. 92-49 on June 18, 1992, and amended on April 21, 1994. The Policy describes the procedures the State Board and the Regional Board follow in making decisions on investigations to determine the vertical and horizontal extent of a discharge, and the appropriate cleanup and abatement methods. The Policy applies to all investigations and cleanup and abatement activities, for all types of discharges subject to Water Code Section 13304.

Section 13304 applies to any person who discharges or who has discharged waste into waters of the State in violation of any waste discharge requirement or other order or prohibition issued by a Regional Board or the State Board, or who has caused or permitted, causes or permits, or threatens to cause or permit any waste to be discharged or deposited where it is, or probably will be, discharged into the waters of the State and creates, or threatens to create, a condition of pollution or nuisance. Section 13304 authorizes the Regional Board to require complete cleanup of all waste discharged and to require restoration of affected water to background conditions (i.e., the water quality that existed before the discharge). The Policy requires dischargers to clean up and abate the effects of discharges in a manner that promotes attainment of either background water quality, or the best water quality which is reasonable, if background levels of water quality cannot be restored. Cleanup levels prescribed by the State Board or Regional Boards must:

- Be consistent with maximum benefit to the people of the State; and
- Be established in a manner consistent with California Code of Regulations, Title 23, Chapter 15 regulations.

Dischargers are required to carry out a phased investigation to determine the nature and extent of soil and ground water pollution at a site. The Policy describes various procedures to ensure that dischargers have the opportunity to select cost-effective methods, for detecting discharges, and for cleanup and abatement. The Policy also contains criteria for development of reasonable schedules for investigation and cleanup and abatement, or other remedial action at a site.

For further details about the Policy, the reader should refer to State Board Resolution No. 92-49.

REGIONAL BOARD RESOLUTIONS

The San Diego Regional Board has adopted many resolutions which, in addition to the State Board Resolutions described previously, are important to the Regional Board's implementation of the Basin Plan. All of the Regional Board Resolutions which implement, interpret, or make specific the Basin Plan and which are listed below have been incorporated in this Basin Plan and are therefore superseded by this Basin Plan.

Resolution No. 78-6. Adopted February 27, 1978. *A Resolution Adopting Amendments to the Comprehensive Water Quality Control Plan for the San Diego Region.* This resolution deleted water quality objectives and beneficial uses for certain portions of basins 1.10, 1.20, 1.30, 1.40, 1.50, 2.10, 3.10, 4.10, 4.20, 4.30, 4.40, 4.50, 4.60, 5.10, 6.10, 7.10, and 11.10.

Resolution No. 79-25. Adopted March 26, 1979. *A Resolution Concerning the 'Agreement Between the California Regional Water Quality Control Board, San Diego Region and the Elsinore-Murrietta-Anza Resource Conservation District Regarding the Sediment Control Ordinance.'*

Resolution No. 79-44. Adopted June 25, 1979. *A Resolution Concerning 'Guidelines for New Community and Individual Sewerage Facilities.'*

Resolution No. 80-48. Adopted September 22, 1980. *A Resolution Concerning the San Diego County Department of Health Services Minimum Criteria for the Design and Construction of Evapotranspiration and Evapotranspiration-Infiltration Systems.*

Resolution No. 81-16. Adopted March 23, 1981. *A Resolution Adopting Amendments to the Comprehensive Water Quality Control Plan for the San Diego Region.* This resolution amended the beneficial uses and water quality objectives for the Aliso, Carlsbad, Agua Hedionda, Batiquitos and Telegraph hydrographic subareas.

Resolution No. 83-04. Adopted January 24, 1983. A Resolution Adopting an Amendment to the Comprehensive Water Quality Control Plan for the San Diego Region. This resolution amended the water quality objectives for nutrients in coastal lagoons.

Resolution No. 83-21. Adopted July 18, 1983. *A Resolution Conditionally Waiving Adoption of Waste Discharge Requirements for Certain Specific Types of Discharges.*

Resolution No. 83-21, Addendum No 1. Adopted November 15, 1993. *An Addendum Conditionally Waiving Adoption of Waste Discharge Requirements for Temporary Discharge of Specified Contaminated Soils.*

Resolution No. 83-21, Addendum No 2. Adopted November 15, 1993. *An Addendum Conditionally Waiving Adoption of Waste Discharge Requirements for Disposal / Reuse of Dredge Spoils in Industrial or Commercial Applications.*

Resolution No. 83-21, Addendum No 3. Adopted November 15, 1993. *An Addendum Conditionally Waiving Adoption of Waste Discharge Requirements for Green Waste Composting Facilities.*

Resolution No. 83-27. Adopted October 3, 1983. *A Resolution Adopting Amendments to the Comprehensive Water Quality Control Plan for the San Diego Region, San Elijo Hydrographic Subarea.*

Resolution No. 83-28. Adopted August 29, 1983. *A Resolution Supporting the County of San Diego's Moratorium on Subsurface Disposal Systems in the Valley Center Area.*

Resolution No. 84-20. Adopted August 27, 1984. *A Resolution Adopting Amendments to the Comprehensive Water Quality Control Plan for the San Diego Region, Mission San Diego Hydrographic Subarea.*

Resolution No. 85-89. Adopted December 16, 1985. *A Resolution Adopting Amendments to the Comprehensive Water Quality Control Plan for the San Diego Region, Mission San Diego Hydrographic Subarea and Sycamore Canyon Subarea, and a portion of the Santee Hydrographic Subarea.*

Resolution No. 85-92. Adopted December 16, 1985. *Designation of Class III Landfills Within the San Diego Region to Accept Shredder Wastes as Required by Section 25143.6 of the Health and Safety Code.*

Resolution No. 86-06. Adopted March 24, 1986. *A Resolution Adopting Amendments to the Comprehensive Water Quality Control Plan for the San Diego Region.* This resolution established a goal and action plan for encouraging and promoting water reclamation.

Resolution No. 87-71. Adopted November 16, 1987. *A Resolution Adopting Amendments to the Comprehensive Water Quality Control Plan for the San Diego Region.* This resolution established a policy on dairy waste management.

Resolution No. 87-91. Adopted December 21, 1987. *A Resolution Adopting Amendments to the Comprehensive Water Quality Control Plan for the San Diego Region.* This resolution established a policy on erosion and sediment control.

Resolution No. 88-25. Adopted March 14, 1988. *A Resolution Regarding the Proposed State Water Resources Control Board Policy for Water Quality Control Defining 'Sources of Drinking Water' for the Purposes of Discharge Prohibitions.*

Resolution No. 88-49. Adopted April 25, 1988. *A Resolution Adopting Amendments to the Comprehensive Water Quality Control Plan for the San Diego Region for a Portion of the Otay Hydrographic Subunit.*

Resolution No. 88-97. Adopted October 3, 1988. *A Resolution Supporting the Proposed Interim Solution to the Tijuana Sewage Problem Consisting of a Sewage Treatment Plant Within the United States and an Ocean Outfall.*

Resolution No. 89-33. Adopted April 10, 1989. *Incorporation of 'Sources of Drinking Water' Policy into the Water Quality Control Plan (Basin Plan) of the San Diego Region.*

Resolution No. 89-53. Adopted July 10, 1989. *Addition of Portions of the Otay Valley Hydrologic Area to the List of Waters Excepted From the 'Sources of Drinking Water' Policy.*

Resolution No. 90-27. Adopted April 23, 1990. *A Resolution Adopting Amendments to the Comprehensive Water Quality Control Plan for the San Diego Region, for the Mission San Diego and a Portion of the Santee Hydrologic Subareas.* This resolution establishes a biostimulatory substances water quality compliance methodology for part of the San Diego River.

Resolution No. 90-28. Adopted March 12, 1990 April 23, 1990. *A Resolution Adopting Amendments to the Comprehensive Water Quality Control Plan for the San Diego Region, for a Portion of the San Clemente Hydrologic Subunit.*

Resolution No. 90-53. Adopted September 24, 1990. *A Resolution Adopting Amendments to the Comprehensive Water Quality Control Plan for Portions of the Santa Margarita Hydrologic Unit (2.00), San Diego Region*. This resolution establishes a biostimulatory substances water quality compliance methodology for part of the Santa Margarita River.

Resolution No. 90-61. Adopted November 5, 1990. *A Resolution Amending Resolution No. 90-40, A Regionwide Groundwater Amendment to the Comprehensive Water quality Control Plan for the San Diego Region.'* This resolution revised the language regarding use of reclaimed water contained in Resolution No. 90-40, *A Resolution Reconsidering and Amending Resolution No. 90-26, 'A Regionwide Groundwater Amendment to the Comprehensive Water Quality control Plan for the San Diego Region,'* and Resolution No. 90-26, *A Resolution Adopting A Regionwide Groundwater Amendment to the Comprehensive Water Quality Control Plan for the San Diego Region.*

Resolution No. 91-23. Adopted March 11, 1991. *A Resolution Amending Resolution No. 90-27, 'A Resolution Adopting Amendments to the Comprehensive Water Quality Control Plan for the San Diego Region, for the Mission San Diego and a Portion of the Santee Hydrologic Subareas.'*

Resolution No. 91-46. Adopted May 20, 1991. *A Resolution Rescinding and Replacing Resolution No. 88-91 and Addenda, and Establishing a Regional Board Drought Policy.*

Resolution No. 91-79. Adopted December 9, 1991. *A Resolution Amending Resolution No. 90-55, 'Adopting Amendments to the Comprehensive Water Quality Control Plan for the San Diego Region.'* This resolution establishes revised Basin Plan chapters for beneficial uses and water quality objectives.

Resolution No. 92-21. Adopted April 6, 1992. *A Resolution Concerning the Agreement Between the California Regional Water Quality Control Board, San Diego Region, and the Resource Conservation Districts of San Diego County Regarding the Erosion and Sediment Control Policy.*

Resolution No. 93-02. Adopted February 1, 1993. *A Resolution Adopting Amendments to the Comprehensive Water Quality Control Plan for the San Diego Region for the Escondido Hydrologic Subarea (4.62).*

Resolution No. 94-09. Adopted February 10, 1994. *A Resolution Adopting Amendments to the Comprehensive Water Quality Control Plan for the San Diego Region, Portions of the Pauba (2.51) and Wolf (2.52) Hydrologic Subareas.*

Resolution No. 94-25. Adopted February 10, 1994. *A Resolution Adopting Amendments to the Comprehensive Water Quality Control Plan for the San Diego Region for the Laguna (1.10), Mission Viejo (1.20), and San Clemente (1.30) Hydrologic Areas.*

Resolution No. 94-139. Adopted October 13, 1994. *A Resolution Adopting Amendments to the Water Quality Control Plan for a portion of the Poway Hydrologic Area (6.20).*

Regional Board Water Quality Management Policy. This policy consists of five general water quality policy statements and is described in Chapter 1 of this Basin Plan.

NEW REGIONAL BOARD RESOLUTIONS

The following Basin Plan amendments have been adopted since the September 8, 1994 update.

Resolution No. 95-48. Adopted May 16, 1995. *A Resolution Adopting Amendments to the Water Quality Control Plan for the Alluvial Aquifer of the Moosa (903.13) and the Valley Center (903.14) Hydrologic Subareas.*

Resolution No. 95-95. Adopted October 12, 1995. *A Resolution Adopting An Amendment to the Water Quality Control Plan, San Diego Region. Types of Discharges Identified for Conditional Waiver of Waste Discharge Requirements.* (See pages 4-11, 4-35.01, 4-35.02, D-1.01 and D-6).

Resolution No. 95-115. Adopted October 12, 1995. *A Resolution Adopting Amendments to the Water Quality Control Plan for the San Diego Basin (9), Table 4-4. Types of Discharges Identified for Conditional Waiver of Waste Discharge Requirements.* (See pages 4-11, D-1.02 and D-2).

Resolution No. 96-30. Adopted May 9, 1996. *A Resolution Adopting an Amendment to the Water Quality Control Plan for the San Diego Region Providing an Exception to the Prohibition of Discharges of Recycled Wastewater to Surface Water Bodies Used for Municipal Water Supply.* (See page 4-15).

Resolution No. 96-34. Adopted August 8, 1996. *A Resolution Adopting an Amendment to the Water Quality Control Plan for the San Diego Region, Table 4-4, Item 26, Composting and Processing, Mulching, or Grinding Waste Management Units* (See page 4-11).

Resolution No. 97-04. Adopted March 12, 1997. *A Resolution Adopting Amendments to the Water Quality Control Plan for the San Diego Region for the Designation of COLD and SPWN Beneficial Uses.* (See pages 2-8, 2-8.1, and 2-11 thru 2-47).

REPRINT OF RESOLUTION NO. 77-1

STATE WATER RESOURCES CONTROL BOARD
RESOLUTION NO. 77-1
POLICY WITH RESPECT TO WATER RECLAMATION IN CALIFORNIA

WHEREAS:

1. The California Constitution provides that the water resources of the State be put to beneficial use to the fullest extent of which they are capable, and that waste or unreasonable use or unreasonable method of use of water be prevented, and that conservation of such waters is to be exercised with a view to the reasonable and beneficial use thereof in the interest of the people and for the public welfare;

2. The California Legislature has declared that the State Water Resources Control Board and each Regional Water Quality Control Board shall be the principal state agencies with primary responsibility for the coordination and control of water quality;

3. The California Legislature has declared that the people of the State have a primary interest in the development of facilities to reclaim water containing waste to supplement existing surface and underground water supplies;

4. The California Legislature has declared that the State shall undertake all possible steps to encourage the development of water reclamation facilities so that reclaimed water may be made available to help meet the growing water requirements of the State;

5. The Board has reviewed the document entitled "*Policy and Action Plan for Water Reclamation in California*," dated December 1976. This document recommends a variety of actions to encourage the development of water reclamation facilities and the use of reclaimed water. Some of these actions require direct implementation by the Board; others require implementation by the Executive Officer and the Regional Boards. In addition, this document recognizes that action by many other state, local, and federal agencies and the California State Legislature would also encourage construction of water reclamation facilities and the use of reclaimed water. Accordingly, the Board recommends for its consideration a number of actions intended to coordinate with the program of this Board;

6. The Board must concentrate its efforts to encourage and promote reclamation in water-short areas of the State where reclaimed water can supplement or replace other water supplies without interfering with water rights or instream beneficial uses or placing an unreasonable burden on present water supply systems; and

7. In order to coordinate the development of reclamation potential in California, the Board must develop a data collection, research, planning, and implementation Program for water reclamation and reclaimed water uses.

THEREFORE, BE IT RESOLVED:

1. That the State Board adopt the following Principles:
   I. The State Board and the Regional Boards shall encourage, and consider or recommend for funding, water reclamation projects which meet Condition 1, 2, or 3 below and which do not adversely impact vested water rights or unreasonably impair instream beneficial uses or place an unreasonable burden on present water supply systems;
      (1) Beneficial use will be made of wastewaters that would otherwise be discharged to marine or brackish receiving waters or evaporation ponds,

      (2) Reclaimed water will replace or supplement the use of fresh water or better quality water,

      (3) Reclaimed water will be used to preserve, restore, or enhance instream beneficial uses which include, but are not limited to, fish, wildlife, recreation and esthetics associated with any surface water or wetlands.

II. The State Board and the Regional Boards shall (1) encourage reclamation and reuse of water in water-short areas of the State, (2) encourage water conservation measures which further extend the water resources of the State, and (3) encourage other agencies, in particular the Department of Water Resources, to assist in implementing this policy.

III. The State Board and the Regional Boards recognize the need to protect the public health including potential vector problems and the environment in the implementation of reclamation projects.

IV. In implementing the foregoing Principles, the State Board or the Regional Boards, as the case may be, shall take appropriate actions, recommend legislation, and recommend actions by other agencies in the areas of (1) planning, (2) project funding, (3) water rights, (4) regulation and enforcement, (5) research and demonstration, and (6) public involvement and information.

2. That, in order to implement the foregoing Principles, the State Board:
   (a) Approves Planning Program Guidance Memorandum No. 9, "*PLANNING FOR WASTEWATER Reclamation*,"

   (b) Adopts amendments and additions to Title 23, California Administrative Code Sections 654.4, 761, 764.9, 783, 2101, 2102, 2107, 2109, 2109.1, 2109.2, 2119, 2121, 2133(b)(2), and 2133(b)(3),

   (c) Approves Grants Management Memorandum No. 9.01, "*WASTEWATER RECLAMATION*,"

   (d) Approves the Division of Planning and Research, Procedures and Criteria for the Selection of Wastewater Reclamation Research and Demonstration Project,

   (e) Approves "*GUIDELINES FOR REGULATION OF WATER RECLAMATION*,"

   (f) Approves the Plan of Action contained in Part III of the document identified in Finding Five above,

   (g) Directs the Executive Officer to establish an Interagency Water Reclamation Policy Advisory Committee. Such Committee shall examine trends, analyze implementation problems, and report annually to the Board the results of the implementation of this policy, and

   (h) Authorizes the Chairperson of the Board and directs the Executive Officer to implement the foregoing Principles and the Plan of Action contained in Part III of the document identified in Finding Five above, as appropriate.

3. That not later than July 1, 1978, the Board shall review this policy and actions taken to implement it, along with the report prepared by the Interagency Water Reclamation Policy Advisory Committee, to determine whether modifications to this policy are appropriate to more effectively encourage water reclamation in California.

4. That the Chairperson of the Board shall transmit to the California Legislature a complete copy of the "*Policy and Action Plan for Water Reclamation in California*."

CERTIFICATION

The undersigned, Executive Officer of the State Water Resources Control Board, does hereby certify that the foregoing is a full, true, and correct copy of a resolution duly and regularly adopted at a special meeting of the State Water Resources Control Board held on January 6, 1977.

Original signed by
Bill B. Dendy
Executive Officer
State Water Resources Control Board

REPRINT OF RESOLUTION NO. 88-63

STATE WATER RESOURCES CONTROL BOARD
RESOLUTION NO. 88-63
ADOPTION OF POLICY ENTITLED "*SOURCES OF DRINKING WATER*"

WHEREAS:

1. California Water Code Section 13140 provides that the State Board shall formulate and adopt State Policy for Water Quality Control; and,

2. California Water Code Section 13240 provides that Water Quality Control Plans "*shall conform*" to any State Policy for Water Quality Control; and,

3. The Regional Boards can conform the Water Quality Control Plans to this policy by amending the plans to incorporate the policy; and,

4. The State Board must approve any conforming amendments pursuant to Water Code Section 13245; and,

5. "*Sources of drinking water*" shall be defined in Water Quality Control Plans as those water bodies with beneficial uses designated as suitable, or potentially suitable, for municipal or domestic water supply (MUN); and,

6. The Water Quality Control Plans do not provide sufficient detail in the description of water bodies designated MUN to judge clearly what is, or is not, a source of drinking water for various purposes.

THEREFORE BE IT RESOLVED:
All surface and ground waters of the state are considered to be suitable, or potentially suitable, for municipal or domestic water supply and should be so designated by the Regional Boards [1] with the exception of:

1. <u>Surface and ground waters where:</u>
   a. The total dissolved solids (TDS) exceed 3,000 mg/L (5,000 uS/cm, electrical conductivity) and it is not reasonably expected by Regional Boards to supply a public water system, or

   b. There is contamination, either by natural processes or by human activity (unrelated to a specific pollution incident), that cannot reasonably be treated for domestic use using either Best Management Practices or best economically achievable treatment practices, or

   c. The water source does not provide sufficient water to supply a single well capable of producing an average sustained yield of 200 gallons per day.

2. <u>Surface waters where</u>:
   a. The water is in systems designed or modified to collect or treat municipal or industrial wastewaters, process waters, mining wastewaters, or storm water runoff, provided that the discharge from such systems is monitored to assure compliance with all relevant water quality objectives as required by the Regional Boards; or,

   b. The water is in systems designed or modified for the primary purpose of conveying or holding agricultural drainage waters, provided that the discharge from such systems is monitored to assure compliance with all relevant water quality objectives as required by the Regional Boards.

3. Ground water where:
The aquifer is regulated as a geothermal energy producing source or has been exempted administratively pursuant to 40 Code of Federal Regulations, Section 146.4 for the purpose of underground injection of fluids associated with the production of hydrocarbon or geothermal energy, provided that these fluids do not constitute a hazardous waste under 40 CFR, Section 261.3.

4. Regional Board Authority to Amend Use Designations:
Any body of water which has a current specific designation previously assigned to it by a Regional Board in Water Quality Control Plans may retain that designation at the Regional Board's discretion. Where a body of water is not currently designated as MUN but, in the opinion of a Regional Board, is presently or potentially suitable for MUN, the Regional Board shall include MUN in the beneficial use designation.

The Regional Boards shall also assure that the beneficial uses of municipal and domestic supply are designated for protection wherever those uses are presently being attained, and assure that any changes in beneficial use designations for waters of the State are consistent with all applicable regulations adopted by the Environmental Protection Agency.

The Regional Boards shall review and revise the Water Quality Control Plans to incorporate this policy.

CERTIFICATION

The undersigned, Administrative Assistant to the Board, does hereby certify that the foregoing is a full, true, and correct copy of a policy duly and regularly adopted at a meeting of the State Water Resources Control Board held on May 19, 1988.

Original signed by
Maureen Marche
Administrative Assistant to the Board

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[1] This policy does not affect any determination of what is a potential source of drinking water for the limited purposes of maintaining a surface impoundment after June 30, 1988, pursuant to Section 25208.4 of the Health and Safety Code.

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CHAPTER 6
SURVEILLANCE, MONITORING AND ASSESSMENT

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6. SURVEILLANCE, MONITORING AND ASSESSMENT

INTRODUCTION

California's well-being is linked to the health of its water. To protect and preserve this basic resource, the State Board and the Regional Board closely monitor water quality throughout the state. A comprehensive surveillance and monitoring program provides basic information needed to evaluate the effectiveness of California's water quality control program.

Historically, a wide variety of interested state, federal, and local agencies have sampled, analyzed, and tracked water quality. The State Board monitoring program coordinates existing information, and supplements it where necessary to meet data needs.

The Porter-Cologne Water Quality Control Act delegates primary responsibility for coordination and control of water quality in California to the State Board. Section 13163 of the Act states that in conducting this mission, the State Board shall coordinate water quality investigations, recognizing that other state agencies may have primary statutory responsibility for such investigations, and shall consult with the concerned Regional Boards in implementing this section.

Pursuant to these mandates, the State Board in 1976 established a coordinated Primary Water Quality Monitoring Network for California. Participants in the coordinated Primary Network included the California Departments of Fish and Game (DFG), Water Resources (DWR), and Health Services (DOHS) as well as the Federal Bureau of Reclamation, United States Geologic Survey (USGS), and the United States Environmental Protection Agency (US EPA).

The goal of the Primary Network has been to provide an overall, continuous assessment of water quality in the State. This goal is to be achieved by statewide monitoring of water quality parameters that can affect beneficial uses of state waters.

This chapter contains a discussion of the objectives and various elements of the State and Regional Board's surveillance and monitoring programs. Not all of these programs are currently active in the San Diego Region, as many are unfunded at this time.

STATE SURVEILLANCE AND MONITORING PROGRAMS

The State's surveillance and monitoring programs are designed to assure the collection of data necessary to:

- Establish and review water quality standards, goals, and objectives;
- Determine maximum daily loadings, waste load allocations, and effluent limitations;
- Perform segment classifications and ranking; and
- Establish the relationship between water quality and individual point and nonpoint sources of pollutants.

These data must be verified and properly interpreted to evaluate water quality trends and to make the necessary changes in the enforcement and/or planning programs to carry out program objectives. Output based upon data obtained from this program is used to prepare reports satisfying the requirements of federal Clean Water Act, Sections 104, 106, 208, 301, 303, 304, 305, 307, 308, 314, 402, and the applicable portions of the State's Porter-Cologne Water Quality Control Act.

The overall objectives of the State's surveillance and monitoring program are:

- To measure the achievement of water quality goals and objectives specified in the Basin Plan;
- To measure specific effects of water quality changes on the established beneficial uses;
- To measure background conditions of water quality and determine long-term trends in water quality;
- To locate and identify sources of water pollution that pose an acute, accumulative, and/or chronic threat to the environment;

- To provide information needed to relate receiving water quality to mass emissions of pollutants by waste dischargers;

- To provide data for determining compliance with permit conditions;

- To provide the documentation necessary to support the enforcement of permit conditions and waste discharge requirements;

- To measure waste loads discharged to receiving waters and to identify the limits of their effects, and in water quality limited segments, to prepare waste load allocations necessary to achieve water quality control;

- To provide data needed to carry on the continuing planning process;

- To provide a clearinghouse for the collection and dissemination of water quality data gathered by other agencies and private parties cooperating in the program;

- To measure the effects of water rights decisions on water quality and to guide the State Board in its responsibility to regulate unappropriated water for the control of quality; and

- To prepare reports on water quality conditions as required by federal and state regulations and other users requesting water quality data.

The surveillance and monitoring program is designed to meet the objectives set forth above. An optimum surveillance and monitoring program requires flexibility and must be able to respond to needs specified in the Basin Plan as it is implemented and revised. To ensure that the surveillance and monitoring program is flexible and adapts to change, statewide water quality assessments are performed every two years to provide a timely cycle to evaluate the program's effectiveness and make appropriate changes.

The surveillance and monitoring program provides for collection and analysis of samples and the reporting of water quality data. It includes laboratory support and quality assurance, storage of data for rapid and systematic retrieval, and preparation of reports and data summaries. Most importantly, it includes interpretation and evaluation of data leading to recommendations for action.

Surveillance and monitoring at the State level is made up of three programs. These are the Toxic Substance Monitoring, State Mussel Watch and Bay Protection and Toxic Cleanup Programs.

TOXIC SUBSTANCE MONITORING PROGRAM

One method of monitoring for toxic substances (toxic elements and organic compounds) is to collect and analyze water samples. A major problem with this approach is that toxic discharges are likely to occur in an intermittent fashion and thus are likely to be missed with "*grab*" sampling of the water. Another limitation to analyzing water samples is that generally, harmful toxicants are present in low concentrations in the water. Toxicants are concentrated through the aquatic food chain through the process of bioaccumulation. Thus, in the Toxic Substances Monitoring Program, the flesh of fish and other aquatic organisms is analyzed for toxic metals and synthetic organic compounds.

Streams and lakes in the region are sampled according to their importance to the State in terms of water quality. Priority is given to waters where contaminants are suspected and/or to waters where no other source of water quality information is available. Routine chemical and biological water monitoring is performed by the Department of Water Resources and/or USGS; and toxic substances monitoring of resident organisms is performed by the Department of Fish and Game.

The objectives of the Toxic Substance Monitoring program are:

- To develop statewide baseline data and to demonstrate trends in the occurrence of toxic elements and organic substances in the aquatic biota;

- To assess impacts of accumulated toxicant upon the usability of State waters by man;

- To assess impacts of accumulated toxicant upon the aquatic biota; and

- Where problem concentrations of toxicant are detected, to attempt to identify sources of toxicant and to relate concentrations found in the biota to concentrations found in the water.

The samples collected in the Toxic Substance Monitoring program are benthic invertebrates and fish. The flesh of bivalve mollusks or crayfish tailflesh and fish livers are analyzed for important

TABLE 6 - 1. SYNTHETIC ORGANIC COMPOUNDS ANALYZED IN THE STATE MUSSEL WATCH AND TOXIC SUBSTANCES MONITORING PROGRAMS

Aldrin	P,P'- DDMU	delta Lindane
Chlorbenside	O,P'- DDT	Total Lindane[2]
alpha Chlordane	P,P'- DDT	Methoxychlor
gamma Chlordane	Total DDT	Methyl Parathion
cis Chlordane	Diazinon	Oxadiazon[2]
trans Chlordane	Dieldrin	PCB 1248
Oxychlordane	Endrin	PCB 1254
Total Chlordane	Endosulfan 1	PCB 1260
cis Nonachlor	Endosulfan 2	Total PCB
trans Nonachlor	Endosulfan Sulfate	Pentachlorophenol[1]
Chlorpyrifos	Total Endosulfan	Phenol[1]
Dacthal	Ethyl Parathion	Ronnel[1]
Dicofol[2]	Heptachlor	Tetrachlorphenol[1]
P,P'- DDE	Heptachlor Epoxide	Tetradifon[1]
O,P'- DDE	Heptachlorobenzene	Toxaphene
P,P'- DDD	alpha Lindane	Tributylin[1]
O,P'- DDD	beta Lindane	
P,P'-DDMS	gamma Lindane	

[1] These constituents only sampled in the State Mussel Watch Program.
[2] These constituents only sampled in the Toxic Substances Monitoring Program.

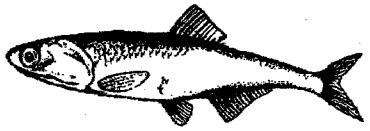
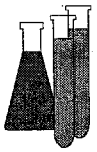

metals, including arsenic, cadmium, chromium, copper, lead, nickel, silver, and zinc; fish flesh is analyzed for mercury. In addition, both invertebrate and fish flesh samples are analyzed for 55 synthetic organic compounds, most of which are pesticides. Toxic Substance Monitoring reports have been published annually since 1977.

STATE MUSSEL WATCH PROGRAM

The State Mussel Watch (Mussel Watch) program provides documentation of the quality of coastal marine and estuarine waters. The Mussel Watch program fulfills the goal of providing the state with long-term trends in the quality of these waters.

Mussels were chosen as the indicator organism for trace metals and synthetic organic compounds in the coastal and estuarine waters. Although the mussel populations of bays and estuaries are of a different species than those found in the open coast; their suitability as sentinels for monitoring the presence of toxic pollutants stems from several factors including: (1) their ubiquity along the California coast; (2) their ability to concentrate pollutants above ambient sea water levels and to provide a time-averaged sample; and (3) their non-motile nature which permits a localized measurement of water quality. The trace metals analyzed for in mussel tissues include aluminum, cadmium, chromium, copper, lead, manganese, mercury, nickel, silver, and zinc. Synthetic organic compounds analyzed for are summarized in Table 6-1. When compared with alternative sampling designs such as seawater and sediment sampling, the Mussel Watch program is a more cost effective program. Mussel Watch reports have been published annually since 1978.

During the 1977 and 1978 sampling periods, the focus of the Mussel Watch program was, for the most part, on open coast monitoring of sites outside

the vicinity of known pollutant sources. Monitoring of water quality in the State Board's designated Areas of Special Biological Significance (ASBS), to establish baseline conditions relating to the range of typical conditions in water, sediment and biota, was given prime importance in the early years of the program.

Based on the identification of "*hot spot*" areas during 1977 and 1978, intensive sampling of these areas was implemented in 1979. Such a sampling strategy was intended to confirm previous findings, establish the magnitude of the potential problem and identify pollutant sources. The program has since evolved to include transplanting *Mytilus californianus* mussels into select California bays and estuaries at selected sites to confirm potential toxic substance pollution (i.e., in the vicinity of dischargers).

BAY PROTECTION AND TOXIC CLEANUP PROGRAM

California Water Code, Division 7, Chapter 5.6 established a comprehensive program within the State Board to protect the existing and future beneficial uses of California's bays and estuaries. The Bay Protection and Toxic Cleanup Program (BPTCP) provides focus on the State Board and regional boards efforts to control pollution of the State's bays and estuaries. The BPTCP also establishes a program to identify toxic hot spots and plan for their cleanup. Chapter 5.6, Sections 13390 through 13396.5 were added to Division 7 of the California Water Code by SB 475 (Stats. 1989, Chapter 269), SB 1845 (Stats. 1990, Chapter 1294), and AB 41 (Stats. 1989, Chapter 1032). New legislation (SB 1084 Calderon; Stats. 1993, Chapter 1157) extends program funding through 1998. The BPTCP is a statewide program which is coordinated with the California Department of Fish and Game and Cal-EPA's Office of Environmental Health Hazard Assessment. The program was established: (1) to provide protection for existing and future beneficial uses of bay and estuarine waters; (2) to provide a plan for remedial action at toxic hot spots; (3) to further compliance with federal law pertaining to the identification of waters where the protection and propagation of shellfish, fish, and wildlife are threatened by toxic pollutants and contribute to the development of effective strategies to control these pollutants; and (4) to allow these programs to be structured and maintained in a manner which allows the State and Regional Boards to make maximum use of any federal funds which may be available for the program. To attain the goals of the program, the State and Regional Boards are required to do the following:

- Develop and maintain a program to identify toxic hot spots, plan for their cleanup or mitigation, and amend water quality control plans and policies to abate toxic hot spots;
- Formulate and adopt a water quality control plan for enclosed bays and estuaries;
- Review and, if necessary, revise waste discharge requirements to conform to the plan;
- Develop a database of toxic hot spots;
- Develop an ongoing monitoring and surveillance program;
- Develop sediment quality objectives;
- Develop criteria for the assessment and priority ranking of toxic hot spots; and
- Fund the program through fees on point and nonpoint dischargers (Title 17 California Code of Regulations Section 2236).

Program accomplishments include:

- Adoption of an approach for establishing sediment quality objectives;
- Installation of a computer system for a consolidated database of information being collected to identify toxic hot spots;
- Implementation of regional monitoring program;
- Development of draft site ranking criteria to be used for priority ranking of toxic hot spots; and
- Implementation of a fee system supporting the program.

The development of regional and statewide cleanup plans is ongoing. For the period July, 1992 through June, 1994 there are two main sediment sampling and analysis efforts for the BPTCP. The first includes toxicity screening where the primary goal is to determine bioassay protocols, establish reference sites and a consolidated database. The second is measurement of the bioeffects associated with

toxicants. This includes a survey of sediment contamination and toxicity; two independent toxicity tests including ten-day solid phase amphipod survival, and pore-water test of sea urchin egg fertilization; chemical analyses of sediment samples including trace metals, pesticides, hydrocarbons, tributyltin, acid volatile sulfides and selected normalizers (such as grain size and total organics). Surveillance and monitoring sites in this region are located in the Pacific Ocean, Tijuana River, San Diego Bay, and Mission Bay.

In addition, the San Diego Region BPTCP includes an Underwater Hull Cleaning (UHC) study and a water circulation study for San Diego Bay. The components of the UHC study includes surveys, water sampling and recommendations. The results of the UHC study should assist the Regional Board to determine appropriate regulations for underwater hull cleaners.

REGIONAL SURVEILLANCE AND MONITORING PROGRAMS

The Regional Board participates in the implementation of the following surveillance and monitoring programs:

- Compliance Inspections and Monitoring;
- Complaint Investigation
- Intensive Surveys;
- Municipal Storm Water Monitoring;
- Water Quality Assessment Activities; and
- Quality Assurance and Quality Control.

COMPLIANCE INSPECTIONS AND MONITORING

The Regional Board ensures compliance with the Water Quality Control Plan, NPDES permits and waste discharge requirements through implementation of a comprehensive self monitoring program and compliance inspection program.

COMPLIANCE MONITORING

Compliance monitoring provides data which is used to determine compliance with discharge requirements and receiving water standards and to support enforcement actions. Data are collected from self monitoring reports generated by waste dischargers.

Self monitoring reports submitted to the Regional Board are reviewed, and if violations are noted, appropriate action is taken, ranging from administrative enforcement to judicial abatement depending on the circumstances. Self monitoring data have also been used to develop pollutant loadings and to indicate the general improvement noted in the receiving water.

Self monitoring report requirements are dependent on the type and quantity of effluent discharged. For example, the City of San Diego, Water Utilities Department, conducts an Ocean Monitoring Program as part of the environmental monitoring requirements for the Point Loma Sewage Outfall. The program includes chemical and biological testing of ocean waters, sediments, fish, and benthic infauna. Most of the monitoring stations are in close vicinity to the Point Loma Sewage Outfall; however, stations range geographically from the shoreline to six miles offshore and from La Jolla to the Mexican border.

COMPLIANCE INSPECTIONS

Regional Board staff periodically conducts inspections of all dischargers regulated under an NPDES permit or waste discharge requirements. Treatment, storage, and discharge facilities are inspected to determine compliance with the permit. Compliance inspection reports are written based on staff inspections of a particular site and include observations made by staff and/or results of analyses performed on samples collected by staff. During the inspections facts and information are gathered to assess the degree of compliance with the following NPDES permit or waste discharge requirement provisions:

- Effluent and receiving water limitations;
- Self-monitoring reports;
- Record keeping and reporting;
- Compliance time schedules, if applicable;
- Best management plans, if applicable; and
- Other conditions, provisions and prohibitions.

During some inspections, samples are collected to further determine compliance. Inspections can be either announced or unannounced. Announced inspections facilitate direct communication with the discharger to review procedures and operations. Unannounced inspections have the advantage that staff can witness normal day-to-day operations without giving the discharger the opportunity to

prepare for the visit. Upon discovery of a noncompliance the procedures discussed in the enforcement section of Chapter 4 are followed to gain correction.

COMPLAINT INVESTIGATIONS

This task involves investigation of complaints of citizens and public or governmental agencies on the discharge of pollutants or creation of nuisance conditions. It is a Regional Board responsibility to prepare reports or letters and follow-up actions to document observed conditions and to institute appropriate corrective actions. In instances where the Regional Board cannot respond to a complaint because of resource limitations, the Regional Board notifies other agencies if it falls within their jurisdiction.

The Regional Board strives to ensure that responses to complaints involving threats to water quality be made in an expedient manner, as resources allow. For the purpose of this policy, response includes the following three components: (1) Thorough documentation of complaints; (2) Appropriate follow-up including site inspections, referral to, or notification of, other regulatory agencies, corrective actions, enforcement actions, etc.; and (3) Notification to complainant, as appropriate, of findings and subsequent actions.

DEFINITION OF ACTIVITIES

Complaint activities include all activities necessary to respond to a complaint or incident including the following: (1) Receiving and documenting complaints/incidents (e.g., spills); (2) Any follow-up activities to gather additional information (e.g., research, telephone contacts, coordination with other agencies, etc.); (3) Preparation for any field inspections necessary to investigate a complaint/incident; (4) Field inspections, including travel; (5) Sampling of spill and/or receiving waters for documentation, if appropriate; and (6) Documenting findings and responding to complainant.

NOTIFICATION TO OTHER AGENCIES

The Regional Board notifies other responsible regulatory agencies (e.g., Public Health, Department of Health Services, Department of Fish and Game, Department of Food and Agriculture, Integrated Solid Waste Management Board) of the content of a complaint if it falls within said agency's jurisdiction.

Except for a discharge in compliance with waste discharge requirements, any person who causes or permits any reportable quantity of hazardous substance or sewage to be discharged in or on any waters of the State, or discharged or deposited where it is or probably will be discharged in or on any waters of the State, shall, as soon as possible, notify the Office of Emergency Services of the discharge in accordance with the spill reporting provision of the State toxic disaster contingency plan. The person shall also immediately notify the State Board or appropriate Regional Board of the discharge (Water Code Section 13271).

Similarly, any person who discharges any oil or petroleum product under the above-stated conditions shall, as soon as possible, notify the Office of Emergency Services of the discharge in accordance with the spill reporting provision of the State oil spill contingency plan. Immediate notification of an appropriate agency of the federal government, or of the appropriate Regional Board (in accordance with the reporting requirements set under Water Code Section 13267 or 13383) shall satisfy the oil spill notification requirements of this paragraph (Water Code Section 13272).

REPORTABLE QUANTITIES OF HAZARDOUS WASTE AND SEWAGE DISCHARGES

Water Code Section 13271 requires that the State Board and the Department of Health Services adopt regulations establishing reportable quantities for substances listed as hazardous wastes or hazardous materials pursuant to section 25140 of the Health and Safety Code. Reportable quantities are those which should be reported because they may pose a risk to public health or the environment if discharged to ground or surface water.

Similarly, the State Board was required to adopt regulations establishing reportable quantities for sewage. These regulations for sewage and hazardous materials discharge do not supercede waste discharge requirements or water quality objectives.

The State Board adopted regulations for reportable quantities are included in subchapter 9.2 of the California Code of Regulations.

INSPECTION IN RESPONSE TO COMPLAINTS

The Regional or State Board may inspect the facilities of any discharger at any time pursuant to Water Code, Section 13267. Such inspections should normally be conducted with consent of the occupant and/or owner of the facilities. If an inspection request is refused by any occupant of the premises, an effort to gain access should be made with the owner of the premises. The Clean Water Act and California Water Code provide that a credentialed inspector must be allowed entry to the facilities subject to regulation under these laws. Regional Board staff do not inspect sites which pose a threat to their health or safety. For sites which could involve toxic and hazardous materials field work, a Health Evaluation Plan (HEP) is completed.

If all attempts to obtain consent fail, the inspection may be made pursuant to a warrant in accordance with the procedure set forth in Title 13, Section 13267(c). In all cases where an inspection warrant is required, staff of the State Board's Office of Chief Counsel is consulted relative to procedures.

An inspection is permitted without consent and without a warrant when there is an emergency which affects the public health or safety. Advice from the State Board's Office of Chief Counsel is sought before making such an inspection.

When an inspection is done in response to a complaint, and the inspector may be entering an "*unknown*" situation, every safety precaution is taken. Again, in no instance does staff make an inspection of a site which may pose a threat to their health and safety. Thorough notes and documentation are made during the inspection, including photographs, if appropriate. After an inspection is completed, an inspection report is prepared describing what was found.

FINDINGS OF NONCOMPLIANCE

If during the course of a complaint investigation, a noncompliance is discovered, procedures as outlined in the enforcement section of Chapter 4 (Implementation chapter) are followed.

INTENSIVE SURVEYS

Intensive monitoring surveys provide detailed water quality data to locate and evaluate violations of receiving water standards, to develop waste load allocations and to assess the water quality condition. They usually involve localized, intermittent sampling at a higher than normal frequency. Intensive surveys should be repeated at appropriate intervals depending on the parameters involved, the variability of conditions, and changes in hydrologic or effluent regimes.

MUNICIPAL STORM WATER MONITORING

The storm water permitting program has been established to protect water quality of the water bodies which receive storm water runoff. (For a complete description of this program, refer to Chapter 4, Implementation Chapter). Sampling of storm water runoff has indicated that storm water discharges contain significant amounts of pollutants. Therefore, the Region's municipal storm water permits requires the permittee to develop comprehensive management and monitoring programs. Because each permit generally covers a large number of water bodies, the required monitoring program is in two phases.

Phase I requires the discharger to sample storm water discharges and to sample those receiving waters where the beneficial uses are threatened or impaired due to runoff of storm water and urban nuisance water. Phase I requires both a dry and wet weather monitoring program. San Diego copermittees are required to sample two major types of runoff stations: (1) mass loading; and (2) land use stations. The dry weather monitoring program requires periodic colormetric field tests and visual inspections of the storm water conveyance system to detect non-storm water flows. Under Phase II the dischargers will be required to develop storm water management and monitoring programs for the remaining water bodies included under the permit.

Storm water discharges from urbanized areas consist mainly of surface runoff emanating from residential, commercial, and industrial areas. In addition, there are storm water discharges from agricultural and other land uses. The constituents of concern in these discharges include: total and fecal coliform, enterococcus, total suspended solids, biochemical oxygen demand, chemical oxygen demand, total organic carbon, oil and grease, heavy metals, nutrients, base/neutral and acid extractables, pesticides, herbicides, petroleum hydrocarbon products, and/or those causing extremely high or low pH.

The objectives of the storm water monitoring program are to: (1) define the type, magnitude, and

sources of pollutants in the storm water discharges within the permittee's jurisdiction so that appropriate pollution prevention and correction measures can be identified; (2) evaluate the effectiveness of pollution prevention and correction measures; and (3) evaluate compliance with water quality objectives established for the storm water system or its components.

BIENNIAL WATER QUALITY INVENTORY / WATER QUALITY ASSESSMENT REPORT

Section 305(b) of the federal Clean Water Act requires all states to prepare and submit a biennial Water Quality Inventory Report, (commonly referred to as a "*305(b) Report*"). In California, this report is used by the State Board and the US EPA to prioritize funding for water quality programs. As required by the Clean Water Act, Section 305(b), the report must contain:

- A description of the water quality of the major navigable water bodies in the state;
- An analysis of the extent to which significant navigable waters provide for the protection and propagation of a balanced population of shellfish, fish, and wildlife and allow recreational activities in and on the water;
- An analysis of the extent to which elimination of the discharge of pollutants has been achieved;
- An estimate of the environmental impact, the economic, and social costs necessary to achieve the objective of the Clean Water Act, the economic and social benefits of the achievement, and the date of such achievement; and
- A description of the nature and the extent of nonpoint sources of pollutants and recommendations as to the programs which must be taken to control them, with estimates of cost.

Each Regional Board prepares a biennial Water Quality Assessment (WQA) Report for its Region, using data collected by regional planning, permitting, surveillance, and enforcement programs. The regional reports contain inventories of the major water bodies in the region, including rivers and streams, lakes and reservoirs, bays and harbors, estuaries, coastal waters, wetlands, and ground water. For each water body, the report identifies the total size and the extent of the water body classified as having "*good*", "*intermediate*", "*impaired*", or "*unknown*" water quality. The report describes general problems and sources of water quality impairment. Additionally, the data base also indicates if the water body is included on any of the federal "*lists*". These lists indicate specific types of water quality impairments and are organized by the appropriate sections of the Clean Water Act as follows:

Section 131.11: Segments which may be affected by toxic pollutants, or segments with concentrations of toxic pollutants that warrant concern.

Section 303(d): List of Water Quality Limited Segments where objectives or goals of the Clean Water Act are not attainable with the Best Available Treatment/Best Control Technology (BAT/BCT).

Section 304(m): So-called "*mini-list*" of waters not meeting State adopted numeric water quality objectives due to toxic point sources after implementation of BAT/BCT.

Section 304(s): So-called "*short list*" of waters not achieving water quality standards due to point source discharges of toxic pollutants after implementation of BAT/BCT.

Section 304(l): So-called "*long list*" of waters not meeting the water quality goals of the Clean Water Act after implementation of BAT/BCT.

Section 314: A list of lake priorities for restoration.

Section 319: A list of impaired surface water bodies from nonpoint source problems due to both toxic and nontoxic pollutants.

Upon adoption of the Regional WQA Reports by respective Regional Boards, the reports are compiled into a statewide report entitled California Water Quality Assessment Report. Upon adoption of this statewide report by the State board, the report is submitted to the US EPA to satisfy Section 305(b) reporting requirements of the Clean Water Act.

CLEAN WATER STRATEGY

The Clean Water Strategy (CWS) is a process that the State Board implemented to assure that staff and fiscal resources are directed at the highest priority water quality issues throughout California. The primary objective of the CWS is to more

effectively define and respond to priorities as revealed by the best available water quality information.

The CWS relies on the Water Quality Assessment condition ratings to provide the technical information necessary to identify water bodies needing protection or prevention actions, additional assessment, or cleanup activities. In addition to the Water Quality Assessment, the regions determined the relative resource value of their water bodies to recognize the relative importance of individual waters when compared to each other. The regions developed priority water body lists which are based upon the severity of their water quality problems or needs and relative resource values, from which the State Board assembled a statewide priority list based upon the same criteria.

There are six phases involved in implementing the Clean Water Strategy. As of this date, phase 1 and 2 have been completed. The State Board has begun a pilot study to determine the feasibility of phases 3 through 6.

Phase 1: Obtain the best information;
Phase 2: Compare and prioritize water body concerns;
Phase 3: Prioritize actions to address concerns;
Phase 4: Allocate new resources;
Phase 5: Implement strategy goals; and
Phase 6: Review results.

QUALITY ASSURANCE AND QUALITY CONTROL

The statewide Quality Assurance (QA) program was developed to ensure that data generated from environmental studies are technically sound, scientifically valid, and legally defensible. A federal regulation (US EPA Order 5360.1) requiring the State to develop and implement a Quality Assurance Program Plan (QAPP) was adopted in April 1993. The program mandate is identified in 40 CFR 30.503 (July 1, 1987).

The State Board has appointed a QA Program manager to direct, coordinate, and administer the State QAPP. Independently, each Regional Board has appointed a QA officer to administer its Regional responsibilities. The State and Regional Boards jointly administer the program, however the State Board has lead responsibility for managing the overall program and reporting to the US EPA. The duties of the Regional Board QA officer include overseeing and implementing QA procedures conducted in the Regional Board laboratory, interacting with project managers on the required preparation of QA Project Plans, and evaluating compliance inspection data on all major dischargers.

OTHER MONITORING PROGRAMS

In addition to the State's surveillance and monitoring program, several other agencies monitor water quality, complementing the State's efforts. These agencies are usually local health departments or water supply agencies.

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GLOSSARY

Basin Plan - The plan for the protection of water quality prepared by the Regional Water Quality Control Board in response to the Porter-Cologne Water Quality Control Act. The Basin Plan for the San Diego Region is also known as the Water Quality Control Plan for the San Diego Basin (9) and contains Water Quality Standards for the federal Clean Water Act.

Beneficial Uses - The uses of water necessary for the survival or well being of man, plants, and wildlife. These uses of water serve to promote the tangible and intangible economic, social, and environmental goals "Beneficial Uses" of the waters of the State that may be protected against include, but are not limited to, domestic, municipal, agricultural and industrial supply; power generation; recreation; aesthetic enjoyment; navigation; and preservation and enhancement of fish, wildlife, and other aquatic resources or preserves. Existing beneficial uses are uses that were attained in the surface or ground water on or after November 28, 1975; and potential beneficial uses are uses that would probably develop in future years through the implementation of various control measures. "Beneficial Uses" are equivalent to "Designated Uses" under federal law. [California Water Code Section 13050(f)].

Best Management Practices (BMPs) - The practice or combination of practices that are determined to be the most effective, practicable means of preventing or reducing the amount of pollution generated by nonpoint sources to a level compatible with water quality goals (including technological, economic, and institutional considerations).

Bioaccumulation - The accumulation of contaminants in the tissues of organisms through any route, including respiration, ingestion, or direct contact with contaminated water, sediment, food, or dredged material.

California Water Code, Division 7 - a.k.a. Porter Cologne Water Quality Control Act

Capping - The controlled, accurate placement of contaminated material at an open-water site, followed by a covering or cap of clean isolating material.

CEQA - California Environmental Quality Act of 1970

Clean Water Act - a.k.a. Federal Water Pollution Control Act

Confined disposal - Placement of dredged material within dikes nearshore or upland confined disposal facilities that enclose the disposal area above any adjacent water surface, isolating the dredged material from adjacent waters during placement. Confined disposal does not refer to subaqueous capping or contained aquatic disposal.

Contaminant - A chemical or biological substance in a form that can be incorporated into, onto, or be ingested by and that harms aquatic organisms, consumers of aquatic organisms, or users of the aquatic environment.

Contaminated sediment or contaminated dredged material - Contaminated sediments or contaminated dredged materials are defined as those that have been demonstrated to cause an unacceptable adverse effect on human health or the environment.

Contamination - means an impairment of the quality of the waters of the state by waste to a degree which creates a hazard to the public health through poisoning or through the spread of disease. "Contamination" includes any equivalent effect resulting from the disposal of waste, whether or not waters of the state are affected.

Dredged material - Material excavated from waters of the United States or ocean waters. The term dredged material refers to material which has been dredged from a water body, while the term sediment refers to material in a water body prior to the dredging process.

Dredged material discharge - The term dredged material discharge means any addition of dredged material into waters of the United States or ocean waters. The term includes open- water discharges; discharges resulting from unconfined disposal operations (such as beach nourishment or other beneficial uses); discharges from confined disposal facilities that enter waters of the United States (such as effluent, surface runoff, or leachate); and overflow from dredge hoppers, scows, or other transport vessels.

Effluent Limitations - Limitations on the volume of each waste discharge, and the quantity and concentrations of pollutants in the discharge. The limitations are designed to ensure that the discharge does not cause water quality objectives to be exceeded in the receiving water and does not adversely affect beneficial uses.

Ephemeral - Water bodies, or segments thereof, that contain water only for a short period following precipitation events.

Hydrologic Area - A major logical subdivision of a hydrologic unit which includes both water-bearing and nonwater-bearing formations. It is best typified by a major tributary of a stream, a major valley, or a plain along a stream containing one or more ground water basins and having closely related geologic, hydrologic, and topographic characteristics. Area boundaries are based primarily on surface drainage boundaries. However, where strong subsurface evidence indicates that a division of ground water exists, the area boundary may be based on subsurface characteristics.

Hydrologic Subarea - A major logical subdivision of a hydrologic area which includes both water-bearing and nonwater-bearing formations.

Hydrologic Unit - A classification embracing one of the following features which are defined by surface drainage divides: (1) in general, the total watershed area, including water-bearing and nonwater-bearing formations, such as the total drainage area of the San Diego River Valley; and (2) in coastal areas, two or more small contiguous watersheds having similar hydrologic characteristics, each watershed being directly tributary to the ocean and all watersheds emanating from one mountain body located immediately adjacent to the ocean.

Implementation Plan - Basin Plan chapter which describes the actions by the Regional Board and others that are necessary to achieve and maintain the designated beneficial uses and water quality objectives of the Region's waters.

Intermittent - Water bodies, or segments thereof, that contain water for extended periods during the year, but not at all times.

Interrupted - Water bodies or streams that contain perennial segments or pools, with intervening intermittent or ephemeral segments.

Leachate - Water or any other liquid that may contain dissolved (leached) soluble materials, such as organic salts and mineral salts, derived from a solid material. For example, rainwater that percolates through a confined disposal facility and picks up dissolved contaminants is considered leachate.

Major federal action - Includes actions with effects that may be major and that are potentially subject to federal control and responsibility. Major refers to the context (meaning that the action must be analyzed in several contexts, such as the effects on the environment, society, regions, interests, and locality) and intensity (meaning the severity of the impact). It can include (a) new and continuing activities, projects, and programs entirely or partly financed, assisted, conducted, regulated, or approved by federal agencies; (b) new or revised agency rules, regulations, plans, policies, or procedures; and (c) legislative proposals. Action does not include funding assistance solely in the form of general revenue-sharing funds where there is no federal agency control over the subsequent use of such funds. Action does not include judicial or administrative civil or criminal enforcement action.

National Pollution Discharge Elimination System (NPDES) - These permits pertain to the discharge of waste to surface waters only. All State and Federal NPDES permits are also WDRs.

Nonpoint Sources - This refers to pollutants from diffuse sources that reach water through means other than a discernable, confined, and discrete conveyance.

Non-storm Water Discharge - Any discharge to a storm water conveyance system that is not composed entirely of storm water.

Nuisance - means anything which meets all of the following requirements: (1) Is injurious to health, or is indecent or offensive to the senses, or an obstruction to the free use of property, so as to interfere with the comfortable enjoyment of life or property; (2) Affects at the same time an entire community or neighborhood, or any considerable number of persons, although the extent of the annoyance or damage inflicted upon individuals may be unequal; and (3) Occurs during or as a result of the treatment or disposal of waste.

Open-water disposal - Placement of dredged material in rivers, lakes, estuaries, or oceans via pipeline or surface release from hopper dredges or barges.

Person - Also includes any city, county, district, the state or any department or agency thereof. "Person" includes the United States, to the extent authorized by federal law.

pH - Term used to refer to the hydrogen ion concentration of water. The acidity or alkalinity of water is measured by the pH factor.

Point Sources - This refers to pollutants discharged to water through any discernable, confined, and discrete conveyance.

Pollution - means an alteration of the quality of the waters of the state by wastes to a degree which unreasonably affects either of the following: (1) The waters for beneficial uses, or (2) Facilities which serve those beneficial uses. "Pollution" may include "contamination."

Porter-Cologne Water Quality Control Act (Porter-Cologne Act) - This is also known as the California Water Code.

Quality of the Water - or "quality of the waters" refers to chemical, physical, biological, bacteriological, radiological, and other properties and characteristics of water which affect its use.

Reclaimed water - or "recycled water" means water which, as a result of treatment of waste, is suitable for a direct beneficial use or a controlled use that would not otherwise occur and is therefor considered a valuable resource.

Regional Board - a.k.a. California Regional Water Quality Control Board

Region - a.k.a. San Diego Basin (9)

Sewage, Domestic - Waste and wastewater from humans or household operations that is discharged to or otherwise enters a treatment works. [40 CFR 503.9(g)]

Sewage Sludge - A solid, semi-solid, or liquid residue generated during the treatment of domestic sewage in a treatment works. Sewage sludge includes, but is not limited to, domestic septage; scum or solids removed in primary, secondary, or advanced wastewater treatment processes; and a material derived from sewage sludge. Sewage sludge does not include ash generated during the firing of sewage sludge in a sewage incinerator or grit and screenings generated during preliminary treatment of domestic sewage in a treatment works. [40 CFR 503.9(w)]

State Board - a.k.a. State Water Resources Control Board

Statewide Plan - A water quality control plan adopted by the State Water Resources Control Board in accordance with the provisions of Water Code Sections 13240 through 13244, for waters where water quality standards are required by the Federal Water Pollution Control Act. Such plans supersede regional water quality control plans for the same waters to the extent of a conflict. [California Water Code Section 13170].

Triennial Review - Review of the Basin Plan which is required to be done every three years by the federal Clean Water Act [Section 303(c)(1)].

Waste - Includes sewage and any and all other waste substances, liquid, solid, gaseous, or radioactive, associated with human habitation, or of human or animal origin, or from any producing, manufacturing, or processing operation of whatever nature, including waste placed within containers of whatever nature prior to, and for purposes of, disposal.

Waste Discharge Requirements (WDRs) - The name of permits issued by the Regional Board for the discharge of waste to land. The discharge of waste to land may potentially may impact ground water quality. These permits require that waste not be discharged in a manner that would cause an exceedance of applicable water quality objectives or adversely affect beneficial uses designated in the Basin Plan.

Water Quality Criteria - Numerical or narrative limits for constituents or characteristics of water designed to protect specific designated uses of the water. When criteria are met, water quality will generally protect the designated use [40 CFR Section 131.3(b)]. This term is also used to describe scientific information on the relationship that the effect of a constituent concentration has on human health, aquatic life, or other uses of water, such as the criteria in the USEPA "Gold Book". California's water quality criteria are called "water quality objectives". See "water quality standard".

Water Quality Control - means the regulation of any activity or factor which may affect the quality of the water of the state and includes the prevention and correction of water pollution and nuisance.

Water Quality Goal - The most stringent, applicable, numerical water quality limit for a constituent or parameter of concern in a specific body of ground or surface water at a specific site that is chosen to protect either (1) existing water quality or (2) beneficial uses of water. In the first case, the water quality goal is set equal to the background level in the body of water. In the second case, the water quality goal is set at the less stringent of either (a) the numerical limit which implements all applicable water quality objectives or (b) the background level.

Water Quality Objectives - Numerical or narrative limits on constituents or characteristics of water designed to protect designated beneficial uses of the water. [California Water Code Section 13050(h)]. California's water quality objectives are established by the State and Regional Water Boards in the *Water Quality Control Plans*. See "water quality standards".

Water Quality Standards - Provisions of State or federal law which consist of a designated use or uses for waters of the United States and water quality criteria for such waters based upon such uses. Water quality standards are to protect the public health or welfare, enhance the quality of water and serve the purposes of the Act [40 CFR Section 131.3(i)]. A water quality standard under the Federal Clean Water Act is equivalent to a beneficial use designation plus a water quality objective. In California, water quality standards are promulgated by the State and Regional Water Boards in *Water Quality Control Plans*. Water quality standards are enforceable limits for the bodies of surface or ground waters for which they are established.

Water Quality Control Plans - There are two types of water quality control plans - Basin Plans and Statewide Plans. Regional Boards adopt Basin Plans for each region based upon surface water hydrologic basin boundaries. The Regional Basin Plans designates or describes (1) existing and potential beneficial uses of ground and surface water; (2) water quality objectives to protect the beneficial uses; (3) implementation programs to achieve these objectives; and (4) surveillance and monitoring activities to evaluate the effectiveness of the water quality control plan. The Statewide Plans address water quality concerns for surface waters that overlap Regional Board boundaries, are statewide in scope, or are otherwise considered significant and contain the same four elements. Statewide Water Quality Control Plans include the Ocean Plan, the Enclosed Bays and Estuaries Plan, the Inland Surface Waters Plan, and the Thermal Plan. A water quality control plan consists of a designation or establishment for the waters within a specified area of (1) beneficial uses to be protected, (2) water quality objectives, and (3) a program of implementation needed for achieving water quality objectives. [California Water Code Section 13050(j)].

Waters of the State - Any water, surface or underground, including saline waters within the boundaries of the State [California Water Code Section 13050(e)].

ACRONYMS

ACL ..... Aministrative Civil Liability
Adj. SAR ..... Adjusted Sodium Adsorption Ratio
AF ..... Acre-foot (Acre-feet)
af/y ..... acre-foot (acre-feet) per year
AGR ..... beneficial use of agricultural supply
AQUA ..... beneficial use of aquaculture
ASBS . beneficial use of Area of Special Biological Significance
BAT ..... Best Available Technology
BCT ..... Best Control Technology
BEP ..... Bays and Estuaries Plan
BIOL .... beneficial use of preservation of biological habitats of special significance
BMP ..... Best Management Practice
BOD ..... Biological Oxygen Demand
BPTCP ..... Bay Protection and Toxic Cleanup Program
°C ..... degrees Centigrade
Ca ..... Calcium
Cal-EPA's ..... California Environmental Protection Agency
CBOD ..... Carbonaceous Biochemical Oxygen Demand
CCR ..... California Code of Regulations
CEQA ..... California Environmental Quality Act of 1970
CERCLA ..... Comprehensive, Environmental Response, Compensation, and Liability Act, commonly referred to as Superfund
CFR ..... Code of Federal Regulations
CIWMB ..... California Integrated Waste Management Board
COLD ..... beneficial use of cold freshwater habitat
COMM ..... beneficial use ofcommercial and sport fishing
CWA ..... federal Clean Water Act
CWC ..... California Water Code
CWS ..... Clean Water Strategy
CZARA .... Coastal Zone Act Reauthorization Amendments
DDE ..... Dichlorodiphenyldichloroethylene
DDT ..... Dichlorodiphenyltrichloroethane
DFG ..... Department of Fish and Game
DoD ..... Department of Defense
DOHS ..... Department of Health Services
DPR ..... Department of Pesticide Regulation
DTSC ..... Department of Toxic Substance Control
DWR ..... Department of Water Resources
E. Coli ..... *Escherichia coli*
EIR ..... Environmental Impact Report
EIS ..... Environmental Impact Statement
EST ..... beneficial use of estuarine habitat
ET ..... Evapotranspiration
ETI ..... Evapotranspiration-Infiltration
°F ..... degrees Fahrenheit
FFA ..... Federal Facility Agreement
FRSH ..... beneficial use of freshwater replenishment
ft ..... foot (feet)
Gold Book ..... Quality Criteria for Water, 1986
GWR ..... beneficial use of ground water recharge
HA ..... Hydrologic Area
HEP ..... Health Evaluation Plan
HSA ..... Hydrologic Subarea
HU ..... Hydrologic Unit
IND ..... beneficial use of industrial service supply
ISWP ..... Inland Surface Waters Plan
K ..... Potassium
l ..... liter
LA ..... Load Allocation
m ..... meter(s)
MAA ..... Management Agency Agreement
MAR ..... beneficial use of marine habitat
MBAS ..... Methylene Blue-Activated Substances
MEP ..... Maximum Extent Practicable
mg ..... milligram(s)
Mg ..... Magnesium
mg/l ..... milligram(s) per liter
MGD ..... Million Gallons per Day
MIGR ..... beneficial use of migration of aquatic organisms
MPRSA ..... Marine Protection, Research and Sanctuaries Act of 1972
ml ..... milliliter(s)
MLLW ..... Mean Lower Low Water
MOU ..... Memorandum of Understanding
MSD ..... Marine Sanitation Device
MUN ..... beneficial use of municipal and domestic supply
Mussel Watch ..... State Mussel Watch
MWD ..... Metropolitan Water Districtof Southern California
NASSCO ..... National Steel and Shipbuilding Company
Na ..... Sodium
NAV ..... beneficial use of navigation
ND ..... Negative Declaration
NEPA ..... National Environmental Policy Act of 1969
ng/l ..... nannograms per liter
No ..... number(s)
NPDES ..... National Pollutant Discharge Elimination System
NPSMP ..... Nonpoint Source Management Plan
NTU ..... turbidity unit
O,P'-DDD ..... O,P'-Dichlorodiphenyldichloroethane
O,P'-DDE ..... O,P'-Dichlorodiphenyldichloroethylene
P,P'-DDD ..... P,P'-Dichlorodiphenyldichloroethane
P,P'-DDE ..... P,P'-Dichlorodiphenyldichloroethylene
P,P'-DDMS .. P,P'-Dichloro-diphenylmonochlorosaturatedethan
PAH ..... polyaromatic hydrocarbon
PCB ..... polychlorinated biphenyl
pH ..... hydrogen ion concentration
POTW ..... Publicly Owned Treatment Works
POW ..... beneficial use of hydropower generation
ppb ..... part(s) per billion (ng/g)
ppm ..... part(s) per million (ug/g)
Primary Network .. Primary Water Quality Monitoring Network
PROC ..... beneficial use of industrial process supply
QA ..... Quality Assurance
QAPP ..... Quality Assurance Program Plan
RARE . beneficial use of rare, threatened,or endangered species
RCD ..... Resource Conservation District
RCRA .... Resource Conservation and Recovery Act of 1976
REC-1 ..... beneficial use of contact water recreation
REC-2 ..... beneficial use of non-contact water recreation
ROWD ..... Report of Waste Discharge
RV ..... Recreational Vehicle
SAL ..... beneficial use of inland saline water habitat
SAR ..... sodium adsorbtion ratio
SCE ..... Southern California Edison
SDG&E ..... San Diego Gas and Electric Company
SHELL ..... beneficial use of shellfish harvesting
SONGS ..... San Onofre Nuclear Generating Station
SPWN ..... beneficial use of spawning, reproduction, and/or early development
SRF ..... State Revolving Fund
SWAT ..... Solid Waste Assessment Test
SWP ..... State Water Project
SWRCB ..... California State Water Resources Control Board
TBT ..... Tributyl tin
TDS ..... Total Dissolved Solids
TMDL ..... Total Maximum Daily Load
TSM ..... Toxic Substances Monitoring
TSS ..... Total Suspended Solids

ug ..... microgram(s)
ug/l ..... micrograms per liter
UHC ..... Underwater Hull Cleaning
USCG ..... United States Coast Guard
US EPA ..... United States Environmental Protection Agency
USGS ..... United States Geologic Survey
UST ..... Underground Storage Tank
WARM ..... beneficial use of warm freshwater habitat
WDR ..... Waste Discharge Requirement
WILD ..... beneficial use of wildlife habitat
WLA ..... Waste Load Allocation
WQA ..... Water Quality Assessment
WQLS ..... Water Quality Limited Segment
WQLZ ..... Water Quality Limited Zone
WRR ..... Water Reclamation Requirement

APPENDIX B - 1. **Summary of the Regional Growth Forecast for Various Land Uses Within the San Diego Association of Governments' Sphere of Influence.**

HU 901 - 911	Year 1990	Year 2000	Year 2010	Year 2015
TOTAL ACRES	1,895,749	1,895,749	1,895,749	1,895,749
Developed Acres	395,746	428,622	539,895	660,646
Low Density Single Family	52,556	61,663	127,357	227,763
Single Family	141,512	159,132	194,286	207,021
Multiple Family	24,068	26,288	31,139	33,564
Mobile Homes	5,344	5,127	4,774	4,468
Other Residential	1,095	1,095	1,095	1,095
Industrial	35,043	36,167	38,790	40,034
Retail	24,850	25,733	27,238	28,084
Office	2,642	2,756	3,135	3,327
Schools	10,309	10,624	11,130	11,359
Agriculture	3,544	3,546	3,546	3,546
Parks	83,119	83,119	83,119	83,119
Roads & Freeways	11,665	13,372	14,288	17,267

APPENDIX B - 2. **Summary of the Regional Growth Forecast for Various Land Uses Within the Southern California Association of Governments' Sphere of Influence.**

HU 901 - 911	Year 1994
TOTAL ACRES	460,572
Developed Acres	121,766
Low Density Single Family	3,793
Single Family	24,395
Multiple Family	6,388
Mobile Homes	1,045
Other Residential	9,484
Industrial	3,087
Retail	20,060
Office	1,262
Schools	1,291
Agriculture	46,887
Parks	2,523
Roads & Freeways	1,551

APPENDIX B - 3. **Regional Growth Forecast for Various Land Uses Within SANDAG's Sphere of Influence for the San Juan Hydrologic Unit (Hydrologic Unit Basin 901).***

HU 901	Year 1990	Year 2000	Year 2010	Year 2015
TOTAL ACRES	100,823	100,823	100,823	100,823
Developed Acres	6,137	6,137	6,137	6,137
Low Density Single Family	0	0	0	0
Single Family	152	152	152	152
Multiple Family	100	100	100	100
Mobile Homes	142	142	142	142
Other Residential	27	27	27	27
Industrial	2816	2816	2816	2816
Retail	0	0	0	0
Office	0	0	0	0
Schools	8	8	8	8
Agriculture	0	0	0	0
Parks	2487	2487	2487	2487
Roads & Freeways	405	405	405	405

Regional Growth Forecast for Various Land Uses Within SANDAG's Sphere of Influence for the Santa Margarita Hydrologic Unit (Hydrologic Unit Basin 902).*

HU 902	Year 1990	Year 2000	Year 2010	Year 2015
TOTAL ACRES	122,902	122,902	122,902	122,902
Developed Acres	8,600	9,011	11,957	13,362
Low Density Single Family	2,090	2,340	5,137	5,965
Single Family	727	879	1,013	1,548
Multiple Family	459	460	464	470
Mobile Homes	61	61	61	61
Other Residential	11	11	11	11
Industrial	4,573	4,580	4,585	4,588
Retail	330	332	337	340
Office	0	0	0	0
Schools	50	50	50	50
Agriculture	0	0	0	0
Parks	148	148	148	148
Roads & Freeways	151	151	151	182

* This is the Regional Growth Forecast for the area within SANDAG's Sphere of Influence only; that portion covered within SCAG's Sphere of Influence is not shown.

APPENDIX B - 3 (continued). **Regional Growth Forecast for the Period 1990 through 2015 for the San Luis Rey Hydrologic Unit (Hydrologic Unit Basin 903).**

HU 903	Year 1990	Year 2000	Year 2010	Year 2015
TOTAL ACRES	351,640	351,640	351,640	351,640
Developed Acres	37,262	42,289	60,999	79,877
Low Density Single Family	14,985	16,599	29,134	44,539
Single Family	5,019	8,196	13,963	17,066
Multiple Family	1,722	1,889	2,057	2,077
Mobile Homes	620	392	391	391
Other Residential	86	86	86	86
Industrial	1,531	1,543	1,634	1,653
Retail	1,068	1,144	1,295	1,364
Office	60	66	78	75
Schools	360	369	374	384
Agriculture	161	161	161	161
Parks	11,005	11,005	11,005	11,005
Roads & Freeways	646	786	825	1,052

Regional Growth Forecast for the Period 1990 through 2015 for the Carlsbad Hydrologic Unit (Hydrologic Unit Basin 904).

HU 904	Year 1990	Year 2000	Year 2010	Year 2015
TOTAL ACRES	132,554	132,554	132,554	132,554
Developed Acres	56,749	64,927	79,666	92,898
Low Density Single Family	6,834	8,348	12,617	19,299
Single Family	27,365	32,713	40,582	46,007
Multiple Family	5,385	5,863	7,097	7,181
Mobile Homes	1,715	1,715	1,448	1,389
Other Residential	103	103	103	103
Industrial	4,133	4,330	5,059	5,483
Retail	4,274	4,496	4,944	5,183
Office	376	420	556	612
Schools	1,517	1,568	1,759	1,841
Agriculture	274	274	274	274
Parks	3,387	3,387	3,387	3,387
Roads & Freeways	1,386	1,710	1,840	2,140

APPENDIX B - 3 (continued). **Regional Growth Forecast for the Period 1990 through 2015 for the San Dieguito Hydrologic Unit (Hydrologic Unit Basin 905).**

HU 905	Year 1990	Year 2000	Year 2010	Year 2015
TOTAL ACRES	217,586	217,586	217,586	217,586
Developed Acres	38,210	42,855	62,662	83,105
Low Density Single Family	9,559	12,482	24,900	42,295
Single Family	14,271	15,802	22,695	24,991
Multiple Family	1,146	1,220	1,379	1,492
Mobile Homes	140	140	140	140
Other Residential	8	8	8	8
Industrial	904	941	1,066	1,098
Retail	2,385	2,413	2,468	2,493
Office	142	147	218	269
Schools	442	466	481	488
Agriculture	770	772	772	772
Parks	8,011	8,011	8,011	8,011
Roads & Freeways	432	453	526	1,049

Regional Growth Forecast for the Period 1990 through 2015 for the Penasquitos Hydrologic Unit (Hydrologic Unit Basin 906).

HU 906	Year 1990	Year 2000	Year 2010	Year 2015
TOTAL ACRES	92,823	92,823	92,823	92,823
Developed Acres	47,609	50,663	56,484	61,032
Low Density Single Family	988	1,071	2,110	4,910
Single Family	20,740	22,441	25,240	25,484
Multiple Family	4,081	4,532	5,313	5,786
Mobile Homes	322	333	273	210
Other Residential	67	67	67	67
Industrial	4,736	4,954	5,701	6,051
Retail	3,641	3,882	4,107	4,243
Office	714	726	766	783
Schools	2,628	2,715	2,835	2,888
Agriculture	745	745	745	745
Parks	7,353	7,353	7,353	7,353
Roads & Freeways	1,595	1,844	1,974	2,515

APPENDIX B - 3 (continued). **Regional Growth Forecast for the Period 1990 through 2015 for the San Diego Hydrologic Unit (Hydrologic Unit Basin 907).**

HU 907	Year 1990	Year 2000	Year 2010	Year 2015
TOTAL ACRES	289,243	289,243	289,243	289,243
Developed Acres	82,095	84,372	99,269	118,659
Low Density Single Family	8,802	9,399	18,364	36,328
Single Family	27,121	26,068	33,000	33,468
Multiple Family	4,187	4,342	4,688	4,959
Mobile Homes	1,178	1,178	1,178	1,170
Other Residential	96	96	96	96
Industrial	5,524	5,524	5,823	6,001
Retail	5,079	5,168	5,347	5,408
Office	713	749	831	877
Schools	2,098	2,124	2,157	2,188
Agriculture	216	216	216	216
Parks	24,521	24,521	24,521	24,521
Roads & Freeways	2,590	2,936	3,049	3,427

Regional Growth Forecast for the Period 1990 through 2015 for the Pueblo San Diego Hydrologic Unit (Hydrologic Unit Basin 908).

HU 908	Year 1990	Year 2000	Year 2010	Year 2015
TOTAL ACRES	44,368	44,368	44,368	44,368
Developed Acres	33,226	33,402	34,177	34,374
Low Density Single Family	0	0	0	0
Single Family	15,950	15,902	15,780	15,548
Multiple Family	3,817	3,967	4,797	5,233
Mobile Homes	151	151	133	102
Other Residential	162	162	162	162
Industrial	4,340	4,373	4,394	4,399
Retail	4,235	4,251	4,289	4,296
Office	415	416	419	421
Schools	1,178	1,179	1,194	1,196
Agriculture	0	0	0	0
Parks	1,641	1,641	1,641	1,641
Roads & Freeways	1,337	1,361	1,368	1,376

APPENDIX B - 3 (continued). **Regional Growth Forecast for the Period 1990 through 2015 for the Sweetwater Hydrologic Unit (Hydrologic Unit Basin 909).**

HU 909	Year 1990	Year 2000	Year 2010	Year 2015
TOTAL ACRES	147,593	147,593	147,593	147,593
Developed Acres	56,400	59,870	73,470	90,120
Low Density Single Family	5,686	6,262	16,882	32,718
Single Family	22,859	25,084	27,149	27,329
Multiple Family	2,004	2,273	2,686	2,962
Mobile Homes	443	443	436	436
Other Residential	90	90	90	90
Industrial	1,229	1,302	1,364	1,380
Retail	2,380	2,500	2,644	2,712
Office	141	152	174	182
Schools	1,262	1,278	1,356	1,388
Agriculture	164	164	164	164
Parks	19,036	19,036	19,036	19,036
Roads & Freeways	1,104	1,285	1,490	1,723

Regional Growth Forecast for the Period 1990 through 2015 for the Otay Hydrologic Unit (Hydrologic Unit Basin 910).

HU 910	Year 1990	Year 2000	Year 2010	Year 2015
TOTAL ACRES	100,465	100,465	100,465	100,465
Developed Acres	15,762	19,416	30,411	45,290
Low Density Single Family	2,198	2,818	8,514	21,814
Single Family	4,729	6,785	11,040	11,628
Multiple Family	799	1,152	1,849	2,418
Mobile Homes	466	466	466	377
Other Residential	338	338	338	338
Industrial	3,664	3,737	3,897	3,964
Retail	1,044	1,106	1,239	1,354
Office	17	17	32	40
Schools	429	498	523	537
Agriculture	1,155	1,155	1,155	1,155
Parks	665	665	665	665
Roads & Freeways	257	679	692	998

APPENDIX B - 3 (continued). **Regional Growth Forecast for the Period 1990 through 2015 for the Tijuana Hydrologic Unit (Hydrologic Unit Basin 911).**

HU 911	Year 1990	Year 2000	Year 2010	Year 2015
TOTAL ACRES	295,751	295,751	295,751	295,751
Developed Acres	13,695	15,731	24,661	35,792
Low Density Single Family	1,411	2,344	9,700	19,895
Single Family	2,578	3,109	3,672	3,801
Multiple Family	398	489	710	885
Mobile Homes	108	108	108	51
Other Residential	107	107	107	107
Industrial	1,593	2,016	2,450	2,602
Retail	414	440	569	671
Office	62	63	63	64
Schools	339	370	393	393
Agriculture	57	57	57	57
Parks	4,866	4,866	4,866	4,866
Roads & Freeways	1,763	1,763	1,967	2,399

APPENDIX C
WATER QUALITY CRITERIA

The literature contains many different water quality criteria designed to protect specific beneficial uses of water. A summary of the specific numerical water quality criteria considered by the Regional Board for designation as water quality objectives is described in Table C-1, Water Quality Criteria - Inorganic Constituents; and Table C-2, Water Quality Criteria - Organic Constituents. The water quality criteria summarized in Tables C-1 and C-2 provided the basis for the Regional Board's designation of many of the specific numerical water quality objectives described earlier in this Chapter.

The water quality criteria presented in Tables C-1 and C-2 are not enforceable water quality objectives. The purpose of presenting the information summarized in these tables is to allow interested persons to compare available water quality criteria to the specific water quality objectives designated by the Regional Board described in Chapter 3.

A summary of the available types of numerical water quality criteria considered by the Regional Board for designation as numerical water quality objectives are summarized below.

- ***Maximum Contaminant Levels (MCLs):***

  MCLs are part of the drinking water standards adopted both by the California Department of Health Services (DHS), Office of Drinking Water in Title 22 of the California Code of Regulations (CCR), Division 4, Chapter 15, "*Domestic Water Quality and Monitoring*" and by the US EPA under the Safe Drinking Water Act. The State MCL drinking water standards must be at least as stringent as those adopted by US EPA. Primary MCLs are derived from the one in a million incremental cancer risk estimate for carcinogens and from threshold toxicity levels for non-carcinogens. Secondary MCLs are derived from human welfare considerations (e.g., taste or odor).

- ***Maximum Contaminant Level Goals (MCL Goals):***

  MCL Goals are promulgated by US EPA under the National Primary Drinking Water Regulations as the first step in establishing MCLs. MCL Goals are set at levels which represent no adverse health risks.

- ***State "Action" Levels:***

  Action levels are published by the DHS's Office of Drinking Water and are based mainly on health effects. The 10^{-6} incremental cancer risk estimates are used for carcinogens and threshold toxicity limits are used for other constituents.

- ***Proposition 65 Regulatory Limits:***

  Proposition 65 limits are established under the California Safe Drinking Water and Toxic Enforcement Act of 1986 for known human carcinogens and reproductive toxins. For carcinogens the No-Significant-Risk-Levels are set at the one-in-100,000 incremental cancer risk level. 1/1000 of the No-Observable-Effect Level (NOEL) is used for reproductive toxicants.

- ***National Ambient Water Quality Criteria:***

  These criteria are published by US EPA under the federal Clean Water Act to protect human health and welfare and freshwater and marine aquatic life. These criteria are found in: *Quality Criteria for Water, 1986* - the "*Gold Book*"; the *Ambient Water Quality Criteria* volumes (1980, 1984, 1986, 1987, and 1989); *Quality Criteria for Water (1976)* - the "*Red*

Book"; and *Water Quality Criteria, 1972* - the "*Blue Book*".

- ***Health Advisories and Water Quality Advisories:***

These advisories are published by US EPA's Office of Water. Short-term (10 days or less), long-term (7 years or less), and lifetime exposure health advisories for non-carcinogens and suspected human health carcinogens are included where sufficient data exist.

- ***Suggested No-Adverse-Response Levels (SNARLS):***

These human health-related criteria are published by the National Academy of Sciences in the *Drinking Water and Health Volumes*. Incremental cancer risk estimates are presented separately for carcinogens.

- ***Water Quality for Agriculture:***

Water Quality for Agriculture was published by the Food and Agriculture Organization of the United Nations in 1985, which contains criteria protective of agricultural uses of water.

- ***Water Quality Criteria:***

Water Quality Criteria was written by McKee and Wolf and published by the State Water Resources Control Board in 1963 and 1978. It contains criteria for human health and welfare, aquatic life, agricultural use, industrial use, and various other beneficial uses.

Table C-1. WATER QUALITY CRITERIA - INORGANIC CONSTITUENTS

Inorganic Constituent	BASIN PLAN				Drinking Water Standards (California & Federal) Maximum Contaminant Levels (MCLs)		
	Ocean Waters (1) "‡" = carcinogen	Bays and Estuaries	Inland Surface Waters	Ground Water	California Dept. of Health Services		US EPA
					Primary MCL	Secondary MCL	Primary MCL
Ammonia	600 (2)	NH3 not > 0.025 mg/l	NH3 not > 0.025 mg/l				
Antimony	1200						6 (8)
Arsenic	8				50		50
Beryllium	0.033 ‡						4 (8)
Boron			0.5 mg/l or as noted in Table 3-1	0.5 mg/l or as noted in Table 3-2			
Bromide							
Cadmium	1				10		5
Chloride			250 mg/l or as noted in Table 3-1	60 mg/l or as noted in Table 3-2		250,000 (7)	
Chlorine	2 (3)						
Chromium (III)	190,000						
Chromium (VI)	2 (4)						
Chromium (total)	2 (4)				50		100
Color			20 units or as noted in Table 3-1	15 units or as noted in Table 3-2		15 units	
Copper	3					1000	1300 (9)
Cyanide	1						200 (8)
Fluoride			1.0 mg/l or as noted in Table 3-1	1.0 mg/l or as noted in Table 3-2	1400 to 2400 (5)		4000
Iron			0.3 mg/l or as noted in Table 3-1	0.3 mg/l or as noted in Table 3-2		300	
Lead	2				50		15 (9)
Manganese			0.05 mg/l or as noted in Table 3-1	0.05 mg/l or as noted in Table 3-2		50	
Mercury(inorganic)	0.04				2		2
Nickel	5						100 (8)
Nitrate			5 mg/l or as noted in Table 3-1	5 mg/l or as noted in Table 3-2	45,000 (6)		10,000 (10)

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Table C-1 -- Values are in μg/l (ppb) unless otherwise indicated. Numbers in parentheses indicate endnotes following the tables.

Table C-1. WATER QUALITY CRITERIA - INORGANIC CONSTITUENTS

Inorganic Constituent	BASIN PLAN				Drinking Water Standards (California & Federal) Maximum Contaminant Levels (MCLs)		
	Ocean Waters (1) "‡" = carcinogen	Bays and Estuaries	Inland Surface Waters	Ground Water	California Dept. of Health Services		US EPA
					Primary MCL	Secondary MCL	Primary MCL
Oxygen, dissolved	Shall not be depressed > 10%	Shall not be less than 5.0 mg/l with designated MAR. The annual mean DO shall not be less than 7 mg/l more than 10% of the time.	Shall not be less than 5.0 mg/l in inland surface waters with WARM or less than 6.0 m/l in waters with COLD beneficial use The annual mean D.O. conc. shall not be less than 7 mg/l more than 10% of the time.				
pH	Shall not be +/- 0.2 units of natural pH	Shall not be depressed below 7.0; nor raised above 9.0. Changes in normal ambient pH shall not exceed 0.2 units.	Shall not be depressed below 6.5 nor raised above 8.5. Changes in normal ambient pH levels shall not exceed 0.5 units in fresh waters with designated COLD or WARM beneficial uses.				
Phosphorus			Shall not exceed 0.05 mg/l in any steam at the point where it enters any standing body of water,nor 0.025 mg/l in any standing body of water; for flowing waters, shall not exceed 0.1 mgl total P. These values not to be exceeded more than 10% of the time.				
Radioactivity, Gross Alpha					15 pCi/l		15 pCi/l (12)
Radioactivity, Gross Beta					50 pCi/l		4 mrem/yr
Radium 226 + 228					5 pCi/l		5 pCi/l / 20 pCi/l (13)
Selenium	15				10		50
Settleable solids			Shall not contain suspended and settleable solids in concentrations that result in the deposition of solids that cause nuisance or adversely affect beneficial uses.				
Silver	0.7				50		100
Sodium			60% Na; or as noted in Table 3-1	60% Na; or as noted in Table 3-2			
Strontium-90					8 pCi/l		
Sulfate			65 mg/l; or as noted in Table 3-1	60 mg/l; or as noted in Table 3-2		250,000 (7)	400,000-500,000 (13)
Total dissolved solids (TDS)			300 mg/l; or as noted in Table 3-1	350 mg/l; or as noted in Table 3-2		500,000 (11)	
Thallium	14						2 (8)
Tritium					20,000 pCi/l		
Turbidity		Shall not be less than 50% of the depth at locations where measurement is made by means of a standard Secchi disk, or as noted in Chapter 3 page 15.	20 NTU; or as noted in Table 3-1. Waters shall be free of changes in turbidity that cause nuisance or adversely affect beneficial uses.	5 NTU; or as noted in Table 3-2. Waters shall be free of changes in turbidity that cause nuisance or adversely affect beneficial uses.		5 units	1 to 5 units
Uranium					20 pCi/l		20 µg/l = 30 pCi/l (13)
Zinc	20					5000	

Table C-1 -- Values are in µg/l (ppb) unless otherwise indicated. Numbers in parentheses indicate endnotes following the tables.

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Table C-1. WATER QUALITY CRITERIA - INORGANIC CONSTITUENTS

Inorganic Constituent	Drinking Water Standards (Federal) Maximum Contaminant Levels (MCLs) US EPA		California Recommended Public Health Level (RPHL) Department of Health Services	Health Advisories or Suggested No-Adverse-Response Levels (SNARLs) for toxicity other than cancer risk		US EPA Integrated Risk Information System (IRIS) Reference Dose as a Water Quality Criterion (16)	One-in-a-Million Incremental Cancer Risk Estimates for Drinking Water			California Proposition 65 Regulatory Level as a Water Quality Criterion (19)	Agricultural Water Quality Goals (21)
	Secondary MCL	MCL Goal		US EPA	National Academy of Sciences (NAS)		Cal/EPA Cancer Potency Factor as a Water Quality Criterion (17)	US EPA Integrated Risk Information System (IRIS)	US EPA Health Advisory or SNARL		
Ammonia				30,000 (14)					(D)		
Antimony		6 (8)		3		2.8			(D)		
Arsenic								0.02	0.02 (A,14)	5	100
Beryllium		4 (8)		4000 / 20,000 (7-yr,14,15)				0.008	0.008 (B,14)	(18)	100
Boron				600 (14)		630			(D)		750 (22) / 700
Bromide					2300						
Cadmium		5		5	5	3.5	(18)		(D)	(18)	10
Chloride	250,000										106,000
Chlorine						1050			(D)		
Chromium (III)											
Chromium (VI)							0.083		(A)	(18)	100
Chromium (total)		100		100		35			(D)		
Color	15 units										
Copper	1000	1300							(D)		200
Cyanide		200 (8)		200		150			(D)		
Fluoride	2000	4000				840			(D)		1000
Iron	300										5000
Lead		zero							(B)	0.25 (20)	5000
Manganese	50					980					200
Mercury(inorganic)		2	2 (13)	2		2.1			(D)		
Nickel		100 (8)		100		140	(18)		(D)	(18)	200
Nitrate		10,000 (2)		10,000 (2)		11,000 (2)			(D)		

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Table C-1 -- Values are in μg/l (ppb) unless otherwise indicated. Numbers in parentheses indicate endnotes following the tables.

Table C-1. WATER QUALITY CRITERIA - INORGANIC CONSTITUENTS

Inorganic Constituent	Drinking Water Standards (Federal) Maximum Contaminant Levels (MCLs) US EPA		California Recommended Public Health Level (RPHL) Department of Health Services	Health Advisories or Suggested No-Adverse-Response Levels (SNARLs) for toxicity other than cancer risk		US EPA Integrated Risk Information System (IRIS) Reference Dose as a Water Quality Criterion (16)	One-in-a-Million Incremental Cancer Risk Estimates for Drinking Water			California Proposition 65 Regulatory Level as a Water Quality Criterion (19)	Agricultural Water Quality Goals (21)
	Secondary MCL	MCL Goal		US EPA	National Academy of Sciences (NAS)		Cal/EPA Cancer Potency Factor as a Water Quality Criterion (17)	US EPA Integrated Risk Information System (IRIS)	US EPA Health Advisory or SNARL		
Oxygen, dissolved											
pH	6.5 to 8.5 units										
Phosphorus				0.1 (23)					(D)		
Radioactivity, Gross Alpha		zero							(A)		
Radioactivity, Gross Beta		zero							0.04 mrem/yr (A,14)		
Radium 226 + 228		zero (13)							0.22–0.26 pCi/l (A,14)		
Selenium		50				35					20
Settleable solids											
Silver				100 (14)		35			(D)		
Sodium				2000 (24)							
Strontium-90									(A)		
Sulfate	250,000	400,000-500,000 (13)									
Total dissolved solids (TDS)	500,000										450,000
Thallium		0.5 (8)		0.4		0.5					
Tritium									(A)		
Turbidity											
Uranium		zero (13)			35				1.7 pCi/l (A)		
Zinc	5000			2000		2100			(D)		2000

Table C-1 -- Values are in μg/l (ppb) unless otherwise indicated. Numbers in parentheses indicate endnotes following the tables.

Table C-1. WATER QUALITY CRITERIA - INORGANIC CONSTITUENTS

Inorganic Constituent	US EPA National Ambient Water Quality Criteria									
	Health and Welfare Protection			Freshwater Aquatic Life Protection						
				Recommended Criteria				Additional Toxicity Information		
	Non-Cancer Public Health Effects	One-in-a-Million Incremental Cancer Risk Estimate	Taste & Odor or Welfare	Continuous Concentration (4-day Average)	24-hour Average	Maximum Concentration (1-hour Average)	Maximum (Instantaneous)	Acute	Chronic	Other
Ammonia				(26)		(26)				
Antimony	14 / 4300 (25)			30 (13,27)		88 (13,27)		9000	1600	610 (42)
Arsenic		0.018 / 0.14 (25)		190 (27)		360 (27)		850 (41)		48 (43)
Beryllium								130	5.3	
Boron										
Bromide										
Cadmium				0.55 (28,29)		1.4 (28,36)				
Chloride	250,000			230,000 (30)		860,000 (30)				
Chlorine				11 (31)		19 (31)				
Chromium (III)				98 (28,32)		820 (28,37)				
Chromium (VI)				11		16				
Chromium (total)										
Color										
Copper			1000	5.4 (28,33)		7.5 (28,38)				
Cyanide	700 / 220,000 (25)			5.2		22				
Fluoride										
Iron			300				1000			
Lead				0.99 (28,34)		25 (28,39)				
Manganese			50							
Mercury(inorganic)	0.14 / 0.15 (25)			0.012		2.4				
Nickel	610 / 4600 (25)			73 (28,35)		653 (28,40)				
Nitrate	10,000 (2)									

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Table C-1 -- Values are in μg/l (ppb) unless otherwise indicated. Numbers in parentheses indicate endnotes following the tables.

Table C-1. WATER QUALITY CRITERIA - INORGANIC CONSTITUENTS

Inorganic Constituent	US EPA National Ambient Water Quality Criteria									
	Health and Welfare Protection			Freshwater Aquatic Life Protection						
				Recommended Criteria				Additional Toxicity Information		
	Non-Cancer Public Health Effects	One-in-a-Million Incremental Cancer Risk Estimate	Taste & Odor or Welfare	Continuous Concentration (4-day Average)	24-hour Average	Maximum Concentration (1-hour Average)	Maximum (Instantaneous)	Acute	Chronic	Other
Oxygen, dissolved				(22)	(22)					
pH			5 to 9 units				6.5 to 9.0 units			
Phosphorus										
Radioactivity, Gross Alpha										
Radioactivity, Gross Beta										
Radium 226 + 228										
Selenium				5		20				
Settleable solids										
Silver				0.12 (13)		0.84 (28,44)			0.12	
Sodium										
Strontium-90										
Sulfate			250,000							
Total dissolved solids (TDS)										
Thallium	1.7 / 6.3 (25)							1400	40	20 (46)
Tritium										
Turbidity										
Uranium										
Zinc						54 (28,45)				

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Table C-1 -- Values are in µg/l (ppb) unless otherwise indicated. Numbers in parentheses indicate endnotes following the tables.

Table C-1. WATER QUALITY CRITERIA - INORGANIC CONSTITUENTS

Inorganic Constituent	US EPA National Ambient Water Quality Criteria Saltwater Aquatic Life Protection						California Ocean Plan Numerical Water Quality Objectives					
	Recommended Criteria			Additional Toxicity Informatio			Human Health Protection	Marine Aquatic Life Protection				
	Continuous Concentration (4-day Average)	Maximum Concentration (1-hour Average)	Maximum (Instantaneous)	Acute	Chronic	Other	(30-day Average) "‡" = carcinogen	6-month Median	30-day Average	7-day Average	Daily Maximum	Instantaneous Maximum
Ammonia	35 (47)	233 (47)						600 (2)			2400 (2)	6000 (2)
Antimony	500 (13,27)	1500 (13,27)					1200					
Arsenic	36 (27)	69 (27)		2319 (41)		13 (43)		8			32	80
Beryllium							0.033 ‡					
Boron												
Bromide												
Cadmium	9.3	43						1			4	10
Chloride												
Chlorine	7.5 (48)	13 (48)						2 (3)			8 (3)	60 (3)
Chromium (III)				10,300 (49)			190,000					
Chromium (VI)	50	1100						2 (4)			8 (4)	20 (4)
Chromium (total)								2 (4)			8 (4)	20 (4)
Color												
Copper	2.9	2.9						3			12	30
Cyanide	1	1						1			4	10
Fluoride												
Iron												
Lead	5.6	140						2			8	20
Manganese			100									
Mercury(inorganic)	0.025	2.1						0.04			0.16	0.4
Nickel	8.3	75						5			20	50
Nitrate												

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Table C-1 -- Values are in μg/l (ppb) unless otherwise indicated. Numbers in parentheses indicate endnotes following the tables.

Table C-1. WATER QUALITY CRITERIA - INORGANIC CONSTITUENTS

Inorganic Constituent	US EPA National Ambient Water Quality Criteria Saltwater Aquatic Life Protection						California Ocean Plan Numerical Water Quality Objectives					
	Recommended Criteria			Additional Toxicity Informatio			Human Health Protection	Marine Aquatic Life Protection				
	Continuous Concentration (4-day Average)	Maximum Concentration (1-hour Average)	Maximum (Instantaneous)	Acute	Chronic	Other	(30-day Average) "‡" = carcinogen	6-month Median	30-day Average	7-day Average	Daily Maximum	Instantaneous Maximum
Oxygen, dissolved												
pH			6.5 to 8.5 units									6.0 to 9.0 units
Phosphorus			0.1 (50)									
Radioactivity, Gross Alpha												15 pCi/l (12)
Radioactivity, Gross Beta												50 pCi/l
Radium 226 + 228												5 pCi/l
Selenium	71	300						15			60	150
Settleable solids									1000	1500		3000
Silver	0.92 (13)	2.3						0.7			2.8	7
Sodium												
Strontium-90												8 pCi/l
Sulfate												
Total dissolved solids (TDS)												
Thallium				2130			14					
Tritium												20,000 pCi/l
Turbidity									75 NTU	100 NTU		225 NTU
Uranium												20 pCi/l
Zinc	86	95						20			80	200

Table C-1 -- Values are in μg/l (ppb) unless otherwise indicated. Numbers in parentheses indicate endnotes following the tables.

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ENDNOTES FOR TABLE C-1 - INORGANICS

(7-day) For exposure of 7 days or less.
(10-day) For exposure of 10 days or less.
(24-hr) For exposure of 24 hours or less.
(7-yr) For "longer-term" exposure (7 years or less, EPA).

(A) Known human carcinogen; sufficient epidemiologic evidence in humans.

(B) Probable human carcinogen; sufficient evidence from animal studies; no or inadequate human data.
(C) Possible human carcinogen; limited evidence from animal studies; no human data.
(D) Not classified as to human carcinogenicity; no data or inadequate evidence.
(E) Evidence of non-carcinogenicity for humans.

(1) Or as noted in the California Ocean Plan (Reference 28)
(2) Expressed as nitrogen.
(3) For total chlorine residual; for intermittent chlorine sources see Reference 26, Chapter IV, Table B.
(4) Value developed for chromium VI; may be applied to total chromium if valence unknown.

(5) MCL varies with air temperature; 2.4 mg/l (S 53.7 °F); 2.2 mg/l (53.8 - 58.3 °F); 2.0 mg/l (58.4 - 63.8 °F); 1.8 mg/l (63.9 - 70.6 °F); 1.6 mg/l (70.0 - 79.2 °F); 1.4 mg/l (79.3 - 90.5 °F).
(6) As NO3.
(7) Recommended level; Upper level = 500 mg/l; Short-term level = 600 mg/l.
(8) Effective 17 January 1994.
(9) MCL includes this "Action level", to be exceeded in no more than 10 percent of samples.

(10) As nitrogen; in addition, MCL for total nitrate and nitrite = 10,000 µg/l (as N).
(11) Recommended level; Upper level = 1000; Short-term level = 1500 mg/l.
(12) Includes Radium 226 but excludes Radon and Uranium.
(13) Proposed.
(14) Draft / tentative / provisional.
(15) Calculated for child / for adult
(16) Assumes 70 kg body weight, 2 liters/day water consumption, and 20% relative source contribution. An additional uncertainty factor of 10 is used for Class C carcinogens.

(17) Assumes 70 kg body weight and 2 liters/day water consumption.
(18) Determined not to pose a risk of cancer through ingestion (Title 22, CCR, Division 2).
(19) Regulatory dose level divided by 2 liters per day average consumption; represents a 1-in-100,000 incremental cancer risk estimate unless otherwise noted.
(20) Based on reproductive toxicity

(21) Reference 19 unless noted otherwise.
(22) See Reference 16.
(23) For white phosphorus.
(24) Guidance level (Reference 3) assumes reletive source contribution of 10% from drinking water.
(25) For consumption of water and aquatic organisms / for consumption of aquatic organisms only.
(26) Varies with pH and temperature.

(27) For the trivalent form.
(28) Value based on hardness of 40 mg/l; value increases with increasing hardness.
(29) For hardness in mg/l as CaCO3, criterion = e(0.7852[ln(hardness)] - 3.490) µg/l.
(30) For dissolved chloride associated with sodium; criterion probably will not be adequately protective when chloride is associated with potassium, calcium, or magnesium, rather than sodium.
(31) For total residual chlorine.
(32) For hardness in mg/l as CaCO3, criterion = e(0.8190[ln(hardness)] + 1.561) µg/l.
(33) For hardness in mg/l as CaCO3, criterion = e(0.8545[ln(hardness)] - 1.465) µg/l.

(34) For hardness in mg/l as CaCO3, criterion = e(1.273[ln(hardness)] - 4.705) µg/l.

(35) For hardness in mg/l as CaCO3, criterion = e(0.8460[ln(hardness)] + 1.1645) µg/l.

(36) For hardness in mg/l as CaCO3, criterion = e(1.128[ln(hardness)] - 3.828) µg/l.
(37) For hardness in mg/l as CaCO3, criterion = e(0.8190[ln(hardness)] + 3.688) µg/l.
(38) For hardness in mg/l as CaCO3, criterion = e(0.9422[ln(hardness)] - 1.464) µg/l.
(39) For hardness in mg/l as CaCO3, criterion = e(1.273[ln(hardness)] - 1.460) µg/l.

(40) For hardness in mg/l as CaCO3, criterion = e(0.8460[ln(hardness)] + 3.3612) µg/l.
(41) For the pentavalent form.
(42) Toxicity to algae occurs.
(43) Based on reproductive toxicity.
(44) For hardness in mg/l as CaCO3, criterion = e(1.72[ln(hardness)] - 6.52) µg/l.
(45) For hardness in mg/l as CaCO3, criterion = e(0.8473[ln(hardness)] + 0.8604) µg/l.
(46) Toxicity to one species of fish after 2600 hours of exposure.

(47) Unionized ammonia concentrations
(48) For sum of chlorine-produced oxidants.
(49) EC50 for eastern oyster embryos.

(50) For elemental phosphorus; marine or estuarine.

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Table C-2 WATER QUALITY CRITERIA - ORGANIC CONSTITUENTS

Organic Constituent	BASIN PLAN				Drinking Water Standards (California & Federal) Maximum Contaminant Levels (MCLs)					California Recommended Public Health Level (RPHL) Department of Health Services	California State Action Levels Department of Health Services		Other Taste and Odor Thresholds	Health Advisories or Suggested No-Adverse-Response Levels (SNARLS) for toxicity other than cancer risk	
	Ocean Waters (1) "‡" = carcinogen	Bays and Estuaries	Inland Surface Waters and Ground Waters		California Dept. of Health Services		US Environmental Protection Agency							US EPA	National Academy of Sciences (NAS)
			Primary MCL	Secondary MCL	Primary MCL	Secondary MCL	Primary MCL	Secondary MCL	MCL Goal		Toxicity	Taste & Odor			
Acenaphthylene	0.0088 ‡ (2)														
Acenaphthylene	220														
Acrylonitrile	0.10 ‡													1 / 4 (7-yr,13,14)	
Aldrin	0.000022 ‡										0.05 (LOQ)			0.3 (10-day,14)	
Anthracene	0.0088 ‡ (2)														
Atrazine			3		3		3		3	3 (11)				3	150
Bentazon			18		18					18 (11)				20	
Benz(a)anthracene	0.0088 ‡ (2)						0.1 (11)		zero (11)						
Benzene	5.9 ‡		1		1		5		zero	0.35 (11)				200 (10-day)	
Benzidine	0.000069 ‡														
Benzo(b)fluoranthene	0.0088 ‡ (2)						0.2 (11)		zero (11)						
Benzo(k)fluoranthene	0.0088 ‡ (2)						0.2 (11)		zero (11)						
Benzo(g,h,i)perylene	0.0088 ‡ (2)														
Benzo(a)pyrene	0.0088 ‡ (2)						0.2 (12)		zero (12)						
alpha-BHC	0.008 (3)										0.7				500 (7-day,3)
beta-BHC	0.008 (3)										0.3				500 (7-day,3)
Gamma-BHC (Lindane)	0.008 (3)		4		4		0.2		0.2					0.2	500 (7-day,3)
delta-BHC	0.008 (3)														500 (7-day,3)
technical-BHC	0.008 (3)														500 (7-day)
Bis(2-chloroethoxy) methane	4.4														
Bis(2-chloroethyl) ether	0.045 ‡														
Bis(2-chloroisopropyl) ether	1200													300	
Bromodichloromethane	130 ‡ (4)		100 (10)		100 (10)		100 (10)							400 / 1300 (7-yr,13,14)	
Bromoform	130 ‡ (4)		100 (10)		100 (10)		100 (10)							2000 (10-day)	
Bromomethane	130 ‡ (4)													10	
Carbofuran			18		18		40		40	18 (11)				40	
Carbon tetrachloride	0.90 ‡		0.5		0.5		5		zero	0.5 (11)				200 (10-day)	200 (7-day)
Catechol	30 (5)														2200 (24-hr)
Chlordane	0.000023 ‡ (6)		0.1		0.1		2		zero	0.03 (11)				60 (10-day)	
Chlorobenzene	570		30		30		100		100	30 (11)				100	
4-Chloro-m-cresol	1 (7)														
4-Chloro-o-cresol	1 (7)														
6-Chloro-m-cresol	1 (7)														
Chloroform	130 ‡		100 (10)		100 (10)		100 (10)							4000 (10-day)	
Chloromethane	130 ‡ (4)													3	
2-Chlorophenol	1 (7)													40 (14)	
3-Chlorophenol	1 (7)														
4-Chlorophenol	1 (7)														
Chrysene	0.0088 ‡ (2)						0.2 (11)		zero (11)						
2,4-D			100		100		70		70					70	87.5
DBCP			0.2		0.2		0.2		zero	0.002 (11)				50 (10-day)	
DDD	0.00017 ‡ (8)														
DDE	0.00017 ‡ (8)														
DDT	0.00017 ‡ (8)														
Dibenz(a,h)anthracene	0.0088 ‡ (2)						0.3 (11)		zero (11)						
Dibromochloromethane	130 ‡ (4)		100 (10)		100 (10)		100 (10)							60 (14)	18,000 (24-hr)
Dibutyl phthalate	3500														770
1,2-Dichlorobenzene	5100 (9)						600	10 (11)	600		130 (9)	10		600	300 (15)
1,3-Dichlorobenzene	5100 (9)						600		600		130 (9)	20		600	

Table C-2 -- Values are in μg/l (ppb) unless otherwise indicated. Numbers in parentheses indicate endnotes following the tables.

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Table C-2 WATER QUALITY CRITERIA - ORGANIC CONSTITUENTS

Organic Constituent	BASIN PLAN				Drinking Water Standards (California & Federal) Maximum Contaminant Levels (MCLs)					California Recommended Public Health Level (RPHL) Department of Health Services	California State Action Levels Department of Health Services		Other Taste and Odor Thresholds	Health Advisories or Suggested No-Adverse-Response Levels (SNARLS) for toxicity other than cancer risk	
	Ocean Waters (1) "‡" = carcinogen	Bays and Estuaries	Inland Surface Waters and Ground Waters		California Dept. of Health Services		US Environmental Protection Agency							US EPA	National Academy of Sciences (NAS)
			Primary MCL	Secondary MCL	Primary MCL	Secondary MCL	Primary MCL	Secondary MCL	MCL Goal		Toxicity	Taste & Odor			
1,4-Dichlorobenzene	18 ‡		5		5		75	5 (11)	75	5 (11)				75	94 (15)
3,3'-Dichlorobenzidine	0.0081 ‡														
1,1-Dichloroethane			5		5					5 (11)					
1,2-Dichloroethane	130 ‡		0.5		0.5		5		zero	0.3 (11)				700 (10-day)	
1,1-Dichloroethylene	7100		6		6		7		7	6 (11)				7	100
cis-1,2-Dichloroethylene			6		6		70		70	6 (11)				70	
trans-1,2-Dichloroethylene			10		10		100		100	10 (11)				100	
Dichloromethane	450 ‡						5 (12)		zero (12)		40			2000 (10-day)	5000 (7-day)
2,3-Dichlorophenol	1 (7)														
2,4-Dichlorophenol	1 (7)													20	2000 / 7000 (13)
2,5-Dichlorophenol	1 (7)														
2,6-Dichlorophenol	1 (7)														
3,4-Dichlorophenol	1 (7)														
1,2-Dichloropropane			5		5		5		zero	5 (11)				90 (10-day)	
1,3-Dichloropropene	8.9 ‡		0.5		0.5					0.2 (11)				30 (10-day)	
Dieldrin	0.000040 ‡										0.05 (LOQ)			0.5 (10-day)	
Di(2-ethylhexyl)phthalate	3.5 ‡		4		4		6 (12)		zero (12)	4 (11)					4200
Diethyl phthalate	33,000								5000 (11)					5000	
2,4-Dimethylphenol	30 (5)											400			
Dimethyl phthalate	820,000														
4,6-Dinitro-o-cresol	30 (5)														
Dinitrophenol															110
2,4-Dinitrophenol	4														110
2,4-Dinitrotoluene	2.6 ‡													500 (10-day)	
1,2-Diphenylhydrazine	0.16 ‡														
Endosulfan	9 (16)														
Endosulfan sulfate	9 (16)														
Endrin	0.002		0.2		0.2		2 (12) / 0.2		2 (12)					2	
Ethylbenzene	4100		680		680		700	30 (11)	700	680 (11)			29 (18)	700	
Ethylene dibromide (EDB)			0.02		0.02		0.05		zero	0.01 (11)				8 (10-day)	
Fluoranthene	15														
Fluorene	0.0088 ‡ (2)														
Glyphosate			700		700		700 (12)		700 (12)	700 (11)				700	
Heptachlor	0.00072 ‡ (17)		0.01		0.01		0.4		zero	0.01 (11)				10 (10-day)	
Heptachlor epoxide	0.00072 ‡ (17)		0.01		0.01		0.2		zero	0.007 (11)				0.1 (7-yr)	
Hexachlorobenzene	0.00021 ‡						1 (12)		zero (12)					50 (10-day)	30 (7-day)
Hexachlorobutadiene	14 ‡													1	
Hexachlorocyclopentadiene	58						50 (12)	8 (11)	50 (12)						
Hexachloroethane	2.5 ‡													1	
Indeno(1,2,3-c,d)pyrene	0.0088 ‡ (2)						0.4 (11)		zero (11)						
Isophorone	150,000													100	
Methanes, halo-	130 ‡ (4)						100 (10)								
Methoxychlor			100		100		40		40					40	700
Molinate			20		20					20 (11)					
Nitrobenzene	4.9														5 (7-day)
2-Nitrophenol	30 (5)														290 (7-day,19)
Nitrophenol	30 (5)														290 (7-day)
4-Nitrophenol	30 (5)													60 (14)	290 (7-day,19)
N-Nitrosodimethylamine	7.3 ‡														

Table C-2 -- Values are in μg/l (ppb) unless otherwise indicated. Numbers in parentheses indicate endnotes following the tables.

Table C-2 WATER QUALITY CRITERIA - ORGANIC CONSTITUENTS

Organic Constituent	BASIN PLAN				Drinking Water Standards (California & Federal) Maximum Contaminant Levels (MCLs)					California Recommended Public Health Level (RPHL) Department of Health Services	California State Action Levels Department of Health Services		Other Taste and Odor Thresholds	Health Advisories or Suggested No-Adverse-Response Levels (SNARLS) for toxicity other than cancer risk	
	Ocean Waters (1) "‡" = carcinogen	Bays and Estuaries	Inland Surface Waters and Ground Waters		California Dept. of Health Services		US Environmental Protection Agency							US EPA	National Academy of Sciences (NAS)
			Primary MCL	Secondary MCL	Primary MCL	Secondary MCL	Primary MCL	Secondary MCL	MCL Goal		Toxicity	Taste & Odor			
N-Nitrosodiphenylamine	2.5 ‡														
trans-Nonachlor	0.000023 ‡ (6)														
Oil & grease	25,000														
Oxychlordane	0.000023 ‡ (6)														
PAHs	0.0088 ‡ (2)						see individual chemicals		see individual chemicals					see individual chemicals	
Pentachlorophenol	1 (7)						1		zero		30			300 (10-day)	6 / 21 (13)
Phenanthrene	0.0088 ‡ (2)														
Phenol	30 (5)											5.0 (22)		4000	
Phenols, chlorinated	1														
Phenols, nitro-	30 (5)														
Phenols, non-chlorinated	30														
Phthalate esters		see individual chemicals		see individual chemicals		see individual chemicals		see individual chemicals						see individual chemicals	see individual chemicals
Phenanthrene	0.0088 ‡ (2)		1												
Phenazopyridine			1												
Phenazopyridine hydrochloride			1												
Phenesterin			1												
Phenobarbital			1												
Phenol	30 (5)		1									5.0 (22)		4000	
Phenols, chlorinated	1		1												
Phenols, nitro-	30 (5)		1												
Phenols, non-chlorinated	30		1												
Phenoxybenzamine			1												
Phenoxybenzamine hydrochloride			1												
Phenyl glycidyl ether			1												
o-Phenylphenate, sodium			1												
Polychlorinated biphenyls	0.000019 ‡						0.5 (21)		zero (21)						50 (7-day)
Pyrene	0.0088 ‡ (2)														
Resorcinol	30 (5)														500 (7-day)
Simazine			10		10		4 (12)		4 (12)					4	1505
2,3,7,8-TCDD (Dioxin)	0.0000000039 ‡ (20)						0.00003 (12)		zero (12)					0.0001 (10-day)	0.0007
1,1,2,2-Tetrachloroethane	1200		1		1					1 (11)					
Tetrachloroethylene (PCE)	99 ‡		5		5		5		zero	0.7 (11)				2000 (10-day)	
2,3,4,6-Tetrachlorophenol	1 (7)														
2,3,5,6-Tetrachlorophenol	1 (7)														
Thiobencarb			70	1	70	1				70 (11)					
Toluene	85,000						1000	40 (11)	1000		100		42 (18)	1000	340
Toxaphene	0.00021 ‡		5		5		3		zero					40 (10-day)	8.75
2,4,5-TP (Silvex)			10		10		50		50					50	5.25
Tributyltin	0.0014														
1,1,1-Trichloroethane	540,000		200		200		200		200	200 (11)				200	3800
1,1,2-Trichloroethane	43,000		32		32		5 (12)		3 (12)					3	
Trichloroethylene (TCE)	27 ‡		5		5		5		zero	2.5 (11)					
Trichlorofluoromethane			150		150					150 (11)				2000	8000 (7-day)
2,4,5-Trichlorophenol	1 (7)														
2,4,6-Trichlorophenol	0.29 ‡														2500 (7-day)
1,1,2-Trichloro-1,2,2-trifluoroethane			1200		1200					1200 (11)					
Trinitrophenol	30 (5)														200 (7-day)
Vinyl chloride	36 ‡		0.5		0.5		2		zero	0.15 (11)				3000 (10-day)	
Xylene(s)			1750		1750		10,000	20 (11)	10,000	1750 (11)			17 (18)	10,000	

Table C-2 -- Values are in μg/l (ppb) unless otherwise indicated. Numbers in parentheses indicate endnotes following the tables.

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Table C-2 WATER QUALITY CRITERIA - ORGANIC CONSTITUENTS

Organic Constituent	US EPA Integrated Risk Information System (IRIS) Reference Dose as a Water Quality Criterion (23)	One-in-a-Million Incremental Cancer Risk Estimates for Drinking Water: Cal/EPA Cancer Potency Factor as a Water Quality Criterion (24)	US EPA Integrated Risk Information System (IRIS)	US EPA Health Advisory or SNARL	National Academy of Sciences (NAS) *Drinking Water and Health*	California Proposition 65 Regulatory Level as a Water Quality Criterion	Agricultural Water Quality Goals (28)	US EPA National Ambient Water Quality Criteria: Health and Welfare Protection: Non-Cancer Public Health Effects	One-in-a-Million Incremental Cancer Risk Estimate	Taste and Odor or Welfare	Freshwater Aquatic Life Protection Recommended Criteria: Continuous Concentration (4-day Average)	24-hour Average	Maximum Concentration (1-hour Average)
Acenaphthylene				(C)				320 / 780 (29)					
Acenaphthylene		0.035	0.07	0.07 (B1)	0.38	0.35			0.059 / 0.66 (29)				
Acrylonitrile		0.0021	0.002	0.002 (B2,14)	0.003	0.02			0.00013 / 0.00014 (29)				
Aldrin	2100			(D)				9600 / 110,000 (29)					
Anthracene	3.5		0.14	(C)				25 (30)					
Atrazine	18			(D)									
Bentazon				(B2)					0.0028 / 0.031 (32)				
Benz(a)anthracene		0.35	1	1.0 (A)		3.5			1.2 / 71 (29)				
Benzene		0.00007		(A)		0.0005			0.00012 / 0.00054 (29)				
Benzidine				(B2)					0.0028 / 0.031 (32)				
Benzo(b)fluoranthene				(B2)					0.0028 / 0.31 (32)				
Benzo(k)fluoranthene				(D)									
Benzo(g,h,i)perylene		0.0029	0.003	(B2)		0.03			0.0028 / 0.031 (32)				
Benzo(a)pyrene					0.33	0.15			0.0039 / 0.013 (29)				
alpha-BHC					0.12	0.25			0.014 / 0.046 (29)				
beta-BHC	0.2	0.032		0.03 (C)	0.054	0.3			0.019 / 0.063 (29)			0.08	
Gamma-BHC (Lindane)													
delta-BHC		0.0088				0.1			0.0123				
technical-BHC													
Bis(2-chloroethoxy) methane		0.014			0.42	0.15			0.031 / 1.4 (29)				
Bis(2-chloroethyl) ether	280			(D)				1400 / 170,000 (29)					
Bis(2-chloroisopropyl) ether		0.27	1.4	0.6 (B2,14)		2.5			0.27 / 22 (29)				
Bromodichloromethane			4	4 (B2,14)					4.3 / 360 (29)				
Bromoform	7			(D)				48 / 4000 (29)					
Bromomethane	35			(E)									
Carbofuran		0.23	0.3	0.3 (B2)	4.5	2.5			0.25 / 4.4 (29)				
Carbon tetrachloride													
Catechol		0.029 / 0.027	0.03	0.03 (B2)	0.028	0.25			0.00057 / 0.00059 (29)			0.0043	
Chlordane	140			(D)	2.3 (25)			680 / 21,000 (29)		20			
Chlorobenzene										3000			
4-Chloro-m-cresol										1800			
4-Chloro-o-cresol										20			
6-Chloro-m-cresol		1.1 / 0.43	6	6.0 (B2,14)	0.26 / 5.6 (26)	10			5.7 / 470 (29)				
Chloroform	2.8			(C)									
Chloromethane	35			(D)						0.1			
2-Chlorophenol										0.1			
3-Chlorophenol										0.1			
4-Chlorophenol				(B2)					0.0028 / 0.31 (32)				
Chrysene	70			(D)				100					
2,4-D		0.005	0.03	0.03 (B2)	0.051	0.05			0.025				
DBCP		0.15				1 (8)			0.00083 / 0.00084 (29)				
DDD		0.1				1 (8)			0.00059 / 0.00059 (29)				
DDE		0.1	0.1	(B2)	0.042	1 (8)			0.00059 / 0.00059 (29)			0.0010	
DDT				(B2)		0.1			0.0028 / 0.031 (32)				
Dibenz(a,h)anthracene	14			(C)	0.6	3.5			0.41 / 34 (29)				
Dibromochloromethane	700			(D)				2700 / 12,000 (29)					
Dibutyl phthalate	620			(D)				2700 / 17,000 (29)					
1,2-Dichlorobenzene	620			(D)				400 / 2600 (31)					
1,3-Dichlorobenzene													

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Table C-2 -- Values are in µg/l (ppb) unless otherwise indicated. Numbers in parentheses indicate endnotes following the tables.

Table C-2 WATER QUALITY CRITERIA - ORGANIC CONSTITUENTS

Organic Constituent	US EPA Integrated Risk Information System (IRIS) Reference Dose as a Water Quality Criterion (23)	One-in-a-Million Incremental Cancer Risk Estimates for Drinking Water				California Proposition 65 Regulatory Level as a Water Quality Criterion	Agricultural Water Quality Goals (28)	US EPA National Ambient Water Quality Criteria					
								Health and Welfare Protection			Freshwater Aquatic Life Protection Recommended Criteria		
		Cal/EPA Cancer Potency Factor as a Water Quality Criterion (24)	US EPA Integrated Risk Information System (IRIS)	US EPA Health Advisory or SNARL	National Academy of Sciences (NAS) *Drinking Water and Health*			Non-Cancer Public Health Effects	One-in-a-Million Incremental Cancer Risk Estimate	Taste and Odor or Welfare	Continuous Concentration (4-day Average)	24-hour Average	Maximum Concentration (1-hour Average)
1,4-Dichlorobenzene	70	0.88		(C)		10		400 / 2600 (31)					
3,3'-Dichlorobenzidine		0.029				0.3			0.04 / 0.077 (29)				
1,1-Dichloroethane						50							
1,2-Dichloroethane		0.5	0.4	0.4 (B2)	0.71	5			0.38 / 99 (29)				
1,1-Dichloroethylene	6.3		0.06	0.06 (C)					0.057 / 3.2 (29)				
cis-1,2-Dichloroethylene	70			(D)									
trans-1,2-Dichloroethylene	140			(D)									
Dichloromethane		2.5	5	5 (B2)		25			4.7 / 1600 (29)				
2,3-Dichlorophenol										0.04			
2,4-Dichlorophenol	21			(D)				93 / 790 (29)		0.3			
2,5-Dichlorophenol										0.5			
2,6-Dichlorophenol										0.2			
3,4-Dichlorophenol										0.3			
1,2-Dichloropropane		0.56	0.5	0.5 (B2)									
1,3-Dichloropropene		0.19	0.2	0.2 (B2)	0.45			10 / 1700 (29)					
Dieldrin		0.0022	0.002	0.002 (B2)	0.0019	0.02			0.00014 / 0.00014 (29)			0.0019	
Di(2-ethylhexyl)phthalate		4.2	3	3 (B2)	2.4	40			1.8 / 5.9 (29)		360 (11)		400 (11)
Diethyl phthalate	5600			(D)				23,000 / 120,000 (29)					
2,4-Dimethylphenol	140									400			
Dimethyl phthalate				(D)				313,000 / 2,900,000(29)					
4,6-Dinitro-o-cresol								13.4 / 765 (29)					
Dinitrophenol								70					
2,4-Dinitrophenol								70 / 14,000 (29)					
2,4-Dinitrotoluene		0.11	50	0.05 (B2)		1			0.11 / 9.1 (29)				
1,2-Diphenylhydrazine						0.4			0.040 / 0.54 (29)				
Endosulfan								0.93 / 2.0 (29)				0.056	
Endosulfan sulfate								0.93 / 2.0 (29)				0.056 (35)	
Endrin	2.1			(D)				0.76 / 0.81 (33,29)				0.0023	
Ethylbenzene	700			(D)				3100 / 29,000 (29)					
Ethylene dibromide (EDB)		0.0097	0.0004	0.0004 (B2)	0.055	0.1							
Fluoranthene				(D)				300 / 370 (29)					
Fluorene	280			(D)				1300 / 14,000 (29)					
Glyphosate	700			(D)									
Heptachlor		0.0061 / 0.0078	0.008	0.008 (B2)	0.012	0.1			0.00021 / 0.00021 (29)			0.0038	
Heptachlor epoxide		0.0027 / 0.0038	0.004	0.004 (B2)		0.04			0.00010 / 0.00011 (29)			0.0038	
Hexachlorobenzene		0.019		0.02 (B2)	0.017	0.2			0.00075 / 0.00077 (29)		3.68 (11)		6 (11)
Hexachlorobutadiene	1.4			(C)					0.44 / 50 (29)				
Hexachlorocyclopentadiene	49			(D)				240 / 17,000 (29)		1			
Hexachloroethane				(C)		10			1.9 / 8.9 (29)				
Indeno(1,2,3-c,d)pyrene				(B2)					0.0028 / 0.031 (32,29)				
Isophorone	140			40 (C)					8.4 / 600 (29)				
Methanes, halo-													
Methoxychlor	35			(D)				100					
Molinate	14												
Nitrobenzene								17 / 1900 (29)		30			
2-Nitrophenol													
Nitrophenol													
4-Nitrophenol				(D)									
N-Nitrosodimethylamine		0.0022				0.02			0.00069 / 8.1 (29)				

Table C-2 -- Values are in μg/l (ppb) unless otherwise indicated. Numbers in parentheses indicate endnotes following the tables.

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Table C-2 WATER QUALITY CRITERIA - ORGANIC CONSTITUENTS

Organic Constituent	US EPA Integrated Risk Information System (IRIS) Reference Dose as a Water Quality Criterion (23)	One-in-a-Million Incremental Cancer Risk Estimates for Drinking Water				California Proposition 65 Regulatory Level as a Water Quality Criterion	Agricultural Water Quality Goals (28)	US EPA National Ambient Water Quality Criteria					
								Health and Welfare Protection			Freshwater Aquatic Life Protection Recommended Criteria		
		Cal/EPA Cancer Potency Factor as a Water Quality Criterion (24)	US EPA Integrated Risk Information System (IRIS)	US EPA Health Advisory or SNARL	National Academy of Sciences (NAS) *Drinking Water and Health*			Non-Cancer Public Health Effects	One-in-a-Million Incremental Cancer Risk Estimate	Taste and Odor or Welfare	Continuous Concentration (4-day Average)	24-hour Average	Maximum Concentration (1-hour Average)
N-Nitrosodiphenylamine		3.9				40			5.0 / 16 (29)				
trans-Nonachlor													
Oil & grease													
Oxychlordane													
PAHs									0.0028 / 0.31 (29)				
Pentachlorophenol		1.9	0.3	0.3 (B2)		20			0.28 / 8.2 (29)	30	(34)		(36)
Phenanthrene											6.3 (11)		30 (11)
Phenol	4200			(D)				21,000 / 4,600,000 (29)		300			
Phenols, chlorinated													
Phenols, nitro-													
Phenols, non-chlorinated													
Phthalate esters			see individual chemicals			see individual chemicals		see individual chemicals					
Phenanthrene											6.3 (11)		30 (11)
Phenazopyridine						2							
Phenazopyridine hydrochloride						2.5							
Phenesterin						0.0025							
Phenobarbital						1							
Phenol	4200			(D)				21,000 / 4,600,000 (29)		300			
Phenols, chlorinated													
Phenols, nitro-													
Phenols, non-chlorinated													
Phenoxybenzamine						0.1							
Phenoxybenzamine hydrochloride						0.15							
Phenyl glycidyl ether						2.5 (11)							
o-Phenylphenate, sodium						100							
Polychlorinated biphenyls		0.0045	0.005	0.005 (B2)	0.16 (37)	0.045			0.000044/0.000045(29)			0.014	
Pyrene	210 (14)			(D)				960 / 11,000 (29)					
Resorcinol													
Simazine	3.5			(C)									
2,3,7,8-TCDD (Dioxin)		0.00000027	0.0000002	0.0000002 (B2)		0.0000025			1.3E-8 / 1.4E-8 (29)				
1,1,2,2-Tetrachloroethane				(C)		1.5			0.17 / 11 (29)				
Tetrachloroethylene (PCE)		0.69	0.7	0.7 (B2)	3.6	7			0.8 / 8.85 (29)				
2,3,4,6-Tetrachlorophenol										1			
2,3,5,6-Tetrachlorophenol													
Thiobencarb													
Toluene	1400			(D)		3500 (38)		6800 / 200,000 (29)					
Toxaphene		0.029	0.03	0.03 (B2)		0.3			0.00073 / 0.00075 (29)		0.0002		0.73
2,4,5-TP (Silvex)	53			(D)				10					
Tributyltin													
1,1,1-Trichloroethane	250			(D)	17 (25)								
1,1,2-Trichloroethane	2.8		0.6	0.6 (C)		5			0.60 / 42 (29)				
Trichloroethylene (TCE)		2.3 (11)	3	3 (B2)	1.5 (25)	25			2.7 / 81 (29)				
Trichlorofluoromethane	2100			(D)					0.19				
2,4,5-Trichlorophenol								2600		1	63 (100)		100 (11)
2,4,6-Trichlorophenol		0.5	3	3 (B2,14)		5			2.1 / 6.5 (29)	2			
1,1,2-Trichloro-1,2,2-trifluoroethane													
Trinitrophenol													
Vinyl chloride		0.13	0.015	0.015 (A)	1.1	1.5			2 / 525 (29)				
Xylene(s)	14,000			(D)									

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Table C-2 -- Values are in μg/l (ppb) unless otherwise indicated. Numbers in parentheses indicate endnotes following the tables.

Table C-2 WATER QUALITY CRITERIA - ORGANIC CONSTITUENTS

Organic Constituent	US EPA Ambient Water Quality Criteria (cont.) Freshwater Aquatic Life Protection (cont.) Recommended Criteria (cont.)				California Ocean Plan Numerical Water Quality Objectives						US EPA National Ambient Water Quality Criteria Saltwater Aquatic Life Protection Recommended Criteria						
	Maximum (Instantaneous)	Additional Toxicity Information			Human Health Protection (30-day Average) "‡" = carcinogen	Marine Aquatic Life Protection					Continuous Concentration (4-day Average)	24-hour Average	Maximum Concentration (1-hour Average)	Maximum (Instantaneous)	Additional Toxicity Information		
		Acute	Chronic	Other		6-month Median	30-day Average	7-day Average	Daily Maximum	Instantaneous Maximum					Acute	Chronic	Other
Acenaphthylene					0.0088 ‡ (2)										300 (32)		
Acenaphthylene		68	21		220										55		
Acrylonitrile		7550		2600 (44)	0.10 ‡												
Aldrin	3				0.000022 ‡									1.3			
Anthracene					0.0088 ‡ (2)										300 (32)		
Atrazine	1.0 (30)																
Bentazon																	
Benz(a)anthracene					0.0088 ‡ (2)										300 (32)		
Benzene		5300			5.9 ‡										5100		700 (47)
Benzidine		2500			0.000069 ‡												
Benzo(b)fluoranthene					0.0088 ‡ (2)										300 (32)		
Benzo(k)fluoranthene					0.0088 ‡ (2)										300 (32)		
Benzo(g,h,i)perylene					0.0088 ‡ (2)										300 (32)		
Benzo(a)pyrene					0.0088 ‡ (2)										300 (32)		
alpha-BHC						0.004 (3)			0.008 (3)	0.012 (3)							
beta-BHC						0.004 (3)			0.008 (3)	0.012 (3)							
Gamma-BHC (Lindane)	2.0					0.004 (3)			0.008 (3)	0.012 (3)				0.16			
delta-BHC						0.004 (3)			0.008 (3)	0.012 (3)							
technical-BHC		100				0.004 (3)			0.008 (3)	0.012 (3)					0.34		
Bis(2-chloroethoxy) methane					4.4												
Bis(2-chloroethyl) ether		238,000 (39	122 (43)		0.045 ‡												
Bis(2-chloroisopropyl) ether		238,000 (39	122 (43)		1200												
Bromodichloromethane		11,000 (40)			130 ‡ (4)										12,000 (40)	6400 (40)	11,500 (40,48)
Bromoform		11,000 (40)			130 ‡ (4)										12,000 (40)	6400 (40)	11,500 (40,48)
Bromomethane		11,000 (40)			130 ‡ (4)										12,000 (40)	6400 (40)	11,500 (40,48)
Carbofuran																	
Carbon tetrachloride		35,200			0.90 ‡										50,000	6400 (40)	11,500 (40,48)
Catechol						30 (5)			120 (5)	300 (5)							
Chlordane	2.4				0.000023 ‡ (6)							0.004		0.09			
Chlorobenzene		250 (41)		50 (41,45)	570										160 (41)	129 (41)	
4-Chloro-m-cresol		30				1 (7)			4 (7)	10 (7)							
4-Chloro-o-cresol						1 (7)			4 (7)	10 (7)							
6-Chloro-m-cresol						1 (7)			4 (7)	10 (7)							
Chloroform		28,900	1240		130 ‡										12,000 (40)	6400 (40)	11,500 (40,48)
Chloromethane		11,000 (40)			130 ‡ (4)										12,000 (40)	6400 (40)	11,500 (40,48)
2-Chlorophenol		4380		2000 (46)		1 (7)			4 (7)	10 (7)							
3-Chlorophenol						1 (7)			4 (7)	10 (7)							
4-Chlorophenol						1 (7)			4 (7)	10 (7)					29,700		
Chrysene					0.0088 ‡ (2)										300 (32)		
2,4-D																	
DBCP																	
DDD		0.6			0.00017 ‡ (8)										3.6		
DDE		1050			0.00017 ‡ (8)										14		
DDT	1.1				0.00017 ‡ (8)							0.001		0.13			
Dibenz(a,h)anthracene					0.0088 ‡ (2)										300 (32)		
Dibromochloromethane		11,000 (40)			130 ‡ (4)										12,000 (40)	6400 (40)	11,500 (40,48)
Dibutyl phthalate		940 (42)	3 (42)		3500										2944 (42)		3.4 (49,42)
1,2-Dichlorobenzene		1120 (31)	763 (31)		5100 (9)										1970 (31)	129 (41)	
1,3-Dichlorobenzene		1120 (31)	763 (31)		5100 (9)										1970 (31)	129 (41)	

Table C-2 -- Values are in $\mu g/l$ (ppb) unless otherwise indicated. Numbers in parentheses indicate endnotes following the tables.

Table C-2 WATER QUALITY CRITERIA - ORGANIC CONSTITUENTS

Organic Constituent	US EPA Ambient Water Quality Criteria (cont.) Freshwater Aquatic Life Protection (cont.) Recommended Criteria (cont.)				California Ocean Plan Numerical Water Quality Objectives						US EPA National Ambient Water Quality Criteria Saltwater Aquatic Life Protection						
						Marine Aquatic Life Protection					Recommended Criteria						
	Maximum (Instantaneous)	Additional Toxicity Information			Human Health Protection (30-day Average) "‡" = carcinogen	6-month Median	30-day Average	7-day Average	Daily Maximum	Instantaneous Maximum	Continuous Concentration (4-day Average)	24-hour Average	Maximum Concentration (1-hour Average)	Maximum (Instantaneous)	Additional Toxicity Information		
		Acute	Chronic	Other											Acute	Chronic	Other
1,4-Dichlorobenzene		1120 (31)	763 (31)		18 ‡										1970 (31)	129 (41)	
3,3'-Dichlorobenzidine					0.0081 ‡												
1,1-Dichloroethane																	
1,2-Dichloroethane		118,000	20,000		130 ‡										113,000		
1,1-Dichloroethylene		11,600 (50)			7100										224,000 (50)		
cis-1,2-Dichloroethylene		11,600 (50)													224,000 (50)		
trans-1,2-Dichloroethylene		11,600 (50)													224,000 (50)		
Dichloromethane		11,600 (50)			450 ‡										12,000 (40)	6400 (40)	11,500 (40,48)
2,3-Dichlorophenol						1 (7)			4 (7)	10 (7)							
2,4-Dichlorophenol		2020	365	70 (56)		1 (7)			4 (7)	10 (7)							
2,5-Dichlorophenol						1 (7)			4 (7)	10 (7)							
2,6-Dichlorophenol						1 (7)			4 (7)	10 (7)							
3,4-Dichlorophenol						1 (7)			4 (7)	10 (7)							
1,2-Dichloropropane		23,000 (51)	5700 (51)												10,300 (51)	3040 (51)	
1,3-Dichloropropene		6060 (52)	244 (52)		8.9 ‡										790 (52)		
Dieldrin	2.5				0.000040 ‡							0.0019		0.71			
Di(2-ethylhexyl)phthalate		940 (42)	3 (42)		3.5 ‡						360 (11)		400 (11)		2,944 (42)		3.4 (49,42)
Diethyl phthalate		940 (42)	3 (42)		33,000										2,944 (42)		3.4 (49,42)
2,4-Dimethylphenol		2120				30 (5)			120 (5)	300 (5)							
Dimethyl phthalate		940 (42)	3 (42)		820,000										2,944 (42)		3.4 (49,42)
4,6-Dinitro-o-cresol		230 (53)		150 (49,53)	220	30 (5)			120 (5)	300 (5)					4850 (53)		
Dinitrophenol		230 (53)		150 (49,53)		30 (5)			120 (5)	300 (5)					4850 (53)		
2,4-Dinitrophenol		230 (53)		150 (49,53)	4	30 (5)			120 (5)	300 (5)					4850 (53)		
2,4-Dinitrotoluene		330 (54)	230 (54)		2.6 ‡										590 (54)		370 (54,48)
1,2-Diphenylhydrazine		270 (9)			0.16 ‡												
Endosulfan	0.22					9 (16)			18 (16)	27 (16)		0.0087		0.034			
Endosulfan sulfate						9 (16)			18 (16)	27 (16)		0.0087 (35)					
Endrin	0.18					0.002			0.004	0.006		0.0023		0.037			
Ethylbenzene		32,000			4100										430		
Ethylene dibromide (EDB)																	
Fluoranthene		3980			15										40	16	
Fluorene					0.0088 ‡ (2)										300 (32)		
Glyphosate																	
Heptachlor	0.52				0.00072 ‡ (17)							0.0036		0.053			
Heptachlor epoxide	0.52				0.00072 ‡ (17)							0.0036		0.053			
Hexachlorobenzene		250 (41)		50 (41,45)	0.00021 ‡										160 (41)	129 (41)	
Hexachlorobutadiene		90	9.3		14 ‡										32		
Hexachlorocyclopentadiene		7.0	5.2		58										7		
Hexachloroethane		980	540		2.5 ‡										940		
Indeno(1,2,3-c,d)pyrene					0.0088 ‡ (2)										300 (32)		
Isophorone		117,000			150,000										12,900		
Methanes, halo-		11,000			130 ‡ (4)										12000	6400	11,500 (48)
Methoxychlor	0.03													0.03			
Molinate																	
Nitrobenzene		27,000			4.9										6680		
2-Nitrophenol		230 (53)		150 (49,53)		30 (5)			120 (5)	300 (5)					4850 (53)		
Nitrophenol		230 (53)		150 (49,53)		30 (5)			120 (5)	300 (5)					4850 (53)		
4-Nitrophenol		230 (53)		150 (49,53)		30 (5)			120 (5)	300 (5)					4850 (53)		
N-Nitrosodimethylamine		5850 (55)			7.3 ‡										3,300,000 (55)		

Table C-2 -- Values are in µg/l (ppb) unless otherwise indicated. Numbers in parentheses indicate endnotes following the tables.

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Table C-2 WATER QUALITY CRITERIA - ORGANIC CONSTITUENTS

Organic Constituent	US EPA Ambient Water Quality Criteria (cont.) Freshwater Aquatic Life Protection (cont.) Recommended Criteria (cont.)				California Ocean Plan Numerical Water Quality Objectives						US EPA National Ambient Water Quality Criteria Saltwater Aquatic Life Protection Recommended Criteria						
	Maximum (Instantaneous)	Additional Toxicity Information			Human Health Protection (30-day Average) "‡" = carcinogen	Marine Aquatic Life Protection					Continuous Concentration (4-day Average)	24-hour Average	Maximum Concentration (1-hour Average)	Maximum (Instantaneous)	Additional Toxicity Information		
		Acute	Chronic	Other		6-month Median	30-day Average	7-day Average	Daily Maximum	Instantaneous Maximum					Acute	Chronic	Other
N-Nitrosodiphenylamine		5850 (55)			2.5 ‡										3,300,000 (55)		
trans-Nonachlor					0.000023 ‡ (6)												
Oil & grease							25,000	40,000		75,000							
Oxychlordane					0.000023 ‡ (6)												
PAHs					0.0088 ‡ (2)										300		
Pentachlorophenol				1.74 (57)		1 (7)			4 (7)	10 (7)	7.9		13				
Phenanthrene					0.0088 ‡ (2)						4.6 (11)		7.7 (11)		300 (32)		
Phenol		10,200	2560			30 (5)			120 (5)	300 (5)					5800		
Phenols, chlorinated						1			4	10							
Phenols, nitro-		230		150 (49)		30 (5)			120 (5)	300 (5)					4850		
Phenols, non-chlorinated						30			120	300							
Phthalate esters		940	3												2944		3.4 (49,42)
Phenanthrene					0.0088 ‡ (2)						4.6 (11)		7.7 (11)		300 (32)		
Phenazopyridine																	
Phenazopyridine hydrochloride																	
Phenesterin																	
Phenobarbital																	
Phenol		10,200	2560			30 (5)			120 (5)	300 (5)					5800		
Phenols, chlorinated						1			4	10							
Phenols, nitro-		230		150 (49)		30 (5)			120 (5)	300 (5)					4850		
Phenols, non-chlorinated						30			120	300							
Phenoxybenzamine																	
Phenoxybenzamine hydrochloride																	
Phenyl glycidyl ether																	
o-Phenylphenate, sodium																	
Polychlorinated biphenyls		> 2			0.000019 ‡							0.03			>10		
Pyrene					0.0088 ‡ (2)										300 (32)		
Resorcinol						30 (5)			120 (5)	300 (5)							
Simazine	10 (58)																
2,3,7,8-TCDD (Dioxin)					0.0000000039 ‡ (20)												
1,1,2,2-Tetrachloroethane		9320 (59)	2400		1200										9020		
Tetrachloroethylene (PCE)		5280	840		99 ‡										10,200	450	
2,3,4,6-Tetrachlorophenol						1 (7)			4 (7)	10 (7)							
2,3,5,6-Tetrachlorophenol						1 (7)			4 (7)	10 (7)					440		
Thiobencarb																	
Toluene		17,000			85,000										6300	5000	
Toxaphene					0.00021 ‡						0.0002		0.21				
2,4,5-TP (Silvex)																	
Tributyltin	0.026 (30)				0.0014									0.010 (30)			
1,1,1-Trichloroethane		18,000		200 (60)	540,000										31,200		
1,1,2-Trichloroethane		18,000	9400		43,000												
Trichloroethylene (TCE)		45,000		21,900 (61)	27 ‡										2000		
Trichlorofluoromethane		11,000 (40)													12,000 (40)	6400 (40)	11,500 (40,48)
2,4,5-Trichlorophenol						1 (7)			4 (7)	10 (7)	11 (11)		240 (11)				
2,4,6-Trichlorophenol			970		0.29 ‡	1 (7)			4 (7)	10 (7)							
1,1,2-Trichloro-1,2,2-trifluoroethane																	
Trinitrophenol		230 (53)		150 (49,53)		30 (5)			120 (5)	300 (5)					4850 (53)		
Vinyl chloride					36 ‡												
Xylene(s)																	

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Table C-2 -- Values are in µg/l (ppb) unless otherwise indicated. Numbers in parentheses indicate endnotes following the tables.

ENDNOTES FOR TABLE C-2 ORGANICS

(7-day) For exposure of 7 days or less.
(10-day) For exposure of 10 days or less.
(24-hr) For exposure of 24 hours or less.
(7-yr) For "longer-term" exposure (7 years or less, EPA).

(A) Known human carcinogen; sufficient epidemiologic evidence in humans.
(B1) Probable human carcinogen; limited epidemiologic evidence in humans
(B2) Probable human carcinogen; sufficient evidence from animal studies; no or inadequate human data.
(C) Possible human carcinogen; limited evidence from animal studies; no human data.
(D) Not classified as to human carcinogenicity; no data or inadequate evidence.
(E) Evidence of non-carcinogenicity for humans.

(1) For hardness in mg/l as $CaCO_3$, criterion = e(0.8473[ln(hardness)] + 0.8604) µg/l.
(2) For sum of acenaphthylene, anthrancene, benz(a)anthrancene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(g,h,i)perylene, benzo(a)pyrene, chrysene, dibenz(a,h)anthracene, fluorene, indeno(1,2,3-c,d)pyrene, phenanthrene, and pyrene.
(3) For hardness in mg/l as $CaCO_3$, criterion = e(1.273[ln(hardness)] – 1.460) µg/l.
(4) For sum of bromoform, bromomethane, chloromethane, dibromochloromethane, and bromodichloromethane.
(5) For sum of nonchlorinated phenolic compounds.
(6) For the sum of oxychlordane and alpha and gamma isomers of chlordane, chlordene and nonachlor.
(7) For sum of chlorinated phenolic compounds.
(8) Instantaneous maximum.
(9) For sum of 1,2- and 1-3-dichlorobenzenes.
(10) From Reference 30.
(11) Proposed.
(12) Effective 17 January 1994.
(13) For hardness in mg/l as $CaCO_3$, criterion = e(0.8473[ln(hardness)] + 0.7614) µg/l.
(14) MCL varies with air temperature; 2.4 mg/l (Š 53.7 °F); 2.2 mg/l (53.8 – 58.3 °F); 2.0 mg/l (58.4 – 63.8 °F); 1.8 mg/l (63.9 – 70.6 °F); 1.6 mg/l (70.0 – 79.2 °F); 1.4 mg/l (79.3 – 90.5 °F).
(15) Based on organoleptic considerations (taste, odor, color, laundry staining, etc.)
(16) For hardness in mg/l as $CaCO_3$, criterion = e(1.273[ln(hardness)] – 4.705) µg/l.
(17) As $CaCO_3$; minimum concentration except where natural concentrations are less.
(18) Toxicity to algae occurs.
(19) For hardness in mg/l as $CaCO_3$, criterion = e(0.8190[ln(hardness)] + 1.561) µg/l.
(20) For "TCDD equivalents" calculated as the sum of 2,3,7,8-chlorinated dibenzodioxin and dibenzofuran concentrations multiplied by their respective U.S. EPA Toxicity Equivalency Factors.
(21) Expressed as decachlorobiphenyl.
(22) For hardness in mg/l as $CaCO_3$, criterion = e(0.8190[ln(hardness)] + 3.688) µg/l.
(23) Assumes 70 kg body weight, 2 liters/day water consumption, and 20% relative source contribution. An additional uncertainty factor of 10 is used for Class C carcinogens.
(24) Assumes 70 kg body weight and 2 liters/day water consumption.
(25) For sum of dichloropropanes.
(26) Draft / tentative / provisional.
(27) For sum of halomethanes.
(28) Reference 19 unless noted otherwise.
(29) For the sum of oxychlordane and alpha and gamma isomers of chlordane, chlordene and nonachlor.
(30) For hardness in mg/l as $CaCO_3$, criterion = e(0.7852[ln(hardness)] – 3.490) µg/l.
(31) For hardness in mg/l as $CaCO_3$, criterion = e(1.128[ln(hardness)] – 3.828) µg/l.
(32) For hardness in mg/l as $CaCO_3$, criterion = e(0.9422[ln(hardness)] – 1.464) µg/l.
(33) For sum of dichlorobenzenes.
(34) For total trihalomethanes (sum of bromoform, bromodichloromethane, chloroform and dibromochloromethane); based largely on technology and economics.
(35) Based on endosulfan; U.S. EPA Water Quality Advisory (Reference 13).
(36) Determined not to pose a risk of cancer through ingestion (Title 22, CCR, Division
(37) Includes Radium 226 but excludes Radon and Uranium.
(38) Pentavalent arsenic [As(V)] effects on plants.
(39) Recommended level; Upper level = 500 mg/l; Short-term level = 600 mg/l.
(40) For sum of dichloroethylenes.
(41) For sum of dichloropropenes.
(42) As NO_3.
(43) Effective 17 January 1994.
(44) Toxicity to a fish species exposed for 7.5 days.
(45) Adverse behavioral effects occur to one species.
(46) For hardness in mg/l as $CaCO_3$, criterion = e(1.72[ln(hardness)] – 6.52) µg/l.
(47) Adverse effects on a fish species exposed for 168 days.
(48) A decrease in the number of algal cells occurs.
(49) Guidance level (Reference 3) assumes reletive source contribution of 10% from drinking water.
(50) For chlorinated systems.
(51) For white phosphorus.
(52) For sum of carcinogenic polynuclear aromatic hydrocarbons.
(53) For sum of nitrophenols.
(54) For hardness in mg/l as $CaCO_3$, criterion = e(0.8460[ln(hardness)] + 3.3612) µg/l.
(55) For total chlorine residual; for intermittent chlorine sources see Reference 26,
(56) For consumption of water and aquatic organisms / for consumption of aquatic organisms only.
(57) MCL includes this "Action level"; to be exceeded in no more than 10 percent of samples.
(58) For sum of nonchlorinated phenolic compounds.
(59) Recommended level; Upper level = 1000; Short-term level = 1500 mg/l.
(60) For sum of tetrachloroethanes.
(61) Calculated from corn oil gavage animal study / from drinking water animal study.

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REFERENCES

Drinking Water Standards — Maximum Contaminant Levels (MCLs)

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2. U. S. Environmental Protection Agency, 40 Code of Federal Regulations, Parts 141 and 143.

3. U. S. Environmental Protection Agency, Office of Water, "Drinking Water Regulations and Health Advisories" (December 1992).

4. U. S. Environmental Protection Agency, Region 9, Drinking Water Branch, "Drinking Water Standards and Health Advisory Table" (December 1992).

5. U. S. Environmental Protection Agency, Federal Register, Volume 56, No. 110 (Friday, 7 June 1991), pages 26460-26564. Corrected in FR, Vol. 56, No. 135 (Mon., 15 July 1991) pages 32112-32113.

6. U. S. Environmental Protection Agency, Federal Register, Volume 56, No. 126 (Monday, 1 July 1991), pages 30266-30281. Amended by Federal Register, Volume 57, pages 22178 et seq. (27 May 1992).

7. U. S. Environmental Protection Agency, Federal Register, Volume 56, No. 138 (Thursday, 18 July 1991), pages 33050-33127.

8. U. S. Environmental Protection Agency, Federal Register, Volume 57, No. 138 (Friday, 17 July 1992), pages 31776-31849.

California State Action Levels

9. California Department of Health Services, Office of Drinking Water, "Summary: Maximum Contaminant Levels (MCLs) and Action Levels (ALs)" (18 October 1990).

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11. U. S. Environmental Protection Agency, Office of Drinking Water "Health Advisory" documents (various dates).

12. National Academy of Sciences, "Drinking Water and Health", Vol.1 (1977), Vol. 3 (1980), Vol. 4 (1982), Vol. 5 (1983), Vol. 6 (1986), and Vol. 7 (1987).

13. U. S. Environmental Protection Agency, "Water Quality Advisory" documents (March 1986, September 1987).

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14. California Environmental Protection Agency, Office of Environmental Health Hazard Assessment (OEHHA), California Code of Regulations, Title 22, Division 2, Chapter 3, Articles 7 and 8.

15. California Environmental Protection Agency, Office of Environmental Health Hazard Assessment (OEHHA), Proposition 65 "Status Report" (January 1993).

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References 3, 4, 11, 12, and 13.

16. U. S. Environmental Protection Agency, "Quality Criteria for Water, 1986" (May 1986) plus updates (various dates).

17. U. S. Environmental Protection Agency, Federal Register, Vol. 49, No. 194 (Wednesday, 15 February 1984) [TCDD cancer risk level].

18. "California Environmental Protection Agency Criteria for Carcinogens", Office of Environmental Health Hazard Assessment (July 1992).

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19. Ayers, R. S. and D. W. Westcot, "Water Quality for Agriculture", Food and Agriculture Organization of the United Nations - Irrigation and Drainage Paper No. 29, Rev. 1, Rome (1985).

U. S. EPA National Ambient Water Quality Criteria

References 13 and 16.

20. U. S. Environmental Protection Agency, "Water Quality Criteria, 1972" (1973).

21. U. S. Environmental Protection Agency, Federal Register, Volume 55, No. 93, (Monday, 14 May 1990), pp. 19987-19992.

22. U. S. Environmental Protection Agency, Federal Register, Volume 57, No. 246 (Tuesday, 22 December 1992), pp. 60848-60923.

23. U. S. Environmental Protection Agency, "Ambient Water Quality Criteria" documents (various dates).

California Inland Surface Waters Plan - Numerical Water Quality Objectives

24. California State Water Resources Control Board, "Water Quality Control Plan for Inland Surface Waters of California", Document 91-12 WQ, Chapter II (11 April 1991).

25. California State Water Resources Control Board, "Functional Equivalent Document: Amendments of the Water Quality Control Plan for Inland Surface Waters of California", Draft (November 1992).

California Enclosed Bays and Estuaries Plan - Numerical Water Quality Objectives

26. California State Water Resources Control Board, "Water Quality Control Plan for Enclosed Bays and Estuaries of California", Document 91-13 WQ, Chapter II (11 April 1991).

27. California State Water Resources Control Board, "Functional Equivalent Document: Amendments of the Water Quality Control Plan for Enclosed Bays and Estuaries of California", Draft (November 1992).

California Ocean Plan - Numerical Water Quality Objectives

28. California State Water Resources Control Board, "Water Quality Control Plan: Ocean Waters of California", Chapter IV (22 March 1990).

Other References

29. McKee & Wolf, California State Water Resources Control Board, "Water Quality Criteria" (1963, 1978).

30. U.S. Environmental Protection Agency, Federal Register, Vol. 54, No. 97 (Mon., 22 May 1989), pp. 22138, 22139.

APPENDIX D

CONDITION(S) FOR CONDITIONAL WAIVER OF WASTE DISCHARGE REQUIREMENTS OF ITEMS IN TABLE 4-4

CONDITIONS FOR ITEM 21. SHORT-TERM USE OF RECLAIMED WATER:

1. Short-term water reclamation projects are projects that last one year or less. Short-term projects can include temporary use of reclaimed water for dust control, soil compaction, green belt irrigation, or any other temporary reuse project authorized by the Executive Officer, for which no permanent physical reclaimed water facilities or structures are installed; and

2. The reclaimed water producer must submit a written request for a waiver to the Regional Board. This request must include written notification from the local health department or the State Department of Health Services that the proposed project complies with all local and State health requirements for reclaimed water use and Title 22, Division 4, Chapter 3, Reclamation Criteria, Articles 1 - 10. This written notification shall also specify any monitoring required to demonstrate compliance with Title 22, Division 4, Chapter 3, Articles 2, 3, 4, 5, and 5.1. A new written request for a waiver must be submitted to the Regional Board if the temporary project exceeds one year. New written requests must be received 60 days prior to expiration of the one year project. If no new request is received the short-term project must cease immediately.

CONDITIONS FOR ITEM 24. TEMPORARY DISCHARGE OF SPECIFIED CONTAMINATED SOILS:

a. *General Conditions for All Temporary Waste Piles*

(1) The discharger shall file a Report of Waste Discharge which provides the technical information necessary to demonstrate that the discharge meets the criteria set forth herein. The discharger shall submit a fee of $750.00 pursuant to Section 2200, Title 23 of the California Code of Regulations.

(2) This waiver specifically does not apply to hazardous waste, as defined in Section 66261.3, Division 4.5, Title 22 of the California Code of Regulations, or as amended.

(3) All waste piles used for treatment or storage shall be bermed to prevent surface runoff/runon from contacting wastes and to prevent erosion and transport of contaminated soils by surface runoff. Berm material shall consist of clean, noncontaminated soil.

(4) All waste piles used for treatment or storage shall be protected against 100-year peak stream flows as defined by the County flood control agency.

(5) Wastes discharged to waste piles established under this waiver, together with any containment materials used at the temporary waste pile, and any underlying geologic materials contaminated by the discharge, shall be removed within the maximum time period allowed under the applicable Special Conditions. Subsequently the site shall be restored to its original state within 30 days following the removal of all treatment facilities, related equipment, etc. and shall be disposed of or stored in accordance with applicable regulations.

(6) If return water or ponded water contained within the treatment or storage area of the temporary waste pile will be disposed of at a location other than to a sanitary sewer system, then the discharger shall submit written notification to the Executive Officer prior to initiating the discharge and either: 1) obtain waste discharge requirements; 2) obtain a waiver of waste

discharge requirements or 3) obtain a written determination from the Executive Officer that the disposal of the return water or ponded water is not subject to regulation by the Regional Board.

b. *Special Conditions Applicable to Waste Piles for Treatment or Storage of Soils Contaminated with Petroleum Hydrocarbons*

(1) Temporary waste piles established under this waiver shall be limited to a maximum time period of four months or 120 days.

(2) All waste piles shall be overlain by a suitable heavy gauge plastic sheeting (not less than 10 mils thick) to adequately prevent rainwater infiltration, control fugitive dust, and other nuisances.

(3) All waste piles shall be underlain by either a suitable heavy gauge plastic sheeting (not less than 10 mils thick) or a liner of low permeability approved by the Executive Officer.

(4) Unless otherwise stated herein, waste piles shall conform to provisions in the state's Local Oversight Program (LOP) for Orange, Riverside, and San Diego Counties.

c. *Special Conditions Applicable to Waste Piles for Treatment or Storage of Dredge Spoils Contaminated with Heavy Metals*

(1) Temporary waste piles established under this waiver shall be limited to a maximum time period of nine months or 270 days.

(2) All waste piles shall be overlain by either a suitable heavy gauge plastic sheeting or an alternative approved by the Executive Officer to adequately prevent rainwater infiltration, control fugitive dust, and other nuisances. The control methods shall be subject to approval by the Executive Officer.

(3) All waste piles shall be underlain by a liner of low permeability (not less than 20 mils thick). The liner and containment facility shall be designed to contain all waste and fluids, and shall be subject to approval by the Executive Officer.

(4) Materials used in containment structures shall have the appropriate chemical and physical properties to ensure that such structures do not fail to contain waste because of: the stress of installation, pressure gradients, physical contact with the waste or leachate, or chemical reactions with soil and rock.

CONDITIONS FOR ITEM 25. DISPOSAL / REUSE OF DREDGE SPOILS IN INDUSTRIAL OR COMMERCIAL APPLICATIONS

a. *General Conditions for Disposal/Reuse of Treated Dredge Spoil in Industrial or Commercial Applications*

(1) The discharger shall file a report of waste discharge which provides the technical information necessary to demonstrate that the residual concentrations of constituents of concern meet the criteria set forth herein. The discharger shall submit a fee of $750.00 pursuant to CCR Title 23, Section 2200.

(2) All sampling and analytical procedures, including documentation of waste characterization, shall be in accordance with the indicated methods described in *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*, SW-846, U.S. Environmental Protection Agency (current edition). Reported concentrations levels shall be mean average, with an 80% upper confidence interval, and the total range within each constituent.

(3) The Waste Extraction Test (WET) shall be used for all metal elements, polychlorinated biphenols (PCB's), tributyltin (TBT), and their compounds to determine the amount of extractable substance

from a contaminated soil. Procedures for the WET are described in Section 66261.24, Article 3, Chapter 11, Division 4.5, Title 22 of the California Code of Regulations, or as amended. Concentration limits are based on the modified WET methodology (using deionized water in place of sodium citrate buffer solution) and then multiplied by the ten fold dilution rate used in the test.

(4) The Toxicity Characteristic Leaching Procedure (TCLP) shall be used for all volatile organic compounds to determine the amount of extractable substance from a contaminated soil. Procedures for the TCLP are described in Appendix I, Chapter 18, Division 4.5, Title 22 of the California Code of Regulations, or as amended. Concentration limits are based on the modified TCLP methodology (using deionized water in place of sodium acetate buffer solution) and then multiplied by the twenty fold dilution rate used in the test.

(5) This waiver specifically does not apply to hazardous waste, as defined in Section 66261.3, Division 4.5, Title 22 of the California Code of Regulations, or as amended.

(6) The discharge shall meet the additional conditions outlined under the exact type of discharge proposed. The levels of contaminants in the soil shall not exceed any of the maximum concentration limits listed under the type of discharge proposed for the soil.

(7) The discharge shall be protected against 100-year peak stream flows as defined by the County flood control agency.

(8) The discharger shall file a certification report when disposal/reuse is completed, on a form approved by the Executive Officer.

(9) This waiver applies only to the contaminants specified under each disposal use category. These may not be the only pollutants found in contaminated soils that could threaten water quality. Contaminated soils from other sources including, but not limited to; solvents, pesticides, other metals, salts, and nutrients, are excluded from this waiver. Contaminants that are suspected constituents of concern that are not listed may need to be evaluated based on knowledge of the site cleanup and on a case by case basis until such time as numerical limits applicable for a waiver can be established.

b. *Special Conditions Applicable to Use of Treated Dredge Spoil for Industrial or Commercial Reuse/Fill near Groundwater, Bays and Estuaries, and Pacific Ocean*

(1) Soil shall be covered by either (1) **constructed** materials (e.g. used as roadbase, fill beneath buildings, bridge abutments), or (2) not less than 2 feet of **noncontaminated clean** fill to minimize surface water infiltration, preclude exposure by erosion, and control leaching effects.

(2) Soil shall be placed a minimum of 100 feet away from any surface water.

(3) Soil shall be placed a minimum of 5 feet above the highest anticipated elevation of ground water [CCR, Title 23, Section 2530 (c)].

(4) This waiver does not apply to basins that are designated for municipal and domestic supply.

(5) The applicable standards for the underlying ground water basins shall not only be based upon the water quality of those basins, but also the surface water of an enclosed bay, estuary, or Pacific Ocean that it is in contact with.

(6) The average concentration of contaminants in the soil shall not exceed any of the following concentration limits (mean average with an 80% upper confidence interval):

Constituents	Ground Water[1]	Bays and Estuaries[4]	Pacific Ocean[5a]
	Concentration Limit (Numerical Objective Multiplied by 10-fold Attenuation)		
Metals			
Chromium (VI)	500 ug/l	500 ug/l[4a]	20 ug/l
Copper	10000 ug/l[3]	29 ug/l[4b]	30 ug/l
Lead	500 ug/l	56 ug/l[4a]	20 ug/l
Mercury	20 ug/l	0.25 ug/l[4c]	0.4 ug/l
Silver	500 ug/l	23 ug/l[4d]	7 ug/l[5c]
Zinc	50000 ug/l[3]	860 ug/l[4a]	200 ug/l
Synthetic			
PCBs	5 ug/l	0.0007 ug/l[4c]	0.00019 ug/l[5b]
TBT	0.2 ug/l	0.05 ug/l[4c]	0.014 ug/l[5b]
Hydrocarbons			
TPH	100 mg/kg[6]	100 mg/kg[6]	100 mg/kg[6]
TRPH	1000 mg/kg[6]	1000 mg/kg[6]	1000 mg/kg[6]
Benzene	10 ug/l	210 ug/l[4c]	59 ug/l[5b]
Toluene	10000 ug/l	3000000 ug/l[4c]	850000 ug/l[5b]
Ethylbenzene	6800 ug/l	290000 ug/l[4c]	4300 ug/l[5b]
Total Xylenes	17500 ug/l	--	--
Naphthalene	200 ug/l[2]	200 ug/l[2]	200 ug/l[2]

Water Quality Objectives are derived from the following sources.

1. California Drinking Water Standards, primary maximum contaminant levels

2. US EPA suggested no adverse response levels (SNARLs)

3. California Drinking Water Standards, secondary maximum contaminant levels

4. Best Professional Judgement for Bays and Estuaries
   a. 4-day Average Concentration - Saltwater Aquatic Life Protection
   b. 1-hour Average Concentration - Saltwater Aquatic Life Protection
   c. 30-day Average Concentration - Human Health Protection
   d. Instantaneous Maximum Concentration - Saltwater Aquatic Life Protection

5. California Ocean Plan Criteria, Marine Aquatic Life Protection
   a. 6-month Median Concentration - Saltwater Aquatic Life Protection
   b. 30-day Average Concentration - Human Health Protection
   c. Instantaneous Maximum Concentration - Saltwater Aquatic Life Protection

6. No Numerical Objectives Used - Constituent is an Indicator of Other Contaminants

DEFINITION OF TERMS IN CONDITIONS FOR ITEM 25

Total Petroleum Hydrocarbon (TPH): Determination of concentration of residual gasoline and diesel in a soil shall utilize US EPA test method 8015 (carbon ranges C_4 through C_{24}), based on wet-weight total concentrations.

Total Recoverable Petroleum Hydrocarbons (TRPH): Determination of concentration of residual hydrocarbons in a soil shall utilize US EPA test method 418.1, based on wet-weight total concentrations.

Solute concentrations: Concentrations of the constituents of concern in deionized water using modified Waste Extraction Test (WET) or the Toxicity Characteristic Leaching Procedure (TCLP) methodologies.

Solute: Deionized water used as extraction solution in the WET and TCLP methodologies.

Limit: A concentration value not to be exceeded which is necessary to protect water quality and beneficial uses for the San Diego Region (This limit may be based on water quality objectives or a water quality objective multiplied by an appropriate attenuation factor).

Clean Fill: Soil containing no waste or leachate in accordance with CCR Title 23 Section 2581 (a)(3).

Attenuation: The amount of reduction in the concentration of a constituent as it moves through a soil. The reduction may result from a combination of processes, including; assimilation, adherence, adsorption, degradation, and separation of the waste from water.

CONDITIONS FOR ITEM 26. COMPOSTING AND PROCESSING, MULCHING, OR GRINDING FACILITIES

A. APPLICABILITY

1. ***Types of Facilities***
   a. *Facilities composting Green Waste, Agricultural Waste, Food Processing Waste or Paper Waste*
   b. *Facilities processing, mulching or grinding Green Waste, or Agricultural Waste*

2. ***Size of Facilities***
   a. *Composting and Processing, Mulching, or Grinding Operations Less than Five Hundred (500) Cubic Yards*

   The submittal of a report of waste discharge and the issuance of waste discharge requirements are waived for discharges from the following:
   (1) Green waste, food processing waste, agricultural waste, or paper waste composting operations that do not exceed five hundred (500) cubic yards at any given time;
   (2) Green waste or agricultural waste processing, mulching or grinding operations that do not exceed a total volume of five hundred (500) cubic yards at any given time.

   b. *Composting and Processing, Mulching, or Grinding Operations Greater than Five Hundred (500) Cubic Yards*

   For dischargers who comply with the following *Reporting, Site, Operational, and General Conditions*, the issuance of waste discharge requirements are waived for discharges resulting from the following:
   (1) The storage and treatment by composting of greater than five hundred (500) cubic yards at any given time of green waste, food processing waste, agricultural waste, or paper waste, and any additives as approved by the RWQCB; or
   (2) The storage and treatment by processing, mulching, or grinding of greater than five hundred (500) cubic yards of green waste, or agricultural waste.

B. REPORTING CONDITIONS

1. *Report of Waste Discharge*
The discharger shall file a report of waste discharge that includes a technical report containing a requirement-by-requirement analysis based on acceptable engineering standards and best management practices, of how the process and physical designs of the facility will ensure compliance with the conditions listed herein. The discharger shall submit a fee pursuant to CCR Title 23, Section 2200 for a Threat to Water Quality and Complexity Rating 3-C, Chapter 15.

2. *General Industrial Storm Water Permit*
The discharger shall file either a Notice of Intent to comply with the requirements set forth in State Water Resources Control Board (SWRCB) NPDES General Permit No. CAS000001 for the discharge of storm water or submit documentation that the NPDES storm water permit requirements are not applicable to the discharger's facility.

3. *Changes in Operation*
The discharger shall notify the RWQCB of:

a. any significant change in the nature and quantity of waste composted or processed, area of operation, or season of operation; or
b. termination of operation.

C. SITE CONDITIONS

1. *Control and Management*
All areas upon which green waste, food processing waste, agricultural waste, or paper waste and any feedstock additives are discharged for composting or processing, mulching, grinding, storing and treating shall be designed, constructed and maintained to prevent the degradation of waters of the state. Such facility operations shall be equivalent to the water quality protection achieved through the implementation of the following measures:

a. *Precipitation*
All precipitation and surface drainage from outside the compost, process, treatment or storage areas including that collected from roofed areas, and runoff from tributary areas resulting from a 25-year, 24-hour storm shall be diverted away from the such areas.

b. *Runoff*
The discharger shall develop and implement a plan to reduce or eliminate the discharge of pollutants into surface waters including storm water. The plan shall describe measures taken to prevent contaminated process water and reduce or eliminate contaminated storm water from being discharged from the site.

c. *Water Quality Protection*
All compost, process and storage areas shall be sited where soil characteristics, distance from waste to ground water, and other factors will ensure no impairment of beneficial uses of surface waters or ground waters beneath or adjacent to the facility.

d. *Stream Flow*
The facilities shall be protected from inundation or washout by overflow from any stream channel during a 25-year peak stream flow.

e. *Surface Maintenance*
If the equipment operating near or on compost, process, storage, or treatment areas produces subsidence, cracking, or otherwise compromises any surface, the discharger shall repair any damaged areas immediately.

D. OPERATIONAL CONDITIONS

1. *Additives*

Dischargers who use additives as defined in this document shall report to the RWQCB's Executive Officer for his approval the type, and quantity of the additive. The use of additives shall comply with the *CONDITIONS* listed in this document.

2. *Discharge Specifications*

The discharge of green waste, food processing waste, agricultural waste, or paper waste for storage and treatment by composting or processing, grinding, or mulching shall not cause or threaten to cause a condition of contamination, pollution or nuisance.

3. *Maintenance*

Containment structures such as embankments, liners or surface impoundments shall be maintained in order to ensure proper performance whenever wastes are discharged.

4. *Wet Weather Preparations*

Prior to the rainy season, the discharger shall conduct a survey of the operation to ensure that the site has been graded and prepared to prevent erosion and to prevent ponding of waste water at any location not designed and operated to retain water.

5. *Inspections*

The discharger shall inspect compost, process, storage and treatment areas for emergence of leachate, ponding, or surface failures such as cracking or subsidence; such inspections shall be frequent enough to ensure compliance with the Conditions of this waiver. If visible leachate, ponding, cracking, or subsidence of surfaces is observed, the discharger shall immediately take necessary measures to maintain the performance standards described in *SITE CONDITIONS C.*

E. GENERAL CONDITIONS

1. *Prohibitions*

The inclusion of the following wastes for treatment by composting or processing under the conditions of this waiver are prohibited:

a. municipal solid waste;
b. sludges (including sewage sludge, water treatment sludge, and industrial sludge);
c. septage;
d. liquid wastes, unless specifically approved by the Regional Board;
e. animal waste, except manure when used as an additive;
f. oil and grease; and
g. hazardous, designated, and any other wastes determined by the Regional Board to pose a potential threat to water quality.

2. *Entry and Inspection*

The discharger shall allow the RWQCB, or an authorized representative upon the presentation of credentials and other documents as may be required by law, to:

a. Enter upon the discharger's premises where a conditionally waived facility or activity is located or conducted, or where records must be kept under the conditions of this waiver;
b. Have access to and copy, at reasonable times, any records that must be kept under the conditions of this waiver;
c. Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this waiver; and
d. Sample or monitor at reasonable times, for the purposes of assuring compliance with this waiver or as otherwise authorized by the California Water Code, any substances or parameters at any location.

DEFINITION OF TERMS IN CONDITIONS FOR ITEM 26

GREEN WASTE: Material that consists of or contains waste from plants, including leaves, clippings, cuttings, trimmings of grass, weeds, shrubbery, bushes, or trees, residential or community garden wastes, and untreated wood wastes.

FOOD PROCESSING WASTE: Material that consists of or contains only pre-processed and post-processed waste derived from plants, or foods processed or produced at restaurants, hospitals and food distributors.

AGRICULTURAL WASTE: Material that consists of the plant waste coming directly from an agricultural commodity, and is the product of farms and ranches and by-products processed from these products, as defined in Division 21, Part 2, Chapter 1 Section 58619 of the Food and Agriculture Code. Agricultural waste includes agricultural, floricultural, silvicultural, vermicultural or viticultural products.

PAPER WASTE: Material that consists of nonhazardous paper and paper by-products.

ADDITIVE: Material that consists of waste or products which are approved by the RWQCB's Executive Officer for mixture with feedstock or treated waste to adjust the moisture level, the carbon to nitrogen ratio, or the porosity of the wastes to create a condition favorable to the processing, or to improve the end-product. Additives may include manures, fertilizers, and chemical amendments.

DISCHARGER: Any person who discharges waste which could affect the quality of waters of the state, and includes any person who owns a waste management unit or who is responsible for the operation of a waste management unit pursuant to Title 23, California Code of Regulations, Section 2601.

CONDITIONS FOR ITEM 28. PERMANENT RECLAIMED WATER PROJECTS:

1. The discharger shall submit a report of waste discharge pursuant to Section 13260 or 13522.5 of the California Water Code. This report shall contain sufficient technical information from which the Regional Board can determine if the proposed discharge complies with all applicable reclamation regulations; and

2. The proposed discharge of reclaimed water must be in compliance with the California Code of Regulations, Title 22, Division 4, Chapter 3, Articles 1 - 10; and

3. The proposed discharge of reclaimed water must be in compliance with the Water Quality Control Plan, San Diego Basin (9); and

3. The report of waste discharge must contain a letter from the local health department of the State Department of Health Services stating that the proposed project complies with all State and local Health requirements for the use of reclaimed water. This letter shall also specify any monitoring required to demonstrate compliance with Title 22, Division 4, Chapter 3, Reclamation Criteria, Articles 2, 3, 4, 5 and 5.1; and

5. Temporary waiver's of waste discharge requirements remain in effect for a project until the Regional Board is able to adopt permanent requirements. The Regional Board will adopt requirements, as appropriate, at the earliest possible opportunity, and in accordance with Regional Board priorities.

EXECUTIVE SUMMARY

The Urban Runoff Technical Advisory Committee (TAC) reviewed the management of urban runoff pollution from new development, re-development, construction, existing development, and from roads, highways, and bridges. The TAC recommends that control of urban runoff pollution is primarily the responsibility of local government and that each local government in California should have a comprehensive program to control pollution from these sources. The TAC further recommends that the Regional Water Quality Control Boards (RWQCBs) oversee the efforts by local government. The TAC recommends three enforcement options to ensure that each local government have an effective program--a general National Pollutant Discharge Elimination System (NPDES) storm water permit, an individual NPDES storm water permit, or a Porter-Cologne Section 13225(c) report. Since larger cities and some urbanized counties already are permitted through the NPDES municipal storm water program, the TAC recommends that the RWQCBs coordinate with all the remaining cities and counties to develop enforceable, comprehensive programs. It is recommended that State Water Resources Control Board (SWRCB), working with the RWQCBs, develop a model storm water program so that smaller local governments can more readily adopt a program.

The TAC reviewed the management measures contained in the U. S. Environmental Protection Agency's (USEPA) *Guidance Specifying Management Measures for Source of Nonpoint Pollution in Coastal Waters* [(g) Guidance] and found them to be suitable for implementation in California. In addition, the TAC makes a number of general recommendations on how the SWRCB and RWQCBs and local government can improve management of polluted runoff. Finally, the TAC noted that if water quality is to be improved, it is critical that the other major sources of nonpoint pollution (agriculture, abandoned mines, and forestry) also be aggressively addressed by the SWRCB/RWQCB.

URBAN RUNOFF TECHNICAL ADVISORY COMMITTEE REPORT

FOREWORD

TAC MEMBERSHIP

The Urban Runoff Technical Advisory Committee (TAC) was formed in March, 1994 at the request of the State Water Resources Control Board (SWRCB) as part of their effort to improve management of nonpoint source pollution (NPS). The TAC met once per month, alternating between Los Angeles, Oakland, and Sacramento. The TAC included representatives from state and local government, industry and business, and environmental groups. Several of the members are also members of the State Storm Water Quality Task Force, whose focus is on the National Pollutant Discharge Elimination System (NPDES) storm water permits for urban runoff. The TAC members were volunteers and received no compensation for their participation or travel expenses. A complete listing of the TAC members is included in this report as Appendix E.

RELATIONSHIP OF PROGRAM MANDATES AND APPROACH TAKEN BY TAC

Urban runoff pollution is generated from both point and nonpoint sources. The three key statutes driving urban runoff pollution controls are: 1) Clean Water Act (CWA) Section 402(p) which establishes NPDES storm water permit requirements for certain municipal and industrial storm water discharges; 2) CWA Section 319 which requires the development and implementation of a statewide nonpoint source pollution control plan (i.e., the NPS Program); and 3) Coastal Zone Act Reauthorization Amendments (CZARA) Section 6217 which requires states to implement management measures to control nonpoint source pollution in coastal waters. After consideration of the statutory drivers for urban runoff pollution control, the TAC concluded that while different legal authorities may apply to different situations, the goals of the NPDES, NPS, and CZARA programs are complementary. This resulted in the TAC taking the approach that is described in the following paragraphs. A complete discussion comparing the Section 402 (p) NPDES storm water program requirements and the CZARA, Section 6217 requirements can be found as Attachment D in the Appendix.

There has always been overlap and ambiguity between the programs designed to control urban runoff pollution. For example, runoff may often originate as a nonpoint source but ultimately be channelized and become a point source. Consequently, the effective control of urban runoff pollution must address both point and nonpoint sources. Although the TAC was initially charged with addressing only the non-NPDES sources, the TAC concluded that the State's water quality goals dictate that all urban sources of pollution to waters of the state be more effectively controlled whether or not they are currently covered by a permit program. Additionally, since the SWRCB decided not to create a new or separate program for the coastal zone to meet the requirements of CZARA, the TAC considered recommendations for the control of urban runoff

pollution statewide.

The TAC used the management measures contained in the EPA document *Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters* [(g) Guidance], as a benchmark to determine if management of urban runoff pollution is being adequately handled in California. This analysis was applied to all urban sources, whether or not they were located within an existing NPDES area or in the coastal zone. The TAC found that current regulation of unpermitted sources (i.e., sources not regulated under Section 402(p)) is either inadequate or inconsistent statewide, and additionally that the current NPDES storm water program for covered sources could be improved. The recommendations of this TAC, therefore, address how unpermitted sources of urban runoff should be controlled and how to improve the existing NPDES system. The recommendations include suggestions for new programs where necessary, but these new programs are not part of a new Coastal Nonpoint Program nor do they apply only to the coastal zone or coastal watersheds.

RELATIONSHIP OF RECOMMENDATIONS TO OTHER NONPOINT SOURCES

The TAC recognized that other nonpoint sources must be managed at a level consistent with the management of urban runoff in a watershed in order to successfully prevent or remedy water quality impairment. The recommended management measures and implementation mechanisms of the Urban TAC represent a consensus of interested parties and are based on the assumption that a consistent or comparable level of action will be recommended for non-urban nonpoint sources. The commitment and success of implementation of urban runoff management actions is dependent on the validity of this assumption.

SECTION 1: INTRODUCTION

A. PROBLEM STATEMENT

Urban development often results in impacts to the land and consequently the water bodies adjacent to the land. The two major changes that result from urbanization are changes in stream hydrology and an increase in pollutant loading. Changes in stream hydrology resulting from urbanization include: increased peak discharges; increased total volume of runoff; decreased time needed for runoff to reach the stream; increased frequency and severity of flooding; changes in streamflow during dry periods due to reduced level of infiltration in the watershed; and greater runoff velocity during storms. Ample evidence also exists about the pollutants that are entrained in urban runoff. The pollutants include sediment, nutrients, oxygen-demanding substances, road salts, heavy metals, petroleum hydrocarbons, pathogenic bacteria, viruses, and pesticides.

The above impacts and pollutants also result from human activities that occur after urbanization. These impacts are often due to a lack of education and awareness about watershed dynamics and daily activities that generate pollutants that can reach water bodies.

Impacts from hydrologic changes and from pollutants range from declines in aquatic biological populations (including anadromous fish), to eutrophication, to toxicity in marine organisms (including shellfish), to declines in aquatic vegetation, and to impacts on human health. There are also more subtle impacts, such as changes in water temperature and changes in stream bottom topography due to increased flows, and loss of riparian and wetland habitats.

A final aspect of the problem that needs to be recognized is the impacts of pollutants generated by outside sources. Examples of activities that can exacerbate the urban runoff pollution problem are runoff from agricultural operations that are either outside or within the urban area, atmospheric deposition, and active or abandoned mining operations.

B. EXISTING PROGRAMS

Since urban pollutants originate from a multitude of sources, effective control of these pollutants requires a cooperative effort by many regulatory agencies. Attachment C found in the Appendix provides a summary of existing statutory/regulatory programs that should be considered as part of the State's comprehensive urban runoff control program.

C. APPLICABILITY OF PROGRAMS TO COMMUNITY SIZE

The TAC recommends that urban runoff pollution controls be implemented statewide. However, the TAC concluded that the level of effort and types of controls may need to vary depending on community size. The TAC recommends that communities of all sizes implement programs such as those proposed in Attachment A to address control of urban runoff pollution from new development and construction. Attachment A is the TAC's *Recommendation for New and Redevelopment Controls for Storm Water Programs* and presents a comprehensive program that the RWQCBs should administer to ensure that all local governments are effectively controlling runoff. Also, all communities should aggressively apply pollution prevention practices and implement public information and participation programs. The TAC recommends that only those communities that meet the census definition of urbanized area (i.e.,an area populated by 50,000 persons and/or a population density of 1,000 persons per square mile) be required to fully implement the management measures for existing development.

SECTION 2: GENERAL RECOMMENDATIONS FOR CONTROL OF URBAN RUNOFF POLLUTION

A. POLLUTION PREVENTION HIERARCHY

The control of urban nonpoint source pollution should be approached in a hierarchical manner with pollution prevention given the highest priority. The TAC recommends that nonpoint source

pollution control can be accomplished most effectively by giving priority to methods in the following order:

1. **Prevention** - implementation of practices that use or promote pollution free alternatives (e.g., implementation of practices such as integrated pest management, or trip reduction programs);

2. **Source control** - implementation of control measures that focus on preventing or minimizing urban runoff from contacting pollutant sources (e.g., controls through land use planning practices or material exposure control practices);

3. **Treatment controls** - implementation of practices that require treatment of polluted runoff either onsite or offsite (e.g., extended detention basins).

B. WATERSHED PROTECTION

The SWRCB/RWQCBs should strongly encourage areawide watershed planning, policy adoption and regional storm water quality control implementation. The TAC defines watershed-based water quality protection as the prevention/control of pollution and management of human activities in a geographically or other defined drainage area to protect, restore, and/or enhance the natural resources and beneficial uses within the watershed. Watershed may be defined on a variety of levels - such as different geographic scales relative to drainage areas and effected municipalities.

C. PUBLIC INFORMATION AND PARTICIPATION

The effective prevention/control of urban runoff pollution requires the aggressive implementation of a public information and participation program (PI/P) within all aspects of implementation. The TAC recognizes that education with an emphasis on pollution prevention is the fundamental basis for solving nonpoint source pollution problems. An effective program includes general and focused outreach programs, education programs, and citizens participation programs.

Target Audiences should include:

1. Government: Educate government agencies and officials to achieve better communication, consistency, collaboration, and coordination at the federal, state and local levels.

2. K-12/Youth Groups: Establish statewide education programs, including curricula, on watershed awareness and nonpoint source pollution problems and solutions, based on a state lead role building upon and coordinating with existing local programs.

3. Development Community: Educate the development community, including developers, contractors, architects, and local government planners, engineers, and inspectors, on nonpoint source pollution problems associated with development and redevelopment and construction activities and involve them in problem definitions and solutions.

4. Business and Industrial Groups

D. ENFORCEMENT MECHANISMS

1. Regional Boards should ensure effective implementation of municipal storm water programs that include the TAC Recommendations through one of three mechanisms:

a. Water Code Section 13225(c) authority to require reports from local governments on implementation of storm water programs. In this case, no permit would be issued unless there was failure to demonstrate an adequate program; or

b. Individual NPDES storm water permits issued to specific storm water programs, (i.e., the existing program requiring municipal storm water permits for storm drain systems servicing populations greater than 100,000); or

c. A general NPDES storm water permit requiring implementation of a municipal storm water program (i.e., a new program for jurisdictions servicing populations less than 100,000).

2. Through administration of the NPDES Municipal Storm Water Program, RWQCBs should require that each city and county have the legal authority to control sources of urban runoff pollution into their storm drain system(s), waterbodies, and associated habitats. It is recommended that each city and county adopt an urban runoff ordinance which has enforceable provisions and includes the following components:

a. Requirements for new development and re-development, both pre- and post-construction;

b. Requirements for industrial sources, including those covered under the General Permit for Industrial Storm Water Discharges;

c. Requirements for commercial sources, especially those not already covered by the Phase I NPDES storm water permits;

d. Effective prohibition of discharges of other than storm water to storm drain systems; and

e. Good Housekeeping Practices which apply to all public and private properties.

E. SMALL COMMUNITY ASSISTANCE

The TAC recognizes the difficulties that small communities, both incorporated and unincorporated, face in development and implementation of new programs. Because of staffing limitations and financial constraints, SWRCB/RWQCBs need to provide technical and financial assistance. Technical assistance should include, at a minimum, development of a model municipal storm water program, educational information, and staff training.

The TAC noted that these small community limitations, such as one staff person having many roles and responsibilities, may be an advantage in implementation of a watershed protection program. Because coordination within the planning and public works departments would be easier due to overlapping responsibilities, small communities would be good candidates for implementing pilot watershed programs.

F. COORDINATION OF INSPECTION PROGRAMS

In order to maximize use of limited budgets, it is recommended that each city and county and the state agencies devise ways to utilize existing permitting and inspection programs to help implement Storm Water Management Plans and the State Nonpoint Source Program. In particular, multiple tasks can be done by single agencies. Examples include: building inspectors check for installation of best management practices during building permit inspections; hazardous waste inspectors verify that good housekeeping practices are being followed; and adding an oil leak inspection component to the State smog check program.

G. SIGNIFICANT UNPERMITTED SOURCES

It is recommended that SWRCB/RWQCBs develop a list of sources (land use activities) currently not covered by the Municipal, Industrial, or Construction NPDES storm water permits that may significantly contribute to water quality degradation, and develop programs to ensure that these sources are controlled.

H. ALTERNATIVE TRANSPORTATION

Personal vehicles (their brakes, tires, and internal combustion engines) are a major source of many pollutants in urban runoff. Given this and in the interest of pollution prevention, watershed-based planning, and consistency with current efforts by SWRCB/RWQCBs on the NPDES municipal storm water permit requirements, local governments should look to local transportation/congestion management as a way to reduce nonpoint source pollution. The incorporation of pollution prevention into transportation systems should occur in NPDES permitted and non-permitted areas alike through the planning process and the development of community plans with focus on areas that are experiencing or expecting growth.

Urban/suburban areas should be designed to maximize the use of:

a. Alternative modes of transportation (e.g., bicycles, roller blades) through construction of dedicated traffic lanes;

b. Mass transit systems (e.g., busses, trains) by requiring easements/rights of way; and

c. Alternative fuel and zero-emission vehicles (or hybrids) by providing fueling recharging stations.

I. ECONOMIC IMPACTS AND INTERSTATE COMPETITION

It is recommended that SWRCB convey to USEPA that USEPA should consider the market implications their programs and recommendations have for California and for competition between states. It is also recommended that regulations be the same for at least the western states, and it would be preferable to have the federal government require other states to meet California's high standards than to have California lower its standards in order to create equal standards for the various states

SECTION 3: RECOMMENDATIONS FOR IMPLEMENTATION OF URBAN RUNOFF POLLUTION CONTROLS BY SOURCE CATEGORY

I. NEW DEVELOPMENT, SITE DEVELOPMENT AND CONSTRUCTION

A. INTRODUCTION

This section of the TAC report addresses the issue of new development, including site development and construction, and covers four EPA (g) Guidance management measures. The TAC reviewed the management measures and adopted each of them as appropriate for implementation in a statewide program, making only a minor revision in one measure (measure B.3 below).

The recommendation for these management measures includes a group of general principles that the TAC feels should be incorporated into a program to control urban runoff. These four principles embody much of the intent of the EPA management measures and are the same principles in the *General Recommendations* section above.

The next section of the report presents the TAC's recommendation on how the implementation process for controlling urban runoff could be improved. This section addresses the gaps that the

TAC identified in current implementation and suggests ways in which current implementation can be improved. Much of the substance of these recommendations can be implemented through a program like that detailed in Attachment A that would be overseen by the RWQCBs.

In order to assure that implementation will occur, the TAC recommends three options at the state level. Two options utilize current or proposed NPDES permitting. The other option is a program utilizing non-regulatory encouragement, that is, if local governments develop a comprehensive storm water program, the NPDES storm water permit can be avoided. Finally, the TAC recommends that each local government develop and implement an enforceable urban runoff ordinance.

B. EPA (g) GUIDANCE MANAGEMENT MEASURES

1. New Development Management Measure

a. By design or performance:

i. After construction has been completed and the site is permanently stabilized, reduce the average annual total suspended solid (TSS) loadings by 80 percent. For the purposes of this measure, an 80 percent TSS reduction is to be determined on an average annual basis,[1] or

ii. Reduce the postdevelopment loadings of TSS so that the average annual TSS loadings are no greater than predevelopment loadings, and

b. To the extent practicable, maintain postdevelopment peak runoff rate (and average volume) at levels that are similar to predevelopment levels.[2]

Sound watershed management requires that both structural and nonstructural measures be employed to mitigate the adverse impacts of storm water. Nonstructural Management Measures 2 and 3 can be effectively used in conjunction with Management Measure 1 to reduce both the short- and long-term costs of meeting the treatment goals of this management measure.[3]

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[1] Based on the average annual TSS loadings from all storms less than or equal to the 2-year/24-hour storm. TSS loadings from storms greater than the 2-year/24-hour storm are not expected to be included in the calculation of the average annual TSS loadings.

[2] The TAC concluded that maintaining postdevelopment average runoff volume at levels that are similar to predevelopment levels was essentially impracticable in California.

[3] The TAC expressed concern about the application and implementation of this management measure in California.

2. Site Development Management Measure

Plan, design, and develop sites to:

a. Protect areas that provide important water quality benefits and/or are particularly susceptible to erosion and sediment loss;

b. Limit increase of impervious areas, except where necessary;

c. Limit land disturbance activities such as clearing and grading, and cut and fill to reduce erosion and sediment loss; and

d. Limit disturbance of natural drainage features and vegetation.

3. Construction Site Erosion and Sediment Control Management Measure

a. Reduce erosion and, to the extent practicable, retain sediment onsite during and after construction, and

b. Prior to land disturbance, prepare and implement an effective erosion and sediment control plan or similar administrative document that contains erosion and sediment control provisions.[4]

4. Construction Site Chemical Control Management Measure

a. Limit application, generation, and migration of toxic substances;

b. Ensure the proper storage and disposal of toxic materials; and

c. Apply nutrients at rates necessary to establish and maintain vegetation without causing significant nutrient runoff to surface waters.

However, rather than propose an alternative management measure, the TAC recommended acceptance of this measure contingent on the assumption that application and implementation of the TAC's *Recommendations for Municipal Management of New and Redevelopment Storm Water Runoff* (Attachment A) would result in the functional equivalent of implementation of this management measure.

[4] The TAC amended the EPA management measure by changing the word "approved" to "effective." The purpose was to avoid recommending that all erosion control plans must have a formal approval.

C. GENERAL PRINCIPLES FOR CONTROL OF URBAN RUNOFF FROM NEW DEVELOPMENT AND CONSTRUCTION

1. To the extent feasible, preserve, and where possible, create or restore areas that provide water quality benefits, such as riparian corridors and wetlands, and promote the design of new development so that it protects the natural integrity of drainage systems and water bodies.

2. Avoid conversions of areas particularly susceptible to erosion and sediment loss and/or establish development guidance that identifies these areas and protects them from erosion and sediment loss. These areas are characterized by steep slopes, highly erodible soils, periods of intense rainfall, and inability to re-vegetate once disturbed.

3. Require the integration of storm water quality protection into construction and post-construction activities at all development sites. This should include minimizing the use of toxic materials and their proper containment on site.

4. Wherever practicable, maintain peak runoff rates at pre-development levels.

D. MECHANISMS TO IMPLEMENT MANAGEMENT MEASURES CONSISTENT WITH PRINCIPLES

1. Improve the use of the California Environmental Quality Act (CEQA) process through:

a. RWQCBs should distribute to, and request that local governments utilize, a CEQA Checklist that addresses watershed, water quality, and nonpoint source pollution impacts. An example of an appropriate Checklist is the attached *Revised Environmental Checklist* (Attachment B);

b. SWRCB should recommend to the Governor's Office of Planning and Research that it pursue amendments to the CEQA Guidelines to include appropriate revisions to the CEQA Checklist (see (a) above for recommended changes to Checklist); and

c. SWRCB should recommend to the Governor's Office of Planning and Research that it pursue amendments to the CEQA Guidelines to include appropriate revisions to the Applicant's Environmental Information Forms that are compatible with the above CEQA Checklist revisions.

2. SWRCB and RWQCBs should adopt statewide and regional policy addressing the prevention and control of urban runoff pollution.

The regional policies should embrace the *General Principles for Control of Urban Runoff*, and identify policies and practices that should be implemented by local governments for the prevention and control of urban runoff pollution from new development, redevelopment, and construction activities. A regional policy should at a minimum, set requirements for the implementation of a baseline program such as that presented in the TACs *Recommendations for Management of New and Redevelopment Storm Water Runoff* (Attachment A).

3. All local governments should adopt and implement a storm water runoff control program.

The program should include new and redevelopment management elements based on the attached *TAC Recommendations for Municipal Management of New and Redevelopment Storm Water Runoff* (Attachment A).

4. SWRCB/RWQCBs should identify and provide incentives for local governments to commence watershed planning in order to maximize the use of limited resources and to maximize the benefits of NPS pollution controls.

As part of the regional policy, the TAC recommends that RWQCBs encourage areawide watershed management planning, policy adoption, and regional storm water quality control implementation as a better approach than restrictions and controls on individual development projects. The favored approach has greater potential to achieve watershed protection goals, reduce conflicts with other existing policies, plans and/or requirements, and eliminate apparent arbitrariness and unfairness in dealing with individual development projects.

5. The SWRCB, in a coordinated effort with the RWQCBs, should provide assistance to small local governments for development and implementation of an urban runoff control program.

At a minimum, this assistance should include:

a. *Model Storm Water Program*. Development of a model storm water program that includes: the TAC's *Recommendations for Municipal Management of New and Redevelopment Storm Water Runoff* (Attachment A); a model urban runoff ordinance which has enforceable provisions; and model language regarding protection of water quality from urban sources for inclusion in General Plan documents;

b. *Training*. Development of training programs directed at both government staff and the regulated community;

c. *Public Information and Participation*. Development of generic public information materials for dissemination by the local governments; and

d. *Technical and Financial Assistance*. Funding and assistance for pilot programs (e.g., monitoring programs and watershed planning).

6. SWRCB/RWQCBS should consider reorganization of programs and staffing priorities.

SWRCB/RWQCBs need more staff assigned to review projects at the planning level (i.e., CEQA review), nonpoint source pollution issues, and watershed management tasks. This should be accomplished through a reordering of staff priorities, reorganization, and/or increases in staff allocation to the Boards.

E. ENFORCEMENT MECHANISMS

1. SWRCB/RWQCBs should ensure effective implementation of local government storm water programs through one of the following three enforcement mechanisms (see TAC Recommendation E(1) in Section II of this report):

a. Section 13225(c) report by the local government

b. Individual municipal NPDES storm water permit (current program)

c. General municipal NPDES storm water permit (new program)

2. Local Urban Runoff Ordinance

Each local government should have the legal authority to control sources of runoff into their storm drain system(s), waterbodies, and associated habitats. It is recommended that each local government adopt an urban runoff ordinance which has enforceable provisions (see TAC Recommendation E(2) in Section II of this report).

II. EXISTING DEVELOPMENT

A. INTRODUCTION

This section of the report addresses the issue of urban runoff from existing development which is addressed by a single EPA (g) Guidance management measure. The TAC adopted the EPA measure, finding it appropriate and feasible to implement in California. However, the TAC finds that in addition to identifying pollution reduction opportunities, agencies need to equally

emphasize pollution prevention. The theme of prevention is raised by the TAC in each of the source categories it has reviewed and analyzed within this report.

B. EPA (g) GUIDANCE MANAGEMENT MEASURE

1. Existing Development Management Measure

Develop and implement watershed management programs to reduce runoff pollutant concentrations and volumes from existing development:

a. Identify priority local and/or regional watershed pollutant reduction opportunities, e.g., improvements to existing urban runoff control structures;

b. Contain a schedule for implementing appropriate controls;

c. Limit destruction of natural conveyance systems; and

d. Where appropriate, preserve, enhance, or establish buffers along surface waterbodies and their tributaries.

C. RECOMMENDATIONS REGARDING EXISTING DEVELOPMENT

1. Recommendations for Local Governments

a. Incorporate watershed information into the planning and management processes, including a requirement to specifically address watersheds in the Conservation and Open Space Elements (or local equivalents) of General Plans.

b. Relate the development of local and areawide storm water programs to known water quality problems and beneficial uses of receiving waters.

c. Municipal storm water programs should determine local water quality goals and focus efforts on the reduction of priority pollutants.

d. There should be an emphasis on education for pollution prevention rather than on regulation.

e. Management practices should emphasize pollution prevention over pollution control; when source control is necessary, nonstructural controls should take priority.

f. Consider use of open space programs to maintain and enhance water quality.

g. Municipal storm water programs should focus initially on O&M activities of public agencies.

h. In order to assist the RWQCBs in identifying industries and construction projects that should be covered by general permits, municipal storm water programs should provide pertinent available information to the RWQCBs.

i. Local governments should advise those industries and construction projects with which they come into contact of the requirement to be covered by the state general permits.

2. Recommendations for Regional Boards

a. RWQCBs should work with municipal storm water program staffs to educate decision-makers in local governments about Regional Water Quality Control Plans (Basin Plans) and their relationship to storm water programs.

b. RWQCBs should coordinate with local governments regarding water quality concerns and programs.

c. RWQCBs should assist local governments with financial and technical assistance for pilot retrofit projects designed to reduce targeted pollutants.

d. RWQCBs should encourage local governments to cooperate with other groups such as Resource Conservation Districts (RCDs) on watershed management programs.

e. RWQCBs should refer local governments to the *California Storm Water Best Management Practices (BMP) Handbooks* and the (g) Guidance for assistance in creating their own water quality programs.

f. A pilot program should be established by at least one RWQCB to develop small city nonpoint source pollution prevention programs.

g. Upon completion of the small city pilot project, all RWQCBs should work with local jurisdictions to implement nonpoint source pollution prevention programs in small cities and towns not covered by municipal NPDES storm water permits.

3. Recommendations for State Water Resources Control Board

a. SWRCB should revise the California Nonpoint Source Management Plan to incorporate Existing Development practices a, b, d, e, and f from Chapter 4 of the (g) Guidance.

b. SWRCB/RWQCBs should work through the California Board of Education and County Departments of Education to incorporate water quality issues into the curriculum (biology, ecology, geography etc.).

c. SWRCB should examine the possibility of conditioning certain state grants and loans to local governments to require the development and implementation of water quality management programs (possibly including a watershed approach).

d. SWRCB/RWQCBs should encourage state and local government agencies, including special districts, to operate their programs and facilities in a manner that protects water quality by setting examples through the operation of their own facilities and programs.

e. SWRCB/RWQCBs should cooperate with air quality management districts in the certification of dust palliatives to control fugitive dust.

f. SWRCB/RWQCBs should cooperate with air quality management districts to identify issues of common concern and to seek solutions which would assist in the reduction of both air and water pollution; for example, SWRCB/RWQCBs should encourage municipalities, counties, and port districts to convert their fleet vehicles to zero-emission vehicles.

g. SWRCB/RWQCBs should encourage the development of water quality awareness programs by the California State Association of Counties (CSAC) and the California League of Cities.

h. SWRCB should consider issuing a simplified General NPDES Storm Water Permit without extensive water quality monitoring requirements for smaller cities and counties in California.

III. WATERSHED PROTECTION

A. INTRODUCTION

The TAC's working definition for watershed-based water quality protection is the prevention/control of pollution and management of human activities in a geographically or other defined drainage area to protect, restore, and/or enhance the natural resources and beneficial uses within the watershed. To the extent practicable, the hydrologic areas or subareas defined by the Department of Water Resources should be used to define watershed boundaries, although a smaller area, such as a tributary stream within a subarea could be an appropriate unit for management purposes.

This management measure requires no specific triggers for implementation. As the framework for water quality protection, the approach should be automatically integrated into all nonpoint source pollution prevention/reduction programs. Although there are no triggers per se for this management measure, each Regional Board should establish priorities among the watersheds within its region for the implementation of nonpoint source pollution prevention programs.

The TAC concluded that implementation of the Watershed Protection Management Measure, in conjunction with those for the TAC's existing and new development management measure proposals, would meet EPA requirements and strengthen the Nonpoint Source Management Plan.

The Technical Advisory Committee recommends the EPA Watershed Protection Management Measure be adopted and incorporated into California Nonpoint Source Management Plan.

B. EPA (g) GUIDANCE MANAGEMENT MEASURE

1. Watershed Protection Management Measure

Develop a watershed protection program to:

a. Avoid conversion, to the extent practicable, of areas that are particularly susceptible to erosion and sediment loss;

b. Preserve areas that provide important water quality benefits and/or are necessary to maintain riparian and aquatic biota; and

c. Site development, including roads, highways, and bridges, to protect to the extent practicable the natural integrity of waterbodies and natural drainage systems.

C. RECOMMENDATIONS REGARDING WATERSHED PROTECTION

1. The watershed protection management measure should be strengthened by adding an education element.

Components of the educational element should include:

a. An educational program for local governments on watershed awareness and planning

b. An educational program for citizens on watershed awareness and oversight

c. An educational program for municipal residential/industrial/commercial facilities (and their associations) which conduct outdoor activities that potentially contribute to nonpoint

source pollution

The education program should include comprehensive K-12 programs that involve all science disciplines directly in the watershed. All agencies with responsibility for watershed should be involved along with community groups. These elements could be developed and implemented by municipal programs and/or SWRCB/RWQCBs, the Soil Conservation Service, or local organizations such as resource conservation districts (RCDs), or nonprofit organizations. For example, under agreements with RWQCBs, the Soil Conservation Service and RCDs could assist with training and education of municipalities, community groups, boys and girls clubs, etc.

SWRCB could underwrite the costs of training provided by University Extension or analogous courses. In addition, SWRCB should work with licensing boards and other professional organizations to incorporate nonpoint source pollution certification into licensing requirements.

2. Watershed management strategies in NPDES municipal storm water programs:

a. Municipal permits should have watershed specific components.

b. All NPDES permits and Waste Discharge Requirements (WDRs) should be considered for reissuance on a watershed basis.

c. Monitoring programs should be designed to support watershed assessments and planning.

d. Monitoring should include a volunteer citizens' monitoring and reporting program.

e. SWRCB should adopt a central monitoring data base in California.

f. In order to determine where impacts to watersheds are occurring, GIS programs in California should be coordinated.

g. All permit applications and Notices of Intent (NOIs) should be coded by hydrologic subarea.

h. Municipal permittees and RWQCBs should share information, by hydrologic subareas, of all point source permittees, including industrial and construction permittees.

i. Local governments should be encouraged to include watershed information in the appropriate elements of their general plans and to require that watershed consideration be included in environmental documentation.

j. SWRCB/RWQCBs should promote coordination within the existing regulatory framework among state, regional and local agencies regulating pollutant sources

impacting air, land, and water.

k. At least one watershed management pilot project based on a hydrologic area should be designated within each areawide municipal permit by a municipal permittee in coordination with the appropriate Regional Board.

3. Non-NPDES municipal permit areas where the mechanism for enforcing programs will evolve from Porter-Cologne and municipal programs:

a. Local governments should be encouraged to develop ordinances to address all sources that may cause water quality impairment.

b. RWQCBs with areas not covered by municipal NPDES storm water permits should designate at least one new pilot watershed project based on a hydrologic area not within the jurisdiction of a municipal program. Pilot projects should develop and implement watershed management plans to reduce beneficial use impairment. The criteria for choosing pilot project sites should include consideration of the SWRCB's Water Quality Assessment and should focus on impaired waterbodies. RWQCBs could serve as the coordinating agencies. In this capacity, they would review proposed programs and oversee implementation.

4. Small community considerations

One advantage for small communities in the context of watershed protection may be that it is easier for them to coordinate efforts/planning/strategies among their departments (i.e., street/storm drain maintenance, litter control, parks and recreation, etc.). Because of this they could be good candidates for developing and implementing pilot programs.

IV. POLLUTION PREVENTION

A. INTRODUCTION

This section of the report addresses the issue of pollution prevention which is covered by a single EPA (g) Guidance management measure. The TAC adopted the EPA measure, finding it appropriate and feasible for implementation in a statewide program for the control of urban runoff pollution. The theme of prevention is raised by the TAC in each of the source categories it has reviewed and analyzed within this report.

B. EPA (g) GUIDANCE MANAGEMENT MEASURE

1. Pollution Prevention

Implement pollution prevention and education programs to reduce nonpoint source pollutants generated from the following activities, where applicable;

a. The improper storage, use, and disposal of household hazardous chemicals, including automobile fluids, pesticides, paints, solvents, etc.;

b. Lawn and garden activities, including the application and disposal of lawn and garden care products, and the improper disposal of leaves and yard trimmings;

c. Turf management on golf courses, parks, and recreational areas;

d. Improper operation and maintenance of onsite disposal systems;

e. Discharge of pollutants into storm drains including floatables, waste oil, and litter;

f. Commercial activities including parking lots, gas stations, and other entities not under NPDES purview; and

g. Improper disposal of pet excrement.

C. RECOMMENDATIONS REGARDING POLLUTION PREVENTION

1. Recommendations for Prevention at the Source

The first stage of controlling pollution of storm water is prevention of pollution at the source. The following recommendations are designed to incorporate that concept into the California storm water program:

a. Pollution prevention programs should be designed to emphasize source reduction.

b. Pollution prevention programs should be related to watershed management.

c. Government agencies should examine municipal landscape/facility maintenance/pest control programs and make necessary modifications in order to prevent contributions of toxic materials to receiving waters.

d. The revised California Nonpoint Source Management Plan should incorporate the pollution prevention Management Measure from Chapter 4 of the “g” Guidance:

2. Recommendations for Educational Programs

The pollution prevention program should be based on a sound public education program. Such a program should be designed to address specific target audiences.

a. Education programs should emphasize pollution prevention and be related to watershed management.

b. Municipal storm water programs should work through local school districts to incorporate water quality issues into the curriculum (biology, ecology, geography etc.).

c. Youth groups, business and industrial groups, environmental organizations and ecology clubs at schools should be included in public service and public awareness programs related to water quality and pollution prevention.

V. ROADS, HIGHWAYS, AND BRIDGES

A. STATEMENT OF PROBLEM/APPLICABILITY/ADOPTION OF MANAGEMENT MEASURES

The development or redevelopment of surface transportation systems is a complex undertaking that can result in long and short term water quality degradation. Alignments can parallel, adjoin, or cross waterways unnecessarily, increasing the proximity of pollutant sources to surface waters. Alignments in areas of steeper slopes can create large cuts and fills, increasing the potential for sediment erosion. Pollutants can be accentuated by not allowing enough right-of-way for vegetative uptake of total and dissolved solids. Finally, signal timing can accentuate traffic congestion increasing the burden of particulate matter that enters the air and watersheds.

The Management Measures and practices discussed here address the problems of point and nonpoint source impacts on water quality from all phases of roadway and bridge development. In this discussion, roadways include tertiary, secondary, and primary collectors and arterials, as well as inter-regional state highways and state routes in the National Highway System (NHS).

The TAC reviewed the six USEPA management measures identified for roads, highways, and bridges and adopted each of them as appropriate for implementation in a statewide program for the control of urban runoff pollution. All of the management practices in the (g) Guidance are also recommended for inclusion in the program.

B. EPA (g) GUIDANCE MANAGEMENT MEASURES

1. Management Measure for Planning, Siting, and Developing Roads and Highways

Plan, site, and develop roads and highways to:

a. Protect areas that provide important water quality benefits or are particularly susceptible to erosion or sediment loss;

b. Limit land disturbance such as clearing and grading and cut and fill to reduce erosion and sediment loss; and

c. Limit disturbance of natural drainage features and vegetation.

2. Site, design, and maintain bridge structures so that sensitive and valuable aquatic ecosystems and areas providing important water quality benefits are protected from adverse effects.

3. Management Measure for Construction Projects

a. Reduce erosion and, to the extent practicable, retain sediment onsite during and after construction and

b. Prior to land disturbance, prepare and implement an approved erosion control plan or similar administrative document that contains erosion and sediment control provisions.

4. Management Measure for Construction Site Chemical Control

a. Limit the application, generation, and migration of toxic substances;

b. Ensure the proper storage and disposal of toxic materials; and

c. Apply nutrients at rates necessary to establish and maintain vegetation without causing significant nutrient runoff to surface water.

5. Management Measure for Operation and Maintenance

Incorporate pollution prevention procedures into the operation and maintenance of roads, highways, and bridges to reduce pollutant loadings to surface waters.

6. Management Measure for Road, Highway, and Bridge Runoff Systems

Develop and implement runoff management systems for existing roads, highways, and bridges to reduce pollutant concentrations and volumes entering surface waters.

a. Identify priority and watershed pollutant reduction opportunities (e.g., improvements to existing urban runoff control structures); and

b. Establish schedules for implementing appropriate controls.

C. RECOMMENDED MECHANISMS TO HELP INSURE THE IMPLEMENTATION OF MANAGEMENT MEASURES AND BMPs FOR ROADS, HIGHWAYS, AND BRIDGES

a. SWRCB/RWQCBs should work with the Federal Highways Administration (FHWA), Caltrans, and local transportation agencies to ensure water quality protection concerns are addressed in FHWA biannual Regional audits of highway drainage systems.

b. SWRCB/RWQCBs should encourage Caltrans and local transportation agencies to establish standard procedures to ensure adequacy of the storm water pollution prevention plans for all public works projects prior to contract advertising for the project.

c. SWRCB/RWQCBs should encourage Caltrans and local transportation agencies to work with the Soil Conservation Service to develop model specifications for bid items on erosion and sediment control features for use in state and local public works contracts.

d. SWRCB/RWQCBs should establish forums to promote the discussion and resolution of policy conflicts (e.g., fire safety, pesticide safety, traffic safety) with local and state agencies in the design of transportation corridors.

e. SWRCB/RWQCBs should work with local, state, and federal agencies to establish minimum storm intensity/duration and frequency standards for sediment control during and after construction.

f. SWRCB/RWQCBs should work with Caltrans, to formalize the representation of Caltrans, and other appropriate transportation agencies at the Interagency Advisory Committee on nonpoint source issues.

g. SWRCB should work with federal and state agencies to promote research on controlling nonpoint source pollution including:

   i. Alternative automotive materials (e.g., brake pads);
   ii. Effectiveness of treatment systems (e.g., oil/water separators) ;
   iii. Effectiveness of maintenance systems (e.g., street sweeping equipment);
   iv. Pollutant fate and transport (e.g., aerial deposition and particle size distributions);
   v. Regional specificity of predictors (e.g., runoff regression equations for arid climates);
   vi. Facilities design for pollutant containment (e.g., truck weigh stations, inspection stations, agricultural inspection stations, run away truck ramps, and border crossings).

h. SWRCB should support an increase in total funding dollars for environmental enhancement grants pursuant to the Intermodal Surface Transportation Efficiency Act of 1991 (ISTE), and encourage local, regional, and state agencies to apply for these grants.

i. SWRCB and USEPA should encourage the regional permits between Caltrans Districts and multiple RWQCBs to ensure consistency and cost effectiveness.

j. SWRCB should encourage Caltrans to use strong mechanisms in their contract specifications to ensure protection of beneficial uses and enforcement for non compliance.

k. RWQCBs and Caltrans should establish procedures to make available to RWQCB staff, current project updates including monthly lists of District STATUS books, and "Status of Going Contracts" calendars.

l. Caltrans, toll bridge authorities, and local agencies involved in the operation, construction, or maintenance of roads, highways, and bridges should revisit cooperative agreements they have with each other in order to improve the terms for accepting storm water connections.

m. The Regional Transportation Planning Agencies (RTPAs) should be encouraged to incorporate nonpoint source structural BMPs into their Transportation Improvement Programs (TIPs).

n. Congestion Management Agencies (CMAs) should incorporate structural BMPs and the analysis of particulate matter (PM2.5, PM10,and >PM10) into their Congestion Management Plans (CMPs).

o. CMAs should support the use of alternative transportation for people, goods, and services (mass transit, zero emission vehicles, low emission vehicles) beyond its current level-of-effort.

p. CEQA and NEPA lead agencies should include reasonable dollar figures on water quality management/maintenance in the life cycle costs of roadway systems when comparing alternatives.

q. Caltrans should require training for nonpoint source prevention and control for road construction contractors through Cooperative Training Assistance Program (CTAP) or Caltrans courses.

r. Regional, local, and state transportation agencies should provide unit cost data on sediment and erosion control bid items.

s. The Resources Agency and CalEPA should urge the California Transportation Commission (CTC) to raise the dollar value per acre of state highway landscaping jobs, and to redefine highway landscaping to include water pollution control (e.g., landscape right-of-ways with plants that serve as valuable habitat adjacent to watercourses.)

Article 1

Feature article from Watershed Protection Techniques. 1(3): 100-111

The Importance of Imperviousness

The emerging field of urban watershed protection often lacks a unifying theme to guide the efforts of its many participants—planners, engineers, landscape architects, scientists, and local officials. The lack of a common theme has often made it difficult to achieve a consistent result at either the individual development site or cumulatively, at the watershed scale.

In this article a unifying theme is proposed based on a physically defined unit: imperviousness. Imperviousness here is defined as the sum of roads, parking lots, sidewalks, rooftops, and other impermeable surfaces of the urban landscape. This variable can be easily measured at all scales of development, as the percentage of area that is not "green."

Imperviousness is a very useful indicator with which to measure the impacts of land development on aquatic systems. Reviewed here is the scientific evidence that relates imperviousness to specific changes in the hydrology, habitat structure, water quality and biodiversity of aquatic systems. This research, conducted in many geographic areas, concentrating on many different variables, and employing widely different methods, has yielded a surprisingly similar conclusion: stream degradation occurs at relatively low levels of imperviousness (~10%). Most importantly, imperviousness is one of the few variables that can be explicitly quantified, managed and controlled at each stage of land development. The remainder of this article details the relationship between imperviousness and stream quality.

The Components of Imperviousness

Imperviousness represents the imprint of land development on the landscape. It is composed of two primary components: the *rooftops* under which we live, work and shop, and the *transport* system (roads, driveways, and parking lots) that we use to get from one roof to another. As it happens, the transport component now often exceeds the rooftop component in terms of total impervious area created. For example, transport-related imperviousness comprised 63 to 70% of total impervious cover at the site in 11 residential, multifamily and commercial areas where it had actually been measured (City of Olympia, 1994b). This phenomenon is observed most often in suburban areas and reflects the recent ascendancy of the automobile in both our culture and landscape. The sharp increases in per capita vehicle ownership, trips taken, and miles travelled have forced local planners to increase the relative size of the transport component of imperviousness over the last two decades.

Traditional zoning has strongly emphasized and regulated the first component (rooftops) and largely neglected the transport component. While the rooftop component is largely fixed in zoning, the transport component is not. As an example, nearly all zoning codes set the maximum density for an area, based on dwelling units or rooftops. Thus, in a given area, no more than one single family home can be located on each acre of land, and so forth.

Thus, a wide range in impervious cover is often seen for the same zoning category. For example, impervious area associated with medium density single family homes can range from 20% to nearly 50%, depending on the layout of streets and parking. This suggests that significant opportunities exist to reduce the share of imperviousness from the transport component.

Imperviousness and Runoff

The relationship between imperviousness and runoff may be widely understood, but it is not always fully appreciated. Figure 1 illustrates the increase in the site runoff coefficient as a result of site impervious cover, developed from over 40 runoff monitoring sites across the nation. The runoff coefficient ranges from zero to one and expresses the fraction of rainfall volume that is actually converted into storm runoff volume. As can be seen, the runoff coefficient closely tracks percent impervious cover, except at low levels where soils and slope factors become more important. In practical terms, this means that the total runoff volume for a one-acre parking lot (Rv = 0.95) is about 16 times that produced by an undeveloped meadow (Rv = 0.06).

To put this in more understandable terms, consider the runoff from a one-inch rainstorm (see Table 1). The total runoff from a one-acre meadow would fill a standard size office to a depth of about two feet (218 cubic feet). By way of comparison, if that same acre was completely paved, a one-inch rainstorm would completely fill your office, as well as the *two* next to it. The peak discharge, velocity and time of concentration of stormwater runoff also exhibit a striking increase after a meadow is replaced by a parking lot (Table 1).

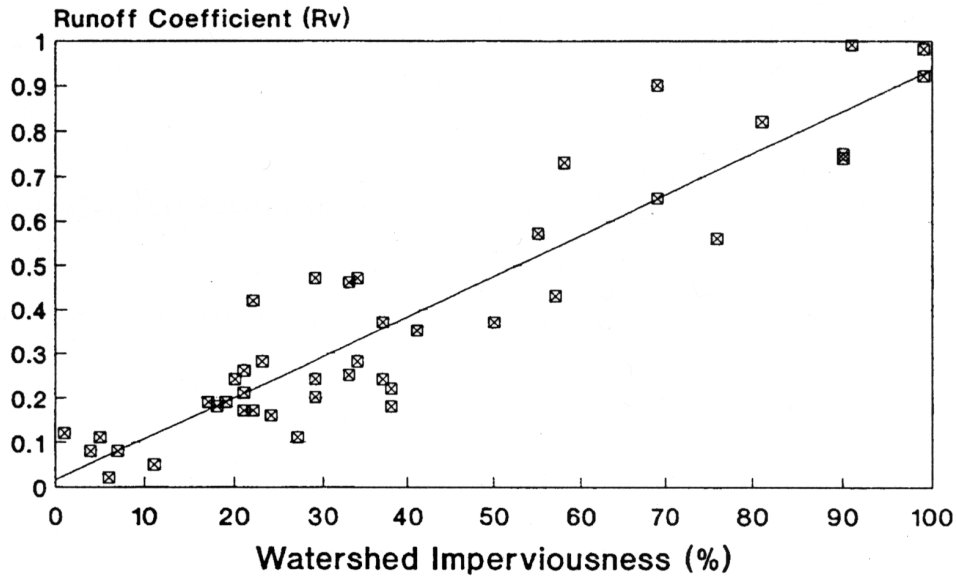

Figure 1: Watershed Imperviousness and the Storm Runoff Coefficient

Because infiltration is reduced in impervious areas, one would expect groundwater recharge to be proportionately reduced. This, in turn, should translate into lower dry weather stream flows. Actual data, however, that demonstrate this effect is rare. Indeed, Evett *et al.* (1994) could not find any statistical difference in low stream flow between urban and rural watersheds after analyzing 16 North Carolina watersheds. Simmons and Reynolds (1982) did note that dry weather flows dropped 20 to 85% after development in several urban watersheds in Long Island, New York.

It should be noted that transport-related imperviousness often exerts a greater hydrological impact than the rooftop-related imperviousness. In residential areas, runoff from rooftops can be spread out over pervious areas, such as backyards, and rooftops are not always directly connected to the storm drain system. This may allow for additional infiltration of runoff. Roads and parking lots, on the other hand, are usually directly connected to the storm drain system.

Table 1: Comparison of One Acre of Parking Lot Versus One Acre of Meadow in Good Condition

Runoff or Water Quality Parameter	Parking Lot	Meadow
Curve number (CN)	98	58
Runoff coefficient	0.95	0.06
Time of concentration (minutes)	4.8	14.4
Peak discharge rate (cfs), 2 yr., 24 hr. storm	4.3	0.4
Peak discharge rate (cfs), 100 yr. storm	12.6	3.1
Runoff volume from one-inch storm (cubic feet)	3450	218
Runoff velocity @ 2 yr. storm (feet/second)	8	1.8
Annual phosphorus load (lbs/ac./yr.).	2	0.50
Annual nitrogen load (lbs/ac./yr.).	15.4	2.0
Annual zinc load (lbs/ac./yr.)	0.30	ND

Key Assumptions:
Parking lot is 100% impervious with 3% slope, 200 feet flow length, Type 2 Storm, 2 yr. 24 hr. storm = 3.1 inches, 100 yr. storm = 8.9 inches, hydraulic radius = 0.3, concrete channel, and suburban Washington 'C' values.
Meadow is 1% impervious with 3% slope, 200 foot flow length, good vegetative condition, B soils, and earthen channel.

Imperviousness and the Shape of Streams

Confronted by more severe and more frequent floods, stream channels must respond. They typically do so by increasing their cross-sectional area to accommodate the higher flows. This is done either through widening of the stream banks, downcutting of the stream bed, or frequently, both. This phase of channel instability, in turn, triggers a cycle of streambank erosion and habitat degradation.

The critical question is at what level of development does this cycle begin? Recent research models developed in the Pacific Northwest suggest that a threshold for urban stream stability exists at about 10% imperviousness (Booth, 1991; Booth and Reinelt, 1993) (Figure 2). Watershed development beyond this threshold consistently resulted in unstable and eroding channels. The rate and severity of channel instability appears to be a function of sub-bankfull floods, whose frequency can increase by a factor of 10 even at relatively low levels of imperviousness (Hollis, 1975; Macrae and Marsalek, 1992; Schueler, 1987).

A major expression of channel instability is the loss of instream habitat structures, such as the loss of pool and riffle sequences and overhead cover, a reduction in the wetted perimeter of the stream and the like. A number of methods have been developed to measure the structure and quality of instream habitat in recent years (Galli, 1993; Gibson *et al.*, 1993; Plafkin *et al*., 1989). Where these tools have been applied to urban streams, they have consistently demonstrated that a sharp threshold in habitat quality exists at approximately 10 to 15% imperviousness (Booth and Reinelt, 1993; Galli, 1994; Shaver *et al*., 1995). Beyond this threshold, urban stream habitat quality is consistently classified as poor.

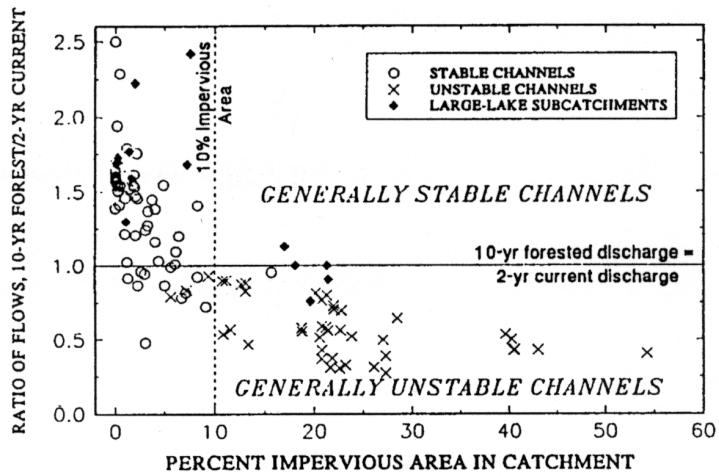

Figure 2: Channel Stability as a Function of Imperviousness (Booth and Reinelt, 1993)

Imperviousness and Water Quality

Impervious surfaces collect and accumulate pollutants deposited from the atmosphere, leaked from vehicles or derived from other sources. During storms, accumulated pollutants are quickly washed off and rapidly delivered to aquatic systems.

Monitoring and modeling studies have consistently indicated that urban pollutant loads are directly related to watershed imperviousness. Indeed, imperviousness is the key predictive variable in most simulation and empirical models used to estimate pollutant loads. For example, the Simple Method assumes that pollutant loads are a direct function of watershed imperviousness (Schueler, 1987), as imperviousness is the key independent variable in the equation.

Threshold Limits for Maintaining Background Pollutant Loads

Suppose that watershed runoff drains into a lake that is phosphorus-limited. Also assume that the present background load of phosphorus from a rural land use amounts to 0.5 lbs/ac/yr. The Simple Method predicts that the post-development phosphorus load will exceed background loads once watershed imperviousness exceeds 20 to 25% (Figure 3), thereby increasing the risk of nutrient over-enrichment in the lake.

Urban phosphorus loads can be reduced when urban stormwater treatment practices are installed, such as stormwater ponds, wetlands, filters or infiltration practices. Performance monitoring data indicates that stormwater practices can reduce phosphorus loads by as much as 40 to 60%, depending on the practice selected. The impact of this pollutant reduction on the post-development phosphorus loading rate from the site is shown in Figure 3. The net effect is to raise the phosphorus threshold to about 35 to 60% imperviousness, depending on the performance of the stormwater practice installed. Therefore, even when effective practices are widely applied, a threshold of imperviousness is eventually crossed, beyond which predevelopment water quality cannot be maintained.

Imperviousness and Stream Warming

Impervious surfaces both absorb and reflect heat. During the summer months, impervious areas can have local air and ground temperatures that are 10 to 12 degrees warmer than the fields and forests that they replace. In addition, the trees that could have provided shade to offset the effects of solar radiation are absent.

Water temperature in headwater streams is strongly influenced by local air temperatures. Galli (1991) reported that stream temperatures throughout the summer are increased in urban watersheds, and the degree of warming appears to be directly related to the impervious cover of the contributing watershed. He monitored five headwater streams in the Maryland Piedmont over a six-month period, each of which had different levels of impervious cover (Figure 4). Each of the urban streams had mean temperatures that were consistently warmer than a forested reference stream, and the size of the increase (referred to as the delta-T) was a direct function of watershed imperviousness. Other factors, such as lack of riparian cover and ponds, were also demonstrated to amplify stream warming, but the primary contributing factor appeared to be watershed impervious cover (Galli, 1991).

Imperviousness and Stream Biodiversity

The health of the aquatic ecosystem is a strong environmental indicator of watershed quality. A number of research studies have recently examined the links between imperviousness and the biological diversity in streams. Some of the key findings are summarized in Table 2.

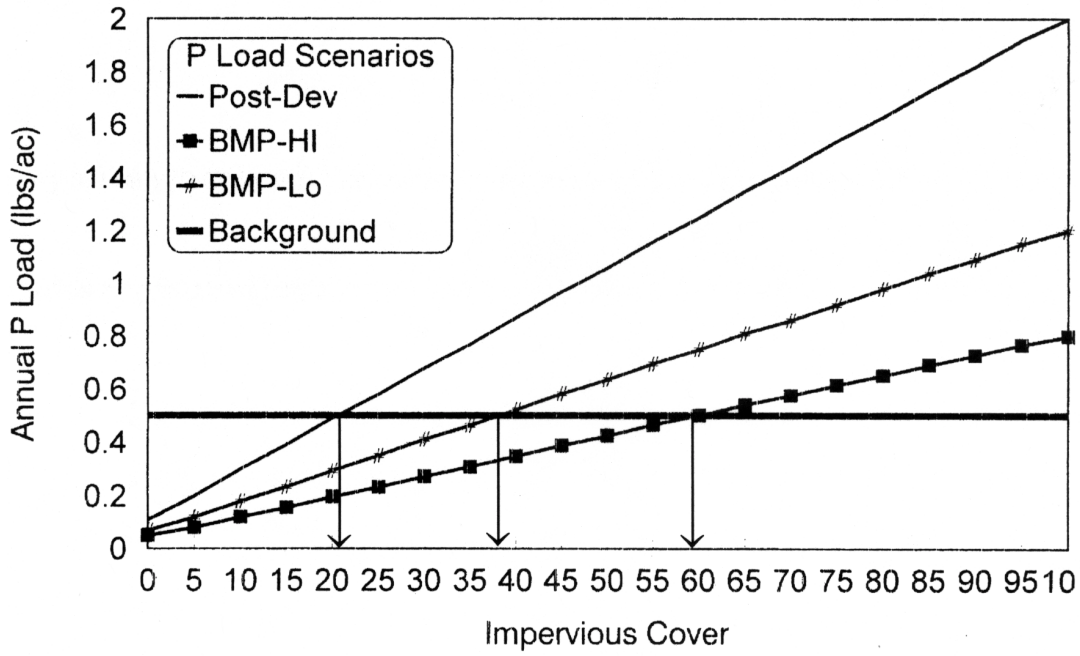

Figure 3: The Effect of Impervious Cover on Urban Phosphorus Load Under Several Scenarios, as Computed by the Simple Method

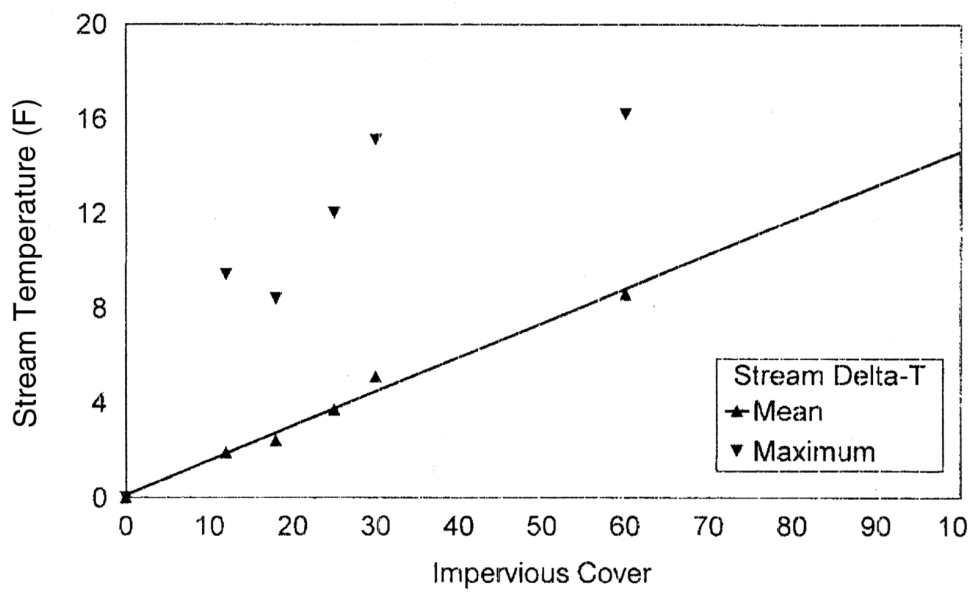

Delta-t is the difference in mean or max stream temperature from a developed stream, compared to an undisturbed stream.

Figure 4: The Effect of Impervious Cover on Stream Temperature (Galli, 1991)

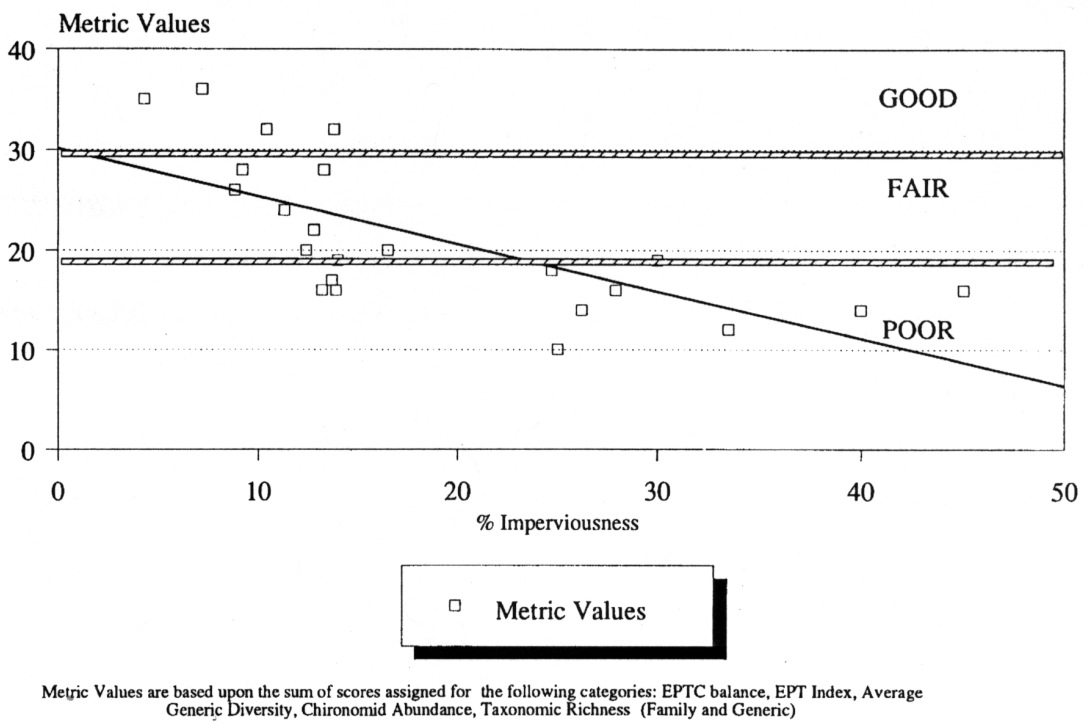

Metric Values are based upon the sum of scores assigned for the following categories: EPTC balance, EPT Index, Average Generic Diversity, Chironomid Abundance, Taxonomic Richness (Family and Generic)

Figure 5: Impacts of Imperviousness on Macroinvertebrate Communities in the Headwater Streams of the Anacostia River (Schueler and Galli, 1992)

Aquatic Insects

The diversity, richness and composition of the aquatic insect community has frequently been used to evaluate the quality of urban streams. Not only are aquatic insects a useful environmental indicator, but they also form the base of the stream food chain in most regions of the country.

Klein (1979) was one of the first to note that macroinvertebrate diversity drops sharply in urban streams in Maryland. Diversity consistently became poor when watershed imperviousness exceeded 10 to 15%. The same basic threshold has been reported by all other research studies that have looked at macroinvertebrate diversity in urban streams (Table 2).

In each study, sensitive macroinvertebrates were replaced by ones that were more tolerant of pollution and hydrologic stress. Species such as stoneflies, mayflies, and caddisflies largely disappeared and were replaced by chironomids, tubificid worms, amphipods, and snails. Species that employ specialized feeding strategies—shredding leaf litter, grazing rock surfaces, filtering organic matter that flows by, or preying on other insects—were lost.

A typical example of the relationship between imperviousness and macroinvertebrate diversity is shown in Figure 5. The graph summarizes diversity trends for 23 sampling stations in headwater streams of the Anacostia watershed (Schueler and Galli, 1992). While good to fair diversity was noted in all headwater streams with less than 10% impervious cover, nearly all stations with 12% or more impervious cover recorded poor diversity. The same sharp drop in macroinvertebrate diversity at around 12 to 15% impervious cover was also observed in streams in the coastal plain and piedmont of Delaware (Shaver *et al.*, 1995).

Other studies have utilized other indicators to measure the impacts of urbanization on stream insect communities. For example, Jones and Clark (1987) monitored 22 stations in Northern Virginia and concluded that aquatic insect diversity composition changed markedly after watershed population density exceeded four or more individuals per acre. This population density roughly translates to half-acre or one acre lot residential use, or perhaps 10 to 15% imperviousness.

Steedman (1988) evaluated 208 Ontario stream sites, and concluded that aquatic insect diversity shifted from fair to poor at about 35% urban land use. Since "urban land" includes both pervious and impervious cover, the actual threshold in the Ontario study may well be closer to seven to 10% imperviousness (Booth and Reinelt, 1993). Steedman also reported that urban streams with intact riparian forests had higher diversity than those that did not, for the same level of urbanization.

While the exact point at which stream insect diversity shifts from fair to poor is not known with absolute precision, it is clear that few, if any, urban streams can

Table 2: Review of Key Findings of Urban Stream Studies Examining the Relationship of Urbanization to Stream Quality

Ref.	Year	Location	Biological Parameter	Key Finding
Booth	1991	Seattle	Fish habitat/ channel stability	Channel stability and fish habitat quality declined rapidly after 10% imperv.
Galli	1994	Maryland	Brown trout	Abundance and recruitment of brown trout declines sharply at 10-15% imperv.
Benke *et al.*	1981	Atlanta	Aquatic insects	Negative relationship between number of insect species and urbanization in 21 streams
Jones and Clark	1987	Northern Virginia	Aquatic insects	Urban streams had sharply lower diversity of aquatic insects when human population density exceeded 4 persons/acre. (estimated 15-25% imperv. cover)
Limburg and Schimdt	1990	New York	Fish spawning	Resident and anadromous fish eggs and larvae declined sharply in 16 tributary streams greater than 10% imperv.
Shaver *et al.*	1994	Delaware	Aquatic insects	Insect diversity at 19 stream sites dropped sharply at 8 to 15% imperv.
Shaver *et al.*	1994	Delaware	Habitat quality	Strong relationship between insect diversity and habitat quality; majority of 53 urban streams had poor habitat
Schueler and Galli	1992	Maryland	Fish	Fish diversity declined sharply with increasing imperv., loss in diversity began at 10-12% imperv.
Schueler and Galli	1992	Maryland	Aquatic insects	Insect diversity metrics in 24 subwatersheds shifted from good to poor over 15% imperv.
Black and Veatch	1994	Maryland	Fish/insects	Fish, insect and habitat scores were all ranked as poor in 5 subwatersheds that were greater than 30% imperv.
Klein	1979	Maryland	Aquatic insects/fish	Macroinvertebrate and fish diversity declines rapidly after 10% imperv.
Luchetti and Fuersteburg	1993	Seattle	Fish	Marked shift from less tolerant coho salmon to more tolerant cutthroat trout populations noted at 10-15% imperv. at 9 sites
Steedman	1988	Ontario	Aquatic insects	Strong negative relationship between biotic integrity and increasing urban land use/ riparian condition at 209 stream sites. Degradation begins at about 10% imperv.
Pedersen and Perkins	1986	Seattle	Aquatic insects	Macroinvertebrate community shifted to chironomid, oligochaetes and amphipod species tolerant of unstable conditions.
Steward	1983	Seattle	Salmon	Marked reduction in coho salmon populations noted at 10-15% imperv. at 9 sites
Taylor	1993	Seattle	Wetland plants/ amphibians	Mean annual water fluctuation was inversely correlated to plant and amphibian density in urban wetlands. Sharp declines noted over 10% imperv.
Garie and McIntosh	1986	NewJersey	Aquatic insects	Drop in insect taxa from 13 to 4 noted in urban streams
Yoder	1991	Ohio	Aquatic insects/ fish	100% of 40 urban sites sampled had fair to very poor index of biotic integrity scores

support diverse aquatic insect communities at moderate to high levels of impervious cover (25% or more). Four different studies (Benke *et al*., 1981; Black and Veatch, 1994; Booth, 1991; Garie and McIntosh, 1986) all failed to find aquatic insect communities with good or excellent diversity in these highly urban streams.

Fish Surveys

The abundance and diversity of the fish community can also serve as an excellent environmental indicator. Surprisingly, relatively few studies have examined the influence of imperviousness on fish communities in headwater streams. The results of one study are illustrated in Figure 6. Four similar subwatersheds in the Maryland Piedmont were sampled for the number of fish species present. As the level of watershed imperviousness increased, the number of fish species collected dropped. Two sensitive species (trout and sculpin) were lost as imperviousness increased from 10 to 12%, and four more were lost when impervious cover increased to 25%. Significantly, only two species remained in the fish community at 55% imperviousness. Sensitive species, defined as those with a strong dependence on the substrate for feeding and/or spawning, showed a more precipitous decline. Klein (1979) found a similar relationship between fish diversity and watershed impervious cover in several dozen headwater streams in the Maryland Piedmont.

Salmonid fish species (trout and salmon) and anadromous fish species appear to be most negatively impacted by impervious cover. Trout have stringent temperature and habitat requirements, and seldom are present in mid-Atlantic watersheds where imperviousness exceeds 15% (Galli, 1994). Declines in trout spawning success are evident above 10% imperviousness (Galli, 1994). In the Pacific Northwest, Luchetti and Feurstenburg (1993) seldom found sensitive coho salmon in watersheds beyond 10 or 15% imperviousness. Booth and Reinelt (1993) noted that most urban stream reaches had poor quality fish habitat when imperviousness exceeded eight to 12%.

Fish species that migrate from the ocean to spawn in freshwater creeks are also very susceptible to impacts of urbanization such as fish barriers, pollution, flow changes, and other factors. For example, Limburg and Schmidt (1990) discovered that the density of anadromous fish eggs and larvae declined sharply after a 10% imperviousness threshold was surpassed in 16 subwatersheds draining into the Hudson River.

The Influence of Imperviousness on Other Urban Water Resources

Several other studies point to the strong influence of imperviousness on other important aquatic systems such as shellfish beds and wetlands.

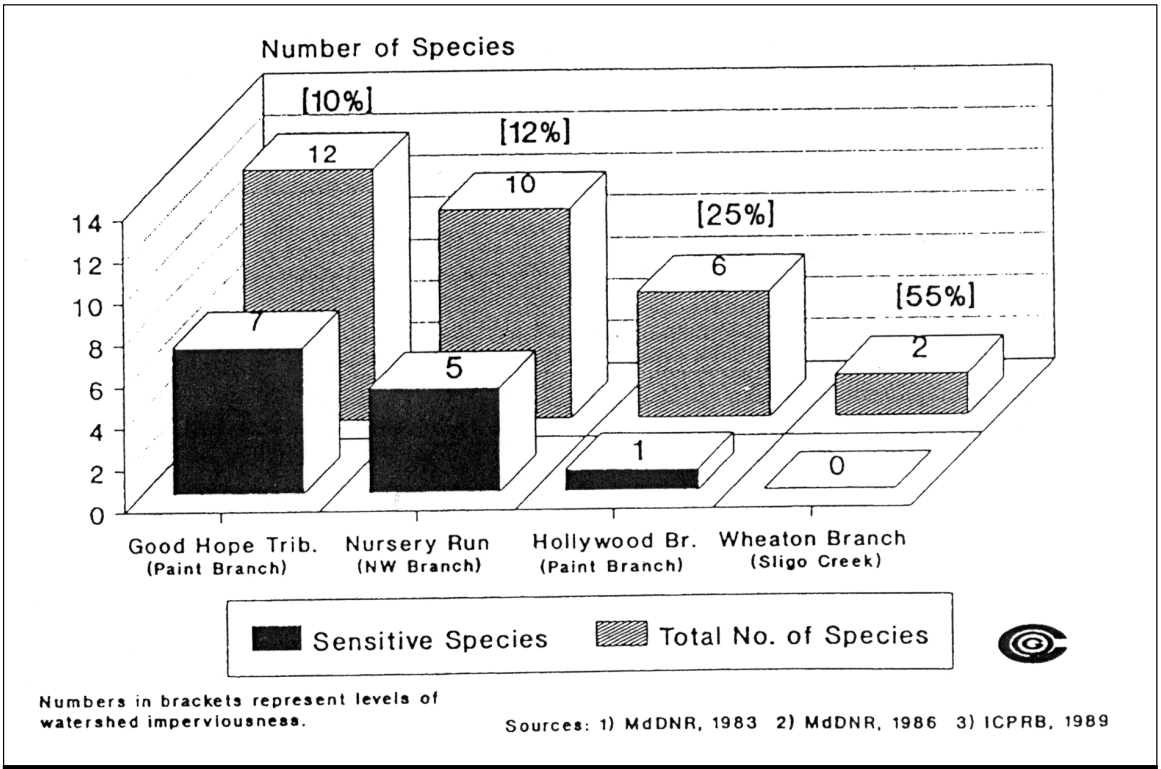

Figure 6: Fish Diversity as a Function of Watershed Imperviousness in Four Subwatersheds in the Maryland Piedmont (Schueler and Galli, 1992)

Even relatively low levels of urban development yield high levels of bacteria, derived from urban runoff or failing septic systems. These consistently high bacterial counts often result in the closure of shellfish beds in coastal waters, and it is not surprising that most closed shellfish beds are in close proximity to urban areas. Indeed, it may be difficult to prevent shellfish closure when more than one septic drain field is present per seven acres—a very low urban density (Duda and Cromartie, 1982). Although it is widely believed that urban runoff accounts for many shellfish bed closures (now that most point sources have been controlled), no systematic attempt has yet been made to relate watershed imperviousness to the extent of shellfish bed closures.

Taylor (1993) examined the effect of watershed development on 19 freshwater wetlands in King County, Washington, and concluded that the additional stormwater contributed to greater annual water level fluctuations (WLF). When the annual WLF exceeded about eight inches, the richness of both the wetland plant and amphibian community dropped sharply. This increase in WLF began to occur consistently when upstream watersheds exceeded 10 to 15% imperviousness.

Implications at the Watershed Level

The many independent lines of research reviewed here converge toward a common conclusion: that it is extremely difficult to maintain predevelopment stream quality when watershed development exceeds 10 to 15% impervious cover. What implications might this apparent threshold have for watershed planning?

Should Low Density or High Density Development be Encouraged?

At first glance, it would seem appropriate to limit watershed development to no more than 10% total impervious cover. While this approach may be wise for an individual "sensitive" watershed, it is probably not practical as a uniform standard. Only low density development would be feasible under a 10% zoning scenario, perhaps one-acre lot residential zoning, with a few widely scattered commercial clusters. At the regional scale, development would thus be spread over a much wider geographic area than it would otherwise have been. At the same time, additional impervious area (in the form of roads) would be needed to link the community together.

Paradoxically, the best way to minimize the creation of additional impervious area at the regional scale is to concentrate it in high density clusters or centers. The corresponding impervious cover in these clusters is expected to be very high (25% to 100%), making it virtually impossible to maintain predevelopment stream quality. A watershed manager must then confront the fact that to save one stream's quality it may be necessary to degrade another.

A second troubling implication of the impervious cover/stream quality relationship involves the large expanses of urban areas that have already been densely developed. Will it be possible to fully restore stream quality in watersheds with high impervious cover? Some early watershed restoration work does suggests that biological diversity in urban streams can be partially restored, but only after extensive stormwater retrofit and habitat structures are installed. For example, fish and macroinvertebrate diversity has been partially restored in one tributary of Sligo Creek, Maryland (Galli, 1994). In other urban watersheds, however, comprehensive watershed restoration may not be feasible, due to a lack of space, feasible sites, or funding.

A Proposed Scheme for Classifying Urban Stream Quality Potential

The thresholds provide a reasonable foundation for classifying the potential stream quality in a watershed based on the ultimate amount of impervious cover. One such scheme is outlined in Table 3. It divides urban streams into three management categories based on the general relationship between impervious cover and stream quality:

1. Sensitive streams (one to 10% impervious cover)
2. Impacted streams (11 to 25% impervious cover)
3. Non-supporting streams (26 to 100% impervious cover)

The resource objective and management strategies in each stream category differ to reflect the potential stream quality that can be achieved. The most protective category are "sensitive streams" in which strict zoning, site impervious restrictions, stream buffers and stormwater practices are applied to maintain predevelopment stream quality. "Impacted streams" are above the threshold and can be expected to experience some degradation after development (i.e., less stable channels and some loss of diversity). The key resource objective for these streams is to mitigate these impacts to the greatest extent possible, using effective stormwater management practices.

The last category, "non-supporting streams," recognizes that predevelopment channel stability and biodiversity cannot be fully maintained, even when stormwater practices or retrofits are fully applied. The primary resource objective shifts to protect downstream water quality by removing urban pollutants. Efforts to protect or restore biological diversity in degraded streams are not abandoned; in some priority subwatersheds, intensive stream restoration techniques

Table 3: A Possible Scheme for Classifying and Managing for Headwater Urban Streams Based on Ultimate Imperviousness

Urban Stream Classification	Sensitive (0-10% Imperv.)	Impacted (11-25% Imperv.)	Non-supporting (26-100% Imperv.)
Channel stability	Stable	Unstable	Highly Unstable
Water quality	Good	Fair	Fair-Poor
Stream biodiversity	Good-Excellent	Fair-Good	Poor
Resource objective	Protect biodiversity and channel stability	Maintain critical elements of stream quality	Minimize downstream pollutant loads
Water quality objectives	Sediment and temperature	Nutrient and metal loads	Control bacteria
Stormwater Practice Selection Factors	Secondary environmental impacts	Removal efficiency	Removal efficiency
Land Use Controls	Watershed-wide imp. cover limits (ICLs), site ICLs	Site imp. cover limits (ICLs)	Additional infill and redevelopment encouraged
Monitoring and enforcement	GIS monitoring of imp. cover, biomonitoring	Same as "Stressed"	Pollutant load modeling
Development rights	Transferred out	None	Transferred in
Riparian buffers	Widest buffer network	Average bufferwidth	Greenways

are employed to attempt to partially restore some aspects of stream quality. In other subwatersheds, however, new development (and impervious cover) is encouraged to protect other sensitive or impacted streams.

Watershed-Based Zoning

Watershed-based zoning is based on the premise that impervious cover is a superior measure for gauging the impacts of growth, compared to population density, dwelling units or other factors. The key steps in watershed-based zoning are as follows: *First*, a community undertakes a comprehensive physical, chemical and biological monitoring program to asses the current quality of its entire inventory of streams. The data are used to identify the most sensitive stream systems and to refine impervious/stream quality relationships. *Next*, existing impervious cover is measured and mapped at the subwatershed level. Projections of future impervious cover due to forecasted growth are also made at this time.

The *third* step involves designating the future stream quality for each subwatershed based on some adaptation of the urban stream classification scheme presented earlier. The existing land use master plan is then modified to ensure that future growth (and impervious cover) is consistent with the designated stream classification for each subwatershed.

The *final* step in the watershed-based zoning process involves the adoption of specific resource objectives for each stream and subwatershed. Specific policies and practices on impervious cover limits, stormwater practices, and buffers are then instituted to meet the stream resource objective, and these practices directly applied to future development projects.

Watershed-based zoning should provide managers with greater confidence that resource protection objectives can be met in future development. It also forces local governments to make hard choices about which streams will be fully protected and which will become at least partially degraded. Some environmentalists and regulators will be justifiably concerned about the streams whose quality is explicitly sacrificed under this scheme. However, the explicit stream quality decisions which are at the heart of watershed-based zoning are preferable to the uninformed and random "non-decisions" that are made every day under the present zoning system.

A Cautionary Note

While the research on impervious cover and stream quality is compelling, it is doubtful whether it can serve as the sole foundation for legally defensible zoning and regulatory actions at the current time. One key reason is that the research has not been standardized. Different investigators, for example, have used different methods to define and measure imperviousness. Second, researchers have employed a wide number of techniques to measure stream quality characteristics that are not always comparable with each other. Third, most of the studies have been confined to few ecoregions in the

country. Little research has been conducted in the Northeast, Southeast, Midwest, and semi-arid Western regions. Lastly, none of the studies has yet examined the effect of widespread application of stormwater practices on impervious cover/stream quality relationships. Until studies determine how much stormwater practices can "cheat" the impervious cover/stream quality relationship, it can be argued that structural practices alone can compensate for imperviousness effects.

On the positive side, it may be possible for a community to define the impervious cover/stream quality relationship in a short time and at relatively low cost. A suggested protocol for conducting a watershed monitoring study is presented in Table 4. The protocol emphasizes comparative sampling of a large population of urban subwatersheds of different increments of imperviousness (perhaps 20 to 50).

A rapid sampling program collects consistent data on hydrologic, morphologic, water quality, habitat and biodiversity variables within each subwatershed. For comparison purposes, series of undeveloped and undisturbed reference streams are also monitored. The sampling data are then statistically and graphically analyzed to determine the presence of imperviousness/stream quality relationships.

The protocol can be readily adapted to examine how stormwater practices can shift the stream quality/imperviousness relationship. This is done by adjusting the sampling protocol to select two groups of study subwatersheds: those that are effectively served by stormwater practices and those that are not.

Table 4: Proposed Protocol for Defining Functional Relationships Between Watershed Imperviousness and Stream Quality

- General study design
  A systematic evaluation of stream quality for a population of 20 to 50 small subwatersheds that have different levels of watershed imperviousness. Selected field measurements are collected to represent key hydrological, morphological, water quality, habitat and biodiversity variables within each defined subwatershed. The population of subwatershed data is then statistically analyzed to define functional relationships between stream quality and imperviousness.

- Defining reference streams
  Up to 5 non-urban streams in same geo-hydrological region, preferably fully forested, or at least full riparian forest coverage along same length. Free of confounding NPS sources, imperviousness less than 5%, natural channel and good habitat structure.

- Basic Subwatershed Variables
  Watershed area, standard definition and method to calculate imperviousness, presence/absence of stormwater practices.

- Selecting subwatersheds
  Drainage areas from 100 to 500 acres, known level of imperviousness and age, free of confounding sources (active construction, mining, agriculture, or point sources). Select three random non-overlapping reaches (100 feet) for summer and winter sampling of selected variables in each of five key variables groups:

  1. Hydrology variables: summer dry weather flow, wetted perimeter, cross-sectional area of stream, peak annual storm flow (if gaged).
  2. Channel morphology variables: channel alteration, height, angle and extent of bank erosion, substrate embeddedness, sediment deposition, substrate quality.
  3. Water quality variables: summer water temperature, turbidity, total dissolved solids, substrate fouling index, EP toxicity test, wet weather bacteria, wet weather hydrocarbon.
  4. Habitat Variables: pool- riffle ratio, pool frequency, depth and substrate, habitat complexity, instream cover, riffle substrate quality, riparian vegetative cover, riffle embeddeness
  5. Ecological Variables: fish diversity, macroinvertebrate diversity, index of biological integrity, EPA Rapid Bioasessment Protocol, fish barriers, leaf pack processing rate.

Conclusion

Research has revealed that imperviousness is a powerful and important indicator of future stream quality and that significant degradation occurs at relatively low levels of development. The strong relationship between imperviousness and stream quality presents a serious challenge for urban watershed managers. It underscores the difficulty in maintaining urban stream quality in the face of development.

At the same time, imperviousness represents a common currency that can be measured and managed by planners, engineers and landscape architects alike. It links activities of the individual development site with its cumulative impact at the watershed scale. With further research, impervious cover can serve as an important foundation for more effective land use planning decisions.

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Project Summary

Potential Groundwater Contamination from Intentional and Nonintentional Stormwater Infiltration

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The research summarized here was conducted during the first year of a 3-yr cooperative agreement to identify and control stormwater toxicants, especially those adversely affecting groundwater. The purpose of this research effort was to review the groundwater contamination literature as it relates to stormwater. Potential problem pollutants were identified, based on their mobility through the unsaturated soil zone above groundwater, their abundance in stormwater, and their treatability before discharge. This information was used with earlier EPA research results to identify the possible sources of these potential problem pollutants. Recommendations were also made for stormwater infiltration guidelines in different areas and monitoring that should be conducted to evaluate a specific stormwater for its potential to contaminate groundwater.

This Project Summary was developed by EPA's Risk Reduction Engineering Laboratory, Cincinnati, OH, to announce key findings of the research project that is fully documented in a separate report of the same title (see Project Report ordering information at back).

Introduction

Before urbanization, groundwater was recharged by precipitation infiltrating through pervious surfaces, including grasslands and woods. This infiltrating water was relatively uncontaminated. Urbanization, however, reduced the permeable soil surface area through which recharge by infiltration could occur. This resulted in much less groundwater recharge and greatly increased surface runoff. In addition, the waters available for recharge generally carried increased quantities of pollutants. With urbanization, waters having elevated contaminant concentrations also recharge groundwater, including effluent from domestic septic tanks, wastewater from percolation basins and industrial waste injection wells, infiltrating stormwater, and infiltrating water from agricultural irrigation. This report addresses potential groundwater problems associated with stormwater toxicants and describes how conventional stormwater control practices can reduce these problems.

Sources of Pollutants

High bacteria populations have been found in sheetflow samples from sidewalks, roads, and some bare ground (collected from locations where dogs would most likely be "walked"). Tables 1 and 2 summarize toxicant concentrations and likely sources or locations having some of the highest concentrations found during an earlier phase of this EPA-funded research. The detection frequencies for the heavy metals are all close to 100% for all source areas, and the detection frequencies for the organics listed on these tables ranged from about 10% to 25%. Vehicle service areas had the greatest abundance of observed organics.

Table 1. *Concentrations of Heavy Metals in Observed Areas (µg/L)*

Toxicant	*Highest Median*		*Highest Observed*	
Cadmium	*Vehicle service area runoff*	*8*	*Street runoff*	*220*
Chromium	*Landscaped area runoff*	*100*	*Roof runoff*	*510*
Copper	*Urban receiving water*	*160*	*Street runoff*	*1250*
Lead	*CSO*	*75*	*Storage area runoff*	*330*
Nickel	*Parking area runoff*	*40*	*Landscaped area runoff*	*130*
Zinc	*Roof runoff*	*100*	*Roof runoff*	*1580*

Table 2. *Maximum Concentrations of Toxic Organics from Observed Sources*

Toxicant	*Maximum, µg/L*	*Detection Frequency, %*	*Significant Sources*
Benzo (a) anthracene	*60*	*12*	*Gasoline, wood preservative*
Benzo (b) fluoranthene	*226*	*17*	*Gasoline, motor oils*
Benzo (k) fluoranthene	*221*	*17*	*Gasoline, bitumen, oils*
Benzo (a) pyrene	*300*	*17*	*Asphalt, gasoline, oils*
Fluoranthene	*128*	*23*	*Oils, gasoline, wood preservative*
Naphthalene	*296*	*13*	*Coal tar, gasoline, insecticides*
Phenanthrene	*69*	*10*	*Oils, gasoline, coal tar*
Pyrene	*102*	*19*	*Oils, gasoline, bitumen, coal tar, wood preservative*
Chlordane	*2.2*	*13*	*Insecticide*
Butyl benzyl phthalate	*128*	*12*	*Plasticizer*
Bis (2-chloroethyl) ether	*204*	*14*	*Fumigant, solvents, insecticides, paints, lacquers, varnishes*
Bis (2-chloroisopropyl) ether	*217*	*14*	*Pesticide manufacturing*
1,3-Dichlorobenzene	*120*	*23*	*Pesticide manufacturing*

Stormwater Constituents Having High Potential to Contaminate Groundwater

Nutrients

Nitrates are one of the most frequently encountered contaminants in groundwater. Phosphorus contamination of groundwater has not been as widespread, or as severe, as that of nitrogen compounds. Whenever nitrogen-containing compounds come into contact with soil, a potential exists for nitrate leaching into groundwater, especially in rapid-infiltration wastewater basins, stormwater infiltration devices, and agricultural areas. Nitrate has leached from fertilizers and affected groundwaters under various turf grasses in urban areas, including golf courses, parks, and home lawns. Significant leaching of nitrates occurs during the cool, wet seasons. Cool temperatures reduce denitrification and ammonia volatilization and limit microbial nitrogen immobilization and plant uptake. The use of slow-release fertilizers (including composted organic mulches, urea formaldehyde (UF), methylene urea, isobutylidene diurea (IBDU), and sulfur-coated urea) is recommended in areas having potential groundwater nitrate problems.

Residual concentrations of nitrate in soil vary greatly and depend on the soil texture, mineralization, rainfall and irrigation patterns, organic matter content, crop yield, nitrogen fertilizer/sludge application rate, denitrification, and soil compaction. Nitrate is highly soluble (>1 kg/L) and will stay in solution in the percolation water. If it leaves the root zone without being taken-up by plants, it will readily reach the groundwater.

Pesticides

Urban pesticide contamination of groundwater can result from municipal and homeowner use for pest control and the subsequent collection of the pesticide in stormwater runoff. Pesticides that have been found in urban groundwaters include: 2,4-D, 2,4,5-T, atrazine, chlordane, diazinon, ethion, malathion, methyl trithion, silvex, and simazine. Heavy repetitive use of mobile pesticides (those that are not likely to be retained by various processes in the soil before they reach the groundwater, such as 2,4-D, acenaphthylene, alachlor, atrazine, cyanazine, dacthal, diazinon, dicamba, and malathion) on irrigated and sandy soils will likely contaminate groundwater. Fungicides and nematocides must be mobile to reach the target pest, and hence, they generally have the highest groundwater contamination potential. Pesticide leaching depends on patterns of use, soil texture, total organic carbon content of the soil, pesticide persistence, and depth to the water table.

The greatest pesticide mobility occurs in areas with coarse-grained or sandy soils without a hardpan layer, and with soils that have low clay and organic matter content and high permeability. Structural voids, generally found in the surface layer of finer-textured soils rich in clay, can transmit pesticides rapidly when the voids are filled with water and the adsorbing surfaces of the soil matrix are bypassed. In general, pesticides with low water solubilities, high octanol-water partitioning coefficients, and high carbon partitioning coefficients are less mobile. The slower moving pesticides that may better sorb to soils have been recommended for use in areas of groundwater contamination concern. These include the fungicides iprodione and triadimefon, the insecticides isofenphos and chlorpyrifos, and the herbicide glyphosate.

Pesticides decompose in soil and water, but the total decomposition time can range from days to years. Literature half-lives for pesticides generally apply to surface soils and do not account for the reduced microbial activity found deep in the vadose zone. Pesticides with a 30-day half life can show considerable leaching. An order-of-magnitude difference in half-life results in a five- to ten-fold difference in percolation loss. Organophosphate pesticides are less persistent than organochlorine pesticides, but they also are not strongly adsorbed by the sediment and are likely to leach into the vadose zone and the groundwater.

Other Organics

The most commonly occurring organic compounds found in urban groundwaters include phthalate esters (especially bis(2-ethylhexyl)phthalate) and phenolic compounds. Other, more rarely found, organics include the volatiles: benzene, chloroform, methylene chloride, trichloroethylene, tetrachloroethylene, toluene, and xylene. Polycyclic aromatic hydrocarbons (PAHs) (especially benzo(a)anthracene, chrysene, anthracene, and benzo(b)fluoroanthenene) have also been found in groundwaters near industrial sites.

Groundwater contamination from organics, like that from other pollutants, occurs

more readily in areas with sandy soils and where the water table is near the land surface. Organics can be removed from the soil and recharge water by volatilization, sorption, and degradation. Volatilization can significantly reduce the concentrations of the most volatile compounds in groundwater, but the rate of gas transfer from the soil to the air is usually limited by the presence of soil water. Hydrophobic sorption onto soil organic matter limits the mobility of less soluble base/neutral and acid extractable compounds through organic soils and the vadose zone. Sorption is not always a permanent removal mechanism, however. Organic resolubilization can occur during wet periods following dry periods. Many organics can be degraded by microorganisms, at least partially, but others cannot. Temperature, pH, moisture content, ion exchange capacity of the soil, and air availability may limit the microbial degradation potential for even the most degradable organic compound.

Microorganisms

Viruses have been detected in groundwater where stormwater recharge basins were located short distances above the aquifer. Enteric viruses are more resistant to environmental factors than are enteric bacteria, and they exhibit longer survival times in natural waters. They can occur in potable and marine waters in the absence of fecal coliforms. Enteroviruses are also more resistant to commonly used disinfectants than are indicator bacteria (such as fecal coliforms), and they can occur in groundwater in the absence of indicator bacteria.

The factors that affect the survival of enteric bacteria and viruses in the soil include pH, antagonism from soil microflora, moisture content, temperature, sunlight, and organic matter. The two most important attributes of viruses that permit their long-term survival in the environment are their structure and very small size. These characteristics permit virus occlusion and protection within colloid-size particles. Viral adsorption is promoted by increasing cation concentration, decreasing pH, and decreasing soluble organics. Since the movement of viruses through soil to groundwater occurs in the liquid phase and involves water movement and associated suspended virus particles, the distribution of viruses between the adsorbed and liquid phases determines the viral mass available for movement. Once the virus reaches the groundwater, it can travel laterally through the aquifer until it is either adsorbed or inactivated.

The major bacterial removal mechanisms in soil are straining at the soil surface and at intergrain contacts, sedimentation, sorption by soil particles, and inactivation. Because their size is larger than viruses, most bacteria are retained near the soil surface because of this straining effect. In general, enteric bacteria survive in soil between 2 and 3 mo, although survival times up to 5 yr have been documented.

Metals

From a groundwater pollution standpoint, the metals in stormwater presenting the most environmental concern are aluminum, arsenic, cadmium, chromium, copper, iron, lead, mercury, nickel, and zinc. The majority of these metals (with the common exception of zinc) are, however, mostly associated with the particulate fractions and can be mostly removed by either sedimentation or filtration processes.

In general, studies of recharge basins receiving large metal loads found that most of the heavy metals are removed either in the basin sediment or in the vadose zone. Dissolved metal ions are removed from stormwater during infiltration mostly by adsorption onto the near-surface particles in the vadose zone, and the particulate metals are filtered out at the soil surface. Studies at recharge basins found that lead, zinc, cadmium, and copper accumulated at the soil surface with little downward movement over many years. At a commercial site, however, nickel, chromium, and zinc concentrations have exceeded regulatory limits in the soils below a recharge area. Allowing percolation ponds to go dry between storms can be counterproductive to the removal of lead from the water during recharge. Apparently, the adsorption bonds between the sediments and the metals can be weakened during the drying period.

Similarities in water quality between runoff water and groundwater have shown that there is significant downward movement of copper and iron in sandy and loamy soils. Arsenic, nickel, and lead, however, did not significantly move downward through the soil to the groundwater. The exception to this was some downward movement of lead with the percolation water in sandy soils beneath stormwater recharge basins. Zinc, which is more soluble than iron, has been found in higher concentrations in groundwater than iron. The order of attenuation in the vadose zone from infiltrating stormwater is: zinc (most mobile) > lead > cadmium > manganese > copper > iron > chromium > nickel > aluminum (least mobile).

Salts

Salt applications for winter traffic safety is a common practice in many northern areas, and the sodium and chloride, which are collected in the snowmelt, travel down through the vadose zone to the groundwater with little attenuation. Soil is not very effective at removing salts. Salts that are still in the percolation water after it travels through the vadose zone will contaminate the groundwater. Infiltrating stormwater has increased sodium and chloride concentrations above background concentrations. Fertilizer and pesticide salts also accumulate in urban areas and can leach through the soil to the groundwater.

Studies of depth of pollutant penetration in soil have shown that sulfate and potassium concentrations decrease with depth, whereas sodium, calcium, bicarbonate, and chloride concentrations increase with depth. Once contamination with salts begins, the movement of salts into the groundwater can be rapid. The salt concentration may not lessen until the source of the salts is removed.

Treatment of Stormwater

Table 3 summarizes the filterable fraction of toxicants found in runoff sheet flows from many urban areas found during an earlier phase of this EPA-funded research. Pollutants that are mostly in filterable forms have a greater potential of affecting groundwater and are more difficult to control with the use of conventional stormwater control practices which mostly rely on sedimentation and filtration principles. Luckily, most of the toxic organics and metals are associated with the nonfilterable (suspended solids) fraction of the wastewaters during wet weather. Possible exceptions include zinc, fluoranthene, pyrene, and 1,3-dichlorobenzene, which may be mostly found in the filtered sample portions. Pollutants in dry-weather storm drainage flows, however, tend to be much more associated with filtered sample fractions and would not be as readily controlled with the use of sedimentation.

Sedimentation is the most common fate and control mechanism for particulate-related pollutants. This would be common for most stormwater pollutants, as noted above. Particulate removal can occur in many conventional stormwater control processes, including catchbasins, screens, drainage systems, and detention ponds. Sorption of pollutants onto solids and metal precipitation increases the sedimentation potential of these pollutants and also encourages more efficient bonding of the pollutants in soils to prevent their leaching

Table 3. *Reported Filterable Fractions of Stormwater Toxicants from Source Areas*

Constituent	Filterable Fraction (%)
Cadmium	20 to 50
Chromium	<10
Copper	<20
Iron	Small amount
Lead	<20
Nickel	Small amount
Zinc	>50
Benzo (a) anthracene	None found in filtered fraction
Fluoranthene	65
Naphthalene	25
Phenanthrene	None found in filtered fraction
Pyrene	95
Chlordane	None found in filtered fraction
Butyl benzyl phthalate	Irregular
Bis (2-chloroethyl) ether	Irregular
Bis (2-chlrorisopropyl) ether	None found in filtered fraction
1,3-Dichlorobenzene	75

to groundwaters. Detention ponds are probably the most common management practice for the control of stormwater runoff. If properly designed, constructed, and maintained, wet detention ponds can be very effective in controlling a wide range of pollutants. The monitored performance of wet detention ponds indicates more than 90% removal for suspended solids, 70% for BOD_5 and COD, about 60% to 70% for nutrients, and about 60% to 95% for heavy metals. Catchbasins are very small sedimentation devices. Adequate cleaning can help reduce the total solids and lead urban runoff yields by between 10% and 25%, and COD, total Kjeldahl nitrogen, total phosphorus, and zinc by between 5% and 10%. Other important fate mechanisms available in wet detention ponds, but which are probably not important in small enclosed sump devices such as catchbasins, include volatilization and photolysis. Biodegradation, biotransformation, and bioaccumulation (into plants and animals) may also occur in larger and open ponds.

Upland infiltration devices (such as infiltration trenches, porous pavements, percolation ponds, and grass roadside drainage swales) are located at urban source areas. Infiltration (percolation) ponds are usually located at stormwater outfalls or at large paved areas. These basins, along with perforated storm sewers, can infiltrate flows and pollutants from all upland sources combined. Infiltration devices can safely deliver large fractions of the surface flows to groundwater, if carefully designed and located. Local conditions that can make stormwater infiltration inappropriate include steep slopes, slowly percolating soils, shallow groundwater, and nearby groundwater uses. Grass filter strips may be quite effective in removing particulate pollutants from overland flows. The filtering effects of grasses, along with increased infiltration/recharge, reduce the particulate sediment load from urban landscaped areas. Grass swales are another type of infiltration device and can be used in place of curb and gutter drainages in most land uses, except possibly strip commercial and high density residential areas. Grass swales allow the recharge of significant amounts of surface flows. Swales can also reduce pollutant concentrations because of filtration. Soluble and particulate heavy metal (copper, lead, zinc, and cadmium) concentrations can be reduced by at least 50%, COD, nitrate nitrogen, and ammonia nitrogen concentrations can be reduced by about 25%, but only inconsistent concentration reductions can be expected for organic nitrogen, phosphorus, and bacteria.

Sorption of pollutants to soils is probably the most significant fate mechanism of toxicants in biofiltration devices. Many of the devices also use sedimentation and filtration to remove the particulate forms of the pollutants from the water. Incorporation of the pollutants onto soil with subsequent biodegradation and minimal leaching to the groundwater is desired. Volatilization, photolysis, biotransformation, and bioconcentration may also be significant in grass filter strips and grass swales. Underground seepage drains and porous pavements offer little biological activity to reduce toxicants.

Results and Conclusions

This entire research project will provide guidance on critical source area treatment, especially for the protection of groundwater quality. Much of the information will also be useful for analyzing stormwater problems and needed controls for surface water discharges.

Table 4 is a summary of the pollutants found in stormwater that may cause groundwater contamination problems for various reasons. This table does not consider the risk associated with using groundwater contaminated with these pollutants. Causes of concern include high mobility (low sorption potential) in the vadose zone, high abundance (high concentrations and high detection frequencies) in stormwater, and high soluble fractions (small fraction associated with particulates that would have little removal potential using conventional stormwater sedimentation controls) in the stormwater. The contamination potential is the lowest rating of the influencing factors. As an example, when no pretreatment is used before percolation through surface soils, the mobility and abundance criteria are most important. When a compound is mobile but in low abundance (such as for volatile organic compounds, VOCs), then the groundwater contamination potential would be low. When the compound is mobile, however, and also in high abundance (such as for sodium chloride, in certain conditions), then the groundwater contamination potential would be high. When sedimentation pretreatment is to be used before infiltration, then some of the pollutants will likely be removed before infiltration. In this case, all three influencing factors (pollutant mobility, pollutant abundance in stormwater, and fraction of the pollutant associated with the filtered sample fraction) would be considered. As an example, chlordane would have a low contamination potential with sedimentation pretreatment, whereas it would have a moderate contamination potential when no pretreatment is used. In addition, when subsurface infiltration/injection is used instead of surface percolation, the compounds would most likely be more mobile, making the abundance criteria the most important, with some regard given to the filterable fraction information for operational considerations.

This table is only appropriate for initial estimates of contamination potential because of the simplifying assumptions made, such as the worst case mobility conditions assumed (for sandy soils having low organic content). When the soil is clayey and has a high organic content, then most of the organic compounds would be less mobile than that shown on this table. The abundance and filterable fraction information is generally applicable for warm weather stormwater runoff in residential and commercial areas. The pollutant concentrations and detection

frequencies, however, would be greater for critical source areas (especially vehicle service areas) and critical land uses (especially manufacturing industrial areas).

The stormwater pollutants of most concern (those that may have the greatest adverse impacts on groundwaters) include:

- Nutrients: nitrate has a low to moderate potential for contaminating groundwater when both surface percolation and subsurface infiltration/injection are used because of its relatively low concentrations in most stormwaters. When the stormwater nitrate concentration is high, then the groundwater contamination potential would likely also be high.
- Pesticides: lindane and chlordane have moderate potentials for contaminating groundwater when surface percolation (with no pretreatment) or when subsurface injection (with minimal pretreatment) are used. The groundwater contamination potentials for both of these compounds would very likely be substantially reduced with adequate sedimentation pretreatment.
- Other organics: 1,3-dichlorobenzene may have a high potential for contaminating groundwater when subsurface infiltration/injection (with minimal pretreatment) is used. It would, however, probably have a lower groundwater contamination potential for most surface percolation practices because of its relatively strong sorption to vadose zone soils. Both pyrene and fluoranthene would also very likely have high groundwater contamination potentials for subsurface infiltration/injection practices, but lower contamination potentials for surface percolation practices because of their more limited mobility through the unsaturated zone (vadose zone). Others (including benzo(a)anthracene, bis (2-ethylhexyl) phthalate, pentachlorophenol, and phenanthrene) may also have moderate groundwater contamination potentials when surface percolation with no pretreatment, or subsurface injection/infiltration, is used. These compounds would have low groundwater contamination potentials when surface infiltration is used with sedimentation pretreatment. VOCs may also have high groundwater contamination potentials if present in the stormwater (which is possible for some industrial and commercial facilities and vehicle service establishments).
- Pathogens: enteroviruses very likely have high potentials for contaminating groundwater when any percolation or subsurface infiltration/injection practice is used, depending on their presence in stormwater (especially if contaminated with sanitary sewage). Other pathogens, including *Shigella*, *Pseudomonas aeruginosa*, and various protozoa, would also have high groundwater contamination potentials when subsurface infiltration/injection practices are used without disinfection. When disinfection (especially by chlorine or ozone) is used, then disinfection by-products (such as trihalomethanes or ozonated bromides) would have high groundwater contamination potentials.
- Heavy Metals: nickel and zinc possibly have high potentials for contaminating groundwater when subsurface infiltration/injection is used. Chromium and lead would have moderate groundwater contamination potentials for subsurface infiltration/injection practices. All metals would possibly have low groundwater contamination potentials when surface infiltration is used with sedimentation pretreatment.
- Salts: chloride would very likely have a high potential for contaminating groundwater in northern areas where road salts are used for traffic safety, irrespective of the pretreatment, infiltration, or percolation practices used.

Pesticides have been mostly found in urban runoff from residential areas, especially in dry weather flows associated with landscaping irrigation runoff. The other organics, especially the volatiles, are mostly found in industrial areas. The phthalates are found in all areas. The PAHs are also found in runoff from all areas, but they are in higher concentrations and occur more frequently in industrial areas. Pathogens are most likely associated with sanitary sewage contamination of storm drainage systems, but several bacterial pathogens are commonly found in surface runoff in residential areas. Zinc is mostly found in roof runoff and other areas where galvanized metal comes into contact with rainwater. Salts are at their greatest concentrations in snowmelt and early spring runoff in northern areas.

The control of these compounds requires various approaches, including source area controls, end-of-pipe controls, and pollution prevention. All dry weather flows should be diverted from infiltration devices because of their potentially high concentrations of soluble heavy metals, pesticides, and pathogens. Similarly, all runoff from manufacturing industrial areas should also be diverted from infiltration devices because of their relatively high concentrations of soluble toxicants. Combined sewer overflows should also be diverted because of sewage contamination. In areas of snow and ice control, winter snowmelt and runoff and early spring runoff should also be diverted from infiltration devices.

All other runoff should include pretreatment using sedimentation processes before infiltration, to both minimize groundwater contamination and to prolong the life of the infiltration device (if needed). This pretreatment can take the form of grass filters, sediment sumps, wet detention ponds, etc., depending on the runoff volume to be treated, treatment flow rate, and other site specific factors. Pollution prevention can also play an important role in minimizing groundwater contamination problems, including reducing the use of galvanized metals, pesticides, and fertilizers in critical areas. The use of specialized treatment devices, such as those being developed and tested during this research, can also play an important role in treating runoff from critical source areas before these more contaminated flows commingle with cleaner runoff from other areas. Sophisticated treatment schemes, especially the use of chemical processes or disinfection, may not be warranted, except in special cases, especially when the potential of forming harmful treatment by-products (such as THMs and soluble aluminum) is considered.

The use of surface percolation devices (such as grass swales and percolation ponds) that have a substantial depth of underlying soils above the groundwater is preferable to the use of subsurface infiltration devices (such as dry wells, trenches or seepage drains, and especially injection wells), unless the runoff water is known to be relatively free of pollutants. Surface devices are able to take greater advantage of natural soil pollutant removal processes. Unless all percolation devices are carefully designed and maintained, however, they may not function properly and may lead to premature hydraulic failure or contamination of the groundwater.

Recommendations

With a reasonable degree of site-specific design considerations to compensate for soil characteristics, infiltration may be

Table 4. *Potential of Stormwater Pollutants to Contaminate Groundwater*

Compounds		Mobility (sandy/low organic soils)	Abundance in Stormwater	Fraction Filterable	Contamination Potential: Surface Infilt. and No Pretreatment	Contamination Potential: Surface Infilt. with Sedimentation	Contamination Potential: Sub-surface Inj. with Minimal Pretreatment
Nutrients	nitrates	mobile	low/moderate	high	low/moderate	low/moderate	low/moderate
Pesticides	2,4-D	mobile	low	likely low	low	low	low
	γ-BHC (lindane)	intermediate	moderate	likely low	moderate	low	moderate
	malathion	mobile	low	likely low	low	low	low
	atrazine	mobile	low	likely low	low	low	low
	chlordane	intermediate	moderate	very low	moderate	low	moderate
	diazinon	mobile	low	likely low	low	low	low
Other organics	VOCs	mobile	low	very high	low	low	low
	1,3-dichloro-benzene	low	high	high	low	low	high
	anthracene	intermediate	low	moderate	low	low	low
	benzo(a) anthracene	intermediate	moderate	very low	moderate	low	moderate
	bis (2-ethylhexyl) phthalate	intermediate	moderate	likely low	moderate	low	moderate
	butyl benzyl phthalate	low	low/moderate	moderate	low	low	low/moderate
	fluoranthene	intermediate	high	high	moderate	moderate	high
	fluorene	intermediate	low	likely low	low	low	low
	naphthalene	low/inter.	low	moderate	low	low	low
	pentachlorophenol	intermediate	moderate	likely low	moderate	low	moderate
	phenanthrene	intermediate	moderate	very low	moderate	low	moderate
	pyrene	intermediate	high	high	moderate	moderate	high
Pathogens	enteroviruses	mobile	likely present	high	high	high	high
	Shigella	low/inter.	likely present	moderate	low/moderate	low/moderate	high
	Pseudomonas aeruginosa	low/inter.	very high	moderate	low/moderate	low/moderate	high
	protozoa	low/inter.	likely present	moderate	low/moderate	low/moderate	high
Heavy metals	nickel	low	high	low	low	low	high
	cadmium	low	low	moderate	low	low	low
	chromium	inter./very low	moderate	very low	low/moderate	low	moderate
	lead	very low	moderate	very low	low	low	moderate
	zinc	low/very low	high	high	low	low	high
Salts	chloride	mobile	seasonally high	high	high	high	high

very effective in controlling both urban runoff quality and quantity problems. This strategy encourages infiltration of urban runoff to replace the natural infiltration capacity lost through urbanization and to use the natural filtering and sorption capacity of soils to remove pollutants; however, the potential for some types of urban runoff to contaminate groundwater through infiltration requires some restrictions. Infiltration of urban runoff having potentially high concentrations of pollutants that may pollute groundwater requires adequate pretreatment or the diversion of these waters away from infiltration devices. The following general guidelines for the infiltration of stormwater and other storm drainage effluent are recommended in the absence of comprehensive site-specific evaluations:

- Dry weather storm drainage effluent should be diverted from infiltration devices because of their probable high concentrations of soluble heavy metals, pesticides, and pathogenic microorganisms.
- Combined sewage overflows should be diverted from infiltration devices because of their poor water quality, especially their high pathogenic microorganism concentrations and high clogging potential.
- Snowmelt runoff should be diverted from infiltration devices because of its potential for having high concentrations of soluble salts.
- Runoff from manufacturing industrial areas should be diverted from infiltration devices because of its potential for having high concentrations of soluble toxicants.
- Construction site runoff must be diverted from stormwater infiltration devices (especially subsurface devices) because of its high suspended solids concentrations, which would quickly clog infiltration devices.
- Runoff from other critical source areas, such as vehicle service facilities and large parking areas, should at least receive adequate pretreatment to eliminate their groundwater contamination potential before infiltration.
- Runoff from residential areas (the largest component of urban runoff in most cities) is generally the least polluted urban runoff flow and should be considered for infiltration. Very little treat-

ment of residential area stormwater runoff should be needed before infiltration, especially if surface infiltration is through the use of grass swales. When subsurface infiltration (seepage drains, infiltration trenches, dry wells, etc.) is used, then some pretreatment may be needed, such as by using grass filter strips, or other surface filtration devices.

Recommended Stormwater Quality Monitoring to Evaluate Potential Groundwater Contamination

Most past stormwater quality monitoring efforts have not adequately evaluated stormwater's potential for contaminating groundwater. The following list shows the stormwater contaminants that are recommended for monitoring when stormwater contamination potential needs to be considered, or when infiltration devices are to be used. Other analyses are appropriate for additional monitoring objectives (such as evaluating surface water problems). In addition, all phases of urban runoff should be sampled, including stormwater runoff, dry-weather flows, and snowmelts.

- Urban runoff contaminates with the potential to adversely affect groundwater:
  - Nutrients (especially nitrates)
  - Salts (especially chloride)
  - VOCs (if expected in the runoff, such as runoff from manufacturing industrial or vehicle service areas, could screen for VOCs with purgable organic carbon analyses)
  - Pathogens (especially enteroviruses, if possible, along with other pathogens such as *Pseudomonas aeruginosa*, *Shigella*, and pathogenic protozoa)
  - Bromide and total organic carbon (to estimate disinfection by-product generation potential, if disinfection by either chlorination or ozone is being considered)
  - Pesticides, in both filterable and total sample components (especially lindane and chlordane)
  - Other organics, in both filterable and total sample components (especially 1,3 dichlorobenzene, pyrene, fluoranthene, benzo(a)anthracene, bis (2-ethylhexyl) phthalate, pentachlorophenol, and phenanthrene)
  - Heavy metals, in both filterable and total sample components (especially chromium, lead, nickel, and zinc)
- Urban runoff compounds with the potential to adversely affect infiltration and injection operations:
  - Sodium, calcium, and magnesium (to calculate the sodium adsorption ratio to predict clogging of clay soils)
  - Suspended solids (to determine the need for sedimentation pretreatment to prevent clogging)

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The complete report, entitled "Potential Groundwater Contamination from Intentional and Nonintentional Stormwater Infiltration," (Order No. PB94-165354AS; Cost: $27.00, subject to change) will be available only from:
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Mosquitos in Constructed Wetlands: A Management Bugaboo?

Urban planners considering constructed wetlands for stormwater treatment might be concerned that mosquitos could become a major nuisance. Some observations in the field indicate that mosquitos are not a problem in constructed wetlands (Adams, 1983; Bennett, 1983). In general, functioning stormwater wetlands are less likely to produce mosquitos than are nutrient-laden secondary sewage and agricultural wastewater ponds or ponds that do not have frequent turnover. Even so, strong preconceptions exist, and building a wetland without first gauging public opinion could result in a major public relations headache. Those involved in the decision to build a wetland and the wetland designer can familiarize themselves with the breeding requirements of prevalent mosquito species to determine whether they feed on humans or carry disease and the likelihood that a wetland will be a high producer of mosquitos. Public opinion surveys and good information dispersal are important to avoid setbacks or negative impressions of wetlands and stormwater practices. Preventive measures can be incorporated in the site selection and design. In general, the basic design and maintenance of a good stormwater pond deters mosquito production (Table 1). If, indeed, mosquitos emerge, various biological controls can be used to subdue larval and adult populations.

An anti-mosquito strategy is as follows:

1. Assess the probable mosquito nuisance level of the area. Inform the public of the differences between stormwater and wastewater treatment.
2. After obvious high-risk sites have been ruled out (the local riding stable!) and there is still a moderate risk, modify the wetland design (e.g., maintenance of base flow, choice of vegetation) to deter mosquito breeding.
3. Choose and implement appropriate controls (Table 2) and monitor production levels.

Consult Biologists Familiar With the Locality at Each Stage

Some form of public involvement could be incorporated into the technical process. It cannot be assumed that residents will accept different designs equally. It might be worth considering inviting interested residents to participate in the planning well before designs are finalized and resources committed to the project.

Mosquito Risk

Where and when are mosquitos a concern? Wherever there is standing water, there may be mosquitos. Depending on the species, eggs are laid directly in standing water or in dry cavities (ground depressions, old tires) that later receive water. The larvae feed on algae and organic particles and take in oxygen by floating at the surface. Larvae develop into pupae, which emerge from the water as winged adults. The females of most species feed on the blood of animals although not all feed on humans. Many species of *Culex* do indeed feed on humans and these are the major nuisance species of North America. Some species of *Culex* carry encephalitis. Only species of *Anopheles* may potentially carry malaria and while there are such mosquitos in North America, the disease itself has not recently occurred here.

Mosquito production is sensitive to water level fluctuations. For the majority of species, production

Table 1: How Well-Designed Stormwater Wetlands Deter Mosquito Production

Mosquito breeding requirements	Stormwater pond design
■ Shallow, stagnant water; anaerobic condition ■ Egg rafts of permanent-pool species float on the water	■ In a well-constructed and maintained stormwater pond the water is kept moving; residence time is only a few days.
■ Adult females choose environments of high nutrition (anaerobic, high nutrients and bacteria) in which to lay their eggs.	■ Urban stormwater ponds are in non-agricultural settings and do not have high nutrient loads or animal waste.
■ Temporary-pool species require periodic drying (as in containers, puddles, tidal marshes)	■ Well-designed on-line systems are not expected to dry out.

increases with duration of standing water. However, there is an important exception in the case of "temporary pool" mosquitos. Impounding and flooding marshes is a way of controlling mosquitos in mainly coastal areas, where the prevalent nuisance species is one that depends on dry periods for egg development. In some localities, this approach could backfire if permanent-pool mosquitos also occur in the area where temporary-pool species are being controlled. One could inadvertently trade one nuisance species for another! It is important to know which species one is dealing with and what their breeding requirements are before implementing controls.

Being bit by a mosquito near a wetland does not necessarily mean that the mosquito came from the wetland. Female freshwater mosquitos range over half a mile (WRRI, 1989). Saltwater marsh species may range as far as 40 miles away from the site of emergence and be a nuisance in urban centers (R. Wolfe, personal communication). Therefore, mosquitos in an urban area could be coming from a number of sources, not necessarily the nearest wetland.

Designs for Deterrence

Which wetland designs contribute to and which deter mosquito production? Some factors that make wetlands good water treatment devices also make them more likely to be breeding areas for mosquitos:

- Dense vegetation is desired to better filter incoming water, stabilize the pond bottom, provide microbe substrate, and take up excess nutrients. Unfortunately, dense submerged vegetation can be correlated with high mosquito larvae production (WRRI, 1989), probably because the foliage provides refuge from predators and particles of plant detritus are food for larvae. Trees could be planted to shade out herbaceous aquatics but this would be counterproductive for water treatment.
- Low oxygen content and the presence of partially decomposed organic matter makes wetlands good immobilizers of trace metals. Mosquito larvae also thrive in these conditions.
- High surface area-to-volume ratio of the pond is generally recommended to achieve sheetflow and maximize the area of substrate for pollutant adsorption. Unfortunately, these large areas of shallow water are conducive to mosquito production. Deeper and steep-sided ponds will probably produce fewer mosquitos.
- A gradual bank slope increases vigor, diversity, and efficacy of the vegetation and lessens erosion (article 92). This design might also lead to higher mosquito production.

Certainly these basic design principles need not be abandoned, so long as it is understood that post-construction mosquito controls might be needed.

Some design considerations for mosquito deterrence include the following:

- Get an idea of future nutrient load on the wetland—is any septage or agricultural and animal waste likely? Sites of high nutrient load should be avoided. This is not likely to be a problem in developed settings.
- Attempting to avoid standing water altogether by building wetlands with flow-through gravel bottoms or that operate intermittently is probably unnecessary. Keeping a wetland dry is counterproductive to stormwater treatment processes (for example, the microbial activity in the muck layer). In addition, the degree of water level control appropriate in wastewater treatment or impoundments requires more supervision than can usually be given to a stormwater practice. Wastewater wetlands are built for a different purpose than are stormwater wetlands and function under different circumstances; therefore, their design and operation should not be copied blindly.
- Choose emergent vegetation with minimal submerged growth—dense submerged foliage provides refuge for the larvae and interferes with sampling and control.
- Cover open canals where feasible to cut down on standing water open to the sun; replace open troughs with closed distributor pipes (Tennessen, 1993).
- A properly laid-down parallel pipe system (article 150) will drain away and shouldn't cause any problems.
- Construct stormwater ponds on-line. Keep inflows and outflows clear of debris to maintain base flow.

Evaluation of Controls

Bacteria

The bacterium *Bacillus thuringiensis israelensis* (Bti) is a common insecticidal control of mosquitos and flies. It is widely available in briquet, powder, or liquid form. Commercial Bti is considered safe enough to add to drinking water (WRRI, 1989). It is active against most mosquitos, but less so against anophelenes. It is also toxic to many flies. There appears to be no evidence as yet that it is harmful to "desired" insects. Bti does not appear to interfere with the activity of larvae-eating fish (Mian, 1986). In addition, the presence of nitrates and phosphates does not interfere with

Table 2: Comparison of Mosquito Controls

Control	Efficacy	Availability
Biological controls		
Mesocyclops, a copepod	50-90% larvae consumed every few days	Laboratory reared, not easily obtained
Fish	Live-hatchers tend to do better than egg-layers; native spp. should be chosen, restocking not necessary except after severe winters or in shallow ponds	Non-natives may be prohibited in your areas. State Dept. Natural Resources or Mosquito Control often raise stocks of native fish
Pupfish *(Cyprinodon)*	Egg-layer, good survival in unpolluted water but sensitive to wastewater	Most restricted to desert streams/springs in Southwest, some endangered.
Guppy *(Poecilia reticulata)*	Prolific live-hatchers, high efficacy, sensitive to pH but tolerant of wide range of temperatures and dissolved oxygen	Non-native
Mosquitofish *(Gambusia spp.)*	Live-hatching, does well in non-polluted waters	Wide-ranging native and introduced spp. in US, E. coast, S.E., Missisipi and Colorado R. basins
Killifish *(Fungilis spp.)*	Voracious, very successful in MD and DE coastal programs	Several native spp., hardy overwinterer
Larvicides		
Cyromazine, methoprene (insect hormones)	One-time application good for 30+ days, application time should correspond with larval development	Several US distributors
Organophosphates (e.g. Abate)	Broad spectrum toxin, lethal for many invertebrates	Several US distributors
Bacillus sphaericus	Efficacy depends on injestion by larvae, not as effective as Bti against non-Culex spp.	Product in development, available in some states, not nationwide
Bacillus thuringiensis israeliensus (Bti)	Highly effective if applied at correct time, efficacy depends on injestion by larvae, high turbidity or suspended solids interfere with injestion	Widely used in various forms, several distributors in US

References: Mian, 1986; Castelberry, 1990; Toyama, 1986; Cohen, 1986; Tennessen, 1993; Jones, 1990; Ali, 1989

uptake of *Bacillus* larvicides, as is the case with organophosphates (Tennessen, 1993). The agent is applied as pellets, dust, or slug injection. Bti becomes active upon ingestion by the larvae. It loses its efficacy as the larvae age or as turbidity increases. A newer bacterial strain, *Bacillus sphaericus*, showed longer activity than Bti in one study but was not as effective as Bti against species other than *Culex* (WRRI, 1989). *B. sphaericus* is approved by the U.S. EPA but state registration is pending. At least one American company is developing the product. Tennessen (1993) recommends weekly treatments with Bti before sampling reaches 0.5 larvae/dipper, blower application for small wetlands, and slug injection for large cells.

Chemical Larvicides

Unlike *Bacillus* larvicides, organophosphate larvicides, such as temephos, are non-specific—they kill whatever animal receives a lethal dose. This means that the dose required to kill the mosquito larvae in a pond could do away with many other invertebrates in the wetland and pose a threat to downstream habitats. If these chemical larvicides are overapplied, the dose may be high enough to be a risk to the health of other animals and an irritant to people. This makes organophosphates inappropriate control agents in populated areas. Some non-phosphitic chemicals that are used as larvicides are methoprene, an insect hormone mimic, and cyromazine, an insect growth regulator which purportedly affects only flies and mosquitos. Cyromazine was found effective in one study of a drainage ditch. A one-time application of cyromazine (0.5 g active ingred./m^3), prevented pupation and emergence for about forty days in a drainage ditch (Cohen, 1986).

The chemical Sevin (carbaryl) is toxic to humans and animals and should not be used.

Insect-Eating Fish

The best fish for mosquito control are those species that reproduce quickly and have a wide tolerance of environmental conditions. The more fish in the pond, the fewer mosquitos that emerge. Castleberry (1990) compared three species - pupfish (*Cyprinodon nevadensis amargosae*), mosquitofish (*Gambusia affinis*), and guppies (*Poecilia reticulata*) - in tanks planted with pondweed and containing *Culex* larvae. Guppies became well established, and tanks containing these fish produced the fewest mosquitos. Mosquitofish placed second and pupfish last. The trouble with pupfish may be that they are egg-laying and the eggs have a narrow environmental tolerance. The live-hatchers did better. Mian *et al.* (1986) observed high survival rates for both the guppy and a different species of pupfish (*Cyprinodon macularius*). In another study, guppies began to die when pH fell below 5.5 (Toyama, 1989), indicating that acidity may be more of a factor than dissolved oxygen for fish survival. This would indicate that fish may not be the best control choice at industrial sites or in waters known to be highly acidic. The natural ranges of these fish should be noted: guppies are non-native; pupfish are native to desert springs and streams of the western US; species of *Gambusia* have a wide range in the US. Native minnows and killifish have done a good job in keeping down mosquitos in Maryland and Delaware and overwinter successfully if ponds are deep enough (at least three feet) (Wolfe, Lesser, personal communication). State DNR personnel should be contacted before any fish are introduced into wetlands.

Copepods

Copepods, tiny swimming crustaceans, feed on mosquito larvae and show some promise. Mosquito larvae consumption by a copepod was compared along with the performance of pupfish and guppies (Mian, 1986). The copepod was not adversely affected by effluent in the water and consumed between 50 and 90% of the mosquito larvae in a 24 to 72 hour period, whether there was other suitable food or not.

Other Animals

Putting up nest boxes to make the site more attractive to martins, swallows, etc., wouldn't hurt in reducing number of adult mosquitos. Tadpoles can be introduced into ponds to increase the frog population but it is unlikely that they are as effective as some of the larvae-eating fish.

Ecological Impacts of Control

Mosquito control techniques other than actual draining or flooding of marshes are fairly recent. The research has focussed on the efficacy of the new techniques and little is known about the ecological side effects. *Bacillus* larvicides supposedly act only on flies and mosquitos. Larvicides tend to be tested in the lab or in the field for target species only (mosquitos). Aside from cursory observation of aquatic invertebrate abundance, no one seems to know what the effects on the whole invertebrate community are. As for the impounding of tidal marshes to control temporary pool species, there are conflicting observations on the impacts to fish diversity and plant productivity depending on the location and native species.

Conclusion

It would seem then, from both an ecological and management standpoint, that designing a wetland that optimizes surface area and plant growth without excessive mosquito production is a more efficient approach than costly manipulations after the fact. It would also seem that, where necessary, biological

rather than chemical control of mosquitos is preferred, since the biological controls specifically target mosquito larvae and are harmless to humans, unlike many chemicals even at standard doses. As more comparisons are made between stormwater and wastewater wetlands and also reference natural wetlands, it could well be discovered that mosquito control in stormwater wetlands is rarely warranted. ***—JMC***

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Preface to Second Edition

The first edition of this book having been on the whole well received, I have tried to retain as far as possible its general style and character in the second. Nevertheless some sections have needed extensive revision and updating, and I have taken the opportunity to expand or develop some topics, often in response to the many constructive suggestions I have received from readers and reviewers, and from my own students. Inevitably, I have had to delete some material for reasons of space.

The main changes are to revise, update and extend those areas in which there have been significant technical advances, or which were perhaps inadequately covered in the first edition. To keep the book within manageable proportions, I have omitted some material which was included in the first edition; in most cases, this material is by now readily accessible elsewhere and has been appropriately referenced. I have rewritten and/or restructured some sections of the book, to take account of the comments I have received regarding the readers' impression of the most appropriate order in which the material should be presented. Readers of the first edition may detect some greater reliance on secondary sources than was shown in the first. This reflects the increased availability of high-quality monographs and reviews since the first edition. It also, sadly, reflects the experience which I and colleagues at other universities have had over the last few years that students simply no longer have ready access to primary sources, and increasingly do not have the opportunity to develop the skills required to assess and evaluate them. This may be a trend which many deplore, but we have little choice other than, as authors and teachers, to modify our approach to suit the changing circumstances. Nevertheless I still believe that the main purpose of this second edition is the same as the first: 'To impart not only factual information, but also some idea of the areas of uncertainty which must remain; to impart to the reader some sense of how he/she may evaluate for him/herself the quality and reliability of the vast amount of material he/she may encounter; and to concentrate on the elucidation of principles rather than the promulgation of data'. In relation to this aim, I have not been inhibited in preferring sometimes to cite older, original material over more recently-dated sources. The rate of increase in knowledge and understanding, even in science, is often slower than the rate of increase in the number of published works. Also, the

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understanding of basic principles and methodology is often more easily achieved through the study of clear and accessible examples, which are sometimes rare in material published under the constraints of space and jargon which are characteristic of many modern journals.

One of the fascinations of studying water pollution is that it demands some familiarity with a wide range of specialisms. In the following pages, I have been foolhardy enough to attempt to touch upon subjects ranging from molecular biology to international law, all of which are relevant to my chosen topic. I cannot write with equal authority and fluency upon all of these subjects, so in many cases I have had to rely heavily upon the assistance and advice of colleagues. I am obstinate enough sometimes to have followed my own path, so must accept responsibility for any errors of fact or interpretation which remain. Many of my colleagues may not even be aware of the extent of their assistance, perhaps because in conversation they have set off a train of thought or drawn my attention to a source of information. Their contributions are no less valued for that, but some have offered me very specific and extensive support or assistance, including Dr A.Abbott, Mr A. Milne, Ms K.Shepherd and Dr D.Reid. I am particularly grateful to Ms L.Kiakides, who has afforded me every form of help, both in the preparation of the book itself and in shouldering many responsibilities which were properly mine in order to allow me to finish it.

P.D.Abel
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1

Water Pollution Problems and Solutions

Water is one of our most important natural resources, and there are many conflicting demands upon it. Skilful management of our water bodies is required if they are to be used for such diverse purposes as domestic and industrial supply, crop irrigation, transport, recreation, sport and commercial fisheries, power generation, land drainage and flood protection, and waste disposal. An important objective of most water management programmes is the preservation of aquatic life, partly as an end in itself and partly because water which sustains a rich and diverse fauna and flora is more likely to be useful to us, and less likely to be a hazard to our health, than one which is not so endowed. To meet this objective, it is necessary to maintain within certain limits factors such as water depth and flow regimes, temperature, turbidity and substratum characteristics, and the many parameters which contribute to the chemical quality of the water. In waters which receive waste discharges, whether by design or by accident, one or more of these variables may come to lie outside the limits which can be tolerated by one or more of the species which live there, and consequently the biological characteristics of the water are altered.

The biologist's role in the monitoring and control of water pollution is to detect and accurately to describe these alterations, to elucidate as precisely as possible the mechanisms by which they are brought about, and to seek to understand the qualitative and quantitative relationships between pollution and its biological consequences. He or she may also need to be aware of the application of biological processes in the control or amelioration of pollution, and of the serious consequences for public health which water pollution threatens. Finally, he or she must be able to offer constructive advice to other specialists—chemists, engineers, administrators and legislators—who share the responsibility for managing our water resources.

All of these topics will be discussed in the following chapters, but first it might be useful to gain some idea of the nature and scale of the problems posed by water pollution.

1.1 The Scale of Water Pollution

Water pollution, like other environmental concerns, has been the focus of widespread public interest for about three decades now, and this interest seems to be increasing. While this has many obvious benefits, it sometimes can appear that the public perception of water pollution, as manifested for example by political debate and the activities of pressure groups, does not always accord with the scientific reality. This can lead to ill-advised or cost-ineffective actions, including legislation and regulation, in an attempt to deal with perceived or publicised problems which may, in fact, be less serious than others which are less well publicised or less easy for the educated layman to understand. It is therefore important to gain some idea of the real nature and extent of water pollution.

Britain may perhaps fairly be taken as a representative example of a developed country, and is one of the few countries, even in the developed world, where adequate information is available to undertake a general survey. In fact, national surveys of water quality have taken place at regular intervals since 1958; they currently take place once every five years, the most recent one for which data are available being in 1990 (NRA, 1991). Of approximately 40000km of main river surveyed in England and Wales, 65.3% was classified in 1990 as 'good'; 23.4% as 'fair'; 9.5% as 'poor'; and 1.6% as 'bad'. (The basis of these classifications, and the applications of the survey data, are described and discussed in more detail in Chapter 6.) Thus approximately 35% of the total length of rivers in England and Wales could be said to be significantly influenced by pollution, and about 12% of the total seriously so. Bad as this may seem, it does in fact represent a considerable improvement of the situation as recorded in earlier surveys 30 or so years ago (see Chapter 6), which perhaps gives some confidence that the application of the principles and techniques outlined later in this book is of some use!

The distribution of the more seriously polluted rivers throughout the country is, of course, by no means even; the worst situations tend to be found in and around the larger conurbations and industrial areas. However, the common perception of pollution as being caused primarily by industry is not correct. Although this may once have been true, the most recent survey data clearly indicate that today other sources, particularly agriculture, require much more attention than they sometimes receive.

This is most easily seen by referring to a report on water pollution incidents which occurred in England and Wales in 1991 (NRA, 1992). Approximately 28000 incidents were reported to the NRA in 1991, a number which has increased fairly steadily since records began in 1981, when about 12000 incidents were reported. This increase is probably misleading. An 'incident' may arise through accidental,

negligent or illegal discharge of wastes to water; or through failure, for whatever reason, of waste treatment processes causing them to exceed their discharge limits. The apparent increase in incidents is probably largely accounted for by the increasingly strict regulation and monitoring of known sources of pollution, and by increased public awareness and willingness to report incidents which in earlier times probably went unnoticed. Nevertheless, and allowing for the fact that about 20% of the incidents reported were unsubstantiated or had no significant effect, over 22000 significant incidents did occur, of which 386 were categorised as 'major'. Of the significant incidents recorded, roughly 28% had causes related to the sewage and water treatment industry itself; 23% related to oil discharges; 13% originated from farms; 12% from industrial sources; and 22% from other sources such as road accidents or leaching of contaminated water from waste dumps.

These figures are probably representative of most Western countries in a similar state of economic and industrial development as Britain, but some idea of the scale of water pollution problems in developing countries can be obtained from Brinkhurst's (1993) account of his experiences in China:

> "It is hard to imagine what horrors are associated with the gross levels of water pollution that an aquatic biologist encounters in the Third World. I have visited the People's Republic of China twice attempting to collect aquatic oligochaetes from clean water. The existence of clean-water species in a group of so-called indicator organisms such as the oligochaetes will be mentioned below, but it is sufficient to say that they were nowhere to be found. Reports exist of normal communities of benthos along the Sino-Soviet border from work done during a previous era of cooperation between China and the USSR. Otherwise, the wide rivers, shown on maps of the middle regions of China, usually are reduced to a thin trickle in the middle of a wide valley. The Gobi Desert surges towards Beijing at an accelerating pace. Only the widths of the bridges and the large areas of dry river bed remain as testimony to the former size of these rivers. The water is sometimes jet black, sometimes rainbow-hued with chemicals, or it is steaming with heat. Even springs among the limestone hills of Guilin contain world-wide 'indicator' species, reflecting upstream contamination not alleviated by a spell underground."

Brinkhurst goes on to surmise that similar scenes are to be witnessed in Eastern Europe; certainly, such information as has become available since 1990 (Carter and Turnock, 1993) indicates that the situation there is extremely bad and still deteriorating. Elsewhere in the world, such limited information as exists on a country-by-country basis does little to counter his pessimism (see, for example, UNEP, 1991).

Yet the experience of Britain and some other of the more fortunate countries of the world shows that it is possible to combine economic and industrial development, increased population and the concomitant demands on water resources, with actual improvement of the conditions of the aquatic environment from the dreadful state which we know existed after our own industrial revolution. What is required is the understanding and application of the relevant scientific and technical principles, combined with an appropriate legislative framework and, of course, preferably an informed and sympathetic climate of public opinion. Those scientific principles most likely to fall within the domain of the biologist form the subjects of the succeeding chapters; but perhaps the best introduction to the scope of the problems to be faced, and some of their solutions, is to look at some case studies.

1.2 Metalliferous Rivers

In many parts of the world, rivers have become contaminated with heavy metals such as zinc, lead and copper as a result of mining and associated activities. In Britain, three areas of the country are particularly well known because they contain a number of metalliferous rivers: one is in the south-west of England, one is in West Wales and one is in the North Pennine Orefield in northern England. Although these areas were once major centres for the extraction and processing of metal and mineral ores, within the last hundred years or so the mining activities have declined considerably, or ceased altogether. These areas never became major population centres, and were never subject to the intensive pollution pressures of modern urban and industrial society. The effects of the mining activity are still detectable, but these effects have not been compounded and complicated by those of other forms of pollution associated with modern development. For this reason, they offer the opportunity to investigate the impact of an important group of industrial pollutants—heavy metals—on waters which are relatively unaffected by the pressures which have more recently been unleashed on water bodies in more densely-populated areas. They have therefore been extensively studied, and provide a good illustration of the biological effects of pollution, of the methods which may be used in studying these effects, and of the questions which biologists seek to investigate and answer about polluted waters. The following account is largely based upon the review of Green (1984). Mance (1987) also discusses some studies of metalliferous rivers.

Ecological studies on metalliferous rivers in West Wales began about 70 years ago, and have continued, intermittently, ever since. Carpenter (1922, 1924) observed that fewer invertebrate species occurred in these rivers at stations close to the lead mines, and that the differences in abundance of invertebrates appeared to be due to lead in the mine effluents rather than to physical differences in the river bed or any other parameter of water quality. Certain invertebrate groups (Platyhelminthes, Mollusca, Crustacea, Oligochaeta and many Insecta) were always absent from the most heavily polluted sites, but some insect species such

as *Cloeon simile* (Ephemeroptera), *Simulium latipes* (Diptera) and *Velia currens* (Hemiptera) appeared to be tolerant of elevated lead concentrations. Following the closure of a mine and the cessation of pollution, Carpenter (1926) described a process of recovery. The first stage was the establishment of a restricted fauna consisting almost entirely of insect larvae on a substratum bearing a limited covering of algae and bryophytes. Oligochaetes, molluscs, platyhelminthes, crustaceans and many insect species remained absent. Subsequently, the encroachment of chlorophyceous algae was accompanied by an increase in invertebrate species diversity, with oligochaetes, turbellarians, caddis larvae and other insects becoming established. In the final stage of recovery, macrophytes were established in physically-suitable areas and there was a large increase in the numbers of invertebrate taxa present, including molluscs, and the development of fish populations. This process of recovery which occurred following the closure of a mine could also be observed in reverse (Carpenter, 1926) when a mine which had been closed for some years was subsequently reopened. The same stages of succession could also be observed contemporaneously in successive reaches of a polluted river with increasing distance from the source of pollution (Carpenter, 1924). The toxic agent responsible for these changes was at first assumed to be lead, particularly dissolved lead rather than the particulate component of the mine effluents. Carpenter (1925) investigated the toxicity of dissolved lead salts to fish, but at the concentrations of lead found in the river water, lead salts alone were less toxic than the river water. This indicated that the mine effluents contained some additional toxic agent, and zinc was soon identified as being an important factor.

During the decades following Carpenter's early investigations, advances in techniques of taxonomy, ecological sampling and chemical analysis provided more detailed information on the effects of metal pollution in upland rivers. Jones (1940a, b) studied the Rivers Ystwyth and Rheidol, also in Wales, and confirmed the general pattern described by Carpenter. In the Ystwyth it became clear that zinc, rather than lead, was the most abundant toxic agent; by 1958 lead levels had declined markedly but zinc levels remained high (Jones, 1958). This probably occurred because zinc is more soluble than lead, and because the pattern of mining activity in the area tended to result in the fairly efficient removal of lead and silver from the ores, whereas waste material dumped in and around the mines remained rich in zinc. Between 1940 and 1958, there was no substantial increase in the number of species found in the Ystwyth. Molluscs, crustaceans, oligochaetes and leeches were still absent. Among the insects, the fauna remained restricted but *Rhithrogena semicolorata* (Ephemeroptera), *Simulium* spp. (Diptera), and the stoneflies *Leuctra* spp. and *Nemoura* spp. were fairly numerous. Caseless caddis larvae were more numerous than cased caddis larvae.

On the basis of some toxicity tests, the absence of fish, molluscs and crustaceans was ascribed to the presence of toxic metals in the water, but the scarcity of flatworms, and the absence of leeches and oligochaetes was thought to be due to the unfavourable characteristics of the substratum. By 1980, little further improvement had occurred. Brooker and Morris (1980) recorded more species than were found in 1958, but much of the increase was apparently due to the fact that some groups of animals earlier identified to genus, particularly chironomids and simulids, were identified to the species. Paradoxically, the association of particular metal levels with the biological characteristics of the water is becoming more difficult. For example, it is now known that high levels of calcium to some extent protect animals from the toxic effects of heavy metals, whereas low levels can, quite apart from any influence of heavy metals, themselves act as limiting factors.

A great deal more is now known about the influence of purely physical factors on the patterns of distribution of invertebrate species. Therefore it is less easy than it might earlier have appeared to interpret the available biological data solely in terms of the measured heavy metal levels. Nevertheless in the nearby river Rheidol, where metal levels are lower, the invertebrate community is distinctly richer. Whereas Carpenter (1924) recorded 29 species, Laurie and Jones (1938) recorded 103 following a distinct reduction in the metal levels some years earlier; Jones (1949) recorded 130 species, though molluscs and crustaceans were still absent. Brooker and Morris (1980) recorded 134 species.

Elsewhere in Britain and in other parts of the world, metalliferous rivers similar to those in Wales have been widely studied, though rarely over such a long period of time. In south-west England, Brown (1977) studied the River Hayle which is contaminated with zinc, copper and iron. Metalliferous rivers in the North Pennine Orefield have received some attention (e.g. Armitage, 1980). Examples from North America include the studies of Sprague *et al.* (1965) on rivers polluted with copper and zinc; and of Gale *et al.* (1973) on rivers polluted with zinc and lead. Zinc-polluted rivers in Australia have been investigated by Weatherley *et al.* (1967). The river South Esk in Tasmania, which contains cadmium, zinc, copper, iron and manganese, has been investigated by Thorp and Lake (1973), Tyler and Buckney (1973) and Norris *et al.* (1982). There are, of course, many other rivers polluted with heavy metals, but in most of these the effects of heavy metal pollution are compounded or modified by substantial inputs of organic matter and/or other industrial pollutants. Based on his review of investigations relating to rivers polluted solely or predominantly by heavy metals without these other complicating factors, Green (1984) drew attention to the following general points.

In rivers polluted by heavy metals, the invertebrate fauna is affected by the elimination, or numerical reduction, of certain species. If the input of pollution ceases, the invertebrate fauna gradually recovers with the passage of time. A

similar process of recovery can be observed with increasing distance from a source of pollution, as the concentration of pollutants decreases. The nature of the recovery is a gradual increase in the numbers of species and in the numbers of individuals found in the water. Taxa which are universally affected by metal mining and associated activities are Mollusca, Crustacea, Platyhelminthes and Oligochaetes. Some groups, however, appear to behave inconsistently in response to metal pollution. One such group is the larvae of caddis flies (Trichoptera). In the Rheidol and Ystwyth, for example, Jones (1940b) noted the absence of cased caddis larvae from polluted stations, whereas carnivorous, caseless species such as *Rhyacophila dorsalis* and *Polycentropus flavomaculatus* were present. In laboratory experiments, no evidence was found that the concentration of dissolved metal found in the rivers was lethal to cased caddis species, and in fact some species were able to construct their cases, in the laboratory, from particles of solid mine waste. This suggested that metals may exert indirect effects on some species in the field, possibly related to the effects of the metal on the food source of the caddis larvae.

An alternative explanation, of course, may be that sublethal toxicity rather than lethal toxicity plays some part in the elimination of species. Animals may be able to survive, for a short period of time, exposure to levels of metals similar to those found in the rivers, but may be unable to complete their entire life cycles under these conditions. In some cases, however, caddis larvae appear actually to become more abundant than expected in the polluted stretches of metalliferous rivers (Norris *et al.,* 1982; Sprague *et al.,* 1965; Weatherley *et al.,* 1967). Commonly, reduced predation pressure from fish has been suggested as a possible reason for this. There is also some inconsistency in the reported response of another important insect group, the Ephemeroptera (mayflies), to metal pollution. Some invertebrate groups which are commonly reduced or absent from polluted waters appear to be affected by alterations to the physical characteristics of the river bed which are caused by the particulate matter in mine effluents, rather than by the toxic action of the metals themselves. Oligochaetes, platyhelminths and leeches are possible examples.

Another form of stream-bed alteration which may have profound effects is the development of excessive algal growth, as reported in some metalliferous rivers in northern England (Armitage, 1980). One hypothesis to account for this process is that the metals, by removing herbivorous invertebrates, allow the establishment of an unusually luxurious algal mat on the river bed, which in turn interferes with the normal patterns of distribution of animals which are not themselves directly affected by the metal. Algal growth may, of course, be enhanced in rivers with substantial inputs of plant nutrients or organic matter, so this particular phenomenon may not be universal. However, there is evidence (see Chapter 4) that organic matter can afford some protection to aquatic species from the toxic effects of metals, so the outcome in any individual case may be difficult to predict. Indeed, no two rivers

are exactly similar in their physical, chemical andbiological characteristics, and the interactions of living organisms with one another and with their physical environment are so complex that whatever general pattern emerges, it will inevitably be subject to significant variations of detail according to the precise local circumstances.

One major difficulty in studying the effects of pollution in the field and in drawing from them conclusions of general applicability is that it is usually impossible, in any individual case, to compare what is happening in the polluted river with what would have been happening had the river not been polluted. Most commonly, surveys of polluted rivers consist of contemporaneous observations of different sites along a river or within a river system at different distances from the source of pollution. However, it is well known that, even in the complete absence of pollution, the biological characteristics of different points within a river system vary widely according to the physical and chemical conditions prevailing at the different locations. The precise relationships between the biological community and its physical environment are not well understood, and it is therefore extremely difficult to distinguish the consequences of pollution from the response of the community to natural variations in its physical environment. The RIVPACS system (see Chapter 3) represents a recent development towards a solution of this difficulty. Nevertheless, it would be very interesting to have available for study two physically and chemically identical rivers, of which one was polluted (preferably with a single pollutant). In practice, such a pair of rivers probably does not exist, although attempts have been made on a limited scale to approach this situation experimentally. However, a pair of rivers which approaches this ideal as closely as we may reasonably hope is to be found in the North Pennine Orefield in northern England, and may be used as a case study.

1.2.1 The Rivers East and West Allen

The Rivers East and West Allen in Northumberland, England, lie within the North Pennine Orefield. They flow roughly northwards for approximately 18 kilometres before joining to form the River Allen, itself a tributary of the South Tyne (Figure 1.1). The rivers drain adjacent valleys which were heavily exploited for a variety of metal and mineral ores, particularly during the eighteenth and nineteenth centuries. After the early years of the present century, mining activity declined rapidly and virtually ceased in 1946. Sporadic mining for fluorspar took place at the Beaumont mine at the head of the East Allen until 1979, and a very limited amount of mining continued intermittently at Barneycraig on the West Allen until 1981; since that time no activity has been recorded in either valley. Until the end of the nineteenth century, mining in the Allendales was dominated by the production of lead ore. The West Allen mines, in particular, produced substantial quantities of zinc ore, but this seems to have been simply discarded prior to 1899, being

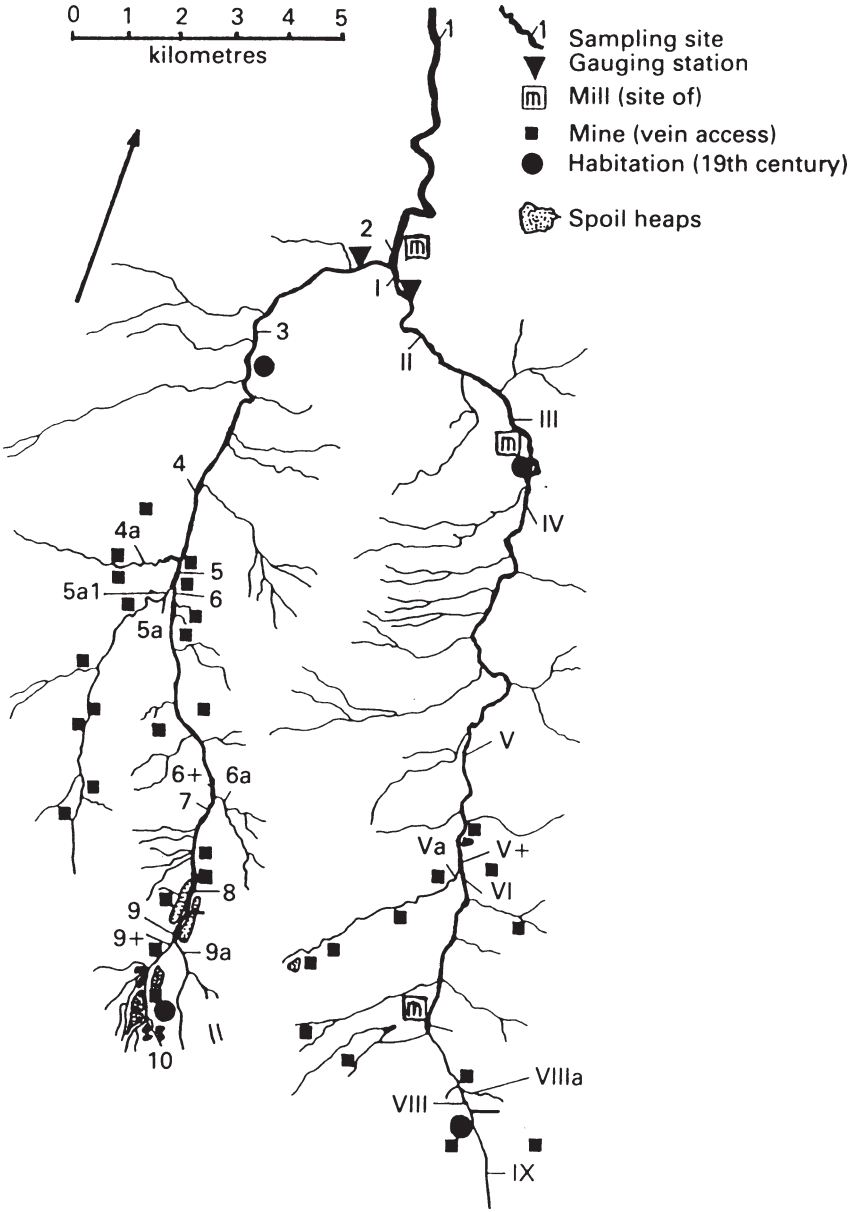

Figure 1.1 Map of the Rivers East and West Allen, showing sampling stations, derelict mines and workings, and remaining spoil heaps. After Green (1984)

returned as backfill to disused shafts or left in surface spoil heaps. Although the East Allen mines produced far greater quantities of ore than those on the West Allen, the zinc-bearing veins are almost entirely confined to the West Allen. Moreover, in the East Allen valley most of the waste material was removed when the mines closed, while on the West Allen there remain extensive areas of spoil heaps and derelict land associated with mining activity. As a result, the River West Allen today contains considerably higher levels of zinc than the East Allen. A comparative study of these two physically-similar and geographically-adjacent rivers therefore provides a valuable opportunity to study the ecological effects of zinc.

1.2.2 Physical and Chemical Survey

A series of 15 sampling stations was established on the West Allen and its tributaries. A further 12 stations on the East Allen were chosen for

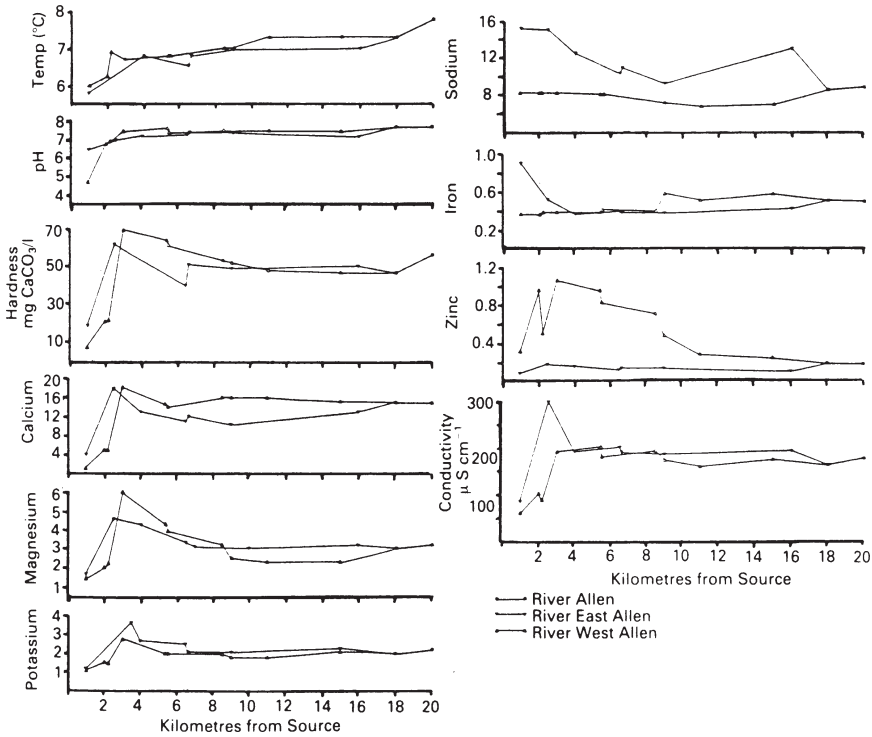

Figure 1.2 Median values of chemical determinands at mainstream sites on the Rivers East Allen, West Allen and Allen, plotted against distance from source (Green, 1984)

Table 1.1 Values of chemical variables for one pair of equivalent sites on the East and West Allen, 1979–80. Data from Abel and Green (1981). (Values as mg l^{-1} unless otherwise stated; ND = not detectable)

	Detection limit	West Allen Site 7		East Allen Site VI	
		Mean	Range	Mean	Range
pH		7.7	6.7–8.6	7.5	5.9–8.8
conductivity (μS cm^{-1})		257	61–460	214	62–330
Ca		33	6–73	38	5–65
Mg		6.39	1.35–13.8	3.9	1.57–13.8
K		2.5	0.5–4.1	2.9	0.8–5.2
Na		9.53	4.5–16	12.75	5.3–23.4
Mn		0.10	0.01–2.0	0.17	0.01–1.0
Fe		0.41	0.01–1.1	0.22	0.01–1.0
Pb	0.1		ND–trace		ND–trace
Cu	0.03	ND		ND	
Co	0.06	ND		ND	
Cd	0.01	ND		ND	
Ni	0.06	ND		ND	
Zn	0.001	1.31	0.45–3.68	0.13	<0.001–0.36

comparative study. The East Allen stations were chosen so that each was broadly similar in physical terms (width, depth, distance from source, substratum characteristics, nature of the surrounding terrain) to a site on the West Allen. Thus sites 7, 6a and 6+ on the West Allen could be considered as 'equivalent sites' to VI, Va and V+ on the East Allen (Figure 1.1). Between June 1979 and October 1980, samples for chemical analysis were taken twice monthly from each site. The results are summarised in Figure 1.2. In terms of temperature, pH, conductivity and a wide range of chemical determinands the two rivers are very similar. Zinc levels in the West Allen were consistently up to ten times higher than in the East, placing some stretches of the West Allen among the most heavily zinc-polluted rivers and the East Allen at the upper end of the range found among rivers which may be considered unpolluted. Concentrations of toxic heavy metals other than zinc (copper, cadmium, lead, nickel, chromium) fell consistently below the detection limits of atomic absorption spectrophotometry. Some representative data for one pair of equivalent sites are given in Table 1.1, and levels of dissolved zinc for several pairs of sites are compared in Table 1.2. Compared to the soft, acidic Welsh rivers discussed earlier, the Allens are slightly alkaline and harder, though the zinc levels are broadly comparable.

Table 1.2 Concentrations of filtrable zinc (mgl^{-1}) in river water from equivalent sites on the East and West Allen, 1979–80. Data from Abel and Green (1981). West Allen sites are designated by Arabic numerals, East Allen sites by Roman numerals

West Allen				East Allen			
		Zinc concentration				Zinc concentration	
Site	km from source	Mean	Range	Site	km from source	Mean	Range
10	1	0.24	0.04–0.56	IX	1	0.24	<0.001–0.83
8	3	1.88	0.65–4.15	VII	4	0.19	0.1–0.34
7	5.5	1.31	0.45–3.68	VI	6.5	0.13	<0.001–0.36
6a[a]	5.5	0.09	<0.001–0.33	Va[a]	6.5		0.04–0.49
6+	5.5	0.87	0.09–1.88	V+	6.5		0.11–0.14
5	9	0.51	0.12–1.22	V	9		<0.001–0.23
4	11	0.50	0.04–1.28	IV	13		0.08–0.49
3	15	0.34	0.08–0.80	III	17		0.04–0.31

[a]Denotes tributary site.

1.2.3 Biological Survey

Twenty-three sampling stations on the two river systems were surveyed in May, June and October 1980. In addition certain sites were surveyed at monthly intervals during this period. Five replicate Surber samples (see Section 3.3) were taken on each sampling occasion. The results of the survey indicated that the East Allen is, in biological terms, typical of many upland streams and rivers. The fauna is dominated by insects, with molluscs, crustaceans, oligochaetes and platyhelminths also represented. In all 121 taxa were recorded from the Allens during the survey (this number has since increased considerably, partly through improved taxonomic techniques). As expected, the headwaters of the East Allen are relatively poor in species and numbers of individuals, but the fauna develops rapidly and in its lower reaches the East Allen is a moderately good trout fishery. In contrast the West Allen, though initially similar to the East, receives zinc inputs about three kilometres from its source and the invertebrate fauna is markedly affected; some of the survey results are summarised in Figure 1.3. Within the general pattern of reduced species diversity and numbers of individuals at the zinc-polluted sites, the effects of the zinc on particular invertebrate species could clearly be seen. Four species which were common in the East Allen were entirely absent from the mainstream of the West Allen: *Gammarus pulex* (Crustacea), *Ancylus fluviatilis* (Mollusca), *Taeniopteryx nebulosa* (Plecoptera), and *Hydroptila* sp. (Trichoptera). Several other species were absent from many stations on the West Allen, although present

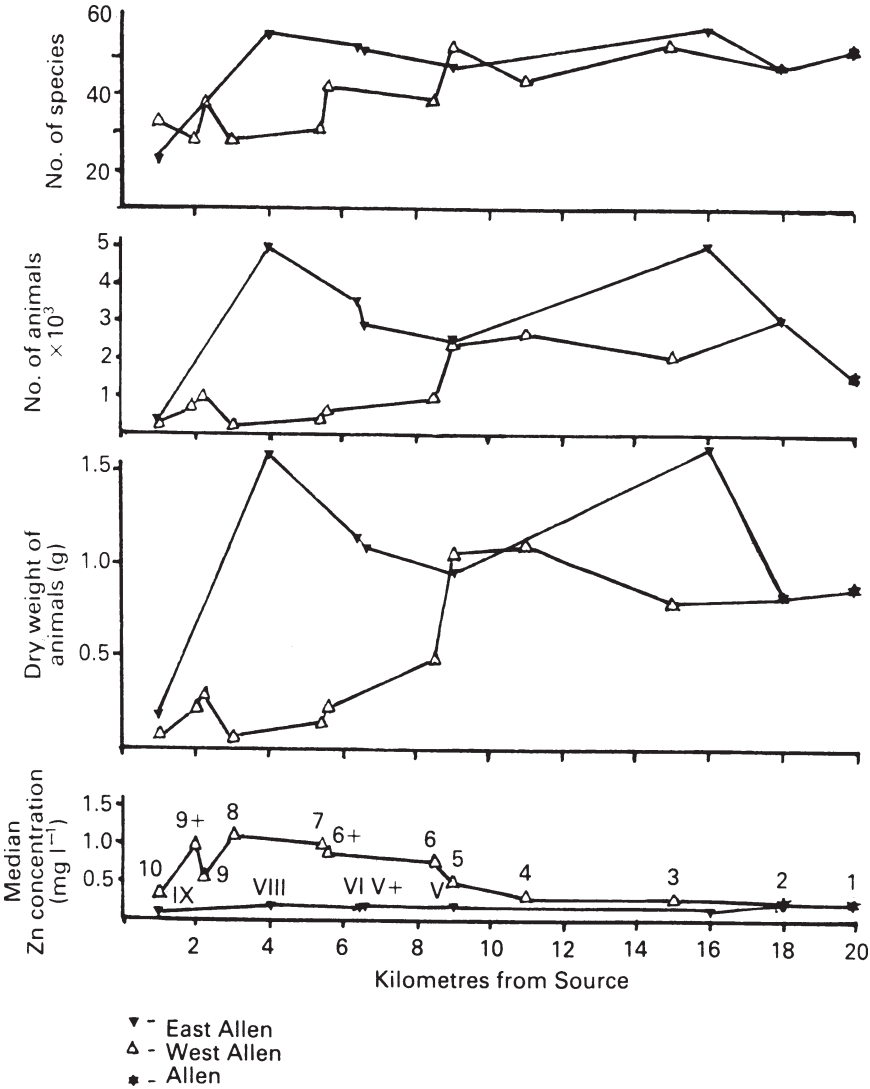

Figure 1.3 Total number of species, total number of animals and the total dry weight of animals collected from each sampling station during May-October 1980 in the Rivers East Allen, West Allen and Allen (Green, 1984)

in the East (Table 1.3). Species found in both rivers were generally present in greatly reduced numbers in the West Allen; Figure 1.4 shows some data for Plecoptera species, and similar patterns were shown by Ephemeroptera, Trichoptera, Coleoptera and Diptera. Moreover, the survey data indicated that the life cycles of some species were altered in the zinc-polluted stretches. For example, nymphs of the stonefly *Amphinemoura sulcicollis* disappeared

Table 1.3 Species found along the length of the East Allen, but absent from three or more sites on the mainstream of the West Allen. Data from Green (1984)

Plecoptera:	*Leuctra fusca*
	Siphonoperla torrentium
	Taeniopteryx nebulosa[a]
Ephemeroptera:	*Ecdyonurus venosus*
	Ecdyonurus dispar
	Baetis muticus
	Ephemerella ignita
	Caenis sp.
Trichoptera:	*Hydropsyche instabilis*
	Hydropsyche fulvipes
	Hydroptila sp[a]
Crustacea:	*Gammarus pulex*[a]
Mollusca:	*Ancylus fluviatilis*[a]

[a]Species absent from all sites on the mainstream West Allen.

from the East Allen in July/August as the mature nymphs emerged from the water as adults. Nymphs of the new generation were abundantly reestablished by October; in the West Allen, however, no new nymphs had appeared by October in the more polluted stretches, perhaps because the peak zinc concentrations tend to occur during the summer and have a particularly marked effect on the early life stages. Possibly the limited populations of this and similarly-affected species in the West Allen are restored later in the year by downstream drift from unpolluted tributaries. The results of some further analyses of the survey data are described in Section 3.4.

1.2.4 Zinc Toxicity

The depletion of the invertebrate fauna in the zinc-polluted stretches may be due to the direct toxic action of the zinc; or may arise as a consequence of, for example, the disappearance of an animal's prey species or some other indirect cause. Green (1984) tested the lethal toxicity of zinc to several invertebrate species under conditions similar to those found in the Allens. One way to measure lethal toxicity is to determine the concentration of the poison which will kill half of a sample of animals within a specific period, such as four days—this value is termed the 96-hour median lethal concentration, or 96 h LC50. Methods of measuring toxicity are discussed in detail in Chapter 4. Table 1.4 shows some results. All of the species tested

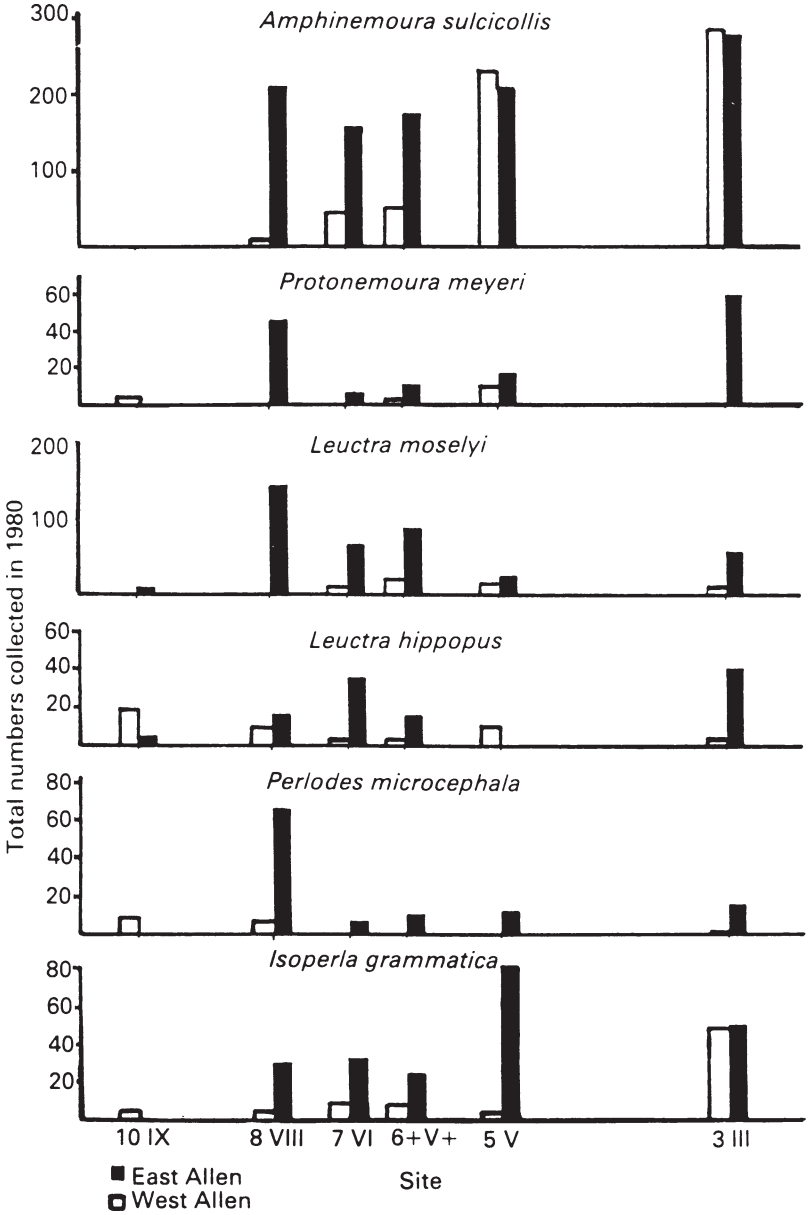

Figure 1.4 Total numbers of selected species of Plecoptera (stoneflies) from 'equivalent sites' on the Rivers East and West Allen during May-October 1980 (Green, 1984)

Table 1.4 Toxicity of zinc to some invertebrate species. Data extracted from Green (1984). Where two sets of results are given, the results represent the range of toxicity values recorded in replicate tests carried out at different times

Species	Result[a]
Gammarus pulex	2.0(1.67–2.40) 336 h LC50 0.66 (0.50–0.88)
Baetis rhodani	1.3(0.6–2.9)
	31(16.3–58.9) 336 h LC50 16.5 (7.5–36.3)
Rhithrogena semicolorata	70(36.8–133) 336 h LC50 52 (34.4–78.5)
	135(71–256) 336 h LC50 68 (45.3–102)
Leuctra moselyi	15.7(9.24–26.7)
	55(30.6–99) 336 h LC50 17.5 (4.07–75.3)
Amphinemoura sulcicollis	120 h LC50 130 (59.1–286)
Isoperla grammatica	90(40.9–198)
Lymnaea peregra	2.6(0.8–8.3)
Chloroperla tripunctata	No mortalities in 144 h at concentrations >360 mg l^{-1}
Deronectes depressus	No mortalities in 14 h at concentrations >360 mg l^{-1}
Limnephilus sp.	No mortalities in 288 h at concentrations >360 mg l^{-1}

[a]96 h LC50 values in mg l^{-1} unless otherwise stated.
Values in parentheses are 95% confidence limits.

were either absent from all or part of the West Allen mainstream, or found only in greatly reduced numbers.

Comparing the zinc levels in the water (Table 1.2) with the values in Table 1.4, three groups of animals can be distinguished. First, those such as *Gammarus pulex* and the snail *Lymnaea peregra,* for which the LC50 values are very close to the zinc concentrations found in the river. It is reasonable to conclude that the river water is rapidly toxic to these species, and that any individuals which found themselves in the polluted stretches would quickly die if they were unable to escape speedily to a less polluted area. Second, there is a group of species which appears to be remarkably resistant to zinc. The stonefly *Chloroperla tripunctata,* a caddis fly of the genus *Limnephilus,* and the beetle *Deronectes depressus* withstood concentrations of zinc greater than 360 mg l^{-1} for up to 12 days without any animals dying at all. This suggests that although the possibility of sublethal toxicity cannot be discounted, it is likely that mechanisms other than the direct effect of zinc on the animals are largely involved. Third, there is an intermediate group for which median lethal zinc concentrations are roughly between 10 and 100 times higher than the zinc levels recorded in the river. For this group, indirect effects may also be involved; however, experience with many poisons and animals, particularly fish, which have been more extensively studied, suggests that sublethal toxicity of zinc is likely to be an important factor in the observed ecological status of these species.

Some species were tested on more than one occasion at different times of the year and the median lethal concentrations varied considerably (Table 1.4). In part, this is probably a reflection of the fact that toxicity often cannot be measured, however it is expressed, with great precision. However, it is possible that some species vary in their susceptibility to zinc at different times of the year, according to the stage of the life cycle which they have reached. The effect seems to be particularly marked in the case of the mayfly *Baetis rhodani*. This feature of the results, along with the various aspects of sublethal toxicity and the nature and extent of the indirect effects of zinc, all need to be further investigated before the effects of the zinc on the receiving water fauna can be fully understood.

1.2.5 Some Further Questions

The investigations of the Allens and other metalliferous rivers show that in each case, the effects of the metal on the receiving water fauna are broadly similar. Generally, it is observed that there is a reduction in the number of species present in the polluted areas, together with a reduction in numbers of individuals of those species which are not eliminated altogether. Certain species appear to be particularly sensitive to heavy metals, others apparently more resistant, and the status of some species with respect to metal pollution appears to vary from one location to another. In other words, there is a perceptible general pattern which is subject to variations in detail. It is important to know to what extent the findings of any particular study are of general application, and to what extent they are restricted to, for example, particular geographic regions, or to waters which have particular physical, chemical or biological characteristics. Therefore it is necessary to consider in more detail the ecotoxicological mechanisms which may underlie the observed effects of the metals. By doing this, it will be possible to illustrate some of the biological questions which may arise out of the investigation of a polluted water.

The role of sublethal toxicity is potentially an important area for further investigation. In the river West Allen, the concentrations of zinc which are lethal to several of the affected species are between 10 and 100 times higher than the zinc levels recorded in the water, that is, within the range where sublethal toxicity may be expected. The measurement of sublethal toxicity gives rise to a number of technical and conceptual difficulties, some of which are discussed in detail in Chapter 4. However, some experiments on sublethal effects of zinc on Limnephilid caddis larvae (which are generally absent from the West Allen) were reported by Abel and Green (1981). These experiments showed that feeding rates of the animals, expressed as the quantity of food consumed per day, were reduced by 30% in animals exposed to the levels of zinc consistently recorded in the river water. The same authors claimed that activity levels, expressed as the percentage of time spent swimming by

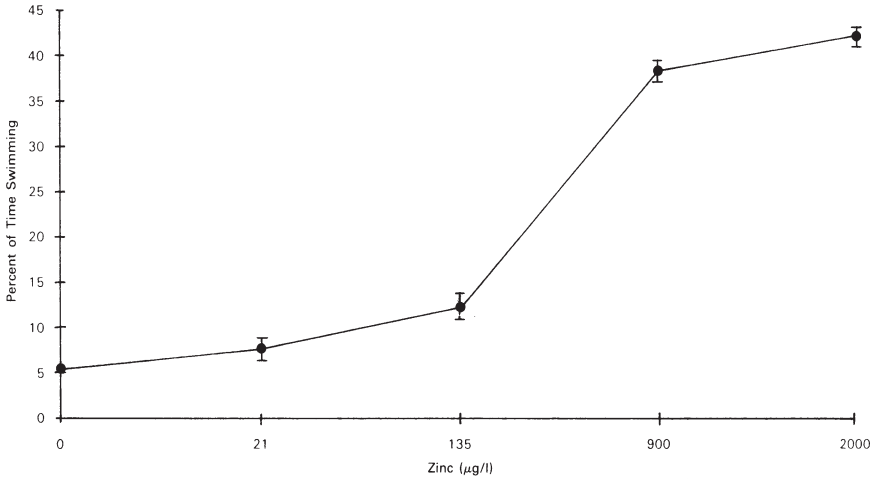

Figure 1.5 Percentage of time spent actively swimming by *Gammarus pulex* exposed to different concentrations of zinc. Animals were observed via a remotely-controlled video camera to minimise disturbance

animals in an observation chamber, were considerably increased by exposure to the ambient zinc levels of the West Allen. These findings (for the Isopod crustacean *G. pulex*) were confirmed by Austin (1992) using a more sophisticated observation procedure based on analysis of remotely-controlled videotaped observations of the animals under similar conditions (Figure 1.5); and Crane (1995) also found that the feeding rate of *G. pulex* was reduced by 50% at a zinc concentration of 0.5 mg l^{-1}.

Whatever the underlying mechanism, a combination of increased activity combined with decreased feeding is potentially of profound ecological significance, leading for example to decreased growth rate and reproductive capacity, and may be associated with the ecological effects of the pollutants on the aquatic fauna. The increased activity levels may represent avoidance reactions on the part of the animals—it has been well documented that fish and invertebrates show measurable avoidance reactions to pollutants in laboratory choice chambers. In the field, hyperactive invertebrates are likely to suffer from increased rates of downstream drift, leading to depopulation of polluted stretches of river. Gilhooley (1988) showed this effect in artificial stream channels at the concentrations of zinc typically found in metalliferous rivers. Similar effects have been recorded in artificially-acidified streams in experiments to assess the ecological impact of acidification of waters (Hall *et al.,* 1980; Ormerod *et al.,* 1987).

Another aspect of sublethal toxicity is the possible accumulation of metals in the animal tissues. Animals may survive exposure to low levels of pollutants without apparent effect, but may continue to accumulate metal from solution, by ingestion

of or contact with particulates, or from their food, until harmful levels of the pollutant in the tissues are reached. These considerations relate not only to heavy metals but also to refractory organic pollutants including certain pesticides. One reason for concern about this phenomenon is that animal tissues containing heavy metals (and other pollutants) may cause harm to consumer organisms—fish consumed by humans are an obvious example—but there are obvious concerns relating to the passage of pollutants up the food chain which may affect all predators. If, however, we consider simply one species without regard to these aspects, we still need to know whether the level of metal in the tissues is harmful to the organism itself. For reasons explained in Chapter 4, this is not always an easy question to answer; however, the presence of the class of inducible metal-binding proteins known as metallothioneins (see Chapter 4) may be used as an indication that the level of metal in the organism under study is abnormally high. Metallothioneins have been tentatively identified as being present in the tissues of some invertebrates living in metalliferous rivers in the North Pennine Orefield (see Figure 4.18).

The effects of other poisons, and of environmental factors which modify toxicity, should also be considered. In many of the rivers referred to above, more than one metal was present in significant quantities. In the zinc-polluted river Nent in the North Pennine Orefield, substantial inputs of organic farm waste were recorded (Armitage, 1980), which may modify the toxicity of the heavy metals present (see Chapter 4). Clearly, some of the differences observed between different rivers may be attributable to such confounding factors. In addition, the toxicity of heavy metals is greatly influenced by levels of calcium, and indeed calcium itself may be a limiting factor; while it may be tempting to ascribe the absence of certain species (particularly molluscs and crustaceans) to the presence of zinc or other heavy metals, they may in fact be limited by levels of calcium lower than 10 mg l^{-1} (Edwards *et al.,* 1978). Even levels of sodium may be limiting to some species (Sutcliffe, 1967, 1983). It is particularly important to take account of such factors in upland, mineral-poor waters where faunistic differences may be too easily and simplistically ascribed to pollution effects whereas in fact they may reflect the effects of natural influences.

The partitioning of the zinc in the river environment is likely to have a great bearing on the correct interpretation of toxicological data. The precise form in which the zinc is present can have a large influence on its toxicity (see Section 4.2). Metals may exist, in the aquatic environment, in dissolved, colloidal or particulate form; in two or more different oxidation states; as simple ions, inorganic complexes or organometal complexes. The biological and toxic properties of these different forms may vary greatly. In laboratory tests, the metal is normally presented to the animals in dissolved form, but it is almost certainly never entirely in the form of simple ions. In the river, the measurements made of 'dissolved' metals are, more accurately, of that fraction of the metals which can pass through a 0.45 μm filter, which is not necessarily the same thing. Another aspect of partitioning is

that many animals burrow into the substratum, and may be exposed to levels of zinc in the substratum which are much higher than those in the overlying water. Green (1984) devised an apparatus for sampling the interstitial water without contamination with overlying water, and in the Allens found zinc levels in the interstitial water up to 25 times higher than those in the water flowing over the substratum. All of these factors complicate the interpretation of toxicological data and their application to the situation in the field.

Finally, the effects of the pollutant on the decomposer organisms of the river may be considered. The productivity of many aquatic ecosystems, particularly rivers, is sustained by the input of allochthonous organic matter (that is, organic material from outside the river) such as dead leaves. Decomposer organisms—bacteria and fungi especially—are thus of great importance in making available to the river fauna the major energy source represented by detritus. Indeed it is likely that most aquatic animals, like animals generally, cannot readily digest plant material unaided by microorganisms. An invertebrate may appear to be eating a dead leaf, but in reality is probably obtaining its nutrition from the bacteria, fungi, protozoa and microinvertebrates which have colonised the leaf and processed it into a form which is more accessible to detritivorous macroinvertebrates. Zinc is known as a fairly potent bactericide and fungicide. Possibly, therefore, one effect of the zinc is to interfere with the processing of detritus by decomposer organisms, thus depriving the invertebrates of a major food source and being indirectly responsible for the depletion of the fauna. Similar arguments have been adduced in relation to the acidification of surface waters (Haines, 1981; Howells, 1990; see Chapter 2). However, Chappell and Goulder (1994) studied the activity of extracellular microbial enzymes in the rivers East and West Allen, and found no evidence of reduced activity in the zinc-polluted river.

These and similar questions will be recurring themes in the following chapters. Even an apparently simple and straightforward case of a river polluted with a single toxic agent can clearly give rise to some questions which are difficult to answer. It is important, however, to understand the mechanisms by which the observed effects of the pollution are brought about, because this understanding may lead us to the means by which the effects can be remedied or at least ameliorated. The next case study shows that with a suitable combination of field and laboratory studies, detailed investigation of the effects of pollutants can provide an empirical basis for tackling practical problems relating to the control of pollution and the management of polluted waters.

1.3 Toxicity and the Status of Fisheries

Our second case study illustrates the way in which toxicological data obtained from laboratory investigations can be combined with chemical and biological data from field surveys into a predictive model which suggests specific measures to

protect or improve the status of fisheries in polluted waters. The example is particularly instructive because historically, toxicological research has been dominated by the measurement of lethal toxicity. There is, therefore, a widely-held view that a great deal of toxicological research is misdirected, irrelevant or of limited value in the actual management of polluted waters, since the most intractable problems in practice arise from sublethal, rather than lethal, toxic effects. The following example shows that this view is based on an inadequate understanding of the applications of toxicological data.

The account is based upon the application by Alabaster *et al.* (1972) of the results of a long series of investigations carried out by what was then the Water Pollution Research Laboratory, a Government establishment in Stevenage, UK. These investigations were based upon the work of a substantial number of people carried out over a period of nearly 20 years. The results can be synthesised into an empirical relationship between the presence of certain common toxic pollutants and the ecological status of aquatic communities which can be used for specific management purposes. For example, when several pollutants are present, it allows the identification of those which are responsible for the greatest adverse effects, so that pollution control measures can be selectively directed towards those pollutants whose removal would lead to the greatest improvement. It also allows predictions to be made of the likely effects of additional pollution, or of physical changes in the receiving water environment.

In the more heavily polluted rivers of Britain and of similar industrialised countries, the most abundant toxic pollutants are copper, zinc, phenol, cyanides and ammonia. The toxicity of these poisons to the rainbow trout, *Salmo gairdneri,* was first studied in great detail. The rainbow trout was chosen because it is a widely-available species, is amenable to life in the laboratory, and is a fish of considerable commercial importance. Consequently a great deal is known about many aspects of its biology. Additionally, it is sensitive to most toxic pollutants and reacts more quickly than most species to adverse environmental conditions. Within a few years, the lethal toxicity of the common pollutants to this species was reliably determined. The effects of common environmental variables on pollutant toxicity were also studied. In particular temperature, water hardness, pH and dissolved oxygen concentration were found to have significant effects on the toxicity of many pollutants. Finally, methods were devised for the study of the effects of fluctuating concentrations of poisons, and for determining the toxicity of poisons in different combinations of varying composition. Much of this work is described in greater detail in Chapter 4.

A crucial idea in the development of this approach is that of the unit of toxicity, or toxic unit. A toxic unit was defined as the concentration of a pollutant which would kill half of a sample of rainbow trout in 48 hours (i.e. the 48-hour median lethal concentration or 48 h LC50 as described in Chapter 4). Because trout react

quickly to most poisons at lethal concentrations, the 48 h LC50 is close to the lethal threshold concentration, that is, the concentration which would just kill half the sample of fish during an exposure of indefinite duration. A few simple examples will illustrate how toxic units are used.

Assume that, under a certain set of conditions, it is found that the concentration of zinc which will kill half the trout in 48 hours is 2 mg l^{-1}. Under these conditions, one toxic unit of zinc is 2 mg l^{-1}. Now, assume that the experiment is repeated under similar conditions, but in water which has a greater degree of hardness. It may be found that the 48 h LC50 for zinc is now 10 mg l^{-1}. Under these new conditions, one toxic unit of zinc is 10 mg l^{-1}, and 2 mg l^{-1} zinc is now equivalent to only 0.2 toxic units. Now assume that we wish to measure the toxicity of copper to trout. In soft water, one toxic unit of copper may be equal to 0.5 mg l^{-1} and in hard water 2.5 mg l^{-1}. Now assume that we wish to know whether, in the soft water, fish would survive in the presence of 1.5 mg l^{-1} zinc together with 0.25 mg l^{-1} copper. In this case, 1.5 mg l^{-1} zinc equals 0.75 toxic units, and 0.25 mg l^{-1} copper equals 0.5 toxic units. The total number of toxic units is therefore 1.25, whereas we know that by definition, 1 toxic unit will kill half the fish in 48 hours. Therefore we would expect that significantly more than half of the fish would die within 48 hours. In the hard water, however, zinc would contribute 0.15 toxic units, and copper 0.1 toxic units, a total of only 0.25 toxic units. We might therefore expect that the majority of fish would survive these concentrations of zinc and copper in the hard water. These expectations assume, of course, that the effect of the poisons in combination is neither more nor less than the sum of their individual effects. This point has been extensively investigated (see Section 4.2.3) and fortunately, with some important exceptions, appears to be generally true for this group of pollutants. It is not true, however, for all combinations of pollutants. The toxicity of mixtures of poisons is discussed more fully in Chapter 4.

The next stage is to use this technique to estimate the expected toxicity of polluted river water to fish, and to compare the results with the observed status of fish populations. It is not difficult to measure the concentrations of zinc, copper, phenol, cyanides and ammonia in samples of river water. The temperature, pH, hardness and dissolved oxygen concentration of the water at the time of sampling must also be determined. Using these data, the measured concentrations of each pollutant, in mg l^{-1}, can be converted into toxic units. Summing these 'fractional toxicities' will give a measure, in toxic units, of the total toxicity of the river water. Obviously, the toxicity of the river water will vary with time, depending upon the amount of effluent being discharged, the quantity of water available for dilution, and the prevailing environmental factors. It would not be sensible to try to associate the observed status of the fish population of a stretch of river with the toxicity of the water on any single occasion. It is necessary to take a relatively large number of samples over a reasonably long period of time, ideally a whole

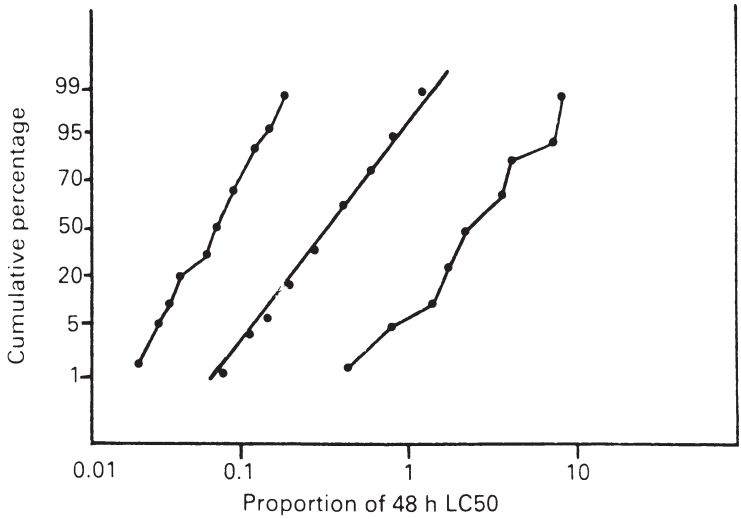

Figure 1.6 Distributions of toxicity calculated by the method of Alabaster *et al.* (1972). The line on the left is typical of a station which supports fish; the line on the right represents a fishless station; and the central line is reconstructed from the boundary distribution of toxicity between fishless and fish-supporting stations in the River Trent catchment. See text for explanation

year, and to calculate the toxicity of the water on each occasion. A graph of the kind shown in Figure 1.6 then is constructed. Each sampling station investigated generates one line on the graph.

The line on the left of Figure 1.6 represents the distribution of toxicity over time at a sampling station which sustains a fish population. It is constructed by plotting the cumulative frequency with which a given level of toxicity occurs in a number of samples taken from the site under investigations over a period of time. It is convenient to plot the graph using a logarithmic scale for the toxicity values and a probability scale for the y-axis. Thus, in the example shown, on 5% of sampling occasions the toxicity was equal to or less than 0.04 toxic units. On 20% of occasions, it was equal to or less than 0.055 toxic units, on 50% of occasions it was equal to or less than 0.08 toxic units, and so on. The line on the right of Figure 1.6 represents toxicity distribution typical of a fishless station. The increased toxicity of the water is represented by a shift of the line towards the right. Plotting a large number of these lines (one for each of the sampling stations studied) showed that the lines fell in various places on the diagram, depending upon the distributions of toxicity recorded at each station. However, lines corresponding to stations where fish were normally present were grouped to the left of the diagram, and lines corresponding to stations which were normally fishless were grouped to the right; a line can be constructed through the

Table 1.5 Coordinates of approximate boundary distribution of 48 h LC50 between fishless and fish-supporting waters in the River Trent catchment area, England. See Figure 1.5 and text for explanation. Data from Alabaster *et al.* (1972)

Per cent probability	1	5	10	25	50	75	90	95	99
Sum of proportions of LC50	0.07	0.10	0.13	0.18	0.28	0.41	0.60	0.73	1.1

narrow zone of demarcation between the two groups. From this line it is possible to read off the 'coordinates of boundary distribution between fishless and fish-supporting waters' (Alabaster *et al.,* 1972). The central line in Figure 1.6 has been reconstructed from the coordinates determined by Alabaster *et al.* (1972) for sampling stations in the catchment area of the River Trent. The values of the coordinates are shown in Table 1.5.

These data show that a water will only sustain a fish population if for at least 50% of the time the toxicity of the water is less than 0.28 toxic units; and if for 90% of the time its toxicity is less than 0.6 toxic units, for 95% of the time less than 0.73 toxic units, and so on. Where the toxicity of the water exceeds 1.0 toxic unit for as little as 2 or 3% of the time, fish will generally be absent. The simplest way to determine whether or not a sampling station is likely to support fish is to draw the line of toxicity distribution. If the line, or any substantial portion of the line, falls to the right of the boundary line, the water will be unlikely to support fish. The further to the left the line falls, the smaller is the likely effect of toxic pollution on the fish population. Where the line falls to the left of the boundary but close to it, the fishery may be of only marginal quality.

Although this relationship between toxicity and fishery status is purely empirical, it has considerable potential value in water management, as the following examples show. Assume that a stretch of river is fishless, and that we wish to know the most effective means of re-establishing a fish population. Chemical analysis of the water on a number of occasions reveals that several pollutants are present, and that the dissolved oxygen concentrations are generally low. Many poisons are more toxic at low dissolved oxygen levels. Could the fishery be restored by increasing dissolved oxygen levels, or is the removal of specific toxic substances required? In the toxicity distribution represented by the line on the right of Figure 1.6, the toxicity has been calculated using the dissolved oxygen calculations measured on each sampling occasion. These values can be recalculated, on the assumption that the dissolved oxygen concentration will be increased to any desired level. A new line can therefore be constructed using the hypothetical oxygen values, and this line will be displaced to the left.

If the displacement carries the line beyond the boundary distribution, it is expected that a fishery could be re-established by increasing the levels of dissolved oxygen in the water. This could be achieved relatively easily and cheaply, for example by imposing stricter controls on the discharge of sewage or organic wastes which cause reduced dissolved oxygen levels; by upgrading sewage treatment plants; or by utilising one of the various methods available for aerating rivers such as constructing a weir. (Any of these strategies are also likely to reduce problems associated with ammonia levels, since ammonia is produced in significant quantities by the decay of organic matter.)

If, however, the displacement does not carry the line beyond the boundary distribution, the desired effect is likely to be achieved only by the removal of specific toxic substances, which may be more difficult and expensive. A similar line of reasoning can be applied in situations where, for example, it is proposed to site a new discharge on a river and we wish to predict the likely effect of the new discharge. The new discharge may contain additional toxic pollutants, and/or may alter the temperature, dissolved oxygen or other environmental characteristics of the receiving water. If the effect of the proposed new conditions is significantly to shift the existing distribution of toxicity towards the boundary conditions, or to carry the existing distribution beyond the boundary conditions, the decision may well be made that the proposed new discharge is unacceptable, or should be subjected to more rigorous control.

A further application of this technique is the determination of the relative contributions of each of several pollutants to the overall toxicity of the water. It is frequently the case that several pollutants are present in significant quantities, but chemical analysis alone cannot reveal which of them is exerting the most serious adverse effect on the biota. If the most significant pollutants can be identified, specific control measures may be directed against those, rather than against pollutants whose biological impact may be small, thus affording greater efficiency in the allocation of resources. Alternatively, we may wish to know whether the addition of a new pollutant, or an increase in the expected concentration of an existing pollutant, is likely to have any serious effect. Since the fractional toxicities of each pollutant are initially determined separately, plotting them in the manner shown in Figure 1.7 allows these questions to be answered.

In one example given by Alabaster *et al.* (1972), the toxicity distribution of ammonia alone was plotted, giving a line similar to that shown on the left of Figure 1.7. A second line, showing the toxicity distribution of metals and ammonia combined, displaced the line significantly to the right. This indicates that metals were contributing substantially to the overall toxicity of the water. A third line, showing the effect of including cyanide in the calculation, similarly indicated a smaller, but substantial contribution from cyanide. Phenol, however, contributed little to the overall toxicity, although it was present in the water; its inclusion in the calculation gave only a very slight displacement to the right. Using the same method, the authors were able

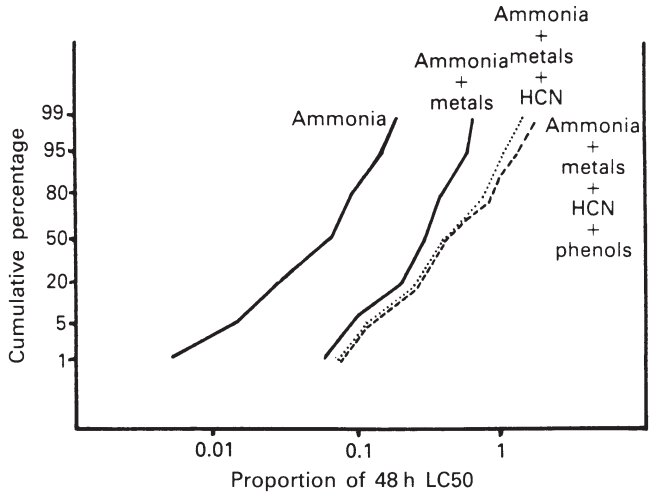

Figure 1.7 Contribution to toxicity from ammonia, metals, hydrogen cyanide and phenols at a heavy-polluted site in the River Trent catchment (Alabaster *et al.*, 1972)

to show that among the metals present, copper and zinc were identifiable as major pollutants in the sites they studied, whereas nickel, chromium and cadmium contributed little to the overall toxicity of the water. This was in spite of the fact that nickel alone formed 20% of the total metal present in chemical analyses. However, nickel and, in particular, cadmium are known to be very slow-acting poisons (see Chapter 4). The model in use relies upon the 48-h LC50 as the definition of the toxic unit, and this is only satisfactory if the 48-h LC50 is a good approximation of the lethal threshold concentration. Since this is not the case for nickel and cadmium, the calculations were revised using the lethal threshold concentration as the definition of the toxic unit. Under these circumstances, the results indicated that nickel and cadmium (but not, in the cases studied, chromium) were significant pollutants in some instances.

The synthesis of data from field and laboratory studies into the potentially useful model for the management of polluted waters has many advantages. Toxicological data, particularly those derived from the study of lethal toxicity, can rapidly be accumulated and replicated under controlled conditions, but are difficult to apply to real situations in the field because our knowledge of ecotoxicological mechanisms is inadequate. We might expect, for example, that if the level of pollution in the water was equal to the 48-h LC50, that half or more of the fish would die and that sublethal toxicity and mechanisms involving the relationships of fish with other members of the aquatic community might be sufficient to account for the total absence of fish from a particular site. The empirical finding that fish are absent if the toxicity exceeds 1.0 toxic unit for 1% of the time, or exceeds 0.07 toxic units for 99% of the time (Table

1.5) is, however, more directly useful to us. It does not actually matter, in the day-to-day management of the water, why exactly this happens—whether, for example, it arises through sublethal toxicity, avoidance by the fish of specific adverse conditions which they have detected, or because the pollutants are adversely affecting the food organisms of the fish. Knowledge of ecotoxicological mechanisms is ultimately valuable because it allows the interpretation and application of data in the frequent circumstances that decisions have to be made on the basis of incomplete information. In these same circumstances, purely empirical relationships are also useful for precisely the same reasons.

An alternative approach would be to rely entirely upon data from field surveys. In principle, any particular management decision could be formulated with reference to experience of what has happened previously in a similar situation elsewhere. In practice, the database of previous information which would be required is so vast that even if it existed, the task of collating it and analysing it in such a way as to extract from it the specific information required would be impossible. In any case, new situations are constantly arising; and water bodies differ so widely in their physical, chemical and biological characteristics that purely anecdotal evidence is of limited predictive value without some attempt to understand and apply fundamental principles. In practice, the control and amelioration of the problems raised by water pollution are best achieved by a combination of approaches—field based and laboratory based, empirical and fundamental.

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2

Sources and Effects of Water Pollutants

There are hundreds, perhaps thousands of pollutants whose effects are of actual or potential concern. Their numbers increase annually, as new compounds and formulations are synthesised. A substantial minority of these find commercial applications and become significant pollutants of water during their manufacture and in subsequent use. It is clearly impossible within the scope of a short book to discuss all of these in detail; instead, the sources and effects of broad categories of pollutants will be discussed in general terms, and where appropriate reference will be made to further sources of information.

2.1 The Nature of Effluents

Water pollution is most commonly associated with the discharge of effluents from sewers or sewage treatment plants, drains and factories. Outfalls of this kind are known as 'point-source discharges'. Most cases of accidental, negligent or illegal discharge are also from point sources. The concentration of pollutant in the receiving water is initially high, decreasing as the distance from the point of discharge increases. The effects of the pollution are therefore frequently easy to observe. Some of the more serious forms of pollution arise, however, from 'diffuse' sources, that is the pollutant does not enter the water from a single point. For example, in agricultural areas, surface water runoff and groundwater infiltration into lakes and rivers can introduce plant nutrients (from fertilisers) and pesticides in substantial quantities to water bodies. The effects of pollution from diffuse sources can be serious, but are often less immediately obvious than those from point sources as there is no adjacent unpolluted area with which comparisons may

Table 2.1 Analysis of sewage effluents after primary and secondary treatment. Figures given are in mg l^{-1}, and are the range of values found at four different treatment works, as summarised by Bond and Straub (1974). Treatment plants operating under adverse conditions yield higher values than those shown here, but values at the upper end of the ranges shown would in many countries exceed modern effluent standards

Analysis	Range
Total solids	640–1167
Suspended solids	15–51
Biological oxygen demand	2–70
Chemical oxygen demand	31–155
Organic carbon	13–20
Anionic detergents	0.75–1.4
Ammonia	1.9–22
Nitrate	0.25–38
Nitrite	0.2–1.8
Chloride	69–300
Sulphate	61–270
Phosphate	6.2–9.6
Sodium	144–243
Potassium	20–26

be made. Many pollutants also enter water through fallout from the atmosphere. Historically, control and prevention of water pollution have concentrated on point sources as these are more obvious, easily identifiable and in theory easier to regulate at the point of origin. As awareness has increased of the significance of diffuse sources of pollution, control strategies have been under development but are based more on the application of good practices designed to reduce pollutant impact rather than on regulation of specific sources of input (see, for example, MAFF, 1991).

Most effluents are complex mixtures of a large number of different harmful agents. These include toxic substances of many kinds, extreme levels of suspended solids, and dissolved and particulate putrescible organic matter. In addition, many effluents are hot, of extreme pH value, and normally contain high levels of dissolved salts. Detailed compilations of data on the composition of sewage and industrial effluents of many kinds are given by Bond and Straub (1974), and by Sittig (1975). Some representative values for treated sewage effluent are given in Tables 2.1 and 2.2. Most effluents also vary in their strength and composition, on a seasonal, diurnal or even hourly basis. Most sewage treatment plants report regular diurnal peaks and troughs in their output according to patterns of water use. Sometimes storm-water drains are connected to the sewerage system, so the strength of the sewage effluent will vary with rainfall. Alterations in the

Table 2.2 Levels of heavy metals recorded in the final effluent of a typical sewage treatment plant operating under good conditions. Data from Bond and Straub (1974)

Metal	Concentration range ($\mu g\, l^{-1}$)	Typical % removal compared to raw sewage
Zn	85–190	65
Al	460–550	77.5
Fe	160–290	70.5
Cr	36–70	76
Cu	31–38	60.5
Pb	<20	
Ag	11–12	17.3
Cd	<20	
Ni	<10	
Sr	280–450	17.6
B	240–260	13.3

strength and composition of sewage also influence the efficiency of the sewage treatment process, so that dilution of the influent does not necessarily cause an improvement in the quality of the effluent. In industrial plants, variations in the quality of the raw materials, or changes in specification of the finished product, will require changes in the operating conditions of the plant and lead to changes in the composition of the effluent. Many industrial processes are 'batch' rather than continuous processes, so that some effluent discharges will be intermittent rather than continuous.

Nevertheless, it is often possible to generalise about the effects of different kinds of effluent on their receiving waters. Broadly speaking, the effects of sewage effluent, kraft pulp mill effluent, coal mine effluent and so on are consistent wherever they occur. However, a detailed understanding of the effects of individual components of an effluent, and of the consequences of variation in the composition of an effluent, is essential for pollution control. Waste-water treatment is expensive, and in order to devise cost-effective treatment processes it is necessary to identify those components of the effluent which cause the greatest damage to the environment. This is because it is usually impossible to devise an economically-feasible process which will be equally effective against all the components of a complex effluent. Frequently, treatment of an effluent to remove one component will exacerbate the problem of removing another; it is notoriously difficult, for example, to treat satisfactorily effluents which contain both cyanides and phenolic compounds, although many basic industrial processes produce just such an effluent. Therefore in order to devise the optimum pollution control strategy it is necessary to study, in the laboratory and in the field, the effects of effluents and of their individual components.

2.2 The Environmental Requirements of Aquatic Organisms

The effects of pollutants in aquatic ecosystems cannot be understood without some knowledge of the ecophysiology and basic biology of the aquatic biota. Those aspects which have most bearing on the interaction between water pollutants and aquatic organisms are briefly discussed here. There are many authoritative and readable texts on freshwater ecology which may be recommended to readers who require a fuller treatment. Among these are Hynes' (1970) classic text and more recent volumes such as Moss (1988), Jeffries and Mills (1990), Maitland (1990), Calow and Petts (1992, 1994) and Allan (1995).

In order to survive, a living organism must spend its life in an environment which meets its needs: a suitable physical habitat which provides space, shelter, and a sufficient supply of food, oxygen and other metabolic requirements; and which is not subject to extremes of temperature or other physical variables which lie outside the range which the organism can tolerate. Obviously, different habitats have very different physical characteristics, and organisms have evolved a fascinating array of adaptations which have enabled them to colonise every part of the Earth. To a greater or lesser extent, every living organism is adapted—in its morphology, physiology and behaviour—to the environment it normally inhabits. Some are remarkably specialised, that is they are adapted to specific places and/or modes of life in which they are very successful, but are excluded from living in most habitats. Others are more generalised in their adaptations, perhaps being nowhere particularly abundant but able to survive reasonably well in a wider range of habitats. Few organisms, however, are universally distributed.

Any of a living organism's many individual requirements may be a *limiting factor* preventing the establishment, survival or reproduction of a species in a particular habitat. Aquatic plants, for example, are commonly limited in their distribution and abundance by the availability of nutrients, such as phosphorus or nitrogen. An abundance of phosphorus is of no use to the plant if it has no nitrogen, and vice versa. Further, the nutrients must be present in a form which the plant can use. Photosynthetic plants, of course, also require light, an important limiting factor in most aquatic habitats. The non-photosynthetic flora (fungi, bacteria) are more likely to be influenced by the levels of dissolved or particulate organic material present. Animals, in turn, are greatly influenced by the quality and quantity of the aquatic flora, because many animals rely upon plants for food, shelter, as a repository for eggs, and so on. Animals are also influenced by the physical environment—current speed, nature of the substratum, temperature—but in addition are generally much more susceptible than plants and bacteria to the prevailing levels of oxygen.

Although some aquatic animals are air-breathers, the majority have to obtain their oxygen from water. Oxygen is not very soluble in water, and water is a rather dense and viscous medium. Moving through water requires a great deal of energy expenditure, and therefore a high oxygen consumption. To obtain from the water

the meagre amount of oxygen dissolved therein requires that the respiratory surfaces be moved through the water, or the water be moved over the respiratory surfaces. Further, as the water temperature increases, the solubility of oxygen in water decreases, while the oxygen requirement of the animal actually increases. Thus the survival of animals in water is crucially dependent upon the extent to which their oxygen demand can be matched to the availability of oxygen from the environment.

Alexander (1970) describes elegantly and in detail the respiratory predicament of fishes. A fish at rest in well-oxygenated water ventilates its gills fairly slowly. Respiratory exchange is efficient, and the fish removes most of the oxygen from the water passing over its gills. If, however, the fish ventilates more quickly, as it must for example if it becomes physically active, the water passing over the gills has less time to equilibrate with the blood, and the efficiency of respiratory exchange drops. Thus, in order to double the rate of oxygen uptake, the fish must more than double the amount of water pumped over the gills. Measurements of the ventilatory mechanisms in fish suggest that a resting fish can remove 80% of the oxygen in the water passing over the gills, but this figure drops to about 30% in an actively swimming fish. Therefore, to increase its oxygen uptake by a factor of five, a fish must pump about 15 times as much water per unit of time. The density and viscosity of water are such that the muscles which pump the water over the gills themselves consume a significant proportion of the oxygen obtained from the water. This proportion increases dramatically as the fish's activity increases, or as the temperature rises, or as the dissolved oxygen level in the water falls. Alexander (1970) calculated that a resting fish in water containing 8 ml oxygen per litre might under typical conditions expend 0.025 ml oxygen to work the respiratory muscles, in order to obtain 6ml oxygen. However, if the oxygen concentration in the water fell to 1 ml per litre, the fish would expend 0.25 ml oxygen in order to obtain only 0.3 ml. At this point, the fish is clearly close to asphyxiation and has no ability to engage in physical activity.

Clearly, oxygen is an important limiting factor to fishes. Equally clearly, however, limiting factors interact with one another. An oxygen concentration which is acceptable at 10°C is limiting, even lethal, at 20°C, because as the temperature rises the metabolic rate of the fish also rises; thus most aquatic animals need more oxygen at higher temperatures, but the solubility of oxygen in water decreases with temperature, as does the efficiency of respiratory exchange. Varley (1967) described very simply the interactions of temperature and oxygen and their influence on the distribution patterns of freshwater fishes in Britain. Similar principles are involved among the invertebrates. Nymphs of stoneflies (Plecoptera), for example, are particularly fastidious in their requirements for oxygen, and are absent from waters whose oxygen concentration drops much below saturation value for appreciable periods of time. Ephemeroptera (mayfly) nymphs are a little more

tolerant, but are generally more sensitive to oxygen depletion than Trichoptera (caddis fly) larvae. The amphipod crustacean *Gammarus pulex* and the isopod *Asellus aquaticus* are remarkably similar in their habits and environmental requirements, but above a critical oxygen concentration *Gammarus* predominates, while below that level it tends to be replaced by *Asellus*. The distribution of individual species is often correlated with dissolved oxygen levels in the water. Indeed, the response of invertebrates to the prevailing levels of dissolved oxygen is so well known that their distribution patterns can be used as indicators of the prevailing environmental conditions (see Chapter 3).

Other correlates with distribution patterns can be found. An excellent example is Maitland's (1980) study of mayfly (Ephemeroptera) species in the British Isles. There are 47 species of Ephemeroptera recorded in the British Isles, a rather smaller number of species than is found in continental Europe. This illustrates an important general biogeographical principle; the British Isles, like other islands situated offshore from the continental land mass, has a relatively poor fauna and flora. Second, there is a distinct pattern of distribution in relation to altitude, each species having its own upper and lower limit of distribution, some being confined to upland areas and others to lowland waters. Altitude, of course, will tend itself to be correlated with other factors, such as temperature, and a variety of physical and chemical characteristics of the water, so in fact it would be expected that several correlations may be found between physico-chemical parameters and the presence or absence of species. At its simplest level, Maitland's (1980) study identified four specific habitat types which would *not* be expected to sustain mayfly nymphs: small water bodies liable to desiccation; water bodies susceptible to saline intrusion; nutrient-poor upland waters in exposed areas; and lowland waters subject to eutrophication or pollution.

The patterns of distribution and abundance of organisms cannot, of course, be explained solely in ecophysiological terms. A habitat may be perfectly adequate, physically and chemically, for a herbivorous animal, but if the habitat is not suitable for the animal's food plants the herbivore will be absent. Where a habitat is marginally acceptable to a species, the organism may nevertheless be absent because another species, with similar requirements, is better adapted to those conditions and competes more successfully for the available resources. Some organisms are absent from particular habitats not because the habitats are unsuitable, but simply because the species concerned have so far failed to overcome a geographical barrier which prevents their spread. In other words, the observed patterns of distribution and abundance of species are the net result of a complex interaction of physical, chemical and biological factors. Patterns of distribution in relation to these factors are, however, discernible and with an adequate database and suitable methods of analysis can be formed into very useful tools for assessing the impact of pollution on a habitat. The type of study represented by Maitland (1980) was developed into

RIVPACS (River Invertebrate Prediction and Classification System), which is now widely used in pollution monitoring. RIVPACS is described more fully in Chapter 3. Even with simple methods of analysis, within a habitat it is frequently possible to observe a zonation pattern in the distribution of species in response to directional changes in the physical environment. The zones may be sharply delineated, as on a steeply-sloping seashore, or they may merge gradually one into another, as is more typically found along the length of a river (Hawkes, 1975; Hynes, 1970). Pollution may directly influence one or more components of the dynamic equilibrium of physical, chemical and biological phenomena which give an ecological community its characteristics. The influence of the pollution will extend even to organisms which are not directly susceptible, as the system accommodates itself to the new conditions. Indeed, it is frequently possible to observe consistent zonation patterns in the biological community which occur in response to sources of pollution. The response to organic pollution in rivers, for example, is particularly well known.

2.3 Organic Pollution

The discharge of excessive quantities of organic matter is undoubtedly the oldest, and even today the most widespread form of water pollution. Its significance to human health is discussed in Chapter 5; the present discussion is concerned with its effect on the receiving waters.

The major sources of organic pollution are sewage and domestic wastes; agriculture (especially runoff from inadequately stored animal wastes and silage); various forms of food processing and manufacture; and numerous industries involving the processing of natural materials such as textile and paper manufacture. Most organic waste waters contain a high proportion of suspended matter, and in part their effects on the receiving water are similar to those of other forms of suspended solid (see Section 2.8). However, the most important consequences of organic pollution can be traced to its effect on the dissolved oxygen concentration in the water and sediments. In an unpolluted water, the relatively small amount of dead organic matter is readily assimilated by the fauna and flora. Some is consumed by detritivorous animals and incorporated into their biomass. The remainder is decomposed by bacteria and fungi, which are themselves consumed by organisms at higher trophic levels. The activity of microorganisms results in the breakdown of complex organic molecules to simple, inorganic substances, such as phosphate and nitrate, carbon dioxide and water. During these metabolic processes, oxygen is consumed. However, where the organic load is light, the oxygen removed from the water is readily replaced by photosynthesis and by re-aeration from the atmosphere.

Where the input of organic material exceeds the capacity of the system to assimilate it, a number of changes take place. How far the sequence of

Table 2.3 Approximate analysis of the organic component of sewage (after Higgins and Burns, 1975)

Lipids	30%
Amino acids, starch, glycoproteins	8%
Hemicellulose	3%
Cellulose	4%
Lignin	6%
Protein	25%
Alcohol-soluble fraction	3%
Ash	21%

changes proceeds depends upon the severity of the organic load and the physical characteristics of the receiving water. Initially, the enhanced level of organic matter will stimulate increased activity of the aerobic decomposer organisms. When their rate of oxygen consumption exceeds the rate of re-aeration of the water, the dissolved oxygen concentration in the water will fall. This alone may be sufficient, as argued earlier, to eliminate some species, which may or may not be replaced by others with less rigorous demands for oxygen. If the drop in oxygen concentration is very severe, the aerobic decomposers themselves will no longer be able to function, and anaerobic organisms will become predominant.

The biochemical reactions involved in the breakdown of organic matter, and the microorganisms involved, are described in general terms by Dugan (1972) and by Higgins and Burns (1975). The composition of organic waste varies according to its source, and in particular according to the relative abundance of material of plant, animal or microbial origin. Typically, however, the composition of organic waste is approximately as shown in Table 2.3. Most effluents, of course, also contain other materials, in particular toxic matter (see Tables 2.1 and 2.2), derived from various sources. To illustrate the effects of the breakdown of organic matter on the receiving water, proteins may be used as an example. The first stage of decomposition of proteins is usually their breakdown by hydrolysis to their constituent amino acids. A typical amino acid is alanine, and its breakdown under aerobic conditions may be summarised:

$$\underset{\text{Alanine}}{CH_3.C(NH_2)(H)COOH} + \tfrac{1}{2}O_2 \rightarrow \underset{\text{Pyruvic acid}}{CH_3.C(=O)-COOH} + \underset{\text{Ammonia}}{NH_3}$$

Pyruvic acid is an important substance in the metabolism of most living organisms. It is produced in normal metabolism during the glycolytic (anaerobic) phase of the breakdown of carbohydrates and, as in this case, from the breakdown of excess

amino acids. In aerobic organisms, the pyruvate enters the citric acid cycle, the primary means by which compounds are broken down to release energy, carbon dioxide and water. Under aerobic conditions, therefore, proteins will be broken down ultimately to these relatively innocuous compounds, while providing a source of metabolic energy for the organisms responsible for the catabolism. Ammonia is also a common end product of the metabolism of nitrogenous compounds (such as amino acids) and in aquatic organisms is generally excreted as such. Normally, the ammonia diffuses rapidly into the environment, but where the level of organic enrichment is high, it can create difficulties for living organisms as it is very toxic (see Section 2.7.2). Typically, therefore, organic wastes contain high levels of ammonia; the eventual fate of the ammonia is very relevant to the effects of water pollution and is discussed below.

Under anaerobic conditions, the breakdown of amino acids takes place through different metabolic pathways. Some amino acids, such as cysteine, contain sulphur as well as nitrogen, and its breakdown is used as an example in the following sequence of reactions which are catalysed by acid-producing and methanogenic bacteria:

$$4CH_3H_7O_2NS + 8H_2O \rightarrow 4CH_3COOH + 4CO_2 + 4NH_3 + 4H_2S + 8H$$

$$4CH_3COOH + 8H \rightarrow 5CH_4 + 3CO_2 + 2H_2O.$$

In this case, the products of decomposition include (in addition to ammonia, carbon dioxide and water) acetic acid, hydrogen sulphide and methane. These compounds are very toxic to most forms of aquatic life and, in addition, they are aesthetically undesirable by virtue of their unpleasant odours.

The fate of the ammonia largely depends upon the level of oxygen present. Under aerobic conditions, nitrifying bacteria predominate and the ammonia is converted to nitrite (e.g. by bacteria of the genus *Nitrosomonas*) and subsequently to nitrate (e.g. by *Nitrobacter* spp.). Thus the toxic ammonia is oxidised to the less toxic nitrite and to the relatively innocuous nitrate. Since, however, both ammonia and nitrate are important plant nutrients, problems related to eutrophication can arise as a consequence of organic inputs to water (see Section 2.4). Under anaerobic conditions, denitrification of the nitrate typically takes place under the influence of other bacteria such as *Thiobacillus denitrificans* and some *Pseudomonas* species. These cause the reduction of nitrate to elemental nitrogen, which readily displaces the less-soluble oxygen from solution and contributes still further to the deoxygenation of the water. The processes are most easily understood by reference to Figure 2.1 which summarises the nitrogen cycle in the aquatic environment. Note that the gaseous phases of the cycle are usually of limited significance in the aquatic environment.

These chemical changes, combined with the blanketing effect of fine organic particles on the substratum, lead to the deoxygenation of the water

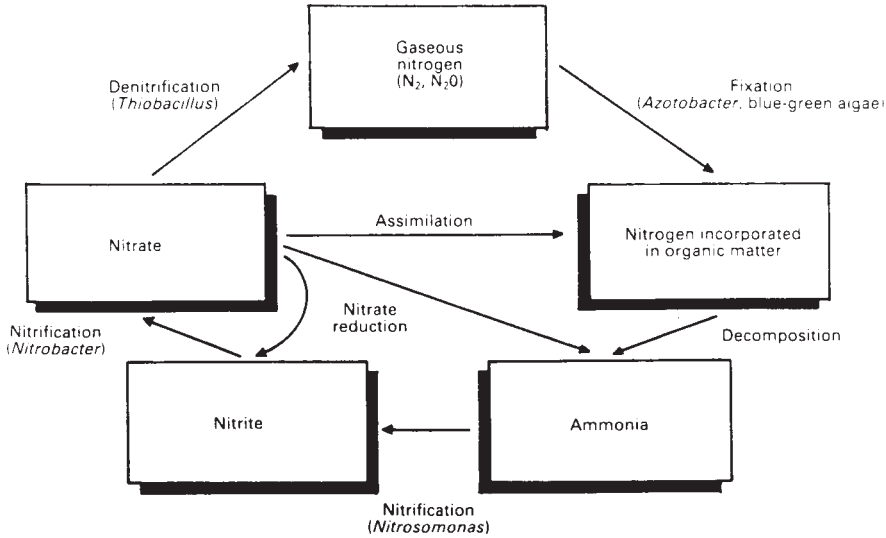

Figure 2.1 Summary of the nitrogen cycle in fresh-water ecosystems

and substratum, and readily bring about profound changes in the fauna and flora of the receiving water. In severe cases, animal life may be completely eliminated. Hynes (1960) summarised in diagrammatic form the changes which typically occur in a river below a discharge of organic effluent (Figure 2.2).

The strength of an organic effluent is frequently expressed in terms of its biological oxygen demand (BOD). This is defined as the quantity of oxygen utilised, expressed in mg l^{-1}, by the effluent during the microbial degradation of its organic content. BOD is typically measured by taking a sample of water or effluent and aerating it until it is saturated with oxygen. The dissolved oxygen concentration in part of the aerated sample is then determined by one of the well-known standard procedures. Another part of the aerated sample is incubated, in a sealed bottle of known volume for a period of (typically) five days, at a controlled temperature which is usually 15°C or 20°C. Usually the incubation is carried out in the dark, to eliminate oxygen production by any photosynthetic organisms which may be present. At the end of the incubation period, the concentration of dissolved oxygen remaining in the sample is determined. The difference between the initial and final dissolved oxygen concentrations is used to determine the BOD of the sample, which is expressed as milligrams of oxygen consumed per litre of sample. The basic assumption of the method is that oxygen is mainly consumed by aerobic microorganisms during the metabolism of organic matter. This is not necessarily true, since many effluents contain chemically-reduced compounds which undergo oxidation by purely chemical reactions.

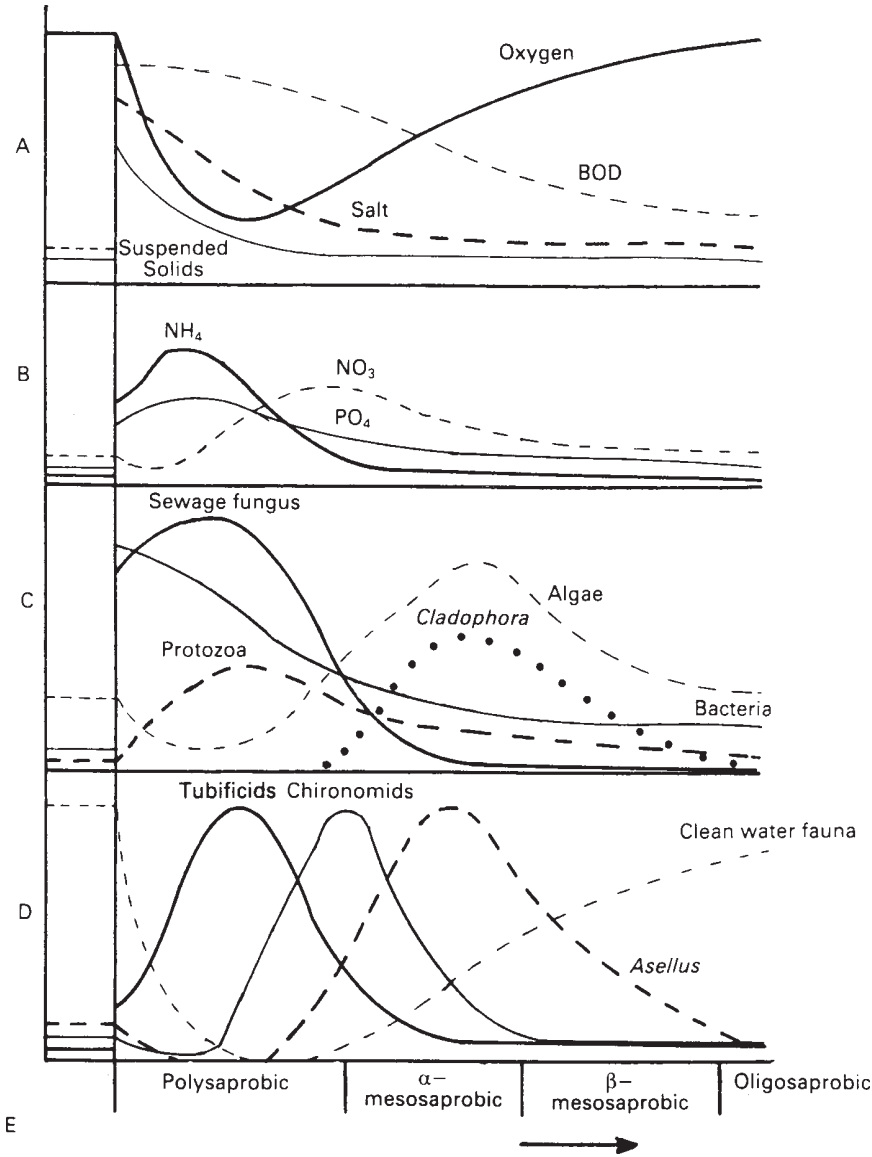

Figure 2.2 Changes in water quality and abundance of selected organisms typically found in a river below the discharge of an organic effluent, after Hynes (1960). See text for explanation. (E) shows the zones described by Kolkwitz and Marsson (1909). Other descriptive systems have been used (see Hellawell (1986) for a summary) but are not significantly different

For this reason, it is often necessary to carry out other determinations (for example, of chemical oxygen demand, or of permanganate value) in addition to BOD in order to characterise precisely the likely effects of an effluent or correctly interpret the significance of a BOD value. Within these limitations, BOD values are generally useful as indicators of the organic loading of water. They typically range from one or two milligrams per litre in unpolluted water, to 10000 milligrams per litre or more in raw wastes, untreated effluents or severely polluted receiving waters. The wide range of expected values means that the precise details of the method of determination have frequently to be modified according to the circumstances; raw samples, for example, often need to be diluted before the determination is carried out. The incubation period of five days (rather than some shorter period) in practice compensates for the fact that some samples will have, initially, very few microorganisms present, while others will contain a large inoculum. Detailed descriptions of the procedures which may be employed for BOD and other relevant determinations, and for the interpretation of their results, are available in several handbooks, for example APHA (1995). Note that in recent years, the term *biochemical oxygen demand* has become a popular synonym for *biological oxygen demand*. The present author prefers the term *biological* oxygen demand as it has historic precedence and avoids confusion with the *chemical oxygen demand,* which refers to the oxygen demand imposed by the *chemical* oxidation of reduced substances in the water.

Figure 2.2(A) shows the immediate effect of the effluent on the BOD of the receiving water. Correspondingly, the dissolved oxygen (DO) level drops, gradually recovering as the BOD falls with increasing distance downstream. The oxygen sag curve varies in its dimensions according to the strength of the effluent and the physical characteristics of the river. (Knowing the BOD of the effluent and certain physical characteristics of the river, oxygen sag curves can be predicted according to mathematical models. This can be useful in planning, for example by predicting the likely effect of a proposed new outfall on a receiving water.) Figure 2.2(A) also shows the typical changes in the suspended solids and dissolved salt concentrations of a receiving water downstream of an organic effluent. Figure 2.2(B) shows how ammonia, nitrates and phosphates typically behave. Ammonia in the receiving water reaches peak levels at the point of greatest deoxygenation, but declines as aerobic conditions are re-established and reduced nitrogen compounds are oxidised to nitrates.

Figures 2.2(C) and (D) show the responses of the plant and animal communities to these physical and chemical changes. 'Sewage fungus' is a characteristic and conspicuous feature of waters which are heavily polluted with organic matter. It is not, in fact, a fungus at all, although its dense, blanketing growths of matted, greyish-brown filaments suggest this idea to many people. It is an aggregation, of varying composition, of bacteria, algae, fungi and protozoa, frequently dominated by the

slime-forming bacterium *Sphaerotilus natans* (Curtis and Curds, 1971). Algae are generally reduced initially (partly because the high levels of suspended solids prevent photosynthesis), but increase rapidly in abundance downstream as light penetration improves and levels of nitrate and phosphate remain high. *Cladophora* is a particularly conspicuous attached filamentous alga, widely associated with mild organic pollution or with the early stages of recovery from more severe pollution, and appears to be especially responsive to elevated phosphate levels (Pitcairn and Hawkes, 1973; Whitton, 1970).

The animal community (Figure 2.2(D)) also shows a clear pattern of response. The 'clean-water fauna' initially declines, and may be entirely eliminated, in the region immediately below the outfall. Tubificid worms, being typically tolerant of low dissolved oxygen levels and silty substrata, usually dominate the fauna in the more seriously affected areas. The larvae of the midge *Chironomus* (Diptera) spp. typically become established further downstream, followed by the isopod crustacean *Asellus,* and the gradual re-establishment of the 'clean-water fauna' as the river returns to its normal physical and chemical status. In any particular situation, the total number of species involved can be very large. The general pattern, subject to many variations in detail, is of a zonation, with increasing distance from the source of pollution, every bit as obvious as that along the length of an unpolluted river, or along a transect on a steeply-sloping seashore. The distribution of many individual species in response to organic pollution has been studied in detail in many different parts of the world. Hellawell (1986) gives a detailed summary of these observations. Several early investigators attempted to provide systematic descriptions of the zonation pattern of plants and animals observed in response to organic pollution with increasing distance from the pollution source, and one such description is shown in Figure 2.2(E). These descriptive systems eventually gave rise to the idea of indicator organisms, and to the development of numerical indices (pollution indices and biotic indices), which are widely used in the biological surveillance of water quality. These topics are further discussed in Chapter 3.

2.4 Nutrient Pollution

Plant growth in water may be limited by any of several factors, including light and the physical characteristics of the habitat. In many cases, however, the limiting factor is the availability of inorganic nutrients, particularly phosphate (Moss, 1988). Increased input of nutrients can therefore trigger increased plant growth which, if excessive, leads to changes in the biological characteristics of the receiving water. The discharge of organic matter to water is an important source of plant nutrients, since the aerobic decomposition of organic matter results in the release of phosphate, nitrate and other nutrients. Domestic sewage typically contains high levels of phosphate because detergent washing powder formulations normally contain high levels of phosphate. For example, the level of phosphate typically found in treated

sewage effluent (Table 2.1) may be compared with the levels normally found in unpolluted waters, which range from about 0.001 to 1 mg l^{-1} (Moss, 1988). Food-processing effluents are often high in nitrate and phosphate, and in agricultural areas runoff from land carries nutrients into the water, especially if artificial fertilisers are used. Many agricultural and forestry practices lead to increased soil erosion, carrying plant nutrients from the land to the water. Intensive rearing of livestock contributes significant nutrient loads to surface waters.

Increased plant growth can sometimes be considered beneficial, especially in oligotrophic waters where primary productivity is nutrient-limited. Moderately-increased plant growth can provide increased productivity of herbivorous and detritivorous animals, leading to increased overall productivity. It is not unknown, for example, for fishermen deliberately to 'fertilise' lakes to increase fish yield. The increased spatial heterogeneity of the habitat can also give rise to an increase in species diversity. Excessive plant growth, however, has four main adverse consequences. The blanketing effect of macrophytes and filamentous algae can result in major faunal alterations owing to physical changes in the habitat. Respiration of dense plant growths can produce depressed dissolved oxygen levels, not only at night when photosynthesis ceases but also during the day if the density of plant growth reduces light penetration. Some algal species, under the influence of elevated nutrient levels, 'bloom'—that is they reproduce rapidly and dominate the flora. These algal blooms give rise to several problems, including tainting and discolouration of the water (rendering it unsuitable for potable supply) and the production of toxins which are harmful to fish and invertebrates. Following an extensive outbreak of algal blooms during 1989 in Britain, the National Rivers Authority produced a useful report which summarises the problems associated with algal blooms (NRA, 1990). Finally, the eventual decay of the plant biomass has exactly the same effect as the input of a large quantity of allochthonous organic matter.

2.5 Eutrophication

The phenomenon of eutrophication is particularly associated with lakes and slow-flowing waters. It is widely, and erroneously, believed that pollution by plant nutrients and organic matter actually causes eutrophication. It is more accurate to say that pollution accelerates what is probably a natural process. To understand the causes and consequences of eutrophication requires some knowledge of the special characteristics of lakes.

In temperate latitudes, most lakes were formed by glaciation. Moving glaciers gouged out hollows in the earth, and when the ice retreated these hollows became filled with water from the melting ice. Such lakes are not, therefore, geologically ancient phenomena. In modern times, substantial man-made lakes have become common in many parts of the world. A lake

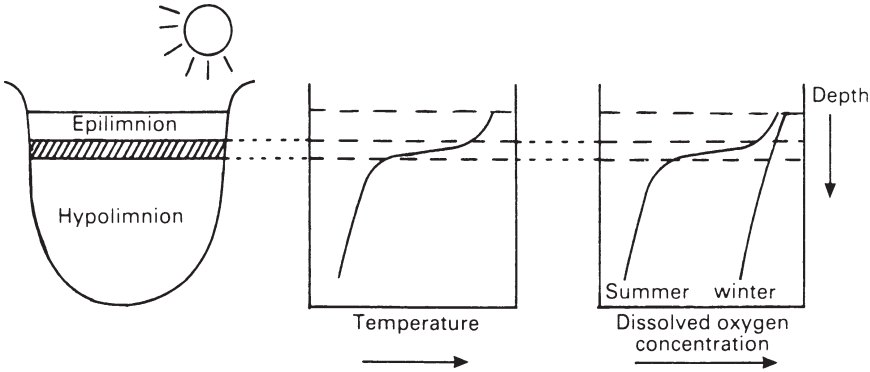

Figure 2.3 Thermocline formation in a typical lake. The diagram on the left shows the stratification which develops, the thermocline being represented by the shaded area. The centre diagram shows the temperature profile. The diagram on the right shows the deoxygenation of the hypolimnion which occurs in eutrophic lakes in the summer. The vertical mixing which occurs in winter tends to abolish the stratification, redistributing oxygen and plant nutrients through the water column

is a body of water which is very slow-moving. Some lakes have rivers flowing into or out of them. Even those which do not, however, are not static; water moves slowly into or out of the lake via the ground. Because the water moves only very slowly, some physical and chemical processes occur in lakes which do not occur in moving waters. Of particular importance are stratification, and temporal variations in chemical quality of the water.

Stratification occurs because the lake water is heated by the sun at the surface. Because warm water is less dense than cooler water, and water is a poor conductor of heat, during the warmer months of the year an upper layer of warm water, the epilimnion, becomes established and sharply delineated from a lower layer of cooler, denser water, the hypolimnion. Between them is a very narrow zone, the thermocline, within which the water temperature drops very sharply with only a slight increase in water depth (Figure 2.3). Little or no vertical mixing can take place, the lake being effectively divided horizontally into two distinct layers separated by the thermocline. Obviously, stratification cannot occur in very shallow lakes.

Photosynthesis can only occur in shallow water, where light can penetrate. At the lake margins, emergent plants and rooted aquatic macrophytes occur, but as the depth of the water increases, primary production is possible only by phytoplankton in the surface waters, within the epilimnion. During the winter, phytoplankton growth is restricted by low temperatures and low light intensity. In spring and summer increasing temperatures and light intensity stimulate phytoplankton growth, leading to an increase in population density and the depletion of nutrients in the water of the epilimnion. Plant growth

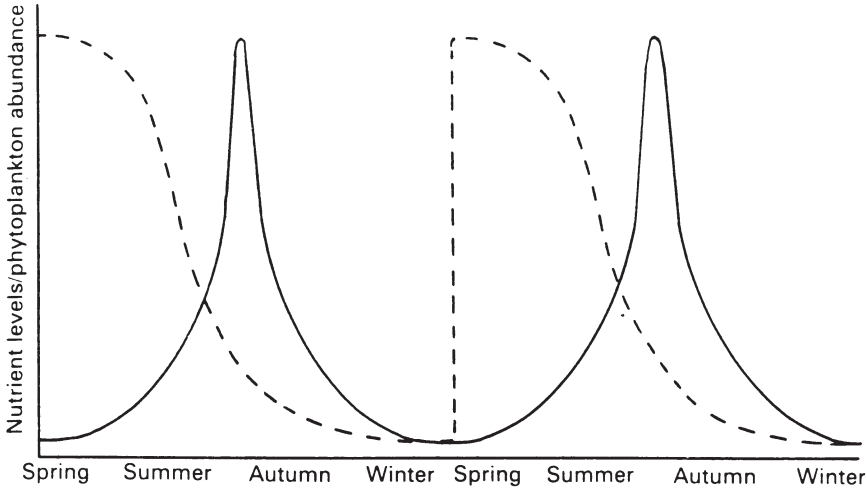

Figure 2.4 Seasonal cycling of nutrients and phytoplankton in the surface waters of a lake. Nutrient levels (dotted line) decline as phytoplankton growth (solid line) takes place. Stratification leads to nutrient depletion of the surface layers, so the phytoplankton population declines and senescent cells fall to the hypolimnion. Abolition of the thermocline in winter redistributes the plant nutrients allowing the cycle to begin again the following spring

and reproduction slow down, and as the plant cells senesce and die, they sink into the hypolimnion and eventually to the bottom of the lake, where they begin to decompose. The inorganic nutrients which are the products of decomposition remain in the hypolimnion, however, as the stratification prevents vertical mixing of the water and upwards diffusion is slow. As the autumn approaches, reduced temperatures, light intensity and limited nutrients accelerate the decline of the phytoplankton population. In the winter, the epilimnion cools and becomes more dense. Its water sinks, displacing the hypolimnion which is now warmer and lighter than the epilimnion. The lake waters become thoroughly mixed, and nutrients from the hypolimnion are brought to the surface, bringing about conditions suitable for the start of the next annual cycle (Figure 2.4).

Underlying these annual cycles is a progressive change in the physical and chemical characteristics of the lake. At its formation, the lake contains few plant nutrients or dissolved minerals of any kind, and a negligible quantity of organic matter. With the passage of time, dissolved minerals including plant nutrients enter the lake from surface runoff and groundwater infiltration, at a rate which depends largely upon the climate and the geology of the surrounding area. As the nutrient levels rise, a flora and fauna becomes established and develops, contributing an increased content of organic matter in the lake. Organic matter is also gradually accumulated from outside the lake, progressively building up a

layer of sediment on the lake bottom. Airborne dust also falls into the lake, and the lake begins slowly to fill up. The rate at which this happens varies from the barely detectable up to a few millimetres per year. The gradual deposition of material on the floor of the lake basin causes the lake to shrink, new land being formed at its edges (Figure 2.5). This new land is colonised by terrestrial plants, and in some lakes it is possible, by walking away from the lake's edge, to see clearly the various stages of development of the terrestrial flora, a classic example of ecological succession. In areas where these processes have occurred, for various reasons, at different rates in different lakes, it is possible to see contemporaneously all the stages of a lake's development from nutrient-poor, sparsely-populated lakes of low productivity, through various stages of nutrient enrichment, to swamp or marsh and eventually dry land.

The term *eutrophication* is applied to the process whereby the nutrient levels of lakes increase from oligotrophic (nutrient poor) to eutrophic (nutrient rich). It appears to be a natural process, although some authors have argued that it is not inevitable or intrinsically unidirectional (Moss, 1988). Since its basic cause is, however, the accumulation of plant nutrients and organic matter in the lake basin, clearly anthropogenic influences will accelerate it. The transition from oligotrophic to eutrophic is accompanied by qualitative and quantitative changes in the biota. Since plant growth is commonly limited by nutrient levels, a gradual increase in nutrient levels would be expected to lead to successional changes in the plant community and corresponding changes in the animal community. Animals, in particular, are likely also to be affected by deoxygenation of the hypolimnion. In eutrophic lakes, the stratification which leads to nutrient depletion of the epilimnion also causes oxygen depletion of the hypolimnion. Oxygen demand due to aerobic decomposition of detritus is high in the hypolimnion, but the absence of either vertical mixing or photosynthesis in the hypolimnion prevents re-oxygenation of the hypolimnion from the atmosphere (Figure 2.3). The sensitivity of aquatic animals to dissolved oxygen levels, and its consequences for their patterns of distribution and abundance, has already been discussed.

Moss (1988), Mason (1991) and Jeffries and Mills (1990) discuss in detail some well-studied case histories of eutrophication, and a very full account is given by Harper (1992). Attempts have been made to restore eutrophic lakes, with varying degrees of success, or to manage lakes and their catchment areas in such a way as to reduce the effects of anthropogenic activities on eutrophication (Harper, 1992).

2.6 Thermal Pollution

The extent of the use of water for cooling is formidable. Howells (1983) estimated that in Britain 28% of rainfall and 50% of river flow were utilised

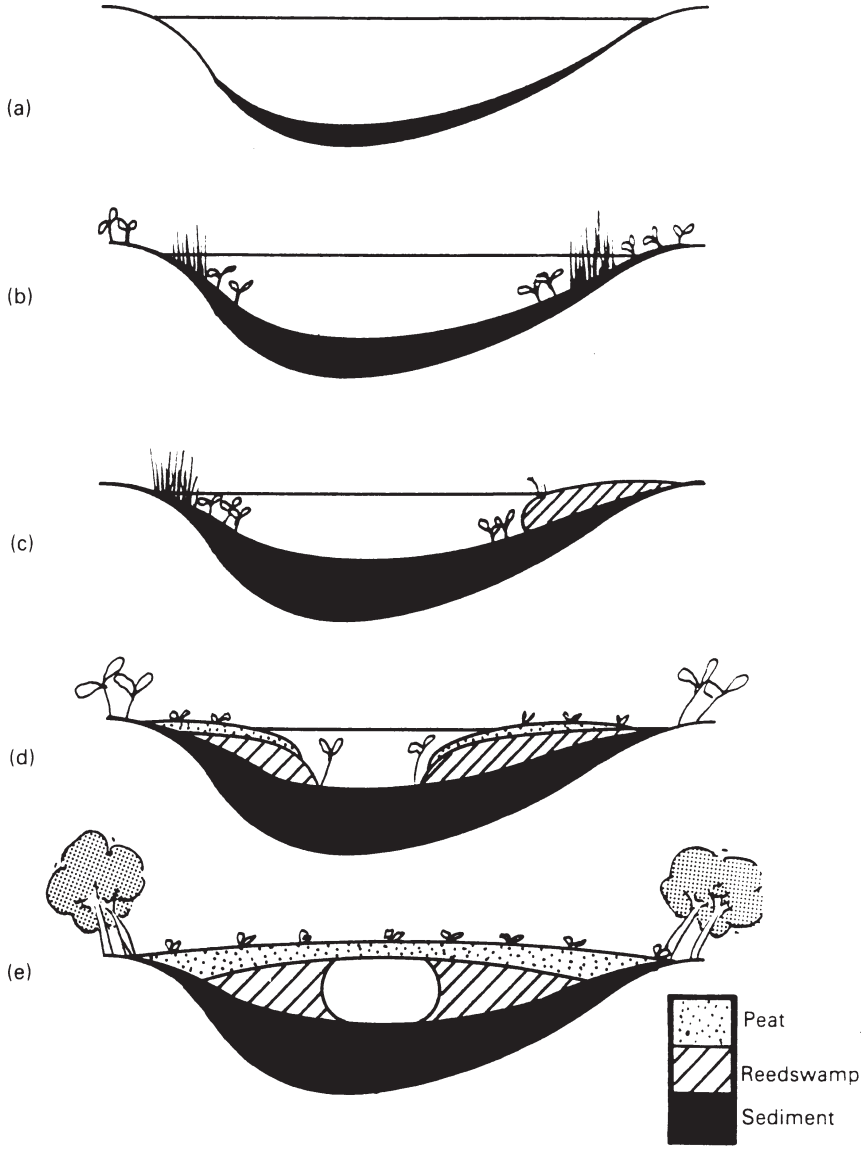

Figure 2.5 Stages of development of a typical glacially-formed temperate lake from oligotrophic (upper diagrams) to eutrophic (lower diagrams)

for this purpose. More recently, attempts to reduce these percentages have been made in view of increasing demands on water for other purposes, and the availability of improved technology. In fact, Britain has relatively few large inland power stations, and the bulk of the demand falls upon a single river system, the Trent (Lester, 1975) which supplies cooling water for approximately one-third of the

nation's power-generating capacity; most of the remainder is situated on coastal or estuarine sites. In Britain, direct cooling is rare; water abstracted from the river is recirculated within the plant and much of the excess heat is dissipated through cooling towers. Direct cooling would in fact require far more water than is available from the relatively small rivers. In the USA, direct cooling is more common, and about 10% of runoff is used for cooling (Castenholtz and Wickstrom, 1975). Very large rivers are, of course, more common in large continental land masses; further, the climate in much of the USA is such that river temperatures of 30°C or more are not uncommon, whereas in Britain river temperatures above 24°C are extremely rare. To this extent, the problems of dissipating waste heat differ widely from one location to another.

Temperature is of such profound importance in chemical and biological processes that the effect of temperature alterations on aquatic biological communities is potentially large. Hot effluents from industrial processes and power generation can cause temperature increases in the receiving water of 10°C or more. Some effluents, such as water pumped from deep mines or regulating reservoirs, may be significantly colder than the receiving water, although the effects of cold effluents have received relatively little attention. Because the density of water alters with temperature, hot effluents often form a surface plume rather than mixing quickly with the receiving water. This can exacerbate some of the adverse effects, but may sometimes act to minimise the influence of the effluent on the benthic community, and fish can avoid the elevated temperature by remaining in deeper water.

Elevated temperatures can influence aquatic organisms directly, as the organisms respond physiologically or behaviourally to the new conditions; or indirectly, as the changed temperature influences the chemical environment. For example, increased temperature reduces the solubility of oxygen in water. At the same time, it may increase BOD by stimulating more rapid breakdown of organic matter by microorganisms. Temperature affects the toxicity of some poisons (see Chapter 4) either through its effect on the organisms themselves or because the dissociation of ionisable pollutants (such as ammonia or cyanides, see Section 2.7.2) is temperature-dependent. The direct effects of elevated temperature on fishes have been particularly well studied and may be used to indicate the potential impact of thermal pollution on aquatic animals generally. Varley (1967) gives a very readable introduction to the relationships between fish and their thermal environment, and their consequences for fish distribution patterns. Alabaster and Lloyd (1980) provide a detailed review of the literature relating to the temperature requirements of freshwater fishes, and Hellawell (1986) provides a concise summary of the effects of thermal pollution on the aquatic environment.

The maximum temperature which fish can withstand varies from species to species, and also within a species according to the environmental history of the fish. Generally, fish can acclimate to gradually-rising temperatures, so that the lethal temperature depends to some extent on the temperature to which the fish was initially acclimated. Relatively small, sudden changes

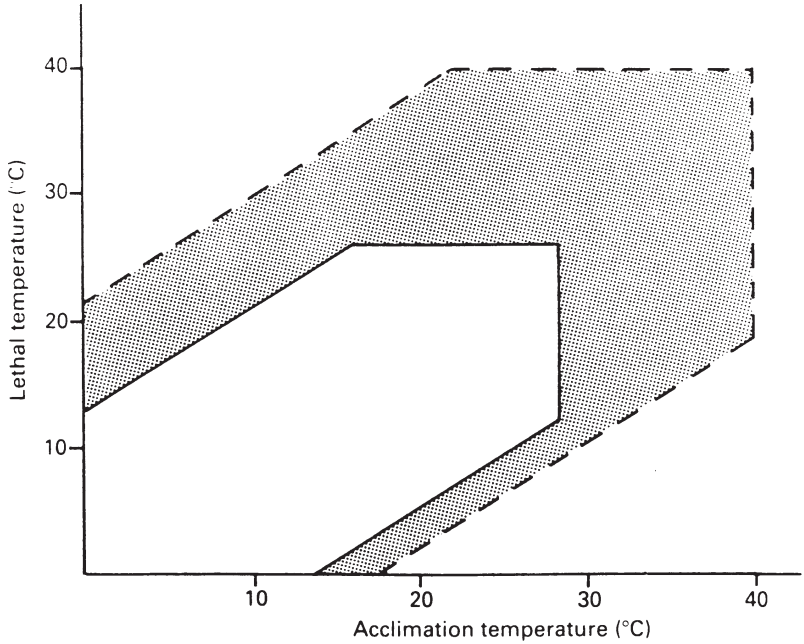

Figure 2.6 Temperature tolerance diagrams for (dotted line) a eurythermal warm-water-adapted fish and (solid line) a stenothermal cold-water-adapted fish. The upper lethal temperature increases with acclimation temperature until the ultimate upper lethal temperature is reached. The lower lethal temperature is also influenced by acclimation temperature. Only temperature changes within the boundaries are tolerated

of temperature which do not allow the acclimation process to occur can be more harmful than larger, more gradual changes. Acclimation to altered temperature is probably achieved by the induction and synthesis of isoenzymes. Many enzymes are known to exist in several forms, each having the same function but each modified to perform optimally at a particular temperature, or under some other specific condition. This is one way in which poikilothermic animals can continue to function over wide ranges of temperature, although the adjustments involved require periods ranging from several hours to several days. The relationship between acclimation temperature and the upper lethal temperature may be summarised in a temperature tolerance diagram (Figure 2.6). The temperature at which the upper lethal temperature ceases to rise with acclimation temperature is termed the ultimate upper lethal temperature. Values range from about 24°C for Salmonid fishes to 40°C or more for fishes characteristic of warmer environments. In general, the ultimate upper lethal temperature for a particular species is several degrees higher than any temperature likely to be encountered in its normal habitat. Therefore death of fish due to high

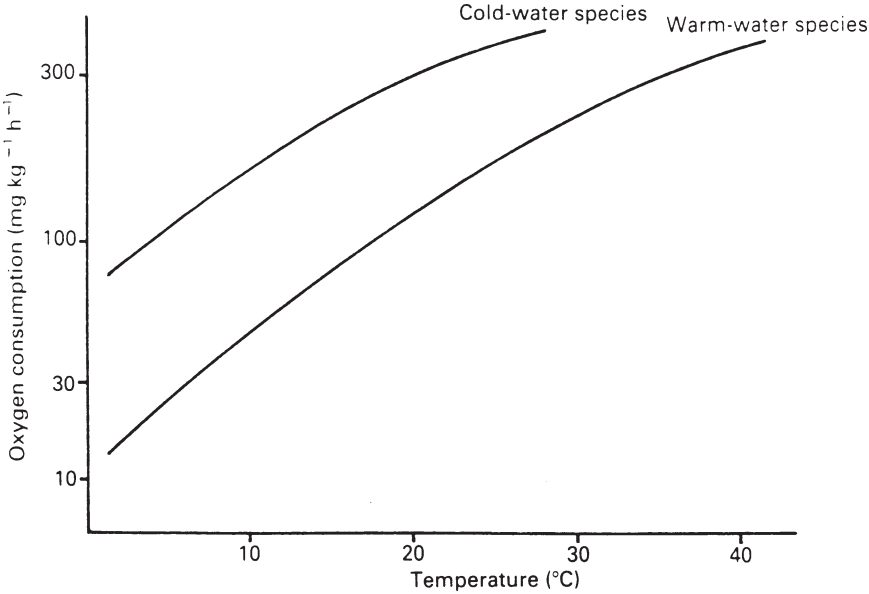

Figure 2.7 Relation between oxygen consumption and temperature for fish at rest. The upper line represents a cold-water-adapted species, the lower line a warm-water-adapted species

temperature alone is probably rare, and the adverse effects of elevated temperature are due to more subtle mechanisms.

The effects of temperature on the respiratory physiology of fish are particularly important. Even under favourable conditions, aquatic animals face formidable difficulties in balancing their needs for oxygen against the meagre quantity available from water and the high energy cost of obtaining it (see Section 2.2). Increased temperature both reduces the amount of oxygen available and increases the animal's demand for it. In addition, for animals in the wild it is not sufficient to survive passively; survival presupposes the need to engage in physical activity, which imposes still further demands for oxygen. In fish, constraints imposed by the size, structure and efficiency of the gills, and by the limited solubility of oxygen in water, limit the maximum possible oxygen consumption to a value of about 400 mg kg^{-1} h^{-1} in most species.

In Figure 2.7, the effect of temperature on the oxygen consumption of two fish species is shown. Warm-water species require to reach the maximum possible rate of oxygen expenditure only at fairly high temperatures. As the temperature falls, their metabolic rate falls until it is too low to permit physical activity, and the fish become torpid. In the wild, they would not survive because they would be unable to find food, avoid predators, or even maintain their position in a current. Cold-water species, such as Salmonids, however, must be active at low

temperatures. They are adapted to high rates of oxygen consumption at low temperatures. However, their rate of oxygen consumption increases with temperature at about the same rate as that for cold-water species (Figure 2.7). Therefore they reach the maximum possible rate at a much lower temperature. As argued in Section 2.2, when the fish reaches this condition the energy cost of working the respiratory muscles is such that there is no oxygen available for the tissues, and the fish dies. Further, the need to retain a margin of capacity for physical activity is important. At its ultimate upper lethal temperature, the fish has no scope to indulge in physical activity other than respiratory movements. At very low temperatures, it has little scope for muscular activity of any sort, since the efficiency of muscle tissue decreases with temperature. At intermediate temperatures, the difference between basal metabolism (oxygen consumption at rest) and active metabolism (oxygen consumption during physical activity) reaches a distinct maximum (Figure 2.8). In practice, the temperature regime which is favourable for the indefinite survival of the fish includes a much narrower range of temperatures than that which would allow the survival of the fish under laboratory conditions.

The range of temperatures which is suitable for growth, reproduction and development of fishes is also generally rather narrower than that which simply allows survival. Temperature is, in conjunction with photoperiod, an important trigger for the onset of reproductive cycles. Temperature also governs the rate of development of fish eggs. In most species, the average temperature multiplied by the time taken for the eggs to hatch is a constant. In Salmonids, eggs typically require 410 degree-days; for example, 41 days at 10°C or 51 days at 8°C. This relationship only holds good, however, within a certain temperature range—below about 5°C and above about 15°C, the proportion of eggs successfully developing is markedly reduced. In Cyprinid fishes, development of eggs may be much quicker, typically three days at 20°C in carp, with other species showing intermediate values. Thus quite short-term anomalies in the temperature regime, if they occur at a critical period, can exert a serious effect on fish reproduction. Studies of the growth of many fish species, particularly those which are widely cultured, show that temperature has critical effects on growth rate and on food conversion efficiency (i.e. the ratio between the increase in weight of the fish and the quantity of food consumed). (In fish, sexual maturity normally occurs when the animal has reached a critical size rather than a critical age.) Clearly, temperature anomalies can have a major influence on the reproductive success of fish, without necessarily giving rise to any obvious immediate effects on the adult population. In practice, fish have considerable powers of mobility and in laboratory experiments show clear preferences for particular temperatures, ranging from about 13°C for Salmonids to 37°C for carp (Varley, 1967). Thus areas subject to thermal anomalies may be devoid of fish through avoidance reactions, but without any serious long-term effects on the population, provided that the fish do have access to cooler water.

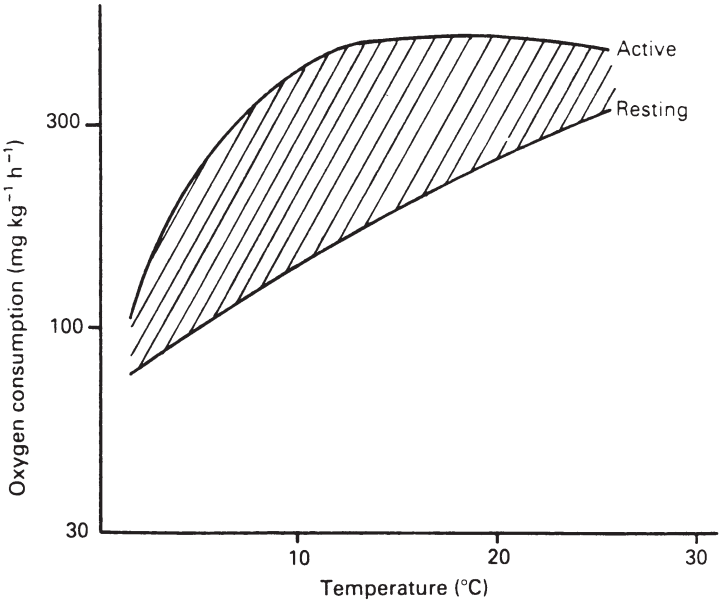

Figure 2.8 Effect of temperature on (lower line) the resting or standard metabolism of a fish and (upper line) the active metabolism. The shaded area represents the 'scope for activity' of the fish

In view of the prevalence of heated effluents, and of the potential importance of elevated temperatures indicated by laboratory studies, it is perhaps surprising that unequivocal examples of ecological damage by thermal pollution are rare. Reviewers such as Castenholtz and Wickstrom (1975), Howells (1983) and Hellawell (1986) cite no clear instances of any readily-detectable adverse effect of elevated temperature, as such, on the ecology of a receiving water, apart from numerous autecological studies whose significance to the overall ecosystem is unknown. Poff and Matthews (1986) did produce some data which appear to show that in a North American stream receiving power-station effluent, invertebrate communities showed reduced diversity and changes in species dominance, compared to nearby undisturbed streams. This is the type of effect which would be expected, but it seems that river communities are often more resilient to thermal disturbance than theory would predict. However, the review of Alabaster and Lloyd (1980), based largely upon research (including field studies) in Eastern Europe which was previously little-known, suggests that temperature increases of between 2 and 8°C do produce significant alterations in the biota of receiving waters.

The apparent difficulty of detecting the ecological effects of thermal pollution may be due to any of several causes. In Eastern Europe, where such effects are more apparent, the prevailing climate is significantly more extreme than in Western Europe or the USA where most studies have been carried out. In many

circumstances, heated effluents are discharged to rivers which are also polluted with toxic or organic matter, and the effects of elevated temperature may be difficult to distinguish from other pollution effects. Since *low* temperatures can also limit biological processes, in some circumstances artificially-elevated temperatures may actually be beneficial in terms of overall productivity. Also, local conditions undoubtedly influence the impact of heated effluents. In many countries, power generation reaches its maximum during the winter months when river temperatures are low and river discharges high. In others, depending upon climatic and economic factors, demands for electric power (for refrigeration or air-conditioning) in summer, when river discharges are lowest and temperatures naturally highest, may approach or exceed winter levels. The effects of heated effluents on the ecology of receiving waters may therefore be expected to vary from one region to another. Finally, the effects of elevated temperatures may be difficult to predict or detect without detailed knowledge of specific local circumstances. For example, increased temperature will accelerate microbial decomposition of organic matter. In sluggish, poorly-aerated waters this will accentuate the effects of organic pollution; but in turbulent waters which re-aerate rapidly from the atmosphere, the effect of elevated temperature would be to reduce the extent of the zone within which the adverse effects of organic inputs manifested themselves, and in a lightly-polluted water might lead to a beneficial increase in overall productivity. It is therefore unwise to attempt generalisations on the effects of thermal pollution; each case must be considered individually.

2.7 Toxic Pollution

There are about four million different chemical substances in existence, a number which increases by about 300000 every year. Of these, about 63000 are in common use (Maugh, 1978). Goodman (1974) estimated that about 10000 chemicals are produced in quantities exceeding 500 kg yr^{-1}. A large proportion of these thousands of chemicals are, presumably, only produced and/or used in only a small number of locations. Nevertheless the number of pollutants which can be considered as widespread is still formidably large. A realistic figure is indicated by the 1978 Great Lakes Water Quality Agreement between the US and Canadian governments (reprinted in Nriagu and Simmons, 1983). Appendix 1 of this agreement lists 271 different substances which, on the basis of toxicological and discharge data, are considered hazardous to the North American Great Lakes. Appendix 2 of the same agreement lists a further 106 'potentially hazardous polluting substances'.

The present discussion is confined, of necessity, to a general description of the sources and characteristics of some of the major categories of toxic pollutant. The categories chosen are for convenience, and are not necessarily mutually exclusive;

many pesticides, for example, contain heavy metals. It is not at all easy to give specific descriptions of the effects of a given pollutant, because of the diversity of the chemicals involved, the wide range of environmental conditions which prevail in different receiving waters, the fact that poisons frequently occur in complex mixtures, and the enormous differences in the physiology of the organisms which are exposed to them. The study of pollutant toxicity and toxic effects is described in some detail in Chapters 1 and 4. Specific information on the toxicity and toxic effects of pollutants is best sought in review articles and other data compilations, which are referred to where appropriate. A very comprehensive reference work is that of Hellawell (1986). It is important to note, however, that toxicity data obtained from such compilations can be extremely misleading, for reasons which are explained fully in Chapter 4. It is recommended that wherever possible the original sources are consulted, and the validity of the data assessed in relation to the methodological criteria described in Chapter 4.

2.7.1 Heavy Metals

'Heavy metals' is an imprecise term that is generally taken to include the metallic elements with an atomic weight greater than 40, but excluding the alkaline earth metals, alkali metals, lanthanides and actinides. The most important heavy metals from the point of view of water pollution are zinc, copper, lead, cadmium, mercury, nickel and chromium. Aluminium (see Section 2.9) may be important in acid waters. Some of these metals (e.g. copper, zinc) are essential trace elements to living organisms, but become toxic at higher concentrations. Others, such as lead and cadmium, have no known biological function. Industrial processes, particularly those concerned with the mining and processing of metal ores, the finishing and plating of metals and the manufacture of metal objects, are the main source of metal pollution. In addition, metallic compounds are widely used in other industries: as pigments in paint and dye manufacture; in the manufacture of leather, rubber, textiles and paper; and many others. Quite apart from industrial sources, domestic wastes contain substantial quantities of metals because the water has been in prolonged contact with copper, zinc or lead pipework or tanks. The prevalence of heavy metals in domestic formulations, such as cosmetic or cleansing agents, is frequently overlooked. Some forms of intensive agriculture give rise to severe metal pollution; copper, for example, is widely added to pig feed and is excreted in large quantities by the animals. Mance (1987) gives a detailed review of metal pollution.

Heavy metals may be classed (see Table 2.4) generally as toxic or very toxic to aquatic animals and to many plant species, though large interspecific differences in susceptibility occur even within closely-related groups of

Table 2.4 Degrees of pollutant toxicity, classified according to the scheme proposed by the Joint IMCO/FAO/UNESCO/WHO Group of Experts on the Scientific Aspects of Marine Pollution (1969)

Degree of toxicity	Acute toxicity threshold, ($mg\,l^{-1}$)
Practically non-toxic	Above 10 000
Slightly toxic	1000–10 000
Moderately toxic	100–1000
Toxic	1–100
Very toxic	Below 1

organisms. Relatively little is known about the interaction of heavy metals with the aquatic microbial flora. Algae, macroinvertebrates and fishes have, however, been widely studied. In general, the heavy metals may be listed in approximate order of decreasing toxicity as follows: Hg, Cd, Cu, Zn, Ni, Pb, Cr, Al, Co. However, this sequence is very tentative and the position of each element in the series will vary with the species tested and the conditions of the experiment. Apart from some remarkable interspecific variations in susceptibility to metals, the toxicity of most metals varies enormously with the environmental conditions, mainly because of the effect of environmental conditions on the chemical speciation of the metal (see Section 4.2). Study of the ecological effects of heavy metals as water pollutants is often hampered by the fact that other pollutants are normally additionally present. However, there is an enormous literature on heavy metal toxicity (see, for example, Alabaster and Lloyd, 1980; Hellawell, 1986; Mance, 1987; Whitton and Say, 1975) and some important aspects of the impact of heavy metals as water pollutants have already been discussed in Chapter 1.

Two features of heavy metal toxicity which should not be overlooked are their ability to form organometal complexes and their potential for bioaccumulation. There is some evidence (see Section 4.2) that the presence of organic substances can reduce heavy metal toxicity considerably, at least as measured in conventional toxicity tests. However, a number of organometal compounds are known to be particularly hazardous to aquatic life. Tributyltin, for example, a constituent of antifouling paints, is implicated in severe environmental damage in harbours, boatyards and inland waters, and appears in the 'Black Lists' of substances compiled by international organisations such as the European Union and United Nations Environment Programme. Similarly, the dangers associated with methylated forms of mercury are well known. Many metals, whether organically-complexed or not, are known to accumulate in plant and animal tissues to very high levels, posing a potential toxic hazard to the organisms themselves, or organisms higher in the food chain including humans, which may consume them.

2.7.2 Ammonia, Cyanides and Phenols

Ammonia, cyanides and phenols are considered together because, with copper and zinc, they are the most widespread and serious toxic water pollutants in industrialised countries. Ammonia and its compounds are ubiquitous constituents of industrial effluents because ammonia is a staple raw material in many branches of the chemical industry; it is, therefore, a common end-product of industrial processes as well as an important by-product of others, notably the production of coke and gas from coal, from power generation and from most processes involving the heating or combustion of fuel. It is also a natural product of the metabolism of organic wastes in treatment plants and receiving waters. The toxicity of ammonia to fish is well documented, and although less is known of its effect on invertebrates it appears that levels of ammonia which are tolerable to fish present little danger to most invertebrates (Alabaster and Lloyd, 1980). In aqueous solution, ammonia forms an equilibrium between unionised ammonia, ammonium ion and hydroxide ions:

$$NH_3 + H_2O \rightleftharpoons NH_4^+ + OH^-.$$

Unionised ammonia is very toxic to most organisms, but ammonium ion is only moderately toxic. The toxicity of the solution therefore depends on the quantity of unionised ammonia. This in turn depends upon the pH and temperature of the water; as pH and temperature rise, the proportion of unionised ammonia also rises. The effect of pH and temperature on ammonia toxicity is therefore considerable. In order to know whether a given level of total ammonia is likely to be toxic, it is necessary to use the pH and temperature values to calculate the corresponding level of free ammonia. (Some authors, such as Alabaster and Lloyd (1980) and Hellawell (1986), have published tables or nomographs to facilitate the calculation.) As an example, the European Inland Fisheries Advisory Commission (EIFAC) recommends that unionised ammonia concentrations should not exceed 0.025 mg l^{-1}. In a water of pH 8.5 at a temperature of 20°C, this corresponds to a *total* ammonia concentration of 0.22 mg l^{-1}. In a cooler, acid water, however (pH 6.5, 5°C), a concentration of *total* ammonia of 63.3 mg l^{-1} would be acceptable, whereas at pH 6.5 and 20°C, the maximum acceptable concentration of *total* ammonia would be 20 mg l^{-1}.

Cyanide is also a very common constituent of industrial effluents, being produced from processes involving coking and/or combustion such as steelworks, gas production and power generation. Cyanides are also used in the hardening, plating and cleaning of metals. Cyanides dissociate in aqueous solution:

$$KCN + H_2O \rightleftharpoons H^+ + K^+ + HCN \rightleftharpoons CN^- + H^+.$$

The dissociation, and consequently the toxicity of cyanide, is pH-dependent, low pH favouring the formation of undissociated HCN which is highly toxic. Cyanide ions readily form complexes with heavy metal ions. The stability and toxicity of

these complexes varies according to the metal and also with the pH. Thus the toxicity of cyanides and effluents containing cyanides (which commonly contain substantial amounts of heavy metal) is, as with ammonia, greatly influenced by pH, but is less well understood. It is clear, however (see Chapter 1), that the contribution of cyanides to the overall toxicity of complex industrial effluents can be identified, and is often significant.

Phenolic substances include the monohydric phenols (phenol, cresols and xylenols) and the dihydric phenols including catechols and resorcinols. They are found in a wide range of industrial effluents, and are particularly associated with gas and coke production, the refining of petroleum, power generation, many branches of the chemical industry and the production of glass, rubber, textiles and plastics. Alabaster and Lloyd (1980) and Buikema *et al.* (1979) provide detailed reviews of the literature. The latter review includes discussion of phenol derivatives which are used for specialised purposes such as pesticides. Apart from these, phenolic substances rarely occur as pollutants except as components of complex effluents which contain a variety of other polluting substances. In practice, therefore, the major concern is to determine the extent to which phenols contribute to the overall toxicity of an effluent, and an example was discussed in Chapter 1.

2.7.3 Pesticides

Pesticides are a diverse group of poisons of widely-varying chemical affinities, ranging from simple inorganic substances to complex organic molecules. Of the latter, some are natural metabolites, particularly of plants, while others are synthetic derivatives of natural products or completely synthetic substances produced in chemical factories under conditions which do not exist in the natural world. They have in common only that each pesticide is highly toxic to some forms of life and of intermediate or negligible toxicity to others, and that they have been widely introduced into the natural environment. Pesticides are introduced into aquatic systems by various means: incidentally in the course of their manufacture, and through discharge consequent upon their use. Surface water runoff from agricultural land and the side-effects of aerial spraying are especially important, and many serious pollution incidents arise through the accidental or negligent discharge of concentrated pesticide solutions which have been used for agricultural purposes such as sheep-dipping. Additionally, many pesticides are deliberately introduced into water bodies to kill undesirable organisms such as insect or molluscan vectors of human diseases, weeds, fish and algae.

Pesticides are also used in many industrial processes, for example in the manufacture of textiles and in the production and processing of perishable materials such as paper and timber products. They are therefore an important component of many industrial effluents. Because of their enormous diversity and their importance as pollutants, pesticides have attracted an enormous literature. Useful introductions are given, for example, by Khan (1977), Perring and Mellanby (1977), Brown (1978) and Muirhead-Thompson (1987). A valuable summary of pesticides as water

pollutants is given by Hellawell (1986). In many countries, the special significance of pesticides as pollutants (and as widely-used toxic chemicals in the working environment) has led to the development of strict controls on their use. One example is the Control of Pesticides Regulations, operated in Britain by the Ministry of Agriculture.

Insofar as it is possible to generalise about the polluting effects of such a diverse group of substances, the following points are perhaps of greatest significance. First, effective pesticides are more or less selective in their effects, that is they are extremely toxic to some forms of life and relatively harmless to others. Second, their modes of application vary according to the circumstances. In some cases, pesticides are applied in relatively high concentrations for relatively short periods. This pattern of application typically occurs where pesticides are applied to water to kill weeds, disease vectors or other undesirable organisms, or as an incidental effect of aerial spraying of crops. Here, the principal concern may be to determine their short-term toxicity to non-target organisms, and it may be advantageous to devise specific toxicity testing protocols in order to estimate the impact of the pesticides on the receiving-water biota (see Chapter 4). However, in lowland rivers draining agricultural areas, pesticides are more likely to be present at low but fairly consistent levels, and in this case the major areas of toxicological interest will be their potential sublethal effects, their capacity to accumulate in individual organisms and via the food chain, and the development of resistance through acclimation and/or genetic adaptation. Many pesticides are known to be refractory to chemical and biological degradation, and their persistence in the environment has for many years been a cause for concern. Probably the best example of this is the well-known case of DDT, which has been used in such enormous quantities in the last 50 years that no part of the world is now free from measurable contamination, and its manufacture and use in many countries are now banned or severely restricted. One consequence of this, however, is that other pesticides are used as substitutes; many of these are of much more recent discovery than DDT, and may eventually be found to be equally or more dangerous when sufficient information about them has been accumulated.

2.8 Suspended Solids

Virtually all effluents contain suspended particulate matter, but especially those associated with mining and quarrying for coal, china clay, stone and other mineral materials. Dredging, engineering works and boat traffic commonly introduce particulate matter into suspension. Storm-water drainage and surface water runoff also contribute substantial loads. Suspended matter may be organic or inert, and some forms are chemically reactive (for example, the ferric hydroxide precipitate associated with acid mine drainage (see Section 2.9)). The present discussion is confined to the physical effects of suspended solid matter. The effects of suspended matter on the receiving water biota are both direct and indirect. Direct effects include physical abrasion of body surfaces, and especially of delicate structures

such as gills. Physical damage of this kind interferes with respiration and renders the animals susceptible to infections. High levels of suspended particulates may interfere with the filter-feeding mechanisms of invertebrates, and possibly with the feeding of fish which locate their food visually. In laboratory experiments high levels of suspended solids can kill fish. The concentrations of suspended solids at which these effects occur vary with the species and the nature of the particulate matter. Herbert and Merkens (1961) found that kaolin and diatomaceous earth in suspension at a concentration of 270 mg l^{-1} caused substantial mortality to trout over a period of 10–15 days, but other investigations have shown large differences between the lethal concentrations of different types of suspended matter (Alabaster and Lloyd, 1980).

Indirect effects are mainly due to increased turbidity and the blanketing effect of the particulates when they eventually settle. Increased turbidity will reduce or prevent photosynthesis, leading to a reduction in primary productivity or the complete elimination of plants. Alternatively, certain forms of silting can, depending on the physical conditions, bring about major changes in the community by promoting the formation of stable weed beds. Salmonid fishes require aerated gravel beds for egg-laying sites, and the silting of gravel beds can eliminate salmonid populations by depriving the fish of suitable nest sites. In many rivers, salmonid population density is governed by the availability of nest sites rather than by biological or chemical factors. Invertebrate distribution patterns are profoundly influenced by the size of the particles composing the substratum (Hynes, 1970). Mayfly nymphs with exposed abdominal gills (e.g. *Ecdyonurus, Rhithrogena, Ephemerella*) may be replaced by species with covered gills or which are adapted for burrowing (e.g. *Caenis, Ephemera*). Insects which crawl upon the substratum may generally be disadvantaged in favour of species whose means of locomotion is better suited to a soft substratum, such as leeches, oligochaetes and some molluscs. Thus the input of even inert fine particulates can readily bring about major community changes. Herbert *et al.* (1961) described the effects of china clay wastes on the ecology of trout streams, and discussed the mechanisms by which alterations occurred. Other field and laboratory studies are reviewed by Alabaster (1972) and Alabaster and Lloyd (1980). The majority of unpolluted British rivers contain fewer than 50 mg suspended solids per litre of water, and about half have under 30 mg l^{-1}. Alabaster and Lloyd (1980) tentatively suggest that waters containing more than 80 mg l^{-1} are unlikely to support good fisheries.

2.9 Extreme pH and Acidification

Many effluents, especially if untreated, are strongly acidic or alkaline. All natural waters have some buffering capacity, that is the ability to absorb acid or alkaline inputs without undergoing a change in pH. This buffering capacity is usually expressed in terms of the acidity (ability to neutralise alkalis) and alkalinity (ability to neutralise acids) of the water, and is determined by titration in the presence of a suitable indicator. The relationship between the pH, acidity and alkalinity of a

water is not simple. Acid waters (pH<7) can have measurable alkalinity, and alkaline waters (pH > 7) can have measurable acidity. Where the buffering capacity of the water is exceeded by the input of an effluent, the pH of the water will change. Unpolluted natural waters show a pH range from 3.0 to 11.0 or more; those lying between 5.0 and 9.0 generally support a diverse assemblage of species and this range may be considered broadly acceptable (Alabaster and Lloyd, 1980). This does not mean, however, that pH changes within the range 5.0–9.0 are of no consequence. For example, pH is an important determinant of the distribution patterns of aquatic species, as can be seen from the study of invertebrate communities in unpolluted rivers (Haines, 1981; Sutcliffe, 1983; Sutcliffe and Carrick, 1973). In addition, apparently small changes in pH can have major effects on the toxicity of pollutants such as ammonia, so that the effect of a given level of pollutant can vary, depending upon pH, from being scarcely noticeable to being extremely serious.

A very common form of pollution involving extreme pH is acid mine drainage. Coal mines are the most common source of acid mine drainage, but it can occur wherever mineral ores are mined. A series of reactions commencing with the oxidation of the common mineral pyrite (FeS_2) is responsible, and certain autotrophic bacteria are closely involved (Lundgren *et al.,* 1972). The reactions may be summarised:

$$2FeS_2 + 2H_2O + 7O_2 \longrightarrow 2FeSO_4 + 2H_2SO_4$$
$$4FeSO_4 + 2H_2SO_4 + O_2 \longrightarrow 2Fe_2(SO_4)_3 + 2H_2O$$
$$Fe_2(SO_4)_3 + FeS_2 \longrightarrow 3FeSO_4 + 2S$$
$$2S + 3O_2 + H_2O \longrightarrow 2H_2SO_4$$
$$Fe_2(SO_4)_3 + 6H_2O \longrightarrow 2Fe(OH)_3 + 3H_2SO_4.$$

These reactions occur chemically, but only very slowly at acid pH values. The sequence of reactions may therefore be self-limiting. However, certain bacteria, especially *Thiobacillus thiooxidans* and *Ferrobacillus ferroxidans* possess enzymes which bring about these reactions rapidly. These bacteria are abundant in acid mine waters, especially since they are tolerant of low pH whereas many species commonly found in soil and water are not. Further, they are autotrophic, that is they require no substantial amount of organic matter for growth, and soon dominate the flora.

The effects of acid mine drainage are threefold. The low pH itself has adverse effects on the receiving water flora and fauna. It also promotes the solubilisation of heavy metals, which exert their own toxic effects. Third, as the drainage water is diluted and the pH rises, ferric hydroxide precipitates and discolours the water, producing the effects of suspended particles. As the hydroxide settles, it forms a gelatinous layer over and within the substratum, causing both direct and indirect

effects on the receiving water community. In general, the result is a marked reduction in species diversity and biomass in the affected areas (Koryak *et al.,* 1972; Letterman and Mitsch, 1978; Scullion and Edwards, 1980). The effect on the receiving water community is influenced by the alkalinity of the water or the presence of nearby alkaline discharges; where the acid is neutralised, the effects are due to the ferric hydroxide alone, rather than to the combined effect of hydroxide and low pH.

A phenomenon which has recently received widespread attention is that water bodies in some parts of the world, especially in North America and Northern Europe, appear to be becoming steadily more acidic. The reason, it is suggested, is that airborne pollutants from industrial areas are transported by prevailing winds to areas remote from their source, and precipitated in 'acid rain'. The subject has caused much controversy both within the scientific community and among the general public, particularly since the problem not only has grave implications for important economic interests, but has already given rise to differences between the governments of some countries. It is not yet clear, for example, whether the main cause is sulphur dioxide emissions from power stations, or motor vehicle exhausts. Some countries have already begun expensive programmes to limit SO_2 emissions, while others argue that the extent of acid rain is not controlled by the amount of SO_2 emitted but by chemical reactions in the atmosphere and that the reduction of SO_2 emissions would therefore not lead to a decrease in acid rain. It is also clear that certain forestry practices lead to acid runoff from the soil into surface waters, so that the source of the problem may lie not in distant industrial areas, but within the affected areas themselves. These controversies do not directly concern us, but it is appropriate to consider the extent to which natural waters are becoming acidified, whether or not this is a natural phenomenon, and what its biological consequences may be.

The consequences of acidification are undoubtedly serious. Haines (1981) and Howells (1990) provide general reviews, and Baker and Schofield (1985) discuss the impact of acidification on North American fish populations. It is generally accepted that as pH decreases, both the diversity of species and the overall productivity of aquatic ecosystems decline. These phenomena can readily be observed through contemporary studies on waters of different pH values. Several mechanisms appear to be involved. First, every species has its own zone of tolerance to pH. The pH range which permits survival may be wider than that which will permit successful reproduction. This is particularly well documented for fish, both in laboratory experiments and through field observations (Baker and Schofield, 1985). Sutcliffe (1983) draws attention to the important influence of pH on the mechanisms of ionic regulation in aquatic species. Naturally-acid waters tend to be found in areas of base-poor geology and tend to be low in nutrients, dissolved

ions and buffering capacity. Therefore they have low primary productivity, present unusual difficulty to animals and plants in maintaining ionic balance, and are particularly susceptible to extraneous inputs of acid. The distribution of invertebrates in relation to pH was investigated in a catchment in northern England (Sutcliffe, 1983; Sutcliffe and Carrick, 1973) and revealed a pattern which is widely repeated elsewhere (Haines, 1981). Phytoplankton, zooplankton and macrophytes behave similarly in relation to pH. Generally, the pattern is of reduced species diversity as pH declines, although in favourable circumstances acid-tolerant species may become locally abundant. Undoubtedly, an apparently small change in pH can bring about major changes in community structure. (It may be appropriate to recall that a reduction of 1 pH unit represents a tenfold increase in hydrogen ion concentration; and that a pH change from, say, 6.9 to 6.6 means that the hydrogen ion concentration has approximately doubled.)

In addition, low pH values in theory could strongly and progressively reduce the rate of decomposition of organic detritus, presumably through the effect of low pH on the fungal and bacterial organisms responsible for this process (Haines, 1981). Many aquatic ecosystems depend on the decomposition of allochthonous detritus (i.e. organic material from outside the system, such as fallen leaves) as the main source of energy for the animals in the system. Primary (photosynthetic) production of organic matter in acid waters is naturally low, being normally limited by the low availability of nutrients; it may also be itself inhibited by the susceptibility of phytoplankton and macrophyte species to low pH. The alternative source of energy for animals, organic detritus, is only available in the presence of microbial decomposers, since animals cannot digest plant material unaided. Therefore the overall productivity of the system will decline. However, Gilmour (1992), reviewing the results of experimental acidification studies, concluded that the effects of acidification on microbial decomposition processes do not in practice become significant until the pH drops below 5, by which time other more direct effects on the fauna and flora will already have taken place. Field studies on acidified lakes in Europe largely point towards a similar conclusion (Howells, 1990). Indeed, such evidence as exists suggests that microbial decomposers and their associated biogeochemical processes are more robust to reduced pH than are higher organisms, and that nutrient cycling may actually be accelerated by low pH.

A third effect of acidification is to increase the threat of heavy metal toxicity. Aluminium, a metal which does not commonly cause serious problems of toxicity to aquatic life, has received particular attention. Burrows (1977) and Odonell *et al.* (1984) have summarised the role of aluminium as a toxic water pollutant. Although it is a very abundant metal, forming up to 7% of the earth's crust, it is highly reactive and readily forms stable compounds of very low solubility. In most natural

waters which have been investigated, the dissolved aluminium concentration lies between 0.05 and 10 mg l^{-1}. Within the pH range of approximately 5.5 to 7.0, aluminium is practically non-toxic and is certainly harmless at the concentrations found in most waters. The chemistry of aluminium and its compounds at low pH is poorly understood, but it appears that as pH falls aluminium compounds become more soluble and that the proportion of free aluminium rises. Below pH 4, the toxic effects of free hydrogen ion are so severe that the presence of aluminium is probably of little significance. However, between pH 4 and 5.5, the toxicity of aluminium is high, reaching a maximum at around pH 5. At this pH, the level of aluminium naturally present in water is acutely toxic to fish. High levels of calcium appear to offer some protection, although acid waters with high calcium levels are unusual. Aluminium toxicity is likely, therefore, to be a major contributor to the effects of acidification. Surges of acidity in upland rivers associated with snowmelt are not uncommon, and can be particularly damaging to salmonid fish populations which tend to be breeding at the time when snowmelt is likely to occur, leaving young fry vulnerable (Howells, 1990).

More rarely, aluminium can also cause toxicity in alkaline waters, as the solubility of aluminium compounds also increases with pH above 7.0. Aluminium compounds are widely used in the treatment of potable waters, and discharges from water-treatment works can have adverse consequences (Hunter *et al.,* 1980).

Finally, the question of whether acidification is a recent phenomenon, and whether it is a cyclic or an irreversible change, can only be answered indirectly. Accurate measurement of pH, particularly in weakly-buffered solutions like natural surface waters, has only been possible for about 30 years, and even within this timespan few water bodies have been studied systematically. It is also difficult to distinguish long-term trends from diurnal or seasonal pH variations, so the data available even from recent measurements of surface water pH are not altogether reliable. However, contemporary observations on the distribution of diatoms in relation to water pH show that the diatom community shows distinct qualitative changes according to the pH of the water. Analysis of the diatom community therefore indicates approximately the pH of the water. The characteristic siliceous frustules of diatoms accumulate at the bottom of lakes and decay only very slowly, so analysis of a core of lake sediment allows the changes in the diatom community over long periods of time to be determined. Thus, indirectly, any changes in the pH of the water may be inferred. Flower and Battarbee (1983) used this technique to estimate changes in the pH of two lakes in Scotland over several hundred years (Figure 2.9), and their results are typical of many studies. It appears that the pH of lake water declines slowly for natural reasons; rain is naturally acidic. However, the rate of decline of lake pH

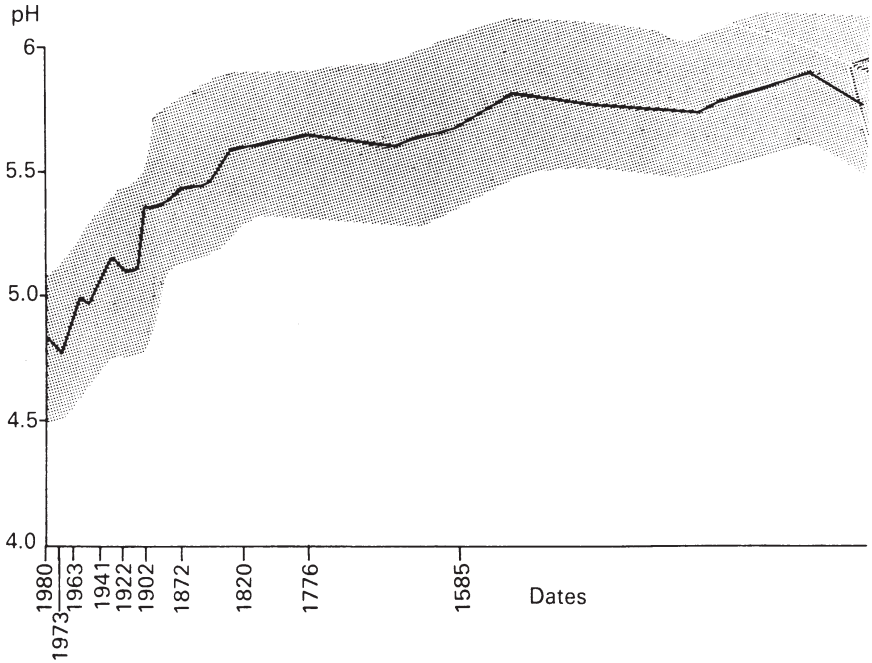

Figure 2.9 Changes in pH of a lake in Scotland with time, inferred from the composition of the diatom community in lake sediment cores at different depths (Flower and Battarbee, 1983). (Reproduced by permission from *Nature*, **305**, pp. 130–132; copyright © 1983 Macmillan Magazines Ltd)

appears to have accelerated rapidly within the last 150 years or so, corresponding to the period during which Britain became heavily industrialised. Further discussion of many aspects of acidification is given by Howells (1990).

2.10 Detergents

Synthetic detergents are an interesting group of pollutants because they were virtually unknown before 1945, yet within a few years became responsible for some spectacular water pollution problems which, unusually, came rapidly to the attention of the general public. The alkylbenzene sulphonate detergents (Figure 2.10) rapidly replaced soap as domestic and industrial cleaning agents because of their cheapness and greater efficiency, and particularly because they did not cause precipitation of calcium salts in areas supplied with hard water. Unfortunately they were not readily broken down by sewage treatment processes, giving rise to problems of toxicity to the receiving-water biota, and of foaming in watercourses and treatment works.

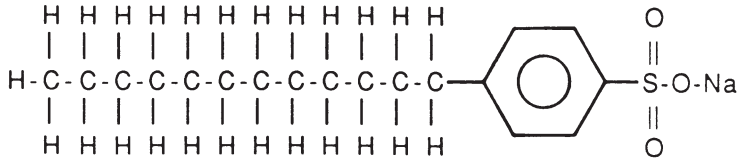

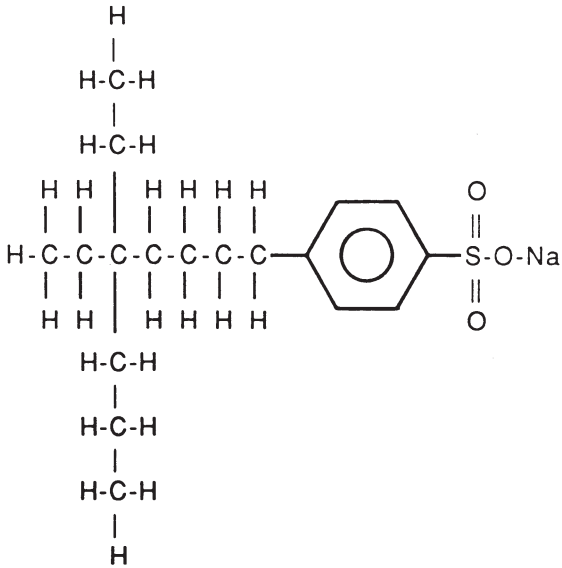

Figure 2.10 Molecular structure of (above) a typical 'soft' (biodegradable) linear alkylate sulphonate detergent and (below) a 'hard' alkylbenzene sulphonate detergent

In areas where industrial usage of detergents was pronounced (for example, in textile-processing industries) whole towns were frequently covered in detergent foam; in waste treatment works, a number of serious accidents occurred through, for example, operatives falling into sedimentation tanks which were concealed under a thick layer of foam. Consultation between regulatory authorities and the detergent manufacturers led to research which showed that modifications to the manufacturing process could produce *linear alkylate sulphonate* (LAS) detergents (Figure 2.10), which were rapidly degraded in conventional waste treatment plants. From 1965 onwards, 'soft' or biodegradable detergents were introduced for domestic use, and although these are generally more toxic to aquatic organisms, their unbranched hydrocarbon chain is more readily broken

down in treatment processes and in practice, toxicity and foaming problems had largely disappeared by the early 1970s. Synthetic detergents remain significant causes of pollution in some circumstances however. Their toxicity to aquatic organisms is reviewed by Abel (1974). 'Soft' detergents are not suitable for use in certain industrial processes. Detergents are widely used as components of oil-dispersants, particularly in coastal and marine habitats, and are often more toxic to aquatic organisms than the oil itself (see Chapter 7). Finally, some components of detergent formulations exert adverse effects of their own. The best known example is the high level of phosphate found in many formulations (see Section 2.4). Less widely appreciated are the adverse effects of boron, from perborate additives to detergent formulations, which can cause adverse effects on crops if contaminated surface waters are used for irrigation (Lester, 1975; see also Table 2.2).

2.11 Oil and Petroleum Products

Oil pollution is commonly perceived as being a problem associated mainly with the marine environment, but in fact oil and related substances account for about one-quarter of reported pollution incidents of fresh waters in Britain (NRA, 1994a); and probably the pattern is not much different in other parts of the world. Also, about one-quarter of all the oil released to the seas by human activity is estimated to enter via rivers. The sources of oil pollution are the usual ones—illegal, negligent or accidental discharges, plant failures and so on—but to these must be added inputs from roads and railways, particularly in the case of traffic accidents, and discharges associated with oil extraction from inland oilfields and processing plants.

The effects of oil discharges vary enormously, because the characteristics of the receiving waters and the various types of oil are themselves very variable. Fortunately many small discharges have relatively trivial effects, but substantial discharges can have severe impacts. Some case studies are reviewed by Green and Trett (1989). Generally, light oils are relatively volatile and disperse quickly, though they are extremely toxic and can cause severe local damage. Fast-flowing waters often recover rapidly, over a few weeks or months, but lentic waters are much more susceptible to long-term damage. Heavy oils are less toxic, but can have marked physical effects in the substratum and the banksides, which of course will be reflected in changes to the biological community. Heavy oils may remain *in situ* for long periods; they do, over time, decompose biologically and chemically, but in so doing impose a high BOD. Frequently, the effects of oil pollution are not dissimilar from those of heavy organic pollution, with varying levels of toxic effects adding to the overall impact. Oils, unlike most forms of water pollution, can also have damaging effects on terrestrial organisms, such as plants, birds and mammals living at the water's edge, since heavy oil contamination usually leads to deposition of oil on the banks of lakes or rivers.

Generally, the use of oil dispersants, which are commonly used in dealing with marine spills, is avoided in freshwater because of their high toxicity. Also, the physical conditions of freshwater habitats are often amenable to containment and recovery of oil by booms, skimmers and/or the use of absorbent materials.

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3

Biological Monitoring of Water Quality

3.1 The Conceptual Basis of Biological Monitoring

We have by now seen ample evidence that the levels of abundance and patterns of distribution of aquatic organisms may be affected by pollution of the water in which they live. Hellawell (1977, 1978) summarised diagrammatically the changes which may occur in a community subject to pollution (Figure 3.1). Which, if any, of these responses occur will depend upon the nature and severity of the pollution, and upon the relative susceptibility of the species within the community to specific kinds of environmental alteration. It follows that given suitable techniques of sampling and data analysis, monitoring of the biological characteristics of waters might indicate the occurrence of ecologically significant environmental changes—including the incidence of pollution—which may otherwise be undetected.

This basic idea has been understood and utilised in monitoring the effects of pollution since the early years of the twentieth century (Cairns and Pratt, 1993), although many biologists have felt that the techniques of biological monitoring have not, at least until quite recently, been accepted and developed as rapidly as they might have been. There are probably several reasons for this. First, chemists and physical scientists are frequently sceptical of biological results which can sometimes appear to them to lack precision, and frequently require expert interpretation. Biologists themselves, perhaps under pressure to produce results quickly and economically, frequently have in fact failed to follow the best practice and have on occasions produced ambiguous, misleading or inaccurate results. In a recent analysis of published studies, Resh and McElravy (1993) found a number of cases where, for various reasons, some aspects of the monitoring programmes reviewed were

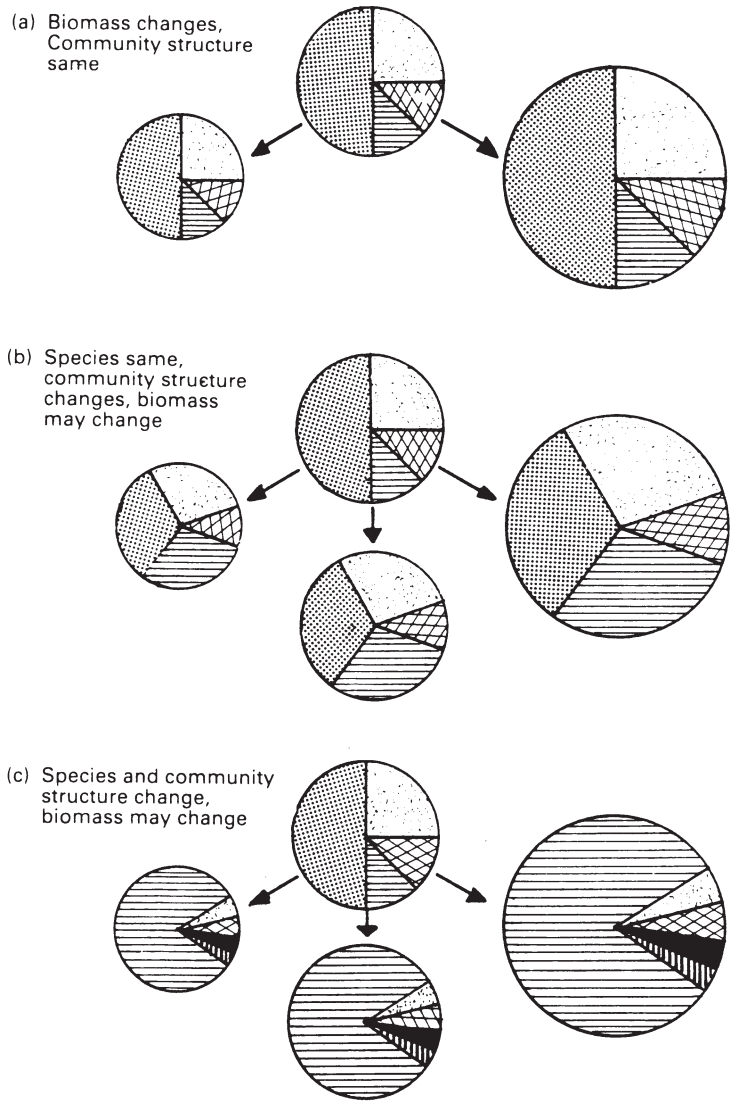

Figure 3.1 Possible responses of a community to environmental change (from Hellawell, 1978)

inadequate in one way or another, casting doubt on the validity of the results. Insofar as biological monitoring procedures have been adopted in the past by regulatory agencies, biologists have encountered resistance from legislators and administrators who are reluctant to modify regulatory practices, laws and regulations to take account of improvements in techniques, preferring instead to rely on 'established' methodology which more recent research shows can be greatly

improved upon. Finally, there is the stubborn belief that biological monitoring is prohibitively expensive—it certainly is demanding of trained human resources. However, in a very illuminating discussion of this and some of the other points raised above, Brinkhurst (1993) produces evidence to show that the cost-effectiveness of biological monitoring techniques actually compares favourably with physical and chemical methods.

Perhaps optimistically, Rosenberg and Resh (1993) express the view that 'Biomonitoring may have come of age with the recent adoption, by North American and European governments, of national programs of environmental monitoring and assessment that include the use of aquatic biota'. Certainly an impressive consensus has been developing over the last decade or so among actual practitioners of biological monitoring. In fact, this consensus has been in existence among specialists for much longer than that, though it has not always been appreciated by those who wish to utilise their services but who do not wish to pay the necessary price in patience, financial resources or flexibility of attitude. We should also remember that in any field in which new ideas and techniques are being constantly developed, the consensus must always lag a little behind the best approaches, and must itself evolve rather than be fixed in stone. The evolution of this consensus is perhaps best traced through the literature of biomonitoring during the last 20 years (see, for example, Hellawell (1977, 1986); Metcalfe-Smith, (1994); Rosenberg and Resh, (1993)). Now that techniques of biological monitoring are becoming more widely accepted, there are also specific recommendations published in accessible form by reputable agencies, which are a useful source of guidance to the relatively inexperienced. These include APHA (1995), ISO (1985, 1991) and DIN (1983a, b, 1987, 1990). The purpose of this chapter is to give a general introduction to the best current practice. Biological monitoring is a powerful tool, but a very dangerous one if not used correctly.

Biological monitoring programmes are carried out for a variety of reasons. For example, most regulatory agencies, such as water authorities, routinely monitor the biota of the waters for which they are responsible. Typically, sampling stations are surveyed at intervals of between one and six months. Information is gathered on the presence and relative abundance of species, and may be used to derive numerical values, for example of species diversity or biotic index (see Section 3.4), to facilitate spatial or temporal comparisons. Significant alterations from previously-established conditions may indicate the need for further investigation, and lead to action designed to preserve or improve the existing water quality. Sites known to be at special risk from existing pollution sources, and sites of special commercial or conservation value, for example salmon rivers, may receive special attention such as more frequent or more extensive surveillance. Proposed new developments, such as the siting of new effluent discharges, abstraction from or canalisation of watercourses, may be preceded by programmes of biological surveillance to establish 'baseline' biological conditions of the affected water. After implementation, the biota

may continue to be monitored to determine the biological effects of the development and to assist in minimising them. Biological monitoring of receiving waters may also, of course, be used to establish the effectiveness of effluent treatment processes and of the often expensive improvements to them which may be undertaken. Lemlin (1980) describes a good example of this approach. The effectiveness of a ten-year programme of improvement in the effluent treatment plant of an oil refinery was monitored by studying the distribution and abundance of saltmarsh flora in the area receiving the effluent. Since the cost of the alterations to the treatment plan was measurable in millions of pounds, confirmation that this cost was justified in terms of a measurable improvement in the receiving environment was of value to those responsible for the management of the refinery.

Living organisms can provide useful indications of the chemical quality of water. (The term 'sentinel organism' is frequently used to describe the use of living organisms in this way.) For example, chemical analysis of biological material has been widely used to indicate contamination of the environment with levels of contaminants which may be potentially damaging in the long term, but which may not be otherwise detected. Biological monitoring, in conjunction with physical and chemical surveillance of water quality, generates information which is potentially useful in establishing water quality standards. To determine the level of a pollutant which is 'acceptable' (however that may be defined) is a frequently-recurring problem, and many toxicological and ecophysiological investigations are designed to provide information on this point. Complementary information may be provided by analysis of biological and chemical survey data, which may indicate directly the association between particular chemical conditions and the biological characteristics of the water.

Using modern techniques, chemical and physical analyses of water quality can be made with great precision. As will be seen, biological monitoring can be expensive of time and of human and physical resources. Its justification, however, is clear when some of the limitations of purely physical and chemical monitoring are considered. For example, a chemical analysis will only reveal the presence of the substance which the analysis is specifically designed to detect. The presence of a hitherto unsuspected pollutant would therefore not be detected by routine chemical surveillance, since it is uneconomic routinely to analyse water for large numbers of pollutants which might occur only very rarely. Biological surveillance, however, if properly carried out, might reveal the occurrence of ecologically-significant environmental changes and call attention to the need for further investigation.

Second, the concentration of pollutants in receiving waters fluctuates widely and rapidly. Even if samples are taken very frequently, it is highly probable that peak concentrations, which may be of greater biological significance than the 'background' levels, will be missed entirely (Figure 3.2). Unlike a chemical analysis, a biological survey does not simply indicate the

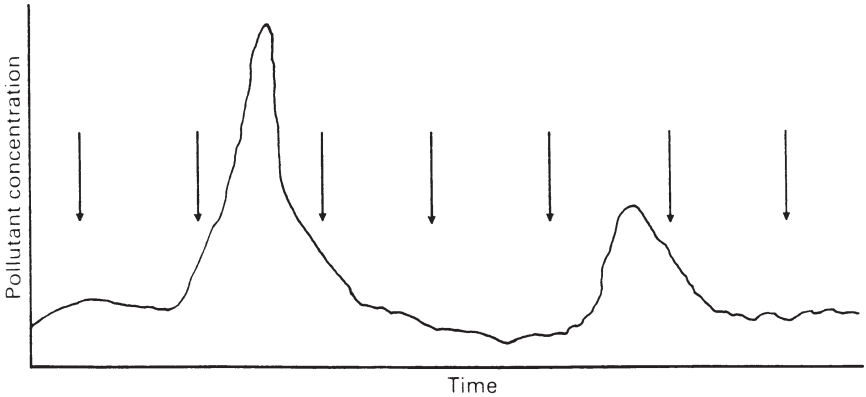

Figure 3.2 Chemical sampling, even at frequent intervals (arrows) can miss biologically-significant peak concentrations

conditions prevailing at the instant of sampling. The organisms which live in the water respond to the totality of the environmental conditions which they have experienced throughout their lives. This is also important because pollutants usually occur in unpredictable mixtures rather than singly, and their action on aquatic organisms is subject to the modifying effects of environmental conditions (e.g. dissolved oxygen, temperature, water hardness) which themselves fluctuate and interact. The results of experimental studies are therefore difficult to apply to field situations (e.g. in terms of formulating water quality standards) in the absence of reliable information concerning the performance of species in polluted conditions in real rivers. Good biological monitoring programmes are thus complementary to toxicological and ecophysiological studies—each facilitates the interpretation and application of the results of the other.

Finally, biological monitoring data can not only be used to obtain information about the existing quality of the water, or to ensure compliance with pollution control measures, or to check on the efficiency of waste treatment processes; it can also be used to formulate water management strategies, notably through the identification of technically and economically feasible water quality objectives. Indeed, this arguably most advanced strategy of water quality management absolutely requires extensive and accurate biological (and physico-chemical) monitoring data, and is further discussed in Chapter 6.

3.2 Indicator Organisms

It is fundamental to ecology that an organism cannot survive indefinitely in an environment that does not provide its physical, chemical and nutritional requirements. Thus the presence of a particular species, especially if it is reasonably abundant, indicates that its environmental requirements are being

met. Its absence, however, does not *necessarily* indicate the converse—one species may, for example, be competitively excluded from a particular habitat by another. Nevertheless, within certain limitations the presence, absence or relative abundance of species may be used as indicators of environmental quality. Changes in the presence, absence or relative abundance of species, whether sudden or gradual, may therefore imply a corresponding change in environmental conditions. In its broadest sense, then, the term *indicator organism* can be used of any member of the fauna or flora of a habitat, and any species may be considered as a potential indicator organism.

Some organisms have such wide tolerances of different environmental conditions that their patterns of distribution or abundance are only slightly affected by quite wide variations in environmental quality. These species may tell us little about their environment which is not readily apparent by other means. The term *indicator organism* is therefore sometimes reserved for those species which have narrow and specific environmental tolerances, so that they will show a marked response to quite small changes in environmental quality. If the environmental factors which are most commonly limiting to the species concerned are known, its presence will be indicative of a specific environmental condition. Thus, nymphs of Plecoptera (stoneflies) are not found in waters where the dissolved oxygen concentration falls substantially below its saturation value for appreciable periods of time. Hence their presence indicates that the water is well oxygenated; and although their absence does not *necessarily* indicate the converse, their absence from waters wherein they might normally be expected at least suggests a possibility for further investigation. In practice, however, it is rare that enough is known of the ecology and physiology of a species for its presence or absence to be indicative of a specific environmental condition. There are, furthermore, very few organisms whose presence specifically indicates that the water is polluted. One exception may be, for example, the presence of coliform bacteria, indicating faecal contamination. Although several organisms are known frequently to be associated with polluting conditions—for example Tubificid worms, and the 'sewage fungus' *Sphaerotilus natans*—they do occur widely in environments which are not polluted. In the present discussion, indicator organisms are considered to be 'those which, by their presence and abundance, provide some indication, either qualitatively or quantitatively or both, of the prevailing environmental conditions' (Hellawell, 1978). The use of the term 'indicator organism' in this sense should be distinguished from the use of the same term to apply to organisms whose tissue levels of contaminants are measured in order to infer the possible extent of chemical contamination of the environment ('sentinel organisms'). The term is widely used in both senses and it is important to distinguish between them.

Ideally all members of a community should be considered as potential indicators of water quality and included in biological monitoring programmes. In practice groups such as the bacteria, algae, protozoa and macroinvertebrates require such different sampling methods and taxonomic

skills that most investigators choose only one such group. Normally this is found satisfactory except for the most extensive and detailed research programmes. The group most commonly employed as indicators is the macroinvertebrate fauna. These possess many of the characteristics required of indicator organisms, including:

1 They are a diverse group in which some hundreds of common species from several different phyla are represented, so there is a reasonable expectation that at least some will respond to a given environmental change.
2 They have relatively limited mobility and relatively long life cycles, so may sensibly be used for temporal and spatial analyses.
3 Good identification keys are available for most macroinvertebrate groups, and it is possible to achieve a reasonable level of taxonomic competence quite quickly.
4 Their high levels of abundance under favourable conditions facilitate quantitative analysis. Sampling techniques are fairly simple and well developed.

The disadvantages of macroinvertebrates as indicators, like their advantages, are common to some other groups. Seasonal variations in presence or abundance are a normal feature of many life cycles, so results need cautious interpretation. Many species drift passively downstream in substantial numbers, and may therefore be found in areas in which they cannot survive indefinitely. Finally, although it is relatively easy to obtain good qualitative samples of macroinvertebrates, reliable quantitative sampling is difficult owing to the physical characteristics of aquatic habitats and the complex horizontal and vertical distribution patterns of at least some species.

Although much of this chapter will be concerned specifically with invertebrates, many of the points discussed are of general relevance and it is undoubtedly true that other groups could, with advantage, be more widely used as indicators. The use of algae as indicators is discussed by Whitton (1979) and Shubert (1984). A scheme for the use of macrophytes as indicators of water quality has been proposed by Haslam (1982). The case for protozoa as indicators is put by Cairns (1974, 1979). The advantages and disadvantages of bacteria, protozoa, algae, macroinvertebrates, macrophytes and fish have been summarised by Hellawell (1978, 1986). More detailed discussions of several of the commonly-used groups of indicator organisms may be found in the volumes edited by Hart and Fuller (1974), James and Evison (1979), Hellawell (1986) and Rosenberg and Resh (1993).

3.3 Sampling Methods

The validity of any ecological investigation depends crucially upon the sampling technique and strategy adopted at its outset. Many factors influence the design of a sampling programme. These include: the objectives of the investigation and the type of analysis to which the data are to be subjected; the physical characteristics

of the habitat to be sampled; the characteristics of the organisms to be sampled—their size, habits, abundance and patterns of distribution; and constraints on the human, physical and financial resources available for the investigation. Frequently, a sampling programme is devised on the basis of a series of compromises between what the investigator would like to do, and what it is possible to do. In order to make sensible decisions about sampling—in particular, how to maximise the quantity and *quality* of the information obtained for a given sampling effort—it is necessary to understand something of the characteristics of the sampling techniques available. In the present discussion, some of the more commonly-used methods will be briefly described and their performance as qualitative and quantitative techniques examined.

Good general descriptions of the various methods are given by Southwood (1978), Hynes (1970), Green (1979) and Hellawell (1978, 1986). Elliot (1977) and Hellawell (1978) discuss the statistical considerations underlying the choice of sampling strategies and the analysis of data. Many experienced practitioners tend to make judgements about sampling strategy more or less intuitively; but in a very stimulating discussion of the considerations underlying the development of monitoring programmes, Parr (1994) persuasively argues the case for a more considered approach. His discussion offers useful advice on designing monitoring programmes for various purposes, covering points such as the location of sample sites, frequency of sampling, and choice of data analytical methods. These considerations are all mutually interactive, and decisions and choices should always be made with this in mind, and with a clear idea of the purpose of the investigation. In view of the increasing importance of accurate biological sampling in the overall management of aquatic habitats, several national and international agencies have recently offered specific guidance and recommendations which are designed to be of assistance to inexperienced investigators and also to promote standardisation of techniques. These include APHA (1995), ISO (1985, 1991) and DIN (1983a, b, 1987, 1990).

Probably the most widely-used macroinvertebrate sampling method is the so-called 'kick sample'. A standard pond-net is held facing upstream, while the operator or a partner disturbs the substratum, preferably by hand rather than by actual kicking. Disturbed animals are washed into the net. Some operators, by sampling from a known area or for a standard period of time, attempt to introduce a quantitative element into the technique. However, it is very difficult in practice adequately to standardise either the area sampled or the duration of a sampling period, and almost impossible to standardise on the actual sampling effort, that is the degree of vigour or enthusiasm with which the sampling operation is carried out! Consequently large variation between samples and between operators is to be expected, and although it

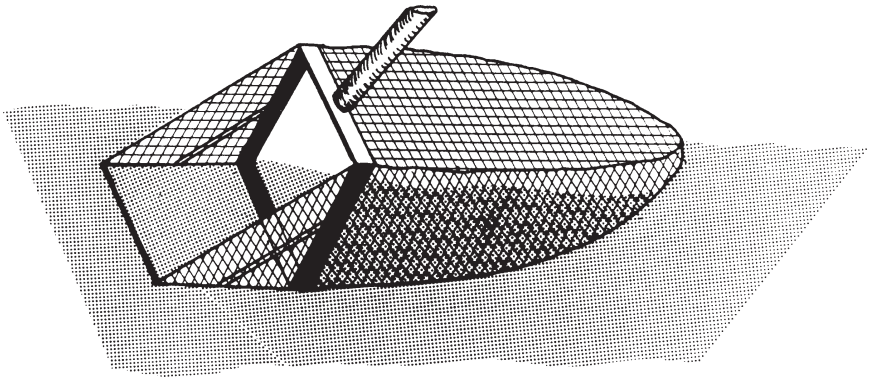

Figure 3.3 A Surber sampler (from Hellawell, 1978)

is possible to obtain good qualitative samples, the technique is rarely acceptable as a quantitative one.

The Surber sampler (Figure 3.3) is designed to reduce some of the problems associated with operator variability and the standardisation of sampling effort and sampling area. A quadrat (usually 0.1 m^2) is attached to the frame of the collecting net in such a way that it can be placed on the substratum. The substratum within the quadrat is disturbed and animals are washed by the current into the net. Triangular vanes of netting at the sides of the sampler are designed to reduce the loss of material around the sides of the net. Box or cylinder samplers (Figure 3.4) of various designs operate on a similar principle. Here the objective is to isolate as completely as possible the area to be sampled by pushing the sampler into the substratum. Both Surber and box/cylinder samplers can be used quantitatively, but both types can only be used in fairly shallow water.

For deeper water, grabs or dredges must be used. Both are available in a wide variety of designs (Figures 3.5, 3.6). Grabs are the preferred method for fine substrata, but their efficiency is often low. Elliot and Drake (1981a) compared the performance of seven commonly-used designs. In one series of trials, the grabs were used to catch plastic beads (representing animals) from tanks containing known densities of beads in gravel of various sizes. The efficiencies of the grabs, in terms of the numbers caught as a percentage of the number available to be caught, are summarised in Table 3.1. The efficiency of all grabs was low when the modal particle size exceeded 16 mm and some performed poorly under all conditions. Furthermore, the grabs in general operated inefficiently when the 'animals' were buried 3 cm below the surface.

For sampling deep water with coarse substratum, dredges (Figure 3.5) may be used. These are dragged along the bed collecting substratum and animals

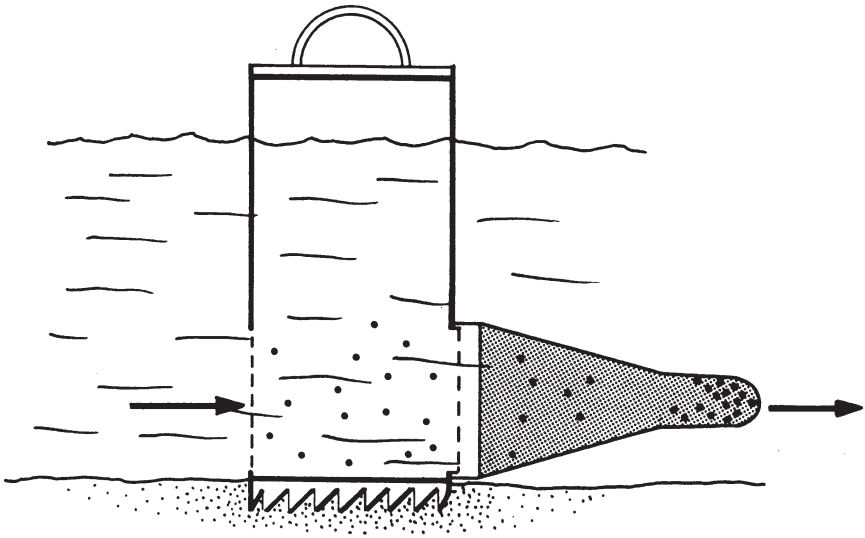

Figure 3.4 A cylinder sampler

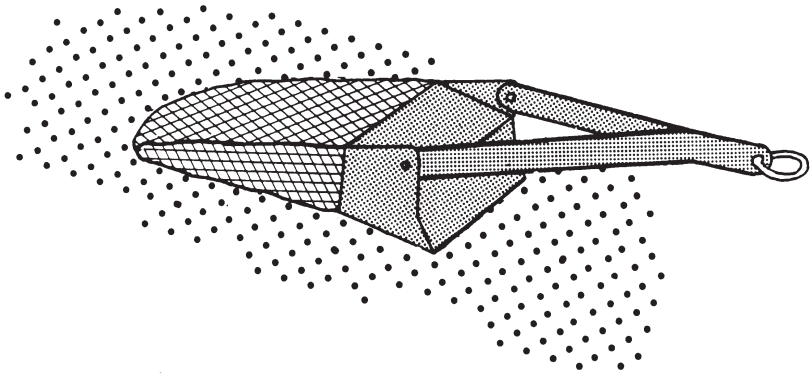

Figure 3.5 A dredge sampler (from Hellawell, 1978)

in the collecting net. Again, it is impossible in practice to standardise the area sampled and consequently to use dredges as reliable quantitative samplers. Elliot and Drake (1981b) assessed in field trials the efficiencies of four dredges as qualitative samplers. For each sample, a dredge was dragged along the river bed for five metres. The qualitative efficiency of each dredge was determined by expressing the number of taxa caught in five samples as a percentage of the total number of taxa caught at each site by all four dredges. Maximum values ranged from 76% for the most efficient to under 40% for the least efficient. These values were biased by the fact that the larger

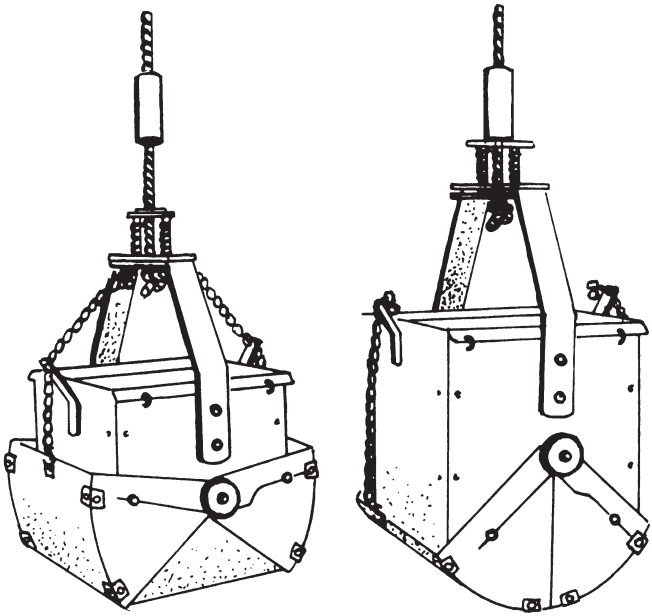

Figure 3.6 An Ekman grab in its open (left) and closed (right) positions

Table 3.1 Efficiencies of seven grabs at recovering animals from the surface and below the surface of two different substrata. Data from Elliot and Drake (1981a)

	% Efficiency			
	Substratum 2–4mm		Substratum 8–16 mm	
Grab	Surface	3 cm below surface	Surface	3 cm below surface
Ponar	100	70	88	50
Weighted Ponar	100	70	100	50
Van-Veen	87	56	50	50
Birge–Ekman	73	37	30	7
Allan	51	36	25	7
Friedinger	59	7	30	7
Dietz–La Fond	22	26	25	20

dredges caught more individuals; a more reliable indicator of the comparative performance of the dredges is that the least efficient design would need to be used 150 times to take a sample comparable with that obtained by using the most efficient dredge only five times.

A completely different sampling technique is to place artificial substrates

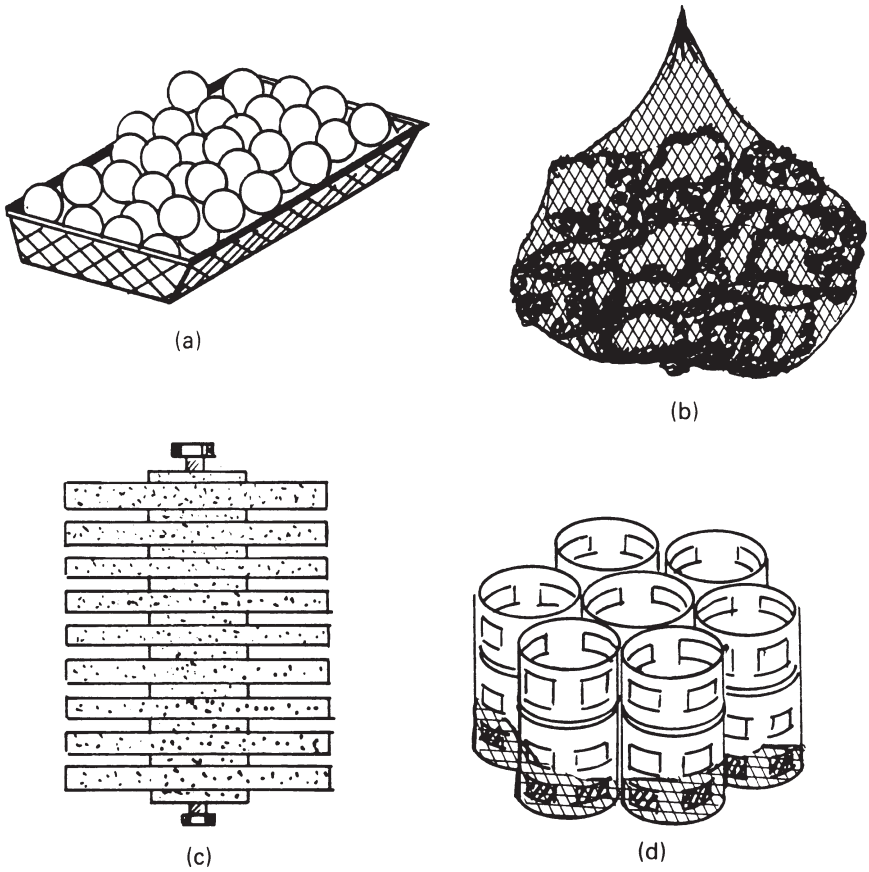

Figure 3.7 Some designs of artificial substrate samplers: (a) Wire tray or basket filled with stones; (b) Slag bag; (c) Multiplate sampler; (d) SAUFU (Standard Aufwuchs Unit)

in the water. These may take various forms (Figure 3.7) for example baskets or trays filled with stones, porcelain spheres, etc.; 'multiplate' samplers; or bundles of plastic material. Two designs which have been extensively evaluated in Britain are the slag bag, and the SAUFU (Standard Aufwuchs Unit) (HMSO, 1985). The slag bag consists of standardised quantities of graded slag (as used in sewage filter-beds) contained in a bag of plastic mesh. The SAUFU is constructed from a number of units of synthetic plastic material, again originally designed for use in sewage filter beds and similar processes, arranged in a circular configuration. After a period of time they become colonised by plants and animals and can be recovered from the water and the biota extracted. Sampling units may be standardised, for example by using graded stones or completely artificial material. The advantages of standardisation, however, must be weighed against the possibility that some

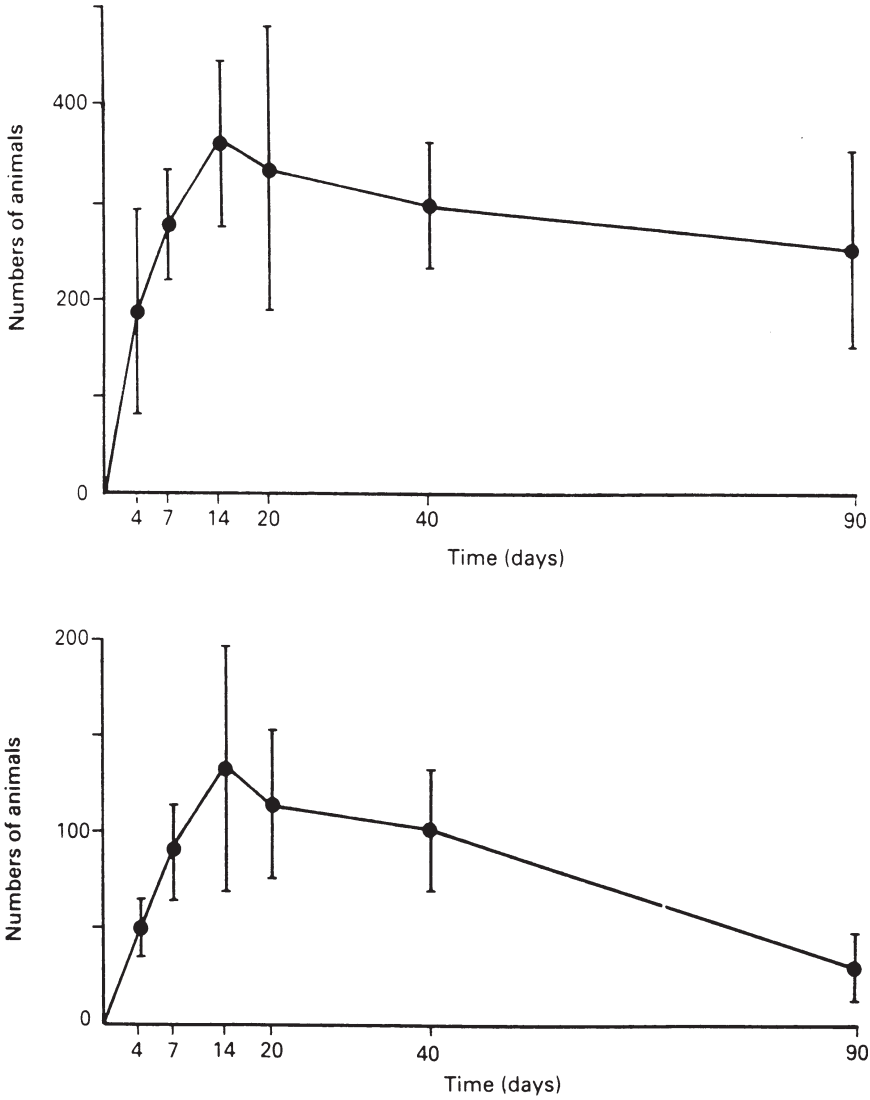

Figure 3.8 Colonisation of artificial substrate samplers exposed on a gravel river bed (upper graph) and a muddy river bed (lower graph) (from Hellawell, 1978, based on data given by Pearson and Jones, 1975)

designs are likely to be selective, that is the colonising fauna may be unrepresentative of the community sampled. Samplers may be embedded in the substratum, rested upon it, or suspended in mid-water. Typically it may take several weeks for samplers to be fully colonised, and frequently the numbers of taxa and numbers of individuals

recovered reach a peak and then decline (Figure 3.8). Thus it is important to standardise the colonisation period. APHA (1995) recommends six weeks as the optimum period, though this may vary from one location to another, and also depending upon the purpose of the survey; whether, for example, it is to determine the maximum number of species present or to obtain a representative sample of the benthic fauna.

3.3.1 Evaluating Sampling Techniques

An important characteristic of a qualitative sampling technique is the rate of taxon accretion, that is the relationship between sampling effort and the number of taxa caught. Obviously it is important to ensure that a qualitative sample contains a reasonably high proportion of the species actually present. To determine the extent of the sampling effort required to achieve this, a taxon accretion curve (Figure 3.9) should be plotted. The correct procedure is to take a large number of samples, and determine the mean number of taxa recovered, with confidence limits. Samples are then considered together in randomly-chosen pairs, threes, fours and so on. (A simple computer program can be used to calculate the values for all possible permutations of two, three, four, etc.) A simpler method is to plot the cumulative number of taxa recovered against the number of samples taken, but this method can give misleading results owing to the possibility that the earlier samples may, by chance, contain abnormally high or abnormally low numbers of taxa. The resulting curve (Figure 3.9), shows the point at which large increments in sampling effort yield few additional taxa, and the optimum sampling effort can thus be determined. As a guide, general experience shows that about five Surber samples, or 10–20 minutes of kick sampling, yields about 80% of the total number of taxa, though obviously this depends upon the characteristics of the habitat, and the competence with which the sampling is undertaken. Experienced operators tend to recover about 40–50% of the available taxa in one three-minute kick sample, whereas inexperienced operators achieve only about half this level of efficiency. Although it is rarely feasible to recover all the rarer taxa, it should be remembered that when making spatial or temporal comparisons between communities it is often the presence or absence of the rarer species that provides the most useful information.

Kick sampling is in practice the basis of most routine monitoring programmes, and an evaluation of the technique by Furse *et al.* (1981) yielded some interesting results. Four physically-different sites on a river were sampled by three experienced operators, each operator sampling each site for two periods of three minutes. The mean number of taxa caught per sample varied from 31.9 to 37.5 families, and from 48.3 to 58.3 species. Analysis of variance of the data showed that differences in the number of taxa per sample were significant with respect both to sites and to operators. The

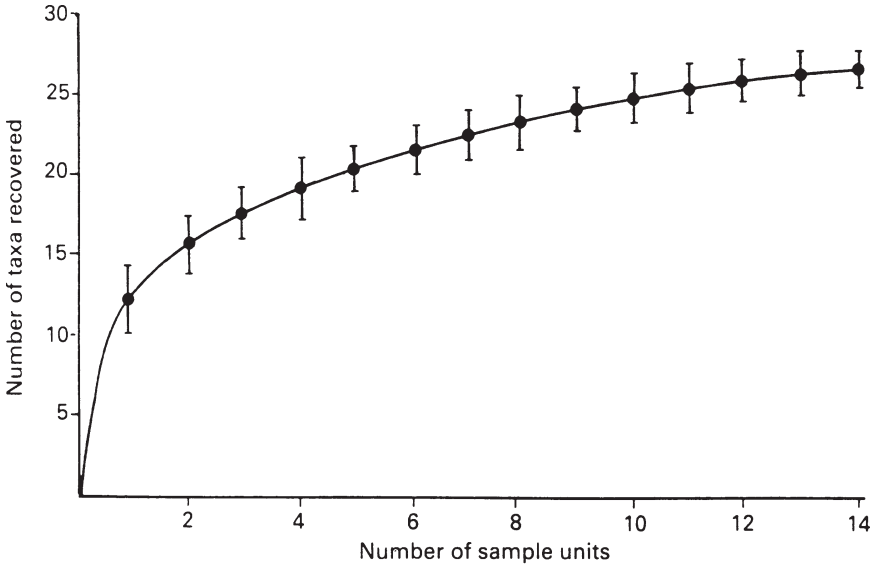

Figure 3.9 A taxon accretion curve

question then arises of whether the inter-operator differences are so large as to outweigh inter-site differences. If this were the case, kick sampling would be inadequate even as a qualitative technique since most monitoring programmes involve several different operators. To test this, the authors subjected their data to ordination and average-linkage cluster analyses. Six samples were taken at each site, and if inter-site differences were sufficiently large to outweigh inter-operator differences, the result of these analyses should be that each group of six samples should group together and be distinct from each other such group. (The principles of cluster analysis are described in Section 3.4.)

Samples were first classified using similarity coefficients (see Section 3.4) based on the presence or absence of *families*. This resulted in several 'misclassifications', that is samples which grouped with those from sites other than their own. The similarity coefficients were then recalculated to take into account the relative abundance of each family, rather than simply its presence or absence (the advantages of doing this are described in Section 3.4). The resulting plots showed a marked reduction in the number of misclassifications. Perfect inter-site segregation could, however, be achieved by using data on the presence or absence of *species*. These results indicate that in addition to sampling technique, the methods of data analysis and the level of taxonomic skill employed are important contributors to the accuracy and validity of biological monitoring. An intrinsically weak sampling technique may yield biologically meaningful results if adequate taxonomic skills and analytical methods are brought to bear. In connection with the latter, however, caution must be exercised. It is a common weakness of many ecological investigations to use

sophisticated analytical techniques on inherently poor data, as if mathematical manipulation could compensate for bad experimental design or inadequate sampling effort. A good test is whether the data analysis employed is biologically sensible. In the present case, if one site contains 99 individuals of taxon A and one of B, and another contains one of A and 99 of B, they are clearly biologically different. To work in terms of species presence and absence, therefore, is wasting valuable information—since both contain A and B, we might erroneously conclude that they are both the same. Thus the use of a more sophisticated coefficient of similarity is biologically justified.

Quantitative sampling is obviously more demanding than qualitative sampling. Estimates of relative population density are often useful in biological monitoring. It may be valuable to know, for example, that the abundance of a species has halved, or doubled, over time, or that the ratio of abundance of two species has altered. Provided that the data are interpreted cautiously, most sampling methods will yield some information on the relative abundance of the taxa recovered. However, there are several factors other than the actual population density which influence the catch per unit sampling effort. Southwood (1978) offered a very accessible explanation of some of these, and urged the adoption of a more careful approach to the interpretation of relative abundance data than is often shown. Many of the methodological texts referred to earlier in this chapter provide guidance on how these principles need to be applied in the specific context of biological monitoring.

The estimation of absolute population density is extremely difficult. The number of samples required to estimate population density is given approximately by the formula:

$$n = \left(\frac{st}{D\bar{x}} \right)^2$$

where n=the number of samples required; $\bar{x}$ and s are the mean, and its standard deviation, respectively of the number of individuals per sample caught in a pilot survey; t=the value of Student's t for the required level of confidence; and D=the index of precision, that is the ratio of the standard error to the arithmetic mean expressed as a decimal.

Thus for example, if the mean number of individuals per sample is 10 and the standard deviation is 5, to obtain an estimate of the population density which lies within 10% of the true value with 95% confidence,

$$n = \left(\frac{5 \times 2}{0.1 \times 10} \right)^2 = 100 \text{ samples.}$$

The numbers chosen for this example are typical of values found in real investigations. Unfortunately, the pattern of distribution of benthic invertebrates

(and of many other kinds of organism) seems to be such that very large numbers of samples are required for reliable estimates of population density. Even to estimate population densities to within ±20% or ±40% of their true values may require several hundred samples (Elliot and Drake, 1981a; Hellawell, 1977, 1978).

A further difficulty is that nearly all commonly-used sampling techniques are very superficial, in that only the top few centimetres of the substratum are sampled. That this can lead to serious errors is shown by the results of Coleman and Hynes (1970). They used artificial substrate samplers embedded 30 cm into the substratum and divided horizontally into four equal layers. Only 20% of the total catch was found in the top 7.5 cm and 26% was found between 22.5 and 30 cm deep. Clearly animals burrow deep within the substratum and only a small proportion of the population is recovered by normal sampling techniques. Radford and Hartland-Rowe (1971) compared a Surber sampler with an embedded sampler of 17.5 cm depth. Although the samplers produced similar qualitative results, the Surber took only 10% of the numbers and 53% of the biomass taken by an equivalent area of embedded sampler. Even allowing for the greater volume of substratum sampled by the embedded sampler their data suggest that smaller individuals, which may comprise a substantial proportion both numerically and in terms of biomass, are not adequately sampled by the usual techniques. The limitations of sampling techniques are to a large extent a reflection of the characteristics both of the habitats under investigation and of the organisms which live in them. An appreciation of these limitations is essential at all stages of an investigation—in its design, in the analysis of the data, and in the formulation of its conclusions.

3.4 Data Analysis and Interpretation

The interpretation of biological survey data is essentially a series of comparisons—spatial, temporal, or both—and a variety of methods of data analysis are available to facilitate the process. At this point, however, it must be stressed that the following discussion is primarily based around *current practice* in biological monitoring of water quality. Over the last ten or 15 years, a body of opinion has been growing that current practices are generally flawed because inadequate consideration has been given to the basic requirements of design and analysis of data from field surveys. This view has recently been eloquently summarised by Underwood (1994). The basic argument is that most monitoring programmes are ill-designed in that they do not involve a testable hypothesis, they are incapable of distinguishing an anthropogenic impact from coincidental and confounding factors and that they are therefore naive and unreliable, if not a complete waste of time. The implications of this are profound, given that current legislation all over the world leads major environmental decisions to be made on the basis of what may be completely false information. On the other hand, proper methodology could lead to monitoring techniques which are more accurate, more simple and more cost-effective of

resources. It will probably take two more decades before these ideas are reflected in practice, but in order to increase the rate at which this occurs, or at least to promote the evaluation of their validity, the present description of practices and procedures currently in use should perhaps be compared with the propositions put forward in Underwood's (1994) discussion.

Consider a single sampling station at a single point in time. Our sample or samples have yielded data in the form of a list of species, and perhaps an indication of their relative abundance. Assuming that the sample is reasonably representative of the community from which it was drawn, that it has been obtained by an appropriate sampling method, we wish to infer from the sample data whether that community is affected by pollution. To know if pollution is affecting the community, we need to know whether that community is 'normal' or not. This can only be done by making temporal or spatial comparisons—is the community at this site the same as it was on some previous occasion? Or is it similar to physically comparable sites at different locations? Clearly in order to answer these questions we need to know the range of temporal and spatial variation in community characteristics which may be considered 'normal'. To the extent that this knowledge is lacking, no matter how sophisticated our analytical techniques, a reasonable interpretation is impossible. Therefore a major need is for basic knowledge of the range of temporal and spatial variation in the community characteristics of *unpolluted* habitats.

In practice such information is available to varying degrees in particular cases, and the comparisons made will be determined by the extent of 'baseline' information available, and by the purposes of the survey. For example, comparisons may be made between different sites along the length of a river, or between samples taken from the same site at different times. Hellawell (1978, 1986) provides a very full discussion, with examples, of the methods which may be used to analyse and present the results of biological surveys. The results of such comparisons may be simply expressed as in Figure 3.10, by plotting some characteristic of the community (in this case, numbers of species) against distance along the river. Such simple procedures may show a clear and comprehensible pattern, but obviously much of the information obtained from the survey is not being used. For example, there may be changes not only in the numbers of species present, but also in their relative abundance. Further, the species present at some sites may be completely different from those present at others. Such valuable biological information should not be wasted. One solution to this problem is to use one or more of the indices available (see below) as the variable which describes the communities. In Figure 3.10 it can be seen that the Chandler Biotic Score more clearly demonstrates the biological impact of the effluents

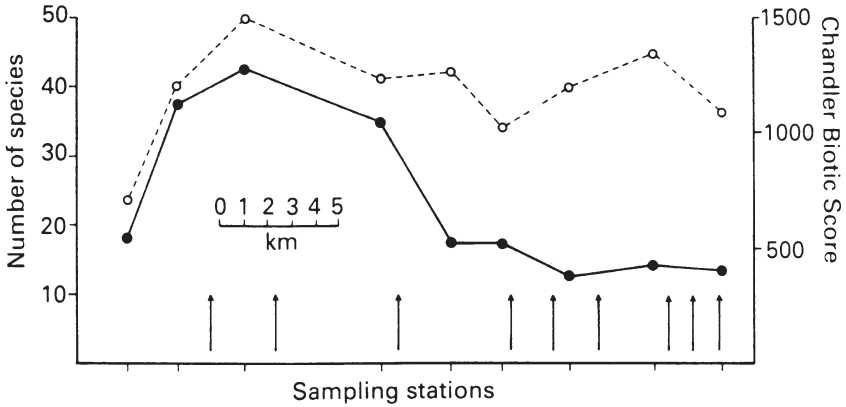

Figure 3.10 Number of invertebrate species (dotted line) and Chandler Biotic Score (solid line) at stations along the length of a polluted river. Arrows indicate inputs of pollution. Adapted from Hellawell (1978)

than does the number of species present at each station. However, it is not always the case that such derived values are more useful than the raw data, and it is always advisable to compare stations directly in terms, for example, of species numbers, numbers of individuals, and total biomass. Also, it is frequently informative simply to display the relative abundance of taxa (Figures 2.2, 3.11), which may clearly demonstrate differences between the various communities under comparison.

More sophisticated methods of analysis are frequently useful. Given that the data from a single site at a single point in time typically take the form of a list of species and their relative abundance, and that comparisons between data sets may have to be made in both space and time, some means of condensing the data to manageable proportions is often essential. It is also important because although an experienced biologist may be capable of interpreting complex sets of ecological data by inspection, other specialists with whom he/she must co-operate (chemists, engineers, administrators) cannot be expected to do so. Therefore the raw data are frequently condensed by using them to compute one or more of several numerical indices or coefficients, of which four types can be distinguished: pollution indices; diversity indices; biotic indices; and similarity indices or coefficients. The applications of each of these will now be considered in turn.

3.4.1 Pollution Indices

Pollution indices have reached a high degree of sophistication in many central and Eastern European countries (Sladecek, 1979). They are essentially developments of the descriptive Saprobien system of Kolkwitz and Marsson

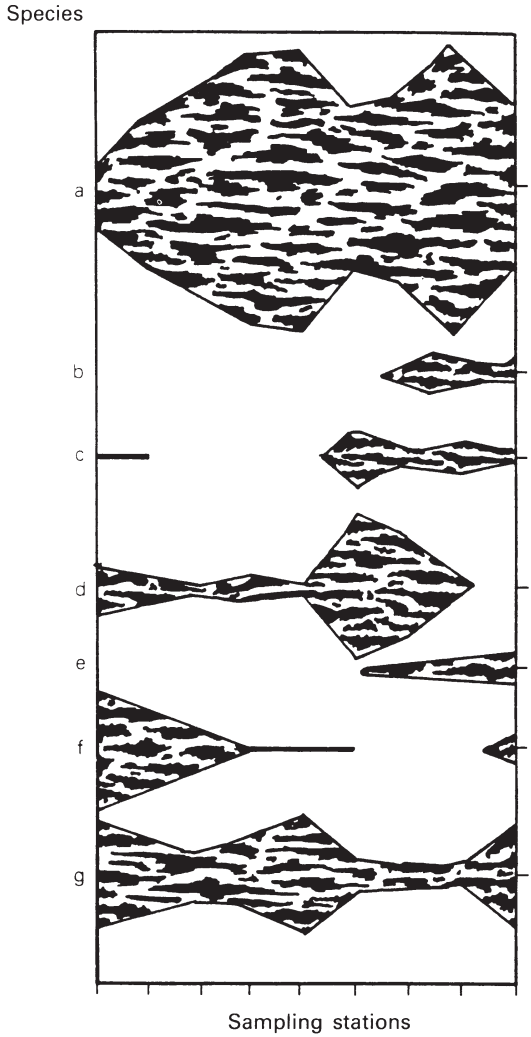

Figure 3.11 The use of 'kite' diagrams to represent the abundance of species at different sites. The width of the 'kites' represents the abundance of each species

(1909) and are based on the fact that in rivers subject to organic pollution, communities downstream of the pollutant input show a regular and more or less predictable sequence of changes in the presence and abundance of indicator species, such as were described in Chapter 2 (see Figure 2.2).

A typical pollution index is that of Pantle and Buck (1955). Organisms present in a sample are given an s-score and an h-score. The h-score is an index of relative abundance: organisms are scored 1, 3 or 5 depending upon whether they are rare,

frequent or abundant, respectively. The *s*-score relates to the saprobic zone of which the species are characteristic; a score of between 1 and 4 is assigned to each species, depending upon whether it is typically found in oligosaprobic, *a*-mesosaprobic, *β*-mesosaprobic or polysaprobic zones, respectively. Central European workers have compiled extensive catalogues of the saprobic scores of invertebrate species, which are regularly updated as new information on distribution patterns is obtained. A good example is that of Wegl (1983). The saprobity index is given by

$$S = \frac{\Sigma sh}{\Sigma h}$$

and typically varies from less than 1.0 for unpolluted waters to 4.0 for heavily organically polluted waters. Hellawell (1978, 1986) and Washington (1984) give several other examples of pollution indices. In Germany, the Biological Effective Organic Loading method (Persoone and Pauw, 1979) and in the Netherlands the K-Index (briefly described by Metcalfe-Smith, 1994) represent other examples of saprobic-based pollution indices. Although they are widely used in continental Europe, they are less favoured in Britain and North America.

3.4.2 Diversity Indices

Diversity indices were developed by theoretical ecologists who were interested in such questions as the relationship between stability and diversity in ecosystems. Washington (1984) lists no fewer than 18 different diversity indices which have been used in water pollution studies (Table 3.2). Such a variety of diversity indices has arisen because ecosystem diversity is not easily defined, and therefore can be measured in several different ways, depending on how the concept is defined. Some simple examples will illustrate the point.

A simple measure of diversity is the number of species present in the community. However, it could be argued that this is an inadequate measure. For example, consider two communities of 1000 organisms. Community A contains one individual each of species a, b and c, and 997 of d; community B contains 250 individuals each of a, b, c and d. Although each community contains four species, nearly all the individuals in A belong to the same species. Arguably, therefore, community B is a more diverse one than A. A numerical value derived both from the number of species in the community, and from the distribution of individuals between those species, is therefore a better index of community diversity. The application of diversity indices in water quality monitoring is discussed by Wilhm and Dorris (1968), Hellawell (1977, 1978, 1986), Kaesler *et al.* (1978) and Washington (1984). Diversity indices differ from one another in, for example, the relative

Table 3.2 Diversity indices which are widely used in aquatic ecosystem studies, arranged in eight groups according to their derivation. After Washington (1984)

(1) *Simpson's Index*
Simpson's D

$$\text{where } D = \frac{\sum_{i=1}^{s} n_i(n_i - 1)}{n(n-1)} \qquad (1949)$$

(2) *Relatives of species number*
Kothé's species deficit

$$\frac{A_1 - A_x}{A_1} \times 100 \qquad (1962)$$

Odum's species per thousand individuals (Odum *et al.*, 1960)

(3) *Guesses by data fitting*

$$\text{Gleason's index} \quad D = \frac{S}{\ln N} \qquad (1922)$$

$$\text{Margalef's index} \quad D = \frac{S-1}{\ln N} \qquad (1958)$$

$$\text{Menhinick's index} \quad D = \frac{S}{\sqrt{N}} \qquad (1964)$$

(4) *Curve fitting approach*
Motomura's geometric series,

$$y = Ac^{(x-1)} \qquad \text{(Whittaker, 1965)}$$

Fisher's α,

$$\text{where } S_1 = \alpha \ln\left(1 + \frac{N}{\alpha}\right) \qquad \text{(Fisher } et\ al.\text{, 1943)}$$

The modified Yule 'characteristic'

$$\frac{M_1^2}{M_2 - M_1} = \frac{n^2}{\Sigma n(n-1)} \qquad \text{(Williams, 1964)}$$

Preston's log-normal 'a'

$$\text{where } y = y_0 \exp(-aR)^2 \qquad (1948)$$

(5) *Information theory*

$$\text{Brillouin's } H = \frac{1}{N} \ln \frac{N!}{\prod_{i=1}^{s} N_i!} \qquad (1951)$$

Table 3.2 *continued*

Shannon's $H = -\sum_{i=1}^{s} \frac{n_i}{n} \ln \frac{n_i}{n}$ (Shannon and Weaver, 1949)

Evenness† $E = \frac{H'}{H'_{\max}}$

Redundancy $R = \frac{H'_{\max} - H'}{H'_{\max} - H'_{\min}}$ (Patten, 1962)

(6) Hurlbert's PIE $= \left(\frac{N}{N-1}\right)\left(1 - \sum_{i=1}^{s} p_i^2\right)$ (1971)

(7) McIntosh's 'Ecological distance' relative

McIntosh's $M = \frac{n - \sqrt{\sum_{i=1}^{s} n_i^2}}{n - \sqrt{n}}$ (1967)

(8) *Theory of runs*

Cairns' SCI $= \overline{Dl_1} \times$ No. taxa (Cairns *et al.*, 1968)

$$\overline{Dl_1} = \frac{\sum \frac{\text{no. runs}}{\text{no. specimens}}}{\text{no. times done to be statistically significant}}$$

Keefe's TU $= 1 - \left(\frac{n}{n-1}\right)\left\{\sum_{i=1}^{K} p_i^2 - \frac{1}{n}\right\}$ (Keefe and Bergerson, 1977)

†See Washington (1984) for a discussion of Evenness.

List of terms

S = the number of species in either a 'sample' or a 'population';
K = the number of taxa in either a 'sample' or a 'population';
N = the number of individuals in a population or community;
N_1 = the number of individuals in species i of a population or community;
n = the number of individuals in a sample from a population;
n_1 = the number of individuals in a species i of a sample from a population;
$p_1 = n_1/n$ = the fraction of a sample of individuals belonging to species i;
$\Pi_1 = N_1/N$ = the fraction of a population of individuals belonging to species i.

Symbols of indices from the literature have been changed to conform to the above.

weighting given to the number of species and to the distribution of individuals between species (the 'evenness' component). Some indices are based on specific assumptions of community structure, and many are not independent of sample

size. Washington (1984) divides diversity indices into eight groups, according to the basis on which they are derived (Table 3.2). Having considered each in detail, he concluded that all were unsuitable for application to aquatic ecosystems except for Simpson's *D* (1949), Hurlbert's PIE (1971), indices based on the theory of runs (Cairns *et al.,* 1968; Keefe and Bergerson, 1976) and McIntosh's *M* (1967). The most widely used indices in practice are those based on information theory, such as the Shannon-Weaver index (Shannon and Weaver, 1949). However, as Washington (1984) points out, the biological relevance of such indices has been widely doubted in recent years.

Diversity indices seem to be particularly favoured by American workers, but are widely used throughout the world. A practical advantage of diversity indices is that it is not necessary to identify specimens. It is necessary only to recognise whether a particular specimen is of the same species, or of a different species, as previously-encountered individuals. Thus it is a useful method of analysis in circumstances where taxonomic skills are lacking, where it is necessary to work with unfamiliar groups of organisms, or where the fauna of an area has been inadequately described and no taxonomic keys exist.

3.4.3 Biotic Indices

In Britain, empirically-derived biotic indices of water quality are generally preferred. These indices are based on two observed characteristics of the communities inhabiting polluted waters. First, they generally contain fewer species than communities from comparable unpolluted waters; and second, as the degree of pollution increases species will tend to be selectively removed in order of their relative susceptibility to that form of pollution. The Trent Biotic Index (Woodiwiss, 1964) has been widely used, and is reproduced in Table 3.3. To derive the index value, each specimen in the sample is identified to the level at which it can be assigned to one of the groups listed in the lower part of the table. It can be seen that in most cases fairly limited taxonomic expertise is required. When the number of groups in the sample is known, the table is entered at the appropriate column (e.g. if seven groups are present, enter the table at column 5). The line in the table at which the correct index value is given is determined by the presence of the highest-ranking indicator group (column 1). Thus if seven groups are present, of which the highest-ranking member is *Gammarus,* the TBI value is V. If seven groups are present, but one is a species of Plecoptera, the TBI score is VII.

The Trent Biotic Index, originally devised for use in the River Trent catchment in England, has been widely used throughout the UK and some European countries, sometimes in modified form. It is a simple system requiring minimal sampling and taxonomic expertise, and the values it yields show a consistent relationship with some chemical variables such as BOD and permanganate values (Woodiwiss, 1964). However, it does not work well

Table 3.3 The Trent Biotic Index (Woodiwiss, 1964)

Key indicator groups	Diversity of fauna	Total number of groups (see Part 2) present				
		0–1	2–5	6–10	11–15	16+
Column No: 1	2	3	4	5	6	7
		Biotic Index				
Plecoptera nymphs present	More than one species	—	VII	VIII	IX	X
	One species only	—	VI	VII	VII	IX
Ephemeroptera nymphs present	More than one species[a]	—	VI	VII	VIII	IX
	One species only[a]	—	V	VI	VII	VIII
Trichoptera larvae present	More than one species[b]	—	V	VI	VII	VIII
	One species only[b]	IV	IV	V	VI	VII
Gammarus present	All above species absent	III	IV	V	VI	VII
Asellus present	All above species absent	II	III	IV	V	VI
Tubificid worms and/or Red Chironomid larvae present	All above species	I	II	III	IV	—
All above types absent	Some organisms such as *Eristalis tenax* not requiring dissolved oxygen may be present	0	I	II	—	—

[a] *Baetis rhodani* excluded.
[b] *Baetis rhodani* (Ephem.) is counted in this section for the purpose of classification. The term 'Group used for purpose of the biotic index' means any one of the species included in the following list of organisms or sets of organisms:
Each known species of Plathyhelminthes (flatworms); Annelid worms (excluding genus *Nais*); genus *Nais* (worms); each known species of Hirudinea (leeches); each known species of Mollusca (snails); each known species of Crustacea (hog louse, shrimps); each known species of Plecoptera (stonefly); each known genus of Ephemeroptera (mayfly) excluding *Baetis rhodani*; *Baetis rhodani* (mayfly); each family of Trichoptera (caddis-fly); each species of Neuroptera larvae (alder fly); family Chironomidae (midge larvae) except *Chironomus thummi*; Chironomus thummi (blood worms); family Simulidae (black-fly larvae); each known species of other fly larvae; each known species of Coleoptera (beetles and beetle larvae); each known species of Hydracarina (water mites).

in all polluted waters. Since the ranking of key indicator species reflects their tolerance to organic pollution (or low dissolved oxygen levels), the system gives anomalous results when used with communities subject to some kinds of toxic pollution. Consider, for example, the data shown in Table 3.4. In this simple example, invertebrate samples were taken from three stations on a river heavily polluted with zinc, and from an unpolluted tributary. The marked faunal impoverishment of the polluted sites 7 and 6+ caused by the zinc is evident from the raw data, but is not reflected in the Trent Biotic Index values (Table 3.4). Site 7, for example, has a score of 9, which might normally be taken to indicate good water quality. The reasons for this anomalously high index value are threefold, and may be used to illustrate some important defects in many biotic indices. First, the index takes no account of abundance:

Table 3.4 Invertebrates collected by kick sampling from three sites on the zinc-polluted river West Allen and an unpolluted tributary (see text). Levels of dissolved zinc, and Trent, Chandler and BMWP biotic index values are also shown

	Site			
	7	6a	6+	4
Dissolved Zn, $mg\,l^{-1}$	1.28	0.04	0.76	0.38
Invertebrate taxa:				
Plecoptera				
Protonemoura meyeri	2	7	16	5
Isoperla grammatica	1	0	0	3
Amphinemoura sulcicollis	3	0	0	8
Leuctra fusca	0	3	2	24
Taeniopteryx nebulosa	0	0	0	2
Chloroperla tripunctata	0	0	0	1
Perla bipunctata	0	1	0	0
Perlodes microcephala	0	2	0	0
Brachyptera risi	0	0	3	0
Ephmeroptera				
Baetis rhodani	2	9	7	3
Ecdyonurus venosus	0	67	7	131
Rhithrogena semicolorata	0	7	5	13
Trichoptera				
Polycentropus flavomaculatus	1	0	2	1
Agapetus sp.	1	2	0	0
Rhyacophila dorsalis	0	1	0	2
Hydropsyche sp.	0	0	0	5
Philopotamus sp.	0	0	2	0
Coleoptera				
Limnius volckmari	1	16	0	0
Elmis aenea	0	1	0	0
Diptera				
Chironomidae	0	1	0	1
Simulidae	1	0	0	0
Dicranota	1	0	0	0
Tipula	1	10	1	0
Neuroptera				
Sialis lutaria	0	1	0	0
Mollusca				
Ancylastrum fluviatilis	0	11	0	0
Other taxa				
Gammarus pulex	1	35	0	2
Hydracarina	0	0	0	1
Hirudinea	0	0	0	1
Oligochaeta	0	0	0	1
Total no. of taxa	11	16	10	17
Total no. of individuals	15	174	46	204
Trent Biotic Index value	IX	X	VIII	X
Chandler Biotic Score value	588	1001	618	998
BMWP Score	59	79	61	95

one individual of a taxon contributes as much to the index value as one thousand individuals. Second, because the index is designed to assess the biological quality of waters subject to organic pollution, it gives a high score to stoneflies. Since stoneflies are not particularly sensitive to zinc, the result is unduly influenced by the presence of stoneflies. Third, because there are only 11 possible Trent Biotic Index scores (0–10), the enormous variety of biological communities is made to conform to one of these 11 categories. A score of 7, for example, can be achieved in eight different ways. A sample consisting of two different stoneflies is scored identically with one containing no stoneflies or mayflies, one caddis larva and ten other groups. Consequently the index is often insensitive to major differences in community characteristics. In the present example, both sites 6a and 4 are assigned a score of 10, but inspection of the raw data indicates that they sustain different biological communities. For this reason, the system has been subjected to various modifications designed to overcome some of these difficulties. In one of these, the 'extended' Trent Biotic Index (Table 3.5), the range of scores is increased so that scores between 0 and 15 are possible.

Some of these difficulties are overcome by the more sophisticated Biotic Score System of Chandler (1970). This system demands a higher level of taxonomic competence and also takes into account the abundance of the taxa present in the sample (Table 3.6). To determine the biotic score value, each taxon present is accorded a score according to its abundance in a standard sample and to its position in the ranking order of sensitivity to pollution. Note also that for pollution-tolerant taxa, increased abundance results in a *lower* score being assigned. The sum of the scores for the individual taxa gives the overall biotic score for the sample. Theoretically there is no upper limit to the score value, but in practice the scale is from 0 to 2000. The Chandler Biotic Score system is superior, in principle, to the simpler Trent Biotic Index. It has a wider range of possible values, it takes abundance into account, and it is less likely to be seriously influenced by the fortuitous presence of small numbers of unrepresentative taxa. Consequently it is able to distinguish more readily between different communities, and is more sensitive than the Trent Index to slight alterations in water quality. Table 3.4 shows Biotic Score values for the four West Allen sites. The difference between the polluted sites 7 and 6+ and the cleaner sites 6a and 4 is more clearly emphasised by the Chandler Biotic Score. Although the system fails to distinguish between sites 6a and 4, an experienced biologist would perhaps recognise that while a score of about 1000 is good for a small upland beck, it is not particularly high for a stream with physical characteristics of site 4. A discussion of the advantages and limitations of the various kinds of biotic index is given by Washington (1984) and Metcalfe-Smith (1994). The Trent Biotic Index has been widely modified for use in different countries in Europe (Metcalfe, 1989) and the United States (Hilsenhoff, 1987).

More recently in regions where biotic indices are widely used, a scheme known as the BMWP score (Armitage *et al.,* 1983; ISO/BMWP, 1979) has

Table 3.5 The extended version of the Trent Biotic Index. Groups are defined as shown in Table 3.3

		Total number of groups present									
		0–1	2–5	6–10	11–15	16–20	21–25	26–30	30–35	36–40	41–45
Biogeographical region: Midlands, England		Biotic indices									
Plecoptera nymphs present	More than one species	—	7	8	9	10	11	12	13	14	15
	One species only	—	6	7	8	9	10	11	12	13	14
Ephemeroptera nymphs present	More than one species[a]	—	6	7	8	9	10	11	12	13	14
	One species only[a]	—	5	6	7	8	9	10	11	12	13
Trichoptera larvae present	More than one species[b]	—	5	6	7	8	9	10	11	12	13
	One species only[b]	4	4	5	6	7	8	9	10	11	12
Gammarus present	All above species absent	3	4	5	6	7	8	9	10	11	12
Asellus present	All above species absent	2	3	4	5	6	7	8	9	10	11
Tubificid worms and/or Red Chironomid larvae present	All above species absent	1	2	3	4	5	6	7	8	9	10
All above types absent	Some organisms such as *Eristalis tenax* not requiring dissolved oxygen may be present	0	1	2	—	—	—	—	—	—	—

[a] *Baetis rhodani* excluded.
[b] *Baetis rhodani* (Ephem.) is counted in this section for the purpose of classification.

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largely superseded earlier indices (the initials stand for Biological Monitoring Working Party). Like other schemes, it is largely derived empirically, and represents a compromise between ecological validity and practical constraints. For example the taxonomic requirement is limited to the need to identify specimens to the family level. In the BMWP scheme, specimens in a sample are identified to family and each family present assigned a score according to Table 3.7. The BMWP score is the sum of the individual scores of the families recorded at each site. No account is taken of abundance, or of the fact that a family may be represented in the sample by more than one species. These features of the scheme could, in some respects, be considered regressive; comparison of the performance of earlier indices tends to show that more discriminating conclusions are obtained from those indices which rely on more detailed identification of specimens, and which take account of the abundance of taxa. However, these apparent disadvantages are counterbalanced by other considerations. Unlike earlier schemes, the BMWP score system was not devised for any single catchment or geographical area; it is specifically intended to apply equally well to all areas of Britain, and in principle to biogeographical zones on a continental scale. It therefore includes a number of taxonomic groups (e.g. Odonata and Hemiptera) which do not feature prominently in previous systems. This overcomes a major disadvantage of earlier indices, which tended to perform badly outside a relatively small geographic area, and were generally only appropriate for lotic waters. Thus the BMWP index opens up the possibility of a common scoring system for biological monitoring of a wider range of habitat types on a national or even international scale. As biological monitoring becomes incorporated more widely into strategies for environmental management and pollution control, it is increasingly obvious that a major constraint on the number of locations which can be monitored and the frequency with which they can be surveyed is the time-consuming nature of the sorting and identification stages of the whole process, which is expensive of skilled human resources. The relatively simple input data required by the BMWP system offers enormous economies in this respect which in many circumstances compensate for its potential shortcomings. In addition, the BMWP system now forms the basis of a potentially powerful tool for the monitoring and management of water quality, the RIVPACS system, which is described in Section 3.4.6. In the example shown in Table 3.4, the BMWP score ranks the sites in a very similar pattern to the Chandler score, but is much simpler taxonomically.

3.4.4 Similarity Indices

Calculation of the degree of similarity between samples, like the calculation of diversity, can be done in various ways depending upon how similarity is defined. Thus there are a variety of similarity coefficients available for use.

Table 3.6 The Chandler Biotic Score System (Chandler, 1970)

		Abundance in standard sample				
		Present 1–2	Few 3–10	Common 11–50	Abundant 51–100	Very abundant 100 +
Groups present in sample		Points scored				
	Planaria alpina					
Each species of	Taenopterygidae, Perlidae, Perlodidae, Isoperlidae,Chloroperlidae	90	94	98	99	100
Each species of	Leuctridae, Capniidae, Nemouridae (excluding *Amphinemoura*)	84	89	94	97	98
Each species of	Ephemeroptera (excluding *Baetis*)	79	84	90	94	97
Each species of	Cased caddis, Megaloptera	75	80	86	91	94
Each species of	*Ancylus*	70	75	82	87	91
—	*Rhyacophilia* (Trichoptera)	65	70	77	83	88
Genera	*Dicranota, Limnophora*	60	65	72	78	84
Genus	*Simulium*	56	61	67	73	75
Genera of	Coleoptera, Nematoda	51	55	61	66	72

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—	*Amphinemoura* (Plecoptera)	47	50	54	58	63
—	*Baetis* (Ephemeroptera)	44	46	48	50	52
—	*Gammarus*	40	40	40	40	40
Each species of	Uncased caddis (exc. *Rhyacophila*)	38	36	35	33	31
Each species of	Tricladida (excluding *P. alpina*)	35	33	31	29	25
Genera of	Hydracarina	32	30	28	25	21
Each species of	Mollusca (excluding *Ancylus*	30	28	25	22	18
—	Chironomids (excl. *C. riparius*)	28	25	21	18	15
Each species of	*Glossiphonia*	26	23	20	16	13
Each species of	*Asellus*	25	22	18	14	10
Each species of	Leech (excl. *Glossiphonia,*					
—	*Haemopsis*)	24	20	16	12	8
—	*Haemopsis*	23	19	15	10	7
—	*Tubifex* sp.	22	18	13	12	9
—	*Chironomus riparius*	21	17	12	7	4
—	*Nais*	20	16	10	6	2
Each species of	Air breathing species	19	15	9	5	1
	No animal life			0		

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Table 3.7 The BMWP score system

Allocation of biological scores: Families	Score
Siphlonuridae Heptageniidae Leptophlebiidae Ephemerellidae Potamanthidae Ephemeridae Taeniopterygidae Leuctridae Capniidae Perlodidae Perlidae Chloroperlidae Aphelocheiridae Phryganeidae Molannidae Beraeidae Odontoceridae Leptoceridae Goeridae Lepidostomatidae Brachycentridae Sericostomatidae	10
Astacidae Lestidae Agriidae Gomphidae Cordulegasteridae Aeshnidae Corduliidae Libellulidae Psychomyiidae Philopotamidae	8
Caenidae Nemouridae Rhyacophilidae Polycentropidae Limnephilidae	7
Neritidae Viviparidae Ancylidae Hydroptilidae Unionidae Corophiidae Gammaridae Platycnemididae Coenagriidae	6
Mesovelidae Hydrometridae Gerridae Nepidae Naucoridae Notonectidae Pleidae Corixidae Haliplidae Hygrobiidae Dytiscidae Gyrinidae Hydrophilidae Clambidae Helodidae Dryopidae Elminthidae Chrysomelidae Curculionidae Hydropsychidae Tipulidae Simuliidae Planariidae Dendrocoelidae	5
Baetidae Sialidae Piscicolidae	4
Valvatidae Hydrobiidae Lymnaeidae Physidae Planorbidae Sphaeriidae Glossiphoniidae Hirudidae Erpobdellidae Asellidae	3
Chironomidae	2
Oligochaeta (whole class)	1

One measure of similarity is the number of species common to samples or communities, as in Sorensen's (1948) coefficient:

$$S = \frac{2c}{a + b}$$

where a=the number of taxa in community a, b=the number of taxa in community b, and c=the number of taxa common to both.

If we have two samples, A and B, each containing two species, x and y, then according to Sorensen's coefficient they are 100% similar. However, if sample A contains 99 individuals of x and one of y, and sample B contains one of x and 99 of y, they are clearly biologically different, and Sorensen's coefficient is a misleading figure. Clearly there are advantages in using coefficients which take into account the relative abundance of species in the sample, and this can be done in various ways. Sneath and Sokal (1973) give a comprehensive list of similarity indices. Of the large number available, relatively few have been applied in aquatic studies and it is not yet clear which indices are generally preferable (Washington, 1984). They have been more widely used by terrestrial ecologists, but their applications in biological monitoring of aquatic habitats are becoming more widely appreciated.

Analysis of survey data by similarity indices offers some important advantages, and may in fact eventually be found superior to analysis by diversity indices. Comparisons may be made simultaneously in space and time, each site or sample being compared in turn with every other site or sample. The following simple example, based on unpublished data obtained by the author and Dr G.Chabrzyk, illustrates the technique.

Samples of benthic invertebrates were taken from each of nine consecutive stretches of a river in northern England. Sites AA, B, D, F and H are riffles (stretches of turbulent water) and sites A, C, E and G are pools. Two similarity coefficients were used, Sorensen's (1948) and Raabe's (1952). The latter is one which takes into account the relative abundance of the species in the sample. Every possible pair of sites was compared, and the results displayed as a matrix (Figure 3.12). Boxes in the matrix can be shaded differentially, each pattern of shading corresponding to a different level of similarity. In some cases, visual inspection of the matrix allows any patterns to be detected. For example, in Figure 3.12 it is immediately obvious that site G has a low similarity with any other site, which suggests that there is some unusual feature of this site which deserves further investigation. More detailed examination of the matrix reveals other interesting features.

There is no doubt that this approach is a very promising one. Its principal disadvantage is that the calculations involved are very tedious, particularly for large data sets. However, they can easily be programmed into a modern microcomputer of modest capacity. In fact, further treatment of the data greatly assists interpretation. The process of average-linkage cluster analysis (Pielou, 1984; Williams, 1971) allows a dendrogram to be constructed which displays visually the varying degrees of affinity between the sample stations

	AA	A	B	C	D	E	F	G	H
AA		●	●	●	■		■		●
A	58.8			●	●	●	●		●
B	69.0	47.4			●	●	■		■
C	62.1	69.3	48.1		●	●	●		●
D	86.9	59.4	62.0	58.7			■		
E	46.9	62.3	67.4	63.3	41.5		●		■
F	78.9	59.9	76.8	61.6	71.9	63.0			●
G	38.3	39.4	32.0	44.0	37.3	47.2	37.2		
H	52.6	51.0	74.1	55.9	45.5	70.6	67.1	32.8	

□ <50 ⊡ 50 – 70 ■ >70

% similarity

Figure 3.12 Matrix of Raabe's similarity coefficients for nine alternating pool and riffle stretches on the River East Allen

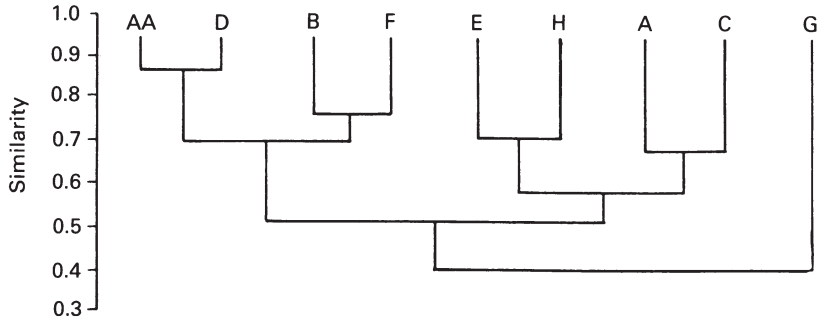

Figure 3.13 Dendrogram derived by average-linkage cluster analysis of the matrix shown in Figure 3.12

(Figure 3.13). Site G is now clearly seen to be dissimilar to all other sites, with a similarity to them of less than 40%. Two major groupings are now apparent—sites AA, D, B and F, with a similarity of at least 70%, and sites E, H, A and C with a similarity of just under 60%. All the sites on the first group are riffles, and would be expected to have a high similarity. However,

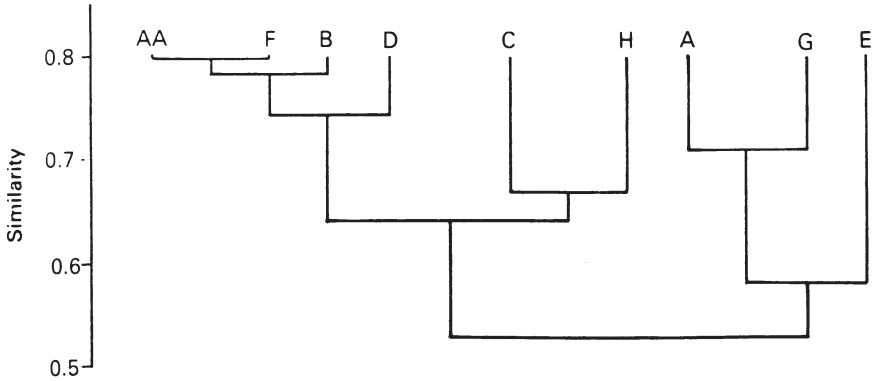

Figure 3.14 Dendrogram derived by average-linkage cluster analysis of a matrix of Sorensen's similarity coefficients, based on the same raw data used to derive Figure 3.13

another interesting result is that riffle site H has a high affinity with the pool sites E, A and C. Thus the analysis has drawn attention to two stations, out of the nine samples, which have unusual or unexpected biological characteristics, and which perhaps require further investigation.

Figure 3.14 shows the corresponding dendrogram based on the Sorensen coefficient of similarity. Here the pattern is somewhat different. Again, riffle sites AA, B, D and F form a group of high affinity, but the relationship of the 'anomalous' sites G and H with the remaining sites is less obvious. The reason for this is clear from examination of some of the raw data (Table 3.8). Sampling stations A and G are faunistically poor, but have a number of taxa in common. However, site A is dominated by Chironomidae and Limoniinae in roughly equal numbers, whereas site G is dominated by oligochaetes with a much smaller number of chironomids, and other taxa present only in very small numbers. Thus with Sorensen's coefficient, but not with Raabe's, A and G appear very similar.

As argued above, the Sorensen coefficient is a purely qualitative one and arguably inferior to the Raabe one. The example is included to demonstrate the fact that the choice of coefficient can greatly influence the outcome of the analysis, and that sophisticated data analysis is not a substitute for sound biological reasoning, but an adjunct to it. Ideally, several coefficients should be used and the results compared before any definite conclusion is reached. Also, there are several different methods of cluster analysis (Pielou, 1984; Williams, 1971). Hellawell (1978) gives step-by-step descriptions of methods for constructing dendrograms. Many standard computer software packages are readily available which will carry out various forms of cluster analysis.

A further level of sophistication is to estimate the degree of probability

Table 3.8 Numbers of individuals of various taxa recovered from artificial substrate samples at two sites on the River East Allen (see text and Figures 3.13 and 3.14)

Taxon	Nos. of individuals	
	Site A	Site G
Oligochaeta	6	51
Chironomidae	36	20
Limoniinae	32	4
Empididae	1	—
Limnius volckmari	1	1
Esolus parallelepipedus	1	1
Elmis aenea	1	—
Ancylastrum fluviatilis	6	—
Pisidium sp.	2	—
Polycentropus flavomaculatus	8	1
Baetis rhodani	—	3

with which the sites are similar (or different). This is necessary because most samples do not include all the species present in the habitat. Thus two sites which are in fact identical may produce a similarity coefficient of 90%, 80%, 70%, 60%, or even less, depending upon the efficiency of sampling. At what level of similarity, therefore, do we conclude that two sites are significantly different? The question can be answered objectively by using, for example, Kendall's rank correlation coefficient (Kendall, 1962) in place of the more conventional indices of similarity. Examples are given by Hellawell (1978). This approach has been used in Figures 3.15 and 3.16, which relate to data on the invertebrate communities of 23 sampling stations on the rivers East and West Allen (Green, 1984), and which indicate the application of cluster analysis in the study of a polluted river system. In these figures, stations numbered with Roman numerals are situated on the unpolluted River East Allen. Stations numbered with Arabic numerals are situated on the West Allen, which is heavily polluted with zinc in certain stretches. The similarity matrix (Figure 3.15) immediately indicates certain stations which have low similarity to the remaining stations. Construction of the dendrogram (Figure 3.16) allows a more detailed interpretation. In interpreting the dendrogram, we are particularly interested in those sampling stations which appear in an unexpected position. It must be remembered, however, that the appearance of a station in an unexpected position does not in itself indicate that the station is polluted.

At the level of Kendall's *tau* which indicates significant dissimilarity between the stations, seven groups, labelled A-G, are apparent (Figure 3.16). Group A and B each consist of only one station, IX and 10 respectively, which are thus both

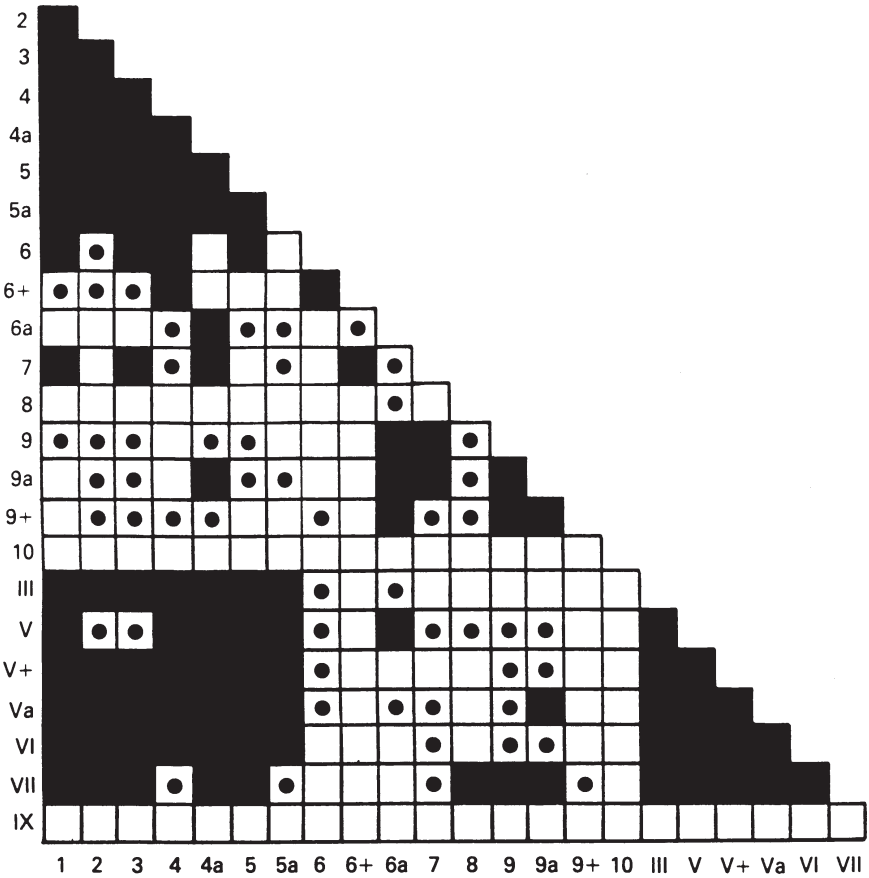

Figure 3.15 Matrix of Kendall's rank correlation coefficients for pairs of sites on the East and West Allen (Green, 1984). In this matrix, open squares indicate pairs of sites which are significantly different from each other

dissimilar from each other and from any other station. These sites are, in fact, the headwaters of the two rivers, where the physical conditions tend to promote unstable and highly variable communities. This grouping is not, therefore, unexpected. Group D contains four stations: 9, 9a and 9+ are all physically similar and adjacent to one another. The fourth station in the group, 6a, is a small tributary with similar physical properties to 9, 9a and 9+, so this grouping is again in accordance with expectations. Group A comprises 13 stations which include most of the downstream sites on both rivers. Note, however, that within this group two large subgroups occur, comprising stations 1, 2, 3, 4 and 5 and stations III, V, Va, V+ and VI. Thus stations on the same river tend, as expected, to be more closely similar to one another than to stations on another river. The

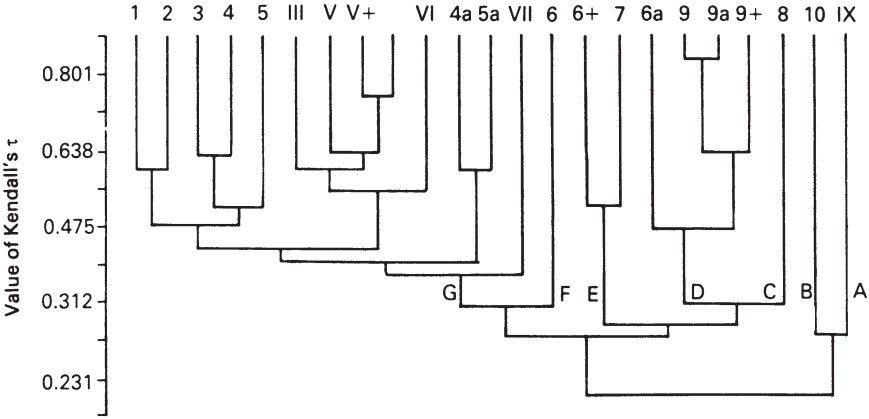

Figure 3.16 Dendrogram derived by average-linkage cluster analysis of the matrix shown in Figure 3.15. See text for discussion (Green, 1984)

groupings which are anomalous are therefore C, E and F, comprising stations 8, 6+ and 7, and 6 respectively. Chemical analysis of the water at these stations showed that it contained abnormally high levels of zinc (Abel and Green, 1981; Green, 1984). Thus the use of this technique allowed polluted sites to be identified from a large data matrix. The analysis of data by similarity indices, although relatively recent in its application to aquatic ecosystems, is nevertheless a promising approach. It does not in itself allow a particular habitat to be diagnosed as 'polluted' but it does allow a large number of spatial and temporal comparisons to be made simultaneously. It draws attention to habitats which have unusual biological characteristics by comparison with the majority of habitats sampled, and thus allows further research to be directed where it will be most profitable.

3.4.5 Other Multivariate Techniques

Cluster analysis is one of a variety of so-called multivariate analytical techniques which are becoming increasingly popular in the analysis of large and complex sets of ecological data, and lend themselves well to the analysis of biological monitoring data. Though the principles are, in general, not particularly new, they were little used until in recent years the widespread availability of microcomputers made it feasible routinely to carry out the long, complex and tedious calculations which these techniques require. Commonlyused forms of multivariate analysis include, in addition to the various forms of cluster analysis, principal components analysis (PCA); correspondence analysis; discriminant function analysis (DFA); and time-series analysis. It is beyond the scope of this book to provide detailed descriptions

of these processes, but a useful introduction to their applications in biological monitoring of aquatic habitats is given by Norris and Georges (1993). More detailed coverage of these types of analysis in ecological investigations is given by Gauch (1982), Pielou (1984) and Jolliffe (1986).

Many commercially-available software packages now offer the facility to utilise these advanced forms of data analysis routinely. It is important to remember, however, that the accessibility of such techniques can lead the inexperienced investigator into serious error. Most data analytical techniques make certain assumptions about the nature or quality of the input data, and many data sets violate the assumptions or preconditions of the method. Probably the most common error is to subject data sets to a whole range of different analytical processes until the 'right' result (i.e. what the investigator wants or expects) is obtained. There is therefore a great danger that misleading or erroneous results, leading to false conclusions, can readily be obtained. It is therefore important that the operator ensures that he or she is familiar with the assumptions and restrictions of the analytical method used, and develops at least sufficient understanding of the particular analytical process to enable the output of the computer to be interpreted critically and sensibly.

3.4.6 RIVPACS

In the UK, since the early 1980s, the approach of using multivariate techniques to explore the factors governing the distribution of river invertebrates on a national basis has been under development. It has now evolved into RIVPACS (River Invertebrate Prediction and Classification System) and is in use by the National Rivers Authority—now part of the Environment Agency, the main regulatory agency concerned with monitoring of water pollution—to assist in the analysis and interpretation of survey data. A brief history of the development of this system is given by Metcalfe-Smith (1994).

In most polluted rivers, the pollution existed long before any accurate biological records were taken. It is therefore difficult to judge what may have been the ecological status of a particular river stretch in the absence of pollution. If we could predict the nature of the biological community at a given location, assuming the absence of pollution, this knowledge would provide a benchmark against which could be judged the effectiveness of measures to reduce pollution or ameliorate water quality. Without this knowledge, the best information available can only come from contemporaneous studies of similar river stretches in the immediate locality. At best, however, this provides only a crude indication, since quite small variations in local conditions are readily observed to produce significant differences in river communities; and in many areas, suitable unpolluted sites for comparison do not exist.

The factors which govern the distribution and abundance of invertebrate species in rivers are partly local—current speed, water depth and width, nature of the substratum, chemical characteristics of the water, and so on—and partly related to broader parameters such as latitude, longitude, altitude and climate. In theory, if the influence of these factors on the distribution of a particular organism was known, it should be possible to predict the nature of the community which we should expect to find in any particular location.

The first stage in developing a predictive model for river invertebrate communities was an extensive survey of over 400 sites throughout Britain, on rivers of all physical types, using a rigorously standardised sampling technique. All sampling stations chosen were situated on rivers which were known, from previously obtained monitoring data, to be free of significant pollution. At each sampling site, values were also recorded of a range of abiotic factors such as altitude, latitude, longitude, temperature, current speed, width, depth, and of a range of chemical determinands. The taxa present in the biological samples were identified, and the raw data took the form of a list of taxa present at each site, together with the physical and chemical data for each site.

A cluster analysis of the kind described in Section 3.4.4 produced a dendrogram of all the sites, similar in form (but much larger!) to that shown in Figure 3.16. This revealed a number of groupings and subgroupings of sites, which could be interpreted as described earlier, each group or subgroup being characterised by certain common taxa and, to some extent, by common physical and chemical characteristics. In order to investigate the degree to which particular physical and chemical factors influenced the presence or absence of taxa, a principal components analysis was undertaken, which identified a number of key factors which influenced, to varying degrees, the observed pattern of distribution of taxa. From this outcome it was possible to develop a model which would predict, for any given location, the taxa likely to be present at any location within mainland Britain, assuming the absence of pollution or other disturbing factors. To obtain the prediction, it is necessary to input a minimum of eight physical parameters for the site under investigation: latitude, longitude, altitude, distance from source, discharge, width, depth and substratum composition. Additional determinands may be input to improve the accuracy of the prediction, such as slope, alkalinity, mean air temperature, annual air temperature range, chloride concentration.

A typical output from the program for one site is shown in Figure 3.17.

Figure 3.17 Part of the output of a RIVPACS prediction for a river site in the North of England. The probability of incidence of invertebrate families is shown, as is the predicted BMWP score based on 1000 virtual samples

RIVPACS

PREDICTION OF FAUNA

WEAR BELMONT **'Autumn'**

Probability of group membership

4b	60.3%
3d	25.9%
3c	4.4%
4c	3.3%
3b	2.0%
3a	2.0%

Predicted BMWP families in decreasing order of probability

99.8%	Elmidae
99.2%	Chironomidae
97.9%	Hydropsychidae
94.5%	Oligochaeta
93.2%	Baetidae
86.7%	Gammaridae (incl. Crangonyctidae & Niphargidae)
85.1%	Rhyacophilidae (incl. Glossosomatidae)
83.1%	Ancylidae (incl. Acroloxidae)
82.2%	Simuliidae
80.2%	Heptageniidae
79.3%	Caenidae
76.9%	Erpobdellidae
73.1%	Sphaeriidae
72.8%	Hydrobiidae (incl. Bithyniidae)
71.4%	Tipulidae
62.4%	Lymnaeidae
58.2%	Polycentropidae
55.4%	Gyrinidae
54.0%	Glossiphoniidae
48.2%	Taeniopterygidae
48.1%	Hydroptilidae
47.7%	Leptoceridae
46.8%	Perlodidae
46.4%	Asellidae
41.6%	Lepidostomatidae
38.0%	Nemouridae
36.0%	Hydrophilidae (incl. Hydraenidae)
35.5%	Sericostomatidae
34.3%	Planariidae (incl. Dugesiidae)
33.6%	Ephemerellidae
33.0%	Planorbidae
25.7%	Ephemeridae
21.5%	Brachycentridae

Predicted BMWP score, number of taxa and ASPT

	n	mean	sd	lcl	ucl
BMWP score	1000	127.9	20.202	88.27	167.47
No. taxa	1000	22.5	2.844	16.97	28.12
ASPT	1000	5.7	0.376	4.92	6.39

First, the site is assigned to one of the groups identified in the cluster analysis. Where the data are insufficient to assign a site with certainty, a range of possibilities is shown with associated degrees of probability. Second, the program lists those families included in the BMWP score index (see Section 3.4.3) which are expected to be present. Again, each family listed is assigned the level of probability with which its presence is predicted. At this stage, it is possible to compare the prediction of the model with data obtained from field surveys. To take a simple example, if several families are shown as having a high probability of presence, say 80% or more, but are rarely or never found at that site, there is an immediate indication that there may be some extraneous influence on the site concerned. Note, however, that in any comparison between observed and predicted values, one vital precondition *must* be met: that the sampling technique utilised to obtain the real samples must be exactly the same as that used in the original survey which gave rise to the model. Obviously, if the sampling effort or efficiency is different, the comparison between observed and predicted values is completely invalidated. This emphasises the importance of standardising sampling techniques (see Section 3.3).

The next stage is to estimate the predicted BMWP score for the site. In real life, single samples tend, even with standardised techniques, to produce variable results (sampling error) due to random variations. We therefore tend to take as large a number of samples as is feasible and average the results, which smoothes out the random variations and allows us to determine the extent of sampling error, and the degree of confidence we may place in our results. RIVPACS, in order to obtain a reasonable prediction of the BMWP score for the site in question, generates 1000 'virtual' samples from the list of predicted families present, taking into account their probability of presence, and produces a mean BMWP score and mean number of families present, together with the confidence limits of these means. These provide another means of comparison between actual and predicted values. Finally, the program computes the average score per taxon (ASPT) for the BMWP index, i.e. the total score for the site divided by the number of taxa present. This is sometimes useful to distinguish between sites which have similar scores but very different taxa present; for example, a site which had just three families of Plecoptera present would have an ASPT of 10 from a total score of 30. Another site could have the same total score, but a completely different community—say six families of molluscs, three families of leeches and one family of Crustacea. In this case (see Table 3.7) the average score per taxon would be only 3 (although the number of taxa present would be 10!).

It is possible also to display graphically the expected BMWP against a series of observed values (Figure 3.18), thus showing whether there are any consistent trends towards improvement or deterioration. If, on any particular occasion, the observed BMWP is unusually lower or higher than the expected value, or if it deviates in either direction from the established pattern, it may be possible to associate this deviation with a particular event or set of

Routine Biological Report. For District No 4.

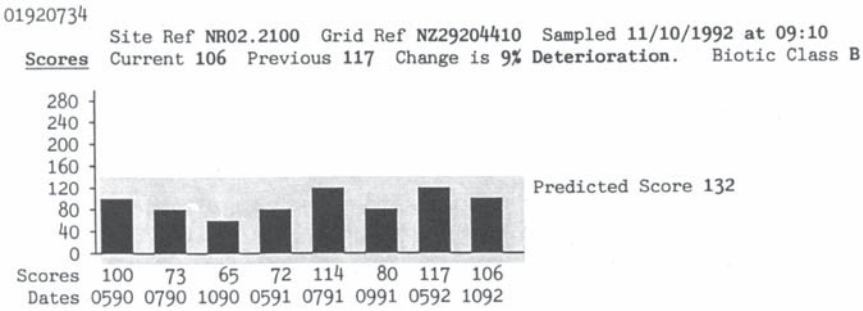

Figure 3.18 Part of the RIVPACS output for a river site, showing the predicted BMWP score (shaded area) compared with observed scores (vertical bars) on a number of occasions. Observed scores are consistently below the predicted value, which may indicate sub-optimal water quality

circumstances, and thereby obtain valuable information about factors influencing the site under investigation. Some groups of rivers (as defined in the cluster analysis) consistently yield underestimates of BMWP, presumably because they are influenced by factors peculiar to them which the system does not consider. Consistent overestimates could, of course, also occur in theory, though they would tend to be interpreted as evidence of extraneous influences on the river. As the system develops, it is likely that these inconsistencies will be reduced or eliminated.

3.4.7 Some General Comments about Data Analysis and Interpretation

Though the examples used in the preceding discussion have been deliberately simplified, in reality biological monitoring generates large and complex data sets. Even for the specialist, the detection of consistent patterns among the data requires some form of data processing to reduce its bulk and to highlight consistent trends. For specialists in other disciplines, these trends need to be explained in clear terms, though there is an obvious danger that in the process of simplifying the data to aid comprehension, misleading conclusions may be drawn. The simple examples used above show clearly how different forms of data processing may lead to completely different conclusions.

There is probably no single form of data analysis which can be recommended for all circumstances. Several authors have attempted to compare the performance of pollution, diversity and biotic indices by using them to analyse sets of data (e.g. Balloch *et al.*, 1976; Cook, 1976; Hellawell, 1978; Norris and Georges, 1993; Nuttall and Purves, 1974; Watton and Hawkes, 1984). Generally, the simpler indices tend to suffer to a greater degree from one or more of several disadvantages: insensitivity to major differences between communities; the production of anomalous or misleading results when non-organic pollution is involved; or undue

bias in the result owing to the fortuitous presence or absence of small numbers of particular taxa. In view of the great variety of index methods available, and of the fact that none are universally applicable, it is important that no single method be relied upon. There is, unfortunately, a tendency to invest indices with a scientific validity which they do not necessarily possess, and it is necessary to emphasise some of their limitations.

First, it must be realised that the process of calculating an index results in the loss of most of the information represented by the raw data. The data contained in one sample typically consist of a list of species, tabulated to show the relative abundance of each. Such a table clearly contains many separate pieces of information. To reduce this to a single number, by calculating an index value, results in just one piece of information, the index value itself. Thus to rely solely on the index value is to reject most of the information which has been collected. That the consequences of this lead to error is easily demonstrated. Consider the Trent Biotic Index (Table 3.3). It has been seen that a score of VII can be obtained in at least eight different ways. So a sampling station which yields the same score on two different occasions may, in fact, have changed dramatically, and over-reliance on index values in the analysis of the data will actually obscure this fact. Similarly, a particular value of diversity index can be obtained from any of a large number of quite different samples. Two samples which have equal diversity index values may have quite a different composition, indeed they may be so different biologically that they have no species in common at all.

Second, comparison of index values, particularly diversity index values, from different sources (i.e. different laboratories) is extremely dangerous. Consider the widely-used Shannon-Weaver index:

$$H = \sum_{i=1}^{s} P_i \log P_i$$

where P_i is the proportion of the total population belonging to the *i*th species and *s* is the total number of species in the sample. Some authors use $\log_2$, some use natural logarithms, and some use $\log_{10}$. Provided the same base is always used, no problem arises. However, most authors do not even state which base they have used, and therefore comparisons between results from different laboratories are meaningless.

A further difficulty arises through the use of different levels of taxonomic analysis. In theory every individual specimen is identified to the species. In practice this is rare, either because adequate keys do not exist or because individual laboratories lack suitably trained personnel. The extent of simple taxonomic error is, of course, unknown, but it is clear that different laboratories indulge to a varying, and usually undisclosed, extent in taxonomic 'lumping', which again renders inter-laboratory comparisons meaningless. Even within a single laboratory, during a single research programme, personnel changes can result in differing taxonomic standards being applied during a single investigation. Over-reliance on index

methods, particularly those which require only identification to the family level, can cause major community changes to be completely overlooked. For example, the replacement of one species by another which belongs to the same family or genus is a biological change of potentially large significance, and precisely the sort of change which biological monitoring is intended to detect. Preoccupation with indices as methods of data analysis could cause an investigator completely to overlook even such a conspicuous alteration in community structure.

This does not mean that index values are useless in pollution studies. It does mean, however, that the index value is *not* the end-point of the data analysis, as many people seem to think. Index values themselves require biological interpretation. They are simply an aid to the analysis of the raw data, and should always be interpreted by referring back to the raw data *before* any conclusion is reached.

Multivariate methods, particularly in view of the more or less routine use of sophisticated computer software packages, equally need to be treated with caution. Again, the test is whether the analysis aids the detection and interpretation of any patterns which may be present in the data, and whether the conclusions drawn are biologically sensible. It is essential that the operator understands the assumptions and limitations of the analysis, and where different analyses produce different results, the investigator should not simply choose the analysis which produces the result which is wanted or expected, but seeks to understand by further analysis *why* the different methods have produced different outcomes. Uncritical acceptance of computer output, no matter how sophisticated, is a recipe for serious error. Any form of data analysis is designed to be an aid to biological understanding, not a substitute for it.

4

The Toxicity of Pollutants to Aquatic Organisms

There are many circumstances in which the need to measure toxicity may arise. Many thousands of chemical substances are used for industrial, agricultural and domestic purposes, and their numbers increase annually. The toxicity of these chemicals and of their by-products and degradation products to aquatic animals needs to be determined, since any compound manufactured and used in substantial quantities is likely to become a contaminant of watercourses. In the case of novel compounds or formulations, toxicity testing may precede large-scale manufacture and form part of the research into the feasibility of its commercial application. Toxicity tests may be incorporated into effluent monitoring schemes. Identification of the more toxic components of complex effluents may be a prerequisite for the development and improvement of effective treatment processes. The measurement of toxicity is essential in the formulation of quality standards for receiving waters. Finally, compliance with a toxicity standard may be a legal requirement for consent to discharge an effluent. In this chapter we shall consider the basic principles of toxicology in relation to water pollutants and aquatic organisms, and the methods by which the toxicity and toxic effects of pollutants to aquatic life may be studied. The application of toxicological data in water pollution control, and their use in the formulation of water quality standards will also be considered, both in this chapter and in Chapter 6.

Toxic pollutants may exert their effects in several ways, depending upon the characteristics of the poison, of the receiving water, and of the biological community the water sustains. In extreme cases, animals may be killed by the poison. In some circumstances, poisons—insecticides, herbicides, molluscides, piscicides—are applied to water with the express purpose of killing some species and in the hope

that others will be unaffected. Lower concentrations of poison may exert sublethal toxic effects. Some poisons appear to accumulate in the tissues of organisms during their lifetime, and exert toxic effects after prolonged exposure to concentrations which are barely measurable by chemical means. It is widely suspected that some of these may pass from prey to predator organisms and achieve high concentrations in species at the top of a food web. Many poisons are known to be mutagenic, teratogenic or carcinogenic, but the study of these phenomena in aquatic organisms is in its infancy.

From a biological point of view, any toxic effect is significant if it influences, or is likely to influence, the physiology or behaviour of the organism in such a way as to alter its capacity for growth, reproduction or mortality, or its pattern of dispersal, since these are the major determinants of the distribution and abundance of species. Species which are not directly affected by a pollutant may nevertheless be indirectly influenced. For example, if a predator is deprived of its normal prey by the action of a pollutant on the prey, it may itself be numerically reduced. Alternatively it may prey upon some other species, which itself may show a numerical response. Where two competing species are unequally affected by the pollutant, both may show a change in distribution and/or abundance. Thus the effects of toxic pollutants can only be fully understood with some knowledge of trophic, competitive and other interspecific relationships.

Since pollutants can exert such a variety of toxic effects at different levels of biological organisation, an enormously wide range of investigative methods has been employed in their study. There is an enormous literature on the subject of pollutant toxicity to aquatic organisms, especially fish and invertebrates. Much of it is, unfortunately, of limited or even doubtful value, for reasons that will be made clear.

For the purposes of this discussion it is necessary at the outset clearly to define four basic terms which are widely misunderstood:

1 *Lethal toxicity:* toxic action resulting in the death of the organism.
2 *Sublethal toxicity:* toxic action resulting in adverse effects in the organism other than its death.
3 *Acute toxicity:* toxic action whose effects manifest themselves quickly (by convention, within a period of a few days).
4 *Chronic toxicity:* toxic action whose effects manifest themselves over a longer period (by convention, within periods measurable in weeks or months rather than days).

A common misunderstanding among the ill-informed is to use the terms ‘acute’ and ‘lethal’ as if they were synonymous, and to do the same with the terms ‘chronic’ and ‘sublethal’. This is clearly wrong. There are numerous examples

of sublethal toxic effects which manifest themselves quickly, and of organisms which die only after prolonged exposure to a poison. Thus it is perfectly correct to talk of acute sublethal toxicity, acute lethal toxicity, chronic sublethal toxicity or chronic lethal toxicity and in many circumstances it is important to distinguish correctly between them.

4.1 Lethal Toxicity and its Measurement

Approaches to measuring lethal toxicity vary in their complexity, in terms of the procedures employed, the apparatus required and the methods of collecting and processing the data produced. There are corresponding differences in the amount of information yielded, the degree of confidence which may be placed in the results, and the purposes for which those results may validly be used. There are many different reasons for carrying out toxicity tests, and it is important that the procedure chosen is appropriate to the purpose for which the results are required. Alabaster and Lloyd (1980) have discussed toxicity testing procedures in relation to their various applications. A useful practical guide to toxicity test methods has been published by HMSO (1983a). There are indeed several such useful manuals, not all of which are readily accessible; Abel (1991) refers to several of these. Since the results of toxicity tests may be significant in connection with pollution control legislation, national and international agencies have made some attempts to agree upon standard procedures (e.g. Alabaster and Lloyd, 1980; APHA, 1995; ASTM, 1973; Maki and Duthie, 1978). These and other sources frequently make specific recommendations on many aspects of toxicity testing methodology (see also Axiak and Abel, 1991; Reish and Oshida, 1986; Sprague, 1969, 1970, 1973; UNEP/FAO/IAEA, 1989; Ward and Parrish, 1982). In some circumstances, special procedures are required in order to obtain meaningful results. This can arise where, for example, the properties of the organism under test, or of the poison to be tested, are unusual in some way; or where the pattern of occurrence of the pollutant in water does not follow the usual pattern. Some examples of modified test procedures are described by Axiak and Abel (1991); see also Section 4.1.5. Some of the simpler methods are widely used but provide very limited information, and their results need to be interpreted with more caution than is sometimes exercised. The reasons for this will become clear later in this chapter, but it is first necessary to understand the principles of more rigorous procedures.

4.1.1 The Experimental Conditions

The basic requirement is for groups of animals to be exposed to each of a series of concentrations of poison in suitable containers. A toxicity test does not differ from other types of experiment in that due consideration should be given to matters such as sample size, acclimation of animals to the experimental conditions, and

maintenance of a constant environment. Normally samples of at least ten are used, and the appropriate range of poison concentrations may be estimated on the basis of preliminary experiments so as to cause most of the animals to die over a period ranging from a few hours to a few days. However, it is often necessary to investigate the effects of lower concentrations such that the experiment may last for several weeks or more. The main practical difficulties encountered are in ensuring constant environmental conditions, maintaining the poison concentrations at their nominal levels, and minimising stress to the animals.

The toxicity of many poisons is greatly influenced by environmental conditions such as pH, temperature, water hardness and dissolved oxygen concentration. Clearly such variables should ideally be measured and controlled during any test, particularly since the presence of the animals themselves is likely to cause a gradual deterioration in the initial experimental conditions. This will arise due to utilisation of dissolved oxygen and excretion of carbon dioxide and other toxic metabolites such as ammonia. Poison concentrations may vary during the experiment due to absorption and metabolism by the animals, chemical and microbiological breakdown, by evaporation, or through adsorption onto the sides of the test vessels. These considerations suggest that the test containers should be fairly large and that the test solutions should be replaced regularly. It is generally considered that a minimum test volume of two to three litres per gram of animal tissue, to be renewed at least once daily, is normally required. The preferred arrangement, however, is to construct a 'continuous flow' apparatus in which the test solutions are automatically replenished, usually achieving a total replacement of solution every six to eight hours. The replacement rate may be greater or less depending upon the size of the test containers, the size, activity level and metabolic rate of the animals, and the volatility or degradability of the poison under test. In practice, most investigators use apparatus of their own design and construction, and of varying degrees of complexity.

4.1.2 Data Collection and Analysis

The raw data from a toxicity test take the form of a record of increasing mortality in each test container as time passes. The survival time of each individual in the experiment should be recorded accurately. In practice the series of observation times recommended by Sprague (1973) are usually adequate, namely at 0.25, 0.5, 0.75, 1, 2, 4, 8, 14±2, 24, and 33±3, hours, and thereafter at daily intervals.

The next step is to estimate the median survival time (LT50) of each group of animals, that is the time required for half the animals to die. The most widely-used technique is the rapid graphical method of Litchfield (1949), which is derived from a procedure developed by Bliss (1935, 1937). For each group of animals, a graph is plotted of cumulative percentage mortality

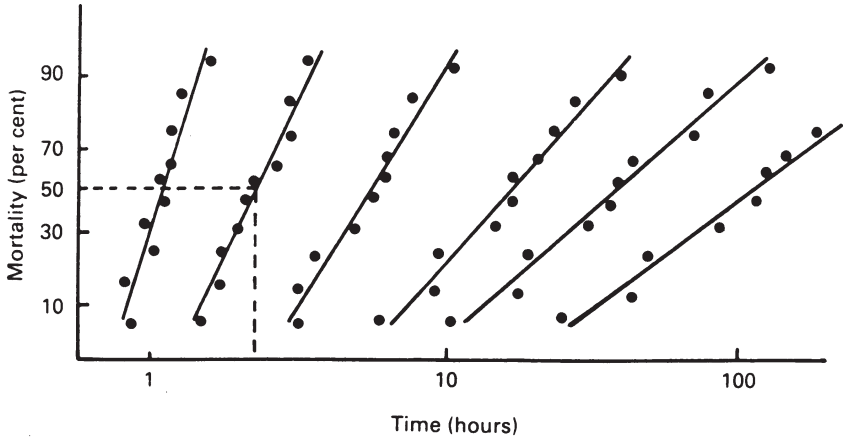

Figure 4.1 Probit lines resulting from plots of cumulative percentage mortality in each test tank against time, using logarithmic–probability graph paper. The dotted lines show how median survival times are read from each line. Lines on the left are for the higher poison concentrations

against elapsed time. For reasons which will be discussed later, the mortality data are transformed to probits (or plotted on a probability scale) and the time values are transformed to log times. The straight line of best fit is then drawn through each set of points. This line may be computed, but in practice lines fitted by eye are often satisfactory. The result is a set of 'probit lines' or time-mortality curves as shown in Figure 4.1. Values of LT50 can now be read off each line as shown. The time for each percentage response, for example LT10, LT90, can also be read off if required. Normally values for LT16, LT50 and LT84 are required. To estimate confidence limits, the *slope function, S,* for each probit line is determined by

$$S = \frac{\dfrac{\text{LT 84}}{\text{LT 50}} + \dfrac{\text{LT 50}}{\text{LT 16}}}{2} .$$

Using the values of S and N (where N = the number of animals in the test tank), the factor f is computed:

$$f = \text{antilog}\left(\frac{1.96 \log S}{\sqrt{N}}\right) = S^{1.96/\sqrt{N}}.$$

Litchfield (1949) provides a nomograph for the computation of f from values of S and N. The procedure is slightly more complex if not all the animals die during the experiment, or if a 'split' probit line (see below) is obtained. The upper and lower confidence limits of the LT50 are given by LT50×f and LT50/f respectively. LT50 values and their confidence limits for each group of animals can be plotted against

poison concentration to give a toxicity curve (Figure 4.2). It is customary to use logarithmic scales on both axes, since the ranges of survival times and poison concentrations to be displayed frequently span several orders of magnitude. This transformation does not, of course, alter the shape of the curve.

An alternative method of plotting the raw data is widely used. This method produces essentially the same toxicity curve but it is arrived at by a different route. For each observation time, a graph is plotted of percentage mortality (transformed to probits) against poison concentration (transformed to log concentration). Instead of a series of survival time-mortality curves (Figure 4.1) we now have a series of concentration-mortality curves (Figure 4.3). For each observation time, the median lethal concentration or LC50 (sometimes termed median tolerance limit, TL_M) can be read off. This value is defined as the concentration causing half the animals to die *within a specified period of time*. Its confidence limits can be estimated by a procedure analogous to that described above (Litchfield and Wilcoxon, 1949), based on the original method of Bliss (1935). The resulting toxicity curve (Figure 4.4) of LC50 against observation time differs only in that confidence limits are expressed in terms of concentration rather than time. For certain applications this approach has some advantages; for example, where the test forms part of a research programme designed to establish water quality standards, it is obviously preferable to estimate errors associated with lethal concentrations rather than with survival times. However, the computation of the results is more complex since, among other difficulties, the number of points on each probit line is small. Unless the chosen range of concentrations is narrow, most groups of animals in the test will show either zero or 100% mortality at any single observation time. Thus the lines of best fit must be calculated rather than fitted by eye (Litchfield and Wilcoxon, 1949).

Since these calculations can be tedious, there are obvious advantages in using a computer. Probit analysis is available on several commercially-available statistical software packages, and a purpose-designed program in fact requires a microcomputer of very modest capacity. Inexperienced users should, however, beware of some major problems which can arise with commercial software packages; since they are designed for general purposes, difficulties can arise with the mathematical notations, the format of the input data and in the interpretation of the output, which can lead to erroneous results. The use of 'home-made' programs must be particularly strongly discouraged. Unless they are written with a full understanding of the mathematical and toxicological principles involved, they almost invariably produce ridiculous results. Buhagiar and Abel (1991) provide a full discussion of the subject, and introduced the Toxicologist System, a dedicated and efficient program which carries out probit analysis for toxicity tests with aquatic organisms, plots the graphs and assists in the interpretation of

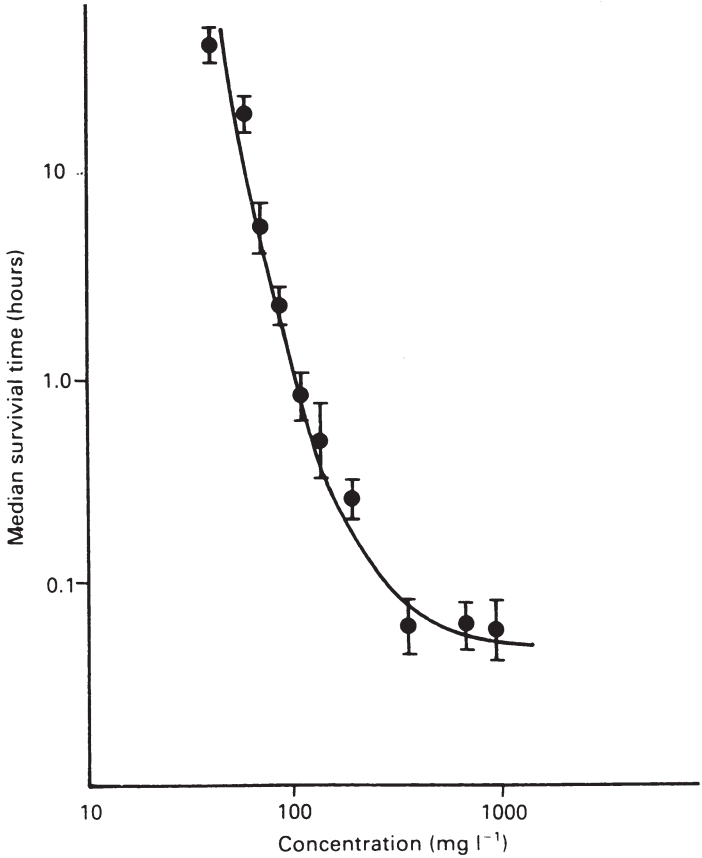

Figure 4.2 Toxicity curve relating median survival time to poison concentration; rainbow trout (*Salmo gairdneri*) exposed to sodium lauryl sulphate (Abel, 1978). Vertical bars represent 95% confidence limits

unusual probit lines. It also takes advantage of the computer to produce a mathematically exact solution rather than an approximation, while to the operator it appears to follow the familiar graphical procedure.

We may now consider the interpretation of lethal toxicity test results.

4.1.3 Probit Lines

The theoretical basis of the log-probit transformation of mortality data is given by Bliss (1935, 1937) and Finney (1971). This technique of data analysis is widely used in many types of toxicological and pharmacological research. Hewlett and Plackett (1979) provide a lucid and succinct account of the general theory and practice of probit analysis, and Sprague (1969) discusses its application to toxicity tests involving aquatic animals. In practical terms, the

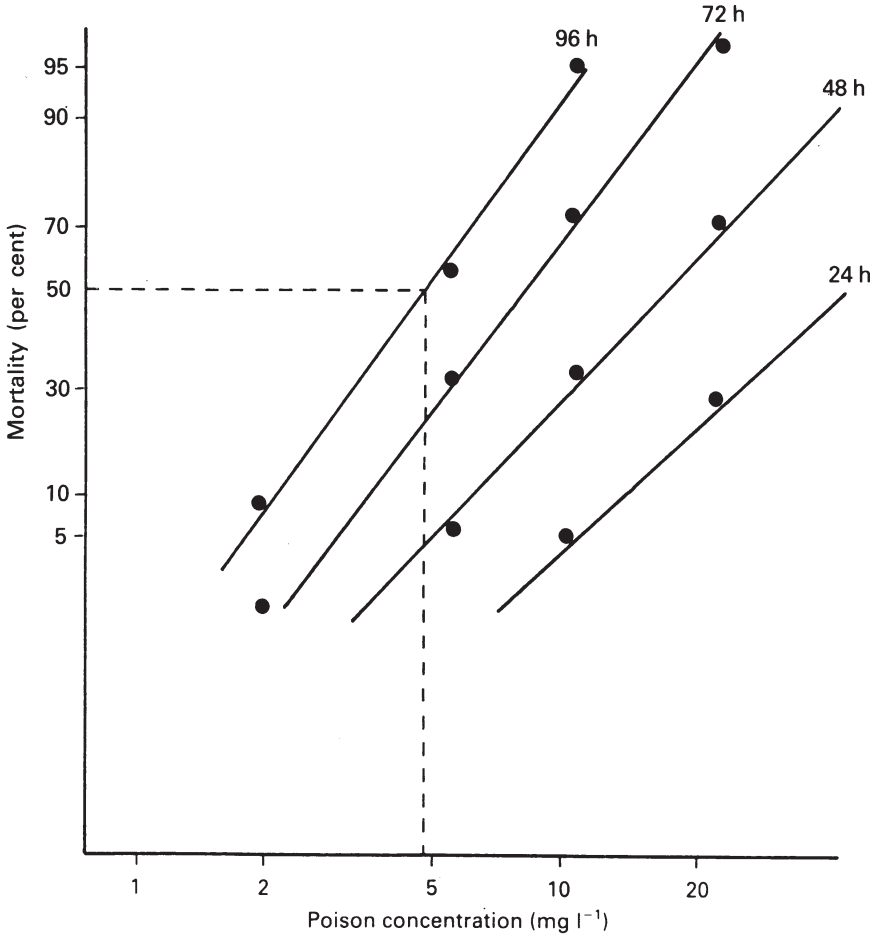

Figure 4.3 Probit lines resulting from plots of percentage mortality at specified observation times (probability scale) against poison concentration (log scale). The dotted line shows how the 96 h LC50 value may be read off

purpose of the transformation is to allow the estimation of median survival times and/or median lethal concentrations, and their confidence limits, from a relatively small sample. Other transformations have occa sionally been used (Sprague, 1969) and some have been discussed in detail by Stephan (1977), who argues that the log-probit transformation is not necessarily the best. However, it is by far the most widely used, and in practice all appropriate transformations appear to produce very similar results.

Because the probit lines are an essential intermediate stage in the construction of the final toxicity curve, it is often overlooked that they can provide other information of toxicological interest. Useful indications are

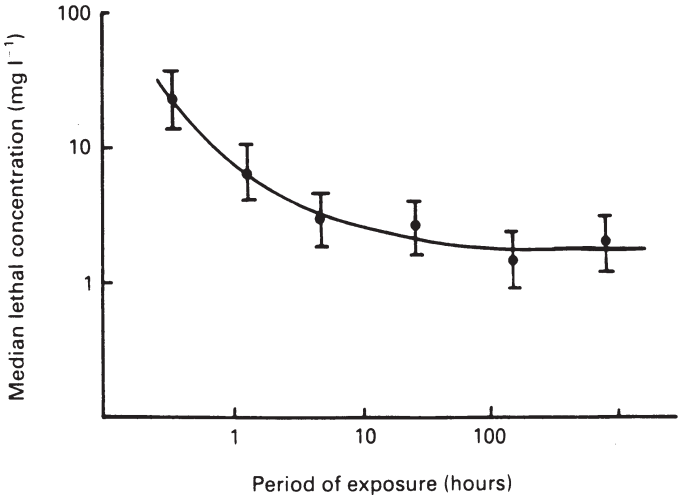

Figure 4.4 A toxicity curve in which median lethal concentrations and their confidence limits have been plotted against time. See Figure 4.15 for other examples

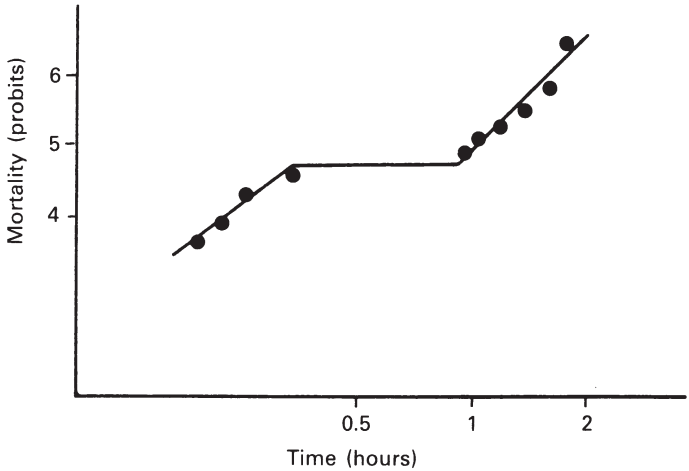

Figure 4.5 A 'split' probit line from an experiment to determine the lethal toxicity of the detergent sodium lauryl sulphate to rainbow trout, *Salmo gairdneri*. The discontinuity indicated a heterogeneity in the population of test animals, in this case due to the existence of two separate mechanisms of toxic action (Abel, 1978)

provided by examination of probit lines for irregularities of slope or the presence of inflections. 'Split' probit lines (Figure 4.5) occasionally occur, which indicates a heterogeneity of the population from which the sample was drawn (Hewlett and Plackett, 1979). Such heterogeneity may be due to intra-specific variability in

susceptibility to the poison between sexes or age classes, or may indicate the development of resistant strains within the population.

Another possible explanation is that the poison may have two (or more) mechanisms of action, and that animals which are resistant to one mechanism may subsequently succumb to another. Tyler (1965) concluded on the basis of split probit lines that high temperature had three separate mechanisms of lethal action in fish. Confirmation that such an interpretation can be correct is given by studies on the toxicity and toxic effects of an anionic detergent (Abel, 1976, 1978). A concentration-dependent change in the mode of lethal action of the detergent was found to be associated with the occurrence of split probit lines in toxicity tests.

Where the heterogeneity in susceptibility to the poison is not pronounced, it may be manifested by an alteration in the slope of the probit lines rather than in the occurrence of inflections (Hewlett and Plackett, 1979). Simple tests for significant differences in the slope of probit lines are available (e.g. Litchfield, 1949) and have been used to demonstrate the occurrence of more than one mode of lethal action in fish exposed to toxic pollutants (Abel, 1978; Burton *et al.,* 1972).

Ball (1967a) showed that the slope of the probit lines was an important datum in comparing the relative susceptibilities of species to poisons. Ammonia was equally toxic, in terms of the 5-day LC50 value, to roach *(Rutilus rutilus)* and rudd *(Scardinius erythrophthalamus).* However, there was a considerable difference in the slope of the concentration-mortality curves. In practical terms, this may be important in the application of the toxicological data to water quality standards. For example, an ammonia concentration equivalent to two-thirds of the 5-day LC50 may be expected to kill less than 1% of rudd, but 16% of roach.

These examples illustrate the potential importance of a full analysis of probit lines in the investigation of lethal toxicity. Such detailed consideration is rarely given, and it would appear that much useful information from toxicity tests may thereby be lost. Where irregularities of the kind described above are found to occur, they may indicate promising lines of further investigation.

4.1.4 Toxicity Curves

The toxicity curve describes the empirical relationship between poison concentration and survival time of the animals. Some representative curves are shown in Figures 4.2–4.9. There have been several attempts at mathematical descriptions of toxicity curves (reviewed by Sprague, 1969), but the validity and usefulness of this are questionable (Brown, 1973), as is speculation concerning the shape of the curve, and such practices have long been discontinued. As Brown (1973) points out, for any poison there will be a concentration so low that it will never cause the death of half the animals.

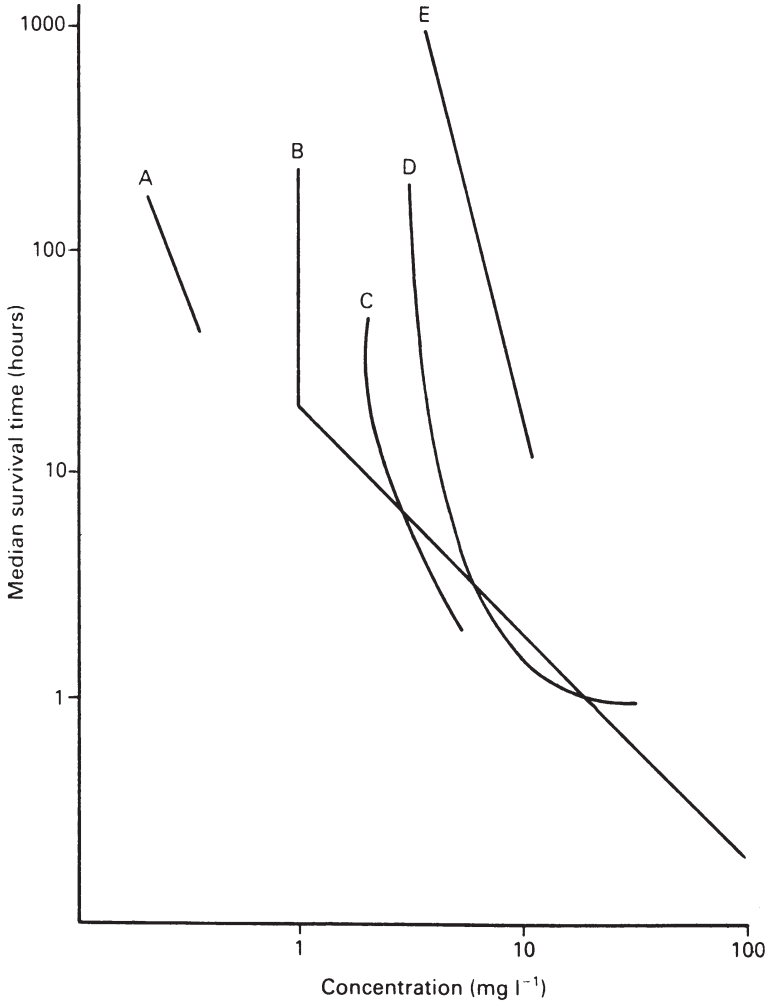

Figure 4.6 Some toxicity curves for various species of fish exposed to different detergents, redrawn from the originals to the same scale. A, *Salmo gairdneri*, linear alkylate sulphonate (Brown *et al.*, 1968); B, *Salmo salar*, polyoxyethylene lauryl ether ((Wildish, 1972); C, *Lepomis macrochirus*, linear alkylate sulphonate (Hokanson and Smith, 1971); D, *Gadus morrhua*, alkylbenzene sulphonate (Swedmark *et al.*, 1971); E, *Salmo gairdneri*, alkylbenzene sulphonate (Herbert *et al.*, 1957)

Thus the curve will become asymptotic to the time axis. The concentrations at which this occurs may be termed the *threshold median lethal concentration* or threshold LC50. (A synonymous term is *incipient lethal level* or ILL.) Further, even at very high concentrations death will not be instantaneous,

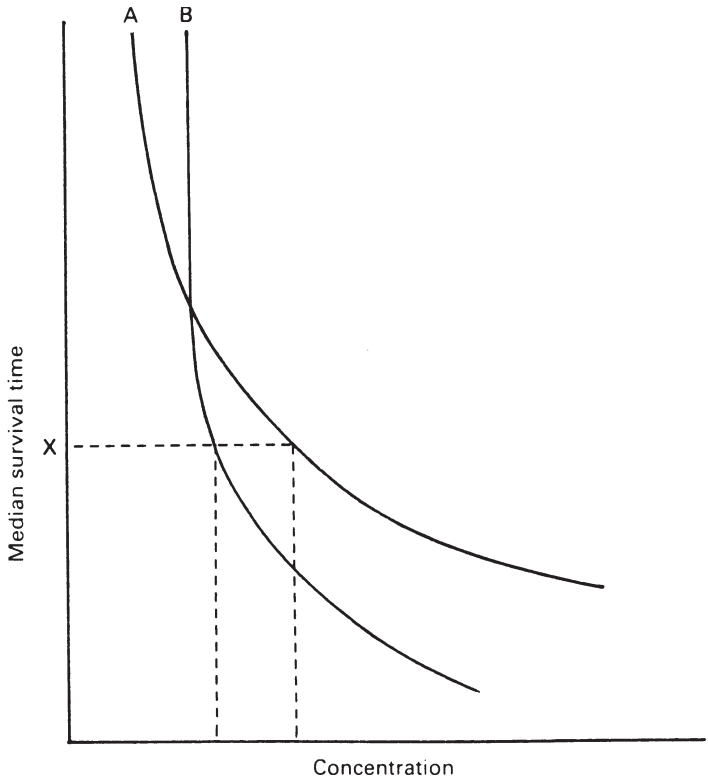

Figure 4.7 Two hypothetical toxicity curves. Substance A is clearly more toxic than substance B, since the lethal threshold concentration of A is smaller. However, had the test been discontinued at time X, B would have appeared more toxic than A

but will take a finite period of time to occur. Thus the curve will become asymptotic to the concentration axis. Between these two asymptotes, the curve generally will show a decrease in survival time as concentration increases. Whether the toxicity curve is a straight line or a curve is therefore of no significance. Where a straight line is obtained, it may be considered as a segment of a larger curve. This point is illustrated by Brown (1973), and also in Figure 4.6. Here, toxicity curves for several species of fish exposed to some synthetic detergents have been redrawn from the originals to the same scale. Clearly, no significance can be attached to the fact that, for example, curves A and E are rectilinear while C and D are curvilinear. Most of these curves, and A and E in particular, cover only part of the range over which survival time changes with poison concentration. More extensive testing over a wider range of concentration is required to establish the true shape of the curves.

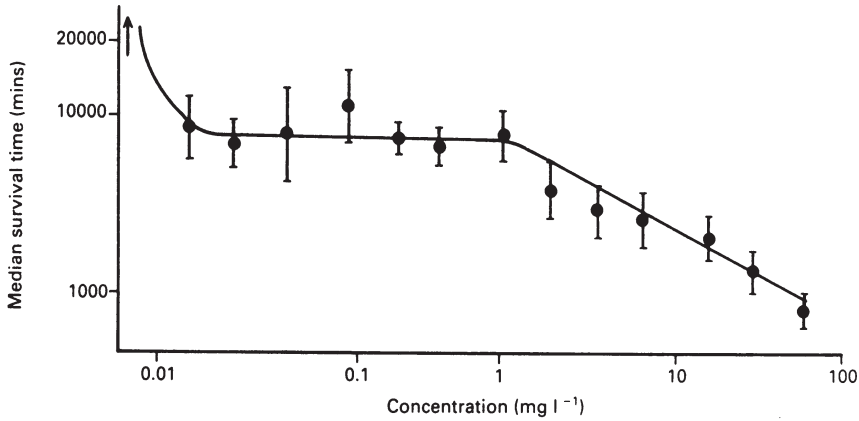

Figure 4.8 Toxicity curve for rainbow trout (*Salmo gairdneri*) exposed to cadmium (Ball, 1967b)

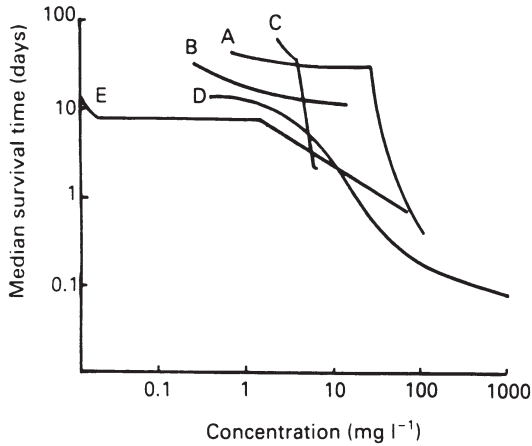

Figure 4.9 Toxicity curves for several fish species exposed to cadmium, redrawn to the same scale. Note that none of the curves shows a clear threshold concentration, despite the long duration of most of the tests. Inflections in the curves, and segments of curve over which mortality is apparently unrelated to poison concentration, commonly occur. Finally, the curves for different species frequently intersect: which species appears most, or least, sensitive depends upon the duration of the toxicity test. A, *Tilapia aurea* (Abel and Papoutsoglou, 1986); B, *Cyprinus carpio* (Abel and Papoutsoglou, 1986); C, *Noemacheilus barbatulatus* (Solbé and Flook, 1975); D, *Gasterosteus aculeatus* (Pascoe and Cram, 1977); E, *Salmo gairdneri* (Ball, 1967b)

The most important feature of a toxicity curve is the indication it gives of the threshold median lethal concentration, and wherever possible tests should be continued until a lethal threshold is apparent. Figure 4.7 shows clearly the importance of determining lethal threshold concentrations. In this diagram, two toxicity curves are shown. These may represent two poisons tested against the same species, or one poison tested against one species under different environmental conditions. Clearly A is more toxic than B, since the lethal threshold concentration of A is smaller than that of B. If, however, the experiment had been terminated arbitrarily at time X, as shown on the diagram, it would be erroneously concluded that B is more toxic than A. Therefore unless complete toxicity curves are obtained, and lethal thresholds established, the results of any test must be interpreted with caution. This is particularly important where comparisons between species, poisons or environmental conditions are involved. For example, Ball (1967a) found that in tests lasting one day, trout were more sensitive to ammonia than coarse fish. However, when the tests were continued for up to five days, all fish were found to be equally sensitive, the difference between trout and coarse fish being simply that the latter were more slow to react.

Apart from being the only proper basis for comparative studies of lethal toxicity, lethal thresholds are also useful, in conjunction with other information, in setting water quality standards (see Chapter 6). A major criticism of many investigations of lethal toxicity is that experiments are not continued long enough. Sprague (1969) examined 375 published measurements of lethal toxicity and found that only 211 of these showed a lethal threshold within four days. In 122 cases the time required to show a lethal threshold was between four and seven days, and 42 cases required longer than this. Although the results of shorter experiments are by no means invalid, it is nevertheless clear that unless lethal thresholds are clearly established the interpretation which may validly be put on the results is strictly limited. Further, useful toxicological information may be lost. Ball (1967b) reported an example of the advantages of continuing tests as long as is economically or practically feasible (Figure 4.8). The toxicity curve for rainbow trout exposed to cadmium was linear over a concentration range between 1 and 64 mg l^{-1} and a time period of about six days. Continuing the test for 14 days revealed that cadmium continued to act lethally down to 0.01 mg l^{-1} and that the threshold concentration may lie as low as 0.008 mg l^{-1}. Fish exposed to concentrations between 0.01 and 1.0 mg l^{-1} continued to die throughout the latter part of the experiment, and between these two concentrations survival time did not increase as the cadmium concentration decreased. These results demonstrated that cadmium was a very slow-acting poison which was considerably more toxic than shorter tests had previously indicated. Toxicity curves for five fish species exposed to cadmium have been compared (Abel and Papoutsoglou, 1986) and show some interesting features (Figure 4.9).

4.1.5 Alternative Methods for Measuring Lethal Toxicity

As indicated earlier, there are many different reasons for measuring the toxicity of pollutants to aquatic organisms, and it is important to use a method which is appropriate to the purpose for which the results are required. The procedures described above are unnecessarily elaborate for some purposes, and similarly there are circumstances in which these conventional methods provide inadequate information. It is therefore sometimes necessary to consider alternative methods, on the one hand simpler, and on the other more complicated, than those discussed already. The modifications may be to the experimental apparatus, to the collection of data, to the methods of data analysis, or to the duration of the test. The most common reasons for modifying a test procedure are:

1 *The purpose of the test:* for example, routine screening and monitoring of effluents do not necessarily require the same level of complexity as toxicity measurements designed to contribute to the formulation of a water quality standard. Tests required for legal or quasi-legal purposes such as certification of toxic chemicals for use in water, or for purposes of meeting consent conditions for discharge of wastes, usually must conform to the relevant procedures laid down by the regulatory authority. This type of test is usually kept as simple as possible, consistent with producing useful data, as the results may become subject to legal challenge on the grounds that the procedures were incorrectly followed. However they are usually not suitable for any purpose other than that for which they were designed.
2 *The characteristics of the pollutant:* for example, certain substances have unusual physical or chemical properties, such as low solubility, immiscibility with water, volatility, susceptibility to adsorption or degradation, or other reasons which affect their behaviour in the test and which will require special steps to be taken to ensure that the final result is relevant to the way in which the chemical will behave in the environment. Examples include oil dispersants and certain pesticides. It is also important in some circumstances to consider the pattern of use or discharge of the chemical. For example, a test which assumes continuous exposure of organisms to the chemical will generally produce false results if the organisms are exposed only intermittently. This is particularly relevant to certain forms of pesticide applications, and to estimating the impact of effluent plumes or mixing zones on the receiving water biota (Abel, 1980a, b; Abel and Garner, 1986).
3 *The characteristics of the test organisms:* for example, some organisms have special requirements by virtue of their size, behaviour or environmental requirements which may dictate modifications to the test procedure.

A more detailed discussion of these points is given by Axiak and Abel (1991).

4.2 Factors Influencing Toxicity

There is a great deal of published information on the comparative toxicity of pollutants to different species under different conditions, and the present discussion is a selective review of some of the more salient features of the literature. Only influences on lethal toxicity are considered here: factors affecting sublethal toxicity have been little studied. Regrettably, much of the available literature is of limited value, or at least requires cautious interpretation, largely because of the kinds of methodological limitations discussed earlier. For example, we have seen (Figure 4.4) that comparing two LC50 values for a single time period such as 48 or 96 hours can lead to erroneous conclusions. Any biotic or abiotic influence on toxicity may affect the speed of response of the organisms as well as, or instead of, the actual quantity of poison required to kill the animals. Therefore comparisons of toxicity based on measurements of survival times, mortality rates, or fixed-time LC50 values are not adequate firmly to establish the existence or magnitude of an effect on toxicity. The importance of determining lethal threshold values is rarely more evident than when discussing comparative toxicity.

Unfortunately, much of the literature on comparative toxicity takes precisely the form of tabulations of LC50 values, or comparisons of survival times or mortality rates. Therefore the existence and magnitude of many potential influences on toxicity are not well established, despite in many cases the existence of a substantial literature. Indeed, many of the best-known influences on toxicity have been well established for many years, and much of the more recent literature fails to shed further light on the subject.

4.2.1 The Toxic Properties of the Pollutant

The toxicity of a pollutant under any given circumstances must be a function of its chemical structure or configuration, and quite small alterations in the poison molecule can produce major variations in toxicity. Synthetic anionic detergents are a group of compounds which illustrate this well. Modern anionic detergents are of the linear alkylate sulphonate type, consisting of a sulphonated benzene ring with an unbranched alkyl chain containing about 12 carbon atoms (see Figure 2.10). The degradation products of detergents are markedly less toxic to aquatic organisms than the original molecule (Kimerle and Swisher, 1977; Swisher *et al.,* 1964). Numerous studies have shown that the length of the hydrocarbon chain of an anionic detergent molecule exerts a large influence on its toxicity (Abel, 1974; Hirsch, 1963; Lindahl and Cabridenc, 1978; Maki and Bishop, 1979). These studies

are in general agreement that the toxicity of anionic detergents to fish, invertebrates and algae (expressed in terms of 48 h LC50 values) increases by up to one order of magnitude for each increase of 2 alkyl carbons in the detergent molecule, although very long hydrocarbon chains (C16 and above) tend to show reduced toxicity.

The existence of such empirical relationships between chemical structure and toxicity has since been confirmed in other groups of compounds, and has given rise to the idea of *quantitative structure-activity relationships* (QSARs). QSARs may be used to predict toxicity, even of compounds which have not yet been synthesised, and are discussed further in Section 4.6. The toxicity of both organic and inorganic poisons is greatly influenced by the physico-chemical state in which the poison is present. Heavy metal ions, for example, may exist in any of several different oxidation states; in dissolved, colloidal or particulate form; and as simple ions or as inorganic or organo-metal complexes. These various forms may have very different toxic properties. This fact explains, at least in part, the effect of some environmental conditions on toxicity.

The toxicity of copper provides a good example. Pagenkopf *et al.* (1974) recorded from published literature 96-h LC50 values for *Pimephales promelas* ranging over two to three orders of magnitude. From the chemical data provided on the environmental conditions of these experiments, they calculated the equilibrium concentrations of five possible copper species ($CuCO_3$, $Cu(CO_3)^{2-}$, , CuOH+ and Cu^{2+}). The concentration of Cu^{2+} required to kill half the fish within 96 h was nearly constant, and it is apparently the major toxic species. $CuOH^{+}$ was found to be rather less toxic, and the other copper species apparently contributed little to the toxic action of copper. In each case examined, a substantial proportion of the total copper present was complexed with carbonate and hydroxide. It is also known that complexation of copper with dissolved organic material causes a marked reduction in its toxicity. Sewage effluent, glycine, humic substances, and suspended organic matter (Brown *et al.,* 1974) and organic chelating agents such as nitrilotriacetic acid (Shaw and Brown, 1974) markedly reduce the toxic action of copper.

The influence on toxicity of the physico-chemical state, and molecular structure or configuration of pollutants may thus have extensive implications for the conduct of toxicity tests, and for the interpretation of test results, particularly when such results are to be extrapolated in the formulation of water quality standards. Lee (1973), in his review of the topic, pointed out that with the increasing use of chronic, sublethal toxicity testing, concentrations of pollutants which are found deleterious in experimental conditions are sometimes equal to or less than the apparent 'natural' concentrations found in waters which sustain a healthy biota. An obvious possible explanation is that under laboratory conditions the poison may largely be present in a form different from that which predominates in natural waters. While it has

long been standard practice to monitor, control and record the physical environment of toxicity tests, until recently little attention has been paid to the chemistry of the poison under test conditions. Lee (1973) recommended procedures for minimising the problems which may be associated with the influence of the chemical environment on the results of toxicity tests, in particular that in the design and execution of toxicity tests, consideration should be given to the chemistry of the test substance, and to the determination of the precise form of the substance which is responsible for the observed toxic effect. It is surprising, even disappointing, that although the general principle was understood 20 years ago, toxicologists have been slow to incorporate it into routine practice, and to this extent much uncertainty remains about the accuracy of many measurements of toxicity.

4.2.2 The Effects of Environmental Conditions

Since the environmental conditions may affect both the poison and the organism under test, it is not surprising that their influence on toxicity can be large. Most of the systematic studies on the effects of environmental conditions on toxicity were carried out in the 1960s and 1970s using fish. More recent work has done little to change the general pattern which is summarised here, except to confirm that the same overall pattern appears to apply also to invertebrates.

Water hardness is among the most important environmental influences on toxicity, and its effects are particularly well known in relation to heavy metal toxicity. Lloyd (1960) found that the concentration of zinc which was lethal to rainbow trout *(S.gairdneri)* within two-and-a-half days varied by a factor of eight over the hardness range 12–320 mg l^{-1} as $CaCO_3$. Other metals are similarly influenced, including copper (Howarth and Sprague, 1978), cadmium (Calamari *et al.,* 1980) and silver (Davies *et al.,* 1978). It is now known that this effect is largely due to the effect of water hardness on the distribution of the total available metal ions between each of several inorganic complexes, which are not all equally toxic (see Section 4.2.1). However, the fact that the effect of hardness on toxicity has at least partly a biological basis can be shown by acclimating fish to hard water and exposing them to the metal in soft water. Such fish are more resistant to zinc (Lloyd, 1965) and cadmium (Calamari *et al.,* 1980) than similar fish acclimated and exposed in soft water. Hardness has also been reported to affect the toxicity of poisons other than metals, and should always be considered as a potentially significant modifier of toxicity.

The effects of *temperature* on toxicity may be expected to be complex. Temperature influences the rate of metabolic processes, including the uptake, metabolism and excretion of poisons. Increased temperature will increase the oxygen requirements of aquatic organisms, while decreasing the solubility

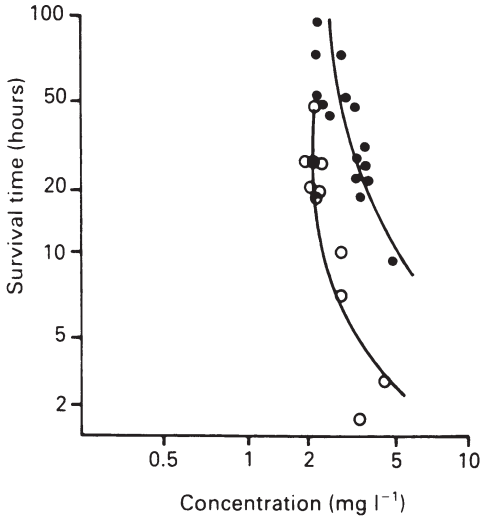

Figure 4.10 Effect of temperature on the toxicity of linear alkylate sulphonate detergent to *Lepomis macrochirus*. Open circles represent tests at 25°C, closed circles tests at 15°C (Hokanson and Smith, 1971)

of oxygen in water. The properties of the poison itself may, of course, be directly influenced by temperature; for example, through its effect on the equilibrium between molecular and ionised forms. Temperature is itself an important limiting factor to aquatic organisms. Further, as Sprague (1970) points out, it appears to be particularly important in studying temperature effects to determine lethal threshold concentrations, rather than LC50 values at arbitrarily-selected observation times. This is because temperature may influence the rate of reaction of the organism to the poison, but not the actual lethal threshold concentration. For these reasons, the large literature relating to temperature effects on toxicity affords little opportunity for reliable generalisation. It appears to be generally true that at higher temperatures, the time taken for organisms to react to a given concentration of poison is reduced. Cairns *et al.* (1975) cite numerous examples. It follows that results of short-term tests where lethal thresholds are not established, and in particular comparisons based on 48-h or 96-h LC50 values (i.e. the vast majority of reported results), are likely to be misleading and to exaggerate the magnitude of apparent temperature effects on toxicity. Reliable reports of temperature effects on lethal threshold concentrations appear to be very scarce.

These points are well illustrated by the following examples. Hokanson and Smith (1971) showed that the lethal threshold concentrations of an anionic detergent to *Lepomis macrochirus* were similar at 15°C and 25°C. However, at the higher temperature median survival times were reduced and the lethal

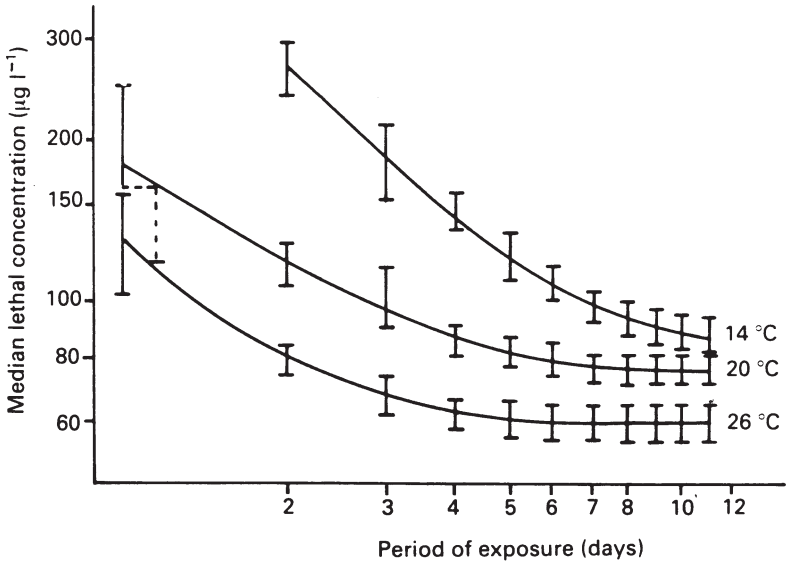

Figure 4.11 Effects of temperature on the toxicity of hydrogen sulphide to *Carassius auratus* (Adelman and Smith, 1972)

threshold time was 20–24 h at 25°C compared with 48–51 h at 15° (Figure 4.10). Adelman and Smith (1972) studied the effects of temperature on the toxicity of hydrogen sulphide to goldfish, *Carassius auratus,* in tests lasting 11 days. Their results showed that lethal threshold concentrations ranged from approximately 90 μg l^{-1} at 14°C to approximately 60 μg l^{-1} at 26°C, that is hydrogen sulphide was more toxic at the higher temperature. However, the complete toxicity curves (Figure 4.11) show clearly that the apparent increase in toxicity with temperature was much more pronounced in tests of shorter duration. An example of decreased toxicity with increasing temperature is given by Brown *et al.* (1967a, b). The 48-h LC50 of phenol to *Salmo gairdneri* was 5 mg l^{-1} at 6°C and increased to 9 mg l^{-1} at 18°C. Toxicity curves published by these authors indicate that 48-h LC50 values were in this case close to the lethal threshold concentrations. Interestingly, at all but the lowest concentrations tested the effect of increased temperature was to *reduce* median survival times, that is the toxicity curves intersect in the manner illustrated in Figure 4.7. Thus even when the effect of increased temperature is to reduce toxicity in terms of lethal threshold concentration, comparison of short-term LC50 values would lead to exactly the opposite conclusion. These examples all illustrate the danger of arbitrarily-terminated toxicity tests, and explain why, unfortunately, most of the literature relating to temperature effects on toxicity must be regarded as being of very limited value.

The effects of *dissolved oxygen* on toxicity have been less widely investigated, but in general low dissolved oxygen (DO) concentrations appear to cause an increase in the toxicity of poisons. As with temperature, the majority of reports deal with

toxicity as measured by survival times, mortality rates, or tests of arbitrarily-fixed short duration, and accordingly need cautious interpretation, but there are some clear examples of the effects of oxygen concentration on threshold toxicity values. Hokanson and Smith (1971) found that the lethal threshold concentration of an LAS detergent to *Lepomis macrochirus* increased from 0.4 mg l^{-1} at 2 mg DO l^{-1} to 2.2 mg l^{-1} at 7.5 mg DO l^{-1}. Thurston *et al.* (1981) reported lethal threshold concentrations of ammonia to *S.gairdneri* ranging from 0.32mg NH_3 l^{-1} at 2.6 mg DO l^{-1} to 0.81 mg NH_3 l^{-1} at 8.6 mg DO l^{-1}. Acclimation of fish to low dissolved oxygen concentrations prior to testing may influence the results of experiments. Lloyd (1960) found a small increase in the toxicity of zinc to *S. gairdneri* at low DO levels which was abolished if fish were acclimated to low DO before testing. Similar results were obtained by Adelman and Smith (1972) for *Carassius auratus* exposed to hydrogen sulphide.

Although extreme *pH values* are deleterious to aquatic organisms, the pH range 6–9 is generally considered acceptable to most species. Within this range, however, the toxicity of many poisons is influenced by pH. Particularly strongly affected are those poisons which dissociate into ionised and unionised fractions, of which one is markedly more toxic than the other. The best-known example is ammonia (Alabaster and Lloyd, 1980) which is more toxic at high pH values. The reason is that unionised ammonia has high toxicity and the ammonium ion has very low toxicity, and the proportion of unionised ammonia in solution increases rapidly with pH; thus the toxicity of ammonia is about ten times higher at pH 8 than at pH 7. Alabaster and Lloyd (1980) also cite cyanide, nickelo-cyanide complex, sodium sulphide and zinc as examples of poisons whose toxicity is substantially influenced by pH. It is reasonable to assume that pH is potentially an important determinant of toxicity for any poison which ionises in solution.

The effect of *salinity* on toxicity has received some attention since many pollutants are discharged to saline waters. Some poisons appear to be least toxic to fish at salinities corresponding to approximately 30–40% sea water, when the water is roughly isotonic with fish body fluids. Examples include zinc (Herbert and Wakeford, 1964), ammonia (Herbert and Shurben, 1965) and alkylbenzene sulphonate detergent (Eisler, 1965). The effect of salinity on zinc toxicity appears particularly large (Figure 4.12) although in this case the toxicity is expressed as 48-h LC50 and not lethal threshold concentrations. Phenol toxicity to *Salmo gairdneri* increased steadily with salinity (Brown *et al.,* 1967), 48-h LC50 values ranging from 9 mg l^{-1} in fresh water down to 5 mg l^{-1} in 60% sea water. Cadmium is reported to increase in toxicity to the estuarine fish *Fundulus heteroclitus* (Eisler, 1971) as salinity increases. There is no generally accepted hypothesis to explain salinity effects on toxicity. Herbert and Wakeford (1964) suggested that zinc was less toxic to fish in isotonic medium because of the reduced importance of osmoregulatory

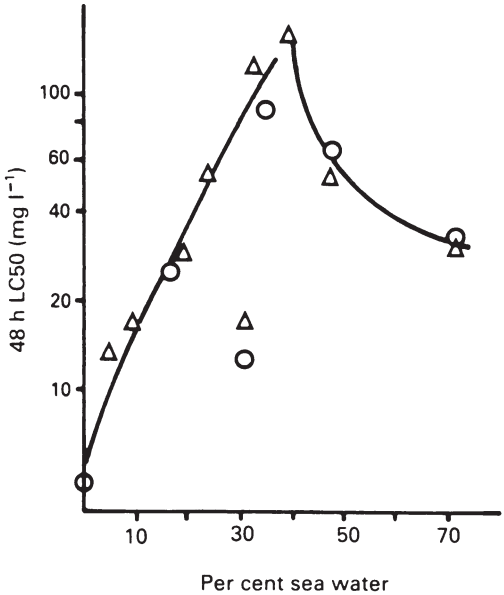

Figure 4.12 Effect of salinity on the toxicity of zinc to *Salmo gairdneri* (Herbert and Wakeford, 1964)

stress during intoxication. Skidmore (1970) showed that trout poisoned by zinc in fresh water maintained normal osmotic and ionic balance, and that death was due to asphyxiation associated with gill damage. This does not mean, however, that osmoregulatory requirements have no influence in zinc poisoning. It has been suggested (Abel and Skidmore, 1975) that the gill damage associated with poisoning by zinc and other pollutants is a consequence of a rearrangement of the gill epithelium to preserve an osmotic barrier in the face of a rapid loss of viable epithelial cells due to the action of the poison. Thus the gill damage, and consequent tissue hypoxia, may be less extensive for fish in isotonic medium, though this has never been investigated. Poisons which are more toxic in hypertonic medium may be so because teleosts drink copiously in hypertonic medium, and thus may accumulate poison more rapidly. The effect of salinity on chemical speciation of the toxicant (see above) may also be relevant.

4.2.3 Combinations of Poisons

An important environmental variable which may influence the toxicity of a poison is the presence of other poisons. Although most toxicological investigations involve the study of a single pollutant, the biota of polluted waters are usually exposed to several pollutants simultaneously.

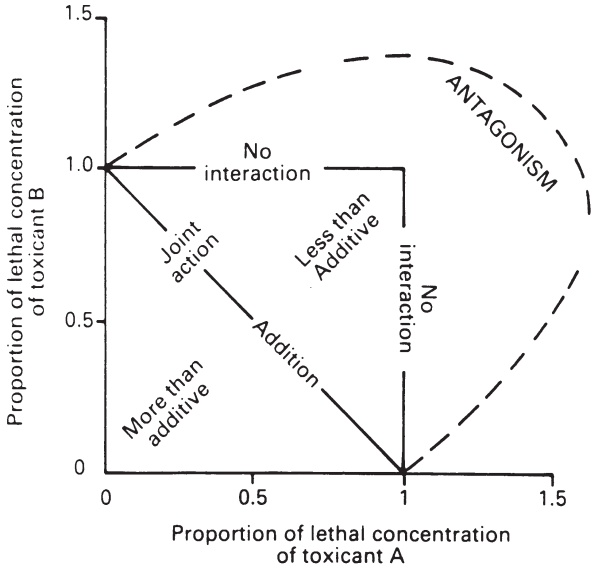

Figure 4.13 Diagram showing terms used to describe the combined effects of two pollutants (Sprague, 1970). For full explanation, see text

Sprague (1970) has pointed out that the terminology widely used to describe the behaviour of poisons acting simultaneously is confused and potentially misleading. In particular, the terms *synergism, potentiation* and *antagonism* have been defined and used in different ways by different authors, and their use is best avoided. Sprague proposed a system of nomenclature based on that of Gaddum (1948). This scheme is shown in Figure 4.13 and is the one adopted here. Sprague's description of this scheme of nomenclature is as follows.

> "The diagram represents the combination of two toxicants. The axes represent concentrations. The concentration of 1.0 toxic unit of toxicant A produces the response (death in this case) in the absence of toxicant B, and 1.0 unit of B will do the same in the absence of A. If the response is produced by combinations of the two toxicants represented by points inside the square, the toxicants are helping one another; this is called *joint action* which may be further broken down in three special cases, as follows. If the response is just produced by combinations represented by points on the diagonal straight line (e.g. 0.5A+0.5B) the effects are said to be *additive*. If the response is produced by combinations falling in the lower left triangle (e.g. 0.5A+0.2B) the effect is *more-than-additive*. If in the upper right triangle (e.g. 0.8A+0.7B) the toxicants are still working together in joint action but are *less-than-additive*. Those combinations falling exactly in the upper and right boundaries of the square show *no interaction* between the toxicants. For example, if 1.0 unit of A is required to just produce the response, no matter what concentration of B, below

1.0 unit, is present, then A is causing the response and B is neither helping nor hindering. If more than 1.0 unit of A is required to just produce the effect, because of the presence of B, this is *antagonism,* with B antagonising the effect of A. That combination of concentrations would fall on some point to the right of the square (e.g. 1.5A+0.5B). Any combination of concentrations which would fall outside the square would represent antagonism, loosely represented by the broken curved line."

A useful method for measuring the toxicity of poisons in combination was described by Brown (1969) and Sprague (1970). The concentration of a pollutant can be expressed as toxic units, that is as a proportion of its lethal threshold concentration, or of some approximation of the lethal threshold concentration such as 48-h or 96-h LC50. Thus:

$$\text{Toxic units} = \frac{\text{Concentration of poison}}{\text{Lethal threshold concentration}}$$

Thus for any poison, one toxic unit is equal to its lethal threshold concentraton. To test the toxicity of a mixture of poisons, the following procedure may be employed. Assume we wish to test the effect of two poisons acting simultaneously. Having determined the lethal threshold concentration of each poison individually, test organisms are then exposed to a mixture of the poisons which contains, say, 0.5 toxic units of each poison (i.e. half the lethal threshold concentration of each poison). If significantly more than half die, the poisons are more-than-additive. If significantly fewer than half die, the poisons are less-than-additive. Obviously it is feasible, using this technique, to investigate the effects of combinations containing more than two poisons, and of mixtures in other than equal proportions. Marking (1977) proposed a modification of this approach, whereby the toxicity of chemicals in combination may be expressed in terms of a single numerical value. Index values of zero represent additive toxicity; values significantly above, or below, zero represent more-than-additive and less-than-additive toxicity respectively. The method includes a simple test of significance for values near zero. An alternative approach (Calamari and Marchetti, 1973) is to construct complete toxicity curves for the poisons individually and in combination, converting values on the concentration axis of the graph to toxic units (Figure 4.14).

There are several examples in the literature of both additive and more-than-additive toxicity. Mixtures of copper and zinc (Lloyd, 1961; Sprague and Ramsay, 1965); copper and phenol; copper, zinc and phenol; and copper, zinc and nickel (Brown and Dalton, 1970; Marking, 1977) have all been reported to be simply additive. More-than-additive toxicity has been reported for anionic detergents with copper or mercury (Calamari and Marchetti, 1973), the piscicide rotenone with sulphoxide or piperonyl butoxide, and the organophosphate insecticides malathion and Delnav

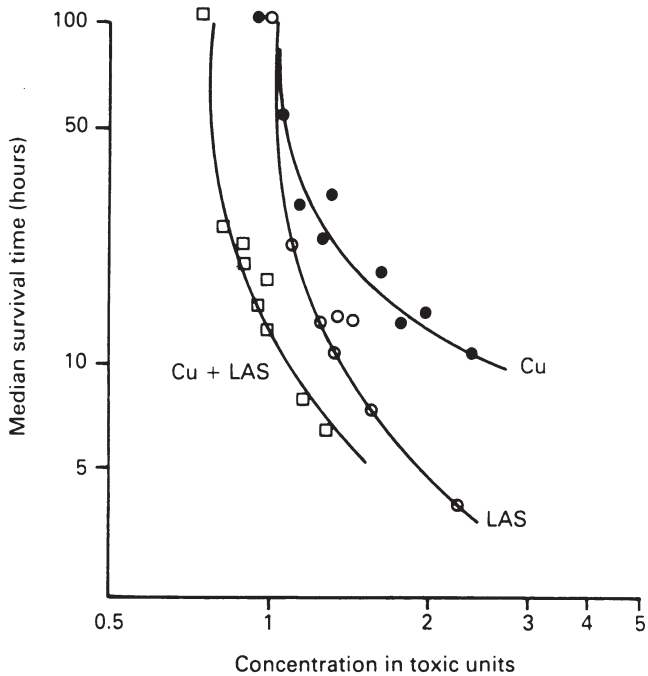

Figure 4.14 Toxicity of copper (Cu), detergent (LAS) and a copper-detergent mixture (Cu+LAS) to *Salmo gairdneri*. Poison concentrations are expressed in toxic units (Calamari and Marchetti, 1973)

(Marking, 1977). As in other types of toxicological study, it appears that tests of short duration where threshold toxicity values are not established are likely to produce misleading results. Sprague (1970) cites examples which illustrate that while threshold toxicities may be simply additive, survival times in strong mixtures may be shorter than expected on the basis of simple additive toxicity.

Examples of less-than-additive toxicity seem to be rare. Calamari and Marchetti (1973) reported that a mixture of equal proportions (in toxic units) of copper and the non-ionic detergent nonylphenol ethoxylate showed a less-than-additive toxicity to *S. gairdneri,* but this conclusion was based on a comparison of observed and expected survival times. One circumstance in which less-than-additive toxicity sometimes occurs is when a component of a mixture is present as a small fraction of the whole mixture. Thus Brown *et al.* (1969) found that the observed toxicity of a mixture of ammonia, phenol and zinc to rainbow trout was significantly less than the predicted toxicity when zinc contributed about 0.75 toxic units and the remaining 0.25 toxic units was roughly equally distributed between the phenol and the ammonia.

In the case of ammonia, Lloyd and Orr (1969) demonstrated that concentrations below 0.12 toxic units exerted no effect on the water permeability of the fish. If toxic levels of ammonia exert their effect at least partly by increasing water permeability of the fish, as is apparently the case, this finding suggests an explanation for the non-contribution of low concentrations of ammonia to the toxicity of mixtures. For most poisons, however, no such detailed knowledge of their mode of actions exists, and their behaviour in mixtures can be predicted only on the basis of empirical findings without any explanation of the underlying mechanism. Nevertheless a series of attempts by British workers to predict the toxicity of mixtures, and to test such predictions against field observations of the fishery status of polluted rivers, have been reasonably successful. Sprague (1971) reviews some early attempts and more recent examples include those of Alabaster *et al.* (1972), Solbé (1973) and Garland and Rolley (1977). In British rivers the most common toxic pollutants are ammonia, phenols, cyanide, zinc and copper. For those poisons, summation of the fractional toxicities expressed in toxic units as described above gives generally good agreement between predicted and observed toxicities in laboratory experiments. The application of this technique in field conditions was discussed in Chapter 1.

4.2.4 Fluctuating Concentrations

The concentrations of pollutants in receiving waters are rarely constant; they fluctuate, often quite widely and with rapid periodicity. Consequently the effects of fluctuations of poison concentration are of some interest. Additionally, even in the best-designed toxicity tests some fluctuation in the poison concentration is occasionally unavoidable, and information on the response of test animals to fluctuating concentrations would also be of value in this context. Surprisingly, there have been relatively few investigations of the point. Brown *et al.* (1969) determined the 48-h LC50 of ammonia, zinc, and an ammonia-zinc mixture to *Salmo gairdneri*. They then exposed replicate groups of fish to a constant 48-h LC50 of each poison, and to fluctuating concentrations such that the mean concentration was a 48-h LC50 but the actual concentration varied between 0.5 and 1.5 times the 48-h LC50 at intervals of one to four hours. In the majority of cases there was no significant difference between the survival times of fish exposed to constant concentrations and those exposed to fluctuating concentrations, suggesting that fluctuations of ±50% of the nominal concentration do not affect the response of the fish. However, in the case of ammonia, where the periodicity of the fluctuations was two hours rather than one, the median survival time was significantly reduced. Thurston *et al.* (1981) reported similar findings, also using trout exposed to ammonia. In these experiments fish were alternately exposed to ammonia and clean water, the periodicity of the fluctuations being six or 12 hours. On the basis of 96-h LC50 values for stable and fluctuating concentrations, the

fish were more sensitive to the fluctuating concentrations, than to a constant concentration equivalent to the mean value. One explanation of this (Brown *et al.,* 1969) is that when the periodicity of fluctuation is long, fish will suffer irreversible damage during the exposure to the peak concentration which cannot be compensated for during exposure to the lower concentration. An extreme case of fluctuating concentrations is the test designed to determine the effects of a relatively short exposure to poisons, followed by an extended period of recovery in clean water (Abel, 1980b; Abel and Garner, 1986). In this case, tests based on continuous exposure to lethal concentrations were found severely to underestimate the impact of short, high-level exposures as might occur during an accidental discharge.

4.2.5 Biotic Factors Influencing Toxicity

Animals may show both interspecific and intraspecific variation in susceptibility to pollutants. It is beyond the scope of the present discussion to review in detail all the relevant literature. However, it is possible to draw attention to some of the more salient general findings regarding the way in which the biological characteristics of the test organisms influence their response to toxic pollutants.

Among fishes, interspecific variation in susceptibility is probably smaller than was once thought, and may be less important than variation due to environmental conditions. Because of the large influence of environmental conditions on toxicity, it is arguably unwise to place too much reliance on comparisons between the results of different investigators who have measured toxicity under different environmental conditions. In many studies, environmental variables which are known to have a large influence on toxicity have not been measured or specified; and there have been relatively few studies in which several species have been tested under similar conditions.

Thatcher (1966) found that 96-h LC50s of an alkylbenzene sulphonate detergent to 11 species ranged from 7.7 mg l^{-1} to 22 mg l^{-1}. For a linear alkylate sulphonate detergent tested against five species, 96-h LC50s varied from 3.3 mg l^{-1} to 6.4 mg l^{-1} (Thatcher and Santner, 1967). Lethal threshold concentrations of the fungicide captan to three fish species ranged from 29 to 64 µg l^{-1} (Hermanutz *et al.,* 1973). The 96-h LC50 of hydrogen cyanide to five species varied from 57 to 191 µg l^{-1} (Smith *et al.,* 1978). Interspecific variations in short-term LC50 values of about threefold to fourfold appear to be typical for many types of poison (Sprague, 1970). Larger differences have occasionally been reported, particularly for pesticides. Eisler (1970) determined the 96-h LC50 of 12 insecticides for seven estuarinespecies. Interspecific variations for endrin were 0.05–3.1 µg $l^{-1;}$ for dieldrin, 0.9–34 µg $l^{-1;}$ for heptachlor, 0.8–194 µg l^{-1}; and for malathion, 27–3250 µg l^{-1}.

The importance of determining lethal thresholds, rather than relying on short-term LC50 values, is again evident from Ball's (1967a) studies on the relative susceptibility of fish species to ammonia. Although Salmonid fishes are widely

considered to be more sensitive to pollutants than coarse fish, he showed that the lethal threshold concentration of ammonia for *Salmo gairdneri* was the same as that for three Cyprinid species *(Abramis brama, Rutilus rutilus* and *Scardinius erythrophthalmus).* However, the trout reacted far more rapidly to the ammonia than did the cyprinids, so that in tests of short duration they would appear to be more sensitive. Ball (1967c) also measured the toxicity of zinc to trout and four coarse fish species. In this case the trout were markedly more sensitive: the threshold LC50 value for trout was 4.6 mg l^{-1}, significantly lower than the corresponding values for *Rutilus rutilus, Abramis brama* and *Perca fluviatilis,* which lay between 14.3 and 17.3 mg l^{-1}. The gudgeon, *Gobio gobio,* had a seven-day LC50 (not a threshold value) of 8.4 mg l^{-1}. As seen earlier, the toxicity of both zinc and ammonia is greatly influenced by environmental conditions, and it is likely that variation in susceptibility between trout under different environmental conditions is actually greater than that between trout and other fish species. The results of Smith *et al.* (1978) indicate that environmentally-induced variability in the toxicity of cyanide to fishes is of a similar magnitude to interspecific variability.

A further point arising from Ball's (1967a) study has been referred to earlier but is also relevant here. It appears that some species may show much greater individual variation in susceptibility to a poison than others. Thus in one of Ball's experiments, the five-day LC50 values of undissociated ammonia to roach *(Rutilus rutilus)* and rudd *(Scardinius erythrophthalmus)* were identical, but the slopes of the probit lines differed, indicating that roach were more variable in response than rudd. The practical implications relate to the application of toxicity data to field observations, and to the formulation of water quality standards. In an example given by the author, two-thirds of the five-day LC50 of ammonia would kill only 1% of a rudd population, but 16% of a roach population. This example again illustrates the advantages of a full analysis of toxicity test data, and the limitations of comparative studies based on simple determinations of short-term LC50 values.

Several authors have undertaken comparative studies of the susceptibility of invertebrate species to pollutants. In most of these, however, authors have chosen representative species from each of several orders, classes or phyla. Not surprisingly, the susceptibility of such 'representative' species shows some very wide variations, often of two or three orders of magnitude in terms of short-term LC50 values, in comparison with the phylogenetically more uniform fishes (e.g. Bell, 1971; Gaufin *et al.,* 1965; Rye and King, 1976). However, there have been some studies of the comparative toxicity of poisons to fairly closely-related species and it is useful to consider some examples in the present context. For five genera of oligochaetes exposed to four poisons, variation between 96-h LC50 values was generally less than one order of magnitude, although the two marine genera tested appeared highly resistant to the lethal action of cadmium (Chapman *et al.,* 1982). There were four species of *Daphnia* (Winner and Farrell, 1976). Sanders (1970) measured

only small differences between the 72-h LC50 values of copper tested against the toxicity of several herbicides to six crustaceans representing four orders. In general, variations in 48-h LC50 values between species were within one order of magnitude or less, but some species displayed considerable resistance to some or all of the herbicides, and some herbicides elicited interspecific variations in 48-h LC50 values spanning three orders of magnitude. These and similar examples from the literature indicate that it is not easy to draw firm conclusions about the relative susceptibility of invertebrate species to many poisons; there remains a need for continuous review in an accessible form of the data which is available.

4.2.6 Intraspecific Variation

The effects of size and age of fish on their susceptibility to poisons has been the subject of surprisingly few systematic investigations, although the point is important both for the practical application of toxicological data and because laboratories which routinely carry out toxicity tests cannot always obtain animals of standard size and/or age. In most reports, fish of different sizes have also been of different ages, so the separate influences of these two variables remains largely unknown. Nevertheless it is common practice to standardise as far as possible on the age and size of animals, and to restrict the size/age range of specimens in a test as narrowly as is practicable.

Adelman *et al.* (1976) measured the toxicity of pentachlorophenol to goldfish *(Carassius auratus)* and fathead minnows *(Pimephales promelas)* of different sizes and ages. Differences in threshold LC50 values were small and probably of no practical significance. However, the range of sizes and ages tested was small, for example, from four to 14 weeks of age and 13–30 mm in length for the fathead minnow. Kumaguru and Beamish (1981) found a more marked effect of size on the toxicity of the pesticide permethrin to *Salmo gairdneri*. The 96-h LC50 values ranged from 3 $\mu g\ l^{-1}$ for fish weighing 1 g, to 287 $\mu g\ l^{-1}$ for 50-g fish. In contrast Stendahl and Sprague (1972) reported that small rainbow trout (1.5g) were more resistant than larger (12 g) fish to vanadium, although lethal threshold concentrations were not established for the smaller fish and the difference in susceptibility is probably small.

The young of most species show a clear division of their life cycle into distinct stages, and there have been several investigations of the relative susceptibility to poisons of the different life stages of fish. (Toxicity tests spanning whole life cycles are discussed later.) Skidmore (1965) found that zebrafish *(Brachydanio rerio)* were most susceptible to zinc between 4 and 13 days after hatching. Eggs were considerably more resistant than newly-hatched fry, and after 13 days resistance increased rapidly. This seems to be a general pattern, similar results having been reported for species exposed to detergents (Marchetti, 1965), hydrogen sulphide (Smith and Oseid, 1972) and heavy metals (Chapman, 1978).

An important potential source of intraspecific variation in susceptibility to poisons is genetic variation between different strains or populations of a species. Many waters have been subjected to pollution for a period equivalent to many generations of the organisms living there, and it may be expected that natural selection would lead to an increase in the tolerance of populations living in polluted waters. Thus natural populations may in fact be more tolerant of pollutants than those used in laboratory experiments, which are usually inbred strains or acquired from unpolluted habitats. It is important, however, to distinguish increased resistance due to genetic adaptation, from that due to acclimation effects (i.e. long-term exposure to low levels conferring increased resistance to a subsequent high-level exposure) which are not genetically determined and of which a few examples exist in the literature (Sprague, 1970). Also, since such differences in tolerance are likely to be relatively small, short-term LC50 values or median survival times at fairly high concentrations are not really adequate measures of toxicity. Thus examples of genetically-acquired resistance to poisons are few. Brown (1976) reported that Isopod crustaceans *Asellus meridianus* from metal-polluted streams were more resistant to copper and lead than animals from clean streams, and that the resistance persisted to the F_2 generation. Rahel (1982) reported that perch *(Perca flavescens)* from acid lakes were more tolerant to low pH than those from alkaline lakes. He did not show that the difference was genetically based, but acclimation experiments failed to produce increased tolerance in fish from alkaline lakes. Swarts *et al.* (1978) measured the resistance of several strains of brook trout *(Salvelinus fontinalis)* to low pH and investigated the effects of genetic and environmental influences on resistance. They found that fish could not be acclimated to low pH, that strain differences in resistance to low pH were detectable, but that an attempt to produce a resistant strain by breeding from fish which had survived exposure to low pH was unsuccessful.

4.3 Applications of Lethal Toxicity Measurements

Until fairly recently, the literature on the toxicity of pollutants was dominated by measurements of lethal toxicity, and the relevance of these measurements was widely questioned. There are, however, genuine technical and conceptual difficulties with the measurement of sublethal toxicity (see Section 4.4), and as these difficulties have been resolved there has been much more emphasis on measurements of sublethal toxicity at poison concentrations which more realistically simulate the levels at which organisms are more usually exposed in the field. However, it would be a mistake to think that lethal toxicity testing is of no value, or that it has been altogether superseded by more recently-developed sublethal test methods. On the contrary, lethal toxicity testing continues to make a valuable and very practical

contribution to the control and regulation of pollution, as the following examples may illustrate.

There remain instances (in the UK, about one every day of the year) of illegal, negligent or accidental discharge of polluting material to watercourses which cause observable damage to the receiving environment, frequently involving mortalities of fish. In order to investigate the causes of these, and where appropriate to take legal action against the perpetrator, it is often insufficient to rely on the circumstantial evidence that a certain substance was present at or before the time the fish died. It is obviously preferable to be able to show causation, i.e. that the substance actually caused the death of the fish. There can be circumstances where the true cause of an incident can be obscured by the fortuitous presence of an unrelated but more obvious condition; or where the nature of the suspect substance is not actually known. Therefore some measure of the toxicity of the suspect substance is often required.

In some heavily polluted rivers, the total burden of pollutants can reach, at least at times, levels which are threatening to the endogenous fauna. In order to formulate specific and cost-effective remedial measures to improve the overall water quality, a model based on a careful series of lethal toxicity tests has been found useful. This approach was described in Section 1.3.

A related application of toxicity measurements can be used to assist in improving the quality of effluents. This is particularly important for effluents which are complex and/or very variable in nature. Measuring the toxicity of a series of effluent samples at different times (see Figure 4.15), can yield useful information (Lloyd, 1991a). In this case, effluent samples 4 and 9 are markedly more toxic than the other samples. If some chemical data are available, for example regarding the composition of the effluents or the operating conditions of the plant producing them, then it may be possible to identify particular components of the effluent or particular operating conditions which are associated with increased toxicity, so that structural or process modifications can be implemented to reduce the overall impact of the effluent. In another case (Figure 4.16), an effluent contained a number of components, one of which was thought to be responsible for most of the toxicity. Comparison of the toxicity of the whole effluent with a range of concentrations of the suspect substance equal to those in the effluent samples showed that the toxicities of the two were almost identical, confirming that the suspect substance was indeed the main cause of the problem. This means, of course, that improved effluent treatment can be specifically designed to remove the chlorpyrifos.

In fact, toxicity measurements are increasingly used in the regulation of effluent discharges: permission to discharge is frequently granted or withheld at least partly on the basis of a measurement of effluent toxicity; and measurements of toxicity may be specified in discharge consents to be carried

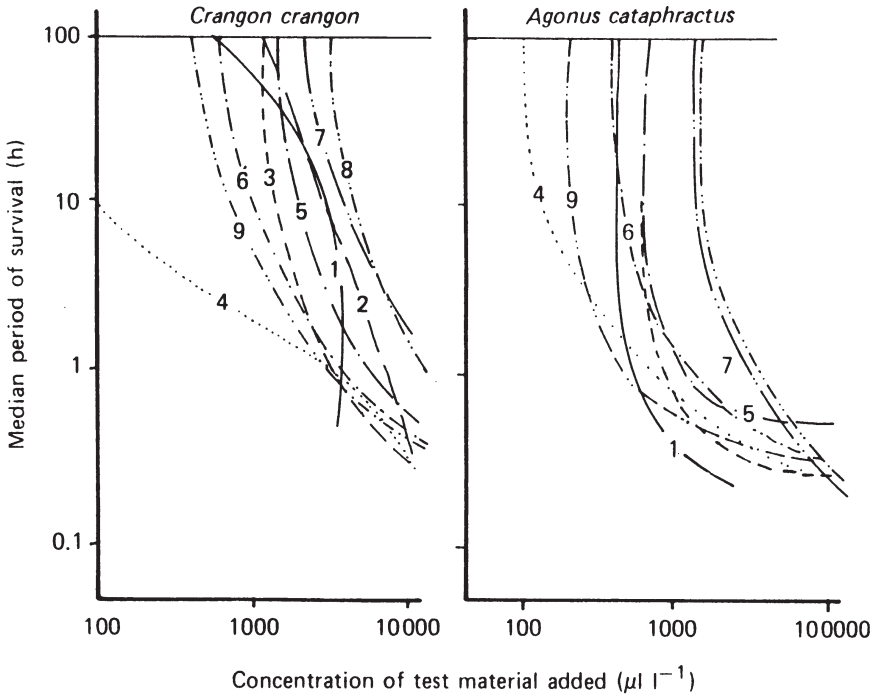

Figure 4.15 Time-series toxicity curves for a complex effluent tested against two different species under identical conditions at different times. After Lloyd (1991)

out on a regular basis. Even a simple test can influence decisions on whether or not to grant permission to discharge, or whether to carry out further research. For example, an effluent whose toxicity curve shows a distinct lethal threshold within a short time, as do most of the samples in Figure 4.15, will almost certainly be treated more leniently than one which shows little sign of such a threshold, as in Figure 4.16.

Lethal toxicity tests also form an important part of the process known as *sequential hazard assessment* (see Chapter 6). This is a codified sequence of investigations and observations on the properties of poisons or effluents, designed to allow a reasonably informed decision to be made quickly on whether or not a particular substance is environmentally acceptable. Although in an ideal world every poison and effluent should go through an exhaustive testing process, in practice it is neither feasible nor necessary to do so. In the light of all available information, and some reasonably brief toxicity measurements, it is often possible to make a rapid decision in a particular case and concentrate resources on more difficult cases. Finally, some chemicals are released to the environment under such rare and special circumstances that lethal toxicity tests provide all the information

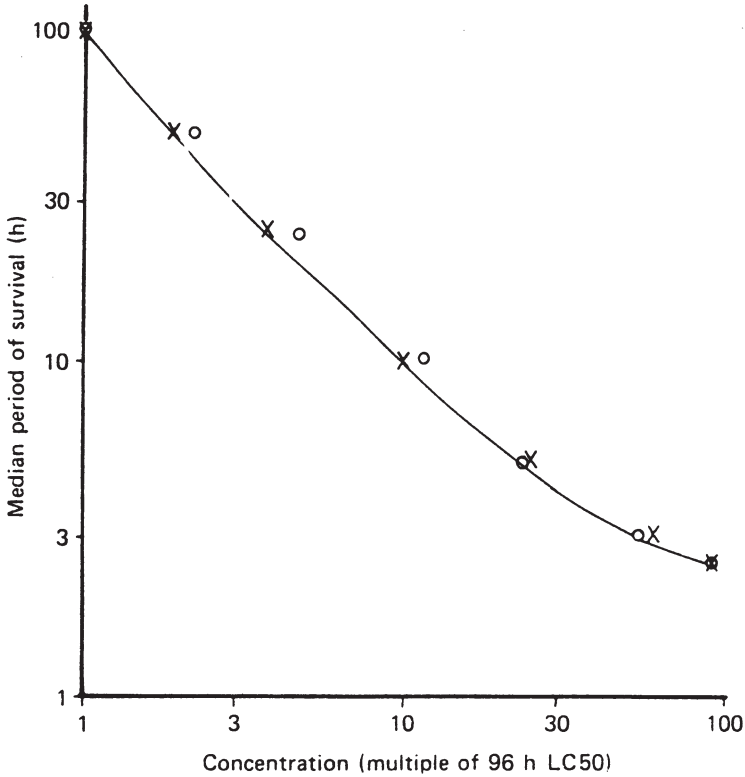

Figure 4.16 Toxicity curve for a complex effluent containing chlorpyrifos, compared with chlorpyrifos alone. Circles represent effluent containing chlorpyrifos, crosses represent chlorpyrifos alone. After Lloyd (1991)

which is likely to be required to assess their acceptability. Regulatory agencies therefore tend to license them for sale or use on the basis of lethal toxicity tests alone. Oil dispersants provide a good example. They are only used rarely, under circumstances where their effects are likely to be short-lived and localised, and only when a body of water has already been heavily contaminated with oil. However, in many countries their sale or use is forbidden unless their toxicity to living organisms is sufficiently low. By this means, manufacturers are encouraged to develop products and formulations of low toxicity, and the original, more toxic, formulations in use some 30 years ago have gradually been phased out.

4.4 Sublethal Toxicity

The fauna of polluted waters is more commonly exposed to relatively low concentrations of poison for long periods, rather than to levels of pollution which will cause rapid mortality. Therefore it is important to study the effects on aquatic

organisms of exposure to sublethal levels of pollution over periods which represent at least a substantial proportion of their life cycle. The historical predominance of acute lethal toxicity studies has therefore often been criticised as being of limited relevance to real situations, but is due less to the failure of toxicologists to appreciate the point than to the many technical and conceptual difficulties involved in the measurement of sublethal toxicity.

Relatively few species can be satisfactorily maintained in the laboratory for long periods and fewer still can complete their life cycle under such conditions since their environmental requirements are complex, unknown or both. Maintenance of constant experimental conditions for periods which may exceed a year is expensive of human and physical resources, and the longer an experiment continues the greater is the chance of failure due to accident or equipment malfunction. Therefore the preferred species for research of this kind are those which can be cultured in the laboratory, are indigenous to the geographical area in which the study takes place, have reasonably short generation times and which display a more or less representative response to a wide variety of poisons; that is they should not be unusually resistant or unusually sensitive to particular poisons or categories of poison. Unfortunately in many regions few, if any, species which meet all these requirements are available.

Assuming that purely technical difficulties can be overcome, the problem remains that whereas the death of an organism is an unequivocal and easily-identifiable response to toxic action, criteria of sublethal toxic effects are less easy to define and, as will be seen, if they are recognised their biological significance is frequently difficult to assess. Nevertheless the meaningful application of data from lethal toxicity studies to many practical pollution problems is difficult, if not impossible, in the absence of some information on sublethal toxicity. Therefore a wide variety of approaches to the measurement of sublethal toxicity has been employed, and some of the more important ones are reviewed here.

4.4.1 Single-species Toxicity Tests

Because of the practical problems of maintaining animals under experimental conditions for very long periods, early studies in sublethal toxicity generally relied on the use of histological, pathological, biochemical, haematological, physiological or behavioural criteria of toxic effect in experiments lasting weeks rather than months. Sprague (1971) has reviewed some examples of these studies. More recently, the ever-increasing range of analytical and diagnostic techniques devised by biochemists and clinical chemists has been widely applied or adapted to the detection of sublethal toxic responses of fish to pollutants. Table 4.1 lists some of the techniques which have been

Variable	Variable
Cardiovascular physiology	*Enzyme assays* (various tissues)
Heart rate	Lactate dehydrogenase
Arterial pO2	Glutamic-oxaloacetic transaminase
Ventilation rate	γ-Aminolevulinate dehydrase
Cough frequency	
Opercular and buccal pressure	*Others*
Ventilation volume	Urine pyruvic acid content
Oxygen consumption	O_2 consumption of tissue homogenate
Oxygen utilisation	Electrophoretic patterns of serum proteins
Ventilation frequency	Body moisture content
	Body lipid content
Haematology	Body protein content
Haematocrit	Liver glycogen content
Haemoglobin content	Liver phenylalanine content
Methaemoglobin content	Urine excretion rate
Total blood cell counts	Swimming performance
Erythrocyte counts	Food conversion efficiency
Differential leucocyte counts	Locomotor activity
Erythrocyte ATP concentration	
Blood metabolite levels	
Lactate	
Glucose	
Sodium	
Chloride	
Cortisol	
Serum proteins	
Pyruvate	
Osmolality	
Cholesterol	
Other electrolytes	

used. The list is a representative rather than an exhaustive one, and no attempt is made here to review this aspect of pollution toxicology in detail. Rather, the discussion will focus on some conceptual and practical difficulties raised by the very diversity of criteria which have been employed.

The objective of experiments such as those represented in Table 4.1 is essentially to determine whether animals exposed to sublethal levels of pollutant are healthy or not. It might be thought that with the aid of the

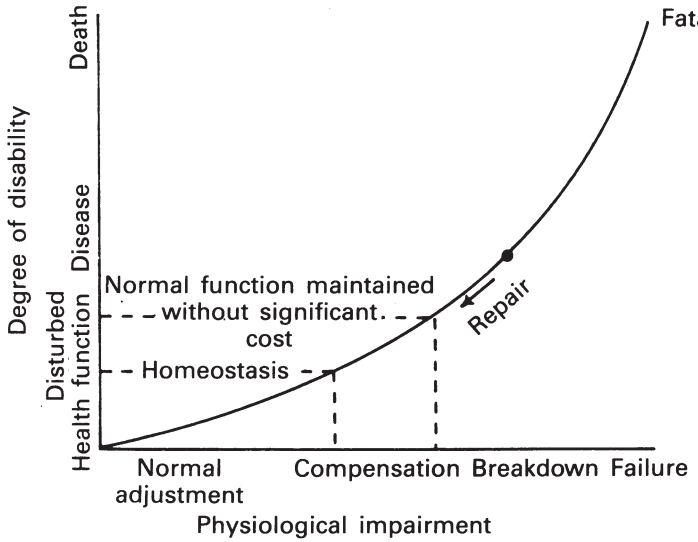

Figure 4.17 A possible relation between physiological impairment following increasing exposure to pollutants and the consequent disability of the fish (Lloyd, 1972)

wide range of modern diagnostic and analytical techniques, the state of health of the test animals can be relatively easily determined, but this is not necessarily the case. For example, in order to state that a particular value is abnormal it is necessary to know the normal range for that particular variable, and the way it is affected by the physiological status and environmental history of the animal. For aquatic animals, including fish, such detailed knowledge of their biochemistry and physiology is generally lacking. Thus although it is possible to say that a particular value is statistically different from that of the control animals, it cannot readily be inferred that the change has any ecological consequences. The 'abnormal' value may represent not damage to the fish, but a metabolic adjustment well within the animal's ability to compensate for varying environmental conditions, which are a normal feature of aquatic life and to which many aquatic animals have a wide range of tolerance. Mount and Stephan (1967a) succinctly stated the difficulty thus: 'An exposure causing death is obviously significant, but even the best fish physiologist would have difficulty establishing that a 10 per cent reduction in haematocrit would result in an undesirable effect on a population'.

A more detailed exposition of the problem was given by Lloyd (1972) with the aid of the diagram reproduced in Figure 4.17. The diagram shows the hypothetical relationship between physiological impairment following exposure to pollutants, and the consequent disability of the fish. Measured values of physiological or biochemical variables, or alterations in the behaviour of the animal or in the

histological appearance of a tissue, may represent conditions within the areas of the graph marked 'homeostasis' or 'normal function maintained without significant cost', even though they may be statistically different from control values. The toxicologist's problem is to distinguish the point at which the value of a measured variable deviates so far from the control that it falls outside these zones. Unless this is clearly established, any change in the value of a measured variable is not necessarily an indicator of sublethal toxic effect. An example is provided by the report of Grant and Mehrle (1973) on the effect of exposure to sublethal levels of endrin on 19 physiological and biochemical variables in the rainbow trout. Although statistically significant differences occurred in 12 of these, the authors showed that nine out of 16 blood serum variables showed similar changes when the fish were subjected to moderate exercise, thus casting doubt on their usefulness as indicators of toxic effect.

Thus the validity of the approach to sublethal toxicity which is implicit in much of the work published in the last 30 years or so is questionable. Essentially this implicit approach has been to measure as many variables as possible, and to seek to determine the 'no observed effect concentration' (NOEC), that is, the highest concentration which has no observable effect on any of the variables measured. The 'maximum acceptable toxicant concentration' (MATC) is thus determined as lying between the NOEC and the next highest concentration tested. This rationale may be criticised on several grounds. First, as we have seen, a statistically significant difference in a measured variable between exposed and control fish does not imply that sublethal toxicity has occurred, unless it can be shown or at least reasonably expected that the change has actual or potential ecological significance. Second, there is a certain arbitrariness under this protocol in the decision as to whether or not a particular concentration exerts a sublethal toxic effect. If, for example, in an experiment 20 variables are measured, it follows that another 20, or 50, or 100, have not been measured. Any of these might, if they had been measured, have shown a difference from the control value. Thus the NOEC is determined partly by the choice of variables to be measured during the experiment. Further, there is no general agreement on what variables should be measured, so comparisons of results from different sources are difficult. Practising scientists will recognise that some variables are measured because they are easy to measure, some are selected in order to follow precedent, and some because of the availability of equipment or skilled personnel capable of making the measurement. Of course some measurements are made because there is a sound biological reason for making them, and as will be seen later it is becoming possible at least for some pollutants to identify on a rational basis specific and useful indicators of sublethal toxic effect. Finally, the use of the NOEC as the end-point of the experiment is a statistical absurdity since, as Skalski (1981) pointed out, it depends upon the non-falsification of the null hypothesis, a procedure which cannot be carried out with confidence (in the statistical sense). Such criticisms are not to deny the usefulness of the existing

literature and practices in the study of sublethal toxicity. Rather, they are a reflection of the fact that the methodology is in a relatively early stage of development.

It is generally accepted that a pollutant effect on growth, reproduction or development of a species is an unequivocal criterion of sublethal toxic effect, since its ecological significance is reasonably clear. The first successful toxicity tests over a complete life cycle of a fish species appear to be those of a group of American workers (e.g. Mount and Stephan, 1967a, b) using the fathead minnow, *Pimephales promelas*. Since then, tests have been successfully carried out with about half a dozen fish species, mainly North American or small tropical species. It remains true that the number of species with which it is practicable to carry out such tests is, at the present time, a very small proportion indeed of the aquatic fauna as a whole. Apart from reproduction, it is clearly easier to carry out investigations on the effects of pollutants on growth rates, using a wider range of species. However, there are examples in the literature which show that growth rate is not necessarily a very sensitive indicator of sublethal toxic effect (Sprague, 1971), and there are even some examples of growth apparently being stimulated by sublethal concentrations of poison (e.g. McLeay and Brown, 1974).

Obviously experiments conducted over the whole, or a substantial proportion, of the life cycle of a species are both expensive and time-consuming, and it is not feasible to test all poisons, species and environmental conditions using such procedures. Consequently it remains important to develop and evaluate rapid methods for measuring sublethal toxicity. One approach is the so-called 'critical life stage bioassay'. Analysis of the results of a large number of partial- and complete-life-cycle tests with various species and poisons shows that in the majority of cases, the early embryo and larval stages are the most sensitive part of the life cycle, and an estimate of the MATC based solely on the response of the embryo-larval stages generally lies very close to the value obtained when the whole life cycle is considered (Macek and Sleight, 1977; McKim, 1977). Thus the duration and scale of experiments can be considerably reduced, and the critical life stage bioassay (sometimes called the 'embryo-larval test') has been widely used. It also offers the possibility of increasing the range of species available for testing, since there are several species (e.g. many salmonids) whose eggs and early life stages can be maintained in the laboratory but which are difficult or expensive to maintain throughout an entire life cycle. Nevertheless there remain many species of interest which cannot be used, or which are only available during a relatively short period of the year. Thus interest remains strong in alternative criteria of sublethal toxicity.

For the reasons outlined above, such criteria should preferably be specific responses to the pollutant, that is related to the poison's mechanism of toxic action, rather than non-specific responses which may merely represent physiological adjustment to new, but perfectly tolerable, environmental conditions. Ideally, sublethal toxicity tests should also be rapid, sensitive, relevant to actual environmental conditions, and based upon a measurable response which

has, or may reasonably be expected to have, ecological significance; that is, likely to reduce significantly the fitness of the population. As we know relatively little about mechanisms of toxic action in fish and aquatic invertebrates, examples which meet all of these criteria are rare. Nevertheless there appears to have been a distinct change in emphasis in the study of sublethal toxicity over the last 15 years, away from the traditional approaches and towards a novel series of techniques based on improved knowledge of the physiology, biochemistry and cellular biology of aquatic species and of their interactions with toxic substances. Some examples are given below.

Heavy metals being among the most common of pollutants, the discovery of metallothioneins in the 1970s gave rise to interest in their use as 'biomarkers' of toxic effect. Metallothioneins are a group of proteins characterised by their low molecular weight (6000–20000), their high content of amino acids containing sulphydryl groups (especially cysteine), and their ability to bind to heavy metals. They are absent, or present at very low levels, in the tissues of vertebrates and invertebrates, but are produced at high levels when the animal is exposed to heavy metals (Kagi and Nordberg, 1979). They are relatively easy to isolate and identify using standard biochemical techniques. A tissue homogenate is separated into fractions of different molecular weight by gel chromatography, and the optical density of the fractions measured in the UV range at 250 and 280 nm. Fractions of the appropriate molecular weight which show a high absorbance at 250 nm compared to 280 nm (this is due to the sulphydryl groups), may be tentatively identified as containing metallothioneins if they also contain high levels of heavy metal; this last stage is destructive of the sample, as atomic absorption spectrophotometry is usually used to determine the metal content of the fractions. Figure 4.18 shows a typical result obtained from Plecopteran larvae isolated from a metal-contaminated river.

The potential value of metallothioneins is that since they appear only to be produced in quantity in animals under stress from heavy metals, they could be used directly to determine the level of heavy metal which a particular organism found unacceptable. Alternatively, it may be possible to determine whether the level of heavy metal present in a particular environment was above the limits of tolerance of the organisms living there. Some caution, however, is required at the present stage of knowledge. For example, many heavy metals which are toxic at a certain level are normal, even essential, metabolites at lower levels. Therefore organisms must have some means of metabolising them, and the induction of metallothioneins may represent a normal adjustment of the organism, or detoxification, rather than a manifestation of toxic effect. Although there are examples of the use of metallothioneins to assess the extent of metal pollution in field situations (Roch *et al.,* 1982, appear to have reported one of the first examples), there

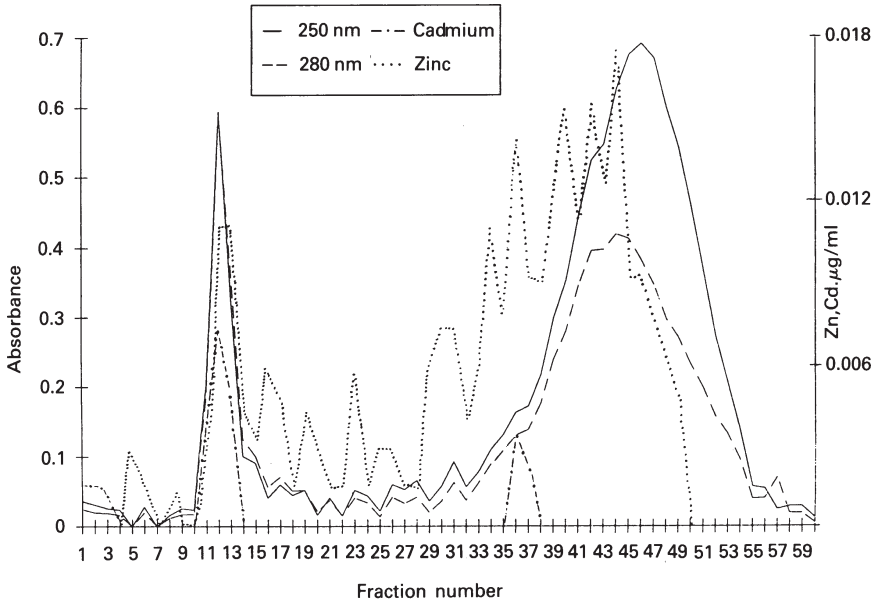

Figure 4.18 Elution profile of the cytosolic supernatant from homogenised tissue of a stonefly nymph, *Diura bicaudata*, taken from a metal-polluted river. The presence of metallothionein in fractions 11–13 is suggested by the corresponding peaks for zinc, cadmium and absorbance at 250 nm

is as yet no clear link between metallothionein levels and variables of direct ecological significance. Benson and Birge (1985) reported an association between metallothionein levels and metal resistance, in field and laboratory trials. Possibly further experience may allow the determination of levels of metallothionein which can be considered abnormal. Some other proteins of a generally similar nature, often called stress proteins, have been found to be induced by other forms of stress, such as temperature shock, and may be confused with metallothioneins (Sanders, 1990), if indeed they are different entities at all.

Mehrle and Mayer (1980) in a brief review of clinical tests in aquatic toxicology, drew attention to a promising series of investigations involving study of the effects of poisons on biochemical processes related specifically to growth in fish. They argued that growth in fish is the culmination of a series of biochemical processes which should show changes *before* any effect on growth rate is detectable by conventional measurements of weight and length. They showed that several organic toxicants affected the vertebral collagen content of fish, and the proline and hydroxyproline growth rate, and were more sensitive indicators of toxic effect than measurement of growth rate itself.

A group of enzymes known as mixed-function oxidases (MFO) are widely found in vertebrates, including fishes, and have been reported in some invertebrates. They show some potential as indicators of sublethal toxic effect, and possibly as a means of monitoring pollutant effects in field populations (Addison, 1984). The normal function of MFO appears to be associated with the metabolism of steroid hormones, but they have been found to be produced at elevated levels in animals exposed to some pollutants, particularly aromatic hydrocarbons and halogenated hydrocarbons. Metabolites of these important pollutants appear to resemble those of some natural steroids, and to induce MFO synthesis. Thus elevated MFO levels may be used to indicate exposure of the animal to pollutants. The technique and its applications are not, as yet, well developed; for example, the link between MFO synthesis and actual toxic effect is not generally established. Mixed-function oxidase production may again, therefore, represent an adjustment whereby 'normal function is maintained without significant cost' (see Figure 4.17). However, it seems likely that enhanced MFO production can lead to another important consequence, genotoxic effects.

The relationship between MFO and genotoxicity is explained by Zahn (1991), and in Figure 4.19. MFO breaks down toxic organic chemicals but the immediate consequence is the production of carcinogenic compounds which can cause alteration of the DNA of the cells, which can be detected by a variety of techniques (Zahn, 1991). Nearly all DNA alterations can be considered as deleterious; and although there is a repair mechanism for restoring damaged DNA, if it becomes overwhelmed DNA damage will accumulate and have consequences either in the present generation (e.g. through tumour formation), or, of course, in future generations (e.g. through the production of mutations).

Lysosomes in cells appear to be deeply involved in the detoxification of or response to toxic substances, and tests based on lysosomal stability have been developed (Moore, 1991). Physiological measurements to determine the effect of exposure to pollutants on the scope for growth of some animals appear to show promise (Axiak, 1991). These have mainly been applied in the rather different circumstances of the marine environment, where they have particular advantages over more conventional approaches (see Section 7.3). Indeed, the range of methods available for assessing sublethal toxicity appears to be limited only by the ingenuity of investigators, and it increases year by year.

4.4.2 Experimental Ecosystems

An alternative approach to the study of sublethal toxicity is that of the experimental ecosystem. Instead of exposing a population of a single species to the pollutant, populations of two or more species, frequently representing different trophic levels, are maintained and exposed together to the pollutant.

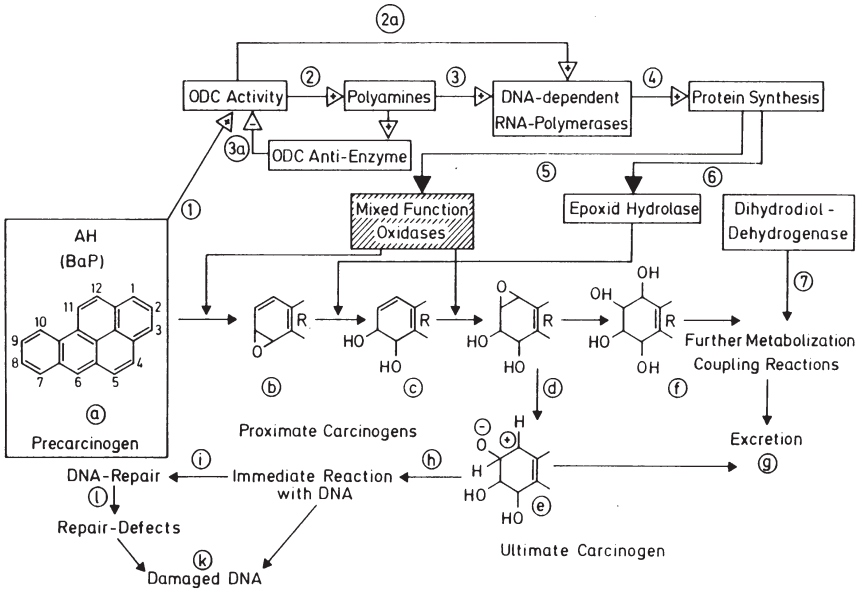

Figure 4.19 Fate and effects of polycyclic aromatic hydrocarbons (PAH). Sequence of events initiated by contact of an inexperienced vertebrate with benzo(a)pyrene (B(a)P). Only a selection of reactions is given. B(a)P is used as an example (+ arrows mean increase, − arrows mean decrease of enzyme activity).

(1) The precarcinogen form provokes a rise in ornithine decarboxylase (ODC) activity (Byus *et al.*, 1976) leading to (2) an increased polyamine synthesis (Russell, 1973) and RNA synthesis through (3) more RNA polymerase activity (Russell, 1971; Jacob and Rose, 1976). The latter is also enhanced by (2a) direct action of ODC (McEnroe and Healy, 1977). RNA synthesis is followed by (4) protein synthesis (DePierre and Ernster, 1978), which enables (5) synthesis of MFO and (6) epoxide hydratase (DePierre and Ernster, 1978). (3a) ODC-antienzyme is induced by high levels of polyamine (Heller *et al.*, 1976). (7) Dihydrodiol-epoxygenase action.

Out of many PAH, B(a)P is one; and from this, one single pathway to an 'ultimate carcinogen' with the capability as an electrophilic to combine, among many others, with DNA, is depicted. The precarcinogen (a) B(a)P, under the influence of MFO is transformed into the (b) 7,8-epoxide and by epoxide hydrolase into (c) the 7,8-trans-diol, which is another substrate for the MFO, thus yielding two diastereomeric forms of (d) 7,8-diol-9,10-epoxide-B(a)P. These 'proximate carcinogens' give rise to 'ultimate carcinogens', which most likely are (e) carbenium ions with the capability to (h) direct action with nucleophilics (Yang *et al.*, 1977) in specific manner (Deutsch *et al.*, 1978; Meehan and Straub, 1979). (f) Some of the compounds arising from the activity of the MFO, epoxide hydrolase, glutathione-*S*-transferase, UDP-glucuronic acid transferase and sulphotransferase may be transformed and/or coupled, thus being detoxified

In part this approach represents an attempt to make the experimental situation more realistic, and hence more directly applicable to the field situation. For example, in the field the ecology of a species is governed not only by its relationship with the physical and chemical environment and by purely endogenous population processes, but also by its relationship with other species (prey, predators, competitors, parasites) with which it shares its habitat. Thus the ecological effect of a pollutant on a species does not depend only upon the properties of the species itself; its influence may be accentuated or attenuated depending upon the nature of interspecific relationships which exist in the environment. Experimental ecosystems are both useful and necessary for studying these and other phenomena, including the distribution of pollutants between water, sediments and living tissues; the biodegradation of pollutants; and the accumulation of pollutants by living organisms from their environment, and the passage of pollutants through the food chain.

Experimental ecosystems vary in their scale and complexity. Generally the smaller-scale systems offer the advantages of more precisely-controlled experimental conditions, but are at best gross simplifications of real systems. Larger-scale systems more closely represent natural systems, but clearly cannot be so precisely controlled and experiments may be difficult or impossible to replicate. The smallest systems are more-or-less enclosed vessels containing populations of microorganisms or plankton. On a larger scale, experimental aquaria or ponds ranging in size from a few litres to a few cubic metres have been used (Giddings, 1983). Experimental river channels, both on a laboratory scale and outdoors, have been widely used (e.g. Arthur *et al.,* 1982; Watton and Hawkes, 1984). Finally, there have been attempts to isolate large water masses in lakes and coastal marine areas, to study the processes which occur within, as it were, a representative sample of the natural environment (Davies and Gamble, 1979; Steele, 1979). Since they vary widely in their scale, complexity and objectives perhaps the only generalisation which can be made about experimental ecosystems is that they can provide valuable information which bridges the gap between laboratory and field studies. Large-scale systems are, however, expensive to maintain, and their use is likely to be confined to aiding the interpretation of the results of more economical methods of study. There appears to have

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and (g) excreted (Oesch, 1982; Yang *et al.*, 1978). (i) Interaction of DNA with ultimate carcinogens leads to strand scissions (Gamper *et al.*, 1977) and to coupling of PAH derivatives (Miller and Miller, 1981). DNA alterations cause repair to start, which to a certain degree may cause (l) some secondary DNA defects (Hanawalt and Friedberg, 1978). This altogether results, in a time-dependent manner, in DNA showing (k) secondary alterations giving rise to mutagenesis/carcinogenesis (Ames *et al.*, 1975; Huberman and Sachs, 1974, 1977)

been some reduction in interest in experimental ecosystems in recent years, perhaps because their results have been less useful and informative than was once hoped. However, this tendency is to some extent counteracted by recent legislative pressure which is leading to the development of artificial ecosystem techniques for regulatory purposes. This arises because, particularly in Europe and the United States, laws are being promulgated which demand that pollutants discharged to the environment are shown to have no unacceptable environmental effect. Such laws are not necessarily very sensible, and they are certainly not scientifically sensible. First, it is not possible to prove that an effect does not exist; second, there is no definition of what is acceptable; and third, experimental ecosystems do not, as we have seen, necessarily simulate the natural environment much more accurately than properly controlled experiments. Nevertheless, if such laws exist some attempt must be made to conform with them, and the volume edited by Hill *et al.* (1994) provides a very full review of recent developments in the applications of experimental ecosystems. (See further discussion in Section 7.2.3.)

4.4.3 Bioaccumulation

Bioaccumulation is an aspect of sublethal toxicity which has received much attention, though many areas of uncertainty remain. Pollutants may, over long time periods, accumulate in tissues to levels which may be harmful to the organism. Since many aquatic species are utilised for human consumption, the public health significance of toxic substances accumulated in their tissues is obvious. Many national and international agencies set concentration limits for pollutants, particularly heavy metals, in tissues for human consumption, and promote research and monitoring programmes. Study of the uptake, metabolism and excretion of pollutants, and of their distribution in the various body organs and tissues, makes an important contribution to understanding their mechanisms of action. Levels of pollutants in the tissues of living organisms are widely used to indicate the degree of contamination of the waters in which they live, particularly when the pollutants are present only intermittently or in very low concentrations, making chemical analysis of the water difficult. Finally, many poisons, particularly heavy metals and refractory organic compounds such as some pesticides, are widely believed to pass from the tissues of prey organisms into those of predators and to attain concentrations there which are several orders of magnitude higher than those in the tissues of the prey species. This phenomenon poses a specific threat to long-lived organisms at the higher trophic levels.

Studies of bioaccumulation are carried out in the laboratory, in experimental ecosystems and in the field. Laboratory investigations are usually concerned initially with determining the 'bioconcentration factor' (BCF), that is, the ratio between the concentration in the animals and the concentration in the water, when the animals

have been exposed for sufficiently long for an equilibrium or steady state to be achieved. This ratio is generally regarded as a valid indicator of the capacity of a pollutant to accumulate in animal tissues. Such limited data as are available (Davies and Dobbs, 1984; Schnoor, 1982) suggest that laboratory-derived BCF values agree reasonably well with those derived from field observations on the animals of polluted waters, at least for certain groups of organic pollutants and provided certain conditions are met in the laboratory determinations. Under certain conditions, there is a good correlation between log P (where P=the octanol-water partition coefficient of the chemical) and the BCF. This offers the possibility that the bioaccumulation potential of a pollutant can be indicated by the result of a relatively simple chemical determination, rather than by the expensive and time-consuming estimation of BCF. However, Davies and Dobbs (1984) in their study of this question, found it necessary to reject determinations of BCF which did not meet certain criteria.

There are many models of bioaccumulation. In the simplest possible model, two compartments are considered: the organism and the environment. Pollutant will enter the organism at a certain rate, which is dependent upon the amount present in the environment. Pollutant will also be lost from the organism, at a rate dependent upon the amount present in the organism. This simple model can be expressed mathematically and predicts that organisms exposed to a constant level of pollutant will eventually reach a 'steady state'; that is, the concentration of pollutant will increase to a certain level and thereafter remain constant. Conversely, the model predicts that in contaminated organisms maintained in clean water, the concentration of pollutant in the organism will decline exponentially. These predictions are generally confirmed by experimental findings.

Such a simple model is of limited practical use, however, and it is not difficult to see why. Most organisms cannot be considered as a single compartment. Studies of the distribution of pollutants in animals invariably show that the pollutant is very unevenly distributed between the various body tissues. Different pollutants behave in different ways. Clearly the animal will begin to suffer harm when the poison concentration in a particular organ reaches a critical level. Thus the concentration of the pollutant in the whole body is not a good indicator of harmful effect. For this reason, models have been derived which treat the organism as a set of interacting compartments. These models treat discrete organs (e.g. liver, kidney, brain) as interacting compartments connected via the blood (itself considered a compartment) with each other and with the external environment. Further, in some models the exchange of pollutants between the compartments is considered as a series of separate processes. For example, uptake of the pollutant from the environment may occur through the body surface, or by ingestion of food or of non-food particulate material. Elimination of the pollutant may occur through outwards diffusion, through renal or gastrointestinal excretion, or by metabolic breakdown. Clearly models which attempt a complete and accurate description of

bioaccumulation soon become extremely complex, and for that reason they are not treated in detail here. Hamelink (1977) and Moriarty (1984) provide good discussions of the strengths and weaknesses of bioconcentration models.

The purpose of such models is twofold. First, if they can be validated by experimental findings (i.e. if the predictions of the models correspond with actual observations), they provide the means for making useful predictions based on comparatively simple experimental measurements. In other words, they can eventually become a substitute for actual experimentation, which may be time-consuming and expensive. Second, they can provide valuable information about the mechanisms of bioaccumulation. If, for example, an experimental finding does not agree with a prediction of a model, it indicates that one or more of the assumptions in the model is wrong, and thus focuses attention on areas which require further investigation. Although it is by no means clear that any existing model is of general application, studies on bioaccumulation and its mechanisms are of great practical importance. For instance, Moriarty (1984) has convincingly argued that the lack of understanding of bioaccumulation processes in single species has serious implications for ideas about the passage of pollutants through food chains.

It is widely believed that many pollutants pass through succeeding trophic levels and accumulate in high concentrations in the tissues of long-lived predators. Although there are a small number of widely-accepted examples of this, it is by no means well established that this is a general phenomenon, even for persistent pollutants like heavy metals and refractory organics. Moriarty (1984) has discussed some of the inadequacies of current knowledge. For example, comparing tissue levels of pollutants in field populations is very likely to produce biased results if, as is usually the case, mean levels of pollutants are compared. This is because of the differences in pollutant concentrations between individuals of the *same* species; frequently, mean values are biased by a very small number of individuals which have very high concentrations; that is, the frequency distribution of pollutant concentration values is highly skewed. Further, although under experimental conditions a steady-state concentration of the pollutant in the tissues generally is eventually achieved, it is not clear that this is the case in the field. Field populations are generally exposed to lower, and more widely-fluctuating, pollutant concentrations in their environment. Clearly a comparison between tissue pollutant concentrations in two different species is invalid if they are not both at their respective steady-state concentrations. It is also true that the interpretation of field observations, and the design of experimental investigations, often rests upon unverified, and unwarranted, assumptions about what animals actually eat. Obviously in a simplified experimental system, predators will feed on prey which may not form their normal or natural diet in the field. A further example is the widespread assumption that large marine predatory fish such as tunas feed primarily

or exclusively on smaller fish such as mackerel, herring or sardine. However, the stomach contents of several hundred tunas caught in the Mediterranean during an international angling contest consisted almost entirely of crustaceans and plankton (Fowler *et al.,* 1979). This should not have been a surprise to anyone who knows anything about the biology of tunas, but this simple observation destroyed some elaborate theoretical models! Thus while the question of bioaccumulation and biomagnification along food chains is an important and interesting one, authoritative answers require the solution of several technical and conceptual problems, and a greater knowledge of the basic ecology and physiology of many species.

4.5 Evaluating Toxicological Data

The literature on the toxicity of pollutants to aquatic organisms is enormous, and yet there are several important questions which cannot yet be clearly answered. The range and variety of lethal and sublethal toxicity test methods available are huge, and increasing; as is the recorded occurrence of sublethal toxic effects whose significance can frequently only be guessed at. The number of chemicals requiring some form of risk assessment increases by hundreds each year, the majority of species have yet to be investigated, and every circumstance has its own environmental conditions which we do know will influence toxicity considerably.

Probably few readers of this book will ever themselves be actively engaged in toxicological investigations, yet probably the majority will at some time need to refer to toxicological data and evaluate its reliability and significance. It is unfortunate that a great deal of the information available is of poor quality and likely to be misleading. This section offers some simple guidelines to assist in the evaluation of toxicological data.

Measurements of lethal toxicity are, in principle, the most straightforward because the criterion of toxicity, death of the organism, is usually easily recognisable. However, much published data are of less use than it may at first appear. Probably the commonest mistake is to use simple test methods for purposes for which they are not suitable. For example, tests designed for routine screening and monitoring are of little value in comparing the toxicities of different poisons, the susceptibility of different species or the effects of environmental conditions, for reasons explained in Section 4.1. Similarly, data presented in the form of fixed-time LC50 values are of doubtful significance unless there is some indication of how close that time is to that at which the lethal threshold becomes apparent. It is still disturbingly common to see data presented in the form of cumulative mortality curves—often without even the log-probit transform, which allows median values and their confidence limits to be determined—which are incapable of distinguishing between the speed of reaction of the organisms and the inherent toxicity of the pollutant to which they are exposed. All reports should be routinely examined to see if adequate

information is given on the chemical composition of the dilution water, the volume of the test containers and how frequently the test solutions are changed; on the frequency of observations of the experiment; and whether any steps have been taken to *measure* the actual concentrations of poison in the solutions, and the other experimental variables which are known to have large influences on the final result. To the extent that such information is lacking, the significance which can be attached to the results is diminished. Finally, some checks can often be done, based on internal evidence of the report, on whether the results have been correctly computed. This should not be necessary, but experience unfortunately shows that it often is! For example, if an LC50 value is expressed as, say, 15.56±0.008 mg l^{-1}, a rapid back-calculation will probably show that to achieve this result, the experimental concentrations would have to be impossibly closely spaced. Therefore the investigator did not carry out the experiment properly, or does not understand the calculations, or both!

For sublethal toxicity experiments, the same considerations apply, but in addition there is the problem of evaluating the biological significance, if any, of the toxic effect used as the end-point of the experiment. At one extreme, any effect could be considered significant. On the other hand, arguably only those effects which are of ecological significance could be considered as important. This point has yet to be resolved by consensus, but it is important in view of the considerable demand for toxicity tests for regulatory purposes. There is a tendency, whenever a novel toxic effect is discovered, to suggest that it could be used as a toxicity test, particularly if the experimental procedure is relatively quick, simple and sensitive. However, it is important to distinguish between the study of sublethal toxicity *per se,* and the application of sublethal toxic effects as test methods for regulatory purposes. If we wish to know how poisons affect organisms at sublethal levels, what is the sequence of cause and effect at succeeding levels of biological integration from the passage of the poison molecule into the organism, its initial reaction within the cells, and the ultimate consequences of this at the level of the whole organism or the population, then we are legitimately interested in any response we can detect. If, however, we wish to develop a particular biological response into a test method for regulatory purposes, we should be interested in a much smaller range of effects. For this purpose, we require methods which offer economies of time and scale, which are ecologically relevant and which bear some relation to the behaviour of a range of key organisms exposed to a wide range of pollutants as determined by more conventional methods. Thus, since insecticides are designed to be harmful to insects and relatively harmless to other species, any sublethal response of an insect species to an insecticide is most unlikely to be of use as a general test method for regulatory purposes, since it will give little accurate idea of how non-insecticidal poisons might behave. Toxicity testing for regulatory purposes is one important branch of ecotoxicology, but no more than that. Similarly, not all sublethal toxic

effects are suitable for this purpose, though they may be interesting for other reasons; and not all sublethal toxic effects have any particularly clear ecological significance. They may, in fact, be quite trivial.

4.6 Quantitative Structure-Activity Relationships (QSARs)

In Section 4.2.1 it was seen that in a homologous series of linear alkylate sulphonate detergents, a regular empirical relationship could be discerned between the lethal toxicity of the detergent and the length of the hydrocarbon chain. This is a simple example of a *quantitative structure-activity relationship,* or QSAR. To determine whether or not a QSAR exists for a particular group of chemicals, it is necessary to plot a graph to show the relationship between some measure of biological activity (such as 96-h LC50, bioconcentration factor, or the concentration causing some sublethal effect) against some structural parameter (chain length, molecular weight) or some value closely related to structural parameters such as octanol-water partition coefficient. If a good correlation is found, using univariate or multivariate linear or non-linear regression techniques, the QSAR for this group of chemicals can be a useful predictive tool.

For example, if measured toxicity data for several of a particular group of chemicals are available, it becomes possible to predict with reasonable accuracy the likely toxicity of any other chemical in the group. This can afford considerable savings of time and resources in the development of novel compounds, or where a chemical is encountered for which no data on biological activity are available. Another possibility is that of predicting the toxicity of chemicals to one species based on data for another species. This situation commonly arises, since the bulk of the available data relates to a relatively small number of 'standard' species, whereas the species under threat from real pollution incidents are usually of another kind. Figure 4.20 shows the basis of this idea. The line is based on the open circles, which are coordinates of a plot of the toxicity of 16 chemicals to *Daphnia* against the toxicity of the same chemicals to the guppy. Note that this line is *not* a QSAR. Superimposed on this line are toxicity *predictions* based upon the QSAR for this group of chemicals for *Daphnia*. The fact that all the data points, whether real or predicted, fall close to the line suggests that for this group of chemicals, the two species share a common QSAR. This does not mean that the toxicity of the chemicals to the two species is the same. However, it does mean that the *Daphnia* QSAR can be easily adapted to make predictions for this group of chemicals against the guppy. In principle, it should then be necessary only to undertake real tests on a new species with a few chemicals in a series, to establish the commonality of the QSAR, in order to be able to make reasonable estimates of toxicity of the whole group to that species (Lloyd, 1991b).

There are still, however, some limitations on the use of QSARs which

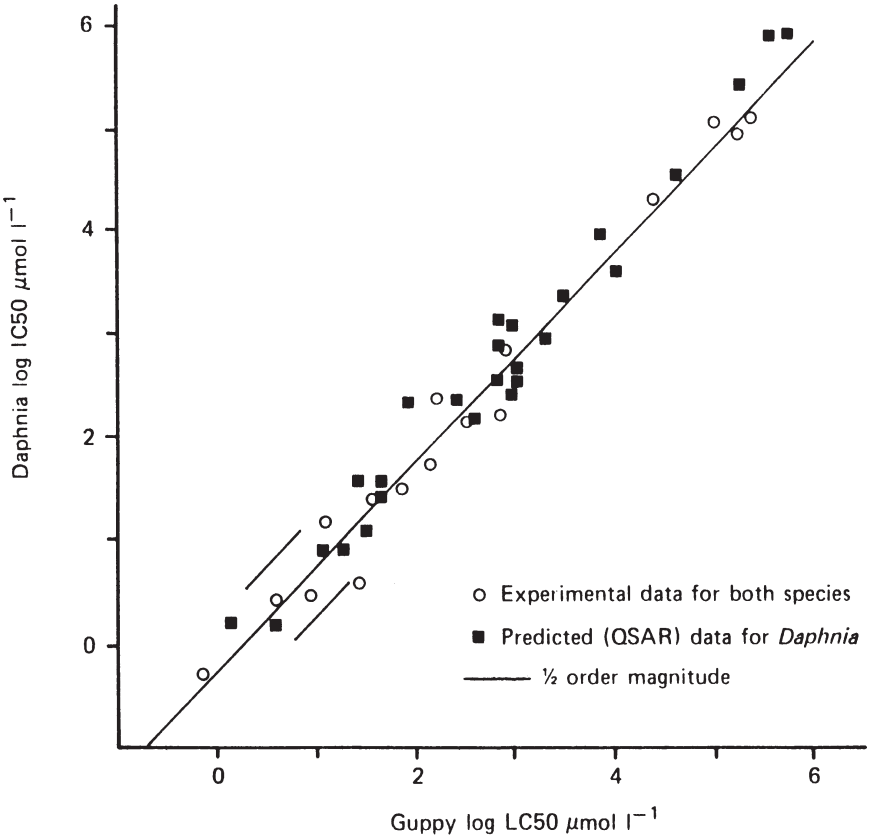

Figure 4.20 Correlation between the sensitivities of two organisms to 42 industrial organic chemicals. After Lloyd (1991)

means that they cannot yet be considered a substitute for real measurements in risk assessment, but rather as a useful aid. First, QSARs are correlations, not causal relationships. In any group of chemicals, it is not uncommon to find one or more which cause the QSAR to break down. There are several possible reasons for this, but one important one is that the idea of QSARs makes a hidden assumption, that each chemical in the QSAR has basically the same mechanism of action in the living organism. This is not necessarily the case. However, where it can safely be assumed that a group of chemicals does have the same mechanism of action, a further possibility is opened that a group of chemicals in a QSAR do not have to form a homologous series, or be structural isomers, or necessarily to have any such close chemical similarity. Thus the idea of QSARs could be extended to very large groups of chemicals indeed. Of course, the term 'mechanism of action' subsumes a complex series of biological and chemical processes, but some attempt has been made to recognise basic modes of action in terms of the symptoms poisons

produce in fish: so-called *fish acute toxicity syndromes* (FATS). Five toxic syndromes have been recognised so far (Lloyd, 1991b): respiratory uncoupling, respiratory irritation, acetylcholinesterase inhibition, and narcosis types I and II. Any chemical which causes one of these syndromes at acutely-toxic levels in fish appears to form a QSAR with all others which cause the same syndrome. This empirical finding appears greatly to extend the potential of QSARs in the future.

Second, QSARs do not appear to work well with chemicals which are strongly polar; they work best with non-polar organic chemicals. QSAR predictions are also insufficiently accurate for many purposes—in view of the many factors which can influence a measurement of toxicity, predictions to within an order of magnitude are probably the best that can be achieved. Nevertheless use of QSARs is a promising approach which at the very least offers the possibility of a substantial reduction in the number of toxicological experiments which currently need to be carried out. Konemann (1981) and Kaiser (1987) are useful sources of further information.

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5

Water Pollution and Public Health

It is widely but erroneously believed that the marked increase in life expectancy which has occurred among the populations of many countries since the end of the nineteenth century was due to advances in medical science. In fact, in the conditions which prevailed in the swelling and poorly-sanitated cities of the nineteenth century, and which still prevail in much of the developing world today, the major hazards to life were epidemic diseases which exacted a heavy toll, particularly among the young. Certainly medical scientists played a major role in establishing the nature and the means of transmission of these diseases. Nevertheless the control of epidemic diseases was achieved largely through the development of proper methods for the treatment and disposal of wastes, and by attention to the provision of clean water supplies, together with education and legislation concerned with general hygiene. These developments preceded by some decades the availability of medical treatments, such as antibiotics, for the cure of waterborne infections. Today, those of us who live in the better-developed parts of the world can be reasonably optimistic, should we catch a waterborne disease, of a successful outcome, since most of these diseases respond well to modern medical treatments. Nevertheless we should not forget that the overwhelming majority of us will never become infected in the first place; and the reason for this is primarily the existence of adequate measures for the monitoring and control of pollution.

All this is of more than historical interest, since in many parts of the world today waterborne diseases remain a major hazard. They are endemic in those countries which have not yet established systems for the sanitary disposal of wastes. It is striking that in times of war or natural catastrophe, when sanitary systems cannot be maintained satisfactorily, waterborne diseases take very little time to spread through the human population. Even in countries where waterborne diseases are not considered endemic, the speed and frequency of international travel and

the magnitude of international trade present a constant threat of the reintroduction and spread of infections. Further, increasing demands upon the water resources even of developed countries present new public health problems. Britain, for example, is not a country which could be considered as suffering from an overall shortage of water. Nevertheless the demands on the country's water resources are such that it is increasingly necessary for water to be reused. The preferred sources of water supply are upland surface waters or ground water from deep wells or boreholes; these are unlikely to be contaminated with noxious chemicals or disease-causing organisms and can be rendered suitable for potable water supply with minimal treatment. However, Evans and Johnson (1984) estimate that already 30% of Britain's water supply is derived from lowland rivers. Such water is likely already to have been used several times over by communities upstream, and to have received waste discharges from domestic, agricultural and industrial sources. The reuse of water poses special problems in relation to the spread of infectious diseases and of other harmful effects caused by chemical contaminants.

Public health measures for the control of infectious and other diseases associated with water take various forms. Examples include good medical services for rapid diagnosis and treatment; a system of rapid reporting of infectious diseases so that epidemics and their sources can be quickly identified and eliminated; education and general public awareness of good hygienic practices; and controls over the processing and handling of food for human consumption. The monitoring and control of water pollution is a central element in the preservation of public health, because water is potentially the means by which many diseases can be spread.

5.1 Water Pollution and Pathogens

Pathogenic organisms which are spread by polluted water include bacteria, viruses and parasites. Some common examples are discussed here, but it is important to remember that many infections are never identified as caused by any of the well-known agents of epidemic disease, particularly in the less well-developed areas of the world. In fact, diarrhoea, which may be caused by bacterial, viral or parasitic infections, is responsible, according to some estimates, for six million deaths per year (Slade and Ford, 1983). UNEP (1989a) estimated that in 1988 there were over 1300 million cases of diarrhoeal illness worldwide, causing four million deaths, mainly of infants. Some common means of transmission of enteric diseases are summarised in Figure 5.1.

5.1.1 Bacterial Pathogens

Typhoid fever is a disease of the gastrointestinal tract which frequently gives rise to systemic infections. If diagnosed and treated with antibiotics, it is

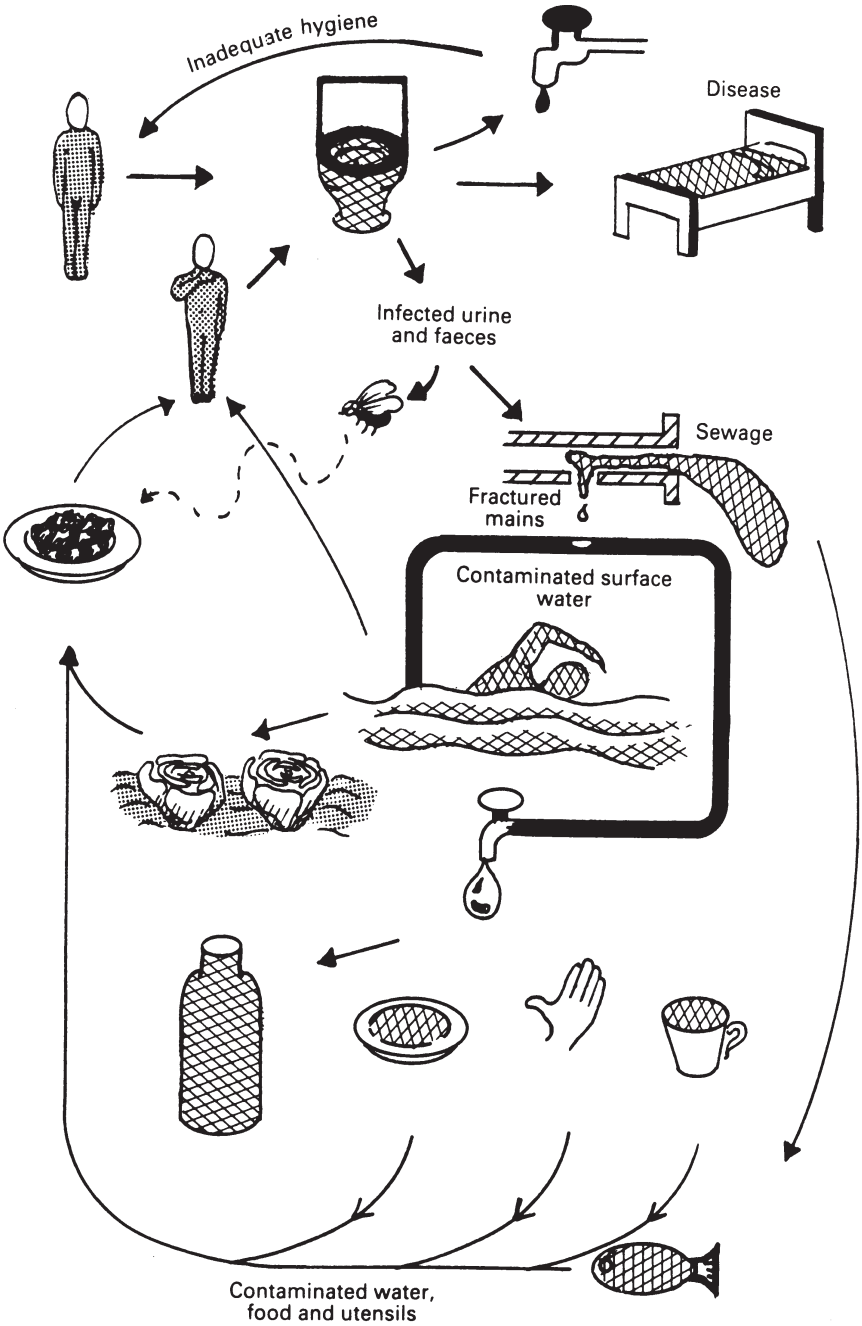

Figure 5.1 Summary of the modes of transmission of enteric diseases through contaminated water

debilitating but rarely fatal. Without treatment it is fatal in between 12% and 30% of cases (Hornick, 1982). The disease is rare wherever public health and pollution control measures are adequate, but minor outbreaks are not uncommon, particularly among travellers recently returned from less-developed parts of the world. Typhoid infection is usually caused by ingestion of bacteria from faecally-contaminated water or food. In Britain, the most serious epidemic of recent times affected over 500 patients. It was caused by canned meat imported from Argentina. It was discovered that the canned and sterilised meat had been cooled in contaminated water, and that water had leaked through imperfect seals in the cans (Ash *et al.,* 1964). Figures for typhoid outbreaks in more recent years in various regions of the world are given by UNEP (1989a). The causative organism is *Salmonella typhi*. If the bacteria survive passage through the acid of the stomach (a process which may be assisted if the bacteria are ingested with water), they colonise the intestine and enter the epithelial cells of the gut lining. Very few bacteria (between 100 and 1000 cells) are required to establish a *Salmonella typhi* infection; for other *Salmonella* infections, the minimum infective dose is rather higher, approximately 10^5 to 10^6 cells. Ulceration of the intestine occurs, and bacteria enter the bloodstream. At this stage, fever occurs and the patient becomes mentally and physically debilitated. Subsequently, the bacteria may become established in various parts of the body, especially in the lymph nodes, gall-bladder, spleen and skin—characteristic haemorrhagic spots on the skin may be seen in some patients. Infected individuals excrete large numbers of bacteria in the faeces, providing a source of infection of further individuals. An interesting and dangerous feature of this disease is that in some cases the symptoms of infection can be mild and undiagnosed, although the patient becomes chronically infected with *Salmonella* without showing symptoms of the disease. These 'carriers' are a persistent source of infection in the community; further, even if diagnosed, the disease in such patients does not readily respond to the normal treatment with antibiotics. It is estimated (Hornick, 1982) that in the USA there are about three or four typhoid carriers per 100000 in those populations which have been studied, although this number seems to be declining. However, it must be assumed that typhoid carriers will be present in any sizeable community.

Bacterial dysentery (shigellosis) and its cause were first recognised in Japan at the end of the nineteenth century during an epidemic involving 90000 cases. It was almost certainly a scourge of the human population long before its nature was understood. Keusch (1982) refers to descriptions of the disease in the Old Testament, and by the ancient Greek writer Thucydides. Today the disease remains common throughout the world. In the USA as recently as 1978, data from the Centre for Disease Control indicated nearly 25 cases per 100000 among infants (Keusch, 1982). In a rural community in Guatemala during the period 1965–1969, the incidence rate among infants was almost 200000 per 100000 per year, that is each infant was attacked by the disease on average twice per year (Mata, 1978).

Shigellosis is caused by the consumption, in faecally-contaminated water or food, of live bacteria of the genus *Shigella;* known pathogenic species include *Sh.dysenteriae, Sh. flexneri* and *Sh. sonnei*. All of these appear to be associated exclusively with humans and some non-human primates, and transmission of the disease is usually by the faecal-oral route. *Shigella sonnei* outbreaks, although less serious than *S. dysenteriae,* are not uncommon in schools and similar establishments. If ingested bacteria survive passage through the stomach, they invade the epithelial cells of the intestine and give rise to ulcerous lesions. It is believed that the bacteria also secrete a toxin which may have pathological effects. Infected patients excrete bacteria with the faeces. Like typhoid, the disease typically takes a few days to manifest itself. The classical symptoms are the frequent passage, in small volume, of stools accompanied by blood and mucus, along with severe abdominal cramps; often, however, watery diarrhoea is the only manifestation and many infected patients may be undiagnosed. Shigellosis is often a seriously debilitating disease which can give rise to chronic infection and periodic recurrence of symptoms. If untreated, death occurs in up to 15% of cases, most fatalities occurring among infants and elderly patients. Complications include haemolytic anaemia and Reiter's syndrome, an arthritic condition. As with typhoid fever, chronically-infected patients can act as carriers of the disease within the community without manifesting clinical symptoms of the disease.

Cholera is perhaps the most devastating of the waterborne bacterial diseases, and well exemplifies the importance to public health of good sanitation and water pollution control. Cholera epidemics are by no means uncommon, especially in countries where adequate waste disposal practices are not well established. Benenson (1982) in his account of the disease, considered that it was possible to identify seven cholera pandemics; the most recent of these he considered to have originated in Indonesia in 1958 and to have spread to South-West Asia, India, the Middle East, Africa and to some countries in Southern Europe by 1976. At the time of writing Benenson (1982) considered this pandemic to be still extant. Earlier epidemics affected Britain and other European countries (Benenson, 1982; Fraser, 1984). The disease appears to be endemic to areas of Asia and to have first been recognised in Europe in the early sixteenth century, almost certainly introduced by a sailor returning from a foreign journey. The frequency of foreign travel in modern times presents a constant threat of the reintroduction and spread of the disease even in countries where good pollution control practices are established. UNEP (1989a) records data showing about 50 000 cases worldwide per year as a background level of morbidity, reaching much higher numbers in certain years when particularly large outbreaks occur.

Cholera is caused by the bacterium *Vibrio cholerae,* and is transmitted by ingestion of live bacteria from polluted water or other material contaminated with faecal matter from an infected individual. The bacteria colonise the intestinal tract and produce a potent toxin which attacks the intestinal mucosa and interferes with

the normal processes of salt and water balance which occur across the gut wall. The patient suffers severe diarrhoea involving sudden and massive dehydration of the body and serious salt imbalance which impairs the normal function of many organs. Death, due to circulatory failure consequent upon dehydration and salt imbalance, can occur within hours of infection. In some cases the bacterium can cause serious infections in other parts of the body.

Bacteria of the genus *Vibrio* have been studied mainly because of the medical importance of *V. cholerae,* which was first recognised about one hundred years ago. More recently, a wider biological perspective upon the genus *Vibrio* has become available, which is important when considering the status of these organisms in relation to water pollution (Colwell, 1984). Vibrios appear to be primarily free-living organisms of soil and water, particularly associated with saline environments such as estuaries and salt marshes. Apart from *V. cholerae,* several other *Vibrio* species are pathogenic to humans, and some are pathogenic in aquatic organisms including crustaceans and molluscs. These animals are primarily detritivores and filter-feeders, and frequently accumulate high concentrations of *Vibrio* bacteria in their bodies. This gives rise to a hazard of human infection, especially in areas where shellfish are cultured, harvested, processed or consumed in significant quantities.

5.1.2 Viral Pathogens

At the time when the relationship between water pollution and the spread of bacterial diseases was first understood, the role of viruses was hardly recognised. Today, the importance of viruses as agents of disease is well known, and it is clear that the pollution of water with human wastes is a major potential source of serious disease.

The viruses of greatest interest in this context are the group known as enteric viruses. The taxonomy of viruses is complex and unfamiliar to many biologists, and is based not only on the morphological and physical characteristics of the organisms but also upon their chemical and immunological properties. The term ‘enteric viruses’ is one of convenience rather than a distinct taxonomic grouping. Enteric viruses include agents from widely different taxonomic groups, but they have in common the fact that the intestine is their primary lodgement site. As they are commonly found also in water, they can potentially be transmitted by ingestion of water or other matter contaminated with faecal waste from an infected individual. Human pathogenic viruses that are commonly found in polluted water are listed in Table 5.1. However, the link water-patient-water-patient has so far been firmly established only for poliovirus and Hepatitis type A virus.

In many cases, viral infections caused by these agents do not cause serious symptoms, but acute gastrointestinal and diarrhoeal illnesses are the commonest waterborne diseases in the more developed countries, and they

Virus	Disease caused
Enteroviruses	
*Polio (3)	Paralysis, meningitis, fever
Echo (34)	Meningitis, respiratory disease, rash, fever, gastroenteritis
Coxsackie A (24)	Herpangina, respiratory disease, meningitis, fever, hand, foot and mouth disease
Coxsackie B (6)	Myocarditis, congenital heart anomalies, rash, fever, meningitis, respiratory disease, pleurodynia
New enteroviruses types 68 to 71 (4)	Meningitis, encephalitis, respiratory disease, rash, fever, acute haemorrhagic conjunctivitis
*Hepatitis A (enterovirus 72)	Infectious hepatitis
Norwalk (2)	Epidemic vomiting, diarrhoea, fever
Rotavirus (4)	Gastroenteritis, diarrhoea
Reovirus (3)	Unknown
Parvoviruses	
Adeno-associated (3)	Unknown
Adenovirus (30)	Respiratory disease, conjunctivitis, gastroenteritis
Cytomegalovirus (1)	Infectious mononucleosis, hepatitis, pneumonitis, immunological deficiency
Papovavirus SV 40-like (2)	Immunosuppression, progressive multi-focal leucoencephaly

may have serious consequences in some patients, particularly in infants, elderly patients and immunologically compromised hosts. In addition, some enteric viruses are capable of causing seriously debilitating or even fatal illness, and can give rise to epidemics. Consequently they are considered as serious hazards to public health, and some examples are discussed briefly here. A fuller account of the subject is given in a concise form by Rao and Melnick (1986).

Poliovirus is the causative organism of poliomyelitis, probably the most familiar of the waterborne viral diseases. In developed countries, public health policy generally dictates that the majority of the population is immunised in childhood against this disease. Poliovirus infection is primarily one of the alimentary tract and may cause symptoms of fever, vomiting and diarrhoea. These symptoms may not be recognised as serious. In a minority of cases (up to approximately 1%) the virus enters the bloodstream of the infected individual and may penetrate the nervous system and give rise to paralysis; this may be permanent and, if vital organs are affected (such as respiratory muscles), fatal. Infected individuals, whether or not showing serious disease symptoms, excrete poliovirus in large quantities in the faeces, giving rise to the risk of infection of further individuals.

Hepatitis A (infectious hepatitis) is clearly transmitted through contaminated water, and numerous outbreaks of the disease have been traced to this source (Rao and Melnick, 1986; Vaughn and Landry, 1983). Viral hepatitis of the non-A, non-B form has also been shown to give rise to waterborne epidemics with fatality rates of up to 40% among susceptible groups of the population (Rao and Melnick, 1986). There is strong circumstantial evidence of the waterborne spread of rotavirus, Norwalk virus and of infections caused by consumption of shellfish from polluted water which contain high concentrations of parvovirus, rotavirus and small round virus (SRV).

5.1.3 Parasitic Infections

Parasitic infections can also be spread through polluted water. Amoebic dysentery, caused by the protozoan *Entamoeba histolytica,* is a typical example. Of the world's population, no less than 4000 million are at risk of infection, and 400 million actually infected (UNEP, 1991). Its life cycle consists of four stages: trophozoite, pre-cyst, cyst and metacyst. Ingestion of the mature cyst from contaminated food or water initiates the infection. In the small intestine the cyst gives rise to the metacyst, which in turn divides to give a number of amoebae. These enter the large intestine, where they may invade the host tissues or give rise to further cysts. Infected patients excrete trophozoites (amoebae) and cysts in the faeces, though only the cysts can survive in the external environment and survive passage through the stomach to initiate a new infection. Within the large intestine, invasion of the host tissues causes ulceration and abscesses, which may spread to other organs such as the liver. The most obvious symptom of acute amoebic dysentery is diarrhoea, accompanied by blood and mucus. Chronic infection can occur giving rise to recurrent episodes of diarrhoea alternating with constipation.

Other parasitic protozoans with relatively simple life cycles are known to spread in a similar manner. Examples include the flagellate *Giardia lamblia,* which causes serious gastrointestinal disorders; major outbreaks continue to be recorded in Europe and the USA (Zaman and Ah Keong, 1982). Another protozoan which has been causing concern recently is *Cryptosporodium parvum* (Badenoch, 1990). Originally thought to be spread to humans directly from animals or by person-to-person contact, it is now increasingly thought to be transmitted via water. Current sewage and water treatment processes do not always remove protozoans effectively, as they were not designed to do so, and there may be a need to modify treatment processes in areas where protozoan parasites pose risks.

Parasitic nematodes (roundworms) are important human parasites, and many have a simple life cycle involving direct transmission by the faecal-oral route. Others require passage through an intermediate host, but completion of the life cycle is facilitated by contamination of water, soil or food with faecal wastes of infected individuals. In many species, the life cycle includes a stage which is specifically adapted for survival in the external environment, so that infective life stages may remain viable in water or soil for long periods. In some species, a period in the external environment is essential for completion of the life cycle. One example of a nematode with a simple life cycle which causes human infection is the whipworm *Trichuris trichiura.* Mild infections produce few serious symptoms, but provide a focus of infection from which more serious cases can arise. Heavy infection produces symptoms of dysentery, and leads to severe damage of the intestinal tract, anaemia and (especially in children) loss of weight. The faeces of infected individuals contain eggs which require about 20 days in the external environment to complete their development; the infective stage can survive for several months in water or soil. Several other nematode species have similar life cycles.

Tapeworms (cestodes) include a number of species which infect humans and whose transmission is aided by contamination of water or soil with human faecal matter. The beef tapeworm, *Taenia saginata,* is a typical example; again, there are a number of other species whose life cycles are broadly similar. The adult *T. saginata* lives in the human intestine and sheds, in the faeces of the host, proglottides which contain eggs. The eggs are ingested by cattle, from polluted water or from pasture contaminated with human faeces. In the cattle, the eggs develop through several stages, migrating through the intestinal wall and via the circulation to the muscles, where the cysticercus stage is formed. This encysted state remains in the muscle, and if ingested by a human in uncooked or partially-cooked beef, develops into an adult tapeworm.

Trematode parasites which infect humans include a number of blood flukes (Schistosomes), liver flukes, intestinal flukes and pulmonary flukes which cause serious disease. They are relatively rare in temperate zones and in countries where pollution control and public health practices are well established, but are major causes of ill health and economic loss in many parts of the world (Zaman and Ah Keong, 1982). Their life cycles are complex, involving one or more intermediate hosts, and all require a period of development within the body of a mollusc, usually an aquatic snail. Invariably, transmission of these parasites involves the contamination of water with human faeces. The life cycle of a typical blood fluke is shown in Figure 5.2.

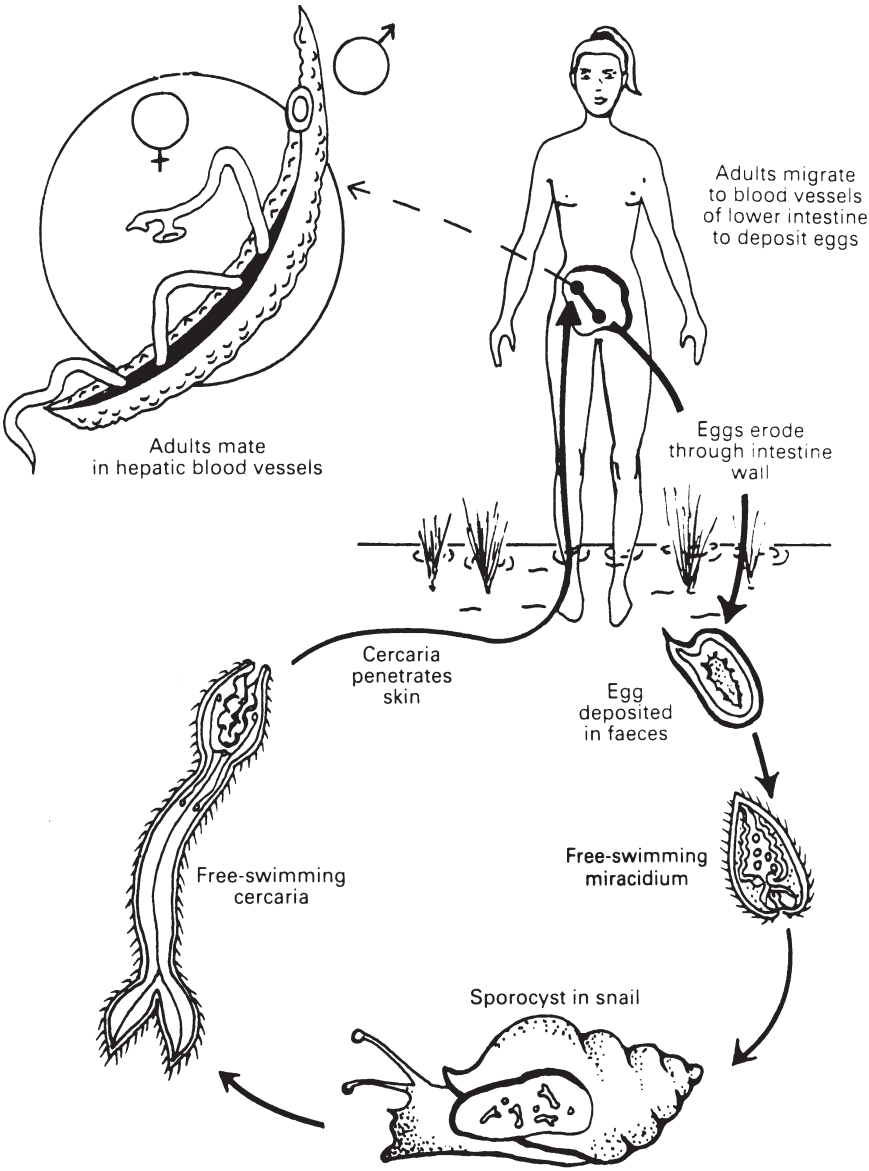

Figure 5.2 Life cycle of a typical trematode parasite of humans, *Schistosoma mansoni* (not to scale)

Control of the spread of parasitic diseases is an enormous public health problem in many parts of the world. UNEP (1991) estimates that currently 600 million people in the world are at risk from Schistosome infection, and 200 million are actually infected. Detailed consideration of the life cycles of parasites is required

in order to understand their modes of transmission, the control measures which may be effective against them and the relationship between water pollution and the spread of parasitic infection. Where the life cycle includes one or more intermediate hosts, control measures may be directed against the intermediate host in order to break the cycle of infection. Aquatic molluscs living in polluted waters can readily become established as a reservoir of human infection. It is often important, therefore, to eliminate aquatic molluscs by various means, including the use of selective poisons. In this case, an understanding of the toxicological principles and techniques discussed in Chapter 4 clearly becomes important. Alternative methods of eliminating aquatic molluscs include management of the flow regime of drainage and irrigation channels, where this is technically feasible, since many aquatic molluscs are restricted to static or slow-flowing waters.

Strict regulation of food processing and handling is also important, including effective systems for the inspection of meat and other foodstuffs to avoid infected material being used for human consumption. Education of the general public in personal hygiene, and in the appropriate techniques for the preparation and cooking of food can do much to limit the spread of disease. Deep freezing food (-20°C for 24 h) is usually sufficient to kill infective stages of parasitic worms. Adequate medical facilities for the diagnosis and treatment of infection are of obvious importance. Nevertheless a large proportion of the most serious parasitic diseases—whether caused by protozoa, nematodes, cestodes or trematodes—have in common that their transmission is facilitated by the contamination of watercourses or land with human faecal wastes. The monitoring and control of water pollution, and the development of adequate methods for the safe treatment and disposal of wastes, is therefore arguably the most powerful single measure that can be taken against many parasitic diseases.

5.1.4 Pathogens in the Aquatic Environment and in Waste Water Treatment Processes

Deprived of the favourable growth conditions provided by their hosts, many pathogens die quite quickly. They may, however, remain viable sufficiently long to create a hazard to the health of bathers or other recreational users of the receiving water, and to render the water unsuitable for domestic or agricultural uses. It is therefore necessary to consider the survival rate of pathogens in the aquatic environment, and the effectiveness of waste treatment processes in removing them from effluents.

Some representative data on the survival of bacteria are summarised by James M.Montgomery Inc. (1985). For a range of enteric bacteria and pathogens in well water, times for 50% reduction in the initial population at 9.5°C to 12.5°C varied from 2.4 to 24 hours. For a 99.9% reduction, however, much longer periods of 20 days or more appear to be necessary for some pathogens. Factors which influence the survival

times of bacteria include the temperature, the light intensity and the quality of the water. It is therefore highly desirable that sewage treatment processes remove as many pathogenic bacteria as possible. Conventional treatment processes (see Chapter 6) are often reasonably effective in removing bacterial pathogens from the final effluent, although the pathogens may become concentrated in the sludge. Further, treatment plants cannot always be operated at maximum efficiency, particularly at times of high storm-water input. Under ideal conditions, primary and secondary treatment of sewage reduce the numbers of pathogens in the effluent by 90% or more, compared with the raw sewage. Much lower removal rates are obtained during the frequent periods when treatment plants do not operate under ideal conditions.

Viruses survive at least as long as bacteria. Sattar (1981) in his summary of a large number of reports refers to enteric viruses in natural fresh waters requiring from less than one day to over 21 days for 99% loss of infectivity. In sea water, there are several reports of periods over 100 days for 99% loss of infectivity. A wide range of physical, chemical and biological factors have been reported to influence virus survival (Block, 1983; Sattar, 1981). The behaviour of viruses in sewage treatment plants is almost impossible to predict (Gerba, 1981; Sorber, 1983). In some cases, almost complete removal of virus particles has been reported, whereas in others the viruses have been found to pass freely. It is possible that high removal rates can be achieved in pilot plants operating under continuously optimal conditions, but that under the varying and often sub-optimal conditions which prevail in operational treatment plants, virus removal is much less efficient. As with bacteria, it is likely that viruses removed from the liquid effluent are to a large extent retained in the sludge. While conventional primary and secondary treatment cannot be considered generally effective in virus removal, some forms of tertiary treatment have been found to be successful (Rao and Melnick, 1986). Tertiary treatment of sewage, however, is still carried out only exceptionally even in better-developed communities.

At least some parasitic organisms may be expected to survive in the environment for long periods. The life cycle of many parasites includes a stage which is specifically adapted for survival in the external environment, to facilitate passage from one host to another. Some intestinal nematode parasites of humans which do not require any intermediate host do require a period in the external environment in order to complete their life cycle. Being relatively large, they settle readily and are often efficiently removed from sewage effluent by conventional treatment processes, although again they may tend to be concentrated in the sludge.

5.2 Monitoring Pathogens in Water

Since practicable waste treatment processes, however efficient, do not remove all the pathogens from sewage it is necessary to monitor receiving waters for the presence of pathogens. This is particularly necessary in waters which are used for

bathing, fisheries or as a source of further water supply. It also provides information on the operational efficiency of the treatment plant. Because there are so many potential pathogens, in routine monitoring generally no attempt is made to identify them all. Most commonly, the presence or level of abundance of coliform bacteria is used as an overall indicator of contamination of the water with faecal material. Coliform bacteria are so-called because they resemble *Escherichia coli,* a normal inhabitant of the human intestine which is excreted in vast numbers in the faeces of healthy individuals. *E. coli* itself is not normally pathogenic, although some other coliforms are. Depending upon the environmental conditions, coliforms survive only a few hours or days outside their hosts; therefore their presence in water suggests that it has been recently contaminated, and that pathogens are likely to be present. Further, because the non-pathogenic *E. coli* is excreted by healthy individuals, it will nearly always be far more abundant in sewage than other coliforms or other enteric pathogens. Therefore by ensuring that the numbers of coliforms are kept at a low level, it is possible to be reasonably certain that the numbers of pathogens present are very small indeed. Coliform bacteria can be readily isolated, identified and counted from water samples (see Section 5.2.1).

Despite these advantages, coliforms are by no means the only organisms which can be used as indicators of faecal contamination. Not all coliforms are of human faecal origin, so simply counting the total number of coliforms present can be misleading. It also sometimes happens that pathogens may be present when coliforms are absent or rare. The different types of coliform can be distinguished from one another by biochemical tests, and it is often suggested that specifically human faecal coliforms, rather than total coliforms, are a better indicator of sewage contamination (Bonde, 1977). Other bacterial indicators are available, such as faecal streptococci; this group is also easy to identify and occurs in large numbers in the faeces of healthy individuals. Pathogenic viruses, and the infective life stages of parasites, behave in many respects differently from bacteria. Although the presence of viruses or parasites is not routinely used to indicate faecal contamination, there are circumstances where it is advisable, for reasons of public health, to monitor water bodies for their presence. Standard methods for monitoring waters for pathogens have been widely published (e.g. APHA, 1995), and a brief review of some modern developments is given by Singh and McFeters (1992).

5.2.1 Monitoring for Coliforms

Coliforms are Gram-negative rod-shaped bacteria which are most readily distinguished from others by means of their biochemical properties. A common test for the presence of coliforms in water is to inoculate a suitable liquid growth medium with a quantity of the water and to observe the result. The medium used (lactose broth) contains lactose, a sugar which is fermented by coliforms to produce acid and gas. The medium may also contain substances which inhibit

the growth of non-coliform bacteria while promoting the growth of coliforms. The production of acid is detected by incorporating an indicator dye in the medium; gas production is detected by inserting into the culture vessel a small inverted test tube (Durham tube). After a period of incubation at 35°C, positive cultures are easily recognised by the fact that the medium has changed colour and a bubble of gas has collected at the top of the Durham tube. This simple presumptive test for coliforms does not distinguish between coliforms of faecal origin and those from other sources. Confirmation of the presence of faecal coliforms requires that positive cultures are tested on a solid medium, lactose-peptone agar containing sodium sulphite and basic fuchsine. On this medium, colonies of faecal coliforms acquire a greenish colour, non-faecal coliforms a red colour and non-coliform colonies are uncoloured. Alternatively, a definitive one-stage test for faecal coliforms is to test for acid and gas production in lactose broth at 44.5°C. However, this test gives misleading results unless the incubation temperature is very precisely controlled. The growth media required are readily available commercially in made-up form.

Estimation of the numbers of coliforms present in a sample of water is done in one of two ways, the plate-count method or the Most Probable Number (MPN) method. In the plate-count method, an aliquot of the test water, usually about 1 ml, is mixed with the growth medium before the agar has set. When the medium has solidified and the plate has been incubated, each viable bacterium in the original aliquot will have given rise to a colony on the plate which can be readily observed. If a number of replicate plates are set up, the mean number of coliforms per ml of water can be calculated, along with its confidence limits, giving a reasonably accurate estimate of the number of coliforms present in the water.

A variation of the plate count technique which has some advantages is to use commercially-available millipore filters with a pore size of 0.45 microns. A known volume of water is filtered through the sterile filter disc, which is subsequently placed on a suitable solid medium. The number of colonies which develop during incubation corresponds to the number of viable cells present in the original sample.

The MPN method is simpler but much less accurate. Suppose that the sample of water actually contains 100 bacteria per ml. A series of tenfold dilutions will each contain, on average, ten bacteria per ml. If each of these dilutions is further diluted by a factor of ten, and an aliquot of 1 ml taken from each, then on average each 1-ml aliquot will now contain one bacterium. However, some will contain more than one, and some will contain none. If these aliquots are incubated in liquid medium as described above, those aliquots which contain no bacteria will score negative, and those which contain one or more will score positive. If aliquots from the original tenfold dilution were incubated in a similar fashion, very few of them would be negative, since

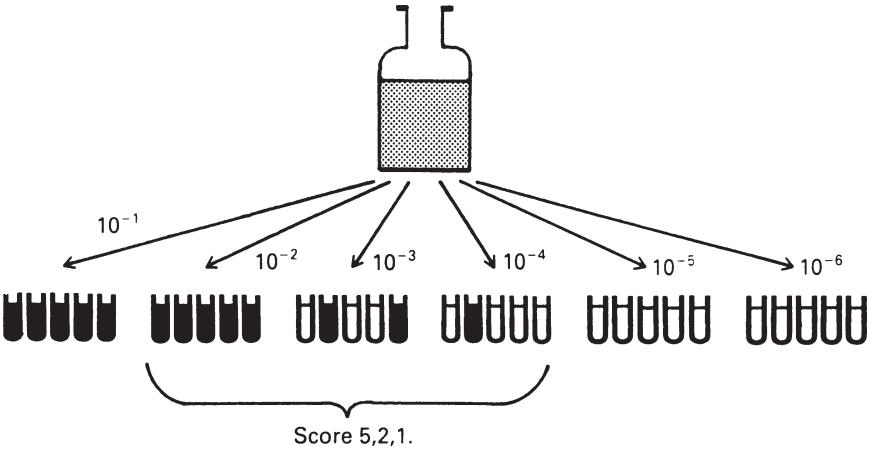

Figure 5.3 Determination of the most probable number of coliforms in a sample of water. See text for explanation

the probability of a 1-ml aliquot containing no bacteria is small when the average content of bacteria is 10 per ml. However if a 1000-fold dilution of the original sample were made, only one aliquot out of ten would be expected to contain a bacterium and to score positive. This line of reasoning forms the basis of the MPN method, since for a given concentration of bacteria in the original sample, a given dilution factor and a given aliquot size, the ratio of positive to negative results that would be expected on average can be calculated statistically. In practice, there are a number of variants of the MPN procedure, but all are based on the same principle. One way to proceed is progressively to dilute the original sample by factors of 10. From each dilution, a number of culture tubes (usually three to five) are inoculated with an aliquot of the diluted sample and incubated. When the bacteria are present in high concentration, all five tubes will score positive. When the dilution is very great, all five tubes will be negative. At intermediate dilutions, some tubes will be positive and some will be negative.

In the example shown in Figure 5.3, aliquots of the original sample have been inoculated into liquid media in groups of five tubes, so that the original sample is diluted to 10^{-1}, 10^{-2}, 10^{-3}, 10^{-4}, 10^{-5} and 10^{-6} of its original strength. As expected, at the highest dilutions (10^{-5} and 10^{-6}), all the tubes score negative—no coliforms were present in any of the inocula. At the lower dilutions (10^{-1}, 10^{-2}), all five are positive, that is each tube was inoculated with at least one coliform. At the intermediate dilutions (10^{-3} and 10^{-4}), some tubes are positive and some are negative. The three sets of tubes indicated in the diagram are the ones used to determine the MPN, the number of positive scores in each set of tubes being

five, two and one respectively. Using a table of MPN values specifically calculated for this procedure, the MPN corresponding to a score of 5, 2, 1 can be determined. Note that, starting from the left of the diagram, scores of 5, 5, 2; 5, 2, 1; 2, 1, 0; or 1, 0, 0 could be generated. Every MPN protocol specifies a set of rules for deciding which sets of tubes are used to obtain the score. In this case, the rule is 'select the greatest dilution giving some positive reactions together with the two preceding sets of dilutions'. Numerous variants of the basic MPN procedure are employed. These variations include the number of tubes tested at each dilution, the range of dilutions required, the size of the inoculum and the method of scoring. They are necessary because the numbers of bacteria found in raw sewage, river water and treated drinking water are obviously greatly different. It is important to realise, therefore, that MPN tables can be used only in conjunction with the exact procedure for which they were calculated. Detailed descriptions of various MPN procedures for different purposes are given, for example, by APHA (1995) and by HMSO (1983b).

An important disadvantage of the MPN procedure is that it is intrinsically inaccurate and potentially misleading. Assume that an MPN value is obtained of 100 organisms per 100 ml of water. This figure may be the most probable number, but a value of 80, or 120, is only slightly less probable; and the probability that the true number is either 80 or 120 could be greater than the probability that the true number is actually 100. In fact, although 100 is the most probable single number, it is almost certain that the true number is some greater or lesser value. Most MPN tables show, in addition to the MPN itself, the 95% confidence limits of the calculated value. Strictly, the test is incapable of estimating the number of bacteria in the original sample; it can only estimate with 95% confidence that the number of bacteria lies within a certain range. If this range were sufficiently narrow, this would not matter very much. In practice, however, the range is wide. For example, most published MPN tables show that for an MPN value of around 100 organisms per 100 ml, the 95% confidence limits embrace values from about 25 to about 270. Generally, the method cannot reliably distinguish between bacterial counts an order of magnitude apart. The MPN procedure is widely and routinely used in water quality monitoring, and arguably its limitations are not as fully appreciated as they should be.

Monitoring for other bacteria, and indeed for other microorganisms such as yeasts, algae and protozoa, can often be carried out (whether qualitatively or quantitatively) using procedures similar in principle to those used for coliforms, but with the appropriate culture media. Many proprietary kits are available from various manufacturers to reduce the time and labour required by the conventional methods, and many of these have been officially approved for use by regulatory agencies such as the US Environmental Protection Agency.

5.2.2 Monitoring for Viruses

Isolating, identifying and counting viruses from the aquatic environment is intrinsically more difficult than monitoring bacteria, and there is less agreement on standard methods (Dobberkau *et al.,* 1981; Gerba, 1983; Rao and Melnick, 1986). As they are generally far less numerous than bacteria, and because the efficiency of virus recovery is often low, large volumes of water (100 litres or more) sometimes have to be processed by special filtration procedures and other complex techniques for concentrating the virus particles. The viruses must then be inoculated into cultures of living cells and allowed to grow. They are then isolated from the cell cultures and identified. The identification of viruses itself requires specialised techniques, including the observations of their effects on the cells in culture, electron microscopy, immunological techniques and biotechnological methods (Reynolds and Rose, 1991). Many viruses of potential interest are notoriously difficult to grow in cell culture, or grow only very slowly. It takes much longer, often weeks rather than days, to obtain the eventual results than is the case with bacteria, and accurate quantitative results can be obtained only with great difficulty. For these reasons, and because of the specialist skills and facilities required for virological work, routine monitoring for viruses is not practised very widely, but it may become more common as new methods are developed. In view of the difficulties of isolating and identifying viruses from water, it would be advantageous for routine monitoring purposes to use a single, readily-identifiable virus species as an indicator of the possible presence of pathogenic viruses. One possibility is to use attenuated poliovirus for this purpose. In many countries, children are immunised routinely against polio by means of an oral vaccine containing live but attenuated (non-pathogenic) poliovirus. Thus in any large community, there will always be some people excreting the attenuated virus, and its presence in water might be taken to indicate that enteric viruses, including pathogens, are likely to be present in the water.

5.2.3 Monitoring for Parasites

Monitoring for parasites requires skilled personnel rather than specialised equipment. The most common method of identifying parasites is direct visual examination, under the microscope, of the water sample by someone trained to recognise the various life stages of parasitic organisms. The identification may be aided by certain staining procedures, and quantitative results can be obtained by using standard microscopical techniques of counting. Sometimes it is necessary to concentrate the suspended matter in a water sample of known volume, for example by centrifugation. Some parasitic protozoa, including *Entamoeba*

histolytica, can be cultured in suitable growth media and treated rather like bacteria (Diamond, 1983), and similar techniques for *Giardia* and *Cryptosporidium* are under development (e.g. HMSO, 1990; Musial *et al.,* 1987; Singh and McFeters, 1992). In areas where amoebic dysentery is endemic, a group of non-pathogenic intestinal amoebae (of the genus *Entamoeba* but distinguishable from *E. histolytica*) are useful indicators of the possible presence of pathogenic protozoa, rather as coliforms can be used as indicators of pathogenic bacteria.

5.3 Water Pollution and Water Supply

An important consequence of water pollution is that polluted water is generally less acceptable than clean water for most of the purposes to which water may be put. To take an obvious example, water carrying a heavy burden of potentially pathogenic organisms may be unsuitable for use as a source of potable water supply, or may only be rendered suitable by means of elaborate and expensive purification processes. These difficulties are exacerbated by the increasing need for water to be reused as demands on water resources increase.

5.3.1 Potable Water Supply

The requirement that potable water be free from pathogenic organisms is obviously of prime importance, and water treatment processes are designed to achieve this end. Conventional water treatment processes are less effective in removing chemical contaminants which may give rise to harmful effects. Nitrates are common pollutants of water (see Chapter 2), and may be found in high concentrations in water bodies used as sources for potable supply. Excessive nitrate in drinking water is dangerous, particularly to young children and to babies fed on dried or bottled milk. Nitrate ions are readily converted in the stomach (at the low pH of gastric juices) to nitrite ions which pass readily into the bloodstream. The nitrite ions react with the haemoglobin of the blood, forming methaemoglobin, a relatively stable compound which has a lower oxygen-carrying capacity than haemoglobin. Cyanosis (blueing of the skin) is the most obvious symptom of severe methaemoglobinaemia. Some thousands of fatalities have been recorded around the world, and in many countries nitrate in water supplies is routinely monitored to ensure that the concentration does not exceed 50–100 mg l^{-1}. In some areas of Britain, for example, it is necessary to distribute bottled water at times when the nitrate levels in the public water supply exceed the safe level. Nitrates (converted to nitrites in the stomach) can also react in the gut with amines to form potent carcinogens, although the epidemiological significance of this process is not yet clear.

Benes (1978) lists, in addition to nitrates, a large number of potentially toxic substances which can occur, in trace amounts, in drinking water derived from polluted sources. These include trace metals, pesticides, and a large number of

organic compounds, some of which are derived from industrial or agricultural pollution, some from leaching of chemicals from plastic and other materials used in the water distribution system, and even some derived from chemicals used in the processing of water and waste water. The significance of these 'micropollutants' is not well established, but their presence in drinking water is a potential cause for concern. In Europe, member states of the European Union are subject to two European Community Directives (see Chapter 6) governing the presence of trace pollutants and are obliged to ensure that levels of trace pollutants do not exceed certain limits. The two directives are the so-called 'Surface Water Abstraction' directive, which sets limits on the quality of water intended for human consumption *before* treatment, and the 'Drinking Water' directive which sets limits for water *after* treatment. These directives reflect public and official concern, though many argue that the limits set are unnecessarily strict, imposing high monitoring costs for no strongly-established scientific reason; and in some cases the limits set are so low that they may be technically impossible to achieve.

Nevertheless many national authorities attempt to follow guidelines laid down by international bodies such as the World Health Organisation, and may be subject also to mandatory standards laid down nationally or, as in the case of members of the European Union, through the relevant EU Directives. A useful guide to the problems of trace pollutants in potable water is given by Nicolson (1993).

5.3.2 Agricultural Water Supply

Agricultural activities are a major source of serious water pollution, but at the same time agriculture imposes a heavy demand for supplies of clean water. Noy and Feinmesser (1977) briefly summarised some of the difficulties which can arise from the use of polluted water for agricultural purposes. The seriousness of such problems depends, to a large extent, on the varying conditions which prevail in different parts of the world, especially in relation to the climate, the availability of water and the extent to which waste treatment facilities and general public health provisions are established. The volume edited by Shuval (1977a) includes examples from several different countries. The disposal of waste waters, whether treated or not, and of sludges from treatment processes to agricultural land has many economic and agricultural benefits, but there are a number of hazards associated with these practices. Even where the deliberate reuse of water is not practised, it is increasingly likely that agricultural water supplies will be drawn from water bodies which have previously received waste matter.

The most obvious adverse effects of polluted water in agriculture relate to the presence of toxic matter, especially heavy metals, and of pathogenic organisms. Agricultural animals probably do not differ much from humans in their sensitivity

to toxic heavy metals, and heavily-contaminated water is no more acceptable to them than it would be as a potable supply for humans. The sensitivity of plant species to heavy metals in their environment is well known. Although there is some possibility that crops may accumulate sufficient heavy metal to be hazardous to consumers, in practice the effects of toxic metals are initially economic; some crops will give a reduced yield, or fail altogether, if the levels of toxic metals in the soil or irrigation water are too high. Thus water pollution can restrict the uses to which land can usefully be put, or impose extra costs relating to the supply of water of adequate quality. Boron, for example, is like many other elements an essential requirement in trace amounts for plants; in excess, however, it is toxic. The widespread use of perborates in detergent formulations has led to concern that domestic sewage effluent, without any contamination from industrial sources, could so elevate the boron content of receiving waters as to exert an adverse effect on crops. Consequently it has been necessary for national and international agricultural agencies to formulate detailed recommendations concerning the chemical quality of water used for various agricultural purposes.

Pathogenic organisms in water or sludges applied to agricultural land present obvious potential dangers. Again, the magnitude of the hazard depends greatly upon the climatic, agricultural and general public health situation of the geographical area concerned. Infective life stages of parasites can be ingested by animals from contaminated water and transmitted to human consumers; some parasites may be transmitted directly to human consumers, particularly from salad vegetables or other crops which are eaten uncooked. The hazards from pathogenic bacteria and viruses have not been properly evaluated in many parts of the world, but Shuval (1977b) and Vaughn and Landry (1983) have briefly reviewed some studies which suggest that microbial contamination of arable crops through irrigation with contaminated water can contribute to the spread of disease.

5.3.3 Industrial Water Supply

Industrial usage accounts for a very large proportion of the total demand for water, and about two-thirds of the water used in industrial processes is used for cooling. The use in some industrial processes of sewage or other effluents, or of water which is too polluted for other water supply purposes, would appear to offer some advantages. In practice, the use of polluted water in industrial processes is subject to certain constraints. For example, the dairy and food-processing industries obviously require water of the highest quality, and it is not always economically feasible to construct and operate safely water distribution systems in which water of different quality is supplied to different factories within an area.

Many of the problems which can arise are not of a strictly biological nature; for example, the presence of ammonia and other chemicals can exacerbate corrosion problems in pipework. A common difficulty is the growth of bacterial slimes and the accumulation of organic detritus in cooling systems; this can be controlled by chlorination, provided that the presence of free chlorine at relatively high levels does not interfere with the normal operation of the factory. Shuval (1977b) drew attention to the possibility that the use of polluted water in cooling towers may spread pathogenic microorganisms over a wide area. Eden *et al.* (1977) discuss water reuse practices in Britain, and describe some examples of the use of polluted water for industrial water supply. A new and recent pressure is the demand from some very modern industries, such as the manufacture of electronic components, for water of a very high standard of purity. This could lead to the siting of manufacturing plants, often dealing with highly toxic chemicals, in the vicinity of the least-polluted water bodies of greatest utility and conservation value. In many countries planning considerations prevent this, and the alternative approach is to require potable water of the highest quality, and then to subject it to even further advanced treatment at the point of use. Some biologists may take the view that such developments should be vigorously opposed. Others may argue that the application of known principles and practices and of others yet to be discovered will allow an optimum water-use strategy to be devised which would not necessarily prohibit proposals which are of considerable social and economic value. The socio-economic dimension is here not directly relevant; but we may be certain that as one biological problem is solved, another will surely arise.

6

Water Pollution Control

Biologists have an important function in the control of water pollution. First, many waste treatment processes depend upon the controlled application of biological phenomena. Secondly, the assessment of the effects of pollution is ultimately a judgement which can only be made by biologists. Appropriate strategies for the treatment and disposal of wastes, and the assessment of the efficacy of such strategies, are therefore impossible without sound biological advice. Additionally, however, effective pollution control requires the expenditure of money, the professional advice of other scientific specialists such as chemists, engineers and hydrologists, and the formulation and enforcement of laws, regulations and administrative practices. The extent to which pollution is successfully controlled therefore depends upon constructive interactions between specialists from a diverse spectrum of disciplines.

The amount of money spent on the design, construction and operation of a sewage treatment works can be fairly precisely estimated. Any competent chemist can accurately determine the concentration of zinc, phenol or ammonia in a sample of water. Biologists, however, do have difficulty in estimating the number of fish or mayfly nymphs in a lake; and non-biologists may be forgiven if they do not easily understand why a million mayfly nymphs are preferable to an equal number of beetle larvae, particularly if they have been informed that in other places and under other circumstances the beetle larvae must be preserved! A legislative assembly may understand that while it can pass a law stating that all rivers must contain salmon, it is futile so to do; but the legislators may wonder why a concentration of ammonia which is harmless in one river may be devastating in another. The role of legislation is, however, clear. Since pollution control is expensive, technical advances do not necessarily lead to more effective pollution control in the absence of legislative, administrative and economic pressures which

can be brought to bear on the individuals, industries and communities which are responsible for pollution. Equally, laws or international agreements on the control of pollution cannot be effective in the absence of the necessary technical and economic resources, including the availability of suitably skilled personnel.

Effective pollution control therefore depends upon the availability of adequate technical means, of an appropriate legislative and administrative framework, and of trained personnel drawn from a variety of disciplines who are able to communicate effectively with one another. In this chapter, some technical and administrative aspects of water pollution control are considered together.

6.1 Biological Treatment of Waste Water

Sewage, and wastes consisting largely of putrescible organic matter, can be very effectively treated by biologically-based processes. In practice, these processes are often effective in treating wastes containing toxic substances, provided that the concentration of toxic matter is not too high. If untreated wastes are discharged to water they are broken down and assimilated into the receiving water ecosystem by a variety of physical, chemical and biological mechanisms. This may, however, cause disturbances in the receiving water ecosystem such as were described in Chapter 2. The objective of waste water treatment is therefore to minimise these disturbances by ensuring that the processes responsible for the breakdown of organic matter, and for the removal of suspended solids, pathogens and toxic substances take place, as far as possible, within the treatment plant itself rather than in the receiving water. In this way the effluent will have a relatively small effect on the receiving water when it is discharged.

Biological waste treatment processes have evolved over a period of more than one hundred years, partly through trial and error but increasingly by design, as understanding of the underlying biological and engineering principles has improved. The biological aspects of waste treatment processes have been described and discussed in the volumes edited by Curds and Hawkes (1975, 1983a, 1983b) and Gray (1992). Texts which also cover the engineering aspects of waste treatment processes include those of Mudrack and Kunst (1986), Hanel (1988) and Horan (1990). In tropical and developing countries, the design, operational and public health aspects of waste water treatment are significantly different, and are treated by Cairncross and Feachem (1993). A useful introductory text to water and waste water treatment technology for biologists is that of the Open University (1993).

Numerous variations of the basic methods are available, but it is convenient to describe conventional processes of biological waste treatment

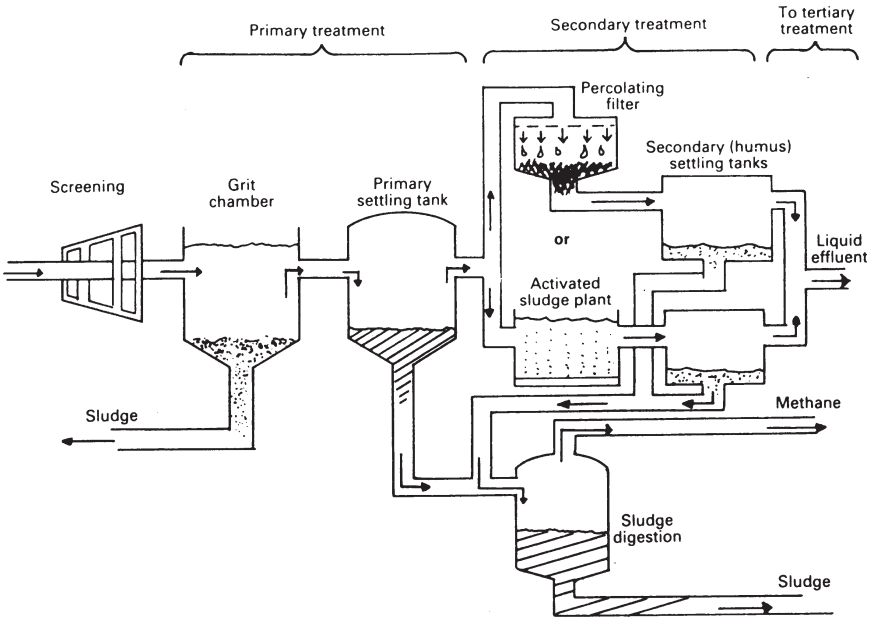

Figure 6.1 The different stages of a typical sewage treatment process

in terms of a division into preliminary/primary, secondary and tertiary stages. A typical treatment process can be summarised as in Figure 6.1. The efficiency of the various stages of sewage treatment varies widely, according to the quality of the waste water, the design of the plant and the operating conditions, which themselves vary widely, but some typical data are summarised in Table 6.1. Some other relevant data were given in Chapter 2 (Tables 2.1 and 2.2).

6.1.1 Primary Treatment

The initial treatment of the waste water is purely physical, consisting typically of screening and settling. The water is passed through series of screens formed from metal bars, to remove large objects such as bottles or pieces of wood. These large objects may be incinerated or otherwise disposed of, or may be comminuted into small particles and returned into the system. This stage, and a period of settlement to remove inorganic particles (grit), is often referred to as preliminary treatment. The water is then passed through one or more sedimentation tanks which are designed to allow a high proportion of the suspended organic particulate matter to settle at the bottom of the tank. This stage, together with the preliminary treatment stage, is often referred to as primary treatment. The settled organic particulate matter

Table 6.1 Effect of various sewage treatment processes on the 5-day biological oxygen demand (BOD), suspended solids content and bacterial numbers in sewage. The values given are those typically obtained under good operating conditions. Data from Klein (1966)

	Approximate percentage reduction (compared to values in raw sewage)		
Process	5-day BOD	Suspended solids	Bacteria
Sedimentation	30–40	40–75	25–75
Sedimentation + percolating filters	80–90	80–90	90–95
Sedimentation + activated sludge	85–95	85–95	90–98
Oxidation ponds	75–95	[a]	>99

[a]Suspended solids content of oxidation pond effluent can be very high, owing to the production of algae in the pond.

(primary sludge) may be disposed of in various ways (see Section 6.1.4), and the remaining liquid may then pass to the secondary treatment stage.

6.1.2 Secondary Treatment

Secondary treatment, if applied, is most commonly undertaken by one of three methods; percolating filters, the activated sludge process, or oxidation (stabilisation) ponds. These are all essentially biologically-based processes in which organic matter is broken down aerobically by the metabolic activity of microorganisms. It is important that the breakdown of organic matter occurs aerobically; under these conditions, organic compounds (mainly composed of the elements carbon, hydrogen, oxygen, phosphorus, nitrogen and sulphur) are rendered into relatively innocuous inorganic compounds such as carbon dioxide, water, carbonates, nitrates, sulphates and phosphates. Under anaerobic conditions, organic matter is broken down by different metabolic pathways (usually by predominantly different microorganisms) to produce methane, ammonia, amines, organic compounds of phosphorus and hydrogen sulphide. These compounds are, in general, toxic to most forms of life as well as being aesthetically unacceptable. (Some of the reactions involved in aerobic and anaerobic decomposition processes were summarised in Section 2.3.) Anaerobic conditions in waste treatment plants are therefore generally avoided, as they impair the efficiency of the treatment process and produce an effluent with undesirable and potentially

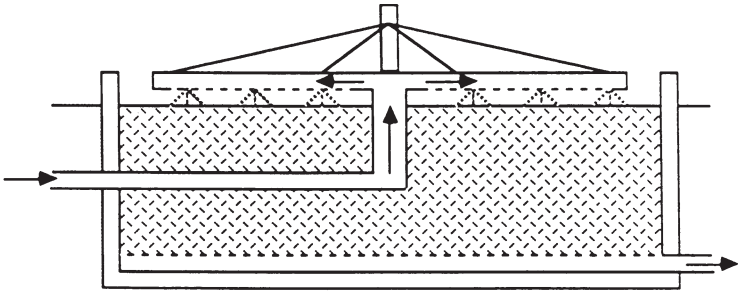

Figure 6.2 Cross-section through a percolating filter

harmful characteristics. There are, however, some circumstances—such as sludge treatment (Section 6.1.4)—where the controlled use of anaerobic decomposition is beneficial. Also, anaerobic decomposition plays an important part in the functioning of oxidation ponds (see below).

Percolating (trickling) filters consist of circular or rectangular beds, usually about 2 m deep and from a few square metres up to about 2000 square metres in surface area, of stones, slag or synthetic material through which the settled sewage is allowed to percolate slowly (Figure 6.2). The preferred material for constructing the filter bed is fairly coarse (25–50 mm) and of more or less uniform size to ensure that air-filled void spaces are plentiful. Materials with rough surfaces (high surface area/volume ratio) are advantageous. Traditionally stones or slag were used in filter beds, but these are increasingly replaced by lightweight plastic materials specially designed for the purpose which are more efficient. When sewage is allowed to trickle through the filter, the surfaces of the filter medium become colonised with a thin film of bacteria and other microorganisms. This biological film is responsible for the breakdown of organic matter in the sewage. It typically contains heterotrophic bacteria which utilise complex organic compounds, and autotrophic bacteria which oxidise simple compounds, for example converting ammonia to nitrate. In addition, however, percolating filters support a variety of other organisms, including fungi, algae, protozoa, and many invertebrates, especially annelids, insect larvae, nematodes and rotifers.

The relationships between these various organisms in the percolating filter, and their role in the treatment process, have been the subject of much study (Curds and Hawkes, 1975; Hawkes, 1963). Some appear simply to colonise, opportunistically, the favourable environment which the filter provides. Some of the filter biota are undoubtedly a potential source of nuisance; flies, for example, can become very numerous in the vicinity of trickling filters, and excessive growth of fungal mycelium within the filter can fill the void spaces, reducing the filter's efficiency and in severe cases rendering it inoperative. However, many of the organisms typically found in percolating filters make a positive contribution to its function. Protozoa feed on bacteria, and/or particulate organic matter, thereby contributing to the biological processing of the matter present in the sewage. The invertebrate

species feed upon the meiofauna, on bacteria, and on particulate organic matter. They also browse upon the microbial film which is being continuously generated upon the surfaces of the filter medium. Their activities have three beneficial effects. First, they prevent the microbial film becoming too thick; excessive growth of the film would eventually tend to reduce the efficiency of the filter. Second, they process organic matter—whether newly-synthesised by microbial activity, or that originally present in the sewage—consolidating it into faecal pellets which settle out more readily at the secondary sedimentation stage. Finally, through their respiration they are responsible for the conversion of a significant proportion of the organic matter to carbon dioxide and water.

In effect, the trickling filter is an intensely-productive semi-controlled ecosystem whose energy source is the organic material present in the sewage. The precise characteristics of the community which develops in the filter depend upon the quality of the sewage and the operating conditions of the filter. The qualitative and quantitative characteristics of the filter bed community can sometimes be used to assess the performance of the treatment process in much the same way that indicator organisms can be used to assess the biological quality of receiving waters (Chapter 3). Overall, the filter ensures that the organic matter present in the sewage is biologically utilised under aerobic conditions. Were this matter to be discharged untreated into the receiving water, its utilisation would result in deoxygenation of the water, with the undesirable consequences described in Chapter 2. The effluent from the percolating filter is very different from the settled sewage which entered it a few hours earlier (Table 6.1), although it still contains a lot of organic matter. A large proportion of this, however, is recently-elaborated biomass. The biological film and its associated grazing organisms gradually break off from the underlying filter medium, and the liquid effluent from the percolating filter therefore requires further settling in tanks similar to those used in primary treatment. This gives rise to a secondarily-treated liquid sewage effluent (which may be discharged, or subjected to tertiary treatment) and to secondary sludge, or humus. The secondary sludge has a high organic content, and may be disposed of by various means (Section 6.1.4).

An alternative to percolating filters as a means of secondary treatment of sewage is the activated sludge process. In theory, secondary treatment by biological oxidation could be achieved simply by holding settled sewage in a suitable container and subjecting it to aeration. In practice, early experiments showed that the period of time required for acceptable treatment to be achieved by this simple approach was far too long. In addition, the exigencies of sewage treatment dictate that the process should be a continuous-flow rather than a batch-type operation. Various solutions to these problems have been devised, and the development and principles of the activated sludge process are described by Hawkes (1983a). The first operational plants which worked on a continuous flow basis appear to be those at Davyhulme, Manchester and in Worcester, both in England, in 1914

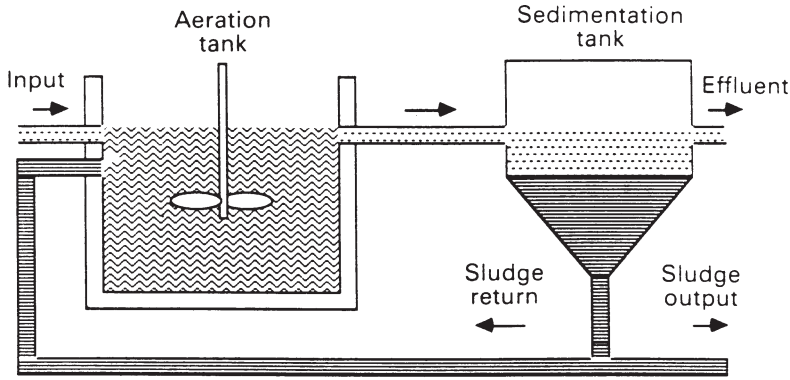

Figure 6.3 The activated sludge process

and 1916 respectively. The method is about equally as effective as percolating filters, but in some circumstances has economic and engineering advantages. It is cheaper to install and requires less land, and nuisances caused by odours and insects associated with percolating filters are less troublesome. However, the process is more expensive to operate, and requires much stricter supervision of its operating conditions, so its suitability for a given location depends on local circumstances and the availability of qualified staff to operate the system.

There are many variants of the activated sludge process, but its basic principles are illustrated in Figure 6.3. Settled sewage is introduced to a tank at a rate which is designed to allow complete replacement of the tank's contents within a period of a few hours. During this time, the sewage in the tank is aerated vigorously. Microbial metabolism brings about breakdown of the organic material present in the sewage. As in the percolating filter, the end-products of this breakdown are carbon dioxide, water, simple inorganic compounds and a considerable quantity of newly-synthesised organic matter consisting largely of microbial biomass. The effluent from the tank is passed to settling tanks in which the organic solids are separated from the liquid component of the effluent. However, an essential feature of the activated sludge process is that a substantial proportion of the organic solids is returned directly to the reaction tank (Figure 6.3), while only the liquid effluent is discharged.

The biological processes which occur within the reaction tank have been the subject of much study (Geraldi, 1990; Hawkes, 1983a). Growth of bacteria, fungi, protozoa and microinvertebrates (particularly rotifers) results in the production of an organic floc. The physical and biological characteristics of this floc appear to be extremely important. The characteristics of the floc are greatly influenced by the operating conditions of the process, and in turn the efficiency of the process is clearly influenced by the characteristics of the floc. A plant which is performing badly is frequently found to have a floc whose physical appearance and biological composition is very different from that

found in a plant which is operating well. In fact, regular inspection of the floc characteristics is widely used in monitoring the correct operation of the activated sludge process. A rather narrower range of organisms is typically found in activated sludge tanks than in percolating filters. Again, the question arises of whether these organisms are fortuitously colonising a favourable environment, or whether they have a specific and desirable role in the process. Experimental studies (Curds, 1975) have shown clearly that protozoa are responsible for a marked reduction in the turbidity of the effluent, and for the reduction in the numbers of bacteria present in the effluent. Effluents from plants containing protozoa also have lower values of biological oxygen demand (BOD), chemical oxygen demand (COD), organic nitrogen and suspended solids compared to those from plants operating without protozoa. Rotifers also appear to be important. Doohan (1975) suggests that they are responsible for removing non-flocculated bacteria. They also promote floc formation, by producing faecal pellets and by breaking up large floc particles, both processes providing nuclei for the formation of further floc.

Oxidation (stabilisation) ponds are also widely used as a means of sewage treatment. Strictly speaking, oxidation ponds are not a means of secondary treatment, but rather an alternative means of complete sewage treatment to what have come to be regarded as conventional methods. Where oxidation ponds are employed, there is frequently no division of the treatment process into primary, secondary and tertiary. Some forms of tertiary treatment, as conventionally practised, in fact involve the treatment of secondary sewage effluent in what amounts to an oxidation pond (see Section 6.1.3). As Hawkes (1983b) points out, treatment of used waters in biological oxidation processes involves the speeding-up and intensification of the natural processes of purification which occur in natural ecosystems. Oxidation ponds represent the lowest practicable level of this intensification, while percolating filters and activated sludge processes represent respectively higher levels. Thus to treat the sewage from 1000 people typically requires an area of 35 square metres in an activated sludge plant; but 210 square metres of percolating filter and between 2000 and 50000 square metres of oxidation pond, depending upon climatic conditions, are required to treat the same amount of sewage to a similar standard. Oxidation ponds are therefore particularly associated with warmer climates and regions which are technologically less well developed, although they are utilised in all parts of the world where local conditions are appropriate.

As with other sewage treatment processes, many variations of the basic procedure have been developed (Mara, 1988). A typical process is that described by Hawkes (1983b) as the facultative oxidation pond. A typical pond (Figure 6.4) is about 1 m in depth. Waste is introduced near the bottom of the pond, which has a retention time of a few hours or days, depending upon local conditions. Frequently, ponds are arranged in series so that the

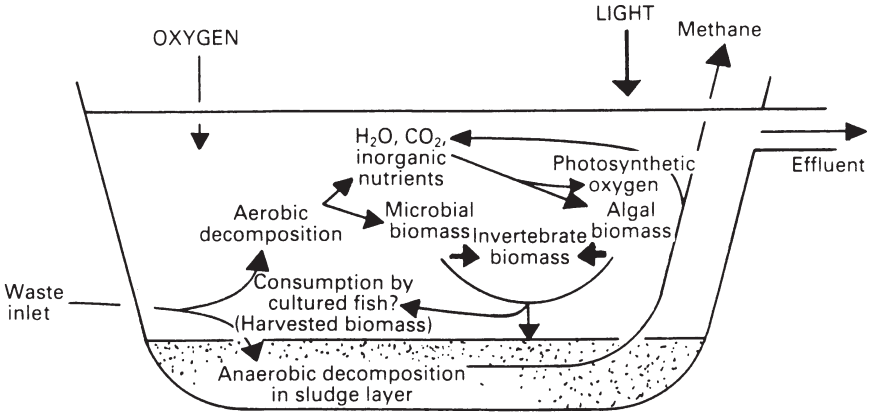

Figure 6.4 Summary of the processes which occur in a facultative oxidation pond

effluent from one pond is passed to another for further treatment. The pond acts as a sedimentation tank, so that a layer of organically-rich sludge accumulates on the bottom. Within this sludge layer, anaerobic conditions quickly become established and decomposition of organic material takes place, resulting in the production of methane, carbon dioxide, ammonia and other metabolites typical of decomposition by anaerobic bacteria. These products themselves undergo further transformations in the upper, aerobic layers of the pond. Algae are particularly important in the functioning of oxidation ponds. If light is available, algal photosynthesis removes carbon dioxide and plant nutrients from the water, while providing photosynthetic oxygen. This allows the development of an aerobic bacterial flora which brings about further degradation of organic matter in the sewage. The waste material is thus broken down and resynthesised into new biomass. In part, this biomass eventually settles down into the sludge layer and is recycled within the system. However, the newly-synthesised material, through respiration, is responsible for converting a significant proportion of the waste matter to carbon dioxide and water. It also provides a rich source of energy which is capable of supporting a complex ecosystem. In some cases, waste treatment can be combined with aquaculture so that useful material (e.g. plant biomass, fish), can actually be harvested from the system. As a means of sewage treatment, stabilisation ponds compare well, under favourable conditions, with the standards achieved by other processes (Hawkes, 1983b; Mara, 1988).

6.1.3 Tertiary Treatment

After secondary treatment and sedimentation, the effluent is often discharged without further treatment. Tertiary treatment, if necessary, is applied to the effluent to bring about specific improvements to the secondary effluent before it is

discharged. The precise nature of the tertiary treatment required depends upon the efficiency of the earlier stages of treatment, the characteristics of the receiving water and the uses to which the receiving water may subsequently be put. It is not therefore possible to describe a typical procedure for tertiary treatment, but the following examples illustrate the range of treatments which may be employed. The principal reasons for employing tertiary treatment are to bring about a further reduction in the BOD, suspended solids, ammonia, nitrate and phosphate in the effluent. Frequently, the most convenient method of achieving this is to pass the effluent through a further stage of biological filtration, perhaps using a modified form of percolating filter known as a 'high rate' filter. Nitrogen and phosphorus can be removed by a modified activated sludge process (Horan, 1990), and ion-exchange processes are available for the removal of phosphate and other inorganic ions, although they are expensive. Sand filters, similar to those used in water supply treatment plants, are effective in improving the quality of the final effluent. Sand filters, of course, are not simply physical filters; as in the percolating filter, the sand particles develop a microbial flora whose metabolism contributes to the effectiveness of the process.

An additional stage of simple sedimentation in a suitable tank has frequently been found to produce a useful reduction of BOD and suspended solids in the final effluent. Lagoons, similar to oxidation ponds, are a useful form of tertiary treatment where sufficient land is available, and effectively reduce BOD, suspended solids and nutrients. Traditionally, a widely-employed alternative is simply to allow the effluent to pass slowly over an area of slightly-sloping grassland. Organic solids are deposited and utilised in the soil, reducing suspended solids and BOD, and plant nutrients can be effectively absorbed by the growth of grass, which can be periodically mowed and removed; this method is however now largely obsolete. The optimum solution for any particular tertiary treatment problem depends primarily upon local conditions. Finally, tertiary treatment is sometimes required to remove pathogens from the effluent. Any form of tertiary treatment is likely to assist in removing pathogens, by sedimentation and mortality due to the passage of time outside the normal host. However, it is sometimes necessary to employ special techniques such as ultra-violet irradiation of the final effluent. A concise description of the major types of tertiary treatment in current use, and their applications, is given by IWEM (1994).

6.1.4 Sludge Disposal

Sewage treatment generates substantial volumes of organically-rich sludge. In stabilisation ponds the sludge itself plays an important part in the treatment process, but in other processes the sludge which is generated following primary and secondary treatment must be disposed of. Various means are employed to treat and dispose of sewage sludge, the method chosen depending mainly upon local

conditions and the particular characteristics of the sludge. In general, sewage sludge is composed approximately of 98% water and 2% organic and inorganic particulate matter. Secondary sludge tends to have a higher organic content than primary sludge, and all sludges contain some quantity of potentially toxic material, and various pathogenic organisms.

One approach to the problem of sludge disposal is to regard it simply as waste material. In coastal areas, particularly in Britain and the USA, sewage sludge is frequently dumped at sea from specially-constructed vessels. The extent to which this practice represents a serious threat of marine pollution is a matter of controversy. Traditionally the United Kingdom, having a relatively long coastline, has regarded sludge disposal at sea under controlled conditions as a legitimate option, but under pressure from other European countries which have short coastlines, has agreed to eliminate this practice by 1997. At inland sites, disposal at sea is not practicable and other means of disposal must be sought. A major difficulty is to reduce the bulk of the sludge, and one of the simplest means of achieving this is to spread the liquid sludge onto drying beds, allowing the water to evaporate and consolidating the sludge into a more compact form, so that it can be accumulated on-site or perhaps transported elsewhere for disposal as landfill, as fertiliser or for other useful purposes. In some cases, liquid sludge is transported from the treatment site and spread onto agricultural land, where it may perform a useful function both as fertiliser and as a means of irrigation. However, the presence of toxic material, pathogens and parasites in sewage sludge presents a severe limitation on the disposal of sludge to agricultural land, and the commonly-held belief that this is a feasible means of solving the problem of sludge disposal is naive and largely false. At the very least, sludge requires dewatering and heat treatment before use in agriculture, and in addition high transport costs usually render this option unacceptable. Because sewage sludge is, potentially, a valuable resource rather than simply a waste material, many methods have been devised specifically for the treatment of sludge, and in particular for reducing its bulk (for ease of transport), and for eliminating pathogenic organisms. Descriptions and evaluations of sludge treatment processes are given by White (1978) and Frost *et al.* (1990); some important biological aspects of sludge treatment are discussed by Mosey (1983), Green (1983) and Frost *et al.* (1990). The methods of sludge treatment applied in particular circumstances depend largely upon local conditions and upon economic considerations.

Traditional sludge-drying beds are formed by spreading a layer of sludge, approximately 200 mm thick, over a drainage layer of ash or similar material. Liquid effluent from the drying beds can be collected by drainage channels and is ideally recirculated for further secondary treatment, as it has a high BOD and organic content. The remaining water is lost by evaporation. Sludge-drying beds require extensive land areas, especially in temperate or cool climates, and can create local nuisances due to odours and insects. They have largely been superseded by other methods of treatment. There are many advantages in reducing the water

content of sludge by other means, and the addition of chemical coagulating agents (such as compounds of iron and aluminium) to sludge has been found useful. Heat treatment of sludge (at about 200°C for 0.5 h) also appears to aid coagulation, and is useful in reducing the load of pathogenic organisms. Various processes of sludge dewatering which rely on filtration under pressure are also widely used.

Sludge treatment processes which are essentially biological in nature include anaerobic fermentation and composting. Anaerobic fermentation of sludge (sludge digestion) takes place in closed vessels, and results in a marked reduction in the organic content of the sludge as a result of anaerobic bacterial action. The operating conditions of sludge digesters vary (some, for example, are heated to promote the growth of particular bacteria, or to speed up the digestion process). In many cases, the end product of bacterial metabolism is methane, which can be collected and burned to provide energy for heating the digesters, or for other stages of the sewage treatment process. Composting of sludge is an aerobic process similar to the traditional garden compost heap; typically, sewage sludge is mixed with solid domestic waste in a ventilated enclosure. The end product of the process is an organic humus of value as an agricultural fertiliser. In many conurbations, the disposal of domestic solid wastes and of sewage sludge each pose a problem. Domestic waste has a high organic content but is too dry and frequently too deficient in nitrogen to allow composting to occur. Sewage sludge has too high a water content to allow aerobic decomposition to occur readily. Mixing the two forms of waste together under appropriate conditions can offer an economic solution to both problems. Finally, if no other method is appropriate to local conditions, sewage sludge can, like solid domestic waste, be incinerated.

6.1.5 Biological Treatment of Industrial Waste Water

Although conventional biological treatment processes were devised primarily for the treatment of sewage, they often work well with industrial wastes, though frequently the treatment processes have to be modified. Many industrial waste waters are similar in composition to raw sewage, particularly those from the dairy and foodprocessing industries, and from industries involved in the processing of natural materials. However, a common problem is that industrial waste waters are much more concentrated than typical sewage. Dairy wastes, for example, are difficult to treat by conventional biological filtration because the filters readily clog with fatty material and fungal masses. The concentrated nature of dairy effluents means that they rapidly begin to decompose anaerobically, so clogging of the filters rapidly leads to the breakdown of the whole treatment process. A typical means of overcoming this difficulty is to modify the conventional treatment process. First, the raw effluent is diluted; this can be achieved by mixing the raw effluent with a quantity of the final, treated effluent. Secondary treatment is carried out not with a conventional percolating filter, but by a modified process known as

alternating double filtration. In this system, two percolating filters are arranged in series. The effluent from the first is passed, after settling, through the second. The biological film in the first filter builds up rapidly; however, before the filter becomes clogged the flow of effluent is diverted so that the second filter receives the raw effluent first, while the first filter now receives partially-treated effluent. This has the effect of stripping out from the first filter the excessive quantity of film, which settles out in the sedimentation tank. When the second filter approaches the stage at which it begins to clog, the filters are alternated again. The regular alternation of the filters brings about a very effective treatment of the highly-concentrated waste; indeed, many conventional sewage treatment works operate on the alternating double filtration system simply to increase the speed of treatment.

A wide variety of industrial waste waters can be successfully treated by modified biological processes. A common practice is continuously to seed the percolating filter or activated sludge plant with a range of microorganisms which have been specifically isolated and cultured for their ability to metabolise the waste in question. Frequently, industrial wastes need special pretreatment before they are amenable to biological treatment. Common forms of pretreatment include: neutralisation of extreme pH; the removal of toxic substances by ion-exchange, coagulation or volatilisation; and the physical separation of oils, greases or other undesirable matter which may interfere with the normal treatment processes. A common difficulty is that many wastes, including some which are principally organic in origin, are deficient in one or more of the nutrients which are essential for the rapid development of the fauna and flora of the treatment process. For most biological treatment processes, the elements carbon, nitrogen and phosphorus should be present roughly in the ratio 100:5:1. In many industrial waste waters the nutrient elements are deficient, and frequently nitrogen, phosphorus or other nutrients in a biologically-available form are added to the waste water to enhance the efficiency of the treatment process. As the physical, chemical and biological processes underlying the treatment of different kinds of waste material become better understood, it becomes increasingly possible to develop specific processes by design rather than through the traditional, largely empirical approach (Rittman, 1992).

6.2 The Legislative and Administrative Framework of Water Pollution Control

Important as it is, the control of water pollution is only one aspect of the overall management and utilisation of water resources. Generally, the policies and practices associated with water pollution control are broadly compatible with those of water supply, fisheries, conservation and recreation. They may conflict, however, with political or economic priorities associated with waste disposal, industrial or agricultural development, transportation or other legitimate demands upon water resources. Pollution control policies must also be formulated in accordance with

the available technical, human and economic resources. Therefore the legislative and administrative measures which are employed in water pollution control vary widely from one country to another, and indeed change over time within a single country as circumstances change. This discussion introduces some examples of legislative and administrative approaches to water pollution control. It is based largely upon the procedures adopted in Britain, Europe and the United States. The systems adopted in these countries are not necessarily perfect, but they represent the kinds of system which have evolved in countries which are relatively wealthy, industrialised and, at least in some regions, very densely populated.

Most developed countries have some form of legally-constituted regulatory agency which is responsible for the monitoring and control of water pollution. The legislative framework within which the regulatory agencies operate may be broadly similar in different countries, but in practice the important consideration is the basis upon which consent conditions, i.e. permission to discharge waste material to water, are formulated. It is upon this issue that practices differ widely between different countries, depending upon local circumstances; and it is upon this issue that purely scientific or technical judgements need to be balanced against socio-economic criteria. As pollution is increasingly recognised as an international rather than a purely local problem, such differences in approach become correspondingly more important. To take a simple example, many European rivers pass through several different countries and differences in pollution control strategies can give rise to disagreements between sovereign states. In Europe, members of the European Union are increasingly subject to European laws and regulations which may dictate departures from their normal pollution control practices; differences which may arise between politicians from the different countries concerned are no more vigorously debated than those which occur between the scientists! Similar situations arise in the USA and in other federal countries, where state regulatory agencies may be subject to federal laws which are different in approach or emphasis from state laws or practices. It is therefore important to consider the various approaches which may be taken to the problem of what constitutes an 'acceptable' level of pollution.

For the purposes of this discussion, four general principles can be distinguished as forming the basic elements of an effective strategy of pollution control:

1 the 'polluter pays' principle;
2 receiving water quality standards;
3 emission standards; and
4 water quality objectives.

It is necessary to examine these basic elements before comparing how they are employed within different legal traditions to achieve the common objective of a satisfactory level of pollution control.

6.2.1 The 'Polluter Pays' Principle

It is widely accepted that those who are responsible for pollution should contribute towards the costs of monitoring, regulating and controlling the adverse effects of pollution. However, the 'polluter pays' principle is clearly insufficient in itself as an effective and equitable mechanism of environmental protection. Consider, for example, a factory which produces a substantial amount of contaminated waste water. The factory owners may be unwilling to meet the costs of treating the wastes, or may lack the technical ability to do so. The factory therefore discharges untreated waste, thereby obtaining an economic benefit at the expense of the community at large. Clearly the factory should be made to compensate the community for this, perhaps passing on the economic charge to the eventual consumers of its products. The calculation of the charge to be made, however, is difficult. It should be possible to calculate the economic cost of treating the waste, and the extra costs incurred at water treatment works owing to the fact that the raw water is of lesser quality than it would otherwise have been. The additional costs to the regulatory authorities of monitoring the effects of the pollution, and the economic losses associated with any deterioration of fisheries, are in principle calculable, though not easily so. However, it is difficult to estimate in purely economic terms the amenity or aesthetic value of unpolluted water in comparison with polluted water, or to put a cost in money terms on the loss of species diversity in the aquatic community. It must also be recognised that not all polluters can be identified and charged. Further, there are several objections to the idea that permission to pollute should be given in exchange for a cash contribution to the community at large. In the absence of some additional form of regulation, the 'polluter pays' principle leads almost inevitably to the idea that pollution is a right which may be exercised by anyone who is able and willing to pay the appropriate charge. There are moral and philosophical arguments against such a proposition, but in any case the idea is impracticable. For example, some rivers may already be so polluted that any additional burden would create ecological or public health consequences which are unacceptable at any price. Some forms of pollution, such as radioactivity or certain toxic chemicals, are so potentially hazardous that their disposal demands special procedures; to allow their discharge simply in exchange for an economic charge would be extremely dangerous. Finally, some habitats are of particular scientific, conservation or amenity value and their protection from pollution would be undermined by acceptance of the simple proposition that pollution can be compensated for by a cash payment. Thus while considerations of logic and equity dictate that elements of the 'polluter pays' principle should be preserved, the principle must operate within a regulatory framework which prevents the inherent tendency of the principle to lead to environmentally undesirable consequences.

Some examples from British regulatory practice illustrate one way in which the 'polluter pays' principle can be incorporated into an overall pollution control

strategy. For example, every household pays a charge for the water it consumes which is distinct from general taxation, and includes also a charge for 'environmental services' (i.e. sewage treatment). Activities such as pollution monitoring, fisheries, river management, and flood prevention are the responsibility of the Environment Agency, and are financed partly from general taxation but also from charges levied on polluters directly, through levies on local communities collected by the local authorities and from the sale of, for example, fishing licences. The discharge of wastes to water is expressly forbidden except with the permission of the regulatory agency (Environment Agency—formed in April 1996 through the amalgamation of the National Rivers Authority with other statutory agencies concerned with environmental protection, such as Her Majesty's Inspectorate of Pollution). Permission can be refused altogether, to prevent discharges of especially hazardous waste or to protect specific habitats. The Agency may charge the polluter for the discharge consent, to cover the cost of any investigations which may be required. Where permission to discharge is granted, qualitative and quantitative limits are set which may not be exceeded. If the limits are exceeded, fines and penalties are imposed by the courts upon the offender. These economic penalties are often in themselves relatively insignificant, although recently they have been considerably increased (NRA, 1993), partly because of extra powers conferred upon the courts by the Water Resources Act of 1991. However, offenders can often be compelled to pay for the restoration of any damage they cause (such as restocking rivers with fish) and this cost is often the most significant penalty.

Sewerage charges to industrial premises are charged for at a rate which may reflect the costs of treating the waste water, of monitoring the impact of the discharge on the receiving water, of increased costs of managing and maintaining the receiving water and of increased water treatment costs of downstream water supply works. Large undertakings frequently undertake their own waste treatment, either in exchange for reduced sewage treatment charges or because the consent conditions for their discharges make this an absolute requirement. Smaller undertakings are permitted, within limitations, to discharge wastes to the public sewerage system in exchange for a payment. The level of these payments can, at least in principle, be set at a value which acts as an economic incentive to the factory operators to improve the quality or reduce the quantity of the effluent. Thus the 'polluter pays' principle operates only within regulatory constraints which are intended to ensure that the principle has beneficial rather than adverse environmental effects.

6.2.2 Receiving Water Quality Standards

In order to decide whether or not a polluting discharge should be permitted, and if so under what conditions, it is obviously necessary to have some idea of the maximum quantity of pollutant which a water body can assimilate without undergoing adverse consequences. Where the receiving water is to be used as

a source of water supply, or for recreational or agricultural purposes, clearly special considerations may apply. However, for the purposes of this discussion it will be assumed that the dominant consideration is the preservation of aquatic life. The degree of pollution which is deemed 'acceptable' in any particular circumstances is only partly a biological question, but a reasonable objective which may be adopted is that the existing biological characteristics of the receiving water should not be significantly altered by the discharge of wastes to the receiving water. To implement this water quality objective (see Section 6.2.4) by means of specific decisions on the quantity and quality of effluent which may be discharged requires a reasonably reliable estimation of the likely effects of pollutant concentrations on individual species within the aquatic community, on the community as a whole and on the physico-chemical environment of the receiving water. If it can be established, for example, that a certain concentration of a toxic substance is unlikely to exert any significant effect in the receiving environment or upon its biota, then discharges can be regulated by various means to ensure that the concentration of the poison in the receiving environment is kept below that level.

Water quality standards for different forms of pollution are devised in different ways, because the means by which pollutants bring about their effects vary. Putrescible organic matter, for example, brings about a variety of changes in the receiving water environment (see Chapter 2) but these can largely be avoided if the dissolved oxygen concentration is maintained above a certain level. Knowing the BOD of the effluent, the degree of dilution afforded by the receiving water and certain physical characteristics of the receiving environment, it is possible to predict fairly accurately the oxygen sag curve which will occur. The dissolved oxygen requirements of many important aquatic species, especially fishes, are reasonably well known (see, for example, Alabaster and Lloyd, 1980). Therefore it is relatively easy to determine a quality standard for dissolved oxygen which can be translated into an emission standard (see Section 6.2.3) for organic matter. Toxic pollutants present greater difficulties, mainly because relatively little information exists on the effects of long-term, low-level exposure of animals to many poisons. Additionally, the toxicity of many poisons is greatly influenced by environmental conditions; many poisons are selective in their effects; and they normally occur in water in mixtures and at fluctuating concentrations (see Chapter 4). Water quality standards for toxic pollutants are derived on the basis of evidence from experimental studies and, where they exist, observations made during chemical and biological studies of polluted waters. For all but the most common pollutants, however, relatively little data are available from field studies and water quality standards have to be based on toxicological studies, especially toxicity test data of various kinds (see Chapter 4). This is obviously also true in the case of novel pollutants.

The bulk of the available toxicological data relates to lethal levels of pollutants; much less information is available on sublethal toxicity and the behaviour of pollutants at realistic levels in, for example, controlled or semi-controlled ecosystems. Data of the latter kind are accumulating slowly, as techniques are developed, but the main problem of formulating water quality standards from toxicological data remains that of using median lethal concentrations, or other data from relatively short-term experiments, as the basis for estimating concentrations which will not only fail to kill any organisms, but which will allow them to survive, grow and reproduce normally. One widely-used technique for deriving water quality standards from toxicological data is the 'application factor'. It is relatively quick and simple to determine lethal toxicity. The application factor is based upon the assumption that for every poison there must be a concentration which is so low that it has a negligible effect; and that this concentration should bear some approximate relation to the lethal threshold concentration, or other measure of acute toxic effect. Thus, multiplying the lethal threshold concentration by a factor (e.g. 0.1) should give a rough indication of the 'acceptable' level of the poison.

Methods of deriving application factors vary, and were briefly reviewed by Sprague (1971). Some methods are little more than simple extrapolation of the data, others are based upon statistical or other considerations, but all are subject to a degree of arbitrariness. There is little scientific validity in their use, but in practice they have been found useful and many regulatory agencies in Europe and North America have published recommended application factors for a wide range of poisons. Values vary from about 0.01 for persistent or cumulative poisons, to about 0.3 for rapidly-degradable poisons of fairly low toxicity. As Sprague (1971) emphasised, 'The value of the application factor is assigned on the basis of the judgement of scientists'. Although the basic concept of the application factor is, in practice, still widely used, the more recent literature contains few references to the idea. In part, this may be a reflection of the development of sublethal toxicity test methods and, particularly in the USA, of the idea of the NOEC (no observable effect concentration). Attempts were made, in the late 1960s and early 1970s, to determine application factors experimentally by calculating the ratio of the NOEC to the lethal concentration. However, the determination of NOEC is itself a somewhat arbitrary process (see Chapter 4), and the whole approach seems to have been superseded by what has come to be known as sequential hazard assessment (Duthie, 1977).

Sequential hazard assessment is not in fact a particularly novel approach to assessing the potential hazards of water pollutants. Rather, it is simply a codification of the sequence of investigative processes which has long been recognised as

necessary to derive water quality standards from toxicological data. The development of modern techniques, and very importantly the gradual accumulation of a reliable database of previous experience, render sequential hazard assessment possible; but the underlying process of scientific judgement remains the same as it always has been. The approach has been described, with examples, very clearly by Tooby (1978), and can be expressed in the form of a simple flow chart (Figure 6.5).

Essentially, a sequential hazard assessment scheme consists of a number of steps, each providing progressively more complex information. Each succeeding stage in the investigation is generally more expensive and time-consuming than the previous one. The advantage of such a scheme is that, at least in some cases, the later and more difficult steps can be dispensed with. For example, Figure 6.5 shows that the preliminary assessment is designed to establish the 'margin of safety'. Here, the results of a few simple screening tests can be compared with the projected environmental concentrations and patterns of use of the chemical. If, say, the 96-h LC50 of the chemical to a carefully-chosen range of test species is more than 10000 times greater than the expected environmental concentration, experience suggests that the chemical is not particularly hazardous. Taking into account its pattern of use (e.g. whether it will be permanently present in the water, or only for a few hours or a few days occasionally), the decision may be made that no further tests are required and that permission to discharge may be given, at least provisionally. If, on the other hand, the 96-h LC50 values are within an order of magnitude of the projected environmental concentration, the likely decision will be that the chemical is unacceptable, again without the need for further tests. Margins of safety lying between these two extremes would tend to indicate the need for further investigations, that is, to proceed to the next step of the scheme.

At any stage, the investigation can be terminated when sufficient information has been gained to make, in the light of previous experience, a decision. Both industry and regulatory authorities can follow a similar procedure, and the advantages in terms of speed and economy are obvious. The procedure not only allows the simple decision 'accept or reject the chemical' to be made. It clearly also permits decisions to be made upon, for example, the concentrations which are acceptable and any restrictions or conditions which should be put on the discharge of the pollutant (e.g. to protect early life stages at certain times of the year). Obviously, however, any water quality standard determined on this basis is tentative, and should ideally be evaluated in the light of ecological monitoring of the receiving waters subsequent to the discharge of the pollutant.

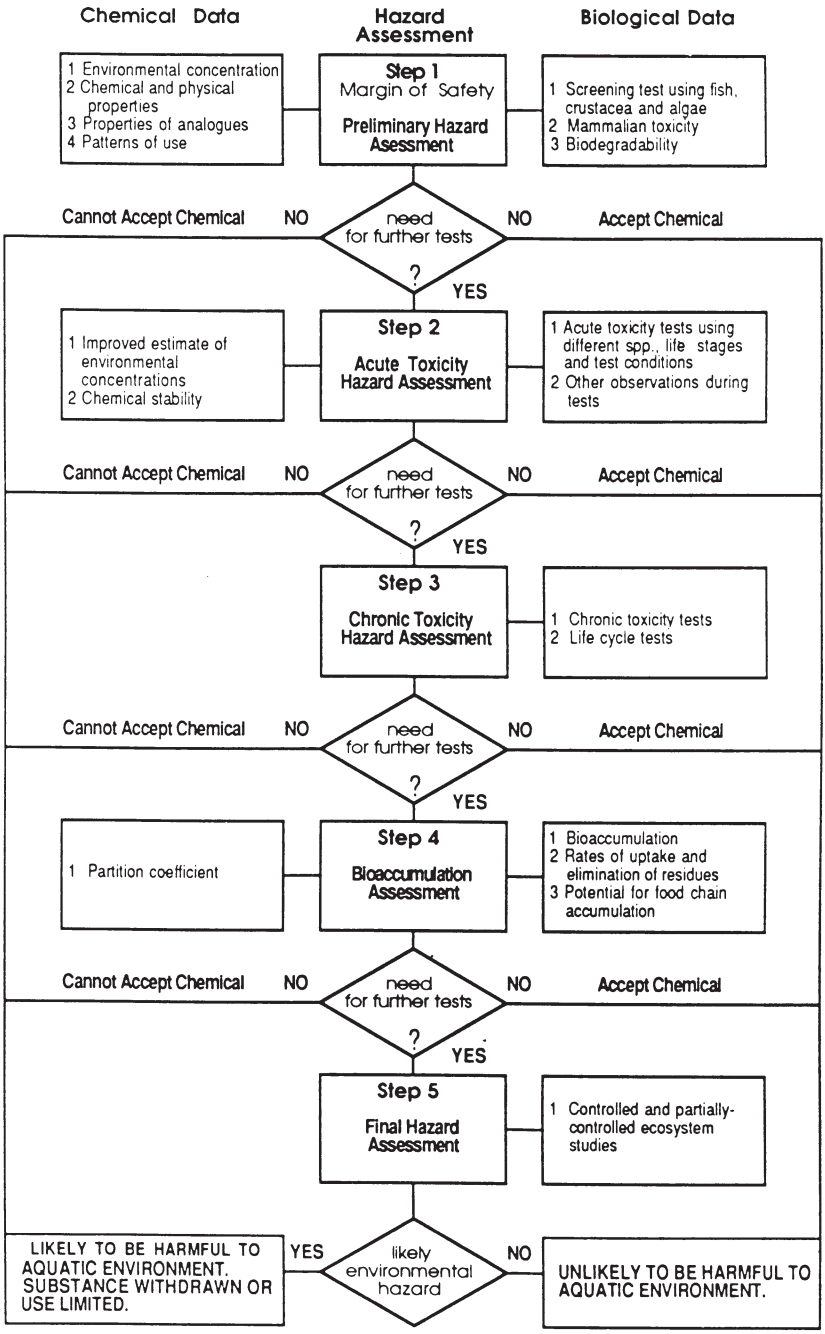

Figure 6.5 Flow chart summarising the steps in the sequential hazard assessment procedure. After Tooby (1978)

In the case of common industrial pollutants of long standing, where for example it is desired to improve the status of a polluted receiving water, the approach to determining water quality standards is often significantly different. A large amount of toxicological information may already exist, and data from field observations are likely to assume a greater significance. A very good illustration of the considerations which may be taken into account in formulating water quality standards is the series of reviews edited by Alabaster and Lloyd (1980). These reviews recommend water quality standards for the protection of European freshwater fisheries against several common industrial pollutants. It is also useful to recall the sophisticated approach to formulating water quality standards for toxic substances described in Section 1.2. The common industrial pollutants copper, zinc, phenol, ammonia and cyanide frequently occur together, and their toxicity is greatly influenced by environmental conditions. The technique described in Section 1.2 offers the means to identify specific threats to, or potential improvements in, the biological status of a receiving water which can be fairly easily implemented by specific regulatory action against polluting discharges or by alternative strategies of river management. The successful application of this method requires, however, an extensive database of chemical, biological and toxicological information.

Water quality standards such as those recommended by EIFAC (Alabaster and Lloyd, 1980) are advisory rather than mandatory, but have been widely adopted and incorporated into national practice in many countries. They have been updated from time to time (see, for example, EIFAC Technical Paper series published by UN FAO, Rome). However, in many parts of the world they have been superseded by mandatory standards, either national or supranational, such as European Union directives which govern standards in member states of that Union; a situation rather similar to that which pertains to drinking water quality standards (see Chapter 5), where advisory WHO standards are increasingly superseded by similar mandatory standards.

What is not yet clear is the extent to which more recent developments in toxicological techniques—particularly those based upon cellular, biochemical and genotoxicological approaches such as described in Chapter 4—may play a role in the future in determining water quality standards. Computer modelling is also becoming widely used to predict the likely environmental impact of novel pollutants. These are likely to be areas of development over the next few years; some examples of applications in the rather different circumstances of the marine environment are discussed in Section 7.2.3.

6.2.3 Emission Standards

Emission standards are the limit values set upon the quantity and/or quality of the effluent which may be discharged; in other words, the consent conditions which form the basis of permission to discharge wastes to water. In some jurisdictions,

such as the UK, emission standards are usually set having regard to considerations of the overall receiving water quality standards which are desirable; these in turn are based upon water quality objectives (see Section 6.2.4). In other jurisdictions, emission standards (often referred to as 'end-of-pipe' controls) are accorded much greater importance and form the major, if not the only, element of the water pollution control strategy.

An early example of an emission standard in Britain was the recommendation of the Royal Commission on Sewage Disposal in 1915 that sewage effluent should contain no more than 30 mg l^{-1} suspended solids and should have a BOD value not exceeding 20 mg l^{-1}. This recommendation (the so-called 30/20 standard) was based on the assumption that the effluent would normally be diluted at least eight times by the volume of the receiving water. In practice, consent conditions for the discharge of effluents may set limits on the strength and quantity of effluent which may be discharged; individual components of the effluent may be subject to specific restrictions; and consent conditions may vary according to the time of year, or the physical conditions of the receiving water such as temperature or the volume of dilution water available.

It is comparatively easy to monitor compliance with emission standards, and they have often been found useful even when set at more or less arbitrary levels. For example, the 30/20 standard resulted in a substantial improvement in the quality of many British rivers, even if the standard was not universally achieved, because at the time it was implemented most sewage was discharged either untreated, or treated only to a poor standard. Emission standards for oil and toxic substances can usefully be applied to effluents in which they are only rarely to be expected (for example as a result of plant failure), since the existence of the standard will require the effluent to be monitored and will thus tend to prevent pollution caused by unusual occurrences which may otherwise be undetected. Emission standards are also administratively convenient. Consider, for example, a river which is already polluted to which it is proposed to discharge a new effluent. The regulatory agency may decide that the river cannot accommodate a substantial increment of pollution, and may wish to set consent conditions for the new factory which are more restrictive than those which apply to the established discharges. This can lead to litigation or political lobbying from the owners of the new factory, who may feel that they are being treated inequitably in comparison with their competitors. An equitable and administratively convenient solution would be to revise the consent conditions of all the factories concerned so that each factory was subject to the same consent conditions—in other words, uniform emission standards would be imposed on all.

The administrative convenience of uniform emission standards tends to lead to their assuming a degree of importance in pollution control strategies which can be counter-productive. This problem is becoming more acute as pollution control

strategies become internationalised. Within the European Union, for example, member states have agreed in principle to adopt policies designed to reduce environmental pollution. Different states within the Community may each feel that their particular pollution control strategy is adequate in relation to local conditions. Inevitably, however, emission standards will vary from one place to another, and some states will be able to argue that the stricter constraints under which they operate impose upon them an unfair economic disadvantage. It is therefore difficult, politically and administratively, to avoid moving towards a policy of uniform emission standards regardless of local conditions. A similar situation can arise where several states enter into agreements to limit pollution in rivers, lakes or seas to which all discharge effluents.

An alternative approach to emission standards is to specify not a range of limit values relating to the quality or quantity of the effluent itself, but to specify a process or method by which the effluent must be treated before it is discharged. This approach is sometimes advantageous with particular effluents or with particular types of material, or where there is disagreement about the environmental quality standard which needs to be achieved. In the USA, the Clean Water Acts of 1972 and 1987 give the Environmental Protection Agency the powers to insist that an effluent is treated by the 'best available technology' (BAT). Of course, any effluent can be treated completely if cost is no object, so in practice a less rigorous code is used for all but the most dangerous substances, which specifies treatment by the 'best practicable technology' (BPT). This implies that some form of cost-benefit analysis needs to be undertaken before the decision is made concerning what constitutes the BPT, which tends to give rise to extensive litigation. In Europe, a similar idea has gained currency, and is known as 'best available technology not entailing excessive cost' (BATNEEC).

The principal disadvantages of uniform emission standards are that they are not always appropriate for the protection of the receiving environment, and that they can lead to the inefficient use of resources. For example, a sewage works discharging to a river which is already heavily polluted could operate to a comparatively low standard of effluent quality and still actually improve the quality of the receiving water, perhaps leaving resources to spare which could be better utilised elsewhere. Conversely, a new discharge which meets a uniform emission standard could have a seriously adverse effect if sited on a river which was previously unpolluted. For this reason, in Britain and several other countries, a fourth element of pollution control strategy has been developed, the concept of water quality objectives.

6.2.4 Water Quality Objectives

The concept of pollution regulation by water quality objectives (WQOs) is based on the argument that the most effective use of resources and the greatest degree of protection and improvement of receiving waters is in practice achieved by the

formulation of emission standards which are designed to be appropriate to the particular receiving water under consideration. In other words, uniform emission standards are specifically rejected. Instead, each receiving water is considered individually, and a technically and economically feasible management objective is determined. An example of such an objective may be that the receiving water should sustain a healthy population of cyprinid fish. The appropriate receiving water quality standards are then determined, and can be translated into emission standards designed to achieve the initial objective.

The principal difficulty of the WQO approach is that it can only be sensibly and effectively applied on the basis of extensive and reliable information about the current status of receiving waters and of the pollution loads which they are receiving. Without this information, feasible water quality objectives cannot be set, and if the objective is not realistic the resulting emission standards will be as arbitrary and inefficient as uniform emission standards. For example, it may be highly desirable that all rivers sustain populations of salmonid fishes and a diverse invertebrate fauna. Such an objective ignores the fact that many rivers are, for various reasons, naturally unable to do so. Also, regulatory agencies are more likely to enjoy the co-operation of industry and the support of the general public if the economic resources devoted to pollution control result fairly quickly in a perceptible improvement in environmental quality. It is therefore important that water quality objectives are realistic in relation to the current status of the receiving waters.

In Britain, the application of WQOs to pollution control rests upon extensive national surveys of all substantial rivers. These surveys began in 1958, and now take place every five years. The survey work is undertaken by the National Rivers Authority (now part of the Environment Agency, see Section 6.3). An important aspect of the national river surveys is the development of a national scheme for the collection and analysis of data. This was a major factor in the development of the BMWP Score, a biotic index of water quality devised to be appropriate in all parts of the country and in all types of river (see Section 3.4.3). On the basis of the survey information, a national system of river classification was developed over a period of time (NRA, 1991) which can be used to formulate sensible water quality objectives. The classification scheme currently in use is shown in Table 6.2, and a summary of the national survey results since 1958 is shown in Table 6.4.

The classification system immediately suggests several objectives. For a Class 1A or 1B river, an obvious objective is to prevent any deterioration at all. For rivers of intermediate classification, a reasonable objective is at least to preserve them in their present condition, and where feasible to improve them so that they attain the next-highest classification. In a typical scheme devised by the Severn-Trent Water Authority (Young, 1980) it was proposed to leave Class X rivers as they are; to eliminate Class 4 rivers by improving them to Class 3 quality; to improve selected rivers of Classes 3 and 2 to 2 and 1B respectively; and to preserve Class 1A rivers

in their present condition (Table 6.3). The 1990 National Survey (NRA, 1991) in fact showed that the projected improvements did not take place, and that the 1990 situation was almost the same as that of 1980. Results of the 1995 survey are not yet published.

Note that an important aspect of the classification system is the current or potential uses of the water, which both determine the present classification of the water and help to identify those rivers for which improvements would be most cost-effective. Prior to 1980, the classification scheme was based largely upon physical and chemical criteria and are often referred to as RPS (River Pollution Survey) classes. The new classification scheme differs essentially in that the basis of the classification gives rather more weight to the actual and potential uses of the water, and to biological characteristics; the old Class 1 (unpolluted) has been split into Classes 1A and 1B; while the old Class 4 (grossly polluted) has been replaced by Classes 4 and X. Classes 1A and 1B are both generally of good quality, and a 1B river cannot be promoted to a Class 1A. They are different for natural reasons, for example 1A rivers tend to be upland, and 1B lowland stretches. Class X rivers are defined as insignificant ditches or watercourses; they often act as surface drains, and the principal management objective is to prevent them becoming a health hazard or public nuisance.

Table 6.4 summarises the classifications of non-tidal rivers and canals in England and Wales in national surveys between 1958 and 1990, demonstrating a steady overall improvement in water quality during most of that period. The effect of the change in classification system in 1985 is shown by the 1980 data, which in Table 6.4 are presented both in the old and new formats. The report of the 1985 survey showed that the rate of improvement had slowed, and by 1990 that some rivers had clearly deteriorated (NRA, 1991). This is less obvious from the summary data shown in Table 6.4 than from the more detailed region-by-region breakdown shown in the original report. Significant deteriorations which occurred in some regions are masked, in the summary table, by improvements elsewhere. The report argues that this is at least partly due to changes in survey methodology, though there is little doubt that much of the deterioration is significant and real. However, the reasons for the deterioration, which were the subject of much ill-informed speculation, actually emerge from the data in the report itself and from other data in the public domain (e.g. NRA, 1992, 1994a). For example, the South-West region of the country, where considerable deterioration took place between 1985 and 1990, is not an industrial area but is dominated by intensive dairy farming, much of it subsidised by the European Common Agricultural Policy. The area suffers from chronic water shortage and during the period concerned suffered from a four-year drought. Therefore the common assumption that the problems were related to industry or to any laxity on the part of the newly-privatised water utility companies is largely unsus

Table 6.2 The National Water Quality Classification Scheme used in Britain

River class	Quality criteria	Remarks	Current potential uses
	Class limiting criteria (95 percentile)		
1A Good quality	(i) Dissolved oxygen saturation greater than 80% (ii) Biochemical oxygen demand not greater than 3 mg/l (iii) Ammonia not greater than 0.4 mg/l (iv) Where the water is abstracted for drinking water, it complies with requirements for A2[a] water (v) Non-toxic to fish in EIFAC terms (or best estimates if EIFAC figures not available)	(i) Average BOD probably not greater than 1.5 mg/l (ii) Visible evidence of pollution should be absent	(i) Water of high quality suitable for potable supply abstractions and for all other abstractions (ii) Game or other high class fisheries (iii) High amenity value
1B Good quality	(i) DO greater than 60% saturation (ii) BOD not greater than 5 mg/l (iii) Ammonia not greater than 0.9 mg/l (iv) Where water is abstracted for drinking water, it complies with the requirements for A2[a] water (v) Non-toxic to fish in EIFAC terms (or best estimates if EIFAC figures not available)	(i) Average BOD probably not greater than 2 mg/l (ii) Average ammonia probably not greater than 0.5 mg/l (iii) Visible evidence of pollution should be absent (iv) Waters of high quality which cannot be placed in Class 1A because of the high proportion of high quality effluent present or because of the effect of physical factors such as canalisation, low gradient or eutrophication (v) Class 1A and Class 1B together are essentially the Class 1 of the River Pollution Survey (RPS)	Water of less high quality than Class 1A but usable for substantially the same purposes

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2 Fair quality	(i) DO greater than 60% saturation (ii) BOD not greater than 9 mg/l (iii) Where water is abstracted for drinking water it complies with the requirements for A3[a] water (iv) Non-toxic to fish in EIFAC terms (or best estimates if EIFAC figures not available)	(i) Average BOD probably not greater than 5 mg/l (ii) Similar to Class 2 of RPS (iii) Water not showing physical signs of pollution other than humic colouration and a little foaming below weirs	(i) Waters suitable for potable supply after advanced treatment (ii) Supporting reasonably good coarse fisheries (iii) Moderate amenity value
3 Poor quality	(i) DO greater than 10% saturation (ii) Not likely to be anaerobic (iii) BOD not greater than 17 mg/l. This may not apply if there is a high degree of re-aeration	Similar to Class 3 of RPS	Waters which are polluted to an extent that fish are absent or only sporadically present. May be used for low grade industrial abstraction purposes. Considerable potential for further use if cleaned up
4 Bad quality	Waters which are inferior to Class 3 in terms of dissolved oxygen and likely to be anaerobic at times	Similar to Class 4 of RPS	Waters which are grossly polluted and are likely to cause nuisance
X	DO greater than 10% saturation		Insignificant watercourses and ditches not usable, where the objective is simply to prevent nuisance developing

Notes: (a) Under extreme weather conditions (e.g. flood, drought, freeze-up), or when dominated by plant growth, or by aquatic plant decay, rivers usually in Class 1, 2 and 3 may have BODs and dissolved oxygen levels, or ammonia content outside the stated levels for those classes. When this occurs the cause should be stated along with analytical results.

(b) The BOD determinations refer to 5-day carbonaceous BOD (ATU). Ammonia figures are expressed as NH_4.

(c) In most instances the chemical classification given above will be suitable. However, the basis of the classification is restricted to a finite number of chemical determinands and there may be few cases where the presence of a chemical substance other than those used in the classification markedly reduces the quality of the water. In such cases, the quality classification of the water should be down-graded on the basis of biota actually present, and the reasons stated.

(d) EIFAC (European Inland Fisheries Advisory Commission) limits should be expressed as 95 percentile limits.

[a]EEC category A2 and A3 requirements are those specific in the EEC Council Directive of 16 June 1975 concerning the Quality of Surface Water Intended for Abstraction of Drinking Water in the Member State.

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Table 6.3 Proposed river quality objectives for the Severn–Trent Water Authority area in 1978 (data from Young, 1980)

Classification	Existing quality km	Proposed quality km
1A	877 (14.3%)	877 (14.3%)
1B	2417 (39.5%)	2543 (41.5%)
2	2085 (34.1%)	2360 (38.6%)
3	565 (9.2%)	292 (4.8%)
4	128 (2.1%)	0 (0%)
X	46 (0.8%)	46 (0.8%)

tainable in view of the facts. In 1995, however, a national drought occurred which caused much greater disruption to water supplies than had occurred during earlier droughts in 1976 and 1983. On this occasion, the National Rivers Authority supported the widespread public criticism of some water utilities for poor investment in, and management of, water resources. Many households faced emergency restrictions on water use; and greatly increased abstraction rates from rivers exacerbated pollution and ecological problems which were the NRA's responsibility to deal with.

Pollution control by quality objectives is arguably the most scientifically and economically sophisticated approach to the problem of devising an effective system for regulating waste discharges. However, its effectiveness and public acceptance depend crucially upon extensive and accurate information. This in turn depends upon the establishment of nationally-based or regionally-based systems of monitoring and co-ordination, and of an appropriate technical and administrative infrastructure; these are, unfortunately, well established in relatively few parts of the world. It is for this reason that regulatory strategies differ from one country to another, although these differences primarily consist of differences in the relative emphasis given to the 'polluter pays' principle, water quality standards, emission standards, and water quality objectives. Some of the issues involved are discussed in the volumes edited by Stiff (1980) and Lack (1984).

6.3 Water Pollution Law in Practice

Biologists are not lawyers, but they do need to interact with lawyers, particularly if they are working for a regulatory agency, or advising individuals or organisations concerned with water pollution. The following discussion is a brief comparative account of the law relating to water pollution mainly based upon Britain, Europe, and North America. McLoughlin and Bellinger (1993) provide a general discussion of the relevant principles, and a comparative survey of practice in a variety of different countries.

Table 6.4 Summary of the results of the British National River Surveys, 1958–1990. Data from NRA (1991) (see text for details)

	Former classifications 1958–1980 surveys								New classification 1980–1990 surveys						
	Non-tidal rivers and canals									Freshwater rivers and canals					
	1958		1970		1975		1980			1980*		1985		1990	
Class	km	%	km	%	km	%	km	%	Class	km	%	km	%	km	%
Unpolluted	24 950	72	28 500	74	28 810	75	28 810	75	Good 1A	13 830	34	13 470	33	12 408	29
									Good 1B	14 220	35	13 990	34	14 536	34
Doubtful	5220	15	6270	17	6730	17	7110	18	Fair 2	8670	21	9730	24	10 750	25
Poor	2270	7	1940	5	1770	5	2000	5	Poor 3	3260	8	3560	9	4022	9
Grossly polluted	2250	6	1700	4	1270	3	810	2	Bad 4	640	2	650	2	662	2
									X	–	–	–	–	39	–
									Unclassified	–	–	–	–	17	–
Total	34 690		38 400		38 590		38 740		Total	40 630		41 390		42 434	

*As revised in 1985

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6.3.1 Water Pollution Law in Britain

The United Kingdom consists of Great Britain (England, Wales and Scotland), and the province of Northern Ireland. For our purposes, the law and legal systems of England and Wales are identical. Scotland has its own legal system and its law is different in many ways from that of England and Wales, and there are special considerations relating to Northern Ireland, so for purposes of this discussion the term 'Britain' relates largely to England and Wales only. In Scotland, the overall thrust of the legal provision is the same as in England, but the methods of administration and enforcement are different. Reid (1993) gives a brief summary.

Until 1974, responsibility for the various aspects of water management was shared between a large number of different organisations. Broadly speaking, water supply was the function of a large number of separate bodies, of which some were municipal undertakings and others were private companies. Sewage disposal was the responsibility of municipal authorities around the country; and river management (drainage, flood prevention, fisheries, conservation and pollution monitoring) was undertaken by a number of River Authorities. Separate management of these three basic functions worked reasonably well (although many municipal authorities neglected their sewage treatment works), and is still practised in many countries. However, the potential advantages of a unified management system for all aspects of the hydrological cycle were widely recognised. The Water Act 1973 led to the establishment of ten Regional Water Authorities in England and Wales in 1974 (Scotland retained the old system), each Authority being responsible for all aspects of water management within its area. These areas were defined not by political boundaries, but by the major river catchment areas. These large, unified authorities with their considerable physical, human and financial resources were intended to be better able to cope with the increasingly complex management and technical problems associated with increasing demands for water. Arguably, it is easier to devise and implement policies on the interrelated problems of water supply, pollution control and monitoring, conservation, river management, recreation, fisheries and so on within a single organisation. However, one paradox of the unified management system was that the organisation responsible for monitoring and regulating waste discharges was itself the single most important polluter of water, since the water authorities were themselves responsible for sewage disposal. This difficulty was resolved by requiring that the water authorities, which were normally empowered to grant or refuse permission to discharge wastes to water, required the approval of the Secretary of State (Environment Minister) for their own discharges. In practice, the system did not work very well. Faced with continuous demands for public investment from the water authorities to meet environmental quality standards, successive governments could not resist the temptation to relax consent conditions as an alternative to

increasing public expenditure. However, by the late 1980s a further major change took place.

Under the Water Act 1989, the Government privatised the water utilities. This was a politically controversial move, but the reasons for it were only partly ideological. It was becoming obvious that in many parts of the country, substantial capital investment would be required to renew water supply, drainage and sewerage systems, many of which were reaching the end of their useful lives. Additionally, demand for water was increasing and environmental quality standards were becoming inexorably more demanding. Rather than face the burden of these enormous costs on the public purse and make substantial increases in general taxation, it appeared politically more comfortable to turn the Water Authorities into private utility companies able to raise capital through the commercial money markets and by the issue of shares in the companies. One problem remained, which arose through Britain's obligations under European Community law to designate a "competent authority" to fulfil the role of a regulatory agency, which could not be a private company. Bearing in mind the problems referred to earlier which had arisen from the 1973 Water Act, the opportunity was taken to create a new agency, the National Rivers Authority (NRA), to undertake most of the regulatory and river management functions, leaving water supply and sewage disposal as the responsibility of the private water utility companies. The 1989 Water Act conferred a range of powers and responsibilities on the NRA to enable it to carry out its functions. In April 1996, the NRA became part of the new Environment Agency.

It is not easy to give a summary of water pollution law in Britain which remains up-to-date, as it remains in a state of rapid flux. However, the following summary attempts to give an overall picture of the general pattern of legal provision. A useful and fairly brief account is given by NSCA (1992, and later editions; see also *Croner's Environmental Management,* 1995). The powers and responsibilities of the water utilities and the NRA in Britain are defined in a number of laws, including the Rivers (Prevention of Pollution) Acts of 1951 and 1961; The Water Acts of 1945, 1973, 1983 and 1989; the Salmon and Freshwater Fisheries Act 1975; the Control of Pollution Act 1974 and the Environmental Protection Act 1990. Many of the provisions of these Acts remain in force, but the key Acts which are directly relevant today are the Water Act 1989, subsequently amended by the Water Resources Act 1991 and the Water Industry Act 1991. Howarth (1990) provides an accessible guide to the 1989 Act. In fact the 1991 Water Resources Act substantially repealed the 1989 Act and replaced it with an amended version, but the general situation remains much the same.

The basic legal position is that the discharge of waste matter to water bodies is prohibited by any person, organisation or other legal entity unless permission has been granted by the NRA (or Environment Agency). Consent is normally given only if certain conditions are met, such conditions relating to both the quality and quantity of the effluent, any other conditions which the NRA deem necessary, and normally requiring in addition that the quality, quantity and effects of the effluent be systematically monitored and recorded. Failure to observe the consent conditions

can lead to prosecution of the offender. In addition, the NRA has a general duty to ensure that the waters for which it is responsible (i.e. all fresh waters and also estuaries and coastal waters) do not deteriorate, and indeed that under appropriate circumstances the quality of the waters is actually improved. For this reason, large-scale programmes of chemical and biological monitoring are undertaken. This activity not only ensures that their statutory responsibilities are being met, but also provides useful data for the formulation of water quality objectives (see Section 6.2.4).

It is possible to anticipate some future developments in British law and practice which are currently under discussion. For example, it is proposed to introduce *statutory* water quality objectives, that is WQOs which have legal force. At present, WQOs are primarily used as management, planning and administrative tools as described in Section 6.2.4. A statutory WQO would be designated for a particular body of water and it would become a legal obligation for that objective to be achieved and maintained. The purpose of this is to prevent the possibility that established WQOs could be arbitrarily altered by administrative decision as a result, say, of negotiations between the NRA, other planning or regulatory authorities and polluters themselves. Statutory WQOs, once designated, could only be reviewed or revised as a result of a legally-enforceable and defined process; this will place increasing responsibility on polluters and regulatory authorities alike.

From 1989 to 1996, the NRA was the principal regulatory agency of the aquatic environment in Britain; other agencies had responsibilities which sometimes overlapped or complemented the NRA's activities. These included Her Majesty's Inspectorate of Pollution, mainly concerned with air pollution and pollution associated with solid wastes; and the Drinking Water Inspectorate, specifically concerned with the quality of drinking water and of water bodies used as a source for drinking water supply. Local authorities also had some regulatory functions. These organisations and their functions have now been merged into a single Environmental Agency. It remains to be seen what influence this will have on policy and practice in the future.

However, undoubtedly the major source of rapid change at the present time in British pollution control practice stems from the UK's membership of the European Union.

6.3.2 European Water Pollution Law

Currently 15 countries have acceded to the European Union (formerly the European Economic Community), and further countries are expected to join in the near future. It is not clear at present how the Union may develop in the future, but its status is perhaps best described as a union of independent sovereign states which are bound by a series of treaties to co-operate and to harmonise national policies in areas such as trade, social and economic policy, and the environment. Thus there is no such thing as Federal law, as exists for example in the USA, and European environmental law impinges upon the national law of member states largely through

the adoption by the member states of legal instruments known as directives. Directives are developed and proposed by the European Commission, and adopted by the member states, sometimes with amendments or derogations to reflect particular national interests or circumstances. Directives essentially set targets or objectives to be achieved, usually within a time limit, but do not specify the means by which these objectives are to be achieved; that is left to each member state according to its own custom and practice. Obviously, in some circumstances a particular state may already have achieved the objective, so the directive may have no influence on existing custom and practice; in other cases, in order to comply with the directive a member state may have to amend its custom and practice, or even pass new legislation through its own Parliament, create new agencies, or take other appropriate steps. Therefore European legislation can have a significant influence on individual member states.

EC directives which are relevant to water have been published by the Commission of the European Communities (1992), which lists 17, though the number increases annually. Some of the more important ones are:

- 76/464/EEC—Directive on pollution caused by certain dangerous substances discharged into the aquatic environment of the community.
- 78/659/EEC—Directive on the quality of fresh waters needing protection or improvement in order to support fish life.
- 79/923/EEC—Directive on the quality required for shellfish waters.
- 91/676/EEC—Directive concerning the protection of waters against pollution caused by nitrates from agricultural sources.
- 91/271/EEC—Directive concerning urban waste water treatment.

At the time of writing, a draft directive concerning the ecological quality of water has been circulated for consultation. One of the major thrusts of this directive is to establish in all member states a system of biological monitoring of water quality and national surveying and reporting thereof, similar to that which has been in operation in the UK since 1958 (see Section 6.2.4)

The Commission of the European Communities (1992) publication simply prints the text of the relevant directives up to that date. Of more direct interest is the effect the directives have on national policy and practice, and indeed the origin and intent of the directives. Haigh (1990, 1995) explains the background and impact of each relevant directive on UK policy and practice; *Croner's Environmental Management* (1995) is also a useful and practical guide. A report on the implementation in the UK of the Freshwater Fish Directive (78/659/EEC) has been published by the NRA (1994b). The ostensible reason for the involvement of the European Union in environmental matters is that pollution is a genuinely transnational problem which demands transnational solutions. However, many directives betray the origin of the European Union as essentially a trading bloc or economic community, in that a major force behind many of them seems to be that one member state should not obtain undue economic

advantage over others by adopting lower environmental standards. (Similar arguments apply in relation to other matters such as social security policy or environmental safety in the workplace.) There seem to be several different categories of directive, in terms of their origin and purpose. Some, such as those listed above, are of fairly clear relevance. A number of directives are concerned with specific pollutants or specific industries, of which some have scientific validity but others really represent nothing more than the expression of national interest. A good example is the directive on waste from the titanium dioxide industry (78/176/EEC) (Haigh, 1995). In this case, a dispute between France and Italy over an Italian factory which was obsolete, badly sited and poorly regulated arose because its wastes were polluting the sea between Italy and Corsica. The obvious solution was to tackle the problem by national action to close, improve or regulate the offending factory. Since the Italian government was unable or unwilling to do this, France initiated against the entire industry a directive whose economic impact is very damaging but whose environmental relevance is extremely doubtful.

Many directives are of a very technical nature, though no less important for that. Several are concerned with methods of measurement or analysis, or frequency of sampling for chemical or microbiological purposes. The need for such directives appears to arise because, as we have seen earlier in this book, the methods of measurement chosen, whether for counting coliforms in water or estimating the toxicity of pollutants, can greatly influence the results. Further, the reliability and accuracy of measurements depend crucially on the sampling size, frequency, distribution in space, and so on. Some member states are technically unable or politically unwilling to comply fully with the requirements for environmental data, so a need is created for these 'methodological' directives as a means of quality control on the information forwarded to the European Commission. A further source of doubt about some aspects of European legislation concerns the inadequate scientific advice which some legislators appear to receive; one may suggest there are too many lawyers and not enough scientists involved! For example, careful study of some directives will reveal limit values for chemicals enacted as environmental quality standards, or specified detection limits, which are actually beyond the best available technology, and certainly beyond the capability of most laboratories involved in routine monitoring.

There will certainly therefore be still further changes in European law over the next few years, as the process of harmonisation of practices continues, as the less technically well-endowed members of the Union improve their standards, and as scientific reality intrudes upon legislative optimism. It will certainly be interesting to see whether, now that the European Union extends from the Arctic to the Mediterranean, the bureaucratic obsession with standardisation can be sustained in the face of climate and biogeography. In the meantime, we may expect continuing controversy because of the different traditions and stages of development of the various member states. The UK, and some other Northern European countries, for example, reject the European emphasis on emission

controls because they have already developed strategies based on water quality objectives which they consider superior. It is an inevitable consequence of this that *some* waters 'will not meet EC standards'; that is the whole point. Most waters, as the monitoring data show, are much better than EC standards. However, those states which have elaborate monitoring systems in place can manage through water quality objectives, whereas most member states do not have the necessary information, though they may do if and when they begin to comply with the draft ecological directive referred to above! However, it must be pointed out that the moves in Europe towards water quality objectives are completely at variance with moves which are also under consideration to move towards emission controls based on BATNEEC (see above). The two approaches are fundamentally different, and it may be of interest to study the experience of the United States, where after two decades of technology-driven emission controls which produced little improvement, increasing emphasis is being placed on the development of water quality standards and water quality objectives.

6.3.3 Water Pollution Law in the USA

The United States has a different legal and constitutional tradition from Europe. The primacy of Federal law over state law, and the powers of Federal agencies over state or local agencies, are much more clearly defined than in Europe; and the Constitution guarantees certain rights and is frequently invoked. Despite the differences in legal mechanisms, however, there are certain parallels in the legal position regarding water pollution. A summary of US law relating to water pollution is given by Anderson *et al.* (1990) and Wilcher (1993).

Historically, the responsibility for the control of pollution has passed gradually from local to state authorities, and now resides ultimately with a Federal agency, the Environmental Protection Agency, which was established in 1970. The key items of legislation are the Federal Water Pollution Control Act 1972, amended in 1977; and the Clean Water Act 1987. Federal policy evolved through three stages. The first was to confine itself to *post hoc* action against polluters, usually through prosecution under Federal law. The second stage was to involve State governments by requiring them to identify waters which could be used to assimilate different levels of waste, and to plan water management strategies accordingly ('water use zoning'); federal action would only be taken as a last resort. Finally, a concerted national effort was put in place to control pollution by 'end-of-pipe' controls based on the best available technology, with the State governments acting as agents of Federal policy. Throughout this time, little or no attention was paid at Federal level to the question of receiving water quality standards; emission controls based on best available technology was, in effect, the only strategy employed.

Certain States, however, were beginning to realise the drawbacks of this approach and began to develop strategies based upon water quality standards and a rudimentary form of water quality objectives; however without Federal

recognition, their progress was limited. There was no incentive to improve, or even monitor, receiving water quality under this system; permission to discharge would be granted as long as the polluter had fitted the right technology to his outfall pipe. This failure to consider receiving water quality standards meant that while conventional point sources of pollution, such as sewage discharges and discharges of unexceptional industrial discharges were tolerably catered for, no policy was formulated or could be legally enforced relating to toxic substances, or to discharges from non-point sources. Eventually the Natural Resources Defense Council brought a lawsuit against the Environmental Protection Agency, alleging that the EPA had failed, through over-reliance on an inadequate policy, to carry out its responsibilities. As a result, the EPA was required to regulate the discharge of 65 categories of toxic pollutant, and began to develop a control strategy for toxic pollutants. The 1977 amendments to the Federal Water Pollution Control Act, and the 1987 Clean Water Act, were closely related to this sequence of events.

US commentators regard as highly significant the provision under the Clean Water Act 1987 for 'citizens' suits' (Wilcher, 1993). Under the Clean Water Act, any citizen of standing may bring a lawsuit against any person guilty of a violation of water pollution law. Citizens have access to relevant data under the Freedom of Information Act, and the term 'of standing' merely means any citizen who has been affected in any way by the violation. (Interestingly, until 1973 under English common law a similar provision existed, but it was abolished by the Water Act 1973.) Suits may be brought not only against polluters, but also against regulatory agencies who do not fulfil their statutory obligations.

Thus the legal situation in the USA is also in a rapidly-changing situation, though for different reasons from those which apply in Europe. In effect, the legislation and corresponding Federal policy since 1972 has largely failed. Parr (1994) briefly cites some data showing the extent of contamination of US watercourses. At present, the pollution control strategy is broadly as follows. The EPA remains the ultimate regulatory agency, and its main policy plank is the National Pollutant Discharge Elimination System (NPDES). Any person or organisation wishing to discharge waste to water must apply for an NPDES permit. The permit specifies discharge limits, but these are still heavily based upon best available technology. However, states are now encouraged by the EPA to make local determinations of receiving water quality standards, and if best available technology requirements do not meet receiving water quality standards, more stringent requirements may be incorporated into the permit. The EPA has now developed criteria for toxic pollutants, including 108 which are hazardous to human health and 27 which threaten aquatic life. The EPA is now requiring states to develop biological criteria for the determination of water quality standards; it always had this power under the Clean Water Act, but did not use it until recently. Thus the USA seems to be moving towards a system of biological monitoring leading to a water quality objective-based approach, and perhaps will end up with a system similar to that which is evolving in Europe, though by

a different route. The individual states may determine quality standards according to local conditions, meeting broad objectives set and enforced by the Federal agency. Already nearly half the states are using some kind of biological assessment, and some have begun to develop a water quality classification scheme (Parr, 1994).

So far, the discussion has applied only to identifiable, point-source discharges. Under the earlier policy of EPA, virtually nothing could be done about diffuse sources, mainly of agricultural origin. Currently, the EPA consults with state and local governments to develop local plans based upon good management practices. State schemes which are approved by the EPA are eligible for financial assistance from Federal sources.

The US experience perhaps offers a salutary lesson in the non-cost-effectiveness of emission standards alone as a pollution control strategy, particularly those based on technology-driven criteria. The Federal government recognised that best available technology controls were expensive, and undertook a scheme of financial assistance to publicly-operated treatment works (POTW). Between 1972 and 1988, despite all the evidence that this particular policy was having no effect, the total cost of the POTW programme from Federal and State funds was 58 billion dollars; this does not, of course, include costs to private industry. There can be no clearer illustration of the need for scientists to give accurate advice and information, and for legislators to resist the pressures to be seen to be taking action until they fully understand what action they need to take.

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Estuarine and Marine Pollution

The effects of water pollution, and their consequences for public health, became obvious in lakes and rivers long before any general threat to estuaries and seas was widely perceived. Consequently the methodology and literature relating to the study of estuarine and marine pollution are less well developed, and many of the basic approaches to the study of pollution in maritime habitats are derived from ideas developed for freshwater habitats. Certainly, the answers sought from the study of freshwater, marine and estuarine habitats are essentially the same; nevertheless there are significant physical, chemical and biological differences between freshwater and maritime environments. Because of these differences, the technical and conceptual approach to the study of pollution in maritime habitats must be different, at least in emphasis, to that which is appropriate to the study of fresh waters. This chapter introduces some of the special problems of pollution which occur in estuaries and in the sea, and considers the extent to which the concepts and methodology which are appropriate for fresh waters can be applied to the study of pollution in maritime habitats. A good general introduction to the problems of marine pollution is given by Clark (1992), and more detailed reviews of some important aspects may be found in Kinne (1984a, b) and Preston (1989).

During the present century social, economic and industrial trends have combined to increase the threat of pollution to estuaries and coastal seas. Most of the world's major cities are now situated on estuaries or close to the coast. Increasingly, large industrial sites are required to be placed away from centres of population, but close to sources of water for cooling and waste disposal, and with access to transportation facilities (e.g. by ships of steadily-increasing size) for the import and export of raw materials and of finished products. Thus major industrial development increasingly takes place in the lower reaches of estuaries

or at coastal sites, often on reclaimed land. In many parts of the world, the availability of relatively cheap international travel has led to the development of an economically-important tourist industry. This has increased the pressures of urbanisation upon coastal areas especially; but at the same time it has created strong economic, aesthetic and public health pressures in favour of uncontaminated beaches and coastal seas. Additionally, it has become necessary to consider whether the seas themselves, in spite of their vastness, can accommodate the wastes of which they are the ultimate recipient.

7.1 Pollution of Estuaries

Estuaries vary so widely in their characteristics that it is difficult to define them satisfactorily, but Barnes' (1984) definition is a very useful one: 'An estuary is a region containing a volume of water of mixed origin derived partly from a discharging river system and partly from the adjacent sea; the region usually being partially enclosed by a land mass'. In order to understand the effects of pollution in estuaries, it is first necessary to consider some of their special characteristics. Concise descriptions which emphasise those characteristics of estuaries which are particularly relevant to their response to pollution include those of Barnes and Green (1972), Perkins (1974), Arthur (1975) and Barnes (1984).

Barnes (1984) recognises four main types of estuary, based on their geomorphological characters:

1 Drowned river valleys (coastal plain estuaries), formed by the rise in sea level which occurred at the end of the last glaciation, about 10000 years ago.
2 Tectonically-produced estuaries, formed by the subsidence of land and consequent invasion by the sea.
3 Fjords, glacially-overdeepened valleys into which the sea penetrates. These frequently have a sill at their mouth which greatly restricts the interchange of water between the estuary and the open sea, so that the volume of water lying within the fjord but below the level of the sill is effectively isolated, and behaves rather like a lake.
4 Bar-built estuaries, formed by the deposition of sand or shingle in a line parallel to the shore which blocks or diverts a discharging river system, forming an estuary in a former area of sea between the land and the sand or shingle bar.

The precise physical characteristics of an estuary greatly influence the biological processes which occur within the estuary, to the extent that it is difficult to generalise about the biological properties of estuaries and the way in which pollution affects them. In some estuaries, for example, the volume

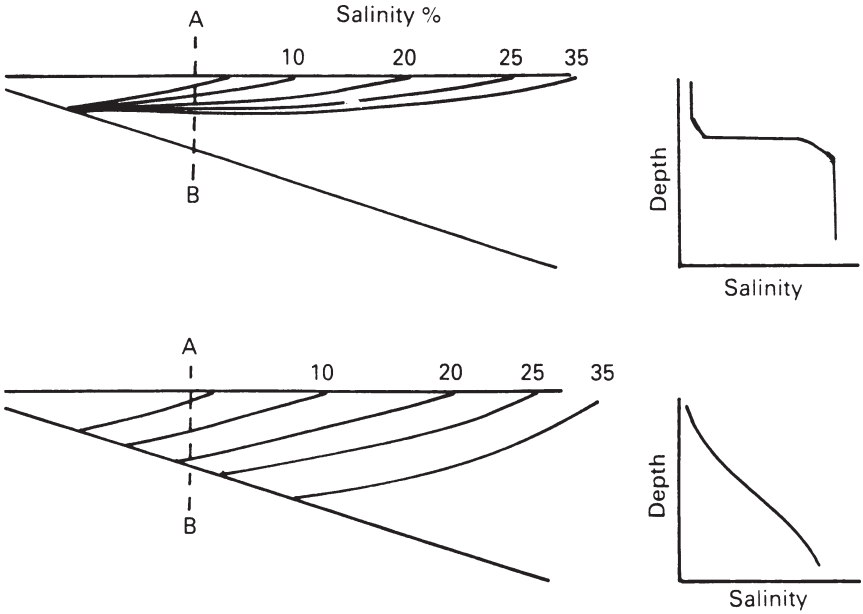

Figure 7.1 Horizontal and vertical salinity profiles of two estuaries. In the upper diagram, the position of the isohalines indicates little vertical mixing, the fresh water tending to flow out above a salt-water intrusion (salt-wedge). There is a sharp discontinuity in the vertical salinity profile through the section A–B. The lower diagram represents an estuary where vertical mixing is more pronounced

of fresh water discharged may greatly exceed the amount of sea water intrusion; in others, the reverse is the case. The ratio of fresh water to sea water, their patterns of mixing and the consequent influences upon the biological characteristics of the estuary depend ultimately upon the shape and size of the estuary, the magnitude of the tidal influences, and the geomorphology and geochemistry of the area. This discussion attempts to describe some relevant aspects of representative coastal plain estuaries (the most common type).

The precise pattern of mixing of fresh water and sea water in estuaries varies greatly, depending upon geomorphological factors. However, all estuaries display both a longitudinal and a vertical gradient of salinity (Figure 7.1). Further, the salinity of the water at a given point in the estuary tends to vary greatly from hour to hour, according to the state of the tide. Since most living organisms do not tolerate rapid and wide fluctuations in the salinity of their environment, the number of species which can live under estuarine conditions is restricted by comparison with the biota of the open sea, or of fresh water. The majority of species found in estuaries are either freshwater organisms which penetrate the estuary downwards, and which become progressively less

numerous as they reach their limits of tolerance; or marine organisms which, in similar fashion, become numerically depleted as they penetrate further upstream. Physico-chemical processes within the estuary also produce conditions which limit the biota. By the time a river reaches the sea, most of its load of suspended matter has been deposited, and only the finest particulate matter remains in suspension. The mixing of fresh water with sea water involves a marked increase in the pH and in the level of dissolved salts; these promote the coagulation of fine particulate matter, and of organic and inorganic colloidal matter (Phillips, 1972). Since, during each tidal cycle, the water mass is sometimes moving in one direction and sometimes in the opposite direction, it follows that at every point in the estuary at some time the net water velocity is zero. These processes encourage the deposition of fine organic and inorganic matter on the bed of the estuary. Since most estuaries are also sheltered from wind and wave action, particulate matter brought into the estuary with the incoming sea water also tends to be deposited within the estuary. The bed of an estuary therefore typically consists of fine silt with a high organic content which many animals will not tolerate, particularly since estuarine muds will tend to be hypoxic owing to the high biological oxygen demand (BOD) (see Section 2.3) imposed by its organic content.

Plants, whether macrophytic or planktonic, will also be limited because the high turbidity characteristic of estuarine waters inhibits photosynthesis. In addition, it appears that few animals and plants have evolved specifically to estuarine conditions. One reason for this may be that, geologically speaking, estuaries are short-lived features; fluctuations in sea level and the corresponding changes in the position of the coastline mean that an estuary rarely occupies the same position for more than a few tens of thousands of years. The estuarine biota is derived from the freshwater and marine organisms which penetrate the estuary from either end. At the seaward end, the biota is similar to that of the adjacent sea, but species die out rapidly with increasing distance from the sea as they reach their limits of tolerance to decreasing salinity. A similar process occurs to limit the penetration of freshwater species from the landward end. These factors combine to create the typical situation whereby the estuary has a varied biota at its seaward and landward extremes, but species diversity is characteristically low in the middle reaches. Nevertheless, the handful of species which can survive in the estuary proper are often found in great abundance. The enormous numbers of sea birds which congregate in estuaries at low tide, to feed upon the abundance of invertebrate life, are readily observable. Similarly, estuaries are important sources of food for fish which visit at high tide. The export of biomass from estuaries is almost certainly very important in sustaining populations of ecologically and commercially important species which are not themselves actual residents of the estuary. In addition, many estuaries yield large quantities of shellfish of high commercial value, either from exploitation of natural populations or by means of aquaculture, as well as being crucial in the life cycle of migratory fish.

Given these natural characteristics, it is not difficult to recognise that the principal pollution threat in estuaries is likely to arise from deoxygenation of the water column and sediments due to the accumulation of organic matter, and the accumulation of toxic materials in the sediments. Many polluted estuaries have been studied in detail, and in general this has been found to be the case. In Britain, several of the largest and most industrialised estuaries have been under investigation for about 60 years (e.g. Department of Scientific and Industrial Research, 1935, 1964; Porter, 1973; Royal Commission on Environmental Pollution, 1972). In some of them pollution control measures applied in recent years have led to dramatic improvements, and although there remain some grossly-polluted estuaries, most have recovered to a good quality (NRA, 1991). While the precise situation varies in detail from one estuary to another (and these differences in detail are very significant in the design and implementation of appropriate pollution control strategies), some important general features emerge from these and similar studies.

First, it is clear that the long-held assumption that polluting matter is rapidly flushed from an estuary is wrong. Flushing times depend upon the topography of the estuary, the amount of fresh water input and the degree of mixing which occurs between the sea water and the fresh water. However, in most cases flushing times are relatively long, and in some cases essentially the same body of water moves up and down the estuary, according to the tidal cycle, for days or even weeks on end. In addition, indentures and embayments of the estuary shoreline can entrap polluting material more or less permanently. Partial deoxygenation of the water and sediments is a normal phenomenon of many unpolluted estuaries, but in polluted estuaries extensive sections become completely anoxic, either at regular intervals or more or less permanently (Figure 7.2), and are consequently devoid of higher forms of life. The accumulation of toxic matter in the sediments undoubtedly contributes to the elimination of species. Valuable sport and commercial fisheries are eliminated. The predominance of anaerobic microorganisms, producing hydrogen sulphide and methane as by-products of their respiration, is both inimical to the normal estuarine biota and aesthetically unpleasant. Combined with the obvious presence of tar balls, faecal matter, vegetable and domestic wastes and sewer scum, this effect destroys the recreational and commercial potential of the estuarine shores.

The estuary of the River Tees in northern England provides a salutary, but unfortunately by no means unique, example. In the early years of the present century the river supported migratory (salmonid) fish which were exploited commercially and for sport. Above the estuary even today the river is very little polluted, but industrial development of the estuary (Porter, 1973) including substantial petrochemical, agrochemical and steel-making complexes together with dramatic population increases, eliminated the fishery by 1937 (Perkins, 1974). A major survey of the estuary (Department of Scientific and Industrial Research, 1935) recorded the virtual absence of life

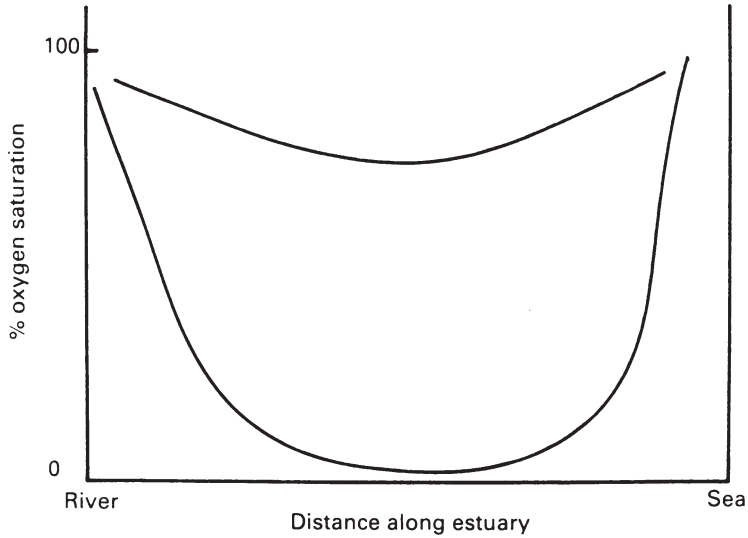

Figure 7.2 Oxygen sag curves in (upper line) an unpolluted estuary and (lower line) a heavily-polluted estuary

from the most polluted reach, extending up to 6km in the central part of the estuary. Severe deoxygenation of the water was a more or less permanent feature, and on occasions the estuary water was rapidly lethal to fish. A more recent survey carried out in 1967 showed that in many respects the position had actually worsened (Porter, 1973). Fortunately here and in some other British estuaries, remedial action is now being implemented, with considerable success but at great cost. A good example of what can be achieved is the Thames. Wood (1982) described the decline of this major estuary from about 1800 to 1950, and the subsequent efforts to restore its water quality, a process which has continued to the present day.

7.2 Pollution of the Seas

Through the direct discharge of wastes to the sea, the discharge of polluted rivers into the sea, from land runoff and atmospheric fallout, the seas are the ultimate recipient of most pollution in most of its various forms. It is now very obvious that extensive areas of sea, particularly in coastal areas, are very seriously affected. What is not clear, however, is the extent to which these are purely local problems which are amenable to local solutions, such as improved waste treatment or the more effective dispersal of wastes over a wider area; or alternatively, the extent to which the severe and obvious local disturbances have more subtle adverse consequences further afield, possibly involving alterations to the entire marine ecosystem. It is virtually impossible to assess the ecological significance of the

substantial quantities of some potentially dangerous pollutants which enter the seas through atmospheric fallout. Except in the case of the most severe incidents of pollution, it is very difficult clearly to distinguish the effects of pollution from the natural fluctuations and variations which are known to occur in marine populations and communities. This is true even of communities and species which have been extensively studied on account of their ecological or commercial importance. Nevertheless the quantity and variety of polluting materials which now enter the seas are so great that the long-standing assumption that the seas are sufficiently vast to act as a waste sink of infinite capacity must be questioned. To determine the extent to which the sea's capacity to absorb waste matter is being approached or exceeded is the central question facing biologists in the study of marine pollution. A brief discussion of some of the commoner forms of marine pollution will illustrate the difficulties.

7.2.1 Oil Pollution

The public perception of oil pollution as a major threat to the sea has been distorted by the occurrence of a relatively small number of major accidents (shipwrecks, oil-well blowouts), by the enormous tonnage of oil transported around the world, by the vigorous and expensive efforts made to clear oil spills (more often for aesthetic than ecological reasons) from beaches, and by the fact that sea birds, in substantial numbers, are often the most conspicuous casualties of major spills.

Detailed reviews of the scientific evidence, such as those given by Johnston (1984) and in the volume edited by Clark (1982a), afford a more realistic perspective. First, only about one-third of all the oil which enters the sea does so as a result of activities associated with oil transportation, and of that only about one-quarter is due to accidents and major spillages; the remainder is accounted for by normal operational losses. About 45% of the oil which reaches the sea does so from polluted rivers, urban runoff, municipal wastes and effluents from non-petroleum industries. Up to 20% of the total enters the sea from natural oil seeps, that is locations where oil naturally escapes from under the sea bed. Finally, oil is produced, ultimately, by living organisms, and hydrocarbon production by contemporary populations of marine phytoplankton almost certainly far outweighs anthropogenic inputs of hydrocarbons to the sea. On the basis of figures cited by Davenport (1982), hydrocarbon production by phytoplankton is at least 30 times greater than the anthropogenic input. Johnston (1984) estimates that five million tons of oil enter the sea annually from anthropogenic sources, compared to a total production of biogenic hydrocarbons of at least 10^{17} tons annually.

Experience of major oil spillages such as that caused by the wreck of the *Torrey Canyon* in 1967 (Smith, 1968; Southward and Southward, 1978) and the *Amoco Cadiz* in 1979 (Conan, 1982) has shown that the principal danger is damage to the littoral and sublittoral communities when the oil is washed ashore. Even large oil

slicks on the open seas readily disperse, a process which may be aided by the use of oil dispersants or other means. The more volatile fractions evaporate, and the heavier fractions eventually sink and are degraded by microbial action. Commonly, substantial amounts of heavier material form tar balls, usually a few millimetres in diameter, which are of more or less neutral buoyancy and float around in the water for long periods. There are few regions of the world where tar balls are not found, and in some areas, such as the Mediterranean, they are washed up on beaches where they form a considerable nuisance. Whether tar balls or sunken oil have any serious biological consequences is not known. Since oil is degraded by microorganisms, it has been suggested that oil could have a eutrophicating effect similar to that which may occur when other forms of organic material are discharged to water. Oil which is washed ashore after major spillages initially causes dramatic damage in the littoral and sublittoral zones, but in most of the major spills which have occurred in the last 20 years it has been found that recolonisation and restoration of the affected areas occur spontaneously and quite rapidly, within three or four years in high-energy environments (rocky, wave-washed areas) and over a rather longer period in more sheltered shores. Wave action has an important effect in physically breaking up and dispersing the oil; in sheltered areas, oil may initially be simply buried with sand and may be subsequently re-released during rough weather, so the time required for complete recovery may be ten or more years.

Although polluted shores recover fairly quickly and spontaneously, the community which is re-established may differ in some ways from that which was destroyed. More recent spills have shown that improved techniques of response to and management of the accident, particularly in the early hours after the accident, are most important in minimising environmental damage. The 1989 accident, in Alaska, to the *Exxon Valdes* gave rise to great concern, partly because it was the first major accident in Arctic waters, and partly because there was a degree of delay and confusion in the initial response which led to increased damage to the environment. However, in 1993 the spill in the Shetland Islands, UK, from the *Braer* was rapidly contained and the Government committee charged with investigating the incident was able to conclude within two years that 'the impact of the spill on the environment and ecology of South Shetland has been minimal' (ESGOSS, 1994).

The worst case to date of oil spillage into the marine environment occurred as a result of the Gulf War in 1991. Following the invasion of Kuwait by Iraqi forces in late 1990, an international force acting under United Nations authority forced the Iraqi troops to withdraw early in 1992. During their retreat, the invaders destroyed hundreds of oil wells and deliberately discharged massive quantities of oil into the Persian Gulf. Since that time, an enormous international effort has been made to study the effects of this spillage and to remediate the environmental damage. A preliminary account of these studies is given, for example, in the volume edited by

Price and Robinson (1993). Once again, it appears that initial estimates of the extent of environmental damage were probably over-pessimistic; however, the studies will undoubtedly continue for some time and may in future add a great deal to the understanding of the effects of major oil spills.

It is now generally agreed that a large part of the damage associated with oil spillages is in fact attributable to the toxicity of the oil dispersant materials which are often applied as an emergency measure. The newer oil dispersants are much less toxic than those in use formerly, but it is now widely accepted that they should be used cautiously, if at all, in coastal waters. They represent an additional toxic hazard and are usually applied for aesthetic rather than ecological reasons, for example to accelerate the removal of the oil from recreational beaches in tourist areas. Probably the best strategy is to sink the oil at sea before it reaches the shore. Surprisingly little research has been done in areas subject to natural oil seepage from under the sea bed, but the available data indicate that in these areas the effects of the oil are readily detectable in the immediate locality of the discharge but do not spread very far. In zones of intermediate oil concentration, the microbial breakdown of oil may cause an enriching effect leading to increased productivity, if not an actual increase in species diversity.

Chronic oil pollution of coastal areas, in harbours and around oil installations and refineries, is much more significant, in terms of the total area affected, than the more dramatic major accidents. The effects of chronic pollution are readily detectable in such locations, but experience has shown that while some effects may be long-lasting, rapid improvements take place following the installation or upgrading of appropriate pollution control facilities. The effects of offshore oil installations, if they are properly managed, are confined to the immediate vicinity of the installations. There is little evidence that oil pollution in the open seas associated with normal shipping operations has any effects other than purely local ones. Similarly, there is no evidence that oil pollution of any kind has far-reaching consequences for ecologically or commercially important species or communities (Clark, 1982a). Sea bird deaths in large numbers are conspicuously related to oil pollution, but while this may be distressing for some people the numbers involved are actually small in relation to natural mortality rates. In any case, adult mortality rates are not, for sea bird populations, generally the principal factor governing population density, and no sea bird population is known to be seriously threatened by oil. No evidence has been found to suggest that fish stocks, except in localised areas, are adversely influenced by oil pollution (or, indeed, pollution of any other kind in the sea). Planktonic organisms are, like polluting oil, mobile and patchily distributed; although they are sensitive to oil, damage again appears to be confined in time and space to the immediate vicinity of the discharge.

It is reasonable to conclude that some of the more extravagant fears about oil pollution of the sea are probably unfounded. Nevertheless oil is a serious pollution threat. Although the problems may be localised, there are many large areas detectably affected. Some habitats of particular ecological importance, such as mangrove swamps, mud flats, coastal bays and estuaries, are permanently at risk from accidents. The potential does exist for a local problem to have far-reaching consequences; for example, a major spill occurring in the nursery grounds of a fish population, if it occurred at an appropriate time, could have major ecological and economic implications. Finally, the view that oil pollution is a matter for local rather than global concern may simply reflect the fact that the techniques and knowledge currently available are not sufficient to allow the detection of potentially important but subtle effects. The threat of oil pollution therefore fully justifies both further research and the continuing efforts to control and abate it.

7.2.2 Sewage and Domestic Wastes

Coastal towns and cities all over the world discharge sewage, often completely untreated, into the sea. In addition, substantial quantities of sewage enter the sea from grossly-polluted rivers. It is now widely recognised that this has created significant ecological damage and measurable public health risks, particularly in the many locations where sewage is discharged at the shoreline or through short outfalls perhaps only 100 or 200 metres in length. The health hazards arise mainly from the high numbers of pathogenic organisms which may be found in the water and on the beaches, presenting a danger to bathers and recreational users of the beach, and from the accumulation of pathogens in fish and shellfish which may be used for human consumption. Reish (1984) provides a detailed review of the effects of sewage discharges in marine environments.

The effects of sewage in the marine environment are, in principle, exactly the same as the effects in fresh water, and arise through the same mechanisms (see Section 2.3). The extent to which the adverse consequences manifest themselves seems to depend greatly on local conditions. In some cases, apparently large discharges appear to be accommodated without serious disturbance to the ecosystem, and the nutrient-enriching effect may even be considered beneficial. In other cases, severe disturbance of the benthic communities, even to complete elimination, has been recorded. In addition, problems similar to those associated with extreme eutrophication in lakes occur, including deoxygenation of the hypolimnion and sea bed, and the creation of algal blooms. Many of the algal blooms are associated with the production of algal toxins which are damaging to fish and other species of both ecological and commercial significance. As in fresh water, it is possible to rank species of benthic invertebrates in approximate order of susceptibility to organic pollution. The most severely polluted zones contain few species which are apparently tolerant of pollution, and species diversity tends

to increase in a fairly predictable fashion as the intensity of pollution decreases. Thus the effects of sewage pollution on the marine benthic community can be monitored in a similar way to the effects in fresh water, at least in some localities. Bellan (1970) described a zonation of benthic species in the vicinity of sewage discharges into the sea off Marseilles, a pattern which has been observed, with some variations, in other locations (Perkins, 1974, 1979). However, in a number of locations where such a pattern may be expected, by reason of known substantial sewage discharges, it is not apparent. This may be due to local conditions of tides and currents which affect sediment movements and the dispersion of the pollution, but until more data are available it is difficult to decide whether the absence of the expected zonation indicates that the pollution is exerting little effect, or whether the available techniques of monitoring are insufficiently sensitive to allow significant effects to be detected. For various reasons, techniques of biological monitoring are less well developed in the marine environment than in fresh water (see Section 7.2.3).

Whether or not sewage discharges exert serious effects on the receiving environment therefore appears to depend upon the extent to which satisfactory dispersion can be achieved through the design and location of the outfall in relation to the local conditions of tides, winds and currents. Determining the optimum strategy for marine sewage disposal requires a detailed knowledge of local conditions, and probably each case needs individual consideration. Frequently, improvements to the local environment can be achieved by constructing a sufficiently long outfall of suitable design and in a favourable location. In many circumstances, however, this is not technically or economically feasible and actual treatment of the sewage is required. In Britain, a common solution is to give sewage primary and sometimes secondary treatment, discharging the liquid effluent through a relatively short outfall (sufficiently long to avoid public nuisance, for example) and dumping the sludge from specially-constructed ships further out to sea. The extent to which this practice is acceptable is currently controversial; the British government, under pressure from neighbouring states, has agreed to end this practice by 1997. There is greater agreement, however, that sewage pollution of the sea is a very serious problem in many areas of the world, and that the waste disposal facilities of coastal towns and cities are in urgent need of upgrading. In Europe, for example, at least three substantial sea areas, totalling up to one million square kilometres in area, are thought to be in imminent danger. These are the northern Adriatic, the Baltic and parts of the eastern North Sea. In these seas, periodic deoxygenation of the sediments and water column have been recorded, often associated with heavy losses of marine life. In addition, excessive plant growth and toxic phytoplankton blooms are increasingly frequent occurrences, and the potential for serious ecological damage and economic loss affecting wide areas is now recognised.

Clark (1992) provides some brief case studies of seas in other parts of the world apparently under threat for similar reasons.

The Mediterranean sea provides a good example of a sea under serious threat although the extent of the threat is still not fully quantified. The sea is more or less enclosed, and its freshwater input is less than the rate of water evaporation, so its salinity is in places measurably higher than most seas. The loss of water by evaporation is replaced by an influx of cold water from the Atlantic ocean via the Straits of Gibraltar. This influx displaces a volume of warmer water which flows out at the surface in the opposite direction. There is no significant interchange with the waters of the Black Sea, and it is estimated that the volume of the Mediterranean is replaced only once every 80 years. The sea supports a substantial number of species—probably several hundred—which are not found elsewhere, and there is evidence of colonisation of non-indigenous species from the Indian Ocean via the Suez Canal, whose ecological impact is not clear. Most of the population of its 18 coastal states live in the narrow coastal strip, and depend heavily upon the sea, directly or indirectly, for their livelihoods. Some of these coastal states are advanced, industrialised countries, others are undergoing rapid development and some are among the poorest countries in the world. At least two states, Libya and Algeria, are substantial producers of oil and gas, and the search for exploitable minerals from the Mediterranean is well advanced. The indigenous population of about 100 million people is supplemented by about 30 million tourists per year who visit various parts, mostly in coastal areas. About 120 cities discharge sewage and industrial wastes into the sea, about 80% of which is untreated or treated to a poor standard. Identifiable ecological damage and/or health hazards affect about 25% of the coastline, and in many areas the coastline is over 90% developed or urbanised. Table 7.1 lists UNEP's estimate of the quantities of some common pollutants discharged annually to the Mediterranean. To this must be added up to 25% of the annual input of petroleum hydrocarbons into the world's seas, as the Mediterranean is one of the world's busiest shipping areas; this excludes inputs from major accidents (UNEP, 1985, 1989b).

In an attempt to evaluate and alleviate some of these actual and potential problems, UNEP established the Mediterranean Action Plan. This and other examples of international efforts to regulate marine pollution are discussed in Section 7.4.

7.2.3 Toxic Pollutants

Of the many toxic pollutants which enter the sea, probably the greatest concern is due to the conservative pollutants, such as heavy metals and refractory organic substances like certain pesticides, polychlorinated biphenyl compounds and similar substances. In coastal areas all over the world, the discharge of toxic wastes causes readily-identifiable ecological damage in

Table 7.1 Estimates of the quantities of pollutants entering the Mediterranean Sea annually from anthropogenic sources. Data from UNEP (1985)

Pollutant	Quantity (tons)
Mineral oils	120 000
Phenols	12 000
Synthetic detergents	60 000
Mercury	100
Lead	3 800
Chromium	2 400
Zinc	21 000
Phosphorus	320 000
Nitrogen	800 000

localised areas. In at least one well-documented case, Minamata Bay in Japan, widespread and serious human illness was caused by consumption of contaminated seafood (Tsubaki and Irukayama, 1977). There is an enormous literature on the effects of toxic pollutants such as metals (Bryan, 1984) and pesticides (Ernst, 1984) in the sea, but perhaps the most intractable problem is to discover whether their effects are confined to the localities in which they are released, or whether more widespread damage is occurring. Conservative pollutants have, at least in theory, the capacity to accumulate in sediments, and in the tissues of living organisms, until they reach concentrations which may be harmful; such effects may not become obvious until many years after the pollutants have been discharged at what may initially appear to be a 'safe' rate.

In the case of heavy metals such as lead, mercury and cadmium which have no known biological function, inputs to the sea from anthropogenic sources approach or exceed the natural rates of input due to weathering of rocks. Many refractory organic substances are completely synthetic and in the absence of anthropogenic inputs would not be found in the sea at all. This suggests that study of the biogeochemical cycles of these substances should be a useful approach. If, for example, it could be shown that the levels of mercury in sea water, sediments or living organisms were steadily rising, it could be argued that existing controls on mercury emissions are inadequate and that contamination is more than simply a local problem. However, in practice great uncertainty exists about some basic aspects of the biogeochemistry of mercury and other metals. Aston *et al.* (1986) point out that estimates of the mercury concentrations found in open sea water have actually been lowered by about one order of magnitude over the last two decades. This has happened because the levels being measured are at or close to the detection limits of the analytical procedures. As measurement techniques improved, the problems of contamination during the taking and processing of the samples became more apparent, and as increased precautions

against contamination were employed, the levels of mercury recorded have actually declined. This casts considerable doubt on the validity of most of the results available, even if obtained by the very best available techniques; in effect, there is no realistic baseline with which to compare the values currently being recorded.

An alternative approach is to measure the concentrations of toxic substances in sediments and living organisms, and a large volume of information is being accumulated. Collation of this information into a comprehensive bank of baseline data presents formidable problems of quality control, and difficulties of comparison caused by differences in methodology, but will undoubtedly be useful in the future. Such studies do frequently indicate, however, the existence of 'hot spots', or areas of apparently elevated concentrations of toxic matter, usually associated with urban or industrial pollution. The extent to which these elevated concentrations are harmful can only be assessed by toxicological studies. Bryan (1979) drew attention to some of the difficulties of interpreting data on the measured tissue levels of pollutants in marine organisms (see also Section 4.4.3). As with many other forms of toxicological investigation, the large differences between the best available experimental techniques and the reality of the field are particularly problematical when studying marine pollution. In laboratory experiments, uptake of pollutant occurs largely from solution. In the sea, animals almost certainly obtain most of their body burden of pollutants by ingestion of contaminated food or sediment. It is well known that the route of entry of a poison greatly influences the extent of its toxic effect. Further, some species appear to be able to immobilise and store pollutants within their bodies, and some appear to have developed a measurable degree of tolerance through genetic and/or acclimation mechanisms. Therefore the existence of a given level of a pollutant in the tissues does not necessarily indicate that it is intrinsically harmful.

In earlier chapters the principles of toxicological investigation and their applications to freshwater pollution were discussed. In fresh water, it frequently occurs that the concentrations of pollutants actually found in the environment are close to those which can be reliably maintained in controlled laboratory experiments. The results of toxicological studies can, cautiously, be applied successfully to many field situations. In the sea, except for the grossest and most localised forms of pollution, the difference between the concentrations found in the environment and those which can be maintained accurately in controlled experiments is much wider, frequently several orders of magnitude. This, together with the generally inadequate understanding of the effects of the marine environment on the chemical form and speciations of toxic substances (Burton, 1979), casts great doubt on the usefulness of conventional toxicological approaches when applied to marine organisms. Some alternative approaches are discussed in the volume edited by Cole (1979), and developed further by Abel and Axiak (1991).

Abel and Axiak (1991) argue that the whole question of assessing the impact of toxic pollutants in the marine environment requires a radically different toxicological approach. In fresh waters, it is both feasible and demonstrably successful to determine water quality standards (for example, in the form of maximum acceptable concentrations) and to devise emission standards based upon these. In the sea, it is not possible to determine a water quality standard, for the reasons outlined above. Even if it were, it would be impossible to regulate emissions accordingly. In practice, at least for the foreseeable future, the optimum pollution control strategy would appear to be one based upon some form of hazard assessment linked to strict emission controls, possibly technologically-based ones. In other words, the pollution control strategy best suited to the marine environment is very different from that most suited to fresh waters which was described in Chapter 6. This in turn means that the nature of the toxicological information we need for the protection of the marine environment is rather different from that which has historically been found useful in fresh waters. We do not wish to know the maximum 'safe' level of a pollutant in the sea; we wish to know whether a given level of contamination which we can detect is or is not exerting any adverse effect. Therefore, except in certain special circumstances, the kinds of toxicological investigation which have been found useful in fresh waters have little place when our concern is the assessment of toxic effect in marine environments. This probably explains why many of the more recent biochemical, physiological and genotoxic approaches have been largely developed by marine rather than freshwater scientists.

A promising application of biochemical techniques in assessing the response of the mussel *Mytilus edulis* to pollution was described by Bayne *et al.* (1979). Measurements of some biochemical parameters in animals from different natural populations were used to derive a model to allow prediction of growth rates. The predictions agreed well with the observed growth rates of animals in the field. Animals were transplanted from their natural environment to polluted locations, and subsequent measurements of the biochemical indicators showed that they had responded to the polluted conditions in a way which was detectable. These responses could be related to fecundity. Depending upon the degree of specificity and sensitivity which can be obtained, techniques of this sort probably represent a more directly useful approach to problems of measuring toxicity than those which have been found appropriate in fresh waters. Stebbing (1979) argued that instead of carrying out toxicity tests and seeking to compare the results with the environmental concentrations, it may be more useful in the marine situation to use suitably sensitive organisms to bioassay the sea water; subsequent treatment of the sea water to remove pollutants can, if the response of the test organism is abolished, then be used to indicate which pollutants are exerting a measurable biological effect.

Stebbing (1979) reported some success with this approach, using the growth and development of the colonial hydroid *Campanularia flexuosa*. This organism appears to be sufficiently sensitive to allow the bioassay of polluted sea water,

and has the advantage that variation due to genetic variability can be excluded by the use of a single clone. (American readers may be confused by the distinction between the terms 'toxicity test' and 'bioassay', since many American authors have in recent years begun to use the two terms synonymously. The difference between the terms is important as the present example indicates, and has been clearly explained by Brown (1973). It is unfortunate that the distinction in meaning between these terms which was universally accepted for decades has become blurred.) Further examples of toxicological techniques found useful in assessing the impact of pollutants in the sea are discussed in Section 4.3, also in the volume edited by Abel and Axiak (1991), and in a short review by Gray (1992).

To the extent that studying the toxicity of pollutants to individual marine organisms is of limited value, the study of toxic effects at the population or community level of organisation is of even greater importance in the sea than in fresh waters. Several attempts have been made using artificial or semi-natural ecosystems (Davies and Gamble, 1979; Steele, 1979), but these are difficult to maintain and control on sufficiently large scale and with a sufficient degree of replication to allow them to be widely used as predictive tools. In any particular set of circumstances, such experimental systems indicate the range of possible outcomes or mechanisms rather than what actually does happen in the field. They are probably best regarded as attempts to study natural processes on a larger scale, though not necessarily in a more realistic manner, than is possible in the laboratory. The most ambitious experimental ecosystems involve the enclosure of large volumes of water, together with the biomass they contain. However, the very existence of an artificial boundary is likely to interfere with the processes which occur within the enclosure, for example by preventing lateral water movement and by affording a surface for colonisation by algae and microorganisms which would normally not be present. Boundary effects can, of course, be reduced by increasing the size of the enclosure, but the expense of maintaining the systems soon becomes prohibitive and renders replication of experiments impossible.

In practice, it is sometimes found that variability between control replicates exceeds that due to the experimental manipulation. Further, in an enclosure which is sufficiently large to ignore boundary effects, the degree of control available to the experimenter is scarcely better than that available in the completely natural environment; and in any case, in very large enclosures the degree of variability found in different regions within the system is such that the procedures of sampling and analysis which must be employed, and the precision of the results obtained, show little improvement over what would be required if the enclosure were not there at all. Steele (1979) concluded that 'the experiments conducted with large scale ecosystems so far have probably taught us more about the general ecological interactions within such systems than about subtle long-term effects of pollutants'. Such studies have, however, drawn attention to the importance of specific processes which undoubtedly

require further study. These include interspecific and intraspecific interactions, and the role of sedimentary processes and of sediment-water interactions in the behaviour of pollutants in ecosystems.

7.3 Marine Biological Monitoring

Since laboratory experiments and other simulations of the marine environment are inevitably much further removed from reality than is the case with freshwater systems, the importance of studying the effects of pollution directly in the field is obvious. In Chapter 3, the concept and practice of biological monitoring of polluted waters were discussed. The same principles should, in theory, be applicable in the marine environment, but for various reasons this is not, in practice, always the case. One important general reason is that, apart from severely-polluted coastal areas and other special circumstances, the extent of the community response that may occur as a result of pollution in the sea is probably much smaller in relation to naturally-occurring spatial and temporal variations than is the case in fresh waters. Thus the difficulty of distinguishing pollution effects from natural phenomena is much greater. Perkins (1979) pointed out that even in fresh waters, biological monitoring has been much better developed and more successful in rivers than in lakes; to some extent lakes and the seas resemble one another more closely than they do rivers, particularly in certain physical features. It is, therefore, important to consider some of the special problems which may be encountered in seeking to apply conventional techniques of biological monitoring in the marine environment.

7.3.1 Indicator Organisms

The concept of indicator organisms is central to biological monitoring (Chapter 3). Two requirements of indicator organisms are relatively limited mobility, and reasonably long life cycles. Thus the organisms will reflect, by their presence, absence or abundance, the environmental conditions of the place where they are situated over their entire life up to the time of sampling. However, many marine organisms have a planktonic phase in the life cycle, so the distribution and abundance of the adults may reflect events which took place at some previous time in a distant location, perhaps at a crucial early stage of the life cycle, or at metamorphosis. Most freshwater invertebrates have more or less annual life cycles, though some have two or more generations per year and some have overlapping generations in a life span of two years or so. Perhaps for this reason (and perhaps because depopulated stretches of river can be rapidly recolonised by downstream drift of organisms), in rivers even after catastrophic pollution incidents the 'normal' flora and fauna tend to become re-established within a few months.

In contrast, many marine species appear to have much longer life spans, and there is evidence that in marine communities a single event can have profound consequences which, because of the long life span of the organisms and the

nature of interspecific interactions, can persist for a very long time. Lewis (1972) followed population changes of four littoral species on an unpolluted English shore over four years. A combination of climatic events and biotic interactions resulted in repeated large fluctuations in population density, in some cases of more than tenfold. A major determinant of the marked community changes which occurred during the observation period was the success or failure of the planktonic stages in settling and metamorphosis to the sessile adult. Perkins (1979) refers to other examples where single events, not related to pollution, had consequences which persisted for several years. Thus it appears that in marine communities single events, often of natural origin, can cause profound changes which persist long after the disturbing influence has ceased. To this extent, the use of marine organisms as indicators of environmental quality may give a very misleading picture; certainly it is difficult to distinguish pollution-induced changes from natural phenomena.

Many marine species are also known to undergo long-term fluctuations in their levels of abundance. This is particularly well known in fishes, occurs independently of fishing pressure, and completely negates any possibility, on the basis of current knowledge, of reliably using fishery statistics as indicators of marine pollution, although the idea is remarkably common. Invertebrates almost certainly undergo similar fluctuations. A cautionary example is *Acanthaster planci,* the 'Crown of Thorns' starfish, which attracted much attention in the Pacific 15–20 years ago. Its increased abundance and damaging effect on coral reef ecosystems were widely attributed to pollution or other anthropogenic influence, but it is likely that in fact periodic increases in its population density are a natural feature of its ecology (Moore, 1978).

This does not mean that the concept of indicator organisms is invalid or inappropriate in marine systems. There are some species, such as the polychaete *Capitella capitata,* which have been widely associated with polluted conditions (Reish, 1973). However, it is clear that the concept cannot simply be transferred from fresh water without further fundamental research. The fact that the idea works successfully in rivers may be due to a fortuitous peculiarity of the river ecosystem—perhaps its simplicity—but it is certainly in part due also to the much greater knowledge that exists about rivers and their biota. In interpreting the data from biological surveys, we implicitly or explicitly compare what we have found with what we expected to find. Our expectations depend upon knowledge of the previous condition of the habitat under investigation, on contemporary knowledge of physically-similar and geographically-adjacent habitats, or at worst upon a broad but detailed knowledge of the ecophysiology of our indicator organisms. For marine organisms, this knowledge does not exist, and is urgently required. Perkins (1979) refers to an example which illustrates the need for more background knowledge of the ecology of marine indicator

organisms. Observations of the benthic community along a transect away from a marine waste outfall showed that the diversity and abundance of invertebrates increased with increasing distance from the pollution source. The obvious conclusion, that the outfall was exerting a significant polluting effect, was however erroneous. Subsequent studies in an adjacent, physically-similar area showed that the impoverished community near the pollution discharge was due to natural, physical disturbances caused by wave action, and that the pollution in fact had no detectable effect.

Clearly, then, the concept of indicator organisms in marine pollution studies is likely to remain of limited value until a great deal of additional information is obtained. Survey data will have to be evaluated in the light of the normal, natural variations in community structure and population density which occur in relation to temporal and spatial variations of the physical environment, and due to processes intrinsic to the populations and communities involved. Long-term studies, extending ideally over decades rather than years, of both polluted and unpolluted habitats, are ultimately required before indicator organisms can be used in the marine environment in the same way that they can be used in rivers. Again, however, there is a case to be made that the identification and evaluation of indicator organisms in the marine environment should not necessarily follow the same route which was pursued in freshwater studies. A very promising and potentially rapid method of identifying marine indicator organisms has been suggested (Gray and Pearson, 1982; Pearson *et al.,* 1983) based upon the study of the distribution of individuals between species in marine communities.

In many ecological communities, a few species are represented by a large number of individuals, while the majority of species are represented by a very small number of individuals. In practice, it is frequently found that in a reasonably representative sample of the community, most of the species are recorded as one or two individuals, one or two species contain nearly all the individuals, and some species are represented by intermediate numbers of individuals. This pattern is also commonly found in the benthic invertebrate communities of unpolluted marine habitats. The species present in the sample may be divided into abundance classes: Class I for species represented by just one individual; Class II for those with two or three individuals; Class III for four to seven individuals; Class IV for eight to 15; and so on. A graph or histogram of the percentage of species belonging to a particular abundance class, against the abundance class (Figure 7.3) approximates to one half of a normal curve. In such communities, the distribution of individuals between species is log-normal. In a community which is disturbed by pollution, some species will be rarer and some commoner than might be expected in an unpolluted area, and this log-normal

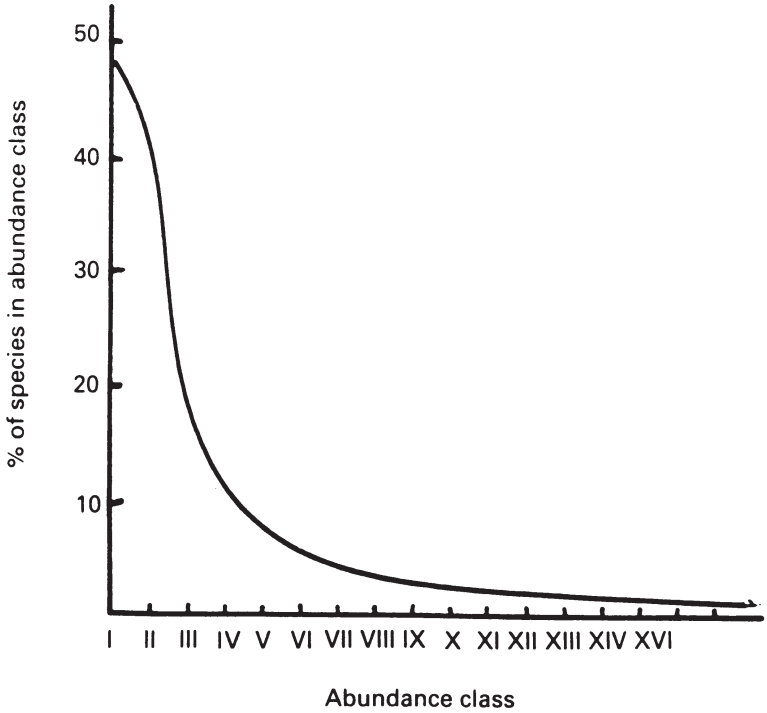

Figure 7.3 Log-normal distribution of individuals between species in a typical benthic community. Deviations from the log-normal can be detected by simple statistical tests

distribution will be distorted. These distortions have been shown to be associated with polluted conditions (Gray, 1979).

Pearson *et al.* (1983) argue that species which may be useful indicators of community responses to pollution can be identified objectively, without any need for detailed knowledge of their general ecology or sensitivity to pollution. Species in abundance Classes I and II, the rare species, are rejected as indicators. Some of these may be rare because of pollution, but since the majority of species are rare and there are many possible reasons to account for rarity, rarity alone is an insufficient ground for recognising an indicator. The very few species which are found in the higher abundance classes, that is the most abundant species, are also rejected as indicators, for reasons explained below. Those species in abundance Classes V and VI are those which are tentatively identified as those which will be the most sensitive indicators in a community of externally-induced disturbance such as pollution. In practice, these species would typically be those which contain between 16 and 63 individuals per sampling unit; the sampling unit being typically five replicate 0.1-m^2 grab samples (Pearson *et al.,* 1983).

It is implicit in this method that the conventional approach to the recognition of indicator species is rejected. To take an example, the polychaete *Capitella capitata* is, conventionally, widely regarded as an indicator of organic pollution in marine habitats, because it is often found in abundance in such conditions. Gray (1979) and Pearson *et al.* (1983) argue that this view is mistaken. First, it appears that *C. capitata* is not, in fact, particularly tolerant of pollution. Several other polychaete species are measurably more resistant to various forms of pollution in experimental studies, but are not found abundantly in polluted conditions in the field. They argue that the association of *C. capitata* with polluted conditions is not due to its tolerance of pollution, but to the fact that it is an opportunist species with a high reproductive capacity and good powers of dispersal, which allow it readily to colonise disturbed areas, and quickly to make good any population losses due to adverse environmental conditions. Its population density is subject, in any particular location, to rapid and massive fluctuations. Second, the authors argue that *C. capitata* is a complex of at least six subspecies, which are difficult to distinguish by conventional taxonomic means. Similar considerations apply to many of the marine species which are regarded, on the conventional approach, as useful indicators. Therefore the use of the most abundant species as indicators is potentially misleading.

In contrast, the use of this approach offers several interesting possibilities. First, the deviation of community structure from the log-normal is amenable to statistical tests of significance, which pollution and diversity indices are not. Second, it allows the identification, by objective means, of a relatively small number of species which, in any particular location, are likely to respond to environmental change. This allows the expense and effort of monitoring to be concentrated on these species, rather than on more abundant, more taxonomically-difficult species whose significance as indicators is in any case in doubt. In their analysis of six extensive data sets from different parts of the world, Pearson *et al.* (1983) found that their method rapidly identified similar lists of species to those determined by more time-consuming methods. Further, the method allows the identification of indicator species specific to particular forms of pollution. Their analysis also suggests that in different parts of the world, different indicator species will be involved in community responses to pollution. Although, therefore, it may be necessary to identify different sets of indicator species for each form of pollution and each individual location, the method affords the means whereby this can be done relatively quickly.

7.3.2 Sampling Methodology

The importance of adequate sampling techniques, and the relationship between sampling strategy, data analysis and the validity of the final results were discussed in Chapter 3. The same considerations of course apply also

Table 7.2 Comparison of the number (n) of replicate 0.1 m^2 samples required to give standard error of counts per taxon equal to 20% of the mean. Data from survey of Forties oilfield (Hartley, 1979), given by Hartley (1982). The number of samples required (n) is generally <5 for gross taxonomic groupings (polychaetes, molluscs, crustaceans). However, for individual species the number of replicate samples required is much larger. Note that only the more abundant species have been considered. For rare species, the number of samples required may be much larger

					Range and mean of values of (n) for numerically dominant species[a]	
	X	$\bar{X}$	s^2	n	Range	Mean
Station 15						
Polychaetes	420	84.0	278.5	0.99		
Crustaceans	58	11.6	17.3	3.21	0.6–18.6	5.51
Molluscs	132	26.4	11.3	0.41		
Station 16						
Polychaetes	407	81.4	419.3	1.58		
Crustaceans	59	11.8	11.2	2.01		
Molluscs	157	31.4	31.3	0.79		
Station 17						
Polychaetes	431	86.2	237.7	0.92		
Crustaceans	66	13.2	16.2	2.32	2.7–96.1	20.68
Station 18						
Polychaetes	341	68.2	17.2	0.09		
Crustaceans	62	12.4	32.3	5.25		
Molluscs	127	25.4	43.3	1.68	1.5–14.9	6.00

[a]Regarded as those top ranked species contributing to the first 50% of the number of individuals at each station (10–12 taxa for these stations).

to the marine environment. Unfortunately, sampling in the marine environment is notoriously difficult and expensive, especially if the use of offshore vessels is involved. There is therefore an inevitable tendency to attempt to minimise the sampling effort undertaken in marine survey work. There is a danger that in some cases the effort undertaken is, in the end, wasted, or worse, that inaccurate information is obtained which serves only to confuse or mislead. This may appear, to some, an extreme statement; but as recently as 1982 the editor of a well-known journal in the field publicly drew attention to the poor quality of much research, and cited inadequate sampling as a major reason (Clark, 1982b). Hartley (1982) discussed some common failings of many investigations, and made some specific recommendations. In particular, he showed that the number of samples required to

estimate accurately the population density of benthic invertebrates is, as in fresh water, often inconveniently large (Table 7.2). Other sources of error, and of difficulty in comparing results from different sources, are the different efficiencies of the various designs of grab (or other sampling device) which are used, and variations in the procedure employed to extract the animals, usually by some form of sieving. Sources of guidance on the subject of sampling in marine ecological research are available (e.g. Dybern *et al.,* 1976; Holme and McIntyre, 1984; Stirn, 1981), but an urgent need is for wider general agreement on standardised methods for pollution surveys.

7.3.3 Data Analysis

The interpretation of biological survey data is essentially a series of comparisons—temporal, spatial or both—and some of the methods available were described in Chapter 3. One difference between marine survey data and that from fresh water is immediately apparent. For practical purposes, a river is usually considered as a one-dimensional system, that is having length, but negligible width or depth. At least, width and depth effects are, in practice, usually ignored in biological surveys; and the comparison of communities above and below a source of pollution, and at various distances from the pollution source, usually allows any effects of pollution on the receiving water fauna to be readily detected. The relatively strong and unidirectional flow of rivers, and the accretion of unpolluted water along the length of the river, tend to accentuate differences between communities at different points. Marine habitats, in contrast, are at least two-dimensional, and may be three-dimensional if the pelagic biota are to be considered. Further, since observations at a single point in time are clearly of very limited value, the additional dimension of time is likely to be involved in many surveys. Thus the analysis of marine survey data is intrinsically more complex than that of river data. It follows that the data required from a marine survey, for the purposes of meaningful spatial and temporal comparisons, the design of the sampling programme which produces the data, and the methods of data analysis and interpretation employed, must also be more complex.

Index methods (Section 3.4) have often been found useful in analysing survey data in freshwater surveys, and have also been applied to marine work. Diversity indices have been widely used, but are subject to the limitations discussed in Section 3.4 (see also Gray and Pearson, 1982; Reish, 1984). The use of deviation from the log-normal distribution of individuals among species to identify disturbed communities (Gray and Mirza, 1979; see also Section 7.3.1) seems to offer some advantages. Multivariate methods of analysis such as cluster analysis (Section 3.4) appear promising. Analysis based on inspection of a matrix of similarity coefficients, but stopping short of constructing the dendrogram, was recommended under the

name 'trellis method' by Stirn (1981). Some examples of cluster analysis applied to the interpretation of marine survey data are discussed by Reish (1984). Biotic and pollution indices have been rarely used, for the obvious reason that this form of index relies on some form of ranking of known species in order of susceptibility to pollution, and for most marine species it is as yet impossible to do this. Perhaps the nearest approach to the idea is the nematode: copepod ratio. It has frequently been observed that in samples of the benthic meiofauna, the ratio of nematodes to copepods varies with the intensity of organic pollution in the area from which the samples were taken. The use of this ratio as an index of organic pollution was suggested by Rafaelli and Mason (1981). The idea has not been fully tested. Amjad and Gray (1983) found that it produced satisfactory results in Oslo Fjord, but in the Firth of Forth (Shiells and Anderson, 1985), the ratio varied along apparent pollution gradients in an inconsistent manner.

This latter example illustrates an important difference between maritime habitats and rivers which is often overlooked. Whereas, in a river, it is reasonable to expect that a pollution gradient exists along the length of the river, with pollution decreasing with increasing distance downstream from the source of the discharge, in estuarine and marine habitats this is not the case. In these environments there are complex vertical and horizontal patterns of water movement, which are not constant or unidirectional and which are influenced greatly by tides and winds. Therefore it cannot be assumed that pollution decreases unidirectionally with increasing distance from the point of discharge. In the above case, it is possible either that the pollution index used is not valid, or that the pollution gradient is not as it is assumed to be, or indeed that the pollution is not exerting a sufficiently large effect to be detectable.

7.4 International Co-operation on Marine Pollution

It was argued in Chapter 6 that effective pollution control requires adequate scientific and technical means, combined with a suitable legislative framework. Since the jurisdiction of any individual state does not extend beyond its own boundaries, it follows that any attempt to control or regulate marine pollution will require some degree of international co-operation. Added to this are a number of other difficulties. For example, in many situations there is inadequate background information available; many states do not possess the physical resources, or adequately trained personnel, which are required to tackle pollution problems. Many of these countries, especially if they are economically disadvantaged and facing numerous other social problems as a consequence, are inclined to regard industrial and agricultural development as a potential solution to their difficulties rather than as a problem requiring regulation. Finally, in many parts of the world long-standing antagonisms tend to inhibit co-operation even on non-political matters of mutual interest; in the Mediterranean, for example, between Turkey and Greece, or between Israel and

the Arab states, or in Africa until recently between the Republic of South Africa and its immediate neighbours. Nevertheless it is widely recognised that some form of international co-operation is necessary and some progress has been made, though many difficulties remain.

International law relating to marine pollution is both vague and weak (Brubacker, 1993). General principles exist which are based on ideas of abuse of rights, custodianship of the environment and good neighbourliness between states, but very few cases have been pursued in international courts and the principles of liability and rights to compensation have not been clearly established by case law. Nor are there any enforceable provisions relating to the type and quantity of pollution, its effects on the environment and how these may be determined. Thus in practice, international co-operation on the control of pollution depends mainly upon a series of treaties or conventions. These may be bilateral, regional or global, and provisions for dealing with violations of the treaty tend to vary. Frequently such provisions consist of some form of arbitration panel, established by mutual consent, with ultimate appeal to the United Nations, or some other international legal forum. Brubacker (1993) lists 89 different international legal instruments which are relevant to the control of marine pollution; to these should be added many provisions in the national laws of individual states, and obligations which arise out of broader forms of international agreement, such as the treaties binding many European states into the European Union, many of which are relevant. This section can therefore only cite a small number of examples.

One of the first treaties to cover marine pollution was the London Dumping Convention, arising from an intergovernmental conference on the Convention on the Dumping of Wastes at Sea, in London in 1972. This is a global convention, binding states which ratify it to prevent vessels under their jurisdiction from dumping certain specified waste materials and toxic substances (the 'Black List') anywhere at sea; a second, so-called 'grey' list of materials was subjected to restrictions, basically requiring parties to the Convention to regulate closely the disposal at sea of these substances. At about the same time a similar convention, the Oslo Convention, was negotiated on a regional basis by states bordering the North Sea and North-East Atlantic. The Paris Convention, in 1974, applies to the coastal states of the North and Barents Seas, and adopts similar black and grey lists. However, this Convention extended controls to pollution from land-based sources and from offshore installations.

The London, Oslo and Paris Conventions formed the model for the Barcelona Convention (United Nations, 1978, 1984), and its daughter conventions and protocols, which are the basis of the Mediterranean Action Plan. The United Nations Environment Programme, formed in 1972, recognised the threat to the Mediterranean and convened a conference of Mediterranean coastal states in 1975.

The Barcelona Convention, adopted in 1976 by all the coastal Mediterranean states (except Albania) and the European Economic Community (now the European Union), binds the participants to co-operate in four major areas: integrated planning, pollution monitoring and research, legal matters, and institutional and financial arrangements. UNEP recognised that given the very different levels of technical and economic development of the Mediterranean states, some form of assistance to the less well-endowed parties to the convention would have to be given. UNEP was therefore appointed to carry out co-ordinating and secretariat functions. The costs of the plan are mainly met by contributions in kind (manpower, facilities) from institutions of the participating states; only the European Union and the wealthier parties make substantial cash contributions. UNEP itself has funds allocated to it by the United Nations, from a Mediterranean Trust Fund established for the purpose. The money pays for the co-ordinating and secretariat functions, scientific conferences, research grants and the supply of capital equipment to the poorer laboratories.

All MAP activities are derived from the Barcelona Convention and its protocols. The 1976 Protocol on the Prevention of Pollution by Dumping from Ships and Aircraft is similar to the London, Oslo and Paris Conventions. The 1980 Protocol for the Prevention of Pollution from Land-based Sources binds the states to take measures to control sewage, industrial wastes and agricultural chemicals at source. The 1976 Protocol concerning Co-operation in Combating Pollution by Oil and Other Harmful Substances in Cases of Emergency commits the governments to co-operation in the case of serious accidents. A Regional Marine Pollution Emergency Response Centre was established in Malta, to provide training and technical advice, formulate contingency plans and co-ordinate government responses to accidents. The 1982 Protocol concerning Specially Protected Areas agrees policies for the designation, protection and management of the habitats of endangered species and other areas of biological importance. About 40 such areas have been designated so far. The Blue Plan, Priority Actions Programme and the Programme for Pollution Monitoring and Research in the Mediterranean (MEDPOL) derive from the Barcelona Convention itself. The Blue Plan is concerned with long-term planning. Pressure on the sea mounts through the development of industry and tourism, and population movements towards the limited coastal strip. The Blue Plan reports on subjects such as water resources, population trends, tourism, food requirements and transport. It offers advice to governments on the local, national and regional consequences of particular development policies. Its aim is to reduce long-term pressures on the sea by providing a rational basis for environmentally-acceptable development, and to advise on policies to prevent or reverse harmful development. The Priority Actions Programme offers technical advice and financial support for specific projects which are environmentally

advantageous and can be implemented fairly swiftly. Examples include projects on aquaculture, solar energy, water resource development, waste disposal and land use planning in earthquake zones. MEDPOL carries out biological and chemical monitoring, and research. Harmonised monitoring programmes for pollutants in water, sediments and living organisms have been established, along with reference methods tested and evaluated by intercalibration exercises. Laboratories were equipped and trained in the appropriate techniques. Provision was made for the servicing and maintenance of equipment, which is often installed in relatively remote locations. Studies are undertaken on, for example, the biogeochemical cycles of selected pollutants; input of pollutants from the atmosphere; microbiological quality of coastal waters, ecotoxicological and eutrophication problems.

The Mediterranean Action Plan in turn became the model for other areas of the world, under UNEP's Regional Seas Programme. Conventions exist for the Kuwait Action Plan Region, West and Central Africa, East Africa, East Asian Seas, the Caribbean, Southeast Pacific, Southwest Pacific, Red Sea and Gulf of Aden, and the Southwest Atlantic; all are basically the same as the Barcelona Convention and its protocols. This comprehensive framework has had mixed success, though this is hardly surprising. Some participating states, as happens with all international agreements, pursue their treaty obligations more assiduously than others. A major problem remains the shortage of suitably qualified and experienced personnel, aggravated by the limitations of the educational system, and its shortage of resources, in many countries. This has a number of consequences. First, a great deal of the monitoring and research data is in practice of limited value. Second, it is arguable that some substantial part of the total research effort is wasted on relatively unimportant problems of purely local relevance, or is based on technical or conceptual approaches which are outdated. This occurs, in part, because within the MAP and its sister plans the overall direction of the activities is strongly influenced by the scientists from the region who are participating in it. Even senior staff from many countries have, until recently, had limited access to the international literature and have had little opportunity to experience the pace and rigours of modern research. Also, precisely because staff are scarce, they are frequently under pressure to concentrate their efforts on local problems which need urgent attention. In many such cases, there is no real need for research as such, rather the application of existing knowledge is what is required; but in many parts of the world, particularly where the legislative framework of pollution control is weak, scientists have little experience of the regulatory aspects of pollution science. They are therefore inclined to tackle fairly simple problems by initiating relatively trivial research when the obvious solution is to adapt general principles which have been well tried elsewhere. Nevertheless, the MAP does show that progress can be made. Perhaps one of its major achievements will be the emergence of a corps of scientists, suitably

experienced by virtue of the opportunity they have had to participate more fully than before in the international scientific community. To this can be added progress towards more accurately quantifying the pollution threat to some of the world's seas, and measures in hand to combat the threat at the technical and legislative levels. Cheap and unbiased technical advice is now available, and many cities and industries have begun to construct pollution control facilities for the first time.

In Europe, directives of the European Union relating to the control of water pollution influence fresh waters, estuaries and coastal seas. Since a large part of the pollution discharged to the seas originates from polluted rivers, these directives will probably in due course have some ameliorative effect on the North Sea and the Mediterranean. Although compliance with EU directives is far from complete in many member states, historically the southern states have had a less rigorous approach to pollution control than some of the northern ones, so some improvement is to be expected. Also, the EU has effective means of enforcing compliance; such powers are not widely used, if they exist at all, under many other treaties. It is expected that some countries of Eastern Europe, where there remain many serious pollution problems, will in the foreseeable future join the EU and be subject to more strict environmental controls than at present, so some benefit may accrue in time to the Baltic and North Seas by this route.

One final example of international co-operation in preventing pollution of the seas relates to agreements regulating shipping operations, usually under the auspices of the International Maritime Organisation (IMO). Shipping operations can cause a great deal of pollution, for example by the discharge of oily ballast water, through accidents, and through negligent operation of routine procedures. The IMO therefore has enacted many regulations which are designed to reduce marine pollution. For example, the discharge of oily ballast water is illegal, and various modifications to the design, construction and operation of ships should be observed in order to avoid this. Ships are supposed to have a certificate of seaworthiness, to avoid major accidents; similarly, the crew are supposed to be properly trained and experienced so that they follow the often complex regulations, and avoid endangering their ships and cargoes. This has resulted in a considerable reduction in pollution from shipping operations, but some problems remain. For example, under international law the responsibility for certificating ships and their crews, for checking the design and construction of ships and for enforcing the regulations usually lies with the state with which the vessel is registered. A number of countries, not entirely confined to the Third World, generate considerable national income from ship registration, and many shipowners find it advantageous for various reasons to register their vessels under 'flags of convenience'. Some of these so-called Flag states are notorious for the laxity with which they enforce regulations. Because of this, many Port states (that is, states which a ship happens to be visiting) have begun to exercise

their rights to inspect visiting ships for seaworthiness, structural soundness, safety and pollution control equipment, and certification of crew qualifications. A typical outcome is that reported from Australia in 1995 (MER, 1996); approximately 10% of 2542 ships inspected were detained for remedy of serious deficiencies, and 56% of the ships detained were registered in one of only four countries. Similarly, records of ships lost at sea or otherwise causing pollution incidents show that certain countries of registration appear with astounding frequency.

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STRENGTHENING THE USE OF SCIENCE IN ACHIEVING THE GOALS OF THE ENDANGERED SPECIES ACT: AN ASSESSMENT BY THE ECOLOGICAL SOCIETY OF AMERICA[1]

ECOLOGICAL SOCIETY OF AMERICA
AD HOC COMMITTEE ON ENDANGERED SPECIES

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PREFACE

The Ecological Society of America is the nation's leading professional society of ecologists representing 7500 ecological researchers in the United States, Canada, Mexico, and 62 other nations. Founded in 1915, ESA seeks to promote the responsible application of ecological principles to the solution of environmental problems through ESA reports, journals, research, and expert testimony to Congress.

In March of 1992, then President of the Ecological Society of America, H. Ronald Pulliam, established an Ecological Society of America ad hoc Committee on Endangered Species. The primary charge to this committee, made up of nine distinguished ecologists, was to produce a report addressing the ecological issues relevant to reauthorization of the Endangered Species Act. The Society's goal in this endeavor was to provide legislators with scientifically credible information.

The Ecological Society of America has produced other reports focusing on possible ecological consequences of the release of genetically modified organisms, delineation of wetlands, and ecological research priorities. These reports have been favorably received and viewed as credible because of the Ecological Society's reputation and because the reports focused on science in a policy context.

The following document is based on an exhaustive effort on the part of the ad hoc Committee that included soliciting comments on earlier drafts from some 30 academic, public, and private agency biologists, open discussions on the topic during annual meetings of the Ecological Society of America, and external review by 20 other biological scientists. It is our hope that this report will prove useful as Congress considers reauthorization of the Endangered Species Act.

[1] For a copy of the report or further information contact: The Ecological Society of America, 2010 Massachusetts Avenue, NW, Suite 400, Washington, DC 20036. Ph: (202) 833-8773; Fax: (202) 833-8775.

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EXECUTIVE SUMMARY

By enacting the Endangered Species Act of 1973, Congress established a national commitment to preserve the Nation's biological resources for the benefit of the American public. The Endangered Species Act sets out a series of steps for determining whether a species is at risk of extinction, removing the major causes of its endangerment, and returning the species to a viable state. The Act specifies all the steps, procedures, and mechanisms to accomplish its goals. Scientific information is needed for implementing each of these procedures, but the Act itself provides little guidance as to how to use science to achieve the goals of the Act.

Therefore, the Ecological Society of America undertook an analysis of how scientific information could be used more effectively to assist in the preservation of the Nation's biological resources. This report concludes that:

- The 1973 Endangered Species Act is a powerful and sensible way to protect biological diversity, and contains the procedures and mechanisms with which to achieve this goal.
- On the basis of science, the most important priorities to use in deciding which candidate species to list are: (1) number of other species that will benefit from the listing; (2) ecological role of the species; (3) the organism's recovery potential; and (4) its taxonomic distinctness.
- Formal Population Viability Analysis offers a method to identify how a species' survival potential can be maximized in the least controversial manner.
- The likelihood of restoring the viability of an endangered species is enhanced when: (1) recovery plans seek to achieve a population distributed in suitable habitats across the landscape; and (2) these plans are developed and implemented expeditiously.
- Additional programs for ecosystem-level protection that would complement existing legislation offer promise for a proactive approach that would effectively protect our Nation's biological heritage at lower long-term cost.

I. INTRODUCTION

The Endangered Species Act, as amended in 1988, has three purposes:

> "... to provide a means whereby the ecosystems upon which endangered species and threatened species depend may be conserved.

. . . to provide a program for the conservation of such endangered species and threatened species.

. . . to take such steps as may be appropriate to achieve the purposes of the treaties and conventions . . ." (Endangered Species Act 1988).

By enacting the Endangered Species Act of 1973, Congress, on behalf of the American people, established a national goal and commitment to protect the Nation's biological resources. The Act establishes the form and sequence for the process of providing federal protection, from listing threatened and endangered species to the implementation of their recovery. The Act is a powerful and sensible way to protect biological diversity that specifies the procedures and mechanisms to achieve that goal. However, the original legislation and subsequent amendments to the Act do not explicitly specify how science will be used to carry out the legislative mandate. Instead, the manner in which scientific knowledge is to be used is largely left to the discretion of the implementing agencies, the United States Fish and Wildlife Service and National Marine Fisheries Service.

The goals of the Act are to identify species that are at risk of extinction, to implement a process for reducing that risk by limiting additional sources of jeopardy, and to develop and implement a recovery program. The process is flexible and can be applied to individual species or to groups of species that share an ecosystem or management area. If the valuable scientific knowledge that has accumulated over the past several decades of analytical ecological research is used to the fullest extent, the Act can become an even more powerful tool in achieving the societal goals for which it was enacted.

The Act has improved the status of some species, such as the California sea otter, Peregrine Falcon, American alligator, Whooping Crane, and Bald Eagle. Nevertheless, each year, many more species are added to the list of endangered species than are successfully recovered and removed from the list. Despite being protected, some species are becoming extinct. Currently 955 species in the U.S. are on the list of endangered and threatened species; only slightly more than half of them have approved recovery plans (Department of the Interior 1995).

Given this growing list of threatened and endangered species and the limited success in recovery of endangered species, the Ecological Society of America undertook an analysis of the Endangered Species Act, with the objective of assessing how the Act could be made more effective through better use of scientific information. The nation's biological diversity has great economic, aesthetic, and spiritual value. Modern society draws upon biological diversity as a source of medicines, fiber, food, as sources of genes for future incorporation into crop plants, and for uses we cannot predict. The extensive services that natural ecosystems provide, such as cleansing of air and water, control of erosion, and stabilization of climate, depend in part on the richness of species in those systems. Therefore, the Ecological Society's analysis accepts and supports the goals and objectives of preserving the biological heritage of the United States and explores how science can be used more effectively than it has been in the past to enhance the achievement of those goals.

II. THE IMPLEMENTATION PROCESSES OF THE ENDANGERED SPECIES ACT

The Endangered Species Act sets out a series of steps for determining whether a species is at risk of extinction, removing the major causes of its endangerment, and returning the species to a viable state. The major stages in this process are: (1) listing a species as threatened or endangered, (2) designating the habitat that is critical for survival of the species, (3) providing immediate protection and prohibition of acts that would further jeopardize the species, (4) developing and implementing recovery plans, and (5) delisting the species once it has been restored to a viable state. Scientific information must be used at all of these stages if an accurate initial assessment and a successful recovery program are to be achieved.

The process of listing a species includes a series of steps that begins with a decision to propose a species as a candidate for protection and culminates in one of three outcomes: rejection of the claim for protection; inclusion of the species under federal protection as either an endangered or threatened species; or placing the species in an ill-defined category, known as "warranted, but precluded." Although decisions on status of species designated "warranted, but precluded" are to be made within a 12-month finding period, since 1982 114 species have remained in this category for two or more years. Fifty-six have been in this category for at least eight years (GAO 1992).

Once a species is listed, the Endangered Species Act requires the designation of "critical habitat." In the legislative language, "critical habitat" is defined as the minimal area that is needed to supply the species with its immediate survival needs. The Endangered Species Act also provides immediate protection to a species when it is listed as threatened or endangered. Section 7 of the Act requires all federal agencies to ensure that any actions they authorize, fund, or carry out do not jeopardize the continued existence of any listed species or adversely modify its habitat. Thus, every federal agency must examine whether any action it proposes to carry out might adversely affect a listed species and these assessments must be scrutinized and evaluated by the Fish and Wildlife Service or the National Marine Fisheries Service. Scrutiny occurs through a process known as "formal consultation" and ends with a written "biological opinion" containing the service's views. These opinions are not legally binding on the

other federal agency but federal agencies are reluctant to proceed with a project in the face of a jeopardy opinion because the probability that a citizen suit will be brought against the action is very high. In such suits, jeopardy opinions are given considerable weight by the courts. Formal consultations serve other purposes in addition to making jeopardy determinations. They also search for reasonable alternatives or adjustments to the proposed action that could avoid jeopardizing a listed species.

Section 7 also deals with incidental take, which is defined as a taking of a listed species that is incidental to, and not the primary purpose of, otherwise lawful activities. The term "take" refers to many possible perturbations to the species, including "harm, harass, kill, wound, catch," etc., all of which are prohibited under the Act unless authorized by a permit, an incidental take statement, or a special rule. Incidental take has been interpreted to include harm to the habitat of a species as well as direct harm to the species itself, and this interpretation has been upheld in a 1995 Supreme Court decision. From a scientific standpoint, degradation or destruction of the habitat of a species can be at least as harmful to the survival of the species as direct injury to an individual of the species. In 1982 Congress amended the Act to provide mechanisms for regulating incidental take on nonfederal land. Those procedures are now found in section 10(a)(1)(B). Persons applying for an incidental take permit under Section 10(a)(1)(B) must submit a "Habitat Conservation Plan" or HPC along with other materials attendant to their permit application.

In the case of Section 7, "harm" is defined as an action that significantly reduces both the survival and recovery of a species. Similarly, in the definition of harmful destruction of critical habitat, a jeopardy ruling requires that both the survival and recovery of a species be affected. Many actions slow a recovery process, but it is difficult to show unambiguously that an action threatens the survival of a species (Rohlf 1989).

When a species is listed, the Endangered Species Act requires that a recovery plan be developed. The ultimate goal of the recovery plan is to improve the status of the species in its natural habitat to such a degree that it can be delisted. However, by the time a species becomes eligible for listing, its habitat is often destroyed or badly degraded, the population is decimated, and its genetic diversity seriously eroded. Additional delays in developing and implementing recovery plans further imperil the species. In practice, recovery plans are often not developed for years, if at all. Through 1991, 61% of the listed species had approved recovery plans but, of the more than 200 species without recovery plans, more than half had been listed for three or more years (GAO 1992). The recovery of species under these circumstances is one of the greatest challenges to the application of ecological science.

In addition to being delayed, recovery plans often have weak goals. A review of the 314 approved recovery plans for threatened and endangered species that were approved by the U.S. Fish and Wildlife Service and the National Marine Fisheries Service as of mid-1991, found that population goals were often no higher than existing population densities at the time of listing (Tear et al. 1993). More than half of the vertebrates would remain in serious risk of extinction even if they met the population targets in their recovery plans. In some cases, habitat destruction was so severe that the recovery plans had little chance of success. The reviewers concluded that, "Recovery plans all too often 'manage for extinction' rather than for survival" (Tear et al. 1993).

The ultimate goal of the Endangered Species Act is to restore populations so that they no longer are threatened with extinction. When that state is reached, the Act provides for delisting of the species.

III. THE ROLE OF SCIENCE IN THE ENDANGERED SPECIES ACT

Scientific information is needed for implementing all of the processes specified in the Endangered Species Act. The more high-quality science is used, the more effectively and more efficiently the Act can achieve the important goals society has asked it to accomplish.

A. Use of Science in the Listing Process

Listing a species as threatened or endangered is the first step in conferring legal protection. It is the conclusion to a decision-making process that draws heavily on ecological science, particularly for assessing the level of risk to a species and developing priorities for listing.

Species are proposed for protection because they are thought to be in danger of extinction or at risk of becoming endangered with extinction. For species deserving protection, delaying the decision to provide protection and recovery will bring most of these vulnerable species even closer to the brink of extinction, restrict the options available for achieving recovery, and increase the eventual cost of the recovery process. Therefore, streamlining the listing process can increase the effectiveness of the Act in achieving its goals and potentially reduce the total costs of doing so.

There is no scientific reason why listing, which is an administrative decision based on the available information, should require much time or agency resources. The uncertainty that may result from sparse information is part of the risk that is evaluated during the listing process. Adding independent peer review or other administrative processes to the listing process would unnecessarily lengthen the time to make a listing decision without providing any substantial benefits. The major problem with the listing process has been its slowness, not inadequacy of the quality of the listing decisions.

1. *Which Biological Units Should Be Listed?*

In the language of the Act, a "species" is taken to include any subspecies of fish or wildlife (including invertebrates such as insects, crustaceans, and mollusks) or plant (including fungi). For vertebrates, any distinct population segment of a species, that is one with unique morphological features or genetic traits, qualifies as a species. How distinct is distinct enough must be judged on a case-by-case basis. The meaning of "species" in the language of the Act is, therefore, somewhat imprecise, but the wording recognizes that a species is made up of an assemblage of individuals that collectively express genetic, morphological, and behavioral variation, and that this variation is the basis of evolutionary change and adaptation.

The scientific justification for extending protection to distinct population segments of species is that genetic diversity provides the raw material for adaptation of a species to changing conditions. A wide geographic range decreases the likelihood that a catastrophic event such as wildfire, disease, or alien species introduction could wipe out an entire species. The capacity to respond to environmental change through ecological and evolutionary processes is enhanced by large population size, extended geographical distribution (including spatial structure among its populations), and intraspecific genetic diversity. Therefore, because loss of specific population segments can contribute to the decline of a population and increase the probability of its extinction, protection of population segments is biologically appropriate.

The National Marine Fisheries Service has introduced the concept of an "evolutionarily significant unit" to better define and identify distinct population segments. An evolutionarily significant unit is a population that is reproductively isolated from other populations of the same species, which therefore represents an important part of the evolutionary history and future evolutionary potential of the species. For example, the species of Pacific salmon are subdivided into many distinct spawning runs that are evolutionarily significant units of central importance for the future survival and evolution of the species (Waples 1991).

New species often arise when genes from two species combine and the number of chromosomes is increased, a process called polyploidy. Polyploidy has given rise to many species of plants and some animals, including trout and salmon. Hybrid populations may play unique ecological roles and may stimulate evolutionary processes. For example, hybrid populations of plants sometimes provide opportunities for increased speciation among herbivorous insects (Bush 1975). The biological processes that produce these genetic mixtures are natural components in the larger processes of speciation and evolution. For these reasons, it is scientifically appropriate to protect species of hybrid origin.

2. *Science and Listing Priorities*

Currently more than 3000 species are "Candidates" for listing under the Endangered Species Act, including more than 2000 vascular plants, 200 mammals, and 750 insects. This large number of candidate species greatly exceeds the capacity of the Fish and Wildlife Service (FWS) and National Marine Fisheries Service to evaluate and propose species for listing as threatened or endangered. In recent years, about 100 species have been listed annually. At the international level, the IUCN Species Survival Commission classifies species by levels of extinction risk for inclusion in the Red Data Book (IUCN Red List Categories 1994).

The scarcity of resources available for listing species requires agencies to make choices about how those resources can best be allocated to meet the objectives of the Endangered Species Act. In the 1970s and 1980s, the FWS developed several different schemes for setting priorities for listing species. These priority systems incorporated such criteria as: magnitude and imminence of threat, availability of information, taxonomic distinctness of the species, recovery potential, and population status. The current scheme, adopted in 1983, establishes priorities for listing based on three criteria: (1) magnitude of threat, (2) immediacy of threat, and (3) taxonomic status (the greater the evolutionary distinctness of a taxon, the higher its priority). A fourth criterion, recovery potential, is included in setting priorities for the development of recovery plans.

This system of priority-setting has the advantage of being relatively simple. It uses information that is available for most species, and employs criteria that can be evaluated relatively objectively (Tobin 1990). However, it does not take full advantage of ecological knowledge that could better guide limited resources. From an ecological perspective, three attributes should be considered in a determination of listing priorities:

(a) Inclusive Benefits. Will the habitat managed on its behalf benefit other species, especially species that are listed or are candidates for listing?

Given the limited resources available for endangered species protection, giving high priority to species that serve as protective "umbrellas" for other species makes good ecological sense. For example, the Florida Scrub Jay (*Aphelocoma coerulescens coerulescens*) is restricted to scrub oak habitats on the Florida peninsula. Many rare species of reptiles, insects, and plants inhabit, and are restricted to, those scrub habitats. Many of them benefit from the land that is managed for the protection of the jay. Similarly, many but not all species requiring old-growth temperate rain forest will benefit if sufficient Spotted Owl habitat is protected.

The umbrella species approach must be used carefully because every acre of land or body of water will contain large numbers of species. Thus, virtually any organism could be considered an umbrella species at

some scale. Moreover, an important fact about endangered species is that they rarely have exactly the same requirements. Therefore, even when a suitable umbrella species exists, the ecological needs of other community members must also be considered. The most useful umbrella species are ones whose habitats harbor numerous endemic, rare species. Thus, umbrella species should be given priority for listing in proportion to the number of other endemic, rare species that co-occur with them.

(b) Ecological Role. Does the species play an especially important role in the ecosystem in which it lives? Do other species depend on it for their survival? Will its loss substantially alter the functioning of the ecosystem?

> Keystone species, organisms whose impact on its community or ecosystem are large, and disproportionately large relative to their abundance (Power and Mills 1995), merit special attention in the listing process. Unfortunately, determining which species are keystone and which are not is difficult because a species' importance in an ecosystem is not necessarily proportional to its size, abundance, or charisma. Tiny fig wasps and African elephants are both keystone species.

(c) Taxonomic Distinctness. How evolutionarily distinct is the taxon in question? On scientific grounds, the more evolutionarily distinct an organism is, the higher should be its priority for protection. All things being equal, therefore, saving the sole surviving member of a genus may have a higher priority than saving an imperiled species within a large genus that contains many other species. Similarly, protecting full species would normally be given a higher priority than protecting subspecies and populations (Vane-Wright et al. 1991).

Species also have important scientific, aesthetic, and social values, but, given the paucity of information about most species, priorities are difficult to assign using those values. Therefore, provisionally it seems scientifically reasonable to give high priority to species immediately threatened with extinction, to umbrella species, and to taxonomically unique species. Existing priorities for listing also could be modified by including considerations of inclusive benefits and ecological role. For example, among current high-priority species (species and monotypic genera facing high-magnitude imminent threats), those providing more inclusive benefits or playing more important ecological roles should be given higher priority.

B. The Use of Science to Establish Recovery Priorities

The immediate consequence of listing a species under the Endangered Species Act is to trigger a series of processes that can recover the species and enable it to be delisted. Recovery is much more complex and difficult than listing, and development of recovery plans usually requires the generation of substantial new information in addition to the evaluation of existing information.

1. *Science and Critical Habitat Designation*

Once a species is listed, the Endangered Species Act requires the designation of "critical habitat." Because loss of habitat is the cause of endangerment of most species, designation and preservation of habitat is a vital part of Endangered Species Act procedures. Because recovery is a long-term, not a short-term process, and the goal of the Act is to preserve species in perpetuity, enough habitat must be preserved to allow the species to survive in the long term. But how long is long term and how much is enough?

The scientific procedure used to estimate the probability of survival of a population for a specified period of time is known as Population Viability Analysis, or PVA (Shaffer 1990). Although there is no strict definition of what is or is not included, each PVA should include an analysis of the best available information on the focal species. Most PVA analyses combine data from field studies with simulation modeling of the possible impacts of various extinction factors (Menges 1990, Murphy et al. 1990, Stacey and Taper 1992, Doak et al. 1994).

The details of a PVA analysis depend on the characteristics of the focal species (Murphy et al. 1990). Species with low population densities and small geographic ranges (most endangered large vertebrates, for example) and small geographic ranges (many plants) require a PVA that includes analysis of the genetic and demographic factors that affect small populations. Smaller organisms, such as most threatened invertebrates, frequently are restricted to a few habitat patches, but within those patches they often have high population densities. For these species PVAs need to analyze environmental uncertainty and the probability of local catastrophic factors. PVAs for plants require different emphases than PVAs for animal species because individual plants may survive for many years even if they are not reproducing successfully (Schemske et al. 1994). A PVA for a migratory species may also have to incorporate explicitly how its populations are linked through migration and how its population dynamics are influenced by processes operating at a landscape scale.

A good PVA addresses the issue of how long is long enough by attempting to answer the following questions: Is the population viable in both the short term and the long term? What factors are currently putting it at risk? How can these risks be reduced or eliminated so that the population can both survive and recover? There are no clear criteria for determining how long is long enough, but in practice a minimum viable population (MVP) is typically defined as one that has a 90% probability of persisting for 200 years.

A PVA was performed on the Acorn Woodpecker

(*Melanerpes formicivorus*), a nonendangered bird that lives in small, isolated populations in the oak woodlands of western United States and Mexico (Stacey and Taper 1992). A simulation model showed that most of these populations would become extinct within 20 years if they were totally isolated from one another. However, with a small amount of migration among populations, the model indicated that most of the populations would last more than 1000 years. Historical records indicate that local populations of these woodpeckers have survived more than 70 years, suggesting that migration must be important in maintaining them.

Population viability can seldom be assessed by focusing on a single patch of suitable habitat and the organisms living in it. Most organisms live in islands of suitable habitat, among which there is an exchange of individuals, embedded in a larger landscape. Because the populations in the various patches are linked by the movement of dispersing individuals, the fate of the populations is interconnected. Studies of population viability of many organisms will therefore need to consider the importance of factors that link subpopulations. The whole set of populations of a species that are linked through migration in a habitat mosaic is known as a "metapopulation."

The long-term survival of metapopulations can be strongly affected by the spatial and temporal distribution of suitable and unsuitable habitat patches. Populations living in high-quality habitats (referred to as "source" habitats) have birth rates greater than death rates; the excess individuals may migrate into lower quality habitats ("sink" habitats) where birth rates are less than death rates. The viability of metapopulations depends on the existence of sufficient high-quality habitats, but a large fraction of the individuals may live in the suboptimal habitats (Pulliam et al. 1992). To determine the critical habitat needs of such species requires identification of source and sink habitats, which may be difficult.

Not every rare and endangered species is patchily distributed in a spatially structured habitat mosaic. Some live in just a few continuous or in completely isolated habitats. Some have a "core-satellite" structure in which one very large population (the core) determines the population dynamics in the small (satellite) populations. Nonetheless, because many species do depend on source and sink habitats, every protection and recovery plan for species should investigate the need to include (1) spatially distributed populations that are linked through migration, and (2) special protection of the most stable, high-quality habitats.

For some species, the designated critical habitat may need to include more than habitat actually occupied by the species. This is especially true in cases where the quality of critical habitat is dependent on land use in the surrounding area (e.g., Noss 1983, Turner et al. 1995). Although this is a general concern, the need for a larger scale of focus in the designation of critical habitat is most apparent for aquatic species. If the watershed that supplies river and lake ecosystems is degraded, the critical habitat needed by the endangered species may also be destroyed.

The data available for most candidate species will not allow a precise determination of MVP or critical habitat. From a scientific standpoint, the resolution to this problem is to designate interim critical habitat at the time a species is listed and to designate long-term critical habitat as part of the recovery plan. A monitoring and research program that generates information about the requirements of the species needs to be established. Procedures should allow for revisions of critical habitat designations if suggested by additional information.

The Endangered Species Act, although it focuses on species as the objects of concern, clearly recognizes that preservation of the ecosystems upon which endangered and threatened species depend is a necessary component of the recovery process. This feature was written into the Act because loss of habitat is by far the most important cause of endangerment of species in the United States. A particular habitat type may be lost by destruction or conversion to other habitat types unsuitable for the species that live in it. A habitat may also be degraded by pollutants without being otherwise altered. The fact that habitat preservation is the most important element of most recovery plans creates several possibilities for using scientific information in more comprehensive ways.

Because many species that depend upon a habitat that has been greatly reduced in area or otherwise degraded are similarly affected by losses of that habitat, a number of listed or candidate species are likely to live in the same habitat. In a recent out-of-court settlement, the United States Fish and Wildlife Service formalized a commitment to emphasize multiple-species listings and proposals that address entire ecosystems (Jaffe 1993), a result that demonstrates the appropriateness and legality of multispecies processes under the existing Act. Managing for multiple species within a single management area focuses efforts on recovery of threatened species while simultaneously directing attention to broader issues of habitat quality and quantity.

Multispecies planning differs from ecosystem management because its focus is still on species. Nonetheless, a multispecies approach to preservation plans inevitably directs attention to habitats and ecosystems. Habitat-based packages that combine the listing efforts for many species have the potential to eliminate unnecessary duplication of efforts and to prevent species from becoming threatened in the first place. Thus, a likely consequence of more extensive use of a habitat approach is that the need to invoke the Endangered Species Act will arise less frequently than it does now.

2. *Use of Science in Protection and Prohibition Against Jeopardy*

Section 7 of the Endangered Species Act provides immediate protection to a species when it is listed as threatened or endangered. The analyses leading to no jeopardy or jeopardy opinions, together with the search for nonjeopardizing alternatives, offer considerable scope for the use of ecological knowledge. Jeopardy opinions, as well as nonjeopardy opinions, may become irrelevant unless they are regularly updated to reflect changed circumstances and new information. Ideally, recovery plans should provide tangible standards or yardsticks for judging whether particular federal actions satisfy Section 7. Recovery teams could play a useful role in this regard, by advising the Fish and Wildlife Service and National Marine Fisheries Service with respect to particular consultations.

The likelihood that a species will become extinct does not increase uniformly as its population declines. Rather, thresholds at which the probability of extinction rises rapidly are the rule. The importance of thresholds needs to be taken into consideration during evaluations of "incidental take." A determination of the consequences of incidental take should be based on the effect it would have on the process of restoring the species to its safe minimum population density. Thus, if the damage from incidental take was estimated to cause a 5% loss in the population size of a listed species, the consequences of that additional mortality on the likelihood of extinction could be shown explicitly through a population viability analysis. Furthermore, because PVAs emphasize the principal causes of a species' vulnerability to extinction, alternatives to the proposed action, such as mitigation, could be considered and evaluated.

In the broadest sense, the implementation of the Endangered Species Act is a process of risk assessment and risk management. Assessing risk of extinction, which is the function of the listing process, is a purely biological procedure. Any associated economic consequences that might arise from designating an imperiled species as endangered or threatened are not, and should not be, part of the risk assessment equation. However, in the "risk management" phase which follows the listing of a species, the Act appropriately permits the consideration of possible economic costs and infringement of personal property rights in the designation of critical habitat, in the determination of allowable harm to the species (takings and jeopardy), and in the development and implementation of recovery plans.

Formal population viability analyses could assist this process because a given level of probability of survival for a specified time period might well be achieved in many different ways, some of which would impose more restrictions on private land owners than others. PVAs could identify those options that would achieve maximum protection while reducing costs and lowering political controversy.

Science can play a valuable role in stimulating the consideration and evaluation of a wide range of actions at the time a federal action is contemplated. All too often formal consultations are limited to a consideration of a small number of options that are proposed as ways of avoiding harm to some listed species. Impacts of the options on other species often are not considered, and options that might be better than those being evaluated are rarely discussed. Broadening the range of options being considered increases the up-front costs, but if superior options are identified and eventually implemented, long-term costs may be reduced substantially.

Biologists in the agencies responsible for implementing the Endangered Species Act generally try to use the best scientific information and methods available. Failure to use the best available information and methods is generally due to inadequate budgets and overworked staff. Incorporating greater scientific rigor into the recovery process will result in initially higher costs because better methods for identifying species at risk, formal population viability analysis, and adequate habitat restoration and recovery programs all require greater investment. However, if the best available science is used consistently, common patterns will emerge and species protection and recovery will become more cost effective. In other words, as experience is gained, each new case can build upon the results of previous cases. Rather than treating each new species to be protected as a totally novel situation, more powerful general rules can be applied and the process thereby simplified. The rapidly growing field of Conservation Biology, with its own professional, scientific Society of Conservation Biology, is already providing some of the needed information.

Furthermore, the development of general rules that are well grounded in both experience and theory can be useful in predicting which kinds of species and circumstances are likely to be sensitive to disturbance from human activities and in evaluating acceptable alternatives to the proposed actions.

In many regions of the United States, particularly the West Coast and the Southeast, threatened and endangered species occur on private land, and the concurrence of landowners will be required to protect the habitat of the species and to implement species recovery plans. This situation generates a need for interdisciplinary studies by resource economists and ecologists. The objectives of these studies should be the development of models and field approaches for determining least-cost solutions to habitat protection.

Furthermore, the pathways to these solutions should be "user-friendly" so that landowners can identify with the process. As an example of this approach, Liu (1992) developed a model for pine plantation management that shows the effects of different tree-harvesting patterns

and rotation lengths on the population size of Bachman's Sparrow. This model shows how the real opportunity costs of forgoing the most profitable management plan are related to the probability of survival of Bachman's Sparrow.

3. *Use of Science in Development and Implementation of Recovery Plans*

When a species is listed, the Endangered Species Act requires that a recovery plan be developed. The ultimate goal of the recovery plan is to recover the species in its natural habitat to such a degree that it can be delisted. However, by the time a species becomes eligible for listing, its habitat is often destroyed or badly degraded, the population is decimated, and its genetic diversity seriously eroded. Therefore, scientific information is especially needed for setting population goals, captive breeding and release, and habitat protection and restoration.

(a) Setting Goals for Recovery. The first goal of a recovery plan is to stop the population decline before the species is on the brink of extinction. If listing as an endangered species was warranted, a recovery plan usually must aim for a population size significantly greater than the size at the time of listing. A good recovery plan for an endangered species typically has three goals for achieving viable populations. First, it calls for the establishment of multiple populations, distributed so that migration among them is possible, so that a single catastrophic event cannot wipe out the whole species. Second, it moves to stop known threats that guarantee the continued decline and eventual extinction of the population. Third, it plans for achieving annual population growth rates greater than zero, which will increase the size of populations to levels where demographic and normal environmental uncertainties are less threatening. Doing so requires careful analysis of the habitat requirements of the species and the distribution of suitable habitats in the landscape.

Analyses to determine long-term recovery goals and programs for attaining them are a vital component of recovery plans. However, because their development may require considerable time, short-term interim goals may be needed to prevent the species from becoming extinct while long-term plans are being developed. Interim population goals should be biologically attainable during the first years of the recovery process. One exception to setting larger recovery goals is if a species were naturally restricted to a very small area. In such a case, it might be listed as endangered, but recovery might require only removal of the threat it faces, in the restricted area.

General tentative guidelines for establishing viable population sizes are available (e.g., Gilpin and Soulé 1986), but these target population goals are no more than rough estimates and should not be viewed as substitutes for a more thorough analysis. Interim population goals need to be flexible and readily adjustable. For example, an appropriate goal over a three-year period for a rapidly reproducing species might be the establishment of three semi-isolated populations with a combined population size greater than three times the original population size at the time of listing. For species with low reproductive rates, an increase in the size of the population of that magnitude within a few years may not be possible. Although interim goals are necessary, population viability analyses should begin immediately so that long-term population goals can be established and the most important factors threatening the species can be identified in a timely manner.

It is always tempting to set as a recovery goal a population of a specific size and spatial distribution. For many species, however, a goal of a relatively constant population is biologically unrealistic and probably intrinsically undesirable. Many species live in unstable, fluctuating environments, and their populations have historically fluctuated together with the states of their environments. For example, many species depend upon habitats that are maintained by periodic fires, droughts, or floods. Populations of such species inevitably fluctuate greatly in space and time. Realistic management goals must reflect this biological reality.

For example, the 1986 recovery plan for the Snail Kite (*Rostrhamus sociabilis*) in the Florida Everglades sets an interim population goal for reclassification from endangered to threatened of an "annual average of 650 birds for a ten-year period with annual population declines of less than 10% of the average." However, kite numbers vary, and have probably always varied, considerably according to surface water conditions, which change dramatically along with drought cycles in southern Florida. Achieving a population having the stability outlined in the interim population goal is probably unattainable. Also, attempting to achieve great population stability might well lead to management interventions that in the long term reduce the quality of kite habitat and, hence, the long-term viability of the population. However, it is generally useful to establish critical minimum population sizes below which extinction probabilities become unacceptably high even if they are sustained for only short time periods.

(b) Captive-breeding and Translocation. Reintroduction of captive-bred individuals and translocation of individuals between populations are often components of recovery plans. While reintroduction programs are necessary where species have been extirpated in the wild, this approach has several important caveats. Captive breeding programs are expensive, can save only one species at a time, and can be used only rarely because available facilities are limited. Also, because unexpected undesirable consequences may arise, captive propagation programs are risky. Deleterious genes may increase in captivity, or individuals released in areas other than the ones from which they or their parents were taken may not be adapted to the environments in which they are released. Diseases may be carried by

the reintroduced individuals. Behavioral traits may develop in captivity that prevent individuals from functioning appropriately in nature. For these reasons, careful attention must be given to the sources of individuals for release to the wild and their treatment in captivity. Similar considerations apply to introductions of plants propagated in botanical gardens and other artificial environments.

There is also a danger that wild populations may be depleted to obtain individuals for captive breeding programs, although in special instances, such as occurred in the case of the California Condor in the 1980s, capture of all remaining individuals in the wild population may be warranted. Captive breeding programs may draw attention away from the need to protect and restore habitats for the focal species. Successful species recovery plans ultimately depend on adequate amounts of protected habitat. Captive-release or translocation programs of native populations, although important, cannot substitute for the failure to protect or restore natural habitat (Povilitis 1990). The danger is illustrated by the Gila topminnow, which was reclassified from endangered to threatened because artificial habitats were successfully restocked with captive-bred fish. However, the natural habitat continued to degrade from the effects of alien mosquitofish and agricultural water withdrawals (Simons et al. 1989). The continuing loss of the fish's natural habitat makes its survival in artificial pools increasingly improbable.

(c) Habitat Protection and Restoration. Often the best approach for restoring habitat is to control the source of the degradation and let nature take its course. Unfortunately, habitats are often very badly degraded or too small to contain adequate heterogeneity and natural disturbance regimes. In those situations, active management is needed to restore and maintain the habitat. Habitat restoration and ecological management are critically important to the species recovery process. Methods to restore and manage habitats are not yet well developed, but the field of Restoration Ecology is growing rapidly (Jordan et al. 1987, MacMahon and Jordan 1994). Its practitioners increasingly should be able to provide insights and guidance for restoration efforts in a variety of habitats.

Critical components in the development of a recovery plan for a listed species are determination of the current extent of its suitable habitat, assessment of the quality of the remaining habitat, and establishment of priorities for the areas to be targeted for restoration efforts. Restoration efforts can also be designed to test hypotheses about how the ecological community in question functions and the roles of the various species that might be reintroduced as part of the restoration project. Ideally, several different restoration projects should be initiated in different patches of a given habitat so that more than one hypothesis about the functioning of the community can be tested. Such a procedure would increase the probability that the results of specific restoration projects are generalizable to other habitats, while increasing the speed of restoration of the habitat in question by identifying more promising restoration techniques.

C. Delisting, the Ultimate Goal of the Endangered Species Act

Delisting is the ultimate objective of the Act. Measures of progress toward this goal include prevention of extinction and slowing the rate of population decline. The criteria for delisting should be established early in the recovery process, and they should be based on sound biological information. As discussed previously, delisting criteria should be consistent with natural fluctuations in the habitats supporting a species.

However, results obtained as recovery is underway may require modifications in the original criteria as better information about habitat requirements and population dynamics of the species becomes available.

IV. CONCLUSIONS

Protection is not afforded to species and their habitats under the Endangered Species Act until species are already threatened with extinction. By that time, both the range of a species and its total population size are likely to have been seriously reduced. Recovery under these circumstances is likely to require major habitat restoration efforts and, possibly, captive propagation. These activities are more expensive and are less likely to be successful, the later in the decline of the population they are initiated. Therefore, the goals of the Endangered Species Act are more likely to be achieved, and to be realized at lower total cost, if preservation of biological diversity is approached in a more proactive manner.

The most important elements of a proactive approach would be to identify habitats and biological communities that are being seriously reduced in area or are being otherwise degraded and then to establish policies that prevent further losses of those habitats and restore degraded parts of them. Such an approach could not replace a species-by-species analysis because not all species are threatened by habitat loss and threatened species require different habitat types. Nonetheless, a habitat-based, proactive approach should greatly reduce the number of species that would need to be considered for listing. In addition, a proactive approach, by identifying habitats experiencing or likely to experience serious losses would allow federal agencies to initiate preservation plans while more options are available than will be present at such time when particular species would become candidates for listing. Habitat- and ecosystem-level planning can be accomplished under the existing Endangered Species Act, particularly through the use of critical habitat designations for already listed "umbrella species." For both scientific and economic reasons, such proactive plan-

ning needs to be greatly increased. The establishment of the National Biological Service is an important step in developing the data needed for proactive, habitat-, and ecosystem-level planning.

However, if the protection of habitats and ecosystems is to become an important means for conserving biological diversity, some important questions need to be addressed. Ecosystems are not closed systems; they are dependent on outside conditions. Ecosystems and habitats can be recognized at many scales. Aquatic ecosystems may range in size and complexity from small ponds to the Great Lakes. Determining the most appropriate scales for protecting them will require considerable information and complex biological judgments. New legislation for ecosystem-level protection, designed to complement and strengthen current legislation, could greatly assist protecting the nation's renewable natural resources, including its rich biological diversity. An ecosystem approach could help to reverse the slide toward extinction by preventing habitat degradation. The Endangered Species Act would then function as the safety net for those species whose survival cannot be guaranteed within the protected ecosystems.

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AN EPIDEMIOLOGICAL STUDY OF POSSIBLE ADVERSE HEALTH EFFECTS OF SWIMMING IN SANTA MONICA BAY

Final Report

May 7, 1996

Santa Monica BAY Restoration PROJECT

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A Partnership To Restore And Protect Santa Monica Bay

Funded by US EPA and the State Water Resources Control Board in cooperation with the public, local agencies, and industry.

A Health Effects Study of Swimmers in Santa Monica Bay[1]

Summary

In the summer of 1995, the Santa Monica Bay Restoration Project (SMBRP) conducted the first large-scale epidemiologic study in the nation to investigate possible adverse health effects associated with swimming in ocean waters contaminated by urban runoff. The overall objective of this study was to answer the public's most frequently asked question, *"How safe is it to swim in Santa Monica Bay?"* by investigating swimmers' reports of illness and determining whether the risks of contracting these illnesses were associated with exposure to pathogens in urban runoff.

BACKGROUND

Since the genesis of the Santa Monica Bay Restoration Project (SMBRP), a primary focus of energy has been to find the answer to a fundamental human health question: *"How safe is it to swim in Santa Monica Bay?"* Nearly fifty million tourists and local residents come to Santa Monica Bay's public beaches each year to enjoy its recreational resources, but there has been wide public perception and some scientific evidence that there may be health risks associated with swimming in beach areas contaminated by runoff.

In previous investigations conducted by the SMBRP, human pathogens were detected in summer runoff, an unexpected result since sewer and storm drain systems in Los Angeles are completely separate. Possible sources of pathogen contamination into the storm drain system include illegal sewer connections, leaking sewer lines, malfunctioning septic systems, illegal dumping from recreational vehicles, or direct human sources such as campers or transients. Other potential sources of human pathogens in near shore areas include sewage spills into storm drains, small boat waste discharges and swimmers themselves.

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[1] "An Epidemiological Study of Possible Adverse Health Effects of Swimming in Santa Monica Bay."

The members of the SMBRP therefore decided that the definitive step necessary to answer this question of swimming-related health risks was an epidemiological study. Through this study, we would finally know if risks exist and whether they differ according to where one swims, and we would have the basis for revising recreational water quality standards and monitoring programs so that they are based on risks to human health.

STUDY OVERVIEW

During the course of the study (June to September 1995), 15,492 beachgoers who swam at three Santa Monica Bay beaches located near flowing storm drain outlets (Santa Monica Beach near Ashland Avenue, Will Rogers Beach at Santa Monica Canyon, and Surfrider Beach near Malibu Creek), were interviewed. Nine to 14 days after the beach interviews, 13,278 follow-up telephone interviews were conducted to ascertain the occurrence of symptoms--fever, chills, eye discharge, earache, ear discharge, skin rash, infected cut, nausea, vomiting, diarrhea, diarrhea with blood, stomach pain, coughing, coughing with phlegm, nasal congestion, sore throat and a group of symptoms indicative of "highly credible gastrointestinal illness" (HCGI)[2] and "significant respiratory disease" (SRD)[3].

Water samples were collected daily in ankle depth water at various distances from the drains (0, 100 yards north and south, and at 400 yards) (Figure 1) and analyzed for total and

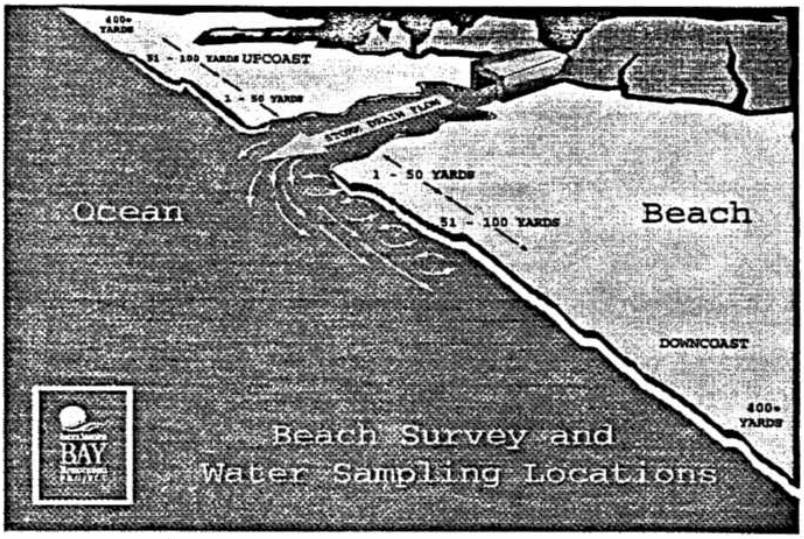

Figure 1. Beach survey and water sampling locations.

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[2] Two definitions of HCGI were used in this study and grouped as HCGI-1 (vomiting, diarrhea and fever, stomach pain and fever) or HCGI-2 (vomiting and fever).

[3] Symptoms including fever and nasal congestion, fever and sore throat, and cough with sputum.

fecal coliforms, enterococci, and *E. coli*. In addition, water samples were collected at storm drain sites every Friday, Saturday and Sunday and analyzed for enteric viruses.

SUMMARY OF FINDINGS

The analyses conducted in this study addressed two questions: a) What are the risks of illness relative to the distance one swims from a flowing storm drain?; and b) Are the risks of illness associated with measures of water quality? The major findings resulting from these analyses are as follows:

1. **There is an increased risk of illness associated with swimming near flowing storm drain outlets in Santa Monica Bay.** Statistically significant increases in risks for a broad range of adverse health effects (fever, chills, ear discharge, vomiting, coughing with phlegm, HCGI-2[4] and SRD) were found for subjects that swam in front of storm drains (at 0 yards) in comparison to those who swam over 400 yards away[5] (Table 1). For example, there was a 57 percent greater incidence of fever for swimmers at the drain than at 400 yards away. These increases in risk appeared to be limited to the 0 yards distance, as a significant drop-off in effects were observed at other distances upcoast or downcoast from the drain (Figure 2).

Table 1. Comparative health outcomes for swimming in front of drains versus 400+ yards away.

Health Outcome	Relative Risk (0 vs. 400+ Yds.)	Estimated No. of Excess Cases per 10,000 Persons
Fever	57%	259
Chills	58%	138
Ear Discharge	127%	88
Vomiting	61%	115
Coughing with phlegm	59%	175
Any of the above symptoms	44%	373
HCGI-2	111%	95
SRD	66%	303
HCGI-2 or SRD	53%	314

[4] See footnote 2.

[5] Indicator bacteria levels at 400 yards are low, therefore comparisons could be made between rates of illness in swimmers at this distance and at 0 yards.

The estimated number of excess cases of illness attributable to swimming at the drain reached into the 100's per 10,000 exposed subjects (greater than 1 percent) suggesting that significant numbers of beachgoers swimming near storm drain outlets are subject to increased health risks.

Figure 2. Reports of HCGI-2 and SRD relative to distance from drains.

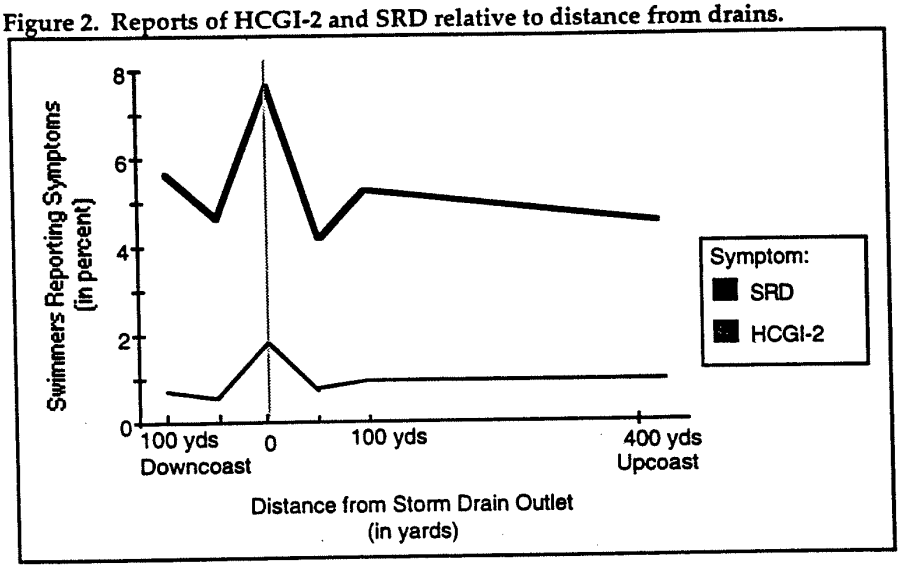

The results did not change when adjusted for age, beach, gender, race, California versus out-of-state resident, socioeconomic status, or worry about potential health hazards at the beach. Distance results also did not change substantially when controlled for each bacterial indicator.

2. **There is an increased risk of illness associated with swimming in areas with high densities of bacterial indicators.** Researchers used "cutoff points" to determine whether there were differences in the incidence of illness for those who swam in waters with bacterial densities "greater than" versus "less than" certain cutoff levels. Symptoms were found to be associated with swimming in areas where bacterial indicator counts were "greater than" the cutoff points that are used as part of federal and state water quality standards. (Cutoffs vary by type of bacterial indicator.)

   Table 2 shows the various outcomes that were found to be associated with these high densities of indicator bacteria. For *E. coli*, associations were seen for earache and nasal congestion. Only skin rash was associated with total coliforms and fecal coliforms. For enterococci, effects were noted for diarrhea with blood and HCGI-1.

Table 2. Health outcomes associated with swimming in areas with high bacterial indicator counts.

Indicator (cutoff)	Health Outcomes	Increased Risk	Excess Cases per 10,000 Persons
E. coli (> 320 cfu*)	Earache	46%	149
	Nasal Congestion	24%	211
Enterococcus (>106 cfu)	Diarrhea w/ blood	323%	27
	HCGI-1	44%	130
Total coliform (>10,000 cfu)	Skin rash	200%	165
Fecal coliform (>400 cfu)	Skin rash	88%	74

*colony forming units

3. **The total coliform to fecal coliform ratio was found to be one of the better indicators for predicting health risks.** In addition to investigating single bacterial indicators, associations between adverse health effects and the ratio of total to fecal coliforms were investigated. Significant associations were observed, with incidence of illness generally increasing as the ratio of densities of total coliforms to fecal coliforms decreased (Figure 3). When analyses were restricted to times when total coliforms exceeded 1,000 cfu, the strongest effects were generally observed when the ratio of 2:1 was used for comparison.

None of the bacterial results changed when adjusted for age, beach, gender, race, California vs. out-of-state resident, socioeconomic status or worry about potential health hazards at the beach.

Figure 3. Relationship of excess cases of illness and total-to-fecal coliform ratios.

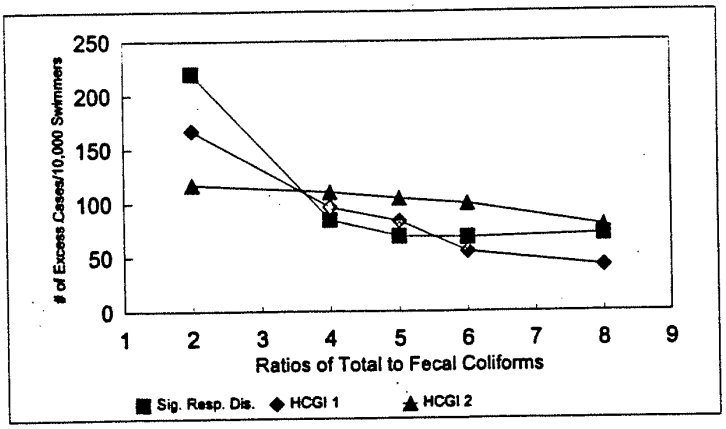

4. **Illnesses were reported more often on days when the samples were positive for enteric viruses.** Seventeen water samples (taken in the storm drain) were positive for enteric viruses. Although based on small numbers, a comparison of subjects who were swimming within 50 yards of the drain on days when samples were tested for viruses indicates that a number of outcomes were reported more often on days when the samples were positive for viruses versus days when samples were negative. Symptoms for which increased risks were noted include: fever (53 percent increase), vomiting (89 percent increase), HCGI-1 (74 percent increase) and HCGI-2 (126 percent increase). Results remained essentially unchanged when adjusted for covariates or for each bacterial indicator. Research with gene probes is ongoing and will be presented in a future addendum to this report.

5. **High densities of bacterial indicators were measured on a significant number of survey days, particularly in front of drains.** A great deal of day-to-day variability in bacterial indicator counts was recorded, however high bacterial densities in water samples were detected most frequently directly in front of drains (at 0 yards) (see Table 4). High densities of *E. coli*, fecal coliforms, and enterococcus occurred on over 25 percent of survey days. Total coliform levels were exceeded less frequently (8.6 percent of days). Total-to-fecal coliform ratios of less than 5 occurred on 12 percent of survey days.

Table 4. Percentage of survey days when bacterial indicator cutoff levels were exceeded in Santa Monica Bay.

Bacterial Indicator (cutoffs)	Percent of Survey Days Bacterial Cutoffs Exceeded			
		Distance from Drain Outlets		
	0 yards	1-100 yards upcoast	1-100 yards downcoast	400+ yards upcoast
E. coli (>320 cfu)	25.0%	3.5%	6.7%	0.6%
Total coliforms (>10,000 cfu)	8.6%	0.4%	0.9%	0.0%
Fecal coliforms (>400 cfu)	29.7%	3.0%	8.6%	0.9%
Enterococcus (>106 cfu)	28.7%	6.0%	9.6%	1.3%
Total/fecal ratio ≤5 (total coliforms>1000 cfu)	12.0%	0.5%	3.9%	0.4%

High counts were recorded more frequently downcoast (versus upcoast) from storm drain outlets due to the general pattern of water flow along the Bay's shoreline. At 400 yards away, high counts occurred on generally less than one percent of days.

5. **Characteristics of the survey population.** Persons who bathed and immersed their heads in the ocean water were potential subjects for this study. There were no restrictions based on age, sex or race. Persons who had bathed at the study beaches within seven days of the survey date (before and after) were excluded, as were subjects who bathed on multiple days. Since a primary research question was whether the risk of illness was associated with levels of particular indicator organisms in the water, it would have been impossible to link subjects' experiences with specific counts on a given day if they were in the water on numerous days.

   Fifty-five percent of the subjects surveyed were male, 45 percent female. Forty-eight percent of the subjects were children (under 12 years of age); 13-to-25 year-olds comprised 26 percent of the survey population and the remaining 26 percent were aged 26 and over. The ethnicity of the survey population was 45 percent white, 43 percent Latino, 3 percent black, 3 percent Asian, 3 percent multi-ethnic, and 2 percent "other." Children and Latino subjects tended to swim closer to the drain. Sixty-three percent of subjects swimming at the drain were children under 12. Eighty-eight percent of the surveyed subjects were residents of California.

THE EPI STUDY ACTION AGENDA

The results of this health risk investigation provide both good new and cause for concern. *The good news is that, of the Bay's 50-plus mile coastline, less than 2 miles are problematic.* However, the study has also confirmed that there is some risk of illness associated with swimming immediately adjacent to flowing storm drains. Although it is not yet known what specific pathogens cause illness, the study confirms that the bacterial indicators that are being monitored *do help* to predict risk. In addition, a new tool, the total-to-fecal coliform ratio, has been found to be a useful predictor of illness. With the scientific findings now documented through this study, we have laid the foundation to develop new policies and actions that will improve our ability to protect the public's health.

As a first step, the members of the Santa Monica Bay Restoration Project have identified an "Epi Study Action Agenda" to respond to the findings of this study and because of the need to "act now." Some of these actions have already begun, but many more steps are yet to be

taken. Like the broader issue of urban runoff and storm water pollution, however, prevention and elimination of pathogen contamination in recreational waters requires a long-term, comprehensive approach. There is, however, much that can begin immediately.

Educating and advising the public about the health risks of swimming near storm drain outlets, ensuring that pathogen sources are identified and controlled, and preventing contamination of runoff into the drainage system are among the governmental actions that have been initiated. The general public also has a role to play -- taking action to prevent urban runoff pollution at home, at the work site and at play.

(This "Action Agenda" will be refined and considered for adoption by the SMBRP Watershed Council at its June meeting.)

EDUCATE AND ADVISE THE PUBLIC

1. **Improve warnings to swimmers by posting new signs and flags near flowing storm drains.** The Los Angeles County Department of Health Services (LACDHS) will revise the Beach Regulatory Protocol to ensure that beaches are well posted and/or closed as necessary. These revisions include:

   a. Strengthen the wording on warning signs posted near flowing storm drain outlets to read as follows: "WARNING! STORM DRAIN WATER MAY CAUSE ILLNESS. NO SWIMMING." This warning will be posted in both English and Spanish.

   b. Post warning signs on both sides of all flowing storm drains in Los Angeles County and place crossed flags adjacent to the signs.

   The remaining procedures contained in the Protocol (regarding incidents such as beach closure requirements in cases of sewage spills, etc.) will continue to be implemented as appropriate.

2. **Warn swimmers to stay away from storm drain outlets.** Los Angeles County Lifeguards will advise beachgoers to stay away from areas directly in front of storm drain outlets when swimming.

3. **Integrate messages about human health risks associated with contaminated urban runoff into storm water education campaigns.**

IMPLEMENT SOURCE CONTROL MEASURES

4. **Prevent and control sources of pathogens to urban runoff.** Controlling pathogen sources is but one part of a comprehensive strategy to address the problem of urban runoff pollution. The Los Angeles County Department of Public Works (LAC-DPW) and the cities in the Santa Monica Bay watershed will therefore continue to implement urban runoff source control measures (including Best Management Practices such as storm drain stenciling, street sweeping, and used oil recycling programs), and where needed, will expand or accelerate these programs.

5. **Divert dry-weather flows from problem storm drains.** The LAC-DPW and cities will continue to work with municipal wastewater agencies and the Los Angeles Regional Water Quality Control Board (LARWQCB) to complete the assessments of projects to divert dry-weather flows from problem storm drains to sewage treatment facilities. Projects that are feasible and cost-effective will be implemented in a timely manner.

6. **Construct a pilot dry-weather flow treatment facility at the Pico-Kenter drain.** The cities of Los Angeles and Santa Monica have been investigating construction of a pilot ozonation facility to treat dry-weather flows from the Pico-Kenter drainage area.

7. **Investigate and correct malfunctioning septic systems.** Cities and the Los Angeles County Department of Health Services will enhance programs to investigate and correct malfunctioning septic systems, especially in the watersheds along the northern Santa Monica Bay coastline;

8. **Maximize the ability to respond to and control sewage spills.** Municipal wastewater treatment facility operators will review sewage spill reporting and response procedures and develop/modify procedures where necessary to block, capture and re-direct spills to storm drains back into the sewer system.

IDENTIFY AND PREVENT PATHOGEN SOURCES

9. **Identify and eliminate illicit connections and illicit discharges to the storm drain system.** The municipal storm water/urban runoff pollution control permit issued by Los Angeles Regional Water Quality Control Board (LARWQCB) requires

implementation of programs to identify and eliminate illicit connections and discharges to the storm drain system. To accelerate the implementation of these programs, the LAC-DPW will develop a model program which includes standardized storm drain inspection procedures, illicit connection and discharge identification and elimination procedures, and enforcement procedures to terminate illicit connections and discharges.

10. **Investigate adverse impacts of street and sidewalk washing and develop methods to eliminate or minimize impacts.** The City of Los Angeles will, in the next year, investigate the impact of street and sidewalk washing on pathogen loadings to storm drain systems and will develop appropriate Best Management Practices to minimize the adverse impacts.

11. **Develop standardized procedures for locating sources of pathogens.** The LAC-DPW will lead efforts to develop a standardized sanitary survey protocol (procedures) for locating sources of pathogens and based in the results of this study, develop criteria for initiation of a sanitary survey;

INCORPORATE FINDINGS INTO STANDARDS AND MONITORING PROGRAMS

12. **Provide periodic reports to the public on beach water quality.** Shoreline bacterial monitoring programs are currently conducted by the City of Los Angeles, the County Sanitation Districts of Los Angeles County and the Los Angeles County Department of Health Services. These programs currently report individual bacterial indicator counts and it is recommended that the total-to-fecal coliform ratio also be added and incorporated into the regional water quality data base maintained by the LARWQCB. Both the individual indicator counts and total/fecal ratio should be used as the basis for development of periodic reports to the public on beach water quality prepared by the LARWQCB, SMBRP, Heal the Bay or other organizations.

13. **Review and revise recreational water quality standards or criteria.** Recreational use of coastal waters occurs near urbanized regions throughout California and the U.S. Current standards/criteria for bacterial indicators are not based on epidemiological studies of swimmers in marine waters contaminated by urban runoff. Given the results of this study, it is recommended that the U.S. Environmental Protection Agency, the California State Department of Health Services and the State Water

Resources Control Board review existing recreational water quality standards/criteria for marine waters and revise them as appropriate.

14. **Review water quality data trends in Santa Monica Bay.** The SMBRP will spearhead a team to review existing water quality data utilizing analytical methodologies identified through this study, so that additional results can be incorporated into modifications of the beach warning protocol and water quality monitoring and reporting activities.

15. **Support additional research projects that help answer additional questions about potential health risks.** Examples of such studies may include an assessment of health risks to persons who frequently swim in the Bay (e.g. surfers and lifeguards) or research efforts necessary to improve our ability to more quickly detect human pathogens in urban runoff.

FINANCE SOURCE CONTROL MEASURES

16. **Seek financing at local, state and federal levels for implementation of source control measures.** The members of the SMBRP will investigate financing mechanisms to support implementation of local efforts to control storm water and urban runoff pollution.

ACTIONS THE PUBLIC CAN TAKE

In addition to governmental action, the general public can take steps to help reduce urban runoff pollution. Urban runoff pollution includes bacteria, trash and chemicals which are washed into the storm drain system from streets, neighborhoods, business locations, parking lots, construction sites, etc. This type of pollution is a problem because, unlike the sewer system, which includes treatment plants, the storm drain system carries water and whever else is put into it--without treatment--to our streams and the ocean. Urban runoff pollution can be minimized by following these suggestions:

1. **Practice "good housekeeping " in and around the home.**
   - Clean up after your pet. Dispose of wastes in trash cans.
   - Make sure that septic tanks are properly maintained.
   - Properly dispose of disposable diapers.
   - Use a broom rather than a hose to clean up garden clippings. Deposit leaves and grass clippings in a trash can or start a compost pile.

- Take leftover household hazardous materials to a Countywide Household Hazardous Waste collection event or other local collection program.
- Take used motor oil and antifreeze to a participating gas station or other recycling center.
- Have your car inspected and maintained regularly to reduce leakage of oil, antifreeze and other fluids.
- Recycle reuseable materials.

2. **Practice "good housekeeping" at your worksite and where you play.**
   - Clean up spills of materials such as vehicle fluids, paints and solvents properly.
   - Control runoff and prevent erosion at construction sites.
   - Cover and maintain dumpsters.
   - Properly dispose of kitchen wastes. Wash down floor mats in areas that drain to the sewer system.
   - Compost or haul away manure from horses or other livestock.
   - Use pumpout and dump stations to dispose of sewage from boats and recreational vehicles.

3. **Promote pollution prevention and awareness in your community.**
   - Participate in programs such as storm drain stenciling and Coastal Cleanup Day.
   - Support your municipality by reporting any dumping of inappropriate materials into storm drains (such as oil and antifreeze) to 1-800-303-0003.

STUDY PARTICIPANTS

A unique team was assembled to carry out the various elements of this study. Dr. Robert Haile, USC School of Medicine, Department of Preventive Medicine, served as Principal Investigator. Dr. Haile led the research team that conducted the beach and follow-up telephone interviews and conducted the health risk analyses utilizing water quality and survey data. The City of Los Angeles Environmental Monitoring Division (LA-EMD) analyzed daily water samples for total coliform, fecal coliform and enterococcus. Heal the Bay volunteers collected the daily bacterial indicator samples and their Executive Director, Dr. Mark Gold served as a principal study advisor. The County Sanitation District of Orange County (CSDOC) collected and analyzed water samples for enteric viruses. The University of Southern California, Department of Biology conducted enteric virus analysis utilizing polymerase chain reaction (PCR)/gene probe technique. The Santa Monica Bay Restoration Project and Foundation served as principal project organizer and was responsible for project

management, coordination of financing and contracts, and for providing technical and policy oversight.

FUNDING FOR THIS STUDY

The financial and human resources for this study were provided by many public and private entities. The Santa Monica Bay Restoration Project and Foundation thanks the following organizations for their support and commitment to this important scientific undertaking: the State Water Resources Control Board, City of Los Angeles, Beach Cities Health District, City of Santa Monica, Los Angeles County Department of Public Works, Los Angeles Regional Water Quality Control Board, Chevron Companies, Las Virgenes Municipal Water District, Milken Families Foundation, Heal the Bay, and the U.S. Environmental Protection Agency.

ABOUT THE SANTA MONICA BAY RESTORATION PROJECT AND FOUNDATION

The Santa Monica Bay Restoration Project (SMBRP) is a coalition of government, environmentalists, scientists, industry and the public charged with finding solutions to the Bay's problems. The SMBRP, established in 1988 as part of the Clean Water Act National Estuary Program, completed a comprehensive "Bay Restoration Plan" in 1994 that outlines a wide range of actions necessary to restore and protect the Bay. Implementing this health effects study was one of the Plan's highest priorities.

The Santa Monica Bay Restoration Foundation is a non-profit, 501(c)(3) community foundation of the SMBRP. The Foundation is an independent fundraising vehicle created to attract research, planning and implementation funds for activities, such as this epidemiological study, that lead to the restoration and enhancement of Santa Monica Bay.

AN EPIDEMIOLOGICAL STUDY OF POSSIBLE ADVERSE HEALTH EFFECTS OF SWIMMING IN SANTA MONICA BAY

Final Report

Submitted by: Robert W. Haile and, in alphabetical order, James Alamillo, Kevin Barrett, Ron Cressey, John Dermond, Carolyn Ervin, Alice Glasser, Nina Harawa, Patricia Harmon, Janice Harper, Charles McGee, Robert C. Millikan, Mitchell Nides, John S. Witte

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GLOSSARY

Bacterial Indicator Counts - one way of estimating the amount of untreated sewage in contaminated water is to test it for bacteria that are commonly found in human waste. The amount of these bacteria found can then "indicate" the amount of contamination even if they themselves are not pathogenic.

Bathing (or swimming) - by bathing, subjects had to immerse their faces in the water; incidental splashing of the face would not qualify as "bathing" for purposes of this study.

"Cabelli-type" -refers to the Victor Cabelli's classic studies comparing health outcomes in swimmers versus non-swimmers while monitoring marine water quality. His studies were sponsored by the Environmental Protection Agency in the late seventies and early eighties.

Cohort - the study group being followed over a defined period of time.

Colony forming units (cfu) - the unit of measure used to evaluate the bacterial indicator counts. It refers to the density of the bacterial colonies grown per 100mL of water sampled.

Confounder - an independent risk for the outcome of interest that is also associated with the exposure of interest so it can distort its apparent effect on disease outcome.

Cytopathic Effect (CPE) - microscopic observations of changes in the morphology and/or growth rate of a cell culture assay system resulting from infection of the cells by virus.

Downcoast - in this study refers to the area south of the storm drain of interest.

Enteric Viruses - refers to a group of viruses transmitted through human waste. Can cause a variety of adverse health effects.

Enterococcus - (formerly known as Streptococcus faecalis). A bacteria that is part of the normal flora found in human and animal waste. Commonly used as a bacterial indicator.

E. coli - another bacteria normally found in human waste. Is sometimes used as a bacterial indicator.

Fecal Coliforms - a group of bacteria from the intestinal tract of humans, mammals and birds, commonly found in urban run-off. Commonly used as a bacterial indicator of the presence of sewage.

HCGI1 - (highly credible gastroenteritis one) - defined for this study as a person having either 1) vomiting 2) diarrhea and fever 3) stomach pain and fever. This is the standard definition for this symptom complex as defined by the EPA and used by many previous studies.

HCGI 2 - (highly credible gastroenteritis two) - defined for this study as a person having vomiting and fever.

Indicator Counts-refers to bacterial indicator counts as defined above.

Odds Ratio - it approximates the risk ratio in this study. (See Risk Ratio below).

Pathogenic - refers to organisms that cause disease.

PEPS - Population Estimation and Projection System from LA County 1993.

Plaque Forming Unit (PFU) - macroscopic hole(s) in the monolayer of a cell culture assay system resulting from localized lysis of the cells in the monolayer that initially

began with infection of one cell by an infectious unit of virus. In the PFU assay technique, agar is incorporated into the medium so that cell lysis resulting in release of additional infectious virus restricts the infection of new cells to only the adjacent healthy cells. Multiple cycles results in a hole in the monolayer.

Plume - refers to the quantity and direction the run-off from the storm drain takes when it enters the ocean. Due to ocean currents, it is generally believed that plumes from the storm drains considered in this study usually go downcoast, but this may not always be the case.

RR (Risk Ratio) - a measure of relative effect comparing the symptom risk of exposed subjects to subjects in a different exposure category.

SRD (significant respiratory disease) - in our study defined as a complex of symptoms that include; 1) fever and nasal congestion; 2) fever and sore throat and 3) cough with sputum.

Study Area 1 - defined as the area within 100 yards upcoast and downcoast of the storm drain of interest, the "exposed area".

Study Area 2 - defined as the area 400+ yards upcoast and downcoast of the storm drain of interest, the "control area".

Total Coliforms - bacteria that can originate from soil, plants, human and animal waste. Commonly used as a bacterial indicator.

Total Coliform/Fecal Coliform Ratio - a ratio used by bacteriologists as an additional bacterial indicator. For those wishing to know more, the baseline ratio is derived from the cut-off points of total and fecal coliforms, 1000(total)/200(fecal)=5. When one is

exposed to sewage contaminated water the fecal coliforms increase thus decreasing the ratio to <5.

Upcoast-refers to the area north of the storm drain of interest.

Water Sampling-In this study refers to taking samples of ocean water in front of the storm drain and at 100 and 400 yards away in order to test for the following indicators, total and fecal coliforms, enterococus, E. coli and enteric viruses.

participate were then interviewed about basic demographic data and about their bathing, including type of bathing activity (particularly immersion of the head into ocean water). Distance from the storm drain, gender, age, and race of the subject were noted by the interviewer.

On the same days that subjects were recruited, morning water samples were collected at ankle depth at 0, 100 yards north and south of the storm drain, and 400 yards north or south (depending on which area was used as a "control" area). Samples were analyzed for total and fecal coliforms, enterococci, and *E. coli*. In addition, one sample each Friday, Saturday, and Sunday of the study was taken in the storm drain (0 yards) at each study beach and analyzed for enteric viruses.

Nine to fourteen days after the interview date, subjects were interviewed by telephone to ascertain the occurrence(s) of fever, chills, eye discharge, earache, ear discharge, skin rash, infected cut, nausea, vomiting, diarrhea, diarrhea with blood, stomach pain, coughing, coughing with phlegm, nasal congestion, sore throat, and a group of symptoms indicative of highly credible gastrointestinal illness (HCGI) and significant respiratory disease (SRD). Of the 15,492 subjects interviewed on the beach, we were able to contact and interview 13,278 (86% follow-up). Of these 13,278, 1,485 were found to be ineligible because they bathed (and immersed their heads) at a study beach between the day of the beach interview and the telephone follow-up. This left 11,793 eligible subjects who provided data that were analyzed for this study. Of these, 107 were excluded because they reported not immersing their faces in the ocean water, leaving 11,686 subjects for analysis.

Analyses addressed the following two questions: 1) What are the relative risks of specific adverse health outcomes in subjects bathing at 0, 1-50, and 51-100 yards from a storm drain compared to subjects bathing at the same beach, but beyond 400 yards from a storm drain? 2) Are risks of specific outcomes (e.g. highly credible gastrointestinal illness; ear, eye and sinus infections; upper respiratory infections; skin rashes and lesions) among subjects associated with levels of the bacterial indicators (or viruses) mentioned above.

EXECUTIVE SUMMARY

A cohort study was conducted to investigate the possible adverse health effects of bathing in Santa Monica Bay and whether the risks of ill health outcomes were associated with urban runoff from storm drains. Exposures of primary interest were pathogens that produced acute illnesses (for reasons discussed in our original proposal, chronic health effects were not studied).

Three beaches with a wide range of indicator counts and high density of bathers were studied. The beaches were Santa Monica Beach (near the Ashland Avenue storm drain), Will Rogers Beach (Santa Monica Canyon Channel or storm drain) and Surfrider Beach (near Malibu Creek).

Persons who bathed and immersed their heads in the ocean water were potential subjects for this study. There were no restrictions based on age, sex, or race. Persons who had bathed at the study beaches, Mothers' Beach in Marina del Rey or near the Santa Monica Pier within seven days of the study date were excluded, as were subjects who bathed at the study beaches (or Mothers Beach or near the Santa Monica Pier) between the date of the beach interview and the telephone follow-up. Subjects who bathed on multiple days had to be excluded since one of our primary research questions was whether risk of health outcomes was associated with levels of specific indicator organisms on the day a subject entered the water. Given the range of incubation periods for the outcomes of interest and that the counts were quite variable from day to day, it would have been impossible to link subjects' experiences with specific counts on a given day if they were in the water on numerous days. Persons bathing within 100 yards upcoast or downcoast of the storm drain and persons bathing greater than 400 yards beyond a storm drain were targeted for this study.

For this study, 22,085 subjects were interviewed on the beach to ascertain eligibility and willingness to participate. Of these, 17,253 subjects were found to be eligible and able to participate (had a telephone and were able to speak English or Spanish). Of these, 15,492 agreed to participate. Eligible subjects who agreed to

respectively. Diarrhea with blood RR=4.23 (1.12-15.91) and HCGI 1 RR=1.44 (1.03-2.03) were associated with enterococci, using the higher cutpoint of 106 cfu.

It is conceivable that real increases in risk might have been missed with these cutpoints, particularly since they were not based on data that were generated by previous studies of Santa Monica Bay, so we also calculated odds ratios from categorical models using quintiles (of bacterial indicator levels) and from continuous models. For the continuous linear (on logistic scale) models, the odds ratios correspond to a unit increase equal to the difference between the 90th and 10th percentiles (i.e. the difference between the midpoints of the fifth and first quintiles). In general, results from the categorical models resembled results using the cutpoints (to define dichotomies) described above. The continuous models yielded a number of positive associations. For *E. coli*, small but statistically significant associations were seen for skin rash and stomach pain. Only skin rash was associated with total coliforms. Fever, skin rash, and HCGI 1 and 2 were associated with fecal coliforms. For enterococci, significant positive associations were noted for fever, skin rash, nausea, diarrhea, stomach pain, coughing, runny nose, HCGI 1, HCGI 2, and SRD.

In addition to investigating single bacterial indicators, associations between adverse health effects and the ratio of total to fecal coliforms, and the ratio of total coliforms to enterococci were investigated. For the total to fecal ratio, we initially used a cutpoint of 5.0, assuming the risk may be higher when the ratio is smaller. For the entire data set, significant associations were observed for diarrhea RR=1.28 (1.08-1.51) and HCGI 2 RR=1.87 (1.20-2.90). We then estimated effects of this ratio restricted to subjects in water where the total coliforms exceeded 1,000 cfu. Significant effects were observed for nausea RR=1.48 (1.08-2.04), diarrhea RR=1.40 (1.07-1.85), and HCGI2 RR=3.12 (1.60-6.07). We also conducted a similar analysis restricted to subjects in water where the total coliforms exceeded 5,000 cfu. Significant effects were observed for fever, eye discharge, skin rash, nausea, diarrhea, stomach pain, nasal congestion, HCGI 1, and SRD. Risk ratios ranged from 2-7. We then conducted a similar analysis restricted to subjects in water where the total coliforms exceeded 10,000 cfu. Here we observed significant

As a measure of strength of association, we relied initially on the risk ratio (RR), which expresses the risk (proportion of subjects who report a given symptom) among subjects who bathed, for example, in front of the drain (0 yards) versus the risk among subjects who bathed 400+ yards from the drain. Comparing subjects who swam at 0 versus 400+ yards from the drain for all three beach sites combined, statistically significant increases in risk were observed for fever, where the RR=1.57 (95% C.L. = 1.17-2.10), chills RR=1.58 (1.04-2.39), ear discharge RR=2.27 (1.14-4.51), vomiting RR=1.61 (1.01-2.56), coughing with phlegm RR=1.59 (1.10-2.29), a group of symptoms we labeled highly credible gastrointestinal illness (HCGI 2) RR=2.11 (1.12-3.97), and a group of symptoms indicative of significant respiratory disease (SRD) RR=1.66 (1.25-2.21). These increases in risk were observed predominantly at the distance of 0 yards.

A second set of analyses was completed, restricted to days when the total coliforms to fecal coliforms ratio was greater than 5 for the water samples taken at 400 yards. The rationale was to exclude days when the plume from the drain or some other source of high counts apparently reached the 400 yard area, making this less than an ideal "control" zone. The relative risks for the seven outcomes cited above all increased. In addition, some significant increases in risk were observed for adverse health effects at distances of 1-50 and 51-100 yards from the drain, compared to 400+ yards from the drain.

The results for distance did not change when adjusted for age, beach, gender, race, California versus out-of-state resident, socioeconomic status, and worry about potential health hazards at the beach. Distance results also did not change substantially when controlled for each bacterial indicator.

A number of approaches to analyzing the effects of bacterial indicators were taken. We first calculated risk ratios for the lower and higher cutpoints described in the text (e.g. 200 and 400 colony forming units, or cfu, for fecal coliforms). Very few associations were observed when these cutpoints were used. None were detected for *E. coli* at lower cutpoints (35 or 70 cfu). Earache RR= 1.46(1.06-2.00) and runny nose RR=1.24(1.00-1.53) were associated with *E. coli* at the highest cutpoint of 320 cfu. Only skin rash was associated with total and fecal coliforms using the cutpoints of 10,000 and 400 cfu,

indicator) of interest. For a number of outcomes, the attributable number ranged into the 100's of new cases per 10,000 exposed subjects (complete results are presented in Tables 65-70).

In summary, both sets of results (the positive associations between adverse health effects and a) distance from the drain and b) bacterial indicators and presence of enteric viruses) taken together strongly suggest that there is an increased risk of a relatively broad range of symptoms caused by swimming in ocean water at the beach sites included in this study, particularly close to the drains and when indicator densities increase or ratios between selected indicators decrease.

associations with eye discharge, ear discharge, skin rash, nausea, diarrhea, stomach pain, nasal congestion, HCGI 1, and HCGI 2. The significant RR's ranged from 2-39. All the effects noted above became consistently stronger as the analyses were increasingly restricted to occasions with higher counts of total coliforms. Since this ratio appeared to be informative, a range of cutpoints (2, 4, 6, 8) was subsequently investigated. There was a consistent pattern of stronger risk ratios as the cutpoint became lower (when the analyses were restricted to times when total coliforms exceeded 1,000 or 5000 cfu), with the strongest effects generally observed when the cutpoint of 2 was used. The consistency of the results suggests the observed associations are real.

None of the bacterial results changed when adjusted for age, beach, gender, race, California versus out-of-state resident, socioeconomic status, and worry about potential health hazards at the beach. They also did not change when we adjusted the bacterial results for distance from the drain.

The analysis of samples for enteric viruses yielded seventeen samples (taken in the storm drain) that were positive for enteric viruses. This number of positive samples did not enable us to conduct many analyses; however, we were able to compare the frequency of outcomes reported by subjects who were swimming within 50 yards of the drain on days when samples were tested for viruses and found to be negative versus days when the samples were positive for viruses. Results are presented in Table 73. Although based on small numbers, a number of outcomes were reported more often on days when the samples were positive for viruses, including fever (RR=1.53, 95% CI 0.97-2.42, p=value 0.07); vomiting (RR=1.89, 0.94-3.78), HCGI-1 (RR=1.74, 0.99-3.06) and HCGI-2 (RR=2.26, 0.91-5.60). Results remained essentially unchanged when adjusted for covariates or for each bacterial indicator. Research with gene probes is ongoing and will be presented in an addendum at a later date.

The attributable number for noteworthy distance and bacterial indicator results was also calculated. This attributable number is an estimate of the number of new cases of a specific adverse health outcome that is attributable to the exposure (distance or bacterial indicator) of interest. For a number of outcomes, the attributable number ranged into the

Beaches in Santa Monica Bay are heavily used during the summer months. It is estimated that 50-60 million persons visit Santa Monica Bay beaches annually. Concern about adverse health effects due to swimming in the bay has been raised by interested parties (SMBRP, 1995), citing numerous anecdotal reports of illnesses that were perceived to be caused by swimming in the bay. "Is it safe to swim in Santa Monica Bay?" appeared to be a prevalent concern.

These circumstances (high volume of urban runoff in storm drains, numerous days with high levels of bacterial indicators, isolation of pathogenic human enteric viruses even when water quality indicator densities were low, heavily populated beaches, and concern about adverse health effects) provided the motivation to study the possible health effects of swimming in the bay. It was decided by the Technical Committee and the Management Committee of the Santa Monica Bay Restoration Project (SMBRP) that an epidemiological study of bathers in Santa Monica Bay was the most direct and relevant means of addressing the question, "Is it safe to swim in Santa Monica Bay?" A pilot study was conducted in the summer of 1994 to assess the feasibility of a large-scale study. The protocol for the large scale study was revised as a result of this pilot study and was subsequently approved by SMBRP.

II. MATERIALS AND METHODS

Overview:

A cohort study was conducted to investigate the possible adverse health effects of bathing in Santa Monica Bay and whether the risks of ill health outcomes were associated with urban runoff from storm drains. Exposures of primary interest were pathogens that produced acute illnesses (for reasons discussed in our original proposal, chronic health effects were not studied).

Three beaches with a wide range of indicator counts and high density of bathers were studied. The beaches were Santa Monica Beach (near the Ashland Avenue storm drain), Will Rogers Beach (Santa Monica Canyon Channel or storm drain) and Surfrider Beach (near Malibu Creek). Maps indicating beach sites are included in Appendix E.

I. INTRODUCTION

At the time this study began, there had never been an epidemiologic study of persons who swam in marine waters contaminated by heavy urban runoff. Waters adjacent to the County of Los Angeles receive runoff from a system of storm drains year round. Even in the dry months of the summer, an average of 10-25 million gallons of runoff (or non-storm water discharge) per day enter Santa Monica Bay from the storm drain system (this includes, of course, substantial flows from permitted discharges beyond the control of the owner/operator at the facility). These drains are separated completely from the municipal sewage system of pipes and treatment plants; waters collected by the storm drain system are not subject to treatment and are discharged directly into the ocean at a number of sites. Years of monitoring by public agencies and recent surveys by the Santa Monica Bay Restoration Project have demonstrated that total and fecal coliforms as well as enterococci are sometimes elevated in surfzones adjacent to storm drain outlets; pathogenic human enteric viruses have been isolated from storm drain effluents, even when levels of all indicators, including F2 male-specific bacteriophage, were low (SMBRP, 1991). Sewage spills and hydraulic overload following rainstorms occur intermittently and may lead to discharge of primary-treated sewage and floatables such as tampon applicators into storm drains (NRDC, 1991); leaky sewer lines, illegal sewer connections, blocked sewer overflows, leaky septic tanks and local direct human sources (such as the transient population and illegal dumping of recreational vehicles) may also contribute human waste to storm drains emptying into the bay (SMBRP, 1990, 1992). At least 338 beach closures/advisories (many due to high bacteria levels attributable to storm drain runoff) occurred in Los Angeles and San Diego Counties in 1990 (NRDC, 1991). Water sampling at varying depths and distances from storm drains has established that a gradient of water quality (as measured by bacterial indicator densities) exists at Santa Monica Bay beaches receiving storm drain effluent (SMBRP, 1991).

Nine to fourteen days after the interview date, subjects were interviewed by telephone to ascertain the occurrence(s) of fever, chills, eye discharge, earache, ear discharge, skin rash, infected cut, nausea, vomiting, diarrhea, diarrhea with blood, stomach pain, coughing, coughing with phlegm, nasal congestion, sore throat, and a group of symptoms indicative of highly credible gastrointestinal illness (HCGI) and significant respiratory disease (SRD). Of the 15,492 subjects interviewed on the beach, we were able to contact and interview 13,278 (86% follow-up). Of these 13,278, 1,485 were found to be ineligible because they swam (and immersed their heads) at a study beach between the day of the beach interview and the telephone follow-up. This left 11,793 eligible subjects who provided data for this study. We excluded 107 of these subjects because they reported not immersing their faces in ocean water, leaving 11,686 subjects for analysis.

Analyses addressed the following two questions: 1) What are the relative risks of specific outcomes in subjects bathing at 0, 1-50, and 51-100 yards of a storm drain compared to subjects bathing at the same beach, but beyond 400 yards of a storm drain? 2) Are risks of specific outcomes (e.g. highly credible gastrointestinal illness; ear, eye and sinus infections; upper respiratory infections; skin rashes and lesions) among subjects associated with levels of the bacterial indicators (or viruses) mentioned above. Given this design of the study, we are not able to address the effects of repeated exposures or chemical contamination or special at risk populations.

A detailed description of the study follows, including sections on study preparation, data collection (beach and telephone interviews), collection of water samples, laboratory analyses of water samples, and statistical analyses of the data.

Study Preparation:

Staff Recruitment and Selection:

The project coordinating team of the Santa Monica Bay Beach Study consisted of a multi-ethnic group of researchers with extensive experience in the design and conduct of epidemiologic studies. Included in this team were the study's principal investigator, the principal project coordinator, the study physician, and several professionals with

Persons who bathed and immersed their heads in the ocean water were potential subjects for this study. There were no restrictions based on age, sex, or race. Persons who bathed at the study beaches, Mothers' Beach in Marina del Rey or near the Santa Monica Pier within seven days of the study date were excluded, as were subjects who bathed at the study beaches (or Mothers Beach or near Santa Monica Pier) between the date of the beach interview and the telephone follow-up. Subjects who swam on multiple days had to be excluded since one of our primary research questions was whether risk of health outcomes was associated with levels of specific indicator organisms on the day a subject entered the water. Given the range of incubation periods for the outcomes of interest and that the counts were quite variable from day to day, it would have been impossible to link subjects' experiences with specific counts on a given day if they were in the water on numerous days. Persons bathing within 100 yards upcoast or downcoast of the storm drain and persons bathing greater than 400 yards beyond a storm drain were targeted for this study.

For this study, 22,085 subjects were interviewed on the beach to ascertain eligibility and willingness to participate. Of these, 17,253 subjects were found to be eligible and able to participate (had a telephone and were able to speak English or Spanish). Of these, 15,492 agreed to participate. Eligible subjects who agreed to participate were then interviewed about basic demographic data and about their bathing, including type of bathing activity (particularly immersion of the head into ocean water). Distance from the storm drain, gender, age, and race of the subject were noted by the interviewer.

On the same days that subjects were recruited, morning water samples were collected at ankle depth at 0, 100 yards north and south of the storm drain, and 400 yards north or south (depending on which area was used as a "control" area). Samples were analyzed for total and fecal coliforms, enterococci, and *E. coli*. In addition, one sample each Friday, Saturday, and Sunday of the study was taken in the storm drain (0 yards) at each study beach and analyzed for enteric viruses.

interview. Interviewing instructions contained in the original version of the beach questionnaire were eliminated after a few days of field-testing, streamlining it from two sheets (3-sides) to one double-sided sheet that could be folded up while remaining attached to a clipboard. Interviewers were able to write down respondents' phone numbers and useful comments on the flip side of the beach questionnaire (field sheet) without worrying about it being lifted and carried away by a sudden gust of wind.

The telephone questionnaire was finalized after consultation with the study physician, the Chief of Infectious Disease at Olive View/UCLA Medical Center, and the California State Department of Health Services. Previous studies have suggested that acute infectious diseases including gastroenteritis, ear and respiratory infections, conjunctivitis, and skin rashes can be transmitted through polluted salt or brackish water. Therefore, sixteen questions representative of easily recognizable symptoms of these illnesses were asked during the telephone interview. The instrument was designed with space available for comments. In addition, the questionnaire contained sections for recording demographic information obtainable from the field sheet or the telephone interview. At the end of the telephone interview, respondents were queried about their levels of concern regarding health hazards at the beach. Interviewers used probing techniques to elicit better information whenever respondents experienced difficulty in answering questions clearly. Questions concerning types and durations of water activities were not included because participants in our pilot study found them annoying and too difficult to answer.

The symptoms and corresponding probes are listed below:

1. **Fever** - defined as a temperature equal to or greater than 100° F or 38° C. If the temperature was not taken, a subjective answer was considered positive if the respondent either volunteered or answered positive to the probes of feeling warm, achy and/or having chills.
2. **Chills** - substantiated by probing for uncontrollable shaking. Not considered "yes" when fever was "no."

diverse research backgrounds and practical expertise in data collection, management and analysis.

Other staff were recruited from several sources (mainly UCLA and Santa Monica City College) by fliers and adds in the UCLA newspaper. Ideal candidates were those who could be trained to interview both at the beach and on the telephone. First, a project coordinator screened each applicant for experience and telephone demeanor, then explained the job requirements. Next, applicants were interviewed by three to four project coordinators. Staff members who had worked on the pilot study two years earlier were contacted and offered positions as experienced interviewers and/or mid-level supervisors.

The mid-level supervisory and interviewing/office staffs were comprised of individuals representing various ethnicities and educational backgrounds. Twenty-four interviewers were undergraduate students, 17 were college graduates and 9 had worked toward or achieved graduate degrees. Thirteen telephone and beach interviewers were bilingual in English and Spanish and several students, although not completely bilingual, could manage the beach interview in Spanish. Other interviewers' language skills allowed for the conduct of interviews in Japanese, French and German. Fifty staff members worked the majority of the summer -- 24 mainly full-time, 26 part-time.

Questionnaire Development:

The beach questionnaire and the follow-up telephone questionnaire were developed by the project coordinating team during a series of meetings. The beach questionnaire was photocopied on colored paper in order to distinguish among the three beaches (Santa Monica/Ashland: yellow; Surfrider/Malibu:pink; Will Rogers/Santa Monica Canyon Channel: blue). The telephone questionnaire was formatted to be scanned by an optical mark reader. Both questionnaires were fully translated into Spanish, with special attention paid to the diversity of Latino/a subgroups living around and within the Los Angeles area. Appendix A contains a copy of each questionnaire.

The coordinating team designed the beach questionnaire to serve as an instrument on which to record subjects' names, telephone numbers and swimming locations, plus as an aid in determining subject eligibility and accessibility for the follow-up telephone

Orientation and Training:

All office and interviewing personnel were introduced to general interviewing techniques, the study background and protocol, and participated in role-playing exercises during an 8-hour orientation and training session. Pertinent information and materials were provided in a "Santa Monica Bay Beach Study Training Manual" (See Appendix D). During the following week, the supervisory staff underwent a day of practice training on the beach, and then worked during the following four days one-on-one practice training with the rest of the beach interviewers. At the beginning of data collection staff meetings were held each day to discuss experiences on the beach and to address questions and problems. Emphasis was placed on ways to observe and approach potential subjects and strategies were standardized for handling answers to their questions. As a result of these early meetings, the field sheet was streamlined and the method of assigning interviewers to designated areas on the beach was developed.

New beach interviewers who joined the project after the onset of the study first trained in the office with experienced interview supervisors, and then were taken to the beaches and allowed to practice the interview by interacting with beach patrons in non-study areas. This protocol was used for training beach interviewers throughout the summer.

A separate 8-hour training session was later held for telephone interviewers in which telephone interviewing techniques and the telephone questionnaire were emphasized. Interviewers were instructed on the use of standardized probes to clarify symptom events and to document answers to probes as well as comments voluntarily offered by subjects.

Telephone interviewers continued their training by conducting interviews under the direction and observation of a trained supervisor. These interviewers and their supervisors became adept at handling numerous scenarios by sharing experiences during the first few days of telephone interviews. Phone supervisors provided suggestions to beach interviewers about the types of comments on the field sheet (i.e., respondent's demeanor, swimming behavior, etc.) most useful in expediting the phone interview. The

3. **Redness and discharge from eyes** - used to evaluate the diagnosis of conjunctivitis. Both redness and discharge were documented because BOTH had to be positive for a "yes" answer. Standard probes to "don't know" responses were "Did you have pink eye?...Did you have yellow discharge?" This was done to exclude irritation from salt water, smog and other sources.
4. **Earache** - To substantiate a positive response, the respondent was also asked if he/she had an ear infection.
5. **Discharge/draining from ear** - used to assess swimmer's ear.
6. **Skin rash** - The respondent was asked the location of the rash. Only rashes covering the body (as opposed to small patches, for example, on the foot or arm) were marked positive on the questionnaire. This was done to increase the chances that the observed rash was a generalized viral exanthem or contact rash that was more likely to be caused by immersion in polluted ocean water.
7. **Cuts or scrapes that became infected** - several probes were used to delineate a positive answer including more redness, swelling, pus and red streaks around the cut.
8. **Nausea** (not related to pregnancy) - The two probes that were used were, "Did you feel like throwing up?" or "...feel so sick that you couldn't eat?".
9. **Vomiting** - self-explanatory.
10. **Diarrhea** - self-explanatory.
11. **Diarrhea with blood** - would narrow condition down to certain diseases that present with this symptom, like Shigellosis or *E. coli* 0157.
12. **Stomach pain or cramps** - menstrual cramps were excluded. Interviewers were instructed to circle which symptom was experienced if not both.
13. **Coughing** - a probe for allergies and smoking was used.
14. **Coughing with phlegm** - self-explanatory.
15. **Nasal congestion/runny nose** - allergies/smoking probe used.
16. **Sore throat** - interviewers probed by asking if one had trouble with swallowing or eating (e.g, "Was it difficult to swallow food?").

water. Appendix B contains pamphlets and forms used on the beach. (The field sheet is in Appendix A.)

The number of staff members required at the beach sites ranged from 3 to 12 depending on the expected size of the crowd that day. Anticipating the crowd size depended primarily on weather prediction, and the number of interviews collected from a particular day of the week during previous weeks. For example, unless unusual weather was predicted, Sundays and holidays were consistently the days with the largest crowds at all three beach sites. Generally numbers increased at all the sites as the week progressed from Monday to Friday. Sometimes, uncertainty in the weather resulted in office staff being sent to the beach when beach crowds were unexpectedly large.

The average work day at the beach usually began around 11:00 A.M. Monday through Thursday; 10:00 - 10:30 A.M. Friday through Sunday. Beach interviewers could be easily identified by blue T-shirts bearing the "Santa Monica Bay Beach Study" logo. Upon arrival, the first item of business for the beach supervisor was to measure the areas within 50 and 100 yards on both sides of the selected storm drain. This was usually done by pacing off steps and was done daily because the outlets shifted for two of the three storm drains. The storm drain at Ashland was fixed (concrete), whereas those at Will Rogers and Malibu were often dredged by bulldozers or temporarily maintained by dry weather flows. They were occasionally reforming, straying, multiplying or disappearing.

The area boundaries (at 50, 100, and 400 yards) were marked with visible objects such as trash cans or beach umbrellas, although these markers were not used when the area happened to be bordered by a life guard station. In either case, survey areas could be easily delineated without arousing suspicion by beachgoers as to why these areas were important to the study.

Beach interviewers were responsible for determining and recording the locations of eligible participants. On the field sheet (see Appendix A) the storm drain was designated as point **0** (as indicated by the diagram on the next page, subjects did not have to be in the middle of the drain to be coded as point 0; they had to be in the water within a range of distance (usually a matter of 2-20 yards) where the flow from the drain entered

methods for training telephone interviewers were maintained throughout the summer as new staff members were enlisted.

Data Collection:

Personnel Structure:

The scope of data collection and management required the availability of workers seven days a week from 9 A.M. to 9:30 or 10 P.M. Each task accomplished at the beach and at the study office was managed by a mid-level supervisor. The study employed three telephone room supervisors and seven beach supervisors. Although specialists were developed for each task, the success of the study depended on staff flexibility. In essence, each full-time staff member had a main job (e.g. beach interviewer) and an alternative job (e.g. data editor or telephone interviewer.) Most workers were skilled in multiple tasks and clerical tasks were shared. Staff members generally settled into the roles where they felt most comfortable, resulting in maximum productivity.

Project coordinators organized and supervised mid-level supervisory personnel and at times assumed some of their responsibilities. Beach and telephone supervisors, along with at least two project coordinators, attended weekly meetings during which schedules were planned and employee performances were discussed. Supervisors staggered beach interviewers' schedules to insure adequate crews on the beach during the afternoons when beaches tended to be busier. Basically, flexibility was encouraged so that beach interviewers, phoners and data editors could switch tasks depending on weather conditions and beach attendance on a particular day.

Beach Interviews:

Staff assigned to recruit subjects at the beach sites gathered each morning one half hour before leaving the office in carpools. The selected supervisor of each beach site was responsible for insuring that the crew assigned to her/his beach was transported and had the appropriate supplies. Supplies included pencils and clipboards, field sheets, forms on which to tally non-participants and ineligibles, forms on which to tally completed interviews and monitor interviewers, information pamphlets in English and Spanish, gifts for respondents (frisbees, visors and buckets), umbrellas, beach towels, ice chests, and

the bay); the two zones spanning up to 50 yards on either side of point **0** were designated **4** and **5**; zones **3** and **6** spanned from 50 to 100 yards in either direction; and zones **1** (downcoast) and **8** (upcoast) were 400 yards and beyond in either direction. All zones except for **1** and **8,** i.e., up to 100 yards on either side of the storm drain, were considered exposure zones and were referred to as **Study Area 1**. Zones **1** and **8,** i.e., 400 yards and beyond, were considered control zones and were referred to as **Study Area 2**. Mostly zones 1 and 8 served as Study Area 2 at Malibu and Ashland beaches, respectively. The sampling strategy required that one subject be recruited from Study Area 2 for every 3 subjects in Study Area 1. It was extremely rare that a subject either swam across zones or entered the water in different zones. When this occurred, the subject was coded in the zone closest to the drain.

Generally one or more interviewers covered each zone, but this depended on the number of interviewers working that day and on the number of beachgoers occupying each zone. Bilingual interviewers were often placed strategically, either in heavily populated areas, one on each side of the drain, or were encouraged to traverse zones -- often being called out of assigned zones to assist in an interview. Covering small areas of the beach insured that surveyors could recognize those in their area who were newly arrived, those who had already been approached, and those who did not need to be approached since they had not immersed their heads in the water. Having individuals responsible for small areas provided the best opportunity for contacting every eligible participant. This system also insured that beachgoers were not disturbed by repeated approaches about the survey.

On a typical weekday during the earliest phase of the study, the majority of time was spent recruiting participants from Study Area 1 (exposure). Recruitment from Study Area 2 (control) was usually left until later in the day when the beach crew had an idea of the number of people needed from that area. For instance, if by 2:00 p.m. 30 interviews had been completed in Study Area 1, the supervisor would send a team to Study Area 2 until the necessary number of interviews was accumulated, say 10 or more. As the study progressed, the supervisors became more familiar with the beaches and knew how to

DIAGRAM ILLUSTRATING ZONES

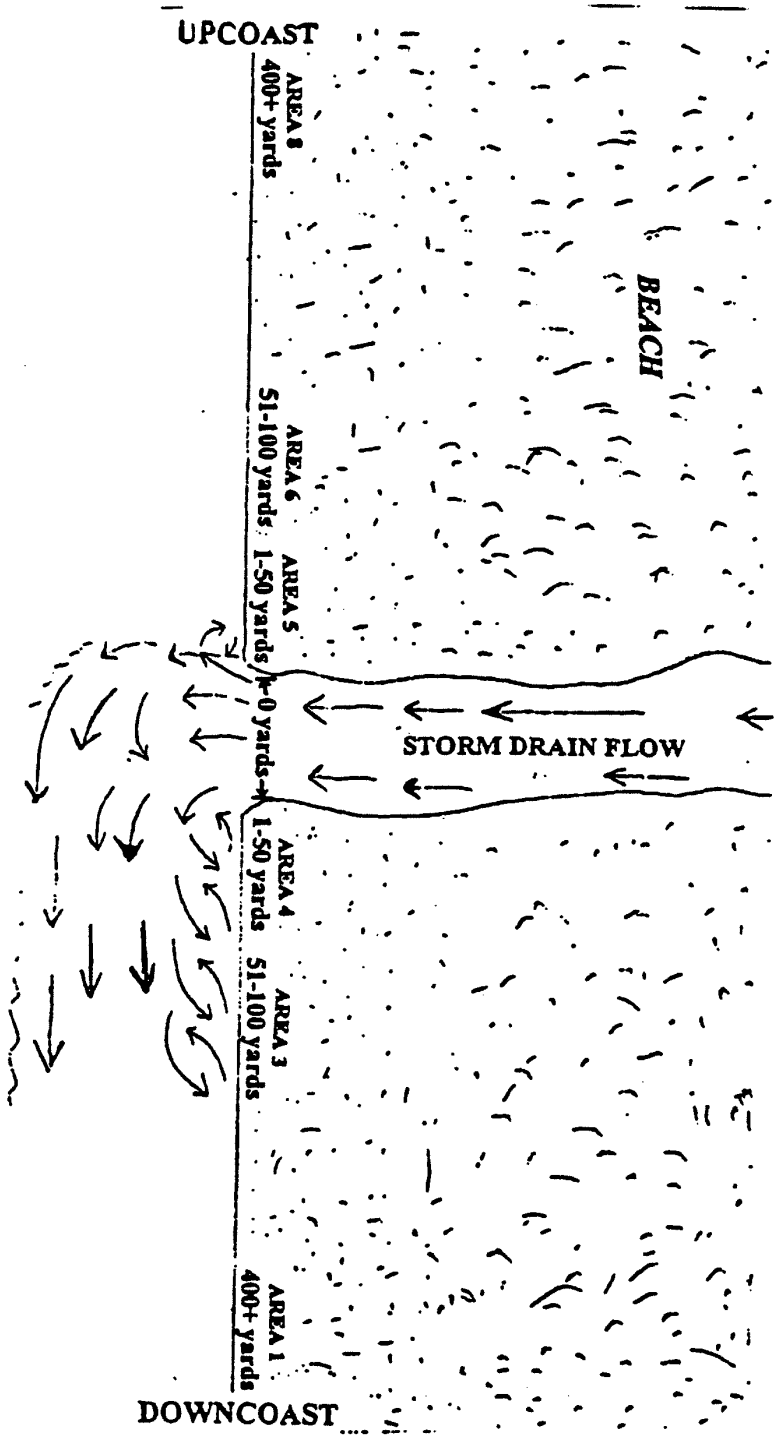

Participants were told that someone from the beach study office would phone them in 9 days and asked the number and time of day at which they could most easily be contacted. All respondents received an information pamphlet that described the study, provided the study office telephone number, and served as a reminder of the follow-up telephone interview. This pamphlet was printed in English as well as Spanish. Participants were encouraged to call the study office to be interviewed if they happened to be inaccessible on the scheduled phone interview date. Information about all members of a particular household was recorded on the same field sheet.

Unsuccessful interviews were tallied on a "Log of Non-Participants" sheet by race, gender and reason for non-participation (Appendix B). Only individuals who could be approached directly were tallied, as it was not feasible to determine the identity and number of accompanying children under 12.

Most essential to data quality was the careful observation of the bathing/swimming behaviors of the respondents approached for interview. Different techniques were used to approach potential subjects. Sometimes an interviewer waited until a group came back from the water to their towels, let them rest for a few minutes, and then approached. An alternative approach involved waiting until several unassociated groups had gone in and come out of the water. The interviewer then made "rounds" of 4-8 groups at a time. Many of the written parts of the interview were completed later at the encampment where beach interviewers were situated.

Since the beach contact laid the groundwork for the follow-up telephone interview, the interviewers spent as much time as each individual or family needed to establish rapport and convey a sense of professional interest in their swimming behavior. A level of trust had to be established in order to obtain phone numbers. In the early stages of the study, telephone interviewers were faced with a significant percentage of calling attempts resulting in wrong telephone numbers. Some of these were undoubtedly due to people's reluctance to give out their correct numbers. However, the percentage of wrong numbers decreased considerably when it became policy for beach recruiters to repeat the number aloud and verify it as written with the person being interviewed.

dispatch interviewers to Study Area 2 earlier in the day. On crowded days, such as weekends, interviewers were automatically assigned to Study Area 2 for the entire day, and supervisors provided them with regular notice as to the numbers needed from their area. Similarly, interviewers provided supervisors with regular reports on the quantity of their interviews.

Interviewers approached every potentially eligible beach visitor in their assigned zones. During the first few weeks of data collection, eligibility for adults and children was determined differently. Adults were eligible only if their heads or faces had been submerged in the ocean water (subjects with only incidental wetting of their faces, e.g. from splashing, were not recruited). Early on, children 12 years and younger were eligible if they had had any contact with the water, preferably hands and face (we assumed a lower standard of sanitary practices might place them at risk of exposure); however, once it seemed as though the projected sample size would easily be achieved, project coordinators decided to have children recruited under the same criteria as adults. Members of the same family were allowed to be subjects in this study because a) we judged that it would have been very difficult to identify and recruit only one member per family and b) it would have been impossible to achieve our sample size since we had to approach every potentially eligible subject throughout the study period to achieve our sample size.

A single adult or any adult member of a family could serve as the source of information on him-/herself or other family members. That adult was also often the source of information on children who were not part of the family but had come to the beach under his/her supervision. Children 12 years or older could be questioned directly if the interviewer had obtained consent from an accompanying adult. Teenagers who were not accompanied by adults were recruited and told to inform their parents about the follow-up telephone interview. Finally, in theory, a person could have been recruited into the study more than once, if they met the eligibility criteria each time. In reality, only a handful (perhaps 5) of subjects participated in the study twice.

temporarily affected by algal blooms that made swimming unpleasant. One of the study zones at Ashland within Study Area 2 is approximately 250 yards from the Pico-Kenter storm drain -- a drain with a history of high indicator counts, usually diverted during previous summers.

Telephone Interviews:

The majority of telephone interviews were conducted from the beach study office, although occasionally an interviewer called from home if an interview could not be completed during regular office hours. Interviewers were scheduled to begin calling at 8 A.M. and interviewing generally continued until 9 or 10 P.M. Study participants were telephoned 9 to 14 days after their interviews at the beach. Interviews were conducted in English and Spanish.

In order to conduct telephone interviews, callers needed the field sheet in hand so that they could review the household size, names and ages of potential study eligibles, and read useful comments regarding eligibility and approachability. For this reason, a "calling queue" system was established in which field sheets were organized by scheduled call date, preferred call time (i.e., morning, afternoon, evening), and whether or not they were Spanish-only or out-of-area calls. Often phone numbers had to be obtained for participants that were interviewed as part of a group at the beach but lived in a different household.

Usually the contact person for the telephone interview was the respondent who had provided information at the beach interview; however, other options were utilized. A spouse could answer questions about the other's health when knowledgeable and comfortable with the idea; otherwise, the interview was conducted with each spouse separately. Interviewers were instructed not to allow participants existing in non-marital relationships to answer for partners, since they were considered more likely to be in a "honeymoon" phase wherein confidences about health problems might not be shared.

Adults were generally required to answer for children under 12, but could do so for any of their children if preferred. Often interviews were conducted with the parent asking the child questions. A divorced or separated parent could respond for a child only

Interviewers carrying toys experienced enhanced success upon approaching households with children. In such cases, it was advantageous to have two interviewers approach the group, one with toys and the other with paperwork. The interviewer with the toys was able to keep the children occupied, relieving the parent's concern or need to watch them while participating in the interview, probably offsetting a fair number of refusals. An example of a typical beach interview is included in Appendix C.

Beach interviewers usually left the beach to return to the study office around 4:30 P.M. on weekdays and 5:30 P.M. on weekends. Supervisors collected the field sheets and non-participation log sheets, edited them for accuracy and completeness, and tallied the day's interviews on the "Beach Interview: Daily Tally Sheet" (Appendix B). One of the office staff was responsible for reviewing the field sheets on a daily basis and contacting beach interviewers, if necessary, to obtain missing information.

Several conditions at the study beaches resulted in logistical dilemmas for the survey. At study onset, the creek outlet at Malibu was close to the pier and most of the interviews were conducted on its south side where the people were swimming. In addition, no-flow days were common, i.e., there was no visible outlet from the creek to the ocean. Moreover, lifeguards often placed flags designating surfing-only areas such that Study Area 1 was off-limits to families and swimmers. When strictly enforced, swimmers were made to leave the area before they became eligible for the study. It was also not uncommon for lifeguards to approach people playing directly in the area of the storm drain and tell them to move to a "safer" area before they could become eligible to be interviewed. This happened at Ashland and Will Rogers as well.

Malibu's creek outlet was eventually moved upcoast for the summer in order to create greater accessibility to the more popular beach area during peak season. The noise and fumes emitted by bulldozers disrupted several days of interviewing, especially since it took several park service outings to get the outlet to stay upcoast. The outlet at Will Rogers beach also shifted positions so that it was subjected to bulldozings in order to create more usable beach. When the outlet was dredged, parts of the beach, especially within Study Area 1, were not available to beachgoers. Ashland and Will Rogers were

following the beach interview (the first calling day), the field sheets were placed in a "call-back" compartment to receive priority attention during the next 5 days. All "call-backs" were attempted at least 3 times a day. Generally, interviews were completed within the 9- to 14-day window period, but there were exceptions. For a few days beyond the 5th calling day, field sheets were kept in a compartment for special priority calls. If these participants were accessed after the 5th day, interviewers made sure that the reported symptoms had occurred within the study window period. Families with small children were not called after 9 P.M., while the success rate among young singles was enhanced when calling hours were extended to 10 P.M. on some nights. At least one bilingual (English/Spanish) interviewer telephoned from the study office. Unattainable phone interviews were tracked on the "Log of Weekly Loss-To-Follow-Up" sheet (Appendix B).

The interviewing staff became very skilled at developing immediate rapport with the respondents over the phone. The interview proceeded smoothly once the interviewer introduced her/himself, the purpose for the call, and established eligibility. The telephone questionnaire was relatively easy to administer, as there were no open-ended questions. Interviewers sometimes linked questions about symptoms that regularly occur together, improving the flow of the interview without de-emphasizing the importance of each symptom. Information regarding swimming location was generally bubbled after the interview was completed, and interviewers were always blinded as to any preliminary analyses relating locations to health outcomes. The average interview took about 3 minutes per respondent. Appendix C contains a typical example.

When attempted calls were answered by an answering machine or someone other than a designated contact person or eligible participant, the interviewer left a message asking that the contact person return the call by phoning the study office and asking to speak to "Toni" -- a unisex name which none of the interviewers normally used. Afterwards, the corresponding field sheet was placed in the appropriate "Toni" folder according to beach, so as to be easily retrievable upon call-back. In this way, anyone answering the telephone could interview a caller asking for "Toni", having been trained

if he/she was the custodian since the beach interview. With older children, interviews were facilitated once the interviewer had introduced her/himself and the study to a parent or guardian. Only rarely, when a language difficulty was otherwise unresolvable, would a capable child be allowed to interpret for an adult or another child. Nannies or babysitters who were daily care-givers could answer for charges.

Beach participants were eligible to respond to the follow-up telephone interview if they had not been back in the water at any of the 3 study beaches or at Mothers' Beach in Marina del Rey and the area around Santa Monica Pier since the day of the beach interview (subjects in the water at Mother's Beach or around the Santa Monica Pier were excluded because these areas are associated with high bacterial counts and swimming there may have caused symptoms such as the ones under investigation in this study). Very few subjects visited beaches other than the study beaches. Ineligible participants were tallied on a "Log of Weekly Loss-To-Follow-Up" sheet (Appendix B) according to ethnicity, age group (younger than 12, 12 and older), gender and map code. The telephone interviewer also verified that the participant had gotten her/his face wet in ocean water on the beach interview day. If both these criteria were met, the participant was deemed study eligible. A telephone interview form was dedicated to each participant who was then assigned a unique identifier.

The identifier consisted of a letter corresponding to the visited beach, a number designating the household, and a letter specific to a participating household member. Telephone interview forms were preprinted with sequential household identifying numbers and grids premarked with those numbers. At the time of the phone interview, an interviewer reviewed the field sheet to determine the number of forms required. The interviewer bubbled (i.e. darkened in pencil the circle indicating the correct data item) in the beach letter, the household number, and the participant letter in the provided section on the telephone interview form. The same identifier(s) was recorded on the field sheet.

The first attempt at calling the contact person was determined by the preferred time indicated on the field sheet. Respondents who said they could be called "anytime" were first called in the morning. If calling attempts were unsuccessful on the 9th day

to the beach visit, the interviewer asked for a description of how often the symptom was experienced. This was done to decide whether the symptom was associated with an ongoing condition such as an allergy or smoker's cough, etc. In the majority of cases, if the symptom was already present at the time of the beach visit, it was not considered an event. A "don't know" (DK) was also not considered an event.

Phone interviewers were encouraged to write comments on the questionnaire form. Comments volunteered by the respondent were written on the left side of the page to differentiate them from answers to standard probes that were written on the right side. These comments were used in symptom ascertainment, especially when the respondent reported having had the symptom prior to the beach visit. The study physician reviewed these comments, and if the information was unclear, would question the interviewer for a better understanding. Sometimes, the study physician would re-phone the respondent to clarify the response. There were a few rare cases where an existent symptom worsened so dramatically after the beach visit that it was considered an event. In these cases, the study physician darkened the extra bubble associated with each symptom on the far right of the questionnaire form.

Data Editing:

Each completed telephone questionnaire underwent at least four reviews before it was scanned. Interviewers reviewed each questionnaire upon completion, although on busy telephoning shifts this step might have been bypassed. Telephone supervisors reviewed each interview and addressed any immediately apparent inconsistencies or omissions prior to the form's subsequent examination by a project coordinator. The study physician verified all ambiguous symptom events. Finally the forms were subjected to the final edit step.

In the final edit step, one staff person reviewed the field sheet while another reviewed the accompanying telephone form(s). The editor with the telephone form read aloud all the information which appeared on the top, i.e., identifier, beach and phone dates, interviewer numbers, age category, gender, map code, and whether or not respondent had gotten his/her face wet. The editor with the field sheet would check this

in advance to recognize a "Toni call." On average, 10 to 15 interviews were conducted in this fashion on a daily basis.

Interviewers kept track of their calls on the "Telephone Tally Sheet" (Appendix B), an instrument designed to keep account of the telephone activity of each work shift, i.e., 9 A.M. - 3 P.M.; 3 P.M. - 9:30 P.M. Calls were tallied within the following categories: completed interview, answering machine, "Toni call", busy signal, later appointment, no answer, disconnected, and wrong number. Also tallied were the number of households and individuals, and the number of attempts to complete these interviews. These tally sheets were helpful in allocating staff to the most productive hours.

The close supervision of telephone interviews allowed for optimum quality control. Telephone interviews were always monitored by a supervisor to insure that probes were used uniformly and answers to respondents' questions were addressed in an accurate and unbiased manner. Supervisors reviewed each questionnaire for content soon after the interview took place so that interviewers were directed as to how to unravel inconsistencies and recall or obtain missing information, even calling the respondent back if necessary. There were occasions when supervisors made these calls in order to validate information. All interviews were also reviewed by a project coordinator within 24 hours after completion.

Office Operations (Other Than Telephoning):

Symptom Evaluation:

For our purposes, determining that a participant experienced a specific health outcome depended on the self-report of having one or more representative symptoms. Each of the 16 symptoms listed in the phone questionnaire was associated with 3 possible questions. For each symptom, the first question was asked, "Did you or your child have (symptom) at any time since your visit to the beach?" When the response was negative, the interviewer moved on to the next symptom. If the response was positive, the interviewer continued by asking, "Was this a problem you had before going to the beach?" If the answer was "no", this was considered a symptom event, and the interviewer moved on. However, if the respondent reported having had the symptom prior

A similar method was used for the detection and correction of logical errors, for example, inadherence to skip patterns. Records containing logical errors were listed and corrections were entered into a computer file that was merged with the original data set.

Other aspects of data management involved the creation of new variables like symptom groups, and the merging of bacterial indicator counts and household income estimates with the questionnaire data. Bi-weekly progress reports describing the numbers of completed interviews as well as respondent characteristic were generated using Excel 5.0. Excel was also used to enter and report daily beach interviews, daily non-participation and weekly loss-to-follow-up counts.

Collection of Water Samples

Samples were collected daily from mid-June to September at three locations; Santa Monica Beach near the Ashland Avenue storm drain (Ashland), Will Rogers Beach near the Santa Monica Canyon storm drain (Will Rogers), and Surfrider Beach near Malibu Creek (Malibu). Four samples were taken at each location. Three of the sampling points at each location (0 yards, 100 yards upcoast and downcoast of the storm drain flows) represented a grid presumably covering the most elevated indicator bacteria counts in the surf-zone. The fourth sample (400 yards upcoast or downcoast) represented a control site that was presumably unaffected by high indicator densities from storm drain flows. For quality assurance purposes, one duplicate per beach site was collected on each sampling day. Discharge flow rates at the time of sampling were not made.

All samples were collected at ankle depth with sampling poles and one liter, high-density, sterile polypropylene bottles. Samples were taken at ankle depth because 1) all shoreline monitoring is done with ankle depth samples; 2) children were presumed to be at higher risk and are exposed mostly to water at ankle depth; 3) previous studies (SMBRP, 1990) demonstrated that bacterial densities at chest depth were at least an order of magnitude lower than ankle depth samples; 4) additional samples would increase the costs and demands on the lab to unacceptable levels. The samples were collected from the incoming surf as the surf foam reached the sample bottle at the height of the sampler's ankle. The sample bottles were immediately sealed and placed on ice. All samples were

vocalized information against that on the field sheet. Any necessary corrections were made on the telephone form and the entire telephone form was inspected for dark and thorough marking (bubbling.) Unresolvable inconsistencies were referred to the telephone interviewer and corrected. Once edited in this manner, the telephone forms were set into a pile separate from the field sheets, ready for scanning. The field sheets were stamped "Completed", initialed by the editor, and filed in sequential identifier order for later reunification with the telephone form.

Data Management:

The telephone interview forms were scanned on a NCS OPSCAN 5 optical mark reader. Edit checks were conducted to locate and correct miscoded identifiers, inappropriately missing responses to variables, and logical response errors. In most cases, missing data were the result of the scanner having failed to pick up marked responses.

Miscoded identifiers and missing data for selected variables, i.e., beach and phone interview dates, gender, age, interviewer numbers, and map code, were initially manually edited in the data set if the information was written on the form but not coded or lightly bubbled. At this point, the forms were reunited with the field sheets and filed.

Most data management tasks were performed using Dbase IV. The data manager printed a list of identifiers and values from the telephone forms that could be verified with the field sheets. This list was used as a final check for data consistency between the two interview forms. Corrections were made to the telephone forms along with brief notations describing the corrections, and photocopies of the forms were given to the data manager to perform manual edits.

The data manager next produced a hard-copy list and computer file on which to enter the remaining missing responses. Office staff examined the field sheet and telephone interview and either entered the correct responses or confirmed the nonexistence of data. The missing data were entered into the computer file and merged with the original data set.

(52 grams per 1 liter, with the addition of 10 mL of 1% of Bacto rosolic acid in 0.2N NaOH) was used for fecal coliforms. Difco mE Agar (7.12 grams per 100 mL with the addition of 0.024 grams nalidixic acid and 1.5 mL of 1% triphenyl tetrazolium chloride) was used for the initial isolation of enterococci. BBL Esculin Iron Agar (16.5 grams per 1 liter) was used for the substrate test for enterococci. Each batch of agar media was tested for pH and sterility. Positive and negative control cultures were also inoculated onto representative portions of the prepared plates. Only media that passed all QA checks were used.

E. coli was analyzed using Hach m-ColiBlue24 Broth, which is commercially prepared and packaged in PourRite ampules. The ampules were refrigerated until the day of use when the tops were broken and the liquid broth aseptically poured onto a sterile absorbent pad in a sterile 47mm petri dish with a tight-fitting lid. All ampules were used before their expiration dates.

Sterile phosphate buffered water was used as the diluent for all dilutions and also as a rinse water during membrane filtration. The phosphate buffer was made according to Standard Methods for the Examination of Water and Wastewater (American Public Health Association, 1992) Section 9050C1. The buffer was prepared with 1.25 mL stock phosphate buffer solution (34 grams potassium dihydrogen phosphate in 1 liter deionized water) and 5 mL stock magnesium chloride solution (81.1 grams magnesium chloride per 1 liter deionized water) per 1 liter deionized water. Buffer was dispensed into either 1 liter screw-capped flasks (for rinse water) or into screw-capped test tubes (9 mL per tube) for dilution blanks. The buffer was autoclaved, cooled, and then tested for pH and sterility. Buffer was stored at room temperature until used. The holding time for the prepared buffer was three months.

Membrane Filtration Procedure

Water samples were analyzed by the membrane filtration procedure according to Standard Methods. Total coliform densities by membrane filtration were determined as recommended in Standard Methods Section 9222B and fecal coliform densities were determined according to Section 9222D. Enterococci densities were analyzed according

collected between 8:00 A.M. and 11:00 A.M. in the following order; Malibu, Will Rogers, and Ashland. After all samples were collected, they were transferred to the Los Angeles Bureau of Sanitation's Environmental Monitoring Division's microbiology laboratory at the Hyperion Treatment Plant by noon for analysis. Samples were taken in the morning because a) it was not feasible to collect samples later in the day and have them analyzed given the daily schedule in the lab and b) it was not advisable to have staff obviously collecting water samples at specific locations relative to the drain at the same time subjects were being interviewed on the beach.

Laboratory Determination of Bacterial Indicators (Total and Fecal Coliforms, *E. coli*, Enterococcus)

All laboratory work was conducted by the City of Los Angeles, Environmental Monitoring Division, Biology Section - Microbiology Unit.

Samples

All samples were collected using clean, sterile 1 liter polypropylene sample bottles, leaving ample air space in the bottle to facilitate mixing by shaking. After collection, samples were transported to the lab in an iced cooler to maintain sample temperature below 10°C. Samples were received within six hours of sample collection and analyses started within two hours of arrival to the lab.

Media

Agar used for the culturing of the indicator bacteria total coliforms, fecal coliforms, and enterococci were prepared according to the manufacturers' directions using a New Brunswick Scientific Co., Inc. AgarMatic benchtop sterilizer. Each agar was cooled to approximately 45°C and aseptically dispensed via a pump and sterile tubing into sterile, disposable 60mm petri dishes for total coliforms and enterococci. Agar for fecal coliforms was dispensed into 47mm sterile petri dishes with tight-fitting lids. Prepared plates were placed in covered containers and refrigerated until used. The maximum holding time for the prepared plates was two weeks.

Difco mEndo Agar LES (51 grams of dehydrated media to 1 liter of deionized water containing 20 mL of 95% ethanol) was used for total coliforms. Difco mFC Agar

10. The walls of the funnel are rinsed down three times with approximately 30 mL of sterile, buffered rinse water. When the rinse water has drained through, the vacuum is turned off.
11. The funnel is lifted off and the filter is aseptically removed using a sterile forceps. The filter is aseptically placed, using a rolling motion, grid side up onto the surface of the appropriately labeled petri dish containing agar or a broth-saturated pad. Care is taken to avoid trapping air between the agar or pad surface and the filter.
12. Steps 6-11 are repeated for each sample volume or dilution required for the sample. The smallest sample volume is filtered first, followed by increasing sample volumes.
13. If dilutions are required, 1:10 serial dilutions are made, using sterile 9 mL dilution blanks and 1 mL of sample. The most dilute sample aliquot is filtered first, followed by increasing sample concentration dilutions.
14. When all the sample volumes or dilutions have been filtered for the sample, the plates are placed into the appropriate incubators.
    a. Total coliform mEndo LES agar plates are incubated for 24 ± 2 hours at 35.0 ± 0.5°C.
    b. Fecal coliform mFC agar plates are incubated for 24 ± 2 hours at 44.5 ± 0.2°C. These plates are incubated within 20 minutes of filtration to ensure heat-shock of the non-fecal bacteria. The plates are placed in either dry heat-sink incubators or sealed in water-proof bags and placed in a 44.5 ± 0.2°C water bath.
    c. Enterococcus mE agar plates are incubated for 48 ± 2 hours at 41.0 ± 0.5°C.
    d. *E. coli* broth plates are incubated for 24 ± 4 hours at 35.0 ± 0.5°C.
15. All sample collection, filtering, and incubation times are recorded in the sample log book.

B. Colony Morphology

to Section 9230C. *E. coli* densities by membrane filtration were determined as recommended by Hach Method 10029 for m-ColiBlue24 Broth.

A. Filtration/Incubation

Millipore's Microfil System, consisting of disposable 100 mL polypropylene "push-fit" sterile funnels and HA 0.45 μm sterile membrane filters, were used for filtering each sample. Samples were filtered under partial vacuum provided by a vacuum pump. The filtration procedure used is as follows:

1. Using an alcohol flamed-sterilized forceps, a new sterile membrane filter is aseptically placed, grid side up, onto the sterile filter support base.
2. The Microfil sterile, disposable funnel is aseptically placed on the support and pushed down to fix it firmly in place.
3. The funnel is rinsed with approximately 20-30 mL of sterile, buffered water. This is the sample QA blank to ensure that the equipment and the buffered rinse water were sterile.
4. The vacuum is applied and the buffered rinse water is allowed to drain through the filter. The vacuum is turned off.
5. The funnel is lifted off and the filter is aseptically removed using a sterile forceps. The filter is aseptically placed, using a rolling motion, grid side up, onto the surface of the appropriately labeled petri dish containing agar. Care is taken to avoid trapping air between the agar surface and the filter.
6. A new sterile filter is aseptically placed onto the filter support base.
7. The membrane filter is wet with approximately 20-30 mL of sterile, buffered rinse water before the sample aliquot is added, using sterile disposable pipets or sterile graduated cylinders.
8. The sample is swirled in the filter funnel by moving the funnel in a gentle circular motion to evenly distribute bacterial cells on the filter surface.
9. The vacuum is applied and the buffer and sample is allowed to drain through the filter.

adding the counts of all the sample volumes filtered and multiplying by 100 and then dividing by the sum of all the volumes (mL) filtered.

Quality Assurance

Quality assurance and quality control tests were performed to verify the validity of the analytical data collected. All areas that influence the reported data were subjected to established microbiological quality control procedures in accordance with Standard Methods. These areas included sample storage and holding, lab facilities, personnel, equipment, supplies, media, and analytical test procedures. In addition, duplicate analyses were performed on ten percent of all samples. When quality control results were not within acceptable limits, corrective action was initiated. The laboratory also participated in performance evaluation samples sent by the State Department of Health Services. The quality assurance program helped ensure the production of uniformly high quality and defensible data. The Hyperion microbiology laboratory has been certified by the California State Department of Health Services.

Virus Sampling and Assay for Enteric Viruses

All laboratory work was conducted at the Environmental Sciences Laboratory of the County Sanitation District of Orange County.

Sampling Design and Frequency

Method 9510 C g of Standard Methods for the Examination of Water and Wastewater, 18th edition was used in all virus sampling. The sampling was performed at three storm drain sites on Friday, Saturday and Sunday from June 23 to September 24, 1995. Sampling days and duration of the project reflected heaviest beach usage during the 1995 swimming year. Water samples as large as 100 gallons were filtered through electropositive filters at ambient pH. Flow rate through the adsorption filter was kept below 5 gpm. Adsorption filters were eluted in the field with one liter of sterile 3% beef extract adjusted to pH 9.0 with sodium hydroxide.

Field eluates were returned to the laboratory where they were reconcentrated using an organic flocculation procedure described by Katezenelson et al., 1976. In this method, the eluate was adjusted to pH 3.5 by dropwise addition of 1N HCI while mixing

A stereoscopic microscope with a fluorescent lamp is used to aid in identifying and counting colonies after the appropriate incubation times. All colony counts, counting times, and any other notable information is recorded on the sample data worksheet.

1. Total coliforms: typical colonies have a pink to dark-red color with a shiny, greenish-gold, metallic surface sheen. The sheen may appear only in the central area or on the periphery.
2. Fecal coliforms: any colony exhibiting any light or dark blue color, whether covering the entire colony or only in or on part of the colony.
3. Enterococcus: after 48 ± 2 hours incubation, mE filters with growth on them are transferred to room temperature EIA plates. These EIA plates are incubated for 20 minutes at 41.0 ± 0.5 °C. Enterococci are pink to red-brown colonies with black or reddish-brown precipitate or halos on the underside of the filter when place on EIA agar.
4. *E. coli*: all blue to purple colored colonies (total coliforms are all red plus blue/purple colored colonies).

C. Calculations

Due to the possible adverse effect of colony crowding on sheen or color development on the membrane filter, and to be assured of a statistically valid colony count, minimum and maximum levels are adhered to for each of the indicator organisms. The minimum and maximum ranges are as follows:

1. Total bacteria: <200 total colonies (background and indicator bacteria)
2. Total coliform: 20 - 80 coliform colonies
3. Fecal coliform: 20 - 60 fecal coliform colonies
4. Enterococcus: 20 - 60 enterococcus colonies
5. *E. coli*: 50 coliform colonies

Indicator bacteria are expressed as bacterial density - colony forming units (CFU) per 100 mL of sample. Counts within the statistical range for the bacterial indicator are calculated by multiplying the colony count by 100 and dividing by the volume (mL) of sample filtered. If no counts fall within the ideal range, the density is calculated by

final concentrate that could be quantified. The remaining concentrate volume was split in half and analyzed using the liquid overlay technique known as the cytopathic effect assay (CPE). The CPE assay is generally considered to detect a greater number of viruses, but it is not quantitative. All flasks of BGMK cells used in the CPE method were frozen after a maximum of 10 days. The flasks were then thawed and a portion of the original flask was transferred to a fresh flask of BGMK cells. Flasks that did not exhibit CPE in the initial CPE assay or the subsequent passage to fresh cells were considered to be negative for detectable infectious viruses. Any flask exhibiting CPE in either initial or subsequent passages was further examined by the plaque forming unit method to confirm the presence of infectious viruses.

Statistical Analyses

From the initial data set of 11,793 subjects who were successfully contacted and eligible, 107 were excluded due to reporting that they (or their child) did not get their face wet when swimming, leaving a total of 11,686 subjects included here. When looking at the bacteriological exposures, subjects with missing values (for the bacterial densities) were excluded (subject counts for each of these exposures are given in the tables). Socioeconomic status (SES) was estimated from census data (based on median values for each subject's zip code); missing SES values (for 1,546 subjects) were imputed as the median value among all subjects.

To assess the health effects of swimming near storm drains and high bacteriological levels, we first used simple descriptive statistics, such as histograms, tabular comparisons, and stratified analyses. We then calculated odds ratios (ORs) and 95% confidence intervals (CIs) from logistic regression models. These models provided approximate relative risks while allowing for control of potential confounding. We fit models for the two primary exposures (i.e., distance of swimming from the storm drain and measures of bacteriological exposure) for each of the outcomes of interest. We present results from modeling the exposure categorically and continuously. For the continuous models, we either present ORs and 95% CIs, or P values for trend; note that one can assess the trend P from the continuous 95% CIs.

continuously on a magnetic mixer. After reaching pH 3.5, mixing continued for an additional 30 minutes in order to maximize the potential for virus particles to adsorb to the organic floc. The entire eluate was then centrifuged at 3000 X g for 10 minutes in order to recover the floc. The pelletized floc was then resuspended in 0.45N Na_2HPO_4. In most cases, the final concentrate was in the 10 to 15 mL range.

Analyses of initial samples on tissue culture indicated that some of the final concentrates were toxic to host cells. Because of this toxicity, all final concentrates were detoxified prior to assay using the procedure described by Glass et al, 1978.

Additional parameters measured by the field team was ambient pH, temperature, conductivity and Total Dissolved Solids.

Seed Studies

Seed studies were performed at the laboratory using water collected from each sample location. Six studies were performed in water collected from Santa Monica Canyon, seven in water from Malibu and seven in water from Ashland. These studies were done to measure the effectiveness (i.e., percent recovery) of the virus adsorption, elution and reconcentration procedures in actual storm drain effluent.

Two 35 gallon containers were filled with water from each location. The water was trucked to the L.A. County Sanitation Districts Laboratory where a known amount of vaccine strain poliovirus was added to the water. Three grab samples were taken from the 35 gallon containers at the beginning and end of each experiment. These grab samples were diluted 1:10 in Hank's Balanced Salt Solution (HBSS) to minimize any toxic effect to the virus by the water itself. Percent recovery was measured by comparing the concentration of virus as measured in the grab samples to the concentration measured in the final sample concentrates.

Enteric Virus Assay

All samples were analyzed for infectious human enteric viruses on Buffalo green monkey kidney cells (BGMK). Ten percent of the final concentrate volume was initially analyzed by the plaque forming unit (PFU) technique. The reason for this initial screening was to determine whether there were viruses present in a small portion of the

participants at the beach, ineligible, lost to follow-up, or from whom we obtained completed interviews did not differ by beach site (Figure 2). Reasons for non-participation are listed in Table 2. The major reason for non-participation was that the subject was ineligible because of a prior visit to a study beach (usually the same beach) or Mothers' Beach in the prior seven days (17% of beach contacts). Of the 22,085 persons approached on the beach, only 1761 (8%) refused to participate. Whites were slightly more likely to be non-participants than other racial ethnic groups (usually because they were ineligible). There were no major differences in the ethnicity or gender of non-participants across beaches (Figure 3). Reasons for "non-actualized" telephone interviews, meaning the attempt did not result in a completed interview from a subject interviewed at the beach, are presented in Table 3. The major reason was that subjects were found to be ineligible because they had returned to a study beach and immersed their heads in the water subsequent to the day of the beach interview (10% of beach interviews). The major reason for losses to follow-up was an apparently wrong or disconnected number (8% of beach interviews), which occurred predominantly early in the study. The proportions of "non-actualized" telephone interviews did not differ substantially by ethnicity, gender, or age (Figure 4) (although there was a slight tendency for whites and older subjects to fall into this category).

Table 4 presents characteristics of the 11,793 subjects who remained eligible throughout the study and completed the beach and telephone interviews. An objective was to have a ratio of 3:1 for subjects 0-100 versus greater than 400 yards from the storm drain. We achieved a ratio of 2.9:1. The majority of subjects (78%) came from family units where we included more than one subject per family. Only ten percent of subjects had residences in zip codes where the median household income was less than $25,000. This percentage was slightly higher at Ashland (13%). Eighty-eight percent of subjects were residents of California and there were no differences in this percentage by beach. We compared the study subjects with residents of Los Angeles County using the Population Estimation And Projection System (PEPS) for 1993 provided to us by the Toxics Epidemiology Program of the Department of Health Services of Los Angeles

Potential confounders adjusted for include: age, beach, race, gender, SES, California versus out-of-state residence and worry about potential environmental hazards due to swimming in the Santa Monica Bay. In addition, we adjusted the distance results for each of the bacteriological exposures and we adjusted the bacteriological results for distance. We also performed subgroup analyses by age and beach for the exposures/outcomes of interest. Interactions between distance from the drains and bacteriological exposures were assessed (with logistic regression) as well. Finally, for the significant results, we estimated the number of cases attributable to the corresponding exposure. The list of variables available for analysis is presented after the narrative portion of the Results and Discussion sections.

III. RESULTS

For clarity of presentation, we will describe all major results in this narrative section, followed by the Discussion Section. All of the tables and figures are provided after the References Section (before the Appendices). Results will be described in four sections: descriptive data from the beach and telephone interviews, descriptive data from the laboratory determinations of bacterial indicators, associations between risk of health outcomes and distance from the storm drain, and associations between bacterial indicators and risk of health outcomes. At the end of the last section, we present results of multivariate modeling where we included both distance from the drain and the bacterial indicators in the same model. After the section on multivariate modeling, we present an analysis of the virus data. Final results for all associations we examined are included here.

Descriptive Data (from the beach and telephone interviews)

Table 1 presents a calendar with the number of completed interviews by day. As expected, more interviews were completed on weekends. Also, more interviews were completed in July than other months. As stated earlier, we were able to successfully complete telephone follow-up interviews for 84% of the eligible subjects who were interviewed on the beach (Figure 1). The proportions of subjects who were non-

be due to swimming in the ocean making it more difficult to detect any excess risk due to swimming). This decision was made prior to seeing what risk ratios were associated with this variable.

With respect to proportions of subjects reporting symptoms, there were no differences by gender. There were no substantial differences by age, although the proportion of children 0-12 with fever and vomiting was slightly higher than among older subjects and the proportion of children 0-12 with cuts that became infected was slightly lower than among older subjects. There were generally no differences by ethnicity, socioeconomic status (SES), or residence in California versus outside of California, with the following minor exceptions. Latino/a subjects reported less diarrhea, stomach pain or cramps, and nasal congestion. Based on the opinion of many of our bilingual staff, we suspect this may reflect some underreporting of these symptoms, rather than a real difference in outcomes. Persons who lived in zip codes where the median household income was less than $25,000 reported higher rates of fever, while subjects who lived in zip codes with median household incomes greater than $25,000 reported higher rates of diarrhea, but generally there were no striking differences by this ecological measure of SES. Overall, there was a tendency for California residents to report more symptoms than non-residents, but these differences were small.

Finally, Table 11 also presents results for the variable regarding level of concern about environmental hazards at the beach. As level of concern increases, the proportion of subjects reporting symptoms increases. This question was asked only at the end of the telephone interview because we did not want to bias responses to the list of symptoms by asking before then and we did not want to ask it at the beach because we wanted a streamlined questionnaire and we did not want to raise concerns about the beach for subjects who participated in this study. The manner in which it was asked does not enable us to distinguish between two possibilities: people with a high degree of concern overreported their symptoms relative to the other subjects or, more plausibly, those who subsequently experienced symptoms after the beach interview had their level of concern raised (after the fact). In either event, this variable was not strongly associated with

County (Table 5). As expected, the study subjects were younger (e.g. 48% were under 12 years of age versus 22% from PEPS). This reflects the fact that beachgoers who enter the water tend to be younger, which allowed us to examine possible differences in effects by age. The proportion of male study subjects was slightly higher in the study than in Los Angeles County (55% vs 50%). For White and Latino/a subjects, there were no substantial differences between study subjects and their proportions in L.A. County.

Table 6 presents subject age by map area (distance from the drain) for each beach. Table 7 presents similar data by gender for each beach and Table 8 presents these data by ethnicity. A summary for all beaches combined is presented in Table 9. Children 0-12 years of age tended to swim at the drain more than older subjects (63% of subjects swimming at the drain were children 0-12, whereas children 0-12 represented only 48% of all subjects). There were no differences by gender (e.g. 53% of subjects swimming at the drain were males and they constituted 55% of all study subjects). There was a tendency for Latino/a subjects to swim at the drain more so than Whites (59% of subjects swimming at the drain were Latino/a, whereas they comprised 43% of the total study subjects).

Table 10 presents counts of each symptom ascertained from the telephone interview. Table 11 presents rates for each symptom by various categories. The most commonly reported single symptoms were: nasal congestion (reported by 9.1% of respondents), coughing (7.1%), sore throat (6.8%), stomach pain or cramps (6.2%), diarrhea (5.3%), and fever (4.8%). The most commonly reported composite variable was significant respiratory disease or SRD (5%), which is defined as all those reporting any one or more of the following symptom groups: 1) fever and nasal congestion or 2) fever and sore throat or 3) cough with phlegm. The other composite variables were HCGI 1 (3%) and HCGI 2 (0.9%). HCGI 1 included all those experiencing any one or more of the following symptom groups: 1) vomiting or 2) diarrhea and fever or 3) stomach ache and fever. HCGI 2 includes all those reporting both vomiting and fever (we decided to exclude diarrhea in this second composite since diarrhea was reported relatively commonly by study subjects and much of it may represent background rates that may not

Avenue for each indicator, Figures 6A-D present the counts for Malibu, and Figures 7A-D for Will Rogers.

From the tables and figures, four major points are evident: 1) the counts were highly variable from day to day; 2) for a substantial proportion of days, the counts exceeded the established cutoffs; 3) the counts were generally higher in front of the drain and then dropped off with increasing distance from the drain; 4) the water samples taken at 400 yards were not always "clean" with respect to the bacterial indicators (i.e. counts occasionally exceeded the established cutoffs). Also, in general, the water quality (as judged by these indicators) was relatively poor compared to previous years.

Associations Between Distance from the Drain and Health Outcomes

As a measure of the strength of association, we rely predominantly on the risk ratio (labeled RR in the tables). This ratio expresses the risk (proportion of subjects who report a given symptom) among subjects who swam, for example, in front of the drain (designated 0 yards) versus the risk among subjects who swam 400+ yards from the drain. For the sake of brevity, subjects who swam 400+ yards from the drain are referred to as "controls" since they served as the reference group for all calculations in this section. Ninety-five percent confidence intervals are presented for each RR. For example, in Table 17, the RR for fever is 1.57, suggesting that the risk of fever for subjects swimming at 0 yards (in front of the drain) is 57% higher than the corresponding risk for subjects who swam at 400+ yards from the drain. The interval estimate is 1.17-2.10, which is narrow and the lower bound is above 1.0, indicating the result is informative and statistically significant at alpha = .05. For interested readers, we also present the absolute number of subjects in each comparison group who reported a symptom and the absolute risk in each group, facilitating calculations of excess risk and attributable numbers.

Since the predominant direction of the plumes traveling from the storm drains into the ocean was downcoast, we distinguished distance from the drain by designating upcoast and downcoast distances. Tables 17-21 present risks and RR's for subjects swimming at 0 versus 400+yards, 1-50 yards upcoast versus 400+yards, 51-100 yards

upcoast vs. 400+ yards, 1-50 yards downcoast vs. 400+ yards, and 51-100 yards downcoast vs. 400+ yards, respectively. The effects for 0 yards and the downcoast distances are also summarized in Table 22, and the 0 yards and upcoast distances are summarized in Table 23. Comparing subjects who swam at 0 versus 400+ yards from the drain, we observed statistically significant increases in risk for fever, where the RR=1.57 (95% C.L. = 1.17-2.10), chills RR=1.58 (1.04-2.39), ear discharge RR=2.27 (1.14-4.51), vomiting RR=1.61 (1.01-2.56), coughing with phlegm RR=1.59 (1.10-2.29), HCGI 2 RR=2.11 (1.12-3.97), and SRD RR=1.66 (1.25-2.21). These increases in risk appeared to be limited to the 0 yards distance, since we observed very few significant effects at other distances upcoast or downcoast from the drain, and no significant trends with increasing distance from the drain (data not shown).

As we noted earlier, there were a number of days when the bacterial indicators at 400 yards exceeded the cutoff points, suggesting that this distance was not always a "clean control" area. As we describe in the next section, one of the better indicators for predicting health risks is the total coliforms to fecal coliforms ratio. We conducted a second set of analyses restricted to the days when the total to fecal ratio was greater than 5 for the water samples taken at 400 yards for a given beach (we noted that the enterococci count was always less than 106 during these times). The rationale was to exclude days when the plume from the drain (or some other source of higher counts, such as septic tanks) apparently reached the 400 yard point, making this point less than an ideal "control" zone. The prior expectation was that health risks associated with distance should increase since we "cleaned up" the control area. Results are presented in Tables 24-30. The relative risk point estimates for the seven outcomes found significant above (fever, chills, ear discharge, vomiting, coughing with phlegm, HCGI 2, and SRD) all increased for the 0 yards versus 400+ yards comparison (see Table 24). The interval estimates were wider since the results were based on fewer numbers of subjects. It was also of interest to see if health effects were observed for the other distances of 1-50 and 51-100 yards versus 400+ yards from the drain. A number of higher RR's were observed for the effect of swimming 1-50 yards upcoast, but none reached statistical significance

(Table 25). For subjects at 51-100 yards upcoast versus 400+ yards, significant increases in risk were observed for sore throat RR=1.45 (1.01-2.09) and SRD RR=1.91 (1.16-3.16) (Table 26). Similarly, for swimmers 1-50 yards downcoast, we observed a number of higher risks (Table 27); only the effect of SRD was statistically significant RR=1.77 (1.07-2.95). At 51-100 yards downcoast, significant increases in risk were observed for coughing, coughing with phlegm, nasal congestion, and SRD. Results are summarized in Tables 29 (downcoast) and 30 (upcoast).

Distance Effects Adjusted For Potential Confounders: We then used logistic regression to adjust for potential confounders. The resulting odds ratios provide close approximations to risk ratios and using logistic regression allows for more efficient and complex modeling of associations. Results are presented in Table 31. Adjusting for beach, age, race, gender, SES, California versus out-of-state residents, and worry about potential health hazards at the beach did not change the essential findings, although the associations for vomiting and HCGI 2 were slightly attenuated and no longer significant. It is possible, but, in our opinion, highly unlikely that we have missed a major confounder of the distance effects.

Possible Heterogeneity By Beach and By Age: We hesitate providing results for subgroups since the study was never designed to have sufficient power to detect subgroup differences. With this caveat, we explored possible differences in effects by beach and by age. Results for each beach separately are presented in Tables 32-34. There appear to be some differences in effects by beach, but it is difficult to judge what is real versus what is due to random variation with smaller numbers; the only noteworthy result from a test of heterogeneity was for earache ($p<0.01$). Results for three age categories (0-12, 13-25, 26+) are presented in Tables 35-37. It appears that children and young adults have higher risks associated with distance than older adults for a number of outcomes. In fact, the highest risks were usually noted for subjects aged 13-25 years of age. A heterogeneity test was significant only for SRD ($p=0.05$)

Associations Between Bacterial Indicators and Health Outcomes

We took a number of approaches to analyzing the effects of bacterial indicators. For each indicator, we calculated risk ratios using the higher and lower cutpoints described earlier (e.g. 200 and 400 cfu for fecal coliforms). This ratio expresses the risk of a given outcome among subjects who swam in water where the bacterial indicator was higher than the cutpoint (presumably higher risk) compared to the risk of the same outcome among subjects who swam in water where the same bacterial indicator was below the cutpoint. It was conceivable that we might have failed to detect a real increase in risk with these cutpoints, particularly since they were not based on prior data that were obtained for Santa Monica Bay, so we also calculated odds ratios from categorical models using quintiles (instead of dichotomies, as above), and from continuous models. For the categorical models, the quintile medians, total number of subjects in each quintile, and the number reporting a given symptom in each quintile are provided in the tables. For the continuous linear (on logistic scale) models, odds ratios correspond to a unit increase equal to the difference between the 90th and 10th percentiles (i.e. the difference between the midpoints of the fifth and first quintiles). Results for each bacterial indicator are presented below.

E. coli. Results are presented in Tables 38-42. We observed no effects on risk using the cutpoints of 35 or 70 cfu for any symptom (Tables 38 and 39). We also investigated effects associated with cutpoints of 160 and 320 (Table 40). At the highest cutpoint of 320, associations were observed for earache RR=1.46(1.06-2.00) and nasal congestion RR=1.24(1.00-1.53). Results for the categorical and continuous models are presented in Table 41. No effects were observed for the categorical model (quintiles). With the continuous model, small but significant effects were noted for skin rash, nausea, and stomach pain. These associations were slightly stronger for skin rash and no longer statistically significant for nausea and stomach pain after adjustment for covariates (Table 42).

Enterococcus. Results are presented in Tables 43-46. No increases in risk were detected when 35 cfu was used as the cutpoint (Table 44). When 106 cfu was used as the

cutpoint, significant effects were noted for diarrhea with blood RR=4.23 (1.12-15.91) and HCGI 1 RR=1.44 (1.03-2.03) (Tables 43 and 44). Results from the categorical model suggest positive associations for diarrhea and stomach pain, where the odds ratios for the fifth versus first quintile were 1.31 (1.00-1.72) and 1.31 (1.02-1.68) respectively. In the continuous model, positive associations were noted for fever, skin rash, nausea, diarrhea, stomach pain, coughing, runny nose, and HCGI 1 (Table 45). The categorical findings were substantially weakened, while the continuous results were essentially unchanged after adjustment for covariates (Table 46).

Total Coliforms. Results are presented in Tables 47-50. No significant effects were seen when the cutpoint of 1,000 cfu was used (Table 48). When 10,000 cfu was used as the cutpoint, only skin rash exhibited a positive association RR=3.00 (1.86-4.83) (Tables 47 and 48). Similarly, the categorical model only showed an association with skin rash and the continuous model did not yield any associations (Table 49). Results did not materially change after adjustment for covariates (Table 50).

Fecal Coliforms. Results are presented in Tables 51-54. No significant effects were seen when 200 cfu was used as the cutpoint (Table 52). When 400 cfu was used, only an association with skin rash was evident RR=1.88 (1.21-2.94) (Tables 51 and 52). A similar effect was observed in the categorical model, where the odds ratio for skin rash comparing the fifth to the first quintile was 2.04 (1.09-3.81). In the continuous model, significant effects were observed for fever, skin rash, and HCGI 1. Adjusting for the potential confounders did not change the results except, with the continuous model, nasal congestion was now positively associated with fecal coliforms.

In addition to investigating effects for single indicators, as above, we also assessed the effects of the total coliforms to fecal coliforms ratio and the ratio of total coliforms to enterococcus. Results are summarized below.

Total coliforms to fecal coliforms ratio. As initially suggested by Jack Petralia (Los Angeles County Department of Health Services) we initially used a ratio of 5.0 for the cutpoint, assuming that the risk may be higher when the ratio is smaller than 5.0. When the effects of this ratio were estimated for the entire data set, significant effects

were noted for diarrhea RR=1.28 (1.08--1.51) and HCGI 2 RR=1.87 (1.20-2.90) (Table 55). We then estimated effects of this ratio restricted to subjects in water where the total coliform levels were greater than 5,000 cfu. Significant effects were observed for fever, eye discharge, skin rash, nausea, diarrhea, stomach pain, nasal congestion, HCGI 1, and SRD (Table 56). The significant RR's ranged from 2-7. We then conducted a similar analysis restricted to subjects in water where the total coliform level exceeded 10,000 cfu. Here we observed significant increases in risk for eye discharge, ear discharge, skin rash, nausea, diarrhea, stomach pain, nasal congestion, HCGI 1, and HCGI 2 (Table 57). The significant RR's ranged from 2-39. Results for all three analyses (the entire data set, counts > 5,000 cfu, counts > 10,000 cfu) are summarized in Table 58. It is noteworthy that all the effects noted above became consistently stronger as the analyses were increasingly restricted to occasions with higher total counts.

Since this ratio appeared to be informative (using 5.0 as a cutpoint), we decided to explore a range of cutpoints (2, 4, 6, 8) to see which cutpoint yielded the strongest associations (Table 59a for all the data, 59b restricted to times when the total coliforms exceeded 1,000 cfu and Table 59c for occasions when the total coliforms were greater than 5,000. When the ratio cutpoints were analyzed for all days, diarrhea and diarrhea with blood were associated with the ratio at some cutpoints but no consistent patterns across cutpoints was evident. In contrast, when analysis was restricted to times when the total coliforms exceeded 5,000 cfu, there was a strong and consistent pattern of increasing RR's as the ratio decreased, with the strongest effects observed using a cutpoint of 2.0. When the analysis was restricted to times when the total coliforms exceeded 1,000 cfu, the pattern was not as strong or consistent, although most effects were again strongest using the cutpoint of 2.0.

Results for the categorical and continuous models are presented in Table 60 (note: this analysis included the entire data set). The categorical model indicated a positive association with diarrhea, coughing and coughing with phlegm and the continuous model yielded associations with diarrhea, stomach pain, cough, coughing with phlegm, and sore throat. Results were, in general, slightly weaker when adjusted for covariates (Table 61)

and statistical significance remained only for cough and cough with phlegm; nevertheless, for the associations with diarrhea, stomach pain, and sore throat from the continuous model, adjusting for covariates only shifted the lower 95% C.I. bound from 1.00 to 0.98 or 0.97.

Total coliforms to enterococci ratio. Accepted cutpoints are not available for this ratio, so the analysis explored a range of cutpoints (4, 7, 10, 13), in addition to categorical and continuous models. Results for the range of cutpoints are presented in Table 62. Diarrhea was associated with this ratio at all cutpoints with an odds ratio of 1.4-1.5. In general, the highest cutpoint of 13 yielded the greatest number of significant associations (fever, nausea, diarrhea, and stomach pain were associated with this ratio when 13 was used as the cutpoint). In the categorical model, the ratio was associated with increases in risk for nausea, diarrhea, and HCGI 1 (Table 63). In the continuous model, no effects were noted. Results were slightly weaker for nausea and HCGI-2 and essentially unchanged for diarrhea and HCGI-1 after adjustment for covariates (Table 64).

Results of Multivariate Modeling With Both Distance and Bacterial Indicators

To further assess the associations for distance and bacterial indicators, these exposures were simultaneously included in logistic regression models. Hence, in these models, distance was adjusted for the bacterial indicator and vice-versa. When modeling the potential associations with distance from the drain, including *E. coli*, enterococcus, total coliform, or fecal coliform one-at-a-time as covariates generally did not alter the findings presented here; the only differences were that earache now appeared positively associated with enterococcus (adjusted OR=1.51, 95% CI=1.0-2.28) and with fecal coliform (adjusted OR=1.61, 95% CI=1.06-2.44) comparing the highest to lowest quintile and that the total coliform-skin rash association was slightly weakened. A model that included both distance and all indicators together did not materially alter our general findings.

To investigate further the potential associations for distance and bacterial measures, we modeled the interactions between these exposures using logistic regression. In particular, we looked at the interaction between swimming (at zero or four-hundred yards from the drain) and swimming when the bacterial level was above or below the highest cutpoints used here. For example, for fecal coliform, we compared the risk for those swimming at the storm drain when fecal coliform > 400 cfu versus the risk for those swimming at 400+ yards when fecal coliform <= 400 cfu (i.e., the referent group). In addition, we compared the risk from swimming at 400+ yards when fecal coliform > 400 cfu and the risk from swimming at the storm drain when fecal coliform <= 400 cfu to the risk for those swimming at 400+ yards when fecal coliform <= 400 cfu. This type of modeling helps distinguish whether a combination of exposures (e.g., swimming at the storm drain and swimming on high count days) increases one's risk over the exposures alone. Based on these models, we observed the following noteworthy results (i.e. a pattern of increased risk associated with both high bacterial counts and distance in front of the drain). In comparison with swimming at 400+ yards when *E. coli* <= 70 cfu, the relative risk of vomiting for swimming at 400+ yards when *E. coli* > 70 cfu was 0.63 (95% CI=0.19-2.05), for swimming at the storm drain when *E. coli* <= 70 cfu was 1.26 (95% CI-0.65-2.47), and for swimming at the storm drain when *E. coli* >70 cfu was 2.11 (95% CI=1.14-3.89). The relative risk of HCGI 2 for swimming at 400+ yards when *E. coli* > 70 cfu was 0.74 (95% CI=0.38-1.44), for swimming at the storm drain when *E. coli* <= 70 cfu was 1.65 (95% CI=0.70-3.90), and for swimming at the storm drain when *E. coli* > 70 cfu was 2.45 (95% CI1.08-5.57), again in comparison with swimming at 400+ yards when *E. coli* <= 70 cfu. Finally, the relative risk of HCGI 2 for swimming at 400+ yards when enterococcus > 106 cfu was 6.34 (95% CI=0.81-49.36), for swimming at the storm drain when enterococcus <= 106 cfu was 1.71 (95% CI=0.76-3.87), and for swimming at the storm drain when enterococcus > 106 cfu was 4.68 (95% CI=1.97-11.10), in comparison with swimming at 400+ yards when enterococci <=106 cfu. Note that the interaction model for distance and total coliform did not converge.

Summary of Bacteriological Results

Tables 65-70 summarize the noteworthy distance and bacterial indicator results presented above. For each association, the relative risk and attributable number are presented. The attributable number is an estimate of the number of new occurrences of the specified outcome that are attributable to the exposure of interest. For example, based on the results from this study, the first row of table 65 indicates that approximately 259 new cases of fever will occur for every 10,000 people who swim at the drain instead of 400 yards (or more) away from the drain. These values are estimated as:

Attributable number = A * (RR-1) / RR,

where A = the number of exposed and diseased subjects, and RR = the risk ratio. The attributable numbers have an important public health interpretation: they provide an estimate of the maximum number of potential cases that could be prevented (based on the specific point estimate and assuming a causal effect) if the exposure was completely eliminated. The attributable numbers per 10,000 subjects exposed ranged into the 100's for a number of exposures. At meetings organized by the SMBRP prior to the start of the study (and attended by senior scientists who were to direct the study, SMBRP staff and technical advisors, and public health practitioners from the L.A. County Department of Health Services), an excess risk of 1 case per 100 exposed subjects was identified by verbal consensus as a "noteworthy" risk. The attributable number corresponds to this excess risk and any number above 100/10,000 represents an excess risk greater than 1/100. For bathing at the drain versus 400+ yards, attributable numbers for fever (259), chills (138), vomiting (115), coughing with phlegm (175) and SRD (303) all exceeded 100 cases/10,000 exposed. For bacterial indicators, when the entire data set was analyzed (Table 66), attributable numbers exceeded 100 cases/10,000 exposed for HCGI1 (130 for enterococcus), skin rash (165 for total coliforms), diarrhea (277 for the total to fecal ratio), nausea (147 for the total to enterococcus ratio), diarrhea (262 for the total to enterococcus ratio, and HCGI1 (111 for the total to enterococcus ratio). The attributable numbers from the continuous models were much smaller because the odds ratios from these models were relatively weak (Table 67). Table 68 presents attributable numbers for

the range of cutpoints (2, 3, 4, 5, 8) for the ratio of total to fecal coliforms for the entire data set. Diarrhea was most often associated with higher attributable numbers, but there was no consistent pattern across the range of cutpoints. When a similar analysis was done, but restricted to occasions when the total coliforms exceeded 1,000 cfu (Table 69B), the highest attributable numbers were generally associated with the cutpoint of 2.0. Many of these numbers were in the range of 100-400 cases per 10,000 exposed subjects. When this analysis was restricted to days when the total coliforms were greater than 5,000 cfu, there was a consistent pattern of higher attributable numbers associated with lower cutpoints. At the cutpoint of 2, attributable numbers ranged into the mid- and high 100's of cases per 10,000 exposed subjects for a number of outcomes. Finally, Table 70 presents a similar analysis for a range of cutpoints for the ratios of total coliforms to enterococcus. Diarrhea had the higher attributable numbers across all cutpoints (around 200 cases/10,000 exposed). Higher attributable numbers were associated with the highest cutpoint of 13.

Results of Virus Sampling Procedures

Results of the virus sampling procedures are presented in Tables 71 and 72. The percentage recovery from the seed experiments was quite high. Enteric viruses were detected on 8/11, 8/26, 9/3, 9/9, 9/10, 9/16 for Ashland; 7/21, 7/28, 8/25, 8/26, 9/9, 9/10, and 9/16 for Malibu, and 7/7, 7/18, 7/28, and 8/4 for Santa Monica Canyon. This number of positive samples did not enable us to conduct many analyses; however, we were able to compare the frequency of outcomes reported by subjects who were swimming within 50 yards of the drain on days when samples were tested for viruses and found to be negative versus days when the samples were positive for viruses. Results are presented in Table 73. Although based on small numbers, a number of outcomes were reported more often on days when the samples were positive for viruses, including fever (RR=1.53, 95% CI 0.97-2.42, p-value 0.07); vomiting (RR=1.89, 0.94-3.78), HCGI-1 (RR=1.74, 0.99-3.06) and HCGI-2 (RR=2.26, 0.91-5.60).

In Table 74, we present results for the virus analysis, adjusted for covariates. Results remained essentially unchanged. Finally, we also adjusted these results further

by including the bacterial indicators, one at a time, into the model (results not shown). These last series of adjustments made essentially no difference in the results (e.g. for fever, the crude RR=1.53 p=0.07, adjusted for covariates RR=1.56 p=0.06, adjusted for covariates plus fecal coliforms RR=1.57 p=0.06, covariates plus *E. coli* RR=1.58 p=0.06, covariates plus total coliforms RR=1.56 p=0.06, and covariates plus enterococcus RR=1.57 p=0.06).

Research with gene probes is ongoing and will be presented in an addendum to this report sometime in the near future (the lab conducting this work hopes to complete the assays by Spring, 1996).

IV. DISCUSSION

The following circumstances provided the motivation to conduct an epidemiological study of the possible acute health effects of swimming in Santa Monica Bay: A) the beaches are heavily populated in the summer months, B) there is a measurable volume of discharge into the bay from storm drains even in the summer months when there is little rainfall, C) there are numerous days with high levels of bacterial indicators, D) pathogenic human enteric viruses have been isolated from storm drain effluent even when bacterial indicator counts are low, and, E) anecdotal reports raised concern about adverse health effects of swimming in the bay. Based on numerous meetings and extensive peer review, the Santa Monica Bay Restoration Project decided that an epidemiological study of subjects swimming at selected beaches in Santa Monica Bay was the most direct and relevant means of addressing the question of possible adverse health effects.

The initial goal, as stated in the approved protocol, was to recruit 9000 subjects. Through refining our office and field techniques, we were able to complete interviews on 11,793 subjects who remained eligible throughout the follow-up phase of the study while completing the study at least $100,000 below the projected budget. Of the 22,085 subjects approached on the beach, only 1761 refused to participate, for a response rate on initial contact of 92%. Also, of the 15,492 eligible subjects interviewed on the beach, we

were able to contact by telephone and interview 13,278 (86% follow-up). The potential for selection biases would seem to be minimal, given the high response rates. It is also worth noting that the proportions and reasons for ineligibility or loss to follow-up were similar by beach.

The three beach sites where the study was conducted, Surfrider/Malibu, Will Rogers/Santa Monica Canyon, and Santa Monica/Ashland Avenue, were selected because prior data indicated they were heavily populated and experienced a wide range of indicator counts in the past. Throughout the summer, we encountered the size of crowds we expected at Malibu and Ashland Avenue. Work at Will Rogers by the Los Angeles County Department of Public Works throughout much of the summer substantially diminished the crowds at this beach. Our prior expectation of a wide range of indicator counts was realized throughout the summer of this study. We also observed a high degree of variability from day to day, and a substantial proportion of days when levels exceeded generally established cutpoints, particularly for samples taken at the drain. Malibu and Will Rogers exceeded cutpoints more often than Ashland Avenue; in fact, the lower standard cutpoints were exceeded the majority of the time for most of the bacterial indicators at Malibu and Will Rogers. Counts were generally highest at the drain and then diminished as distance from the drain increased. Of note, however, is that the counts for water samples taken at 400 yards sometimes exceeded cutpoints at all three beaches, suggesting this distance did not always represent a "clean control area".

We operationalized the issue of health effects from swimming in Santa Monica Bay into two research questions. 1) What are the relative risks of specific health outcomes among subjects bathing at 0, 1-50, and 51-100 yards of a storm drain compared to subjects bathing at the same beach but beyond 400 yards from a drain? We reasoned that if pathogens were coming from a storm drain and causing symptoms in swimmers, the risk of these specific symptoms should be higher in subjects who swim closer to the drain. 2) Are the risks of specific outcomes associated with levels of indicator organisms (as they are commonly monitored by departments of public health). This second question is motivated primarily by policy considerations, so we wanted to test the predictive value

of feasible, common monitoring practices. Results addressing each question are discussed below.

Associations between distance and health outcomes.

We observed differences in risk when we compared subjects swimming at 0 yards (meaning where the drain enters the bay) versus subjects swimming at 400+ yards. Significant increases in risk were noted for the single symptoms of fever, chills, ear discharge, vomiting, and coughing with phlegm, and the composite variables of HCGI 2 and SRD. Most of the risk ratios ranged from 1.5-2.0, suggesting a 50-100% increase in risk. The strongest effects were for ear discharge and HCGI 2. Very few increases in risk were observed for subjects swimming at 1-50 or 51-100 yards from the drain compared to subjects swimming at 400+ yards. This was an unexpected result. We are aware of at least two alternative explanations. One is that the risk is actually limited to subjects swimming in front of the drain, possibly because the level of pathogens at greater distances from the drain was quickly diluted below an infectious dose. This seems implausible since the plume clearly traveled beyond this point and high bacterial counts were noted at 1-50 and 51-100 yards (and some of these bacterial indicators were associated with increased risk of disease). Another explanation is that the risk is highest at 0 yards, but there may also be an elevated but smaller risk at 1-50 or 51-100 yards, which we were unable to detect because the reference group (subjects at 400+ yards) was occasionally exposed to water with high bacterial counts. To address this possibility, we analyzed a subset of the data restricted to days and beaches where the total:fecal ratio for the water sample taken at 400 yards was greater than 5.0. We chose this ratio because it was associated with adverse health effects (see below). This reanalysis yielded stronger relative risks when comparing subjects at 0 versus 400+ yards (compared to the original analysis of the entire unrestricted data set) and we also observed some increases in risk at 1-50 and 51-100 yards. This suggests that risk may not be limited to the 0 yards distance, and argues against a standard that discourages swimming only at the mouth of the drain (although the risks are clearly higher there).

The results regarding distance were not changed when we controlled for potential confounders, and are very unlikely to be due to confounding. The concern with confounding has been raised previously (Saliba 1990, Fleischer 1993, Kay 1994,), but it dealt with a different study design, sometimes referred to as the "Cabelli-type" study. In this design, risks in swimmers are compared to risks in non-swimmers. The problem with that design is that swimmers and non-swimmers are self-selected and may differ with respect to background risks since there are presumably many other exposures/pathways that can produce the symptoms under investigation. Some of these are unknown or difficult to quantify, so doubt remains, even after adjustment for the known and measured potential confounders, that the swimmers and non-swimmers are actually comparable. We implemented a design that should have substantially reduced the potential for confounding by restricting it entirely to swimmers (who immersed their heads in the water) and making comparisons between groups of swimmers (defined, for example, by distance from the drain) to estimate risk ratios. A priori, we believed that the background risk of subjects swimming closer to a drain should not be materially different from the background risk of subjects swimming farther away (they are all self-selected swimmers). When we compared a number of characteristics between subjects at different distances, the only variables that were differentially distributed by distance were age and ethnicity. Younger subjects and Latino/a subjects tended to swim closer to the drains. These variables, however, were not independent risk factors for the outcomes. When we controlled for these, as well as other covariates, there was no evidence of confounding.

We limited analyses of subgroups for three reasons: 1) the study was never designed to detect subgroup differences with reasonable power; 2) there were few reasons, a priori, to expect differences in effects between subgroups defined by most variables (e.g. gender, California resident, ethnicity, etc); and 3) policies that may emerge from this work would most likely have to apply to the "general population" and not to specific subgroups (it would seem implausible to establish one policy for one subgroup of the population defined, for example, by age, race, gender, and SES, and other policies for other subgroups). Based on discussions with interested parties, we agreed to explore

differences by beach and by age of the subjects. There appeared to be some differences when we stratified by beach; however, it is difficult to judge whether these are real differences or simply the result of random variation with smaller sample sizes per subgroup. When we stratified by age into three categories (0-12, 13-25, >25), the increased health risks observed earlier appeared to be stronger for children and adults less than 25. In fact, the strongest associations were usually evident in the 13-25 year age group. We presume this is due mostly to their increased activity (and hence exposure) in the water, which we did not attempt to quantify, and less so to any increased susceptibility for a given dose of exposure.

We decided not to restrict recruitment to one subject per family for two reasons. 1) It would have been impossible to achieve the sample size we needed. As it was, we approached every single potentially eligible subject throughout the study period to achieve our sample size. 2) We believed it would have been very difficult to only select and recruit one subject per family and explain this to the satisfaction of the family. Given the strong reasons for accepting other family members, we decided to proceed with this plan since we believe the effects on our results and conclusions are trivial. When we consider the effects of possible intra-familial transmission, the following distinction is helpful. If a case of illness was caused by swimming at a study beach and that case infects other family members and results in illness, all of these cases are rightly attributed to the swimming related exposure. On the other hand, if a case of illness was caused by some other exposure and this case transmitted the infection to other cases in the family during the follow-up period for that family, these cases should not be (and are not) attributed to the swimming exposure. Families such as these should be distributed similarly by distance from the drain and by levels of indicator counts and are reflected in the background rates. To the extent this happened, it would reduce our power only. Nevertheless, to further address this issue, we included a family variable as a covariate (controlling for it in the logistic models did not change any of the results) and stratified the results by this variable to look for heterogeneity (and similar effects were noted in the stratum comprised of single subjects and the stratum comprised of subjects from families

where more than one subject per family was included). We have added results and text to the Results and Discussion sections to address this issue.

Associations between bacterial indicators and health outcomes.

In general, when we estimated risk ratios using the established cutpoints, there were very few positive associations with any single indicator. There were none for *E. coli* at the lower cutpoints of 35 and 70 cfu. At the highest cutpoint of 320 cfu, earache and nasal congestion were weakly associated with *E. coli*. Only skin rash was associated with total and fecal coliforms at the higher cutpoints of 10,000 cfu and 400 cfu, respectively. Enterococci were positively associated with diarrhea with blood and HCGI 1 at the higher cutpoint of 106 cfu. The risk of diarrhea with blood was four times higher, but this estimate was based on very few cases. There was about a 40-50% increase in risk of HCGI, consistent with previous results by Cabelli (1982) and Genthe (preprint).

We recognize that these cutpoints do not have a strong scientific basis, particularly when applied to West Coast beaches with heavy urban runoff such as Santa Monica Bay, so we also investigated possible effects of the bacterial indicators with the use of categorical models (where quintiles were assessed) and continuous models. For the most part, the categorical models yielded results similar to the dichotomous results described above. The continuous models generally yielded more positive associations, particularly for enterococci. No additional associations were detected for total coliforms; fever, skin rash, and HCGI 1 were associated with fecal coliforms; skin rash, nausea, and stomach pain were associated with *E. coli*. Continuous results for enterococci indicate positive associations with fever, skin rash, nausea, diarrhea, stomach pain, coughing, runny nose, and HCGI 1.

In addition to evaluating single indicators, associations with the total coliform to fecal coliform ratio and the total coliform to enterococci ratio were investigated. For the total:entero ratio, the categorical model indicated inverse associations with nausea, diarrhea, and HCGI 1. This ratio was not more predictive of health risks than the continuous model for enterococci alone. In contrast, the ratio of total to fecal coliforms proved to be quite informative. There were two components to the rationale for this

analysis. First, as the level of fecal coliforms increased relative to total coliforms (i.e. the ratio was low), concern increased that there was substantial fecal contamination of the storm drain, possibly increasing risk of adverse health effects. Second, the effect of this lower ratio should be stronger when there was a higher degree of contamination, indicated by total coliform counts in excess of 1,000, 5,000 or 10,000 cfu. The results were consistent with this rationale. Using a ratio of 5.0 as the cutpoint, diarrhea and HCGI 2 were associated with a lower ratio when all the data were analyzed, regardless of the absolute level of total coliforms. When this analysis was restricted to subjects in water where the total coliforms exceeded 5,000 cfu, significantly higher risks were detected for nine different outcomes. Further, when this analysis was restricted to subjects in water where the total coliforms exceeded 10,000 cfu, the risk ratios for these nine outcomes all increased again (with the absolute risk in the exposed group reaching 14-19% for each symptom). Although the number of subjects became small in some subgroups, the strong consistency of the results across the increasing levels of total coliforms is persuasive that the associations are probably real. Which cutpoint (for the ratio) is associated most consistently with risk is an important question. When a range of cutpoints (2, 3, 4, 5, 6, 8) was analyzed using the entire data set, no consistent pattern emerged. This is not entirely surprising since an analysis of all data points treats all ratios of similar numerical value equally, even though a ratio of 5 when the total coliforms are very low may not increase risk (although the same ratio of 5 may be associated with increased risks when the density of total coliforms is high (say, above 1,000 or 5,000 cfu). When this type of analysis was restricted to days when the total coliform densities were high (above 1,000 cfu and particularly above 5,000) a consistent pattern emerged, with higher risks and attributable numbers associated with low ratios.

For reasons developed in the previous section on distance effects, it is very unlikely that the bacterial indicator associations observed in this study are confounded to any substantial degree. It is highly unlikely that the background risks are different for subjects exposed to higher or lower levels of a given indicator level, which were unknown to the subjects, particularly if one stratifies by distance.

It is worth considering which bacterial indicators are the most useful. This will depend, of course, on criteria used to define "usefulness". It would seem that the magnitude of the attributable numbers and the frequency that selected cutpoints are exceeded may be useful components of any set of criteria. From Tables 66 and 67, when all data are considered together no single indicator (or ratio of indicators) stood out as having the highest attributable numbers. Enterococci (at levels above 106 cfu) were associated with an attributable number of 130 cases of HCGI 1 per 10,000 exposed subjects; total coliforms (at levels above 10,000 cfu) were associated with an attributable number of 165 cases of skin rash; the ratio of total to fecal coliforms had an attributable number of 277 cases of diarrhea; and the ratio of total coliforms to enterococci had attributable numbers of 147 and 262 for nausea and diarrhea, respectively. From the continuous models, enterococci had the greater number of associations but the effects (estimated by odds ratios) and the attributable numbers were small. The largest attributable numbers were observed for the total to fecal coliforms ratio when the analyses were restricted to subjects in water where the total coliforms exceeded 5,000 cfu. The attributable numbers increased very consistently as the ratio decreased from 8 to 6 to 5 to 4 to 2. However, these stronger effects would be limited to a smaller proportion of the beach going population (those swimming in water where the total coliforms exceeded 5,000 cfu). It is also worth noting (from Table 65) that the effect of swimming at the drain (0 yards) versus 400+ yards from the drain was associated with relatively large attributable numbers (e.g. 303/10,000 exposed subjects for SRD, 115 for vomiting, 175 coughing with phlegm).

We very briefly review results of other studies to lend a broader context to our results, although we point out that results of other studies may not be relevant to the situation in Santa Monica Bay and different designs were employed in these other studies.

The question of whether acute infectious disease can be acquired through bathing in marine water contaminated with sewage has been the subject of several large epidemiological studies conducted throughout the world. The most consistent finding of

these studies is that bathers, defined as those that immerse their heads in water while swimming, are at a higher risk of contracting gastrointestinal (GI) disease than those who do not immerse their heads, the non-bathers. However, this has not always been observed. Another aspect of these studies has been to investigate whether elevated counts of certain bacterial indicators commonly found in sewage contaminated water are predictive of disease, even though the bacteria themselves may not be pathogenic. To date, the reported results trying to associate elevated indicator counts with health outcomes have been inconsistent.

Cabelli (1979) was the first investigator to demonstrate an association between water quality at ocean beaches and health outcomes. He conducted a large, prospective cohort study of 8,000 subjects sponsored by the EPA that has subsequently become a classic study of health outcomes and marine water quality. The study compared symptom rates among bathers and non-bathers at two beaches that had been classified as relatively unspoiled (RU) and barely acceptable (BA) using coliform counts as the indicators to make this determination. Family groups were interviewed on the beach to document bathing behavior and again by phone 8-10 days later to assess the development of GI and respiratory symptoms. Water sampling for bacterial indicators (total and fecal coliforms, *E. coli*, Enterobacter, Enterococcus, Klebsiella and P. aeruginosa) was done concurrently at the two beaches. The BA beach not only reported higher symptom rates than the RU beach but also mean levels of the bacterial indicators were significantly higher than at the RU beach. A noteworthy result of this study was that measurable health effects occurred at both marine beaches within guidelines (total and fecal coliforms standards) developed for fresh water beaches.

Cabelli (1982) next used the results of a large prospective cohort study to develop a linear regression model for the relationship between mean enterococci density and gastroenteritis among bathers. Almost 26,000 subjects were identified on weekends over a six year period in three locations: two ocean beaches (New York and Boston), and one brackish/fresh water lake (Louisiana). Exposure status (bathers were defined in Cabelli's study as having the head immersed underwater, non-bathers included waders and those

who stayed out of the water) was determined by interview on each study day. Individuals who swam immediately prior to or after the weekend under study were excluded from the analysis. Incidence of gastroenteritis was obtained by telephone interview 8-10 days later; subjects did not make use of a toll-free number or local clinic for medical advice/diagnosis. Enterococci densities were determined for each study day. Based upon the results of the regression analysis, the authors concluded that bathing in water containing as little as 10 enterococci/100 ml of sample represented an absolute risk of GI illness of 10 per 1000 bathers and a relative risk of 2.0 comparing bathers and non-bathers.

Current EPA criteria concerning the sanitary quality of marine waters are based upon these results (Cabelli, 1984; Cabelli, 1989). Several criticisms have been leveled against the 1982 study (Fleisher, 1991): (1) Results were pooled for marine and estuarine water locations, despite the fact that survival of pathogenic organisms may be inversely correlated with salinity (Dufour, 1984); (2) Results from several beach locations were combined without considering local differences in marine flora, sewage outflow, immunity/demographic characteristics of subjects, beach contour and sediment/turbidity characteristics. Fleisher's analysis of Cabelli's data showed significant variation in the mathematical relationship between indicator levels and disease outcome among the beaches studied: in addition, a surprisingly poor fit for HCGI relative to total GI symptoms in the linear regression model led Fleisher to fit an alternative (logistic) model to the data -- one with more "biological support" -- choosing covariates "not based solely on statistical considerations but rather on hypotheses generated by previous epidemiologic studies" (Fleisher, 1991, p. 262). From this reanalysis, Fleisher concluded that "not only the magnitude...but the existence of any relationship between enterococci density and gastroenteritis may be site specific" (Fleisher, 1991, p. 263). (3) Cabelli had speculated earlier (1979) that the primary disease outcome -- an acute, relatively mild gastroenteritis which had a short incubation period and duration -- was most compatible with exposure to human rotaviruses or Norwalk-like viruses, so that estimates of water

quality based upon proxy measures might be subject to considerable error (further discussed below).

The Cabelli-EPA study design has been endorsed by the World Health Organization and the United Nations environment program. "Cabelli-style" ocean studies have been carried out at a number of locations throughout the world. Most report higher morbidity among bathers (head immersed in water) as compared to non-bathers for gastrointestinal illness, eye and ear infections. Correlations with indicator organisms however are inconsistent (for review, see Saliba 1990). In Hong Kong (Cheung, 1990), Staphylococci levels were correlated with ear, respiratory, and total illness, while *E. coli* was found to be the best predictor of gastroenteritis. In South Africa (von Schirnding, 1992), bathers and non-bathers were compared for incidence of gastro-intestinal, respiratory, and skin symptoms at two beaches, one with high levels of indicators (enterococcus and coliforms) and the other relatively clean: symptom rates were higher for swimmers at the polluted beach, but "were not statistically significant." In the United Kingdom (Balarajan, 1991), enterococcus and coliform levels "varied appreciably" and could not be correlated with illness; overall, a relative risk of 1.31 (95% confidence interval 1.04 to 1.64) was obtained for occurrence of at least one symptom (GI, respiratory, other) in bathers compared to non-bathers after controlling for age and sex. Genthe (19..) reported that enterococcus was the most predictive of gastroenteritis, although fecal coliforms were also significantly associated with risk. Staphylococcus was not associated with risk. Several investigators have recently suggested that these studies may underestimate the true risk: (1) Non-differential measurement error in estimated organism densities could result in a 30 to 57% underestimate of true risk (Fleisher, 1990). Both the MPN and MF methods of enumerating coliforms are imprecise; Fleisher points out that none of the studies cited above made use of replicate determinations on individual samples, nor did they consider diurnal and other variations which may occur in bacterial indicator levels, particularly at marine locations. (2) Bacterial indicators do not reflect the occurrence of enteroviruses in marine waters, which are likely to be the true pathogen of interest (Gerba, 1979), nor do they reflect levels of Vibrio spp., marine

pathogens recently linked to a variety of human health outcomes including necrotizing wound infections (Howard, 1988) (3) These studies attempted to gain power by including subjects from a variety of locations without accounting for variations between beaches. Smaller studies focussing on subgroups (such as snorkelers, windsurfers, and bathers) within a given location have reported a more pronounced effect (Dewailly, 1986; Philipp, 1985; Deitmer, 1990); for example, Dewailly reported a relative risk of 5.5 for symptoms of gastroenteritis among windsurfers at a specific estuarine location.

Using a Cabelli-like approach the New Jersey Department of Health commissioned a large prospective cohort study in the late 1980's to investigate water quality and health outcomes after swimming in fresh and ocean water in that state. 16,089 subjects were recruited from nine ocean and two lake beaches. Again, bathers and non-bathers were identified, interviewed on the beach and telephoned up to 10 days later to ascertain the development of symptoms. Water sampling for bacterial indicators, total and fecal coliforms, enterococcus, C. Perfringens as well as F2 male-specific bacteriophage (developed by Cabelli et al to estimate levels of viral pathogens) was concurrently done. Bathers at all beaches had higher symptom rates than non-bathers (an excess of 12.1 cases per 1000 subjects was reported) even though illness could not be correlated with any elevation of any of the bacterial indicators. However, these findings are not surprising since none of the beaches were located near any areas of heavy urban run-off. The water tested was "generally of high quality"[3] leading the authors to conclude that the observed health effects were "the natural consequences of bathing, not the result of contaminated water".

A number of concerns have been raised about the New Jersey study. (See our original proposal for a detailed description - available from the Santa Monica Bay Restoration Project). Some of the concerns were: (1) The study had little power to detect an association between health effects and sewage contamination. None of the beaches studied were located near heavy urban runoff areas, so that the water tested was "generally of high quality" at all beaches. Little variability in indicator levels was observed between sampling sites, so that the effect of a range of indicators (either within

or across beaches) was not assessed. Water samples were collected only at chest depth and not ankle depth; children (at increased risk for symptoms in most studies when compared with adults) wade, play and swim in the near shore areas where their activities and wave action may disturb sediments, releasing absorbed bacteria and virus into the water. (2) The conclusions rely heavily on p-values. Measures of effect, such as risk ratios with confidence intervals, were not calculated. (3) The issue of residual confounding was not addressed; confounding may be due to lack of comparability of exposed and unexposed groups.

Finally, it should be noted that Cabelli-like studies are not the only kind that have been used to investigate health outcomes after immersion in marine water contaminated by sewage. Fleisher, (1993) using a randomized intervention and follow-up design, conducted the first epidemiological study that related indicator organism density to an individual bather. In 1989 and 1990, he recruited 484 subjects from various locations in the United Kingdom. Subjects were given an interview, a physical exam to exclude ongoing illness and then randomly assigned to a bather or non-bather group. On the day of the trial non-bathers were assigned to a roped off beach area while bathers were carefully monitored. Water sampling for elevated bacterial indicators, total and fecal Coliforms as well as enterococcus (in his papers, Fleisher uses the older nomenclature for enterococcus, Streptococcus faecalis) was done at the actual time bathers were in the water. Food consumption habits at the time of the trial were also monitored in order to exclude food-borne illness as a confounder. After the trial, follow-up for GI disease was done through either an interview or a mailed questionnaire. Results showed that only enterococcus cultured from water samples taken from the surface at chest depth was predictive for development of GI symptoms. Fleisher continued the randomized intervention and follow-up studies with more detailed follow-up exams after bathing (1993), the results of which still support enterococcus as the best predictor of GI disease.

As was mentioned, the study design employed here is different in fundamental ways from the study designs commonly employed by other investigators. The major difference between the design used here and the Cabelli-type study design is that all of

our analyses were between different groups of swimmers whereas studies employing the Cabelli-type design compare risks between swimmers and non-swimmers. A major challenge with the Cabelli-type design is to ensure comparability between swimmers and non-swimmers. For example, in one of Cabelli's studies, there was an anomalous finding among children of a significantly higher rate of gastrointestinal symptoms for nonbathers relative to bathers at the unpolluted beach, suggesting that the two groups were not comparable. Perhaps parents tended to keep children out of the water who were feeling ill or incubating gastrointestinal illnesses. Differences between persons who choose to bathe and those who do not are difficult to measure and account for in the analysis of such studies (Saliba, 1990). The Cabelli-type design is similar to the one used here in that it is an observational cohort study and it relies on measurements of bacterial indicators that are feasible on a large scale and are similar to those that are commonly practiced by various health agencies. Fleischer (1993) and Kay (1994) have raised additional concerns with this type of study. The major concern deals with measurement errors and misclassification of exposure status due to "failure to control for the substantial amount of temporal and spatial variation in indicator organism densities shown to occur within just a few hours at marine water bathing locations" and the fact that "the microbiological quality of water was not assigned to each bather at the time and place of bathing".

To address the concerns with confounding and misclassification of exposure status, Fleischer and Kay used a very different design. Instead of an observational study, they used a randomized trial wherein subjects were randomly assigned to bathing and non-bathing groups and numerous water samples were taken every half-hour over the exposure period every 20 meters and at three depths (at surf, mid, and chest depths). In principle, if the trial is large enough, randomization should generate a balance between comparison groups ("exposed" and "unexposed") with respect to the distribution of other risk factors for the health outcomes under study. Also, as they argue, the water testing protocol should reduce misclassification of exposure status for individual subjects.

As we see it, with respect to measurement of bacterial indicators, the two approaches are addressing slightly different questions and may be seen, at some level, as complementing each other. The approach taken by Fleischer aims at estimating a more accurate dose-response relationship for indicator counts as they pertain to individuals by reducing misclassification of exposure for individual subjects as it pertains to this objective. This generates interesting, useful data and may detect associations missed by a Cabelli-type approach, but it is also a step further removed from helping to set policy based on bacterial indicators. Given a predictive result generated from this more intense sampling scheme, the policy implication for where, when, and what to monitor for is not obvious, given limited resources of the agencies responsible for monitoring. For example, Kay (1994) suggests that, based on their results, enterococci should replace coliforms as the basis for setting standards and that adverse health effects were identified when concentrations exceeded 32 per 100 ml. It is not so obvious where and when one should monitor for enterococci. Clearly the intense protocol used in the trial is not feasible. If one does less (read less accurate in terms of assessing exposure for a given subject) monitoring, the nature of the dose-response curve probably changes since "dose" is being measured differently. A level of 32 per 100 ml may no longer be associated with the same risk as in the trial. The approach taken by Cabelli addresses more directly the question of whether bacterial indicators, as they are commonly measured by health departments, do in fact predict risk of adverse health effects. If the results of such a study are negative, as they have been in a number of studies with respect to specific indicators, the only appropriate conclusion is that these indicators, **as measured**, do not predict risk. Left unanswered is whether different, perhaps more intense, sampling and measurement protocols would yield different results. If the results are positive, the connection to a monitoring policy is more obvious since the sampling scheme employed in the study is close to the usual monitoring protocol.

Since there is no perfect design for all scientific and policy purposes, we settled on an observational design that would minimize the potential for confounding, which we viewed as a major lingering concern with previous studies. We had doubts about the

feasibility and ethics of trying to conduct a randomized trial given the "charged" nature of the debate regarding Santa Monica Bay. Given the observational design, we chose to focus on two questions (Is distance associated with risk of adverse health outcomes? Do bacterial indicators, as they are commonly monitored, predict risk of adverse health outcomes?) that were primarily motivated by policy considerations.

Aside from the emphasis on distance and bacterial indicators, this is the first large scale study of which we are aware that also included measurements of viruses. The standard method, which appeared to be running very well, as judged in part by the excellent recovery rates, detected virus on a number of occasions. Only limited statistical analysis was possible. It was of interest that a number of adverse health effects were reported more often on days when the samples were positive, suggesting assays for viruses may be informative for predicting risk. The research involving gene probes is ongoing. We hope to include the results as an addendum to this report. Cabelli (1982) and Kay (1994) both mention that Norwalk-like viruses are a plausible cause of gastroenteritis. Enteroviruses, the commonest viruses in sewage effluent, can cause respiratory symptoms. As pointed out by Walker (1992), testing for viruses is potentially important. Not only are viruses potentially responsible for many of the symptoms associated with swimming in ocean water but they decay at a slower rate in sea water than bacteria and they can cause infection at a much lower dose.

In summary, we believe that the results of this study are valid for the purposes of addressing the two research questions we posed in the beginning. Distance from the storm drain, particularly swimming in front of the storm drains that we studied, is associated with an increased risk for a relatively broad range of adverse health effects, including HCGI and significant respiratory disease. A number of bacterial indicators, particularly the total coliforms to fecal coliforms ratio and enterococcus, measured in a manner similar to routine monitoring, are also associated with increased risk of adverse health effects. Both sets of results suggest that there is an increased risk of a relatively broad range of symptoms caused by swimming adjacent to the drains at the beach sites included in this study. The estimated attributable numbers, which reached into the 100's

per 10,000 exposed subjects, suggest these risks are not trivial when we consider the millions of persons who visit the beaches in Santa Monica Bay. In numerous discussions organized by the SMBRP, prior to the start of this study, an excess risk of 1 case per 100 exposed was generally considered a noteworthy health risk, so the study was designed to detect this level of risk (of course, the relative magnitude of these risks compared to other health risks will be a matter of judgement by interested parties). It is also probable that the risk is higher than we observed in this study since both distance and bacterial indicators are proxy measures of the actual pathogens causing these adverse health effects. It is worth recalling here that we excluded subjects who frequently entered the water at these beaches. We did this so we could link reported outcomes with a specific set of bacterial indicators for the one day and place a subject was in the water, which we needed to address the second research question we posed. If there is a dose-response relationship such that increasing exposure is associated with increasing risk, which seems plausible, then one may conclude that surfers, lifeguards, and other subjects who frequently enter the water and immerse their heads may be at an increased risk of adverse health outcomes (perhaps substantially so) than the relatively infrequent recreational swimmers included in this study. A counter-argument that has been raised is that frequent swimmers may develop an immunity to the pathogens and thereby have a lower risk. This would seem to be an important issue that warrants further study. Surfers would seem to be an appropriate group to study since there are not enough lifeguards at a given beach to achieve the statistical power one needs. The study design would have to be different than the one used here to address the issue of frequent use. Interested readers are referred to the original proposal for this study, where an adjunct study of surfers was presented. We consider the policy implications of the present study to be beyond the scope of this final report. They will be the subject of a separate report issued by the Santa Monica Bay Restoration Project.

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LIST OF VARIABLES

ITEM	RANGE	CODES
BEACH ID	A,M;W	A=ASHLAND,M=MALIBU,W=WILL ROGERS
PARTICIPANT #	1-12500	
RELATION	A,B,C,D,E,F,G,H,I,J	
PRE PRINTED #	1-12500	
BEACH INT MONTH	06-10	06=JUNE,07=JULY,08=AUG,09=SEPT,10=OCT
BEACH INT DAY	1-31	
PHONE INT MONTH	06-10	06=JUNE,07=JULY,08=AUG,09=SEPT,10=OCT
PHONE INT DAY	1-31	
WATER CLEAN?	1-2	1=NO,2=YES
GENDER	1-2	1=FEMALE,2=MALE
AGE	1-9	1=0-12,2=13-18,3=19-25,4=26-35,5=36-45,6=46-55,7=56-65,8=66-75,9=>75
EXACT AGE FOR UNDER 12	1-12	
MAP CODE	1-8	
BEACH INTR #	0-999	
PHONE INTR #	0-999	
Q1 FACE WET	1-2	1=NO FACE NOT WET,2 YES FACE GOT WET
Q2	1-3	1=NO CHILD DID NOT GET FACE WET,2=YES GOT FACE WET,3=DON'T KNOW/REMEBER
Q3.1.A FEVER	1-3	1=NOT HAVE SYMPTON SINCE VISIT,2=YES HAD SYMPTON SINCE VISIT, 3=DK
Q3.1.C FEVER	2	2=EVENT DUE TO BEACH VISIT
Q3.2.A CHILLS	1-3	1=NOT HAVE SYMPTON SINCE VISIT,2=YES HAD SYMPTON SINCE VISIT, 3=DK
Q3.2.C CHILLS	2	2=EVENT DUE TO BEACH VISIT
Q3.3.A EYE DISCHARGE	1-3	1=NOT HAVE SYMPTON SINCE VISIT,2=YES HAD SYMPTON SINCE VISIT, 3=DK
Q3.3.B EYE DISCHARGE	1-3	1=NOT HAD SYMPTON BEFORE VISIT,2=YES HAD SYMPTOM BFORE VISIT, 3=DK
Q3.3.C EYE DISCHARGE	2	2=EVENT DUE TO BEACH VISIT
Q3.4.A EARACHE	1-3	1=NOT HAVE SYMPTON SINCE VISIT,2=YES HAD SYMPTON SINCE VISIT, 3=DK
Q3.4.B EARACHE	1-3	1=NOT HAD SYMPTON BEFORE VISIT,2=YES HAD SYMPTOM BFORE VISIT, 3=DK
Q3.4.C EARACHE	2	2=EVENT DUE TO BEACH VISIT
Q3.5.A EAR DISCHARGE	1-3	1=NOT HAVE SYMPTON SINCE VISIT,2=YES HAD SYMPTON SINCE VISIT, 3=DK
Q3.5.B EAR DISCHARGE	1-3	1=NOT HAD SYMPTON BEFORE VISIT,2=YES HAD SYMPTOM BFORE VISIT, 3=DK
Q3.5.C EAR DISHCARGE	2	2=EVENT DUE TO BEACH VISIT
Q3.6.A SKIN RASH	1-3	1=NOT HAVE SYMPTON SINCE VISIT,2=YES HAD SYMPTON SINCE VISIT, 3=DK
Q3.6.B SKIN RASH	1-3	1=NOT HAD SYMPTON BEFORE VISIT,2=YES HAD SYMPTOM BFORE VISIT, 3=DK
Q3.6.C SKIN RASH	2	2=EVENT DUE TO BEACH VISIT
Q3.7.A INFECTED CUT	1-3	1=NOT HAVE SYMPTON SINCE VISIT,2=YES HAD SYMPTON SINCE VISIT, 3=DK
Q3.7.B INFECTED CUT	1-3	1=NOT HAD SYMPTON BEFORE VISIT,2=YES HAD SYMPTOM BFORE VISIT, 3=DK
Q3.7.C INFECTED CUT	2	2=EVENT DUE TO BEACH VISIT

LIST OF VARIABLES

Q3.8.A NAUSEA	1-3	1=NOT HAVE SYMPTON SINCE VISIT,2=YES HAD SYMPTON SINCE VISIT, 3=DK
Q3.8.B NAUSEA	1-3	1=NOT HAD SYMPTON BEFORE VISIT,2=YES HAD SYMPTOM BFORE VISIT, 3=DK
Q3.8.C NAUSEA	2	2=EVENT DUE TO BEACH VISIT
Q3.9.A VOMITING	1-3	1=NOT HAVE SYMPTON SINCE VISIT,2=YES HAD SYMPTON SINCE VISIT, 3=DK
Q3.9.B VOMITING	1-3	1=NOT HAD SYMPTON BEFORE VISIT,2=YES HAD SYMPTOM BFORE VISIT, 3=DK
Q3.9.C VOMITING	2	2=EVENT DUE TO BEACH VISIT
Q3.10.A DIARRHEA	1-3	1=NOT HAVE SYMPTON SINCE VISIT,2=YES HAD SYMPTON SINCE VISIT, 3=DK
Q3.10.B DIARRHEA	1-3	1=NOT HAD SYMPTON BEFORE VISIT,2=YES HAD SYMPTOM BFORE VISIT, 3=DK
Q3.10.C DIARRHEA	2	2=EVENT DUE TO BEACH VISIT
Q3.11.A DIARRHEA W/ BLOOD	1-3	1=NOT HAVE SYMPTON SINCE VISIT,2=YES HAD SYMPTON SINCE VISIT, 3=DK
Q3.11.B DIARRHEA W/ BLOOD	1-3	1=NOT HAD SYMPTON BEFORE VISIT,2=YES HAD SYMPTOM BFORE VISIT, 3=DK
Q3.11.C DIARRHEA W/ BLOOD	2	2=EVENT DUE TO BEACH VISIT
Q3.12.A STOMACH PAIN	1-3	1=NOT HAVE SYMPTON SINCE VISIT,2=YES HAD SYMPTON SINCE VISIT, 3=DK
Q3.12.B STOMACH PAIN	1-3	1=NOT HAD SYMPTON BEFORE VISIT,2=YES HAD SYMPTOM BFORE VISIT, 3=DK
Q3.12.C STOMACH PAIN	2	2=EVENT DUE TO BEACH VISIT
Q3.13.A COUGHING	1-3	1=NOT HAVE SYMPTON SINCE VISIT,2=YES HAD SYMPTON SINCE VISIT, 3=DK
Q3.13.B COUGHING	1-3	1=NOT HAD SYMPTON BEFORE VISIT,2=YES HAD SYMPTOM BFORE VISIT, 3=DK
Q3.13.C COUGHING	2	2=EVENT DUE TO BEACH VISIT
Q3.14.A COUGH W/ PHLEGM	1-3	1=NOT HAVE SYMPTON SINCE VISIT,2=YES HAD SYMPTON SINCE VISIT, 3=DK
Q3.14.B COUGH W/ PHLEGM	1-3	1=NOT HAD SYMPTON BEFORE VISIT,2=YES HAD SYMPTOM BFORE VISIT, 3=DK
Q3.14.C COUGH W/ PHLEGM	2	2=EVENT DUE TO BEACH VISIT
Q3.15.A RUNNY NOSE/CONGES	1-3	1=NOT HAVE SYMPTON SINCE VISIT,2=YES HAD SYMPTON SINCE VISIT, 3=DK
Q3.15.B RUNNY NOSE/CONGES	1-3	1=NOT HAD SYMPTON BEFORE VISIT,2=YES HAD SYMPTOM BFORE VISIT, 3=DK
Q3.15.C RUNNY NOSE/CONGES	2	2=EVENT DUE TO BEACH VISIT
Q3.16.A SORE THROAT	1-3	1=NOT HAVE SYMPTON SINCE VISIT,2=YES HAD SYMPTON SINCE VISIT, 3=DK
Q3.16.B SORE THROAT	1-3	1=NOT HAD SYMPTON BEFORE VISIT,2=YES HAD SYMPTOM BFORE VISIT, 3=DK
Q3.16.C SORE THROAT	2	2=EVENT DUE TO BEACH VISIT
Q4 WORRIED ABOUT HAZARD	1-4	1=NOT AT ALL WORRIED,2=SOMEWHAT WORRIED,3=A LITTLE WORRIED,4=VERY WORRIED
Q5 ETHNIC BACKGROUND	1-6	1=WHITE,2=BLACK,3=LATINO,4=ASIAN,5=MULTI-ETHNIC,6=OTHER
Q6 ZIP CODE	0-99999	
MEDIAN INCOME FOR ZIP		MEDIAN HOUSEHOLD INCOME FOR RESPONDENTS ZIP CODE
RECODED AGE	1-2	1=0-12,2=>12
RECODED MAP AREA	1-2	1=DIRTY (AREAS 0/3/4/5/6),2=CLEAN (AREAS 1/8)
E COLI FROM SAMPLE AREA1		
E COLI FROM SAMPLE AREA2		
E COLI FROM SAMPLE AREA3		
E COLI FROM SAMPLE AREA4		

LIST OF VARIABLES

E COLI FROM SAMPLE AREA5		
ENTEROCOCCUS AREA1		
ENTEROCOCCUS AREA2		
ENTEROCOCCUS AREA3		
ENTEROCOCCUS AREA4		
ENTEROCOCCUS AREA5		
FECAL COLIFORMS AREA1		
FECAL COLIFORMS AREA2		
FECAL COLIFORMS AREA3		
FECAL COLIFORMS AREA4		
FECAL COLIFORMS AREA5		
TOTAL COLIFORMS AREA1		
TOTAL COLIFORMS AREA2		
TOTAL COLIFORMS AREA3		
TOTAL COLIFORMS AREA4		
TOTAL COLIFORMS AREA5		
FLOW		
FAMILY SIZE		1=INDIVIDUAL,2-9=FAMILY SIZE
HCGI_1		
HCGI_2		
SRD		

Table 1. Completed Interviews by Beach Interview Date

JUNE

	22	23	24	25	26	27	28	29	30	total
Ashland	15	4	61	103	16	19	22	34	20	294
Malibu	3	5	39	36	2	28	13	20	15	161
W Rogers	8	0	13	17	5	11	2	9	13	78
total	26	9	113	156	23	58	37	63	48	533

JULY

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	monthly total
Ashland	114	159	108	133	20	31	52	72	238	43	75	45	46	50	115	41	42	31	39	21	54	181	338	32	29	55	69	51	265	244	31	2824
Malibu	32	70	15	31	21	18	23	37	66	39	22	39	62	40	81	61	43	29	49	32	61	62	139	41	31	38	58	38	196	135	37	1614
W Rogers	38	43	39	31	10	10	21	18	34	34	37	27	37	30	69	26	13	2	20	28	26	45	84	57	13	9	8	30	58	138	18	1053
total	184	272	162	195	51	59	96	127	338	116	134	111	145	120	265	128	98	62	108	81	141	288	561	130	73	102	135	119	519	517	86	5523

AUGUST

BEACH	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	monthly total
Ashland	17	13	29	20	72	203	16	29	12	47	40	166	287	24	22	11	17	21	121	99	18	16	25	18	32	116	151	49	18	37	8	1754
Malibu	51	21	19	18	57	117	20	52	77	35	74	139	101	43	25	19	32	60	117	71	26	21	31	56	21	66	134	30	31	2	45	1611
W Rogers	3		5	7	70	25	29	26	9	32	41	56	56	8	7	2	1	21	10	16	4	0	1	7	8	33	36	3	7	12	6	541
total	71	34	53	45	199	345	65	107	98	114	155	361	444	75	54	32	50	102	248	186	48	37	57	81	61	215	321	82	56	51	59	3906

SEPTEMBER

BEACH	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	monthly total
Ashland	38	118	346	357					21	77						29	20						23	19								1048
Malibu	13	126	150	245					21	30						26	24							15								650
W Rogers	16	28	62	27																												133
total	67	272	558	629	0	0	0	0	42	107	0	0	0	0	0	55	44	0	0	0	0	0	23	34	0	0	0	0	0	0	0	1831
																																11793

Figure 1. Study Eligibles

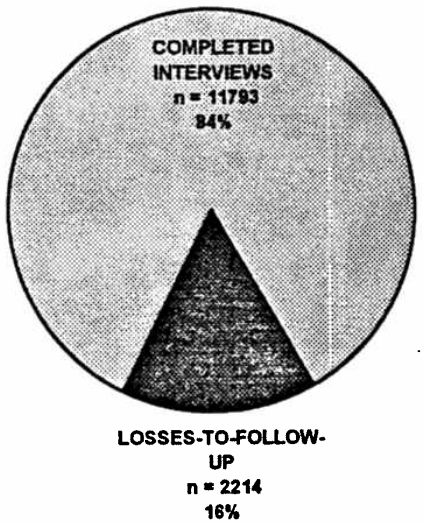

Figure 2. Beach Encounters by Beach

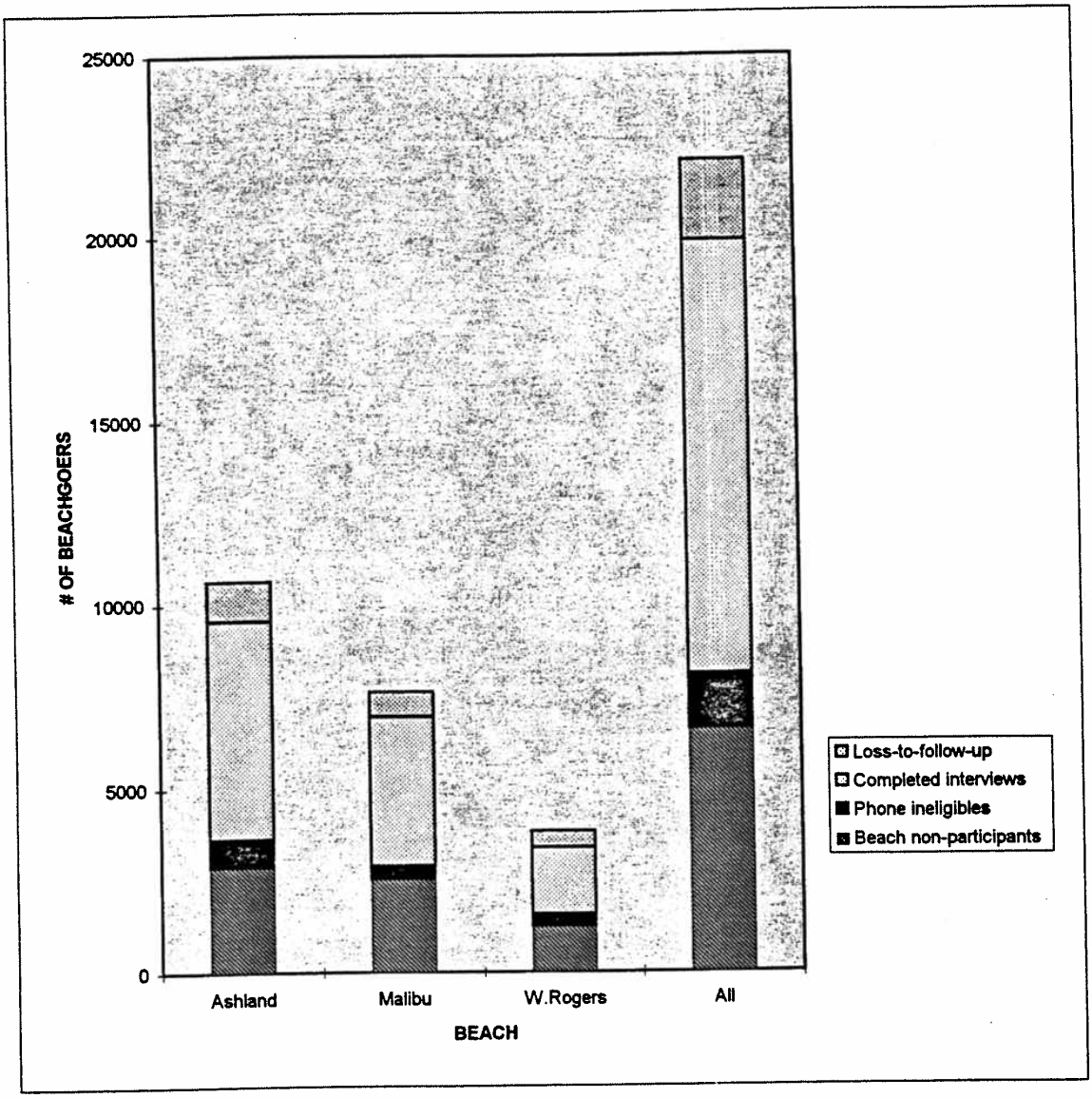

	Ashland	Malibu	W.Rogers	All
Beach non-participants (incl. ineligibles)	2862 (27%)	2508 (33%)	1223 (32%)	6593 (30%)
Phone ineligibles (back to beach)	766 (7%)	380 (5%)	339 (9%)	1485 (7%)
Completed interviews	5920 (56%)	4067 (53%)	1806 (47%)	11793 (53%)
Losses-to-follow-up	1078 (10%)	681 (9%)	455 (12%)	2214 (10%)
	10626	7636	3823	22085

Table 2. Reasons for Non-Participation at the Beach (All Beaches)

		%	*% of all beach encounters*
Ineligible (been to beach)	3681	56	*17*
Refusal	1761	27	*8*
Language difficulty	648	10	*3*
No telephone	503	8	*2*
	6593	101*	*30*

Table 3. Reasons for Non-Actualized Telephone Interviews (All Beaches)

		%	*% of all beach interviews*
Ineligible (back to beach)	1485	40	*10*
Wrong number/disconnect	1170	32	*8*
Answering machine	504	14	*3*
No answer	283	8	*2*
Other reason (moved, etc.)	235	6	*1*
Refusal	22	1	*0*
	3699	101*	*24*

* Does not add to 100% due to rounding.

Figure 3. Non-Participation (Including Ineligibles) at 3 Beaches by Ethnicity and Gender*

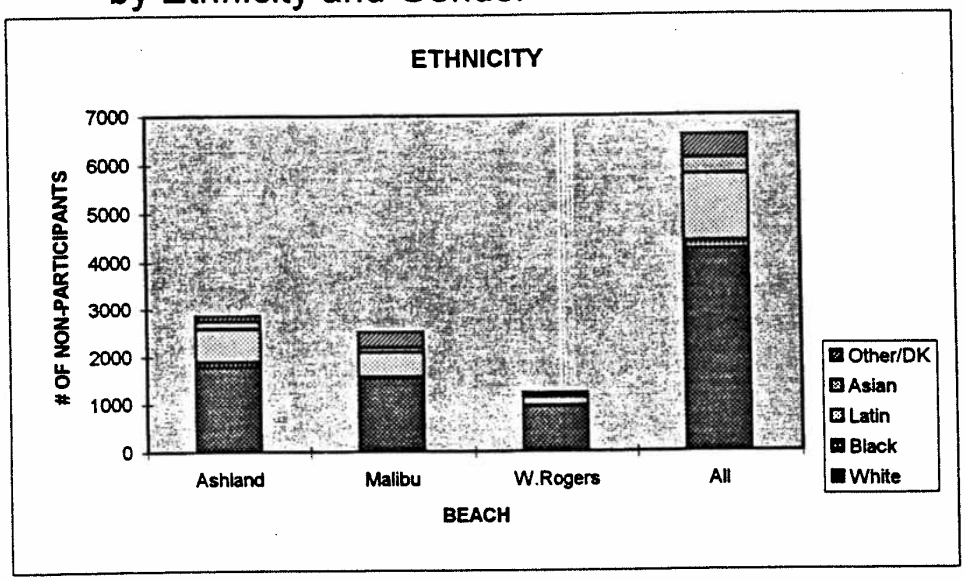

	Ashland	Malibu	W.Rogers	All
White	1768 (62%)	1530 (61%)	930 (76%)	4228 (64%)
Black	123 (4%)	31 (1%)	28 (2%)	182 (3%)
Latin	691 (24%)	509 (20%)	172 (14%)	1372 (21%)
Asian	151 (5%)	113 (5%)	55 (4%)	319 (5%)
Other/DK	129 (4%)	325 (13%)	38 (3%)	492 (7%)

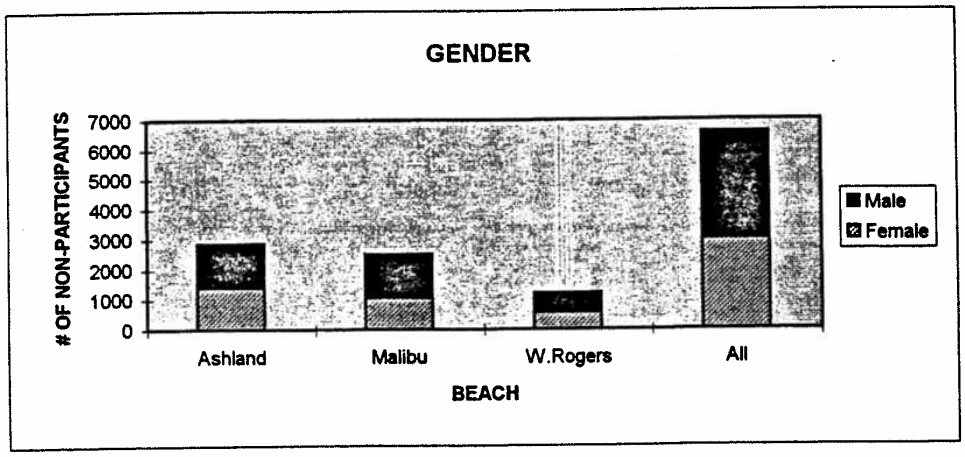

	Ashland	Malibu	W.Rogers	All
Female	1384 (48%)	1057 (42%)	559 (46%)	3000 (46%)
Male	1478 (52%)	1451 (58%)	664 (54%)	3593 (54%)

* Children younger than 12 were not tallied.

Figure 4. Non-Actualized Telephone Interviews from 3 Beaches by Ethnicity, Age and Gender

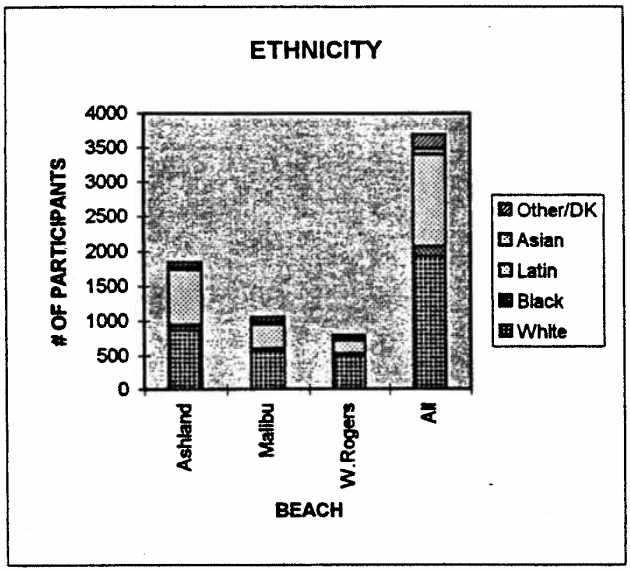

	Ashland	Malibu	W.Rogers	All
White	856 (46%)	569 (54%)	505 (64%)	1930 (52%)
Black	88 (5%)	29 (3%)	17 (2%)	134 (4%)
Latin	87 (43%)	353 (33%)	194 (24%)	1334 (36%)
Asian	38 (2%)	31 (3%)	19 (2%)	88 (2%)
Other/DK	75 (4%)	79 (7%)	59 (7%)	213 (6%)

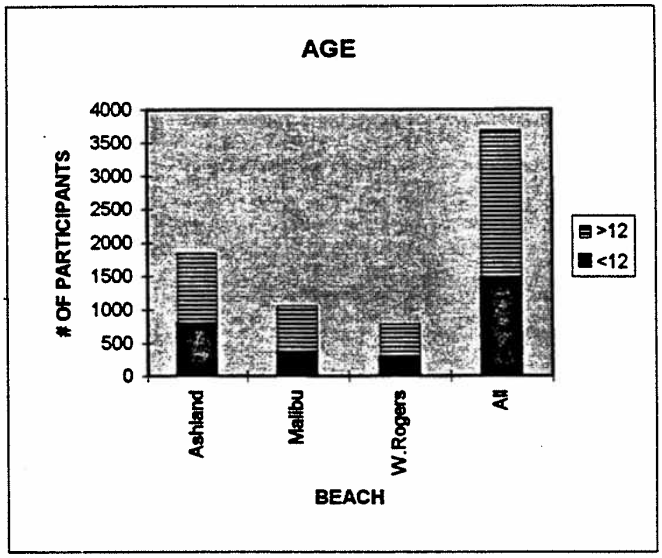

	Ashland	Malibu	W.Rogers	All
≤12	812 (44%)	381 (36%)	299 (38%)	1492(40%)
>12	1032 (56%	680 (64%)	495 (62%)	2207(60%)

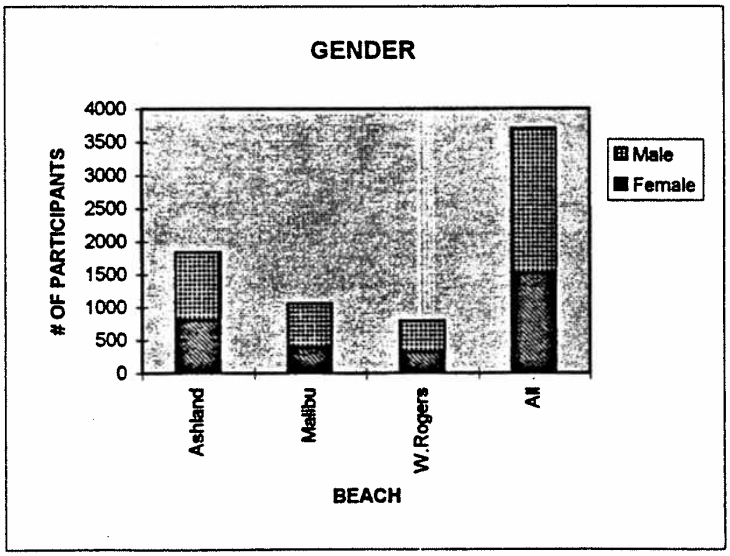

	Ashland	Malibu	W.Rogers	All
Female	803 (44%)	392 (37%)	316 (40%)	1511 (41%)
Male	1041(56%)	669 (63%)	478 (60%)	2188 (59%)

Table 4. Beach Study Respondent Characteristics

Proximity to Drain

BEACH	0-100 Yds	>400 Yds	RATIO
Ashland	4388	1532	2.9:1
Malibu	3034	1033	2.9:1
W Rogers	1310	496	2.6:1
	8732	3061	2.9:1

Family Size

BEACH	individuals			family members			totals		
Ashland	1115	(19%)	{43%}	4805	(81%)	{52%}	5920	(100%)	{50%}
Malibu	920	(23%)	{36%}	3147	(77%)	{34%}	4067	(100%)	{34%}
W Rogers	547	(30%)	{21%}	1259	(70%)	{14%}	1806	(100%)	{15%}
	2582	(22%)	{100%}	9211	(78%)	{100%}	11793	(100%) *	{100%} †

SES based on zip code (California only)

BEACH	<=25000			>25000			totals		
Ashland	655	(13%)	{64%}	4583	(87%)	{50%}	5238	(100%)	{51%}
Malibu	238	(7%)	{23%}	3142	(93%)	{34%}	3380	(100%)	{33%}
W Rogers	128	(8%)	{13%}	1464	(92%)	{16%}	1592	(100%)	{16%}
	1021	(10%)	{100%}	9189	(90%)	{100%}	10210	(100%)	{100%}

Residency based on zip code

BEACH	CA resident			Outside CA			totals		
Ashland	5341	(90%)	{51%}	579	(10%)	{42%}	5920	(100%)	{50%}
Malibu	3472	(85%)	{33%}	595	(15%)	{43%}	4067	(100%)	{34%}
W Rogers	1612	(89%)	{15%}	194	(11%)	{14%}	1806	(100%)	{15%}
	10425	(88%)	{100%}	1368	(12%)	{100%}	11793	(100%)	{100%}

* ( ) row percentages
† { } column percentages

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Table 5. Beach Study Respondent Characteristics vs. PEPS

Beach Study Respondents

AGE		
0-12	5,718	48%
13-18	1,772	15%
19-25	1,213	10%
26-35	1,688	14%
36-45	994	8%
46-55	314	3%
56-65	61	1%
66-75	30	0%
>75	3	0%
	11,793	

PEPS*

AGE		
0-14	2,074,678	22%
14-19	539,427	6%
20-24	653,813	7%
25-34	1,746,236	19%
35-44	1,583,407	17%
45-54	1,043,714	11%
55-64	668,540	7%
65-74	538,028	6%
>75	392,559	4%
	9,240,402	

Beach Study Respondents

AGE		
<=12	5,718	48%
13-25	2,985	25%
>=26	3,090	26%

PEPS

AGE		
>=14	2,074,678	22%
15-24	1,193,240	13%
>=25	5,972,484	65%

*Population Estimation and Projection System (Los Angeles County, 1993)

Table 5, cont. Beach Study Respondent Characteristics vs. PEPS

Beach Study Respondents

GENDER		
female	5,319	45%
male	6,474	55%

PEPS*

GENDER		
female	4,726,498	50%
male	4,713,953	50%

Beach Study Respondents

ETHNICITY		
White	5,295	45%
Black	367	3%
Latino	5,103	43%
Asian/other	1,028	9%

PEPS

ETHNICITY		
White	3,414,147	36%
Black	938,202	10%
Latino	3,871,909	41%
Asian/other	1,216,192	13%

*Population Estimation and Projection System (Los Angeles County, 1993)

Table 6. Respondent Age by Map Area for Each Beach

Ashland										
Map Area*	0-12			13-25			>=26			totals
drain	91	(59%)	{3%}	23	(15%)	{2%}	40	(26%)	{3%}	154 (100%) {3%}
1-50 down	656	(54%)	{21%}	234	(19%)	{17%}	318	(26%)	{11%}	1208 (100%) {20%}
1-50 up	688	(51%)	{22%}	353	(26%)	{25%}	309	(23%)	{12%}	1350 (100%) {23%}
51-100 down	216	(48%)	{7%}	122	(27%)	{9%}	114	(25%)	{5%}	452 (100%) {8%}
51-100 up	588	(48%)	{19%}	321	(26%)	{23%}	315	(26%)	{15%}	1224 (100%) {21%}
400+ down	105	(57%)	{3%}	44	(24%)	{3%}	36	(19%)	{2%}	185 (100%) {3%}
400+ up	714	(53%)	{23%}	309	(23%)	{22%}	324	(24%)	{17%}	1347 (100%) {23%}
	3058	(52%)	{100%}	1406	(24%)	{100%}	1456	(25%)	{100%}	5920 (100%) † {100%} ‡

Malibu										
Map Area	0-12			13-25			>=26			totals
drain	390	(65%)	{21%}	119	(20%)	{11%}	94	(16%)	{9%}	603 (100%) {15%}
1-50 down	124	(35%)	{7%}	117	(33%)	{11%}	111	(32%)	{5%}	352 (100%) {9%}
1-50 up	412	(39%)	{22%}	337	(32%)	{31%}	310	(29%)	{16%}	1059 (100%) {26%}
51-100 down	85	(39%)	{5%}	75	(35%)	{7%}	57	(26%)	{3%}	217 (100%) {5%}
51-100 up	362	(45%)	{19%}	196	(24%)	{18%}	245	(31%)	{15%}	803 (100%) {20%}
400+ down	457	(48%)	{24%}	237	(25%)	{21%}	252	(27%)	{19%}	946 (100%) {23%}
400+ up	49	(56%)	{3%}	22	(25%)	{2%}	16	(18%)	{1%}	87 (100%) {2%}
	1879	(46%)	{100%}	1103	(27%)	{100%}	1085	(27%)	{100%}	4067 (100%) {100%}

Will Rogers										
Map Area	0-12			13-25			>=26			totals
drain	50	(57%)	{6%}	22	(25%)	{5%}	16	(18%)	{3%}	88 (100%) {5%}
1-50 down	155	(40%)	{20%}	102	(27%)	{21%}	127	(33%)	{23%}	384 (100%) {21%}
1-50 up	80	(40%)	{10%}	46	(23%)	{10%}	76	(38%)	{14%}	202 (100%) {11%}
51-100 down	182	(39%)	{23%}	138	(30%)	{29%}	145	(31%)	{26%}	465 (100%) {26%}
51-100 up	57	(33%)	{7%}	41	(24%)	{9%}	73	(43%)	{13%}	171 (100%) {9%}
400+ down	234	(52%)	{30%}	115	(26%)	{24%}	99	(22%)	{18%}	448 (100%) {25%}
400+ up	23	(48%)	{3%}	12	(25%)	{3%}	13	(27%)	{2%}	48 (100%) {3%}
	781	(43%)	{100%}	476	(26%)	{100%}	549	(30%)	{100%}	1806 (100%) {100%}

* down = downcoast; up = upcoast

( ) row percentages

† { } column percentages

Table 7. Respondent Gender by Map Area for Each Beach

Map Area*	Ashland female			Ashland male			Ashland totals		
drain	87	(56%)	{3%}	67	(44%)	{2%}	154	(100%)	{3%}
1-50 down	553	(46%)	{20%}	655	(54%)	{21%}	1208	(100%)	{20%}
1-50 up	642	(48%)	{23%}	708	(52%)	{22%}	1350	(100%)	{23%}
51-100 down	212	(47%)	{8%}	240	(53%)	{8%}	452	(100%)	{8%}
51-100 up	548	(45%)	{20%}	676	(55%)	{21%}	1224	(100%)	{21%}
400+ down	75	(41%)	{3%}	110	(59%)	{3%}	185	(100%)	{3%}
400+ up	629	(47%)	{23%}	718	(53%)	{23%}	1347	(100%)	{23%}
	2746	(46%)	{100%}	3174	(54%)	{100%}	5920	(100%) †	{100%} ‡

Map Area	Malibu female			Malibu male			Malibu totals		
drain	271	(45%)	{15%}	332	(55%)	{15%}	603	(100%)	{15%}
1-50 down	124	(35%)	{7%}	228	(65%)	{10%}	352	(100%)	{9%}
1-50 up	457	(43%)	{25%}	602	(57%)	{26%}	1059	(100%)	{26%}
51-100 down	86	(40%)	{5%}	131	(60%)	{6%}	217	(100%)	{5%}
51-100 up	366	(46%)	{20%}	437	(54%)	{19%}	803	(100%)	{20%}
400+ down	452	(48%)	{25%}	494	(52%)	{22%}	946	(100%)	{23%}
400+ up	38	(44%)	{2%}	49	(56%)	{2%}	87	(100%)	{2%}
	1794	(44%)	{100%}	2273	(56%)	{100%}	4067	(100%)	{100%}

Map Area	Will Rogers female			Will Rogers male			Will Rogers totals		
drain	42	(48%)	{5%}	46	(52%)	{4%}	88	(100%)	{5%}
1-50 down	164	(43%)	{21%}	220	(57%)	{21%}	384	(100%)	{21%}
1-50 up	85	(42%)	{11%}	117	(58%)	{11%}	202	(100%)	{11%}
51-100 down	186	(40%)	{24%}	279	(60%)	{27%}	465	(100%)	{26%}
51-100 up	85	(50%)	{11%}	86	(50%)	{8%}	171	(100%)	{9%}
400+ down	202	(45%)	{26%}	246	(55%)	{24%}	448	(100%)	{25%}
400+ up	15	(31%)	{2%}	33	(69%)	{3%}	48	(100%)	{3%}
	779	(43%)	{100%}	1027	(57%)	{100%}	1806	(100%)	{100%}

* down = downcoast; up = upcoast
† ( ) row percentages
‡ { } column percentages

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Table 8. Respondent Ethnicity by Map Area for Each Beach

Ashland																							
Map Area*	White			Black			Latino			Asian			multi			other			totals				
drain	28	(18%)	{1%}	8	(5%)	{3%}	108	(70%)	{4%}	4	(3%)	{2%}	4	(3%)	{2%}	2	(1%)	{2%}	154	(100%)		{3%}	
1-50 down	464	(38%)	{21%}	52	(4%)	{19%}	558	(46%)	{20%}	65	(5%)	{31%}	39	(3%)	{21%}	30	(2%)	{23%}	1208	(100%)		{20%}	
1-50 up	457	(34%)	{20%}	60	(4%)	{22%}	725	(54%)	{25%}	35	(3%)	{17%}	49	(4%)	{26%}	24	(2%)	{18%}	1350	(100%)		{23%}	
51-100 down	207	(46%)	{9%}	20	(4%)	{7%}	186	(41%)	{7%}	21	(5%)	{10%}	8	(2%)	{4%}	10	(2%)	{8%}	452	(100%)		{8%}	
51-100 up	471	(38%)	{21%}	55	(4%)	{20%}	590	(48%)	{21%}	38	(3%)	{18%}	46	(4%)	{24%}	24	(2%)	{18%}	1224	(100%)		{21%}	
400+ down	71	(38%)	{3%}	12	(6%)	{4%}	82	(44%)	{3%}	1	(1%)	{0%}	13	(7%)	{7%}	6	(3%)	{5%}	185	(100%)		{3%}	
400+ up	564	(42%)	{25%}	64	(5%)	{24%}	609	(45%)	{21%}	45	(3%)	{22%}	31	(2%)	{16%}	34	(3%)	{26%}	1347	(100%)		{23%}	
	2262	(38%)	{100%}	271	(5%)	{100%}	2858	(48%)	{100%}	209	(4%)	{100%}	190	(3%)	{100%}	130	(2%)	{100%}	5920	(100%)	†	{100%}	‡

Malibu																					
Map Area	White			Black			Latino			Asian			multi			other			totals		
drain	231	(38%)	{11%}	5	(1%)	{10%}	337	(56%)	{21%}	13	(2%)	{10%}	11	(2%)	{10%}	5	(1%)	{5%}	602	(100%)	{15%}
1-50 down	161	(46%)	{8%}	3	(1%)	{6%}	157	(45%)	{10%}	7	(2%)	{6%}	11	(3%)	{10%}	13	(4%)	{14%}	352	(100%)	{9%}
1-50 up	499	(47%)	{24%}	24	(2%)	{49%}	459	(43%)	{28%}	25	(2%)	{20%}	22	(2%)	{20%}	27	(3%)	{29%}	1056	(100%)	{26%}
51-100 down	132	(61%)	{6%}	0	(0%)	{0%}	67	(31%)	{4%}	4	(2%)	{3%}	7	(3%)	{6%}	7	(3%)	{8%}	217	(100%)	{5%}
51-100 up	450	(56%)	{22%}	2	(0%)	{4%}	271	(34%)	{17%}	50	(6%)	{40%}	11	(1%)	{10%}	19	(2%)	{20%}	803	(100%)	{20%}
400+ down	535	(57%)	{26%}	15	(2%)	{31%}	300	(32%)	{18%}	25	(3%)	{20%}	49	(5%)	{44%}	22	(2%)	{24%}	946	(100%)	{23%}
400+ up	36	(41%)	{2%}	0	(0%)	{0%}	50	(57%)	{3%}	1	(1%)	{1%}	0	(0%)	{0%}	0	(0%)	{0%}	87	(100%)	{2%}
	2044	(50%)	{100%}	49	(1%)	{100%}	1641	(40%)	{100%}	125	(3%)	{100%}	111	(3%)	{100%}	93	(2%)	{100%}	4063	(100%)	{100%}

Will Rogers																					
Map Area	White			Black			Latino			Asian			multi			other			totals		
drain	22	(25%)	{2%}	3	(3%)	{6%}	57	(65%)	{9%}	4	(5%)	{7%}	2	(2%)	{3%}	0	(0%)	{0%}	88	(100%)	{5%}
1-50 down	173	(45%)	{17%}	6	(2%)	{13%}	171	(45%)	{28%}	13	(3%)	{22%}	16	(4%)	{27%}	5	(1%)	{10%}	384	(100%)	{21%}
1-50 up	107	(53%)	{11%}	13	(6%)	{28%}	66	(33%)	{11%}	5	(2%)	{9%}	7	(3%)	{12%}	4	(2%)	{8%}	202	(100%)	{11%}
51-100 down	277	(60%)	{28%}	13	(3%)	{28%}	119	(26%)	{20%}	18	(4%)	{31%}	19	(4%)	{32%}	19	(4%)	{39%}	465	(100%)	{26%}
51-100 up	105	(61%)	{11%}	0	(0%)	{0%}	47	(27%)	{8%}	10	(6%)	{17%}	4	(2%)	{7%}	5	(3%)	{10%}	171	(100%)	{9%}
400+ down	277	(62%)	{28%}	11	(2%)	{23%}	127	(28%)	{21%}	7	(2%)	{12%}	10	(2%)	{17%}	16	(4%)	{33%}	448	(100%)	{25%}
400+ up	28	(58%)	{3%}	1	(2%)	{2%}	17	(35%)	{3%}	1	(2%)	{2%}	1	(2%)	{2%}	0	(0%)	{0%}	48	(100%)	{3%}
	989	(55%)	{100%}	47	(3%)	{100%}	604	(33%)	{100%}	58	(3%)	{100%}	59	(3%)	{100%}	49	(3%)	{100%}	1806	(100%)	{100%}

* down = downcoast; up = upcoast
† ( ) row percentages
‡ { } column percentages

Table 9. Age, Gender and Ethnicity by Map Area For All Beaches

	beach											
Map Area*	Ashland			Malibu			Will Rogers			totals		
drain	154	(18%)	{3%}	603	(71%)	{15%}	88	(10%)	{5%}	845	(100%)	{7%}
1-50 down	1208	(62%)	{20%}	352	(18%)	{9%}	384	(20%)	{21%}	1944	(100%)	{16%}
1-50 up	1350	(52%)	{23%}	1059	(41%)	{26%}	202	(8%)	{11%}	2611	(100%)	{22%}
51-100 down	452	(40%)	{8%}	217	(19%)	{5%}	465	(41%)	{26%}	1134	(100%)	{10%}
51-100 up	1224	(56%)	{21%}	803	(37%)	{20%}	171	(8%)	{9%}	2198	(100%)	{19%}
400+ down	185	(12%)	{3%}	946	(60%)	{23%}	448	(28%)	{25%}	1579	(100%)	{13%}
400+ up	1347	(91%)	{23%}	87	(6%)	{2%}	48	(3%)	{3%}	1482	(100%)	{13%}
	5920	(50%)	{100%}	4067	(34%)	{100%}	1806	(15%)	{100%}	11793	(100%) †	{100%} ‡

	age											
Map Area	0-12			13-25			>=26			totals		
drain	531	(63%)	{9%}	164	(19%)	{5%}	150	(18%)	{5%}	845	(100%)	{7%}
1-50 down	935	(48%)	{16%}	453	(23%)	{15%}	556	(29%)	{18%}	1944	(100%)	{16%}
1-50 up	1180	(45%)	{21%}	736	(28%)	{25%}	695	(27%)	{22%}	2611	(100%)	{22%}
51-100 down	483	(43%)	{8%}	335	(30%)	{11%}	316	(28%)	{10%}	1134	(100%)	{10%}
51-100 up	1007	(46%)	{18%}	558	(25%)	{19%}	633	(29%)	{20%}	2198	(100%)	{19%}
400+ down	796	(50%)	{14%}	396	(25%)	{13%}	387	(25%)	{13%}	1579	(100%)	{13%}
400+ up	786	(53%)	{14%}	343	(23%)	{11%}	353	(24%)	{11%}	1482	(100%)	{13%}
	5718	(48%)	{100%}	2985	(25%)	{100%}	3090	(26%)	{100%}	11793	(100%)	{100%}

	gender								
Map Area	female			male			totals		
drain	400	(47%)	{8%}	445	(53%)	{7%}	845	(100%)	{7%}
1-50 down	841	(43%)	{16%}	1103	(57%)	{17%}	1944	(100%)	{16%}
1-50 up	1184	(45%)	{22%}	1427	(55%)	{22%}	2611	(100%)	{22%}
51-100 down	484	(43%)	{9%}	650	(57%)	{10%}	1134	(100%)	{10%}
51-100 up	999	(45%)	{19%}	1199	(55%)	{19%}	2198	(100%)	{19%}
400+ down	729	(46%)	{14%}	850	(54%)	{13%}	1579	(100%)	{13%}
400+ up	682	(46%)	{13%}	800	(54%)	{12%}	1482	(100%)	{13%}
	5319	(45%)	{100%}	6474	(55%)	{100%}	11793	(100%)	{100%}

* down = downcoast; up = upcoast
† ( ) row percentages
‡ { } column percentages

Table 9, cont. Age, Gender and Ethnicity by Map Area For All Beaches

	ethnicity																						
Map Area*	White			Black			Latino			Asian			multi			other			totals				
drain	281	(33%)	{5%}	16	(2%)	{4%}	502	(59%)	{10%}	21	(2%)	{5%}	17	(2%)	{5%}	7	(1%)	{3%}	844	(100%)		{7%}	
1-50 down	798	(41%)	{15%}	61	(3%)	{17%}	886	(46%)	{17%}	85	(4%)	{22%}	66	(3%)	{18%}	48	(2%)	{18%}	1944	(100%)		{16%}	
1-50 up	1063	(41%)	{20%}	97	(4%)	{26%}	1250	(48%)	{24%}	65	(2%)	{17%}	78	(3%)	{22%}	55	(2%)	{20%}	2608	(100%)		{22%}	
51-100 down	616	(54%)	{12%}	33	(3%)	{9%}	372	(33%)	{7%}	43	(4%)	{11%}	34	(3%)	{9%}	36	(3%)	{13%}	1134	(100%)		{10%}	
51-100 up	1026	(47%)	{19%}	57	(3%)	{16%}	908	(41%)	{18%}	98	(4%)	{25%}	61	(3%)	{17%}	48	(2%)	{18%}	2198	(100%)		{19%}	
400+ down	883	(56%)	{17%}	38	(2%)	{10%}	509	(32%)	{10%}	33	(2%)	{8%}	72	(5%)	{20%}	44	(3%)	{16%}	1579	(100%)		{13%}	
400+ up	628	(42%)	{12%}	65	(4%)	{18%}	676	(46%)	{13%}	47	(3%)	{12%}	32	(2%)	{9%}	34	(2%)	{13%}	1482	(100%)		{13%}	
	5295	(45%)	{100%}	367	(3%)	{100%}	5103	(43%)	{100%}	392	(3%)	{100%}	360	(3%)	{100%}	272	(2%)	{100%}	11789	(100%)	†	{100%}	‡

* down = downcoast; up = upcoast
† ( ) row percentages
‡ { } column percentages

Table 10. Subgroup Specific Symptom Counts

	TOTAL	A) gender		B) age groups			C) ethnicity					
Symptom		Female	Male	<=12	13-25	>=26	White	Black	Latino	Asian	multi	other
Fever	567	257	310	323	121	123	259	21	231	18	27	11
Chills	296	140	156	139	70	87	150	8	114	7	11	6
Redness/discharge from eyes	212	108	104	118	39	55	72	8	112	2	12	6
Earache	407	192	215	185	119	103	212	15	152	6	9	12
Discharge/draining from ears	79	41	38	29	27	23	33	1	41	0	3	1
Skin rash	110	56	54	55	21	34	35	2	65	1	3	4
Cuts becoming infected	76	29	47	21	31	24	46	1	24	2	2	1
Nausea	432	219	213	206	106	119	223	16	155	10	18	10
Vomiting	204	91	113	144	33	27	80	7	98	5	11	3
Diarrhea	627	286	341	307	130	190	365	23	174	15	30	20
Diarrhea with blood	14	7	7	7	4	3	5	0	8	0	1	0
Stomach pain or cramps	736	351	385	370	194	171	387	28	250	23	30	18
Coughing	834	372	462	454	214	166	389	34	333	28	35	14
Coughing with phlegm	390	156	234	195	111	84	176	10	177	8	14	4
Nasal congestion or runny nose	1079	477	602	504	307	268	588	32	361	31	43	23
Sore throat	802	386	416	350	233	219	422	25	291	14	28	21
hcgi_1	355	166	189	223	65	67	164	16	141	9	20	5
hcgi_2	101	39	62	76	15	10	43	2	48	2	5	1
srd	589	264	325	307	158	124	276	20	241	14	26	11

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Table 10, cont. Subgroup Specific Symptom Counts

	D) SES		E) residency		F) concern about hazards			
Symptom	<=$25,000	>$25,000	CA resident	non CA	not at all worried	somewhat worried	a little worried	very worried
Fever	64	447	526	40	46	68	122	227
Chills	30	236	272	24	20	39	59	140
Redness/discharge from eyes	15	176	194	16	23	26	46	77
Earache	22	336	363	39	28	56	83	172
Discharge/draining from ears	3	71	75	3	7	5	20	38
Skin rash	22	79	104	6	14	12	25	44
Cuts becoming infected	3	62	67	8	6	14	13	33
Nausea	32	347	387	39	18	55	82	195
Vomiting	12	172	187	13	11	20	47	83
Diarrhea	22	497	532	90	34	98	119	273
Diarrhea with blood	2	10	13	1	1	2	4	5
Stomach pain or cramps	41	598	652	78	53	98	151	295
Coughing	75	663	764	66	85	117	164	324
Coughing with phlegm	30	314	363	24	48	57	71	152
Nasal congestion or runny nose	72	863	964	103	93	171	238	424
Sore throat	61	634	721	75	73	134	178	301
hcgi_1	27	288	322	29	22	36	72	150
hcgi_2	6	89	97	3	5	10	21	47
srd	49	473	547	39	60	87	118	220

Table 11. Subgroup Specific Symptom Rates per 100 Persons

SYMPTOM	TOTALS	A) gender		B) age			C) ethnicity					
		female	male	0-12	13-25	>=26	White	Black	Latino	Asian	multi	other
1 Fever	4.8	4.8	4.8	5.6	4.1	4.0	4.9	5.7	4.5	4.6	7.5	4.0
2 Chills	2.5	2.6	2.4	2.4	2.3	2.8	2.8	2.2	2.2	1.8	3.1	2.2
3 Redness/discharge from eyes	1.8	2.0	1.6	2.1	1.3	1.8	1.4	2.2	2.2	0.5	3.3	2.2
4 Earache	3.5	3.6	3.3	3.2	4.0	3.3	4.0	4.1	3.0	1.5	2.5	4.3
5 Discharge/draining from ears	0.7	0.8	0.6	0.5	0.9	0.7	0.6	0.3	0.8	0.0	0.8	0.4
6 Skin rash	0.9	1.1	0.8	1.0	0.7	1.1	0.7	0.5	1.3	0.3	0.8	1.4
7 Cuts becoming infected	0.6	0.5	0.7	0.4	1.0	0.8	0.9	0.3	0.5	0.5	0.6	0.4
8 Nausea	3.7	4.1	3.3	3.6	3.6	3.9	4.2	4.4	3.0	2.6	5.0	3.6
9 Vomiting	1.7	1.7	1.7	2.5	1.1	0.9	1.5	1.9	1.9	1.3	3.1	1.1
10 Diarrhea	5.3	5.4	5.3	5.4	4.4	6.1	6.9	6.3	3.4	3.8	8.3	7.2
11 Diarrhea with blood	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.2	0.0	0.3	0.0
12 Stomach pain or cramps	6.2	6.6	5.9	6.5	6.5	5.5	7.3	7.6	4.9	5.9	8.3	6.5
13 Coughing	7.1	7.0	7.1	7.9	7.2	5.4	7.3	9.3	6.5	7.1	9.7	5.1
14 Coughing with phlegm	3.3	2.9	3.6	3.4	3.7	2.7	3.3	2.7	3.5	2.0	3.9	1.4
15 Nasal congestion or runny nose	9.1	9.0	9.3	8.8	10.3	8.7	11.1	8.7	7.1	7.9	11.9	8.3
16 Sore throat	6.8	7.3	6.4	6.1	7.8	7.1	8.0	6.8	5.7	3.6	7.8	7.6
HCGI_1	3.0	3.1	2.9	3.9	2.2	2.2	3.1	4.4	2.8	2.3	5.6	1.8
HCGI_2	0.9	0.7	1.0	1.3	0.5	0.3	0.8	0.5	0.9	0.5	1.4	0.4
SRD	5.0	5.0	5.0	5.4	5.3	4.0	5.2	5.4	4.7	3.6	7.2	4.0

Table 11, cont. Subgroup Specific Symptom Rates per 100 Persons

SYMPTOM	D) SES <=25,000	D) SES >25,000	E) residency CA resident	E) residency outside CA	F) concern about environmental hazards at beach not at all worried	F) somewhat worried	F) a little worried	F) very worried
1 Fever	6.3	4.9	5.0	3.1	3.0	3.3	4.9	6.6
2 Chills	2.9	2.6	2.6	1.9	1.3	1.9	2.4	4.1
3 Redness/discharge from eyes	1.5	1.9	1.9	1.2	1.5	1.3	1.9	2.2
4 Earache	2.2	3.7	3.5	3.0	1.8	2.7	3.3	5.0
5 Discharge/draining from ears	0.3	0.8	0.7	0.2	0.5	0.2	0.8	1.1
6 Skin rash	2.2	0.9	1.0	0.5	0.9	0.6	1.0	1.3
7 Cuts becoming infected	0.3	0.7	0.6	0.6	0.4	0.7	0.5	1.0
8 Nausea	3.1	3.8	3.7	3.0	1.2	2.6	3.3	5.7
9 Vomiting	1.2	1.9	1.8	1.0	0.7	1.0	1.9	2.4
10 Diarrhea	2.2	5.4	5.1	7.0	2.2	4.7	4.8	7.9
11 Diarrhea with blood	0.2	0.1	0.1	0.1	0.1	0.1	0.2	0.1
12 Stomach pain or cramps	4.0	6.5	6.3	6.0	3.4	4.7	6.1	8.5
13 Coughing	7.3	7.2	7.3	5.1	5.5	5.6	6.6	9.4
14 Coughing with phlegm	2.9	3.4	3.5	1.9	3.1	2.7	2.9	4.4
15 Nasal congestion or runny nose	7.1	9.4	9.2	8.0	6.0	8.2	9.6	12.3
16 Sore throat	6.0	6.9	6.9	5.8	4.7	6.4	7.2	8.7
HCGI_1	2.6	3.1	3.1	2.2	1.4	1.7	2.9	4.3
HCGI_2	0.6	1.0	0.9	0.2	0.3	0.5	0.8	1.4
SRD	4.8	5.1	5.2	3.0	3.9	4.2	4.8	6.4

Table 12. Percentage of Days in which Bacterial Indicators Exceeded the Standard Cutoff Levels

A. ASHLAND

Bacterial Indicator	AREA: Storm Drain 0 Yards (%)	1-100 Yards Upcoast (%)	1-100 Yards Downcoast (%)	400 + Yards Upcoast (%)	Cutoff cfu
E. coli	30.8	7.8	9.1	11.7	35
E. coli	19.2	5.2	2.6	3.9	70
Entercoccus	19.0	6.3	5.1	5.1	35
Fecal Coliforms	11.4	3.8	3.8	1.3	200
Total Coliforms	44.3	12.7	12.8	3.8	1000

B. MALIBU

Bacterial Indicator	AREA: Storm Drain 0 Yards (%)	1-100 Yards Upcoast (%)	1-100 Yards Downcoast (%)	400 + Yards Downcoast (%)	Cutoff cfu
E. coli	60.3	24.4	66.7	52.6	35
E. coli	55.1	15.4	53.8	25.6	70
Entercoccus	51.3	19.2	48.7	21.8	35
Fecal Coliforms	52.6	10.3	43.6	11.5	200
Total Coliforms	23.1	3.8	14.1	6.4	1000

C. WILL ROGERS

Bacterial Indicator	AREA: Storm Drain 0 Yards (%)	1-100 Yards Upcoast (%)	1-100 Yards Downcoast (%)	400 + Yards Downcoast (%)	Cutoff cfu
E. coli	74.0	21.9	45.2	15.1	35
E. coli	58.9	13.7	17.8	1.4	70
Entercoccus	79.5	23.3	42.5	9.6	35
Fecal Coliforms	56.2	6.8	8.2	1.4	200
Total Coliforms	46.6	5.5	5.5	0.0	1000

Note: Samples collected once daily between 8 am and 11 am.

cfu = colony forming units

Table 13. Percentage of Days in which Bacterial Indicators Exceeded the Higher Cutoff Levels

A. ASHLAND

Bacterial Indicator	AREA: Storm Drain 0 Yards (%)	1-100 Yards Upcoast (%)	1-100 Yards Downcoast (%)	400 + Yards Upcoast (%)	Cutoff cfu
E. coli	9.0	1.3	0.0	0.0	160
E. coli	6.4	1.3	0.0	0.0	320
Entercoccus	6.3	0.0	1.3	0.0	106
Fecal Coliforms	10.1	1.3	1.3	0.0	400
Total Coliforms	25.3	1.3	3.8	0.0	5,000
Total Coliforms	15.2	0.0	1.3	0.0	10,000

B. MALIBU

Bacterial Indicator	AREA: Storm Drain 0 Yards (%)	1-100 Yards Upcoast (%)	1-100 Yards Downcoast (%)	400 + Yards Downcoast (%)	Cutoff cfu
E. coli	47.4	10.3	33.3	7.7	160
E. coli	39.7	7.7	19.2	1.3	320
Entercoccus	34.6	5.1	17.9	2.6	106
Fecal Coliforms	46.2	6.4	21.8	2.6	400
Total Coliforms	5.1	2.6	1.3	0.0	5,000
Total Coliforms	3.8	1.3	0.0	0.0	10,000

C. WILL ROGERS

Bacterial Indicator	AREA: Storm Drain 0 Yards (%)	1-100 Yards Upcoast (%)	1-100 Yards Downcoast (%)	400 + Yards Downcoast (%)	Cutoff cfu
E. coli	42.5	5.5	8.2	0.0	160
E. coli	28.8	1.4	1.4	0.0	320
Entercoccus	45.2	6.8	9.6	1.4	106
Fecal Coliforms	32.9	1.4	2.7	0.0	400
Total Coliforms	16.4	1.4	2.7	0.0	5,000
Total Coliforms	6.8	0.0	1.4	0.0	10,000

Note: Samples collected once daily between 8 am and 11 am.

cfu = colony forming units

Table 14. Total Coliforms/Enterococcus Within Specified Ranges

A. ASHLAND

Total Coliforms/Enterococcus	AREA: Storm Drain 0 Yards (% of days)	1-100 Yards Upcoast (% of days)	1-100 Yards Downcoast (% of days)	400 + Yards Upcoast (% of days)
<=7	2.5	21.5	25.6	21.8
<=10	11.4	27.9	26.9	29.5
<=13	15.2	30.4	30.8	42.3

B. MALIBU

Total Coliforms/Enterococcus	AREA: Storm Drain 0 Yards (% of days)	1-100 Yards Upcoast (% of days)	1-100 Yards Downcoast (% of days)	400 + Yards Downcoast (% of days)
<=7	44.9	66.7	50.0	51.3
<=10	59.0	78.2	74.4	74.4
<=13	68.0	84.6	80.8	83.3

C. WILL ROGERS

Total Coliforms/Enterococcus	AREA: Storm Drain 0 Yards (% of days)	1-100 Yards Upcoast (% of days)	1-100 Yards Downcoast (% of days)	400 + Yards Downcoast (% of days)
<=7	46.6	65.8	69.9	83.6
<=10	60.3	78.1	79.5	91.8
<=13	69.9	82.2	89.0	95.9

Note: Samples collected once daily between 8 am and 11 am.

Table 15. Total Coliforms/Fecal Coliforms Within Specified Ranges

A. ASHLAND

	AREA			
Total Coliforms/Fecal Coliforms	Storm Drain 0 Yards **(% of days)**	1-100 Yards Upcoast **(% of days)**	1-100 Yards Downcoast **(% of days)**	400 + Yards Upcoast **(% of days)**
<=5	17.7	34.2	30.8	48.7
<=4	17.7	29.1	26.9	41.0
<=2	7.6	20.3	14.1	24.4

B. MALIBU

	AREA			
Total Coliforms/Fecal Coliforms	Storm Drain 0 Yards **(% of days)**	1-100 Yards Upcoast **(% of days)**	1-100 Yards Downcoast **(% of days)**	400 + Yards Downcoast **(% of days)**
<=5	82.1	85.9	88.5	89.7
<=4	80.8	82.1	82.1	84.6
<=2	51.3	68.0	55.1	60.3

C. WILL ROGERS

	AREA			
Total Coliforms/Fecal Coliforms	Storm Drain 0 Yards **(% of days)**	1-100 Yards Upcoast **(% of days)**	1-100 Yards Downcoast **(% of days)**	400 + Yards Downcoast **(% of days)**
<=5	52.1	76.7	75.3	84.9
<=4	41.1	72.6	63.0	75.3
<=2	13.7	27.4	24.7	30.1

Note: Samples collected once daily between 8 am and 11 am.

Table 16. Total Coliforms/Fecal Coliforms Within Specified Ranges On Days When Total Coliforms > 1000 and > 5000

A. ASHLAND

AREA

> 1000 Total Coliforms/Fecal Coliforms	Storm Drain 0 Yards (% of days)	1-100 Yards Upcoast (% of days)	1-100 Yards Downcoast (% of days)	400 + Yards Upcoast (% of days)
<=5	0.0	0.0	0.0	0.0
<=4	0.0	0.0	0.0	0.0
<=2	0.0	0.0	0.0	0.0

> 5000

Total Coliforms/Fecal Coliforms				
<=5	0.0	0.0	0.0	-
<=4	0.0	0.0	0.0	-
<=2	0.0	0.0	0.0	-

B. MALIBU

AREA

> 1000 Total Coliforms/Fecal Coliforms	Storm Drain 0 Yards (% of days)	1-100 Yards Upcoast (% of days)	1-100 Yards Downcoast (% of days)	400 + Yards Downcoast (% of days)
<=5	55.6	0.0	54.6	20.0
<=4	55.6	0.0	36.4	0.0
<=2	16.7	0.0	18.2	0.0

> 5000

Total Coliforms/Fecal Coliforms				
<=5	25.0	0.0	0.0	-
<=4	25.0	0.0	0.0	-
<=2	0.0	0.0	0.0	-

Note: Samples collected once daily between 8 am and 11 am.

Table 16 Continued. Total Coliforms/Fecal Coliforms Within Specified Ranges On Days When Total Coliforms > 1000 and > 5000

C. WILL ROGERS

> 1000	AREA			
Total Coliforms/Fecal Coliforms	Storm Drain 0 Yards **(% of days)**	1-100 Yards Upcoast **(% of days)**	1-100 Yards Downcoast **(% of days)**	400 + Yards Downcoast **(% of days)**
<=5	50.0	25.0	75.0	-
<=4	41.2	25.0	75.0	-
<=2	14.7	0.0	0.0	-

> 5000

Total Coliforms/Fecal Coliforms				
<=5	33.3	0.0	50.0	-
<=4	33.3	0.0	50.0	-
<=2	16.7	0.0	0.0	-

Note: Samples collected once daily between 8 am and 11 am.

Figure 5A. Daily *E.coli* Indicator Counts at Ashland Beach (Cutoff = 35 cpu)

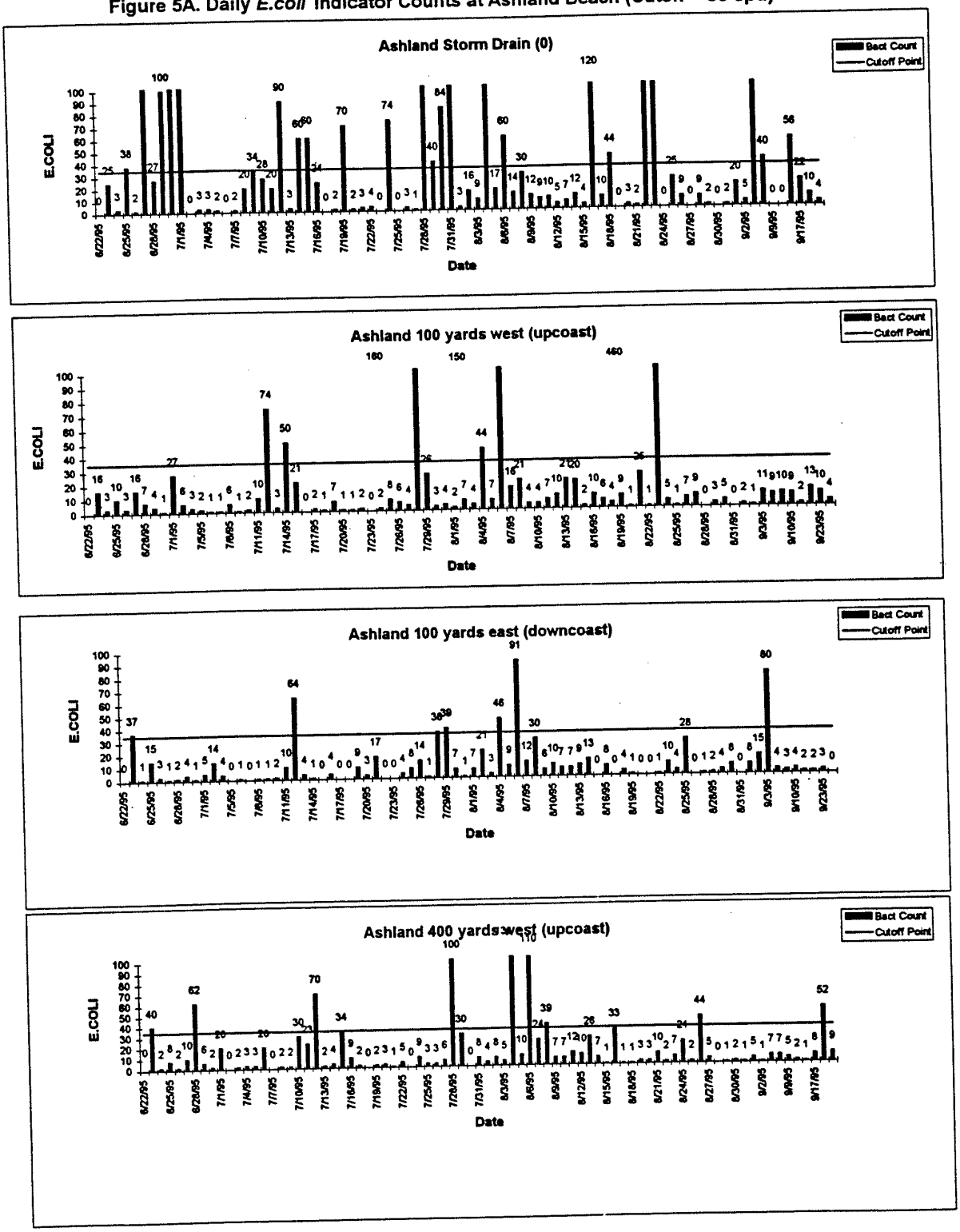

Figure 5A, cont. Daily *E.coli* Indicator Counts at Ashland Beach (Cutoff = 70 cpu)

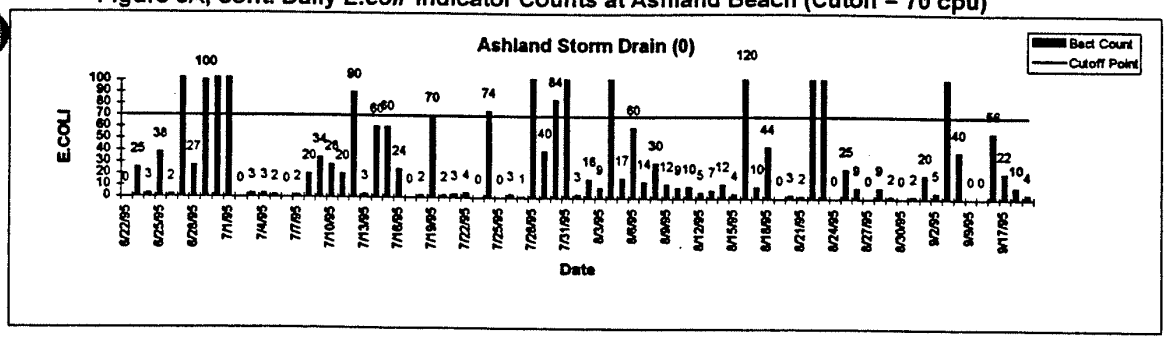

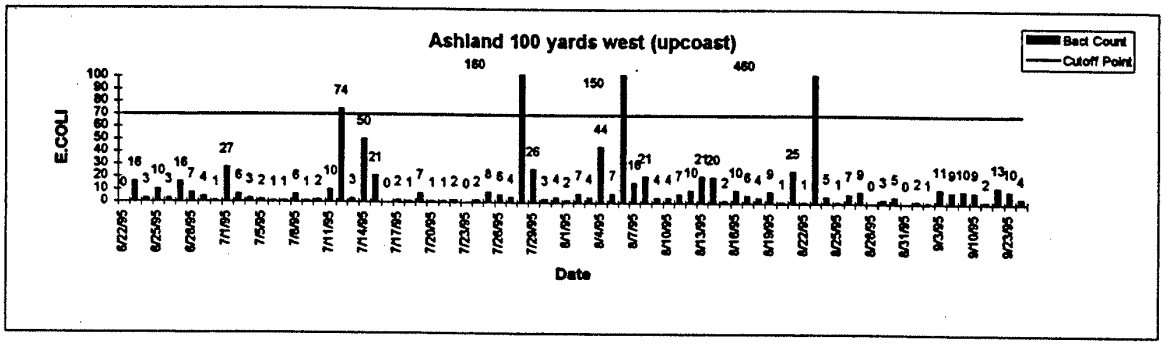

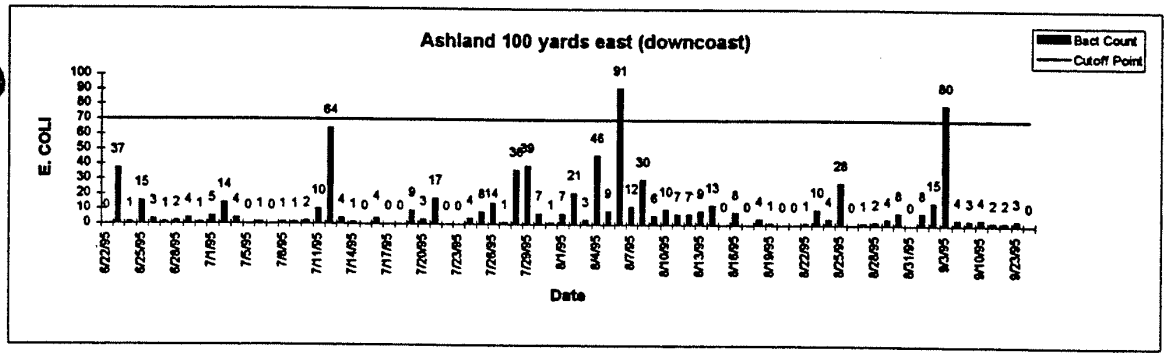

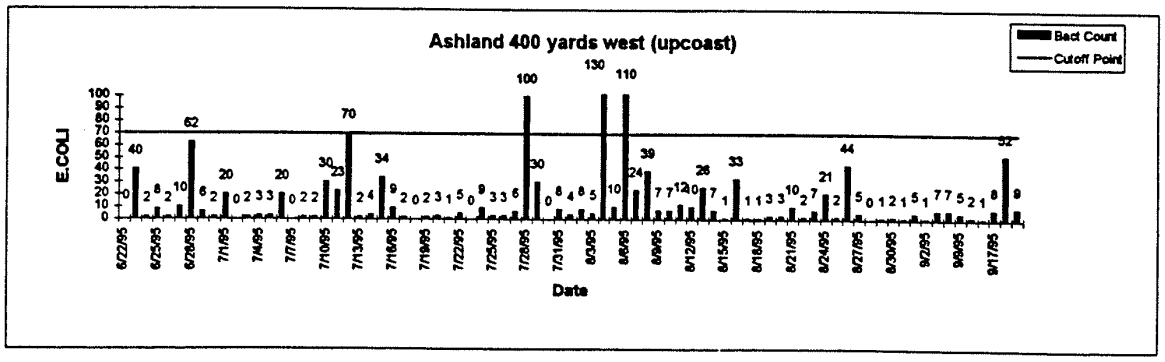

Figure 5B. Daily Enterococcus Indicator Counts at Ashland Beach (Cutoff = 35 cpu)

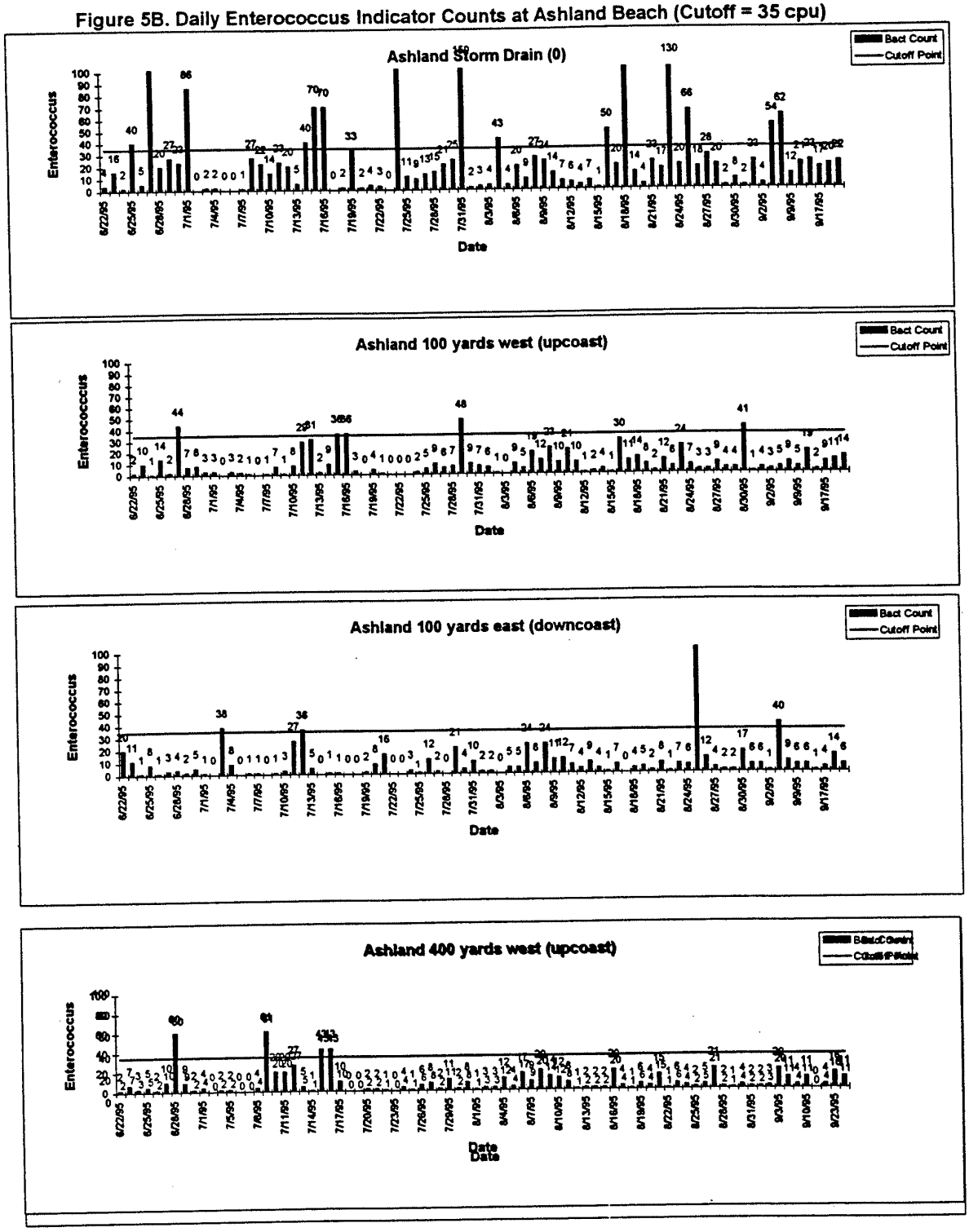

Figure 5B, cont. Daily Enterococcus Indicator Counts at Ashland Beach (Cutoff = 106 cpu)

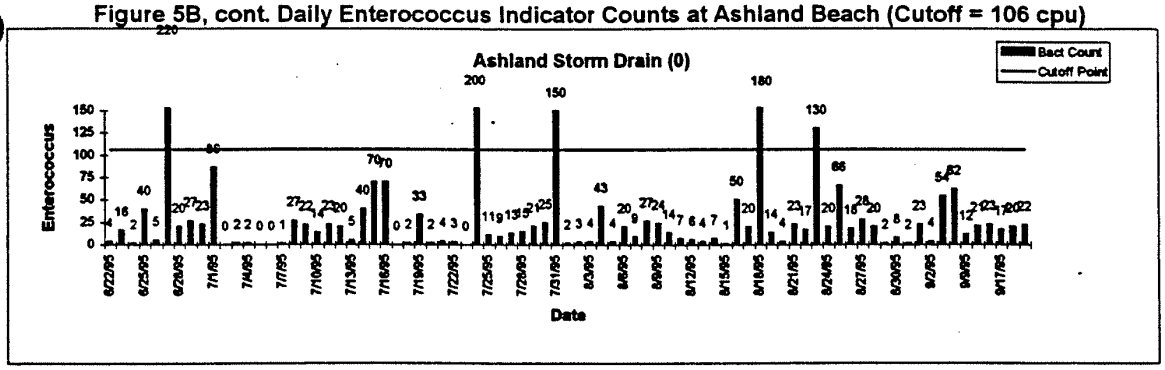

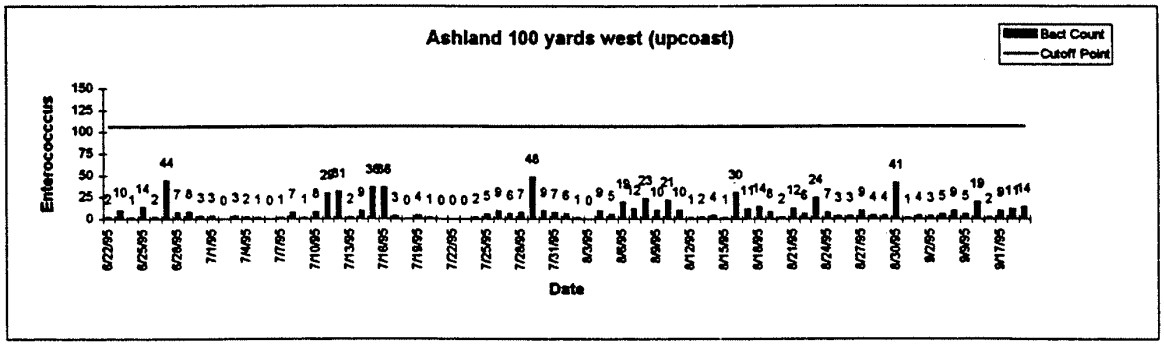

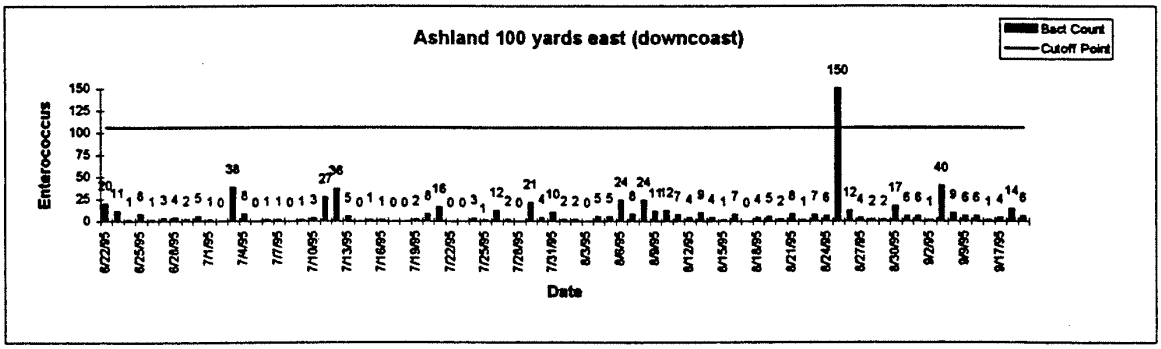

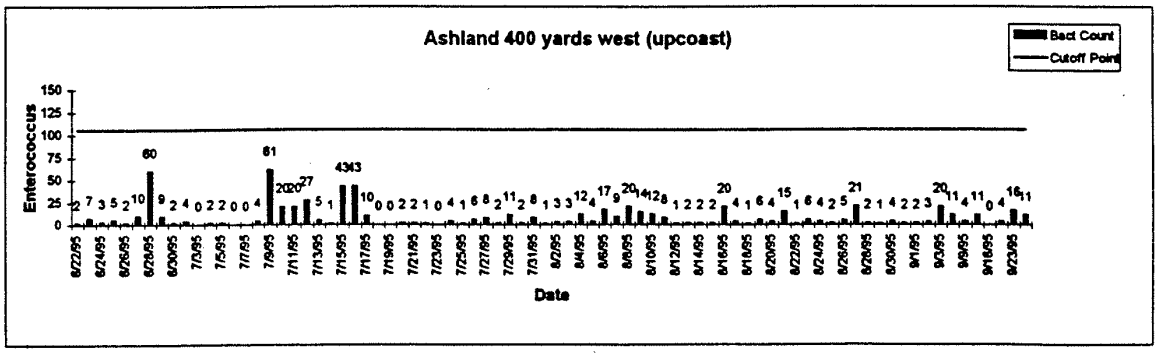

Figure 5C. Daily Fecal Coliform Indicator Counts at Ashland Beach (Cutoff = 200 cpu)

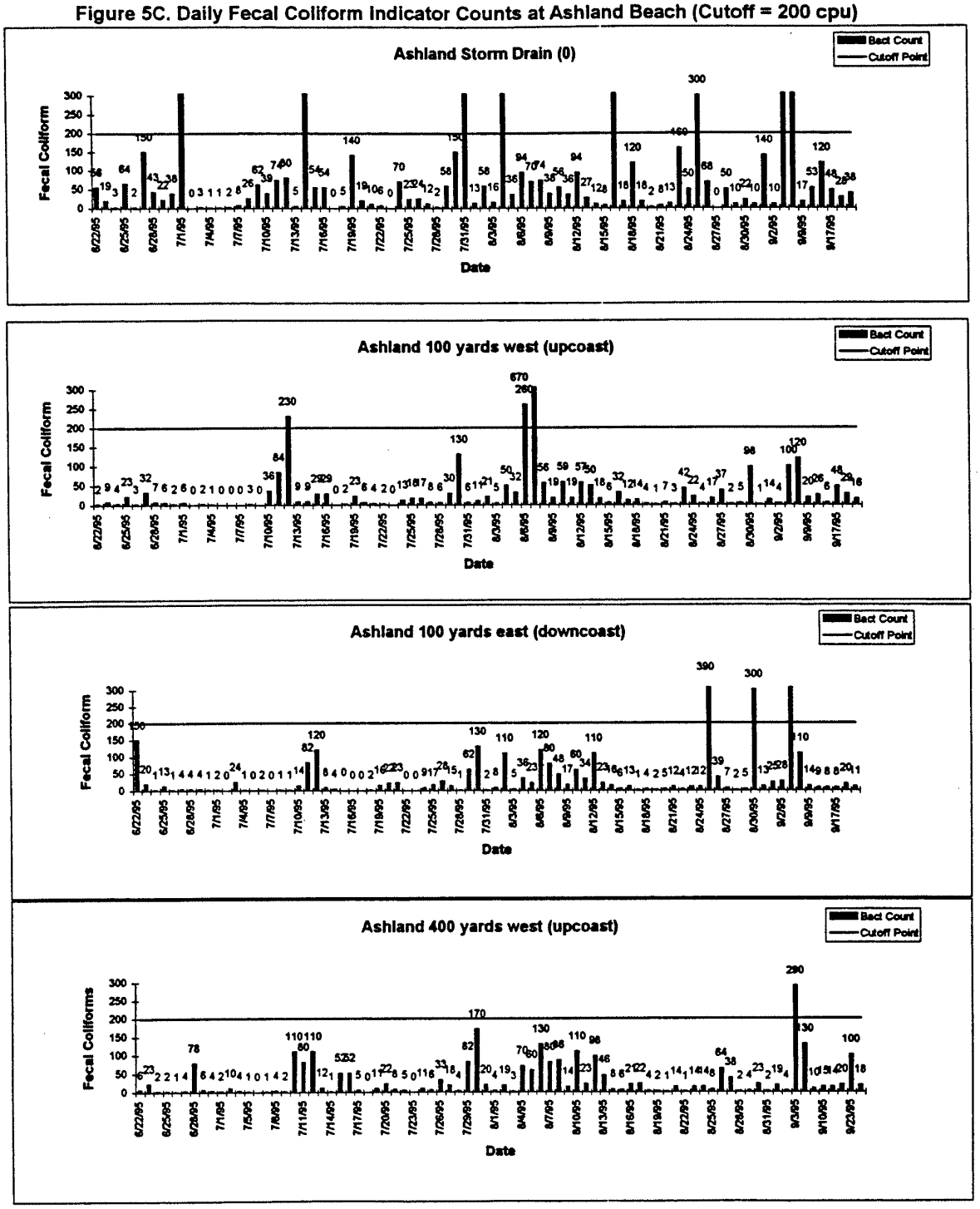

Figure 5C, cont. Daily Fecal Coliform Indicator Counts at Ashland Beach (Cutoff = 400 cpu)

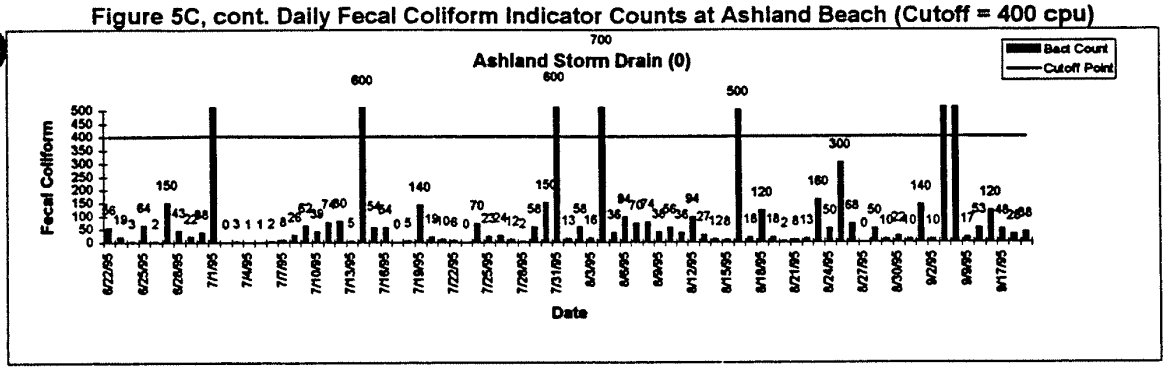

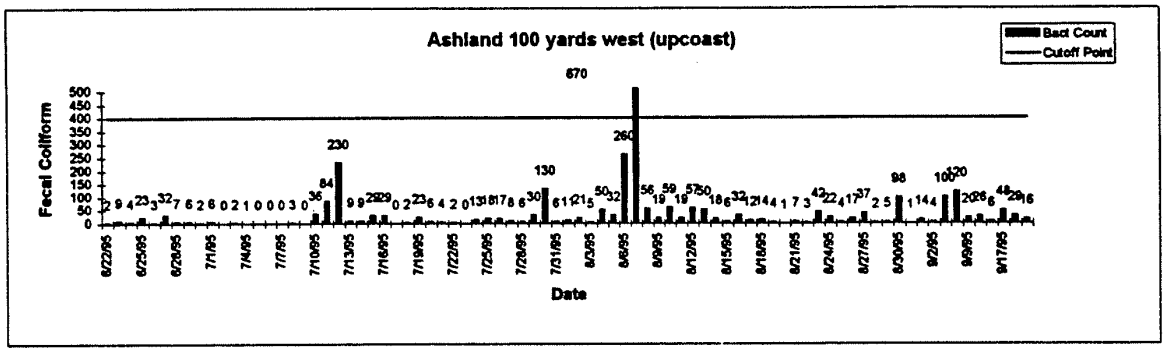

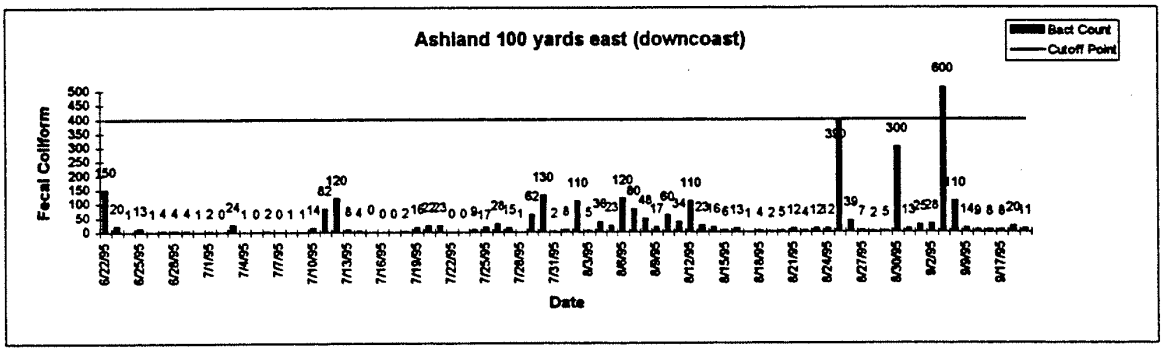

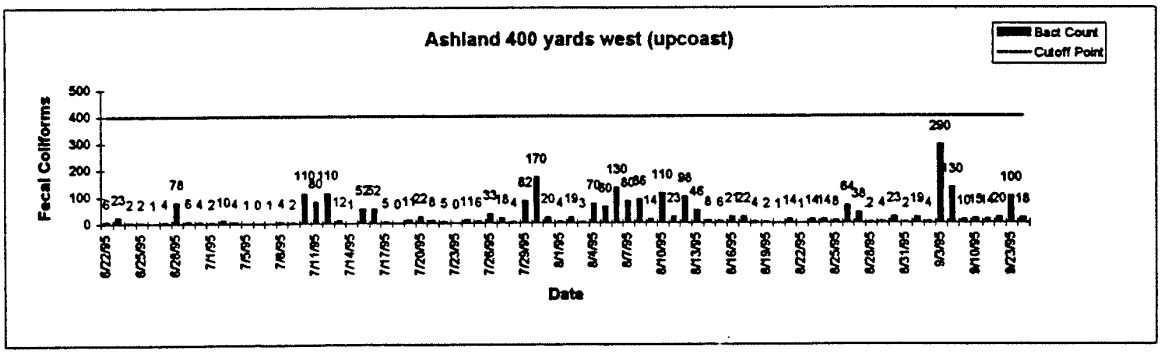

Figure 5D. Daily Total Coliform Indicator Counts at Ashland Beach (Cutoff = 1000 cpu)

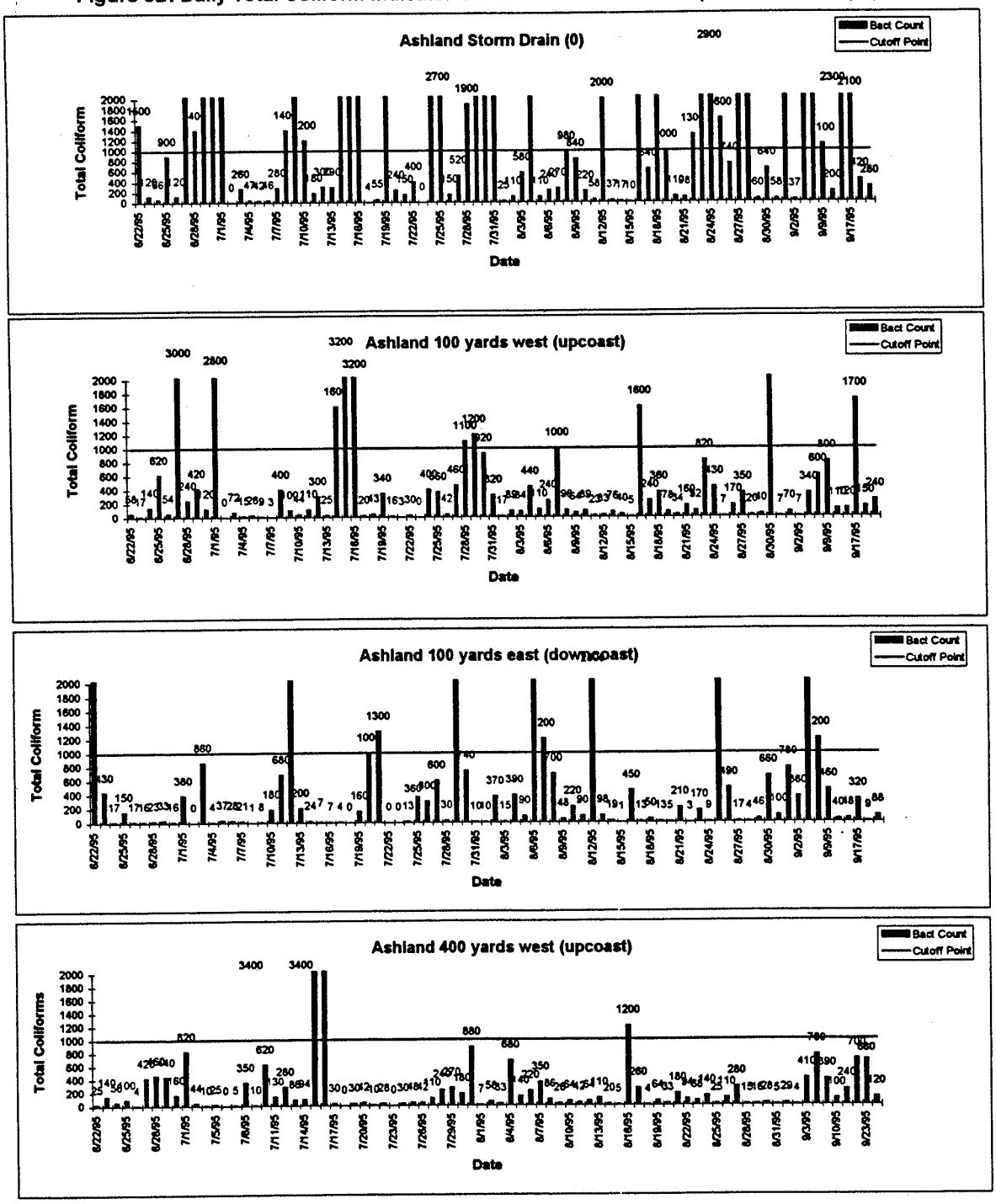

Figure 5D, cont. Daily Total Coliform Indicator Counts at Ashland Beach (Cutoff = 10,000 cpu)

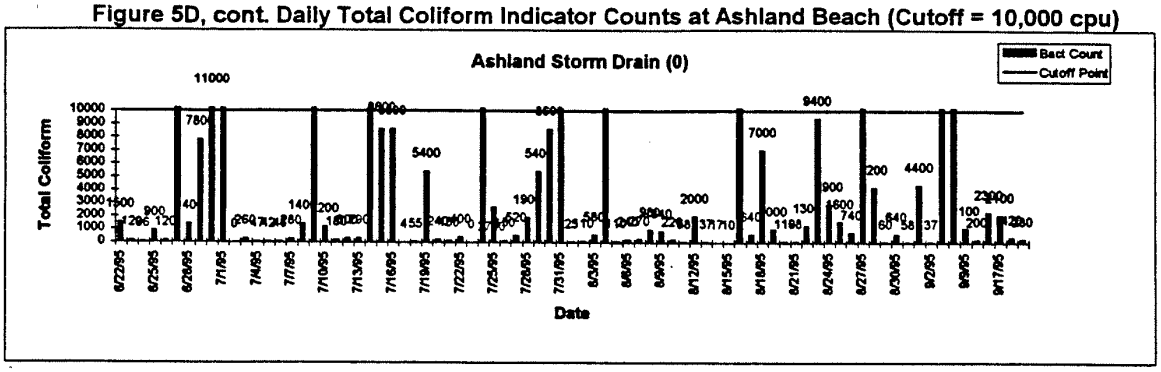

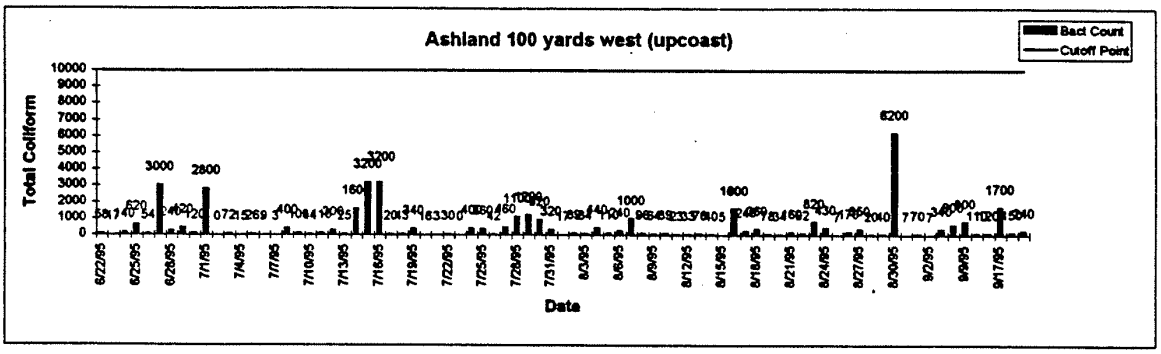

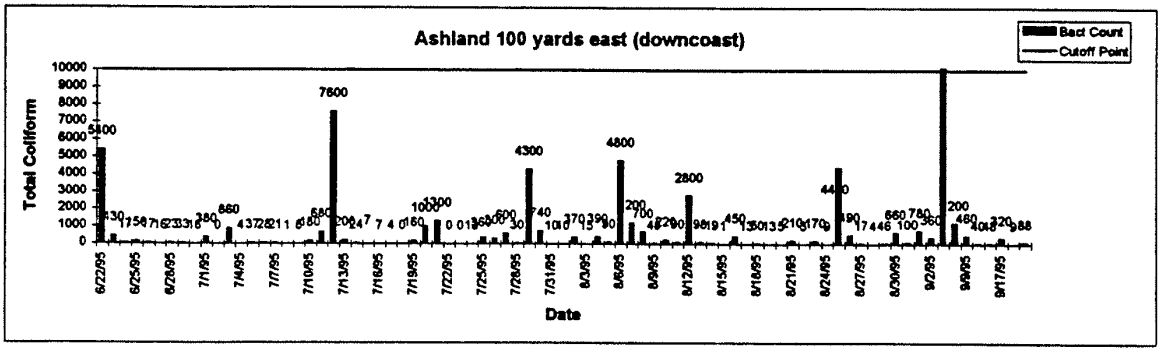

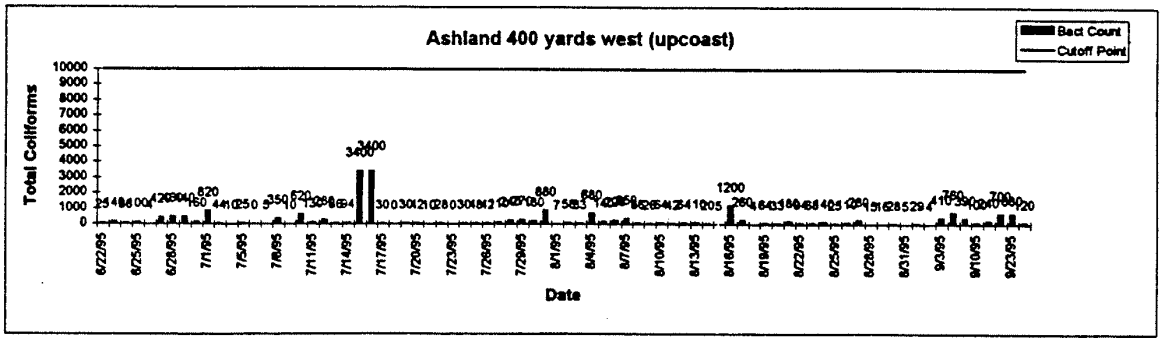

Figure 6A. Daily *E.coli* Indicator Counts at Malibu Beach (Cutoff = 35 cpu)

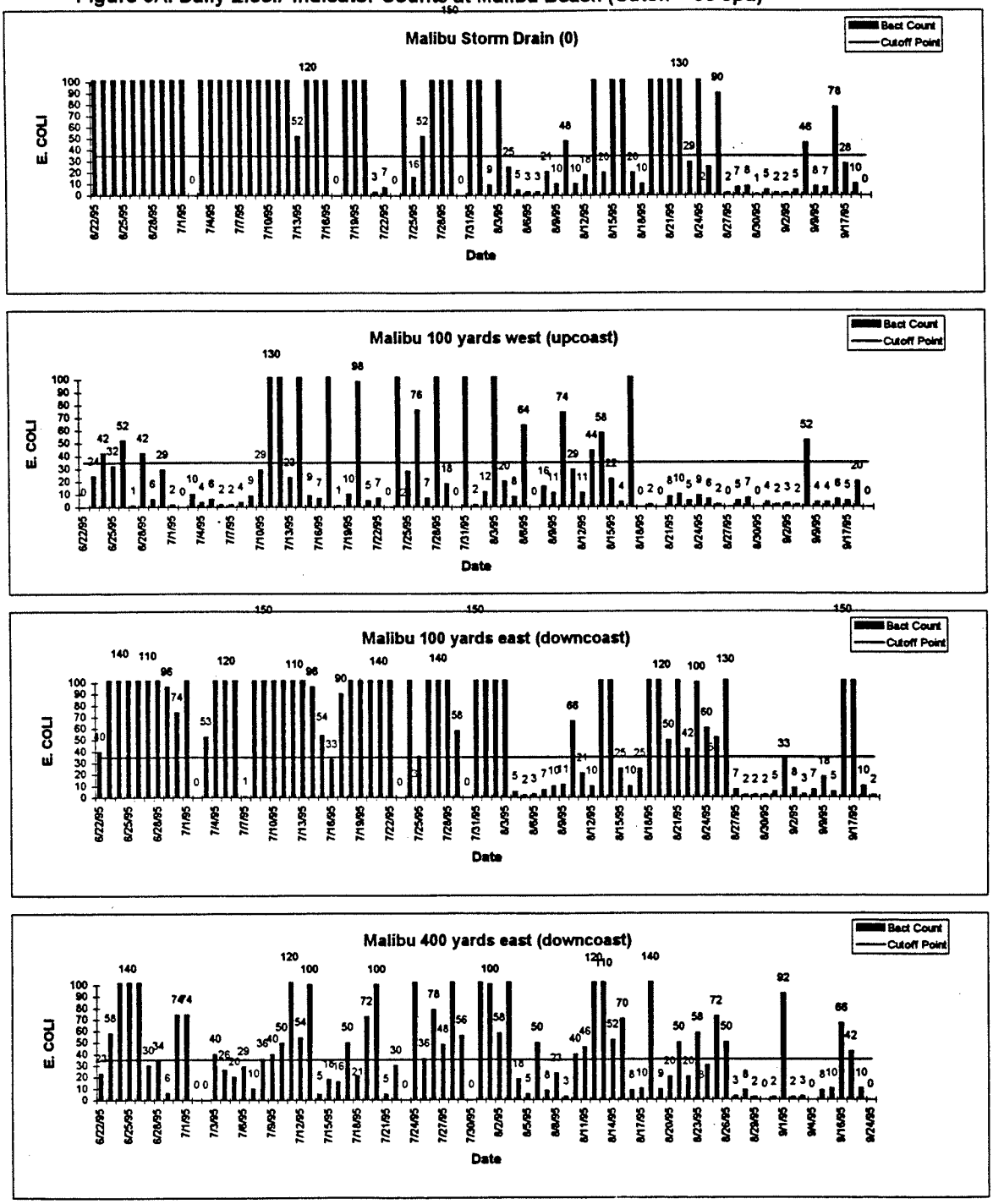

Figure 6A, cont. Daily *E.coli* Indicator Counts at Malibu Beach (Cutoff = 70 cpu)

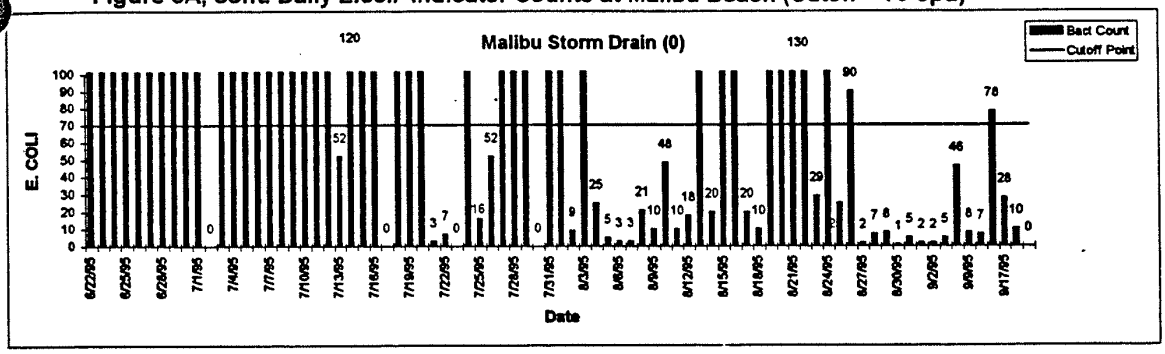

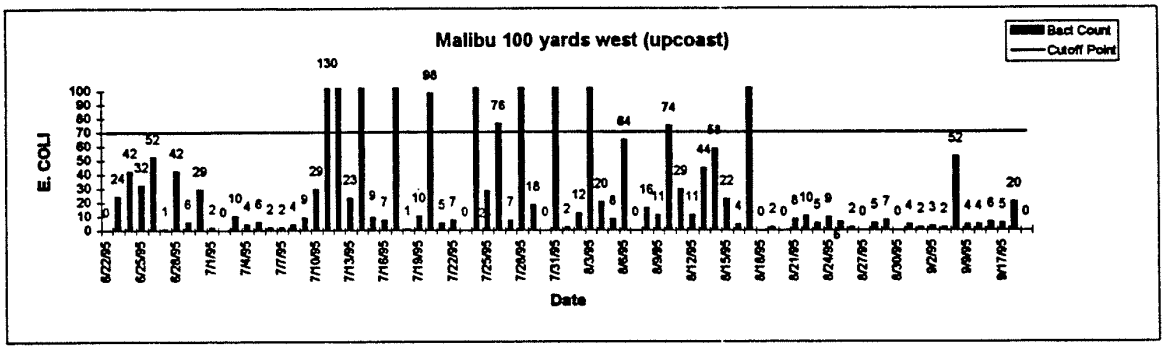

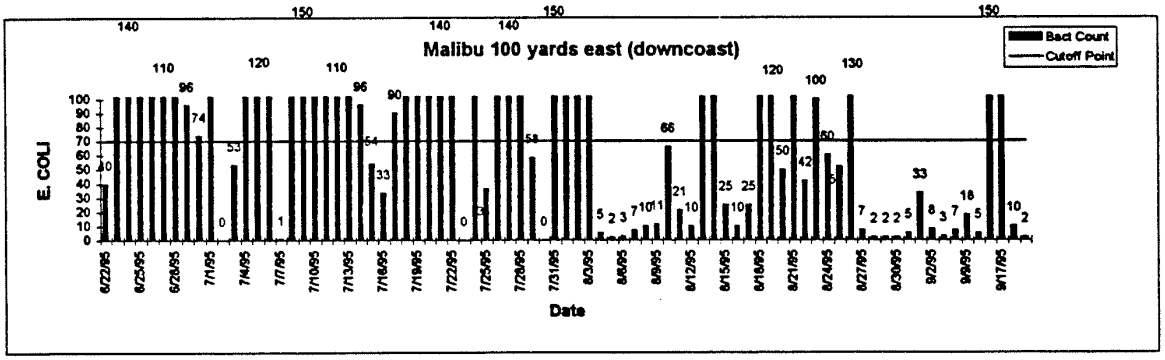

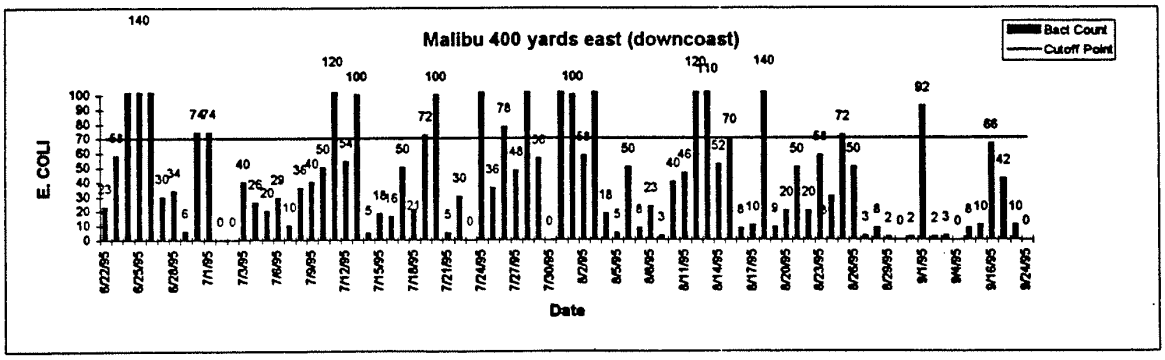

Figure 6B. Daily Enterococcus Indicator Counts at Malibu Beach (Cutoff = 35 cpu)

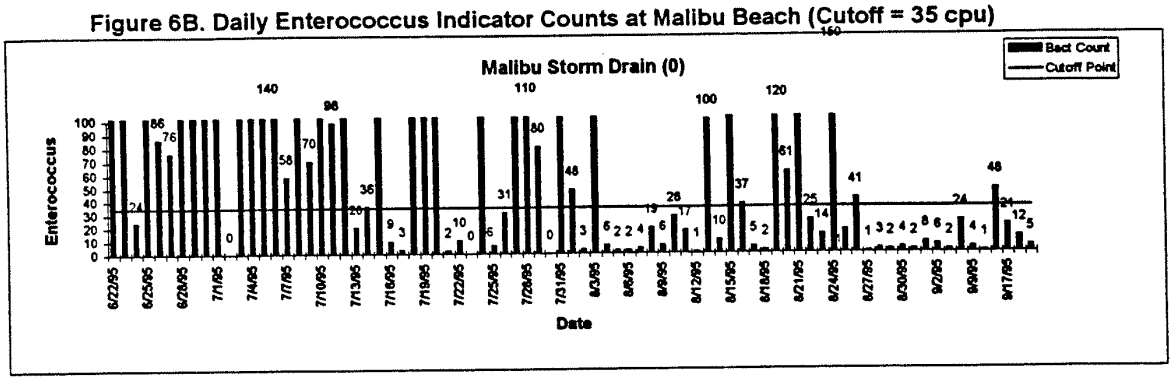

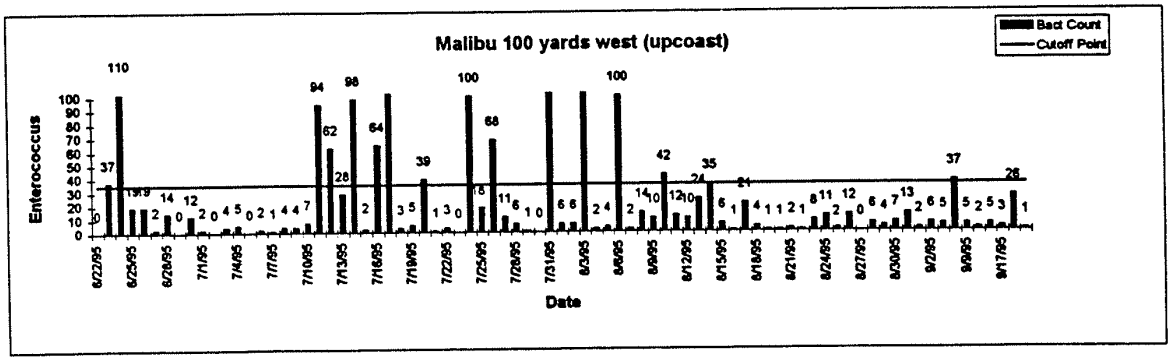

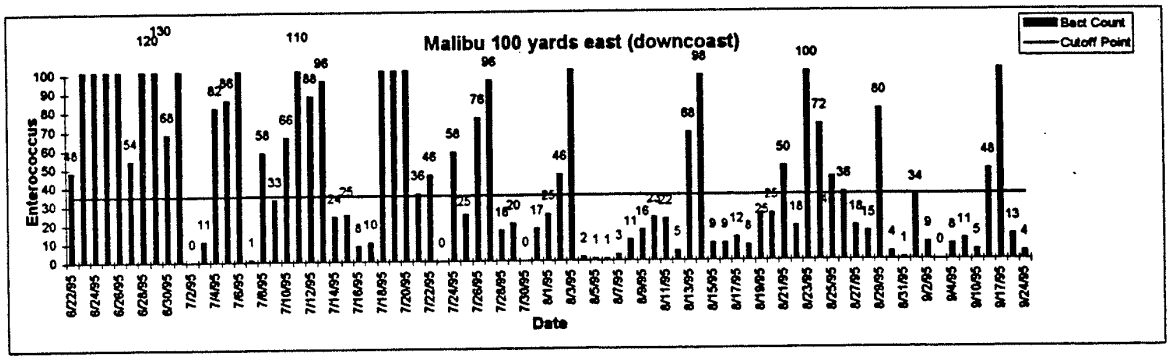

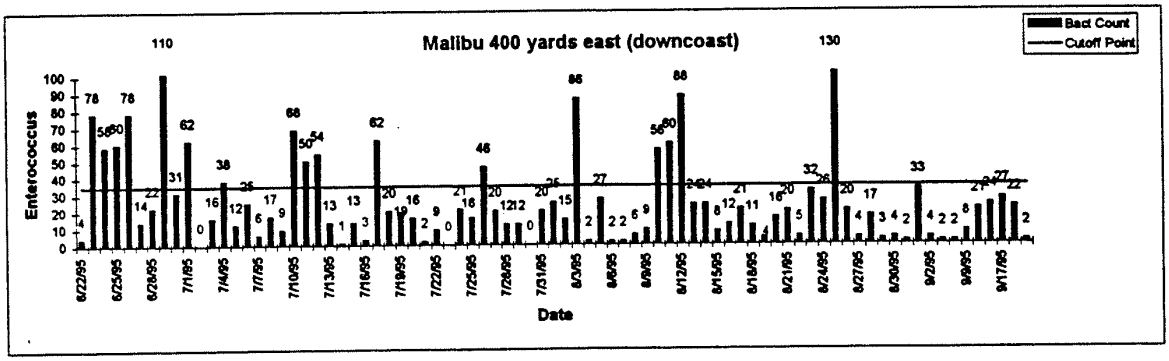

Figure 6B, cont. Daily Enterococcus Indicator Counts at Malibu Beach (Cutoff = 106 cpu)

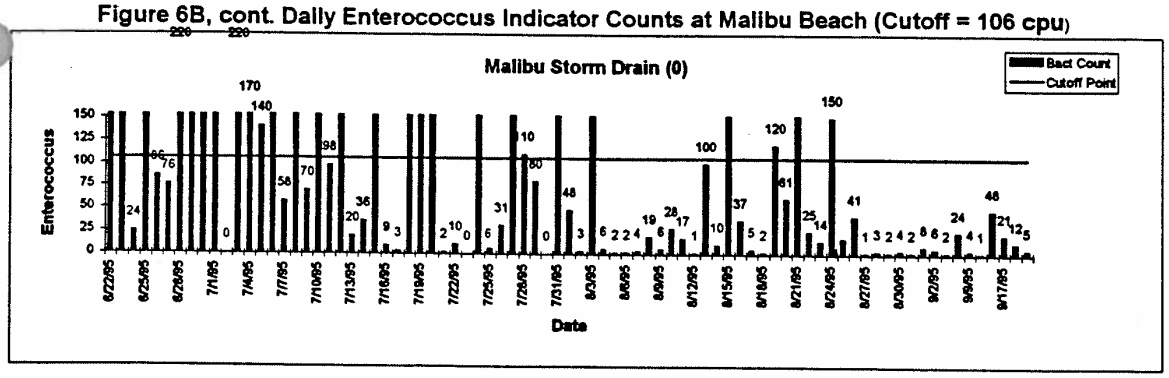

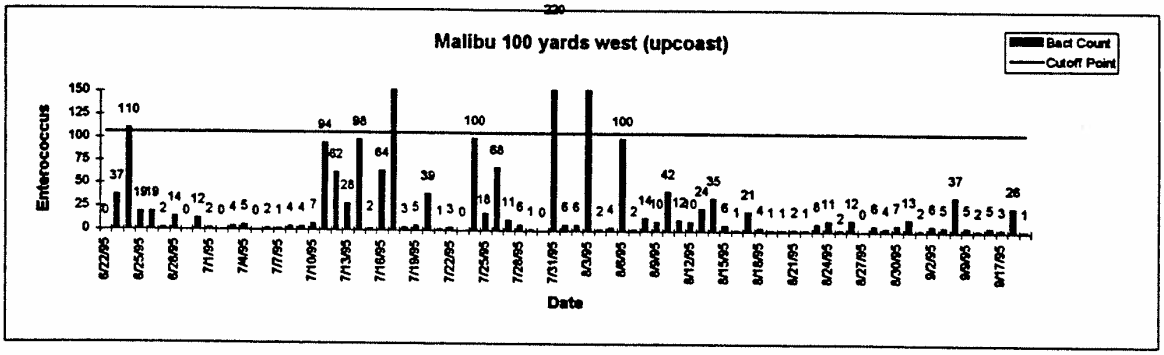

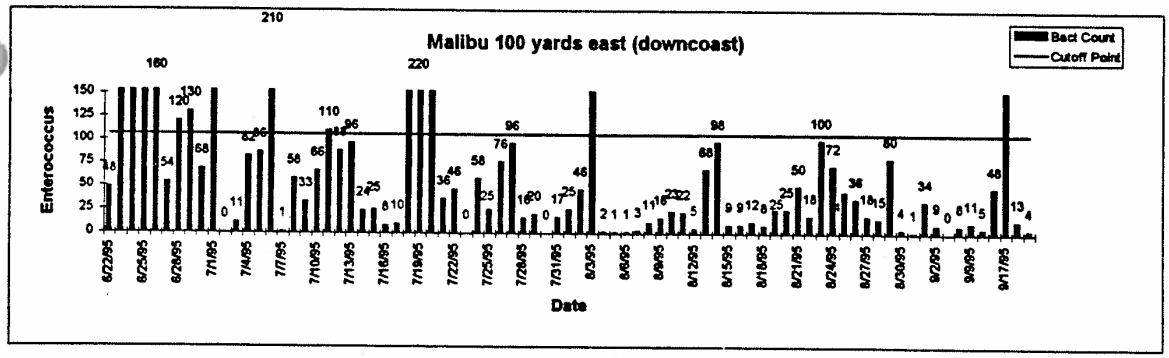

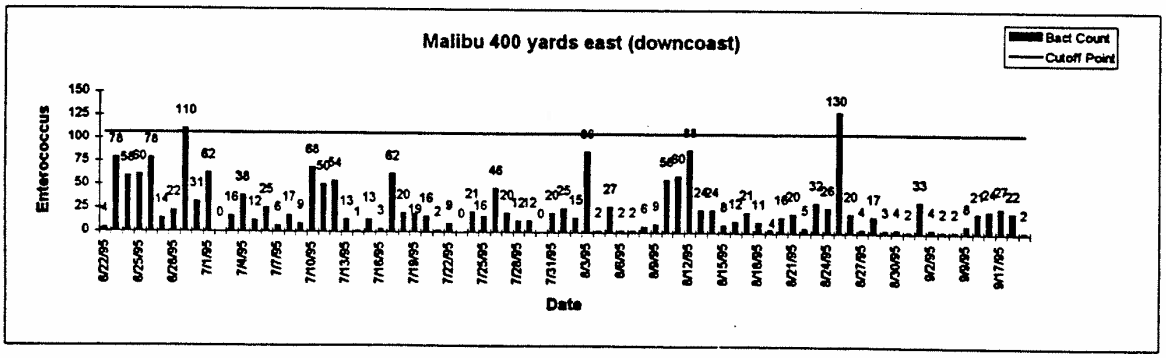

Table 6C. Daily Fecal Coliform Indicator Counts at Malibu Beach (Cutoff = 200 cpu)

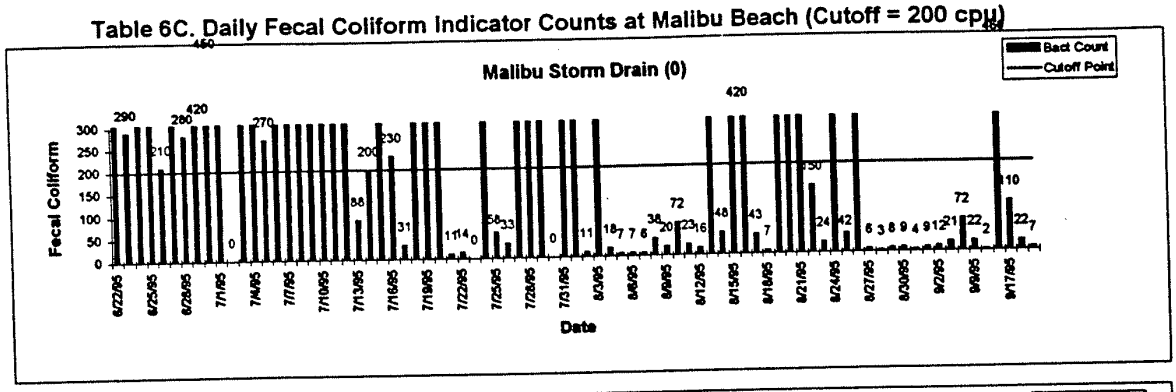

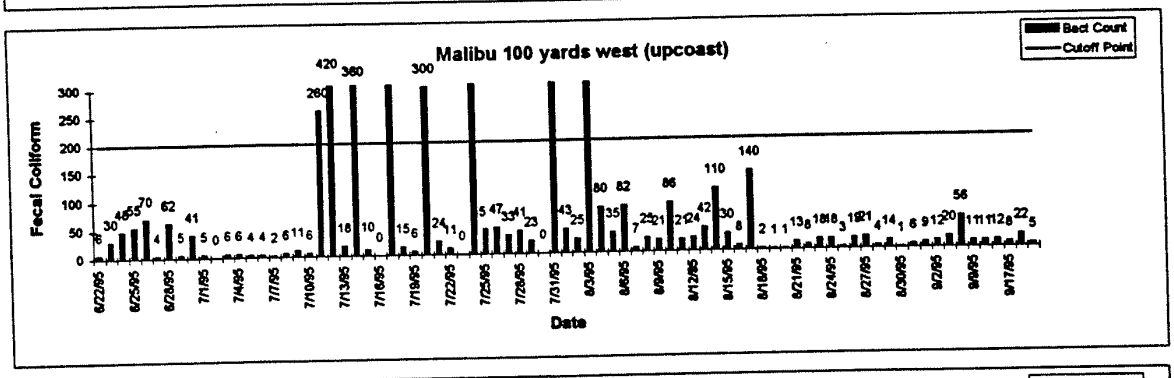

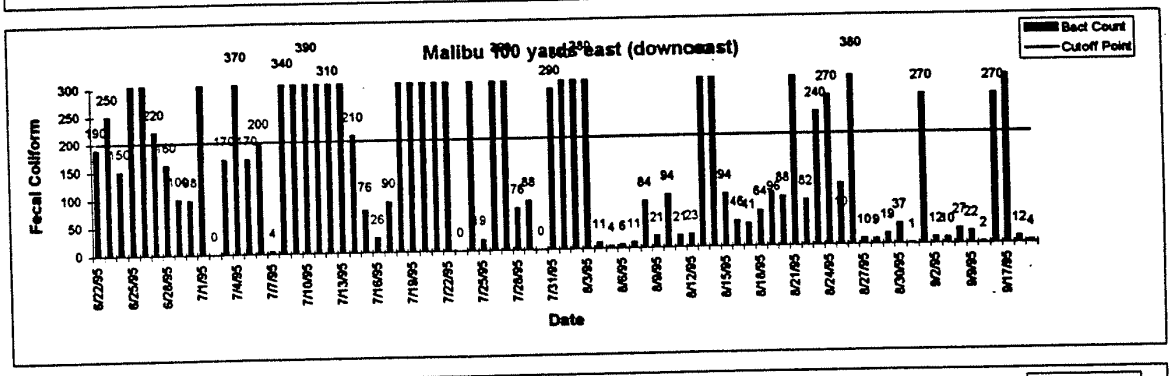

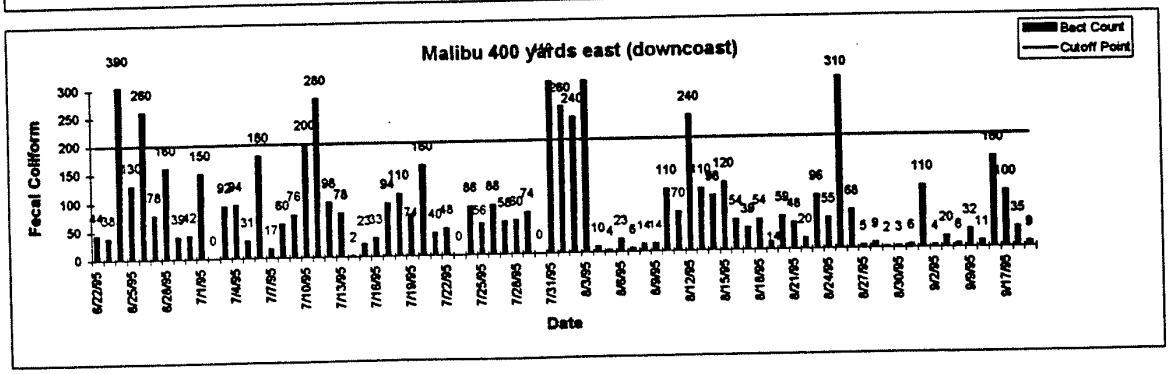

Figure 6C, cont. Daily Fecal Coliform Indicator Counts at Malibu Beach (Cutoff = 400 cpu)

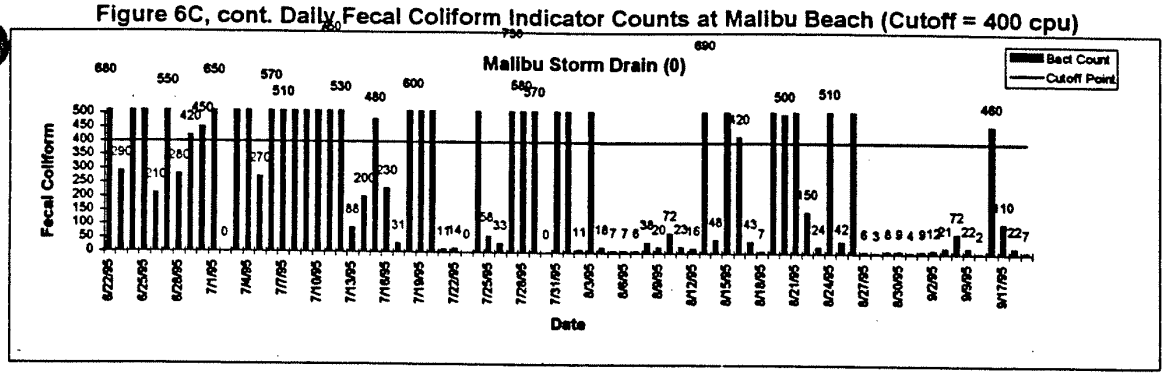

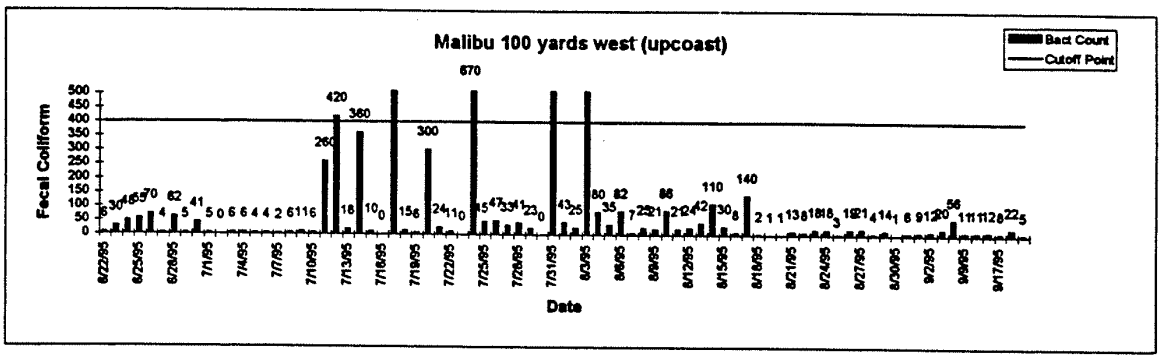

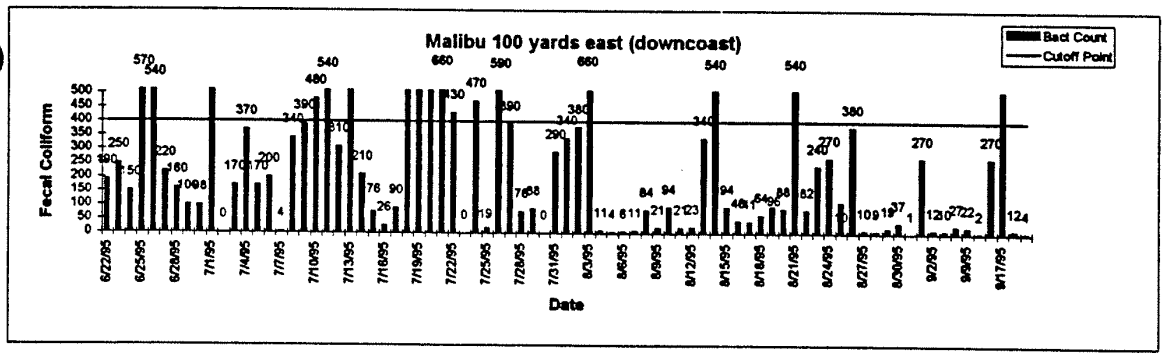

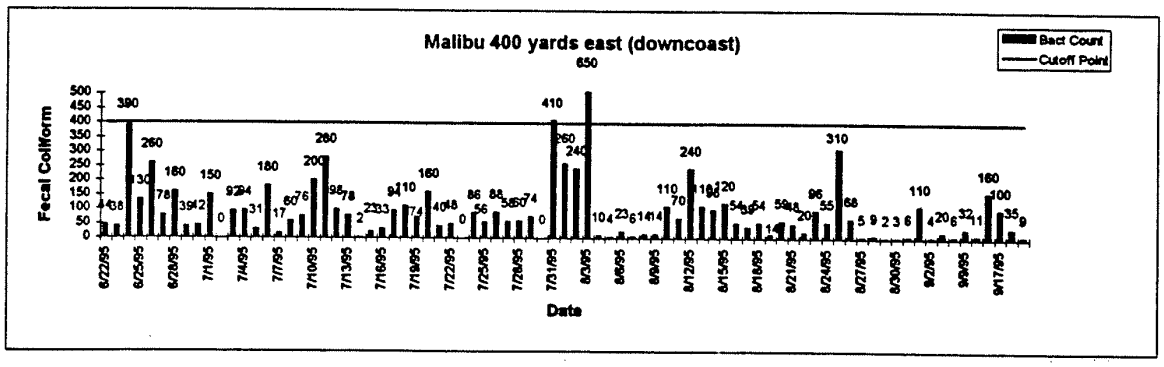

Table 6D. Daily Total Coliform Indicator Counts at Malibu Beach (Cutoff = 1000 cpu)

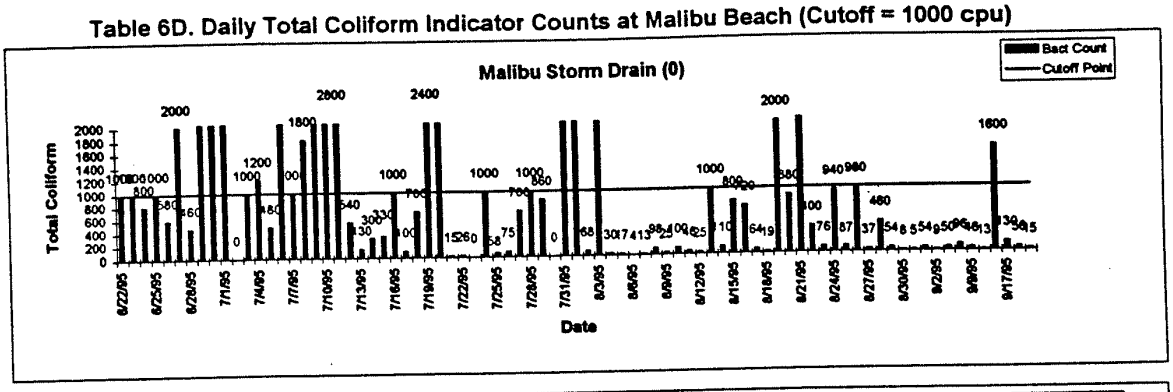

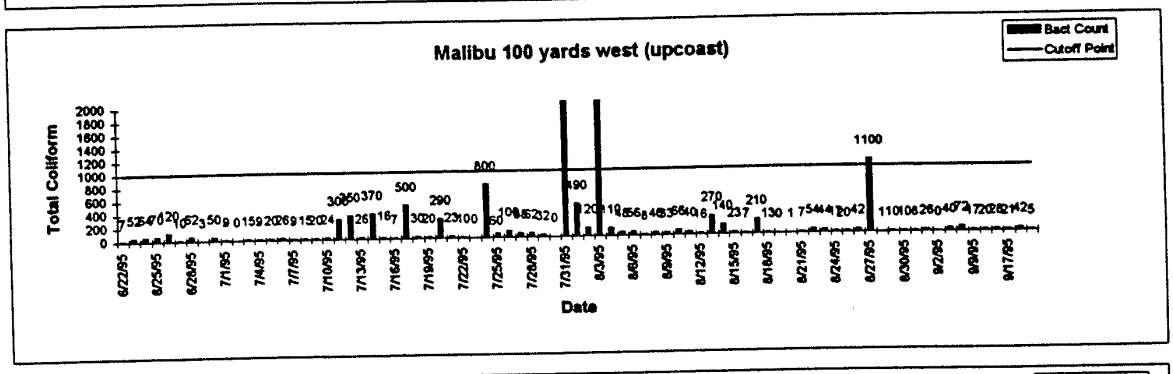

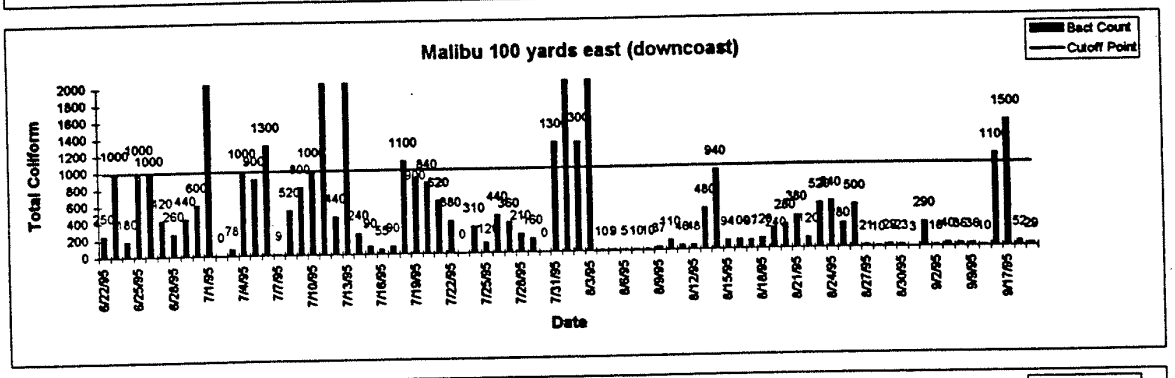

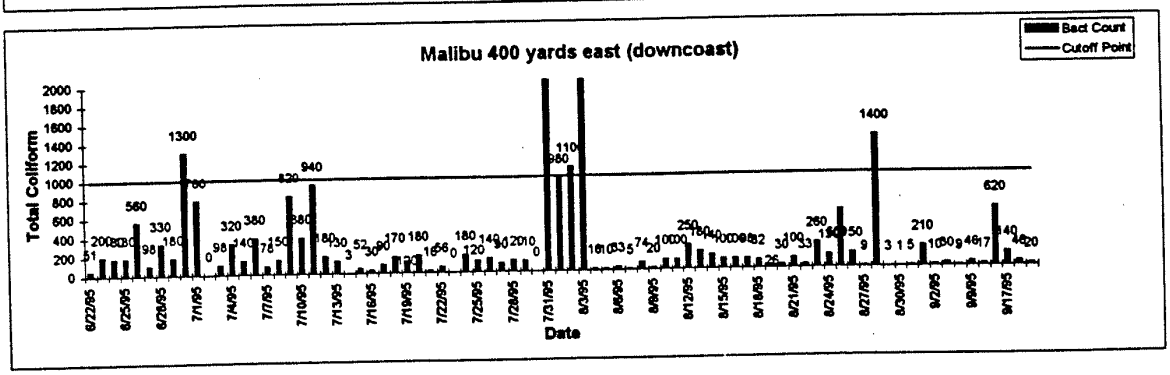

Figure 6D, cont. Daily Total Coliform Indicator Counts at Malibu Beach (Cutoff = 10,000 cpu)

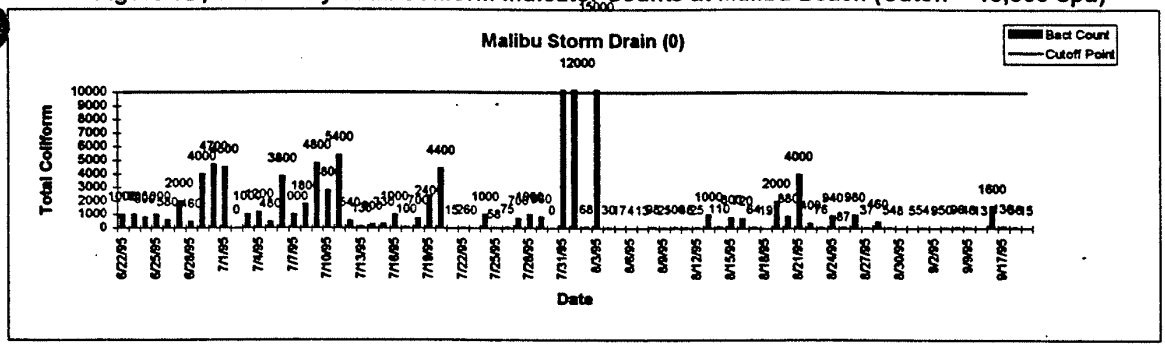

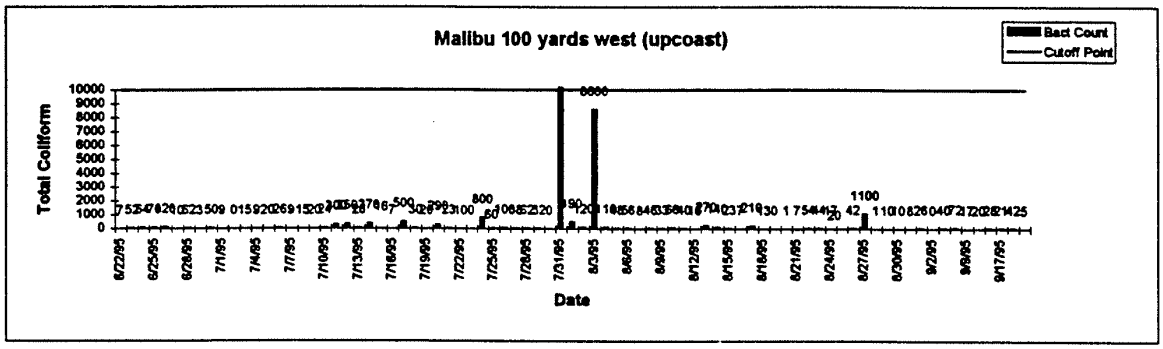

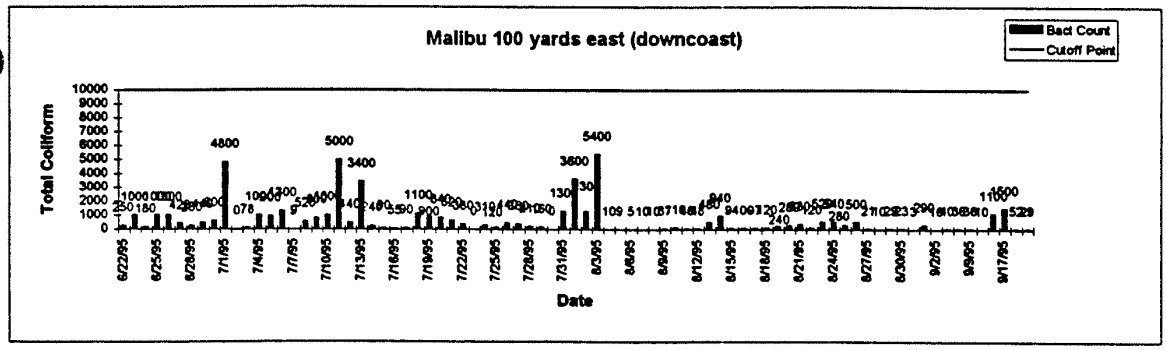

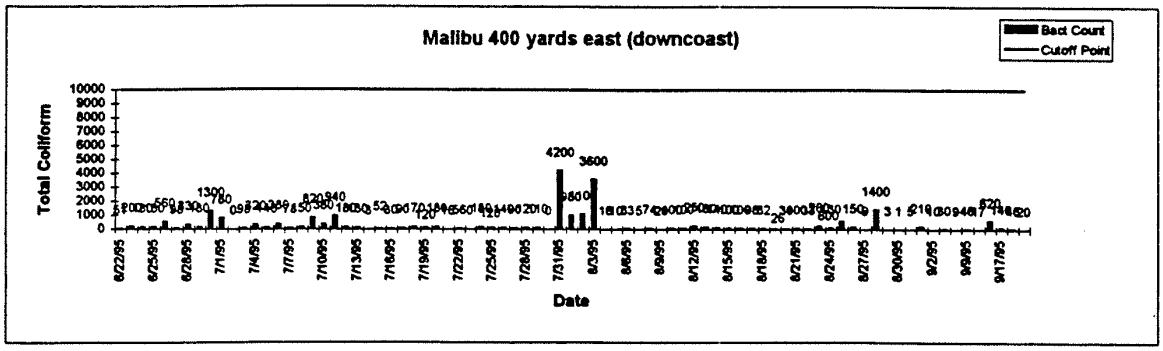

Figure 7A. Daily *E.coli* Indicator Counts at Will Rogers Beach (Cutoff = 35 cpu)

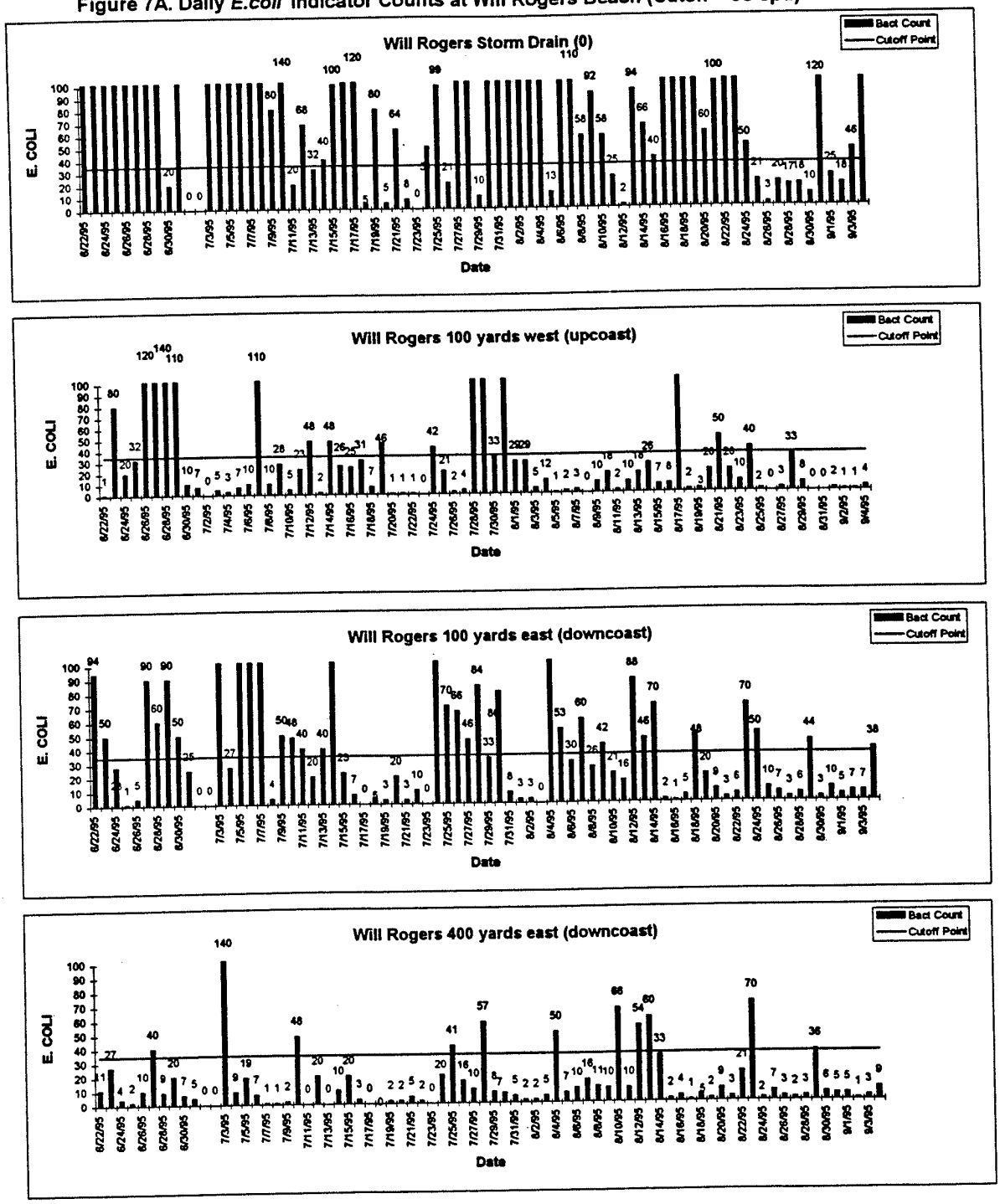

Figure 7A, cont. Daily *E.coli* Indicator Counts at Will Rogers Beach (Cutoff = 70 cpu)

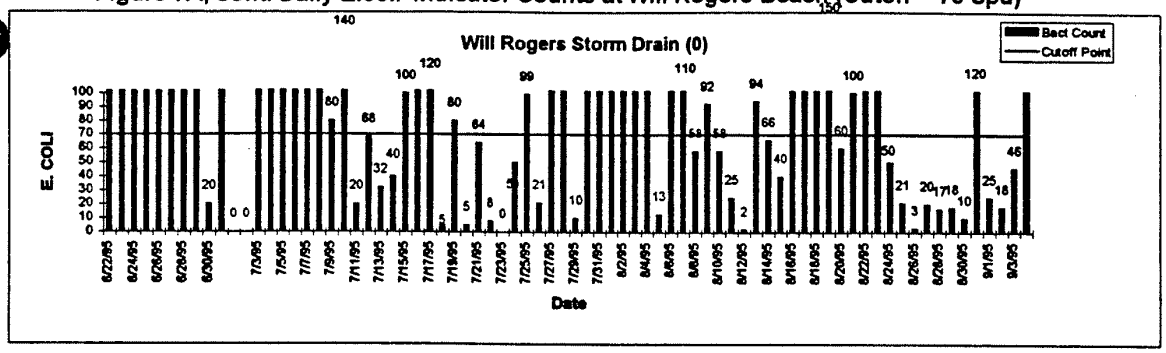

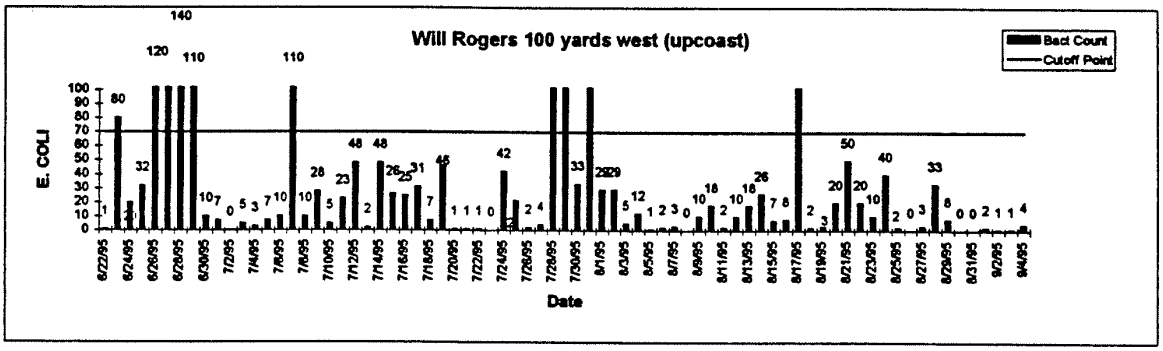

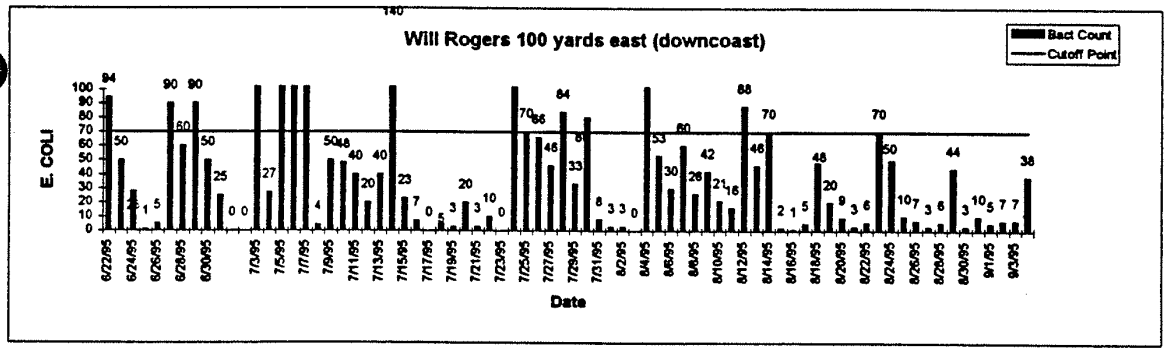

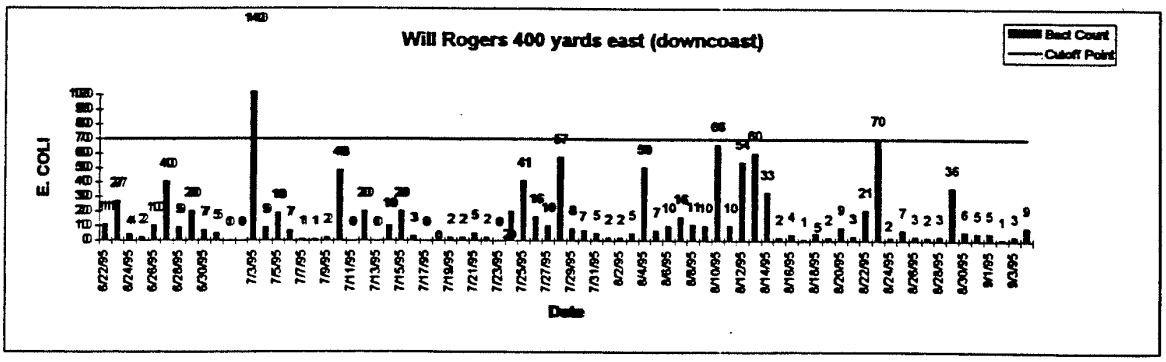

Figure 7B. Daily Enterococcus Indicator Counts at Will Rogers Beach (Cutoff = 35 cpu)

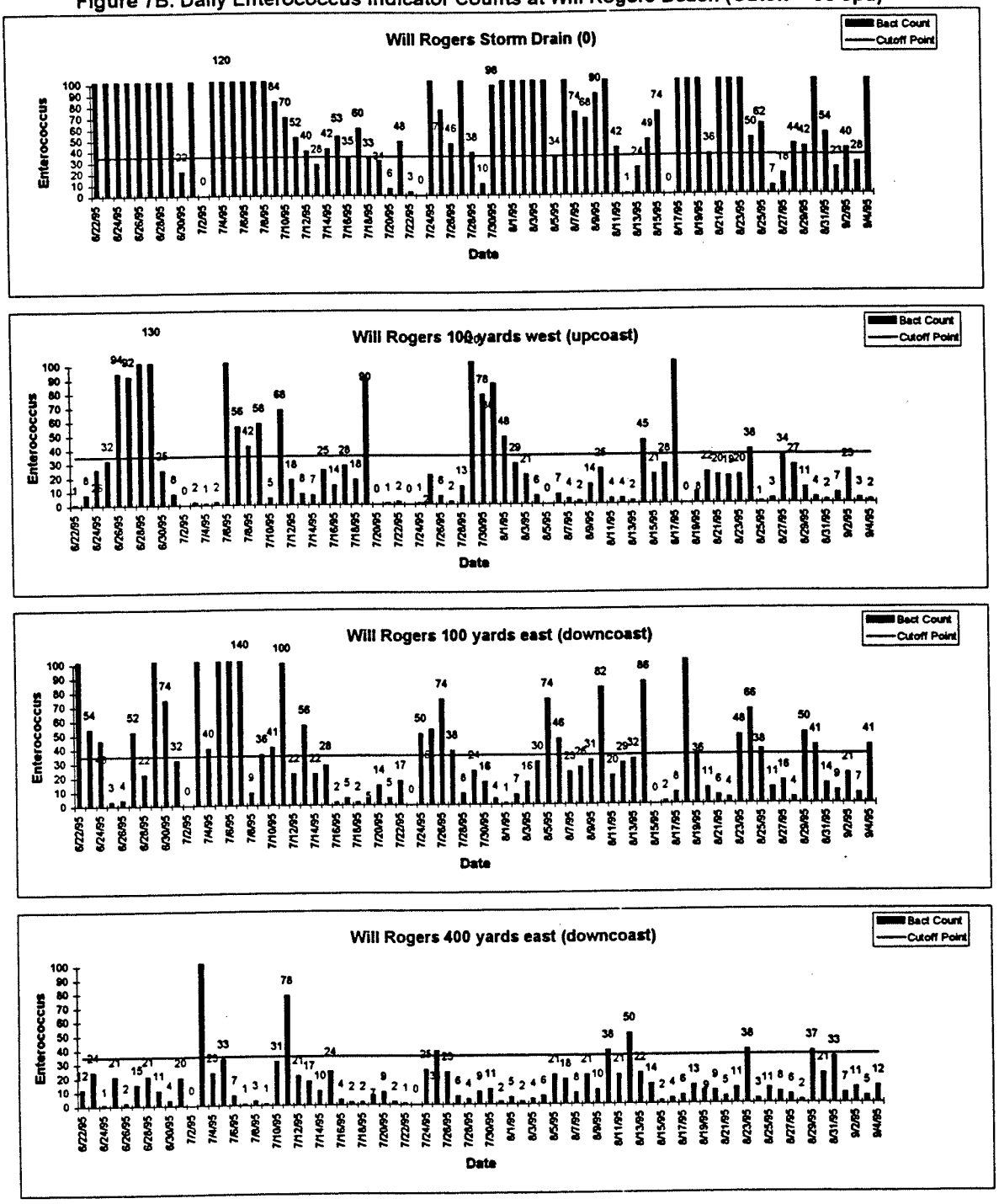

Figure 7B, cont. Daily Enterococcus Indicator Counts at Will Rogers Beach (Cutoff = 106 cpu)

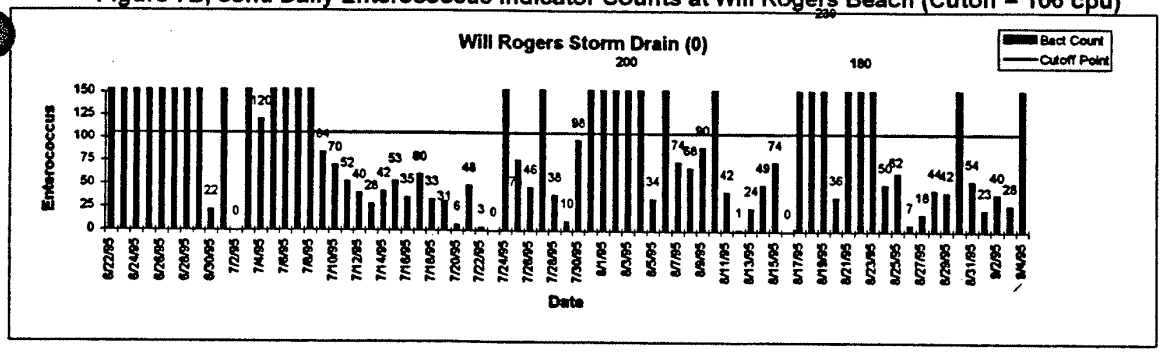

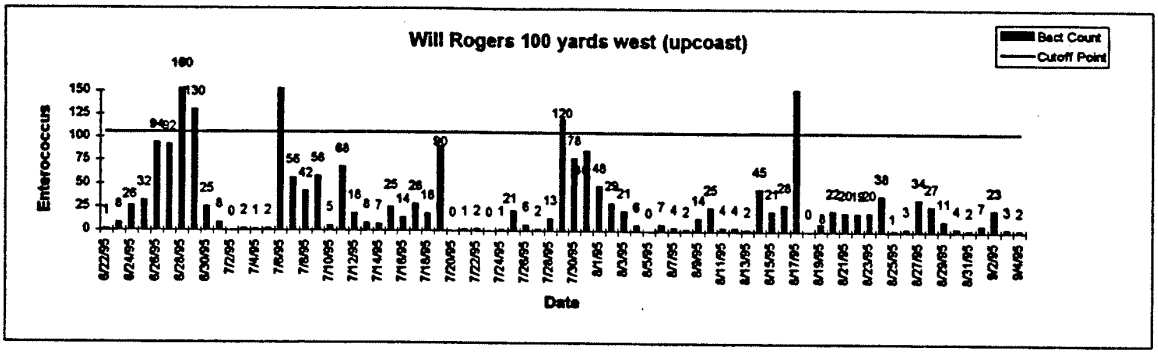

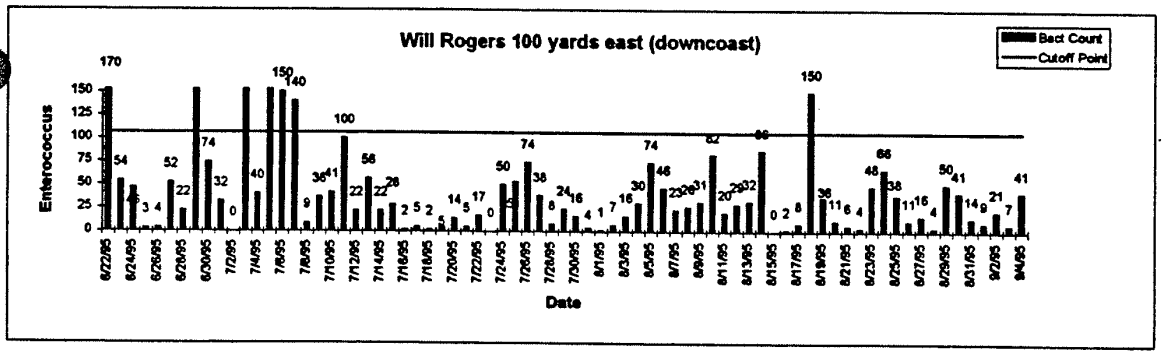

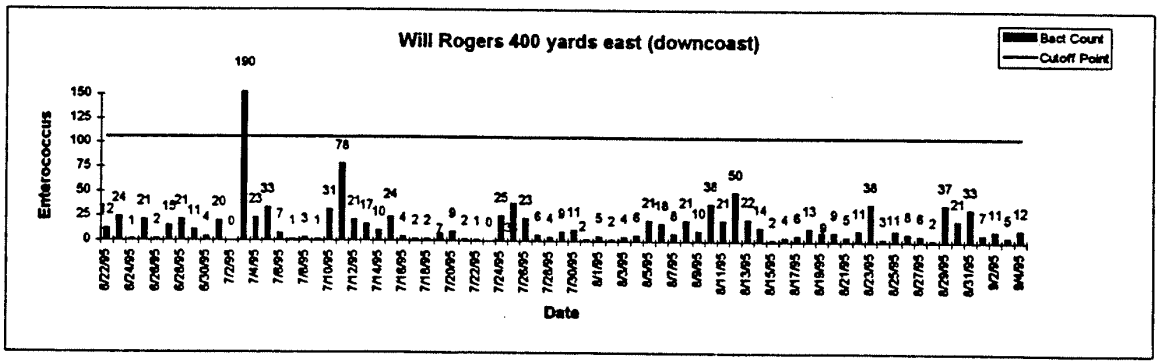

Figure 7C. Daily Fecal Coliform Indicator Counts at Will Rogers Beach (Cutoff = 200 cpu)

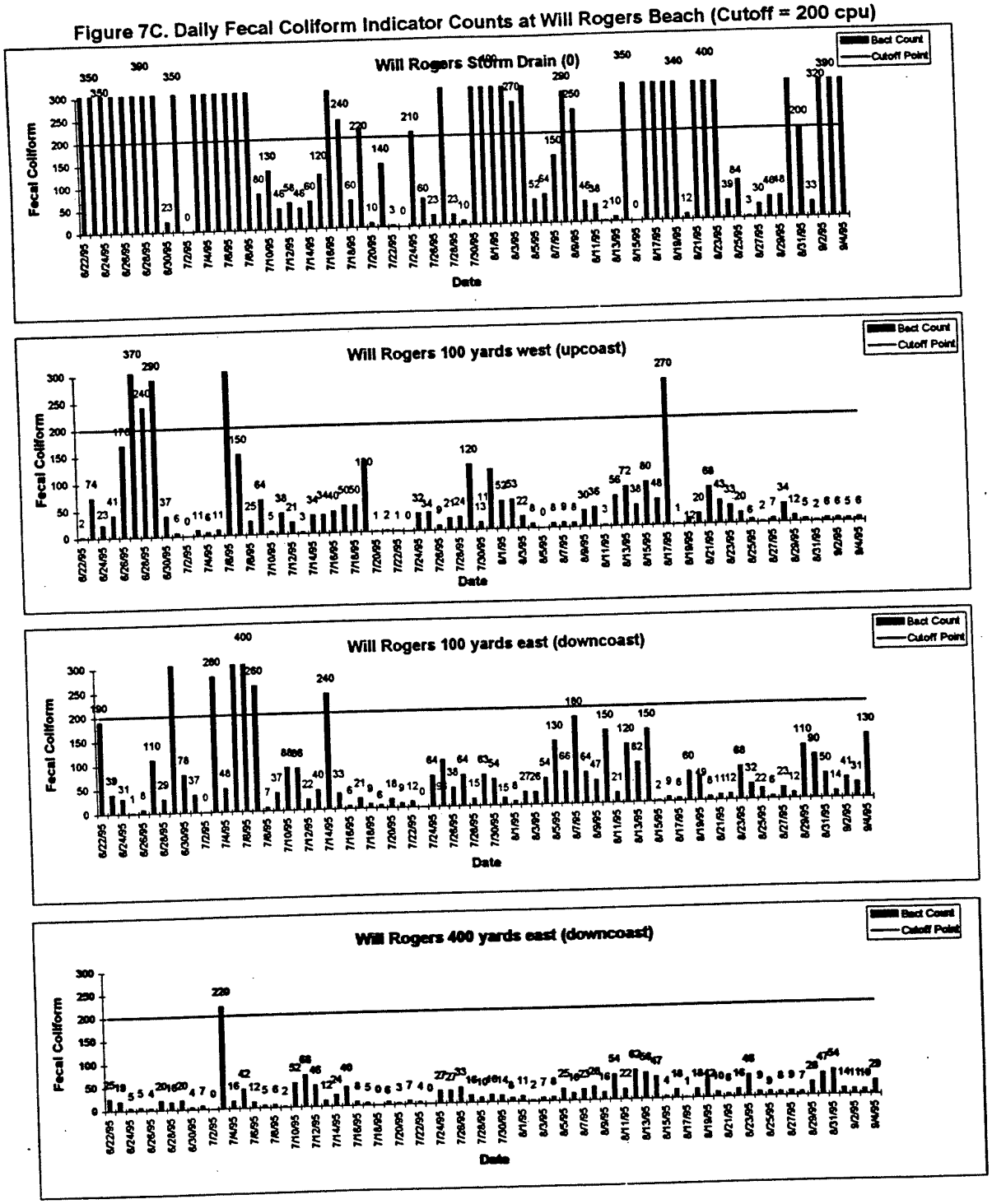

Figure 7C, cont. Daily Fecal Coliform Indicator Counts at Will Rogers Beach (Cutoff = 400 cpu)

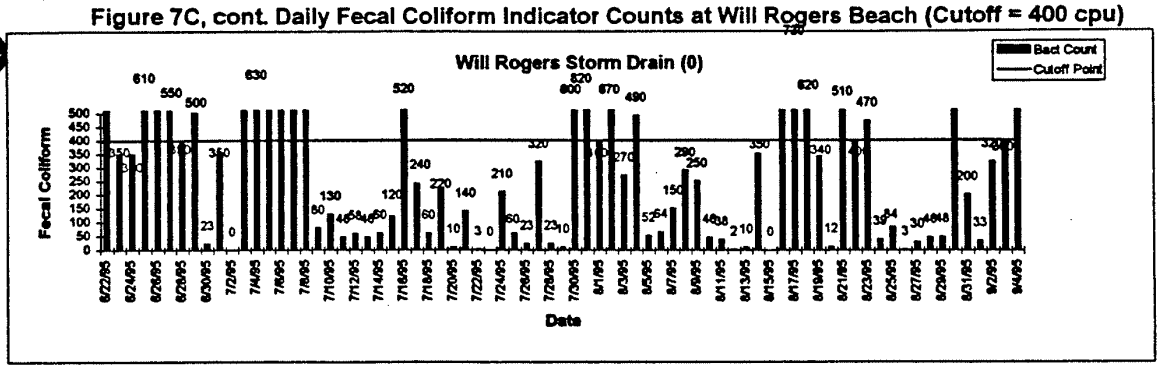

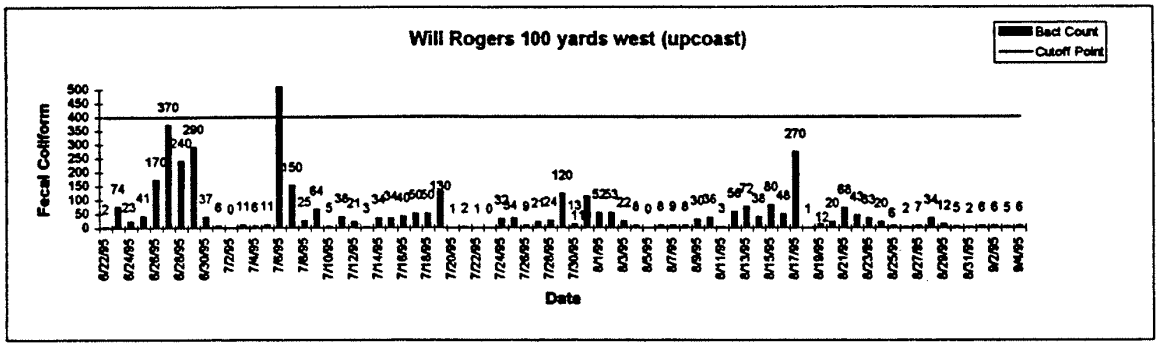

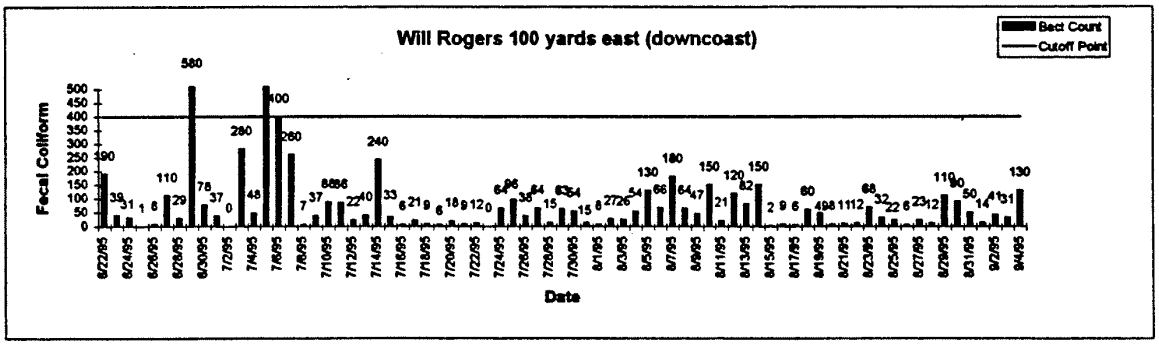

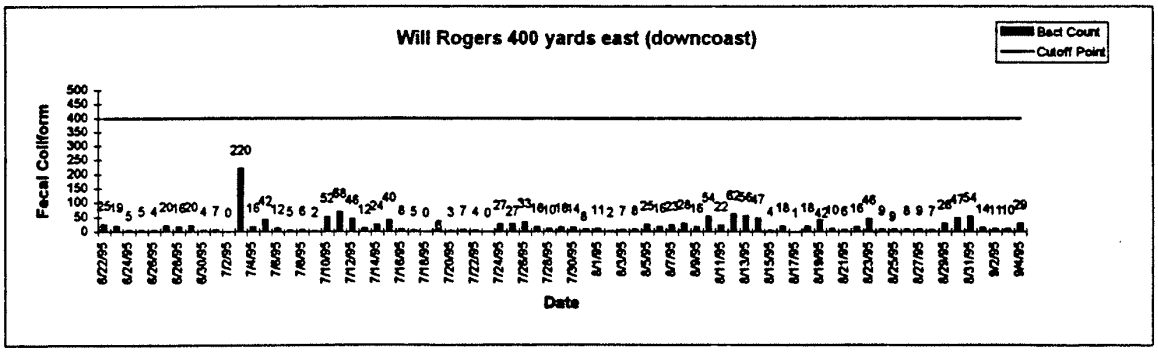

Figure 7D. Daily Total Coliform Indicator Counts at Will Rogers Beach (Cutoff = 1000 cpu)

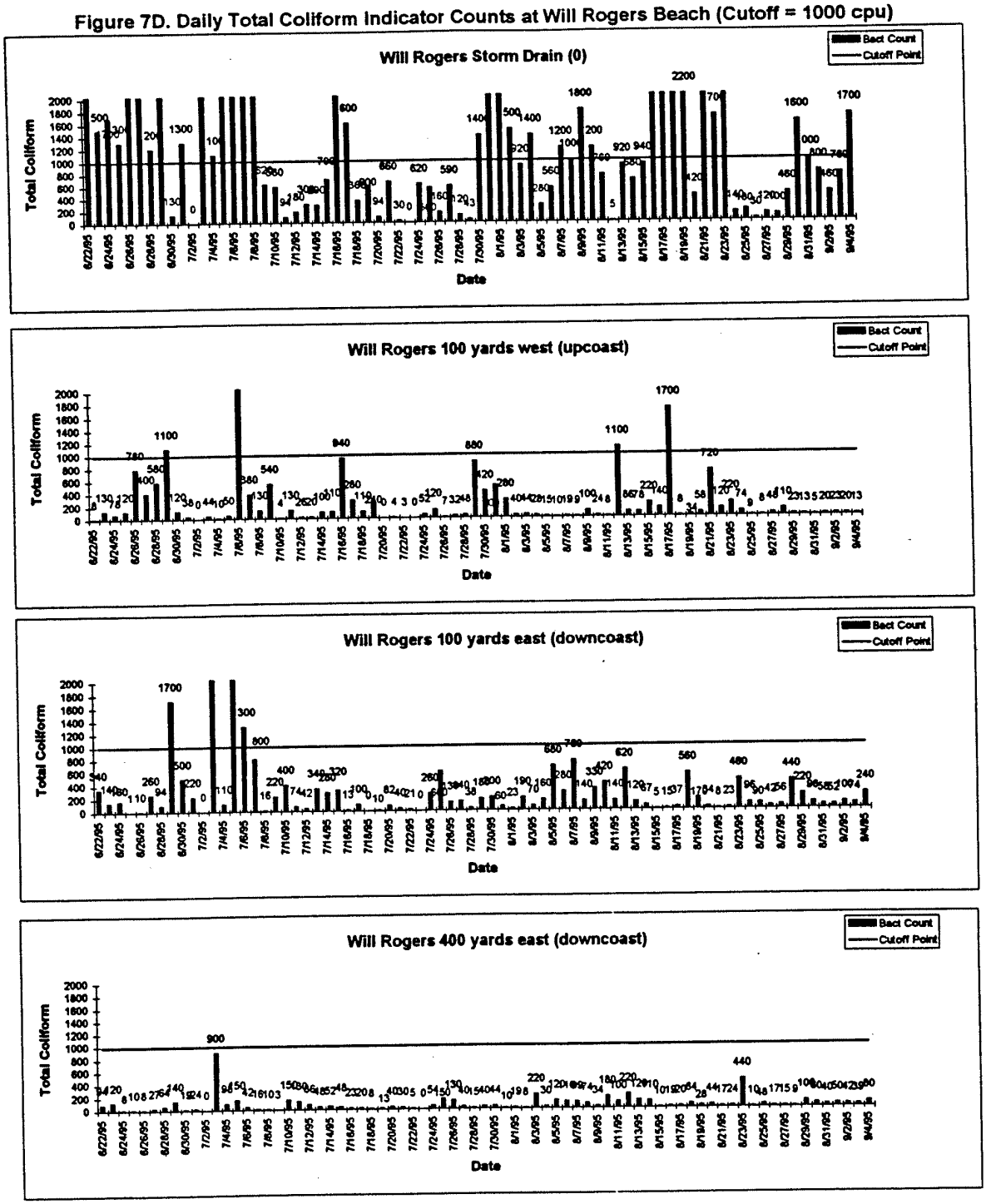

Figure 7D, cont. Daily Total Coliform Indicator Counts at Will Rogers Beach (Cutoff = 10,000 cpu)

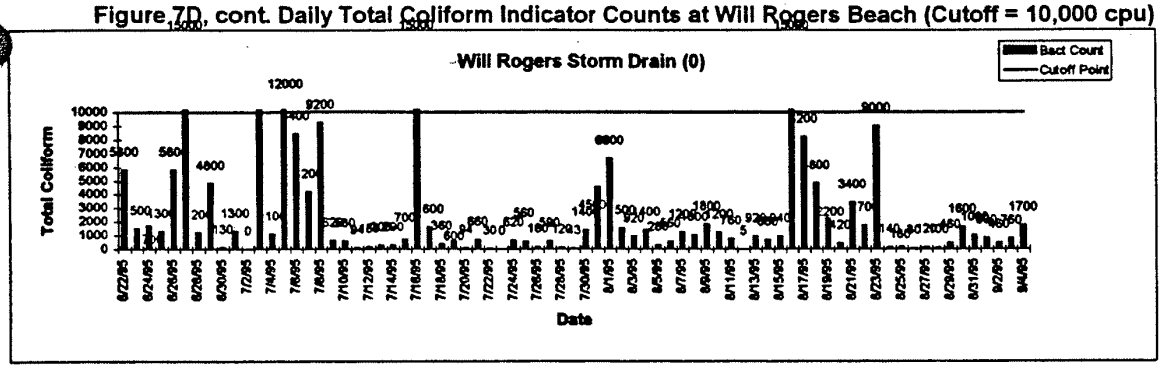

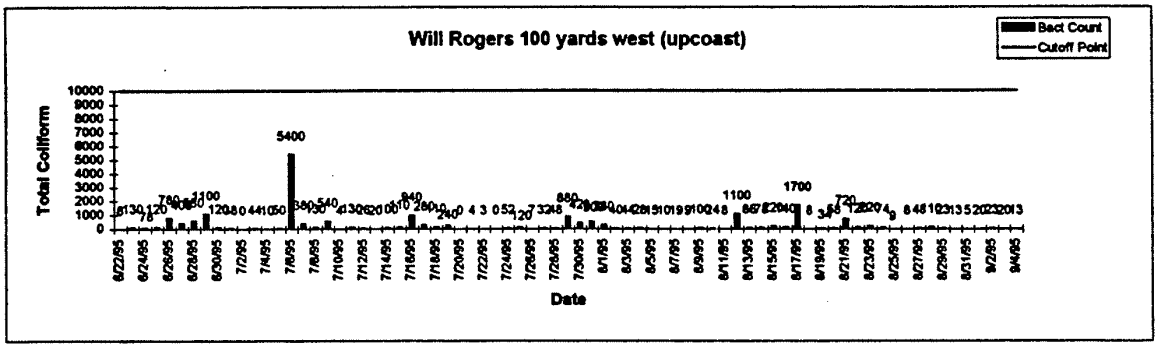

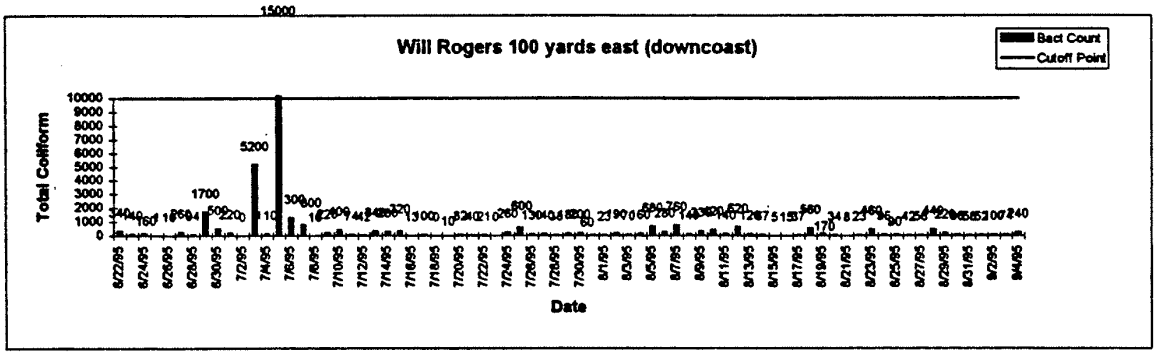

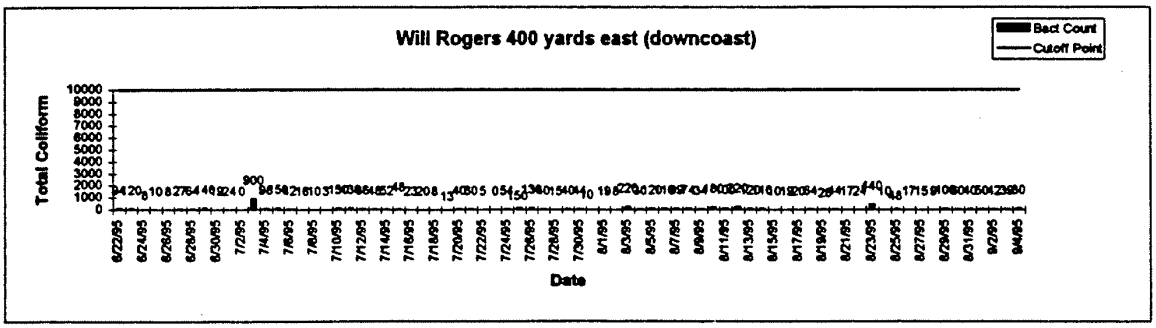

Table 17. Risks Among Swimmers at the Drain vs. Risks Among Controls

ALL BEACHES

SYMPTOMS	Total Exposed = 827 0 yds		Total Unexposed = 3030 400+ yds				
	Ill	Risks	Ill	Risks	RR	Lower 95%CI	Upper 95% CI
Fever*	59	0.071	138	0.046	1.57	1.17	2.10
Chills*	31	0.037	72	0.024	1.58	1.04	2.39
Eye discharge	19	0.023	61	0.020	1.14	0.69	1.90
Earache	38	0.046	116	0.038	1.20	0.84	1.72
Ear discharge*	13	0.016	21	0.007	2.27	1.14	4.51
Skin rash	4	0.005	23	0.008	0.64	0.22	1.84
Infected cut	6	0.007	17	0.006	1.29	0.51	3.27
Nausea	40	0.048	133	0.044	1.10	0.78	1.56
Vomiting*	25	0.030	57	0.019	1.61	1.01	2.56
Diarrhea	53	0.064	204	0.067	0.95	0.71	1.27
Diarrhea w/ blood	2	0.002	7	0.002	1.05	0.22	5.03
Stomach pain	61	0.074	206	0.068	1.08	0.82	1.43
Coughing	55	0.067	209	0.069	0.96	0.72	1.28
Phlegm*	39	0.047	90	0.030	1.59	1.10	2.29
Nasal congestion	74	0.089	273	0.090	0.99	0.78	1.27
Sore throat	59	0.071	190	0.063	1.14	0.86	1.51
HCGI 1	35	0.042	102	0.034	1.26	0.86	1.83
HCGI 2*	15	0.018	26	0.009	2.11	1.12	3.97
SRD*	63	0.076	139	0.046	1.66	1.25	2.21

* statistically significant at $p < 0.05$

Table 18. Risks Among Swimmers at 1-50 Yards Upcoast vs. Risks Among Controls

ALL BEACHES

SYMPTOMS	Total Exposed = 2592 1-50 yds		Total Unexposed = 3030 400+ yds				
	Ill	Risks	Ill	Risks	RR	Lower 95%CI	Upper 95% CI
Fever	114	0.045	138	0.046	0.99	0.78	1.26
Chills	63	0.025	72	0.024	1.05	0.75	1.46
Eye discharge	50	0.020	61	0.020	0.98	0.68	1.42
Earache	81	0.032	116	0.038	0.84	0.63	1.11
Ear discharge	19	0.008	21	0.007	1.08	0.58	2.01
Skin rash*	35	0.014	23	0.008	1.82	1.08	3.08
Infected cut	23	0.009	17	0.006	1.62	0.87	3.03
Nausea	82	0.032	133	0.044	0.74	0.56	0.97
Vomiting	36	0.014	57	0.019	0.76	0.50	1.14
Diarrhea	120	0.047	204	0.067	0.70	0.57	0.88
Diarrhea w/ blood	1	0.000	7	0.002	0.17	0.02	1.39
Stomach pain	163	0.064	206	0.068	0.95	0.78	1.16
Coughing	173	0.068	209	0.069	0.99	0.82	1.20
Phlegm	80	0.032	90	0.030	1.06	0.79	1.43
Nasal congestion	205	0.081	273	0.090	0.90	0.76	1.07
Sore throat	177	0.070	190	0.063	1.12	0.92	1.36
HCGI 1	71	0.028	102	0.034	0.83	0.62	1.12
HCGI 2	20	0.008	26	0.009	0.92	0.52	1.65
SRD	112	0.044	139	0.046	0.97	0.76	1.23

* statistically significant at $p < 0.05$

Table 19. Risks Among Swimmers at 51-100 Yards Upcoast vs. Risks Among Controls

ALL BEACHES

SYMPTOMS	Total Exposed = 2186 51-100 yds		Total Unexposed = 3030 400+ yds				
	Ill	Risks	Ill	Risks	RR	Lower 95%CI	Upper 95% CI
Fever	109.00	0.050	138	0.046	1.09	0.86	1.40
Chills	54	0.025	72	0.024	1.04	0.73	1.47
Eye discharge	45	0.021	61	0.020	1.02	0.70	1.50
Earache	81	0.037	116	0.038	0.97	0.73	1.28
Ear discharge	10	0.005	21	0.007	0.66	0.31	1.40
Skin rash	20	0.009	23	0.008	1.21	0.66	2.19
Infected cut	10	0.005	17	0.006	0.82	0.37	1.78
Nausea	75	0.034	133	0.044	0.78	0.59	1.03
Vomiting	40	0.018	57	0.019	0.97	0.65	1.45
Diarrhea	96	0.044	204	0.067	0.65	0.52	0.83
Diarrhea w/ blood	1	0.000	7	0.002	0.20	0.02	1.61
Stomach pain	126	0.058	206	0.068	0.85	0.68	1.05
Coughing	164	0.075	209	0.069	1.09	0.89	1.32
Phlegm	69	0.032	90	0.030	1.06	0.78	1.45
Nasal congestion	214	0.098	273	0.090	1.09	0.92	1.29
Sore throat	168	0.077	190	0.063	1.23	1.00	1.50
HCGI 1	63	0.029	102	0.034	0.86	0.63	1.17
HCGI 2	19	0.009	26	0.009	1.01	0.56	1.83
SRD	114	0.052	139	0.046	1.14	0.89	1.45

Table 20. Risks Among Swimmers at 1-50 Yards Downcoast vs. Risks Among Controls

ALL BEACHES

	Total Exposed	= 1926	Total Unexposed	= 3030			
		1-50 yds		400+ yds			
SYMPTOMS	Ill	Risks	Ill	Risks	RR	Lower 95% CI	Upper 95% CI
Fever	94	0.049	138	0.046	1.07	0.83	1.38
Chills	45	0.023	72	0.024	0.98	0.68	1.42
Eye discharge	23	0.012	61	0.020	0.59	0.37	0.95
Earache	55	0.029	116	0.038	0.75	0.54	1.02
Ear discharge	6	0.003	21	0.007	0.45	0.18	1.11
Skin rash	18	0.009	23	0.008	1.23	0.67	2.28
Infected cut	14	0.007	17	0.006	1.30	0.64	2.62
Nausea	61	0.032	133	0.044	0.72	0.54	0.97
Vomiting	27	0.014	57	0.019	0.75	0.47	1.17
Diarrhea	82	0.043	204	0.067	0.63	0.49	0.81
Diarrhea w/ blood	2	0.001	7	0.002	0.45	0.09	2.16
Stomach pain	108	0.056	206	0.068	0.82	0.66	1.03
Coughing	123	0.064	209	0.069	0.93	0.75	1.15
Phlegm	63	0.033	90	0.030	1.10	0.80	1.51
Nasal congestion	166	0.086	273	0.090	0.96	0.80	1.15
Sore throat	127	0.066	190	0.063	1.05	0.85	1.31
HCGI 1	50	0.026	102	0.034	0.77	0.55	1.08
HCGI 2	12	0.006	26	0.009	0.73	0.37	1.44
SRD	93	0.048	139	0.046	1.05	0.81	1.36

Table 21. Risks Among Swimmers at 51-100 Yards Downcoast vs. Risks Among Controls

ALL BEACHES

	Total Exposed = 1125		Total Unexposed = 3030				
	51-100 yds		400+ yds				
SYMPTOMS	Ill	Risks	Ill	Risks	RR	Lower 95% CI	Upper 95% CI
Fever	49	0.044	138	0.046	0.96	0.70	1.32
Chills	31	0.028	72	0.024	1.16	0.77	1.76
Eye discharge	14	0.012	61	0.020	0.62	0.35	1.10
Earache	35	0.031	116	0.038	0.81	0.56	1.18
Ear discharge	9	0.008	21	0.007	1.15	0.53	2.51
Skin rash	10	0.009	23	0.008	1.17	0.56	2.45
Infected cut	6	0.005	17	0.006	0.95	0.38	2.40
Nausea	40	0.036	133	0.044	0.81	0.57	1.15
Vomiting	18	0.016	57	0.019	0.85	0.50	1.44
Diarrhea	67	0.060	204	0.067	0.88	0.68	1.16
Diarrhea w/ blood	1	0.001	7	0.002	0.38	0.05	3.12
Stomach pain	68	0.060	206	0.068	0.89	0.68	1.16
Coughing*	99	0.088	209	0.069	1.28	1.01	1.60
Phlegm	45	0.040	90	0.030	1.35	0.95	1.91
Nasal congestion*	137	0.122	273	0.090	1.35	1.11	1.64
Sore throat	76	0.068	190	0.063	1.08	0.83	1.39
HCGI 1	33	0.029	102	0.034	0.87	0.59	1.28
HCGI 2	9	0.008	26	0.009	0.93	0.44	1.98
SRD	63	0.056	139	0.046	1.22	0.91	1.63

* statistically significant at $p < 0.05$

Table 22. Risks Among Swimmers At Each Distance vs. Risks Among Controls

ALL BEACHES – downcoast

	drain (0 yds)			1 - 50 yards			51 - 100 yards		
SYMPTOMS	RR	Lower 95% CI	Upper 95% CI	RR	Lower 95% CI	Upper 95% CI	RR	Lower 95% CI	Upper 95% CI
Fever	1.57	1.17	2.10	1.07	0.83	1.38	0.96	0.70	1.32
Chills	1.58	1.04	2.39	0.98	0.68	1.42	1.16	0.77	1.76
Eye discharge	1.14	0.69	1.90	0.59	0.37	0.95	0.62	0.35	1.10
Earache	1.20	0.84	1.72	0.75	0.54	1.02	0.81	0.56	1.18
Ear discharge	2.27	1.14	4.51	0.45	0.18	1.11	1.15	0.53	2.51
Skin rash	0.64	0.22	1.84	1.23	0.67	2.28	1.17	0.56	2.45
Infected cut	1.29	0.51	3.27	1.30	0.64	2.62	0.95	0.38	2.40
Nausea	1.10	0.78	1.56	0.72	0.54	0.97	0.81	0.57	1.15
Vomiting	1.61	1.01	2.56	0.75	0.47	1.17	0.85	0.50	1.44
Diarrhea	0.95	0.71	1.27	0.63	0.49	0.81	0.88	0.68	1.16
Diarrhea w/ blood	1.05	0.22	5.03	0.45	0.09	2.16	0.38	0.05	3.12
Stomach pain	1.08	0.82	1.43	0.82	0.66	1.03	0.89	0.68	1.16
Coughing	0.96	0.72	1.28	0.93	0.75	1.15	1.28	1.01	1.60
Phlegm	1.59	1.10	2.29	1.10	0.80	1.51	1.35	0.95	1.91
Nasal congestion	0.99	0.78	1.27	0.96	0.80	1.15	1.35	1.11	1.64
Sore throat	1.14	0.86	1.51	1.05	0.85	1.31	1.08	0.83	1.39
HCGI_1	1.26	0.86	1.83	0.77	0.55	1.08	0.87	0.59	1.28
HCGI_2	2.11	1.12	3.97	0.73	0.37	1.44	0.93	0.44	1.98
SRD	1.66	1.25	2.21	1.05	0.81	1.36	1.22	0.91	1.63

Table 23. Risks Among Swimmers At Each Distance vs. Risks Among Controls

ALL BEACHES – upcoast

	drain (0 yds)			1 - 50 yards			51 - 100 yards		
SYMPTOMS	RR	Lower 95% CI	Upper 95% CI	RR	Lower 95% CI	Upper 95% CI	RR	Lower 95% CI	Upper 95% CI
Fever	1.57	1.17	2.10	0.99	0.78	1.26	1.09	0.86	1.40
Chills	1.58	1.04	2.39	1.05	0.75	1.46	1.04	0.73	1.47
Eye discharge	1.14	0.69	1.90	0.98	0.68	1.42	1.02	0.70	1.50
Earache	1.20	0.84	1.72	0.84	0.63	1.11	0.97	0.73	1.28
Ear discharge	2.27	1.14	4.51	1.08	0.58	2.01	0.66	0.31	1.40
Skin rash	0.64	0.22	1.84	1.82	1.08	3.08	1.21	0.66	2.19
Infected cut	1.29	0.51	3.27	1.62	0.87	3.03	0.82	0.37	1.78
Nausea	1.10	0.78	1.56	0.74	0.56	0.97	0.78	0.59	1.03
Vomiting	1.61	1.01	2.56	0.76	0.50	1.14	0.97	0.65	1.45
Diarrhea	0.95	0.71	1.27	0.70	0.57	0.88	0.65	0.52	0.83
Diarrhea w/ blood	1.05	0.22	5.03	0.17	0.02	1.39	0.20	0.02	1.61
Stomach pain	1.08	0.82	1.43	0.95	0.78	1.16	0.85	0.68	1.05
Coughing	0.96	0.72	1.28	0.99	0.82	1.20	1.09	0.89	1.32
Phlegm	1.59	1.10	2.29	1.06	0.79	1.43	2.60	2.03	3.34
Nasal congestion	0.99	0.78	1.27	0.90	0.76	1.07	1.09	0.92	1.29
Sore throat	1.14	0.86	1.51	1.12	0.92	1.36	1.23	1.00	1.50
HCGI_1	1.26	0.86	1.83	0.83	0.62	1.12	0.86	0.63	1.17
HCGI_2	2.11	1.12	3.97	0.92	0.52	1.65	1.01	0.56	1.83
SRD	1.66	1.25	2.21	0.97	0.76	1.23	1.14	0.89	1.45

Table 24. Risks Among Swimmers at the Drain vs. Risks Among Controls

CONTROLS EXPOSED TO TOTAL/FECAL RATIOS > 5

SYMPTOMS	Total Exposed = 827 0 yds		Total Unexposed = 624 400+ yds				
	Ill	Risks	Ill	Risks	RR	Lower 95%CI	Upper 95% CI
Fever*	59	0.071	27	0.043	1.65	1.06	2.57
Chills*	31	0.037	11	0.018	2.13	1.08	4.20
Eye discharge	19	0.023	19	0.030	0.75	0.40	1.41
Earache	38	0.046	26	0.042	1.10	0.68	1.80
Ear discharge	13	0.016	4	0.006	2.45	0.80	7.48
Skin rash	4	0.005	3	0.005	1.01	0.23	4.48
Infected cut	6	0.007	1	0.002	4.53	0.55	37.51
Nausea	40	0.048	27	0.043	1.12	0.69	1.80
Vomiting	25	0.030	10	0.016	1.89	0.91	3.90
Diarrhea	53	0.064	36	0.058	1.11	0.74	1.67
Diarrhea w/ blood	2	0.002	0	0.000	–	–	–
Stomach pain	61	0.074	44	0.071	1.05	0.72	1.52
Coughing	55	0.067	34	0.054	1.22	0.81	1.85
Phlegm*	39	0.047	11	0.018	2.68	1.38	5.18
Nasal congestion	74	0.089	46	0.074	1.21	0.85	1.73
Sore throat	59	0.071	33	0.053	1.35	0.89	2.04
HCGI 1	35	0.042	23	0.037	1.15	0.69	1.92
HCGI 2*	15	0.018	2	0.003	5.66	1.30	24.66
SRD*	63	0.076	17	0.027	2.80	1.65	4.73

* statistically significant at $p < 0.05$

Table 25. Risks Among Swimmers at 1-50 Yards Upcoast vs. Risks Among Controls

CONTROLS EXPOSED TO TOTAL/FECAL RATIOS > 5

SYMPTOMS	Total Exposed = 2592		Total Unexposed = 624				
	1-50 yds		400+ yds				
	Ill	Risks	Ill	Risks	RR	Lower 95%CI	Upper 95% CI
Fever	114	0.045	27	0.043	1.04	0.69	1.57
Chills	63	0.025	11	0.018	1.41	0.75	2.67
Eye discharge	50	0.020	19	0.030	0.65	0.39	1.09
Earache	81	0.032	26	0.042	0.77	0.50	1.19
Ear discharge	19	0.008	4	0.006	1.17	0.40	3.43
Skin rash	35	0.014	3	0.005	2.88	0.89	9.33
Infected cut	23	0.009	1	0.002	5.67	0.77	41.94
Nausea	82	0.032	27	0.043	0.75	0.49	1.15
Vomiting	36	0.014	10	0.016	0.89	0.44	1.78
Diarrhea	120	0.047	36	0.058	0.82	0.57	1.18
Diarrhea w/ blood	1	0.000	0	0.000	–	–	–
Stomach pain	163	0.064	163	0.261	0.25	0.20	0.30
Coughing	173	0.068	34	0.054	1.26	0.88	1.79
Phlegm	80	0.032	11	0.018	1.79	0.96	3.35
Nasal congestion	205	0.081	46	0.074	1.10	0.81	1.50
Sore throat	177	0.070	33	0.053	1.32	0.92	1.90
HCGI 1	71	0.028	23	0.037	0.76	0.48	1.21
HCGI 2	20	0.008	2	0.003	2.47	0.58	10.53
SRD	112	0.044	17	0.027	1.63	0.98	2.69

Table 26. Risks Among Swimmers at 51-100 Yards Upcoast vs. Risks Among Controls

CONTROLS EXPOSED TO TOTAL/FECAL RATIOS > 5

SYMPTOMS	Total Exposed = 2186 51-100 yds		Total Unexposed = 624 400+ yds				
	Ill	Risks	Ill	Risks	RR	Lower 95%CI	Upper 95% CI
Fever	109	0.050	27	0.043	1.15	0.76	1.74
Chills	54	0.025	11	0.018	1.40	0.74	2.66
Eye discharge	45	0.021	19	0.030	0.68	0.40	1.15
Earache	81	0.037	26	0.042	0.89	0.58	1.37
Ear discharge	10	0.005	4	0.006	0.71	0.22	2.27
Skin rash	20	0.009	3	0.005	1.90	0.57	6.38
Infected cut	10	0.005	1	0.002	2.85	0.37	22.26
Nausea	75	0.034	27	0.043	0.79	0.52	1.22
Vomiting	40	0.018	10	0.016	1.14	0.57	2.27
Diarrhea	96	0.044	36	0.058	0.76	0.52	1.10
Diarrhea w/ blood	1	0.000	0	0.000	–	–	–
Stomach pain	126	0.058	44	0.071	0.82	0.59	1.14
Coughing	164	0.075	34	0.054	1.38	0.96	1.97
Phlegm	69	0.032	11	0.018	1.79	0.95	3.36
Nasal congestion	214	0.098	46	0.074	1.33	0.98	1.80
Sore throat*	168	0.077	33	0.053	1.45	1.01	2.09
HCGI 1	63	0.029	23	0.037	0.78	0.49	1.25
HCGI 2	19	0.009	21	0.034	0.26	0.14	0.48
SRD*	114	0.052	17	0.027	1.91	1.16	3.16

* statistically significant at $p < 0.05$

Table 27. Risks Among Swimmers at 1-50 Yards Downcoast vs. Risks Among Controls

CONTROLS EXPOSED TO TOTAL/FECAL RATIOS > 5

	Total Exposed = 1926		Total Unexposed = 624				
	1-50 yds		400+ yds				
SYMPTOMS	Ill	Risks	Ill	Risks	RR	Lower 95% CI	Upper 95% CI
Fever	94	0.049	27	0.043	1.13	0.74	1.71
Chills	45	0.023	11	0.018	1.33	0.69	2.55
Eye discharge	23	0.012	19	0.030	0.39	0.22	0.72
Earache	55	0.029	26	0.042	0.69	0.43	1.08
Ear discharge	6	0.003	4	0.006	0.49	0.14	1.72
Skin rash	18	0.009	3	0.005	1.94	0.57	6.58
Infected cut	14	0.007	1	0.002	4.54	0.60	34.43
Nausea	61	0.032	27	0.043	0.73	0.47	1.14
Vomiting	27	0.014	10	0.016	0.87	0.43	1.80
Diarrhea	82	0.043	36	0.058	0.74	0.50	1.08
Diarrhea w/ blood	2	0.001	0	0.000	–	–	–
Stomach pain	108	0.056	44	0.071	0.80	0.57	1.12
Coughing	123	0.064	34	0.054	1.17	0.81	1.69
Phlegm	63	0.033	11	0.018	1.86	0.98	3.50
Nasal congestion	166	0.086	46	0.074	1.17	0.85	1.60
Sore throat	127	0.066	33	0.053	1.25	0.86	1.81
HCGI 1	50	0.026	23	0.037	0.70	0.43	1.14
HCGI 2	12	0.006	2	0.003	1.94	0.44	8.66
SRD*	93	0.048	17	0.027	1.77	1.07	2.95

* statistically significant at $p < 0.05$

Table 28. Risks Among Swimmers at 51-100 Yards Downcoast vs. Risks Among Controls

CONTROLS EXPOSED TO TOTAL/FECAL RATIOS > 5

	Total Exposed	= 1125	Total Unexposed	= 624			
		51-100 yds		400+ yds			
SYMPTOMS	Ill	Risks	Ill	Risks	RR	Lower 95% CI	Upper 95% CI
Fever	49	0.044	27	0.043	1.01	0.64	1.59
Chills	31	0.028	11	0.018	1.56	0.79	3.09
Eye discharge	14	0.012	19	0.030	0.41	0.21	0.81
Earache	35	0.031	26	0.042	0.75	0.45	1.23
Ear discharge	9	0.008	4	0.006	1.25	0.39	4.04
Skin rash	10	0.009	3	0.005	1.85	0.51	6.69
Infected cut	6	0.005	1	0.002	3.33	0.40	27.58
Nausea	40	0.036	27	0.043	0.82	0.51	1.33
Vomiting	18	0.016	10	0.016	1.00	0.46	2.15
Diarrhea	67	0.060	36	0.058	1.03	0.70	1.53
Diarrhea w/ blood	1	0.001	0	0.000	–	–	–
Stomach pain	68	0.060	44	0.071	0.86	0.59	1.24
Coughing*	99	0.088	34	0.054	1.62	1.11	2.35
Phlegm*	45	0.040	11	0.018	2.27	1.18	4.36
Nasal congestion*	137	0.122	46	0.074	1.65	1.20	2.27
Sore throat	76	0.068	33	0.053	1.28	0.86	1.90
HCGI 1	33	0.029	23	0.037	0.80	0.47	1.34
HCGI 2	9	0.008	2	0.003	2.50	0.54	11.52
SRD*	63	0.056	17	0.027	2.06	1.21	3.48

* statistically significant at $p < 0.05$

Table 29. Risks Among Swimmers At Each Distance vs. Risks Among Controls

CONTROLS EXPOSED TO TOTAL/FECAL RATIOS > 5 – downcoast

	drain (0 yds)			1 - 50 yards			51 - 100 yards		
SYMPTOMS	RR	Lower 95% CI	Upper 95% CI	RR	Lower 95% CI	Upper 95% CI	RR	Lower 95% CI	Upper 95% CI
Fever	1.65	1.06	2.57	1.13	0.74	1.71	1.01	0.64	1.59
Chills	2.13	1.08	4.20	1.33	0.69	2.55	1.56	0.79	3.09
Eye discharge	0.75	0.40	1.41	0.39	0.22	0.72	0.41	0.21	0.81
Earache	1.10	0.68	1.80	0.69	0.43	1.08	0.75	0.45	1.23
Ear discharge	2.45	0.80	7.48	0.49	0.14	1.72	1.25	0.39	4.04
Skin rash	1.01	0.23	4.48	1.94	0.57	6.58	1.85	0.51	6.69
Infected cut	4.53	0.55	37.51	4.54	0.60	34.43	3.33	0.40	27.58
Nausea	1.12	0.69	1.80	0.73	0.47	1.14	0.82	0.51	1.33
Vomiting	1.89	0.91	3.90	0.87	0.43	1.80	1.00	0.46	2.15
Diarrhea	1.11	0.74	1.67	0.74	0.50	1.08	1.03	0.70	1.53
Diarrhea w/ blood	--	--	--	--	--	--	--	--	--
Stomach pain	1.05	0.72	1.52	0.80	0.57	1.12	0.86	0.59	1.24
Coughing	1.22	0.81	1.85	1.17	0.81	1.69	1.62	1.11	2.35
Phlegm	2.68	1.38	5.18	1.86	0.98	3.50	2.27	1.18	4.36
Nasal congestion	1.21	0.85	1.73	1.17	0.85	1.60	1.65	1.20	2.27
Sore throat	1.35	0.89	2.04	1.25	0.86	1.81	1.28	0.86	1.90
HCGI_1	1.15	0.69	1.92	0.70	0.43	1.14	0.80	0.47	1.34
HCGI_2	5.66	1.30	24.66	1.94	0.44	8.66	2.50	0.54	11.52
SRD	2.80	1.65	4.73	1.77	1.07	2.95	2.06	1.21	3.48

Table 30. Risks Among Swimmers At Each Distance vs. Risks Among Controls

CONTROLS EXPOSED TO TOTAL/FECAL RATIOS > 5 – upcoast

	drain (0 yds)			1 - 50 yards			51 - 100 yards		
SYMPTOMS	RR	Lower 95% CI	Upper 95% CI	RR	Lower 95% CI	Upper 95% CI	RR	Lower 95% CI	Upper 95% CI
Fever	1.65	1.06	2.57	1.04	0.69	1.57	1.15	0.76	1.74
Chills	2.13	1.08	4.20	1.41	0.75	2.67	1.40	0.74	2.66
Eye discharge	0.75	0.40	1.41	0.65	0.39	1.09	0.68	0.40	1.15
Earache	1.10	0.68	1.80	0.77	0.50	1.19	0.89	0.58	1.37
Ear discharge	2.45	0.80	7.48	1.17	0.40	3.43	0.71	0.22	2.27
Skin rash	1.01	0.23	4.48	2.88	0.89	9.33	1.90	0.57	6.38
Infected cut	4.53	0.55	37.51	5.67	0.77	41.94	2.85	0.37	22.26
Nausea	1.12	0.69	1.80	0.75	0.49	1.15	0.79	0.52	1.22
Vomiting	1.89	0.91	3.90	0.89	0.44	1.78	1.14	0.57	2.27
Diarrhea	1.11	0.74	1.67	0.82	0.57	1.18	0.76	0.52	1.10
Diarrhea w/ blood	--	--	--	--	--	--	--	--	--
Stomach pain	1.05	0.72	1.52	0.25	0.20	0.30	0.82	0.59	1.14
Coughing	1.22	0.81	1.85	1.26	0.88	1.79	1.38	0.96	1.97
Phlegm	2.68	1.38	5.18	1.79	0.96	3.35	1.79	0.95	3.36
Nasal congestion	1.21	0.85	1.73	1.10	0.81	1.50	1.33	0.98	1.80
Sore throat	1.35	0.89	2.04	1.32	0.92	1.90	1.45	1.01	2.09
HCGI_1	1.15	0.69	1.92	0.76	0.48	1.21	0.78	0.49	1.25
HCGI_2	5.66	1.30	24.66	2.47	0.58	10.53	0.26	0.14	0.48
SRD	2.80	1.65	4.73	1.63	0.98	2.69	1.91	1.16	3.16

Table 31. Adjusted Odds Ratios and 95% Confidence Intervals for Outcomes of Interest by Distance from Drain.†

	Distance from drain (in yards)				
	400	100-50	50-1	0	trend P
# exposed:	3030	3311	4518	827	
Fever *	138 1.00	158 1.06 0.83-1.34	208 1.04 0.84-1.30	59 1.53 1.10-2.12	0.10
Chills	72 1.00	85 1.06 0.77-1.46	108 1.03 0.76-1.40	31 1.54 0.99-2.40	0.24
Eye discharge	61 1.00	59 0.88 0.61-1.27	73 0.79 0.56-1.12	19 1.20 0.70-2.06	0.61
Earache	116 1.00	116 0.89 0.68-1.16	136 0.80 0.62-1.03	38 1.32 0.89-1.94	0.70
Ear discharge *	21 1.00	19 0.78 0.42-1.46	25 0.82 0.46-1.47	13 2.28 1.10-4.71	0.26
Skin rash	23 1.00	30 1.15 0.66-1.98	53 1.51 0.92-2.47	4 0.62 0.21-1.83	0.41
Infected cut	17 1.00	16 0.80 0.40-1.59	37 1.50 0.84-2.68	6 1.55 0.59-4.05	0.08
Nausea	133 1.00	115 0.77 0.60-1.00	143 0.74 0.58-0.94	40 1.10 0.75-1.60	0.22
Vomiting	57 1.00	58 0.97 0.67-1.40	63 0.76 0.53-1.09	25 1.40 0.85-2.31	0.86
Diarrhea	204 1.00	163 0.70 0.57-0.87	202 0.67 0.55-0.82	53 0.95 0.69-1.32	0.01
Diarrhea with blood	7 1.00	2 0.26 0.05-1.23	3 0.26 0.07-1.02	2 0.80 0.15-4.20	0.19
Stomach pain	206 1.00	194 0.85 0.70-1.05	271 0.91 0.75-1.09	61 1.06 0.78-1.43	0.78
Cough	209 1.00	263 1.18 0.97-1.42	296 0.97 0.81-1.17	55 0.99 0.72-1.35	0.53
Cough & phlegm *	90 1.00	114 1.15 0.87-1.53	143 1.08 0.82-1.41	39 1.65 1.11-2.46	0.11

Table 31 (continued)

Runny nose	273 1.00	351 1.18 1.00-1.40	371 0.92 0.78-1.09	74 1.04 0.79-1.38	0.33
Sore throat	190 1.00	244 1.17 0.96-1.42	304 1.09 0.90-1.32	59 1.19 0.87-1.63	0.33
HCGI 1*	102 1.00	188 1.03 0.83-1.28	239 0.97 0.79-1.19	69 1.48 1.09-2.00	0.23
HCGI 2	26 1.00	28 1.03 0.60-1.76	32 0.88 0.52-1.49	15 1.58 0.81-3.08	0.57
Signif.* resp. disease	161 1.00	198 1.12 0.90-1.39	239 1.01 0.82-1.24	67 1.64 1.21-2.23	0.10

* Statistically significant at p<05.

† All results adjusted for: age, beach, gender, race, tourist versus local residence, socioeconomic status, and worry about potential hazards of swimming in the Santa Monica Bay. The number of diseased subjects are given on the first line for each outcome. Trend P is from a linear model.

Table 32. Crude Odds Ratios and 95% Confidence Intervals for Outcomes of Interest by Distance from Drain Among Swimmers at Ashland Beach.†

	Distance from drain (in yards)				
	400	100-50	50-1	0	trend P
# exposed:	1523	1667	2534	154	
Fever	71 1.00	77 0.99 0.71-1.38	111 0.94 0.69-1.27	11 1.57 0.81-3.04	0.92
Chills*	27 1.00	42 1.43 0.88-2.33	57 1.28 0.80-2.02	7 2.64 1.13-6.16	0.15
Eye discharge*	38 1.00	32 0.76 0.48-1.23	39 0.61 0.39-0.96	11 3.01 1.50-6.01	0.67
Earache	66 1.00	57 0.78 0.54-1.12	62 0.55 0.39-0.79	7 1.05 0.47-2.33	0.01
Ear discharge	8 1.00	8 0.91 0.34-2.44	13 0.98 0.40-2.36	1 1.24 0.15-9.96	0.95
Skin rash	12 1.00	13 0.99 0.45-2.18	34 1.71 0.88-3.32	1 0.82 0.11-6.37	0.11
Infected cut	6 1.00	8 1.22 0.42-3.52	16 1.61 0.63-4.11	0 0.00 0.00-+INF	0.49
Nausea	66 1.00	57 0.78 0.54-1.12	67 0.60 0.42-0.85	4 0.59 0.21-1.64	0.00
Vomiting	34 1.00	32 0.86 0.53-1.40	35 0.61 0.38-0.99	3 0.87 0.26-2.87	0.06
Diarrhea	94 1.00	60 0.57 0.41-0.79	103 0.64 0.48-0.86	5 0.51 0.20-1.27	0.00
Diarrhea with blood	5 1.00	1 0.18 0.02-1.56	1 0.12 0.01-1.03	0 0.00 0.00-+INF	0.03
Stomach pain	93 1.00	90 0.88 0.65-1.18	144 0.93 0.71-1.21	6 0.62 0.27-1.45	0.44
Cough	111 1.00	133 1.10 0.85-1.43	176 0.95 0.74-1.21	9 0.79 0.39-1.59	0.44
Cough & phlegm	47 1.00	57 1.11 0.75-1.65	86 1.10 0.77-1.58	5 1.05 0.41-2.69	0.66

Table 32 (continued)

Runny nose	140 1.00	169 1.11 0.88-1.41	200 0.85 0.68-1.06	12 0.83 0.45-1.54	0.08
Sore throat	99 1.00	127 1.19 0.90-1.56	156 0.94 0.73-1.22	6 0.58 0.25-1.35	0.27
HCGI 1	54 1.00	50 0.84 0.57-1.24	63 0.69 0.48-1.00	5 0.91 0.36-2.32	0.08
HCGI 2	13 1.00	14 0.98 0.46-2.10	16 0.74 0.35-1.54	0 0.00 0.00-+INF	0.24
Signif. resp. disease	84 1.00	99 1.08 0.80-1.46	140 1.00 0.76-1.32	10 1.19 0.60-2.34	0.93

* Statistically significant at p<.05

† The number of diseased subjects are given on the first line for each outcome. Trend P is from a linear model.

Table 33. Crude Odds Ratios and 95% Confidence Intervals for Outcomes of Interest by Distance from Drain Among Swimmers at Malibu Beach.†

	Distance from drain (in yards)				
	400	100-50	50-1	0	trend P
# exposed:	1013	1012	1399	587	
Fever*	48 1.00	45 0.94 0.62-1.42	61 0.92 0.62-1.35	42 1.55 1.01-2.38	0.14
Chills	37 1.00	23 0.61 0.36-1.04	37 0.72 0.45-1.14	21 0.98 0.57-1.69	0.72
Eye discharge	15 1.00	14 0.93 0.45-1.94	24 1.16 0.61-2.23	7 0.80 0.33-1.98	0.97
Earache*	26 1.00	35 1.36 0.81-2.28	49 1.38 0.85-2.23	30 2.04 1.20-3.49	0.02
Ear discharge*	7 1.00	4 0.57 0.17-1.95	11 1.14 0.44-2.95	12 3.00 1.17-7.66	0.01
Skin rash	6 1.00	6 1.00 0.32-3.11	12 1.45 0.54-3.88	3 0.86 0.21-3.46	0.78
Infected cut	7 1.00	4 0.57 0.17-1.95	14 1.45 0.58-3.61	6 1.48 0.50-4.44	0.22
Nausea	46 1.00	36 0.78 0.50-1.21	53 0.83 0.55-1.24	34 1.29 0.82-2.04	0.47
Vomiting*	17 1.00	16 0.94 0.47-1.87	21 0.89 0.47-1.70	22 2.28 1.20-4.33	0.04
Diarrhea	67 1.00	61 0.91 0.63-1.30	67 0.71 0.50-1.01	48 1.26 0.86-1.85	0.92
Diarrhea with blood	2 1.00	1 0.50 0.05-5.52	1 0.36 0.03-3.99	2 1.73 0.24-12.30	0.79
Stomach pain	7 1.00	65 0.91 0.64-1.29	95 0.97 0.70-1.33	52 1.29 0.89-1.87	0.28
Cough	61 1.00	79 1.32 0.93-1.87	88 1.05 0.75-1.47	40 1.14 0.76-1.72	0.86
Cough & phlegm*	25 1.00	38 1.54 0.92-2.57	41 1.19 0.72-1.98	29 2.05 1.19-3.54	0.05

Table 33 (continued)

Runny nose	88 1.00	103 1.19 0.88-1.61	122 1.00 0.75-1.34	58 1.15 0.81-1.63	0.76
Sore throat	59 1.00	76 1.31 0.92-1.87	100 1.24 0.89-1.74	44 1.31 0.87-1.96	0.21
HCGI 1	33 1.00	27 0.81 0.49-1.36	41 0.90 0.56-1.43	28 1.49 0.89-2.49	0.22
HCGI-2*	10 1.00	10 1.00 0.41-2.42	9 0.65 0.26-1.60	15 2.63 1.17-5.89	0.08
Signif. resp. disease*	49 1.00	63 1.31 0.89-1.92	70 1.04 0.71-1.51	49 1.79 1.19-2.70	0.05

* Statistically significant at $p<.05$.

† The number of diseased subjects are given on the first line for each outcome. Trend P is from a linear model.

Table 34. Crude Odds Ratios and 95% Confidence Intervals for Outcomes of Interest by Distance from Drain Among Swimmers at Will Roger's Beach.†

	Distance from drain (in yards)				
	400	100-50	50-1	0	trend P
# exposed:	494	632	585	86	
Fever	19 1.00	36 1.51 0.86-2.67	36 1.64 0.93-2.90	6 1.87 0.73-4.84	0.08
Chills	8 1.00	20 1.99 0.87-4.55	14 1.49 0.62-3.58	3 2.20 0.57-8.44	0.35
Eye discharge	8 1.00	13 1.28 0.52-3.10	10 1.06 0.41-2.70	1 0.71 0.09-5.78	0.89
Earache	24 1.00	24 0.77 0.43-1.38	25 0.87 0.49-1.55	1 0.23 0.03-1.73	0.29
Ear discharge	6 1.00	7 0.91 0.30-2.73	1 0.14 0.02-1.16	0 0.00 0.00-+INF	0.04
Skin rash	5 1.00	11 1.73 0.60-5.02	7 1.18 0.37-3.76	0 0.00 0.00-+INF	0.74
Infected cut	4 1.00	4 0.78 0.19-3.14	7 1.48 0.43-5.10	0 0.00 0.00-+INF	0.81
Nausea	21 1.00	22 0.81 0.44-1.49	23 0.92 0.50-1.69	2 0.54 0.12-2.33	0.58
Vomiting	6 1.00	10 1.31 0.47-3.62	7 0.99 0.33-2.95	0 0.00 0.00-+INF	0.57
Diarrhea	43 1.00	42 0.75 0.48-1.16	32 0.61 0.38-0.98	0 0.00 0.00-+INF	0.00
Stomach pain	42 1.00	39 0.71 0.45-1.11	32 0.62 0.39-1.00	3 0.39 0.12-1.28	0.02
Cough	37 1.00	51 1.08 0.70-1.68	32 0.71 0.44-1.17	6 0.93 0.38-2.27	0.23
Cough & phlegm	18 1.00	19 0.82 0.43-1.58	16 0.74 0.38-1.47	5 1.63 0.59-4.52	0.94

Table 34 (continued)

Runny nose	45 1.00	79 1.43 0.97-2.10	49 0.91 0.60-1.39	4 0.49 0.17-1.39	0.21
Sore throat	32 1.00	41 1.00 0.62-1.62	48 1.29 0.81-2.05	9 1.69 0.78-3.67	0.12
HCGI 1	15 1.00	19 0.99 0.50-1.97	17 0.96 0.47-1.93	2 0.76 0.17-3.39	0.78
HCGI 2	3 1.00	4 1.04 0.23-4.68	7 1.98 0.51-7.71	0 0.00 0.00-+INF	0.55
Signif. resp. disease	28 1.00	36 1.01 0.60-1.67	29 0.87 0.51-1.48	8 1.71 0.75-3.88	0.80

* Statistically significant at $p<.05$.

† The number of diseased subjects are given on the first line for each outcome. Trend P is from a linear model.

Table 35. Crude Odds Ratios and 95% Confidence Intervals for Outcomes of Interest by Distance from Drain Among Children Under 12 Years Old.†

	Distance from drain (in yards)				
	400	100-50	50-1	0	trend P
# exposed:	1551	1470	2079	514	
Fever*	86 1.00	78 0.95 0.70-1.31	113 0.98 0.73-1.31	42 1.52 1.03-2.22	0.18
Chills	38 1.00	37 1.03 0.65-1.63	44 0.86 0.55-1.34	20 1.61 0.93-2.80	0.51
Eye discharge	43 1.00	27 0.66 0.40-1.07	36 0.62 0.39-0.97	12 0.84 0.44-1.60	0.13
Earache	54 1.00	50 0.98 0.66-1.44	58 0.80 0.55-1.16	22 1.24 0.75-2.06	0.82
Ear discharge*	8 1.00	6 0.79 0.27-2.28	7 0.65 0.24-1.80	7 2.66 0.96-7.38	0.31
Skin rash	13 1.00	14 1.14 0.53-2.43	26 1.50 0.77-2.93	2 0.46 0.10-2.05	0.81
Infected cut	6 1.00	5 0.88 0.27-2.89	8 0.99 0.34-2.87	2 1.01 0.20-5.00	0.97
Nausea	75 1.00	45 0.62 0.43-0.91	61 0.59 0.42-0.84	25 1.01 0.63-1.60	0.12
Vomiting*	42 1.00	31 0.77 0.48-1.24	47 0.83 0.55-1.27	23 1.68 1.00-2.83	0.32
Diarrhea	110 1.00	69 0.65 0.47-0.88	85 0.56 0.42-0.75	38 1.05 0.71-1.53	0.05
Diarrhea with blood	2 1.00	1 0.53 0.05-5.82	2 0.75 0.10-5.30	2 3.03 0.43-21.53	0.42
Stomach pain	114 1.00	81 0.74 0.55-0.99	133 0.86 0.66-1.12	39 1.03 0.71-1.51	0.79
Cough	127 1.00	137 1.15 0.90-1.48	139 0.80 0.63-1.03	40 0.95 0.65-1.37	0.12
Cough & phlegm*	54 1.00	56 1.10 0.75-1.61	53 0.73 0.49-1.07	28 1.60 1.00-2.55	0.88

Table 35 (continued)

Runny nose	146 1.00	148 1.08 0.85-1.37	152 0.76 0.60-0.96	48 0.99 0.70-1.40	0.09
Sore throat	100 1.00	102 1.08 0.81-1.44	106 0.78 0.59-1.03	37 1.13 0.76-1.66	0.37
HCGI 1	71 1.00	50 0.73 0.51-1.06	72 0.75 0.54-1.04	29 1.25 0.80-1.94	0.86
HCGI 2	22 1.00	14 0.67 0.34-1.31	26 0.88 0.50-1.56	14 1.95 0.99-3.83	0.19
Signif. resp. disease*	86 1.00	88 1.08 0.80-1.47	88 0.75 0.56-1.02	47 1.71 1.18-2.48	0.53

* Statistically significant at $p<.05$.

† The number of diseased subjects are given on the first line for each outcome. Trend P is from a linear model.

Table 36. Crude Odds Ratios and 95% Confidence Intervals for Outcomes of Interest by Distance from Drain Among Swimmers Aged 12-25 Years Old.†

	Distance from drain (in yards)				
	400	100-50	50-1	0	trend P
# exposed:	739	892	1188	163	
Fever*	25 1.00	39 1.31 0.78-2.18	46 1.15 0.70-1.89	11 2.07 1.00-4.29	0.23
Chills	14 1.00	22 1.31 0.67-2.58	28 1.25 0.65-2.39	6 1.98 0.75-5.23	0.29
Eye discharge	7 1.00	14 1.67 0.67-4.15	15 1.34 0.54-3.30	3 1.96 0.50-7.66	0.49
Earache	33 1.00	38 0.95 0.59-1.53	38 0.71 0.44-1.14	10 1.40 0.67-2.90	0.53
Ear discharge	7 1.00	6 0.71 0.24-2.12	12 1.07 0.42-2.72	2 1.30 0.27-6.31	0.67
Skin rash	5 1.00	3 0.50 0.12-2.08	13 1.62 0.58-4.57	0 0.00 0.00-+INF	0.53
Infected cut	8 1.00	6 0.62 0.21-1.79	15 1.17 0.49-2.77	2 1.14 0.24-5.40	0.55
Nausea	25 1.00	40 1.34 0.81-2.23	34 0.84 0.50-1.42	7 1.28 0.54-3.02	0.61
Vomiting	7 1.00	19 2.28 0.95-5.44	5 0.44 0.14-1.40	2 1.30 0.27-6.31	0.20
Diarrhea	43 1.00	31 0.58 0.36-0.93	46 0.65 0.43-1.00	10 1.06 0.52-2.15	0.28
Diarrhea with blood	3 1.00	1 0.28 0.03-2.65	0 0.00 0.00-+INF	0 0.00 0.00-+INF	0.07
Stomach pain	52 1.00	54 0.85 0.57-1.26	77 0.92 0.64-1.32	11 0.96 0.49-1.88	0.78
Cough	43 1.00	71 1.40 0.95-2.07	87 1.28 0.88-1.87	13 1.40 0.74-2.67	0.25
Cough & phlegm*	21 1.00	32 1.27 0.73-2.23	48 1.44 0.85-2.42	10 2.23 1.03-4.84	0.05

Table 36 (continued)

Runny nose	72 1.00 0.87-1.65	102 1.20 0.74-1.37	116 1.00 0.62-1.88	17 1.08	0.90
Sore throat	46 1.00	67 1.22 0.83-1.80	105 1.46 1.02-2.09	15 1.53 0.83-2.81	0.03
HCGI 1	16 1.00	24 1.25 0.66-2.37	21 0.81 0.42-1.57	4 1.14 0.38-3.45	0.58
HCGI 2	1 1.00	10 8.37 1.07-65.51	3 1.87 0.19-17.99	1 4.56 0.28-73.21	0.98
Signif. resp. disease	46 1.00	55 0.99 0.66-1.48	81 1.10 0.76-1.60	16 1.64 0.90-2.98	0.20

* Statistically significant at $p<.05$.

† The number of diseased subjects are given on the first line for each outcome. Trend P is from a linear model.

Table 37. Crude Odds Ratios and 95% Confidence Intervals for Outcomes of Interest by Distance from Drain Among Adults Over 25 Years Old.†

	Distance from drain (in yards)				
	400	100-50	50-1	0	trend P
# exposed:	740	949	1251	150	
Fever	27 1.00	41 1.19 0.73-1.96	49 1.08 0.67-1.74	6 1.10 0.45-2.71	0.86
Chills	20 1.00	26 1.01 0.56-1.83	36 1.07 0.61-1.86	5 1.24 0.46-3.36	0.69
Eye discharge	11 1.00	18 1.28 0.60-2.73	22 1.19 0.57-2.46	4 1.82 0.57-5.78	0.48
Earache	29 1.00	28 0.75 0.44-1.26	40 0.81 0.50-1.32	6 1.02 0.42-2.51	0.65
Ear discharge	6 1.00	7 0.91 0.30-2.72	6 0.59 0.19-1.83	4 3.35 0.93-12.02	0.64
Skin rash	5 1.00	13 2.04 0.72-5.75	14 1.66 0.60-4.64	2 1.99 0.38-10.34	0.42
Infected cut	3 1.00	5 1.30 0.31-5.46	14 2.78 0.80-9.71	2 3.32 0.55-20.04	0.04
Nausea	33 1.00	30 0.70 0.42-1.16	48 0.85 0.54-1.34	8 1.21 0.55-2.67	0.98
Vomiting	8 1.00	8 0.78 0.29-2.08	11 0.81 0.32-2.03	0 0.00 0.00-+INF	0.37
Diarrhea	51 1.00	63 0.96 0.66-1.41	71 0.81 0.56-1.18	5 0.47 0.18-1.19	0.09
Diarrhea with blood	2 1.00	0 0.00 0.00-+INF	1 0.30 0.03-3.26	0 0.00 0.00-+INF	0.26
Stomach pain	40 1.00	59 1.16 0.77-1.75	61 0.90 0.60-1.35	11 1.38 0.69-2.77	0.87
Cough	39 1.00	55 1.11 0.73-1.69	70 1.07 0.71-1.59	2 0.24 0.06-1.02	0.44
Cough & phlegm	15 1.00	26 1.36 0.72-2.59	42 1.68 0.92-3.05	1 0.32 0.04-2.47	0.38
Runny nose	55 1.00	101 1.48 1.05-2.09	103 1.12 0.79-1.57	9 0.79 0.38-1.65	0.75

Table 37 (continued)

Sore throat	44 1.00	75 1.36 0.92-2.00	93 1.27 0.88-1.84	7 0.77 0.34-1.75	0.66
HCGI 1	15 1.00	22 1.15 0.59-2.23	28 1.11 0.59-2.09	2 0.65 0.15-2.89	0.93
HCGI 2	3 1.00	4 1.04 0.23-4.66	3 0.59 0.12-2.93	0 0.00 0.00-+INF	0.35
Signif. resp. disease	29 1.00	55 1.51 0.95-2.39	70 1.45 0.93-2.26	4 0.67 0.23-1.94	0.48

* Statistically significant at $p<.05$.

† The number of diseased subjects are given on the first line for each outcome. Trend P is from a linear model.

Table 38. Risks For High vs. Low E.Coli Indicator Counts

ALL BEACHES

	Total Exposed	= 2654	Total Unexposed	= 7724			
		> 70 cfu		≤ 70 cfu			
SYMPTOMS	Ill	Risks	Ill	Risks	RR	Lower 95% CI	Upper 95% CI
Fever	135	0.051	363	0.047	1.08	0.89	1.31
Chills	68	0.026	186	0.024	1.06	0.81	1.40
Eye discharge	43	0.016	146	0.019	0.86	0.61	1.20
Earache	98	0.037	259	0.034	1.10	0.88	1.38
Ear discharge	17	0.006	50	0.006	0.99	0.57	1.71
Skin rash	28	0.011	72	0.009	1.13	0.73	1.75
Infected cut	15	0.006	49	0.006	0.89	0.50	1.59
Nausea	94	0.035	290	0.038	0.94	0.75	1.19
Vomiting	44	0.017	138	0.018	0.93	0.66	1.30
Diarrhea	144	0.054	411	0.053	1.02	0.85	1.23
Diarrhea w/ blood	3	0.001	8	0.001	1.09	0.29	4.11
Stomach pain	171	0.064	477	0.062	1.04	0.88	1.24
Coughing	197	0.074	540	0.070	1.06	0.91	1.24
Phlegm	88	0.033	267	0.035	0.96	0.76	1.22
Nasal congestion	251	0.095	702	0.091	1.04	0.91	1.19
Sore throat	186	0.070	516	0.067	1.05	0.89	1.23
HCGI 1	83	0.031	234	0.030	1.03	0.81	1.32
HCGI 2	24	0.009	69	0.009	1.01	0.64	1.61
SRD	135	0.051	390	0.050	1.01	0.83	1.22

Table 39. Risks For High vs. Low Bacterial Indicators

E. coli

	> 35 cfu		> 70 cfu	
Symptoms	RR	95% CI	RR	95% CI
Fever	1.16	0.98, 1.38	1.07	0.89 , 1.30
Chills	1.07	0.84, 1.37	1.06	0.80 , 1.39
Eye discharge	0.89	0.67, 1.20	0.85	0.61 , 1.19
Earache	0.94	0.77, 1.16	1.09	0.87 , 1.37
Ear discharge	0.83	0.51, 1.35	0.96	0.56 , 1.67
Skin rash	1.07	0.72, 1.59	1.13	0.73 , 1.74
Infected cut	0.74	0.44, 1.24	0.89	0.50 , 1.58
Nausea	1.10	0.90, 1.34	0.93	0.74 , 1.17
Vomiting	1.01	0.75, 1.35	0.92	0.65 , 1.28
Diarrhea	1.12	0.95, 1.31	1.00	0.83 , 1.21
Diarrhea w/ blood	1.70	0.52, 5.58	1.08	0.29 , 4.09
Stomach pain	1.18	1.01, 1.37	1.03	0.87 , 1.22
Coughing	0.94	0.81, 1.08	1.06	0.91 , 1.24
Phlegm	0.82	0.66, 1.01	0.97	0.77 , 1.22
Nasal congestion	0.97	0.86, 1.10	1.04	0.91 , 1.19
Sore throat	0.97	0.83, 1.12	1.04	0.89 , 1.22
HCGI_1	1.05	0.84, 1.30	1.02	0.80 , 1.31
HCGI_2	1.34	0.89 , 2.01	1.01	0.64 , 1.61
SRD	0.93	0.78, 1.10	1.01	0.83 , 1.22

Table 40. Odds Ratios and 95% Confidence Intervals for E. Coli Dichotomized First at 160 cfu, then at 320 cfu. The Number of Diseased Subjects are Given on the First Line for Each Outcome.

	Cutpoint	
	160 cfu	320 cfu
# exposed:	1509	991
Fever	74.00 1.03 0.80-1.32	45.00 0.94 0.69-1.28
Chills	40.00 1.10 0.78-1.55	22.00 0.90 0.58-1.39
Eye discharge	29.00 1.07 0.72-1.59	23.00 1.32 0.85-2.05
Earache*	65.00 1.32 1.00-1.74*	47.00 1.46 1.06-2.00*
Ear discharge	12.00 1.28 0.69-2.40	6.00 0.93 0.40-2.16
Skinrash	21.00 1.57 0.97-2.55	15.00 1.68 0.97-2.92
Infected cut	12.00 1.36 0.72-2.55	9.00 1.56 9.77-3.16
Nausea	60.00 1.09 0.82-1.45	42.00 1.17 0.84-1.62
Vomiting	28.00 1.07 0.71-1.61	20.00 1.17 0.73-1.88
Diarrhea	81.00 1.00 0.79-1.28	56.00 1.07 0.80-1.42
Diarrhea with blood	2.00 1.31 0.28-6.05	0.00 0.00 0.00-+INF
Stomache pain	101.00 1.09 0.88-1.36	70.00 1.16 0.90-1.50
Cough	111.00 1.05 0.85-1.29	82.00 1.20 0.95-1.53
Cough & phlegm	54.00 1.06 0.79-1.42	43.00 1.32 0.95-1.83

Table 40 (continued)

nny nose*	146.00 1.07 0.89-1.29	108.00 1.24 1.00-1.53*
Sorethroat	104.00 1.02 0.83-1.27	75.00 1.14 0.89-1.47
HCGI-1	53.00 1.19 0.88-1.60	36.00 1.22 0.86-1.74
HCGI-2	16.00 1.22 0.71-2.10	10.00 1.14 0.59-2.21
Signif. resp. disease	83.00 0.95 0.75-1.21	61.00 1.09 0.83-1.44

* Statistically significant at p<.05.

Table 41. Crude Odds Ratios and 95% Confidence Intervals for E. Coli by Quintiles and from a Linear Model.†

	Quintile (cfu)					linear model
	1	2	3	4	5	
midpoints:	2.00	7.50	23.00	56.00	310.00	
# exposed:	2122	2096	2141	2052	2082	
Fever	99 1.00	104 1.07 0.80-1.41	85 0.84 0.63-1.14	119 1.26 0.96-1.65	98 1.01 0.76-1.34	0.99 0.94-1.04
Chills	56 1.00	48 0.86 0.59-1.28	48 0.85 0.57-1.25	56 1.04 0.71-1.51	50 0.91 0.62-1.34	0.99 0.92-1.07
Eye discharge	36 1.00	43 1.21 0.78-1.90	41 1.13 0.72-1.78	33 0.95 0.59-1.52	37 1.05 0.66-1.67	1.04 0.98-1.10
Earache	83 1.00	67 0.81 0.58-1.13	71 0.84 0.61-1.16	57 0.70 0.50-0.99	82 1.01 0.74-1.38	1.03 0.98-1.08
Ear discharge	16 1.00	14 0.89 0.43-1.82	16 0.99 0.49-1.99	9 0.58 0.26-1.32	14 0.89 0.43-1.83	0.98 0.84-1.14
Skin rash*	16 1.00	18 1.14 0.58-2.24	25 1.56 0.83-2.92	18 1.16 0.59-2.29	23 1.47 0.77-2.79	1.07 1.01-1.14
Infected cut	1 1.00	13 1.20 0.54-2.68	19 1.72 0.82-3.62	7 0.66 0.25-1.70	14 1.30 0.59-2.87	1.02 0.91-1.15
Nausea*	85 1.00	68 0.80 0.58-1.11	72 0.83 0.61-1.15	78 0.95 0.69-1.30	82 0.98 0.72-1.34	1.04 1.00-1.08
Vomiting	47 1.00	30 0.64 0.40-1.02	33 0.69 0.44-1.08	36 0.79 0.51-1.22	36 0.78 0.50-1.20	1.02 0.95-1.10
Diarrhea	125 1.00	86 1.17 0.90-1.53	122 0.77 0.58-1.03	115 1.17 0.89-1.52	1.08 0.82-1.41	1.03 0.99-1.07
Diarrhea with blood	2 1.00	1 0.51 0.05-5.58	2 0.99 0.14-7.04	3 1.55 0.26-9.30	3 1.53 0.26-9.16	0.85 0.38-1.87
Stomach pain*	141 1.00	119 0.85 0.66-1.09	109 0.75 0.58-0.98	145 1.07 0.84-1.36	135 0.97 0.76-1.24	1.04 1.00-1.07
Cough	150 1.00	157 1.06 0.84-1.34	140 0.92 0.72-1.17	141 0.97 0.76-1.23	149 1.01 0.80-1.28	1.02 0.98-1.06
Cough & phlegm	67 1.00	91 1.39 1.01-1.92	69 1.02 0.73-1.44	61 0.94 0.66-1.34	67 1.02 0.72-1.44	1.02 0.97-1.07

Table 41 (continued)

Runny nose	197 1.00	204 1.05 0.86-1.29	173 0.86 0.69-1.06	189 0.99 0.80-1.22	192 0.99 0.81-1.22	1.02 0.99-1.06
Sore throat	145 1.00	154 1.08 0.85-1.37	131 0.89 0.70-1.13	138 0.98 0.77-1.25	139 0.98 0.77-1.24	1.01 0.97-1.05
HCGI 1	83 1.00	56 0.67 0.48-0.95	48 0.56 0.39-0.81	66 0.82 0.59-1.13	64 0.78 0.56-1.09	1.02 0.97-1.08
HCGI 2	22 1.00	14 0.64 0.33-1.26	14 0.63 0.32-1.23	24 1.13 0.63-2.02	19 0.88 0.47-1.63	1.02 0.93-1.12
Signif. resp. disease	114 1.00	147 1.33 1.03-1.71	113 0.98 0.75-1.28	116 1.06 0.81-1.38	107 0.95 0.73-1.25	1.01 0.97-1.06

* Statistically significant at $p<.05$.

† Linear results correspond to an increase in the exposure equal to the difference between the 90th and 10th percentiles. The number of subjects with each outcome are given on the first line.

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Forest Service Specifications for Construction of Roads & Bridges

Preface

The Forest Service, U.S. Department of Agriculture, developed this book for use in the preparation and administration of contracts for the construction of roads and bridges on the National Forest Development Road System under Public Works Contracts, or as a condition of Timber Sale Contracts.

This book contains the Standard Specifications that commonly apply in Public Works and Timber Sale Contracts. When designated in a Forest Service contract, the specifications in this book are binding on the parties signing the contract and become a part of the contract. Provisions and clauses pertinent to Public Works Contracts are located in the Federal Acquisition Regulation (FAR). Standard Provisions and Special Provisions for timber sale projects are located in the Timber Sale Contract, Divisions B (BT) and C (CT) respectively. Conditions and requirements peculiar to individual projects, including additions and revisions to Standard Specifications, are located in the SPECIAL PROJECT SPECIFICATIONS section of the Contract.

In the development of this book, some section numbers were not utilized. The section numbers that are not included in this book may be used when it is necessary to develop a specification that is not adequately covered in one of the sections contained in this book, as long as it utilizes the same format and is included within the appropriate division.

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Forest Service

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ENVIRONMENTAL PROTECTION AGENCY

40 CFR Part 122

[FRL-5533-7]

Interpretive Policy Memorandum on Reapplication Requirements for Municipal Separate Storm Sewer Systems

AGENCY: Environmental Protection Agency (EPA).
ACTION: Policy statement; interpretation

SUMMARY: By today's notice EPA announces federal policy, signed by Robert Perciasepe, Assistant Administrator for Water, on May 17, 1996, regarding application requirements for renewal or reissuance of National Pollutant Discharge Elimination System (NPDES) permits for Municipal separate storm sewer systems (MS4s). Today's action responds to requests from municipalities and NPDES permit writers for clarification about regulations which do not appear to address reapplication requirements, i.e., permit reissuance. Today's notice explains that MS4 permit applicants and NPDES permit writers have considerable discretion to customize appropriate and streamlined reapplication requirements on a case-by-case basis, specifically, by using the fourth year annual report as the principal reapplication document.

EFFECTIVE DATE: This policy is effective May 17, 1996.

FOR FURTHER INFORMATION CONTACT: Marilyn Fonseca, Office of Wastewater Management, MC-4203, U.S. Environmental Protection Agency, 401 M Street SW., Washington, DC 20460, (202)-260-0592, e-mail: Fonseca.Marilyn@epamail.epa.gov

SUPPLEMENTARY INFORMATION: The text of this policy is as follows:

Municipal Separate Storm Sewer System Permit Reapplication Policy

The 1987 amendments to the Clean Water Act added Section 402(p) which directed the Environmental Protection Agency to establish regulations governing storm water discharges under the National pollutant Discharge Elimination System (NPDES) program. Early in the program, Congress specifically required NPDES permits for municipal separate storm sewer systems (MS4s) serving populations over 100,000. In response, EPA promulgated regulations in 1990 that established permit application requirements for MS4s that serve populations over 100,000. MS4 permits have since been drafted and finalized for many municipal systems. A number of MS4 permits are due to expire and must be reissued.

EPA is providing this policy memorandum to outline permit reapplication requirements for regulated MS4s. There are three components to EPA's reapplication policy. First, EPA is not requiring that the process used for part 1 and 2 of the initial permit application be repeated in full. Second, EPA has identified basic information that should be included in every reapplication package. Finally, EPA is seeking to improve existing MS4 storm water management programs by using information and experience municipalities have gained during the previous permit term.

Is a Permit Reapplication Necessary?

Yes. The requirement that all point source discharges authorized by a NPDES permit must reapply is well Established at 40 CFR 122.41(b) and 122.46(a):

Duty to reapply. If the permittee wishes to continue an activity regulated by this permit after the expiration date of this permit, the permittee must apply for and obtain a new permit.

Duration of permits. NPDES permits shall be effective for a fixed term not to exceed 5 years.

The reapplication requirement is also found at 40 CFR 122.21(d):

Duty to reapply….All other permittees with currently effective permits shall submit a new application 180 days before the existing permit expires.

Therefore, all regulated Phase I MS4s need to participate in a permit reapplication process.

Where a complete reapplication package has been submitted as directed by the permit authority, conditions of an expired MS4 permit will continue until the effective date of a new permit, as stated in 40 CFR 122.6(A) and (b):

(a) EPA permits. When EPA is the permit issuing authority, the conditions of an expired permit continue in force…until the effective date of a new permit…and (b) Effect. Permits continued under this section remain fully effective and enforceable.

Are Initial MS4 Permit Application Requirements Applicable to Permit Reapplication?

No. The scope of the initial permit application requirements was comprehensive and regulated MS4s invested considerable resources to develop these applications. The initial applications have laid the foundation for the long-term implementation of MS4 storm water management programs. EPA believes reapplications should focus on maintenance and improvement of these programs.

The MS4 permit application requirements at 40 CFR 122.26(d)(1) and (2) apply to the first round permit applications required of large and medium MS4s. The permit application deadline regulations in 40 CFR 122.26(e)(3) & (4) clearly reflect the "one time" nature of the Part I & II application requirements for large and medium MS4s. EPA has not promulgated regulations applicable to reapplication for MS4s. Requirements to demonstrate adequate legal authority, perform source identification (e.g., identify major outfalls and facility inventory), characterize data, and develop a storm water management program should have been addressed in the initial application phase. Therefore, to request the same information again, where it has already been provided and has not been changed, would be needlessly redundant. Thus, as a practical matter, most first-time permit application requirements are unnecessary for purposes of second round MS4 permit application.

What Basic Information Must Be Submitted for an MS4 Permit Reapplication?

EPA is committed to allowing permitting authorities to develop flexible reapplication requirements that are site-specific. In the absence of reapplication regulations specific to MS4s, minimum reapplication requirements are drawn from the generic NPDES permit application regulations at 40 CFR 122.21(f). EPA regulations suggest the following basic information be included as part of any permit reapplication:

-- name and mailing address(es) of the permittee(s) that operate the MS4, and
-- names and titles of the primary administrative and technical contacts for the municipal permittee(s).

In addition, in the reapplication, municipalities should identify any proposed changes or improvements to the storm water management program and monitoring activities for the upcoming five year term of the permit, if those proposed changes have not already been submitted pursuant to 40 CFR 122.42(c). [A requirement to submit proposed changes to the storm water management program is specified in the annual reporting requirements in 40 CFR 122.42(c)(2).] EPA encourages permitting authorities to make use of the fourth year annual report as the basic permit reapplication package.

Changes to the storm water management program may be justified due to the availability of new information on the relative magnitude of a problem or new data on water quality impacts of the storm water discharges. Municipalities may also propose to de-emphasize some program components and strengthen others, based on the experience gained under the first permit. Proposed elimination of a program component might be justified upon permit renewal; for example, when a component is no longer a problem area (i.e., all detention basins have been retrofitted) or when a different water quality program would serve the same goals.

The components of the original storm water management program which are found to be effective should be continued and made an ongoing part of the proposed new storm water management program. Such components may include:

—continued emphasis on public education programs, particularly programs on proper disposal of waste oil and household hazardous waste and pesticide application;
—continued, if not greater, emphasis on addressing impacts of new development/construction;
—proper storm design criteria for all new developments;
—retrofitting and/or upgrading of the existing storm sewer system according to a priority system;
—more frequent maintenance of storm sewer systems and storm water treatment systems;
—coordination with adjacent MS4s on monitoring or other efforts; and
—using a watershed approach to storm water management.

The accumulated annual report information as outlined in 40 CFR 122.42(c) should be evaluated and, to the extent applicable, be incorporated by reference into the reapplication package.

To reiterate, MS4s may use the fourth year annual report, which emphasizes proposed changes to the storm water management program, with the additional required basic information, as the MS4 permit reapplication. Changes to the storm water management program should be jointly developed by the permitting authority and the permit applicant. In this regard, we urge permit issuance authorities and permittees to work together to assure that the permit reapplication is complete and addresses all appropriate issues. The permitting agency may request additional technical information be submitted in the reapplication. NPDES permitting authorities, therefore, can exercise their information gathering authority under CWA Section 308, or analogous State provisions to complete the permit reapplication on a case-by case basis, as appropriate.

What Additional Information Should Be Considered for a Reapplication?

EPA also recommends the following information be provided by reapplicants to the permitting authority, as outlined in 40 CFR 122.26(d)(1)(iv)(C):

—identification of any previously unidentified water bodies that receive discharges from the MS4, and
—a summary of any known water quality impacts on the newly identified receiving waters (based on best available data).

In addition, EPA recommends the following information be provided to the permitting authority as well:

—a description of changes in co-applicants since issuance of initial MS4 permit, and
—identification number of the existing NPDES MS4 permit.

Further, EPA encourages permitting authorities to work with permittees to determine if storm water monitoring efforts are appropriate and useful. For example, during the previous permit term, municipalities may have found that their monitoring program was not fully successful in characterizing the nature and extent of storm water problems. Reapplication is an appropriate time for MS4s to evaluate their monitoring program and propose changes to make the program more appropriate and useful. To accomplish this, municipalities may wish to consider using monitoring techniques other than end-of-the pipe chemical-specific monitoring, including habitat assessments, bioassessments and/or other biological methods.

Permitting authorities should incorporate any such new information, together with assembled materials from the initial application and the existing permit, to form the administrative record for any reissued MS4 permits. Such administrative records should be made publicly available as part of the process to reissue the permit.

Dated: June 28, 1996.

Michael B. Cook,

Director, Office of Wastewater Management.

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United States
Environmental Protection
Agency

Office oF water
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EPA

Interim Permitting Approach For Water Quality-Based Effluent Limitations In Storm Water Permits

INTERIM PERMITTING APPROACH FOR WATER QUALITY-BASED EFFLUENT LIMITATIONS IN STORM WATER PERMITS

In response to recent questions regarding the type of water quality-based effluent limitations that are most appropriate for National Pollutant Discharge Elimination System (NPDES) storm water permits, the Environmental Protection Agency (EPA) is adopting an interim permitting approach for regulating wet weather storm water discharges. Due to the nature of storm water discharges, and the typical lack of information on which to base numeric water quality-based effluent limitations (expressed as concentration and mass), EPA will use an interim permitting approach for NPDES storm water permits.

The interim permitting approach uses best management practices (BMPs) in first-round storm water permits, and expanded or better-tailored BMPs in subsequent permits, where necessary, to provide for the attainment of water quality standards. In cases where adequate information exists to develop more specific conditions or limitations to meet water quality standards, these conditions or limitations are to be incorporated into storm water permits, as necessary and appropriate. This interim permitting approach is not intended to affect those storm water permits that already include appropriately derived numeric water quality-based effluent limitations. Since the interim permitting approach only addresses water quality-based effluent limitations, it also does not affect technology-based effluent limitations, such as those based on effluent limitations guidelines or developed using best professional judgement, that are incorporated into storm water permits.

Each storm water permit should include a coordinated and cost-effective monitoring program to gather necessary information to determine the extent to which the permit provides for attainment of applicable water quality standards and to determine the appropriate conditions or limitations for subsequent permits. Such a monitoring program may include ambient monitoring, receiving water assessment, discharge monitoring (as needed), or a combination of monitoring procedures designed to gather necessary information.

This interim permitting approach applies only to EPA; however, EPA also encourages authorized States and Tribes to adopt similar policies for storm water permits. This interim permitting approach provides time, where necessary, to more fully assess the range of issues and possible options for the control of storm water discharges for the protection of water quality. This interim permitting approach may be modified as a result of the ongoing Urban Wet Weather Flows Federal Advisory Committee policy dialogue on this subject.

Qs & As FOR INTERIM PERMITTING APPROACH FOR WATER QUALITY-BASED EFFLUENT LIMITATIONS IN STORM WATER PERMITS

Question 1: Must EPA require that storm water dischargers, industrial or municipal, be subject to numeric water quality-based effluent limitations (expressed as concentration and mass) in order to attain water quality standards (WQS)?

Answer 1: No. Although National Pollutant Discharge Elimination System (NPDES) permits must contain conditions to ensure that water quality standards are met, this does not require the use of numeric water quality-based effluent limitations. Under the Clean Water Act (CWA) and NPDES regulations, permitting authorities may employ a variety of conditions and limitations in storm water permits, including best management practices, performance objectives, narrative conditions, monitoring triggers, action levels (e.g., monitoring benchmarks, toxicity reduction evaluation action levels), etc., as the necessary water quality-based limitations, where numeric water quality-based effluent limitations are determined to be unnecessary or infeasible.

Analysis:

A. The Clean Water Act does not require numeric effluent limitations.

Section 301 of the CWA requires that discharger permits include effluent limitations necessary to meet State or Tribal WQS. Section 502 defines "effluent limitation" to mean <u>any</u> restriction on quantities, rates, and concentrations of constituents discharged from point sources. The CWA does not say that effluent limitations need be numeric. As a result, EPA and States have flexibility in terms of how to express effluent limitations.

B. EPA's regulations do not always require numeric effluent limitations.

EPA has, through regulation, interpreted the statute to allow for non-numeric limitations (e.g., "best management practices" or BMPs, see 40 CFR 122.2) to supplement or replace numeric limitations in specific instances that meet the criteria specified at 40 CFR 122.44(k). This regulation essentially codifies a court case addressing storm water discharges. <u>NRDC</u> v. <u>Costle</u>, 568 F.2d 1369 (D.C. Cir. 1977). In that case, the Court stated that EPA need not establish numeric effluent limitations where such limitations were infeasible.

C. EPA has interpreted the statute and regulations to allow BMPs in lieu of numeric limitations.

EPA has defended use of BMPs as a substitute for numeric limitations in litigation involving storm water discharges (CBE v. EPA, 91-70056 (9th Cir.)(brief on merits)) and in correspondence (Letter from Michael Cook, EPA, to Peter Lehner, NRDC, May 31, 1995). EPA has found that numeric limitations for storm water permits can be very difficult to develop at this time because of the existing state of knowledge about the intermittent and variable nature of these types of discharges and their effects on receiving waters. Some storm water permits, however, currently do contain numeric water quality-based effluent limitations where adequate information exists to derive such limitations.

Question 2: Has EPA provided guidance on a methodology for deriving numeric water quality-based effluent limitations?

Answer 2: Yes, but primarily for continuous wastewater discharges at low flow conditions in the receiving water, not intermittent wet weather discharges during high flow conditions. Regulations at 40 CFR 122.44(d) specify the requirements under which permitting authorities establish water quality-based effluent limitations when a facility has the "reasonable potential" to cause or contribute to an excursion of numeric or narrative water quality criteria. In addition, EPA guidance in the Technical Support Document for Water Quality-Based Toxics Control (TSD) and the NPDES Permit Writers Training Manual, supplemented with total maximum daily load (TMDL) and modeling guidance, supports issuing permits that include numeric water quality-based effluent limitations. This guidance was based on crafting numeric water quality-based effluent limitations using TMDLs, or calculations similar to those used in developing TMDLs, and wasteload allocations (WLAs) derived through modeling. EPA expects the Urban Wet Weather Flows Federal Advisory Committee (60 FR 21189, May 1, 1995) will review this issue at greater length and may provide recommendations on how to proceed.

Question 3: Why can numeric water quality-based effluent limitations be difficult to derive for storm water permits?

Answer 3: Storm water discharges are highly variable both in terms of flow and pollutant concentrations, and the relationships between discharges and water quality can be complex. The water quality impacts of storm water discharges are related to the uses designated by States and

Tribes in their WQS, the quality of the storm water discharge (e.g., conventional or toxic pollutants conveyed to the receiving water) and quantity of the storm water (e.g., erosion and loss of habitat caused by increased flows and velocity). Uses may be impacted by both water quality and water quantity. Depending on site-specific considerations, some of the water quality impacts of storm water discharges may be more related to the physical effects (e.g. stream bank erosion, streambed scouring, extreme temperature variations, sediment smothering) than the type and amount of pollutants present in the discharge. For municipal storm water discharges in particular, the current use of system-wide permits and a variety of jurisdiction-wide BMPs, including educational and programmatic BMPs, does not easily lend itself to the existing methodologies for deriving numeric water quality-based effluent limitations. These methodologies were designed primarily for process wastewater discharges which occur at predictable rates with predictable pollutant loadings under low flow conditions in receiving waters. Using these methodologies, limitations are typically derived for each specific outfall to be protective of low flows in the receiving water. Because of this, permit writers have not made wide-spread use of the existing methodologies and models for storm water discharge permits. In addition, wet weather modeling is technically more difficult and expensive than the simple dilution models generally used in the permitting process.

Question 4: Has EPA previously recognized the technical difficulty in deriving numeric water quality-based effluent limitations for storm water discharges?

Answer 4: Yes. EPA recognized the technical difficulty in deriving numeric water quality-based effluent limitations for wet weather discharges in its brief on the merits in Citizens for a Better Environment (CBE) v. United States Environmental Protection Agency, 91-70056 (9th Cir.) and in the Great Lakes Water Quality Guidance (58 FR 20841, April 16, 1993).

In the CBE case, EPA explained why it was technically infeasible to derive numeric water quality-based effluent limitations for the discharge of metals in storm water into South San Francisco Bay and asserted that a water quality-based effluent limitation could take the form of a narrative statement, such as a BMP, if it was infeasible to derive a numeric limitation. In explaining its arguments in the CBE case, EPA cited 40 CFR 122.44(k)(2), which provides that BMPs may be imposed in NPDES permits "to control or abate the discharge of pollutants when ... (2) [n]umeric effluent limitations are infeasible."

In the Great Lakes Water Quality Guidance, EPA did not extend the method for calculating wasteload allocations, the basis for numeric water quality-based effluent limitations, to storm water or combined sewer overflow (CSO) discharges because the varying nature of these discharges is inconsistent with the assumptions used in developing the guidance. The Great Lakes Water Quality Guidance defers to national guidance and policy on wet weather and does not seek to establish a separate and distinct set of wet weather requirements. EPA expects the Urban Wet Weather Flows Advisory Committee to provide recommendations about how to address the broader technical issues involved in achieving compliance with WQS in a wet weather context.

Question 5: What are the potential problems of using standard methodologies to derive numeric water quality-based effluent limitations for storm water permits?

Answer 5: Correctly derived numeric water quality-based effluent limitations provide a greater degree of confidence that a discharge will not cause or contribute to an exceedance of the WQS, because numeric water quality-based effluent limitations are derived directly from the numeric component of those standards. In addition, numeric water quality-based effluent limitations can avoid the expense associated with overly protective treatment technologies because numeric water quality-based effluent limitations provide a more precisely quantifed target for permittees. Potential problems of incorporating inappropriate numeric water quality-based effluent limitations rather than BMPs in storm water permits at this time are significant in some cases. Deriving numeric water quality-based effluent limitations for any NPDES permit without an adequate effluent characterization, or an adequate receiving water exposure assessment (which could include the use of dynamic modeling or continuous simulations) may result in the imposition of inappropriate numeric limitations on a discharge. Examples of this include the imposition of numeric water quality criteria as end-of-pipe limitations without properly accounting for the receiving water assimilation of the pollutant or failure to account for a mixing zone (if allowed by applicable State or Tribal WQS). This could lead to overly stringent permit requirements, and excessive and expensive controls on storm water discharges, not necessary to provide for attainment of WQS. Conversely, an inadequate effluent characterization could lead to water quality-based effluent limitations that are not stringent enough to provide for attainment of WQS. This could result because effluent characterization and exposure assessments for discharges with high variability of pollutant

concentrations, loadings, and flow are more difficult than with process wastewater discharges at low flows.

Question 6: How are water quality-based effluent limitations developed for combined sewer overflow (CSO) discharges?

Answer 6: The CSO Control Policy issued by EPA on April 19, 1994 (59 FR 18688) provides direction on compliance with the technology-based and water quality-based requirements of the CWA for communities with combined sewer systems. The CSO Policy provides for implementation of technology-based requirements (expressed as "nine minimum controls") by January 1, 1997.

In addition, under the CSO Policy, communities are also expected to develop long-term control plans that will provide for attainment of WQS through either the "presumption approach" or the "demonstration approach." Under the presumption approach, CSO controls would be presumed to attain WQS if certain performance criteria are met. A program that meets the criteria specified in the CSO policy is presumed to provide an adequate level of control to meet the water quality-based requirements of the CWA, provided the permitting authority determines that such presumption is reasonable based on characterization, monitoring, and modeling of the system, including consideration of sensitive areas. Under the demonstration approach, the permittee would demonstrate that the selected CSO controls, when implemented, would be adequate to meet the water quality-based requirements of the CWA.

The CSO Policy anticipates that it will be difficult in the early stages of permitting to determine whether numeric water quality-based effluent limitations are necessary for CSOs, and, if so, what the limitations should be. For that reason, in the absence of sufficient data to evaluate the need for numeric water quality-based effluent limitations, the Policy recommends that the first phase of CSO permits ("Phase I") contain a narrative requirement to comply with WQS. Further, so-called "Phase II" permits would contain water quality-based effluent limitations, as provided in 40 CFR 122.44(d)(1) and 122.44(k), that may take the form of numeric performance or design standards, such as a certain number of overflow events or a certain percent volume capture. Generally, only after the long-term control plan is in place and after collection of sufficient water quality data (including applicable wasteload allocations developed during a TMDL process) would numeric water quality-based effluent limitations be included in the permit. This would likely occur only after several permitting cycles.

Question 7: If BMPs alone are demonstrated to provide adequate water quality protection, are additional controls necessary?

Answer 7: No. If the permitting authority determines that, through implementation of appropriate BMPs required by the NPDES storm water permit, the discharges have the necessary controls to provide for attainment of WQS and any technology-based requirements, additional controls need not be included in the permit. Conversely, if a discharger (municipal or industrial) fails or refuses to adopt and implement adequate BMPs , the permitting authority may have to consider other approaches to ensure water quality protection.

If, however, the permitting authority has adequate information on which to base more specific conditions or limitations, such limitations are to be incorporated into storm water permits, as necessary and appropriate. Such conditions or limitations may include an integrated suite of BMPs, performance objectives, narrative standards, monitoring triggers, numeric water quality-based effluent limitations, action levels, etc. Storm water permits may also need to include additional requirements to receive State or Tribal 401 certifications.

Question 8: What is EPA doing to develop information about the linkage between BMPs and water quality and to facilitate a watershed-based approach to storm water permitting?

Answer 8: The Agency has cooperative agreements with WERF (Water Environment Research Foundation) and ASCE (American Society of Civil Engineers) to research which BMPs are most effective under which circumstances. The results of this research should provide permitting authorities and permittees with information about how to evaluate the effectiveness of different kinds of BMPs in different circumstances and to select the most appropriate controls to achieve water quality objectives. EPA also has cooperative agreements with the Watershed Management Institute and other organizations to conduct research over the next two to four years that will examine the capability of storm water BMPs to improve redeiving water quality and restore/protect the biological integrity of those waters. EPA expects the Urban Wet Weather Flows Federal Advisory Committee to provide recommendations on how to permit storm water discharges on a watershed basis.

Question 9: The interim permitting approach states that permits should include monitoring programs to generate necessary

information to determine the extent to which permits are providing for the attainment of water quality standards. What types of monitoring should be included and how much monitoring is necessary?

Answer 9: The amount and types of monitoring necessary will vary depending on the individual circumstances of each storm water discharge. EPA encourages dischargers and permitting authorities to carefully evaluate monitoring needs and storm water program objectives so as to select useful and cost-effective monitoring approaches. For most dischargers, storm water monitoring can be conducted for two basic reasons: 1) to identify if problems are present, either in the receiving water or in the discharge, and to characterize the cause(s) of such problems; and 2) to assess the effectiveness of storm water controls in reducing contaminants and making improvements in water quality.

Under the NPDES storm water program, large and medium municipal separate storm sewer system permittees are required to conduct monitoring. EPA recommends that each such municipal permittee design the monitoring effort to be supportive of the goals and objectives of its storm water management program when developing such a program for the term of its NPDES permit. To accomplish this, a municipal permittee may use a variety of storm water monitoring tools including receiving water chemistry; receiving water biological assessments (benthic invertebrate surveys, fish surveys, habitat assessments, etc.); effluent monitoring; including chemical, whole effluent and visual examinations; illicit connections screening; and combinations thereof, or other methods. Techniques that assess receiving waters will help to identify the degree to which storm water discharges are contributing to any water quality problems. Techniques that assess storm water discharge characteristics will help to identify potential causes of any identified water quality problems. The municipal permittee, in conjunction with the applicable NPDES permitting authority, should determine which monitoring approaches would be most appropriate given the objectives of the storm water management program. If municipal permittees conduct ambient monitoring, it may be most cost-effective to pool resources with other organizations (including, for example, other municipalities, States, and Tribes) conducting monitoring within the same watershed. This could be best accomplished through a coordinated watershed monitoring strategy.

For industrial storm water dischargers, monitoring may be required under the terms of an NPDES permit for storm water discharges. For those industrial storm water permits that do require monitoring, this is typically done to characterize contaminants that might be found in the

industrial runoff and/or to assess the effectiveness of the industrial storm water pollution prevention plan in reducing these contaminants. This typically involves end-of-pipe chemical-specific monitoring. End-of-pipe monitoring may be more appropriate for an industrial facility than for a municipal permittee, given the industrial facility's more discrete site characteristics, which make management strategies such as collection and treatment more feasible. Industries, for the most part, have readily defined storm water conveyances into which runoff flows from discrete drainage areas. Industries may more readily identify and control existing on-site sources of storm water contamination or provide collection and treatment within these discrete drainage areas to control pollutant concentrations in their storm water discharges.

EPA and other organizations are currently working to improve approaches for monitoring storm water and the potential effects upon water quality. These new approaches are called storm water program "environmental indicators." Environmental indicators are designed to be more meaningful monitoring tools that storm water dischargers can use to conduct storm water monitoring for the purposes described above. A manual describing each of the recommended storm water program environmental indicators is being prepared by the Center for Watershed Protection in Silver Spring, Maryland. That manual is expected to be ready by the end of August 1996 and should provide useful information for storm water dischargers contemplating the need to develop a cost-effective, meaningful storm water monitoring program. In addition, EPA expects the Urban Wet Weather Flows Federal Advisory Committee to provide recommendations on how to better monitor storm water and other wet weather discharges using a watershed approach.

Question 10: Does this interim permitting approach apply to both storm water discharges associated with industrial activity and storm water discharges from municipal separate storm sewer systems?

Answer 10: Yes. The interim permitting approach is applicable to both discharges from municipal separate storm sewer systems and storm water discharges associated with industrial activity (as defined by 40 CFR 122.26(b)(14)). The interim permitting approach would not affect, however, permits that already incorporate appropriately derived numeric water quality-based effluent limitations. Since the interim permitting approach only addresses water quality-based effluent limitations, it also does not affect technology-based effluent limitations, such as those based on effluent limitations guidelines or developed using best

professional judgement, that are incorporated into storm water permits. In addition, particularly for some industries, adequate information may already have been collected with which to assess the reasonable potential for a storm water discharge to cause or contribute to an excursion of a WQS, and from which a numeric water quality-based effluent limitation can be (or has been) appropriately derived. An adequate amount of storm water pollutant source information may also exist with which to assess the effectiveness of the industrial storm water control measures in complying with the limitations and in reducing storm water contaminants for protecting water quality.

Coastal California Gnatcatcher (*Polioptila californica californica*) Presence/Absence Survey Guidelines February 28, 1997

The coastal California gnatcatcher (*Polioptila californica californica*) was listed as threatened on March 25, 1993, under the Endangered Species Act of 1973, as amended (Act). The final rule for this action was published in the Federal Register on March 30, 1993 (58 Federal Register 16742). On December 10, 1993, pursuant to section 4(d) of the Act, the U.S. Fish and Wildlife Service (Service) defined specific conditions associated with certain land use activities under which incidental take of coastal California gnatcatchers and their habitat would not be a violation of section 9 of the Act (58 Federal Register 65088).

The coastal California gnatcatcher, a small gray songbird, is a resident of scrub dominated plant communities from southern Ventura County southward through Los Angeles, Orange, Riverside, San Bernardino, and San Diego Counties, California into Baja California, Mexico, to approximately 30 degrees North latitude near El Rosario (American Ornithologists' Union 1957; Atwood 1980, 1990; Jones and Ramirez 1995). The coastal California gnatcatcher is strongly associated with sage scrub in its various successional stages.

The majority of plant species found in sage scrub are low-growing, drought-deciduous shrubs and sub-shrubs, including California sagebrush (*Artemisia californica*), California buckwheat (*Eriogonum fasciculatum*), and sages (*Salvia mellif*era, *S. apiana*) (Holland 1986, Sawyer and Keeler-Wolf 1995). Other commonly occurring species include lemonadeberry (*Rhus integrifolia*), coast goldenbush (*Isocoma menziesii*), laurel sumac (*Malosma laurina*), boxthorn (*Lycium* spp.), cliff spurge (*Euphorbia misera*), and jojoba (*Simmondsia chinensis*). Succulent species, such as cacti (*Opuntia littoralis*, *O. prolifera, Ferocactus viridescens*), and *Dudleya* spp. are represented in maritime succulent and southern coastal bluff scrubs. Sage scrub often occurs in a patchy, or mosaic, distribution pattern throughout the range of the coastal California gnatcatcher. Coastal California gnatcatchers also use chaparral, grassland, and riparian plant communities where they occur adjacent to or intermixed with sage scrub. Although existing quantitative data may reveal relatively little about coastal California gnatcatcher use of these other habitats, these areas may be critical during certain times of year for dispersal or as foraging areas during inclement conditions (e.g., drought). Breeding territories also have been documented in non-sage scrub habitat (e.g., chaparral and grassland/ruderal habitat).

The breeding season of the coastal California gnatcatcher extends from about February 15 through August 30, with the peak of nesting activity occurring from mid-March through mid-May. Incubation takes 14 days. The young fledge at 8 to 13 days of age and are dependent upon their parents for as little as three to four weeks (ERCE 1990), but fledglings may associate with their parents for several months.

This protocol is based on the best available scientific information regarding the detectability of the coastal California gnatcatcher and is subject to change pending receipt of additional pertinent scientific data. Information used to create this protocol included: Braden and Woulfe (1995a, 1995b), Brussard *et al*. (1992), Mock *et al*. (1990), and other unpublished information in the Service files.

The following protocol is issued as guidance to section 10(a)(1)(A) permittees. A section 10(a)(1)(A) permit under the Act shall be obtained prior to initiating any field surveys. Any surveys not conducted under a valid 10(a)(1)(A) permit will not be accepted by the Service. Failure to obtain a scientific permit prior to survey work may result in violation(s) of section 9 of the Act.

I. Coastal California gnatcatcher surveys shall be completed by permitted biologists if proposed projects contain coastal sage scrub, alluvial fan scrub, chaparral, or intermixed or adjacent areas of grassland and riparian habitats, and is located within the range of this species. The protocol should be followed for all surveys unless otherwise authorized by the Service in writing.

II. The permittee shall notify the appropriate Service Fish and Wildlife Office in writing, at least ten (10) working days prior to the anticipated start date of survey work and receive approval prior to beginning work. The Ventura Fish and Wildlife Office (2493 Portola Road, Suite B, Ventura, California 93003, Tel: 805/644-1766, FAX 805/644-3958) shall be notified for all work in Ventura County and in the areas north and west of the San Gabriel Mountains in Los Angeles County. The Carlsbad Fish and Wildlife Office (2730 Loker Avenue West, Carlsbad, California 92008, Tel: 619/431-9440, FAX 619/431-9624) shall be notified for all work south of the above areas.

III. Jurisdictions participating in the NCCP interim section 4(d) process:

The number of surveys conducted within active NCCP areas is based on the prior recommended guidelines and the fact that, through the interim section 4(d) process, loss of coastal sage scrub requires mitigation on a habitat basis, regardless of whether habitat is occupied by coastal California gnatcatchers.

- From February 15 and August 30, a minimum of **three (3)** surveys shall be conducted at least one week apart, to determine presence/absence of coastal California gnatcatchers. Whenever possible, additional surveys should be conducted. Any deviation from this protocol will require concurrence from the Service.

IV. All other jurisdictions:

Breeding and non-breeding season survey protocol for presence/absence of coastal California gnatcatchers in non-NCCP areas are as follows:

- From March 15 through June 30, a minimum of **six (6)** surveys shall be conducted at least one week apart. The protocol for the breeding season was designed to provide a 95% confidence level of detecting coastal California gnatcatchers at a site when they are present.

- From July 1 through March 14, a minimum of **nine (9)** surveys shall be conducted at least two weeks apart.

V. Surveys shall be conducted between 6:00 a.m. and 12:00 p.m. Surveys shall avoid periods of excessive or abnormal heat, wind, rain, fog, or other inclement weather.

VI. Taped coastal California gnatcatcher vocalizations shall be used only until individuals have been initially located. Tapes shall not be used frequently or to elicit further behaviors from the birds.

VII. Surveys shall be conducted by slowly walking survey routes. Sites with deep canyons, ridge lines, steep terrain, and thick shrub cover should be surveyed more slowly. Prevailing site conditions and professional judgment must be applied to determine appropriate survey rates and acreage covered per day. These factors may dictate that the maximum daily coverage specified below is not prudent under certain conditions.

Jurisdictions participating in the NCCP interim section 4(d) process:

- No more than 100 acres (40 ha) shall be surveyed per biologist per day.

All other jurisdictions:

C No more than 80 acres (32 ha) shall be surveyed per biologist per day.

VIII. No attempts shall be made to closely approach or examine coastal California gnatcatcher nests unless authorized by Service permits.

IX. The permittee shall provide the following information in a report to the appropriate Service Fish and Wildlife Office, described above, and the California Department of Fish and Game within 45 days following the field surveys.

A. The location of the survey area delineated on a 7.5 minute U.S. Geological Survey topographic map at 1:24,000 and 1:200 scale.

B. Names of all biologists and associated personnel with reference to their section 10(a)(1)(A) permit number. A complete description of survey methods, including, the number of acres surveyed per biologist per hour and how many total acres surveyed per day per biologist, the number and dates of surveys, start and stop time of surveys, survey routes delineated on maps, the temperature and weather conditions at the beginning and end of each survey, and how frequently taped vocalizations were used.

C. Written and mapped qualitative descriptions of plant communities (including dominant species and habitat quality) on and adjacent to the area surveyed.

D. The number, age (adult, independent juvenile, dependent juvenile, recently fledged juvenile, nestling, unknown), sex of all coastal California gnatcatchers, and color band information (from top to bottom and from left to right) if any. These data also shall be plotted on 1:24,000 and 1:200 scale maps of the survey area.

E. Copies of all reports or other documents that include information gathered under the authority of Service permits (e.g., reports for clients prepared by consulting firm) shall be submitted to the appropriate Service Fish and Wildlife Office immediately upon completion. Raw/field data, notes, and other information resulting form work conducted under this permit shall be submitted to the Service immediately upon request.

This protocol was prepared by the Service's Carlsbad Fish and Wildlife Office, 2730 Loker Avenue West, Carlsbad, California 92008. If you have any questions regarding the development of this protocol please call 619/431-9440.

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County of San Diego v. State of California 15 Cal.4th 68

[No. S046843. Mar 3, 1997.]

COUNTY OF SAN DIEGO, Cross-complainant and Respondent, v. THE STATE OF CALIFORNIA et al., Cross-defendants and Appellants.

(Superior Court of San Diego County, No. 634931, Michael I. Greer, fn. * Harrison R. Hollywood, and Judith McConnell, Judges.)

(Opinion by Chin, J., with George, C. J., Mosk, and Baxter, JJ., Anderson, J., fn. * and Aldrich, J., fn. concurring. Dissenting opinion by Kennard, J.)

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OPINION

CHIN, J.

Section 6 of article XIII B of the California Constitution (section 6) requires the State of California (state), subject to certain exceptions, to "provide a subvention of funds to reimburse" local governments "[w]henever the Legislature or any state agency mandates a new program or higher level of service ...." In this action, the County of San Diego (San Diego or the County) seeks reimbursement under section 6 from the state for the costs of providing health care services to certain adults who formerly received medical care under the California Medical Assistance Program (Medi-Cal) (see Welf. & Inst. Code, § 14063) fn. 1

because they were medically indigent, i.e., they had insufficient financial resources to pay for their own medical care. In 1979, when the electorate adopted section 6, the state provided Medi-Cal coverage to these medically indigent adults without requiring financial contributions from counties. Effective January 1, 1983, the Legislature excluded this population from Medi-Cal. (Stats. 1982, ch. 328, §§ 6, 8.3, 8.5, pp. 1574-1576; Stats. 1982, ch. 1594, §§ 19, 86, pp. 6315, 6357.) Since that date, San Diego has provided medical care to these individuals with varying levels of state financial assistance.

To resolve San Diego's claim, we must determine whether the Legislature's exclusion of medically indigent adults from Medi-Cal "mandate[d] a new program or higher level of service" on San Diego within the meaning of section 6. The Commission on State Mandates (Commission), which the Legislature created to determine claims under section 6, has ruled that section 6 does not apply to the Legislature's action and has rejected reimbursement claims like San Diego's. (See Kinlaw v. State of California (1991) 54 Cal. 3d 326, 330, fn. 2 [285 Cal. Rptr. 66, 814 P.2d 1308] (Kinlaw).) The trial court and Court of Appeal in this case disagreed with the Commission, finding that San Diego was entitled to reimbursement. The state seeks **[15 Cal. 4th 76]** reversal of this finding. It also argues that San Diego's failure to follow statutory procedures deprived the courts of jurisdiction to hear its claim. We reject the state's jurisdictional argument and affirm the finding that the Legislature's exclusion of medically indigent adults from Medi-Cal "mandate[d] a new program or higher level of service" within the meaning of section 6. Accordingly, we remand the matter to the Commission to determine the amount of reimbursement, if any, due San Diego under the governing statutes.

I. Funding of Indigent Medical Care

Before the start of Medi-Cal, "the indigent in California were provided health care services through a variety of different programs and institutions." (Assem. Com. on Public Health, Preliminary Rep. on Medi-Cal (Feb. 29, 1968) p. 3 (Preliminary Report).) County hospitals "provided a wide range of inpatient and outpatient hospital services to all persons who met county indigency requirements whether or not they were public assistance recipients. The major responsibility for supporting county hospitals rested upon the counties, financed primarily through property taxes, with minor contributions from" other sources. (Id. at p. 4.)

Medi-Cal, which began operating March 1, 1966, established "a program of basic and extended health care services for recipients of public assistance and for medically indigent persons." (Morris v. Williams (1967) 67 Cal. 2d 733, 738 [63 Cal. Rptr. 689, 433 P.2d 697] (Morris); id. at p. 740; see also Stats. 1966, Second Ex. Sess. 1965, ch. 4, § 2, p. 103.) It

"represent[ed] California's implementation of the federal Medicaid program (42 U.S.C. §§ 1396-1396v), through which the federal government provide[d] financial assistance to states so that they [might] furnish medical care to qualified indigent persons. [Citation.]" (Robert F. Kennedy Medical Center v. Belshé (1996) 13 Cal. 4th 748, 751 [55 Cal. Rptr. 2d 107, 919 P.2d 721] (Belshé).) "[B]y meeting the requirements of federal law," Medi-Cal "qualif[ied] California for the receipt of federal funds made available under title XIX of the Social Security Act." (Morris, supra, 67 Cal.2d at p. 738.) "Title [XIX] permitted the combination of the major governmental health care systems which provided care for the indigent into a single system financed by the state and federal governments. By 1975, this system, at least as originally proposed, would provide a wide range of health care services for all those who [were] indigent regardless of whether they [were] public assistance recipients ...." (Preliminary Rep., supra, at p. 4; see also Act of July 30, 1965, Pub.L. No. 89-97, § 121(a), 79 Stat. 286, reprinted in 1965 U.S. Code **[15 Cal. 4th 77]** Cong. & Admin. News, p. 378 [states must make effort to liberalize eligibility requirements "with a view toward furnishing by July 1, 1975, comprehensive care and services to substantially all individuals who meet the plan's eligibility standards with respect to income and resources"].) fn. 2

However, eligibility for Medi-Cal was initially limited only to persons linked to a federal categorical aid program by age (at least 65), blindness, disability, or membership in a family with dependent children within the meaning of the Aid to Families with Dependent Children program (AFDC). (See Legis. Analyst, Rep. to Joint Legis. Budget Com., Analysis of 1971-1972 Budget Bill, Sen. Bill No. 207 (1971 Reg. Sess.) pp. 548, 550 (1971 Legislative Analyst's Report).) Individuals possessing one of these characteristics (categorically linked persons) received full benefits if they actually received public assistance payments. (Id. at p. 550.) Lesser benefits were available to categorically linked persons who were only medically indigent, i.e., their income and resources, although rendering them ineligible for cash aid, were "not sufficient to meet the cost of health care." (Morris, supra, 67 Cal.2d at p. 750; see also 1971 Legis. Analyst's Rep., supra, at pp. 548, 550; Stats. 1966, Second Ex. Sess. 1965, ch. 4, § 2, pp. 105-106.)

Individuals not linked to a federal categorical aid program (non-categorically linked persons) were ineligible for Medi-Cal, regardless of their means. Thus, "a group of citizens, not covered by Medi-Cal and yet unable to afford medical care, remained the responsibility of" the counties. (County of Santa Clara v. Hall (1972) 23 Cal. App. 3d 1059, 1061 [100 Cal. Rptr. 629] (Hall).) In establishing Medi-Cal, the Legislature expressly recognized this fact by enacting former section 14108.5, which provided: "The Legislature hereby declares its concern with the problems which will be facing the counties with respect to the medical care

of indigent persons who are not covered [by Medi-Cal] ... and ... whose medical care must be financed entirely by the counties in a time of heavily increasing medical costs." (Stats. 1966, Second Ex. Sess. 1965, ch. 4, § 2, p. 116.) The Legislature directed the Health Review and Program Council "to study this problem and report its findings to the Legislature no later than March 1, 1967." (Ibid.)

Moreover, although it required counties to contribute to the costs of Medi-Cal, the Legislature established a method for determining the amount of their contributions that would "leave them with []sufficient funds to provide hospital care for those persons not eligible for Medi-Cal." (Hall, supra, 23 Cal.App.3d at p. 1061, fn. omitted.) Former section 14150.1, **[15 Cal. 4th 78]** which was known as the "county option" or the "option plan," required a county "to pay the state a sum equal to 100 percent of the county's health care costs (which included both linked and nonlinked individuals) provided in the 1964-1965 fiscal year, with an adjustment for population increase; in return the state would pay the county's entire cost of medical care." fn. 3 (County of Sacramento v. Lackner (1979) 97 Cal. App. 3d 576, 581 [159 Cal. Rptr. 1] (Lackner).) Under the county option, "the state agreed to assume all county health care costs ... in excess of" the county's payment. (Id. at p. 586.) It "made no distinction between 'linked' and 'nonlinked' persons," and "simply guaranteed a medical cost ceiling to counties electing to come within the option plan." (Ibid.) "Any difference in actual operating costs and the limit set by the option provision [was] assumed entirely by the state." (Preliminary Rep., supra, at p. 10, fn. 2.) Thus, the county option "guarantee[d] state participation in the cost of care for medically indigent persons who [were] not otherwise covered by the basic Medi-Cal program or other repayment programs." fn. 4 (1971 Legis. Analyst's Rep., supra, at p. 549.)

Primarily through the county option, Medi-Cal caused a "significant shift in financing of health care from the counties to the state and federal government.... During the first 28 months of the program the state ... paid approximately $76 million for care of non-Medi-Cal indigents in county hospitals." (Preliminary Rep., supra, at p. 31.) These state funds paid "costs that would otherwise have been borne by counties through increases in property taxes." (Legis. Analyst, Rep. to Joint Legis. Budget Com., Analysis of 1974-1975 Budget Bill, Sen. Bill No. 1525 (1973-1974 Reg. Sess.) p. 626 (1974 Legislative Analyst's Report).) "[F]aced with escalating Medi-Cal costs, the Legislature in 1967 imposed strict guidelines on reimbursing counties electing to come under the 'option' plan. ([Former] § 14150.2.) Pursuant to subdivision (c) of [former] section 14150.2, the state imposed a limit on its obligation to pay for medical services to nonlinked persons **[15 Cal. 4th 79]** served by a county within the 'option' plan." (Lackner, supra, 97 Cal.App.3d at p. 589; see also Stats.

1967, ch. 104, § 3, p. 1019; Stats. 1969, ch. 21, § 57, pp. 106-107; 1974 Legis. Analyst's Rep., supra, at p. 626.)

In 1971, the Legislature substantially revised Medi-Cal. It extended coverage to certain noncategorically linked minors and adults "who [were] financially unable to pay for their medical care." (Legis. Counsel's Dig., Assem. Bill No. 949, 3 Stats. 1971 (Reg. Sess.) Summary Dig., p. 83; see Stats. 1971, ch. 577, §§ 12, 23, pp. 1110-1111, 1115.) These medically indigent individuals met "the income and resource requirements for aid under [AFDC] but [did] not otherwise qualify[] as a public assistance recipient." (56 Ops.Cal.Atty.Gen. 568, 569 (1973).) The Legislature anticipated that this eligibility expansion would bring "approximately 800,000 additional medically needy Californians" into Medi-Cal. (Stats. 1971, ch. 577, § 56, p. 1136.) The 1971 legislation referred to these individuals as " '[n] oncategorically related needy person[s].' " (Stats. 1971, ch. 577, § 23, p. 1115.) Subsequent legislation designated them as "medically indigent person[s]" (MIP's) and provided them coverage under former section 14005.4. (Stats. 1976, ch. 126, § 7, p. 200; id. at § 20, p. 204.)

The 1971 legislation also established a new method for determining each county's financial contribution to Medi-Cal. The Legislature eliminated the county option by repealing former section 14150.1 and enacting former section 14150. That section specified (by amount) each county's share of Medi-Cal costs for the 1972-1973 fiscal year and set forth a formula for increasing the share in subsequent years based on the taxable assessed value of certain property. (Stats. 1971, ch. 577, §§ 41, 42, pp. 1131-1133.)

For the 1978-1979 fiscal year, the state assumed each county's share of Medi-Cal costs under former section 14150. (Stats. 1978, ch. 292, § 33, p. 610.) In July 1979, the Legislature repealed former section 14150 altogether, thereby eliminating the counties' responsibility to share in Medi-Cal costs. (Stats. 1979, ch. 282, § 74, p. 1043.) Thus, in November 1979, when the electorate adopted section 6, "the state was funding Medi-Cal coverage for [MIP's] without requiring any county financial contribution." (Kinlaw, supra, 54 Cal.3d at p. 329.) The state continued to provide full funding for MIP medical care through 1982.

In 1982, the Legislature passed two Medi-Cal reform bills that, as of January 1, 1983, excluded from Medi-Cal most adults who had been eligible **[15 Cal. 4th 80]** under the MIP category (adult MIP's or Medically Indigent Adults). fn. 5 (Stats. 1982, ch. 328, §§ 6, 8.3, 8.5, pp. 1574-1576; Stats. 1982, ch. 1594, §§ 19, 86, pp. 6315, 6357; Cooke v. Superior Court (1989) 213 Cal. App. 3d 401, 411 [261 Cal. Rptr. 706] (Cooke).) As part of excluding this population from Medi-Cal, the Legislature created the Medically Indigent Services Account (MISA) as a mechanism for "transfer[ing] [state] funds to the counties for the provision of health care services." (Stats. 1982, ch. 1594, § 86, p. 6357.) Through MISA, the state

annually allocated funds to counties based on "the average amount expended" during the previous three fiscal years on Medi-Cal services for county residents who had been eligible as MIP's. (Stats. 1982, ch. 1594, § 69, p. 6345.) The Legislature directed that MISA funds "be consolidated with existing county health services funds in order to provide health services to low-income persons and other persons not eligible for the Medi-Cal program." (Stats. 1982, ch. 1594, § 86, p. 6357.) It further provided: "Any person whose income and resources meet the income and resource criteria for certification for [Medi-Cal] services pursuant to Section 14005.7 other than for the aged, blind, or disabled, shall not be excluded from eligibility for services to the extent that state funds are provided." (Stats. 1982, ch. 1594, § 70, p. 6346.)

After passage of the 1982 legislation, San Diego established a county medical services (CMS) program to provide medical care to adult MIP's. According to San Diego, between 1983 and June 1989, the state fully funded San Diego's CMS program through MISA. However, for fiscal years 1989-1990 and 1990-1991, the state only partially funded San Diego's CMS program. For example, San Diego asserts that, in fiscal year 1990-1991, it exhausted state-provided MISA funds by December 24, 1990. Faced with this shortfall, San Diego's board of supervisors voted in February 1991 to terminate the CMS program unless the state agreed by March 8 to provide full funding for the 1990-1991 fiscal year. After the state refused to provide additional funding, San Diego notified affected individuals and medical service providers that it would terminate the CMS program at midnight on March 19, 1991. The response to the County's notification ultimately resulted in the unfunded mandate claim now before us.

II. Unfunded Mandates

Through adoption of Proposition 13 in 1978, the voters added article XIII A to the California Constitution, which "imposes a limit on the power of state and local governments to adopt and levy taxes. [Citation.]" (County of Fresno v. State of California (1991) 53 Cal. 3d 482, 486 [280 Cal. Rptr. 92, **[15 Cal. 4th 81]** 808 P.2d 235] (County of Fresno).) The next year, the voters added article XIII B to the Constitution, which "impose[s] a complementary limit on the rate of growth in governmental spending." (San Francisco Taxpayers Assn. v. Board of Supervisors (1992) 2 Cal. 4th 571, 574 [7 Cal. Rptr. 2d 245, 828 P.2d 147].) [1] These two constitutional articles "work in tandem, together restricting California governments' power both to levy and to spend for public purposes." (City of Sacramento v. State of California (1990) 50 Cal. 3d 51, 59, fn. 1 [266 Cal. Rptr. 139, 785 P.2d 522].) Their goals are "to protect residents from excessive taxation and government spending. [Citation.]" (County of Los Angeles v. State of California (1987) 43 Cal. 3d 46, 61 [233 Cal. Rptr. 38, 729 P.2d 202] (County of Los Angeles).)

Article XIII B of the California Constitution includes section 6, which is the constitutional provision at issue here. It provides in relevant part: "Whenever the Legislature or any state agency mandates a new program or higher level of service on any local government, the state shall provide a subvention of funds to reimburse such local government for the costs of such program or increased level of service, except that the Legislature may, but need not, provide such subvention of funds for the following mandates: [¶] ... [¶] (c) Legislative mandates enacted prior to January 1, 1975, or executive orders or regulations initially implementing legislation enacted prior to January 1, 1975." Section 6 recognizes that articles XIII A and XIII B severely restrict the taxing and spending powers of local governments. (County of Fresno, supra, 53 Cal.3d at p. 487.) Its purpose is to preclude the state from shifting financial responsibility for carrying out governmental functions to local agencies, which are "ill equipped" to assume increased financial responsibilities because of the taxing and spending limitations that articles XIII A and XIII B impose. (County of Fresno, supra, 53 Cal.3d at p. 487; County of Los Angeles, supra, 43 Cal.3d at p. 61.) With certain exceptions, section 6 "[e]ssentially" requires the state "to pay for any new governmental programs, or for higher levels of service under existing programs, that it imposes upon local governmental agencies. [Citation.]" (Hayes v. Commission on State Mandates (1992) 11 Cal. App. 4th 1564, 1577 [15 Cal. Rptr. 2d 547].)

In 1984, the Legislature created a statutory procedure for determining whether a statute imposes state-mandated costs on a local agency within the meaning of section 6. (Gov. Code, § 17500 et seq.). The local agency must file a test claim with the Commission, which, after a public hearing, decides whether the statute mandates a new program or increased level of service. (Gov. Code, §§ 17521, 17551, 17555.) If the Commission finds a claim to be reimbursable, it must determine the amount of reimbursement. (Gov. Code, § 17557.) The local agency must then follow certain statutory procedures to **[15 Cal. 4th 82]** obtain reimbursement. (Gov. Code, § 17558 et seq.) If the Legislature refuses to appropriate money for a reimbursable mandate, the local agency may file "an action in declaratory relief to declare the mandate unenforceable and enjoin its enforcement." (Gov. Code, § 17612, subd. (c).) If the Commission finds no reimbursable mandate, the local agency may challenge this finding by administrative mandate proceedings under section 1094.5 of the Code of Civil Procedure. (Gov. Code, § 17559.) Government Code section 17552 declares that these provisions "provide the sole and exclusive procedure by which a local agency ... may claim reimbursement for costs mandated by the state as required by Section 6 ...."

III. Administrative and Judicial Proceedings

A. The Los Angeles Action

On November 23, 1987, the County of Los Angeles (Los Angeles) filed a claim (the Los Angeles action) with the Commission asserting that the exclusion of adult MIP's from Medi-Cal constituted a reimbursable mandate under section 6. (Kinlaw, supra, 54 Cal.3d at p. 330, fn. 2.) Alameda County subsequently filed a claim on November 30, 1987, but the Commission rejected it because of the pending Los Angeles claim. (Id. at p. 331, fn. 4.) Los Angeles refused to permit Alameda County to join as a claimant, but permitted San Bernardino County to join. (Ibid.)

In April 1989, the Commission rejected the Los Angeles claim, finding no reimbursable mandate. fn. 6 (Kinlaw, supra, 54 Cal.3d at p. 330, fn. 2.) It found that the 1982 legislation did not impose on counties a new program or a higher level of service for an existing program because counties had a "pre-existing duty" to provide medical care to the medically indigent under section 17000. That section provides in relevant part: "Every county ... shall relieve and support all incompetent, poor, indigent persons ... lawfully resident therein, when such persons are not supported and relieved by their relatives or friends, by their own means, or by state hospitals or other state or private institutions." Section 17000 did not impose a reimbursable mandate under section 6, the Commission further reasoned, because it "was enacted prior to January 1, 1975 ...." Finally, the Commission found no mandate because the 1982 legislation "neither establish[ed] the level of care to be provided nor ... define[d] the class of persons determined to be eligible for medical care since these criteria were established by boards of supervisors" pursuant to section 17001.

On March 20, 1990, the Los Angeles Superior Court filed a judgment reversing the Commission's decision and directing issuance of a peremptory **[15 Cal. 4th 83]** writ of mandate. On April 16, 1990, the Commission and the state filed an appeal in the Second District Court of Appeal. (County of Los Angeles v. State of California, No. B049625.) fn. 7 In early 1992, the parties to the Los Angeles action agreed to settle their dispute and to seek dismissal. In April 1992, after learning of this agreement, San Diego sought to intervene. Explaining that it had been waiting for resolution of the action, San Diego requested that the Court of Appeal deny the dismissal request and add (or substitute in) the County as a party. The Court of Appeal did not respond. On December 15, 1992, the parties to the Los Angeles action entered into a settlement agreement that provided for vacation of the superior court judgment and dismissal of the appeal and superior court action. Consistent with the settlement agreement, on December 29, 1992, the Court of Appeal filed an order vacating the superior court judgment, dismissing the appeal, and instructing the superior court to dismiss the action without prejudice on remand. fn. 8

B. The San Diego Action

1. Administrative Attempts to Obtain Reimbursement

On March 13, 1991, San Diego submitted an invoice to the State Controller seeking reimbursement of its uncompensated expenditures on the CMS program for fiscal year 1989-1990. The Controller is a member of the Commission. (Gov. Code, § 17525.) On April 12, the Controller returned the invoice "without action," stating that "[n]o appropriation has been given to this office to allow for reimbursement" of medical costs for adult MIP's, and noting that litigation was pending regarding the state's reimbursement obligation. On December 18, 1991, San Diego submitted a similar invoice for the 1990-1991 fiscal year. The state has not acted regarding this second invoice. **[15 Cal. 4th 84]**

2. Court Proceedings

Responding to San Diego's notice of intent to terminate the CMS program, on March 11, 1991, the Legal Aid Society of San Diego filed a class action on behalf of CMS program beneficiaries seeking to enjoin termination of the program. The trial court later issued a preliminary injunction prohibiting San Diego "from taking any action to reduce or terminate" the CMS program.

On March 15, 1991, San Diego filed a cross-complaint and petition for writ of mandate under Code of Civil Procedure section 1085 against the state, the Commission, and various state officers. fn. 9 The cross-complaint alleged that, by excluding adult MIP's from Medi-Cal and transferring responsibility for their medical care to counties, the state had mandated a new program and higher level of service within the meaning of section 6. The cross-complaint further alleged that the state therefore had a duty under section 6 to reimburse San Diego for the entire cost of its CMS program, and that the state had failed to perform its duty.

Proceeding from these initial allegations, the cross-complaint alleged causes of action for indemnification, declaratory and injunctive relief, reimbursement and damages, and writ of mandate. In its first declaratory relief claim, San Diego alleged (on information and belief) that the state contended the CMS program was a nonreimbursable, county obligation. In its claim for reimbursement, San Diego alleged (again on information and belief) that the Commission had "previously denied the claims of other counties, ruling that county medical care programs for [adult MIP's] are not state-mandated and, therefore, counties are not entitled to reimbursement from the State for the costs of such programs." "Under these circumstances," San Diego asserted, "denial of the County's claim by the Commission ... is virtually certain and further administrative pursuit of this claim would be a futile act."

For relief, San Diego requested a judgment declaring the following: (1) that the state must fully reimburse San Diego if it "is compelled to provide any CMS Program services to

plaintiffs ... after March 19, 1991"; (2) that section 6 requires the state "to fully fund the CMS Program" (or, alternatively, that the CMS program is discretionary); (3) that the state must pay San Diego for all of its unreimbursed costs for the CMS program during **[15 Cal. 4th 85]** the 1989-1990 and 1990-1991 fiscal years; and (4) that the state shall assume responsibility for operating any court-ordered continuation of the CMS program. San Diego also requested that the court issue a writ of mandamus requiring the state to fulfill its reimbursement obligation. Finally, San Diego requested issuance of preliminary and permanent injunctions to ensure that the state fulfilled its obligations to the County.

In April 1991, San Diego determined that it could continue operating the CMS program using previously unavailable general fund revenues. Accordingly, San Diego and plaintiffs settled their dispute, and plaintiffs dismissed their complaint.

The matter proceeded solely on San Diego's cross-complaint. The court issued a preliminary injunction and alternative writ in May 1991. At a hearing on June 25, 1991, the court found that the state had an obligation to fund San Diego's CMS program, granted San Diego's request for a writ of mandate, and scheduled an evidentiary hearing to determine damages and remedies. On July 1, 1991, it issued an order reflecting this ruling and granting a peremptory writ of mandate. The writ did not issue, however, because of the pending hearing to determine damages. In December 1992, after an extensive evidentiary hearing and posthearing proceedings on the claim for a peremptory writ of mandate, the court issued a judgment confirming its jurisdiction to determine San Diego's claim, finding that section 6 required the state to fund the entire cost of San Diego's CMS program, determining the amount that the state owed San Diego for fiscal years 1989-1990 and 1990-1991, identifying funds available to the state to satisfy the judgment, and ordering issuance of a peremptory writ of mandate. fn. 10 The court also issued a peremptory writ of mandate directing the state and various state officers to comply with the judgment.

The Court of Appeal affirmed the judgment insofar as it provided that section 6 requires the state to fund the CMS program. The Court of Appeal also affirmed the trial court's finding that the state had required San Diego to spend at least $41 million on the CMS program in fiscal years 1989-1990 and 1990-1991. However, the Court of Appeal reversed those portions of the judgment determining the final reimbursement amount and specifying the state funds from which the state was to satisfy the judgment. It remanded the matter to the Commission to determine the reimbursement amount and appropriate statutory remedies. We then granted the state's petition for review.

IV. Superior Court Jurisdiction

[2a] Before reaching the merits of the appeal, we must address the state's assertion that the superior court lacked jurisdiction to hear San **[15 Cal. 4th 86]** Diego's mandate claim. According to the state, in Kinlaw, supra, 54 Cal. 3d 326, we "unequivocally held that the orderly determination of [unfunded] mandate questions demands that only one claim on any particular alleged mandate be entertained by the courts at any given time." Thus, if a test claim is pending, "other potential claims must be held in abeyance ...." Applying this principle, the state asserts that, since "the test claim litigation was pending" in the Los Angeles action when San Diego filed its cross-complaint seeking mandamus relief, "the superior court lacked jurisdiction from the outset, and the resulting judgment is a nullity. That defect cannot be cured by the settlement of the test claim, which occurred after judgment was entered herein."

In Kinlaw, we held that individual taxpayers and recipients of government benefits lack standing to enforce section 6 because the applicable administrative procedures, which "are the exclusive means" for determining and enforcing the state's section 6 obligations, "are available only to local agencies and school districts directly affected by a state mandate ...." (Kinlaw, supra, 54 Cal.3d at p. 328.) In reaching this conclusion, we explained that the reimbursement right under section 6 "is a right given by the Constitution to local agencies, not individuals either as taxpayers or recipients of government benefits and services." (Id. at p. 334.) We concluded that "[n]either public policy nor practical necessity compels creation of a judicial remedy by which individuals may enforce the right of the county to such revenues." (Id. at p. 335.)

In finding that individuals do not have standing to enforce the section 6 rights of local agencies, we made several observations in Kinlaw pertinent to operation of the statutory process as it applies to entities that do have standing. Citing Government Code section 17500, we explained that "the Legislature enacted comprehensive administrative procedures for resolution of claims arising out of section 6 ... because the absence of a uniform procedure had resulted in inconsistent rulings on the existence of state mandates, unnecessary litigation, reimbursement delays, and, apparently, resultant uncertainties in accommodating reimbursement requirements in the budgetary process." (Kinlaw, supra, 54 Cal.3d at p. 331.) Thus, the governing statutes "establish[] procedures which exist for the express purpose of avoiding multiple proceedings, judicial and administrative, addressing the same claim that a reimbursable state mandate has been created." (Id. at p. 333.) Specifically, "[t]he legislation establishes a test-claim procedure to expeditiously resolve disputes affecting multiple agencies ...." (Id. at p. 331.) Describing the Commission's application of the test-claim procedure to claims regarding exclusion of adult MIP's from Medi-Cal, we observed: "The test claim by the County of Los Angeles was filed prior to that

[15 Cal. 4th 87] proposed by Alameda County. The Alameda County claim was rejected for that reason. (See [Gov. Code,] § 17521.) Los Angeles County permitted San Bernardino County to join in its claim which the Commission accepted as a test claim intended to resolve the [adult MIP exclusion] issues .... Los Angeles County declined a request from Alameda County that it be included in the test claim ...." (Id. at p. 331, fn. 4.)

Consistent with our observations in Kinlaw, we here agree with the state that the trial court should not have proceeded to resolve San Diego's claim for reimbursement under section 6 while the Los Angeles action was pending. A contrary conclusion would undermine one of "the express purpose[s]" of the statutory procedure: to "avoid[] multiple proceedings ... addressing the same claim that a reimbursable state mandate has been created." (Kinlaw, supra, 54 Cal.3d at p. 333.)

[3] However, we reject the state's assertion that the error was jurisdictional. The power of superior courts to perform mandamus review of administrative decisions derives in part from article VI, section 10 of the California Constitution. (Bixby v. Pierno (1971) 4 Cal. 3d 130, 138 [93 Cal. Rptr. 234, 481 P.2d 242]; Lipari v. Department of Motor Vehicles (1993) 16 Cal. App. 4th 667, 672 [20 Cal. Rptr. 2d 246].) That section gives "[t]he Supreme Court, courts of appeal, [and] superior courts ... original jurisdiction in proceedings for extraordinary relief in the nature of mandamus ...." (Cal. Const., art. VI, § 10.) "The jurisdiction thus vested may not lightly be deemed to have been destroyed." (Garrison v. Rourke (1948) 32 Cal. 2d 430, 435 [196 P.2d 884], overruled on another ground in Keane v. Smith (1971) 4 Cal. 3d 932, 939 [95 Cal. Rptr. 197, 485 P.2d 261].) "While the courts are subject to reasonable statutory regulation of procedure and other matters, they will maintain their constitutional powers in order effectively to function as a separate department of government. [Citations.] Consequently an intent to defeat the exercise of the court's jurisdiction will not be supplied by implication." (Garrison, supra, at p. 436.) [2b] Here, we find no statutory provision that either "expressly provide[s]" (id. at p. 435) or otherwise "clearly indicate[s]" (id. at p. 436) that the Legislature intended to divest all courts other than the court hearing the test claim of their mandamus jurisdiction.

Rather, following Dowdall v. Superior Court (1920) 183 Cal. 348 [191 P. 685] (Dowdall), we interpret the governing statutes as simply vesting primary jurisdiction in the court hearing the test claim. In Dowdall, we determined the jurisdictional effect of Code of Civil Procedure former section 1699 on actions to settle the account of trustees of a testamentary trust. Code of Civil Procedure former section 1699 provided in part: "Where any trust **[15 Cal. 4th 88]** has been created by or under any will to continue after distribution, the Superior Court shall not lose jurisdiction of the estate by final distribution, but shall retain jurisdiction thereof for the purpose of the settlement of accounts under the trust." (Stats. 1889, ch. 228, § 1, p.

337.) We explained that, under this section, "the superior court, sitting in probate upon the distribution of an estate wherein the will creates a trust, retain[ed] jurisdiction of the estate for the purpose of the settlement of the accounts under the trust." (Dowdall, supra, 183 Cal. at p. 353.) However, we further observed that "the superior court of each county in the state has general jurisdiction in equity to settle trustees' accounts and to entertain actions for injunctions. This jurisdiction is, in a sense, concurrent with that of the superior court, which, by virtue of the decree of distribution, has jurisdiction of a trust created by will. The latter, however, is the primary jurisdiction, and if a bill in equity is filed in any other superior court for the purpose of settling the account of such trustee, that court, upon being informed of the jurisdiction of the court in probate and that an account is to be or has been filed therein for settlement, should postpone the proceeding in its own case and allow the account to be settled by the court having primary jurisdiction thereof." (Ibid.)

Similarly, we conclude that, under the statutes governing determination of unfunded mandate claims, the court hearing the test claim has primary jurisdiction. Thus, if an action asserting the same unfunded mandate claim is filed in any other superior court, that court, upon being informed of the pending test claim, should postpone the proceeding before it and allow the court having primary jurisdiction to determine the test claim.

However, a court's erroneous refusal to stay further proceedings does not render those further proceedings void for lack of jurisdiction. As we explained in Dowdall, a court that refuses to defer to another court's primary jurisdiction "is not without jurisdiction." (Dowdall, supra, 183 Cal. at p. 353.) Accordingly, notwithstanding pendency of the Los Angeles action, the trial court here did not lack jurisdiction to determine San Diego's mandamus petition. (See Collins v. Ramish (1920) 182 Cal. 360, 366-369 [188 P. 550] [although trial court erred in refusing to abate action because of former action pending, new trial was not warranted on issues that the trial court correctly decided]; People ex rel. Garamendi v. American Autoplan, Inc. (1993) 20 Cal. App. 4th 760, 772 [25 Cal. Rptr. 2d 192] (Garamendi) ["rule of exclusive concurrent jurisdiction is not 'jurisdictional' in the sense that failure to comply renders subsequent proceedings void"]; Stearns v. Los Angeles City School Dist. (1966) 244 Cal. App. 2d 696, 718 [53 Cal. Rptr. 482, 21 A.L.R.3d 164] [where trial court errs in failing to stay proceedings in **[15 Cal. 4th 89]** deference to jurisdiction of another court, reversal would be frivolous absent errors regarding the merits].) fn. 11

The trial court's failure to defer to the primary jurisdiction of the court hearing the Los Angeles action did not prejudice the state. Contrary to the state's assertion, the trial court did not "usurp" the Commission's "authority to determine, in the first place, whether or not legislation creates a mandate." The Commission had already exercised that authority in the

Los Angeles action. Moreover, given the settlement of the Los Angeles action, which included vacating the judgment in that action, the trial court's exercise of jurisdiction here did not result in one of the principal harms that the statutory procedure seeks to prevent: multiple decisions regarding an unfunded mandate question. Finally, the lack of an administrative record specifically relating to San Diego's claim did not prejudice the state because the threshold determination of whether a statute imposes a state mandate is an issue of law. (County of Fresno v. Lehman (1991) 229 Cal. App. 3d 340, 347 [280 Cal. Rptr. 310].) To the extent that an administrative record was necessary, the record developed in the Los Angeles action could have been submitted to the trial court. fn. 12 (See Los Angeles Unified School Dist. v. State of California (1988) 199 Cal. App. 3d 686, 689 [245 Cal. Rptr. 140].)

We also find that, on the facts of this case, San Diego's failure to submit a test claim to the Commission before seeking judicial relief did not affect the superior court's jurisdiction. Ordinarily, counties seeking to pursue an unfunded mandate claim under section 6 must exhaust their administrative remedies. (Central Delta Water Agency v. State Water Resources Control Bd. (1993) 17 Cal. App. 4th 621, 641 [21 Cal. Rptr. 2d 453]; County of Contra Costa v. State of California (1986) 177 Cal. App. 3d 62, 73-77 [222 Cal. Rptr. 750] (County of Contra Costa).) However, counties may pursue section 6 claims in superior court without first resorting to administrative remedies if they "can establish an exception to" the exhaustion requirement. (County of Contra Costa, supra, 177 Cal.App.3d at p. 77.) The futility exception to the exhaustion requirement applies if a county can "state with assurance that the [Commission] would rule adversely in its own particular case. [Citations.]" (Lindeleaf v. Agricultural Labor Relations Bd. (1986) 41 Cal. 3d 861, 870 [226 Cal. Rptr. 119, 718 P.2d 106]; see also County of Contra Costa, supra, 177 Cal.App.3d at pp. 77-78.) **[15 Cal. 4th 90]**

We agree with the trial court and the Court of Appeal that the futility exception applied in this case. As we have previously noted, San Diego invoked this exception by alleging in its cross-complaint that the Commission's denial of its claim was "virtually certain" because the Commission had "previously denied the claims of other counties, ruling that county medical care programs for [adult MIP's] are not state-mandated and, therefore, counties are not entitled to reimbursement ...." Given that the Commission rejected the Los Angeles claim (which alleged the same unfunded mandate claim that San Diego alleged) and appealed the judicial reversal of its decision, the trial court correctly determined that further attempts to seek relief from the Commission would have been futile. Therefore, we reject the state's jurisdictional argument and proceed to the merits of the appeal.

V. Existence of a Mandate Under Section 6

[4] In determining whether there is a mandate under section 6, we turn to our decision in Lucia Mar Unified School Dist. v. Honig (1988) 44 Cal. 3d 830 [244 Cal. Rptr. 677, 750 P.2d 318] (Lucia Mar). There, we discussed section 6's application to Education Code section 59300, which "requires a school district to contribute part of the cost of educating pupils from the district at state schools for the severely handicapped." (Lucia Mar, supra, at p. 832.) Before 1979, the Legislature had statutorily required school districts "to contribute to the education of pupils from the districts at the state schools [citations] ...." (Id. at pp. 832-833.) The Legislature repealed the statutory requirements in 1979 and, on July 12, 1979, the state assumed full-funding responsibility. (Id. at p. 833.) On July 1, 1980, when section 6 became effective, the state still had full-funding responsibility. On June 28, 1981, Education Code section 59300 took effect. (Lucia Mar, supra, at p. 833.)

Various school districts filed a claim seeking reimbursement under section 6 for the payments that Education Code section 59300 requires. The Commission denied the claim, finding that the statute did not impose on the districts a new program or higher level of service. The trial court and Court of Appeal agreed, the latter "reasoning that a shift in the funding of an existing program is not a new program or a higher level of service" under section 6. (Lucia Mar, supra, 44 Cal.3d at p. 834.)

We reversed, finding that a contrary result would "violate the intent underlying section 6 ...." (Lucia Mar, supra, 44 Cal.3d at p. 835.) That section "was intended to preclude the state from shifting to local agencies the financial responsibility for providing public services in view of the[] **[15 Cal. 4th 91]** restrictions on the taxing and spending power of the local entities" that articles XIII A and XIII B of the California Constitution imposed. (Lucia Mar, supra, at pp. 835-836.) "The intent of the section would plainly be violated if the state could, while retaining administrative control of programs it has supported with state tax money, simply shift the cost of the programs to local government on the theory that the shift does not violate section 6 ... because the programs are not 'new.' Whether the shifting of costs is accomplished by compelling local governments to pay the cost of entirely new programs created by the state, or by compelling them to accept financial responsibility in whole or in part for a program which was funded entirely by the state before the advent of article XIII B, the result seems equally violative of the fundamental purpose underlying section 6 ...." (Id. at p. 836, italics added, fn. omitted.) We thus concluded in Lucia Mar "that because [Education Code] section 59300 shifts partial financial responsibility for the support of students in the state-operated schools from the state to school districts-an obligation the school districts did not have at the time article XIII B was adopted-it calls for [the school districts] to support a 'new program' within the meaning of section 6." (Ibid., fn. omitted.)

The similarities between Lucia Mar and the case before us "are striking. In Lucia Mar, prior to 1979 the state and county shared the cost of educating handicapped children in state schools; in the present case from 1971-197[8] the state and county shared the cost of caring for [adult MIP's] under the Medi-Cal program.... [F]ollowing enactment of [article XIII A], the state took full responsibility for both programs." (Kinlaw, supra, 54 Cal.3d at p. 353 (dis. opn. of Broussard, J.).) As to both programs, the Legislature cited adoption of article XIII A of the California Constitution, and specifically its effect on tax revenues, as the basis for the state's assumption of full funding responsibility. (Stats. 1979, ch. 237, § 10, p. 493; Stats. 1979, ch. 282, § 106, p. 1059.) "Then in 1981 (for handicapped children) and 1982 (for [adult MIP's]), the state sought to shift some of the burden back to the counties." (Kinlaw, supra, 54 Cal.3d at p. 353 (dis. opn. of Broussard, J.).)

Adopting the Commission's analysis in the Los Angeles action, the state nevertheless argues that Lucia Mar "is inapposite." The school program at issue in Lucia Mar "had been wholly operated, administered and financed by the state" and "was unquestionably a 'state program.' " " 'In contrast,' " the state argues, " 'the program here has never been operated or administered by the State of California. The counties have always borne legal and financial responsibility for' " it under section 17000 and its predecessors. fn. 13 The courts have interpreted section 17000 as "impos[ing] upon counties a duty to **[15 Cal. 4th 92]** provide hospital and medical services to indigent residents. [Citations.]" (Board of Supervisors v. Superior Court (1989) 207 Cal. App. 3d 552, 557 [254 Cal. Rptr. 905].) Thus, the state argues, the source of San Diego's obligation to provide medical care to adult MIP's is section 17000, not the 1982 legislation. Moreover, because the Legislature enacted section 17000 in 1965, and section 6 does not apply to "mandates enacted prior to January 1, 1975," there is no reimbursable mandate. Finally, the state argues that, because section 17001 give counties "complete discretion" in setting eligibility and service standards under section 17000, there is no mandate. A contrary conclusion, the state asserts, "would erroneously expand the definition of what constitutes a 'new program' under" section 6. As we explain, we reject these arguments.

A. The Source and Existence of San Diego's Obligation

1. The Residual Nature of the Counties' Duty Under Section 17000

The state's argument that San Diego's obligation to provide medical care to adult MIP's predates the 1982 legislation contains numerous errors. First, the state misunderstands San Diego's obligation under section 17000. That section creates "the residual fund" to sustain indigents "who cannot qualify ... under any specialized aid programs." (Mooney, supra, 4 Cal.3d at p. 681, italics added; see also Board of Supervisors v. Superior Court, supra, 207

Cal.App.3d at p. 562; Boehm v. Superior Court (1986) 178 Cal. App. 3d 494, 499 [223 Cal. Rptr. 716] [general assistance "is a program of last resort"].) By its express terms, the statute requires a county to relieve and support indigent persons only "when such persons are not supported and relieved by their relatives or friends, by their own means, or by state hospitals or other state or private institutions." (§ 17000.) fn. 14 "Consequently, to the extent that the state or federal governments provide[d] care for [adult MIP's], the [C]ounty's obligation to do so [was] reduced ...." (Kinlaw, supra, 54 Cal.3d at p. 354, fn. 14 (dis. opn. of Broussard, J.).) fn. 15

As we have explained, the state began providing adult MIP's with medical care under Medi-Cal in 1971. Although it initially required counties to **[15 Cal. 4th 93]** contribute generally to the costs of Medi-Cal, it did not set forth a specific amount for coverage of MIP's. The state was primarily responsible for the costs of the program, and the counties were simply required to contribute funds to defray the state's costs. Beginning with the 1978-1979 fiscal year, the state paid all costs of the Medi-Cal program, including the cost of medical care for adult MIP's. Thus, when section 6 was adopted in November 1979, to the extent that Medi-Cal provided medical care to adult MIP's, San Diego bore no financial responsibility for these health care costs. fn. 16

The California Attorney General has expressed a similar understanding of Medi-Cal's effect on the counties' medical care responsibility under section 17000. After the 1971 extension of Medi-Cal coverage to MIP's, Fresno County sought an opinion regarding the scope of its duty to provide medical care under section 17000. It asserted that the 1971 repeal of former section 14108.5, which declared the Legislature's concern with the counties' problems in caring for indigents not eligible for Medi-Cal, evidenced a legislative intent to preempt the field of providing health services. (56 Ops.Cal.Atty.Gen., supra, at p. 571.) The Attorney General disagreed, concluding that the 1971 change "did not alter the duty of the counties to provide medical care to those indigents not eligible for Medi-Cal." (Id. at p. 569.) The Attorney General explained: "The statement of concern acknowledged the obligation of counties to continue to provide medical assistance under section 17000; the removal of the statement of concern was not accompanied by elimination of such duty on the part of the counties, except as the addition of [MIP's] to the Medi-Cal program would remove the burden on the counties to provide medical care for such persons." (Id. at p. 571, italics added.) **[15 Cal. 4th 94]**

Indeed, the Legislature's statement of intent in an uncodified section of the 1982 legislation excluding adult MIP's from Medi-Cal suggests that it also shared our understanding of section 17000. Section 8.3 of the 1982 Medi-Cal revisions expressly declared the Legislature's intent "[i]n eliminating [M]edically [I]ndigent [A]dults from the Medi-Cal

program ...." (Stats. 1982, ch. 328, § 8.3, p. 1575; Stats. 1982, ch. 1594, § 86, p. 6357.) It stated in part: "It is further the intent of the Legislature to provide counties with as much flexibility as possible in organizing county health services to serve the population being transferred." (Stats. 1982, ch. 328, § 8.3, p. 1576; Stats. 1982, ch. 1594, § 86, p. 6357, italics added.) If, as the state contends, counties had always been responsible under section 17000 for the medical care of adult MIP's, the description of adult MIP's as "the population being transferred" would have been inaccurate. By so describing adult MIP's, the Legislature indicated its understanding that counties did not have this responsibility while adult MIP's were eligible for Medi-Cal. These sources fully support our rejection of the state's argument that the 1982 legislation did not impose a mandate because, under section 17000, counties had always borne the responsibility for providing medical care to adult MIP's.

2. The State's Assumption of Full Funding Responsibility for Providing Medical Care to Adult MIP's Under Medi-Cal

To support its argument that it never relieved counties of their obligation under section 17000 to provide medical care to adult MIP's, the state characterizes as "temporary" the Legislature's assumption of full-funding responsibility for adult MIP's. According to the state, "any ongoing responsibility of the county was, at best, only temporarily, partially, alleviated (and never supplanted)." The state asserts that the Court of Appeal thus "erred by focusing on one phase in th[e] shifting pattern of arrangements" for funding indigent health care, "a focus which led to a myopic conclusion that the state alone is forever responsible for funding the health care for" adult MIP's.

A comparison of the 1978 and 1979 statutes that eliminated the counties' share of Medi-Cal costs refutes the state's claim. The Legislature expressly limited the effect of the 1978 legislation to one fiscal year, providing that the state "shall pay" each county's Medi-Cal cost share "for the period from July 1, 1978, to June 30, 1979." (Stats. 1978, ch. 292, § 33, p. 610.) The Legislative Counsel's Digest explained that this section would require the state to pay "[a]ll county costs for Medi-Cal" for "the 1978-79 fiscal year only." (Legis. Counsel's Dig., Sen. Bill No. 154, 4 Stats. 1978 (Reg. Sess.), Summary Dig., p. 71.) The digest further explained that the purpose of the bill containing this section was "the partial relief of local government from the temporary difficulties brought about by the approval of Proposition 13." **[15 Cal. 4th 95]** (Id. at p. 70, italics added.) Clearly, the Legislature knew how to include words of limitation when it intended the effects of its provisions to be temporary.

By contrast, the 1979 legislation contains no such limiting language. It simply provided: "Section 14150 of the Welfare and Institutions Code is repealed." (Stats. 1979, ch. 282, § 74, p. 1043.) In setting forth the need to enact the legislation as an urgency statute, the

Legislature explained: "The adoption of Article XIII A ... may cause the curtailment or elimination of programs and services which are vital to the state's public health, safety, education, and welfare. In order that such services not be interrupted, it is necessary that this act take effect immediately." (Stats. 1979, ch. 282, § 106, p. 1059.) In describing the effect of this legislation, the Legislative Counsel first explained that, "[u]nder existing law, the counties pay a specified annual share of the cost of" Medi-Cal. (Legis. Counsel's Dig., Assem. Bill No. 8, 4 Stats. 1979 (Reg. Sess.), Summary Dig., p. 79.) Referring to the 1978 legislation, it further explained that "[f]or the 1978-79 fiscal year only, the state pays ... [¶] ... [a]ll county costs for Medi-Cal ...." (Ibid.) The 1979 legislation, the digest continued, "provid [ed] for state assumption of all county costs of Medi-Cal." (Ibid.) We find nothing in the 1979 legislation or the Legislative Counsel's summary indicating a legislative intent to eliminate the counties' cost share of Medi-Cal only temporarily.

The state budget process for the 1980-1981 fiscal year confirms that the Legislature's assumption of all Medi-Cal costs was not viewed as "temporary." In the summary of his proposed budget, then Governor Brown described Assembly Bill No. 8, 1981-1982 Regular Session, generally as "a long-term local financing measure" (Governor's Budget for 1980-1981 as submitted to Legislature (1979-1980 Reg. Sess.) Summary of Local Government Fiscal Relief, p. A-30) through which "[t]he total cost of [the Medi-Cal] program was permanently assumed by the State ...." (Id. at p. A-32, italics added.) Similarly, in describing to the Joint Legislative Budget Committee the Medi-Cal funding item in the proposed budget, the Legislative Analyst explained: "Item 287 includes the state cost of 'buying out' the county share of Medi-Cal expenditures. Following passage of Proposition 13, [Senate Bill No.] 154 appropriated $418 million to relieve counties of all fiscal responsibility for Medi-Cal program costs. Subsequently, [Assembly Bill No.] 8 was enacted, which made permanent state assumption of county Medi-Cal costs." (Legis. Analyst, Rep. to Joint Legis. Budget Com., Analysis of 1980-1981 Budget Bill, Assem. Bill No. 2020 (1979-1980 Reg. Sess.) at p. 721, italics added.) Thus, the state errs in asserting that the 1979 legislation eliminated the counties' financial support of Medi-Cal "only temporarily." **[15 Cal. 4th 96]**
3. State Administration of Medical Care forAdult MIP's Under Medi-Cal

The state argues that, unlike the school program before us in Lucia Mar, supra, 44 Cal. 3d 830, which "had been wholly operated, administered and financed by the state," the program for providing medical care to adult MIP's " 'has never been operated or administered by' " the state. According to the state, Medi-Cal was simply a state "reimbursement program" for care that section 17000 required counties to provide. The state is incorrect.

One of the legislative goals of Medi-Cal was "to allow eligible persons to secure basic health care in the same manner employed by the public generally, and without discrimination or segregation based purely on their economic disability." (Stats. 1966, Second Ex. Sess. 1965, ch. 4, § 2, p. 104.) "In effect, this meant that poorer people could have access to a private practitioner of their choice, and not be relegated to a county hospital program." (California Medical Assn. v. Brian (1973) 30 Cal. App. 3d 637, 642 [106 Cal. Rptr. 555].) Medi-Cal "provided for reimbursement to both public and private health care providers for medical services rendered." (Lackner, supra, 97 Cal.App.3d at p. 581.) It further directed that, "[i] nsofar as practical," public assistance recipients be afforded "free choice of arrangements under which they shall receive basic health care." (Stats. 1966, Second Ex. Sess. 1965, ch. 4, § 2, p. 115.) Finally, since its inception, Medi-Cal has permitted county boards of supervisors to "prescribe rules which authorize the county hospital to integrate its services with those of other hospitals into a system of community service which offers free choice of hospitals to those requiring hospital care. The intent of this section is to eliminate discrimination or segregation based on economic disability so that the county hospital and other hospitals in the community share in providing services to paying patients and to those who qualify for care in public medical care programs." (§ 14000.2.) Thus, "Medi-Cal eligibles were to be able to secure health care in the same manner employed by the general public (i.e., in the private sector or at a county facility)." (1974 Legis. Analyst's Rep., supra, at p. 625; see also Preliminary Rep., supra, at p. 17.) By allowing eligible persons "a choice of medical facilities for treatment," Medi-Cal placed county health care providers "in competition with private hospitals." (Hall, supra, 23 Cal.App.3d at p. 1061.)

Moreover, administration of Medi-Cal over the years has been the responsibility of various state departments and agencies. (§§ 10720-10721, 14061-14062, 14105, 14203; Belshé, supra, 13 Cal.4th at p. 751; Morris, supra, 67 Cal.2d at p. 741; Summary of Major Events, supra, at pp. 2-3, 15.) Thus, "[i]n adopting the Medi-Cal program the state Legislature, for the most part, shifted indigent medical care from being a county responsibility to a State **[15 Cal. 4th 97]** responsibility under the Medi-Cal program. [Citation.]" (Bay General Community Hospital v. County of San Diego (1984) 156 Cal. App. 3d 944, 959 [203 Cal. Rptr. 184] (Bay General); see also Preliminary Rep., supra, at p. 18 [with certain exceptions, Medi-Cal "shifted to the state" the responsibility for administration of the medical care provided to eligible persons].) We therefore reject the state's assertion that, while Medi-Cal covered adult MIP's, county facilities were the sole providers of their medical care, and counties both operated and administered the program that provided that care.

The circumstances we have discussed readily distinguish this case from County of Los Angeles v. Commission on State Mandates (1995) 32 Cal. App. 4th 805 [38 Cal. Rptr. 2d

304], on which the state relies. There, the court rejected the claim that Penal Code section 987.9, which required counties to provide criminal defendants with certain defense funds, imposed an unfunded state mandate. Los Angeles filed the claim after the state, which had enacted appropriations between 1977 and 1990 "to reimburse counties for their costs under" the statute, made no appropriation for the 1990-1991 fiscal year. (County of Los Angeles v. Commission on State Mandates, supra, at p. 812.) In rejecting the claim, the court first held that there was no state mandate because Penal Code section 987.9 merely implemented the requirements of federal law. (County of Los Angeles v. Commission on State Mandates, supra, at pp. 814-816.) Thus, the court stated, "[a]ssuming, arguendo, the provisions of [Penal Code] section 987.9 [constituted] a new program" under section 6, there was no state mandate. (County of Los Angeles v. Commission on State Mandates, supra, at p. 818.) Here, of course, it is unquestionably the state that has required San Diego to provide medical care to indigent persons.

In dictum, the court also rejected the argument that, under Lucia Mar, supra, 44 Cal. 3d 830, the state's "decision not to reimburse the counties for their programs under [Penal Code] section 987.9" imposed a new program by shifting financial responsibility for the program to counties. (County of Los Angeles v. Commission on State Mandates, supra, 32 Cal.App.4th at p. 817.) The court explained: "In contrast [to Lucia Mar], the program here has never been operated or administered by the State of California. The counties have always borne legal and financial responsibility for implementing the procedures under [Penal Code] section 987.9. The state merely reimbursed counties for specific expenses incurred by the counties in their operation of a program for which they had a primary legal and financial responsibility." (Ibid.) Here, as we have explained, between 1971 and 1983, the state administered and bore financial responsibility for the medical care that adult MIP's received under Medi-Cal. The Medi-Cal program was not simply a **[15 Cal. 4th 98]** method of reimbursement for county costs. Thus, the state's reliance on this dictum is misplaced. fn. 17

In summary, our discussion demonstrates the Legislature excluded adult MIP's from Medi-Cal knowing and intending that the 1982 legislation would trigger the counties' responsibility to provide medical care as providers of last resort under section 17000. Thus, through the 1982 legislation, the Legislature attempted to do precisely that which the voters enacted section 6 to prevent: "transfer[] to [counties] the fiscal responsibility for providing services which the state believed should be extended to the public." fn. 18 (County of Los Angeles, supra, 43 Cal.3d at p. 56; see also City of Sacramento v. State of California, supra, 50 Cal.3d at p. 68 [A "central purpose" of section 6 was "to prevent the state's transfer of the cost of government from itself to the local level."].) Accordingly, we view the 1982 legislation

as having mandated a " 'new program' " on counties by "compelling them to accept financial responsibility in whole or in part for a program," i.e., medical care for adult MIP's, "which was funded entirely by the state before the advent of article XIII B." fn. 19 (Lucia Mar, supra, 44 Cal.3d at p. 836.)

A contrary conclusion would defeat the purpose of section 6. Under the state's interpretation of that section, because section 17000 was enacted before 1975, the Legislature could eliminate the entire Medi-Cal program and shift to the counties under section 17000 complete financial responsibility for medical care that the state has been providing since 1966. However, the taxing and spending limitations imposed by articles XIII A and XIII B would greatly limit the ability of counties to meet their expanded section 17000 obligation. "County taxpayers would be forced to accept new taxes or see the county forced to cut existing programs further ...." (Kinlaw, supra, 54 Cal.3d at p. 351 (dis. opn. of Broussard, J.).) As we have previously explained, the voters, recognizing that articles XIII A and XIII B left counties "ill equipped" to assume such increased financial responsibilities, adopted section 6 precisely to avoid this result. (County of Los Angeles, **[15 Cal. 4th 99]** supra, 43 Cal.3d at p. 61.) Thus, it was the voters who decreed that we must, as the state puts it, "focus [] on one phase in th[e] shifting pattern of [financial] arrangements" between the state and the counties. Under section 6, the state simply cannot "compel[] [counties] to accept financial responsibility in whole or in part for a program which was funded entirely by the state before the advent of article XIII B ...." fn. 20 (Lucia Mar, supra, 44 Cal.3d at p. 836.)

B. County Discretion to Set Eligibility and Service Standards

[5a] The state next argues that, because San Diego had statutory discretion to set eligibility and service standards, there was no reimbursable mandate. Citing section 16704, the state asserts that the 1982 legislation required San Diego to spend MISA funds "only on those whom the county deems eligible under § 17000," "gave the county exclusive authority to determine the level and type of benefits it would provide," and required counties "to include [adult MIP's] in their § 17000 eligibility only to the extent state funds were available and then only for 3 years." (Original emphasis.) fn. 21 According to the state, under section 17001, "[t]he counties **[15 Cal. 4th 100]** have complete discretion over the determination of eligibility, scope of benefits and how the services will be provided." fn. 22

The state exaggerates the extent of a county's discretion under section 17001. It is true "case law ... has recognized that section 17001 confers broad discretion upon the counties in performing their statutory duty to provide general assistance benefits to needy residents. [Citations.]" (Robbins v. Superior Court (1985) 38 Cal. 3d 199, 211 [211 Cal. Rptr. 398, 695 P.2d 695] (Robbins).) However, there are "clear-cut limits" to this discretion. (Ibid.) [6] The

counties may exercise their discretion "only within fixed boundaries. In administering General Assistance relief the county acts as an agent of the state. [Citation.] When a statute confers upon a state agency the authority to adopt regulations to implement, interpret, make specific or otherwise carry out its provisions, the agency's regulations must be consistent, not in conflict with the statute, and reasonably necessary to effectuate its purpose. (Gov. Code, § 11374.)" (Mooney, supra, 4 Cal.3d at p. 679.) Thus, the counties' eligibility and service standards must "carry out" the objectives of section 17000. (Mooney, supra, 4 Cal.3d at p. 679; see also Poverty Resistance Center v. Hart (1989) 213 Cal. App. 3d 295, 304-305 [261 Cal. Rptr. 545]; § 11000 ["provisions of law relating to a public assistance program shall be fairly and equitably construed to effect the stated objects and purposes of the program"].) County standards that fail to carry out section 17000's objectives "are void and no protestations that they are merely an exercise of administrative discretion can sanctify them." (Morris, supra, 67 Cal.2d at p. 737.) Courts, which have " 'final responsibility for the interpretation of the law,' " must strike them down. (Id. at p. 748.) Indeed, despite the counties' statutory discretion, "courts have consistently invalidated ... county welfare regulations that fail to meet statutory requirements. [Citations.]" (Robbins, supra, 38 Cal.3d at p. 212.)

1. Eligibility

[5b] Regarding eligibility, we conclude that counties must provide medical care to all adult MIP's. As we emphasized in Mooney, section 17000 requires counties to relieve and support " 'all indigent persons lawfully resident therein, "when such persons are not supported and relieved by their relatives" or by some other means.' " (Mooney, supra, 4 Cal.3d at p. 678; see also Bernhardt v. Board of Supervisors (1976) 58 Cal. App. 3d 806, 811 [130 Cal. Rptr. 189].) Moreover, section 10000 declares that the statutory "purpose" of division 9 of the Welfare and Institutions Code, which includes section 17000, "is to provide for protection, care, and assistance to the **[15 Cal. 4th 101]** people of the state in need thereof, and to promote the welfare and happiness of all of the people of the state by providing appropriate aid and services to all of its needy and distressed." (Italics added.) Thus, counties have no discretion to refuse to provide medical care to "indigent persons" within the meaning of section 17000 who do not receive it from other sources. fn. 23 (See Bell v. Board of Supervisors (1994) 23 Cal. App. 4th 1695, 1706 [28 Cal. Rptr. 2d 919] [eligibility standards may not "defeat the purpose of the statutory scheme by depriving qualified recipients of mandated support"]; Washington v. Board of Supervisors (1993) 18 Cal. App. 4th 981, 985 [22 Cal. Rptr. 2d 852] [courts have repeatedly "voided county ordinances which have attempted to redefine eligibility standards set by state statute"].)

Although section 17000 does not define the term "indigent persons," the 1982 legislation made clear that all adult MIP's fall within this category for purposes of defining a county's obligation to provide medical care. fn. 24 As part of its exclusion of adult MIP's, that legislation required counties to participate in the MISA program. (Stats. 1982, ch. 1594, §§ 68, 70, 86, pp. 6343-6347, 6357.) Regarding that program, the 1982 legislation amended section 16704, subdivision (c)(1), to require that a county board of supervisors, in applying for MISA funds, "assure that it will expend such funds only for [specified] health services ... provided to persons certified as eligible for such services pursuant to Section 17000 ...." (Stats. 1982, ch. 1594, § 70, p. 6346.) At the same time, the 1982 legislation amended section 16704, subdivision (c)(3), to provide that "[a]ny person whose income and resources meet the income and resource criteria for certification for services pursuant to Section 14005.7 other than for the aged, blind, or disabled, shall not be excluded from eligibility for services to the extent that state funds are provided." (Stats. 1982, ch. 1594, § 70, p. 6346.) As the state correctly explains, under this provision, "counties had to include [Medically Indigent Adults] in their [section] 17000 eligibility" standards. By requiring counties to make all adult MIP's eligible for services paid for with MISA funds, while at the same time requiring counties to promise to spend such funds only on those certified as eligible under section 17000, the Legislature established that all adult MIP's are "indigent persons" for purposes of the counties' duty to provide medical care under section 17000. Otherwise, the counties could not comply with their promise. **[15 Cal. 4th 102]**

Our conclusion is not affected by language in section 16704, subdivision (c)(3), making it "operative only until June 30, 1985, unless a later enacted statute extends or deletes that date." fn. 25 As we have explained, the subdivision established that adult MIP's are "indigent persons" within the meaning of section 17000 for medical care purposes. As we have also explained, section 17000 requires counties to relieve and support all "indigent persons." Thus, even if the state is correct in asserting that section 16704, subdivision (c)(3), is now inoperative and no longer prohibits counties from excluding adult MIP's from eligibility for medical services, section 17000 has that effect. fn. 26

Additionally, the coverage history of Medi-Cal demonstrates that the Legislature has always viewed all adult MIP's as "indigent persons" within the meaning of section 17000 for medical care purposes. As we have previously explained, when the Legislature created the original Medi-Cal program, which covered only categorically linked persons, it "declar[ed] its concern with the problems which [would] be facing the counties with respect to the medical care of indigent persons who [were] not covered" by Medi-Cal, "whose medical care [had to] be financed entirely by the counties in a time of heavily increasing medical costs." (Stats. 1966, Second Ex. Sess. 1965, ch. 4, § 2, p. 116 [enacting former § 14108.5].)

Moreover, to ensure that the counties' Medi-Cal cost share would not leave counties "with insufficient funds to provide hospital care for those persons not eligible for Medi-Cal," the Legislature also created the county option. (Hall, supra, 23 Cal.App.3d at p. 1061.) Through the county option, "the state agreed to assume all county health care costs ... in excess of county costs incurred during the 1964-1965 fiscal year, adjusted for population increases." (Lackner, supra, 97 Cal.App.3d at p. 586.) Thus, the Legislature expressly recognized that the categorically linked persons initially eligible for Medi-Cal did not constitute all "indigent persons" entitled to medical care under section 17000, and required the state to share in the financial responsibility for providing that care.

In adding adult MIP's to Medi-Cal in 1971, the Legislature extended Medi-Cal coverage to noncategorically linked persons "who [were] financially unable to pay for their medical care." (Legis. Counsel's Dig., Assem. Bill No. 949, 3 Stats. 1971 (Reg. Sess.) Summary Dig., p. 83.) This **[15 Cal. 4th 103]** description was consistent with prior judicial decisions that, for purposes of a county's duty to provide "indigent persons" with hospitalization, had defined the term to include a person "who has insufficient means to pay for his maintenance in a private hospital after providing for those who legally claim his support." (Goodall v. Brite (1936) 11 Cal. App. 2d 540, 550 [54 P.2d 510].)

Moreover, the fate of amendments to section 17000 proposed at the same time suggests that, in the Legislature's view, the category of "indigent persons" entitled to medical care under section 17000 extended even beyond those eligible for Medi-Cal as MIP's. The June 17, 1971, version of Assembly Bill No. 949 amended section 17000 by adding the following: "however, the health needs of such persons shall be met under [Medi-Cal]." (Assem. Bill No. 949 (1971 Reg. Sess.) § 53.3, as amended June 17, 1971.) The Assembly deleted this amendment on July 20, 1971. (Assem. Bill No. 949 (1971 Reg. Sess.) as amended July 20, 1971, p. 37.) Regarding this change, the Assembly Committee on Health explained: "The proposed amendment to Section 17000, ... which would have removed the counties' responsibilities as health care provider of last resort, is deleted. This change was originally proposed to clarify the guarantee to hold counties harmless from additional Medi-Cal costs. It is deleted since it cannot remove the fact that counties are, by definition, a 'last resort' for any person, with or without the means to pay, who does not qualify for federal or state aid." (Assem. Com. on Health, Analysis of Assem. Bill No. 949 (1971 Reg. Sess.) as amended July 20, 1971 (July 21, 1971), p. 4.)

The Legislature's failure to amend section 17000 in 1971 figured prominently in the Attorney General's interpretation of that section only two years later. In a 1973 published opinion, the Attorney General stated that the 1971 inclusion of MIP's in Medi-Cal "did not alter the duty of the counties to provide medical care to those indigents not eligible for Medi-Cal." (56

Ops.Cal.Atty.Gen., supra, at p. 569.) He based this conclusion on the 1971 legislation, relevant legislative history, and "the history of state medical care programs." (Id. at p. 570.) The opinion concluded: "The definition of medically indigent in [the chapter establishing Medi-Cal] is applicable only to that chapter and does not include all those enumerated in section 17000. If the former medical care program, by providing care only for a specific group, public assistance recipients, did not affect the responsibility of the counties to provide such service under section 17000, we believe the most recent expansion of the medical assistance program does not affect, absent an express legislative intent to the contrary, the duty of the counties under section 17000 to continue to provide services to those eligible under section 17000 but not under [Medi-Cal]." (Ibid., italics added.) The Attorney General's opinion, although not binding, is entitled to considerable weight. **[15 Cal. 4th 104]** (Freedom Newspapers, Inc. v. Orange County Employees Retirement System (1993) 6 Cal. 4th 821, 829 [25 Cal. Rptr. 2d 148, 863 P.2d 218].) Absent controlling authority, it is persuasive because we presume that the Legislature was cognizant of the Attorney General's construction of section 17000 and would have taken corrective action if it disagreed with that construction. (California Assn. of Psychology Providers v. Rank (1990) 51 Cal. 3d 1, 17 [270 Cal. Rptr. 796, 793 P.2d 2].)

In this case, of course, we need not (and do not) decide whether San Diego's obligation under section 17000 to provide medical care extended beyond adult MIP's. Our discussion establishes, however, that the obligation extended at least that far. The Legislature has made it clear that all adult MIP's are "indigent persons" under section 17000 for purposes of San Diego's obligation to provide medical care. Therefore, the state errs in arguing that San Diego had discretion to refuse to provide medical care to this population. fn. 27

2. Service Standards

[7] A number of statutes are relevant to the state's argument that San Diego had discretion in setting service standards. Section 17000 requires in general terms that counties "relieve and support" indigent persons. Section 10000, which sets forth the purpose of the division containing section 17000, declares the "legislative intent that aid shall be administered and services provided promptly and humanely, with due regard for the preservation of family life," so "as to encourage self-respect, self-reliance, and the desire to be a good citizen, useful to society." (§ 10000.) "Section 17000, as authoritatively interpreted, mandates that medical care be provided to indigents and section 10000 requires that such care be provided promptly and humanely. The duty is mandated by statute. There is no discretion concerning whether to provide such care ...." (Tailfeather v. Board of Supervisors (1996) 48 Cal. App. 4th 1223, 1245 [56 Cal. Rptr. 2d 255] (Tailfeather).)

Courts construing section 17000 have held that it "imposes a mandatory duty upon all counties to provide 'medically necessary care,' not just **[15 Cal. 4th 105]** emergency care. [Citation.]" (County of Alameda v. State Bd. of Control (1993) 14 Cal. App. 4th 1096, 1108 [18 Cal. Rptr. 2d 487]; see also Gardner v. County of Los Angeles (1995) 34 Cal. App. 4th 200, 216 [40 Cal. Rptr. 2d 271]; § 16704.1 [prohibiting a county from requiring payment of a fee or charge "before [it] renders medically necessary services to ... persons entitled to services under Section 17000"].) It further "ha[s] been interpreted ... to impose a minimum standard of care below which the provision of medical services may not fall." (Tailfeather, supra, 48 Cal.App.4th at p. 1239.) In Tailfeather, the court stated that "section 17000 requires provision of medical services to the poor at a level which does not lead to unnecessary suffering or endanger life and health ...." (Id. at p. 1240.) In reaching this conclusion, it cited Cooke, supra, 213 Cal.App.3d at page 404, which held that section 17000 requires counties to provide "dental care sufficient to remedy substantial pain and infection." (See also § 14059.5 [defining "[a] service [as] 'medically necessary' ... when it is reasonable and necessary to protect life, to prevent significant illness or significant disability, or to alleviate severe pain"].)

During the years for which San Diego sought reimbursement, Health and Safety Code section 1442.5, former subdivision (c) (former subdivision (c)), also spoke to the level of services that counties had to provide under Welfare and Institutions Code section 17000. fn. 28 As enacted in September 1974, former subdivision (c) provided that, whether a county's duty to provide care to all indigent people "is fulfilled directly by the county or through alternative means, the availability of services, and the quality of the treatment received by people who cannot afford to pay for their health care shall be the same as that available to nonindigent people receiving health care services in private facilities in that county." (Stats. 1974, ch. 810, § 3, p. 1765.) The express "purpose and intent" of the act that contained former subdivision (c) was "to insure that the duty of counties to provide health care to indigents [was] properly and continuously fulfilled." (Stats. 1974, ch. 810, § 1, p. 1764.) Thus, until its repeal in September 1992, fn. 29 former subdivision (c) "[r]equire[d] that the availability and quality of services provided to indigents directly by the county or alternatively be the same as that available to nonindigents in private facilities in that county." (Legis. Counsel's Dig., Sen. Bill No. 2369, 2 Stats. 1974 (Reg. Sess.) Summary Dig., p. 130; see also Gardner v. County of Los Angeles, supra, 34 Cal.App.4th at p. 216; **[15 Cal. 4th 106]** Board of Supervisors v. Superior Court, supra, 207 Cal.App.3d at p. 564 [former subdivision (c) required that care provided "be comparable to that enjoyed by the nonindigent"].) fn. 30 "For the 1990-91 fiscal year," the Legislature qualified this obligation by providing: "nothing in [former] subdivision (c) ... shall require any county to exceed the standard of care provided by the state Medi-Cal program. Notwithstanding any other

provision of law, counties shall not be required to increase eligibility or expand the scope of services in the 1990-91 fiscal year for their programs." (Stats. 1990, ch. 457, § 23, p. 2013.)

Although we have identified statutes relevant to service standards, we need not here define the precise contours of San Diego's statutory health care obligation. The state argues generally that San Diego had discretion regarding the services it provided. However, the state fails to identify either the specific services that San Diego provided under its CMS program or which of those services, if any, were not required under the governing statutes. Nor does the state argue that San Diego could have eliminated all services and complied with statutory requirements. Accordingly, we reject the state's argument that, because San Diego had some discretion in providing services, the 1982 legislation did not impose a reimbursable mandate. fn. 31

VI. Minimum Required Expenditure

[8] The Court of Appeal held that, under the governing statutes, the Commission must initially determine the precise amount of any reimbursement due San Diego. It therefore reversed the damages portion of the trial court's judgment and remanded the matter to the Commission for this determination. Nevertheless, the Court of Appeal affirmed the trial court's finding that the Legislature required San Diego to spend at least $41 million on its CMS program for fiscal years 1989-1990 and 1990-1991. In affirming this finding, the Court of Appeal relied primarily on section 16990, subdivision (a), as it read at all relevant times. The state contends this provision did not mandate that San Diego spend any minimum amount on the CMS program. It further asserts that the Court of Appeal's "ruling in effect sets a damages baseline, in contradiction to [its] ostensible reversal of the damage award." **[15 Cal. 4th 107]**

Former section 16990, subdivision (a), set forth the financial maintenance-of-effort requirement for counties that received funding under the California Healthcare for the Indigent Program (CHIP). The Legislature enacted CHIP in 1989 to implement Proposition 99, the Tobacco Tax and Health Protection Act of 1988 (codified at Rev. & Tax. Code, § 30121 et seq.). Proposition 99, which the voters approved on November 8, 1988, increased the tax on tobacco products and allocated the resulting revenue in part to medical and hospital care for certain persons who could not afford those services. (Kennedy Wholesale, Inc. v. State Bd. of Equalization (1991) 53 Cal. 3d 245, 248, 254 [279 Cal. Rptr. 325, 806 P.2d 1360].) During the 1989-1990 and 1990-1991 fiscal years, former section 16990, subdivision (a), required counties receiving CHIP funds, "at a minimum," to "maintain a level of financial support of county funds for health services at least equal to its county match and any overmatch of county funds in the 1988-89 fiscal year," adjusted annually as

provided. (Stats. 1989, ch. 1331, § 9, p. 5427.) Applying this provision, the Court of Appeal affirmed the trial court's finding that the state had required San Diego to spend in fiscal years 1989-1990 and 1990-1991 at least $41 million on the CMS program.

We agree with the state that this finding is erroneous. Unlike participation in MISA, which was mandatory, participation in CHIP was voluntary. In establishing CHIP, the Legislature appropriated funds "for allocation to counties participating in" the program. (Stats. 1989, ch. 1331, § 10, p. 5436, italics added.) Section 16980, subdivision (a), directed the State Department of Health Services to make CHIP payments "upon application of the county assuring that it will comply with" applicable provisions. Among the governing provisions were former sections 16990, subdivision (a), and 16995, subdivision (a), which provided: "To be eligible for receipt of funds under this chapter, a county may not impose more stringent eligibility standards for the receipt of benefits under Section 17000 or reduce the scope of benefits compared to those which were in effect on November 8, 1988." (Stats. 1989, ch. 1331, § 9, p. 5431.)

However, San Diego has cited no provision, and we have found none, that required eligible counties to participate in the program or apply for CHIP funds. Through Revenue and Taxation Code section 30125, which was part of Proposition 99, the electorate directed that funds raised through Proposition 99 "shall be used to supplement existing levels of service and not to fund existing levels of service." (See also Stats. 1989, ch. 1331, §§ 1, 19, pp. 5382, 5438.) Counties not wanting to supplement their existing levels of service, and which therefore did not want CHIP funds, were not bound by the program's requirements. Those counties, including San Diego, that chose **[15 Cal. 4th 108]** to seek CHIP funds did so voluntarily. fn. 32 Thus, the Court of Appeal erred in concluding that former section 16990, subdivision (a), mandated a minimum funding requirement for San Diego's CMS program.

Nor did former section 16991, subdivision (a)(5), which the trial court and Court of Appeal also cited, establish a minimum financial obligation for San Diego's CMS program. Former section 16991 generally "establish[ed] a procedure for the allocation of funds to each county receiving funds from the [MISA] ... for the provision of services to persons meeting certain Medi-Cal eligibility requirements, based on the percentage of newly legalized individuals under the federal Immigration Reform and Control Act (IRCA)." (Legis. Counsel's Dig., Assem. Bill No. 75, 4 Stats. 1989 (Reg. Sess.) Summary Dig., p. 548.) Former section 16991, subdivision (a)(5), required the state, for fiscal years 1989-1990 and 1990-1991, to reimburse a county if its combined allocation from various sources was less than the funding it received under section 16703 for fiscal year 1988-1989. fn. 33 Nothing about this state reimbursement requirement imposed on San Diego a minimum funding requirement for its CMS program.

Thus, we must reverse the judgment insofar as it finds that former sections 16990, subdivision (a), and 16991, subdivision (a)(5), established a $41 million spending floor for San Diego's CMS program. Instead, the various statutes that we have previously discussed (e.g., §§ 10000, 17000, and Health & Saf. Code, § 1442.5, former subd. (c)), the cases construing those statutes, and any other relevant authorities must guide the Commission's determination of the level of services that San Diego had to provide and any reimbursement to which it is entitled. **[15 Cal. 4th 109]**

VII. Remaining Issues

[9] The state raises a number of additional issues. It first complains that a mandamus proceeding under Code of Civil Procedure section 1085 was an improper vehicle for challenging the Commission's position. It asserts that, under Government Code section 17559, review by administrative mandamus under Code of Civil Procedure section 1094.5 is the exclusive method for challenging a Commission decision denying a mandate claim. The Court of Appeal rejected this argument, reasoning that the trial court had jurisdiction under Code of Civil Procedure section 1085 because, under section 6, the state has a ministerial duty of reimbursement when it imposes a mandate.

Like the Court of Appeal, but for different reasons, we reject the state's argument. "[M]andamus pursuant to [Code of Civil Procedure] section 1094.5, commonly denominated 'administrative' mandamus, is mandamus still. It is not possessed of 'a separate and distinctive legal personality. It is not a remedy removed from the general law of mandamus or exempted from the latter's established principles, requirements and limitations.' [Citations.] The full panoply of rules applicable to 'ordinary' mandamus applies to 'administrative' mandamus proceedings, except where modified by statute. [Citations.]" (Woods v. Superior Court (1981) 28 Cal. 3d 668, 673-674 [170 Cal. Rptr. 484, 620 P.2d 1032].) Where the entitlement to mandamus relief is adequately alleged, a trial court may treat a proceeding brought under Code of Civil Procedure section 1085 as one brought under Code of Civil Procedure section 1094.5 and should deny a demurrer asserting that the wrong mandamus statute has been invoked. (Woods, supra, 28 Cal.3d at pp. 673-674; Anton v. San Antonio Community Hosp. (1977) 19 Cal. 3d 802, 813-814 [140 Cal. Rptr. 442, 567 P.2d 1162].) Thus, even if San Diego identified the wrong mandamus statute, the error did not affect the trial court's ability to grant mandamus relief.

"In any event, distinctions between traditional and administrative mandate have little impact on this appeal ...." (McIntosh v. Aubry (1993) 14 Cal. App. 4th 1576, 1584 [18 Cal. Rptr. 2d 680].) The determination whether the statutes here at issue established a mandate under section 6 is a question of law. (County of Fresno v. Lehman, supra, 229 Cal.App.3d at

p. 347.) In reaching our conclusion, we have relied on no facts that are in dispute. Where, as here, a "purely legal question" is at issue, courts "exercise independent judgment ..., no matter whether the issue arises by traditional or administrative mandate. [Citations.]" (McIntosh, supra, 14 Cal.App.4th at p. 1584.) As the state concedes, even under Code of Civil Procedure section 1094.5, a judgment must "be reversed if based on erroneous conclusions of law." Thus, any differences between the two mandamus statutes have had no impact on our analysis. **[15 Cal. 4th 110]**

The state next contends that the trial court prejudicially erred in denying the "peremptory disqualification" motion that the Director of the Department of Finance filed under Code of Civil Procedure section 170.6. We will not review this ruling, however, because it is reviewable only by writ of mandate under Code of Civil Procedure section 170.3, subdivision (d). (People v. Webb (1993) 6 Cal. 4th 494, 522-523 [24 Cal. Rptr. 2d 779, 862 P.2d 779]; People v. Hull (1991) 1 Cal. 4th 266 [2 Cal. Rptr. 2d 526, 820 P.2d 1036].)

Nor can we address the state's argument that the trial court erred in granting a preliminary injunction. The May 1991 order granting the preliminary injunction was "immediately and separately appealable" under Code of Civil Procedure section 904.1, subdivision (a)(6). (Art Movers, Inc. v. Ni West, Inc. (1992) 3 Cal. App. 4th 640, 645 [4 Cal. Rptr. 2d 689].) Thus, the state's attempt to challenge the order in an appeal filed after entry of final judgment in December 1992 was untimely. fn. 34 (See Chico Feminist Women's Health Center v. Scully (1989) 208 Cal. App. 3d 230, 251 [256 Cal. Rptr. 194].) Moreover, the state's attempt to appeal the order granting the preliminary injunction is moot because of (1) the trial court's July 1 order granting a peremptory writ of mandate, which expressly "supersede[d] and replace[d]" the preliminary injunction order and (2) entry of final judgment. (Sheward v. Citizens' Water Co. (1891) 90 Cal. 635, 638-639 [27 P. 439]; People v. Morse (1993) 21 Cal. App. 4th 259, 264-265 [25 Cal. Rptr. 2d 816]; Art Movers, Inc., supra, 3 Cal.App.4th at p. 647.)

Finally, the state requests that we reverse the trial court's reservation of jurisdiction regarding an award of attorney fees. This request is premature. In the judgment, the trial court "retain[ed] jurisdiction to determine any right to and amount of attorneys' fees ...." This provision does not declare that San Diego in fact has a right to an award of attorney fees. Nor has San Diego asserted such a right. As San Diego states, at this point, "[t]here is nothing for this Court to review." We will not give an advisory ruling on this issue.

VIII. Disposition

The judgment of the Court of Appeal is affirmed insofar as it holds that the exclusion of adult MIP's from Medi-Cal imposed a mandate on San Diego within the meaning of section 6. The judgment is reversed insofar as it holds that the state required San Diego to spend at least $41 million on the CMS program in fiscal years 1989-1990 and 1990-1991. The matter is **[15 Cal. 4th 111]** remanded to the Commission to determine whether, and by what amount, the statutory standards of care (e.g., Health & Saf. Code, § 1442.5, former subd. (c); Welf. & Inst. Code, §§ 10000, 17000) forced San Diego to incur costs in excess of the funds provided by the state, and to determine the statutory remedies to which San Diego is entitled. George, C. J., Mosk, J., Baxter, J., Anderson, J., fn. * and Aldrich, J., fn. concurred.

KENNARD, J.

I dissent.

As part of an initiative measure placing spending limits on state and local government, the voters in 1979 added article XIII B to the California Constitution. Section 6 of this article provides that when the state "mandates a new program or higher level of service on any local government," the state must reimburse the local government for the cost of such program or service. Under subdivision (c) of this constitutional provision, however, the state "may, but need not," provide such reimbursement if the state mandate was enacted before January 1, 1975. (Cal. Const., art. XIII B, § 6, subd. (c).) Subdivision (c) is the critical provision here.

Because the counties have for many decades been under a state mandate to provide for the poor, a mandate that existed before the voters added article XIII B to the state Constitution, the express language of subdivision (c) of section 6 of article XIII B exempts the state from any legal obligation to reimburse the counties for the cost of medical care to the needy. The fact that for a certain period after 1975 the state directly paid under the state Medi-Cal program for these costs did not lead to the creation of a new mandate once the state stopped doing so. To hold to the contrary, as the majority does, is to render subdivision (c) a nullity.

The issue here is not whether the poor are entitled to medical care. They are. The issue is whether the state or the counties must pay for this care. The majority places this obligation on the state. The counties' win, however, may be a pyrrhic victory. For, in anticipation of today's decision, the Legislature has enacted legislation that will drastically reduce the counties' share of other state revenue, as discussed in part III below.

I

Beginning in 1855, California imposed a legal obligation on the counties to take care of their poor. (Mooney v. Pickett (1971) 4 Cal. 3d 669, 677-678 **[15 Cal. 4th 112]** [94 Cal. Rptr. 279, 483 P.2d 1231].) Since 1965, this obligation has been codified in Welfare and Institutions Code section 17000. (Stats. 1965, ch. 1784, § 5, p. 4090.) That statute states in full: "Every county and every city and county shall relieve and support all incompetent, poor, indigent persons, and those incapacitated by age, disease, or accident, lawfully resident therein, when such persons are not supported and relieved by their relatives or friends, by their own means, or by state hospitals or other state or private institutions." (Welf. & Inst. Code, § 17000.) Included in this is a duty to provide medical care to indigents. (Board of Supervisors v. Superior Court (1989) 207 Cal. App. 3d 552, 557 [254 Cal. Rptr. 905].)

A brief overview of the efforts by federal, state, and local governments to furnish medical services to the poor may be helpful.

Before March 1, 1966, the date on which California began its Medi-Cal program, medical services for the poor "were provided in different ways and were funded by the state, county, and federal governments in varying amounts." (Assem. Com. on Public Health, Preliminary Rep. on Medi-Cal (Feb. 29, 1968) p. 3.) The Medi-Cal program, which California adopted to implement the federal Medicaid program (42 U.S.C. § 1396 et seq.; see Morris v. Williams (1967) 67 Cal. 2d 733, 738 [63 Cal. Rptr. 689, 433 P.2d 697]), at first limited eligibility to those persons "linked" to a federal categorical aid program by being over age 65, blind, disabled, or a member of a family with dependent children. (Legis. Analyst, Rep. to Joint Legis. Budget Com., Analysis of 1971-1972 Budget Bill, Sen. Bill No. 207 (1971 Reg. Sess.), pp. 548, 550.) Persons not linked to federal programs were ineligible for Medi-Cal; they could obtain medical care from the counties. (County of Santa Clara v. Hall (1972) 23 Cal. App. 3d 1059, 1061 [100 Cal. Rptr. 629].)

In 1971, the Legislature revised Medi-Cal by extending coverage to certain so-called "noncategorically linked" persons, or "medically indigent persons." (Stats. 1971, ch. 577, §§ 12, 13, 22.5, 23, pp. 1110-1111, 1115.) The revisions included a formula for determining each county's share of Medi-Cal costs for the 1972-1973 fiscal year, with increases in later years based on the assessed value of property. (Id. at §§ 41, 42, pp. 1131-1133.)

In 1978, California voters added to the state Constitution article XIII A (Proposition 13), which severely limited property taxes. In that same year, to help the counties deal with the drastic drop in local tax revenue, the Legislature assumed the counties' share of Medi-Cal costs. (Stats. 1978, ch. 292, § 33, p. 610.) In 1979, the Legislature relieved the counties of their obligation to share in Medi-Cal costs. (Stats. 1979, ch. 282, § 106, p. 1059.) **[15 Cal. 4th 113]** Also in 1979, the voters added to the state Constitution article XIII B, which placed

spending limits on state and local governments and added the mandate/reimbursement provisions at issue here.

In 1982, the Legislature removed from Medi-Cal eligibility the category of "medically indigent persons" that had been added in 1971. The Legislature also transferred funds for indigent health care services from the state to the counties through the Medically Indigent Services Account. (Stats. 1982, ch. 328, §§ 6, 8.3, 8.5, pp. 1574-1576; Stats. 1982, ch. 1594, §§ 19, 86, pp. 6315, 6357.) Medically Indigent Services Account funds were then combined with county health service funds to provide health care to persons not eligible for Medi-Cal (Stats. 1982, ch. 1594, § 86, p. 6357), and counties were to provide health services to persons in this category "to the extent that state funds are provided" (id., § 70, p. 6346).

From 1983 through June 1989, the state fully funded San Diego County's program for furnishing medical care to the poor. Thereafter, in fiscal years 1989-1990 and 1990-1991, the state partially funded San Diego County's program. In early 1991, however, the state refused to provide San Diego County full funding for the 1990-1991 fiscal year, prompting a threat by the county to terminate its indigent medical care program. This in turn led the Legal Aid Society of San Diego to file an action against the County of San Diego, asserting that Welfare and Institutions Code section 17000 imposed a legal obligation on the county to provide medical care to the poor. The county cross-complained against the state. The county argued that the state's 1982 removal of the category of "medically indigent persons" from Medi-Cal eligibility mandated a "new program or higher level of service" within the meaning of section 6 of article XIII B of the California Constitution, because it transferred the cost of caring for these persons to the county. Accordingly, the county contended, section 6 required the state to reimburse the county for its cost of providing such care, and prohibited the state from terminating reimbursement as it did in 1991. The county eventually reached a settlement with the Legal Aid Society of San Diego, leading to a dismissal of the latter's complaint.

While the County of San Diego's case against the state was pending, litigation was proceeding in a similar action against the state by the County of Los Angeles and the County of San Bernardino. In that action, the Superior Court for the County of Los Angeles entered a judgment in favor of Los Angeles and San Bernardino Counties. The state sought review in the Second District Court of Appeal in Los Angeles. In December 1992, the parties to the Los Angeles case entered into a settlement agreement providing for dismissal of the appeal and vacating of the superior court judgment. **[15 Cal. 4th 114]** The Court of Appeal thereafter ordered that the superior court judgment be vacated and that the appeal be dismissed.

The County of San Diego's action against the state, however, was not settled. It proceeded on the county's claim against the state for reimbursement of the county's expenditures for medical care to the indigent. fn. 1 The majority holds that the county is entitled to such reimbursement. I disagree.

II

Article XIII B, section 6 of the California Constitution provides: "Whenever the Legislature or any state agency mandates a new program or higher level of service on any local government, the state shall provide a subvention of funds to reimburse such local government for the costs of such program or increased level of service, except that the Legislature may, but need not, provide such subvention of funds for the following mandates: [¶] ... [¶] (c) Legislative mandates enacted prior to January 1, 1975, or executive orders or regulations initially implementing legislation enacted prior to January 1, 1975." (Italics added.) fn. 2

Of importance here is Welfare and Institutions Code section 17000 (hereafter sometimes section 17000). It imposes a legal obligation on the counties to provide, among other things, medical services to the poor. (Board of Supervisors v. Superior Court, supra, 207 Cal.App.3d at p. 557; County of San Diego v. Viloria (1969) 276 Cal. App. 2d 350, 352 [80 Cal. Rptr. 869].) Section 17000 was enacted long before, and has existed continuously since, January 1, 1975, the date set forth in subdivision (c) of section 6 of article XIII B of the California Constitution. Thus, section 17000 falls within subdivision (c)'s language of "[l]egislative mandates enacted prior to January 1, 1975," rendering it exempt from the reimbursement provision of section 6.

Contrary to the majority's conclusion, the Legislature's 1982 legislation removing the category of "medically indigent persons" from Medi-Cal did not meet California Constitution, article XIII B, section 6's requirement of imposing on local government "a new program or higher level of service," and therefore did not entitle the counties to reimbursement from the state under section 6 of article XIII B. The counties' legal obligation to provide medical care arises from section 17000, not from the subsequently enacted **[15 Cal. 4th 115]** 1982 legislation. The majority itself concedes that the 1982 legislation merely "trigger[ed] the counties' responsibility to provide medical care as providers of last resort under section 17000." (Maj. opn., ante, at p. 98.) Although certain actions by the state and the federal government during the 1970's and 1980's may have alleviated the counties' financial burden of providing medical care for the indigent, those actions did not supplant or remove the counties' existing legal obligation under section 17000 to furnish such care. (Cooke v. Superior Court (1989) 213 Cal. App. 3d 401, 411 [261

Cal. Rptr. 706]; Madera Community Hospital v. County of Madera (1984) 155 Cal. App. 3d 136, 151 [201 Cal. Rptr. 768].)

The state's reimbursement obligation under section 6 of article XIII B of the California Constitution arises only if, after January 1, 1975, the date mentioned in subdivision (c) of section 6, the state imposes on the counties "a new program or higher level of service." That did not occur here. As I pointed out above, the counties' legal obligation to provide for the poor arises from section 17000, enacted long before the January 1, 1975, cutoff date set forth in subdivision (c) of section 6. That statutory obligation remained in effect when, during a certain period after 1975, the state assumed the financial burden of providing medical care to the poor, in an effort to help the counties deal with a drastic drop in local revenue as a result of the voters' passage of Proposition 13, which severely limited property taxes. Because the counties' statutory obligation to provide health care to the poor was created before 1975 and has existed unchanged since that time, the state's 1982 termination of Medi-Cal eligibility for "medically indigent persons" did not create a "new program or higher level of service" within the meaning of section 6 of article XIII B, and therefore did not obligate the state to reimburse the counties for their expenditures in health care for the poor.

III

In imposing on the state a legal obligation to reimburse the counties for their cost of furnishing medical services to the poor, the majority's holding appears to bail out financially strapped counties. Not so.

Today's decision will immediately result in a reduction of state funds available to the counties. Here is why. In 1991, the Legislature added section 11001.5 to the Revenue and Taxation Code, providing that 24.33 percent of the moneys collected by the Department of Motor Vehicles as motor vehicle license fees must be deposited in the State Treasury to the credit of the Local Revenue Fund. In anticipation of today's decision, the Legislature stated in subdivision (d) of this statute: "This section shall cease to be operative on **[15 Cal. 4th 116]** the first day of the month following the month in which the Department of Motor Vehicles is notified by the Department of Finance of a final judicial determination by the California Supreme Court or any California court of appeal [that]: [¶] ... [¶] (2) The state is obligated to reimburse counties for costs of providing medical services to medically indigent adults pursuant to Chapters 328 and 1594 of the Statutes of 1982." (Rev. & Tax. Code, § 11001.5, subd. (d); see also id., § 10753.8, subd. (b).)

The loss of such revenue, which the Attorney General estimates at "hundreds of millions of dollars," may put the counties in a serious financial bind. Indeed, realization of the scope of this revenue loss appears to explain why the County of Los Angeles, after a superior court victory in its action seeking state reimbursement for the cost of furnishing medical care to "medically indigent persons," entered into a settlement with the state under which the superior court judgment was effectively obliterated by a stipulated reversal. (See Neary v. Regents of University of California (1992) 3 Cal. 4th 273 [10 Cal. Rptr. 2d 859, 834 P.2d 119].) In a letter addressed to the Second District Court of Appeal, sent while the County of Los Angeles was engaged in settlement negotiations with the state, the county's attorney referred to the legislation mentioned above in these terms: "This legislation was quite clearly written with this case in mind. Consequently, to pursue this matter, the County of Los Angeles risks losing a funding source it must have to maintain its health services programs at current levels. The additional funding that might flow to the County from a final judgment in its favor in this matter, is several years away and is most likely of a lesser amount than this County's share of the vehicle license fees." (Italics added.) Thus, the County of Los Angeles had apparently determined that a legal victory entitling it to reimbursement from the state for the cost of providing medical care to the category of "medically indigent persons" would not in fact serve its economic interests.

I have an additional concern. According to the majority, whenever there is a change in a state program that has the effect of increasing a county's financial burden under section 17000 there must be reimbursement by the state. This means that so long as section 17000 continues to exist, an increase in state funding to a particular county for the care of the poor, once undertaken, may be irreversible, thus locking the state into perpetual financial assistance to that county for health care to the needy. This would, understandably, be a major disincentive for the Legislature to ever increase the state's funding of a county's medical care for the poor.

The rigidity imposed by today's holding will have unfortunate consequences should the state's limited financial resources prove insufficient to **[15 Cal. 4th 117]** reimburse the counties under section 6 of article XIII B of the California Constitution for the "new program or higher level of service" of providing medical care to the poor under section 17000. In that event, the state may be required to modify this "new program or higher level of service" in order to reconcile the state's reimbursement obligation with its finite resources and its other financial commitments. Such modifications are likely to take the form of limitations on eligibility for medical care or on the amount or kinds of medical care that the counties must provide to the poor under section 17000. A more flexible system-one that actively encouraged shared state and county responsibility for indigent medical care, using a

variety of innovative funding mechanisms-would be less likely to result in a curtailment of medical services to the poor.

And if the Legislature is unable or unwilling to appropriate funds to comply with the majority's reimbursement order, the law allows the county to file "in the Superior Court of the County of Sacramento an action in declaratory relief to declare the mandate unenforceable and enjoin its enforcement." (Gov. Code, § 17612, subd. (c); see maj. opn., ante, at p. 82.) Such a declaration would do nothing to alleviate the plight of the poor.

Conclusion

The dispute in this case ultimately arises from a collision between the taxing limitations on the counties imposed by article XIII A of the state Constitution and the preexisting, open-ended mandate imposed on them under Welfare and Institutions Code section 17000 to provide medical care for the poor. As I have explained, the Legislature's assumption thereafter of some of the resulting financial burden to the counties did not repeal section 17000's mandate, nor did the Legislature's later termination of its financial support create a new mandate. In holding to the contrary, the majority imposes on the Legislature an obligation that the Legislature does not have under the law.

I recognize that my resolution of this issue-that under existing law the state has no legal obligation to reimburse the counties for health expenditures for the poor-would leave the counties in the same difficult position in which they find themselves now: providing funding for indigent medical care while maintaining other essential public services in a time of fiscal austerity. But complex policy questions such as the structuring and funding of indigent medical care are best left to the counties, the Legislature, and ultimately the electorate, rather than to the courts. It is the counties that must figure out how to allocate the limited budgets imposed on them by the electorate's adoption of articles XIII A and XIII B of the California Constitution among indigent medical care programs and a host of other pressing **[15 Cal. 4th 118]** and essential needs. It is the Legislature that must decide whether to furnish financial assistance to the counties so they can meet their section 17000 obligations to provide for the poor, and whether to continue to impose the obligations of section 17000 on the counties. It is the electorate that must decide whether, given the ever-increasing costs of meeting the needs of indigents under section 17000, counties should be afforded some relief from the taxing and spending limits of articles XIII A and XIII B, both enacted by voters' initiative. These are hard choices, but for the reasons just given they are better made by the representative branches of government and the electorate than by the courts.

FN *. Retired judge of the San Diego Superior Court, assigned by the Chief Justice pursuant to article VI, section 6 of the California Constitution.

FN *. Presiding Justice, Court of Appeal, First Appellate District, Division Four, assigned by the Chief Justice pursuant to article VI, section 6 of the California Constitution.

FN . Associate Justice, Court of Appeal, Second Appellate District, Division Three, assigned by the Chief Justice pursuant to article VI, section 6 of the California Constitution.

FN 1. Except as otherwise indicated, all further statutory references are to the Welfare and Institutions Code.

FN 2. Congress later repealed the requirement that states work towards expanding eligibility. (See Cal. Health and Welfare Agency, The Medi-Cal Program: A Brief Summary of Major Events (Mar. 1990) p. 1 (Summary of Major Events).)

FN 3. Former section 14150.1 provided in relevant part: "[A] county may elect to pay as its share [of Medi-Cal costs] one hundred percent ... of the county cost of health care uncompensated from any source in 1964-65 for all categorical aid recipients, and all other persons in the county hospital or in a contract hospital, increased for such county for each fiscal year subsequent to 1964-65 by an amount proportionate to the increase in population for such county .... If the county so elects, the county costs of health care in any fiscal year shall not exceed the total county costs of health care uncompensated from any source in 1964-65 for all categorical aid recipients, and all other persons in the county hospital or in a contract hospital, increased for such county for each fiscal year subsequent to 1964-65 by an amount proportionate to the increase in population for such county ...." (Stats. 1966, Second Ex. Sess. 1965, ch. 4, § 2, p. 121.)

FN 4. Former section 14150 provided the standard method for determining the counties' share of Medi-Cal costs. Under it, "a county was required to pay the state a specific sum, in return for which the state would pay for the medical care of all [categorically linked] individuals .... Financial responsibility for nonlinked individuals ... remained with the counties." (Lackner, supra, 97 Cal.App.3d at p. 581.)

FN 5. In this opinion, the terms "adult MIP's" and "Medically Indigent Adults" refer only to those persons who were excluded from the Medi-Cal program by the 1982 legislation.

FN 6. San Diego lodged with the trial court a copy of the Commission's decision in the Los Angeles action.

FN 7. In setting forth the facts relating to the Los Angeles action, we rely in part on the appellate record from that action, of which we take judicial notice. (Evid. Code, §§ 452, subd. (d), 459.)

FN 8. The settlement resulted from 1991 legislation that changed the system of health care funding as of June 30, 1991. (See § 17600 et seq.; Stats. 1991, chs. 87, 89, pp. 231-235, 243-341.) That legislation provided counties with new revenue sources, including a portion of state vehicle license fees, to fund health care programs. However, the legislation declared that the statutes providing counties with vehicle license fees would "cease to be operative on the first day of the month following the month in which the Department of Motor Vehicles is notified by the Department of Finance of a final judicial determination by the California Supreme Court or any California court of appeal" that "[t]he state is obligated to reimburse counties for costs of providing medical services to medically indigent adults pursuant to Chapters 328 and 1594 of the Statutes of 1982." (Rev. & Tax. Code, §§ 10753.8, subd. (b)(2), 11001.5, subd. (d)(2); see also Stats. 1991, ch. 89, § 210, p. 340.) Los Angeles and San Bernardino Counties settled their action to avoid triggering these provisions. Unlike the dissent, we do not believe that consideration of these recently enacted provisions is appropriate in analyzing the 1982 legislation. Nor do we assume, as the dissent does, that our decision necessarily triggers these provisions. That issue is not before us.

FN 9. The cross-complaint named the following state officers: (1) Kenneth W. Kizer, Director of the Department of Health Services; (2) Kim Belshé, Acting Secretary of the Health and Welfare Agency; (3) Gray Davis, the State Controller; (4) Kathleen Brown, the State Treasurer; and (5) Thomas Hayes, the Director of the Department of Finance. Where the context suggests, subsequent references in this opinion to "the state" include these officers.

FN 10. The judgment dismissed all of San Diego's other claims.

FN 11. In Garamendi, supra, 20 Cal.App.4th at pages 771-775, the court discussed procedural requirements for raising a claim that another court has already exercised its concurrent jurisdiction. Given our conclusion that the trial court's error here was not jurisdictional, we express no opinion about this discussion in Garamendi or the sufficiency of the state's efforts to raise the issue in this case.

FN 12. Notably, in discussing the options still available to San Diego, the state asserts that San Diego "might have been able to go to superior court and file a [mandamus] petition based on the record of the prior test claim."

FN 13. "County General Assistance in California dates from 1855, and for many years afforded the only form of relief to indigents." (Mooney v. Pickett (1971) 4 Cal. 3d 669, 677 [94 Cal. Rptr. 279, 483 P.2d 1231] (Mooney).) Section 17000 is substantively identical to former section 2500, which was enacted in 1937. (Stats. 1937, chs. 369, 464, pp. 1097, 1406.)

FN 14. See also County of Los Angeles v. Frisbie (1942) 19 Cal. 2d 634, 639 [122 P.2d 526] (construing former section 2500); Jennings v. Jones (1985) 165 Cal. App. 3d 1083, 1091 [212 Cal. Rptr. 134] (counties must support all indigent persons "having no other means of support"); Union of American Physicians & Dentists v. County of Santa Clara (1983) 149 Cal. App. 3d 45, 51, fn. 10 [196 Cal. Rptr. 602]; Rogers v. Detrich (1976) 58 Cal. App. 3d 90, 95 [128 Cal. Rptr. 261] (counties have duty of support "where such support is not otherwise furnished").

FN 15. In asserting that Medi-Cal coverage did not supplant San Diego's obligation under section 17000, the dissent incorrectly relies on Madera Community Hospital v. County of Madera (1984) 155 Cal. App. 3d 136 [201 Cal. Rptr. 768] (Madera) and Cooke, supra, 213 Cal. App. 3d 401. (Dis. opn. of Kennard, J., post, at p. 115.) In Madera, the court voided a county ordinance that extended county benefits under section 17000 only to persons " 'meeting all eligibility standards for the Medi-Cal program.' " (Madera, supra, 155 Cal.App.3d at p. 150.) The court explained: "Because all funding for the Medi-Cal program comes from either the federal or the state government ..., [c]ounty has denied any financial obligation whatsoever from county funds for the medical care of its indigent and poor residents." (Ibid.) Thus, properly understood, Madera held only that Medi-Cal does not relieve counties of their obligation to provide medical care to persons who are "indigent" within the meaning of section 17000 but who are ineligible for Medi-Cal. The limit of Madera's holding is apparent from the court's reliance on a 1979 opinion of the Attorney General discussing the scope of a county's authority under section 17000. (Madera, supra, 155 Cal.App.3d at pp. 151-152.) The Attorney General explained that "[t]he county obligation [under section 17000] to provide general relief extends to those indigents who do not qualify under specialized aid programs, ... including Medi-Cal." (62 Ops.Cal.Atty.Gen. 70, 71, fn. 1 (1979).) Moreover, the Madera court expressly recognized that state and federal programs "alleviate, to a greater or lesser extent, [a] [c]ounty's burden." (Madera, supra, 155 Cal.App.3d at p. 151.) In Cooke, the court simply made a passing reference to Madera in dictum describing the coverage history of Medi-Cal. (Cooke, supra, 213 Cal.App.3d at p. 411.) It neither analyzed the issue before us nor explained the meaning of the dictum that the dissent cites.

FN 16. As we have previously explained, even before 1971 the state, through the county option, assumed much of the financial responsibility for providing medical care to adult MIP's.

FN 17. Because County of Los Angeles v. Commission on State Mandates, supra, 32 Cal. App. 4th 805, is distinguishable, we need not (and do not) express an opinion regarding the court's analysis in that decision or its conclusions.

FN 18. The state properly does not contend that the provision of medical care to adult MIP's is not a "program" within the meaning of section 6. (See County of Los Angeles, supra, 43 Cal.3d at p. 56 [section 6 applies to "programs that carry out the governmental function of providing services to the public"].)

FN 19. Alternatively, the 1982 legislation can be viewed as having mandated an increase in the services that counties were providing through existing section 17000 programs, by adding adult MIP's to the indigent population that counties already had to serve under that section. (See County of Los Angeles, supra, 43 Cal.3d at p. 56 ["subvention requirement for increased or higher level of service is directed to state mandated increases in the services provided by local agencies in existing 'programs' "].)

FN 20. In reaching a contrary conclusion, the dissent ignores the electorate's purpose in adopting section 6. The dissent also mischaracterizes our decision. We do not hold that "whenever there is a change in a state program that has the effect of increasing a county's financial burden under section 17000 there must be reimbursement by the state." (Dis. opn. of Kennard, J., post, at p. 116.) Rather, we hold that section 6 prohibits the state from shifting to counties the costs of state programs for which the state assumed complete financial responsibility before adoption of section 6. Whether the state may discontinue assistance that it initiated after section 6's adoption is a question that is not before us.

FN 21. As amended in 1982, section 16704, subdivision (c)(1), provided in relevant part: "The [county board of supervisors] shall assure that it will expend [MISA] funds only for the health services specified in Sections 14132 and 14021 provided to persons certified as eligible for such services pursuant to Section 17000 and shall assure that it will incur no less in net costs of county funds for county health services in any fiscal year than the amount required to obtain the maximum allocation under Section 16702." (Stats. 1982, ch. 1594, § 70, p. 6346.) Section 16704, subdivision (c)(3), provided in relevant part: "Any person whose income and resources meet the income and resource criteria for certification for services pursuant to Section 14005.7 other than for the aged, blind, or disabled, shall not be excluded from eligibility for services to the extent that state funds are provided. Such

persons may be held financially liable for these services based upon the person's ability to pay. A county may not establish a payment requirement which would deny medically necessary services. This section shall not be construed to mandate that a county provide any specific level or type of health care service .... The provisions of this paragraph shall become inoperative if a court ruling is issued which decrees that the provisions of this paragraph mandates [sic] that additional state funds be provided and which requires that additional state reimbursement be made to counties for costs incurred under this paragraph. This paragraph shall be operative only until June 30, 1983, unless a later enacted statute extends or deletes that date." (Stats. 1982, ch. 1594, § 70, pp. 6346-6347.)

FN 22. Section 17001 provides: "The board of supervisors of each county, or the agency authorized by county charter, shall adopt standards of aid and care for the indigent and dependent poor of the county or city and county."

FN 23. We disapprove Bay General, supra, 156 Cal.App.3d at pages 959-960, insofar as it (1) states that a county's responsibility under section 17000 extends only to indigents as defined by the county's board of supervisors, and (2) suggests that a county may refuse to provide medical care to persons who are "indigent" within the meaning of section 17000 but do not qualify for Medi-Cal.

FN 24. Our conclusion is limited to this aspect of a county's duty under section 17000. We express no opinion regarding the scope of a county's duty to provide other forms of relief and support under section 17000.

FN 25. The 1982 legislation made the subdivision operative until June 30, 1983. (Stats. 1982, ch. 1594, § 70, p. 6347.) In 1983, the Legislature repealed and reenacted section 16704, and extended the operative date of subdivision (c)(3) to June 30, 1985. (Stats. 1983, ch. 323, §§ 131.1, 131.2, pp. 1079-1080.)

FN 26. Given our analysis, we express no opinion about the statement in Cooke, supra, 213 Cal.App.3d at page 412, footnote 9, that the "life" of section 16704, subdivision (c)(3), "was implicitly extended" by the fact that the "paragraph remains in the statute despite three subsequent amendments to the statute ...."

FN 27. Although asserting that nothing required San Diego to provide "all" adult MIP's with medical care, the state never precisely identifies which adult MIP's were legally entitled to medical care and which ones were not. Nor does the state ever directly assert that some adult MIP's were not "indigent persons" under section 17000. On the contrary, despite its argument, the state seems to suggest that San Diego's medical care obligation under section 17000 extended even beyond adult MIP's. It asserts: "At no time prior to or following 1983

did Medi-Cal ever provide medical services to, or pay for medical services provided to, all persons who could not afford such services and therefore might be deemed 'medically indigent.' ... For some period prior to 1983, Medi-Cal paid for services for some indigent adults under its 'medically indigent adults' category.... [A]t no time did the state ever assume financial responsibility for all adults who are too indigent to afford health care." (Original emphasis.)

FN 28. The state argues that former subdivision (c) is irrelevant to our determination because, like section 17000, it "predate[d] 1975." Our previous analysis rejecting this argument in connection with section 17000 applies here as well.

FN 29. Statutes 1992, chapter 719, section 2, page 2882, repealed former subdivision (c) and enacted a new subdivision (c) in its place. This urgency measure was approved by the Governor on September 14, 1992, and filed with the Secretary of State on September 15, 1992.

FN 30. We disapprove Cooke, supra, 213 Cal.App.3d at page 410, to the extent it held that Health and Safety Code section 1442.5, former subdivision (c), was merely "a limitation on a county's ability to close facilities or reduce services provided in those facilities," and was irrelevant absent a claim that a "county facility was closed [or] that any services in [the] county ... were reduced." Although former subdivision (c) was contained in a section that dealt in part with closures and service reductions, nothing limited its reach to that context.

FN 31. During further proceedings before the Commission to determine the amount of reimbursement due San Diego, the state may argue that particular services available under San Diego's CMS program exceeded statutory requirements.

FN 32. Consistent with the electorate's direction, in its application for CHIP funds, San Diego assured the state that it would "[e]xpend [CHIP] funds only to supplement existing levels of services provided and not to fund existing levels of service ...." Because San Diego's initial decision to seek CHIP funds was voluntary, the evidence it cites of state threats to withhold CHIP funds if it eliminated the CMS program is irrelevant.

FN 33. Former section 16991, subdivision (a)(5), provided in full: "If the sum of funding that a county received from its allocation pursuant to Section 16703, the amount of reimbursement it received from federal State Legalization Impact Assistance Grant [(SLIAG)] funding for indigent care, and its share of funding provided in this section is less than the amount of funding the county received pursuant to Section 16703 in fiscal year 1988-89 the state shall reimburse the county for the amount of the difference. For the 1990-91 fiscal year, if the sum of funding received from its allocation, pursuant to Section 16703

and the amount of reimbursement it received from [SLIAG] Funding for indigent care that year is less than the amount of funding the county received pursuant to Section 16703 in the 1988-89 fiscal year, the state shall reimburse the amount of the difference. If the department determines that the county has not made reasonable efforts to document and claim federal SLIAG funding for indigent care, the department shall deny the reimbursement." (Stats. 1989, ch. 1331, § 9, p. 5428.)

FN 34. Despite its argument here, when it initially appealed, the state apparently recognized that it could no longer challenge the May 1991 order. In its March 1993 notice of appeal, it appealed only from the judgment entered December 18, 1992, and did not mention the May 1991 order.

FN *. Presiding Justice, Court of Appeal, First Appellate District, Division Four, assigned by the Chief Justice pursuant to article VI, section 6 of the California Constitution.

FN . Associate Justice, Court of Appeal, Second Appellate District, Division Three, assigned by the Chief Justice pursuant to article VI, section 6 of the California Constitution.

FN 1. I agree with the majority that the superior court had jurisdiction to decide this case. (Maj. opn., ante, at pp. 85-90.)

FN 2. Section 6 of article XIII B pertains to two types of mandates: new programs and higher levels of service. The words "such subvention" in the first paragraph of this constitutional provision makes the subdivision (c) exemption applicable to both types of mandates.

The Natural Flow Regime

A paradigm for river conservation and restoration

N. LeRoy Poff, J. David Allan, Mark B. Bain, James R. Karr, Karen L. Prestegaard, Brian D. Richter, Richard E. Sparks, and Julie C. Stromberg

Humans have long been fascinated by the dynamism of free-flowing waters. Yet we have expended great effort to tame rivers for transportation, water supply, flood control, agriculture, and power generation. It is now recognized that harnessing of streams and rivers comes at great cost: Many rivers no longer support socially valued native species or sustain healthy ecosystems that provide important goods and services (Naiman et al. 1995, NRC 1992).

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The ecological integrity of river ecosystems depends on their natural dynamic character

The extensive ecological degradation and loss of biological diversity resulting from river exploitation is eliciting widespread concern for conservation and restoration of healthy river ecosystems among scientists and the lay public alike (Allan and Flecker 1993, Hughes and Noss 1992, Karr et al. 1985, TNC 1996, Williams et al. 1996). Extirpation of species, closures of fisheries, groundwater depletion, declines in water quality and availability, and more frequent and intense flooding are increasingly recognized as consequences of current river management and development policies (Abramovitz 1996, Collier et al. 1996, Naiman et al. 1995). The broad social support in the United States for the Endangered Species Act, the recognition of the intrinsic value of noncommercial native species, and the proliferation of watershed councils and riverwatch teams are evidence of society's interest in maintaining the ecological integrity and self-sustaining productivity of free-flowing river systems.

Society's ability to maintain and restore the integrity of river ecosystems requires that conservation and management actions be firmly grounded in scientific understanding. However, current management approaches often fail to recognize the fundamental scientific principle that the integrity of flowing water systems depends largely on their natural dynamic character; as a result, these methods frequently prevent successful river conservation or restoration. Streamflow quantity and timing are critical components of water supply, water quality, and the ecological integrity of river systems. Indeed, streamflow, which is strongly correlated with many critical physicochemical characteristics of rivers, such as water temperature, channel geomorphology, and habitat diversity, can be considered a "master variable" that limits the distribution and abundance of riverine species (Power et al. 1995, Resh et al. 1988) and regulates the ecological integrity of flowing water systems (Figure 1). Until recently, however, the importance of natural streamflow variability in maintaining healthy aquatic ecosystems has been virtually ignored in a management context.

Historically, the "protection" of river ecosystems has been limited in scope, emphasizing water quality and only one aspect of water quantity: minimum flow. Water resources management has also suffered from the often incongruent perspectives and fragmented responsibility of agencies (for example, the US Army Corps of Engineers and Bureau of Reclamation are responsible for water supply and flood control, the US Environmental Protection Agency and state environmental agencies for water quality, and the US Fish &

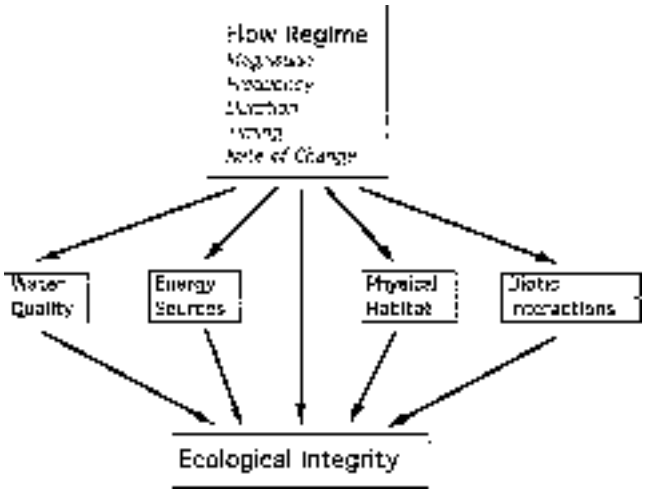

Figure 1. Flow regime is of central importance in sustaining the ecological integrity of flowing water systems. The five components of the flow regime—magnitude, frequency, duration, timing, and rate of change—influence integrity both directly and indirectly, through their effects on other primary regulators of integrity. Modification of flow thus has cascading effects on the ecological integrity of rivers. After Karr 1991.

Wildlife Service for water-dependent species of sporting, commercial, or conservation value), making it difficult, if not impossible, to manage the entire river ecosystem (Karr 1991). However, environmental dynamism is now recognized as central to sustaining and conserving native species diversity and ecological integrity in rivers and other ecosystems (Holling and Meffe 1996, Hughes 1994, Pickett et al. 1992, Stanford et al. 1996), and coordinated actions are therefore necessary to protect and restore a river's natural flow variability.

In this article, we synthesize existing scientific knowledge to argue that the natural flow regime plays a critical role in sustaining native biodiversity and ecosystem integrity in rivers. Decades of observation of the effects of human alteration of natural flow regimes have resulted in a well-grounded scientific perspective on why altering hydrologic variability in rivers is ecologically harmful (e.g., Arthington et al. 1991, Castleberry et al. 1996, Hill et al. 1991, Johnson et al. 1976, Richter et al. 1997, Sparks 1995, Stanford et al. 1996, Toth 1995, Tyus 1990). Current pressing demands on water use and the continuing alteration of watersheds require scientists to help develop management protocols that can accommodate economic uses while protecting ecosystem functions. For humans to continue to rely on river ecosystems for sustainable food production, power production, waste assimilation, and flood control, a new, holistic, ecological perspective on water management is needed to guide society's interactions with rivers.

The natural flow regime

The natural flow of a river varies on time scales of hours, days, seasons, years, and longer. Many years of observation from a streamflow gauge are generally needed to describe the characteristic pattern of a river's flow quantity, timing, and variability—that is, its natural flow regime. Components of a natural flow regime can be characterized using various time series (e.g., Fourier and wavelet) and probability analyses of, for example, extremely high or low flows, or of the entire range of flows expressed as average daily discharge (Dunne and Leopold 1978). In watersheds lacking long-term streamflow data, analyses can be extended statistically from gauged streams in the same geographic area. The frequency of large-magnitude floods can be estimated by paleohydrologic studies of debris left by floods and by studies of historical damage to living trees (Hupp and Osterkamp 1985, Knox 1972). These historical techniques can be used to extend existing hydrologic records or to provide estimates of flood flows for ungauged sites.

River flow regimes show regional patterns that are determined largely by river size and by geographic variation in climate, geology, topography, and vegetative cover. For example, some streams in regions with little seasonality in precipitation exhibit relatively stable hydrographs due to high groundwater inputs (Figure 2a), whereas other streams can fluctuate greatly at virtually any time of year (Figure 2b). In regions with seasonal precipitation, some streams are dominated by snowmelt, resulting in pronounced, predictable runoff patterns (Figure 2c), and others lack snow accumulation and exhibit more variable runoff patterns during the rainy season, with peaks occurring after each substantial storm event (Figure 2d).

Five critical components of the flow regime regulate ecological processes in river ecosystems: the magnitude, frequency, duration, timing, and rate of change of hydrologic conditions (Poff and Ward 1989, Richter et al. 1996, Walker et al. 1995). These components can be used to characterize the entire range of flows and specific hydrologic phenomena, such as floods or low flows, that are critical to the integrity of river ecosystems. Furthermore, by defining flow regimes in these terms, the ecological consequences of particular human activities that modify one or more components of the flow regime can be considered explicitly.

- The *magnitude* of discharge[1] at any given time interval is simply the amount of water moving past a fixed location per unit time. Magnitude can refer either to absolute or to relative discharge (e.g., the amount of water that inundates a floodplain). Maximum and minimum magnitudes of flow vary with climate and watershed size both within and among river systems.
- The *frequency* of occurrence refers to how often a flow above a given magnitude recurs over some specified time interval. Frequency of occurrence is inversely related to flow magnitude. For example, a 100-year flood is equaled or exceeded on average once every 100 years (i.e., a chance of 0.01 of occurring in any given year). The average (median)

[1]Discharge (also known as streamflow, flow, or flow rate) is always expressed in dimensions of volume per time. However, a great variety of units are used to describe flow, depending on custom and purpose of characterization: Flows can be expressed in near-instantaneous terms (e.g., ft^3/s and m^3/s) or over long time intervals (e.g., acre-ft/yr).

flow is determined from a data series of discharges defined over a specific time interval, and it has a frequency of occurrence of 0.5 (a 50% probability).

• The *duration* is the period of time associated with a specific flow condition. Duration can be defined relative to a particular flow event (e.g., a floodplain may be inundated for a specific number of days by a ten-year flood), or it can be a defined as a composite expressed over a specified time period (e.g., the number of days in a year when flow exceeds some value).

• The *timing*, or *predictability*, of flows of defined magnitude refers to the regularity with which they occur. This regularity can be defined formally or informally and with reference to different time scales (Poff 1996). For example, annual peak flows may occur with low seasonal predictability (Figure 2b) or with high seasonal predictability (Figure 2c).

• The *rate of change*, or *flashiness*, refers to how quickly flow changes from one magnitude to another. At the extremes, "flashy" streams have rapid rates of change (Figure 2b), whereas "stable" streams have slow rates of change (Figure 2a).

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Figure 2. Flow histories based on long-term, daily mean discharge records. These histories show within- and among-year variation for (**a**) Augusta Creek, MI, (**b**) Satilla River, GA, (**c**) upper Colorado River, CO, and (**d**) South Fork of the McKenzie River, OR. Each water year begins on October 1 and ends on September 30. Adapted from Poff and Ward 1990.

Hydrologic processes and the flow regime. All river flow derives ultimately from precipitation, but in any given time and place a river's flow is derived from some combination of surface water, soil water, and groundwater. Climate, geology, topography, soils, and vegetation help to determine both the supply of water and the pathways by which precipitation reaches the channel. The water movement pathways depicted in Figure 3a illustrate why rivers in different settings have different flow regimes and why flow is variable in virtually all rivers. Collectively, overland and shallow subsurface flow pathways create hydrograph peaks, which are the river's response to storm events. By contrast, deeper groundwater pathways are responsible for baseflow, the form of delivery during periods of little rainfall.

Variability in intensity, timing, and duration of precipitation (as rain or as snow) and in the effects of terrain, soil texture, and plant evapotranspiration on the hydrologic cycle combine to create local and regional flow patterns. For example, high flows due to rainstorms may occur over periods of hours (for permeable soils) or even minutes (for impermeable soils), whereas snow will melt over a period of days or weeks, which slowly builds the peak snowmelt flood. As one proceeds downstream within a watershed, river flow reflects the sum of flow generation and routing processes operating in multiple small tributary watersheds. The travel time of flow down the river system, combined with nonsynchronous tributary inputs and larger downstream channel and floodplain storage capacities, act to attenuate and to dampen flow peaks. Consequently, annual hydrographs in large streams typically show peaks created by widespread storms or snowmelt events and broad seasonal influences that affect many tributaries together (Dunne and Leopold 1978).

The natural flow regime organizes and defines river ecosystems. In rivers, the physical structure of the environment and, thus, of the habitat, is defined largely by physical processes, especially the movement of water and sediment within the channel and between the channel and floodplain. To understand the biodiversity, production, and sustainability of river ecosystems, it is necessary to appreciate the central organizing role played by a dynamically varying physical environment.

The physical habitat of a river includes sediment size and heterogeneity, channel and floodplain morphology, and other geomorphic features. These features form as the available sediment, woody debris, and other transportable materials are moved and deposited by flow. Thus, habitat conditions associated with channels and floodplains vary among

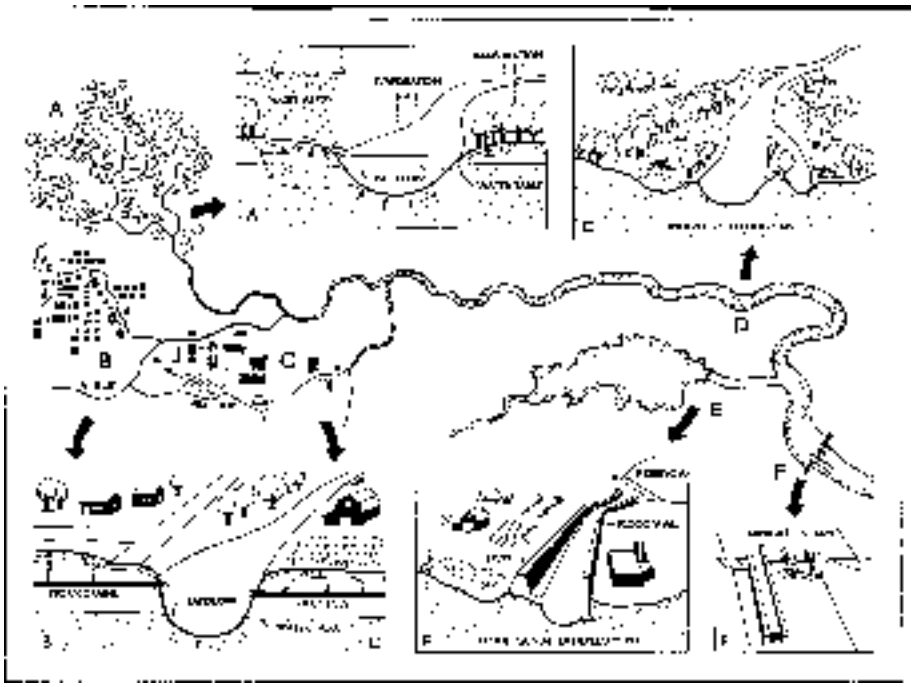

Figure 3. Stream valley cross-sections at various locations in a watershed illustrate basic principles about natural pathways of water moving downhill and human influences on hydrology. Runoff, which occurs when precipitation exceeds losses due to evaporation and plant transpiration, can be divided into four components (**a**): overland flow (1) occurs when precipitation exceeds the infiltration capacity of the soil; shallow subsurface stormflow (2) represents water that infiltrates the soil but is routed relatively quickly to the stream channel; saturated overland flow (3) occurs where the water table is close to the surface, such as adjacent to the stream channel, upstream of first-order tributaries, and in soils saturated by prior precipitation; and groundwater flow (4) represents relatively deep and slow pathways of water movement and provides water to the stream channel even during periods of little or no precipitation. Collectively, overland and shallow subsurface flow pathways create the peaks in the hydrograph that are a river's response to storm events, whereas deeper groundwater pathways are responsible for baseflow. Urbanized (**b**) and agricultural (**c**) land uses increase surface flow by increasing the extent of impermeable surfaces, reducing vegetation cover, and installing drainage systems. Relative to the unaltered state, channels often are scoured to greater depth by unnaturally high flood crests and water tables are lowered, causing baseflow to drop. Side-channels, wetlands, and episodically flooded lowlands comprise the diverse floodplain habitats of unmodified river ecosystems (**d**). Levees or flood walls (**e**) constructed along the banks retain flood waters in the main channel and lead to a loss of floodplain habitat diversity and function. Dams impede the downstream movement of water and can greatly modify a river's flow regime, depending on whether they are operated for storage (**e**) or as "run-of-river," such as for navigation (**f**).

rivers in accordance with both flow characteristics and the type and the availability of transportable materials.

Within a river, different habitat features are created and maintained by a wide range of flows. For example, many channel and floodplain features, such as river bars and riffle–pool sequences, are formed and maintained by dominant, or bankfull, discharges. These discharges are flows that can move significant quantities of bed or bank sediment and that occur frequently enough (e.g., every several years) to continually modify the channel (Wolman and Miller 1960). In many streams and rivers with a small range of flood flows, bankfull flow can build and maintain the active floodplain through stream migration (Leopold et al. 1964). However, the concept of a dominant discharge may not be applicable in all flow regimes (Wolman and Gerson 1978). Furthermore, in some flow regimes, the flows that build the channel may differ from those that build the floodplain. For example, in rivers with a wide range of flood flows, floodplains may exhibit major bar deposits, such as berms of boulders along the channel, or other features that are left by infrequent high-magnitude floods (e.g., Miller 1990).

Over periods of years to decades, a single river can consistently provide ephemeral, seasonal, and persistent types of habitat that range from free-flowing, to standing, to no water. This predictable diversity of in-channel and floodplain habitat types has promoted the evolution of species that exploit the habitat mosaic created and maintained by hydrologic variability. For many riverine species, completion of the life cycle requires an array of different habitat types, whose availability over time is regulated by the flow regime (e.g., Greenberg et al. 1996, Reeves et al. 1996, Sparks 1995). Indeed, adaptation to this environmental dynamism allows aquatic and floodplain species to persist in the face of seemingly harsh conditions, such as floods and droughts, that regularly destroy and re-create habitat elements.

From an evolutionary perspective, the pattern of spatial and temporal habitat dynamics influences the relative success of a species in a particular environmental setting. This habitat template (Southwood 1977), which is dictated largely by flow regime, creates both subtle and profound differences in the natural histories of species in different segments of their ranges. It also influences species distribution and abundance, as well as ecosystem function (Poff and Allan 1995, Schlosser 1990, Sparks 1992, Stanford et al. 1996). Human alteration of flow regime changes the established pattern of natural hydrologic variation and disturbance, thereby altering habitat dynamics and creating new conditions to which the native biota may be poorly adapted.

Human alteration of flow regimes

Human modification of natural hydrologic processes disrupts the dynamic equilibrium between the movement of water and the movement of sediment that exists in free-flowing rivers (Dunne and Leopold 1978). This disruption alters both gross- and fine-scale geomorphic features that constitute habitat for aquatic and riparian species (Table 1). After

Table 1. Physical responses to altered flow regimes.

Source(s) of alteration	Hydrologic change(s)	Geomorphic response(s)	Reference(s)
Dam	Capture sediment moving downstream	Downstream channel erosion and tributary headcutting	Chien 1985, Petts 1984, 1985, Williams and Wolman 1984
		Bed armoring (coarsening)	Chien 1985
Dam, diversion	Reduce magnitude and frequency of high flows	Deposition of fines in gravel	Sear 1995, Stevens et al. 1995
		Channel stabilization and narrowing	Johnson 1994, Williams and Wolman 1984
		Reduced formation of point bars, secondary channels, oxbows, and changes in channel planform	Chien 1985, Copp 1989, Fenner et al. 1985
Urbanization, tiling, drainage	Increase magnitude and frequency of high flows	Bank erosion and channel widening	Hammer 1972
		Downward incision and floodplain disconnection	Prestegaard 1988
	Reduced infiltration into soil	Reduced baseflows	Leopold 1968
Levees and channelization	Reduce overbank flows	Channel restriction causing downcutting	Daniels 1960, Prestegaard et al. 1994
		Floodplain deposition and erosion prevented	Sparks 1992
		Reduced channel migration and formation of secondary channels	Shankman and Drake 1990
Groundwater pumping	Lowered water table levels	Streambank erosion and channel downcutting after loss of vegetation stability	Kondolf and Curry 1986

such a disruption, it may take centuries for a new dynamic equilibrium to be attained by channel and floodplain adjustments to the new flow regime (Petts 1985); in some cases, a new equilibrium is never attained, and the channel remains in a state of continuous recovery from the most recent flood event (Wolman and Gerson 1978). These channel and floodplain adjustments are sometimes overlooked because they can be confounded with long-term responses of the channel to changing climates (e.g., Knox 1972). Recognition of human-caused physical changes and associated biological consequences may require many years, and physical restoration of the river ecosystem may call for dramatic action (see box on the Grand Canyon flood, page 774).

Dams, which are the most obvious direct modifiers of river flow, capture both low and high flows for flood control, electrical power generation, irrigation and municipal water needs, maintenance of recreational reservoir levels, and navigation. More than 85% of the inland waterways within the continental United States are now artificially controlled (NRC 1992), including nearly 1 million km of rivers that are affected by dams (Echeverria et al. 1989). Dams capture all but the finest sediments moving down a river, with many severe downstream consequences. For example, sediment-depleted water released from dams can erode finer sediments from the receiving channel. The coarsening of the streambed can, in turn, reduce habitat availability for the many aquatic species living in or using interstitial spaces. In addition, channels may erode, or downcut, triggering rejuvenation of tributaries, which themselves begin eroding and migrating headward (Chien 1985, Petts 1984). Fine sediments that are contributed by tributaries downstream of a dam may be deposited between the coarse particles of the streambed (e.g., Sear 1995). In the absence of high flushing flows, species with life stages that are sensitive to sedimentation, such as the eggs and larvae of many invertebrates and fish, can suffer high mortality rates.

For many rivers, it is land-use activities, including timber harvest, livestock grazing, agriculture, and urbanization, rather than dams, that are the primary causes of altered flow regimes. For example, logging and the associated building of roads have contributed greatly to degradation of salmon streams in the Pacific Northwest, mainly through effects on runoff and sediment delivery (NRC 1996). Converting forest or prairie lands to agricultural lands generally decreases soil infiltration and results in increased overland flow, channel incision, floodplain isolation, and headward erosion of stream channels (Prestegaard 1988). Many agricultural areas were drained by the construction of ditches or tile-and-drain systems, with the result that many channels have become entrenched (Brookes 1988).

These land-use practices, combined with extensive draining of wetlands or overgrazing, reduce retention of water in watersheds and,

A controlled flood in the Grand Canyon

Since the Glen Canyon dam first began to store water in 1963, creating Lake Powell, some 430 km (270 miles) of the Colorado River, including Grand Canyon National Park, have been virtually bereft of seasonal floods. Before 1963, melting snow in the upper basin produced an average peak discharge exceeding 2400 m^3/s; after the dam was constructed, releases were generally maintained at less than 500 m^3/s. The building of the dam also trapped more than 95% of the sediment moving down the Colorado River in Lake Powell (Collier et al. 1996).

This dramatic change in flow regime produced drastic alterations in the dynamic nature of the historically sediment-laden Colorado River. The annual cycle of scour and fill had maintained large sandbars along the river banks, prevented encroachment of vegetation onto these bars, and limited bouldery debris deposits from constricting the river at the mouths of tributaries (Collier et al. 1997). When flows were reduced, the limited amount of sand accumulated in the channel rather than in bars farther up the river banks, and shallow low-velocity habitat in eddies used by juvenile fishes declined. Flow regulation allowed for increased cover of wetland and riparian vegetation, which expanded into sites that were regularly scoured by floods in the constrained fluvial canyon of the Colorado River; however, much of the woody vegetation that established after the dam's construction is composed of an exotic tree, salt cedar (*Tamarix* sp.; Stevens et al. 1995). Restoration of flood flows clearly would help to steer the aquatic and riparian ecosystem toward its former state and decrease the area of wetland and riparian vegetation, but precisely how the system would respond to an artificial flood could not be predicted.

In an example of adaptive management (i.e., a planned experiment to guide further actions), a controlled, seven-day flood of 1274 m^3/s was released through the Glen Canyon dam in late March 1996. This flow, roughly 35% of the pre-dam average for a spring flood (and far less than some large historical floods), was the maximum flow that could pass through the power plant turbines plus four steel drainpipes, and it cost approximately $2 million in lost hydropower revenues (Collier et al. 1997). The immediate result was significant beach building: Over 53% of the beaches increased in size, and just 10% decreased in size. Full documentation of the effects will continue to be monitored by measuring channel cross-sections and studying riparian vegetation and fish populations.

instead, route it quickly downstream, increasing the size and frequency of floods and reducing baseflow levels during dry periods (Figure 3b; Leopold 1968). Over time, these practices degrade in-channel habitat for aquatic species. They may also isolate the floodplain from overbank flows, thereby degrading habitat for riparian species. Similarly, urbanization and suburbanization associated with human population expansion across the landscape create impermeable surfaces that direct water away from subsurface pathways to overland flow (and often into storm drains). Consequently, floods increase in frequency and intensity (Beven 1986), banks erode, and channels widen (Hammer 1972), and baseflow declines during dry periods (Figure 3c).

Whereas dams and diversions affect rivers of virtually all sizes, and land-use impacts are particularly evident in headwaters, lowland rivers are greatly influenced by efforts to sever channel–floodplain linkages. Flood control projects have shortened, narrowed, straightened, and leveed many river systems and cut the main channels off from their floodplains (NRC 1992). For example, channelization of the Kissimmee River above Lake Okeechobee, Florida, by the US Army Corps of Engineers transformed a historical 166 km meandering river with a 1.5 to 3 km wide floodplain into a 90 km long canal flowing through a series of five impoundments, resulting in great loss of river channel habitat and adjacent floodplain wetlands (Toth 1995). Because levees are designed to prevent increases in the width of flow, rivers respond by cutting deeper channels, reaching higher velocities, or both.

Channelization and wetland drainage can actually increase the magnitude of extreme floods, because reduction in upstream storage capacity results in accelerated water delivery downstream. Much of the damage caused by the extensive flooding along the Mississippi River in 1993 resulted from levee failure as the river reestablished historic connections to the floodplain. Thus, although elaborate storage dam and levee systems can "reclaim" the floodplain for agriculture and human settlement in most years, the occasional but inevitable large floods will impose increasingly high disaster costs to society (Faber 1996). The severing of floodplains from rivers also stops the processes of sediment erosion and deposition that regulate the topographic diversity of floodplains. This diversity is essential for maintaining species diversity on floodplains, where relatively small differences in land elevation result in large differences in annual inundation and soil moisture regimes, which regulate plant distribution and abundance (Sparks 1992).

Ecological functions of the natural flow regime

Naturally variable flows create and maintain the dynamics of in-channel and floodplain conditions and habitats that are essential to aquatic and riparian species, as shown schematically in Figure 4. For purposes of illustration, we treat the components of a flow regime individually, although in reality they interact in complex ways to regulate geomorphic and ecological processes. In describing the ecological functions associated with the components of a flow regime, we pay particular attention to high- and low-flow events, because they often serve as ecological "bottlenecks" that present critical stresses and opportunities for a wide array of riverine species (Poff and Ward 1989).

The magnitude and frequency of high and low flows regulate numerous ecological processes. Frequent, moderately high flows effectively transport sediment through the channel (Leopold et al. 1964). This sediment movement, combined with the force of moving water, exports organic resources, such as detritus and attached algae, rejuvenating the biological community and allowing many species with fast life cycles and good colonizing ability to reestablish (Fisher 1983). Consequently, the composition and relative abundance of species that are present in a stream or river often reflect the frequency and intensity of high flows (Meffe and Minckley 1987, Schlosser 1985).

High flows provide further ecological benefits by maintaining ecosystem productivity and diversity. For example, high flows remove and transport fine sediments that would otherwise fill the interstitial spaces in productive gravel habitats (Beschta and Jackson 1979). Floods import woody debris into the channel (Keller and Swanson 1979), where it creates new, high-quality habitat (Figure 4; Moore and Gregory 1988, Wallace and Benke 1984). By connecting the channel to the floodplain, high overbank flows also maintain broader productivity and diversity. Floodplain wetlands provide important nursery grounds for fish and export organic matter and organisms back into the main channel (Junk et al. 1989, Sparks 1995, Welcomme 1992). The scouring of floodplain soils rejuvenates habitat for plant species that germinate only on barren, wetted surfaces that are free of competition (Scott et al. 1996) or that require access to shallow water tables (Stromberg et al. 1997). Flood-resistant, disturbance-adapted riparian communities are maintained by flooding along river corridors, even in river sections that have steep banks and lack floodplains (Hupp and Osterkamp 1985).

Flows of low magnitude also provide ecological benefits. Periods of low flow may present recruitment opportunities for riparian plant species in regions where floodplains are frequently inundated (Wharton et al. 1981). Streams that dry temporarily, generally in arid regions, have aquatic (Williams and Hynes 1977) and riparian (Nilsen et al. 1984) species with special behavioral or physiological adaptations that suit them to these harsh conditions.

Figure 4. Geomorphic and ecological functions provided by different levels of flow. Water tables that sustain riparian vegetation and that delineate in-channel baseflow habitat are maintained by groundwater inflow and flood recharge (A). Floods of varying size and timing are needed to maintain a diversity of riparian plant species and aquatic habitat. Small floods occur frequently and transport fine sediments, maintaining high benthic productivity and creating spawning habitat for fishes (B). Intermediate-size floods inundate low-lying floodplains and deposit entrained sediment, allowing for the establishment of pioneer species (C). These floods also import accumulated organic material into the channel and help to maintain the characteristic form of the active stream channel. Larger floods that recur on the order of decades inundate the aggraded floodplain terraces, where later successional species establish (D). Rare, large floods can uproot mature riparian trees and deposit them in the channel, creating high-quality habitat for many aquatic species (E).

The duration of a specific flow condition often determines its ecological significance. For example, differences in tolerance to prolonged flooding in riparian plants (Chapman et al. 1982) and to prolonged low flow in aquatic invertebrates (Williams and Hynes 1977) and fishes (Closs and Lake 1996) allow these species to persist in locations from which they might otherwise be displaced by dominant, but less tolerant, species.

The timing, or predictability, of flow events is critical ecologically because the life cycles of many aquatic and riparian species are timed to either avoid or exploit flows of variable magnitudes. For example, the natural timing of high or low streamflows provides environmental cues for initiating life cycle transitions in fish, such as spawning (Montgomery et al. 1983, Nesler et al. 1988), egg hatching (Næsje et al. 1995), rearing (Seegrist and Gard 1978), movement onto the floodplain for feeding or reproduction (Junk et al. 1989, Sparks 1995, Welcomme 1992), or migration upstream or downstream (Trépanier et al. 1996). Natural seasonal variation in flow conditions can prevent the successful establishment of nonnative species with flow-dependent spawning and egg incubation requirements, such as striped bass (*Morone saxatilis*; Turner and Chadwick 1972) and brown trout (*Salmo trutta*; Moyle and Light 1996, Strange et al. 1992).

Seasonal access to floodplain wetlands is essential for the survival of certain river fishes, and such access can directly link high wetland productivity with fish production in the stream channel (Copp 1989, Welcomme 1979). Studies of the effects on stream fishes of both extensive and limited floodplain inundation (Finger and Stewart 1987, Ross and Baker 1983) indicate that some fishes are adapted to exploiting floodplain habitats, and these species decline in abundance when floodplain use is restricted. Models indicate that catch rates and biomass of fish are influenced by both maximum and minimum wetland area (Power et al. 1995, Welcomme and Hagborg 1977), and empirical work shows that the area of floodplain water bodies during nonflood periods influences the species richness of those wetland habitats (Halyk and Balon 1983). The timing of floodplain inundation is important for some fish because migratory and reproductive behaviors must coincide with access to and avail-

Table 2. Ecological responses to alterations in components of natural flow regime.[a]

Flow component	Specific alteration	Ecological response	Reference(s)
Magnitude and frequency	Increased variation	Wash-out and/or stranding	Cushman 1985, Petts 1984
		Loss of sensitive species	Gehrke et al. 1995, Kingsolving and Bain 1993, Travnichek et al. 1995
		Increased algal scour and wash-out of organic matter	Petts 1984
		Life cycle disruption	Scheidegger and Bain 1995
		Altered energy flow	Valentin et al. 1995
	Flow stabilization	Invasion or establishment of exotic species, leading to:	
		Local extinction	Kupferberg 1996, Meffe 1984
		Threat to native commercial species	Stanford et al. 1996
		Altered communities	Busch and Smith 1995, Moyle 1986, Ward and Stanford 1979
		Reduced water and nutrients to floodplain plant species, causing:	
		Seedling desiccation	Duncan 1993
		Ineffective seed dispersal	Nilsson 1982
		Loss of scoured habitat patches and secondary channels needed for plant establishment	Fenner et al. 1985, Rood et al. 1995, Scott et al. 1997, Shankman and Drake 1990
		Encroachment of vegetation into channels	Johnson 1994, Nilsson 1982
Timing	Loss of seasonal flow peaks	Disrupt cues for fish:	
		Spawning	Fausch and Bestgen 1997, Montgomery et al. 1993, Nesler et al. 1988
		Egg hatching	Næsje et al. 1995
		Migration	Williams 1996
		Loss of fish access to wetlands or backwaters	Junk et al. 1989, Sparks 1995
		Modification of aquatic food web structure	Power 1992, Wootton et al. 1996
		Reduction or elimination of riparian plant recruitment	Fenner et al. 1985
		Invasion of exotic riparian species	Horton 1977
		Reduced plant growth rates	Reily and Johnson 1982
Duration	Prolonged low flows	Concentration of aquatic organisms	Cushman 1985, Petts 1984
		Reduction or elimination of plant cover	Taylor 1982
		Diminished plant species diversity	Taylor 1982
		Desertification of riparian species composition	Busch and Smith 1995, Stromberg et al. 1996
		Physiological stress leading to reduced plant growth rate, morphological change, or mortality	Kondolf and Curry 1986, Perkins et al. 1984, Reily and Johnson 1982, Rood et al. 1995, Stromberg et al. 1992
	Prolonged baseflow "spikes"	Downstream loss of floating eggs	Robertson 1997
	Altered inundation duration	Altered plant cover types	Auble et al. 1994
	Prolonged inundation	Change in vegetation functional type	Bren 1992, Connor et al. 1981
		Tree mortality	Harms et al. 1980
		Loss of riffle habitat for aquatic species	Bogan 1993
Rate of change	Rapid changes in river stage	Wash-out and stranding of aquatic species	Cushman 1985, Petts 1984
	Accelerated flood recession	Failure of seedling establishment	Rood et al. 1995

[a]Only representative studies are listed here. Additional references are located on the Web at http://lamar.colostate.edu/~poff/natflow.html.

ability of floodplain habitats (Welcomme 1979). The match of reproductive period and wetland access also explains some of the yearly variation in stream fish community composition (Finger and Stewart 1987).

Many riparian plants also have life cycles that are adapted to the seasonal timing components of natural flow regimes through their "emergence phenologies"—the seasonal sequence of flowering, seed dispersal, germination, and seedling growth. The interaction of emergence phenologies with temporally varying environmental stress from flooding or drought helps to maintain high species diversity in, for example, southern floodplain forests (Streng et al. 1989). Productivity of riparian forests is also influenced by flow timing and can increase when short-duration flooding occurs in the growing season (Mitsch and Rust 1984, Molles et al. 1995).

The rate of change, or flashiness, in flow conditions can influence spe-

cies persistence and coexistence. In many streams and rivers, particularly in arid areas, flow can change dramatically over a period of hours due to heavy storms. Non-native fishes generally lack the behavioral adaptations to avoid being displaced downstream by sudden floods (Minckley and Deacon 1991). In a dramatic example of how floods can benefit native species, Meffe (1984) documented that a native fish, the Gila topminnow (*Poeciliopsis occidentalis*), was locally extirpated by the introduced predatory mosquitofish (*Gambusia affinis*) in locations where natural flash floods were regulated by upstream dams, but the native species persisted in naturally flashy streams.

Rapid flow increases in streams of the central and southwestern United States often serve as spawning cues for native minnow species, whose rapidly developing eggs are either broadcast into the water column or attached to submerged structures as floodwaters recede (Fausch and Bestgen 1997, Robertson in press). More gradual, seasonal rates of change in flow conditions also regulate the persistence of many aquatic and riparian species. Cottonwoods (*Populus* spp.), for example, are disturbance species that establish after winter–spring flood flows, during a narrow "window of opportunity" when competition-free alluvial substrates and wet soils are available for germination. A certain rate of floodwater recession is critical to seedling germination because seedling roots must remain connected to a receding water table as they grow downward (Rood and Mahoney 1990).

Ecological responses to altered flow regimes

Modification of the natural flow regime dramatically affects both aquatic and riparian species in streams and rivers worldwide. Ecological responses to altered flow regimes in a specific stream or river depend on how the components of flow have changed relative to the natural flow regime for that particular stream or river (Poff and Ward 1990) and how specific geomorphic and ecological processes will respond to this relative change. As a result of variation in flow regime within and among rivers (Figure 2), the same human activity in different locations may cause different degrees of change relative to unaltered conditions and, therefore, have different ecological consequences.

Flow alteration commonly changes the magnitude and frequency of high and low flows, often reducing variability but sometimes enhancing the range. For example, the extreme daily variations below peaking power hydroelectric dams have no natural analogue in freshwater systems and represent, in an evolutionary sense, an extremely harsh environment of frequent, unpredictable flow disturbance. Many aquatic populations living in these environments suffer high mortality from physiological stress, from wash-out during high flows, and from stranding during rapid dewatering (Cushman 1985, Petts 1984). Especially in shallow shoreline habitats, frequent atmospheric exposure for even brief periods can result in massive mortality of bottom-dwelling organisms and subsequent severe reductions in biological productivity (Weisberg et al. 1990). Moreover, the rearing and refuge functions of shallow shoreline or backwater areas, where many small fish species and the young of large species are found (Greenberg et al. 1996, Moore and Gregory 1988), are severely impaired by frequent flow fluctuations (Bain et al. 1988, Stanford 1994). In these artificially fluctuating environments, specialized stream or river species are typically replaced by generalist species that tolerate frequent and large variations in flow. Furthermore, life cycles of many species are often disrupted and energy flow through the ecosystem is greatly modified (Table 2). Short-term flow modifications clearly lead to a reduction in both the natural diversity and abundance of many native fish and invertebrates.

At the opposite hydrologic extreme, flow stabilization below certain types of dams, such as water supply reservoirs, results in artificially constant environments that lack natural extremes. Although production of a few species may increase greatly, it is usually at the expense of other native species and of systemwide species diversity (Ward and Stanford 1979). Many lake fish species have successfully invaded (or been intentionally established in) flow-stabilized river environments (Moyle 1986, Moyle and Light 1996). Often top predators, these introduced fish can devastate native river fish and threaten commercially valuable stocks (Stanford et al. 1996). In the southwestern United States, virtually the entire native river fish fauna is listed as threatened under the Endangered Species Act, largely as a consequence of water withdrawal, flow stabilization, and exotic species proliferation. The last remaining strongholds of native river fishes are all in dynamic, free-flowing rivers, where exotic fishes are periodically reduced by natural flash floods (Minckley and Deacon 1991, Minckley and Meffe 1987).

Flow stabilization also reduces the magnitude and frequency of overbank flows, affecting riparian plant species and communities. In rivers with constrained canyon reaches or multiple shallow channels, loss of high flows results in increased cover of plant species that would otherwise be removed by flood scour (Ligon et al. 1995, Williams and Wolman 1984). Moreover, due to other related effects of flow regulation, including increased water salinity, non-native vegetation often dominates, such as the salt cedar (*Tamarix* sp.) in the semiarid western United States (Busch and Smith 1995). In alluvial valleys, the loss of overbank flows can greatly modify riparian communities by causing plant desiccation, reduced growth, competitive exclusion, ineffective seed dispersal, or failure of seedling establishment (Table 2).

The elimination of flooding may also affect animal species that depend on terrestrial habitats. For example, in the flow-stabilized Platte River of the United States Great Plains, the channel has narrowed dramatically (up to 85%) over a period of decades (Johnson 1994). This narrowing has been facilitated by vegetative colonization of sandbars that formerly provided nesting habitat for the threatened piping plover (*Charadius melodius*) and endangered least tern (*Sterna antillarum*; Sidle et al. 1992). Sand-

hill cranes (*Grus canadensis*), which made the Platte River famous, have abandoned river segments that have narrowed the most (Krapu et al. 1984).

Changes in the duration of flow conditions also have significant biological consequences. Riparian plant species respond dramatically to channel dewatering, which occurs frequently in arid regions due to surface water diversion and groundwater pumping. These biological and ecological responses range from altered leaf morphology to total loss of riparian vegetation cover (Table 2). Changes in duration of inundation, independent of changes in annual volume of flow, can alter the abundance of plant cover types (Auble et al. 1994). For example, increased duration of inundation has contributed to the conversion of grassland to forest along a regulated Australian river (Bren 1992). For aquatic species, prolonged flows of particular levels can also be damaging. In the regulated Pecos River of New Mexico, artificially prolonged high summer flows for irrigation displace the floating eggs of the threatened Pecos bluntnose shiner (*Notropis sinius pecosensis*) into unfavorable habitat, where none survive (Robertson in press).

Modification of natural flow timing, or predictability, can affect aquatic organisms both directly and indirectly. For example, some native fishes in Norway use seasonal flow peaks as a cue for egg hatching, and river regulation that eliminates these peaks can directly reduce local population sizes of these species (Næsje et al. 1995). Furthermore, entire food webs, not just single species, may be modified by altered flow timing. In regulated rivers of northern California, the seasonal shifting of scouring flows from winter to summer indirectly reduces the growth rate of juvenile steelhead trout (*Oncorhyncus mykiss*) by increasing the relative abundance of predator-resistant invertebrates that divert energy away from the food chain leading to trout (Wootton et al. 1996). In unregulated rivers, high winter flows reduce these predator-resistant insects and favor species that are more palatable to fish.

Riparian plant species are also strongly affected by altered flow timing (Table 2). A shift in timing of peak flows from spring to summer, as often occurs when reservoirs are managed to supply irrigation water, has prevented reestablishment of the Fremont cottonwood (*Populus fremontii*), the dominant plant species in Arizona, because flow peaks now occur after, rather than before, its germination period (Fenner et al. 1985). Non-native plant species with less specific germination requirements may benefit from changes in flood timing. For example, salt cedar's (*Tamarix* sp.) long seed dispersal period allows it to establish after floods occurring any time during the growing season, contributing to its abundance on floodplains of the western United States (Horton 1977).

Altering the rate of change in flow can negatively affect both aquatic and riparian species. As mentioned above, loss of natural flashiness threatens most of the native fish fauna of the American Southwest (Minckley and Deacon 1991), and artificially increased rates of change caused by peaking power hydroelectric dams on historically less flashy rivers creates numerous ecological problems (Table 2; Petts 1984). A modified rate of change can devastate riparian species, such as cottonwoods, whose successful seedling growth depends on the rate of groundwater recession following floodplain inundation. In the St. Mary River in Alberta, Canada, for example, rapid drawdowns of river stage during spring have prevented the recruitment of young trees (Rood and Mahoney 1990). Such effects can be reversed, however. Restoration of the spring flood and its natural, slow recession in the Truckee River in California has allowed the successful establishment of a new generation of cotton-

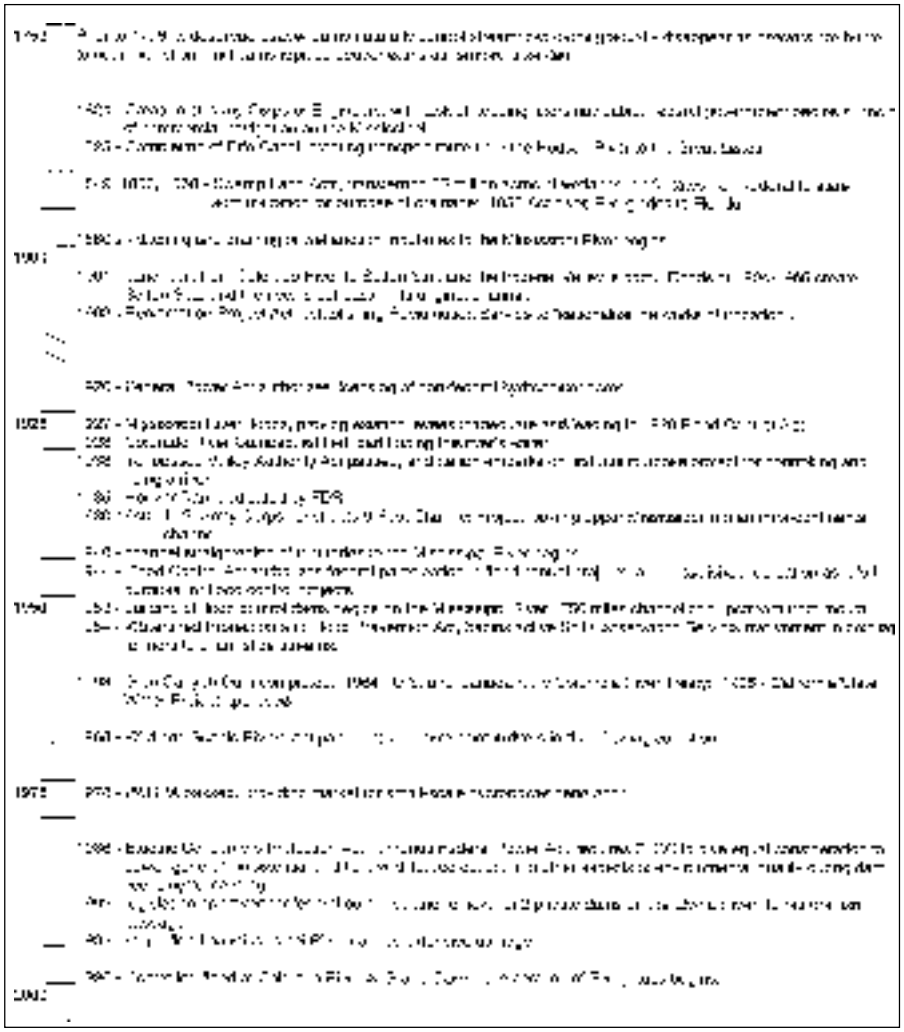

Figure 5. A brief history of flow alteration in the United States.

Table 3. Recent projects in which restoration of some component(s) of natural flow regimes has occurred or been proposed for specific ecological benefits.

Location	Flow component(s)	Ecological purpose(s)	Reference
Trinity River, CA	Mimic timing and magnitude of peak flow	Rejuvenate in-channel gravel habitats; restore early riparian succession; provide migration flows for juvenile salmon	Barinaga 1996[a]
Truckee River, CA	Mimic timing, magnitude, and duration of peak flow, and its rate of change during recession	Restore riparian trees, especially cottonwoods	Klotz and Swanson 1997
Owens River, CA	Increase base flows; partially restore overbank flows	Restore riparian vegetation and habitat for native fishes and non-native brown trout	Hill and Platts in press
Rush Creek, CA (and other tributaries to Mono Lake)	Increase minimum flows	Restore riparian vegetation and habitat for waterfowl and non-native fishes	LADWP 1995
Oldman River and tributaries, southern Alberta, Canada	Increase summer flows; reduce rates of postflood stage decline; mimic natural flows in wet years	Restore riparian vegetation (cottonwoods) and cold-water (trout) fisheries	Rood et al. 1995
Green River, UT	Mimic timing and duration of peak flow and duration and timing of nonpeak flows; reduce rapid baseflow fluctuations from hydropower generation	Recovery of endangered fish species; enhance other native fishes	Stanford 1994
San Juan River, UT/NM	Mimic magnitude, timing, and duration of peak flow; restore low winter baseflows	Recovery of endangered fish species	—[b]
Gunnison River, CO	Mimic magnitude, timing, and duration of peak flow; mimic duration and timing of nonpeak flows	Recovery of endangered fish species	—[b]
Rio Grande River, NM	Mimic timing and duration of floodplain inundation	Ecosystem processes (e.g., nitrogen flux, microbial activity, litter decomposition)	Molles et al. 1995
Pecos River, NM	Regulate duration and magnitude of summer irrigation releases to mimic spawning flow "spikes"; maintain minimum flows	Determine spawning and habitat needs for threatened fish species	Robertson 1997
Colorado River, AZ	Mimic magnitude and timing	Restore habitat for endangered fish species and scour riparian zone	Collier et al. 1997
Bill Williams River, AZ (proposed)	Mimic natural flood peak timing and duration	Promote establishment of native trees	USCOE 1996
Pemigewasset River, NH	Reduce frequency (i.e., to no more than natural frequency) of high flows during summer low-flow season; reduce rate of change between low and high flows during hydropower cycles	Enhance native Atlantic salmon recovery	FERC 1995
Roanoke River, VA	Restore more natural patterning of monthly flows in spring; reduce rate of change between low and high flows during hydropower cycles	Increased reproduction of striped bass	Rulifson and Manooch 1993
Kissimmee River, FL	Mimic magnitude, duration, rate of change, and timing of high- and low-flow periods	Restore floodplain inundation to recover wetland functions; reestablish in-channel habitats for fish and other aquatic species	Toth 1995

[a]J. Polos, 1997, personal communication. US Fish & Wildlife Service, Arcata, CA.
[b]F. Pfeifer, 1997, personal communication. US Fish & Wildlife Service, Grand Junction, CO.

wood trees (Klotz and Swanson 1997).

Recent approaches to streamflow management

Methods to estimate environmental flow requirements for rivers focus primarily on one or a few species that live in the wetted river channel. Most of these methods have the narrow intent of establishing minimum allowable flows. The simplest make use of easily analyzed flow data, of assumptions about the regional similarity of rivers, and of professional opinions of the minimal flow needs for certain fish species (e.g., Larson 1981).

A more sophisticated assessment of how changes in river flow affect aquatic habitat is provided by the Instream Flow Incremental Methodology (IFIM; Bovee and Milhous

1978). IFIM combines two models, a biological one that describes the physical habitat preferences of fishes (and occasionally macroinvertebrates) in terms of depth, velocity, and substrate, and a hydraulic one that estimates how the availability of habitat for fish varies with discharge. IFIM has been widely used as an organizational framework for formulating and evaluating alternative water management options related to production of one or a few fish species (Stalnaker et al. 1995).

As a predictive tool for ecological management, the IFIM modeling approach has been criticized both in terms of the statistical validity of its physical habitat characterizations (Williams 1996) and the limited realism of its biological assumptions (Castleberry et al. 1996). Field tests of its predictions have yielded mixed results (Morehardt 1986). Although this approach continues to evolve, both by adding biological realism (Van Winkle et al. 1993) and by expanding the range of habitats modeled (Stalnaker et al. 1995), in practice it is often used only to establish minimum flows for "important" (i.e., game or imperiled) fish species. But current understanding of river ecology clearly indicates that fish and other aquatic organisms require habitat features that cannot be maintained by minimum flows alone (see Stalnaker 1990). A range of flows is necessary to scour and revitalize gravel beds, to import wood and organic matter from the floodplain, and to provide access to productive riparian wetlands (Figure 4). Interannual variation in these flow peaks is also critical for maintaining channel and riparian dynamics. For example, imposition of only a fixed high-flow level each year would simply result in the equilibration of in-channel and floodplain habitats to these constant peak flows.

Moreover, a focus on one or a few species and on minimum flows fails to recognize that what is "good" for the ecosystem may not consistently benefit individual species, and that what is good for individual species may not be of benefit to the ecosystem. Long-term studies of naturally variable systems show that some species do best in wet years, that other species do best in dry years, and that overall biological diversity and ecosystem function benefit from these variations in species success (Tilman et al. 1994). Indeed, experience in river restoration clearly shows the impossibility of simultaneously engineering optimal conditions for all species (Sparks 1992, 1995, Toth 1995). A holistic view that attempts to restore natural variability in ecological processes and species success (and that acknowledges the tremendous uncertainty that is inherent in attempting to mechanistically model all species in the ecosystem) is necessary for ecosystem management and restoration (Franklin 1993).

Managing toward a natural flow regime

The first step toward better incorporating flow regime into the management of river ecosystems is to recognize that extensive human alteration of river flow has resulted in widespread geomorphic and ecological changes in these ecosystems. The history of river use is also a history of flow alteration (Figure 5). The early establishment of the US Army Corps of Engineers is testimony to the importance that the nation gave to developing navigable water routes and to controlling recurrent large floods. However, growing understanding of the ecological impacts of flow alteration has led to a shift toward an appreciation of the merits of free-flowing rivers. For example, the Wild and Scenic Rivers Act of 1968 recognized that the flow of certain rivers should be protected as a national resource, and the recent blossoming of natural flow restoration projects (Table 3) may herald the beginning of efforts to undo some of the damage of past flow alterations. The next century holds promise as an era for renegotiating human relationships with rivers, in which lessons from past experience are used to direct wise and informed action in the future.

A large body of evidence has shown that the natural flow regime of virtually all rivers is inherently variable, and that this variability is critical to ecosystem function and native biodiversity. As we have already discussed, rivers with highly altered and regulated flows lose their ability to support natural processes and native species. Thus, to protect pristine or nearly pristine systems, it is necessary to preserve the natural hydrologic cycle by safeguarding against upstream river development and damaging land uses that modify runoff and sediment supply in the watershed.

Most rivers are highly modified, of course, and so the greatest challenges lie in managing and restoring rivers that are also used to satisfy human needs. Can reestablishing the natural flow regime serve as a useful management and restoration goal? We believe that it can, although to varying degrees, depending on the present extent of human intervention and flow alteration affecting a particular river. Recognizing the natural variability of river flow and explicitly incorporating the five components of the natural flow regime (i.e., magnitude, frequency, duration, timing, and rate of change) into a broader framework for ecosystem management would constitute a major advance over most present management, which focuses on minimum flows and on just a few species. Such recognition would also contribute to the developing science of stream restoration in heavily altered watersheds, where, all too often, physical channel features (e.g., bars and woody debris) are re-created without regard to restoring the flow regime that will help to maintain these re-created features.

Just as rivers have been incrementally modified, they can be incrementally restored, with resulting improvements to many physical and biological processes. A list of recent efforts to restore various components of a natural flow regime (that is, to "naturalize" river flow) demonstrates the scope for success (Table 3). Many of the projects summarized in Table 3 represent only partial steps toward full flow restoration, but they have had demonstrable ecological benefits. For example, high flood flows followed by mimicked natural rates of flow decline in the Oldman River of Alberta, Canada, resulted in a massive cottonwood recruitment that extended for more than 500 km downstream from the Oldman Dam. Dampening of the unnatural flow fluctuations caused by hydroelectric generation on the Roanoke River in

Virginia has increased juvenile abundances of native striped bass. Mimicking short-duration flow spikes that are historically caused by summer thunderstorms in the regulated Pecos River of New Mexico has benefited the reproductive success of the Pecos bluntnose shiner.

We also recognize that there are scientific limits to how precisely the natural flow regime for a particular river can be defined. It is possible to have only an approximate knowledge of the historic condition of a river, both because some human activities may have preceded the installation of flow gauges, and because climate conditions may have changed over the past century or more. Furthermore, in many rivers, year-to-year differences in the timing and quantity of flow result in substantial variability around any average flow condition. Accordingly, managing for the "average" condition can be misguided. For example, in human-altered rivers that are managed for incremental improvements, restoring a flow pattern that is simply proportional to the natural hydrograph in years with little runoff may provide few if any ecological benefits, because many geomorphic and ecological processes show nonlinear responses to flow. Clearly, half of the peak discharge will not move half of the sediment, half of a migration-motivational flow will not motivate half of the fish, and half of an overbank flow will not inundate half of the floodplain. In such rivers, more ecological benefits would accrue from capitalizing on the natural between-year variability in flow. For example, in years with above-average flow, "surplus" water could be used to exceed flow thresholds that drive critical geomorphic and ecological processes.

If full flow restoration is impossible, mimicking certain geomorphic processes may provide some ecological benefits. Well-timed irrigation could stimulate recruitment of valued riparian trees such as cottonwoods (Friedman et al. 1995). Strategically clearing vegetation from river banks could provide new sources of gravel for sediment-starved regulated rivers with reduced peak flows (e.g., Ligon et al. 1995). In all situations, managers will be required to make judgments about specific restoration goals and to work with appropriate components of the natural flow regime to achieve those goals. Recognition of the natural flow variability and careful identification of key processes that are linked to various components of the flow regime are critical to making these judgments.

Setting specific goals to restore a more natural regime in rivers with altered flows (or, equally important, to preserve unaltered flows in pristine rivers) should ideally be a cooperative process involving river scientists, resource managers, and appropriate stakeholders. The details of this process will vary depending on the specific objectives for the river in question, the degree to which its flow regime and other environmental variables (e.g., thermal regime, sediment supply) have been altered, and the social and economic constraints that are in play. Establishing specific criteria for flow restoration will be challenging because our understanding of the interactions of individual flow components with geomorphic and ecological processes is incomplete. However, quantitative, river-specific standards can, in principle, be developed based on the reconstruction of the natural flow regime (e.g., Richter et al. 1997). Restoration actions based on such guidelines should be viewed as experiments to be monitored and evaluated—that is, adaptive management—to provide critical new knowledge for creative management of natural ecosystem variability (Table 3).

To manage rivers from this new perspective, some policy changes are needed. The narrow regulatory focus on minimum flows and single species impedes enlightened river management and restoration, as do the often conflicting mandates of the many agencies and organizations that are involved in the process. Revisions of laws and regulations, and redefinition of societal goals and policies, are essential to enable managers to use the best science to develop appropriate management programs.

Using science to guide ecosystem management requires that basic and applied research address difficult questions in complex, real-world settings, in which experimental controls and statistical replication are often impossible. Too little attention and too few resources have been devoted to clarifying how restoring specific components of the flow regime will benefit the entire ecosystem. Nevertheless, it is clear that, whenever possible, the natural river system should be allowed to repair and maintain itself. This approach is likely to be the most successful and the least expensive way to restore and maintain the ecological integrity of flow-altered rivers (Stanford et al. 1996). Although the most effective mix of human-aided and natural recovery methods will vary with the river, we believe that existing knowledge makes a strong case that restoring natural flows should be a cornerstone of our management approach to river ecosystems.

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CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN DIEGO REGION

ORDER NO. 98-02
NPDES NO. CAS0108766

WASTE DISCHARGE REQUIREMENTS FOR URBAN RUNOFF FROM THE RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT, THE COUNTY OF RIVERSIDE, AND THE INCORPORATED CITIES OF RIVERSIDE COUNTY WITHIN THE SAN DIEGO REGION

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I. FACT SHEET

PROJECT

The attached pages contain information concerning an application for renewal of waste discharge requirements and a National Pollutant Discharge Elimination System (NPDES) permit, Order No. 98-02, NPDES No. CAS0108766, which prescribes waste discharge requirements for urban storm water runoff from the cities and the unincorporated areas in Riverside County within the jurisdiction of the SDRWQCB. On January 17, 1995 the Riverside County Flood Control and Water Conservation District (RCFC&WCD), the County of Riverside, the Cities of Temecula and Murrieta (Cities), hereinafter collectively referred to as Permittees, submitted NPDES Application No. CAS0108766 for an area-wide storm water discharge permit under the NPDES program. The permit application was submitted in accordance with the previous NPDES permit (Order No. 90-46) which expired on July 1, 1995. Additionally, the permit application follows guidance provided by staff of the State Water Resources Control Board (State Board) and the Regional Water Quality Control Boards (RWQCBs).

PROJECT AREA

The permitted area is delineated by the Santa Ana RWQCB-SDRWQCB boundary line on the north, the SDRWQCB - Colorado River Basin RWQCB boundary line on the east, and the County of Riverside (County) boundary line on the south and west. The permitted area is shown on Attachment 1 (Western Riverside County NPDES Permit Area).

CLEAN WATER ACT REQUIREMENTS

The Federal Clean Water Act (CWA) allows the United States Environmental Protection Agency (USEPA) to delegate its NPDES permitting authority to states with an approved environmental regulatory program. The State of California is one of the delegated states. The California Water Code (CWC) authorizes the State Board, through its Regional Boards, to regulate and control the discharge of pollutants into waters of the State and tributaries thereto. Section 405 of the Water Quality Act (WQA) of 1987 added Section 402(p) to the CWA. Pursuant to Section 402(p)(4) of the CWA, the USEPA promulgated regulations for storm water permit applications for storm water discharges associated with industrial activities and municipal separate storm sewer systems (MS4s) serving a population of 100,000 or more. As shown in Appendix I to 40 CFR 122 (the final Phase I storm water regulations), the County of Riverside has an unincorporated, urbanized-area population of greater than 100,000 and less than 250,000 (based on the 1980 decennial census) and is therefore required to obtain coverage under a municipal NPDES storm water permit . USEPA intended that Phase I municipal NPDES storm water permits focus on the areas within a county which are either already highly urbanized or are rapidly developing. The portion of Riverside County within the jurisdiction of the SDRWQCB is one the fastest growing areas in the State. Riverside County was California's fastest growing county from 1980 to 1990. Riverside County grew three times faster than Orange County and more than two times faster than San Diego County during that same time period. Temecula is currently the fastest growing city in Riverside County. From 1990 to 1997 Temecula was the 11th fastest growing city in the State. This permit governing municipal and industrial storm water discharges meets both the statutory requirements of Section 402(p)(3) of the CWA and all requirements applicable to an NPDES permit issued under the issuing authority's discretionary authority in accordance with Section 401(a)(1)(B) of the CWA.

AREA-WIDE STORM WATER PERMIT

To regulate and control storm water discharges from the Riverside County area to the MS4s, an area-wide approach is essential. The entire MS4 is not controlled by a single entity; the RCFC&WCD, the County, several Cities, and the State Department of Transportation (Caltrans), in addition to other smaller entities, manage the systems. In addition to the Cities, the County and the RCFC&WCD, there are a number of other contributors of urban storm water runoff to these storm drain systems. While there are other contributors to their MS4s, the Permittees are responsible for all discharges from their MS4s. Together with the SDRWQCB and USEPA , the Permittees share a responsibility to enforce the laws, regulations, and ordinances that apply to discharges of storm water runoff.

The management and control of the entire MS4 cannot be effectively carried out without the cooperation and efforts of all these entities. Also, it would not be practical at this time to issue a separate storm water permit to each of the entities within the permitted area whose land/facilities drain into the storm drain systems operated by the Permittees. The SDRWQCB has concluded that the best management option for this portion of Riverside County is to issue an area-wide storm water permit to the RCFC&WCD, Riverside County, and the cities in Riverside County. Storm water discharges from other state, federal, utility, or special district facilities and state or federal lands will either be added to the Riverside County permit or permitted separately if required.

COORDINATION WITH OTHER REGIONAL AGENCIES

In developing best management practices (BMPs) and monitoring programs, consultation/coordination with other drainage management entities and other Regional Boards is highly desirable. SDRWQCB staff will coordinate the program with other Regional Boards, other dischargers, and other entities on an "as needed" basis. The municipal storm water permit/program process is at the same stage of development in both the Santa Ana RWQCB and SDRWQCB areas of Riverside County.

EXISTING FACILITIES AND PROGRAMS

Within the San Diego Region, the MS4 owned and operated by the RCFC&WCD currently serves a population of approximately 100,000, occupying an area of approximately 630 square miles. The RCFC&WCD's MS4 includes an estimated 30 miles of open and closed storm drains. The MS4s owned and operated by the remaining Permittees include an estimated 2 miles of open and closed storm drains. Storm water discharges from urbanized areas consist mainly of surface runoff from residential, commercial, and industrial developments. In addition, the MS4 receives storm water discharges from agricultural land uses. Although the CWA specifically excludes agricultural discharges from regulation under an NPDES permit, SDRWQCB encourages the Permittees to seek cooperative ways to control these discharges to and from their MS4s. The constituents of concern and significance in storm water discharges are: human pathogens, total suspended solids, biochemical oxygen demand (BOD), chemical oxygen demand (COD), oil and grease (O&G), heavy metals, nutrients and organic chemicals such as pesticides and petroleum hydrocarbon components.

This permit places an emphasis on the Permittees' programs to control the discharge of sediment from construction sites through their MS4s. During the past 5 years, SDRWQCB staff has observed a significant occurrence of sediment discharges from construction activities which threaten to impair the beneficial uses of the Santa Margarita River and its tributaries. During this period, SDRWQCB staff estimates to have expended over 50% of its storm water resources to address this specific problem. These resources have been spent in efforts to ensure that dischargers comply with applicable NPDES permits. SDRWQCB staff anticipate that this level of effort will be necessary for the next few years as the Permitted area continues to grow. The rapid development occurring in the area subject to this Permit presents both a special problem and a special opportunity for the Permittees. Due to the number of construction activities ongoing at any time and the erosive nature of the soil in the area, the Permittees need to increase their oversight of construction activities, conduct increased site inspections (for compliance with their ordinances), and diligently enforce their ordinances as appropriate. The fact that the Permitted area is currently developing (as opposed to fully "built-out"), provides the Permittees with a

unique opportunity and responsibility to incorporate BMPs into their general and specific plans. Careful consideration of water quality issues during the planning and zoning decision-making process is an effective means for reducing sediment and other pollutants in urban runoff. Structural BMPs are also very effective in reducing pollutants and can be cost-effective in developing areas since installation of new structural BMPs is less costly than retrofitting.

To protect the beneficial uses of waters of the State, the pollutants from all sources need to be controlled. Recognizing this, and the fact that urban runoff discharges contain pollutants, the Permittees and the SDRWQCB have agreed that an area-wide municipal storm water permit is the most effective way to develop and implement a comprehensive municipal storm water management program in a timely and cost-effective manner. This area-wide municipal storm water permit contains requirements with time schedules that will allow the Permittees to continue to address water quality problems caused by urban runoff through their existing storm water management programs.

PERMIT REQUIREMENTS

In accordance with Section 402(p)(3), as part of a program to reduce the pollutants in urban runoff discharges, the Permittees have been required to submit existing management plans and programs being implemented or developed in the previous municipal storm water NPDES permit to reduce pollutants in urban runoff discharges. In addition, the Permittees will be required to report, review and/or revise these management programs and control measures in accordance with a time schedule approved by the Executive Officer of the SDRWQCB for this municipal storm water permit.

If existing municipal storm water management programs are not effective in controlling pollutant loading from urban runoff discharges and in achieving the water quality objectives of the receiving waters, additional programs shall be developed and implemented upon consultation and approval of the Executive Officer.

The permit also requires further development and implementation of management programs and/or BMPs during the life of the permit such that the quality of urban runoff discharges can be improved and the water quality objectives of the receiving waters ultimately can be met. It is also expected that through implementation of these programs and/or BMPs the beneficial uses of the receiving waters will be protected.

PERFORMANCE STANDARDS FOR STORM WATER AND NON-STORM WATER DISCHARGES

The Permittees are required to reduce all discharges of pollutants in storm water and non-storm water from their MS4s to the maximum extent practicable (MEP). In addition, this permit regulates the Permittees' industrial discharges (including construction discharges), which are subject to the Best Available Technology Economically Achievable (BAT) / Best Conventional Pollutant Control Technology (BCT) performance standards.

BENEFICIAL USES / RECEIVING WATERS

Storm water flows, which are discharged to and from MS4s in Riverside County, are tributary to various water bodies of the state, including inland surface streams, the Santa Margarita River, the Santa Margarita Lagoon, and the Pacific Ocean. The beneficial uses of the inland water bodies in this watershed include municipal and domestic supply, agricultural supply (AGR), industrial service supply (IND), industrial process supply (PROC), groundwater recharge (GWR), contact water recreation (REC1), non-contact water recreation (REC2), warm freshwater habitat (WARM), cold freshwater habitat (COLD), wildlife habitat (WILD), and preservation of rare and endangered species (RARE). The beneficial uses of the Pacific Ocean are industrial service supply (IND), navigation (NAV), contact water recreation (REC1), non-contact water recreation (REC2), commercial and sport fishing (COMM), wildlife habitat (WILD), rare, threatened, or endangered species (RARE), marine habitat (MAR), aquaculture (AQUA), migration of aquatic organisms (MIGR), spawning, reproduction, and/or early development (SPWN), and shellfish harvesting (SHELL). The ultimate goal of this municipal storm water management program is to protect the beneficial uses of the receiving waters.

ANTIDEGRADATION ANALYSIS

The SDRWQCB has considered whether a complete antidegradation analysis, pursuant to Title 40 Code of Federal Regulations (40 CFR), Part 131.12 and State Board Resolution No. 68-16, is required for these municipal storm water discharges. The SDRWQCB finds that the pollutant loading rates from urban runoff discharges to the receiving waters should not degrade water quality with the implementation of the requirements in this order. As a result, the quality of urban runoff discharges and receiving waters will be improved, thereby protecting the beneficial uses of waters of the United States. This is consistent with the federal and state antidegradation requirements and a complete antidegradation analysis is not necessary.

PUBLIC WORKSHOP

The SDRWQCB recognizes the significance of Riverside County's Storm Water/Cleanwater Protection Program and will conduct, participate, and/or assist with at least one workshop every year during the term of this permit to promote and discuss the objectives of the municipal storm water management program. The details of these workshops will be published in local newspapers and mailed to interested parties. Persons wishing to be included in the mailing list for any of the items related to this permit may register their name, mailing address and phone number with the SDRWQCB office at the address given below.

PUBLIC HEARING

On April 8, 1998, the SDRWQCB held a public hearing in Temecula regarding the proposed waste discharge requirements.

INFORMATION AND COPYING

Persons wishing additional information may write to the above address or call Greg Gearheart at (619) 627-3941. Copies of the application, proposed waste discharge requirements, and other documents (other than those which the Executive Officer maintains as confidential) are available at the SDRWQCB office for inspection and copying by appointment scheduled between the hours of 10:00 a.m. and 4:00 p.m., Monday through Thursday (excluding holidays).

REGISTER OF INTERESTED PERSONS

Any person interested in a particular application or group for applications may leave his name, address and phone number as part of the file for an application. Copies of tentative waste discharge requirements will be mailed to all interested parties.

II. WASTE DISCHARGE REQUIREMENTS

A. FINDINGS

The SDRWQCB finds that:

1. **PERMITTEES:** These entities are hereinafter referred to in this Order as *Permittees* or *dischargers*. The terms and conditions of this Order apply to discharges to and from municipal separate storm sewer systems (MS4s) owned or operated by the following:

   a. the Riverside County Flood Control and Water Conservation District (RCFC&WCD);
   b. the County of Riverside (County);
   c. the City of Temecula; and
   d. the City of Murrieta (collectively referred to as Cities).

2. **LEGAL AUTHORITY:** This Order implements all of the portions of the CWA, the CWC, the CFR and the California Code of Regulations (CCR) applicable to the discharge of urban runoff in the San Diego Region.

3. **BASIS AND SCOPE OF REISSUED PERMIT:** In July of 1990, the Permittees (except for Murrieta, which had not yet been incorporated) voluntarily sought and obtained an NPDES storm water permit (Order No. 90-46) that preceded USEPA's November 1990 final NPDES storm water regulations for discharges from MS4s. This type of permit was called an "Early Permit." As shown in Appendix I to 40 CFR 122 (the final Phase I storm water regulations), the County of Riverside has an unincorporated, urbanized-area population of greater than 100,000 and less than 250,000 (based on the 1980 decennial census) and is therefore required to obtain coverage under a municipal NPDES storm water permit. USEPA intended that Phase I municipal NPDES storm water permits focus on the areas within a county which are either already highly urbanized or are rapidly developing. The portion of Riverside County within the jurisdiction of the SDRWQCB is one of the fastest growing areas in the State. Each Permittee owns and operates an MS4 which discharges into one or more surface water bodies in the San Diego Region including numerous creeks, the Santa Margarita River, the Santa Margarita Lagoon, the Pacific Ocean and tributaries thereto. Permittees' discharges contain pollutants which may adversely affect the water quality of waters of the United States. These surface waters are waters of the United States as defined in 40 CFR 122.2. The Permittees may lack legal jurisdiction over storm water discharges into their systems from Native American tribal lands. The SDRWQCB encourages the Permittees to seek cooperative ways to control these discharges to and from their MS4s.

4. **POLLUTANT SOURCES:** Pollutants occur in urban runoff. The sources of these pollutants occur primarily in commercial, industrial, and residential urban land use areas. The most important pollutant sources include motor vehicles; construction site runoff; industrial site runoff; sewage spills; illegal dumping; illicit connections or improper plumbing of sewage; commercial site runoff ; paved surfaces; animal waste; and residential site runoff (e.g., home and garden care). The most important pollutant categories include metals (e.g., copper, lead, zinc and cadmium), human pathogens (e.g., bacteria, parasites and viruses), synthetic organics (e.g., petroleum products, pesticides, and PAHs), sediment; nutrients (e.g., nitrogen and phosphorus fertilizers), and oxygen demanding substances (decaying vegetation, animal waste, and other organic matter).

5. **DRAINAGE AREA MANAGEMENT PLAN (DAMP):** Order No. 90-46 required the Permittees to develop and implement a DAMP; develop and implement storm water and receiving water monitoring

plans; to eliminate illegal and illicit discharges to the storm drain systems; and, to enact the necessary legal authority to effectively prohibit illegal and illicit discharges. On April 26, 1996 the Executive Officer of the SDRWQCB approved the DAMP for the Santa Margarita Watershed.

6. **REPORT OF WASTE DISCHARGE / NPDES PERMIT RENEWAL APPLICATION:** On January 17, 1995 the RCFC&WCD submitted a Report of Waste Discharge (NPDES permit renewal application), which included the following major components:

   a. A map of the drainage area and maps of existing storm drain facilities
   b. A summary of the storm water management program
   c. A Consolidated Program for Water Quality Monitoring
   d. A copy of a Proposed Storm Water/Urban Run-off Management and Discharge Control Ordinance
   e. A copy of the current Implementation Agreement
   f. A copy of the Interagency Agreements
   g. The Drainage Area Management Plan (DAMP)
   h. A copy of Proposed Riverside County Grading and Erosion Control Ordinance

   On April 26, 1996 the Executive Officer of the SDRWQCB approved the Report of Waste Discharge submitted as an application for renewal of the NPDES permit.

7. **SIGNIFICANT CONTRIBUTORS OF POLLUTANTS CONSIDERATIONS:** Each of the Permittees are significant contributors of pollutants to waters of the United States in the Santa Margarita Watershed based on the following considerations:

   a. Monitoring data collected by municipal dischargers within the San Diego Region (including the Permittees) and others indicate that urban runoff discharges contain metals, pathogens, sediment, and nutrients in concentrations that could adversely affect receiving waters.

   b. Pollutant loads during the first several storms of the wet season may be significantly higher than pollutant loads from storms later in the season because the semiarid San Diego Region has an extended dry season.

   c. In the semiarid San Diego Region, most receiving water streams are essentially ephemeral in nature. Non-storm water flows containing pollutants discharge into these streams during dry weather conditions. During the dry weather season these streams have no reliable dilution waters available to aid in protection of the public health and wildlife and to provide sufficient assimilative capacity to ensure that discharges do not contribute to violations of receiving water quality objectives. Accordingly, non-storm water flows to these streams during dry weather periods could adversely affect receiving waters.

   d. All watercourses in the Santa Margarita Watershed terminate into the Santa Margarita Lagoon, which has poor flushing characteristics and little assimilative capacity.

   e. Discharges of storm water containing suspended sediment from construction activity sites in the areas of the Santa Margarita Watershed subject to this Permit, have threatened to cause and/or contribute to the impairment of beneficial uses in portions of the Santa Margarita River and its tributaries. These types of discharges violate Basin Plan Prohibition No. 14. The area covered by this Permit is rapidly growing, so there is a significant potential for these types of discharges to continue through the life of this Permit.

8. **CWA SECTION 303(D) WATER BODIES:** The discharge of urban runoff pollutants by the Permittees into CWA Section 303(d) water bodies is significant because they may contribute to violations of applicable water quality standards. The Santa Margarita Lagoon, which is impaired by eutrophication, is the only CWA Section 303(d) Water Body that receives discharges subject to this permit.

9. **PERFORMANCE STANDARD:** As specified in CWA Section 402 (p)(3) and 40 CFR 122.26, the performance standards applicable to the Permittees' discharges of storm water and non-storm water which are covered by this Permit are summarized below:

STORM WATER AND NON STORM WATER RUNOFF FROM	MAXIMUM EXTENT PRACTICABLE (MEP) [for Municipal Discharges as defined in CWA Section 402 (p)(3)(B)]	BEST AVAILABLE TECHNOLOGY (BAT) / BEST CONVENTIONAL TECHNOLOGY (BCT) [for Industrial Discharges as defined in CWA Section 402 (p)(3)(A)]
All Permittee-Owned MS4s unless specified below	X	
Permittee-Owned Industrial Facilities	X [If the activity at the facility is **not** one of the 11 categories listed in 40 CFR 122.26 (b)(14)(i-xi)]	X [If the activity at the facility is one of the 11 categories listed in 40 CFR 122.26 (b)(14)(i-xi)]
Permittee-Owned Construction Sites	X [Sites that disturb less than 5 acres]	X [Sites that disturb 5 acres or more, or less than 5 acres but are part of a larger common plan of development or sale]

10. **POLLUTION PREVENTION:** The SDRWQCB and the Permittees fully support pollution prevention as a fundamental principle of the SDRWQCB's mission to protect the quality of the Region's ground and surface waters.

11. **CONSTRUCTION ACTIVITY SITES:** The rapid development occurring in the area subject to this Permit presents both a special problem and a special opportunity for the Permittees. Due to the sheer number of construction activities ongoing at any time and the erosive nature of the soil in the area, the Permittees need to increase their oversight of construction activities, conduct increased site inspections (for compliance with their ordinances), and diligently enforce their ordinances as appropriate.

12. **IMPORTANCE OF PLANNING:** The fact that the Permitted area is currently developing (as opposed to fully "built-out"), provides the Permittees with a unique opportunity and responsibility to incorporate BMPs into their general and specific plans. Careful consideration of water quality issues during the planning and zoning decision-making process is an effective means for reducing sediment and other pollutants in urban runoff. Structural BMPs are also very effective in reducing pollutants and can be cost-effective in developing areas since installation of new structural BMPs is less costly than retrofitting.

13. **RECEIVING WATER LIMITATIONS:** The Basin Plan designates beneficial uses to be protected in the receiving water bodies, and contains both numeric and narrative receiving water quality objectives (including all incorporated plans, policies, and resolutions). Attainment of these water quality objectives ensures water quality necessary to sustain the beneficial uses. Receiving water limitations, based on the numeric and narrative receiving water quality objectives, are required in this Order to ensure that water quality needed to sustain the beneficial uses is attained in spite of the discharges of storm water and non-storm water flows regulated by this Order.

14. **RECEIVING WATER LIMITATIONS:** Numeric effluent limitations do not provide an appropriate mechanism for regulating discharges from MS4s at this time because such discharges are generally not susceptible to conventional wastewater treatment approaches (i.e., removal of pollutants in a conventional wastewater treatment plant). Such full scale treatment of all flows from MS4s may be technologically and economically infeasible. For discharges from MS4s, best management practices (BMPs), rather than numeric effluent limitations, are used to promote attainment of receiving water quality objectives.

15. **RECEIVING WATER LIMITATIONS:** Development and implementation of storm water management programs that include both nonstructural as well as structural BMPs designed to reduce discharges of pollutants into and from storm water conveyance systems can protect the beneficial uses of the receiving waters by promoting attainment of receiving water quality objectives.

16. **RECEIVING WATER LIMITATIONS:** Implementation of BMPs is not equivalent to attainment of receiving water quality objectives. If there are violations of receiving water quality objectives as determined by the SDRWQCB and the USEPA, an iterative process of BMP development, education, implementation, enforcement, assessment, and adjustment by the Discharger is necessary to assure that its storm water management program is sufficiently comprehensive and effective to promote consistent compliance with receiving water quality objectives.

17. **BENEFICIAL USES OF INLAND SURFACE WATERS:** The beneficial uses of inland surface waters in the Santa Margarita Watershed designated in the Basin Plan are: Municipal and Domestic supply (MUN); Agricultural supply (AGR); Industrial process supply (PROC); Industrial service supply (IND); Ground Water Recharge (GWR); Contact water recreation (REC1); Non-contact water recreation (REC2); Warm freshwater habitat (WARM); Cold freshwater habitat (COLD); Wildlife habitat (WILD); and Rare, threatened, or endangered species (RARE). Beneficial uses of inland surface waters vary. The beneficial uses for specific inland surface waters are described in the Basin Plan. Inland surface waters consist of all waters exclusive of the waters of the Pacific Ocean, enclosed bays and estuaries, coastal lagoons, and ground waters.

18. **BENEFICIAL USES OF COASTAL WATERS:** The beneficial uses of coastal waters in the Santa Margarita Watershed and the Pacific Ocean designated in the Basin Plan are: Industrial service supply (IND); Navigation (NAV); Contact water recreation (REC1); Non-contact water recreation (REC2); Commercial and sport fishing (COMM); Estuarine habitat (EST); Wildlife habitat (WILD); Preservation of biological habitats of special significance (BIOL); Rare, threatened, or endangered species (RARE); Marine habitat (MAR); Aquaculture (AQUA); Migration of aquatic organisms (MIGR); Spawning,

reproduction, and/or early development(SPWN); Warm freshwater habitat (WARM); and Shellfish harvesting (SHELL). Beneficial uses of coastal waters vary. The beneficial uses for specific coastal waters are described in the Basin Plan. Coastal waters are defined as waters subject to tidal action and include ocean waters and enclosed bays and estuaries.

19. **ANTIDEGRADATION:** The Basin Plan contains the following general antidegradation water quality objective which applies to all waters of the State within the San Diego Region:

"Wherever the existing quality of water is better than the quality of water established herein as objectives, such existing quality shall be maintained unless otherwise provided by the provisions of the State Water Resources Control Board Resolution No. 68-16, 'Statement of Policy with Respect to Maintaining of Waters in California', including any revisions thereto, or the federal antidegradation policy, 40 CFR 131.12 (for surface waters only)."

Discharges from Permittee storm water conveyance systems in compliance with the terms and conditions of this Order should not degrade surface water quality. Furthermore, the purpose of this Order is to reduce pollutants in storm water discharges to the MEP in conformance with CWA section 402(p)(3)(B)(ii). Therefore, the SDRWQCB finds that this Order is in conformance with SWRCB Resolution No. 68-16 and the federal antidegradation policy described in 40 CFR 131.12.

20. **NPDES PERMIT:** This Order shall serve as an NPDES permit pursuant to CWA section 402, and waste discharge requirements pursuant to CWC section 13260 for the discharge of urban runoff to surface waters of the project area of the Santa Margarita Watershed.

21. **CEQA:** The issuance of this Order for the discharge of urban runoff is exempt from the requirement for preparation of environmental documents under the California Environmental Quality Act (Public Resources Code, Division. 13, Chapter 3, section 21000 et seq.) in accordance with the CWC section 13389 and as provided in categorical exemption classes of the CEQA Guidelines (Title 14, CCRs sections 15301-15329).

22. **PRINCIPAL PERMITTEE:** The RCFC&WCD will serve as the principal Permittee for this permit.

23. **PUBLIC NOTICE:** The SDRWQCB has notified the Permittees and all known interested parties of its intent to renew an NPDES permit for the existing discharge of storm water and non-storm water.

24. **PUBLIC HEARING:** The SDRWQCB has, at a public meeting on April 8, 1998, held, or provided an opportunity for, a public hearing, and heard and considered all comments pertaining to the terms and conditions of this Order.

IT IS HEREBY ORDERED that the Riverside County Flood Control and Water Conservation District, the County of Riverside, the City of Temecula, and the City of Murrieta (hereinafter referred to as the Dischargers, or Permittees), in order to meet the provisions contained in Division 7 of the California Water Code and regulations adopted thereunder, and the provisions of the Clean Water Act, as amended, and regulations and guidelines adopted thereunder, shall each comply with the following:

B. RESPONSIBILITIES OF THE PRINCIPAL PERMITTEE

The principal Permittee (RCFC&WCD) shall be responsible for managing the overall storm water program and shall:

1. Conduct water quality monitoring of the MS4 outfalls within the Santa Margarita River drainage area.

2. Develop criteria for inspections of the MS4s.

3. Conduct inspections of the MS4s owned and operated by the RCFC&WCD.

4. Implement management programs, monitoring programs, and related plans as required by this order.

5. Enact and revise policies and ordinances necessary to establish and maintain adequate legal authority within the scope of the Riverside County Flood Control and Water Conservation District Act, as required by the Federal Storm Water Regulations, 40 CFR, Part 122.26(d)(2)(i)(A-F).

6. Respond and/or arrange for responding to emergency situations such as accidental spills, leaks, illicit discharges/illegal connections, etc., to prevent or reduce the discharge of pollutants to the MS4s and to waters of the United States.

7. Prepare and submit to the Executive Officer of the Regional Board, unified reports, plans, and programs necessary to comply with this order.

The activities of the principal Permittee shall include, but not be limited to, the following:

8. Coordinate permit activities and participate in any committees/subcommittees formed to coordinate permit compliance activities.

9. Provide technical and administrative support and inform the Permittees of the progress of other pertinent municipal programs, pilot projects, research studies, etc.

10. Coordinate the implementation of storm water quality management activities within the Santa Margarita River drainage area such as monitoring programs, public education, other pollution prevention measures, household hazardous waste collection, etc.

11. Gather and disseminate information on the progress of statewide municipal storm water programs and evaluate the information for potential use in the execution of this order.

12. Monitor the implementation of the plans and programs required by this order and determine their effectiveness in reducing pollutant loadings to surface waters to the applicable performance standard, as described in Finding No. 9.

13. Coordinate activities pertaining to implementation of this order with the SDRWQCB.

14. Solicit and coordinate public input for any major proposed storm water management programs and implementation plans.

15. Develop and implement mechanisms, performance standards, etc., to promote consistent implementation of BMPs among the Permittees.

16. In conjunction with the Permittees, implement the BMPs listed in the approved DAMP.

C. *RESPONSIBILITIES OF THE PERMITTEES*

Each Permittee shall be responsible for managing the storm water program within its jurisdiction and shall:

1. Conduct storm drain system inspections in accordance with the criteria developed by the principal Permittee.

2. Enact and revise policies and ordinances necessary to establish and maintain adequate legal authority as required by the Federal Storm Water Regulations, 40 CFR, Part 122.26(d)(2)(i)(A-F) within 120 days of adoption of this order.

3. Implement management programs, monitoring programs, and related plans as required by this order.

4. Respond and/or arrange for responding to emergency situations such as accidental spills, leaks, illicit discharges/illegal connections, etc., to prevent or reduce the discharge of pollutants to the municipal separate storm drain systems and to waters of the United States.

The Permittees' activities shall include, but not be limited to, the following:

5. Administer and enforce the storm water and erosion control ordinances adopted pursuant to Items 1. and 3., above.

6. Conduct and coordinate with the principal Permittee any surveys, monitoring and/or characterizations needed to identify the pollutant sources and drainage areas.

7. Review and comment on all plans, strategies, management programs, monitoring programs, as developed by the principal Permittee or any subcommittee to comply with this order.

8. Participate in committees and/or subcommittees formed by the principal Permittee to address compliance with this order.

9. In conjunction with the principal Permittee, implement the BMPs listed in the approved DAMP.

10. Submit to the principal Permittee any information necessary to develop unified report submittals to the Executive Officer of the SDRWQCB.

11. Prepare and submit any specific reports/information related to the Permittees' storm water program as deemed necessary by the Executive Officer of the SDRWQCB.

D. DISCHARGE LIMITATIONS

1. The Permittees shall prohibit illicit discharges from entering into the MS4s and require controls to reduce the discharge of pollutants to the applicable performance standard, as described in Finding No. 9.

2. This order regulates storm water discharges to waters of the United States from the Permittees' existing MS4s. Accordingly, the Permittees shall implement the BMPs (structural and/or non-structural control measures) necessary to reduce the pollutants in the discharge to the applicable performance standard, as described in Finding No. 9. All other discharges are prohibited except those listed under Item 3., below, those for which the SDRWQCB has issued individual permits or waived waste discharges requirements, and those discharges which are in accordance with Item 5., below.

3. The following discharges need not be prohibited by the Permittees unless identified by the Permittees or the SDRWQCB as sources of pollutants to the waters of the United States.

   a. Discharges authorized by an NPDES permit, or for which an approval has been issued by the SDRWQCB or State Board office;

   b. Discharges from potable water line flushing and other potable water sources;

   c. Discharges from fire fighting and fire hydrant testing and flushing;

   d. Discharges from landscape irrigation, lawn watering and other irrigation activities;

   e. Diverted stream flows:

   f. Rising ground waters and natural springs;

   g. Uncontaminated groundwater infiltration (as defined in 40 CFR 35.2005(20)) and uncontaminated pumped groundwater;

   h. Passive foundation drains;

   i. Air conditioning condensate;

   j. Water from crawl space pumps;

   k. Passive footing drains;

   l. Discharges from individual residential vehicle washing (not including discharges from mobile sources such as automobile/equipment detailing or washing);

   m. Flows from riparian habitats and wetlands;

   n. Dechlorinated swimming pool discharges;

   o. Street wash water and run-off from fire fighting (program descriptions shall address discharges or flows from fire fighting only where such discharges are identified as

significant sources of pollutants to waters of the United States),

p. Waters not otherwise containing wastes as defined in CWC Section 13050 (d); and

q. Other types of discharges identified and recommended by the Permittees and approved by the SDRWQCB.

For purposes of this order, a discharge may include storm water and other types of discharges as indicated above.

4. The Permittees shall take necessary steps as required under Item 1., above, to ensure that non-storm water discharges to their MS4s do not cause or contribute to violations of water quality objectives or discharge pollutants to waters of the United States.

5. Non-storm water discharges from Permittees' activities into waters of the state are prohibited unless the non-storm water discharges are permitted by an NPDES permit or are included in Item 3., above. If permitting or immediate elimination of the non-storm water discharges is impractical, the Permittees shall include in the Municipal Facilities Strategy, required under Section II. F., Provision 14., of this order, a proposed plan to address the non-storm water discharges.

6. The discharge of storm water and non-storm water shall not cause or contribute to degradation of groundwaters.

7. Pollutants in storm water discharges from the Permittees' MS4s shall be reduced to the applicable performance standard, as described in Finding No. 9.

E. RECEIVING WATER LIMITATIONS

1. Storm water discharges and authorized non-storm water discharges to any surface or ground water shall not adversely impact human health or the environment.

2. The DAMP shall be designed and implemented, or shall be in the process of being revised in accordance with the procedures set forth below to ensure that discharges authorized by this permit shall not cause or substantially (in more than a de minimus amount) contribute to a continuing or recurring exceedance of any applicable water quality standards contained in a Statewide Water Quality Control Plan or the SDRWQCB's Basin Plan.

3. If the discharges cause or contribute to an exceedance of the applicable water quality standards, Permittee shall take the following steps:

   a. Upon a determination by either the Permittee or the SDRWQCB that discharges are causing or contributing to an exceedance of an applicable water quality standard, the Permittee shall promptly notify and thereafter submit a report to the SDRWQCB that describes BMPs that are currently being implemented and additional BMPs that will be implemented to prevent or reduce any pollutants that are causing or contributing to the exceedance of water quality standards. The report may be incorporated in the annual update to the DAMP unless the SDRWQCB directs an earlier submittal. The SDRWQCB may require modifications to the report;

b. Submit any modifications to the report required by the SDRWQCB within 30 days of notification;

c. Within 30 days following approval of the report described above by the SDRWQCB, the Permittee shall revise its DAMP and monitoring program to incorporate the approved modified BMPs that have been and will be implemented, the implementation schedule, and any additional monitoring required;

d. Implement the revised DAMP and monitoring program in accordance with the approved schedule; and

e. Reduce pollutants in storm water discharges and authorized non-storm water discharges, following implementation of the DAMP revised in accordance with paragraph 3 above, to levels which shall not cause or contribute to an exceedance of any applicable water quality standards.

4. So long as Permittees have complied with the procedures set forth in paragraph 3 above and are implementing the revised DAMP, they do not have to repeat the same procedure for continuing or recurring exceedances of the same receiving water limitations unless directed by the SDRWQCB to develop additional BMPs.

F. PROVISIONS

GENERAL

1. The Permittees shall demonstrate compliance with all the requirements in this order and specifically with Section D., Discharge Limitations, and Section E., Receiving Water Limitations, through timely implementation of their approved DAMP and any modifications, revisions, or amendments thereto, which are developed pursuant to this order. The DAMP and any amendments thereto are hereby made an enforceable part of this order.

2. Permittees shall implement all elements of the DAMP. Each Permittee shall develop and, at the SDRWQCB Executive Officer's request, submit a plan describing how they will implement the applicable portions of the DAMP. Any proposed revisions to the DAMP shall be submitted to the SDRWQCB Executive Officer.

3. The Permittees shall comply with the Consolidated Program for Water Quality Monitoring required by the Monitoring and Reporting Requirements contained in this order The SDRWQCB Executive Officer may revise the MRP to allow the Permittees to participate in regional, statewide, national, or other monitoring programs in lieu of the Consolidated Program for Water Quality Monitoring.

4. All plans, reports and subsequent amendments submitted in compliance with this order shall be implemented immediately and shall be an enforceable part of this Order upon submission to the SDRWQCB Executive Officer. All submittals by the Permittees must be adequate to implement the requirements of this order.

5. The Permittees shall report to the SDRWQCB Executive Officer:

a. Any enforcement actions and known discharges of storm or wastewaters to MS4s owned or

operated by the Permittees which may impair domestic water supply sources (e.g., discharges due to a levee break, sewer overflows, illegal discharges to the street, etc.) or which may have an impact on human health or the environment.

b. Any industrial facilities and/or construction sites found not to be in compliance with the Permittees' ordinances or where the activities may be contributing pollutants to the waters of the U.S.; and

c. Any suspected or reported activities on federal, state, or other entity's land or facilities, where the Permittees do not have any jurisdiction, and where the suspected or reported activities may be contributing pollutants to waters of the United States.

6. The Permittees shall not issue occupancy permits, or any other use entitlements, unless the applicant is informed of his obligation under the State's NPDES industrial general permit. The Permittees shall not issue grading or building permits to developments that may result in land disturbance of five acres or more (or less than five acres, if it is part of a larger common plan of development or sale which is five acres or more) unless the applicant shows proof of coverage under the State's NPDES General Construction Activity Storm Water Permit. The proof of coverage may include a letter from the Regional Board office, a copy of the Notice of Intent, etc. The Permittees shall coordinate the activities of the various departments/sections within each Permittee's jurisdiction to insure consistent implementation of storm water regulations.

7. Permit application and special NPDES program requirements contained in 40 CFR 122.21 (a), (b), (d) (2), (f), and (p), 122.41 (a), (b), (c), (d), (e), (f), (g), (h), (i), (j), (k), and (l); and 122.42 (c) are incorporated into this order by reference.

IMPLEMENTATION AGREEMENT

8. Within 120 days of issuance of this Order, the Permittees shall submit to the SDRWQCB Executive Officer an updated copy of an implementation agreement with authorized signatures of each of the Permittees. Any subsequent revisions to the implementation agreement shall be forwarded to the SDRWQCB Executive Officer within 30 days of approval by the Permittees. At a minimum, the implementation agreement should include all the essential elements of the existing agreement, developed in accordance with Order No. 90-46.

LEGAL AUTHORITY

9. The Permittees shall adopt a Storm Water/Urban Run-off Management and Discharge Control Ordinance. Within 180 days of issuance of this Order, each Permittee's Chief Legal Counsel shall certify to the SDRWQCB Executive Officer that it has adequate legal authority to control the discharges of pollutants into the municipal storm drain system and that it has, at a minimum, satisfied each of the following regulatory requirements [contained in 40 CFR Section 122.26(d)(2)(i)(A-F)]:

a. control through ordinance, permit, contract order or similar means, the contribution of pollutants to the MS4 by storm water discharges associated with industrial activity (including construction activity) and the quality of storm water discharge from sites of industrial activity (including construction activity);

b. prohibit through ordinance, order or similar means, illicit discharges to the MS4;

c. control through ordinance, order or similar means, the discharge to a MS4 of spills, dumping, or

disposal of materials other than storm water;

d. control through interagency agreements among Permittees the contribution of pollutants from one portion of the MS4 to another;

e. require compliance with conditions in ordinances, permits, contracts and orders; and

f. carry out all inspection, surveillance and monitoring procedures necessary to determine compliance and noncompliance with permit conditions including prohibition on illicit discharges to the MS4.

ENFORCEMENT/COMPLIANCE STRATEGY

10. Within 360 days of issuance of this Order, the Permittees shall develop, submit to the SDRWQCB Executive Officer, and implement an enforcement/compliance strategy which describes each Permittees' programs for enforcing their storm water and erosion control ordinances. This enforcement/compliance strategy should include a mechanism to determine compliance of industrial facilities and construction sites with the Permittees' ordinances, and notification to the SDRWQCB Executive Officer any finding of non-compliance and any proposed local enforcement action.

PUBLIC EDUCATION AND OUTREACH

11. The Permittees shall continue to implement the public education efforts already underway and shall implement all of the proposed efforts identified in the Report of Waste Discharge.

12. When feasible, the Permittees shall participate in joint outreach with other programs including, but not limited to, other municipal storm water programs to ensure that a consistent message on storm water pollution prevention is brought to the public.

13. The Permittees shall develop public education materials to encourage the public to report illegal dumping from residential, industrial, construction and commercial sites into public streets, storm drains and other water bodies.

MUNICIPAL FACILITIES

14. This Order regulates the discharge of storm water and non-storm water from Permittee-owned facilities associated with industrial activity. The Permittees shall reduce pollutants (to the applicable performance standards, as defined in Finding No. 9) in such discharges through implementation of BMPs.

The Permittees shall develop a pollution prevention strategy to address their public agency facilities and associated activities which are determined by the Permittees to be sources of concern regarding storm water pollution. The pollution prevention strategy shall be developed to ensure that public agency facilities and associated activities that are currently not required to obtain coverage under the State's general storm water permits are not sources of pollutants into the waters of the United States. The pollution prevention strategy shall be submitted to the SDRWQCB Executive Officer within 180 days of issuance of this Order. In developing the pollution prevention strategy, the Permittees shall consider the following:

a. Identification of public agency facilities and associated activities that are potential contributors of pollutants to waters of the United States;

b. Potential pollutants of concern that are associated with the facilities and associated activities;

c. Proposed BMPs and a schedule for their implementation to ensure that these facilities are not sources of pollutants into the waters of the United States;

d. A monitoring program to measure the effectiveness of the BMPs;

e. A schedule for training of public agency staff to ensure proper implementation of the BMPs; and

f. Identification of any non-storm water discharges from the public agency facilities/activities, frequency of the discharge, characterization of the discharge, volume, flow and duration of the discharge, short term source control BMPs to mitigate the impacts from the discharge, and a schedule for elimination or permitting of the discharge.

PERMITTEE-OWNED CONSTRUCTION PROJECTS/ACTIVITIES

15. This Order regulates the discharge of storm water run-off from construction projects, regardless of size, that are under ownership and/or direct responsibility of any of the Permittees. The Permittees shall prevent and control (to the applicable performance standards, as defined in Finding No. 9) discharges of contaminated runoff from all construction sites under ownership and/or direct responsibility of any of the Permittees through implementation of BMPs.

16. Prior to commencement of Permittee-owned construction activities, the Permittees shall notify the SDRWQCB Executive Officer of proposed construction projects that disturb more than one (1) acre of land. Upon completion of the project, the SDRWQCB Executive Officer shall be notified of the completion of the project.

17. For Permittee-owned projects that will disturb more than five (5) acres (or less than five acres, but part of a larger common plan of sale or development), the Permittees shall develop and implement a storm water pollution prevention plan (SWPPP) and a monitoring program that is specific for the construction project prior to the commencement of any of the construction activities. The SWPPP and monitoring program shall be implemented throughout the duration of the construction project. The SWPPP shall be kept at the construction site and released to the public and/ or SDRWQCB staff upon request.

18. The SWPPP and the monitoring program for the Permittee-owned construction projects shall be consistent with the requirements of the State's General Permit for Storm Water Discharges Associated with Construction Activities (State Board Order No. 92-08 DWQ).

19. The Permittees shall give advance notice to the SDRWQCB Executive Officer of any planned changes in the Permittee-owned construction activities which may result in non-compliance with this Order. In the event of conditions at a Permittee-owned project site which constitute non-compliance with this Order, the Permittees shall: 1) notify the SDRWQCB Executive Officer within 3 days of the of the non-compliance; 2) take all reasonable steps to minimize or correct any adverse impact on the environment resulting from non-compliance with this Order; and 3) shall, within 30 days of notification, report the following to the SDRWQCB Executive Officer:

a. a description of the events which lead to the non-compliance;

b. a description of the actions taken by the responsible Permittee to minimize or correct any adverse impacts on the environment resulting from the non-compliance;

c. an assessment of the adverse impacts on the environment resulting from the non-compliance.

20. All other terms and conditions of State Board Order No. 92-08 DWQ shall be applicable.

NEW DEVELOPMENT (INCLUDING RE-DEVELOPMENT)

21. The Permittees shall immediately require all construction operations not under ownership and/or direct responsibility of any of the Permittees, regardless of size, to prevent and control (to the MEP, as defined in Finding No. 9) discharges of contaminated runoff from construction sites.

Within 270 days of issuance of this Order, the Permittees shall implement and submit to the SDRWQCB Executive Officer Supplement B to the DAMP for Erosion Control which describes the following: 1) the Permittees' recommended BMPs which prevent and control discharges of contaminated runoff from construction sites; and 2) the Permittees' programs (i.e., Permittees' ordinances, inspection program, enforcement program, etc.) to require construction operations to implement BMPs.

22. Within 180 days of issuance of this Order, the Permittees shall implement the new development BMPs (DAMP Supplement A) that were developed pursuant to SDRWQCB Order No. 90-46.

23. For new development projects where the Permittees act as lead agency for the California Environmental Quality Act (CEQA), the Permittees shall ensure that their processes for approving General Plan CEQA checklist documents, and any other CEQA documents approved by the Permittees for new developments, comply with the requirements of this Order. If necessary, these processes shall be revised to include requirements for evaluation of storm water-related impacts and identification of appropriate mitigation measures.

24. The Permittees shall establish a mechanism to insure proper maintenance and operation of all permanent flood control structures. For new developments, the parties responsible for the maintenance of the flood control structures and funding sources for maintenance and operation of the facilities shall be identified prior to issuance of grading permits.

FISCAL RESOURCES

25. The Permittees shall prepare and submit a unified fiscal analysis report appropriate for implementation of the requirements of this order to the Executive Officer of the SDRWQCB. The fiscal analysis report shall be submitted as part of the Annual Report no later than **October 15** of each year and shall at a minimum include the following:

a. Each Permittee's expenditures for the previous fiscal year;
b. Each Permittee's budget for the current fiscal year;
c. A description of the source of funds;

MONITORING AND REPORTING REQUIREMENTS

26. The Permittees shall implement the Consolidated Program for Water Quality Monitoring (submitted as part of the Report of Waste Discharge) until development and implementation of other acceptable monitoring programs.

27. All reports and other submittals required by this order shall be signed by the principal Permittee and copies shall be submitted to the Executive Officer of the SDRWQCB under penalty of perjury.

28. The Permittees shall submit three copies of an ANNUAL REPORT to the Executive Officer of the SDRWQCB and one copy of an ANNUAL REPORT to the Regional Administrator of USEPA, Region 9 no later than **October 15** of each year. This report may be submitted in a mutually agreed upon electronic format. At a minimum, the annual report shall include the following:

    a. A review of the status of program implementation and compliance (or non-compliance) with the schedules contained in this order.

    b. An assessment of the effectiveness of control measures established under the illicit discharge elimination program and the DAMP. The effectiveness may be measured in terms of how successful the program has been in eliminating illicit connections / illegal discharges (IC/IDs) and in reducing pollutant loads in storm water discharges.

    c. An assessment of any storm water management program modifications made to comply with CWA requirements to reduce the discharge of pollutants to the applicable performance standard.

    d. The results and information described in the Consolidated Program for Water Quality Monitoring for the previous year.

    e. Fiscal Resources Report, as required by Section II.F.25.

29. Permittees shall be responsible for the submittal of all required information/materials needed to comply with this Monitoring and Reporting Program in a timely manner to the principal Permittee. All such submittals shall be signed by a duly authorized representative of the Permittee under penalty of perjury.

    All information/materials required by this order shall be submitted to the SDRWQCB Executive Officer in accordance with the following schedule:

ITEM	*DUE DATE*
Revised Implementation Agreement	September 10, 1998
Legal Authority Certification	November 9, 1998
Municipal Activities Pollution Prevention Strategy	November 9, 1998
Supplement B to the DAMP for Erosion Control	February 9, 1999
Enforcement Compliance Strategy	May 13, 1999
Report of Waste Discharge (NPDES Renewal Application)	November 9, 2002
Annual Report, including: **1. Program Status** **2. Effectiveness Assessment of Illegal Discharge Elimination Program** **3. Program Modifications** **4. Monitoring Program Results** **5. Fiscal Resources Report**	October 15 of each year (next report due in 1998)

PERMIT EXPIRATION AND RENEWAL

30. This Order expires five years from the date of issuance of this Order and the Permittees must file a Report of Waste Discharge (NPDES permit renewal application) no later than 180 days in advance of such expiration date as application for issuance of new waste discharge requirements. The Report of Waste Discharge shall, at a minimum, include the following:

a. Any revisions to the DAMP including, but not limited to, all the activities the Permittees propose to undertake during the next permit term, goals and objectives of such activities, an evaluation of the need for additional source control and/or structural BMPs, any proposed pilot studies, etc.;

b. Changes in land use and/or population including map updates; and

c. Any significant changes to the storm drain systems, outfalls, detention or retention basins or dams, and other controls, including map updates of the storm drain systems.

31. The SDRWQCB may modify, revoke or reissue this Order prior to its expiration date for the following reasons:

a. To address significant changes in conditions identified in the technical reports required by the Regional Board which were unknown at the time of the issuance of this order;

b. To incorporate applicable requirements of statewide water quality control plans and policies adopted by the State Board or any amendments to the Basin Plan approved by the SDRWQCB, the State Board, and, if necessary, by the Office of Administrative Law; or

c. To comply with any applicable requirements, guidelines, or regulations issued or approved under the Clean Water Act, if the requirements, guidelines, or regulations contain different conditions or additional requirements than those included in this order.

d. To incorporate new or revised program elements and compliance schedule(s) necessary to comply with Section II.E. of this Order.

32. This order shall serve as a NPDES permit pursuant to Section 402 (p) of the CWA, or amendments thereto, and shall become effective ten days after the date of its adoption provided the Regional Administrator of the USEPA has no objections. If the Regional Administrator objects to its issuance, the permit shall not become effective until such objection is withdrawn.

33. Order No. 90-46 is hereby rescinded.

I, John H. Robertus, Executive Officer, do hereby certify that the foregoing is a full, true, and correct copy of an Order adopted by the SDRWQCB, on May 13, 1998.

John H. Robertus
Executive Officer

III. GLOSSARY

Best Available Technology Economically Achievable (BAT) / Best Conventional Pollutant Control Technology (BCT)
BAT and BCT are treatment-based performance standards which measure the effectiveness of pollutant reduction in discharges, as defined in CWA 402(p) and 40 CFR 122, for specific categories of industrial facilities subject to storm water effluent limitations, new source performance standards, or toxic pollutant effluent standards. Effluent limitations have been defined in 40 CFR for the reduction of toxic pollutants using BAT, and the reduction of conventional pollutants using BCT.

Best Management Practices (BMPs)
BMPs are defined in 40 CFR 122.2 as schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the pollution of waters of the United States. BMPs also include treatment requirements, operating procedures and practices to control plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage.

Controls
Controls are defined in Section 402 (p)(3)(B)(iii) of the Clean Water Act (CWA) as a means to reduce the discharge of pollutants to the maximum extent practicable (MEP), including maintenance practices, control techniques and system design and engineering methods, and such other provisions as the Administrator or State determines appropriate for the control of such pollutants.

CWA Section 303(d) Water Bodies
Certain water bodies receiving storm water discharges are designated by the SWRCB and USEPA as CWA section 303(d) water bodies. A "section 303(d) water body" is an impaired water body in which water quality does not meet applicable water quality standards and/or is not expected to meet water quality standards, even after the application of technology based pollution controls required by the CWA. The discharge of storm water and non-storm water pollutants by the Permittees are significant because these discharges contribute to violations of applicable water quality standards.

Maximum Extent Practicable (MEP)
Under Section 402(p) of the CWA, municipalities are required to reduce the discharge of pollutants from their storm water conveyance systems to the MEP. MEP is the critical performance standard which municipalities must attain in order to comply with their municipal storm water permits.

To achieve the MEP standard, municipalities must employ whatever BMPs are technically feasible (i.e., are likely to be effective) and are not cost prohibitive. The major emphasis is on technical feasibility. Reducing pollutants to the MEP means choosing effective BMPs, and rejecting applicable BMPs only where other effective BMPs will serve the same purpose, or the BMPs would not be technically feasible, or the cost would be prohibitive. In selecting BMPs to achieve the MEP standard, the following factors may be useful to consider:

a. Effectiveness: Will the BMPs address a pollutant (or pollutant source) of concern?
b. Regulatory Compliance: Is the BMP in compliance with storm water regulations as well as other environmental regulations?
c. Public Acceptance: Does the BMP have public support?
d. Cost: Will the cost of implementing the BMP have a reasonable relationship to the pollution control benefits to be achieved?
e. Technical Feasibility: Is the BMP technically feasible considering soils, geography, water resources, etc.?

The final determination regarding whether a municipality has reduced pollutants to the maximum extent practicable can only be made by the Regional or State Water Boards, and not by the municipal discharger. If a municipality reviews a lengthy menu of BMPs and chooses to select only a few of the least expensive, it is likely that MEP has not been met. On the other hand, if a municipal discharger employs all applicable BMPs except those where it can show that they are not technically feasible in the locality, or whose cost would exceed any benefit derived, it would have met the standard. Where a choice may be made between two BMPs which should provide generally comparable effectiveness, the discharger may choose the least expensive alternative and exclude the more expensive BMP. However, it would not be acceptable either to reject all BMPs which would address a pollutant source, or to pick a BMP based solely on cost, which would be clearly less effective. In selecting BMPs the municipality must make a serious attempt to comply and practical solutions may not be lightly rejected. In any case, the burden would be on the municipal discharger to show compliance with its permit. After selecting a menu of BMPs, it is the responsibility of the discharger to ensure that all BMPs are implemented. [Source: February 11, 1993 memo entitled "Definition of Maximum Extent Practicable" by Elizabeth Jennings, Senior Staff Counsel, SWRCB].

Municipal Separate Storm Sewer System (MS4)
A conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, or storm drains): **(i)** owned or operated by a State, city, town, borough, county, parish, district, association, or other public body (created by or pursuant to State law) having jurisdiction over disposal of sewage, industrial wastes, storm water, or other wastes, including special districts under State law such as a sewer district, flood control district or drainage district, or similar entity, or an Indian tribal organization, or a designated and approved management agency under section 208 of the CWA that discharges to waters of the United States; **(ii)** designated or used for collecting or conveying storm water; **(iii)** which is not a combined sewer; and **(iv)** which is not part of a Publicly Owned Treatment Works (POTW) as defined at 40 CFR 122.2.

Non-Storm Water
Non-storm water consists of all discharges to and from a storm water conveyance system which do not originate from precipitation events (i.e., all discharges from a conveyance system other than storm water). Non-storm water includes illicit discharges, non-prohibited discharges, and NPDES permitted discharges. An illicit discharge is defined at 40 CFR 122.26(b)(2) as any discharge to a municipal storm water conveyance system that is not composed entirely of storm water except discharges pursuant to a separate NPDES permit and discharges resulting from emergency fire fighting activities.

Person
A person is defined as an individual, association, partnership, corporation, municipality, State or Federal agency, or an agent or employee thereof. [40 CFR 122.2].

Pollution Prevention
Pollution prevention is defined as practices and processes which reduce or eliminate the generation of pollutants, in contrast to source control, pollution control, treatment or disposal.

Public Agency Facilities
Facilities owned and operated by public agencies, including corporate yards, fire stations, vehicle maintenance facilities, etc.

Storm Water
Storm water is defined as runoff from precipitation and snow melt consisting only of those discharges which originate from precipitation events. Storm water is that portion of precipitation which flows across a surface to the storm drain system or receiving waters. Examples of this phenomenon include: water that flows off a building's roof when it rains (runoff from an impervious surface); water that flows into streams when snow on the ground begins to melt (runoff from a semi-pervious surface); and water that flows from a vegetated surface when rainfall is in excess of the rate at which it can infiltrate into the underlying soil (runoff from a pervious surface). When all factors are equal, runoff increases as the perviousness of a surface decreases. During precipitation events in urban areas, storm water picks up and transports pollutants into and through storm water conveyance systems, and ultimately to waters of the United States.

Municipal Separate Storm Sewer System (MS4)
A conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, or storm drains): **(i)** owned or operated by a State, city, town, borough, county, parish, district, association, or other public body (created by or pursuant to State law) having jurisdiction over disposal of sewage, industrial wastes, storm water, or other wastes, including special districts under State law such as a sewer district, flood control district or drainage district, or similar entity, or an Indian tribal organization, or a designated and approved management agency under section 208 of the CWA that discharges to waters of the United States; **(ii)** designated or used for collecting or conveying storm water; **(iii)** which is not a combined sewer; and **(iv)** which is not part of a Publicly Owned Treatment Works (POTW) as defined at 40 CFR 122.2.

Urban Runoff
Urban runoff is defined as all flows in a MS4 and consists of the following components: (1) storm water (wet weather flows) and (2) non-storm water illicit discharges (dry weather flows).

Waste
As defined in California Water Code Section 13050(d), "**waste** includes sewage and any and all other waste substances, liquid, solid, gaseous, or radioactive, associated with human habitation, or of human or animal origin, or from any producing, manufacturing, or processing operation, including waste placed within containers of whatever nature prior to, and for purposes of, disposal."

Attachment 1: Map of Project Area Subject to Permit

WESTERN RIVERSIDE COUNTY NPDES PERMIT AREA

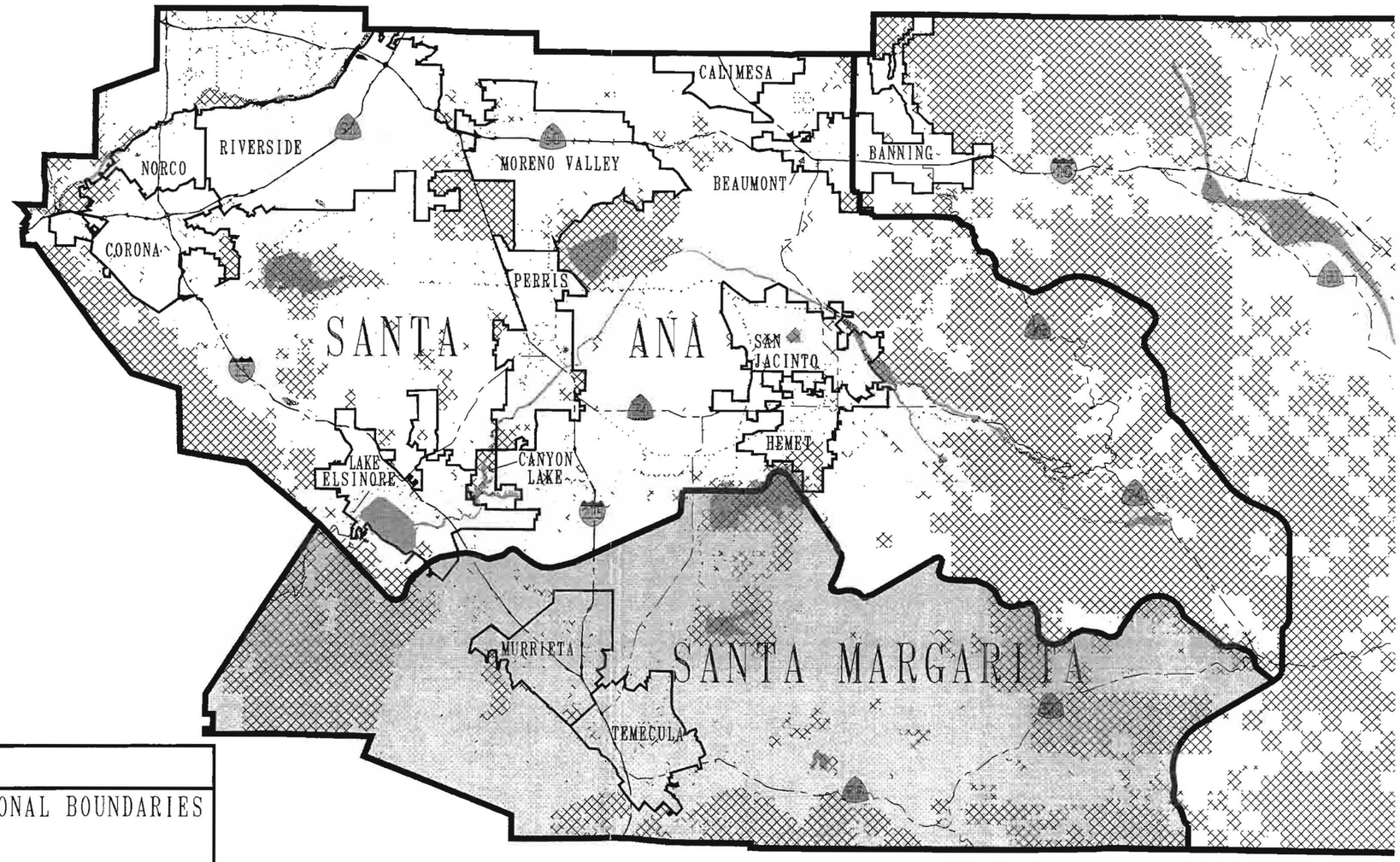

N.T.S.

LEGEND

- NPDES PERMIT REGIONAL BOUNDARIES
- SANTA ANA PERMIT
- SANTA MARGARITA PERMIT
- STATE & FEDERAL LANDS EXEMPTED FROM NPDES PERMIT AREAS

* PARCEL DATA WITHIN CITIES MAY NOT BE COMPLETE

This map was made by the Riverside County Geographic Information System. The map elements were produced by the Assessor and the Transportation and Land Management Agency which is comprised of the Administration, Aviation, and Information Resources divisions and the Building & Safety, Planning and Transportation departments. The County of Riverside assumes no warranty or legal responsibility for the information contained on this map. Data and information represented on this map is subject to update and modification. The Geographic Information System and other sources should be queried for the most current information.

COUNTY OF RIVERSIDE • TRANSPORTATION and LAND MANAGEMENT AGENCY • TLMA

12/06/94

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN DIEGO REGION

ADDENDUM NO. 1 TO ORDER NO. 98-02
NPDES PERMIT NO. CAS0108766

AN ADDENDUM MODIFYING ORDER NO. 98-02 TO INCORPORATE LANGUAGE DEVELOPED BY THE UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

The California Regional Water Quality Control Board, San Diego Region (hereinafter Regional Board) finds that:

1. Order No. 98-02 (NPDES Permit No. CAS0108766) specifies Waste Discharge Requirements for D**ischarges of Storm Water and Urban Runoff from the Riverside County Flood Control District, the County of Riverside, and the Incorporated Cities of Riverside County within the San Diego Region** (Co-Permittees)**.**

2. NPDES No. CAS0108766 issued by the USEPA on May 30, 1999 established waste discharge requirements for the Co-Permittees.

3. The requirements of Order No. 98-02 must be modified to assure consistency with the NPDES No. CAS0108766, issued by the USEPA.

4. This Regional Board has notified all known interested parties of its intent to modify Order No. 98-02 to reflect the addition of the language developed by the United States Environmental Protection Agency.

5. This Regional Board in public hearing heard and considered all comments pertaining to the final draft of the addendum.

IT IS HEREBY ORDERED THAT Order No. 98-02 is modified to incorporate by reference the terms and conditions contained in National Pollutant Discharge Elimination System Permit No. CAS0108766. All references to USEPA Region IX in the terms and conditions of Permit No. CAS0109766 shall be considered as meaning USEPA Region IX and the Regional Water Quality Control Board, San Diego Region.

I, John H. Robertus, Executive Officer, do hereby certify the foregoing is a full, true, and correct copy of an Addendum adopted by the California Regional Water Quality Control Board, San Diego Region, on November 8, 2000.

John H. Robertus

JOHN H. ROBERTUS
Executive Officer

S:/storm/lair/riverside/order98-02addendum

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CUMULATIVE IMPACTS OF SECTION 404 CLEAN WATER ACT PERMITTING ON THE RIPARIAN HABITAT OF THE SANTA MARGARITA, CALIFORNIA WATERSHED

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Abstract: The Santa Margarita River is one of the few remaining free-flowing river systems on the Southern California coastal plain, and it provides one of the most expansive, unspoiled riparian habitats in Southern California. There is concern among resource managers that the cumulative impacts associated with rapid development of the upper watershed will degrade the ecological integrity of the entire watershed. In response to this concern, we assessed the impacts of development projects in this watershed, which were subject to regulation under Section 404 of the Clean Water Act. Cumulative impacts were assessed by comparing the conditions present at each project site prior to issuance of the Section 404 permit to conditions present after issuance of the permit. Changes between pre- and post-project site conditions were evaluated using a semantic categorization for the following six criteria: endangered species habitat, structural diversity, spatial diversity, undeveloped open space, linear contiguity, and adjacent habitat. The impact assessment showed that although the Section 404 permit program has attenuated project impacts, it has failed at minimizing cumulative impacts. Projects permitted under Section 404 contributed to the disruption of movement corridors linking the habitats of the upper and lower watershed and resulted in extensive floodplain encroachment, which may have hydrologic as well as ecological implications. More importantly, this assessment identified the types of activities and habitat functions that should be addressed during revisions in permitting procedures and should be emphasized in the watershed planning process. These conclusions will be incorporated into an ongoing Advanced Identification study sponsored by the U.S. Environmental Protection Agency and U.S. Army Corps of Engineers to develop a management plan for the Santa Margarita Watershed.

Key Words: cumulative impacts, watershed management, wetlands, riparian habitat, habitat assessment, Section 404

INTRODUCTION

Section 404 of the Clean Water Act (CWA), which regulates the discharge of dredged material, placement of fill material, and excavation within waters of the United States (including wetlands), recognizes that "although an individual discharge may, in itself, constitute a minor change, the cumulative effect of numerous piecemeal changes can result in a major impairment of water {or wetland} resources and interfere with the productivity and water quality of aquatic ecosystems." Furthermore, the assessment of cumulative impacts is mandated under regulations at 40 CFR Part 230.11 of the CWA, which requires the USACOE to collect information regarding cumulative impacts, document their findings, and consider the results in the decision-making process for permit applications.

Cumulative effects can be manifested in several ways: time-crowded perturbations, in which disturbances occur so close in time that the system cannot recover; space-crowded perturbations, in which disturbances are so closely spaced that their effects are not dissipated; synergism, the interaction of disturbances that produce effects different from the individual disturbances; nibbling, disturbances that produce effects by small incremental changes; and distant effects, in

which disturbances cause effects remote in time or space from the original disturbance (Johnston 1994). Lee and Gosselink (1988) assert that nibbling losses are the most significant contributor to cumulative impacts, and therefore, should be the focus of evaluation during permit review. However, when reviewing a permit application, there are seldom enough data available on the status of wetlands in the watershed surrounding the permit site to determine if cumulative losses are occurring. Therefore, decisions are typically made on a case-by-case basis without the benefit of quantitative information on how previously granted permits relate to the current proposal or how a permitting decision will affect the status of other wetlands in the region (Kentula et al. 1992a, 1992b). Often the cumulative impacts resulting from the integration of multiple perturbations across time and space either go undetected or are judged to be not measurably significant (Hirsch 1988, Lee and Gosselink 1988).

Several authors have attempted to assess the cumulative loss of wetland area in specific regions of the United States associated with Section 404 permitting (Mager and Thayer 1986, Mager and Ruebsamen 1988, Fenner 1991, Holland and Kentula 1992, Kentula et al. 1992b, Sifneos et al. 1992a, 1992b, Allen 1993, Allen and Feddema 1996). The majority of these studies assess cumulative impacts by comparing the area impacted and mitigated as reported in Section 404 permit files. Mager and Thayer (1986) and Mager and Ruebsamen (1988) reported that 7,408 Section 404 permits were issued in the southeast U.S. between 1981 and 1987, authorizing impacts to 119,994 ha of aquatic habitat. The permitted projects included 67,689 ha of mitigation, resulting in a net loss of 52,305 ha, assuming all required mitigation was successfully completed. In Louisiana, 226 permits were issued between 1982 and 1987, impacting 10,000 ha, with only 8% of the area impacted being mitigated (Sifneos et al. 1992a). Kentula et al. (1992b) reviewed 93 permits requiring compensatory mitigation in Oregon and Washington between 1977 and 1987 and found that 135 ha were impacted, but only 87 ha were created to compensate for the losses.

The effect of Section 404 permitting on California wetlands has been investigated by several authors. Holland and Kentula (1992) analyzed 324 individual permits requiring compensatory mitigation in California between 1971 and 1987. These permits authorized 1,176 ha of impacts and required 1,256 ha of mitigation. Since approximately 175 individual permits and 1,800 general permit authorizations are issued annually by the Corps in California (USACOE 1995), the 324 permits investigated (issued over 17 years) represent only a fraction of the actual area impacted, with the majority of permits not requiring mitigation. Fenner (1991) reported that in San Diego County between 1985 and 1989, 102 ha were impacted, but only 94 ha were mitigated. Allen (1993) evaluated 75 permits issued in Southern California between 1987 and 1989 for mitigation compliance. Although the permit records reported 80 ha of impacts and 112 ha of mitigation, field investigations revealed that only 77 ha of the required mitigation were actually completed.

Previous studies of the cumulative effect of Section 404 permitting have focused on the balance between area lost through permitted activities and area gained through mitigation. These studies typically assume that 100% of the functional capacity of the area permitted is lost, that any compensation for losses is achieved through mitigation, and that one hectare of mitigation fully compensates for one hectare of loss. Many of the authors cited above (Mager and Thayer 1986, Mager and Ruebsamen 1988, Holland and Kentula 1992, Sifneos et al. 1992a) acknowledge that the specific impacts associated with the permits and the success of mitigation at replacing lost functions were not investigated in their studies. In addition, Allen (1993) demonstrated that the mitigation area reported in permit files may underestimate the actual cumulative losses of wetlands. If accurate assessments of cumulative impacts are to be achieved, the impact of permitted activities on the various functions of aquatic habitats must be considered in addition to the gross area of impact. Such assessments should account for the preproject *vs.* post-project change in the functional capacity of both permit and mitigation sites.

This study assessed the cumulative impacts of Section 404 CWA permitted activities on the riparian habitat of the Santa Margarita Watershed in Southern California. The assessment accounts for the cumulative impacts of permitted activities on six habitat functions considering both pre- and post-project site conditions, examines which types of projects or permits had the largest proportional contribution to cumulative impacts in the watershed, and provides recommendations for ways to better address cumulative impacts in permitting decisions.

STUDY AREA

The 1,922 km^2 Santa Margarita Watershed is the second largest river basin on the Southern California coastal plain (USACOE 1988, USEPA 1992). The watershed is divided into upper and lower portions, with the upper portion being subdivided into the 575 km^2 Murrieta Creek subwatershed and the 948 km^2 Temecula Creek subwatershed (USEPA 1993) (Figure 1). Murrieta and Temecula creeks meet at the head of Temecula Gorge, forming the beginning of the Santa Margarita River. The Santa Margarita River flows 43

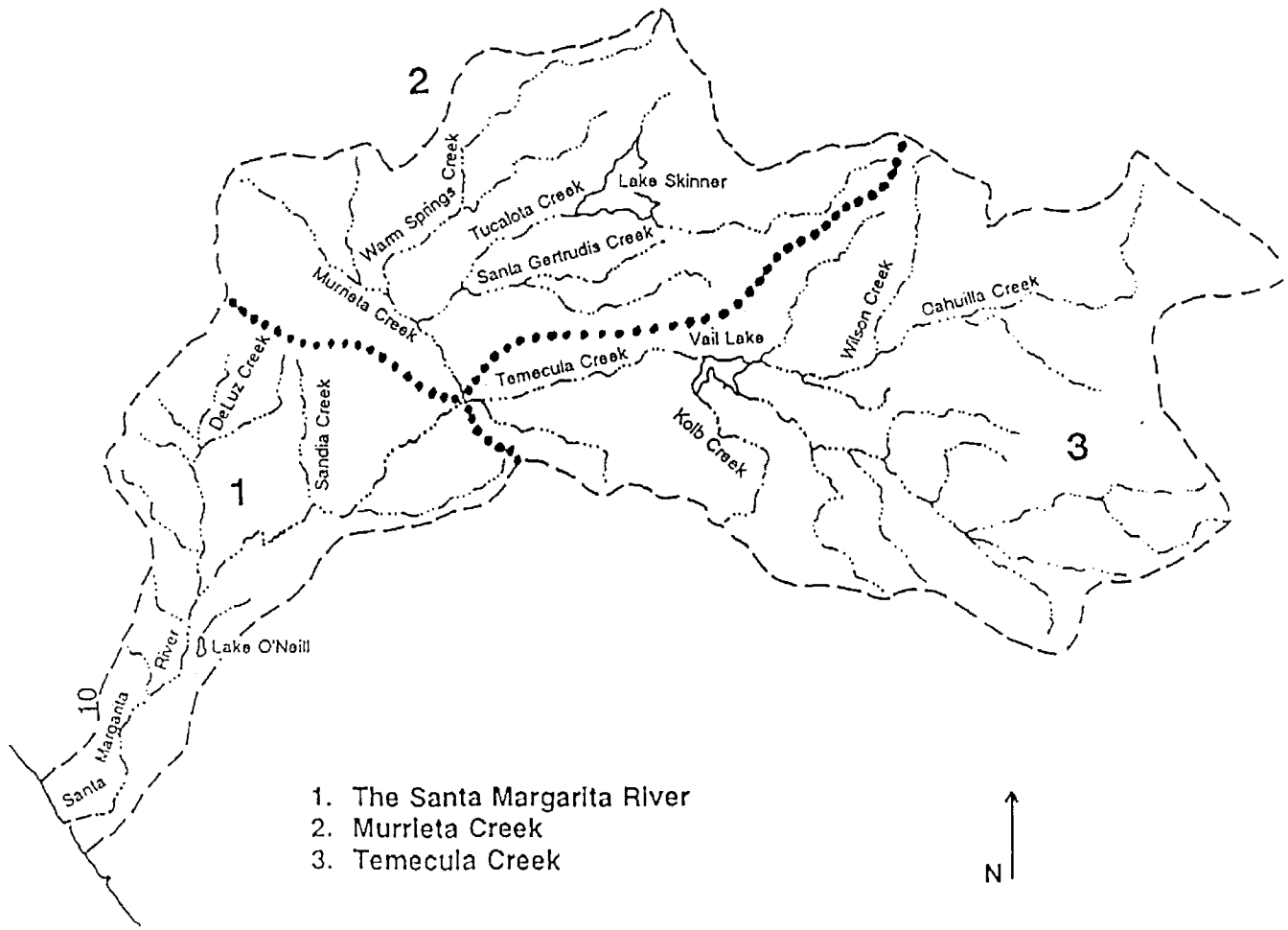

Figure 1. The Santa Margarita watershed. Source: USEPA (1993).

km from this confluence into a broad alluvial coastal floodplain, with extensive riparian strips up to a 1.5 km across in some places (Shapiro 1991). From the coastal plains, the river flows to the ocean, forming one of the few remaining dynamic estuarine ecosystems in Southern California.

The Santa Margarita River is significant because it is one of the few remaining natural gorge rivers in Southern California, with approximately 70 species of special concern (rare, threatened, or endangered) regularly inhabiting the watershed, including 30 that are currently protected under the Federal Endangered Species Act (USEPA 1992). The riparian systems in the upper watershed play an integral role in the maintenance of sensitive downstream ecological functions. The upper watershed riparian habitats are in direct hydrologic contact with downstream systems and are associated with freshwater recharge to a series of downstream aquifers (Shapiro 1991). The Santa Margarita River system provides the main source of beach sand for the beaches of northern San Diego County (USACOE 1988, Shapiro 1991). In addition, these riparian systems often provide breeding, migratory, or escape habitat for many animal species that reside in the lower watershed.

Beginning in the mid 1980s, affordable housing and a less crowded living environment attracted new residents to the upper watershed. The result has been rapid development, converting much of the open space and agricultural uses to urban land use (USEPA 1992). Riverside County's Southwest Community Area Plan (SWAP) predicts that the population in the upper watershed will increase from a current level of approximately 70,000 to approximately 750,000 over the next 20 years, with an associated 245% increase in developed area. This study was prompted by concern that development in the upper watershed may be resulting in landscape-level impacts to the entire watershed.

METHODS

Cumulative impacts of Section 404 permitting on the riparian habitat of the Santa Margarita watershed were assessed based on the following six evaluation

criteria: endangered species habitat, structural diversity of habitats, spatial diversity and interspersion of habitats, undeveloped open space habitat, adjacent habitats (floodplain land use), and linear contiguity of habitats. Site-specific impacts were assessed by comparing the conditions present at each project site prior to issuance of the Section 404 permit to conditions present after issuance of the permit. Each project site was given a pre- and post-project rating (indicator level) of A, B, C, D, or E for each evaluation criterion, with A representing site conditions similar to those present at pristine reference sites and E representing the most degraded condition. Stein and Ambrose (1998) provide a description of the indicator levels for each evaluation criterion. Impact scores, ranging from −4 to +4, were based the change in the number of indicator levels at each site. For projects with off-site compensatory mitigation, the pre- *vs.* post-project changes to both the mitigation site and the project site were evaluated as described above, yielding two impact scores, one for the project site and one for the mitigation site. There was only one case of off-site mitigation in this study.

The chi-squared statistic was used to compare the observed distribution of impact scores to the distribution that would be expected if impact scores were independent of the evaluation criteria (Barber 1988). To simplify the analysis, impact scores were combined into categories: *Substantial Adverse Impacts* (impact scores of −4 and −3), *Adverse Impacts* (impact scores of −2 and −1), and *Minimal Impacts* (impact score of 0). Score of +1 and +2 could have been grouped into an *Enhancement* category and scores of +3 and +4 could have been grouped into a *Substantial Enhancement* category. However, since less than 1% of the affected area resulted in positive impact scores for any criterion, these categories were excluded from analysis. To discern specific contributions to cumulative impacts, the chi-squared analysis was used to compare impact scores based on the type of permit, the size of the project, and the type of activity. Analyses were performed based on the percent of permits and hectares resulting in each level of impact.

Assigning numerical values, rather than letters, to the indicator levels within a criterion would imply a defined arithmetic proportionality between ratings. Justification of such a numerical scale would require knowledge of the weighting and the mathematical relationship between categories. Scientifically defensible data to support such mathematical relationships do not exist. Therefore, we focused our analysis on the direction and the number of indicator levels changed and did not attempt to arbitrarily quantify the magnitude of this change. A more detailed discussion of this method, including assumptions and rationale for choice of criteria is presented by Stein and Ambrose (1998).

To assess the impacts of Section 404 permitting in the Santa Margarita Watershed (hereafter referred to as the "watershed"), general permitting trends were summarized and the following questions were addressed: Have there been cumulative impacts to the upper watershed? How have impacts varied across evaluation criteria? How have nationwide permits contributed to cumulative impacts? What is the relationship between project size and impacts? Do impacts vary based on the type of project permitted? Has Section 404 had any success at reducing cumulative impacts? Answering these questions allowed an understanding of what the cumulative impacts to the upper Santa Margarita Watershed have been, and what can be done to better manage cumulative impacts in the future. Our analysis assumed that current site features and functions reflected the integration of site conditions at the culmination of the permitted project with all other activities in the watershed which had occurred since initiation of project construction. This assumption does not entirely reflect reality because there undoubtedly were other factors outside the control and influence of the Section 404 program that contributed to cumulative impacts. However, the analysis we present allowed us to make broad semi-quantitative evaluations of the contribution of the Section 404 program to cumulative impacts in this watershed.

RESULTS AND DISCUSSION

General Permitting Trends

The USACOE database records and permit files contained 122 Section 404 permit actions in the watershed between 1985 and 1993, of which 90 (74%) were located in the upper watershed. Of the 90 permit applications involving 352 ha of waters of the U.S., 58 ultimately resulted in completed projects. These 58 projects resulted in impacts to 145 ha of waters of the U.S. The remaining 32 applications involved reauthorizations of previously issued permits, permitted projects that were not done, or application withdrawals. Because there were no impacts attributable to Section 404 associated with these 32 projects, they were omitted from the analysis of cumulative impacts.

Discharges of dredged or fill material into waters of the U.S. have been regulated by the CWA since 1975. However, the earliest record of any application being submitted to the Corps for a project in the upper watershed was in 1985, which coincided with the onset of a 225% increase in population and widespread conversion of the Temecula Valley from agriculture and open space to suburban and commercial uses. Much

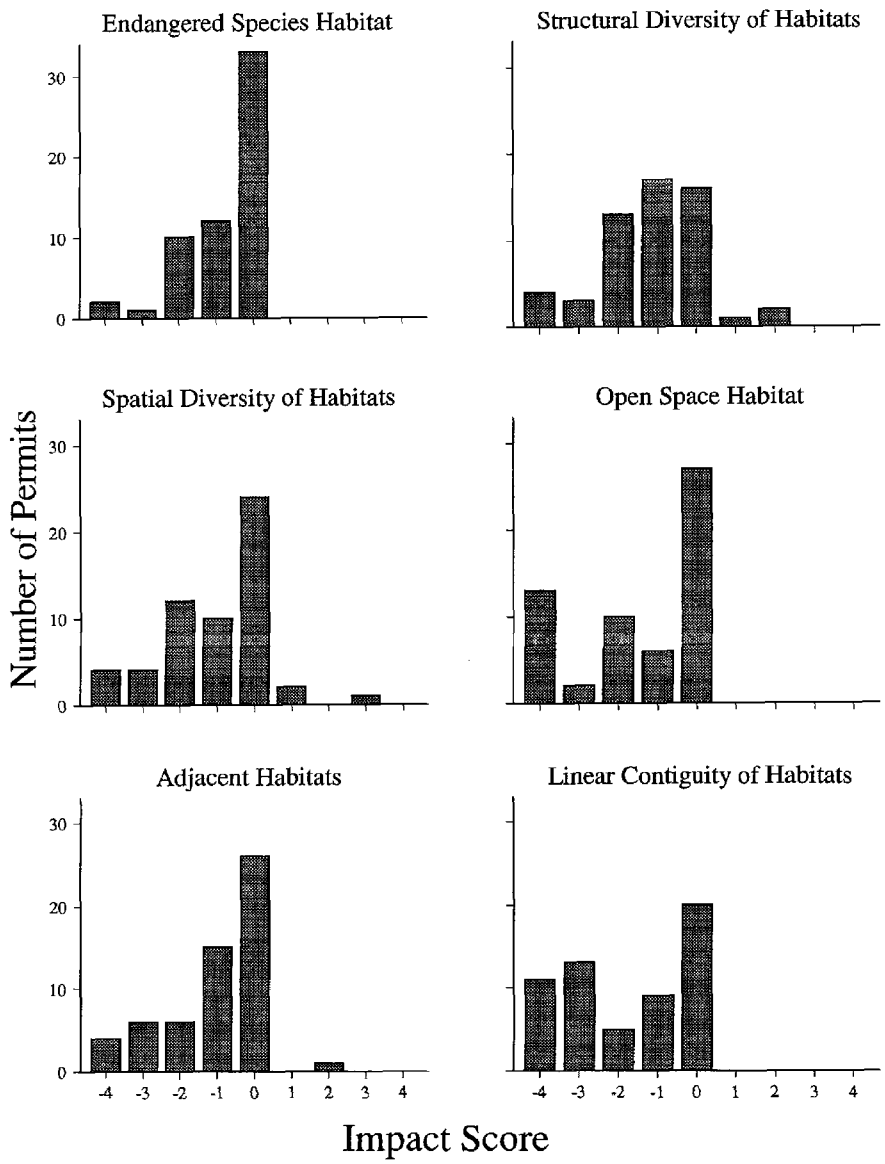

Figure 2. Distribution of permits receiving each impact score by criterion. Number of permits issued receiving each of nine possible impact scores. The impact score is determined by counting the number of indicator levels gained or lost as a result of project construction.

of this conversion involved floodplain development and associated flood-control projects requiring authorization under Section 404 of the CWA. The relationship between urbanization and Corps permitting is illustrated by the strong correlation (R^2=0.95) between population and the cumulative number of Section 404 actions.

Have There Been Cumulative Impacts to the Upper Watershed?

The distribution of impact scores for each criterion based on number of permits and on number of hectares are shown in Figures 2 and 3, respectively. Although the distributions differ, in all cases, the impact scores were concentrated on the negative end of the scale. Approximately 74% of the area impacted resulted in adverse or substantial adverse impacts (scores between −1 and −4), and less than 1% of the affected area resulted in enhancement or substantial enhancement (scores between +1 and +4). For three of the six criteria (endangered species habitat, open space habitat, and linear contiguity of habitats), there were no instances where permitted projects resulted in enhancement. If the Section 404 permitting program had been effective at minimizing cumulative impacts to riparian resources, there would have been a narrow distribution of scores, with the majority of permit sites receiving

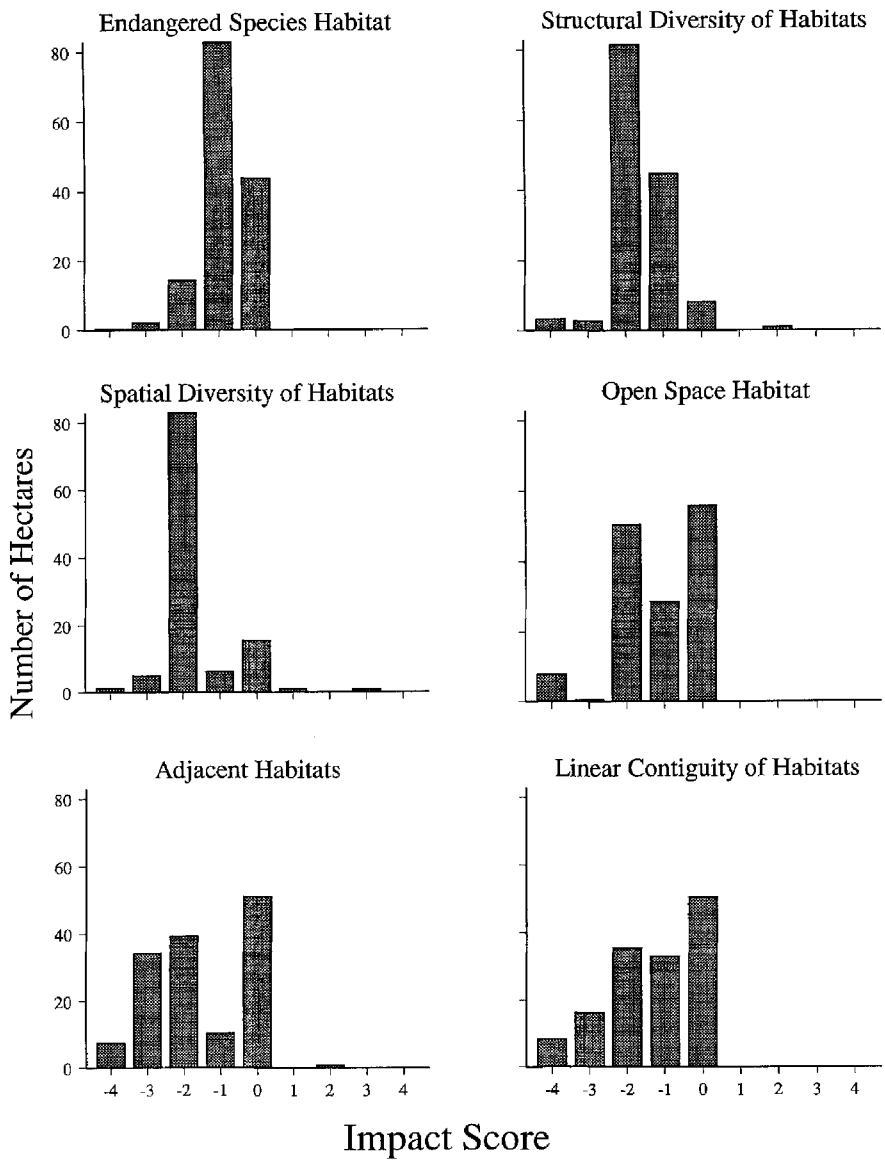

Figure 3. Distribution of hectares receiving each impact score by criterion. Number of hectares impacted receiving each of nine possible impact scores. The impact score is determined by counting the number of indicator levels gained or lost as a result of project construction.

Table 1. Percent of permits and hectares that received minimal impact scores. The average of all six criteria is presented as a mean ± one standard error of the mean (SEM).

Evaluation Criterion	Percent with Minimal Impacts	
	Permits	Hectares
Endangered Species Habitat	57%	31%
Structural Diversity of Habitats	34%	6%
Spatial Diversity of Habitats	47%	12%
Open Space Habitat	47%	39%
Adjacent Habitat	47%	36%
Linear Contiguity of Habitats	34%	35%
Average of all Six Criteria	43 ± 3.6%	27 ± 5.7%

impact scores of 0, −1, or +1. If the goal of the CWA to restore the integrity of aquatic resources had been met, the distribution of impact scores would have been skewed toward the positive end of the scale.

The distribution of impacts based on the three impact categories shows that the majority of projects resulted in adverse or substantial adverse impacts. On average, 44% of the permit sites and 27% of the area permitted received minimal impact scores (Table 1). For every evaluation criterion except endangered species habitat, more than half the permits and area resulted in adverse or substantial adverse impacts, and impact scores were more severe based on area than on permits.

Table 2. Contingency tables for impact scores by criterion. The expected value for each column is shown at the bottom of the column. A (+) indicates the observed value was significantly ($p < 0.05$) greater than expected, a (−) indicates the observed value was significantly ($p < 0.05$) less than expected, and no designation indicates the observed value did not differ from expected. The sum of each row differs slightly because data were unavailable for some criteria at some project sites.

Evaluation Criterion	Substanitial Adverse Impacts	Adverse Impacts	Minimal Impacts
A. Number of Permits			
Endangered Species Habitat	3 (−)	22	33 (+)
Structural Diversity of Habitats	7	30 (+)	19 (−)
Spatial Diversity of Habitats	8	22	27
Open Space Habitat	15 (+)	16 (−)	27
Adjacent Habitats	10	21	27
Linear Contiguity of Habitats	24 (+)	14 (−)	20 (−)
Expected Value (# of permits)	11	21	26
B. Number of Hectares			
Endangered Species Habitat	2.4 (−)	98.4	44.5
Structural Diversity of Habitats	6.1 (−)	127.5 (+)	9.3 (−)
Spatial Diversity of Habitats	6.1 (−)	121.5 (+)	17.4 (−)
Open Space Habitat	8.5 (−)	80.2	56.7 (+)
Adjacent Habitats	42.1 (+)	50.2 (−)	52.6 (+)
Linear Contiguity of Habitats	25.1 (+)	68.8 (−)	51.0 (+)
Expected Value (# of hectares)	15.0	91.0	38.5

The preponderance of projects resulting in adverse and substantial adverse impacts was greater than initially expected, given the pre-existing conditions of many of the project sites. The riparian resources in the urbanizing areas of the upper watershed were generally less structurally developed than those in the less impacted areas of the lower watershed. This was due to site accessibility (access to much of the lower watershed is restricted), scour resulting from increases in urban runoff and impermeable surface area, and existing degradation due to historic agricultural and suburban land use. Consequently, few sites had pre-project ratings of A or B (indicating high function), and most had ratings of C, D, or E. Therefore, it seemed likely that many post-project ratings would be equal to or better than their pre-project ratings (*i.e.,* sites that started out degraded were likely to remain the same or be enhanced). This led to an *a priori* hypotheses that few sites would receive substantial adverse impact scores and many sites would receive minimal impact scores. The former hypothesis was supported by the fact that the substantial adverse impacts category contained the lowest number of permits and hectares for almost every evaluation criteria. However, because less than half the area affected received minimal impact scores, the latter hypothesis was not supported (Table 1), indicating that not only pristine but also lower quality sites were degraded as a result of Section 404 permitted activities.

How Have Impacts Varied Across Evaluation Criteria?

The distribution of impacts varied among evaluation criteria. Some criteria, such as linear contiguity of habitats, had proportionately more permits with substantial adverse impact scores; other criteria, such as structural diversity of habitats, had a concentration of permits with adverse impact scores; while criteria such as endangered species habitat had a majority of permits with minimal impact scores. Differences in the distribution of impacts among the six evaluation criteria can be expressed quantitatively using the chi-squared statistic. Contingency Tables 2a and 2b show the observed number of permits or hectares, respectively, that received substantially adverse, adverse, or minimal impacts for each evaluation criterion. The distribution of impacts as a whole varied significantly based on evaluation criterion, with the Pearson statistic for the distribution of impacts equal to 37.34 for number of permits and 450 for area ($p < 0.01$ for both). The greater variation based on area is expected due to the large range of project sizes (0.04–99 ha).

Analysis of impacts based on the six evaluation criteria revealed differences among criteria: impacts scores for the endangered species habitat criterion were concentrated in the minimal impact category; impact scores for the structural diversity of habitats and spatial diversity of habitats criteria were concentrated

in the adverse impact category; and impact scores for the linear contiguity of habitats, adjacent habitats, and open space habitats were concentrated in the substantial adverse impacts category.

Impacts to endangered species habitat were minimized because potential effects to endangered species are specifically addressed in the Section 404 permitting process. If a project has the potential to adversely impact "threatened or endangered species or a species proposed for such designation, as identified under the Endangered Species Act," the Corps must consult with the USFWS and ensure that the project will not jeopardize the continued existence of that species [33 CFR Part 325.2(b)(5)]. The concentration of minimal impacts scores for the endangered species habitat criterion suggests that the addition of specific statutory requirements to minimize impacts to other criteria may be effective at reducing impacts to those criteria.

Greater-than-expected substantial adverse impacts to habitat adjacent to permitted project sites (*i.e.*, floodplains) can be attributed to the fact that, in the absence of endangered species concerns or adjacent wetlands, impacts to floodplain areas outside of Corps jurisdiction cannot be explicitly addressed during permit evaluation. Project proponents can fill and develop within the floodplain without review or authorization from the Corps. However, the productivity of riparian systems depends on the exchange of nutrients and organisms between active channels and floodplains (Gregory et al. 1991). Therefore, development of the floodplain can sever the normal biogeochemical and hydrologic connections between aquatic habitats and surrounding upland habitats. This may result in the degradation or loss of riparian areas, even if those areas were not directly impacted (Richardson 1994). Expansion of Corps jurisdiction to include the entire riparian floodplain could reduce impacts to the adjacent habitats criterion.

Projects have had substantial adverse effects on linear contiguity. Section 404 allows for the consideration of upstream and downstream effects during permit evaluation. However, in the absence of adequate basinwide information, impacts to corridors are difficult to address, and analysis is confined to the areas immediately adjacent to the proposed project. Riparian strips often constitute important corridors for seasonal migrants, and fragmentation of these corridors can decrease species diversity at a landscape level (Knopf et al. 1988, Hanson et al. 1990). In the Santa Margarita Watershed, the Santa Ana Mountain cougar population is at risk of extinction due to demographic instability resulting from habitat fragmentation (Beier 1993). Beier concluded that the risk of extinction could be reduced by immigration from the Palomar Mountain population via a movement corridor through Pechanga Creek, which is tributary to Temecula Creek. This corridor is currently degraded; however, minor enhancement could make it viable, while continued incremental degradation will almost certainly eliminate migration between the two cougar populations.

The potential effects of a project on structural and spatial diversity of habitats are usually addressed during permit review. Consequently, projects did not affect these criteria as much as the linear contiguity and adjacent habitats criteria. However, structural and spatial diversity of habitats were subjected to greater-than-minimal impacts, suggesting that natural habitat recovery and/or mitigation requirements have not been sufficient to compensate for direct project impacts. Because the complex habitat heterogeneity associated with the different successional stages typically found in riparian communities supports a diverse biological community (Gregory et al. 1991), reduction of the horizontal or vertical structure over contiguous areas may decrease habitat suitability for mammals, birds, and reptiles (Wigley and Roberts 1994). Continued loss of structural and spatial diversity of habitats may lead to decreases in faunal diversity and ultimately to more animal species being listed as threatened or endangered.

Some of the ambiguous results obtained in the chi-squared analysis may result from the extreme heterogeneity of the projects investigated. To isolate specific causes and contributions to cumulative impacts, our analysis was refined by investigating impacts based on type of permit issued (nationwide *vs.* individual), size of project, and type of work performed.

How Have Nationwide Permits Contributed to Cumulative Impacts?

Lee and Gosselink (1988) assert that nationwide permits comprise the most significant contribution to cumulative impacts due to their "nibbling" effect on aquatic resources. By definition, activities authorized under the nationwide permit program must result in minimal individual and cumulative impacts on the environment [33 CFR, Part 330.6(a)(3)]. The large number of projects authorized under the nationwide permits allowed us to test if this statutory requirement has been met.

Of the 58 permits issued in the upper watershed, 49 (84%) were authorized by nationwide permits; however, they accounted for only 21% of the total affected area. Due to the difference in area permitted under individual *vs.* nationwide permits (114.8 *vs.* 30.2 ha), impacts were compared based on the percent of total hectares, rather than the absolute hectares, receiving each score for each type of permit.

Individual permits resulted in greater impacts to the

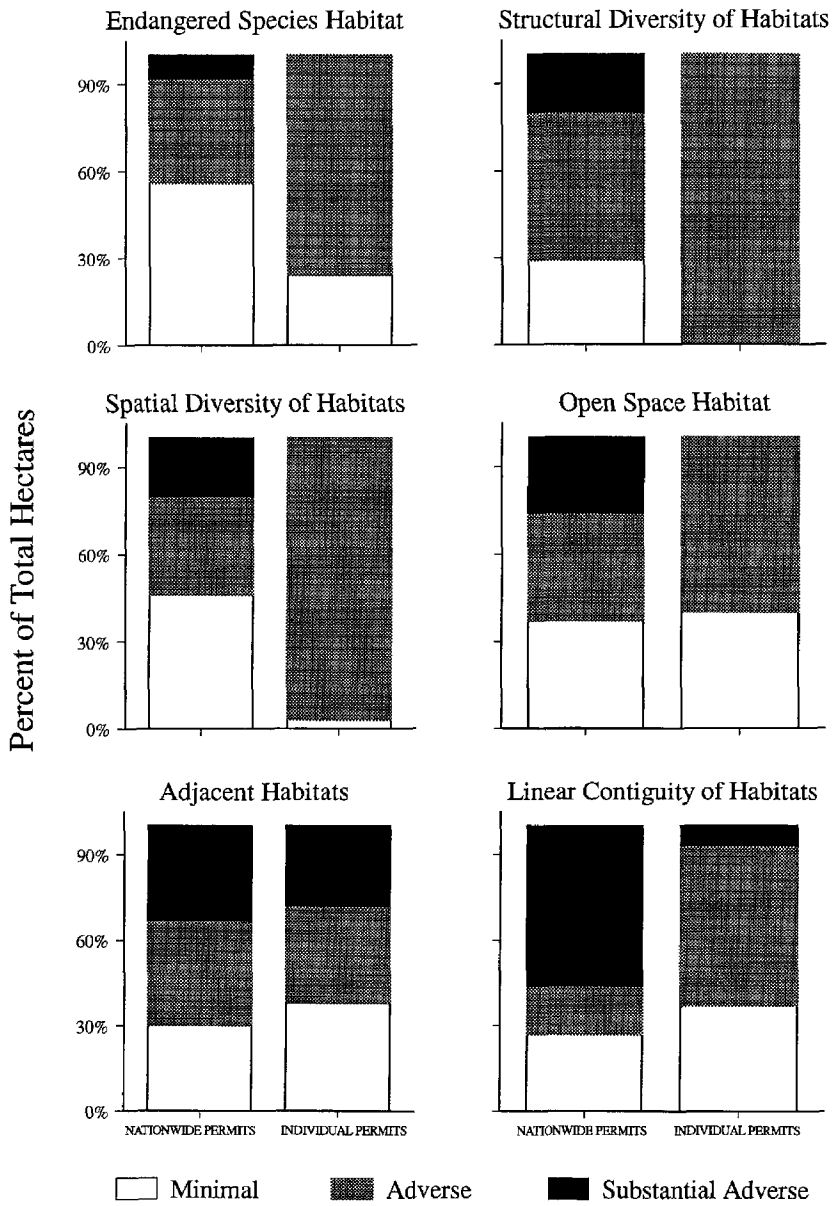

Figure 4. Distribution of impacts by criterion for nationwide *vs.* individual permits. Percent of total area impacted that received impact scores of minimal (white), adverse (grey), or substantial adverse (black) for each evaluation criterion.

endangered species habitat and spatial diversity of habitats criteria, while nationwide permits resulted in greater impacts to the open space habitat and linear contiguity of habitats criteria (Figure 4). Although nationwide permits involved only 21% of the total affected area, they accounted for 55% of the area subjected to substantial adverse impacts. Therefore, although they affect less area than individual permits, nationwide permits contributed proportionally more to cumulative impacts. Differences between nationwide and individual permits may be due to the fact that endangered species habitat and spatial diversity of habitats are usually evaluated during review of both types of permits. Therefore, the smaller projects authorized by nationwide permits generally resulted in fewer impacts to these criteria. Evaluation of open space habitat and linear contiguity of habitats usually occurs only during the extensive review associated with individual permits. The more superficial review associated with nationwide permits often fails to consider these impacts on a regional basis. In addition, mitigation requirements, which are more often associated with individual permits, may help offset some of the secondary impacts to the latter two criteria.

Several of the nationwide permits contain size limitations above which an individual permit is required.

The most commonly used one, Nationwide Permit No. 26, authorized impacts of up to four hectares (ten acres) of waters of the U.S (at the time of this study, Nationwide Permit No. 26 authorized impacts to up to 4 ha of waters of the U.S.; on December 13, 1996, the Corps modified Nationwide Permit No. 26, reducing the maximum area of impact to 1.2 ha). If a project meets the general terms and conditions of a nationwide permit, but will result in greater than minimal impacts, the District Engineer (DE) may exercise discretionary authority and require the project to be processed as an individual permit. However, it is often difficult to build a scientifically defensible case for exercising this authority based on cumulative impacts. Consequently, many small projects proceed unmitigated under authority of the nationwide permit program, resulting in cumulative impacts to an area. As an alternative to exercising discretionary authority on a case-by-case basis, cumulative impacts might be reduced by lowering the threshold of nationwide permits so that certain projects currently permitted by nationwide permits would be subject to the more thorough review and mitigation requirements associated with individual permits. To recommend a new threshold for the nationwide permits, we investigated project impacts by grouping projects into five categories based on the area of waters they impacted: less than 0.4 hectare, 0.4 to 1 hectare, 1 to 2 hectares, 2 to 4 hectares, and greater than 4 hectares. Forty nine of the 54 projects (91%) in the first four size categories were authorized by nationwide permits. The remaining projects were permitted by individual permits.

Large projects were responsible for the majority of affected area in the upper watershed; however, mid-sized projects made the largest proportionate contribution to cumulative impacts (Figure 5 and 6). The 2-to-4 hectare category accounted for 8% of the total area impacted; however, between 16% and 61% of the total area subjected to substantial adverse impacts [$\bar{x}=34\pm6\%$ (SEM)] was in this size category. For all the evaluation criteria, the proportion of substantial adverse impact scores decreased in the greater-than-4-hectares category (Figure 6).

The proportionally high impacts associated with projects involving between 2 and 4 ha of waters could have been reduced if the threshold for Nationwide Permit No. 26 was lower than 4 hectares. The proportional decline in impacts between the 2-to-4-hectares and the greater-than-4-hectares categories may have been due to the more extensive review associated with the individual permit process. Projects authorized by individual permits (usually involving greater than 4 hectares of waters) are subject to compliance with the Section 404(b)(1) guidelines, which mandate the choice of the least environmentally damaging practicable project alternative. In addition, projects permitted by individual permits usually include more comprehensive mitigation requirements. Projects affecting between 2 and 4 hectares had the lowest percent of required mitigation and the poorest mitigation compliance (Stein 1995). If the distribution of impacts for the 2-to-4-hectare category were comparable to that of the greater-than-4 hectares category, overall substantial adverse impacts would have been reduced by an average of $88\pm10\%$ (SEM).

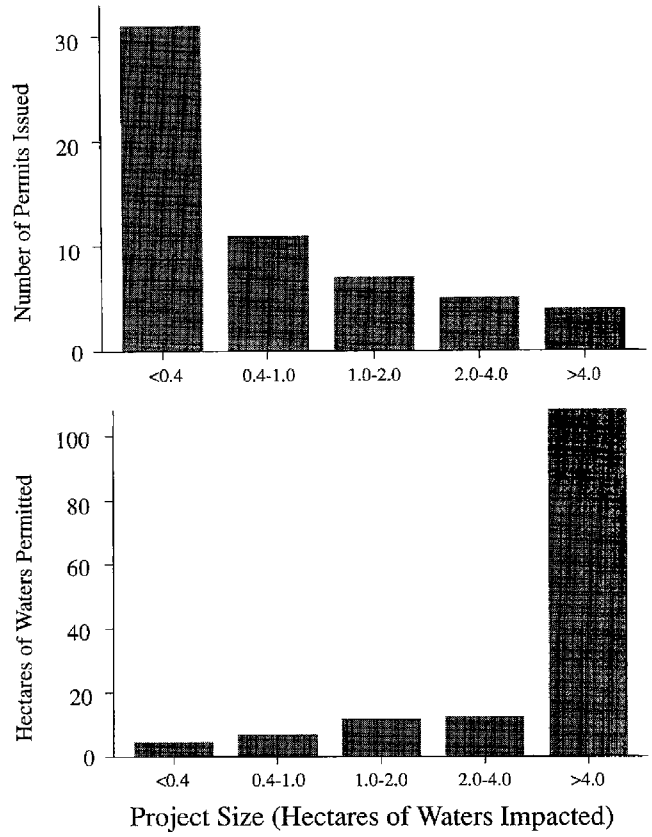

Figure 5. Number of permits issued and hectares permitted in each size range. Projects were divided into five categories based on the hectares of waters impacted. Top graph shows total number of permits issued; bottom graph shows total number of hectares permitted in each size category.

Did Impacts Vary Based on the Type of Project Permitted?

The severity with which a project affected riparian habitat was a function of both the area affected and the type of disturbance that occurred, and these two variables were not always directly related. For example, channelization of a 0.5-hectare tributary may have a more severe impact than the temporary clearing of vegetation from a 3-hectare tributary. To facilitate a comparison of impacts based on type of project, the

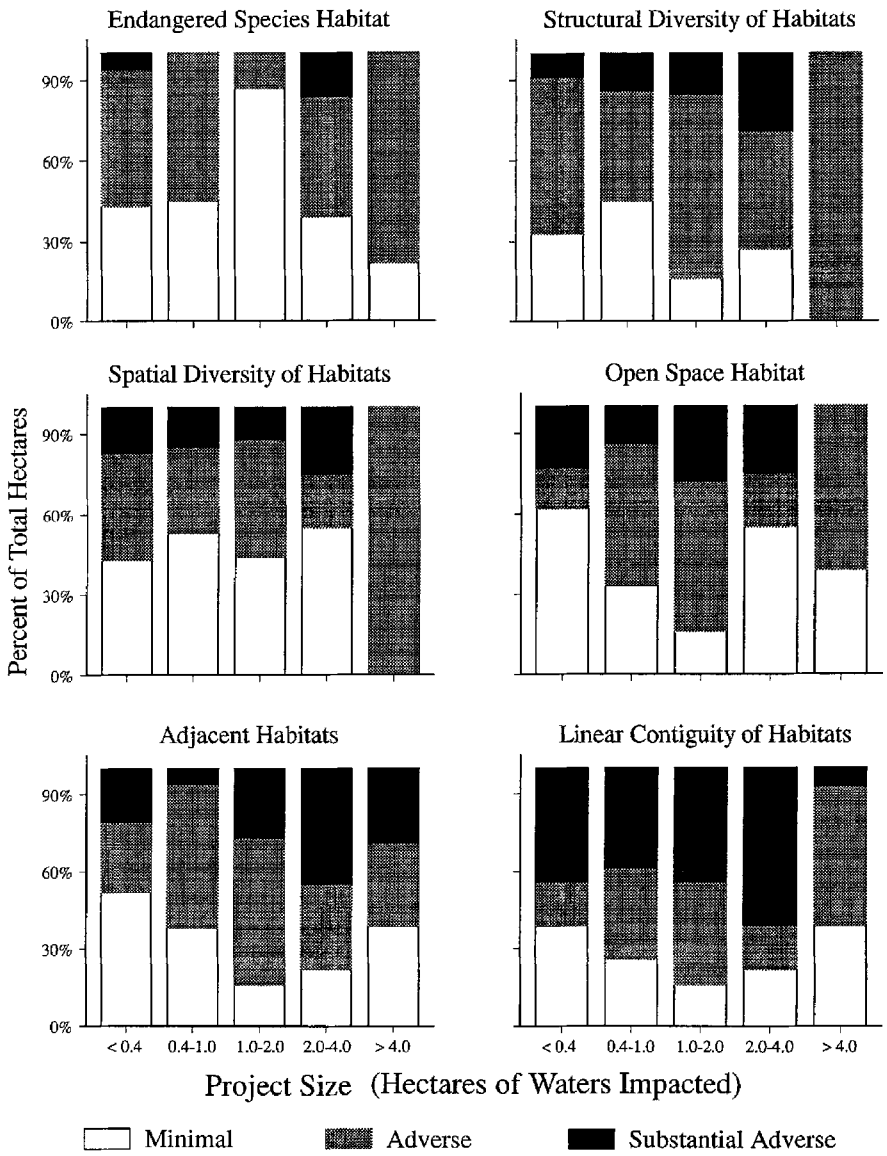

Figure 6. Distribution of impacts by criterion for each size range of projects. Projects were divided into five categories based on the hectares of waters impacted (x axis). Graphs show the percent of total area impacted that received impact scores of minimal (white), adverse (grey), or substantial adverse (black) for each evaluation criterion.

58 permitted projects were divided into six categories based on the type of activity involved (Figure 7).

The cumulative area affected by each type of project varied from 0.8 ha for utility line crossings to 66 ha for channelization projects (Figure 7). However, the severity of impacts associated with each type of project did not necessarily correspond to the magnitude of the affected area. Utility line crossings impacted small areas and involved temporary disturbances associated with trenching, dewatering, and laying pipeline. Sites were usually restored to pre-construction conditions upon completion of the work, and many of the sites had fully recovered between the time the project was done and the time the post-project evaluations were performed. For all six evaluation criteria, between 60% and 100% of the area affected by the utility line crossings resulted in minimal impacts (Figure 8).

Vegetation clearing involved removal of habitat from large areas of channels but did not involve any permanent modification of streamcourses. When vegetation is only cleared from portions of channels on a rotating basis, with time for recovery between successive clearings, impacts to the open space habitat, adjacent habitats, and linear contiguity of habitats criteria are minimized. On the other hand, complete clearing of vegetation from channels on an annual basis results in adverse impact scores for most of the evaluation criteria.

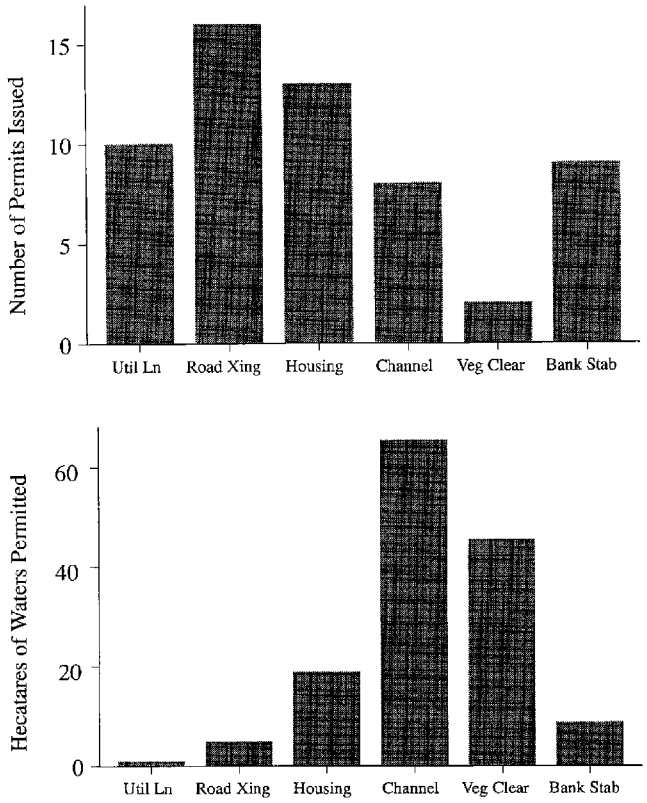

Figure 7. Number of permits issued and hectares permitted for each type of project. Projects were divided into six categories based on the type of project for which a permit was issued. Top graph shows total number of permits issued; bottom graph shows total number of hectares permitted for each type of project. Util Ln = utility line crossings, Road Xing = road crossings, Housing = housing or golf courses, Channel = channelization, Veg Clear = vegetation clearing, and Bank Stab = bank stabilization.

Bank stabilization projects using rip-rap, concrete, or geotextiles often resulted in confinement of riparian zones and restricted the dynamic processes of the riparian system, such as overbank flooding and seed dispersal. In addition, steep banks limit access by fauna that typically move between riparian and upland habitats. In the upper watershed, many of the bank stabilization projects were necessitated by existing development and floodplain encroachment, which had resulted in erosion and bank degradation. Therefore, the pre-project ratings were often low, precluding adverse project-related impacts. Impacts associated with bank stabilization activities could be reduced by encouraging the replacement of steep sided structural protection with vegetated natural bank protection, which uses shallow sideslopes.

Channelization projects made the most substantial contribution to cumulative impacts in the upper watershed, accounting for 66 ha or 45% of the total affected area, with each project affecting an average of 8.5 ha. For every evaluation criterion except endangered species habitat, 100% of the impacts were adverse or substantial adverse. The most severe impacts were to the adjacent habitats criterion, where 46% of the affected area resulted in substantial adverse impacts. These impacts were manifested by the fact that channelization facilitated development of adjacent floodplains, often to the edge of the channel. Careful regulation of large channelization projects could have substantially reduced cumulative impacts to the upper watershed. If structural channelization projects were replaced by installation of broad greenway channels that accommodate riparian growth, use of setback levees at the edge of the floodway, or exclusion of buildings within the floodway, overall impacts to the region could have been substantially reduced.

Road crossings and housing projects affected much less area than channelization projects, a total of 24 ha, but their impacts were proportionally greater than channelization or other activities. Road crossings and housing projects accounted for only 3% and 13% of the total affected area, respectively, but 10% and 50% of the area receiving substantial adverse impact scores were due to these two types of projects. Because these types of projects involved small areas, and consequently were authorized by nationwide permits, their contribution to cumulative impacts was often overlooked. Nevertheless, since these small projects resulted in severe impacts, numerous occurrences within a region resulted in overall degradation of habitat and fragmentation of corridors.

Has Section 404 Been Effective in Any Way at Reducing Cumulative Impacts?

Despite the failure of the Section 404 permit program to minimize cumulative impacts to the upper watershed, its existence has provided some measure of protection to aquatic resources. In many cases, projects were redesigned to reduce mitigation requirements and/or to comply with the terms of the less cumbersome nationwide permit program. For example, a proposed detention basin along a tributary to Murrieta Creek was substantially modified in an effort to comply with the nationwide permit program and reduce mitigation costs. The result was a reduction of impacts from 7.7 ha of high function riparian habitat to 2.4 ha of partially degraded habitat, with the mitigation occurring on a contiguous parcel. In the absence of the Section 404 program, the original project design would probably have been implemented.

Withdrawal of applications for projects that would result in substantial adverse impacts to aquatic resources should also be viewed as a success of the Sec-

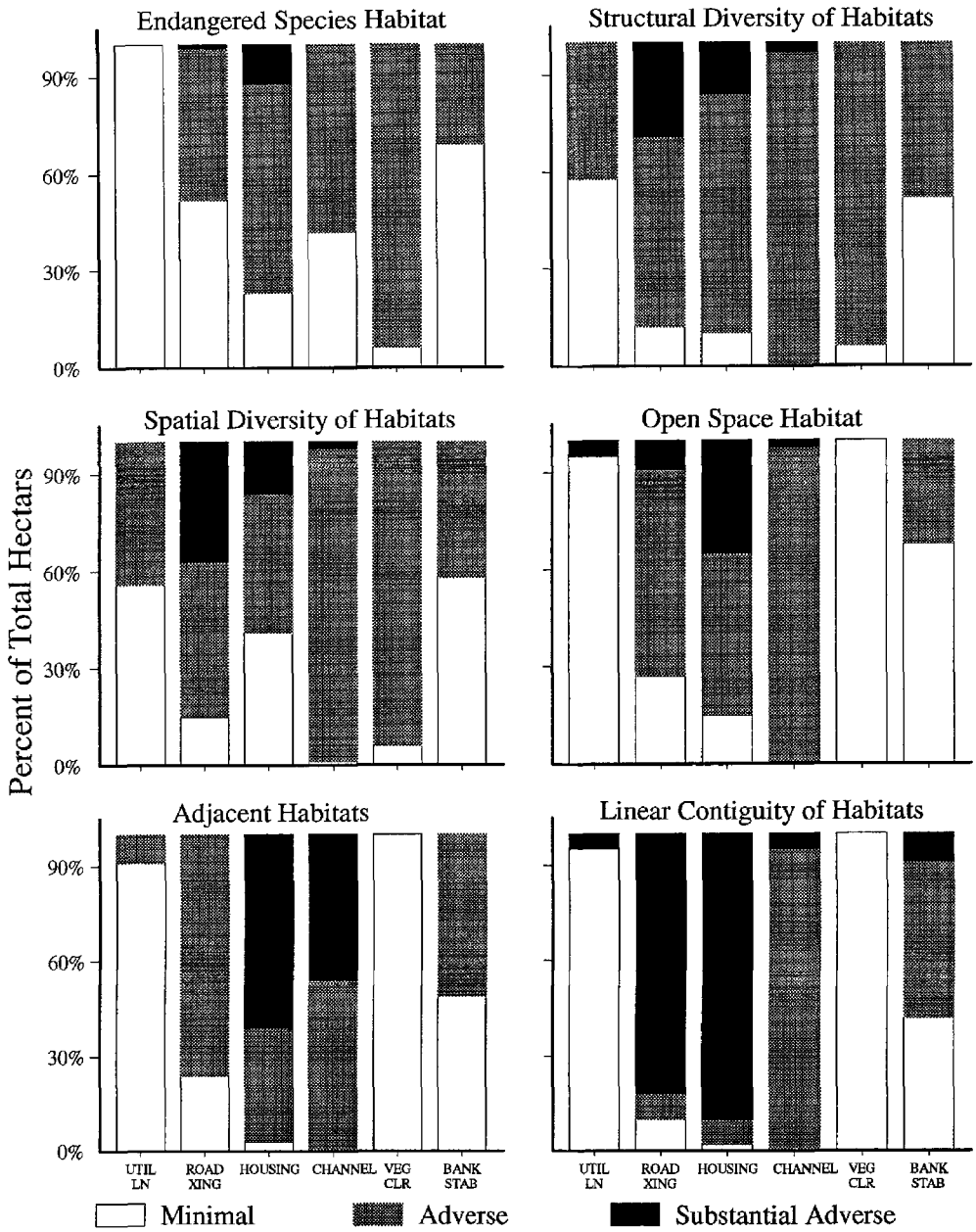

Figure 8. Distribution of impacts by criterion for each type of project. Projects were divided into six categories based on the type of project for which a permit was issued. Graphs show the percent of total area impacted that received impact scores of minimal (white), adverse (grey), or substantial adverse (black) for each evaluation criterion. Abbreviations are the same as in Figure 7.

tion 404 program. Although no permit applications were denied in the upper watershed, ten were withdrawn and the proposed projects either abandoned or redesigned to reduce impacts (Table 3). Six of the ten projects that were withdrawn would have required individual permits and would have each impacted an average of 16±5 ha of waters of the U.S. According to information in the project files, five of these six projects were withdrawn due to the severity of impacts and the possibility of permit denial. Three of these five projects were subsequently redesigned to reduce impacts and applications resubmitted; two have since been permitted. Project redesign or abandonment following withdrawal of permit applications resulted in the avoidance of impacts to approximately 40 ha of waters of the U.S. If constructed, these projects would have resulted in a 28% increase in the total area impacted in the upper watershed.

Table 3. Summary of withdrawn permit applications. Hectares of Waters column represents the area that was requested in the original permit application. Reason Application Withdrawn column is based on information and notes from the project files.

Permit File Number	Type of Permit[a]	Type of Project	Hectares of Waters	Reason Application Withdrawn
880369	NW Permit	Commercial development	0.40	Unknown
900214	NW Permit	Housing	0.57	Enforcement action
930274	NW Permit	Road crossing	0.20	Applicant abandoned project
931017	NW Permit	Road repair and Bank stabilization	1.0	Unknown
870312	Ind Permit	Channelization	30.4	Impacts too large to permit
880271	Ind Permit	Channelization	24.7	Impacts too large to permit
890018	Ind Permit	Sand mining	26.3	Impacts too large to permit
890153	Ind Permit	Sand mining	5.3	Enforcement action
900242	Ind Permit	Channelization	3.8	Impacts too large to permit
910750	Ind Permit	Outfall structure and Channelization	4.5	Impacts too large to permit & EPA denial of NPDES permit

[a] Anticipated type of permit under which project would have been authorized. NW = nationwide, Ind = individual.

CONCLUSIONS AND RECOMMENDATIONS

The Clean Water Act (CWA) goal of restoring and maintaining the chemical, physical, and biological integrity of the nation's waters has not been met in the upper Santa Margarita Watershed. The preponderance of degradation is especially sobering considering that approximately half the project sites were initially somewhat degraded and, despite having potential for enhancement, degenerated further following implementation of permitted activities.

Analysis of impacts based on the six evaluation criteria revealed differences between criteria related to the degree of review each received during permit evaluation. The criteria that were directly evaluated during permit review (endangered species habitat, structural diversity of habitats, and spatial diversity of habitats) were subject to less severe impacts than those not specifically evaluated (linear contiguity of habitats, adjacent habitats, and open space habitats). The greatest proportionate contribution to cumulative impacts was made by projects authorized by nationwide permits, projects impacting between two and four hectares, and road crossing and housing construction projects. The largest gross contribution to cumulative impacts was made by channelization projects.

The most egregious impact to the upper watershed has been the loss of riparian floodplains due to urban encroachment and stream channelization. In some instances, channel bottoms have remained earthen and some riparian vegetation has been allowed to survive. However, many of these channels contain steep sideslopes that isolate the channel from adjacent uplands, limiting dynamic riparian processes such as overbank seed dispersal, and restricting free movement of organisms between upland and riparian habitats. Furthermore, disconnecting rivers from their floodplains reduces their ability to attenuate flood peaks, limits natural sediment deposition and water-quality enhancement, and disrupts downstream successional processes and scour cycles (Warner and Hendrix 1985, Harris and Gosselink 1990).

We recognize that the activities authorized under the Section 404 program represent only one contribution to the cumulative impacts in this watershed. However, this study identified factors within the realm of the Section 404 program that contributed to cumulative impacts. Below, we suggest changes to the Section 404 program that, based on the result of this study, would allow it to more effectively meet the stated goal of minimizing cumulative impacts to aquatic resources.

Recommendations for Managing Cumulative Impacts

The linear nature of riparian systems makes them especially susceptible to cumulative impacts resulting from incremental impacts of many activities occurring over extended periods of time. Management of cumulative impacts to riparian systems is difficult because linear riparian strips are often lengthy and pass through private and public lands, creating a situation where multiple landholders each own a small portion of the riparian zone. This makes it difficult to effectively manage the entire zone and results in piecemeal projects leading to cumulative impacts that degrade the functions of the system. To better address the cumulative impacts associated with Section 404 permitting and to help achieve the Clean Water Act goal of maintaining and restoring the integrity of the aquatic resources of this watershed, we recommend the following changes be made to the Section 404 permit program.

1. *Classify riparian systems as special aquatic sites.* In arid climates, riparian systems have a proportionally greater significance than wetlands elsewhere in the U.S. (USDOI 1994). Despite the fact that riparian systems perform similar functions as wetlands in terms of wildlife habitat, ground-water recharge, flood storage, and sediment retention, they seldom meet the Corps definition of wetlands. Severe impacts to the adjacent habitats criterion was indicative of the lack of protection provided to riparian zones by the Section 404 program. To afford riparian systems the protection enjoyed by wetlands, as well as provide better protection of floodplains, riparian systems should be classified as "special aquatic sites" under Section 404. This change would need to occur either through amendment of the Clean Water Act by Congress or by publication of new regulations in the Federal Register, with subsequent public review and comment.

2. *Consider project specific impacts in a landscape context.* Section 404 regulates activities impacting waters of U.S., not uplands. However, uplands and wetlands function in an integrated manner, and impacts to the latter cannot be considered in a vacuum. Therefore, the impacts of specific projects on landscape-level ecological process must be considered during permit evaluation. In addition, local zoning to protect riparian habitats, comprehensive planning for watercourse development, and improved floodplain management programs may help reduce the impacts to corridors and floodplains we observed in this watershed. Evaluation of permit applications in the context of past actions and current watershed plans would help. Such a plan could also provide appropriate strategies for managing and mitigating these impacts.

3. *Maintain floodplain integrity.* Despite Executive Order 11988, which states that federal agencies should not support floodplain development, substantial floodplain encroachment has occurred in this watershed, partly because much of the floodplain is usually outside Corps jurisdiction. Some of the most egregious impacts in this watershed were associated with channelization of streams and subsequent loss of floodplains. Important links between streams and adjacent uplands could be preserved by replacing structural channelization and bank stabilization, such as concrete and riprap sideslopes, with more natural, shallow, vegetated sideslopes. Promoting riparian growth along streambanks could be effective at stabilizing soil, controlling erosion, and reducing flow velocities by increasing surface roughness. In addition, flood control options such as stepped levees, meander zones, greenbelts, and riparian conservation easements should be considered instead of traditional channelization. Regional policies, zoning ordinances, or permit conditions could be developed which required better protection of floodplains during infrastructure planning and development.

4. *Maintain a low threshold for Nationwide Permit No. 26 and its replacements.* This study demonstrates that impacts were greatest for projects affecting between two and four hectares of waters of the U.S. Most of these projects were authorized by nationwide permits and, therefore, were not subject to review under the Section 404(b)(1) guidelines. On December 13, 1996, the Corps modified Nationwide Permit No. 26, reducing the threshold to 1.2 hectares. The results of this study indicate that this change could substantially reduce cumulative impacts by subjecting more projects to the review and mitigation associated with individual permits. At the same time, this new threshold should still provide a reasonable incentive for applicants to reduce project size and impacts to comply with the nationwide permits. We recommend that any replacement for Nationwide Permit No. 26, which is scheduled to expire on December 13, 1998, contain a threshold no greater than 1.2 hectares.

5. *Explicitly consider impacts to floodplains and corridors during permit evaluation.* This study shows that impacts were proportionally lower for criteria directly evaluated during permit review. To maintain the integrity of adjacent habitats (floodplains) and linear contiguity of habitats (corridors), impacts to these criteria should be explicitly addressed during permit evaluation. A watershed planning approach that accounts for landscape-scale processes would also help reduce cumulative impacts to these criteria.

6. *Adjust permitting and mitigation requirements based on permanence of impacts.* Most riparian systems have a remarkable ability to establish themselves initially and to recover from natural or man caused destruction if left undisturbed (Laymon 1984, reported by Warner and Hendrix 1985). This is illustrated by the proportionally lower impacts that were associated with projects having temporary impacts, such as utility line crossings. However, projects such as channelization or housing construction often resulted in a permanent loss of aquatic resources and/or precluded future habitat from establishing. A distinction should be made between projects with permanent and temporary impacts. Rotating cycles of vegetation clearing should be encouraged to reduce temporal impacts and prevent permanent loss of habitat. If issuance of a Section 404 permit would reduce or eliminate the opportunity for future habitat development or restoration, more emphasis should be placed on avoidance of impacts.

This study has shown that when numerous small decisions on related environmental issues are made

more or less independently, the combined consequences of the decisions are not addressed (Odum 1982). However, modifications to existing permitting procedures and continuation of the proactive planning process may be successful at reducing future cumulative impacts.

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105-3901

In Reply
Refer to: WTR-5

JAN 21 1998

Walt Pettit
Executive Director
California State Water Resources Control Board
P.O. Box 100
Sacramento, CA 95812-0100

Re: SWRCB/OCC File A-1041 for Orange County

Dear Mr. Pettit:

We have reviewed the revised draft Order dated January 15, 1998, prepared by the State Water Resources Control Board concerning the appeal of NPDES permit No. CAS0108740. This permit was issued by the San Diego Regional Water Quality Control Board on August 8, 1996 and authorizes storm water discharges from the municipal separate storm sewer system (MS4) serving the southern portion of Orange County. Our comments on the revised draft Order follow below.

We are pleased that the January 15 draft Order would clarify and establish the State's position that municipal storm water dischargers must meet water quality standards (WQS), which is consistent with EPA's position. We recognize that many municipalities have expressed concern regarding their ability to comply with WQS. If the situation should arise in which a municipality could not comply for technical or economic reasons, the Clean Water Act (CWA) provides several mechanisms to seek relief including a use attainability analysis, the development of site-specific WQS, or a short term WQS variance.

Although the draft Order recognizes the applicability of WQS to MS4 permits, we are concerned with other aspects of the draft Order. While we appreciate that revision of the Orange County permit, which is the basis for this appeal, would create inconsistencies with the earlier Orange County permit issued by the Regional Water Quality Control Board, Santa Ana Region, in March, 1996, the permit includes language which concerns us. In particular, the phrase, "permittees will not be in violation of this provision...." (if certain steps are taken to evaluate and improve the effectiveness of the Drainage Area Management Plan (DAMP)) is of the greatest concern to EPA. We understand this phrase would not appear in future storm water permits, should the alternative language proposed for such future permits be adopted; nevertheless, we feel that it is necessary to state our disagreement with Conclusion 2 of the proposed Order, which would find that the quoted phrase, as used in the Orange County permit, complies with the CWA.

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The Orange County permit includes the requirement that the discharges meet WQS in the receiving water. That requirement was included in the Orange County permit in order to satisfy Section 301(b)(1)(C) of the CWA. Excusing the discharger from violations of that requirement effectively negates the requirement, a result which is inconsistent with CWA Section 301(b)(1)(C). Thus, we disagree with Conclusion 2.

Regarding the proposed receiving water limitations (RWLs) language for future storm water permits, we are pleased to see that the above-quoted phrase is no longer part of the approach for achieving compliance with WQS through storm water permits. We agree strongly, moreover, that the overall structure of the approach, which allows some flexibility for upgrading best management practices (BMPs), but requires compliance with WQS after implementing the upgrade of BMPs, and is limited to municipal storm water discharges, is an acceptable approach. However, the inclusion of certain terms in paragraph 2 of the proposed RWLs compromises the fundamental requirement for achieving WQS to such an extent that EPA would have to object to permits which included such language. The terms of concern are "substantially (in more than a *de minimis* amount)" and "continuing or recurring."

EPA's NPDES permitting regulations include 40 CFR 122.44(d), which implements CWA Section 301(b)(1)(C). Section 122.44(d)(1)(i) provides that "[L]imitations must control all pollutants or pollutant parameters...which the Director determines are or may be discharged at a level which will cause, have the reasonable potential to cause, or contribute to an excursion above any State water quality standard...." This requirement clearly applies to all excursions above WQS. A limitation which regulates pollutants in storm water discharges that are causing or contributing to exceedances of WQS only if those exceedances are "continuing or recurring" does not meet this requirement. Likewise, it is unacceptable to regulate only contributions to WQS exceedances for which the discharge contributes "more that a *de minimis* amount".

All of the provisions which EPA objects to are concepts which are not objectionable in the context of an exercise of enforcement discretion. It might be reasonable to choose not to undertake enforcement action against a discharger which is in the process of making good faith efforts to meet WQS through its BMPs, or enforcement based on exceedances that are isolated events, or for which the discharger has made only *de minimis* contributions. However, it is inconsistent with the CWA and its implementing regulations to prevent regulatory agencies from taking such actions through restrictions in the permit requirements.

Even in those cases which the draft Order contemplates as appropriate for enforcement and does not bar, the phrases of concern unacceptably increase the burden of proof in establishing permit violations. To establish violations of the draft Order's proposed language, the enforcing entity would have to prove the threshold requirement that the exceedances were continuing or recurring, and, if the discharger merely contributed to those exceedances, that its contributions were substantial (in more than a *de minimis* amount). To enforce permits which correctly require compliance with WQS, EPA and other enforcers only have to prove that the discharger has caused or contributed to exceedances of the WQS. Since NPDES regulations at 40 CFR

123.27(b)(2) require that the burden of proof for a delegated State program be no greater than that which would be required for EPA under the CWA, the addition of threshold evidentiary requirements by California is unacceptable.

Last Friday, January 16, I sent you the RWL language which EPA believes would be acceptable for future MS4 permits. It is essentially the same as the language in the January 15 draft order, but without the terms "substantially (in more than a *de minimis* amount)" and "continuing or recurring". We urge you to either adopt our proposed language, or adopt neither version and allow us to continue to work with your staff and the various stakeholders to draft language which provides flexibility but also meets the requirements of the CWA. We would expedite such efforts so that future permits or State Board decisions are not delayed.

Thank you for the opportunity to review and comment on the revised draft Order concerning the Orange County permit appeal. If have any questions regarding this matter, please call me at (415) 744-1860 or refer your staff to Eugene Bromley of the CWA Standards and Permits Office at (415) 744-1906.

Sincerely,

Alexis Strauss
Acting Director
Water Division

cc: Bruce Fujimoto, State Board
Regional Board Executive Officers
Robert Hale, State Storm Water Quality Task Force
Libby Lucas, Environmental Health Coalition
Jeffrey Joseph, Caltrans
Richard Boon, Orange County
Frances L. McChesney, State Board
Michael Cook, U.S. EPA

KCB

STATE OF CALIFORNIA
STATE WATER RESOURCES CONTROL BOARD

ORDER WQ 98-01

Own Motion Review of the Petition of
ENVIRONMENTAL HEALTH COALITION
to Review Waste Discharge Requirements Order 96-03,
NPDES Permit No. CAS0108740,
for Storm Water and Urban Runoff from the
Orange County Flood Control District
and the
Incorporated Cities of Orange County
Within the San Diego Region,
Issued by the
California Regional Water Quality Control Board,
San Diego Region.

SWRCB/OCC File A-1041

BY THE BOARD:

On August 8, 1996, the Regional Water Quality Control Board, San Diego Region (Regional Water Board), adopted Waste Discharge Requirements Order 96-03, NPDES No. CAS0108740, for storm water discharge from municipal separate sewer systems for the incorporated cities of Orange County within the San Diego Regional Water Board's boundaries (Orange County permit).[1] The waste discharge requirements constitute a national pollutant discharge elimination system (NPDES) permit pursuant to section 402(p) of the federal Clean Water Act (CWA).

[1] On March 8, 1996, the Regional Water Quality Control Board, Santa Ana Region, issued waste discharge requirements for storm water discharge to the incorporated cities of Orange County within the Santa Ana Regional Water Board's boundaries that are essentially identical to the permit adopted by the San Diego Regional Water Board.

On September 6, 1996, the State Water Resources Control Board (SWRCB) received a petition from the Environmental Health Coalition (petitioner) contesting certain provisions of the NPDES permit.[2] The SWRCB did not take formal action on the petition within the 270 days specified in Title 23, California Code of Regulations, section 2052(d). The SWRCB will, on its own motion, review the Regional Water Board's action as authorized by California Water Code section 13320(a).

I. BACKGROUND

The primary issue raised by petitioner concerns the Regional Water Board's implementation of the CWA requirement that all NPDES permits must include technology-based effluent limitations and any more stringent limitation necessary to meet water quality standards. Federal and state requirements relevant to the issues raised in the petition are discussed below.[3]

CWA section 301(a) prohibits the discharge of any pollutant unless pursuant to an NPDES permit. (33 U.S.C. § 1311(a).) Section 301(b)(1)(A) requires compliance with effluent limitations necessary to achieve compliance with technology-based standards (e.g., best practicable control technology currently available or secondary treatment). Section 301(b)(1)(C) also requires compliance with any more stringent effluent limitation "necessary to meet water quality standards." (33 U.S.C.

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[2] This order is based on the record before the Regional Water Board. The Regional Water Board also issued an NPDES permit to the Department of Transportation and a petition was filed challenging that permit. In preparing this order, we have reviewed the record for the petition challenging that permit and other documents noted in this Order.

[3] See State Water Resources Control Board Order WQ 91-03 (*Citizens For a Better Environment, et al.*) for an extensive discussion of the regulatory framework for municipal separate storm sewer systems.

§ 1311(b)(1)(c).) CWA section 402 establishes requirements for NPDES permits. (33 U.S.C. § 1342.) NPDES permits must comply with section 301. Section 402(p) establishes specific NPDES permit requirements for municipal storm water discharges and for storm water discharges associated with industrial activities. Section 402(p) includes a technology-based standard for storm water permits issued to municipal separate storm sewer systems. Such permits must require:

> ". . . controls to reduce the discharge of pollutants to the maximum extent practicable, including management practices, control techniques and system, design and engineering methods, and such other provisions as the Administrator or the State determines appropriate for the control of such pollutants." (33 U.S.C. § 1342(p)(3)(B)(iii).)

To comply with CWA sections 301 and 402 for municipal separate storm water discharges, a municipal storm water NPDES permit must include effluent limitations to meet the technology-based standard to reduce pollutants to the "maximum extent practicable" and any more stringent effluent limitations necessary to meet water quality standards. The United States Environmental Protection Agency (EPA) has promulgated regulations to implement NPDES requirements in CWA section 402, including storm water requirements of CWA section 402(p).[4] (See 40 C.F.R. Part 122.26.)

[4] CWA Section 402(p) specifies that permits for industrial discharges are required to comply with all technology-based and water quality-based requirements. (Section 402(p)(3)(A).) In contrast, CWA Section 402(p) specifies that permits for municipal separate storm water discharges shall require controls to comply with technology-based requirements but does not specifically state that municipal permits must require controls to comply with water quality-based requirements. (Section 402(p)(3)(B).) EPA, however, has interpreted the Clean Water Act to require permits for municipal separate storm water discharges to include requirements to achieve compliance with water quality standards. See memorandum "Compliance with Water Quality Standards in NPDES Permits Issued to Municipal Separate Storm Sewer Systems" from E. Donald Elliott, General Counsel, EPA, to Nancy J. Marvel, Regional Counsel, EPA Region 9 (January 9, 1991).

CWA section 303 requires states to adopt water quality standards for surface waters. (33 U.S.C. § 1313.) Water quality standards consist of the designated uses of waters and the water quality criteria for such waters that would support the designated uses. The Regional Water Board in its Water Quality Control Plan for the San Diego region has adopted water quality standards by designating the beneficial uses for waters in the region and establishing water quality objectives (i.e., water quality criteria) to protect those uses. See Water Quality Control Plan for the San Diego Basin (9), September 8, 1994, at Chapters 2 and 3. The SWRCB has also adopted water quality control plans and policies that specify water quality standards which are relevant to this permit (e.g., the SWRCB Ocean Plan). To comply with CWA section 301, municipal storm water permits must include effluent limitations where necessary to meet these water quality standards.

NPDES permits issued by the Regional Water Boards, including municipal storm water permits, typically include a requirement entitled "discharge limitations" or "effluent limitations" that specifies the technology-based effluent limitations and a requirement entitled "receiving water limitations" or "receiving water standards" that specifies the water quality objectives in the Water Quality Control Plan relevant to the discharge and limitations necessary to attain those objectives. The receiving water limitations provision is used to implement the requirement of CWA section 301(b)(1)(C) to include more stringent effluent limitations necessary to meet

water quality standards.[5] The limitations necessary to meet water quality standards are also called the water quality-based effluent limitations. NPDES permits are generally required to include numeric effluent limitations to implement the technology-based standard and water quality-based effluent limitations to attain the water quality standards.[6] (40 C.F.R. § 122.44.) However, the federal regulations allow the use of best management practices (BMPs) to control or abate the discharge of pollutants when numeric effluent limitations are infeasible. (40 C.F.R. § 122.44(k).) The SWRCB has determined that for municipal separate storm water permits, BMPs constitute valid effluent limitations to comply with both the technology-based and water quality-based effluent limitation requirements.[7] See SWRCB Orders WQ 91-03 and WQ 91-04. In fact, narrative effluent limitations requiring implementation of BMPs are generally the most appropriate form of effluent limitations when designed to satisfy technology requirements, including reduction of pollutants to the maximum extent practicable, and water quality-based requirements of the CWA.

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[5] SWRCB Order WQ 91-03 concluded that municipal permits must include effluent limitations necessary to achieve water quality standards. See Order WQ 91-03 at slip op. 36. Orange County and other interested persons have argued that section 402(p) does not require municipal permits to meet water quality standards. While disagreeing, it should be noted that section 402(p) contains explicit authority for states to require provisions in addition to the "maximum extent practical" controls.

[6] See memorandum "Numeric Effluent Limitations in NPDES Permits" from Elizabeth Miller Jennings, Senior Staff Counsel, State Water Resources Control Board, to Central Valley Regional Water Quality Control Board (Aug. 1, 1997).

[7] EPA has issued a national policy entitled "Interim Permitting Approach for Water Quality-Based Effluent Limitations in Stormwater Permits," 61 Fed. Reg. 43761 (Aug. 26, 1996), that addresses issues related to the type of effluent limitations that are appropriate to provide for attainment of water quality standards. The policy applies only to EPA, but EPA has encouraged states to adopt similar policies for storm water permits. The policy states that storm water permits need not include numeric water quality-based effluent limitations. Rather, BMPs should be used to attain water quality-based effluent limitations, which should be expanded in later permits if necessary to provide for attainment of water quality standards.

II. CONTENTIONS AND FINDINGS[8]

The petitioner seeks review of the Orange County permit adopted by the Regional Water Board. The Orange County NPDES permit, adopted by the Regional Water Board, applies to the incorporated cities in Orange County within the boundaries of the San Diego region. The Santa Ana Regional Water Board, on March 8, 1996, adopted an NPDES permit for storm water discharges from the incorporated cities of Orange County within the boundaries of the Santa Ana region.[9] Orange County had requested that the Santa Ana Regional Water Board adopt one permit for all of Orange County. The San Diego Regional Water Board preferred to retain jurisdiction but agreed to adopt a permit consistent with the permit adopted by the Santa Ana Regional Water Board. Both permits for Orange County are essentially identical and require the permittees to develop a plan establishing BMPs to control discharges to the "maximum extent practicable." The Orange County permittees adopted a plan called the "drainage area management plan" (DAMP) that was approved by the San Diego Regional Water Board on April 6, 1996.[10] Both permits also contain the same provision addressing receiving water limitations, which, in relevant part, states:

> "1. Receiving water limitations have been established based on beneficial uses, water quality objectives, and water quality standards contained in the Basin Plan, and amendments thereto, and on ambient water quality. They are intended to protect the beneficial uses and attain the water quality objectives contained in the Basin Plan. The discharge of urban storm water, or non-storm water, from a municipal storm sewer system

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[8] All other contentions raised in the petition which are not discussed in this order are dismissed. (Cal. Code Regs., tit. 23, § 2052; *People* v. *Barry* (1987) 194 Cal.App.3d 158 [239 Cal.Rptr. 349].)

[9] No petition was filed challenging the permit issued by the Santa Ana Regional Water Board.

[10] The DAMP was also approved by the Santa Ana Regional Water Board.

> for which the permittees are responsible under the terms of this permit shall not cause continuing or recurring impairment of beneficial uses or exceedances of water quality objectives. The permittees will not be in violation of this provision so long as they are in compliance with the requirements set forth [in the following provision]."
>
> "a. If the Executive Officer determines that a continuing or recurring impairment of beneficial uses or exceedances of water quality objectives has been caused by urban storm water discharges from the municipal storm sewer system, the following steps shall be taken. . . ."

The remainder of the provision requires the Executive Officer to evaluate the DAMP and if the Executive Officer determines that implementation of the DAMP will not have a reasonable likelihood of preventing future impairment of beneficial uses or exceedances of water quality objectives, the permittees would be required to submit a report evaluating impacts on water quality and proposing changes to implementation of the existing DAMP or proposing revisions to the DAMP. The permittees would then be required to implement the revised DAMP.

Petitioner contends that for several reasons, this receiving water limitations provision is inadequate under the CWA and its implementing regulations and under the Porter-Cologne Water Quality Control Act (Porter-Cologne Act). Petitioner points out that CWA section 402(b), and implementing regulations, require that NPDES permits issued by state agencies comply with the CWA. (33 U.S.C. 1342(b), 40 C.F.R. § 123.25.) The Porter-Cologne Act provides that permits issued subject to federal law must "ensure compliance with all applicable provisions of the [CWA and its implementing regulations], together with any more stringent effluent standards or limitations necessary to implement water quality control plans, or for the protection of

beneficial uses, or to prevent nuisance." (Cal. Water Code § 13377.) Petitioner contends that the receiving water limitations language fails to require attainment of water quality standards.

1. Contention: The receiving water limitations section fails to comply with the CWA and the Porter-Cologne Act because it does not prohibit discharges that "contribute to" as well as "cause" exceedances of water quality objectives as required by federal regulations.

Finding: The SWRCB agrees that the NPDES permit must prohibit discharges that "cause" or "contribute" to violations of water quality standards. Federal regulations specify requirements that must be included in each NPDES permit. (40 C.F.R. § 122.44.) Each NPDES permit must include limitations necessary to achieve water quality standards:

> "Limitations must control all pollutants or pollutant parameters (either conventional, nonconventional, or toxic pollutants) which the Director determines are or may be discharged at a level which will cause, have the reasonable potential to cause, or contribute to an excursion above any State water quality standard, including State narrative criteria for water quality." (40 C.F.R. § 122.44(d)(1)(i).)[11] (Emphasis added.)

The receiving water limitations language of the Orange County NPDES permit requires the permittees to be responsible for those discharges that "cause continuing or recurring impairment of beneficial uses or exceedances of water quality objectives." To comply with the CWA, the phrase quoted in the immediately preceding sentence shall be interpreted so as to require permittees to control discharges that contribute to exceedances

[11] This provision applies to state programs. See 40 C.F.R. section 123.25.

of water quality objectives. Of course such contributions would have to be substantial (in more than a *de minimis* amount) contributions.

2. Contention: The petitioner contends that the receiving water limitations section in the permit violates the CWA and implementing regulations because it does not require compliance with water quality standards. The permit states that the permittees "will not be in violation of [receiving water limitations] so long as they are in compliance with the requirements" for evaluating the DAMP.

Finding: The SWRCB disagrees with petitioner's contention. In SWRCB Order WQ 96-13, the SWRCB reviewed and approved the storm water permit for certain permittees in the Santa Clara Valley issued by the San Francisco Bay Regional Water Board. The Santa Clara Valley permit contains a receiving water limitations section that specifically prohibits discharges that cause or contribute to a violation of water quality objectives, and states that the permittees "shall comply . . . through the timely implementation of control measures and other actions to reduce pollution in the discharge." (Emphasis added.) The receiving water limitations provision in the Orange County permit prohibits discharges that cause exceedances of water quality objectives, and states that the "permittees will not be in violation of this provision so long as they are in compliance with the requirements" for evaluating and improving the effectiveness of the DAMP. The Orange County permit receiving water limitations section is not, as a practical matter, different than the Santa Clara Valley permit approved by this SWRCB. In each case, compliance with the receiving water limitations is achieved by following a

procedure to evaluate and improve the BMPs where necessary to comply with water quality standards.

The SWRCB has already determined that the use of BMPs to achieve both the technology-based effluent limitations and the water quality-based effluent limitations complies with the CWA and the Porter-Cologne Act. See SWRCB Order WQ 91-03. Accordingly, the SWRCB agrees that use of the phrase that the "permittees will not be in violation of . . ." complies with the CWA and, in fact, used that same phrase in SWRCB Water Quality Order 97-03-DWQ (Waste Discharge Requirements for Discharges of Storm Water Associated with Industrial Activities Excluding Construction Activities, NPDES General Permit No. CAS000001) (the General Industrial Permit).

3. Contention: The petitioner contends that the receiving water limitations provision violates the CWA and implementing regulations because the mechanism for determining exceedances of receiving water limitations is unworkable and, therefore, would not result in achievement of water quality standards. The permittees are not considered to be in violation of receiving water limitations as long as the process for evaluating the DAMP are followed. This process, however, will not result in achievement of water quality standards because (1) it is very difficult to demonstrate that urban runoff has "caused" an exceedance of water quality objectives; (2) Regional Water Board staff stated at the Board hearing at which the permit was adopted that there were inadequate resources to oversee the storm water program; (3) the permit does not require submittal of information on the adequacy of the DAMP until after the Executive Officer determines that the plan will not result in achievement of water quality objectives;

and (4) the permit places no time schedule on review of the adequacy of the plan to meet water quality standards. The permit does not require any change to the DAMP until directed by the Executive Officer. Due to these limitations, water quality standards are not likely to be achieved.

Finding: Petitioner has raised legitimate concerns. As discussed above, permittees will be required to control discharges that contribute to exceedances of water quality objectives. The SWRCB's charge under Water Code section 13320 is to determine whether the Regional Water Board has acted appropriately. In this case, the Regional Water Board has directed its Executive Officer to determine when receiving water limitations have been exceeded. In order for such determinations to be made the Executive Officer must devote sufficient resources to make such determinations in a timely manner. Provided this is the case, it can be concluded that the permit is adequate to achieve water quality standards. This conclusion to uphold the permit language is further predicated on the fact that to do otherwise would result in two inconsistent storm water permits for Orange County.

III. ADDITIONAL ISSUES

While upholding the permit as appropriate, the SWRCB has concerns that future storm water permits contain the strongest and clearest possible language to protect water quality. As evidenced by the discussion at the January 7, 1998 workshop review of this petition, there are serious disagreements as to how best to ensure such protection. A review of the record leads to the following conclusions:

- Future storm water permits should contain consistent requirements to ensure water quality protection.
- Such permits must comply with CWA and Porter-Cologne Water Quality Control Act requirements.
- Storm water permits must achieve compliance with water quality standards, but they may do so by requiring implementation of BMPs in lieu of numeric water quality-based effluent limitations.
- Permittees must ultimately be responsible for evaluating and revising BMPs to achieve compliance with water quality standards.
- Permits should be written to clearly identify water quality standards and to clearly require that permittees, through the implementation of BMPs, shall not cause or contribute to exceedances of such water quality standards.
- Given the unique nature of the storm water discharges, it is reasonable that implementation take place, where appropriate, on a phased basis.
- Determinations that additional BMPs are necessary to achieve water quality standards should be based on findings by the permittees or the Regional Boards that storm water discharges are a substantial (in more than a *de minimis* amount) contributor to continuing or recurring exceedances of such standards.

Based upon these conclusions and as a precedent decision,[12] the following receiving water limitation language shall be included in future municipal storm water permits.

RECEIVING WATER LIMITATIONS

1. Storm water discharges and authorized non-storm water discharges to any surface or ground water shall not adversely impact human health or the environment.

2. The SWMP shall be designed and implemented, or shall be in the process of being revised in accordance with the procedures set forth below to ensure that discharges authorized by this permit shall not cause or substantially (in more than a *de minimis* amount) contribute to a continuing or recurring exceedance of any applicable water quality standards contained in a Statewide Water Quality Control Plan or the applicable Regional Water Quality Control Board's Basin Plan.

3. If the discharges cause or contribute to an exceedance of the applicable water quality standards, permittee shall take the following steps:

    a. Upon a determination by either the facility operator or the Regional Water Board that discharges are causing or contributing to an exceedance of an applicable water quality standard, the facility operator shall promptly notify and thereafter submit a report to the appropriate Regional Water Quality Control Board that describes BMPs that are currently being implemented and additional BMPs that will be implemented to prevent or reduce any pollutants that are causing or contributing to the exceedance of water quality standards. The report may be incorporated in the annual update to the SWMP unless the Regional Water Board directs an earlier submittal. The report shall include an implementation schedule. The Regional Water Quality Control Board may require modifications to the report;

    b. Submit any modifications to the report required by the Regional Board within 30 days of notification;

[12] In SWRCB Order WR 96-1, the SWRCB determined that water quality orders are precedent decisions. (See Gov. Code § 11425.60.)

c. Within 30 days following approval of the report described above by the Regional Water Quality Control Board, the facility operator shall revise its SWMP and monitoring program to incorporate the approved modified BMPs that have been and will be implemented, the implementation schedule, and any additional monitoring required;

d. Implement the revised SWMP and monitoring program in accordance with the approved schedule; and

e. Reduce pollutants in storm water discharges and authorized non-storm water discharges, following implementation of the SWMP revised in accordance with paragraph 3 above, to levels which shall not cause or contribute to an exceedance of any applicable water quality standards.

4. So long as permittees have complied with the procedures set forth in paragraph 3 above and are implementing the revised SWMP, they do not have to repeat the same procedure for continuing or recurring exceedances of the same receiving water limitations unless directed by the Regional Water Board to develope additional BMPs.

IV. CONCLUSIONS

After review of the record and consideration of the contentions of the petitioner, and for the reasons discussed above, we conclude:

1. The federal regulations implementing CWA section 402(p) require NPDES permits to prohibit discharges of pollutants that "cause or contribute" to exceedances of water quality standards and the permit will be so interpreted.

2. The specific portion of the receiving water limitations provision that states that "permittees will not be in violation of this provision so long as they are in compliance with the requirements" specifying the process for evaluating and improving the effectiveness of the DAMP complies with the CWA.

3. The Regional Water Board acted appropriately in adopting the permit.

4. Receiving water limitation provisions of future municipal storm water permits shall be consistent with this Order.

V. ORDER

IT IS ORDERED that Order 96-03 shall be interpreted as discussed above. It is further ordered that in other respects, the petition is denied.

CERTIFICATION

The undersigned, Administrative Assistant to the Board, does hereby certify that the foregoing is a full, true, and correct copy of an order duly and regularly adopted at a meeting of the State Water Resources Control Board held on January 22, 1998.

AYE:	John Caffrey Marc Del Piero Mary Jane Forster John W. Brown
NO:	None
ABSENT:	James M. Stubchaer
ABSTAIN:	None

Maureen Marché
Administrative Assistant to the Board

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105-3901

In Reply
Refer to: WTR-5

MAR 1 7 1998

Walt Pettit
Executive Director
California State Water Resources Control Board
P.O. Box 100
Sacramento, CA 95812-0100

Dear Mr. Pettit:

The purpose of this letter is to further clarify our position concerning Order WQ 98-01 adopted by the State Water Resources Control Board on January 22, 1998 in the appeal of Waste Discharge Requirements Order 96-03, NPDES permit No. CAS0108740. This permit authorizes storm water discharges from the municipal separate storm sewer system (MS4) serving the southern portion of Orange County.

As stated in our letter of January 21, 1998, we have concerns regarding the receiving water limitations (RWLs) language which would be included in future California MS4 permits in accordance with Section III of the Order. Our specific concern is with paragraph 2 of the language which only regulates storm water discharges which "cause or substantially (in more than a *de minimis* amount) contribute to a continuing or recurring exceedance" of an applicable water quality standard. We believe that the qualifiers "substantially (in more than a *de minimis* amount)" and "continuing or recurring" are inconsistent with the Clean Water Act (CWA) and its implementing regulations.

NPDES regulations at 40 CFR § 122.44(d)(1)(i) require effluent limitations in permits for "all pollutants or pollutant parameters . . . which the Director determines are or may be discharged at a level which will cause, have the reasonable potential to cause, or contribute to an excursion above any State water quality standard . . . ." This requirement applies to all excursions above standards, not just situations where the excursions are "continuing or recurring" and where the permittee causes or contributes "substantially (in more than a *de minimis* amount)" to the excursions, as the Order would provide.

Our letter of January 21, 1998 also noted the RWLs language would unacceptably increase the burden of proof in establishing permit violations. An enforcing agency would have to show that the exceedances were "continuing or recurring" and that if the permittee were only contributing to the exceedances, that the contributions were "more than a *de minimis* amount." NPDES regulations at 40 CFR § 123.27(b)(2) require that the burden of proof for a delegated

State program be no greater than would be required for EPA under the CWA. Since EPA would not have to meet the kinds of threshold requirements that are in the State's RWLs language in order to establish violations of permits which properly implement 40 CFR § 122.44(d)(1)(i), the State's RWLs language would be inconsistent with 40 CFR § 123.27(b)(2).

We would also like to reiterate our disagreement with Conclusion 2 of the Order regarding the consistency of the existing RWLs language in the Orange County permit with the CWA. The RWLs language in the permit requires compliance with water quality standards as required by Section 301(b)(1)(C) of the CWA and 40 CFR § 122.44(d)(1)(i), but then provides that "permittees will not be in violation of this provision" provided they follow up with certain additional actions to address any exceedances of water quality standards which occur. The CWA does not provide for such an exception to compliance with standards.

Our letter of January 21, 1998 also indicated that Region 9 would object to future State MS4 permits which include the RWLs language in the January 22, 1998 Order. As the Regional Boards and State Board move forward in finalizing RWLs in upcoming MS4 permits and permit appeals, EPA is left in the unfortunate position of objecting to future permits until we can ensure water quality standards are adequately implemented in these permits.

Our letter of January 16, 1998 to the State Board included alternative language which we could accept in State MS4 permits. Our alternative is similar to the RWLs language in the January 22, 1998 Order, but without the qualifiers "substantially (in more than a *de minimis* amount)" and "continuing or recurring." We understand the Board may be willing to consider additional proposals for RWLs language despite the apparent nature of the Order as a precedent setting decision.

If have any questions regarding this matter, please call me at (415) 744-1860 or refer your staff to Eugene Bromley of the CWA Standards and Permits Office at (415) 744-1906.

Sincerely,

Alexis Strauss

Alexis Strauss
Acting Director
Water Division

cc: Bruce Fujimoto, State Board
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Libby Lucas, Environmental Health Coalition
Jeffrey Joseph, Caltrans

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Michael Cook, U.S. EPA
Gary Hudiburgh, U.S. EPA

March 9, 1998

PROPOSED STORM WATER PROVISION REGARDING COMPLIANCE WITH RECEIVING WATER LIMITATIONS FOR MUNICIPAL DISCHARGERS

C. RECEIVING WATER LIMITATIONS

1. Storm water discharges and authorized non-storm water discharges to any surface or ground water shall not adversely impact human health or the environment.

2. The SWMP shall be designed and implemented, or shall be in the process of being revised in accordance with the procedures set forth below, to ensure that discharges authorized by this permit shall not cause or contribute to exceedance of any applicable water quality standards contained in a Statewide Water Quality Control Plan or the applicable Regional Water Quality Control Board's Basin Plan. In evaluating the adequacy of a SWMP in response to any exceedance of an applicable water quality standard in the receiving water body, the Region Water Quality Control Board shall consider the nature of the exceedance. If the permittee's contribution to the exceedance is not substantial (i.e., not more than *de minimis*) and/or the exceedance is not continuing or recurring, the RWQCB need not require permittee to upgrade its SWMP.

3. If the discharges cause or contribute to an exceedance of the applicable water quality standards, Permittee shall take the following steps:

   a. Upon a determination by either the facility operator or the Regional Water Quality Control Board that discharges are causing or contributing to an exceedance of an applicable water quality standard, the facility operator shall promptly notify and thereafter submit a report to the appropriate Regional Water Quality Control Board that describes BMPs that are currently being implemented and additional BMPs that will be implemented to prevent or reduce any pollutants that are causing or contributing to any exceedance of water quality standards. The report may be incorporated in the annual update to the SWMP unless the Regional Water Board directs an earlier submittal. The report shall include an implementation schedule for achieving compliance with paragraph 3.e., below, and shall describe further steps which may be required to prevent any other exceedances of water quality standards which the discharger may cause or contribute to. The Regional Water Quality Control Board may require modifications to the report;

   b. Submit any modifications to the report required by the Regional Board within 30 days of notification;

   c. Revise, within 30 days following approval of the report described above by the Board, its SWMP and monitoring program to incorporate the approved modified BMPs that have been and will be implemented, the implementation schedule, and any additional monitoring required;

d. Implement the revised Plan and monitoring program in accordance with the approved schedule; and

e. Reduce pollutants in storm water discharges and authorized non-storm water discharges, following implementation of the SWMP revised in accordance with this paragraph C.3, to levels which shall not cause or contribute to an exceedance of any applicable water quality standards.

4. So long as permittee has complied with the procedures set forth in paragraph 3 above and is implementing the revised SWMP, permittee does not have to repeat the same procedures for continuing or recurring exceedances of the water quality standard that the revised SWMP is intended to address unless directed by the RWQCB to develop additional BMPs.

LAWYER LOGIN

DEFENDERS OF WILDLIFE v. BROWNER

No. 98-71080.

Email | Print | Comments (0)

197 F.3d 1035 (1999)

DEFENDERS OF WILDLIFE and The Sierra Club, Petitioners, v. Carol M. BROWNER, in her official capacity as Administrator of the United States Environmental Protection Agency, Respondent. City of Tempe, Arizona; City of Tucson, Arizona; City of Mesa, Arizona; Pima County, Arizona; and City of Phoenix, Arizona, Intervenors-Respondents.

United States Court of Appeals, Ninth Circuit.

December 7, 1999.

View Case Cited Cases Citing Case

Attorney(s) appearing for the Case

Jennifer Anderson and David Baron, Arizona Center for Law in the Public Interest, Phoenix, Arizona, for the petitioners.

Alan Greenberg, Attorney, U.S. Department of Justice, Environment & Natural Resources Division, Denver, Colorado, for the respondent.

Craig Reece, Phoenix City Attorney's Office, Phoenix, Arizona; Stephen J. Burg, Mesa City Attorney's Office, Mesa, Arizona; Timothy Harrison, Tucson City Attorney's Office, Tucson, Arizona; and Harlan C. Agnew, Deputy County Attorney, Tucson, Arizona, for the intervenors-respondents.

Before: NOONAN, THOMPSON, and GRABER, Circuit Judges.

1. Probate Lawyer
2. San Diego Lawyer
3. Defense Lawyers
4. Medical Malpractice Lawyers
5. Intellectual Property Attorney

ORDER

The opinion filed September 15, 1999 [191 F.3d 1159], is amended as follows:

On slip opinion page 11687, line 11 [191 F.3d at 1165]: delete "As all parties concede," and change "§" to "Section".

With this amendment, the panel has voted to deny the petition for rehearing. Judge Graber has voted to deny the petition for rehearing en banc, and Judges Noonan and Thompson have so recommended.

The full court has been advised of the petition for rehearing en banc and no

[197 F.3d 1036]

judge of the court has requested a vote on it.

The petition for rehearing and petition for rehearing en banc are DENIED.

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STATE OF CALIFORNIA
STATE WATER RESOURCES CONTROL BOARD

ORDER: WQ 99 - 05

Own Motion Review of the Petition of
Environmental Health Coalition
to Review Waste Discharge Requirements Order No. 96-03,
NPDES Permit No. CAS0108740
for Storm Water and Urban Runoff from the
Orange County Flood Control District
and the
Incorporated Cities of Orange County
Within the San Diego Region,
Issued by the
California Regional Water Quality Control Board,
San Diego Region.

SWRCB/OCC File A-1041

BY THE BOARD:

In Order WQ 98-01, the State Water Resources Control Board (State Water Board) ordered that certain receiving water limitation language be included in future municipal storm water permits. Following inclusion of that language in permits issued by the San Francisco Bay and San Diego Regional Water Quality Control Boards (Regional Water Boards) for Vallejo and Riverside respectively, the United States Environmental Protection Agency (EPA) objected to the permits. The EPA objection was based on the receiving water limitation language. The EPA has now issued those permits itself and has included receiving water limitation language it deems appropriate.

In light of EPA's objection to the receiving water limitation language in Order WQ 98-01 and its adoption of alternative language, the State Water Board is revising its instructions regarding receiving water limitation language for municipal storm water permits. It is hereby ordered that Order WQ 98-01 will be amended to remove the receiving water limitation language contained therein and to substitute the EPA language. Based on the reasons stated here, and as a precedent decision,[1] the following receiving water limitation language shall be included in future municipal storm water permits.[2]

RECEVING WATER LIMITATIONS

The permittees shall comply with Discharge Prohibitions [ ][3] and Receiving Water Limitations [ ] through timely implementation of control measures and other actions to reduce pollutants in the discharges in accordance with the SWMP and other requirements of this permit including any modifications. The SWMP shall be designed to achieve compliance with Receiving Water Limitations [ ]. If exceedance(s) of water quality objectives or water quality standards (collectively, WQS) persist notwithstanding implementation of the SWMP and other requirements of this permit, the permittees shall assure compliance with Discharge Prohibitions [ ] and Receiving Water Limitations [ ] by complying with the following procedure:

---

[1] In SWRCB Order WR 96-1, the State Water Board determined that water quality orders are precedent decisions. (See Gov. Code §11425.60.)

[2] This language may be revised as necessary to ensure that terminology conforms with the rest of the permit.

[3] Insert appropriate numbers for prohibitions and limitations that implement water quality objectives and water quality standards.

a. Upon a determination by either the permittees or the Regional Water Board that discharges are causing or contributing to an exceedance of an applicable WQS, the permittees shall promptly notify and thereafter submit a report to the Regional Water Board that describes BMPs that are currently being implemented and additional BMPs that will be implemented to prevent or reduce any pollutants that are causing or contributing to the exceedance of WQSs. The report may be incorporated in the annual update to the SWMP unless the Regional Water Board directs an earlier submittal. The report shall include an implementation schedule. The Regional Water Board may require modifications to the report.

b. Submit any modifications to the report required by the Regional Water Board within 30 days of notification.

c. Within 30 days following approval of the report described above by the Regional Water Board, the permittees shall revise the SWMP and monitoring program to incorporate the approved modified BMPs that have been and will be implemented, implementation schedule, and any additional monitoring required.

d. Implement the revised SWMP and monitoring program in accordance with the approved schedule.

So long as the permittees have complied with the procedures set forth above and are implementing the revised SWMP, the permittees do not have to repeat the same procedure for continuing or recurring exceedances of the same receiving water limitations unless directed by the Regional Water Board to develop additional BMPs.

///

///

ORDER

IT IS ORDERED that Order WQ 98-01 is revised as discussed above.

CERTIFICATION

The undersigned, Administrative Assistant to the Board, does hereby certify that the foregoing is a full, true, and correct copy of an order duly and regularly adopted at a meeting of the State Water Resources Control Board held on June 17, 1999.

AYE: James M. Stubchaer
Mary Jane Forster
John W. Brown
Arthur G. Baggett, Jr.

NO: None

ABSENT: None

ABSTAIN: None

Maureen Marché
Administrative Assistant to the Board

U.S. Department of the Interior
U.S. Geological Survey

002905

Field Manual of Wildlife Diseases

General Field Procedures and Diseases of Birds

USGS
science for a changing world

002906

U.S. Department of the Interior
U.S. Geological Survey

Field Manual of Wildlife Diseases

General Field Procedures and Diseases of Birds

Biological Resources Division
Information and Technology Report 1999–001

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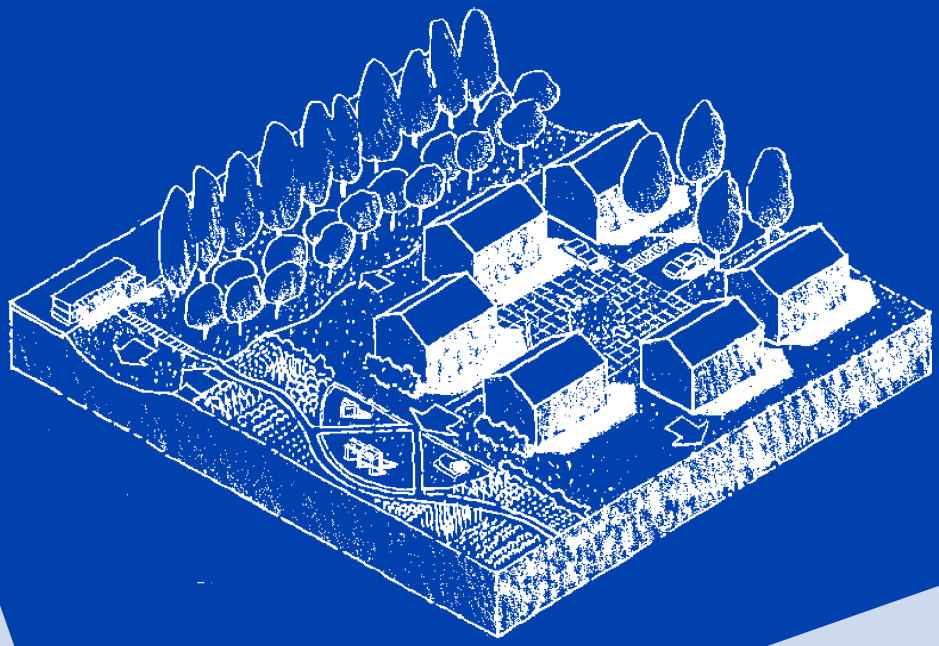

Start at the Source

Design Guidance Manual for Stormwater Quality Protection

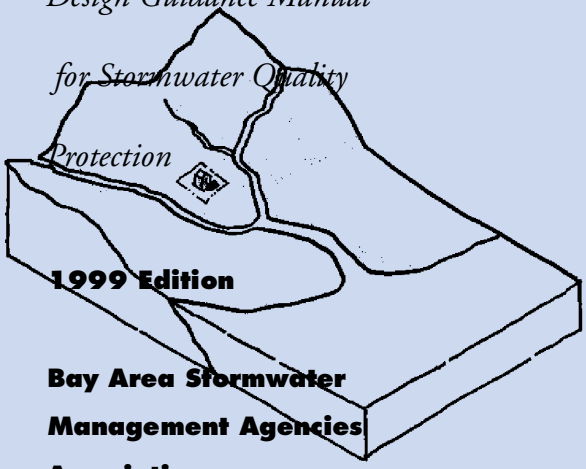

1999 Edition

Bay Area Stormwater Management Agencies Association

B A S M A A

TOM RICHMAN & ASSOCIATES
Urban Design and Landscape Architecture

Finding that the way we design and build communities has a direct effect on water quality, the Bay Area Stormwater Management Agencies Association (BASMAA) has prepared **Start at the Source,** *a manual that aims to help designers, developers, and municipal agencies create communities that achieve water quality goals.*

The ***Site Planning & Design Guidance Manual*** *contains introductory information on hydrology, watersheds, the importance of minimizing impervious land coverage, zoning and planning strategies for stream protection, and conceptual examples of dozens of methods for integrating stormwater management into all kinds of projects, including new development, infill, and redevelopment.*

A ***new technical section*** *presents detailed information on a wide variety of designs that can be adapted to residential, commercial, industrial and institutional projects.*

This document recognizes that the one of the best opportunities to reduce the generation of urban runoff or nonpoint source pollution is through planning and design.

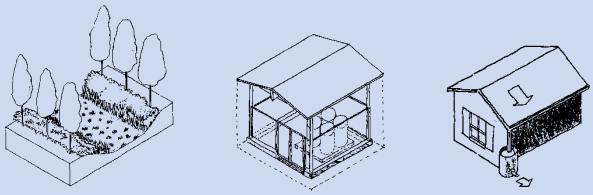

"The more we study stormwater runoff, the more we realize the critical role site planning and design play in our ability to reduce the impacts of development on the quality of our nation's waters. This manual is a significant step in teaching planners and developers to plan for water quality."

Thomas E. Mumley
California Regional Water Quality Control Board
San Francisco Bay Region
Urban Runoff Program Manager

"BASMAA's *Start at the Source* guidance manual is a pioneering effort which focuses on the importance of considering storm water quality in the early stages of planning new residential development in the San Francisco Bay area."

Community Planning & Envirnomental Committee
Consulting Engineers and Land Surveyors of California (CELSOC)

"Through its integrative approach and illustrative method, *Start at the Source* shows how new development can be designed and built to meet functional and market demands while protecting water resources."

Jim Dalton, Executive Vice President
American Society of Landscape Architects

Start at the Source

Design Guidance Manual

for Stormwater Quality

Protection

1999 Edition

Bay Area Stormwater
Management Agencies
Association

B A S M A A
Bay Area
Stormwater Management
Agencies Association

Acknowledgements

This document was prepared for the San Francisco Bay Area Stormwater Management Agencies Association (BASMAA) New Development Committee.

BASMAA Participating Programs

Alameda Countywide Clean Water Program
Contra Costa Clean Water Program
Fairfield-Suisun Urban Runoff Management Program
Marin County Stormwater Pollution Prevention Program
San Mateo Countywide Stormwater Pollution Prevention Program
Santa Clara Valley Urban Runoff Pollution Prevention Program
Vallejo Sanitation and Flood Control District

Geoff Brosseau, Executive Director, BASMAA
Tom Dalziel, Chairman, New Development Committee

This document was first published as *Residential Site Planning & Design Guidance Manual for Stormwater Quality Protection* in January, 1997.

This current edition has been updated and expanded to include commercial, industrial, and institutional development, as well as a technical section to provide more detailed information on the characteristics, applications, design criteria, maintenance, and economics of the details that are discussed in this document.

This manual was developed under the guidance of a Review Committee comprised of representatives from regulatory agencies, planning and public works departments, builders, engineers, landscape architects and members of the academic community. We are grateful for all the comments and suggestions provided by the Review Committee in development of this document.

Thanks also to Professor Robert L. Thayer, Jr. of the University of California at Davis for providing guidance and counsel throughout.

Disclaimer

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Introduction by the Consulting Engineers and Land Surveyors of California (CELSOC)

BASMAA's second edition of "Start at the Source" focuses on the importance of considering storm water quality in the early stages of planning and designing new land development projects.

The implementation of permanent "best management practices" is the most recent newcomer to a list of activities which have stormwater quality as their goal. These efforts include heightening public awareness, care in construction practices, and the dedication of public agencies to increased maintenance efforts related to stormwater quality.

The planning of new projects is not only an activity conducted by planning and engineering professionals, it is equally an effort on the part of cities and counties to make sometimes-difficult choices among public benefits, which are often mutually exclusive. This process involves local agencies deciding what is most important to their community within a range of project acceptability and feasibility. Many of these conflicting issues are pertinent to the subject at hand, and are touched on in this guidance manual.

- Providing compact development may conflict with the idea of minimizing impervious area
- Engineering solutions to high groundwater and expansive soils conflict with the desire to trap and percolate storm drainage;
- Clustering residential density often conflicts with demonstrated preferences of homebuyers
- Reduced pavement widths often conflict with public safety issues
- The ideal of alternative means of transportation conflicts with Americans' love of their automotive freedom;
- The ever growing demand on limited public funds makes the maintenance of new pollution control systems difficult.

Most of all, the need for viable new development projects can conflict with local, regional, and other agencies' unfortunate vision of new growth as a source of revenue to help solve social and environmental problems which were either created by past practices or are more reasonably the responsibility of society in general. These "legacies" include diminishing wetlands, endangered species, school funding shortfalls, deteriorating transportation systems, lack of low cost housing, and even demands for child care. Adding stormwater quality to this list must be resisted.

We encourage Federal, State, and especially local agencies considering these guidelines to proceed in partnership with all sectors of private business and with the professional planning and engineering community to provide reasonable, equitable, responsible and cost effective means of improving water quality.

Rodney T. Andrade
subcommittee chairman
Consulting Engineers and Land Surveyors of California

Consulting Engineers and Land Surveyors of California (CELSOC) is a statewide association of 850 professional engineering and land surveying firms in private practice which are dedicated to enhancing the consulting engineering and land surveying professions and protecting the general public.

Introduction by the American Society of Landscape Architects

Landscape architects are involved with design issues at every scale, from the setting of a catch basin to the layout of new towns. They deal principally with making places between buildings and the systems that link buildings and people together on the land. At the core of this place-making is grading and drainage– the shaping of the land to manage stormwater and accommodate human use.

Historically, grading and drainage design has largely neglected the environmental implications of stormwater runoff. In the past few years, we have begun to recognize the effect of stormwater runoff on environmental quality, especially on watershed and stream health. Today's designers must consider not only flood control and protection of property, but also how to minimize the creation of new runoff, and how to minimize the pollutants carried in that runoff.

The link between development and the quality of our environment is becoming increasingly evident. Though considerable professional attention has been given to direct stream and wetland protection, strategies for minimizing impacts of new development on watersheds have been less well articulated. This manual is an important step in showing how watershed protection can be achieved in urban and suburban development.

Through its integrative approach and illustrative method, "Start at the Source" shows how new development can be designed and built to meet functional and market demands while protecting water resources. It balances broad concepts with practical details. It provides a rationale for the design of places and the selection of building materials. It bridges the traditional gap between landscape architecture and civil engineering.

Finally, and perhaps most importantly, it shows how drainage systems can be integrated into overall site planning and landscape architecture to form the basis of practical, cost-effective, environmentally responsible, and aesthetically pleasing design.

Jim Dalton, Executive Vice President
American Society of Landscape Architects

The American Society of Landscape Architects is a professional association of over 11,000 members whose mission is "the advancement of the art and science of landscape architecture by leading and informing the public, by serving members, and by leading the profession in achieving quality in the natural and built environment."

http://www.asla.org/asla/

How to use this book

This document is intended for use in the **planning and design** phases of residential, commercial, institutional and industrial development and redevelopment. It recognizes that one of the best opportunities to reduce the generation of urban runoff or "nonpoint source pollution" (see glossary) from development is through planning and design. Once developments are built, it is very difficult and expensive to correct land use patterns and storm drain systems that contribute to urban runoff.

Because the principles and techniques described here inform basic siting and design considerations, they will be easiest to incorporate and most effective if explored early in the planning and design phases of a project. Because of the wide variety of development sites in the Bay Area — such as infill, hillside, and redevelopment — and the wide array of regulations facing the development community, many of which are potentially in conflict with each other, this document suggests design and planning strategies for adaptation to each particular condition rather than defining specific solutions for every case.

During the **construction phase** additional strategies must be employed to minimize erosion and the introduction of other pollutants into stormwater runoff. These temporary strategies, such as silt fencing, straw-bales, and erosion control matting, are documented elsewhere. For information on stormwater management during the construction phase, see the *California Storm Water Best Management Practice Handbooks (Construction Activity)* and the *Manual of Standards for Erosion & Sediment Control Measures* by the Association of Bay Area Governments (ABAG).

After construction, other practices must be employed for proper management of properties and facilities to prevent introduction of pollutants into the storm drain system. These "best management practices," such as proper storage and disposal of chemicals, recycling of used oils, and community education, are also treated elsewhere. For a principal source of information on best management practices after construction see the *California Storm Water Best Management Practice Handbooks.*

Along with planning, design, and management practices, effective **maintenance** and operation of control measures is as critical as proper selection and design. Many of the control measures and practices presented in this manual capture and retain stormwater pollutants. It is important to establish a maintenance and monitoring program to ensure that the systems function as designed, and that over the long term pollutants do not accumulate to unacceptable or toxic levels. Maintenance requirements for specific site design and landscape details are discussed in Chapter 8.

This guidance manual is not intended as a prescriptive document mandating that all projects adopt all the ideas presented here. Rather it is a menu of choices to illustrate a design philosophy and approach. Once the basic approach is understood, it is envisioned that each project team will adopt or adapt those solutions that best suit the unique circumstances of each site.

The approach presented here implies some different ways of handling stormwater. Answers to **frequently asked questions** can be found on page 150.

This manual is not intended as a prescriptive document mandating that all projects adopt all the ideas presented here. Rather it is a menu of choices to illustrate a design philosophy and approach.

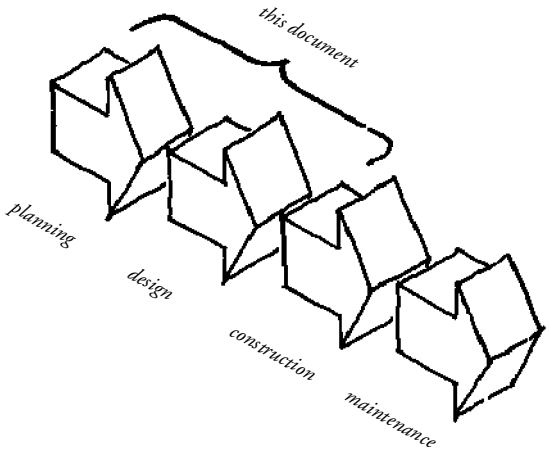

1 Introduction

This Manual has been prepared for the Bay Area Stormwater Management Agencies Association (BASMAA), an association of regional stormwater quality agencies around the San Francisco Bay and Delta.

Finding that the way we design and build communities has a direct effect on water quality, BASMAA has prepared this Manual with a focus on residential, commercial and industrial development, including new development, infill development and redevelopment. It aims to help designers, developers, and municipal agencies create communities that achieve water quality goals.

The Manual attempts to communicate basic stormwater management concepts and to illustrate simple, practical techniques to preserve the natural hydrologic cycle. These techniques are combined in a series of case studies to show how they may be integrated into projects. These case studies reflect the wide range of geographical, hydrological and market conditions found in the San Francisco Bay area, and must be adapted to specific site conditions.

For planners, designers and engineers accustomed to approaching stormwater management as a challenge in controlling large concentrated flows, the approach presented here may require a shift in thinking. Rather than considering only the large, infrequent storms normally associated with drainage and flood control, this document focuses on the small, frequent storms that have the most impact on urban water bodies, and shows how controls for smaller storms can be integrated into a comprehensive drainage system. Also, rather than considering the generally more expensive and complicated end-of-pipe solutions, this document seeks to illustrate the simpler, more economical stormwater management opportunities presented by starting at the source.

The way we design and build communities has a direct effect on water quality.

The Hydrologic Cycle

The continuous circulation of the earth's water from sky to land to sea to sky is called the Hydrologic Cycle.[1]

In its natural condition, soil is covered with a complex matrix of mulch, roots and pores which absorb rainwater. As rainwater infiltrates slowly into the soil, impurities are cleansed by natural biologic processes. Because most rain storms are not large enough to fully saturate the soil, only a small percentage of annual rainwater flows over the surface as runoff. What does become runoff usually travels in a slow meandering pace which allows suspended particles and sediments to settle. In the natural condition, the hydrologic cycle creates a stable supply of groundwater, and surface waters are naturally cleansed of impurities (although some sediment is carried with the flow) before arrival into the sea.

The impervious surfaces associated with urbanization prevent water from infiltrating into the soil. Even the smallest rainstorms generate runoff, which collects pollutants and sediments, and is concentrated in narrow channels or pipes. This rapid, concentrated water flow can affect the hydrologic cycle in four ways: increased volume of flow which could mean increased flood potential, minimized impacts on channel destabilization, increased concentration of pollutants, and reduced groundwater levels. [2]

Builders can avoid these negative impacts by designing developments with stormwater systems that preserve and restore the natural hydrologic cycle.

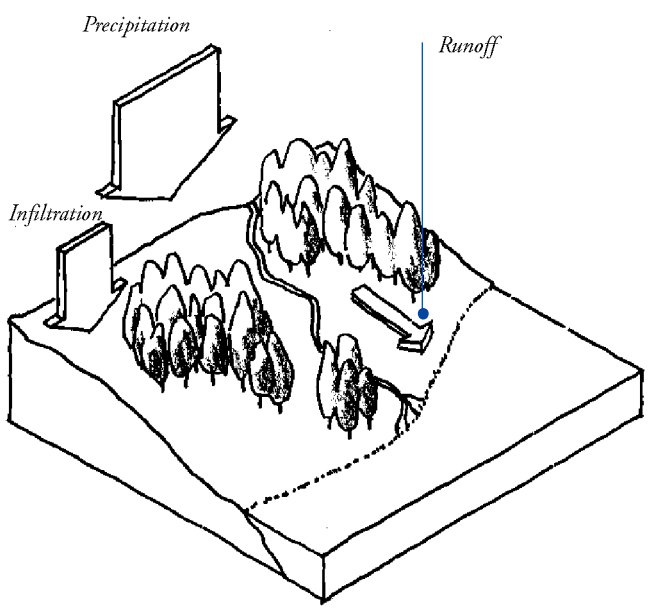

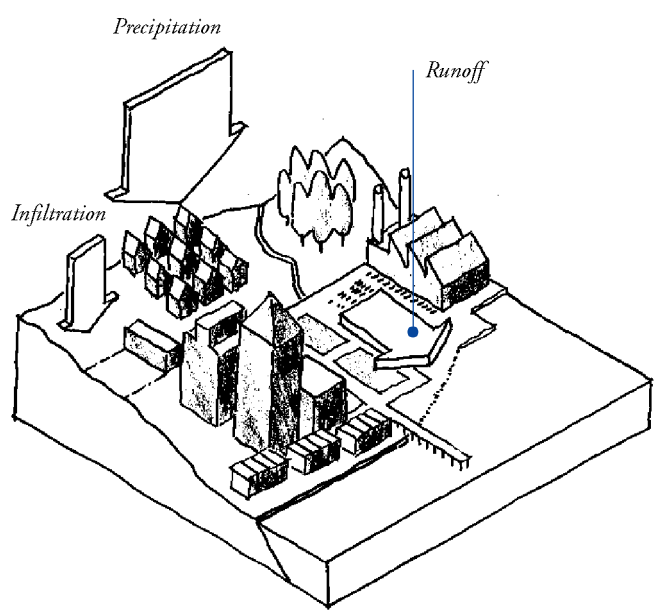

The hydrologic cycle

In **pre-development** landforms, a large percentage of precipitation infiltrates into the soil. A small percentage remains on the surface as runoff.

In **Post-development,** opportunities for infiltration are typically reduced, and a larger proportion of total precipitation becomes surface runoff.

Regulatory Context

As rain falls, it picks up pollutants from the air. Then as it becomes runoff it collects more impurities while passing over rooftops, streets, parking lots, landscaping, and gutters. This runoff typically enters a storm drain system that rapidly conveys it, untreated, to a lake, creek, river, bay or ocean. With the progress made in the past twenty-five years in controlling pollution from factories and other industrial point sources, this concentration of pollutants from various dispersed sources – nonpoint source pollution – is today responsible for over half of the water quality problems in waters of the United States.[3]

The Clean Water Act of 1972, as amended in 1987, prohibits the discharge of pollutants into waters of the United States unless the discharge is in compliance with a National Pollutant Discharge Elimination System (NPDES) permit. Most large population centers are already subject to NPDES permits, and smaller population centers may be required to comply in the next few years. Certain industries and construction projects specified by the U.S. Environmental Protection Agency must also obtain an NPDES permit in order to discharge stormwater runoff. Thus most Bay Area cities, and most large development projects, must comply with NPDES permit requirements.

The federal NPDES permit program requires that subject municipalities "develop, implement and enforce controls to reduce the discharge of pollutants from municipal separate storm sewers which receive discharges from areas of new development and significant redevelopment… [including] after construction is completed."[4]

Within this regulatory context, developers and municipal permitting agencies are required to implement controls that reduce water pollution carried in runoff. These techniques may include storage (detention), filtration, and infiltration practices.

The Nationwide Urban Runoff Program and recent studies "indicate that planning and designing for the minimization of pollutants in stormwater discharge is the most cost effective approach to stormwater quality management." Reducing pollution in stormwater by preventing or reducing the discharge of pollutants at the source is a technically sound and cost effective strategy to bring development into compliance with Federal law.

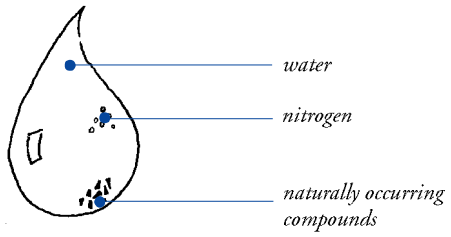

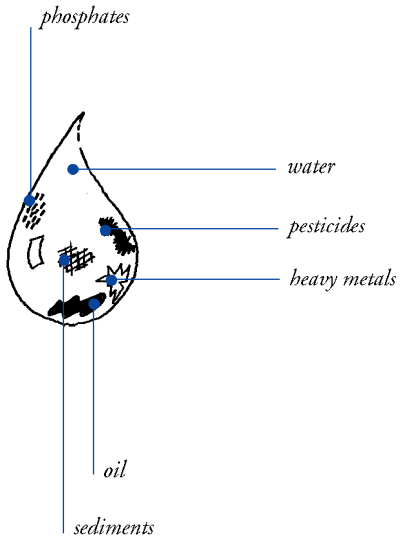

What's in a drop of runoff?

Pre-development runoff generally contains water and a low concentration of naturally occuring compounds.

Post-development runoff contains water and a variety of pollutants collected and concentrated from impervious surfaces.

Infiltration and the risk of groundwater contamination

The purpose of this manual is to encourage landscape designs and features that mitigate increases in site runoff by promoting infiltration through the soil. Allowing rain and runoff to infiltrate into the soil reduces the quantity of pollutants reaching local streams and San Francisco Bay. When implemented throughout a stream's watershed, infiltration protects the stream from increased peak flows, which can cause down-cutting, bank erosion, sedimentation, and losses to property and habitat. The Regional Water Quality Control Board encourages the use of infiltration as a strategy to manage urban runoff and to help protect the beneficial uses of streams and San Francisco Bay. Regional Board staff expects that, as part of their NPDES-permitted stormwater management programs, municipalities will encourage developers to implement the designs and methods described in this manual.

However, any drainage feature, including many of those described in this book, that infiltrates runoff poses some risk of potential groundwater contamination. The Regional Water Quality Control Board prohibits the unauthorized construction or use of any "artificial excavation for the purpose of extracting water or injecting water into the underground."[5] The "Explanation of Policy" attached to Regional Board Resolution 81 states: "wells used to dispose of sewage and surface drainage bypass the normal processes of nature that occur at or near the surface of the soil. The use of such wells may allow for injection of waste into subsurface strata rapidly and unchanged in chemical quality." Illegal disposal of chemical wastes into dry wells and chemical spills have contaminated groundwater in some locations in the Santa Clara County. In some cases, the contamination is severe.

The risks associated with groundwater infiltration can be managed by:

- Designing landscape drainage features so that they promote infiltration of runoff, but do not inject runoff so that it bypasses the natural processes of filtering and transformation that occur in the soil.
- Taking reasonable steps to prevent the illegal discharge of wastes to drainage systems.

The designs in this book promote infiltration only to the top 10 feet of soil. In general, designs that disperse runoff over landscaped areas, or through permeable surfaces, are the most effective, easiest to maintain and have lowest initial costs. These designs also minimize the risks of illegal disposal because the surface is visible and the infiltration rate (per unit area) is relatively low.

For some sites, it may be feasible to use detention basins or dry wells to infiltrate additional runoff in a more compact area. When these techniques are used, the designer should consider the potential for illegal disposal or chemical spills. Detention basins and dry wells should not drain, or be located near, work areas where wash-waters or liquid wastes are generated or where hazardous chemicals are used or stored. If dry wells are used, there should be a sufficient thickness of unsaturated zone below the dry well to allow natural processes to function effectively. Detention basins and dry wells should be clearly marked with a "no dumping" message and should be inspected regularly by the municipal stormwater management program. In some jurisdictions, the local groundwater management agency may require that detention basins, dry wells and similar structures be permitted at the time of construction. Always check with the local groundwater management agency and municipality for construction standards and permitting requirements.

Impervious land coverage as an environmental indicator

A new environmental indicator is emerging to measure the health of urban watersheds — impervious land coverage.[6]

Impervious land coverage is a fundamental characteristic of urban and suburban areas. The rooftops, roadways, parking areas, and other impervious surfaces of development cover soils that, before development, allowed rainwater to infiltrate. By depriving the soil of its ability to infiltrate rainwater, a host of environmental consequences follow.

One of the environmental consequences of impervious land coverage is stream degradation. Impervious surfaces associated with urbanization cause stream degradation in four ways:

1. Rainwater is prevented from infiltrating into the soil, where it can recharge groundwater, reducing base stream flows.

2. Because it cannot infiltrate into the soil, more rainwater runs off, and runs off more quickly, causing increased flow volumes, accelerating erosion in natural channels, and associated reduction of habitat and other stream values. Flooding and channel destabilization may require construction to channelize the stream, with further loss of natural stream uses.

3. As runoff moves over large impervious areas, it collects and concentrates nonpoint source pollutants – pollution from cars, roadways, parking lots, rooftops, etc. – increasing pollution in streams and other water bodies.

4. Impervious surfaces retain and reflect heat, causing increases in ambient air and water temperatures. Increased water temperature negatively impacts aquatic life and reduces the oxygen content of nearby waterbodies.

Impervious surfaces can be defined as any material that prevents or reduces the infiltration of water into the soil. While roads and rooftops are the most prevalent and easily identified types of impervious surface, other types include sidewalks, patios, bedrock outcrops, and compacted soil. As development alters the natural landscape, the percentage of the land covered by impervious surfaces increases.

Roofs and roads have been around many years, but the ubiquitous and impervious pavement we take for granted today is a relatively recent phenomenon. A nationwide road census showed that in 1904, 93 percent of the roads in America were unpaved. With the ascendancy of the automobile in the mid-twentieth century, the interstate highway system, and the growth of suburbia, the percentage of impervious surfaces increased dramatically. A prime contributor to the increase of impervious land coverage is the residential street network – since World War II, typical residential street widths have increased by 50%.

An increasing body of scientific research, conducted in many geographic areas and using many techniques, supports the theory that impervious land coverage is a reliable indicator of stream degradation. Furthermore, impervious land coverage is a practical measure of the impact of development on watersheds because:

- it is quantifiable, meaning that it can be easily recognized and calculated.
- it is integrative, meaning that it can estimate or predict cumulative water resource impacts independent of specific factors, helping to simplify the intimidating complexity surrounding nonpoint source pollution.
- it is conceptual, meaning that it can be easily understood by water resource scientists, municipal planners, landscape architects, developers, policy makers and citizens.

Water resource protection at the local and regional level is becoming more complex. A wide variety of regulatory agencies, diverse sources of nonpoint source pollution, and a multitude of stakeholders makes it difficult to achieve a consistent, easily understandable strategy for watershed protection. Impervious land coverage is emerging as a scientifically sound, easily communicated, and practical way to measure the impacts of new development on water quality.

This document illustrates a variety of site planning principles and design techniques for development. They all aim to reduce impervious land coverage, slow runoff, and to maximize opportunities for infiltration of rainwater into the soil.

Impervious land coverage thresholds

A certain amount of impervious land coverage is unavoidable in any development. Rooftops, by definition, must prevent infiltration of rainwater. Circulation systems– roads, parking, driveways– are the other, and usually most extensive, component of impervious land coverage. For planners, designers and regulators, the essential question is at what threshold of impervious land coverage does significant stream degradation begin?

Many recent studies have evaluated stream and wetland health using many criteria such as pollutant loads, habitat quality, and aquatic species abundance and diversity. These studies consistently show that significant water quality impacts begin at impervious land coverage levels of as little as 10%. At impervious land coverage over 30%, impacts on streams and wetlands become more severe, and degradation is almost unavoidable without special measures.

These impacts on stream health include:

- Creation of significant "new runoff," because soil that would normally absorb rainfall is covered with impervious surfaces.
- Streams receive greater flows more frequently. For example, flow equal to a pre-development 2–year storm may occur every 2–3 months after development.
- The stream channel may need to enlarge itself to contain increased flows, causing stream bank erosion and loss of habitat.
- Stream bank erosion produces sediment which settles where and when velocities slow, covering aquatic vegetation and fish spawning beds, furthering the loss of habitat.

These studies suggest that three broad categories can be established using simple numeric thresholds illustrating the general relationship between impervious land coverage and stream health (exact thresholds/percentages may vary depending on region):

Impervious land coverage	*Stream health*
< 10%	"sensitive"
> 10 and < 30%	"degrading"
> 30%	"non-supporting"

Sensitive streams generally have stable channels, good water quality and good stream biodiversity. Degrading streams generally have unstable channels, fair water quality and biodiversity. Non-supporting streams may have highly unstable channels, fair to poor water quality and poor stream biodiversity.[7]

These impervious land coverage percentages must be measured across an entire site or development area. Sometimes lower overall impervious coverage can be achieved by clustering development at higher densities on one portion of a site, while maintaining open space elsewhere.

Given land values and population densities in the Bay Area, less than 30% overall impervious coverage may be difficult to attain in many basins of a water resource. Even in higher density developments, the impact of impervious land coverage can be mitigated by a variety of site planning and design techniques, which are illustrated in the following pages.

These techniques have three basic goals:

- to minimize overall impervious land coverage and maximize infiltration,
- to minimize as much as practical remaining impervious areas that are not-directly-connected to the storm drain system, and
- to slow runoff within a drainage system.

Two approaches to stormwater management

The conveyance approach to stormwater management seeks to "get rid of the water." A conveyance stormwater system collects and concentrates runoff through a network of impervious gutters, drainage structures and underground pipes. As the conveyance system flows downstream, additional tributary conveyance systems feed into it, requiring it to be continually enlarged as it approaches its outfall. Because the system collects water from impermeable surfaces and carries it through impervious pipes, suspended pollutants are concentrated in the rapidly flowing runoff. When the system reaches its outfall, large volumes of polluted water can be emptied, untreated, into a natural water body.

Several factors contribute to stormwater degradation in a conventional development. Large paved roadway surfaces create and collect runoff. Building sites may be graded severely, removing natural vegetation that absorbs runoff. The curbs, gutters and catch basins collect runoff and carry it rapidly, providing little opportunity for infiltration. In this way, large quantities of runoff are created and carried in a short time to the outfall of a conveyance stormwater system, carrying sediments and other pollutants as a fast flowing untreated discharge into the bay.

The infiltration approach to stormwater management seeks to "preserve and restore the hydrologic cycle." An infiltration stormwater system seeks to infiltrate runoff into the soil by allowing it to flow slowly over permeable surfaces. These permeable surfaces can double as recreational and landscape areas during dry weather. Because the infiltration network allows much of the runoff to return to the soil, overall runoff volume is reduced, and more water is available to replenish groundwater and maintain stream base flows. The slow flow of runoff allows pollutants to settle into the soil where they are naturally mitigated. The reduced volume of runoff that remains takes a long time to reach the outfall, and when it empties into a natural water body, its pollutant load is greatly reduced.

A development designed for stormwater quality generates less runoff because overall impervious land coverage is reduced through clustering and other means. Building sites are fit into the contours, and preserve vegetation as far as feasible. The drainage system attempts to slow runoff, and provides opportunities for it to filter into the soil. In dry weather these infiltration areas can be used for recreation or wildlife habitat. Smaller runoff volumes are created overall, and these volumes take a longer time to the outfall. When runoff from an infiltration-based system arrives, it's cleaner, and moving more slowly as it empties into the bay.

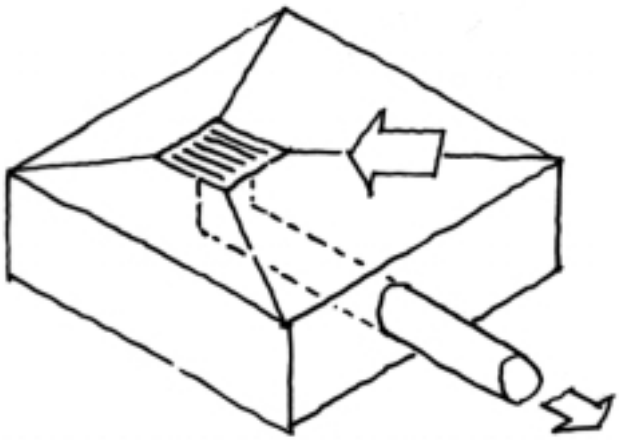

Conveyance Approach

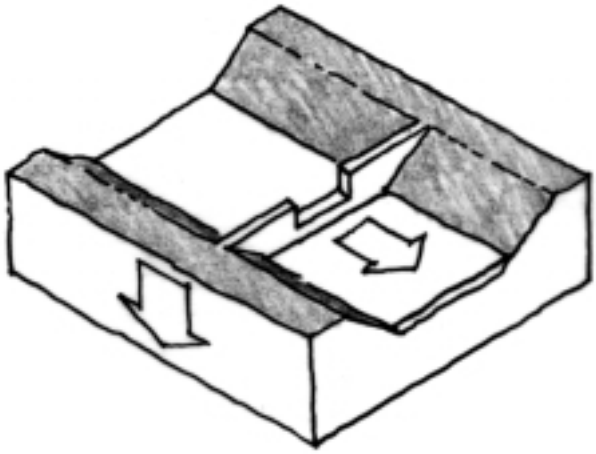

Infiltration Approach

2 Concepts

A *few basic concepts form the foundation for drainage systems that preserve and restore the hydrologic cycle. Once these basic concepts are understood, the ingenuity of designers, planners and builders can be applied to invent specific techniques for the special requirements of any site.*

The concepts spring from an integrated, comprehensive approach to stormwater management, considering each site's unique position within a larger watershed, and each smaller watershed within a site.

The application of these concepts consistently within a site will create a stormwater management approach that minimizes impervious area, reduces direct connections between impervious areas and the stormdrain system, and mimics natural systems while being economical, aesthetically pleasing, and technically sound.

Concepts

2.1 Every site is in a watershed. Rain falls on every site. What happens to the rain depends on the site's place in the larger watershed, and on the smaller watersheds within the site. From where does water enter the site? To where does it go? Understanding that a site has a position in the larger context is essential to stormwater management.

2.2 Start at the source. What happens immediately after a drop of rain hits the ground? Rather than convey stormwater away for treatment at the end of a pipe, water quality is most easily and economically achieved if stormwater management starts at the point that water contacts the earth.

2.3 Think small. For decades planners, engineers and builders have been trained to think big– to design systems that will handle peak flows from the biggest storms. Yet a significant amount of pollutants and flow-induced impacts to streams are in the early rains and small storms. Designing systems to accommodate the big storm is still essential for protection of life and property, but small-scale techniques, applied consistently over an entire watershed, can have a big impact — both improving stormwater quality and reducing overall runoff volume.

2.4 Keep it simple. A wide variety of simple and effective strategies can be employed to achieve stormwater quality goals. Designed for the small storms, these simple strategies often use natural methods and materials, and sometimes require a different kind of engineering or maintenance than conventional modern drainage systems. By employing an array of a few simple techniques throughout a site, improved stormwater management can be achieved economically with modest maintenance requirements, and can often be cost-effectively integrated into larger, flood control-type facilities.

2.5 Integrate the solutions. Providing stormwater management facilities is not a problem – it's an opportunity. By integrating solutions into the overall site plan, stormwater facilities can provide recreational, aesthetic, habitat, *and* water quality benefits.

Concepts

2.1 *Every site is in a watershed*

Once a single drop of rain reaches the earth, its journey is determined by the watershed in which it lands. A watershed is defined by the U.S. Environmental Protection Agency as " the geographic region within which water drains into a particular river, stream, or body of water." [8]

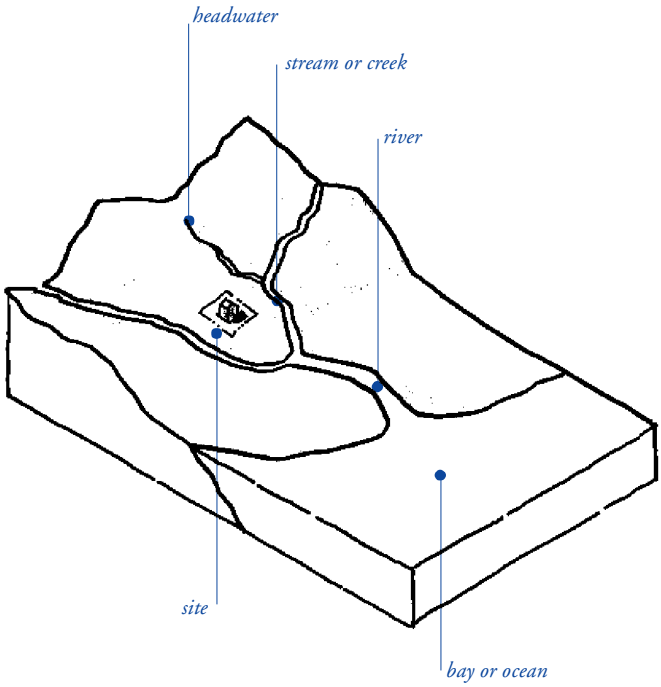

A small puddle in an uneven field reflects a tiny, localized watershed. At a neighborhood scale, gradual changes in elevation, or man-made artifacts like roadways or railroad embankments may define watersheds. Regionally, a range of mountain ridges may create a watershed that is drained by a network of small streams and creeks, each of which forms a tributary to larger water bodies, forming larger watersheds, all of which ultimately empty into a lake, bay or ocean.

No matter where you are in a watershed, or at what scale of watershed you are working, what you do on any particular site always has effects on the overall hyrologic system. By understanding that every site has a relationship to its adjoining watersheds, by investigating the soil and hydrologic conditions of the site, and by appreciating the micro-watersheds within each site, designers can best achieve the overall objective: restoration and preservation of the natural hydrologic system.

Concepts
2.2

Start at the source

***W**hen a single drop of rain lands, it is carried by gravity and soil physics downward into the soil.*

If the soil is covered with an impervious material, such as rooftops, concrete, or asphalt, the single drop of rain flows along whatever surface it encounters, moving downhill, joining with other drops of rain to create runoff.

If this runoff is collected in pipes and conveyed long distances before treatment many opportunities for improved water quality are lost. "End of pipe" strategies, such as large retention ponds, can be important components of an overall stormwater management system, but are more complex and costly than strategies that start at the source.

Small collection strategies, located at the point where runoff initially meets the ground, repeated consistently over an entire project, will usually yield the greatest water quality improvements for the least cost.

Source control is cheapest

If runoff is infiltrated or detained at its source (a) the least costs are incurred and maintenance is minimal. If runoff is carried some distance and treated enroute (b), costs and maintenance demands rise. If runoff is carried directly to the outfall (c), cost for treatment controls are highest and most maintenance intensive.

The most economical, simplest stormwater management opportunities for water quality are at the source of the runoff.

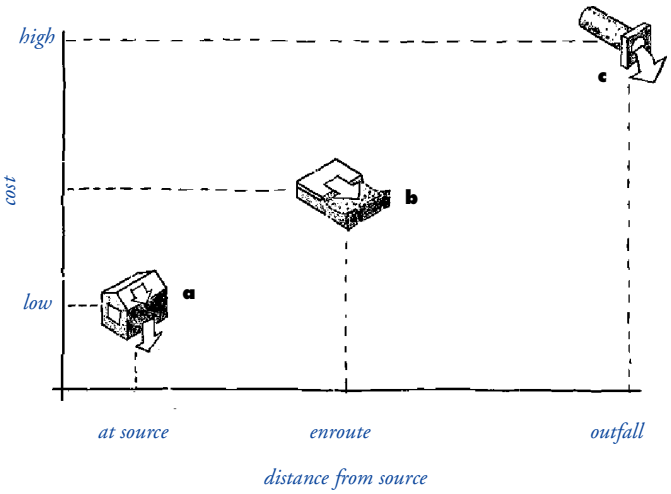

Concepts
2.3

Think small

S*mall storms add up. Because of their frequency, small storms, meaning storm sizes that recur once every two years or more frequently, produce the vast majority of total runoff over time. In the Bay Area, small storms account for eighty percent of total annual rainfall.*

By targeting these small storms, rainfall can be managed for water quality through relatively small water quality systems. In this way, managing frequent small storms can address a large part of the pollution problem.

In the past, stormwater management has focused almost exclusively on flood protection. In the same way that a freeway designed for rush hour traffic can easily handle the traffic on a quiet weekend morning, stormwater systems that can accommodate flood flows are more than adequate to convey more frequent small storms. So, in designing only for flood protection, designers have been able to neglect the small storm and its impacts.

With an awareness of the importance of small storms for water quality protection designers now consider small storms, because of their frequency and cumulative impacts, as well as the infrequent large rainfall event.

Small storms add up

Rainfall is distributed between relatively infrequent large storms and more frequent small storms. For example, in the Bay Area, approximately eighty percent of the total annual rainfall is produced by the accumulated contribution of the many small storms, the size that recurs every two-years or less (two-year recurrence interval). These small storms typically produce between 0.5 to 1.25 inches of rain, depending on microclimate. By comparison, all of the larger storms combined (five, ten, twenty and fifty year intervals) typically produce less than twenty percent of the total annual rainfall.

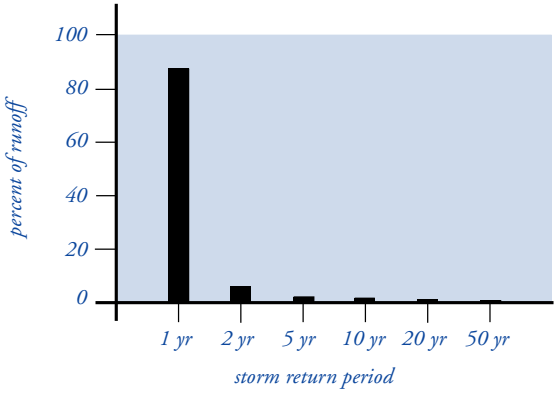

Concepts
2.4

Keep it simple

The techniques illustrated in this document were purposefully kept simple. Being simple, they are easy to understand. They are also relatively easy and inexpensive to design, build and maintain.

To address the many diverse sites found in the Bay Area, this document illustrates a wide variety of techniques, applicable to different soils, sites, and conditions. It is not intended that all *the techniques illustrated here will be appropriate for each project, but instead, that planners, landscape architects, and engineers select and adapt those few that are most suited to a particular site.*

A simple gravel strip, a concave instead of convex planting area, an infiltration basin at the end of a downspout — all of these are simple, but effective strategies for integrating stormwater management into a site plan.

The best stormwater management system will rely on a few simple techniques, applied consistently over an entire project or site.

Simple but effective

Because most stormwater management has generally been focused on complex, large systems, small, simple solutions may appear at first glance less effective. Yet simple solutions can be just as effective, and must undergo the same rigorous engineering analysis as more complex approaches. The difference is that the simple systems generally use lower technology materials and rely on natural materials integrated with the landscape, rather than mechanical or man-made processes, to manage stormwater.

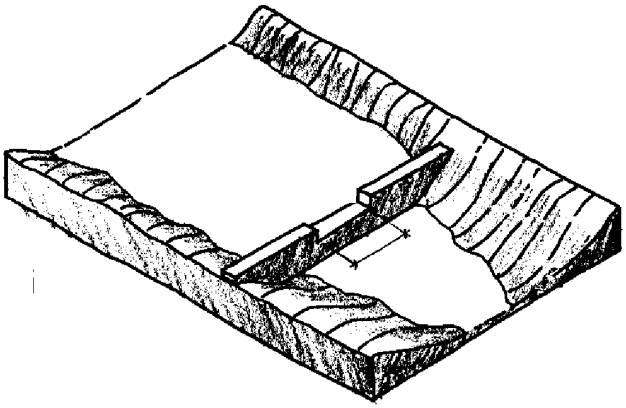

Concepts
2.5

Integrate the solutions

The stormwater management system can become an organizing element for site planning and design. Infiltration devices, drainage swales, and retention areas can be integrated into a site plan to improve aesthetics and provide recreational resources.

For example, a landscaped area, if slightly concave or depressed, can also serve as a temporary detention basin. Drainage swales can be landscaped with attractive riparian species. Pathways can follow these swales, creating attractive greenbelts that reflect natural landforms. A sandy area can serve as a children's playground in the dry season, but become a shallow infiltration basin in the winter rains.

Home buyers and business tenants consistently indicate a preference for water features. A network of small ephemeral pools and swales, treated carefully with attractive planting and maintenance, can satisfy this desire for a relationship to water and give developments a competitive advantage.

An integrated site plan will generally yield a series of smaller stormwater management facilities rather than one large basin at the end of a traditional conveyance system. This integrated approach not only reduces cost while achieving environmental goals, but it also maximizes land values, improves marketability, adds aesthetic interest, and provides increased recreational opportunities.

Design out the hazard, design in the people

Often environmentally sound stormwater management facilities, such as retention basins, are fenced or hidden from view. This approach to stormwater management not only adds significant "opportunity costs" through lost building sites or recreational potential, but also sends a symbolic message that stormwater is hazardous.

There are legitimate concerns for safety and liability, but they can usually be mitigated through simple design strategies such as shallow basin depths and gently sloping sides. By designing out the hazards and designing in the people, most drainage features can be integrated into the site plan to mimic the natural hydrologic cycle, add aesthetics, and increase recreational value.

Water as an amenity

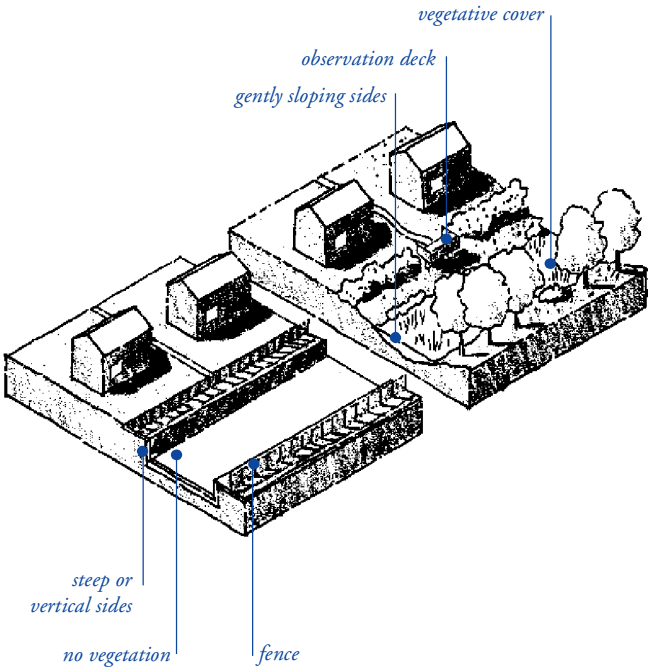

Water as a hazard

3 Planning & Zoning

***P**lanning and zoning practices profoundly influence the impact of development on watersheds.*

Planning determines the pattern of development, what type is permitted, and its relationship to streams and other natural features. Zoning determines where particular land uses are located, requirements for parking, sizes of roadways, permitted impervious land coverage, and types of approved drainage systems.

By understanding how these powerful tools work, they can be focused to protect water quality.

Planning & Zoning

3.1 Watersheds and planning – historical context. Political decisions made a century ago affect our ability to plan for watershed quality. Understanding the historical context of watershed planning helps us to focus current efforts more effectively.

3.2 Watershed-based planning & zoning. Conventional zoning practices don't typically address the impact of development on water quality. Specific zoning approaches can be adopted to make zoning a more effective water quality tool.

3.3 Cluster/infill development. Clustering development at higher densities on a portion of a site can have a beneficial impact on overall watershed health. The denser area may have a very high percentage of impervious land coverage, but total impervious area and land disturbance will be less.

3.4 Street design standards. Streets comprise a very large proportion of land use – up to 25% of total land area. The street pavement itself is often the largest component of total impervious land coverage. A carefully designed street system can protect water quality while also serving its primary transportation function.

3.5 Parking requirements. Parking is often the greatest single land use, and usually it is made of impervious pavement. The amount of parking mandated by zoning codes and standards often far exceeds the usual parking demand. A variety of zoning and planning tools are available to provide adequate, but not excessive, parking supply.

3.6 Community education and outreach. Education and outreach are critical elements of designing for water quality protection. Generating public awareness increases general interest and acceptance and improves long-term maintenance prospects.

3.7 SWMPs, SWPPPs, and BMPs. An alphabet soup of acronyms define government regulations relating to stormwater quality protection. Understanding these regulations is a key to successfully navigating the approval process.

Planning & Zoning
3.1

Watersheds and planning – historical context

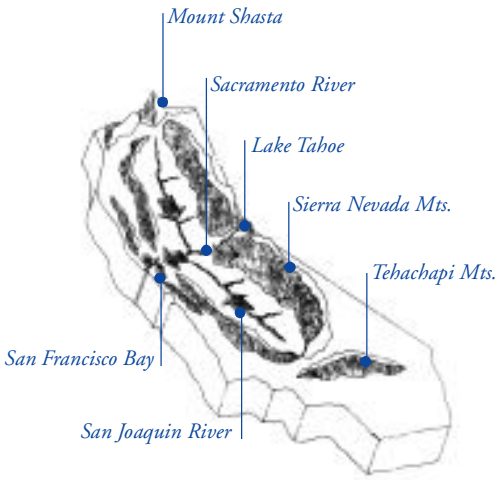

SF Bay drains a vast watershed

In 1878, Major John Wesley Powell, the first Director of the United States Geological Survey, submitted his *Report on the Lands in the Arid Region of the United States* to the U.S. Congress on the future of the American west. In this document, Powell recognized that water would be the limiting resource in the future development of the arid west. He understood that the rectilinear surveys used to divide properties and political entities in the rainy east would not work in the drier west. Instead of boundaries drawn along arbitrary lines, Powell proposed that drainage divides, or watersheds, be the organizing land use principal.

Congress ignored Powell's recommendation, continuing its practice of dividing properties and political entities along arbitrary lines. Where waterways such as rivers or creeks were used for creating political divisions, they often were used to form the border between entities. Yet, ecologically speaking, waterways do not divide land, but unite it by collecting drainage from throughout the watershed. Thus, in the adopted planning system, the political function of a waterway is often precisely opposite to its environmental function. [9]

These kinds of political and jurisdictional barriers to watershed planning also effect the San Francisco Bay, which drains a vast regional watershed extending from the coast ranges in the east to Mount Shasta in the north to Kern County in the south to Lake Tahoe in the east. County and city jurisdictions occasionally follow watershed boundaries (like the Mayacmas ridge separating Sonoma from Napa County), but more often lie in the center of watersheds (like San Francisquito Creek which divides San Mateo from Santa Clara County).

As planners and scientists recognize the threats to water quality, they create new mechanisms to better facilitate watershed-based planning and zoning. These include specific efforts to protect specific streams, such as the San Francisquito Creek Watershed Coordinated Resource Management Process, a collaboration between two counties and multiple cities along San Francisquito Creek, as well as larger regional efforts, such as the Santa Clara Basin Watershed Management Initiative, the Alhambra Creek Watershed Program, the Alameda Creek Watershed Management Program, many regional water quality programs, BASMAA, and the Association of Bay Area Governments (ABAG).

In Powell's scheme, the San Francisco Bay Area would have been treated as a single political entity, and the counties within it would have been divided on the basis of sub-watersheds, protecting the precious water resource and making environmental planning much easier.

Major John Wesley Powell (on horseback) proposed that watersheds be the organizing land use principal in the arid west.

(photo by Smithsonian Institution)

Planning & Zoning
3.2

Watershed-based planning & zoning

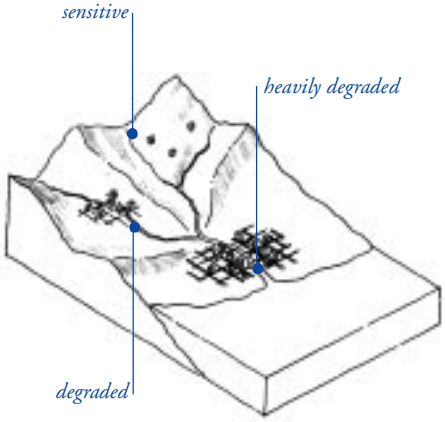

Land use patterns and the types of development permitted are determined by the planning process, which considers social, political, institutional, natural and other factors. In all planning and zoning, protection of natural resources must be balanced with other community priorities such as roads, schools, housing and economic development.

Limits of conventional planning and zoning. Conventional planning and zoning can be limited in their ability to protect the environmental quality of creeks, rivers and other waterbodies. This is a result of two principal factors. First, conventional zoning arises from political, transportation, and social factors that often do not mirror the natural watershed boundaries of a community. Second, conventional zoning can limit development by density (units per acre or allowable square footage). These regulations often address the maximum density of rooftop impervious cover, but have limited impact on the transportation network's contribution to impervious land coverage (roads, parking, pathways, driveways, etc.). Because this transportation component is usually greater than the rooftop component of impervious land coverage, density is an indirect and imprecise measure of forecasting the effect of development on water quality.

State planning law offers guidelines for resource protection but does not require specific protection measures. Local governments consider various priorities to develop General Plans that guide growth over a relatively long time horizon, such as twenty or thirty years. In some instances, local governments may consider the relationship of development to natural features such as creeks and hillsides, and may guide land use changes to minimize impact to these features. These local considerations may differ from city to city and can be difficult to coordinate regionally. In some local jurisdictions, natural factors may only be addressed to the extent of identifying hazards and land that is not suitable for development, while other jurisdictions may set a higher value on natural resource protection. Regardless of the approach of any particular local planning jurisdiction, the priorities of complex natural systems can be difficult to address at the local level, making a balanced pattern of development and resource protection at the regional level difficult to achieve.

Watershed based planning. An alternative to conventional planning and zoning is natural resource and watershed-based planning. Because such planning is natural resource-based, it begins by considering the natural resources of a given area. By being watershed-based, it orients such considerations to watershed areas, rather than only within town, city, or county lines. Such planning enables multiple jurisdictions to work together to plan for both development and conservation that can be environmentally as well as economically sustainable.

The regional approach is inherently difficult because it involves balancing the interests of many independent local governments. When practiced effectively, however, regional resource-based planning enables local and regional areas to realize economic, social and other benefits associated with growth, while conserving the resources needed to sustain such growth, including water quality.

This kind of comprehensive planning involves four basic steps:

- identify the watersheds shared by the participating jurisdictions,
- identify, assess, and prioritize the natural, social and other resources in the watersheds,
- prioritize areas for growth, protection and conservation, based on prioritized resources, and,
- develop plans and regulations to guide growth and protect resources.

Watershed-wide plans can become very detailed, with in-depth data gathering and assessment, extensive public involvement, identification of problems and needs, development of management strategies, and long-term implementation of policies and actions. Local governments, however, can start with simpler yet important steps toward effective watershed planning, such as adopting a watershed-based planning approach, articulating this basic strategy in their General Plans, and beginning to pursue the basic strategy in collaboration with neighboring local governments who share the watersheds.

Watershed-based zoning. Some watershed protection strategies have been adopted under conventional zoning, but they typically have limited value. These strategies include large lot residential zoning, which can reduce the overall impervious area on individual lots, but expands the impervious coverage of the roadway network as well as contributing to urban sprawl.

Another approach is the widespread use of stormwater treatment devices (often called BMPs) to mitigate the impact of impervious land coverage. These devices, even in the best of circumstances, have limited value as a watershed protection strategy, and their performance is often compromised by poor design, construction, or lack of maintenance.

Some resource-based zoning policies that can be developed and incorporated into conventional zoning include:

- overlay districts,
- performance zoning,
- incentive zoning,
- imperviousness overlay zoning,
- planned unit development zoning.

The intent of each of these tools is to introduce flexibility into the zoning structure to encourage natural resource protection.

Restoration. In many cases, municipalities undertake efforts towards preservation or restoration of existing natural resources, such as streams or other water bodies. In areas with the highest levels of existing urbanization, streams may have been impacted so that they don't support habitat in their present degraded condition. It is usually not practical in these circumstances to restore degraded streams to a pristine pre-development condition, with full habitat and ecological function. In these cases, an "urbstine" condition, or one of enhanced environmental vitality consistent with the urban context, may be sought. Planners can work with the community, water quality engineers and wildlife fisheries biologists to define the criteria for an "urbstine" condition, and work to achieve those goals.

Efforts to restore biological diversity may include:

- preventing the introduction of urban pollutants to protect downstream waters,
- mitigating effects of development using biofilters, detention/infiltration basins, pervious pavements, and other strategies,
- retaining the natural riparian corridor and carefully applying measures to prevent or treat runoff,
- protecting and restoring creekbank vegetation,
- restoring the riffle/pool structure and meander length,
- preventing unauthorized diversions of water.

Ideally, General Plans need to look at development projects in the context of the entire watershed, considering site impacts in terms of an overall watershed plan.

Planning & Zoning 3.3

Cluster / infill development

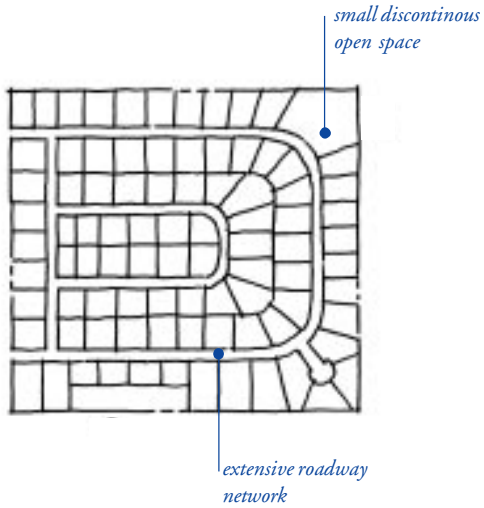

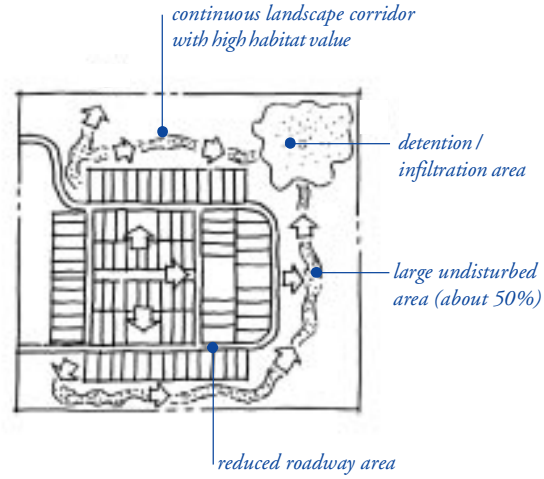

Conventional development standards use setbacks, frontages, roadway geometry, and other methods to arrange individual buildings on individual lots. Development based on the individual lot usually creates a homogeneous community, an extensive roadway network and other infrastructure systems.

Cluster development, a site planning technique in use for several decades, considers not only individual lots, but larger site boundaries. It concentrates development on one portion of a site, and conversely maintains more of the site in open space. One of the principal results of cluster development is reducing the length of the roadway network. Because the other infrastructure elements, such as sewer, power, telephone, and water follow the roads, their costs are also reduced. This means that cluster development can be significantly less expensive to build than conventional single lot development. On-going costs for city services, such as police and fire protection, are also reduced, because the community is more concentrated and therefore more efficiently served. Finally, cluster development provides increased area for passive recreation, because the open space is concentrated in a public or semi-public place, rather than divided in many large, private yards. However, cluster developments can face resistance in the marketplace, because home buyers sometimes prefer the larger lot sizes and wider streets of conventional development patterns.

From a water quality viewpoint, cluster development has multiple benefits compared to conventional zoning. These include:

- reduced impervious surface area by 10 to 50%,
- reduced stormwater runoff,
- reduced encroachment on stream buffers,
- reduced soil erosion since 25 to 60% of site is never cleared and steep hillsides are avoided,
- reduced need for expensive flood control measures,
- larger urban wildlife habitat islands, and,
- reduced reliance on automobiles, because shorter distances make pedestrian, bicycle and mass transit more attractive.

Most cluster development zoning policies have not been explicitly created to support water quality protection. To enhance these benefits, proponents of cluster development for stormwater quality protection have suggested the following cluster development criteria:[10]

- significant impervious surface reduction from reduced roadway network compared to conventional zoning,
- minimum site size (approximately 5 acres),
- minimum open space requirement of approximately 50% of total site,
- consolidation of open space, such that at least 75% is in a contiguous unit for habitat value,
- maintenance of approximately half of the open space in undisturbed vegetated areas (i.e. wetlands, forests, meadows), with the other half as a community green space (i.e. turfgrass, playgrounds, constructed stormwater basins),
- formation of private legal entity to maintain open space in perpetuity (e.g. homeowner's association), and,
- dedication of open space to a public open space district.

Planning & Zoning 3.4

Street design standards

A typical pre-war residential street
28 foot wide with tree-lined parkway between the curb and sidewalk. This traditional design can be found in older neighborhoods throughout the Bay Area.

A typical post-war residential street
36 foot wide with no parkway between sidewalk and curb. This modern design can be found in newer neighborhoods throughout the Bay Area.

Streets are at the nexus of a wide variety of land use and environmental issues. An understanding of their scope, history, and function helps to explain their central importance in the design of development for stormwater quality.

Considered a number of ways, the street is a large design element. In a typical neighborhood, the public right-of-way – the street – comprises approximately 20 to 25% of total land area, making it the single most important determinant of neighborhood character. Streets also can comprise up to 70% of a community's total impervious land coverage, with the remainder of impervious land coverage from rooftops and other structures. This can make street design the single greatest factor in a development's impact on stormwater quality. Because the street exists in the public right-of-way, it comprises a large proportion of total public open space in a typical development. It is also subject to municipal ordinances, standards, and management, giving local jurisdictions a great deal of control over street design. For these reasons, the street is the one of the most important design elements in site planning, and an element that can be most directly affected by local ordinances and policies.

Residential streets. Residential streets present a significant opportunity to apply design for water quality. Unlike streets in commercial and industrial settings, which must be sized to accommodate large trucks, high speeds, and heavy volumes, residential streets typically are intended for low volume, low speed automobile traffic.

Prior to World War II, traditional residential streets were designed as multiple use spaces, shared by pedestrians, children at play, animals, and low volumes of vehicular traffic traveling at low speed. The prototypical residential subdivision, laid out by Frederick Law Olmsted at Riverside, Illinois, in 1869, has 24 foot wide streets with concrete curb and gutter, lined with broad 12 foot wide parkway strips planted with trees. Outside of the parkway strip is a 5 foot wide sidewalk on both sides.[11] This model was copied all over the United States, and many pre-war neighborhoods can be found today with similar traditional street geometries.

After World War II, new street standards were developed to facilitate the automobile, which was growing both in dominance and number. Standards set by professional associations such as the Institute of Transportation Engineers (ITE) and the American Association of State Highway and Transportation Officials (AASHTO) as well as rules promulgated by the Federal Housing Administration increased paved area by up to 50% compared to pre-war designs, setting typical residential street width at 36 feet, plus curb, gutter and 5 feet of sidewalk on both sides.[12]

Street design standards, continued

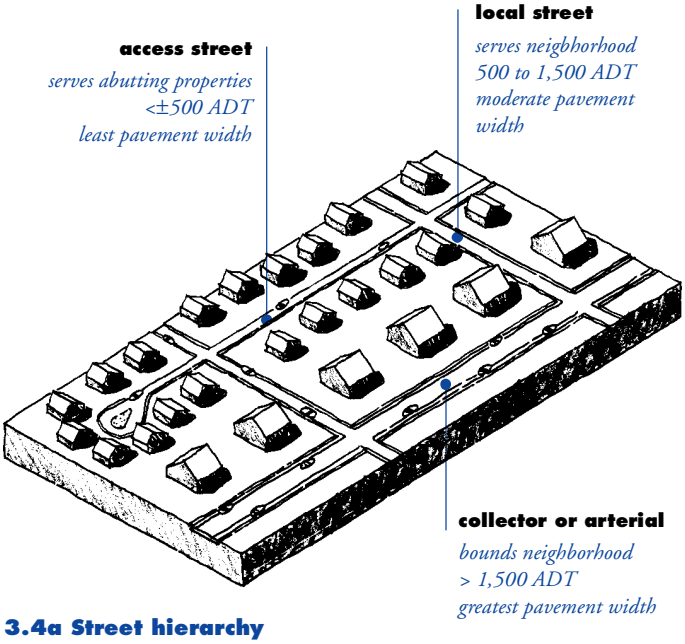

3.4a Street hierarchy

These standards were applied in communities throughout the Bay Area and the United States. For ease of maintenance, many communities abandoned the parkway strip between the curb and sidewalk, bringing the sidewalk flush with the back of the curb and eliminating the street trees. In a typical 50 foot wide right-of-way, this 46 foot wide pavement section (36 feet of street plus 10 feet of sidewalk) creates 92% impervious land coverage in the right-of-way. Compared to the inviting, park-like space of the original Olmsted model, with its 57% impervious land coverage (34 feet of pavement inside a 60 foot right of way), the modern residential street with its 90% impervious coverage can be a hot, treeless place that generates signifcant runoff.

Today professionals from many fields, including transportation engineers, landscape architects, urban designers, and environmental scientists, are reevaluating residential streets with the intent of creating new standards that are more hospitable and more environmentally responsible. New street standards based on the pre-war models (known as "neo-traditional design") are now being studied and adopted in municipalities across the country. At the national professional level, ITE has published neo-traditional street standards that permit local streets between 22 and 30 feet wide, allowing parking on both sides, with or without curbs.

3.4a Street hierarchy. Municipal standards generally classify street widths by the planned function of the street: local, collector or arterial. *Local streets*, the smallest class, are intended to provide access to abutting properties, and have a typical average daily traffic (ADT) of less than 1,500 vehicles. By definition, through traffic and truck traffic are generally discouraged on local streets. *Collector streets* are an intermediate class, intended to collect traffic from local streets and deliver it to larger arterial streets. They also can serve as the primary traffic route within a residential or commercial area, and have a typical ADT between 1,500 and 3,000. Finally, the largest class (except highways and freeways), *arterial streets,* have an ADT between 3,000 and 10,000, and are intended to provide long distance travel, with controlled intersections and higher speeds. For residential design, local streets are most relevant.

A survey of Bay Area municipalities reveals that the **typical current standard** for a two-way local street with parking on both sides requires two moving lanes, plus two parking lanes, plus curb, gutter and sidewalks each side, making a total of 40 to 50 feet of pavement within a typical 50 foot right-of-way (see table).

Yet, the number of vehicle trips on a local street can vary considerably, depending on the number of abutting dwelling units.

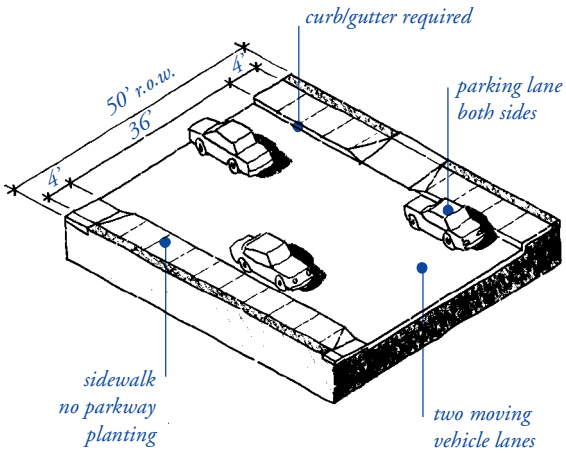

Typical current standard for a local street:

90± % impervious land coverage

Given the generally accepted rule-of-thumb for residential street design of 10 vehicle trips per day per dwelling unit, a street with ten single family homes can be expected to generate an ADT of 100, or an average of one vehicle trip approximately every 15 minutes (every 6 minutes in the peak hour). In comparison, a local street serving one hundred homes (1,000 ADT) will generate an average of one vehicle trip every 90 seconds (every 30 seconds in the peak hour). When built to typical municipal standards, the two mandated moving lanes of a local street use a great deal of land area for very little traffic. If the street is considered in terms of space, rather than lanes, a central space wide enough for one vehicle can be retained for movement, with parking and waiting space along both sides. In the infrequent instance when two vehicles approach in opposite directions, one vehicle can pull into the parking lane to allow the other vehicle to pass in the central moving space. The many driveway openings on either side of the street ensure than at any given segment of the street some space will be available for waiting, even if parking spaces are full on both sides. On lightly traveled streets, the minor inconvenience of waiting for oncoming traffic does not occur very often, making a shared central moving space feasible for streets serving up to 50 dwelling units (500 ADT, one vehicle every 3 minutes average, every 1.5 minutes peak).[13]

Impervious land coverage and street design standards.

Most Bay Area municipal street standards mandate over 80% impervious land coverage in the public right-of-way. Alternative standards can significantly reduce impervious land coverage while meeting access needs of local, residential streets.

Representative local street standards for Bay Area municipalities.

Jurisdiction	Street width	curb/gutter required	sidewalk required	parkway planting	r.o.w. imper.
Alameda Co.	40 ft.	yes	5'/side	no	100%
Concord	36	yes	4'/side	varies	90%
Contra Costa Co.	32	yes	4'/side	no	78%
Palo Alto	40	yes	4'/side	yes	85%
San Jose (std.)	35	yes	5'/side	no	100%
San Mateo Co.	36	yes	4'/side	no	94%

Alternative street standards for local and access streets.

Neotraditional	28±	no	4'±	yes	74%
Rural	20±	no	no	yes	36%
San Jose (alt.)†	30	yes	4'/side	yes	81%

(All standards reflect minor or local street standards for flat areas to accommodate two way traffic, with parking both sides, typical right-of-way between 45 and 60 feet wide.)

† San Jose Narrow Residential street standard, parking one side only.

Street design standards, continued

Unlike most municipal standards, which set street width by number of vehicle lanes and roadway classification (local, collector, arterial), street design by anticipated traffic volumes (ADT) allows for varying pavement width to match usage. Using the analogy of stream flow, this "headwaters streets" system allows the most "upstream" streets, those serving approximately 50 adjacent dwelling units, to have widths as low as 16 feet while allowing two-way traffic. As traffic volumes increase on neighborhood streets, pavement widths also increase, just as streams widen downstream to accommodate increased water volumes.[14] In practice this generates a new class of street for very low traffic volumes, referred to as "access" streets, which are below "local" street in the standard street hierarchy.

For example, an access street serving 50 single family homes (25 each side) with 50 foot width lots would require 1,250 linear feet of street [(50 sfh/2) x 50 ft = 1250]. A 36 foot wide street would cover 45,000 square feet, usually in impervious asphalt or concrete pavement. A 26 foot wide street would cover 32,500 square feet, a reduction of 12,500 of impervious land coverage. Assuming street construction costs of $3 per square foot, this reduction in pavement generates a $37,500 reduction in development costs, or $750 per lot. This does not account for added cost reductions in reduced need for drainage systems because of smaller impervious land coverage. Even greater reductions in pavement can be achieved if on-street parking is not required on both sides the entire length of the street, or if sidewalks are not required on both sides.

General considerations for residential street design. Alternative standards are feasible for local residential streets that employ "neo-traditional" or "headwaters street" design. These alternative standards can reduce impervious land coverage and provide drainage systems with less impact on stormwater quality compared to current typical municipal street standards, while accommodating local traffic and emergency access.

Street designs are often controversial, and development of new street standards must meet a variety of engineering, public safety and functional criteria. Municipal agencies with a strong interest in street design, such as Public Works, Planning, and emergency service providers, often differ on priorities and approaches. Alternative standards must be developed cooperatively so that each agency's legitimate interests are accommodated. In municipalities which have not adopted alternative standards, developers can propose these designs as part of a planned unit development zoning, subject to government approval.

Several communities in the United States have recently adopted new street standards for local access streets, including Bucks County, PA., Boulder, CO., Portland, OR, and San Jose, CA.[15] These new municipal street standards vary, but they all include reduced street widths (generally between 16 and 30 feet), shared moving lanes, reduced design speeds, and an ability to omit curbs, gutters and/or sidewalks on one or both sides. New ITE neo-traditional street design standards currently in review may help formalize acceptable alternative residential street designs.[16]

Planning & Zoning
3.5

Parking requirements

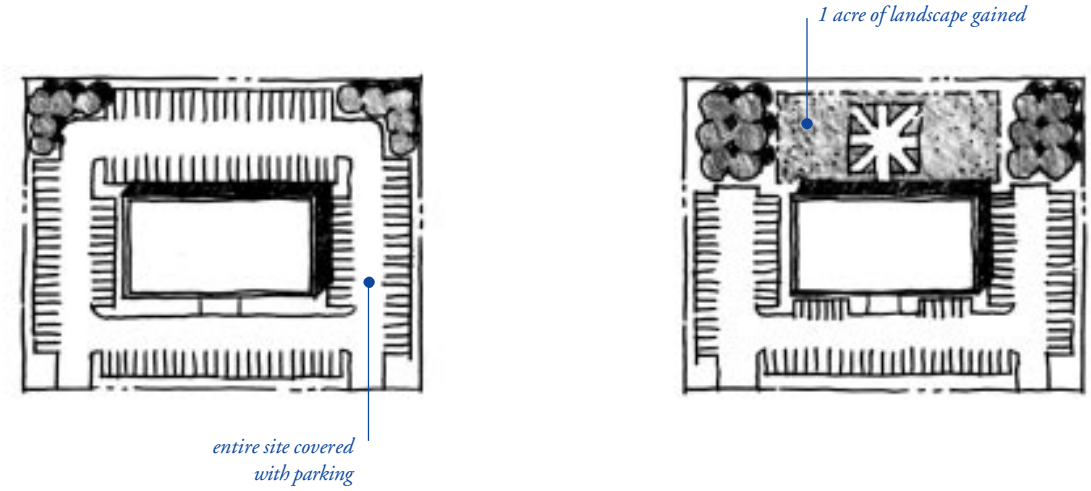

Parking is the greatest single land use in most industrial, office, and commercial development. Municipal codes usually mandate a minimum amount of parking and the type of approved pavement. Adjusting these requirements can significantly mitigate the negative environmental impact of parking, while still providing adequate storage space for cars.

Amount of parking. Parking minimums have been established by planners and professional associations, such as Urban Land Institute, the Institute of Transportation Engineers, the National Parking Association, and the American Planning Association. These minimums are based on empirical methods, usually by counting cars parked at existing land uses, identifying the peak use, and then requiring developers to supply enough parking to meet the peak demand (or near peak demand). These standards typically result in a large, underutilized parking capacity.

For example, a 1995 study of office buildings in ten California cities found that peak parking demand averaged only 56% of capacity. In shopping centers, parking lot design standards supply enough parking for the demand at the "20th busiest hour" of the year. This means that for all but 19 of the 3,000 hours that a typical center is open annually there will be a parking surplus, leaving at least half of the center's spaces vacant at least 40 percent of the time.

Because of these high minimum standards, parking and its associated transportation system usually account for the majority of land use in commercial and industrial sites. A recent survey completed by the City of Olympia, Washington, for example, found that over half of the city's commercial sites were devoted to parking and driveways.

Not only do these standards and their related zoning ordinances mandate high parking minimums– developers are free to build more. They usually do, if they can, because retailers and office tenants demand "plenty of parking" – they naturally want to make it easy for shoppers and tenants to reach their sites. Also, conventional asphalt parking lots are less expensive to build and maintain than turf or landscaped areas, further contributing to the tendency to build even more than the minimum standards.

Land Use Solutions. Several solutions can promote a more balanced approach to parking and land use.

a. institute paid parking. Studies show that motorists park free for 99 percent of all automobile trips. By pricing parking at its true cost, natural economics would tend to reduce demand, free more land for other uses, and encourage alternative transportation. Employer-paid parking programs, with cash incentives for employees who opt not to park, or employee-paid parking, have both proven effective at reducing parking demand in commercial and office uses.

b. reduce parking minimums. Reducing the mandated parking minimums in zoning ordinances can significantly reduce the amount of parking provided. For example, reducing the office use minimum from four to three spaces per thousand square

Parking requirements, continued

feet (1:250, 1:333) would reduce the number of required parking spaces for a 100,000 square foot office building from 400 to 300, a reduction of 25%, or approximately an acre of land that could be converted from parking to landscape that can be designed to filter and infiltrate the runoff from impervious surfaces (see 6.6). Depending on the number of building occupants and availability of alternative transportation, reduced parking minimums may be adequate for a variety of uses.

c. establish parking maximums. Some municipalities, in seeking to reduce the negative impacts of these large parking demands, have established *maximum* parking ratios instead of the more conventional parking minimums. For example, Lacey, Washington, has developed a phased program to implement maximum parking standards for its downtown. These standards will be reduced in three year intervals, giving businesses and travelers time to adjust driving patterns. Parking maximums prevent developers from building more than the maximum allowed parking, and the scarcity of parking, usually coupled with pricing strategies, naturally reduces parking demand and encourages alternative transportation. [17]

d. allow reduced minimum requirements as incentives. Some municipalities allow reduced minimum parking requirements as incentives for transportation demand management programs or for developments that encourage alternative transportation such as live-work, transit oriented residences, office buildings with bicycle commuter facilities, or neighborhood retail shopping areas. In these areas parking requirements can be reduced by as much as 20 to 30%, reflecting the fact that a significant proportion of people do not park at the site.

e. establish landscape reserves. Another strategy to reduce the amount of parking that allows for parking expansion if needed is to identify "landscape reserve" on site plans. These landscape reserves are areas adjacent to parking lots that are of appropriate size and geometry to accommodate additional parking. They are initially installed as landscape areas, but identified as "landscape reserve" on approved plans. If the need for parking increases beyond the amount originally provided, the landscape reserve can be converted to parking.

f. allow shared parking facilities. Shared parking facilities are another strategy to reduce overall parking supply, while still meeting demand. For example, a movie theater's parking demand is usually evenings and weekends, while office building demand usually peaks on weekdays– these uses can share a single parking lot, owned either by the city, or by one or both of the property owners. In commercial districts, parking supply for shoppers can be maintained by allowing employees to park on nearby residential streets, since resident parking peaks in the evening while employee parking peaks during the day. There are considerable obstacles to these shared parking approaches, such as zoning regulations that do not allow combining parking for separate uses, resistance of neighborhood residents towards employee parking on their streets, and liability and insurance issues surrounding sharing of a single, privately owned parking facility by multiple property owners.

g. promote parking garages. Underground or above ground parking garages reduce land coverage by allowing parking to be stacked or combined with building area. The expense of these solutions can be mitigated by providing building credits, in-lieu parking fees, subsidies, or fee waivers.

Parking lot paving. Aside from the amount of occupied land area, the type of parking lot pavement has a direct impact on stormwater quality. Parking lots are usually built of impervious pavement, such as conventional asphalt, and their large land area makes them a significant contributor to environmental degradation. Permeable materials such as porous asphalt, crushed aggregate, open-celled unit pavers, or turf block can be suitable parking lot pavements, especially for parking stalls (as opposed to aisles– see 6.3a Hybrid parking lot), for outlying spaces that are only typically used during peak demand (see 6.3c Overflow parking), or for occasional uses such as churches or sports stadiums.

Many municipalities mandate an impermeable pavement such as conventional asphalt or concrete for parking lots and prohibit the use of other materials. Where these impermeable pavements are mandated, rewriting municipal codes to allow permeable pavement alternatives is a prerequisite for their use.[18]

Community education and outreach

All those involved in the development industry need to understand the impacts of development on water quality, as well as the appropriate application of various strategies. This includes not only those who design and build, but the residents, occupants, and maintenance staff.

Community education and outreach are the key to building this understanding. Furthermore, community education and outreach on stormwater impacts is a minimum requirement of the NPDES regulations.

The NPDES regulations mandate public education and outreach and public involvement/participation as *minimum* control measures.

The activities enumerated in the regulations include:

- distributing of educational materials to the community
- conducting outreach activities on the impacts of stormwater
- providing public education on how to reduce stormwater pollution
- informing individuals and households on proper maintenance of stormwater systems
- teaching how to limit the use and runoff of garden chemicals
- promoting local stream restoration through conservation corps and other citizen groups
- participating in storm drain stenciling
- targeting specific industries or groups with specific stormwater impacts (e.g. restaurants and grease impacts on storm drains)
- engaging the public in a participatory process to develop, implement and review the local stormwater management program
- impaneling a group of citizens to participate in the decision-making process, hold meetings, or work with volunteers
- reaching out to all members of a community.

This outreach effort can be directed towards members of the public and individuals, as well as to targeted groups of commercial, industrial, and institutional entities likely to have significant stormwater impacts. For example, restaurants can be targeted with specific information on the impact of grease on storm drains, and architects can be targeted with specific information on selection of building materials and design for stormwater quality management.

Finally, it is important to involve the public in the development of outreach programs, and to tailor the message to address the viewpoints and concerns of all communities, including minority groups, disadvantaged communities, and children.

Planning & Zoning
3.7

SWMPs, SWPPPs, and BMPs

The current construction environment presents designers and developers with an array of mandates, regulations, and conditions for approval that relate to stormwater quality. By understanding the alphabet soup of acronyms, review agencies, and conditions it becomes easier to navigate the approval process and anticipate the design strategies that will be successful.

The National Pollution Discharge Elimination System (**NPDES**), a provision of the federal Clean Water Act, mandates that each large population center obtain a permit to discharge stormwater. BASMAA's seven participating stormwater programs, for example, serve as umbrella organizations for their co-permittee municipalities.

These NPDES permits are issued by the Regional Water Quality Control Board (**RWQCB**), a division of the State of California Environmental Protection Agency. There are nine regions throughout the state, and each Regional Board monitors each permittee for compliance.

To meet the goals of the NPDES permit, each local stormwater program, and each co-permittee within a program, establishes a Stormwater Management Plan (**SWMP**). These SWMPs give specific local requirements targeted to meet the environmental needs of each watershed, as well as reflecting the political consensus of each community. Because of the differences in each watershed's environmental context, as well as each permittee's attitude towards balancing environmental protection with economic growth, regional SWMPs may have different goals, methods, or targets.

In order to comply with the NPDES permit and requirements for a construction permit, each new development project resulting in a land disturbance of five acres or larger must prepare a Storm Water Pollution Prevention Plan (**SWPPP**). In a typical project, a SWPPP is a document consisting of narrative and a separate sheet within the construction document set, usually in the Civil Engineering or Landscape series, that outlines both a plan to control stormwater pollution during construction (temporary controls) and after construction is completed (the permanent constructed stormwater pollution prevention elements). The permanent controls are usually found on the sheet within the construction documents.

A SWPPP is a series or collection of Best Management Practices (**BMP**). The term Best Management Practice is a widely used, but somewhat inaccurate nomenclature, because the elements described as BMPs are not necessarily always best, nor are they always management practices. They can range from public education, like stenciling catch basins (which may not be as good as replacing the catch basin with an infiltration area), to site planning and design features, like a vegetated swale (which requires management but is not a management practice), to street sweeping (which actually is a management practice). In any case, the term BMP has wide currency and has been formalized in many local ordinances and codes. This document doesn't explicitly use the term BMP to describe the design alternatives presented, though each could be identified as a BMP in any particular SWPPP, depending on the requirements of the local SWMP.

The true management practices widely adopted in the past twenty years like stenciling catch basins and street sweeping, can be considered *"first wave BMPs."* These housekeeping practices have value, and deserve to be continued. But they perpetuate a conventional approach to stormwater management based on collection and conveyance.

Given development pressures and the environmental goals established by the Clean Water Act, more fundamental changes are required. Because the most economical and effective strategies arise in site planning and design, this document emphasizes ways to minimize the creation of new runoff, and to infiltrate or detain runoff in the landscape.

These *"second wave BMPs"* go beyond incremental changes to a conveyance storm drain system. They require a new way of thinking about impervious land coverage and stormwater management. They are a collection of proven methods and techniques that integrates stormwater management into planning and design, that reduces overall runoff, and manages stormwater as a resource, by starting at the source.

These *"second wave BMPs"* require a new way of thinking about impervious land coverage and stormwater management.

4 Site Design

The fundamental hydrological concepts and stormwater management concepts can be applied to site planning to generate forms that are more integrated with natural topography, that reinforce the hydrologic cycle, that are more aesthetically pleasing and that are often less expensive to build.

A few site planning principles help to locate development on the least sensitive portions of a site, and to create urban and suburban forms that accommodate land use while mitigating its impact on stormwater quality.

The application of these principles in developing a site plan will create opportunities for employment of a wide variety of simple design techniques to infiltrate significant amounts of runoff, improve aesthetics, and reduce development costs.

Site Design

4.1 Define development envelope & protected areas. Each site possesses unique topographic and hydrological features, some of which are more suitable for development than others. By identifying the development envelope and protected areas, a site plan can be generated that minimizes both environmental impacts and construction costs.

4.2 Minimize directly connected impervious areas. For decades planners, engineers and builders have been trained to get rid of stormwater. This is accomplished by connecting impervious areas to storm drains. Yet these "directly connected impervious areas (DCIAs)" are a principal contributor to nonpoint source pollution and flow impacts.

4.3 Maximize permeability. A parallel strategy to minimizing DCIAs is to maximize the permeability of the site. This is accomplished both by preserving open space and by using permeable pavement surfaces where feasible.

4.4 Maximize choices for mobility. By planning for alternative modes of transportation – bicycles, pedestrians, transit – reliance on automobiles can be reduced.

4.5 Use drainage as a design element. Unlike conveyance storm drain systems that hide water beneath the surface and work independently of surface topography, a drainage system for stormwater quality protection can work with natural land forms and land uses to become a major design element of a site plan.

Site Design

4.1 *Define development envelope and protected areas*

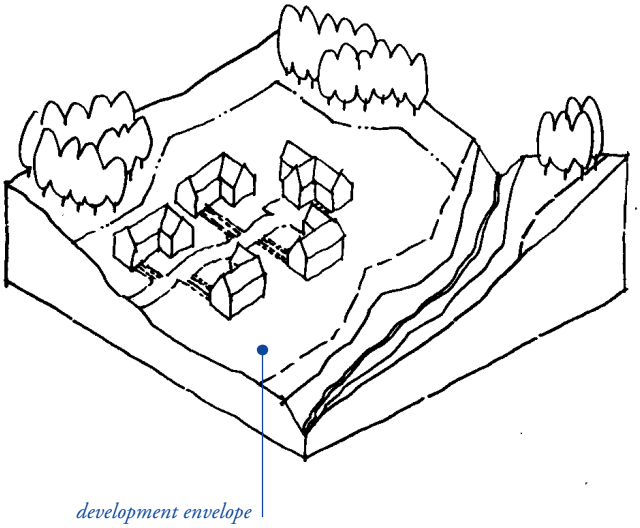

The first step in site planning is to define the development envelope. This is done by identifying protected areas, setbacks, easements and other site features, and by consulting applicable local standards and requirements. Site features to be protected may include important existing trees, steep slopes, erosive soils, riparian areas, or wetlands.

By keeping the development envelope compact, environmental impacts can be minimized, construction costs can be reduced, and many of the site's most attractive landscape features can be retained. In some cases economics or other factors may not allow avoidance of all sensitive areas. In these cases, care can be taken to mitigate the impacts of development through site work and other landscape treatments.

Set back development from creeks, wetlands, and riparian habitats.

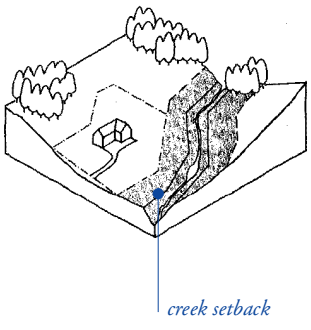

Preserve significant trees. Trees protect soil structure, aid in soil permeability, and provide aesthetics.

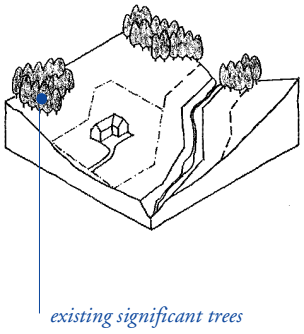

Avoid erosive soils and slopes. These include steep or long continuous slopes, soils high in silt or fine sand, or soils lacking vegetative cover.

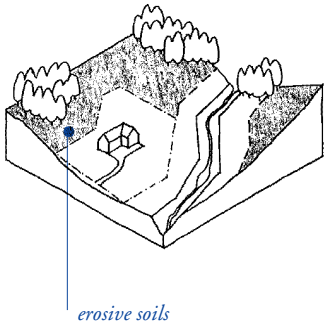

Site Design

4.2 *Minimize "directly connected impervious areas"*

Directly connected impervious area (DCIA)

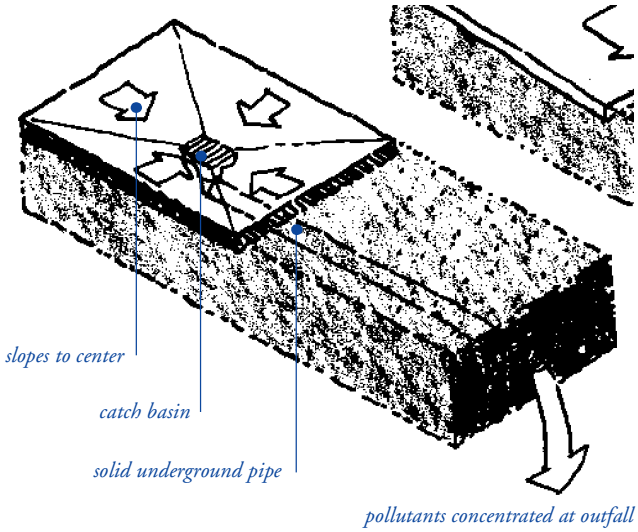

Not-directly connected impervious area

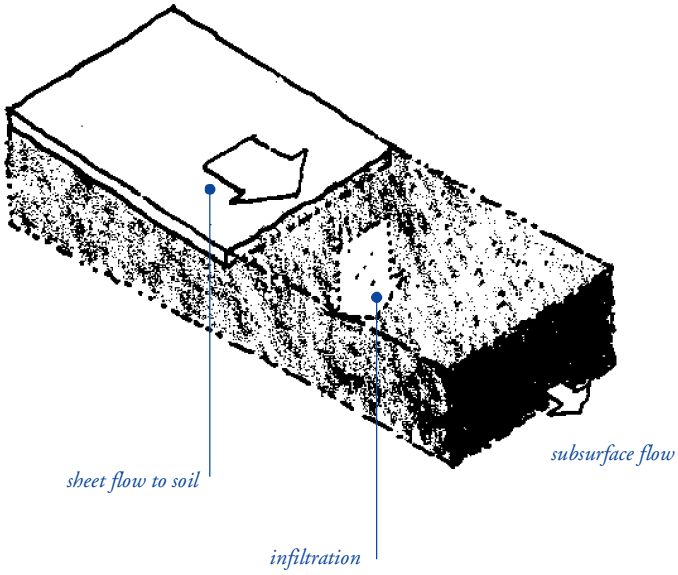

Impervious areas directly connected to the storm drain system are the greatest contributor to nonpoint source pollution. Any impervious surface which drains into a catch basin, area drain, or other conveyance structure is a "directly connected impervious area (DCIA)." As stormwater runoff flows across parking lots, roadways, and paved areas, the oils, sediments, metals, and other pollutants are collected and concentrated. If this runoff is collected by a drainage structure and carried directly along impervious gutters or in sealed underground pipes, it has no opportunity for filtering by plant material or infiltration into the soil. It also increases in speed and volume, which may cause higher peak flows downstream, and may require larger capacity storm drain systems, increasing flood and erosion potential.

A basic site planning principle for stormwater management is to minimize these directly connected impervious areas. This can be done by limiting overall impervious land coverage or directing runoff from these impervious areas to pervious areas and/or small depressions, especially the first 1/3 to 1/2 inch of rain. This means that if the site is 50% impervious, then the pervious areas must have capacity to infiltrate two times the treatment depth. In this example, that is 2/3" to 1" of rain, because both surfaces are subject to rain. Larger storms may require an underground storm drain system, but even these systems can mitigate stormwater quality impacts if runoff from impervious surfaces passes through pervious areas and depressions before being collected in conveyance devices.

Site Design

4.3 *Maximize permeability*

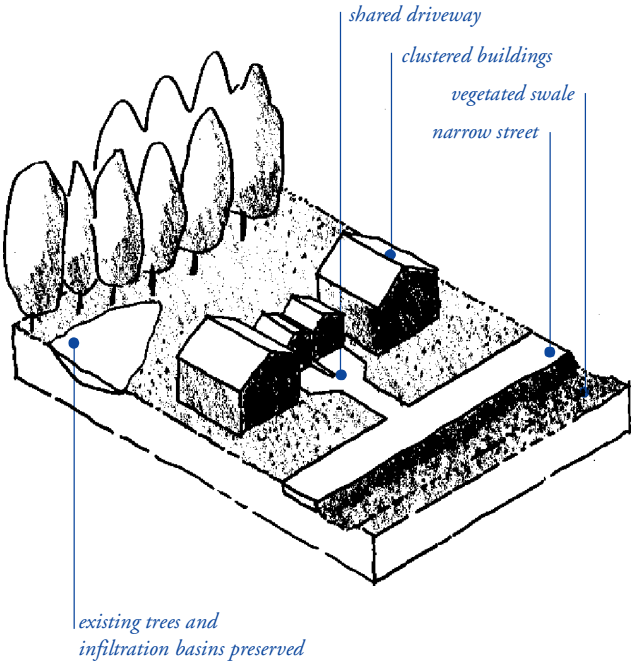

Within the development envelope, many opportunities are available to maximize the permeability of new construction. These include minimizing impervious areas, paving with permeable pavement materials, clustering buildings, and reducing the land coverage of buildings by building taller and narrower footprints. All of these strategies make more land available for infiltration and open space.

Clustered driveways, small visitor parking bays, and other strategies can also minimize the impact of transportation-related surfaces while still providing adequate access.

Once site coverage is minimized through clustering and careful planning, pavement surfaces can be selected for permeability. A patio of brick-on-sand, for example, is more permeable than a large concrete slab. Gravel, mulch, and lawns are permeable ground covers suitable for a wide variety of uses. Pervious concrete and porous asphalt, used in the eastern United States, are alternative materials that can preserve permeability where a larger, more intensely used paved area is needed.

Maximizing permeability at every possible opportunity requires the integration of many small strategies. These strategies will be reflected at all levels of a project, from site planning to materials selection. In addition to the environmental and aesthetic benefits, a high-permeability site plan may allow the reduction or elimination of expensive underground conveyance storm drain systems, yielding significant savings in development costs.

Site Design

4.4 *Maximize choices for mobility*

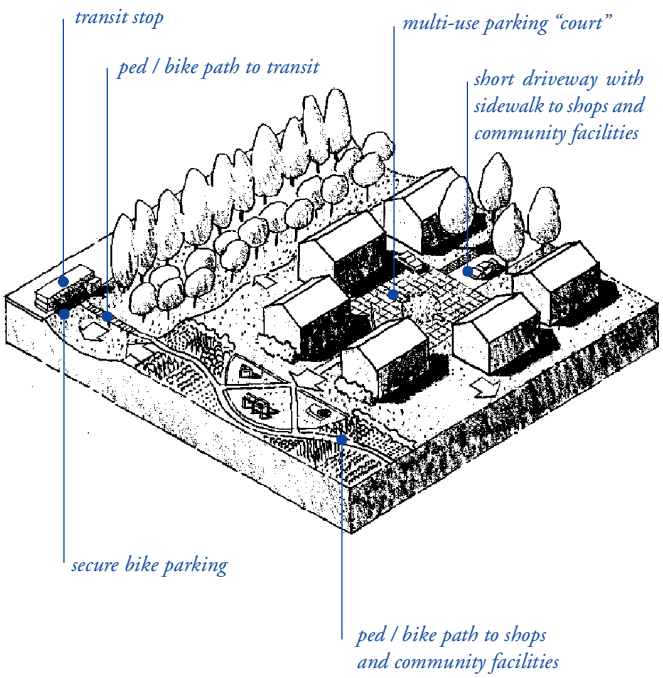

Given the costs of automobile use, both in land area consumed and pollutants generated, maximizing choices for mobility is a basic principle for environmentally responsible site planning. By designing developments to promote alternatives to automobile use, a primary source of stormwater pollution can be mitigated.

Bicycle lanes and paths, secure bicycle parking at community centers and shops, direct, safe pedestrian connections, and transit facilities are all site planning elements that maximize choices for mobility.

The automobile is a valuable, essential element of our current transportation system, and its use must be accommodated. But by giving comparable accommodation to other transportation modes, less environmentally costly choices for mobility become more viable.

Site Design

4.5

Use drainage as a design element

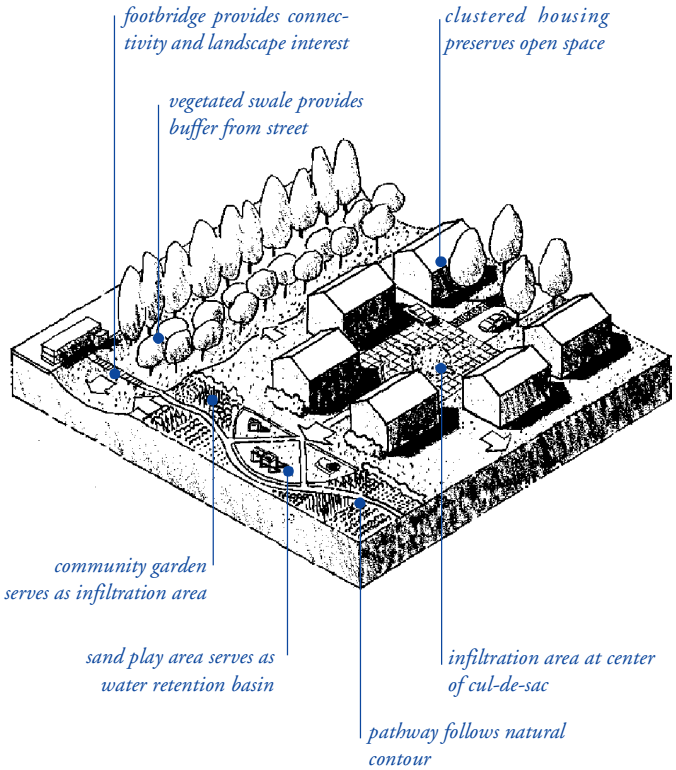

Unlike conveyance storm drain systems that hide water beneath the surface and work independently of surface topography, a drainage system for stormwater infiltration can work with natural land forms and land uses to become a major design element of a site plan.

By applying stormwater management techniques early in the site plan development, the drainage system can suggest pathway alignment, optimum locations for parks and play areas, and potential building sites. In this way, the drainage system helps to generate urban form, giving the development an integral, more aesthetically pleasing relationship to the natural features of the site. Not only does the integrated site plan complement the land, it can also save on development costs by minimizing earthwork and expensive drainage structures.

Attractive? Yes. Nuisance? Not necessarily. Because of concerns about safety and liability, many developers and municipal agencies are reluctant to combine stormwater facilities with recreational uses. Yet, a well-designed stormwater facility can be safe and attractive.

This sand play area at Village Homes in Davis, California, doubles as a stormwater detention basin. Designed to hold about six inches of rainwater, this playground has been in use for over twenty years without any reported water-related accidents, lawsuits, or injuries.[19] It shows that multi-use stormwater management facilities can be both attractive and safe.

5 Drainage Systems

Conventional drainage systems are designed to achieve a single objective — flood control during large, infrequent storms. This objective is met by conveying and/or detaining peak runoff from large, infrequent storms. Drainage systems designed to meet a single flood control objective fail to address the environmental effects of increases in runoff volume and velocity caused by development, as well as flow peaks. Increased runoff from small, frequent storms erodes urban streams and washes eroded sediment and other constituents from the urban landscape into downstream receiving waters, often damaging adjoining property and impairing their use by people and wildlife.

Today's drainage systems must cost-effectively manage flooding, control streambank erosion, and protect water quality. To do this, designers must integrate conventional flood control strategies for large, infrequent storms with three basic stormwater quality control strategies for small, frequent storms:

- *infiltrate runoff into the soil,*
- *retain/detain runoff for later release,*
- *convey runoff slowly through vegetation.*

Integrated flood control/stormwater quality control designs must meet a variety of engineering, horticultural, aesthetic, functional, economic, and safety standards. This chapter briefly outlines methods and criteria for drainage system design.

Drainage Systems

5.1 Drainage system design process
5.2 Site conditions
5.3 Soils
5.4 Pollutants
5.5 Drainage system elements
5.6 System design techniques
5.7 Water quality volume
5.8 Manufactured treatment devices

Today's drainage systems must cost-effectively manage flooding, control streambank erosion, and protect water quality.

Drainage Systems

5.1 *Drainage system design process*

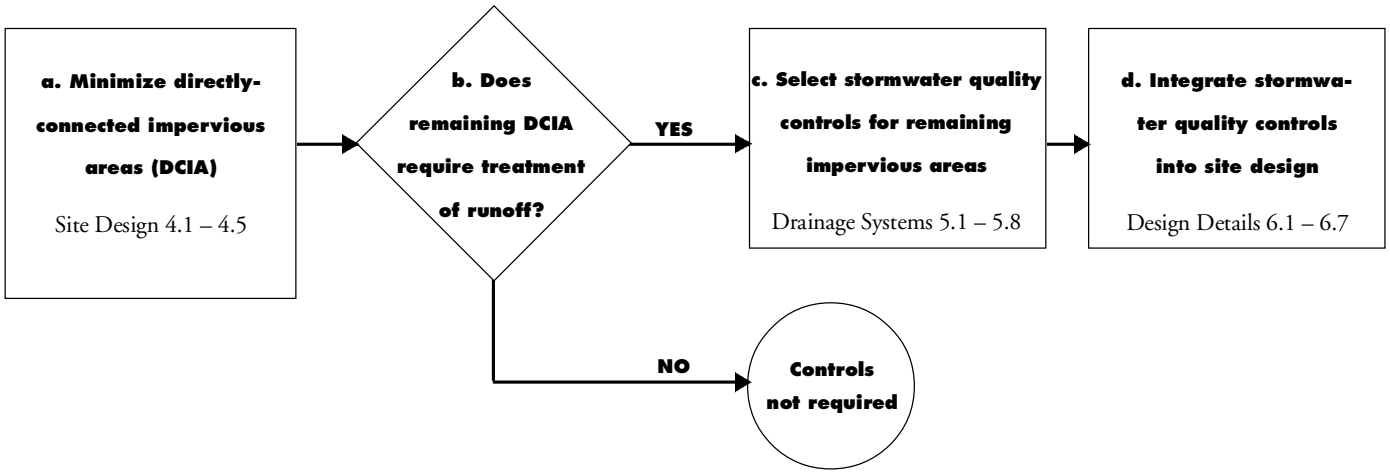

5.1 Drainage system design process. The simple design process described below establishes the foundation of a drainage system for stormwater quality.

a. Minimize directly connected impervious area (DCIA). Using the concepts and site planning strategies outlined previously, design a project to minimize directly connected impervious area.

The DCIA is measured by adding together the square footage of all impervious surfaces that flow directly into a conveyance stormwater system. These impervious surfaces are principally comprised of rooftops and conventional pavements. Impervious surfaces that are not directly connected to a conveyance system are not included in the calculation of DCIA. However, to be considered "disconnected," intervening pervious areas receiving runoff (p) must be at least one half the size of impervious surface areas generating runoff (i). The pervious area must also be of appropriate width, location and slope, and design to effectively manage runoff. [20]

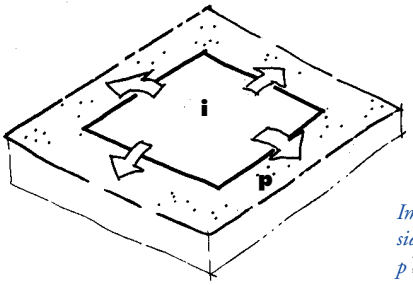

Impervious areas are considered "disconnected" if: $p \geq 1/2\ i$

b. Identify DCIA requiring treatment. In some areas, a site's DCIA coverage may not require stormwater controls if the required treatment is based on other factors (e.g. if site is located upstream from existing or regional treatment facilities, or if it is an infill development in an existing urbanized watershed). If site DCIA coverage is not treated in another manner, some form of stormwater quality control on-site is probably needed.

c. Select stormwater quality controls for remaining impervious areas. There are three stormwater quality controls appropriate for the Bay Area: infiltration, detention/retention, and biofilters. Using these approaches, alone or in combination depending on site conditions and soils, drainage systems can be designed to reduce flows and manage pollutants.

d. Integrate stormwater quality controls into site design. The Design Details section (Chapter 6) describes the many opportunities available to site designers for reducing DCIA and incorporating stormwater quality controls into site design. Local municipalities and developers can evaluate their particular opportunities and constraints to determine practical solutions within the framework presented here. Chapter 8 has more detailed information on each of these design details.

Drainage Systems

5.2 Site conditions

5.2 Site conditions. Site designers and municipal site plan reviewers must understand site conditions and use these as the basis for selecting appropriate stormwater quality controls.

a. Local climate. The Bay Area is distinctive for its widely varied local climates. Local climate will influence selection of controls for a specific site. For example, controls that rely upon vegetation to stabilize soils and filter pollutants may be appropriate in coastal areas with more moisture and/or moderate temperatures, while pervious pavements may be better in hotter, drier portions of the Bay region where vegetation must be more heavily irrigated.

b. "Design storm" size. Design storms used to size stormwater quality controls are significantly different than those used for conventional drainage and flood control facilities. Stormwater quality design storms generally are based on the capture of a certain fraction of the average annual runoff from the site or development. The rainfall analysis presented in the California Storm Water Best Management Practices Handbook indicates that the most "cost-effective" level of stormwater quality protection occurs when about 75 to 85 percent of the annual rainfall is captured and held long enough to allow about 80 percent of the suspended solids to settle (between 12 and 40 hours). This design storm volume ranges between 1 and 1.6 times the average storm volume of about 0.05 feet (0.6 inches) in the Bay Area.[21] The actual design storm volume within this range depends on the drawdown time of the selected stormwater quality control.

c. Soils. Site designers must know the soils at the site when considering infiltration measures including pervious pavements. Soil conditions will determine whether a site is suitable for infiltration, or if a detention/retention system is required. See 5.3 Soils.

d. Erosion. Erosive soils impair the effectiveness of most stormwater quality controls, and must be stabilized before installing these controls. Excessive sediment clogs infiltration devices, rapidly fills detention basins, and covers vegetative measures.

e. Slope. Most stormwater quality controls are sensitive to the slope of local terrain. Biofilters and infiltration basins cannot be used in steep terrain, while detention basins usually can be made to work on any reasonably sized land parcel, as long as the area is not subject to landslides.

f. Flood control and drainage. Stormwater quality controls are sized to capture runoff from storms much smaller than those used to size drainage and flood control systems. Site developers should first consider an integrated system that achieves both stormwater quality and flood control objectives. In these integrated systems, runoff from small storms and the first portion of larger storms enters the stormwater quality control system. Flows exceeding the runoff volume of the stormwater quality control system are either bypassed into a separate drainage/flood control system or accommodated within the stormwater quality control system (as long as these larger flows do not "flush out" the pollutants captured from smaller storms).

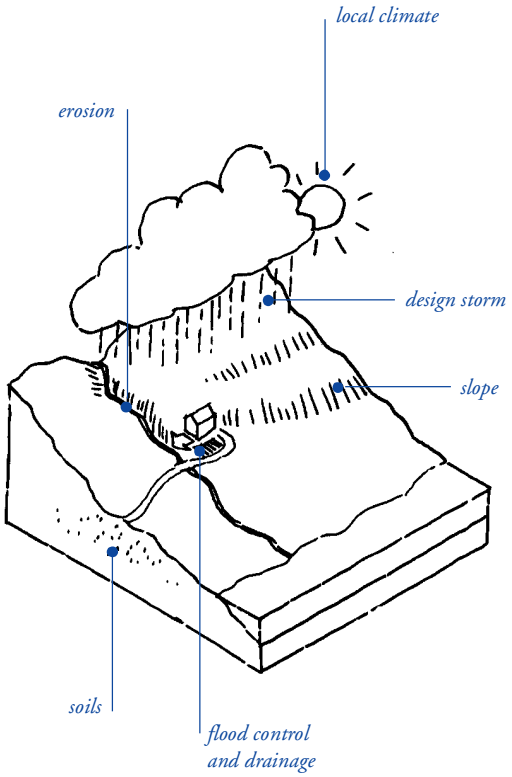

5.2 Site conditions

5.3 Soils

5.3 Soils. The USDA Natural Resources Conservation Service (NRCS) [formerly the Soil Conservation Service (SCS)], classifies a soil's hydrologic effects into four Hydrologic Soil Groups (HSG), labeled A through D. Group A and B soils possess the greatest infiltration rates (unless soils are compacted during construction) and are generally best suited to stormwater infiltration. However, the Bay Area has a relatively high concentration of Group C and D soils, which possess lower infiltration rates that generally limit use of infiltration-based stormwater management systems.

Some soils have compound classifications, such as A/D. This indicates that the natural soil is in group D because of a high water table which impedes infiltration and transmission, but following artificial drainage using such methods as perforated pipe underdrains, the soil's classification is changed to A, making it more appropriate for infiltration with proper site design.

For a specific site, the HSG designation can be obtained by referring to a local soil survey, by consulting the complete national listing given in NRCS Technical Release 55, or by performing an on-site investigation. The accompanying table presents soil infiltration rates for each soil group determined by laboratory studies and measurements. Site designers should compare the design runoff volume with the available soil storage volume to determine if infiltration is feasible, and then use the infiltration rates to determine if the design runoff volume can infiltrate within a reasonable time (generally 24 to 48 hours). For sites with Group C and D soils, retention- and detention-based strategies are often more feasible than infiltration designs.

Hydrologic soil groups (HSG)[22]

Group A: Low runoff potential. Soils having high infiltration rates even when thoroughly wetted and consisting chiefly of deep, well-drained sands or gravels. These soils have a high rate of water transmission.

Group B: Soils having moderate infiltration rates when thoroughly wetted and consisting chiefly of moderately deep to deep, moderately well to well drained sandy loam soils with moderately fine to moderately coarse textures. These soils have a moderate rate of water transmission.

Group C: Soils having slow infiltration rates when thoroughly wetted and consisting chiefly of silty-loam soils with a layer that impedes downward movement of water, or soils with moderately fine to fine texture. These soils have a slow rate of water transmission.

Group D: High runoff potential. Soils having very slow infiltration rates when thoroughly wetted and consisting chiefly of clay soils with a high swelling potential, soils with a permanent high water table, soils with a claypan or clay layer at or near the surface, and shallow soils over nearly impervious material. These soils have a very slow rate of water transmission.

Typical soil infiltration rates.[23]

Soil Type	*Min. Infiltration Rate (inches per hour)*
A	0.30 to 0.45
B	0.15 to 0.30
C	0.05 to 0.15
D	0 to 0.05

5.4 Pollutants

5.4 Pollutants. In a natural state, water is not chemically pure. It contains sediment, minerals, and other impurities depending on the surrounding geology and climate. These impurities do not often arrive at lakes, streams, and bays (known as "receiving waters") in concentrated form, because rainfall can infiltrate slowly into the soil, where it is cleansed by natural biologic processes. When rain falls faster than it can infiltrate, runoff flows over the surface. In most natural conditions, this runoff travels slowly through vegetation, and suspended particles settle or are filtered, sending cleaner runoff to receiving waters.

The impervious surfaces associated with urbanization prevent water from infiltrating and increase the rate of runoff. One can see rain fall on urbanized impervious surfaces – streets, rooftops, parking lots, trash and fuel handling areas, and pervious surfaces such as lawns, playfields, and exposed construction sites. Less visible are the foreign constituents that runoff carries as it flows quickly across urbanized surfaces and empties into its final receiving water. Understanding what pollutants are and where they come from can aid in designing effective stormwater treatment controls.

Constituents[24]

Sediment. Roads, parking lots, and roofs are common sources of sediment due to wear. Unstabilized landscaped areas, stream banks, unprotected slopes and denuded dirt areas also contribute. Sediment is a main component of total suspended solids (TSS), and is detrimental to aquatic life. Sediment also transports pollutants such as trace metals, nutrients, and hydrocarbons that attach to each particle.

Organic Compounds. These compounds are derived from automotive fluids, pesticides, and fertilizers. Organic compounds often attach to soil particles. Removal of soil particles from runoff via sedimentation or filtration will likely reduce the surface water pollution potential of organic compounds as well.

Nutrients. Nutrients include nitrogen, phosphorus, and other organic compounds which can be found in organic litter, fertilizers, food waste, sewage and sediment. Excess nutrients impact creek health and impair use of water in lakes and other water supply sources by promoting excessive growth of algae or vegetation (i.e. eutrophication).

Metals. Sources of trace metals (copper, lead, cadmium, chromium, nickel, and zinc) can include motor vehicles, roofing and construction materials, and chemicals. Trace metals can be toxic to aquatic organisms and, in accumulated quantities, can contaminate drinking water supplies. Removal of sediment from runoff via sedimentation combined with surface infiltration will reduce the amount of metals that reach receiving waters.

Bacteria and viruses. Sources include animal excrement (found in areas where pets are often walked), sanitary sewer overflow, and trash handling areas (dumpsters). Bacteria and viruses may pose public health and safety concerns if they are present in drinking water reservoirs or recreational water bodies.

Oil and Grease. Sources of oil and grease include motor vehicles, food service establishments, and fueling stations. Oil and grease act as carriers for heavy metals and contain hydrocarbon compounds, which even at low concentrations may be toxic to aquatic organisms.

With proper maintenance of stormwater management systems, pollutants infiltrating into the soil do not usually pose a risk of contaminated soil or groundwater. Risk is greater when there is a concentrated source of pollutants, such as in a heavy industrial site or in the case of illegal disposal.

A case study by the USGS of a groundwater recharge basin in Fresno showed that a wide variety of urban runoff pollutants were removed by sorption within the top 1.5 inches of sediment in the basin, but no pollutants were found in the sediment at depth greater than six inches. This shows that the pollutants have not traveled more than six inches deep – well above the level of groundwater wells.[25]

Pollutants, continued

Residential developments present the least potential of contamination of groundwater or soil from infiltration systems, according to a recent study completed by the EPA.[26] This is because residential developments generally have low concentrations of pollutants, and the pollutants that are present have low solubility and mobility. High concentrations, when they occur, such as nitrates and pesticides or an oil spill in a driveway, are localized and small. Based on recent EPA analysis of groundwater protection and infiltration, the Santa Clara Valley Water District, for example, is currently considering revising their policy to permit infiltration basins 10 feet or less in depth.[27]

Risk of groundwater contamination from residential infiltration systems is further minimized by findings that metals tend to remain within the upper one foot of soil depth. Organics such as petroleum hydrocarbons migrate slowly downward– allowing natural degradation to occur. Furthermore, drinking water is typically drawn from significantly greater depths. In the Santa Clara Valley, for example, wells pumped for drinking water supply are deeper than 50 feet by ordinance. In some portions of the valley, water companies pump from in the range of 400 feet, much deeper than the potential migration of most common pollutants. [28]

Some pollutants, such as nitrates and solvents, can migrate to depths that can ultimately threaten water supply wells. Illegal dumping of waste oil, pesticides, herbicides, paint, paint thinner and other chemical products into any type of infiltration device presents additional risk to groundwater. Local water districts and other agencies generally have policies and strategies to protect groundwater supplies from these threats. These policies are an attempt to balance the environmental benefits of infiltration with the compelling need to protect soil and groundwater supplies.

5.5 Drainage system elements

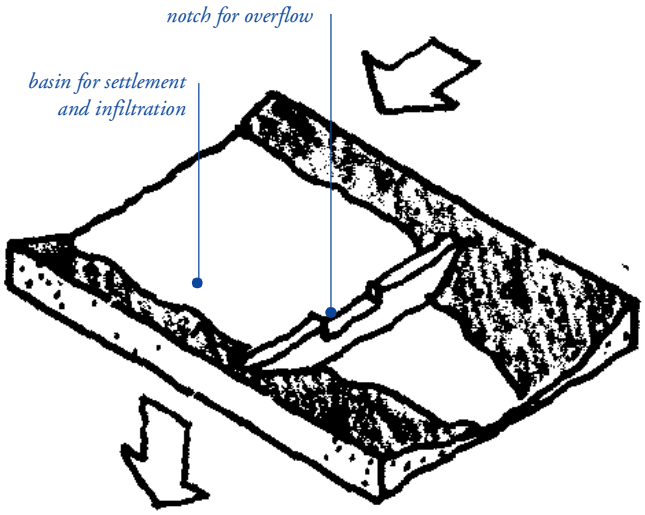

5.5a Infiltration basin

5.5 Drainage system elements. Drainage systems can achieve stormwater management goals by using one of three basic elements, either alone or in combination, depending on site and other conditions: infiltration, retention/detention, and biofilters.

5.5a Infiltration. Infiltration is the process where water enters the ground and moves downward through the unsaturated soil zone. Infiltration is ideal for management and conservation of runoff because it filters pollutants through the soil and restores natural flows to groundwater and downstream water bodies. Infiltration systems are designed to infiltrate the majority of runoff from small storms into the soil rather than discharging it into a surface water body. Infiltration basins can range from a single shallow depression in a lawn, to an integrated swale, pond, and underground storage basin network.

Site soil conditions generally determine if infiltration is feasible. In Soil Groups A and B (see 5.3) infiltration is usually acceptable, but it is severely limited in Soil Groups C and D. It is also limited where high groundwater, steep slopes, or shallow bedrock is present.

Infiltration basins can be either open or closed. Open infiltration basins, which include ponds, swales, and other landscape features, are usually vegetated – the vegetation maintains the porous soil structure and reduces erosion. Closed infiltration basins can be constructed under the land surface with open graded crushed stone, leaving the surface to be used for parking or other uses. Subsurface, closed basins are generally more difficult to maintain and more expensive than surface systems, and are used primarily where high land costs demand that the land surface be reclaimed for economic use.

Other design considerations include clogging that may occur in very fine or poorly drained soils and impacts on slope stability of hillside sites. Infiltration basins are best installed at the end of construction, after the site is fully stabilized. If installed early, bypass flows until the site is stabilized, as construction-related runoff may contain a high proportion of silts which can clog the basin floor.

Infiltration systems have been used by Caltrans and local jurisdictions in California for about three decades[29], though heavy Bay Area soils sometimes limit their local application. The basic

Drainage system elements, continued

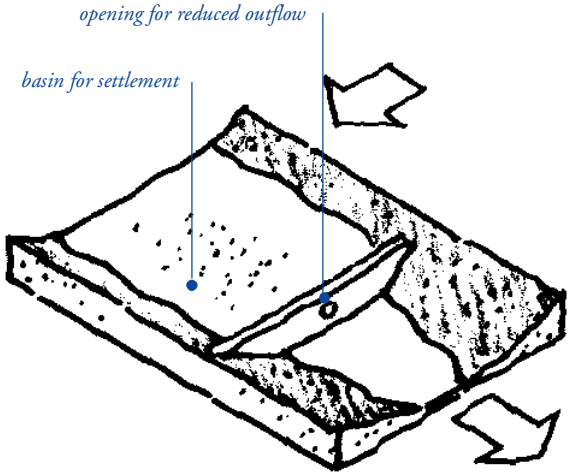

5.5b Retention/detention basin

design goal of infiltration systems is to provide opportunities for rainwater to enter the soil. This is generally accomplished by retarding the flow of runoff, and by bringing it in contact with the soil, either by holding it in ponds or moving it slowly along the ground surface. Infiltration basins are most economical if placed near the source of runoff, but they should be avoided on steep, unstable slopes or near building foundations.

5.5b Retention and detention. Retention and detention systems differ from infiltration systems primarily in intent. While infiltration systems are intended to percolate water into the soil, retention/detention systems are designed primarily to store runoff for later release. Detention systems store runoff for one to two days after a storm and are dry until the next storm. Retention systems usually have a permanent pool that retains the runoff volume until it is replaced during the following storm. Properly designed retention/detention systems release runoff slowly enough to reduce downstream peak flows to their pre-development levels, allow fine sediments to settle, and uptake dissolved nutrients in the runoff where wetland vegetation is included. Retention/detention systems are most appropriate for areas where soils percolate poorly, that is, C/D soils.

The permanent pool of a retention system and the storage volume in a detention basin are both sized equal to the runoff volume from the stormwater quality design storm, plus an additional 20 percent of this volume for sediment storage. Detention system outlets are generally sized to release 50 percent of this volume within 12 to 16 hours, and the remainder in another 24 to 32 hours.

Outlets of detention systems may clog easily if not properly designed and maintained. Retention system outlets must both maintain the permanent pool and slowly release runoff during each storm. Retention times in the permanent pool commonly are set at one to three days for removal of fine sediments, and up to two weeks for removal of dissolved nutrients through biological uptake by wetland vegetation. Common outlet designs are orifices, perforated risers, and V-notch weirs, with an emergency spillway provided to safely convey storms larger than the stormwater quality design storm.

5.5c Biofilters. Biofilters, also known as vegetated swales, are vegetated slopes and channels designed and maintained to transport shallow depths of runoff slowly over vegetation. Biofilters

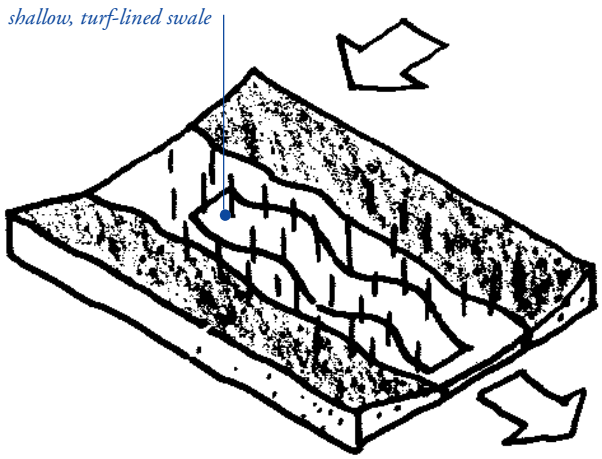

5.5c Biofilter

are effective if flows are slow and depths are shallow. This is generally achieved by grading the site and sloping pavement in a way that promotes sheet flow of runoff. For biofilter systems, features that concentrate flow, such as curb and gutter, paved inverts, and long drainage pathways across pavement, must be minimized. The slow movement of runoff through the vegetation provides an opportunity for sediments and particulates to be filtered and degraded through biological activity. In most soils, the biofilter also provides an opportunity for stormwater infiltration, which further removes pollutants and reduces runoff volumes.

Slow, shallow sheet flow is maintained in the biofilter by constructing it with gently sloping sides (3:1 slope max.), minimal longitudinal slope (1 to 2% recommended, with check dams for steeper slopes), and a flowpath length of at least 10 feet. The key concept is to move water slowly through the vegetation. The most common ground cover material is turfgrass, which must be irrigated through the dry season. For a turfgrass lined biofilter to work effectively, the turf must be mowed regularly and the cuttings removed.[29] Where slopes are less than 1% or where groundwater is high, wetland vegetation can be used in biofilters. Clay soils, or soils where vegetation are inhibited, are generally not appropriate for biofilters.

Biofilters are especially applicable to parking lots, as the long aisles can be sloped into linear grass swales to collect and treat runoff from pavement surfaces. Adjacent pavement elevations should be set slightly higher than the adjacent biofilter. If water enters at concentrated points, as opposed to sheet flow, erosion control should be included at inlets and outlets.[30]

Biofilters should be designed using the stormwater quality design storm. The peak depth of the hydrograph should be less than 3 inches and peak velocity less than 1 ft/second. Large storms should bypass the biofilter, or the biofilter should be sized to accommodate larger storms while meeting water quality criteria. The bottom width of the swale is generally 2 to 8 feet, with grass height of 4 to 6 inches and maximum water depth of less than 2 inches.

5.6 System design techniques

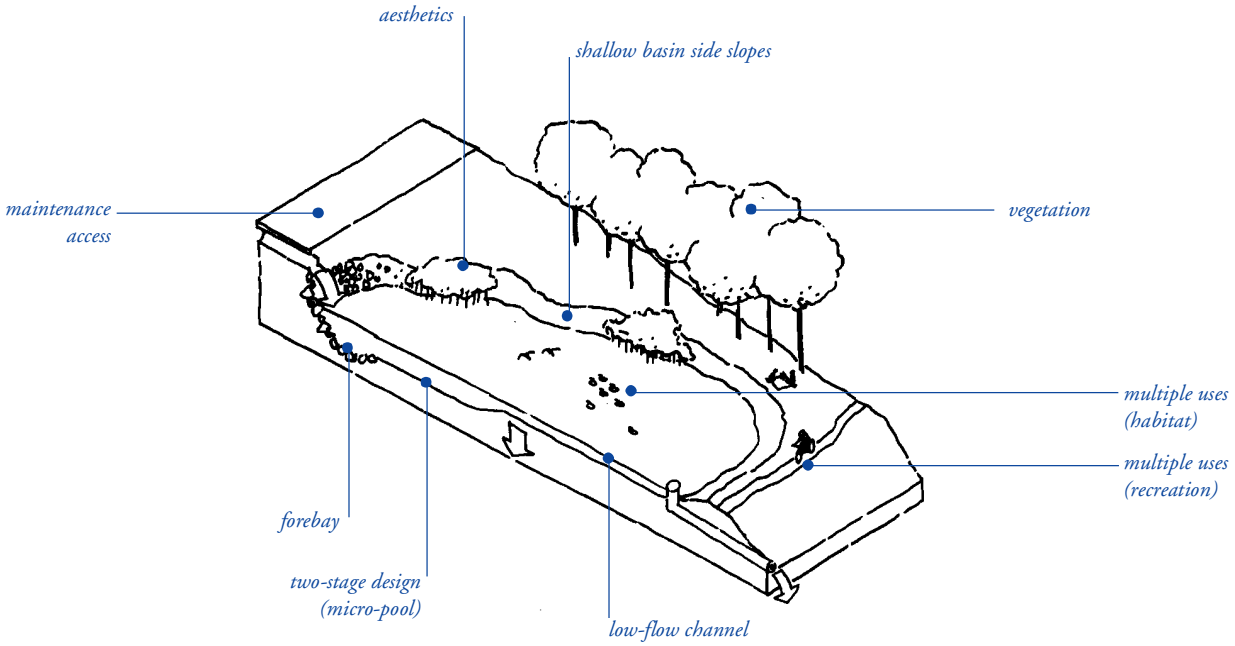

5.6 System design techniques. A variety of techniques are available to design stormwater management systems for water quality protection so that safety and aesthetics are maximized while minimizing maintenance. A key element of system design is to provide a means for managing the runoff from large storms – either a spillway or an embankment designed to withstand overtopping. The stormwater management system is usually comprised of a series of individual elements – basins, swales and pipes – in an interconnected, continuous system. Some of the techniques available to integrate these elements into the site plan and improve their functionality include:

a. Two-stage design. Place 15 to 25% of the volume at a lower stage to create a micro-pool that fills often, keeping the rest of the basin dry and sediment-free most of the time.

b. Basin side slopes. Set side slopes at 4:1 or flatter to prevent bank erosion and minimize risk of drowning.

c. Forebay. Design basins so that larger particles settle in depressions at basin inlets, and so inflows do not erode or resuspend materials in forebay. Plan for maintenance to remove trash, debris and sediment that collects in the forebay, as this is essential to protecting the aesthetic value of the basin and in reducing long-term maintenance costs.

d. Low flow channel. A low-flow channel conveys dry-weather flows and the last of captured volume to the basin outlet.

e. Vegetation. Plant vegetation to control erosion and enhance sediment entrapment.

f. Maintenance access. Access for maintenance must be included in the design of all elements. While most smaller basins and swales can be serviced by typical garden maintenance methods, larger basins may require stable vehicular access ways to forebays and outlets for periodic cleaning or dredging.

g. Multiple uses. Incorporate flood control, recreational facilities, landscaping, and/or wildlife habitat into system design.

h. Aesthetics. Integrate the basins and swales into the site to take advantage of the aesthetic qualities of water and plant materials.

Drainage Systems

5.7 *Water quality volume*

Stormwater systems are engineered to handle specific runoff volumes and flow rates. For flood protection, systems are designed with capacity for the expected peak runoff volumes and flow rates of a given design storm size. This is known as the "peak runoff volume." Peak runoff volumes and flow rates are calculated for various design storm sizes, depending on local conditions, codes, and the potential damage that can be caused by flooding. Large drainage systems flood very infrequently, but they are expensive to construct. Therefore, drainage systems are typically sized to balance flooding risk and cost. Street drainage systems are typically designed for a 10-year storm, meaning that there is a 10 percent chance in any given year that a storm will be large enough to overwhelm the drainage system and flood the street. Since the flooding of a street once every ten years, on average, is a minor inconvenience, designing streets for a ten year storm represents a generally accepted balance of protection and cost. Homes and buildings suffer more severe damage from flooding, and are typically designed to remain protected in the 100 year storm, meaning that the probability of flooding is one percent in any given year.

The same need to balance costs and benefits applies to drainage system design for stormwater quality protection. Many pollutants may be carried by small, frequent storms. Because of this phenomenon, the water quality protection component of a drainage system can be designed to manage a much smaller volume and flow rate of water than the flood protection component. Also, because most rainfall occurs in small, frequent storms, water quality systems with relatively small capacities can have a large impact in minimizing overall runoff and preserving base stream flows.

This amount of water that can be managed to protect water quality is called the "water quality volume (wqv)." The water quality volume can be managed through pollution prevention, infiltration, retention/detention, and biofiltration.

The wqv is the amount of runoff from impervious areas that must be managed before being released into the conveyance storm drain network or receiving water. As with flood control volumes, there are a variety of approaches and standards for defining the water quality volume:

- as a proportion of total annual runoff from impervious surfaces
- as a depth of rainfall
- as the runoff from impervious surfaces of a storm with a particular recurrence interval.

Note that the water quality volume applies only to impervious areas. It is not generally necessary to treat runoff from pervious areas. For this purpose, pervious areas are defined as those areas with a coefficient of runoff of 0.30 or less, meaning that 70% or more of the rainfall landing on a given surface infiltrates into the soil.

Because BASMAA is an association of several stormwater programs representing dozens of municipalities, each with different circumstances, this document does not establish specific hydrologic criteria or a specific water quality volume.

As with flood control, there are a variety of standards and approaches for quantifying how to manage stormwater for water quality protection. The California Storm Water Quality Task Force, in its *Storm Water Best Management Practice Handbooks* (1993), and the Water Environment Federation/American Society of Civil Engineers in their jointly published *Urban Runoff Quality Management* (1998) each adopted an 80% annual capture rate as a standard of practice for the water quality volume. In the San Francisco Bay Area, this translates into approximately the first 0.50-1.25 inches of rain, or a two-year recurrence interval storm.

The Center for Watershed Protection in Silver Spring, Maryland, a leading independent research center, recommends a 90% annual capture rate. Some jurisdictions, such as the City of Olympia (WA) and the Washington State Department of Ecology, have focused on reducing impervious land coverage, adopting impervious surface reduction targets rather than emphasizing a specific water quality volume.

5.8 *Manufactured treatment systems*

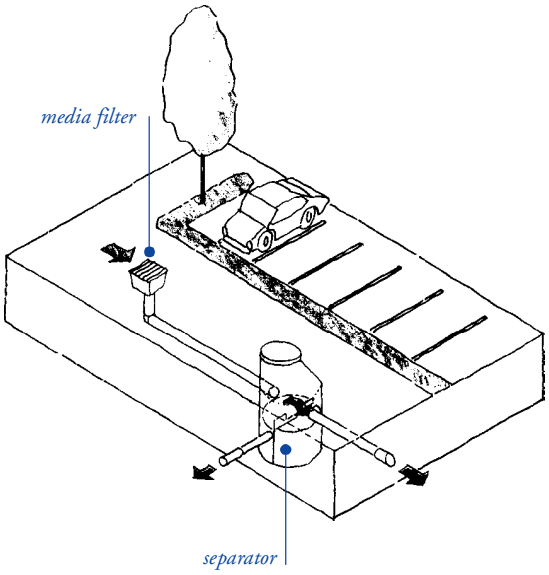

Some areas are so densely developed that streets, buildings and walkways provide almost complete impervious land coverage. Here, land values prohibit the use of landscape solutions such as biofilters, infiltration basins, or wet ponds. In addition, the soil conditions in these highly urbanized locations often do not support infiltration, further reducing the practicality of landscape stormwater quality systems.

In these areas, if treatment is required, manufactured treatment systems can be inserted into a conventional conveyance storm drain system. In some cases, these devices can supplement more integrative site planning and landscape strategies.

These devices are available from many manufacturers, and generally function to separate urban pollutants from runoff. They have minimal impact on reducing overall runoff volumes or mitigating peak flows. Other considerations include both initial expense and the cost of intensive, regular maintenance recommended by device manufacturers, which can include trash removal, replacement of filters, flushing cartridges, and vacuuming of sediment.

Though promoted by their manufacturers, these devices are considered experimental by the scientific community, and their efficacy is still under study. Though many proprietary designs are available, general product categories are presented here.

Catch basin or inlet inserts. Also referred to as inlet filters, catch basin inserts are trays or baskets containing filter and/or oil-absorbent materials installed on the inside of storm drain inlets to filter and capture pollutants. They work through filtration, settling, and absorption.

Separators. These devices (also called oil/grit or oil/water separators, water quality inlets, interceptors) are structures designed to remove pollutants from a wastewater stream based on physical differences between the pollutant and water. Lighter materials such as oil and buoyant trash will float to the surface and heavier materials such as sediments will sink.

Media filters. These devices use media to filter pollutants from urban runoff. Media includes sand, gravel, peat, compost, activated carbon, fabric, and resin.

In a watershed plan that employs clustered, dense development to preserve open space, on-site treatment in the more densely developed portion of the watershed may not be necessary. Dense or clustered development allows for significant areas to be preserved and remain undeveloped, reducing the need to mitigate throughout the entire watershed.

6 Site Design and Landscape Details

Once a site plan is generated, a multitude of small design decisions must be made, each of which will affect the hydrology of a development. These design decisions include selection of paving materials, collection of roof runoff, grading of landscaped areas, and many other details.

Any particular detail may make little difference in the overall impact of a development, but taken together, these details exert a profound influence on the ability of a development to meet stormwater quality goals. Consistent with the concept of starting at the source, these details look for opportunities to manage small quantities of runoff at many diverse locations throughout a site.

A variety of design techniques and details are presented in this chapter. Each illustrates an approach to design and construction for maximizing infiltration, providing retention, slowing runoff, and minimizing impervious land coverage. The techniques presented here are not all-inclusive, and may not be appropriate for every site or condition, but it is hoped that, once the intent of these details is understood, designers and builders will use their ingenuity to develop additional strategies consistent with water quality goals.

Site Design and Landscape Details

6.1 Permeable pavements
6.2 Streets
6.3 Parking lots
6.4 Driveways
6.5 Buildings
6.6 Landscape
6.7 Outdoor work areas

Look for opportunities throughout the site.

• For more information about these design details, see Chapter 8.

Design Details Matrix

This matrix summarizes the details described on the following pages by their initial construction cost, maintenance cost, relative effectiveness at meeting stormwater quality goals, and their suitability for use in expansive, clay soils. Conventional approaches are also evaluated for comparison.

Legend ○ Least ◗ ● Most

	Cost (initial)	Cost (maint.)	Effectiveness	OK in clay†
6.1 Permeable pavements				
Conventional asphalt/concrete	◗	○	○	●
6.1a Pervious concrete	●	●	●	○
6.1b Porous asphalt	●	●	●	○
6.1c Turf block	◗	●	●	◗
6.1d Brick	●	◗	◗	◗
6.1e Natural stone	●	◗	◗	◗
6.1f Concrete unit pavers	●	◗	◗	◗
6.1g Crushed aggregate	○	◗	●	●
6.1h Cobbles	○	◗	◗	●
6.2 Streets				
Conventional street standards	●	○	○	●
6.2a Access street: urban neo-traditional standard	○	○	●	●
6.2b Access street: rural standard	○	◗	●	●
6.2c Urban curb/swale system	◗	◗	●	◗
6.2d Rural swale system	○	◗	●	◗
6.2e Dual drainage system	●	●	●	●
6.2f Concave median	○	○	●	◗
6.2g Cul-de-sac	○	○	●	◗
6.3 Parking lots				
6.3a Hybrid parking lot	○	◗	●	●
6.3b Parking grove	◗	○	●	●
6.3c Overflow parking	○	◗	●	●
6.3d Porous pavement recharge bed	●	●	●	●
6.4 Driveways				
Conventional driveway	○	◗	○	●
6.4a Not directly-connected impervious driveway	○	○	●	◗
6.4b Crushed aggregate	○	◗	●	●
6.4c Unit pavers on sand	●	◗	◗	◗
6.4d Paving only under wheels	○	◗	●	●
6.4e Flared driveways	○	○	●	●
6.4f Temporary parking	○	◗	●	●
6.5 Buildings				
Conventional pipe system	●	◗	○	●
6.5a Dry-well	○	◗	●	◗
6.5b Cistern	●	◗	◗	●
6.5c Foundation planting	○	○	●	◗
6.5d Pop-up emitters	○	◗	●	○
6.5e Building materials	◗	◗	●	●
6.6 Landscape				
Conventional pipe system	●	◗	○	●
6.6a Grass/vegetated swales	○	◗	●	●
6.6b Extended detention (dry) ponds	○	◗	●	●
6.6c Wet ponds	○	●	●	●
6.6d Plant species selection for infiltration areas	○	◗	●	●
6.6e Landscape maintenance for stormwater systems	◗	◗	●	●

† Details are indicated suitable for clay if they either reduce DCIA or can be designed as retention/detention systems.

• For more information about these design details, see Chapter 8.

Details 6.1 *Permeable pavements*

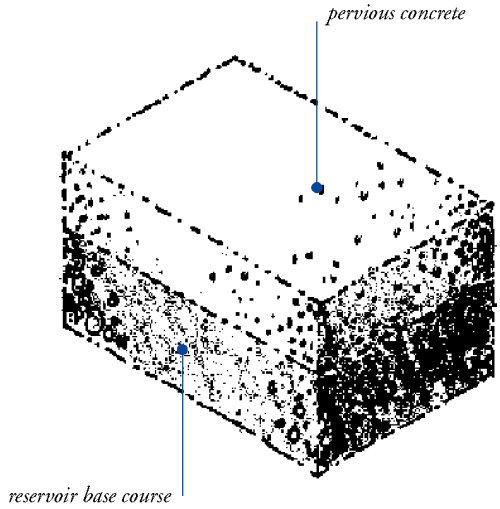

6.1a Pervious concrete

6.1 Permeable pavements. Permeable pavements are a method of infiltrating stormwater while simultaneously providing a stable load-bearing surface. While forming a surface suitable for walking and driving, permeable pavements also contain sufficient void space to infiltrate runoff into the underlying reservoir base course and soil. In this way they can dramatically reduce impervious surface coverage without sacrificing intensity of use.

There are three main categories of permeable pavements: poured-in-place pervious concrete and porous asphalt, unit pavers-on-sand, and granular materials.

All of these permeable pavements (except turf block) have in common a reservoir base course. This base course provides a stable load-bearing surface as well as an underground reservoir for water storage. The base course must meet two critical requirements:

- it must be *open graded*, meaning that the particles are of a limited size range, so that small particles do not choke the voids between large particles. Open-graded crushed stone of all sizes has a 38 to 40% void space, allowing for substantial subsurface water storage.[31]
- it must be *crushed stone*, not rounded river gravel. Rounded river gravel will rotate under pressure, causing the surface structure to deform. The angular sides of a crushed stone base will form an interlocking matrix, allowing the surface to remain stable.

Depending on the use of the surface, a permeable, engineered base section may need to be added to support the intended load. This applies to areas subject to heavy vehicle loads, but is also important for large areas where settling could result in unwanted puddles in areas such as pedestrian walkways.

Pervious concrete and porous asphalt are two emerging paving materials with similar properties. Like their impervious, conventional counterparts, both make a continuous, smooth paving surface. They differ from their conventional counterparts in that they allow water to pass through the surface course to the rock base course that serves as a reservoir and infiltration basin for stormwater. Both pervious concrete and porous asphalt share similar design considerations.

6.1a Pervious concrete. Pervious concrete, also known as Portland cement pervious pavement, is most commonly used in Florida, where it was developed in the 1970s. Pervious concrete is a discontinuous mixture of coarse aggregate, hydraulic cement and other cementitious materials, admixtures, and water, which forms a permeable pavement.

Details

6.1

Permeable pavements, continued

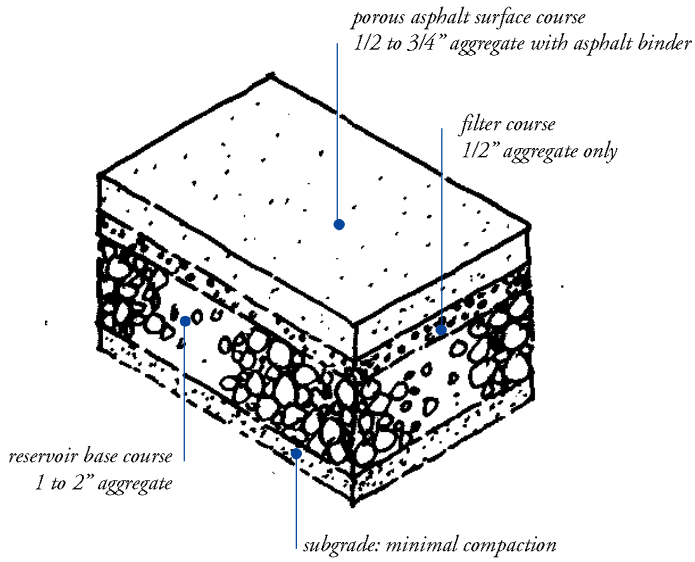

6.1b Porous asphalt

(adapted from City of Rockville, MD. specifications)

Pervious concrete, like other concretes, acts as a rigid slab. It has an appearance very similar to exposed aggregate concrete, and provides a similar walking or riding surface. An aggregate base course can be added to increase total pavement thickness or hydraulic storage. Pervious concrete is an extremely permeable material: in tests by the Florida Concrete and Products Association, permeability of new surfaces has been measured as high as 56 inches per hour. With improper installation or mix, permeability can be reduced to 12 inches per hour. Even after attempts to clog the surface with soil by pressure washing, the material retained some permeability.[32] Because of its porosity, pervious concrete pavements usually do not require curbs and gutters for primary drainage control.

6.1b Porous asphalt. Porous asphalt consists of an open-graded asphalt concrete over an open-graded aggregate base, over a draining soil. Unlike traditional asphalt concretes, porous asphalt contains very little fine aggregate (dust or sand), and is comprised almost entirely of stone aggregate and asphalt binder, giving it the common name "popcorn mix." Without fines filling the voids between larger particles, porous asphalt has a void content of 12-20%, making it very permeable.

Porous asphalt is used by Caltrans as a wearing course on freeways because its porosity creates a superior driving surface in rainy weather. These installations are always over an impermeable asphalt layer and are not permeable pavements.[33]

In installations where porous asphalt has been used over a permeable base, the pavement becomes an infiltration system, allowing water to pass through the surface and collect in the open-graded aggregate base, achieving stormwater management without curb or gutter systems. In these sites, mostly parking lots and light duty roads in the eastern United States, permeability has been maintained over long periods without special maintenance. The oldest porous asphalt pavement in the United States, at the University of Delaware Visitors' Center, was built in 1973, and is still permeable and structurally sound after 23 years.[34]

On light duty streets built of porous asphalt, some loss of porosity occurs in localized areas due to sedimentation or scuffing at intersections due to repeated wheel turning, but the overall performance of the pavement is not significantly compromised.[35]

Pervious concrete and porous asphalt design considerations: Sealing and clogging of the pavement surface is possible, even with maintenance and high power vacuuming. Most successful installations are in Florida and other coastal areas where slopes are

flat, soils sandy, and winter sanding/salting minimal. Avoid installation in high traffic areas, and stabilize surrounding land to minimize sediment deposition on the pavement.

Installation must meet special requirements. Subgrade uniformity is essential, and slopes over a few percent are not recommended because of potential subgrade erosion. A permeable base and an infiltration rate of at least 0.5 inches/hour in the native soil is required (i.e. a HSG A or B soil).

Installation of pervious concrete and porous asphalt requires special tools and has narrower tolerances than traditional concretes or asphalts. Finally, lack of independent testing (especially in the case of pervious concrete) limits the ability to make judgements about long-term performance.

Unit costs of these permeable pavements are greater than traditional concrete and asphalt, though this cost can be offset by not building a curb and gutter drainage system. Potentially a valuable means of reducing impervious land coverage in areas requiring a large, smooth pavement, their relative unfamiliarity, special requirements and lack of conclusive testing have made pervious concrete and porous asphalt little used in the San Francisco Bay Area to date. If these materials begin to gain wider local acceptance, their relative costs will likely go down.

Coefficients of Runoff

The chart below illustrates typical ranges for the coeficient of runoff (C) for various materials.[36]

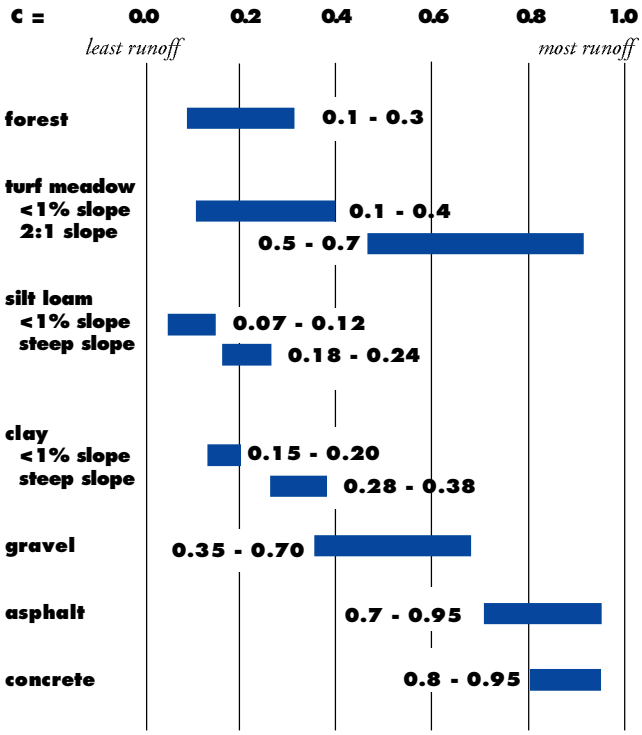

Details 6.1 *Permeable pavements, continued*

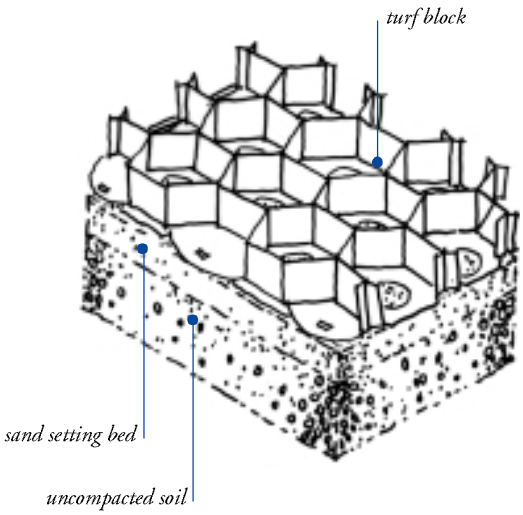

6.1c Turf block

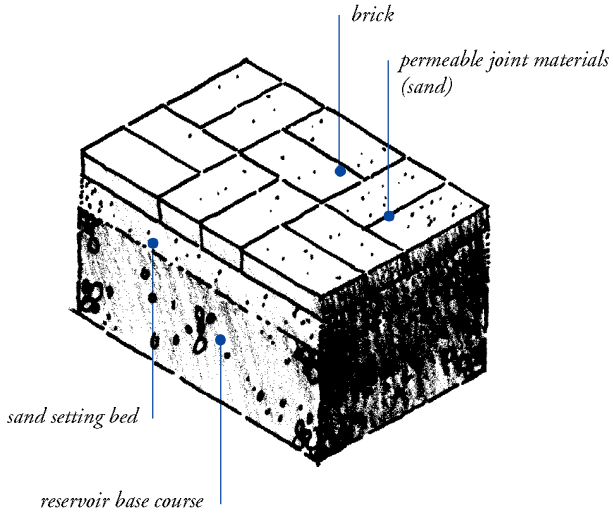

6.1d Brick

Unit pavers-on-sand. A wide variety of unit pavers are available for use in outdoor applications. Unlike poured-in-place concretes or asphalts, which create one continuous surface, unit pavers are discrete units that are set in a pattern on a prepared base. This gives unit pavers great flexibility in design, construction, and maintenance. *Open-celled unit pavers* are designed to create a permeable pavement surface, allowing water to pass through precast voids. *Solid unit pavers,* made of impermeable materials, can produce permeable pavement surfaces if they are spaced to expose a permeable joint and set on a permeable base. Unit pavers are available in many colors, shapes, and textures. Sometimes colored concrete is stamped to appear like unit pavers, but this pavement surface performs both hydrologically and structurally like a poured concrete slab, and does not provide the stormwater infiltration opportunities of unit pavers-on-sand.

6.1c Turf block. Turf block is one example of an open celled unit paver. These open celled unit pavers are available in both precast concrete or plastic, and are filled with soil and planted with turf. They were developed in Germany in the 1960s to reduce the "heat island" effect of large parking areas and are now used throughout the world. The products vary in size, weight, surface characteristics, strength, durability, interlocking capabilities, proportion of open area per grid, runoff characteristics, and cost. Laboratory tests have shown that open celled units have runoff coefficients of from 0.05 to 0.35, depending on slope, and surface configuration.[37]

When planted with turf, they are generally most successful in overflow parking areas, driveways, or emergency access roads. If installed in heavily used parking areas the turf often does not get adequate sunlight, and on heavily traveled roadways it can be worn away from tire abrasion. Occasionally open celled unit pavers are filled with alternatives to turf, either an inert gravel or a lower maintenance groundcover such as chamomile, that can absorb some traffic. Because of their irregular surface, open celled unit pavers generally do not provide comfortable walking surfaces, though the degree of comfort varies depending on design.

6.1d Brick. Clay fired brick is an ancient, solid paving material of great durability and flexibility. When laid on a permeable base with sand joints, brick paving provides an opportunity for a limited amount of stormwater infiltration, especially at low rainfall intensities. One experiment found coefficient of runoff volume to rainfall volume between 0.13 and 0.51 at half hour rainfall intensities up to 0.03 inches, increasing to between 0.66 and 0.76 at intensities between 0.06 and 0.12 inches per half hour.[38] The larger the joints, the greater the permeability.

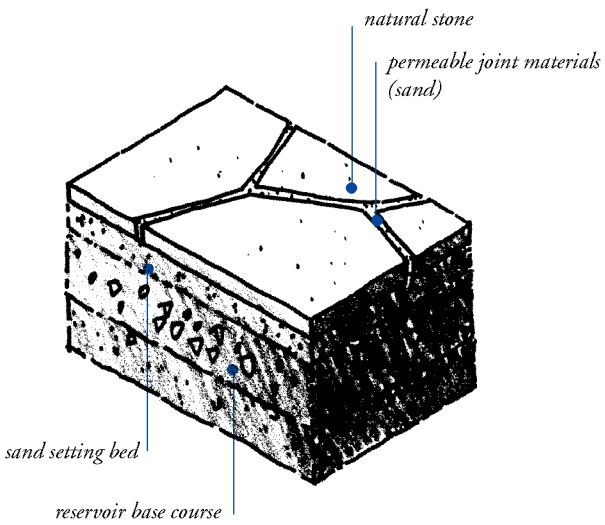

6.1e Natural stone

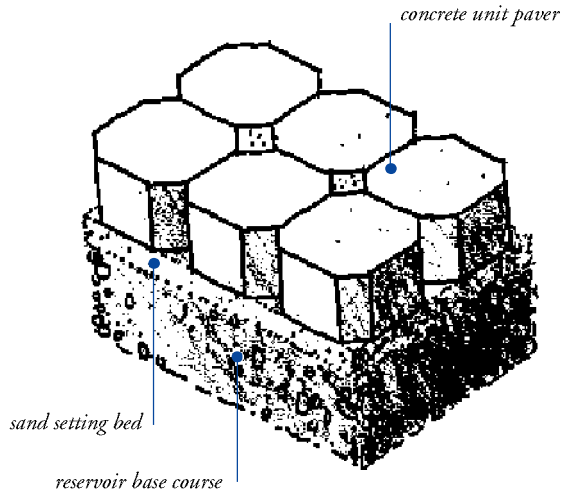

6.1f Concrete unit pavers

Brick is available in a wide range of colors and finishes, and can be set in a variety of patterns. When laid on sand, it creates a very suitable walking or riding surface. Though it was widely used for roads in the early part of this century, it is today generally used for driveways, pathways, plazas, and patios.

Because brick is a relatively soft material, brick pavements can develop a rich character over time as the surface becomes slightly worn with use and the natural colors and textures are exposed. Brick is generally comparable in cost with other solid unit pavers, though shipping costs and special finishes or colors can affect price significantly.

6.1e Natural stone. Natural stone paving materials are available in a wide variety of shapes and colors. Because of their high cost and relative brittleness, they are usually laid in thin pieces on a mortar bed over concrete, making an impervious pavement. Some natural stone materials, such as flagstone and granite, are available in thicker slabs suitable for laying on sand. When laid in a random pattern with wide sand, gravel, or soil joints (from 1/2 to 4 inches) random cut stone can create a highly permeable pavement. The joints can be planted with small groundcovers or left bare. Smaller, square cut stones can also be made into permeable pavements. The cobblestone walks of older European cities are a familiar example of natural stone pavement. Stones set in these tighter sand joints can be expected to have a permeability similar to brick-on-sand.

Because of their high cost natural stone pavements are generally limited to patio areas or walkways, where they can be attractive accents. Some stone materials, such as flagstone and slate, are relatively brittle and suitable for pedestrian areas only. Paving made of harder stone, such as granite, can bear vehicular loads.

6.1f Concrete unit pavers. Solid precast concrete unit pavers are available in a wide variety of colors, shapes, sizes, and textures. They are designed to be set on sand, and form an interlocking pavement surface that can bear heavy traffic loads. Their permeability and performance is similar to brick-on-sand. Some manufacturers are now producing concrete unit pavers with small voids to increase permeability (e.g. "Ecostone"). The cost of concrete unit pavers is generally the lowest of all unit pavers, though it can vary depending on shipping, special colors or finishes.

Unit pavers-on-sand considerations. Installation costs for unit pavers on sand are higher than traditional asphalt or concrete paving. Unit pavers-on-sand, however, are generally less expensive to install than mortar-set unit pavers on a rigid concrete base, especially considering the added cost of drainage struc-

Details 6.1 *Permeable pavements, continued*

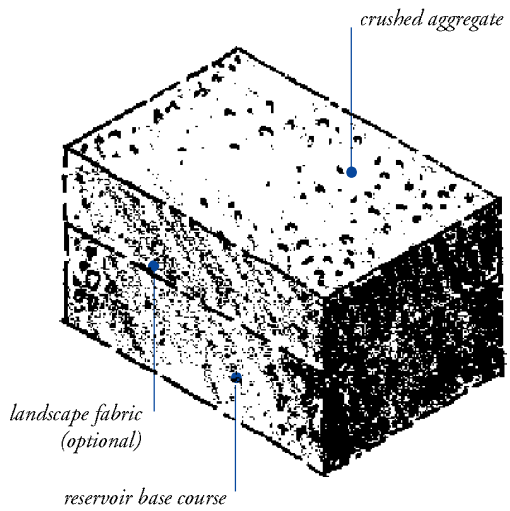

6.1g Crushed aggregate

tures required for the mortared design. Solid unit pavers require no special maintenance, though the joints between units may require occasional weed supression, depending on the size of the joints, the subgrade, and other conditions. Grassed open-celled unit pavers require the same maintenance as lawns. Open-celled pavers filled with gravel require periodic "topping off" of the voids to replace gravel picked up by tire tread and pedestrians.

Unit pavers are especially valuable for walkable surfaces around trees, as they allow infiltration of water and air. If root growth causes the pavement surface to become uneven, the unit pavers can be removed and reset smoothly. Differential settlement can occur in a pavement made of unit pavers on sand, creating tripping hazard. This most often occurs if the base is improperly prepared, but can be remedied by recompacting the base and relaying the pavers. Penetration of mineral and organic particles into narrow sand joints of solid unit pavers-on-sand can severely limit permeability over time.

Granular materials. A wide variety of loose aggregates can be made to form permeable pavements suitable for walking, jogging, biking, or light vehicular traffic. The size of these granular materials ranges from fine aggregates to large stones, and can be divided into two general categories: gravels and cobbles. Depending on the aggregate size, these granular pavements have a runoff coefficient of 0.20 to 0.40.[39]

6.1g Crushed aggregate (gravel). A variety of crushed aggregates, generally known as gravel, can be used to form a permeable pavement. Aggregates are available in many sizes, ranging from approximately 2" to sand sized grains known as "fines." Relatively inexpensive to purchase and easy to install, gravel can be laid in any shape or configuration. To keep aggregates confined to its desired area, it is laid in a field that is bounded by some rigid frame such as wood header, metal edging or concrete band. Many colors, grades, and types of parent material are available, including crushed decomposed granite, base rock, and pea gravel. In selecting gravel pavements for pedestrian or vehicular traffic, crushed stones provide the most suitable surface, as the angled facets of the aggregate form an interlocking, semi-rigid matrix. Naturally worn small stones, such as pea gravel, have smooth round surfaces which rotate under pressure, making for a less firm footing. For surfaces subject to vehicular use, crushed gravel sizes between 3/8" and 3/4" make a stable surface that is also easy to walk on.

Found in a variety of settings ranging from Parisian cafes to Japanese ceremonial gardens to rural roadways, crushed aggre-

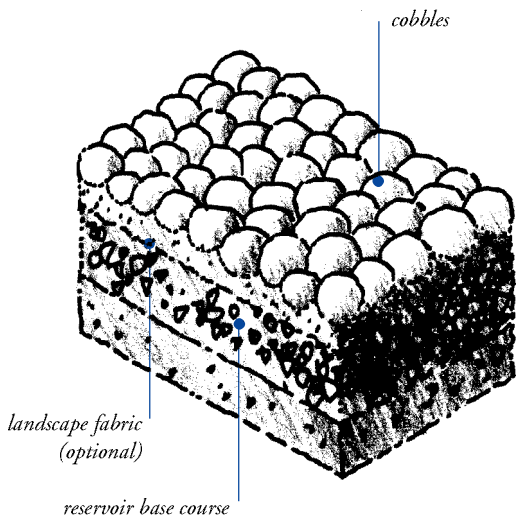

6.1h Cobbles

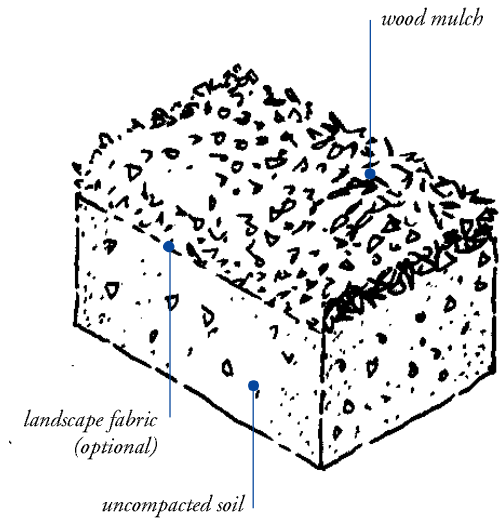

6.1i Wood mulch

gate is a versatile, economical permeable pavement material with a long history of use.

6.1h Cobbles. Larger granular materials are known as cobbles. Cobble sizes generally range from approximately 6" to 24" diameter and are available in a variety of stones and colors. Cobbles do not make a suitable surface for walking or vehicular traffic, but are useful as a permeable pavement in areas where little traffic is desired, such as under large trees, or in hard to maintain areas such as median islands. Cobbles have similar construction characteristics as gravel, except they are somewhat more labor intensive to install because each cobble must generally be set individually.

6.1i Wood mulch. Wood mulches and wood chips are among organic granular materials that can be used as permeable surfaces suitable for light pedestrian use. Some of these mulches meet federal requirements for playground fall surfaces, and can be inexpensive, permeable pavements for outdoor play areas.

Granular materials considerations. If laid on a slope, and subjected to moderate traffic or concentrated runoff, loose gravel can be displaced and require periodic regrading. Organic materials such as bark or wood chips decompose over time and must be replenished. Weed abatement may be required periodically, though this can be minimized by laying permeable landscape fabric between the gravel and subgrade. Installation costs for gravel and other granular materials are generally the least of all permeable pavements, but require a degree of periodic maintenance to preserve the integrity of the pavement surface.

Concrete and asphalt. Conventional concrete and asphalt (technically known as **portland cement concrete** and **asphaltic concrete**, respectively) are impervious pavements widely used in site development. Because of their ease of installation, flexibility, durability, economy, and load bearing capabilities, concrete and asphalt are the most commonly used pavement materials. With a runoff coefficient of near 1.0, conventional concrete and asphalt pavements are principal contributors to impervious land coverage in most development.

In site design for stormwater quality, these materials are best used sparingly. If more permeable pavement materials cannot be used, minimizing the area of concrete and asphalt surfaces through clustering and other techniques will reduce the resulting impervious land coverage. For remaining area, designing asphalt and concrete pavement surfaces to slope towards infiltration basins instead of into directly-connected collection structures will minimize their negative impact on water resources.

Details 6.2 Streets

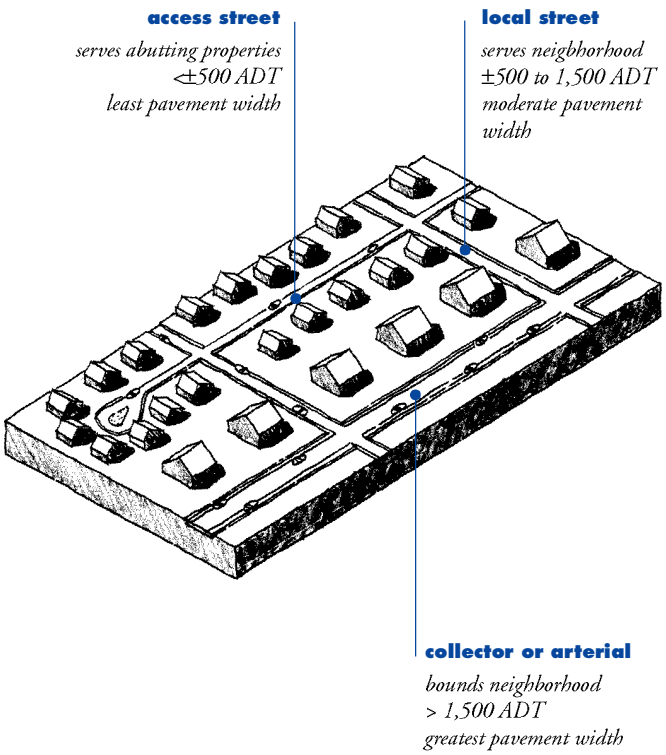

More than any other single element, street design has a powerful impact on stormwater quality. Streets and other transport-related structures typically can comprise between 60 and 70% of the total impervious area, and, unlike rooftops, streets are almost always directly connected to an underground stormwater system.[40]

The combination of large, directly connected impervious areas, together with the pollutants generated by automobiles, makes the street network a principal contributor to nonpoint source pollution. Locally, the Santa Clara Valley Urban Runoff Program estimated that automobiles were the source of half or more of the copper, cadmium and zinc in its waterways.[41]

Street design is usually mandated by local municipal standards. These standards have been developed since World War II to facilitate efficient automobile traffic and maximize parking. Most require large impervious land coverage, with a typical Bay Area local street standard mandating that 85% or more of the public right-of-way be covered with impervious pavement.

In recent years new street standards have been gaining acceptance that meet the access requirements of local residential streets while reducing impervious land coverage. These standards generally create a new class of street that is smaller than the current local street standard, called an "access" street. An access street is at the lowest end of the street hierarchy and is intended only to provide access to a limited number of residences.

Two approaches in particular have been implemented with success in various American communities: "neo-traditional design" and "headwaters streets."[42] Neo-traditional design seeks to emulate the tree-lined, compact streets found in pre-war, traditional residential neighborhoods. The headwaters streets concept suggests that streets be scaled to traffic volume just as stream size increases with water volume. Both strategies allot street space according to anticipated traffic levels rather than mandating a predetermined number of vehicle lanes.

Recognizing that street design is the greatest factor in a development's impact on stormwater quality, it is important that designers, municipalities and developers employ street standards that reduce impervious land coverage.

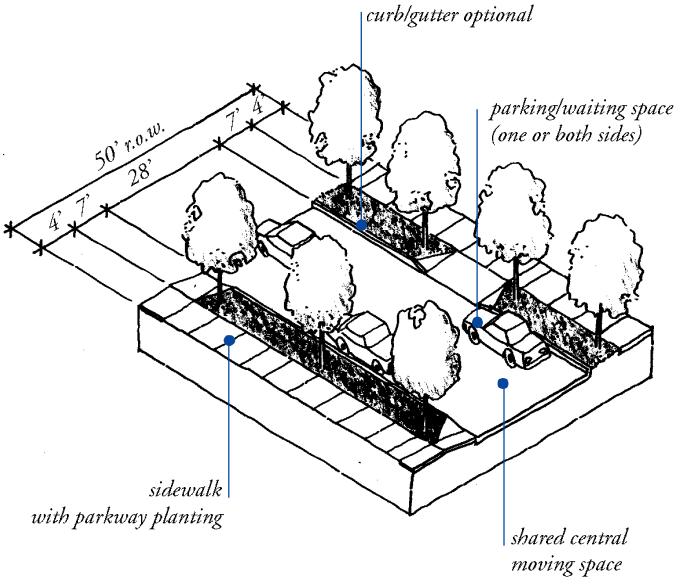

6.2a Access street: urban neo-traditional standard

74±% impervious land coverage

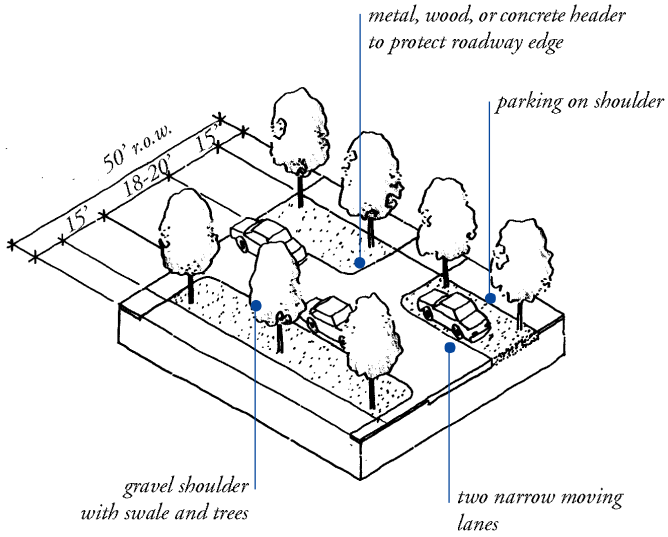

6.2b Access street: rural standard

36±% impervious land coverage

Two types of access streets can be built using neo-traditional standards: urban or rural.

6.2a Urban neo-traditional standard. An urban standard will utilize curbs and gutters, though the gutter may be tied to a biofilter or swale rather than an underground storm drain. According to an informational report published by the Institute of Transportation Engineers (ITE), pavement widths for neo-traditional urban streets are typically from 26 to 30' wide with a shared central moving lane, and parking permitted on one or both sides. Sidewalks are provided on at least one side of the street, though usually preferable on both sides.[43]

6.2b Rural Standard. A rural standard can be used where aesthetics and other factors permit, with curbs and gutters replaced by gravel shoulders, further reducing construction costs and improving opportunities for stormwater infiltration. The gravel shoulders are graded to form a drainage way, with opportunities for infiltration basins, ponding and landscaping. A narrow two-lane paved roadway is provided, approximately 18 to 22 feet wide. Most of the time single vehicles use the center of the paved roadway. When two cars are present moving in opposite directions, drivers reduce speeds and move towards the right hand shoulder. Protection of the roadway edge and organization of parking are two issues in rural street design. Roadway edge protection can be achieved by flush concrete bands, steel edge, or wood headers. Parking can be organized by bollards, trees, or allowed to be informal. On very low volume, low speed, access streets, sidewalks may not be required, as pedestrians walk in the street or on the shoulder.

The current typical municipal street standards that mandate 80 to 100% impervious land coverage in the public right-of-way are a principal contributor to the environmental degradation caused by development. A street standard that allows a hierarchy of streets sized according to average daily traffic volumes yields a wide variety of benefits: improved safety from lower speeds and volumes, improved aesthetics from street trees and green parkways, reduced impervious land coverage, less heat island effect, and lower development costs. If the reduction in street width is accompanied by a drainage system that allows for infiltration of runoff, the impact of streets on stormwater quality can be greatly mitigated.

Street width considerations. The experience of both the pre-war traditional streets and newer subdivisions of neo-traditional design has shown that low volume streets with shared moving lanes can be safe, often safer than wider streets, because drivers are

Details 6.2 *Streets, continued*

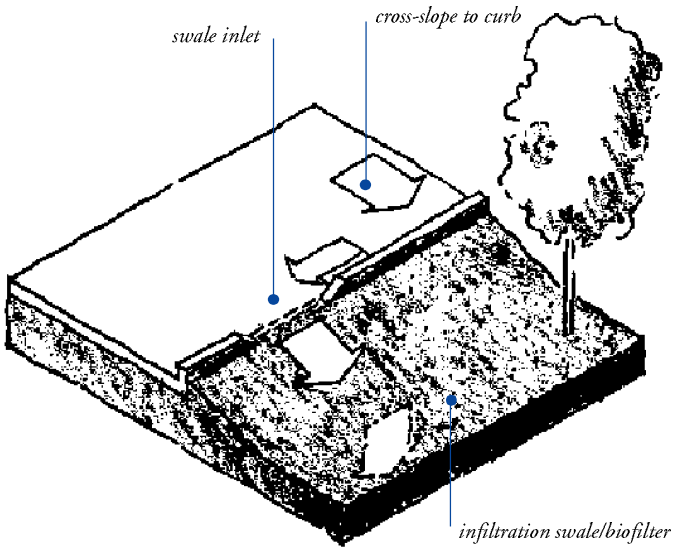

6.2c Urban curb/swale system

more cautious. These neo-traditional streets are designed for traffic speeds between 15 to 25 mph, compared to a design speed of 30 mph for most current municipal standards.[44] This reduced design speed increases safety, particularly for pedestrians. Nevertheless, shared moving space may promote unsafe conditions or high incidences of driver inconvenience if traffic volumes are much above 500-750 ADT. On access streets where bicycle traffic is especially high, such as designated bike routes or in university towns, wider streets may be advisable to provide adequate space.

Emergency service providers often raise objections to reduced street widths. Typical Fire Department standards require greater moving space for emergency access than accommodated by neo-traditional designs. A principal concern is that emergency access may be blocked if a vehicle becomes stalled in the single moving lane. Grid street systems provide multiple alternate emergency access routes to address this concern, though there may be a marginal increase in response times. Documenting the number of instances where delay has occurred in existing pre-war neighborhoods with street widths below current Fire Department standards may be a suitable way to asses the risk of this situation arising in new neighborhoods with neo-traditional street design, and to balance it with the demonstrated increased risk from higher traffic speeds on wider streets.

Inlet detail for urban curb/swale system
Just as a drop inlet collects runoff into an underground pipe system, a swale inlet collects runoff into a surface infiltration system. This swale inlet includes boulders set in soil to dissipate flow velocities and minimize erosion.

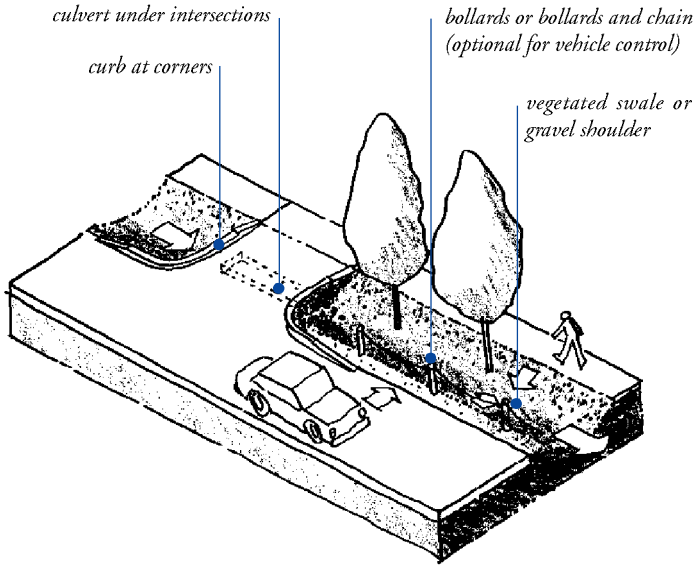

6.2d Rural swale system

Emergency service access is one factor of many that form a general assessment of neighborhood safety. One way to balance emergency service access with the benefits of access streets is to allow parking on one side only to preserve a wider moving space.

Hillside sites have special access concerns and fire risks. Because of the potential of shared moving lanes to be blocked by a single vehicle, with no comparable alternate route, reduced street widths may not be advisable on long cul-de-sac streets or narrow hillside sites.

Street drainage. Current Bay Area municipal standards generally require concrete curb and gutter along both sides of a residential street, regardless of number of houses served. The curb and gutter serves several purposes: it collects stormwater and directs it to underground conveyance drainage systems, it protects the pavement edge, it prevents vehicle trespass onto the pedestrian space, it provides an edge against which street sweepers can operate, and it helps to organize on-street parking.

Curb and gutter systems provide a directly connected conduit to natural water bodies and may act to collect and concentrate pollutants. There are two alternatives to typical curb and gutter systems that meet functional requirements while lessening the street's impact on stormwater quality.

6.2c Urban curb/swale system. On streets where a more urban character is desired, or where a rigid pavement edge is required, curb and gutter systems can be designed to empty into drainage swales. These swales can run parallel to the street, in the parkway between the curb and the sidewalk, or can intersect the street at cross angles, and run between residences, depending on topography. Runoff travels along the gutter, but instead of being emptied into a catch basin and underground pipe, multiple openings in the curb direct runoff into surface swales or infiltration/detention basins. If planted with turfgrass and gently sloped, these swales function as biofilters (see Drainage systems 5.5c). Because concentration of flow will be highest at the curb opening, erosion control must be provided, which may include a settlement basin for ease of debris removal.

6.2d Rural swale systems. On streets where a more rural character is desired, concrete curb and gutter need not be required. Since there is no hard edge to the street, the pavement margins can be protected by a rigid header of steel, wood or a concrete band poured flush with the street surface. Parking can be permitted on a gravel shoulder. If the street is crowned in the middle, this gravel shoulder also can serve as a linear swale, permitting infiltration of stormwater along its entire length. Because runoff from the street is not concentrated, but dispersed

Details 6.2 *Streets, continued*

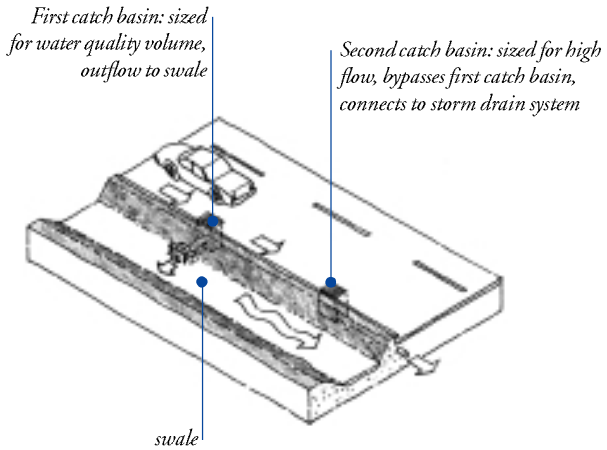

6.2e Dual drainage system

along its entire length, the buildup of pollutants in the soil is minimized. If parking is not desired on the shoulder, or if it needs to be organized, bollards, trees or groundcovers can be installed along the shoulder to prevent vehicle trespass.

In these ways edge treatments other than continuous concrete curb and gutters with underground drainage systems can be integrated into street design to create a headwaters street system that minimizes impact on stormwater quality and that captures the most attractive elements of traditional neighborhood design.

6.2e Dual drainage system. A dual drainage system is one that captures the first flush of rainfall from the 2-year storm event in a catch basin that outflows to a grass swale with small check dams. Consituents are filtered as water passes through the swale, to the outlet that directs flow back into the main storm drainage system. Runoff in excess of the 2-year storm event is captured by a second catch basin that is directly connected to the storm drain. This system can work effectively at treating the small storms while making provisions for the large storms.

Street drainage considerations. The perception that surface swale systems require a great deal of maintenance is a barrier to their acceptance. In practice, maintenance is required for all drainage systems, and surface systems can require comparable or less maintenance than underground systems. Design factors for low maintenance include:

- erosion control at curb openings
- shallow side slopes and flat bottoms (as opposed to ditches which erode)
- planting with easily maintained groundcover such as turf
- minimizing weeds through proper plant selection or installation of permeable landscape fabric.

Maintenance practices for surface systems are different than most urban Public Works Departments currently practice, and some employee retraining may be required to facilitate maintenance of street systems using surface swales instead of concrete curbs and underground pipes. One advantage of surface drainage systems is that problems, when they occur, are easy to fix because they are visible and on the surface.

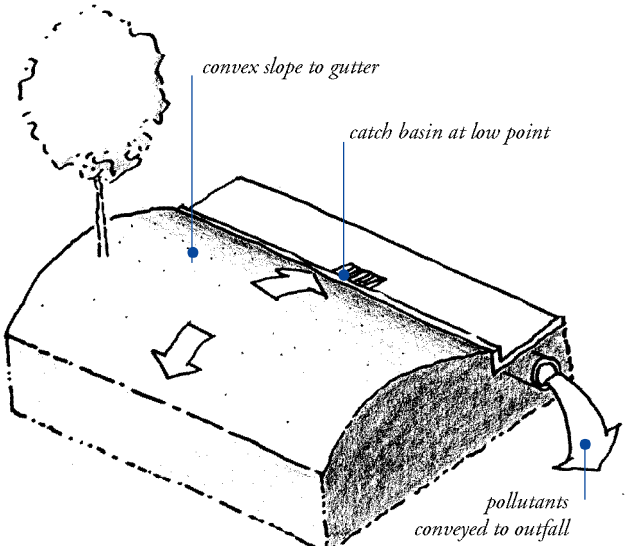

Conventional median design: convex surface

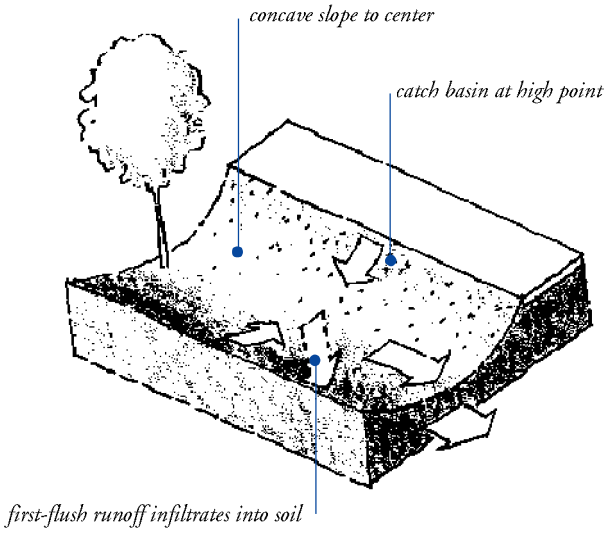

6.2f Concave median

Medians. Sometimes streets are designed with central medians to divide traffic for safety or aesthetics.

Conventional median design includes a convex surface rising above the pavement section, with drainage directed towards a curb and gutter system. Runoff is conveyed rapidly off the median and the street directly into a catch basin/underground pipe system, concentrating pollutants and carrying them to water bodies.

6.2f Concave median. If the soil level in the median is designed as a concave surface slightly depressed below the pavement section, water is directed from the street into the median.

Concave medians are especially valuable at treating the first-flush runoff, which carries a high concentration of oils and other pollutants off the street, especially if the median is designed as a landscaped swale or turf lined biofilter. Because of the relatively small area provided by the median for stormwater infiltration and retention, a catch basin and underground storm drain system may be required. By setting catch basin rim elevations just below the pavement elevation, but above the flow line of the infiltration swale, a few inches of water will collect in the swale before overflowing into the underground system.

Catch-basin design for medians.

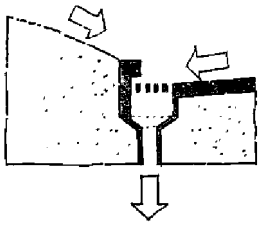

A catch basin located at the low point of a ***conventional convex median*** and gutter collects all runoff – including the first flush.

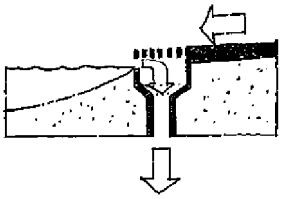

Like an overflow drain in a bathtub, a catch basin located just below the pavement surface, and a few inches above the flow line of a ***concave median,*** provides an opportunity to pond runoff while also providing drainage for larger storms.

Details 6.2 *Streets, continued*

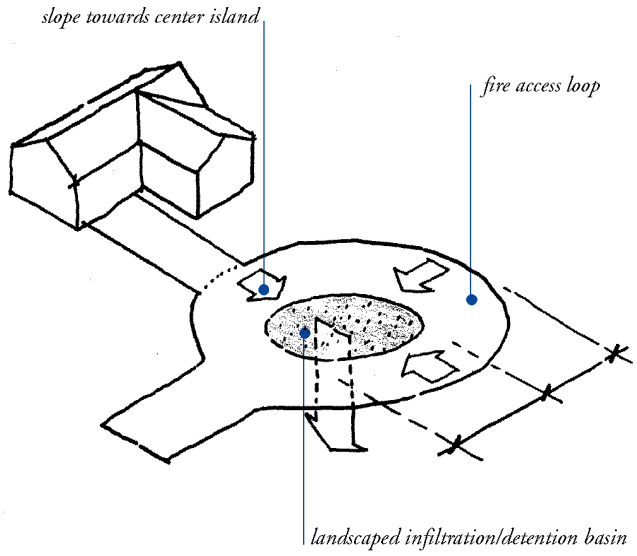

6.2g Cul-de-sac

6.2g Cul-de-sac. Cul-de-sac streets present special opportunities and challenges. Because cul-de-sac streets terminate, they require a turn-around area large enough to accommodate large trucks, such as occasional moving vans and emergency access vehicles. Fire departments, in particular, often require 60 feet or greater diameter turnarounds. If an entire 60 foot diameter turnaround is paved, it creates an 11,000 square foot impervious circle, or $^1/_4$ acre of impervious land coverage. Aside from the implications for stormwater quality, this is especially unfortunate as a design element, because it creates an unattractive heat island at the front of several homes.

A turnaround with a central concave landscaped area can create an opportunity for stormwater infiltration or detention. A landscaped area in the center of a cul-de-sac can reduce impervious land coverage 30 to 40%, depending on configuration. Design of a landscaped cul-de-sac must be coordinated with fire department personnel to accommodate turning radii and other operational needs.

Details 6.3 *Parking lots*

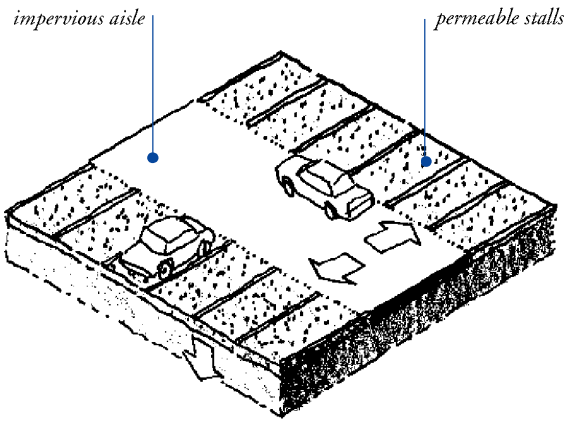

6.3a Hybrid parking lot

6.3 Parking lots. In any development, storage space for stationary automobiles can consume many acres of land area, often greater than the area covered by streets or rooftops. In a neighborhood of single family homes, this parking area is generally located on private driveways or along the street. In higher density residential developments, parking is often consolidated in parking lots.

The space for storage of the automobile, the standard parking stall, occupies only 160 square feet, but when combined with aisles, driveways, curbs, overhang space, and median islands, a parking lot can require up to 400 square feet per vehicle, or nearly one acre per 100 cars. Since parking is usually accommodated on an asphalt or concrete surface with conventional underground storm drain systems, parking lots typically generate a great deal of directly-connected impervious area.

There are many ways to both reduce the impervious land coverage of parking areas and to filter runoff before it reaches the storm drain system.

6.3a Hybrid parking lot. Hybrid lots work on the principle that pavement use differs between aisles and stalls. Aisles must be designed for speeds between 10 and 20 mph, and durable enough to support the concentrated traffic of all vehicles using the lot. The stalls, on the other hand, need only be designed for the 2 or 3 mph speed of vehicles maneuvering into place. Most of the time the stalls are in use, vehicles are stationary. Hybrid

Hybrid parking lot.
This hybrid lot in a mixed-use development in Medford Village, N.J. uses crushed aggregate parking stalls and a conventional asphalt aisle.
(photo: Bruce Ferguson)

Details 6.3 *Parking lots, continued*

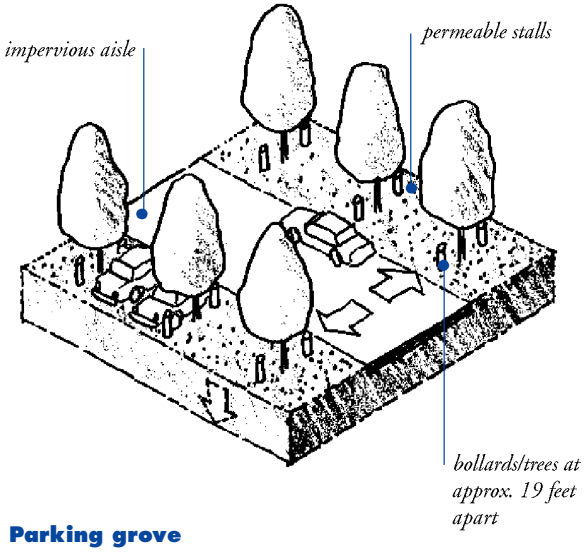

6.3b Parking grove

lots reduce impervious surface coverage in parking areas by differentiating the paving between aisles and stalls, combining impervious aisles with permeable stalls.

If the aisles are constructed of a more conventional, impermeable material suitable for heavier vehicle use, such as asphalt, the stalls can be constructed of a permeable pavement. This can reduce the overall impervious surface coverage of a typical double-loaded parking lot by 60%, and avoid the need for an underground drainage system.

Permeable stalls can be constructed of a number of materials, including crushed aggregate, open-celled unit pavers, porous asphalt, or pervious concrete (see Permeable Pavements, 6.1). A hybrid lot of crushed aggregate stalls and conventional asphalt aisles is a low-cost, practical design that is easily constructed from standard materials (see photo, previous page). In most cases, stall markings are not required, as the geometry of the edges promotes orderly parking. If desired, stalls can be indicated with wood headers, change in unit paver color, or pavement markers ("botts dots").

6.3b Parking Grove. A variation on the permeable stall design, a grid of trees and bollards can be used to delineate parking stalls and create a "parking grove." If the bollard and tree grid is spaced approximately 19 feet apart, two vehicles can park between each row of the grid. This 9.5 foot stall spacing is slightly more generous than the standard 8.5 to 9 foot stall, and allows for the added width of the tree trunks and bollards. A benefit of this design is that the parking grove not only shades parked

Parking Grove.
This parking grove at a Seaside, FL. hotel uses bollards and trees at approximately 10 ft. on center to create a shady courtyard that accommodates parking. The crushed oyster shell pavement is permeable and stable for walking and driving.

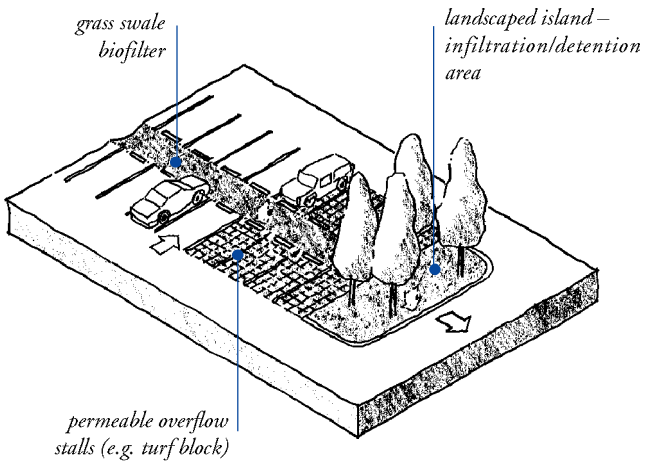

6.3c Overflow parking

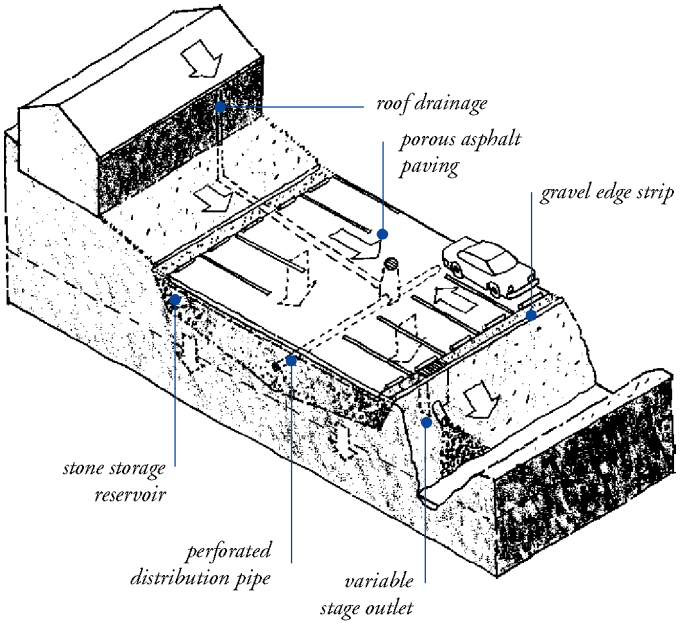

6.3d Porous pavement recharge bed
(adapted from Prince Georges Co., MD)

cars, but presents an attractive open space when cars are absent.

6.3c Overflow parking. In some locations daily parking needs fluctuate, often with peak use occurring only for special events or seasons. Typically, parking lots must be constructed to accommodate the peak demand, generating a high proportion of impervious land coverage of very limited usefulness.

An alternative is to differentiate between regular and peak parking demands, and to construct the peak parking stalls of a different, more permeable, material. This "overflow parking" area can be made of a turf block, which appears as a green lawn when not occupied by vehicles, or crushed stone. The same concept can be applied to areas with temporary parking needs, such as emergency access routes or, in residential applications, RV or trailer parking (see 6.4f Temporary parking).

6.3d Porous pavement recharge bed. In some cases parking lots can be designed to perform more complex stormwater management functions. Subsurface stormwater storage and infiltration can be achieved by constructing a stone-filled reservoir below the pavement surface and directing runoff underground by means of perforated distribution pipes. Subsurface infiltration basins eliminate the possibilities of mud, mosquitoes and safety hazards sometimes perceived to be associated with ephemeral surface drainage. They also can provide for storage of large volumes of runoff, and can be incorporated with roof runoff collection systems. These underground infiltration and storage systems are relatively expensive, and required extensive engineering, but have been used in a variety of locations in the eastern United States where land values are high and the need to control runoff is great.[45] Similar high land values are found throughout the Bay Area, and as emphasis on stormwater management increases, the economic viability of these solutions will increase.

Details 6.4 *Driveways*

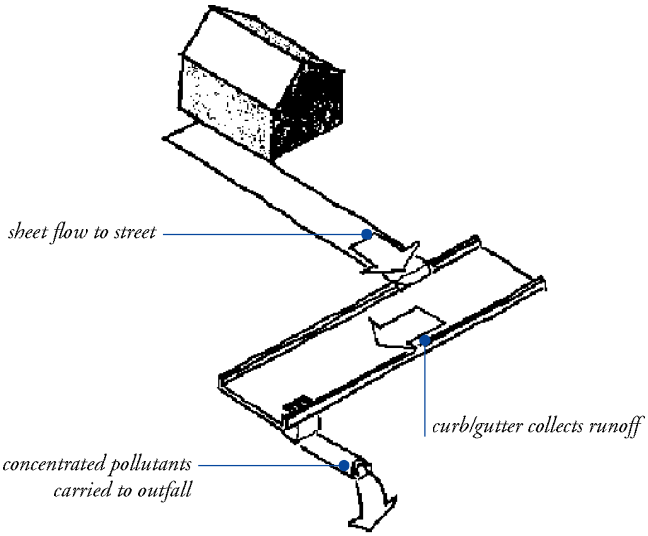

Directly-connected impervious driveway

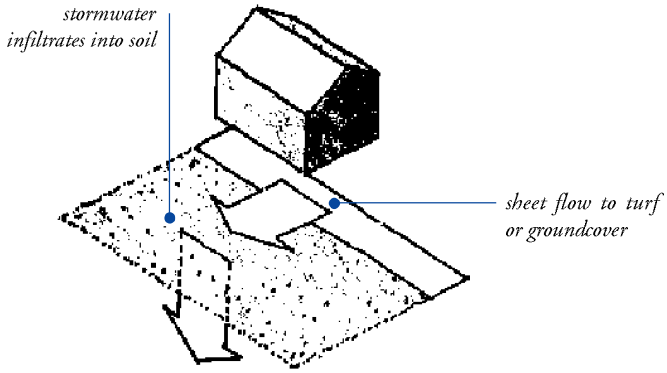

6.4a Not directly-connected impervious driveway

6.4 Driveways. Driveways can comprise up to 40% of the total transportation network in a conventional development, with streets, turn-arounds and sidewalks comprising the remaining 60%.

Driveway length is generally determined by garage setback requirements, and width is usually mandated by municipal codes and ordinances. If garages are set back from the street, long driveways are required, unless a rear alley system is included to provide garage access. If parking for two vehicles side-by-side is required, a 20 foot minimum width is required. Thus, if a 20 foot setback and a two-car wide driveway are required, a minimum of 400 square feet of driveway will result, or 4% of a typical 10,000 square foot residential lot. If the house itself is compact, and the driveway is long, wide, and paved with an impervious material such as asphalt or concrete, it can become the largest component of impervious land coverage on the lot.

Municipalities can reduce the area dedicated to driveways by allowing for tandem parking (one car in front of the other). Also, if shared driveways are permitted, then two or more garages can be accessed by a single driveway, further reducing required land area. Rear alley access to the garage can reduce driveway length, but overall impervious surface coverage may not be reduced if the alleys are paved with impervious materials and the access streets remain designed to conventional municipal standards.

6.4a Not directly-connected impervious driveway. A conventional driveway that is a "directly connected impervious area" drains directly to the storm drain system – collecting and concentrating pollutants. The easiest way to reduce the impact of a conventional impervious driveway on water quality is to slope it to drain onto an adjacent turf or groundcover area. By passing driveway runoff through a permeable landscaped area, pollutants can be dispersed and cleansed in the soil. A conventional impervious driveway directly connected to the storm drain network collects and concentrates pollutants.

6.4b Crushed aggregate driveway. Gravel and other granular materials can make a suitable permeable pavement for driveways especially those that serve single family homes. Because it is lightly used by very slow moving vehicles, a well-constructed driveway of granular material can serve as a relatively smooth

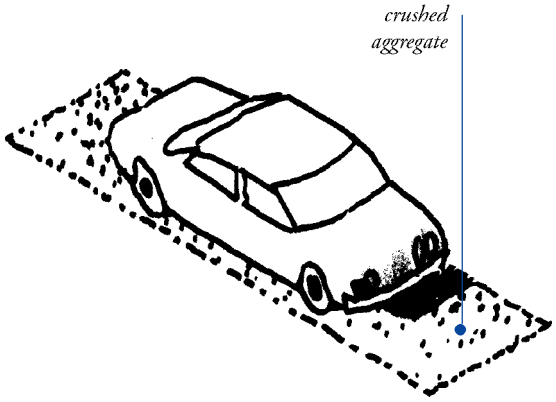

6.4b Crushed aggregate driveway

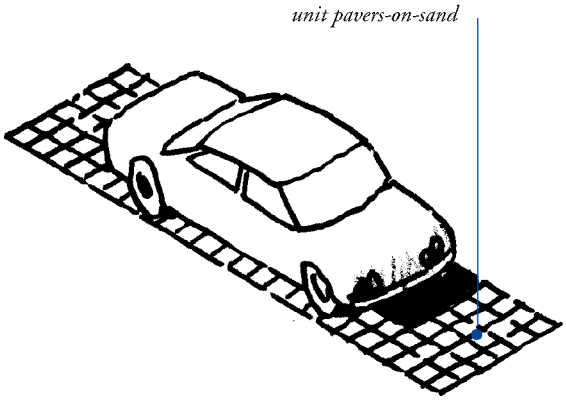

6.4c Unit pavers on sand

pavement with minimal maintenance. In choosing a granular material for a gravel driveway, use crushed stone aggregate. For proper infiltration and stormwater storage, the aggregate must be open-graded (see 6.1 Permeable pavements).

6.4c Unit pavers on sand. Unit pavers on sand can make a permeable, attractive driveway. A pavement of brick-on-sand or turf-block can make the driveway more integrated with the garden rather than an extension of the street penetrating deep into the garden space. For parking, a permeable, engineered base structural section may be required in addition to the sand setting bed.

6.4d Paving only under wheels. Concrete paving only under the wheel tracks is a viable, inexpensive design if the driveway is straight between the garage and the street. By leaving the center strip open to be planted with grass, groundcover or filled with a permeable material such as gravel, a driveway of two concrete wheel tracks can reduce impervious surface coverage by 60 to 70% compared with a single lane concrete driveway.

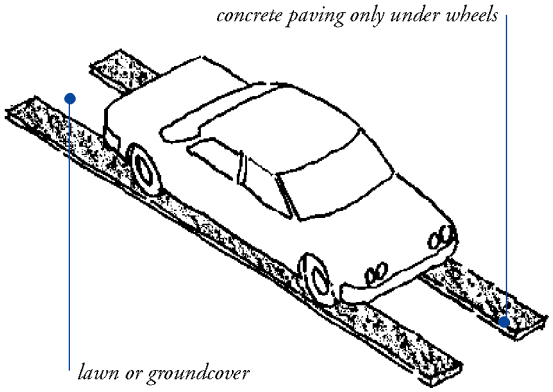

6.4d Paving only under wheels

Details 6.4 *Driveways (continued)*

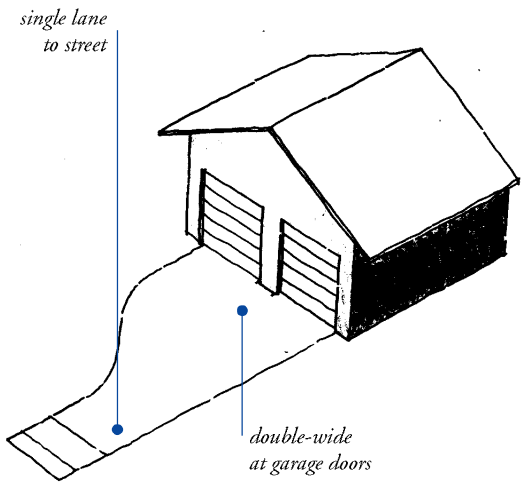

6.4e Flared driveways

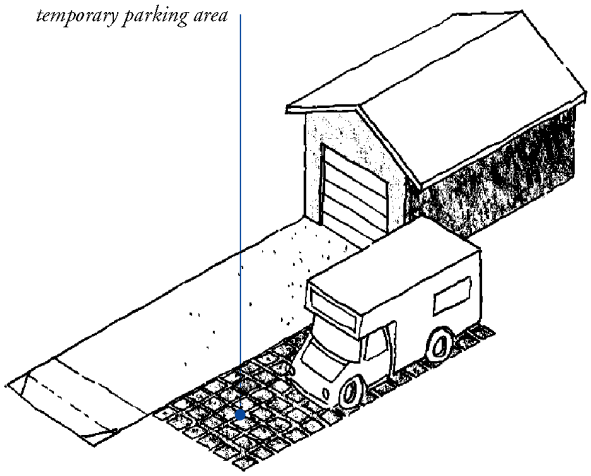

6.4f Temporary parking

6.4e Flared driveways. Long driveways or driveways that serve multi-car garages do not require the full multi-lane width along their entire length. The approach to the garage can be a single lane, adequate to accommodate the relatively infrequent vehicle trips, while the front of the garage can be flared to provide access to all garage doors. This strategy can reduce overall pavement cost and land coverage while maintaining adequate access for all parking spaces.

6.4f Temporary parking. In some areas, parking or access is required infrequently. These areas can be paved with a permeable turf-block or similar paver, and maintained as a landscaped surface. For the majority of the time when it is not used for parking, it appears and functions as a green space. When needed for parking or access, the surface supports vehicle loads. This is an especially valuable strategy for emergency access routes or overflow parking.

Driveway considerations. Driveways offer a relatively simple opportunity to improve both the aesthetics and permeability of residential developments.

By allowing tandem parking, shared driveways, or rear alley access, municipalities can minimize mandated driveway requirements.

For designers and developers, the driveway's intimate relationship with the residence, and its relative freedom from government regulation, make it an element that can be designed to increase permeability and market appeal.

Some treatments, such as turf-block or gravel, require greater maintenance than poured-in-place asphalt or concrete designs. Other materials, such as brick or unit pavers, require a greater initial expense. Both the maintenance and cost implications of these designs can be balanced by the improved aesthetic and market appeal of driveways made from more attractive, more permeable pavements.

Details 6.5 *Buildings*

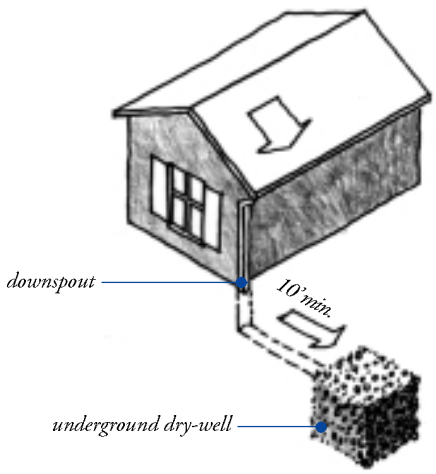

6.5a Dry-well

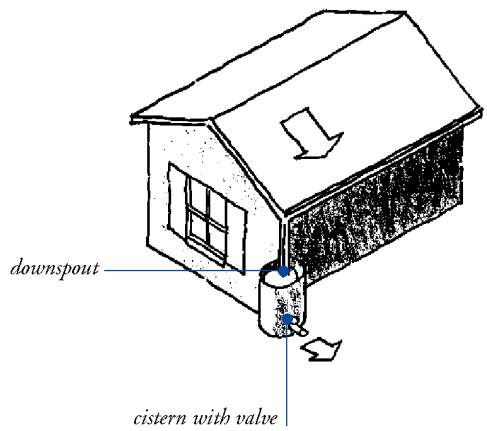

6.5b Cistern

6.5 Buildings. By definition, buildings create impervious land coverage. An important planning consideration is the site coverage and floor area ratio (F.A.R.). Buildings of equal floor area ratio can have widely different impervious coverage. For example, a two story building with 1,000 square feet of floor area will create 500 square feet of impervious area, while a one story building of the same floor area will create twice as much impervious land coverage. Therefore, tall skinny buildings have less impact on stormwater quality than low, spreading ones.

Once the building size and coverage is determined, there are a limited number of techniques for managing runoff from individual buildings to collect rooftop runoff and allow it to infiltrate into the soil.

6.5a Dry-well. If a gutter and downspout system is used to collect rainwater that falls on a roof, runoff becomes highly concentrated. If the downspout is connected to a dry-well, this runoff can be stored and slowly infiltrated into the soil.

A dry-well is constructed by digging a hole in the ground and filling it with an open graded aggregate. An underground connection from the downspout conveys water into the dry well, allowing it to be stored in the voids. To minimize sedimentation from lateral soil movement, the sides and top of the stone storage matrix can be wrapped in a permeable filter fabric, though the bottom may remain open. A perforated observation pipe can be inserted vertically into the dry-well to allow for inspection and maintenance.

In practice, dry-wells receiving runoff from single roof downspouts have been successful over long periods because they contain very little sediment. They must be sized according to the amount of rooftop runoff received, but are typically 4 to 5 feet square, and 2 to 3 feet deep, with a minimum of 1 foot soil cover over the top (maximum depth of 10 feet).

To protect the foundation, dry-wells must be set away from the building at least 10 feet. They must be installed in soils that accommodate infiltration. In poorly drained soils, dry-wells have very limited feasibility.

6.5b Cistern. Another way to store and slowly release roof runoff into the soil is to empty the downspout into a cistern. A cistern is an above ground storage vessel with either a manually operated valve or a permanently open outlet.

If the cistern has an operable valve, the valve can be closed to store stormwater for irrigation or infiltration between storms. This system requires continual monitoring by the resident or

Details 6.5 *Buildings, continued*

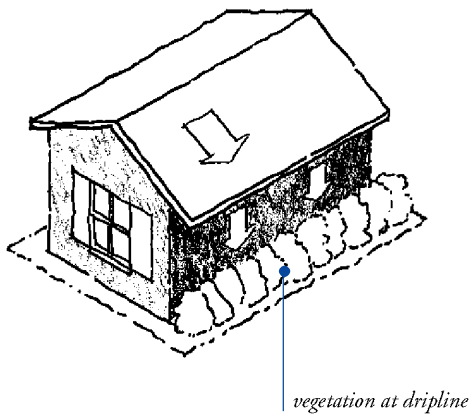

6.5c Foundation planting

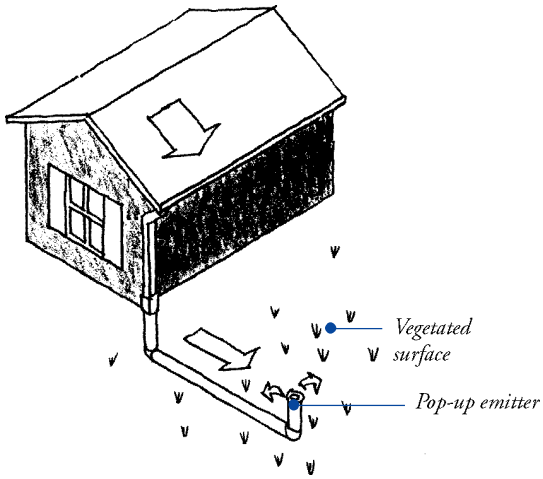

6.5d Pop-up drainage emitter

grounds crews, but provides greater flexibility in water storage and metering. If a cistern is provided with an operable valve and water is stored inside for long periods, the cistern must be covered to prevent mosquitoes from breeding.

A cistern system with a permanently open outlet can also provide for metering stormwater runoff. If the cistern outlet is significantly smaller than the size of the downspout inlet (say 1/4 to 1/2 inch diameter), runoff will build up inside the cistern during storms, and will empty out slowly after peak intensities subside. This is a feasible way to mitigate the peak flow increases caused by rooftop impervious land coverage, especially for the frequent, small storms.

Cisterns can be incorporated into the aesthetics of the building and garden. Japanese, Mediterranean and American Southwest architecture provide many examples of attractive cisterns made of a variety of materials.

If a cistern holds more than 6" depth of water, it must be covered securely or have a top opening of 4" or less to prevent small children from gaining access to the standing water. The cistern must be designed and maintained to minimize clogging by leaves and other debris.

6.5c Foundation planting. For buildings that do not use a gutter system, landscape planting around the base of the eaves can provide increased opportunities for stormwater infiltration and protect the soil from erosion caused by concentrated sheet flow coming off the roof.

Foundation plantings can reduce the physical impact of water on the soil and provide a subsurface matrix of roots that encourage infiltration. These plantings must be sturdy enough to tolerate the heavy runoff sheet flows, and periodic soil saturation.

6.5d Pop-up drainage emitter. Discharging the downspout to landscaped areas allows for polishing and infiltration of the runoff. The downspout can be directly connected to a pipe which daylights some distance from the building foundation, releasing the roof runoff through a pop-up emitter. Similar to a pop-up irrigation head, the emitter only opens when there is flow from the roof. The emitter remains flush to the ground during dry periods, for ease of lawn or landscape maintenance.

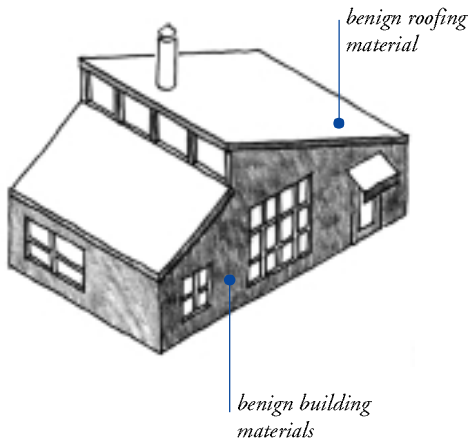

6.5e Building materials

6.5e Building materials. Selection of building materials and construction practices has an affect on stormwater quality. Some building materials contribute to stormwater degradation as they age or combine with rainwater and air. Some construction practices use materials that pollute runoff. Other materials and practices are more benign. Examples of considerations in materials selection and building practices include:

Concrete. Check the contents and source of the concrete mixture for impurities. Avoid form separators such as diesel fuel or petroleum based oil. Vegetable oil can be used as a non-toxic alternate (though plaster and stucco may not adhere effectively to an oiled concrete substrate).

Wood. For landscape materials such as steps and walls, avoid using railroad ties and woods that have been pressure treated with creosote or penta wood preservatives. Many recycled plastic products are becoming more commonly available and are often suitable wood substitutes for decking, headers and other landscape uses. Steel studs and frames are also becoming a cost-effective substitute for wood framing.

Roofing. Materials that can generate polluted runoff under some conditions include copper sheeting (trace metal), asphalt shingles (by-product of oil refining process), zinc (trace metal; lead used in zincing process). Some alternative roofing materials include: slate, steel, stone, and terra cotta tiles. These materials are durable and fireproof. They may also require design attention to accommodate the added weight load.

Paints and coatings. Lead-based paints have been commonly used in building. White lead was used on wood siding, door and window frames, and casings. Red lead was used as a primer for steel window frames on commercial and industrial buildings When renovating old buildings, test for lead in the existing paint before proceeding with removal practices such as sanding or water blasting to avoid paint chips landing on and leaching into the soil.

Details 6.6 *Landscape*

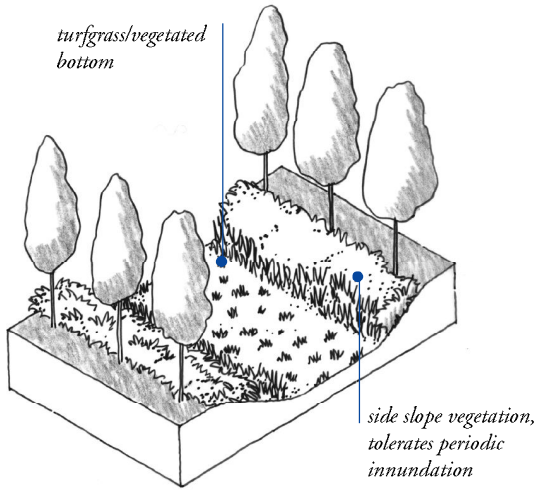

6.6a Grass/vegetated swales

6.6 Landscape. In the natural landscape, most soils infiltrate a high percentage of rainwater through a complex web of organic and biological activities that build soil porosity and permeability. Roots reach into the soil and separate particles of clay, insects excavate voids in the soil mass, roots decay leaving networks of macropores, leaves fall and form a mulch over the soil surface, and earthworms burrow and ingest organic detritus to create richer, more porous soil. These are just a few examples of the natural processes that occur within the soil.[46]

In development, a certain amount of soil must be covered with impervious surface, but the remaining landscape can be designed and maintained to maximize its natural permeability and infiltration capacity.

One simple strategy to improve infiltration is to use the grading of landscape surfaces. Landscape surfaces are conventionally graded to have a slight convex slope. This causes water to run off a central high point into a surrounding drainage system, creating increased runoff. If a landscape surface is graded to have a slightly concave slope, it will hold water. The infiltration value of concave vegetated surfaces is greater in permeable soils. Soils of heavy clay or underlain with hardpan provide less infiltration value. In these cases concave vegetated surfaces must be designed as retention/detention basins, with proper outlets or underdrains to an interconnected system.

Multiple small basins. Biofilters, infiltration, retention/detention basins are the basic elements of a landscape designed for stormwater management (see Drainage system elements 5.5). The challenge for designers is to integrate these elements creatively and attractively in the landscape – either within a conventional landscape aesthetic, or by presenting a different landscape image that emphasizes the role of water and drainage.

Multiple small basins can provide a great deal of water storage and infiltration capacity. These small basins can fit into the parkway planting strip or shoulders of street rights-of-way. If connected by culverts under walks and driveways, they can create a continuous linear infiltration system. Infiltration and retention/detention basins can be placed under wood decks, in parking lot planter islands, and at roof downspouts. Outdoor patios or seating areas can be sunken a few steps, paved with a permeable pavement such as flagstone or gravel, and designed to hold a few inches of water collected from surrounding rooftops or paved areas for a few hours after a rain.

All of these are examples of small basins that can store water for

An ordinary lawn.
This lawn presents a conventional landscape appearance – its role as an effective biofilter capable of holding a few inches of water is barely noticable.

A different landscape image.
This infiltration basin uses simple landscape materials to create a landscape of great diversity that accentuates its role in a surface drainage network.

Basins for every landscape type.

a brief period, allowing it to infiltrate into the soil, slowing its release into the drainage network, and filtering pollutants.

6.6a Grass/vegetated swales. Parking lot drainage can be integrated with landscaping to provide infiltration and retention/detention basins. Grass swales can be a particularly effective design strategy in large conventionally paved parking lots, by providing low maintenance, linear biofilters along the perimeter of the lot or along internal islands. Stormwater is directed to these linear landscaped spaces and travels slowly over turfgrass or other vegetated surfaces, allowing pollutants to settle and slowing runoff velocities (See chapter 8 for details).

6.6b Extended detention (dry) ponds. Extended detention (dry) ponds can be used for both pollutant removal and flood control. These ponds store water during storms anywhere from a few hours up to a few days, discharge it to adjacent surface waters, and are dry between storms. Clay or impervious soils should not affect pollutant removal effectiveness, as the main removal mechanism is settling.

Extended detention ponds are generally appropriate for developments of ten acres or larger, and have the potential for multiple uses including flood control basins, parks, playing fields, tennis courts, open space, and overflow parking lots.

It is important to consider design elements to improve pond safety. The most important being shallow side slopes of no steeper than 3:1. This prevents people from accidentally falling into deep water. Barriers such as fencing and/or vegetation are also used, but they prevent access for recreational use, and also can present a hazardous situation if the side slopes are steep, because people drawn to the water can breach or climb the barrier and fall into deep water.

6.6c Wet ponds. Wet ponds are permanent pools of water that detain and treat stormwater runoff. These ponds, if designed with a fringe wetland at the pond edge, can increase property values by providing a significant landscape amenity with opportunities for passive recreation (e.g., birdwatching, fishing), and can be combined with pedestrian and bicycle circulation to provide active recreation. The fringe wetland is also an important factor in increasing pollutant removal.

6.6d Plant species selection for infiltration areas. The proper selection of plant materials can improve the infiltration potential of landscape areas. Deep rooted plants help to build soil porosity. Plant leaf-surface area helps to collect rainwater before it lands on the soil, especially in light rains, increasing the overall water-holding potential of the landscape. A single street tree can have a total leaf surface area of several hundred to

Details 6.6 *Landscape, continued*

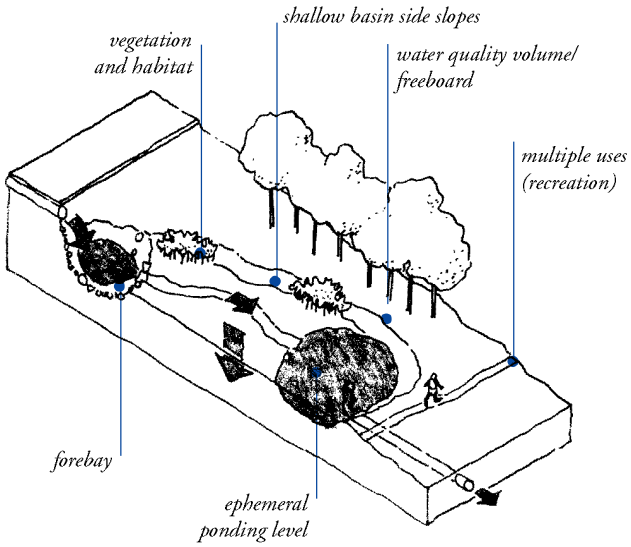

6.6b Extended detention (dry) ponds

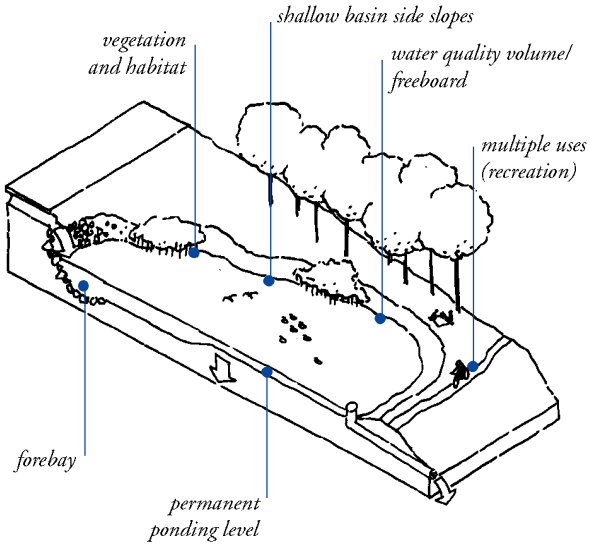

6.6c Wet ponds

several thousand square feet, depending on species and size. This above ground surface area created by trees and other plants greatly contributes to the water-holding capacity of the land.

A large number of plant species will survive moist soils or periodic inundation. These plants provide a wide range of choices for planted infiltration/detention basins and drainage swales. Most inundated plants have a higher survival potential on well-drained alluvial soils than on fine-textured shallow soils or clays. Though oaks generally do not tolerate summer moisture, mature valley and blue oaks (*Quercus lobata* and *Q. douglasii*) in alluvial soils can survive winter inundation for up to 100 days annually.[47]

Landscape considerations. Landscape can perform a wide variety of stormwater management functions. In designing landscapes for stormwater management, appropriate groundcover must be selected. Turf grass lawns, woody perennials, and cobbles can all be used, depending on the desired aesthetic effect.

6.6e Landscape maintenance for stormwater systems. All landscape treatments require maintenance. Landscapes designed to perform stormwater management functions are not necessarily more maintenance intensive than highly manicured conventional landscapes. A concave lawn requires the same mowing, fertilizing and weeding as a convex one, and often less irrigation because more rain is filtered into the underlying soil. Sometimes infiltration basins may require a different kind of maintenance than conventionally practiced.

Typical maintenance activities include periodic inspection of surface drainage systems to ensure clear flowlines, repair of eroded surfaces, adjustment or repair of drainage structures, soil cultivation or aeration, care of plant materials, replacement of dead plants, replenishment of mulch cover, irrigation, fertilizing, pruning and mowing. Also, dead or stressed vegetation may indicate chemical dumping. Careful observation should be made of these areas to determine if such a problem exists.

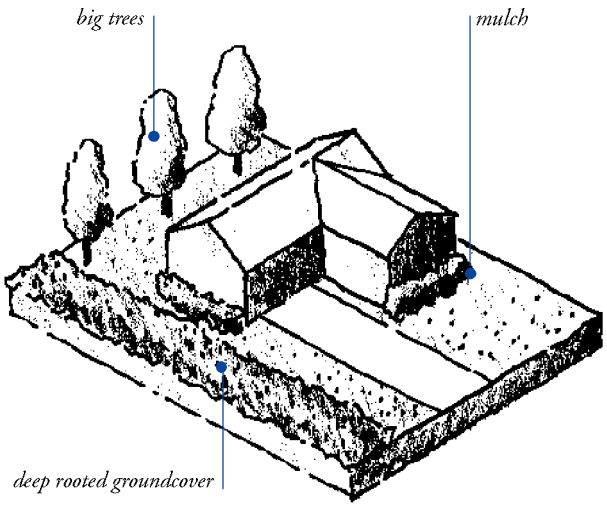

6.6d/e Plant selection and landscape maintenance

Landscape maintenance can have a significant impact on soil permeability and its ability to support plant growth. Most plants concentrate the majority of their small absorbing roots in the upper 6 inches of the soil surface if the surface is protected by a mulch or forest litter. If the soil is exposed or bare, it can become so hot that surface roots will not grow in the upper 8 to 10 inches. The common practice of removing all leaf litter and detritus with leaf blowers creates a hard crusted soil surface of low permeability and high heat conduction. Proper mulching of the soil surface improves water retention and infiltration, while protecting the surface root zone from temperature extremes.[47]

In addition to impacting permeability, landscape maintenance practices can have adverse effects on water quality. Because commonly used fertilizers and herbicides are a source of organic compounds, it is important to keep these practices to a minimum, and prevent overwatering.

When well-maintained and designed, landscaped concave surfaces, infiltration basins, swales and bio-retention areas can add aesthetic value while providing the framework for environmentally sound, comprehensive stormwater management systems.

Details 6.7 *Outdoor work areas*

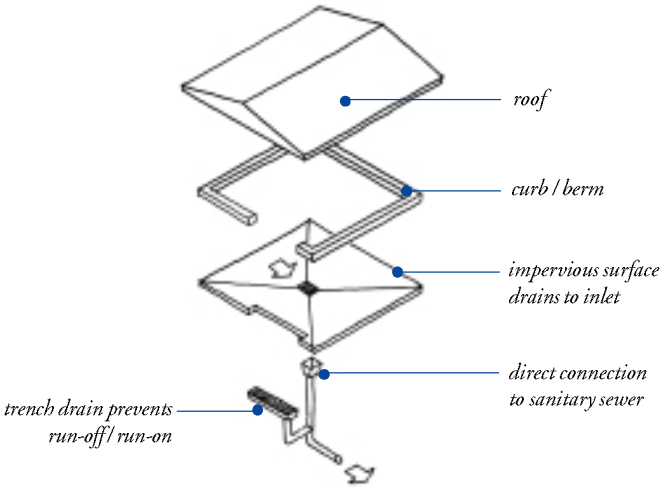

6.7 Typical outdoor work area

6.7 Outdoor work areas. The site design and landscape details listed in previous chapters are appropriate for uses where low concentrations of pollutants can be mitigated through infiltration, retention and detention. Often in commercial and industrial sites, there are outdoor work areas in which a higher concentration of pollutants exists, and thus a higher potential of pollutants infiltrating the soil. These work areas often involve automobiles, equipment, machinery, or other commercial and industrial uses, and require special consideration.

Outdoor work areas are usually isolated elements in a larger development. Infiltration and detention strategies are still appropriate for and can be applied to other areas of the site, such as parking lots, landscape areas, employee use areas, and bicycle paths. It is only the outdoor work area within the development – such as the loading dock, fueling area, or equipment wash – that requires a different drainage approach. This drainage approach is often *precisely the opposite* from the infiltration/detention strategy– in other words, collect and convey.

In these outdoor work areas, infiltration is discouraged and runoff is often routed directly to the sanitary sewer, not the storm drain. Because this runoff is being added to the loads normally received by the water treatment plants (known as "publicly owned treatment works" or POTW), it raises several concerns that must be addressed in the planning and design stage. These include:

- higher flows (if area is exposed to rainfall) that could exceed the sewer system capacity,
- catastrophic spills that may cause harm to POTW operations, and,
- a general increase in pollutants.

These concerns can be addressed at policy, management, and site planning levels.

Policy. Piping runoff and process water from outdoor work areas directly to the sanitary sewer for treatment by a downstream POTW displaces the problem of reducing stormwater pollution. Municipal stormwater programs and/or private developers can work with the local POTW to develop solutions that minimize effects on the treatment facility.

Management. Commercial and industrial sites that host special activities need to implement a pollution prevention program, minimizing hazardous material use and waste. For example, if restaurant grease traps are directly connected to the sanitary sewer, proper management programs can mitigate the amount of grease that escapes from the trap. This grease, if released in large volumes, can clog sewer systems and cause overflows, or

Outdoor work areas

Outdoor work areas that may require structural treatment include:

Auto recycle facilities

Auto wrecking yards

Commercial nurseries

Corporation yards

Fueling stations

Fleet storage areas

Rooftop equipment

Marinas

Outdoor container storage

Outdoor loading/unloading facilities

Public works storage areas

Vehicle service and maintenance areas

Vehicle and equipment washing/steam cleaning facilities

All sites requiring a hazardous materials management plan (HMMP)

Source: Technical Note No. 87. *Watershed Protection Techniques.* Vol. 2, No. 2. February 1997.

damage the downstream treatment system.

Site Planning. Outdoor work areas can be designed in particular ways to reduce their impacts on both stormwater quality and sewage treatment plants (if drainage system is connected):

- create an impermeable surface. This can be a conventional pavement, such as concrete or asphalt, or a prefabricated metal drip pan, depending on the use.
- cover the area with a roof. This prevents rain from falling on the work area and becoming polluted runoff.
- berm or mounding around the perimeter of the area to prevent water from adjacent areas to flow on to the surface of the work area. In this way, the amount of polluted runoff is minimized.
- directly connect runoff. Unlike other areas, runoff from these work areas is directly connected to the sanitary sewer or other specialized containment systems. This allows the more highly concentrated pollutants from these areas to receive special treatment that removes particular constituents. Approval for this connection must be obtained from the appropriate sanitary sewer agency.
- locate the work area away from storm drains or catch basins. If the work area is adjacent to or directly upstream from a storm drain or landscape drainage feature (e.g.

Details 6.7 *Outdoor work areas, continued*

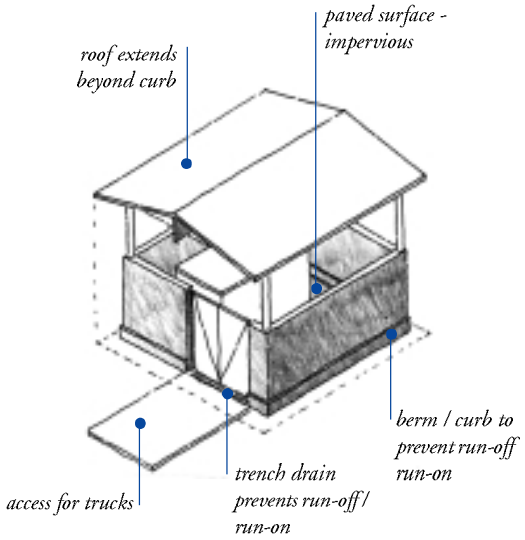

6.7a Garbage and recycling area

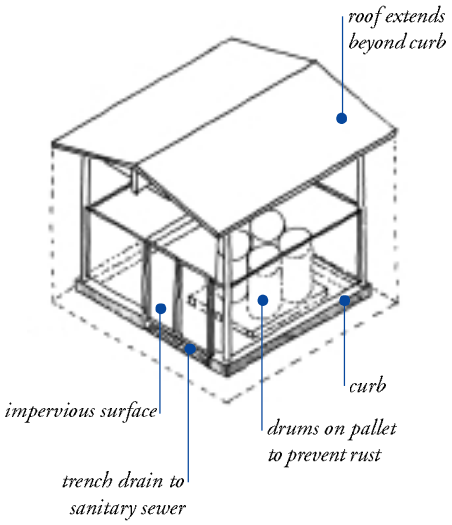

6.7b Maintenance and storage area

bioswale), debris or liquids from the work area can migrate into the stormwater system.

These design elements are general considerations for work areas. In designing any outdoor work area, evaluate local ordinances affecting the use, as many local jurisdictions have specific requirements.

Some activities are common to many commercial and industrial sites. These include garbage and recycling, maintenance and storage, and loading. These activities can have a significant negative impact on stormwater quality, and require special attention to the siting and design of the activity area.

6.7a Garbage and recycling. Garbage and recycling areas must be designed to consider a wide range of factors. These include sizes of receptacles for both trash and a variety of recycled materials. They must be sited so that receptacles are accessible for collection by standard collection trucks, yet out of the way so as not to disturb the aesthetics of the site. Garbage and recycling areas should also be located away from drainage paths and waterways to prevent debris and spills from entering the drainage system.[49] Regular maintenance plans should be implemented for sweeping, litter control, and spill cleanup.

Protection from rainfall and "run-on" surface drainage can be achieved by designing a roof or covering for the enclosure, and a curb or berm around the perimeter to contain any leakage from trash containers and dumpsters. The dumpsters or trash containers need to sit on a paved area, not lawn or unpaved soil, to prevent infiltration of leakage. Plastic liners may also be used to contain liquid waste. In cases where water cannot be diverted from the areas (such as areas located within a low spot), a self-contained drainage system must be designed.

6.7b Maintenance and storage. To reduce the possibility of contact with stormwater runoff, maintenance and storage areas can be sited away from drainage paths and waterways.[50] Implementing a regular maintenance plan for sweeping, litter control, and spill cleanup, also helps prevent stormwater pollution.

Specifying impermeable surfaces for vehicle and equipment maintenance areas will reduce the chance of pollutant infiltration. A concrete surface will usually last much longer than an asphalt one, as vehicle fluids can either dissolve asphalt or can be absorbed by the asphalt and released later.[51]

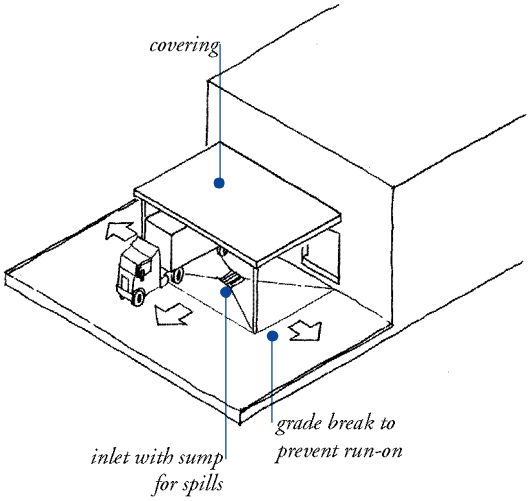

6.7c Loading area

Vehicle and equipment washing. It is generally advisable to cover areas used for regular washing of vehicles, trucks, or equipment, surround them with a perimeter berm, and clearly mark them as a designated washing area. Sumps or drainlines can be installed to collect wash water, which may be treated for reuse or recycling, or for discharge to the sanitary sewer. The POTW may require some form of pretreatment, such as a trap, for these areas.

Fueling and maintenance activities must be isolated from the vehicle washing facilities. These activities have specific requirements (see below).

Storage of bulk materials, fuels, oils, solvents, other chemicals, and process equipment should be accommodated on an impervious surface covered with a roof. To reduce the chances of corrosion, materials should not be stored directly on the ground, but supported by a wire mesh or other flooring above the impervious pavement. In uncovered areas, drums or other containers can be stored at a slight angle to prevent ponding of rainwater from rusting the lids. Liquid containers should be stored in a designated impervious area that is roofed, fenced within a berm, to prevent spills from flowing into the storm drain.

If hazardous materials are being used or stored, additional specific local, state or federal requirements may apply.

6.7c Loading. Loading areas and docks can be designed with a roof or overhang, and a surrounding curb or berm. The area should be graded to direct flow toward an inlet with a shutoff valve or dead-end sump. The sump must be designed with enough capacity to hold a spill while the valve is closed. If the sump has a valve, it must be kept in the closed position and require an action to open it. All sumps must have a sealed bottom so they cannot infiltrate water. Contaminated accumulated waste and liquid must not be discharged to a stormdrain and may be discharged to the sanitary sewer only with the POTW's permission. If it does not receive approval for discharge to the sanitary sewer, it must be conveyed to a hazardous waste (or other offsite disposal) facility, and may require pretreatment.[52]

Details
6.7

Outdoor work areas, continued

Some specific uses have unique requirements.

Restaurants. Though special regulations and zoning ordinances address restaurant pollutants, there are still areas in which poor maintenance practices contribute to stormwater pollution. It is preferable that all cooking and cleaning activities occur inside the restaurant. If these activities are performed outside, there are some simple site design elements that can help reduce the potential for stormwater pollution (See case study 7.2f).

Containment curbs or berms can be designed around areas in which floor mat, container washing, exhaust filter and sink cleaning may take place. A covered, secondary containment area can be designed so that kitchen grease is contained, collected, and removed regularly by a recycling/disposal service, or disposed of through a grease trap with a sanitary sewer connection.[53]

Fueling areas. In all vehicle and equipment fueling areas, plans must be developed for cleaning near fuel dispensers, emergency spill cleanup, and routine inspections to prevent leaks and ensure properly functioning equipment.[54]

If the fueling activities are minor, fueling can be performed in a designated, covered and bermed area that will not allow run-on of stormwater or runoff of spills.[55]

Retail gasoline outlets and vehicle fueling areas have specific design guidelines (See case study 7.2g). These are described in a Best Management Practice Guide for retail gasoline outlets developed by the California Stormwater Quality Task Force, in cooperation with major gasoline corporations. The practice guide addresses standards for existing, new, or substantially remodeled facilities.

Fuel dispensing areas are defined as extending 6.5 feet from the corner of each fuel dispenser or the length at which the hose and nozzle assemble may be operated plus 1 foot, whichever is less. These areas must be paved with smooth impervious surface, such as Portland cement concrete, with a 2%-4% slope to prevent ponding, and must be covered. The cover must not drain onto the work area. The fuel dispensing area must be separated by the rest of the site by a grade break that prevents run-on of stormwater.

Within the gas station, the outdoor trash receptacle area (garbage and recycling), and the air/water supply area must be paved and graded to prevent stormwater run-on.

7 Case Studies

The site planning principles and design concepts described in the previous pages are integrated on the following pages in a series of case studies reflecting the diverse topography and market conditions of the Bay Area.

The case studies are illustrative. They show an approach to site planning and design that integrates stormwater management as an organizing element. Each of the details in Chapter 6 is illustrated at least once to show how the details work in combination with each other. Real sites, and real projects, will require unique combinations to suit unique conditions.

Site planning and design is a complex and demanding process. To be successful, a new development must meet marketing, economic, regulatory, engineering, environmental, construction, and design criteria. The following case studies attempt to show that by treating stormwater as a resource, and using it as a means to generate design, communities can be built that reward investment, enhance the natural environment, and make better places for people to live and work.

Case Studies

Economic benefits of stormwater management

7.1 Residential development

7.1a Small single lot

7.1b Large single lot

7.1c High density multi-family site

7.1d Small hillside site

7.1e Large hillside site

7.1f Large flat site

7.2 Commercial/industrial/institutional development

7.2a Shopping center

7.2b Industrial park

7.2c Strip mall

7.2d Schools and parks

7.2e Office building

7.2f Restaurant

7.2g Gas stations

7.2h Hotel/motel

Economic benefits of stormwater management

People have a strong emotional attachment to water, arising from its aesthetic qualities– tranquility, coolness and beauty. As a result, most waterbodies within developments can be used as marketing tools to set the tone for entire projects. A recent study conducted by the National Association of Home Builders indicates that "whether a beach, pond, or stream, the proximity to water raises the value of a home by up to 28 percent."[56]

In California's semi-arid climate, most of the techniques described in this document will not be year-round water features, but instead will hold water only during the rainy months. These ephemeral ponds and streams have a unique character, changing with the seasons and reflecting (literally) daily changes in weather.

Water features command a premium in the marketplace. Homebuyers and renters nation-wide demonstrate a willingness to pay a premium for properties adjacent to urban runoff controls that are designed with aesthetics in mind. According to the US E.P.A., land values for lots fronting runoff controls commanded 5 to 15% premiums over comparable lots at residential projects in Virginia, Colorado, Illinois and Kansas. In Davis, California, properties at Village Homes, a residential subdivision built in the late 1970s with seasonal swales and other environmental features, command significantly higher values than comparable homes in nearby conventionally designed subdivisions.

Stormwater management for water quality presents developers with an opportunity to design more attractive projects that will have an advantage over conventionally designed competitors. Not only do subdivisions sell faster and at a premium, but development costs are generally lower for surface drainage systems compared to conventional underground systems.[57]

Factors that lead to increases in property values. Urban runoff systems that appear to be natural systems are most effective at commanding increases in property values. If recreation is included (e.g. a walking path along a swale or playfield/infiltration basin), an additional premium is realized. These recreational areas and wetlands can become a feature attraction when advertising the property. Amenities such as trails and gazebos may add costs, but these can be compensated for by faster sales and additional profits. Developers can charge premiums for properties with water views, stream frontage, access to greenbelts, or other amenities.

Maintenance. Proper maintenace of the drainage system is essential for homebuyer acceptance and marketing. Runoff controls that are poorly maintained can be a hazard or a nuisance. Maintenance costs need not be significantly higher than conventionally designed projects. For example, a concave lawn requires the same maintenance as a convex one, though the concave lawn can form part of a stormwater management system. In some designs, such as vegetated swales or seasonal ponds, periodic maintenance will be required, but it is less than other amenities routinely included in new development, such as fountains or tennis courts.

Green marketing. Many consumers today demonstrate a preference for products and services that are "environment friendly." Organically grown cotton clothing, natural foods, and recycled papers are a few of the products that sell at a premium to conventional competitors but command increasing market share. Homebuyers, too, respond to products that consciously promote more environmentally responsible designs, as long as these designs are safe, attractive and functional. By promoting a natural drainage system, developers can meet federal mandates for environmental quality while simultaneously differentiating their product through increased habitat, a more diverse landscape, and additional recreational opportunities.

This drainage swale, integrated with a pathway system and landscaping, makes an attractive recreational area that enhances property values.

Case Study

7.1a *Small single lot*

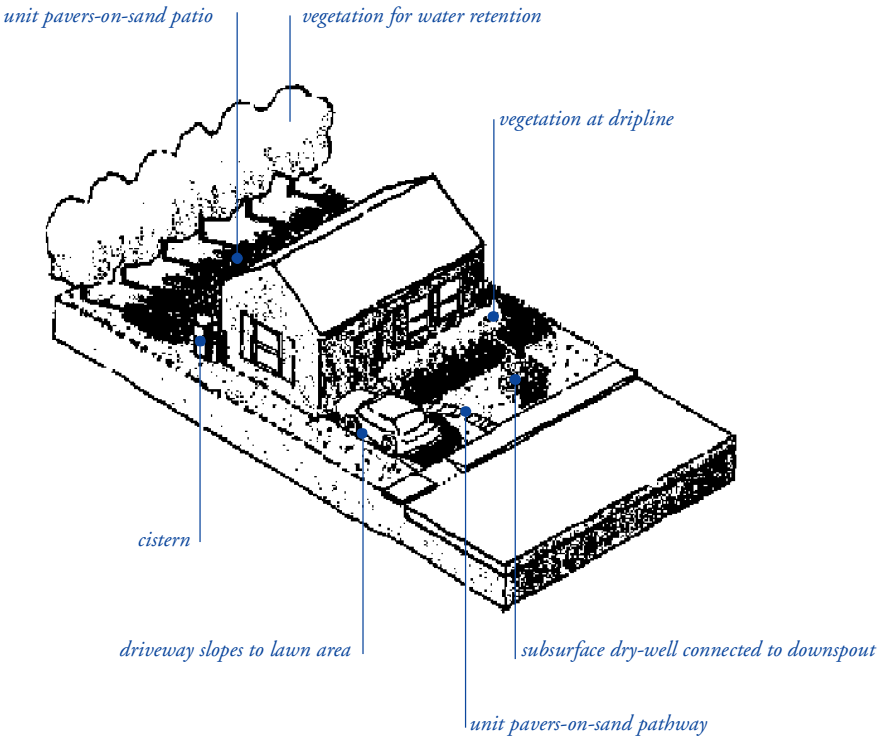

7.1a Small single lot. Even a small, single-family home lot can provide opportunities for stormwater management. Because they occur at the intimate, garden level, these opportunities can add aesthetic richness that will directly benefit residents. Stormwater management techniques can also provide habitat for wildlife, create shade, improve character, provide supplemental irrigation water, and promote growth of landscape planting.

Homeowner education is an important element of stormwater management techniques at all levels, but especially at the single lot scale. Residents need to be educated on the intent of various design elements, and their proper care. They especially need to understand the maintenance needs of more active elements, such as cisterns, which need periodic cleaning or emptying. If dry-wells are included, residents must also understand that they are for rainwater only – never as a place to dump oil, pesticides, paint thinner, solvents, cleaners such as 409, degreasers, or other unwanted wastes.

The techniques illustrated in this example are:

- unit pavers-on-sand patio
- not directly connected impervious driveway
- unit pavers-on-sand pathway
- dry-well connected to roof downspout
- cistern
- vegetation for water retention (deep rooted trees)
- vegetation at dripline of roof.

Case Study

7.1b *Large single lot*

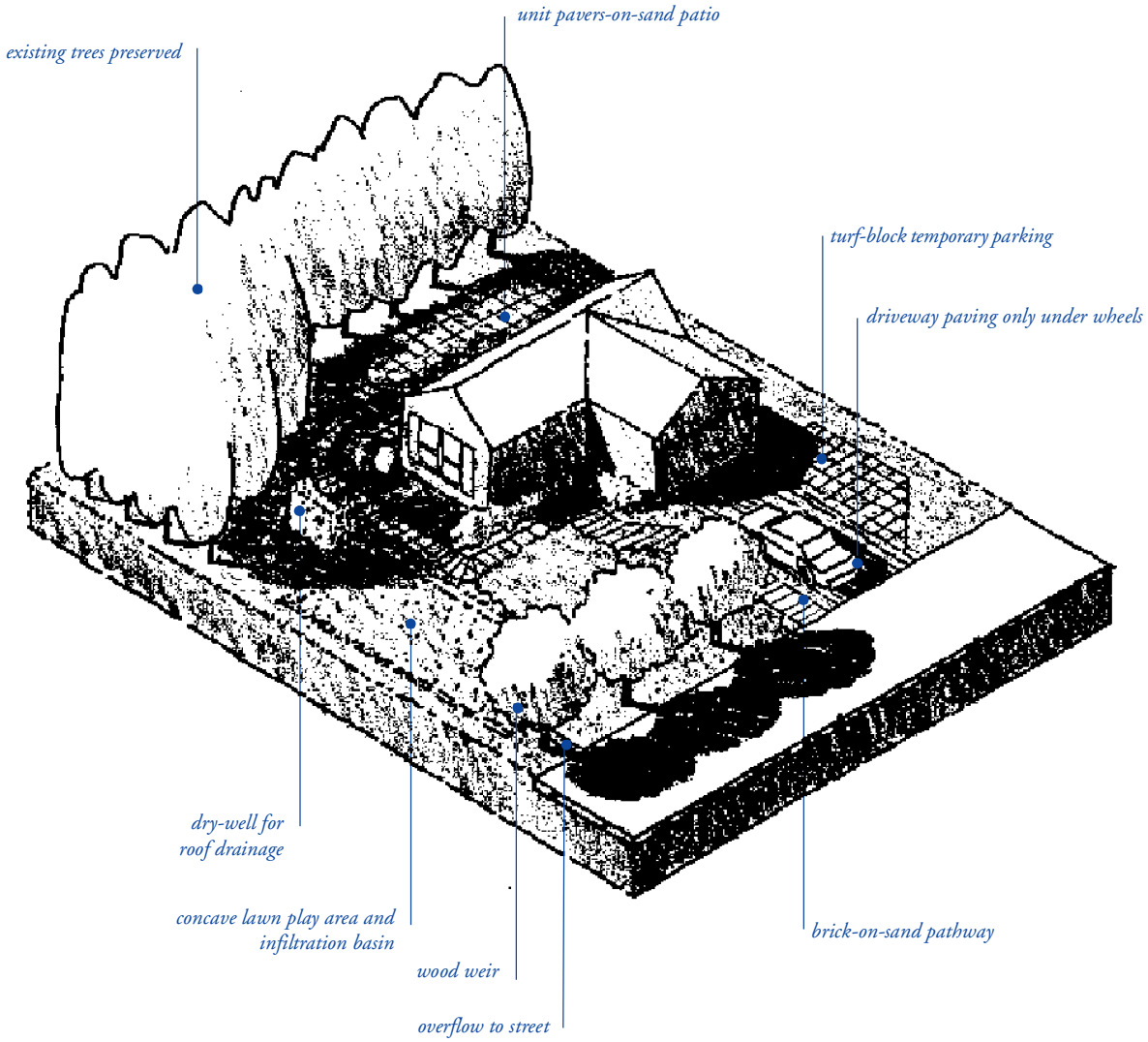

7.1b Large single lot. A large single-family home lot usually provides many opportunities for stormwater management. Because the ratio of impervious cover relative to land area is usually low, adequate landscape area is available to accommodate a variety of subtle infiltration strategies.

As will the small single lot, homeowner education is important so that residents understand the intent of various design elements, and their proper care. They especially need to understand the maintenance needs of more active elements, such as cisterns, which need periodic cleaning or emptying. If dry-wells are included, residents must also understand that they are for rainwater only – never as a place to dump oil, pesticides, paint thinner, solvents, cleaners, degreasers, or other unwanted wastes.

The techniques illustrated in this example are:

- unit pavers-on-sand patio
- concave lawn play area and infiltration basin
- not directly connected impervious driveway
- brick-on-sand pathway
- dry-well connected to roof downspout
- cistern
- vegetation for water retention (deep rooted trees)
- vegetation at dripline of roof.

Case Study

7.1c

High density multi-family site

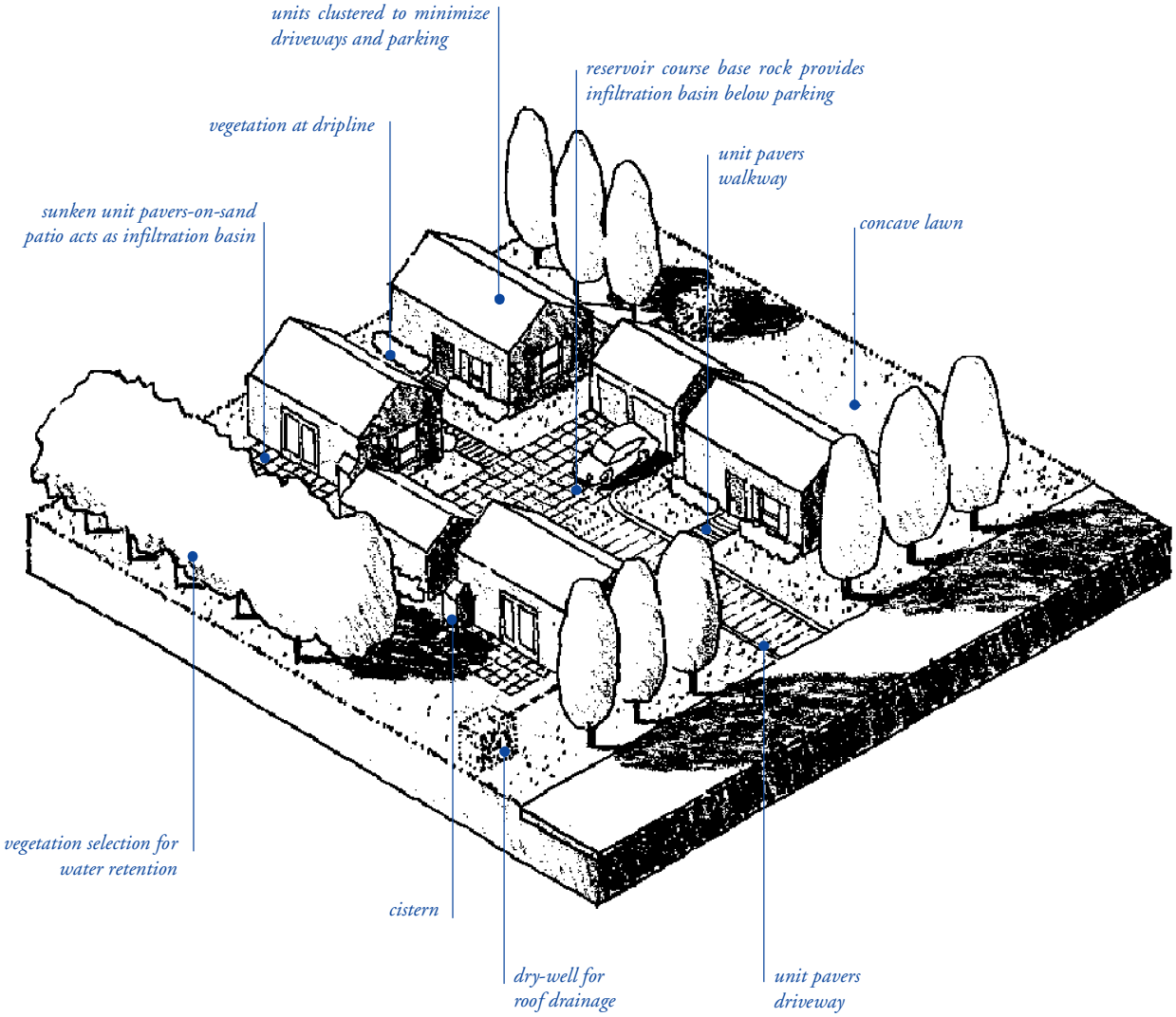

7.1c High density multi-family site. In the Bay Area, many of the sites for new construction are infill or redevelopment sites. These sites usually have higher densities (typically from 12 to 40 units per acre) which demands a greater proportion of pavement and roof coverage.

Opportunities for on-site stormwater management usually still exist, even in the most densely developed infill site, though they may require greater creativity or multiple use of space.

Continuous homeowner education is needed to prevent dumping. Hazardous waste disposal must be provided for used oil/solvents, cleaners, etc.

The techniques illustrated in this example are:

- unit pavers-on-sand patio
- concave lawn play area and infiltration basin
- not directly connected impervious driveway
- brick-on-sand pathway
- dry-well connected to roof downspout
- cistern
- vegetation for water retention (deep rooted trees)
- vegetation at dripline of roof.

Case Study

7.1d *Small hillside site*

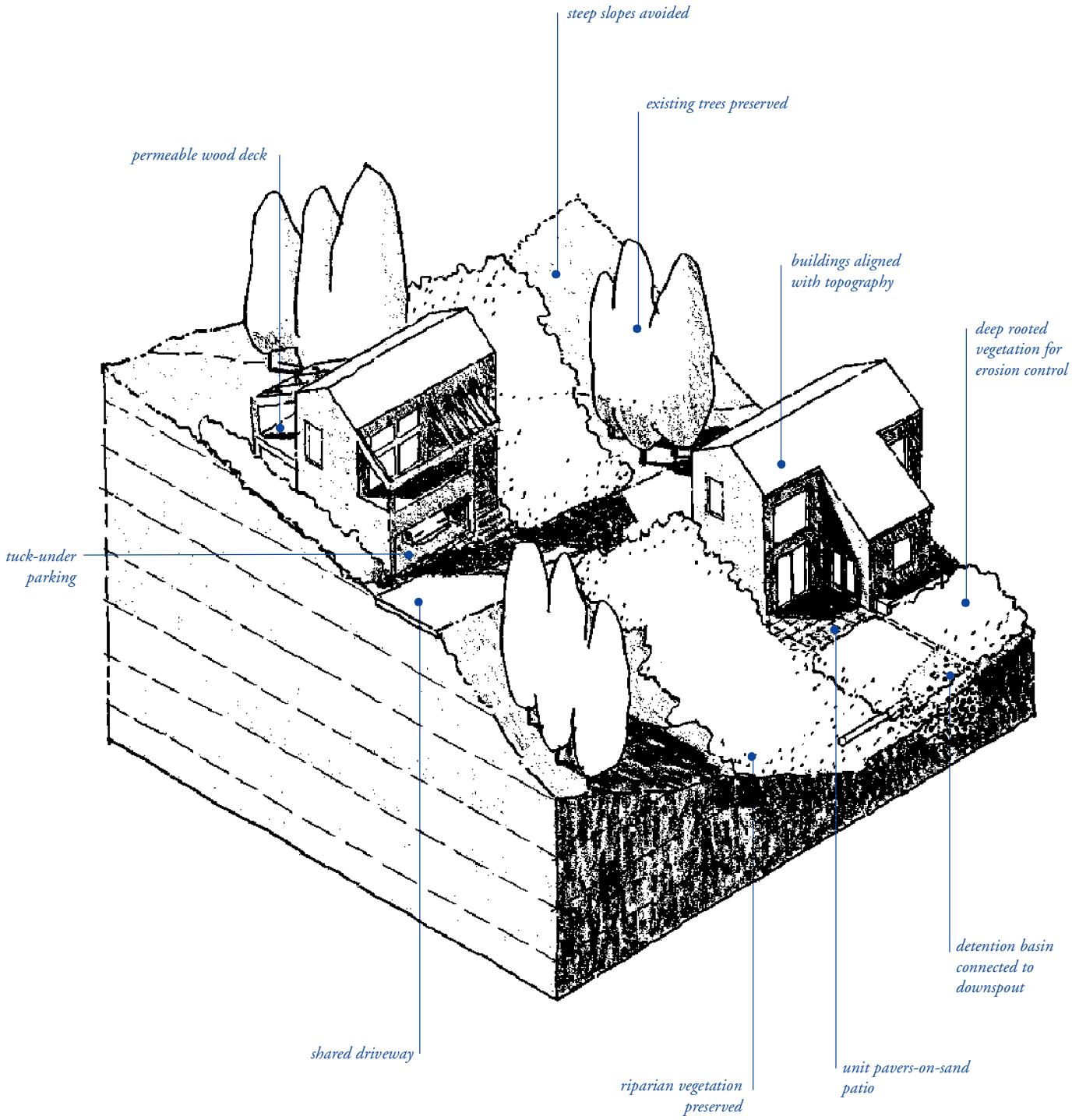

7.1d Small hillside site. Hillside sites present particular challenges for stormwater management. Because slopes are often pronounced, some infiltration strategies that are best suited to more level sites, such as dry wells or infiltration basins, are impractical and can cause landslides or severe damage. Erosion must be prevented through siting with contours to minimize grading and careful stabilization of disturbed slopes. Finally, drainage systems and detention devices must be located so that water does not compromise the integrity of building foundations and other structures.

The techniques illustrated in this example are:

- avoidance of steep slopes
- buildings aligned with topography to minimize grading
- preservation of existing trees
- preservation of riparian vegetation
- deep rooted vegetation for erosion control
- shared driveway
- tuck-under parking
- permeable wood deck for outdoor use area
- unit pavers-on-sand patio
- detention basin connected to roof downspout (downslope from building)

Case Study

7.1e

Large hillside site

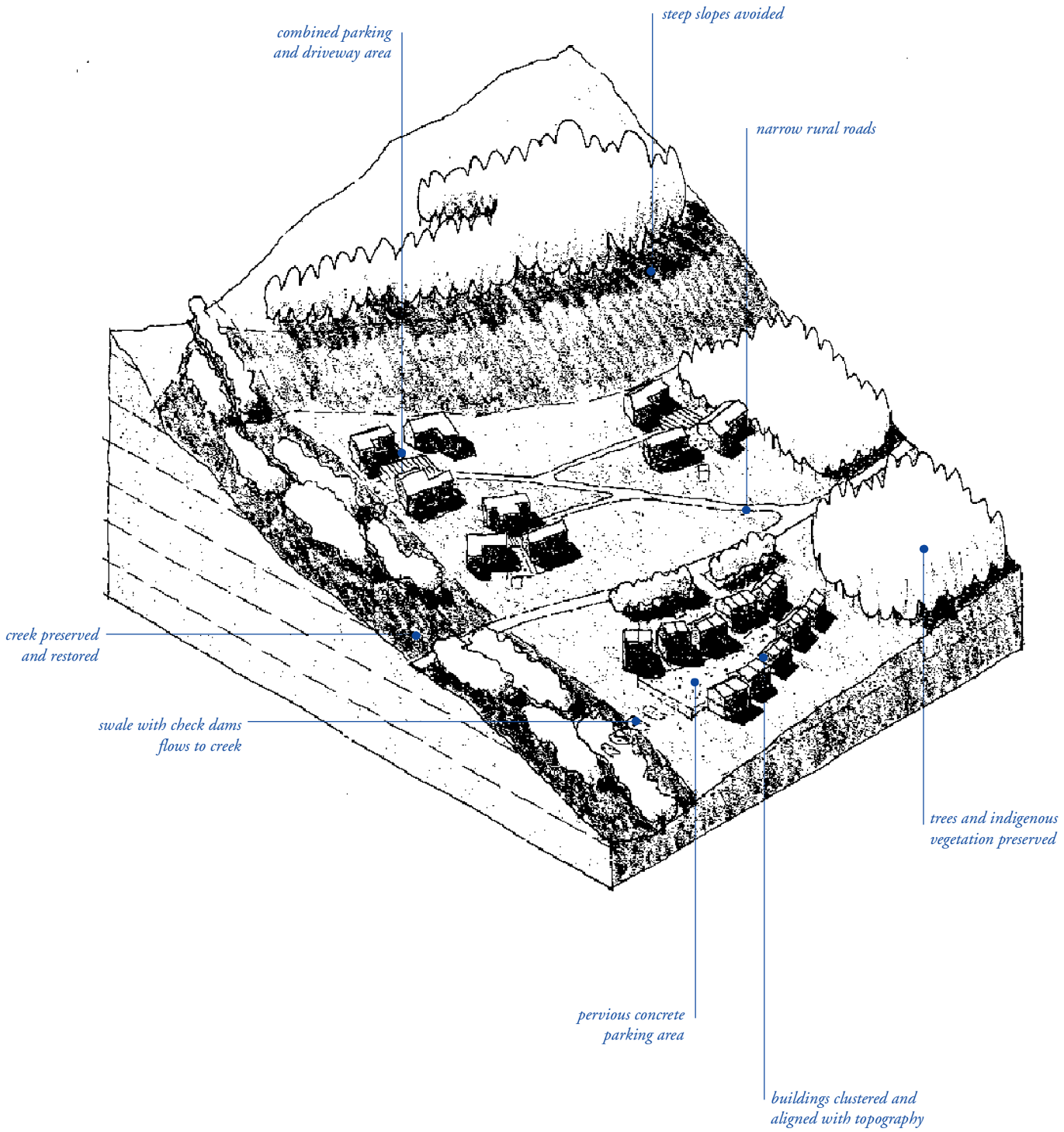

7.1e Large hillside site. Larger hillside sites present similar challenges as smaller sites, but sometimes offer more opportunities for stormwater management. Because slopes are often pronounced, some infiltration strategies that are best suited to more level sites are impractical and may cause landslides. Erosion must be prevented through siting with contours to minimize grading and careful stabilization of disturbed slopes. Finally, drainage systems, infiltration basins and detention devices must be located so that water does not compromise the integrity of building foundations and other structures.

This example shows a large scale application of the site planning and design principles discussed earlier. Each cluster of buildings could also contain the finer grain elements like those illustrated for the small hillside site (7.1d).

The techniques illustrated in this example are:

- avoidance of steep slopes
- buildings clustered and aligned with topography
- preservation of existing trees and indigenous vegetation
- creek preserved and restored
- narrow rural roads
- combination parking and driveway area
- pervious concrete parking area
- swale with check dams flows to creek

Case Study

7.1f *Large flat site*

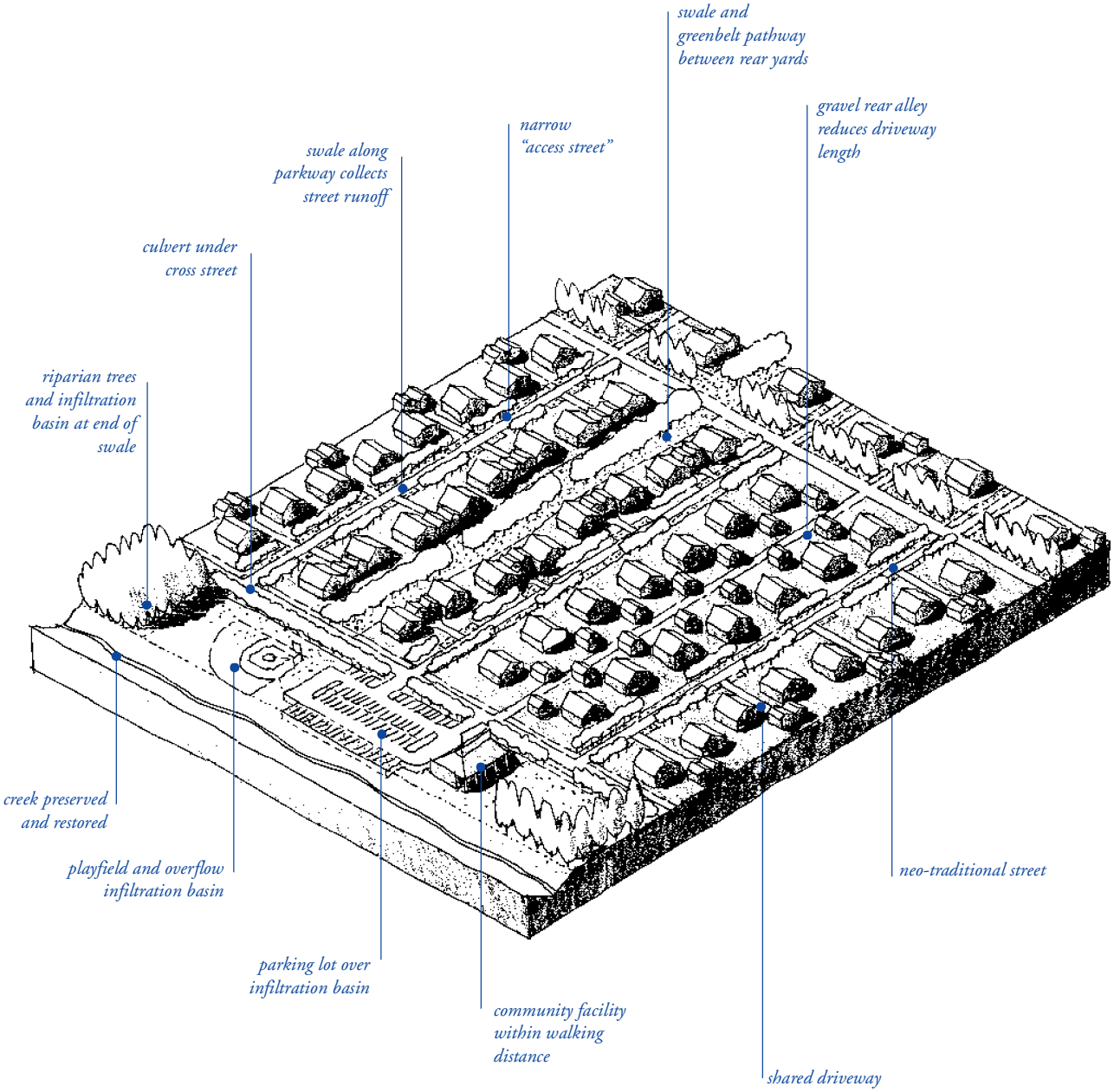

7.1f Large flat site. Larger flat sites present some of the greatest opportunities for stormwater management. If soils have adequate percolation rates, infiltration swales and basins are easily incorporated. In more poorly drained soils, flat sites allow for detention and retention systems to slow the speed of runoff and hold it for later release. This allows sediments to settle and minimzes stream bank erosion from high velocity flows.

This example applies the site planning and design principles discussed earlier at the neighborhood scale. For the purposes of illustration, two different street access systems are shown: driveways from the street or rear alley access. Each has different planning implications, but both can be integrated with appropriate stormwater management.

Each cluster of buildings could also contain the finer grain elements like those illustrated for the small single lot, large single lot and infill site.

The techniques illustrated in this example are:

- neo-traditional street design
- gravel rear alley reduces driveway length
- shared driveways to minimze pavement
- community facility within walking distance
- parking lot over infiltration basin
- depressed playfield with multiple use as infiltration basin
- swale along parkway collects street runoff
- culvert to carry parkway swale under cross street
- riparian trees and infiltration basin at end of swale
- swale and greenbelt pathway between rear yards

Case Study

7.2a *Shopping center*

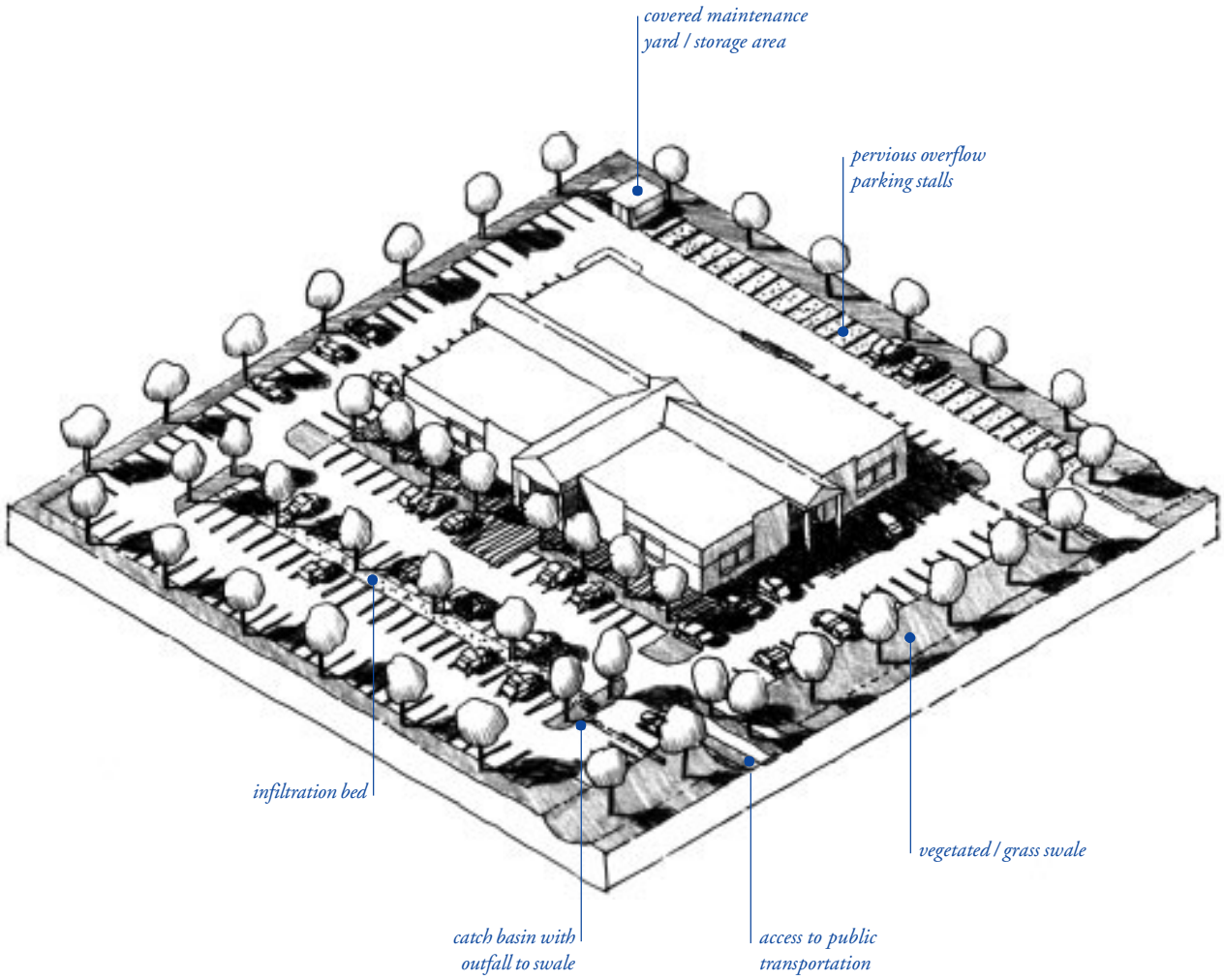

7.2a Shopping center. Shopping centers present many opportunities for stormwater management, especially in the parking areas. Infiltration swales and extended detention (dry) basins can be incorporated into space between parking aisles. Recognizing that much of the parking is only necessary during peak times, such as the holiday season, a proportion of outlying stalls may be paved with a more permeable pavement such as crushed aggregate or turfblock .

The utility functions inherent in any shopping center also need attention, such as restaurant wash-down areas, trash collection areas, and service yards. These outdoor work areas require specific techniques to prevent polluted runoff from entering the storm drain system or local water bodies. Similarly, potential hazardous materials use within the shopping center, i.e. dry cleaning establishments, requires special attention and treatment.

If well designed, correctly installed, and properly maintained, stormwater management techniques can enhance the aesthetic character of a shopping center and improve its marketability.

The techniques illustrated in this example are:

– vegetated/grass swale along perimeter
– infiltration bed to divide parking aisles
– pervious overflow parking stalls
– public transportation service
– covered maintenance yard/service areas

Case Study

7.2b *Industrial park*

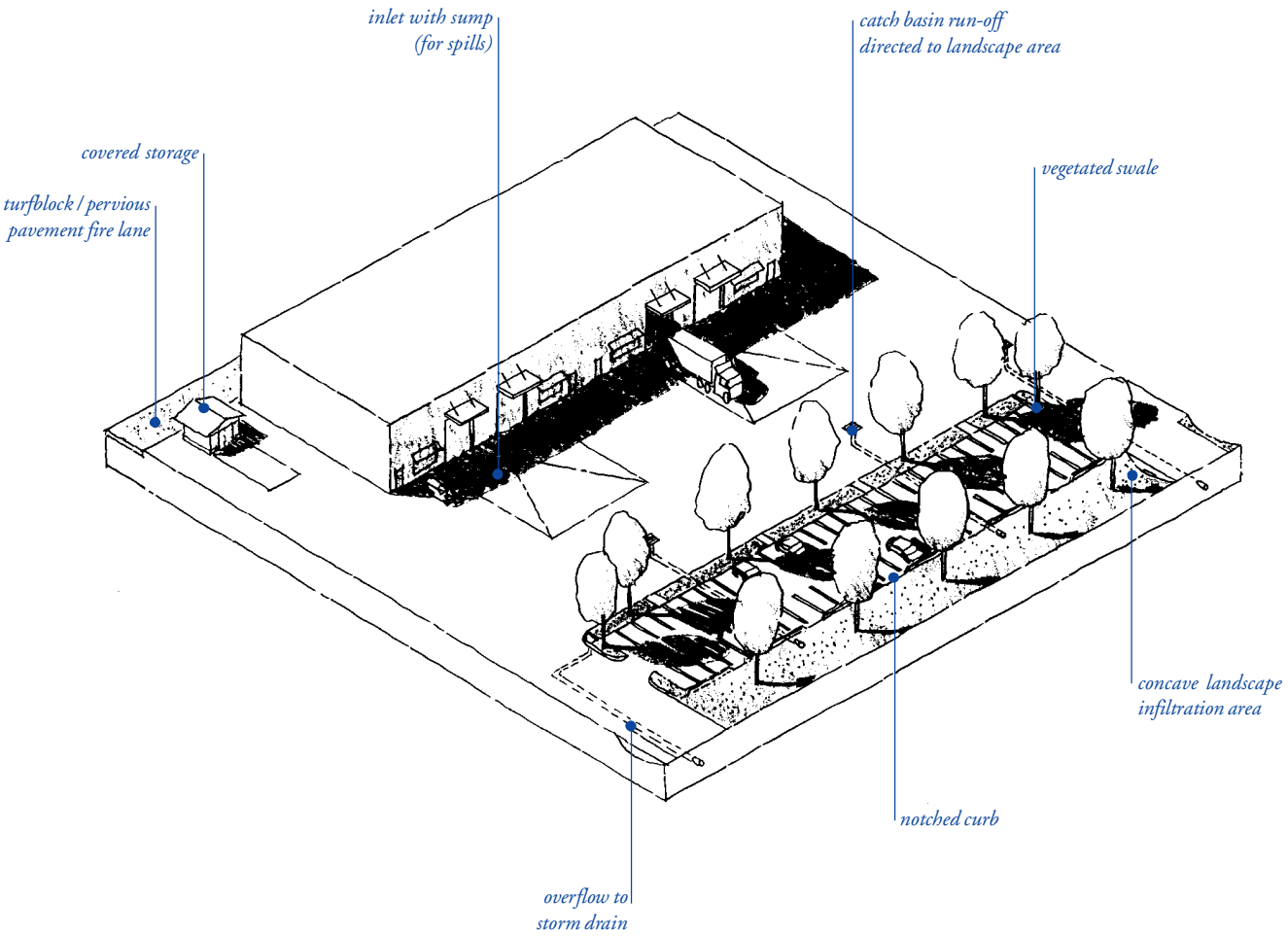

7.2b Industrial park. Industrial parks present special challenges when designing for stormwater management. They usually require large paved areas for truck access and employee parking, and space is usually limited. They also often have chemical storage and other special activity areas that require that infiltration techniques are avoided.

Still, there are opportunities to incorporate design details to protect stormwater quality. These include minimizing impervious surface area through the use of permeable pavements, infiltration areas to collect runoff, and proper treatment of special activity areas.

The techniques illustrated in this example are:

- vegetated/grass swale along perimeter
- catch basin runoff directed to infiltration area
- permeable pavement fire lane
- notched curb to direct runoff from parking area into swale
- proper loading dock design
- covered maintenance yard/service areas

Case Study

7.2c Strip Mall

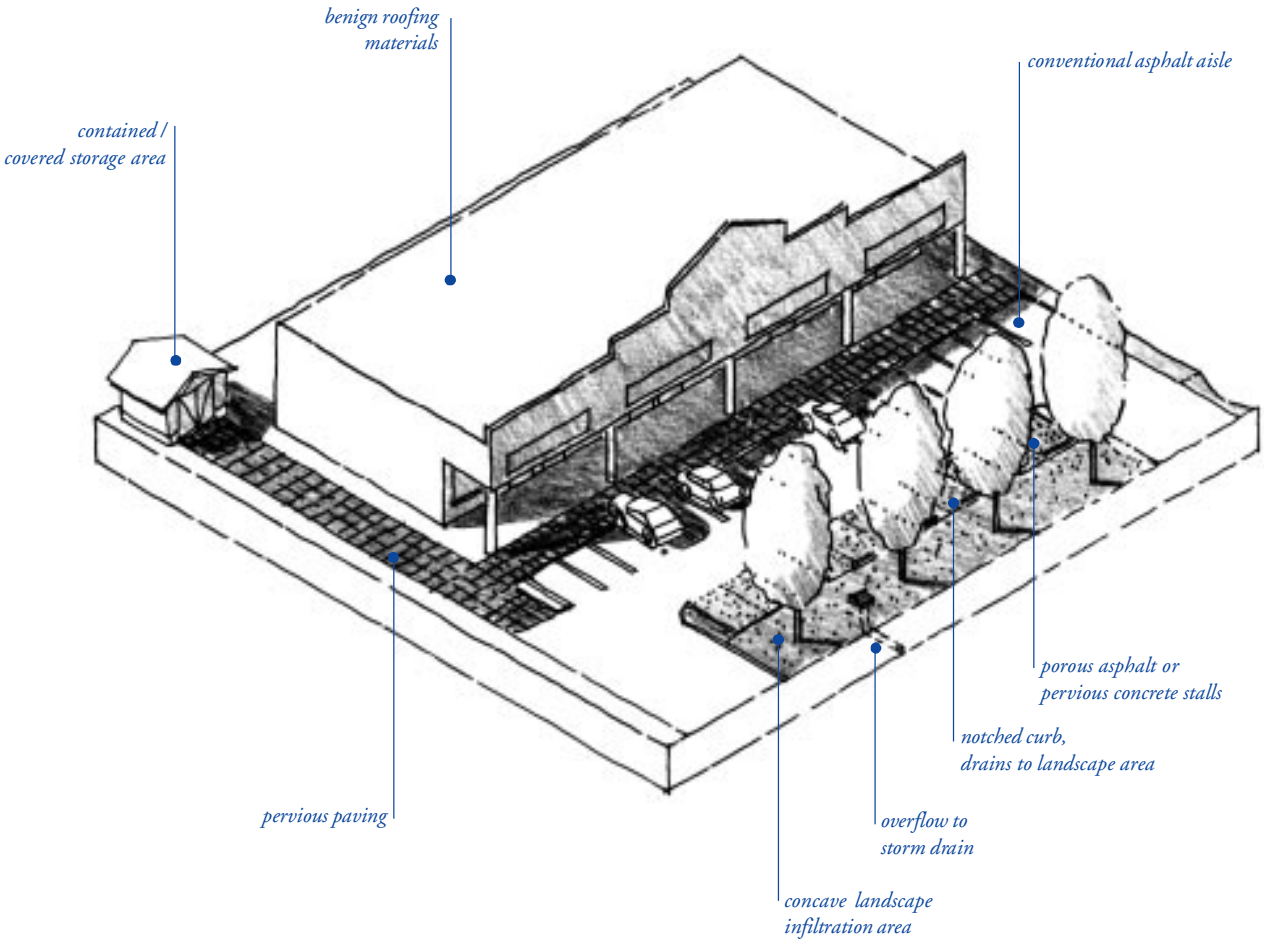

7.2c Strip Mall. Though strip malls are usually very densely developed, they present opportunites for stormwater management techniques. These can be implemented without changing the normal aesthetics or function.

Parking areas can be paved in porous asphalt or other permeable pavements. Buildings can be constructed from benign materials, and the landscape buffers, usually required by local jurisdictions, can be designed as infiltration areas with appropriate overflow into the storm drain system.

Finally, trash and other storage areas can be properly designed and constructed to prevent pollutants from running off these areas into the storm drain system.

The techniques illustrated in this example are:

– benign roofings materials
– catch basin runoff directed to infiltration area
– permeable pavement parking stalls
– concave landscape areas to infiltrate runoff
– notched curb to direct runoff from parking area into swale
– covered maintenance yard/service areas

Case Study

7.2d Schools and parks

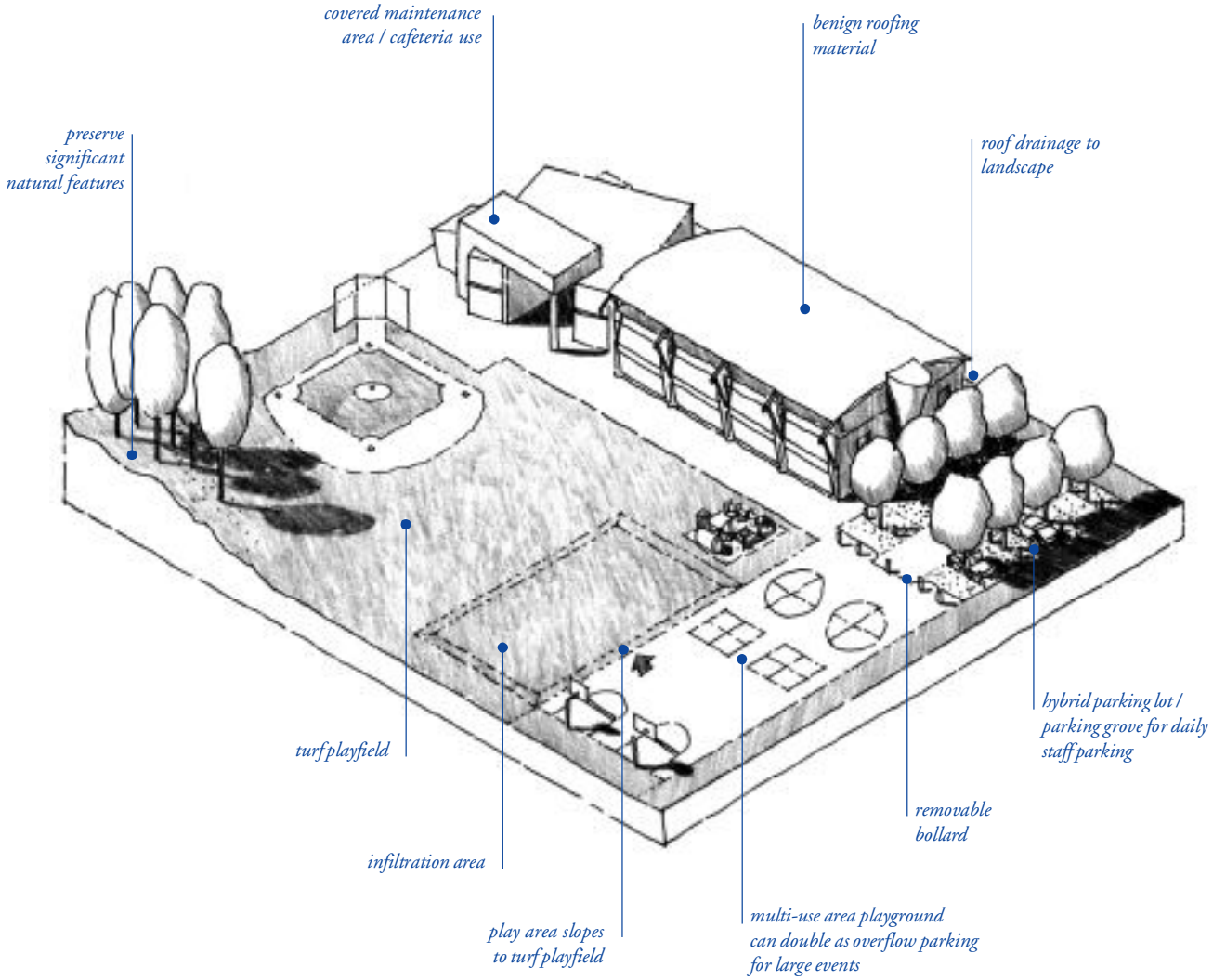

7.2d Schools and parks. Schools and parks present a wide range of opportunities for stormwater management techniques. Large landscape areas for passive and active recreation can be designed as extended detention (dry) ponds to infiltrate and detain runoff, while drying up shortly after rains.

At schools, staff parking can be located in parking groves, since the teaching staff generally parks for long periods. Paved areas, such as basketball courts, can be designed as parking or other multi-use space for special events, thus reducing the need for additional impervious land coverage. Buildings can be designed from benign building materials with appropriately designed outdoor work areas for service, cafeteria, and utility needs.

In large subdivisions, land is often reserved for future schools and parks. Land can be reserved in the lower portion of the site for these uses and designed to receive stormwater from the entire subdivision watershed. This approach illustrates how stormwater management can influence overall site planning and design.

The techniques illustrated in this example are:

- benign roofings materials
- catch basin runoff directed to infiltration area
- parking grove for staff use
- multi-use paved areas
- concave landscape areas to infiltrate runoff
- preservation of significant natural areas
- covered maintenance yard/service areas

Case Study

7.2e *Office building*

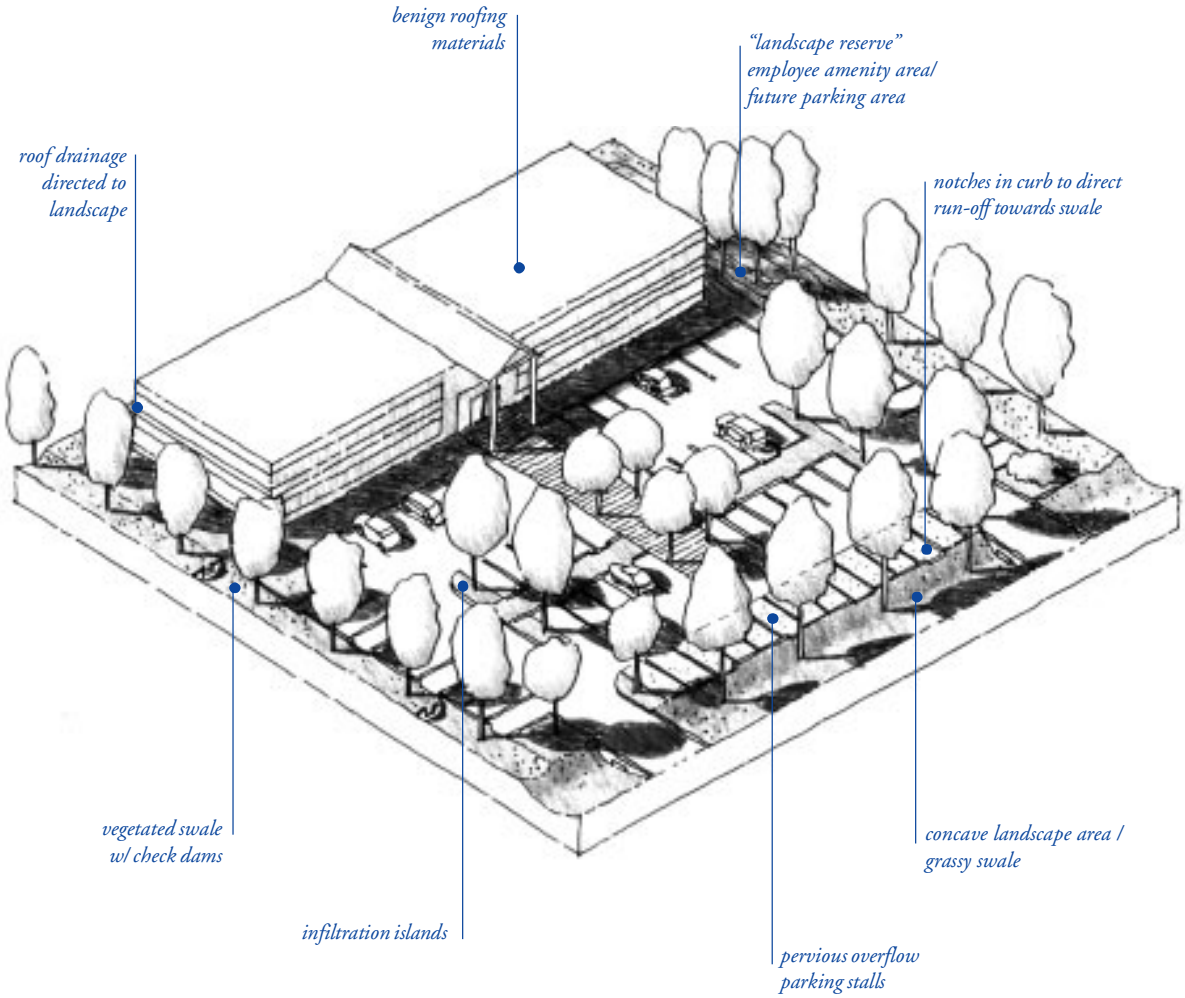

7.2e Office buildings. Office buildings can integrate stormwater management techniques in many ways.

Buildings can be designed from benign materials with appropriately designed outdoor work areas for service, cafeteria, and utility needs.

Landscape areas for employee use and perimeter screening can be designed as extended detention (dry) basins or biofilters (grassy swales) to infiltrate and detain runoff, while drying up shortly after rains. These areas can also be designed as fountains or entry statements to add aesthetic enhancement .

Parking can be treated in a variety of ways, with overflow parking accommodated on permeable pavement. Impervious parking stalls can be designed to drain onto landscape infiltration areas. Alternative transportation can be promoted by providing bicycle lockers, showers and clothes lockers for bicycle commuters, and company sponsored van- and carpool programs.

Finally, many jurisdictions allow a portion of the required parking to be held in "landscape reserve," until a need for the full parking supply is established. This means that the original construction only builds parking to meet anticipated staff needs. If the parking demand increases, the area held in landscape reserve can be modified to accommodate parking. In this way, parking is held to a minimum based on actual use, rather than by a zoning formula that may not apply to the office building's actual parking need.

The techniques illustrated in this example are:

– benign building materials
– catch basin runoff directed to infiltration area
– vegetated swale with check dams
– landscaped "parking reserve"
– concave landscape areas to infiltrate runoff
– pervious overflow parking stalls
– roof drainage directed to landscape

Case Study

7.2f

Restaurant

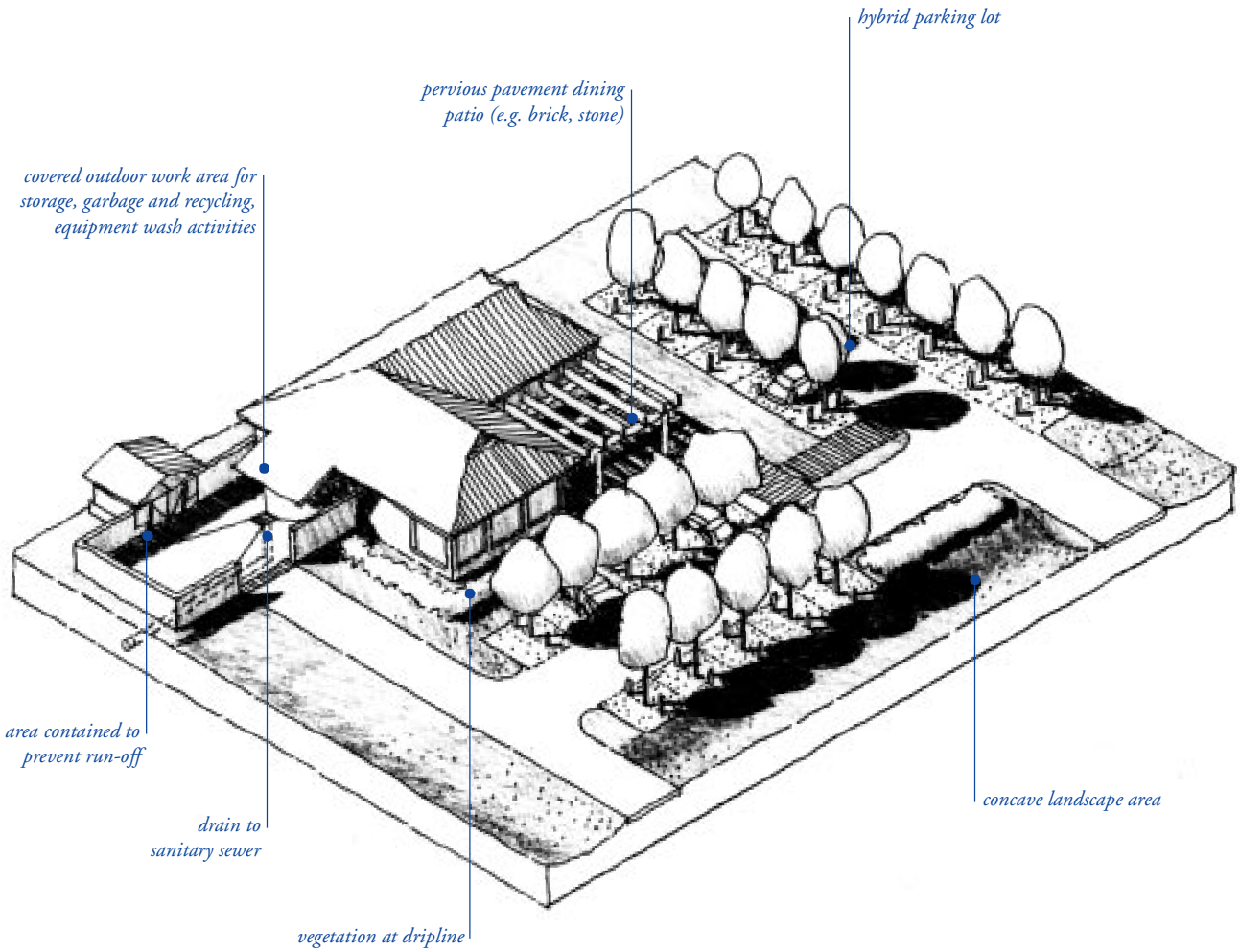

7.2f Restaurant. Restaurants offer a strong contrast between infiltration opportunities and special activity areas. Careful selection of materials such as brick or stone paving for outdoor patios can enhance the restaurant's aesthetic while allowing for infiltration. Landscape plantings can also be selected for stormwater infiltration.

Parking can be provided in a variety of ways, with hybrid parking lots for staff, who stay for long shifts, or with landscaped infiltration islands in lots with conventional paving for patrons, who stay for shorter periods.

In contrast to these infiltration opportunities, restaurants have special activity areas that need to be isolated from the storm drain system. Grease, stored items, trash, and other food waste must be kept in properly designed and maintained special activity areas. Local ordinances may have design guidelines for allowable square footage of covered and uncovered areas.

The techniques illustrated in this example are:

– permeable pavement patio
– benign building materials
– catch basin runoff directed to infiltration area
– hybrid parking lot
– vegetation at dripline
– concave landscape areas to infiltrate runoff
– covered outdoor work area (trash, food waste, storage, equipment wash)

Case Study

7.2g *Gas station*

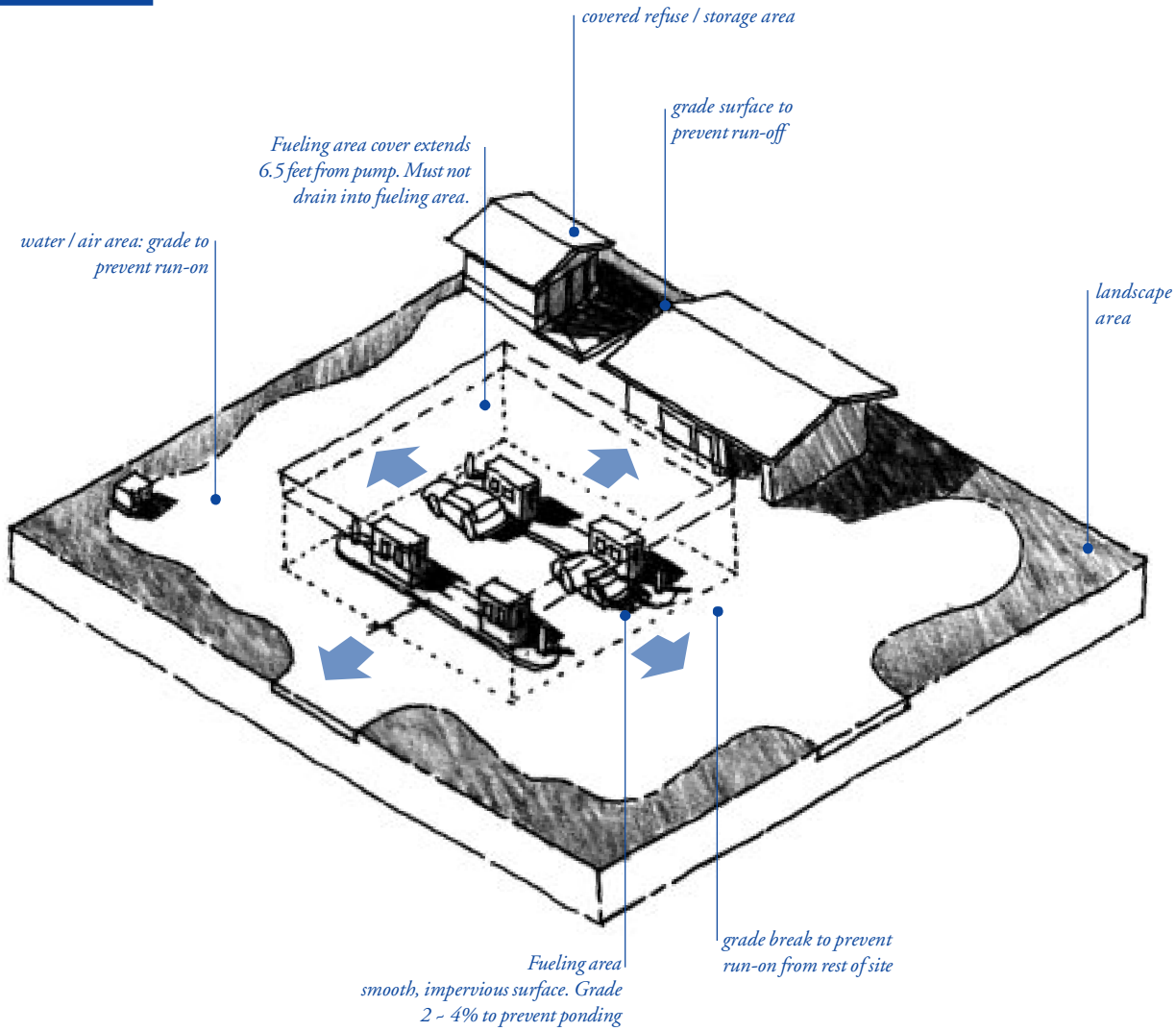

7.2g Gas station. Gas stations and vehicle fueling areas have specific design guidelines. These are described in a Best Management Practice Guide for retail gasoline outlets developed by the California Stormwater Quality Task Force, in cooperation with major gasoline corporations. Designing for prevention is the first step. Plans must be developed for cleaning near fuel dispensers, emergency spill cleanup, and routine inspections to prevent leaks and ensure properly functioning equipment. [1]

The practice guide addresses standards for existing, new, or substantially remodeled facilities, and is available from www.blymyer.com/swqtf.

Some of these features are illustrated in the case study above:

– fueling area cover
– flat impervious surface fueling area (2%-4% slope to prevent ponding,
– grade break (e.g., curb, berm) that prevents run-on of stormwater
– separate water / air area graded to prevent run-on
– covered refuse / storage area

Case Study

7.2h Hotel/motel

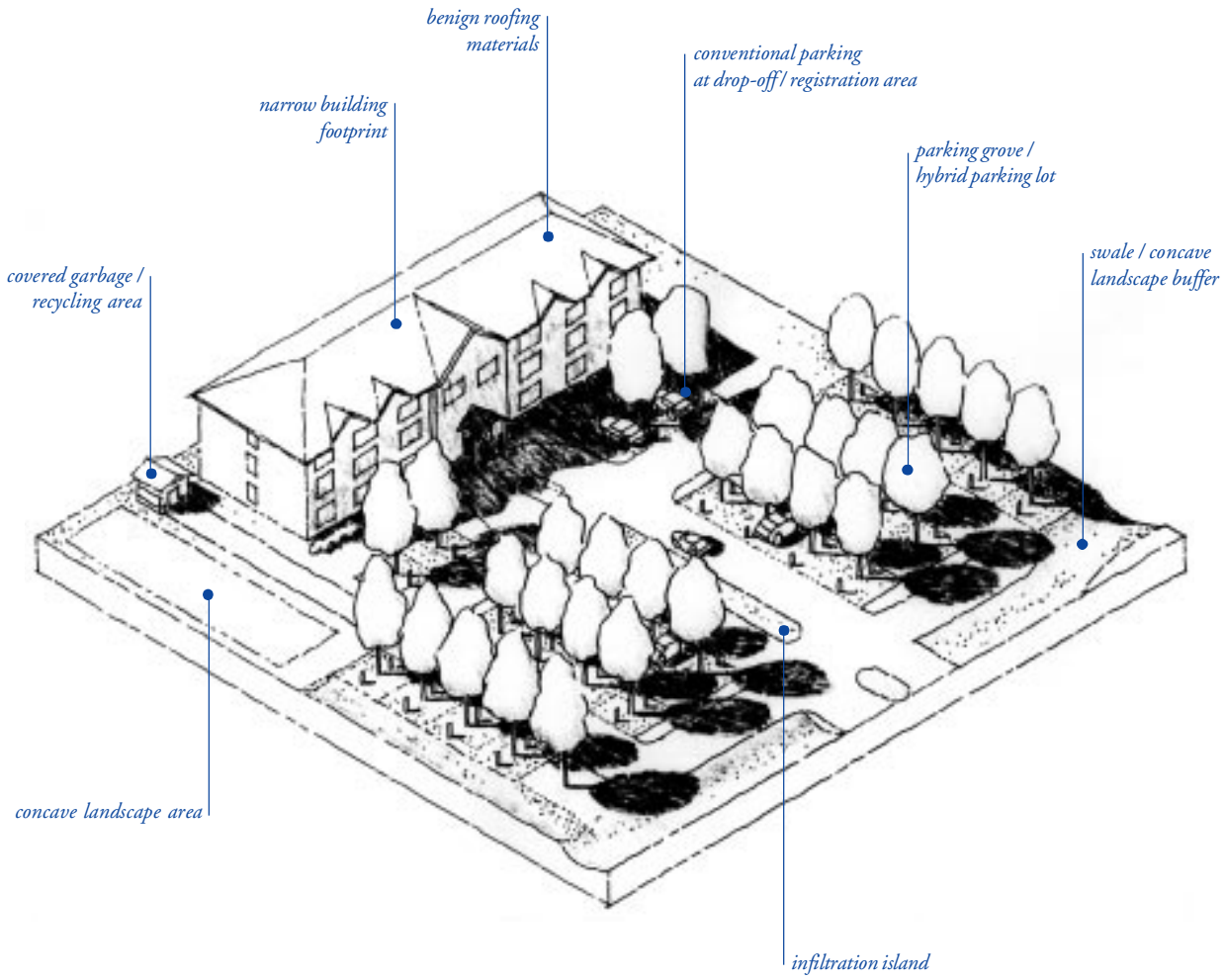

7.2h Hotel/motel. Hotels and motels present many opportunities for stormwater management designs. Because guests park for long periods of time, such as overnight, parking areas can be designed as parking groves or hybrid lots. This increases the aesthetic appeal of the hotel, reduces heat island effect, and minimizes the impact of parking when the hotel is not highly occupied. However, it is important to retain some conventional parking for more heavily used drop-off and loading areas.

Landscape areas for guest use can be designed as infiltration/ detention areas to hold water briefly after rains. Perimeter areas also can provide opportunities for stormwater management.

The building can be designed from benign materials with a narrow multistory footprint, rather than a sprawling single floor. Rainwater can be directed in gutters and downspouts into landscape areas.

The techniques illustrated in this example are:

- permeable pavement patio
- benign building materials, narrow building footprint
- catch basin runoff directed to infiltration area
- parking grove
- vegetation at dripline
- concave landscape areas to infiltrate runoff
- covered special activity area (trash, food waste, storage)

8 Technical Section

The site design and landscape details illustrated here have two purposes:

- *to minimize the creation of new runoff, and,*
- *to infiltrate or detain runoff in the landscape.*

The techniques presented here illustrate an approach to design and construction for maximizing infiltration, providing retention, slowing runoff, and minimizing impervious land coverage. They are not all-inclusive, and may not be appropriate for every site or condition. Each detail is given in a generic or typical form– particular site and soil conditions must be assessed by a qualified professional to determine which details are appropriate and what modifications are required for their proper application.

Technical Section

8.1 Permeable pavements
8.2 Streets
8.3 Parking lots
8.4 Driveways
8.5 Buildings
8.6 Landscape

8.1 Permeable Pavements

Permeable pavements are a method of reducing impervious land coverage while simultaneously providing a stable load-bearing surface. While forming a surface suitable for walking and driving, permeable pavements also contain sufficient void space to infiltrate runoff into soil. By making pavements permeable, impervious surface coverage can be reduced without sacrificing intensity of use.

There are three main categories of permeable pavements: poured-in-place, unit pavers-on-sand, and granular materials. A typical component of these permeable pavements is a reservoir base course. This base course provides a stable load-bearing surface as well as an underground reservoir for water storage. The base course must meet two requirements:

- *it must be open graded, meaning that the particles are of a limited size range, with no fines, so that small particles do not choke the voids between large particles. Open-graded crushed stone of all sizes has a 38 to 40% void space, allowing for substantial subsurface water storage.*
- *it must be crushed stone, not rounded river gravel. Rounded river gravel will tend to rotate under pressure, causing the surface structure to deform. The angular sides of the crushed stone will form an interlocking matrix, keeping the surface stable.*

Permeable pavements must be laid on a relatively flat slope, generally 5% or flatter. If permeable pavements are laid on steep slopes, the underlying base course tends to migrate downhill, causing the surface to deform.

Permeable Pavements

Pervious concrete

Porous asphalt

Turf block

Brick

Natural stone

Unit pavers on sand

Crushed aggregate (gravel)

Cobbles

Permeable Pavements

Pervious concrete

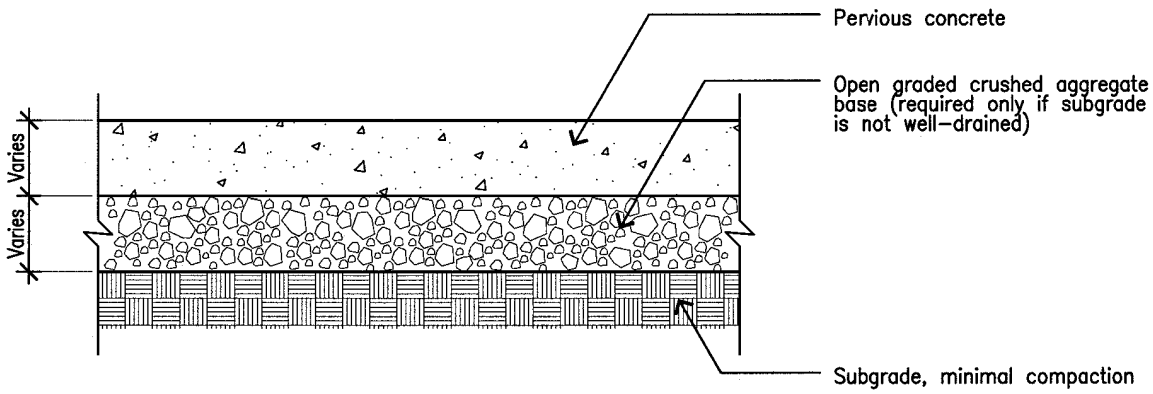

Conditions, dimensions, and materials shown are typical. Modifications may be required for proper application, consult qualified professional.

Pervious Concrete is a discontinuous mixture of coarse aggregate, hydraulic cement, and other cementitious materials, admixtures, and water, which has a surface-void content of 15-25%, allowing water and air to pass through the pavement.

Characteristics

- Rigid, poured-in-place slab.
- Appearance similar to exposed aggregate.
- Curb and gutter system may not be necessary to control low flow.
- Runoff coefficient: very low to nil (can infiltrate up to 140 cm/h [56”/h]).
- Reduces impervious land coverage.

Applications

- Flat sites (slope ≤ 5%) with uniform, permeable subgrade (or appropriate depth to construct deep base).
- Low traffic volume bikeways, streets, travel lanes, parking stalls, residential driveways, patios.
- Not appropriate for gas stations, truck stops, areas in which high concentrations of hydrocarbons can be leached into the soil.

Design

- Subgrade and base rock design must be determined by a qualified professional according to soil conditions and intended use or anticipated loads.
- Subgrade must be uniform, well-drained (infiltration rate ≥ 5”/hr). Top 6” of subgrade should be granular/gravely soil, predominantly sandy, with low to moderate amount of clay or silt.
- Base of open graded, crushed (not rounded) stone, no fines. Must be designed to support surface uses, allow water to flow through, and prevent migration of subbase soils.
- Special attention and tools required for installation.

Maintenance

- Inspect for clogging after installation and annually; remove spot clogs.
- Some installers recommend quarterly vacuum sweeping or high pressure hosing.
- Maintenance can be high first few years, until site is fully stabilized.

Economics

- Installation costs up to 50% greater than conventional concrete.
- Costs can be offset by savings in not installing curb and gutter drainage system.
- Maintenance cost up to 1-2% of construction cost annually.

Examples/resources

- Drain cover at Stanford Shopping Center, Palo Alto, CA.
- Tree grates in city sidewalks, Los Angeles, CA.
- Florida Concrete and Products Association (407) 423-8279.

Permeable pavements

Porous asphalt

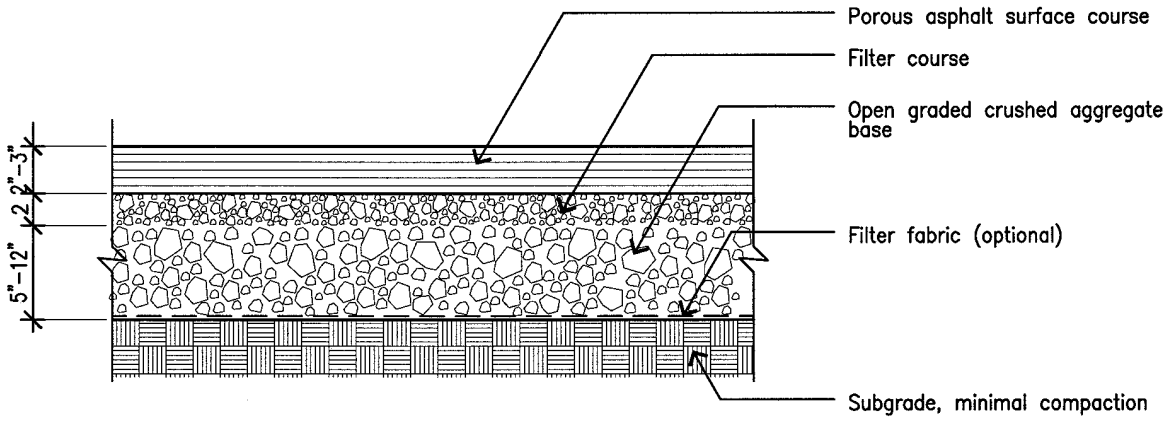

Conditions, dimensions, and materials shown are typical. Modifications may be required for proper application, consult qualified professional.

Porous Asphalt is an open graded asphalt concrete over an open graded aggregate base and a draining soil. It is composed almost entirely of stone aggregate and an asphalt binder. Porous asphalt is widely used as a top lift on state highways to minimize water ponding and hydroplaning. In this case it does not create a permeable pavement, because the porous ("open graded") asphalt is lain over a conventional asphalt lift.

Characteristics

- Flexible, poured-in-place slab.
- Appearance similar to conventional asphalt, though rougher surface.
- Rough, coarse surface improves traction in wet conditions, but may result in a rough ride.
- Curb and gutter system may not be necessary to control low flow.
- Runoff coefficient: very low to nil (can infiltrate 50-150 cm/h [20-60"/h])
- Reduces impervious land coverage.

Applications

- For use in areas with low traffic use, such as parking lots, travel lanes, parking stalls (surface may be too rough for bicycle path).
- Flat sites (slope ≤ 5%) with uniform, permeable subgrade (or appropriate depth to construct deep base).
- Not appropriate for gas stations, truck stops, areas in which hydrocarbons can be leached into the soil.
- May not be appropriate in areas where children are at play (pavement may cause abrasion injuries).

Design

Asphalt mix void content of 12 - 20%.

Surface composition 4.5 - 6.5% asphalt aggregate, 2.5 - 3.0% asphaltic cement.

Base composition 5" to 12" depth open graded crushed (not rounded) 1/2 - 1" stone, having infiltration rate ≥ 5" per hour.

- Filter fabric may be required below base course.

Subgrade and base rock design must be determined by a qualified professional according to soil conditions and intended use or anticipated loads.

- Special tools required for installation.

Maintenance

- Most failures occur when substantial quantities of sediment erode onto pavement surface. This can happen if pavement is located downhill from an erosive and sediment is allowed to wash over the surface, or during construction due to a lack of erosion/sediment control measures. Void spaces then become clogged, either requiring wet-vacuuming or reducing the permeability of the surface.
- Some installers recommend quarterly vacuum sweeping and high pressure hosing, though installations are known that have had no special maintenance and remain permeable for 20 years.
- Inspect for clogging after installation and annually; remove spot clogs.
- Take measures to ensure that future property managers do not use top-coat or slurry seal, as this will clog the asphalt pores.

Economics

- Up to 50% more than conventional asphalt pavement.
- Costs can be offset by savings in reducing or eliminating curb and gutter drainage system.
- Maintenance cost up to 1-2% of construction cost annually.

Examples/resources

- Asphalt Institute (805) 373-5130.
- Metropolitan Transportation Commission, pavement management div. (510) 464-7700.
- CalTrans Specifications, Section 39, Asphalt Concrete "Open Graded" type.

Permeable pavements

Turf block

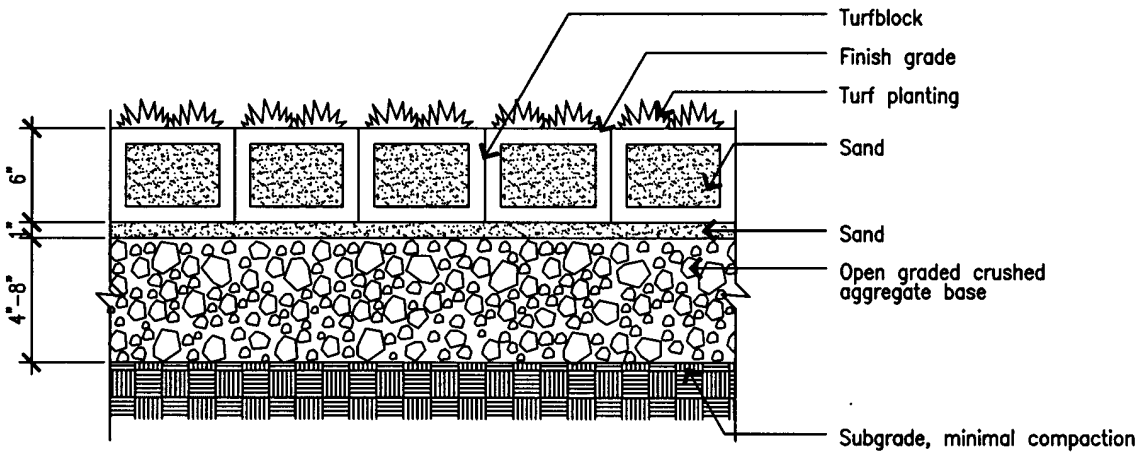

Conditions, dimensions, and materials shown are typical. Modifications may be required for proper application, consult qualified professional.

Turf block is an open-celled unit paver in which the cells are filled with soil and planted with turf. Sometimes the cells are filled with crushed rock only.

Characteristics

- Units vary in size, weight, surface characteristics, strength, durability, proportion of open area, interlocking capability, runoff characteristics, and cost.
- Original turf block was made solely of concrete, newer plastic styles are available. Concrete block is bulkier, with smaller openings for soil and infiltration. The concrete draws the moisture out of the soil, tending to dry out the grass in hot, dry weather. Plastic open-celled pavers eliminate this problem and have a greater void/soil space.
- Requires deep rooted grass species that can penetrate reservoir base course. Frequent watering may be required because the bulk of root and soil mass are located in the top 3"-4".
- Curbs and gutters generally not necessary to control low flow.
- Runoff coefficient: similar to grass, 0.15-0.60.
- Permeability is directly related to the permeability of the subgrade.
- Reduces impervious land coverage.

Applications

- Areas of low flow traffic and infrequent parking such as: residential driveways, overflow parking areas, the outer 1/3 of commercial and retail developments where parking space is used less often and for shorter periods of time, fire/emergency access roads, utility roads, street shoulders.
- Not suitable for all day parking, heavy use or areas with turning movements because the grass gets insufficient sun for optimal growth, or is suppressed by constant abrasion.
- Swales in urban areas. Turf block prevents mowers from getting stuck or creating grooves in the swale.

Design

- Flat sites (slope ≤ 5%)
- Base course: open-graded and composed of crushed rock (not rounded).
- Subgrademust be designed for anticipated loads.
- Provide underdrain system where there are no deep permeable soils.
- Irrigation required to maintain turf.

Maintenance

- May need occasional reseeding.
- Similar to maintenance of regular lawn, requiring mowing, fertilization, and irrigation.

Economics

- $4-6 per square foot, installed.

Examples/resources

- Emergency access/fire lane. Guadalupe River Project, San José, CA.
- Parking lot with asphalt aisles, turf block stalls, University of Miami Orange Bowl Stadium, Miami, FL.
- Shopping mall expansion overflow parking, NEMO Project, CT.

Permeable pavements

Brick

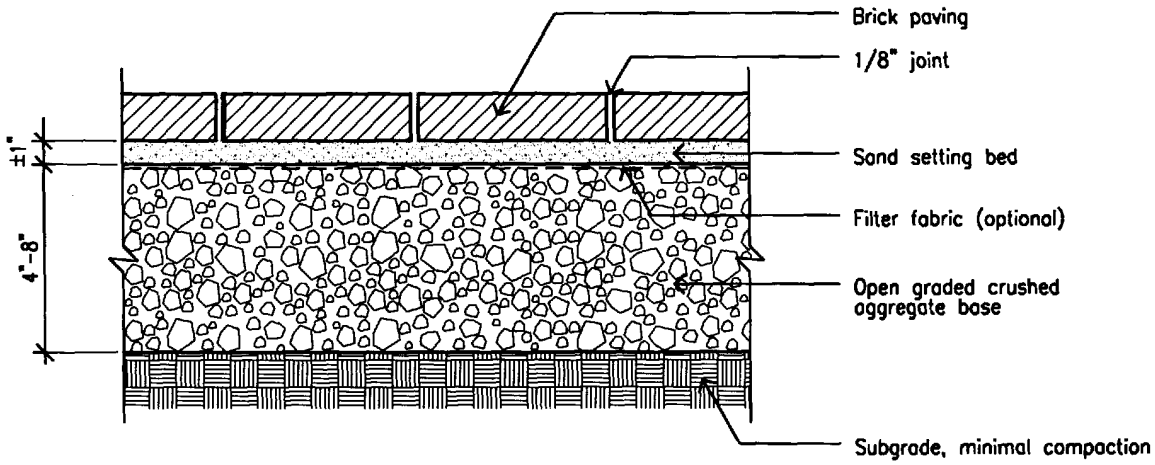

Conditions, dimensions, and materials shown are typical. Modifications may be required for proper application, consult qualified professional.

Brick is a solid unit paver available in a variety of colors and sizes, and a traditional building material with a long history. Brick are typically lain either with sand joints on a crushed rock base, or with mortared joints on a concrete base. Only sand joints on a crushed rock base form a permeable pavement.

Characteristics

- Available in a variety of materials and finishes. Typically, bricks are rectangular in shape and made of a fired clay. Concrete bricks are also commonly available.
- Runoff coefficient: 0.13 to 0.76, depending on rainfall intensity and joint spacing. Brick pavement is more permeable in light rains and with wider joints.

Applications

- Driveways, walkways, patios, public sidewalks, plazas, low volume streets.
- Flat sites (slope ≤ 5%).
- Reduces impervious land coverage.

Design

- Because the bricks are lain loose, the field must be enclosed by a rigid frame. Concrete, mortared brick on a concrete grade beam, redwood header, and metal edging are commonly used.
- To maximize permeability, use an open-graded crushed rock base course (not rounded pea gravels, no fines).
- In areas with pedestrian traffic, make joints not larger than 1/4".
- Subgrade must be designed for anticipated loads.

Maintenance

- Longevity ensured by locating in low-erosion conditions, quality construction, and installation of good base layer.
- Easy to repair, since units are easily lifted and reset.
- Periodically add joint material (sand) to replace material that has been moved/worn by traffic or weather.
- Occasional weed suppression may be required.

Economics

- $6–10 per square foot. Generally more expensive than concrete or asphalt, less expensive than brick on concrete.

Examples/resources

- Widely used as patios, plazas, sidewalks, driveways.

Permeable pavements

Natural stone

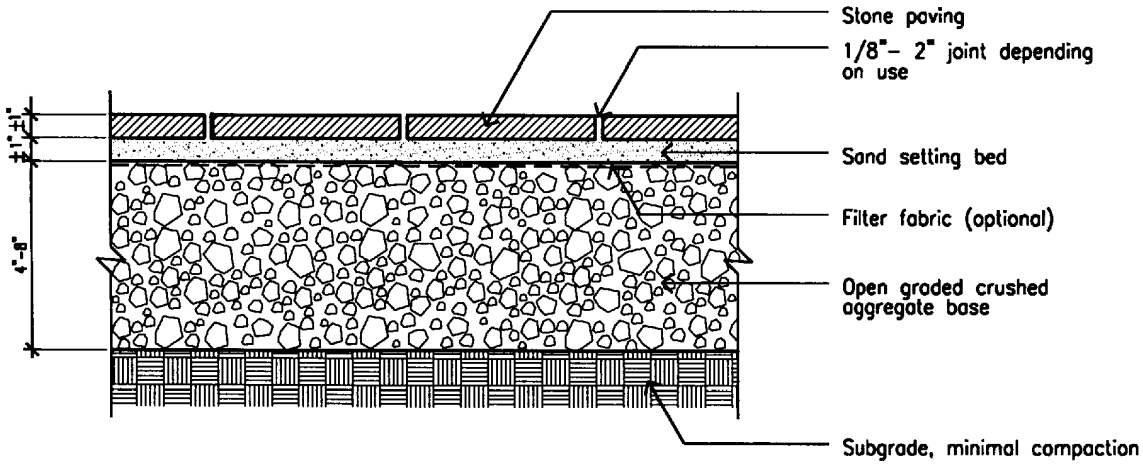

Conditions, dimensions, and materials shown are typical. Modifications may be required for proper application, consult qualified professional.

Natural stone paving is made of discrete units set in a pattern on a prepared base. A traditional building material with a long history, natural stone is typically lain either with sand joints on a crushed rock base, or with mortared joints on a concrete base. Only sand joints on a crushed rock base form a permeable pavement.

Characteristics

- Available in a variety of natural materials of varying colors, textures, shapes, and finishes. These include flagstone, slate, granite, and bluestone. For sand-set permeable pavement, the stone must be at least 1" thick– thinner pieces suitable for mortar-setting will crack if sand-set.
- Shapes range from random broken pieces of irregular patterns to cut stone of geometric patterns.
- Permeability is determined by the size of the joints. Large joints in patio or light traffic areas can be filled with plant material such as moss or turf.
- Runoff coefficient: 0.25 - 0.8 depending on joint size. Natural stone pavement is more permeable in light rains and with wider joints.
- Reduces impervious land coverage.

Applications

- Driveways, walkways, patios, low-use parking stalls.
- Flat sites (slope ≤ 5%).

Design

- Because the stone is laid loose, the field must be enclosed by a rigid frame. Concrete, mortared stone on a concrete grade beam, redwood header, and metal edging are commonly used.
- To maximize permeability, use an open-graded crushed rock base course (not rounded pea gravels, no fines).
- Subgrade must be designed for anticipated loads.

Maintenance

- Longevity ensured by locating in low-erosion conditions, quality construction, and installation of good base layer.
- Easy to repair, since units are easily lifted and reset.
- Periodically add joint material (sand) to replace material that has been moved/worn by traffic or weather.
- Occasional weed suppression may be required.

Economics

- Unit cost varies from $10–25 per square foot, depending on material selected.

Examples/resources

- Parking lot stalls, La Casitas del Arroyo community building, Pasadena, CA.
- Widely used as patios, plazas, sidewalks, driveways.

Permeable pavements

Unit pavers on sand

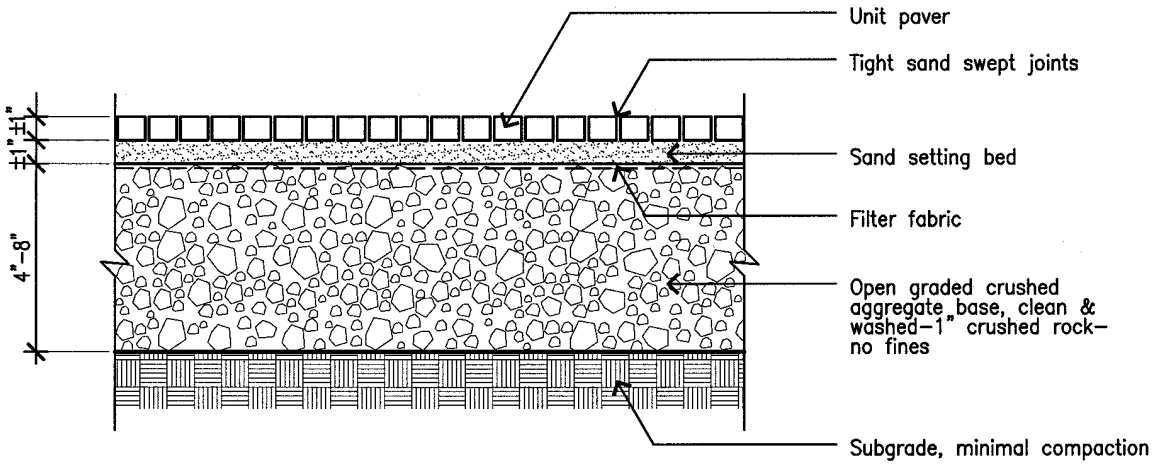

Conditions, dimensions, and materials shown are typical. Modifications may be required for proper application, consult qualified professional.

Unit pavers on sand are discrete units that are set in a pattern on a prepared base. A variation on traditional brick technology, unit pavers are typically made of pre-cast concrete in shapes that form interlocking patterns. Some of these shapes form patterns that include an open cell to increase permeability.

Characteristics

- Widely used as patios, plazas, sidewalks, driveways.
- Open celled unit pavers are designed with precast voids to allow water to pass through.
- Solid unit pavers can form a permeable surface when spaced to expose permeable joints and set on a permeable base.
- Available in a variety of materials, colors and shapes.
- Runoff coefficient: 0.1 - 0.35 (more permeable with open cells or larger joints).
- Reduces impervious land coverage.

Applications

- Parking stalls, private driveways, walkways, patios.
- Can be used for low volume streets, travel lanes, bikeways.
- Flat sites (slopes ≤ 5%).

Design

- Because the unit pavers are lain loose, the field must be enclosed by a rigid frame. Concrete bands, metal or plastic edgings are commonly used.
- To maximize permeability, use an open-graded crushed rock base course (not rounded pea gravels, no fines).
- May not be suitable on expansive soils without special subgrade preparation.

Maintenance

- Longevity ensured by locating in low-erosion conditions, quality construction, and installation of good base layer.
- Easy to repair, since units are easily lifted and reset.
- Periodically add joint material (sand) to replace material that has been moved/worn by traffic or weather.
- Occasional weed suppression may be required.

Economics

- Installation cost $9-15 per square foot
- More expensive than conventional concrete or asphalt, less expensive than unit pavers on slab.

Examples/resources

- Ecostone, SF RIMA are two manufacturers of open-celled concrete unit pavers.
- St. Andrews Church, Sonoma CA. uses uses Ecostone in drop-off area near entrance.
- 3170 Porter Drive, Palo Alto, uses Ecostone in parking lot stalls to increase permeability near heritage oak trees.

Permeable pavements

Crushed aggregate

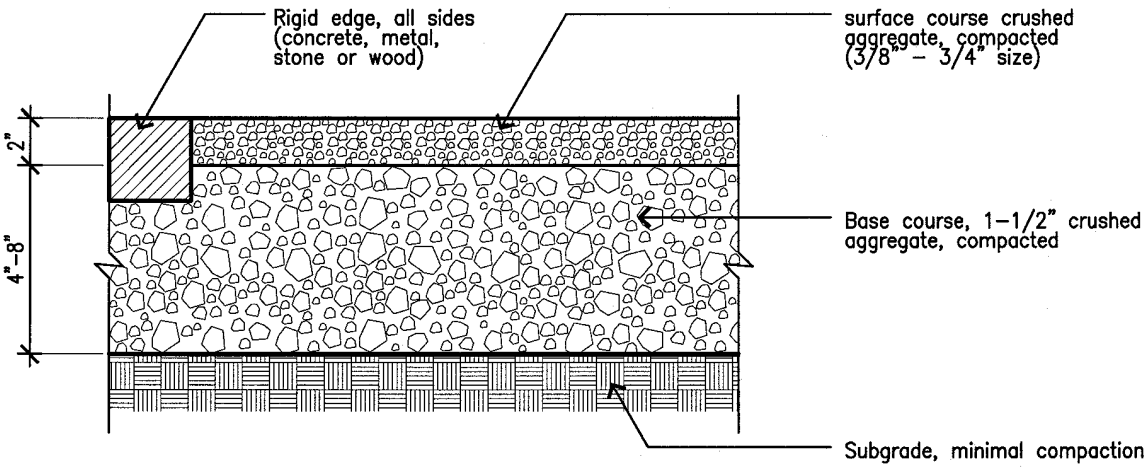

Conditions, dimensions, and materials shown are typical. Modifications may be required for proper application, consult qualified professional.

Crushed aggregate is crushed stone ranging from sand-sized "fines" to 2" diameter stone.

Characteristics

- A granular material, crushed aggregate can be laid in any shape field or configuration.
- Runoff coefficient 0.10 – 0.40. Pavements of fine crushed stone (e.g. decomposed granite fines) is relatively impermeable. Permeability increases with larger aggregate sizes. Open graded mixes are more permeable than mixes that include fines.
- Easy to install.
- Reduces impervious land coverage.

Applications

- Low volume, low speed vehicle traffic areas.
- Parking stalls, private driveways, walkways, patios.
- Areas of low erosion.
- Not appropriate for ADA-compliant accessible paths of travel.

Design

- Because the aggregate is laid loose, the field must be enclosed by a rigid frame in most applications. Concrete, mortared brick on a concrete grade beam, redwood header, and metal edging are commonly used.
- To maximize permeability, use an open-graded crushed rock base course (not rounded pea gravels, no fines).
- In areas with pedestrian traffic, use smaller aggregate (3/8" size). Larger aggregate (3/4" size) makes a better driving surface.

Maintenance

- Longevity ensured by locating in low-erosion conditions, quality construction, and installation of good base layer.
- Easy to repair, since aggregate is easily regraded and replenished.
- Occasional weed suppression may be required.
- To maximize permeability, minimize compaction of subgrade.
- Periodic and/or replenishing, raking of displaced gravel may be required.

Economics

- Less expensive than conventional asphalt or concrete pavement.
- Least expensive of all pavements, ranging from $1 to $3 per square foot.
- Reduced impervious land coverage reduces or eliminates need for catch basins/underground storm drain system.

Examples/resources

- Widely used as patios, plazas, driveways.

Permeable pavements

Cobbles

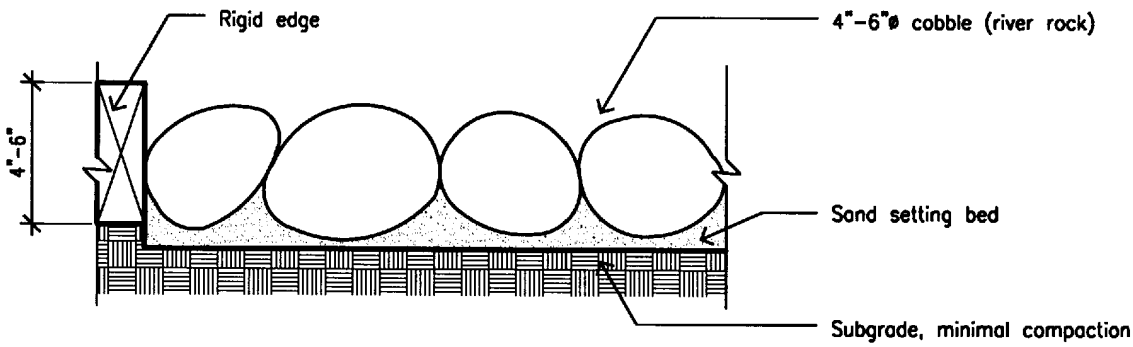

Conditions, dimensions, and materials shown are typical. Modifications may be required for proper application, consult qualified professional.

Cobbles are natural stones of various sizes. River rock is rounded, other cobbles can be angular in shape. Cobbles are typically set in native soil with soil joints or on a mortar bed with mortared joints. Only soil set cobbles are a permeable pavement.

Characteristics

- Can be laid in a fields of any shape or configuration, with or without base.
- Material varies in color, shape, and size.
- Runoff coefficient 0.60 – 0.90; higher for larger sizes.
- Easy to install.
- Reduces impervious land coverage.

Applications

- Garden areas.
- Not suitable for walkway surface.

Design

- Rigid edge such as concrete, brick, wood or metal band is useful to keep cobbles in place.
- To maximize permeability, use an open-graded crushed rock base course (not rounded pea gravels, no fines).
- Diameters range from 4” to 8”.
- A permeable filter fabric may be provided under the cobbles to suppress weeds and minimize migration of soil.

Maintenance

- Periodic weed suppression may be required.
- Resetting or replacement of cobbles may be required periodically.

Economics

- Easy to remove/reinstall
- Cost varies widely depending on material. Washed river rock is less costly than angular granite cobbles.

Examples/resources

- Commonly used around bases of trees in lawn areas.
- Commonly used in parkway planter strips and median islands.
- Commonly used as decorative mulch in landscaped areas.

8.2 Streets

More than any other single element, street design has a powerful impact on stormwater quality. Streets and other transport-related structures typically can comprise between 60 and 70% of the total impervious area, and, unlike rooftops, streets are almost always directly connected to an underground stormwater system.

From a technical point of view, streets present many complex design challenges. First, their design must respond to a variety of traffic loads, ranging from the most heavily travelled highway to the least travelled access street or lane. Second, street design is often mandated by a wide array of industry and government standards, many of which may conflict with current stormwater management practice.

The intent of the technical details that follow is two-fold:

- *to reduce the impervious surface area by "right-sizing" streets to fit the transportation demand, and*
- *to disconnect the street as far as possible from the underground stormwater system by incorporating infiltration/detention areas and swales into their design.*

Streets

Access street: urban neo-traditional standard

Access street: rural standard

Urban curb/swale system

Rural swale system

Dual drainage system

Concave median

Cul-de-sac

Streets

Access street: urban neo-traditional standard

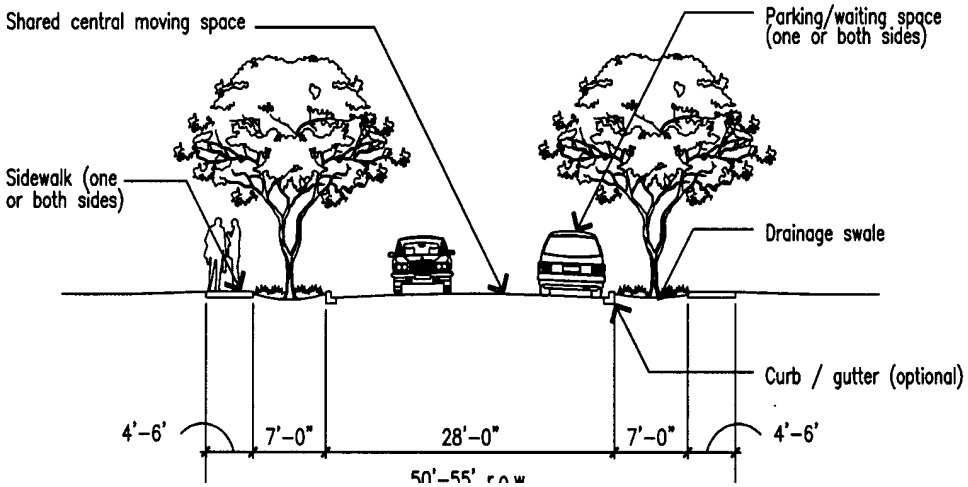

Conditions, dimensions, and materials shown are typical. Modifications may be required for proper application, consult qualified professional.

Urban neo-traditional standard access streets have a typical pavement width of 20 to 30' for vehicular movement and parking, as compared to conventional local streets, that typically require 36 to 40' of pavement.

Characteristics

- Central shared space for traffic in both directions.
- Sidewalks provided on one or both sides of the street depending on adjacent land uses, pedestrian needs.
- Parkway on one or both sides can be used for planting and surface drainage.
- Generally utilize curbs and gutters, though the gutter may be tied to a biofilter or swale rather than an underground storm drain.
- Reduces impervious land coverage by up to 50 percent.
- Reduces sediment, oil and grease, hydrocarbons when combined with biofilters and swales.

Applications

- Appropriate for areas where traffic volumes are at or below 500-750 ADT and speeds between 15 to 25 mph.
- Most appropriate for grid street systems.
- May not be appropriate for long cul-de-sac streets or hillside sites with high fire risks (because of the potential of shared moving space to be blocked by a single vehicle, with no alternate emergency route).

Design

- Construction detailing same as typical street standard.
- Coordinate with local and regional zoning ordinances and public works standards.
- Streets with special uses, such as bike routes, may require additional pavement width.
- Depending on topography, parkway strip can be designed as a linear swale/biofilter, with curb openings directly into swale (see 6.2c Urban curb/swale system).

Maintenance

- Standard street maintenance practices required.
- Parkway strip between curb and sidewalk requires mowing, tree care. This can be the responsibility of the local jurisdiction or the adjacent property owner, depending on local codes and ordinances.

Access street: urban neo-traditional standard, continued

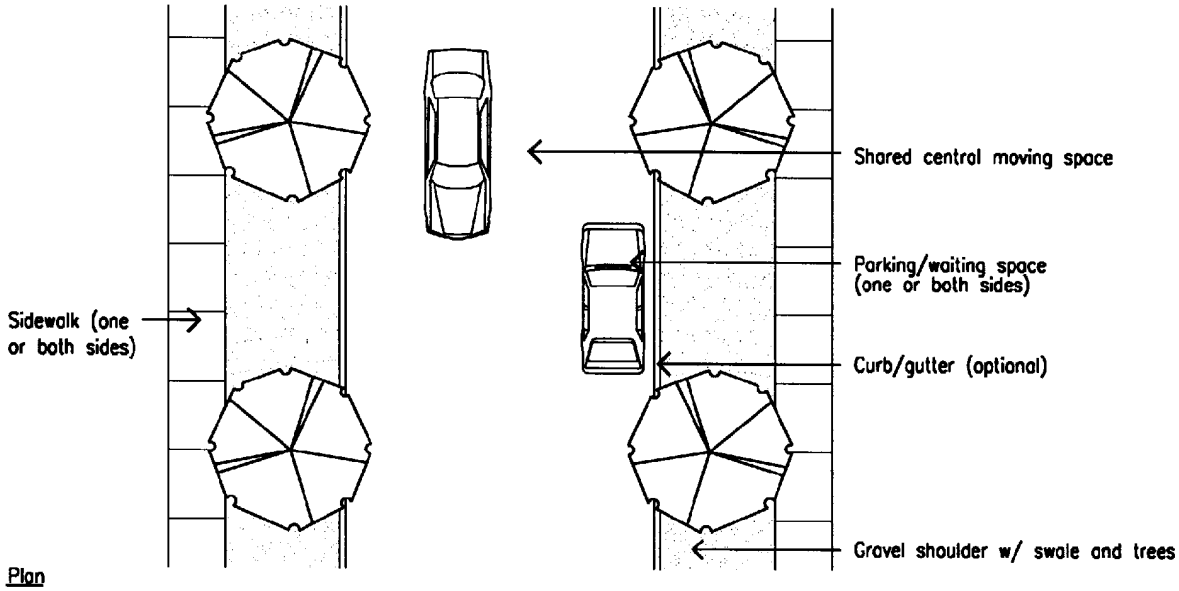

Conditions, dimensions, and materials shown are typical. Modifications may be required for proper application, consult qualified professional.

Economics

- Narrower street section reduces initial construction costs.
- Increased parkway adds additional landscape maintenance cost, especially compared with conventional street section without a parkway strip.
- Properties on narrower streets with tree-lined landscaped parkways typically command higher values than those on wider treeless streets.

Examples/resources

- Institute of Transportation Engineers (ITE) "Traditional Neighborhood Development Street Design Guidelines," 1997.
- Skinny Streets program, Portland, OR.
- Velarde, Loreto Streets, Mountain View, CA.
- Typical of neighborhoods built before WWII.

Streets

Access street: rural standard

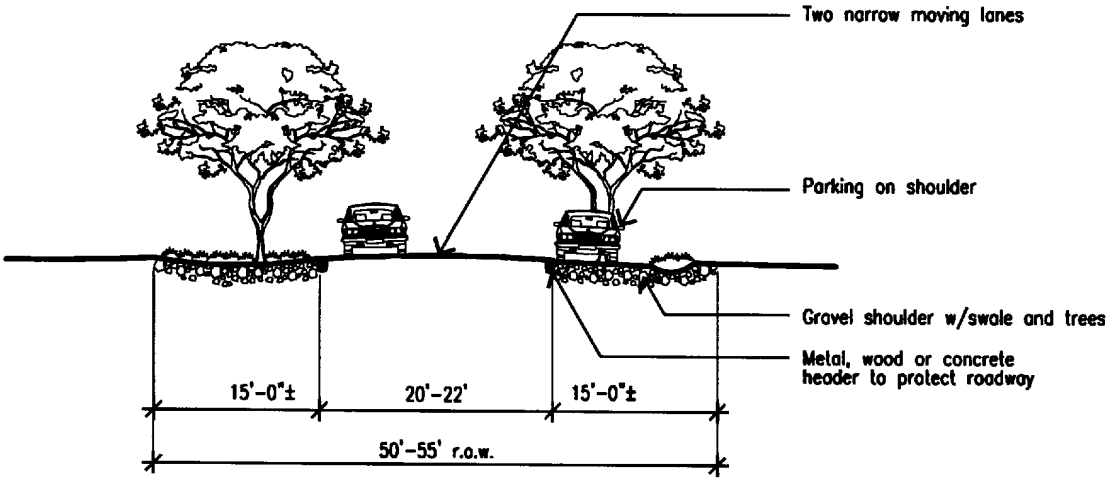

Conditions, dimensions, and materials shown are typical. Modifications may be required for proper application, consult qualified professional.

Rural standard access streets have an 18'–22' two-lane paved roadway, with no curb or gutters. Gravel or crushed aggregate shoulders act as drainageway and parking area.

Characteristics

- Vehicles tend use the center of the narrow paved roadway. When two cars are present moving in opposite directions, drivers reduce speeds and move towards the right hand shoulder.
- Permeability: Road is crowned to the gravel shoulders on each side. Reduced pavement width allows for shoulder on one or both sides that can be used for planting and surface drainage.
- Reduces impervious land coverage.
- Reduces sediment, oil and grease, hydrocarbons when combined with biofilters and swales.

Applications

- Appropriate for areas where traffic volumes are at or below 500-750 ADT and speeds between 15 to 25 mph.
- May not be appropriate for long cul-de-sac streets or hillside sites with high fire risks (because of the potential of shared moving space to be blocked by a single vehicle, with no alternate emergency route).
- Rural standard presents a more informal aesthetic and is suitable for less urban locations.

Design

- Roadway edge protection can be achieved by flush concrete bands, steel edge, or wood headers.
- Depending on topography, gravel shoulder can be designed as a linear swale/biofilter, with water sheet flowing directly into swale.
- Parking can be organized by bollards, trees, or allowed to be informal.
- Parking can be allowed only on one side to preserve a wider moving space for emergency vehicles.
- On very low volume, low speed, access streets, sidewalks may not be required, as pedestrians walk in the street or on the shoulder.
- If catch basins are used, provide settlement basin before inlet, or raise inlet above bottom of swale, to prevent sediment from filling catch basin.

Maintenance

- Gravel shoulders require periodic regrading and replenishing.
- Elimination of curb means that conventional street sweeper machinery cannot be used.

Access street: rural standard, continued

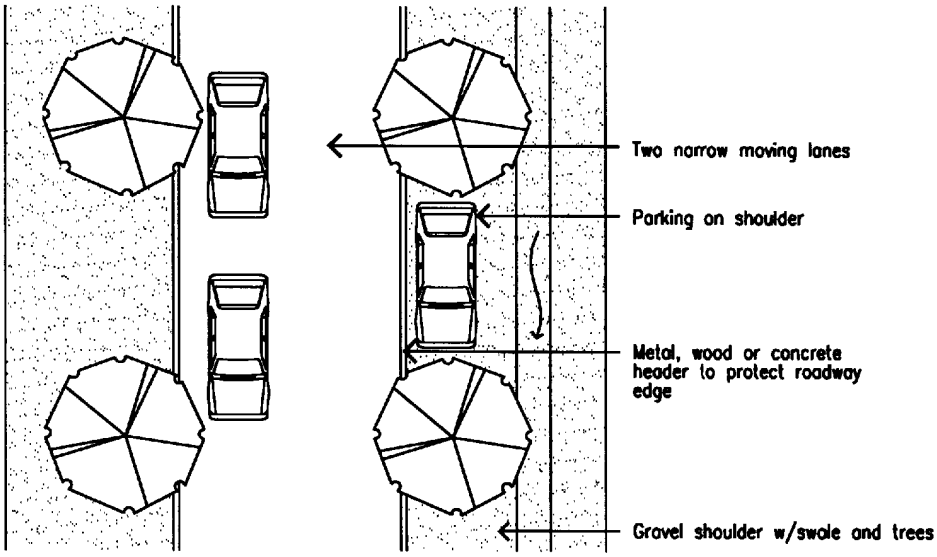

Conditions, dimensions, and materials shown are typical. Modifications may be required for proper application, consult qualified professional.

- Landscaped shoulder with surface stormdrain elements requires maintenance. This can be the responsibility of the local jurisdiction or the adjacent property owner, depending on local codes and ordinances.

Economics

- Narrower street section and elimination of curb and gutter reduces initial street construction costs significantly.
- Reduced roadway pavement width and increased infiltration in gravel shoulders reduces or eliminates need for underground stormdrain system.
- Landscaped shoulder with surface stormdrain elements adds moderate landscape maintenance cost.
- Properties on narrower streets with tree-lined landscaped parkways typically command higher values than those on wider treeless streets.

Examples/resources

- Institute of Transportation Engineers (ITE) "Traditional Neighborhood Development Street Design Guidelines," 1997.
- Skinny Streets program, Portland, OR.
- Residential streets, Atherton, CA.
- Neighborhoods built before WWII.

Streets

Urban curb/swale system

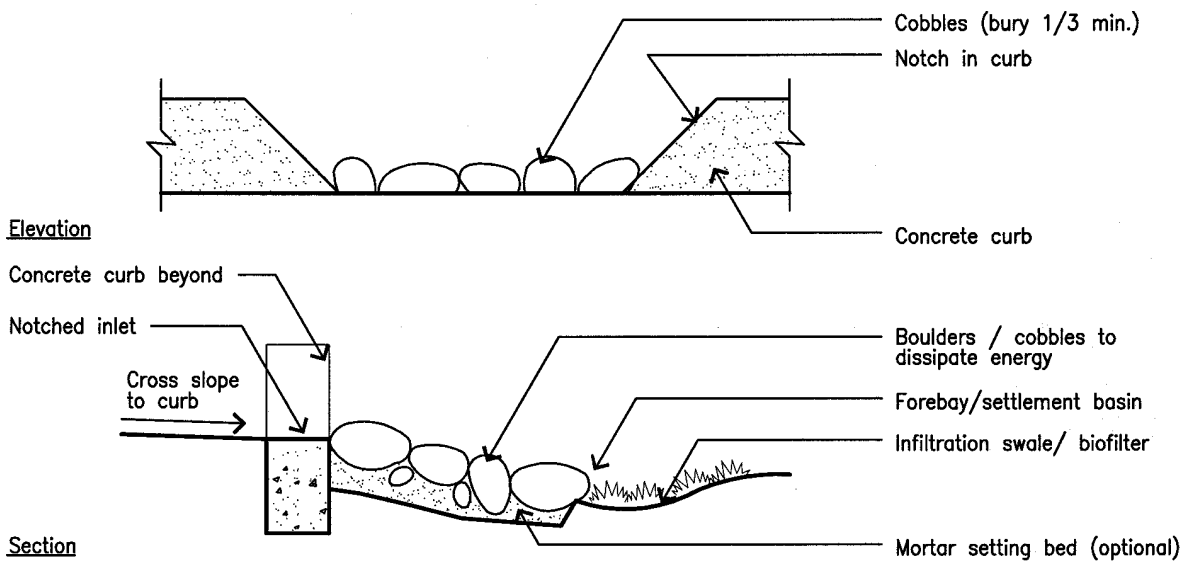

Conditions, dimensions, and materials shown are typical. Modifications may be required for proper application, consult qualified professional.

Urban curb/swale systems are a hybrid of standard urban curb and gutter with a more rural or suburban swale drainage system. It provides a rigid pavement edge for vehicle control, street sweeping, and pavement protection, while still allowing surface flow in landscaped areas for stormwater quality protection.

Characteristics

- Runoff travels along the gutter, but instead of being emptied directly into catch basins and underground pipes, it flows into surface swales.
- Stormwater can be directed into swales either through conventional catch basins with outfall to the swale or notches in the curb with flowline leading to the swale.
- Swales remove dissolved pollutants, suspended solids (including heavy metals, nutrients), oil and grease by infiltration.

Applications

- Residential developments, commercial office parks, arterial streets, concave median islands.
- Swale system can run either parallel to roadway or perpendicular to it, depending on topography and adjacent land uses.

Design

- Size curb opening or catch basin for design storm.
- Multiple curb openings closely spaced are better than fewer openings widely spaced because it allows for greater dissipation of flow and pollutants.
- Provide energy dissipators at curb notches or catch basin outfall into swale.
- Provide settlement basin at bottom of energy dissipator to allow for sedimentation before water enters swale.

Maintenance

- Annual removal of built-up sediment in settlement basin may be required.
- Catch basins require periodic cleaning.
- Inspect system prior to rainy season and during or after large storms.

Economics

- Cost savings through elimination of underground storm drain network.
- Cobble-lined curb opening may add marginal cost compared to standard catch basin.
- Swale system requires periodic landscape maintenance.

Examples/resources

- Residential street network, Village Homes subdivision, Davis, CA.
- Dual-drainage system, Folsom, CA.

Streets

Rural swale system

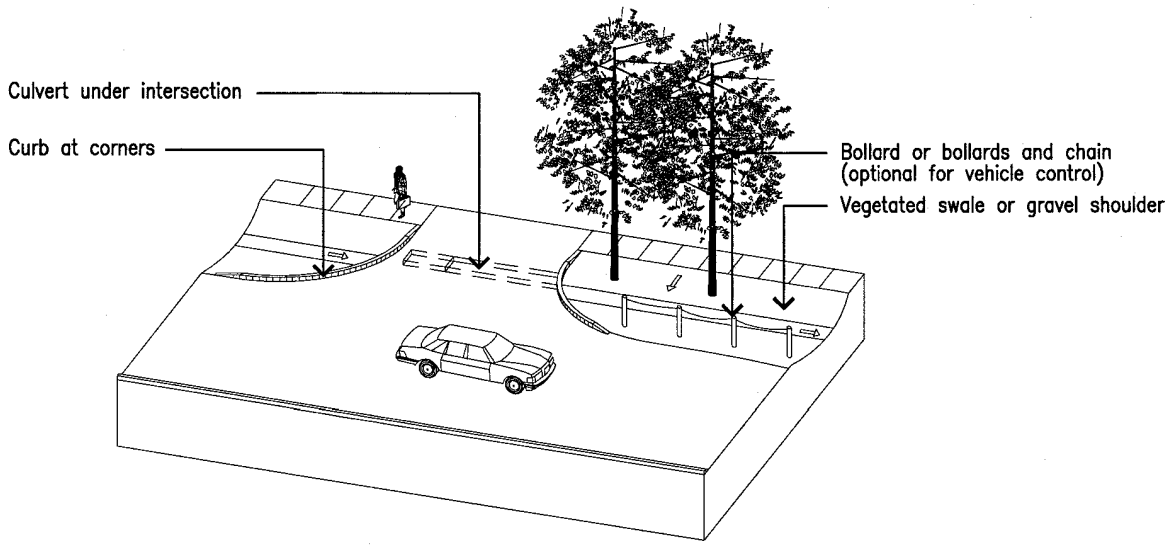

Conditions, dimensions, and materials shown are typical. Modifications may be required for proper application, consult qualified professional.

Rural swale systems are a combination of street design elements that allow for surface drainage while simultaneously protecting the roadway edge, organizing parking, and allowing for driveway access and pedestrian circulation.

Characteristics

- Shoulder can be designed to accommodate parking or to serve as a linear swale, permitting infiltration of stormwater along its entire length.
- Runoff from the street is not concentrated, but dispersed along its entire length, and build-up of pollutants in the soil is minimized.

Design

- Concrete curb and gutter not required.
- Ensure that culverts under intersections drain, to avoid standing water and resulting septic condition.
- Provide concrete curb at intersection radii to protect roadway edge and landscape area from turning movements.
- Crown street to direct runoff to shoulders. If drainage is provided on one side only, then provide cross-slope towards swale.
- Protect pavement edge with rigid header of steel, wood or a concrete band poured flush with the street surface.
- If parking is not desired on the shoulder, or if it needs to be organized, install bollards, trees or groundcovers along the shoulder to prevent vehicle trespass.
- Central medians can be used to divide traffic for safety or aesthetics.

Maintenance

- Surface systems require periodic maintenance and inspection.
- Maintenance for surface systems is different than most urban Public Works Departments currently practice, and employee retraining may be required.
- Surface drainage systems are easier to monitor and clear than underground systems, because problems, when they occur, are visible and on the surface. This eliminates the need for subsurface inspection or street excavation.

Economics

- Surface swales are less costly to install than underground pipe systems, but may have higher on-going maintenance costs.

Examples/resources

- City of Folsom, CA.

Streets

Dual drainage system

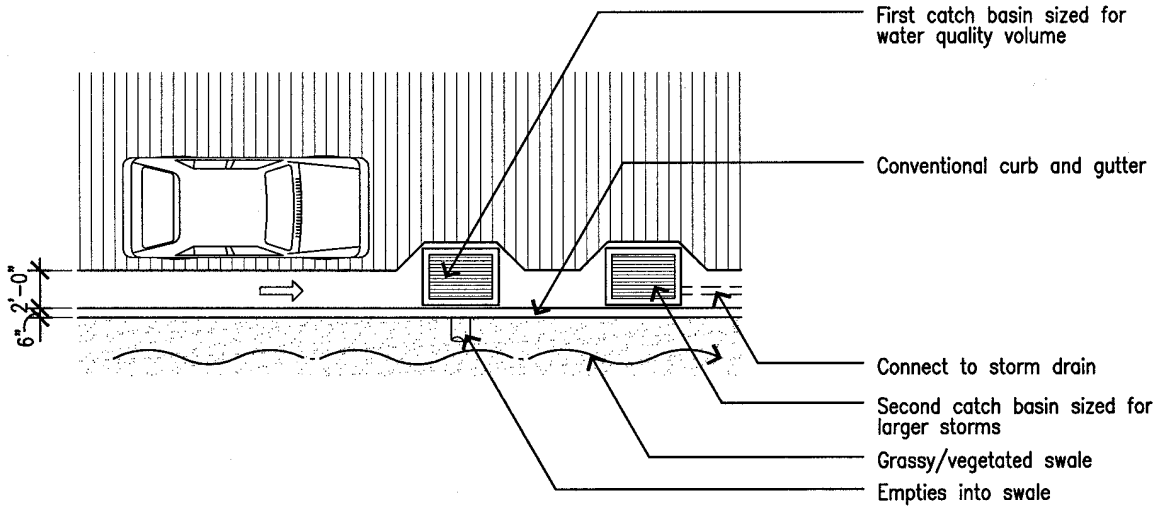

Conditions, dimensions, and materials shown are typical. Modifications may be required for proper application, consult qualified professional.

Dual drainage systems provide a pair of catch basins at each inlet point– the first is sized to direct the water quality volume into a landscaped infiltration area, and the second collects the overflow of larger storms and directs it to the storm drain system.

Characteristics

- "Treatment train" approach provides for both water quality and flood protection.
- Separation of water quality volume from larger storms provides a bypass that prevents flushing of sediment and pollutants in vegetated swale during larger storms.
- Appearance of typical urban street.

Applications

- Streets in residential or commercial developments, arterial streets.
- Swale can be located on shoulder or in concave median.
- Not appropriate for industrial areas due to the potential of spills.

Design

- Locate two catch basins adjacent to each other.

First (uphill) catch basin Design outlet pipe to accommodate the water quality volume and direct to adjacent grass or vegetated swale. When first catch basin is full (because inflow exceeds volume of outlet pipe), water will flow past first basin inlet and enter second catch basin.

Second (downhill) catch basin Design to accommodate larger volumes and connect outlet to underground storm drain system or to detention pond.

- Culverts must be provided to carry swale under cross streets and driveways.
- Design swale to accommodate water quality volume.
- If swale is planted with turf grass, provide supplemental irrigation to maintain turf.
- For additional information on swale design, see Technical Detail 6.6a Grass/vegetated swales.

Maintenance

- Perform standard maintenance practices on swale and catch basins.

Economics

- Dual drainage system is more expensive to install and maintain than other solutions because of multiple elements.

Examples/resources

- City of Folsom, CA, Highway 50 at Folsom exit. Contact City Engineer.

Streets

Concave median

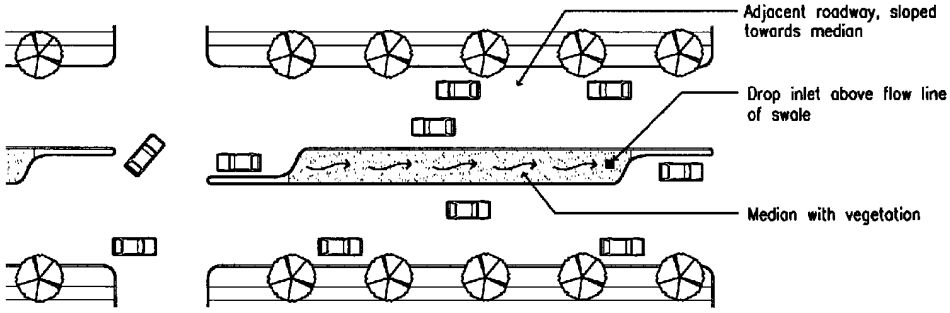

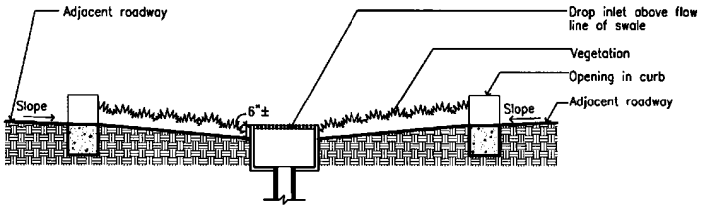

Conditions, dimensions, and materials shown are typical. Modifications may be required for proper application, consult qualified professional.

Concave medians. Conventional medians are normally designed as a convex surface to shed water onto adjacent pavement and into a curb and gutter system. Concave medians reverse this relationship by depressing the median surface slightly depressed below the adjacent pavement section and designing the median to receive runoff.

Characteristics

- Provides safety and aesthetic functions of traditional convex medians while accommodating stormwater infiltration.
- Helps to disconnect impervious street surface from storm drain system by directing street runoff into landscaped or aggregate-filled median for infiltration.
- Can be designed as a landscaped swale or turf-lined biofilter to treat first-flush runoff, which carries a high concentration of oils and other pollutants off the street.

Design

- Adjacent roadway design must provide cross-slope into medians.
- Runoff from street can be directed into swale by sheet flow or curb inlets.
- Concave medians must be sized to accommodate the water quality volume, and planting must be designed to withstand periodic inundation.
- Catch basin and underground storm drain system may be required for high flows, depending on the available area for infiltration and retention.
- Set catch basin rim elevations just below the pavement elevation, but above the flow line of the infiltration area so that the water quality volume will collect in the swale before overflowing into the underground system.

Maintenance

- Landscaped concave medians have maintenance requirements similar to landscaped convex medians.
- Some maintenance staff retraining may be required to facilitate maintenance of swales or other stormwater detention elements.

Economics

- Costs are similar to convex landscaped medians.

Streets

Cul-de-sac

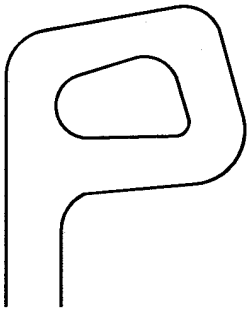

Cul–de–sac: Asymmetrical

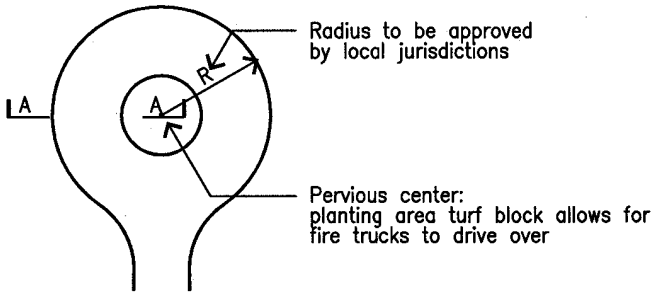

Cul–de–sac: Symmetrical

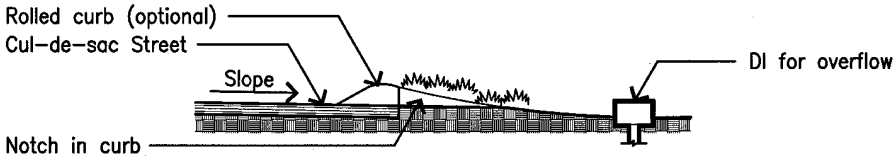

Section A–A

Conditions, dimensions, and materials shown are typical. Modifications may be required for proper application, consult qualified professional.

Cul-de-sac streets are dead-end streets that require turnaround areas large enough to accommodate large trucks and emergency access vehicles.

Characteristics

- Conventional cul-de-sacs are paved across their entire diameter. This large impervious area adds to environmental degradation by increasing runoff and creating a heat island at the front of adjacent land uses.
- A turnaround with a central concave landscaped space or other pervious surface can meet fire department access requirements and create an opportunity for stormwater infiltration or detention.
- A landscaped area in the center of a cul-de-sac can reduce impervious land coverage by 30 to 40%, depending on configuration, while maintaining the required turning radius.

Applications

- Appropriate for cul-de-sac streets in residential, commercial, and institutional settings.

Design

- Street termination requires turnaround area large enough to accommodate large trucks, such as occasional moving vans and emergency access vehicles (fire departments often require 60 feet or greater diameter turnarounds).
- Some local fire departments may require the center landscaped area to accommodate fire trucks. This can be achieved by providing a permeable load bearing surface such as turf-block, and eliminating woody plant materials such as trees from the planting area.
- Asymmetrical cul-de-sac design is more rural than conventional round cul-de-sac design.
- Curb with slots may be needed to allow run-on from the street while keeping vehicles off landscaping.

Maintenance

- Similar to other planted medians.

Economics

- Cost of extending storm drain the length of the cul-de-sac may outweigh the savings gained from reduction of paved area.
- Landscaping in center island may add costs for irrigation, planting, and periodic maintenance.

8.3 Parking Lots

In any development, storage space for stationary automobiles can consume many acres of land area, often greater than the area covered by streets or rooftops.

The standard parking stall occupies only 160 square feet, but when combined with aisles, driveways, curbs, overhang space, and median islands, a parking lot can require up to 400 square feet per vehicle, or nearly one acre per 100 cars. Since parking is usually accommodated on an asphalt or concrete surface with a conventional underground storm drain system, parking lots typically generate a great deal of directly-connected impervious area. Because the cars sitting in these lots shed hydrocarbons, heavy metals and other pollutants, parking lots are a primary collector and conveyor of urban runoff pollution.

There are many ways to both reduce the impervious land coverage of parking areas and to filter runoff before it reaches the storm drain system.

Parking Lots

Hybrid parking lot

Parking grove

Overflow parking

Porous pavement recharge bed

Parking lots

Hybrid parking lot

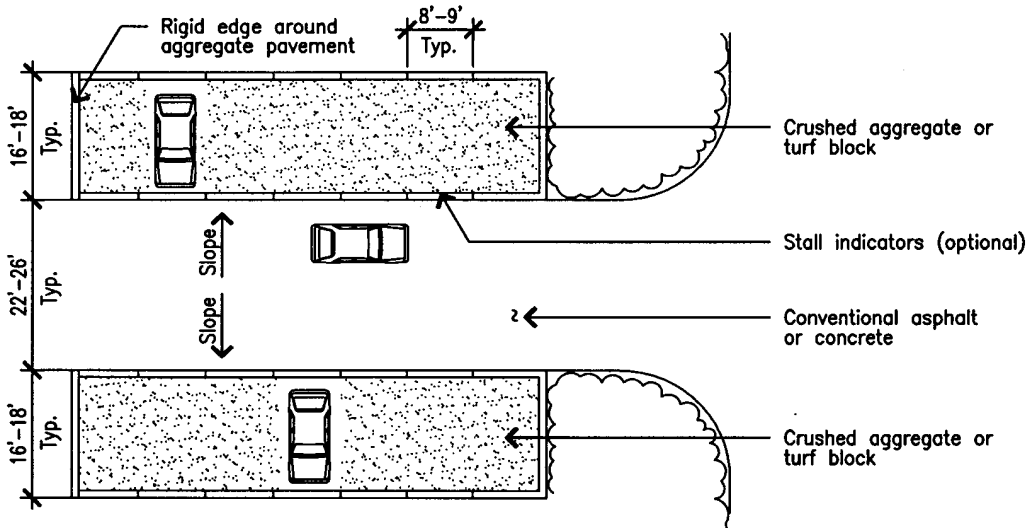

Conditions, dimensions, and materials shown are typical. Modifications may be required for proper application, consult qualified professional.

Hybrid parking lots differentiate paving, combining impervious aisles with permeable stalls. Impervious aisles are designed to carry moving vehicle traffic and accommodate turning movements. Permeable stalls are designed for stationary or very slow moving cars. There are many possible combinations of materials.

Characteristics

- Hybrid lot can reduce the overall impervious surface coverage of a typical double-loaded parking lot by 60%, and avoid the need for an underground drainage system.
- Differentiation between aisles and stalls can mitigate the overall visual impact of the parking lot.

Applications

- Commercial areas, offices, multi-family housing, hotels, restaurants.
- Selection of permeable pavement material depends on use. Porous asphalt, pervious concrete or unit pavers are recommended for stalls in areas with high turnover, such as restaurants. Areas with low turnover, such as hotels, office buildings, and housing can use crushed aggregate for stalls.
- Variable permeability, depending on pavements chosen.
- High ground water or lack of deep, permeable soils may limit applications.

Design

- Keep permeable pavement areas relatively flat (slope ≤ 5%). See Section 6.1 Permeable pavements.
- Aisles are constructed of conventional asphalt or concrete suitable for heavier traffic use, speeds between 10 and 20 mph, and designed to support the concentrated traffic of all vehicles using the lot.
- Stalls are constructed of a permeable pavement, such as open-graded crushed aggregate, open-celled unit pavers, turfblock, porous asphalt, or pervious concrete.
- Slope aisles into adjacent permeable stalls.
- Subdrain or overflow drainage may be required depending on design storm and underlying soils.
- Stall markings can be indicated with wood headers laid in field of permeable pavement, change in unit paver color, concrete bands or pavement markers ("botts dots"), depending on the material used.
- Designated handicapped stalls must be made of an ADA compliant pavement.

Maintenance

- Periodic weed control, sweeping, and regrading required for gravel stalls.
- Irrigation, fertilizer, weed control, and mowing required for turf block stalls.
- Pressure hosing or vacuum sweeping may be required for pervious concrete or porous asphalt stalls.

Hybrid parking lot, continued

Economics

- Reduction of overall impervious surface coverage may eliminate or reduce need for underground drainage system.
- Construction cost will depend on materials chosen. A hybrid lot of conventional asphalt aisles with crushed aggregate stalls will be lower cost than a lot entirely paved in asphalt. A hybrid lot of conventional asphalt aisles with unit pavers stalls will be higher cost than a lot entirely paved in asphalt.

Examples/resources

- Parking lot. Medford Village, NJ.

Parking lots

Parking grove

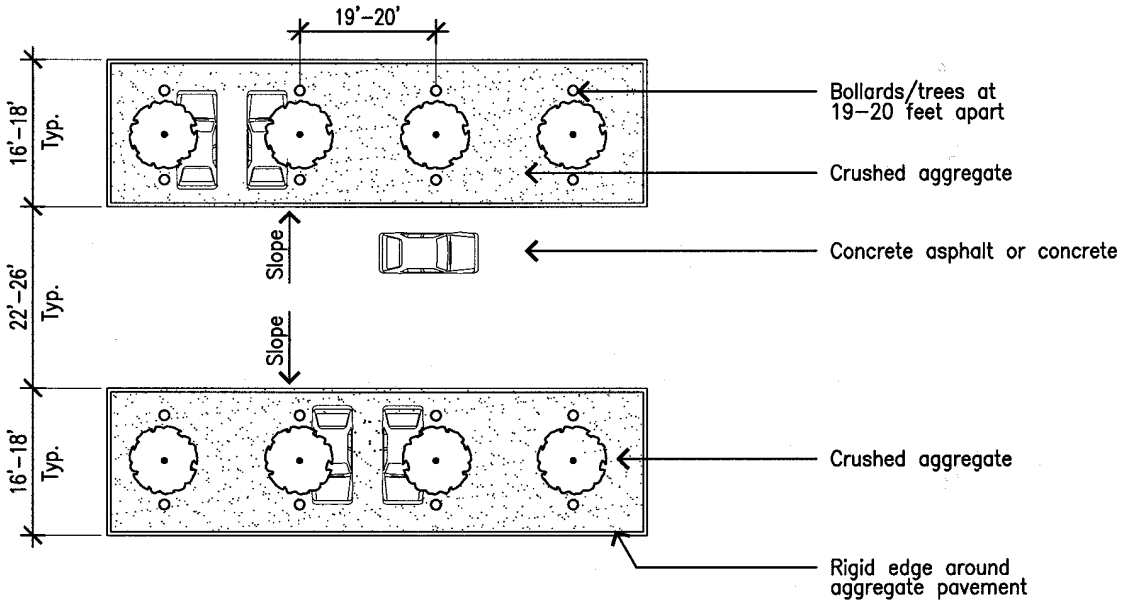

Conditions, dimensions, and materials shown are typical. Modifications may be required for proper application, consult qualified professional.

Parking groves, a variation on the hybrid parking lot design (See 6.3a), use a grid of trees and bollards to delineate parking stalls and create a shady environment. The permeable stalls reduce impervious land coverage while the trees reduce heat island effect and improve soil permeability.

Characteristics

- Parking grove not only shades parked cars, but presents an attractive open space when cars are absent.
- Permeability depends on the type of pavement used.
- Reduces impervious land coverage.

Applications

- Best in locations where the users of the parking lot are a consistent group of people (such as multi-family housing or an office building) who become familiar with parking between the trees.
- Best in situations where vehicles park for long periods of time, such as hotels, housing, offices.
- Not recommended for high turnover lots, such as restaurants and commercial areas because of additional care needed to navigate around trees.

Design

- Parking stalls must be oversized to accommodate thickness of bollards and trees. A grid of trees/bollards spaced approximately 19 feet apart allows two vehicles to park between each row of the grid (9.5 foot space per stall, compared to the standard 8.5 to 9 foot space per stall). A grid of 28 to 30 feet allows for three cars between each pair of trees.
- Set trees/bollards at least three feet in from end of stall to allow for turning movements into and out of stall.
- Trees should be protected during the establishment period with double staking of 3" diameter wood stakes. Align stakes along implied stall line.
- Bollards may be omitted if proper tree staking is provided during establishment period.
- Metal tree cages are not recommended because they are easily damaged and can scratch cars.
- Trees should be selected for high, horizontal branching structure, and should not be prone to limb breakage (such as Eucalyptus spp. and Grevillea robusta), or insects that secrete honeydew (such as Celtis).
- Provide irrigation to trees as required.

Maintenance

- Requires tree pruning and maintenance to ensure clearance of vehicles.
- Trees may occasionally be hit by cars, but will heal themselves under normal circumstances.

Economics

- More expensive to construct and maintain than standard parking lots.

Examples/resources

- Seaside Motel Auto Court, Seaside, FL.

Parking lots

Overflow parking

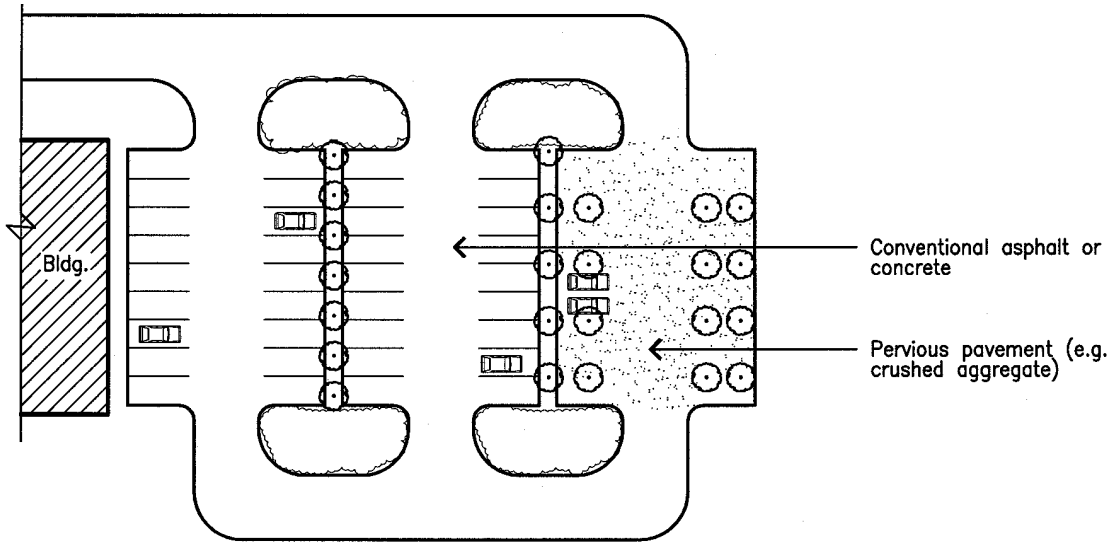

Conditions, dimensions, and materials shown are typical. Modifications may be required for proper application, consult qualified professional.

Overflow parking design differentiates between regular and peak parking demands, constructing the regular demand parking stalls with traditional impervious materials and constructing peak parking stalls of a different, more permeable, material.

Characteristics

- Overflow area can be pervious materials such as turf block, crushed stone, unit pavers on sand, and can be designed to break up an expanse of continuous parking lot.
- Permeability depends on pavement used.

Applications

- Large parking lots with variable capacity needs such as shopping malls, conference centers, office complexes, amusement parks, sport facilities.
- Visitor parking areas in multifamily residential developments or office complexes.
- Facilities with infrequent but extensive peak parking needs, such as churches, sports arenas, and conference centers.

Design

- Must be designed to accommodate volume of overflow parking.
- In many uses, regular parking demand accounts for approximately two-thirds of total, with one-third accommodated as overflow.
- Irrigation may be necessary if overflow parking is turf block.

Maintenance

- Maintenance depends on pavement selected.

Economics

- Cost depends on pavement selected and overall design.

Examples/resources

- Gravel overflow parking at Nordstrom parking lot. Corte Madera, CA.
- Orange Bowl parking lot, FL.

Parking lots

Porous pavement recharge bed

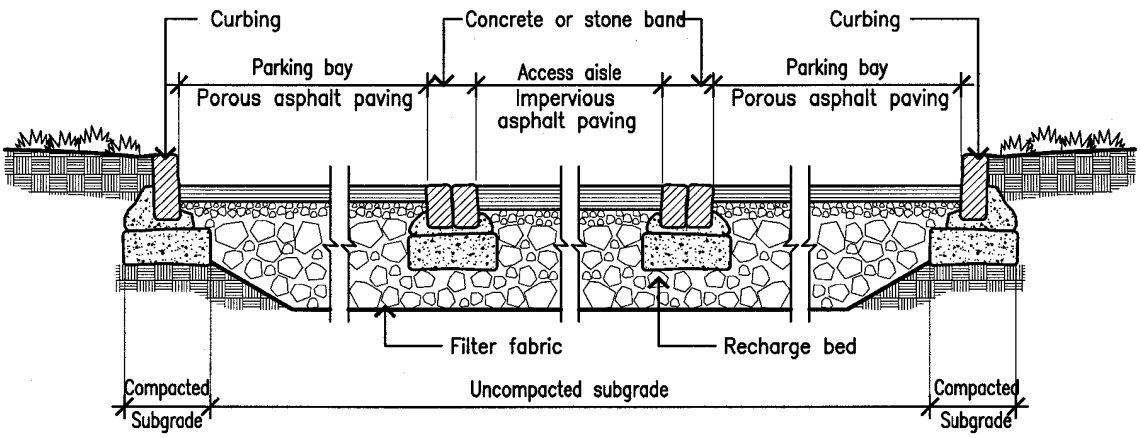

Conditions, dimensions, and materials shown are typical. Modifications may be required for proper application, consult qualified professional. Detail adapted from Andropogon Associates.

Porous pavement recharge beds underneath parking lots are gravel beds that receive and store infiltration.

Characteristics

- Underground system eliminates the possibilities of mud, mosquitoes and safety hazards sometimes associated with ephemeral surface drainage.
- Provides for storage of large volumes of runoff, which is directed underground by means of perforated distribution pipes.
- Constraints include soil infiltration rates, depth to water table and bedrock, and traffic type and volume.

Applications

- Underneath parking lots generally in areas where land values are high and the need to control runoff is great.

Design

- 2-1/2" porous asphalt paving on clean gravel topcourse.
- Recharge and storage basin of clean open-graded crushed stone with 40% void space.
- Filter fabric placed on floor and sides of recharge bed following excavation allows water to pass readily, but prevents soil fines from migrating up into rock basin, reducing effective storage area of recharge bed.
- Design an unpaved edge of porous pavement, and top off with stone (such as river stone), place wheelstops at edge. This functions as an emergency overflow inlet around perimeter of parking bay.
- Limit porous surfaces to parking areas receiving least wear and tear.
- Soil layer of 4 feet or more with percolation rate of 0.5 inches per hour or more required; must be field tested.
- Direct all sediment-laden runoff from impervious surfaces (e.g., roof tops, roads, parking areas, walkways, etc) away from porous pavement/recharge bed or pretreat to eliminate sedimentation.
- Prevent failures by implementing strict erosion/sediment control during construction (sediment that erodes or is tracked on to the surface can clog void spaces in pavement and prevent stormwater from entering the recharge bed below).

Maintenance

- Vacuum sweeping or pressure hosing recommended twice per year under normal circumstances.

Economics

- Expensive, requires extensive engineering.

Examples/resources

- Morris Arboretum, Philadelphia, PA.
- Automatic Data Processing corporate offices, Philadelphia, PA.

8.4 Driveways

Driveways can comprise up to 40% of the total transportation network in a conventional residential development, with streets, turn-arounds and sidewalks comprising the remaining 60%.

There are several ways to reduce the impact of driveways on water quality. These include directing runoff from an impervious driveway to a landscaped infiltration area, constructing the driveway from a permeable pavement, and reducing the overall amount of pavement provided.

Driveways

Not directly-connected impervious driveway

Gravel driveway

Unit pavers on sand

Paving only under wheels

Flared driveways

Temporary parking

Driveways

Not-directly connected impervious driveway

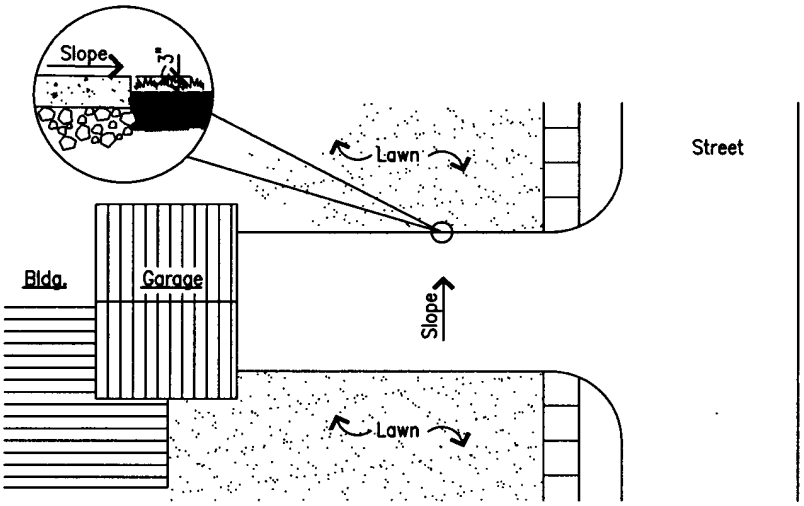

Conditions, dimensions, and materials shown are typical. Modifications may be required for proper application, consult qualified professional.

Not directly-connected impervious driveway slopes the surface to drain into an adjacent turf or groundcover area, rather sloping towards the curb and gutter in the street as commonly done.

Characteristics

- Appearance is the same as conventional driveway.
- Pollutants are dispersed and cleansed in the soil as driveway runoff passes through a permeable landscaped area.

Applications

- Suitable for all driveways with sufficient adjacent landscape areas.

Design

- Cross slope must be greater than longitudinal slope to direct runoff into adjacent landscape
- Adjacent landscaped area must be sized to accommodate the water quality volume.
- Edge of driveway must be approximately 3 inches above the vegetated area, so that vegetation or turf doesn't block sheet flow from driveway onto soil.

Maintenance

- Edging of adjacent lawn is important to allow unimpeded flow of runoff from driveway onto lawn.

Economics

- Cost is same as conventional driveway.

Driveways

Crushed aggregate driveway

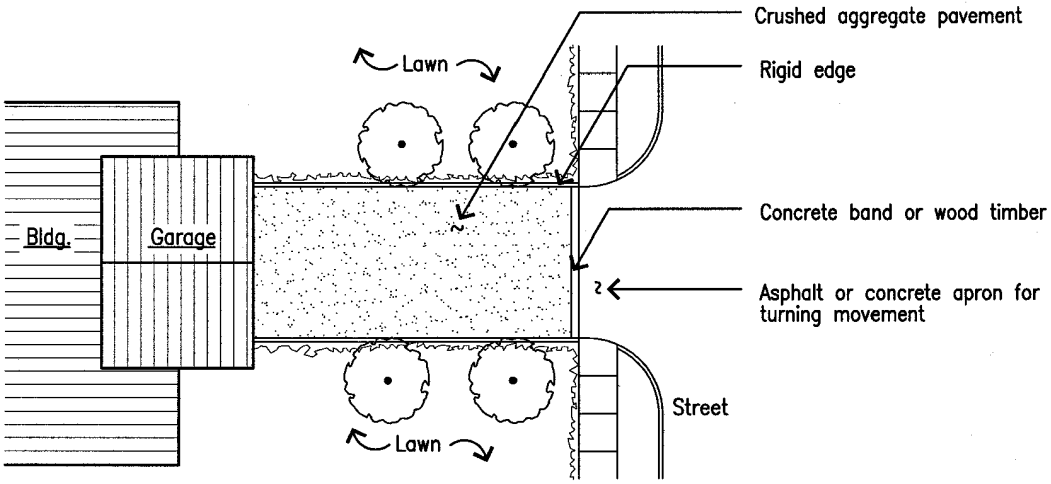

Conditions, dimensions, and materials shown are typical. Modifications may be required for proper application, consult qualified professional.

Crushed aggregate driveway. Crushed stone and other granular materials can make a relatively smooth permeable pavement suitable for the low speeds and volumes of typical residential driveways.

Characteristics

- Aesthetic can be formal or rural depending on design and materials.
- Crushed aggregate driveways have a distinctive "crunchy" sound reminiscent of traditional country estates and homes.

Applications

- For driveways that are lightly used by very slow moving vehicles, and those that serve single family homes.
- Not suitable for multi-use driveways such as those that accommodate children's play.
- Flat sites (slope ≤ 5%).

Design

- Rigid edge such as wood header, concrete, metal, or brick band desirable to contain aggregate material and to maintain surface strength.
- Provide a non-granular apron at intersection of driveway with street to accommodate turning movements.
- Provide a concrete band or wood timber at transition between apron and crushed aggregate driveway to absorb impact of repeated wheel crossings.
- Use open-graded crushed aggregate (such as 3/8" to 3/4" granite) rather than rounded stones such as pea gravel. Angles of the crushed stone form a matrix that holds the granular material in place, able to bear the load traffic without substantial displacement.
- Minimize compaction of finished grade and subgrade. Roll surface of aggregate sufficiently to stabilize the stone.
- Open-celled plastic matrix can be used to provide added stability of crushed aggregate.

Maintenance

- Weed control may be needed periodically.
- Periodic replenishment of aggregate may be required.

Economics

- Least cost of all pavement materials.
- $1 to $3 per square foot, depending on design.

Examples/resources

- Open-celled matrixes are available from Gravelpave, GeoWeb by Presto.

Driveways

Unit pavers on sand driveway

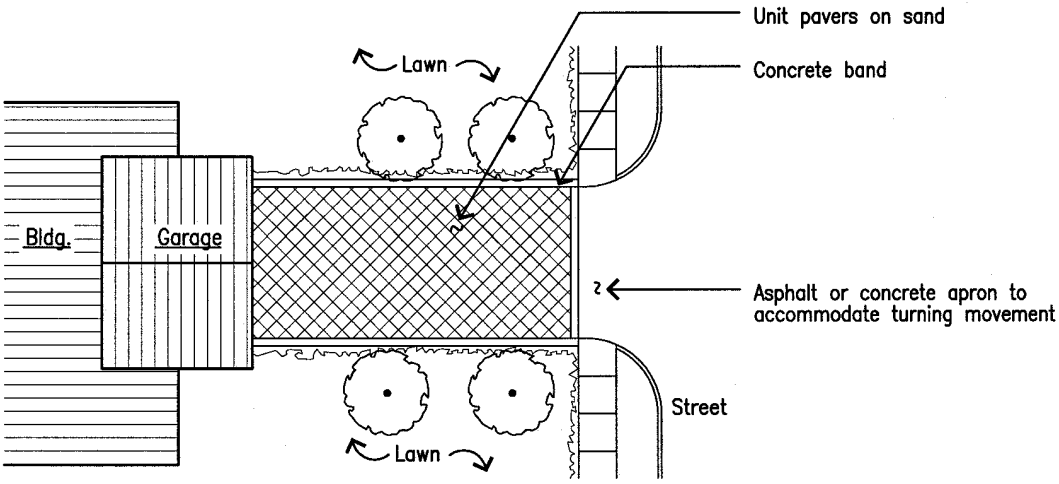

Conditions, dimensions, and materials shown are typical. Modifications may be required for proper application, consult qualified professional.

Unit pavers on sand are discrete units that are set in a pattern on a prepared base and bound by a rigid edge to form a pavement suitable for a driveway.

Characteristics

- A pavement of brick or unit pavers on sand can make the driveway more integrated with the garden rather than an extension of the street penetrating deep into the garden space.
- Available in a variety of natural and synthetic materials, such as brick, natural stone, cast concrete.
- Runoff coefficient of open celled units: 0.10-0.35 (more permeable if larger voids, solid units: 0.10-0.20. Infiltration rates are higher during lighter, lower intensity rains.

Applications

- Residential driveways.
- Accent to traditional asphalt in low volume commercial driveway.
- Flat sites (slope ≤ 5%).

Design

- Because the unit pavers are lain loose, the field must be enclosed by a rigid frame. Concrete bands, metal or plastic edging are commonly used.
- To maximize permeability, use an open-graded crushed rock base course (not rounded pea gravels, no fines).
- May not be suitable on expansive soils without special subgrade preparation.

Maintenance

- Longevity ensured by locating in low-erosion conditions, quality construction, and installation of good base layer.
- Easy to repair, since units are easily lifted and reset.
- Periodically add joint material (sand) to replace material that has been moved/worn by traffic or weather.
- Occasional weed suppression may be required.

Economics

- Installation cost $9-15 per square foot
- More expensive than conventional concrete or asphalt, less expensive than unit pavers on slab.
- Increased construction and maintenance costs can be offset by improved aesthetic and market appeal compared to conventional asphalt or concrete driveways.

Driveways

Paving only under wheels

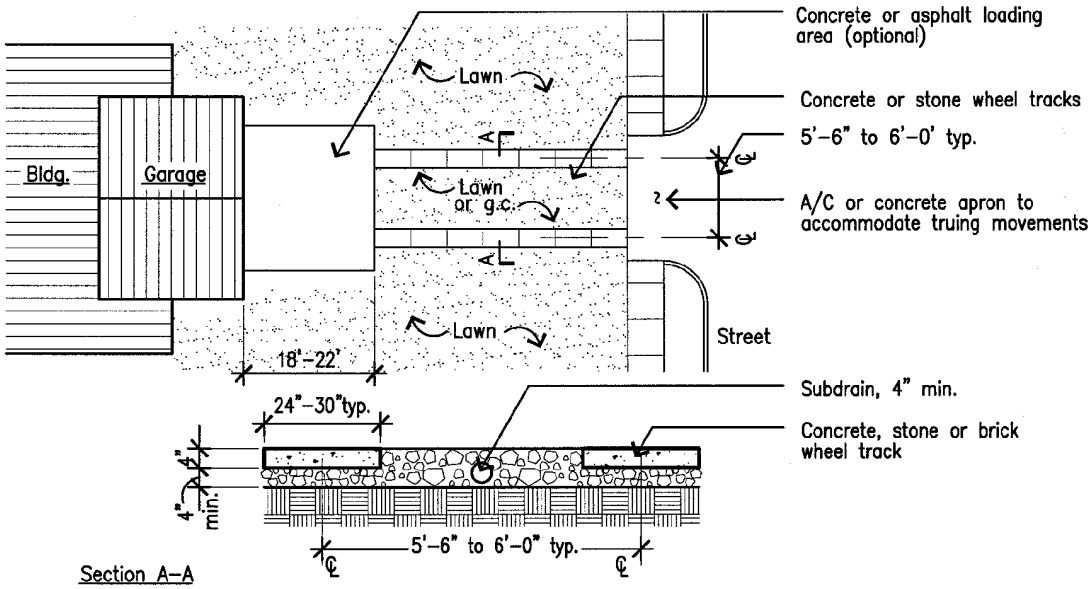

Conditions, dimensions, and materials shown are typical. Modifications may be required for proper application, consult qualified professional.

Paving only under wheels. Paving only under the wheel tracks, with the area between landscaped reduces impervious land coverage, also called a "Hollywood driveway."

Characteristics

- Center strip planted with grass, groundcovers, or filled with gravel.
- A driveway of two paved wheel tracks can reduce impervious surface coverage by 60 to 70% compared with a single lane paved driveway.

Applications

- Residential, low density single family, duplex, mobile home.
- Best in straight driveways, not recommended for curving driveways.

Design

- Wheel tracks should be wide enough to accommodate variability in driving and vehicle widths.
- Wheel tracks must be designed to support vehicle loads, usually concrete or mortar-set unit pavers such as stone or brick.
- A perforated drain line buried between wheel tracks to collect and direct runoff may be added in soils with low infiltration rates.
- If ground cover or grass is selected for center strip, irrigation system must be provided, and parked vehicles must be moved periodically so that a single location is not continuously shaded.

Maintenance

- Area between wheel tracks requires maintenance.
- If area between tracks is planted with lawn, additional edging will be needed.

Economics

- Reduced pavement area reduces construction costs.
- Complex detailing, inclusion of landscape planting and irrigation can add significant costs.

Driveways

Flared driveways

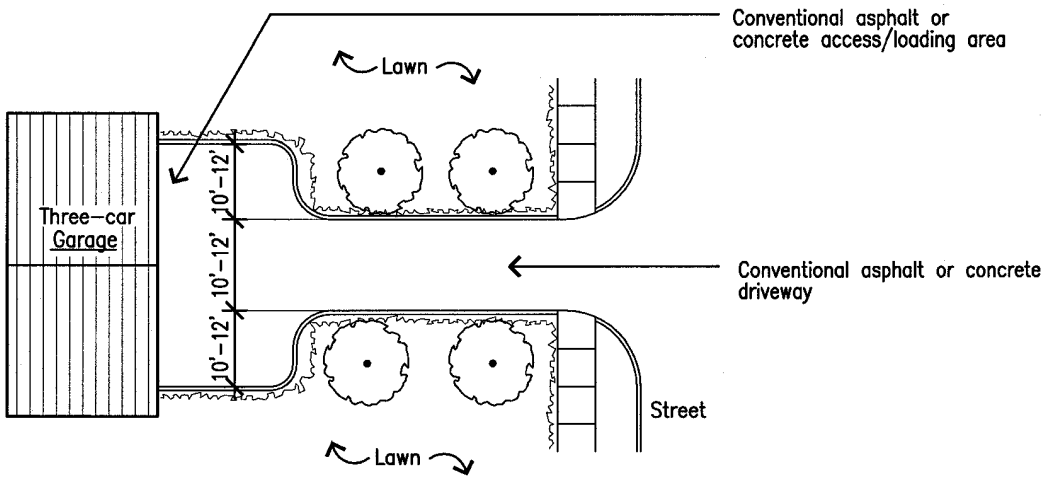

Conditions, dimensions, and materials shown are typical. Modifications may be required for proper application, consult qualified professional.

Flared driveways use a single lane to provide access to multiple-car garages by flaring the area in front of the garage.

Characteristics

- The approach to the garage from the street is a single lane, adequate to accommodate the relatively infrequent vehicle trips, while the portion of the driveway at the garage is widened to provide access to all garage doors.
- Reduces impervious surface area compared to multi-lane driveway extending entire length from garage to street.

Applications

- Appropriate for multi-car garages or single family homes with adjacent garages that do not require the full multi-lane width along their entire length.

Design

- Typical driveway design, single lane width at street, and flare to serve garages that are shared.
- Provide adequate depth in front of multi-car garage for vehicle parking and maneuvering.

Maintenance

- Same as standard driveway.

Economics

- Reduces overall pavement cost.

Driveways

Temporary parking

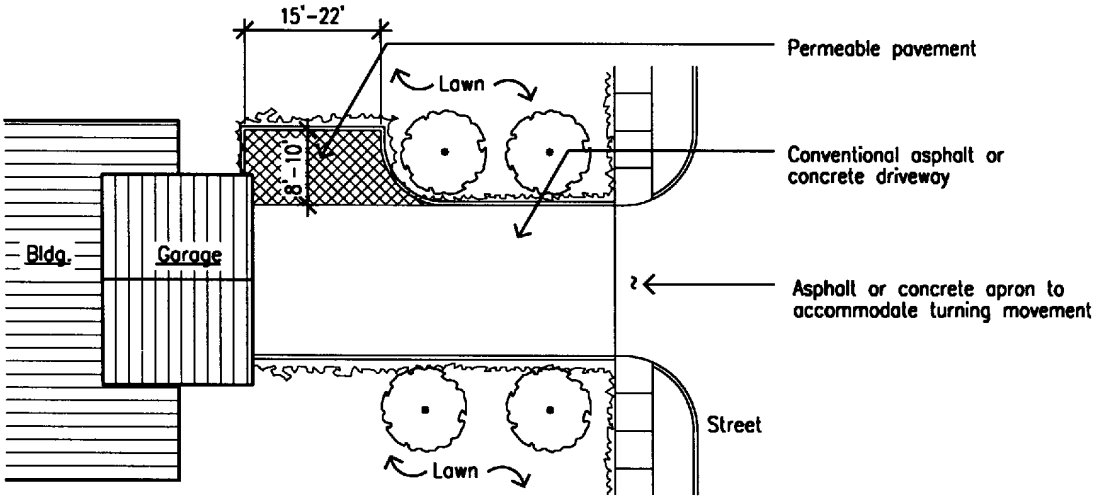

Conditions, dimensions, and materials shown are typical. Modifications may be required for proper application, consult qualified professional.

Temporary parking is paved with a permeable surface, such as turf-block or open-celled unit paver, and maintained as a landscaped surface.

Characteristics

- Appears and functions as green space or patio for the majority of the time when not used for parking.
- Runoff coefficient depends on the type of pavement used.
- Reduces impervious surface area.

Applications

- Residential driveway applications, such as RV or trailer parking.
- Areas where parking or loading access is required infrequently.
- Guest parking areas.

Design

- Must be designed to support vehicle loads.

Maintenance

- Turf-block requires similar maintenance as conventional lawn.
- Brick or unit pavers require periodic weed supression.

Economics

- Higher initial cost than asphalt or concrete parking areas.
- Increased construction and maintenance costs can be offset by improved aesthetic and market appeal compared to conventional asphalt or parking areas.

8.5 Buildings

By definition, buildings create impervious land coverage. There are, however, techniques to treat runoff from individual buildings and to collect rooftop runoff for infiltration into the soil.

Roof runoff is typically either channeled in gutters and downspouts or allowed to sheetflow off the roof. Downspouts focus runoff, concentrating the entire watershed of the roof into one or a few points. This concentrated flow can be stored and slowly infiltrated into the soil in a controlled manner through dry-wells, cisterns, or by directing flow into landscape infiltration/detention areas.

Sheet runoff from roofs can be directed and infiltrated onto adjacent landscape areas through grading, mulching, and plant selection.

Buildings

Dry-well

Cistern

Foundation planting

Pop-up drainage emitters

Buildings

Dry-well

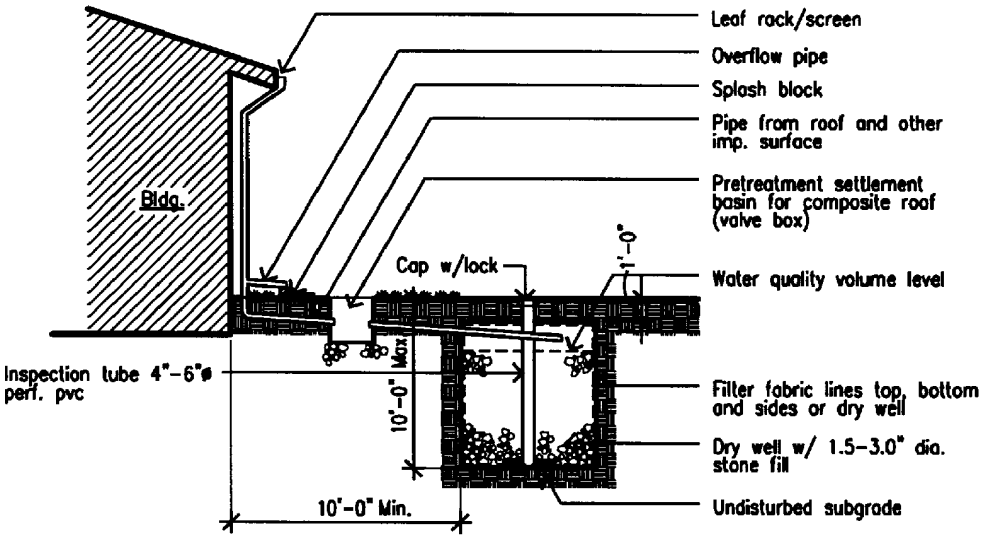

Conditions, dimensions, and materials shown are typical. Modifications may be required for proper application, consult qualified professional.

Dry-well. A dry-well is a subsurface basin to which runoff is diverted for infiltration. The roof downspout is connected to the dry-well, allowing runoff to be stored and slowly infiltrated.

Characteristics

- Compact.
- Hidden from view, has no effect on aesthetics.

Applications

- Not appropriate for slopes >40% or areas with expansive soils.
- Many agencies have policies regarding dry wells because of concerns that include migration of pollutants into groundwater, or dumping of pollutants into drywell. Most jurisdictions permit drywells that are connected directly to roof downspouts and are less than ten feet deep. Check local regulations.

Design

- Confirm requirements with local municipal ordinances. These may include overall depth, as well as setbacks from structures, property lines, water supply wells, groundwater level, septic drainfields, and sensitive areas.
- Dimension calculations assume:

  1) Total volume runoff generated by roof in a design storm (e.g. 10 year, 24-hour, etc.) must be stored or infiltrated by the system during the storm.

  2) Infiltration system empty at beginning of storm and full at end.

  3) Rainfall and infiltration rates constant for duration of storm, including a safety factor.
- Subgrade must be relatively permeable (not appropriate for clay).
- Requires excavation filled with drain rock and wrapped top, sides and bottom with filter fabric. Excavation is sized to accommodate water quality volume storm, accounting for 38-40% void space of gravel fill.
- A buried catch basin (concrete, plastic, or metal) or large diameter pipe with open bottom set on end can be used to contain drain rock.
- Roof downspouts are attached to the dry well, an overflow pipe is provided for runoff in excess of water quality volume.
- Provide perforated observation pipe (such as a 6" diameter PVC) to allow for inspection and maintenance.
- Provide pre-treatment sedimentation basin for composite roofs. This can be a small plastic valve box with open bottom.

Maintenance

- Requires inspection at beginning of rainy season.
- Remove sediment from sedimentation basin prior to rainy season.

Economics

- Relatively inexpensive to construct and maintain.

Buildings

Cistern

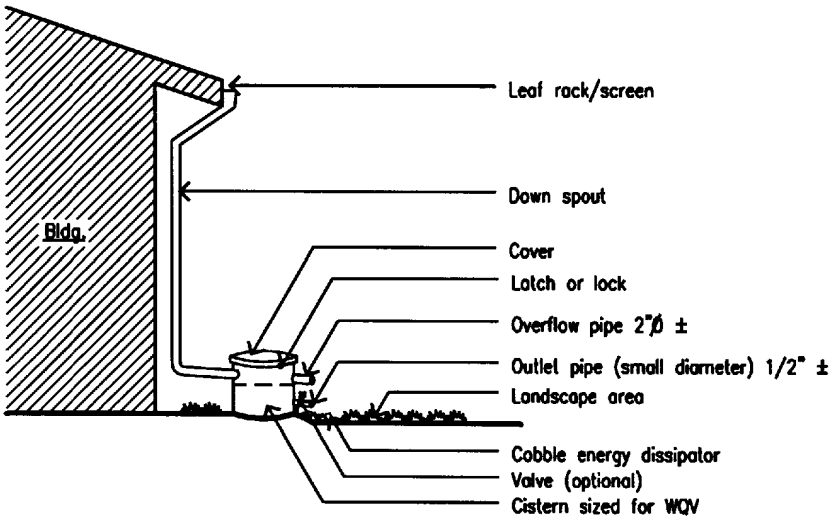

Conditions, dimensions, and materials shown are typical. Modifications may be required for proper application, consult qualified professional.

Cistern. A cistern is an above ground storage vessel that is directly connected with the roof downspout. Water is slowly released with either a manually operated valve or a permanently open outlet.

Characteristics

- Cisterns can be incorporated into the aesthetics of the building and garden. Japanese, Mediterranean and American southwest architecture provide many examples of attractive cisterns made of a variety of materials.
- Reduces peak runoff and allows sediment to settle.
- Provides more infiltration benefits than connecting directly to storm drain.

Applications

- Residential, commercial, office buildings.

Design

- Manually operated valve can be closed to store stormwater for irrigation use or infiltration between storms.
- Cistern must be covered to prevent mosquitoes from breeding.
- Permanently open outlet must be sized appropriately. If it is significantly smaller than the size of the downspout inlet (approx. 1/4 to 1/2 inch diameter), runoff will build up inside the cistern during storms, and will empty out slowly after peak intensities subside, mitigating the peak flow runoff from impervious rooftops, especially for the frequent, small storms.
- Size cistern for water quality volume, provide overflow for larger storms.
- Provide secure cover or ≤ 4" top opening if holding more than 6" depth of water, to prevent small children from gaining access to the standing water.
- Provide screen on gutter and intake of outlet pipe to minimize clogging by leaves and other debris.

Maintenance

- System requires regular monitoring and cleaning.
- Maintenance required to ensure that system is not clogged by leaves or other debris.

Economics

- Low installation cost.

Buildings

Foundation planting

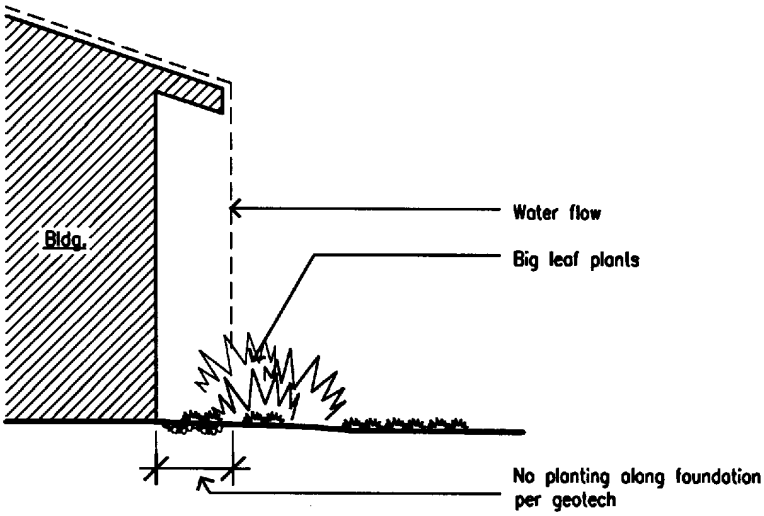

Conditions, dimensions, and materials shown are typical. Modifications may be required for proper application, consult qualified professional.

Foundation planting. Landscape planting around the base of the eaves can reduce the physical impact of water on the soil and provide a subsurface matrix of roots that encourage infiltration.

Characteristics

- Foundation planting serves function of to provides increased opportunities for stormwater infiltration.
- Planting protects the soil from erosion caused by concentrated sheet flow coming off the roof, reducing the amount of sediment in urban runoff.

Applications

- For buildings that do not use a gutter system.

Design

- Locate plants at the roof drip-line.
- Select plants with high capacity for vertical water storage.
- Select plants with leaf architecture that intercepts rainwater and traps it for eventual evaporation.
- Select plants sturdy enough to tolerate the heavy runoff sheet flows, and periodic soil saturation.
- Provide mulch cover in planting bed to protect soil from impact of falling rainwater and to increase soil water-holding potential.
- Protect perimeter of foundation as required by local soil conditions.

Maintenance

- Regular garden maintenance.

Buildings

Pop-up drainage emitter

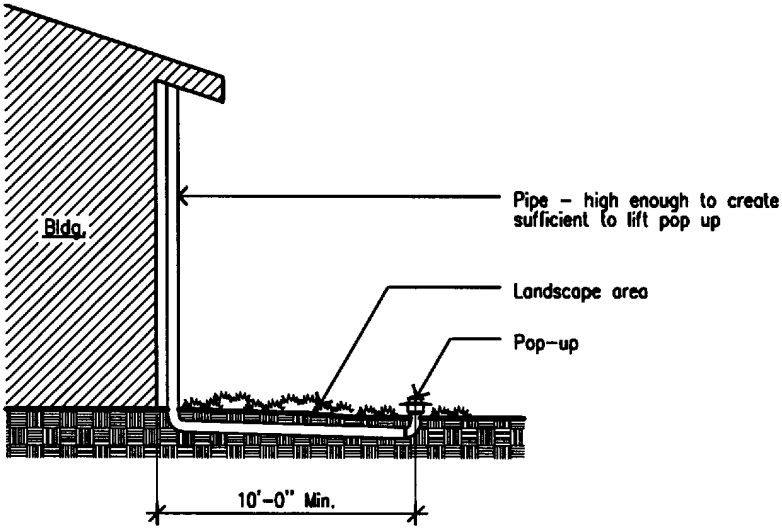

Conditions, dimensions, and materials shown are typical. Modifications may be required for proper application, consult qualified professional.

Pop-up drainage emitters allow water collected by downspouts and roof gutter systems to flow through a drainage pipe away from structural foundations, and "pop-up" to disperse in lawn or landscaped areas.

Characteristics

- Emitter is opened by the hydrostatic pressure flowing through the drain pipe. As flow diminishes, the emitter closes again.
- Blends into the surrounding landscape; appearance similar to standard pop-up sprinkler.
- Sheet flow of runoff allows for infiltration.

Applications

- Can use for water captured by standard gutter and downspout system, grates, catch basins, grates and drains.
- Can use to divert water away from erosion-prone or poor drainage areas.
- May be more effective in certain soil types.

Design

- Size emitter(s) according to downspout and watershed (roof area) size.
- Design pipe riser to height required to create head sufficient enough to lift pop-up.
- Design outfall to sheetflow onto vegetated area (such as lawn or groundcover) or suitable landscaped or paved infiltration and drainage system.

Maintenance

- Standard maintenance practices can be used.
- Emitter is only open when water is flowing through the drain pipe, minimizing the risk of debris and rodents entering the pipes.

Economics

- Emitter unit cost $12-20 each plus pipe.

Examples/resources

- City of Milpitas has info. on the sq. ft. of landscape required per sq. ft. roof.

8.6 Landscape

Landscape solutions for stormwater quality combining site engineering – grading and drainage – with landscape architecture. This presents an opportunity for civil engineers and landscape architects to cooperate on the designs for integration of function and aesthetics.

One concern among developers and property owners is that landscape stormwater infiltration and detention areas will become subject to government regulation as wetlands after they are established.

According to the California Regional Water Quality Control Board, these landscape areas are not classified as jurisdictional wetlands *subject to mitigation if their land use is later changed, as long as:*

- *the design elements (e.g., swales, ponds) are clearly identified on plans and documentation as stormwater treatment areas (BMPs),*
- *the design elements are not used as mitigation for impacts to other wetlands, and*
- *the design elements do not impact or replace existing wetlands.*

Landscape

Grass/vegetated swales

Extended detention (dry) ponds

Wet ponds

Plant species selection for infiltration areas

Landscape

Grass/vegetated swales

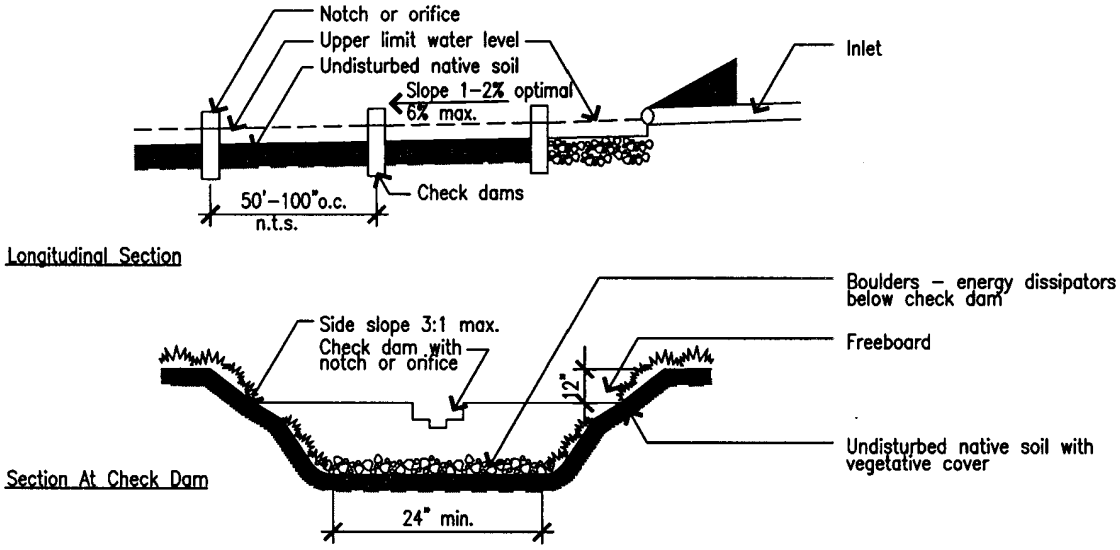

Conditions, dimensions, and materials shown are typical. Modifications may be required for proper application, consult qualified professional.

Grass/vegetated swales. An alternative to lined channels and pipes, grass and vegetated swales are vegetated earthen channels that convey and infiltrate water and remove pollutants.

Characteristics

- If properly designed and maintained, swales can last for at least 50 years.
- Can be used in all types of soil. In clay or impermeable soils, swale may require an underdrain to keep maximum water residence time below 24 hours. In sandy or highly permeable soils, swale may require soil amendments to maintain dense turf or vegetation.
- When swales are not holding water, they appear as a typical landscaped area.
- Pollutants and water are filtered by grass/vegetation and removed by infiltration into soil.
- Swales remove suspended solids, the pollutants that are adsorbed onto the solids (including heavy metals and nutrients), oil and grease.

Applications

- Swales require approx. 1200 square feet minimum per impermeable acre (i.e., they will occupy an area equal to at least 2.75% of site's total impermeable area)
- A single grassy swale can drain approximately 4 acres of land. Multiple swales would be required to drain a larger site.
- Parking lot medians, perimeters of impervious pavements.
- Street and highway medians, edges (in lieu of curb and gutter, where appropriate).
- In combination with constructed treatment systems or sand filters.

Design

- Grass swales move water more quickly than vegetated swales. A grass swale is planted with turf grass; a vegetated swale is planted with bunch grasses, shrubs or trees.
- Pollutant removal effectiveness can be maximized by increasing residence time of water in swale.
- Incorporate systems that temporarily divert flows to allow for maintenance.

Longitudinal slope Optimal longitudinal slope is approximately 2% at bottom of the swale. Low slopes reduce public hazards and limit erosion by reducing water velocities and increase pollutant removal by increasing residence time.

For slopes ≤1%, install an underdrain to limit standing water in swale.

Install check dams approximately every 50 to 100 feet on slopes between 4% and 6% to reduce velocity.

Do not use swales on slopes greater than 6%.

Installing turf block bottoms on grass swales can minimize wet, muddy con-

Grass/vegetated swales, continued

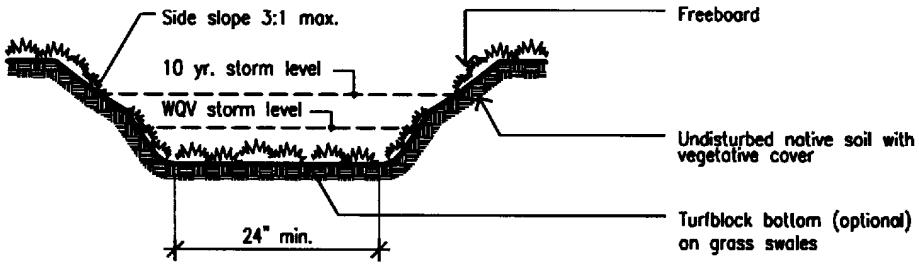

Typical Section

Conditions, dimensions, and materials shown are typical. Modifications may be required for proper application, consult qualified professional.

ditions that hinder maintenance activities.

Side slope 3:1 (horizontal:vertical) or shallower, to limit erosion and to improve maintainability.

Residence time 9 minutes achieves approximately 80% removal of total suspended solids (TSS).

Inlet Sheet flow or multiple dispersed inlets are better than a single inlet.

If a single inlet (pipe or curb cut) is necessary, design an energy dissipator and flow spreader (such as cobbles or gravel) where water enters the swale to reduce erosion and maintenance.

Planting Select plant species that can survive through both periods of inundation and periods of drought.

A variety of grass species, including native and non-native, can together produce a swale turf that is adapted to varying site environments (see table).

Both trees and shrubs can be located adjacent to swales, and on the banks of larger swales.

If planted with turfgrass, provide supplemental irrigation, to keep swale green year round.

Establishment If establishing vegetation during the dry season, it must be planted at least one month prior to the beginning of the rainy season and irrigated to promote establishment until regular rains begin.

If establishing vegetation during the wet season, divert stormwater runoff from the swale during the first rainy season in which the vegetation is being established.

Erosion control measures such as netting or blankets may be used to aid establishment.

Mosquito prevention Design for maximum residence time of 24 hours (mosquitoes generally require 48 hours to breed and hatch).

Maintenance

- Grass swale maintenance includes mowing and removing clippings and litter; vegetated swales may require additional maintenance of plants.
- Periodically remove sediment accumulation at top of bank, in swale bed, or behind check dams.
- Monitor for erosion and reseed grass or replace plants, erosion control netting and mulch as necessary.
- Fertilize and replace turf well in advance of rainy season to minimize water quality degradation.

Economics

- Grass swale construction cost per linear foot $4.50-$8.50 (from seed) to $15-20 (from sod), compare to $2 per inch of diameter underground pipe

e.g., a 12" pipe would cost $24 per linear foot).

- $0.75 annual maintenance cost per linear foot

Examples/resources

- 10.9 acre site drains parking lot and roof runoff into swales. BT Office Supply Warehouse, 6601 Overlake Place, Newark, CA.
- Parking lot and roof runoff drains to swale at office building. 3150 Porter Drive, Palo Alto, CA.
- Santa Clara Valley Water District offices. 5750 Almaden Blvd., San José, CA.
- Landscape Architecture Technical Information Series (LATIS), *Vegetated Swales*, 1999.

Grass species for swales

There are many alternatives to conventional turfgrass suitable for use in vegetated swales.

Scientific Name	*Festuca rubra †*
Common Name	Molate/Red fescue
Agrostis exerata †	*Hordeum brachyantherum †*
Bentgrass	Meadow barley
Bromus carinatus †	*Hordeum brachyantherum salt †*
California Brome	Meadow barley salt
Buchloe dactyloides	*Juncus spp.*
Buffalo Grass	Rushes
Elymus triticoides	*Stipa pulchra †*
Creeping wildrye	Purple needle grass
Festuca idahoensis	*Vulpia myuros v. hirsuta †*
Idaho fescue, Blue bunchgrass	Zorro annual fescue

† California native

Landscape

Extended detention (dry) ponds

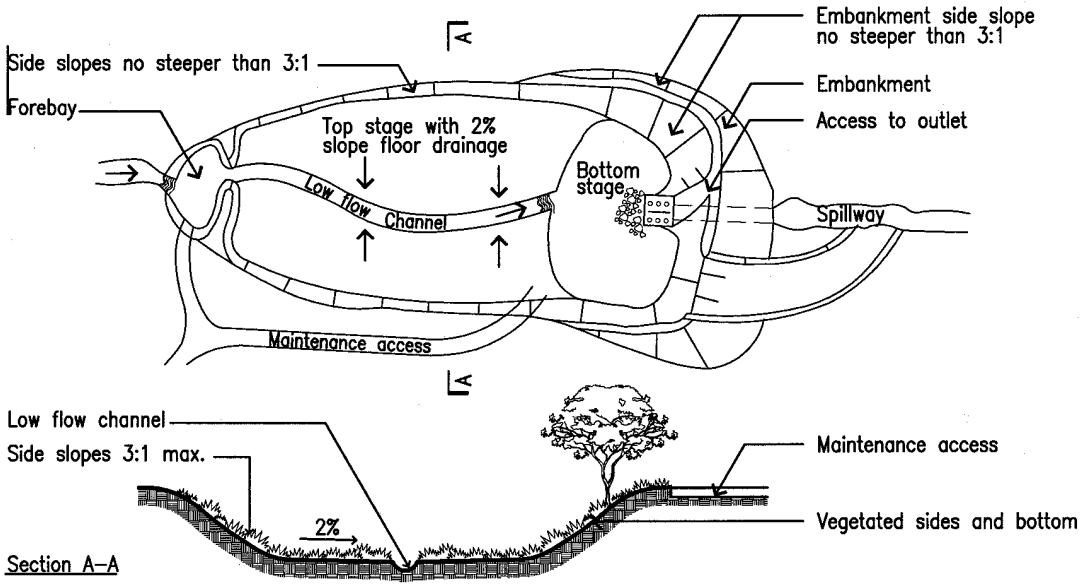

Conditions, dimensions, and materials shown are typical. Modifications may be required for proper application, consult qualified professional.

Extended detention (dry) ponds store water during storms for a short period of time (from a few hours up to a few days), and discharge water to adjacent surface waters. They are *dry* between storms, and do *not* have a permanent pool of water.

Characteristics

- If properly designed, ponds can have a lifetime of 50 years.
- Clay or impervious soils should not affect pollutant removal effectiveness, as the main removal mechanism is settling.
- Pollutants removed primarily through gravitational settling of suspended solids, though a small portion of the dissolved pollutant load may be removed by contact with the pond bottom sediments and/or vegetation, and through infiltration.
- Moderate to high removal of suspended solids (sediment) and heavy metals.
- Low to moderate removal of nutrients and Biological Oxygen Demand (B.O.D.).
- Pollutant removal can be maximized by increasing residence time (average 24 hours); two-stage pond design, with the addition of wetland vegetation to lower stages of the pond; sediment-trapping forebay to allow efficient maintenance; regular maintenance and sediment cleanout; installing adjustable gate valves to achieve target detention times; designing pond outlet to detain smaller treatment volumes (less than two-year storm event).

Applications

- May be initially used as construction settling basins, but must be regraded and cleaned out before used as a post-construction wet pond.
- May be designed for both pollutant removal and flood control.
- May be appropriate for developments of 10 acres or larger.
- Potential for multiple uses including flood control basins; parks, playing fields, and tennis courts; open space; overflow parking lots.

Design

- Coordinate pond design, location, and use with local municipal public works department and/or county flood control department to reduce potential downstream flooding.
- Default conditions for safety have been to fence basins with chain link. Consider aesthetic design elements with safety analyst to address pond barriers, such as fencing and/or vegetation, and shallow side slopes (8:1 to 12:1).

Residence time Design pond for an average residence time of 24 hours, with a maximum of 40 hours.

Slopes Inside basin slopes should be not greater than 3:1 (horizontal:vertical), to minimize erosion and allow heavy equipment access for periodic cleanout.

Inlet Design energy dissipation at the inlet to minimize erosion and promote settling in the forebay. A trash rack can be installed at the inlet to capture large debris before it enters the basin.

Outlet Vertical risers, negatively sloped pipes, and perforated pipes in a gravel bed are all methods of discharging water from the pond. Vertical risers have the advantage of being less susceptible to clogging.

Vegetation Vegetation can enhance pollutant removal and the aesthetic appearance of extended detention ponds. Specify emergent wetland vegetation and non-wetland plants tolerant of inundation.

Mosquito prevention Minimize pond area that has a depth less than 18 inches.

Use foundation aeration to limit periods of still water during detention.

Plant emergent vegetation with minimal submerged growth.

Apply *Bacillus* (Bti) or other bacteria.

Maintenance

- Regular inspection during wet season for sediment buildup and clogging of inlets and outlets (designing forebay to trap sediments can decrease frequency of required maintenance, as maintenance energy is concentrated towards a smaller area of the basin, and less disruptive than complete cleaning).
- Clean inlet trash rack and outlet standpipe as necessary.
- Clean out basin sediment approximately once per year (this may vary depending on pond depth and design, and if forebay is used). Once site is stabilized, annual cleaning will not likely be needed.
- Mow and maintain pond vegetation, replant or reseed as necessary to control erosion.

Economics

- Least expensive stormwater quality pond option available. 0-25% additional cost when added to conventional stormwater detention facilities.
- Construction cost $0.10-$5.00 per cubic foot of storage (savings from preparing silt basins used during construction for use as extended detention ponds).
- Maintenance cost 3-5% of construction cost annually.

Landscape

Wet ponds

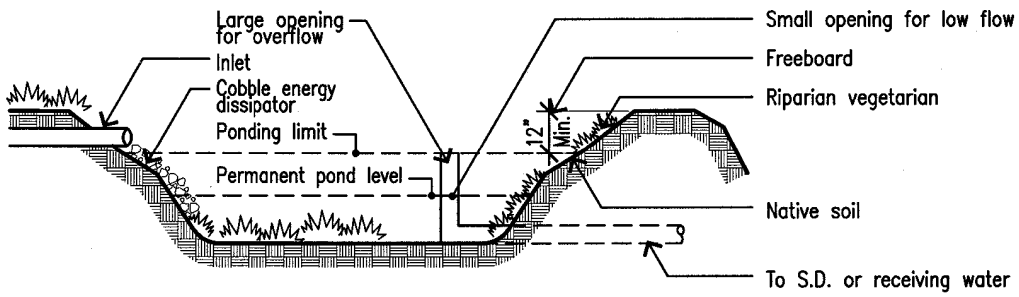

Conditions, dimensions, and materials shown are typical. Modifications may be required for proper application, consult qualified professional.

Wet ponds are permanent pools of water that detain and treat stormwater runoff. They can be enhanced by designing a forebay to trap incoming debris and sediment, and by establishing a fringe wetland at the pond edge to increase pollutant removal and enhance the aesthetic, economic, and habitat value of the pond.

Characteristics

- If properly designed, wet ponds can last indefinitely.
- Clay or impervious soils should not affect pollutant removal effectiveness, as the main removal mechanism is settling.
- Can increase property values by providing a significant landscape amenity.
- Wet ponds provide moderate to high removal of most urban stormwater pollutants, including total suspended solids, sediment, heavy metals, phosphorus, nitrogen, and B.O.D. Removal rates are dependent on residence time of water in pond, amount of wetland vegetation fringing the pond, and other factors.
- Pollutants are removed by settling suspended solids, uptake by wetland plants and algae, and bacterial decomposition.

Applications

- Wet ponds are appropriate for stormwater drainage in a development or project with a drainage area greater than approximately 2 acres, but are more cost effective for drainage areas greater than 10 acres.
- Landscape amenity in residential or commercial development with opportunities for passive recreation (e.g., birdwatching, fishing, boating), and can be combined with consideration to pedestrian and bicycle circulation to provide active recreation.
- May be initially used as construction settling basins, but must be regraded and cleaned out before used as a post-construction wet pond.

Design

- Coordinate pond design, location, and use with local municipal public works department and/or county flood control department to reduce potential downstream flooding.
- Pretreatment may be needed to remove trash, debris and sediments and to reduce maintenance.
- For risk management, basins area often fenced. Other alternatives to minimize risk include screening vegetation and shallow side slopes (8:1 to 12:1).

Area Surface area must equal 1% of the drainage area for high pollutant removal (e.g. 100 acre drainage area would require a 1 acre wet pond).

Storage volume Design permanent pool to store 0.5-1.0" of runoff per contributing watershed area (a storage volume of 1.0" of runoff per contributing watershed area in the Bay Area will capture and treat the runoff from about 75-85% of the rainstorms each year).

Residence time In general, pollutant removal increases as residence time increases. Pollutant removal can be accomplished with a few days of residence time. The California Stormwater BMP Handbook: Municipal recommends that removal of very fine sediments and removal of dissolved nutrients by plants requires a minimum residence time of 14 days.

Side slopes Forebay side slopes 4:1 to allow access for heavy equipment for periodic cleanout and sediment removal.

Permanent pool side slope 4:1 or shallower if wetland vegetation will be planted around the edge. Shallower slopes will also increase safety and wildlife habitat value.

Depth Range from 3 to 9 feet maximum. A depth greater than 9 feet may produce odor generated from depletion of oxygen in bottom sediments.

Length to width ratio Minimum 3:1 length:width ratio, baffles separating inflow and outflow pipes, and small islands will help avoid flow short circuiting.

Inlet and Outlet Energy dissipation should be used to minimize erosion and promote settling in the forebay.

A weir overflow should be used to pass high-return period (50- or 100- year) flows through the pond and to avoid erosion and flooding.

Vegetation Wet ponds may be constructed with or without a fringe wetland. If fringe wetland is not used, inundation-tolerant grass or other vegetation may be used on the banks. However, this will lower pollutant removal and wildlife value. Wet pond vegetation should consist of wetland plants, including emergent plants, and non-wetland plants tolerant of inundation.

Where fringe wetlands are used, wetland vegetation should occupy 25-50% of the pond surface area to enhance pollutant removal.

Establish vegetation with irrigation 6 months prior to the rainy season, to stabilize the wet pond prior to the rainy season. If this is impossible, appropriate erosion control measures such as blankets, matting, or mulch may be used.

Maintenance

- Check facility annually and after each major storm for erosion and debris.
- Approximately every 2-5 years (when 10-15% of storage volume has been lost), remove sediment from forebay and main pool. Studies generally indicate that pond sediments meet sludge toxicity limits and can be safely disposed of as normal landfill.
- Replant or reseed as necessary to control erosion.
- Provide supplemental water in summer, if required.

Economics

- Construction cost: $0.50-$1.00 per cubic foot of storage.
- Annual maintenance cost is approximately 5% of capital cost for <100,000 cubic feet of storage; 3% for 100,000-1,000,000 cu. ft.; 1% for >1,000,000 cu. ft.

Examples/resources

- Ponds planned to receive summer dry weather flows from landscape irrigation and car washing uses in residential development. Basking Ridge, San José CA.
- West Davis Ponds, Davis, CA.
- Parking lot and structure runoff drain to wet pond in strip mall development. South Napa Marketplace, Napa CA.

Landscape

Plant species selection for infiltration areas

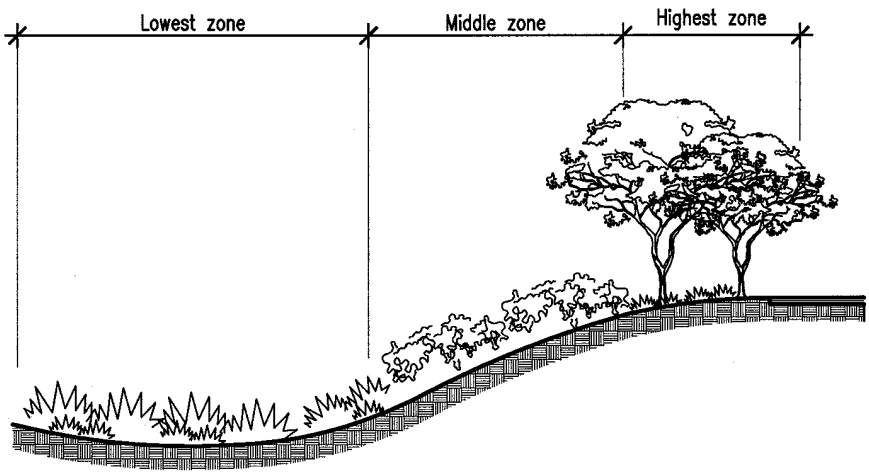

Conditions, dimensions, and materials shown are typical. Modifications may be required for proper application, consult qualified professional.

Plant species selection for infiltration areas can improve the infiltration potential of landscape areas as well as improve the aesthetics of design.

Characteristics

- Deep rooted plants help to build soil porosity.
- Leaf surface-area helps collect rainwater before it lands on the soil, especially in light rains, increasing the overall water holding potential of the landscape.
- Select species that are tolerant of moist soils or periodic inundation, as well as drought if planted without supplemental irrigation.

Applications

- Applicable to all treatment devices that incorporate plant materials.

Design

- Select appropriate plant species depending on zone of innundation: lowest, middle, and highest.
- Most plants and grasses require initial irrigation during establishment period, as well as during dry periods.
- Select the appropriate plant for the use, water cycle, and aesthetic goals.
- Consider sight-line and other requirements for parking lots and street-side plantings.
- Include mulch cover in planting areas.

Maintenance

- Maintenance can have a significant impact on soil permeability and its ability to support plant growth. If the soil is exposed or bare, it can become so hot that surface roots will not grow in the upper 8 to 10 inches, where the majority of small absorbing roots lie. The common practice of removing all leaf litter and detritus with leaf blowers creates a hard crusted soil surface of low permeability and high heat conduction. Proper mulching of the soil surface improves water retention and infiltration, while protecting the surface root zone from temperature extremes.
- Slightly more attention to maintenance and care of plant material may be required than in non-infiltration areas.

Economics

- Riparian and native plant material species are approximately 20% more expensive to purchase than common landscape species.
- Changing from the leaf blower maintenance practice to more manual practices may increase labor cost.

Plant Species for Infiltration Areas

Most infiltration and detention basins are designed to remain inundated for less than 48 hours (drawdown time). The following trees and shrubs tolerate wet soil and periodic inundation, and may be suitable for planting in basins and biofilters depending on regional hardiness and other factors. This list is not all-inclusive, and draws from both native and exotic species. Local riparian habitats may provide additional native species suitable for wet locations.

Highest Zone

Acer negundo	Box Elder
Acer rubrum	Red Maple
Acer saccharinum	Silver Maple
Alnus spp.	Alder
Betula spp.	Birch
Carya illinoensis	Pecan
Carya ovata	Buttonbush
Casuarina spp.	She-Oak
Clethra arborea	Lily-of-the-Valley
Cornus stolonifera	Redtwig Dogwood
Diospyros virginiana	Persimmon
Eucalyptus camalduensis	Red Gum
E. citriodora	Lemon Gum
E. erythrocorys	Red-Cap Gum
Fraxinus latifolia	Oregon Ash
Gleditsia triacanthos	Honey Locust
Liquidambar styraciflua	Liquidambar
Liriodendron tulipifera	Tulip Tree
Magnolia grandiflora	Southern Magnolia
M. virginiana	Sweet Bay
Melaleuca quinquenervia	Cajeput Tree
Nyssa sylvatica	Tupelo
Picea sitchensis	Sitka Spruce
Platanus x acerifolia	London plane
Platanus occidentalis	Sycamore
P. racemosa	California Sycamore
Populus deltoides	Cottonwood
Pterocarya stenocarpus	Wingnut
Quercus macrocarpa	Bur Oak
Q. palustris	Pin Oak
Salix spp.	Willow
Sequoia sempervirens	Coast Redwood
Taxodium distichum	Bald Cypress
Thuja occidentalis	Arborvitae

Middle Zone

Cornus stolonifera	Redtwig Dogwood
Gaultheria shallon	Salal
Equisetum hyemale	Horsetail
Ferns (many spp.)	Fern
Iris (many spp.)	Iris
Mimulus	Monkeyflower
Miscanthus sinensis	Japanese Silver Grass
Myoporum parvifolium 'Putah Creek'	Myoporum
Myrica	Pacific Wax Flower
Salix spp.	Willow
Vaccinium	Huckleberry

Lowest Zone

Acorus gramineus	Acorus
Carex spp.	Sedge
Deschampsia caespitosa	Tufted Hairgrass
Iris (many spp.)	Iris
Leucothoe davisiae	Sierra Laurel
Scirpus cernuus	Bulrush
Juncus spp.	Rush
Tradescantia virginiana	Spiderwort
Typha latifolia	Common Cattail

Table adapted from Harris (1992), Sunset Western Garden Book (1988), and ABAG (1995b)

9 Next Steps

This document illustrates an approach and philosophy towards site planning and design for stormwater management. The design details and site planning principles presented here are proven, practical methods for reducing the impact of new development on environmental quality.

This approach seeks to restore the hydrologic cycle by infiltrating runoff into the soil as close to its source as possible. It proposes simple site planning principles to cluster development, preserve natural areas, and avoid development on fragile lands. It accepts impervious land coverage as an environmental indicator, and seeks to maximize the permeability of new development. It aims to achieve all these objectives economically while creating communities that are more beautiful and desirable places to live.

The document has one goal: to create better projects. Because of the complex nature of development, this goal can only be achieved if developers, regulatory agencies, local governments, designers, contractors, maintenance staff, and others in the real estate industry work cooperatively.

Each group active in development can take a series of steps to create better projects.

Next Steps

9.1 Frequently asked questions
9.2 Getting started
9.3 Keys to success
9.4 Resources

Communities can be built that reward investment, are kind to the natural environment, and make better places for people to live.

Next Steps

9.1 *Frequently asked questions*

9.1 Frequently asked questions. The techniques described in this document have three basic goals:

– to minimize or reduce overall impervious land coverage,
– to ensure that remaining impervious areas are not directly connected to a storm drain system as far as feasible, and
– to slow runoff within a drainage system.

Because this approach is different than the conventional stormwater management approach of conveying water offsite as quickly as possible – "getting rid of the water" – it often raises questions. A few of the most frequently asked questions are addressed below.

If pollutants infiltrate into the soil, will there be a problem with contaminated soil or groundwater in the long term?

Not usually, especially in residential areas. The risk of contamination is a function of a compound's relative mobility, concentration, and solubility. In residential areas, the concentrations of most pollutants are generally low, and capturing them in the ground where they will eventually degrade is usually the best way to manage them. A recent study published by the U.S. EPA found that residential areas pose the least risk of groundwater contamination from infiltration practices. This study found that the risk from compounds with greatest potential for groundwater pollution – nitrate-nitrogen, pesticides, organic compounds and heavy metals – was generally low provided that runoff percolates through the soil layer. Runoff from some sites in residential communities with higher concentrations of pollutants, such as car wash facilities and service stations, may not be suitable for infiltration.

If water is standing in pools, won't they breed mosquitoes?

Not if the pools are properly designed. All of the techniques described in this document that utilize surface drainage – such as infiltration basins, biofilters, and detention basins – can be designed to dry up within 48 hours of a storm. Even an extended retention basin, which is a semi-permanent pool that holds water for two or three weeks, should be designed to dry up in the spring before temperatures are warm enough to breed mosquitoes.

What about expansive clay soils that don't infiltrate?

The Bay Area's expansive clay soils – with their high runoff potential and low infiltration rates – present special challenges. Also, because these soils have a high swelling potential, care must be taken to prevent damage to foundations from saturated soils. Though infiltration may not be feasible, retention and detention strategies that hold water for later release are often practical. Minimizing impervious land coverage and directly-connected impervious areas are also viable strategies, even in expansive clay soils.

You recommend reducing street widths by adopting "neo-traditional" standards. How is that going to help?

The street is the single most important design element in site planning. Reducing street widths can reduce overall impervious land coverage significantly. For example, most Bay Area municipal street standards mandate between 80 and 100% impervious surface coverage in the right-of-way for streets, curb, gutter and sidewalk. If new standards are adopted for the most lightly traveled local streets, impervious surface coverage can be reduced by 25 to 60%. This alone helps to reduce the generation of "new" runoff from a proposed development. If the street design includes alternative stormwater collection strategies, such as linear biofilters and infiltration basins rather than standard catch basins and storm drains, the pollution generated by vehicles can be controlled near its source.

What about cost? Aren't these designs expensive to build?

These designs emphasize source control because it's the cheapest form of pollution control. Treatment control systems – collecting pollutants and treating them at the end of a pipe before the outfall – are more expensive to build and maintain, and require treating greater quantities of runoff.

Of the source control designs illustrated here, costs vary. Some designs, like concave vegetated surfaces or sloping driveways towards adjacent landscape rather than towards curbs and gutters, are cost neutral. Others, like gravel parking aisles, are less costly than conventional pavements. Cluster development, a

Next Steps

9.1 *Frequently asked questions, continued*

strategy for minimizing overall impervious land coverage, can be less expensive than conventional development because of reductions in roadway and utility requirements. Some of the techniques, such as pervious concrete, do add cost when compared to conventional materials, but these costs can sometimes be offset by savings generated by not having to install an underground drainage system.

Aren't these designs more expensive to maintain? And who's responsible for maintaining them, anyway?

Though some of the design details need special maintenance, many of them don't. For example, a lawn with a gently sloping concave surface requires the same maintenance as one that is convex. Yet the concave lawn holds water, making it a stormwater management device, while the convex lawn sheds water, making it a contributor to "new" runoff. Overall, the maintenance requirements of the designs recommended here can be comparable to conventional practice, though they may require a different kind of maintenance.

Maintenance responsibility will depend on the control's design and location. Some controls located on private property, such as a dry well or concave lawn near a home, will be maintained by the homeowner. Other controls, such as swales or basins along streets or in parks, may be maintained by a public agency. Still others may be the responsibility of a homeowner's association or management company. In all cases adequate maintenance and proper education are critical to the long-term viability of each control. Once people understand the design intent of a control, and are given guidance on its proper maintenance, acceptance increases and maintenance effort can be optimized.

What about liability?

Compared to building large, single detention basins, the approach described in these pages minimizes risk. By minimizing impervious surface coverage and creating multiple, small basins in the landscape, overall runoff is reduced, and the runoff that remains is held in small, shallow pools for limited periods of time. These small source controls, if properly designed and maintained, present very limited risk.

For example, Village Homes, in Davis, California was built in the mid-1970s using a surface drainage system that includes infiltration basins in private gardens, community lawns and children's playgrounds connected by a continuous network of seasonal swales and pools. For over twenty years this system has functioned successfully in a residential environment with no injuries or litigation associated with the storm drain system.

Where can I get more copies of this manual?

Call your local stormwater program (see Resources, p. 154). They can get you more copies of this manual and help you to implement its design philosophy into your project.

I need more technical information. Where can I get it?

This document contains general technical information and design guidance. For more technical information, see the Resources section and the bibliography.

Next Steps

9.2 *Getting started*

9.2 Getting Started. The following lists illustrate the wide range of options available that each of the groups active in development can take to begin implementing guidelines for better site planning and design. The lists are not meant to be mandates or all-inclusive, but to serve as a menu for each community to select from depending upon priorities, resources, and local conditions.

Regulatory agencies

- promote education and exchange of information on stormwater management
- create a regulatory environment that facilitates the implementation of better stormwater management practices
- assist local governments in the monitoring and evaluation of alternative stormwater management practices
- recognize and reward projects that take risks and that embrace better stormwater management practices.

Local governments

- adopt standards and alternatives for design and stormwater management, such as impervious surface reduction and on-site stormwater infiltration or detention
- establish an incentive program to encourage alternatives that achieve water quality goals
- establish a penalty program for projects that do not achieve water quality goals
- adopt access street standards for low volume, access streets
- adopt drainage standards and details that permit surface drainage and infiltration/retention systems in combination with conventional underground conveyance systems
- review zoning and other ordinances for driveways, setbacks, lot coverage, and other factors to accommodate more environmentally responsible land use
- modify maintenance practices on public lands and in the public right-of-way to accommodate stormwater infiltration/detention systems
- build a culture of environmental stewardship across all departments and offices
- use these principles and techniques in siting and designing government facilities.

The building industry

- think of water as an amenity to be featured rather than a liability to be gotten rid of or a hazard from which the public must be protected
- market the stormwater system as a landscape feature that can improve product competitiveness
- explore techniques that have proven successful elsewhere, but have not yet been widely used in the Bay Area
- work cooperatively with local governments to build prototype projects that demonstrate better stormwater management practices
- invest in designs and materials that may have a higher initial cost, but that yield long-term value
- educate landscape crews on maintenance practices for stormwater infiltration systems and soil health
- exhibit a willingness to take risks in order to advance the industry and improve the environment.

Design professionals

- invest in continuing education to learn about better stormwater management practice and design
- educate clients and approval bodies on the principles and advantages of designing developments for better stormwater management
- test designs and approaches to ensure successful implementation
- conceive of the drainage system as a fundamental design element to be creatively explored
- complete post-construction review of built projects to evaluate long-term performance of stormwater system designs
- practice continuous incremental improvement of stormwater system designs and detailing.

Next Steps

9.3 *Keys to success*

9.3 Keys to success. Site planning and design for stormwater management involves the coordination of many disciplines and activities. Building successful projects requires careful follow-through from concept to design to construction and maintenance.

Conceptual stage

- be sure to understand site constraints, local microclimates, and soil conditions
- determine regulatory environment and which particular design strategies are favored by regulatory agencies
- have a preliminary meeting between the development team and local government officials to discuss overall stormwater management goals and strategies
- consult local stormwater program to learn what has worked (and what hasn't) in a local area.

Design stage

- establish a stormwater management awareness among all disciplines in the design team
- hold regular cross-discipline coordination meetings to evaluate overall stormwater management solutions as design develops
- consult with local nurseryperson or horticulturist to determine appropriate plant material selection for the site's microclimate
- verify that stormwater systems are sized appropriately for the given water quality volume, and that residence time will be within acceptable limits
- carefully coordinate related design elements, especially
  – underground utilities and surface drainage
  – curb cuts and catch basins
  – materials and pavement selection
  – downspouts, area drains and roof drains
  – grading of roads, parking and adjacent landscape areas
- check proposed stormwater solutions with geotechnical engineer to verify suitability given site soil conditions

Construction documents stage

- ensure details and specifications are coordinated across disciplines (e.g. civil engineering and landscape architecture)
- if plans call for unconventional detailing, such as notched curbs or porous asphalt, be sure they are clearly and boldly identified on the drawings as different from conventional details (or contractor may not notice the difference)
- double-check all calculations for proper sizing and function
- if using manufactured products, such as turf block or catch basin inserts, take advantage of manufacturer's design consultation services, if available

Construction stage

- hold a pre-bid meeting with all contractors to review principal design elements and site conditions
- hold a pre-construction meeting with selected contractor to review construction documents in detail, especially details that differ from those conventionally used
- explain to the contractor the design intent of the various stormwater management designs– if they understand why something is designed a certain way, they are more likely to build it the way it's designed
- insist on meeting with the job foreman, not just the contractor's estimator or client service representative– the foreman will be the one actually supervising the work
- make periodic site visits during construction to ensure that designs are being correctly implemented

Post-construction stage

- hold a project closing meeting with the contractor to verify that designs were correctly implemented and to learn how they could be improved
- hold a meeting with the owner or the owner's maintenance staff to explain the stormwater system
- provide the owner and the maintenance staff with a Management Handbook describing how the stormwater system is designed to work and how to maintain it
- make post-occupancy visits to evaluate long-term performance

Next Steps

9.4 *Resources*

9.4 Resources. The following resources are available for further information and assistance with particular aspects of site planning and design for stormwater management protection.

Regional water resources and pollution prevention

Bay Area Stormwater Management Agencies Association (BASMAA)
1515 Clay Street, Suite 1400
Oakland, California 94612
voice: 510 622.2300
www.basmaa.org

Alameda Countywide Clean Water Program
510 670.5543

Contra Costa Clean Water Program
925 313.2360

San Mateo Countywide Stormwater Pollution Prevention Program
650 599.1406

Vallejo Sanitation and Flood Control District
707 644.8949

Fairfield-Suisun Urban Runoff Management Program
707 429.8930

Marin County Stormwater Pollution Prevention Program
415 485.3363

Santa Clara Valley Urban Runoff Pollution Prevention Program
800 794.2482

California Regional Water Quality Control Board
San Francisco Bay Region
1515 Clay Street, Suite 1400
Oakland, California 94612
510 622.2300

Central Valley Region
3443 Routier Road, Suite A
Sacramento, California 95827
916 255.3000

California Environmental Protection Agency
State Water Resources Control Board
901 P Street
Sacramento, California 95814
voice: 916 657.1025
fax: 916 657.2127

Local planning and development

Association of Bay Area Governments (ABAG)
P.O. Box 2050
Oakland, California 94604-2050
voice: 510 464.7900
fax: 510 464.7970
info@abag.ca.gov

Out-of-state planning and pollution prevention

Site Planning for Urban Stream Protection
available from Department of Environmental Programs
Metropolitan Washington Council of Governments
777 N. Capitol Street N.E., Suite 300
Washington, DC 20002
voice: 202 962.3200

The Center for Watershed Protection
8391 Main Street
Ellicott City, Maryland 21043
voice: 410 461.8323
New document for planning and zoning: *Rapid Watershed Planning Handbook: A Comprehensive Guide for Managing Urbanizing Watersheds.* October 1998.

Next Steps

9.4 *Resources, continued*

Nonpoint Education for Municipal Officials (NEMO)
Univ. of Connecticut Cooperative Extension System
1066 Saybrook Road, Box 70
Haddam, Connecticut 06438
voice: 860 345.4511
fax: 860 345.3357

Technical documents

California Storm Water Best Management Practice Handbooks
Stormwater Quality Task Force (Roesner, Walker, et. al.).
available through Blue Print Service, Oakland, CA.
510 287.5485

Design and Construction of Urban Stormwater Management Systems
American Society of Civil Engineers Manuals and Reports of Engineering Practice No. 77
Water Environment Federation Manual of Practice FD-20
jointly published by ASCE and WEF, 1992

Urban Runoff Quality Management
WEF Manual of Practice No. 23
ASCE Manual and Report on Engineering Practice No. 87
jointly published by American Society of Civil Engineers (ASCE) and the Water Environment Federation (WEF)
voice: (WEF) 703 684.2400
www.wef.org
www.asce.org

Stormwater Infiltration
by Bruce K. Ferguson
CRC Press
Boca Raton, FL

Methodology for Analysis of Detention Basins for Control of Urban Runoff Quality
Environmental Protection Agency (EPA-440/5-87-001)
Washington, DC

Economic Benefits of Runoff Controls
Environmental Protection Agency. (EPA 841-S-95-002)
Washington, DC

Low-Impact Development Design Manual
Department of Environmental Resources
Prince George's County, Maryland

On-site Residential Stormwater Management Alternatives
Dept. of Civil Engineering
University of Washington
3201 Fremont Avenue North
Seattle, Washington 98103
206 543.5539

Impervious Surface Reduction Study
City of Olympia Public Works Department
P.O. Box 1967
Olympia, Washington 98507-1967
voice: 360 753.8598
fax: 360 753.8087

Time-Saver Standards for Landscape Architecture, second ed.
by Charles W. Harris & Nicholas T. Dines, co-editors
McGraw-Hill Publishing Company, New York, 1998.

Traffic Engineering for Neo-Traditional Neighborhood Design
Institute of Transportation Engineers (ITE)
525 School Street, S.W., Suite 410
Washington, DC 20024-2729
voice: 202 544.8050
fax: 202 863.5486
www.ite.org

A Appendices

The following pages provide supplementary information for those seeking more detail on residential site planning and design guidance for stormwater quality.

The appendices were adapted from a variety of technical sources drawn from throughout the United States.

Appendices

A.1 Glossary. Relevant terms and acronyms used in the text and common to stormwater management issues.

A.2 Bibliography. A listing of relevant documents on site planning and design for stormwater management. These documents address a wide range of approaches to current practice, including engineering, environmental science, landscape arcitecture, planning, horticulture, real estate marketing and development.

A.3 Footnotes. References for information cited in the text.

Appendix A.1 *Glossary*

Access streets The lowest order street in the hierarchy of streets, it conducts traffic between individual dwelling units and higher order streets (such as collector and subcollector streets). Access streets convey the lowest traffic volume, and are prime candidates for reduced street widths.

Alternative modes of transportation Modes of transportation other than the single passenger automobile, such as transit, bicycling, carpooling, and walking.

Alternative surfaces Pavement types other than conventional asphalt or concrete. Examples include porous pavement and pavers.

Amenity Something that increases material or physical comfort.

Aquifer The underground layer of rock or soil in which groundwater resides. Aquifers are replenished or recharged by surface water percolating through soil. Wells are drilled into aquifers to extract water for human use.

Arterial street A street that provides a direct route for long-distance travel within the region and also to different parts of the city. Traffic on an arterial street is given preference at intersections, and some access control may be considered in order to maintain capacity to carry high volumes of traffic.

Average daily traffic (ADT) The average total number of vehicles that traverse a road or highway on a typical day. Often used to classify and design roadway systems.

Best Management Practice A method, activity, maintenance procedure, or other management practice for reducing the amount of pollution entering a water body. The term originated from the rules & regulations developed pursuant to the federal Clean Water Act (40 CFR 1 30).

Bioretention A technique that uses parking lot islands, planting strips, or swales to collect and filter urban stormwater, that includes grass and sand filters, loamy soils, mulch, shallow ponding and native trees and shrubs.

Buffer A zone created or sustained adjacent to a shoreline, wetland or stream where development is restricted or prohibited to minimize the negative effects of land development on animals and plants and their habitats.

Building footprint Commonly used term to describe the ground area that a building covers.

Catchment The smallest watershed management unit, defined as the area of a development site to its first intersection with a stream, usually as a pipe or open channel outfall.

Check dam (a) A log or gabion structure placed perpendicular to a stream to enhance aquatic habitat. (b) An earthen or log structure, used in grass swales to reduce water velocities, promote sediment deposition, and enhance infiltration.

Cluster Development A development pattern for residential, commercial, industrial, institutional, or combination of uses, in which the uses are grouped or "clustered," through a density transfer, rather than spread evenly throughout the parcel as in conventional lot-by-lot development. A local jurisdiction's Critical Area Program may authorize such development by permitting smaller lot sizes if a specified portion of the land is kept in permanent open space to provide natural habitat or open space uses through public or private dedication.

Collector street Acts as the primary traffic route within a residential or commercial area.

Constructed wetland An artificial wetland system designed to mitigate the impacts of urban runoff.

Contamination. The impairment of water quality by waste to a degree that creates a hazard to public health through poisoning or through the spread of disease.

Cul-de-sac A circular section located at the end of an access street that permits vehicles to turn around.

Curbs A concrete barrier on the margin of a road or street that is used to direct stormwater runoff to an inlet, protect pavement edges, and protect lawns and sidewalks from encroachment by vehicles.

Density The average number of families, persons, or housing units per unit of land, usually density is expressed "per acre".

Design storm A rainfall event of specified size, intensity, and return frequency (e.g., a storm that occurs only once every 2 years) that is used to calculate runoff volume and peak discharge rate.

Detention The temporary storage of storm runoff which is used to control discharge rates sufficiently to provide gravity settling of pollutants.

Detention time The amount of time water actually is present in a basin. Theoretical detention time for a runoff event is the average time parcels of water reside in the basin over the period of release from the basin.

Drainage basin (see Watershed) A land area bounded by high points, which drains all surface water into a single stream or other body of water.

Effective Impervious Surface The portion of impervious surface that generates stormwater runoff which must be managed or directed to a stormwater conveyance system, rather than infiltrating into the ground.

Ephemeral stream A stream or waterway that holds water only for a few hours or days, and dries up shortly after rain storms.

Erosion The wearing away of land surface by wind or water. Erosion occurs naturally from weather or runoff but can be intensified by land-clearing practices related to farming, residential or industrial development, road, building, or timber cutting.

Evapotranspiration The loss of surface water into the atmosphere, through plants and evaporation.

Excess parking Parking spaces that are constructed over and above the number required or predicted based on the parking demand ratio for a particular land use or activity

Excess stormwater runoff Any increase in stormwater resulting from: an increase in the imperviousness of a site, including all additions to buildings, roads, and parking lots; changes in permeability caused by compaction during construction or modifications in contours, including the filling or drainage of small depression areas; the alteration of drainageways, or regrading of slopes; the destruction of forest; or the installation of collection systems to intercept street flows or to replace swales or other drainageways.

Filter fabric Textile of relatively small mesh or pore size that is used to (a) allow water to pass through while keeping sediment out (permeable), or (b) prevent both runoff and sediment from passing through (impermeable).

Filter strips A vegetated area that treats sheetflow and/or interflow to remove sediment and other pollutants. Used to treat shallow concentrated stormflows over very short contributing distances in urban areas.

First flush The delivery of a disproportionately large load of pollutants during the early part of storms due to the rapid runoff of accumulated pollutants. The first flush of runoff has been defined several ways (e.g., one-half inch per impervious acre).

Forebay An extra storage space provided near an inlet of a wet pond or constructed wetland to trap incoming sediments before they accumulate in the pond.

Grassed channel A long, open, and grassed channel used to convey stormwater runoff to a downstream point. It is designed to filter out pollutants during water quality storms, and also convey large storm events.

Green space The proportion of open space in a cluster development that is retained in an undisturbed vegetative condition.

Groundwater Water stored underground that fills the spaces between soil particles or rock fractures. A zone underground with enough water to withdraw and use for drinking water or other purposes is called an aquifer.

Habitat The specific area or environment in which a particular type of plant or animal lives. An organism's habitat must provide all of the basic requirements for life and should be free of harmful contaminants.

Appendix A.1 *Glossary, continued*

Hammerhead A "T" shaped turnaround option for lightly traveled residential streets. Creates less impervious cover compared to a circular cul-de-sac.

Headwater stream A term for the smaller first and second order tributary streams in a drainage network.

Heat island effect The increase in ambient temperatures generated by heat radiating from paved surfaces exposed to sunlight.

Hydrology The science of the behavior of water in the atmosphere (air), on the surface of the earth, and underground.

Impermeable Not able to be infiltrated by water.

Impervious surface Any surface which cannot be effectively (easily) penetrated by water. Examples include pavement, buildings, compacted soils, and rock outcrops.

Imperviousness The percentage of impervious cover within a development site or watershed.

Infill Developing vacant parcels or redeveloping existing property to achieve higher density in urban areas as an alternative to development in outlying rural areas.

Infiltration The downward entry of water into the surface of the soil, as contrasted with percolation which is movement of water through soil layers.

Infiltration basin A concave vegetated surface (e.g., pond, swale) designed to hold water so that it can gradually infiltrate into the soil.

Interconnected streets Street system that allows traffic to circulate within neighborhoods instead of creating cul-de-sacs and dead end streets that result in disconnected residential areas. A grid pattern of blocks is a typical example.

Nonpoint source pollution Pollution that enters water from dispersed and uncontrolled sources, such as rainfall or snowmelt moving over and through the ground rather than single, identifiable sources. A nonpoint source is any source of water pollution that does not meet the legal definition of point source in section 502(14) of the Clean Water Act (e.g., forest practices, agricultural practices, on site sewage disposal, automobiles, and recreational boats). While individual sources may seem insignificant, they may contribute pathogens, suspended solids, and toxicants which result in significant cumulative effects.

Non-renewable resources Resources that are not naturally regenerated or renewed.

Nonstructural control A practice that does not require construction of a facility to control urban runoff.

NPDES National Pollutant Discharge Elimination System, a provision of the Clean Water Act that prohibits discharge of pollutants into waters of the United States unless a special permit is issued by EPA, a state, or another delegated agency.

Open space A portion of a cluster development that is set aside for public or private use and is not developed with homes. The space may be used for active or passive recreation, or may be reserved to protect or buffer natural areas (see also green space)

Perennial streams A stream channel that has running water throughout the year.

Performance criteria Technical standards that govern the development process that are based on meeting general objectives for design, rather than prescribing rigid, uniform and detailed design requirements.

Permeable A type of soil or other material that allows passage of water or other liquid.

Permeable surfaces Areas characterized by materials that allow stormwater to infiltrate the underlying soils (e.g., soil covered or vegetated areas)

Pervious A soil or material that has the specific quality of allowing the passage of water or other liquid.

Point Source Pollution A source of pollutants from a single point of conveyance, such as a pipe. For example, the discharge from a sewage treatment plant or a factory is a point source.

Pollutants A chemical or other additive that adversely alters the

physical, chemical, or biological properties of the environment.

Porous pavement Asphalt or concrete paving material consisting of a coarse mixture cemented together with sufficient interconnected voids to provide a high rate of permeability.

Premium An additional charge for real estate property with an amenity such as a water view or a view of wooded land.

Receiving waters Lakes, rivers, wetlands, and coastal waters that receive runoff.

Recharge Area A land area in which surface water infiltrates soil and reaches to the zone of saturation, such as where rainwater soaks through the earth to reach an aquifer.

Recharge Infiltration of surface water to groundwater.

Retrofit To provide or add new equipment, parts, or techniques unavailable at the time of original construction.

Riparian Area Habitat found along the bank of a natural and freshwater waterway, such as a river, stream, or creek, that provides for a high density, diversity, and productivity of plant and animal species.

Runoff Water from rain, melted snow, or agricultural or landscape irrigation that flows over the land surface.

Runoff coefficient The runoff coefficient determines the portion of rainfall that will run off the watershed. It is based on the permeability and water-holding capacity of the various surfaces in the watershed. The runoff coefficient value, expressed as *C,* can vary from close to zero to up to 1.0. A low *C* value indicates that most of the water is retained for a time on the site, as by soaking into the ground or forming puddles, whereas a high *C* value means that most of the rain runs off rapidly.

Setback A zone designated to protect sensitive areas from negative impacts associated with development.

Shared parking A parking strategy designed to reduce the total number of parking spaces needed within an area, by allowing adjacent users to share parking areas during non competing hours of operation (e.g., a shared lot for a theater and an office building).

Sheetflow A flow condition during a storm where the depth of stormwater runoff is very shallow in depth and spread uniformly over the land surface. This sheet flow quickly changes into concentrated channel flow within several hundred feet.

Steep slope An area of a development site that is too steep to (a) safely build on or (b) has a high potential for severe soil erosion during construction.

Stormwater conveyance A system of gutters, pipes, or ditches used to carry stormwater from surrounding land areas to constructed or natural drainage systems.

Stormwater runoff Rain that flows off the surface of the land without entering the soil.

Structural control A practice that involves design and construction of a facility to mitigate the adverse impact of urban runoff, and often requires maintenance.

Subdivision The process (and the result) of dividing a parcel of raw land into smaller buildable sites, streets, open spaces, and public areas, and the designation of utilities and other improvements. Critical Area regulations govern the density and design of new subdivisions.

Subwatershed A watershed management unit whose boundaries are typically defined as all of the land draining to the point where two second order streams combine together to form a third order stream. A subwatershed may be a few square miles in area, and are the key geographic unit for urban stream classification and watershed- based zoning,

Surface water Water on the surface of the land that has not infiltrated the soil including streams, lakes, rivers, and ponds.

Swale An open drainage channel that has been explicitly designed to detain or infiltrate the entire runoff volume associated with a water quality storm event.

Trip generation rate A statistic that indicates the number of vehicular trips that are taken from an average dwelling unit in a

Appendix A.1 *Glossary, continued*

particular land use category on a typical day. For example, studies have shown that one single family home generates about 10 trips per day.

Unbuildable lands The portions of a development site where structures cannot be located for physical or environmental reasons (e.g., easements, open water, steep slopes, floodplains, wetlands and stream buffers).

Unit Pavers Concrete grid and modular pavement whose spaces are filled with pervious materials such as sod, sand, or gravel.

Water table The upper surface of groundwater or the level below which the soil is saturated with water. The water table indicates the uppermost extent of ground water.

Watershed (see Drainage basin) The geographic region within which water drains into a particular river, stream or body of water. A watershed includes hill, lowlands, and the body of water into which the land drains. Watershed boundaries are defined by the ridges of separating watersheds.

Wet pond Pond for urban runoff management that is designed to detain urban runoff and always contains water.

Zoning A set of regulations and requirements which govern the use, placement, spacing, and size of land and buildings within a specific area (zone).

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STATE WATER RESOURCES CONTROL BOARD
901 P STREET
SACRAMENTO, CALIFORNIA
JULY 15, 1999

FACT SHEET FOR NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) PERMIT FOR STORM WATER DISCHARGES FROM THE STATE OF CALIFORNIA, DEPARTMENT OF TRANSPORTATION (CALTRANS) PROPERTIES, FACILITIES, AND ACTIVITIES (ORDER NO. 99 – 06 - DWQ)

BACKGROUND

In 1972, The Federal Water Pollution Control Act [also referred to as the Clean Water Act (CWA)] was amended to provide that the discharge of pollutants to waters of the United States from any point source is unlawful, unless the discharge is in compliance with an NPDES permit. The 1987 amendments to the CWA added section 402(p) which directs that storm water discharges are point source discharges and establishes a framework for regulating municipal and industrial storm water discharges under the NPDES program. On November 16, 1990, the U.S. Environmental Protection Agency (USEPA) promulgated final regulations that establish the storm water permit requirements.

Pursuant to these regulations, storm water permits are required for discharges from a municipal separate storm sewer system (MS4) serving a population of 100,000 or more. USEPA defined MS4 to include road systems owned by states which are in an area with a population greater than 100,000. The regulations also specified a requirement for storm water permits from 11 categories of industry, including construction activities where the construction activity disturbs five acres or more.

In California, the MS4s were issued individual NPDES permits by the Regional Water Quality Control Boards (RWQCB). Caltrans is currently under permit in all of the areas of California that have been determined to require an MS4 permit with the exception of the Salinas area. Industrial activities are covered by General Permits that have been adopted by the State Water Resources Control Board (SWRCB). Caltrans currently seeks coverage under the NPDES General Permit for Construction Activities (Construction General Permit) for construction activities that are over five acres. The exception to this is in the Lake Tahoe area, where the RWQCB adopted its own Construction General Permit for projects over five acres and Waste Discharge Requirements (WDRs) for projects under five acres.

In 1996, Caltrans requested that the SWRCB, consider adopting a single NPDES permit for storm water discharges from all Caltrans properties, facilities, and activities that would cover both the MS4 requirements and the statewide Construction General Permit requirements. The federal regulations allow for the issuance of system-wide MS4 NPDES permits. Caltrans submitted an application for a permit with a draft Storm Water Management Plan (SWMP) in August 1996. The SWRCB gave Caltrans comments on the SWMP and received a revised SWMP from Caltrans in March 1997. Because the RWQCBs have issued NPDES storm water permits to all of the areas currently requiring a permit, with the exception of the Salinas area, this permit was not considered a new storm water permit, and a Part I and Part II application were not required.

The "Interpretative Policy Memorandum on Reapplication Requirements for Municipal Separate Storm Sewer Systems" issued by USEPA on May 17, 1996 outlines the requirements for permittees seeking a second Municipal NPDES Storm Water Permit. The requirements are: (1) name and address of the applicant; (2) name and title of primary administrative and technical contacts; and (3) proposed changes or improvements to the storm water management program and monitoring activities for the upcoming five-year term of the permit. In addition, USEPA recommends that the applicant provide identification of any previously unidentified water bodies and a summary of any known water quality impacts.

This permit is intended to cover all municipal storm water activities by Caltrans in California, both in areas that require an MS4 permit and areas that do not currently require a permit. It is also intended to cover all Caltrans construction activities that require a permit under the federal regulations. It directs that all existing storm water permits for discharges from Caltrans properties, facilities, and activities should be rescinded. RWQCBs may in the future issue individual storm water permits for Caltrans construction activities, as explained below.

This permit shall be implemented and enforced by the nine RWQCBs.

PROHIBITIONS

This permit authorizes storm water and authorized nonstorm water discharges from Caltrans properties, facilities, and activities. This permit prohibits discharges of material other than storm water (nonstorm water discharges) that are not authorized by this permit.

EFFLUENT LIMITATIONS

NPDES permits for storm water discharges must meet all applicable provisions of sections 301 and 402 of the CWA. These provisions require control of pollutant discharges to the Maximum Extent Practicable (MEP) for the MS4 permit requirements and to the standard of Best Available Technology Economically Achievable/Best Conventional Technology (BAT/BCT) for Construction General Permit requirements. It

also requires dischargers to implement more stringent controls, if necessary, to meet water quality standards.

It is not feasible at this time to establish numeric effluent limitations for storm water. The reasons why establishment of numeric effluent limitations is not feasible are discussed in detail in SWRCB Orders No. WQ 91-03 and WQ 91-04. Therefore, this permit allows Caltrans to implement Best Management Practices (BMPs) to comply with the requirements of this permit.

RECEIVING WATER LIMITATIONS

Storm water discharges shall not cause or contribute to a violation of an applicable water quality standard. This permit requires Caltrans to reduce or prevent pollutants in storm water discharges and authorized nonstorm water discharges through the development and implementation of BMPs which constitutes compliance with either MEP or BAT/BCT, whichever is applicable. Storm water discharges must also be in compliance with water quality standards. If receiving water quality standards are exceeded, Caltrans is required to submit a written report providing additional BMPs or other measures to be taken that will be implemented to achieve water quality standards.

MS4 PERMIT REQUIREMENTS

MS4 permit requirements are to be implemented to MEP. These requirements are addressed in the SWMP that is an integral and enforceable component of this NPDES Permit. However, the SWMP also refers to other documents that Caltrans has prepared which give the detailed discussion of how the program elements are to be implemented. Where the SWMP was determined to be inadequate, further requirements are outlined in the permit. Caltrans will submit changes to the SWMP on an annual basis. Substantive changes to the SWMP will require approval by the SWRCB.

The SWMP which was submitted in August 1996 defined terms in the development of the program in a way that is inconsistent with the definitions in Title 40 of the Code of Federal Regulations Section 122.22 (40 CFR 122.22). Caltrans is required to rewrite the SWMP in a manner that is consistent with the definitions in the regulations. Caltrans also uses terms such as "winter season" and "significant erodible slope" which are not used in the regulations. Caltrans uses terms such as these to determine the scope of the program, with the understanding that Caltrans is responsible for discharges at all times during the year, and that if implementation of the program using these terms leads to discharge of pollutants, the terms will have to be redefined.

Caltrans is required to submit a revised SWMP within 90 days of the adoption of this permit. Because the SWMP is an integral and enforceable part of this permit, this revised SWMP will be presented to the State Board for approval. The incorporation of this revised SWMP into the permit will be made pursuant to the federal regulations for NPDES permit modification found at 40 CFR Section 122.62 and 40 CFR Section 124.

Caltrans has developed a BMP program for control of pollutants from existing facilities and for new and reconstructed facilities as part of the SWMP. This BMP program must be revised to reflect the definition of pollutant in the federal requirements, including a reevaluation of BMPs. The evaluation of the feasibility of structural BMPs in the SWMP does not reflect the current state of knowledge among other transportation agencies. BMPs are rejected that are routinely used by other transportation agencies. Therefore, the BMP selection in the SWMP does not meet MEP. The federal regulations require the consideration of structural BMPs where they are appropriate. MEP cannot be met without the consideration of structural BMPs. The fact that a BMP has not been used before is not an adequate reason to reject its use if other factors make it appropriate

In addition to the annual submittal of the SWMP, this permit also requires Caltrans to submit a workplan that explains how the program will be implemented in each Region. The purpose of the workplan is to bring the theoretical and proposed program of the SWMP to the practical and implementable level at the regional, watershed and water body level. Through the workplan process, Caltrans will be able to discuss the implementation of the program and show how their priorities will address specific local needs.

The MS4 permit requirements include:

Coordination with Local Agencies

This permit requires Caltrans to develop a program for communication with local agencies and coordination with other MS4 programs where the programs overlap geographically with Caltrans facilities.

Legal Authority

In the April 1998 SWMP, Caltrans submitted a certification of adequate legal authority to implement the program. Through implementation of a storm water program, Caltrans may find that the legal authority is, in fact, not adequate. This permit requires Caltrans to reevaluate the legal authority each year and recertify that it is adequate. Caltrans must submit the analysis of the legal authority as part of the Annual Report each year. If it becomes clear that the legal authority is not adequate to fully implement the SWMP and the requirements of the permit, Caltrans must seek the authority necessary for implementation of the program.

Fiscal Analysis

Caltrans must maintain adequate funding to implement an effective storm water program and must submit an analysis of the funding each year. This includes a report on the funding that is dedicated to storm water as well as an estimate of the funding that has been allocated to various program elements that is not included in the storm water

program funding. An example of this would be to estimate the funding that has been made available to the Maintenance Program to implement the development of Maintenance Facility Pollution Prevention Program Plans (FPPP) and to implement the BMPs that are necessary for water quality. In addition, Caltrans is required to seek adequate funding from the legislature for an effective storm water program.

Vegetation Control Program

This permit requires Caltrans to develop a program for vegetation control that minimizes the use of agricultural chemicals and maximizes the use of appropriate native and adapted vegetation for erosion control and filtering of runoff.

Storm Water System Management

This permit requires Caltrans to develop a program to monitor and clean storm drain inlets. For storm water structures that contain excessive material on a regular basis, Caltrans must determine if an Illicit Connection/Illegal Discharge (IC/ID) Detection investigation is warranted or if an enhanced BMP program is required for the drainage area. Vegetation in storm channels may reduce erosion from these channels and provide filtration and may be subject to sections 401 and 404 of the CWA.

Accidental Spills

This permit requires Caltrans to notify the MS4 permittee of any spills that may have an impact on the MS4's ability to comply with its municipal storm water permit. This means any spill that could reach the MS4 permittee's storm drain system in a large enough quantity to impact the system. Caltrans must also notify the RWQCB of any spill that may reach a receiving water and have an adverse effect on the receiving water. Generally, this notification would be limited to spills that are large enough to require cleanup or lane closure, but only if the spill could have an impact on water quality.

Illicit Connection/Illegal Discharge (IC/DC) Detection

This permit requires Caltrans to have a program to detect and investigate IC/IDs. Because Caltrans is different from a typical municipality, it is not intended that Caltrans should do routine inspections of their system for illicit connections. It is unlikely that a discharger would have access to the Caltrans storm drain system to make an illicit connection. It is also not intended that Caltrans would do routine field screening for illegal discharges. The Caltrans system is too large and spread out for this to be effective. However, Caltrans is required to train field maintenance personnel to recognize IC/IDs and to respond to them. Caltrans is also required to have a method for receiving and responding to public complaints.

Characterization of Discharges

In the areas which require an MS4 permit, Caltrans is required to characterize discharges as specified in 40 CFR 122.26(iv)(d)(1) and (2) over the life of the permit. This requirement was to be done as part of the Part II application for the initial permits that Caltrans received in these areas; so for most areas, this data should already be available. The purpose of this requirement is to provide Caltrans with adequate information about the storm drain system to effectively implement the program. This characterization is a one time requirement. If adequate information was submitted under the original Part II application, this requirement is satisfied and the data should be used as the basis for the Regional Workplans.

Maintenance Facilities

This permit requires Caltrans to prepare FPPP for all maintenance facilities, implement BMP programs at each facility as necessary and periodically inspect each facility. Monitoring is only required as part of the overall monitoring program to determine the effectiveness of the BMP program.

Training and Public Education

The Training and Public Education component consists of three parts to address the three major audiences that Caltrans must address. The three audiences are Caltrans employees, Caltrans contractors, and the general public. Caltrans has prioritized these three parts and has developed and implemented programs for the first two audiences. The program for the final part, which addresses the general public, will be developed and implemented during this permit period.

The detailed requirements in the permit outlining what is to be included in a public education component were recommended by the Public Information/Public Participation Subcommittee of the California Storm Water Quality Task Force. The members of this committee are all responsible for public education programs throughout the State and have experience in developing public education programs.

Program Evaluation and Monitoring

This permit requires Caltrans to evaluate the effectiveness and adequacy of the storm water program on an annual basis. This includes both monitoring and a self-audit of the program. Caltrans has submitted a three-year monitoring strategy that will be updated annually. Caltrans will also be required to submit a detailed monitoring program prior to the upcoming rainy season for each year. The monitoring is intended to demonstrate the effectiveness of its storm water and nonstorm water programs and specifically to achieve the following objectives:

1. Characterization of storm water discharges, including pollutant concentrations and mass loadings, from locations representative of Caltrans owned properties, facilities, and activities. Of particular interest is the discharge of high volume systems which discharge to areas subject to or sensitive to beach closures;

2. Evaluation of effectiveness of maintenance activity control measures;

3. Evaluation of effectiveness of maintenance facility pollution prevention plans;

4. Evaluation of effectiveness of construction erosion prevention and control measures;

5. Evaluation of effectiveness of permanent control measures; and

6. Evaluation of effectiveness of highway operation control measures.

Caltrans has also submitted a Guidance Manual for Stormwater Monitoring Protocols which specifies the manner in which monitoring is to be undertaken.

In addition to monitoring, Caltrans must perform a program audit each year to determine how well the program is being implemented and whether the program is actually adequate. Caltrans must submit an outline of this audit six months in advance of the Annual Report so that the SWRCB can evaluate the methods to be used to perform the audit.

Region Specific Concerns

Each of the RWQCBs was given the opportunity to specify specific water quality concerns in their Region that required special conditions. At this time, these requirements are limited to items that Caltrans is currently responsible for either under a current NPDES permit or under a RWQCB Basin Plan. Region-specific concerns have been identified in the Lahontan RWQCB. Some of the requirements are specific to the Lake Tahoe Hydrologic Unit and are based on the unique quality of the resource. Other requirements are applicable to the entire region.

To accommodate the concerns about the Lake Tahoe Hydrologic Unit, the Lahontan RWQCB has placed requirements in the RWQCB Basin Plan that are, therefore, requirements of this permit. They include (1) numeric effluent limits for storm water, (2) nonstorm water discharge prohibitions, (3) a requirement for the capture and treatment of all storm water from the 20-year storm, (4) erosion control guidelines for high mountain areas, (5) construction site and maintenance facility inspection requirements, and (6) a winter ban on soil disturbance throughout the Lake Tahoe Hydrologic Unit and other high mountain portions of the Region. If the Basin Plan requirements that are referenced in this NPDES Permit are changed during the life of this NPDES Permit,

Caltrans can request that the terms of this permit be changed to reflect the changes in the Basin Plan.

In addition, the Lahontan RWQCB requires Caltrans to meet some specific requirements in their construction program. These include involving the RWQCB in the design of the project and early submittal of Storm Water Pollution Prevention Plans (SWPPP).

The Lahontan RWQCB requires that Caltrans submit information to them about the program to control snow and ice throughout the Region. This requirement includes the submittal of information about the use of abrasives and deicing agents throughout the Region, including the location of the use, the source and chemistry of the deicing agents and abrasives, and the volume of abrasive and deicing agents used on individual highway segments. For example, Caltrans must report separately on abrasives and deicing agents use within the Lake Tahoe Hydrologic Unit by volume of material used on State Route 50, State Route 89, State Route 28, and State Route 267, rather than providing only the total volume used in the Lake Tahoe Hydrologic Unit or within a specific Caltrans District. In the Truckee River Hydrologic Unit, the reports would be volume of material used on State Route 89S, State Route 89N, State Route 267, and Interstate 80.

Caltrans is required to develop a monitoring program that evaluates the effectiveness of BMPs used to recover abrasives and deicing materials and that evaluates the impacts of abrasives and deicing materials on surface waters within the Lake Tahoe Hydrologic Unit. A report on the use of deicing agents and abrasives is required each year as part of the Annual Report.

CONSTRUCTION PERMIT REQUIREMENTS

Construction activities which disturb five acres or more outside of the Lake Tahoe Hydrologic Area are currently required to be covered by the Construction General Permit. The current Construction General Permit is SWRCB Order 99- DWQ.

The Lahontan RWQCB has developed an NPDES Storm Water Permit for construction projects that involve more than five acres of soil disturbance and non-NPDES waste discharge requirements for construction projects for projects less than five acres within the Lake Tahoe Hydrologic Unit. The current Lahontan Construction Permit is Lahontan RWQCB Board Order 6-93-63. The WDRs for small projects are contained in Lahontan RWQCB Board Order 6-91-31. All projects within the Lake Tahoe Hydrologic Area are currently subject to one of these two Board Orders depending on the size of the project.

Storm water discharges from all Caltrans construction projects will be covered by this permit except for those projects that the RWQCB determines should be covered by an individual permit. Caltrans will be required to notify the RWQCB that a project is to be covered under this permit at least 30-days prior to the onset of construction. This 30-day

notification under this permit is the equivalent of filing a Notice of Intent (NOI) under the Construction General Permit.

The RWQCB can require submittal of the SWPPP up to 30 days prior to the onset of soil disturbance, require changes to the SWPPP, perform inspections, and take enforcement action. Caltrans can negotiate an alternative process with the appropriate RWQCB if an alternative method of complying with the requirement for early submittal of the SWPPP is appropriate.

The permit requires Caltrans to implement an effective construction storm water program. The program that Caltrans plans to implement is contained in their SWMP. This plan, in turn, refers to BMP manuals and the Standard Specifications that contain the details of the BMP implementation.

Caltrans must implement an effective construction storm water program during the entire year throughout the State. Because the construction storm water program will be implemented year round, regardless of whether or not Caltrans elects to implement baseline or more advanced erosion control measures, any discharges of material not authorized by this permit is a violation.

Caltrans construction projects may involve soils that contain lead in quantities that meet the State definition of hazardous waste but not the federal definition. The Department of Toxic Substances Control (DTSC) has issued waivers allowing Caltrans to use these soils in construction projects under a narrow range of conditions. In addition to the waivers, Caltrans also needs authorization from the RWQCB to allow the use of these soils. Caltrans is required to obtain WDRs from the RWQCB for the use of these soils.

ANNUAL REPORT

This permit requires Caltrans to submit an Annual Report each April. The Annual Report will contain (1) an evaluation of the previous year's program, (2) the results of the program audit, including information about compliance with the construction requirements and maintenance facility requirements, (3) a vegetation management report, (4) an IC/ID report, (5) a nonstorm water discharge report, (6) an analysis of the legal authority, (7) an analysis of the fiscal resources for the coming year, (8) a report on the training and public education program, and (9) reports on the regional requirements. The Annual Report must also contain a monitoring report and a monitoring plan for the upcoming year and workplans for each of the regions. There is a one year lag in the reporting of the monitoring program and the program audit in the Annual Report. This lag is intended to allow Caltrans the time to adequately analyze the data that has been generated.

STATE WATER RESOURCES CONTROL BOARD

ORDER NO. 99 - 06 - DWQ
NPDES NO. CAS000003

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) PERMIT
STATEWIDE STORM WATER PERMIT
AND
WASTE DISCHARGE REQUIREMENTS (WDRs)
FOR THE
STATE OF CALIFORNIA, DEPARTMENT OF TRANSPORTATION (CALTRANS)

The State Water Resources Control Board (SWRCB) finds that:

1. **NPDES PERMIT APPLICATION**: On September 5, 1996, Caltrans, located at 1120 N Street, Sacramento, California 95814 submitted an NPDES Permit application for storm water discharges from the Caltrans highways, properties, facilities, and activities throughout the State of California for Caltrans headquarters and for the District offices including: the North Coast region (District 1), Northern Central Valley and Far Northeastern region (District 2), Sacramento area (District 3), San Francisco Bay area (District 4), Central Coast (District 5), Lower Central Valley (District 6), Los Angeles Basin (District 7), San Bernardino area (District 8), Mono/Inyo area (District 9), Middle Central Valley (District 10), San Diego area (District 11), and Orange County (District 12). The application was accepted on October 4, 1996. As part of the application, Caltrans submitted a Storm Water Management Plan (SWMP) and Monitoring Plan. The SWMP and Monitoring Plan were amended in March 1997 and again in April 1998. The application is considered an application for permit reissuance because Caltrans is currently under permit in all of the parts of the State for which a Municipal Separate Storm Sewer System (MS4) permit is currently required. The MS4 permits that Caltrans holds, the permitting agency, the adoption date, and expiration date are shown in Table 1.

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TABLE 1
CURRENT CALTRANS STORM WATER PERMITS

RWQCB	Caltrans District	Board Order	NPDES Permit Number	Adoption Date	Expiration Date
North Coast	4	97-119	CA0025038	10/22/97	10/22/02
San Francisco Bay	4 and 10	94-098	CAS029998	8/17/94	8/27/99
Los Angeles	7	90-079	CA0061654	6/18/90	6/18/95
Central Valley	6	94-244	CA0083500	9/16/94	9/1/99
Central Valley	3, 4, 6 and 10	95-001	CA0083640	1/27/95	1/1/00
Lahontan	3	6-93-62	CAS616002	6/11/93	6/11/98
Colorado River Basin	8 and 11	94-038	CAS617001	11/15/94	11/17/99
Santa Ana River	8 and 12	94-5	CA8000279	7/8/94	7/8/99
San Diego	8,11, and 12	97-08	CAS029998	3/12/97	3/12/02

2. **FEDERAL AUTHORITY**: In 1972, the Federal Water Pollution Control Act (also referred to as the Clean Water Act [CWA]) was amended to provide that the discharge of pollutants to waters of the United States from any point source is effectively prohibited unless the discharge is in compliance with an NPDES Permit. The 1987 amendments to the CWA added section 402(p) that establishes a framework for regulating municipal and industrial storm water discharges under the NPDES Permit Program.

3. **STATE AUTHORITY:** California Water Code section 13376 provides that any person discharging or proposing to discharge pollutants to waters of the United States must apply for and obtain WDRs. (For this permit, the State term "WDRs" is equivalent to the federal term "NPDES permits" as used in the CWA). Furthermore, municipal and industrial storm water discharges are discharges of waste that could affect the quality of the waters of the State. Applicable State of California regulations are contained in the California Code of Regulations (CCR), Title 23, Division 3, Chapter 9.

4. **CALTRANS DISCHARGES SUBJECT TO MUNICIPAL STORM WATER PERMIT REGULATIONS**: On November 16, 1990, the U.S. Environmental Protection Agency (USEPA) promulgated final regulations that establish application requirements for storm water permits codified at Title 40 of the Code of Federal Regulations (CFR), Section 122.26 (40 CFR 122.26). Federal regulations 40 CFR 122.26(a)(iii) and (iv) require that NPDES storm water permits be issued for discharges from large and medium MS4s. The regulations define "municipal separate storm sewer" to mean "a conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, manmade channels, or storm drains): (i) owned or operated by a State, city, town, borough, county, . . .". Caltrans, as the owner of an MS4, is subject to an NPDES Permit in those areas of the State subject to an MS4 storm water permit. Caltrans performs activities that impact storm water quality. These activities include operation of roads and highways, construction activities, and maintenance activities.

To enable Caltrans to implement a uniform storm water program, this NPDES Permit will cover storm water discharges from all Caltrans highways, properties, activities and facilities throughout the State.

5. **CALTRANS DISCHARGES SUBJECT TO CONSTRUCTION STORM WATER PERMIT REGULATIONS**: Federal regulations (40 CFR 122.26) require discharges of storm water associated with construction activity including clearing, grading, and excavation activities (except operations that result in disturbance of less than five acres of total land area and which are not part of a larger common plan of development or sale) to obtain an NPDES Permit and to implement Best Management Practices (BMPs) that achieve the performance standards of Best Available Technology economically achievable/Best Conventional Pollutant Control Technology (BAT/BCT) to reduce or eliminate storm water pollution.

6. **STORM WATER DISCHARGE DEFINITION**: Storm water discharges consist only of those discharges that originate from precipitation events. Storm water is defined in 40 CFR 122.26(b)(13) as storm water runoff, snowmelt runoff, and surface runoff and drainage. During precipitation events, storm water picks up and transports pollutants into and through municipal storm water conveyance systems and ultimately to waters of the United States.

7. **NONSTORM WATER DISCHARGE DEFINITION:** Nonstorm water discharges consist of all discharges from a municipal storm water conveyance system which do not originate from precipitation events (i.e., all discharges from a conveyance system other than storm water). Nonstorm water discharges include illicit discharges, nonprohibited discharges, and NPDES permitted discharges. An illicit discharge is defined in 40 CFR 122.26(b)(2) as "any discharge to a municipal storm sewer that is not composed entirely of storm water except discharges pursuant to an NPDES Permit (other than the NPDES Permit for discharges from the MS4) and discharges resulting from fire fighting activities." Nonstorm water discharges are addressed in Provision B of this permit.

8. **PERFORMANCE STANDARDS:** CWA section 402(p) establishes two different performance standards for storm water discharges. NPDES permits issued for MS4 storm water discharges require controls to reduce the discharge of pollutants to the Maximum Extent Practicable (MEP). Caltrans can reduce pollutants to MEP through the effective implementation of BMPs. NPDES Permits issued for industrial storm water discharges (including construction activities) must meet BAT for toxic pollutants and BCT for conventional pollutants. In addition, storm water discharges may not cause or contribute to exceedance of water quality standards. The requirements for compliance with water quality standards are described in Provision C., Receiving Water Limitations.

9. **CALTRANS ACTIVITIES**: Caltrans is primarily responsible for the design, construction, management, and maintenance of the State highway system, including freeways, bridges, tunnels, maintenance facilities, and related properties, and facilities.

10. **CALTRANS BUDGET**: Caltrans derives funding from federal, State, and local government sources. The annual operating budget for Caltrans is determined through the

State's financial planning process. The final determination on the budget is made by the Legislature and the Governor.

11. **REGIONAL WATER QUALITY CONTROL BOARD (RWQCB) BASIN PLANS:** Each RWQCB has adopted a Basin Plan containing the policies, prohibitions and requirements that apply to that Region. Caltrans is subject to the policies and prohibitions and requirements contained in these Basin Plans in the Region in which the Basin Plan is applicable.

12. **CALTRANS DISCHARGES**: Caltrans discharges consist of storm water and nonstorm water runoff generated from (a) maintenance and operation of State-owned highways, freeways, and roads; (b) maintenance facilities; (c) other properties, facilities, activities, and construction projects; (d) permanent discharges from subsurface dewatering, and (e) temporary construction related dewatering which discharge directly or through municipal storm water conveyance systems to surface water bodies in the State. These surface water bodies include creeks, rivers, reservoirs, lakes; wetlands, lagoons, estuaries, bays, and the Pacific Ocean and tributaries thereto. These surface waters are waters of the United States as defined in 40 CFR 122.2. This permit regulates storm water discharges on Caltrans highways, properties, and facilities.

13. **POTENTIAL POLLUTANTS IN CALTRANS DISCHARGES**: Discharges of storm water from the Caltrans owned rights-of-way, properties, facilities, and activities, including storm water management activities in construction, maintenance, and operation of State-owned highways within the State of California have been shown to be contributors of pollutants to waters of the United States. As such, the discharge of storm water may be causing or threatening to cause violations of water quality objectives. The quality and quantity of these discharges vary considerably and are affected by hydrology, geology, land use, season, and sequence and duration of hydrologic events. Pollutants occur in both the storm water discharges and nonstorm water discharges. Pollutant sources from Caltrans rights-of-way, properties, facilities, and activities include motor vehicles, highway maintenance, construction site runoff, maintenance facility runoff, illegal dumping, spills, and landscaping care. Pollutant categories include metals (such as copper, lead, and zinc), synthetic organics (petroleum products and pesticides), sediment, nutrients (nitrogen and phosphorus fertilizers), debris, oxygen demanding substances (decaying vegetation, animal waste, and other organic matter), and other pollutants which may cause aquatic toxicity in the receiving waters.

14. **STORM WATER MANAGEMENT PLAN (SWMP)**: The SWMP submitted by Caltrans describes a framework for management of storm water discharges during the term of this permit. The title page and table of contents of the SWMP are attached to this NPDES Permit. The SWMP describes the Caltrans facilities, the institutional arrangements within Caltrans, legal authorities, funding, training and public education and participation, the annual reporting program evaluation process, and monitoring studies to be undertaken. The SWMP includes a discussion of activities to be implemented by each of the Divisions within Caltrans, including programs for design and construction, maintenance, and additional region-specific programs to be undertaken. Revisions to the SWMP for subsequent years will be submitted to the SWRCB as part of the Annual Reporting and Program Evaluation Process. This NPDES Permit directs Caltrans to implement its

SWMP. Where the SWMP was found to be inadequate, this NPDES Permit directs Caltrans to fulfill additional requirements and specifies what these requirements are.

Caltrans SWMP must be revised in accordance with the Provisions of this NPDES Permit to address concerns about the scope, detail of proposed actions, and time frame for implementation.

Caltrans began implementation of this SWMP in March 1997.

15. **ENFORCEABILITY OF THE SWMP**: The SWMP and modifications or revisions to the SWMP that are approved, in accordance with Provision F.1 of this NPDES Permit, and future year workplans to be submitted, in accordance with the SWMP and Provision F.1 of this NPDES Permit, are integral to and an enforceable component of this NPDES Permit.

16. **LOCAL MUNICIPALITIES:** The RWQCBs have issued NPDES Permits for the discharge of storm water from municipal storm water conveyance systems to municipalities in California which require these permits. Caltrans operates highways and highway-related properties, activities, and facilities that cross through all of these permitted areas. Some storm water discharges from Caltrans-owned rights-of-way, properties, facilities, and activities discharge to storm water conveyance systems managed by these municipalities. Some storm water discharges from these municipalities discharge to storm water conveyance systems managed by Caltrans.

17. **LOCAL CONTROL**: This NPDES Permit does not preempt or supersede the authority of local municipal agencies to prohibit, restrict, or control storm water discharges and authorized nonstorm water discharges to storm drain systems or other watercourses within their jurisdictions as allowed by State and federal law.

18. **CALTRANS CONSTRUCTION PROGRAM**: Caltrans performs construction activities that are required to have NPDES Permits for storm water discharges from the construction site. This NPDES Permit will effectively regulate storm water discharges from construction projects within the Caltrans rights-of-way. Caltrans will not be required to obtain coverage under the State NPDES General Permit for Construction Activities (Construction General Permit), SWRCB Board Order 92-08 DWQ.

19. **DREDGE AND FILL MATERIALS:** This NPDES Permit does not authorize discharges of fill or dredged material regulated by the U.S. Army Corps of Engineers under CWA section 404 and does not constitute a waiver of water quality certification under CWA section 401.

20. **RECEIVING WATER LIMITATIONS**: The impact of storm water runoff from highway facilities on the water quality of receiving waters is highly variable. For this reason, this NPDES Permit does not include numeric effluent limitations. Instead, this NPDES Permit will emphasize the use of BMPs to control storm water pollution and the establishment of a monitoring program to determine the impact of storm water runoff from highways on receiving water bodies. The Lahontan RWQCB does have numeric effluent limits for storm water discharges for the Tahoe Basin in the Basin Plan. These numeric effluent limits also appear in their Regional Construction Permits (RWQCB Board Orders

6-91-31 and 6-93-63) and the Caltrans MS4 Permit RWQCB Board Order No. 6-93-62) for the Tahoe Basin, and these limits apply to this NPDES Permit in that area.

It is the SWRCBs intent that this NPDES Permit shall ensure attainment of applicable water quality objectives and protection of the beneficial uses of receiving waters. This NPDES Permit, therefore, includes standard requirements to the effect that discharges shall not cause or contribute to violations of water quality objectives nor shall they cause certain conditions to occur which create a condition of nuisance or water quality impairment in receiving waters. "Standard" language is the standard for storm water permits; it is not the same as the "standard" language for other NPDES permits. Accordingly, the SWRCB is requiring that these standard requirements be addressed through the implementation of control measures to reduce pollutants in storm water discharges.

Receiving water limitations in this NPDES Permit are based on the federal CWA, RWQCB Basin Plans and policies, USEPA Guidance, Best Professional Judgement, and BMPs.

21. **CALIFORNIA ENVIRONMENTAL QUALITY ACT (CEQA)**: The action to adopt an NPDES Permit is exempt from Provisions of the CEQA (CEQA: Public Resources Code section 21100, et. seq.), pursuant to section 13389 of the California Water Code.

22. **PUBLIC NOTIFICATION**: The SWRCB has notified Caltrans and all known interested agencies and persons of its intent to prescribe an NPDES Permit and WDRs for said discharge and has provided them with an opportunity for a public meeting and an opportunity to submit comments.

23. **PUBLIC HEARING**: The SWRCB in a public meeting held on June 9, 1998 heard and considered all comments pertaining to this NPDES Permit. The permit was adopted at a public meeting held on July 15, 1999.

24. **RWQCB ENFORCEMENT**: Following adoption of this NPDES Permit, the RWQCBs shall enforce the Provisions.

25. **IMPLEMENTATION:** This NPDES permit is in compliance with section 402 of the CWA and shall take effect upon adoption by the SWRCB.

26. **ANTI-DEGRADATION:** This NPDES Permit is consistent with the anti-degradation Provision, section 40 CFR 131.12 and SWRCB Resolution 68-16.

IT IS HEREBY ORDERED that all MS4 storm water permits issued to Caltrans by RWQCBs shall be rescinded insofar as they apply to Caltrans.

IT IS HEREBY ORDERED that in order to meet the Provisions contained in Division 7 of the California Water Code and regulations adopted thereunder and the Provisions of the Federal CWA and the regulations and guidelines adopted thereunder, Caltrans shall comply with the following: (***REPORTING REQUIREMENTS ARE SHOWN IN ITALICS WITH ALL CAPITAL LETTERS***):

A. GENERAL DISCHARGE PROHIBITIONS

1. Any discharge from Caltrans rights-of-way or Caltrans properties, facilities, and activities within those rights-of-way that is not composed entirely of "storm water" to waters of the United States is prohibited unless authorized pursuant to Section B of this NPDES Permit. For some discharges, Caltrans may also need to obtain Water Quality Certification under CWA S2. The discharge of runoff from Caltrans owned rights-of-way or Caltrans properties, facilities, and activities to waters of the United States which have not been reduced to the MEP is prohibited. The discharge of runoff from construction sites containing pollutants which have not been reduced using BAT for toxic pollutants and BCT for conventional pollutants to waters of the United States is prohibited.

2. The discharge of pollutants or dredged or fill material to waters of the United States, except as authorized by an NPDES Permit or a dredged or fill material permit (subject to the exemption described in California Water Code (CWC) section 13376), is prohibited.

3. The discharge of waste to waters of the State in a manner causing or threatening to cause a condition of pollution or nuisance defined in CWC section 13050, is prohibited.

4. The dumping, deposition, or discharge of waste by Caltrans directly into waters of the State or adjacent to such waters in any manner that may allow its being transported into the waters is prohibited unless authorized by the RWQCB.

5. The discharge of any radiological, chemical, or biological warfare agent into waters of the State is prohibited. The discharge shall not contain toxic substances in concentrations that are toxic to or that produce detrimental physiological responses in human, plant, animal, or aquatic life.

6. The discharge of sand, silt, clay, or other earthen materials from any activity, including land grading and construction, in quantities which cause deleterious bottom deposits, turbidity, or discoloration in waters of the State or which unreasonably affect or threaten to affect beneficial uses of such waters, is prohibited.

7. Wastes or wastewater from road sweeping vehicles or from other maintenance or construction activities shall not be discharged to any surface waters or to any storm drain leading to surface water bodies.

Caltrans shall achieve the pollutant reductions described in General Discharge Prohibitions A.2. above through implementation of the SWMP described in General Requirements, Provision E., below.

B. NONSTORM WATER DISCHARGE PROHIBITIONS

1. Caltrans shall effectively prohibit nonstorm water discharges into its storm water conveyance system unless such discharges are either:

   a. authorized by a separate NPDES permit; or

   b. authorized in accordance with Nonstorm Water Discharge Prohibition B.2. of this NPDES Permit.

2. Exempted Discharges.

   In carrying out nonstrom Water Discharge Prohibition B.1. of this NPDES Permit, the following nonstorm water discharges need not be prohibited unless they are identified as sources of pollutants to receiving waters:

   a. flows from riparian habitats or wetlands;
   b. diverted stream flows;
   c. springs;
   d. rising ground waters; and
   e. uncontaminated ground water infiltration.

   If any of the above categories of discharges or sources of such discharges are identified as sources of pollutants to receiving waters, then such categories or sources shall be addressed as conditionally exempted discharges in accordance with Prohibition B.3.

3. Conditionally Exempted Discharges

   The following nonstorm water discharges need not be prohibited if identified by either Caltrans or the Executive Director as not being sources of pollutants to receiving waters or if appropriate control measures to minimize the adverse impacts of such sources are developed and implemented under the SWMP in accordance with Prohibition B.4.:

   a. uncontaminated pumped ground water;
   b. foundation drains;
   c. water from crawl space pumps;
   d. footing drains;
   e. air conditioning condensate;
   f. irrigation water;
   g. landscape irrigation;
   h. lawn or garden watering;
   i. planned and unplanned discharges from potable water sources;
   j. water line and hydrant flushing;
   k. individual residential car washing; and
   l. discharges or flows from emergency fire fighting activities.

4. Caltrans shall identify and describe the categories of discharges 3.a through 3.l that are to be exempt from Prohibition B.1 in the Annual Report. For each such category, Caltrans shall identify and describe as necessary and appropriate to the category either documentation that the discharges are not sources of pollutants to receiving waters or circumstances in which they are not found to be sources of pollutants to receiving waters. Otherwise, Caltrans shall describe (a) control measures to reduce pollutants to the maximum extent practicable and minimize the adverse impacts of such sources, (b) procedures and Performance Standards for their implementation, (c) procedures for notifying the SWRCB of these discharges, and (d) procedures for monitoring and record management. Such submissions shall be deemed to be incorporated into the SWMP unless disapproved by the Executive Director. If necessary, on a case-by-case basis, Caltrans shall prohibit any individual or class of nonstorm water discharge(s) listed above that is determined by Caltrans to be a significant source of pollutants to waters of the United States.

5. Permit Authorization for Exempted Discharges

   a. Discharges of nonstorm water from sources owned or operated by Caltrans are authorized and permitted by this Order, if they are in accordance with the conditions of this Provision and the SWMP.

   b. Any RWQCB may require dischargers of nonstorm water other than Caltrans to apply for and obtain coverage under an NPDES permit and comply with the control measures developed by Caltrans pursuant to Provision B. Nonstorm water discharges that are in compliance with such control measures may be accepted by Caltrans and are not subject to Prohibition B.1. Caltrans may refer nonstorm water dischargers to the Caltrans system to the RWQCB for permitting or enforcement.

   c. Caltrans may propose additional categories of nonstorm water discharges to be included in the exemption to Discharge Prohibition B.1. Such proposals are subject to approval in accordance with the NPDES permit regulations.

6. If a RWQCB Executive Officer determines that any individual or class of nonstorm water discharge(s) listed in Nonstorm Water Discharge Prohibition B.2 or B.3. above may be a significant source of pollutants to waters of the United States in that region, the RWQCB Executive Officer may require Caltrans to monitor and submit a report on the discharge and to follow the procedures outlined in Nonstorm Water Prohibition B.4. The RWQCB may require that discharge cease in the event that nonstorm water discharges are a significant source of pollutants to waters of the United States.

7. Caltrans shall examine all illicit connection/illegal discharge (IC/ID) investigation results for the presence of elevated levels of pollutants (e.g., chlorine, sediments, or surfactants) which may be the result of one or more classes of nonprohibited nonstorm water discharge(s) identified in Nonstorm Water Discharge Prohibition B.2. or B.3. above. If such elevated levels of pollutants are commonly present, Caltrans

shall conduct a follow-up investigation to identify the source of the elevated pollutants.

8. Discharges or flows from health and safety emergencies, such as fire fighting activities and accident response, shall be addressed only when such flows are identified by Caltrans to be significant sources of pollutants to waters of the United States. *(It is not the intention of the SWRCB for Caltrans to prohibit, under any circumstances, the discharge of water or other fire retardants that flow into storm water conveyance systems as a result of their use for protection of life and public or private property. However, there may be instances when specified BMPs are appropriate for fire fighting flows).* Although this NPDES Permit does not prohibit these discharges, they may still be subject to regulation under the federal and/or State law.

9. Caltrans shall submit a ***COMPREHENSIVE NONSTORM WATER REPORT*** each year as part of the Annual Report. This report shall include the analysis of each category of discharge, and the BMPs to be implemented for each category. Caltrans must also periodically evaluate the effectiveness of the modified BMPs by examining illicit discharge/illegal dumping investigation results and take any further action necessary to reduce such pollutant concentrations.

C. RECEIVING WATER LIMITATIONS

C-1- RECEIVING WATER LIMITATIONS FOR MUNICIPAL ACTIVITIES:

1. The discharge of storm water from a facility or activity that causes or contributes to the violation of water quality standards or water quality objectives (collectively WQSs) is prohibited.

2. The discharges shall not cause the following conditions to create a condition of nuisance or to adversely affect beneficial uses of waters of the State:

   a. Floating, suspended solids, or deposited macroscopic particulate matter, or foam;

   b. Bottom deposits or aquatic growths;

   c. Alteration of temperature, turbidity, or apparent color beyond present natural background levels;

   d. Visible, floating, suspended, or deposited oil or other products of petroleum origin, and /or;

   e. Toxic or deleterious substances present in concentrations or quantities which will cause deleterious effects on aquatic biota, wildlife, or waterfowl, or which render any of these unfit for human consumption

either at levels created in the receiving waters or as a result of biological concentration.

3. Caltrans shall comply with Parts C-1.1. and 2. of this permit through timely implementation of control measures and other actions to reduce pollutants in the discharges in accordance with the SWMP and other requirements of this permit including any modifications; the SWMP shall be designed to achieve compliance with Parts C-1.1. and 2. of this permit; if exceedance(s) of WQSs persist notwithstanding implementation of the SWMP and other requirements of this permit, the permittee shall assure compliance with Parts C-1.1. and 2. of this permit by complying with the following procedure:

   a. Upon a determination by either Caltrans or the RWQCB that discharges are causing or contributing to an exceedance of an applicable WQS, Caltrans shall promptly notify and thereafter submit a report to the appropriate RWQCB. The report shall describe BMPs that are currently being implemented and additional BMPs that will be implemented to prevent or reduce any pollutants that are causing or contributing to the exceedance of water quality standards. The report may be incorporated in the annual update to the SWMP unless the RWQCB directs an earlier submittal. The report shall include an implementation schedule. The RWQCB may require modifications to the report;

   b. Submit any modifications to the report required by the RWQCB within 30 days of notification;

   c. Within 30 days following approval of the report described above by the RWQCB, Caltrans shall revise the SWMP and monitoring program to incorporate the approved modified BMPs that have been and will be implemented, the implementation schedule, and any additional monitoring required; and

   d. Implement the revised SWMP and monitoring program in accordance with the approved schedule.

4. So long as Caltrans has complied with the procedures set forth in Receiving Water Limitations C-1-3. above and are implementing the revised SWMP, Caltrans does not have to repeat the same procedure for continuing or recurring exceedances of the same receiving water limitations unless directed by the RWQCB to develop additional BMPs.

C-2-RECEIVING WATER LIMITATIONS FOR CONSTRUCTION ACTIVITIES:

1. Storm water discharges and authorized nonstorm water discharges to any surface or ground water shall not adversely impact human health or the environment.

2. The SWPPP developed for the construction activity covered by this NPDES Permit

shall be designed and implemented such that storm water discharges and authorized nonstorm water discharges shall not cause or contribute to an exceedance of any applicable water quality standards contained in a Statewide Water Quality Control Plan and/or the applicable RWQCB's Basin Plan.

3. Should it be determined by Caltrans, SWRCB or RWQCB staff that storm water discharges and/or authorized nonstorm water discharges are causing or contributing to an exceedance of an applicable water quality standard, Caltrans shall:

   a. Implement corrective measures immediately following discovery that water quality standards were exceeded, followed by notification of the RWQCB by telephone as soon as possible but no later than 48 hours after the discharge has been discovered. This notification shall be followed by a report within 14 days to the appropriate RWQCB, unless otherwise directed by the RWQCB, describing (1) the nature and case of the water quality standard exceedance; (2) the BMPs currently being implemented; (3) any additional BMPs which will be implemented to prevent or reduce pollutants that are causing or contributing to the exceedance of water quality standards; and (4) any maintenance or repair of BMPs. This report shall include an implementation schedule for corrective actions and shall describe the actions taken to reduce the pollutants causing or contributing to the exceedance.

   b. Caltrans shall revise its SWPPP and monitoring program immediately after the report to the RWQCB to incorporate the additional BMPs that have been and will be implemented, the implementation schedule, and any additional monitoring needed.

   c. Nothing in this section shall prevent the appropriate RWQCB from enforcing any provisions of this permit while Caltrans prepares and implements the above report.

D. RWQCB AUTHORITIES

1. Following adoption of this permit, RWQCBs shall implement the Provisions of this permit. Implementation of this permit may include, but is not limited to, reviewing SWPPPs, reviewing Maintenance Facility Pollution Prevention Plans (FPPPs), reviewing monitoring reports, conducting compliance inspections, conducting monitoring, reviewing the Annual Reports and taking enforcement actions.

2. RWQCBs may require submittal of, require changes to, specify a format for, and enforce Provisions of SWPPPs and FPPPs. RWQCBs may also designate projects which do not meet the acreage requirements based upon water quality concerns and require SWPPPs. RWQCBs may require that Caltrans submit all SWPPPs automatically up to 30 days in advance of the onset of construction.

3. RWQCBs may require retention of records for more than three years.

4. RWQCBs may require additional monitoring and reporting program requirements and may provide guidance on monitoring plan implementation.

5. RWQCBs may require Caltrans to conduct additional site inspections, submit reports and certifications, to perform water quality sampling and analysis of discharges from construction sites, roadways and maintenance facilities.

6. RWQCB staff may inspect Caltrans facilities and construction sites.

7. The RWQCB Executive Officer may require Caltrans to monitor and submit a report on nonstorm water discharges that have been determined to be a source of pollutants in the region.

8. RWQCB may issue Caltrans other individual storm water NPDES permits, particularly for large construction projects or other discharges beyond the scope of this permit.

E. GENERAL REQUIREMENTS

In order to meet the federal requirements contained in the CWA and the corresponding regulations contained in the 40 CFR 122.26, Caltrans shall:

1. Maintain and implement an effective SWMP. The SWMP shall identify and describe the BMPs used to control or reduce pollutants to waters of the United States to MEP for the Municipal Storm Water Management activities (all activities except construction). For the Construction Management Program, the SWMP shall identify and describe BMPs used to control or reduce pollutants to waters of the United States that meet BAT/BCT. BMP development is a fluid and dynamic process, and the menu of BMPs contained in the SWMP may require changes over time as experience is gained and/or the state of the art progresses. The SWMP shall be reviewed annually and modified as necessary to maintain an effective program. The SWMP shall reflect the principles that storm water management is to be a year-round proactive program to eliminate or control pollutants at their source or to reduce them from the discharge by either structural or nonstructural means when elimination at the source is not possible. The ***REVISED SWMP*** shall be submitted to the SWRCB's Executive Director by April 1 as part of the Annual Report (40 CFR 122.26 (d)(vi)) each year. In accordance with NPDES Permit regulations, significant changes to the program will be taken to the SWRCB for approval. Caltrans shall change all other appropriate manuals to reflect modifications to the SWMP.

2. In addition to the revised SWMP, Caltrans shall submit ***REGIONAL WORKPLANS*** (workplans) each year for each region by April 1 as part of the Annual Report each year. The workplans will be forwarded to the appropriate RWQCB's Executive Officer for approval. The workplan shall cover all activities to be undertaken by the Districts in the region and shall address the water bodies in the region, the impact of the Caltrans discharge on the water body and the BMPs and monitoring program to be implemented in the region, and changes that are to be made to the previous year's

program. The workplan shall also include identification of high risk areas, such as locations where spills from Caltrans owned rights-of-way, activities or facilities can discharge directly to municipal or domestic water supply reservoirs or ground water percolation facilities, and consideration of appropriate spill containment and spill prevention control measures for these new areas. Because the BMP programs and monitoring program are described in other documents, this workplan shall describe how the various programs will be implemented in the Region.

3. The SWMP shall define terms in a manner that is consistent with the definitions in 40 CFR 122.2. This includes, but is not limited to, the definitions for pollutant, waters of the United States, and point source. Where there is a conflict between the SWMP and the permit language, the permit language shall govern.

4. The SWMP shall include or describe procedures for implementing the following:

CHAPTER 1.	PROGRAM OVERVIEW (Provision F)
CHAPTER 2.	PROGRAM MANAGEMENT (Provision G)
CHAPTER 3.	CONSTRUCTION PROGRAM MANAGEMENT (Provision H)
CHAPTER 4.	MAINTENANCE PROGRAM MANAGEMENT (Provision I)
CHAPTER 5.	TRAINING AND PUBLIC EDUCATION (Provision J)
CHAPTER 6.	PROGRAM EVALUATION/REPORTING (Provision K)
CHAPTER 7.	LOCATION SPECIFIC REQUIREMENTS (Provision L)

F. PROGRAM OVERVIEW

Caltrans shall implement the program specified in the SWMP. Caltrans shall also implement any additional requirements contained in this Provision F.

1. Caltrans must reevaluate and revise the BMP program in the SWMP to reflect the definition of pollutant in the federal regulations. The selection of BMPs must reflect the need to meet MEP, or where appropriate, BAT/BCT and water quality standards. It is appropriate to address pollutants known to be in a waste stream, even if there is not yet any documented evidence of adverse effect. Decisions regarding storm water management should be made in response to site-specific circumstances, depending on the location and nature of the activity in question and the local receiving water conditions. In geographic areas in which the requirements in effect prior to adoption of this permit are more stringent than the requirements of this permit, Caltrans will specify in the SWMP and regional workplans, a program which is at least as stringent as the prior requirements for that area. In no event shall the BMP program in any part of the State be less stringent than it was under the prior requirements.

2. The revised SWMP shall be submitted within 90 days of the adoption of the permit. Until such time as Caltrans has an approved SWMP, Caltrans will continue to meet the requirements that were in effect under the permits adopted by RWQCBs.

3. Caltrans shall include an analysis of the feasibility of structural controls in the BMP selection process. At a minimum, a consideration of structural controls for water

quality improvement shall be included in the design of any new construction or major reconstruction or repair projects.

The SWMP shall be updated each year as part of the Annual Report and shall contain the following elements:

a. A listing of appropriate control measures, including design, operation, and maintenance specifications, referenced by facility type, location, and other suitable factors. (Suitable factors may include prevention and control of erosion and sedimentation, source control of potential pollutants, control of pathogens, control and treatment of runoff, spill containment, and protection of wetlands and water quality resources);

b. An effective operation and maintenance program for BMPs;

c. Consideration of pollution prevention and pollutant removal factors, including spill containment and corresponding operation and maintenance requirements in the design of facility drainage structures and other features;

d. Development and implementation of policies, programs, procedures, and standards to improve pollutant removal and water quality benefits of landscape design after construction is completed;

e. A description of how these BMPs will be developed, constructed and maintained by the Environmental Engineering, Project Development, Construction, and Maintenance Branches and other affected functional offices and branches;

f. A ***BMP SELECTION REPORT*** which presents the revisions to the BMP programs (including both structural and nonstructural BMP candidates) to be implemented in the coming year along with the process used for evaluating the revised BMPs. The process shall include a mechanism for public input and review during the BMP selection process; and

g. A mechanism for evaluating new treatment and control technologies and for considering these technologies as part of the BMP programs. A ***NEW TECHNOLOGY REPORT*** is required as part of the Annual Report each year.

4. Storm Water Drainage System Retrofitting: In urban areas subject to a MS4 permit, Caltrans shall seek opportunities to retrofit the Storm Water Drainage System for water quality improvement whenever a section of the rights-of-way undergoes significant construction or reconstruction. Permanent control measures shall be implemented, both to control erosion and to control runoff of pollutants resulting from normal use of Caltrans facilities such as highways.

   a. Controls that shall be considered: Techniques that capture and or reduce the amount of pollutants, especially sediment from entering the storm drain system

or receiving water. Cost effectiveness is a factor in the consideration of controls.

b. Treatment controls that have proven to be cost prohibitive to date and therefore need not be considered for most situations include reverse osmosis, ion exchange, and granular activated carbon.

G. PROGRAM MANAGEMENT

Caltrans shall implement the program specified in their SWMP. Caltrans shall also implement any additional requirements contained in this Provision G.

.1. Coordination with MS4 Permittees

a. Caltrans is expected to comply with lawful requirements of municipalities, counties, drainage districts, and other local and or regional agencies regarding discharges of storm water to separate storm sewer systems or other watercourses under the jurisdiction of the local and or regional agencies. These include, but are not limited to applicable requirements in MS4 storm water programs developed to comply with NPDES Permits issued by the RWQCBs to local agencies.

b. Caltrans shall submit a ***MUNICIPAL COORDINATION PLAN*** to the SWRCB Executive Director within 90 days of the adoption of the Permit for approval. The plan shall describe the approach that Caltrans will take in establishing communication, coordination, cooperation, and collaboration of Caltrans storm water management activities and other pertinent activities with MS4 storm water management programs including establishing agreements with municipalities, flood control departments, or districts as necessary or appropriate. Caltrans shall report on the progress of this interagency cooperation in each Annual Report.

2. Legal Authority

a. Caltrans shall establish and maintain adequate legal authority through ordinance, statute, permit, contract or other means to control discharges to and from Caltrans properties, facilities and activities pursuant to 40 CFR 122.26(d)(2)(i)(A-F).

b. Caltrans has provided a statement certified by its chief legal counsel that Caltrans has adequate legal authority to implement and enforce each of the key regulatory requirements contained in 40 CFR 122.26(d)(2)(i)(A-F). Caltrans shall submit annually, as part of the Annual Report, an ***ANALYSIS OF THE ADEQUACY OF LEGAL AUTHORITY*** based on Caltrans experiences during the previous year and explain and justify whatever conclusions are reached in the annual certification of legal authority.

3. Fiscal Resources

   a. Caltrans shall maintain adequate fiscal resources to maintain compliance with this NPDES Permit. This includes but is not limited to:

      (1) implementing and maintaining all BMPs identified in the SWMP,

      (2) maintaining an effective storm water monitoring program, and

      (3) retaining adequate trained personnel to manage the storm water program.

   b. Caltrans shall submit a ***FISCAL ANALYSIS*** of the storm water program expenditures within 90 days of the adoption of this permit and shall include one for the 3rd year and 5th year of the Permit period in the Annual Report submitted April 1. At a minimum, the fiscal analysis shall show the allocation of funds to the Districts for compliance with this permit; the funding of the program elements; and a comparison of actual past year expenditures with the current year's expenditures and next year's proposed expenditures. The 3rd year report shall show how Caltrans funding met the goals set out for the program in the first two years. The 5th year report shall contain the budget analysis for the next permit period.

4. Policies: Caltrans shall identify policies needed to resolve conflicts between implementation of the storm water program and current standard practices and policies.

5. Inspection Program: Caltrans shall have an inspection program to insure actions are implemented and facilities are constructed, operated, and maintained in accordance with this NPDES Permit and the SWMP. The program shall include training for inspection personnel, documentation of field activities, a reporting system that can be used to track effectiveness of control measures, enforcement procedures (or referral for enforcement) for noncompliance, and responsibilities and responsible personnel of all affected functional offices and branches.

H. CONSTRUCTION PROGRAM MANAGEMENT

Caltrans shall implement the program specified in the SWMP. Caltrans shall also implement any additional requirements contained in this Provision H.

1. Caltrans shall have a program to control all construction in the rights-of-way. This includes both construction by Caltrans, construction done under contract for Caltrans, and construction done by local government agencies or other third parties on Caltrans or nonCaltrans projects. The program must include:

   a. review of construction site plans;

   b. requirement of structural and nonstructural BMPs;

c. site inspections and enforcement; and

d. education of construction site operators.

The program must be implemented year round on all construction projects in all parts of the State. The SWMP must be revised to address these requirements and have a program and a schedule for inspections.

2. The Construction Management Program shall be in compliance with requirements of the NPDES General Permit for Construction Activities (Construction General Permit) not including NOI filing. The current Construction General Permit is SWRCB Board Order 92-08--DWQ.

Terms that are defined in the Construction General Permit will have the same definition for the construction portion of this NPDES Permit.

3. The Lahontan RWQCB has adopted an NPDES Storm Water Permit for construction projects that involve more than five acres of soil disturbance and nonNPDES WDRs for construction projects for projects less than five acres within the Lake Tahoe Hydrologic Unit. The current nonNPDES Lahontan Construction Permit is Board Order 6-93-63. The WDRs for small projects are contained in Lahontan RWQCB Board Order 6-91-31. Projects in the Lake Tahoe Hydrologic Unit must be in compliance with the Provisions of the Lahontan RWQCB Order that is applicable to the project. The Lahontan RWQCB has also developed erosion control guidelines for high mountain areas throughout the region. Caltrans shall follow these guidelines in the appropriate parts of the region.

4. Caltrans shall plan, site, and develop roads and highways in a manner that protects water quality, beneficial uses of water and minimizes erosion and sedimentation .

5. Caltrans shall site, design, and maintain bridge structures so that sensitive and valuable aquatic ecosystems and areas providing water quality benefits are protected from adverse effects.

6. Caltrans shall limit the application, generation, and migration of toxic substances from construction sites.

7. Caltrans shall implement adequate erosion and sediment control BMPs during the interim period between completion of construction and final landscaping activities.

8. The following items apply to construction activities:

a. A report of ***NOTIFICATION OF CONSTRUCTION*** for all construction projects shall be submitted to the appropriate RWQCB at least 30 days prior to the start of construction. The tentative start date, tentative duration, location of construction, description of project, an estimate of the number of affected acres, resident engineer in charge of the project, and telephone number of the resident

engineer shall be reported. If a resident engineer has not been assigned at the time of notification, information about the construction field office should be provided and the resident engineer information provided when the assignment is made.

b. A site specific SWPPP shall be developed and implemented for each construction project as required by the State Construction General Permit (or the appropriate Lahontan RWQCB Permit). The RWQCBs can designate projects under five acres which pose a threat to water quality as being subject to the conditions of this permit and can require the development and implementation of an SWPPP from these projects. For projects that may have a significant potential water quality impact, Caltrans is encouraged to involve the RWQCB staff in the planning stages. The SWPPP shall contain a BMP program that meets the performance standards of BAT/BCT. The resident engineer shall approve the SWPPP prior to construction and ensure that the SWPPP is effectively implemented. The SWPPP shall contain all of the elements required by the Construction General Permit. Caltrans is responsible for having an effective SWPPP at all times and for implementing the SWPPP at an appropriate level through the entire year. RWQCB staff has the authority to require the submittal of an ***SWPPP*** at any time, including up to 30 days prior to commencement of significant soil disturbance activities; to require changes to the SWPPP; and to enforce the provisions of the SWPPP.

The SWPPP shall contain a BMP program for any mobile operations that are used in the construction project. This includes operations such as asphalt recycling, concrete mixing, crushing, and storage of materials that are established by the contractor within the construction site or on other property specifically arranged for and provided by Caltrans for execution of the project.

The SWPPP shall apply to all areas that are directly related to the construction activity, including but not limited to staging areas, storage yards, material borrow areas and storage areas, access roads, etc., whether or not they reside within the Caltrans rights-of-way.

c. Monitoring and inspection of construction sites shall be done in accordance with the Provisions of the Construction General Permit. Noncompliance shall be reported in accordance with the plan to be submitted under Program Evaluation and Reporting Provision K.2.a.

d. A ***NOTICE OF COMPLETION*** shall be submitted to the RWQCB upon completion of the construction and stabilization of the site. A project will be considered complete when the criteria for final stabilization in the Construction General Permit are met.

9. Caltrans has applied for and received variances from the California Department of Toxic Substances Control (DTSC) for the reuse of some soils that contain lead. Notification that projects involve soils that are subject to this variance shall be provided to the appropriate RWQCB(s) in writing 30 days prior to advertisement for

bids to allow a determination by the RWQCB(s) of the need for development of WDRs.

I. MAINTENANCE PROGRAM MANAGEMENT

Caltrans shall implement the program specified in the SWMP. Caltrans shall also implement any additional requirements contained in this Provision I.

1. Highway Maintenance Activities

   a. Caltrans shall develop and implement runoff management programs and systems for existing roads, highways, and bridges to reduce runoff pollutant concentrations and volumes entering surface waters.

      (1) Identify priority and watershed pollutant reduction opportunities (e.g., improvements to existing urban runoff control structures).

      (2) Establish schedules for implementing appropriate controls.

      (3) Identify road segments with slopes that are prone to erosion and discharge of sediment and stabilize these slopes to the extent possible.

   b. Vegetation Control: Caltrans shall revise the Vegetative Control Program to reflect the following elements:

      (1) Enhancement of the use of appropriate native and adapted vegetation throughout all Caltrans rights-of way for the purpose of preventing erosion and removing pollutants in storm water and nonstorm water runoff.

      (2) Application of herbicides in a manner that minimizes or eliminates the discharge of herbicides to receiving waters. Factors to be considered include timing in relation to expected precipitation events, proximity to water bodies, and the effects of using combinations of chemicals.

      (3) Caltrans shall apply nutrients at rates necessary to establish and maintain vegetation without causing significant nutrient runoff to surface water.

      (4) In places where Caltrans has already developed vegetation control management plans, Caltrans shall continue to implement these plans and integrate them into their overall statewide plan. In instances where elements of these plans are to be changed or dropped, Caltrans shall discuss the changes in the workplan portion of the Annual Report.

   c. Storm Water Drainage System Facilities Maintenance

      (1) Caltrans shall remove all waste from those inlets that pose a significant threat to water quality on an annual basis prior to the winter season each

year. All waste removed from drain inlets shall be managed in accordance with all applicable laws and regulations, including CCR Title 27, Division 2, Subdivision 1.

(2) Drain inlets which contain significant materials must be considered for an IC/ID investigation and considered for an enhanced BMP program focused on reducing the sources of the material found in the inlet.

2. Highway Surveillance Activities

a. Accidental Spills

(1) Caltrans will follow Office of Emergency Services (OES) procedures for reporting highway spills.

(2) A report of ***DISCHARGE OR THREAT OF DISCHARGE NOTIFICATION*** will be made under the following conditions: Caltrans will notify the owner/operator of the MS4 or the principal permittee as soon as practicable, but no later than 24 hours after onset of or threat of discharge of any discharge or threat of discharge which can cause adverse conditions to the storm sewer system or the receiving water that is not covered by OES procedures from a highway to a storm sewer system subject to an MS4 permit.

(3) A report of ***DISCHARGE OR THREAT OF DISCHARGE NOTIFICATION*** will be made immediately to the RWQCB of any discharge which can cause adverse conditions to the storm sewer system or the receiving water, with a follow up in writing within 24 hours. Adverse conditions include but are not limited to serious violations or serious threatened violations of WDRs, significant spills of petroleum products or toxic chemicals, or serious damage to control facilities that could affect compliance. Caltrans shall perform follow-up monitoring of major spills and/or perform confirmation sampling to ensure that threats to waters of the United States have been eliminated as determined by the local RWQCB. (This Provision applies to highway operation, not construction projects. Provisions for reporting discharges are contained in the Construction General Permit).

b. IC/ID Detection Program: Caltrans shall implement the IC/ID Detection Element described in the SWMP in conjunction with the legal authority with the following changes:

(1) Detection of IC/IDs: Caltrans shall develop procedures for receiving and investigating public complaints including establishing telephone numbers which the public can use to report IC/IDs and shall post these numbers in places where illegal dumping is found to be a problem.

(2) Investigation of each IC/ID: Caltrans shall develop procedures to conduct investigations of every IC/ID to identify the source. These procedures may include further field screening (observations and field analyses), collection and laboratory analysis of samples (upstream and downstream), smoke or dye tests, video taping with a remote control camera, or other appropriate means.

(3) Elimination of IC/IDs: Caltrans shall eliminate all identified IC/IDs as expeditiously as possible. In addition to reporting IC/IDs to the municipal authorities and to the RWQCBs, Caltrans shall use its own legal authority to eliminate IC/IDs.

(4) Caltrans shall develop a procedure to track all reports of IC/IDs and the action taken on them. A ***REPORT ON THE IC/ID PROGRAM*** will be required each year as part of the Annual Report.

(5) Caltrans shall report on the program developed under this Provision as part of the April 2000 Annual Report. (***DEVELOPMENT OF IC/ID PROGRAM***).

3. Program for Highway Maintenance Facilities

a. Caltrans shall prepare Maintenance FPPPs for all maintenance facilities. Because these facilities are considered municipal activities rather than industrial activities, these FPPPs must have BMP programs that reduce pollutants to MEP.

b. Generic FPPP elements can be used for activities that are performed at more than one maintenance facility; however, each site must be evaluated separately and provided with appropriate site specific BMPs.

c. RWQCB staff has the authority to require the submittal of a FPPP at any time, to require changes to a FPPP, and to require the implementation of the Provisions of a FPPP.

J. TRAINING AND PUBLIC EDUCATION

Caltrans shall implement the program specified in the SWMP. Caltrans shall also implement any additional requirements contained in this Provision J.

In areas where Caltrans is already participating in an areawide Public Education Program, Caltrans will continue participation. The Public Education Program shall address the three main audiences that impact Caltrans storm water discharges. The three audiences are: Caltrans Employees; Caltrans Construction Contractors, and the General Public. The program shall contain the following elements for each of these groups:

1. Caltrans Employees

a. Caltrans shall implement the program specified in the SWMP.

b. Caltrans shall provide frequent educational reminders to employees to reinforce the training.

2. Caltrans Construction Contractors

a. Caltrans shall implement the program specified in the SWMP.

b. Caltrans shall provide outreach to contractors to raise their awareness of the problems and causes of storm water pollution and to reinforce their training.

3. General Public

a. ***PLAN FOR DEVELOPMENT AND IMPLEMENTATION OF A PUBLIC EDUCATION PROGRAM***: Caltrans shall submit a plan for approval by the SWRCB Executive Director within 180 days of adoption of this NPDES permit for development and implementation of a Public Education Program that includes education of the general public and commercial and industrial entities whose actions may impair storm water quality discharged from Caltrans properties, facilities and activities. In areas where a Caltrans is already part of a Public Education Program with other MS4 permittees, Caltrans must continue with their participation in the program. (***PLAN FOR DEVELOPMENT AND IMPLEMENTATION OF A PUBLIC EDUCATION PROGRAM***)

b. The plan shall include the following elements:

(1) Research--A plan for conducting research on public behavior that affects the quality of Caltrans runoff. The information gathered will form the foundation for all the public education conducted.

(2) Public Education Strategy--Develop a three-year public education strategy. The strategy should be based on the research conducted and must include goals and objectives to be achieved regarding changing behaviors.

(3) Mass Media Advertising--Develop and conduct an advertising campaign as a focal point of the public education strategy. The campaign should focus on the behaviors of concern and should be designed to motivate the public to change those behaviors. The public education campaigns may be done as a cooperative effort with other MS4 permittees.

c. Upon approval of the submitted plan, Caltrans shall implement the plan to develop a Public Education Program. The ***PUBIC EDUCATION PROGRAM PROGRESS REPORT*** on the progress made on the public education program development will be made as part of the Annual Report each year. A proposed ***PUBLIC EDUCATION PROGRAM*** will be submitted with the Annual Report in 2001. The ***PUBLIC EDUCATION PROGRAM*** shall be submitted with the

Annual Report in 2002. Caltrans will begin implementation of the plan in April 2002.

K. PROGRAM EVALUATION AND REPORTING

Caltrans shall implement the program specified in the SWMP. Caltrans shall also implement any additional requirements contained in this Provision K.

1. Characterization of Discharges: Caltrans shall develop a plan to identify and describe existing major discharges and points of discharge, as defined in 40 CFR 122.26(iv)(d)(1 and 2), to surface water bodies in areas subject to the MS4 permit requirements and to identify and describe other discharge points as funding allows. Caltrans shall also provide information concerning major existing structural controls (such as the location of detention basins, infiltration basins, etc.). Characterization should be done in phases with the highest priority given to discharge points that are part of BMP studies and in areas where these discharges fit into ongoing watershed characterization studies. For discharges that contain pollutants, Caltrans shall investigate the source of the pollutants and, where appropriate, eliminate the IC/ID or implement BMP programs. The plan shall also identify procedures for notifying the RWQCB and affected municipal storm water management agencies of these discharges and future planned discharges and procedures for monitoring and record management. Discharges which Caltrans cannot control, such as discharges from other parties over which Caltrans has no authority, shall be referred to the appropriate regulatory agency for appropriate action. The ***PLAN FOR CHARACTERIZATION STUDIES***, describing how the studies shall be carried out, shall be submitted with the 1999 Annual Report. Characterization studies shall be completed by April 1, 2003.

2. Receiving Water Monitoring: Caltrans has submitted a three-year monitoring strategy that outlines the research monitoring that it intends to undertake in the next three years. The ***MONITORING STRATEGY REPORT UPDATE*** will be updated annually based on the results of previous years' monitoring and in response to the needs of the program and the funding available. The updated Monitoring Strategy Report will be submitted as part of each Annual Report.

   a. Caltrans shall submit to the SWRCB by April 1, 2000 and each April 1 thereafter a ***MONITORING AND REPORTING PROGRAM*** acceptable to the Executive Director that shall identify and justify sampling locations, frequencies, and methods, suite of pollutants to be analyzed, analytical methods, and quality assurance procedures. Alternative monitoring methods (special projects, literature review, visual observations, use of indicator parameters, etc.) may be proposed with justification. Current MS4 Permits for Caltrans have monitoring requirements. Results of the monitoring efforts undertaken under RWQCB MS4 Permits may be submitted to fulfill these monitoring requirements.

   The RWQCB Executive Officers are authorized to require additional monitoring and reporting by Caltrans when additional information is needed to assess

existing or potential adverse impacts by storm water discharges, to evaluate effectiveness of storm water pollution prevention or control measures, or to demonstrate compliance with permit requirements.

3. Compliance Monitoring and Evaluation

a. Caltrans shall prepare a plan to be submitted as part of the Annual Report due April 1, 2000 explaining how the RWQCBs will be notified about noncompliance. The plan shall include the identification in each Office and Region, the parties to notify and receive the notification. The notification shall identify the type(s) of noncompliance, describe the actions necessary to achieve compliance, and include a time schedule, subject to the modifications by the RWQCB indicating when compliance will be achieved. Noncompliance notifications must be submitted verbally within 5 working days, with written followup within 30 days of identification of noncompliance. (***REPORTING OF NONCOMPLIANCE***)

b. Construction site monitoring and inspections shall be carried out as required by the Construction General Permit or the applicable Lahontan RWQCB Permit.

c. Maintenance Facility Compliance Monitoring

(1) Caltrans is required to conduct periodic inspections. The purpose of the inspections is to identify areas contributing to a discharge of storm water associated with the maintenance facility activities and to evaluate whether control practices to reduce pollutant loadings identified in the FPPP are adequate and properly implemented or whether additional control practices are needed. A record of the inspections must include the date of the inspection, the individual(s) who performed the inspection, and the observations.

(2) Any noncompliance shall be reported to the RWQCB in accordance with the plan to be submitted under Program Evaluation and Reporting Provision K.3.a.

(3) The RWQCB may require Caltrans to conduct additional site inspections, to submit reports and certifications, or to perform sampling and analysis.

(4) Records of all inspections, compliance certifications, and noncompliance reporting must be retained for a period of at least three years. With the exception of noncompliance reporting, Caltrans is not required to submit these records unless otherwise requested.

(5) Monitoring at all maintenance facilities is not required.

d. Overall Management Program Effectiveness:

Caltrans shall perform a self-audit of the storm water program each year to determine (1) if the program is being implemented as required by this NPDES Permit, the SWMP, and the guidance documents prepared by Caltrans; and (2) if the program specified by the SWMP and the guidance documents is adequate. The results of this ***SELF-AUDIT*** shall be submitted by April 1, 2000 and as a part of the Annual Report thereafter to the SWRCB Executive Director. Caltrans may use any method to evaluate program effectiveness and shall identify the direct and indirect measurements that will be used to track the long-term effectiveness. An outline of the proposed audit is to be submitted by February 1 of each year so that the SWRCB and RWQCBs can evaluate the measures to be used.

4. Reporting

Caltrans shall submit 13 copies of an ***ANNUAL REPORT*** to the SWRCB Executive Director by April 1 each year starting on April 1, 2000. The Annual Report shall contain the data and a summary and analysis of the data collected in the previous year. The report due on April 1, 2000 will cover data collected during the winter of 1998-1999. Reports that are required from Caltrans include the items listed in Table 2.

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TABLE 2
COMPILATION OF REPORTING REQUIREMENTS

Provision	Requirement	Date Required
B.9	Comprehensive Nonstorm Water Report	Every Annual Report
E.1, F.1	Revised SWMP, including Revisions to the BMP Programs with Justification and Public Input	Every Annual Report
E.2	Regional Workplans	Every Annual Report
F.2.f	BMP Selection Report	Every Annual Report
F.2.g	New Technology Report	Every Annual Report
G.1.b	Municipal Coordination Plan	April 1, 2000
G.1.b	Municipal Coordination Program Report	Every Annual Report
G.2.b	Analysis of the Adequacy of Legal Authority	Every Annual Report
G.3.b	Fiscal Analysis	90 days from adoption
G.3.b	Fiscal Analysis	3rd and 5th year Annual Report
H.8.a	Notification of Construction	At least 30 days prior to construction
H.8.b	SWPPP	Request by RWQCB
H.8.d	Notice of Completion	Upon final stabilization
I.2.a.(2)	Discharge or Threat of Discharge Notification to MS4 Permittee	Upon discharge or threat of discharge
I.2.a.(3)	Discharge or Threat of Discharge Notification to RWQCB	Upon discharge or threat of discharge
I.2.b.(4)	Report on the IC/ID Program	Every Annual Report
I.2.b.(5)	Development of IC/ID Program	April 1, 2000
I.3.c	FPPP	Request by RWQCB
J.3.a	Plan for Development and Implementation of a Public Education Program	April 1, 2000
J.3.c	Public Education Program Progress Report	Every Annual Report
J.3.c	Public Education Program	April 1, 2003
K.1	Plan for Characterization Studies	April 1, 2000
K.2	Monitoring Strategy Report Update	Every Annual Report
K.2.a	Monitoring and Reporting Program	Every Annual Report
K.3.a	Reporting of Noncompliance	April 1, 2000
K.3.d	Self Audit	Every Annual Report
L.10.a	De-icer Monitoring Proposal	Every Annual Report
L.10.b	De-icer Report	June 1, 2000
M.7	Report of Waste Discharge	180 days prior to expiration of permit

These reporting requirements are contained in the text of the NPDES Permit. If there is a discrepancy between the text of the NPDES Permit and this table, the text of the NPDES Permit contains the requirement.

L. LOCATION SPECIFIC REQUIREMENTS

Caltrans shall implement the program specified in the SWMP. Caltrans shall also implement any additional requirements contained in this Provision L.

Lahontan Region: The Water Quality Control Plan for the Lahontan Region (Basin Plan) has additional requirements which have been historically applied to Caltrans permits and which apply to this NPDES Permit in the Lahontan Region. These requirements include:

1. Numerical effluent limitations for storm water discharges within the Lake Tahoe Hydrologic Unit, as specified in Table 5.6-1 on page 5.6-4 of the Basin Plan.

2. Caltrans shall comply with all Waste Discharge Prohibitions specified in sections 4.1 and 5.2 of the Basin Plan.

3. The following nonstorm water discharges which are permitted under Nonstorm Water Provision B.2. of this NPDES permit are prohibited within the Lahontan Region:

   a. Water line-flushing discharges.

   b. Ground or surface water pumping discharges associated with construction activities that would violate numerical effluent limitations within the Lake Tahoe Hydrologic Unit or receiving water objectives throughout the Lahontan Region, as specified on pages 3-3 through 3-56 of the Basin Plan.

   c. Potable water resource discharges.

   d. Uncontaminated pumped ground water discharges that would violate numerical effluent limitations within the Lake Tahoe Hydrologic Unit or receiving water objectives throughout the Lahontan Region, as specified on pages 3-3 through 3-56 of the Basin Plan.

   e. Air conditioning condensate discharges (not applicable to vehicles).

4. Storm water/urban runoff collection, treatment, and/or infiltration disposal facilities shall be designed, installed, and maintained for the discharge of storm water runoff from all impervious surfaces generated by the 20-year, one-hour design storm (1) within the Lake Tahoe Hydrologic Unit (one inch of rain), (2) within the Truckee River Hydrologic Unit (3/4-inch of rain), (3) within the East Fork Carson River and West Fork Carson River Hydrologic Units (one inch of rain), and (4) within the Mammoth Creek Hydrologic Unit above the 7,000-foot elevation (one inch of rain). All Caltrans facilities within the Lake Tahoe Hydrologic Unit must be retrofitted to comply with this requirement by the Year 2008. If site conditions do not allow for adequate on site disposal, all site runoff must be treated to meet applicable Effluent Limits and/or Receiving Water Limitations specified in the Basin Plan. Runoff in excess of the design storm and generated by the facility or within the project site shall only be discharged to a storm drain or stabilized drainage adequate to convey the 100-year 24-hour flow. The RWQCB Executive Officer may approve alternative mitigation measures.

   All Caltrans facilities within the Lake Tahoe Hydrologic Unit must be retrofitted to comply with this provision by the Year 2008. Caltrans shall continue to participate in the Capital Improvement Program (CIP), as described in volume IV of the CWA Section 208 Water Quality Management Plan (208 Plan). The purpose of the CIP is to identify projects, develop an implementation program, and develop a funding mechanism for storm water runoff and erosion control projects in the Lake Tahoe Hydrologic Unit.

5. All construction/maintenance projects shall comply with Erosion Control Guidelines for the Lake Tahoe Hydrologic Unit, Erosion Control Guidelines for the Truckee River Hydrologic Unit, and Erosion Control Guidelines for the North Lahontan Region where applicable.

6. Caltrans shall inspect active project sites and maintenance facilities prior to, during, and after storms to ensure that BMPs are functioning adequately and preventing the discharge of pollutants to surface waters or storm water conveyance systems that discharge to surface waters.

7. Unless granted a variance by the RWQCB Executive Officer, there shall be neither removal of vegetation nor disturbance of existing ground surface conditions between October 15 of any year and May 1 of the following year, except when there is an emergency situation that threatens the public health or welfare. This prohibition period applies to the Lake Tahoe, Truckee River, East Fork Carson River, and West Fork Carson River Hydrologic Units and above the 5,000-foot elevation in the portions of Mono and Inyo Counties within the Lahontan Region.

8. Project Review Requirements

   a. Caltrans shall participate in early project design consultation for all projects within the Lake Tahoe, Truckee River, and Mammoth Creek Hydrologic Units. This requirement also applies to projects involving more than five acres of soil disturbance or that require a CWA section 404 permit throughout the Lahontan Region. Caltrans shall solicit RWQCB staff review when project development/design is at the 50 percent design level. Consultation with RWQCB staff shall continue throughout the remainder of the design development and environmental review process.

   b. Caltrans shall submit an SWPPP or a Water Pollution Control Plan for RWQCB staff review and approval no later than 30 days prior to beginning construction activities. RWQCB staff's proposed modifications shall be included within the plans prior to beginning construction activities.

9. Snow and Ice Control

   Where abrasives and/or de-icing agents are used on highways within the Lahontan Region, the following shall be recorded:

   a. Location of the source of abrasives materials.

   b. Types and chemistry of de-icing agents.

      (1) Deicing salt shall be analyzed for: total phosphorus, total nitrogen, iron, and percent NaCl.

(2) Alternative deicers shall be analyzed for: total nitrogen, and total phosphorus.

c. Type and chemistry of abrasives with the gradation and percent organic matter. Gradation and percent organic matter shall be determined from composite samples. The composite samples shall be taken from one stockpile that represents all deliveries from the originating source. Composite samples shall be taken from every new delivery from a new originating source.

(1) Abrasives shall be analyzed for: volatile solids, iron, total nitrogen, total phosphorus, and total reactive phosphorus.

d. Volume of abrasives and deicing agents used on individual highway's segments.

10. Reporting/Notification Issues

a. Caltrans shall submit a monitoring program proposal that evaluates the effectiveness of BMPs used to recover abrasives and deicing materials and that evaluates the impacts of abrasives and deicing materials on surface waters within the Lake Tahoe Hydrologic Unit. The proposal shall include monitoring locations and sampling and analysis methodologies. The proposal shall be submitted within 180 days of adoption of this NPDES Permit for review and approval by the Lahontan RWQCB Executive Officer. (***DEICER MONITORING PROPOSAL***)

b. A report shall be submitted, as part of the Annual Report each year describing the results of the abrasives and deicing materials analysis and the annual results of the above-referenced monitoring program involving BMP effectiveness and surface water impacts. The report shall also include a summary of Caltrans CIP activities, including progress on implementing the CIP, and project effectiveness. Project effectiveness has historically been documented with photographs including preproject photographs, photographs taken during the spring following project completion, and photographs taken two years following project completion. If photographs or project site inspections indicate that the project is not fully meeting project objectives, Caltrans shall include within the report a corrective action plan and a schedule that will meet the project objectives. (***DEICER REPORT***)

11. Caltrans shall immediately notify the RWQCB by telephone, not later than 24 hours, whenever an adverse condition occurs as a result of a discharge with written confirmation following within two weeks. An adverse condition includes, but is not limited to, a serious violation or a serious threatened violation of conditions specified in this NPDES Permit, significant discharges of spills of petroleum products or toxic chemicals, or serious damage to control facilities that could affect compliance.

M. OTHER PROVISIONS

1. Caltrans shall ensure that all personnel whose decisions or activities could affect storm water quality are familiar with the contents of this NPDES Permit.

2. Caltrans shall comply with all conditions and limitations of this NPDES Permit upon adoption of this NPDES Permit. Any NPDES Permit noncompliance constitutes a violation of the CWA and the CWC and is grounds for enforcement action pursuant to the CWA and CWC, NPDES Permit termination, or denial of a renewal application.

3. This NPDES Permit does not authorize violation of any federal, State, or local law or regulation.

4. Caltrans shall properly operate and maintain at all times any facilities and systems of treatment and control (and related appurtenances) which are installed or used by Caltrans to achieve compliance with the conditions of this NPDES Permit and with the requirements of SWPPPs. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures.

5. This NPDES Permit does not convey any property rights of any sort or any exclusive privileges, authorize any injury to private property or any invasion of personal rights, nor any infringement of federal, State, or local laws or regulations.

6. Caltrans shall comply with the Standard Provisions for NPDES Permit found at 40 CFR 122.41 and 40 CFR 122.42(c).

7. This NPDES Permit expires five years from date of adoption, 2004, and Caltrans shall file a complete Report of Waste Discharge in accordance with Title 23, CCR, at least 180 days in advance of such date as an application for issuance of a new Board Order. (***REPORT OF WASTE DISCHARGE***)

8. This Board Order shall serve as an NPDES Permit pursuant to section 402 of the Federal CWA, as amended, and shall become effective at the end of ten (10) days from the date of the Board Meeting which this NPDES Permit was adopted by the SWRCB, provided that the Regional Administrator, USEPA, has no objections.

9. This NPDES Permit may be modified, revoked and reissued, or terminated for cause. The filing of a request by Caltrans for an NPDES Permit modification, revocation and reissuance, or termination or a notification of planned changes or anticipated noncompliance does not stay any NPDES Permit condition. Causes for modification include the promulgation of new regulations or adoption of new regulations by the SWRCB or the RWQCBs, including revisions to the RWQCB Basin Plans.

10. Signatory Requirements

a. All permit applications, reports, or information submitted to the RWQCB, SWRCB, and/or USEPA shall be signed by either a principal Executive Officer, Executive Director, or ranking elected official. [40 CFR 122.22(a)]

b. All reports required by this NPDES Permit and other information requested by the RWQCB, SWRCB, or US EPA shall be signed by a person described in Other Provisions 10.a. of this Provision or by a duly authorized representative of that person. A person is a duly authorized representative only if:

(1) The authorization is made in writing by a person described in Other Provisions 10.a. of this Provision;

(2) The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity, such as the position of plant manager, operator of a well or a well field, superintendent, position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters for the company. (A duly authorized representative may thus be either a named individual or any individual occupying a named position); and

(3) The written authorization is submitted to the RWQCB. [40 CFR 122.22(b)]

c. Changes to authorization: If an authorization under Other Provisions 10.b. of this Provision is no longer accurate because a different individual or position has responsibility for the overall operation of the facility, a new authorization satisfying the requirements of Other Provisions 10.b. of this Provision must be submitted to the RWQCB prior to or together with any reports, information, or applications to be signed by an authorized representative. [40 CFR 122.22(c)].

d. Certification: Any person signing a document under Other Provisions 10.a. or b. of this Provision shall make the following certification:

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is true, accurate, and complete to the best of my knowledge and belief. I

am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment of knowing violations. [40 CFR 122.22(d)]

e. The CWA provides that any person who knowingly makes any false statement, representation, or certification in any record or other document submitted or required to be maintained under this NPDES Permit, including monitoring reports or reports of compliance or noncompliance, upon conviction, shall be punished by a fine of not more than $10,000 per violation, imprisonment for not more than two years per violation, or by both.

CERTIFICATION

The undersigned, Administrative Assistant to the SWRCB, does hereby certify that the foregoing is a full, true, and correct copy of an order duly and regularly adopted at a meeting of the State Water Resources Control Board held on July 15, 1999.

AYE: James M. Stubchaer
Mary Jane Forster
John W. Brown
Arthur G. Baggett, Jr.

NO: None

ABSENT: None

ABSTAIN: None

Maureen Marché
Administrative Assistant to the Board

United States
Environmental Protection
Agency

Office of Water
4503F
Washington, DC 20460

EPA 841-B-99-002
July 1999

EPA

Rapid Bioassessment Protocols for Use in Wadeable Streams and Rivers

Periphyton, Benthic Macroinvertebrates, and Fish

Second Edition

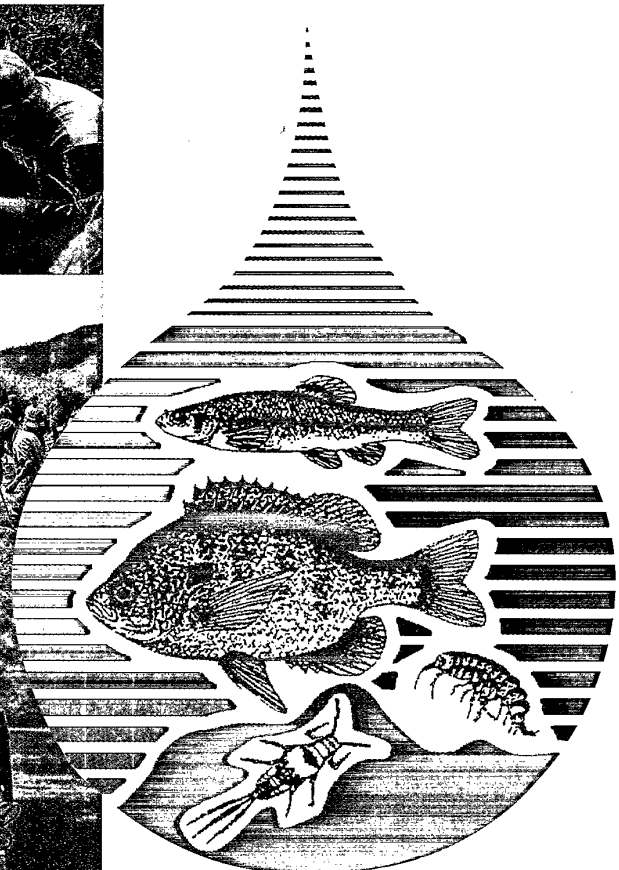

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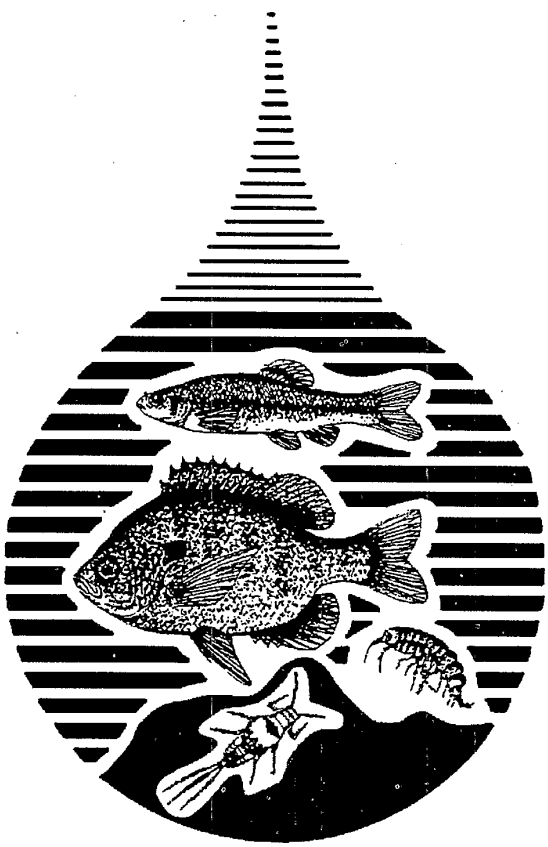

http://www.epa.gov/OWOW/monitoring/techmon.html

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NOTICE

This document has been reviewed and approved in accordance with U.S. Environmental Protection Agency policy. Mention of trade names or commercial products does not constitute endorsement or recommendation for use.

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This entire document, including data forms and other appendices, can be downloaded from the website of the USEPA Office of Wetlands, Oceans, and Watersheds:

http://www.epa.gov/OWOW/monitoring/techmon.html

FOREWORD

In December 1986, U.S. EPA's Assistant Administrator for Water initiated a major study of the Agency's surface water monitoring activities. The resulting report, entitled "Surface Water Monitoring: A Framework for Change" (U.S. EPA 1987), emphasizes the restructuring of existing monitoring programs to better address the Agency's current priorities, e.g., toxics, nonpoint source impacts, and documentation of "environmental results." The study also provides specific recommendations on effecting the necessary changes. Principal among these are:

1. To issue guidance on cost-effective approaches to problem identification and trend assessment.

2. To accelerate the development and application of promising biological monitoring techniques.

In response to these recommendations, the Assessment and Watershed Protection Division developed the rapid bioassessment protocols (RBPs) designed to provide basic aquatic life data for water quality management purposes such as problem screening, site ranking, and trend monitoring, and produced a document in 1989 (Plafkin et al. 1989). Although none of the protocols were meant to provide the rigor of fully comprehensive studies, each was designed to supply pertinent, cost-effective information when applied in the appropriate context.

As the technical guidance for biocriteria has been developed by EPA, states have found these protocols useful as a framework for their monitoring programs. This document was meant to have a self-corrective process as the science advances; the implementation by state water resource agencies has contributed to refinement of the original RBPs for regional specificity. This revision reflects the advancement in bioassessment methods since 1989 and provides an updated compilation of the most cost-effective and scientifically valid approaches.

DEDICATION

All of us who have dealt with the evaluation and diagnosis of perturbation to our aquatic resources owe an immeasurable debt of gratitude to *Dr. James L. Plafkin*. In addition to developing the precursor to this document in 1989, Jim was a driving force within EPA to increase the use of biology in the water pollution control program until his untimely death on February 6, 1990. Throughout his decade-long career with EPA, his expertise in ecological assessment, his dedication, and his vision were instrumental in changing commonly held views of what constitutes pollution and the basis for pollution control programs. Jim will be remembered for his love of life, his enthusiasm, and his wit. As a small token of our esteem, we dedicate this revised edition of the RBPs to his memory.

ACKNOWLEDGMENTS

Dr. James L. Plafkin of the Assessment and Watershed Protection Division (AWPD) in USEPA's Office of Water, served as principal editor and coauthor of the original Rapid Bioassessment Protocols document in 1989. Other coauthors of the original RBPs were consultants to the AWPD, Michael T. Barbour, Kimberly D. Porter, Sharon Gross and Robert M. Hughes. Principal authors of this revision are Michael T. Barbour, James (Sam) Stribling, Jeroen Gerritsen, and Blaine D. Snyder. Many others also contributed to the development of the original RBP document. Special thanks goes to the original Rapid Bioassessment Workgroup. The Workgroup, composed of both State and USEPA Regional biologists (listed in Chapter 1), was instrumental in providing a framework for the basic approach and served as primary reviewers of various drafts. Dr. Kenneth Cummins and Dr. William Hilsenhoff provided invaluable advice on formulating certain assessment metrics in the original RBP approach. Dr. Vincent Resh also provided a critical review that helped strengthen the RBP approach. While not directly involved with the development of the RBPs, Dr. James Karr provided the framework (Index of Biotic Integrity) and theoretical underpinnings for "re-inventing" bioassessment for water resource investigations. Since 1989, extensive use and application of the IBI and RBP concept has helped to refine specific elements and strengthen the overall approach. The insights and consultation provided by these numerous biologists have provided the basis for the improvements presented in this current document.

This revision of the RBPs could not have been accomplished without the support and oversight of Chris Faulkner of the USEPA Office of Water. Special thanks go to Ellen McCarron and Russell Frydenborg of Florida DEP, Kurt King of Wyoming DEQ, John Maxted of Delaware DNREC, Dr. Robert Haynes of Massachusetts DEP, and Elaine Major of University of Alaska, who provided the opportunity to test and evaluate various technical issues and regional specificity of the protocols in unique stream systems throughout the United States. Editorial and production support, report design, and HTML formatting were provided by a team of Tetra Tech staff — Brenda Fowler, Michael Bowman, Erik Leppo, James Kwon, Amanda Richardson, Christiana Daley, and Abby Markowitz. Technical assistance and critical review was provided by Dr. Jerry Diamond of Tetra Tech.

A Technical Experts Panel was convened by the USEPA to provide an in-depth review and recommendations for revisions to this document. This group of esteemed scientists provided not only useful comments, but assisted in revising sections of the document. In particular, Drs. Jan Stevenson and Loren Bahls revised the periphyton chapter; and Dr. Phil Kaufmann provided assistance on the habitat chapter. The Technical Experts Panel included:

Dr. Reese Voshell, Virginia Tech University (Chair)

Dr. Loren Bahls, University of Montana

Dr. David Halliwell, Aquatic Resources Conservation Systems

Dr. James Karr, University of Washington

Dr. Phil Kaufmann, Oregon State University

Dr. Billie Kerans, Montana State University

Dr. Jan Stevenson, University of Louisville

Dr. Charles Hawkins (Utah State University) and Dr. Vincent Resh (University of California, Berkeley) served as outside readers.

Much appreciation is due to the biologists in the field (well over a hundred) who contributed their valuable time to review both the original and current documents and provide constructive input. Their help in this endeavor is sincerely appreciated.

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1 THE CONCEPT OF RAPID BIOASSESSMENT

1.1 PURPOSE OF THE DOCUMENT

> *Biological assessment* is an evaluation of the condition of a waterbody using biological surveys and other direct measurements of the resident biota in surface waters.

The primary purpose of this document is to describe a practical technical reference for conducting cost-effective biological assessments of lotic systems. The protocols presented are not necessarily intended to replace those already in use for bioassessment nor is it intended to be used as a rigid protocol without regional modifications. Instead, they provide options for agencies or groups that wish to implement rapid biological assessment and monitoring techniques. This guidance, therefore, is intended to provide basic, cost-effective biological methods for states, tribes, and local agencies that (1) have no established bioassessment procedures, (2) are looking for alternative methodologies, or (3) may need to supplement their existing programs (not supersede other bioassessment approaches that have already been successfully implemented).

The Rapid Bioassessment Protocols (RBPs) are essentially a synthesis of existing methods that have been employed by various State Water Resource Agencies (e.g., Ohio Environmental Protection Agency [EPA], Florida Department of Environmental Protection [DEP], Delaware Department of Natural Resources and Environmental Control [DNREC], Massachusetts DEP, Kentucky DEP, and Montana Department of Environmental Quality [DEQ]). Protocols for 3 aquatic assemblages (i.e., periphyton, benthic macroinvertebrates, fish) and habitat assessment are presented. All of these protocols have been tested in streams in various parts of the country. The choice of a particular protocol should depend on the purpose of the bioassessment, the need to document conclusions with confirmational data, and available resources. The original Rapid Bioassessment Protocols were designed as inexpensive screening tools for determining if a stream is supporting or not supporting a designated aquatic life use. The basic information generated from these methods would enhance the coverage of broad geographical assessments, such as State and National 305(b) Water Quality Inventories. However, members of a 1986 benthic Rapid Bioassessment Workgroup and reviewers of this document indicated that the Rapid Bioassessment Protocols can also be applied to other program areas, for example:

- Characterizing the existence and severity of impairment to the water resource
- Helping to identify sources and causes of impairment
- Evaluating the effectiveness of control actions and restoration activities
- Supporting use attainability studies and cumulative impact assessments
- Characterizing regional biotic attributes of reference conditions

Therefore, the scope of this guidance is considered applicable to a wider range of planning and management purposes than originally envisioned, i.e., they may be appropriate for priority setting, point and nonpoint-source evaluations, use attainability analyses, and trend monitoring, as well as initial screening.

1.2 HISTORY OF THE RAPID BIOASSESSMENT PROTOCOLS

In the mid-1980's, the need for cost-effective biological survey techniques was realized because of rapidly dwindling resources for monitoring and assessment and the extensive miles of un-assessed stream miles in the United States. It was also recognized that the biological data needed to make informed decisions relevant to the Nation's waters were greatly lacking across the country. It was further recognized that it was crucial to collect, compile, analyze, and interpret environmental data rapidly to facilitate management decisions and resultant actions for control and/or mitigation of impairment. Therefore, the principal conceptual underpinnings of the RBPs were:

- Cost-effective, yet scientifically valid, procedures for biological surveys
- Provisions for multiple site investigations in a field season
- Quick turn-around of results for management decisions
- Scientific reports easily translated to management and the public
- Environmentally-benign procedures.

The original RBPs were developed in two phases. The first phase centered on the development and refinement of the benthic macroinvertebrate protocols. The second phase involved the addition of analogous protocols pertinent to the assessment of fish assemblages.

The benthic macroinvertebrate protocols were originally developed by consolidating procedures in use by various State water quality agencies. In 1985, a survey was conducted to identify States that routinely perform screening-level bioassessments and believed that such efforts were important to their monitoring programs. Guidance documents and field methods in common use were evaluated in an effort to identify successful bioassessment methods that used different levels of effort. Original survey materials and information obtained from direct personal contacts were used to develop the draft protocols.

Missouri Department of Natural Resources (DNR) and Michigan Department of Natural Resources both used an approach upon which the screening protocol (RBP I) in the original document was based. The second (RBP II) was more time and labor intensive, incorporating field sampling and family-level taxonomy, and was a less intense version of RBP III. The concept of family-level taxonomy was based on the approach used by the Virginia State Water Control Board (SWCB) in the late 1980s. The third protocol (RBP III) incorporated certain aspects of the methods used by the North Carolina Division of Environmental Management (DEM) and the New York Department of Environmental Conservation (DEC) and was the most rigorous of the 3 approaches.

In response to a number of comments received from State and USEPA personnel on an earlier version of the RBPs, a set of fish protocols was also included. Fish protocol V was based on Karr's work (1981) with the Index of Biological Integrity (IBI), Gammon's Index of Well Being (1980), and standard fish population assessment models, coupled with certain modifications for implementation in different geographical regions. During the same time period as the development of the RBPs, Ohio EPA developed precedent-setting biological criteria using the IBI and Index of Well Being (IWB), as well as a benthic macroinvertebrate index, called the Invertebrate Community Index (ICI), and published methods and supporting documentation (Ohio EPA 1987). A substantial database on their use for site-specific fish and benthic macroinvertebrate assessments exists, and has been published (DeShon 1995, Yoder 1995, Yoder and Rankin 1995a,b). In the intervening years since 1989, several other states have followed suit with similar methods (Davis et al. 1996).

A workgroup of State and USEPA Regional biologists (listed below) was formed in the late 1980's to review and refine the original draft protocols. The Rapid Bioassessment Workgroup was convened from 1987 through 1989 and included biologists using the State methods described above and biologists from other regions where pollution sources and aquatic systems differed from those areas for which the draft protocols were initially developed.

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The original RBPs (Plafkin et al. 1989) have been widely distributed and extensively tested across the United States. Under the direction of Chris Faulkner, Monitoring Branch of AWPD the AWPD of USEPA, a series of workshops has been conducted across the Nation since 1989 that have been directed to training and discussions on the concept and approach to rapid bioassessment. As a result of these discussions and the opportunity of applying the techniques in various stream systems, the procedures have been improved and refined, while maintaining the basic concept of the RBPs. This document reflects those improvements and serves as an update to USEPA's Rapid Bioassessment Protocols.

1.3 ELEMENTS OF THIS REVISION

Refinements to the original RBPs have occurred from regional testing and adaptation by state agency biologists and basic researchers. The original concept of large, composited samples, and multimetric analyses has remained intact for the aquatic assemblages, and habitat assessment has remained integral to the assessment. However, the specific methods for benthic macroinvertebrates have been refined, and protocols for periphyton surveys have been added. A section on conducting performance-based evaluations, i.e., determining the precision and sensitivity of methods, to enable sharing of comparable data despite certain methodological differences has been added. Various technical issues, e.g., the testing of subsampling, selection of index period, selection and calibration of biological metrics for regional application have been refined since 1989. Many of these technical issues, e.g., development of reference condition, selection of index period and selection/calibration of metrics, have been discussed in other documents and sources (Barbour et al. 1995, Gibson et al. 1996, Barbour et al. 1996a). This revision draws upon the original RBPs (Plafkin et al. 1989) as well as numerous other sources that detail relevant modifications. This document is a compilation of the basic approaches to conducting rapid bioassessment in streams and wadeable rivers and focuses on

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[1] deceased
[2] no longer with state agency or USEPA department relevant to water resource assessments of ecosystem health.

the periphyton, benthic macroinvertebrates, and fish assemblages and assessing the quality of the physical habitat structure.

2 APPLICATION OF RAPID BIOASSESSMENT PROTOCOLS (RBPs)

2.1 A FRAMEWORK FOR IMPLEMENTING THE RAPID BIOASSESSMENT PROTOCOLS

The Rapid Bioassessment Protocols advocate an integrated assessment, comparing habitat (e.g., physical structure, flow regime), water quality and biological measures with empirically defined reference conditions (via actual reference sites, historical data, and/or modeling or extrapolation). Reference conditions are best established through systematic monitoring of actual sites that represent the natural range of variation in "minimally" disturbed water chemistry, habitat, and biological conditions (Gibson et al. 1996). Of these 3 components of ecological integrity, ambient water chemistry may be the most difficult to characterize because of the complex array of possible constituents (natural and otherwise) that affect it. The implementation framework is enhanced by the development of an empirical relationship between habitat quality and biological condition that is refined for a given region. As additional information is obtained from systematic monitoring of potentially impacted and site-specific control sites, the predictive power of the empirical relationship is enhanced. Once the relationship between habitat and biological potential is understood, water quality impacts can be objectively discriminated from habitat effects, and control and rehabilitation efforts can be focused on the most important source of impairment.

2.2 CHRONOLOGY OF TECHNICAL GUIDANCE

A substantial scientific foundation was required before the USEPA could endorse a bioassessment approach that was applicable on a national basis and that served the purpose of addressing impacts to surface waters from multiple stressors (see Stribling et al. 1996a). Dr. James Karr is credited for his innovative thinking and research in the mid-1970's and early 1980's that provided the formula for developing bioassessment strategies to address issues mandated by the Clean Water Act. The USEPA convened a few key workshops and conferences during a period from the mid-1970's to mid-1980's to provide an initial forum to discuss aspects of the role of biological indicators and assessment to the integrity of surface water. These workshops and conferences were attended by National scientific authorities who contributed immensely to the current bioassessment approaches advocated by the USEPA. The early RBPs benefitted from these activities, which fostered attention to biological assessment approaches. The RBPs embraced the multimetric approach described in the IBI (see Karr 1981, Karr et al. 1986) and facilitated the implementation of bioassessment into monitoring programs across the country.

Since the publication of the original RBPs in 1989, U.S. Environmental Protection Agency (USEPA) has produced substantial guidance and documentation on both bioassessment strategies and implementation policy on biological surveys and criteria for water resource programs. Much of this effort was facilitated by key scientific researchers who argued that bioassessment was crucial to the underpinnings of the Clean Water Act. The work of these researchers that led to these USEPA documents resulted in the national trend of adapting biological assessment and monitoring approaches for detecting problems, evaluating Best Management Practices (BMPs) for mitigation of

nonpoint source impacts, and monitoring ecological health over time. The chronology of the crucial USEPA guidance, since the mid-1980's, relevant to bioassessment in streams and rivers is presented in Table 2-1. (See Chapter 11 [Literature Cited] for EPA document numbers.)

Table 2-1. Chronology of USEPA bioassessment guidance (relevant to streams and rivers).

Year	Document Title	Relationship to Bioassessment	Citation
1987	Surface Water Monitoring: A Framework for Change	USEPA calls for efficacious methods to assess and determine the ecological health of the nation's surface waters.	USEPA 1987
1988	Proceedings of the First National Workshop on Biological Criteria (Lincolnwood, Illinois)	USEPA brings together agency biologists and "basic" researchers to establish a framework for the initial development of biological criteria and associated biosurvey methods.	USEPA 1988
1989	Rapid Bioassessment Protocols for Use in Streams and Rivers: Benthic Macroinvertebrates and Fish	The initial development of cost-effective methods in response to the mandate by USEPA (1987), which are to provide biological data on a national scale to address the goals of the Clean Water Act.	Plafkin et al. 1989
1989	Regionalization as a Tool for Managing Environmental Resources	USEPA develops the concept of ecoregions and partitions the contiguous U.S. into homogeneous regions of ecological similarity, providing a basis for establishment of regional reference conditions.	Gallant et al. 1989
1990	Second National Symposium on Water Quality Assessment: Meeting Summary	USEPA holds a series of National Water Quality Symposia. In this second symposium, biological monitoring is introduced as an effective means to evaluating the quality of water resources.	USEPA 1990a
1990	Biological Criteria: National Program Guidance for Surface Waters	The concept of biological criteria is described for implementation into state water quality programs. The use of biocriteria for evaluating attainment of "aquatic life use" is discussed.	USEPA 1990b
1990	Macroinvertebrate Field and Laboratory Methods for Evaluating the Biological Integrity of Surface Waters	This USEPA document is a compilation of the current "state-of-the-art" field and laboratory methods used for surveying benthic macroinvertebrates in all surface waters (i.e., streams, rivers, lakes, and estuaries).	Klemm et al. 1990
1991	Biological Criteria: State Development and Implementation Efforts	The status of biocriteria and bioassessment programs as of 1990 is summarized here.	USEPA 1991a
1991	Biological Criteria Guide to Technical Literature	A limited literature survey of relevant research papers and studies is compiled for use by state water resource agencies.	USEPA 1991b
1991	Technical Support Document for Water Quality–Based Toxics Control	USEPA describes the approach for implementing water quality-based toxics control of the nation's surface waters, and discusses the value of integrating three monitoring tools, i.e., chemical analyses, toxicity testing, and biological surveys.	USEPA 1991c
1991	Biological Criteria: Research and Regulation, Proceedings of the Symposium	This national symposium focuses on the efficacy of implementing biocriteria in all surface waters, and the proceedings documents the varied applicable approaches to bioassessments.	USEPA 1991d

Table 2-1. Chronology of USEPA bioassessment guidance (relevant to streams and rivers) (Continued).

Year	Document Title	Relationship to Bioassessment	Citation
1991	Report of the Ecoregions Subcommittee of the Ecological Processes and Effects Committee	The SAB (Science Advisory Board) reports favorably that the use of ecoregions is a useful framework for assessing regional fauna and flora. Ecoregions become more widely viewed as a basis for establishing regional reference conditions.	USEPA 1991e
1991	Guidance for the Implementation of Water Quality–Based Decisions: The TMDL Process	The establishment of the TMDL (total maximum daily loads) process for cumulative impacts (nonpoint and point sources) supports the need for more effective monitoring tools, including biological and habitat assessments.	USEPA 1991f
1991	Design Report for EMAP, the Environmental Monitoring and Assessment Program	USEPA's Environmental Monitoring and Assessment Program (EMAP) is designed as a rigorous national program for assessing the ecological status of the nation's surface waters.	Overton et al. 1991
1992	Procedures for Initiating Narrative Biological Criteria	A discussion of the concept and rationale for establishing narrative expressions of biocriteria is presented in this USEPA document.	Gibson 1992
1992	Ambient Water-Quality Monitoring in the U.S. First Year Review, Evaluation, and Recommendations	Provide first-year summary of task force efforts to develop and recommend framework and approach for improving water resource quality monitoring.	ITFM 1992
1993	Fish Field and Laboratory Methods for Evaluating the Biological Integrity of Surface Waters	A compilation of the current "state-of-the-art" field and laboratory methods used for surveying the fish assemblage and assessing fish health is presented in this document.	Klemm et al. 1993
1994	Surface Waters and Region 3 Regional Environmental Monitoring and Assessment Program: 1994 Pilot Field Operations and Methods Manual for Streams	USEPA focuses its EMAP program on streams and wadeable rivers and initiates an approach in a pilot study in the Mid-Atlantic Appalachian mountains.	Klemm and Lazorchak 1994
1994	Watershed Protection: TMDL Note #2, Bioassessment and TMDLs	USEPA describes the value and application of bioassessment to the TMDL process.	USEPA 1994a
1994	Report of the Interagency Biological Methods Workshop	Summary and results of workshop designed to coordinate monitoring methods among multiple objectives and states. [Sponsored by the USGS]	Gurtz and Muir 1994
1995	Generic Quality Assurance Project Plan Guidance for Programs Using Community Level Biological Assessment in Wadeable Streams and Rivers	USEPA develops guidance for quality assurance and quality control for biological survey programs.	USEPA 1995a
1995	The Strategy for Improving Water Quality Monitoring in the United States: Final Report of the Intergovernmental Task Force on Monitoring Water Quality	An Intergovernmental Task Force (ITFM) comprised of several federal and state agencies draft a monitoring strategy intended to provide a cohesive approach for data gathering, integration, and interpretation.	ITFM 1995a
1995	The Strategy for Improving Water Quality Monitoring in the United States: Final Report of the Intergovernmental Task Force on Monitoring Water Quality, Technical Appendices	Various issue papers are compiled in these technical appendices associated with ITFM's final report.	ITFM 1995b
1995	Environmental Monitoring and Assessment Program Surface Waters: Field Operations and Methods for Measuring the Ecological Condition of Wadeable Streams	A revision and update of the 1994 Methods Manual for EMAP.	Klemm and Lazorchak 1995

Table 2-1. Chronology of USEPA bioassessment guidance (relevant to streams and rivers) (Continued).

Year	Document Title	Relationship to Bioassessment	Citation
1996	Biological Assessment Methods, Biocriteria, and Biological Indicators: Bibliography of Selected Technical, Policy, and Regulatory Literature	USEPA compiles a comprehensive literature survey of pertinent research papers and studies for biological assessment methods. This document is expanded and updated from USEPA 1991b.	Stribling et al. 1996a
1996	Summary of State Biological Assessment Programs for Wadeable Streams and Rivers	The status of bioassessment and biocriteria programs in state water resource programs is summarized in this document, providing an update of USEPA 1991a.	Davis et al. 1996
1996	Biological Criteria: Technical Guidance for Streams and Small Rivers	Technical guidance for development of biocriteria for streams and wadeable rivers is provided as a follow-up to the Program Guidance (USEPA 1990b). This technical guidance serves as a framework for developing guidance for other surface water types.	Gibson et al. 1996
1996	The Volunteer Monitor's Guide to Quality Assurance Project Plans	USEPA develops guidance for quality assurance for citizen monitoring programs.	USEPA 1996a
1996	Nonpoint Source Monitoring and Evaluation Guide	USEPA describes how biological survey methods are used in nonpoint-source investigations, and explains the value of biological and habitat assessment to evaluating BMP implementation and identifying impairment.	USEPA 1996b
1996	Biological Criteria: Technical Guidance for Survey Design and Statistical Evaluation of Biosurvey Data	USEPA describes and define different statistical approaches for biological data analysis and development of biocriteria.	Reckhow and Warren-Hicks 1996
1997	Estuarine/Near Coastal Marine Waters Bioassessment and Biocriteria Technical Guidance	USEPA provides technical guidance on biological assessment methods and biocriteria development for estuarine and near coastal waters.	USEPA 1997a
1997	Volunteer Stream Monitoring: A Methods Manual	USEPA provides guidance for citizen monitoring groups to use biological and habitat assessment methods for monitoring streams. These methods are based in part on the RBPs.	USEPA 1997b
1997	Guidelines for Preparation of Comprehensive State Water Quality Assessments (305[b] reports)	USEPA provides guidelines for states for preparing 305(b) reports to Congress.	USEPA 1997c
1997	Biological Monitoring and Assessment: Using Multimetric Indexes Effectively	An explanation of the value, use, and scientific principles associated with using a multimetric approach to bioassessment is provided by Drs. Karr and Chu.	Karr and Chu 1999
1998	Lake and Reservoir Bioassessment and Biocriteria Technical Guidance Document	USEPA provides technical guidance on biological assessment methods and biocriteria development for lakes and reservoirs.	USEPA 1998
1998	Environmental Monitoring and Assessment Program Surface Waters: Field Operations and Methods for Measuring the Ecological Condition of Wadeable Streams	A revision and update of the 1995 Methods Manual for EMAP.	Lazorchak et al. 1998

2.3 PROGRAMMATIC APPLICATIONS OF BIOLOGICAL DATA

States (and tribes to a certain extent) are responsible for identifying water quality problems, especially those waters needing Total Maximum Daily Loads (TMDLs), and evaluating the effectiveness of point and nonpoint source water quality controls. The biological monitoring protocols presented in this guidance document will strengthen a state's monitoring program if other bioassessment and monitoring techniques are not already in place. An effective and thorough biological monitoring program can help to improve reporting (e.g., 305(b) reporting), increase the effectiveness of pollution prevention efforts, and document the progress of mitigation efforts. This section provides suggestions for the application of biological monitoring to wadeable streams and rivers through existing state programs.

2.3.1 CWA Section 305(b)—Water Quality Assessment

Section 305(b) establishes a process for reporting information about the quality of the Nation's water resources (USEPA 1997c, USEPA 1994b). States, the District of Columbia, territories, some tribes, and certain River Basin Commissions have developed programs to monitor surface and ground waters and to report the current status of water quality biennially to USEPA. This information is compiled into a biennial *National Water Quality Inventory* report to Congress.

Use of biological assessment in section 305(b) reports helps to define an understandable endpoint of relevance to society—the biological integrity of waterbodies. Many of the better-known and widely reported pollution cleanup success stories have involved the recovery or reappearance of valued sport fish and other pollution-intolerant species to systems from which they had disappeared (USEPA 1980). Improved coverage of biological integrity issues, based on monitoring protocols with clear bioassessment endpoints, will make the section 305(b) reports more accessible and meaningful to many segments of the public.

Biological monitoring provides data that augment several of the section 305(b) reporting requirements. In particular, the following assessment activities and reporting requirements are enhanced through the use of biological monitoring information:

- Determine the status of the water resource (Are the designated/beneficial and aquatic life uses being met?).
- Evaluate the causes of degraded water resources and the relative contributions of pollution sources.
- Report on the activities underway to assess and restore water resource integrity.
- Determine the effectiveness of control and mitigation programs.
- Measure the success of watershed management plans.

2.3.2 CWA Section 319—Nonpoint Source Assessment

The 1987 Water Quality Act Amendments to the Clean Water Act (CWA) added section 319, which established a national program to assess and control nonpoint source (NPS) pollution. Under this program, states are asked to assess their NPS pollution problems and submit these assessments to USEPA. The assessments include a list of "navigable waters within the state which, without

additional action to control nonpoint source of pollution, cannot reasonably be expected to attain or maintain applicable water quality standards or the goals and requirements of this Act." Other activities under the section 319 process require the identification of categories and subcategories of NPS pollution that contribute to the impairment of waters, descriptions of the procedures for identifying and implementing BMPs, control measures for reducing NPS pollution, and descriptions of state and local programs used to abate NPS pollution. Based on the assessments, states have prepared nonpoint source management programs.

Assessment of biological condition is the most effective means of evaluating cumulative impacts from nonpoint sources, which may involve habitat degradation, chemical contamination, or water withdrawal (Karr 1991). Biological assessment techniques can improve evaluations of nonpoint source pollution controls (or the combined effectiveness of current point and nonpoint source controls) by comparing biological indicators before and after implementation of controls. Likewise, biological attributes can be used to measure site-specific ecosystem response to remediation or mitigation activities aimed at reducing nonpoint source pollution impacts or response to pollution prevention activities.

2.3.3 Watershed Protection Approach

Since 1991, USEPA has been promoting the Watershed Protection Approach (WPA) as a framework for meeting the Nation's remaining water resource challenges (USEPA 1994c). USEPA's Office of Water has taken steps to reorient and coordinate point source, nonpoint source, surface waters, wetlands, coastal, ground water, and drinking water programs in support of the watershed approach. USEPA has also promoted multi-organizational, multi-objective watershed management projects across the Nation.

The watershed approach is an integrated, inclusive strategy for more effectively protecting and managing surface water and ground water resources and achieving broader environmental protection objectives using the naturally defined hydrologic unit (the watershed) as the integrating management unit. Thus, for a given watershed, the approach encompasses not only the water resource, such as a stream, river, lake, estuary, or aquifer, but all the land from which water drains to the resource. The watershed approach places emphasis on all aspects of water resource quality—physical (e.g., temperature, flow, mixing, habitat); chemical (e.g., conventional and toxic pollutants such as nutrients and pesticides); and biological (e.g., health and integrity of biotic communities, biodiversity).

As states develop their Watershed Protection Approach (WPA), biological assessment and monitoring offer a means of conducting comprehensive evaluations of ecological status and improvements from restoration/rehabilitation activities. Biological assessment integrates the condition of the watershed from tributaries to mainstem through the exposure/response of indigenous aquatic communities.

2.3.4 CWA Section 303(d)—The TMDL Process

The technical backbone of the WPA is the TMDL process. A total maximum daily load (TMDL) is a tool used to achieve applicable water quality standards. The TMDL process quantifies the loading capacity of a waterbody for a given stressor and ultimately provides a quantitative scheme for allocating loadings (or external inputs) among pollutant sources (USEPA 1994a). In doing so, the TMDL quantifies the relationships among sources, stressors, recommended controls, and water quality conditions. For example, a TMDL might mathematically show how a specified percent reduction of a pollutant is necessary to reach the pollutant concentration reflected in a water quality standard.

Section 303(d) of the CWA requires each state to establish, in accordance with its priority rankings, the total maximum daily load for each waterbody or reach identified by the state as failing to meet, or not expected to meet, water quality standards after imposition of technology-based controls. In addition, TMDLs are vital elements of a growing number of state programs. For example, as more permits incorporate water quality-based effluent limits, TMDLs are becoming an increasingly important component of the point-source control program.

TMDLs are suitable for nonchemical as well as chemical stressors (USEPA 1994a). These include all stressors that contribute to the failure to meet water quality standards, as well as any stressor that presently threatens but does not yet impair water quality. TMDLs are applicable to waterbodies impacted by both point and nonpoint sources. Some stressors, such as sediment deposition or physical alteration of instream habitat, might not clearly fit traditional concepts associated with chemical stressors and loadings. For these nonchemical stressors, it might sometimes be difficult to develop TMDLs because of limitations in the data or in the technical methods for analysis and modeling. In the case of nonpoint source TMDLs, another difficulty arises in that the CWA does not provide well-defined support for regulatory control actions as it does for point source controls, and controls based on another statutory authority might be necessary.

Biological assessments and criteria address the cumulative impacts of all stressors, especially habitat degradation, and chemical contamination, which result in a loss of biological diversity. Biological information can help provide an ecologically based assessment of the status of a waterbody and as such can be used to decide which waterbodies need TMDLs (USEPA 1997c) and aid in the ranking process by targeting waters for TMDL development with a more accurate link between bioassessment and ecological integrity.

Finally, the TMDL process is a geographically-based approach to preparing load and wasteload allocations for sources of stress that might impact waterbody integrity. The geographic nature of this process will be complemented and enhanced if ecological regionalization is applied as part of the bioassessment activities. Specifically, similarities among ecosystems can be grouped into homogeneous classes of streams and rivers that provides a geographic framework for more efficient aquatic resource management.

2.3.5 CWA Section 402—NPDES Permits and Individual Control Strategies

All point sources of wastewater must obtain a National Pollutant Discharge Elimination System (NPDES) permit (or state equivalent), which regulates the facility's discharge of pollutants. The approach to controlling and eliminating water pollution is focused on the pollutants determined to be harmful to receiving waters and on the sources of such pollutants. Authority for issuing NPDES permits is established under Section 402 of the CWA (USEPA 1989).

Point sources are generally divided into two types—industrial and municipal. Nationwide, there are approximately 50,000 industrial sources, which include commercial and manufacturing facilities. Municipal sources, also known as publicly owned treatment works (POTWs), number about 15,700 nationwide. Wastewater from municipal sources results from domestic wastewater discharged to POTWs, as well as the "indirect" discharge of industrial wastes to sewers. In addition, stormwater may be discrete or diffuse, but is also covered by NPDES permitting regulations.

USEPA does not recommend the use of biological survey data as the basis for deriving an effluent limit for an NPDES permit (USEPA 1994d). Unlike chemical-specific water quality analyses, biological data do not measure the concentrations or levels of chemical stressors. Instead, they directly measure the impacts of any and all stressors on the resident aquatic biota. Where

appropriate, biological assessment can be used within the NPDES process (USEPA 1994d) to obtain information on the status of a waterbody where point sources might cause, or contribute to, a water quality problem. In conjunction with chemical water quality and whole-effluent toxicity data, biological data can be used to detect previously unmeasured chemical water quality problems and to evaluate the effectiveness of implemented controls.

Some states have already demonstrated the usefulness of biological data to indicate the need for additional or more stringent permit limits (e.g., sole-source discharge into a stream where there is no significant nonpoint source discharge, habitat degradation, or atmospheric deposition) (USEPA 1994d). In these situations, the biological findings triggered additional investigations to establish the cause-and-effect relationship and to determine the appropriate limits. In this manner, biological data support regulatory evaluations and decision making. Biological data can also be useful in monitoring highly variable or diffuse sources of pollution that are treated as point sources such as wet-weather discharges and stormwater runoff (USEPA 1994d). Traditional chemical water quality monitoring is usually only minimally informative for these types of point source pollution, and a biological survey of their impact might be critical to effectively evaluate these discharges and associated treatment measures.

2.3.6 Ecological Risk Assessment

Risk assessment is a scientific process that includes stressor identification, receptor characterization and endpoint selection, stress-response assessment, and risk characterization (USEPA 1992, Suter et al. 1993). Risk management is a decision-making process that involves all the human-health and ecological assessment results, considered with political, legal, economic, and ethical values, to develop and enforce environmental standards, criteria, and regulations (Maughan 1993). Risk assessment can be performed on an on-site basis or can be geographically-based (i.e., watershed or regional scale), and it can be used to assess human health risks or to identify ecological impairments. In early 1997, a report prepared by a Presidential/Congressional Commission on risk enlarged the context of risk to include ecological as well as public health risks (Karr and Chu 1997).

Biological monitoring is the essential foundation of ecological risk assessment because it measures present biological conditions — not just chemical contamination — and provides the means to compare them with the conditions expected in the absence of humans (Karr and Chu 1997). Results of regional bioassessment studies can be used in watershed ecological risk assessments to develop broad scale (geographic) empirical models of biological responses to stressors. Such models can then be used, in combination with exposure information, to predict risk due to stressors or to alternative management actions. Risks to biological resources are characterized, and sources of stress can be prioritized. Watershed risk managers can and should use such results for critical management decisions.

2.3.7 USEPA Water Quality Criteria and Standards

The water quality standards program, as envisioned in Section 303(c) of the Clean Water Act, is a joint effort between the states and USEPA. The states have primary responsibility for setting, reviewing, revising, and enforcing water quality standards. USEPA develops regulations, policies, and guidance to help states implement the program and oversees states' activities to ensure that their adopted standards are consistent with the requirements of the CWA and relevant water quality standards regulations (40 CFR Part 131). USEPA has authority to review and approve or disapprove state standards and, where necessary, to promulgate federal water quality standards.

A water quality standard defines the goals of a waterbody, or a portion thereof, by designating the use or uses to be made of the water, setting criteria necessary to protect those uses, and preventing

degradation of water quality through antidegradation provisions. States adopt water quality standards to protect public health or welfare, enhance the quality of water, and protect biological integrity.

Chemical, physical, or biological stressors impact the biological characteristics of an aquatic ecosystem (Gibson et al. 1996). For example, chemical stressors can result in impaired functioning or loss of a sensitive species and a change in community structure. Ultimately, the number and intensity of all stressors within an ecosystem will be evidenced by a change in the condition and function of the biotic community. The interactions among chemical, physical, and biological stressors and their cumulative impacts emphasize the need to directly detect and assess the biota as indicators of actual water resource impairments.

Sections 303 and 304 of the CWA require states to protect biological integrity as part of their water quality standards. This can be accomplished, in part, through the development and use of biological criteria. As part of a state or tribal water quality standards program, biological criteria can provide scientifically sound and detailed descriptions of the designated aquatic life use for a specific waterbody or segment. They fulfill an important assessment function in water quality-based programs by establishing the biological benchmarks for (1) directly measuring the condition of the aquatic biota, (2) determining water quality goals and setting priorities, and (3) evaluating the effectiveness of implemented controls and management actions.

Biological criteria for aquatic systems provide an evaluation benchmark for direct assessment of the condition of the biota that live either part or all of their lives in aquatic systems (Gibson et al. 1996) by describing (in narrative or numeric criteria) the expected biological condition of a minimally impaired aquatic community (USEPA 1990b). They can be used to define ecosystem rehabilitation goals and assessment endpoints. Biological criteria supplement traditional measurements (for example, as backup for hard-to-detect chemical problems) and will be particularly useful in assessing impairment due to nonpoint source pollution and nonchemical (e.g., physical and biological) stressors. Thus, biological criteria fulfill a function missing from USEPA's traditionally chemical-oriented approach to pollution control and abatement (USEPA 1994d).

Biological criteria can also be used to refine the aquatic life use classifications for a state. Each state develops its own designated use classification system based on the generic uses cited in the CWA, including protection and propagation of fish, shellfish, and wildlife. States frequently develop subcategories to refine and clarify designated use classes when several surface waters with distinct characteristics fit within the same use class or when waters do not fit well into any single category. As data are collected from biosurveys to develop a biological criteria program, analysis may reveal unique and consistent differences between aquatic communities that inhabit different waters with the same designated use. Therefore, measurable biological attributes can be used to refine aquatic life use or to separate 1 class of aquatic life into 2 or more subclasses. For example, Ohio has established an *exceptional warmwater* use class to include all *unique waters* (i.e., not representative of regional streams and different from their standard warmwater class).

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3 ELEMENTS OF BIOMONITORING

3.1 BIOSURVEYS, BIOASSAYS, AND CHEMICAL MONITORING

The water quality-based approach to pollution assessment requires various types of data. Biosurvey techniques, such as the Rapid Bioassessment Protocols (RBPs), are best used for detecting aquatic life impairments and assessing their relative severity. Once an impairment is detected, however, additional ecological data, such as chemical and biological (toxicity) testing is helpful to identify the causative agent, its source, and to implement appropriate mitigation (USEPA 1991c). Integrating information from these data types as well as from habitat assessments, hydrological investigations, and knowledge of land use is helpful to provide a comprehensive diagnostic assessment of impacts from the 5 principal factors (see Karr et al. 1986, Karr 1991, Gibson et al. 1996 for description of water quality, habitat structure, energy source, flow regime, and biotic interaction factors). Following mitigation, biosurveys are important for evaluating the effectiveness of such control measures. Biosurveys may be used within a planning and management framework to prioritize water quality problems for more stringent assessments and to document "environmental recovery" following control action and rehabilitation activities. Some of the advantages of using biosurveys for this type of monitoring are:

- Biological communities reflect overall ecological integrity (i.e., chemical, physical, and biological integrity). Therefore, biosurvey results directly assess the status of a waterbody relative to the primary goal of the Clean Water Act (CWA).
- Biological communities integrate the effects of different stressors and thus provide a broad measure of their aggregate impact.
- Communities integrate the stresses over time and provide an ecological measure of fluctuating environmental conditions.
- Routine monitoring of biological communities can be relatively inexpensive, particularly when compared to the cost of assessing toxic pollutants, either chemically or with toxicity tests (Ohio EPA 1987).
- The status of biological communities is of direct interest to the public as a measure of a pollution free environment.
- Where criteria for specific ambient impacts do not exist (e.g., nonpoint-source impacts that degrade habitat), biological communities may be the only practical means of evaluation.

Biosurvey methods have a long-standing history of use for "before and after" monitoring. However, the intermediate steps in pollution control, i.e., identifying causes and limiting sources, require integrating information of various types—chemical, physical, toxicological, and/or biosurvey data. These data are needed to:

Identify the specific stress agents causing impact: This may be a relatively simple task; but, given the array of potentially important pollutants (and their possible combinations), it is likely to be both difficult and costly. In situations where specific chemical stress agents are either poorly understood or too varied to assess individually, toxicity tests can be used to focus specific chemical investigations or to characterize generic stress agents (e.g., whole effluent or ambient toxicity). For situations where habitat degradation is prevalent, a combination of biosurvey and physical habitat assessment is most useful (Barbour and Stribling 1991).

Identify and limit the specific sources of these agents: Although biosurveys can be used to help locate the likely origins of impact, chemical analyses and/or toxicity tests are helpful to confirm the point sources and develop appropriate discharge limits. Impacts due to factors other than chemical contamination will require different ecological data.

Design appropriate treatment to meet the prescribed limits and monitor compliance: Treatment facilities are designed to remove identified chemical constituents with a specific efficiency. Chemical data are therefore required to evaluate treatment effectiveness. To some degree, a biological endpoint resulting from toxicity testing can also be used to evaluate the effectiveness of prototype treatment schemes and can serve as a design parameter. In most cases, these same parameters are limited in discharge permits and, after controls are in place, are used to monitor for compliance. Where discharges are not controlled through a permit system (e.g., nonpoint-source runoff, combined sewer outfalls, and dams) compliance must be assessed in terms of ambient standards. Improvement of the ecosystem both from restoration or rehabilitation activities are best monitored by biosurvey techniques.

Effective implementation of the water quality-based approach requires that various monitoring techniques be considered within a larger context of water resource management. Both biological and chemical methods play critical roles in a successful pollution control program. They should be considered complementary rather than mutually exclusive approaches that will enhance overall program effectiveness when used appropriately.

3.2 USE OF DIFFERENT ASSEMBLAGES IN BIOSURVEYS

The techniques presented in this document focus on the evaluation of water quality (physicochemical constituents), habitat parameters, and analysis of the periphyton, benthic macroinvertebrate, and fish assemblages. Many State water quality agencies employ trained and experienced benthic biologists, have accumulated considerable background data on macroinvertebrates, and consider benthic surveys a useful assessment tool. However, water quality standards, legislative mandate, and public opinion are more directly related to the status of a waterbody as a fishery resource. For this reason, separate protocols were developed for fish and were incorporated as Chapter 8 in this document. The fish survey protocol is based largely on Karr's Index of Biotic Integrity (IBI) (Karr 1981, Karr et al. 1986, Miller et al. 1988), which uses the structure of the fish assemblage to evaluate water quality. The integration of functional and structural/compositional metrics, which forms the basis for the IBI, is a common element to the rapid bioassessment approaches.

The periphyton assemblage (primarily algae) is also useful for water quality monitoring, but has not been incorporated widely in monitoring programs. They represent the primary producer trophic level, exhibit a different range of sensitivities, and will often indicate effects only indirectly observed in the benthic and fish communities. As in the benthic macroinvertebrate and fish assemblages, integration of structural/compositional and functional characteristics provides the best means of assessing impairment (Rodgers et al. 1979).

In selecting the aquatic assemblage appropriate for a particular biomonitoring situation, the advantages of using each assemblage must be considered along with the objectives of the program. Some of the advantages of using periphyton, benthic macroinvertebrates, and fish in a biomonitoring program are presented in this section. References for this list are Cairns and Dickson (1971), American Public Health Association et al. (1971), Patrick (1973), Rodgers et al. (1979), Weitzel (1979), Karr (1981), USEPA (1983), Hughes et al. (1982), and Plafkin et al. (1989).

3.2.1 Advantages of Using Periphyton

- Algae generally have rapid reproduction rates and very short life cycles, making them valuable indicators of short-term impacts.
- As primary producers, algae are most directly affected by physical and chemical factors.
- Sampling is easy, inexpensive, requires few people, and creates minimal impact to resident biota.
- Relatively standard methods exist for evaluation of functional and non-taxonomic structural (biomass, chlorophyll measurements) characteristics of algal communities.
- Algal assemblages are sensitive to some pollutants which may not visibly affect other aquatic assemblages, or may only affect other organisms at higher concentrations (i.e., herbicides).

3.2.2 Advantages of Using Benthic Macroinvertebrates

- Macroinvertebrate assemblages are good indicators of localized conditions. Because many benthic macroinvertebrates have limited migration patterns or a sessile mode of life, they are particularly well-suited for assessing site-specific impacts (upstream-downstream studies).
- Macroinvertebrates integrate the effects of short-term environmental variations. Most species have a complex life cycle of approximately one year or more. Sensitive life stages will respond quickly to stress; the overall community will respond more slowly.
- Degraded conditions can often be detected by an experienced biologist with only a cursory examination of the benthic macroinvertebrate assemblage. Macro-invertebrates are relatively easy to identify to family; many "intolerant" taxa can be identified to lower taxonomic levels with ease.
- Benthic macroinvertebrate assemblages are made up of species that constitute a broad range of trophic levels and pollution tolerances, thus providing strong information for interpreting cumulative effects.
- Sampling is relatively easy, requires few people and inexpensive gear, and has minimal detrimental effect on the resident biota.

- Benthic macroinvertebrates serve as a primary food source for fish, including many recreationally and commercially important species.

- Benthic macroinvertebrates are abundant in most streams. Many small streams (1st and 2nd order), which naturally support a diverse macroinvertebrate fauna, only support a limited fish fauna.

- Most state water quality agencies that routinely collect biosurvey data focus on macroinvertebrates (Southerland and Stribling 1995). Many states already have background macroinvertebrate data. Most state water quality agencies have more expertise with invertebrates than fish.

3.2.3 Advantages of Using Fish

- Fish are good indicators of long-term (several years) effects and broad habitat conditions because they are relatively long-lived and mobile (Karr et al. 1986).

- Fish assemblages generally include a range of species that represent a variety of trophic levels (omnivores, herbivores, insectivores, planktivores, piscivores). They tend to integrate effects of lower trophic levels; thus, fish assemblage structure is reflective of integrated environmental health.

- Fish are at the top of the aquatic food web and are consumed by humans, making them important for assessing contamination.

- Fish are relatively easy to collect and identify to the species level. Most specimens can be sorted and identified in the field by experienced fisheries professionals, and subsequently released unharmed.

- Environmental requirements of most fish are comparatively well known. Life history information is extensive for many species, and information on fish distributions is commonly available.

- Aquatic life uses (water quality standards) are typically characterized in terms of fisheries (coldwater, coolwater, warmwater, sport, forage). Monitoring fish provides direct evaluation of "fishability" and "fish propagation", which emphasizes the importance of fish to anglers and commercial fishermen.

- Fish account for nearly half of the endangered vertebrate species and subspecies in the United States (Warren and Burr 1994).

3.3 IMPORTANCE OF HABITAT ASSESSMENT

The procedure for assessing physical habitat quality presented in this document (Chapter 5) is an integral component of the final evaluation of impairment. The matrix used to assess habitat quality is based on key physical characteristics of the waterbody and surrounding land, particularly the catchment of the site under investigation. All of the habitat parameters evaluated are related to overall aquatic life use and are a potential source of limitation to the aquatic biota.

The alteration of the physical structure of the habitat is one of 5 major factors from human activities described by Karr (Karr et al. 1986, Karr 1991) that degrade aquatic resources. Habitat, as structured by instream and surrounding topographical features, is a major determinant of aquatic community potential (Southwood 1977, Plafkin et al. 1989, and Barbour and Stribling 1991). Both the quality and quantity of available habitat affect the structure and composition of resident biological communities. Effects of such features on biological assessment results can be minimized by sampling similar habitats at all stations being compared. However, when all stations are not physically comparable, habitat characterization is particularly important for proper interpretation of biosurvey results.

Where physical habitat quality at a test site is similar to that of a reference, detected impacts can be attributed to water quality factors (i.e., chemical contamination) or other stressors. However, where habitat quality differs substantially from reference conditions, the question of appropriate aquatic life use designation and physical habitat alteration/restoration must be addressed. Final conclusions regarding the presence and degree of biological impairment should thus include an evaluation of habitat quality to determine the extent that habitat may be a limiting factor. The habitat characterization matrix included in the Rapid Bioassessment Protocols provides an effective means of evaluating and documenting habitat quality at each biosurvey station.

3.4 THE REGIONAL REFERENCE CONCEPT

The issue of reference conditions is critical to the interpretation of biological surveys. Barbour et al. (1996a) describe 2 types of reference conditions that are currently used in biological surveys: site-specific and regional reference. The former typically consists of measurements of conditions upstream of a point source discharge or from a "paired" watershed. Regional reference conditions, on the other hand, consist of measurements from a population of relatively unimpaired sites within a relatively homogeneous region and habitat type, and therefore are not site-specific.

The reference condition establishes the basis for making comparisons and for detecting use impairment; it should be applicable to an individual waterbody, such as a stream segment, but also to similar waterbodies on a regional scale (Gibson et al. 1996).

Although both site-specific and ecoregional references represent conditions without the influence of a particular discharge, the 2 types of references may not yield equivalent measurements (Barbour et al. 1996a). While site-specific reference conditions represented by the upstream, downstream, or paired-site approach are desirable, they are limited in their usefulness. Hughes (1995) points out three problems with site-specific reference conditions: (1) because they typically lack any broad study design, site-specific reference conditions possess limited capacity for extrapolation— they have only site-specific value; (2) usually site-specific reference conditions allow limited variance estimates; there are too few sites for robust variance evaluations because each site of concern is typically represented by one-to-three reference sites; the result could be an incorrect assessment if the upstream site has especially good or especially poor habitat or chemical quality; and (3) they involve a substantial assessment effort when considered on a statewide basis.

The advantages of measuring upstream reference conditions are these: (1) if carefully selected, the habitat quality is often similar to that measured downstream of a discharge, thereby reducing complications in interpretation arising from habitat differences, and (2) impairments due to upstream influences from other point and nonpoint sources are already factored into the reference condition (Barbour et al. 1996a). New York DEC has found that an upstream-downstream approach aids in

diagnosing cause-and-effect to specific discharges and increase precision (Bode and Novak 1995). Where feasible, effects should be bracketed by establishing a series or network of sampling stations at points of increasing distance from the impact source(s). These stations will provide a basis for delineating impact and recovery zones. In significantly altered systems (i.e., channelized or heavily urbanized streams), suitable reference sites are usually not available (Gibson et al. 1996). In these cases, historical data or simple ecological models may be necessary to establish reference conditions. See Gibson et al. (1996) for more detail.

Innate regional differences exist in forests, lands with high agricultural potential, wetlands, and waterbodies. These regional differences have been mapped by Bailey (1976), U.S. Department of Agriculture (USDA) Soil Conservation Service (1981), Energy, Mines and Resources Canada (1986), and Omernik (1987). Waterbodies reflect the lands they drain (Omernik 1987, Hunsaker and Levine 1995) and it is assumed that similar lands should produce similar waterbodies. This ecoregional approach provides robust and ecologically-meaningful regional maps that are based on an examination of several mapped land variables. For example, hydrologic unit maps are useful for mapping drainage patterns, but have limited value for explaining the substantial changes that occur in water quality and biota independent of stream size and river basin.

Omernik (1987) provided an ecoregional framework for interpreting spatial patterns in state and national data. The geographical framework is based on regional patterns in land-surface form, soil, potential natural vegetation, and land use, which vary across the country. Geographic patterns of similarity among ecosystems can be grouped into ecoregions or subecoregions. Naturally occurring biotic assemblages, as components of the ecosystem, would be *expected* to differ among ecoregions but be relatively similar within a given ecoregion. The ecoregion concept thus provides a geographic framework for efficient management of aquatic ecosystems and their components (Hughes 1985, Hughes et al. 1986, and Hughes and Larsen 1988). For example, studies in Ohio (Larsen et al. 1986), Arkansas (Rohm et al. 1987), and Oregon (Hughes et al. 1987, Whittier et al. 1988) have shown that distributional patterns of fish communities approximate ecoregional boundaries as defined *a priori* by Omernik (1987). This, in turn, implies that similar water quality standards, criteria, and monitoring strategies are likely to be valid throughout a given ecoregion, but should be tailored to accommodate the innate differences among ecoregions (Ohio EPA 1987).

However, some programs, such as EMAP (Klemm and Lazorchak 1994) and the Maryland Biological Stream Survey (MBSS) (Volstad et al. 1995) have found that a surrogate measure of stream size (catchment size) is useful in partitioning the variability of stream segments for assessment. Hydrologic regime can include flow regulation, water withdrawal, and whether a stream is considered intermittent or perennial. Elevation has been found to be an important classification variable when using the benthic macroinvertebrate assemblage (Barbour et al. 1992, Barbour et al. 1994, Spindler 1996). In addition, descriptors at a smaller scale may be needed to characterize streams within regions or classes. For example, even though a given stream segment is classified within a subecoregion or other type of stream class, it may be wooded (deciduous or coniferous) or open within a perennial or intermittent flow regime, and represent one of several orders of stream size.

Individual descriptors *will not apply to all regional reference streams,* nor will all conditions (i.e., deciduous, coniferous, open) be present in all streams. Those streams or stream segments that represent characteristics atypical for that particular ecoregion should be excluded from the regional aggregate of sites and treated as a special situation. For example, Ohio EPA (1987) considered aquatic systems with unique (i.e., unusual for the ecoregion) natural characteristics to be a separate aquatic life use designation (exceptional warmwater aquatic life use) on a statewide basis.

Although the final rapid bioassessment guidance should be generally applicable to all regions of the United States, each agency will need to evaluate the generic criteria suggested in this document for inclusion into specific programs. To this end, the application of the regional reference concept versus the site-specific control approach will need to be examined. When Rapid Bioassessment Protocols (RBPs) are used to assess impact sources (upstream-downstream studies), regional reference criteria may not be as important if an unimpacted site-specific control station can be sampled. However, when a synoptic ("snapshot") or trend monitoring survey is being conducted in a watershed or river basin, use of regional criteria may be the only means of discerning use impairment or assessing impact. Additional investigation will be needed to: delineate areas (classes of streams)that differ significantly in their innate biological potential; locate reference sites within each stream class that fully support aquatic life uses; develop biological criteria (e.g., define optimal values for the metrics) using data generated from each of the assemblages.

3.5 STATION SITING

Site selection for assessment and monitoring can either be "targeted", i.e., relevant to special studies that focus on potential problems, or "probabilistic", which provides information of the overall status or condition of the watershed, basin, or region. In a probabilistic or random sampling regime, stream characteristics may be highly dissimilar among the sites, but will provide a more accurate assessment of biological condition throughout the area than a targeted design. Selecting sites randomly provides an unbiased assessment of the condition of the waterbody at a scale above the individual site or stream. Thus, an agency can address questions at multiple scales. Studies for 305(b) status and trends assessments are best done with a probabilistic design.

Most studies conducted by state water quality agencies for identification of problems and sensitive waters are done with a targeted design. In this case, sampling sites are selected based on known existing problems, knowledge of upcoming events that will adversely affect the waterbody such as a development or deforestation; or installation of BMPs or habitat restoration that are intended to improve waterbody quality. This method provides assessments of individual sites or stream reaches. Studies for aquatic life use determination and those related to TMDLs can be done with a random (watershed or higher level) or targeted (site-specific) design.

To meaningfully evaluate biological condition in a targeted design, sampling locations must be similar enough to have similar biological expectations, which, in turn, provides a basis for comparison of impairment. If the goal of an assessment is to evaluate the effects of water chemistry degradation, comparable physical habitat should be sampled at all stations, otherwise, the differences in the biology attributable to a degraded habitat will be difficult to separate from those resulting from chemical pollution water quality degradation. Availability of appropriate habitat at each sampling location can be established during preliminary reconnaissance. In evaluations where several stations on a waterbody will be compared, the station with the greatest habitat constraints (in terms of productive habitat availability) should be noted. The station with the least number of productive habitats available will often determine the type of habitat to be sampled at all sample stations.

Locally modified sites, such as small impoundments and bridge areas, should be avoided unless data are needed to assess their effects. Sampling near the mouths of tributaries entering large waterbodies should also be avoided because these areas will have habitat more typical of the larger waterbody (Karr et al. 1986).

For bioassessment activities where the concern is non-chemical stressors, e.g., the effects of habitat degradation or flow alteration, or cumulative impacts, a different approach to station selection is used. Physical habitat differences between sites can be substantial for two reasons: (1) one or a set of sites is more degraded (physically) than another, or (2) is unique for the stream class or region due to the essential natural structure resulting from geological characteristics. Because of these situations, the more critical part of the siting process comes from the recognition of the habitat features that are representative of the region or stream class. In basin-wide or watershed studies, sample locations should not be avoided due to habitat degradation or to physical features that are well-represented in the stream class.

3.6 DATA MANAGEMENT AND ANALYSIS

USEPA is developing a biological data management system linked to STORET, which provides a centralized system for storage of biological data and associated analytical tools for data analysis. The field survey file component of STORET provides a means of storing, retrieving, and analyzing biosurvey data, and will process data on the distribution, abundance, and physical condition of aquatic organisms, as well as descriptions of their habitats. Data stored in STORET become part of a comprehensive database that can be used as a reference, to refine analysis techniques or to define ecological requirements for aquatic populations. Data from the Rapid Bioassessment Protocols can be readily managed with the STORET field survey file using header information presented on the field data forms (Appendix A) to identify sampling stations.

Habitat and physical characterization information may also be stored in the field survey file with organism abundance data. Parameters available in the field survey file can be used to store some of the environmental characteristics associated with the sampling event, including physical characteristics, water quality, and habitat assessment. Physical/chemical parameters include stream depth, velocity, and substrate characteristics, as well as many other parameters. STORET also allows storage of other pertinent station or sample information in the comments section.

Entering data into a computer system can provide a substantial time savings. An additional advantage to computerization is analysis documentation, which is an important component for a Quality Assurance/Quality Control (QA/QC) plan. An agency conducting rapid bioassessment programs can choose an existing system within their agency or utilize the STORET system developed as a national database system.

Data collected as part of state bioassessment programs are usually entered, stored and analyzed in easily obtainable spreadsheet programs. This method of data management becomes cumbersome as the database grows in volume. An alternative to spreadsheet programs is a multiuser relational database management system (RDMS). Most relational database software is designed for the Windows operating system and offer menu driven interfaces and ranges of toolbars that provide quick access to many routine database tasks. Automated tools help users quickly create forms for data input and lookup, tables, reports, and complex queries about the data. The USEPA is developing a multiuser relational database management system that can transfer sampling data to STORET. This relational database management system is EDAS (Ecological Data Application System) and allows the user to input, compile, and analyze complex ecological data to make assessments of ecosystem condition. EDAS includes tools to format sampling data so it may be loaded into STORET as a batch file. These batch files are formatted as flat ASCII text and can be loaded (transferred) electronically to STORET. This will eliminate the need to key sample data into STORET.

By using tables and queries as established in EDAS, a user can enter, manipulate, and print data. The metrics used in most bioassessments can be calculated with simple queries that have already been created for the user. New queries may be created so additional metrics can be calculated at the click of the mouse each time data are updated or changed. If an operation on the data is too complex for one of the many default functions then the function can be written in code (e.g., visual basic access) and stored in a module for use in any query. Repetitive steps can be handled with macros. As the user develops the database other database elements such as forms and reports can be added.

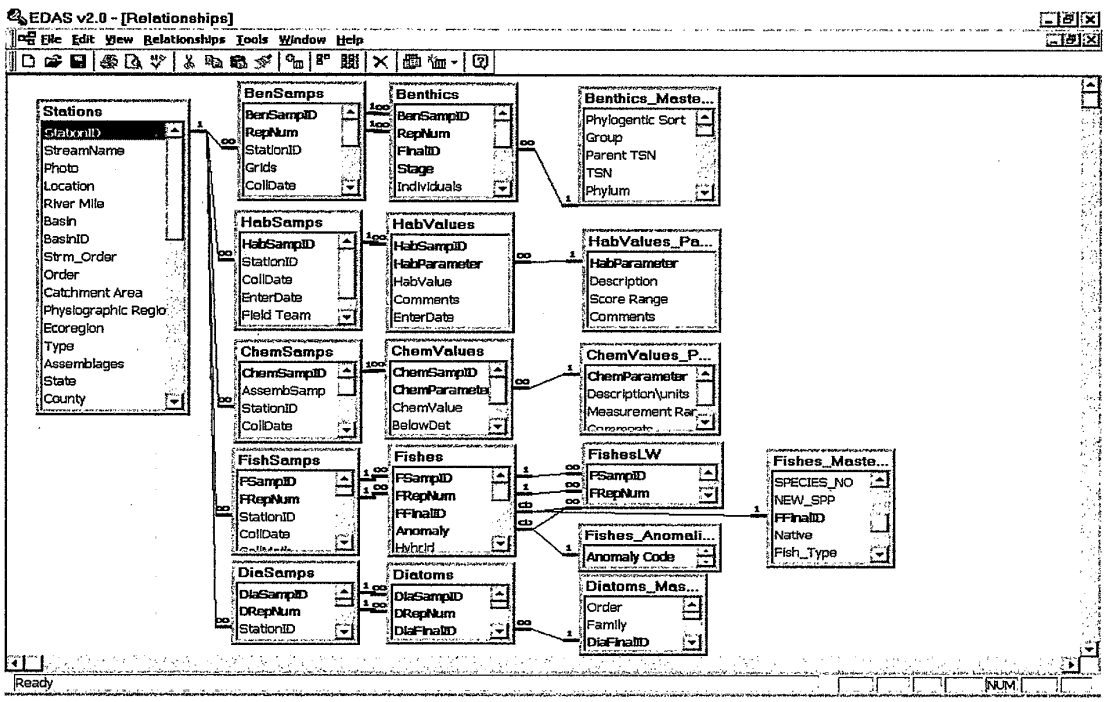

Figure 3-1. Example of the relationship of data tables in a typical relational database.

Table design is the foundation of the relational database, such as EDAS (Figure 3-1), because they function as data containers. Tables are related through the use of a unique identifier or index. In the example database "StationId" links the tables "ChemSamps", "HabSamps", and "BenSamps" to the "Stations" table. The chemical parameters and habitat parameters table act as reference tables and contain descriptive data (e.g., measurement units, detection limits). This method of storing data is more efficient than spreadsheets, because it eliminates a lot of redundant data. Master Taxa tables are created for the biological data to contain all relevant information about each taxon. This information does not have to be repeated each time a taxon is entered into the database.

Input or lookup forms (Figure 3-2) are screens that are designed to aid in entering or retrieving data. Forms are linked to tables so data go to the right cell in the right table. Because of the relationships among the tables, data can be updated across all the tables that are linked to the form. Reports can be generated in a variety of styles, and data can be exported to other databases or spreadsheet programs.

3.7 TECHNICAL ISSUES FOR SAMPLING THE PERIPHYTON ASSEMBLAGE

3.7.1 Seasonality

Stream periphyton have distinct seasonal cycles, with peak abundance and diversity typically occurring in late summer or early fall (Bahls 1993). High flows may scour and sweep away periphyton. For these reasons, the index period for periphyton sampling is usually late summer or early fall, when stream flow is relatively stable (Kentucky DEP 1993, Bahls 1993).

Algae are light limited, and may be sparse in heavily shaded streams. Early spring, before leafout, may be a better sampling index period in shaded streams.

Finally, since algae have short generation times (one to several days), they respond rapidly to environmental changes. Samples of the algal community are "snapshots" in time, and do not integrate environmental effects over entire seasons or years.

3.7.2 Sampling Methodology

Artificial substrates (periphytometers) have long been used in algal investigations, typically using glass slides as the substrate, but also with glass rods, plastic plates, ceramic tiles and other substances. However, many agencies are sampling periphyton from natural substrates to characterize

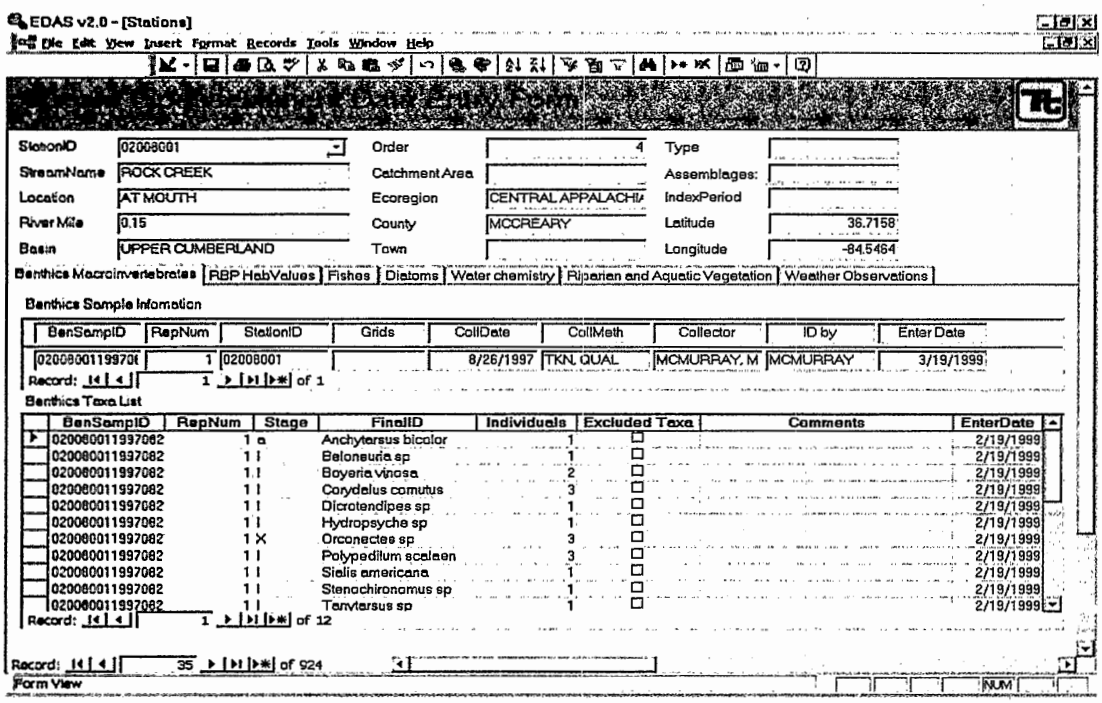

Figure 3-2. Example input or lookup form in a typical relational database.

the natural community. Advantages of artificial and natural substrates are summarized below (Cairns 1982, Bahls 1993).

Advantages of Artificial Substrates:

- Artificial substrates allow sample collection in locations that are typically difficult to sample effectively (e.g., bedrock, boulder, or shifting substrates; deep or high velocity water).
- As a "passive" sample collection device, artificial substrates permit standardized sampling by eliminating subjectivity in sample collection technique. Direct sampling of natural substrate requires similar effort and degree of efficiency for the collection of each sample. Use of artificial substrates requires standardization of setting and retrieval; however, colonization provides the actual sampling mechanism.
- Confounding effects of habitat differences are minimized by providing a standardized microhabitat. Microhabitat standardization may promote selectivity for specific organisms if the artificial substrate provides a different microhabitat than that naturally available at a site.
- Sampling variability is decreased due to a reduction in microhabitat patchiness, improving the potential for spatial and temporal similarity among samples.
- Sample collection using artificial substrates may require less skill and training than direct sampling of natural substrates.

Disadvantages of Artificial Substrates:

- Artificial substrates require a return trip; this may be a significant consideration in large states or those with limited technical resources.
- Artificial substrates are prone to loss, natural damage or vandalism.
- The material of the substrate will influence the composition and structure of the community; solid artificial substrates will favor attached forms over motile forms and compromise the usefulness of the siltation index.
- Orientation and length of exposure of the substrate will influence the composition and structure of the community.

3.8 TECHNICAL ISSUES FOR SAMPLING THE BENTHIC MACROINVERTEBRATE ASSEMBLAGE

3.8.1 Seasonality for Benthic Collections (adapted from Gibson et al. 1996)

The ideal sampling procedure is to survey the biological community with each change of season, then select the appropriate sampling periods that accommodate seasonal variation. Such indexing makes the best use of the biological data. However, resident assemblages integrate stress effects

over the course of the year, and their seasonal cycles of abundance and taxa composition are fairly predictable within the limits of interannual variability.

Many programs have found that a single index period provides a strong database that allows all of their management objectives to be addressed. However, if one goal of a program is to understand seasonal variability, then establishing index periods during multiple seasons is necessary. Although a single index period would not likely be adequate for assessing the effects of catastrophic events, such as spill, those assessments should be viewed as special studies requiring sampling of reference sites during the same time period.

Ultimately, selection of the appropriate sampling period should be based on 3 factors that reflect efforts to:

1. minimize year-to-year variability resulting from natural events,
2. maximize gear efficiency, and
3. maximize accessibility of targeted assemblage.

Sampling and comparisons of data from the same seasons (or index periods) as the previous year's sampling provides some correction and minimization of annual variability. The season of the year during which sampling gear is most effective is an important consideration for selecting an index period. For example, low flow or freezing conditions may hamper an agency's ability to sample with its selected gear. Seasons where those conditions are prevalent should be avoided. The targeted assemblage(s) should be accessible and not be inhabiting hard-to-reach portions of the sampling area. For example, if benthos are primarily deep in the substrate in winter, beyond normal sampling depth, that period should be avoided and another index period chosen. If high flows are typical of spring runoff periods, and sampling cannot occur, the index period should be established during typical or low flow periods.

3.8.2 Benthic Sampling Methodology

The benthic RBPs employ direct sampling of natural substrates. Because routine evaluation of a large number of sites is a primary objective of the RBPs, artificial substrates were eliminated from consideration due to time required for both placement and retrieval, and the amount of exposure time required for colonization. However, where conditions are inappropriate for the collection of natural substrate samples, artificial substrates may be an option. The Science Advisory Board (SAB 1993) cautioned that the only appropriate type of artificial substrates to be used for assessment are those that are "introduced substrates", i.e., substrates that are representative of the natural substrate of the stream system, such as rock-filled baskets in cobble- or gravel-bottomed streams. Ohio EPA and Maine DEP, are examples of states that use artificial substrates for their water resource investigations (Davis et al. 1996).

Advantages and disadvantages of artificial substrates (Cairns 1982) relative to the use of natural substrates are presented below.

Advantages of Artificial Substrates:

- Artificial substrates allow sample collection in locations that are typically difficult to sample effectively (e.g., bedrock, boulder, or shifting substrates; deep or high velocity water).

- As a "passive" sample collection device, artificial substrates permit standardized sampling by eliminating subjectivity in sample collection technique. Direct sampling of natural substrate requires similar effort and degree of efficiency for the collection of each sample. Use of artificial substrates requires standardization of setting and retrieval; however, colonization provides the actual sampling mechanism.

- Confounding effects of habitat differences are minimized by providing a standardized microhabitat. Microhabitat standardization may promote selectivity for specific organisms if the artificial substrate provides a different microhabitat than that naturally available at a site (see second bullet under Disadvantages below). Most artificial substrates, by design, select for the Scraper and Filterer components of the benthic assemblages or for Collectors if accumulation of debris has occured in the substrates.

- Sampling variability is decreased due to a reduction in microhabitat patchiness, improving the potential for spatial and temporal similarity among samples.

- Sample collection using artificial substrates may require less skill and training than direct sampling of natural substrates. Depending on the type of artificial substrate used, properly trained technicians could place and retrieve the substrates. However, an experienced specialist should be responsible for the selection of habitats and sample sites.

Disadvantages of Artificial Substrates:

- Two trips (one to set and one to retrieve) are required for each artificial substrate sample; only one trip is necessary for direct sampling of the natural substrate. Artificial substrates require a long (8-week average) exposure period for colonization. This decreases their utility for certain rapid biological assessments.

- Samples may not be fully representative of the benthic assemblage at a station if the artificial substrate offers different microhabitats than those available in the natural substrate. Artificial substrates often selectively sample certain taxa, misrepresenting relative abundances of these taxa in the natural substrate. Artificial substrate samples would thus indicate colonization potential rather than the resident community structure. This could be advantageous if a study is designed to isolate water quality effects from substrate and other microhabitat effects. Where habitat quality is a limiting factor, artificial substrates could be used to discriminate between physical and chemical effects and assess a site's potential to support aquatic life on the basis of water quality alone.

- Sampler loss or perturbation commonly occurs due to sedimentation, extremely high or low flows, or vandalism during the relatively long (at least several weeks) exposure period required for colonization.

- Depending on the configuration of the artificial substrate used, transport and storage can be difficult. The number of artificial substrate samplers required for sample collection increases such inconvenience.

3.9 TECHNICAL ISSUES FOR THE SURVEY OF THE FISH ASSEMBLAGE

3.9.1 Seasonality for Fish Collections

Seasonal changes in the relative abundances of the fish community primarily occur during reproductive periods and (for some species) the spring and fall migratory periods. However, because larval fish sampling is not recommended in this protocol, reproductive period changes in relative abundance are not of primary importance.

Generally, the preferred sampling season is mid to late summer, when stream and river flows are moderate to low, and less variable than during other seasons. Although some fish species are capable of extensive migration, fish populations and individual fish tend to remain in the same area during summer (Funk 1957, Gerking 1959, Cairns and Kaesler 1971). The Ohio Environmental Protection Agency (1987) stated that few fishes in perennial streams migrate long distances. Hill and Grossman (1987) found that the three dominant fish species in a North Carolina stream had home ranges of 13 to 19 meters over a period of 18 months. Ross et al. (1985) and Matthews (1986) found that stream fish assemblages were stable and persistent for 10 years, recovering rapidly from droughts and floods indicating that substantial population fluctuations are not likely to occur in response to purely natural environmental phenomena. However, comparison of data collected during different seasons is discouraged, as are data collected during or immediately after major flow changes.

3.9.2 Fish Sampling Methodology

Although various gear types are routinely used to sample fish, electrofishing equipment and seines are the most commonly used collection methods in fresh water habitats. Each method has advantages and disadvantages (Hendricks et al. 1980, Nielsen and Johnson 1983). However, electrofishing is recommended for most fish field surveys because of its greater applicability and efficiency. Local conditions may require consideration of seining as an optional collection method. Advantages and disadvantages of each gear type are presented below.

3.9.2.1 Advantages and Disadvantages of Electrofishing

Advantages of Electrofishing:

- Electrofishing allows greater standardization of catch per unit of effort.

- Electrofishing requires less time and a reduced level of effort than some sampling methods (e.g., use of ichthyocides) (Hendricks et al. 1980).

- Electrofishing is less selective than seining (although it is selective towards size and species) (Hendricks et al. 1980). (See second bullet under Disadvantages below).
- If properly used, adverse effects on fish are minimized.
- Electrofishing is appropriate in a variety of habitats.

Disadvantages of Electrofishing:

- Sampling efficiency is affected by turbidity and conductivity.
- Although less selective than seining, electrofishing is size and species selective. Effects of electrofishing increase with body size. Species specific behavioral and anatomical differences also determine vulnerability to electroshocking (Reynolds 1983).
- Electrofishing is a hazardous operation that can injure field personnel if proper safety procedures are ignored.

3.9.2.2 Advantages and Disadvantages of Seining

Advantages of Seining:

- Seines are relatively inexpensive.
- Seines are lightweight and are easily transported and stored.
- Seine repair and maintenance are minimal and can be accomplished onsite.
- Seine use is not restricted by water quality parameters.
- Effects on the fish population are minimal because fish are collected alive and are generally unharmed.

Disadvantages of Seining:

- Previous experience and skill, knowledge of fish habitats and behavior, and sampling effort are probably more important in seining than in the use of any other gear (Hendricks et al. 1980).
- Sample effort and results for seining are more variable than sampling with electrofishing.
- Use of seines is generally restricted to slower water with smooth bottoms, and is most effective in small streams or pools with little cover.
- Standardization of unit of effort to ensure data comparability is difficult.

3.10 SAMPLING REPRESENTATIVE HABITAT

Effort should be made when sampling to avoid regionally unique natural habitat. Samples from such situations, when compared to those from sites lacking the unique habitat, will appear different, i.e., assess as in either better or worse condition, than those not having the unique habitat. This is due to the usually high habitat specificity that different taxa have to their range of habitat conditions; unique habitat will have unique taxa. Thus, all RBP sampling is focused on sampling of representative habitat.

Composite sampling is the norm for RBP investigations to characterize the reach, rather than individual small replicates. However, a major source of variance can result from taking too few samples for a composite. Therefore, each of the protocols (i.e., for periphyton, benthos, fish) advocate compositing several samples or efforts throughout the stream reach. Replication is strongly encouraged for precision evaluation of the methods.

When sampling wadeable streams, rivers, or waterbodies with complex habitats, a complete inventory of the entire reach is not necessary for bioassessment. However, the sampling area should be representative of the reach, incorporating riffles, runs, and pools if these habitats are typical of the stream in question. Midchannel and wetland areas of large rivers, which are difficult to sample effectively, may be avoided. Sampling effort may be concentrated in near-shore habitats where most species will be collected. Although some deep water or wetland species may be undersampled, the data should be adequate for the objective of bioassessment.

4 PERFORMANCE-BASED METHODS SYSTEM (PBMS)

Determining the performance characteristics of individual methods enables agencies to share data to a certain extent by providing an estimate of the level of confidence in assessments from one method to the next. The purpose of this chapter is to provide a framework for measuring the performance characteristics of various methods. The contents of this chapter are taken liberally from Diamond et al. 1996, which is a refinement of the PBMS approach developed for ITFM (1995b). This chapter is best assimilated if the reader is familiar with data analysis for bioassessment. Therefore, the reader may wish to review Chapter 9 on data analysis before reading this PBMS material. Specific quality assurance aspects of the methods are included in the assemblage chapters.

Regardless of the type of data being collected, field methods share one important feature in common—they cannot tell whether the information collected is an accurate portrayal of the system of interest (Intergovernmental Task Force on Monitoring Water Quality [ITFM] 1995a). Properties of a given field sample can be known, but research questions typically relate to much larger spatial and temporal scales. It is possible to know, with some accuracy, properties or characteristics of a given sample taken from the field; but typically, research questions relate to much larger spatial and temporal scales. To grapple with this problem, environmental scientists and statisticians have long recognized that field methods must strive to obtain information that is representative of the field conditions at the time of sampling.

An accurate assessment of stream biological data is difficult because natural variability cannot be controlled (Resh and Jackson 1993). Unlike analytical assessments conducted in the laboratory, in which accuracy can be verified in a number of ways, the accuracy of macroinvertebrate assessments in the field cannot be objectively verified. For example, it isn't possible to "spike" a stream with a known species assemblage and then determine the accuracy of a bioassessment method. This problem is not theoretical. Different techniques may yield conflicting interpretations at the same sites, underscoring the question of accuracy in bioassessment. Depending on which methods are chosen, the actual structure and condition of the assemblage present, or the trends in status of the assemblage over time may be misinterpreted. Even with considerable convergence in methods used in the U.S. by states and other agencies (Southerland and Stribling 1995, Davis et al. 1996), direct sharing of data among agencies may cause problems because of the uncertainty associated with unfamiliar methods, misapplication of familiar methods, or varied data analyses and interpretation (Diamond et al. 1996).

4.1 APPROACHES FOR ACQUIRING COMPARABLE BIOASSESSMENT DATA

Water quality management programs have different reasons for doing bioassessments which may not require the same level or type of effort in sample collection, taxonomic identification, and data analysis (Gurtz and Muir 1994). However, different methods of sampling and analysis may yield comparable data for certain objectives despite differences in effort. There are 2 general approaches for acquiring comparable bioassessment data among programs or among states. The first is for everyone to use the same method on every study. Most water resource agencies in the U.S. have developed standard operating procedures (SOPs). These SOPs would be adhered to throughout statewide or regional areas to provide comparable assessments within each program. The Rapid

Bioassessment Protocols (RBPs) developed by Plafkin et al. (1989) and refined in this document are attempts to provide a framework for agencies to develop SOPs. However, the use of a single method, even for a particular type of habitat, is probably not likely among different agencies, no matter how exemplary (Diamond et al. 1996).

The second approach to acquiring comparable data from different organizations, is to encourage the documentation of performance characteristics (e.g., precision, sensitivity) for all methods and to use those characteristics to determine comparability of different methods (ITFM 1995b). This documentation is known as a performance-based method system (PBMS) which, in the context of biological assessments, is defined as a system that permits the use of any method (to sample and analyze stream assemblages) that meets established requirements for data quality (Diamond et al. 1996). Data quality objectives (DQOs) are qualitative and quantitative expressions that define requirements for data precision, bias, method sensitivity, and range of conditions over which a method yields satisfactory data (Klemm et al. 1990). The determination of DQOs for a given study or agency program is central to all data collection and to a PBMS, particularly, because these objectives establish not only the necessary quality of a given method (Klemm et al. 1990) but also the types of methods that are likely to provide satisfactory information.

In practice, DQO's are developed in 3 stages: (1) determine what information is needed and why and how that information will be used; (2) determine methodological and practical constraints and technical specifications to achieve the information desired; and (3) compare different available methods and choose the one that best meets the desired specifications within identified practical and technical limitations (USEPA 1984, 1986, Klemm et al. 1990, USEPA 1995a, 1997c). It is difficult to make an informed decision regarding which methods to use if data quality characteristics are unavailable. The successful introduction of the PBMS concept in laboratory chemistry, and more recently in laboratory toxicity testing (USEPA 1990c, American Society of Testing and Materials [ASTM] 1995), recommends adapting such a system for biological monitoring and assessment.

If different methods are similar with respect to the quality of data each produces, then results of an assessment from those methods may be used interchangeably or together. As an example, a method for sample sorting and organism identification, through repeated examination using trained personnel, could be used to determine that the proportion of missed organisms is less than 10% of the organisms present in a given sample and that taxonomic identifications (to the genus level) have an accuracy rate of at least 90% (as determined by samples verified by recognized experts). A study could require the above percentages of missed organisms and taxonomic accuracy as DQOs to ensure the collection of satisfactory data (Ettinger 1984, Clifford and Casey 1992, Cuffney et al. 1993a). In a PBMS approach, any laboratory sorting and identification method that documented the attainment of these DQOs would yield comparable data and the results would therefore be satisfactory for the study.

For the PBMS approach to be useful, 4 basic assumptions must be met (ITFM 1995b):

1. DQOs must be set that realistically define and measure the quality of the data needed; reference (validated) methods must be made available to meet those DQOs;

2. to be considered satisfactory, an alternative method must be as good or better than the reference method in terms of its resulting data quality characteristics;

3. there must be proof that the method yields reproducible results that are sensitive enough for the program; and

4. the method must be effective over the prescribed range of conditions in which it is to be used. For bioassessments, the above assumptions imply that a given method for sample collection and analysis produces data of known quality, including precision, the range of habitats over which the collection method yields a specified precision, and the magnitude of difference in data among sites with different levels or types of impairment (Diamond et al. 1996).

PERFORMANCE CHARACTERISTICS

- **Precision**
- **Bias**
- **Performance range**
- **Interferences**
- **Sensitivity**

Thus, for multimetric assessment methods, such as RBPs, the precision of the total multimetric score is of interest as well as the individual metrics that make up the score (Diamond et al. 1996). Several performance characteristics must be characterized for a given method to utilize a PBMS approach. These characteristics include method precision, bias, performance range, interferences, and sensitivity (detection limit). These characteristics, as well as method accuracy, are typically demonstrated in analytical chemistry systems through the use of blanks, standards, spikes, blind samples, performance evaluation samples, and other techniques to compare different methods and eventually derive a reference method for a given analyte. Many of these performance characteristics are applicable to biological laboratory and field methods and other prelaboratory procedures as well (Table 4-1). It is known that a given collection method is not equally accurate over all ecological conditions even within a general aquatic system classification (e.g., streams, lakes, estuaries). Therefore, assuming a given method is a "reference method" on the basis of regulatory or programmatic reasons does not allow for possible translation or sharing of data derived from different methods because the performance characteristics of different methods have not been quantified. One can evaluate performance characteristics of methods in 2 ways: (1) with respect to the collection method itself and, (2) with respect to the overall assessment process. Method performance is characterized using quantifiable data (metrics, scores) derived from data collection and analysis. Assessment performance, on the other hand, is a step removed from the actual data collected. Interpretive criteria (which may be based on a variety of approaches) are used to rank sites and thus, PBMS in this case is concerned with performance characteristics of the ranking procedures as well as the methods that lead to the assessment.

Table 4-1. Progression of a generic bioassessment field and laboratory method with associated examples of performance characteristics.

Step	Procedure	Examples of Performance Characteristics
1	Sampling device	***Precision***—repeatability in a habitat. ***Bias***—exclusion of certain taxa (mesh size). ***Performance range***—different efficiency in various habitat types or substrates. ***Interferences***—matrix or physical limitations (current velocity, water depth).
2	Sampling method	***Precision***—variable metrics or measures among replicate samples at a site. ***Bias***—exclusion of certain taxa (mesh size) or habitats. ***Performance range***—limitations in certain habitats or substrates. ***Interferences***—high river flows, training of personnel.

Table 4-1. Progression of a generic bioassessment field and laboratory method with associated examples of performance characteristics. (Continued)

Step	Procedure	Examples of Performance Characteristics
3	Field sample processing (subsampling, sample transfer, preservation)	***Precision***—variable metrics among splits of subsamples. ***Bias***— efficiency of locating small organisms. ***Performance range***—sample preservation and holding time. ***Interferences***—Weather conditions. **Additional characteristics:** ***Accuracy***—of sample transfer process and labeling.
4	Laboratory sample processing (sieving, sorting)	***Precision***—split samples. ***Bias***—sorting certain taxonomic groups or organism size. ***Performance range***—sorting method depending on sample matrix (detritus, mud). ***Interferences***—distractions; equipment. **Additional characteristics:** ***Accuracy***—sorting method; lab equipment.
5	Taxonomic enumeration	***Precision***—split samples. ***Bias***—counts and identifications for certain taxonomic groups. ***Performance range***—dependent on taxonomic group and (or) density. ***Interferences***—appropriateness of taxonomic keys. ***Sensitivity***— level of taxonomy related to type of stressor **Additional characteristics:** ***Accuracy***—identification and counts.

Data quality and performance characteristics of methods for analytical chemistry are typically validated through the use of quality control samples including blanks, calibration standards, and samples spiked with a known quantity of the analyte of interest. Table 4-2 summarizes some performance characteristics used in analytical chemistry and how these might be translated to biological methods.

The collection of high-quality data, particularly for bioassessments, depends on having adequately trained people. One way to document satisfactory training is to have newly trained personnel use the method and then compare their results with those previously considered acceptable. Although field crews and laboratory personnel in many organizations are trained in this way (Cuffney et al. 1993b), the results are rarely documented or quantified. As a result, an organization cannot assure either itself or other potential data users that different personnel performing the same method at the same site yield comparable results and that data quality specifications of the method (e.g., precision of metrics or scores) are consistently met. Some of this information is published for certain bioassessment sampling methods, but is defined qualitatively (see Elliott and Tullett 1978, Peckarsky 1984, Resh et al. 1990, Merritt et al. 1996 for examples), not quantitatively. Quantitative information needs to be more available so that the quality of data obtained by different methods is documented.

Table 4-2. Translation of some performance characteristics, derived for laboratory analytical systems, to biological laboratory systems (taken from Diamond et al. 1996).

Performance Characteristics	Analytical Chemical Methods	Biological Methods
Precision	Replicate samples	Multiple taxonomists identifying 1 sample; split sample for sorting, identification, enumeration; replicate samples within sites; duplicate reaches
Bias	Matrix-spiked samples; standard reference materials; performance evaluation samples	Taxonomic reference samples; "spiked" organism samples
Performance range	Standard reference materials at various concentrations; evaluation of spiked samples by using different matrices	Efficiency of field sorting procedures under different sample conditions (mud, detritus, sand, low light)
Interferences	Occurrence of chemical reactions involved in procedure; spiked samples; procedural blanks; contamination	Excessive detrital material or mud in sample; identification of young life stages; taxonomic uncertainty
Sensitivity	Standards; instrument calibration	Organism-spiked samples; standard level of identification
Accuracy	Performance standards; procedural blanks	Confirmation of identification, percentage of "missed" specimens

It is imperative that the specific range of environmental conditions (or performance range) is quantitatively defined for a sampling method (Diamond et al. 1996). As an example, the performance range for macroinvertebrate sampling is usually addressed qualitatively by characterizing factors such as stream size, hydrogeomorphic reach classification, and general habitat features (riffle vs. pool, shallow vs. deep water, rocky vs. silt substrate; Merritt et al. 1996). In a PBMS framework, different methods could be classified based on the ability of the method to achieve specified levels of performance characteristics such as data precision and sensitivity to impairment over a range of appropriate habitats. Thus, the precision of individual metrics or scores obtained by different sampling methods can be directly and quantitatively compared for different types of habitats.

4.2 ADVANTAGES OF A PBMS APPROACH FOR CHARACTERIZING BIOASSESSMENT METHODS

Two fundamental requirements for a biological assessment are: (1) that the sample taken and analyzed is representative of the site or the assemblage of interest and, (2) that the data obtained are an accurate reflection of the sample. The latter requirement is ensured using proper quality control (QC) in the laboratory including the types of performance characteristics summarized in Table 4-2. The first requirement is met through appropriate field sampling procedures, including random selection of sampling locations within the habitat type(s) of interest, choice of sampling device, and sample preservation methods. The degree to which a sample is representative of the environment depends on the type of sampling method used (including subsampling) and the ecological endpoint being measured. For example, many benthic samples may be needed from a stream to obtain 95% confidence intervals that are within 50% of the mean value for macroinvertebrate density, whereas fewer benthic samples may be needed to determine the dominant species in a given habitat type at a particular time (Needham and Usinger 1956, Resh 1979, Plafkin et al. 1989).

Several questions have been raised concerning the appropriateness or "accuracy" of methods such as RBPs, which take few samples from a site and base their measures or scores on subsamples. Subsampling methods have been debated relevant to the "accuracy" of data derived from different methods (Courtemanch 1996, Barbour and Gerritsen 1996, Vinson and Hawkins 1996). Using a PBMS framework, the question is not which subsampling method is more "accurate" or precise but rather what accuracy and precision level can a method achieve, and do those performance characteristics meet the DQOs of the program? Looking at bioassessment methods in this way, (including subsampling and taxonomic identification), forces the researcher or program manager to quantitatively define beforehand the quality control characteristics necessary to make the type of interpretive assessments required by the study or program.

Once the objectives and data quality characteristics are defined for a given study, a method is chosen that meets those objectives. Depending on the data quality characteristics desired, several different methods for collecting and sorting macroinvertebrates may be suitable. Once data precision and "accuracy" are quantified for measures derived from a given bioassessment method, the method's sensitivity (the degree of change in measures or endpoints between a test site and a control or reference site that can be detected as a difference) and reliability (the degree to which an objectively defined impaired site is identified as such) can be quantified and compared with other methods. A method may be modified (e.g., more replicates or larger samples taken) to improve the precision and "accuracy" of the method and meet more stringent data requirements. Thus, a PBMS framework has the advantage of forcing scientists to focus on the ever-important issue: what type of sampling program and data quality are needed to answer the question at hand?

A second advantage of a PBMS framework is that data users and resource managers could potentially increase the amount of available information by combining data based on known comparable methods. The 305(b) process of the National Water Quality Inventory, (USEPA 1997c) is a good example of an environmental program that would benefit from a PBMS framework. This program is designed to determine status and trends of surface water quality in the U.S. A PBMS framework would make explicit the quality and comparability of data derived from different bioassessment methods, would allow more effective sharing of information collected by different states, and would improve the existing national database. Only those methods that met certain DQOs would be used. Such a decision might encourage other organizations to meet those minimum data requirements, thus increasing the amount of usable information that can be shared. For example, the RBPs used by many state agencies for water resources (Southerland and Stribling 1995) could be modified for field and laboratory procedures and still meet similar data quality objectives. The overall design steps of the RBPs, and criteria for determining useful metrics or community measures, would be relatively constant across regions and states to ensure similar quality and comparability of data.

4.3 QUANTIFYING PERFORMANCE CHARACTERISTICS

The following suggested sampling approach (Figure 4-1) need only be performed once for a particular method and by a given agency or research team; it need not be performed for each bioassessment study. Once data quality characteristics for the method are established, limited quality control (QC) sampling and analysis should supplement the required sampling for each bioassessment study to ensure that data quality characteristics of the method are met (USEPA 1995a). The additional effort and expense of such QC are negligible in relation to the potential environmental cost of producing data of poor or unknown quality.

The first step is to define precision of the collection method, also known as "measurement error". This is accomplished by replicate sampling within sites (see Hannaford and Resh 1995). The samples collected are processed and analyzed separately and their metrics compared to obtain a more

realistic measure of the method precision and consistency. Repeated samples within sites estimate the precision of the entire method, comprising variability due to several sources including small-scale spatial variability within a site; operator consistency and bias; and laboratory consistency. Finally, it is desirable to sample a range of site classes (stream size, habitat type) over which the method is likely to be used. This kind of sampling, processing, and analysis should reveal potential biases.

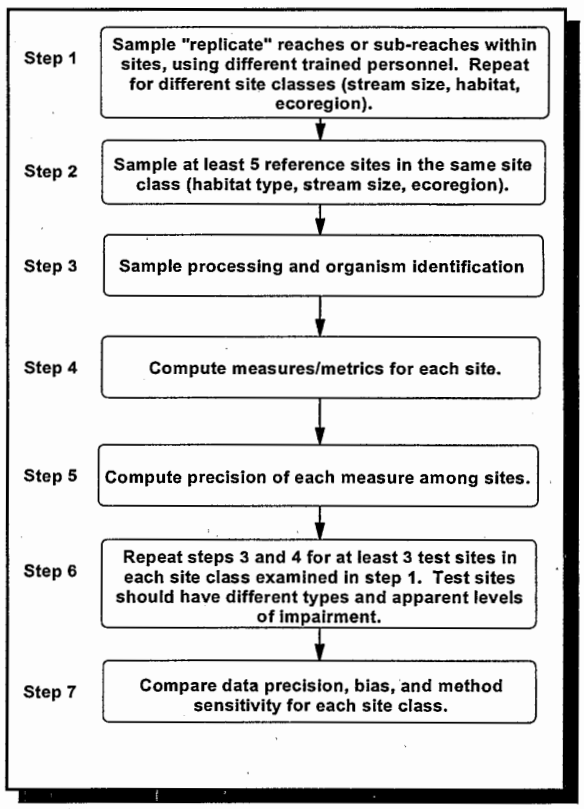

Figure 4-1. Flow chart summarizing the steps necessary to quantify performance characteristics of a bioassessment method (modified from Diamond et al. 1996).

Once the precision of the method is known, one can determine the actual variability associated with sampling "replicate" reference sites within an ecoregion or habitat type. This is known as sampling error, referring to the sample (of sites) drawn from a subpopulation (sites in a region). The degree of assemblage similarity observed among "replicate" reference streams, along with the precision of the collection method itself, will determine the overall precision, accuracy, and sensitivity of the bioassessment approach as a whole. This kind of checking has been done, at least in part, by several states (Bode and Novak 1995; Yoder and Rankin 1995a; Hornig et al. 1995; Barbour et al. 1996b), some USEPA programs (Gibson et al. 1996), and the U.S. Geological Survey (USGS) National Water Quality Assessment Program (Cuffney et al. 1993b, Gurtz 1994). Evaluation of metric or score variability among replicate reference sites can result in improved data precision and choices of stream classification. For example, the Arizona Department of Environmental Quality (DEQ) determined that macroinvertebrate assemblage structure varied substantially within ecoregions resulting in large metric variability among reference sites and poor classification (Spindler 1996). Using detrended correspondence and cluster analysis, the state agency determined that discrimination of sites by elevation and watershed area, corresponding to montane upland, desert lowland, and transition zones, resulted in much lower variability among reference sites and a better classification scheme to measure sensitivity to impairment.

If multiple reference sites are sampled in different site classes (where the sampling method is judged to be appropriate), several important method performance characteristics can be quantified, including: (1) precision for a given metric or assessment score across replicate reference sites within a site class; (2) relative precision of a given metric or score among reference sites in different classes; (3) range of classes over which a given method yields similar precision and "accuracy"; (4) potential interferences to a given method that are related to specific class characteristics and qualities; and (5) bias of a given metric, method, or both, owing to differences in classes (Diamond et al. 1996).

A study by Barbour et al. (1996b) for Florida streams, illustrates the importance of documenting method performance characteristics using multiple reference sites in different site classes. Using the same method at all sites, fewer taxa were observed in reference sites from the Florida Peninsula (one site class) compared to the Florida Panhandle (another site class), resulting in much lower reference values for taxa richness metrics in the Peninsula. Although metric precision was similar among reference sites in each site class, method sensitivity (i.e., the ability of a metric to discern a difference between reference and stressed sites) was poorer in the Peninsula for taxa richness. Thus, bioassessment "accuracy" may be more uncertain for the Florida Peninsula; that is, the probability of committing a Type II error (concluding a test site is no different from reference — therefore minimally impaired — when, in fact, it is) may be greater in the Peninsula region. In the context of a PBMS, the state agency can recognize and document differences in method performance characteristics between site classes and incorporate them into their DQOs. The state in this case can also use the method performance results to identify those site classes for which the biological indicator (index, metric, or other measurement endpoint) may not be naturally sensitive to impairment; i.e., the fauna is naturally species-poor and thus less likely to reflect impacts from stressors. If the state agency desires greater sensitivity than the current method provides, it may have to develop and test different region-specific methods and perhaps different indicators.

In the last step of the process, a method is used over a range of impaired conditions so as to determine the method's sensitivity or ability to detect impairment. As discussed earlier, sites with known levels of impairment or analogous standards by which to create a calibration curve for a given bioassessment method are lacking. In lieu of this limitation, sampling sites are chosen that have known stresses (e.g., urban runoff, toxic pollutants, livestock intrusion, sedimentation, pesticides). Because different sites may or may not have the same level of impairment within a site class (i.e., they are not replicate sites), precision of a method in impaired sites may best be examined by taking and analyzing multiple samples from the same site or adjacent reaches (Hannaford and Resh 1995).

The quantification of performance characteristics is a compromise between statistical power and cost while maintaining biological relevance. Given the often wide variation of natural geomorphic conditions and landscape ecology, even within supposedly "uniform" site classes (Corkum 1989, Hughes 1995), it is desirable to examine 10 or more reference sites (Yoder and Rankin 1995a, Gibson et al. 1996). More site classes in the evaluation process would improve documentation of the performance range and bias for a given method. Using the sampling design suggested in Figure 4-1, data from at least 30 sites (reference and test sites combined), sampled within a brief time period (so as to minimize seasonal changes in the target assemblage), are needed to define performance characteristics. An alternative approach might be to use bootstrap resampling of fewer sites to evaluate the nature of variation of these samples (Fore et al. 1996).

A range of "known" stressed sites within a site class is sampled to test the performance characteristics of a given method. It is important that stressed sites meet the following criteria: (1) they belong to the same site class as the reference sites examined; (2) they clearly have been receiving some chemical, physical, or biological stress(es) for some time (months at least); and (3) impairment is not obvious without sampling; i.e., impairment is not severe.

The first criterion is necessary to reduce potential interferences owing to class differences between the test and reference sites. Thus, the condition of the reference site will have high probability of serving as a true blank as discussed earlier. For example, it is clearly inappropriate to use high gradient mountain streams as references for assessing plains streams.

The second criterion, which is the documented presence of potential stresses, is necessary to ensure the likelihood that the test site is truly impaired (Resh and Jackson 1993). A potential test site might include a body of water that receives toxic chemicals from a point-source discharge or from nonpoint

sources, or a water body that has been colonized by introduced or exotic "pest" species (for example, zebra mussel or grass carp). Stresses at the test site should be measured quantitatively to document potential cause(s) of impairment.

The third criterion, that the site is not obviously impaired, provides a reasonable test of method sensitivity or "detection limit." Severe impairment (e.g., a site that is dominated by 1 or 2 invertebrate species, or a site apparently devoid of aquatic life) generally requires little biological sampling for detection.

4.4 RECOMMENDED PROCESS FOR DOCUMENTATION OF METHOD COMPARABILITY

Although a comparison of methods at the same reference and test sites at the same time is preferable (same seasons and similar conditions), it is not essential. The critical requirement when comparing different sampling methods is that performance characteristics for each method are derived using similar habitat conditions and site classes at similar times/seasons (Diamond et al. 1996). This approach is most useful when examining the numeric scores upon which the eventual assessment is based. Thus, for a method such as RBP that sums the values of several metrics to derive a single score for a site, the framework described in Figure 4-1 should use the site scores. If one were interested in how a particular multimetric scoring system behaves, or one wishes to compare the same metric across methods, then individual metrics could be examined using the framework in Figure 4-1. For multivariate assessment methods that do not compute metric scores, one could instead examine a measure of community similarity or other variable that the researcher uses in multivariate analyses (Norris 1995).

Method comparability is based on 2 factors: (1) the relative magnitude of the coefficients of variation in measurements within and among site classes, and (2) the relative percent differences in measurements between reference and test sites. It is important to emphasize that comparability is not based on the measurements themselves, because different methods may produce different numeric scores or metrics and some sampling methods may explicitly ignore certain taxonomic groups, which will influence the metrics examined. Instead, detection of a systematic relationship among indices or the same measures among methods is advised. If 2 methods are otherwise comparable based on similar performance characteristics, then results of the 2 methods can be numerically related to each other. This outcome is a clear benefit of examining method comparability using a PBMS framework.

Figure 4-1 summarizes a suggested test design, and Table 4-3 summarizes recommended analyses for documenting both the performance characteristics of a given method, and the degree of data comparability between 2 or more methods. The process outlined in Figure 4-1 is not one that is implemented with every study. Rather, the process should be performed at least once to document the limitations and range of applicability of the methods, and should be cited with subsequent uses of the method(s).

The following performance characteristics are quantified for each bioassessment method and compared: (1) the within-class coefficient of variation for a given metric score or index by examining reference-site data for each site class separately (e.g., CV_{A1r} and CV_{B1r}; Fig. 4-1); (2) difference or bias in precision related to site class for a given metric or index (by comparing reference site coefficient of variation from each class: CV_{A1r}/CV_{B1r}; Table 4-3); and (3) estimates of method sensitivity or discriminatory power, by comparing test site data with reference site data

Table 4-3. Suggested arithmetic expressions for deriving performance characteristics that can be compared between 2 or more methods. In all cases, $\bar{x}$ = mean value, X = test site value, s = standard deviation. Subscripts are as follows: capital letter refers to site class (A or B); numeral refers to method 1 or 2; and lower case letter refers to reference (r) or test site (t) (modified from Diamond et al. 1996).

Performance Characteristic	Parameters for Quantifying Method Comparability	Desired Outcome
Relative *precision* of metric or index *within* a site class	CV_{A1r} and CV_{A2r} ; CV_{B1r} and CV_{B2r}	Low values
Relative *precision* of metric or index *between* sites (population of samples at a site) or site classes (population of sites)	$\frac{CV_{A1r}}{CV_{B1r}}$; $\frac{CV_{A2r}}{CV_{B2r}}$	High ratio
Relative *sensitivity* or "detection limit" of metric or index *within* a site class. Comparison of those values between methods reveals the most sensitive method	$\frac{\bar{x}_{A1r}-X_{A1t}}{s_{A1r}}$; $\frac{\bar{x}_{A2r}-X_{A2t}}{s_{A2r}}$ $\frac{\bar{x}_{B1r}-X_{B1t}}{s_{B1r}}$; $\frac{\bar{x}_{B2r}-X_{B2t}}{s_{B2r}}$	High ratio
Relative *sensitivity* of metric or index *between* site classes	$\frac{\bar{x}_{A1r}-X_{A1t}}{s_{A1r}}$; $\frac{\bar{x}_{B1r}-X_{B1t}}{s_{B1r}}$ $\frac{\bar{x}_{A2r}-X_{A2t}}{s_{A2r}}$; $\frac{\bar{x}_{B2r}-X_{B2t}}{s_{B2r}}$	High ratio

within each site class as a function of reference site variability (Table 4-3), e.g.,

$$\frac{\bar{x}_{A1r}-X_{A1t}}{s_{A1r}}.$$

A method that yields a smaller difference between test and reference sites in relation to the reference site variability measured (Table 4-3) would indicate less discriminatory power or sensitivity; that is, the test site is erroneously perceived to be similar to or better than the reference condition and not impaired (Type II error).

Relatively few methods may be able to consistently meet the above data quality criterion and also maintain high sensitivity to impairment because both characteristics require a method that produces relatively precise, accurate data. For example, if the agency's intent is to screen many sites so as to prioritize "hot spots" or significant impairment in need of corrective action, then a method that is inexpensive, quick, and tends to show impairment when significant impairment is actually present (such as some volunteer monitoring methods) (Barbour et al. 1996a) can meet prescribed DQOs with less cost and effort. In this case, the data requirements dictate high priority for method sensitivity or

discriminatory power (detection if impaired sites), understanding that there is likely also to be a high Type I error rate (misidentification of unimpaired sites).

Relative accuracy of each method is addressed to the extent that the test sites chosen are likely to be truly impaired on the basis of independent factors such as the presence of chemical stresses or suboptimal habitat. A method with relatively low precision (high variance) among reference sites compared with another method may suggest lower method accuracy. Note that a method having lower precision may still be satisfactory for some programs if it has other advantages, such as high ability to detect impaired sites with less cost and effort to perform.

Once performance characteristics are defined for each method, data comparability can be determined. If 2 methods are similarly precise, sensitive, and biased over the habitat types sampled, then the different methods should produce comparable data. Interpretive judgements could then be made concerning the quality of aquatic life using data produced by either or both methods combined. Alternatively, the comparison may show that 2 methods are comparable in their performance characteristics in certain habitats or regions and not others. If this is so, results of the 2 methods can be combined for the type for the types of habitats in which data comparability was demonstrated, but not for other regions or habitat types.

In practice, comparability of bioassessment methods would be judged relative to a reference method that has already been fully characterized (using the framework summarized in Figure 4-1) and which produces data with the quality needed by a certain program or agency. The qualities of this reference method are then defined as method performance criteria. If an alternative method yields less precision among reference sites within the same site class than the reference method (e.g., $CV_{A1r} > CV_{A2r}$ in Table 4-3), then the alternative method probably is not comparable to the reference method. A program or study could require that alternative methods are acceptable only if they are as precise as the reference method. A similar process would be accomplished for other performance characteristics that a program or agency deems important based on the type of data required by the program or study.

4.5 CASE EXAMPLE DEFINING METHOD PERFORMANCE CHARACTERISTICS

Florida Department of Environmental Protection (DEP) has developed a statewide network for monitoring and assessing the state's surface waters using macroinvertebrate data. Florida DEP has rigorously examined performance characteristics of their collection and assessment methods to provide better overall quality assurance of their biomonitoring program and to provide defensible and appropriate assessments of the state's surface waters (Barbour et al. 1996b, c). Much of the method characterization process developed for Florida DEP is easily communicated in the context of a PBMS approach.

In addition to characterizing data quality and method performance based on ecoregional site classes, Florida DEP also characterized their methods based on season (summer vs. winter sampling index periods), and size of subsample analyzed (100, 200, or 300-organism subsample). In addition, analyses were performed on the individual component metrics which composed the Florida stream condition index (SCI). For the sake of brevity, the characterization process and results for the SCI in the summer index period and the Peninsula and Northeast bioregions are summarized. The same process was used for other bioregions in the state and in the winter index period.

Performance Criteria Characteristics of Florida SCI (see Figure 4-1 for process)

Characterize Measurement Error (Method Precision Within a Site)—A total of 7 sites in the Peninsula bioregion were subjected to multiple sampling (adjacent reaches). The DEP observed a mean SCI = 28.4 and a CV (within a stream) = 6.8%. These data suggest low measurement error associated with the method and the index score. Given this degree of precision in the reference condition SCI score, power analysis indicated that 80% of the time, a test site with an SCI 5 points less (based on only a single sample at the test site) than the reference criterion, could be distinguished as impaired with 95% confidence. This analysis also indicated that if duplicate samples were taken at the test site, a difference of 3 points in the SCI score between the test site and the reference criterion could be distinguished as impaired with 95% confidence.

Characterize Sampling Error (Method Precision on a Population of Reference Sites)—A total of 56 reference sites were sampled in the Peninsula bioregion (Step 1, Figure 4-1). The SCI score could range from a minimum of 7 to a theoretical maximum of 31 based on the component metric scores. However, in the Peninsula, reference site SCI scores generally ranged between 21 and 31. A mean SCI score of 27.6 was observed with a CV of 12.0%.

Determine Method and Index Sensitivity—Distribution of SCI scores of the 56 reference sites showed that the 5th percentile was a score of 20. Thus, 95% of Peninsula reference sites had a score >20. Accuracy of the method, using known stressed sites, indicated that approximately 80% of the test sites had SCI scores ≤ 20 (Fig. 4-2). In other words, a stressed site would be assessed as impaired 80% of the time using the collection method in the Peninsula bioregion in the summer, and an impairment criterion of the 5th percentile of reference sites. The criterion could also be raised to, say, the 25th percentile of reference sites, which would increase accuracy of correctly classifying stressed sites to approximately 90%, but would decrease accuracy of correctly assessing unimpaired sites to 75%.

Determination of Method Bias and Relative Sensitivity in Different Site Classes—A comparative analysis of precision, sensitivity, and ultimately bias, can be performed for the Florida DEP method and the SCI index outlined in Table 4-3. For example, the mean SCI score in the Panhandle bioregion, during the same summer index period, was 26.3 with a CV = 12.8% based on 16 reference sites. Comparing this CV to the one reported for the Peninsula in the previous step, it is apparent that the precision of this method in the Panhandle was similar to that observed in the Peninsula bioregion.

The 5th percentile of the Panhandle reference sites was an SCI score of 17, such that actual sensitivity of the method in the Panhandle was slightly lower than in the Peninsula bioregion (Figure 4-2). An impaired site would be assessed as such only 50% of the time in the Panhandle bioregion in the summer as opposed to 80% of the time in the Peninsula bioregion during the same index period. Part of the difference in accuracy of the method among the 2 bioregions can be attributed to differences in sample size. Data from only 4 "known" impaired sites were available in the Panhandle bioregion while the Peninsula bioregion had data from 12 impaired sites. The above analyses show, however, that there may be differences in method performance between the 2 regions (probably attributable to large habitat differences between the regions) which should be further explored using data from additional "known" stressed sites, if available.

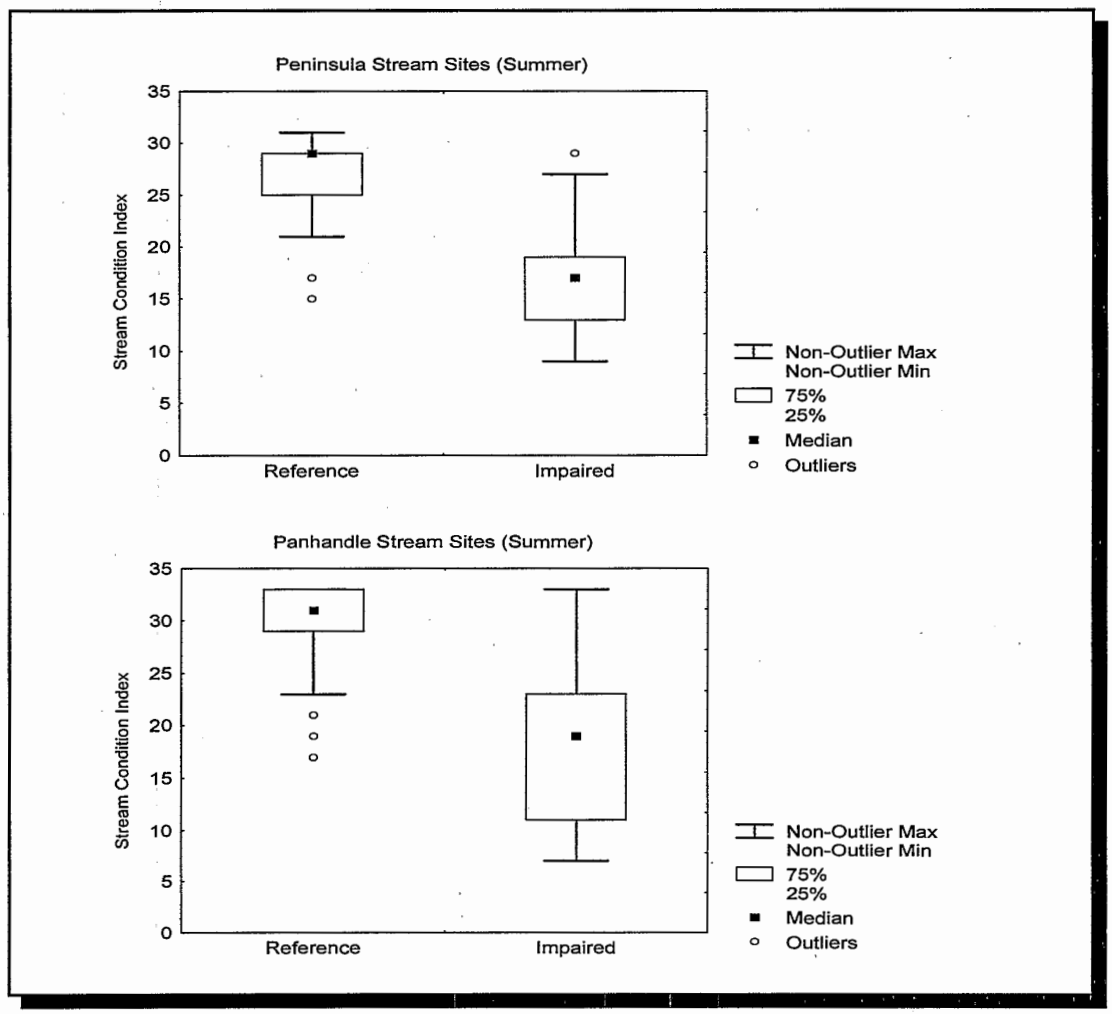

Figure 4-2. Comparison of the discriminatory ability of the SCI between Florida's Peninsula and Panhandle Bioregions. Percentiles used (not $\bar{x}$, sd) to depict relationship.

4.6 APPLICATION OF THE PBMS

The PBMS approach is intended to provide information regarding the confidence of an assessment, given a particular method. By having some measure of confidence in the endpoint and the subsequent decision pertinent to the condition of the water resource, assessment and monitoring programs are greatly strengthened. Three primary questions can be identified that enable agencies to ascertain the value and scientific validity of using information derived from different methods. Use of PBMS is necessary for these questions to be answered.

Question 1 — How rigorous must a method be to accurately detect impairment?

The analyses of Ohio EPA (1992) reveal that the power and ability of a bioassessment technique to accurately portray biological community performance and ecological integrity, and to discriminate even finer levels of aquatic life use impairments, are directly related to the data dimensions (i.e.,

ecological complexity, environmental accuracy, discriminatory power) produced by each (Barbour et al. 1996b). For example, a technique that includes the identification of macroinvertebrate taxa to genus and species will produce a higher attainment of data dimensions than a technique that is limited to family-level taxonomy. In general, this leads to a greater discrimination of the biological condition of sites.

Some states use one method for screening assessments and a second method for more intensive and confirmatory assessments. Florida DEP uses a BioRecon (see description in Chapter 7) to conduct statewide screening for their watershed-based monitoring. A more rigorous method based on a multihabitat sampling (see Chapter 7) is used for targeted surveys related to identified or suspected problem areas. North Carolina Water Quality Division (WQD) has a rapid EPT index (cumulative number of species of Ephemeroptera, Plecoptera, Trichoptera) to conduct screening assessments. Their more intensive method is used to monitor biological condition on a broader basis.

Use of various methods having differing levels of rigor can be examined with estimates of precision and sensitivity. These performance characteristics will help agencies make informed decisions of how resulting data can be used in assessing condition.

Question 2 — How can data derived from different methods be compared to locate additional reference sites?

Many agencies are increasingly confronted with the issue of locating appropriate reference sites from which to develop impairment/unimpairment thresholds. In some instances, sites outside of jurisdictional boundaries are needed to refine the reference condition. As watershed-based monitoring becomes implemented throughout the U.S., jurisdictional boundaries may become impediments to effective monitoring. County governments, tribal associations, local environmental interest groups, and state water resource agencies are all examples of entities that would benefit from collaborative efforts to identify common reference sites.

In most instances, all of the various agencies conducting monitoring and assessment will be using different methods. A knowledge of the precision and sensitivity of the methods will allow for an agency to decide whether the characterization of a site as reference or minimally impaired by a second agency or other entity fits the necessary criteria to be included as an additional reference site.

Question 3 — How can data from different methods be combined or integrated for increasing a database for assessment?

The question of combining data for a comprehensive assessment is most often asked by states and tribes that want to increase the spatial coverage of an assessment beyond their own limited datasets. From a national or regional perspective, the ability to combine datasets is desirable to make judgements on the condition of the water resource at a higher geographical scale. Ideally, each dataset will have been collected with the same methods.

This question is the most difficult to answer even with a knowledge of the precision and sensitivity. Widely divergent methodologies having highly divergent performance characteristics are not likely to be appropriate for combining under any circumstances. The risk of committing error in judgement of biological condition from a combined dataset of this sort would be too high.

Divergent methodologies with similar or nearly identical performance characteristics are plausible candidates for combining data at metric or index levels. However, a calibration of the methods is necessary to ensure that extrapolations of data from one method to the other is scientifically valid. The best fit for a calibrated model is a 1:1 ratio for each metric and index. Realistically, the

calibration will be on a less-than-perfect relationship; extrapolations may be via range of values rather than absolute numbers. Thus, combining datasets from dissimilar methods may be valuable for characterizing severe impairment or sites of excellent condition. However, sites with slight to moderate impairment might not be detected with a high level of confidence.

For example, a 6-state collaborative study was conducted on Mid-Atlantic coastal plain streams to determine whether a combined reference condition could be established (Maxted et al. in review). In this study, a single method was applied to all sites in the coastal plain in all 6 states (New Jersey, Delaware, Maryland, Virginia, North Carolina, and South Carolina). The results indicated that two Bioregions exist for the coastal plain ecoregion—the northern portion, including coastal plain streams in New Jersey, Delaware, and Maryland; and the southern portion that includes Virginia, North Carolina, and South Carolina. In most situations, agencies have databases from well-established methods that differ in specific ways. The ability to combine unlike datasets has historically been a problem for scientific investigations. The usual practice has been to aggregate the data to the least common denominator and discard data that do not fit the criteria.

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5 HABITAT ASSESSMENT AND PHYSICOCHEMICAL PARAMETERS

An evaluation of habitat quality is critical to any assessment of ecological integrity and should be performed at each site at the time of the biological sampling. In general, habitat and biological diversity in rivers are closely linked (Raven et al. 1998). In the truest sense, "habitat" incorporates all aspects of physical and chemical constituents along with the biotic interactions. In these protocols, the definition of "habitat" is narrowed to the quality of the instream and riparian habitat that influences the structure and function of the aquatic community in a stream. The presence of an altered habitat structure is considered one of the major stressors of aquatic systems (Karr et al. 1986). The presence of a degraded habitat can sometimes obscure investigations on the effects of toxicity and/or pollution. The assessments performed by many water resource agencies include a general description of the site, a physical characterization and water quality assessment, and a visual assessment of instream and riparian habitat quality. Some states (e.g., Idaho DEQ and Illinois EPA) include quantitative measurements of physical parameters in their habitat assessment. Together these data provide an integrated picture of several of the factors influencing the biological condition of a stream system. These assessments are not as comprehensive as needed to adequately identify all causes of impact. However, additional investigation into hydrological modification of water courses and drainage patterns can be conducted, once impairment is noted.

The habitat quality evaluation can be accomplished by characterizing selected physicochemical parameters in conjunction with a systematic assessment of physical structure. Through this approach, key features can be rated or scored to provide a useful assessment of habitat quality.

5.1 PHYSICAL CHARACTERISTICS AND WATER QUALITY

Both physical characteristics and water quality parameters are pertinent to characterization of the stream habitat. An example of the data sheet used to characterize the physical characteristics and water quality of a site is shown in Appendix A. The information required includes measurements of physical characterization and water quality made routinely to supplement biological surveys.

Physical characterization includes documentation of general land use, description of the stream origin and type, summary of the riparian vegetation features, and measurements of instream parameters such as width, depth, flow, and substrate. The water quality discussed in these protocols are *in situ* measurements of standard parameters that can be taken with a water quality instrument. These are generally instantaneous measurements taken at the time of the survey. Measurements of certain parameters, such as temperature, dissolved oxygen, and turbidity, can be taken over a diurnal cycle and will require instrumentation that can be left in place for extended periods or collects water samples at periodic intervals for measurement. In addition, water samples may be desired to be collected for selected chemical analysis. These chemical samples are transported to an analytical laboratory for processing. The combination of this information (physical characterization and water quality) will provide insight as to the ability of the stream to support a healthy aquatic community, and to the presence of chemical and non-chemical stressors to the stream ecosystem. Information requested in this section (Appendix A-

1, Form 1) is standard to many aquatic studies and allows for some comparison among sites. Additionally, conditions that may significantly affect aquatic biota are documented.

5.1.1 Header Information (Station Identifier)

The header information is identical on all data sheets and requires sufficient information to identify the station and location where the survey was conducted, date and time of survey, and the investigators responsible for the quality and integrity of the data. The stream name and river basin identify the watershed and tributary; the location of the station is described in the narrative to help identify access to the station for repeat visits. The rivermile (if applicable) and latitude/longitude are specific locational data for the station. The station number is a code assigned by the agency that will associate the sample and survey data with the station. The STORET number is assigned to each datapoint for inclusion in USEPA's STORET system. The stream class is a designation of the grouping of homogeneous characteristics from which assessments will be made. For instance, Ohio EPA uses ecoregions and size of stream, Florida DEP uses bioregions (aggregations of subecoregions), and Arizona DEQ uses elevation as a means to identify stream classes. Listing the agency and investigators assigns responsibility to the data collected from the station at a specific date and time. The reason for the survey is sometimes useful to an agency that conducts surveys for various programs and purposes.

5.1.2 Weather Conditions

Note the present weather conditions on the day of the survey and those immediately preceding the day of the survey. This information is important to interpret the effects of storm events on the sampling effort.

5.1.3 Site Location/Map

To complete this phase of the bioassessment, a photograph may be helpful in identifying station location and documenting habitat conditions. Any observations or data not requested but deemed important by the field observer should be recorded. A hand-drawn map is useful to illustrate major landmarks or features of the channel morphology or orientation, vegetative zones, buildings, etc. that might be used to aid in data interpretation.

5.1.4 Stream Characterization

Stream Subsystem: In regions where the perennial nature of streams is important, or where the tidal influence of streams will alter the structure and function of communities, this parameter should be noted.

Stream Type: Communities inhabiting coldwater streams are markedly different from those in warmwater streams, many states have established temperature criteria that differentiate these 2 stream types.

Stream Origin: Note the origination of the stream under study, if it is known. Examples are glacial, montane, swamp, and bog. As the size of the stream or river increases, a mixture of origins of tributaries is likely.

5.1.5 Watershed Features

Collecting this information usually requires some effort initially for a station. However, subsequent surveys will most likely not require an in-depth research of this information.

Predominant Surrounding Land Use Type: Document the prevalent land-use type in the catchment of the station (noting any other land uses in the area which, although not predominant, may potentially affect water quality). Land use maps should be consulted to accurately document this information.

Local Watershed Nonpoint Source Pollution: This item refers to problems and potential problems in the watershed. Nonpoint source pollution is defined as diffuse agricultural and urban runoff. Other compromising factors in a watershed that may affect water quality include feedlots, constructed wetlands, septic systems, dams and impoundments, mine seepage, etc.

Local Watershed Erosion: The existing or potential detachment of soil within the local watershed (the portion of the watershed or catchment that directly affects the stream reach or station under study) and its movement into the stream is noted. Erosion can be rated through visual observation of watershed and stream characteristics (note any turbidity observed during water quality assessment below).

5.1.6 Riparian Vegetation

An acceptable riparian zone includes a buffer strip of a minimum of 18 m (Barton et al. 1985) from the stream on either side. The acceptable width of the riparian zone may also be variable depending on the size of the stream. Streams over 4 m in width may require larger riparian zones. The vegetation within the riparian zone is documented here as the dominant type and species, if known.

5.1.7 Instream Features

Instream features are measured or evaluated in the sampling reach and catchment as appropriate.

Estimated Reach Length: Measure or estimate the length of the sampling reach. This information is important if reaches of variable length are surveyed and assessed.

Estimated Stream Width (in meters, m): Estimate the distance from bank to bank at a transect representative of the stream width in the reach. If variable widths, use an average to find that which is representative for the given reach.

Sampling Reach Area (m^2): Multiply the sampling reach length by the stream width to obtain a calculated surface area.

Estimated Stream Depth (m): Estimate the vertical distance from water surface to stream bottom at a representative depth (use instream habitat feature that is most common in reach) to obtain average depth.

Velocity: Measure the surface velocity in the thalweg of a representative run area. If measurement is not done, estimate the velocity as slow, moderate, or fast.

Canopy Cover: Note the general proportion of open to shaded area which best describes the amount of cover at the sampling reach or station. A densiometer may be used in place of visual estimation.

High Water Mark (m): Estimate the vertical distance from the bankfull margin of the stream bank to the peak overflow level, as indicated by debris hanging in riparian or floodplain vegetation, and deposition of silt or soil. In instances where bank overflow is rare, a high water mark may not be evident.

Proportion of Reach Represented by Stream Morphological Types: The proportion represented by riffles, runs, and pools should be noted to describe the morphological heterogeneity of the reach.

Channelized: Indicate whether or not the area around the sampling reach or station is channelized (e.g., straightening of stream, bridge abutments and road crossings, diversions, etc.).

Dam Present: Indicate the presence or absence of a dam upstream in the catchment or downstream of the sampling reach or station. If a dam is present, include specific information relating to alteration of flow.

5.1.8 Large Woody Debris

Large Woody Debris (LWD) density, defined and measured as described below, has been used in regional surveys (Shields et al. 1995) and intensive studies of degraded and restored streams (Shields et al. 1998). The method was developed for sand or sand-and-gravel bed streams in the Southeastern U.S. that are wadeable at baseflow, with water widths between 1 and 30 m (Cooper and Testa 1999).

Cooper and Testa's (1999) procedure involves measurements based on visual estimates taken by a wading observer. Only woody debris actually in contact with stream water is counted. Each woody debris formation with a surface area in the plane of the water surface >0.25 m^2 is recorded. The estimated length and width of each formation is recorded on a form or marked directly onto a stream reach drawing. Estimates are made to the nearest 0.5 m , and formations with length or width less than 0.5 m are not counted. Recorded length is maximum width in the direction perpendicular to the length. Maximum actual length and width of a limb, log, or accumulation are not considered.

If only a portion of the log/limb is in contact with the water, only that portion in contact is measured. Root wads and logs/limbs in the water margin are counted if they contact the water, and are arbitrarily given a width of 0.5 m Lone individual limbs and logs are included in the determination if their diameter is 10 cm or larger (Keller and Swanson 1979, Ward and Aumen 1986). Accumulations of smaller limbs and logs are included if the formation total length or width is 0.5 m or larger. Standing trees and stumps within the stream are also recorded if their length and width exceed 0.5 m.

The length and width of each LWD formation are then multiplied, and the resulting products are summed to give the aquatic habitat area directly influenced. This area is then divided by the water surface area (km^2) within the sampled reach (obtained by multiplying the average water surface width by reach length) to obtain LWD density. Density values of 10^3 to 10^4 m^2/km^2 have been reported for channelized and incised streams and on the order of 10^5 m^2/km^2 for non-incised streams (Shields et al. 1995 and 1998). This density is not an expression of the volume of LWD, but rather a measure of LWD influence on velocity, depth, and cover.

5.1.9 Aquatic Vegetation

The general type and relative dominance of aquatic plants are documented in this section. Only an estimation of the extent of aquatic vegetation is made. Besides being an ecological assemblage that responds to perturbation, aquatic vegetation provides refugia and food for aquatic fauna. List the species of aquatic vegetation, if known.

5.1.10 Water Quality

Temperature (°C), Conductivity or "Specific Conductance" (µohms), Dissolved Oxygen (µg/L), pH, Turbidity: Measure and record values for each of the water quality parameters indicated, using the appropriate calibrated water quality instrument(s). Note the type of instrument and unit number used.

Water Odors: Note those odors described (or include any other odors not listed) that are associated with the water in the sampling area.

Water Surface Oils: Note the term that best describes the relative amount of any oils present on the water surface.

Turbidity: If turbidity is not measured directly, note the term which, based upon visual observation, best describes the amount of material suspended in the water column.

5.1.11 Sediment/Substrate

Sediment Odors: Disturb sediment in pool or other depositional areas and note any odors described (or include any other odors not listed) which are associated with sediment in the sampling reach.

Sediment Oils: Note the term which best describes the relative amount of any sediment oils observed in the sampling area.

Sediment Deposits: Note those deposits described (or include any other deposits not listed) that are present in the sampling reach. Also indicate whether the undersides of rocks not deeply embedded are black (which generally indicates low dissolved oxygen or anaerobic conditions).

Inorganic Substrate Components: Visually estimate the relative proportion of each of the 7 substrate/particle types listed that are present over the sampling reach.

Organic Substrate Components: Indicate relative abundance of each of the 3 substrate types listed.

5.2 A VISUAL-BASED HABITAT ASSESSMENT

Biological potential is limited by the quality of the physical habitat, forming the template within which biological communities develop (Southwood 1977). Thus, habitat assessment is defined as the evaluation of the structure of the surrounding physical habitat that influences the quality of the water resource and the condition of the resident aquatic community (Barbour et al. 1996a). For streams, an encompassing approach to assessing structure of the habitat includes an evaluation of the variety and quality of the substrate, channel morphology, bank structure, and

riparian vegetation. Habitat parameters pertinent to the assessment of habitat quality include those that characterize the stream "micro scale" habitat (e.g., estimation of embeddeddness), the "macro scale" features (e.g., channel morphology), and the riparian and bank structure features that are most often influential in affecting the other parameters.

EQUIPMENT/SUPPLIES NEEDED FOR HABITAT ASSESSMENT AND PHYSICAL/WATER QUALITY CHARACTERIZATION

- Physical Characterization and Water Quality Field Data Sheet*
- Habitat Assessment Field Data Sheet*
- clipboard
- pencils or waterproof pens
- 35 mm camera (may be digital)
- video camera (optional)
- upstream/downstream "arrows" or signs for photographing and documenting sampling reaches
- Flow or velocity meter
- *In situ* water quality meters
- Global Positioning System (GPS) Unit

* It is helpful to copy field sheets onto water-resistant paper for use in wet weather conditions

Rosgen (1985, 1994) presented a stream and river classification system that is founded on the premise that dynamically-stable stream channels have a morphology that provides appropriate distribution of flow energy during storm events. Further, he identifies 8 major variables that affect the stability of channel morphology, but are not mutually independent: channel width, channel depth, flow velocity, discharge, channel slope, roughness of channel materials, sediment load and sediment particle size distribution. When streams have one of these characteristics altered, some of their capability to dissipate energy properly is lost (Leopold et al. 1964, Rosgen 1985) and will result in accelerated rates of channel erosion. Some of the habitat structural components that function to dissipate flow energy are:

- sinuosity
- roughness of bed and bank materials
- presence of point bars (slope is an important characteristic)
- vegetative conditions of stream banks and the riparian zone
- condition of the floodplain (accessibility from bank, overflow, and size are important characteristics).

Measurement of these parameters or characteristics serve to stratify and place streams into distinct classifications. However, none of these habitat classification techniques attempt to differentiate the quality of the habitat and the ability of the habitat to support the optimal biological condition of the region. Much of our understanding of habitat relationships in streams has emerged from comparative studies that describe statistical relationships between habitat variables and abundance of biota (Hawkins et al. 1993). However, in response to the need to incorporate broader scale habitat assessments in water resource programs, 2 types of approaches for evaluating habitat structure have been developed. In the first, the Environmental Monitoring and Assessment Program (EMAP) of the USEPA and the National Water-Quality Assessment Program (NAWQA) of the USGS developed techniques that incorporate measurements of various features of the instream, channel, and bank morphology (Meader et al. 1993, Klemm and Lazorchak 1994). These techniques provide a relatively comprehensive characterization of the physical structure of the stream sampling reach and its surrounding floodplain. The second type

was a more rapid and qualitative habitat assessment approach that was developed to describe the overall quality of the physical habitat (Ball 1982, Ohio EPA 1987, Plafkin et al. 1989, Barbour and Stribling 1991, 1994, Rankin 1991, 1995). In this document, the more rapid visual-based approach is described. A cursory overview of the more quantitative approaches to characterizing the physical structure of the habitat is provided.

The habitat assessment matrix developed for the Rapid Bioassessment Protocols (RBPs) in Plafkin et al. (1989) were originally based on the Stream Classification Guidelines for Wisconsin developed by Ball (1982) and "*Methods of Evaluating Stream, Riparian, and Biotic Conditions*" developed by Platts et al. (1983). Barbour and Stribling (1991, 1994) modified the habitat assessment approach originally developed for the RBPs to include additional assessment parameters for high gradient streams and a more appropriate parameter set for low gradient streams (Appendix A-1, Forms 2,3). All parameters are evaluated and rated on a numerical scale of 0 to 20 (highest) for each sampling reach. The ratings are then totaled and compared to a reference condition to provide a final habitat ranking. Scores increase as habitat quality increases. To ensure consistency in the evaluation procedure, descriptions of the physical parameters and relative criteria are included in the rating form.

The Environmental Agency of Great Britain (Environment Agency of England and Wales, Scottish Environment Protection Agency, and Environment and Heritage Service of Northern Ireland) have developed a River Habitat Survey (RHS) for characterizing the quality of their streams and rivers (Raven et al. 1998). The approach used in Great Britain is similar to the visual-based habitat assessment used in the US in that scores are assigned to ranges of conditions of various habitat parameters.

A biologist who is well versed in the ecology and zoogeography of the region can generally recognize optimal habitat structure as it relates to the biological community. The ability to accurately assess the quality of the physical habitat structure using a visual-based approach depends on several factors:

- the parameters selected to represent the various features of habitat structure need to be relevant and clearly defined
- a continuum of conditions for each parameter must exist that can be characterized from the optimum for the region or stream type under study to the poorest situation reflecting substantial alteration due to anthropogenic activities
- the judgement criteria for the attributes of each parameter should minimize subjectivity through either quantitative measurements or specific categorical choices
- the investigators are experienced in or adequately trained for stream assessments in the region under study (Hannaford et al. 1997)
- adequate documentation and ongoing training is maintained to evaluate and correct errors resulting in outliers and aberrant assessments.

Habitat evaluations are first made on instream habitat, followed by channel morphology, bank structural features, and riparian vegetation. Generally, a single, comprehensive assessment is made that incorporates features of the entire sampling reach as well as selected features of the catchment. Additional assessments may be made on neighboring reaches to provide a broader evaluation of habitat quality for the stream ecosystem. The actual habitat assessment process

involves rating the 10 parameters as optimal, suboptimal, marginal, or poor based on the criteria included on the Habitat Assessment Field Data Sheets (Appendix A-1, Forms 2,3). Some state programs, such as Florida Department of Environmental Protection (DEP) (1996) and Mid-Atlantic Coastal Streams Workgroup (MACS) (1996) have adapted this approach using somewhat fewer and different parameters.

Reference conditions are used to scale the assessment to the "best attainable" situation. This approach is critical to the assessment because stream characteristics will vary dramatically across different regions (Barbour and Stribling 1991). The ratio between the score for the test station and the score for the reference condition provides a percent comparability measure for each station. The station of interest is then classified on the basis of its similarity to expected conditions (reference condition), and its apparent potential to support an acceptable level of biological health. Use of a percent comparability evaluation allows for regional and stream-size differences which affect flow or velocity, substrate, and channel morphology. Some regions are characterized by streams having a low channel gradient, such as coastal plains or prairie regions.

Other habitat assessment approaches or a more rigorously quantitative approach to measuring the habitat parameters may be used (See Klemm and Lazorchak 1994, Kaufmann and Robison 1997, Meader et al. 1993). However, holistic and rapid assessment of a wide variety of habitat attributes along with other types of data is critical if physical measurements are to be used to best advantage in interpreting biological data. A more detailed discussion of the relationship between habitat quality and biological condition is presented in Chapter 10.

A generic habitat assessment approach based on visual observation can be separated into 2 basic approaches—one designed for high-gradient streams and one designed for low-gradient streams. High-gradient or riffle/run prevalent streams are those in moderate to high gradient landscapes. Natural high-gradient streams have substrates primarily composed of coarse sediment particles (i.e., gravel or larger) or frequent coarse particulate aggregations along stream reaches. Low-gradient or glide/pool prevalent streams are those in low to moderate gradient landscapes. Natural low-gradient streams have substrates of fine sediment or infrequent aggregations of more coarse (gravel or larger) sediment particles along stream reaches. The entire sampling reach is evaluated for each parameter. Descriptions of each parameter and its relevance to instream biota are presented in the following discussion. Parameters that are used only for high-gradient prevalent streams are marked with an "a"; those for low-gradient dominant streams, a "b". If a parameter is used for both stream types, it is not marked with a letter. A brief set of decision criteria is given for each parameter corresponding to each of the 4 categories reflecting a continuum of conditions on the field sheet (optimal, suboptimal, marginal, and poor). Refer to Appendix A-1, Forms 2 and 3, for a complete field assessment guide.

PROCEDURE FOR PERFORMING HABITAT ASSESSMENT

1. Select the reach to be assessed. The habitat assessment is performed on the same 100 m reach (or other reach designation [e.g., 40 x stream wetted width]) from which the biological sampling is conducted. Some parameters require an observation of a broader section of the catchment than just the sampling reach.

2. Complete the station identification section of each field data sheet and habitat assessment form.

3. It is best for the investigators to obtain a close look at the habitat features to make an adequate assessment. If the physical and water quality characterization and habitat assessment are done before the biological sampling, care must be taken to avoid disturbing the sampling habitat.

4. Complete the **Physical Characterization and Water Quality Field Data Sheet**. Sketch a map of the sampling reach on the back of this form.

5. Complete the **Habitat Assessment Field Data Sheet**, in a team of 2 or more biologists, if possible, to come to a consensus on determination of quality. Those parameters to be evaluated on a scale greater than a sampling reach require traversing the stream corridor to the extent deemed necessary to assess the habitat feature. As a general rule-of-thumb, use 2 lengths of the sampling reach to assess these parameters.

QUALITY ASSURANCE PROCEDURES

1. Each biologist is to be trained in the visual-based habitat assessment technique for the applicable region or state.

2. The judgment criteria for each habitat parameter are calibrated for the stream classes under study. Some text modifications may be needed on a regional basis.

3. Periodic checks of assessment results are completed using pictures of the sampling reach and discussions among the biologists in the agency.

Parameters to be evaluated in sampling reach:

1 EPIFAUNAL SUBSTRATE/AVAILABLE COVER

high and low gradient streams

Includes the relative quantity and variety of natural structures in the stream, such as cobble (riffles), large rocks, fallen trees, logs and branches, and undercut banks, available as refugia, feeding, or sites for spawning and nursery functions of aquatic macrofauna. A wide variety and/or abundance of submerged structures in the stream provides macroinvertebrates and fish with a large number of niches, thus increasing habitat diversity. As variety and abundance of cover decreases, habitat structure becomes monotonous, diversity decreases, and the potential for recovery following disturbance decreases. Riffles and runs are critical for maintaining a variety and abundance of insects in most high-gradient streams and serving as spawning and feeding refugia for certain fish. The extent and quality of the riffle is an important factor in the support of a healthy biological condition in high-gradient streams. Riffles and runs offer a diversity of habitat through variety of particle size, and, in many small high-gradient streams, will provide the most stable habitat. Snags and submerged logs are among the most productive habitat structure for macroinvertebrate colonization and fish refugia in low-gradient streams. However, "new fall" will not yet be suitable for colonization.

Selected References

Wesche et al. 1985, Pearsons et al. 1992, Gorman 1988, Rankin 1991, Barbour and Stribling 1991, Plafkin et al. 1989, Platts et al. 1983, Osborne et al. 1991, Benke et al. 1984, Wallace et al. 1996, Ball 1982, MacDonald et al. 1991, Reice 1980, Clements 1987, Hawkins et al. 1982, Beechie and Sibley 1997.

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover **(high and low gradient)**	Greater than 70% (50% for low gradient streams) of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% (30-50% for low gradient streams) mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% (10-30% for low gradient streams) mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% (10% for low gradient streams) stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

1a. Epifaunal Substrate/Available Cover—High Gradient

Optimal Range

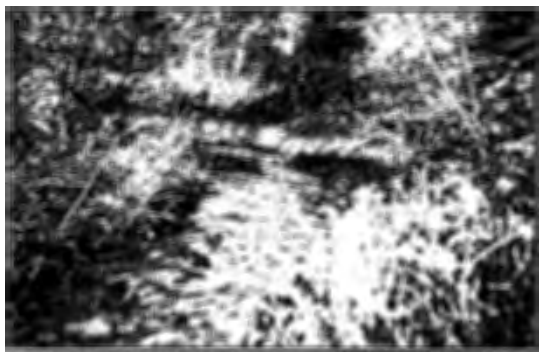

Poor Range

1b. Epifaunal Substrate/Available Cover—Low Gradient

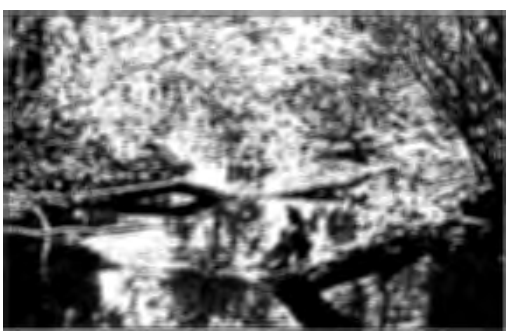

Optimal Range (*Mary Kay Corazalla, U. of Minn.*)

Poor Range

2a EMBEDDEDNESS

high gradient streams

Refers to the extent to which rocks (gravel, cobble, and boulders) and snags are covered or sunken into the silt, sand, or mud of the stream bottom. Generally, as rocks become embedded, the surface area available to macroinvertebrates and fish (shelter, spawning, and egg incubation) is decreased. Embeddedness is a result of large-scale sediment movement and deposition, and is a parameter evaluated in the riffles and runs of high-gradient streams. The rating of this parameter may be variable depending on where the observations are taken. To avoid confusion with sediment deposition (another habitat parameter), observations of embeddedness should be taken in the upstream and central portions of riffles and cobble substrate areas.

Selected References

Ball 1982, Osborne et al. 1991, Barbour and Stribling 1991, Platts et al. 1983, MacDonald et al. 1991, Rankin 1991, Reice 1980, Clements 1987, Benke et al. 1984, Hawkins et al. 1982, Burton and Harvey 1990.

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
2.a Embeddedness (high gradient)	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

2a. Embeddedness—High Gradient

Optimal Range *(William Taft, MI DNR)*

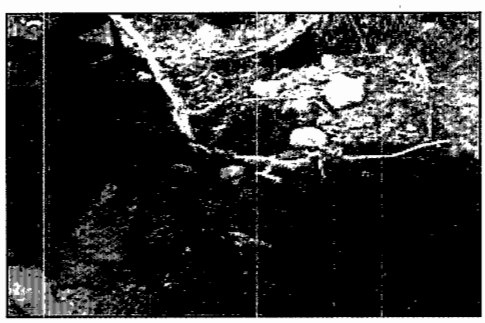

Poor Range *(William Taft, MI DNR)*

2b POOL SUBSTRATE CHARACTERIZATION

low gradient streams

Evaluates the type and condition of bottom substrates found in pools. Firmer sediment types (e.g., gravel, sand) and rooted aquatic plants support a wider variety of organisms than a pool substrate dominated by mud or bedrock and no plants. In addition, a stream that has a uniform substrate in its pools will support far fewer types of organisms than a stream that has a variety of substrate types.

Selected References

Beschta and Platts 1986, U.S. EPA 1983.

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
2b. Pool Substrate Characterization (low gradient)	Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.	All mud or clay or sand bottom; little or no root mat; no submerged vegetation.	Hard-pan clay or bedrock; no root mat or submerged vegetation.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

2b. Pool Substrate Characterization—Low Gradient

Optimal Range
(Mary Kay Corazalla, U. of Minn.)

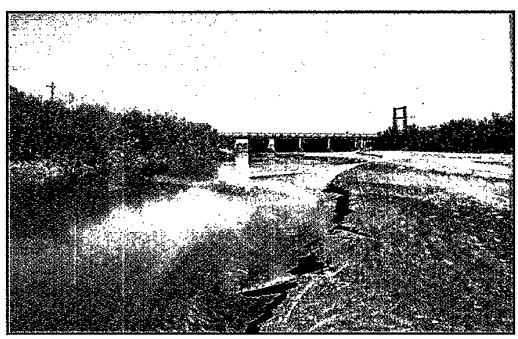

Poor Range

3a VELOCITY/DEPTH COMBINATIONS

high gradient streams

Patterns of velocity and depth are included for high-gradient streams under this parameter as an important feature of habitat diversity. The best streams in most high-gradient regions will have all 4 patterns present: (1) slow-deep, (2) slow-shallow, (3) fast-deep, and (4) fast-shallow. The general guidelines are 0.5 m depth to separate shallow from deep, and 0.3 m/sec to separate fast from slow. The occurrence of these 4 patterns relates to the stream's ability to provide and maintain a stable aquatic environment.

Selected References

Ball 1982, Brown and Brussock 1991, Gore and Judy 1981, Oswood and Barber 1982.

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
3a. Velocity/ Depth Regimes **(high gradient)**	All 4 velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (slow is <0.3 m/s, deep is >0.5 m)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow-deep).
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

3a. Velocity/Depth Regimes—High Gradient

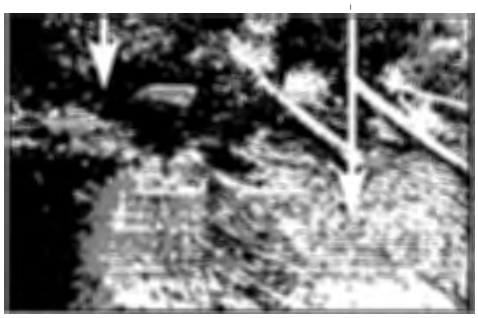

Optimal Range *(Mary Kay Corazalla, U. of Minn.)*
(arrows emphasize different velocity/depth regimes)

Poor Range *(William Taft, MI DNR)*

3b POOL VARIABILITY

low gradient streams

Rates the overall mixture of pool types found in streams, according to size and depth. The 4 basic types of pools are large-shallow, large-deep, small-shallow, and small-deep. A stream with many pool types will support a wide variety of aquatic species. Rivers with low sinuosity (few bends) and monotonous pool characteristics do not have sufficient quantities and types of habitat to support a diverse aquatic community. General guidelines are any pool dimension (i.e., length, width, oblique) greater than half the cross-section of the stream for separating large from small and 1 m depth separating shallow and deep.

Selected References

Beschta and Platts 1986, USEPA 1983.

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
3b. Pool Variability (low gradient)	Even mix of large-shallow, large-deep, small-shallow, small-deep pools present.	Majority of pools large-deep; very few shallow.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

3b. Pool Variability—Low Gradient

Optimal Range *(Peggy Morgan, FL DEP)*

Poor Range *(William Taft, MI DNR)*

4 SEDIMENT DEPOSITION

high and low gradient streams

Measures the amount of sediment that has accumulated in pools and the changes that have occurred to the stream bottom as a result of deposition. Deposition occurs from large-scale movement of sediment. Sediment deposition may cause the formation of islands, point bars (areas of increased deposition usually at the beginning of a meander that increase in size as the channel is diverted toward the outer bank) or shoals, or result in the filling of runs and pools. Usually deposition is evident in areas that are obstructed by natural or manmade debris and areas where the stream flow decreases, such as bends. High levels of sediment deposition are symptoms of an unstable and continually changing environment that becomes unsuitable for many organisms.

Selected References

MacDonald et al. 1991, Platts et al. 1983, Ball 1982, Armour et al. 1991, Barbour and Stribling 1991, Rosgen 1985.

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
4. Sediment Deposition **(high and low gradient)**	Little or no enlargement of islands or point bars and less than 5% (<20% for low-gradient streams) of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% (20-50% for low-gradient) of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% (50-80% for low-gradient) of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% (80% for low-gradient) of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

4a. Sediment Deposition—High Gradient

Optimal Range

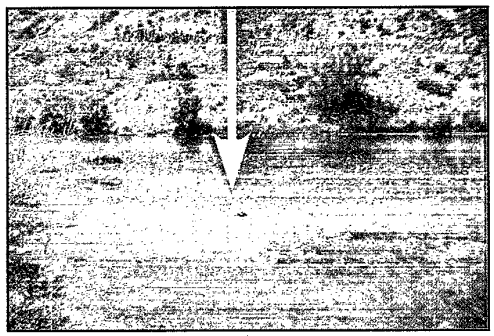

Poor Range
(arrow pointing to sediment deposition)

4b. Sediment Deposition—Low Gradient

Optimal Range

Poor Range
(arrows pointing to sediment deposition)

5 CHANNEL FLOW STATUS

high and low gradient streams

The degree to which the channel is filled with water. The flow status will change as the channel enlarges (e.g., aggrading stream beds with actively widening channels) or as flow decreases as a result of dams and other obstructions, diversions for irrigation, or drought. When water does not cover much of the streambed, the amount of suitable substrate for aquatic organisms is limited. In high-gradient streams, riffles and cobble substrate are exposed; in low-gradient streams, the decrease in water level exposes logs and snags, thereby reducing the areas of good habitat. Channel flow is especially useful for interpreting biological condition under abnormal or lowered flow conditions. This parameter becomes important when more than one biological index period is used for surveys or the timing of sampling is inconsistent among sites or annual periodicity.

Selected References

Rankin 1991, Rosgen 1985, Hupp and Simon 1986, MacDonald et al. 1991, Ball 1982, Hicks et al. 1991.

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
5. Channel Flow Status **(high and low gradient)**	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

5a. Channel Flow Status—High Gradient

Optimal Range

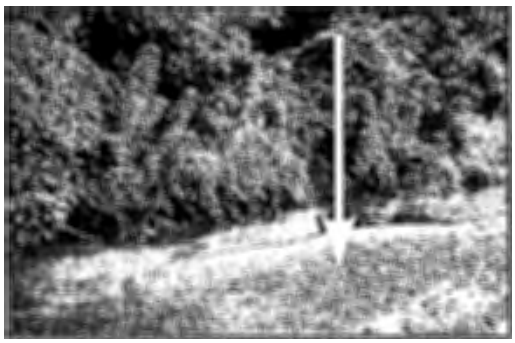

Poor Range
(arrow showing that water is not reaching both banks; leaving much of channel uncovered)

5b. Channel Flow Status—Low Gradient

Optimal Range

Poor Range *(James Stahl, IN DEM)*

Parameters to be evaluated broader than sampling reach:

6 CHANNEL ALTERATION

high and low gradient streams

Is a measure of large-scale changes in the shape of the stream channel. Many streams in urban and agricultural areas have been straightened, deepened, or diverted into concrete channels, often for flood control or irrigation purposes. Such streams have far fewer natural habitats for fish, macroinvertebrates, and plants than do naturally meandering streams. Channel alteration is present when artificial embankments, riprap, and other forms of artificial bank stabilization or structures are present; when the stream is very straight for significant distances; when dams and bridges are present; and when other such changes have occurred. Scouring is often associated with channel alteration.

Selected References

Barbour and Stribling 1991, Simon 1989a, b, Simon and Hupp 1987, Hupp and Simon 1986, Hupp 1992, Rosgen 1985, Rankin 1991, MacDonald et al. 1991.

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
6. Channel Alteration **(high and low gradient)**	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

6a. Channel Alteration—High Gradient

Optimal Range

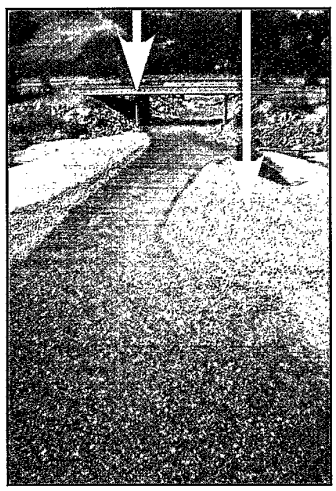

Poor Range
(arrows emphasizing large-scale channel alterations)

6b. Channel Alteration—Low Gradient

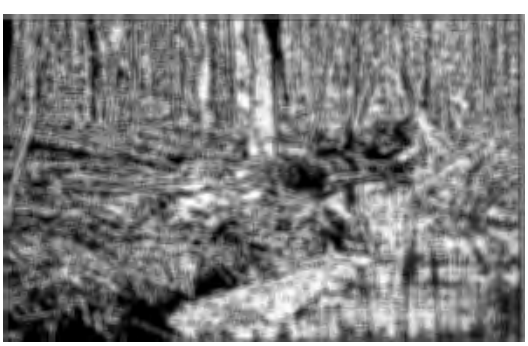

Optimal Range

Poor Range *(John Maxted, DE DNREC)*

7a FREQUENCY OF RIFFLES (OR BENDS)

high gradient streams

Is a way to measure the sequence of riffles and thus the heterogeneity occurring in a stream. Riffles are a source of high-quality habitat and diverse fauna, therefore, an increased frequency of occurrence greatly enhances the diversity of the stream community. For high gradient streams where distinct riffles are uncommon, a run/bend ratio can be used as a measure of meandering or sinuosity (see 7b). A high degree of sinuosity provides for diverse habitat and fauna, and the stream is better able to handle surges when the stream fluctuates as a result of storms. The absorption of this energy by bends protects the stream from excessive erosion and flooding and provides refugia for benthic invertebrates and fish during storm events. To gain an appreciation of this parameter in some streams, a longer segment or reach than that designated for sampling should be incorporated into the evaluation. In some situations, this parameter may be rated from viewing accurate topographical maps. The "sequencing" pattern of the stream morphology is important in rating this parameter. In headwaters, riffles are usually continuous and the presence of cascades or boulders provides a form of sinuosity and enhances the structure of the stream. A stable channel is one that does not exhibit progressive changes in slope, shape, or dimensions, although short-term variations may occur during floods (Gordon et al. 1992).

Selected References

Hupp and Simon 1991, Brussock and Brown 1991, Platts et al. 1983, Rankin 1991, Rosgen 1985, 1994, 1996, Osborne and Hendricks 1983, Hughes and Omernik 1983, Cushman 1985, Bain and Boltz 1989, Gislason 1985, Hawkins et al. 1982, Statzner et al. 1988.

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
7a. Frequency of Riffles (or bends) **(high gradient)**	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

7a. Frequency of Riffles (or bends)—High Gradient

Optimal Range
(arrows showing frequency of riffles and bends)

Poor Range

7b CHANNEL SINUOSITY

low gradient streams

Evaluates the meandering or sinuosity of the stream. A high degree of sinuosity provides for diverse habitat and fauna, and the stream is better able to handle surges when the stream fluctuates as a result of storms. The absorption of this energy by bends protects the stream from excessive erosion and flooding and provides refugia for benthic invertebrates and fish during storm events. To gain an appreciation of this parameter in low gradient streams, a longer segment or reach than that designated for sampling may be incorporated into the evaluation. In some situations, this parameter may be rated from viewing accurate topographical maps. The "sequencing" pattern of the stream morphology is important in rating this parameter. In "oxbow" streams of coastal areas and deltas, meanders are highly exaggerated and transient. Natural conditions in these streams are shifting channels and bends, and alteration is usually in the form of flow regulation and diversion. A stable channel is one that does not exhibit progressive changes in slope, shape, or dimensions, although short-term variations may occur during floods (Gordon et al. 1992).

Selected References

Hupp and Simon 1991, Brussock and Brown 1991, Platts et al. 1983, Rankin 1991, Rosgen 1985, 1994, 1996, Osborne and Hendricks 1983, Hughes and Omernik 1983, Cushman 1985, Bain and Boltz 1989, Gislason 1985, Hawkins et al. 1982, Statzner et al. 1988.

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
7b. Channel Sinuosity **(low gradient)**	The bends in the stream increase the stream length 3 to 4 times longer than if it was in a straight line. (Note - channel braiding is considered normal in coastal plains and other low-lying areas. This parameter is not easily rated in these areas.)	The bends in the stream increase the stream length 2 to 3 times longer than if it was in a straight line.	The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line.	Channel straight; waterway has been channelized for a long distance.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

7b. Channel Sinuosity—Low Gradient

Optimal Range

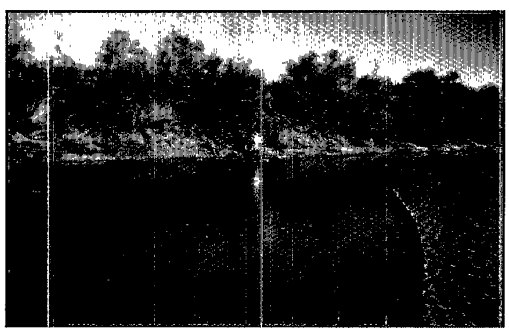

Poor Range

8 BANK STABILITY (condition of banks)

high and low gradient streams

Measures whether the stream banks are eroded (or have the potential for erosion). Steep banks are more likely to collapse and suffer from erosion than are gently sloping banks, and are therefore considered to be unstable. Signs of erosion include crumbling, unvegetated banks, exposed tree roots, and exposed soil. Eroded banks indicate a problem of sediment movement and deposition, and suggest a scarcity of cover and organic input to streams. Each bank is evaluated separately and the cumulative score (right and left) is used for this parameter.

Selected References

Ball 1982, MacDonald et al. 1991, Armour et al. 1991, Barbour and Stribling 1991, Hupp and Simon 1986, 1991, Simon 1989a, Hupp 1992, Hicks et al. 1991, Osborne et al. 1991, Rosgen 1994, 1996.

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
8. Bank Stability (score each bank) **Note: determine left or right side by facing downstream** **(high and low gradient)**	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE ___ (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

8a. Bank Stability (condition of banks)—High Gradient

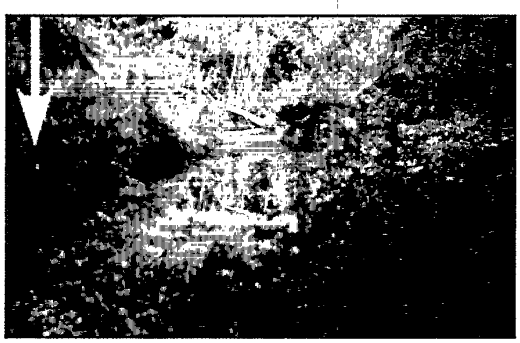

Optimal Range
(arrow pointing to stable streambanks)

Poor Range *(MD Save Our Streams)*
(arrow highlighting unstable streambanks)

8b. Bank Stability (condition of banks)—Low Gradient

Optimal Range *(Peggy Morgan, FL DEP)*

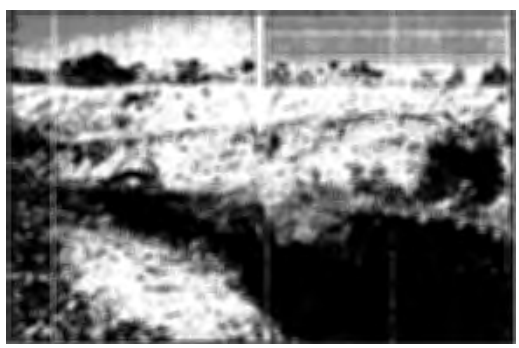

Poor Range
(arrow highlighting unstable streambanks)

9 BANK VEGETATIVE PROTECTION

high and low gradient streams

Measures the amount of vegetative protection afforded to the stream bank and the near-stream portion of the riparian zone. The root systems of plants growing on stream banks help hold soil in place, thereby reducing the amount of erosion that is likely to occur. This parameter supplies information on the ability of the bank to resist erosion as well as some additional information on the uptake of nutrients by the plants, the control of instream scouring, and stream shading. Banks that have full, natural plant growth are better for fish and macroinvertebrates than are banks without vegetative protection or those shored up with concrete or riprap. This parameter is made more effective by defining the native vegetation for the region and stream type (i.e., shrubs, trees, etc.). In some regions, the introduction of exotics has virtually replaced all native vegetation. The value of exotic vegetation to the quality of the habitat structure and contribution to the stream ecosystem must be considered in this parameter. In areas of high grazing pressure from livestock or where residential and urban development activities disrupt the riparian zone, the growth of a natural plant community is impeded and can extend to the bank vegetative protection zone. Each bank is evaluated separately and the cumulative score (right and left) is used for this parameter.

Selected References

Platts et al. 1983, Hupp and Simon 1986, 1991, Simon and Hupp 1987, Ball 1982, Osborne et al. 1991, Rankin 1991, Barbour and Stribling 1991, MacDonald et al. 1991, Armour et al. 1991, Myers and Swanson 1991, Bauer and Burton 1993.

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
9. Vegetative Protection (score each bank) **Note: determine left or right side by facing downstream.** **(high and low gradient)**	More than 90% of the streambank surfaces and immediate riparian zones covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE ___ (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE ___ (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

9a. Bank Vegetative Protection—High Gradient

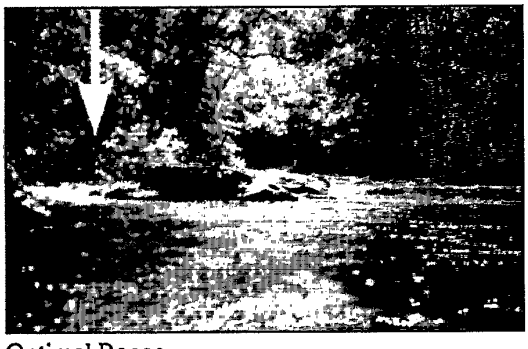

Optimal Range
(arrow pointing to streambank with high level of vegetative cover)

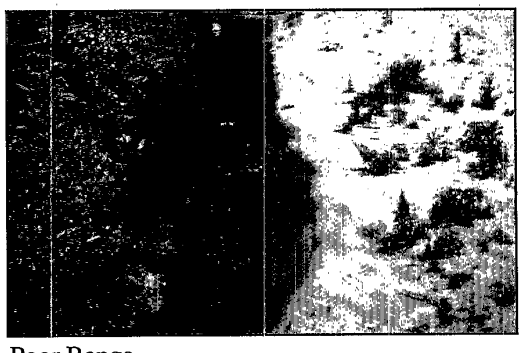

Poor Range
(arrow pointing to streambank with almost no vegetative cover)

9b. Bank Vegetative Protection—Low Gradient

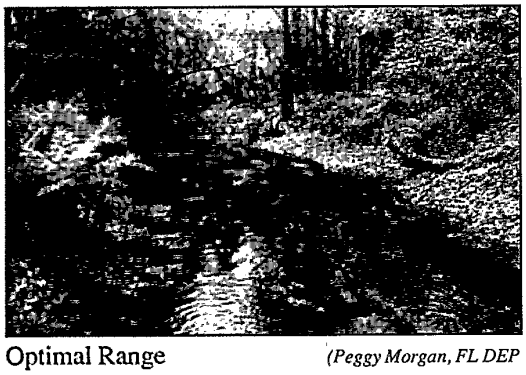

Optimal Range *(Peggy Morgan, FL DEP*

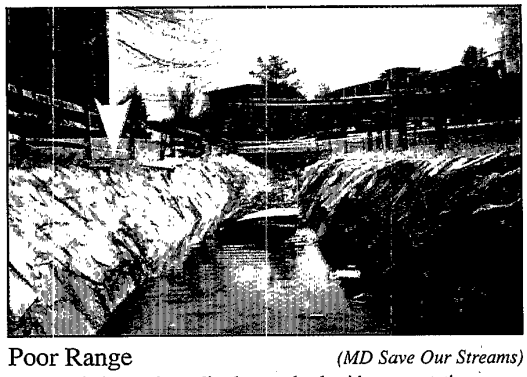

Poor Range *(MD Save Our Streams)*
(arrow pointing to channelized streambank with no vegetative cover)

10 RIPARIAN VEGETATIVE ZONE WIDTH

high and low gradient streams

Measures the width of natural vegetation from the edge of the stream bank out through the riparian zone. The vegetative zone serves as a buffer to pollutants entering a stream from runoff, controls erosion, and provides habitat and nutrient input into the stream. A relatively undisturbed riparian zone supports a robust stream system; narrow riparian zones occur when roads, parking lots, fields, lawns, bare soil, rocks, or buildings are near the stream bank. Residential developments, urban centers, golf courses, and rangeland are the common causes of anthropogenic degradation of the riparian zone. Conversely, the presence of "old field" (i.e., a previously developed field not currently in use), paths, and walkways in an otherwise undisturbed riparian zone may be judged to be inconsequential to altering the riparian zone and may be given relatively high scores. For variable size streams, the specified width of a desirable riparian zone may also be variable and may be best determined by some multiple of stream width (e.g., 4 x wetted stream width). Each bank is evaluated separately and the cumulative score (right and left) is used for this parameter.

Selected References

Barton et al. 1985, Naiman et al. 1993, Hupp 1992, Gregory et al. 1991, Platts et al. 1983, Rankin 1991, Barbour and Stribling 1991, Bauer and Burton 1993.

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
10. Riparian Vegetative Zone Width (score each bank riparian zone) **(high and low gradient)**	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE ___ (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE ___ (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

10a. Riparian Vegetative Zone Width—High Gradient

Optimal Range
(arrow pointing out an undisturbed riparian zone)

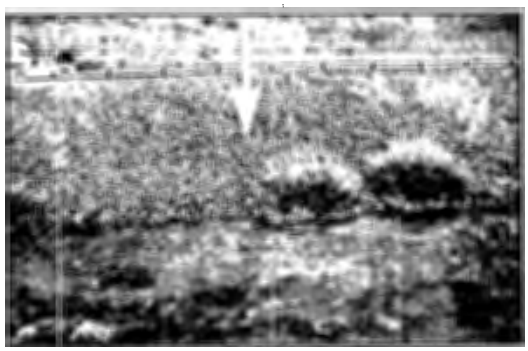

Poor Range
(arrow pointing out lack of riparian zone)

10b. Riparian Vegetative Zone Width—Low Gradient

Optimal Range
(arrow emphasizing an undisturbed riparian zone)

Poor Range *(MD Save Our Streams)*
(arrow emphasizing lack of riparian zone)

5.3 ADDITIONS OF QUANTITATIVE MEASURES TO THE HABITAT ASSESSMENT

Kaufmann (1993) identified 7 general physical habitat attributes important in influencing stream ecology. These include:

- channel dimensions
- channel gradient
- channel substrate size and type
- habitat complexity and cover
- riparian vegetation cover and structure
- anthropogenic alterations
- channel-riparian interaction.

All of these attributes vary naturally, as do biological characteristics; thus expectations differ even in the absence of anthropogenic disturbances. Within a given physiographic-climatic region, stream drainage area and overall stream gradient are likely to be strong natural determinants of many aspects of stream habitat, because of their influence on discharge, flood stage, and stream power (the product of discharge times gradient). In addition, all of these attributes may be directly or indirectly altered by anthropogenic activities.

In Section 5.2, an approach is described whereby habitat quality is interpreted directly in the field by biologists while sampling the stream reach. This Level 1 approach is observational and requires only one person (although a team approach is recommended) and takes about 15 to 20 minutes per stream reach. This approach more quickly yields a habitat quality assessment. However, it depends upon the knowledge and experience of the field biologist to make the proper interpretation of observed of both the natural expectations (potentials) and the biological consequences (quality) that can be attributed to the observed physical attributes. Hannaford et al. (1997) found that training in habitat assessment was necessary to reduce the subjectivity in a visual-based approach. The authors also stated that training on different types of streams may be necessary to adequately prepare investigators.

The second conceptual approach described here confines observations to habitat characteristics themselves (whether they are quantitative or qualitative), then later ascribing quality scoring to these measurements as part of the data analysis process. Typically, this second type of habitat assessment approach employs more quantitative data collection, as exemplified by field methods described by Kaufmann and Robison (1997) for EMAP, Simonson et al. (1994), Meador et al. (1993) for NAWQA, and others cited by Gurtz and Muir (1994). These field approaches typically define a reach length proportional to stream width and employ transect measurements that are systematically spaced (Simonson et al. 1994, Kaufmann and Robison 1997) or spaced by judgement to be representative (Meador et al. 1993). They usually include measurement of substrate, channel and bank dimensions, riparian canopy cover, discharge, gradient, sinuosity, in-channel cover features, and counts of large woody debris and riparian human disturbances. They may employ systematic visual estimates of substrate embeddedness, fish cover features, habitat types, and riparian vegetation structure. The time commitment in the field to these more

quantitative habitat assessment methods is usually 1.5 to 3 hours with a crew of two people. Because of the greater amount of data collected, they also require more time for data summarization, analysis, and interpretation. On the other hand, the more quantitative methods and less ambiguous field parameters result in considerably greater precision. The USEPA applied both quantitative and visual-based (RBPs) methods in a stream survey undertaken over 4 years in the mid-Atlantic region of the Appalachian Mountains. An earlier version of the RBP techniques were applied on 301 streams with repeat visits to 29 streams; signal-to-noise ratios varied from 0.1 to 3.0 for the twelve RBP metrics and averaged (1.1 for the RBP total habitat quality score). The quantitative methods produced a higher level of precision; signal-to-noise ratios were typically between 10 and 50, and sometimes in excess of 100 for quantitative measurements of channel morphology, substrate, and canopy densiometer measurements made on a random subset of 186 streams with 27 repeat visits in the same survey. Similarly, semi-quantitative estimates of fish cover and riparian human disturbance estimates obtained from multiple, systematic visual observations of otherwise measurable features had signal:noise ratios from 5 to 50. Many riparian vegetation cover and structure metrics were moderately precise (signal:noise ranging from 2 to 30). Commonly used flow dependent measures (e.g., riffle/pool and width/depth ratios), and some visual riparian cover estimates were less precise, with signal:noise ratios more in the range of those observed for metrics of the EPA's RBP habitat score (<2).

The USEPA's EMAP habitat assessment field methods are presented as an option for a second level (II) of habitat assessment. These methods have been applied in numerous streams throughout the Mid-Atlantic region, the Midwest, Colorado, California, and the Pacific Northwest. Table 5-1 is a summary of these field methods; more detail is presented in the field manual by Kaufmann and Robison (1997).

Table 5-1. Components of EMAP physical habitat protocol.

Component	Description
1. Thalweg Profile	Measure maximum depth, classify habitat, determine presence of soft/small sediment at 10-15 equally spaced intervals between each of 11 channel cross-sections (100-150 along entire reach). Measure wetted width at 11 channel cross-sections and mid-way between cross-sections (21 measurements).
2. Woody Debris	Between each of the channel cross sections, tally large woody debris numbers within and above the bankfull channel according to size classes.
3. Channel and Riparian Cross-Sections	At 11 cross-section stations placed at equal intervals along reach length: • **Measure**: channel cross section dimensions, bank height, undercut, angle (with rod and clinometer); gradient (clinometer), sinuosity (compass backsite), riparian canopy cover (densiometer). • **Visually Estimate***: substrate size class and embeddedness; areal cover class and type (e.g., woody) of riparian vegetation in Canopy, Mid-Layer and Ground Cover; areal cover class of fish concealment features, aquatic macrophytes and filamentous algae. • **Observe & Record***: human disturbances and their proximity to the channel.
4. Discharge	In medium and large streams (defines later) measure water depth and velocity @ 0.6 depth (with electromagnetic or impeller-type flow meter) at 15 to 20 equally spaced intervals across one carefully chosen channel cross-section. In very small streams, measure discharge with a portable weir or time the filling of a bucket.

* Substrate size class and embeddedness are estimated, and depth is measured for 55 particles taken at 5 equally-spaced points on each of 11 cross-sections. The cross-section is defined by laying the surveyor's rod or tape to span the wetted channel. Woody debris is tallied over the distance between each cross-section and the next cross-section upstream. Riparian vegetation and human disturbances are observed 5 m upstream and 5 m downstream from the cross section station. They extend shoreward 10 m from left and right banks. Fish cover types, aquatic macrophytes, and algae are observed within channel 5 m upstream and 5 m downstream from the cross section stations. These boundaries for visual observations are estimated by eye.

Table 5-2 lists the physical habitat metrics that can be derived from applying these field methods. Once these habitat metrics are calculated from the available physical habitat data, an assessment would be obtained from comparing these metric values to those of known reference sites. A strong deviation from the reference expectations would indicate a habitat alteration of the particular parameter. The close connectivity of the various attributes would most likely result in an impact on multiple metrics if habitat alteration was occurring. The actual process for interpreting a habitat assessment using this approach is still under development.

Table 5-2. Example of habitat metrics that can be calculated from the EMAP physical habitat data.

Channel mean width and depth
Channel volume and Residual Pool volume
Mean channel slope and sinuosity
Channel incision, bankfull dimensions, and bank characteristics
Substrate mean diameter, % fines, % embeddedness
Substrate stability
Fish concealment features (areal cover of various types, e.g., undercut banks, brush)
Large woody debris (volume and number of pieces per 100 m)
Channel habitat types (e.g., % of reach composed of pools, riffles, etc.)
Canopy cover
Riparian vegetation structure and complexity
Riparian disturbance measure (proximity-weighted tally of human disturbances)

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6 PERIPHYTON PROTOCOLS

By R. Jan Stevenson, University of Louisville, and
Loren L. Bahls, University of Montana

Benthic algae (periphyton or phytobenthos) are primary producers and an important foundation of many stream food webs. These organisms also stabilize substrata and serve as habitat for many other organisms. Because benthic algal assemblages are attached to substrate, their characteristics are affected by physical, chemical, and biological disturbances that occur in the stream reach during the time in which the assemblage developed.

Diatoms in particular are useful ecological indicators because they are found in abundance in most lotic ecosystems. Diatoms and many other algae can be identified to species by experienced algologists. The great numbers of species provide multiple, sensitive indicators of environmental change and the specific conditions of their habitat. Diatom species are differentially adapted to a wide range of ecological conditions.

Periphyton indices of biotic integrity have been developed and tested in several regions (Kentucky Department of Environmental Protection 1993, Hill 1997). Since the ecological tolerances for many species are known (see section 6.1.4), changes in community composition can be used to diagnose the environmental stressors affecting ecological health, as well as to assess biotic integrity (Stevenson 1998, Stevenson and Pan 1999).

Periphyton protocols may be used by themselves, but they are most effective when used with one or more of the other assemblages and protocols. They should be used with habitat and benthic macroinvertebrate assessments particularly because of the close relation between periphyton and these elements of stream ecosystems.

Presently, few states have developed protocols for periphyton assessment. Montana, Kentucky, and Oklahoma have developed periphyton bioassessment programs. Others states are exploring the possibility of developing periphyton programs. Algae have been widely used to monitor water quality in rivers of Europe, where many different approaches have been used for sampling and data analysis (see reviews in Whitton and Rott 1996, Whitton et al. 1991). The protocols presented here are a composite of the techniques used in Kentucky, Montana, and Oklahoma (Bahls 1993, Kentucky Department of Environmental Protection 1993, Oklahoma Conservation Commission 1993).

Two Rapid Bioassessment Protocols for periphyton are presented. These protocols are meant to provide examples of methods that can be used. Other methods are available and should be considered based on the objectives of the assessment program, resources available for study, numbers of streams sampled, hypothesized stressors, and the physical habitat of the streams studied. Examples of other methods are presented in textboxes throughout the chapter.

The first protocol (6.1) is a standard approach in which species composition and/or biomass of a sampled assemblage is assessed in the laboratory. The second protocol (6.2) is a field-based rapid survey of periphyton biomass and coarse-level taxonomic composition (e.g., diatoms, filamentous greens, blue-green algae) and requires little taxonomic expertise. The two protocols can be used together. The first protocol has the advantage of providing much more accuracy in assessing biotic integrity and in diagnosing causes of impairment than the second protocol, but it requires more effort than the second protocol. Additionally, the first protocol provides the option of sampling the natural substrate of the stream or placing artificial substrates for colonization.

6.1 STANDARD LABORATORY-BASED APPROACH

6.1.1 Field Sampling Procedures: Natural Substrates

Periphyton samples should be collected during periods of stable stream flow. High flows can scour the stream bed, flushing the periphyton downstream. Recolonization of substrates will be faster after less severe floods and in streams with nutrient enrichment. Peterson and Stevenson (1990) recommend a three-week delay following high, bottom-scouring stream flows to allow for recolonization and succession to a mature periphyton community. However, recovery after high discharge can be as rapid as 7 days if severe scouring of substrata did not occur (Stevenson 1990).

Two sampling approaches are described for natural substrate sampling. Multihabitat sampling best characterizes the benthic algae in the reach, but results may not be sensitive to subtle water quality changes because of habitat variability between reaches. Species composition of assemblages from a single habitat should reflect water quality differences among streams more precisely than multi-habitat sampling, but impacts in other habitats in the reach may be missed.

The length of stream sampled depends upon the objectives of the project, budget, and expected results. Multihabitat sampling should be conducted at the reach scale (30-40 stream widths) to ensure sampling the diversity of habitats that occur in the stream. Ideally, single habitat sampling should also be conducted at the reach scale. A shorter length of stream can probably be sampled for single habitat samples than multihabitat samples because the chosen single habitat (e.g., riffles) is usually common within the study streams.

6.1.1.1 Multihabitat Sampling

The following procedures for multihabitat sampling of algae have been adapted from the Kentucky and Montana protocols (Kentucky DEP 1993, Bahls 1993). These procedures are recommended when subsequent laboratory assessments of species composition of algal assemblages will be performed.

1. Establish the reach for multihabitat sampling as per the macroinvertebrate protocols (Chapter 7). In most cases, the reach required for periphyton sampling will be the same size as the reach required for macroinvertebrate or fish sampling (30-40 stream widths) so that as many algal habitats can be sampled as is practical.

FIELD EQUIPMENT FOR PERIPHYTON SAMPLING--NATURAL SUBSTRATES

- stainless steel teaspoon, toothbrush, or similar brushing and scraping tools
- section of PVC pipe (3" diameter or larger) fitted with a rubber collar at one end
- field notebook or field forms*; pens and pencils
- white plastic or enamel pan
- petri dish and spatula (for collecting soft sediment)
- forceps, suction bulb, and disposable pipettes
- squeeze bottle with distilled water
- sample containers (125 ml wide-mouth jars)
- sample container labels
- preservative [Lugol's solution, 4% buffered formalin, "M3" fixative, or 2% glutaraldehyde (APHA 1995)]
- first aid kit
- cooler with ice

* During wet weather conditions, waterproof paper is useful or copies of field forms can be stored in a metal storage box (attached to a clip-board).

2. Before sampling, complete the physical/chemical field sheet (see Chapter 5; Appendix A-1, Form 1) and the periphyton field data sheet (Appendix A-2, Form 1). Visual estimates or quantitative transect-based assessments can be used to determine the percent coverage of each substrate type and the estimated relative abundance of macrophytes, macroscopic filamentous algae, diatoms and other microscopic algal accumulations (periphyton), and other biota (see section 6.2).

3. Collect algae from all available substrates and habitats. The objective is to collect a single composite sample that is representative of the periphyton assemblage present in the reach. Sample all substrates (Table 6-1) and habitats (riffles, runs, shallow pools, nearshore areas) roughly in proportion to their areal coverage in the reach. Within a stream reach, light, depth, substrate, and current velocity can affect species composition of periphyton assemblages. Changes in species composition of algae among habitats are often evident as changes in color and texture of the periphyton. Small amounts (about 5 mL or less) of subsample from each habitat are usually sufficient. Pick specimens of macroalgae by hand in proportion to their relative abundance in the reach. Combine all samples into a common container.

Table 6-1. Summary of collection techniques for periphyton from wadeable streams (adapted from Kentucky DEP 1993, Bahls 1993).

Substrate Type	Collection Technique
Removable substrates (hard): gravel, pebbles, cobble, and woody debris	Remove representative substrates from water; brush or scrape representative area of algae from surface and rinse into sample jar.
Removable substrates (soft): mosses, macroalgae, vascular plants, root masses	Place a portion of the plant in a sample container with some water. Shake it vigorously and rub it gently to remove algae. Remove plant from sample container.
Large substrates (not removable): boulders, bedrock, logs, trees, roots	Place PVC pipe with a neoprene collar at one end on the substrate so that the collar is sealed against the substrate. Dislodge algae in the pipe with a toothbrush, nail brush, or scraper. Remove algae from pipe with pipette.
Loose sediments: sand, silt, fine particulate organic matter, clay	Invert petri dish over sediments. Trap sediments in petri dish by inserting spatula under dish. Remove sediments from stream and rinse into sampling container. Algal samples from depositional habitats can also be collected with spoons, forceps, or pipette.

4. Place all samples into a single water-tight, unbreakable, wide-mouth container. A composite sample measuring four ounces (ca. 125 ml) is sufficient (Bahls 1993). Add recommended amount of Lugol's (IKI) solution, "M3" fixative, buffered 4% formalin, 2% glutaraldehyde, or other preservative (APHA 1995).

5. Place a permanent label on the outside of the sample container with the following information: waterbody name, location, station number, date, name of collector, and type of preservative. Record this information and relevant ecological information in a field notebook or on the periphyton field data sheet (Appendix A-2, Form 1). Place another label with the same

information inside the sample container. (Caution! Lugol's solution and other iodine-based preservatives will turn paper labels black.)

6. After sampling, review the recorded information on all labels and forms for accuracy and completeness.

7. Examine all brushing and scraping tools for residues. Rub them clean and rinse them in distilled water before sampling the next site and before putting them away.

8. Transport samples back to the laboratory in a cooler with ice (keep them cold and dark) and store preserved samples in the dark until they are processed. Be sure to stow samples in a way so that transport and shifting does not allow samples to leak. When preserved, check preservative every few weeks and replenish as necessary until taxonomic evaluation is completed.

9. Log in all incoming samples (Appendix A-2, Form 2). At a minimum, record sample identification code, date, stream name, sampling location, collector's name, sampling method, and area sampled (if it was determined).

6.1.1.2 Single Habitat Sampling

Variability due to differences in habitat between streams may be reduced by collecting periphyton from a single substrate/habitat combination that characterizes the study reach (Rosen 1995). For comparability of results, the same substrate/habitat combination should be sampled in all reference and test streams. Single habitat sampling should be used when biomass of periphyton will be assessed.

1. Define the sampling reach. The area sampled for single habitat sampling can be smaller than the area used for multihabitat sampling. Valuable results have been achieved in past projects by sampling just one riffle or pool.

2. Before sampling, complete the physical/chemical field sheet (see Chapter 5; Appendix A-1, Form 1) and the periphyton field data sheet (Appendix A-2, Form 1). Complete habitat assessments as in multihabitat sampling so that the relative importance of the habitats sampled can be characterized.

3. The recommended substrate/habitat combination is cobble obtained from riffles and runs with current velocities of 10-50 cm/sec. Samples from this habitat are often easier to analyze than from slow current habitats because they contain less silt. These habitats are common in many

CHLOROPHYLL *a* SUBSAMPLING (OPTIONAL)

1. Chlorophyll *a* subsamples should be taken as soon as possible (< 12 hours after sampling). Generally, if chlorophyll subsamples can not be taken in the lab on the day of collection, subsample in the field.

2. Homogenize samples. In the field, shake vigorously. In the lab, use a tissue homogenizer.

3. Record the initial volume of sample on the periphyton sample log form.

4. Stir the sample on a magnetic stirrer and subsample. When subsampling, take at least two aliquots from the sample for each chlorophyll sample (two aliquots provides a more representative subsample than one). Record the subsample volume for chlorophyll *a* on the periphyton sample log form.

5. Concentrate the chlorophyll subsample on a glass fiber filter (e.g., Whatman® GFC or equivalent).

6. Fold the filter and wrap with aluminum to exclude light.

7. Store the filter in a cold cooler (not in water) and eventually in a freezer.

streams. In low gradient streams where riffles are rare, algae on snags or in depositional habitats can be collected. Shifting sand is not recommended as a targeted substrate because the species composition on sand is limited due to the small size and unstable nature of the substratum. Phytoplankton should be considered as an alternative to periphyton in large, low gradient streams.

4. Collect several subsamples from the same substrate/habitat combination and composite them into a single container. Three or more subsamples should be collected from each reach or study stream.

5. The area sampled should always be determined if biomass (e.g., chlorophyll) per unit area is to be measured.

6. If you plan to assay samples for chlorophyll *a*, do not preserve samples until they have been subsampled (see textbox entitled "Chlorophyll *a* Subsampling").

7. Store, transport, process, and log in samples as in steps 4-9 in section 6.1.1.1.

6.1.2 Field Sampling Procedures: Artificial Substrates

Most monitoring groups prefer sampling natural substrates whenever possible to reduce field time and improve ecological applicability of information. However, periphyton can also be sampled by collecting from artificial substrates that are placed in aquatic habitats and colonized over a period of time. This procedure is particularly useful in non-wadeable streams, rivers with no riffle areas, wetlands, or the littoral zones of lentic habitats. Both natural and artificial substrates are useful in monitoring and assessing waterbody conditions, and have corresponding advantages and disadvantages (Stevenson and Lowe 1986, Aloi 1990). The methods summarized here are a composite of those specified by Kentucky (Kentucky DEP 1993), Florida (Florida DEP 1996), and Oklahoma (Oklahoma CC 1993). Although glass microslides are preferred, a variety of artificial substrates have been used with success (see #2 below and textbox on p 6-6).

1. Microslides should be thoroughly cleaned before placing in periphytometers (e.g., Patrick et al. 1954). Rinse slides in acetone and clean with Kimwipes®.

2. Place surface (floating) or benthic (bottom) periphytometers fitted with glass slides, glass rods, clay tiles, plexiglass plates or similar substrates in the study area. Allow 2 to 4

QUALITY CONTROL (QC) IN THE FIELD

1. Sample labels must be accurately and thoroughly completed, including the sample identification code, date, stream name, sampling location, and collector's name. The outside and any inside labels of the container should contain the same information. Chain of custody and sample log forms must include the same information as the sample container labels. **Caution!** Lugol's solution and iodine-based preservatives will turn paper labels black.

2. After sampling has been completed at a given site, all brushes, suction and scraping devices that have come in contact with the sample should be rubbed clean and rinsed thoroughly in distilled water. The equipment should be examined again prior to use at the next sampling site, and rinsed again if necessary.

3. After sampling, review the recorded information on all labels and forms for accuracy and completeness.

4. Collect and analyze one replicate sample from 10% of the sites to evaluate precision or repeatability of sampling technique, collection team, sample analysis, and taxonomy.

weeks for periphyton recruitment and colonization.

3. Replicate a minimum of 3 periphytometers at each site to account for spatial variability. The total number should depend upon the study design and hypotheses tested. Samples can either be composited or analyzed individually.

4. Attach periphytometers to rebars pounded into the stream bottom or to other stable structures. Periphytometers should be hidden from view to minimize disturbance or vandalism. Avoid the main channel of floatable, recreational streams. Each periphytometer should be oriented with the shield directed upstream.

5. If flooding or a similar scouring event occurs during incubation, allow waterbody to equilibrate and reset periphytometers with clean slides.

6. After the incubation period (2-4 weeks), collect substrates. Remove algae using rubber spatulas, toothbrushes and razor blades. You can tell when all algae have been removed from substrates by a change from smooth, mucilaginous feel (even when no visible algae are present) to a non-slimy or rough texture.

7. Store, transport, process, and log in samples as in steps 4-9 in section 6.1.1.1.

8. One advantage of using artificial substrates is that containers (e.g., whirl-pack bags or sample jars) can be purchased that will hold the substrates so that substrates need not be scraped in the field. Different substrates can be designated for microscopic analysis and chlorophyll assay. Then algae and substrates can be placed in sampling containers and preserved for later processing and microscopic analysis or placed in a cooler on ice for later chlorophyll *a* analysis. Laboratory sample processing is preferred; so if travel and holding time are less than 12 hours, it is not necessary to split samples before returning to the lab.

FIELD EQUIPMENT/SUPPLIES NEEDED FOR PERIPHYTON SAMPLING-- ARTIFICIAL SUBSTRATES

- periphytometer (frame to hold artificial substrata)
- microslides or other suitable substratum (e.g., clay tiles, sanded Plexiglass® plates, or wooden or acrylic dowels)
- sledge hammer and rebars
- toothbrush, razor blade, or other scraping tools
- water bottle with distilled water
- white plastic or enamel pan
- aluminium foil
- sample containers
- sample container labels
- field notebook (waterproof)
- preservative [Lugol's solution, 4% buffered formalin, "M^3" fixative, or 2% glutaraldehyde (APHA 1995)]
- cooler with ice

6.1.3 Assessing Relative Abundances of Algal Taxa: Both "Soft" (Non-Diatom) Algae and Diatoms

The Methods summarized here are a modified version of those used by Kentucky (Kentucky DEP 1993), Florida (Florida DEP 1996), and Montana (Bahls 1993). For more detail or for alternative methods, see Standard Methods for the Examination of Water and Wastewater (APHA 1995).

Many algae are readily identifiable to species level by trained personnel who have a good library of literature on algal taxonomy (see section 6.3). All algae can not be identified to species because: the growth forms of some algal species are morphologically indistinguishable with the light microscope (e.g., zoospores of many green algae); the species has not been described previously; or the species is not in the laboratory's literature. Consistency in identifications within a laboratory and program is very important, because most bioassessment are based on contrasts between reference and test sites. Accuracy of identifications becomes most important when using autecological information from

other studies. Quality assurance techniques are designed to ensure "internal consistency" and also improve comparisons with information in other algal assessment and monitoring programs.

6.1.3.1 "Soft" (Non-Diatom) Algae Relative Abundance and Taxa Richness

1. Homogenize algal samples with a tissue homogenizer or blender.

2. Thoroughly mix the homogenized sample and pipette into a Palmer counting cell (see textbox for alternative methods). Algal suspensions that produce between 10 and 20 cells in a field provide good densities for counting and identifying cells. Lower densities slow counting. Dilute samples if cells overlap too much for counting.

3. Fill in the top portion of the benchsheet for "soft" algae (Appendix A-2, Form 3) with enough information from the sample label and other sources to uniquely identify the sample.

4. Identify and count 300 algal "cell units" to the lowest possible taxonomic level at 400X magnification with the use of the references in Section 6.3.

   - Distinguishing cells of coenocytic algae (e.g., *Vaucheria*) and small filaments of blue-green algae is a problem in cell counts. "Cell units" can be defined for these algae as 10mm sections of the thallus or filament.
   - For diatoms, only count live diatoms and do not identify to lower taxonomic levels if a subsequent count of cleaned diatoms is to be undertaken (See section 6.1.3.2).
   - Record numbers of cells or cell units observed for each taxon on a benchsheet.
   - Make taxonomic notes and drawings on benchsheets of important specimens.

5. Optional - To better determine non-diatom taxa richness, continue counting until you have not observed any new taxa for 100 cell units or about three minutes of observation.

6.1.3.2 Diatom Relative Abundances and Taxa Richness

1. Subsample at least 5-10 mL of concentrated preserved sample while vigorously shaking the sample (or using magnetic stirrer). Oxidize (clean) samples for diatom analysis (APHA 1995, see textbox entitled "Oxidation Methods for Cleaning Diatoms").

2. Mount diatoms in Naphrax® or another high refractive index medium to make permanent slides. Label slides with same information as on the sample container label.

3. Fill in the top portion of the bench sheet for diatom counts (Appendix A-2, Form 4) with enough information from the sample label to uniquely identify the sample.

4. Identify and count diatom valves to the lowest possible taxonomic level, which should be species and perhaps variety level, under oil immersion at 1000X magnification with the use of the references in Section 6.3. At minimum, count 600 valves (300 cells) and at least until 10 valves of 10 species have been observed. Be careful to distinguish and count both valves of intact frustules. The 10 valves of 10 species rule ensures relatively precise estimates of relative abundances of the dominant taxa when one or two taxa are highly dominant. Six hundred valve counts were chosen to conform with methods used in other national bioassessment programs (Porter et al. 1993). Record numbers of valves observed for each taxon on the bench sheet. Make taxonomic notes and drawings on benchsheets and record stage coordinates of important specimens.

5. Optional - To estimate total diatom taxa richness, continue counting until you have not observed any new species for 100 specimens or about three minutes of observation.

6.1.3.3 Calculating Species Relative Abundances and Taxa Richness

1. Relative abundances of "soft" algae are determined by dividing the number of cells (cell units) counted for each taxon by the total number of cells counted (e.g., 300). Enter this information on Appendix A-2, Form 3.

2. Relative abundances of diatoms have to be corrected for the number of live diatoms observed in the count of all algae. Therefore, determine the relative abundances of diatom species in the algal assemblage by dividing the number of valves counted for each species by the total number of valves counted (e.g., 600); then multiply the relative abundance of each diatom taxon in the diatom count by the relative abundance of live diatoms in the count of all algae. Enter this information on Appendix A-2, Form 4. Some analysts prefer to treat diatom and soft algal species composition separately. In this case, determine the relative abundances of diatom species in the algal assemblage by dividing the number of valves counted for each species by the total number of valves counted (e.g., 600).

3. Total taxa richness can be estimated by adding the number of "soft" algal taxa and diatom taxa.

6.1.3.4 Alternative Preparation Techniques

Palmer counting cells are excellent for identifying and counting soft-algae in most species assemblages. When samples have many very small blue-green algae or a few, relatively important large cells, other slide preparation techniques may be useful to increase magnification and sample size, respectively. Because accurate diatom identification is not possible in Palmer cells, we have recommended counting cleaned diatoms in special mounts. However, if the taxonomy of algae in samples is well known, preparation and counting time can be reduced by mounting algae in syrup. In syrup, both soft algae and diatoms can be identified, but resolution of morphological details of diatoms is not as great as in mounts of diatoms in resins (e.g., Naphrax®).

Assemblages with many small cells: We recommend a simple wet mount procedure when samples contain many small algae so samples can be observed at 1000X. A small volume of water under the coverglass prevents movement of cells when adjusting focus and using oil immersion. These preparations usually last several days if properly sealed (see below).

Wet mounts:

1. Clean coverglasses and place on flat surface.

2. Pipette 1.0 mL of algal suspension onto the coverglass.

3. Dry the algal suspension on the coverglass. For convenience, the evaporation of water can be increased on a slide-warmer or slowed by drying the sample in a vapor chamber (as simple as a cake pan or aluminum foil hood placed over samples).

4. As soon as the algal suspension dries, invert the coverglass into the 0.02 mL of distilled water on a microscope slide.

5. Seal the water under the microscope slide with fingernail polish or polyurethane varnish.

Assemblages with a few large cells: Sedgewick-Rafter counting chambers, which are large modified microscope slides with 1.0 mL wells, increase sample size. Counts in Sedgewick-Rafter counting cells should be done after counts in Palmer cells or wet mounts so that the relation between sample proportions with the two methods can be determined. While keeping track of the proportion of sample observed, identify and count large algae in transects at 200X or 100X magnification in the counting cell.

Syrup mounts:

1. Prepare Taft's syrup medium (TSM) by mixing 30 mL of clear corn syrup (e.g., Karo's® Corn Syrup) with 7 mL of formaldehyde and 63 mL of distilled water. Dilute a 10 mL proportion of this 100% TSM with 90 mL of distilled water to make 10% TSM.

2. Place 0.2 mL of 10% TSM on coverglass.

3. Place 1.0 mL of algal suspension on coverglass. Consider using several dilutions.

4. Let dry for 24 hours. Alternatively, dry on slide warmer on low setting. Do not overdry or cells will plasmolyze.

5. Place another ≈ 1.0 mL of 10% TSM on cover glass and dry (overnight or 4 hours on a slide warmer). Apply 10% TSM quickly to avoid patchy resuspension of the original layer of TSM and algae.

6. Invert coverglass onto microscope slide; place slide on hot plate to warm the slide and syrup. Do not boil, just warm. Press coverglass gently in place

OXIDATION (CLEANING) METHODS FOR DIATOMS

Concentrated Acid Oxidation:

1. Place a 5-10 mL subsample of preserved algal sample in a beaker.

2. Under a fume hood, add enough concentrated nitric or sulfuric acid to produce a strong exothermic reaction. Usually equal parts of sample and acid will produce such a reaction.
(Caution! With some preservatives and samples from hard water, adding concentrated acid will produce a violent exothermic reaction. Use a fume hood, safety glasses, and protective clothing. Separate the sample beakers by a few inches to prevent cross-contamination of samples in the event of overflow.)

3. Allow the sample to oxidize overnight.

4. Fill the beaker with distilled water.

5. Wait 1 hour for each centimeter of water depth in the beaker.

6. Siphon off the supernatant and refill the beaker with distilled water. Siphon from the center of the water column to avoid siphoning light algae that have adsorbed onto the sides and surface of the water column.

7. Repeat steps 4 through 6 until all color is removed and the sample becomes clear or has a circumneutral pH.

Hydrogen Peroxide/Potassium Dichromate Oxidation:

1. Prepare samples as in step 1 above, but use 50% H_2O_2 instead of concentrated acid.

2. Allow the sample to oxidize overnight, then add a microspatula of potassium dichromate.
(Caution! This will cause a violent exothermic reaction. Use a fume hood, safety glasses, and protective clothing. Separate the sample beakers by a few inches to prevent cross-contamination in the event of overflow.)

3. When the sample color changes from purple to yellow and boiling stops, fill the beaker with distilled water.

4. Wait 4 hours, siphon off the supernatant, and refill the beaker with distilled water. Siphon from the center of the water column to avoid siphoning light algae that have adsorbed onto the sides and surface of the water column.

5. Repeat step 4 until all color is removed and the sample becomes clear.

with forceps, being careful to keep all syrup under the coverglass. The syrup should spread under coverglass.

7. Remove the slide from the hotplate. Cooling should partially seal the coverglass to the slide.

8. More permanently seal the syrup under slides by painting fingernail polish around the edge of the cover glass and onto the microscope slide.

Note: Preserve color of chloroplasts by keeping samples in dark.

Special Note: If slides get too warm in storage, syrup will loose viscosity and become runny. Algae and medium may then escape containment under coverglass. Store slides in a horizontal position.

6.1.4 Metrics Based on Species Composition

The periphyton metrics presented here are used by several states and environmental assessment programs throughout the US and Europe (e.g., Kentucky DEP 1993, Bahls 1993, Florida DEP 1996, Whitton et al. 1991, Whitton and Kelly 1995). Each of these metrics should be tested for response to human alterations of streams in the region in which they are used (see Chapter 9, Biological Data Analysis). In many cases, diatom and soft algal metrics have been determined separately because changes in small abundant cyanobacteria (blue-green algae) can numerically overwhelm metrics based on relative abundance and because green algae with large cells (e.g., *Cladophora*) may not have appropriate weight. However, attempts should be made to integrate diatoms and soft algae in as many metrics as possible, especially in cases such as species and generic richness when great variability in relative abundance is not an issue.

Many metrics can be calculated based on presence/absence data or on relative abundances of taxa. For example, percent Pollution Tolerant Diatoms can be calculated as the sum of relative abundances of pollution tolerant taxa in an assemblage or as the number of species that are tolerant to pollution in an assemblage. Percent

COSTS AND BENEFITS OF SIMPLER ANALYSES

- We recommend that all algae (soft and diatom) be identified and counted. Information may be lost if soft algae are not identified and counted because some impacts may selectively affect soft algae. Most of the species (and thus information) in a sample will be diatoms. Costs of both analyses are not that great.

- Costs can be reduced by only counting diatoms or soft algae. Since diatoms are usually the most species-rich group of algae in samples and most metrics are based on differences in taxonomic composition, we recommend that diatoms be counted. In addition, permanently preserved and readily archived microslides of diatoms can serve as a historic reference of ecological conditions.

- In general, identifying algae to species is recommended for two reasons: (1) to better characterize differences between assemblages that may occur at the species level and (2) because large differences in ecological preferences do exist among algal species within the same genus.

- However, substantial information can be gained by identifying algae just to the genus level. Whereas identifying algae only to genus may loose valuable ecological information, costs of analyses can be reduced, especially for inexperienced analysts.

- If implementing a new program and only an inexperienced analyst is available for the job, identifying diatom genera in assemblages can provide valuable characterizations of biotic integrity and environmental conditions.

- As analysts get more experience counting, the taxonomic level of their analyses should improve. The cost of an experienced analyst counting and identifying algae to species is not much greater than analysis to genus.

community similarity can be calculated as presented below, which quantifies the percent of organisms in two assemblages that are the same. Alternatively, it can be calculated as the percent of species that are the same by making all relative abundances greater than 0 equal to 1. The following metrics can also be calculated with presence/absence data instead of species relative abundances: % sensitive taxa, % motile taxa, % acidobiontic, % alkalibiontic, % halobiontic, % saprobiontic, % eutrophic, simple autecological indices, and change in inferred ecological conditions. Although we may find that metrics based on species relative abundances are more sensitive to environmental change, metrics based on presence/absence data may be more appropriate when developing metrics with multihabitat samples and proportional sampling of habitats is difficult. In the latter case, presence/absence of species should remain the same, even if relative abundance of taxa differs with biases in multihabitat sampling.

The metrics have been divided into two groups which may be helpful in developing an Index of Biotic Integrity (IBI). Metrics in the first group are less diagnostic than the second group of metrics. Metrics in the first group (species and generic richness, Shannon diversity, etc.) generally characterize biotic integrity ("natural balance in flora and fauna...." as in Karr and Dudley 1981) without specifically diagnosing ecological conditions and causes of impairment. The second group of metrics more specifically diagnoses causes of impaired biotic integrity. Metrics from both groups could be included in an IBI to make a hierarchically diagnostic IBI. Alternatively, an IBI could be constructed from only metrics of biotic integrity so that inference of biotic integrity and diagnosis of impairment are independent (Stevenson and Pan 1999).

Autecological information about many algal species and genera has been reported in the literature. This information comes in several forms. In some cases, qualitative descriptions of the ecological conditions in which species were observed were reported in early studies of diatoms. Following the development of the saprobic index by Kolkwitz and Marsson (1908), several categorical classification systems (e.g., halobian spectrum, pH spectrum) were developed to describe the ecological preferences and tolerances of species (see Lowe 1974 for a review). Most recently, the ecological optima and tolerances of species for specific environmental conditions have been quantified by using weighted average regression approaches (see ter Braak and van Dam 1989 for a review). We have compiled a list of references for this information in Section 6.4. These references will be valuable for developing many of the metrics below.

Metrics of Biotic Integrity

1. **Species richness** is an estimate of the number of algal species (diatoms, soft algae, or both) in a sample. High species richness is assumed to indicate high biotic integrity because many species are adapted to the conditions present in the habitat. Species richness is predicted to decrease with increasing pollution because many species are stressed. However, many habitats may be naturally stressed by low nutrients, low light, or other factors. Slight increases in nutrient enrichment can increase species richness in headwater and naturally unproductive, nutrient-poor streams (Bahls et al. 1992).

2. **Total Number of Genera** (Generic richness) should be highest in reference sites and lowest in impacted sites where sensitive genera become stressed. Total number of genera (diatoms, soft algae, or both) may provide a more robust measure of diversity than species richness, because numerous closely related species are within some genera and may artificially inflate richness estimates.

3. **Total Number of Divisions** represented by all taxa should be highest in sites with good water quality and high biotic integrity.

4. **Shannon Diversity (for diatoms).** The Shannon Index is a function of both the number of species in a sample and the distribution of individuals among those species (Klemm et al. 1990). Because species richness and evenness may vary independently and complexly with water pollution. Stevenson (1984) suggests that changes in species diversity, rather than the diversity value, may be useful indicators of changes in water quality. Species diversity, despite the controversy surrounding it, has historically been used with success as an indicator of organic (sewage) pollution (Wilhm and Dorris 1968, Weber 1973, Cooper and Wilhm 1975). Bahls et al. (1992) uses Shannon diversity because of its sensitivity to water quality changes. Under certain conditions Shannon diversity values may underestimate water quality e.g., when total number of taxa is less than 10. Assessments for low richness samples can be improved by comparing the assemblage Shannon Diversity to the Maximum Shannon Diversity value (David Beeson[1], personal communication).

5. **Percent Community Similarity (PS_c) of Diatoms.** The percent community similarity (PS_c) index, discussed by Whittaker (1952), was used by Whittaker and Fairbanks (1958) to compare planktonic copepod communities. It was chosen for use in algal bioassessment because it shows community similarities based on relative abundances, and in doing so, gives more weight to dominant taxa than rare ones. Percent similarity can be used to compare control and test sites, or average community of a group of control or reference sites with a test site. Percent community similarity values range from 0 (no similarity) to 100%.

The formula for calculating percent community similarity is:

$$PS_c = 100 - .5\Sigma_{i=1}^{s}|a_i - b_i| = \Sigma_{i=1}^{s}\min(a_i, b_i)$$

where:

a_i = percentage of species i in sample A
b_i = percentage of species i in sample B

6. **Pollution Tolerance Index for Diatoms.** The pollution tolerance index (PTI) for algae resembles the Hilsenhoff biotic index for macroinvertebrates (Hilsenhoff 1987). Lange-Bertalot (1979) distinguishes three categories of diatoms according to their tolerance to increased pollution, with species assigned a value of 1 for most tolerant taxa (e.g., *Nitzschia palea* or *Gomphonema parvulum*) to 3 for relatively sensitive species. Relative tolerance for taxa can be found in Lange-Bertalot (1979) and in many of the references listed in section 6.4. Thus, Lange-Bertalot's PTI varies from 1 for most polluted to 3 for least polluted waters when using the following equation:

$$PTI = \frac{\Sigma n_i t_i}{N}$$

where:

n_i = number of cells counted for species i
t_i = tolerance value of species i
N = total number of cells counted

[1]David Beeson is a phycologist with Schafer & Associates, Inc.

In some cases, the range of values for tolerances has been increased, thereby producing a corresponding increase in the range of PTI values.

7. **Percent Sensitive Diatoms.** The percent sensitive diatoms metric is the sum of the relative abundances of all intolerant species. This metric is especially important in smaller-order streams where primary productivity may be naturally low, causing many other metrics to underestimate water quality.

8. **Percent *Achnanthes minutissima*.** This species is a cosmopolitan diatom that has a very broad ecological amplitude. It is an attached diatom and often the first species to pioneer a recently scoured site, sometimes to the exclusion of all other algae. *A. minutissima* is also frequently dominant in streams subjected to acid mine drainage (e.g., Silver Bow Creek, Montana) and to other chemical insults. The percent abundance of *A. minutissima* has been found to be directly proportional to the time that has elapsed since the last scouring flow or episode of toxic pollution. For use in bioassessment, the quartiles of this metric from a population of sites has been used to establish judgment criteria, e.g., 0-25% = no disturbance, 25-50% = minor disturbance, 50-75% = moderate disturbance, and 75-100% = severe disturbance. Least-impaired streams in Montana may contain up to 50% *A. minutissima* (Bahls, unpublished data).

9. **Percent live diatoms** was proposed by Hill (1997) as a metric to indicate the health of the diatom assemblage. Low percent live diatoms could be due to heavy sedimentation and/or relatively old algal assemblages with high algal biomass on substrates.

Diagnostic Metrics that Infer Ecological Conditions

The ecological preferences of many diatoms and other algae have been recorded in the literature. Using relative abundances of algal species in the sample and their preferences for specific habitat conditions, metrics can be calculated to indicate the environment stressors in a habitat. These metrics can more specifically infer environmental stressors than the general pollution tolerance index.

10. **Percent Aberrant Diatoms** is the percent of diatoms in a sample that have anomalies in striae patterns or frustule shape (e.g, long cells that are bent or cells with indentations). This metric has been positively correlated to heavy metal contamination in streams (McFarland et al. 1997).

11. **Percent Motile Diatoms.** The percent motile diatoms is a siltation index, expressed as the relative abundance of *Navicula* + *Nitzschia* + *Surirella*. It has shown promise in Montana (Bahls et al. 1992). The three genera are able to crawl towards the surface if they are covered by silt; their abundance is thought to reflect the amount and frequency of siltation. Relative abundances of Gyrosigma, Cylindrotheca, and other motile diatoms may also be added to this metric.

12. **Simple Diagnostic Metrics** can infer the environmental stressor based on the autecology of individual species in the habitats. For example, if acid mine drainage was impairing stream conditions, then we would expect to find more acidobiontic taxa in samples. Calculate a simple diagnostic metric as the sum of the percent relative abundances (range 0-100%) of species that have environmental optima in extreme environmental conditions. For example (see Table 6-2):

% acidobiontic + % acidophilic
% alkalibiontic + % alkaliphilic
% halophilic
% mesosaprobic + % oligosaprobic + % saprophilic
% eutrophic

13. **Inferred Ecological Conditions with Simple Autecological Indices (SAI)** - The ecological preferences for diatoms are commonly recorded in the literature. Using the standard ecological categories compiled by Lowe (1974, Table 6-2), the ecological preferences for different diatom species can be characterized along an environmental (stressor) gradient. For example, pH preferences for many taxa are known. These preferences (Θ_i) can be ranked from 1-5 (e.g., acidobiontic, acidophilic, indifferent, alkaliphilic, alkalibiontic, Table 6-2) and can be used in the following equation to infer environmental conditions (EC) and effect on the periphyton assemblage.

$$SAI_{EC} = \Sigma\, \Theta_i p_i$$

14. **Inferred Ecological Conditions with Weighted Average Indices** are based on the specific ecological optima (β_i) for algae, which are being reported more and more commonly in recent publications (see Pan and Stevenson 1996). Caution should be exercised, because we do not know how transferable these optima are among regions and habitats. Using the following equation, the ecological conditions (EC) in a habitat can be inferred more accurately by using the optimum environmental conditions (β_i) and relative abundances (ρ_i) for taxa in the habitat (ter Braak and van Dam 1989, Pan et al., 1996) than if only the ecological categorization were used (as above for the SAI). Optimum environmental conditions are those in which the highest relative abundances of a taxon are observed. These can be determined from the literature or from past surveys of taxa and environmental conditions in the study area (see ter Braak and van Dam 1989). In a pH example, the specific pH in a habitat can be inferred if we know the pH optima (H_i) of taxa in the habitat, and use the following general equation:

$$WAI_{EC} = \Sigma \beta_i p_i$$

and modify for inferring pH:

$$WAI_{pH} = \Sigma\, H_i p_i$$

15. **Impairment of Ecological Conditions** can be inferred with algal assemblages by calculating the deviation (Δ_{EC}) between inferred environmental conditions at a test site and at a reference site.

Compare inferred ecological conditions at the test site to the expected ecological conditions (EC_{ex}) of regional reference sites by using either simple autecological indices (SAI_{EC}) or weighted average indices (WAI_{EC}):

$$\Delta_{EC} = |SAI_{EC} - EC_{ex}|$$

$$\Delta_{EC} = |WAI_{EC} - EC_{ex}|$$

Table 6-2. Environmental definitions of autecological classification systems for algae (as modified or referenced by Lowe 1974). Definitions for classes are given if no subclass is indicated.

Classification System/ Ecological Parameter	Class	Subclass	Conditions of Highest Relative Abundances
pH Spectrum	Acidobiontic		Below 5.5 pH
	Acidophilic		Above 5.5 and below 7 pH
	Indifferent		Around 7 pH
	Alakaliphilic		Above 7 and below 8.5 pH
	Alkalibiontic		Above 8.5 pH
Nutrient Spectrum - based on P and N concentrations	Eutrophic		High nutrient conditions
	Mesotrophic		Moderate nutrient conditions
	Oligotrophic		Low nutrient conditions
	Dystrophic		High humic (DOC) conditions
Halobion Spectrum - based on chloride concentrations or conductivity	Polyhalobous		Salt concentrations > 40,000 mg/L
	Euhalobous		Marine forms: 30,000-40,000 mg/L
	Mesohalobous	Alpha range	Brackish water forms: 10,000-30,000 mg/L
	Mesohalobous	Beta range	Brackish water forms: 500-10,000 mg/L
	Oligohalobous	Halophilous	Freshwater - stimulated by some salt
	Oligohalobous	Indifferent	Freshwater - tolerates some salt
	Oligohalobous	Halophobic	Freshwater - does not tolerate small amounts of salt
Saprobien System - based on organic pollution	Polysaprobic		Characteristic of zone of degradation and putrefication, oxygen usually absent or low in concentration
	Mesosaprobic	Alpha range	Zone of organic load oxidation — N as amino acids
		Beta range	Zone of organic load oxidation — N as ammonia
	Oligosaprobic		Zone in which oxidation of organics complete, but high nutrient concentrations persist
	Saprophilic		Usually in polluted waters, but also in clean waters
	Saproxenous		Usually in clean waters, but also found in polluted waters
	Saprophobic		Only found in unpolluted waters

6.1.5 Determining Periphyton Biomass

Measurement of periphyton biomass is common in many studies and may be especially important in studies that address nutrient enrichment or toxicity. In many cases, however, sampling benthic algae misses peak biomass, which may best indicate nutrient problems and potential for nuisance algal growths (Biggs 1996, Stevenson 1996).

Biomass measurements can be made with samples collected from natural or artificial substrates. To quantify algal biomass (chl *a*, ash-free dry mass, cell density, biovolume cm^{-2}), the area of the substrate sampled must be determined. Two national stream assessment programs sample and assess area-specific cell density and biovolume (USGS-NAWQA, Porter et al. 1993; and EMAP, Klemm and Lazorchak 1994). These programs estimate algal biomass in habitats and reaches by collecting composite samples separately from riffle and pool habitats.

Periphyton biomass can be estimated with chl *a*, ash-free dry mass (AFDM), cell densities, and biovolume, usually per cm^2 (Stevenson 1996). Each of these measures estimates a different component of periphyton biomass (see Stevenson 1996 for discussion).

LABORATORY EQUIPMENT FOR PERIPHYTON ANALYSIS

- compound microscope with 10X or 15X oculars and 20X, 40X and 100X (oil) objectives
- tally counter (for species proportional count)
- microscope slides and coverglasses
- immersion oil, lens paper and absorbent tissues
- tissue homogenizer or blender
- magnetic stirrer and stir bar
- forceps
- hot plate
- fume hood
- squeeze bottle with distilled water
- oxidation reagents (HNO_3, H_2SO_4, $K_2Cr_2O_7$, H_2O_2)
- 200-500 ml beakers
- safety glasses and protective clothing
- drying oven for AFDM
- muffle furnace for AFDM
- aluminum weighing pans for AFDM
- spectrophotometer or fluorometer for chl *a*
- centrifuge for chl *a*
- graduated test tubes for chl *a*
- acetone for chl *a*
- $MgCO_3$ for chl *a*

6.1.5.1 Chlorophyll *a*

Chlorophyll *a* ranges from 0.5 to 2% of total algal biomass (APHA 1995), and this ratio varies with taxonomy, light, and nutrients. A detailed description of chlorophyll *a* analysis is beyond the scope of this chapter. Standard methods (APHA 1995, USEPA 1992) are readily available. The analysis is relatively simple and involves:

1. extracting chlorophyll *a* in acetone;
2. measuring chlorophyll concentration in the extract with a spectrophotometer or fluorometer; and
3. calculating chlorophyll density on substrates by determining the proportion of original sample that was assessed for chlorophyll.

6.1.5.2 Ash-Free Dry Mass

Ash-free dry mass is a measurement of the organic matter in samples, and includes biomass of bacteria, fungi, small fauna, and detritus in samples. A detailed description of analysis is beyond the scope of this chapter, but standard methods (APHA 1995, USEPA 1995) are readily available. The analysis is relatively simple and measures the difference in mass of a sample after drying and after incinerating organic matter in the sample. We recommend using AFDM versus dry mass to measure periphyton biomass because silt can account for a substantial proportion of dry mass in some samples. Ash mass in samples can be used to infer the amount of silt or other inorganic matter in samples.

6.1.5.3 Area-Specific Cell Densities and Biovolumes

Cell densities (cells cm^{-2}) are determined by dividing the numbers of cells counted by the proportion of sample counted and the area from which samples were collected. Cell biovolumes (mm^3 biovolume cm^{-2}) are determined by summing the products of cell density and biovolume of each

species counted (see Lowe and Pan 1996) and dividing that sum by the proportion of sample counted and the area from which samples were collected.

6.1.5.4 Biomass Metrics

High algal biomass can indicate eutrophication, but high algal biomass can also accumulate in less productive habitats after long periods of stable flow. Low algal biomass may be due to toxic conditions, but could be due to a recent storm event and spate or naturally heavy grazing. Thus, interpretation of biomass results is ambiguous and is the reason that major emphasis has not been placed on quantifying algal biomass for RBP. However, nuisance levels of algal biomass (e.g., > 10 μg chl *a* cm^{-2}, > 5 mg AFDM cm^{-2}, > 40% cover by macroalgae; see review by Biggs 1996) do indicate nutrient or organic enrichment. If repeated measurements of biomass can be made, then the mean and maximum benthic chl *a* could be used to define trophic status of streams. Dodds et al. (1998) have proposed guidelines in which the oligotrophic-mesotrophic boundary is a mean benthic chl *a* of 2 μg cm^{-2} or a maximum benthic chl *a* of 7 μg cm^{-2} and the mesotrophic-eutrophic boundary is a mean of 6 μg chl *a* cm^{-2} and a maximum of 20 μg chl *a* cm^{-2}.

QUALITY CONTROL IN THE LABORATORY

1. Upon delivery of samples to the laboratory, complete entries on periphyton sample log-in forms (Appendix 2, Form 2).
2. Maintain a voucher collection of all samples and diatom slides. They should be accurately and completely labeled, preserved, and stored in the laboratory for future reference. Specimens on diatom slides should be clearly circled with a diamond or ink marker to facilitate location. A record of the voucher specimens should be maintained. Photographs of specimens improve "in-house" QA.
3. For every QA/QC sample (replicate sample in every 10th stream), assess relative abundances and taxa richness in replicate wet mounts and a replicate diatom slide to assess variation in metrics due to variability in sampling within reaches (habitats), sample preparation, and analytical variability.
4. QA/QC samples should be counted by another taxonomist to assess taxonomic precision and bias, if possible.
5. Common algal taxa should be the same for the two wet mount replicates. The percent community similarity index (Whittaker 1952) (see Section 6.5.1) calculated from proportional counts of the two replicate diatom slides should exceed 75%.
6. If it is not possible to get another taxonomist in the lab to QA/QC samples, an outside taxonomist should be consulted on a periodic basis to spot-check and verify taxonomic identifications in wet mounts and diatom slides. All common genera in the wet mount and all major species on the diatom slide (>3% relative abundance) should be identified similarly by both analysts (synonyms are acceptable). Any differences in identification should be reconciled and bench sheets should be corrected.
7. A library of basic taxonomic literature is an essential aid in the identification of algae and should be maintained and updated as needed in the laboratory (see taxonomic references for periphyton in Section 6.5). Taxonomists should participate in periodic training to ensure accurate identifications

6.2 FIELD-BASED RAPID PERIPHYTON SURVEY

Semi-quantitative assessments of benthic algal biomass and taxonomic composition can be made rapidly with a viewing bucket marked with a grid and a biomass scoring system. The advantage of using this technique is that it enables rapid assessment of algal biomass over larger spatial scales than substrate sampling and laboratory analysis. Coarse-level taxonomic characterization of communities is also possible with this technique. This technique is a survey of the natural substrate and requires no laboratory

processing, but hand picked samples can be returned to the laboratory to quickly verify identification. It is a technique developed by Stevenson and Rier[2].

1. Fill in top of Rapid Periphyton Survey (RPS) Field Sheet, Appendix A-2, Form 5.

2. Establish at least 3 transects across the habitat being sampled (preferably riffles or runs in the reach in which benthic algal accumulation is readily observed and characterized).

3. Select 3 locations along each transect (e.g., stratified random locations on right, middle, and left bank).

4. Characterize algae in each selected location by immersing the bucket with 50-dot grid (7 x 7 + 1) in the water.
   - First, characterize macroalgal biomass.
     - Observe the bottom of the stream through the bottom of the viewing bucket and count the number of dots that occur over macroalgae (e.g., Cladophora or Spirogyra) under which substrates cannot be seen. Record that number and the kind of macroalgae under the dots on RPS field sheet.
     - Measure and record the maximum length of the macroalgae.
     - If two or more types of macroalgae are present, count the dots, measure, and record information for each type of macroalgae separately.
   - Second, characterize microalgal cover.
     - While viewing the same area, record the number of dots under which substrata occur that are suitable size for microalgal accumulation (gravel > 2 cm in size).
     - Determine the kind (usually diatoms and blue-green algae) and estimate the thickness (density) of microalgae under each dot using the following thickness scale:
       0 - substrate rough with no visual evidence of microalgae
       0.5 - substrate slimy, but no visual accumulation of microalgae is evident
       1 - a thin layer of microalgae is visually evident
       2 - accumulation of microalgal layer from 0.5-1 mm thick is evident
       3 - accumulation of microalgae layer from 1 mm to 5 mm thick is evident
       4 - accumulation of microalgal layer from 5 mm to 2 cm thick is evident
       5 - accumulation of microalgal layer greater than 2 cm thick is evident
       Mat thickness can be measured with a ruler.
     - Record the number of dots that are over each of the specific thickness ranks separately for diatoms, blue-green algae, or other microalgae.

5. Statistically characterize density of algae on substrate by determining:
   - total number of grid points (dots) evaluated at the site (D_t);
   - number of grid points (dots) over macroalgae (D_m)

FIELD EQUIPMENT FOR RAPID PERIPHYTON SURVEY

- viewing bucket with 50-dot grid [Make the viewing bucket by cutting a hole in bottom of large (≥0.5 m diameter) plastic bucket, but leave a small ridge around the edge. Attach a piece of clear acrylic sheet to the bottom of the bucket with small screws and silicon caulk. The latter makes water tight seal so that no water enters the bucket when it is partially submerged. Periphyton can be clearly viewed by looking down through the bucket when it is partially submerged in the stream. Mark 50 dots in a 7 x 7 grid on the top surface of the acrylic sheet with a waterproof black marker. Add another dot outside the 7 x 7 grid to make the 50 dot grid.]
- meter stick
- pencil
- Rapid Periphyton Survey Field Sheet

[2] S.T. Rier is a graduate student at the University of Louisville.

- total number of grid points (dots) over suitable substrate for microalgae at the site (d_t);
- number of grid points over microalga of different thickness ranks for each type of microalga (d_i);
- average percent cover of the habitat by each type of macroalgae (i.e., 100X D_m/D_t);
- maximum length of each type of macroalgae;
- mean density (i.e., thickness rank) of each type of macroalgae on suitable substrate (i.e., $\Sigma d_i r_i/d_t$); maximum density of each type of microalgae on suitable substrate.

6. QA/QC between observers and calibration between algal biomass (chl *a*, AFDM, cell density and biovolume cm^{-2} and taxonomic composition) can be developed by collecting samples that have specific microalgal rankings and assaying the periphyton.

6.3 TAXONOMIC REFERENCES FOR PERIPHYTON

A great wealth of taxonomic literature is available for algae. Below is a subset of that literature. It is a list of taxonomic references that are useful for most of the United States and are either in English, are important because no English treatment of the group is adequate, or are valuable for the good illustrations.

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7 BENTHIC MACROINVERTEBRATE PROTOCOLS

Rapid bioassessment using the benthic macroinvertebrate assemblage has been the most popular set of protocols among the state water resource agencies since 1989 (Southerland and Stribling 1995). Most of the development of benthic Rapid Bioassessment Protocols (RBPs) has been oriented toward RBP III (described in Plafkin et al. 1989). As states have focused attention on regional specificity, which has included a wide variety of physical characteristics of streams, the methodology of conducting stream surveys of the benthic assemblage has advanced. Some states have preferred to retain more traditional methods such as the Surber or Hess samplers (e.g., Wyoming Department of Environmental Quality [DEQ]) over the kick net in cobble substrate. Other agencies have developed techniques for streams lacking cobble substrate, such as those streams in coastal plains. State water resource agencies composing the Mid-Atlantic Coastal Streams (MACS) Workgroup, i.e., New Jersey Department of Environmental Protection (DEP), Delaware Department of Natural Resources and Environmental Control (DNREC), Maryland Department of Natural Resources (DNR) and Maryland Department of the Environment (MDE), Virginia DEQ, North Carolina Department of Environmental Management (DEM), and South Carolina Department of Health and Environmental Control (DHEC), and a workgroup within the Florida Department of Environmental Protection (DEP) were pioneers in this effort. These 2 groups (MACS and FLDEP) developed a multihabitat sampling procedure using a D-frame dip net. Testing of this procedure by these 2 groups indicates that this technique is scientifically valid for low-gradient streams. Research conducted by the U.S. Environmental Protection Agency (USEPA) for their Environmental Monitoring and Assessment Program (EMAP) program and the United States Geological Survey (USGS) for their National Water

STANDARD BENTHIC MACROINVERTEBRATE SAMPLING GEAR TYPES FOR STREAMS
(assumes standard mesh size of 500 μ nytex screen)

- **Kick net:** Dimensions of net are 1 meter (m) x 1 m attached to 2 poles and functions similarly to a fish kick seine. Is most efficient for sampling cobble substrate (i.e., riffles and runs) where velocity of water will transport dislodged organisms into net. Designed to sample 1 m^2 of substrate at a time and can be used in any depth from a few centimeters to just below 1m (Note -- Depths of 1m or greater will be difficult to sample with any gear).

- **D-frame dip net:** Dimensions of frame are 0.3 m width and 0.3 m height and shaped as a "D" where frame attaches to long pole. Net is cone or bag-shaped for capture of organisms. Can be used in a variety of habitat types and used as a kick net, or for "jabbing", "dipping", or "sweeping".

- **Rectangular dip net:** Dimensions of frame are 0.5 m width and 0.3 m height and attached to a long pole. Net is cone or bag-shaped. Sampling is conducted similarly to the D-frame.

- **Surber:** Dimensions of frame are 0.3 m x 0.3 m, which is horizontally placed on cobble substrate to delineate a 0.09 m^2 area. A vertical section of the frame has the net attached and captures the dislodged organisms from the sampling area. Is restricted to depths of less than 0.3 m.

- **Hess:** Dimensions of frame are a metal cylinder approximately 0.5 m in diameter and samples an area 0.8 m^2. Is an advanced design of the Surber and is intended to prevent escape of organisms and contamination from drift. Is restricted to depths of less than 0.5 m.

Quality Assessment Program (NAWQA) program have indicated that the rectangular dip net is a reasonable compromise between the traditional Surber or Hess samplers and the RBP kick net described the original RBPs.

From the testing and implementation efforts that have been conducted around the country since 1989, refinements have been made to the procedures while maintaining the original concept of the RBPs. Two separate procedures that are oriented toward a "single, most productive" habitat and a multihabitat approach represent the most rigorous benthic RBP and are essentially a replacement of the original RBP III. The primary differences between the original RBP II and III are the decision on field versus lab sorting and level of taxonomy. These differences are not considered sufficient reasons to warrant separate protocols. In addition, a third protocol has been developed as a more standardized biological reconnaissance or screening and replaces RBP I of the original document.

Kicknet

D-frame Dipnet

Rectangular Dipnet

Hess sampler

(Mary Kay Corazalla, Univ. of Minnesota)

7.1 SINGLE HABITAT APPROACH: 1 METER KICK NET

The original RBPs (Plafkin et al. 1989) emphasized the sampling of a single habitat, in particular riffles or runs, as a means to standardize assessments among streams having those habitats. This approach is still valid, because macroinvertebrate diversity and abundance are usually highest in cobble substrate (riffle/run) habitats. Where cobble substrate is the predominant habitat, this sampling approach provides a representative sample of the stream reach. However, some streams naturally lack the cobble substrate. In cases where the cobble substrate represents less than 30% of the sampling reach in reference streams (i.e., those streams that are representative of the region), alternate habitat(s) will need to be sampled (See Section 7.2). The appropriate sampling method should be selected based on the habitat availability of the reference condition and not of potentially impaired streams. For example, methods would not be altered for situations where the extent of cobble substrate in streams influenced by heavy sediment deposition may be substantially reduced from the amount of cobble substrate expected for the region.

7.1.1 Field Sampling Procedures for Single Habitat

1. A 100 m reach representative of the characteristics of the stream should be selected. Whenever possible, the area should be at least 100 meters upstream from any road or bridge crossing to minimize its effect on stream velocity, depth, and overall habitat quality. There should be no major tributaries discharging to the stream in the study area.

FIELD EQUIPMENT/SUPPLIES NEEDED FOR BENTHIC MACROINVERTEBRATE SAMPLING —SINGLE HABITAT APPROACH

- standard kick-net, 500 μ opening mesh, 1.0 meter width
- sieve bucket, with 500 μ opening mesh
- 95% ethanol
- sample containers, sample container labels
- forceps
- pencils, clipboard
- Benthic Macroinvertebrate Field Data Sheet*
- first aid kit
- waders (chest-high or hip boots)
- rubber gloves (arm-length)
- camera
- Global Positioning System (GPS) Unit

* It is helpful to copy fieldsheets onto water-resistant paper for use in wet weather conditions

2. Before sampling, complete the physical/chemical field sheet (see Chapter 5; Appendix A-1, Form 1) to document site description, weather conditions, and land use. After sampling, review this information for accuracy and completeness.

3. Draw a map of the sampling reach. This map should include in-stream attributes (e.g., riffles, falls, fallen trees, pools, bends, etc.) and important structures, plants, and attributes of the bank and near stream areas. Use an arrow to indicate the direction of flow. Indicate the areas that were sampled for macroinvertebrates on the map. Estimate "river mile" for sampling reach for probable use in data management of the water resource agency. If available, use hand-held Global Positioning System (GPS) for latitude and longitude determination taken at the furthest downstream point of the sampling reach.

4. All riffle and run areas within the 100-m reach are candidates for sampling macroinvertebrates. A composite sample is taken from individual sampling spots in the riffles and runs representing different velocities. Generally, a minimum of 2 m^2 composited area is sampled for RBP efforts.

ALTERNATIVES FOR STREAM REACH DESIGNATION

- **Fixed-distance designation**—A standard length of stream, such as a reach, is commonly used to obtain an estimate of natural variability. Conceptually, this approach should provide a mixture of habitats in the reach and provide, at a minimum, duplicate physical and structural elements such as a riffle/pool sequence.
- **Proportional-distance designation**—Alternatively, a standard number of stream "widths" is used to measure the stream distance, e.g., 40 times the stream width is defined by EMAP for sampling (Klemm and Lazorchak 1995). This approach allows variation in the length of the reach based on the size of the stream.

5. Sampling begins at the downstream end of the reach and proceeds upstream. Using a 1 m kick net, 2 or 3 kicks are sampled at various velocities in the riffle or series of riffles. A *kick* is a stationary sampling accomplished by positioning the net and disturbing one square meter upstream of the net. Using the toe or heel of the boot, dislodge the upper layer of cobble or gravel and scrape the underlying bed. Larger substrate particles should be picked up and rubbed by hand to remove attached organisms. If different gear is used (e.g., a D-frame or rectangular net), a composite is obtained from numerous kicks (See Section 7.2).

6. The jabs or kicks collected from different locations in the cobble substrate will be composited to obtain a single homogeneous sample. After every kick, wash the collected material by running clean stream water through the net 2 to 3 times. If clogging does occur, discard the material in the net and redo that portion of the sample in a different location. Remove large debris after rinsing and inspecting it for organisms; place any organisms found into the sample container. Do not spend time inspecting small debris in the field. [Note — an alternative is to keep the samples from different habitats separated as done in EMAP (Klemm and Lazorchak 1995).]

7. Transfer the sample from the net to sample container(s) and preserve in enough 95 percent ethanol to cover the sample. Forceps may be needed to remove organisms from the dip net. Place a label indicating the sample identification code or lot number, date, stream name, sampling location, and collector name into the sample container. The outside of the container should include the same information and the words "preservative: 95% ethanol". If more than one container is needed for a sample, each container label should contain all the information for the sample and should be numbered (e.g., 1 of 2, 2 of 2, etc.). This information will be recorded in the "Sample Log" at the biological laboratory (Appendix A-3, Form 2).

8. Complete the top portion of the "Benthic Macroinvertebrate Field Data Sheet" (Appendix A-3, Form 1), which duplicates the "header" information on the physical/chemical field sheet.

9. Record the percentage of each habitat type in the reach. Note the sampling gear used, and comment on conditions of the sampling, e.g., high flows, treacherous rocks, difficult access to stream, or anything that would indicate adverse sampling conditions.

10. Document observations of aquatic flora and fauna. Make qualitative estimates of macroinvertebrate composition and relative abundance as a cursory estimate of ecosystem health and to check adequacy of sampling.

11. Perform habitat assessment (Appendix A-1, Form 2) after sampling has been completed; walking the reach helps ensure a more accurate assessment. Conduct the habitat assessment with another team member, if possible.

12. Return samples to laboratory and complete log-in form (Appendix A-3, Form 2).

QUALITY CONTROL (QC) IN THE FIELD

1. Sample labels must be properly completed, including the sample identification code, date, stream name, sampling location, and collector's name, and placed into the sample container. The outside of the container should be labeled with the same information. Chain-of-custody forms, if needed, must include the same information as the sample container labels.

2. After sampling has been completed at a given site, all nets, pans, etc. that have come in contact with the sample should be rinsed thoroughly, examined carefully, and picked free of organisms or debris. Any additional organisms found should be placed into the sample containers. The equipment should be examined again prior to use at the next sampling site.

3. Replicate (1 duplicate sample) 10% of the sites to evaluate precision or repeatability of the sampling technique or the collection team.

7.2 MULTIHABITAT APPROACH: D–FRAME DIP NET

Streams in many states vary from high gradient, cobble dominated to low gradient streams with sandy or silty sediments. Therefore, a method suitable to sampling a variety of habitat types is desired in these cases. The method that follows is based on Mid-Atlantic Coastal Streams Workgroup recommendations designed for use in streams with variable habitat structure (MACS 1996) and was used for statewide stream bioassessment programs by Florida DEP (1996) and Massachusetts DEP (1995). This method focuses on a multihabitat scheme designed to sample major habitats in proportional representation within a sampling reach. Benthic macroinvertebrates are collected systematically from all available instream habitats by kicking the substrate or jabbing with a D-frame dip net. A total of 20 jabs (or kicks) are taken from all major habitat types in the reach resulting in

FIELD EQUIPMENT/SUPPLIES NEEDED FOR BENTHIC MACROINVERTEBRATE SAMPLING —MULTI-HABITAT APPROACH

- standard D-frame dip net, 500 μ opening mesh, 0.3 m width (~ 1.0 ft frame width)
- sieve bucket, with 500 μ opening mesh
- 95% ethanol
- sample containers, sample container labels
- forceps
- pencils, clipboard
- Benthic Macroinvertebrate Field Data Sheet*
- first aid kit
- waders (chest-high or hip boots)
- rubber gloves (arm-length)
- camera
- Global Positioning System (GPS) Unit

* It is helpful to copy fieldsheets onto water-resistant paper for use in wet weather conditions

sampling of approximately 3.1 m^2 of habitat. For example, if the habitat in the sampling reach is 50% snags, then 50% or 10 jabs should be taken in that habitat. An organism-based subsample (usually 100, 200, 300, or 500 organisms) is sorted in the laboratory and identified to the lowest practical taxon, generally genus or species.

7.2.1 Habitat Types

The major stream habitat types listed here are in reference to those that are colonized by macroinvertebrates and generally support the diversity of the macroinvertebrate assemblage in stream ecosystems. Some combination of these habitats would be sampled in the multihabitat approach to benthic sampling.

Cobble (hard substrate) - Cobble will be prevalent in the riffles (and runs), which are a common feature throughout most mountain and piedmont streams. In many high-gradient streams, this habitat type will be dominant. However, riffles are not a common feature of most coastal or other low-gradient streams. Sample shallow areas with coarse (mixed gravel, cobble or larger) substrates by holding the bottom of the dip net against the substrate and dislodging organisms by kicking the substrate for 0.5 m upstream of the net.

Snags - Snags and other woody debris that have been submerged for a relatively long period (not recent deadfall) provide excellent colonization habitat. Sample submerged woody debris by jabbing in medium-sized snag material (sticks and branches). The snag habitat may be kicked first to help dislodge organisms, but only after placing the net downstream of the snag. Accumulated woody material in pool areas are considered snag habitat. Large logs should be avoided because they are generally difficult to sample adequately.

Vegetated banks - When lower banks are submerged and have roots and emergent plants associated with them, they are sampled in a fashion similar to snags. Submerged areas of undercut banks are good habitats to sample. Sample banks with protruding roots and plants by jabbing into the habitat. Bank habitat can be kicked first to help dislodge organisms, but only after placing the net downstream.

Submerged macrophytes - Submerged macrophytes are seasonal in their occurrence and may not be a common feature of many streams, particularly those that are high-gradient. Sample aquatic plants that are rooted on the bottom of the stream in deep water by drawing the net through the vegetation from the bottom to the surface of the water (maximum of 0.5 m each jab). In shallow water, sample by bumping or jabbing the net along the bottom in the rooted area, avoiding sediments where possible.

Sand (and other fine sediment) - Usually the least productive macroinvertebrate habitat in streams, this habitat may be the most prevalent in some streams. Sample banks of unvegetated or soft soil by bumping the net along the surface of the substrate rather than dragging the net through soft substrates; this reduces the amount of debris in the sample.

7.2.2 Field Sampling Procedures for Multihabitat

1. A 100 m reach that is representative of the characteristics of the stream should be selected. Whenever possible, the area should be at least 100 m upstream from any road or bridge crossing to minimize its effect on stream velocity, depth and overall habitat quality. There should be no major tributaries discharging to the stream in the study area.

2. Before sampling, complete the physical/chemical field sheet (see Chapter 5; Appendix A-1, Form 1) to document site description, weather conditions, and land use. After sampling, review this information for accuracy and completeness.

ALTERNATIVES FOR STREAM REACH DESIGNATION

- **Fixed-distance designation**—A standard length of stream, such as a reach, is commonly used to obtain an estimate of natural variability. Conceptually, this approach should provide a mixture of habitats in the reach and provide, at a minimum, duplicate physical and structural elements such as a riffle/pool sequence.
- **Proportional-distance designation**—Alternatively, a standard number of stream "widths" is used to measure the stream distance, e.g., 40 times the stream width is defined by EMAP for sampling (Klemm and Lazorchak 1995). This approach allows variation in the length of the reach based on the size of the stream.

3. Draw a map of the sampling reach. This map should include in-stream attributes (e.g., riffles, falls, fallen trees, pools, bends, etc.) and important structures, plants, and attributes of the bank and near stream areas. Use an arrow to indicate the direction of flow. Indicate the areas that were sampled for macroinvertebrates on the map. Approximate "river mile" to sampling reach for probable use in data management of the water resource agency. If available, use hand-held GPS for latitude and longitude determination taken at the furthest downstream point of the sampling reach.

4. Different types of habitat are to be sampled in approximate proportion to their representation of surface area of the total macroinvertebrate habitat in the reach. For example, if snags comprise 50% of the habitat in a reach and riffles comprise 20%, then 10 jabs should be taken in snag material and 4 jabs should be take in riffle areas. The remainder of the jabs (6) would be taken in any remaining habitat type. Habitat types contributing less than 5% of the stable habitat in the stream reach should not be sampled. In this case, allocate the remaining jabs proportionately among the predominant substrates. The number of jabs taken in each habitat type should be recorded on the field data sheet.

5. Sampling begins at the downstream end of the reach and proceeds upstream. A total of 20 jabs or kicks will be taken over the length of the reach; a single *jab* consists of forcefully thrusting the net into a productive habitat for a linear distance of 0.5 m. A *kick* is a stationary sampling accomplished by positioning the net and disturbing the substrate for a distance of 0.5 m upstream of the net.

6. The jabs or kicks collected from the multiple habitats will be composited to obtain a single homogeneous sample. Every 3 jabs, more often if necessary, wash the collected material by running clean stream water through the net two to three times. If clogging does occur that may hinder obtaining an appropriate sample, discard the material in the net and redo that portion of the sample in the same habitat type but in a different location. Remove large debris after rinsing and inspecting it for organisms; place any organisms found into the sample container. Do not spend time inspecting small debris in the field.

7. Transfer the sample from the net to sample container(s) and preserve in enough 95% ethanol to cover the sample. Forceps may be needed to remove organisms from the dip net. Place a label indicating the sample identification code or lot number, date, stream name, sampling location, and collector name into the sample container. The outside of the container should include the same information and the words "preservative: 95% ethanol". If more that one container is needed for a sample, each container label should contain all the information for the sample and should be numbered (e.g., 1 of 2, 2 of 2, etc.). This information will be recorded in the "Sample Log" at the biological laboratory (Appendix A-3, Form 2).

8. Complete the top portion of the "Benthic Macroinvertebrate Field Data Sheet" (Appendix A-3, Form 1), which duplicates the "header" information on the physical/chemical field sheet.

9. Record the percentage of each habitat type in the reach. Note the sampling gear used, and comment on conditions of the sampling, e.g., high flows, treacherous rocks, difficult access to stream, or anything that would indicate adverse sampling conditions.

10. Document observations of aquatic flora and fauna. Make qualitative estimates of macroinvertebrate composition and relative abundance as a cursory estimate of ecosystem health and to check adequacy of sampling.

11. Perform habitat assessment (Appendix A-1, Form 3) after sampling has been completed. Having sampled the various microhabitats and walked the reach helps ensure a more accurate assessment. Conduct the habitat assessment with another team member, if possible.

12. Return samples to laboratory and complete log-in forms (Appendix A-3, Form 2).

QUALITY CONTROL (QC) IN THE FIELD

1. Sample labels must be properly completed, including the sample identification code, date, stream name, sampling location, and collector's name and placed into the sample container. The outside of the container should be labeled with the same information. Chain-of-custody forms, if needed, must include the same information as the sample container labels.

2. After sampling has been completed at a given site, all nets, pans, etc. that have come in contact with the sample should be rinsed thoroughly, examined carefully, and picked free of organisms or debris. Any additional organisms found should be placed into the sample containers. The equipment should be examined again prior to use at the next sampling site.

3. Replicate (1 duplicate sample) 10% of the sites to evaluate precision or repeatability of sampling technique or collection team.

7.3 LABORATORY PROCESSING FOR MACROINVERTEBRATE SAMPLES

Macroinvertebrate samples collected by either intensive method, i.e., single habitat or multihabitat, are best processed in the laboratory under controlled conditions. Aspects of laboratory processing include subsampling, sorting, and identification of organisms.

All samples should be dated and recorded in the "Sample Log" notebook or on sample log form (Appendix A-3, Form 2) upon receipt by laboratory personnel. All information from the sample container label should be included on the sample log sheet. If more than one container was used, the number of containers should be indicated as well. All samples should be sorted in a single laboratory to enhance quality control.

LABORATORY EQUIPMENT/SUPPLIES NEEDED FOR BENTHIC MACROINVERTEBRATE SAMPLE PROCESSING

- log-in sheet for samples
- standardized gridded pan (30 cm x 36 cm) with approximately 30 grids (6 cm x 6 cm)
- 500 micron sieve
- forceps
- white plastic or enamel pan (15 cm x 23 cm) for sorting
- specimen vials with caps or stoppers
- sample labels
- standard laboratory bench sheets for sorting and identification
- dissecting microscope for organism identification
- fiber optics light source
- compound microscope with phase contrast for identification of mounted organisms (e.g., midges)
- 70% ethanol for storage of specimens
- appropriate taxonomic keys

7.3.1 Subsampling and Sorting

Subsampling benthic samples is not a requirement, and in fact, is frowned upon by certain scientists. Courtemanch (1996) provides an argument against subsampling, or to use a volume-based procedure if samples are to be subsampled. Vinson and Hawkins (1996) and Barbour and Gerritsen (1996) provide arguments for a fixed-count method, which is the preferred subsampling technique for RBPs.

Subsampling reduces the effort required for the sorting and identification aspects of macroinvertebrate surveys and provides a more accurate estimate of time expenditure (Barbour and Gerritsen 1996). The RBPs use a fixed-count approach to subsampling and sorting the organisms from the sample matrix of detritus, sand, and mud. *The following protocol is based on a 200-organism subsample, but it could be used for any subsample size (100, 300, 500, etc.).* The subsample is sorted and preserved separately from the remaining sample for quality control checks.

1. Prior to processing any samples in a lot (i.e., samples within a collection date, specific watershed, or project), complete the sample log-in sheet to verify that all samples have arrived at the laboratory, and are in proper condition for processing.

2. Thoroughly rinse sample in a 500 μm-mesh sieve to remove preservative and fine sediment. Large organic material (whole leaves, twigs, algal or macrophyte mats, etc.) not removed in the field should be rinsed, visually inspected, and discarded. If the samples have been preserved in alcohol, it will be necessary to soak the sample contents in water for about 15 minutes to hydrate the benthic organisms, which will prevent them from floating on the water surface during sorting. If the sample was stored in more than one container, the contents of all containers for a given sample should be combined at this time. Gently mix the sample by hand while rinsing to make homogeneous.

SUBSAMPLE PROCEDURE MODIFICATIONS

Subsampling procedures developed by Hilsenhoff (1987) and modified by Plafkin et al. (1989) were used in the original RBP II and RBP III protocols. As an improvement to the mechanics of the technique, Caton (1991) designed a sorting tray consisting of two parts, a rectangular plastic or plexiglass pan (36 cm x 30 cm) with a rectangular sieve insert. The sample is placed on the sieve, in the pan and dispersed evenly.

When a random grid(s) is selected, the sieve is lifted to temporarily drain the water. A "cookie-cutter" like metal frame 6 cm x 6 cm is used to clearly define the selected grid; debris overhanging the grid may be cut with scissors. A 6 cm flat scoop is used to remove all debris and organisms from the grid. The contents are then transferred to a separate sorting pan with water for removal of macroinvertebrates.

These modifications have allowed for rapid isolation of organisms within the selected grids and easy removal of all organisms and debris within a grid while eliminating investigator bias.

3. After washing, spread the sample evenly across a pan marked with grids approximately 6 cm x 6 cm. On the laboratory bench sheet, note the presence of large or obviously abundant organisms; *do not remove them from the pan*. However, Vinson and Hawkins (1996) present an argument for including these large organisms in the count, because of the high probability that these organisms will be excluded from the targeted grids.

4. Use a random numbers table to select 4 numbers corresponding to squares (grids) within the gridded pan. Remove all material (organisms and debris) from the four grid squares, and place the material into a shallow white pan and add a small amount of water to facilitate sorting. If there appear (through a cursory count or observation) to be 200 organisms ± 20% (cumulative of 4 grids), then subsampling is complete.

Any organism that is lying over a line separating two grids is considered to be on the grid containing its head. In those instances where it may not be possible to determine the location of the head (worms for instance), the organism is considered to be in the grid containing most of its body.

If the density of organisms is high enough that many more than 200 organisms are contained in the 4 grids, transfer the contents of the 4 grids to a second gridded pan. Randomly select grids for this second level of sorting as was done for the first, sorting grids one at a time until 200 organisms ± 20% are found. If picking through the entire next grid is likely to result in a subsample of greater than 240 organisms, then that grid may be subsampled in the same manner as before to decrease the likelihood of exceeding 240 organisms. That is, spread the contents of the last grid into another gridded pan. Pick grids one at a time until the desired number is reached. The total number of grids for each subsorting level should be noted on the laboratory bench sheet.

TESTING OF SUBSAMPLING

Ferraro et al. (1989) describe a procedure for calculating the "power-cost efficiency" (PCE), which incorporates both the number of samples and the cost (i.e. time or money) for each alternative sampling scheme. With this analysis, the optimal subsampling size is that by which the costs of increased effort are offset by the lowest theoretical number of samples predicted from the power analysis to provide reliable resolution (Barbour and Gerritsen 1996).

There are 4 primary steps in assessing the PCE of a suite of alternative subsampling strategies:

Step 1: For each subsampling strategy (i.e., 100-, 200-, 300- organism level, or other) collect samples at several reference and impaired stations. The observed differences in each of the core metrics is defined to be the magnitude of the difference desired to be detected. The difference is the "effect size" and is equivalent to the inverse coefficient of variation (CV).

Step 2: Assess the "cost" (c_i), in time or money, of each subsampling scheme *i* at each site. The cost can include labor hours for subsampling, sorting, identification, and documentation. Total cost of each subsampling alternative is the product of cost per site and required sample size.

Step 3: Conduct statistical power analyses to determine the minimum number of replicate samples (n_i) needed to detect the effect size with an acceptable probability of Type I ($\propto$; the probability that the null hypothesis [e.g., "sites are good"] is true and it is rejected. Commonly termed the significance level.) and Type II (β; the probability that the null hypothesis is false and it is accepted) error. Typically, $\propto$ and β are set at 0.05. This step may be deleted for those programs that already have an established number of replicate samples.

Step 4: Calculate the PCE for each sampling scheme by:

$$PCE_i = \frac{(n \mathrm{X}\, c)_{\min}}{(n_i \mathrm{X}\, c_i)}$$

where $(n \mathrm{X}\, c)_{min}$ = minimum value of (n X c) among the *i* sampling schemes. The PCE formula is equivalent to the "power efficiency" ratio of the sample sizes attained by alternative tests under similar conditions (Ferraro et al. 1989) with the n's multiplied by the "cost" per replicate sample. Multiplying n by c puts efficiency on a total "cost" rather than on a sample size basis. The reciprocal of PCE_i is the factor by which the optimal subsampling scheme is more efficient than alternative scheme *i*. When PCE is determined for multiple metrics, the overall optimal subsampling scheme may be defined as that which ranks highest in PCE for most metrics of interest.

5. Save the sorted debris residue in a separate container. Add a label that includes the words "sorted residue" in addition to all prior sample label information and preserve in 95% ethanol. Save the remaining unsorted sample debris residue in a separate container labeled "sample residue"; this container should include the original sample label. Length of storage and archival is determined by the laboratory or benthic section supervisor.

6. Place the sorted 200-organism (± 20%) subsample into glass vials, and preserve in 70% ethanol. Label the vials inside with the sample identifier or lot number, date, stream name, sampling location and taxonomic group. If more than one vial is needed, each should be labeled separately and numbered (e.g., 1 of 2, 2 of 2). For convenience in reading the labels inside the vials, insert the labels left-edge first. If identification is to occur immediately after sorting, a petri dish or watch glass can be used instead of vials.

7. Midge (Chironomidae) larvae and pupae should be mounted on slides in an appropriate medium (e.g., Euperal, CMC-9); slides should be labeled with the site identifier, date collected, and the first initial and last name of the collector. As with midges, worms (Oligochaeta) must also be mounted on slides and should be appropriately labeled.

8. Fill out header information on Laboratory Bench Sheet as in field sheets (see Chapter 5). Also check subsample target number. Complete back of sheet for subsampling/sorting information. Note number of grids picked, time expenditure, and number of organisms. If QC check was performed on a particular sample, person conducting QC should note findings on the back of the Laboratory Bench Sheet. Calculate sorting efficiency to determine whether sorting effort passes or fails.

9. Record date of sorting and slide monitoring, if applicable, on Log-In Sheet as documentation of progress and status of completion of sample lot.

QUALITY CONTROL (QC) FOR SORTING

1. Ten percent of the sorted samples in each lot should be examined by laboratory QC personnel or a qualified co-worker. (A lot is defined as a special study, basin study, entire index period, or individual sorter.) The QC worker will examine the grids chosen and tray used for sorting and will look for organisms missed by the sorter. Organisms found will be added to the sample vials. If the QC worker finds less than 10 organisms (or 10% in larger subsamples) remaining in the grids or sorting tray, the sample passes; if more than 10 (or 10%) are found, the sample fails. If the first 10% of the sample lot fails, a second 10% of the sample lot will be checked by the QC worker. Sorters in-training will have their samples 100% checked until the trainer decides that training is complete.

2. After laboratory processing is complete for a given sample, all sieves, pans, trays, etc., that have come in contact with the sample will be rinsed thoroughly, examined carefully, and picked free of organisms or debris; organisms found will be added to the sample residue.

7.3.2 Identification of Macroinvertebrates

Taxonomy can be at any level, but should be done consistently among samples. In the original RBPs, two levels of identification were suggested — family (RBP II) and genus/species (RBP III) (Plafkin et al. 1989). Genus/species provides more accurate information on ecological/ environmental relationships and sensitivity to impairment. Family level provides a higher degree of precision among samples and taxonomists, requires less expertise to perform, and accelerates assessment results. In either case, only those taxonomic keys that have been peer-reviewed and are available to other taxonomists should be used. Unnamed species (i.e., species A, B, 1, or 2) may be ecologically informative, but may be inconsistently handled among taxonomists and will, thus, contribute to variability when a statewide database is being developed.

1. Most organisms are identified to the lowest practical level (generally genus or species) by a qualified taxonomist using a dissecting microscope. Midges (Diptera: Chironomidae) are mounted on slides in an appropriate medium and identified using a compound microscope. Each taxon found in a sample is recorded and enumerated in a laboratory bench notebook and then transcribed to the laboratory bench sheet for subsequent reports. Any difficulties encountered during identification (e.g., missing gills) are noted on these sheets.

2. Labels with specific taxa names (and the taxonomist's initials) are added to the vials of specimens by the taxonomist. (Note that individual specimens may be extracted from the

sample to be included in a reference collection or to be verified by a second taxonomist.) Slides are initialed by the identifying taxonomist. A separate label may be added to slides to include the taxon (taxa) name(s) for use in a voucher or reference collection.

3. Record the identity and number of organisms on the Laboratory Bench Sheet (Appendix A-3, Form 3). Either a tally counter or "slash" marks on the bench sheet can be used to keep track of the cumulative count. Also, record the life stage of the organisms, the taxonomist's initials and the Taxonomic Certainty Rating (TCR) as a measure of confidence.

4. Use the back of the bench sheet to explain certain TCR ratings or condition of organisms. Other comments can be included to provide additional insights for data interpretation. If QC was performed, record on the back of the bench sheet.

5. For archiving samples, specimen vials, (grouped by station and date), are placed in jars with a small amount of denatured 70% ethanol and tightly capped. The ethanol level in these jars must be examined periodically and replenished as needed, before ethanol loss from the specimen vials takes place. A stick-on label is placed on the outside of the jar indicating sample identifier, date, and preservative (denatured 70% ethanol).

QUALITY CONTROL (QC) FOR TAXONOMY

1. A voucher collection of all samples and subsamples should be maintained. These specimens should be properly labeled, preserved, and stored in the laboratory for future reference. A taxonomist (the reviewer) not responsible for the original identifications should spot check samples corresponding to the identifications on the bench sheet.

2. The reference collection of each identified taxon should also be maintained and verified by a second taxonomist. The word "val." and the 1st initial and last name of the person validating the identification should be added to the vial label. Specimens sent out for taxonomic validations should be recorded in a "Taxonomy Validation Notebook" showing the label information and the date sent out. Upon return of the specimens, the date received and the finding should also be recorded in the notebook along with the name of the person who performed the validation.

3. Information on samples completed (through the identification process) will be recorded in the "sample log" notebook to track the progress of each sample within the sample lot. Tracking of each sample will be updated as each step is completed (i.e., subsampling and sorting, mounting of midges and worms, taxonomy).

4. A library of basic taxonomic literature is essential in aiding identification of specimens and should be maintained (and updated as needed) in the taxonomic laboratory (see attached list). Taxonomists should participate in periodic training on specific taxonomic groups to ensure accurate identifications.

7.4 BENTHIC METRICS

Benthic metrics have undergone evolutionary developments and are documented in the Invertebrate Community Index (ICI) (DeShon 1995), RBPs (Shackleford 1988, Plafkin et al. 1989, Barbour et al. 1992, 1995, 1996b, Hayslip 1993, Smith and Voshell 1997), and the benthic IBI (Kerans and Karr 1994, Fore et al. 1996). Metrics used in these indices evaluate aspects of both elements and processes within the macroinvertebrate assemblage. Although these indices have been regionally

developed, they are typically appropriate over wide geographic areas with minor modification (Barbour et al. 1995).

The process for testing the efficacy and calibrating the metrics is described in Chapter 9. While the candidate metrics described here are ecologically sound, they may require testing on a regional basis. Those metrics that are most effective are those that have a response across a range of human influence (Fore et al. 1996, Karr and Chu 1999). Resh and Jackson (1993) tested the ability of 20 benthic metrics used in 30 different assessment protocols to discriminate between impaired and minimally impaired sites in California. The most effective measures, from their study, were the richness measures, 2 community indices (Margalef's and Hilsenhoff's family biotic index), and a functional feeding group metric (percent scrapers). Resh and Jackson emphasized that both the measures (metrics) and protocols need to be calibrated for different regions of the country, and, perhaps, for different impact types (stressors). In a study of 28 invertebrate metrics, Kerans and Karr (1994) demonstrated significant patterns for 18 metrics and used 13 in their final B-IBI (Benthic Index of Biotic Integrity). Richness measures were useful as were selected trophic and dominance metrics. One of the unique features of the fish IBI presently lacking in benthic indices is the ability to incorporate metrics on individual condition, although measures evaluating chironomid larvae deformities have recently been advocated (Lenat 1993).

Four studies that were published from 1995 through 1997 serve as a basis for the most appropriate candidates for metrics, because the metrics were tested in detail in these studies (DeShon 1995, Barbour et al. 1996b, Fore et al. 1996, Smith and Voshell 1997). These metrics have been evaluated for the ability to distinguish impairment and are recommended as the most likely to be useful in other regions of the country (Table 7-1). Other metrics that are currently in use in various states are listed in Table 7-2 and may be applicable for testing as alternatives or additions to the list in Table 7-1.

Taxa richness, or the number of distinct taxa, represents the diversity within a sample. Use of taxa richness as a key metric in a multimetric index include the ICI (DeShon 1995), the fish IBI (Karr et al. 1986), the benthic IBI (Kerans et al. 1992, Kerans and Karr, 1994), and RBP's (Plafkin et al. 1989, Barbour et al. 1996b). Taxa richness usually consists of species level identifications but can also be evaluated as designated groupings of taxa, often as higher taxonomic groups (i.e., genera, families, orders, etc.) in assessment of invertebrate assemblages. Richness measures reflect the diversity of the aquatic assemblage (Resh et al. 1995). The expected response to increasing perturbation is summarized, as an example, in Table 7-2. Increasing diversity correlates with increasing health of the assemblage and suggests that niche space, habitat, and food source are adequate to support survival and propagation of many species. Number of taxa measures the overall variety of the macroinvertebrate assemblage. No identities of major taxonomic groups are derived from the total taxa metric, but the elimination of taxa from a naturally diverse system can be readily detected. Subsets of "total" taxa richness are also used to accentuate key indicator groupings of organisms. Diversity or variety of taxa within these groups are good indications of the ability of the ecosystem to support varied taxa. Certain indices that focus on a pair-wise site comparison are also included in this richness category.

Table 7-1. Definitions of best candidate benthic metrics and predicted direction of metric response to increasing perturbation (compiled from DeShon 1995, Barbour et al. 1996b, Fore et al. 1996, Smith and Voshell 1997).

Category	Metric	Definition	Predicted response to increasing perturbation
Richness measures	Total No. taxa	Measures the overall variety of the macroinvertebrate assemblage	Decrease
	No. EPT taxa	Number of taxa in the insect orders Ephemeroptera (mayflies), Plecoptera (stoneflies), and Trichoptera (caddisflies)	Decrease
	No. Ephemeroptera Taxa	Number of mayfly taxa (usually genus or species level)	Decrease
	No. Plecoptera Taxa	Number of stonefly taxa (usually genus of species level)	Decrease
	No. Trichoptera Taxa	Number of caddisfly taxa (usually genus or species level)	Decrease
Composition measures	% EPT	Percent of the composite of mayfly, stonefly, and caddisfly larvae	Decrease
	% Ephemeroptera	Percent of mayfly nymphs	Decrease
Tolerance/Intolerance measures	No. of Intolerant Taxa	Taxa richness of those organisms considered to be sensitive to perturbation	Decrease
	% Tolerant Organisms	Percent of macrobenthos considered to be tolerant of various types of perturbation	Increase
	% Dominant Taxon	Measures the dominance of the single most abundant taxon. Can be calculated as dominant 2, 3, 4, or 5 taxa.	Increase
Feeding measures	% Filterers	Percent of the macrobenthos that filter FPOM from either the water column or sediment	Variable
	% Grazers and Scrapers	Percent of the macrobenthos that scrape or graze upon periphyton	Decrease
Habit measures	Number of Clinger Taxa	Number of taxa of insects	Decrease
	% Clingers	Percent of insects having fixed retreats or adaptations for attachment to surfaces in flowing water.	Decrease

Composition measures can be characterized by several classes of information, i.e., the identity, key taxa, and relative abundance. Identity is the knowledge of individual taxa and associated ecological patterns and environmental requirements (Barbour et al. 1995). Key taxa (i.e., those that are of special interest or ecologically important) provide information that is important to the condition of the targeted assemblage. The presence of exotic or nuisance species may be an important aspect of biotic interactions that relate to both identity and sensitivity. Measures of composition (or relative abundance) provide information on the make-up of the assemblage and the relative contribution of the populations to the total fauna (Table 7-2). Relative, rather than absolute, abundance is used because the relative contribution of individuals to the total fauna (a reflection of interactive

principles) is more informative than abundance data on populations without a knowledge of the interaction among taxa (Plafkin et al. 1989, Barbour et al. 1995). The premise is that a healthy and stable assemblage will be relatively consistent in its proportional representation, though individual abundances may vary in magnitude. Percentage of the dominant taxon is a simple measure of redundancy (Plafkin et al. 1989). A high level of redundancy is equated with the dominance of a pollution tolerant organism and a lowered diversity. Several diversity indices, which are measures of information content and incorporate both richness and evenness in their formulas, may function as viable metrics in some cases, but are usually redundant with taxa richness and % dominance (Barbour et al. 1996b).

Table 7-2. Definitions of additional potential benthic metrics and predicted direction of metric response to increasing perturbation.

Category	Metric	Definition	Predicted response to increasing perturbation	References
Richness measures	No. *Pteronarcys* species	The presence or absence of a long-lived stonefly genus (2-3 year life cycle)	Decrease	Fore et al. 1996
	No. Diptera taxa	Number of "true" fly taxa, which includes midges	Decrease	DeShon 1995
	No. Chironomidae taxa	Number of taxa of chironomid (midge) larvae	Decrease	Hayslip 1993, Barbour et al. 1996b
Composition measures	% Plecoptera	Percent of stonefly nymphs	Decrease	Barbour et al. 1994
	% Trichoptera	Percent of caddisfly larvae	Decrease	DeShon 1995
	% Diptera	Percent of all "true" fly larvae	Increase	Barbour et al. 1996b
	% Chironomidae	Percent of midge larvae	Increase	Barbour et al. 1994
	% Tribe Tanytarsini	Percent of Tanytarisinid midges to total fauna	Decrease	DeShon 1995
	% Other Diptera and noninsects	Composite of those organisms generally considered to be tolerant to a wide range of environmental conditions	Increase	DeShon 1995
	% *Corbicula*	Percent of asiatic clam in the benthic assemblage	Increase	Kerans and Karr 1994
	% Oligochaeta	Percent of aquatic worms	Variable	Kerans and Karr 1994
Tolerance/ Intolerance measures	No. Intol. Snail and Mussel species	Number of species of molluscs generally thought to be pollution intolerant	Decrease	Kerans and Karr 1994
	% Sediment Tolerant organisms	Percent of infaunal macrobenthos tolerant of perturbation	Increase	Fore et al. 1996
	Hilsenhoff Biotic Index	Uses tolerance values to weight abundance in an estimate of overall pollution. Originally designed to evaluate organic pollution	Increase	Barbour et al. 1992, Hayslip 1993, Kerans and Karr 1994

Table 7-2. Definitions of additional potential benthic metrics and predicted direction of metric response to increasing perturbation (continued).

Category	Metric	Definition	Predicted response to increasing perturbation	References
Tolerance/ Intolerance measures (continued)	Florida Index	Weighted sum of intolerant taxa, which are classed as 1 (least tolerant) or 2 (intolerant). Florida Index = 2 X Class 1 taxa + Class 2 taxa	Decrease	Barbour et al. 1996b
	% Hydropsychidae to Trichoptera	Relative abundance of pollution tolerant caddisflies (metric could also be regarded as a composition measure)	Increase	Barbour et al. 1992, Hayslip 1993
Feeding measures	% Omnivores and Scavengers	Percent of generalists in feeding strategies	Increase	Kerans and Karr 1994
	% Ind. Gatherers and Filterers	Percent of collector feeders of CPOM and FPOM	Variable	Kerans and Karr 1994
	% Gatherers	Percent of the macrobenthos that "gather"	Variable	Barbour et al. 1996b
	% Predators	Percent of the predator functional feeding group. Can be made restrictive to exclude omnivores	Variable	Kerans and Karr 1994
	% Shredders	Percent of the macrobenthos that "shreds" leaf litter	Decrease	Barbour et al. 1992, Hayslip 1993
Life cycle measures	% Multivoltine	Percent of organisms having short (several per year) life cycle	Increase	Barbour et al. 1994
	% Univoltine	Percent of organisms relatively long-lived (life cycles of 1 or more years)	Decrease	Barbour et al. 1994

Tolerance/Intolerance measures are intended to be representative of relative sensitivity to perturbation and may include numbers of pollution tolerant and intolerant taxa or percent composition (Barbour et al. 1995). Tolerance is generally non-specific to the type of stressor. However, some metrics such as the Hilsenhoff Biotic Index (HBI) (Hilsenhoff 1987, 1988) are oriented toward detection of organic pollution; the Biotic Condition Index (Winget and Mangum 1979) is useful for evaluating sedimentation. The Florida Index (Ross and Jones 1979) is a weighted sum of intolerant taxa (insects and crustaceans) found at a site (Beck 1965) and functions similarly to the HBI (Hilsenhoff 1987) used in other parts of the country. The tolerance/intolerance measures can be independent of taxonomy or can be specifically tailored to taxa that are associated with pollution tolerances. For example, both the percent of Hydropsychidae to total Trichoptera and percent Baetidae to total Ephemeroptera are estimates of evenness within these insect orders that generally are considered to be sensitive to pollution. As these families (i.e., Hydropsychidae and Baetidae) increase in relative abundance, effects of pollution (usually organic) also increase. Density (number of individuals per some unit of area) is a universal measure used in all kinds of biological studies. Density can be classified with the trophic measures because it is an element of production; however, it is difficult to interpret because it requires careful quantification and is not monotonic in its response (i.e., density can either decrease or increase in response to pollution) and is usually linked to tolerance measures.

Feeding measures or trophic dynamics encompass functional feeding groups and provide information on the balance of feeding strategies (food acquisition and morphology) in the benthic assemblage. Examples involve the feeding orientation of scrapers, shredders, gatherers, filterers, and predators. Trophic dynamics (food types) are also included here and include the relative abundance of herbivores, carnivores, omnivores, and detritivores. Without relatively stable food dynamics, an imbalance in functional feeding groups will result, reflecting stressed conditions. Trophic metrics are surrogates of complex processes such as trophic interaction, production, and food source availability (Karr et al. 1986, Cummins et al. 1989, Plafkin et al. 1989). Specialized feeders, such as scrapers, piercers, and shredders, are the more sensitive organisms and are thought to be well represented in healthy streams. Generalists, such as collectors and filterers, have a broader range of acceptable food materials than specialists (Cummins and Klug 1979), and thus are more tolerant to pollution that might alter availability of certain food. However, filter feeders are also thought to be sensitive in low-gradient streams (Wallace et al. 1977). The usefulness of functional feeding measures for benthic macroinvertebrates has not been well demonstrated. Difficulties with the proper assignment to functional feeding groups has contributed to the inability to consider these reliable metrics (Karr and Chu 1997).

Habit measures are those that denote the mode of existence among the benthic macroinvertebrates. Morphological adaptation among the macroinvertebrate distinguishes the various mechanisms for maintaining position and moving about in the aquatic environment (Merritt et al. 1996). Habit categories include movement and positioning mechanisms such as skaters, planktonic, divers, swimmers, clingers, sprawlers, climbers, burrowers. Merritt et al. (1996) provide an overview of the habit of aquatic insects, which are the primary organisms used in these measures. Habit measures have been found to be more robust than functional feeding groups in some instances (Fore et al. 1996).

7.5 BIOLOGICAL RECONNAISSANCE (BioRecon) OR PROBLEM IDENTIFICATION SURVEY

The use of biological survey techniques can serve as a screening tool for problem identification and/or prioritizing sites for further assessment, monitoring, or protection. The application of biological surveys in site reconnaissance is intended to be expedient, and, as such, requires an experienced and well-trained biologist. Expediency in this technique is to minimize time spent in the laboratory and with analysis. The "turn-around" time from the biosurvey to an interpretation of findings is intended to be relatively short. The BioRecon is useful in discriminating obviously impaired and non-impaired areas from potentially affected areas requiring further investigation. Use of the BioRecon allows rapid screening of a large number of sites. Areas identified for further study can then either be evaluated using more rigorous

FIELD EQUIPMENT/SUPPLIES NEEDED FOR BENTHIC MACROINVERTEBRATE SAMPLING —BIORECON

- standard D-frame dip net, 500 μ opening mesh, 0.3 meter width (~ 1.0 ft frame width)
- sieve bucket, with 500 μ opening mesh
- 95% ethanol
- sample containers
- sample container labels
- forceps
- field data sheets*, pencils, clipboard
- first aid kit
- waders (chest-high or hip boots), rubber gloves (arm-length)
- camera
- Global Positioning System (GPS) Unit

* It is helpful to copy fieldsheets onto water-resistant paper for use in wet weather conditions

bioassessment methods for benthic macroinvertebrates and/or other assemblages, or ambient toxicity methods.

Because the BioRecon involves limited data generation, its effectiveness depends largely on the experience of the professional biologist performing the assessment. The professional biologist should have assessment experience, a knowledge of aquatic ecology, and basic expertise in benthic macroinvertebrate taxonomy.

The BioRecon presented here is refined and standardized from the original RBP I (Plafkin et al. 1989), and is based on the technique developed by Florida DEP (1996), from which the approach derives its name. This biosurvey approach is based on a multihabitat approach similar to the more rigorous technique discussed in Section 7.2. The most productive habitats, i.e., those that contain the greatest diversity and abundance of macroinvertebrates, are sampled in the BioRecon. As a general rule, impairment is judged by richness measures, thereby emphasizing the presence or absence of indicator taxa. Biological attributes such as the relative abundance of certain taxa may be less useful than richness measures in the BioRecon approach, because samples are processed more quickly and in a less standardized manner.

7.5.1 Sampling, Processing, and Analysis Procedures

1. A 100 m reach representative of the characteristics of the stream should be selected. For the BioRecon, it is unlikely that the alternative reach designation approach (i.e., x times the stream width), will improve the resolution beyond a standard 100 m reach. Whenever possible, the area should be at least 100 meters upstream from any road or bridge crossing to minimize its effect on stream velocity, depth and overall habitat quality. There should be no major tributaries discharging to the stream in the study area.

2. Before sampling, complete the "Physical Characterization/Water Quality Field Data Sheet" (Appendix A-1, Form 1) to document site description, weather conditions, and land use. After sampling, review this information for accuracy and completeness.

3. The major habitat types (see 7.2.1 for habitat descriptions) represented in the reach are to be sampled for macroinvertebrates. A total of 4 jabs or kicks will be taken over the length of the reach. A minimum of 1 jab (or kick) is to be taken in each habitat. More than 1 jab may be desired in those habitats that are predominant. Habitat types contributing less than five percent of the stable habitat in the stream reach should not be sampled. Thus, allocate the remaining jabs proportionately among the predominant substrates. The number of jabs taken in each habitat type should be recorded on the field data sheet.

4. Sampling begins at the downstream end of the reach and proceeds upstream. A total of four jabs or kicks will be taken over the length of the reach; a single *jab* consists of forcefully thrusting the net into a productive habitat for a linear distance of 0.5 m. A *kick* is a stationary sampling accomplished by positioning the net and disturbing the substrate for a distance of 0.5 m upstream of the net.

5. The jabs or kicks collected from the multiple habitats will be composited into a sieve bucket to obtain a single homogeneous sample. If clogging occurs, discard the material in the net and redo that portion of the sample in the same habitat type but in a different location. Remove large debris after rinsing and inspecting it for organisms; place any organisms found into the sieve bucket.

6. Return to the bank with the sampled material for sorting and organism identifications. Alternatively, the material can be preserved in alcohol and returned to the laboratory for processing (see Step 7 in Section 7.1.1 for instructions).

7. Transfer the sample from the sieve bucket (or sample jar, if in laboratory) to a white enamel or plastic pan. A second, smaller, white pan may be used for the actual sorting. Place small aliquots of the detritus plus organisms in the smaller pan diluted with a minimal amount of site water (or tap water). Scan the detritus and water for organisms. When an organism is found, examine it with a hard lens, determine its identity to the lowest possible level (usually family or genus), and record it on the Preliminary Assessment Score Sheet (PASS) (Appendix A-3, Form 4) in the column labeled "tally." Place representatives of each taxon in a vial, properly labeled and containing alcohol.

8. If field identifications are conducted, verify in the lab and make appropriate changes for misidentifications.

9. Analysis is done by determining the value of each metric and comparing to a predetermined value for the associated stream class. These value thresholds should be sufficiently conservative so that "good" conditions or non-impairment is verified. Sites with metric values below the threshold(s) are considered "suspect" of impairment and may warrant further investigation. These simple calculations can be done directly on the PASS sheet.

QUALITY CONTROL (QC)

1. Sample labels must be properly completed, including the sample identification code date, stream name, sampling location, and collector's name and placed into the sample container. The outside of the container should be labeled with the same information. Chain-of-custody forms, if needed, must include the same information as the sample container labels.

2. After sampling has been completed at a given site, all nets, pans, etc. that have come in contact with the sample will be rinsed thoroughly, examined carefully, and picked free of organisms or debris. Any additional organisms found should be placed into the sample containers. The equipment should be examined again prior to use at the next sampling site.

3. A second biologist familiar with the recognition and taxonomy of the organisms should check the sample to ensure all taxa are encountered and documented.

7.6 TAXONOMIC REFERENCES FOR MACROINVERTEBRATES

The following references are provided as a list of taxonomic references currently being used around the United States for identification of benthic macroinvertebrates. Any of these references cited in the text of this document will also be found in Chapter 11 (Literature Cited).

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8 FISH PROTOCOLS

Monitoring of the fish assemblage is an integral component of many water quality management programs, and its importance is reflected in the aquatic life use-support designations of many states. Narrative expressions such as "maintaining coldwater fisheries", "fishable" or "fish propagation" are prevalent in state standards. Assessments of the fish assemblage must measure the overall structure and function of the ichthyofaunal community to adequately evaluate biological integrity and protect surface water resource quality. Fish bioassessment data quality and comparability are assured through the utilization of qualified fisheries professionals and consistent methods.

The Rapid Bioassessment Protocol (RBP) for fish presented in this document, is directly comparable to RBP V in Plafkin et al. (1989). The principal evaluation mechanism utilizes the technical framework of the Index of Biotic Integrity (IBI) — a fish assemblage assessment approach developed by Karr (1981). The IBI incorporates the zoogeographic, ecosystem, community and population aspects of the fish assemblage into a single ecologically-based index. Calculation and interpretation of the IBI involves a sequence of activities including: fish sample collection; data tabulation; and regional modification and calibration of metrics and expectation values. This concept has provided the overall multimetric index framework for rapid bioassessment in this document. A more detailed description of this approach for fish is presented in Karr et al. (1986) and Ohio EPA (1987). Regional modification and applications are described in Leonard and Orth (1986), Moyle et al. (1986), Hughes and Gammon (1987), Wade and Stalcup (1987), Miller et al. (1988), Steedman (1988), Simon (1991), Lyons (1992a), Simon and Lyons (1995), Lyons et al. (1996), and Simon (1999).

The RBP for fish involves careful, standardized field collection, species identification and enumeration, and analyses using aggregated biological attributes or quantification of the numbers (and in some cases biomass, see Section 8.3.3, Metric 13) of key species. The role of experienced fisheries scientists in the adaptation and application of the RBP and the taxonomic identification of fishes cannot be overemphasized. The fish RBP survey yields an objective discrete measure of the condition of the fish assemblage. Although the fish survey can usually be completed in the field by qualified fish biologists, difficult species identifications will require laboratory confirmation. Data provided by the fish RBP can serve to assess use attainment, develop biological criteria, prioritize sites for further evaluation, provide a reproducible impact assessment, and evaluate status and trends of the fish assemblage.

Fish collection procedures must focus on a multihabitat approach — sampling habitats in relative proportion to their local representation (as determined during site reconnaissance). Each sample reach should contain riffle, run and pool habitat, when available. Whenever possible, the reach should be sampled sufficiently upstream of any bridge or road crossing to minimize the hydrological effects on overall habitat quality. Wadeability and accessability may ultimately govern the exact placement of the sample reach. A habitat assessment is performed and physical/chemical parameters measured concurrently with fish sampling to document and characterize available habitat specifics within the sample reach (see Chapter 5: Habitat Assessment and Physicochemical Characterization).

8.1 FISH COLLECTION PROCEDURES: ELECTROFISHING

All fish sampling gear types are generally considered selective to some degree; however, electrofishing has proven to be the most comprehensive and effective *single* method for collecting stream fishes. Pulsed DC (direct current) electrofishing is the method of choice to obtain a representative sample of the fish assemblage at each sampling station. However, electrofishing in any form has been banned from certain salmonid spawning streams in the northwest. As with any fish sampling method, the proper scientific collection permit(s) must be obtained before commencement of any electrofishing activities. The accurate identification of each fish collected is essential, and species-level identification is required (including hybrids in some cases, see Section 8.3.3, Metric 11). Field identifications are acceptable; however, voucher specimens must be retained for laboratory verification, particularly if there is any doubt about the correct identity of the specimen (see Section 8.2). Because the collection methods used are not consistently effective for young-of-the-year fish and because their inclusion may seasonally skew bioassessment results, fish less than 20 millimeters total length will not be identified or included in standard samples.

ELECTROFISHING CONFIGURATION AND FIELD TEAM ORGANIZATION

All field team members must be trained in electrofishing safety precautions and unit operation procedures identified by the electrofishing unit manufacturer. Each team member must be insulated from the water and the electrodes; therefore, chest waders and rubber gloves are required. Electrode and dip net handles must be constructed of insulating materials (e.g., woods, fiberglass). Electrofishers/electrodes must be equipped with functional safety switches (as installed by virtually all electrofisher manufacturers). Field team members must not reach into the water unless the electrodes have been removed from the water or the electrofisher has been disengaged.

It is recommended that at least 2 fish collection team members be certified in CPR (cardiopulmonary resuscitation). *Many* options exist for electrofisher configuration and field team organization; however, procedures will always involve pulsed DC electrofishing and a minimum 2-person team for sampling streams and wadeable rivers. Examples include:

- Backpack electrofisher with 2 hand-held electrodes mounted on fiberglass poles, one positive (anode) and one negative (cathode). One crew member, identified as the electrofisher unit operator, carries the backpack unit and manipulates both the anode and cathode poles. The anode may be fitted with a net ring (and shallow net) to allow the unit operator to net specimens. The remaining 1 or 2 team members net fish with dip nets and are responsible for specimen transport and care in buckets or livewells.

- Backpack electrofisher with 1 hand-held anode pole and a trailing or floating cathode. The electrofisher unit operator manipulates the anode with one hand, and has a second hand free for use of a dip net. The remaining 1 or 2 team members also aid in the netting of specimens, and in addition are responsible for specimen transport in buckets or livewells.

- Tote barge (pramunit) electrofisher with 2 hand-held anode poles and a trailing/floating cathode (recommended for large streams and wadeable rivers). Two team members are each equipped with an anode pole and a dip net. Each is responsible for electrofishing and the netting of specimens. The remaining team member will follow, pushing or pulling the barge through the sample reach. A livewell is maintained within the barge and/or within the sampling reach but outside the area of electric current.

The safety of all personnel and the quality of the data is assured through the adequate education, training, and experience of all members of the fish collection team. At least 1 biologist with training

and experience in electrofishing techniques and fish taxonomy *must* be involved in each sampling event. Laboratory analyses are conducted and/or supervised by a fisheries professional trained in fish taxonomy. Quality assurance and quality control must be a continuous process in fisheries monitoring and assessment, and must include all program aspects (i.e., field sampling, habitat measurement, laboratory processing, and data recording).

Tote barge (pram unit) Electrofishing

Backpack Electrofishing

8.1.1 Field Sampling Procedures

1. A representative stream reach (see Alternatives for Stream Reach Designation, next page) is selected and measured such that primary physical habitat characteristics of the stream are included within the reach (e.g., riffle, run and pool habitats, when available). The sample reach should be located away from the influences of major tributaries and bridge/road crossings (e.g., sufficiently upstream to decrease influences on overall habitat quality). The exact location (i.e., latitude and

FIELD EQUIPMENT/SUPPLIES NEEDED FOR FISH SAMPLING—ELECTROFISHING

- appropriate scientific collection permit(s)
- backpack or tote barge-mounted electrofisher
- dip nets
- block nets (i.e., seines)
- elbow-length insulated waterproof gloves
- chest waders (equipped with wading cleats, when necessary)
- polarized sunglasses
- buckets/livewells
- jars for voucher/reference specimens
- waterproof jar labels
- 10% buffered formalin (formaldehyde solution)
- measuring board (500 mm minimum, with 1 mm increments)[a]
- balance (gram scale)[b]
- tape measure (100 m minimum)
- fish Sampling Field Data Sheet[c]
- applicable topographic maps
- copies of field protocols
- pencils, clipboard
- first aid kit
- Global Positioning System (GPS) Unit

[a] Needed only if program/study requires length frequency information

[b] Needed only if total biomass and/or the Index of Well-Being are included in the assessment process (see Section 8.3.3, Metric 13).

[c] It is helpful to copy fieldsheets onto water-resistant paper for use in wet weather conditions.

longitude) of the downstream limit of the reach must be recorded on each field data sheet. (If a Global Positioning System unit is used to provide location information, the accuracy or design confidence of the unit should be noted.) A habitat assessment and physical/ chemical characterization of water quality should be performed within the same sampling reach (see Chapter 5: Habitat Assessment and Physicochemical Characterization).

ALTERNATIVES FOR STREAM REACH DESIGNATION

The collection of a representative sample of the fish assemblage is essential, and the appropriate sampling station length for obtaining that sample is best determined by conducting pilot studies (Lyons 1992b, Simonson et al. 1994, Simonson and Lyons 1995). Alternatives for the designation of stream sampling reaches include:

- **Fixed-distance designation**—A standard length of stream, e.g., a 150-200-meter reach (Ohio EPA 1987), 100-meter reach (Massachusetts DEP 1995) may be used to obtain a representative sample. Conceptually, this approach should provide a mixture of habitats in the reach and provide, at a minimum, duplicate physical and structural elements such as riffle/pool sequences.
- **Proportional-distance designation**— A standard number of stream channel "widths" may be used to measure the stream study reach, e.g., 40 times the stream width is defined by Environmental Monitoring & Assessment Program (EMAP) for sampling (Klemm and Lazorchak 1995). This approach allows variation in the length of the reach based on the size of the stream. Application of the proportional-distance approach in large streams or wadeable rivers may require the establishment of sampling program time and/or distance maxima (e.g., no more than 3 hours of electrofishing or 500-meter reach per sampling site, [Klemm et al. 1993]).

2. Collection via electrofishing begins at a shallow riffle, or other physical barrier at the downstream limit of the sample reach, and terminates at a similar barrier at the upstream end of the reach. In the absence of physical barriers, block nets should be set at the upstream and downstream ends of the reach prior to the initiation of any sampling activities.

3. Fish collection procedures commence at the downstream barrier. A minimum 2-person fisheries crew proceeds to electrofish in an upstream direction using a side-to-side or bank-to-bank sweeping technique to maximize area coverage. All wadeable habitats within the reach are sampled via a single pass, which terminates at the upstream barrier. Fish are held in livewells (or buckets) for subsequent identification and enumeration.

4. Sampling efficiency is dependent, at least in part, on water clarity and the field team's ability to see and net the stunned fish. Therefore, each team member should wear polarized sunglasses, and sampling is conducted only during periods of optimal water clarity and flow.

5. All fish (greater than 20 millimeters total length) collected within the sample reach must be identified to species (or subspecies). Specimens that cannot be identified with certainty in the field are preserved in a 10% formalin solution and stored in labeled jars for subsequent laboratory identification (see Section 8.2). A representative voucher collection must be retained for unidentified specimens, very small specimens, new locality records, and/or a particular region. In addition to the unidentified specimen jar, a voucher collection of a subsample of each species identified in the field should be preserved and labeled for subsequent laboratory verification, if necessary. Obviously, species of special concern (e.g., threatened, endangered) should be noted and released *immediately* on site. Labels should contain (at a minimum) location data (verbal description and coordinates), date, collectors'

names, and sample identification code and/or station numbers for the particular sampling site. Young-of-the-year fish less than 20 millimeters (total length) are not identified or included in the sample, and are released on site. Specimens that can be identified in the field are counted, examined for external anomalies (i.e., deformities, eroded fins, lesions, and tumors), and recorded on field data sheets. An example of a "Fish Sampling Field Data Sheet" is provided in Appendix A-4, Form 1. Space is available for optional fish length and weight measurements, should a particular program/study require length frequency or biomass data. However, these data *are not required* for the standard multimetric assessment. Space is allotted on the field data sheets for the *optional* inclusion of measurements (nearest millimeter total length) and weights (nearest gram) for a subsample (to a maximum 25 specimens) of each species. Although fish length and weight measurements are optional, recording a range of lengths for species encountered may be a useful routine measure. Following the data recording phase of the procedure, specimens that have been identified and processed in the field are released on site to minimize mortality.

6. The data collection phase includes the completion of the top portion of the "Fish Sampling Field Data Sheet" (Appendix A-4, Form 1), which duplicates selected information from the physical/chemical field sheet. Information regarding the sample collection procedures must also be recorded. This includes method of fish capture, start time, ending time, duration of sampling, maximum and mean stream widths. The percentage of each habitat type in the reach is estimated and documented on the data sheet. Comments should include sampling conditions, e.g., visibility, flow, difficult access to stream, or anything that may prove

QUALITY CONTROL (QC) IN THE FIELD

1. Quality control must be a continuous process in fish bioassessment and should include all program aspects, from field collection and preservation to habitat assessment, sample processing, and data recording. Field validation should be conduced at selected sites and will involve the collection of a duplicate sample taken from an adjacent reach upstream of the initial sampling site. The adjacent reach should be similar to the initial site with respect to habitat and stressors. Sampling QC data should be evaluated following the first year of sampling in order to determine a level of acceptable variability and the appropriate duplication frequency.

2. Field identifications of fish *must* be conducted by qualified/trained fish taxonomists, familiar with local and regional ichthyofauna. Questionable records are prevented by: (a) requiring the presence of at least one experienced/trained fish taxonomist on every field effort, and (b) preserving selected specimens (e.g., Klemm and Lazorchak 1995 recommend a subsample of a maximum 25 voucher specimens of each species) and those that cannot by readily identified in the field for laboratory verification and/or examination by a second qualified fish taxonomist (see Section 8.2). Specimens must be properly preserved and labeled (refer to Section 8.1.1, number 5). When needed, chain-of-custody forms must be initiated following sample preservation, and must include the same information as the sample container labels.

3. All field equipment must be in good operating condition, and a plan for routine inspection, maintenance, and/or calibration must be developed to ensure consistency and quality of field data. Field data must be complete and legible, and should be entered on standardized field data forms and/or digital recorders. While in the field, the field team should possess sufficient copies of standardized field data forms and chains-of-custody for all anticipated sampling sites, as well as copies of all applicable Standard Operating Procedures (SOPs).

to be valuable information to consider for future sampling events or by personnel unfamiliar with the site.

8.2 LABORATORY IDENTIFICATION AND VERIFICATION

Fish records of questionable quality are prevented by preserving specimens (that cannot be readily identified in the field) for laboratory examination and/or a voucher collection for laboratory verification. Specimens must be properly preserved (e.g., 10% formalin for tissue fixing and 70% ethanol for long-term storage) and labeled (using museum-grade archival labels/paper, and formalin/alcohol-proof pen or pencil). Labels should contain (at a minimum) site location data (i.e., verbal description and site coordinates), collection date, collector's names, species identification (for fishes identified in the field), species totals, and sample identification code and/or station number. All samples received in the laboratory should be tracked using a sample log-in procedure (Appendix A-4, Form 2). Laboratory fisheries professionals *must* be capable of identifying fish to the lowest possible taxonomic level (i.e., species or subspecies) and should have access to suitable regional taxonomic references (see Section 8.4) to aid in the identification process. Laboratories that do not typically identify fish, or trained fisheries professionals that have difficulty identifying a particular specimen or group of fish, should contact a taxonomic specialist (i.e., a recognized authority for that particular taxonomic group). Taxonomic nomenclature *must* be kept consistent and current. Common and scientific names of fishes from the United States and Canada are listed in Robins et al. (1991).

QUALITY CONTROL (QC) FOR TAXONOMY

1. A representative voucher collection must be retained for unidentified specimens, small specimens, and new locality records. In addition, a second voucher jar should be retained for a subsample of each species identified in the field (e.g., Klemm and Lazorchak 1995 recommend a subsample of 25 voucher specimens of each species). The vouchers must be properly preserved, labeled, and stored in the laboratory for future reference (see Section 8.2).

2. Voucher collections should be verified by a second qualified fish taxonomist, i.e., a professional other than the taxonomist responsible for the original field identifications. The word "validated" and the name of the taxonomist that validated the identification should be added to each voucher label. Specimens sent from the laboratory to taxonomic specialists should be recorded in a "Taxonomy Validation Notebook" (see Chapter 7), noting the label information and date sent. Upon return of the specimens, the date received and findings should also be recorded in the notebook (and the voucher label), along with the name of the person who performed the validation.

3. Information on samples completed (through the identification/validation process) will be tracked in a "Sample Log" notebook, to track the progress of each sample (Appendix A-4, Form 2). Sample log entries will be updated as each step is completed (e.g., receipt, identification, validation, archive).

4. A library of taxonomic literature is essential for the aid and support of identification/verification activities, and must be maintained (and updated as needed) in the laboratory. A list of selected taxonomic references is provided in Section 8.4.

8.3 DESCRIPTION OF FISH METRICS

Through the IBI, Karr et al. (1986) provided a consistent theoretical framework for analyzing fish assemblage data. The IBI is an aggregation of 12 biological metrics that are based on the fish assemblage's taxonomic and trophic composition and the abundance and condition of fish. Such multiple-parameter indices are necessary for making objective evaluations of complex systems. The IBI was designed to evaluate the quality of small Midwestern warmwater streams but has been modified for use in many regions (e.g., eastern and

western United States, Canada, France) and in different ecosystems (e.g., rivers, impoundments, lakes, and estuaries).

The metrics attempt to quantify a biologist's best professional judgment (BPJ) of the quality of the fish assemblage. The IBI utilizes professional judgment, but in a prescribed manner, and it includes quantitative standards for discriminating the condition of the fish assemblage (Figure 8-1). BPJ is involved in choosing both the most appropriate population or assemblage element that is representative of each metric and in setting the scoring criteria. This process can be easily and clearly modified, as opposed to judgments that occur after results are calculated. Each metric is scored against criteria based on expectations developed from appropriate regional reference sites. Metric values approximating, deviating slightly from, or deviating greatly from values occurring at the reference sites are scored as 5, 3, or 1, respectively. The scores of the 12 metrics are added for each station to give an IBI ranging from a maximum of 60 (excellent) to a minimum of 12 (very poor). Trophic and tolerance classifications of selected fish species are listed in Appendix C. Additional classifications can be derived from information in State and regional fish texts, by objectively assessing a large statewide database, or by contacting authors/originators of regional IBI

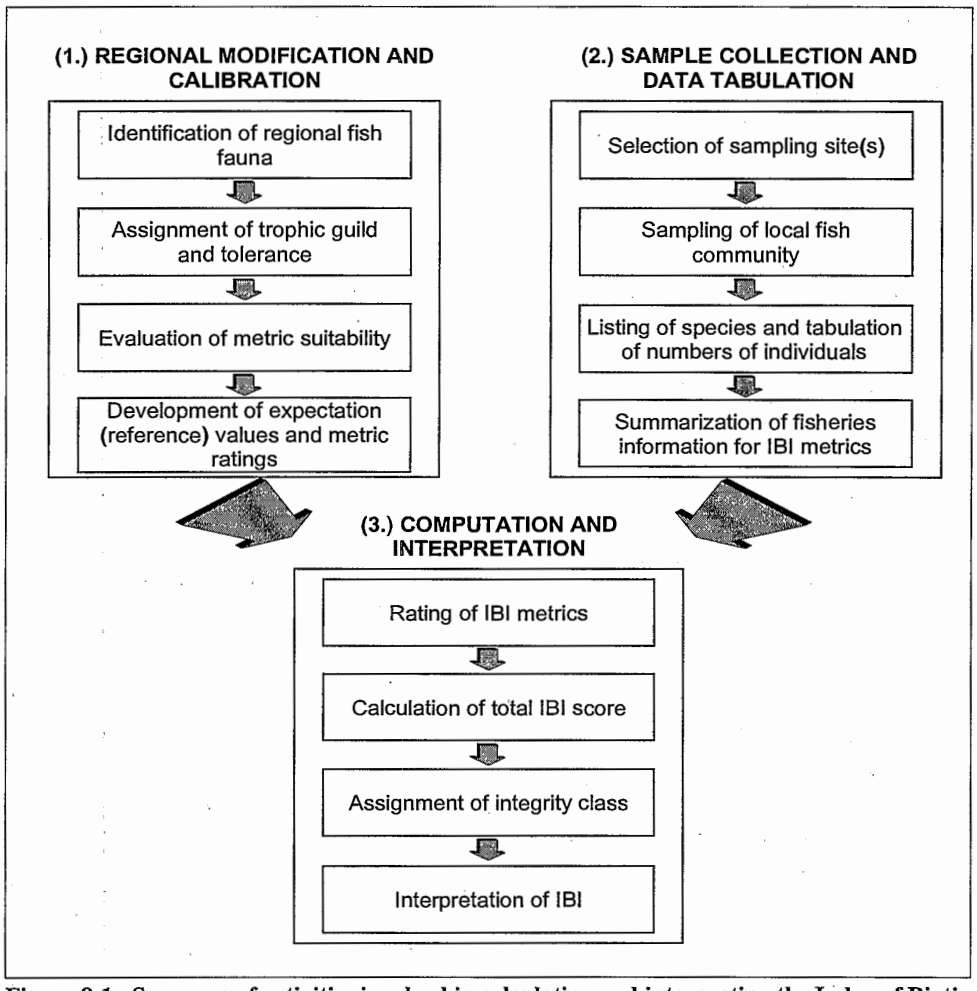

Figure 8-1. Sequence of activities involved in calculating and interpreting the Index of Biotic Integrity (adapted from Karr et al. 1986).

programs or pilot studies. Use of the IBI by water resource agencies may result in further modifications. Many modifications have occurred (Miller et al. 1988) without changing the IBI's basic theoretical foundations.

The IBI serves as an integrated analysis because individual metrics may differ in their relative sensitivity to various levels of biological condition. A description and brief rationale for each of the 12 IBI metrics is outlined below. The original metrics described by Karr (1981) for Illinois streams are followed by substitutes used in or proposed for different geographic regions and stream sizes. Because of zoogeographic differences, different families or species are evaluated in different regions, with regional substitutes occupying the same general habitat or niche. The source for each substitute is footnoted below. Table 8-1 presents an overview of the IBI metric alternatives and their sources for various areas of the United States and Canada.

8.3.1 Species Richness and Composition Metrics

These metrics assess the species richness component of diversity and the health of resident taxonomic groupings and habitat guilds of fishes. Two of the metrics assess assemblage composition in terms of tolerant or intolerant species.

EXAMPLES OF SOURCES FOR METRIC ALTERNATIVES

Karr et al. (1986)
Leonard and Orth (1986)
Moyle et al. (1986)
Fausch and Schrader (1987)
Hughes and Gammon (1987)
Ohio EPA (1987)
Miller et al. (1988)
Steedman (1988)
Simon (1991)
Lyons (1992a)
Barbour et al. (1995)
Simon and Lyons (1995)
Hall et al. (1996)
Lyons et al. (1996)
Roth et al. (1997)
Simon (1999)

Metric 1. Total number of fish species Substitutes (Table 8-1): Total number of resident native fish species and salmonid age classes.

This number decreases with increased degradation; hybrids and introduced species are not included. In coldwater streams supporting few fish species, the age classes of the species found represent the suitability of the system for spawning and rearing. The number of species is strongly affected by stream size at most small warmwater stream sites, but not at large river sites (Karr et al. 1986, Ohio EPA 1987).

Metric 2. Number and identity of darter species Substitutes (Table 8-1): Number and identity of sculpin species, benthic insectivore species, salmonid juveniles (individuals); number of sculpins (individuals); percent round-bodied suckers, sculpin and darter species.

These species are sensitive to degradation resulting from siltation and benthic oxygen depletion because they feed and reproduce in benthic habitats (Kuehne and Barbour 1983, Ohio EPA 1987). Many smaller species live within the rubble interstices, are weak swimmers, and spend their entire lives in an area of 100-400 m^2 (Matthews 1986, Hill and Grossman 1987). Darters are appropriate in most Mississippi Basin streams; sculpins and yearling trout occupy the same niche in western streams. Benthic insectivores and sculpins or darters are used in small Atlantic slope streams that have few sculpins or darters, and round-bodied suckers are suitable in large midwestern rivers.

Metric 3. Number and identity of sunfish species. Substitutes (Table 8-1): Number and identity of cyprinid species, water column species, salmonid species, headwater species, and sunfish and trout species.

Table 8-1. Fish IBI metrics used in various regions of North America.[a]

Alternative IBI Metrics	Midwestern United States	Central Appalachians	Sacramento-San Joaquin	Colorado Front Range	Western Oregon	Ohio	Ohio Headwater Sites	Northeastern United States	Ontario	Central Corn Belt Plain	Wisconsin-Warmwater	Wisconsin-Coldwater	Maryland Coastal Plain	Maryland Non-Tidal
1. Total Number of Species	X	X	X	X				X		X			X	X
#native fish species					X	X	X		X		X			
# salmonid age classes[b]				X	X									
2. Number of Darter Species	X	X		X		X				X	X			
# sculpin species					X									
# benthic insectivore species								X						
# darter and sculpin species							X							
# darter, sculpin, and madtom species											X			
# salmonid juveniles (individuals)[b]			X		X			X						
% round-bodied suckers						X[c]								
# sculpins (individuals)			X											
# benthic species													X	X
3. Number of Sunfish Species	X			X		X				X	X			
# cyprinid species					X									
# water column species								X						
# sunfish and trout species									X					
# salmonid species			X							X				
# headwater species							X							
% headwater species							X			X				
4. Number of Sucker Species	X				X	X		X		X	X			
# adult trout species[b]			X		X									
# minnow species				X			X			X				
# sucker and catfish species									X					
5. Number of Intolerant Species	X			X	X	X		X			X	X	X	X
# sensitive species							X			X				
# amphibian species			X											
presence of brook trout									X					
% stenothermal cool and cold water species												X		
% of salmonid ind. as brook trout												X		
6. % Green Sunfish	X													
% common carp					X									
% white sucker				X				X						
% tolerant species						X	X			X	X	X	X	X
% creek chub		X												
% dace species									X					
% eastern mudminnow													X	

Table 8-1. Fish IBI metrics used in various regions of North America.[a]

Alternative IBI Metrics	Midwestern United States	Central Appalachians	Sacramento-San Joaquin	Colorado Front Range	Western Oregon	Ohio	Ohio Headwater Sites	Northeastern United States	Ontario	Central Corn Belt Plain	Wisconsin-Warmwater	Wisconsin-Coldwater	Maryland Coastal Plain	Maryland Non-Tidal
7. % Omnivores	X			X		X	X	X	X	X	X			
% generalist feeders		X												
% generalists, omnivores, and invertivores														X
8. % Insectivorous Cyprinids	X												X	
% insectivores					X			X		X	X		X	X[e]
% specialized insectivores		X		X										
# juvenile trout			X											
% insectivorous species						X	X							
9. % Top Carnivores	X					X		X	X	X	X	X		
% catchable salmonids					X									
% catchable trout			X											
% pioneering species							X			X			X	
Density catchable wild trout			X											
10. Number of Individuals (or catch per effort)	X	X	X	X	X	X[d]	X[d]		X	X	X[d]		X	
Density of individuals								X						X
% abundance of dominant species													X	X
Biomass (per m²)														X[f]
11. % Hybrids	X							X						
% introduced species				X	X									
% simple lithophills						X				X	X			X
# simple lithophills species							X							
% native species			X											
% native wild individuals			X											
% silt-intolerant spawners													X	
12. % Diseased Individuals (deformities, eroded fins, lesions, and tumors)	X	X		X	X	X	X	X	X	X	X		X	X

Note: X = metric used in region. Many of these variations are applicable elsewhere.

a Taken from Karr et al. (1986), Leonard and Orth (1986), Moyle et al. (1986), Fausch and Schrader (1987), Hughes and Gammon (1987), Ohio EPA (1987), Miller et al. (1988), Steedman (1988), Simon (1991), Lyons (1992a), Barbour et al. (1995), Simon and Lyons (1995), Hall et al. (1996), Lyons et al. (1996), Roth et al. (1997).

b Metric suggested by Moyle et al. (1986) or Hughes and Gammon (1987) as a provisional replacement metric in small western salmonid streams.

c Boat sampling methods only (i.e., larger streams/rivers).

d Excluding individuals of tolerant species.

e Non-coastal Plain streams only.

f Coastal Plain streams only.

These pool species decrease with increased degradation of pools and instream cover (Gammon et al. 1981, Angermeier 1987, Platts et al. 1983). Most of these fishes feed on drifting and surface invertebrates and are active swimmers. The sunfishes and salmonids are important sport species. The sunfish metric works for most Mississippi Basin streams, but where sunfish are absent or rare, other groups are used. Cyprinid species are used in coolwater western streams; water column species

occupy the same niche in northeastern streams; salmonids are suitable in coldwater streams; headwater species serve for midwestern headwater streams; and trout and sunfish species are used in southern Ontario streams. Karr et al. (1986) and Ohio EPA (1987) found the number of sunfish species to be dependent on stream size in small streams, but Ohio EPA (1987) found no relationship between stream size and sunfish species in medium to large streams, nor between stream size and headwater species in small streams.

Metric 4. Number and identity of sucker species. Substitutes (Table 8-1): Number of adult trout species, number of minnow species, and number of suckers and catfish.

These species are sensitive to physical and chemical habitat degradation and commonly comprise most of the fish biomass in streams. All but the minnows are longlived species and provide a multiyear integration of physicochemical conditions. Suckers are common in medium and large streams; minnows dominate small streams in the Mississippi Basin; and trout occupy the same niche in coldwater streams. The richness of these species is a function of stream size in small and medium sized streams, but not in large (e.g., non-wadeable) rivers.

Metric 5. Number and identity of intolerant species. Substitutes (Table 8-1): Number and identity of sensitive species, amphibian species, and presence of brook trout.

This metric distinguishes high and moderate quality sites using species that are intolerant of various chemical and physical perturbations. Intolerant species are typically the first species to disappear following a disturbance. Species classified as intolerant or sensitive should only represent the 5-10 percent most susceptible species, otherwise this becomes a less discriminating metric. Candidate species are determined by examining regional ichthyological books for species that were once widespread but have become restricted to only the highest quality streams. Ohio EPA (1987) uses number of sensitive species (which includes highly intolerant and moderately intolerant species) for headwater sites because highly intolerant species are generally not expected in such habitats. Moyle (1976) suggested using amphibians in northern California streams because of their sensitivity to silvicultural impacts. This also may be a promising metric in Appalachian streams which may naturally support few fish species. Steedman (1988) found that the presence of brook trout had the greatest correlation with IBI score in Ontario streams. The number of sensitive and intolerant species increases with stream size in small and medium sized streams but is unaffected by size of large (e.g., non-wadeable) rivers.

Metric 6. Proportion of individuals as green sunfish. Substitutes (Table 8-1): Proportion of individuals as common carp, white sucker, tolerant species, creek chub, and dace.

This metric is the reverse of Metric 5. It distinguishes low from moderate quality waters. These species show increased distribution or abundance despite the historical degradation of surface waters, and they shift from incidental to dominant in disturbed sites. Green sunfish are appropriate in small midwestern streams; creek chubs were suggested for central Appalachian streams; common carp were suitable for a coolwater Oregon river; white suckers were selected in the northeast and Colorado where green sunfish are rare to absent; and dace (*Rhinichthys* species) were used in southern Ontario. To avoid weighting the metric on a single species, Karr et al. (1986) and Ohio EPA (1987) suggest using a small number of highly tolerant species (e.g., alternative Metric 6—percent abundance of tolerant species).

8.3.2 Trophic Composition Metrics

These three metrics assess the quality of the energy base and trophic dynamics of the fish assemblage. Traditional process studies, such as community production and respiration, are time consuming to conduct and the results are equivocal; distinctly different situations can yield similar results. The trophic composition metrics offer a means to evaluate the shift toward more generalized foraging that typically occurs with increased degradation of the physicochemical habitat.

Metric 7. Proportion of individuals as omnivores. Substitutes (Table 8-1): Proportion of individuals as generalist feeders.

The percent of omnivores in the community increases as the physical and chemical habitat deteriorates. Omnivores are defined as species that consistently feed on substantial proportions of plant and animal material. Ohio EPA (1987) excludes sensitive filter feeding species such as paddlefish and lamprey ammocoetes and opportunistic feeders like channel catfish. In areas where few species fit the true definition of omnivore, the proportion of generalized feeders may be substituted (Leonard and Orth 1986).

Metric 8. Proportion of individuals as insectivorous cyprinids. Substitutes (Table 8-1): Proportion of individuals as insectivores, specialized insectivores, insectivorous species, and number of juvenile trout.

Invertivores, primarily insectivores, are the dominant trophic guild of most North American surface waters. As the invertebrate food source decreases in abundance and diversity due to habitat degradation (e.g., anthropogenic stressors), there is a shift from insectivorous to omnivorous fish species. Generalized insectivores and opportunistic species, such as blacknose dace and creek chub were excluded from this metric by Ohio EPA (1987). This metric evaluates the midrange of biological condition, i.e., low to moderate condition.

Metric 9. Proportion of individuals as top carnivores. Substitutes (Table 8-1): Proportion of individuals as catchable salmonids, catchable wild trout, and pioneering species.

The top carnivore metric discriminates between systems with high and moderate integrity. Top carnivores are species that feed, as adults, predominantly on fish, other vertebrates, or crayfish. Occasional piscivores, such as creek chub and channel catfish, are not included. In trout streams, where true piscivores are uncommon, the percent of large salmonids is substituted for percent piscivores. These species often represent popular sport fish such as bass, pike, walleye, and trout. Pioneering species are used by Ohio EPA (1987) in headwater streams typically lacking piscivores. Pioneering species predominate in unstable environments that have been affected by temporal desiccation or anthropogenic stressors, and are the first to reinvade sections of headwater streams following periods of desiccation.

8.3.3 Fish Abundance and Condition Metrics

The last 3 metrics indirectly evaluate population recruitment, mortality, condition, and abundance. Typically, these parameters vary continuously and are time consuming to estimate accurately. Instead of such detailed population attributes or estimates, general population parameters are evaluated. Indirect estimation is less variable and much more rapidly determined.

Metric 10. Number of individuals in sample. Substitutes (Table 8-1): Density of individuals.

This metric evaluates population abundance and varies with region and stream size for small streams. It is expressed as catch per unit effort, either by area, distance, or time sampled. Generally sites with lower integrity support fewer individuals, but in some nutrient poor regions, enrichment increases the number of individuals. Steedman (1988) addressed this situation by scoring catch per minute of sampling greater than 25 as a 3, and less than 4 as a 1. Unusually low numbers generally indicate toxicity, making this metric most useful at the low end of the biological integrity scale. Hughes and Gammon (1987) suggest that in larger streams, where sizes of fish may vary in orders of magnitude, total fish biomass may be an appropriate substitute or additional metric.

THE INDEX OF WELL-BEING (IWB)

The Iwb (Gammon 1976, 1980, Hughes and Gammon 1987) incorporates two abundance and two diversity measures in an approximately equal fashion, thereby representing fish assemblage quality more realistically than a single diversity or abundance measure. The Iwb is calculated using the formula:

$$Iwb = 0.5 \ln N + 0.5 \ln B + \bar{H}_N + \bar{H}_B$$

where

N = number of individuals caught per unit distance sampled
B = biomass of individuals caught per unit distance
$\bar{H}$ = Shannon diversity index, calculated as:

$$\bar{H} = -\Sigma \frac{n_i}{N} \ln \left(\frac{n_i}{N}\right)$$

where

n_i = relative number or weight of the ith species
N = total number or weight of the sample

THE MODIFIED INDEX OF WELL-BEING (MIWB)

The MIwb (Ohio EPA 1987) retains the same formula as the Iwb; however, highly tolerant species, hybrids, and exotic species are eliminated from the abundance (i.e., number and biomass) components of the formula. This modification increases the sensitivity of the index to a wider array of environmental disturbances.

Metric 11. Proportion of individuals as hybrids. Substitutes (Table 8-1): Proportion of individuals as introduced species, simple lithophils, and number of simple lithophilic species.

This metric is an estimate of reproductive isolation or the suitability of the habitat for reproduction. Generally as environmental degradation increases the percent of hybrids and introduced species also increases, but the proportion of simple lithophils decreases. However, minnow hybrids are found in some high quality streams, hybrids are often absent from highly impacted sites, and hybridization is rare and difficult to detect. Thus, Ohio EPA (1987) substitutes simple lithophils for hybrids. Simple lithophils spawn where their eggs can develop in the interstices of sand, gravel, and cobble substrates without parental care. Hughes and Gammon (1987) and Miller et al. (1988) propose using percent introduced individuals. This metric is a direct measure of the loss of species segregation between midwestern and western fishes that existed before the introduction of midwestern species to western rivers.

Metric 12. Proportion of individuals with disease, tumors, fin damage, and skeletal anomalies

This metric depicts the health and condition of individual fish. These conditions occur infrequently or are absent from minimally impacted reference sites but occur frequently below point sources and

in areas where toxic chemicals are concentrated. They are excellent measures of the subacute effects of chemical pollution and the aesthetic value of game and nongame fish.

Metric 13. Total fish biomass (optional).

Hughes and Gammon (1987) suggest that in larger (e.g., non-wadeable) rivers where sizes of fish may vary in orders of magnitude this additional metric may be appropriate. Gammon (1976, 1980) and Ohio EPA (1987) developed an Index of Well-Being (Iwb) and Modified Index of Well-Being (MIwb), respectively, based upon both fish abundance and biomass measures. The combination of diversity and biomass measures is a useful tool for assessing fish assemblages in larger rivers (Yoder and Rankin 1995b). Ohio EPA (1987) found that the additional collection of biomass data (i.e., in addition to abundance information needed for the IBI) required to calculate the MIwb does not represent a significant expenditure of time, providing that subsampling techniques are applied (see Field Sampling Procedures 8.1.1).

Because the IBI is an adaptable index, the choice of metrics and scoring criteria is best developed on a regional basis through use of available publications (Karr et al. 1986, Ohio EPA 1987, Miller et al. 1988, Steedman 1988; Simon 1991, Lyons 1992a, Simon and Lyons 1995, Hall et al. 1996, Lyons et al. 1996, Roth et al. 1997, Simon 1999). Several steps are common to all regions. The fish species must be listed and assigned to trophic and tolerance guilds. Scoring criteria are developed through use of high quality historical data and data from minimally-impaired regional reference sites. This has been done for much of the country, but continued refinements are expected as more ecological data become available for the fish community.

8.4 TAXONOMIC REFERENCES FOR FISH

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9 BIOLOGICAL DATA ANALYSIS

States are faced with the challenge of not only developing tools that are both appropriate and cost-effective (Barbour 1997), but also the ability to translate scientific data for making sound management decisions regarding the water resource. The approach to analysis of biological (and other ecological) data should be straightforward to facilitate a translation for management application. This is not meant to reduce the rigor of data analysis but to ensure its place in making crucial decisions regarding the protection, mitigation, and management of the nation's aquatic resources. In fact, biological monitoring should combine biological insight with statistical power (Karr 1987). Karr and Chu (1999) state that a knowledge of regional biology and natural history (not a search for statistical relationships and significance) should drive both sampling design and analytical protocol.

A framework for bioassessment can be either an *a priori* or *a posteriori* approach to classifying sites and establishing reference condition. To provide a broad comparison of the 2 approaches, it is assumed that candidate reference sites are available from a wide distribution of streams. In the first stage, data collection is conducted at a range of reference sites (and non-reference or test sites) regardless of the approach. The differentiation of site classes into more homogeneous groups or classes may be based initially on *a priori* physicochemical or biogeographical attributes, or solely on *a posteriori* analysis of biology (Stage 2 as illustrated in Figure 9-1). Analysts who use multimetric indices tend to use *a priori* classification; and analysts who use one of the multivariate approaches tend to use *a posteriori*, multivariate classification. However, there is no reason *a priori* classification could not be used with multivariate assessments, and vice-versa.

Two data analysis strategies have been debated in scientific circles (Norris 1995, Gerritsen 1995) over the past few years — the multimetric approach as implemented by most water resource agencies in the United States (Davis et al. 1996), and a multivariate approach advocated by several water resource agencies in Europe and Australia (Wright et al. 1993, Norris and Georges 1993). The contrast and similarity of these 2 approaches are illustrated by Figure 9-1 in a 5-stage generic process of bioassessment development. While there are many forms of multivariate analyses, the 2 most common multivariate approaches are the Benthic Assessment of Sediment (BEAST) used in parts of Canada, the River Invertebrate Prediction and Classification System (RIVPACS) used in parts of England and its derivation, the Australian River Assessment System (AusRivAS) used in Australia.

The development of the reference condition from the range of reference sites (Figure 9-1, Stage 4), is formulated by a suite of biological metrics in the multimetric approach whereas the species composition data are the basis for models used in the multivariate approach. However, both multivariate techniques differ in their probability models. Once the reference condition is established, which serves as a benchmark for assessment, the final stage becomes the basis for the assessment and monitoring program. In this fifth and final stage (Figure 9-1), the multimetric approach uses established percentiles of the population distribution of the reference sites for the metrics to discriminate between impaired and minimally impaired conditions. Where a dose/response relationship can be established from sites having a gradient of conditions (reference sites unknown), an upper percentile of the metric is used to partition metric values into condition ranges. The BEAST multivariate technique uses a probability model based on taxa ordination space

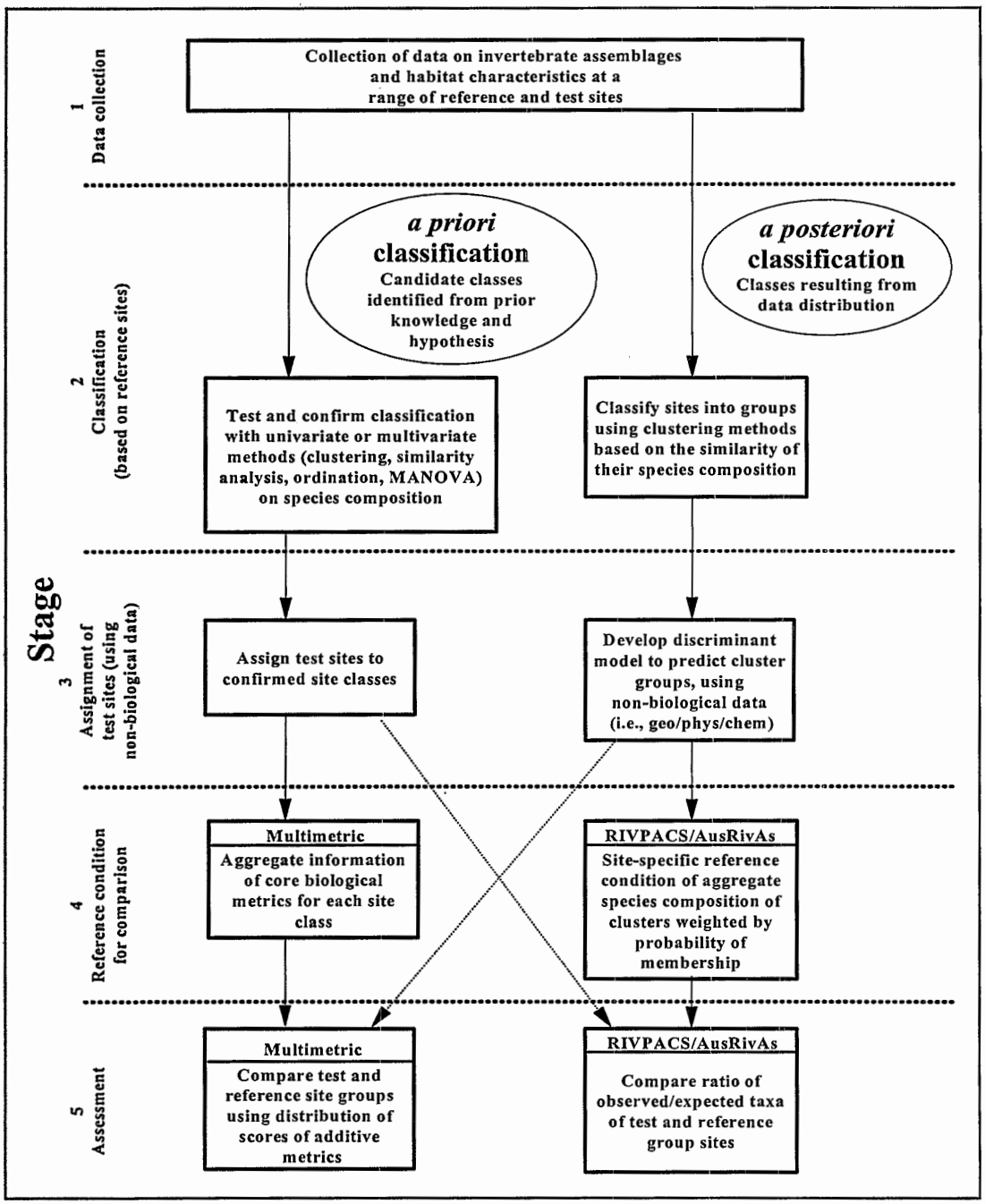

Figure 9-1. Comparison of the developmental process for the multimetric and multivariate approaches to biological data analysis (patterned after ideas based on Reynoldson, Rosenberg, and Resh, unpublished data).

and the "best fit" of the test site(s) to the probability ellipses constructed around the reference site classes (Reynoldson et al. 1995). The AusRivAS/RIVPACS model calculates the probability of expected taxa occurrence from the weighted reference site groups.

The bioassessment program in Maine is an example of a state that uses a multivariate analysis in the form of discriminant function models and applies these models to a variety of metrics. Decisions are made with regard to attainment (or non-attainment) of designated aquatic life uses. The approach used by Maine is based on characteristics of both the multivariate and multimetric approach. In this chapter, only the multimetric approach to biological data analysis is discussed in detail. Discussion of multivariate approaches is restricted to the overview of the discriminant function model used by Maine and the AusRivAS/RIVPACS technique.

9.1 THE MULTIMETRIC APPROACH

Performing data analysis for the Rapid Bioassessment Protocols (RBPs) or any other multimetric approach typically involves 2 phases: (1) Selection and calibration of the metrics and subsequent aggregation into an index according to homogenous site classes; and (2) assessment of biological condition at sites and judgment of impairment. The first phase is a developmental process and is only necessary as biological programs are being implemented. This process is essentially the characterizing of reference conditions that will form the basis for assessment. It is well-documented (Davis and Simon 1995, Gibson et al. 1996, Barbour et al. 1996b) and is summarized here. Developing the framework for reference conditions (i.e., background or natural conditions) is a process that is applicable to non-biological (i.e., physical and chemical) monitoring as well (Karr 1993, Barbour et al. 1996a).

The actual assessment of biological condition is ongoing and becomes cost-effective once Phase 1 has been completed, and the thresholds for determining attainment or non-attainment (impairment) have been established. The establishment of reference conditions (through actual sites or other means) is crucial to the determination of metric and index thresholds. These thresholds are essential elements in performing the assessment. It is possible that reference conditions (and resultant thresholds) will need to be established on a seasonal basis to accommodate year-round sampling and assessment. If data are available, a dose/response relationship between specific or cumulative stressors and biological condition will provide information on a gradient response, which can be a powerful means of determining impairment thresholds.

The 2 phases in data analysis for the multimetric approach are discussed separately in the following section. The reader is referred to supporting documentation cited throughout for more in-depth discussion of the concepts of multimetric assessment.

9.1.1 Metric Selection, Calibration, And Aggregation Into an Index

The development of biological indicators as part of a bioassessment program and as a framework for biocriteria is an iterative process where the site classification and metric selections are revisited at various stages of the analysis. However, once this process has been completed and the various technical issues have been addressed, continued monitoring becomes cost-effective. The conceptual process for proceeding from measurements to indicators to assessment of condition is illustrated in Figure 9-2 (Paulsen et al. 1991; Barbour et al., 1995; Gibson et al., 1996).

Index development outlined in this section requires a stream classification framework to partition natural variability and in which metrics are evaluated for scientific validity. The core metrics

representing various attributes of the targeted aquatic assemblage can be either aggregated into an index or retained as individual measures.

Step 1. Classify the Stream Resource

> *Classification* is the partitioning of natural variability into groups or classes of stream sites that are relatively homogeneous with regard to physical, chemical, and biological attributes.

Site classification provides a framework for organizing and interpreting natural variability among streams; ecoregions are a principal example of a classification framework (Omernik 1995). However, classification variables can be at a coarser or finer scale than ecoregions or subecoregions, such as elevation and drainage area. Elevation was determined to be an important classification variable in montane regions of the country (Barbour et al. 1992, 1994, Spindler 1996). Spindler (1996) found that benthic data adhered more closely to elevation than to ecoregions. Ohio EPA (1987) found that stream size (or drainage area) was a covariate and not a determinant of stream classes. The number of fish species increased with stream size (Figure 9-3).

Classification is best accomplished with reference sites that reflect the most natural and representative condition of the region. Candidate reference sites that are based on minimally degraded physical habitat and water chemistry are used as the basis for stream classification.

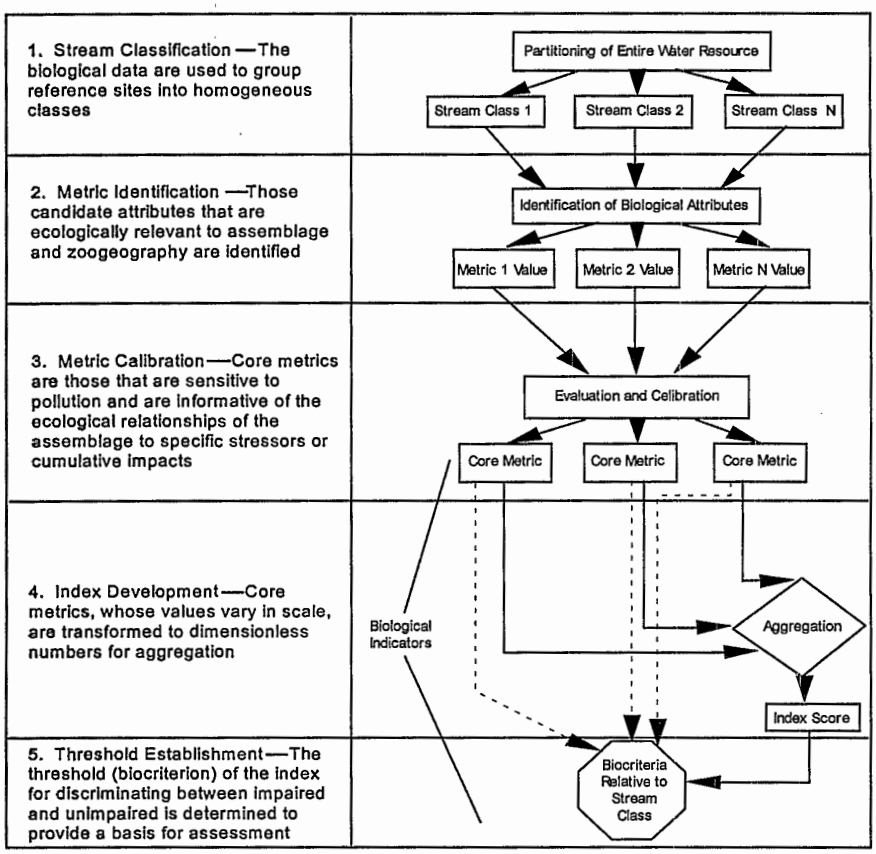

Figure 9-2. Process for developing assessment thresholds (modified from Paulsen et al. [1991] and Barbour et al. [1995]). Dotted lines indicate use of individual metric information to aid in the evaluation of biological condition and cause of impairment.

Quantitative criteria for reference sites aid in a consistent framework for selection. An example of quantitative criteria for identifying reference sites in a statewide study for Maryland (Roth et al., 1997) is presented below (a reference site must meet all 12 criteria):

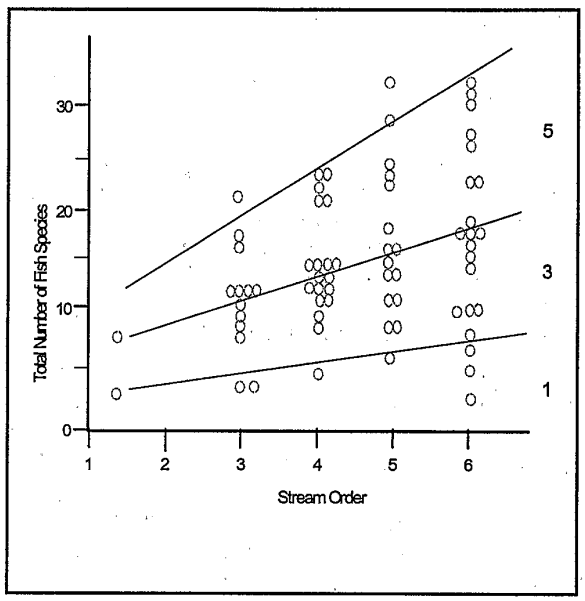

Figure 9-3. Species richness versus stream size (taken from Fausch et al. 1984).

1. pH ≥ 6; if blackwater stream, then pH < 6 and DOC ≥ 8 mg/l
2. ANC ≥ 50 μeq/l
3. DO ≥ 4 ppm
4. nitrate ≤ 300 μeq/l
5. urban land use ≤ 20% of catchment area
6. forest land use ≥ 25% of catchment area
7. remoteness rating: optimal or suboptimal
8. aesthetics rating: optimal or suboptimal
9. instream habitat rating: optimal or suboptimal
10. riparian buffer width ≥ 15 m
11. no channelization
12. no point source discharges

Sites are initially classified according to distinctive geographic, physical, or chemical attributes. Refinement and confirmation of the site classes is accomplished using the biological data (Figure 9-4). Classification is used to determine whether the sampled sites should be placed into specific groups that will minimize variance *within* groups and maximize variance *among* groups. As an example, 3 ecoregionally based delineations (bioregions) were effective at partitioning the variability among reference sites in Florida (Figure 9-5).

Components of Step 1 include:

- Identify classification alternatives. Use physical and chemical parameters that are minimally influenced by human activity to identify classes for testing.
- Identify candidate reference sites that meet the criteria of most "natural" conditions of region.
- Test alternative classification schemes of subecoregion, stream type, elevation, etc., using multiple metric and non-metric biological characteristics including measures such as species composition and EPT taxa (Figure 9-5). Several multivariate classification and ordination

methods, and univariate descriptions and tests, can assist in this process (Reckhow and Warren-Hicks 1996, Gerritsen 1995, 1996, Barbour et al. 1996b).

- Evaluate classification alternatives and determine best distinction into groups or classes using biological data. By confirming resource classification based on biological data, site classes are identified that adequately partition variability.

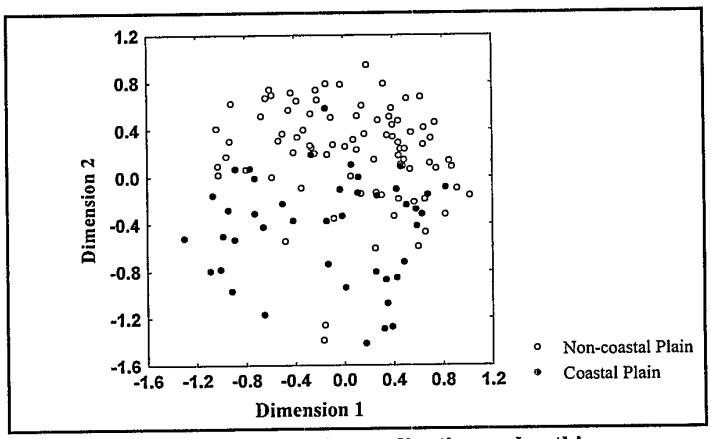

Figure 9-4. Results of mutivariate ordination on benthic macroinvertebrate data from "least impaired" streams from Maryland, using nonmetric multidimensional scaling (NMDS) of Bray-Curtis dissimilarity coefficients.

Step 2. Identify Potential Measures For Each Assemblage

> A *metric* is a characteristic of the biota that changes in some predictable way with increased human influence.

Metrics allow the investigator to use meaningful indicator attributes in assessing the status of assemblages and communities in response to perturbation. The definition of a metric is a characteristic of the biota that changes in some predictable way with increased human influence (Barbour et al. 1995). For a metric to be useful, it must have the following technical attributes: (1) ecologically relevant to the biological assemblage or community under study and to the specified program objectives; (2) sensitive to stressors and provides a response that can be discriminated from natural variation. The purpose of using multiple metrics to assess biological condition is to aggregate and convey the information available regarding the elements and processes of aquatic communities.

All metrics that have ecological relevance to the assemblage under study and that respond to the targeted stressors are potential metrics for testing. From this "universe" of metrics, some will be eliminated because of insufficient data or because the range of values is not sufficient for discrimination between natural variability and anthropogenic effects. This step is to identify the candidate metrics that are most informative, and therefore, warrant further analysis.

The potential measures that are relevant to the ecology of streams within the region or state should be selected to ensure that various aspects of the elements and processes of the aquatic assemblage are addressed. Representative metrics should be selected from each of 4 primary categories: (1) richness measures for diversity or variety of the assemblage; (2) composition measures for identity and dominance; (3) tolerance measures that represent sensitivity to perturbation; and (4) trophic or

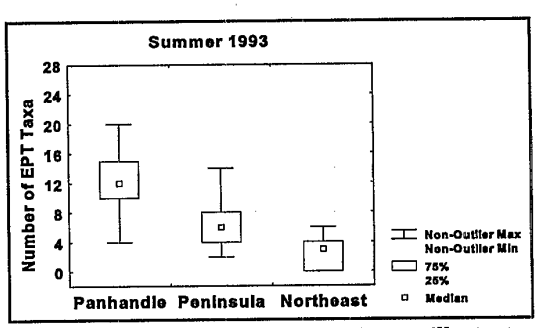

Figure 9-5. An example of a metric that illustrates classification of reference stream sites in Florida into bioregions.

habit measures for information on feeding strategies and guilds. Karr and Chu (1999) suggest that measures of individual health be used to supplement other metrics. Karr has expanded this concept to include metrics that are reflective of landscape level attributes, thus providing a more comprehensive multimetric approach to ecological assessment (Karr et al. 1987). See Table 9-1 for potential metrics that have been useful for periphyton, benthic macroinvertebrates, and fish are summarized in Chapters 6, 7, and 8, respectively.

Components of Step 2 include:

- Review value ranges of potential metrics, and eliminate those that have too many zero values in the population of reference sites to calculate the metric at a large enough proportion of sites.
- Use descriptive statistics (central tendency, range, distribution, outliers) to characterize metric performance within the population of reference sites of each site class.
- Eliminate metrics that have too high variability in the reference site population that they can not discriminate among sites of different condition. The potential for each measure is based on possessing enough information and a specific range of variability to discriminate among site classes and biological condition.

Step 3. Select Robust Measures

Core metrics are those that will discriminate between good and poor quality ecological conditions. It is important to understand the effects of various stressors on the behavior of specific metrics. Metrics that are responsive to specific pollutants or stressors, where the response is well-characterized, are most useful as a diagnostic tool. Core metrics are those that represent diverse aspects of structure, composition, individual health, or processes of the aquatic biota. Together they form the foundation for a sound, integrated analysis of the biotic condition to judge attainment of biological criteria.

> The ability of a biological metric to *discriminate* between "known" reference conditions and "known" stressed conditions (defined by physical and chemical characteristics) is crucial in the selection of *core metrics* for future assessments.

Discriminatory ability of biological metrics can be evaluated by comparing the distribution of each metric at a set of reference sites with the distribution of metrics from a set of "known" stressed sites (defined by physical and chemical characteristics) within each site class. If there is minimal or no overlap between the distributions, then the metric can be considered to be a strong discriminator between reference and impaired conditions (Figure 9-6).

As was done with candidate reference sites (see Step 1), criteria are established to identify a population of "known" stressed sites based on physical and chemical measures of degradation. An example set of criteria established for Maryland streams for which failure indicated a stressed site for testing discriminatory power (Roth et al. 1997) is as follows:

- pH $\leq$ 5 and ANC $\leq$ 0 μeq/l (except for blackwater streams, DOC $\geq$ 8 mg/l)
- DO $\leq$ 2 ppm
- nitrate > 500 μM/l and DO < 3 ppm
- instream habitat rating poor and urban land use > 50% of catchment area

- instream habitat rating poor and bank stability rating poor
- instream habitat rating poor and channel alteration rating poor

Table 9-1. Some potential metrics for periphyton, benthic macroinvertebrates, and fish that could be considered for streams. Redundancy can be evaluated during the calibration phase to eliminate overlapping metrics.

	Richness Measures	Composition Measures	Tolerance Measures	Trophic/Habit Measures
Periphyton	• Total no. of taxa • No. of common nondiatom taxa • No. of diatom taxa	• % community similarity • % live diatoms • Diatom (Shannon) diversity index	• % tolerant diatoms • % sensitive taxa • % aberrant diatoms • % acidobiontic • % alkalibiontic • % halobiontic	• % motile taxa • Chlorophyll a • % saprobiontic • % eutrophic
Benthic Macroinvertebrate	• No. Total taxa • No. EPT taxa • No. Ephemeroptera taxa • No. Plecoptera taxa • No. Trichoptera taxa	• % EPT • % Ephemeroptera • % Chironomidae	• No. Intolerant Taxa • % Tolerant Organisms • Hilsenhoff Biotic Index (HBI) • % Dominant Taxon	• No. Clinger taxa • % Clingers • % Filterers • % Scrapers
Fish	• Total no. of native fish species • No. and identity of darter species • No. and identity of sunfish species • No. and identity of sucker species	• % pioneering species • Number of fish per unit of sampling effort related to drainage area	• No. and identity of intolerant species • % of individuals as tolerant species • % of individuals as hybrids • % of individuals with disease, tumors, fin damage, and skeletal anomalies	• % omnivores • % insectivores • % top carnivores

Step 3 can be separated into 2 elements that correspond to discrimination of core metrics (element 1) and determination of biological/physicochemical associations (element 2). Components of these elements include:

Element 1 Select core measures that are best for discriminating degraded condition

- Good (reference) designations of stream sites should be based on land use, physical and chemical quality, and habitat quality.
- Poor (stressed) designations of stream sites for testing impairment discriminations are also based on judgement criteria involving land use, physical and chemical and quality, and habitat quality.
- Determine which biological metrics best discriminate between the reference sites and sites with identified anthropogenic stressors.

- Those metrics having the strongest discriminatory power will provide the most confidence in assessing biological condition of unknown sites.

Element 2 *Determine the associations/linkages between candidate biological and physicochemical measures*

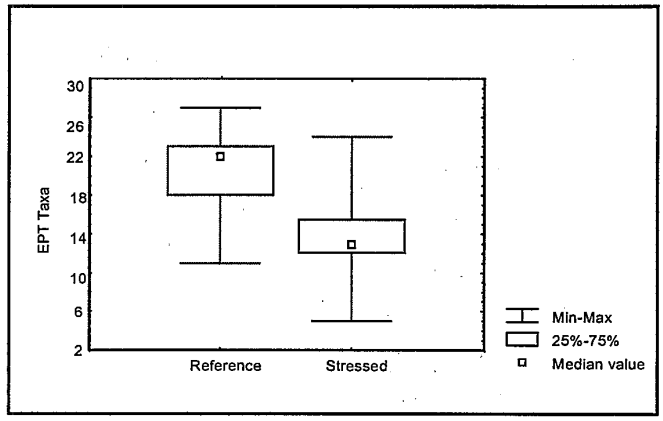

Figure 9-6. Example of discrimination, using the EPT index, between reference and stressed sites in Rocky Mountain streams, Wyoming.

- Plot relationship of metric values against various stressor categories, e.g., chemical concentrations, habitat condition and other measured stressors.

- If desired, multivariate ordination models may be used to elucidate gradients of response of metrics to stressors.

- Monotonic relationships between metrics and stressors allow the use of extreme values (highest or lowest) as reference condition.

- Some metrics may not always be monotonic. For example, total biomass and taxa richness values may exceed the reference at intermediate levels of nutrient enrichment.

- Multiple metrics should be selected to provide a strong and predictable relationship with stream condition.

Step 4. Determine the best aggregation of core measures for indicating status and change in condition

> An *index* provides a means of integrating information from a composite of the various measures of biological attributes.

The purpose of an index is to provide a means of integrating information from the various measures of biological attributes (or metrics). Metrics vary in their scale—they are integers, percentages, or dimensionless numbers. Prior to developing an integrated index for assessing biological condition, it is necessary to standardize core metrics via transformation to unitless scores. The standardization assumes that each metric has the same value and importance (i.e., they are weighted the same), and that a 50% change in one metric is of equal value to assessment as a 50% change in another.

Where possible, the scoring criterion for each metric is based on the distribution of values in the population of sites, which include reference streams; for example, the 95th percentile of the data distribution is commonly used (Figure 9-7) to eliminate extreme outliers. From this upper percentile, the range of the metric values can be standardized as a percentage of the 95th percentile value, or other (e.g., trisected or quadrisected), to provide a range of scores. Those values that are closest to the 95th percentile would receive higher scores, and those having a greater deviation from this percentile would have lower scores. For those metrics whose values *increase* in response to

perturbation (see Table 7-2 for examples of "reverse" metrics for benthic macroinvertebrates) the 5th percentile is used to remove outliers and to form a basis for scoring.

Alternative methods for scoring metrics, as illustrated in Figure 9-7, are currently in use in various parts of the US for multimetric indexes. A "trisection" of the scoring range has been well-documented (Karr et al. 1986, Ohio EPA 1987, Fore et al. 1996, Barbour et al. 1996b). A "quadrisection" of the range has been found to be useful for benthic assemblages (DeShon 1995, Maxted et al. in press). More recent studies are finding that a standardization of all metrics as percentages of the 95th percentile value yields the most sensitive index, because information of the component metrics is retained (Hughes et al. 1998). Unpublished data from statewide databases for Idaho, Wyoming, Arizona, and West Virginia, are supportive of this third alternative for scoring metrics. Ideally, a composite of all sites representing a gradient of conditions is used. This situation is analogous to a determination of a dose/response relationship and depends on the ability of incorporating both reference and non-reference sites.

Aggregation of metric scores simplifies management and decision making so that a single index value is used to determine whether action is needed. Biological condition of waterbodies is judged based on the summed index value (Karr et al. 1986). If the index value is above a criterion, then the stream is judged as "optimal" or "excellent" in condition. The exact nature of the action needed (e.g., restoration, mitigation, pollution enforcement) is not determined by the index value, but by analyses of the component metrics, in addition to the raw data and integrated with other ecological information. Therefore, the index is not the sole determinant of impairment and diagnostics, but when used in concert with the component information, strengthens the assessment (Barbour et al. 1996a).

Components of Step 4 include:

- Determine scoring criteria for each metric (within each site class) from the appropriate percentile of the data distribution (Figure 9-7). If the metric is associated with a significant covariate such as watershed size, a scatterplot of the metric and covariate (Figure 9-3) and a moving estimate of the appropriate percentile, are used to determine scoring criteria as a function of the covariate (e.g., Fausch et al. 1984, Plafkin et al. 1989).

- Test the ability of the final index to discriminate between populations of reference and anthropogenically affected (stressed) sites (Figure 9-8). Generally, indices (aggregate of metrics) discriminate better than individual metrics (e.g., total taxa is generally a weak metric because of inconsistency in taxonomic resolution). Those sites that are misclassified with regard to "reference" and "stressed" can be identified and evaluated for reassignment.

Step 5. Index thresholds for assessment and biocriteria

The multimetric index value for a site is a summation of the scores of the metrics and has a finite range within each stream class and

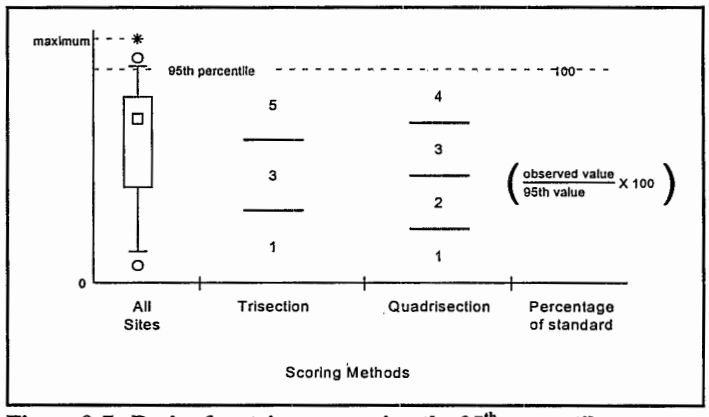

Figure 9-7. Basis of metric scores using the 95th percentile as a standard.

Biocriteria are based on *thresholds* determined to differentiate impaired from non-impaired conditions. While these thresholds may be subjective, the performance of the *a priori* selected reference sites will ultimately verify the appropriateness of the threshold.

index period depending on the maximum possible scores of the metrics (Barbour et al. 1996c). This range can be subdivided into any number of categories corresponding to various levels of impairment. Because the metrics are normalized to reference conditions and expectations for the stream classes, any decision on subdivision should reflect the distribution of the scores for the reference sites. For example, division of the Wyoming benthic IBI range (aggregation of metric scores) within each stream class provides 5 ordinal rating categories for assessment of impairment (Stribling et al. 1999, Figure 9-8).

The 5 rating categories are used to assess the condition of both reference and non-reference sites. Most of the reference sites should be rated as *good* or *very good* in biological condition, which would be as expected. However, a few reference sites may be given the rating as *poor* sporadically among the collection dates. If a "reference" site consistently receives a fair or poor rating, then the site should be re-evaluated as to its proper assignment.

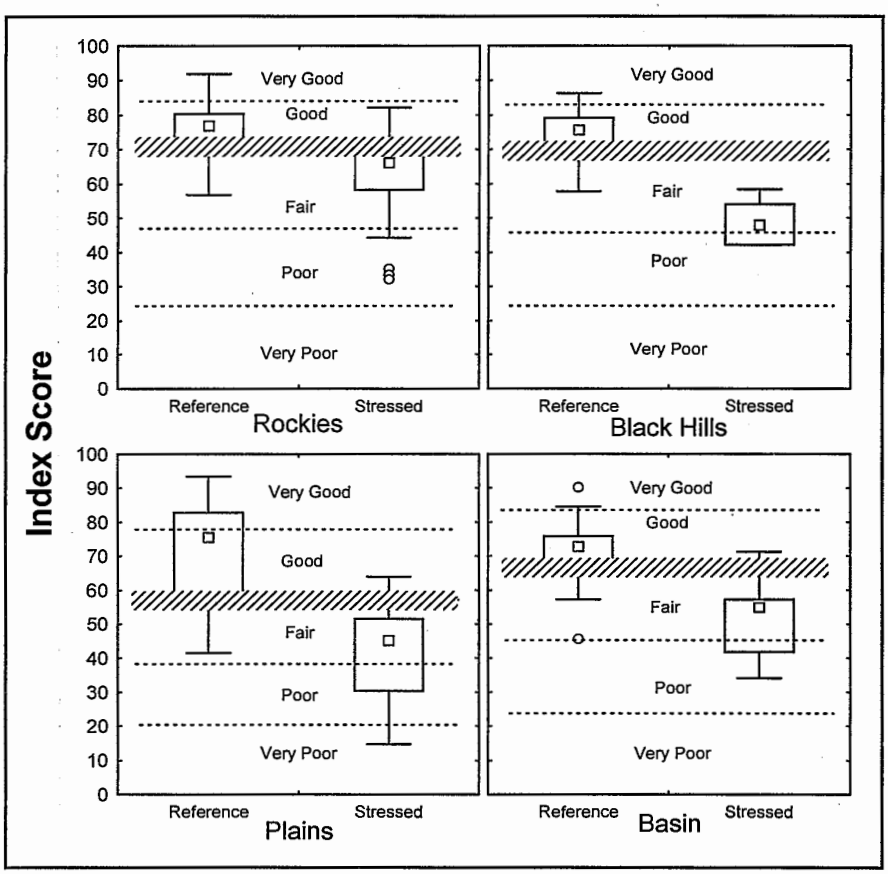

Figure 9-8. Discriminatory power analysis of the Wyoming Benthic Index of Biotic Integrity. The population of stressed sites was determined *a priori*. The 25th percentile of the reference distribution determined the threshold, or separation between "good" and "fair" condition ratings. All other condition ratings resulted from equidistant sectioning of the remaining index range. The shaded region represents the 90% confidence limits around a single observation (no replication) falling near the critical threshold.

Putative reference sites may be rated "poor" for several reasons:

- **Natural variability** — owing to seasonal, spatial, and random biological events, any reference site may score below the reference population 10th percentile. If due to natural variability, a low score should occur 10% of the time or less.

- **Impairment** — stressors that were not detected in previous sampling or surveys may occur at a "reference" site; for example, episodic non-point-source pollution or historical contamination may be present at a site.

- **Non-representative site** — reference sites are intended to be representative of their class. If there are no anthropogenic stressors, yet a "reference" site consistently scores outside the range of the rest of the reference population the site may be a special or unique case, or it may have been misclassified and actually belong to another class of streams.

An understanding of variability is necessary to ensure that sites that are near the threshold are rated with known precision (discussed in more detail in Chapter 4). To account for variance associated with measurement error in an assessment, replication is required. The first step is to estimate the standard deviation of repeated measures of streams. The standard deviation is calculated as the root mean square error (RMSE) of an analysis of variance (ANOVA), where the sites are treatments in the ANOVA.

As an example, the question of precision was tested for the Wyoming Benthic IBI scores in the stream classes. This study showed that the 95% confidence interval (CI) around a single sample is ±8 points, on a scale of 100 (Table 9-2). What if a single site was sampled with no replication and found to be points below the biocriterion? The rightmost column (Table 9-2) shows that a triplicate sample is required for a 95% CI less than 5 points. These conclusions make 3 assumptions:

- measurement error is normally distributed,

- measurement error is not affected by subecoregion or impairment, and

- the sample standard deviation of repeated measures is an unbiased and precise estimate of population measurement error.

Components of Step 5 include:

- The range in possible scores for each stream class is the minimum number of metrics (if a score of 1 is assigned to greatest level of degradation) to the maximum aggregate of scores. Pentasect, quadrisect, or trisect this range, depending on how many biological condition categories are desired.

- Evaluate the validity of these biological condition categories by comparing the index scores of the reference and known stressed sites to those categories. If reference sites are not rated as good or very good, then some adjustment in either the biological condition designations or the listing of reference sites may be necessary.

- Test for confidence in multimetric analysis to determine biological condition for sites that fall within close proximity to threshold. Calculate precision and sensitivity values to determine repeatability and detectable differences that will be important in the confidence level of the assessment.

Table 9-2. Statistics of repeated samples in Wyoming and the detectable difference (effect size) at 0.10 significance level. The index is on a 100 point scale (taken from Stribling et al. 1999).

Metric	Standard Deviation for Repeated Measures	Approx. Mean[a]	Approx. Coefficient of Variation (%)	Detectable Differences (p = 0.10)		
				Single Sample	Duplicate Samples	Triplicate Samples
Total Taxa	4.1	35.9	11.5	7 taxa	5 taxa	5 taxa
Ephemeroptera taxa	0.9	6.8	13.3	2 taxa	1 taxa	1 taxa
Plecoptera taxa	1.0	4.8	21.2	2 taxa	1 taxa	1 taxa
Trichoptera taxa	1.1	6.9	15.3	2 taxa	1 taxa	1 taxa
% non-insects	3.8	8.9	42.9	6.3 %	4.4 %	4.3 %
% diptera (non-chironomid)	1.3	5.1	25.0	2.1 %	1.5 %	1.4 %
HBI	0.27	3.43	7.85	0.44 units	0.31 units	0.26 units
% 5 dominant taxa	4.3	64.2	6.7	7.1 %	5.0 %	4.1 %
% scrapers	4.8	25.5	18.9	7.9 %	5.6 %	4.6 %
Index	2.0	70.0	2.9	3.3 units	2.3 units	1.9 units

a: Mean of 25 replicated sites; population means may differ.

9.1.2 Assessment of Biological Condition

Once the framework for bioassessment is in place, conducting bioassessments becomes relatively straightforward. Either a targeted design that focuses on site-specific problems or a probability-based design, which has a component of randomness and is appropriate for 305(b), area-wide, and watershed monitoring, can be done efficiently. Routine monitoring of reference sites should be based on a random selection procedure, which will allow cost efficiencies in sampling while monitoring the status of the reference condition of a state's streams. Potential reference sites of each stream class would be randomly selected for sampling, so that an unbiased estimate of reference condition can be developed. A randomized subset of reference sites can be resampled at some regular interval (e.g., a 4 year cycle) to provide information on trends in reference sites.

A reduced effort in monitoring reference sites allows more investment of time into assessing other stream reaches and problem sites. Through use of Geographical Information System (GIS) and station location codes, assessment sites throughout the state can be randomly selected for sampling as is being done for the reference sites. This procedure will provide a statistically valid means of estimating attainment of aquatic life use for the state's 305(b) reporting. In addition, the multimetric index will be helpful for targeted sampling at specific problem areas and judging biological condition with a procedure that has been calibrated regionally (Barbour et al. 1996c). To evaluate possible influences on the biological condition of sites, relationships among total bioassessment scores and physicochemical variables can be investigated. These relationships may indicate the influence of particular categories of stressors on the biological condition of individual sites. For example, a strong negative correlation between total bioassessment score and embeddedness would suggest that siltation from nonpoint sources could be affecting the biological condition at a site. Considerations relevant to assessment and diagnostics of biological condition are as follows:

- Evaluate the relationship of biological response signatures such as functional attributes (reproduction, feeding group responses, etc.) to specific stressors.
- Hold physical habitat relationships constant and look for associations with other physical stressors (e.g., hydrologic modification, streambed stability), chemical

stressors (e.g., point-source discharges or pesticide application to cropland), biological stressors (i.e., exotics), and landscape measures (e.g., impervious surface, Thematic mapper land use classes, human population census information, landscape ecology parameter of dominance, contagion, fractal dimension).

- Explore the relationship between historical change in biota and change in landscape (e.g., use available historical data from the state or region).

9.2 DISCRIMINANT MODEL INDEX

Discriminant analysis may be used to develop a model that will divide, or discriminate, observations among two or more predetermined classes. Output of discriminant analysis is a function that is a linear combination of the input variables, and that obtains the maximum separation (discrimination) among the defined classes. The model may then be used to determine class membership of new observations. Thus, given a set of unaffected reference sites, and a set of degraded sites (due to toxicity, low DO, or habitat degradation), a discriminant function model can identify variables that will discriminate reference from degraded sites.

Developing biocriteria with a discriminant model requires a training data set to develop the discriminant model, and a confirmation data set to test the model. The training and confirmation data may be from the same biosurvey, randomly divided into two, or they may be two consecutive years of survey data, etc. All sites in each data set are identified by degradation class (e.g., reference vs stressed) or by designated aquatic life use class. To avoid circularity, identification of reference and stressed, or of designated use classes, should be made from non-biological information such as quality of the riparian zone and other habitat features; presence of known discharges and nonpoint sources, extent of impervious surface in the watershed, extent of land use practices, etc.

One or more discriminant function models are developed from the training set, to predict class membership from biological data. After development, the model is applied to the confirmation data set to determine its performance: The test determines how well the model can assign sites to classes, using independent data that were not used to develop the model. More information on discriminant analysis is in any textbook on multivariate statistics (e.g., Ludwig and Reynolds 1988, Jongman et al. 1987, Johnson and Wichern 1992).

An example of this approach is the hierarchical decision-making technique used by Maine DEP. It begins with statistical models (linear discriminant analysis) to make an initial prediction of the classification of an unknown sample by comparing it to characteristics of each class identified in the baseline database (Davies et al. 1993). The output from analysis by the primary statistical model is a list of probabilities of membership for each of four groups designated as classes A, B, C, and nonattainment (NA) of Class C (Table 9-3). Subsequent models are designed to distinguish between a given class and any higher classes as one group, and any lower classes as a second group.

One or more discriminant models to predict class membership are developed from the training set. The purpose of the discriminant analysis here is not to test the classification (the classification is administrative rather than scientific), but to assign test sites to one of the classes.

Stream biologists from Maine DEP assigned a training set of streams to four life use classes. In operational assessment, sites are evaluated with the two-step hierarchical models. The first stage linear discriminant model is applied to estimate the probability of membership of sites into one of the four classes (A, B, C, or NA). Second, the series of two-way models are applied to distinguish the membership between a given class and any higher classes, as one group. The model uses 31 quantitative measures of community structure, including the Hilsenhoff Biotic Index, Generic Species

Richness, EPT, and EP values. Monitored test sites are then assigned to one of the four classes based on the probability of that result, and uncertainty is expressed for intermediate sites. The classification can be the basis for management action if a site has gone down in class, or for reclassification to a higher class if the site has improved.

Table 9-3. Maine's water quality classification system for rivers and streams, with associated biological standards (taken from Davies et al. 1993).

Aquatic Life Use Class	Management	Biological Standard	Discriminant Class
AA	High quality water for recreation and ecological interests. No discharges or impoundments permitted.	Habitat natural and free flowing. Aquatic life as naturally occurs.	A
A	High quality water with limited human interference. Discharges restricted to noncontact process water or highly treated wastewater equal to or better than the receiving water. Impoundments allowed.	Habitat natural. Aquatic life as naturally occurs.	A and AA are indistinguish-able because biota are "as naturally occurs."
B	Good quality water. Discharge of well treated effluent with ample dilution permitted.	Habitat minimally impaired. Ambient water quality sufficient to support life stages of all indigenous aquatic species. Only nondetrimental changes in community composition allowed.	B
C	Lowest water quality. Maintains the interim goals of the Federal Water Quality Act (fishable/swimmable). Discharge of well-treated effluent permitted.	Ambient water quality sufficient to support life stages of all indigenous fish species. Change in community composition may occur but structure and function of the community must be maintained.	C
NA			Not attaining Class C

Maine biocriteria thus establish a direct relationship between management objectives (the three aquatic life use classes and nonattainment) and biological measurements. The relationship is immediately viable for management and enforcement as long as the aquatic life use classes remain the same. If the classes are redefined, a complete reassignment of streams and a review of the calibration procedure would be necessary. This approach is detailed by Davies et al. (1993).

See Maine DEP's website for more information
http://www.state.me.us/dep/blwq/biohompg.htm

9.3 RIVER INVERTEBRATE PREDICTION AND CLASSIFICATION SCHEME (RIVPACS)

RIVPACS and its derivative, AusRivAS (Australian Rivers Assessment System) are empirical (statistical) models that predict the aquatic macroinvertebrate fauna that would be expected to occur at a site in the absence of environmental stress (Simpson et al. 1996). The AusRivAS models predict the invertebrate communities that would be expected to occur at test sites in the absence of impact. A

comparison of the invertebrates predicted to occur at the test sites with those actually collected provides a measure of biological impairment at the tested sites. The predicted taxa list also provides a "target" invertebrate community to measure the success of any remediation measures taken to rectify identified impacts. The type of taxa predicted by the AusRivAS models may also provide clues as to the type of impact a test site is experiencing. This information can be used to facilitate further investigations e.g., the absence of predicted Leptophlebiidae may indicate an impact on a stream from trace metal input.

These models are the primary ecological assessment analysis techniques for Great Britain (Wright et al. 1993) and Australia (Norris 1995). The models are based on a stepwise progression of multivariate and univariate analyses and have been developed for several regions and various habitat types found in lotic systems. Regional applications of the AusRivAS model, in particular, have been developed for the Australian states and territories (Simpson et al. 1996), and for streams in the Sierra and Cascade mountain ranges in California (Hawkins and Norris 1997). Users of these models claim rapid turn around of results is possible and output can be tailored for a range of users including community groups, managers, and ecologists. These attributes make RIVPACS and AusRivAS likely candidate analysis techniques for rapid bioassessment programs.

Although the same procedures are used to build all AusRivAS models, each model is tailored to specific regions (or states) to provide the most accurate predictions for the season and habitat sampled. The stream habitats for which these models have been applied include the edge/backwater, main channel, riffle, pool, and macrophyte stands. The multihabitat sampling techniques used in many RBP programs have not yet been tested with a RIVPACS model. The models can be constructed for a single season, or data from several seasons may be combined to provide more robust predictions. To date the RIVPACS/AusRivAs models have only been developed for the benthic assemblage. Discussion of RIVPACS and AusRivAS is taken from the *Australian River Assessment System National River Health Program Predictive Model Manual* by Simpson et al. (1996). As is the case with the multimetric approach, a more thorough treatment of the RIVPACS/AusRivAS models can be obtained by referring to the citations of the supporting documentation provided in this discussion.

The reader is directed to the AusRivAS website for more specific information and guidance regarding these multivariate techniques.
http://ausrivas.canberra.edu.au/ausrivas

10 DATA INTEGRATION AND REPORTING

Human impacts on the biological integrity of water resources are complex and cumulative (Karr 1998). Karr (1998) states that human actions jeopardize the biological integrity of water resources by altering one or more of five principal factors — physical habitat, seasonal flow of water, the food base of the system, interactions within the stream biota, and chemical quality of the water. These factors can be addressed in environmental management by shifting our focus from technology-based to water resource-based management strategies. This change in focus requires a commensurate shift from the measurement of pollutant loadings to a measurement of ecosystem health. Biological assessment addresses ecosystem health and cumulative impacts by concentrating on population and community level response rather than on discharger performance (Courtemanch 1995).

The translation of biological data into a report that adequately conveys the message of the assessment is a critical process. It is important to identify the intended audience(s) for the report and to bear in mind that users of the report will likely include groups (i. e. managers, elected officials, communities) who are not biologists. Reports must be coherent and easily understood in order for people to make informed decisions regarding the water resource. First, the data must be summarized and integrated, then clearly explained and presented. The use of a multimetric index provides a convenient, yet technically sound method for summarizing complex biological data for each assemblage (Karr et al. 1986, Plafkin et al. 1989). The procedures for developing the Multimetric Index for each assemblage is described in Chapter 9. The index itself is only an aggregation of contributory biological information and should not be used exclusive of its component metrics and data (Yoder 1991, Barbour et al. 1996a). However, the index and its component metrics serve as effective tools to communicate biological status of a water resource.

10.1 DATA INTEGRATION

Once indices and values are obtained for each assemblage, the question becomes how to interpret all of the results, particularly if the findings are varied and suggest a contradiction in assessment among the assemblages? Also, how are habitat data used to evaluate relationships with the biological data? These questions are among the most important that will be addressed in this chapter. The integration of chemical and toxicological data with biological data is not treated in depth here. It is briefly described in Chapter 3 and discussed in more detail elsewhere (Jackson 1992, USEPA 1997c).

10.1.1 Data Integration of Assemblages

USEPA advises incorporating more than 1 assemblage into biocriteria programs whenever practical. Surveying multiple assemblages provides a more complete assessment of biological condition since the various assemblages respond differently to certain stressors and restoration activities. For instance, Ohio EPA found, in a study of the Scioto River, that fish responded (recovered) more quickly than did benthos to restoration activities aimed at reducing the effects of cumulative impacts (i.e., impoundments, combined sewer overflows, wastewater treatment plants, urbanization) (Yoder and Rankin 1995a). Although significant improvement was observed in the condition of both assemblages in the river from 1980 to 1991, the benthic assemblage was still impaired in several reaches of the river; whereas, the fish assemblage met Ohio's warm water habitat criterion in 1991

for many of the same reaches. The use of both assemblages enhanced the agency's assessment of trend analysis for the Scioto River.

In addition, using more than 1 assemblage allows programs to more fully assess the occurrence of multiple stressors and seasonal variation in the intensity of the stressors (Gibson et al. 1996). Mount et al. (1984) found that benthic and fish assemblages responded differently to the same inputs in the Ottawa River in Ohio. Benthic diversity and abundance responded negatively to organic loading from a wastewater treatment plant and exhibited no observable response to chemical input from industrial effluent. Fish exhibited no response to the organic inputs and a negative response to metal concentrations in the water.

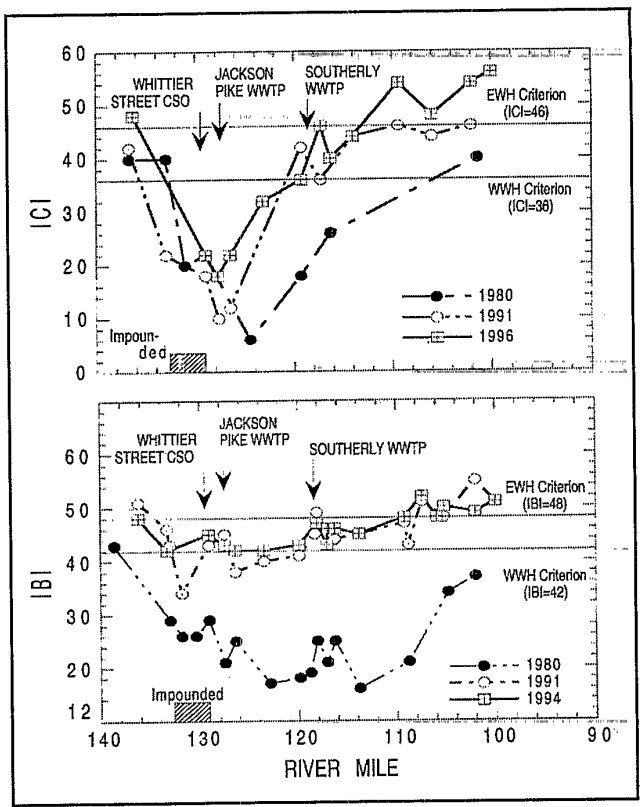

Figure 10-1. Cumulative frequency diagrams (CFD) for the IBI (upper) and the ICI (lower) comparing the pre-1988 and post-1988 status on a statewide basis from Ohio. In each case, estimated attainable level of future performance is indicated. The Warm Water Habitat (WWH) and Exceptional Warm Water Habitat (EWH) biological thresholds are given for each index.

Integration of information from each assemblage should be done such that the results complement and supplement the assessment of the site. Trend analysis (monitoring changes over time) is useful to illustrate differences in response of the assemblages (Figure 10-1). In this example of the Scioto River (Figure 10-1), the improvement in the fish Index of Biotic Integrity (IBI) and the benthic macroinvertebrate Index of Community Integrity (ICI) assemblages can be seen over time (1980 and 1991) and over a length of the river (River Mile [RM] 140 to 90) (Yoder 1995a).

Biological attributes and indices can also be illustrated side-by-side to highlight differences and similarities in the results. Oftentimes, differences in the results are useful for diagnosing cause-and-effect.

10.1.2 Relationship Between Habitat and Biological Condition

Historically, non-chemical impacts to biotic systems have not been a major focus of the nation's water quality agencies. Yet there is clear evidence that habitat alteration is a primary cause of degraded aquatic resources (USEPA 1997c). Habitat degradation occurs as a result of hydrological flow modification, alteration of the system's energy base, or direct impact on the physical habitat structure. Preservation of an ecosystem's natural physical habitat is a fundamental requirement in maintaining diverse, functional aquatic communities in surface waters (Rankin 1995). Habitat quality is an essential measurement in any biological survey because aquatic fauna often have very

specific habitat requirements independent of water-quality composition (Barbour et al. 1996a). Diagnostic evaluations are enhanced when assessment of the habitat, flow regime, and energy base are incorporated into the interpretation of the biological condition (USEPA 1990b).

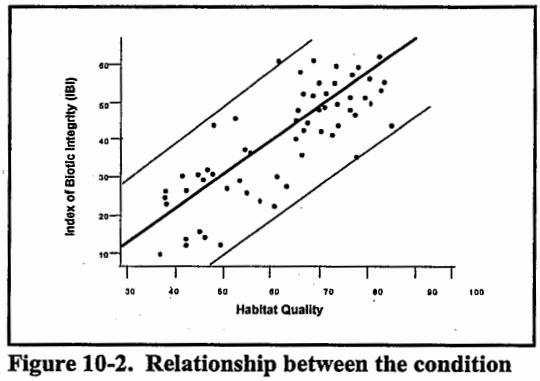

Figure 10-2. Relationship between the condition of the biological community and physical habitat.

The relationship between habitat quality (as defined by site-specific factors, riparian quality, and upstream land use) and biological condition can be graphed, as illustrated in Figure 10-2 to enhance data interpretation. On the X-axis, habitat is shown to vary in quality from 30 points, which is poor (nonsupporting of an acceptable biological condition) to 85 points, which is good (comparable to the reference condition). Biological condition, represented by the fish IBI on the Y-axis, varies from 10 points (severely impaired) to 60 points (excellent). Interpretation of the relationship between habitat and biology as depicted by Figure 10-2 can be summarized by 4 points relating to specific areas of the graph.

1. The upper right-hand corner of the curve is the ideal situation where optimal habitat quality and biological condition occur.

2. The decrease in biological condition is proportional to a decrease in habitat quality.

3. Perhaps the most important area of the graph is the lower right-hand corner where degraded biological condition can be attributed to something other than habitat quality (Barbour et al. 1996a).

4. The upper left-hand corner is where optimal biological condition is not possible in a severely degraded habitat (Barbour et al. 1996a).

A relationship between biology and habitat should be substantiated with a large database sufficient to develop confidence intervals around a regression line. Rankin (1995) found that Ohio's visual-based habitat assessment approach, called the Qualitative Habitat Evaluation Index (QHEI), explained most of the variation in the IBI for the fish assemblage. However, Rankin also pointed out that covariate relationships between aggregate riparian quality and land use of certain subbasins could be used to partition natural variability. In one example, Rankin illustrated how high-quality patches of habitat structure in otherwise habitat-degraded stream reaches may harbor sensitive species, thus masking the effects of habitat alteration.

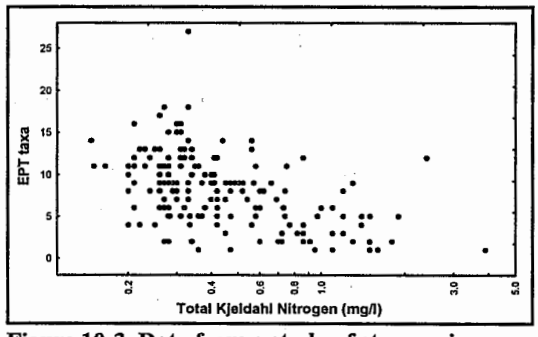

Figure 10-3. Data from a study of streams in Florida's Panhandle.

An informative approach to evaluating affects from specific or cumulative stressors is to ascertain a gradient response of the aquatic community using a bivariate scatter plot. In one example provided by Florida DEP, a gradient response of the EPT taxa indicated a strong relationship to nitrogen in the stream (Figure 10-3).

When multiple data types (i.e., habitat, biological, chemical, etc.) are available, sun ray plots may be used to display the assessment results. As an example, the assessments of habitat, macroinvertebrates and fish are integrated for evaluating of the condition of individual stream sites in a Pennsylvania watershed (Snyder et al. 1998). The assessment scores for each of the triad data types are presented as a percentage of reference condition (Figure 10-4). The area enclosed by each sun ray plot can be measured to provide a comparison of the biological and habitat condition among the sites of interest (Snyder et al. 1998). This technique helps determine the extent of impairment and also which ecological components are most affected.

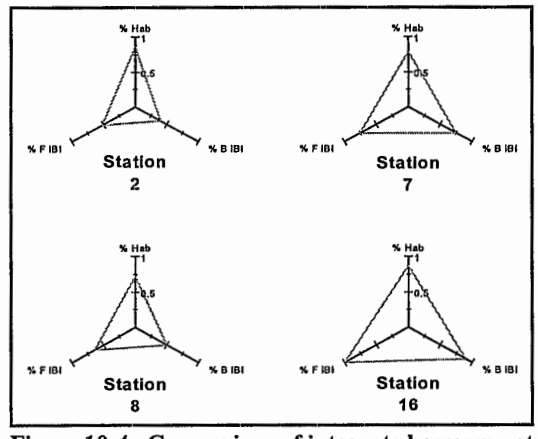

Figure 10-4. Comparison of integrated assessment (habitat, fish, and benthos) among stream sites in Pennsylvania. Station 16 is a reference site. (Taken from Snyder et al. 1998).

10.2 REPORTING

Historically, reports containing assessment results and recommendations for further action have been designed to address objectives and data uses relevant to the specific monitoring program. Increasingly, however, assessment reports are designed to reach a broader, non-scientific audience including water resource managers and the environmentally conscious public. Communicating the condition of biological systems, and the impact of human activities on those systems, is the ultimate purpose of biological monitoring (Karr and Chu 1999). Reporting style and format has become an important component in effectively communicating the findings of ecological assessments to diverse audiences. As pointed out by Karr and Chu (1999), effective communication can transform biological monitoring from a scientific exercise into a powerful tool for environmental decision making.

10.2.1 Graphical Display

Graphical displays are a fundamental tool for illustrating scientific information. Graphs reveal—more effectively than do strictly statistical tools—patterns of biological response. Patterns include "outliers," which may convey unique information that can help diagnose particular problems or reveal specific traits of a site (Karr and Chu 1999). Examples of some of the most useful graphical techniques are presented for specific biological program objectives:

1. Stream classification — a graph should illustrate the distinction between and among site classes or groups. Two common graphical displays are bivariate scatter plots (used in non-metric multidimensional scaling) and cluster dendrograms.

Bivariate scatter plots—used for comparing the scatter or clustering of points given 2 dimensions. Can be used to develop regression lines or to incorporate 3 factors (3-dimensional) (Figure 10-5).

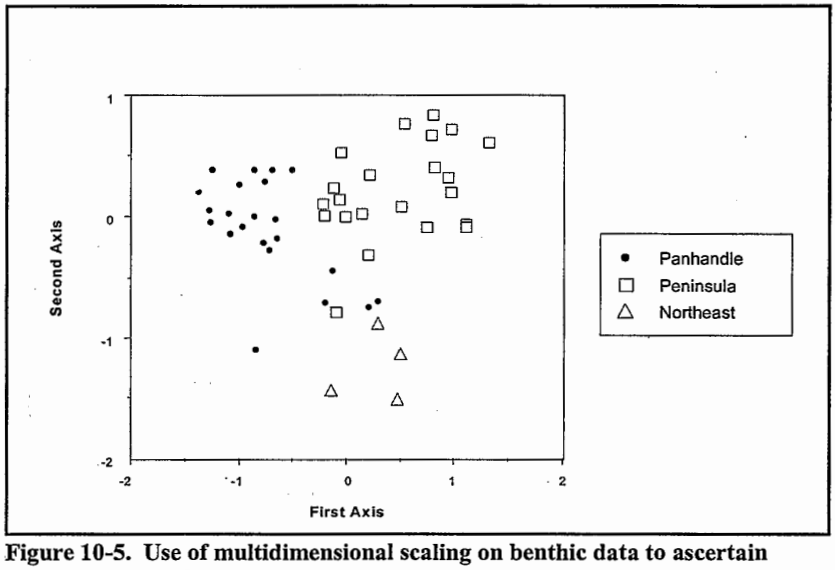

Figure 10-5. Use of multidimensional scaling on benthic data to ascertain stream classification. The first and second axes refer to the dimensions of combinations of data used to measure similarity (Taken from Barbour et al. 1996b).

Cluster dendrogram—used to illustrate the similarities and dissimilarities of sites in support of classes (Figure 10-6).

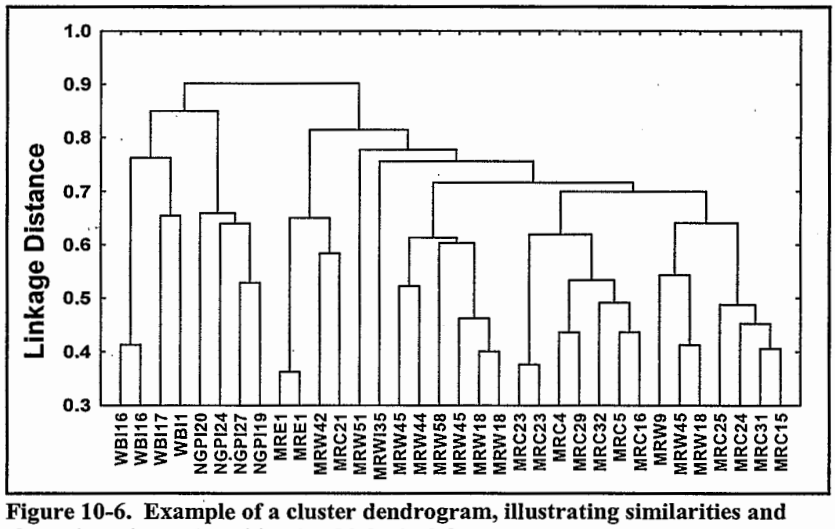

Figure 10-6. Example of a cluster dendrogram, illustrating similarities and clustering of sites (x-axis) using biological data.

2. Problem Identification and Status of Water Resource — The status of the condition of water resources requires consolidating information from many samples and can be illustrated in several ways.

Pie charts—used to illustrate proportional representation of the whole by its component parts. Can be sized according to magnitude or density (Figure 10-7)

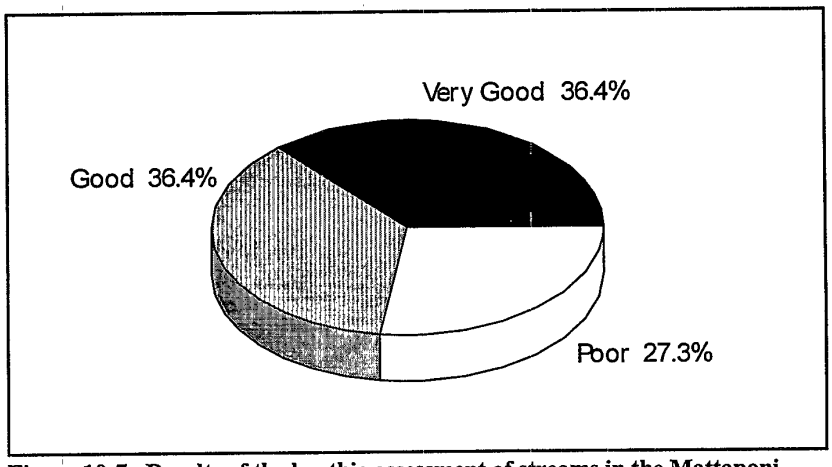

Figure 10-7. Results of the benthic assessment of streams in the Mattaponi Creek watershed of southern Prince George's County, Maryland. Percent of streams in each ecological condition category. (Taken from Stribling et al. 1996b).

Box-and-whisker plots— used to illustrate population attributes (via percentile distribution) and provides some sense of variability (Figure 10-8).

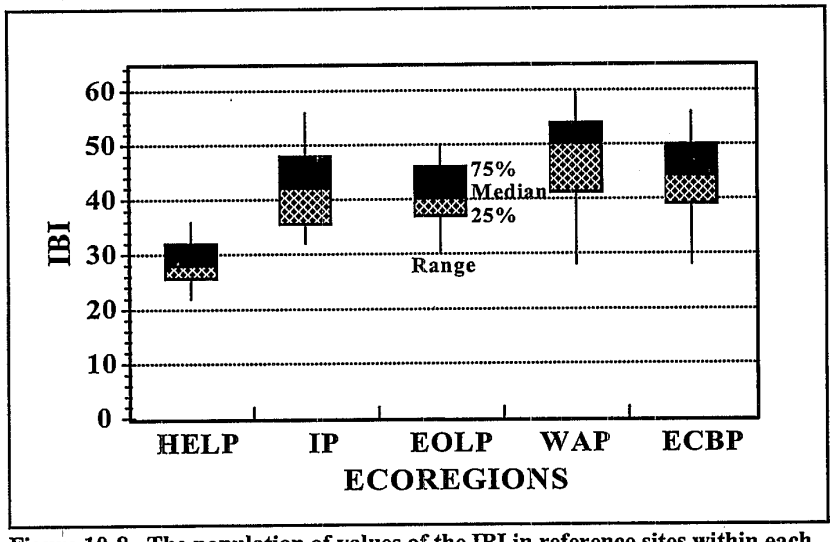

Figure 10-8. The population of values of the IBI in reference sites within each of the ecoregions of Ohio. (Contributed by Ohio EPA).

3. Trend monitoring and assessment — Monitoring over a temporal or spatial scale requires a graphical display depicting trends, which may show improvement, degradation, or no change.

Line graphs—used to illustrate temporal or spatial trends that are contiguous. Assumes that linkage between points is linear (Figure 10-9).

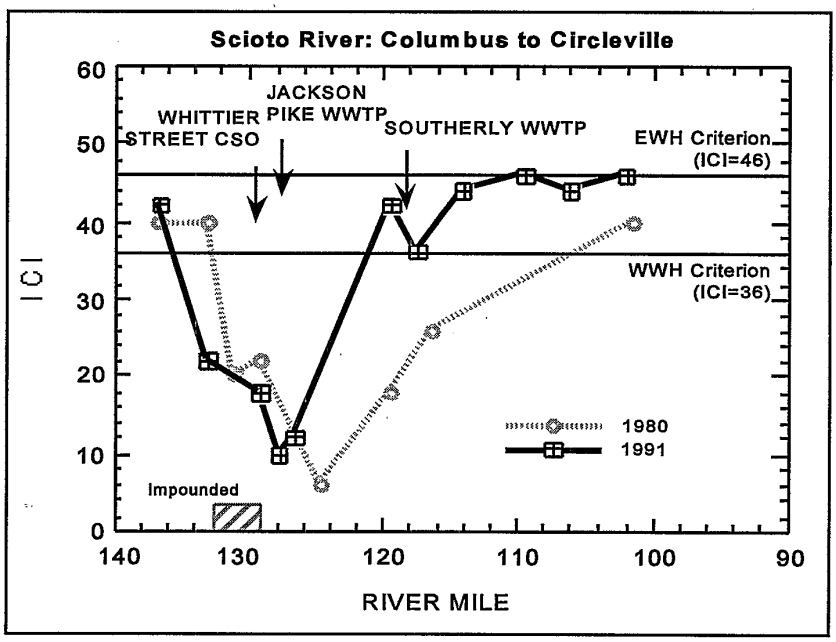

Figure 10-9. Spatial and temporal trend of Ohio's Invertebrate Community Index. The Scioto River - Columbus to Circleville. (Contributed by Ohio EPA).

Cumulative frequency diagram—illustrates an ordered accumulation of observations from lowest to highest value that allows one to determine status of resource at any given level (Figure 10-10).

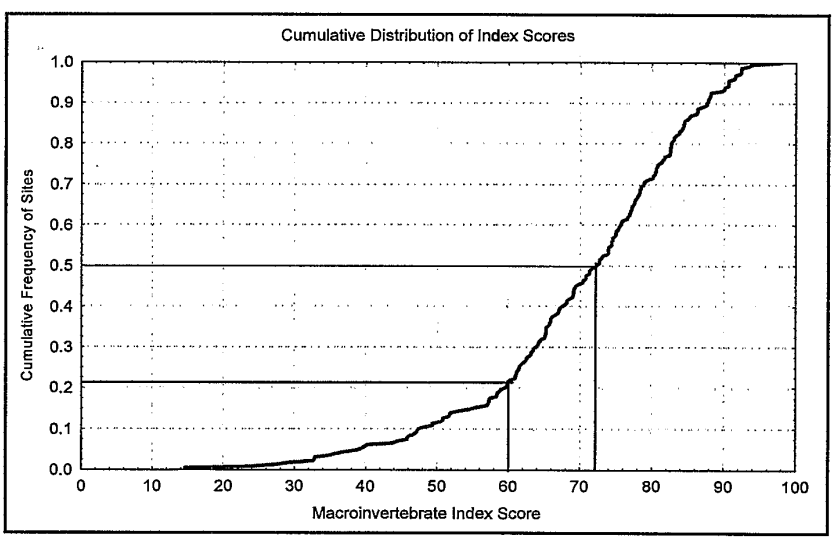

Figure 10-10. Cumulative distribution of macroinvertebrate index scores. 21% of sites scored at or below 60. The median index score is 75, where the cumulative frequency is 50%.

4. A determination of cause-and-effect — illustrating the source of impairment may not be a straightforward process. However, certain graphs lend themselves to showing comparative results in diagnosing problems.

Bar charts — used to display magnitude of values for discrete entities. Can be used to illustrate deviation from a value of central tendency (Figure 10-11).

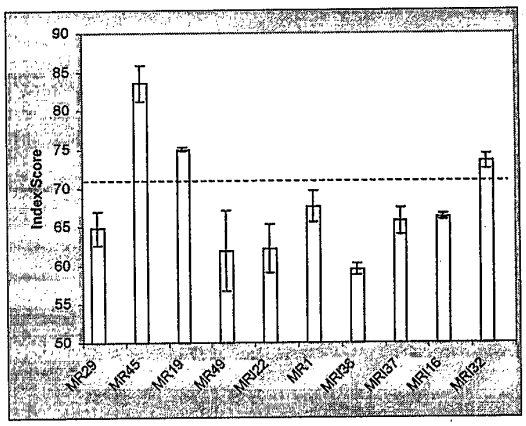

Figure 10-11. Biological assessment of sites in the Middle Rockies, showing mean and standard deviation of repeated measures and the assessment threshold (dashed line).

Sun Ray plots — used to compare more than 2 endpoints or data types. Most effective when reference condition is incorporated into axes or comparison (Figure 10-12).

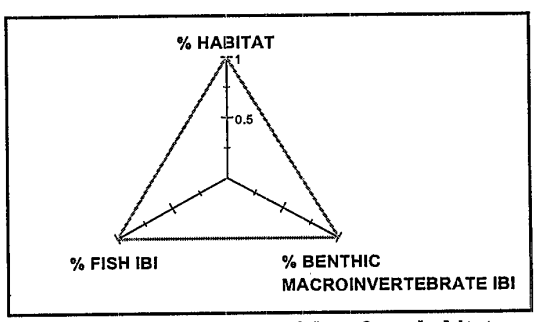

Figure 10-12. Integration of data from habitat, fish, and benthic assemblages.

Box-and-whisker plots— used to illustrate population attributes (via percentile distribution). Distinction among plots illustrates degree of similarity/differences (Figure 10-13).

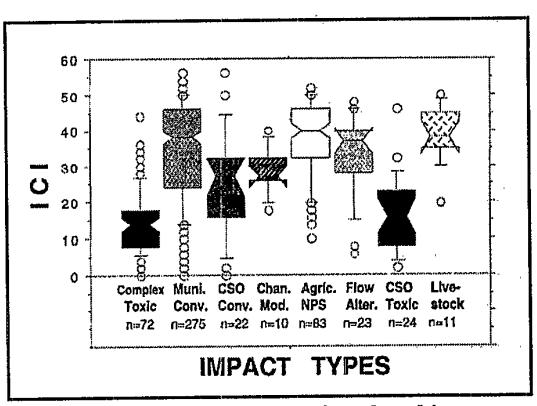

Figure 10-13. The response of the benthic macroinvertebrate assemblage (ICI) to various types of impacts (provided by Ohio EPA).

10.2.2 Report Format

Two basic formats are recommended for reporting ecological assessments. Each of these formats is intended to highlight the scientific process, focus on study objectives, and judge the condition of the assessed sites. The first format is a summary report, targeted for use by managers in making decisions regarding the resource. This report format can also be an invaluable public information tool. The second report format is patterned after that of peer-reviewed journals and is primarily designed for informing a more technical audience.

The *Ecosummary* is an example of the first report format. It has an uncomplicated style and conveys various information including study results. The simplicity of this format quickly and effectively documents results and assists a non-technical audience in making informed decisions. An executive summary format is appropriate. An executive summary format is appropriate to present the "bottom line" assessment for the Ecosummary, which will be read by agency managers and decision-makers. Technical appendices or supplemental documentation should either accompany the report or be available to support the scientific integrity of the study.

These Ecosummaries are generally between 1-4 pages in length and lend themselves to quick and easy dissemination. Color graphics may be added to enhance the presentation or findings. An example of an Ecosummary format used by Florida Department of Environmental Protection (DEP) is illustrated in Figure 10-14. This 1-page report highlights the purpose of the study as well as the results and significance of the findings. A summary of the ecological data in the form of bar charts and tables may be provided on subsequent pages. Because this study follows prescribed methods and procedures, all of this documentation is not included in the report but is included in agency Standard Operating Procedures (SOPs).

The second format for reporting is a *scientific report*, which is structured similarly to a peer-reviewed journal. The report should be peer-reviewed by non-agency scientists to validate its scientific credibility. An abstract or executive summary should be prepared to highlight the essential findings. As in a peer-reviewed journal article, the methods and results are presented succinctly and clearly. The introductory text should outline the objectives and purpose of the study. A discussion of the results should include supporting literature to add credence to the findings, particularly if there is a discussion of suspected cause of impairment. Preparation of a report using this format will require more time than the Ecosummary. However, this report format is more inclusive of supportive information and will be more important in litigious situations.

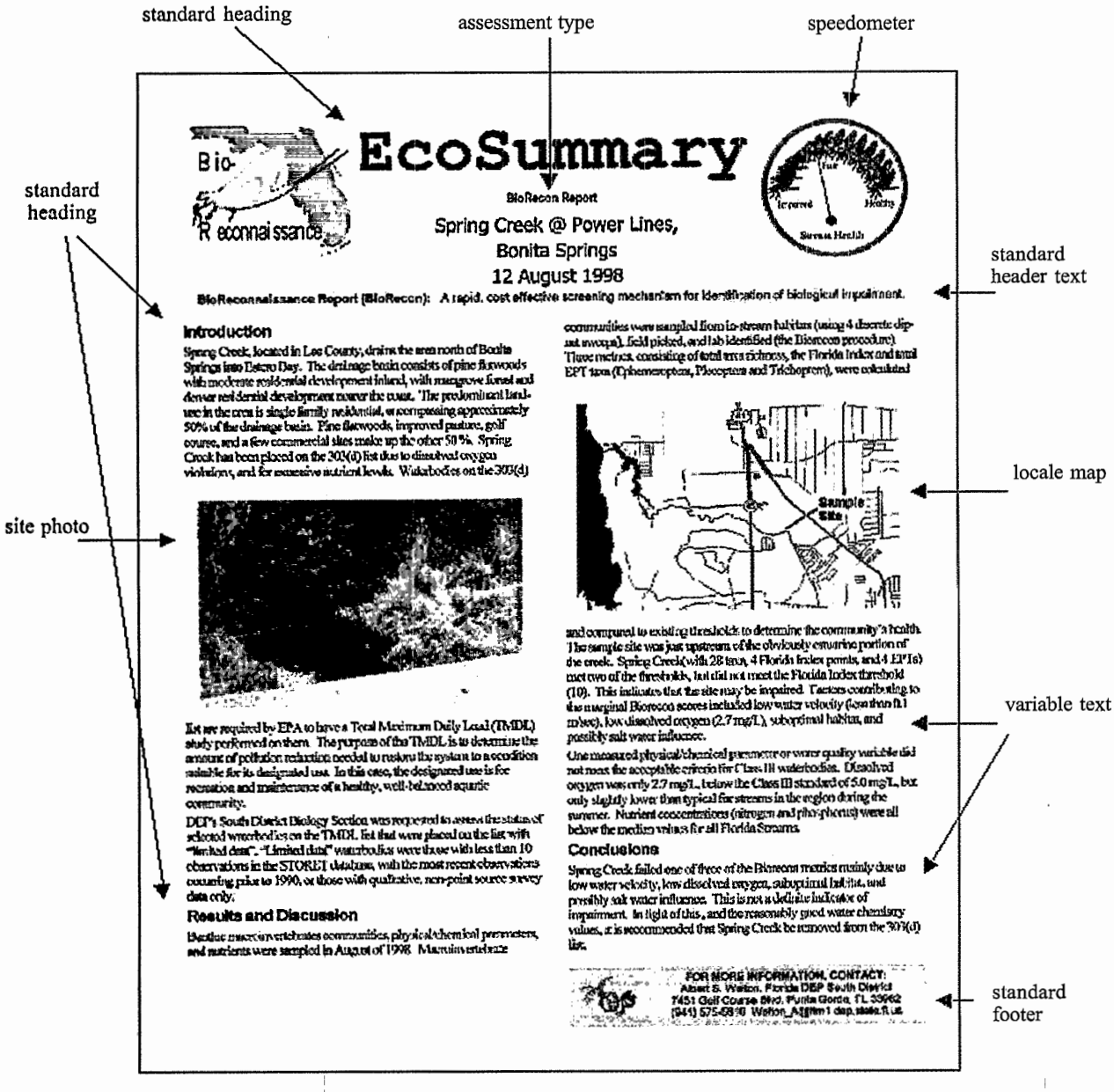

Figure 10-14. Guidance for Florida Ecosummary—A one-page bioassessment report. (Contributed by Florida DEP.)

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APPENDIX A:

SAMPLE DATA FORMS FOR THE PROTOCOLS

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APPENDIX A-1:

Habitat Assessment and Physicochemical Characterization Field Data Sheets

Form 1: Physical Characterization/Water Quality Field Data Sheet
Form 2: Habitat Assessment Field Data Sheet - High Gradient Streams
Form 3: Habitat Assessment Field Data Sheet - Low Gradient Streams

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PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (FRONT)

STREAM NAME	LOCATION	
STATION #_____ RIVERMILE_____	STREAM CLASS	
LAT _____ LONG _____	RIVER BASIN	
STORET #	AGENCY	
INVESTIGATORS		
FORM COMPLETED BY	DATE _____ TIME _____ AM PM	REASON FOR SURVEY

WEATHER CONDITIONS	**Now**	**Past 24 hours**	**Has there been a heavy rain in the last 7 days?** ❑ Yes ❑ No
	❑ storm (heavy rain)	❑	
	❑ rain (steady rain)	❑	**Air Temperature**_____ ^{0} C
	❑ showers (intermittent)	❑	**Other**_____
	____%❑ %cloud cover	❑____%	
	❑ clear/sunny	❑	
SITE LOCATION/MAP	**Draw a map of the site and indicate the areas sampled (or attach a photograph)**		
STREAM CHARACTERIZATION	**Stream Subsystem** ❑ Perennial ❑ Intermittent ❑ Tidal		**Stream Type** ❑ Coldwater ❑ Warmwater
	Stream Origin ❑ Glacial ❑ Spring-fed ❑ Non-glacial montane ❑ Mixture of origins ❑ Swamp and bog ❑ Other_____		**Catchment Area**_____km^2

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (BACK)

WATERSHED FEATURES	**Predominant Surrounding Landuse** ❑ Forest ❑ Commercial ❑ Field/Pasture ❑ Industrial ❑ Agricultural ❑ Other _____ ❑ Residential **Local Watershed NPS Pollution** ❑ No evidence ❑ Some potential sources ❑ Obvious sources **Local Watershed Erosion** ❑ None ❑ Moderate ❑ Heavy
RIPARIAN VEGETATION (18 meter buffer)	**Indicate the dominant type and record the dominant species present** ❑ Trees ❑ Shrubs ❑ Grasses ❑ Herbaceous **dominant species present** _____
INSTREAM FEATURES	**Estimated Reach Length** _____m **Estimated Stream Width** _____m **Sampling Reach Area** _____m^2 **Area in km^2 (m^2x1000)** _____km^2 **Estimated Stream Depth** _____m **Surface Velocity (at thalweg)** _____m/sec **Canopy Cover** ❑ Partly open ❑ Partly shaded ❑ Shaded **High Water Mark** _____m **Proportion of Reach Represented by Stream Morphology Types** ❑ Riffle_____% ❑ Run_____% ❑ Pool_____% **Channelized** ❑ Yes ❑ No **Dam Present** ❑ Yes ❑ No
LARGE WOODY DEBRIS	**LWD** _____m^2 **Density of LWD** _____m^2/km^2 **(LWD/ reach area)**
AQUATIC VEGETATION	**Indicate the dominant type and record the dominant species present** ❑ Rooted emergent ❑ Rooted submergent ❑ Rooted floating ❑ Free floating ❑ Floating Algae ❑ Attached Algae **dominant species present** _____ **Portion of the reach with aquatic vegetation** _____%
WATER QUALITY	**Temperature**_____ ^{0} C **Specific Conductance**_____ **Dissolved Oxygen** _____ **pH** _____ **Turbidity** _____ **WQ Instrument Used** _____ **Water Odors** ❑ Normal/None ❑ Sewage ❑ Petroleum ❑ Chemical ❑ Fishy ❑ Other_____ **Water Surface Oils** ❑ Slick ❑ Sheen ❑ Globs ❑ Flecks ❑ None ❑ Other_____ **Turbidity (if not measured)** ❑ Clear ❑ Slightly turbid ❑ Turbid ❑ Opaque ❑ Stained ❑ Other_____
SEDIMENT/ SUBSTRATE	**Odors** ❑ Normal ❑ Sewage ❑ Petroleum ❑ Chemical ❑ Anaerobic ❑ None ❑ Other_____ **Oils** ❑ Absent ❑ Slight ❑ Moderate ❑ Profuse **Deposits** ❑ Sludge ❑ Sawdust ❑ Paper fiber ❑ Sand ❑ Relict shells ❑ Other_____ **Looking at stones which are not deeply embedded, are the undersides black in color?** ❑ Yes ❑ No

INORGANIC SUBSTRATE COMPONENTS (should add up to 100%)			ORGANIC SUBSTRATE COMPONENTS (does not necessarily add up to 100%)		
Substrate Type	**Diameter**	**% Composition in Sampling Reach**	**Substrate Type**	**Characteristic**	**% Composition in Sampling Area**
Bedrock			Detritus	sticks, wood, coarse plant materials (CPOM)	
Boulder	> 256 mm (10")				
Cobble	64-256 mm (2.5"-10")		Muck-Mud	black, very fine organic (FPOM)	
Gravel	2-64 mm (0.1"-2.5")				
Sand	0.06-2mm (gritty)		Marl	grey, shell fragments	
Silt	0.004-0.06 mm				
Clay	< 0.004 mm (slick)				

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS (FRONT)

STREAM NAME	LOCATION	
STATION #_____ RIVERMILE_____	STREAM CLASS	
LAT _____ LONG _____	RIVER BASIN	
STORET #	AGENCY	
INVESTIGATORS		
FORM COMPLETED BY	DATE _____ TIME _____ AM PM	REASON FOR SURVEY

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (Slow is < 0.3 m/s, deep is > 0.5 m.)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow-deep).
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS (BACK)

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category: Optimal	Suboptimal	Marginal	Poor
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability (score each bank) Note: determine left or right side by facing downstream.	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE ___ (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE ___ (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE ___ (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE ___ (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE ___ (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE ___ (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score _____

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (FRONT)

STREAM NAME	LOCATION	
STATION #_____ RIVERMILE_____	STREAM CLASS	
LAT _____ LONG _____	RIVER BASIN	
STORET #	AGENCY	
INVESTIGATORS		
FORM COMPLETED BY	DATE _____ TIME _____ AM PM	REASON FOR SURVEY

Parameters to be evaluated in sampling reach	Habitat Parameter	Condition Category			
		Optimal	**Suboptimal**	**Marginal**	**Poor**
	1. Epifaunal Substrate/ Available Cover	Greater than 50% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	30-50% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 10% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
	SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
	2. Pool Substrate Characterization	Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.	All mud or clay or sand bottom; little or no root mat; no submerged vegetation.	Hard-pan clay or bedrock; no root mat or vegetation.
	SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
	3. Pool Variability	Even mix of large-shallow, large-deep, small-shallow, small-deep pools present.	Majority of pools large-deep; very few shallow.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.
	SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
	4. Sediment Deposition	Little or no enlargement of islands or point bars and less than <20% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 20-50% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 50-80% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
	SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
	5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
	SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (BACK)

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Channel Sinuosity	The bends in the stream increase the stream length 3 to 4 times longer than if it was in a straight line. (Note - channel braiding is considered normal in coastal plains and other low-lying areas. This parameter is not easily rated in these areas.)	The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line.	The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line.	Channel straight; waterway has been channelized for a long distance.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability (score each bank)	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE ___ (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE ___ (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank) Note: determine left or right side by facing downstream.	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE ___ (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE ___ (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE ___ (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE ___ (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score _____

APPENDIX A-2:

Periphyton Field and Laboratory Data Sheets

Form 1: Periphyton Field Data Sheet
Form 2: Periphyton Sample Log-In Sheet
Form 3: Periphyton Soft Algae Laboratory Bench Sheet (front and back)
Form 4: Periphyton Diatom Laboratory Bench Sheet (front and back)
Form 5: Rapid Periphyton Survey Field Sheet

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PERIPHYTON FIELD DATA SHEET

STREAM NAME	LOCATION	
STATION #_____ RIVERMILE_____	STREAM CLASS	
LAT _____ LONG _____	RIVER BASIN	
STORET #	AGENCY	
INVESTIGATORS		LOT NUMBER
FORM COMPLETED BY	DATE _____ TIME _____ AM PM	REASON FOR SURVEY

HABITAT TYPES	**Indicate the percentage of each habitat type present** ❑ Sand-Silt-Mud-Muck_____% ❑ Gravel-Cobble_____% ❑ Bedrock_____% ❑ Small Woody Debris_____% ❑ Large Woody Debris_____% ❑ Plants, Roots_____% ❑ Riffle_____% ❑Run_____% ❑ Pool_____% ❑ Canopy_____%
SAMPLE COLLECTION	**Gear used** ❑ suction device ❑ bar clamp sample ❑ scraping ❑ Other _____ **How were the samples collected?** ❑ wading ❑ from bank ❑ from boat **If natural habitat collections, indicate the number of samples taken in each habitat type.** ❑ Sand-Silt-Mud-Muck_____% ❑ Gravel-Cobble_____% ❑ Bedrock_____% ❑ Small Woody Debris_____% ❑ Large Woody Debris_____% ❑ Plants, Roots_____%
GENERAL COMMENTS	

QUALITATIVE LISTING OF AQUATIC BIOTA

Indicate estimated abundance: **0 = Absent/Not Observed, 1 = Rare (<5%), 2 = Common (5% - 30%), 3= Abundant (30% - 70%), 4 = Dominant (>70%)**

Periphyton	0	1	2	3	4	Slimes	0	1	2	3	4
Filamentous Algae	0	1	2	3	4	Macroinvertebrates	0	1	2	3	4
Macrophytes	0	1	2	3	4	Fish	0	1	2	3	4

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page __ of __

PERIPHYTON SAMPLE LOG-IN SHEET

Date Collected	Collected By	Number of Containers	Preservation	Station #	Stream Name and Location	Date Received by Lab	Lot Number	Date of Completion		
								sorting	mounting	identification

Serial Code Example: P0754001(1)
P = Periphyton (B = Benthos, F = Fish) ■ 0754 = project number ■ 001 = sample number ■ (1) = lot number (e.g., winter 1996 =1; summer 1996 = 2)

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PERIPHYTON SOFT ALGAE LABORATORY BENCH SHEET (FRONT)

page _____ of _____

STREAM NAME		LOCATION	
STATION #	RIVERMILE	STREAM CLASS	
LAT	LONG	RIVER BASIN	
STORET #	LOT #	AGENCY	
COLLECTORS INITIALS	DATE	TAXONOMISTS INITIALS	DATE
SUBSAMPLE TARGET FOR SOFT ALGAE	❑ 300 ❑ 400 ❑ 500 ❑ Other ____		

TAXA NAME	TALLY	CODE	# OF CELLS	TCR

Taxonomic certainty ratings (TCR) can be determined for each taxa or for the laboratory as a whole. The TCR scale is 1-5, with: 1 = most certain and 5 = least certain. If rating is 3-5, give reason. The number of cells for filamentous algae is an estimate of relative biomass.

Total No. Algal cells _____ **Total No. Taxa** _____

PERIPHYTON SOFT ALGAE LABORATORY BENCH SHEET (BACK)

STREAM IDENTIFICATION CODE	DATE COUNTED
COUNTED TRANSECT LENGTH	COUNTED TRANSECT WIDTH
SIZE OF COVERGLASS	TOTAL SAMPLE VOLUME
VOLUME OF SAMPLE ON COVERGLASS	SAMPLE DILUTION FACTOR
PROPORTION OF SAMPLE COUNTED	AREA OF SUBSTRATE SAMPLED
TOTAL NUMBER OF CELLS COUNTED	TOTAL ASSEMBLAGE CELL DENSITY

TAXONOMY **ID** _____ **Date** _____	Explain TCR ratings of 3-5: Other Comments (e.g. condition of algae): **QC:** ☐ YES ☐ NO **QC Checker** _____ Algal recognition ☐ pass ☐ fail Verification complete ☐ YES ☐ NO

General Comments (use this space to add additional comments):

PERIPHYTON DIATOM LABORATORY BENCH *SHEET (FRONT)*

page _____ of _____

STREAM NAME		LOCATION	
STATION #	RIVERMILE	STREAM CLASS	
LAT	LONG	RIVER BASIN	
STORET #	LOT #	AGENCY	
COLLECTORS INITIALS	DATE	TAXONOMISTS INITIALS	DATE
SUBSAMPLE TARGET FOR DIATOM	❑ 300 ❑ 400 ❑ 600 ❑ Other ____		

TAXA NAME	TALLY (# of valves)	CODE	# OF CELLS	TCR

Taxonomic certainty ratings (TCR) can be determined for each taxa or for the laboratory as a whole. The TCR scale is 1-5, with: 1 = most certain and 5 = least certain. If rating is 3-5, give reason. The number of cells for filamentous algae is an estimate of relative biomass.

Total No. Algal cells _____ **Total No. Taxa** _____

PERIPHYTON DIATOM LABORATORY BENCH SHEET (BACK)

TAXONOMY	Explain TCR ratings of 3-5:
ID _____	Other Comments (e.g. condition of algae):
Date _____	QC: ❑ YES ❑ NO QC Checker _____
	Algal recognition ❑ pass ❑ fail Verification complete ❑ YES ❑ NO

General Comments (use this space to add additional comments):

RAPID PERIPHYTON SURVEY FIELD SHEET

STREAM NAME		LOCATION	
STATION #	RIVERMILE	STREAM CLASS	
LAT	LONG	RIVER BASIN	
STORET #	LOT #	AGENCY	
COLLECTORS INITIALS	DATE	TAXONOMISTS INITIALS	DATE

ASSESSED BY
GRID AREA
ID MACROALGA #1
ID MACROALGA #2
ID MICROALGA #1
ID MICROALGA #2

Macroalga #1 Maximum Length _____

Macroalga #2 Maximum Length _____

TRANSECT/ VIEW #	# DOTS IN GRID AREA	MACROALGA #1 DOTS COVERED	MACROALGA #2 DOTS COVERED	# DOTS MICROALGA SUBSTRATE	MICROALGA #1 DOTS COVERED BY THICKNESS RANK							MICROALGA #2 DOTS COVERED BY THICKNESS RANK						
					0	0.5	1	2	3	4	5	0	0.5	1	2	3	4	5
TOTAL # DOTS AT SITE																		

General Comments:

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APPENDIX A-3:

Benthic Macroinvertebrate Field and Laboratory Data Sheets

Form 1: Benthic Macroinvertebrate Field Data Sheet
Form 2: Benthic Macroinvertebrate Sample Log-In Sheet
Form 3: Benthic Macroinvertebrate Laboratory Bench Sheet
Form 4: Preliminary Assessment Score Sheet (Pass)

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BENTHIC MACROINVERTEBRATE FIELD DATA SHEET

STREAM NAME	LOCATION	
STATION #_____ RIVERMILE_____	STREAM CLASS	
LAT _____ LONG _____	RIVER BASIN	
STORET #	AGENCY	
INVESTIGATORS		LOT NUMBER
FORM COMPLETED BY	DATE _____ TIME _____ AM PM	REASON FOR SURVEY

HABITAT TYPES	**Indicate the percentage of each habitat type present** ❑ Cobble_____% ❑ Snags_____% ❑ Vegetated Banks_____% ❑ Sand_____% ❑ Submerged Macrophytes_____% ❑ Other ( )_____%
SAMPLE COLLECTION	**Gear used** ❑ D-frame ❑ kick-net ❑ Other _____ **How were the samples collected?** ❑ wading ❑ from bank ❑ from boat **Indicate the number of jabs/kicks taken in each habitat type.** ❑ Cobble_____ ❑ Snags_____ ❑ Vegetated Banks_____ ❑ Sand_____ ❑ Submerged Macrophytes_____ ❑ Other ( )_____
GENERAL COMMENTS	

QUALITATIVE LISTING OF AQUATIC BIOTA
Indicate estimated abundance: 0 = Absent/Not Observed, 1 = Rare, 2 = Common, 3= Abundant, 4 = Dominant

Periphyton	0	1	2	3	4	Slimes	0	1	2	3	4
Filamentous Algae	0	1	2	3	4	Macroinvertebrates	0	1	2	3	4
Macrophytes	0	1	2	3	4	Fish	0	1	2	3	4

FIELD OBSERVATIONS OF MACROBENTHOS
Indicate estimated abundance: 0 = Absent/Not Observed, 1 = Rare (1-3 organisms), 2 = Common (3-9 organisms), 3= Abundant (>10 organisms), 4 = Dominant (>50 organisms)

Porifera	0	1	2	3	4	Anisoptera	0	1	2	3	4	Chironomidae	0	1	2	3	4
Hydrozoa	0	1	2	3	4	Zygoptera	0	1	2	3	4	Ephemeroptera	0	1	2	3	4
Platyhelminthes	0	1	2	3	4	Hemiptera	0	1	2	3	4	Trichoptera	0	1	2	3	4
Turbellaria	0	1	2	3	4	Coleoptera	0	1	2	3	4	Other	0	1	2	3	4
Hirudinea	0	1	2	3	4	Lepidoptera	0	1	2	3	4						
Oligochaeta	0	1	2	3	4	Sialidae	0	1	2	3	4						
Isopoda	0	1	2	3	4	Corydalidae	0	1	2	3	4						
Amphipoda	0	1	2	3	4	Tipulidae	0	1	2	3	4						
Decapoda	0	1	2	3	4	Empididae	0	1	2	3	4						
Gastropoda	0	1	2	3	4	Simuliidae	0	1	2	3	4						
Bivalvia	0	1	2	3	4	Tabinidae	0	1	2	3	4						
						Culcidae	0	1	2	3	4						

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page __ of __

BENTHIC MACROINVERTEBRATE SAMPLE LOG-IN SHEET

Date Collected	Collected By	Number of Containers	Preservation	Station #	Stream Name and Location	Date Received by Lab	Lot Number	Date of Completion		
								sorting	mounting	identification

Serial Code Example: B0754001(1)
B = Benthos (F = Fish; P = Periphyton) ■ 0754 = project number ■ 001 = sample number ■ (1) = lot number (e.g., winter 1996 =1; summer 1996 = 2)

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BENTHIC MACROINVERTEBRATE LABORATORY BENCH SHEET (FRONT)

page _____ of _____

STREAM NAME	LOCATION
STATION #_____ RIVERMILE_____	STREAM CLASS
LAT _____ LONG _____	RIVER BASIN
STORET #	AGENCY
COLLECTED BY DATE_____	LOT #
TAXONOMIST DATE_____	SUBSAMPLE TARGET ❑ 100 ❑ 200 ❑ 300 ❑ Other ____

Enter Family and/or Genus and Species name on blank line.

Organisms		No.	LS	TI	TCR	Organisms		No.	LS	TI	TCR
Oligochaeta						Megaloptera					
Hirudinea						Coleoptera					
Isopoda											
Amphipoda						Diptera					
Decapoda											
Ephemeroptera											
						Gastropoda					
						Pelecypoda					
Plecoptera											
						Other					
Trichoptera											
Hemiptera											

Taxonomic certainty rating (TCR) 1-5:1=most certain, 5=least certain. If rating is 3-5, give reason (e.g., missing gills). LS= life stage: I = immature; P = pupa; A = adult TI = Taxonomists initials

Total No. Organisms _____ **Total No. Taxa** _____

BENTHIC MACROINVERTEBRATE LABORATORY BENCH SHEET (BACK)

SUBSAMPLING/SORTING INFORMATION Sorter _____ Date _____	Number of grids picked: _____ Time expenditure _____ No. of organisms _____ Indicate the presence of large or obviously abundant organisms: **QC:** ❑ YES ❑ NO **QC Checker** _____ # organisms originally sorted [ ] ÷ (# organisms recovered by checker [ ] + # organisms originally sorted [ ]) = % sorting efficiency [ ] ≥90%, sample passes _____ <90%, sample fails, action taken _____
TAXONOMY ID _____ Date _____	Explain TCR ratings of 3-5: Other Comments (e.g. condition of specimens): **QC:** ❑ YES ❑ NO **QC Checker** _____ Organism recognition ❑ pass ❑ fail Verification complete ❑ YES ❑ NO

General Comments (use this space to add additional comments):

_____

_____

_____

_____

_____

_____

_____

PRELIMINARY ASSESSMENT SCORE SHEET
(PASS)

page _____ of _____

STREAM NAME	LOCATION
STATION #_____ RIVERMILE_____	STREAM CLASS
LAT _____ LONG _____	RIVER BASIN
STORET #	AGENCY
COLLECTED BY DATE_____	LOT #_____ NUMBER OF SWEEPS _____
HABITATS: ☐ COBBLE ☐ SHOREZONE ☐ SNAGS ☐ VEGETATION	

Enter Family and/or Genus and Species name on blank line.

Organisms		No.	LS	TI	TCR	Organisms		No.	LS	TI	TCR
Oligochaeta						Megaloptera					
Hirudinea						Coleoptera					
Isopoda											
Amphipoda						Diptera					
Decapoda											
Ephemeroptera											
						Gastropoda					
						Pelecypoda					
Plecoptera											
						Other					
Trichoptera											
Hemiptera											

Taxonomic certainty rating (TCR) 1-5:1=most certain, 5=least certain. If rating is 3-5, give reason (e.g., missing gills). LS= life stage: I = immature; P = pupa; A = adult TI = Taxonomists initials

	Site Value	Target Threshold	
Total No. Taxa			If 2 or more metrics are ≥ target threshold, site is **HEALTHY**
EPT Taxa			If less than 2 metrics are within target range, site is **SUSPECTED IMPAIRED**
Tolerance Index			

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Appendix A-4:

Fish Field and Laboratory Data Sheets

Form 1: Fish Sampling Field Data Sheet
Form 2: Fish Sample Log-In Sheet

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FISH SAMPLING FIELD DATA SHEET (FRONT)

page _____ of _____

STREAM NAME	LOCATION	
STATION #_____ RIVERMILE_____	STREAM CLASS	
LAT _____ LONG _____	RIVER BASIN	
STORET #	AGENCY	
GEAR	INVESTIGATORS	
FORM COMPLETED BY	DATE _____ TIME _____ AM PM	REASON FOR SURVEY

SAMPLE COLLECTION	**How were the fish captured?** ❑ back pack ❑ tote barge ❑ other _____ **Block nets used?** ❑ YES ❑ NO **Sampling Duration** Start time _____ End time _____ Duration _____ **Stream width (in meters)** Max_____ Mean_____
HABITAT TYPES	**Indicate the percentage of each habitat type present** ❑ Riffles_____% ❑ Pools_____% ❑ Runs_____% ❑ Snags_____% ❑ Submerged Macrophytes_____% ❑ Other ( )_____%
GENERAL COMMENTS	

SPECIES	TOTAL (COUNT)	OPTIONAL: LENGTH (mm)/WEIGHT (g) (25 SPECIMEN MAX SUBSAMPLE)					ANOMALIES*							
							D	E	F	L	M	S	T	Z

FISH SAMPLING FIELD DATA SHEET (BACK)

SPECIES	TOTAL (COUNT)	OPTIONAL: LENGTH (mm)/WEIGHT (g) (25 SPECIMEN MAX SUBSAMPLE)					ANOMALIES*							
							D	E	F	L	M	S	T	Z

page __ of __

FISH SAMPLE LOG-IN SHEET

Date Collected	Collected By	Number of Containers	Preservation	Station #	Stream Name and Location	Date Received by Lab	Lot Number	Date of Completion		
								sorting	mounting	identification

Serial Code Example: F0754001(1)
F = Fish (B = Benthos; P = Periphyton) ■ 0754 = project number ■ 001 = sample number ■ (1) = lot number (e.g., winter 1996 =1; summer 1996 = 2)

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APPENDIX B:

REGIONAL TOLERANCE VALUES, FUNCTIONAL FEEDING GROUPS AND HABIT/BEHAVIOR ASSIGNMENTS FOR BENTHIC MACROINVERTEBRATES

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APPENDIX B

Appendix B is a list of selected benthic macroinvertebrates of the United States in phylogenetic order. Included are the Taxonomic Serial Number (TSN) and the Parent Taxonomic Serial Number for each of the taxa listed according to the Integrated Taxonomic Information System (ITIS). The ITIS generates a national taxonomic list that is constantly updated and currently posted on the World Wide Web at <www.itis.usda.gov>. If you are viewing this document electronically, this page is linked to the ITIS web site.

This Appendix displays regional tolerance values, primary and secondary functional feeding group information, and primary and secondary habit designations for selected benthic macroinvertebrates. In an effort to provide regionally accurate tolerance information, lists included in this Appendix were taken from the following states (and workgroup): Idaho (Northwest), Ohio[1] (Midwest), North Carolina (Southeast), Wisconsin (Upper Midwest), and the MACS workgroup (Mid-Atlantic Coastal Streams). Tolerance values are on a 0 to 10 scale, 0 representing the tolerance value of an extremely sensitive organism and 10 for a tolerant organism. For functional feeding group and habit/behavior assignments, primary and secondary designations are listed, if both are known. Each characterization is based on the organisms' larval qualities, except a group of beetles (listed as 'adult') that are aquatic as adults. The following are lists of the abbreviations used in this appendix.

FUNCTIONAL FEEDING DESIGNATIONS

PA=parasite
PR=predator
OM=omnivore
GC=gatherer/collector
FC=filter/collector
SC=scraper
SH=shredder
PI=piercer

HABIT/BEHAVIOR DESIGNATIONS

cn=clinger
cb=climber
sp=sprawler
bu=burrower
sw=swimmer
dv=diver
sk=skater

Sources For Benthic Tolerance, Functional Feeding Group, and Habit/Behavior Designations [(a)]

ID= Idaho DEP (Northwest)

OH= Ohio EPA (Midwest)

NC = North Carolina DEM (Southeast)

WI = Wisconsin DNR (Upper Midwest)

MACS= Mid-Atlantic Coastal Streams Workgroup (NJ DEP, DE DNREC, MD DNR, VA DEC, NC DEM, SC DHES)

[(a)] Habit/Behavior information is primarily based on Merritt and Cummins (1996) and pertains to insect larval forms (except for Dryopidae adults) and is mostly at genus level.

[1]Ohio traditionally uses an inverted 60-point scale compared to the other states in this list. In order to be comparable to the other listed states, the Ohio values were converted to a 0-10 scale as discussed above.

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Regional Tolerance Values, Functional Feeding Groups, and Habit/Behavior Assignments for Benthic Macroinvertebrates

Parent TSN	TSN	Scientific Name	Regional Tolerance Values					Functional Feeding Group		Habit/ Behavior	
			Southeast (NC)	Upper Midwest (WI)	Midwest (OH)	Northwest (ID)	Mid-Atlantic (MACS)	primary	secondary	primary	secondary
202423	59490	Nematoda				5		PA			
202423	64183	Nematomorpha						PA			
202423	57411	Nemertea				8		PR			
	57412	Rhynchocoela									
57577	57578	Prostoma graecense	6.6					PR			
57577	193496	Prostoma rubrum									
202423	53963	Platyhelminthes									
53963	53964	Turbellaria				4		PR			
53965	54468	Tricladida				4		GC			
54552	54553	Cura									
54468	54502	Planariidae				1		OM			
54502	54503	Dugesia				4		OM			
54503	54504	Dugesia tigrina	7.5					PR			
54502	54510	Polycelis				6		GC			
54510	54512	Polycelis coronata				1		OM			
202423	46861	Porifera						FC			
47690	47691	Spongillidae						FC			
47691	47692	Spongilla						FC			
47692	47696	Spongilla aspinosa						FC			
	155470	Ectoprocta									
156691	156692	Plumatella repens									
174619	174662	Hydrobates									
202423	48738	Cnidaria									
50844	50845	Hydra				5		PR			
50845	50846	Hydra americana									
156753	156754	Urnatella gracilis									
69458	79118	Bivalvia						FC			
	79119	Pelecypoda				8		FC			
79517	79519	Brachidontes exustus						FC			
79912	79913	Unionidae				8		FC			
79913	79930	Anodonta				8		FC			
79930	79946	Anodonta couperiana						FC			
		Anodonta nuttalliana idahoensis				8		FC			
79913	79951	Elliptio						FC			
79951	79975	Elliptio buckleyi						FC			
79951	79952	Elliptio complanata	5.4								
79951	79964	Elliptio lanceolata	1.9								
79913	80032	Gonidea				4		FC			
80032	80033	Gonidea angulata				8		FC			
79986	80006	Lampsilis teres						FC			
79913	80370	Margaritifera				4		FC			
80370	80371	Margaritifera margaritifera				8		FC			
80059	80067	Quadrula cylindrica						FC			

Parent TSN	TSN	Scientific Name	Regional Tolerance Values					Functional Feeding Group		Habit/ Behavior	
			Southeast (NC)	Upper Midwest (WI)	Midwest (OH)	Northwest (ID)	Mid-Atlantic (MACS)	primary	secondary	primary	secondary
81381	81385	Corbicula						FC			
81385	81387	Corbicula fluminea	6.3		3.2			FC			
81385	81386	Corbicula manilensis						FC			
81333	81335	Mytilopsis leucophaeata						FC			
80384	81388	Pisidiidae				8		GC			
	81389	Sphaeriidae				8	8	FC			
81388	81436	Eupera									
	205642	Byssanodonta cubensis (= Eupera)						FC			
81436	81438	Eupera cubensis						FC			
81388	81427	Musculium					5	FC			
81427	81430	Musculium lacustre					5	FC			
		Byssanodonta (= Eupera)						FC			
81427	81434	Musculium securis					5	FC			
81427	81428	Musculium transversum									
81388	81400	Pisidium	6.8		4.6	8	8	FC			
81400	81405	Pisidium casertanum				8		SC			
81400		Pisidium lilljborgi					8	FC			
81400	81406	Pisidium compressum				8		FC			
81400	81402	Pisidium dubium						FC			
81400	81408	Pisidium fallax				8		FC			
81400	81403	Pisidium idahoense				8		FC			
81400	81424	Pisidium punctatum				8		FC			
81400	81425	Pisidium punctiferum						FC			
81400	81420	Pisidium walkeri				8		FC			
81388	81391	Sphaerium	7.7		4.7	6		GC	FC		
81391	81395	Sphaerium patella				8		FC			
81391	81398	Sphaerium striatinum						FC			
69458	69459	Gastropoda				7		SC			
76437	76568	Ancylidae				6		SC			
76568	76569	Ferrissia	6.9		5.2	6	7	SC			
76569	76573	Ferrissia hendersoni						SC			
76569	76572	Ferrissia rivularis						SC			
76569	76575	Ferrissia walkeri					7	SC			
76585	76586	Hebetancylus excentricus						SC			
76568	76576	Laevapex						SC			
76576	76578	Laevapex diaphanus						SC			
76576	76577	Laevapex fuscus	7.3		6.7			SC			
76576	76579	Laevapex peninsulae						SC			
76476	76477	Lanx				6		GC			
76437	76483	Lymnaeidae			6.9	6	6	SC			
76483	76497	Fossaria			2.6	8		SC			
76483	76484	Lymnaea				8		SC			
76483	76528	Pseudosuccinea						SC			
76528	76529	Pseudosuccinea columella	7.2					SC			
76483	76525	Radix									
76483	76534	Stagnicola	8			10	7	SC			

Parent TSN	TSN	Scientific Name	Regional Tolerance Values					Functional Feeding Group		Habit/ Behavior	
			Southeast (NC)	Upper Midwest (WI)	Midwest (OH)	Northwest (ID)	Mid-Atlantic (MACS)	primary	secondary	primary	secondary
76437	76676	Physidae				8		SC			
76676	76677	Physa				8		SC			
76676	76698	Physella	9.1		7.6	8	8	SC			
76698	76707	Physella cubensis						SC			
76698	76724	Physella hendersoni						SC			
76698	76736	Physella heterostropha						SC			
76437	76591	Planorbidae				7		SC			
76591	76592	Gyraulus				8		SC			
76592	76593	Gyraulus circumstriatus					7	SC			
76592	76595	Gyraulus parvus			5.5			SC			
76591	76599	Helisoma						SC			
76599	76600	Helisoma anceps	6.5		6		7	SC			
76591	76626	Menetus									
76626	205210	Menetus dilatatus	8.4		8.1			SC			
76591	76643	Micromenetus						SC			
76643	76648	Micromenetus dilatatus						SC			
76643	76646	Micromenetus floridensis						SC			
76591	76654	Planorbella				6		SC			
76654	76662	Planorbella duryi						SC			
76654	76667	Planorbella pilsbryi			7.4						
76654	76668	Planorbella scalaris						SC			
76671	205212	Planorbella trivolvis			9.5			SC			
76591	76621	Promenetus						GC			
76591	76673	Vorticifex				8		SC			
76673		Vorticifex effusa				6		SC			
77064	77300	Limacidae									
70160	70163	Neritina reclivata						SC			
70745	70747	Amnicola	4.8			5		SC			
70747	70764	Amnicola dalli						SC			
70747		Amnicola grana					8	SC			
70764	205008	Amnicola dalli johnsoni						SC			
70747	70748	Amnicola limosa					8	SC			
70745	70778	Fluminicola				5		SC			
70778	70782	Fluminicola hindsi				5		SC			
	71549	Pleurocera			3.7						
70298	70493	Hydrobiidae			7			SC			
		Pyrgulopsis idahoensis				8		SC			
70493	70509	Cincinnatia						SC			
70509	70513	Cincinnatia floridana						SC			
70493	70643	Fontelicella				8		SC			
70493	70527	Littoridinops						SC			
70527	70530	Littoridinops monroensis						SC			
70633	70634	Notogillia wetherbyi						SC			
70493	205005	Potamopyrgus				10		SC			
205005	205006	Potamopyrgus antipodarum				8		SC			
70699	70700	Pyrgophorus platyrachis						SC			

Parent TSN	TSN	Scientific Name	Regional Tolerance Values					Functional Feeding Group		Habit/ Behavior	
			Southeast (NC)	Upper Midwest (WI)	Midwest (OH)	Northwest (ID)	Mid-Atlantic (MACS)	primary	secondary	primary	secondary
70712	70713	Rhapinema dacryon						SC			
	70548	Somatogyrus	6.5								
70548	70582	Somatogyrus walkerianus						SC			
70493	70702	Spilochlamys						SC			
70702	70703	Spilochlamys conica						SC			
71541	71654	Elimia	2.5		3.6		2	SC			
71654	71858	Elimia athearni						SC			
71654	71746	Elimia curvicostata						SC			
71654	71761	Elimia floridensis						SC			
71541	71542	Goniobasis									
71541	71570	Juga				7		SC			
71541	71601	Leptoxis	1.6								
70298	71531	Thiaridae						SC			
71531	71532	Melanoides						SC			
71532	71533	Melanoides tuberculata						SC			
70298	70345	Valvatidae						SC			
70345	70346	Valvata				8		SC			
73194	73195	Marisa cornuarietis									
70342	70343	Pomacea paludosa						SC			
331584	70304	Viviparidae				6		SC			
331600	70311	Campeloma						SC			
70311	70312	Campeloma decisum	6.7			6		SC			
70311	70322	Campeloma floridense						SC			
70311	70315	Campeloma geniculum						SC			
70311	70317	Campeloma limum						SC			
70333	70336	Lioplax pilsbryi						SC			
331585	70305	Viviparus						SC			
70305	70307	Viviparus georgianus						SC			
202423	64357	Annelida						GC			
64357	68422	Oligochaeta				5		GC			
68498	69069	Lumbricina				8		GC			
68422	69168	Branchiobdellida									
69168	69169	Branchiobdellidae				6		GC			
69069	69080	Glossoscolecidae					10	GC			
69069	69165	Lumbricidae					10	GC			
68498	68499	Sparganophilidae									
68509	68510	Enchytraeidae	10			10	10	GC			
68509	68854	Naididae						GC			
68423	68424	Aeolosoma									
68854	68967	Allonais						GC			
68967	68971	Allonais inequalis						GC			
68854	69021	Bratislavia						GC			
69021	69022	Bratislavia bilongata						GC			
69021	69023	Bratislavia unidentata						GC			
68934	68935	Chaetogaster diaphanus									
68854	68898	Dero	10				10	GC			

Parent TSN	TSN	Scientific Name	Regional Tolerance Values					Functional Feeding Group		Habit/ Behavior	
			Southeast (NC)	Upper Midwest (WI)	Midwest (OH)	Northwest (ID)	Mid-Atlantic (MACS)	primary	secondary	primary	secondary
68898	555636	Dero botrytis						GC			
68898	68904	Dero digitata						GC			
68898	68902	Dero flabelliger						GC			
68898	68912	Dero furcata						GC			
68898	68924	Dero lodeni						GC			
68898	68900	Dero nivea						GC			
68898	68907	Dero obtusa						GC			
68898	68923	Dero pectinata						GC			
68898	68903	Dero trifida						GC			
68898	68915	Dero vaga						GC			
69003	69004	Haemonais waldvogeli						GC			
	68946	Nais	9.1								
68946	68949	Nais behningi						GC			
68946	68950	Nais communis						GC			
68946	68952	Nais elinguis						GC			
68946	68954	Nais pardalis						GC			
68946	68956	Nais pseudobtusa						GC			
68946	68957	Nais simplex						GC			
68946	68959	Nais variabilis						GC			
68862	68863	Paranais litoralis						GC			
68854	68876	Pristina	9.9					GC			
68876	68879	Pristina aequiseta						GC			
68876	68880	Pristina breviseta						GC			
68876	68881	Pristina foreli						GC			
68876	68894	Pristina leidyi						GC			
68876	68893	Pristina longisoma						GC			
68876	68887	Pristina osborni						GC			
68876	68891	Pristina plumaseta						GC			
68876	68878	Pristina sima						GC			
68876	68895	Pristina synclites						GC			
68854	69024	Pristinella						GC			
69024	69030	Pristinella jenkinae						GC			
69024	69025	Pristinella longisoma						GC			
69024	69026	Pristinella osborni						GC			
68854	68855	Slavina						GC			
68855	68856	Slavina appendiculata	7.1					GC			
68984	68985	Specaria josinae						GC			
69017	69018	Stephensoniana trivandrana						GC			
68871	68873	Stylaria fossularis					8	GC			
68871	68872	Stylaria lacustris	8.5					GC			
68854	69009	Vejdovskyella						GC			
69009	69010	Vejdovskyella comata						GC			
68509	69041	Opistocystidae									
68509	68585	Tubificidae				10	10	GC			
	68588	Peloscolex	8.8								
68679	68683	Aulodrilus americanus						GC			

Parent TSN	TSN	Scientific Name	Regional Tolerance Values					Functional Feeding Group		Habit/ Behavior	
			Southeast (NC)	Upper Midwest (WI)	Midwest (OH)	Northwest (ID)	Mid-Atlantic (MACS)	primary	secondary	primary	secondary
68679	68682	Aulodrilus limnobius	5.2					GC			
68679	68680	Aulodrilus pigueti	4.7					GC			
68679	68684	Aulodrilus pluriseta					8	GC			
68619	68621	Branchiura sowerbyi	8.4					GC			
68585	68745	Haber									
68745	68746	Haber speciosus	2.8								
68660	68662	Ilyodrilus templetoni	9.4					GC			
68808	68809	Isochaetides curvisetosus	7.2					GC			
68808	68810	Isochaetides freyi	7.6								
68585	68638	Limnodrilus	9.6					GC			
68638	68653	Limnodrilus angustipenis						GC			
68638	68652	Limnodrilus cervix	10								
68638	68639	Limnodrilus hoffmeisteri	9.8					GC			
68638	68649	Limnodrilus profundicola						GC			
68638	68644	Limnodrilus udekemianus	9.7					GC			
68780	68610	Spirosperma ferox						GC			
68780	68781	Spirosperma nikolskyi	7.7								
68585	68751	Psammoryctides									
68751	68752	Psammoryctides convolutus						GC			
68793	68794	Quistradrilus multisetosus					10	GC			
68839	68844	Rhyacodrilus sodalis				10		GC			
68585	68780	Spirosperma						GC			
68780	68782	Spirosperma carolinensis					10	GC			
68585	68622	Tubifex				10		GC			
68622	68623	Tubifex tubifex	10					GC			
68439	68440	Lumbriculidae	7.3			8		GC			
68440	68473	Eclipidrilus					8				
68473	68476	Eclipidrilus palustris						GC			
68440	68441	Lumbriculus						GC			
68441	68447	Lumbriculus inconstans						GC			
68441	68444	Lumbriculus variegata						GC			
68422	69290	Hirudinea				10		PR			
69406	69407	Hirudinidae				7		PR			
69407	69408	Haemopsis				10		PR			
69408	69412	Haemopsis marmorata						PR			
69418	69421	Macrobdella ditetra									
69407	69430	Percymoorensis				10		PR			
69407	69423	Philobdella									
69437	69438	Erpobdellidae				8		PR			
69438	69439	Dina				8		PR			
69438	69449	Mooreobdella	7.8					PR			
69449	69454	Mooreobdella tetragon	9.7					PR			
69455	69456	Nephelopsis obscura						PR			
69295	69357	Glossiphoniidae				8		PR			
69388	69389	Alboglossiphonia heteroclita						PR			
69380	69390	Glossiphonia heteroclita									

Parent TSN	TSN	Scientific Name	Regional Tolerance Values					Functional Feeding Group		Habit/ Behavior	
			Southeast (NC)	Upper Midwest (WI)	Midwest (OH)	Northwest (ID)	Mid-Atlantic (MACS)	primary	secondary	primary	secondary
69357	69358	Batracobdella						PA			
69358	69359	Batracobdella paludosa						PA			
69357	69380	Glossiphonia						PR			
555637	555638	Desserobdella phalera						PR			
69380	69381	Glossiphonia complanata						PR			
69357	69396	Helobdella				6		PA	PR		
	204822	Gloiobdella elongata						PR			
69396	69397	Helobdella elongata	9.9					PR			
69396	69401	Helobdella fusca						PA			
69396	69398	Helobdella stagnalis	6.7					PR			
69396	69399	Helobdella triserialis	8.9					PA			
69357	69363	Placobdella				6		PR			
69363	69367	Placobdella multilineata						PR			
69363	69364	Placobdella papillifera	9					PA			
69363	69365	Placobdella parasitica	6.6					PA			
	69374	Batracobdella phalera	7.1								
69363	69372	Placobdella translucens						PA			
69357	69375	Theromyzon				10		PR			
69315	69316	Myzobdella lugubris						PR			
69296	69304	Piscicola				10		PR			
69304	69309	Piscicola salmositica				7		PR			
		Acari						PR			
		Acariformes						PR			
		Corticacarus delicatus				8		PR			
83538	83544	Oribatei									
		Parasitengona									
		Protzia californensis				8		PR			
82754	82769	Trombidiformes									
82862	82864	Arrenurus						PR			
82864	82907	Arrenurus apetiolatus						PR			
82864	82953	Arrenurus bicaudatus						PR			
82864	205790	Arrenurus hovus						PR			
82864	205791	Arrenurus problecornis						PR			
82864	205792	Arrenurus zapus						PR			
83434	83435	Albia						PR			
83176	83177	Clathrosperchon						PR			
82770	82771	Halacaridae									
82770	83122	Hydrachnidae									
83122	83123	Hydrachna						PR			
83224	83225	Hydrodroma						PR			
82770	83281	Hygrobatidae				8		PR			
83281	83282	Atractides						PR			
83281	83297	Hygrobates						PR			
83297	83310	Hygrobates occidentalis				8		PR			
83499	83500	Geayia									
83499	83502	Krendowskia									

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82770	83033	Lebertiidae				8		PR			
83033	83034	Lebertia				8		PR			
83050	205794	Centrolimnesia						PR			
83050	83051	Limnesia						PR			
83145	83146	Limnochares						PR			
83476	83479	Mideopsis						PR			
83239	83240	Frontipoda						PR			
83239	83244	Oxus						PR			
82770	83159	Piersigiidae				8		PR			
83330	83350	Piona						PR			
83164	83172	Wandesia									
82770	83005	Sperchonidae				8		PR			
83005	83006	Sperchon						PR			
83006		Sperchon pseudoplumifer				8		PR			
83005	83029	Sperchonopsis						PR			
83249	83254	Torrenticola						PR			
83072	83093	Koenikea									
83093	205798	Koenikea angulata									
83093	193512	Koenikea aphrasta									
83093	193513	Koenikea elaphra									
83099	205797	Koenikea spinipes carella									
83072	83103	Neumania						PR			
83103	83106	Neumania distincta						PR			
83072	83073	Unionicola						PR			
82697	83677	Crustacea				8		GC			
95495	95599	Decapoda				8		SH			
98789	98790	Rhithropanopeus harrisii									
97250	97251	Potimirim potimirim									
96106	96213	Palaemonidae									
96213	96220	Macrobrachium									
96220	96225	Macrobrachium acanthurus									
96220	96221	Macrobrachium ohione									
96213	96383	Palaemonetes									
96383	96396	Palaemonetes kadiakensis					4	OM			
96383	96385	Palaemonetes paludosus					4				
97306	97324	Astacidae	7.2			8		SC			
97324	97325	Pacifastacus				6		OM			
97325		Pacifastacus cambilii				6		SH			
97325	97328	Pacifastacus connectens				6		SH			
97325	97326	Pacifastacus leniusculus				6		SH			
97306	97336	Cambaridae					6	GC			
97336	97337	Cambarus	8.1								
97336	97421	Orconectes	2.7								
97421	97423	Orconectes limosus					6	SH			
97336	97490	Procambarus	9.5								
97490	97492	Procambarus acutus					9	SH			

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97490	97498	Procambarus alleni									
97490	97514	Procambarus fallax									
97490	97555	Procambarus pygmaeus									
97490	97566	Procambarus spiculifer									
89802	93294	Amphipoda				4		GC			
93584	93589	Corophium						FC			
93589	93594	Corophium lacustre						FC			
93641	93642	Grandidierella bonnieroides						GC			
95080	95081	Crangonyx	8				4	GC			
95081	95088	Crangonyx richmondensis						OM			
95081	193517	Crangonyx serratus	8.1					GC			
93295	93745	Gammaridae						GC			
93745	93747	Anisogammarus				4		GC			
	97160	Argis	8.7	8							
93745	93773	Gammarus				4		OM			
93773	93780	Gammarus fasciatus	6.9				6	GC			
93773	93789	Gammarus lacustris						OM			
93773	93781	Gammarus tigrinus						GC			
	93862	Stygonectes									
93947	93949	Synurella chamberlaini						GC			
94022	94025	Hyalella				8		GC			
94025	94026	Hyalella azteca	7.9	8			8	GC			
93295	95032	Talitridae				8		GC			
89802	92120	Isopoda				8		GC			
92148	92149	Cyathura polita						GC			
92650	92657	Asellidae						GC			
92657	92658	Asellus	9.4	8		8		GC			
92658	92659	Asellus occidentalis				8		GC			
92657	92686	Caecidotea				8	6	GC			
92686		Caecidotea attenuatus					6				
92686		Caecidotea communis				6		GC			
92686	92701	Caecidotea forbesi					6				
92686	92692	Caecidotea racovitzai					6				
92692	92695	Caecidotea racovitzai australis						GC			
92657	92666	Lirceus	7.7				8	GC			
	92977	Munna reynoldsi						GC			
92973	92976	Uromunna reynoldsi						GC			
93207	93209	Probopyris floridensis						GC			
93132	93133	Probopyus pandalicola						GC			
92224	92225	Cirolanidae						GC			
92225	541967	Anopsilana						GC			
92345	92348	Cassidinidea ovalis						GC			
92283	92301	Exosphaeroma						GC			
92283	92337	Sphaeroma						GC			
92337	92338	Sphaeroma destructor						GC			
92337	92342	Sphaeroma terebrans						GC			

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206378	206379	Oniscus asellus									
92623	92624	Edotea montosa						GC			
92564	92588	Idotea						GC			
89802	89807	Mysidacea									
89856	90138	Mysidopsis						FC			
89856	90041	Mysis									
90275	90277	Taphromysis bowmani						FC			
89802	91061	Tanaidacea						FG			
	92068	Hargeria rapax						FC			
92026	92067	Leptochelia rapax									
	91502	Tanais cavolinii (part)									
	91396	Tanais cavolinii (part)									
	91400	Tanais cavolinii (part)									
	91519	Tanais cavolinii (part)									
83677	85257	Copepoda				8		GC			
83677	84195	Ostracoda				8		GC			
83767	83832	Cladocera				8		FC			
83872	83873	Daphnia				8		FC			
89599	89600	Balanus						FC			
89600	89621	Balanus eburneus						FC			
85780	85801	Diaptomus pribilofensis									
85257	88530	Cyclopoida				8		FC			
84409	84763	Entocytheridae									
82697	99208	Insecta									
99209	99237	Collembola				10		GC			
99239	99240	Podura						GC			
99240	99241	Podura aquatica									
99917	99918	Hypogastrura						GC			
99238	99245	Isotomidae						OM			
99245	99246	Isotomurus						GC			
99246	99247	Isotomurus palustris						GC			
99238	99643	Entomobryidae						GC			
100257	100258	Sminthuridae									
100258	100402	Bourletiella						GC			
100402	100436	Bourletiella spinata									
100500	100502	Ephemeroptera						GC			
		Polymitarcidae				2		GC			
101569	101570	Ephoron				2		GC		bu	
101570	101572	Ephoron leukon	1.5	2							
101459	101467	Caenidae				7		GC			
101467	101468	Brachycercus	3.5	3				GC			
101468	101475	Brachycercus maculatus						GC			
101468	101477	Brachycercus prudens				3		GC			
101467	101478	Caenis	7.6	7	3.1	7	7	GC		sp	cb
101478	101480	Caenis amica						OM			
101478	101488	Caenis latipennis				7		GC	SC		

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101478		Caenis macafferti					7	GC			
101478	101483	Caenis diminuta						OM			
101478	101486	Caenis hilaris						OM			
101478	101489	Caenis punctata					7	GC			
101508	101525	Ephemeridae				4		GC			
101525	101526	Ephemera	2.2	1	3.1	4		GC		bu	
101526		Ephemera guttalata	0								
101525	101537	Hexagenia	4.7	6	3.6	6	6	GC		bu	
101537	101538	Hexagenia bilineata						GC			
101537	101552	Hexagenia limbata			2.6			GC			
101540	101549	Hexagenia munda orlando						GC			
101566	101567	Litobrancha recurvata	0	6							
100503	100755	Baetidae				4	4	GC			
	100801	Acentrella				4	4	GC		sw	cn
100801		Acentrella amplus	3.6								
100801		Acentrella insignificans				4		GC			
100801		Acentrella turbida				4		GC			
		Acerpenna					4	SH		sw	cn
		Acerpenna macdunnoughi			1.1		4	SH			
	206620	Acerpenna pygmaeus	3.7	4	2.3			OM			
100755	100800	Baetis			3.1	5	6	GC		sw	cb
100800		Baetis diphetorhageni									
100800	206621	Baetis alachua						OM			
100800	100803	Baetis alius				1		GC	SC		
100800	100821	Baetis australis						OM			
100800	100823	Baetis bicaudatus						GC			
100800	100833	Baetis ephippiatus	3.9					OM			
100800	100835	Baetis flavistriga	7.2	4	2.9	4		GC			
100800	100838	Baetis frondalis	8	5				OM			
100800	100807	Baetis insignificans						GC			
100800	100808	Baetis intercalaris	5.8	6	2.7	5	6	OM	GC		
100800	100810	Baetis intermedius						GC			
100800		Baetis notos				4		GC	SC		
100800	100858	Baetis pluto	4.8								
100800	100860	Baetis propinquus	6.2	6				OM			
100800	100861	Baetis pygmaeus						OM			
100800	100817	Baetis tricaudatus	1.8					GC			
100800	206618	Baetis armillatus			1.5			OM			
100800	206619	Baetis punctiventris						OM			
		Barbaetis						GC		sw	cn
		Plauditus									
		Plauditus cestus					4	GC			
100755	100903	Callibaetis	9.3	9	5.6	9	9	GC		sw	cn
100903	100919	Callibaetis floridanus						GC			
100903	100928	Callibaetis pretiosus						GC			
		Camelobaetidius								sw	cn

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100755	100873	Centroptilum	6.3	2	2.7	2	2	GC			
100873	100884	Centroptilum hobbsi						OM			
100873	100897	Centroptilum viridocularis						OM			
100755	100756	Cloeon	7.4	4	3.5			OM		sw	cn
100756	100758	Cloeon rubropictum						OM			
		Diphetor				5		GC		sw	cn
		Diphetor hageni			2.3	5		GC			
		Fallceon quilleri						GC			
	100794	Heterocloeon	3.6					SC		sw	cn
		Labiobaetis				6		GC		sw	cn
		Labiobaetis frondalis									
		Labiobaetis propinquus				6		GC			
	100899	Paracloeodes	8.7					SC			
	206622	Procloeon						OM	GC	sw	cn
206622	206617	Procloeon rubropictum						OM			
206622	206623	Procloeon viridocularis						OM			
100755	100771	Pseudocloeon	4.4	4	1.7	4		SC			
100771	100776	Pseudocloeon bimaculatum						OM			
100771	100783	Pseudocloeon parvulum						OM			
100771	100784	Pseudocloeon punctiventris						OM			
		Ametropodidae									
101073	101074	Ametropus						GC		bu	
100503	100504	Heptageniidae				4		SC			
100504	100598	Cinygma				4		SC		cn	
100598	100600	Cinygma integrum						SC			
100504	100557	Cinygmula				4		SC		cn	
100557	100570	Cinygmula subaequalis	0								
100504	100626	Epeorus	1.2	0		0		SC		cn	
100626		Epeorus iron				0		SC			
100626		Epeorus ironopis				1		SC			
100626	100629	Epeorus albertae				0		SC			
100626	100632	Epeorus deceptivus				0		SC			
100626	100651	Epeorus dispar	1								
100626	100635	Epeorus grandis				0		SC			
100626	100637	Epeorus longimanus				0		SC			
100626	100642	Epeorus pleuralis	2								
100626	100645	Epeorus rubidus	1.4								
100627	100636	Ironopsis grandis				3		SC			
100504	100602	Heptagenia	2.8	3		4		SC		cn	sw
100602	100694	Heptagenia criddlei						SC			
100602	100608	Heptagenia diabasia			1.9						
100602	100604	Heptagenia elegantula				4		SC			
100602	100610	Heptagenia flavescens						OM			
100602	100612	Heptagenia julia	0.5								
100602	100616	Heptagenia marginalis	2.5								
100602	100619	Heptagenia pulla	2.3								

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100602	100620	Heptagenia simpliciodes						SC			
100504	100666	Ironodes				4		SC		cn	
100504	100676	Leucrocuta	0	1	2.4	1		SC	GC	cn	
100676		Leucrocuta aphrodite	2.5	1							
100676	100677	Leucrocuta hebe			2.7						
100676	100679	Leucrocuta maculipennis			2.1						
100504	100692	Nixe				4		SC	GC	cn	
100692		Nixe simplicioides				2		SH			
100692	100693	Nixe criddlei				2		SH			
100692	100705	Nixe perfida			5.1						
100504	100572	Rhithrogena	0.4	0		0		SC		cn	
100572	100577	Rhithrogena amica	0								
100572	100579	Rhithrogena exilis	0								
100572	100595	Rhithrogena fuscifrons	0								
100572	100583	Rhithrogena hageni						GC			
100572	100575	Rhithrogena morrisoni						SC			
100572	100589	Rhithrogena robusta						GC			
100504	100713	Stenacron			3.1		4	SC		cn	
100713	100735	Stenacron carolina	1.7								
100713	100739	Stenacron floridense						OM			
100713	100714	Stenacron interpunctatum	7.1	7				OM			
100713	100736	Stenacron pallidum	2.9								
100504	100507	Stenonema				2	4	SC		cn	
100507	100513	Stenonema carlsoni	2.1								
100507	100514	Stenonema exiguum			1.9			OM			
100507	100516	Stenonema femoratum	7.5	5	3.1						
100507	100521	Stenonema integrum	5.5	4				OM			
100507	100527	Stenonema ithaca	4.1								
100507		Stenonema lenati	2.3								
100507	100530	Stenonema mediopunctatum	1.7	3	1.9						
100507	100531	Stenonema meririvulanum	0.3								
100507	206616	Stenonema mexicanum integrum			2.6			OM			
100507	100532	Stenonema modestum	5.8	1				SC			
100507	100536	Stenonema pudicum	2.1								
100507	100509	Stenonema pulchellum			2.3						
100507	100541	Stenonema smithae						OM			
100507	100542	Stenonema terminatum	4.5	4	2.3						
100507	100548	Stenonema vicarium	1	2	2.3						
100503	100951	Siphlonuridae				7		GC			
	100953	Siphlonurus	2.6	7		7		GC		sw	cb
100953	100955	Siphlonurus occidentalis				7		GC	SC		
		Acanthametropodidae									
100951	100996	Ameletus				0		GC		sw	cb
100996	101019	Ameletus celer				0		GC	SC		
100996	101009	Ameletus lineatus	2.1	0							
100996	101012	Ameletus similior						GC			

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100996	101005	Ameletus connectus						GC			
100996	101006	Ameletus cooki				0		GC			
100996	101013	Ameletus sparsatus						GC			
100996	101002	Ameletus validus						GC			
100996	101003	Ameletus velox				0		GC			
101094	101232	Ephemerellidae				1		GC			
101232	101338	Attenella				3		GC			
101338	101340	Attenella attenuata	2.6	3							
101338	101345	Attenella delantala				3		GC			
101338	101343	Attenella margarita						GC			
101232	101347	Caudatella				1		GC		cn	
101347		Caudatella cascadia				1		GC			
101347		Caudatella edmundsi						SC			
101347	101351	Caudatella heterocaudata						GC			
101347	101348	Caudatella hystrix						SC			
		Caurinella				0		GC			
		Caurinella idahoensis				0		GC			
101232	101365	Drunella				0		PR		cn	sp
101365		Drunella allegheniensis	1.3								
101365	101389	Drunella coloradensis						PR			
101365		Drunella conestee	0								
101365	101366	Drunella cornutella	0								
101365	101368	Drunella doddsi						SC			
101365	101392	Drunella flavilinea						SC			
101365	101370	Drunella grandis						GC			
101365	185972	Drunella lata	0.1								
101365		Drunella pelosa						SC			
101365	101385	Drunella spinifera						PR			
101365	185974	Drunella tuberculata	0.2								
101365	185973	Drunella walkeri	1								
101365		Drunella wayah	0								
101232	101233	Ephemerella			2.9	1		GC		cn	sw
101233	101251	Ephemerella alleni						GC			
101233	101255	Ephemerella aurivillii						GC			
101233	101259	Ephemerella berneri	0								
101233	101262	Ephemerella catawba	4	1							
101233	101280	Ephemerella hispida	0.6								
101233	101239	Ephemerella inermis						SH			
101233	101240	Ephemerella infrequens						GC			
101233	101282	Ephemerella invaria	2.2	1							
101233	101285	Ephemerella lacustris				1		GC			
101233	101291	Ephemerella needhami	0	2							
101233	101296	Ephemerella rotunda	2.8					OM			
101233	101299	Ephemerella septentrionalis	2								
101233	101305	Ephemerella trilineata						OM			
101232	101324	Eurylophella			2.1		4	SC		cn	sp

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101324	101334	Eurylophella bicolor	5.1	1							
101324		Eurylophella coxalis	2.6								
101324		Eurylophella doris						GC			
101324	101332	Eurylophella funeralis	2.3								
101324	101326	Eurylophella temporalis	4.6	5				GC			
101324	193519	Eurylophella trilineata						GC			
101324		Eurylophella verisimilis	0.3								
101232	101395	Serratella			0.6	2	2	GC		cn	
101395		Serratella carolina	0								
101395	101396	Serratella deficiens	2.7	2	2.1		2				
101395		Serratella micheneri				1		GC			
101395	185976	Serratella serrata	2.7			1		GC			
101395	185975	Serratella serratoides	1.5								
101395		Serratella teresa						GC			
101395	101399	Serratella tibialis						GC			
	101317	Timpanoga				7		GC			
101317	101318	Timpanoga hecuba				7		GC			
101360	101361	Dannella lita	0	4							
101360	101363	Dannella simplex	3.9	2	1.2						
101094	101095	Leptophlebiidae				2		GC			
101095	101108	Choroterpes			4			GC		cn	sp
101108	101114	Choroterpes hubbelli						OM			
101095	101183	Habrophlebia								sw	cn
101183	101184	Habrophlebia vibrans	0					OM			
101095	101122	Habrophlebiodes								sw	cn
101122	101124	Habrophlebiodes brunneipennis									
101095	101148	Leptophlebia	6.4	4		2		GC		sw	cn
101148		Leptophlebia bradleyi						OM			
101148	101161	Leptophlebia intermedia						OM			
101095	101187	Paraleptophlebia	1.2	1	2.8	1	1	GC		sw	cn
101187	101206	Paraleptophlebia bicornuta				4		GC			
101187	101193	Paraleptophlebia debilis						GC			
101187	101195	Paraleptophlebia gregalis				4		GC			
101187	101212	Paraleptophlebia heteronea				2		GC			
101187	101214	Paraleptophlebia memorialis				4		GC			
101187	101227	Paraleptophlebia vaciva				4		GC			
101187	101199	Paraleptophlebia volitans						OM			
101094	101404	Tricorythidae				4		GC			
101404	101405	Tricorythodes	5.4	4	2.7	5	4	GC		sp	cn
101405	101406	Tricorythodes albilineatus						GC			
101405	101413	Tricorythodes minutus				4		GC			
	101429	Leptohyphes	2							cn	
101429	101432	Leptohyphes dolani									
		Baetiscidae									
101493	101494	Baetisca					4	GC		sp	
101494	101497	Baetisca becki						OM			

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101494		Baetisca berneri	0.6								
101494	101499	Baetisca carolina	3.6	5							
101494	101503	Baetisca gibbera	1.4								
101494	101495	Baetisca obesa						OM			
101494	101506	Baetisca rogersi						OM			
		Metretopodidae									
		Siphloplectron	3.1	2			2	PR		sw	cn
		Isonychiidae									
101029	101041	Isonychia	3.8	2	1.9		2	FC		sw	cn
101041	101069	Isonychia arida									
101041	101060	Isonychia sayi									
101041	101062	Isonychia sicca									
		Neoephemeridae									
101460	101461	Neoephemera						GC		sp	cn
101461	101463	Neoephemera compressa						GC			
101461	101464	Neoephemera purpurea	2.1								
101461	101465	Neoephemera youngi						GC			
101523	101524	Dolania americana								bu	
		Anthopotamus			3.2						
	101510	Potamanthus	1.6	4							
109215	109216	Coleoptera						PR			
111952	111953	Amphizoa				1		PR		cn	
109226	109234	Carabidae				4		PR			
109234	111436	Chlaenius									
109226	111963	Dytiscidae				5		PR			
112072	112073	Agabetes acuductus						PR			
111963	111966	Agabus				8	5	PR		sw	dv
111963	112319	Bidessonotus								sw	cb
111963	112322	Bidessus									
111963	112362	Brachyvatus								sw	cb
111963	112136	Celina					5	PR		sw	dv
112136	112142	Celina contiger						PR			
	112379	Colymbetes				5		PR		sw	dv
111963	112561	Copelatus	9.1				5	PR		sw	dv
112561	112567	Copelatus caelatipennis						PR			
111963	112371	Coptotomus	9					PR		sw	dv
112371	112375	Coptotomus interrogatus						PR			
111963	112364	Cybister						PR		sw	dv
111963	112153	Deronectes				5		PR		sw	
112153		Deronectes striatellus						PR			
111963	112159	Derovatellus								sw	cb
111963	112145	Desmopachria				5		PR		sw	cb
	112118	Dytiscus				5		PR		sw	dv
111963	112172	Hydaticus				5		PR		sw	dv
111963	112390	Hydroporus	8.9		4.1	5	5	PR		sw	cb
112390	112423	Hydroporus mellitus	1.8								

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112390	112418	Hydroporus pilatei						PR			
111963	112257	Hydrovatus						PR			
112257	112259	Hydrovatus pustulatus						PR			
112257	112259	Hydrovatus pustulatus						PR			
112259	112261	Hydrovatus pustulatus compressus						PR		sw	cb
111963	112200	Hygrotus						PR		sw	dv
111963	112181	Ilybius					5	PR			
111963	112268	Laccodytes						PR		sw	dv
111963	112278	Laccophilus	10		7.9	5	5	PR			
112278	112281	Laccophilus fasciatus						PR			
112281	112283	Laccophilus fasciatus rufus						PR			
112278	112299	Laccophilus gentilis						PR			
112278	112285	Laccophilus proximus						PR			
112278	112298	Laccophilus schwarzi						PR			
112270	112276	Laccornis difformis								sw	cb
111963	112580	Liodessus						PR		sw	cb
111963	112595	Neoclypeodytes						PR		sw	cb
111963	112314	Oreodytes				5		PR			
112314		Oreodytes congruus				5		PR		sw	dv
111963	112086	Rhantus									
112109	112113	Thermonectus basillaris						PR		sw	cb
111963	112575	Uvarus									
109226	112653	Gyrinidae				5		PR		sw	dv
112653	112711	Dineutus	5.5		3.7	4	4	PR			
112711	112718	Dineutus carolinus									
112711	112715	Dineutus ciliatus									
112711	112713	Dineutus discolor									
112711	112727	Dineutus emarginatus									
112711	112719	Dineutus nigrior					4	PR			
112711	112717	Dineutus serrulatus								sw	dv
112653	112706	Cyretes									
112706	112707	Cyretes iricolor								sw	dv
112653	112654	Gyrinus	6.3		3.6	5	4	PR			
112654	112661	Gyrinus aeneolus					4	PR			
112654	112704	Gyrinus lugens									
112654	112701	Gyrinus pachysomus									
109226	111857	Haliplidae				7				cn	
111857	111947	Brychius						SC			
111947	111948	Brychius hornii								cb	
111857	111858	Haliplus									
111858	111872	Haliplus fasciatus					5	SH		cb	cn
111857	111923	Peltodytes	8.5		7		5	SH			
111923	111926	Peltodytes duodecimpuntatus									
111923	111927	Peltodytes floridensis									
111923	111928	Peltodytes lengi									
111923	111929	Peltodytes muticus									

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111923	111930	Peltodytes oppositus									
111923	111932	Peltodytes sexmaculatus									
109226	112606	Noteridae						PR		cb	
112606	112623	Hydrocanthus	6.9								
112623	112626	Hydrocanthus iricolor						OM			
112623	112624	Hydrocanthus oblongus						OM		bu	
112606	112621	Notomicrus									
112636	193587	Suphis inflatus								cb	
112606	112607	Suphisellus						OM			
112607	112614	Suphisellus floridanus						OM			
112607	112613	Suphisellus gibbulus									
112607	193586	Suphisellus insularis						OM			
112607	112610	Suphisellus puncticollis						OM			
	112745	Hydroscapha				7		SC			
112736	112737	Sphaeriidae				8	8	FC			
114496	114509	Chrysomelidae						SH		cn	
114509	114613	Agasicles									
114613	114614	Agasicles hygrophila						SH		cn	
114509	114615	Disonycha						SH		cn	
114509	114510	Donacia						SH		cn	
114509	114546	Pyrrhalta									
113844	113869	Melyridae						PR			
114654	114666	Curculionidae						SH		cn	cb
114666	114667	Anchytarsus						SH			
114667	114668	Anchytarsus bicolor	3.8					SH		sp	cn
	114037	Lutrochus									
114037	114038	Lutrochus laticeps			2.9					cn	
114666	114779	Bagous						SH			
114779		Bagous carinatus						SH		cn	cb
114666	114676	Phytobius						SH			
	114679	Stenopelmus						SH			
206639	206640	Tyloderma capitale									
113918	113923	Helodidae (= Scirtidae)									
	113924	Scirtidae								cb	
113923	113948	Cyphon					7	SC		cb	sp
113923	113969	Elodes								cb	sp
113923	113925	Prionocyphon								cb	
113923	113929	Scirtes									
113998	114278	Chelonariidae									
114278	114279	Chelonarium lecontei									
113998	113999	Dryopidae (adult)						SH		cb	
113999	114025	Dryops (adult)								cn	
113999	114006	Helichus (adult)	5.4	5	3.2		5	SH			
114006	114011	Helichus basalis (adult)									
114006	114013	Helichus fastigiatus (adult)									
114006	114009	Helichus lithophilus (adult)									

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114006	114017	Helichus striatus (adult)				5		SH			
114017	114019	Helichus striatus foveatus (adult)				5		SH		cb	
113999	114001	Pelonomus (adult)									
114001	114004	Pelonomus obscurus (adult)									
113998	114093	Elmidae				4		GC		cn	bu
	114196	Ampumixis				4		GC	SC	cn	bu
114196	114197	Ampumixis dispar				4		GC		cn	sp
114093	114193	Ancyronyx						OM			
114193	114194	Ancyronyx variegatus	6.9	6	4			OM		cn	
114093	114251	Atractelmis				4		GC		cn	
114093	114164	Cleptelmis				4		GC			
114164	114166	Cleptelmis addenda				4		GC	SC	cn	
114164	114165	Cleptelmis ornata				4		GC		cn	
114093	114208	Cylloepus				4		GC	SC	cn	cb
114093	114126	Dubiraphia	6.4	6	4.7	4	6	GC	SC		
114126	114129	Dubiraphia bivittata			3.1			OM			
114126		Dubiraphia giullianii				6		SC			
114126	114130	Dubiraphia quadrinotata			3.2			OM			
114126	114131	Dubiraphia vittata						OM		cn	cb
114093	114216	Gonielmis				5		GC			
114216	114217	Gonielmis dietrichi						OM		cn	
114093	114237	Heterelmis				4		GC		cn	
114093	114167	Heterlimnius				4		GC			
114167	114169	Heterlimnius corpulentus				4		GC		cn	bu
114167	114168	Heterlimnius koebelei				4		GC	SC	cn	
114093	114137	Lara				4		SH			
114137	114139	Lara avara				4		SH		cn	
114093	114212	Macronychus						OM			
114212	114213	Macronychus glabratus	4.7	4	2.9			OM		cn	cb
114093	114146	Microcylloepus				4		GC	SC		
114146	114147	Microcylloepus pusillus	2.1	3		2		GC			
114147	114151	Microcylloepus pusillus lodingi						OM			
114146	114160	Microcylloepus similis				2		GC		cn	
114093	114142	Narpus				4		GC			
114142	114144	Narpus concolor				4		GC		cn	
114093	114177	Optioservus	2.7	4	3.6	4	4	SC			
114177	193732	Optioservus castanipennis				4		SC			
114177	114178	Optioservus divergens				4		SC			
114177	114190	Optioservus fastiditus			1.9	4	4	SC			
114177	114180	Optioservus quadrimaculatus				4		SC			
114177	114181	Optioservus seriatus				4		SC		cn	
114093	114235	Ordobrevia				4					
114235		Ordobrevia nubrifera				4		GC		cn	
114093	114244	Oulimnius				4		SC			
114244	114245	Oulimnius latiusculus	1.8							cn	
114093	114229	Promoresia					2	SC			

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114229	114230	Promoresia elegans	2.2					OM			
114229	114231	Promoresia tardella	0				2	SC		cn	
114093	114198	Rhizelmis				1		SC		cn	
114093	114095	Stenelmis	5.4	5	3	7	5	SC			
114095	114117	Stenelmis antennalis						OM			
114095	114118	Stenelmis convexula						OM			
114095	114102	Stenelmis crenata						OM			
114095	114104	Stenelmis decorata					5	SC			
114095	114121	Stenelmis fuscata						OM			
114095	114105	Stenelmis humerosa						OM			
114095	114106	Stenelmis hungerfordi						SC			
114095	114108	Stenelmis markeli					5	SC			
114095	114114	Stenelmis sinuata						OM			
114095	114115	Stenelmis vittipennis						OM		cn	
114093	114205	Zaitzevia				4		GC			
114205	114207	Zaitzevia milleri				4		GC			
114205		Zaitzevia parvula				4		GC			
113998	114069	Psephenidae				4		SC		cn	
114069	114087	Ectopria				4	5	SC			
114087	114088	Ectopria nervosa	4.3	5	4			SC		cn	
114069	114085	Eubrianax				4		SC			
114085	114086	Eubrianax edwardsi				4		SC		cn	
114069	114070	Psephenus				4		SC			
114070	114074	Psephenus falli				4		SC		bu	
114070	114072	Psephenus herricki	2.5	4	3.5						
114265	114266	Anchycteis									
114266	114267	Anchycteis velutina									
114265	114273	Ptilodactyla					5	SH			
112752	112756	Hydraenidae				5		PR		cn	cb
112756	112757	Hydraena				5		PR			
112757	112758	Hydraena pennsylvanica								cn	
112756	112777	Ochthebius									
112777	112793	Ochthebius sculptus				5		PR			
112752	112811	Hydrophilidae				5		PR		sw	dv
	112890	Ametor				5					
112811	112812	Berosus	8.6		6.7	5		PR	PI		
112812	112824	Berosus peregrinus									
112812	112821	Berosus striatus								cb	
112811	112845	Chaetarthria				5				bu	
112811	113220	Crenitis				5		PR		bu	
112811	113017	Cymbiodyta								sw	dv
112811	113087	Derallus						OM			
113087	113088	Derallus altus						OM			
113085	113086	Dibolocelus ovatus								bu	sp
112811	112973	Enochrus	8.5			5		GC			
112973	112990	Enochrus ochraceus									

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112811	113162	Helobata						OM			
113162	113165	Helobata striata						OM			
112811	113150	Helochares						OM			
112811	113106	Helophorus	7.9					SH		sw	dv
112811	113244	Hydrobiomorpha									
113244	113245	Hydrobiomorpha castus								cb	cn
112811	113196	Hydrobius				8		PR			
113196	113200	Hydrobius tumidus						OM		cb	
112811	113166	Hydrochus						SH		sw	dv
112811	113204	Hydrophilus									
112811	112858	Laccobius	8		1.9			PR			
112811	112909	Paracymus				5		PR	OM	cn	
112811	112931	Sperchopsis				5	5	PR	CG		
112931	112932	Sperchopsis tessellatus	6.5					OM		cb	
112811	112938	Tropisternus	9.8			5	10	PR			
112938	112951	Tropisternus blatchleyi									
112938	112944	Tropisternus lateralis									
112944	112946	Tropisternus lateralis nimbatus									
112938	193660	Tropisternus striolatus									
113264	113805	Ptiliidae									
113264	113265	Staphylinidae				8		PR		cn	
113265	113304	Bledius						PR		sk	
113265	113576	Stenus								bu	
113265	113440	Thinopinus									
114413	114429	Salpingidae									
109215	152741	Hymenoptera				8		PA			
109215	117232	Lepidoptera				6		SH	SC		
117294	117318	Noctuidae						SH		bu	
117915	117952	Pyroderces				5					
117639	117641	Pyralidae				5		SH		cb	
117641	117741	Acentria				1		SH		cb	
117641	117672	Munroessa						SH			
117672	117677	Munroessa gyralis						SH		cb	
117641	117756	Neargyractis						SH		cb	sw
117641	117642	Paraponyx					5	SH		cn	
117641	117682	Petrophila			2.7	5		SC		cb	sw
117654	117656	Synclita obliteralis						SH			
117906	117909	Prionoxystus				5					
117854	117856	Tortricidae									
109215	115000	Megaloptera									
115000	115023	Corydalidae				0		PR		cn	cb
115023	115024	Chauliodes						PR			
115024	115027	Chauliodes pectinicornis						PR			
115024	115025	Chauliodes rastricornis						PR		cn	cb
115023	115033	Corydalus						PR			
115033	115034	Corydalus cornutus	5.6	6	2.4			PR		cn	cb

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115023	115048	Neohermes								cn	cb
115023	115028	Nigronia						PR			
115028	115029	Nigronia fasciatus	6.2		1.8			PR			
115028	115031	Nigronia serricornis	5.5	0	3.6			PR		cn	cb
115023	115044	Orohermes				0		PR		cb	cn
115085	115086	Climacia									
115086	115087	Climacia areolaris	6.5								
115085	115090	Sisyra						PI			
115000	115001	Sialidae								bu	cb
115001	115002	Sialis	7.4	4	4.9	4	4	PR			
115002	193739	Sialis americana						PR			
115002	115017	Sialis iola						PR			
115002	115010	Sialis moluri						PR			
109215	115095	Trichoptera								sp	
		Beraeidae									
116489	116490	Beraea									
115095	116905	Brachycentridae				1		FC		cn	cb
116905	116933	Amiocentrus				1		GC			
116933	116934	Amiocentrus aspilus				2		GC		cn	
116905	116906	Brachycentrus	2.2			1		FC			
116906	116912	Brachycentrus americanus				1		FC			
116906	116921	Brachycentrus appalachia	1.1								
116906	116922	Brachycentrus chelatus	0								
116906	116914	Brachycentrus lateralis	0.4	1							
116906	116916	Brachycentrus nigrosoma	2.2								
116906	116910	Brachycentrus numerosus	1.8	1							
116906	116918	Brachycentrus occidentalis				1		FC		cn	sp
116906	116924	Brachycentrus spinae	0								
116905	116958	Micrasema				1	2		SH		
116958	116967	Micrasema bactro				1					
116958		Micrasema bennetti	0								
116958	116966	Micrasema burksi	0								
116958	116959	Micrasema charonis	0.3								
116958		Micrasema rickeri	0								
116958	116961	Micrasema rusticum	0					OM			
116958	116960	Micrasema wataga	3.2	2				OM		cn	
116905	116973	Oligoplectrum				1		GC			
115095	116529	Calamoceratidae								sp	
116529	116530	Anisocentropus						SH			
116530	116531	Anisocentropus pyraloides	0.8					SH		sp	
116537	553090	Heteroplectron americanum	2.9				3	SH			
116537	116538	Heteroplectron californicum				1		SH			
		Uenoidae				0		SC			
115933	116331	Farula						SC			
115933	116046	Neophylax	1.6	3		3		SC			
116046	116047	Neophlax concinnus	1.2								

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116046	116050	Neophlax mitchelli	0								
116046	116065	Neophylax occidentalis				3		SC			
116046	116057	Neophlax oligius	2.6								
116046	116052	Neophlax ornatus	1.6								
116046	116054	Neophylax rickeri				3		SC		cn	
116046	116063	Neophylax splendens				3		SC			
115933	116388	Neothremma				0		SC		cn	
116388	116389	Neothremma alicia				0		SC		sp	
115933	116039	Oligophlebodes				1		SC			
		Sericostriata				0		SC			
		Sericostriata surdickae				0		SC			
115095	117120	Glossosomatidae				0		SC		cn	
117120	117121	Agapetus	0			0		SC			
117120	117154	Anagapetus				0		SC		cn	
115236	115238	Culoptila cantha				0		SC		cn	
117120	117159	Glossosoma	1.5			0		SC			
117159	117165	Glossosoma penitus						SC			
117159	117167	Glossosoma alascense						SC			
117159	117162	Glossosoma intermedium				0		SC			
117159	117160	Glossosoma montana						SC			
117159	117202	Glossosoma oregonense						SC			
117159	117220	Glossosoma wenatchee						SC			
115246	115247	Matrioptila jeanae	0								
115096	115221	Protoptila	2.8	1		1		SC			
115221	183768	Protoptila coloma				1		SC			
115221	115232	Protoptila tenebrosa				1		SC		sp	
115095	117015	Helicopsychidae				3		SC		cn	
117015	117016	Helicopsyche				3		SC			
117016	117020	Helicopsyche borealis	0	3	1.8	3		SC			
115095	115398	Hydropsychidae				4	4	FC			
		Hydropsychidae									
		Arctopsychinae				2		FC		cn	
115398	115529	Arctopsyche				1		FC			
115529	115538	Arctopsyche californica				2		FC	OM		
115529	115530	Arctopsyche grandis				2		FC		cn	
115529	115533	Arctopsyche irrorata	0								
		Hydropsychinae						FC			
115398	115570	Ceratopsyche						FC		cn	
115570	115596	Ceratopsyche alhedra	0	3							
115570		Ceratopsyche bifida	1								
115570	115577	Ceratopsyche bronta	2.7	5							
115570		Ceratopsyche macleodi	0.9								
115570	115580	Ceratopsyche morosa	3.2	2	1.8						
115570	115586	Ceratopsyche slossonae	0	4	2						
115570	115589	Ceratopsyche sparna	3.2	1	3.2						
115570		Ceratopsyche ventura	0								

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			Southeast (NC)	Upper Midwest (WI)	Midwest (OH)	Northwest (ID)	Mid-Atlantic (MACS)	primary	secondary	primary	secondary
115398	115408	Cheumatopsyche	6.6	5	2.9	5	5	FC			
115408	115409	Cheumatopsyche campyla				6		FC			
115408	115441	Cheumatopsyche enonis				6		FC			
115408	115426	Cheumatopsyche pettiti				6		FC		cn	
115398	115399	Diplectrona				0		FC			
115399	115402	Diplectrona modesta	2.2					FC		cn	
115398	115618	Homoplectra								cn	
115398	115453	Hydropsyche				4	4	FC			
115453	115456	Hydropsyche aerata			2.6						
115453	115454	Hydropsyche betteni	8.1	6			4	FC			
115453	115458	Hydropsyche bidens			2.5						
115453	115455	Hydropsyche californica				4		FC			
115453	115462	Hydropsyche decalda	4.1					FC			
115453	115463	Hydropsyche demora	1.8								
115453	115465	Hydropsyche dicantha			3.5						
115453	115488	Hydropsyche elissoma						FC			
115453	115468	Hydropsyche frisoni			1.8						
115453	115469	Hydropsyche hageni	0								
115453	115471	Hydropsyche incommoda	5	7							
115453	115474	Hydropsyche mississippiensis						FC			
115453	115513	Hydropsyche occidentalis				4		FC			
115453	115485	Hydropsyche orris			2.6						
115453	115490	Hydropsyche oslari				4		FC			
115453	115477	Hydropsyche phalerata	3.7	1							
115453	206641	Hydropsyche rossi	4.9								
115453	115480	Hydropsyche scalaris	3	2							
115453	115481	Hydropsyche simulans			2.4						
115453	115527	Hydropsyche sparna					4	FC		cn	
115453	115484	Hydropsyche venularis	5.3		2.9						
115453	115482	Hydropsyche valanis			3						
115398	115603	Macrostemum	3.6	3			3	FC			
115603	115608	Macrostemum carolina						FC		cn	
115603	115606	Macrostemum zebratum			1.8						
115398	115556	Parapsyche				1		PR			
115556	115563	Parapsyche almota				3		PR			
115556	115559	Parapsyche cardis	0								
115556	115560	Parapsyche elsis				1		PR		cn	
115398	115551	Potamyia						FC			
115551	115552	Potamyia flava			2.5			FC			
115095	115629	Hydroptilidae				4				cb	
115629	115635	Agraylea			5.7	8				cn	
115629	115826	Dibusa								cn	
115826	115827	Dibusa angata			2.6						
115629	115641	Hydroptila	6.2	6	3.2	6	6	SC	PR		
115641	115643	Hydroptila ajax				6		SC			
115641	115695	Hydroptila arctia				6		SC			

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115641	115696	Hydroptila argosa				6		SC		cn	
115629	115630	Leucotrichia				6		SC		cn	
115630	115631	Leucotrichia pictipes	4.3	2							
115629	115811	Mayatrichia				6		SC			
115811	115812	Mayatrichia ayama						SC		cn	
115629	115833	Neotrichia			3.6			SC			
115833		Neotrichia halia				4		SH		cn	
115629	115714	Ochrotrichia	7.2			4		GC		cn	
115629	115714	Ochrotrichia				4		GC		cb	
115629	115828	Orthotrichia				6		SC		cn	
115629	115779	Oxyethira			5.2						
115629	115817	Stactobiella				2		SH		cb	sp
		Limnephiloidea									
115095	116793	Lepidostomatidae				3		SH			
116793	116794	Lepidostoma	1	1		1	1	SH			
116794	116888	Lepidostoma cinereum				3		SH			
116794	116870	Lepidostoma quercinum				1		SH		sp	cb
115095	116547	Leptoceridae				4		GC		cb	sw
116547	116684	Ceraclea			2.6	5	3	GC		cn	sp
116684	116696	Ceraclea ancylus	2.5	3							
116684		Ceraclea flava	0								
116684	116725	Ceraclea maculata	6.4		3.6						
116684		Ceraclea transversa	2.7								
116547	116598	Mystacides				4	4	GC			
116598	116599	Mystacides sepulchralis	3.5	4							
116547	116651	Nectopsyche			2.4	3	3	SH			
116651	116661	Nectopsyche candida	3.8					OM			
116651	116663	Nectopsyche diarina			3.2						
116651	116659	Nectopsyche exquisita	4.2	3				OM			
116651	116662	Nectopsyche gracilis				3		SC			
116651	116660	Nectopsyche pavida	4.2		2.1			OM			
116651		Nectopsyche halia				3		SC			
116651		Nectopsyche lahontanensis				3		SC		sp	cb
116651		Nectopsyche stigmatica				3		SC		sp	cb
116547	116607	Oecetis	5.7	8	3	8	8	PR			
116607		Oecetis parva									
116607	116608	Oecetis avara									
116607	116609	Oecetis cinerascens									
116607	116643	Oecetis georgia					8				
116607	116613	Oecetis inconspicua					8				
116607	116631	Oecetis nocturna								sp	cn
116607	116636	Oecetis persimilis					8			sw	cb
116547	116548	Setodes	0.9	2				OM			
116547	116565	Triaenodes				6	6				
116565	206642	Triaenodes abus	4.3					SH			
116565	116569	Triaenodes flavescens						SH			

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116565	206643	Triaenodes florida						SH			
116565	116571	Triaenodes ignitus						SH			
116565	116574	Triaenodes injusta	2.2								
116565	116575	Triaenodes marginatus				6	6	sh			
116565	116577	Triaenodes ochraceus						SH			
116565	206644	Triaenodes perna						SH			
116565	116580	Triaenodes tardus	4.7	6				SH			
115095	115933	Limnephilidae				4	4	SH			
115969	115970	Allocosmoecus partitus				0		SC		cn	cb
115867	115907	Cryptochia				0		SH			
	116438	Allomyia				0		SC			
115933	116253	Amphicosmoecus						SH		sp	
	115956	Anabolia						SH			
115933	115935	Apatania	0.6			1		SC			
		Apataniinae				1		SC			
	116247	Arctopora									
115933	116017	Chyranda				1		SH		sp	
116017	116018	Chyranda centralis				1		SH		sp	bu
115933	116013	Clostoeca						SH		sp	
115933	116023	Desmona				1		SH			
		Dicosmoecinae				1		SC			
115933	116265	Dicosmoecus				1		SH			
116265	116266	Dicosmoecus atripes				1		PR		bu	
116265	116268	Dicosmoecus gilvipes				2		SC		cn	
116340	116342	Ecclisocosmoecus scylla				0		SH			
115933	116025	Ecclisomyia				2		GC			
		Eocosmoecus						SH		sp	
		Eocosmoecus schmidi						SH			
115933	116030	Glyphopsyche				1				cn	
115933	116309	Grammotaulius				4		SH		sp	
115933	116295	Grensia				6		SH			
115933	116001	Hesperophylax				5		SH		sp	cb
115933	116286	Homophylax				0		SH			
115933	115995	Hydatophylax				1		SH			
115995	115997	Hydatophylax argus	2.3	2				SH		sp	
115933	116381	Imania						SC		cb	sp
115933	116382	Ironoquia								cn	
116382	116385	Ironoquia punctatissima	7.3	3							
		Limnephilinae				4		SH		sp	
115933	116069	Limnephilus				5		SH		sp	
115933	116344	Manophylax						SC		cn	
115933	116379	Moselyana				4		GC		cn	
115933	116315	Onocosmoecus				1		SH			
116315	116318	Onocosmoecus unicolor				2		SH		cb	
115972	115973	Pedomoecus sierra				0		SC		sp	
115933	116407	Platycentropus									

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	115989	Pseudostenophylax				1		SH			
115933	115974	Psychoglypha				1		GC			
115974	115977	Psychoglypha bella				2		GC		sp	cb
115974	115981	Psychoglypha subborealis				2		GC			
115933	116409	Pycnopsyche	2.3	4	3.3		4	SH			
116409	116413	Pycnopsyche gentilis	0.8								
116409	116414	Pycnopsyche guttifer	2.7					SH		sp	cn
116409	116416	Pycnopsyche lepida	2.5								
116409	116417	Pycnopsyche scabripennis	4					SH			
	116473	Molannidae									
116473	116474	Molanna					6	SC		sp	
116474	116478	Molanna blenda	3.9		4						
116474	116479	Molanna tryphena								sp	
	116496	Odontoceridae									
116496	116520	Namamyia				0		OM	GC		
116496	116522	Nerophilus				0		OM		sp	
116522	116523	Nerophilus californicus				0		OM		sp	
116496	116527	Pseudogoera				0		OM	PR		
116496	116497	Psilotreta	0	0			0	SC			
116497	116498	Psilotreta frontalis								cn	
115095	115257	Philopotamidae				3	3	FC		cn	
115257	115273	Chimarra	2.8	4			4	FC		cn	
	115278	Chimarra aterrima			1.9						
	115276	Chimarra obscura			3.4						
115257	115319	Dolophilodes	1			1		GC			
115257	115258	Wormaldia	0.4			3		FC			
115258	115261	Wormaldia gabriella						SC			
115095	115867	Phryganeidae						SH		cb	
	115892	Phryganea				4		OM			
115867	115868	Ptilostomis	6.7	5			5	SH		cn	
		Goerinae				1		SC			
115933	116423	Goera	0.3							sn	
116423	116431	Goera archaon				1		SC		sb	
115933	116298	Goeracea				0		SC		sp	
		Goereilla						SH			
115095	117043	Polycentropodidae						FC		cn	
115334	115373	Cernotina						PR		cn	
115373	115375	Cernotina spicata						PR			
117043	117091	Cyrnellus						FC		cn	
117091	117092	Cyrnellus fraternus	7.4	8	4			FC			
117043	117095	Neureclipsis	4.4	7	2.7		7	FC		cn	
117095	117098	Neureclipsis crepuscularis									
117043	117104	Nyctiophylax	0.9	5	2.5	5		FC		cn	
	117112	Nyctiophylax moestus	2.6			5	5	PR			
		Paranyctiophylax									
117043	117044	Polycentropus	3.5	6	3.4	6	5	PR	FC	cn	

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115334	115361	Phylocentropus	5.6	4			5	FC		cn	
115334	115395	Polyplectropus									
115095	115334	Psychomyiidae						GC			
115334	115391	Lype						SC		bu	
115391	115392	Lype diversa	4.3	2	2.8			SC			
115334	115335	Psychomyia				2		SC			
115335	115341	Psychomyia flavida	3.3	2	1.9						
115335	115346	Psychomyia lumina				2		SC			
115335	115344	Psychomyia nomada	2								
115334	115350	Tinodes				2		SC			
115095	115096	Rhyacophilidae				0		PR		cn	
115096	115243	Himalopsyche						PR			
115096	115097	Rhyacophila				0		PR			
115097	115098	Rhyacophila acropedes				1		PR			
115097	115160	Rhyacophila acutiloba	0								
115097	115163	Rhyacophila alberta						PR			
115097	115099	Rhyacophila angelita						PR			
115097	115165	Rhyacophila arnaudi						PR			
115097	115146	Rhyacophila atrata	0								
115097	115101	Rhyacophila betteni						PR			
115097	115102	Rhyacophila bifila						PR			
115097	115153	Rhyacophila blarina						PR			
115097	115151	Rhyacophila brunnea						PR			
115097	115131	Rhyacophila carolina	0								
115097	115156	Rhyacophila coloradensis						PR			
115097	115133	Rhyacophila fuscula	2	0							
115097	115105	Rhyacophila grandis				1		PR			
115097	115159	Rhyacophila hyalinata						PR			
115097	115177	Rhyacophila iranda				0		PR			
115097	115134	Rhyacophila ledra	3.4								
115097	115147	Rhyacophila minor	0								
115097	115155	Rhyacophila narvae						PR			
115097	115111	Rhyacophila nevadensis				1		PR			
115097	115138	Rhyacophila nigrita	0								
115097	115208	Rhyacophila oreia						PR			
115097	115114	Rhyacophila pellisa				0		PR			
115097	115116	Rhyacophila rayneri				0		PR			
115097	115187	Rhyacophila robusta									
115097	115117	Rhyacophila rotunda						PR			
115097		Rhyacophila sibirica				0		PR			
115097	115144	Rhyacophila torva	1.8								
115097		Rhyacophila trissemani				1		PR			
115097	115189	Rhyacophila tucula									
115097	115120	Rhyacophila vaccua						PR			
115097	115191	Rhyacophila vaefes				1		PR			
115097		Rhyacophila vaeter				1		PR			

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115097	115152	Rhyacophila vagrita						PR			
115097	115121	Rhyacophila valuma				1		PR			
115097	115123	Rhyacophila velora				1		PR			
115097	115124	Rhyacophila vepulsa									
115097	115125	Rhyacophila verrula									
115097	115195	Rhyacophila visor				1		PR		cn	
115097	115197	Rhyacophila vofixa				0		PR			
115097	115148	Rhyacophila vuphipes	0								
115095	116982	Sericostomatidae						SH			
116982	116983	Agarodes								sp	
116983	116991	Agarodes libalis	0	3							
117012	117013	Fattigia pele	1.1								
116982	117003	Gumaga				3		SH			
100900	103358	Hemiptera						PR		cb	sw
103358	103683	Belostomatidae						PR			
103683	103717	Abedus						PR		cb	sw
103717	103739	Abedus immaculatus						PR			
103683	103684	Belostoma	9.8					PR			
103684	103689	Belostoma flumineum						PR			
103684	103687	Belostoma lutarium						PR		cb	sw
103684	103688	Belostoma testaceum						PR			
103683	103699	Lethocerus						PR		sw	
103358	103364	Corixidae	9			10	5	PR		sw	
103364	103514	Callicorixa						PR			
103364	103501	Cenocorixa						PR		sw	
103501	103504	Cenocorixa bifida				8		PR		sw	
103364	103484	Corisella						PR		sw	
103364	103525	Cymatia				8		PI		sw	cb
103364	103547	Graptocorixa						PR		sw	
103364	103444	Hesperocorixa								sw	
103364	103491	Palmacorixa					5	PR		sw	cb
103364	103365	Ramphocorixa									
103364	103369	Sigara					9	PR			
103369	103370	Sigara alternata								sw	
103369	103398	Sigara washingtonensis				8		GC		sw	cb
103364	181192	Tenagobia				8					
103364	103423	Trichocorixa					5	PR			
103423	103424	Trichocorixa calva									
103423	103429	Trichocorixa sexcincta								sp	
103358	103768	Gelastocoridae						PR			
103768	103769	Gelastocoris						PR		sk	
103358	103801	Gerridae				5		PR			
103801	103829	Gerris						PR			
103829	103842	Gerris buenoi				5		PR		sk	
103829	103841	Gerris remigis				5		PR		sk	
103801	103872	Limnoporus						PR			

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103801	103857	Metrobates						PR		sk	
103857	103859	Metrobates hesperius						PR			
103801	103881	Neogerris						PR		sk	
103881	103882	Neogerris hesione						PR			
103801	103802	Rheumatobates						PR			
103802	103807	Rheumatobates palosi								sk	
103802	103804	Rheumatobates tenuipes									
103801	103811	Trepobates				10		PR		cb	bu
103811	103815	Trepobates pictus						PR		cb	bu
103964	103965	Hebrus						PR		sk	cb
103964	103986	Lipogomphus						PR			
103964	103983	Merragata						PR			
103983	103984	Merragata brunnea						PR		sk	
103983	103985	Merragata hebroides						PR			
103938	103939	Hydrometra						PR			
103939	103944	Hydrometra wileyae						PR		sk	cb
103358	103953	Mesoveliidae						PR			
103953	103954	Mesovelia						PR			
103954	103955	Mesovelia cryptophila						PR			
103954	103956	Mesovelia mulsanti						PR		cn	sw
103358	103613	Naucoridae				5		PR		cb	sw
103613	103614	Ambrysus						PR			
103613	103665	Pelocoris					7	PR			
103665	103667	Pelocoris femoratus						PR		cb	
103358	103747	Nepidae						PR			
103747	103748	Ranatra	7.5					PR			
103748	103749	Ranatra australis						PR			
103748	103750	Ranatra buenoi						PR			
103748	103761	Ranatra drakei						PR			
103748	103755	Ranatra fusca						PR			
103748	103751	Ranatra kirkaldyi						PR			
103748	103754	Ranatra nigra						PR		sw	cb
103358	103557	Notonectidae						PR			
103557	103558	Notonecta						PR			
103558	103573	Notonecta irrorata						PR			
103558	103575	Notonecta uhleri						PR		sw	cb
103358	103602	Pleidae						PR			
103602	103603	Neoplea						PI			
103603	103604	Neoplea striola						PI		cb	
103358	104063	Saldidae				10		PR			
104063	104069	Pentacora						PR			
104063	104140	Saldula				10		PR		sk	
103358	103885	Veliidae									
103885	103900	Microvelia					6	PR			
103900	103908	Microvelia hinei						PR			
103900	103910	Microvelia pulchella						PR			

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103885	103923	Paravelia						PR		sk	
103923	103924	Paravelia brachialis						PR			
103885	103886	Rhagovelia					6	PR			
103886	103894	Rhagovelia choreutes						PR			
103886	103895	Rhagovelia disticta						PR		sk	
103886	103887	Rhagovelia obesa						PR			
	103935	Trochopus						PR			
100500	102467	Plecoptera						PR		cn	
102468	102643	Capniidae				1	1	SH		sp	cn
102643	102644	Allocapnia	2.8	3			3	SH		sp	cn
102643	102688	Capnia				1		SH			
102785	102786	Eucapnopsis brevicauda				1		SH		sp	cn
102788	102804	Paracapnia				1		SH		sp	cn
102804	102805	Paracapnia angulata	0.2	1							
102468	102840	Leuctridae				0		SH			
102840	102841	Despaxia				0		SH		cn	
102841	102842	Despaxia augusta				0		SH		sp	cn
102840	102844	Leuctra	0.7				0	SH		sp	cn
102840	102877	Megaleuctra				0		SH		sp	cn
102909	102910	Moselia infuscata				0		SH			
102840	102887	Paraleuctra				0		SH		sp	cn
102887	102890	Paraleuctra occidentalis				0		SH			
103202	103239	Perlomyia				0		SH		sp	cn
102468	102517	Nemouridae				2		SH			
102517	102540	Amphinemura	3.4	3		2		SH			
102540	102541	Amphinemura delosa								sp	cn
102540	102542	Amphinemura nigritta								sp	cn
102517	102567	Malenka				2		SH		sp	cn
102517	102526	Nemoura								sp	cn
102517	102632	Ostrocera								sp	cn
102517	102622	Ostrocerca								sp	cn
102517	102605	Podmosta				2		SH			
102517	102584	Prostoia	6.1	2		2		SH		sp	cn
102584	102585	Prostoia besametsa				2		SH		sp	cn
102517	102640	Shipsa								sp	cn
102640	102641	Shipsa rotunda	0.3	2							
102517	102556	Soyedina				2		SH			
102517	102614	Visoka						SC		sp	cn
102614	102615	Visoka cataractae				1		SH			
102517	102591	Zapada				2		SH			
102591	102594	Zapada cinctipes				2		SH			
102591	102596	Zapada columbiana				2		SH			
102591	102601	Zapada frigida				2		SH			
102591	102597	Zapada oregonensis				2		SH		cn	sp
102468	102488	Peltoperlidae				2		SH		cn	sp
102488	102489	Peltoperla								cn	sp

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102994	103142	Soliperla				2		SH			
102488	102500	Tallaperla	1.4							cn	sp
102500	102505	Tallaperla cornelia									
102488	102510	Yoraperla				2		SH			
102510		Yoraperla mariana				2		SH			
102510	102512	Yoraperla brevis				2		SH		cn	sp
102468	102470	Pteronarcidae						SH			
102470	102485	Pteronarcella				0		SH			
102485	102486	Pteronarcella badia				0		SH		cn	sp
102485	102487	Pteronarcella regularis				0		SH			
102470	102471	Pteronarcys	1.7		2.2	0		SH			
102471	102473	Pteronarcys californica				0		SH			
102471	102478	Pteronarcys dorsata	1.8					SH			
102471	102484	Pteronarcys princeps				0		SH		sp	cn
102468	102788	Taeniopterygidae				2		SH		sp	cn
102838	102839	Doddsia occidentalis				2		SC		sp	cn
102788	102830	Oemopteryx								sp	cn
102788	102808	Strophopteryx	2.5	3							
102788	102816	Taenionema				2		SC		sp	cn
102816	102827	Taenionema pallidum				2		SC			
102788	102789	Taeniopteryx	6.3	2			2	SH			
102789	102791	Taeniopteryx burksi	5.8					OM			
102789	102792	Taeniopteryx lita						OM		cn	
102789	102795	Taeniopteryx metequi	1.4								
102912	103202	Chloroperlidae				1		PR		cn	
	103236	Kathroperla				0		PR			
103236	103237	Kathroperla perdita				1		GC		cn	
		Chloroperlinae				1		PR			
103202	103203	Alloperla	1.4			1		PR		cn	
103202	103260	Haploperla								cn	
103260	103263	Haploperla brevis	1.3	1							
103202	103303	Neaviperla						PR		cn	
103303	103304	Neaviperla forcipata				1		PR		cn	
103202	103233	Paraperla				1		PR		cn	
103233	103234	Paraperla frontalis						PR			
103202	103305	Plumiperla						PR		cn	
103202	103254	Suwallia	0			1		PR		cn	
103202	103273	Sweltsa	0			1		PR			
103202	103308	Triznaka				1		PR		cn	
102912	102914	Perlidae				1	1	PR			
102914	102917	Acroneuria					0	PR			
102917	102919	Acroneuria abnormis	2.2	0				PR			
102917	102920	Acroneuria arenosa	2.2					PR			
102917	102922	Acroneuria carolinensis	0		2.3						
102917	102923	Acroneuria evoluta			2.8						
102917	102925	Acroneuria internata			2.2						

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102917	102918	Acroneuria lycorias	1.5		2.4			PR			
102917	102926	Acroneuria mela	0.9					PR		cn	
102917	102927	Acroneuria perplexa						PR		cn	
102914	102975	Agnetina			1.8		2	PR		cn	
102975	102983	Agnetina annulipes	0				2			cn	
102975	102979	Agnetina capitata						PR		cn	
102975	102984	Agnetina flavescens	0								
102954	102955	Attaneuria ruralis						PR		cn	
102914	102934	Beloneuria	0			3		PR		cn	
102914	102985	Calineuria				3		PR		cn	
102985	102986	Calineuria californica				1		PR		cn	
102994	103121	Doroneuria				1		PR		cn	
103121	103123	Doroneuria baumanni				1		PR		cn	
103121	103122	Doroneuria theodora				1		PR		cn	
102914	102930	Claassenia				3		PR		cn	
102930	102932	Claassenia sabulosa				3		PR		cn	
102914	102939	Eccoptura								cn	
102939	102940	Eccoptura xanthenes	4.1							cn	
102914	102971	Hesperoperla						PR		cn	
102971	102972	Hesperoperla pacifica				1		PR		cn	
102914	102942	Neoperla	1.6	1	3.1			PR		cn	
102942	102944	Neoperla clymene						PR			
102914	102962	Paragnetina						PR			
102962	102965	Paragnetina fumosa	3.5					PR			
102962	102970	Paragnetina ichusa	0								
102962	102966	Paragnetina immarginata	1.7								
102962	102967	Paragnetina kansensis	2					PR		cn	sp
102962	102968	Paragnetina media			2.1						
103202	103251	Perlesta	0		4.5	5		PR		cn	
103251	103253	Perlesta placida	4.9	5				OM			
103202	103244	Perlinella						PR			
103244	103246	Perlinella drymo	0	1				PR		cn	
103244	103248	Perlinella ephyre						PR		cn	
102912	102994	Perlodidae				2	2	PR		cn	sp
102994	103155	Calliperla				2		PR		cn	sp
102994	103157	Cascadoperla				2		PR			
102994	103118	Clioperla								cn	
103118	103119	Clioperla clio	4.8	1						cn	
102994	103137	Cultus				2		PR		cn	
103137	103139	Cultus decisus	1.6								
102994	103166	Diploperla	2							cn	
103166	103167	Diploperla duplicata	2.7								
103166	103169	Diploperla morgani	1.5								
	103094	Diura				2		PR			
103094	103096	Diura knowltoni				2		SC		cn	
103171	103172	Frisonia picticeps				2		PR		cn	

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102994	103084	Helopicus								cn	
103084	103087	Helopicus bogaloosa	0							cn	
103084	103085	Helopicus subvarians	0.8								
	103124	Isogenoides				2		PR			
103124		Isogenoides hansoni	0								
102994	103070	Isogenus				2		PR			
102994	102995	Isoperla				2	2	PR			
102995	103012	Isoperla bilineata	5.5								
102995	103021	Isoperla dicala	2.2	2							
102995	103004	Isoperla fulva				2		PR			
102995	103029	Isoperla fusca				2		PR			
102995	103020	Isoperla holochlora	0								
102995	103007	Isoperla mormona				2		PR			
102995	103017	Isoperla namata	1.8								
102995	103018	Isoperla orata	0					OM			
102995	103009	Isoperla pinta				2		PR			
102995	103019	Isoperla similis	0.7								
102995	103035	Isoperla slossonae	2.6								
102995	103036	Isoperla transmarina	5.6								
102994	103149	Kogotus				2		PR		cn	
103174	103175	Malirekus hastatus	1.4								
102994	103110	Megarcys				2		PR		cn	
102994	103180	Oroperla				2		PR		cn	
102994	103134	Perlinodes						PR		cn	
103134	103135	Perlinodes aureus				2		PR		cn	
102994	103186	Pictetiella				2		PR		cn	
103186	103188	Pictetiella expansa				2		PR		cn	
103099	103100	Remenus bilobatus	0.3								
102994	103189	Rickera						PR		cn	
103189	103190	Rickera sorpta				2		PR		cn	
102994	103193	Setvena				2		PR		cn	
103193	103194	Setvena bradleyi				2		PR		cn	
102994	103102	Skwala				2		PR			
102994	103197	Yugus				2		PR		cn	sp
103197	103200	Yugus arinus	0								
103197	103198	Yugus bulbosus	0								
100500	101593	Odonata						PR		cb	
101595	101596	Aeshnidae				3		PR			
	101602	Aeshna				5		PR			
101596	101597	Anax				8	5	PR			
101597	101598	Anax junius						PR		cb	sp
101597	101599	Anax longipes						PR		cb	sp
101596	101648	Basiaeschna								cb	sp
101648	101649	Basiaeschna janata	7.7	6				PR			
101596	101645	Boyeria						PR		cb	
101645	101646	Boyeria grafiana	6.3								

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101645	101647	Boyeria vinosa	6.3	2	3.5			PR		cb	sp
101639	101640	Coryphaeschna ingens						PR		cb	cn
101637	101638	Epiaeschna heros						PR		cb	cn
101634	101635	Gomphaeschna furcillata						PR			
101653	101654	Nasiaeschna pentacantha	8					PR		bu	
101595	101664	Gomphidae				1		PR		bu	
101715	101716	Aphylla williamsoni						PR			
101664	101770	Arigomphus								bu	
101770	101771	Arigomphus pallidus						PR			
101664	101730	Dromogomphus	6.3					PR			
101730	101731	Dromogomphus armatus						PR			
101730	101732	Dromogomphus spinosus						PR		bu	
	101725	Erpetogomphus				4		PR			
101777	101780	Gomphurus dilatatus	6.2	5	2.5			PR			
101664	101665	Gomphus					5	PR			
101665	101677	Gomphus dilatatus						PR			
101665	101668	Gomphus geminatus						PR			
101665	101685	Gomphus lividus					5	PR			
101665	101686	Gomphus minutus						PR			
101665	101689	Gomphus pallidus						PR		sp	
101665	101694	Gomphus spiniceps	4.9								
101734	101735	Hagenius brevistylus	4	1				PR		bu	
101791	206625	Hylogomphus geminatus						PR		bu	
101664	101766	Lanthus	2.7							bu	
101664	101736	Octogomphus				1		PR		bu	
101664	101738	Ophiogomphus	6.2	1		1		PR		bu	
101664	101718	Progomphus						PR		bu	
101718	101720	Progomphus obscurus	8.7					PR		bu	
101664	101761	Stylogomphus								bu	
101761	101762	Stylogomphus albistylus	4.8								
101664	206626	Stylurus						PR		sp	
206626	206627	Stylurus ivae						PR			
	101594	Anisoptera						PR			
101659	101660	Tachopteryx				10		PR		bu	
102025	102026	Cordulegastridae						PR		bu	
102026	102027	Cordulegaster	6.1	3		0	3	PR			
102027	102031	Cordulegaster maculata						PR		sp	
101796	102020	Corduliidae				2	5	PR		cb	sp
101851	101852	Didymops transversa						PR		cb	sp
	101862	Epicordulia	5.6								
101862	101863	Epicordulia princeps						PR		sp	
101862	101864	Epicordulia regina						PR		sp	
101797	101918	Macromia	6.7	2			2	PR		sp	
101918	101920	Macromia georgiana						PR		sp	
101918	101924	Macromia georgina						PR		cb	cn
101918	101922	Macromia taeniolata						PR			

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101797	101934	Neurocordulia	5.8					PR			
101934	101938	Neurocordulia alabamensis						PR			
101934	101936	Neurocordulia molesta	3.3	5				PR			
101934	101939	Neurocordulia obsoleta	5.4	0				PR		sp	
101934	101935	Neurocordulia virginiensis	1.6					PR		sp	
101797	101947	Somatochlora	8.9	1		9	1	PR		cb	sp
101947	101949	Somatochlora linearis						PR			
102026	102035	Epitheca					4	PR			
102035	206629	Epitheca princeps						PR			
102035		Epitheca sepia						PR			
206629	206631	Epitheca princeps regina						PR		cb	sp
102035	185986	Epitheca cynosura						PR			
101797	101994	Tetragoneuria	8.5					PR			
101994	101996	Tetragoneuria cynosura						PR		sp	
101796	101797	Libellulidae				9	9	PR		sp	
101830	101831	Brachymesia gravida						PR		sp	
101797	101865	Erythemis						PR		cb	
101865	101866	Erythemis simplicicollis	7.7					PR		cb	
101797	101870	Erythrodiplax						PR		cb	
101870	101872	Erythrodiplax minuscula						PR		sp	
101797	101885	Leucorrhinia									
101797	101893	Libellula	9.8	9		9	8	PR			
101893	101901	Libellula auripennis						PR			
101893	101900	Libellula incesta						PR			
101893	101903	Libellula semifasciata						PR		sp	
101893	101904	Libellula vibrans						PR		sp	cb
102009	102010	Miathyria marcella						PR		sp	
101932	101933	Nannothemis bella						PR		sp	
101797	101945	Orthemis						PR		sp	
101945	101946	Orthemis ferruginea						PR		sp	
101798	101799	Pachydiplax longipennis	9.6					PR		sp	
101797	101803	Perithemis	10				4	PR		sp	
101803	101805	Perithemis seminola						PR		sp	
101803	101804	Perithemis tenera						PR		sp	cb
101808	101809	Plathemis lydia	10	8	8.2			PR			
101797	101976	Sympetrum	7.3	10			4	PR		sp	
101976	101977	Sympetrum ambiguum						PR			
101818	101820	Tramea carolina						PR			
100500	102042	Zygoptera						PR		cb	
102042	102043	Calopterygidae					5	PR		cb	
102043	102052	Calopteryx	8.3	5	3.7	6	6	PR		cb	
102052	102054	Calopteryx dimidiata						PR		cb	cn
102052	102055	Calopteryx maculata						PR			
102043	102048	Hetaerina	6.2	6	2.8			PR			
102048	102050	Hetaerina americana						PR			
102048	102049	Hetaerina titia						PR		cb	sw

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102042	102077	Coenagrionidae			6.1	9	9	PR		cb	
102077	102093	Amphiagrion				5		PR		cn	cb
102077	102139	Argia			5.1	7	6	PR			
102139	102140	Argia apicalis						PR			
102139	102143	Argia fumipennis						PR			
102139	102146	Argia moesta						PR			
102139	102147	Argia sedula						PR			
102139	102148	Argia tibialis						PR		cb	
102139	102154	Argia violacea						PR		cb	
102077	102133	Chromagrion				6		PR		cb	
102077	102102	Enallagma	9	9		9	8	PR		cb	
102102	102103	Enallagma antennuatus						PR		cb	
102102	102104	Enallagma cardenium						PR		cb	
102102	102106	Enallagma daecki						PR		cb	
102102	102108	Enallagma divagans						PR		cb	
102102	102110	Enallagma dubium						PR		cb	
102102	181184	Enallagma pallidum						PR		cb	
102102	102114	Enallagma pollutum						PR		cb	
102102	102115	Enallagma signatum						PR		cb	
102102	102119	Enallagma vesperum						PR		cb	
102102	102120	Enallagma weewa						PR		cb	
102077	102078	Ischnura	9.4	9		9	9	PR		cb	
102078	206632	Ischnura hastata						PR			
102078	102082	Ischnura posita						PR		cb	
102078	102084	Ischnura ramburi						PR		cb	
102077	102135	Nehalennia						PR		cb	
102135	102136	Nehalennia intergricollis						PR		cb	
102096	102099	Telebasis byersi						PR			
102077	102100	Zoniagrion				9		PR			
102058	102061	Lestes				9		PR		cb	
109215	118831	Diptera				7					
121226	121227	Blephariceridae				0		SC			
121229	121230	Agathon				0		SC		cn	
121229	121250	Bibiocephala				0		SC			
121229	121255	Blepharicera	0.2	0		0		SC		sp	bu
121229	121278	Philorus				0		SC		sp	cb
125808	127076	Ceratopogonidae			5.7	6		PR			
127277	127278	Dasyhelea						GC		sp	cn
127076	127112	Forcipomyiinae				6		PR	GC	sp	
127112	127113	Atrichopogon	6.8		4.5	6		PR	GC		
127113	127150	Atrichopogon websteri			4.4						
127112	127152	Forcipomyia				6		SC	PR	bu	
127076	127338	Ceratopogoninae				6		PR		bu	
127526	127533	Alluaudomyia						PR			
127774	127778	Bezzia				6	6	GC	PR	bu	
127526	127564	Ceratopogon					6	PR		bu	

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127339	127340	Culicoides	6.5	10			10	PR	GC	bu	
127683	127720	Nilobezzia						PR			
127774	127859	Palpomyia				6		PR	GC	bu	
127859	127905	Palpomyia tibialis								bu	
127683	127729	Probezzia					6	PR		bu	
127526	127614	Serromyia					6	PR		bu	
127683	127761	Sphaeromias						PR	GC		
127526	127619	Stilobezzia						PR		sp	sw
125808	125886	Chaoboridae						PR			
125892	125904	Chaoborus						PR			
125904	125923	Chaoborus punctipennis	8.5	8				PR			
125887	125888	Eucorethra				7		PR			
125808	127917	Chironomidae				6		GC		bu	
127917	127994	Tanypodinae				7		PR		bu	
127995	127996	Clinotanypus					8	PR			
127996	127998	Clinotanypus pinguis	9.8	8	7.5						
127995	128010	Coelotanypus	6.2					PR			
128010	128012	Coelotanypus concinnus	7.7					PR			
128010	128016	Coelotanypus scapularis						PR		bu	
128010	128018	Coelotanypus tricolor						PR		bu	
	128020	Macropelopiini						PR			
127995	206646	Alotanypus									
128020	128021	Apsectrotanypus						PR		bu	
128021	128024	Apsectrotanypus johnsoni	0					PR			
128020	128026	Brundiniella				6		PR		sp	
128026	128028	Brundiniella eumorpha	3.8								
206647	206648	Fittkauimyia serta								sp	bu
128020	128034	Macropelopia				6		PR			
128020	128048	Psectrotanypus			8.1	10	10	PR		sp	
128048	128056	Psectrotanypus dyari	10	10	8.6						
128270	128271	Djalmabatista						PR		sp	
128271	128272	Djalmabatista pulcher						PR			
128270	128277	Procladius	9.3	9	6.5	9	9	PR	GC	sp	
128277	128285	Procladius bellus						PR			
128069	128070	Natarsia	10	8	5.9		8	PR		sp	
128070	128071	Natarsia baltimoreus			5.6						
127994	128078	Pentaneurini				6		PR			
128078	128079	Ablabesmyia			5.2		8	GC	PR		
128079	128081	Ablabesmyia annulata			4.1			OM			
128079	128083	Ablabesmyia aspera						OM			
128079	128087	Ablabesmyia cinctipes						OM			
128079	128089	Ablabesmyia hauberi						OM			
128079	128090	Ablabesmyia idei						OM			
128079	128093	Ablabesmyia janta	7.1		4.9			OM			
128079	128097	Ablabesmyia mallochi	7.6	8	5			OM			
128079	128113	Ablabesmyia peleensis	4.6					OM		sp	

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			Southeast (NC)	Upper Midwest (WI)	Midwest (OH)	Northwest (ID)	Mid-Atlantic (MACS)	primary	secondary	primary	secondary
128079	128121	Ablabesmyia rhamphe						OM			
128078	128130	Conchapelopia	8.7	6	4.3	6	6	PR			
		Denopelopia atria									
128161	128162	Guttipelopia guttipennis						PR			
	128237	Hayesomyia						PR		sp	
128237	128249	Hayesomyia senata			4.6						
	128131	Helopelopia			3.9		6	PR		sp	
128078	128167	Hudsonimyia						PR			
128078	128170	Krenopelopia						PR		sp	
128170	128171	Krenopelopia hudsoni						PR			
128078	128173	Labrundinia			3.8			PR			
128173	128174	Labrundinia becki						PR			
128173	128175	Labrundinia johannseni						PR			
128173	128176	Labrundinia maculata						PR			
128173	128177	Labrundinia neopilosella					7	PR			
128173	128178	Labrundinia pilosella	6	7	3.1			PR		sp	
128173	128182	Labrundinia virescens	4.5					PR			
128078	128183	Larsia	8.3	6	4.3	6	6	PR			
128183	128184	Larsia berneri						PR			
128183	128186	Larsia decolorata						PR			
128183	128189	Larsia indistincta						PR		sp	
	128132	Meropelopia			2.7		7				
128078	128199	Monopelopia				6		PR		sp	
128199	128200	Monopelopia boliekae						PR			
128078	128202	Nilotanypus	4	6		6		PR		sp	
128202	128203	Nilotanypus fimbriatus			2.8			PR			
128078	128207	Paramerina	2.8			6	4	PR		sp	
128207	128208	Paramerina anomala									
128207	128209	Paramerina fragilis			4.7						
128078	128215	Pentaneura	4.6	6		6		PR	GC		
128215	128216	Pentaneura inconspicua			4.9			PR		sp	
128215	128218	Pentaneura inculta						PR		sp	
128078	128226	Rheopelopia						PR		sp	
128226	128229	Rheopelopia paramaculipennis			2.9						
	128234	Telopelopia okoboji			4						
128078	128236	Thienemannimyia				6	6	PR		sp	
128078	128251	Trissopelopia						PR			
128078	128259	Zavrelimyia	9.3	8	4.1	8	8	PR		sp	
128259	128262	Zavrelimyia sinuosa						PR			
128323	128324	Tanypus	9.6	10	8.8		10	PR	GC		
128324	128329	Tanypus neopunctipennis			7.5			OM			
128324	128335	Tanypus carinatus						OM			
128324	128333	Tanypus punctipennis						OM		sp	
128324	128336	Tanypus stellatus						OM			
127953	127954	Boreochlus				6		GC	SC		
127917	128341	Diamesinae						GC		sp	

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128342	128343	Boreoheptagyia				6		GC			
	128351	Diamesini				2		GC			
128351	128355	Diamesa	7.7	8		5		GC	SC	sp	
128351	128401	Pagastia	2.2	1		1		GC			
128351	128408	Potthastia				2		OM	GC		
128408	128409	Potthastia gaedii	2			6		GC		sp	
128408	128412	Potthastia longimana	7.4			2		GC		sp	
128351	128416	Pseudodiamesa				6		GC		sp	
128351	128426	Sympotthastia	5.7	2		2		GC	SC	sp	
128437	128440	Monodiamesa				7		GC		bu	sp
128437	128446	Odontomesa				4		GC			
128446	128447	Odontomesa fulva	5.9	4							
128437	128452	Prodiamesa				3		GC		sp	
128452	128454	Prodiamesa olivacea	7.9	3							
125808	128457	Orthocladiinae				5		GC		bu	
128457	128563	Corynoneura	6.2	7	3.5	7	7	GC			
128563	128565	Corynoneura celeripes			2.3			GC		sp	
128563	128567	Corynoneura lobata			3.3						
128563	128570	Corynoneura taris						GC			
128457	129182	Thienemanniella	6	6	3.7	6	6	GC			
129182	129193	Thienemanniella fusca						GC			
129182	129189	Thienemanniella similis			2.4			GC			
129182	129190	Thienemanniella xena			3.6			GC			
		Orthocladiini				6		GC			
128457	128460	Acamptocladius						GC		bu	sp
128457	128470	Antillocladius									
128457	128477	Brillia	5.2	5		5	5	SH	GC		
128477	128478	Brillia flavifrons				5		SH			
128477	128487	Brillia par								bu	cn
128477	128482	Brillia retifinis				5		SH		sp	
128457	128511	Cardiocladius	6.2	5		5		PR		cn	bu
128511	128515	Cardiocladius obscurus			2.2						
128457	128520	Chaetocladius				6		GC			
128457	128575	Cricotopus		7	4.3	7	7	SH	GC		
128575	128583	Cricotopus bicinctus	8.7		6.7		7	OM			
128575	128594	Cricotopus festivellus				7		SH			
128575	128610	Cricotopus infuscatus	9								
128575		Cricotopus Isocladius				7		SH			
128575		Cricotopus Nostococladius				7		SH			
128575	128640	Cricotopus politus						OM			
128575		Cricotopus sylvestris	10					OM			
128575	128651	Cricotopus tremulus				7	7	SH		sp	
128575	128659	Cricotopus trifascia				7		OM			
128575	128664	Cricotopus varipes	8.1								
128575	128666	Cricotopus vierriensis	4.8		4.2						
128457	128670	Diplocladius						GC		sp	

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128670	128671	Diplocladius cultriger	7.7	8				GC			
128680	128681	Doncricotopus bicaudatus			4.8						
128457	128689	Eukiefferiella				8		GC	SC		
128689	128704	Eukiefferiella brehmi	3.7			8		GC			
128689	128703	Eukiefferiella brevicalcar	1.7			8		GC			
128689	128693	Eukiefferiella claripennis	5.7	8		8		GC			
128689	128695	Eukiefferiella devonica	2.6			8		GC			
128689	128705	Eukiefferiella gracei	2.7			8		GC			
128689	128706	Eukiefferiella pseudomontana				8		GC		sp	
128457	128712	Georthocladius								sp	
128457	128718	Gymnometriocnemus					7	GC		sp	bu
128457	128730	Heleniella	0			6		GC			
128457	128737	Heterotrissocladius	5.4	0		4		GC	SC	sp	
128737	128746	Heterotrissocladius subpilosus				0		GC		sp	
128457	128750	Hydrobaenus	9.6	8		8	8	SC	GC	sp	
	128771	Krenosmittia				1		GC			
128457	128776	Limnophyes			3.1	8	8	GC			
128457	128811	Lopescladius	2.2	4		6		GC		bu	sp
128457	128818	Mesosmittia								sp	
128457	128821	Metriocnemus						OM	GC		
128457	128844	Nanocladius	7.2	3	5.3	3	3	GC			
128844	128852	Nanocladius crassicornus			4.3		3	GC			
128844	128853	Nanocladius distinctus			6.1			GC			
128844	128855	Nanocladius downesi	2.6								
128844	128859	Nanocladius minimus			4.5						
128844	128860	Nanocladius rectinervis						GC		sp	bu
128844	128862	Nanocladius spiniplenus			3.5						
128457	128867	Oliveridia				6		GC			
128457	128874	Orthocladius		6	3.9			GC			
128874		Orthocladius Eudactylocladius				6		GC			
128874		Orthocladius Euorthocladius	6.3			6		GC			
128874		Orthocladius Pogonocladius				6		GC			
128874	128878	Orthocladius annectens						GC		sp	
128874	128882	Orthocladius carlatus			2						
128874	128885	Orthocladius clarkei	5.8								
128874	128898	Orthocladius dorenus	6.7								
128874	128913	Orthocladius lignicola						GC		sp	
128874	128920	Orthocladius nigritus	0.9								
128874	128923	Orthocladius obumbratus	8.8								
128874	128929	Orthocladius robacki	7.2								
128457	128951	Parachaetocladius	0			6	2	GC		sp	
128457	128968	Parakiefferiella	5.9		4.8	6	4	GC			
128457	128978	Parametriocnemus			2.8	5	5	GC		sp	
128978	128982	Parametriocnemus lundbecki	3.7	5				GC		sp	
128457	128989	Paraphaenocladius				5	4	GC		sp	
128457	129005	Paratrichocladius			2	6		GC		sp	bu

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128457	129011	Parorthocladius				6		GC			
128457	129018	Psectrocladius	3.8	8	5.7	8	8	GC	SH		
129018	129027	Psectrocladius elatus						OM			
129018	129031	Psectrocladius limbatellus				8		GC		sp	
129018	129051	Psectrocladius sordidellus				8		GC			
128457	129052	Pseudorthocladius	0	0		0	0	GC		sp	
128457	129071	Pseudosmittia						GC		sp	
128457	129083	Psilometriocnemus						GC			
128457	129086	Rheocricotopus			4.9	6	6	GC	SH		
129086	129101	Rheocricotopus pauciseta					6	GC			
129086	129102	Rheocricotopus robacki	7.7	6	3.8						
129086	129105	Rheocricotopus tuberculatus	6.8							bu	
128457	129107	Rheosmittia						GC			
128457	129110	Smittia						GC			
128457	129152	Stilocladius						GC		sp	
128457	129156	Symbiocladius				6		PA			
	128877	Symposiocladius								sp	
128877	128915	Symposiocladius lignicola	5.4								
128457	129161	Synorthocladius	4.7	2		2		GC	SC		
129161	129162	Synorthocladius semivirens			2.5						
128457	129197	Tvetenia		5		5	5	GC			
129197	129205	Tvetenia bavarica	4			5		GC			
129197	189327	Tvetenia discoloripes	3.9			5		GC			
128457	129206	Unniella					4	GC		bu	
129206	129207	Unniella multivirga	0					GC			
128457	129208	Xylotopus	6.6	2						bu	
129208	129209	Xylotopus par					2				
128457	129213	Zalutschia					7	SH			
128457	129228	Chironominae				6		GC			
129228	129229	Chironomini				6		GC			
	206655	Apedilum									
206655	129618	Apedilum elachista								sp	bu
129231	129234	Asheum beckae						GC			
129229	129236	Axarus						GC			
129229	206657	Beardius								bu	
206657	206658	Beardius truncatus									
129229	129254	Chironomus	9.8	10	8.1	10	10	GC	SH		
129254	129280	Chironomus decorus						OM			
129254	129313	Chironomus riparius						OM		bu	
129254	129322	Chironomus stigmaterus						OM		sp	bu
129229	129350	Cladopelma	2.5	9			7	GC			
129229	129368	Cryptochironomus			4.9	8	8	PR		sp	
129368	129370	Cryptochironomus blarina	8	8							
129368	129376	Cryptochironomus fulvus	6.7	8				PR		bu	
129229	129394	Cryptotendipes	6.1	6	4.2		6	GC		bu	
129229	129421	Demicryptochironomus	2.1				8	GC			

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129229	129428	Dicrotendipes	7.9		5.6	8	8	GC	FC		
129428	129436	Dicrotendipes fumidus			5.8						
129428	129441	Dicrotendipes leucoscelis						FG			
129428	129445	Dicrotendipes lobus						FG			
129428	129458	Dicrotendipes lucifer			6.3						
129428	129448	Dicrotendipes modestus	9.2	5	5.9			FG			
129428	129450	Dicrotendipes neomodestus	8.3		4.5			FG			
129428	129452	Dicrotendipes nervosus	10					FG			
129428	193743	Dicrotendipes simpsoni	10		7.4			FG			
129428	206649	Dicrotendipes thanatogratus						FG		bu	
129428	183774	Dicrotendipes tritomus						FG			
129229	129459	Einfeldia				8		GC			
129459	129460	Einfeldia austini						GC		cn	
129459	129463	Einfeldia natchitocheae						GC			
129229	129470	Endochironomus			5.6	10	10	SH	GC		
129470	129471	Endochironomus nigricans	7.5	8	5.3						
129470	129474	Endochironomus subtendens									
128457	130046	Endotribelos						GC		bu	cn
130046	130047	Endotribelos hesperium						GC			
129229	129483	Glyptotendipes	8.5	10	6.2		10	FC	GC		
129483	129484	Glyptotendipes amplus			3.2						
129483	129485	Glyptotendipes barbipes					10	FC			
129483	129493	Glyptotendipes meridionalis									
129483	129494	Glyptotendipes paripes								bu	
129483	129496	Glyptotendipes seminole									
129229	129506	Goeldichironomus					8	GC			
129506	206650	Goeldichironomus amazonicus						GC			
129506	129508	Goeldichironomus carus						GC			
129506	206651	Goeldichironomus fluctuans						GC			
129506	129512	Goeldichironomus holoprasinus	10					GC		cb	cn
129506	206652	Goeldichironomus natans						GC		bu	
129229	129516	Harnischia	7.5	8				GC	SC		
129516	129517	Harnischia curtilamellata			3.5						
129229	129522	Kiefferulus					10	GC			
129522	129523	Kiefferulus dux	10	10	5.2			GC		cn	
129525	129526	Lauterborniella agrayloides						GC			
129229	129535	Microtendipes	6.2	7		6		FC	GC		
129535	129540	Microtendipes caelum			2.7						
129535	129541	Microtendipes pedellus						FG			
129535	129547	Microtendipes rydalensis			2			FG			
129229	129548	Nilothauma	5.5	2	3.1		2				
129548	129551	Nilothauma bicorne						GC			
129229	129561	Pagastiella						GC		sp	
129561	206654	Pagastiella orophila						GC			
129561	129562	Pagastiella ostansa	2.6								
129229	129564	Parachironomus	9.2	10	4.1			PR	GC		

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129564	129565	Parachironomus abortivus			8						
129564	129569	Parachironomus carinatus			5.3						
129564	129573	Parachironomus directus			7.9						
129564	129579	Parachironomus frequens			3.8						
129564	129595	Parachironomus hirtalatus									
129564	129581	Parachironomus monochromus	7.9								
129564	129583	Parachironomus pectinatellae			3.7						
129564	129587	Parachironomus schneideri								sp	
129564	129588	Parachironomus sublettei									
129229	129597	Paracladopelma	6.4	7				GC			
129597	129608	Paracladopelma nereis	1.8					GC		cn	
129597	129612	Paracladopelma undine	5.2					GC			
129229	129616	Paralauterborniella					8	GC		bu	
129616	129619	Paralauterborniella nigrohalterale									
129229	129623	Paratendipes	5.3	8	5.7	8	8	GC			
129623	129624	Paratendipes albimanus			4.3			GC		cn	
129623	129632	Paratendipes subaequalis						GC			
129229	129637	Phaenopsectra	6.8	7		7	7	SC	GC		
129637	129642	Phaenopsectra flavipes	8.5		5.7						
129637	129647	Phaenopsectra obediens						OM		cb	cn
129637	129652	Phaenopsectra punctipes			3.5			SC			
129229	129657	Polypedilum				6	6	SH	GC		
129657		Polypedilum Pentapedilum				6		SH			
129657	129725	Polypedilum angulum	5.6								
129657	129666	Polypedilum aviceps	4		1.9						
129657	129726	Polypedilum bergi					6	SH			
129657	129671	Polypedilum convictum	5.3		3.6						
129657	129676	Polypedilum fallax	6.7								
129657	129684	Polypedilum halterale	7.2								
129657	129686	Polypedilum illinoense	9.2		6.9						
129657	129692	Polypedilum laetum									
129657	129698	Polypedilum ontario			2.6						
129657	129708	Polypedilum scalaenum	8.7								
129657	129718	Polypedilum trigonum								bu	
129657	129719	Polypedilum tritum									
129229	129730	Robackia						GC			
129730	129731	Robackia claviger	2.4					GC		bu	
129730	129733	Robackia demeijerei	4.3			7		GC			
129229	129735	Saetheria						GC		wood	
129735	129736	Saetheria hirta						GC			
129735	129737	Saetheria tylus	8.1	4							
129229	129743	Stelechomyia					7	GC		bu	
129743	129744	Stelechomyia perpulchra	4.6					GC		bu	
129229	129746	Stenochironomus	6.4	5	3.6		5	SH	GC		
129229	129785	Stictochironomus	6.7	9	4			OM	GC	bu	
129785	129790	Stictochironomus devinctus						OM			

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129229	129820	Tribelos	6.6	5			5	GC			
129820	206656	Tribelos atrum						GC			
129820	129823	Tribelos fuscicorne			5.1			GC		bu	
129820	129827	Tribelos jucundus			5.6			GC			
129229	129837	Xenochironomus						PR			
129837	129838	Xenochironomus xenolabis	7	0				PR			
129229	129842	Xestochironomus						OM			
129842	129844	Xestochironomus subletti						OM			
129872	130040	Zavreliella								bu	
130040	189328	Zavreliella marmorata									
129850	129851	Pseudochironomus	4.2	5	4.7	5		GC			
129228	129872	Tanytarsini				6		FC			
129872	129873	Cladotanytarsus	3.7	7	4.4	7	7	GC	FC	cb	sp
129872	129884	Constempellina				6		GC			
129872	129890	Micropsectra	1.4	7	3.5	7	7	GC			
129872	129932	Nimbocera				6		FC		sp	
129932	206659	Nimbocera limnetica						FG			
129872	129935	Paratanytarsus	7.7	6	4.2	6	6	GC		cn	
129935		Paratanytarsus inopterus					6	GC			
129872	129952	Rheotanytarsus	6.4	6	3.3	6	6	FC			
129952	129955	Rheotanytarsus distinctissimus						FC		cb	sp
129952	129955	Rheotanytarsus distinctissimus						FC		cb	sp
129952	129957	Rheotanytarsus exiguus						FC			
129872	129962	Stempellina	2	2		2		GC		cb	cn
129872	129969	Stempellinella	5.3	4	2.6	4	4	GC			
129872	129975	Sublettea				6		FC			
129975	129976	Sublettea coffmani	1.7		2.2						
129872	129978	Tanytarsus	6.7	6	3.5	6	6	FC	GC		
129978	130030	Tanytarsus glabrescens						FG		cb	sp
129978	129997	Tanytarsus guerlus						FG			
		Thienemanniola				6		GC			
129872	130038	Zavrelia	2.7			8		GC		sw	
125875	125877	Corethrella								sw	
125808	125930	Culicidae				8		GC		sw	
126233	126234	Aedes					8	FC			
125955	125956	Anopheles	9.1				6	FC			
126233	126455	Culex	10				8	FC			
126233	126518	Deinocerites						FC			
125931	125932	Toxorhynchites						PR			
121226	121286	Deuterophlebiidae						SC			
121286	121287	Deuterophlebia				0		SC		sw	cb
121287	121290	Deuterophlebia nielsoni						SC			
125808	125809	Dixidae				1	1	GC			
125809	125810	Dixa	2.8			1		GC			
125809	125854	Dixella						GC			
125809	125873	Meringodixa				2		GC		bu	

Parent TSN	TSN	Scientific Name	Regional Tolerance Values					Functional Feeding Group		Habit/ Behavior	
			Southeast (NC)	Upper Midwest (WI)	Midwest (OH)	Northwest (ID)	Mid-Atlantic (MACS)	primary	secondary	primary	secondary
125350	125351	Psychodidae				10		GC			
125391	125392	Maruina				1		SC			
125391	125514	Pericoma			5.6	4	4	GC			
125391	125468	Psychoda	9.9		3.7	10		GC			
125468	125469	Psychoda alternata						GC		bu	
125399	125400	Telmatoscopus albipunctatus									
125762	125763	Ptychopteridae				7		GC			
125764	125765	Bittacomorpha									
125785	125786	Ptychoptera				7		GC			
125808	126640	Simuliidae				6		FC		cn	
	126658	Cnephia mutata	4		5						
126648	126674	Gymnopais						SC		cn	
126648	126687	Metacnephia				6		FC			
	126642	Parasimulium						FC			
126648	126703	Prosimulium	2.6			3		FC			
126703	126736	Prosimulium mixtum	3.3	3							
126773	126774	Simulium	4.4		4.8	6	6	FC			
126774	126790	Simulium bivittatum				6		FC			
126774	126832	Simulium jenningsi					6	FC			
126774	126834	Simulium jonesi					6	FC			
126774	126841	Simulium meridionale				6		FC			
126774	126870	Simulium rivuli					6	FC			
126774	126873	Simulium slossonae						FC			
126774	126883	Simulium tuberosum					6	FC		cn	
126774	126892	Simulium venustum	7.4	5			6	FC			
126774	126903	Simulium vittatum	8.7	7		6	6	FC			
126648	126761	Stegopterna									
126648	126767	Twinnia				6		FC			
125762	125799	Tanyderidae									
	125802	Protanyderus				1				sp	bu
125799	125800	Protoplasa				5		GC			
125800	125801	Protoplasa fitchii	5								
125808	126624	Thaumaleidae						OM			
126624	126629	Thaumalea						OM			
126629	126631	Thaumalea elnora						OM			
126629	126632	Thaumalea fusca						OM			
118839	118840	Tipulidae				3		SH		bu	
118841	118905	Megistocera									
118841	119008	Prionocera				4		SH		cn	
118841	119037	Tipula	7.7	4	7.2	4	4	SH			
119037	119041	Tipula abdominalis			4						
119037		Tipula ormosia				4		OM			
119655	119656	Antocha	4.6	3	2.2	3		GC			
119656	119660	Antocha monticola				3		GC			
	120488	Cryptolabis						SH	GC	bu	
121026	121027	Dicranota	0	3		3		PR			

Parent TSN	TSN	Scientific Name	Regional Tolerance Values					Functional Feeding Group		Habit/ Behavior	
			Southeast (NC)	Upper Midwest (WI)	Midwest (OH)	Northwest (ID)	Mid-Atlantic (MACS)	primary	secondary	primary	secondary
120030	120076	Elephantomyia						SH		sp	bu
120397	120503	Erioptera				3		GC			
120397	120640	Gonomyia						GC		bu	sp
119655	119690	Helius					4	GC		bu	sp
120397	120732	Hesperoconopa				1		GC		bu	
120030	120094	Hexatoma	4.7	2	2.3	2	2	PR		bu	sp
	120095	Eriocera						PR		bu	sp
120030	120164	Limnophila				4		PR		bu	
119655	119704	Limonia	10	6		6		SH		bu	
	119706	Geranomyia					3	SH			
120397	120758	Molophilus				4		SH		bu	
120397	120830	Ormosia	6.5			3		GC		bu	
121026	121118	Pedicia				6		PR		bu	
120030	120335	Pilaria				7	7	PR			
120030	120365	Pseudolimnophila	7.3	2			2	PR			
120397	120968	Rhabdomastix				8		PR		sp	bu
120968	120977	Rhabdomastix fascigera				3		GC		bu	
120968	120995	Rhabdomastix setigera				3		GC		bu	
120030	120387	Ulomorpha									
118831	130052	Brachycera									
130928	130929	Atherix				2	2	PR			
130929	130930	Atherix lantha	2.1	2	3.1			PR			
130929	130932	Atherix variegata				2		PR			
130741	130914	Pelecorhynchidae				3		PR			
130914	130915	Glutops				3		PR			
131750	136824	Dolichopodidae	9.7	4		4		PR			
137952	137953	Dolichopus								cn	
131750	135830	Empididae	8.1	6	3.5	6		PR		sp	bu
136304	136305	Chelifera				6		GC			
135844	135849	Clinocera				6		PR			
136304	136327	Hemerodromia				6	6	PR			
136361	136377	Oreogeton				5		PA			
135844	135881	Oreothalia				6		PR			
135930	136123	Rhamphomyia				6		PR		sp	bu
135844	135920	Wiedemannia				6		PR			
130130	130150	Stratiomyidae				8		GC			
130155	130160	Allognosta				7		GC			
130408	130409	Caloparyphus				7		GC		sp	
130408	130436	Euparyphus						GC			
130685	130694	Nemotelus								sp	bu
130483	130573	Odontomyia					7	GC			
130408	130461	Oxycera								sp	bu
130483	130627	Stratiomys						FG			
130741	130934	Tabanidae				8		PR		sp	bu
131061	131078	Chrysops	7.3	6	4.6		7	GC	PR		
131061	131062	Silvius						PR			

Parent TSN	TSN	Scientific Name	Regional Tolerance Values					Functional Feeding Group		Habit/ Behavior	
			Southeast (NC)	Upper Midwest (WI)	Midwest (OH)	Northwest (ID)	Mid-Atlantic (MACS)	primary	secondary	primary	secondary
131318	131527	Tabanus	9.7	5		5	5	PR			
131750	148316	Canaceidae						SC		bu	
131750	146893	Ephydridae				6		GC			
131750	150025	Muscidae				6		PR			
150729	150730	Limnophora	7					PR			
138933	139013	Dohrniphora									
131750	144653	Sciomyzidae				6		PR		bu	
144770	144898	Sepedon						PR			
131750	139621	Syrphidae				10		GC			
141029	141049	Chrysogaster									
	140904	Eristalis	10		0			GC		bu	

APPENDIX C:

TOLERANCE AND TROPHIC GUILDS OF SELECTED FISH SPECIES

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APPENDIX C

Appendix C is a list of selected fishes of the United States in phylogenetic order. Included are the Taxonomic Serial Number (TSN) and the Parent Taxonomic Serial Number for each of the species listed according to the Integrated Taxonomic Information System (ITIS). The ITIS generates a national taxonomic list that is constantly updated and currently posted on the World Wide Web at <www.itis.usda.gov>. If you are viewing this document electronically, this page is linked to the ITIS web site.

Additionally, this Appendix details trophic and tolerance designations for selected fishes of the United States. To generate this list, we compiled a consensus rating for each taxon from the literature sources listed below. Exceptions are listed for each source that does not agree with the consensus of other cited literature. Exceptions are noted by first listing the designation then the literature source code in parentheses. The following is a list of the designations and literature sources used in this Appendix.

TROPHIC DESIGNATIONS

P=Piscivore
H=Herbivore
O=Omnivore
I=Insectivore (including specialized insectivores)
F=Filter feeder
G=Generalist feeder
V=Invertivore

Notes on Trophic Designations
Piscivore—although some investigators separate certain species into subcategories such as parasitic (e.g., sea lamprey) or top carnivore (e.g., walleye), we have grouped these together as piscivores for this list.

TOLERANCE DESIGNATIONS (relevant to non-specific stressors)

I = Intolerant
M = Intermediate
T = Tolerant

Notes on Tolerance Designations
Intolerant—although some investigators separate certain species into subcategories such as rare intolerant, special intolerant or common intolerant, we have grouped these together as intolerant for this list.

Literature Sources For Trophic/Tolerance Designations

(A) = Midwestern United States (Karr et al. 1986)

(B) = Ohio (Ohio EPA 1987)

(C) = Midwestern United States (Plafkin et al. 1989)

(D) = Central Corn Belt Plain (Simon 1991)

(E) = Wisconsin Warmwater (Lyons 1992)

(F) = Maryland Coastal Plain (Hall et al. 1996)

(G) = Northeastern United States (Halliwell et al. 1999)

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A Checklist of Index of Biotic Integrity Designations for Fishes of the United States

(Nomenclature follows Robins et al.1991)

Parent TSN	TSN	Common Name	*Scientific Name*	Trophic	Trophic Exceptions	Tolerance	Tolerance Exceptions
159696	**159697**	**Lampreys**	***Petromyzontidae***				
159723	159724	Ohio lamprey	*Ichthyomyzon bdellium*	P		I	M(G)
159723	159725	Chestnut lamprey	*Ichthyomyzon castaneus*	P		M	
159723	159726	Northern brook lamprey	*Ichthyomyzon fossor*	F		I	
159723	159727	Southern brook lamprey	*Ichthyomyzon gagei*			I	
159723	159728	Mountain brook lamprey	*Ichthyomyzon greeleyi*	F		I	
159723	159730	Silver lamprey	*Ichthyomyzon unicuspis*	P		M	
159700	159705	Least brook lamprey	*Lampetra aepyptera*	F		M	I(D, G)
159700	159708	American brook lamprey	*Lampetra appendix*	F		I	
159700	159704	River lamprey	*Lampetra ayresi*				
159700	159709	Kern brook lamprey	*Lampetra hubbsi*				
159700	159701	Arctic lamprey	*Lampetra japonica*				
159700	159710	Pit-Klamath brook lamprey	*Lampetra lethophaga*				
159700	201891	Vancouver lamprey	*Lampetra macrostoma*				
159700	159711	Miller Lake lamprey	*Lampetra minima*				
159700	159707	Western brook lamprey	*Lampetra richardsoni*				
159700	201892	Klamath lamprey	*Lampetra similis*				
159700	159713	Pacific lamprey	*Lampetra tridentata*				
159721	159722	Sea lamprey	*Petromyzon marinus*	P		M	
161063	**161064**	**Sturgeons**	***Acipenseridae***				
161065	161069	Shortnose sturgeon	*Acipenser brevirostrum*	V		I	
161065	161071	Lake sturgeon	*Acipenser fulvescens*	V	I(E)	M	I(G)
161065	161067	Green sturgeon	*Acipenser medirostris*				
161065	161070	Atlantic sturgeon	*Acipenser oxyrhynchus*	V		I	
161065	161068	White sturgeon	*Acipenser transmontanus*				
161080	161081	Pallid sturgeon	*Scaphirhynchus albus*				
161080	161082	Shovelnose sturgeon	*Scaphirhynchus platorynchus*	I		M	
161063	**161085**	**Paddlefishes**	***Polyodontidae***				
161087	161088	Paddlefish	*Polyodon spathula*	F		I	
161091	**161092**	**Gars**	***Lepisosteidae***				
161093	161095	Spotted gar	*Lepisosteus oculatus*	P		M	
161093	161094	Longnose gar	*Lepisosteus osseus*	P		M	
161093	161096	Shortnose gar	*Lepisosteus platostomus*	P		M	
161093	161098	Florida gar	*Lepisosteus platyrhincus*				
	161097	Alligator gar	*Lepisosteus spatula*	P		M	
161101	**161102**	**Bowfins**	***Amiidae***				
161103	161104	Bowfin	*Amia calva*	P		M	T(G)
161902	**161903**	**Mooneyes**	***Hiodontidae***				
161904	161905	Goldeye	*Hiodon alosoides*	I		I	
161904	161906	Mooneye	*Hiodon tergisus*	I		I	
161124	**161125**	**Freshwater eels**	***Anguillidae***				
161126	161127	American eel	*Anguilla rostrata*	P	G(F)	M	T(F,G)
161699	**161700**	**Herrings**	***Clupeidae***				
161701	161703	Blueback herring	*Alosa aestivalis*	F		M	
161701	161705	Alabama shad	*Alosa alabamae*			M	
161701	161707	Skipjack herring	*Alosa chrysochloris*	P		M	

Parent TSN	TSN	Common Name	*Scientific Name*	Trophic	Trophic Exceptions	Tolerance	Tolerance Exceptions
161701	161704	Hickory shad	*Alosa mediocris*				
161701	161706	Alewife	*Alosa pseudoharengus*	F	V(C)	M	
161701	161702	American shad	*Alosa sapidissima*	V	F(G)	M	
161731	161733	Finescale menhaden	*Brevoortia gunteri*				
161731	161734	Gulf menhaden	*Brevoortia patronus*				
161731	161735	Yellowfin menhaden	*Brevoortia smithi*				
161731	161732	Atlantic menhaden	*Brevoortia tyrannus*				
161721	161722	Atlantic herring	*Clupea harengus*				
161721	551209	Pacific herring	*Clupea pallasi*				
161736	161737	Gizzard shad	*Dorosoma cepedianum*	O	F(E), H(G)	M	T(G)
161736	161738	Threadfin shad	*Dorosoma petenense*	O		M	
161742	161743	Round herring	*Etrumeus teres*				
161752	161753	False pilchard	*Harengula clupeola*				
161752	161754	Redear sardine	*Harengula humeralis*				
161752	161755	Scaled sardine	*Harengula jaguana*				
161752	161757	Flatiron herring	*Harengula thrissina*				
161758	161759	Dwarf herring	*Jenkinsia lamprotaenia*				
161758	161760	Little-eye herring	*Jenkinsia majua*				
161758	161761	Shortband herring	*Jenkinsia stolifera*				
161747	161750	Deepbody thread herring	*Opisthonema libertate*				
161747	161751	Middling thread herring	*Opisthonema medirastre*				
161747	161748	Atlantic thread herring	*Opisthonema oglinum*				
161762	161763	Spanish sardine	*Sardinella aurita*				
161762	161764	Orangespot sardine	*Sardinella brasiliensis*				
161728	161729	Pacific sardine	*Sardinops sagax*				
161699	**161826**	**Anchovies**	***Engraulidae***				
161837	161846	Key anchovy	*Anchoa cayorum*				
161837	161847	Deepbody anchovy	*Anchoa compressa*				
161837	161840	Cuban anchovy	*Anchoa cubana*				
161837	161848	Slough anchovy	*Anchoa delicatissima*				
161837	161838	Striped anchovy	*Anchoa hepsetus*				
161837	161841	Bigeye anchovy	*Anchoa lamprotaenia*				
161837	161842	Dusky anchovy	*Anchoa lyolepis*				
161837	161839	Bay anchovy	*Anchoa mitchilli*				
	161843	Longnose anchovy	*Anchoa nasuta*				
161853	161857	Flat anchovy	*Anchoviella perfasciata*				
161860	161862	Anchoveta	*Cetengraulis mysticetus*				
161827	161830	Silver anchovy	*Engraulis eurystole*				
161827	161828	Northern anchovy	*Engraulis mordax*				
163341	**163342**	**Carps and Minnows**	***Cyprinidae***				
163530	163531	Chiselmouth	*Acrocheilus alutaceus*	H		M	
163532	163533	Longfin dace	*Agosia chrysogaster*				
163507	163508	Central stoneroller	*Campostoma anomalum*	H		M	T(G)
163507	163509	Largescale stoneroller	*Campostoma oligolepis*	H		M	
163507	163510	Mexican stoneroller	*Campostoma ornatum*				
163507	163511	Bluefin stoneroller	*Campostoma pauciradii*				
163349	163350	Goldfish	*Carassius auratus*	O	G(G)	T	
163370	163373	Redside dace	*Clinostomus elongatus*	I		I	
163370	163371	Rosyside dace	*Clinostomus funduloides*	I		I	
163534	163535	Lake chub	*Couesius plumbeus*	I	G(G)	M	
163536	163537	Grass carp	*Ctenopharyngodon idella*	H	O(D)	M	T(D)

Parent TSN	TSN	Common Name	*Scientific Name*	Trophic	Trophic Exceptions	Tolerance	Tolerance Exceptions
163765	163766	Satinfin shiner	*Cyprinella analostana*	I		I	T(G)
163765	163768	Blue shiner	*Cyprinella caerulea*				
163765	163770	Ocmulgee shiner	*Cyprinella callisema*				
163765	163772	Alabama shiner	*Cyprinella callistia*				
163765	163774	Bluestripe shiner	*Cyprinella callitaenia*				
163765	163776	Bluntface shiner	*Cyprinella camura*				
163765	163778	Greenfin shiner	*Cyprinella chloristia*				
163765	163780	Beautiful shiner	*Cyprinella formosa*				
163765	163782	Whitetail shiner	*Cyprinella galactura*				
163765	163784	Tallapoosa shiner	*Cyprinella gibbsi*				
163765	163786	Thicklip chub	*Cyprinella labrosa*				
163765	163788	Bannerfin shiner	*Cyprinella leedsi*				
163765	163790	Plateau shiner	*Cyprinella lepida*				
163765	163792	Red shiner	*Cyprinella lutrensis*	O	I(B,C,D)	T	M(C)
163765	163795	Spotfin chub	*Cyprinella monacha*	I		T	
163765	163797	Whitefin shiner	*Cyprinella nivea*				
163765	163799	Proserpine shiner	*Cyprinella proserpina*				
163765	163801	Fieryblack shiner	*Cyprinella pyrrhomelas*				
163765	163803	Spotfin shiner	*Cyprinella spiloptera*	I		M	T(G)
163765	163806	Tricolor shiner	*Cyprinella trichroistia*				
163765	163809	Blacktail shiner	*Cyprinella venusta*				
163765	163811	Steelcolor shiner	*Cyprinella whipplei*	I		M	I(A)
163765	163814	Altamaha shiner	*Cyprinella xaenura*				
163765	163817	Santee chub	*Cyprinella zanema*				
163343	163344	Common carp	*Cyprinus carpio*	O	G(G)	T	
163512	163514	Devils River minnow	*Dionda diaboli*				
163512	163513	Roundnose minnow	*Dionda episcopa*				
163539	163540	Desert dace	*Eremichthys acros*				
163819	163820	Slender chub	*Erimystax cahni*				
163819	163821	Streamline chub	*Erimystax dissimilis*	I		I	
163819	163822	Ozark chub	*Erimystax harryi*				
163819	163823	Blotched chub	*Erimystax insignis*				
163819	163824	Gravel chub	*Erimystax x-punctatus*	I		M	I(E,G)
163355	163357	Tonguetied minnow	*Exoglossum laurae*	I		I	M(G)
163355	163356	Cutlips minnow	*Exoglossum maxillingua*	I		I	
163541	163542	Alvord chub	*Gila alvordensis*				
163541	163543	Utah chub	*Gila atraria*				
163541	163544	Tui chub	*Gila bicolor*				
163541	163547	Borax Lake chub	*Gila boraxobius*				
163541	163548	Blue chub	*Gila coerulea*				
	163549	Leatherside chub	*Gila copei*				
163541	163550	Thicktail chub	*Gila crassicauda*				
163541	163551	Humpback chub	*Gila cypha*				
163541	163552	Sonora chub	*Gila ditaenia*				
163541	163553	Bonytail	*Gila elegans*				
163541	163560	Gila chub	*Gila intermedia*				
163541	163554	Chihuahua chub	*Gila nigrescens*				
163541	163555	Arroyo chub	*Gila orcutti*				
163541	163556	Rio Grande chub	*Gila pandora*				
163541	163557	Yaqui chub	*Gila purpurea*				

Parent TSN	TSN	Common Name	*Scientific Name*	Trophic	Trophic Exceptions	Tolerance	Tolerance Exceptions
163541	163558	Roundtail chub	*Gila robusta*				
163562	163563	Flame chub	*Hemitremia flammea*				
163564	163565	California roach	*Hesperoleucus symmetricus*				
163358	163365	Rio Grande silvery minnow	*Hybognathus amarus*				
163358	163362	Western silvery minnow	*Hybognathus argyritis*				
163358	163363	Brassy minnow	*Hybognathus hankinsoni*	O	H(E,G)	M	
163358	163364	Cypress minnow	*Hybognathus hayi*	O		M	
163358	163360	Mississippi silvery minnow	*Hybognathus nuchalis*	H	O(D)	M	I(A,E)
163358	163361	Plains minnow	*Hybognathus placitus*				
163358	163359	Eastern silvery minnow	*Hybognathus regius*	H	O(D)	M	I(G)
163690	163691	Silver carp	*Hypophthalmichthys molitrix*	O		T	
163690	163692	Bighead carp	*Hypophthalmichthys nobilis*				
163566	163567	Least chub	*Iotichthys phlegethontis*				
163568	163569	Hitch	*Lavinia exilicauda*				
163570	163571	White River spinedace	*Lepidomeda albivallis*				
163570	163572	Pahranagat spinedace	*Lepidomeda altivelis*				
163570	163573	Virgin spinedace	*Lepidomeda mollispinis*				
163570	163574	Little Colorado spinedace	*Lepidomeda vittata*				
163575	163576	Ide	*Leuciscus idus*				
163825	163826	White shiner	*Luxilus albeolus*				
163825	163828	Cardinal shiner	*Luxilus cardinalis*				
163825	163830	Crescent shiner	*Luxilus cerasinus*				
163825	163832	Striped shiner	*Luxilus chrysocephalus*	I		M	T(G)
163825	163834	Warpaint shiner	*Luxilus coccogenis*				
163825	163836	Common shiner	*Luxilus cornutus*	I	G(G)	M	
163825	163838	Duskystripe shiner	*Luxilus pilsbryi*				
163825	163840	Bleeding shiner	*Luxilus zonatus*				
163825	163843	Bandfin shiner	*Luxilus zonistius*				
163846	163847	Rosefin shiner	*Lythrurus ardens*	I		M	
163846	163849	Blacktip shiner	*Lythrurus atrapiculus*				
163846	163851	Pretty shiner	*Lythrurus bellus*				
163846	163853	Ribbon shiner	*Lythrurus fumeus*	I		M	
163846	163855	Mountain shiner	*Lythrurus lirus*				
163846	163857	Cherryfin shiner	*Lythrurus roseipinnis*				
163846	163859	Ouachita shiner	*Lythrurus snelsoni*				
163846	163861	Redfin shiner	*Lythrurus umbratilis*	I		M	T(G)
163863	163864	Speckled chub	*Macrhybopsis aestivalis*	I		I	
163863	163866	Sturgeon chub	*Macrhybopsis gelida*				
163863	163868	Sicklefin chub	*Macrhybopsis meeki*				
163863	163870	Silver chub	*Macrhybopsis storeriana*	I		M	I(G)
163872	163873	Pearl dace	*Margariscus margarita*	I	G(G)	M	
163582	163583	Spikedace	*Meda fulgida*				
163584	163585	Moapa dace	*Moapa coriacea*				
163520	163521	Peamouth	*Mylocheilus caurinus*	I		M	
163586	163587	Hardhead	*Mylopharodon conocephalus*				

Parent TSN	TSN	Common Name	*Scientific Name*	Trophic	Trophic Exceptions	Tolerance	Tolerance Exceptions
163391	163394	Redspot chub	*Nocomis asper*				
163391	163395	Hornyhead chub	*Nocomis biguttatus*	I	G(G)	I	M(G)
163391	163396	Redtail chub	*Nocomis effusus*				
163391	163393	Bluehead chub	*Nocomis leptocephalus*				
163391	163392	River chub	*Nocomis micropogon*	I	G(G)	I	M(F,G)
163391	163397	Bigmouth chub	*Nocomis platyrhynchus*				
163391	163398	Bull chub	*Nocomis raneyi*				
163367	163368	Golden shiner	*Notemigonus crysoleucas*	O	I(B,D),G(F,G)	T	
163399	163422	Whitemouth shiner	*Notropis alborus*				
163399	163423	Highfin shiner	*Notropis altipinnis*				
163399	163410	Texas shiner	*Notropis amabilis*				
163399	163475	Bigeye chub	*Notropis amblops*	I		I	M(G)
163399	163477	Orangefin shiner	*Notropis ammophilus*				
	163411	Pallid shiner	*Notropis amnis*	I		I	
163399	163401	Comely shiner	*Notropis amoenus*	I		T	
163399	163424	Pugnose shiner	*Notropis anogenus*	I	H(E)	I	
163399	163425	Popeye shiner	*Notropis ariommus*	I		I	
163399	163426	Burrhead shiner	*Notropis asperifrons*				
163399	163412	Emerald shiner	*Notropis atherinoides*	I		M	
163399	163413	Blackspot shiner	*Notropis atrocaudalis*				
163399	163427	Rough shiner	*Notropis baileyi*				
163399	163428	Red River shiner	*Notropis bairdi*				
163399	163402	Bridle shiner	*Notropis bifrenatus*	I		I	
163399	163429	River shiner	*Notropis blennius*	I		M	
163399	163430	Bigeye shiner	*Notropis boops*	I		I	
163399	163431	Tamaulipas shiner	*Notropis braytoni*				
163399	163478	Silverjaw minnow	*Notropis buccatus*	I		M	T(G)
163399	163432	Smalleye shiner	*Notropis buccula*				
163399	163414	Ghost shiner	*Notropis buchanani*	I		M	I(E)
163399	163480	Cahaba shiner	*Notropis cahabae*				
163399	163433	Silverside shiner	*Notropis candidus*				
163399	163403	Ironcolor shiner	*Notropis chalybaeus*	I		I	M(G)
163399	163434	Chihuahua shiner	*Notropis chihuahua*				
163399	163435	Redlip shiner	*Notropis chiliticus*				
163399	163436	Greenhead shiner	*Notropis chlorocephalus*				
163399	163437	Rainbow shiner	*Notropis chrosomus*				
163399	163438	Dusky shiner	*Notropis cummingsae*				
163399	163439	Bigmouth shiner	*Notropis dorsalis*	I		M	
163399	163440	Fluvial shiner	*Notropis edwardraneyi*				
	163441	Broadstripe shiner	*Notropis euryzonus*				
163399	163442	Arkansas River shiner	*Notropis girardi*				
163399	163443	Wedgespot shiner	*Notropis greenei*				
163399	163444	Redeye chub	*Notropis harperi*				
163399	163445	Blackchin shiner	*Notropis heterodon*	I		I	

Parent TSN	TSN	Common Name	*Scientific Name*	Trophic	Trophic Exceptions	Tolerance	Tolerance Exceptions
163399	163446	Blacknose shiner	*Notropis heterolepis*	I		I	
163399	163447	Bluehead shiner	*Notropis hubbsi*				
163399	163404	Spottail shiner	*Notropis hudsonius*	I	G(F)	M	I(A,E,F)
	163448	Sailfin shiner	*Notropis hypselopterus*				
163399	163449	Highscale shiner	*Notropis hypsilepis*				
163399	163481	Highback chub	*Notropis hypsinotus*				
163399	163450	Rio Grande shiner	*Notropis jemezanus*				
163399	163451	Tennessee shiner	*Notropis leuciodus*				
163399	163483	Lined chub	*Notropis lineapunctatus*				
163399	163452	Longnose shiner	*Notropis longirostris*				
163399	163453	Yellowfin shiner	*Notropis lutipinnis*				
163399	163454	Taillight shiner	*Notropis maculatus*				
163399	163455	Cape Fear shiner	*Notropis mekistocholas*				
163399	163485	Blackmouth shiner	*Notropis melanostomus*				
163399	163456	Ozark minnow	*Notropis nubilus*	H		I	
163399	163486	Phantom shiner	*Notropis orca*				
163399	163457	Kiamichi shiner	*Notropis ortenburgeri*				
163399	163415	Sharpnose shiner	*Notropis oxyrhynchus*				
163399	163458	Ozark shiner	*Notropis ozarcanus*				
163399	163459	Peppered shiner	*Notropis perpallidus*				
163399	163460	Coastal shiner	*Notropis petersoni*				
163399	163461	Silver shiner	*Notropis photogenis*	I		I	T(G)
163399	163416	Chub shiner	*Notropis potteri*				
163399	163407	Swallowtail shiner	*Notropis procne*	I		I	M(G)
163399	163409	Rosyface shiner	*Notropis rubellus*	I		I	
163399	163487	Rosyface chub	*Notropis rubescens*	I		I	
163399	163462	Saffron shiner	*Notropis rubricroceus*				
163399	163490	Bedrock shiner	*Notropis rupestris*				
163399	163463	Sabine shiner	*Notropis sabinae*				
163399	163464	New River shiner	*Notropis scabriceps*				
163399	163465	Sandbar shiner	*Notropis scepticus*				
163399	163466	Roughhead shiner	*Notropis semperasper*				
163399	163417	Silverband shiner	*Notropis shumardi*				
	163467	Flagfin shiner	*Notropis signipinnis*				
163399	163418	Bluntnose shiner	*Notropis simus*				
163399	163468	Mirror shiner	*Notropis spectrunculus*				
163399	163469	Silverstripe shiner	*Notropis stilbius*				
163399	163419	Sand shiner	*Notropis stramineus*	I	G(G)	M	
163399	163470	Telescope shiner	*Notropis telescopus*				
163399	163420	Weed shiner	*Notropis texanus*	I	H(E)	I	
163399	163471	Topeka shiner	*Notropis topeka*				
163399	163472	Skygazer shiner	*Notropis uranoscopus*				
163399	163421	Mimic shiner	*Notropis volucellus*	I	G(G)	I	M(G)
	163473	Bluenose shiner	*Notropis welaka*				
163399	163491	Channel shiner	*Notropis wickliffi*	I		M	

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163399	163493	Clear chub	*Notropis winchelli*				
163399	163474	Coosa shiner	*Notropis xaenocephalus*				
163875	163876	Pugnose minnow	*Opsopoeodus emiliae*	I		I	
163878	163879	Oregon chub	*Oregonichthys crameri*				
163588	163589	Sacramento blackfish	*Orthodon microlepidotus*				
163501	163503	Riffle minnow	*Phenacobius catostomus*				
163501	163504	Fatlips minnow	*Phenacobius crassilabrum*				
163501	163502	Suckermouth minnow	*Phenacobius mirabilis*	I		M	
163501	163505	Kanawha minnow	*Phenacobius teretulus*				
163501	163506	Stargazing minnow	*Phenacobius uranops*				
163590	163591	Blackside dace	*Phoxinus cumberlandensis*				
163590	163592	Northern redbelly dace	*Phoxinus eos*	H	G(G)	M	
163590	163593	Southern redbelly dace	*Phoxinus erythrogaster*	H		M	I(A)
163590	163594	Finescale dace	*Phoxinus neogaeus*	I	G(G)	M	
163590	163595	Mountain redbelly dace	*Phoxinus oreas*				
163590	163598	Tennessee dace	*Phoxinus tennesseensis*				
163515	163516	Bluntnose minnow	*Pimephales notatus*	O	G(G)	T	
163515	163517	Fathead minnow	*Pimephales promelas*	O	G(F,G)	T	
163515	163519	Slim minnow	*Pimephales tenellus*				
163515	163518	Bullhead minnow	*Pimephales vigilax*	O		M	
163599	163600	Woundfin	*Plagopterus argentissimus*				
163881	163882	Flathead chub	*Platygobio gracilis*				
163601	163602	Clear Lake splittail	*Pogonichthys ciscoides*				
163601	163603	Splittail	*Pogonichthys macrolepidotus*				
163522	163524	Sacramento squawfish	*Ptychocheilus grandis*				
163522	163525	Colorado squawfish	*Ptychocheilus lucius*				
163522	163523	Northern squawfish	*Ptychocheilus oregonensis*	P		T	
163522	163526	Umpqua squawfish	*Ptychocheilus umpquae*				
163604	163605	Relict dace	*Relictus solitarius*				
163381	163382	Blacknose dace	*Rhinichthys atratulus*	G	I(A)	T	
163381	163384	Longnose dace	*Rhinichthys cataractae*	I		I	M(G)
163381	163388	Loach minnow	*Rhinichthys cobitis*				
163381	163390	Las Vegas dace	*Rhinichthys deaconi*				
163381	163385	Umpqua dace	*Rhinichthys evermanni*				
163381	163386	Leopard dace	*Rhinichthys falcatus*	I		M	
163381	163387	Speckled dace	*Rhinichthys osculus*	I		M	
163606	163607	Bitterling	*Rhodeus sericeus*				
163527	163528	Redside shiner	*Richardsonius balteatus*				
163527	163529	Lahontan redside	*Richardsonius egregius*				
163612	163613	Rudd	*Scardinius erythrophthalmus*	O	I(G)	T	
163374	163376	Creek chub	*Semotilus atromaculatus*	G	I(A)	T	
163374	163375	Fallfish	*Semotilus corporalis*	G		M	
163374	163377	Sandhills chub	*Semotilus lumbee*				
163374	163379	Dixie chub	*Semotilus thoreauianus*				

Parent TSN	TSN	Common Name	*Scientific Name*	Trophic	Trophic Exceptions	Tolerance	Tolerance Exceptions
163347	163348	Tench	*Tinca tinca*				
163341	**163892**	**Suckers**	***Catostomidae***				
163916	163919	River carpsucker	*Carpiodes carpio*	O		M	
163916	163917	Quillback	*Carpiodes cyprinus*	O	G(G)	M	T(G)
163916	163920	Highfin carpsucker	*Carpiodes velifer*	O		I	M(C)
163893	163899	Utah sucker	*Catostomus ardens*				
163893	163900	Yaqui sucker	*Catostomus bernardini*				
163893	163894	Longnose sucker	*Catostomus catostomus*	I		M	I(G)
163893	163901	Desert sucker	*Catostomus clarki*				
163893	163897	Bridgelip sucker	*Catostomus columbianus*				
163893	163895	White sucker	*Catostomus commersoni*	O	I(A)G(F,G)	T	
163893	163902	Bluehead sucker	*Catostomus discobolus*				
163893	163904	Owens sucker	*Catostomus fumeiventris*				
163893	163905	Sonora sucker	*Catostomus insignis*				
163893	163906	Flannelmouth sucker	*Catostomus latipinnis*				
163893	163896	Largescale sucker	*Catostomus macrocheilus*	O		T	
163893	163907	Modoc sucker	*Catostomus microps*				
163893	163908	Sacramento sucker	*Catostomus occidentalis*				
163893	163909	Mountain sucker	*Catostomus platyrhynchus*	H		M	
163893	163910	Rio Grande sucker	*Catostomus plebeius*				
163893	163911	Klamath smallscale sucker	*Catostomus rimiculus*				
163893	163912	Santa Ana sucker	*Catostomus santaanae*				
163893	163913	Klamath largescale sucker	*Catostomus snyderi*				
163893	163914	Tahoe sucker	*Catostomus tahoensis*				
163893	163915	Warner sucker	*Catostomus warnerensis*				
163960	163961	Shortnose sucker	*Chasmistes brevirostris*				
163960	163962	Cui-ui	*Chasmistes cujus*				
163960	163963	June sucker	*Chasmistes liorus*				
163960	163964	Snake River sucker	*Chasmistes muriei*				
163952	163953	Blue sucker	*Cycleptus elongatus*	I	O(A)	I	
163969	163970	Lost River sucker	*Deltistes luxatus*				
163921	163924	Creek chubsucker	*Erimyzon oblongus*	I	O(F),G(G)	M	T(F),I(G)
163921	163922	Lake chubsucker	*Erimyzon sucetta*	I		M	
163921	163926	Sharpfin chubsucker	*Erimyzon tenuis*				
163948	163950	Alabama hog sucker	*Hypentelium etowanum*				
163948	163949	Northern hog sucker	*Hypentelium nigricans*	I	G(G)	I	M(B,D,G)
163948	163951	Roanoke hog sucker	*Hypentelium roanokense*				
163954	163955	Smallmouth buffalo	*Ictiobus bubalus*	I		M	I(E)
163954	163956	Bigmouth buffalo	*Ictiobus cyprinellus*	I	P(A)	M	
163954	163957	Black buffalo	*Ictiobus niger*	I		M	I(E)
163965	163966	Harelip sucker	*Lagochila lacera*	I		I	
163958	163959	Spotted sucker	*Minytrema melanops*	I		M	I(A,E)
163927	163933	Silver redhorse	*Moxostoma anisurum*	I		M	
	163934	Bigeye jumprock	*Moxostoma ariommum*				
	163935	Blackfin sucker	*Moxostoma atripinne*				

Parent TSN	TSN	Common Name	*Scientific Name*	Trophic	Trophic Exceptions	Tolerance	Tolerance Exceptions
163927	163936	River redhorse	*Moxostoma carinatum*	I		I	
163927	163937	Black jumprock	*Moxostoma cervinum*				
	163931	Gray redhorse	*Moxostoma congestum*				
163927	163938	Black redhorse	*Moxostoma duquesnei*	I	G(G)	I	
163927	163939	Golden redhorse	*Moxostoma erythrurum*	I		M	I(G)
	163940	Rustyside sucker	*Moxostoma hamiltoni*				
163927	163941	Copper redhorse	*Moxostoma hubbsi*				
	163942	Greater jumprock	*Moxostoma lachneri*	I		I	
163927	163928	Shorthead redhorse	*Moxostoma macrolepidotum*	I		M	
163927	163943	V-lip redhorse	*Moxostoma pappillosum*				
163927	163932	Blacktail redhorse	*Moxostoma poecilurum*				
	163944	Torrent sucker	*Moxostoma rhothoecum*				
163927	163945	Smallfin redhorse	*Moxostoma robustum*				
	163946	Striped jumprock	*Moxostoma rupiscartes*				
163927	163947	Greater redhorse	*Moxostoma valenciennesi*	I		I	
163967	163968	Razorback sucker	*Xyrauchen texanus*				
163992	**163995**	**Bullhead catfishes**	***Ictaluridae***				
164034	164035	Snail bullhead	*Ameiurus brunneus*				
164034	164037	White catfish	*Ameiurus catus*	I	P(G)	M	
164034	164039	Black bullhead	*Ameiurus melas*	I		M	T(D)
164034	164041	Yellow bullhead	*Ameiurus natalis*	I	O(F),G(G)	T	M(D)
164034	164043	Brown bullhead	*Ameiurus nebulosus*	I	G(F,G)	T	M(D)
164034	164045	Flat bullhead	*Ameiurus platycephalus*				
164034	164047	Spotted bullhead	*Ameiurus serracanthus*				
163996	163997	Blue catfish	*Ictalurus furcatus*	P	I(A)	M	
163996	164001	Headwater catfish	*Ictalurus lupus*				
163996	164000	Yaqui catfish	*Ictalurus pricei*				
163996	163998	Channel catfish	*Ictalurus punctatus*	P	I(A),G(C)	M	
164002	164006	Ozark madtom	*Noturus albater*				
164002	164007	Smoky madtom	*Noturus baileyi*				
164002	164008	Elegant madtom	*Noturus elegans*				
164002	164009	Mountain madtom	*Noturus eleutherus*	I		I	
164002	164010	Slender madtom	*Noturus exilis*	I		I	
164002	164011	Checkered madtom	*Noturus flavater*				
164002	164012	Yellowfin madtom	*Noturus flavipinnis*				
164002	164013	Stonecat	*Noturus flavus*	I		I	M(G)
164002	164014	Black madtom	*Noturus funebris*				
164002	164015	Carolina madtom	*Noturus furiosus*				
164002	164016	Orangefin madtom	*Noturus gilberti*				
164002	164003	Tadpole madtom	*Noturus gyrinus*	I		M	I(A)
164002	164017	Least madtom	*Noturus hildebrandi*				
164002	164004	Margined madtom	*Noturus insignis*	I		M	
164002	164018	Ouachita madtom	*Noturus lachneri*				
164002	164019	Speckled madtom	*Noturus leptacanthus*				

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164002	164020	Brindled madtom	*Noturus miurus*	I		I	M(G)
164002	164021	Frecklebelly madtom	*Noturus munitus*				
164002	164005	Freckled madtom	*Noturus nocturnus*	I		M	I(D)
164002	164022	Brown madtom	*Noturus phaeus*				
164002	164023	Neosho madtom	*Noturus placidus*				
164002	164024	Pygmy madtom	*Noturus stanauli*				
164002	164025	Northern madtom	*Noturus stigmosus*	I		I	
164002	164026	Caddo madtom	*Noturus taylori*				
164002	164027	Scioto madtom	*Noturus trautmani*	I		I	
164028	164029	Flathead catfish	*Pylodictis olivaris*	P		M	
164030	164031	Widemouth blindcat	*Satan eurystomus*				
164032	164033	Toothless blindcat	*Trogloglanis pattersoni*				
162136	**162137**	**Pikes**	***Esocidae***				
162140	162141	Redfin pickerel	*Esox americanus americanus*	P		M	
162140	162142	Grass pickerel	*Esox americanus vermiculatus*	P		M	
162138	162139	Northern pike	*Esox lucius*	P		M	I(G)
162138	162144	Muskellunge	*Esox masquinongy*	P		M	I(E,G)
162138	162143	Chain pickerel	*Esox niger*	P		M	
162136	**162146**	**Mudminnows**	***Umbridae***				
162158	162159	Alaska blackfish	*Dallia pectoralis*				
162160	162161	Olympic mudminnow	*Novumbra hubbsi*				
162147	162153	Central mudminnow	*Umbra limi*	I	O(A,D),G(G)	T	
162147	162148	Eastern mudminnow	*Umbra pygmaea*	G		T	
161930	**162028**	**Smelts**	***Osmeridae***				
162052	162053	Whitebait smelt	*Allosmerus elongatus*				
162029	162033	Wakasagi	*Hypomesus nipponensis*				
162029	162031	Pond smelt	*Hypomesus olidus*				
162029	162030	Surf smelt	*Hypomesus pretiosus*				
162029	162032	Delta smelt	*Hypomesus transpacificus*				
162034	162035	Capelin	*Mallotus villosus*				
162038	162041	Rainbow smelt	*Osmerus mordax*	V	F(E),G(G)	M	I(G)
162047	162048	Night smelt	*Spirinchus starksi*				
162047	162049	Longfin smelt	*Spirinchus thaleichthys*				
162050	162051	Eulachon	*Thaleichthys pacificus*				
161930	**161931**	**Trouts**	***Salmonidae***				
161932	161942	Cisco or Lake herring	*Coregonus artedi*	F		M	I(G)
161932	161933	Arctic cisco	*Coregonus autumnalis*				
161932	161941	Lake whitefish	*Coregonus clupeaformis*	V	P(C),I(E,G)	M	I(G)
161932	161943	Bloater	*Coregonus hoyi*	F		M	
161932	161973	Atlantic whitefish	*Coregonus huntsmani*				
161932	161944	Deepwater cisco	*Coregonus johannae*	F		M	
161932	161945	Kiyi	*Coregonus kiyi*	F		M	
161932	161935	Bering cisco	*Coregonus laurettae*				
161932	161936	Broad whitefish	*Coregonus nasus*				
161932	161946	Blackfin cisco	*Coregonus nigripinnis*	F		I	

Parent TSN	TSN	Common Name	*Scientific Name*	Trophic	Trophic Exceptions	Tolerance	Tolerance Exceptions
161932	161937	Humpback whitefish	*Coregonus pidschian*				
161932	161947	Shortnose cisco	*Coregonus reighardi*	F		I	
161932	161938	Least cisco	*Coregonus sardinella*				
161932	161948	Shortjaw cisco	*Coregonus zenithicus*	F		M	
161974	161987	Golden trout	*Oncorhynchus aguabonita*				
161974	161981	Apache trout	*Oncorhynchus apache*				
161974	161983	Cutthroat trout	*Oncorhynchus clarki*	I		I	
161974	161985	Gila trout	*Oncorhynchus gilae*				
161974	161975	Pink salmon	*Oncorhynchus gorbuscha*	P		M	
161974	161976	Chum salmon	*Oncorhynchus keta*				
161974	161977	Coho salmon	*Oncorhynchus kisutch*	P		M	
161974	161989	Rainbow trout	*Oncorhynchus mykiss*	P	I(C)	M	I(C,G)
161974	161979	Sockeye salmon	*Oncorhynchus nerka*				
161974	161980	Chinook salmon	*Oncorhynchus tshawytscha*	P		M	
162007	162012	Bear Lake whitefish	*Prosopium abyssicola*				
162007	162011	Pygmy whitefish	*Prosopium coulteri*	I		M	
162007	162008	Round whitefish	*Prosopium cylindraceum*	I		M	I(G)
162007	162013	Bonneville cisco	*Prosopium gemmifer*				
162007	162010	Bonneville whitefish	*Prosopium spilonotus*				
162007	162009	Mountain whitefish	*Prosopium williamsoni*	I		I	
161994	161996	Atlantic salmon	*Salmo salar*	P		M	I(G)
161994	161997	Brown trout	*Salmo trutta*	P	I(C)	M	I(G)
161999	162001	Arctic char	*Salvelinus alpinus*	P		I	
161999	162004	Bull trout	*Salvelinus confluentus*				
161999	162003	Brook trout	*Salvelinus fontinalis*	P	I(C)	M	I(E,G)
161999	162000	Dolly Varden	*Salvelinus malma*				
161999	162002	Lake trout	*Salvelinus namaycush*	P		M	I(G)
162005	162006	Inconnu	*Stenodus leucichthys*				
162015	162016	Arctic grayling	*Thymallus arcticus*				
164406	**164407**	**Trout-Perches**	***Percopsidae***				
164408	164409	Trout-perch	*Percopsis omiscomaycus*	I		M	
164408	164410	Sand roller	*Percopsis transmontana*	I		M	
164402	**164403**	**Pirate Perches**	***Aphredoderidae***				
164404	164405	Pirate perch	*Aphredoderus sayanus*	I		M	
164669	**164701**	**Cods**	***Gadidae***				
164724	164725	Burbot	*Lota lota*	P		M	
165614	**165629**	**Killifishes**	***Cyprinodontidae***				
165681	165682	Diamond killifish	*Adinia xenica*				
165686	165687	White River springfish	*Crenichthys baileyi*				
165686	165688	Railroad Valley springfish	*Crenichthys nevadae*				
165630	165632	Leon Springs pupfish	*Cyprinodon bovinus*				
165630	165633	Devils Hole pupfish	*Cyprinodon diabolis*				
165630	165634	Comanche Springs pupfish	*Cyprinodon elegans*				
165630	165635	Conchos pupfish	*Cyprinodon eximius*				

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165630	165636	Lake Eustis minnow	*Cyprinodon hubbsi*				
165630	165637	Desert pupfish	*Cyprinodon macularius*				
165630	165638	Amargosa pupfish	*Cyprinodon nevadensis*				
165630	165639	Pecos pupfish	*Cyprinodon pecosensis*				
165630	165640	Owens pupfish	*Cyprinodon radiosus*				
165630	165641	Red River pupfish	*Cyprinodon rubrofluviatilis*				
165630	165642	Salt Creek pupfish	*Cyprinodon salinus*				
165630	165643	White Sands pupfish	*Cyprinodon tularosa*				
165630	165631	Sheepshead minnow	*Cyprinodon variegatus*				
165690	165691	Pahrump poolfish	*Empetrichthys latos*				
165690	165692	Ash Meadows poolfish	*Empetrichthys merriami*				
165684	165685	Goldspotted killifish	*Floridichthys carpio*				
165644	165659	Whiteline topminnow	*Fundulus albolineatus*				
165644	165671	Stippled studfish	*Fundulus bifax*				
165644	165660	Northern studfish	*Fundulus catenatus*	I		I	
165644	165652	Golden topminnow	*Fundulus chrysotus*				
165644	165661	Banded topminnow	*Fundulus cingulatus*				
165644	165645	Marsh killifish	*Fundulus confluentus*				
165644	165646	Banded killifish	*Fundulus diaphanus*	I		T	M(D,F)
165644	165672	Starhead topminnow	*Fundulus dispar*	I		I	
165644	165675	Russetfin topminnow	*Fundulus escambiae*				
165644	165676	Broadstripe topminnow	*Fundulus euryzonus*				
165644	165651	Gulf killifish	*Fundulus grandis*				
165644	165647	Mummichog	*Fundulus heteroclitus*	G		M	T(G)
165644	165653	Saltmarsh topminnow	*Fundulus jenkinsi*				
165644	165677	Barrens topminnow	*Fundulus julisia*				
165644	165662	Lined topminnow	*Fundulus lineolatus*				
165644	165648	Spotfin killifish	*Fundulus luciae*				
165644	165649	Striped killifish	*Fundulus majalis*				
165644	165663	Blackstripe topminnow	*Fundulus notatus*	I		M	
165644	165664	Bayou topminnow	*Fundulus notti*				
165644	165655	Blackspotted topminnow	*Fundulus olivaceus*	I		M	
165644	165650	California killifish	*Fundulus parvipinnis*				
165644	165656	Bayou killifish	*Fundulus pulvereus*				
165644	165665	Speckled killifish	*Fundulus rathbuni*				
165644	165666	Plains topminnow	*Fundulus sciadicus*				
165644	165667	Seminole killifish	*Fundulus seminolis*				
165644	165657	Longnose killifish	*Fundulus similis*				
165644	165668	Southern studfish	*Fundulus stellifer*				
165644	165669	Waccamaw killifish	*Fundulus waccamensis*				
165644	165658	Plains killifish	*Fundulus zebrinus*				
165693	165694	Flagfish	*Jordanella floridae*				
165695	165696	Pygmy killifish	*Leptolucania ommata*				
165678	165680	Bluefin killifish	*Lucania goodei*				
165678	165679	Rainwater killifish	*Lucania parva*				

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165614	**165876**	**Livebearers**	***Poeciliidae***				
165912	165913	Pike killifish	*Belonesox belizanus*				
165877	165878	Western mosquitofish	*Gambusia affinis*	I		M	T(G)
165877	165883	Amistad gambusia	*Gambusia amistadensis*				
165877	165884	Big Bend gambusia	*Gambusia gaigei*				
165877	165885	Largespring gambusia	*Gambusia geiseri*				
165877	165886	San Marcos gambusia	*Gambusia georgei*				
165877	165887	Clear Creek gambusia	*Gambusia heterochir*				
165877	165896	Eastern mosquitofish	*Gambusia holbrooki*	I	G(F)	M	T(G)
165877	165888	Pecos gambusia	*Gambusia nobilis*				
165877	165882	Mangrove gambusia	*Gambusia rhizophorae*				
165877	165889	Blotched gambusia	*Gambusia senilis*				
165914	165915	Least killifish	*Heterandria formosa*				
165897	165899	Amazon molly	*Poecilia formosa*				
165897	165898	Sailfin molly	*Poecilia latipinna*				
165897	165902	Shortfin molly	*Poecilia mexicana*				
165897	165903	Guppy	*Poecilia reticulata*				
165916	165917	Porthole livebearer	*Poeciliopsis gracilis*				
165916	165918	Gila topminnow	*Poeciliopsis occidentalis*				
165919	165920	Green swordtail	*Xiphophorus helleri*				
165919	165922	Southern platyfish	*Xiphophorus maculatus*				
165919	165925	Variable platyfish	*Xiphophorus variatus*				
165973	**165984**	**Silversides**	***Atherinidae***				
166005	166006	Hardhead silverside	*Atherinomorus stipes*				
165985	165986	Topsmelt	*Atherinops affinis*				
166011	166012	Jacksmelt	*Atherinopsis californiensis*				
166037	166038	Reef silverside	*Hypoatherina harringtonensis*				
166015	166016	Brook silverside	*Labidesthes sicculus*	I		M	I(G)
166013	166014	California grunion	*Leuresthes tenuis*				
165988	165989	Rough silverside	*Membras martinica*				
165992	165993	Inland silverside	*Menidia beryllina*				
165992	166000	Texas silverside	*Menidia clarkhubbsi*				
165992	165995	Key silverside	*Menidia conchorum*				
165992	165997	Waccamaw silverside	*Menidia extensa*				
165992	165994	Atlantic silverside	*Menidia menidia*				
165992	165996	Tidewater silverside	*Menidia peninsulae*				
166362	**166363**	**Sticklebacks**	***Gasterosteidae***				
166396	166397	Fourspine stickleback	*Apeltes quadracus*	I		M	
166403	166404	Tube-snout	*Aulorhynchus flavidus*				
166398	166399	Brook stickleback	*Culaea inconstans*	I		M	I(G)
166364	166365	Threespine stickleback	*Gasterosteus aculeatus*	I		M	
166364	166385	Blackspotted stickleback	*Gasterosteus wheatlandi*				
166386	166387	Ninespine stickleback	*Pungitius pungitius*	I		M	
167185	**167196**	**Sculpins**	***Cottidae***				

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167229	167230	Coastrange sculpin	*Cottus aleuticus*				
167229	167233	Prickly sculpin	*Cottus asper*	I		M	
167229	167235	Rough sculpin	*Cottus asperrimus*				
167229	167236	Black sculpin	*Cottus baileyi*				
167229	167237	Mottled sculpin	*Cottus bairdi*	I		I	M(C,D,G)
167229	167238	Paiute sculpin	*Cottus beldingi*	I		I	
167229	167239	Banded sculpin	*Cottus carolinae*	I		M	
167229	167232	Slimy sculpin	*Cottus cognatus*	I		M	I(E,G)
167229	167240	Shorthead sculpin	*Cottus confusus*				
167229	167241	Utah Lake sculpin	*Cottus echinatus*				
167229	167242	Bear Lake sculpin	*Cottus extensus*				
167229	167243	Potomac sculpin	*Cottus girardi*				
167229	167244	Shoshone sculpin	*Cottus greenei*				
167229	167234	Riffle sculpin	*Cottus gulosus*				
167229	167263	Ozark sculpin	*Cottus hypselurus*				
167229	167245	Marbled sculpin	*Cottus klamathensis*				
167229	167246	Wood River sculpin	*Cottus leiopomus*				
167229	167247	Margined sculpin	*Cottus marginatus*				
167229	167248	Reticulate sculpin	*Cottus perplexus*	I		T	
167229	167249	Pit sculpin	*Cottus pitensis*				
167229	167250	Klamath Lake sculpin	*Cottus princeps*				
167229	167251	Pygmy sculpin	*Cottus pygmaeus*				
167229	167252	Torrent sculpin	*Cottus rhotheus*	I		I	
167229	167253	Spoonhead sculpin	*Cottus ricei*	I		M	I(E)
167229	167254	Slender sculpin	*Cottus tenuis*				
167311	167323	Deepwater sculpin	*Myoxocephalus thompsoni*	I		M	I(E)
167641	**170315**	**Temperate Basses**	***Percichthyidae***				
167676	167678	White perch	*Morone americana*	P	I(E)	M	
167676	167682	White bass	*Morone chrysops*	P	I(A)	M	T(G)
167676	167683	Yellow bass	*Morone mississippiensis*	P	I(A)	M	
167676	167680	Striped bass	*Morone saxatilis*	P		M	I(G)
167913	167914	Wreckfish	*Polyprion americanus*				
167917	167918	Giant sea bass	*Stereolepis gigas*				
168334	168335	Blackmouth bass	*Synagrops bellus*				
168334	168337	Keelcheek bass	*Synagrops spinosus*				
167641	**168093**	**Sunfishes**	***Centrarchidae***				
168094	168095	Mud sunfish	*Acantharchus pomotis*	I		M	
168096	168099	Shadow bass	*Ambloplites ariommus*				
168096	168098	Roanoke bass	*Ambloplites cavifrons*				
168096	168100	Ozark bass	*Ambloplites constellatus*				
168096	168097	Rock bass	*Ambloplites rupestris*	P	I (A)	M	I(A,E)
168174	168175	Sacramento perch	*Archoplites interruptus*				
168101	168102	Flier	*Centrarchus macropterus*	I		M	
168168	168172	Carolina pygmy sunfish	*Elassoma boehlkei*				
168168	168169	Everglades pygmy sunfish	*Elassoma evergladei*				

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168168	168173	Bluebarred pygmy sunfish	*Elassoma okatie*				
168168	168170	Okefenokee pygmy sunfish	*Elassoma okefenokee*				
168168	168171	Banded pygmy sunfish	*Elassoma zonatum*	I		M	
168107	168108	Blackbanded sunfish	*Enneacanthus chaetodon*	I		I	
168107	168113	Bluespotted sunfish	*Enneacanthus gloriosus*	I		M	I(G)
168107	168117	Banded sunfish	*Enneacanthus obesus*	I		M	I(G)
168130	168131	Redbreast sunfish	*Lepomis auritus*	I	G(G)	M	
168130	168132	Green sunfish	*Lepomis cyanellus*	I	V(C)P(A,F),G(G)	T	M(A)
168130	168144	Pumpkinseed	*Lepomis gibbosus*	I	P(F),G(G)	M	
	168138	Warmouth	*Lepomis gulosus*	P	V(C)	M	
168130	168151	Orangespotted sunfish	*Lepomis humilis*	I		M	
168130	168141	Bluegill	*Lepomis macrochirus*	I	G(G)	M	T(C,G)
168130	168152	Dollar sunfish	*Lepomis marginatus*				
168130	168153	Longear sunfish	*Lepomis megalotis*	I		I	M(A,C)
168130	168154	Redear sunfish	*Lepomis microlophus*	I		M	
168130	168155	Spotted sunfish	*Lepomis punctatus*	I		M	
168130	168156	Bantam sunfish	*Lepomis symmetricus*	I		M	
168158	168163	Redeye bass	*Micropterus coosae*				
168158	550562	Smallmouth bass	*Micropterus dolomieu*	P	I(A)	M	I(E)
168158	168164	Suwannee bass	*Micropterus notius*				
168158	168161	Spotted bass	*Micropterus punctulatus*	P		M	
168158	168160	Largemouth bass	*Micropterus salmoides*	P	I(A)	M	T(C)
168158	168162	Guadalupe bass	*Micropterus treculi*				
168165	168166	White crappie	*Pomoxis annularis*	P	I(A,C),V(C)	M	T(C,G)
168165	168167	Black crappie	*Pomoxis nigromaculatus*	P	I(A),V(C)	M	
167641	**168356**	**Perches**	***Percidae***				
	168512	Crystal darter	*Ammocrypta asprella*	I		I	
168511	168513	Naked sand darter	*Ammocrypta beani*				
168511	168514	Florida sand darter	*Ammocrypta bifascia*				
168511	168515	Western sand darter	*Ammocrypta clara*	I		I	M(E)
168511	168516	Southern sand darter	*Ammocrypta meridiana*				
168511	168517	Eastern sand darter	*Ammocrypta pellucida*	I		I	
168511	168518	Scaly sand darter	*Ammocrypta vivax*				
168357	168370	Sharphead darter	*Etheostoma acuticeps*				
168357	168371	Coppercheek darter	*Etheostoma aquali*				
168357	168372	Mud darter	*Etheostoma asprigene*	I		M	
168357	168452	Emerald darter	*Etheostoma baileyi*				
168357	168373	Teardrop darter	*Etheostoma barbouri*				
168357	168453	Splendid darter	*Etheostoma barrenense*				
168357	168374	Orangefin darter	*Etheostoma bellum*				
168357	168375	Greenside darter	*Etheostoma blennioides*	I		M	I(G)
168357	168376	Blenny darter	*Etheostoma blennius*				
168357	168377	Slackwater darter	*Etheostoma boschungi*				
168357	168378	Rainbow darter	*Etheostoma caeruleum*	I		M	I(E,G)

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168357	168379	Bluebreast darter	*Etheostoma camurum*	I		I	
168357	168380	Greenfin darter	*Etheostoma chlorobranchium*				
168357	168365	Bluntnose darter	*Etheostoma chlorosomum*	I		M	
168357	168381	Ashy darter	*Etheostoma cinereum*				
168357	168382	Creole darter	*Etheostoma colletti*				
168357	168383	Carolina darter	*Etheostoma collis*				
168357	168385	Coosa darter	*Etheostoma coosae*				
168357	168386	Arkansas darter	*Etheostoma cragini*				
168357	168454	Fringed darter	*Etheostoma crossopterum*				
168357	168387	Choctawhatchee darter	*Etheostoma davisoni*				
168357	168388	Coldwater darter	*Etheostoma ditrema*				
168357	168389	Black darter	*Etheostoma duryi*				
168357	168390	Brown darter	*Etheostoma edwini*				
168357	168391	Cherry darter	*Etheostoma etnieri*				
168357	168392	Arkansas saddled darter	*Etheostoma euzonum*				
168357	168393	Iowa darter	*Etheostoma exile*	I		M	I(E)
168357	168394	Fantail darter	*Etheostoma flabellare*	I		M	
168357	168455	Saffron darter	*Etheostoma flavum*				
168357	168395	Fountain darter	*Etheostoma fonticola*				
168357	168396	Savannah darter	*Etheostoma fricksium*				
168357	168358	Swamp darter	*Etheostoma fusiforme*	I		M	I(G)
168357	168366	Slough darter	*Etheostoma gracile*	I		M	
168357	168397	Rio Grande darter	*Etheostoma grahami*				
168357	168398	Harlequin darter	*Etheostoma histrio*	I		I	
168357	168399	Christmas darter	*Etheostoma hopkinsi*				
168357	168400	Turquoise darter	*Etheostoma inscriptum*				
168357	168401	Blueside darter	*Etheostoma jessiae*				
168357	168402	Greenbreast darter	*Etheostoma jordani*				
168357	168403	Yoke darter	*Etheostoma juliae*				
168357	168404	Kanawha darter	*Etheostoma kanawhae*				
168357	168405	Stripetail darter	*Etheostoma kennicotti*	I		M	
168357	168367	Greenthroat darter	*Etheostoma lepidum*				
168357	168406	Longfin darter	*Etheostoma longimanum*				
168357	168407	Redband darter	*Etheostoma luteovinctum*				
168357	168456	Brighteye darter	*Etheostoma lynceum*				
168357	168408	Spotted darter	*Etheostoma maculatum*	I		I	
168357	168409	Pinewoods darter	*Etheostoma mariae*				
168357	168410	Smallscale darter	*Etheostoma microlepidum*				
168357	168411	Least darter	*Etheostoma microperca*	I		M	I(E)
168357	168412	Yellowcheek darter	*Etheostoma moorei*				
168357	168413	Lollipop darter	*Etheostoma neopterum*				
168357	168414	Niangua darter	*Etheostoma nianguae*				
168357	168458	Blackfin darter	*Etheostoma nigripinne*				
168357	168369	Johnny darter	*Etheostoma nigrum*	I		M	
168357	168415	Watercress darter	*Etheostoma nuchale*				

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168357	168416	Barcheek darter	*Etheostoma obeyense*				
168357	168417	Okaloosa darter	*Etheostoma okaloosae*				
168357	168418	Sooty darter	*Etheostoma olivaceum*				
168357	168360	Tessellated darter	*Etheostoma olmstedi*	I		M	
168357	168419	Candy darter	*Etheostoma osburni*				
168357	168420	Paleback darter	*Etheostoma pallididorsum*				
168357	168421	Goldstripe darter	*Etheostoma parvipinne*				
168357	168422	Waccamaw darter	*Etheostoma perlongum*				
168357	168423	Riverweed darter	*Etheostoma podostemone*				
168357	168424	Cypress darter	*Etheostoma proeliare*				
168357	168425	Stippled darter	*Etheostoma punctulatum*				
168357	168459	Firebelly darter	*Etheostoma pyrrhogaster*				
168357	168426	Orangebelly darter	*Etheostoma radiosum*				
168357	168460	Kentucky darter	*Etheostoma rafinesquei*				
168357	168427	Bayou darter	*Etheostoma rubrum*				
168357	168428	Redline darter	*Etheostoma rufilineatum*				
168357	168429	Rock darter	*Etheostoma rupestre*				
168357	168430	Arrow darter	*Etheostoma sagitta*				
168357	168461	Bloodfin darter	*Etheostoma sanguifluum*				
168357	168361	Maryland darter	*Etheostoma sellare*				
168357	168362	Sawcheek darter	*Etheostoma serrifer*				
168357	168431	Snubnose darter	*Etheostoma simoterum*				
168357	168435	Slabrock darter	*Etheostoma smithi*				
168357	168368	Orangethroat darter	*Etheostoma spectabile*	I		M	
168357	168436	Spottail darter	*Etheostoma squamiceps*	I		M	
168357	168437	Speckled darter	*Etheostoma stigmaeum*				
168357	168438	Striated darter	*Etheostoma striatulum*				
168357	168439	Gulf darter	*Etheostoma swaini*				
168357	168440	Swannanoa darter	*Etheostoma swannanoa*				
168357	168441	Missouri saddled darter	*Etheostoma tetrazonum*				
168357	168442	Seagreen darter	*Etheostoma thalassinum*				
168357	168443	Tippecanoe darter	*Etheostoma tippecanoe*	I		I	
168357	168444	Trispot darter	*Etheostoma trisella*				
168357	168445	Tuscumbia darter	*Etheostoma tuscumbia*				
168357	168446	Variegate darter	*Etheostoma variatum*	I		I	M(G)
168357	168447	Striped darter	*Etheostoma virgatum*				
168357	168364	Glassy darter	*Etheostoma vitreum*	I		I	
168357	168463	Wounded darter	*Etheostoma vulneratum*				
168357	168466	Boulder darter	*Etheostoma wapiti*				
168357	168448	Redfin darter	*Etheostoma whipplei*				
168357	168449	Banded darter	*Etheostoma zonale*	I		I	
168357	168450	Backwater darter	*Etheostoma zonifer*				
168357	168467	Bandfin darter	*Etheostoma zonistium*				
168519	168520	Ruffe	*Gymnocephalus cernuus*	I		M	

Parent TSN	TSN	Common Name	*Scientific Name*	Trophic	Trophic Exceptions	Tolerance	Tolerance Exceptions
168468	168469	Yellow perch	*Perca flavescens*	I	P(A,C,G);G(F,D)	M	
168471	168476	Amber darter	*Percina antesella*				
168471	168477	Tangerine darter	*Percina aurantiaca*				
168471	168478	Goldline darter	*Percina aurolineata*				
168471	168479	Blotchside darter	*Percina burtoni*				
168471	168472	Logperch	*Percina caprodes*	I		M	
168471	168501	Texas logperch	*Percina carbonaria*				
168471	168480	Channel darter	*Percina copelandi*	I		I	
168471	168481	Piedmont darter	*Percina crassa*				
168471	168482	Bluestripe darter	*Percina cymatotaenia*				
168471	168483	Gilt darter	*Percina evides*	I		I	
168471	168484	Appalachia darter	*Percina gymnocephala*				
168471	168502	Conasauga logperch	*Percina jenkinsi*				
168471	168485	Freckled darter	*Percina lenticula*				
168471	168486	Longhead darter	*Percina macrocephala*	I		I	
168471	168487	Bigscale logperch	*Percina macrolepida*				
168471	168488	Blackside darter	*Percina maculata*	I		M	
168471	168489	Longnose darter	*Percina nasuta*				
168471	168490	Blackbanded darter	*Percina nigrofasciata*				
168471	168473	Stripeback darter	*Percina notogramma*				
168471	201997	Sharpnose darter	*Percina oxyrhynchus*				
168471	168492	Bronze darter	*Percina palmaris*				
168471	168493	Leopard darter	*Percina pantherina*				
168471	168474	Shield darter	*Percina peltata*	I		I	M(G)
168471	168494	Slenderhead darter	*Percina phoxocephala*	I		I	
168471	168495	Roanoke logperch	*Percina rex*				
168471	168496	Roanoke darter	*Percina roanoka*				
168471	168475	Dusky darter	*Percina sciera*	I		M	
168471	168497	River darter	*Percina shumardi*	I		M	
168471	168498	Olive darter	*Percina squamata*				
168471	168499	Snail darter	*Percina tanasi*				
168471	168500	Stargazing darter	*Percina uranidea*	I		I	
168471	168503	Saddleback darter	*Percina vigil*	I		M	
168505	168509	Sauger	*Stizostedion canadense*	P		M	
168505	168506	Walleye	*Stizostedion vitreum*	P		M	
167641	**169237**	**Drums**	***Sciaenidae***				
169363	169364	Freshwater drum	*Aplodinotus grunniens*	V	I(E)	M	
167641	**169770**	**Cichlids**	***Cichlidae***				
169809	169810	Blue tilapia	*Tilapia aurea*				
169809	169811	Spotted tilapia	*Tilapia mariae*				
169809	169812	Blackchin tilapia	*Tilapia melanotheron*				
	170017	Mozambique tilapia	*Tilapia mossambica*				
169809	169820	Wami tilapia	*Tilapia urolepis*				
169809	169813	Redbelly tilapia	*Tilapia zilli*				
170332	**170333**	**Mullets**	***Mugilidae***				

Parent TSN	TSN	Common Name	*Scientific Name*	Trophic	Trophic Exceptions	Tolerance	Tolerance Exceptions
170354	170355	Mountain mullet	*Agonostomus monticola*				
170334	170335	Striped mullet	*Mugil cephalus*				
170334	170336	White mullet	*Mugil curema*				
170334	170337	Redeye mullet	*Mugil gaimardianus*				
170334	170351	Fantail mullet	*Mugil gyrans*				
170334	170338	Liza	*Mugil liza*				
172979	**172980**	**Soles**	***Soleidae***				
172981	172982	Hogchoker	*Trinectes maculatus*	G		I	

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APPENDIX D:

SURVEY APPROACH FOR COMPILATION OF HISTORICAL DATA

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QUESTIONNAIRE SURVEY FOR EXISTING BIOSURVEY DATA AND BIOASSESSMENT INFORMATION

Ecological expertise and knowledge of the aquatic ecosystems of a state can reside in agencies and academic institutions other than the water resource agency. This expertise and historical knowledge can be valuable in problem screening, identifying sensitive areas, and prioritizing watershed-based investigations. Much of this expertise is derived from biological survey data bases that are generally available for specific surface waters in a state. A systematic method to compile and summarize this information is valuable to a state water resource agency.

The questionnaire survey approach presented here is modified from the methods outlined in the original RBP IV (Plafkin et al. 1989) and is applicable to various types of biological data. The purpose of this questionnaire survey is to compile and document historical/existing knowledge of stream physical habitat characteristics and information on the periphyton, macroinvertebrate, and fish assemblages.

The template questionnaire is divided into 2 major sections: the first portion is modeled after RBP IV and serves as a screening assessment; the second portion is designed to query state program managers, technical experts, and researchers regarding existing biosurvey and/or bioassessment data. This approach can provide a low cost qualitative screening assessment (Section 1) of a large number of waterbodies in a relative short period. The questionnaire can also prevent a duplication of effort (e.g., investigating a waterbody that has already been adequately characterized) by polling the applicable experts for available existing information (Section 2).

The quality of the information obtained from this approach depends on survey design (e.g., number and location of waterbodies), the questions presented, and the knowledge and cooperation of the respondents. The potential respondent (e.g., agency chief, program manager, professor) should be contacted initially by telephone to specifically identify appropriate respondents. To ensure maximum response, the questionnaire should be sent at times other than the peak of the field season and/or the beginning or end of the fiscal year. The inclusion of a self-addressed, stamped envelope should also increase the response rate. A personalized cover letter (including official stationary, titles, and signatures) should accompany each questionnaire. As a follow-up to mailings, telephone contact may be necessary.

Historical data may be limited in coverage and varied in content on a statewide basis, but be more comprehensive in coverage and content for specific watersheds. A clearly stated purpose of the survey will greatly facilitate evaluation of data from reaches that are dissimilar in characteristics. The identification of data gaps will be critical in either case. Regardless of the purpose, minimally impaired reference reaches may be selected to serve as benchmarks for comparison. The definition of minimal impairment varies from region to region. However, it includes those waters that are generally free of point source discharges, channel modifications, and/or diversions, and have diverse habitats, complex substrates, considerable instream cover and a wide buffer of riparian vegetation. Selection of specific reaches for consideration (e.g., range and extent) in the questionnaire survey is ultimately dependent on program objectives and is at the discretion of the surveyor. The questionnaire approach and the following template form allows considerable flexibility. Results can be reported as histograms, pie graphs, or box plots.

Questionnaire design and responses should address, when possible, the:

- extent of waterbody or watershed surveyed
- condition of the periphyton, macroinvertebrate and/or fish assemblage
- quality of available physical habitat
- frequency of occurrence of particular factors/causes limiting the biological condition
- effect of waterbody type and size on the spatial and temporal trends, if known
- likelihood of improvement or degradation based on known land use patterns or mitigation efforts

BIOASSESSMENT/BIOSURVEY QUESTIONNAIRE

Date of Questionnaire Survey _____

This questionnaire is part of an effort to assess the biological condition or health of the flowing waters of this state. Our principle focus is on the biotic health of the designated waterbody as indicated by its periphyton, macroinvertebrate and/or fish community. You were selected to participate in this survey because of your expertise in periphyton, macroinvertebrate, and/or fish biology and your knowledge of the waterbody identified in this questionnaire.

Please examine the entire questionnaire form. If you feel that you cannot complete the form, check here [ ] and return it. If you are unable to complete the questionnaire but are aware of someone who is familiar with the waterbody and/or related bioassessments, please identify that person's name, address, and telephone number in the space provided below:

Contact: Name_____
Address_____
Agency/Institution_____
Phone_____ Fax_____
Email_____

This questionnaire is divided into two major sections. Section 1 serves as a screening assessment and Section 2 is a request for existing biosurvey data and/or bioassessment results.

This form addresses the following waterbody:

_____
Waterbody

State:_____ County:_____ Lat./Long.:_____ Waterbody code:_____

Ecoregion:_____ Subecoregion:_____ Description of site/reach:_____

Drainage size:_____ Flow: <1cfs; 1-10cfs; >10cfs _____

Description of data set (i.e., years, seasons, type of data, purpose of survey)_____
_____
_____
_____
_____

SECTION 1. SCREENING ASSESSMENT

Using the scale of biological conditions found in the following text box, please circle the rank that best describes your impression of the condition of the waterbody.

SCALE OF CONDITIONS

5	Species composition, age classes, and trophic structure comparable to non (or minimally) impaired waterbodies of similar size in that ecoregion or watershed.
4	Species richness somewhat reduced by loss of some intolerant species; less than optimal abundances, age distributions, and trophic structure for waterbody size and ecoregion.
3	Intolerant species absent; considerably fewer species and individuals than expected for that waterbody size and ecoregion; trophic structure skewed toward omnivory.
2	Dominated by highly tolerant species, omnivores, and habitat generalists; top carnivores rare or absent; older age classes of all but tolerant species rare; diseased fish and anomalies relatively common for that waterbody size and ecoregion.
1	Few individuals and species present; mostly tolerant species; diseased fish and anomalies abundant compared to other similar-sized waterbodies in the ecoregion.
0	No fish, depauperate macroinvertebrate and/or periphyton assemblages.

(Circle one number using the scale above.)

1. Rank the current conditions of the reach

   5 4 3 2 1 0

2. Rank the conditions of the reach 10 years ago

   5 4 3 2 1 0

3. Given present trends, how will the reach rank 10 years from now?

   5 4 3 2 1 0
   Describe/comment_____

4. If the major human-caused limiting factors were eliminated, how would the reach rank 10 years from now?

   5 4 3 2 1 0
   Describe/comment_____

5. Decision criteria based on:

   ☐ Site-specific reference sites
   ☐ Ecoregional reference conditions
   ☐ Professional opinion _____
   ☐ Other (specify) _____

If impairment noted (i.e., scale of 1-3 given), complete each subsection below by **checking off** the most appropriate limiting factor(s) and probable cause(s). Clarify if reference is to past or current conditions.

PHYSICOCHEMICAL

(a.) WATER QUALITY

Limiting Factor	Probable Cause
☐ Temperature too high ☐ Temperature too low ☐ Turbidity ☐ Salinity ☐ Dissolved oxygen ☐ Gas supersaturation ☐ pH too acidic ☐ pH too basic ☐ Nutrient deficiency ☐ Nutrient surplus ☐ Toxic substances ☐ Other (specify below) _____ ☐ Not limiting	☐ Primarily upstream ☐ Within reach Point source discharge ☐ Industrial ☐ Municipal ☐ Combined sewer ☐ Mining ☐ Dam release Nonpoint source discharge ☐ Individual sewage ☐ Urban runoff ☐ Landfill leachate ☐ Construction ☐ Agriculture ☐ Feedlot ☐ Grazing ☐ Silviculture ☐ Mining ☐ Natural ☐ Unknown ☐ Other (specify below) _____

(b.) WATER QUANTITY

Limiting Factor	Probable Cause
☐ Below optimum flows ☐ Above optimum flows ☐ Loss of flushing flows ☐ Excessive flow fluctuation ☐ Other (specify below) _____ ☐ Not limiting	☐ Dam ☐ Diversion Watershed conversion ☐ Agriculture ☐ Silviculture ☐ Grazing ☐ Urbanization ☐ Mining ☐ Natural ☐ Unknown ☐ Other (specify below) _____

BIOLOGICAL/HABITAT

(Check the appropriate categories)

(a.) Limiting Factor	HABI	PERI	MACR	FISH
Insufficient instream structure				
Insufficient cover				
Insufficient sinuosity				
Loss of riparian vegetation				
Bank failure				
Excessive siltation				
Insufficient organic detritus				
Insufficient woody debris for organic detritus				
Frequent scouring flows				
Insufficient hard surfaces				
Embeddedness				
Insufficient light penetration				
Toxicity				
High water temperature				
Altered flow				
Overharvest				
Underharvest				
Fish stocking				
Non-native species				
Migration barrier				
Other (specify) _____				
Not limiting				

Key:

HABI - Habitat
MACR - Macroinvertebrates
PERI - Periphyton
FISH - Fish

(b.) Probable Cause	HABI	PERI	MACR	FISH
Agriculture				
Silviculture				
Mining				
Grazing				
Dam				
Diversion				
Channelization				
Urban encroachment				
Snagging				
Other channel modifications				
Urbanization/impervious surfaces				
Land use changes				
Bank failure				
Point source discharges				
Riparian disturbances				
Clear cutting				
Mining runoff				
Stormwater				
Fishermen				
Aquarists				
Agency				
Natural				
Unknown				
Other (specify) _____				

Key:

HABI - Habitat
PERI - Periphyton
MACR - Macroinvertebrates
FISH - Fish

SUMMARY: ASPECT OF PHYSICOCHEMICAL OR BIOLOGICAL CONDITION AFFECTED

- ☐ Water quality
- ☐ Water quantity
- ☐ Habitat structure
- ☐ Periphyton assemblage
- ☐ Macroinvertebrate assemblage
- ☐ Fish assemblage
- ☐ Other (specify) _____

SECTION 2. AVAILABILITY OF DATA

Please complete this section with applicable response(s) and fill in the blanks with appropriate information based on your knowledge of available biosurvey and bioassessment information.

Reach characterized by:

☐ Stream habitat surveys		
☐ Periphyton surveys	assemblage ☐	key species ☐
☐ Macroinvertebrate surveys	assemblage ☐	key species ☐
☐ Fish surveys	assemblage ☐	key species ☐

Sampling gear(s) or methods

_____
_____
_____
_____

Sampling frequency (spatial and temporal)

_____
_____
_____
_____

Data analysis/interpretation based on:

Tabulated data ☐
Graphical data ☐
Multivariate analyses. ☐
Multimetric approach. ☐

Electronic file available:

Format _____
_____
_____

Statistical routines include:

_____
_____
_____
_____

Metrics include:

_____
_____
_____
_____

EPA

United States
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Washington, DC 20460

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United States
Environmental Protection
Agency

Office of Water (4303)
Washington, DC 20460

EPA-821-R-99-012
August 1999

Preliminary Data Summary of Urban Storm Water Best Management Practices

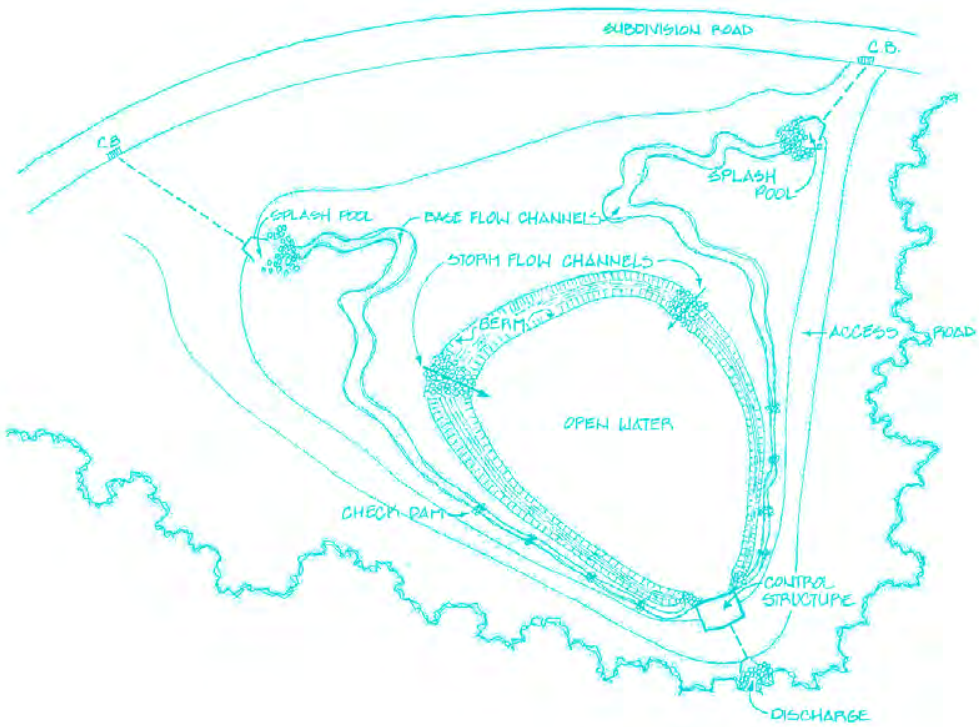

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1.0 Summary

The significance of storm water runoff in affecting water quality in the United States has become an increasing concern in recent years, as further improvements are made in controlling other point sources such as municipal sewage and industrial waste. EPA conducted a broad analysis of storm water runoff characteristics in its *Nationwide Urban Runoff Program* between 1979 and 1983. During the 1980's the Agency made several attempts to promulgate regulatory controls for storm water runoff under the statutory framework of the 1972 Clean Water Act. Following enactment of the Water Quality Act of 1987, EPA began development of a more comprehensive regulatory program. During the course of these actions, the use of best management practices (BMPs) in addressing runoff problems was frequently identified, however it was known that additional research on the performance of BMPs was also needed.

EPA's Engineering and Analysis Division conducted a study on storm water best management practices during 1997 and 1998 as part of its series of preliminary studies in the effluent guidelines program. This report summarizes existing information and data regarding the effectiveness of BMPs to control and reduce pollutants in urban storm water. The report provides a synopsis of what is currently known about the expected costs and environmental benefits of BMPs, and identifies information gaps as well.

Detailed information about BMP design is beyond the scope of this report. Readers are encouraged to consult the wide range of storm water BMP design manuals available from states and localities and other organizations for detailed design guidelines. Information regarding BMP performance and selection is also provided in other EPA documents, such as *Guidance Specifying Management Measure for Sources of Nonpoint Source Pollution in Coastal Water* (US EPA, 1993a); *Urban Runoff Pollution Prevention and Control Planning* (US EPA, 1993c); and *Municipal Wastewater Management Fact Sheets: Storm Water Best Management Practices* (US EPA, 1996e). In addition, readers are encouraged to consult the ASCE/WEF Manuals of Practice, *Design and Construction of Urban Stormwater Management Systems* (ASCE/WEF, 1992) and *Urban Runoff Quality Management* (ASCE/WEF, 1998) for a more thorough discussion of storm water management design.

Summary of Findings

1. Waterways and receiving waters near urban and suburban areas are often adversely affected by urban storm water runoff. Impacts may be manifested in terms of:

- alterations in hydraulic characteristics of streams receiving runoff such as higher peak flow rates, increased frequency and duration of bankfull and sub-bankfull flows, increased occurrences of downstream flooding, and reduced baseflow levels

- changes in receiving stream morphology such as increased rates of sediment transport and deposition, increased shoreline erosion, stream channel widening, and increased stream bed scouring

- aquatic habitat impacts leading to changes in fish and macroinvertebrate populations and loss of sensitive species

- public health and recreation impacts such as increased risk of illness due to contact with contaminated water bodies, contamination of drinking water supplies, beach closures, restrictions on fishing, and shellfish bed closures.

2. A wide variety of BMPs, both structural and non-structural, are available to address urban storm water runoff and discharges.

- For various reasons (such as cost, suitability to site, etc.) some of these BMP types are widely used, some infrequently; some are relatively new designs that are not widely in use.

- Many BMPs are used primarily for water quantity control (i.e. to prevent flooding), although they may provide ancillary water quality benefits.

- Some BMP types have been analyzed for performance in terms of site-specific pollutant removal, although not extensively enough to allow for generalizations.

- The pollutant removal performance of some BMP types is essentially undocumented.

- Some BMP types, particularly non-structural and those that do not have discrete inflow or outflow points, are difficult to monitor.

- There is no widely-accepted definition of "efficiency" or "pollutant removal" for storm water BMPs.

- The role of chemical pollutant monitoring vs. receiving stream biological monitoring in evaluating BMP performance is not well documented.

3. Only a few cost studies have been conducted for storm water BMPs.

- Due to the limited cost data, a lack of clear definitions of performance, and limited "performance" data, it is difficult at this time to develop cost-effectiveness comparisons for various BMP types.

4. The benefits of individual BMPs are site-specific and depend on a number of factors including:

- the number, intensity and duration of wet weather events;
- the pollutant removal efficiency of the BMP;
- the water quality and physical conditions of the receiving waters;
- the current and potential use of the receiving waters; and
- the existence of nearby "substitute" sites of unimpaired waters.

Because these factors will vary substantially from site to site, data are not available with which to develop estimates of benefits for individual BMP types.

5. A number of researchers are continuing to work on BMP performance monitoring, and there are several attempts underway to develop comparison frameworks through the construction of comprehensive databases on BMP design characteristics and performance.

Organization of Report

This report is divided into six chapters. Chapter 1 presents a summary of the major findings of the report. Chapter 2 presents a general introduction of the purposes and goals of this evaluation. Chapter 3 summarizes existing regulations and permits developed by EPA to address urban storm water discharges, including regulations under the National Pollutant Discharge Elimination System (NPDES) and the Coastal Zone Act Reauthorization Amendments (CZARA). Chapter 4 presents an assessment of the environmental problems attributable to urban storm water discharges and Chapter 5 identifies the best management practices that can be used to control the quantity and improve the quality of storm water prior to discharge. Chapter 6 identifies the costs and benefits of storm water BMPs.

2.0 Introduction and Scope

2.1 Effluent Guidelines Program and Consent Decree Requirements

Effluent guidelines are national standards for categories of dischargers to surface waters. The program was established in 1972 under Title III of the Clean Water Act (CWA). Since that time EPA has developed effluent guideline regulations for over 50 categories, primarily industrial dischargers. In these regulations the Agency typically establishes numeric “end-of-pipe” effluent limitations for specific chemical pollutants and/or indicator parameters (e.g. BOD, oil and grease). For some categories, EPA has also issued narrative requirements for best management practices (BMPs) to address control of storm water runoff, plant maintenance schedules and training of plant personnel. The effluent limitations are generally based on the performance of available or demonstrated control and treatment technologies. Resulting effluent limitations are commonly referred to as "technology-based" standards. The regulations are implemented in National Pollutant Discharge Elimination System (NPDES) permits, which are issued by EPA and State agencies under the authority of CWA Section 402.

The Water Quality Act of 1987 added section 304(m) to the CWA. This provision requires EPA to publish a biennial Effluent Guidelines Plan and develop additional regulations. EPA’s effluent guidelines program is currently subject to a consent decree (“Decree”) in *Natural Resources Defense Council et al v. Browner* (D.D.C. 89-2980, January 31, 1992, as amended). The Decree requires the Agency to propose effluent guideline regulations and take final action for 20 point source categories, according to a specified schedule. Additionally, the Decree requires that the Agency conduct 11 preliminary studies to assist in selecting categories for regulation development.

The 1987 amendments also added section 402(p) to the CWA, which requires development of a national program for regulation of storm water discharges. This is discussed further in Chapter 3 of this report.

In 1996, the Natural Resources Defense Council (NRDC) recommended that EPA develop effluent guidelines for categories of storm water dischargers, to supplement the existing NPDES permit regulations covering storm water discharges. Because municipal storm water discharges present a range of complex phenomena that have not been extensively documented in the professional literature, and because there is a lack of generally accepted methods for evaluating storm water management practices, EPA determined that conducting a preliminary study would be appropriate to satisfy one of the study obligations under the Decree. This preliminary study is intended to assist decision making on initiating regulatory development projects.

2.2 Types of Discharges Addressed

This study is focused on BMPs designed to prevent, control or treat storm water discharges, and the nature and measurement of storm water discharges. Storm water discharges may flow directly into surface waters, into municipal separate storm sewer systems ("MS4s"), and/or infiltrate into groundwater. The emphasis on BMPs is intended to support the national NPDES storm water program. Some aspects of the BMPs described herein may also be relevant for other types of wet weather pollution problems, such as combined sewer overflows (CSOs).

Storm water BMPs may be organized into two major groups with multiple subgroups:

- *Structural* BMPs include:
  - > infiltration systems such as infiltration basins and porous pavement
  - > detention systems such as basins and underground vaults
  - > retention systems such as wet ponds
  - > constructed wetland systems
  - > filtration systems such as media filters and bioretention systems
  - > vegetated systems such as grass filter strips and vegetated swales
  - > minimizing directly-connected impervious surfaces
  - > miscellaneous and vendor-supplied systems such as oil/water separators and hydrodynamic devices

- *Non-Structural* BMPs include:
  - > automotive product and household hazardous material disposal
  - > commercial and retail space good housekeeping
  - > industrial good housekeeping
  - > modified use of fertilizers, pesticides and herbicides
  - > lawn debris management
  - > animal waste disposal
  - > maintenance practices such as catch basin cleaning, street and parking lot sweeping, road and ditch maintenance
  - > illicit discharge detection and elimination
  - > educational and outreach programs
  - > storm drain inlet stenciling
  - > low-impact development and land use planning.

The impacts of storm water discharges are described in Chapter 4. Various BMP designs for addressing storm water discharges are described in Chapter 5, and the costs and economic impacts of BMP are described in Chapter 6.

2.3 Data Sources and Data Collection Techniques

ASCE National Stormwater BMP Database

Since 1995, EPA and the American Society of Civil Engineers (ASCE) have operated under a cooperative agreement to develop a database of storm water BMP design and performance. The initial version of this database provides pollutant removal data and other performance measures on approximately 75 BMPs based on published studies and reports. These studies and reports were carefully selected from a comprehensive screening of virtually all available published literature on BMP performance, amounting to about 800 bibliographic references.

A significant objective of the database is to provide a design tool for local storm water designers and planners. The database has the capacity to report extensive detail about the design of BMPs, along with descriptive information about the adjacent watershed, hydrology and other geographic data.

As of early 1999, the initial version of the database is being tested, and a public release will be available in mid-1999. EPA and ASCE are continuing to develop the database and are encouraging organizations that have conducted BMP monitoring to submit their findings to the ASCE Database Clearinghouse for entry into the database. As new data are gathered, periodic updates will be made available to the public through use of the Internet.

Center for Watershed Protection National Pollutant Removal Performance Database

In 1997, the Center for Watershed Protection developed a database for the Chesapeake Research Consortium titled, "National Pollutant Removal Performance Database for Stormwater BMPs" (Brown and Schueler, 1997a). This database focuses on the pollutant removal efficiency of commonly used and innovative urban BMPs for storm water control. The database is derived from 123 research studies developed between 1977 and 1996.

All of the studies in the database utilized data collected with automated sampling equipment and had documented methods to compute pollutant removal efficiencies. More than three-quarters of the studies were based on four or more storm samples, while the remaining studies were either based on fewer than four storms or the sample size was not stated.

Literature Cited

- EPA reports including the Nationwide Urban Runoff Program (NURP), National Water Quality Inventory, Coastal Nonpoint Pollution Program Guidance, NPDES Rules, guidance documents and fact sheets.

- Other Federal agency publications from U.S. Geological Survey and U.S. Department of Agriculture.
- Professional journals and manuals of practice such as those from ASCE and the Water Environment Federation
- Publications of research organizations such as the Center for Watershed Protection, Terrene Institute, Metropolitan Washington Council of Governments and the Watershed Management Institute
- State and local government BMP design manuals.

BMP Performance Data Developed for this Preliminary Study

EPA conducted field performance evaluations at three structural BMP sites during 1998. While these evaluations contribute to the literature on BMP performance, EPA also intended that the field testing would serve as an experimental framework for refining evaluation methodology. Three sites in the Washington, D.C. area were monitored: a constructed wetland, a peat-sand filter, and a regional wet pond. Data summaries for these monitoring activities appear in Chapter 5. Additional findings will be provided in a supplement to this report.

3.0 Existing Storm Water Regulations and Permits

Congress added Section 402(p) to the Clean Water Act in 1987 to require implementation of a comprehensive approach for addressing storm water discharges in two phases. Section 402(p)(4) required EPA to develop permit application regulations under the National Pollutant Discharge Elimination System (NPDES), submission of NPDES permit applications, issuance of NPDES permits, and compliance with NPDES permit conditions. Section 402(p)(6) requires EPA to designate storm water discharges to be regulated (within the statutory definitions provided in section 402(p)(2)) and establish a comprehensive regulatory program, which may include performance standards, guidelines, guidance, and management practices and treatment requirements.

3.1 Phase I NPDES

EPA promulgated the first phase of NPDES storm water permit application regulations ("Phase I") on November 16, 1990 (US EPA, 1990). The provisions addressing MS4s cover those systems serving a population of 100,000 or more. This includes 173 cities, 47 counties and additional systems designated by EPA or states based on such system's interrelationship with or proximity to the aforementioned systems, such as state highway departments. A total of 260 permits, covering approximately 880 operators (local governments, state highway departments, etc.) have been identified as subject to Phase I permit application requirements. As of late 1998, approximately 228 such permits have been issued in final form.

The CWA requires that MS4 permits effectively prohibit non-storm water discharges into the storm sewers as well as reduce the discharge of pollutants to the maximum extent practicable (including management practices, control techniques and system, design and engineering methods, and other provisions appropriate for the control of such pollutants).

Phase I MS4 permittees were required to submit an application that included source identification information, precipitation data, existing data on the volume and quality of storm water discharges, a list of receiving water bodies and existing information on impacts on receiving waters, a field screening analysis for illicit connections and illegal dumping, and other information.

Following this submission, MS4 permittees were to gather and provide additional information including:

- discharge characterization data based on quantitative data from 5 to 10 representative locations in approved sampling plans; estimates of the annual pollutant load and event mean concentration of system discharges for selected conventional pollutants and heavy metals; a proposed schedule to provide estimates of seasonal pollutant loads; and the mean concentration for certain detected constituents in a representative storm event;

- a proposed management program including descriptions of: structural and source control measures that are to be implemented to reduce pollutants in runoff from commercial and residential areas; a program to detect and remove illicit discharges; and a program to control pollutants in construction site runoff.

The Phase I rule also covers storm water discharges "associated with industrial activity." This includes facilities covered by effluent guidelines and other designated classes of industrial and commercial facilities, such as hazardous waste treatment, storage, or disposal; landfills; recycling; vehicle maintenance and equipment cleaning; sewage sludge handling; construction activity (sites with 5 or more acres of disturbed land); and facilities where materials are exposed to storm water. Permittees must prepare a storm water pollution prevention plan which describes pollution sources, measures and controls.

EPA and the states used several permit mechanisms for the many facilities receiving NPDES permits for the first time. EPA issued "baseline" general permits to cover a wide range of facilities with basic requirements, with the intent that more specific requirements would follow in subsequent permit cycles. Industry-specific or "group" permits were issued based on applications submitted by business associations, and other sites were issued individual permits.

The management and pollution prevention plans prepared by MS4s and industrial permittees vary in their level of detail and specificity regarding design and implementation of best management practices (BMPs). EPA and some states have issued guidance on preparation of these plans (US EPA, 1992d; US EPA, 1992e). The Agency has not conducted a nationwide review of these plans.

3.2 Phase II NPDES

EPA proposed the NPDES storm water regulations for the second phase of storm water discharge control (“Phase II”) on January 9, 1998 (US EPA, 1998c). EPA is required to promulgate the Phase II rule in 1999 under a separate consent decree.

The proposal designates two classes of facilities for automatic coverage on a nationwide basis under the NPDES program, (1) small municipal separate storm sewer systems located in urbanized areas (about 3,500 municipalities would be included in the program); and (2) construction activities (pollutants include sediments and erosion from these sites) that disturb equal to or greater than one and less than five acres of land (about 110,000 sites per year will be included in the program). Those facilities designated above would need to apply for NPDES storm water permits by 2002. EPA is anticipating that most permittees would be covered under general permits.

EPA is also proposing to conditionally exclude from the NPDES storm water program Phase I facilities that have "no exposure" of industrial activities, such as industrial products,

processes, or raw materials, to storm water, thereby reducing application of the program to many industrial activities currently covered by the program that have no industrial storm water discharges.

Some facilities that EPA is proposing to cover under the Phase II rule are currently subject to state and/or local storm water management requirements.

3.3 Coastal Zone Act Requirements

Section 6217 of the Coastal Zone Act Reauthorization Amendments (CZARA) of 1990 provides that States with approved coastal zone management programs must develop and submit coastal nonpoint pollution control programs to EPA and the National Oceanic and Atmospheric Administration (NOAA) for approval. Failure to submit an approvable program would result in a reduction of federal grants to such states under both the Coastal Zone Management Act and section 319 of the CWA.

State coastal nonpoint pollution control programs under CZARA are to include enforceable policies and mechanisms that ensure implementation of the management measures throughout the coastal management area. Section 6217(g)(5) defines management measures as "economically achievable measures for the control of the addition of pollutants from existing and new categories and classes of nonpoint sources of pollution, which reflect the greatest degree of pollutant reduction achievable through the application of the best available nonpoint pollution control practices, technologies, processes, siting criteria, operating methods, or other alternatives." The amendments provide for a technology-based approach based on technical and economic achievability under the rationale that neither States nor EPA have the money, time, or other resources to create and expeditiously implement a program that depends on establishing cause and effect linkages between particular land use activities and specific water quality problems. If this technology-based approach fails to achieve and maintain applicable water quality standards and to protect designated uses, sec. 6217(b)(3) requires additional management measures.

EPA issued *Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters* under sec. 6217(g) in January 1993 (US EPA, 1993a). The guidance identifies management measures for five major categories of nonpoint source pollution: agriculture; forestry; urban; marinas and recreational boating; and hydromodification. The management measures reflect the greatest degree of pollutant reduction that is economically achievable for each of the listed sources. These management measures provide reference standards for the states to use in developing or refining their coastal nonpoint programs. In general, the management measures were written to describe systems designed to reduce the generation of pollutants. A few management measures, however, contain quantitative standards that specify pollutant loading reductions. For example, the new development management measure, which is applicable to storm water runoff associated with construction in urban areas,

requires (1) that by design or performance the average annual total suspended solid loadings be reduced by 80 percent and (2) to the extent practicable, that the pre-development peak runoff rate and average volume be maintained. The management measures approach was adopted to provide state officials with flexibility in selecting strategies and management systems and practices that are appropriate for regional or local conditions, provided that equivalent or higher levels of pollutant control are achieved.

Storm water discharges regulated under the existing NPDES program, such as discharges from municipal separate storm sewers serving a population of 100,000 or more and from construction activities that disturb 5 or more acres, do not need to be addressed in Coastal Nonpoint Pollution Control programs. However, potential new sources, such as urban development adjacent to or surrounding municipal systems serving a population of 100,000 or more, smaller urbanized areas, and construction sites that disturb less than 5 acres, that are identified in management measures under section 6217 guidance need to be addressed in Coastal Nonpoint Pollution Control Programs until such discharges are issued an NPDES permit. EPA and NOAA have worked and continue to work together in their activities to ensure that authorities between NPDES and CZARA do not overlap.

EPA and NOAA published *Coastal Nonpoint Pollution Control Program: Program Development and Approval Guidance* (US EPA, 1993d), which addresses such issues as the basis and process for EPA/NOAA approval of State Coastal Nonpoint Pollution Control programs, how EPA and NOAA expect state programs to implement management measures in conformity with EPA guidance, and procedures for reviewing and modifying state coastal boundaries to meet program requirements. The document clarifies that states generally must implement management measures for each source category identified in the EPA guidance developed under section 6217(g). The document also sets quantitative performance standards for some measures. Coastal Nonpoint Pollution Control programs are not required to address sources that are clearly regulated under the NPDES program as point source discharges. Specifically, such programs would not need to address small municipal separate storm sewer systems and construction sites covered under NPDES storm water permits (both general and individual). The guidance also clarifies that regulatory and non-regulatory mechanisms may be used to meet the requirement for enforceable policies and mechanisms, provided that non-regulatory approaches are backed by enforceable state authority ensuring that the management measures will be implemented. Backup authority may include sunset provisions for incentive programs. For example, a state may provide additional incentives if too few owners or operators participate in a tax incentive program or develop mandatory requirements to achieve the necessary implementation of management measures.

3.4 Regional, State and Local Programs

In addition to the existing Federal storm water management programs, there are a variety of State, local and regional storm water management programs in existence. Many of these

programs pre-date the Federal programs and may include BMP design or performance standards, site plan review and inspection programs, and technical assistance. A review of these programs is outside the scope of this report.

4.0 Environmental Assessment

Waterways and receiving waters near urban and suburban areas are often adversely affected by urban storm water runoff. The degree and type of impact varies from location to location, but it is often significant relative to other sources of pollution and environmental degradation. Urban storm water runoff affects water quality, water quantity, habitat and biological resources, public health, and the aesthetic appearance of urban waterways. As reported in the National Water Quality Inventory 1996 Report to Congress (US EPA, 1998d), urban runoff was the leading source of pollutants causing water quality impairment related to human activities in ocean shoreline waters and the second leading cause in estuaries across the nation. Urban runoff was also a significant source of impairment in rivers and lakes. The percent of total impairment attributed to urban runoff is substantial. This impairment constitutes approximately 5,000 square miles of estuaries, 1.4 million acres of lakes, and 30,000 miles of rivers. Seven states also reported in the Inventory that urban runoff contributes to wetland degradation.

Adverse impacts on receiving waters associated with storm water discharges have been discussed by EPA (1995b) in terms of three general classes. These are:

- Short-term changes in water quality during and after storm events including temporary increases in the concentration of one or more pollutants, toxics or bacteria levels.

- Long-term water quality impacts caused by the cumulative effects associated with repeated storm water discharges from a number of sources.

- Physical impacts due to erosion, scour, and deposition associated with increased frequency and volume of runoff that alters aquatic habitat.

As described in the Terrene Institute's *Fundamentals of Urban Runoff Management* (Horner et al, 1994), pollutants associated with urban runoff potentially harmful to receiving waters fall into the categories listed below:

- Solids
- Oxygen-demanding substances
- Nitrogen and phosphorus
- Pathogens
- Petroleum hydrocarbons
- Metals
- Synthetic organics.

These pollutants degrade water quality in receiving waters near urban areas, and often contribute to the impairment of use and exceedences of criteria included in State water quality standards. The quantity of these pollutants per unit area delivered to receiving waters tends to increase with the degree of development in urban areas.

While water quality impacts are often unobserved by the general public, other storm water impacts are more visible. Stream channel erosion and channel bank scour provide direct evidence of water quantity impacts caused by urban storm water. Urban runoff increases directly with imperviousness and the degree of watershed development. As urban areas grow, urban streams are forced to accommodate larger volumes of storm water runoff that recur on a more frequent basis. This leads to stream channel instability. The change in watershed hydrology associated with urban development also causes channel widening and scour, and the introduction of larger amounts of sediment to urban streams. Visible impacts include eroded and exposed stream banks, fallen trees, sedimentation, and recognizably turbid conditions. The increased frequency of flooding in urban areas also poses a threat to public safety and property.

Both water quality and water quantity impacts associated with urban storm water combine to impact aquatic and riparian habitat in urban streams. Higher levels of pollutants, increased flow velocities and erosion, alteration of riparian corridors, and sedimentation associated with storm water runoff negatively impact the integrity of aquatic ecosystems. These impacts include the degradation and loss of aquatic habitat, and reduction in the numbers and diversity of fish and macroinvertebrates.

Public health impacts are for the most part related to bacteria and disease causing organisms carried by urban storm water runoff into waters used for water supplies, fishing and recreation. Water supplies can potentially be contaminated by urban runoff, posing a public health threat. Bathers and others coming in contact with contaminated water at beaches and other recreational sites can become seriously ill. Beach closures caused by urban runoff have a negative impact on the quality of life, and can impede economic development as well. Similarly, the bacterial contamination of shellfish beds poses a public health threat to consumers, and shellfish bed closures negatively impact the fishing industry and local economies.

Aesthetic impacts in the form of debris and litter floating in urban waterways and concentrated on stream banks and beaches are quite visible to the general public. Storm water is a major source of floatables that include paper and plastic bags and packaging materials, bottles, cans, and wood. The presence of floatables and other debris in receiving waters during and following storm events reduces visual attractiveness of the waters and detracts from their recreational value. Nuisance algal conditions including surface scum and odor problems can also be attributed to urban storm water in many instances.

Based on available information and data, the following general statements can be made about urban storm water impacts.

- Impacts to water quality in terms of water column chemistry tend to be transient and elusive, particularly in rivers.
- Impacts to habitat and aquatic life are generally more profound, and are easier to see and quantify than changes in water column chemistry.

- Impacts are typically complex because urban storm water is often one of several sources including municipal discharges and diffuse runoff from agricultural and rural areas that affect urban waterways.
- Impacts are often interrelated and cumulative. For example, both degraded water quality and increased water quantity join to impact habitat and biological resources.

The following sections describe the sources of urban storm water runoff, the pollutants contained in urban runoff and the impacts attributable to urban storm water discharges. Examples supported by field observation and data have been used extensively to show storm water impacts. The impacts described include water quality impacts, water quantity impacts, public health impacts, habitat impacts, and aesthetic impacts.

4.1 Overview of Storm Water Discharges

Storm water runoff from urbanized areas is generated from a number of sources including residential areas, commercial and industrial areas, roads, highways and bridges. Essentially, any surface which does not have the capability to pond and infiltrate water will produce runoff during storm events. When a land area is altered from a natural forested ecosystem to an urbanized land use consisting of rooftops, streets and parking lots, the hydrology of the system is significantly altered. Water which was previously ponded on the forest floor, infiltrated into the soil and converted to groundwater, utilized by plants and evaporated or transpired into the atmosphere is now converted directly into surface runoff. An important measure of the degree of urbanization in a watershed is the level of impervious surfaces. As the level of imperviousness increases in a watershed, more rainfall is converted to runoff. Figure 4-1 illustrates this transformation.

Figure 4-1. Effects of Imperviousness on Runoff and Infiltration

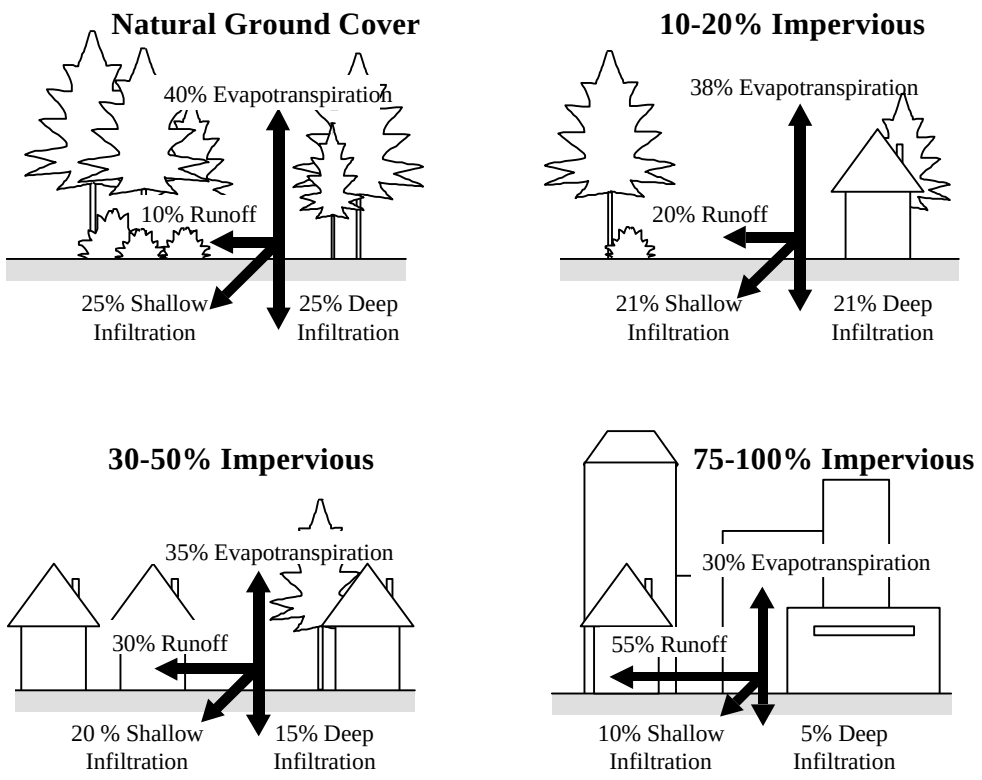

Source: Adapted from Arnold and Gibbons, 1996

The traditional means of managing storm water runoff in urban areas has been to construct a vast curb-and-gutter, catch basin, and storm drain network to transport this runoff volume quickly and efficiently away from the urbanized area and discharge the water to receiving streams. Two types of sewer systems are used to convey storm water runoff: separate storm sewers and combined sewers.

- *Separate storm sewer systems* convey only storm water runoff. Water conveyed in separate storm sewers is frequently discharged directly to receiving streams without receiving any intentional form of treatment. (In a municipality with a separate storm sewer system, sanitary sewer flows are conveyed in a distinct sanitary sewer system to municipal wastewater treatment plants.)

- In a *combined sewer system*, storm water runoff is combined with sanitary sewer flows for conveyance. Flows from combined sewers are treated by municipal wastewater

treatment plants prior to discharge to receiving streams. During large rainfall events however, the volume of water conveyed in combined sewers can exceed the storage and treatment capacity of the wastewater treatment system. As a result, discharges of untreated storm water and sanitary wastewater directly to receiving streams can frequently occur in these systems. These types of discharges are known as combined sewer overflows (CSOs).

Historically, as urbanization occurred and storm drainage infrastructure systems were developed in this country, the primary concern was to limit nuisance and potentially damaging flooding due to the large volumes of storm water runoff that are generated. Little, if any, thought was given to the environmental impacts of such practices. As a result, streams that receive storm water runoff frequently cannot convey the large volumes of water generated during runoff events without significant degradation of the receiving stream. In addition to the problems associated with excess water volume, the levels of toxic or otherwise harmful pollutants in storm water runoff and CSOs can cause significant water quality problems in receiving streams.

In addition to point sources such as municipal separate storm sewers and combined sewer overflows, storm water runoff can enter receiving streams as a non-point source. Storm water runoff from a variety of sources such as parking lots, highways, open land, rangeland, residential areas and commercial areas can enter waterways directly as sheet flow or as a series of diffuse, discrete flows. Due to the diffuse nature of many storm water discharges, it is difficult to quantify the range of pollutant loadings to receiving streams that are attributable to storm water discharges. It is much easier, however, to measure the increased stream flows during rainfall events that occur in urbanized areas and to document impacts to streams that receive storm water runoff.

Awareness of the damaging effects storm water runoff is causing to the water quality and aquatic life of receiving streams is a relatively recent development. Storm water management traditionally was, and still is in many cases, a flood control rather than a quality control program. Local governments intending to improve the quality of their runoff-impacted streams are incorporating best management practices (BMPs) into their drainage programs. BMPs which reduce the volume of runoff discharged to receiving streams, such as minimizing directly connected impervious surfaces, providing on-site storage and infiltration and implementing stream buffers and restoring riparian cover along urban streams can help to prevent further degradation and even result in improvements of streams which receive storm water discharges. However, in many existing urbanized areas, the cost of infrastructure changes necessary to retrofit existing storm water drainage systems with structural BMPs--to provide for storm water quality as well as quantity control--can be prohibitively expensive. In these cases, non-structural BMPs can be implemented to reduce pollutant sources and to reduce the transfer of urban pollutants to runoff, before more expensive, structural controls are instituted.

The climate of a region can have a significant impact on the quantity and quality of storm water runoff. Factors such as the length of the antecedent dry periods between storms, the

average rainfall intensity, the storm duration and the amount of snowmelt present can have significant impacts on the characteristics of runoff from an area. In areas where there is a significant amount of atmospheric deposition of particulates, storm water runoff can contain high concentrations of suspended solids, metals and nutrients. Areas that have infrequent rainfall such as the southwest U.S. can have runoff with significant concentrations of pollutants, especially from “hot spots” such as roads, parking lots and industrial areas. These areas, which typically have high-intensity, short-duration rainfall events, can generate significant loadings of suspended solids in storm water runoff. Many specific geographic factors can influence the nature and constituents contained in storm water runoff. Factors such as the soil types, slopes, land use patterns and the amount of imperviousness of a watershed can greatly affect the quality and quantity of runoff that is produced from an area.

4.2 Pollutants in Urban Storm Water

Storm water runoff from urban areas can contain significant concentrations of harmful pollutants that can contribute to adverse water quality impacts in receiving streams. Effects can include such things as beach closures, shellfish bed closures, limits on fishing and limits on recreational contact in waters that receive storm water discharges. Contaminants enter storm water from a variety of sources in the urban landscape.

Urban storm water runoff has been the subject of intensive research since the inception of the Water Quality Act of 1965. There have been numerous studies conducted to characterize the nature of urban storm water runoff and the performance of storm water BMPs. Data sources include the "208 Studies," the area-wide waste treatment management plans conducted by states under section 208 of the 1972 CWA; EPA's Nationwide Urban Runoff Program (NURP); the U.S. Geological Survey (USGS) Urban Stormwater Database; and the Federal Highway Administration (FHWA) study of storm water runoff loadings from highways. In addition to these federal sources, there is a great deal of information in the technical literature, as well as data collected by states, counties and municipalities. A recent data source is storm water monitoring data collected by municipalities regulated by the Phase I NPDES storm water regulations. As part of the Phase I permit application, regulated municipalities were required to collect data from five representative sites during a minimum of three storm events.

The most comprehensive study of urban runoff was NURP, conducted by EPA between 1978 and 1983. NURP was conducted in order to examine the characteristics of urban runoff and similarities or differences between urban land uses, the extent to which urban runoff is a significant contributor to water quality problems nationwide, and the performance characteristics and effectiveness of management practices to control pollution loads from urban runoff (US EPA, 1983). Sampling was conducted for 28 NURP projects which included 81 specific sites and more than 2,300 separate storm events. NURP focused on the following ten constituents:

- Total Suspended Solids (TSS)

- Biochemical Oxygen Demand (BOD)
- Chemical Oxygen Demand (COD)
- Total Phosphorus (TP)
- Soluble Phosphorus (SP)
- Total Kjeldahl Nitrogen (TKN)
- Nitrate + Nitrite (N)
- Total Copper (Cu)
- Total Lead (Pb)
- Total Zinc (Zn).

NURP examined both the soluble and the particulate fraction of pollutants, since the water quality impacts can depend greatly on the form that the contaminant is present. NURP also examined coliform bacteria and priority pollutants at a subset of sites. Median event mean concentrations (EMCs) for the ten general NURP pollutants for various urban land use categories are presented in Table 4-1.

Table 4-1. Median Event Mean Concentrations for Urban Land Uses

Pollutant	Units	Residential		Mixed		Commercial		Open/ Non-Urban	
		Median	COV	Median	COV	Median	COV	Median	COV
BOD	mg/l	10	0.41	7.8	0.52	9.3	0.31	--	--
COD	mg/l	73	0.55	65	0.58	57	0.39	40	0.78
TSS	mg/l	101	0.96	67	1.14	69	0.85	70	2.92
Total Lead	µg/l	144	0.75	114	1.35	104	0.68	30	1.52
Total Copper	µg/l	33	0.99	27	1.32	29	0.81	--	--
Total Zinc	µg/l	135	0.84	154	0.78	226	1.07	195	0.66
Total Kjeldahl Nitrogen	µg/l	1900	0.73	1288	0.50	1179	0.43	965	1.00
Nitrate + Nitrite	µg/l	736	0.83	558	0.67	572	0.48	543	0.91
Total Phosphorus	µg/l	383	0.69	263	0.75	201	0.67	121	1.66
Soluble Phosphorus	µg/l	143	0.46	56	0.75	80	0.71	26	2.11

COV: Coefficient of variation
Source: Nationwide Urban Runoff Program (US EPA 1983)

Results from NURP indicate that there is not a significant difference in pollutant concentrations in runoff from different urban land use categories. There is a significant difference, however, in pollutant concentrations in runoff from urban sources than that produced from non-urban areas.

The pollutants that are found in urban storm water runoff originate from a variety of sources. The major sources include contaminants from residential and commercial areas, industrial activities, construction, streets and parking lots, and atmospheric deposition. Contaminants commonly found in storm water runoff and their likely sources are summarized in Table 4-2.

Table 4-2. Sources of Contaminants in Urban Storm Water Runoff

Contaminant	Contaminant Sources
Sediment and Floatables	Streets, lawns, driveways, roads, construction activities, atmospheric deposition, drainage channel erosion
Pesticides and Herbicides	Residential lawns and gardens, roadsides, utility right-of-ways, commercial and industrial landscaped areas, soil wash-off
Organic Materials	Residential lawns and gardens, commercial landscaping, animal wastes
Metals	Automobiles, bridges, atmospheric deposition, industrial areas, soil erosion, corroding metal surfaces, combustion processes
Oil and Grease/ Hydrocarbons	Roads, driveways, parking lots, vehicle maintenance areas, gas stations, illicit dumping to storm drains
Bacteria and Viruses	Lawns, roads, leaky sanitary sewer lines, sanitary sewer cross-connections, animal waste, septic systems
Nitrogen and Phosphorus	Lawn fertilizers, atmospheric deposition, automobile exhaust, soil erosion, animal waste, detergents

The concentrations of pollutants found in urban runoff are directly related to degree of development within the watershed. This trend is shown in Table 4-3, a compilation of typical pollutant loadings from different urban land uses.

Table 4-3. Typical Pollutant Loadings from Runoff by Urban Land Use (lbs/acre-yr)

Land Use	TSS	TP	TKN	NH_3-N	NO_2+NO_3-N	BOD	COD	Pb	Zn	Cu
Commercial	1000	1.5	6.7	1.9	3.1	62	420	2.7	2.1	0.4
Parking Lot	400	0.7	5.1	2	2.9	47	270	0.8	0.8	0.04
HDR	420	1	4.2	0.8	2	27	170	0.8	0.7	0.03
MDR	190	0.5	2.5	0.5	1.4	13	72	0.2	0.2	0.14
LDR	10	0.04	0.03	0.02	0.1	NA	NA	0.01	0.04	0.01
Freeway	880	0.9	7.9	1.5	4.2	NA	NA	4.5	2.1	0.37
Industrial	860	1.3	3.8	0.2	1.3	NA	NA	2.4	7.3	0.5
Park	3	0.03	1.5	NA	0.3	NA	2	0	NA	NA
Construction	6000	80	NA	NA	NA	NA	NA	NA	NA	NA

HDR: High Density Residential, MDR: Medium Density Residential, LDR: Low Density Residential
NA: Not available; insufficient data to characterize loadings
Source: Horner et al, 1994

As indicated in Table 4-3, urban storm water runoff can contain significant concentrations of solids, nutrients, organics and metals. A comparison of the concentration of water quality parameters in urban runoff with the concentrations in domestic wastewater is shown in Table 4-4.

Table 4-4. Comparison of Water Quality Parameters in Urban Runoff with Domestic Wastewater (mg/l)

Constituent	Urban Runoff		Domestic Wastewater		
	Separate Sewers		Before Treatment		After Secondary
	Range	Typical	Range	Typical	Typical
COD	200-275	75	250-1,000	500	80
TSS	20-2,890	150	100-350	200	20
Total P	0.02-4.30	0.36	4-15	8	2
Total N	0.4-20.0	2	20-85	40	30
Lead	0.01-1.20	0.18	0.02-0.94	0.10	0.05
Copper	0.01-0.40	0.05	0.03-1.19	0.22	0.03
Zinc	0.01-2.90	0.02	0.02-7.68	0.28	0.08
Fecal Coliform per 100 ml	400-50,000		10^6-10^8		200

Source: Bastian, 1997

As indicated in Table 4-4, the concentrations of select water quality parameters in urban runoff is comparable to that found in untreated domestic wastewater. When untreated urban runoff is discharged directly to receiving streams, the loadings of pollutants can be much higher than the loadings attributable to treated domestic wastewater.

The following paragraphs summarize the major pollutants which are commonly found in urban storm water runoff.

4.2.1 Solids, Sediment and Floatables

Solids are one of the most common contaminants found in urban storm water. Solids originate from many sources including the erosion of pervious surfaces and dust, litter and other particles deposited on impervious surfaces from human activities and the atmosphere. Stream bank erosion and erosion at construction sites are also major sources of solids. Solids contribute to many water quality, habitat and aesthetic problems in urban waterways. Elevated levels of solids increase turbidity, reduce the penetration of light at depth within the water column, and limit the growth of desirable aquatic plants. Solids that settle out as bottom deposits contribute to sedimentation and can alter and eventually destroy habitat for fish and bottom-dwelling organisms

(see Figure 4-2). Solids also provide a medium for the accumulation, transport and storage of other pollutants including nutrients and metals. Sediment bound pollutants often have a long history of interaction with the water column through cycles of deposition, re-suspension, and re-deposition. Impaired navigation due to sedimentation represents another impact affecting recreation and commerce. The relative contribution of TSS in urban storm water from different land uses is presented in Table 4-3. As shown in Table 4-4, the typical concentration of TSS in urban runoff is substantially higher than that in treated wastewater (Bastian, 1997). Construction produces the highest loading of TSS over other urban land use categories evaluated.

Figure 4-2. Effects of Siltation on Rivers and Streams

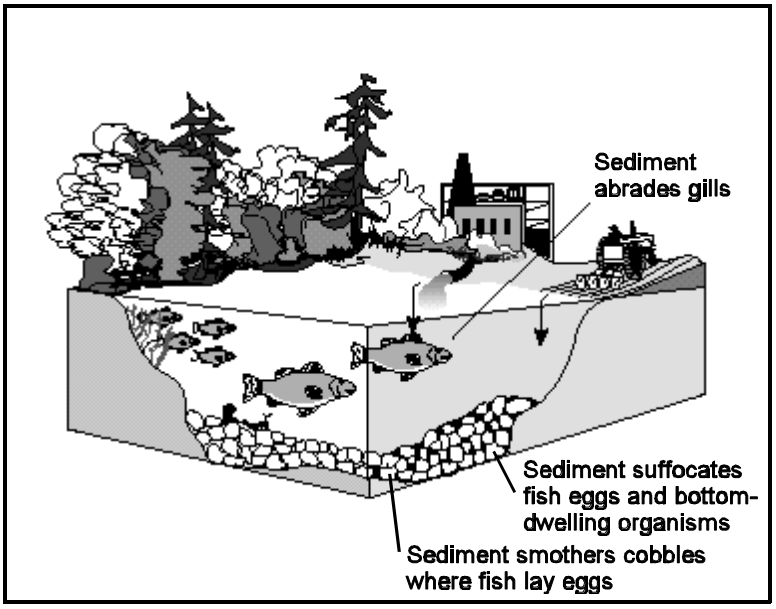

Source: US EPA, 1998d.

4.2.2 Oxygen-Demanding Substances and Dissolved Oxygen

The oxygen-demanding substances found in urban storm water can be measured by Biochemical Oxygen Demand (BOD), Chemical Oxygen Demand (COD), and Total Organic Carbon (TOC). Maintaining appropriate levels of dissolved oxygen in receiving waters is one of the most important considerations for the protection of fish and aquatic life. The amount of dissolved oxygen in urban runoff is typically 5.0 mg/l or greater, and it rarely poses a direct threat to in-stream conditions. As shown in Table 4-4, the level of COD associated with urban runoff is comparable to treated wastewater. The direct impact of urban storm water runoff on dissolved oxygen conditions in receiving waters is not thought to be substantial. However, the secondary impacts on the dissolved oxygen balance in receiving waters due to nutrient enrichment, eutrophication, and resulting sediment oxygen demand may be important.

4.2.3 Nitrogen and Phosphorus

Nitrogen and phosphorus are the principal nutrients of concern in urban storm water. The major sources of nutrients in urban storm water are urban landscape runoff (fertilizers, detergents, plant debris), atmospheric deposition, and improperly functioning septic systems (Terrene Institute, 1996). Animal waste can also be an important source. There are a number of parameters used to measure the various forms of nitrogen and phosphorus found in runoff. Ammonia (NH_3) nitrogen is the nitrogen form that is usually the most readily toxic to aquatic life. Nitrate (NO_3) and nitrite (NO_2) are the inorganic fractions of nitrogen. Very little nitrite is usually found in storm water. Total Kjeldahl nitrogen (TKN) measures the organic and ammonia nitrogen forms. By subtraction, the organic fraction can be determined. Total phosphorus measures the total amount of phosphorus in both the organic and inorganic forms. Ortho-phosphate measures phosphorus that is most immediately biologically available. Most of the soluble phosphorus in storm water is usually present in the ortho-phosphate form.

The degree to which nitrogen and phosphorus are present in a river, lake or estuary can determine the trophic status and amount of algal biomass produced. Excess nutrients tend to increase primary biological productivity. The major impact associated with nutrient over-enrichment is excessive growth of algae that leads to nuisance algal blooms and eutrophic conditions. A secondary impact is the residual negative effect of decomposing algae in the form of sediment oxygen demand that depletes dissolved oxygen concentrations, particularly in bottom waters. The NURP study reported that nutrient levels in urban runoff appear not to be high in comparison with other possible discharges. However, more recent studies and programs have recognized that the amount of nitrogen and phosphorus present in urban storm water can be substantial, and becomes increasingly important as other point sources of nutrients are brought under control. Walker (1987) reported that “cause-effect relationships linking urban development to lake and reservoir eutrophication are well established,” and that “urban watersheds typically export 5 to 20 times as much phosphorus per unit per year, as compared to undeveloped watersheds in a given region.” The nutrient loadings from different urban and suburban land uses are presented in Table 4-3. As shown in Table 4-4, the total phosphorus and total nitrogen concentrations in urban runoff are substantially less than treated wastewater concentrations, but storm water volumes can be greater during wet weather events.

4.2.4 Pathogens

Pathogens are disease-producing organisms that present a potential public health threat when they are present in contact waters. Since storm water runoff typically does not come into contact with domestic wastewaters, and direct exposure to runoff is usually limited, there is generally little threat of pathogens in storm water runoff causing a public health risk. However, where runoff is discharged to recreational waters such as beaches and lakes, or where runoff comes into contact with shellfish beds, there is a potential public health risk associated with pathogen contamination.

There are a number of indicator organisms that have been used to evaluate the presence of harmful pathogens in storm water runoff. Several strains of bacteria are present naturally in the soil and can be transported by runoff. In addition, BMPs with standing water can be breeding grounds for naturally occurring bacteria. Therefore, interpretation of bacteriological sampling results can be difficult. Nevertheless, indicator organisms can provide useful insight into the public health risk associated with runoff. Fecal coliform has been widely used as an indicator for the presence of harmful pathogens in domestic wastewaters, and therefore studies characterizing storm water runoff have frequently used this indicator as well. Other bacterial indicators that have been used to evaluate the presence of harmful pathogens in storm water runoff include *Escherichia coli*, *streptococci* and *enterococci*. The presence of enteric viruses has also been evaluated in storm water runoff, as well as protozoans such as *Giardia lamblia* and *cryptosporidium*.

Fecal coliform concentrations in urban runoff were evaluated by NURP at 17 sites for 156 storm events. NURP reported that coliform bacteria are present at high levels in urban runoff and can be expected to exceed EPA water quality criteria during and immediately after storm events in many surface waters, even those providing high degrees of dilution. Concentrations of fecal coliform found by NURP exhibited a large degree of variability, and did not indicate any distinctions based on land use. Data from different sites did show a dramatic seasonal effect on coliform concentrations. Coliform counts in urban runoff during warmer periods of the year were found to be approximately 20 times greater that those found during colder periods. Based on this data, NURP concluded that coliform sources unrelated to those traditionally associated with human health risk may be significant.

The Terrene Institute (1996) reported that the primary sources of pathogens in urban storm water drains are animal wastes (including pets and birds), failing septic systems, illicit sewage connections, and boats and marinas. Field et al (1993) reported pathogens levels from storm water runoff and urban streams as shown in Table 4-5. Pathogens enumerated included bacteria (total and fecal coliform, fecal streptococci, enterococci, *Pseudomonas aeruginosa*, *Staphylococcus aureus*, and *Salmonella*) and enteroviruses (poliovirus, Coxsackie virus, and Echovirus).

Table 4-5. Densities of Selected Pathogens and Indicator Microorganisms in Storm Water in Baltimore, Maryland Area

Geometric Mean Densities								
Sampling Station	Entero-virus	*Salmon sp.*	*Pseudomon. aeruginosa*	*Staph. aureus*	Total Coliform	Fecal Coliform	Fecal Strep.	*Enterococci*
	PFU/ 10 L	MPN/ 10 L	MPN/ 10 L	MPN/ 100 mL	MPN/ 100 mL (10^4)	MPN/ 100 mL (10^3)	No./ 100 mL (10^4)	No./100 mL (10^4)
Bush St.	6.9	30	2000	120	38	83	56	12
Northwood	170	5.7	590	12	3.8	6.9	5	2.1

PFU: Plaque-forming units
MPN: Most Probable Number
Source: Field et al, 1993

As shown earlier in Table 4-4, typical fecal coliform concentrations for separate urban storm sewers varied widely, ranging between 400-50,000 mpn/100 ml. An example of fecal coliform concentrations measured in sheet flow associated with different impervious surfaces is presented in Table 4-6. The broad range in concentrations illustrates the highly variable nature of fecal coliform concentrations in storm water.

Table 4-6. Fecal Coliform Concentrations Collected in Sheetflow from Urban Land Uses

Land Use	**Median (MPN/100 ml)**	**Range (MPN/100 ml)**
Unpaved driveways and storage areas	26	0.02-300
Roof runoff	1.6	0.56-2.6
Sidewalks	55	19-90
Paved parking and driveways	2.8	0.03-66
Paved roads	19	1.8-430

MPN: Most Probable Number
Source: Field et al, 1993.

4.2.5 Petroleum Hydrocarbons

Petroleum hydrocarbons include oil and grease; the “BTEX” compounds: benzene, toluene, ethyl benzene, and xylene; and a variety of polynuclear aromatic hydrocarbons (PAHs). Sources of petroleum hydrocarbons include parking lots and roadways, leaking storage tanks,

auto emissions, and improper disposal of waste oil. Petroleum hydrocarbons are typically concentrated along transportation corridors.

Petroleum hydrocarbons are known for their acute toxicity at low concentrations (Schueler, 1987). A study by Shepp (1996) measured the petroleum hydrocarbon concentrations in urban runoff from a variety of impervious areas in the District of Columbia and suburban Maryland. The amount of car traffic affects the concentration of hydrocarbons in runoff, with median concentrations ranging from 0.7 to 6.6 mg/l. Concentrations at these levels exceed the maximum concentrations recommended for the protection of drinking water supplies and fisheries protection. As pointed out by Shepp, the maximum concentration of petroleum hydrocarbons for protection of fisheries is 0.01 to 0.1 mg/l.

4.2.6 Metals

The primary sources of metals in urban storm water are industry and automobiles. Atmospheric deposition (both wet and dry) can make a substantial contribution in some parts of the country. A major finding of the NURP study is as follows:

> Heavy metals (especially copper, lead and zinc) are by far the most prevalent priority pollutant constituents found in urban runoff. End-of-pipe concentrations exceed EPA ambient water quality criteria and drinking water standards in many instances. Some of the metals are present often enough and in high enough concentrations to be potential threats to beneficial uses.

Metals in urban storm water have the potential to impact water supply and cause acute or chronic toxic impacts for aquatic life. Typical pollutant loading rates and urban runoff concentrations for lead, zinc and copper are presented in Tables 4-3 and 4-4. The frequency with which metals were detected as priority pollutants in the NURP study is presented in Table 4-7.

Table 4-7. Most Frequently Detected Priority Pollutants in Nationwide Urban Runoff Program Samples (1978-83)

Inorganics	Organics
Detected in 75% or more	
94% Lead 94% Zinc 91% Copper	None
Detected in 50-74%	
58% Chromium 52% Arsenic	None
Detected in 20-49%	
48% Cadmium 43% Nickel 23% Cyanides	22% Bis(2-ethylhexyl)phthalate 20% α-Hexachloro-cyclohexane
Detected in 10-19%	
13% Antimony 12% Beryllium 11% Selenium	19% α-Endosulfan 19% Pentachlorophenol* 17% Chlordane* 15% Lindane* 15% Pyrene** 14% Phenol 12% Phenanthrene** 11% Dichloromethane 10% 4-Nitrophenol 10% Chrysene** 10% Fluoranthene**

* Chlorinated hydrocarbon
** Polynuclear aromatic hydrocarbon
Source: US EPA, 1983

A major study of the quality of Wisconsin storm water (Bannerman et al, 1996) found that the probability of event mean concentrations for some metals (particularly copper and zinc) exceeding Wisconsin water quality criteria for cold water fish communities was high (Table 4-8). A study in Coyote Creek, California reported lead and zinc levels from urban runoff of 100 to 500 times the concentration in the ambient water column (Pitt, 1995).

Table 4-8. Probability of Event Mean Concentration of Constituents in Wisconsin Storm Water Exceeding Wisconsin Surface Water and Ground Water Quality Standards: Metals

Constituent	Probability of exceeding acute toxicity criteria for cold water fish communities (percent)	
	Storm Sewers	Streams
Cadmium, total recoverable	11	0
Copper, total recoverable	87	9
Lead, total recoverable	18	0
Silver, total recoverable	20	-
Zinc, total recoverable	91	7

Source: Bannerman et al, 1996.

4.2.7 Synthetic Organic Compounds

Synthetic organic compounds include a variety of manufactured compounds covering pesticides, solvents and household and industrial chemicals. The frequency that synthetic inorganics were detected as priority pollutants in the NURP study is presented in Table 4-7. In general, organic contaminants were found in less than 20 percent of samples. Nevertheless, synthetic organics do represent a threat. Even low concentrations of some synthetic organics over a long period of time have the potential to pose a severe health risks to humans and aquatic life though direct ingestion or bioaccumulation in the food chain. There is also some evidence that pesticides are found in higher concentrations in urban areas than agricultural areas (US EPA, 1995b). Further, Bannerman et al found that the probability for storm water and urban stream samples to exceed human cancer criteria for public water supply, and toxicity criteria for coldwater fish communities equaled or approached 100 percent for 10 compounds (Table 4-9).

Table 4-9. Probability of Event Mean Concentration of Constituents in Wisconsin Storm Water Exceeding Wisconsin Surface Water and Ground Water Quality Standards: Synthetic Organic Compounds

Constituent (Human cancer criteria for public water supply/ coldwater fish communities)	**Probability of exceedance (percent)**	
	Storm Sewers	**Streams**
Benzo[a]anthracene	98	100
Benzo[a]pyrene	99	100
Benzo[b]fluoranthene	100	100
Benzo[ghi]perylene	99	100
Benzo[k]fluoranthene	99	99
Chrysene	100	100
Indeno pyrene	100	99
Phenanthrene	100	99
Pyrene	100	100
DDT	98	100

Source: Bannerman et al, 1996

4.2.8 Temperature

Water temperature is an important measure of water quality. As described by Malina (1996), "the temperature of water affects some of the important physical properties and characteristics of water, such as… specific conductivity and conductance, salinity, and the solubility of dissolved gases (e.g., oxygen and carbon dioxide)." Specifically, water holds less oxygen as it becomes warmer, resulting in less oxygen being available for respiration by aquatic organisms. Furthermore, elevated temperatures increase the metabolism, respiration, and oxygen demand of fish and other aquatic life, approximately doubling the respiration for a 10°C (18°F) temperature rise; hence the demand for oxygen is increased under conditions where supply is lowered (California SWRCB, 1963).

Certain species of fish, such as salmon and trout, are particularly sensitive and require relatively low water temperatures. Even lower temperatures are required for spawning and egg

hatching (US EPA, 1976). If the temperature of a stream reach is raised by 5 to 10°C (9 to 18°F), it is probable that such cold-water game fish will avoid this reach and that they will be replaced by "rougher," more tolerant fish (California SWRCB, 1963). Thus, even without direct mortality, the character of the fish life will change. Sudden changes in temperature directly stress the aquatic ecosystem. The states have adopted varying criteria to protect fisheries from such stresses. Typically, states limit in-stream temperature rises above natural ambient temperatures to 2.8°C (5°F). Allowable temperature rises in streams that support cold water fisheries may be lower, with some states adopting values as low as 1°C (1.8°F) and 0.6°C (1°F) (US EPA, 1988).

The temperature of urban waters is often affected directly by urban runoff. Urban runoff can be heated as it flows over rooftops, parking lots and roadways. When it reaches urban waterways it can cause a temporary fluctuation in the in-stream water temperature. Other factors that tend to increase summer water temperature in urban waters include the removal of vegetation from stream banks, reduced ground water baseflow, and discharges from storm water facilities with elevated water temperature. Frequent fluctuations in stream temperature stress the aquatic ecosystem, and make it difficult for temperature-sensitive species to survive.

Galli (1990a) undertook a major study of thermal impacts associated with urbanization and storm water management in Maryland. Temperature observations were taken at stream stations representing different levels of development, with impervious cover ranging from 1 percent to 60 percent. Results were compared with Maryland Class III standards for natural trout waters (68 °F) and Class IV standards for recreational trout waters (75 °F). As shown in Figure 4-3, streams in developed watersheds (Lower Whiteoak and Tanglewood Stations) have significantly higher spring and summer temperatures than streams in less developed watersheds. Galli also found that "imperviousness together with local meteorological conditions had the largest influence on urban stream temperatures." As shown in Figure 4-4, the rate of increase in baseflow water temperature in this study was determined to be 0.14 °F for each one percent increase in watershed imperviousness.

Figure 4-3. Relationship Between Increasing Imperviousness and Urban Stream Temperature

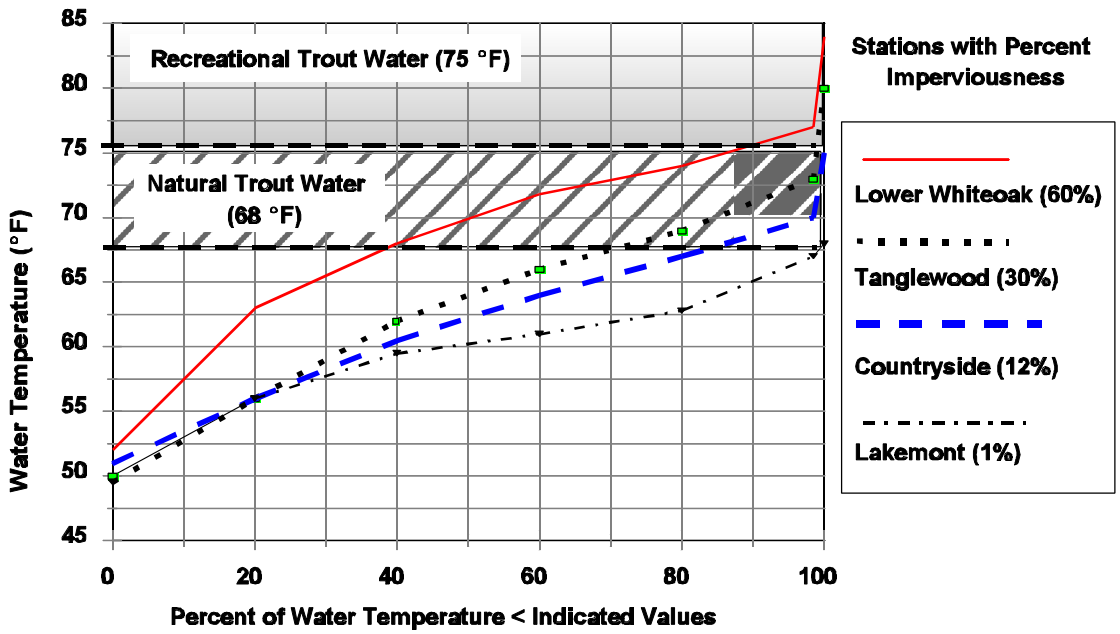

Source: Galli, 1990a

Figure 4-4. Relationship Between Watershed Imperviousness and Baseflow Water Temperature

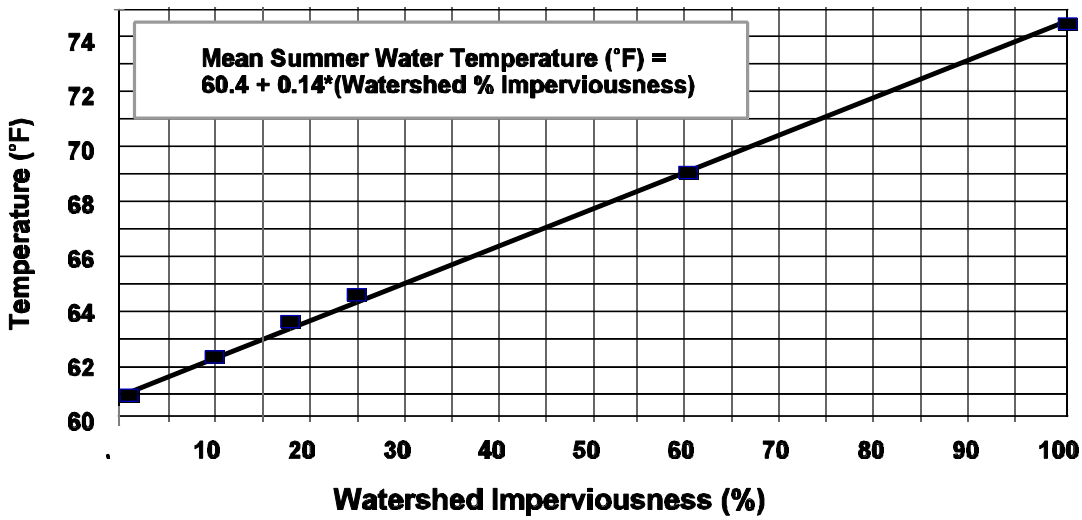

Source: Galli, 1990a

4.2.9 pH

As pointed out by Novotny and Olem (1994), "most aquatic biota are sensitive to pH variations," and "fish kills and reduction and change of other species result when the pH is altered outside their tolerance limits." Most pH impacts in urban waters are caused by runoff of rainwater with low pH levels (acid precipitation). In fact, urban areas tend to have more acidic rainfall than less developed areas. Some buffering of low pH rainwater occurs during contact with buildings, parking lots, roads and collection systems, and during overland flow. This is often very site specific. The alkalinity and thus the capacity of receiving waters to neutralize acidic storm water can also be important, and again is very site specific. Examples of pH impacts on fish populations are difficult to identify due to the cumulative, overlapping impacts from other factors. However, it is thought that the acidification problem in both the United States and Canada grows in magnitude when "episodic acidification" (brief periods of low pH levels from snow melt or heavy downpours) is taken into account (US EPA, 1992a). The spring snow melt can coincide with fish spawning periods.

4.3 Reported Impacts of Urban Storm Water

Urban runoff, which includes runoff from impervious surfaces such as streets, parking lots, buildings, lawns and other paved areas is one of the leading causes of water quality impairment in the United States. Based on the 1996 state Water Quality Inventory reports, siltation (sediment discharged from urban runoff, as well as construction sites, agriculture, mining and forests) is the leading cause of impaired water quality in rivers and streams. In the portion of the inventory identifying sources, urban runoff was listed as the leading source of pollutants causing water quality impairment related to human activities in ocean shoreline waters and the second leading cause in estuaries across the nation. Urban runoff was also a significant source of impairment in rivers and lakes. Urban runoff accounts for 47 percent of impaired miles of surveyed ocean shoreline, 46 percent of the impaired square miles of surveyed estuaries, 22 percent of the impaired acres of surveyed lakes and 14 percent of the impaired miles of surveyed rivers. Figure 4-5 illustrates the level of impairment attributable to urban storm water runoff based on states' Water Quality Inventory assessment reports.

Figure 4-5. Proportions of Impaired Water Bodies Attributed to Urban Runoff

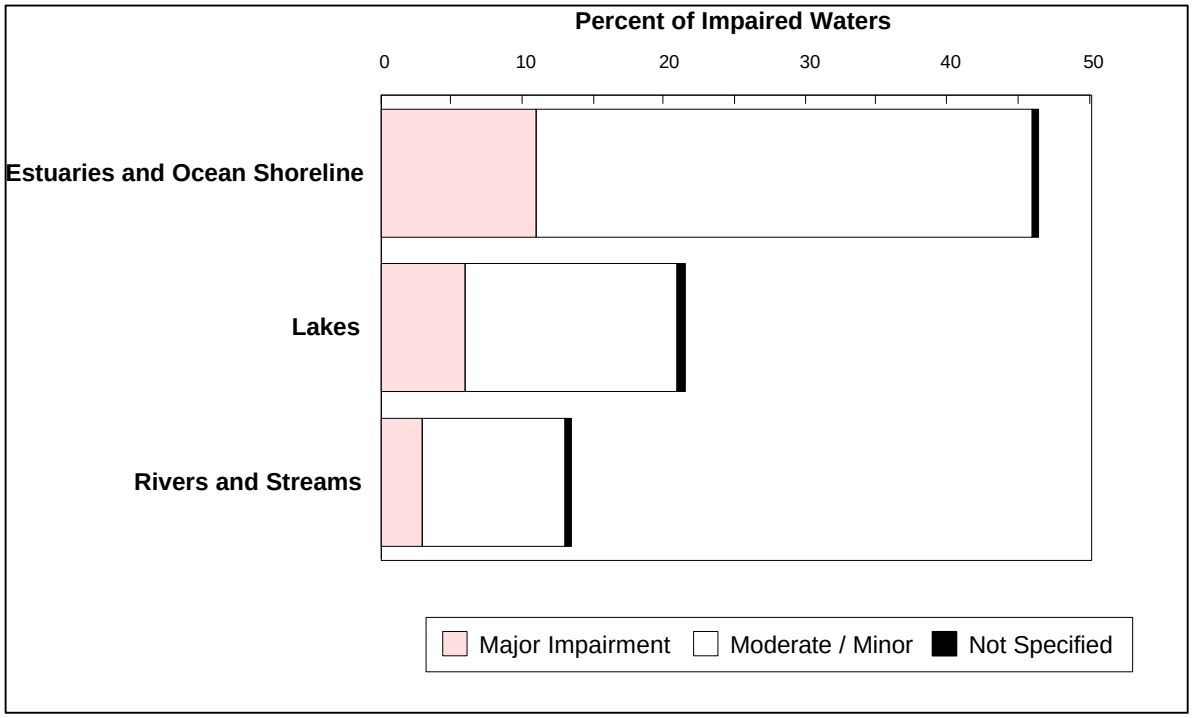

Source: EPA, 1998d.

4.3.1 Flow Impacts

The volume and flow rate of storm water discharges can have significant impacts on receiving streams. In many cases, the impacts on receiving streams due to high storm water flow

rates or volumes can be more significant than those attributable to the contaminants found in storm water discharges. While studies linking increased storm water flows due to urbanization to stream degradation are generally lacking in quantitative data, there are a number of studies that support this hypothesis. EPA summarized studies which contain documented evidence of impacts on steams due to urbanization (US EPA, 1997a). Impacts of urbanization and increased storm water discharges to receiving streams documented in this evaluation include:

- Increase in the number of bankfull events and increased peak flow rates
- Sedimentation and increased sediment transport
- Frequent flooding
- Stream bed scouring and habitat degradation
- Shoreline erosion and stream bank widening
- Decreased baseflow
- Loss of fish populations and loss of sensitive aquatic species
- Aesthetic degradation
- Changes in stream morphology
- Increased temperatures.

The amount of runoff generated within a watershed increases steadily with development. The presence of impervious areas such as roofs, parking lots and highways limits the volume of rain water infiltrated into the soil, and increases the amount of runoff generated. Urbanized areas also tend to have reduced storage capacities for runoff because of regrading, paving, and the removal of vegetative cover. Decreases in infiltration and evapotranspiration and an increase in runoff are the result of urbanization, with runoff volume linked to the percent of impervious area. The relationship between runoff coefficient and percent impervious area is illustrated in Figure 4-6.

Figure 4-6. Relationship of Watershed Imperviousness to Runoff Coefficient Levels

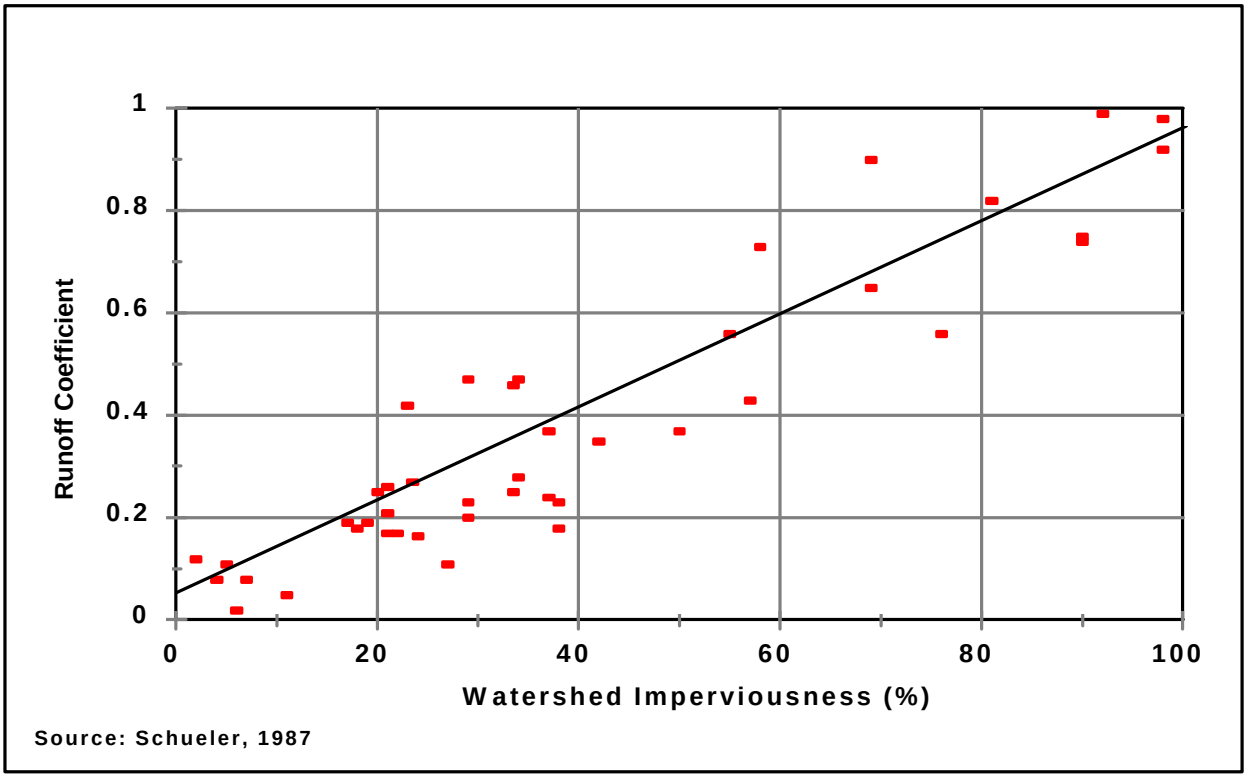

As shown in Table 4-10, the physical impacts to streams associated with increased imperviousness are substantial (US EPA, 1997a).

Table 4-10. Impacts from Increases in Impervious Surfaces

Increased Imperviousness Leads to:	Resulting Impacts				
	Flooding	Habitat loss	Erosion	Channel Widening	Stream bed Alteration
Increased Volume	✔	✔	✔	✔	✔
Increased Peak Flow	✔	✔	✔	✔	✔
Increased Peak Duration	✔	✔	✔	✔	✔
Increased Stream Temp.		✔			
Decreased Base Flow		✔			
Changes in Sediment Loading	✔	✔	✔	✔	✔

Source: EPA, 1997

The Delaware Department of Natural Resources and Environmental Control also identified a list of impacts on physical stream habitat attributed to urban storm water (DE DNREC, 1997). This list is as follows:

- Accelerated bank erosion
- Accelerated bank undercutting
- Increased siltation (burial of stable habitats)
- Elimination of meanders (channelization)
- Channel widening
- Reduced depth
- Reduced baseflow
- Loss of shade
- Increased temperature.

Specific impacts in the areas of flooding, stream bank erosion, and ground water recharge are described in the following subsections.

Flooding

Urbanization increases the frequency and severity of flooding due to increased runoff. Because of the decreased availability of pervious, permeable surfaces, and the related decrease in storage capacity, smaller more frequently occurring storms can create flooding problems. Hydrographs in urban streams peak higher and faster than streams in undeveloped areas. A comparison of estimated runoff volume and peak discharge for developed and undeveloped areas is presented in Table 4-11. As shown, both runoff volume and peak discharge are substantially increased under developed conditions.

Table 4-11. Comparison of Estimated Runoff Volume and Peak Discharge for Developed and Undeveloped Areas

Storm Frequency (years)	Undeveloped Conditions (Woods in good condition)		Developed Conditions (Half-Acre Residential)	
	Estimated Runoff (in)	Estimated Peak Discharge (cfs)	Estimated Runoff (in)	Estimated Peak Discharge (cfs)
2	0.14	1.00	0.60	11.6
10	0.52	5.60	1.33	27.4
100	1.40	19.7	2.64	58.6

Source: Horner et al, 1994

The effects of urbanization on stream shape and the flood plain are illustrated in Figure 4-7. Increased peak discharge raises the flood plain level, flooding areas which were previously not at risk.

Figure 4-7. Effect of Urbanization on Stream Slope and Flooding

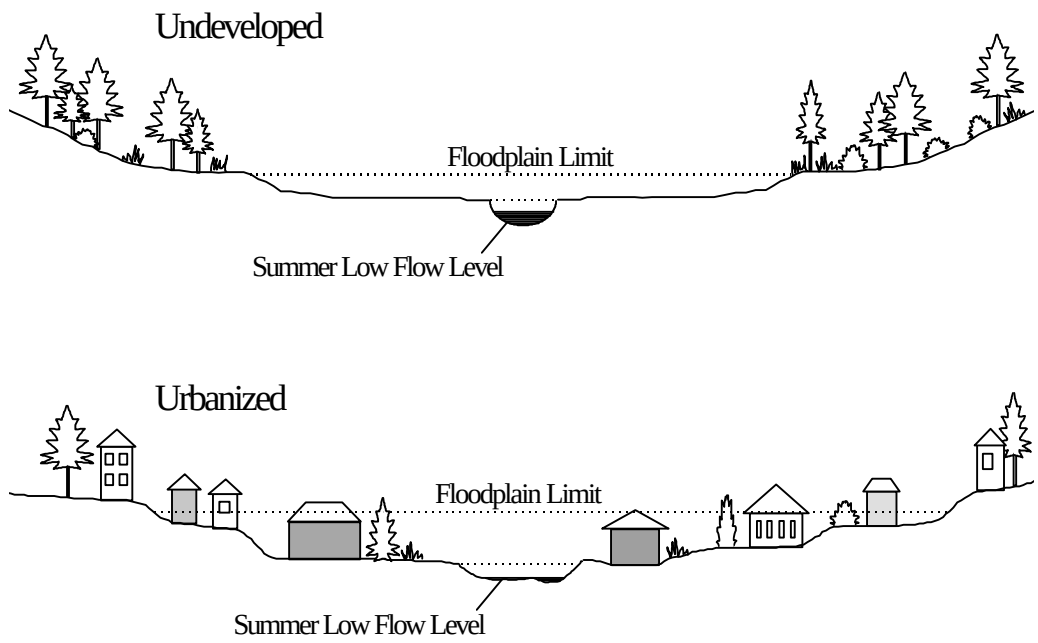

Source: Adapted from Schueler, 1987

A comparison of hydrographs from an urbanized stream (Lincoln Creek) and a non-urbanized stream (Jackson Creek) in Wisconsin are presented in Figure 4-8 (Masterson and Bannerman, 1994). As illustrated, the hydrograph for the urbanized stream exhibits a much higher peak flow rate that would correspond to a higher flood level.

Figure 4-8. Hydrographs for Urban and Non-Urban Streams

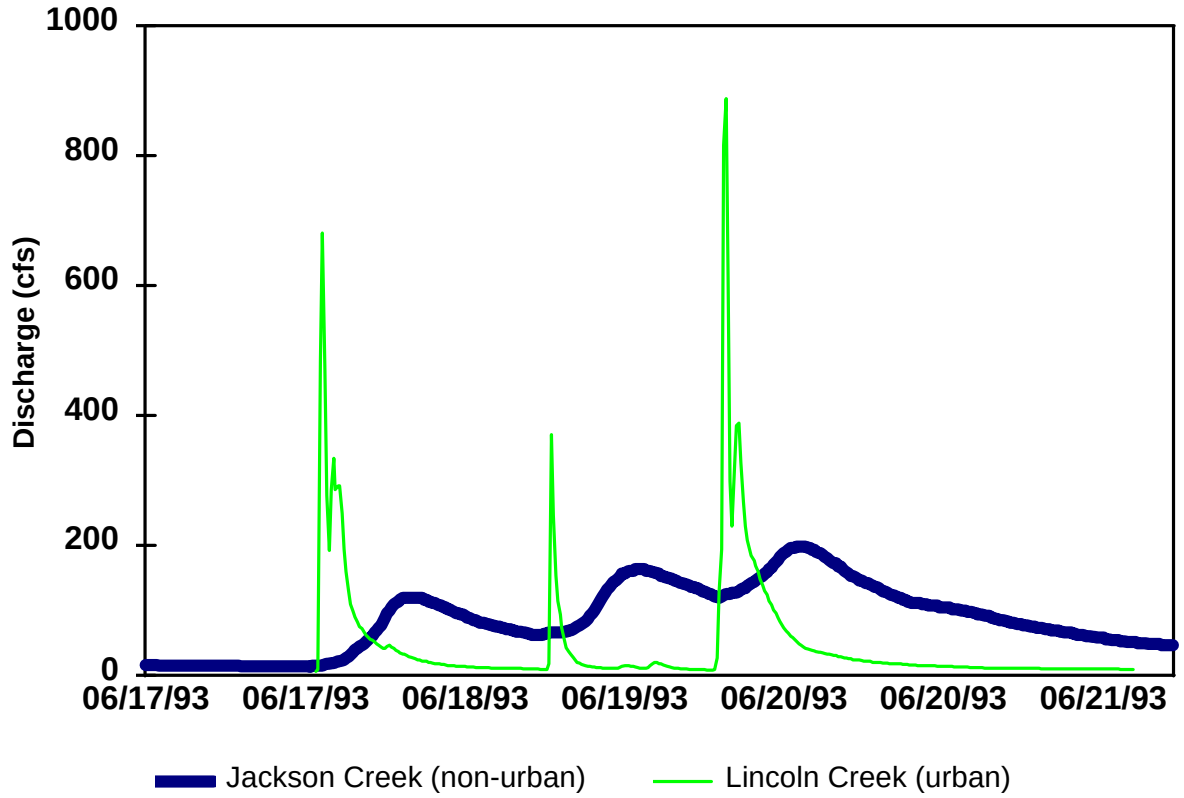

Source: Masterson and Bannerman, 1994

Stream Bank Erosion

Stream bank erosion is a natural phenomenon and source of both sediment and nutrients. However, urbanization can greatly accelerate the process of stream bank erosion. As the amount of impervious area increases, a greater volume of storm water is discharged directly to receiving waters, often at a much higher velocity. The increased volume and velocity of the runoff can overwhelm the natural carrying capacity of the stream network. In addition, streams in urbanized areas can experience an increase in bankfull flows. Since bankfull flows are highly erosive, substantial alterations in stream channel morphology can result.

Excessive bank erosion occurs as streams become wider and straighter to accommodate greater flows and an excess number of erosion-causing events. Signs of stream bank erosion attributable to increased storm water include undercut and fallen stream banks, felled bushes and

trees along the banks, and exposed sewer and utility pipes. Sediments from eroding banks (and upland construction) are deposited in areas where the water slows, causing buildup, destruction of benthic habitat, and a decreased stream capacity for flood waters. This ultimately results in a greater potential for further erosion.

Krug and Goddard (1986) documented these phenomena in their study of Pheasant Branch, a developing watershed of 24.5 square miles near Middleton, Wisconsin. Local population grew markedly between 1970 to 1980, from 8,246 to 11,851, and is projected to reach 18,000 by the year 2000. Problems of stream channel erosion and suspended sediment developed in Pheasant Branch as a result of this growth. The increased erosion and sediment loadings have decreased the mean stream bed elevation by almost 2 feet, and increased the mean channel width by nearly 35 percent.

Table 4-12 shows the modeled percent increase at three sites for the volume of the 2-year flood, bankfull width, and bankfull depth under two development scenarios. These are the projected development levels in the year 2000 (projected urbanization), and complete urbanization of the watershed. The projected results are shown relative to pre-development conditions.

Table 4-12. Percent Increase of Two-Year Flood, Bankfull Width, and Bankfull Depth from Pre-Development Conditions to Urbanized Conditions (Based on Modeling Results)

Site	Projected Urbanization			Complete Urbanization		
	2-year	Width	Depth	2-year	Width	Depth
	(Percent Increase from Pre-urbanization)			(Percent Increase from Pre-urbanization)		
Site 1	99	40	30	140	60	40
Site 2	324	110	80	361	110	80
Site 3	32	10	10	224	80	60

Source: EPA, 1997a

An example of the impact of urbanization on increased sediment loadings in several small streams in Wisconsin before, during and after development is illustrated in Figure 4-9 (Krug and Goddard, 1986). Sediment loads are greatest during construction, but remain elevated after construction relative to pre-development conditions.

Figure 4-9. Sediment Loadings on Small Streams in Wisconsin

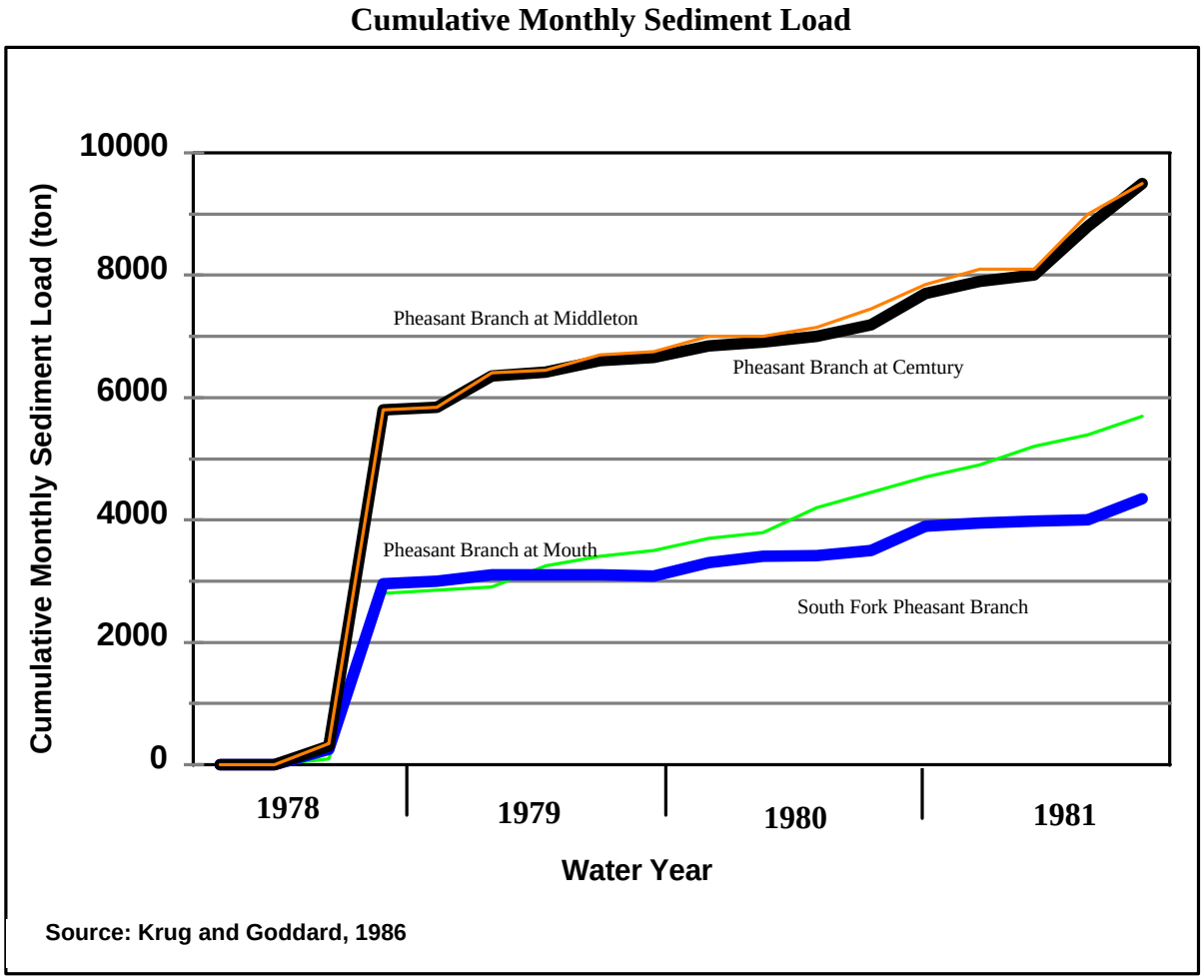

Ground Water Recharge

Urbanization can have a major impact on ground water recharge. As shown earlier in Figure 4-1, both shallow and deep infiltration decrease as watersheds undergo development and urbanization. Ground water recharge is reduced along with a lowering of the water table. This change in watershed hydrology alters the baseflow contribution to stream flow, and it is most pronounced during dry periods. Ferguson (1990) points out that "base flows are of critical environmental and economic concern for several reasons. Base flows must be capable of absorbing pollution from sewage treatment plants and non-point sources, supporting aquatic life dependent on stream flow, and replenishing water-supply reservoirs for municipal use in the seasons when [water] levels tend to be lowest and water demands highest."

Base flows on Long Island, New York were substantially impacted by the construction of storm water conveyance systems during the period of rapid development between the 1940s and

1970s. As illustrated in Table 4-13, a steady decline in the average percent of baseflow was observed for streams in urbanized sewered areas relative to streams in un-sewered or rural areas (US EPA, 1997a).

Table 4-13. Average Percent Base Flow of Selected Streams on Long Island by Area

Years	Urbanized Sewered Area (% Flow from Base Flow)		Urbanized Un-sewered Area (% Flow from Base Flow)		Rural Un-sewered Area (% Flow from Base Flow)	
	Stream 1	Stream 2	Stream 1	Stream 2	Stream 1	Stream 2
1948-1953	(No data)	86	84	94	96	95
1953-1964	63	69	89	89	95	97
1964-1970	17	22	83	84	96	97

Source: US EPA, 1997a

4.3.2 Habitat Impacts

Natural ecosystems are a complex arrangement of interactions between the land, water, plants, and animals. The relationship between storm water discharge and the biological integrity of urban streams is illustrated in Figure 4-10 (Masterson and Bannerman, 1994). As shown, habitat is impacted by changes in both water quality and quantity, and the volume and quality of sediment. As reported by Schueler (1987), “no single factor is responsible for the progressive degradation of urban stream ecosystems. Rather, it is probably the cumulative impacts of many individual factors such as sedimentation, scouring, increased flooding, lower summer flows, higher water temperatures, and pollution.”

Figure 4-10. Relationship Between Urban Storm Water and Aquatic Ecosystems

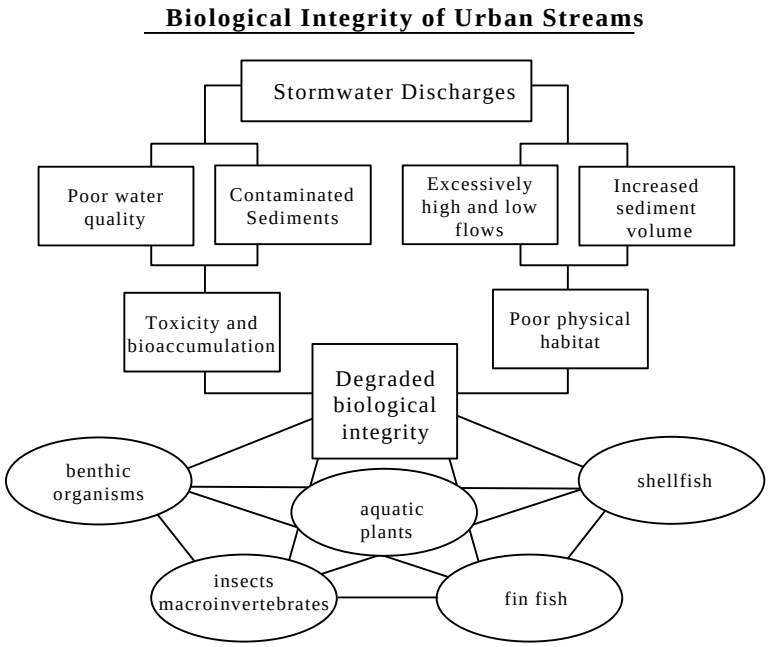

Source: Adapted from Masterson and Bannerman, 1994

Schueler and Claytor (1995) also suggest a direct relationship between watershed imperviousness and stream health (Figure 4-11), and found that stream health impacts tend to begin in watersheds with only 10-20 percent imperviousness (the ten percent threshold). As shown, sensitive streams can exist relatively unaffected by urban storm water with good levels of stream quality where impervious cover is less than 10 percent although some sensitive streams have been observed to experience water quality impacts at as low as 5 percent imperviousness. Impacted streams are threatened and exhibit physical habitat changes (erosion and channel widening) and decreasing water quality where impervious cover is in the range of 10 to 25 percent. Streams in watersheds where the impervious cover exceeds 25 percent are typically degraded, have a low level of stream quality, and do not support a rich aquatic community.

Figure 4-11. Relationship Between Impervious Cover and Stream Quality

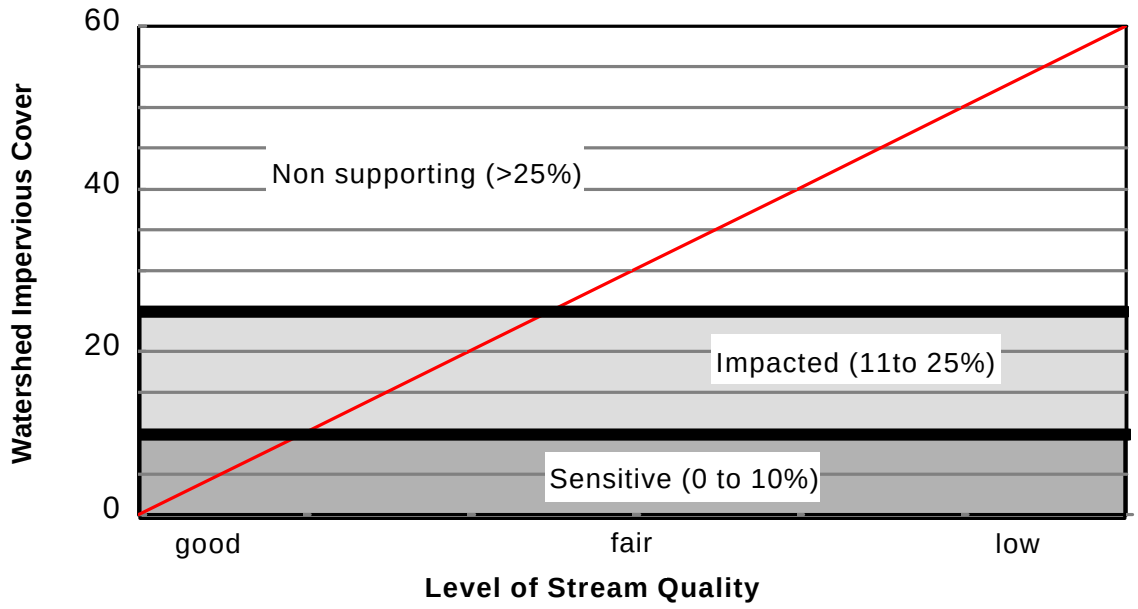

Source: Schueler and Claytor, 1995

A summary of water quality impacts on habitat is presented in Table 4-14. The alteration of species distribution is the major impact, with pollutant tolerant and less sensitive species replacing native species in storm water impacted receiving waters.

Table 4-14. Water Quality Parameters Affecting Habitat

Water Quality Parameter	Habitat Effect
Bacteria	Contamination
Heavy metals	Alteration of species distribution
Toxic organics	Alteration of species distribution
Nutrients	Eutrophication, algal blooms
Sediment	Decreased spawning areas
BOD	Reduced dissolved oxygen levels
Temperature	Reduced dissolved oxygen levels
pH	Alteration of species distribution

Figure 4-12 illustrates that the pH tolerance of various forms of aquatic life varies substantially (US EPA, 1992b). The tolerance of aquatic life to changes in temperature, turbidity and toxic substances is also very important. Contaminants like heavy metals, pesticides, and hydrocarbons can alter the species distribution in receiving waters. Acute and chronic toxicity impacts may also occur. The relative toxicity of storm water samples from a variety of loading source areas is presented in Table 4-15. Some of the identified chronic toxicity effects are decreased growth and respiration rates (US EPA, 1996a). Toxic loads can reduce the hatching and survival rates of aquatic organisms, cause gross effects such as lesions or fin erosion in fish, and can eventually destroy the entire population of some sensitive species (Novotny and Olem, 1994). Hydrocarbons can be especially detrimental to benthic organisms because they can become bound to urban runoff sediments (Schueler, 1987).

Figure 4-12. Low pH Tolerance by Different Species

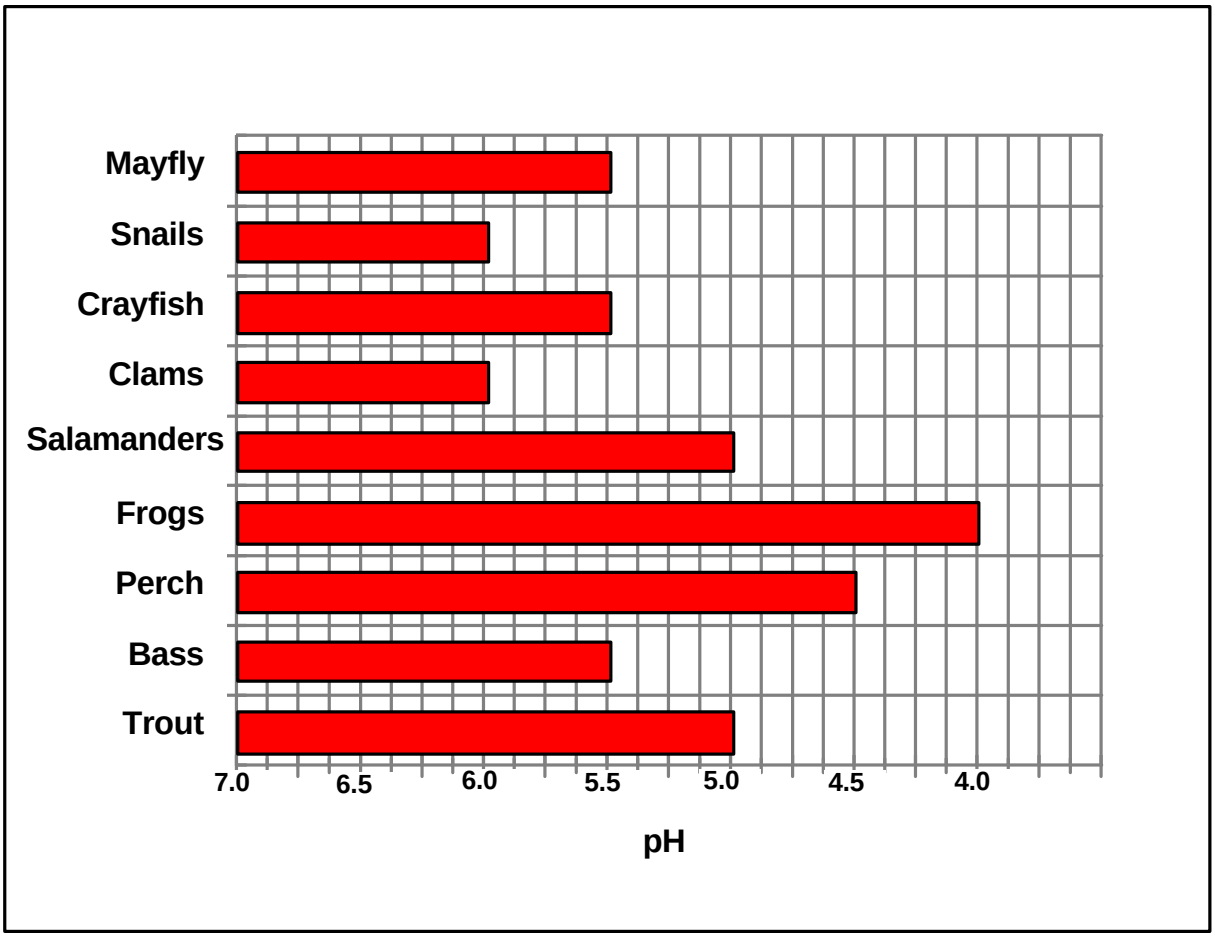

Source: EPA, 1992b

Table 4-15. Relative Toxicities of Samples Using Microtox® Measurement Method

Local Source Areas	Highly Toxic (%)	Moderately Toxic (%)	Not Toxic (%)
Roofs	8	58	33
Parking areas	19	31	50
Storage areas	25	50	25
Streets	0	67	33
Loading docks	0	67	33
Vehicle service areas	0	40	60
Landscaped areas	17	17	66
Urban creeks	0	11	89
Detention ponds	8	8	84
All source areas	9	32	59

Note: Microtox® results are primarily for comparison purposes.
Source: Pitt et al, 1995.

The physical impacts to streams due to urbanization and changes in watershed hydrology also cause many habitat changes. As illustrated in the comparison of healthy and eroding stream banks in Figure 4-13, loss of depth, sediment deposition, loss of shoreline vegetation, and higher temperatures combine to impact habitat.

Figure 4-13. Comparison of a Healthy Stream Bank and an Eroding Bank

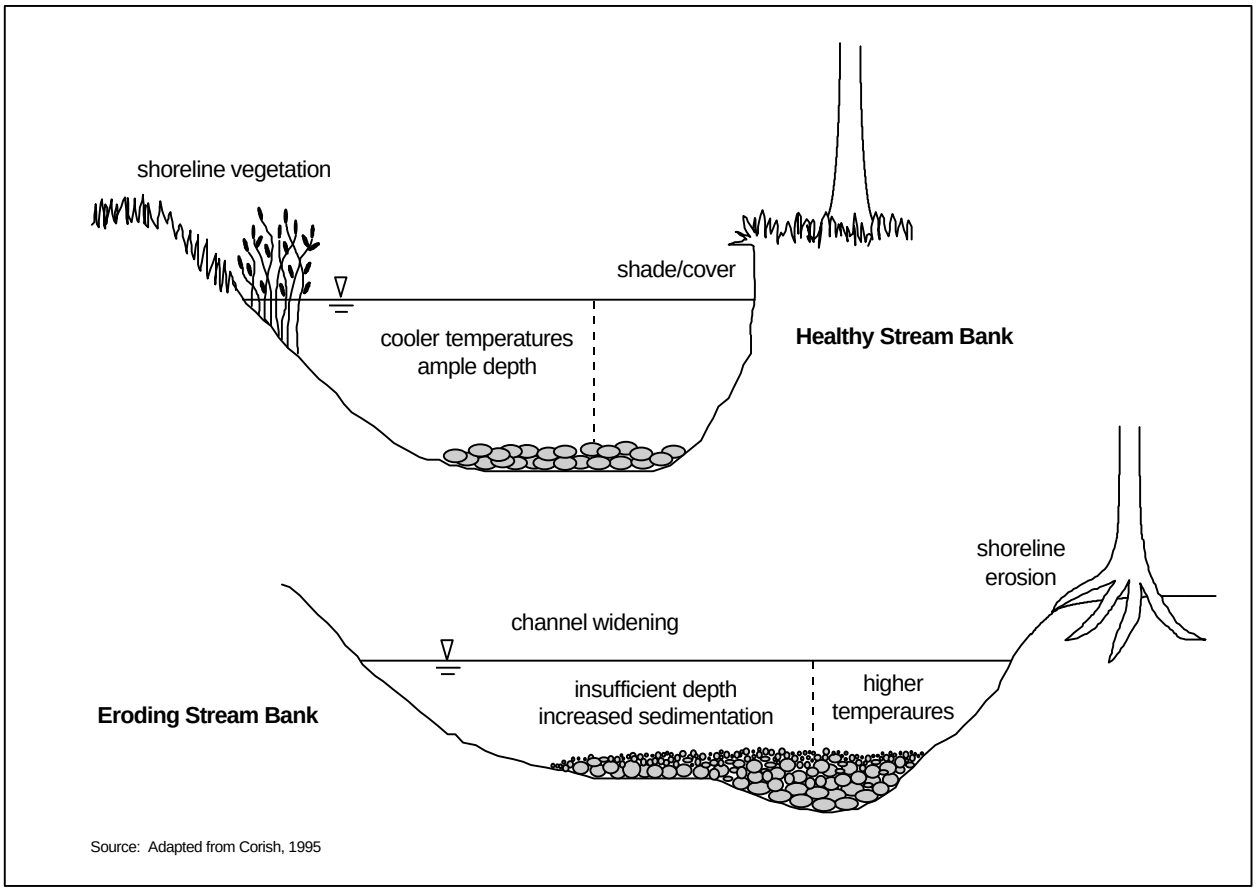

Schueler (1987) states that sediment pollution in the form of increased suspended solids can cause the following harmful impacts to aquatic life:

- Increased turbidity
- Decreased light penetration
- Reduced prey capture for sight feeding predators
- Clogging of gills/filters of fish and aquatic invertebrates
- Reduced spawning and juvenile fish survival.

Sediment is also a carrier of metals and other pollutants, and a source of bioaccumulating pollutants for bottom feeding organisms. The rate of bioaccumulation is widely variable based upon site specific conditions including species, concentration, pH, temperature, and other factors. Barron (1995) reports that the bioaccumulation of organic contaminants results primarily from direct exposure to water and sediment rather than through the food chain.

Macroinvertebrate Impacts

The biological integrity of receiving waters impacted by urban storm water is typically reduced from more pristine, undeveloped circumstances. Impacts include a reduction in total numbers and diversity of macroinvertebrates, and the emergence of more pollutant-tolerant species. In a study in Delaware, it was found that approximately 70 percent of the macroinvertebrate community in streams in undeveloped, forested watersheds consisted of pollution sensitive mayflies, stoneflies and caddisflies, as compared with 20 percent in urbanized watersheds (Maxted and Shaver, 1997). As shown in Table 4-16, the relative abundance of pollution tolerant organisms increased with urbanization, including worms, midges and beetles.

Table 4-16. Delaware Insect Population Abundance by Degree of Urbanization

Population Description				Relative Abundance by Degree of Urbanization (%)		
Class/ Order	**Genus species**	**Common Name**	**PT**	**None**	**Low**	**High**
Insecta/Trichoptera	Diplectrona modesta	caddisfly	0	14	2	1
Insecta/Ephemeroptera	Ephemerella spp.	mayfly	1	12	1	0
Insecta/Plecoptera	Allocapnia spp.	stonefly	3	10	18	3
Insecta/Ephemeroptera	Eurylophella spp.	mayfly	1	8	1	2
Insecta/Coleoptera	Anchytarsus bicolor	beetle	4	6	3	0
Insecta/Ephemeroptera	Stenonema spp.	mayfly	4	5	3	1
Insecta/Coleoptera	Optiservus spp.	beetle	4	4	2	8
Insecta/Coleoptera	Oulimnius latiusculus	beetle	2	4	3	5
Insecta/Trichoptera	Cheumatopsyche spp.	caddisfly	5	1	10	8
Insecta/Trichoptera	Hydropsyche betteni	caddisfly	6	1	4	5
Insecta/Diptera	Simulium vittatum	blackfly	7	0	8	1
Insecta/Diptera	Parametriocnemus spp.	midge	5	0	0	4
Oligochaeta	unidentified (Tubificidae)	worm	10	0	0	4

Note: rare organisms (fewer than 4 per 100 organisms) not included. Relative abundance (%) and pollution tolerance (PT) of macroinvertebrate species commonly found in Piedmont streams of Delaware for three levels of urbanization; none (0-2% impervious cover), low (6-13%), and high (15-50%); PT range from 0 (low tolerance) to 10 (high tolerance).
Source: Maxted and Shaver, 1997.

A study by Kohlepp and Hellenthal (1992) quantified the effects of sediment deposits on macroinvertebrates in Juday Creek, a tributary to the St. Joseph River in Indiana. The study included data before and after upstream channel maintenance operations introduced a large amount of sediment to the creek, similar to increased sediment yield from urban areas. A dramatic change in the species distribution of macroinvertebrates in the river was observed, and this was attributed to the changing sediment load and increased sedimentation. As shown in Figure 4-14, "the result was a shift from a community dominated by filter-feeders in both numbers and production rate in 1981-82, to a community in 1989-90 in which less desirable collector-gatherers and shredders increased in importance in terms of relative contribution to both numbers and production."

Figure 4-14. Effects of Sediment Deposits on Macroinvertebrates in Juday Creek, Indiana Proportion by Functional Feeding Group (percent)

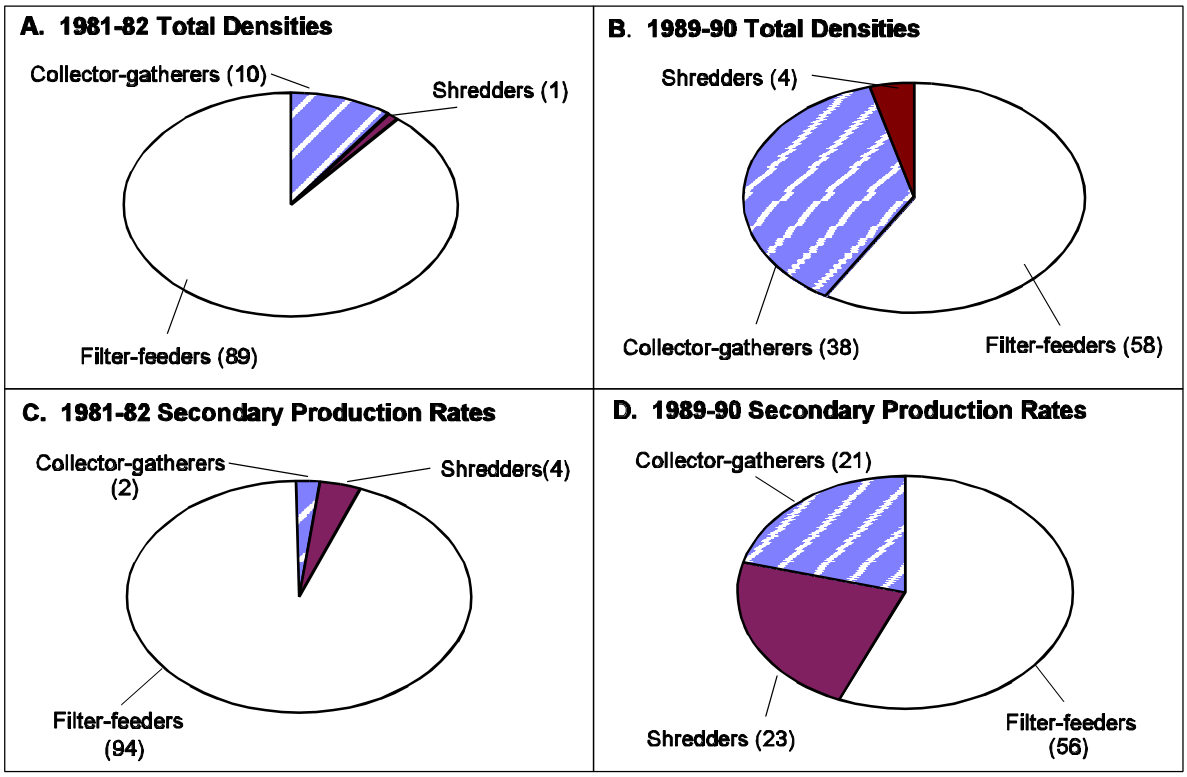

Source: Kohlepp and Hellenthal, 1992

Fish Impacts

The health of an ecosystem is often measured by the abundance and variety of fish species present, and the presence of native species. A case study in California compared fish populations in urbanized and non-urbanized sections of Coyote Creek (Pitt, 1995). The relative abundance of different fish species in the different reaches is presented in Table 4-17. As shown, the native fish are generally replaced by introduced fish in the urbanized section.

Table 4-17. Relative Abundance of Native and Introduced Fish in Urbanized and Non-Urbanized Areas in Coyote Creek, California

Species	Relative Abundance (%)	
	Non-urbanized Reach	Urbanized Reach
Native Fish		
Hitch	34.8	4.8
Threespine stickleback	27.3	0.8
Sacramento sucker	12.6	0.1
Introduced Fish		
Mosquitofish	5.6	66.9
Fathead Minnow	0.6	20.6
Threadfin shad	-	2.4

Source: Pitt, 1995

An illustration of the abundance of fish eggs and larvae associated with different levels of urban land use in New York is presented in Figure 4-15 (Limburg and Schmidt, 1990). This graph supports the “10 percent rule” reported by Schueler and Claytor (1995): stream impacts tend to begin in watersheds with only 10 to 20 percent imperviousness.

Figure 4-15. Average Densities of Fish Eggs and Larvae in New York

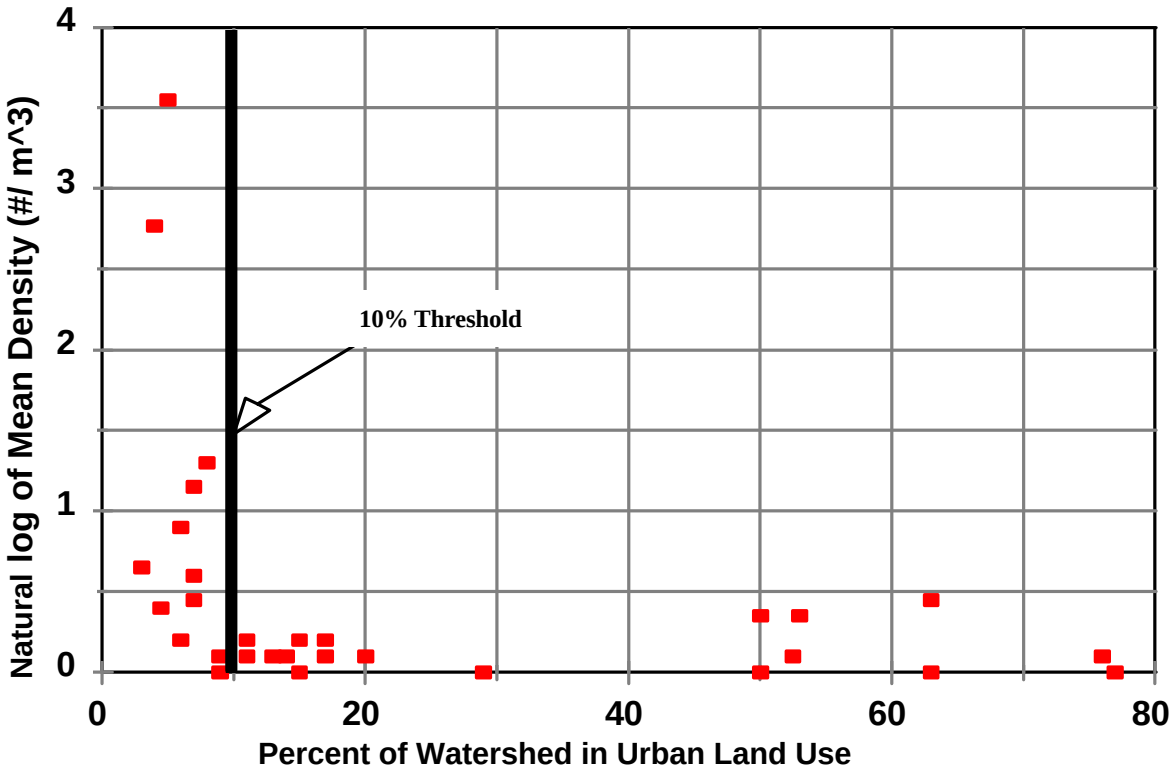

Source: Limburg and Schmidt, 1990

The change in the resident fish community due to urbanization in Tuckahoe Creek in Virginia was quantified by Weaver and Garman (1994). With urbanization increasing the percent of urban land from 7 percent to 28 percent between 1958 and 1990, a dramatic change in the fish assemblage was observed. As shown in Table 4-18, the total number of fish observed dropped sharply along with the total number of species present and the number of common species present.

Table 4-18. Effects of Urbanization on the Fish Community of Tuckahoe Creek, Virginia (Composite of 6 Sites)

Indicator	Fish Assemblage Year	
	1958	1990
% Urban (by land area)	7	28
total abundance	2,056	412
# species - total	31	23
# species - common*	21	6
% bluegill/shiner	28	67

* more than 10 individuals
Source: Weaver and Garman, 1994

4.3.3 Public Health Impacts

Public health impacts associated with urban storm water occur when humans ingest or come in contact with pathogens. While these impacts are not widely reported, they do occur, and some impacts have been documented. Examples related to swimming and contact recreation impacts and shellfish impacts are presented.

Contact Recreation Impacts

Beach closures are a common occurrence in many communities throughout the United States. Beach closures are primarily due to high levels of bacteria in water samples. The presence of medical waste and other dangerous floatable substances on beaches can also cause beach closures to occur. Storm water runoff can be responsible for both bacteria and floatables. Elevated levels of bacteria and viruses represent the most common threat to public health. Diarrhea and infection of the ear, eye, nose, or throat are possible.

A study of epidemiological impacts associated with swimming in the vicinity of storm water outfalls in Santa Monica Bay in California was conducted in 1995 (SMBRP, 1996). The study focused on health effects, and not on possible sources of contamination to the storm drain

system, such as illicit sewage connections and infiltration.[1] While the effects observed may be atypical of properly constructed and maintained storm drain outfalls, the findings indicate the potential health risks associated with pathogens. Major findings of this study are as follows:

- There is an increased risk of illness associated with swimming near flowing storm drain outlets in Santa Monica Bay.
- There is an increased risk of illness associated with swimming in areas with high densities of bacterial indicators.
- The total coliform to fecal coliform ratio was found to be one of the better indicators for predicting health risks.
- Illnesses were reported more often on days when the samples were positive for enteric viruses.
- High densities of bacterial indicators were measured on a significant number of survey days, particularly in front of drains.

People who swim in areas adjacent to flowing storm drains were found to be 50 percent more likely to get sick than people who swam in other areas. The sicknesses included fever, nausea, gastroenteritis, and flu-like symptoms such as nasal congestion, sore throat, fever, or coughing. As illustrated in Figure 4-16, swimmers who swam directly in front of storm drains were much more likely to become ill than those who swam away from the storm drains at distances of 100 to 400 meters. A comparative health outcome in terms of relative risk for swimming in front of the storm drain vs. swimming 400 meters away is presented in Table 4-19.

[1] Pilot studies conducted in the Bay prior to 1995 noted that some outfalls had regular dry weather discharges; this is a common indicator of storm drain contamination (SMBRP, 1990; SMBRP, 1992).

Figure 4-16. Health Effects Observed Relative to Distance from Santa Monica Bay Storm Drains

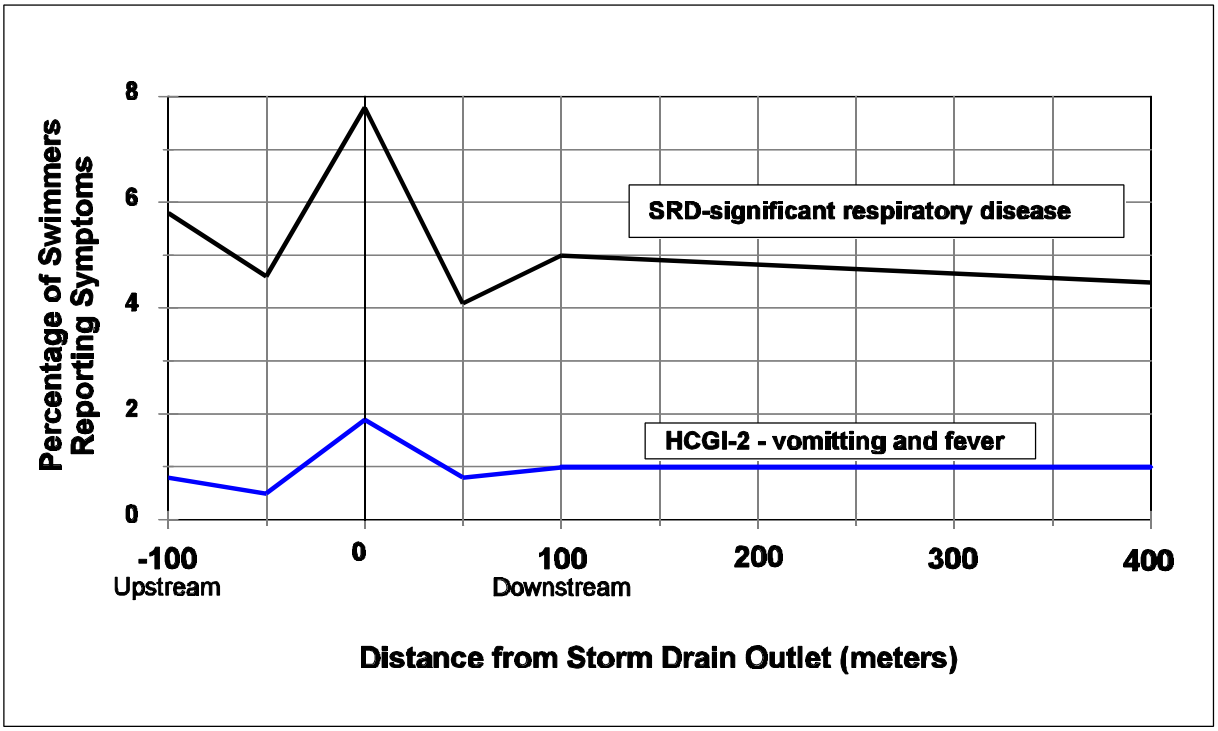

Source: Santa Monica Bay Restoration Project, 1996

Table 4-19. Comparative Health Outcomes for Swimming in Front of Drains in Santa Monica Bay

Health Outcome	Relative Risk for Swimming in Front of Drains*	Estimated No. Of Excess Cases per 10,000 Persons
Fever	57%	259
Chills	58%	138
Ear Discharge	127%	88
Vomiting	61%	115
Coughing with phlegm	59%	175
Any of the above symptoms	44%	373
HCGI-2	111%	95
SRD	66%	303
HCGI-2 or SRD	53%	314

* Compared to swimming 400 meters or more away from drains
Source: Santa Monica Bay Restoration Project, 1996

Seafood Hazard

The consumption of contaminated seafood, particularly shellfish, is a major public health problem. Shellfish are susceptible to bioaccumulating bacteria and viruses because they are filter feeders. In waters polluted by urban runoff, bacteria and viruses can be concentrated in the shellfish to much higher levels than those found in the surrounding waters. This becomes a public health concern because many potentially harmful bacteria and viruses can be ingested when people eat contaminated shellfish. As shown in Figure 4-17, the largest proportion of shellfish harvesting restrictions are caused by urban runoff (US EPA, 1995a).

Figure 4-17. Sources Associated with Shellfish Harvesting Restrictions, in Percent

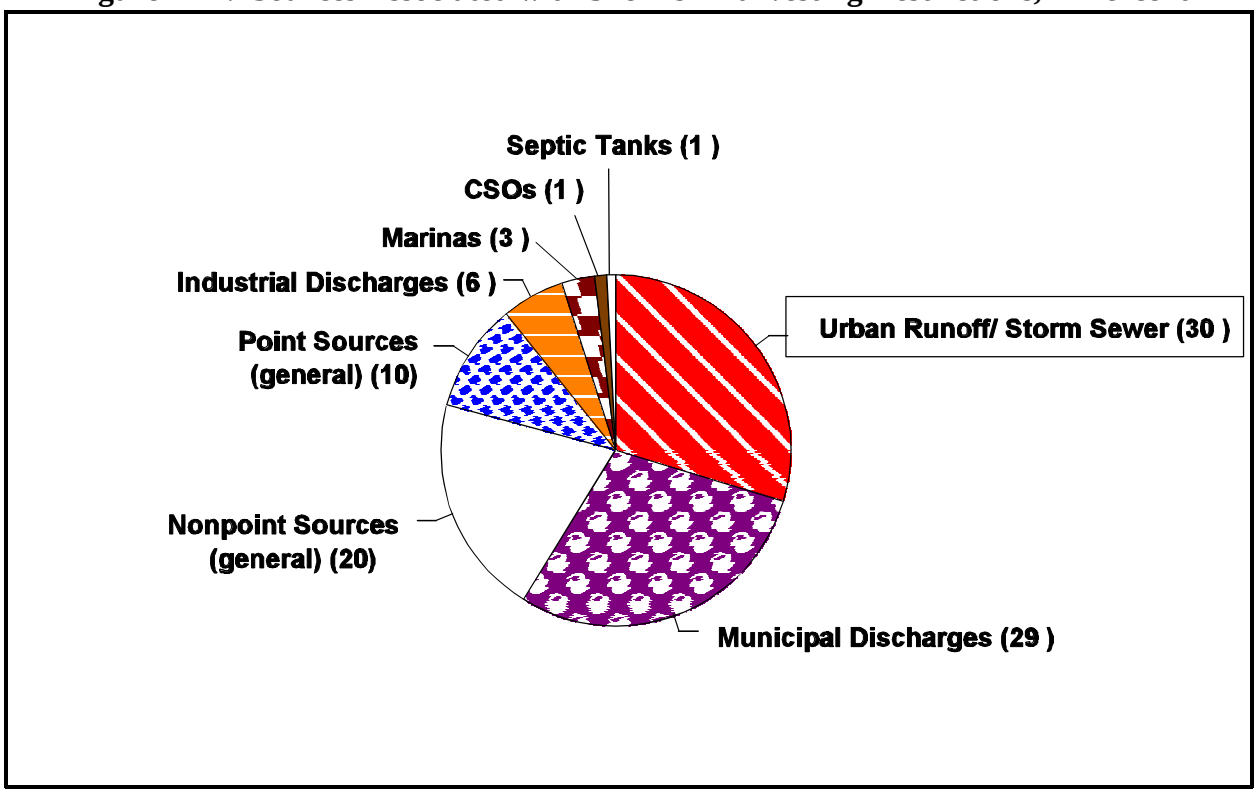

Source: US EPA, 1995a

Fish can also be contaminated for a number of reasons. Recent fish sampling surveys in regions of the U.S. have shown widespread mercury contamination in streams, wetlands, reservoirs, and lakes. Based on 1997 data, 33 states have issued fish consumption advisories because of mercury contamination (US EPA, 1998a). Mercury is an urban/industrial pollutant that is released into the air and ends up in urban runoff by atmospheric deposition (Krabbenhoft and Rickert, 1995). The effects of fish contamination go beyond health issues, and hurt the recreational fishing industry as a whole.

4.3.4 Aesthetic Impacts

The aesthetic impacts associated with urban storm water are often difficult to quantify. However, aesthetic impacts are often very visible to the general public. EPA reports that "people have a strong emotional attachment to water, arising from its aesthetic qualities--tranquillity, coolness, and beauty" (US EPA, 1995c). The presence of floatables within urban waters and deposited along the banks of waterways represents a common aesthetic impact in most urban settings. Floatable wastes originate from street litter and improper solid waste disposal practices. The average total street debris loading rate in New York City was quantified at approximately 156 pounds per curb-mile per day, with a range from 3 to 2,700 pounds (HydroQual, 1995).

Aesthetic impacts from the eutrophication of urban waterways is caused in part by nutrients delivered in urban storm water. As reported by Schueler (1987), aesthetic impacts and nuisance conditions associated with eutrophication can include:

- Surface algal scum
- Water discoloration
- Strong odors
- Release of toxins.

The visual damage to urban streams from accelerated rates of storm water runoff also contribute to aesthetic impacts. These include eroded stream banks, fallen trees, and sedimentation. In summary, aesthetic impacts are often very visible in public areas where shoreline recreation occurs. Aesthetic impacts are therefore the storm water impacts most familiar to the general public.

5.0 Description and Performance of Storm Water Best Management Practices

A storm water best management practice (BMP) is a technique, measure or structural control that is used for a given set of conditions to manage the quantity and improve the quality of storm water runoff in the most cost-effective manner. BMPs can be either engineered and constructed systems ("structural BMPs") that improve the quality and/or control the quantity of runoff such as detention ponds and constructed wetlands, or institutional, education or pollution prevention practices designed to limit the generation of storm water runoff or reduce the amounts of pollutants contained in the runoff ("non-structural BMPs"). No single BMP can address all storm water problems. Each type has certain limitations based on drainage area served, available land space, cost, pollutant removal efficiency, as well as a variety of site-specific factors such as soil types, slopes, depth of groundwater table, etc. Careful consideration of these factors is necessary in order to select the appropriate BMP or group of BMPs for a particular location.

5.1 Goals of Storm Water Best Management Practices

Storm water BMPs can be designed to meet a variety of goals, depending on the needs of the practitioner. In existing urbanized areas, BMPs can be implemented to address a range of water quantity and water quality considerations. For new urban development, BMPs should be designed and implemented so that the post-development peak discharge rate, volume and pollutant loadings to receiving waters are the same as pre-development values. In order to meet these goals, BMPs can be implemented to address three main factors: flow control, pollutant removal and pollutant source reductions.

5.1.1 Flow Control

Flow control involves managing both the volume and intensity of storm water discharges to receiving waters. Urbanization significantly alters the hydrology of a watershed. Increasing development leads to higher amounts of impervious surfaces. As a result, the response of an urbanized watershed to precipitation is significantly different from the response of a natural watershed. The most common effects are reduced infiltration and decreased travel time, which significantly increase peak discharges and runoff volumes. Factors that influence the amount of runoff produced include precipitation depth, infiltrative capacity of soils, soil moisture, antecedent rainfall, cover type, the amount of impervious surfaces and surface retention. Travel time is determined primarily by slope, length of flow path, depth of flow and roughness of flow surfaces. Peak discharges are based on the relationship of these parameters, and on the total drainage area of the watershed, the time distribution of rainfall, and the effects of any natural or manmade storage (USDA/NRCS, 1986).

High flow rates of storm water discharges can cause a number of impacts to receiving streams (see section 4.3), and may also increase the pollutant concentrations in storm water runoff. High velocity runoff can detach and transport significant amounts of suspended solids and

associated pollutants such as nutrients and metals from the urban landscape. In addition, high flow rates in drainage channels and receiving waters can erode stream banks and channels, further increasing suspended solids concentrations in waters that receive storm water discharges. In order to reduce the pollutant concentrations in runoff and receiving water impacts associated with high storm water flow rates, BMPs that provide flow attenuation are frequently implemented.

In areas undergoing new development or redevelopment, the most effective method of controlling impacts from storm water discharges is to limit the amount of rainfall that is converted to runoff. By utilizing site design techniques that incorporate on-site storage and infiltration and reduce the amounts of directly connected impervious surfaces, the amount of runoff generated from a site can be significantly reduced. This can reduce the necessity for traditional structural BMPs to manage runoff from newly developed areas. There are a number of practices that can be used to promote on-site storage and infiltration and to limit the amount of impervious surfaces that are generated. However, the use of on-site infiltration can be limited in certain areas due to factors such as slope, depth to the water table, and geologic conditions.

- *Site design features* such as providing rain barrels, dry wells or infiltration trenches to capture rooftop and driveway runoff, maintaining open space, preserving stream buffers and riparian corridors, using porous pavement systems for parking lots and driveways, and using grassed filter strips and vegetated swales in place of traditional curb-and-gutter type drainage systems can greatly reduce the amount of storm water generated from a site and the associated impacts.

- *Street construction features* such as placing sidewalks on only one side of the street, limiting street widths, reducing frontage requirements and eliminating or reducing the radius of cul-de-sacs also have the potential to significantly reduce the amount of impervious surfaces and therefore the amount of rainfall that is converted to runoff.

- *Construction practices* such as minimizing disturbance of soils and avoiding compaction of lawns and greenways with construction equipment can help to maintain the infiltrative capacity of soils.

There are several guides that contain useful information regarding development practices that can limit the impacts associated with storm water runoff (Delaware DNREC, 1997; US EPA, 1996b; Center for Watershed Protection, 1998).

In areas that are already developed, flow control can be more complicated. Since a drainage infrastructure already exists, retrofitting these systems to provide flow control can be prohibitively expensive. Regional storm water management systems can be used to manage runoff in these areas, but space considerations and high capital costs can limit their usefulness. Depending on site-specific constraints, however, there are a number of practices that can be incorporated on-site to reduce runoff volumes from these areas. Down spouts can be disconnected from the storm drain system and this rainfall can instead be collected and stored on a

property in rain barrels to be used for watering lawns and landscaping during inter-event periods. Infiltration and retention practices such as bioretention areas and infiltration trenches can be constructed to capture runoff from rooftops, lawns and driveways and reduce the volume of runoff discharged to storm sewers. Curb-and-gutter systems can be replaced with grassed swales or wetland channels to provide temporary ponding of runoff. Storm water from commercial areas and golf courses can be collected and stored in ponds and subsequently be used for irrigation. Storm water reuse can help to maintain a more natural, pre-development hydrologic balance in the watershed (Livingston et al, 1998). Parking lots can also be used as short-term storage areas for ponded storm water, and bioretention facilities placed around the perimeter of parking lots can be used to infiltrate this water volume.

Where the generation of runoff cannot be avoided, end-of-pipe structural BMPs may be implemented to decrease the impacts of storm water discharges to receiving streams. However, BMPs are limited in their ability to control impacts, and frequently cause secondary impacts such as increased temperatures of discharges to receiving streams. BMPs that can be designed to provide significant flow attenuation include grassed swales, vegetated filter strips, detention and retention basins, wetland basins, and wetland channels and swales. These BMPs can also provide the added benefit of removing pollutants such as suspended solids and associated nutrients and metals from storm water runoff.

The environmental aspects of storm water quantity control must be carefully balanced against the hazard and nuisance effects of flooding. Large or intense storm events or rapid snowmelt can produce significant quantities of runoff from urban areas with high levels of imperviousness. This runoff must be rapidly transported from urbanized areas in order to prevent loss of life and property due to flooding of streets, residences and businesses. This is frequently accomplished by replacing natural drainage paths in the watershed with paved gutters, storm sewers or other artificial means of drainage. These drainage systems can convey runoff at a faster rate than natural drainage paths, allowing rapid transport of runoff away from areas where flooding is likely to occur. However, as large quantities of runoff are conveyed rapidly from the urban landscape and discharged to receiving streams, downstream areas can flood. Following urbanization, large volumes of runoff can be produced from even small storm events due to the high amounts of impervious surfaces. As a result, flooding of streams that receive runoff can occur much more frequently following urbanization due to this excessive amount of runoff production. Therefore, design of storm water drainage systems must always balance flood protection with ecological concerns.

In highly urbanized and densely populated cities, little opportunity exists for retrofitting storm drainage systems with BMPs to provide water quantity control due to flooding considerations. The large area of impervious surfaces in heavily urbanized areas produce large quantities of runoff. Rapid conveyance by the storm drain system is frequently the only option that exists in order to prevent flooding of yards, streets and basements. In these areas, the most appropriate BMPs are those that limit the generation of pollutants or remove pollutants from the urban landscape. With this principle in mind, a unique opportunity exists in newly developing

areas or in more sparsely populated suburban areas to use BMPs that control runoff at the point of generation, instead of trying to manage it at the point of discharge to the receiving stream. When rainfall is managed as a *resource* instead of as a waste stream requiring treatment, future problems with quantity control may be avoidable. When rainfall is managed at the site level by promoting the concepts of conservation design, and by providing on-site storage, infiltration and usage of rainfall for irrigation of the urban landscape, the need for traditional curb-and-gutter storm drainage system can be reduced. As a result, the need for constructing and maintaining capital-, land- and maintenance-intensive regional BMPs to manage large flows from developed watersheds may be reduced. Nuisance flooding of downstream areas can also be limited by reducing the overall volume of water draining from a watershed. Limiting the discharge of large volumes of storm water to urban streams can help to prevent the degradation of these streams to the point of being non-supporting of a designated use.

5.1.2 Pollutant Removal

Urbanized areas export large quantities of pollutants during storm events. The high population of pollutant sources in urbanized areas contribute large quantities of pollutants that accumulate on streets, rooftops and other surfaces. During rainfall or snowmelt, these pollutants are mobilized and transported from the streets and rooftops into the storm drain system, where they are conveyed and ultimately discharged to waterways. In order to reduce the impacts to receiving waters from the high concentrations of pollutants contained in the runoff, BMPs can be implemented to remove these pollutants.

Properly-designed, constructed and maintained structural BMPs can effectively remove a wide range of pollutants from urban runoff. Pollutant removal in storm water BMPs can be accomplished through a number of physical and biochemical processes. The efficiency of a given BMP in removing pollutants is dependent upon a number of site-specific variables, including the size, type and design of the BMP; the soil types and characteristics; the geology and topography of the site; the intensity and duration of the rainfall; the length of antecedent dry periods; climatological factors such as temperature, solar radiation, and wind; the size and characteristics of the contributing watershed; and the properties and characteristics of the various pollutants.

Pollutant removal in urban storm water BMPs can occur through the following mechanisms:

Sedimentation

Sedimentation is the removal of suspended particulates from the water column by gravitational settling. The settling of discrete particles is dependent upon the particle velocity, the fluid density, the fluid viscosity, and the particle diameter and shape. Sedimentation can be a major mechanism of pollutant removal in BMPs such as ponds and constructed wetlands. Sedimentation can remove a variety of pollutants from storm water runoff. Pollutants such as metals, hydrocarbons, nutrients and oxygen demanding substances can become adsorbed or attached to particulate matter, particularly clay soils. Removal of these particulates by

sedimentation can therefore result in the removal of a large portion of these associated pollutants. The main factor governing the efficiency of a BMP at removing suspended matter by sedimentation is the time available for particles to undergo settling. Fine particulates such as clay and silt can require detention times of days or even weeks to settle out of suspension. Therefore, it is important to evaluate the settling characteristics of the particulates in runoff before BMP design in order to determine the detention time necessary for adequate settling to occur. The overall efficiency of a BMP in removing particulates by settling is also dependent upon the initial concentration of suspended solids in the runoff. In general, runoff with higher initial concentrations of suspended solids will have a greater removal efficiency. In addition, some particles, such as fine clays, will not settle out of suspension without the aid of a coagulant. As a result there is usually a minimum practical limit of approximately 10 mg/l of TSS, below which additional TSS removal can not be expected to occur (UDFCD, 1992).

Flotation

Flotation is the separation of particulates with a specific gravity less than that of water. Trash such as paper, styrofoam "peanuts" used for packaging, and other low-density materials can be removed from storm water by the mechanism of flotation. If the inlet area of the BMP is designed to allow for the accumulation of floatable materials, then these accumulated materials can periodically be manually removed from the BMP. Significant amounts of floatables can be removed from storm water in properly designed BMPs in this manner. In addition, oils and hydrocarbons will frequently rise to the surface in storm water BMPs. If the BMP is designed with an area for these materials to accumulate, then significant removals of these pollutants can occur. Many modular or drop-in filtration systems incorporate an oil and grease or hydrocarbon trap with a submerged outlet pipe that allows these contaminants to accumulate and to be periodically removed.

Filtration

Filtration is the removal of particulates from water by passing the water through a porous media. Media commonly used in storm water BMPs include soil, sand, gravel, peat, compost, and various combinations such as peat/sand, soil/sand and sand/gravel. Filtration is a complex process dependent on a number of variables. These include the particle shape and size, the size of the voids in the filter media, and the velocity at which the fluid moves through the media. Filtration can be used to remove solids and attached pollutants such as metals and nutrients. Organic filtration media such as peat or leaf compost can also be effective at removing soluble nutrients from urban runoff.

Infiltration

Infiltration is the most effective means of controlling storm water runoff since it reduces the volume of runoff that is discharged to receiving waters and the associated water quality and quantity impacts that runoff can cause. Infiltration is also an important mechanism for pollutant control. As runoff infiltrates into the ground, particulates and attached contaminants such as metals and nutrients are removed by filtration, and dissolved constituents can be removed by adsorption. However, infiltration is not appropriate in all areas.

Adsorption

Adsorption, while not a common mechanism used in storm water BMPs, can occur in infiltration systems where the underlying soils contain appreciable amounts of clay. Dissolved metals that are contained in storm water runoff can be bound to the clay particles as storm water runoff percolates through clay soils in infiltration systems.

Biological Uptake

Biological uptake of nutrients is an important mechanism of nutrient control in storm water BMPs. Urban runoff typically contains significant concentrations of nutrients. Ponds and wetlands can be useful for removing these nutrients through biological uptake. This occurs as aquatic plants, algae, microorganisms and phytoplankton utilize these nutrients for growth. Periodic harvesting of vegetation in BMPs allows for permanent removal of these nutrients. If plants are not harvested, however, nutrients can be re-released to the water column from plant tissue after the plants die.

Biological Conversion

Organic contaminants can be broken down by the action of aquatic microorganisms in storm water BMPs. Bacteria present in BMPs can degrade complex and/or toxic organic compounds into less harmful compounds that can reduce the toxicity of runoff to aquatic biota.

Degradation

BMPs such as ponds and wetlands can provide the conditions necessary for the degradation of certain organic compounds, including certain pesticides and herbicides. Open pool BMPs can provide the necessary conditions for volatilization, hydrolysis and photolysis of a variety of organic compounds to take place.

5.1.3 Pollutant Source Reductions

Source reduction is an effective non-structural way of controlling the amounts of pollutants entering storm water runoff. A wide range of pollutants are washed off of impervious surfaces during runoff events. Removing these contaminants from the urban landscape prior to precipitation can effectively limit the amounts of pollutants contained in the storm water runoff. Source reduction can be accomplished by a number of different processes including: limiting applications of fertilizers, pesticides and herbicides; periodic street sweeping to remove trash, litter and particulates from streets; collection and disposal of lawn debris; periodic cleaning of catch basins; elimination of improper dumping of used oil, antifreeze, household cleaners, paint, etc. into storm drains; and identification and elimination of illicit cross-connections between sanitary sewers and storm sewers.

5.2 Types of Storm Water Best Management Practices

There are a variety of storm water BMPs available for managing urban runoff. Regardless of the type, storm water BMPs are most effective when implemented as part of a comprehensive storm water management program that includes proper selection, design, construction, inspection and maintenance. Storm water BMPs can be grouped into two broad categories: structural and non-structural. *Structural* BMPs are used to treat the storm water at either the point of generation or the point of discharge to either the storm sewer system or to receiving waters. *Non-structural* BMPs include a range of pollution prevention, education, institutional, management and development practices designed to limit the conversion of rainfall to runoff and to prevent pollutants from entering runoff at the source of runoff generation. The descriptions in this section provide summary information on a variety of commonly used structural and nonstructural storm water BMPs. Information provided includes a general description of the technology or practice, important components and factors to incorporate into BMP design and planning, and the positive and negative aspects of the technology or practice. In addition, maintenance considerations for structural BMPs are discussed. Quantitative performance data for BMPs are not included in this section. These data are included in section 5.5, "Effectiveness of BMPs in Managing Urban Runoff."

5.2.1 Structural BMPs

There are a wide variety of structural BMPs in use for storm water management. Structural BMPs include engineered and constructed systems that are designed to provide for water quantity and/or water quality control of storm water runoff. Structural BMPs can be grouped into several general categories. However, the distinction between BMP types and the terminology used to group structural BMPs is an area that needs standardization. In particular, the terms "retention" and "detention" are sometimes used interchangeably, although they do have distinct meanings. Storm water detention is usually defined as providing temporary storage of a runoff volume for subsequent release (WEF/ASCE, 1992). Examples include detention basins, underground vaults, tanks or pipes, and deep tunnels, as well as temporary detention in parking lots, roof tops, depressed grassy areas, etc. Retention is generally defined as providing storage of storm water runoff without subsequent surface discharge (WEF/ASCE, 1992). With the strict interpretation of this definition, retention practices would be limited to those practices that either infiltrate or evaporate runoff, such as infiltration trenches, wells or basins. However, retention is also commonly used to describe practices that retain a runoff volume (and hence have a permanent pool) until it is displaced in part or in total by the runoff event from the next storm. Examples include retention ponds, tanks, tunnels, and underground vaults or pipes, and wetland basins. For purposes of this document, and in being consistent with the definitions and terminology used in the ASCE National Stormwater BMP Database, structural BMPs have been grouped and defined as follows:

- Infiltration systems capture a volume of runoff and infiltrates it into the ground.

- Detention systems capture a volume of runoff and temporarily retain that volume for subsequent release. Detention systems to not retain a significant permanent pool of water between runoff events.

- Retention systems capture a volume of runoff and retain that volume until it is displaced in part or in total by the next runoff event. Retention systems therefore maintain a significant permanent pool volume of water between runoff events.

- Constructed wetland systems are similar to retention and detention systems, except that a major portion of the BMP water surface area (in pond systems) or bottom (in meadow-type systems) contains wetland vegetation. This group also includes wetland channels.

- Filtration systems use some combination of a granular filtration media such as sand, soil, organic material, carbon or a membrane to remove constituents found in runoff.

- Vegetated systems (biofilters) such as swales and filter strips are designed to convey and treat either shallow flow (swales) or sheetflow (filter strips) runoff

- Minimizing directly connected impervious surfaces describes a variety of practices that can be used to reduce the amount of surface area directly connected to the storm drainage system by minimizing or eliminating traditional curb and gutter. This is considered by some to be a non-structural practice, but is has been included under the structural heading in this report due to the need to design and construct alternative conveyance and treatment options.

- Miscellaneous and vendor-supplied systems include a variety of proprietary and miscellaneous systems that do not fit under any of the above categories. These include catch basin inserts, hydrodynamic devices, and filtration devices.

5.2.1.1 Infiltration Systems

Infiltration systems include infiltration basins, porous pavement systems, and infiltration trenches or wells. An infiltration BMP is designed to capture a volume of storm water runoff, retain it and infiltrate that volume into the ground. Infiltration of storm water has a number of advantages and disadvantages. The advantages of infiltration include both water quantity control and water quality control. Water quantity control can occur by taking surface runoff and infiltrating this water into the underlying soil. This reduces the volume of water that is discharged to receiving streams, thereby reducing some of the potential impacts caused by an excess flow as well as increased pollutant concentrations in the receiving stream. Infiltration systems can be designed to capture a volume of storm water and infiltrate this water into the ground over a period of several hours or even days, thereby maximizing the infiltrative capacity of the BMP. Infiltration can have many secondary benefits such as increasing recharge of underlying aquifers

and increasing baseflow levels of nearby streams. Infiltration BMPs can also provide water quality treatment. Pollutant removal can occur as water percolates through the various soil layers. As the water moves through the soil, particles can be filtered out. In addition, microorganisms in the soil can degrade organic pollutants that are contained in the infiltrated storm water.

Although infiltration of storm water has many benefits, it also has some drawbacks. First, infiltration may not be appropriate in areas where groundwater is a primary source of drinking water due to the potential for contaminant migration. This is especially true if the runoff is from a commercial or industrial area where the potential for contamination by organics or metals is present. Also, the performance of infiltration BMPs is limited in areas with poorly permeable soils. In addition, infiltration BMPs can experience reduced infiltrative capacity and even clogging due to excessive sediment accumulation. Frequent maintenance may be required to restore the infiltrative capacity of the system. Care must also be taken during construction to limit compaction of the soil layers underlying the BMP. Excessive compaction due to construction equipment may cause a reduced infiltrative capacity of the system. Plus, excessive sediment generation during construction and site grading/stabilization may cause premature clogging of the system. Infiltration systems should not be placed into service until disturbed areas in the drainage have been stabilized by dense vegetation or grasses.

Infiltration Basins

Infiltration basins are designed to capture a storm water runoff volume, hold this volume and infiltrate it into the ground over a period of days. Infiltration basins are almost always placed off-line, and are designed to only intercept a certain volume of runoff. Any excess volume will be bypassed. The basin may or may not be lined with plants. Vegetated infiltration systems help to prevent migration of pollutants and the roots of the vegetation can increase the permeability of the soils, thereby increasing the efficiency of the basin. Infiltration basins are typically not designed to retain a permanent pool volume. Their main purpose is to simply transform a surface water flow into a ground water flow and to remove pollutants through mechanisms such as filtration, adsorption and biological conversion as the water percolates through the underlying soil. Infiltration basins should be designed to drain within 72 hours in order to prevent mosquito breeding and potential odor problems due to standing water and to ensure that the basin is ready to receive runoff from the next storm (US EPA, 1993a). In addition to removing pollutants, infiltration basins are useful to help restore or maintain pre-development hydrology in a watershed. Infiltration can increase the water table, increase baseflow and reduce the frequency of bankfull flooding events. A diagram of a typical infiltration basin is shown below.

Figure 5-1. Infiltration Basin

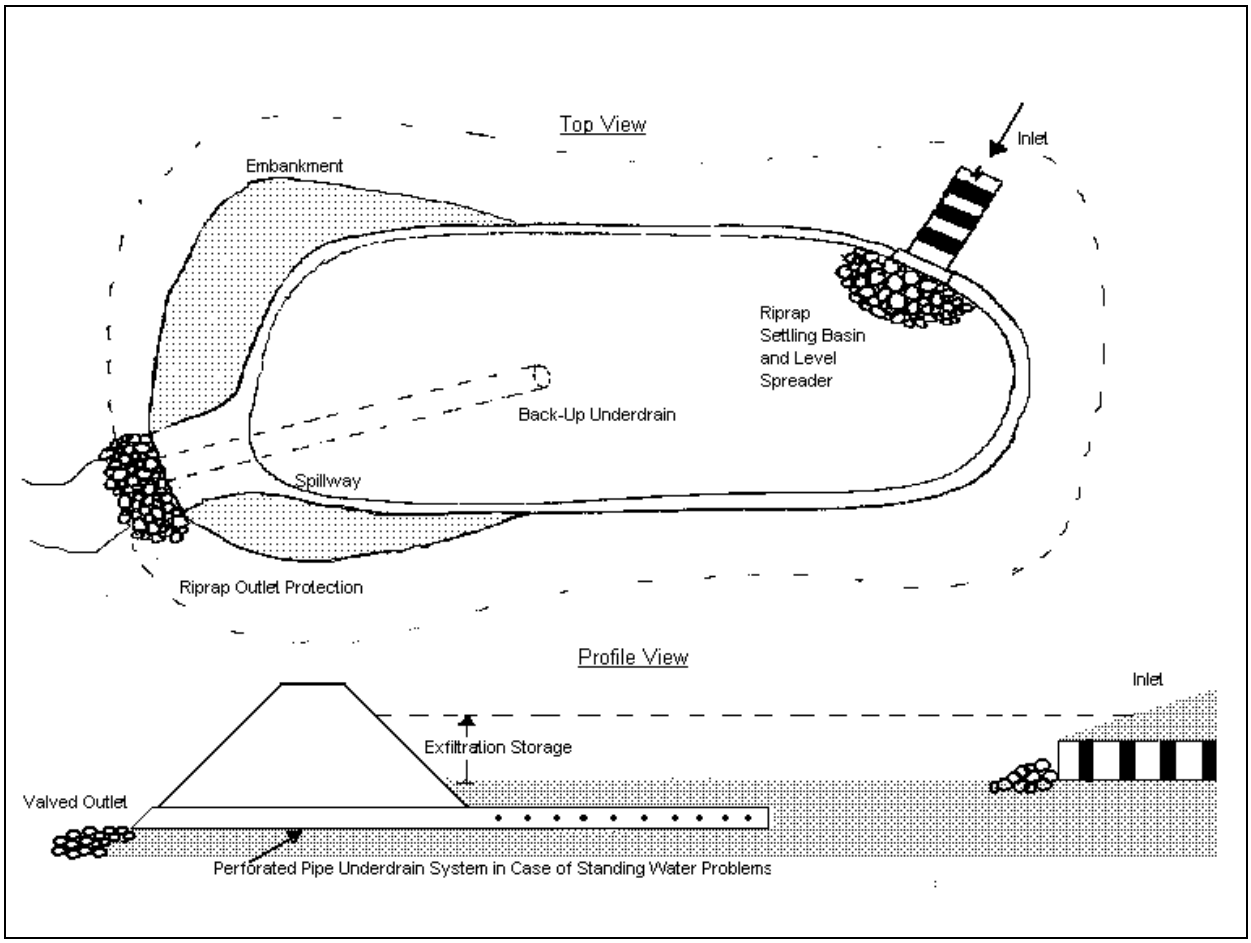

Source: Adapted from Schueler et al, 1992

Porous Pavement Systems

Porous pavement is an infiltration system where storm water runoff is infiltrated into the ground through a permeable layer of pavement or other stabilized permeable surface. These systems can include porous asphalt, porous concrete, modular perforated concrete block, cobble pavers with porous joints or gaps or reinforced/stabilized turf (Urbonas and Strecker, 1996). Permeable pavement can be used in parking lots, roads and other paved areas and can greatly reduce the amount of runoff and associated pollutants leaving the area. Porous pavement systems are suitable for a limited number of applications. Typically, porous pavement can only be used in areas that are not exposed to high volumes of traffic or heavy equipment. They are particularly useful for driveways and streets and in residential areas, and in parking areas in commercial areas. Porous pavement is not effective in areas that receive runoff with high amounts of sediment due to the tendency of the pores to clog. Porous pavements require maintenance including periodic vacuuming or jet-washing to remove sediment from the pores. Paved areas should be clearly marked to indicate that a porous pavement system is in use and to prevent frequent use by

equipment, to prevent excess traffic volume, to limit the use of de-icing chemicals and sand, and to prevent resurfacing with non-porous pavement.

The performance of porous asphalt has been historically very poor in the mid-Atlantic region. However, many of these failures can be attributed to lack of proper erosion and sediment controls during construction or lack of contractor experience with installation of porous pavement systems. Porous concrete systems in use in Florida have performed very well (Florida Concrete and Products Assn., 1993). When properly designed and maintained, porous pavement systems can be an effective means of managing urban storm water runoff. Porous pavement systems are particularly useful for overflow parking areas that are not used on a daily basis. A diagram of a porous asphalt pavement system is shown below.

Figure 5-2. Porous Pavement System

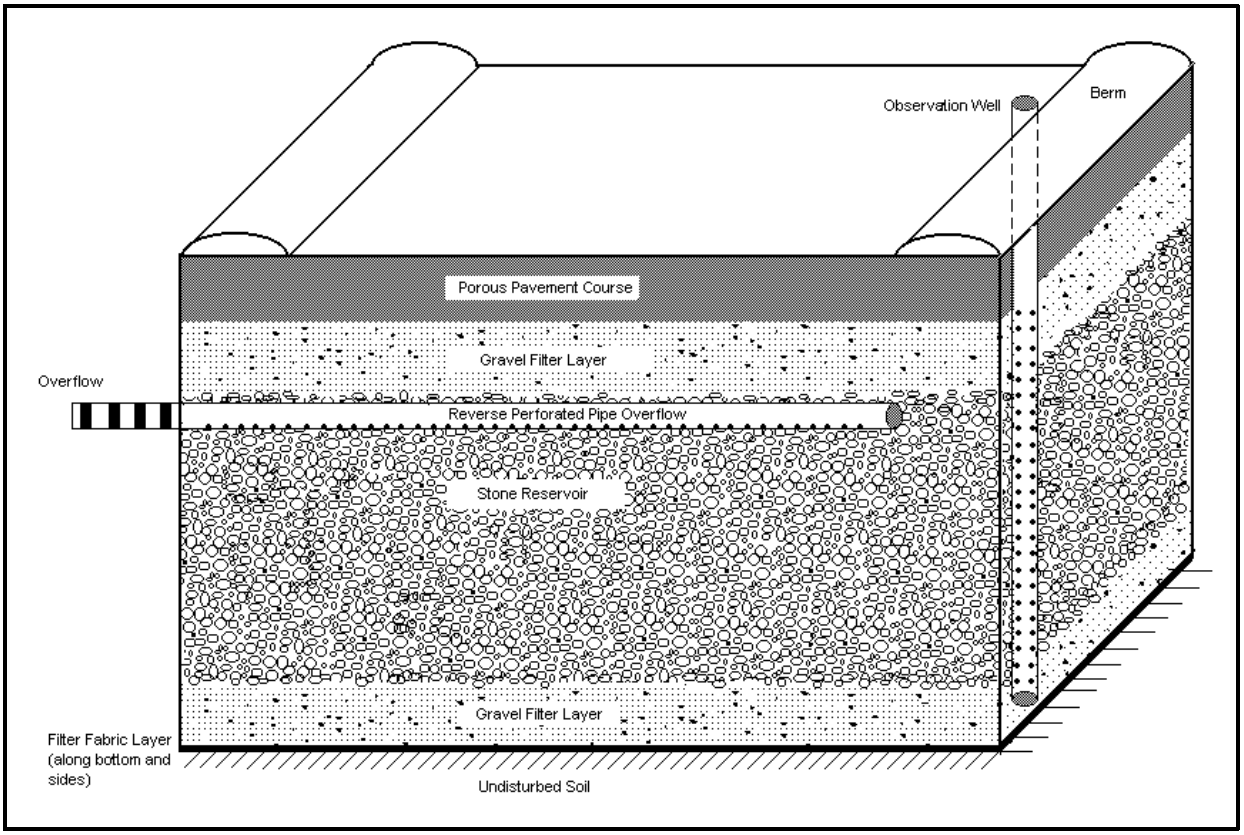

Source: Adapted from Schueler, 1987.

Infiltration Trenches and Wells

An infiltration trench or well is a gravel-filled trench or well designed to infiltrate storm water into the ground. A volume of storm water runoff is diverted into the trench or well where it infiltrates into the surrounding soil. Typically infiltration trenches and wells can only capture a small amount of runoff and therefore may be designed to capture the first flush of a runoff event. For this reason, they are frequently used in combination with another BMP such as a detention

basin to control peak hydraulic flows. Infiltration trenches and wells can be used to remove suspended solids, particulates, bacteria, organics and soluble metals and nutrients through the mechanisms of filtration, absorption and microbial decomposition. They are also useful to provide groundwater recharge and to increase base flow levels in nearby streams. As with all infiltration practices, the possibility for groundwater contamination exists and must be considered where groundwater is a source of drinking water. A diagram of an infiltration trench is shown below.

Figure 5-3. Infiltration Trench

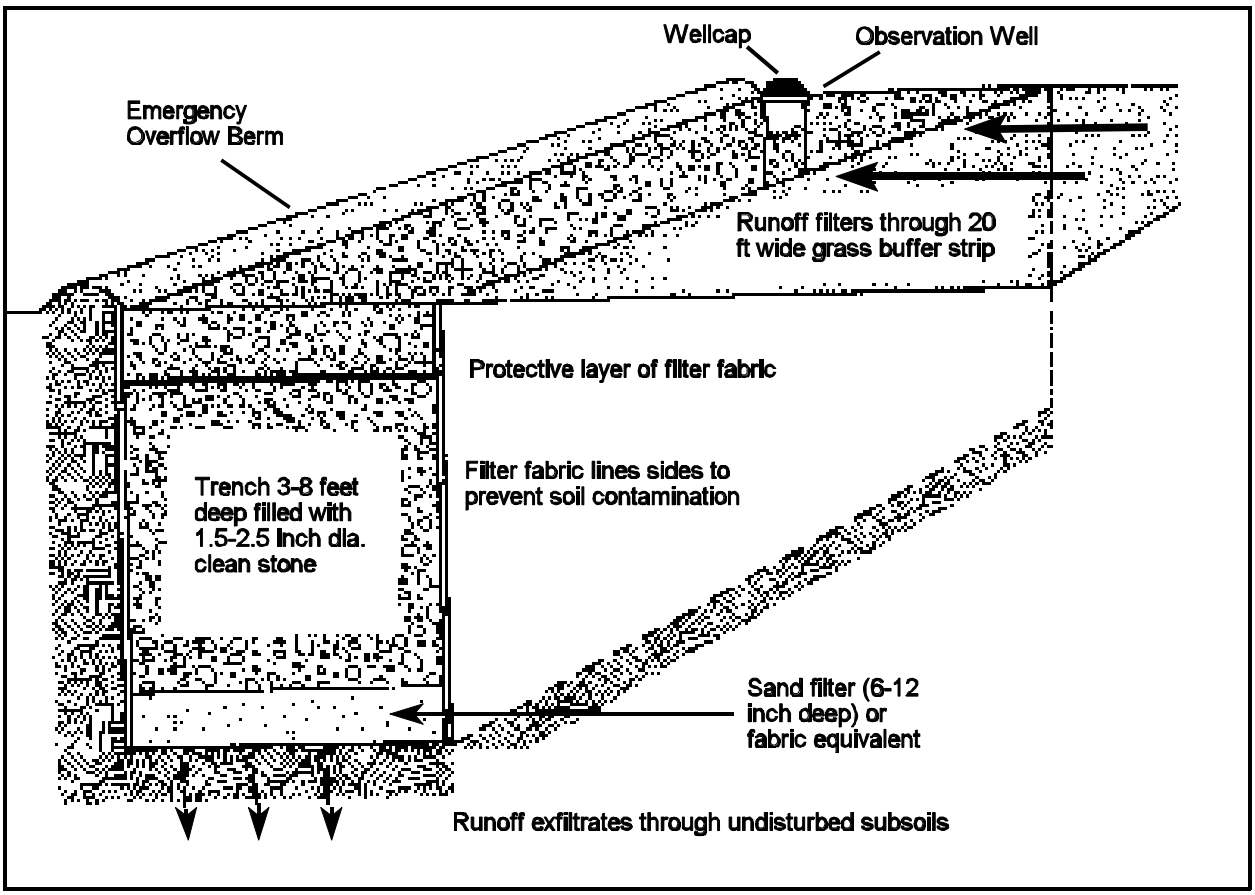

Source: Schueler et al, 1992.

5.2.1.2 Detention Systems

Detention systems are BMPs that are designed to intercept a volume of storm water runoff and temporarily impound the water for gradual release to the receiving stream or storm sewer system. Detention systems are designed to completely empty out between runoff events, and therefore provide mainly water quantity control as opposed to water quality control. Detention basins can provide limited settling of particulate matter, but a large portion of this material can be

re-suspended by subsequent runoff events. Detention facilities should be considered mainly as practices used to reduce the peak discharge of storm water to receiving streams to limit downstream flooding and to provide some degree of channel protection. There are several types of detention facilities used to manage storm water runoff, including detention basins and underground vaults, pipes and tanks.

Detention Basins

Detention basins are designed to intercept a volume of storm water, temporarily impound the water and release it shortly after the storm event. The main purpose of a detention basin is quantity control by reducing the peak flow rate of storm water discharges. They are designed to not retain a permanent pool volume between runoff events. and most basins are designed to empty in a time period of less than 24 hours. The treatment efficiency of detention basins is usually limited to removal of suspended solids and associated contaminants due to gravity settling. The efficiency can be increased by incorporating a forebay or pre-settling chamber for the accumulation of coarse sediment, facilitating periodic cleaning in order to prevent washout by subsequent runoff events. Detention basins can limit downstream scour and loss of aquatic habitat by reducing the peak flow rate and energy of storm water discharges to the receiving stream, but their removal of pollutant of potential water quality concern can be limited. A diagram of a typical detention basin is shown below.

Figure 5-4. Detention Basin

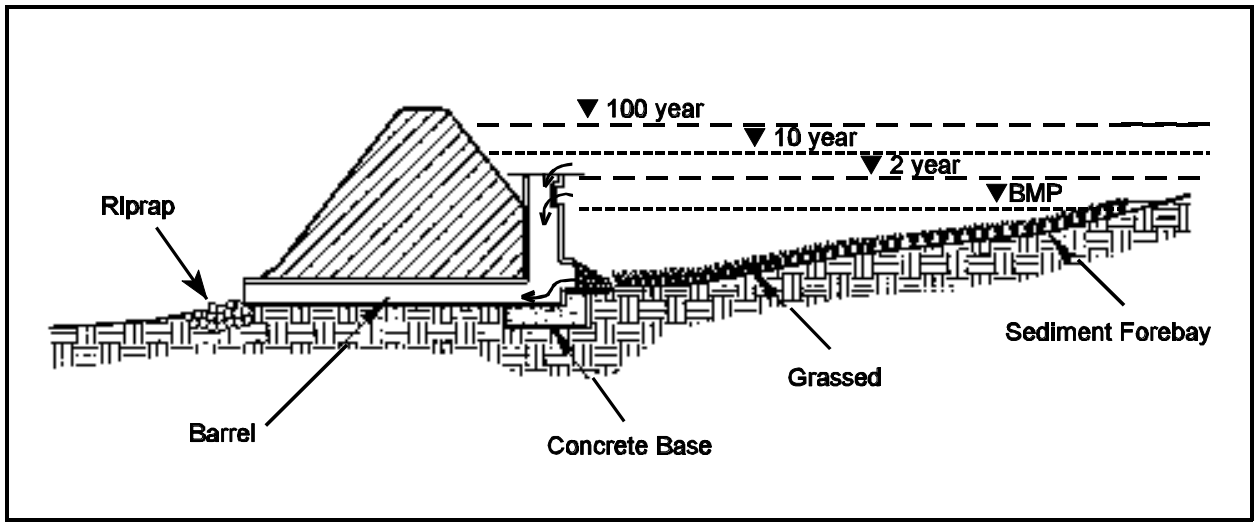

Source: NVPDC, 1992.

Underground Vaults, Pipes and Tanks

Underground detention facilities, such as vaults, pipes and tanks, are designed to provide temporary storage of storm water runoff. Significant water quality improvements should not be expected in underground detention facilities. They should mainly be used for providing storage to limit downstream effects due to high peak flow rates. Like detention basins, underground

detention systems are designed to empty out between runoff events so that storage capacity is available for subsequent runoff events. In addition, studies are being conducted to evaluate the usefulness of in-system detention (storing runoff temporarily in the storm drainage system through the use of valves, gates, orifices, etc.), although these evaluations are in the preliminary stages and are only useful in certain cases (Lake Barcroft Watershed Improvement District, 1998). This is a potential alternative for retrofitting existing storm drains in the upper portions of the drainage system to delay the peak discharge rate and provide a limited amount of additional temporary storage volume. However, a careful analysis of the storm drainage system is necessary in order to prevent flooding in the upper reaches of the drainage area.

5.2.1.3 Retention Systems

Retention systems include wet ponds and other retention systems such as underground pipes or tanks. Retention systems are designed to capture a volume of runoff and retain that volume until it is displaced in part or in total by the next runoff event. Retention systems can provide both water quantity and quality control. The volume available for storage, termed the water quality volume, is provided above the permanent pool level of the system. The main pollutant removal mechanisms in retention systems is sedimentation. By retaining a permanent pool of water, retention systems can benefit from the added biological and biochemical pollutant removal mechanisms provided by aquatic plants and microorganisms, mimicking a natural pond or lake ecosystem. Also, sediments that accumulate in the pond are less likely to be re-suspended and washed out due to the presence of a permanent pool of water. In addition to sedimentation, other pollutant removal mechanisms in retention systems include filtration of suspended solids by vegetation, infiltration, biological uptake of nutrients by aquatic plants and algae, volatilization of organic compounds, uptake of metals by plant tissue, and biological conversion of organic compounds.

<u>Retention Ponds</u>

Retention ponds (also known as wet ponds) are designed to intercept a volume of storm water runoff and to provide storage and treatment of this runoff volume. Water in the pond above the permanent pool level is displaced in part or completely by the runoff volume from subsequent runoff events. Retention ponds, when properly designed and maintained, can be extremely effective BMPs, providing both water quality improvements and quantity control, as well as providing aesthetic value and aquatic and terrestrial habitat for a variety of plants and animals.

Pollutant removal in retention ponds can occur through a number of mechanisms. The main mechanism is the removal of suspended solids and associated pollutants through gravity settling. Aquatic plants and microorganisms can also provide uptake of nutrients and degradation of organic contaminants. Retention basins that incorporate an aquatic bench around the perimeter of the basin that is lined with aquatic vegetation can have an added pollutant removal efficiency. This littoral zone can aid in pollutant removal efficiency by incorporating mechanisms found in wetland systems. These mechanisms include removal of sediment by filtration by aquatic plants,

removal of metals and nutrients through biological uptake by aquatic vegetation and degradation of organic contaminants. If the bottom of the pond is not lined, then infiltration can occur aiding in the maintenance of local groundwater supplies. A diagram of a typical wet pond is shown below.

Figure 5-5. Retention Pond

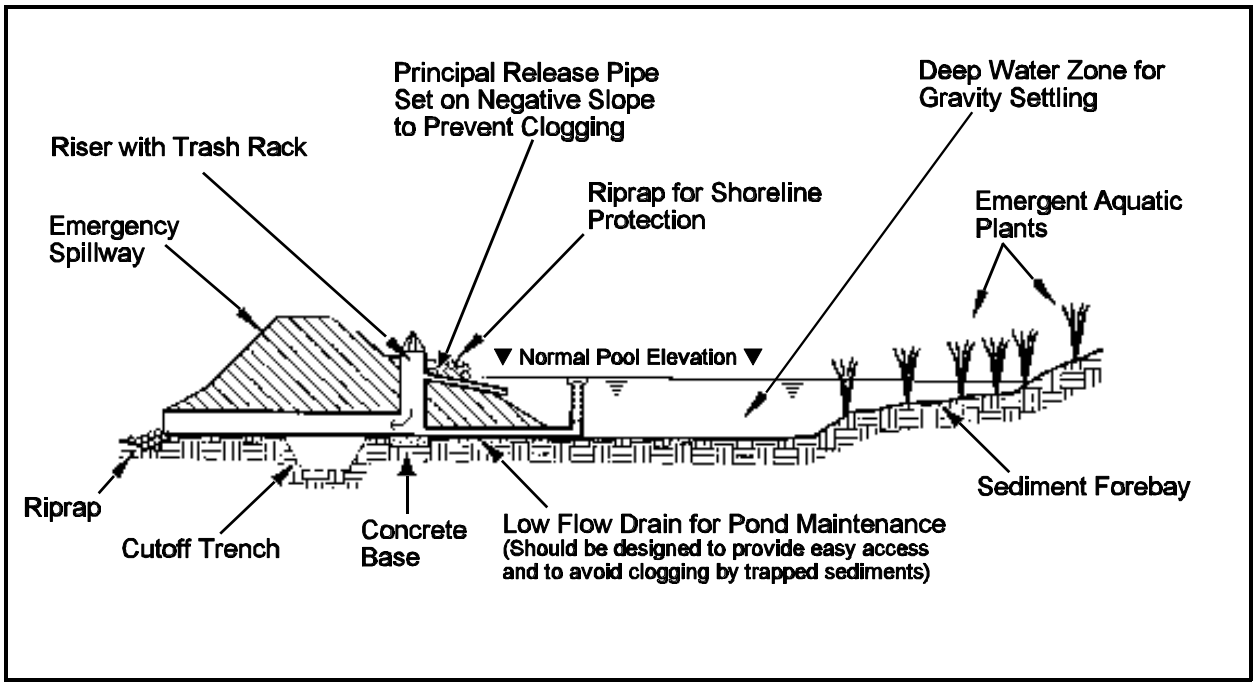

Source: NVPDC, 1992.

Retention Tanks, Tunnels, Vaults and Pipes

Retention systems other than ponds include surface tanks and underground vaults, pipes and tunnels. These systems are not as prevalent as typical wet ponds, and therefore little information is contained in the literature about their design, applicability and usefulness.

5.2.1.4 Constructed Wetland Systems

Constructed wetland systems incorporate the natural functions of wetlands to aid in pollutant removal from storm water. Constructed wetlands can also provide for quantity control of storm water by providing a significant volume of ponded water above the permanent pool elevation. Constructed wetland systems have limits to their application. A water balance must be performed to determine the availability of water to sustain the aquatic vegetation between runoff events and during dry periods. In addition, a sediment forebay or some other pretreatment provision should be incorporated into the wetland system design to allow for the removal of coarse sediments that can degrade the performance of the system. Also, construction sediment should be prevented from entering constructed wetlands, as the resulting sediment loading can

severely degrade the performance of the system. Constructed wetlands are particularly appropriate where groundwater levels are close to the surface because groundwater can supply the water necessary to sustain the wetland system.

Storm water runoff should not be intentionally routed to natural wetlands without pretreatment due to the potentially damaging effects runoff can have on natural wetland systems. In addition, natural wetlands that receive storm water runoff should be evaluated to determine if the runoff is causing degradation of the wetland, and if so measures should be taken to protect the wetland from further degradation and to repair any damage that has been done. In addition, local permitting authorities should be consulted prior to designing and maintaining constructed wetland systems in order to determine if any local regulations apply to their use or maintenance.

Wetland Basins and Wetland Channels

Wetland basins and channels are any of a number of systems that incorporate mechanisms of natural wetland systems for water quality improvement and quantity control. A wetland channel is designed to develop dense wetland vegetation and to convey runoff very slowly (Urbonas and Strecker, 1996). Generally, this rate is less that 2 feet-per-second at the 2-year peak flow. Wetland basins may be designed with or without an open water (permanent pool) component. Wetland basins with open water are similar to retention ponds, except that a significant portion (usually 50 percent or more) of the permanent pool volume is covered by emergent wetland vegetation. Wetland basins without open water are inundated with water during runoff events, but do not maintain a significant permanent pool. Wetland basins of this type, also known as a wetland meadow, support a variety of wetland plants adapted to saturated soil conditions and tolerant of periodic inundation by runoff.

Pollutant removal in wetlands can occur through a number of mechanisms including sedimentation, filtration, volatilization, adsorption, absorption, microbial decomposition and plant uptake. In addition, wetlands can provide for significant water storage during runoff events, thus supplying water quantity control as well. A diagram of a typical storm water wetland system is included below.

Figure 5-6. Constructed Wetland System

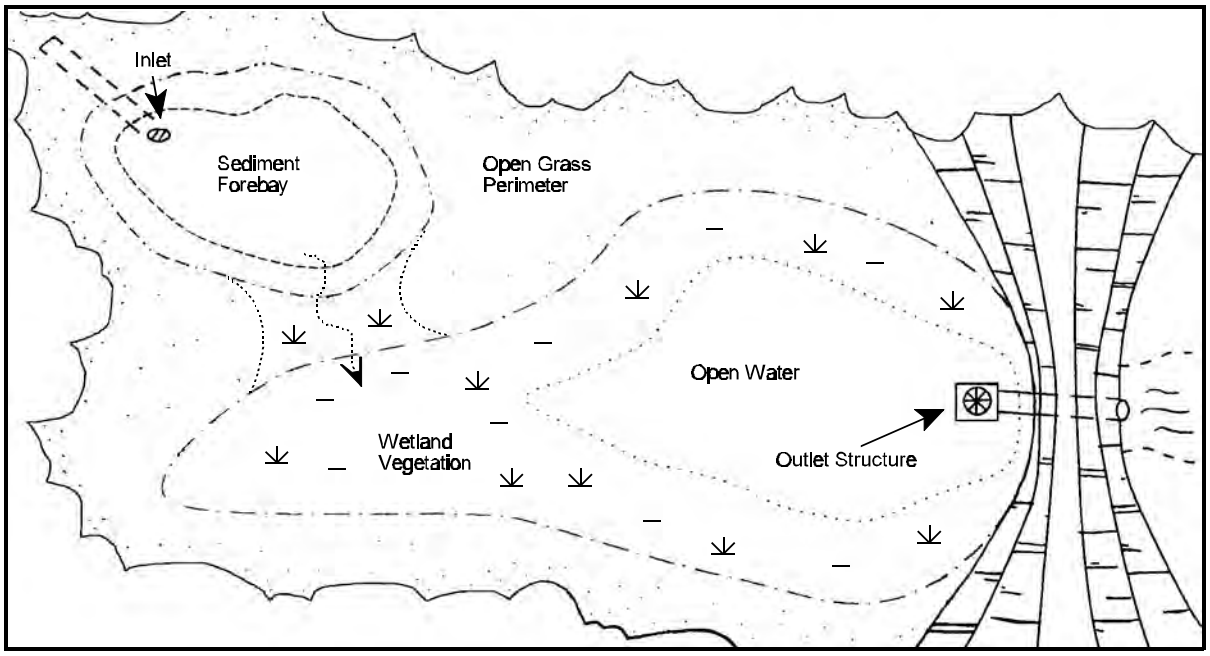

5.2.1.5 Filtration Systems

A filtration system is a device that uses a media such as sand, gravel, peat or compost to remove a fraction of the constituents found in storm water. There are a wide variety of filter types in use. There are also a variety of proprietary designs that use specialized filter media made from materials such as leaf compost. Filters are primarily a water quality control device designed to remove particulate pollutants. Quantity control can be included by providing additional storage volume in a pond or basin, by providing vertical storage volume above the filter bed, or by allowing water to temporarily pond in parking lots or other areas before being discharged to the filter. Media filters are commonly used to treat runoff from small sites such as parking lots and small developments, in areas with high pollution potential such as industrial areas, or in highly urbanized areas where land availability or costs preclude the use of other BMP types. Filters should be placed off-line (i.e., a portion of the runoff volume, called the water quality volume, is diverted to the BMP, while any flows in excess of this volume are bypassed) and are sometimes designed to intercept and treat only the first half inch or inch of runoff and bypass larger storm water flows. A benefit of using filters in highly urbanized areas is that the filter can be placed under parking lots or in building basements, limiting or eliminating costly land requirements. However, placing filters “out of sight” may have implications for continued maintenance and performance. Media filters should use a forebay or pre-settling chamber to remove a portion of the settleable solids prior to filtration. This helps to extend the life of the filter run and prevent clogging of the filter media by removing a portion of the coarse sediment. Also, care must be

taken to prevent construction site sediments and debris such as fines washed off of newly paved areas from entering the filter, as these can cause premature clogging of the filter.

Filter types in common use include surface sand filters such as the “Austin” sand filter and underground vault filters such as the “D.C.” sand filter and the “Delaware” sand filter. There are a number of variations of these basic designs in common use. In addition, there are a number of proprietary filtering systems in use. There are also a number of variations in the types of filtration media that are in use in media filters. Designs may incorporate features such as a layer of filter cloth or a plastic screen, a gravel layer, a peat layer, a compost layer, a layer of peat or a peat/sand mixture. Typical variations in filtration media are shown below.

Figure 5-7. Filter Media

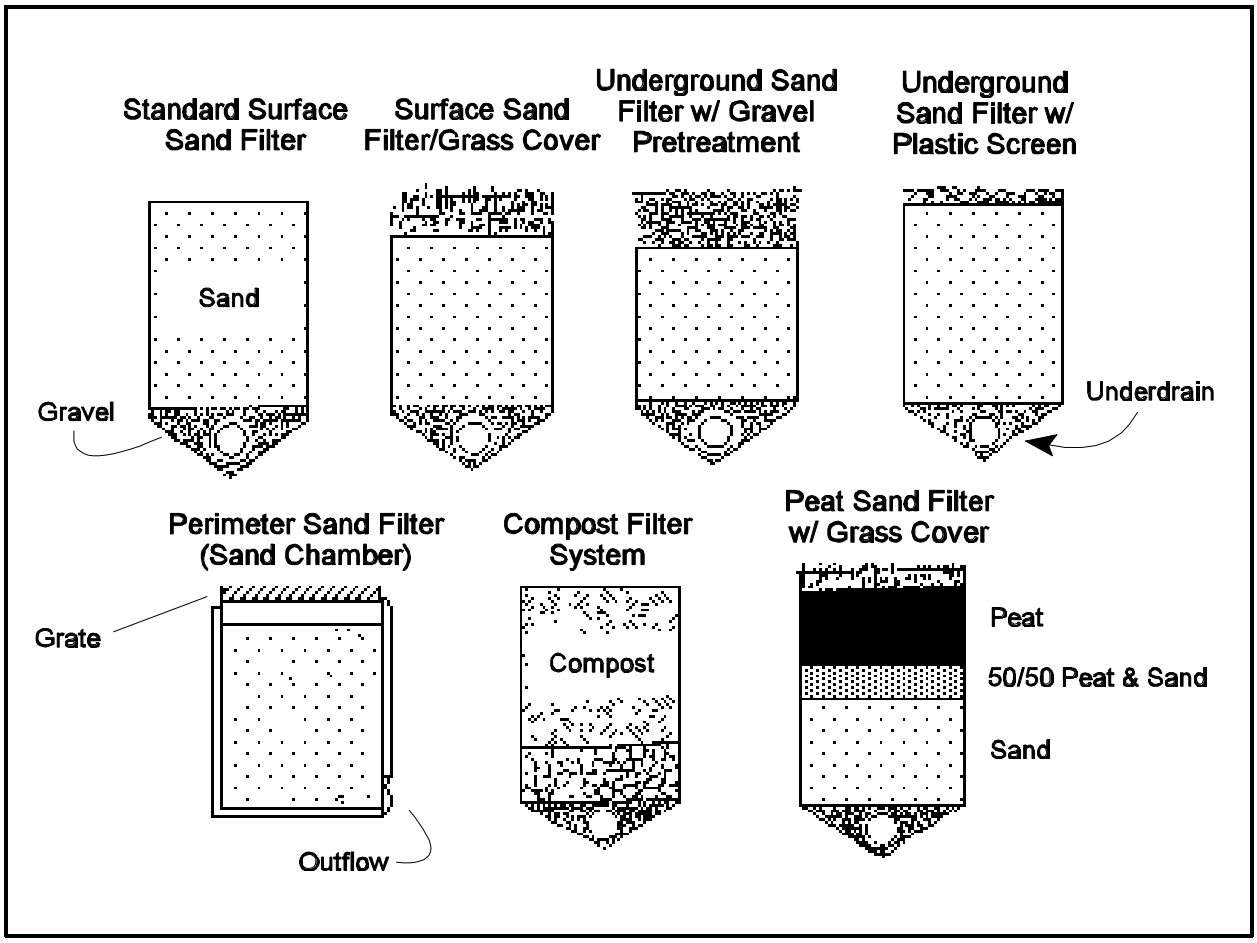

Source: Claytor and Schueler, 1996

Surface Sand Filter

The surface sand filter was developed in Florida in 1981 for sites that could not infiltrate runoff or were too small for effective use of detention systems. The city of Austin, Texas took the development of filter technology further in the mid-1980's. The surface sand filter system

usually incorporates two basins. Runoff first enters a sedimentation basin where coarse particles are removed by gravity settling. This sedimentation basin can be either wet or dry. Water then flows over a weir or through a riser into the filter basin. The filter bed consists of sand with a gravel and perforated pipe under-drain system to capture the treated water. The surface of the filter bed may be planted with grass. Additional storage volume is provided above the filter bed to increase the volume of water that can be temporarily ponded in the system prior to filtration. This two-basin configuration can help to limit premature clogging of the filter bed due to excessive sediment loading. There are several design variations of the simple surface sand filter. Austin uses two variations, termed the partial and the full sedimentation-filtration systems. A diagram of the Austin surface sand filter is shown in Figure 5-8.

Figure 5-8. Austin Full Sedimentation-Filtration System

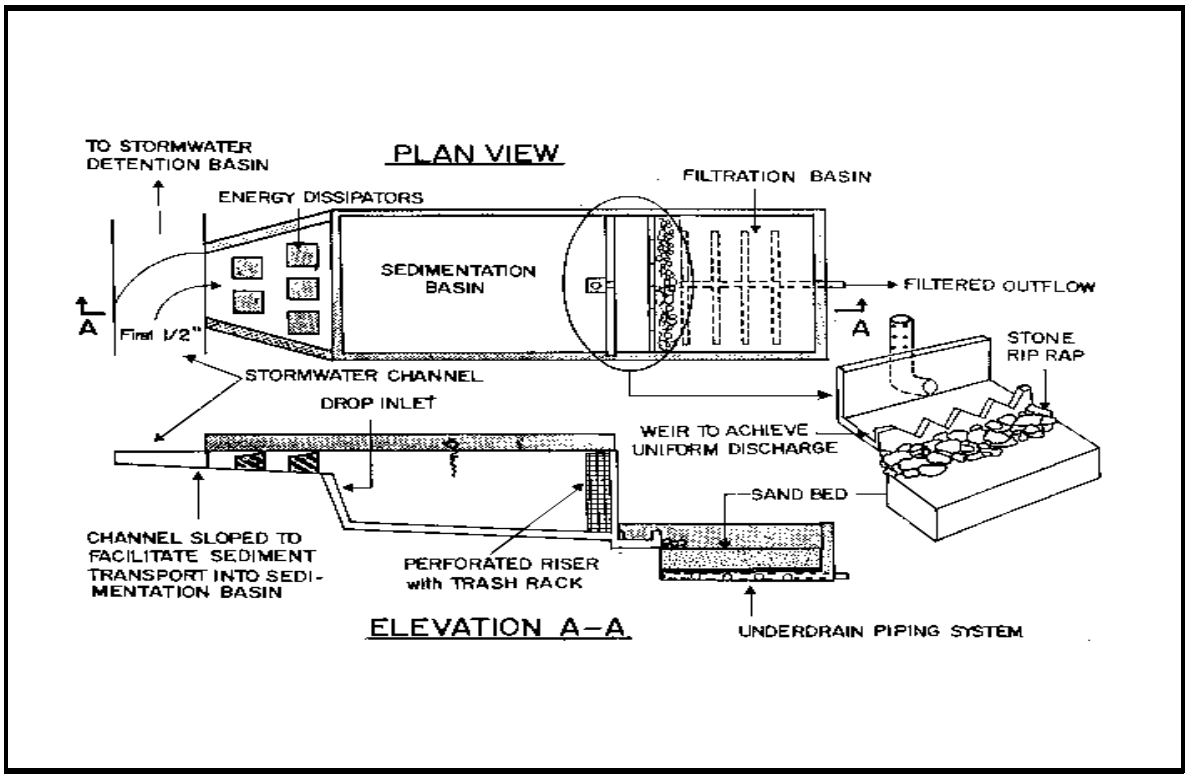

Source: Bell, 1998

Underground Vault Sand Filter

The underground vault sand filter was developed by the District of Columbia in the late 1980's. This filter design incorporates three chambers. The first chamber and the throat of the second chamber contain a permanent pool of water and functions as a sedimentation chamber and an oil and grease and floatables trap, as well as provides for temporary runoff storage. A submerged opening or inverted elbow near the bottom of the dividing wall connects the two chambers. This submerged opening provides a water seal that prevents the transfer of oil and

floatables to the second chamber which contains the filter bed. During a storm event, water flows through the opening into the second chamber and onto the filter bed. Additional runoff storage volume is provided above the filter bed. Filtered water is collected by a gravel and perforated pipe under-drain system and flows into the third chamber, which contains a clearwell and a connection to the storm drain system. Overflow protection can be provided by placing the filter off-line, or by providing a weir at the top of the wall connecting the filter chamber with the clearwell chamber to serve as an overflow. A schematic of the "D.C. Sand Filter" is shown below.

Figure 5-9. Underground Vault Sand Filter

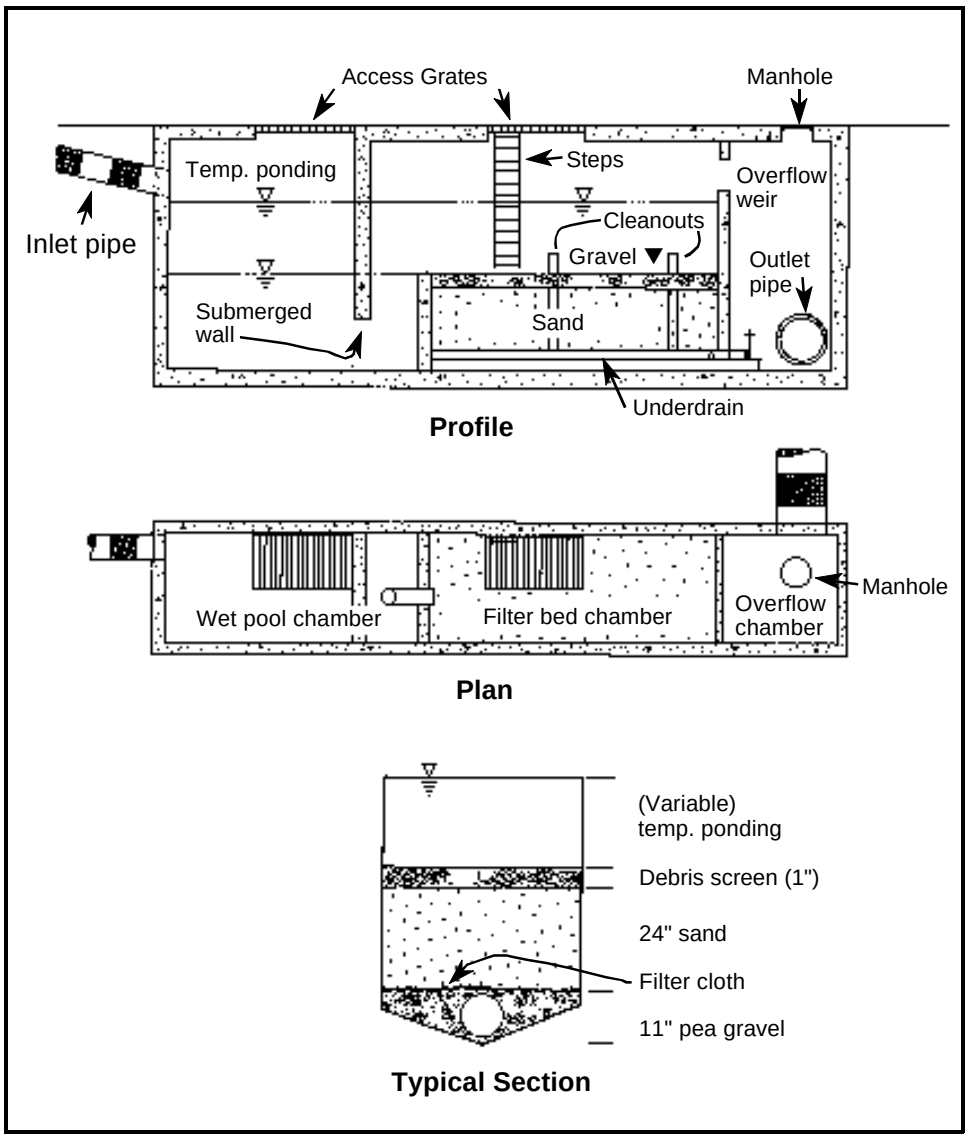

Source: Claytor and Schueler, 1996.

Another underground vault sand filter, also termed a "perimeter" sand filter because it is particularly suited for use around the perimeter of parking lots, was developed in Delaware by Shaver and Baldwin and is known as the "Delaware Sand Filter." This system contains two chambers and a clearwell. Storm water runoff enters the first chamber, which serves as a sedimentation chamber. Water then flows over a series of weirs and into the second chamber which contains the filter media. Additional storage volume is provided by water temporarily ponding in both chambers. Filtered water is collected by a series of gravel and perforated pipe under-drains, and flows into a clearwell that contains a connection to the storm drain system. A schematic of the Delaware Sand Filter is shown below.

Figure 5-10. Delaware Sand Filter

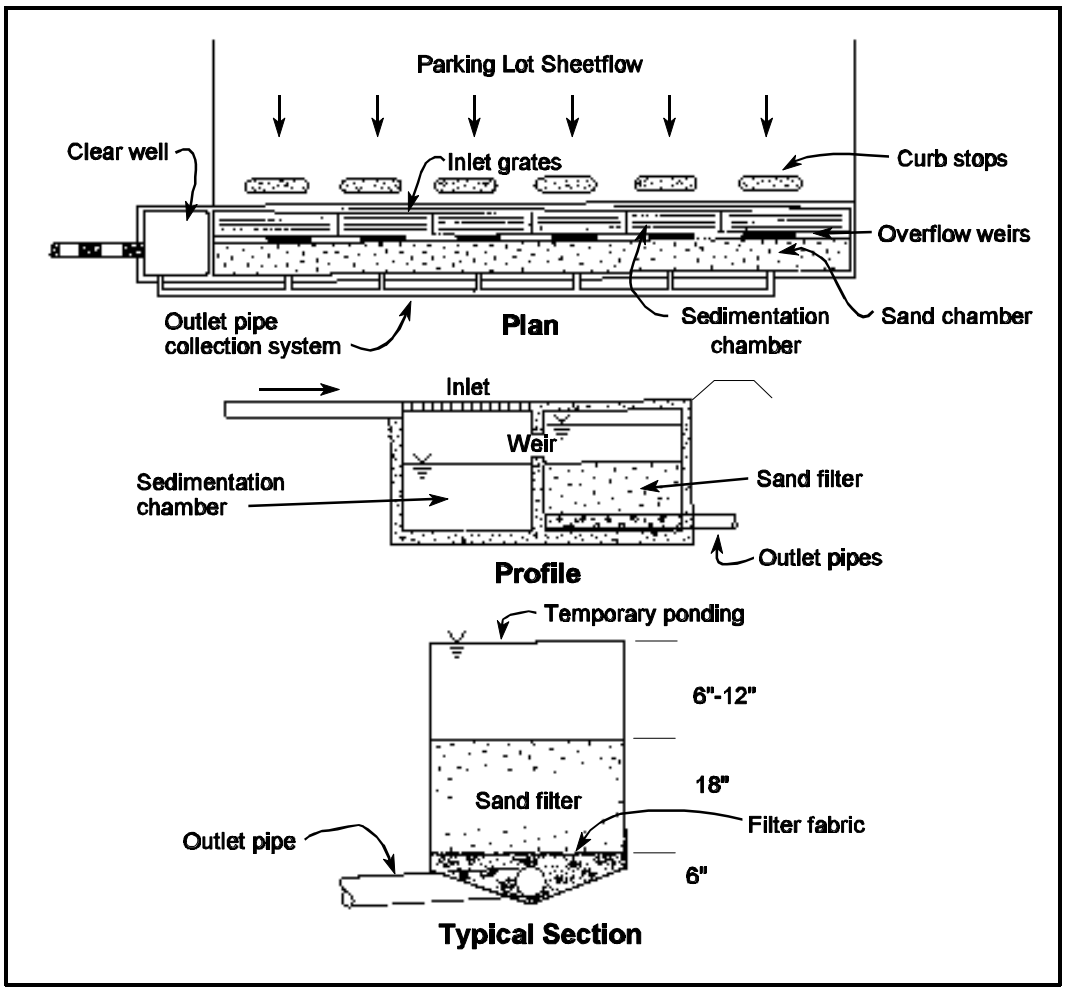

Source: Shaver and Baldwin, 1991

In addition to the three basic filtering systems (D.C., Austin, and Delaware), there are a number of variations in use. The city of Alexandria, Virginia has developed a compound storm water filtering system (Bell, 1998). This design incorporates an anoxic filtration zone in a

permanently flooded gravel layer in the filter. This anoxic zone aids in nitrogen removal by anoxic denitrification. Another configuration uses an upflow anaerobic filter upstream of the sand filter to enhance phosphorus removal by precipitating more iron on the sand filter. A diagram of the Alexandria Compound Filtration System is shown below.

Figure 5-11. Alexandria Compound Filter

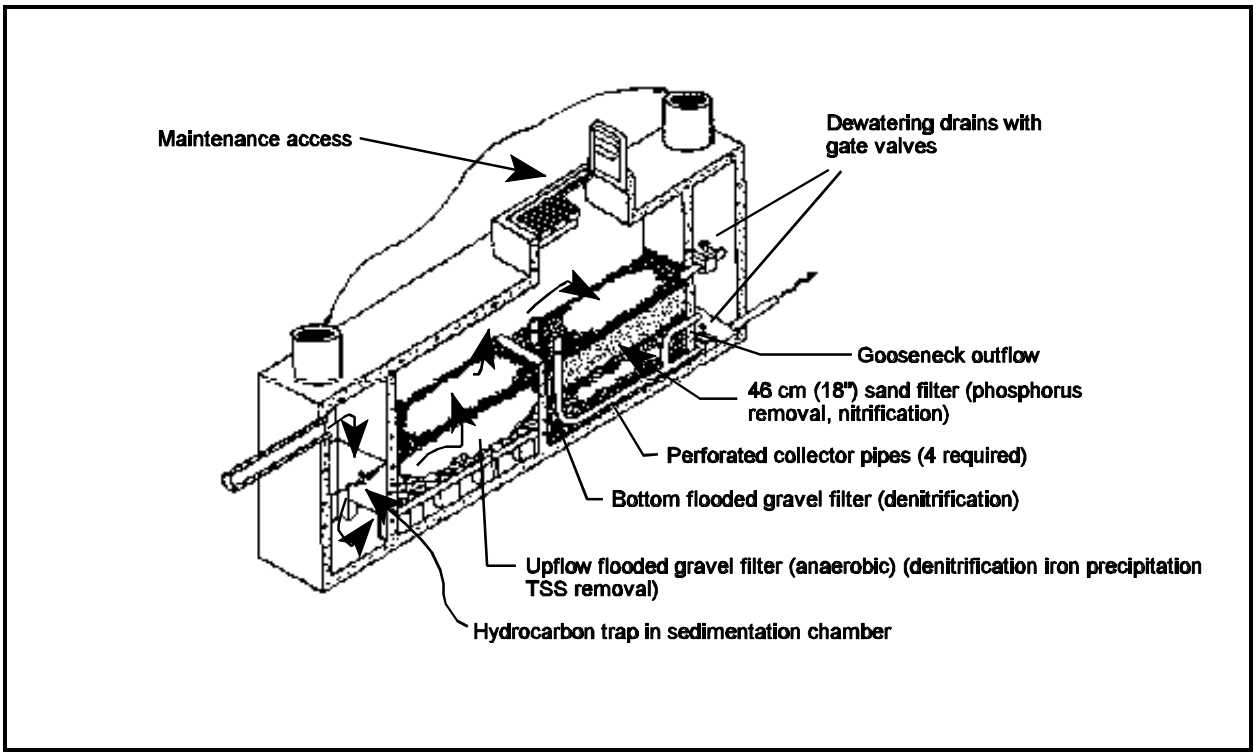

Source: Bell, 1998.

Filters that use an organic filtration media, such as peat or leaf compost, are useful in areas where additional nutrient or metal control is desirable due to the adsorptive capacity, its ion-exchange capability, and is ability to serve as a medium for the growth of a variety of microorganisms. However, peat must be carefully selected (fibric and/or hemic peat should be used, not sapric) and one must question the environmental consequences of destroying peat bogs to obtain filtration media when other technologies are available.

There are a number of references available that contain information on the design and selection of filtering systems for storm water treatment (Urbonas, 1999; Bell, 1998; Claytor and Schueler, 1996; Galli, 1990b; MDE, 1998; NVPDC, 1996a).

Biofiltration/Bioretention Systems

Bioretention systems are designed to mimic the functions of a natural forest ecosystem for treating storm water runoff. Bioretention systems are a variation of a surface sand filter, where the sand filtration media is replaced with a planted soil bed. Storm water flows into the bioretention area, ponds on the surface, and gradually infiltrates into the soil bed. Pollutants are removed by a number of processes including adsorption, filtration, volatilization, ion exchange and decomposition (Prince George's County, MD, 1993). Treated water is allowed to infiltrate into the surrounding soil, or is collected by an under-drain system and discharged to the storm sewer system or directly to receiving waters. When water is allowed to infiltrate into the surrounding soil, bioretention systems can be an excellent source of groundwater recharge. A diagram of a typical bioretention area is shown below.

Figure 5-12. Bioretention System
Traffic Island

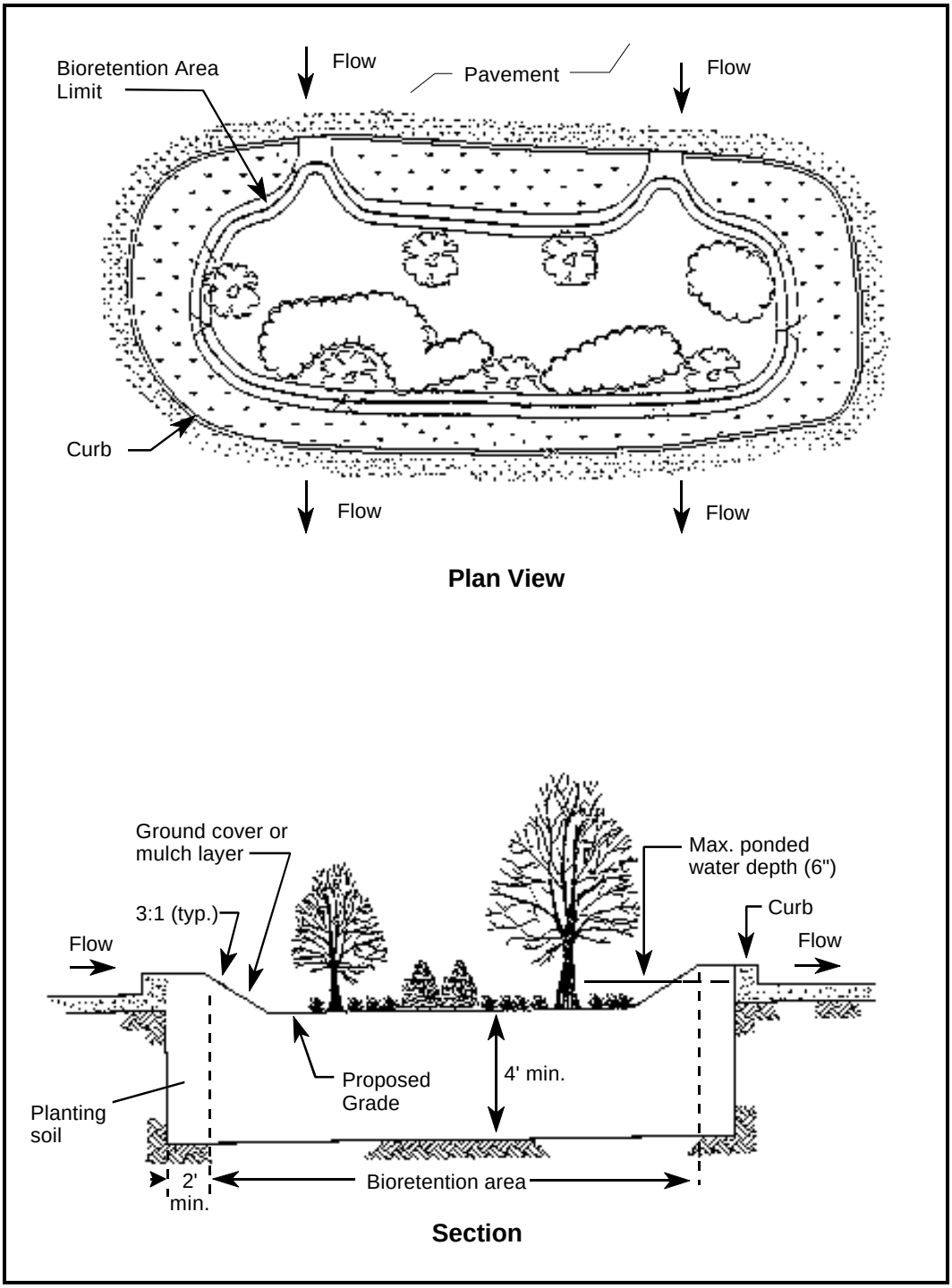

Source: Prince George's County, 1993.

The components of a bioretention system include:

- *Grass Buffer Strips* - runoff enters the bioretention area as sheet flow through the grass buffer strips. The buffers reduce the velocity of the runoff and filter particulates from the runoff.

- *Ponding Area* - The ponding area provides for surface storage of storm water runoff before it filters through the soil bed. The ponding area also allows for evaporation of ponded water as well as allows for settling of sediment in the runoff.

- *Organic Mulch Layer* - The organic mulch layer has several functions. It protects the soil bed from erosion, retains moisture in the plant root zone, provides a medium for biological growth and decomposition of organic matter, and provides some filtration of pollutants.

- *Planting Soil Bed* - The planting soil bed provides water and nutrients to support plant life in the bioretention system. Storm water filters though the planting soil bed where pollutants are removed by the mechanisms of filtration, plant uptake, adsorption and biological degradation.

- *Sand Bed* - the sand bed underlies the planting soil bed and allows water to drain from the planting soil bed through the sand bed and into the surrounding soil. The sand bed also provides additional filtration and allows for aeration of the planting soil bed.

- *Plants* - Plants are an important component of a bioretention system. Plants remove water though evapotranspiration and remove pollutants and nutrient through uptake. The plant species selected are designed to replicate a forested ecosystem and to survive stresses such as frequent periods of inundation during runoff events and drying during inter-event periods.

In addition to providing for treatment of storm water, bioretention facilities, when properly maintained, can be aesthetically pleasing. Bioretention facilities can be placed in areas such as parking lot islands, in landscaped areas around buildings, the perimeter of parking lots, and in other open spaces. Since local regulations frequently require site plans to incorporate a certain percentage of open landscaped area, additional land requirements for bioretention facilities are often not required. The layout of bioretention facilities can be very flexible, and the selection of plant species can provide for a wide variety of landscape designs. However, it is important that a landscape architect with proper experience in designing bioretention areas be consulted prior to construction to insure that the plants selected can tolerate the growing conditions present in bioretention facilities. Bioretention facilities can be adapted easily for use on individual residential lots. Prince George's County, MD has developed the concept of "rain gardens" which are small bioretention systems for use in single or multi-lot residential areas. They provide an easily maintainable, aesthetically pleasing, and effective means of controlling runoff from residential

areas. By disconnecting down spouts and placing a series of bioretention areas throughout a residential area, the volume of storm water runoff produced and requiring subsequent management can be significantly reduced.

Additional design information on bioretention facilities can be found in *Design Manual for Use of Bioretention in Stormwater Management* (Prince George's County, 1993) and in *Design of Stormwater Filtering Systems* (Claytor and Schueler, 1996).

5.2.1.6 Vegetated Systems (Biofilters)

Vegetated systems such as grass filter strips and vegetated swales are used for conveying and treating storm water flows. These BMPs are commonly referred to as *biofilters*, since the grasses and vegetation "filter" the storm water as it flows. Open channel vegetated systems are alternatives to traditional curb-and-gutter and storm sewer conveyance systems. By conveying storm water runoff in vegetated systems, some degree of treatment, storage and infiltration can be provided prior to discharge to the storm sewer system. This can help to reduce the overall volume of storm water runoff that is generated from a particular drainage area.

Grass Filter Strips

Grass filter strips are densely vegetated, uniformly graded areas that intercept sheet runoff from impervious surfaces such as parking lots, highways and rooftops. Grass filter strips are frequently planted with turf grass, however alternatives that adopt any natural vegetated form such as meadows or small forest may be used. Grass filter strips can either accept sheet flow directly from impervious surfaces, or concentrated flow can be distributed along the width of the strip using a gravel trench or other level spreader. Grass filter strips are designed to trap sediments, to partially infiltrate this runoff and to reduce the velocity of the runoff. Grass filter strips are frequently used as a "pretreatment" system prior to storm water being treated by BMPs such as filters or bioretention systems. Grass filter strips can also be used in combination with riparian buffers in treating sheet flows and in stabilizing drainage channel banks and stream banks. In semi-arid climates, grass filter strips may need to be irrigated to maintain a dense stand of vegetation and to prevent export of unstabilized soil. A diagram of a grass filter strip is shown below.

Figure 5-13. Grass Filter Strip

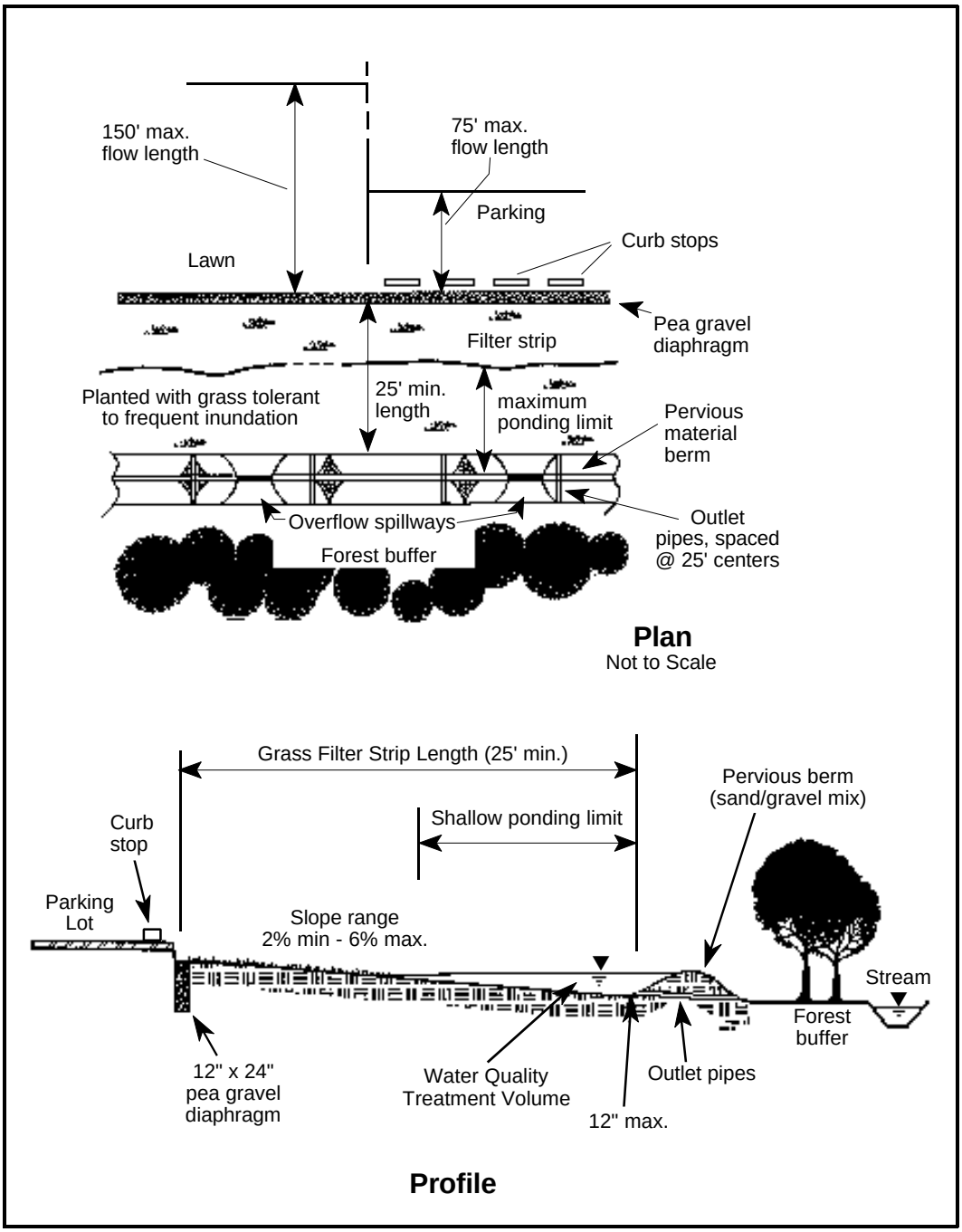

Source: Claytor and Schueler, 1996.

Vegetated Swales

Vegetated swales are broad, shallow channels with a dense stand of vegetation covering the side slopes and channel bottom. Vegetated swales are designed to slowly convey storm water runoff, and in the process trap pollutants, promote infiltration and reduce flow velocities. Vegetated swales can be either wet or dry. Dry swales are used in areas where standing water is not desired, such as in residential areas. Wet swales can be used where standing water does not create a nuisance problem and where the groundwater level is close enough to the surface to maintain the permanent pool in inter-event periods. Wet swales provide the added benefit of being able to include a range of wetland vegetation to aid in pollutant removal.

5.2.1.7 Minimizing Directly-Connected Impervious Surfaces

Minimizing directly-connected impervious surface areas involves a variety of practices designed to limit the amount of storm water runoff that is directly connected to the storm drainage system. Runoff is instead directed to landscaped areas, grass buffer strips, and grassed swales to reduce the velocity of runoff, reduce runoff volumes, attenuate peak flows, and encourage filtration and infiltration of runoff (UDFCD, 1992). By incorporating these principles into site designs, the size and number of conventional BMPs such as ponds and constructed wetland systems can be significantly reduced.

Minimizing directly connected impervious surfaces incorporates both non-structural and structural control measures. Discussions in this section address the structural measures that can be incorporated into existing urbanized or newly developed areas to minimize the amount of runoff discharged to the storm drain system. Additional discussion on non-structural practices that can be used to minimize runoff generation in new developments is included in Section 5.2.3 “Low Impact Development Practices.”

The Denver *Urban Storm Drainage Criteria Manual* (UDFCD, 1992) identifies the following three levels of minimizing directly connected impervious areas:

- *Level 1*: Runoff generated from impervious surfaces such as rooftops, driveways and parking lots is directed to flow over vegetated areas before flowing to a storm sewer system. This increases the travel time of runoff and promotes the removal of suspended solids by sedimentation and filtration.
- *Level 2*: Street curb-and-gutter systems are replaced by grassed swales and pervious street shoulders. Conveyance systems and storm sewer inlets are still used to collect runoff at downstream intersections and crossings.
- *Level 3*: In addition to incorporating Levels 1 and 2, swales are oversized and driveway and street crossing culverts are configured to use the grassed swales as detention basins having the capacity to capture runoff volume for a design storm (2-, 5-, 10- or 100-year runoff).

Practices that reduce the amount of directly connected impervious surfaces can easily be incorporated into site design plans during the planning stages of development projects. Using these practices can result in significant development cost savings due to the decreased need for drainage infrastructure and large end-of-pipe structural BMPs such as ponds and constructed wetlands. These practices can also limit secondary impacts from structural BMPs, such as temperature increases from retention ponds. Minimizing directly connected impervious areas can also be applied to existing urbanized areas through retrofit. Practices that can be used in retrofit instances include disconnecting rooftop downspouts from the storm drain system, use of on-site retention and infiltration to limit the amount of runoff leaving the site and replacing traditional curb-and-gutter systems with grassed swales and wetland channels. Additional discussion on practices that minimize runoff generation is included in Section 5.2.3.

5.2.1.8 Miscellaneous and Vendor-Supplied Systems

There are a wide variety of miscellaneous and proprietary devices that are used for urban storm water management. Many of these systems are “drop-in” systems, and incorporate some combination of filtration media, hydrodynamic sediment removal, oil and grease removal, or screening to remove pollutants from storm water. A few of the systems available include:

- BaySaver
- CDS Technologies
- Hydrasep®
- Storm*ceptor*®
- StormFilter™
- StormTreat™ System
- Vortechs™.

A thorough evaluation of vendor-supplied systems was not conducted in this report. Readers are encouraged to contact the product vendors to obtain information regarding these systems.

One of the main problems facing the use of proprietary devices is the lack of peer-reviewed performance data for these systems. Several vendor-supplied storm water treatment systems are being evaluated through EPA’s Environmental Technology Verification (ETV) program. With financial assistance from the ETV program, the Civil Engineering Research Foundation (CERF) established the Environmental Technology Evaluation Center, commonly known as “EvTEC, ” in 1998. EvTEC is a private sector program designed to utilize networks of experts, testing facilities and stakeholders to evaluate technologies dealing with a variety of environmental problems. One of the EvTEC projects is a collaborative effort with the Washington Department of Transportation (WSDOT) to verify the performance of innovative storm water BMPs under field operating conditions. These evaluations, which are scheduled to begin in 1999, are expected to provide comparable, peer-reviewed data on the performance of these systems (CERF, 1998).

5.2.2 Non-Structural BMPs

Non-structural BMPs include institutional and pollution-prevention type practices designed to prevent pollutants from entering storm water runoff or reduce the volume of storm water requiring management. Non-structural BMPs can be very effective in controlling pollution generation at the source, which in turn can reduce or eliminate the need for costly end-of-pipe treatment by structural BMPs. Non-structural BMPs discussed in this report include education and source controls, recycling and maintenance practices.

5.2.2.1 Education, Recycling and Source Controls

Public education can be an effective means of reducing the amounts of non-point source pollutants entering receiving streams. The public is often unaware that the combined effects of their actions can cause significant non-point source pollution problems. Proper education on day-to-day activities such as recycling of used automotive fluids, household chemical and fertilizer use, animal waste control and other activities can significantly reduce non-point source pollutant loadings to urban streams. The main components of a public education program include:

Automotive Product Disposal

Discharge of automotive fluids such as motor oil and antifreeze to the land or storm drains can cause significant water quality problems. “Do-it-yourself” automobile mechanics often incorrectly assume that materials that are dumped into storm drains will receive treatment at a wastewater treatment plant prior to discharge. Education on appropriate recycling and disposal techniques for these materials can help to reduce pollutant loadings to streams. Education programs should identify the location of community automotive products recycling centers. In addition to impacts associated with dumping used oil and antifreeze, potential runoff pollutant sources from home automobile maintenance activities include dirt, cleaners, oils and solvents from car washing, leaking fluids such as brake and transmission fluid and gasoline spills. To reduce impacts from these activities, the following practices should be used:

- all spills or leaks should be cleaned up using a dry absorbent such as cat litter or commercially available absorbents and disposed of appropriately;
- car washing should be done away from storm drains using biodegradable cleaners, or at a commercial carwash;
- all used fluids should be recycled or disposed of appropriately;
- all fluid leaks should be repaired as soon as possible to reduce loss to the environment.

Commercial and Retail Space Good Housekeeping

Commercial and retail areas can contribute significant pollutant loadings to runoff. The biggest contributor of pollutant is usually impervious surfaces used for vehicle parking, storage and maintenance areas, which can contribute sediment, metals and hydrocarbons. Other sources include raw material and finished product storage areas, pesticides and fertilizers from grounds maintenance, and rooftop runoff. Good housekeeping practices include using porous pavement or

modular paving systems for vehicle parking lots; limiting exposure of materials and equipment to rainfall; spill cleanup, using dry cleanup techniques instead of wet techniques; and limiting direct runoff of rooftops to storm drains.

General Community Outreach

A main problem associated with identifying and controlling nonpoint source pollution is that the public is generally unaware of the sources and control measures for urban nonpoint source pollutants. Information dissemination is a critical need of most local storm water programs. Information that explains the sources of nonpoint source pollution, control measures available and the steps homeowners and commercial owners can do to reduce impacts of their activities can help to increase the public awareness of the need to control nonpoint source pollution. A few of the techniques available for providing educational materials to the public include television, radio and newspaper announcements, distribution of flyers, community newsletters, workshops and seminars, conducting teacher training programs at schools, and supporting citizen-based watershed stewardship groups and volunteer monitoring programs.

Industrial Good Housekeeping

Industrial areas can contribute significant loadings of toxic pollutants to storm water runoff. Therefore, educational programs that inform industrial site owners and operators about pollution prevention and source control programs to reduce nonpoint source pollutant can significantly reduce the amounts of pollutants discharged from industrial areas. Pollution prevention practices include minimizing or eliminating exposure of materials and products to rainfall by storing inside or under cover, spill cleanup, minimizing pesticide/herbicide and fertilizer use, and minimizing discharges of equipment wash water to storm drains.

Storm Drain Inlet Stenciling

Since storm drains frequently discharge runoff directly to water bodies without receiving any type of treatment, storm drain stenciling programs that educate residents not to dump materials into storm drains or onto sidewalks, streets, parking lots and gutters can be effective at reducing nonpoint source pollution associated with illegal dumping. Residents are frequently unaware that materials dumped down storm drains may be discharged to a local water body. Therefore, stenciling the inlets can be a simple yet effective means of alerting residents of this fact. The Northern Virginia *Nonstructural Urban BMP Handbook* (NVPDC, 1996b) contains a useful discussion on developing a storm drain stenciling program.

Pesticide/Herbicide Use

Due to their high aquatic toxicity, pesticides and herbicides can be a significant source of water quality impairment in urban streams. Pesticide usage in the United States was estimated at more than 1.2 billion pounds of active ingredients in 1995 (US EPA, 1997b). Of this total, agricultural usage constituted 939 million pounds (77 percent), commercial, industrial and government usage accounted for 150 million pounds (13 percent) and home and garden usage accounted for 133 million pounds (11 percent). A significant portion of these applications find their way into storm water runoff and ultimately into receiving streams through spray drift,

transport by soils, solubilization by runoff, and by spillage, dumping and improper disposal of containers and residuals. Education on the proper methods of application, application rates and alternatives to pesticides can help to reduce the amount of pesticides that are carried by urban runoff. Alternatives to pesticides, such as in integrated pest management program and pesticide alternatives such as insecticidal soap or natural bacteria, can also reduce the need for pesticides.

Fertilizer Use

A significant amount of nutrients in urban runoff results from misapplication of fertilizer to the urban landscape. Residential lawn and garden maintenance and maintenance of landscape and turfgrass at golf courses, schools and commercial areas uses significant amounts of fertilizers containing nitrogen and phosphorus. Since most fertilizers are water soluble, over-application or application before rainfall events can allow significant quantities to be carried away by storm water runoff. Education on proper application of fertilizers can help to reduce the quantities of nutrients reaching receiving waters.

Household Hazardous Material Disposal

A variety of hazardous and potentially harmful chemicals and materials are improperly used and disposed of by residential homeowners. Materials such as paints and thinners, cleaning products, wood preservatives, driveway sealants and a variety of other miscellaneous household chemicals can find their way into storm water if improperly used, stored or disposed of. Education on usage and holding an annual or semi-annual community household hazardous waste collection program can help to reduce the amounts of these materials that enter storm water runoff.

Lawn Debris Management

Lawn debris such as grass trimmings and leaves require proper management in order to reduce impacts to urban streams. Grass trimmings and leaves can be carried away by runoff and can find their way into streams where they rapidly decompose and release nutrients. Grass trimmings and leaf litter can be controlled by composting or by community curbside collection programs. Composted yard debris can be an excellent source of mulch for residential landscape and gardens. Use of mulch can greatly reduce the need for inorganic fertilizers, which helps to keep nutrient loadings to streams to a minimum.

Pet Waste Disposal

Pet waste can cause significant loadings of bacteria, nutrients and oxygen demanding substances to urban runoff. Pet waste deposited on yards, sidewalks and streets can be carried by runoff into storm drains. As an example, it is estimated that 11,445 pounds of dog waste are generated in the Four Mile Run watershed in northern Virginia each day.[2] 378 pounds of BOD, 39 pounds of total phosphorus and 189 pounds of total nitrogen are washed off into Four Mile Run and its tributaries annually as a result of this pollution load (NVPDC, 1996b). In many areas,

[2] This estimate was calculated based on the total waste load generated by the dog population in the area, not the waste load deposited on yards, sidewalks and streets.

regulations exist prohibiting the deposit of pet waste on public property. However, it is often very difficult to enforce these laws. Community education on the impacts associated with pet waste and alternative disposal methods such as flushing and disposal in the trash can help to reduce impacts associated with pest waste. A particularly useful method of controlling pet waste is for communities to provide pet waste receptacles in parks and other public areas for pet owners to deposit droppings from their pets.

Illicit Discharge Detection and Elimination

Illicit discharges to storm sewers can be a significant source of pollutants in urban storm water. A study conducted in Sacramento, California indicated that slightly less than one-half of the water discharged from a municipal separate storm sewer system was not directly attributable to precipitation runoff (US EPA, 1993b). A major source of illicit discharges to storm drain systems are direct connections of sanitary sewer piping to the storm drain system. In addition to direct connections, seepage and sewage from leaking sanitary sewer lines can find their way into storm drains, especially in areas where storm drains run parallel to the sanitary sewer lines. Spills can also be collected by storm drain inlets.

Detection and elimination of illicit connections and discharges can significantly reduce the concentrations of bacteria, nutrients and oxygen demanding substances contained in storm water discharges. Several methods exist for detection and elimination of illicit cross-connections. Useful indicators of the presence of cross connections include dry weather flows in storm sewer lines and biological indicators that indicate the presence of human fecal matter in storm drain outfalls. Once illicit connections are detected, excavation and correction of the illicit connections are necessary. In addition to detection and elimination of existing cross-connections, plans for new development should be carefully reviewed and inspections should be conducted during construction in order to prevent future cross-connections from being placed. Storm drain stenciling programs and a public spill reporting system can help to educate the public on proper procedures for managing spills to prevent discharge to the storm sewer system.

5.2.2.2 Maintenance Practices

Maintenance programs are necessary in order to reduce the pollutant contribution from the urban landscape and to ensure that storm water collection and treatment systems are operating as designed. Major maintenance practices that can be used include:

Catch Basin Cleaning

Catch basins naturally accumulate sediment and debris such as trash and leaf litter. In order to ensure their continued effectiveness, catch basins need to be periodically cleaned. This can be done by manual means, or by using a vacuum truck.

Street and Parking Lot Sweeping

Urban streets and parking lots can accumulate large amounts of pollutants that can be washed off during storm events. Streets and parking lots comprise a significant portion of the total impervious area within a developed watershed, and a large percentage, if not the entire area, of streets and parking lots are usually directly connected to the storm drain system. In an investigation conducted by Bannerman (Bannerman et al, 1993), data on runoff volumes from streets and parking lots collected during 4 years from two urbanized areas in Wisconsin indicated that 54 percent of the total runoff volume from residential areas was due to direct runoff from streets and parking lots, and that 80 percent of the total runoff volume from commercial areas was due to direct runoff from streets and parking lots. A breakdown of the runoff volumes based on source area is shown in Table 5-1.

Table 5-1. Percent Runoff Volumes Contributed by Source Area in Two Urbanized Areas of Wisconsin

Land Use	**Source Area Percent Runoff Contribution**					
	Feeder Streets	Collector Streets	Arterial Streets	Parking Lots	Total % due to roads and parking lots	Total Other %*
Residential	34	20	--	--	54	46
Commercial	--	10	21	49	80	20

* Other land uses include lawns, driveways, rooftops and sidewalks
Source: Adapted from Bannerman et al, 1993

Furthermore, Bannerman found that runoff from streets and parking lots contributed a significant portion of the total runoff pollutant loading. Table 5-2 summarizes the pollutant load contributions based on land uses, and indicates the total contaminant contribution in the urbanized area attributable to runoff from streets and parking lots.

Table 5-2. Contaminant Load Percentages in Two Urbanized Areas of Wisconsin

Contaminant	Percent Contribution by Source Area						Total Contaminant Contribution by Streets and Parking Lots
	Residential		*Commercial*		*Industrial*		
	Streets	**Parking Lots**	**Streets**	**Parking Lots**	**Streets**	**Parking Lots**	
Total Solids	76	--	57	31	20	60	**78**
Suspended Solids	80	--	68	27	25	55	**80**
Total Phosphorus	58	--	56	28	19	29	**54**
Dissolved Phosphorus	46	--	50	27	18	11	**39**
Dissolved Copper	73	--	50	39	16	73	**82**
Total Copper	78	--	60	32	22	67	**85**
Total Zinc	80	--	45	32	9	30	**49**
Fecal Coliform	78	--	82	10	10	19	**71**

Source: Adapted from Bannerman et al, 1993

Based on these data, streets and parking lots can contribute significant pollutant loadings to urban runoff. Therefore, sweeping programs that can remove a portion of these materials from streets and parking lots may significantly reduce the pollutant load contributions to urban runoff.

Road and Ditch Maintenance

Road and street surfaces undergo breakdown due to frictional action of traffic, freeze-thaw breakdown, frost heaving, and erosion of road subbase. Failure to correct deteriorating pavement can allow exposure of unstabilized subbase material to erosive forces of water and subsequent increases in suspended solids concentrations. The same process occurs in roadside ditches where high runoff rates cause channelization and erosion. Roadside ditches also accumulate sediment and debris from the road surface, which enters runoff during rainfall events. Maintenance of roads and cleaning and stabilization of ditches can help to reduce pollutant loadings from these sources. In roadside ditches, reducing the length and slope of ditch runs and

reducing the velocity of runoff by using check dams can help to prevent excessive channelization and erosion.

Road Salting and Sanding

Road salting and sanding can contribute large quantities of sediment and salts to runoff. Highway maintenance programs in areas where road icing is a problem frequently apply large quantities of sand, salt, and coal ash to prevent icy road surfaces. Snowmelt can carry a large portion of these materials into the storm drainage system and ultimately to receiving streams. High salt concentrations can have significant impacts on receiving streams. In addition, road salt can contain cyanide, which may cause acute or chronic toxicity to aquatic organisms. Alternative deicing products such as acetates, formates and agricultural residues can be used if impacts due to traditional deicing products are significant.

Sediment and Floatables Removal from BMPs

Sediment and floatables removal is an important component of maintenance for BMPs that are designed for sediment capture. Removal of accumulated sediment is important so that the BMP continues to operate efficiently. Accumulation of excess sediment in pond and constructed wetland systems can lead to reduced storage capacity, short-circuiting and re-suspension of previously settled particles. All of these can lead to decreased efficiency of the BMP. Floatables in BMPs can accumulate and block outlet structures leading to changes in BMP hydraulics. Floatables can cause aesthetic impacts, and floating material such as algal scum and other debris can lead to odor problems. Sediment removal is also needed periodically in filtration systems. Sedimentation chambers require periodic cleanout of sediments and floatables (including accumulated oil) and filter beds will accumulate a sediment layer on the surface that will decrease the filtration rate of the system over time. Periodic removal of this sediment layer and a portion of the filtration media is necessary in order to restore the filtration capacity of the system. Sediments also accumulate in infiltration basins. The accumulation of sediments, particularly sediments from construction activities and improperly stabilized soil, will lead to a rapid reduction of the infiltrative capacity of infiltration basins, trenches and wells.

The frequency of sediment removal in BMP types can vary widely. Some BMPs require sediment removal every two or three years, while others may not need maintenance for more than 20 years. The frequency that sediment must be removed depends greatly on the land use and degree of soil stabilization in the contributing watershed. BMPs that receive runoff from a watershed that has significant construction activities will accumulate sediment at a rate much faster than a watershed with little or no construction activity. In addition, watersheds with dense, well established vegetation will contribute less sediment than sparsely vegetated watersheds. Also, watersheds in arid or semi-arid regions, which frequently are subject to high intensity rainfall and highly erosive storm water flows will produce large quantities of solids requiring frequent removal from BMPs. Table 5-3 summarizes maintenance requirements and frequency for different structural BMP types.

Vegetation Maintenance

Vegetative BMPs such as constructed wetlands, grassed filter strips, vegetated swales, and bioretention facilities require periodic vegetation maintenance to enhance performance. Grassed filter strips and vegetated swales require a dense stand of vegetation in order to function properly and to prevent export of sediment from unstabilized planting areas. Several seasons of planting and re-seeding of sparsely vegetated areas may be needed in order to reach optimum performance. Constructed wetland systems frequently require re-planting of wetland vegetation in areas where original plantings failed to become established. Once wetland systems are functioning, periodic vegetation harvesting is necessary to remove excess vegetation and stored nutrients. Invasive species also need to be periodically removed to promote growth of beneficial wetland vegetation. Grassed filter strips and vegetated swales require periodic mowing to remove excess vegetation and stored nutrients. Mowing of these systems should not be done too close to the ground, as dense vegetation is needed for optimum performance.

General BMP Maintenance

BMPs require a variety of periodic maintenance activities in order to enhance performance. In addition to sediment removal and vegetation maintenance, periodic maintenance and repair of outlet structures is needed, filtration media need to be periodically replaced, and eroded areas need to be repaired, to name a few. Table 5-3 summarizes general maintenance activities and frequency for a few BMP types. The actual maintenance schedule varies considerably based on site-specific conditions, and the values given should be used only as a general guideline for established residential or commercial areas without significant inputs of construction sediment or other sediment loadings.

Table 5-3. Recommended BMP Maintenance Schedules

BMP	Activity	Schedule
Retention Pond / Wetland[1]	• Cleaning and removal of debris after major storm events • Harvest excess vegetation • Repair of embankment and side slopes • Repair of control structure	Annual or as needed
	• Removal of accumulated sediment from forebays or sediment storage areas	5-year cycle, or as needed
	• Removal of accumulated sediment from main cells of pond once the original volume has been significantly reduced	20-year cycle (although can vary)
Detention Basin	• Removal of accumulated sediment • Repair of control structure • Repair of embankment and side slopes	Annual or as needed
Infiltration Trench[1]	• Cleaning and removal of debris after major storm events • Mowing[4] and maintenance of upland vegetated areas • Maintenance of inlets and outlets	Annual or as needed
Infiltration Basin[2]	• Cleaning and removal of debris after major storm events • Mowing[4] and maintenance of upland vegetated areas	Annual or as needed
	• Removal of accumulated sediment from forebays or sediment storage areas	3- to 5-year cycle
Sand Filters[3]	• Removal of trash and debris from control openings • Repair of leaks from the sedimentation chamber or deterioration of structural components • Removal of the top few inches of sand and cultivation of the surface when filter bed is clogged (only works for a few cycles) • Clean-out of accumulated sediment from filter bed chamber • Clean out of accumulated sediment from sedimentation chamber	Annual or as needed

1. Modified from Livingston et al (1997)
2. Modified from Livingston et al (1997), based on infiltration trench requirements
3. Modified from Claytor and Schueler (1996)
4. Mowing may be required several times a year, depending on local conditions

Table 5-3. Recommended BMP Maintenance Schedules (continued)

BMP	Activity	Schedule
Bioretention[1]	• Repair of eroded areas • Mulching of void areas • Removal and replacement of all dead and diseased vegetation • Watering of plant material	Bi-Annual or as needed
	• Removal of mulch and application of a new layer	Annual
Grass Swale[2]	• Mowing[4] and litter and debris removal • Stabilization of eroded side slopes and bottom • Nutrient and pesticide use management • De-thatching swale bottom and removal of thatching • Discing or aeration of swale bottom	Annual or as needed
	• Scraping swale bottom, and removal of sediment to restore original cross section and infiltration rate • Seeding or sodding to restore ground cover (use proper erosion and sediment control)	5-year cycle
Filter Strip[3]	• Mowing[4] and litter and debris removal • Nutrient and pesticide use management • Aeration of soil in the filter strip • Repair of eroded or sparse grass areas	Annual or as needed

1. Modified from Prince George's County (1993)
2. Modified from Livingston et al (1997)
3. Modified from Livingston et al (1997) based on grass swale recommendations
4. Mowing may be required several times a year, depending on local conditions

5.2.3 Low-Impact Development Practices

There are a number of low-impact development practices that can be used at the site level. While these practices often do not produce direct removal of pollutants from runoff, they can significantly reduce runoff volumes that are generated, reduce the impacts associated with runoff and reduce the need for conventional structural BMPs. There are a number of practices that are in use, and therefore an exhaustive summary has not been included in this document. However, a few of the more common practices in use are presented briefly in the following sections.

Minimizing Impervious Areas

Minimizing the amount of impervious surfaces that are created in a new development can greatly reduce the volume of storm water runoff that is generated. There are many opportunities that exist for reducing impervious surfaces, including:

- limiting the number, length and radius of cul-de-sacs;

- using porous pavement or modular block pavers in parking areas and low-traffic areas;
- reducing the width of streets;
- placing sidewalks on only one side of the street;
- reducing frontage requirements to lessen paved surface areas.

Although the above practices can reduce the amounts of impervious surfaces that are created, there will still be a great deal of impervious surfaces that must be included into a site plan such as rooftops, streets, driveways and lawns. To limit the impacts associated with runoff from these surfaces, it is important to limit the amount of areas that are directly connected to the storm drainage system. This can be accomplished by providing on-site retention and infiltration to collect rooftop and driveway runoff, and through the use of BMPs such as grassed swales, vegetated filter strips and wetland channels in place of traditional curb-and-gutter systems.

Directed Growth

Directed growth involves placing controls on land use through mechanisms such as master planning and zoning ordinances. Local governments may utilize these mechanisms in order to protect sensitive areas from development and to target growth to areas that are more suitable for development where it is easier to control the impacts associated with runoff. Directed growth can be a complex process, and must balance a number of factors such as economic considerations, local laws and ordinances, secondary impacts such as increased traffic and population in certain areas, as well as the availability of public utilities such as sewage treatment and drinking water service, and schools, hospitals and fire stations. Nevertheless, with careful planning and consideration, directed growth can help to reduce impacts associated with development of an area.

Sensitive Area Protection

Sensitive area protection is an important component of conservation design. Sensitive areas include the areas adjacent to streams, wetlands and natural drainage channels, cold water fisheries, shellfish beds, swimming beaches, recharge areas, and drinking water supplies. These areas are particularly susceptible to degradation by storm water runoff. Preservation of these areas and incorporation of stream and wetland buffers into site plans can help to preserve the integrity of these areas.

Open Space Preservation

Preservation of open space such as forested areas and meadows can help to reduce the impacts associated with development of an area. Open space preservation helps to reduce the generation of runoff, and can reduce the overall impact that results from development of an area by limiting the amount of impervious areas that are created. Open space allows the preservation of buffers and natural drainage corridors, and retains the natural storm water filtering, retention and infiltration effects of these areas. Open space can also increase the aesthetics of a development, and make the area more desirable to potential home buyers.

Minimizing Soil and Vegetation Disturbance

Soil and vegetation disturbance can significantly increase the amount of runoff that is generated from a site and the concentrations of pollutants that are transported by the runoff. Disturbed soil areas are particularly susceptible to erosion during storm events. Vegetation helps to stabilize soil and prevent detachment and transport by flowing water. By minimizing the area that is disturbed to only areas undergoing active construction (often termed "fingerprinting"), erosion of soil can be minimized. In addition, disturbance of soil and vegetation should be limited to only those areas that are necessary. Disturbing soil by excavation, grading and compaction reduces the infiltrative capacity of the soil, creating additional runoff that must be managed. Maintaining naturally vegetated areas minimizes the amount of increased runoff that is produced.

5.3 BMP Selection

BMP selection is a complex process. There are a number of competing factors that need to be addressed when selecting the appropriate BMP or suite of BMPs for an area. It should be stressed that BMPs should be incorporated into a comprehensive stormwater management program. Without proper BMP selection, design, construction and maintenance, BMPs will not be effective in managing urban runoff. BMP selection can be tailored to address the various sources of runoff produced from urbanized areas. For example, a particular suite of BMPs may be developed for use on construction sites and new land development, where opportunities exist for incorporating BMPs that are focused on runoff prevention, reducing impervious surfaces and maintaining natural drainage patterns. In established urban communities, a different suite of BMPs may be more appropriate due to space constraints. In these areas, BMPs may be selected to focus on pollution prevention practices along with retrofit of the established storm drain system with regional BMPs. *Site suitability* for selecting a particular BMP strategy is key to successful performance. Most BMPs have limitations for their applicability, and therefore cannot be applied nationwide. A few considerations to incorporate into BMP selection are:

- drainage area;
- land uses;
- average rainfall frequency, duration and intensity;
- runoff volumes and flow rates;
- soil types;
- site slopes;
- geology/topography;
- availability of land;
- future development/land use in watershed;
- depth to groundwater table;
- availability of supplemental water to support vegetative BMPs;
- susceptibility to freezing;
- safety and community acceptance;
- maintenance accessability;
- periodic and long-term maintenance/rehabilitation needs.

In addition to site-specific applicability requirements, factors such as BMP cost, local regulations or requirements, aesthetics, the experience of a developer or contractor with a particular design, and competing receiving water considerations such as temperature and nutrient levels should be addressed. The combination of these factors make selection of appropriate BMPs a difficult task, and one that should be done only by an experienced storm water practitioner. This is especially true in established urban areas, where knowledge of local factors that affect design and performance is needed. BMP use in arid and semi-arid climates also presents unique challenges. The availability of water to support vegetative and open pool BMPs such as retention ponds and wetland systems is of primary concern in these areas. Without adequate water sources, these systems may not function properly and may become public nuisances. A designer with adequate experience in designing BMPs for arid climates should be consulted in these instances. In addition to arid climates, BMP use in areas where freezing conditions can be encountered presents design problems. In cold climates, design modifications may be needed to adjust for freezing and spring snowmelt (Caraco and Claytor, 1997). Given the variety of local considerations that exist, developing a matrix of BMP applicability is outside of the scope of this report. There are several references that readers should consult to obtain additional information on BMP selection, including *Fundamentals of Urban Runoff Management* (Horner et al, 1994), *Controlling Urban Runoff: A Practical Manual for Planning and Designing Urban BMPs* (Schueler, 1987), *A Watershed Approach to Urban Runoff: Handbook for Decisionmakers* (Terrene Institute, 1996), *Urban Targeting and BMP Selection* (Terrene Institute, 1990), *Guidance Specifying Management Measures for Sources on Nonpoint Source Pollution in Coastal Waters* (US EPA, 1993a), *Handbook Urban Runoff Pollution Prevention and Control Planning* (US EPA, 1993c), *Municipal Wastewater Management Fact Sheets: Storm Water Best Management Practices* (US EPA, 1996e), *Design and Construction of Urban Stormwater Management Systems* (WEF and ASCE, 1992), and *Urban Runoff Quality Management* (WEF and ASCE, 1998).

5.4 Monitoring BMP Effectiveness

Monitoring the effectiveness of BMPs can be done in a number of ways. Since urban runoff frequently contains pollutants that can contribute to water quality impacts to receiving streams, the ability of a BMP to remove pollutants from runoff is often of concern. The typical method for measurement of the pollutant removal efficiency of a BMP system is to collect and analyze *water quality samples*. This can be accomplished by measuring the concentration of a target parameter or group of parameters in an inflow sample or set of samples and comparing these values to samples collected from the outflow of the BMP. The reduction in concentrations or loading across the BMP can be termed the pollutant removal efficiency.

In addition to monitoring the pollutant removal efficiency of BMPs, it is important to *monitor the hydraulic performance* of the BMP. A major problem associated with urban runoff is the total volume and flow rate of water that is discharged to the storm sewer system or the receiving stream. To evaluate the effectiveness of BMPs in reducing these impacts, hydraulic parameters such as the reduction in peak discharge rate, reduction in total volume discharged, and

the time effects of discharges are frequently measured. To do this, measurement of flow rates and water volumes into and out of the system are conducted by using flow monitoring equipment.

Since the ultimate goal of BMPs is to protect or improve the quality of receiving streams, another method of evaluating the effectiveness of BMPs is to *evaluate the quality of waters receiving runoff*. Measures of water quality such as pollutant levels, pH, dissolved oxygen and other parameters can give an indication as to the effectiveness of a given BMP or group of BMPs. Evaluation of the contaminant levels present in sediments of receiving waters is also an important measure of BMP effectiveness. In addition, measures of aquatic habitat and stream channel morphology can give an indication as to the effectiveness of BMPs in controlling impacts or improving channel or habitat quality. Another measure to evaluate the effectiveness of BMPs is to measure the organisms that live in the receiving stream. Biological indicators such as macroinvertebrate counts, fish counts, and aquatic plant surveys can indicate the overall health of the receiving stream and indicate, over time, the effectiveness of BMPs. A potential problem with in-stream indicators is that it is sometimes difficult to isolate the impacts or improvements attributable to one particular variable. Since there are potentially a number of different factors that can influence a stream such as the amount of riparian cover, the existence of point source discharges, seepage from on-site disposal systems, as well as urban runoff, in can be very difficult to isolate impacts or improvements attributable to one particular stressor. Therefore, many years of data, collected both before and after a BMP implementation, may be needed to indicate a change. In spite of these shortcomings, in-stream monitoring and evaluation of the cumulative effects in a watershed as a result of BMP implementation is a very important measure of BMP effectiveness.

5.4.1 Water Quality Monitoring of BMPs

BMP monitoring can be conducted for a number of reasons, and the type of monitoring conducted and the instrumentation or equipment used can vary greatly depending upon the parameters of interest. BMP monitoring and data analysis is a complex process, and therefore a thorough explanation of all of the available monitoring practices and procedures is not included here. An important point to emphasize with respect to BMP monitoring is that consistent data reporting is needed in order to compare data between studies. Consistent reporting of BMP design parameters and watershed parameters as well as consistent monitoring methods and data analysis protocols is key to conducting data comparisons. It is recommended that individuals conducting BMP monitoring use the data reporting protocols developed by the American Society of Civil Engineers (ASCE) for the National Stormwater BMP Database (Urbonas and Strecker, 1996). These protocols are included with the database software, and are also available from the ASCE website.[3]

The following discussion includes a description of the most common methods used to evaluate BMP performance. Readers are encouraged to consult various monitoring manuals that

[3] The website address is http://www.asce.org/peta/tech/nsbd01.html

are available and papers that are contained in the literature for more detailed information on BMP monitoring and data analysis. Recommended references include *Monitoring Guidance for Determining the Effectiveness of Nonpoint Source Controls* (US EPA, 1997c), *NPDES Storm Water Sampling Guidance Document* (US EPA, 1992c), and *Stormwater NPDES Related Monitoring Needs* (Torno, 1995).

BMPs are frequently evaluated by collecting inflow and outflow samples and comparing concentrations of pollutants. Samples can be collected in a number of different ways. The most common way is by collecting flow- or time-weighted composite samples from inflow and outflow points and measuring the concentrations of a targeted group of parameters in these samples. Composite samples can be collected by using automatic samplers, or by collecting a series of discrete samples and manually compositing. Composite samples are useful for determining an overall average or "event mean" concentration for a particular sampling point, and are commonly used to evaluate BMP performance. However, composite samples cannot be used to evaluate any trends in pollutant concentrations over time or varying flow rates. In order to conduct these types of evaluations, it is necessary to collect a series of discrete grab samples either by an automatic sampler or by collecting grabs manually. By collecting a series of discrete time-weighted or flow-weighted samples, a "pollutograph" of concentration versus time or flow rate can be prepared, which can give insight into the performance of the BMP under various hydraulic loadings. Sample results can then be combined mathematically to determine representative event mean concentrations. Manual grab samples are also used for collecting samples that are not amenable to collection by automated equipment, such as microbiological samples, samples for oil and grease evaluation, and samples for volatile organic compounds analysis.

BMP monitoring frequently incorporates measurements of water flow rates and volumes into and out of the system. Flow rates are frequently determined by using a combination of a primary control device (weir, flume or orifice) that is calibrated to discharge water according to a known relationship based on the depth of the water flowing over or through the device, along with a secondary control device (bubbler, pressure transducer, float, etc.) that is used to measure the depth of water flowing through or over the primary control device. A digital recorder is frequently used to record the depth of water measured by the secondary control device and to calculate the flow rate through the primary control device based on a pre-determined relationship between water depth and flow rate. The digital recorder can be used to log this flow data for subsequent retrieval and analysis, and can activate automated sampling equipment to collect samples at pre-determined flow rates or times. By using a configuration such as this, flow-weighted samples or discrete samples can be collected automatically, reducing or eliminating the need for personnel to be on-site during an event.

In addition to measuring surface runoff contributions to BMPs, measurement of the contribution of groundwater and subsurface flow may be necessary for BMPs that have a significant groundwater contribution. Constructed wetland systems that are close to or at groundwater level are a good example of BMPs where measurement of groundwater flows may be necessary.

BMP monitoring programs also frequently incorporate measurements of rainfall depths, intensities and duration by using a rain gauge. Additional meteorological monitoring equipment can measure parameters such as air temperature, solar radiation, humidity, atmospheric pressure and wind speed and direction, which can aid in interpreting BMP performance data. Other instruments such as continuous pH, dissolved oxygen, and conductivity meters are also frequently incorporated into BMP monitoring programs in order to measure parameters of interest.

BMP monitoring programs can also include measurements of the atmospheric deposition rates of pollutants by using wet deposition and dry deposition sampling equipment. Atmospheric deposition can contribute significant loadings of pollutants to storm water BMPs, especially to BMPs that have a large surface area such as ponds or constructed wetlands.

Analysis of data collected from BMP monitoring programs can be conducted in a number of ways. Some of the most common methods used to measure effectiveness are measures of pollutant removal efficiency based on event mean concentrations (EMC). An event mean concentration can be determined directly from a flow-weighted composite sample. Estimations of pollutant removal efficiency in use include the efficiency ratio, the summation of loads, and the regression of loads. These methods are defined as follows (from Martin and Smoot, 1986 and reported by Strecker, 1995):

- The efficiency ratio (ER) is defined in terms of the average event mean concentration of pollutants from inflows and outflows:

$$ER = 1 - \frac{Average\ \ outlet\ \ EMC}{Average\ \ inlet\ \ EMC}$$

- The summation of loads method is based on the loads of pollutants removed during monitored storms:

$$SOL = 1 - \frac{\sum\ \ of\ \ outlet\ \ loads}{\sum\ \ of\ \ inlet\ \ loads}$$

- The regression of loads method defines the efficiency ratio as the slope of a simple linear regression of inlet loads and outlet loads of pollutants. The equation is:

$$Loads\ in = \$ \cdot Loads\ out$$

where β equals the slope of the regression line, with the intercept constrained at zero.

The above are only a few of the methods available for computing BMP pollutant removal efficiency. The selection of method can have a large impact on the reported removal efficiency. As a result, reported removal efficiency is not always comparable between studies due to differences in the way that pollutant removal was calculated. Additional work is needed in this area in order to standardize BMP data analysis and reporting.

5.4.2 Receiving Stream Assessments

Receiving stream assessments are an important means of determining the effectiveness of BMPs. The health of the biological community and the quality of the habitat present in the stream can be strong indicators of the effectiveness of BMPs. There are a number of biological indicators that can be used to evaluate streams, and a discussion of these methods is not within the scope of this document. Readers are encouraged to consult available documents for additional information on this subject, and for recommendations on developing biological criteria programs. Recommended readings include *Biological Criteria Technical Guidance for Streams and Small Rivers* (US EPA, 1996c) and *Restoring Life in Running Waters: Better Biological Monitoring* (Karr and Chu, 1998).

Physical habitat and fish and macroinvertebrate diversity indices have been identified as suitable indicators to assess the effectiveness of storm water controls (Center for Watershed Protection, 1996). EPA's *Rapid Bioassessment Protocols for Use in Streams and Rivers* (US EPA, 1997f) can be used to survey biological communities. In addition, many local and state environmental protection agencies have developed monitoring protocols for streams within their geographic area. Readers are encouraged to contact county and state environmental agencies to obtain more information regarding stream assessments. In addition to surveys of biological communities, measures of stream habitat are also useful for determining the effectiveness of BMPs. Some available methods for assessing habitat include:

- Physical habitat assessment component of EPA's Rapid Bioassessment Protocols;
- The Rapid Stream Assessment Technique (RSAT);
- The Ohio EPA's Qualitative Habitat Evaluation Index (QHEI);
- The Rosgen Stream Classification.

EPA used several receiving stream assessment methods in its 1998 field work at one BMP site. Findings from these assessments will appear in a supplement to this report.

5.5 Effectiveness of BMPs in Managing Urban Runoff

There has been a great deal of storm water and BMP monitoring data collected by a number of organizations. However, most of these data have focused on characterization of pollutants in runoff, and not on the effectiveness of various control measures. Several nation-wide monitoring programs have been conducted to characterize pollutants in urban storm water

runoff and to evaluate the performance of storm water BMPs. The major federal monitoring programs that have been conducted are listed in Table 5-4.

Table 5-4. Sources of Storm Water Runoff and BMP Monitoring Data

Data Source	Year	Type of Monitoring Conducted
"208 Studies" under FWPCA Amendments of 1972	late 1970's	Limited storm water quality data
Nationwide Urban Runoff Program (NURP)	1978-83	Storm water quality data collected at 81 outfalls at 28 cities for a total of 2,300 storm events as well as some BMP data
Federal Highway Administration (FHWA)	1970's - 80's	Storm water runoff loadings from highways at 31 sites in 11 states
USGS Urban Storm Studies*	1970's - 90's	Rainfall, runoff and water-quality data for areas throughout the United States
Phase I NPDES Municipalities (260 permittees)	1990's	Storm water and BMP monitoring data for 5 representative sites during a minimum of 3 storm events

* USGS prepared a database that includes rainfall, runoff and water-quality data for 717 storms from 99 stations in 22 metropolitan areas throughout the United States, including much of the data collected during the NURP program, in the mid-1980's (Driver et al, 1985)

The USGS has been collecting urban rainfall and runoff data for several decades. In the 1970's and early 1980's, monitoring programs were conducted to collect water quality data in addition to rainfall and runoff data in order to characterize the pollutants present in storm water runoff and to evaluate the impacts attributable to wet weather discharges. The major programs included the Nationwide Urban Runoff Program (NURP) conducted by EPA and USGS and the FHWA evaluation of runoff from highways. Data from these evaluations indicated that urban storm water runoff was contributing significant levels of pollutants to the nations waters, and that control of urban runoff was warranted. However, these investigations also indicated that there was insufficient data available to quantify the degree of impacts attributable to urban runoff and to evaluate the effectiveness of various runoff control practices.

In addition to the major federal investigations, some data has been published in the professional literature. A number of bibliographies have been prepared that include storm water BMP-related literature. These include the ASCE Urban BMP Effectiveness Bibliography, and the National Highway Runoff Water-Quality Data and Methodology Synthesis Bibliography compiled by USGS and FHWA. The Center for Watershed Protection (CWP) has prepared a database containing BMP performance data for 123 structural BMPs (Brown and Schueler, 1997a). The

FHWA and ASCE are currently developing databases of published highway and urban BMP effectiveness data. In addition to data in the published literature, a large amount of data has been collected by various cities and municipalities as part of the storm water permitting program under the Phase I NPDES program for storm water discharges. To date, EPA has not undertaken a concerted effort to collect and evaluate this data. In addition to published data sources, a number of states, counties and cities have collected a significant amount of monitoring data for their own use. The extent of this data is not currently known, but several county and city storm water programs have collected a great deal of potentially useful BMP monitoring data. An effort to collect and evaluate these data may provide more useful information on the effectiveness of various control measures.

The effectiveness of BMPs can be measured in various ways. Non-structural BMPs deal mainly with pollution prevention and limiting the amounts of pollutants that are carried away by runoff. Their effectiveness is best measured in terms of the degree of change in people's habits following implementation of the management program or by the degree of reduction of various pollutant sources. It is oftentimes very difficult to measure the success of non-structural BMPs in terms of pollution reduction and receiving stream improvements. Structural BMPs can be measured in terms in the reductions of pollutants discharged from the system and by the degree of attenuation of storm water flow rates and volumes discharged to the environment. Various physical, chemical and biological evaluation methods exist for determining the pollutant removal efficiency of structural BMPs. The following sections summarize existing data on the pollutant removal efficiency of a variety of BMPs.

5.5.1 Controlling Pollution Generation

The literature on the effectiveness of BMPs in controlling the generation of pollutants is not very extensive. Pollution prevention type BMPs such as street sweeping, public education and outreach, collection of lawn debris, etc., are conceptually very effective means of controlling the generation of pollutants that can enter storm water runoff. However, it is often very difficult to develop a representative means of monitoring or evaluating their effectiveness. Additional work in this area is needed in order to measure the effectiveness of these controls. Effectiveness data and information for pollution prevention BMPs that has been identified is presented in the following sections.

Education and Outreach

Evaluating the performance of education and outreach programs is difficult. There is little quantitative data in the literature that measures the effectiveness of these programs in improving water quality. Information exists on how educational programs have been implemented and what their success rate has been as far as changing the habits of a select group of people, but data linking implementation with improvements in water quality are scarce. Nevertheless, educational programs are a valuable component of a comprehensive storm water management program. Surrogate measures of the effectiveness of education and outreach programs include:

- numbers of flyers distributed per given time period;
- number of radio or television broadcasts;
- number of public workshops held per year;
- the percentage of storm drains that have been stenciled;
- the number of volunteer monitoring and stewardship groups that have been formed.

A literature review by ASCE (Strecker and Quigley, 1998) did not identify any published studies that contained quantitative information evaluating the effectiveness of Education and Outreach BMPs in improving water quality.

Recycling and Source Controls

Evaluating the effectiveness of recycling and source control programs can be measured in terms of the quantities of materials that are being recycled, but it is often difficult to determine water quality improvements as a result of these programs. Measures of effectiveness include:

- surveys that evaluate how many residents have changed habits such as picking up pet waste and composting lawn debris;
- volumes of materials such as used oil and antifreeze that are recycled;
- the volume and types of materials collected during community household hazardous waste collection days;
- the number of illicit cross connections that have been detected and eliminated;
- the total curb miles of streets that are swept annually and the quantity of materials removed; and
- reductions in pesticide and fertilizer usage.

Monitoring of storm water quality to evaluate the effectiveness of source control programs is possible, however very few studies have been conducted. The difficulty stems from isolating the impacts of a particular source control program on the overall water quality draining from the watershed. The ASCE bibliography identified one study that potentially contains quantitative information about the effectiveness of recycling automotive products as a BMP (Horner et al, 1985). Additional data are needed in this area in order to evaluate the effectiveness of recycling and source controls.

Maintenance Practices

Maintenance practices are a necessary part of any municipal storm water program. In addition to maintenance of storm water management infrastructure and BMP maintenance, a range of municipal maintenance activities impact the quality of storm water runoff. As with other non-structural control practices, data evaluating the effectiveness of maintenance practices at reducing the impacts associated with storm water discharges are scarce.

Studies conducted during the NURP project indicated that street sweeping was generally not an effective BMP. This is mainly due to the fact that street sweepers remove only the coarse particles on streets, and are not generally effective at removing the fine particles. It is the "fines"

that frequently contain the highest fractions of pollutants, especially metals. In fact, the NURP study report from Winston-Salem reported that street sweeping could actually increase the concentrations of select pollutants by removing the surface "armoring" of coarse particles, which during normal runoff events inhibit the removal of fine surface loads (Noel et al, 1987). Likewise, NURP studies conducted in Long Island, New York, Champaign, Illinois and Bellevue, Washington found little or no benefit of street sweeping programs. A study in Durham, New Hampshire, which evaluated the effectiveness of pavement vacuum cleaning, indicated that this technology was effective at removing BOD and fecal streptococci bacteria. It was thought that these contaminants were mainly associated with the coarser sediments, which this technology was able to effectively remove. Although the NURP data indicated that street sweeping was not an effective BMP for improving water quality, the usefulness of street sweeping programs cannot be discounted. Improvements in sweeper technology have occurred since the NURP studies were conducted, and today's sweepers may be more efficient at removing fine particulates. Regardless, sweeping programs can remove a significant amount of dirt and debris from streets and parking lots. However, obtaining data linking sweeping programs to water quality improvements may be difficult due to the variety of pollutant sources present in urban areas.

Data on other maintenance practices are likewise scarce. Practices such as catch basin cleaning, street pavement repair, and ditch maintenance are all necessary components of a storm water management program. However, data that indicate their effectiveness may be difficult to obtain due to the lack of appropriate evaluation methodologies and the difficulty associated with isolating water quality improvements attributable to these practices. The ASCE bibliography identified two NURP studies that included evaluating the effectiveness of catch basin cleaning as a storm water BMP (Lake Hills and Surrey Downs, Bellevue, Washington).

5.5.2 Controlling Pollution Discharges

There has been a great deal of published data documenting the efficiency of BMPs in removing pollutants from storm water. Much of this data provides useful insights into the performance of various types of storm water BMPs. For the purposes of this study, *efficiency* has been used to describe the ability of the management practice to remove pollutants from runoff. *Effectiveness* refers to the actual improvements in water quality, habitat or other parameters as a result of implementing the management practice. Most of the data contained in the literature reports efficiency of a BMP. Little of the available data can be used to evaluate actual effectiveness.

Brown and Schueler (1997a) documented the pollutant removal efficiency of commonly used and innovative urban storm water BMPs. The number of monitoring reports of various BMP categories included in this study are summarized in Table 5-5.

Table 5-5. Monitoring Studies for BMP Categories

BMP Type	Number of Studies
Detention Basins	8
Retention Basins	35
Wetland Systems	36
Filtration Systems	15
Swales and Filter Strips	20
Other	4

Evaluation of the existing BMP monitoring data gives an indication of the information gaps that exist in BMP monitoring studies that have been performed to date. Commonly used BMPs that are seldom monitored include infiltration trenches, infiltration basins, bioretention practices and filter strips. The reason for the limited number of monitoring studies for these practices is due to the difficulty involved in collecting inflow and outflow samples to calculate pollutant removals. Bioretention practices and filter strips frequently accept runoff as sheet flow, which must be concentrated in order to collect a representative sample. Infiltration practices and bioretention practices can discharge water through a large surface area into surrounding soil layers, and therefore collection of a representative "outflow" sample is problematic. There are also a number of innovative and infrequently used BMPs that are seldom monitored. These include sand filters, vegetated filter strips, filters with organic media, wetland channels and swales.

In addition to a general lack of monitoring data for certain types of BMPs, there is also a lack of performance data for all BMP types for certain parameters. While BMP monitoring studies typically monitor for parameters such as total phosphorus, total lead, and total suspended solids, there is little monitoring data available for parameters such as bacteria, dissolved metals and hydrocarbons. Table 5-6 summarizes the frequency with which selected parameters have been monitored in BMP performance studies (Brown and Schueler, 1997a).

Table 5-6. Extent of Monitoring for Selected Pollutants in BMP Performance Studies

Parameter	Percent Monitored
Total Phosphorus	94
Total Lead	94
Total Suspended Solids	92
Total Nitrogen	70
Soluble Nitrogen	70
Total Zinc	67
Soluble Phosphorus	60
Organic Carbon	55
Total Copper	42
Bacteria	19
Total Cadmium	15
Total Dissolved Solids	13
Dissolved Metals	10
Hydrocarbons	9

Review of the existing BMP monitoring data gives an indication of the pollutant removal efficiency of various BMPs. Several efforts have been conducted to attempt to evaluate the range of pollutant removals that can be expected to occur in various BMP designs. Evaluation of these data can give an indication of the range of pollutant removals expected, however arriving at a fixed numerical "percent removal" for each BMP type or category is a difficult task. The main problem associated with comparing BMP performance data is the variety of techniques that are used to compute performance, as well as the variation in the ways that samples are collected and in the parameters that are measured in the samples. Performance calculations are further complicated by the errors that result from measuring flow rates and volumes of storm water that pass through the BMP. A study conducted by USGS evaluated 23 flow measurement techniques in order to determine potential differences in reported flows. Average percent differences between reported total storm volumes were in many cases greater than 25 percent over a range of storms (Strecker, 1998). With errors of this magnitude, calculation of pollutant loadings and loadings reductions can be complicated significantly.

Efficiency of a BMP can be related to the removal of individual pollutants on both an event basis and on a long-term basis. Frequently, the statistical rigor with which BMP sampling data are analyzed is poor or even nonexistent. Most BMP performance data are reported as event mean concentrations (EMCs). An EMC can either be determined directly from a flow-weighted composite sample, or calculated based on a series of discrete samples. While an EMC may be an appropriate method for determining the reduction in pollutant concentrations for an individual event, an EMC may not give an indication of the long-term performance of the BMP or the performance for runoff events of varying intensity and volume. A more appropriate means of determining the long-term performance of a BMP may be to do a statistical evaluation of inflow

and outflow loadings over a range of storm event sizes and durations. Samples must also account for the seasonality of performance that results with certain BMP types such as ponds and constructed wetlands. The selection of the method used can have a significant impact on the reported performance. Additional work to standardize BMP monitoring protocols and to standardize calculations for performance is needed in order to make BMP monitoring data comparable from site to site.

BMP performance can vary considerably based on differences in the design criteria and performance standards for which the BMP was designed. Comparing pollutant removal efficiency for similar BMP types with very different performance goals may result in widely disparate efficiency estimations. In addition to differences in performance goals, variations in watershed parameters can cause significant differences in performance among otherwise similar BMPs. In most cases, parameters such as the size of the drainage area, the level of watershed imperviousness, the duration and volume of runoff entering the BMP, and the land use of contributing drainage areas are not easily comparable from study to study. In addition, differences in BMP design parameters such as the ratio of the BMP volume to the contributing drainage area, the retention time in the BMP, the physical dimensions and the construction of the BMP further complicate direct comparisons between BMP monitoring data. Also, a great deal of variability exists in the performance of each BMP due to event and seasonal variations.

Despite these shortcomings, some general ranges of expected BMP efficiency have been compiled from the literature. Documents that summarize BMP efficiency information include the CWP's National Pollutant Removal Performance Database (Brown and Schueler, 1997a), the Terrene Institute's report *The Use of Wetlands for Controlling Stormwater Pollution* (Strecker et al, 1992), as well as a variety of articles and documents contained in the professional and scientific literature. In addition, the ASCE National Storm Water BMP Database is expected to provide BMP monitoring studies in a format that will facilitate evaluation and comparison of BMP performance data. Readers are encouraged to consult the variety of referenced information resources for more detailed BMP performance data than is presented in this report. Table 5-7 presents expected pollutant removal efficiencies for various BMP types (US EPA, 1993c). The values found in this table give an indication of the expected overall pollutant removal efficiency for a properly sited, designed, sized, constructed and maintained BMP. The sections that follow Table 5-7 summarize the actual performance data contained in the literature on pollutant removal efficiencies for selected BMP types.

Table 5-7. Structural BMP Expected Pollutant Removal Efficiency

BMP Type	Typical Pollutant Removal (percent)				
	Suspended Solids	Nitrogen	Phosphorus	Pathogens	Metals
Dry Detention Basins	30 - 65	15 - 45	15 - 45	< 30	15 - 45
Retention Basins	50 - 80	30 - 65	30 - 65	< 30	50 - 80
Constructed Wetlands	50 - 80	< 30	15 - 45	< 30	50 - 80
Infiltration Basins	50 - 80	50 - 80	50 - 80	65 - 100	50 - 80
Infiltration Trenches/ Dry Wells	50 - 80	50 - 80	15 - 45	65 - 100	50 - 80
Porous Pavement	65 - 100	65 - 100	30 - 65	65 - 100	65 - 100
Grassed Swales	30 - 65	15 - 45	15 - 45	< 30	15 - 45
Vegetated Filter Strips	50 - 80	50 - 80	50 - 80	< 30	30 - 65
Surface Sand Filters	50 - 80	< 30	50 - 80	< 30	50 - 80
Other Media Filters	65 - 100	15 - 45	< 30	< 30	50 - 80

Source: Adapted from US EPA, 1993c.

Infiltration Systems

Infiltration systems can be considered 100 percent effective at removing pollutants in the fraction of water that is infiltrated, since the pollutants found in this volume are not discharged directly to surface waters. Quantifying the removal efficiency of infiltration systems, therefore, can perhaps best be determined by calculating the percent of the average annual runoff volume that is infiltrated, and assuming 100 percent removal of the pollutants found in that runoff volume. Since collecting samples of runoff once it has been infiltrated can be very difficult, little field data exist on the efficiency of infiltration for treatment of storm water. Since infiltrated water does not leave the BMP as a discrete flow, there is no representative way of collecting a true outflow sample. Infiltration systems can be monitored by installing a series of wells around the perimeter of the BMP for collecting samples. However, this can add significant costs to any monitoring effort. Table 5-8 summarizes the available field data on the efficiency of infiltration practices in treating storm water. Reported removal efficiencies are based on the results of three studies that evaluated the performance of infiltration trenches and two studies that evaluated the efficiency of porous pavement systems.

Table 5-8. Pollutant Removal Efficiency of Infiltration Practices

Parameter	Median or Average Removal Efficiency (percent)	Number of Observations
Total Phosphorus	65	5
Ammonia-Nitrogen	83	3
Nitrate	82	3
Total Nitrogen	83	2
Suspended Solids	89	2
Organic Carbon	82	1
Lead	98	1
Zinc	99	1

Source: Brown and Schueler, 1997a

Conceptually, infiltration should provide significant pollutant removal for a wide variety of storm water pollutants. As water moves through the underlying soil layers, suspended particulates and associated pollutants should be filtered out. In addition, pollutants can be adsorbed by soil particles and microorganisms in the soil can degrade organic pollutants. There is little data available, however, regarding the potential mobility of metals and hydrocarbons that enter groundwater due to infiltration of storm water. This may be a particular problem in areas with extremely high soil permeabilities (such as coastal areas), where pollutants can rapidly enter underlying aquifers with insufficient contact time for breakdown or adsorption of contaminants. Consequently, additional data gathering to target the behavior of these pollutants is warranted.

The success of infiltration systems has been mixed. In same areas, infiltration has been applied successfully, while in others infiltration systems have clogged in a very short time. Many failures can be attributed to contractor inexperience, to compaction of soil by construction equipment and to excess sediment loading during construction activities, and to improper design and siting. In order to apply infiltration successfully, the following guidelines should be applied:

- Permeability of soils must be verified. A percolation rate of 0.5 inches per hour or more, and an soil layer of 4 feet or more is essential (Cahill, 1994).
- Construction site runoff must be kept from entering the recharge bed, and the infiltration system should not be placed into service until all disturbed land that drains to the system has been stabilized by vegetation. Strict erosion and sediment controls during any construction or re-landscaping is a must to prevent clogging of the system.

- A sedimentation basin or chamber placed before the infiltration system to remove a portion of the sediment can help to extend the life of the infiltration system.
- Use of filter fabric between the recharge bed and soil interface (in porous pavement and infiltration trench systems) can prevent the migration of soil into the recharge bed.
- Construction traffic should be directed away from the infiltration bed before and during construction to prevent compaction of underlying soil layers and loss of infiltrative capacity.
- Porous pavement systems should be clearly marked to prevent use by heavy vehicles and resurfacing with non-porous pavement.
- A basin drain should be provided so that the basin can be drained and maintenance performed if the basin becomes clogged.

Readers are encouraged to consult the ASCE/WEF manual of practice (WEF and ASCE, 1992) for additional guidelines on using infiltration systems.

Retention Basins (wet ponds)

Retention basins can be very effective systems for removing pollutants from storm water. Retention basins provide quiescent conditions with long retention times that allow a large fraction of suspended solids and associated pollutants such as metals, nutrients and organics to be removed by sedimentation. In addition, degradation of organic compounds by microorganisms and uptake of nutrients by aquatic vegetation can provide additional water quality benefits. Retention basins have been one of the most widely-monitored storm water BMP types, mainly due to their prevalence and relative ease of monitoring in comparison to other BMP types. In arid regions, artificial or decorative lakes can function as retention basins. However, as with all other BMP types, the available monitoring data are not always comparable from study to study due to variations in procedures, protocols and methods. Although the mechanisms taking place in retention basins are fairly well known, additional data are needed in order to determine what the important design parameters are and to determine what event, seasonal and long-term performance variances exist. Table 5-9 summarizes the pollutant removal efficiency of retention basins systems. Reported removal efficiencies are based on data contained in 35 studies evaluating retention basins.

Table 5-9. Pollutant Removal Efficiency of Retention Basins

Parameter	Median or Average Removal Efficiency (percent)	Range of Removals (percent)		Number of Observations
		Low	High	
Soluble Phosphorus	34	-12	90	20
Total Phosphorus	46	0	91	44
Ammonia-Nitrogen	23	-107	83	14
Nitrate	23	-85	97	27
Organic Nitrogen	23	2	34	6
Total Nitrogen	30	-12	85	24
Suspended Solids	70	-33	99	43
Bacteria	74	-6	99	10
Organic Carbon	35	-30	90	29
Cadmium	47	-25	54	5
Chromium	49	25	62	5
Copper	55	10	90	18
Lead	67	-97	95	34
Zinc	51	-38	96	32

Source: Brown and Schueler, 1997a

The wide range of variability in reported removal efficiencies of retention systems is due to a number of factors. Watershed variables such as the area draining to the pond, the percent imperviousness and land use of the watershed, the design features of the basin such as surface area and depth of permanent pool, and hydraulic and hydrologic parameters such as rainfall intensity, rainfall volume, length of antecedent dry periods, time of concentration and peak inflow rate can have a large impact on the efficiency of a particular retention system. Studies that contain data on the efficiency of retention systems sometimes report only pollutant removal statistics, but fail to report the relationship to the hydraulics of the system. A thorough evaluation of the hydraulics of the system is needed in order to properly evaluate the efficiency of ponds. This evaluation should also include a measure of the expected suspended solids settling characteristics of the pond influent through a settling velocity column test or particle size distribution analysis, which can shed light on the observed efficiency of the pond in removing

sediments and associated pollutants. Greb and Bannerman (1997) reported that the influent particle size distribution plays a significant role in the overall solids removal efficiency. Perhaps the greatest parameter influencing pond efficiency is retention time. Studies indicate that residence times on the order of 14 days may be necessary to allow for sufficient removal of sediment and associated pollutants and to meet receiving water standards (Rushton and Dye, 1993). In fact, Florida requires that the permanent pool volume of ponds treating runoff from new land use activities must provide a minimum residence time of 14 days.

While retention systems can be very effective at removing pollutants from storm water, there are some potential problems associated with these systems. During periods of intense runoff, the retention time in the pond can decrease, resulting in decreased efficiency. In addition, previously removed sediments can be re-suspended, resulting in a net export of pollutants from the pond. This is one of the reasons that negative removals are frequently reported for pond systems for parameters such as suspended solids and associated contaminants such as nutrients and metals. Also, changes in water chemistry such as increased or decreased pH, alkalinity and hardness can occur in the pond, which can effect the solubility of metals that are present in pond sediments and the behavior of various nutrient species. This can also affect the chemistry of the receiving waters, since the aquatic toxicity of certain metal species is dependant on hardness. There is also evidence that anaerobic bottom sediments promote more soluble forms of phosphorus and some metals, which can increase their release to the water column (Rushton and Dye, 1993).

Perhaps the greatest problem is the increased temperature of discharges that occur from storm water retention systems. Retention ponds can have a significant surface area, and during summer months elevation of the temperature of water in the pond can occur. When this warm water is displaced during the next runoff event, the elevated temperature can cause detrimental impacts to the receiving waters, including loss of sensitive species and downstream shift of trophic status (Galli, 1988). Ponds can also fail to function properly in the winter time when the surface of the pond freezes. Water entering the pond can flow over the ice surface directly to the outlet structure. This short circuiting can limit the retention time of storm water entering the ponds and reduce the sedimentation efficiency. Outlet structures are also prone to freezing in the winter time, which can cause serious flooding problems. In order to prevent cold-weather problems with wet ponds, several design features can be incorporated in ponds that are used in cold climates. Readers are encouraged to consult the *Stormwater BMP Design Supplement for Cold Climates* published by CWP (Caraco and Claytor, 1997) for additional information regarding BMP designs for cold climates.

Retention systems also present a potential hazard to nearby residents and children, can often become populated with large number of waterfowl, and can be breeding grounds for mosquitoes and odor producers if not designed and maintained properly. Large ponds also can present a danger of downstream flooding and risk of catastrophic loss of life and property in the event of an embankment or outlet structure failure. Several pond failures have occurred that are attributable to piping around outlet structures and eventual failure of embankments due to poor

installation. Careful adherence to design and construction standards is necessary and inspections during construction should be conducted to ensure that ponds are installed correctly.

In addition to relating performance to measures of pollutant reduction across the BMP, evaluations that measure effluent from BMPs and compares these values to receiving water criteria can provide useful data. One such study was conducted in Florida, and it was determined that effluent from 22 wet detention facilities was in most cases in compliance with class III Florida state water quality standards. The ponds evaluated in this study were permitted by Florida and met the required state design criteria. Parameters analyzed in samples included eight metal species, six nutrient species, turbidity, TSS, temperature, dissolved oxygen, pH and conductivity. The constituents that were in compliance 100 percent of the time included un-ionized ammonia, iron, manganese (class II standard) and nickel. All other analyzed parameters, with the exception of dissolved oxygen, were in compliance greater than 65 percent of the time, with most in compliance greater than 79 percent of the time. Dissolved oxygen was in noncompliance 64 percent of the time (Carr and Kehoe, 1997). The results of this study indicate that evaluation of constituents in BMP effluent and comparison with water quality standards may be an effective measure of BMP effectiveness. In many cases, data of this nature may be more useful than data that indicates percent removal of a targeted group of constituents across the BMP. It is also important to note that the Florida study found that concentrations of constituents (with the exception of dissolved oxygen) in samples collected at these systems did not vary significantly between samples collected immediately before the outflow weir and after the outflow weir. Therefore, sampling before the weir, where more convenient, does not significantly alter sample results. This may be useful where the BMP discharges through an outflow structure where samples are not easily collected (such as in a manhole or other confined space).

In addition to treating runoff, retention systems can be adapted for storm water reuse. Florida is actively seeking reuse of storm water runoff for reuse as irrigation water. Reuse of storm water reduces the volume of water and the amount of pollutants discharged to receiving streams. In addition, reuse of storm water as irrigation water can help to recharge aquifers and restore pre-development hydrologic conditions. Also, significant financial incentives exist for reuse as irrigation in areas where water rates are high. However, the health risks of storm water reuse have not been thoroughly investigated. Additional research in this area is warranted to determine if a risk of exposure to potentially harmful microorganisms or other health risks exist. Livingston et al (1998) presented a discussion of storm water reuse opportunities and discussed design considerations for sizing ponds for reuse. Readers are encouraged to consult this reference for additional information on storm water reuse.

There are a number of design features that can be included in retention system designs to increase their effectiveness, reduce maintenance burdens and reduce impacts to receiving waters. These include:

- A broad, flat aquatic bench around the perimeter of the pond planted with emergent wetland vegetation;

- A permanent pool volume that provides a long residence time to promote maximum removal of suspended solids;
- An irregular pool shape that increases sinuosity of flow paths;
- A sediment forebay for removal of coarse sediments and ease of maintenance;
- A submerged reversed-slope pipe or other non-clogging low-flow orifice;
- Concrete, rather than corrugated metal risers and outlet structures;
- Preservation of riparian cover along drainage channels to limit temperature increases;
- Maintenance access to forebays and inlet and outlet structures for removal of sediments and repairs.

Prince William Parkway Regional Wet Pond

In 1998 EPA conducted sampling activities at a retention system in Prince William County, Virginia. The Prince William Parkway Wet Pond is a regional wet pond located adjacent to a major county road in Dale City. The pond has a surface area of 4 acres, and has a total volume of approximately 25 acre-feet at the permanent pool level. The pond is approximately 1,000 feet in length, 260 feet wide at its widest point, and was constructed by placing an earthen dam in what appears to previously have been a natural drainage channel. The discharge is to Cow Branch, a tributary of Neabsco Creek. The contributing drainage area to the pond is approximately 310 acres. The land use of the watershed is approximately 20 percent commercial, 30 percent forested, 40 percent open land, 5 percent residential (mostly lots less than 1 acre) and 5 percent from other sources. The pond is designed to control up to the 100-year storm event for the fully developed watershed conditions. There are a total of 5 discrete inflow points to the wet pond. Three of these points were natural drainage channels (identified as P1, P2 and P3), while the 4th and 5th points were concrete channels. Points P1, P2 and P3, which represent a majority of the contributing drainage area, were monitored during the course of the study period. The contributing drainage area and percent imperviousness of these sub-basins are:

Sub-Basin	Area (acres)	Imperviousness (%)
P1	84	41
P2	122	17
P3	107	17

The other two inflow points, which conveyed runoff from a small segment of Prince William Parkway, were not monitored and their contributions of both storm flow and pollutant loadings were considered negligible due to the small drainage area in comparison to the overall watershed area. The outflow of the pond occurs through a pair of 8 by 8-foot concrete box culverts. A concrete V-notch weir is installed at the outflow of the pond. See Figure 5-14.

Figure 5-14. Prince William Parkway Regional Wet Pond

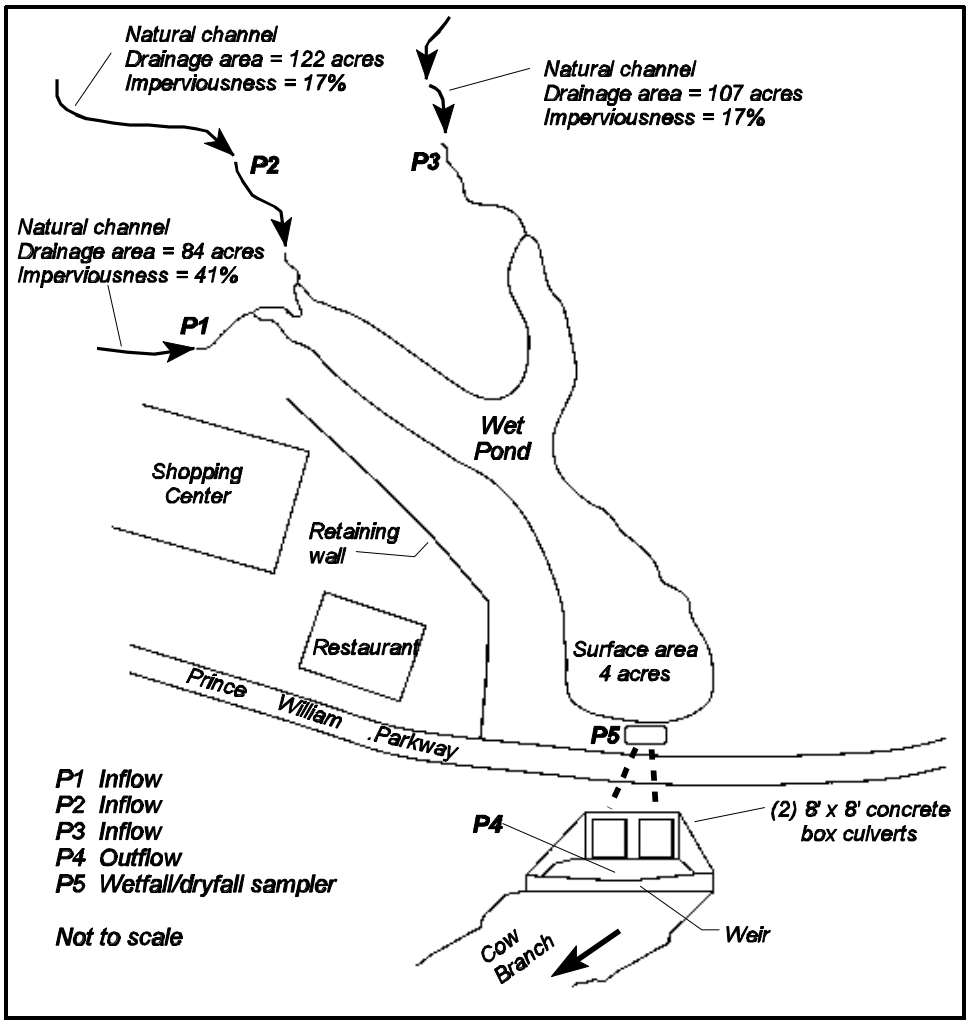

During May through October 1998, rainfall and hydrologic data were collected for 14 storm events and water quality samples were collected during 10 storm events at the pond. In addition, samples of atmospheric deposition (dryfall) and precipitation (wetfall) were collected for a number of storms. The following tables summarize a portion of the analytical data collected during the study period and the corresponding flow volume at each of the sampling points. Wetfall volumes were determined by multiplying the total storm rainfall depth by the surface area of the pond. A detailed presentation of the sampling results and an analysis of the sampling data will be included in a supplement to this report.

Table 5-10. Summary of Prince William Parkway Regional Wet Pond Sampling Data

Sample Location ➤ Sample Dates and Analytes	P1	P1 (dissolved)	P2	P2 (dissolved)	P3	P3 (dissolved)	P4	P4 (dissolved)	Wetfall	Dryfall
6/01/98										
Total Kjeldahl Nitrogen (mg/l as N)	---	---	---	0.95	---	---	---	1.1	0.67	ND (0.1)
Ammonia (mg/l as N)	---	---	0.97	0.39	---	---	0.39	0.37	0.61	ND (0.1)
Nitrate/Nitrite (mg/l as N)	---	---	0.45	0.52	---	---	0.13	0.18	0.18	ND (0.01)
Biochemical Oxygen Demand (mg/l)	---	---	4	7	---	---	4	3	---	---
Chemical Oxygen Demand (mg/l)	---	---	ND (20)	ND (10)	---	---	ND (10)	ND (10)	---	---
Total Organic Carbon (mg/l)	---	---	7	9.1	---	---	5.4	6.5	2.2	ND (1)
Phosphorus (mg/l)	---	---	0.02	ND (0.01)	---	---	0.02	0.03	ND (0.01)	ND (0.01)
Total Orthophosphate (mg/l)	---	---	ND (0.01)	---	---	---	ND (0.01)	---	---	ND (0.01)
Total Suspended Solids (mg/l)	---	---	266	---	---	---	48	---	---	---
Total Dissolved Solids (mg/l)	---	---	46	---	---	---	65	---	---	---
Volatile Suspended Solids (mg/l)	---	---	26	---	---	---	14	---	---	---
Chloride (mg/l)	---	---	4	---	---	---	13	---	---	---
Alkalinity (mg/L)	---	---	5	---	---	---	26	---	---	---
Hardness (mg/l as CaCO3)	---	---	35	---	---	---	35	---	---	---
Runoff Volume (gallons)	201,800		619,700		152,500		1,071,000		61,000	
6/11/98										
Total Kjeldahl Nitrogen (mg/l as N)	---	---	5.6	1.12	---	---	9.52	9.52	2.24	8.96
Ammonia (mg/l as N)	---	---	ND (1)	ND (1)	---	---	ND (1)	ND (1)	ND (1)	ND (1)
Nitrate/Nitrite (mg/l as N)	---	---	0.53	0.59	---	---	0.13	0.16	0.18	0.42
Biochemical Oxygen Demand (mg/l)	---	---	---	3.65	---	---	6.9	2.8	---	---
Chemical Oxygen Demand (mg/l)	---	---	45.6	26	---	---	27.6	27.2	---	---
Total Organic Carbon (mg/l)	---	---	9.35	7.91	---	---	9.35	6.47	3.58	3.58
Phosphorus (mg/l)	---	---	0.25	0.051	---	---	0.25	0.017	0.044	0.038
Total Orthophosphate (mg/l)	---	---	0.094	---	---	---	0.062	---	ND (0.01)	---
Total Suspended Solids (mg/l)	---	---	14	---	---	---	8	---	---	---
Total Dissolved Solids (mg/l)	---	---	49	---	---	---	62	---	---	---
Volatile Suspended Solids (mg/l)	---	---	3	---	---	---	3	---	---	---
Alkalinity (mg/L)	---	---	13.2	---	---	---	24	---	---	---
Hardness (mg/l as CaCO3)	---	---	18	---	---	---	26	---	---	---
Runoff Volume (gallons)	244,500		849,400		242,200		1,434,000		81,500	

Sample Location ➤ Sample Dates and Analytes	P1	P1 (dissolved)	P2	P2 (dissolved)	P3	P3 (dissolved)	P4	P4 (dissolved)	Wetfall	Dryfall
6/12/98										
Total Kjeldahl Nitrogen (mg/l as N)	8.96	11.8	8.96	2.8	---	---	1.68	8.4	5.04	---
Ammonia (mg/l as N)	1.12	ND (1)	ND (1)	ND (1)	---	---	ND (1)	ND (1)	1.12	---
Nitrate/Nitrite (mg/l as N)	1	0.88	0.57	0.61	---	---	0.15	0.12	0.66	---
Biochemical Oxygen Demand (mg/l)	4.3		2.5	2	---	---	3.7	40.8	---	---
Chemical Oxygen Demand (mg/l)	36.4	47.2	106	14	---	---	27.2	20.4	---	---
Total Organic Carbon (mg/l)	5.83	10.2	5.83	5.83	---	---	10.2	10.2	4.37	---
Phosphorus (mg/l)	0.1	0.049	0.82	0.08	---	---	0.18	0.04	0.046	---
Total Orthophosphate (mg/l)	0.038	---	0.099	---	---	---	0.099	---	---	---
Total Suspended Solids (mg/l)	18	---	53	---	---	---	9	---	---	---
Total Dissolved Solids (mg/l)	90	---	37	---	---	---	65	---	---	---
Volatile Suspended Solids (mg/l)	6	---	6	---	---	---	6	---	---	---
Alkalinity (mg/L)	13.9	---	9.7	---	---	---	24	---	---	---
Hardness (mg/l as CaCO3)	28	---	20	---	---	---	28	---	---	---
Runoff Volume (gallons)	162,400		237,600		191,700		631,000		36,000	
6/13/98										
Total Kjeldahl Nitrogen (mg/l as N)	---	---	ND (1)	7.84	---	---	1.68	17.4	---	---
Ammonia (mg/l as N)	---	---	ND (1)	1.12	---	---	ND (1)	ND (1)	---	---
Nitrate/Nitrite (mg/l as N)	---	---	0.2	0.25	---	---	0.28	0.29	---	---
Biochemical Oxygen Demand (mg/l)	---	---	5.9	2.5	---	---	3.9	ND (2)	---	---
Chemical Oxygen Demand (mg/l)	---	---	32.8	25.2	---	---	22.8	20.8	---	---
Total Organic Carbon (mg/l)	---	---	4.37	4.37	---	---	5.83	5.83	---	---
Phosphorus (mg/l)	---	---	0.35	---	---	---	0.091	0.17	---	---
Total Orthophosphate (mg/l)	---	---	0.097	---	---	---	ND (0.1)	---	---	---
Total Suspended Solids (mg/l)	---	---	31	---	---	---	8	---	---	---
Total Dissolved Solids (mg/l)	---	---	245	---	---	---	54	---	---	---
Volatile Suspended Solids (mg/l)	---	---	6	---	---	---	4	---	---	---
Alkalinity (mg/L)	---	---	5.2	---	---	---	22	---	---	---
Hardness (mg/l as CaCO3)	---	---	10		---	---	24	---	---	---
Runoff Volume (gallons)	166,700		411,600		136,000		765,000		43,500	

Sample Location ➤ Sample Dates and Analytes	P1	P1 (dissolved)	P2	P2 (dissolved)	P3	P3 (dissolved)	P4	P4 (dissolved)	Wetfall	Dryfall
6/15/98										
Total Kjeldahl Nitrogen (mg/l as N)	3.92	2.24	8.4	13.4	---	---	21.3	5.6	---	---
Ammonia (mg/l as N)	---	2.8	1.12	9.52	---	---	16.8	6.16	---	---
Nitrate/Nitrite (mg/l as N)	0.23	0.21	0.2	0.35	---	---	0.29	0.31	---	---
Biochemical Oxygen Demand (mg/l)	4.25	3.8	4.05	2.7	---	---	1.8	4	---	---
Chemical Oxygen Demand (mg/l)	18.4	24	22	66.4	---	---	21.6	17.2	---	---
Total Organic Carbon (mg/l)	7.11	19	4.47	9.75	---	---	5.79	20.3	---	---
Phosphorus (mg/l)	0.072	---	0.2	---	---	---	0.069	---	---	---
Total Orthophosphate (mg/l)	0.017	---	ND (0.01)	---	---	---	ND (0.01)	---	---	---
Total Suspended Solids (mg/l)	ND (4)	---	21	---	---	---	ND (4)	---	---	---
Total Dissolved Solids (mg/l)	61	---	58	---	---	---	19	---	---	---
Volatile Suspended Solids (mg/l)	ND (4)	---	5	---	---	---	ND (4)	---	---	---
Alkalinity (mg/L)	10	---	4.2	---	---	---	ND (20)	---	---	---
Hardness (mg/l as CaCO3)	18	---	10	---	---	---	24		---	---
Runoff Volume (gallons)	841,600		1,260,900		719,600		3,097,500		176,000	
6/17/98										
Total Kjeldahl Nitrogen (mg/l as N)	1.05	1.06	---	---	0.55	---	0.75	0.97	---	---
Ammonia (mg/l as N)	0.32	0.26	---	---	ND (0.1)	---	ND (0.1)	ND (0.1)	---	---
Nitrate/Nitrite (mg/l as N)	0.33	0.33	---	---	0.12	---	0.19	0.2	---	---
Biochemical Oxygen Demand (mg/l)	4	4	---	---	---	---	6	4	---	---
Chemical Oxygen Demand (mg/l)	ND (10)	ND (10)	---	---	ND (10)	---	ND (10)	26	---	---
Total Organic Carbon (mg/l)	8.8	9	---	---	7.5	---	8	7.9	---	---
Phosphorus (mg/l)	0.12	---	---	---	0.11	---	0.13	---	---	---
Total Orthophosphate (mg/l)	ND (0.01)	---	---	---	ND (0.01)	---	ND (0.01)	---	---	---
Total Suspended Solids (mg/l)	ND (4)	---	---	---	19	---	8	---	---	---
Total Dissolved Solids (mg/l)	142	---	---	---	121	---	79	---	---	---
Volatile Suspended Solids (mg/l)	ND (4)	---	---	---	ND (4)	---	ND (4)	---	---	---
Alkalinity (mg/L)	26	---	---	---	13	---	10	---	---	---
Hardness (mg/l as $CaCO_3$)	24	---	---	---	---	---	12	---	---	---
Runoff Volume (gallons)	129,400		215,200		162,500		554,500		31,500	

Sample Location ➤ Sample Dates and Analytes	P1	P1 (dissolved)	P2	P2 (dissolved)	P3	P3 (dissolved)	P4	P4 (dissolved)	Wetfall	Dryfall
6/23/98										
Total Kjeldahl Nitrogen (mg/l as N)	0.22	---	1.44	6.1	1.15	0.3	0.76	0.51	---	---
Ammonia (mg/l as N)	0.12	---	0.2	0.5	0.14	0.13	0.31	ND (0.1)	---	---
Nitrate/Nitrite (mg/l as N)	0.23	---	0.4	0.42	0.15	0.14	0.21	0.17	---	---
Biochemical Oxygen Demand (mg/l)	ND (2)	---	ND (2)	6	ND (2)	23	ND (2)	52	---	---
Chemical Oxygen Demand (mg/l)	ND (10)	---	31	15	34	ND (10)	ND (10)	ND (10)	---	---
Total Organic Carbon (mg/l)	3.1	---	4.4	7.7	4.7	7.4	3.2	3.8	---	---
Phosphorus (mg/l)	0.06	---	0.02	---	ND (0.01)	---	0.04	---	---	---
Total Orthophosphate (mg/l)	0.03	---	ND (0.01)	---	ND (0.01)	---	ND (0.01)	---	---	---
Total Suspended Solids (mg/l)	19	---	33	---	29	---	10	---	---	---
Total Dissolved Solids (mg/l)	47	---	79	---	64	---	69	---	---	---
Volatile Suspended Solids (mg/l)	9	---	16	---	13	---	11	---	---	---
Alkalinity (mg/L)	6	---	13	---	7	---	14	---	---	---
Hardness (mg/l as $CaCO_3$)	8	---	20	---	10	---	19	---	---	---
Runoff Volume (gallons)	1,207,300		1,064,200		756,800		3,499,000		199,000	
6/24/98										
Total Kjeldahl Nitrogen (mg/l as N)	0.73	---	0.71	---	0.7	---	0.53	---	---	---
Ammonia (mg/l as N)	0.22	---	0.22	---	0.16	---	0.55	---	---	---
Nitrate/Nitrite (mg/l as N)	0.4	---	0.61	---	0.27	---	0.32	---	---	---
Biochemical Oxygen Demand (mg/l)	3	---	4	---	3	---	2	---	---	---
Chemical Oxygen Demand (mg/l)	ND (10)	---	ND (10)	---	14	---	ND (10)	---	---	---
Total Organic Carbon (mg/l)	3.8	---	4	---	5.6	---	3.1	---	---	---
Phosphorus (mg/l)	0.05	---	0.1	---	0.05	---	0.12	---	---	---
Total Orthophosphate (mg/l)	ND (0.01)	---	ND (0.01)	---	ND (0.01)	---	ND (0.01)	---	---	---
Total Suspended Solids (mg/l)	ND (4)	---	57	---	54	---	8	---	---	---
Total Dissolved Solids (mg/l)	45	---	48	---	69	---	51	---	---	---
Volatile Suspended Solids (mg/l)	4	---	5	---	6	---	3	---	---	---
Alkalinity (mg/L)	6	---	6	---	12	---	8	---	---	---
Hardness (mg/l as $CaCO_3$)	8	---	11	---	17	---	15	---	---	---
Runoff Volume (gallons)	293,200		682,400		290,400		1,415,000		80,000	

Sample Location ➤ Sample Dates and Analytes	P1	P1 (dissolved)	P2	P2 (dissolved)	P3	P3 (dissolved)	P4	P4 (dissolved)	Wetfall	Dryfall
7/31/98										
Total Kjeldahl Nitrogen (mg/l as N)	1.3	1	2.7	---	---	---	1.2	---	---	---
Ammonia (mg/l as N)	1	1.1	0.74	---	---	---	0.96	---	1.5	---
Nitrate/Nitrite (mg/l as N)	1.51	1.51	1.81	---	---	---	0.13	---	---	---
Biochemical Oxygen Demand (mg/l)	6	26	27	6	---	---	5	---	---	---
Chemical Oxygen Demand (mg/l)	16	ND (10)	106	---	---	---	ND (10)	---	---	---
Total Organic Carbon (mg/l)	11	11	20	---	---	---	8.1	---	---	---
Phosphorus (mg/l)	0.05	---	0.36	---	---	---	0.09	---	---	---
Total Orthophosphate (mg/l)	0.03	---	ND (0.1)	---	---	---	ND (0.01)	---	ND (0.01)	---
Total Suspended Solids (mg/l)	9	---	51	---	---	---	11	---	---	---
Total Dissolved Solids (mg/l)	92	---	115	---	---	---	90	---	---	---
Volatile Suspended Solids (mg/l)	9	---	16	---	---	---	7	---	---	---
Alkalinity (mg/L)	17	---	15	---	---	---	25	---	---	---
Hardness (mg/l as $CaCO_3$	40	---	52	---	---	---	36	---	---	---
Runoff Volume (gallons)	79,400		436,900		32,000		593,000		33,500	

Constructed Wetland Systems

Constructed wetlands can be effective BMPs for removing pollutants from urban storm water. The main mechanism of pollutant removal in wetland systems is sedimentation (Strecker et al, 1992). Other pollutant removal mechanisms include filtration by aquatic vegetation and by underlying soil and gravel in systems where subsurface flow is present, biological conversion of organic compounds by microorganisms, uptake of nutrients by aquatic plants and algae, uptake of metals by plant tissue, adsorption of metals by clay soils, and volatilization of hydrocarbons and volatile organics. While the literature contains hundreds of references to constructed wetlands systems, very few quantitative studies have been conducted with sufficient rigor to provide good estimates of performance. Strecker's evaluation of the literature on wetland treatment systems identified only 17 reports that discussed the results of research on a functioning wetland system (of 140 reviewed reports). This indicates that there is a general lack of thorough, scientifically-defensible evaluations on the performance of wetland treatment systems. As a result, there is a wide range of variability in reported efficiency data. Table 5-11 summarizes the pollutant removal efficiency of constructed wetland systems based on Strecker's evaluation of published studies.

Table 5-11. Pollutant Removal Efficiency of Constructed Wetland Systems

Parameter	Median Removal Efficiency (percent)	Range of Removals (percent)		Number of Observations
		Low	High	
Soluble Phosphorus	23	-30	78	12
Ortho-Phosphate	28	-109	93	7
Total Phosphorus	46	-120	97	37
Ammonia-Nitrogen	33	-86	62	15
Nitrate	46	4	95	18
Organic Nitrogen	7	-36	39	7
Total Nitrogen	24	-20	83	11
Suspended Solids	76	-300	98	26
Bacteria	78	55	97	3
Organic Carbon	28	-31	93	15
Cadmium	69	-80	80	6
Chromium	73	38	98	3
Copper	39	2	84	10
Lead	63	23	94	17
Zinc	54	-74	90	16

Sources: Strecker at al (1992); Organic Carbon, Bacteria and Metals from Brown and Schueler, 1997a

Evaluation of wetland performance is problematic because the basic mechanisms taking place in wetland systems are not well understood. Wetlands are complex ecosystems, and variations in design and watershed factors can have a significant impact on performance. As a result, data collected from various sites are not always comparable.

Due to the limited amount of comparable data that is available on the performance of storm water wetland systems, it is difficult to arrive at any meaningful relationships indicating the important factors in wetland system design. Strecker indicated that perhaps the greatest factor influencing performance of constructed wetlands is the hydrology of the watershed and the inflow hydraulics. Other factors having a major influence on performance are wetland size and volume, the design of the inlet and outlet structures, flow patterns through the system, vegetational

community structure, seasonal productivity and decay of wetland plants, and changes in evapotranspiration rates. In addition, the presence of subsurface flows can complicate wetland performance evaluations.

Strecker recommends that an important evaluation step in determining wetland performance is to compare runoff volumes with storage volumes and contact surface area of the wetland. However, he was unable to conduct this evaluation due to the lack of consistent reporting of rainfall statistics, watershed imperviousness, land uses, flow volumes, capacity and surface areas for contact. In order to ensure the comparability of future data reporting for wetland systems, it is recommended that a standardized set of monitoring protocols be adopted for all future monitoring efforts.

An important factor in the variation of reported efficiency is the wide range of designs that are used in constructed wetland systems. A few design variations include:

- ponds with an emergent wetland area on the pond perimeter;
- shallow wetlands with subsurface flow;
- wetland channels;
- pond-wetland systems;
- extended detention wetlands.

Although the design of a particular systems is dependent upon a number of site-specific variables, there are some important design factors that should be incorporated in wetland system designs including:

- a pre-settling chamber for removal of heavy sediments and to limit disturbance of the wetland to remove accumulated sediments;
- adjustable level control at the outlet by means of an adjustable weir or orifice;
- design the flow path to limit short circuiting and dead space and to maximize detention time;
- a broad, densely planted aquatic bench;
- selection of planting species to produce a dense stand of vegetation for filtration and nutrient uptake;
- periodic harvesting of excess vegetation to prevent nutrient release and to remove undesirable species.

Crestwood Marsh Constructed Wetland

In 1998 EPA conducted sampling activities at a constructed wetland in Manassas, Virginia. The Crestwood Marsh is located in a residential area and was originally constructed as a dry detention basin, but conditions at the site were such that a wetland system formed on its own. The outlet structure was modified in 1995 to provide an extended detention time of 24 hours within the wetland. As a result of this modification, the system has developed into a shallow emergent marsh and contains a variety of wetland species. The wetland has a surface area of

8,830 ft^2. The water quality detention volume of the wetland is 2,524 ft^3, and the flood control volume above the water quality volume is 3,523 ft^3. The area draining to the wetland is a 7-acre townhouse community, with the land area consisting of approximately 60 percent townhouses, 30 percent forested and 10 percent open space. The drainage area is estimated to be approximately 40 percent impervious. The constructed wetland is located at the headwaters of a small unnamed stream that drains to Bull Run, within the Occoquan River Watershed.

Flow enters the wetland at the eastern corner through an 18-inch concrete pipe situated flush with the bottom grade (point C1). From this point, water gradually spreads throughout the wetland and drains to the northern corner of the pond and is discharged through a 6-inch PVC outlet pipe (point C3). There is an additional inlet point located at the southwest corner of the wetland, which consists of overland flow from an adjacent area of forested parkland. EPA concentrated the flow at this point in order to allow estimation of flow rates and volumes, and to allow for collection of water quality samples (point C2). See Figure 5-15.

Figure 5-15. Crestwood Marsh Constructed Wetland

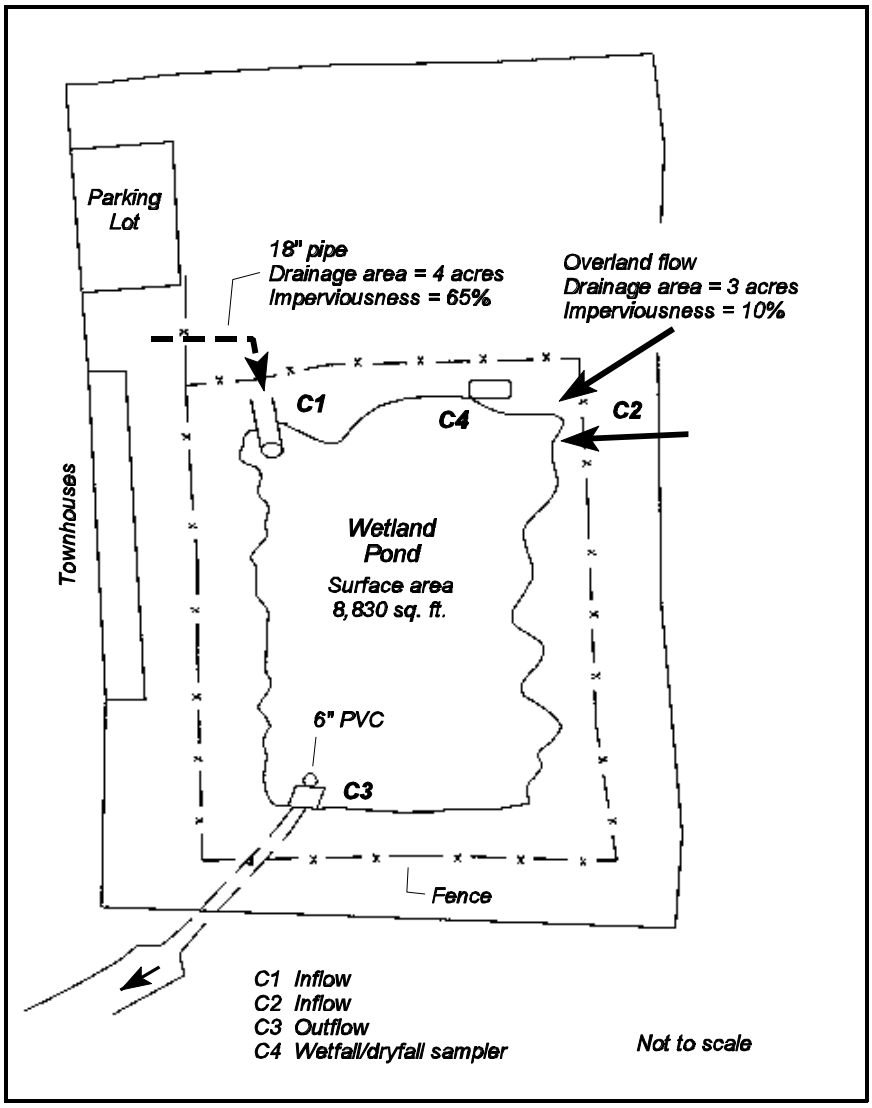

During the spring and summer of 1998, storm event sampling was conducted during nine events. Sampling consisted of collecting flow-weighted composite samples as well as recording rainfall depth, and runoff flow rates and volumes into and out of the wetland. In addition to water quality monitoring, atmospheric deposition and wetfall deposition samples were collected during the study period. The water quality sampling data collected during the study period are summarized in the tables below. Additional data, as well as a detailed description of the sampling program, wetland design, and an evaluation of the performance of the wetland will be included in a supplement to this report.

Table 5-12. Summary of Crestwood Marsh Constructed Wetland Sampling Data

Sample Date ➤	06/01/98			06/11/98			06/12/98		
Analytes **Location ➤**	**C1**	**C2**	**C3**	**C1**	**C2**	**C3**	**C1**	**C2**	**C3**
Runoff Volume (gal)	7,625	No Flow	1,376	9,439	No Flow	3,237	11,621	No Flow	3,903
Total Suspended Solids (mg/l)	41	--	--	18	--	--	70	--	4
Chemical Oxygen Demand (mg/l)	75	--	--	28.4	--	--	37.2	--	--
Total Organic Carbon (mg/l)	13	--	--	5.02	--	--	5.83	--	--
Total Kjeldahl Nitrogen (mg/l as N)	2	--	--	12.3	--	--	5.04	--	--
Total Inorganic Nitrogen (mg/l as N)	0.67	--	--	0.33	--	--	0.47	--	--
Ammonia (mg/l as N)	0.75	--	--	<1	--	--	1.12	--	--
Total Phosphorus (mg/l)	0.12	--	--	0.084	--	--	0.22	--	--
Ortho-Phosphate (mg/l)	<0.01	--	--	0.032	--	--	0.18	--	0.021
Alkalinity (mg/l as $CaCO_3$)	31	--	--	6.8	--	--	4.8	--	4.3
Hardness (mg/l as $CaCO_3$)	--	--	--	--	--	--	14	--	--
Lead	--	--	--	--	--	--	6.9	--	--
Copper	--	--	--	--	--	--	10.1	--	--
Zinc	--	--	--	--	--	--	64.9	--	--
Nickel	--	--	--	--	--	--	6.6	--	--
Aluminum	--	--	--	--	--	--	2690	--	--
Chromium	--	--	--	--	--	--	4.4	--	--

Sample Date ➤	06/14/98			06/16/98			06/23/98		
Analytes **Location ➤**	**C1**	**C2**	**C3**	**C1**	**C2**	**C3**	**C1**	**C2**	**C3**
Runoff Volume (gal)	7,624	No Flow	No Flow	53,457	6,985	57,216	81,327	6,334	139,390
Total Suspended Solids (mg/l)	44	--	--	<4	19	<4	5	34	6
Chemical Oxygen Demand (mg/l)	64	--	--	12.8	45.6	15.2	<10	24	<10
Total Organic Carbon (mg/l)	14.3	--	--	4.47	9.75	5.79	4.1	7.4	3.1
Total Kjeldahl Nitrogen (mg/l as N)	3.36	--	--	2.8	7.28	17.4	0.57	0.44	0.8
Total Inorganic Nitrogen (mg/l as N)	0.4	--	--	0.2	0.15	0.16	0.81	0.27	0.53
Ammonia (mg/l as N)	1.12	--	--	<1	<1	<1	0.37	0.27	0.32
Total Phosphorus (mg/l)	0.17	--	--	0.078	0.2	0.11	0.2	0.24	0.05
Ortho-Phosphate (mg/l)	0.058	--	--	0.05	0.032	0.026	0.12	0.05	0.05
Alkalinity (mg/l as $CaCO_3$)	6.5	--	--	5.2	20	6.7	11	8	<1
Hardness (mg/l as $CaCO_3$)	--	--	--	--	24	44	20	10	<1
Lead	6.6	--	--	<2	<2	<2	--	--	--
Copper	10.3	--	--	<1	<1	<1	--	--	--
Zinc	68.5	--	--	<2	<2	<2	--	--	--

Sample Date ➤	06/14/98			06/16/98			06/23/98		
Analytes **Location ➤**	**C1**	**C2**	**C3**	**C1**	**C2**	**C3**	**C1**	**C2**	**C3**
Nickel	<1	--	--	2.3	<1	<1	--	--	--
Aluminum	3450	--	--	<54	3420	<54	--	--	--
Chromium	<1	--	--	2	4.7	<1	--	--	--

Sample Date ➤	06/24/98			07/24/98			07/31/98		
Analytes **Location ➤**	**C1**	**C2**	**C3**	**C1**	**C2**	**C3**	**C1**	**C2**	**C3**
Runoff Volume (gal)	11,766	7,604	38,353	20,820	9,645	4,579	11,929	761	No Flow
Total Suspended Solids (mg/l)	37	45	<4	68	--	5	30	--	--
Chemical Oxygen Demand (mg/l)	<10	67	18	32	--	<10	27	--	--
Total Organic Carbon (mg/l)	3.6	17	9.2	7.9	--	10.4	12	--	--
Total Kjeldahl Nitrogen (mg/l as N)	0.52	1.28	0.48	1.14	--	0.9	1	--	--
Total Inorganic Nitrogen (mg/l as N)	0.52	0.11	0.15	0.48	--	0.33	0.67	--	--
Ammonia (mg/l as N)	0.18	0.13	0.15	0.46	--	0.22	0.97	--	--
Total Phosphorus (mg/l)	0.11	0.12	0.02	0.15	--	0.83	0.1	--	--
Ortho-Phosphate (mg/l)	0.03	<0.01	<0.01	0.09	--	0.28	0.03	--	--
Alkalinity (mg/l as $CaCO_3$)	7	17	15	2	--	8	4	--	--
Hardness (mg/l as $CaCO_3$)	6	28	17	15	--	--	21	--	--
Lead	--	--	--	18.2	--	--	16.2	--	--
Copper	--	--	--	10.4	--	--	8	--	--
Zinc	--	--	--	75.2	--	--	86.3	--	--
Nickel	--	--	--	10	--	--	11.1	--	--
Aluminum	--	--	--	2430	--	--	1370	--	--
Chromium	--	--	--	7.7	--	--	4.8	--	--

Filtration and Bioretention Systems

Filtration systems are seeing increased usage, especially in ultra-urban environments where space constraints prohibit the use of detention, retention and constructed wetland systems. Filtration systems can provide significant water quality improvements, but only a small amount, if any, water quantity control. It should also be stressed that filters must be placed off-line in order to assure continued functioning, and therefore only provide treatment of a volume of water based on a design storm. Any volume in excess of the design storm is bypassed without treatment.

Limited monitoring data are available on the efficiency of storm water filtering systems. This is mainly due to storm water filters being a relatively new technology, as opposed to more conventional BMPs such as wet ponds and constructed wetland systems. As a result, only a few published monitoring studies are available to evaluate the efficiency of various filter designs. The following Table 5-13 summarizes the pollutant removal efficiencies for storm water filtration systems. Removal efficiencies are based on data collected from 13 monitoring studies.

Table 5-13. Pollutant Removal Efficiency of Storm Water Filtration Systems

Parameter	Median or Average Removal Efficiency (percent)	Range of Removals (percent)		Number of Observations
		Low	High	
Soluble Phosphorus	-31	-37	-25	2
Total Phosphorus	45	-25	80	15
Ammonia-Nitrogen	68	43	94	4
Nitrate	-13	-100	27	13
Organic Nitrogen	28	0	56	2
Total Nitrogen	32	13	71	9
Suspended Solids	81	8	98	15
Bacteria	37	36	83	5
Organic Carbon	57	10	99	11
Cadmium	26	N/A	N/A	1
Chromium	54	47	61	2
Copper	34	22	84	9
Lead	71	-16	89	11
Zinc	69	33	91	15

Source: Brown and Schueler, 1997a

Storm water filtration systems can be highly effective at removing pollutants from storm water runoff. They are particularly effective at removing TSS and total phosphorus, although many filters export inorganic nitrogen due to nitrification of ammonia and organic nitrogen in the filter (Bell, 1998). Bell's study reported that significant phosphorus removals can be attributed to reaction and precipitation with sand that contains iron, calcium and aluminum. Although the limited data that are available on storm water filters indicates that their overall performance is good, additional data are needed to evaluate their efficiency, especially data that can be used to evaluate their long-term hydraulic performance and maintenance requirements. For example, Urbonas et al (1997) found that the hydraulic flow-through rate of a sand filter decreased from 3 feet-per-hour per square foot of filter area to less than 0.05 feet-per-hour after only several storms. This rapid decrease in flow-through rate causes a marked decrease in efficiency, since

more of the storm flow will be bypassed unless adequate detention storage volume is provided upstream of the filter. Therefore, overall TSS removal rates are significantly lower when this bypass flow is accounted for (for example, Urbonas' evaluation of storms over the 1995 season resulted in only a 15 percent overall TSS removal when bypass flows were taken into account). Due to the potential decrease in efficiency of sand filtration systems, careful consideration of design parameters is needed. Urbonas (1999) presents a thorough discussion of sand filtration design. Readers are urged to consult this reference for information on sand filtration system design.

In order to provide adequate filter functioning, the following basic design and operation guidelines should be followed:

- The filter should be placed off-line;
- A sedimentation chamber or basin should be provided upstream of the filter bed in order to allow for the removal of sediments to extend the length of the filter run between maintenance activities;
- The filter should be sized adequately or else adequate detention facilities should be provided upstream of the filter in order to capture expected storm water flows and to minimize bypasses;
- Care should be taken to limit excessive sediment loadings to the filter during construction or landscaping activities;
- Periodic maintenance to remove accumulated sediments and restore the filter flow-through rate may be necessary in areas with high solids loadings.

As with filtration systems, the available data on the performance of bioretention facilities are limited. Since bioretention facilities incorporate many of the same mechanisms as filtration systems, their performance for removal of parameters such as TSS are expected to be similar. Due to their biological nature, however, bioretention facilities are expected to also provide conditions necessary for uptake of nutrients by vegetation, degradation of organic contaminants by soil microorganisms, and biochemical reactions within the soil matrix and around the root zone of plants. Available data on the efficiency of bioretention facilities (based on laboratory data and one field study) indicates that bioretention can obtain removals on the order of 95-97 percent for metals, 75 percent for total phosphorus, 69 percent for TKN, 79 percent for ammonia, 21 percent for nitrate and 56 percent for total nitrogen (adapted from Bell (1998), average of all reported values).

The following general guidelines should be followed when designing bioretention facilities:

- Water should not be allowed to pond for more than four days in order to prevent mosquito breeding and to prevent adverse effects on plants;
- Plants selected for bioretention should be tolerant to stresses found in urban areas such as pollutants, variable soil moisture, periodic inundation, and high temperatures;

- Native plant species should be used whenever possible (Prince George's County, 1993), and species diversity should be maintained in order to prevent loss of all plants in the event of disease or infestation.
- Plants should be placed with regard to the elevation and moisture level of the planting bed (i.e., more water-tolerant species should be placed in lower areas where water is likely to pond longer);
- A mulch layer should be installed and maintained in order to prevent erosion of soils and to retain soil moisture;
- Where concentrated runoff enters the bioretention system, reinforcement (such as stone stabilization or synthetic erosion protection materials) may be needed to reduce erosion of the mulch layer and disturbance of the planting bed (Claytor and Schueler, 1996).
- The clay content of soils used in bioretention facilities may need to be limited to prevent clogging of the soil bed (Bell, 1998).

Readers are encouraged to consult *Design Manual for Use of Bioretention in Stormwater Management* (Prince George's County, 1993) and *Design of Stormwater Filtering Systems* (Claytor and Schueler, 1996) for additional information on the bioretention concept.

Hollywood Branch Peat/Sand Filter

In 1998 EPA conducted sampling activities at a peat/sand filter in Montgomery County, Maryland. The Hollywood Branch filter is a surface sand filter with a peat/sand filtration media that was designed based on the Galli paper (1990b). The filter is located in a county park in the Colesville area of Montgomery County and discharges to Hollywood Branch, a first-order stream that discharges into Paint Branch approximately 3,000 feet downstream of the filter. The drainage area covers approximately 140 acres and consists of 73 percent residential, 13 percent industrial and 14 percent other sources. The filter was one of several retrofit projects installed by Montgomery County as part of a watershed restoration effort in the Paint Branch watershed.

The filter is located off-line of the storm drainage system, and is designed to capture the first 0.1 watershed inches of runoff via a flow-splitter located in the storm sewer. This corresponds to a runoff volume of approximately 50,280 ft^3. Any runoff in excess of this amount bypasses the filter and is discharged directly to Hollywood Branch. Runoff from the flow splitter first enters a small stilling basin before being discharged to the filter. The stilling basin functions as a pre-settling chamber to remove coarse sediments in order to prolong the life of the filter. The stilling basin has a volume of 16,940 ft^3 at the permanent pool level, a depth of 3 feet, and length-to-width ratio of approximately 3:1. The edge of the stilling basin is planted with emergent wetland vegetation. Water is discharged from the stilling basin and into the filter through a submerged 18 inch pipe. The filter has dimensions of 265 feet by 63 feet. The filter is designed to pond water to a maximum depth of 2 feet, which corresponds to a volume of 33,880 ft^3. The filter bed is designed to have a minimum infiltration rate of 1.0 inch/hour. The filter bed consists of a 12-inch peat top layer, underlain by a 4-inch sand/peat mix, which is underlain by a 20-inch layer of sand. Water entering the filter is distributed by a series of interconnected 6 inch PVC half-pipes placed along the surface of the filter bed. The filter contains an under-drain system

consisting of 6 inch perforated PVC pipes encased in a crushed gravel layer. Filtered water collected in the under-drain system is discharged to Hollywood Branch through a 12-inch concrete pipe. See Figure 5-16.

Figure 5-16. Hollywood Branch Peat/Sand Filter

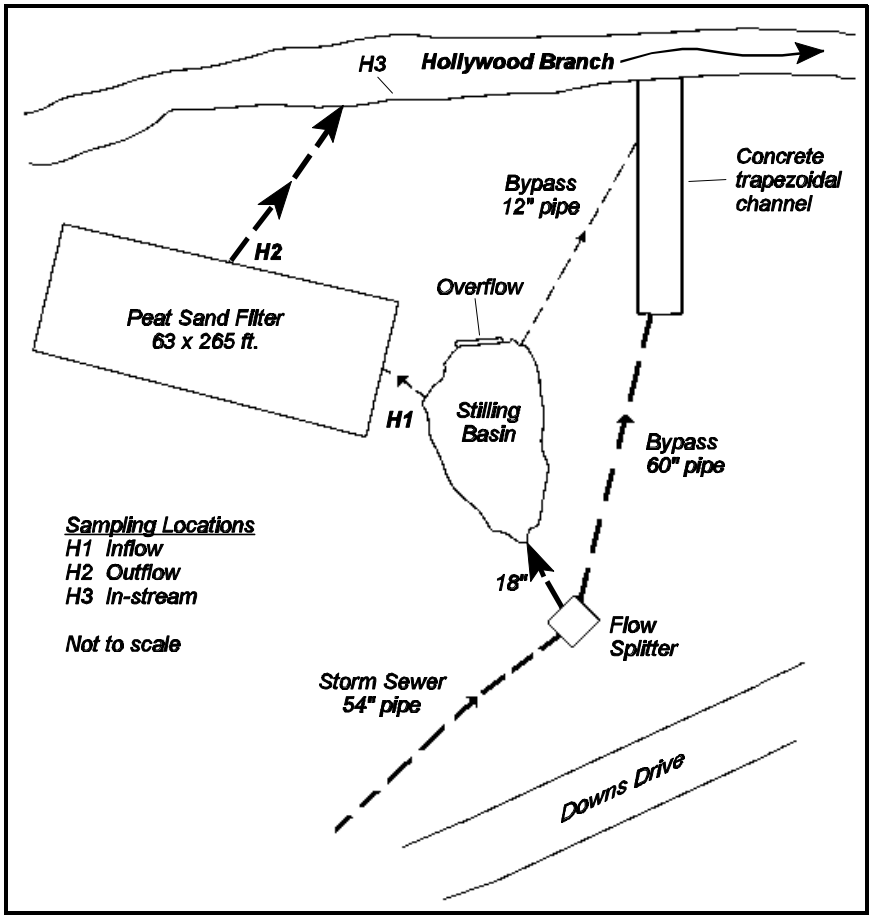

The monitoring program consisted of recording runoff flow rates and volumes and collecting flow-weighted composite samples from the inflow and outflow of the filter using automatic sampling equipment. A tipping bucket rain gauge was used to record precipitation levels. Flow monitoring and water quality sampling was conducted for five events during the spring and summer of 1998. Baseflow samples were collected from the filter on three occasions. In addition, in-stream sediment samples were collected on one occasion, and bioassessment and physical habitat measurements were also conducted.

The following tables summarize the chemical sampling data collected during this evaluation. Additional information describing the sampling program, additional sampling and

assessment data (including sediment, bioassessment and physical habitat assessment) and an analysis of the performance of the filter will be included as a supplement to this report.

Table 5-14. Summary of Hollywood Branch Peat/Sand Filter Storm Event Sampling Data

Analytes / Sample Dates ➤	06/01/98		06/12/98		06/14/98		06/24/98		07/31/98	
	Inflow	Outflow	Inflow	Outflow	Inflow	Outflow	Inflow	Outflow	Inflow	Outflow
Event Volume (gal)	7,597	No flow	68,436	28,470	308,705	149,184	131,744	75,003	151,395	72,537
Total Suspended Solids (mg/l)	--	--	10	< 4	7	17	12	8	38	31
Chemical Oxygen Demand (mg/l)	16	--	25.2	17.6	24	14.4	< 10	11	30	34
Total Organic Carbon (mg/l)	10.4	--	7.29	4.37	4.37	4.37	5.5	6	14	10.4
Total Kjeldahl Nitrogen (mg/l as N)	2	--	7.28	5.6	2.24	11.2	0.91	0.78	1.8	0.68
Total Inorganic Nitrogen (mg/l as N)	1.11	--	0.77	2.14	0.66	2.07	1	1.86	1.13	2.21
Ammonia (mg/l as N)	0.56	--	< 1	< 1	1.68	14.6	0.28	0.16	0.32	< 0.1
Total Phosphorus (mg/l)	0.14	--	0.094	0.16	0.19	0.14	0.19	0.2	0.18	0.15
Ortho-Phosphate (mg/l)	--	--	0.047	0.27	0.23	0.049	< 0.01	< 0.01	0.1	< 0.01
Lead (µg/l)	2.1	--	13.6	2.4	2.3	3.7	2.7	5.6	3.8	8.9
Copper (µg/l)	6.8	--	8.3	2	4.7	1.3	7	4	6.5	11.3
Zinc (µg/l)	17.1	--	40.1	< 2	< 2	< 2	26.8	22.6	43	41.8
Nickel (µg/l)	2.4	--	2.4	22.3	<1	< 1	1.5	4.7	3.2	7.4
Aluminum (µg/l)	< 54	--	488	1360	899	2010	956	2810	497	3450
Chromium (µg/l)	< 1	--	1.4	6.3	< 1	< 1	< 1	4.8	< 1	7.7

Table 5-15. Summary of Hollywood Branch Peat/Sand Filter Baseflow Sampling Data

Sample Dates ➤ Analytes	05/19/98		06/23/98		08/14/98	
	Inflow	Outflow	Inflow	Outflow	Inflow	Outflow
Total Suspended Solids (mg/l)	< 4	< 4	---	< 4	---	< 4
Chemical Oxygen Demand (mg/l)	< 10	< 10	---	< 10	---	< 20
Total Organic Carbon (mg/l)	< 10	< 10	---	3.5	---	6.6
Total Kjeldahl Nitrogen (mg/l as N)	1.66	19.8	---	0.55	---	1.28
Total Inorganic Nitrogen (mg/l as N)	1.79	0.64	---	0.74	---	0.23
Ammonia (mg/l as N)	0.49	< 0.1	---	< 0.1	---	< 1
Total Phosphorus (mg/l)	0.02	< 0.01	---	0.14	---	0.054
Ortho-Phosphate (mg/l)	0.02	0.02	---	< 0.01	---	0.069
Lead (µg/l)	< 2	< 2	---	---	---	< 2
Copper (µg/l)	< 1	< 1	---	---	---	1.2
Zinc (µg/l)	< 2	< 2	---	---	---	30.5
Nickel (µg/l)	2.3	3.1	---	---	---	2.7
Aluminum (µg/l)	59.8	< 54	---	---	---	1590
Chromium (µg/l)	< 1	--	---	---	---	2.3

Open Channel Vegetated Systems

Open channel vegetated systems are used widely for storm water quality control. However, these systems can be difficult to monitor, especially systems that intercept runoff as sheet flow such as grass filter strips. As a result, data on these types of systems are not as prevalent as other more readily monitored BMP types such as ponds and constructed wetlands. Table 5-16 summarizes the pollutant removal efficiency of open channel vegetated systems. Removal efficiencies are based on data collected from 20 monitoring studies.

Table 5-16. Pollutant Removal Efficiency of Open Channel Vegetated Systems

Parameter	Average or Median Removal Efficiency (percent)	Range of Removals (percent)		Number of Observations
		Low	High	
Soluble Phosphorus	11	-45	72	8
Total Phosphorus	15	-100	99	18
Ammonia-Nitrogen	3	-19	78	4
Nitrate	11	-100	99	13
Organic Nitrogen	39	11	86	3
Total Nitrogen	11	-100	99	10
Suspended Solids	66	-100	99	18
Bacteria	-25	-100	0	5
Organic Carbon	23	-100	99	11
Cadmium	49	20	80	6
Chromium	47	14	88	5
Copper	41	-35	89	15
Lead	50	-100	99	19
Zinc	49	-100	99	19

Source: Brown and Schueler, 1997a

Evaluation of available data does not provide a good indication as to the actual performance of these systems. The above data indicate that a wide range in pollutant removal efficiency is reported in the literature for open channel vegetated systems. Since there are a variety of system designs lumped into the above summary, arriving at efficiency estimates for a

particular system type given available data is difficult. In general, these types of BMPs should be effective at removing suspended solids and associated pollutants from runoff by sedimentation and by filtration by vegetation, and are certainly effective at slowing the velocity of storm water runoff and for providing detention of runoff if check dams or other structures are incorporated to provide ponding of runoff. However, dense vegetation must be maintained in order to assure proper functioning. In addition, negative removals are frequently reported for sediment and nutrients. If open channel vegetated systems are not properly maintained, significant export of sediments and associated pollutants such as metals and nutrients can occur from eroded soil. In addition, standing water in these systems can be a significant source of bacteria and can provide the conditions necessary for mosquito breeding. Additional data gathering is needed in order to support these assumptions and to quantify the efficiency of these systems.

Open channel vegetated systems can be used as pretreatment devices for other BMPs, or can be used in a "treatment train" approach. For example, grass filter strips are commonly used to accept sheet flow from parking lots in order to pre-treat runoff prior to being treated by a bioretention facility or a filter. Vegetated swales can be used to convey runoff to BMPs such as ponds or constructed wetlands, providing pretreatment of the runoff volume. When used in combination with other BMPs, the overall quality of the treated runoff can be improved and the total runoff volume can be reduced due to infiltration that occurs in the open channel vegetated systems.

Miscellaneous and Vendor-Supplied Systems

Little data exist in the published literature on the efficiency of vendor-supplied systems. Data is frequently available from the vendors, and as more of these systems are installed it is expected that more data will become available. An evaluation of the efficiency of these systems has not been included in this report. The EvTEC program (see section 5.2.1.8) and other evaluation programs should provide useful information that indicates the efficiency of these systems in removing pollutants from runoff.

5.5.3 Controlling Flow Impacts

The removal of pollutants from storm water runoff is an important function of storm water BMPs. However, in many cases receiving water problems are not due to the pollutants contained in storm water, but rather can be attributed to the large flow rates that result in receiving streams that receive storm water discharges. Therefore, in some cases, controlling the volume and flow rate of storm water discharges is as important, if not more important, than removing pollutants prior to discharge. Site-specific parameters will dictate the importance of flow control in preventing degradation of receiving waters.

Evaluating the effectiveness of BMPs in controlling flow impacts is not an easy task. Site-specific variations such as slope, soil types, ground cover, and watershed-imperviousness can greatly impact the hydraulic response of a watershed to rainfall. In addition, receiving water

parameters greatly influence the degree of flow control that is necessary in order to prevent degradation. As a result, little information is contained in the literature describing the performance of BMPs at controlling impacts in receiving streams due to excessive storm water flows. The literature that does exist, however, indicates a direct correlation between urbanization and receiving stream degradation. It is not difficult to infer, therefore, that storm water flow is a major contributor to receiving stream degradation, and that control of storm water flow rates and volumes is warranted in order to restore degraded receiving waters and to prevent degradation of receiving waters in newly developing areas. Additional information on the hydrological benefits of BMPs is presented in section 6.3.2 of this report.

Important measures of the effectiveness of BMPs at controlling storm water flows include:

- reductions in peak flow rate across the BMP;
- total storage volume provided in the BMP;
- infiltrative capacity of the BMP;
- retention time in the BMP;
- relationship of post-development hydrologic conditions to pre-development hydrology;
- retention volume necessary for receiving stream channel protection.

Local conditions will dictate the BMP design parameters that are necessary to reduce impacts due to flow. For example, the state of Maryland has developed unified BMP sizing criteria that is designed to provide adequate control of pollutants, limit degradation of streams, provide adequate groundwater recharge, and protect downstream areas from flooding. Additional work is needed in other areas of the country to evaluate the effectiveness criteria necessary to limit flow impacts and to provide adequate BMP sizing standards.

Flow control can be accomplished by using both structural and non-structural practices. Structural BMPs that can provide flow control include retention basins, detention basins, constructed wetlands, infiltration practices, grassed swales and minimizing directly connected impervious surface areas. Filters and bioretention facilities can also be adapted to provide some degree of quantity control if they are used in conjunction with detention basins or other means of providing detention of storm water prior to treatment, such as providing temporary ponding in overflow parking areas. Non-structural BMPs and land-use practices that can help to reduce the volume of storm water runoff discharged to receiving streams should also be considered a vital component of storm water management. Practices that can reduce the impact of storm water runoff due to excessive flows include land use regulations such as zoning, natural area and stream buffer preservation, limits on impervious surfaces, and cluster development. Practices that limit the generation of storm water can be very effective in preventing degradation of streams, and can limit the need for structural storm water controls. Information on development practices aimed at reducing impacts due to site development practices can be found in *Conservation Design for Stormwater Management* (Delaware DNREC, 1997) and in *Green Development* (US EPA, 1996b).

5.6 Conclusions

There are a wide variety of BMPs available to manage storm water runoff. The efficiency of various BMP types has been documented to some degree, but there is still a great need for focused research in certain areas, particularly for newer and innovative structural BMP types, as well as non-structural BMPs. However, due to the complexity involved in isolating the reaction of a complex and highly variable system such as a watershed to one isolated input, evaluations of non-structural BMPs are ambitious tasks. Still, where storm water management is largely driven by the availability of scarce funding, data that indicate the cost-effectiveness of various control strategies are badly needed.

Ultimately, receiving stream morphology, habitat and biological communities may turn out the be the driving factors indicating the success of BMPs at controlling impacts due to storm water flows and the pollutants that they contain. In order for such measures to work, however, it is necessary to isolate the response of a receiving stream system to the implementation of BMPs. Frequently, there are too many variables in a watershed and too many other potential sources of degradation to isolate the improvements (or even to indicate potential negative impacts) of a particular BMP or group of BMPs. For example, Maxted and Shaver (1997) did not observe a significant difference in macroinvertebrate communities between 8 sites with storm water retention ponds and 33 sites with no storm water controls. In addition, the BMPs did not prevent the almost complete loss of sensitive aquatic species. Whether or not these impacts were caused by storm water flows, pollutants or other non-storm water sources was not indicated, and the data to be able to answer these questions may not be forthcoming in the foreseeable future. Therefore, until data are available to indicate that specific BMPs can prevent impacts and prevent degradation of receiving streams in urbanized areas, one should not assume that structural, "end-of-pipe" BMPs are the only answer to the storm water problem.

Available data seem to indicate that urbanization and traditional urban development at almost any level can cause degradation of streams, and that BMPs may be able to mitigate these impacts to a certain level. Accordingly, storm water management should start at the point of runoff generation, and incorporate site planning principles that prevent or minimize the generation of runoff, prevent development in floodplains, preserve natural drainage systems, and avoid disturbing sensitive areas such as wetlands and riparian areas. Where runoff generation cannot be avoided, then properly sited, designed, constructed and operated BMPs can be implemented to attempt to reduce the impacts associated with this runoff. There are data available on the effectiveness of BMPs in reducing pollutant loads, but these data are not comprehensive enough to either characterize the performance of all BMPs in use or to determine if they are actually controlling impacts to receiving waters. Additional data gathering is necessary, but the monitoring and data analysis protocols necessary to do so have not been fully developed. Standardization of monitoring protocols for data transferability is a vital component of successful data evaluation, and is an area that should be actively pursued in the near future.

6.0 Costs and Benefits of Storm Water BMPs

Storm water best management practices (BMPs) are the primary tool to improve the quality of urban streams and meet the requirements of NPDES permits. They include both the structural and non-structural options reviewed in Section 5.2 of this report. Some BMPs can represent a significant cost to communities, but these costs should be weighed against the various benefits they provide. This chapter will focus on reviewing available data on the costs and potential benefits of both structural and non-structural BMPs designed to improve the quality of urban and urbanizing streams, and the larger water bodies to which they drain.

As described in previous chapters, storm water runoff can contribute loadings of nutrients, metals, oil and grease, and litter that result in impairment of local water bodies. The extent to which these impairments are eliminated by BMPs will depend on a number of factors, including the number, intensity, and duration of wet weather events; BMP construction and maintenance activities; and the site-specific water quality and physical conditions. Because these factors will vary substantially from site to site, data and information are not available with which to develop dollar estimates of costs and benefits for individual types of BMPs. However, EPA's national estimates of costs and benefits associated with implementation of the NPDES Phase II rule are discussed in Section 6.4.

6.1 Structural BMP Costs

The term structural BMPs, often referred to as "Treatment BMPs," refers to physical structures designed to remove pollutants from storm water runoff, reduce downstream erosion, provide flood control and promote groundwater recharge. In contrast with non-structural BMPs, structural measures include some engineering design and construction.

Structural BMPs evaluated in this report include:

- Retention Basins
- Detention Basins
- Constructed Wetlands
- Infiltration Practices
- Filters
- Bioretention
- Biofilters (swales and filter strips).

The two infiltration systems focused on in this report are infiltration trenches and infiltration basins. Although bioretention can serve as a filtering system or infiltration practice, it is discussed separately because it has separate cost data and design criteria. In this report, wet swales are assumed to have the same cost as biofilters, because there are little cost data available on this practice. Additional information about these structural BMPs, including descriptions, applicability and performance data can be found in Chapter 5 of this report. Other BMPs include

experimental and proprietary products, as well as some conventional structures such as water quality inlets. They are not included in this analysis because sufficient data are not available to support either the performance or the cost of these practices.

6.1.1 Base Capital Costs

The base capital costs refer primarily to the cost of constructing the BMP. This may include the cost of erosion and sediment control during construction. The costs of design, geotechnical testing, legal fees, land costs, and other unexpected or additional costs are not included in this estimate. The cost of constructing any BMP is variable and depends largely on site conditions and drainage area. For example, if a BMP is constructed in very rocky soils, the increased excavation costs may substantially increase the cost of construction. Also, land acquisition costs vary greatly from site to site.[4] In addition, designs vary slightly among BMP types. A wet pond may be designed with or without various levels of landscaping, for example. The data in Table 6-1 represent typical unit costs (dollars per cubic foot of treated water volume) from various studies, and should be considered planning level. In the case of retention and detention basins, ranges are used to reflect the economies of scale involved in designing these BMPs.

[4] Land cost is the largest variable influencing overall BMP cost.

Table 6-1. Typical Base Capital Construction Costs for BMPs

BMP Type	Typical Cost* ($/cf)	Notes	Source
Retention and Detention Basins	0.50-1.00	Cost range reflects economies of scale in designing this BMP. The lowest unit cost represents approx. 150,000 cubic feet of storage, while the highest is approx. 15,000 cubic feet. Typically, dry detention basins are the least expensive design options among retention and detention practices.	Adapted from Brown and Schueler (1997b)
Constructed Wetland	0.60-1.25	Although little data are available to assess the cost of wetlands, it is assumed that they are approx. 25% more expensive (because of plant selection and sediment forebay requirements) than retention basins..	Adapted from Brown and Schueler (1997b)
Infiltration Trench	4.00	Represents typical costs for a 100-foot long trench.	Adapted from SWRPC (1991)
Infiltration Basin	1.30	Represents typical costs for a 0.25-acre infiltration basin.	Adapted from SWRPC (1991)
Sand Filter	3.00-6.00	The range in costs for sand filter construction is largely due to the different sand filter designs. Of the three most common options available, perimeter sand filters are moderate cost whereas surface sand filters and underground sand filters are the most expensive.	Adapted from Brown and Schueler (1997b)
Bioretention	5.30	Bioretention is relatively constant in cost, because it is usually designed as a constant fraction of the total drainage area.	Adapted from Brown and Schueler (1997b)
Grass Swale	0.50	Based on cost per square foot, and assuming 6 inches of storage in the filter.	Adapted from SWRPC (1991)
Filter Strip	0.00-1.30	Based on cost per square foot, and assuming 6 inches of storage in the filter strip. The lowest cost assumes that the buffer uses existing vegetation, and the highest cost assumes that sod was used to establish the filter strip.	Adapted from SWRPC (1991)

* Base year for all cost data: 1997

In some ways there is no such value as the “average” construction cost for some BMPs, because many BMPs can be designed for widely varying drainage areas. However, there is some

value in assessing the cost of a typical application of each BMP. The data in Table 6-2 reflect base capital costs for typical applications of each category of BMP. It is important to note that, since many BMPs have economies of scale, it is not practical to extrapolate these values to larger or smaller drainage areas in many cases.

Table 6-2. Base Costs of Typical Applications of Storm Water BMPs[1]

BMP Type	Typical Cost ($/BMP)	Application	Data Source
Retention Basin	$100,000	50-Acre Residential Site (Impervious Cover = 35%)	Adapted from Brown and Schueler (1997b)
Wetland	$125,000	50-Acre Residential Site (Impervious Cover = 35%)	Adapted from Brown and Schueler (1997b)
Infiltration Trench	$45,000	5-Acre Commercial Site (Impervious Cover = 65%)	Adapted from SWRPC (1991)
Infiltration Basin	$15,000	5-Acre Commercial Site (Impervious Cover = 65%)	Adapted from SWRPC (1991)
Sand Filter	$35,000-$70,000[2,3]	5-Acre Commercial Site (Impervious Cover = 65%)	Adapted from Brown and Schueler (1997b)
Bioretention	$60,000	5-Acre Commercial Site (Impervious Cover = 65%)	Adapted from Brown and Schueler (1997b)
Grass Swale	$3,500	5-Acre Residential Site (Impervious Cover = 35%)	Adapted from SWRPC (1991)
Filter Strip	$0-$9,000[3]	5-Acre Residential Site (Impervious Cover = 35%)	Adapted from SWRPC (1991)

1. Base costs do not include land costs.
2. Total capital costs can typically be determined by increasing these costs by approximately 30%.
3. A range is given to account for design variations.

Although various manuals report construction cost estimates for storm water ponds, EPA has identified only three studies that have systematically evaluated the construction costs associated with structural BMPs since 1985. The three studies used slightly different estimation procedures. Two of these studies were conducted in the Washington, DC region and used a similar methodology (Wiegand et al, 1986; Brown and Schueler, 1997b). In both studies, the costs were determined based on engineering estimates of construction costs from actual BMPs throughout the region. In the third study, conducted in Southeastern Wisconsin, costs were determined using standardized cost data for different elements of the BMP, and assumptions of BMP design (SWRPC, 1991).

Any costs reported in the literature need to be adjusted for inflation and regional differences. All costs reported in this report assume a 3 percent annual inflation rate. In addition, studies are adjusted to the "twenty cities average" construction cost index, to adjust for regional biases, based on a methodology followed by the American Public Works Association (APWA, 1992). Using EPA's rainfall zones (see Figure 6-1), a cost adjustment factor is assigned to each zone (Table 6-3). For example, rainfall region 1 has a factor of 1.12. Thus, all studies in the Northeastern United States are divided by 1.12 in order to adjust for this bias.

Table 6-3. Regional Cost Adjustment Factors

Rainfall Zone	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
Adjustment Factor	1.12	0.90	0.67	0.92	0.67	1.24	1.04	1.04	0.76

Source: Modified from APWA, 1992

Figure 6-1. Rainfall Zones of the United States

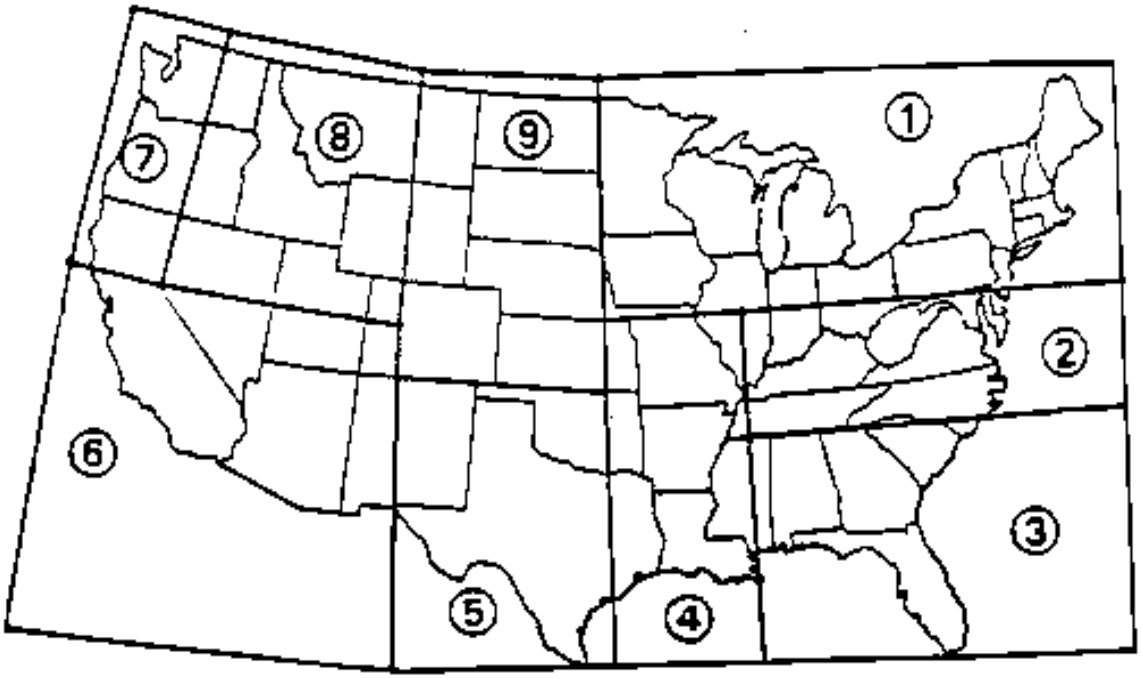

Not shown: Alaska (Zone 7); Hawaii (Zone 7); Northern Mariana Islands (Zone 7); Guam (Zone 7); American Samoa (Zone 7); Trust Territory of the Pacific Islands (Zone 7); Puerto Rico (Zone 3) Virgin Islands (Zone 3).
Source: NPDES Phase I regulations, 40 CFR Part 122, Appendix E (US EPA, 1990)

6.1.1.1 Retention/Detention Basins and Constructed Wetlands

The total volume of the basin is generally a strong predictor of cost (Table 6-4). There are some economies of scale associated with constructing these systems, as evidenced by the slope of the volume equations derived. This is largely because of the costs of inlet and outlet design, and mobilization of heavy equipment that are relatively similar regardless of basin size.

Erosion and sediment control represents only about 5 percent of the construction cost of basins and wetlands (Brown and Schueler, 1997b). Thus, the construction cost estimates presented in Table 6-2 are comparable. The cost of building storm water retention and detention systems has increased since 1986 (Figure 6-2), even after adjusting for inflation. Part of the reason for this increase is thought to be attributable to the improved design of these systems to enhance water quality driven by a more complex regulatory and review environment (Brown and Schueler, 1997b). The cost estimations made by SWRPC (1991) were generally a mid-range between the earlier and more recent studies.

Table 6-4. Base Capital Costs for Storm Water Ponds and Wetlands

BMP Type	Cost Equation or Estimate	Costs Included		Source
		Construc-tion	E&S Control	
Retention Basins and Wetlands	$7.75V^{0.75}$	✔	✔	Wiegand et al, 1986
	$18.5V^{0.70}$	✔		Brown and Schueler, 1997b
Detention Basins	$7.47V^{0.78}$	✔	✔	Brown and Schueler, 1997b
Retention Basins	1.06V: 0.25 acre retention basin (23,300 cubic feet)	✔		SWRPC, 1991
	0.43V: 1.0 acre retention basin (148,000 cubic feet)			
	0.33V: 3.0 acre retention basin (547,000 cubic feet)			
	0.31V: 5.0 acre retention basin (952,000 cubic feet)			

Notes
V refers to the total basin volume in cubic feet
Costs presented from SWRPC (1991) are “moderate” costs reported in that study.

Figure 6-2. Retention Basin Construction Cost

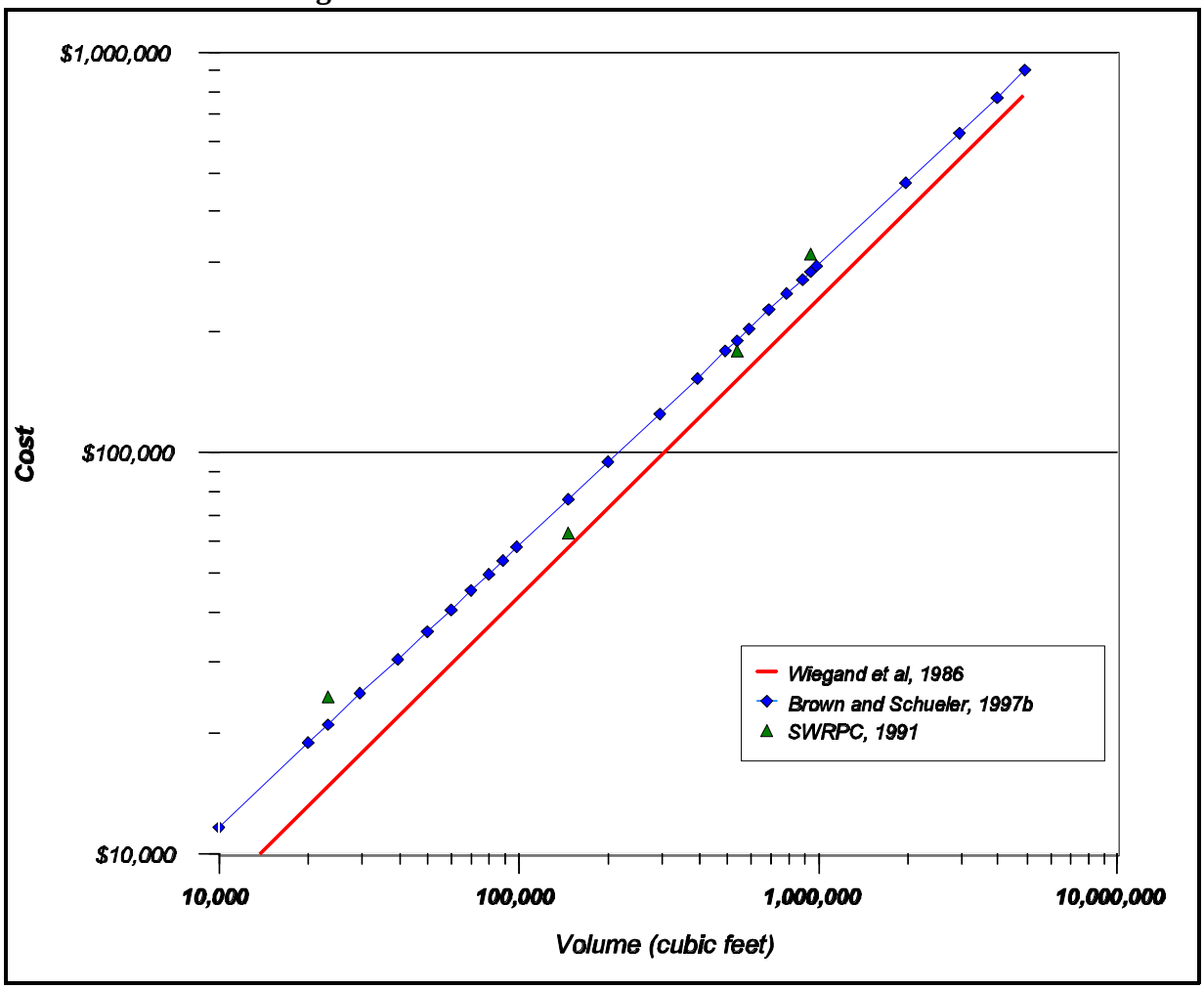

6.1.1.2 Infiltration Practices

Costs for infiltration BMPs are highly variable from site to site, depending on soils and other geotechnical information. Perhaps because of this variability, cost estimates for infiltration trenches have been widely different (Table 6-5; Figure 6-3). Brown and Schueler (1997b) concluded that the Wiegand (1986) equation underestimated cost, partially because of the lack of pretreatment in earlier designs, although they were unable to develop a consistent equation due to a small sample size.

It is difficult to estimate the cost of infiltration basins, mainly due to a lack of recent cost data. The costs estimates for SWRPC are dramatically higher than those estimated by Schueler, 1987 (Figure 6-4). This is largely because the SWRPC document assumes that 50 percent

additional volume is excavated for the spillway, while Schueler uses a retention basin cost equation.

Table 6-5. Base Capital Costs for Infiltration Practices

BMP Type	Cost Equation or Estimate[4]	Costs Included		Source
		Construc-tion	E&S Control	
Infiltration Trenches[1]	$33.7V^{0.63}$	✔		Wiegand et al, 1986
	2V to 4V; average of 2.5V	✔		Brown and Schueler, 1997b
	$4,400: 3-foot deep, 4-foot wide, 100-foot long trench	✔		SWRPC, 1991
	$10,400: 6-foot deep, 10-foot wide, 100-foot long trench			
	3.9V+2,900: 3-foot deep, 100-foot long trench	✔		Modified from SWRPC, 1991
Infiltration Basins[2]	$13.2V^{0.69}$	✔	✔	Schueler, 1987; Modified from Wiegand et al, 1986
	1.3V: 0.25-acre infiltration basin (15,000 cubic feet)	✔		SWRPC, 1991
	0.8V: 1.0-acre infiltration basin (76,300 cubic feet)			
Porous Pavement[3]	50,000A	✔		SWRPC, 1991
	80,000A	✔		Schueler, 1987

1. V for infiltration trenches refers to the treatment volume (cubic feet) within the trench, assuming a porosity of 32%.
2. V for infiltration basins refers to the total basin volume (cubic feet).
3. A is the surface area in acres of porous pavement.
4. Costs presented from SWRPC (1991) are “moderate” costs reported in that study.

Figure 6-3. Infiltration Trench Cost

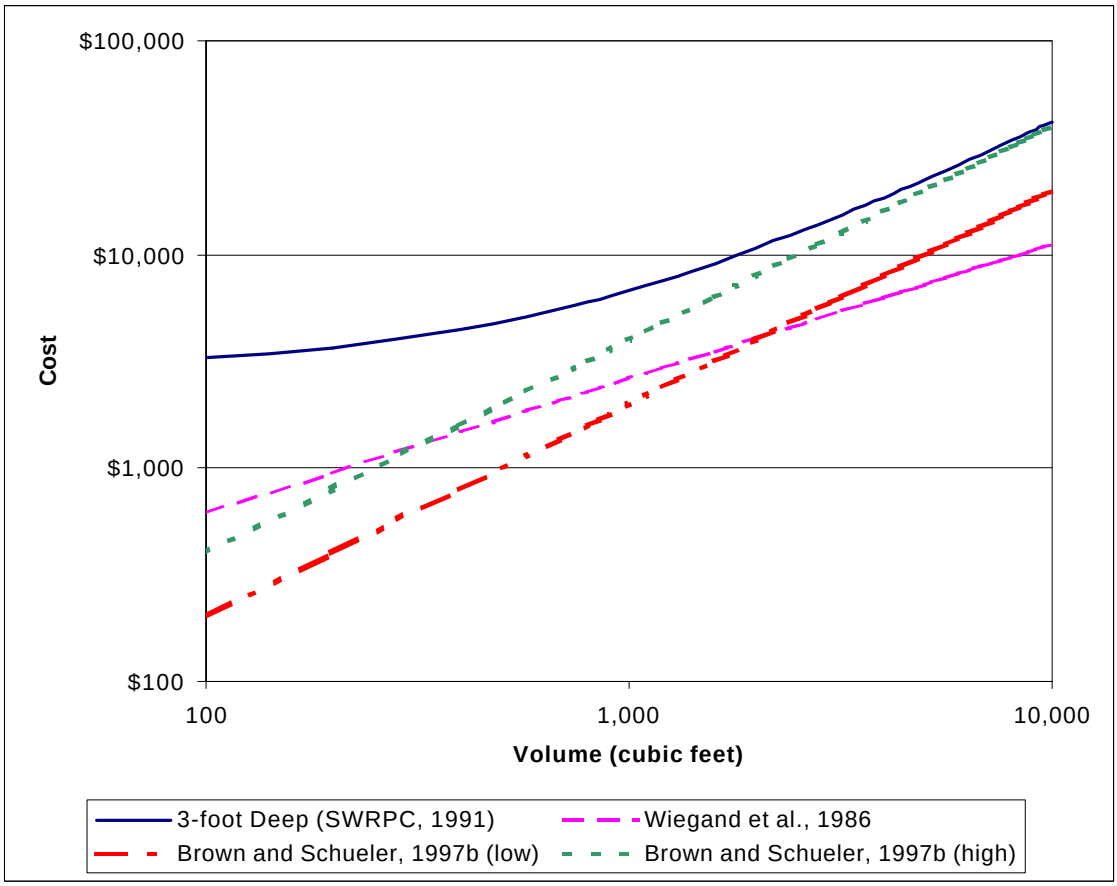

Figure 6-4. Infiltration Basin Construction Cost

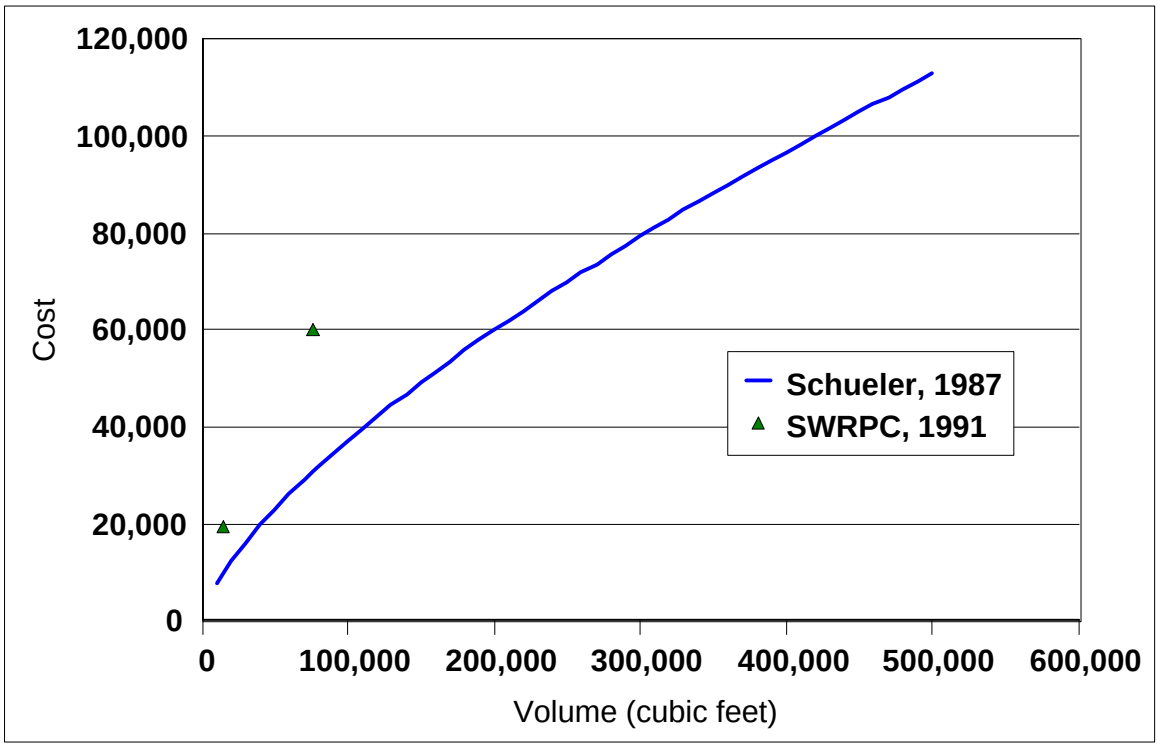

6.1.1.3 Sand Filters

Since sand filters have not been used as long as other BMPs, less information is available on their cost than on most BMPs. In addition, the costs of sand filters vary significantly due to the wide range of design criteria for sand filters (Table 6-6). Brown and Schueler (1997b) were unable to derive a valid relationship between sand filter cost and water quality volume, with costs ranging between $2 and $6 per cubic foot of water quality volume, with a mean cost of $2.50 per cubic foot. The water quality volume includes the pore space in the sand filter, plus additional storage in the pretreatment basin.

Because of the lack of cost data, no equation referencing the economies of scale has been developed. However, it appears that economies of scale do exist. For example, data from Austin indicates that the cost per acre decreased by over 80 percent for a design of a 20-acre drainage area, when compared with a 1-acre drainage area. (Schueler, 1994a).

Table 6-6. Construction Costs for Various Sand Filters

Region (Design)	Cost/Impervious Acre
Delaware	$10,000
Alexandria, VA (Delaware)	$23,500
Austin, TX (< 2 acres)	$16,000
Austin, TX (> 5 acres)	$3,400
Washington, DC (underground)	$14,000
Denver, CO	$30,000-$50,000

Source: Schueler, 1994a

6.1.1.4 Bioretention

Little information is available on the costs of bioretention because it is a relatively new practice. Brown and Schueler (1997b) found consistent construction costs of approximately $5.30 per cubic foot of water quality volume for the construction cost. The water quality volume includes 9 inches above the surface area of the bioretention structure.

6.1.1.5 Vegetative BMPs

The two major types of vegetative BMPs include filter strips and grassed swales (also called “biofilters”). The costs for these BMPs vary, and largely depend on the method used to establish vegetation (Table 6-7).

Table 6-7. Base Capital Costs of Vegetative BMPs

BMP Type	Cost Equation or Estimate[1]	Costs Included		Source
		Construc-tion	E&S Control	
Filter Strips	Existing Vegetation: 0	✔		SWRPC, 1991
	Seed: $13,800/acre			
	Sod: $29,000/acre			
Grassed Channels	25¢ per square foot	✔		SWRPC, 1991

1. Costs presented from SWRPC (1991) are "moderate" costs reported in that study.

6.1.2 Design, Contingency and Permitting Costs

Most BMP cost studies assess only part of the cost of constructing a BMP, usually excluding permitting fees, engineering design and contingency or unexpected costs. In general, these costs are expressed as a fraction of the construction cost (Table 6-8). These costs are generally only estimates, based on the experience of designers.

Table 6-8. Design, Contingency and Permitting Costs

Additional Costs Estimate (Fraction of base construction costs)	Source	Comments
25%	Wiegand et al, 1986	Includes design, contingencies and permitting fees
32%	Brown and Schueler, 1997b	Includes design, contingencies, permitting process and erosion and sediment control

6.1.3 Land Costs

The cost of land is extremely variable both regionally and by surrounding land use. For example, many suburban jurisdictions require open space allocations within the developed site, reducing the effective cost of land for BMPs to zero (Schueler, 1987). On the other hand, the cost of land may far outweigh construction and design costs in ultra-urban settings. For this

reason, some underground BMPs that are relatively expensive to construct may be attractive in this "ultra-urban" setting if sub-surface conditions are suitable (Lundgren, 1996). The land consumed per treatment volume depends largely on how much of the BMP's treatment is underground, and varies considerably (Table 6-9).

Table 6-9. Relative Land Consumption of Storm Water BMPs

BMP Type	Land consumption (% of Impervious Area)
Retention Basin	2-3%
Constructed Wetland	3-5%
Infiltration Trench	2-3%
Infiltration Basin	2-3%
Porous Pavement	0%
Sand Filters	0%-3%
Bioretention	5%
Swales	10%-20%
Filter Strips	100%

Note: Represents the amount of land needed as a percent of the impervious area that drains to the practice to achieve effective treatment.
Source: Claytor and Schueler, 1996

6.1.4 Operation and Maintenance Costs

Maintenance can be broken down into two primary categories: aesthetic/nuisance maintenance and functional maintenance. Functional maintenance is important for performance and safety reasons, while aesthetic maintenance is important primarily for public acceptance of BMPs, and because it may also reduce needed functional maintenance. Aesthetic maintenance is obviously more important for BMPs that are very visible, such as ponds and biofiltration facilities.

In most studies, operation and maintenance (O&M) costs have been estimated as a percentage of base construction costs (Table 6-10). While some BMPs require infrequent, costly

maintenance, others need more frequent but less costly maintenance.[5] Accordingly, selection of appropriate structural BMPs must factor in maintenance cost (and a responsible party to carry out maintenance) to ensure the necessary long-term performance. Typical maintenance activities are included in Table 5-3.

Table 6-10. Annual Maintenance Costs

BMP	Annual Maintenance Cost (% of Construction Cost)	Source(s)
Retention Basins and Constructed Wetlands	3%-6%	Wiegand et al, 1986 Schueler, 1987 SWRPC, 1991
Detention Basins[1]	<1%	Livingston et al, 1997; Brown and Schueler, 1997b
Constructed Wetlands[1]	2%	Livingston et al, 1997; Brown and Schueler, 1997b
Infiltration Trench	5%-20%	Schueler, 1987 SWRPC, 1991
Infiltration Basin[1]	1%-3%	Livingston et al, 1997; SWRPC, 1991
	5%-10%	Wiegand et al, 1986; Schueler, 1987; SWRPC, 1991
Sand Filters[1]	11%-13%	Livingston et al, 1997; Brown and Schueler, 1997b
Swales	5%-7%	SWRPC, 1991
Bioretention	5%-7%	(Assumes the same as swales)
Filter strips	$320/acre (maintained)	SWRPC, 1991

1. Livingston et al (1997) reported maintenance costs from the maintenance budgets of several cities, and percentages were derived from costs in other studies

[5] Maintenance costs can also vary significantly based on a variety of site- and region-specific parameters, therefore the maintenance costs presented in Table 6-10 should be considered only as general guidelines.

6.1.5 Long-Term BMP Costs: Two Scenarios

In order to compare various BMP options, costs were calculated for a 5-acre commercial site and a 38-acre residential site.[6] Construction costs were evaluated using the following steps:

1. *Calculate the water quality volume* (WQ_v).[7]
Using a water quality volume based on a 1-inch storm, the volume is equal to:

$$WQ_v = (.05 + .9I)\,A/12$$

where: WQ_v = Water Quality Volume (Acre-Feet)
I = Impervious Fraction in the Watershed
A = Watershed Area (Acres)

2. *Calculate the detention storage volume.*
Total detention storage was determined using standard peak flow methods (USDA/NRCS, 1986). Detention storage was calculated for a 5-inch storm.

3. *Calculate total volume.*
Many BMPs do not require any detention storage, but for BMPs that do provide flood storage, the total volume is the sum of the water quality and detention volumes calculated in steps 1 and 2.

4. *Determine the construction cost.*
The construction cost for each BMP is determined based on equations described in Section 6.1.1.

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[6] Although these evaluations are useful for comparing potential costs of various structural BMPs, they should not be applied for use in all areas of the country. In addition, the BMPs, selected in these examples and the sizing criteria that the costs were based on should not be considered as recommendations for actual BMP selection and design. They are presented solely for illustrative purposes.

[7] "Water quality volume" refers to the volume of water that the BMP is designed to treat. For example, a BMP may be designed to capture the first inch of runoff from the drainage area. Any volume of rainfall over the first inch would bypass the BMP. Therefore water quality volume for this BMP would be one watershed inch.

6.1.5.1 5-Acre Commercial Development

The following data were used as the basis for the 5-acre commercial development.

Table 6-11. Data for the Commercial Site Scenario

Area (A)	5 acres
Impervious Cover (I)	65%
Water Quality Volume P · Rv · A/12 P = 1" of rainfall Rv = 0.5 + 0.9 (I) A = Drainage Area	0.26 ac-ft
Total Detention Storage (using TR-55 model)	0.74 ac-ft
Total Storage	1.00 ac-ft

These data were then used to compare various BMP options (Table 6-12). Grassed swales and filter strips were not included in this analysis because, although they do improve water quality, they are typically used only in combination with other BMPs in a new development area. Again, it is important to note that the cost of land is not included in this calculation. Although retention basins are the least expensive option on an annual basis, the cost of land may drive designs to less space-consumptive BMPs, such as sand filters or bioretention systems.

Table 6-12. BMP Costs for a Five Acre Commercial Development

BMP Type	Construction Cost Equation	Construction Cost	Typical Design, Contingency & Other Capital Costs (30% of Construction Costs)	Annual Maintenance Costs (% of Construction, $)	Notes	Sources
Retention Basin	$18.5V_t^{0.70}$	$32,700	$9,810	5%; $1,640	Much of the cost associated with this BMP is the extra storage to provide flood control and channel protection. Ponds are very reliable.	a, b, c, d, e
Infiltration Trench	$3.9WQ_v$ +2,900	$47,100	$14,100	12%; $5,650	Although infiltration trenches are designed to last a long time, they need to be inspected and rebuilt if they become clogged.	c, d, e
Infiltration Basin	$1.3WQ_v$	$14,700	$4,410	8%; $1,180	Infiltration basins require careful siting and design to perform effectively..	b, c, d, e
Sand Filter	$4WQ_v$	$45,200	$13,600	12%; $5,420	Sand filters require frequent maintenance in order to function long-term.	a, e, f
Bioretention	$5.30WQ_v$	$60,000	$18,000	6%; $3,600	Bioretention is a relatively new BMP. Little is known about its long-term performance.	a, d

1. WQv = Water Quality Volume, cu. ft. 2. V_t = Total Volume, cu. ft.
3. Sand filter volume was estimated at 4WQv, which is slightly high, to account for the relatively small drainage area.

a. Brown and Schueler, 1997b b. Wiegand et al, 1986 c. Schueler, 1987 d. SWRPC, 1991 e. US EPA, 1993a f. Livingston et al, 1997

6.1.5.2 38-Acre Residential Development

The following data were used as the basis for the 38-acre residential development.

Table 6-13. Data for the Residential Site Scenario

Area (A)	38 acres
Impervious Cover (I)	36%
Water Quality Volume	1.1 ac-ft
Total Detention Storage (using TR-55 model)	2.8 ac-ft
Total Storage	3.9 ac-ft

The same analysis conducted for the commercial site was repeated for the larger site (Table 6-14). Bioretention and infiltration systems were not included in this analysis, because these BMPs are best applied on smaller sites. The costs of swales and filter strips were also not included, although they could be effectively used in combination with retention systems to provide pretreatment.

6.1.6 Adjusting Costs Regionally

The cost data in these examples can be adjusted to specific zones of the country using the regional cost adjustment factors in Table 6-3. For example, if costs for Rainfall Zone 1 were needed, the data in Tables 6-12 or 6-14 would be multiplied by 1.12.

In addition, design variations in different regions of the country may cause prices to be changed. For example, wetland and wet ponds may be restricted in arid regions of the country. Furthermore, while retention basins are used in semi-arid regions, they usually incorporate design variations to improve their performance (Saunders and Gilroy, 1997). In cold regions, BMPs may need to be adapted to account for snowmelt treatment, deep freezes and road salt application (Oberts, 1994; Caraco and Claytor, 1997), which will cause additional changes in BMP costs.

Table 6-14. BMP Costs for a Thirty-Eight Acre Residential Development

BMP Type	Construction Cost Equation	Construction Cost	Design, Contingency and other Capital Costs (30% of Construction)	Annual Maintenance Costs (% of Construction; $)	Notes	Sources
Retention Basin	$18.5V_t^{0.70}$	$84,800	$25,400	5%; $4,240	Pond systems are relatively easy to apply to large sites.	a, b, c, d, e
Sand Filter	$2WQ_v$	$95,800	$28,700	12%; $11,500	Although the sand filter is used in this example, some evidence suggests that sand filters may be subject to clogging if used on a site that drains a relatively pervious drainage area such as this one.	a, e, f

1. WQv = Water Quality Volume, cu. ft. 2. Vt = Total Volume, cu. ft.
3. Sand filter volume was estimated at 2V, which is slightly low, to account for the relatively large drainage area

a. Brown and Schueler, 1997b b. Wiegand et al, 1986 c. Schueler, 1987 d. SWRPC, 1991 e. US EPA, 1993a f. Livingston et al, 1997

6.2 Non-Structural BMP Costs

Non-structural BMPs are management measures that prevent degradation of water resources by preventing pollution at the source, rather than treating polluted runoff. Non-structural practices include a variety of site-specific and regional practices, including: street sweeping, illicit connection identification and elimination, public education and outreach, land use modifications to minimize the amount of impervious surface area, waste collection and proper materials storage. While non-structural practices play an invaluable role in protecting surface waters, their costs are generally not as easily quantified as for structural BMPs. This is primarily because there are no "design standards" for these practices. For example, the cost of a public education program may vary due to staff size. However, it is possible to identify costs associated with specific components of these programs based on past experience.

6.2.1 Street Sweeping

The costs of street sweeping include the capital costs of purchasing the equipment, plus the maintenance and operational costs to operate the sweepers, as well as costs of disposing the materials that are removed. Both equipment and operating costs vary depending on the type of sweeper selected. There are several different options for sweepers, but the two basic choices are mechanical sweepers versus vacuum-assisted sweepers. Mechanical sweepers use brushes to remove particles from streets. Vacuum-assisted dry sweepers, on the other hand, use a specialized brush and vacuum system in order to remove finer particles. While the equipment costs of mechanical sweepers are significantly higher, the total operation and maintenance costs of vacuum sweepers can be lower (Table 6-15).

Table 6-15. Street Sweeper Cost Data

Sweeper Type	Life (Years)	Purchase Price ($)	Operation and Maintenance Costs ($/curb mile)	Sources
Mechanical	5	75,000	30	Finley, 1996; SWRPC, 1991
Vacuum-assisted	8	150,000	15	Satterfield, 1996; SWRPC, 1991

Using these data, the cost of operating street sweepers per curb mile were developed, assuming various sweeping frequencies (Table 6-16). The following assumptions were made to conduct this analysis:

- One sweeper serves 8,160 curb miles during a year (SWRPC, 1991).

- The annual interest rate is 8 percent.

Table 6-16. Annualized Sweeper Costs ($/curb mile/year)

Sweeper Type	Sweeping Frequency					
	Weekly	**Bi-weekly**	**Monthly**	**Four times per year**	**Twice per year**	**Annual**
Mechanical	1,680	840	388	129	65	32
Vacuum-Assisted	946	473	218	73	36	18

Modified from Finley, 1996; SWRPC, 1991; and Satterfield, 1996

6.2.2 Illicit Connection Identification and Elimination

One source of pollutants is direct connections or infiltration to the storm drain system of wastewaters other than storm water, such as industrial wastes. These pollutants are then discharged through the storm drain system directly to streams without receiving treatment. These illicit connections can be identified using visual inspection during dry weather or through the use of smoke or dye tests. Using visual inspection techniques, illicit connections can be identified for between $1,250 and $1,750 per square mile (Center for Watershed Protection, 1996).

6.2.3 Public Education and Outreach

Public education programs encompass many other more specific programs, such as fertilizer and pesticide management, public involvement in stream restoration and monitoring projects, storm drain stenciling, and overall awareness of aquatic resources. All public education programs seek to reduce pollutant loads by changing people's behavior. They also make the public aware of and gain support for programs in place to protect water resources. Most municipalities have at least some educational component as a part of their program. A recent survey found that 30 of the 32 municipal storm water programs surveyed (94 percent) incorporate an education element and 11 programs (34 percent) mandated this element in law or regulation (Livingston et al, 1997).

The City of Seattle, with a population of approximately 535,000, has a relatively aggressive education program, including classroom and field involvement programs. The 1997 budget for some aspects of the program is included in Table 6-17. Although this does not necessarily reflect typical effort or expenditures, it does provide information on some educational expenditures. These data represent only a portion of the entire annual budget.

Table 6-17. Public Education Costs in Seattle, Washington

Item	Description	1997 Budget
Supplies for Volunteers	Covers supplies for the Stewardship Through Environmental Partnership Program	$17,500
Communications	Communications strategy highlighting a newly formed program within the city	$18,000
Environmental Education	Transportation costs from schools to field visits (105 schools with four trips each)	$46,500
Education Services / Field Trips	Fees for student visits to various sites	$55,000
Teacher Training	Covers the cost of training classroom teachers for the environmental education program	$3,400
Equipment	Equipment for classroom education, including displays, handouts, etc.	$38,800
Water Interpretive Specialist: Staff	Staff to provide public information at two creeks	$79,300
Water Interpretive Specialist: Equipment	Materials and equipment to support interpretive specialist program	$12,100
Youth Conservation Corps	Supports clean-up activities in creeks	$210,900

Source: Washington DOE, 1997

Some unit costs for educational program components (based on two different programs) are included in Table 6-18.

Table 6-18. Unit Program Costs for Public Education Programs

Item	Cost	Source
Public Attitude Survey	$1,250-$1,750 per 1,000 households	Center for Watershed Protection, 1996
Flyers	10-25¢/ flyer	Ferguson et al, 1997
Soil Test Kit*	$10	Ferguson et al, 1997
Paint	25-30¢/SD Stencil	Ferguson et al, 1997
Safety Vests for Volunteers	$2	Ferguson et al, 1997

* Includes cost of testing, but not sampling.

Although public education has the intended benefit of raising public awareness, and therefore creating support of environmental programs, it is difficult to quantify actual pollutant reductions associated with education efforts. Public attitudes can be used as a gauge of how these programs perform, however. In Prince George's County, Maryland a public survey was used in combination with modeling to estimate pollutant load reductions associated with public education (Smith et al, 1994; Claytor, 1996; Figure 6-5). An initial study was conducted to estimate pollution from field application of fertilizers, and use of detergents, oil and antifreeze. Pollutant reductions were then completed assuming that 70 percent of the population complied with recommendations of the public education program. A follow-up survey was used to assess the effectiveness of the program. Although insufficient data were available to support a second model run, a follow-up survey indicated that educational programs influenced many citizen behaviors, such as recycling. They were unsuccessful, however, at changing the rate at which citizens apply lawn fertilizers.

Figure 6-5. Changes in Pollutant Load Associated with a Public Education Program Based on a Public Survey

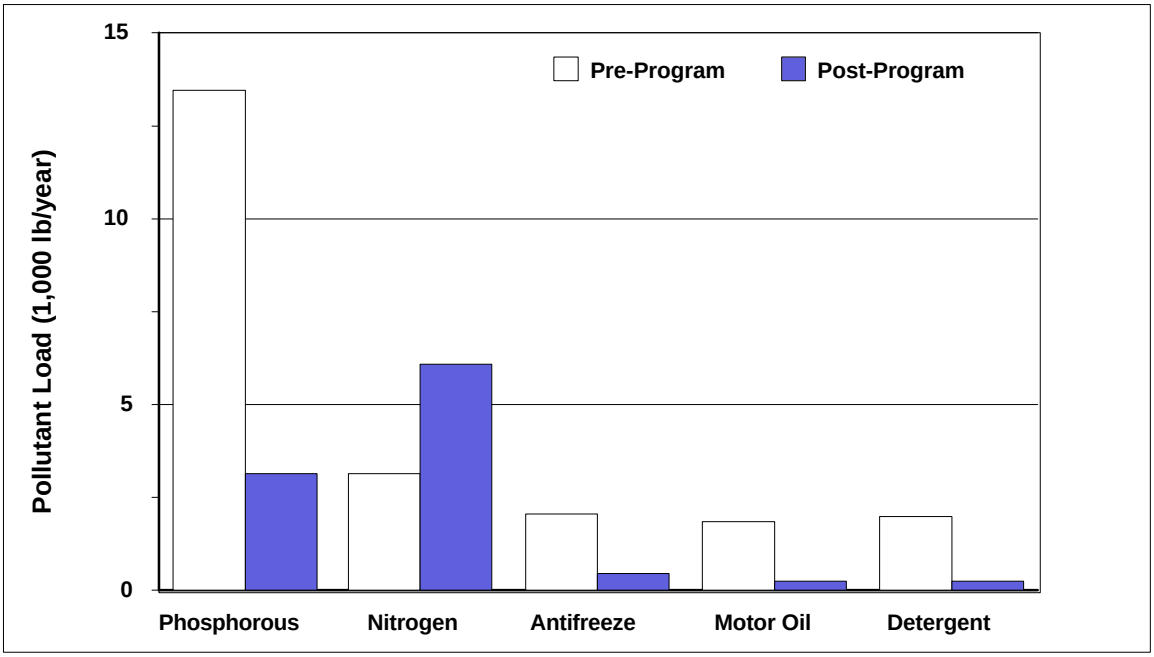

Source: Claytor, 1996

6.2.4 Land Use Modifications

One of the most effective tools to reduce the impacts of urbanization on water resources is to modify the way growth and development occurs across the landscape. At the jurisdictional or regional level, growth can be managed to minimize the outward extension of development. Jurisdictions can direct growth away from environmentally sensitive areas using such techniques as open space preservation, re-zoning or the transfer of development rights. At the site level, the nature of development can be modified to reduce the impacts of impervious cover at individual development projects through techniques such as reduced street widths, clustered housing, smaller parking lots, and incorporation of vegetative BMPs into site design. While there are legal fees associated with changing both local and regional zoning codes, data suggest that concentrating development and minimizing impervious cover at the site level can actually reduce construction costs to both developers and local governments.

By concentrating development near urban areas, the capital costs of development can be lowered substantially due to existing infrastructure and other public services. With conventional development patterns, the cost of servicing residential developments exceeds the tax revenues from these developments by approximately 15 percent (Pelley, 1997). By encouraging growth to occur in a compact region, rather than over a large area, these capital costs can be reduced substantially (Table 6-19).

Table 6-19. Comparison of Capital Costs of Municipal Infrastructure for a Single Dwelling Unit

Development Pattern	Capital Costs[1] (1987 Dollars)
Compact Growth[2]	$18,000
Low-Density Growth (3 units/acre)	$35,000
Low-Density Growth, 10 Miles from Existing Development[3]	$48,000

Notes
1. Costs include streets (full curb and gutter), central sewers and water supply, storm drainage and school construction.
2. Assumes housing mix of 30% single family units and townhouses; 70% apartments.
3. Assumes housing is located 10 miles from major concentration of employment, drinking water plant and sewage treatment plant.

Source: Frank, 1989

Savings can also be realized at the site level by reducing the costs of clearing and grading, paving and drainage infrastructure. A recent study compared conventional development plans with alternative options designed to reduce the impacts of development on the quality of water resources. The cost savings realized through these alternative options are summarized in Table 6-20. In all site designs, the road width was reduced from 28 feet to 20 feet, lot sizes were reduced or reconfigured to consume less open space, and on-site storm water treatment was provided.

Table 6-20. Impervious Cover Reduction and Cost Savings of Conservation Development

Location	Techniques Used	Impervious Cover Reduction	Cost Savings
Sussex County, DE	1. Reduced street widths 2. Smaller lots 3. Cluster development	38%	52%
New Castle County, DE	4.Houses clustered into attached units around courtyards	6%	63%
Kent County, DE	5. Reduced road and driveway widths 6. Minimum disturbance boundary	24%	39%

Source: Delaware DNREC, 1997

6.2.5 Oil and Hazardous Waste Collection

Providing a central location for the disposal of oil or hazardous wastes protects water quality by offering citizens an alternative to disposing of these materials in the storm drain. Disposal costs vary considerably depending on the size of the program, and what types of wastes are collected. One study estimated the capital costs at approximately $30,000, with about $12,000 maintenance for a used oil collection recycling program in a typical MS4 (US EPA, 1998b). This estimate was based on data from the Galveston Bay National Estuary Program. Data from the City of Livonia, Michigan indicates that the cost of hazardous waste disposal averages about $12 per gallon (Ferguson et al, 1997).

6.2.6 Proper Storage of Materials

Proper storage of materials can prevent accidental spills or runoff into the storm drain. The design of storage structures varies depending on the needs of the facility. There are also training costs associated with the proper storage of materials. Typical cost estimates, based on standard construction data, are $6 to $11 per square foot for pre-engineered buildings and $3.40 to $5 per square foot for a 6-inch thick concrete slab (Ferguson et al, 1997).

6.3 Benefits of Storm Water BMPs

Although it is possible to estimate the economic benefits of water quality improvement (US EPA, 1983a), it is difficult to create a "balance sheet" of economic costs and benefits for individual BMPs. Ideally, benefits analysis would specify and quantify a chain of events: pollutant loading reductions achieved by the BMP; the physical-chemical properties of receiving streams and consequent linkages to biologic/ecologic responses in the aquatic environment; and human responses and values associated with these changes. However, the necessary data to conduct such an analysis does not currently exist. Instead, the benefits can be outlined in terms of: 1) effectiveness at reducing pollutant loads; 2) direct water quality impacts; and 3) economic benefits or costs.

6.3.1 Storm Water Pollutant Reduction

A primary function of storm water BMPs is to prevent pollutants from reaching streams and rivers. While all BMPs achieve this function to some extent, there is considerable variability between different types of BMPs. The extent of benefits from non-structural BMPs may be more speculative, partly because their ability to influence human behavior is difficult to predict.

A detailed discussion of pollution removal efficiencies for individual structural BMPs is provided in Section 5.5 of this report, so only non-structural BMPs will be reviewed in this section. Unlike structural BMPs, it is generally not possible to associate specific pollutant removal rates with non-structural BMPs, with the exception of street sweeping (Satterfield, 1996). However, some non-structural BMPs are targeted at specific pollutants. Table 6-21 outlines non-structural BMPs believed by designers to be the most effective for removing specific types of pollutants.

Table 6-21. Non-Structural BMPs Suited to Controlling Various Pollutants

Pollutant	Appropriate BMPs	
Solids	Street Sweeping	Land Use Modifications
Oxygen-Demanding Substances	Street Sweeping Education: Storm Drain Stenciling Land Use Modifications	Education: Pet Scoop Ordinance Illicit Connections Eliminated
Nitrogen and Phosphorus	Street Sweeping Education: Pet Scoop Ordinance Land Use Modifications Proper Materials Handling	Illicit Connections Eliminated Education: Lawn Care Materials Storage and Recycling
Pathogens	Illicit Connections Eliminated Land Use Modifications	Education: Pet Scoop Ordinance
Petroleum Hydrocarbons	Street Sweeping Education: Storm Drain Stenciling Proper Materials Handling	Illicit Connections Eliminated Materials Storage and Recycling Land Use Modifications
Metals	Street Sweeping Education: Storm Drain Stenciling Proper Materials Handling	Illicit Connections Eliminated Materials Storage and Recycling Land Use Modifications
Synthetic Organics	Illicit Connections Eliminated Education: Storm Drain Stenciling Proper Materials Handling	Education: Lawn Care Materials Storage and Recycling Land Use Modifications
Temperature	Land Use Modifications	
pH	Illicit Connections Eliminated Proper Materials Handling	Materials Storage and Recycling Land Use Modifications

6.3.1.1 Solids

Both highway runoff and soil erosion can be sources of solids in urban runoff. Street sweeping can reduce solids in urban runoff by removing solids from roadways and parking lots before they can be detached and transported by runoff. The benefits associated with street sweeping depend largely on the climate. In arid regions, airborne pollutants are a serious concern, and there is a long time between storms for pollutants to accumulate[8]. In humid regions, on the other hand, frequent rainfall makes the use of sweepers between storms less practical. In colder

[8] Therefore, regular sweeping programs in these areas can potentially remove large amounts of solids from roadways.

regions, sweeping is recommended twice per year: once in the fall after leaves fall and once in the spring in anticipation of the spring snowmelt (MPCA, 1989).

Modifying land use to preserve open space and to limit the impervious cover can also reduce solids loads. By preserving open space and maintaining vegetative cover, the amount of land cleared is limited, thus reducing the erosion potential during construction. Natural vegetated cover has less than one percent of the erosion potential of bare soil (Wischmeier and Smith, 1978).

6.3.1.2 Oxygen-Demanding Substances

Since the primary oxygen-demanding substances are organic materials (such as leaves and yard waste), BMPs that target these substances are best suited to reducing the oxygen demand in storm water. BMPs that reduce sediment loads often also reduce the loads of the organic material associated with that sediment. Pet waste is also a significant source of organic pollutants, and its control can reduce the loads of oxygen demanding substances in urban runoff. Finally, programs geared at reducing illegal dumping and eliminating illicit connections and accidental spills of materials can reduce the oxygen demand associated with these sources.

6.3.1.3 Nitrogen and Phosphorus

Nitrogen and phosphorus are prevalent in urban and suburban storm water. Nitrogen and phosphorus are natural components of soil, and can enter runoff from storm-induced erosion. Additional sources include the use of fertilizer on urban lawns and airborne deposition. Street sweeping can reduce nutrient loads by removing deposited nutrients from the street surface. Programs that focus on lawn chemical handling or replacing turf with natural vegetation also act to reduce nutrient loading. Finally, programs that educate the public or industry about illegal dumping to storm drains can result in reducing the nutrient loads associated with dumping chemicals that have high nutrient content. Energy conservation and reduced automobile use can reduce airborne nitrogen deposition.

6.3.1.4 Pathogens

Pathogens, including protozoa, viruses and bacteria, are prevalent in urban runoff. Bacteria can be found naturally in soil, and the urban landscape can produce large loads of bacteria that can be carried by runoff. Dogs in particular can be a significant source of pathogens. Thus, pet scoop ordinances and associated education are effective tools at reducing bacteria in urban runoff. Illicit connections of sewage may also be a source of pathogens, therefore eliminating these sources can effectively reduce pathogens in runoff.

6.3.1.5 Petroleum Hydrocarbons

Petroleum hydrocarbons are present in many chemicals used in the urban environment, from gasoline to cleaning solvents. Since roadways are a major source of petroleum pollution, scheduled street sweeping can be used to remove hydrocarbon build-up prior to storm water runoff. Programs geared at preventing spills of chemicals to the storm drain, either through deliberate or accidental dumping, are effective at reducing hydrocarbon loads. Modifying the way land is developed can reduce hydrocarbon loads on both a site and a regional level by reducing the use of the automobile and replacing impervious surfaces with natural vegetation.

6.3.1.6 Metals

Metals sources in urban runoff include automobiles and household chemicals, which can contain trace metals. Street sweeping can reduce metals loads deposited on the road surface. In addition, programs that focus on reducing dumping and proper material storage can reduce accidental or purposeful spills of chemicals with trace metals to the storm drain system. Finally, modifying land use can reduce metals loads by reducing impervious cover, thus reducing total runoff containing metals, and reducing the roadway length, which is often a source of runoff containing metals.

6.3.1.7 Synthetic Organics

Much of the source of synthetic organics in the urban landscape is household cleaners and pesticides. Thus, education programs geared at reducing chemical and pesticide use, and proper storage and handling of these chemicals, can reduce their concentrations in urban runoff. In addition, land use modifications that replace turf with natural vegetation will reduce pesticide use.

6.3.1.8 Temperature

Most non-structural BMPs are not able to prevent the increase in temperature associated with urban development. One exception is the use of site designs that more closely mimic the natural hydrograph by reducing impervious cover and encouraging infiltration.

6.3.1.9 pH

The primary source of low pH in urban runoff is acid rain, and most non-structural BMPs are not used to treat this problem. BMPs that focus on proper materials handling and disposal can prevent dumping of chemicals with extremely high or low pH, but this is generally not a major problem in urban watersheds.

6.3.2 Hydrological and Habitat Benefits

As reviewed in Chapter 4, one major impact of urbanization is induced through the conversion of farmland, forests, wetlands, and meadows to rooftops, roads, and lawns. This process of urbanization has a profound influence on surface water hydrology, morphology, water quality, and ecology (Horner et al, 1994). In this section, the hydrologic and related habitat impacts are briefly discussed as well as the potential benefits that can be achieved by managing storm water runoff using structural and non-structural BMPs.

Many of these impacts can be directly or indirectly related to the change in the hydrologic cycle from a natural system to the urban system. Figure 4-1 illustrates the fundamental effects that occur along with the development process. In the natural setting, very little annual rainfall is converted to runoff and about half is infiltrated into the underlying soils and water table. This water is filtered by the soils, supplies deep water aquifers, and helps support adjacent surface waters with clean water during dry periods. In the urbanizing conditions, less and less annual rainfall is infiltrated and more and more volume is converted to runoff. Not only is this runoff volume greater, it also occurs more frequently and at higher magnitudes. The result is that less water is available to streams and waterways during dry periods and more flow is occurring during storms. A recent study in the Pacific Northwest found that the ratio of the two-year storm to the baseflow discharge increased more than 20 percent in developed sub-watersheds (impervious cover approximately 50 percent) versus undeveloped sub-watersheds (May et al, 1997).

As a result of urbanization, runoff from storm events increases and accelerates flows, increases stream channel erosion, and causes accelerated channel widening and down cutting (Booth, 1990). This accelerated erosion is a significant source of sediment delivery to receiving waters and also can have a smothering effect on stream channel substrates, thereby eliminating aquatic species habitat. As a result, aquatic habitat is often degraded or eliminated in many urban streams. The results are that aquatic biological communities are among the first to be impacted and/or simplified by land conversion and resulting stream channel modifications. Subsurface drainage systems which frequently serve urbanized areas also contribute to the problem, by bypassing any attenuation achieved through surface flows over vegetated areas.

A unifying theme in stream degradation is this direct link with impervious cover. Impervious cover, or imperviousness, is defined as the sum of roads, parking lots, sidewalks, rooftops, and other impermeable surfaces in the urban landscape. This unifying theme can be used to guide the efforts of the many participants in watershed protection. Figure 6-6 visually illustrates this trend in degradation for a series of small headwater streams in the Mid-Atlantic Piedmont. Here, four stream segments, each with approximately the same drainage area, and subjected to the same physiographic conditions, respond to the effects of increased impervious cover. Similar results have been observed in the Southern United States with studies in Virginia, North Carolina and Georgia evidencing this same decline in fish and macroinvertebrate populations with increasing impervious cover (Crawford and Lenant, 1989; Weaver and Garman, 1994; Couch et al, 1996)

Figure 6-6. Effects of Impervious Cover on Stream Quality

Sensitive Stream ➜
(Impervious Cover ≤10%)
- *Stable Channel*
- *Excellent Biodiversity*
- *Excellent Water Quality*

🡐 Impacted Stream
(Impervious Cover 10-20%)
- *Channel Becoming Unstable*
- *Fair to Good Biodiversity*
- *Fair to Good Water Quality*

Restorable Stream ➜
(Impervious Cover ≈40%)
- *Highly Unstable Channel*
- *Poor Biodiversity*
- *Poor to Fair Water Quality*

Non-Supporting Stream ➜
(Impervious Cover ≈65%)
- *Poor to No Biodiversity*
- *Poor Water Quality*

To mitigate this impact, many local and state governments have required the installation of storm water management detention basins to attenuate this increased runoff volume. It is important to recognize that the change in hydrology caused by urbanization affects more than just a single storm return interval (e.g., the two-year event). Urbanization shifts the entire "rainfall frequency spectrum" (RFS) to a higher magnitude. As illustrated in Figure 6-7, the most significant change is to the smallest, most frequent storms that occur several times per year. In the undeveloped condition, most of the rainfall from these events is infiltrated into the underlying soil. In the developed condition, much of this rainfall is runoff. As the storm return interval increases, the difference between the undeveloped and developed condition narrows. Many jurisdictions only require management of specific storms, usually the two, ten and sometimes, the one hundred year events. The two-year storm is probably the most frequently used control point along this frequency spectrum. Hence, while BMPs may do a fairly good job of managing these specific control points, there have been very few locations across the country that have specific criteria in place to manage storm water over a wide range of runoff events. Claytor and Schueler (1996) describe the RFS as:

> ...classes of frequencies often broken down by return interval, such as the two year storm return interval. Four principal classes are typically targeted for control by stormwater management practices. The two smallest, most frequent classes [Zones 1 and 2] are often referred to as water quality storms, where the control objectives are groundwater recharge, pollutant load reduction, and to some extent control of channel erosion producing events. The two larger classes [Zones 3 and 4] are typically referred to as quantity storms, where the control objectives are channel erosion control, overbank control, and flood control.

Figure 6-7. Stormwater Control Points Along the Rainfall Frequency Spectrum

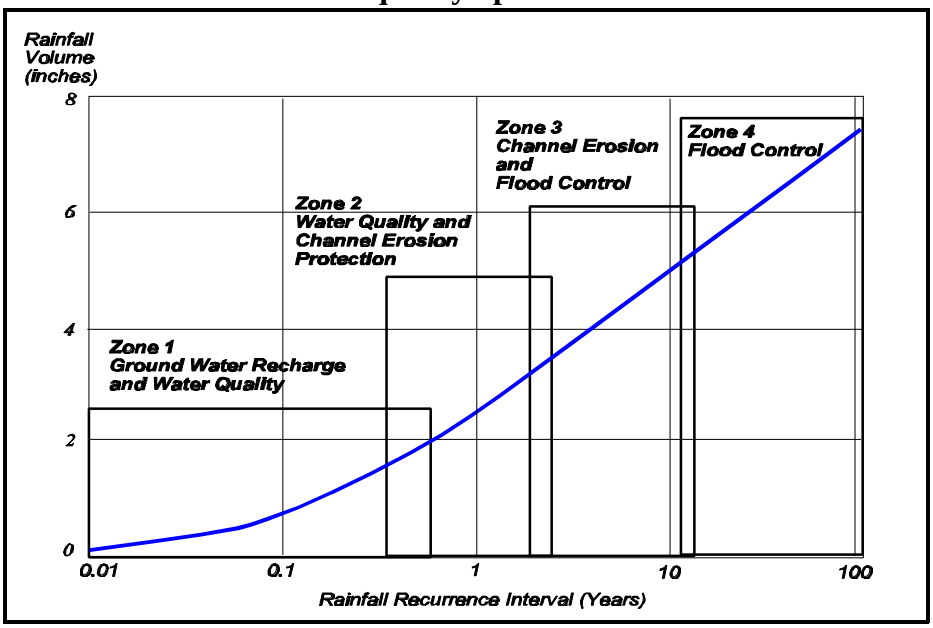

Source: Claytor and Schueler, 1996

One recent study by MacRae (1997) concluded that stream channels below storm water detention basins designed to manage the two year storm experienced accelerated erosion at three times the pre-developed rate. His findings went on to suggest that the streams were eroding at much the same rate as if no storm water controls existed.

Other jurisdictions have employed an additional level of detention storage above and beyond that required for the two year storm. This concept is often called “extended detention” (ED). McCuen and Moglen (1988) conducted a theoretical analysis of this design criteria based on sediment transport capacity of the pre-developed channel versus that with ED control. This study found ED could produce an 85 percent reduction in the pre-developed peak flow of the two-year storm. What it did not analyze, however, was the erosion potential over a wide range of storms. MacRae (1993) suggested a different storm water control criterion called “distributed runoff control” (DRC). Here, channel erosion is minimized if the erosion potential along a channel's perimeter is maintained constant with pre-developed levels. This is accomplished by providing a non-uniform distribution of the storage-discharge relationship within a BMP, where multiple control points are provided along the runoff frequency spectrum.

6.3.2.1 Benefits of BMPs to Control Hydrologic Impacts

Numerous prior studies have documented the degradation of aquatic ecosystems of urban and suburban headwater streams. As stated above, in general, the studies point to a decrease in stream quality with increasing urbanization. Unfortunately, the benefits of BMPs to protect streams from hydrologic impacts have only recently been investigated and only for a few studies.

Maxted and Shaver (1997), Jones et al (1997), and Horner et al (1997) attempted to isolate the potential beneficial influence of local storm water best management practices on the impervious cover/stream quality relationship. Horner examined the possible influence of stream-side management on stream quality as a function of urbanization. Coffman et al (1998) recently presented data on the potential hydrologic benefits of alternative land development techniques. Called the “Low Impact Development Approach,” this methodology attempts to mimic pre-developed hydrology by infiltrating more rainfall at the source, increasing the flow path and time of concentration of the remaining runoff, and providing more detention storage throughout the drainage network, as opposed to a one location at the end of the pipe.

The preliminary findings of Maxted and Shaver, and Jones et al, suggest that, for the BMPs examined, stream quality (as measured by a limited group of environmental indicators) cannot be sustained when compared to reference stream conditions. Jones assessed several BMPs by conducting biomonitoring (fish and macroinvertebrate sampling) above and below BMPs and comparing them to a reference watershed. He found that the biological community tended to be degraded immediately below BMPs as compared to the reference watersheds. One major flaw in the study was the lack of analysis in developed watersheds without BMPs. This would have compared the influence of BMPs on the aquatic community as compared to no BMPs.

Maxted and Shaver examined eight sub-watersheds with and without BMPs. Their study also concluded that BMPs did not adequately mitigate the impacts of urbanization once watershed impervious reached 20 percent cover. While this study was useful in defining the cumulative impacts of BMPs on watersheds, several critical questions remain. First, since no sub-watersheds with less than 22 percent impervious cover were analyzed, little is known about BMP ability to protect the most sensitive species seen in less developed watersheds. Data for sub-watersheds with BMPs was collected approximately three years after data for the sub-watersheds without BMPs, so climatic/seasonal constraints may have affected the outcome as much, or more than the BMPs themselves.

Horner et al (1997) evaluated several sub-watersheds, with varying levels of impervious cover, but only tangentially related the effectiveness of BMPs to protecting stream quality. Horner found that at relatively low levels of urbanization (approximately 4 percent impervious area) the most sensitive aquatic biological communities (e.g., salmonids) were adversely affected, and stream quality degradation (as measured by a several indicators) continued at a relatively continuous rate with increasing impervious area. Horner's study demonstrates a link between urbanization and stream quality in the Puget Sound region, but since the effects of BMPs were not directly assessed, the question of whether BMPs could "raise" these thresholds could not be answered.

Horner did find a positive relationship between stream quality and riparian buffer width and quality. Here, the otherwise direct relationship of degrading stream quality with increasing impervious cover was positively altered where good riparian cover existed. In other words, increasing the buffer width and condition tended to keep the stream systems healthier.

Coffman demonstrated techniques for maintaining pre-developed hydrologic parameters by replicating the curve number and time of concentration. The analysis indicated the amount of storage required on-site to accommodate the change in site imperviousness. The benefits of this type of development, while not yet fully monitored in a field study, are likely to include increased groundwater recharge, reduced channel erosion potential, and decreased flood potential.

One major hydrologic benefit of storm water management structures is the ability to mitigate for the potential flooding associated with medium to larger storms. Storm water detention and retention facilities have been applied in many parts of the country since about 1970 (Ferguson and Debo, 1990). These facilities include wet and dry basins, as well as rooftop and parking lot detention and underground storage vaults. These *storage facilities* attempt to reduce flooding downstream from developments by reducing the rate of flow out of the particular structure being used. Although the rate of flow is reduced, the volume of flow is generally not reduced. Instead, this volume is delivered downstream at a slower rate, and stretched out over a longer time. With the exception of properly design wet ponds, these structures do not provide any water quality benefit beyond the hydrologic modifications. This technique has proved to be a successful method of suppressing flood peaks when properly applied on a watershed-wide basis.

6.3.3 Human Health Benefits

Storm water can impact human health through direct contact from swimming or through contamination of seafood. Most human health problems are caused by pathogens, but metals and synthetic organics may cause increased cancer risks if contaminated seafood are consumed. Mercury, PCBs, and some pesticides have been linked to human birth defects, cancer, neurological disorders and kidney ailments. The risks may be greater to sensitive populations such as children or the elderly. BMPs that reduce pathogens, metals and synthetic organics will help to limit these health risks.

Economic benefits of avoiding human health problems can include swimming and recreation costs, as well as saved medical costs. One study in Saginaw, Michigan estimated that the swimming and beach recreation benefits associated with a CSO retention project exceeded seven million dollars (US EPA, 1998c). As another example, EPA initially estimated that proposed Phase II storm water controls would reduce the cost of shellfish-related illnesses by between $73,000 and $300,000 per year (US EPA, 1997d).

6.3.4 Additional and Aesthetic Benefits

Storm water BMPs can be perceived as assets or detriments to a community, depending on their design. Some examples of benefits include: increased wildlife habitat, increased property values, recreational opportunities, and supplemental uses. Detriments include: mosquito breeding, reduced property values, less developable land and safety concerns. These detriments can be mitigated through careful design.

6.3.4.1 Property Values and Public Perception

The impacts of BMPs on property values are site-specific. The presence of a structural BMP can affect property values in one of three ways: increase the value, decrease the value, or have no impact. BMPs that are visually aesthetic and safe for children can lead to increased property values. A practice becoming more prevalent is to situate developments around man-made ponds, lakes, or wetlands created to control flooding and reduce the impacts of urban runoff. Buffer zones and open areas that control runoff also provide land for outdoor recreation such as walking or hiking and for wildlife habitat. In many cases, developers are able to realize additional profits and quicker sales from units that are adjacent to such areas. A survey of residents in an Illinois subdivision indicates that residents are willing to pay between 5 percent and 25 percent more to be located next to a wet pond, but that being located next to a poorly-designed dry detention basin can reduce home values (Emmerling-Dinovo, 1995).

Safety is also a concern among the public. A childless adult may perceive a wet pond as an amenity, but a family might view it as a potential hazard to children. These concerns can be alleviated using such design features as gently sloping edges, a safety “bench” (a flat area

surrounding a pond) and the use of dense vegetation surrounding ponds and infiltration basins to act as a barrier.

Aesthetic maintenance is also important when considering long term impacts on property values. Poorly-maintained wet ponds or constructed wetlands may be unsightly due to excess algal growth or public littering. Wet ponds and constructed wetlands can also become mosquito breeding grounds. However, mosquito problems can usually be reduced or eliminated through proper design and/or organic controls such as mosquito-eating fish. Successful designs avoid shallow or stagnant water, and reduce large areas of periodic drying, as occur in a dry detention basin (McLean, 1995). All BMPs need to have trash and debris removed periodically to prevent odor and preserve aesthetic values.

6.3.4.2 Dual-Use Systems

Since BMPs can consume a large amount of space, communities may opt to use these facilities for other purposes in addition to storm water management. Two examples are "water reuse" ponds and dual use infiltration or detention basins. In one study, a storm water pond was used to irrigate a golf course in Florida, decreasing the cost of irrigation by approximately 85 percent (Schueler, 1994b). In the southwestern United States, BMPs are often completely dry in between rain events. In these regions, it is very common to design infiltration basins or detention basins as parks that are maintained as a public open space (Livingston et al, 1997).

6.4 Review of Economic Analysis of the NPDES Phase II Storm Water Rule

The proposed storm water Phase II rule specifies that Phase II municipalities and operators of construction sites disturbing between one and five acres of land must apply for and receive a storm water permit. To meet this requirement, municipalities must develop a storm water pollution prevention plan that addresses six minimum measures[9]. Operators of construction sites are required to incorporate soil and erosion controls into their construction sites and implement a water pollution prevention plan. The analysis presented here is a summary of the most recent benefit-cost analysis prepared for the proposed Phase II storm water rule (Preliminary draft number 3). In order to address the issues raised in the public comments and during internal review, EPA gathered additional data and information to refine the analysis of potential benefits and costs conducted for the proposed Phase II rule. These data, analyses, and results are described in detail in the Preliminary Draft of the Economic Analysis of the Final Phase II Storm

[9] The six minimum measures are:

- Public Education and Outreach on Storm Water Impacts
- Public Involvement/Participation
- Illicit Discharge Detection and Elimination
- Construction Site Storm Water Runoff Control
- Post-Construction Storm Water Management in New Development and Redevelopment
- Pollution Prevention/Good Housekeeping for Municipal Operations (US EPA, 1998c).

Water Rule ("EA"), and are summarized in the sections that follow. All cost and benefit estimates are presented in 1998 dollars.

The reader should note that the Agency continues to revise the analysis based on internal review and new data and information. EPA envisions completing the economic analysis in conjunction with the Storm Water Phase II Final Rule. Hence, all estimates are subject to future refinement.

6.4.1 Analyses of Potential Costs

This section provides an overview of the methodology used to estimate costs and pollutant loading reductions for both municipalities and construction sites subject to the final Phase II rulemaking. The specific components of the analysis are discussed in detail in the Draft Final EA. Current Agency estimates of national compliance costs, which are subject to change, are also provided.

6.4.1.1 Municipal Costs

EPA estimated annual per household program cost for automatically designated municipalities (MS4s) using actual expenditures reported by 35 Phase I municipalities. Based on census data, EPA estimated the Phase II municipal universe to be 5,040 MS4s with a total population of 85 million people and 32.5 million households. An average annual per household administrative cost was estimated to address application, record keeping, and reporting requirements, which was added to the program per household cost to derive a total average per household cost. To obtain the national estimate of compliance costs, the Agency multiplied the estimated total per household compliance cost ($9.09) by the expected number of households in Phase II communities. EPA estimates the national Phase II municipal compliance costs to be approximately $295 million (see Section 4.2.1.3 in the draft EA)[10].

6.4.1.2 Construction Costs

In estimating incremental costs attributable to the final Phase II rule, EPA estimated a per site cost for construction sites of one, three, and five acres and multiplied the cost by the total number of Phase II construction starts in these size categories to obtain a national estimate of compliance costs. The Agency used construction start data from eleven municipalities that record construction start information to estimate the number of construction starts disturbing between one and five acres of land (see Section 4.2.2.1 in the Draft Final EA).

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[10] Estimated annual per household cost of compliance ranged from $0.63 to $60.44. See Section 4.2.1.2 in the Draft Final EA for a discussion of how EPA chose the mean value of $9.09 per household. Note that the estimated per household cost does not include municipal expenditures for post-construction storm water controls.

In estimating construction BMP costs, EPA used standard cost estimates from R.S. Means (R.S. Means, 1997a and 1997b) and created 27 model sites of typical site conditions in the United States. The model sites considered three different site sizes (1, 3, and 5 acres), three slope variations (3, 7, and 12 percent), and three soil erosivity conditions (low, medium, and high). The Agency used a database compiled by the Water Environment Federation (1992) to develop and apply BMP combinations appropriate to the model site conditions. For example, sites with shallow slopes and a low erosivity require few BMPs, while larger, steeper, and more erosive sites required more BMPs. Detailed site plans, assumptions, and BMPs that could be used are found in Appendix B-3 of the Draft Final EA. Based on the assumption that any combination of site factors are equally likely to occur on a given site, EPA averaged the matrix of estimated costs to develop an average cost for one, three, and five acre starts for all soil erodibilities and slopes. The average BMP cost was estimated to be $1,206 for a one-acre site, $4,598 for a three-acre site, and $8,709 for a five-acre site.

Administrative costs for the following elements were estimated per construction site and added to each BMP cost: submittal of a notice of intent (NOI) for permit coverage ($74); notification to municipalities ($17); development of a storm water pollution prevention plan ($1,219); record retention ($2); and submittal of a notice of termination ($17) for a total cost of $1,329 per site. From this analysis, EPA estimated total average compliance costs (BMP plus administrative) for a Phase II construction site of $2,535 for sites disturbing between one and two acres of land, $5,927 for sites disturbing between two and four acres, and $10,038 for sites disturbing between four and five acres of land.

The total per site costs were then multiplied by the total number of Phase II construction sites within each of those size categories to obtain the national compliance cost estimate. EPA estimated construction costs for 15 climatic zones to reflect regional variations in rainfall intensity and amount. Once the Phase II storm water rule is fully implemented, the total annual compliance cost is expected to be approximately $512 million (assuming 109,652 construction starts in 1998).

6.4.1.3 Pollutant Loading Reductions

To estimate municipal pollutant loading reductions for the final Phase II rulemaking, EPA used the results from a 1997 EPA draft report that calculated national municipal loading reductions for TSS based on the NURP study (US EPA, 1997d). To estimate pollutant loading reductions from Phase II construction starts, the U.S. Army Corps of Engineers developed a model based on EPA's 27 models sites to estimate sediment loads from construction starts with and without Phase II controls (US ACE, 1998). Estimating the pollutant loading reduction for TSS does not capture the full extent of potential loading reductions that result from implementing storm water controls, but provides a minimum estimate of the reductions that may result from the

Phase II rule[11]. EPA also anticipates that the rule will result in reductions in oil and grease, nitrogen, phosphorus, pathogens, lead, copper, zinc and other metals. Estimated annual TSS loading reductions range from 639,115 to approximately 4 million tons for municipalities and 2 million to 8 million tons for construction sites assuming BMP effectiveness of 20 to 80 percent.

6.4.2 Assessment of Potential Benefits

A number of potential problems are associated with assessing the benefits from the Phase II rule, including identifying the regulated municipalities as sources of current impairment to waters and determining the likely effectiveness of various measures; difficulties in water quality modeling; difficulties in modeling construction site BMP effectiveness; and most importantly, the inability to monetize some categories of benefits with currently available data.

The national benefits of Phase II controls will depend on a number of factors, including the number, intensity, and duration of wet weather events; the success of municipal programs; the effectiveness of the selected construction site BMPs; the site-specific water quality and physical conditions of receiving waters; the current and potential use of receiving waters; and the existence of nearby "substitute" sites of unimpaired waters. Because these factors will vary substantially from site to site, data are not available with which to develop estimates of benefits for each site and aggregate to obtain a national estimate. As a result, the Agency developed national level estimates of benefits based largely on a benefits transfer approach. This approach allows estimates of value developed for one site and level of environmental change to be applied in the analysis of similar sites and environmental changes.

6.4.2.1 Anticipated Benefits of Municipal Measures

As part of an effort to quantify the value of the United States' waters impaired by storm water discharges, EPA applied adjusted Carson and Mitchell (1993) estimates of willingness to pay (WTP) for incremental water quality improvements to estimates of waters impaired by storm water discharges as reported by states in their biennial Water Quality Inventory reports[12]. Potential Phase II benefits are assumed to equal the WTP for the different water quality levels multiplied by the water quality impairment associated with Phase II municipalities multiplied by the relevant number of households (WTP x percent impaired x number of households).

The Carson and Mitchell estimates apply to all fresh water, however it is not clear how these values would be apportioned among rivers, lakes and the Great Lakes. Lakes are the water

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[11] To date, there are no national studies that estimate pollutant loading reductions due to the implementation of municipal storm water controls for the other pollutants found in storm water runoff and discharges.

[12]EPA adjusted the WTP amounts to account for inflation growth in real per capita income, inflation, and a 30 percent increase in attitudes towards pollution control.

bodies most impaired by urban runoff and discharges, followed closely by the Great Lakes and then rivers. Hence, EPA applied the WTP values to the categories separately and assumed that the higher resulting value for lakes represents the high end of the range and the lower resulting value for rivers represents the low end of a value range for all fresh waters (i.e. high end assumes that lake impairment is more indicative of national fresh water impairment while low end assumes that river impairment is more indicative).

The extent to which impairment will be eliminated by the municipal measures is uncertain; hence, estimates are adjusted for a range of potential effectiveness of municipal measures. EPA expects that municipal programs will achieve at least 80% effectiveness, resulting in estimated annual benefits from fresh water use and passive use in the range of $67.2 to $241.2 million. The potential value of improvements in marine waters and human health benefits have not been quantified at this time.

6.4.2.2 Anticipated Benefits of Construction Site Controls

EPA estimates the benefits of construction site controls using a benefits transfer approach applying WTP estimates for an erosion and sediment control plan from Paterson et al (1993) contingent valuation (CV) survey of North Carolina residents. The adjusted WTP estimates are intended to reflect potential benefits of erosion and sediment control programs that protect all lakes, rivers, and streams. In order to transfer adjusted WTP results to estimate the potential benefits of the Phase II rule, EPA calculated the percentage of Phase II construction starts that are not covered by a state program or CZARA for each state. This percentage is multiplied by the number of households in the state and the adjusted mean WTP of $25. The results were then summed across all states and indicate that WTP for the erosion and sediment controls of the Phase II rule may be as high as $624.2 million per year.

6.4.3 Comparison of Benefits and Costs

EPA estimates the total compliance costs of the rule to be $807.2 million. The largest portion of the total cost, $512 million, is associated with erosion and sediment controls at construction sites. EPA was able to develop a partial monetary estimate of expected benefits of both the six minimum municipal measures and the construction components of the rule. The sum of these benefits ranges from $700 to $865 million annually [assuming 80 percent effectiveness of municipal programs and using the mean WTP ($25) from Paterson]. The largest portion of benefits, $624 million, are associated with erosion and sediment controls for construction sites.

6.5 Financial Issues

Effective storm water programs require both the existence of well-performing, cost-effective BMPs and sufficient funding. Financing issues are discussed extensively in other Agency

reports and only briefly reviewed below.[13] Section 6.5.1 focuses on financing options for municipal storm water programs but does not discuss regulatory impacts on municipalities.

6.5.1 Municipal Financing of Storm Water Programs

Around the nation, local government general tax funds are the most commonly used source of funding for storm water programs. However, this may be the least suitable source of storm water program or maintenance funding. General tax revenues originate at a number of sources and are used to finance an equally diverse number of public programs, including education, police and fire protection, civil and criminal courts, and social and economic support programs. Storm water programs and maintenance must compete against a large number of other vital public programs for a very limited number of tax dollars. This problem has been compounded in recent years by tax caps and the public's general opposition to new or higher taxes.

The unreliability of general tax funds has led many communities around the country to develop storm water utilities. Storm water utilities rely on dedicated user charges related to the level of service provided. Charges are typically paid by property owners and managed in a separate enterprise fund. A variety of methods are used to determine charges, but are usually based on some estimate of the amount of storm water runoff contributed by the property, such as the total impervious surface or a ratio of impervious surface to total property area. Generally a flat rate is charged for residential properties.

There are several advantages of using utility fees to finance storm water programs. Unlike general tax revenues, utility charges are a dedicated, stable, and predictable source of funds and are not subject to state "tax cap" limitations. Also, because charges are based on the user's contribution to storm water runoff, it is often seen as more equitable or fair. Finally, utility fees provide a mechanism to incorporate economic incentives for implementation of on-site storm water management through reduced charges. For example, credits or discounts are often provided for on-site retention of storm water by nonresidential property owners. Providing such incentives creates greater flexibility by allowing each user to choose the cheaper option - paying the utility charge or implementing on-site controls. Storm water utilities are now well established as an effective financing option. As of 1991, over 100 communities across the country had instituted storm water utilities (US EPA, 1994a).

Similar to utility fees, the use of inspection or permit fees to help publicly finance storm water programs represents a relatively new application of an established component of government revenues. Often, these fees are associated with the issuance of a permit, such as a

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[13] EPA has prepared publications to assist local governments in planning for program funding (US EPA, 1994b). More recently the Agency has established an internet site with current information, the "Environmental Finance Information Network." The website address is http://www.epa.gov/efinpage/efin.htm .

building permit, clearing permit, storm water permit, or sewer connection permit. A permit program based upon fees for annual inspections, such as a storm water discharge or storm water operating permit, can provide a continuing source of funds. However, many permit or inspection fees are a one time charge, typically when the facility is first constructed. These are generally not a good funding source for continuing storm water system maintenance.

Finally, the use of dedicated contributions from land developers may be used to finance public maintenance of storm water systems. Under this program, the local government assumes the operation and maintenance of a storm water system constructed as part of a private development. All or a portion of the estimated required funding for the O&M is obtained through a one-time contribution by the land developer to a dedicated account which is controlled by the local government. Often the developer is responsible for O&M during a "warranty period," frequently the first two years. Dedicated contributions provide a secure, dedicated funding source that is not subject to state tax cap limits. A disadvantage is that dedicated contributions are only applicable to new storm water systems.

6.6 Summary

The use of BMPs to control storm water runoff and discharges where none previously existed will ultimately result in a change in pollutant loadings, and there are indications that in the aggregate BMPs will improve water quality. The actual manner in which the loadings reductions are achieved will depend on the BMPs selected, which will determine the associated costs. The physical-chemical properties of receiving streams and consequent linkages to biologic/ecologic responses in the aquatic environment, and human responses and values associated with these changes will determine the benefits.

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Storm Water O&M Fact Sheet
Catch Basin Cleaning

DESCRIPTION

Catch basins are chambers or sumps, usually built at the curb line, which allow surface water runoff to enter the storm water conveyance system. Many catch basins have a low area below the invert of the outlet pipe intended to retain coarse sediment. By trapping sediment, the catch basin prevents solids from clogging the storm sewer and being washed into receiving waters. Catch basins must be cleaned periodically to maintain their ability to trap sediment, and consequently their ability to prevent flooding. The removal of sediment, decaying debris, and highly polluted water from catch basins has aesthetic and water quality benefits, including reducing foul odors, reducing suspended solids, and reducing the load of oxygen-demanding substances that reach receiving waters.

APPLICABILITY

Catch basin cleaning should be performed at any facility that has an on-site storm sewer system that includes catch basins and manholes.

Although catch basin cleaning is easily implemented, it is often overlooked in an overall storm water management plan. In addition, many of the catch basin cleaning programs that have been implemented focus only on removal of debris from grate openings; full implementation of the catch basin cleaning BMP should also include removal of debris from the catch basin itself.

ADVANTAGES AND DISADVANTAGES

Catch basin cleaning is an efficient and cost-effective method for preventing the transport of sediment and pollutants to receiving water bodies. This improves both the aesthetics and the quality of the receiving water body.

Limitations associated with cleaning catch basins include:

- Catch basin debris usually contains appreciable amounts of water and offensive organic material which must be properly disposed.
- Catch basins may be difficult to clean in areas with poor accessibility and in areas with traffic congestion and parking problems.
- Cleaning is difficult during the winter when snow and ice are present.

Sediment and debris removed from catch basins can potentially be classified as hazardous waste. As a result, the materials must be disposed in a proper manner to avoid negative environmental impacts.

PERFORMANCE

Based on current data, it is not possible to quantify the water quality benefits to receiving waters resulting from catch basin cleaning. The rate at which catch basins fill with debris, as well as the total amount of material which can be removed by different frequencies of cleaning, are highly variable and cannot be readily predicted. Past studies have estimated that typical catch basins retain up to 57 percent of coarse solids and 17 percent of equivalent biological oxygen demand (BOD).

In addition, data collected as part of a Nationwide Urban Runoff Program (NURP) project in Castro Valley Creek, California, indicated that catch basins, cleaned on an average of once every year and a half, contained approximately 60 pounds of material each at the time of the cleaning.

OPERATION AND MAINTENANCE

Catch basins should be inspected at least annually to determine if they need to be cleaned. Typically, a catch basin should be cleaned if the depth of deposits is greater than or equal to one-third the depth from the basin to the invert of the lowest pipe or opening into or out of the basin. If a catch basin significantly exceeds the one-third depth standard during the annual inspection, then it should be cleaned more frequently. If woody debris or trash accumulates in a catch basin, then it should be cleaned on at least a weekly basis.

Catch basins can be cleaned either manually or by specially designed equipment. This equipment may include bucket loaders and vacuum pumps. Material removed from catch basins is usually disposed in conventional landfills. Before any materials can be disposed, it is necessary to perform a detailed chemical analysis to determine if the materials meet the EPA criteria for hazardous waste. This will help determine how the materials should be stored, treated, and disposed.

COSTS

Catch basin cleaning costs will vary depending upon the method used, the required cleaning frequency, the amount of debris removed, and debris disposal costs.

Cleaning costs for catch basins were estimated in three NURP program studies (Midwest Research Institute, 1982). These estimates are summarized in Table 1.

In communities equipped with vacuum street sweepers, a cleaning cost of $8 per basin cleaned is recommended for budgetary purposes (Southeastern Wisconsin Regional Planning Commission, 1991.) Cleaning catch basins manually costs approximately twice as much as cleaning the basins with a vacuum attached to a sweeper. Therefore, a cost estimate of $16 per catch basin cleaned may be used for manual cleaning. It should be noted that costs vary depending on local market conditions.

TABLE 1 CLEANING COST PER CATCH BASIN

Location	Method	Cost
Castro Valley, CA	Vacuum attached to street sweeper	$7.70
Salt Lake County, UT	Vacuum attached to street sweeper	$10.30
Winston-Salem, NC	Vacuum attached to street sweeper	$6.30

Source: MRI, 1982.

REFERENCES

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3. Southeastern Wisconsin Regional Planning Commission, 1991. *Cost of Urban Nonpoint Source Water Pollution Control Measures,* Technical Report No. 31.

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6. Washington State Department of Ecology, 1992. *Storm Water Management Manual for Puget Sound.*

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Stormwater Management in Western Washington

Volume V
Runoff Treatment BMPs

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Water Quality Program

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Chapter 1 - Introduction

1.1 Purpose of this Volume

Best Management Practices (BMPs) are schedules of activities, prohibitions of practices, maintenance procedures, managerial practices, or structural features that prevent or reduce adverse impacts to waters of Washington State. As described in Volume I of this stormwater manual, BMPs for long-term management of stormwater at developed sites can be divided into three main categories:

- BMPs addressing the amount and timing of stormwater flows;
- BMPs addressing prevention of pollution from potential sources; and
- BMPs addressing treatment of runoff to remove sediment and other pollutants.

This volume of the stormwater manual focuses on the third category, treatment of runoff to remove sediment and other pollutants at developed sites. The purpose of this volume is to provide guidance for selection, design and maintenance of permanent runoff treatment facilities.

BMPs with respect to controlling stormwater flows and control of pollutant sources are presented in Volumes III and IV, respectively.

1.2 Content and Organization of this Volume

Volume V of the stormwater manual contains 12 chapters. Chapter 1 serves as an introduction and summarizes available options for treatment of stormwater. Chapter 2 outlines a step-by-step process for selecting treatment facilities for new development and redevelopment projects. Chapter 3 presents treatment facility “menus” that are used in applying the step-by-step process presented in Chapter 2. These menus cover different treatment needs that are associated with different sites. Chapter 4 discusses general requirements for treatment facilities. Chapter 5 presents information regarding on-site stormwater management BMPs. These BMPs are intended to infiltrate, disperse, or contain runoff on site, as well as to provide treatment. Chapters 6 through 11 provide detailed information regarding specific types of treatment identified in the menus. Chapter 12 discusses special considerations for emerging technologies for stormwater treatment.

The Appendices to this volume contain more detailed information on selected topics described in the various chapters.

1.3 How to Use this Volume

This volume should be consulted to select specific BMPs for runoff treatment for inclusion in Stormwater Site Plans (see Volume I). After the Minimum Requirements have been identified from Volume I, this volume can be used to select specific treatment facilities for permanent use at developed sites, and as an aid in designing and constructing these facilities.

1.4 Runoff Treatment Facilities

1.4.1 General Considerations

Runoff treatment facilities are designed to remove pollutants contained in stormwater runoff. The pollutants of concern include sand, silt, and other suspended solids; metals such as copper, lead, and zinc; nutrients (e.g., nitrogen and phosphorous); certain bacteria and viruses; and organics such as petroleum hydrocarbons and pesticides. Methods of pollutant removal include sedimentation/settling, filtration, plant uptake, ion exchange, adsorption, and bacterial decomposition. Floatable pollutants such as oil, debris, and scum can be removed with separator structures.

1.4.2 Maintenance

Maintenance is required for all types of runoff treatment facilities. See Section 4.6 for maintenance standards for the treatment facilities discussed in this volume.

1.4.3 Treatment Methods

Methods used for runoff treatment facilities and common terms used in runoff treatment are discussed below:

- **Wetpools.** Wetpools provide runoff treatment by allowing settling of particulates during quiescent conditions (sedimentation), by biological uptake, and by vegetative filtration. Wetpools may be single-purpose facilities, providing only runoff treatment, or they may be combined with a detention pond or vault to also provide flow control. If combined, the wetpool facility can often be stacked under the detention facility with little further loss of development area.
- **Biofiltration.** Biofiltration uses vegetation in conjunction with slow and shallow-depth flow for runoff treatment. As runoff passes through the vegetation, pollutants are removed through the combined effects of filtration, infiltration, and settling. These effects are aided by the reduction of the velocity of stormwater as it passes through the biofilter. Biofiltration facilities include swales that are designed to convey and treat concentrated runoff at shallow depths and slow velocities, and filter strips that are broad areas of vegetation for treating sheet flow runoff.

- **Oil/Water Separation.** Oil/water separators remove oil floating on the top of the water. There are two general types of separators - the American Petroleum Institute (API) separators and coalescing plate (CP) separators. Both use gravity to remove floating and dispersed oil. API separators, or baffle separators, are generally composed of three chambers separated by baffles. The efficiency of these separators is dependent on detention time in the center, or detention chamber, and on droplet size. CP separators use a series of parallel plates, which improve separation efficiency by providing more surface area, thus reducing the space needed for the separator. Oil/water separators must be located off-line from the primary conveyance/detention system, bypassing flows greater than the water quality design flow. Other devices/facilities that may be used for removal of oil include "emerging technologies" (see definition below), ~~catch basin inserts~~ and linear sand filters. Oil control devices/facilities should ~~always~~ be placed upstream of other treatment facilities and as close to the source of oil generation as possible.

- **Pretreatment.** Presettling basins are often used to remove sediment from runoff prior to discharge into other treatment facilities. Basic treatment facilities, listed in Step 6 – Figure 2.1, can also be used to provide pretreatment. Pretreatment often must be provided for filtration and infiltration facilities to protect them from clogging or to protect ground water. Appropriate pretreatment devices include a pre-settling basin, wet pond/vault, biofilter, constructed wetland, or oil/water separator. A number of patented technologies have received General and Conditional Use Level designations for Pretreatment through Ecology's TAPE (Technology Assessment Protocol – Ecology) Program. A listing and descriptions are available at Ecology's Emerging Technologies website.

- **Infiltration.** Infiltration refers to the use of the filtration, adsorption, and biological decomposition properties of naturally-occurring soils to remove pollutants as stormwater soaks into the ground. Infiltration can provide multiple benefits including pollutant removal, peak flow control, ground water recharge, and flood control. However, one condition that can limit the use of infiltration is the potential adverse impact on ground water quality. To adequately address the protection of ground water when evaluating infiltration it is important to understand the difference between soils that are suitable for runoff treatment and soils only suitable for flow control. Sufficient organic content and sorption capacity to remove pollutants must be present for soils to provide runoff treatment. Examples are silty and sandy loams. Coarser soils, such as gravelly sands, can provide flow control but are not suitable for providing runoff treatment. The use of coarser soils to provide flow control for runoff from pollutant generating surfaces must always be preceded by treatment to protect ground water quality.

Thus, there will be instances when soils are suitable for treatment but not flow control, and vice versa.

- **Bioinfiltration. Bioinfiltration refers to the use of imported soils as a treatment medium. As in infiltration, the pollutant removal mechanisms include filtration, adsorption, and biological decomposition. Bioinfiltration facilities can be built within earthen swales or placed within vaults. Water that has passed through the treatment media may be discharged to the ground or collected and discharged to surface water.**

- **Filtration.** A relatively new application of a pollutant removal system for stormwater is the use of various media such as sand, perlite, zeolite, and carbon, to remove low levels of total suspended solids (TSS). Specific media such as activated carbon or zeolite can remove hydrocarbons and soluble metals. Filter systems can be configured as basins, trenches or ~~the novel~~ cartridges. A number of patented filtration devices have completed or are in the TAPE program and have an assigned use-level designation.

- **"Emerging Technologies."** Emerging technologies are- those new stormwater treatment devices that are continually being added to the stormwater treatment marketplace. Ecology has established a program – Technology Assessment Protocol – Ecology (TAPE) - to evaluate the capabilities of these emerging technologies. Emerging ~~new~~ technologies that ~~may~~ have ~~not~~ been evaluated ~~using~~ by this program are approved at some level of use under specified design conditions~~protocols, but for which preliminary data indicate that they may provide a desirable level of stormwater pollutant removal. They~~ ~~Only emerging technologies with General Use Level Designations (GULDs) have not been evaluated in sufficient detail to be acceptable as stand alone~~standalone ~~BMPs for general usage in new development or redevelopment situations requiring Basic Treatment. In the instances noted in Chapter 3, a few emerging technologies are allowed to help remove metals, hydrocarbons, and nutrients. Otherwise, t~~Their use is restricted in accordance with their level of development as explained in Chapter 12. The recommendations for use of these emerging technologies will change as we collect more data on their performance. Updated recommendations on their use are~~will be~~ posted to the Ecology website. Meanwhile, emerging technologies can also be used for retrofit situations.

- **"On-line" Systems.** Most treatment facilities can be designed as "On-line" systems with flows above the water quality design flow or volume simply passing through the facility with lesser or no pollutant removal efficiency. However, it is sometimes desirable to restrict flows to treatment facilities and bypass the incremental portion of ~~remaining~~ higher flows around them. These are called "Off-line"

systems. An example of an on-line system is a wetpool that maintains a permanent pool of water for runoff treatment purposes.

- **Design Flow.** For information on determining the design storm and flows for sizing treatment facilities refer to Chapter 4 of this volume.

Chapter 2 - Treatment Facility Selection Process

This chapter describes a step-by-step process for selecting the type of treatment facilities that will apply to individual projects. Physical features of sites that are applicable to treatment facility selection are also discussed. Refer to Chapter 3 for additional detail on the four treatment menus - oil control treatment, phosphorous treatment, enhanced treatment, and basic treatment.

Chapter 12, Section 6 includes links to menus for emerging tehnologies that have a Use-Level Designation for pretreatment, oil, phosphorous, enhanced, or basic treatment. Only technologies with a General Use-Level Designation (GULD) can have an unlimited number of installations.

2.1 Step-by-Step Selection Process for Treatment Facilities

Reviewers: This step-by-step process also appeared~~s~~ in Volume I, Chapter 4, Section 2. We are proposing to replace the text from Volume I with a reference to this Chapter.

Please refer to Figure 2.1. Use the step-by-step process outlined below to determine the type of treatment facilities applicable to the project.

Step 1: Determine the Receiving Waters and Pollutants of Concern Based on Off-Site Analysis

To obtain a more complete determination of the potential impacts of a stormwater discharge, Ecology encourages local governments to require an Off-site Analysis similar to that in Chapter 2 of Volume I (Vol. I Section 2.6.2). Even without an off-site analysis requirement, the project proponent must determine the natural receiving water for the stormwater drainage from the project site (ground water, wetland, lake, stream, or salt water). This is necessary to determine the applicable treatment menu from which to select treatment facilities. The identification of the receiving water should be verified by the local government agency with review responsibility. If the discharge is to the local municipal storm drainage system, the receiving water for the drainage system must be determined.

The local government should verify whether any type of water quality management plans and/or local ordinances or regulations have established specific requirements for that (those) receiving waters. Examples of plans to be aware of include:

- Watershed or Basin Plans: These can be developed to cover a wide variety of geographic scales (e.g., Water Resource Inventory Areas, or sub-basins of a few square miles), and can be focused solely on establishing stormwater requirements (e.g., “Stormwater Basin Plans”), or

can address a number of pollution and water quantity issues, including urban stormwater (e.g., Puget Sound Non-Point Action Plans).

- Water Clean-up Plans: These plans are written to establish a ~~Total .Maximum Daily Load (TMDL) of a pollutant or pollutants in a specific~~ receiving water or basin, and to identify actions necessary to remain below that maximum loading. The plans may identify discharge limitations or management limitations (e.g., use of specific treatment facilities) for stormwater discharges from new and redevelopment projects.
- Groundwater Management Plans (Wellhead Protection Plans): To protect groundwater quality and/or quantity, these plans may identify actions required of stormwater discharges.
- Lake Management Plans: These plans are developed to protect lakes from eutrophication due to inputs of phosphorus from the drainage basin. Control of phosphorus from new development is a likely requirement in any such plans.

An analysis of the proposed land use(s) of the project should also be used to determine the stormwater pollutants of concern. Table 2.1 lists the pollutants of concern from various land uses. Refer to this table for examples of treatment options after determining whether “basic,” “enhanced,” or “phosphorus” treatment requirements apply to the project. Those decisions are made in the steps below.

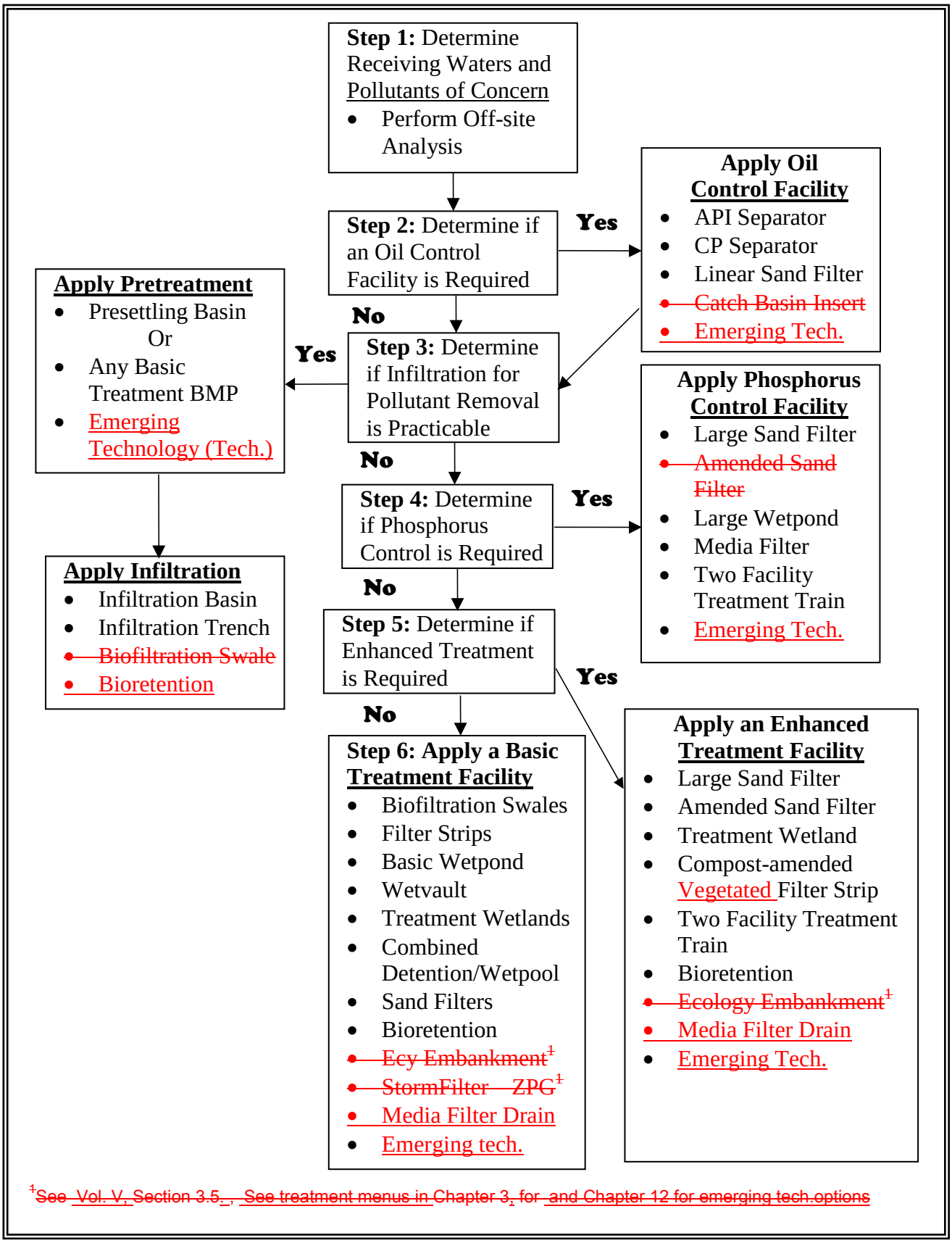

Figure 2.1 – Treatment Facility Selection Flow Chart

Step 2: Determine if an Oil Control Facility/Device is Required

The use of oil control devices and facilities is dependent upon the specific land use proposed for development.

The Oil Control Menu (Chapter 3, Section 3.2) applies to projects that have "high-use sites." High-use sites are those that typically generate high concentrations of oil due to high traffic turnover or the frequent transfer of oil. High-use sites include:

- An area of a commercial or industrial site subject to an expected average daily traffic (ADT) count equal to or greater than 100 vehicles per 1,000 square feet of gross building area.
- An area of a commercial or industrial site subject to petroleum storage and transfer in excess of 1,500 gallons per year, not including routinely delivered heating oil.
- An area of a commercial or industrial site subject to parking, storage or maintenance of 25 or more vehicles that are over 10 tons gross weight (trucks, buses, trains, heavy equipment, etc.).
- A road intersection with a measured average daily traffic (ADT) count of 25,000 vehicles or more on the main roadway and 15,000 vehicles or more on any intersecting roadway, excluding projects proposing primarily pedestrian or bicycle use improvements.

Note: The traffic count can be estimated using information from "Trip Generation," published by the Institute of Transportation Engineers, or from a traffic study prepared by a professional engineer or transportation specialist with experience in traffic estimation. See: http://www.ite.org/tripgen/trippubs.asp

Please refer to the Oil Control Menu for a listing of oil control facility options. Then see Chapter 11 of this volume for guidance on the proper selection of options and design details.

Note that some land use types require the use of a spill control (SC-type) oil/water separator. Those situations are described in Volume IV and are separate from this treatment requirement. While a number of activities may be required to use spill control (SC-type) separators, only a few will necessitate an American Petroleum Institute (API) or a coalescing plate (CP)-type separators for treatment. The following urban land uses are likely to have areas that fall within the definition of "high-use sites" or have sufficient quantities of free oil present that can be treated by an API or CP-type oil/water separator:

- Industrial Machinery and Equipment, and Railroad Equipment Maintenance Areas

- Log Storage and Sorting Yards
- Aircraft Maintenance Areas
- Railroad Yards
- Fueling Stations
- Vehicle Maintenance and Repair Sites
- Construction Businesses (paving, heavy equipment storage and maintenance, storage of petroleum products)

If oil control is required for the site, please refer to the General Requirements in Chapter 4. These requirements may affect the design and placement of facilities on the site (e.g., flow splitting).

If an Oil Control Facility is required, select and apply an Oil Control Facility. Please refer to the Oil Control Menu in Chapter 3, Section 3.2. After selecting an Oil Control Facility, proceed to Step 3.

If an Oil Control Facility is not required, proceed directly to Step 3.

Step 3: Determine if Infiltration for Pollutant Removal is Practicable

Please check the infiltration treatment design criteria in Chapter 3 of Volume III. Infiltration can be effective at treating stormwater runoff, but soil properties must be appropriate to achieve effective treatment while not adversely impacting ground water resources. The location and depth to bedrock, the water table, or impermeable layers (such as glacial till), and the proximity to wells, foundations, septic tank drainfields, and unstable slopes can preclude the use of infiltration. Infiltration treatment facilities must be preceded by a pretreatment facility, such as a presettling basin or vault, to reduce the occurrence of plugging. Any of the basic treatment facilities, and detention ponds designed to meet flow control requirements, can also be used for pre-treatment. If an oil/water separator is necessary for oil control, it can also function as the pre-settling basin as long as the influent suspended solids concentrations are not high. However, frequent inspections are necessary to determine when accumulated solids exceed the 6-inch depth at which clean-out is recommended (See Chapter 4).

If infiltration is planned, please refer to the General Requirements in Chapter 4. They can affect the design and placement of facilities on your site. For non-residential developments, if your infiltration site is within ¼ mile of a fish-bearing stream, a tributary to a fish-bearing stream, or a lake, please refer to the Enhanced Treatment Menu (Chapter 3, Section 3.4). Read the “Where Applied” paragraph in that section to determine if

the Enhanced Treatment Menu applies to part of, or all, of the site. If it does apply, read the Note under "Infiltration with appropriate pretreatment" to identify special pretreatment needs. If your infiltration site is within ¼ mile of a phosphorus-sensitive receiving water, please refer to the Phosphorus Treatment Menu (Chapter 3, Section 3.3) for special pretreatment needs.

Note: Infiltration through soils that do not meet the site suitability criteria in Chapter 3 of Volume III is allowable as a flow control BMP. However, the infiltration facility must be preceded by at least a basic treatment facility. Following a basic treatment facility (or an enhanced treatment or a phosphorus treatment facility in accordance with the previous paragraph), infiltration through the bottom of a detention/retention facility for flow control can also be acceptable as a way to reduce direct discharge volumes to streams and the size of the facility.

If infiltration is practicable, select and apply pretreatment and an infiltration facility.

If infiltration is not practicable, proceed to Step 4.

Step 4: Determine if Control of Phosphorous is Required

Please refer to the plans, ordinances, and regulations identified in Step 1 as sources of information.

The requirement to provide phosphorous control is determined by the local government with jurisdiction, the Department of Ecology, or the USEPA. The local government may have developed a management plan and implementing ordinances or regulations for control of phosphorus from new development and redevelopment for the receiving water(s) of the stormwater drainage. The local government can use the following sources of information for pursuing plans and implementing ordinances and/or regulations:

- Those waterbodies reported under section 305(b) of the Clean Water Act, and designated as not supporting beneficial uses due to phosphorous;
- Those listed in Washington State's Nonpoint Source Assessment required under section 319(a) of the Clean Water Act due to nutrients.

If phosphorus control is required, select and apply a phosphorous treatment facility. Please refer to the Phosphorus Treatment Menu in Chapter 3 Section 3.3. Select an option from the menu after reviewing the applicability and limitations, site suitability, and design criteria of each for compatibility with the site. ~~You may also use Tables 2.1 through 2.3 as an initial screening of options.~~

If you have selected a phosphorus treatment facility, please refer to the General Requirements in Chapter 4. They may affect the design and placement of the facility on the site.

Note: Project sites subject to the Phosphorus Treatment requirement could also be subject to the Enhanced Treatment requirement (see Step 5). In that event, apply a facility or a treatment train that is listed in both the Enhanced Treatment Menu and the Phosphorus Treatment Menu.

If phosphorus treatment is not required for the site, proceed to Step 5.

Step 5: Determine if Enhanced Treatment is Required

Except where specified under Step 6, Enhanced treatment is required for the following project sites that discharge to fish-bearing streams, lakes, or to waters or conveyance systems tributary to fish-bearing streams or lakes:

Industrial project sites,
Commercial project sites,
Multi-family project sites, and
High AADT roads as follows:

Within Urban Growth Management Areas:

- Fully controlled and partially controlled limited access highways with Annual Average Daily Traffic (AADT) counts of 15,000 or more
- All other roads with an AADT of 7,500 or greater

Outside of Urban Growth Management Areas:

- Roads with an AADT of 15,000 or greater unless discharging to a 4th Strahler order stream or larger;
- Roads with an AADT of 30,000 or greater if discharging to a 4th Strahler order stream or larger (as determined using 1:24,000 scale maps to delineate stream order).

~~However, such sites listed above that discharge directly (or, indirectly through a municipal storm sewer system) to Basic Treatment Receiving Waters (Appendix V-A), and~~Any areas of the above-listed project sites that are identified as subject to Basic Treatment requirements (see Step 6) are ~~also~~ not also subject to Enhanced Treatment requirements. For developments with a mix of land use types, the Enhanced Treatment requirement shall apply when the runoff from the areas subject to the Enhanced Treatment requirement comprises 50% or more of the total runoff within a threshold discharge area.

If the project must apply Enhanced Treatment, select and apply an appropriate Enhanced Treatment facility. Please refer to the Enhanced Treatment Menu in Chapter 3, Section 3.4. Select an option from the menu after reviewing the applicability and limitations, site suitability, and design criteria of each for compatibility with the site. ~~You may also use Tables 2.1 through 2.3 for an initial screening of options.~~

Note: Project sites subject to the Enhanced Treatment requirement could also be subject to a phosphorus removal requirement if located in an area designated for phosphorus control. In that event, apply a facility or a treatment train that is listed in both the Enhanced Treatment Menu and the Phosphorus Treatment Menu. If you have selected an Enhanced Treatment facility, please refer to the General Requirements in Chapter 4. They may affect the design and placement of the facility on the site.

If Enhanced Treatment does not apply to the site, please proceed to Step 6.

Step 6: Select a Basic Treatment Facility

The Basic Treatment Menu is required in the following circumstances: ~~generally applied to:~~

- Project sites that discharge to the ground (see Step 3), UNLESS:
  - The soil suitability criteria for infiltration treatment are met (see Chapter 3 of Volume III), and pretreatment is provided, OR ~~or~~
  - The project uses infiltration strictly for flow control – not treatment - and the discharge is within ¼-mile of a phosphorus sensitive lake (use the Phosphorus Treatment Menu), or within ¼ mile of a fish-bearing stream, or a lake (use the Enhanced Treatment Menu).
- Residential projects not otherwise needing phosphorus control in Step 4 as designated by USEPA, the Department of Ecology, or a local government~~; ~~. ~~and~~
- Project sites discharging directly (or indirectly through a municipal separate storm sewer system) to Basic Treatment Receiving Waters listed in Appendix I-C of Volume I~~salt waters, river segments, and lakes listed in Appendix V-A; ~~. ~~and~~
- Project sites that drain to streams that are not fish-bearing, or to waters not tributary to fish-bearing streams~~; ~~.
- Landscaped areas of industrial, commercial, and multi-family project sites, and parking lots of industrial and commercial project sites, dedicated solely to parking of employees' private vehicles that do not involve any other pollution-generating sources (e.g., industrial activities, customer parking, storage of erodible or leachable material,

wastes or chemicals). For developments with a mix of land use types, the Basic Treatment requirement shall apply when the runoff from the areas subject to the Basic Treatment requirement comprises 50% or more of the total runoff within a threshold discharge area.

Please refer to the Basic Treatment Menu in Chapter 3, Section 3.5. Select an option from the menu after reviewing the applicability and limitations, site suitability, and design criteria of each for compatibility with the site. ~~You may also use Tables 2.1 through 2.3 as an initial screening of options.~~

After selecting a Basic Treatment Facility, please refer to the General Requirements in Chapter 4. They may affect the design and placement of the facility on the site.

You have completed the treatment facility selection process.

2.2 Other Treatment Facility Selection Factors

The selection of a treatment facility should be based on site physical factors and pollutants of concern. The requirements for use of Enhanced Treatment or Phosphorus Treatment represent facility selection based on pollutants of concern. Even if the site is not subject to those requirements, try to choose a facility that is more likely to do a better job removing the types of pollutants generated on the site. The types of site physical factors that influence facility selection are summarized below.

~~**Pollutants of Concern (Table 2.1 and Table 2.2)**~~

~~Table 2.1 summarizes the pollutants of concern and those land uses that are likely to generate pollutants. It also provides suggested basic and enhanced treatment options for each land use. For example, oil and grease are the expected pollutants from an uncovered fueling station. Using Table 2.1, a combination of an oil/water separator and a biofilter could be considered as the basic treatment for runoff from uncovered fueling stations. Table 2.2 is a general listing of the relative effectiveness of classes of treatment facilities in removing key stormwater pollutants.~~

Soil Type (Table 2.~~3~~1)

The permeability of the soil underlying a treatment facility has a profound influence on its effectiveness. This is particularly true for infiltration treatment facilities that are ~~best~~ sited in sandy to loamy sand soils. They are not generally appropriate for sites that have final infiltration rates (f) of less than 0.5 inches per hour. Wet pond facilities situated on coarser soils will need a synthetic liner or the soils amended to reduce the infiltration rate and provide treatment. Maintaining a permanent pool in the first cell is necessary to avoid resuspension of settled solids. Biofiltration swales in coarse soils can also be amended to reduce the infiltration rate.

High Sediment Input

High TSS loads can clog infiltration soil, sand filters and coalescing plate oil & water separators. Pretreatment with a presettling basin, wet vault, or another basic treatment facility would typically be necessary.

Other Physical Factors

Slope: Steep slopes restrict the use of several BMPs. For example, biofiltration swales are usually situated on sites with slopes of less than 6%, although greater slopes can be considered. Infiltration BMPs are not suitable when the slope exceeds 15%.

High Water Table: Unless there is sufficient horizontal hydraulic receptor capacity the water table acts as an effective barrier to exfiltration and can sharply reduce the efficiency of an infiltration system. If the high water table extends to within five (5) feet of the bottom of an infiltration BMP, the site is seldom suitable.

Depth to Bedrock/ Hardpan/Till: The downward exfiltration of stormwater is also impeded if a bedrock or till layer lies too close to the surface. If the impervious layer lies within five feet below the bottom of the infiltration BMP the site is not suitable. Similarly, pond BMPs are often not feasible if bedrock lies within the area that must be excavated.

Proximity to Foundations and Wells: Since infiltration BMPs convey runoff back into the soil, some sites may experience problems with local seepage. This can be a real problem if the BMP is located too close to a building foundation. Another risk is ground water pollution; hence the requirement to site infiltration systems more than 100 feet away from drinking water wells.

Maximum Depth: Wet ponds are also subject to a maximum depth limit for the "permanent pool" volume. Deep ponds (greater than 8 feet) may stratify during summer and create low oxygen conditions near the bottom resulting in re-release of phosphorus and other pollutants back into the water.

~~Table 2.1 – Suggested Stormwater Treatment Options for New Development and Redevelopment Projects~~

Pollutant Sources	Pollutants of Concern	Basic Treatment	Enhanced Treatment	Phosphorus Treatment[1]
ROOFS:				
Com/Ind				
Metal	Zn	STW/INF	LSF/ASF/STW/INF	
Vents & Emissions[(2)]	O & G, TSS, Organics	OWS/CBI + BF/WP/STW	OWS/CBI + INF/ASF/STW/LSF	OWS/CBI + INF/LWP/LSF
PARKING LOT/DRIVEWAY:				
>High-use Site	High O & G, TSS, Cu, Zn, PAH	OWS/CBI/LinSF + BF/WP/STW	OWS/CBI + BF/WP/WV + SF	OWS/CBI + LSF/LWP, or OWS/CBI + BF/WP/WV+ SF
<High-use	O & G, TSS	BF/WP/STW	BF/WP/STW/WV + SF	LSF/LWP, or BF/WP/WV+SF
STREETS/HIGHWAYS:				
Arterials/H'ways	O & G, TSS, Cu, Zn, PAH	BF/WP/WV/STW	INF/LSF/ASF/STW, or BF/WV/WP + SF	INF/LSF/LWP, or BF/WV + SF
Residential Collectors	Low O & G, TSS, Cu, Zn	BF/WP/STW/INF	Not Applicable	INF/LSF/LWP, or BF/WV + SF
High Use Site Intersections	High O & G, TSS, Cu, Zn, PAH	OWS + BF/WP/WV/LinSF	OWS + BF/WV+SF, or OWS + LinSF+BF	OWS + ASF, or OWS + LinSF + Filter Strip
OTHER SOURCES:				
Industrial/ Commercial Development	O & G, TSS, Cu, Zn	WP/WV/SF/STW	LSF/ASF/STW, or BF/WP/WV + SF	LSF/ASF/LWP, or BF/WP/STW + SF
Residential Development	TSS, Pest/ Herbicides Nutrients	INF/BF/WP/SF/STW	Not Applicable	INF/LSF/LWP, or BF/WP/STW + SF
Large PGPS	TSS, Nutrients, Pest/Herbicides	WP/STW/SF	Not Applicable	LSF/LWP, or WP/STW + SF
Uncovered Fueling Stations:	High conc. O & G	OWS + BF/WP	OWS + LSF/ASF, or OWS+LinSF+Filter strip	OWS + LSF/ASF, or OWS+LinSF+ Filter strip
Industrial Yards	High O & G, TSS, Metals, PAH	OWS/CBI + BF/WP, or PSB/WV + OWS/CBI + BF/WP	OWS/CBI + LSF/ASF/STW, or OWS/CBI + BF/WP/WV + SF	OWS/CBI + LSF/ASF/LWP, or OWS/CBI + BF/WP/STW + SF
	Metals, TSS, PAH	BF/WP/STW , or PSB +BF/WP/STW	LSF/ASF/STW, or BF/WP/WV + SF	LSF/ASF/LWP, or BF/WP/STW + SF

~~Notes:~~

~~1 Though phosphorus is not typically listed as a pollutant of concern, it is present in most urban runoff situations. It becomes a pollutant of concern when identified by USEPA, the Department of Ecology, or a local government in a local management plan and when requirements are established in local ordinance or rules. If phosphorus is identified as a pollutant of concern, consider the treatment options listed here.~~

~~2 Application of effective source control measures is the preferred approach for pollutant reduction. Where source conrol measures are not used, or where they are ineffective, stormwater treatment is necessary.~~

~~**Legend:**~~

~~ASF = Amended Sand Filter~~
~~BF = Biofilter (includes swales and strips)~~
~~INF = Infiltration~~
~~CBI = Catch Basin Insert, if applicable (See Chapter 10)~~
~~Cu = Copper~~
~~Com/Ind = Commercial or industrial~~
~~LSF = Large Sand Filter~~
~~LinSF = Linear Sand Filter~~
~~LWP = Large Wet Pond~~
~~O & G = Oil and Grease~~
~~OWS = Oil & Water Separator~~
~~PAH = Polycyclic Aromatic Hydrocarbons~~
~~PSB = Presettling Basin~~
~~PGPS = Pollution generating pervious surface~~
~~SF = Sand Filter~~
~~STW = Stormwater Treatment Wetland~~
~~TSS = Total Suspended Solids~~
~~WP = Wet Pond~~
~~WV = Wetvault~~
~~Zn = Zinc~~
~~/ = or : The slashes between the abbreviations for treatment types are intended to indicate equivalent treatment options~~

~~Additional Notes:~~

~~If a detention facility is needed for flow control to meet Min. Requirement #7 or #8, a combined detention and Wetpool (Basic or Large depending upon the discharge circumstance) facility should be considered.~~

~~Table 2.2 – Ability of Treatment Facilities to Remove Key Pollutants[(1) (3)]~~						
	TSS	**Dissolved Metals**	**Soap**	**Total Phosphorus**	**Pesticides/Fungicides**	**Hydro-carbons**
Wet Pond	Ω	+		+	+	+
Wet Vault	Ω			+	+	+
Biofiltration	Ω	+		+	+	+
Sand Filter	Ω	+		+	+	Ω
Constructed Wetland	Ω	Ω	Ω		Ω	Ω
Compost Filters	Ω	+			Ω	Ω
Infiltration[(2)]	Ω	+		Ω	+	Ω
Oil/Water Separator	+			+	+	Ω

Footnotes:
Ω Major Process
\+ Minor Process
(1) Adapted from Kulzer, King Co.
(2) Assumes Loamy sand, Sandy loam, or Loam soils
(3) If neither a Major or Minor Process is shown, the Treatment Facility is not particularly effective at treating the identified pollutant

Table 2.~~3~~1 – Screening Treatment Facilities Based on Soil Type			
Soil Type	**Infiltration**	**Wet Pond***	**Biofiltration* (Swale or Filter Strip)**
Coarse Sand or Cobbles	✕	✕	✕
Sand	✔	✕	✕
Loamy Sand	✔	✕	✔
Sandy Loam	✔	✕	✔
Loam	✕	✕	✔
Silt Loam	✕	✕	✔
Sandy Clay Loam	✕	✔	✔
Silty Clay Loam	✕	✔	✔
Sandy Clay	✕	✔	✔
Silty Clay	✕	✔	✕
Clay	✕	✔	✕

Notes:
✔ Indicates that use of the technology is generally appropriate for this soil type.
✕ Indicates that use of the technology is generally not appropriate for this soil type

* Coarser soils may be used for these facilities if a liner is installed to prevent infiltration, or if the soils are amended to reduce the infiltration rate.
Note: Sand filtration is not listed because its feasibility is not dependent on soil type.

Chapter 3 - Treatment Facility Menus

This chapter identifies choices that comprise the treatment facility menus referred to in Chapter 2. The menus in this chapter are discussed in the order of the decision process shown in Figure 2.1 and are as follows:

Oil Control Menu, Section 3.2
Phosphorus Treatment Menu, Section 3.3
Enhanced Treatment Menu, Section 3.4
Basic Treatment Menu, Section 3.5

Chapter 12, Section 6 includes links to menus for emerging technologies that have a Use-Level Designation for pretreatment, oil, phosphorous, enhanced, or basic treatment. Only technologies with a General Use-Level Designation (GULD) can have an unlimited number of installations.

3.1 Guide to Applying Menus

Read the step-by-step selection process for treatment facilities in Chapter 2.

Determine which menus apply to the discharge situation. This will require knowledge of (1) the receiving water(s) that the project site ultimately discharges to, and (2) whether the local government with jurisdiction, the Department of Ecology or the USEPA, has identified the receiving water as subject to phosphorus control requirements, and (3) whether the site qualifies as subject to oil control.

Determine if your project requires oil control.

If the project requires oil control, or if you elect to provide enhanced oil pollution control, choose one of the options presented in the Oil Control Menu, Section 3.2. Detailed designs for oil control facilities are given in subsequent chapters.

Note: One of the other three treatment menus will also need to be applied along with oil control.

Find the Treatment Menu that applies to the project – Basic, Enhanced, or Phosphorus.

Each menu presents treatment options. Select one option. Since all options are intended to provide equivalent removal of the target pollutant, the choice will depend only on the constraints and opportunities of the site. A project site may be subject to both the Enhanced Treatment requirement and the Phosphorus Treatment requirement. In that event, select a facility or a treatment train that is listed in both treatment menus. Note: If flow control requirements apply, it will usually be more economical to use the combined detention/wetpool facilities. Detailed facility designs for all the possible options are given in subsequent chapters in this Volume.

Read Chapter 4 concerning general facility requirements.

They apply to all facilities and may affect the design and placement of facilities on the site.

3.2 Oil Control Menu

Note: Where this menu is applicable, it is in addition to facilities required by one of the other Treatment Menus.

Where Applied: The Oil Control Menu applies to projects that have **high-use sites. High-use sites** are those that typically generate high concentrations of oil due to high traffic turnover or the frequent transfer of oil**. High-use sites** include:

- An area of a commercial or industrial site subject to an expected average daily traffic (ADT) count equal to or greater than 100 vehicles per 1,000 square feet of gross building area,
- An area of a commercial or industrial site subject to petroleum storage and transfer in excess of 1,500 gallons per year, not including routinely delivered heating oil,
- An area of a commercial or industrial site subject to parking, storage or maintenance of 25 or more vehicles that are over 10 tons gross weight (trucks, buses, trains, heavy equipment, etc.),
- A road intersection with a measured ADT count of 25,000 vehicles or more on the main roadway and 15,000 vehicles or more on any intersecting roadway, excluding projects proposing primarily pedestrian or bicycle use improvements.

Note: The traffic count can be estimated using information from "Trip Generation" published by the Institute of Transportation Engineers, or from a traffic study prepared by a professional engineer or transportation specialist with experience in traffic estimation.

Oil control facilities from this menu should be used on other sites that generate high concentrations of oil. In general, all-day parking areas are not intended to be defined as **high-use sites**, and should not require the oil control options listed in this menu. Gasoline stations, with or without small food stores, will likely exceed the high-use site threshold. The petroleum storage and transfer criterion is intended to address regular transfer operations such as gasoline service stations, not occasional filling of heating oil tanks.

Application on the Project Site: Oil control facilities are to be placed upstream of other facilities, as close to the source of oil generation as practical. For high-use sites located within a larger commercial center,

only the impervious surface associated with the high-use portion of the site is subject to treatment requirements. If common parking for multiple businesses is provided, treatment shall be applied to the number of parking stalls required for the high-use business only. However, if the treatment collection area also receives runoff from other areas, the treatment facility must be sized to treat all water passing through it.

High-use roadway intersections shall treat lanes where vehicles accumulate during the signal cycle, including left and right turn lanes and through lanes, from the beginning of the left turn pocket. If no left turn pocket exists, the treatable area shall begin at a distance equal to three car lengths from the stop line. If runoff from the intersection drains to more than two collection areas that do not combine within the intersection, treatment may be limited to any two of the collection areas.

Performance Goal: The facility choices in the Oil Control Menu are intended to achieve the goals of no ongoing or recurring visible sheen, and to have a 24-hour average Total Petroleum Hydrocarbon (TPH) concentration no greater than 10 mg/l, and a maximum of 15 mg/l for a discrete sample (grab sample).

Note: Use the method for NWTPH-Dx in Ecology Publication No. ECY 97-602, Analytical Methods for Petroleum Hydrocarbons. If the concentration of gasoline is of interest, the method for NWTPH-Gx should be used to analyze grab samples.

Options: Oil control options include facilities that are small, treat runoff from a limited area, and require frequent maintenance. The options also include facilities that treat runoff from larger areas and generally have less frequent maintenance needs.

- **API-Type Oil/Water Separator** – See Chapter 11
- **Coalescing Plate Oil/Water Separator** – See Chapter 11
- ~~**Catch Basin Inserts** – See Chapter 12~~
- **Emerging Stormwater Treatment Technologies** – See Chapter 12
- **Linear Sand Filter** – See Chapter 8

Note: The linear sand filter is used in the Basic, Enhanced, and Phosphorus Treatment menus also. If used to satisfy one of those treatment requirements, the same facility shall not also be used to satisfy the oil control requirement unless enhanced maintenance is assured. This is to prevent clogging of the filter by oil so that it will function for suspended solids and phosphorus removal as well. Quarterly cleaning is required unless specified otherwise by the designer.

3.3 Phosphorus Treatment Menu

Where Applied: The Phosphorus Treatment Menu applies to projects within watersheds that have been determined by local governments, the Department of Ecology, or the USEPA to be sensitive to phosphorus and that are being managed to control phosphorus inputs from stormwater. This menu applies to stormwater conveyed to the lake by surface flow as well as to stormwater infiltrated within one-quarter mile of the lake in soils that do not meet the soil suitability criteria in Chapter 3 of Volume III.

Performance Goal: The Phosphorus Menu facility choices are intended to achieve a goal of 50% total phosphorus removal for a range of influent concentrations of 0.1 – 0.5 mg/l total phosphorus. In addition, the choices are intended to achieve the Basic Treatment performance goal. The performance goal applies to the water quality design storm volume or flow rate, whichever is applicable, and on an annual average basis. The incremental portion of runoff in excess of the water quality design flow rate or volume can be routed around the facility (off-line treatment facilities), or can be passed through the facility (on-line treatment facilities) provided a net pollutant reduction is maintained. Ecology encourages the design and operation of treatment facilities that engage a bypass at flow rates higher than the water quality design flow rate. This is acceptable provided that the overall reduction in phosphorus loading (treated plus bypassed) is at least equal to that achieved with initiating bypass at the water quality design flow rate. Note that wetpool facilities are always designed to be on-line.

Options: Any one of the following options may be chosen to satisfy the phosphorus treatment requirement.

- **Infiltration with appropriate pretreatment** – See Chapter 6 of Volume V, and Chapter 3 of Volume III.

  - Infiltration treatment

    If infiltration is through soils meeting the minimum site suitability criteria for infiltration treatment (See Chapter 3 of Volume III), a presettling basin or a basic treatment facility can serve for pretreatment.

  - Infiltration preceded by Basic Treatment

    If infiltration is through soils that do not meet the soil suitability criteria for infiltration treatment, treatment must be provided by a basic treatment facility unless the soil and site fit the description in the next option below.

- Infiltration preceded by Phosphorus Treatment

  If the soils do not meet the soil suitability criteria **and** the infiltration site is within ¼ mile of a phosphorus-sensitive receiving water, or a tributary to that water, treatment must be provided by one of the other treatment facility options listed below.

- **Large Sand Filter** – See Chapter 8
- ~~**Amended Sand Filter** – See Chapter 12~~

  ~~**Note:** Processed steel fiber and crushed calcitic limestone are the only sand filter amendments for which Ecology has data that documents increased dissolved metals removal. Though Ecology is interested in obtaining additional data on the effectiveness of these amendments, local governments may exercise their judgment on the extent to which to allow their use.~~

- **Large Wetpond** – See Chapter 10
- ~~**Media Filter targeted for**~~**Emerging Stormwater Treatment Technologies targeted for** **phosphorus removal** – See Chapter 12

  ~~**Note:** The use of a Stormfilter™ with iron-infused media is approved for use in limited circumstances, provided a monitoring program consistent with the TAPE protocols (Ch. 12) is implemented.~~

- **Two-Facility Treatment Trains** – See Table 3.1

Table 3.1 – Treatment Trains for Phosphorus Removal

First Basic Treatment Facility	Second Treatment Facility
Biofiltration Swale	Basic Sand Filter or Sand Filter Vault
Filter Strip	Linear Sand Filter (no presettling needed)
Linear Sand Filter	Filter Strip
Basic Wetpond	Basic Sand Filter or Sand Filter Vault
Wetvault	Basic Sand Filter or Sand Filter Vault
Stormwater Treatment Wetland	Basic Sand Filter or Sand Filter Vault
Basic Combined Detention and Wetpool	Basic Sand Filter or Sand Filter Vault

3.4 Enhanced Treatment Menu

Where Applied: Except where specified in Section 3.5 - Basic Treatment, Enhanced treatment is required for the following project sites that discharge to fish-bearing streams, lakes, or to waters or conveyance systems tributary to fish-bearing streams or lakes:

Industrial project sites,
Commercial project sites,
Multi-family project sites, and
High AADT roads as follows:

Within Urban Growth Management Areas:

- Fully controlled and partially controlled limited access highways with Annual Average Daily Traffic (AADT) counts of 15,000 or more
- All other roads with an AADT of 7,500 or greater

Outside of Urban Growth Management Areas:

- Roads with an AADT of 15,000 or greater unless discharging to a 4th Strahler order stream or larger;
- Roads with an AADT of 30,000 or greater if discharging to a 4th Strahler order stream or larger (as determined using 1:24,000 scale maps to delineate stream order).

~~However, such sites listed above that discharge directly (or, indirectly through a municipal storm sewer system) to Basic Treatment Receiving Waters (Appendix V-A), and~~ Any areas of the above-listed project sites that are identified as subject to Basic Treatment requirements (see Section 3.5 below~~Step 6~~) are not also subject to Enhanced Treatment requirements. For developments with a mix of land use types, the Enhanced Treatment requirement shall apply when the runoff from the areas subject to the Enhanced Treatment requirement comprises 50% or more of the total runoff within a threshold discharge area.

Performance Goal: The Enhanced Menu facility choices are intended to provide a higher rate of removal of dissolved metals than Basic Treatment facilities. Based on a review of dissolved metals removal of basic treatment options, a "higher rate of removal" is currently defined as greater than 30% dissolved copper removal, and greater than 60% dissolved zinc removal.- ~~Due to the sparse data available concerning dissolved metals removal in stormwater treatment facilities, a specific numeric removal efficiency goal could not be established at the time of publication. Instead, Ecology relied on available nationwide and local data, and knowledge of the pollutant removal mechanisms of treatment facilities to develop the list of options below.~~ In addition, the menu

choices are intended to achieve the Basic Treatment performance goal. The performance goal assumes that the facility is treating stormwater with dissolved Copper typically ranging from 0.00~~3~~5 to 0.02 mg/l, and dissolved Zinc ranging from 0.02 to 0.3 mg/l.

The performance goal applies to the water quality design storm volume or flow rate, whichever is applicable, and on an annual average basis. The incremental portion of runoff in excess of the water quality design flow rate or volume can be routed around the facility (off-line treatment facilities), or can be passed through the facility (on-line treatment facilities) provided a net pollutant reduction is maintained. Ecology encourages the design and operation of treatment facilities that engage a bypass at flow rates higher than the water quality design flow rate as long as the reduction in dissolved metals loading exceeds that achieved with initiating bypass at the water quality design flow rate. Note that wetpool facilities are always designed to be on-line. **Options:** Any one of the following options may be chosen to satisfy the enhanced treatment requirement:

- **Infiltration with appropriate pretreatment** – See Chapter 3 of Volume III
  - Infiltration treatment

    If infiltration is through soils meeting the minimum site suitability criteria for infiltration treatment (See Chapter 3 of Volume III), a presettling basin or a basic treatment facility can serve for pretreatment.
  - Infiltration preceded by Basic Treatment

    If infiltration is through soils that do not meet the soil suitability criteria for infiltration treatment, treatment must be provided by a basic treatment facility unless the soil and site fit the description in the next option below.
  - Infiltration preceded by Enhanced Treatment

    If the soils do not meet the soil suitability criteria **and** the infiltration site is within ¼ mile of a fish-bearing stream, a tributary to a fish-bearing stream, or a lake, treatment must be provided by one of the other treatment facility options listed below.

- **Large Sand Filter –** See Chapter 8

- ~~**Amended Sand Filter** – See Chapter 12~~

  ~~**Note:** Processed steel fiber and crushed calcitic limestone are the only sand filter amendments for which Ecology has data that documents increased dissolved metals removal. Though Ecology is interested in~~

~~obtaining additional data on the effectiveness of these amendments, local governments may exercise their judgment on the extent to which to allow their use.~~

- **Stormwater Treatment Wetland** – See Chapter 10
- **Compost-amended Vegetated Filter Strip** – See Chapter ~~9~~7
- **Two Facility Treatment Trains** – See Table 3.2

Table 3.2 – Treatment Trains for Dissolved Metals Removal

First Basic Treatment Facility	Second Treatment Facility
Biofiltration Swale	Basic Sand Filter or Sand Filter Vault or Media Filter(1)
Filter Strip	Linear Sand Filter with no pre-settling cell needed
Linear Sand Filter	Filter Strip
Basic Wetpond	Basic Sand Filter or Sand Filter Vault or Media Filter(1)
Wetvault	Basic Sand Filter or Sand Filter Vault or Media Filter(1)
Basic Combined Detention/Wetpool	Basic Sand Filter or Sand Filter Vault or Media Filter(1)
Basic Sand Filter or Sand Filter Vault with a presettling cell if the filter isn't preceded by a detention facility	Media Filter(1)

Footnote:
(1) The media must be ~~of a nature that has the capability to remove dissolved metals effectively based on at least limited data. Ecology includes Stormfilter's ™ leaf compost and zeolite media in this category.~~a type approved for basic or enhanced treatment use by Ecology. See Chapter 12 for approved media filters.

- **Bioretention/~~rain garden~~** – See ~~Appendix III-C~~Chapter 7, and the Low Impact Development Technical Guidance Manual for Puget Sound (LID Manual).
  Note: ~~Any s~~Stormwater runoff that infiltrates through the imported soil mix will have received ~~the equivalent of~~ Enhanced Treatment. Where bioretention~~/rain gardens are~~ is intended to fully meet treatment requirements for its drainage area, ~~they~~it must be designed, using an approved continuous runoff model, to ~~infiltrate~~pass at least 91% of the influent runoff file through the imported soil mix.

- **Media Filter Drain** – See Chapter 8

For Media Filter Drains, Ecology intends to transfer design criteria from the latest approved WSDOT Highway Runoff Manual (see RT.07 on page 5-65 of the 2010 HRM) into Chapter 8.

- **Emerging Stormwater Treatment Technologies – See Chapter 12**
  Ecology Embankment – At the time of publication, this treatment option has received a "Conditional General Use" (GULD) approval for road runoff. See www.ecy.wa.gov/programs/wq/stormwater/newtech/treatment_train for the current status of this treatment option and for design details.

3.5 Basic Treatment Menu

Where Applied: The Basic Treatment Menu is generally applied torequired in the following circumstances:

- Project sites that discharge to the ground (see Step 3 in Chapter 2), UNLESS:
  - The soil suitability criteria for infiltration treatment are met (see Chapter 3 of Volume III), and pretreatment is provided; ORor
  - The project uses infiltration strictly for flow control – not treatment - and the discharge is within ¼-mile of a phosphorus sensitive lake (use the Phosphorus Treatment Menu), or within ¼ mile of a fish-bearing stream, or a lake (use the Enhanced Treatment Menu).
- Residential projects not otherwise needing phosphorus control in Step 4 (See Chapter 2) as designated by USEPA, the Department of Ecology, or a local government; and
- Project sites discharging directly (or indirectly through a municipal separate storm sewer system) to Basic Treatment Receiving Waters salt waters, river segments, and lakes listed in Appendix I-C.V-A; and
- Project sites that drain to streams that are not fish-bearing, or to waters not tributary to fish-bearing streams;

Landscaped areas of industrial, commercial, and multi-family project sites, and parking lots of industrial and commercial project sites, dedicated solely to parking of employees' private vehicles, which do not involve any other pollution-generating sources (e.g., industrial activities, customer parking, storage of erodible or leachable material, wastes or chemicals).

For developments with a mix of land use types, the Basic Treatment requirement shall apply when the runoff from the areas subject to the Basic Treatment requirement comprises 50% or more of the total runoff within a threshold discharge area.

Performance Goal: The Basic Treatment Menu facility choices are intended to achieve 80% removal of total suspended solids for influent concentrations that are greater than 100 mg/l, but less than 200 mg/l. For influent concentrations greater than 200 mg/l, a higher treatment goal may be appropriate. For influent concentrations less than 100 mg/l, the

facilities are intended to achieve an effluent goal of 20 mg/l total suspended solids.

The performance goal applies to the water quality design storm volume or flow rate, whichever is applicable. The goal also applies on an average annual basis to the entire annual discharge volume (treated plus bypassed). The incremental portion of runoff in excess of the water quality design flow rate or volume can be routed around the facility (off-line treatment facilities), or can be passed through the facility (on-line treatment facilities) provided a net TSS reduction is maintained. Ecology encourages the design and operation of treatment facilities that engage a bypass at flow rates higher than the water quality design flow rate as long as the reduction in TSS loading exceeds that achieved with initiating bypass at the water quality design flow rate. Note that wetpool facilities are always designed to be on-line. The performance goal assumes that the facility is treating stormwater with a typical particle size distribution. For a description of a typical particle size distribution, please refer to the stormwater monitoring protocol on the Department of Ecology website.

Options: Any one of the following options may be chosen to satisfy the basic treatment requirement:

- ~~**Bio-infiltration Swale** – See Chapter 7~~
- **Infiltration –** See Chapter 7 of this volume, and Chapter 3 of Vol.~~ume~~ III
- **Sand Filters –** See Chapter 8
- **Biofiltration Swales** – See Chapter 9
- **Vegetated Filter Strip~~s~~** – See Chapter 9
- **Compost-amended Vegetated Filter Strip** – See Chapter 7
- **Basic Wetpond** – See Chapter 10
- **Wetvault** – See Chapter 10 (see note)
- **Stormwater Treatment Wetland –** See Chapter 10
- **Combined Detention and Wetpool Facilities –** See Chapter 10
- **Bioretention/~~rain garden~~** – See ~~Appendix III-C,~~Chapter 7, and the Low Impact Development Technical Guidance Manual for Puget Sound (LID Manual) ~~on-line at:. http://www.psparchives.com/publications/our_work/stormwater/lid/LID_manual2005.pdf~~
- **Note:** ~~**Any stormwater ru**noff that infiltrates through the imported soil mix will have received the equivalent of Enhanced Treatment.~~ Where bioretention~~/rain gardens are~~is intended to fully meet treatment requirements for its drainage area, ~~they~~it must be designed, using an approved continuous runoff model, to ~~infiltrate~~pass at least 91% of the influent runoff file through the imported soil mix.
- **~~Ecology Embankment~~Media filter Drain** – See Chapter 8 ~~At the time of publication, this treatment option has received a "Conditional~~

~~Use" approval for road runoff. See www.ecy.wa.gov/programs/wq/stormwater/newtech/treatment_train for the current status of this treatment option and for design details.~~

For Media Filter Drains, Ecology intends to transfer design criteria from the lastest approved WSDOT Highway Runoff Manual (see RT.07 on page 5-65 of the 2010 HRM) into Chapter 8.

- **Emerging Stormwater Treatment Technologies** – See Chapter 12

- ~~**"StormFilter" with ZPG™ media** – A canister-type filter with zeolite/perlite/granular activated carbon manufactured by Stormwater Management, Inc. See Ecology website for pertinent design and maintenance criteria.~~

Note: A wetvault may be used for commercial, industrial, or road projects if there are space limitations. Ecology discourages the use of wetvaults for residential projects. Combined detention/wetvaults are allowed; see Section 10.3.

Chapter 4 - General Requirements for Stormwater Facilities

Note: All Figures in Chapter 4 are courtesy of King County

This chapter addresses general requirements for treatment facilities. Requirements discussed in this chapter include design volumes and flows, sequencing of facilities, liners, and hydraulic structures for splitting or dispersing flows.

4.1 Design Volume and Flow

4.1.1 Water Quality Design Storm Volume

The volume of runoff predicted from a 24-hour storm with a 6-month return frequency (a.k.a., 6-month, 24-hour storm). **Alternatively, the 91st percentile, 24-hour runoff volume indicated by an approved continuous runoff model.**

Wetpool facilities are sized based upon use of the NRCS (formerly known as SCS) curve number equations in Chapter 2 of Volume III, for the 6-month, 24-hour storm. Treatment facilities sized by this simple runoff volume-based approach are the same size whether they precede detention, follow detention, or are integral with the detention facility (i.e., a combined detention and wetpool facility).
Unless amended to reflect local precipitation statistics, the 6-month, 24-hour precipitation amount may be assumed to be 72 percent of the 2-year, 24-hour amount. Precipitation estimates of the 6-month and 2-year, 24-hour storms for certain towns and cities are listed in Appendix I-B of Volume I. For other areas, interpolating between isopluvials for the 2-year, 24-hour precipitation and multiplying by 72% yields the appropriate storm size. Isopluvials for 2-year, 24-hour amounts for Western Washington are reprinted in Volume III.

4.1.2 Water Quality Design Flow Rate

***Downstream of Detention Facilities*: The full 2-year release rate from the detention facility.**

An approved continuous runoff model should identify the 2-year return frequency flow rate discharged by a detention facility that is designed to meet the flow duration standard.

***Preceding Detention Facilities or when Detention Facilities are not required*: The flow rate at or below which 91% of the runoff volume, as estimated by an approved continuous runoff model, will be treated.**

At the time of publication, all BMPs except wetpool-types should use the 15-minute time series from an approved continuous runoff model.

Design criteria for treatment facilities are assigned to achieve the applicable performance goal at the water quality design flow rate (e.g., 80 percent TSS removal).

- *Off-line facilities*: For treatment facilities not preceded by an equalization or storage basin, and when runoff flow rates exceed the water quality design flow rate, the treatment facility should continue to receive and treat the water quality design flow rate to the applicable treatment performance goal. Only the higher incremental portion of flow rates are bypassed around a treatment facility. Ecology encourages design of systems that engage a bypass at higher flow rates provided the reduction in pollutant loading exceeds that achieved with bypass at the water quality design flow rate.

  Treatment facilities preceded by an equalization or storage basin may identify a lower water quality design flow rate provided that at least 91 percent of the estimated runoff volume in the time series of an approved continuous runoff model is treated to the applicable performance goals (e.g., 80 percent TSS removal at the water quality design flow rate and 80 percent TSS removal on an annual average basis).

- *On-line facilities*: Runoff flow rates in excess of the water quality design flow rate can be routed through the facility provided a net pollutant reduction is maintained, and the applicable annual average performance goal is likely to be met.

~~Treatment facilities that are located downstream of detention facilities should only be designed as on-line facilities.~~

4.1.3 Flows Requiring Treatment

Runoff from pollution-generating impervious or pervious surfaces must be treated. Pollution-generating impervious surfaces (PGIS) are those impervious surfaces considered to be a significant source of pollutants in stormwater runoff. The glossary in Volume I provides additional definitions and clarification of these terms.

Such surfaces include those which are subject to: vehicular use; industrial activities; or storage of erodible or leachable materials, wastes, or chemicals, and which receive direct rainfall or the run-on or blow-in of rainfall. Erodible or leachable materials, wastes, or chemicals are those substances which, when exposed to rainfall, measurably alter the physical or chemical characteristics of the rainfall runoff. Examples include

erodible soils that are stockpiled, uncovered process wastes, manure, fertilizers, oily substances, ashes, kiln dust, and garbage dumpster leakage. Metal roofs are also considered to be PGIS unless they are coated with an inert, non-leachable material (e.g., baked enamel coating).

A surface, whether paved or not, shall be considered subject to vehicular use if it is regularly used by motor vehicles. The following are considered regularly-used surfaces: roads, unvegetated road shoulders, bike lanes within the traveled lane of a roadway, driveways, parking lots, unfenced firelanes, vehicular equipment storage yards, and airport runways.

The following are not considered regularly-used surfaces: paved bicycle pathways separated from and not subject to drainage from roads for motor vehicles, fenced firelanes, and infrequently used maintenance access roads.

Pollution-generating pervious surfaces (PGPS) are any non-impervious surface subject to the use of pesticides and fertilizers or loss of soil. Typical PGPS include lawns, landscaped areas, golf courses, parks, cemeteries, and sports fields.

Summary of Areas Needing Treatment

- All runoff from pollution-generating impervious surfaces is to be treated through the water quality facilities specified in Chapter 2 and Chapter 3.
- Lawns and landscaped areas specified are pervious but also generate run-off into street drainage systems. In those cases the runoff from the pervious areas must be estimated and added to the runoff from impervious areas to size treatment facilities.
- Runoff from backyards can drain into native vegetation in areas designated as open space or buffers. In these cases, the area in native vegetation may be used to provide the requisite water quality treatment, provided it meets the requirements in Chapter 5 under the "Cleared Area Dispersion BMPs," of BMP T5.30 Full Dispersion.
- Drainage from impervious surfaces that are not pollution- generating need not be treated and may bypass runoff treatment, if it is not mingled with runoff from pollution-generating surfaces.
- Roof runoff is still subject to flow control per Minimum Requirement #7. Note that metal roofs are considered pollution generating unless they are coated with an inert non-leachabale material.
- Drainage from areas in native vegetation should not be mixed with untreated runoff from streets and driveways, if possible. It is best to infiltrate or disperse this relatively clean runoff to maximize recharge to shallow ground water, wetlands, and streams.

- If runoff from non-pollution generating surfaces reaches a runoff treatment BMP, flows from those areas must be included in the sizing calculations for the facility. Once runoff from non-pollution generating areas is mixed with runoff from pollution-generating areas, it cannot be separated before treatment.

4.2 Sequence of Facilities

The Enhanced Treatment and Phosphorus Removal Menus, described in Chapter 3, include treatment options in which more than one type of treatment facility is used. In those options, the sequence of facilities is prescribed. This is because the specific pollutant removal role of the second or third facility in a treatment often assumes that significant solids' settling has already occurred. For example, phosphorus removal using a two-facility treatment relies on the second facility (sand filter) to remove a finer fraction of solids than those removed by the first facility.

There is also the question of whether treatment facilities should be placed upstream or downstream of detention facilities that are needed for flow control purposes. In general, all treatment facilities may be installed upstream of detention facilities, although presettling basins are needed for sand filters and infiltration basins. However, not all treatment facilities can function effectively if located downstream of detention facilities. Those facilities that treat unconcentrated flows, such as filter strips and narrow-area biofilters, are usually not practical downstream of detention facilities. Other types of treatment facilities present special problems that must be considered before placement downstream is advisable.

For instance, prolonged flows discharged by a detention facility that is designed to meet the flow duration standard of Minimum Requirement No. 7 may interfere with proper functioning of basic biofiltration swales and sand filters. Grasses typically specified in the basic biofiltration swale design will not survive. A wet biofilter design would be a better choice.

For sand filters, the prolonged flows may cause extended saturation periods within the filter. Saturated sand can lose all oxygen and become anoxic. If that occurs, some amount of phosphorus captured within the filter may become soluble and released. To prevent long periods of sand saturation, adjustments may be necessary after the sand filter is in operation to bypass some areas of the filter. This bypassing will allow them to drain completely. It may also be possible to employ a different type of facility that is less sensitive to prolonged flows.

Oil control facilities must be located upstream of treatment facilities and as close to the source of oil-generating activity as possible. They should also be located upstream of detention facilities, if possible.

Table 4.1 summarizes placement considerations of treatment facilities in relation to detention.

Table 4.1 – Treatment Facility Placement in Relation to Detention		
Water Quality Facility	**Preceding Detention**	**Following Detention**
Basic biofiltration swale (Chapter 9)	OK	OK. Prolonged flows may reduce grass survival. Consider wet biofiltration swale
Wet biofiltration swale (Chapter 9)	OK	OK
Filter strip (Chapter 9)	OK	No—must be installed before flows concentrate.
Basic or large wetpond (Chapter 10)	OK	OK—less water level fluctuation in ponds downstream of detention may improve aesthetic qualities and performance.
Basic or large combined detention and wetpond (Chapter 10)	Not applicable	Not applicable
Wetvault (Chapter 10)	OK	OK
Basic or large sand filter or sand filter vault (Chapter 8)	OK, but presettling and control of floatables needed	OK—sand filters downstream of detention facilities may require field adjustments if prolonged flows cause sand saturation and interfere with phosphorus removal.
Stormwater treatment wetland/pond (Chapter 10)	OK	OK—less water level fluctuation and better plant diversity are possible if the stormwater wetland is located downstream of the detention facility.

4.3 Setbacks, Slopes, and Embankments

The following guidelines for setbacks, slopes, and embankments are intended to provide for adequate maintenance accessibility to runoff treatment facilities. Setback requirements are generally required by local regulations, uniform building code requirements, or other state regulations. Local governments should require specific setback, slopes and embankment limitations to address public health and safety concerns.

4.3.1 Setbacks

Local governments may require specific setbacks in sites with steep slopes, land-slide areas, open water features, springs, wells, and septic tank drain fields. Setbacks from tract lines are necessary for maintenance

access and equipment maneuverability. Adequate room for maintenance equipment should be considered during site design.

Examples of setbacks commonly used include the following:

- Stormwater infiltration systems shall be set back at least 100 feet from open water features and 200 feet from springs used for drinking water supply. Infiltration facilities upgradient of drinking water supplies must comply with Health Department requirements (Washington Wellhead Protection Program, Department of Health, 12/93).
- Stormwater infiltration systems, and unlined wetponds and detention ponds shall be located at least 100 feet from drinking water wells and septic tanks and drainfields.
- Wetvaults and tanks may be required to be set back from building foundations, structures, property lines, and vegetative buffers. A typical setback requirement is 20 feet, for maintenance access.
- All facilities shall be a minimum of 50 feet from any steep (greater than 15%) slope. A geotechnical report must address the potential impact of a wetpond on a steep slope

4.3.2 Side Slopes and Embankments

- Side slopes should preferably not exceed a slope of 3H:1V. Moderately undulating slopes are acceptable and can provide a more natural setting for the facility. In general, gentle side slopes improve the aesthetic attributes of the facility and enhance safety.
- Interior side slopes may be retaining walls, if the design is prepared and stamped by a licensed civil engineer. A fence should be provided along the top of the wall.
- Maintenance access should be provided through an access ramp or other adequate means.
- Embankments that impound water must comply with the Washington State Dam Safety Regulations (Chapter 173-175 WAC). If the impoundment has a storage capacity, including both water and sediment storage volumes, greater than 10 acre-feet above natural ground level, then dam safety design and review are required by the Department of Ecology. See Chapter 3, Volume III, for more detail concerning Detention Ponds.

4.4 Facility Liners

Liners are intended to reduce the likelihood that pollutants in stormwater will reach ground water when runoff treatment facilities are constructed. In addition to groundwater protection considerations, some facility types

require permanent water for proper functioning. An example is the first cell of a wetpond.

Treatment liners amend the soil with materials that treat stormwater before it reaches more freely draining soils. They have slow rates of infiltration, generally less than 2.4 inches per hour (1.7×10^{-3} cm/s), but not as slow as low permeability liners. Treatment liners may use in-place native soils or imported soils.

Low permeability liners reduce infiltration to a very slow rate, generally less than 0.02 inches per hour (1.4×10^{-5} cm/s). These types of liners should be used for industrial or commercial sites with a potential for high pollutant loading in the stormwater runoff. Low permeability liners may be fashioned from compacted till, clay, geomembrane, or concrete. Till liners are preferred because of their general resilience and ease of maintenance.

4.4.1 General Design Criteria

- Table 4.2 shows recommendations for the type of liner generally best suited for use with various runoff treatment facilities.
- Liners shall be evenly placed over the bottom and/or sides of the treatment area of the facility as indicated in Table 4.2. Areas above the treatment volume that are required to pass flows greater than the water quality treatment flow (or volume) need not be lined. However, the lining must be extended to the top of the interior side slope and anchored if it cannot be permanently secured by other means.
- For low permeability liners, the following criteria apply:
  1. Where the seasonal high groundwater elevation is likely to contact a low permeability liner, liner buoyancy may be a concern. A low permeability liner shall not be used in this situation unless evaluated and recommended by a geotechnical engineer.
  2. Where grass must be planted over a low permeability liner per the facility design, a minimum of 6 inches of good topsoil or compost-amended native soil (2 inches compost tilled into 6 inches of native till soil) must be placed over the liner in the area to be planted. Twelve inches of cover is preferred.
- If a treatment liner will be below the seasonal high water level, the pollutant removal performance of the liner must be evaluated by a geotechnical or groundwater specialist and found to be as protective as if the liner were above the level of the groundwater.

See Sections 4.4.2 and 4.4.3 for more specific design criteria for treatment liners and low permeability liners.

Table 4.2 – Lining Types Recommended for Runoff Treatment Facilities		
WQ Facility	**Area to be Lined**	**Type of Liner Recommended**
Presettling basin	Bottom and sides	Low permeability liner or Treatment liner (If the basin will intercept the seasonal high ground water table, a treatment liner is recommended.)
Wetpond	First cell: bottom and sides to WQ design water surface ---------- Second cell: bottom and sides to WQ design water surface	Low permeability liner or Treatment liner (If the wet pond will intercept the seasonal high ground water table, a treatment liner is recommended.) ---------- Treatment liner
Combined detention/WQ facility	First cell: bottom and sides to WQ design water surface ---------- Second cell: bottom and sides to WQ design water surface	Low permeability liner or Treatment liner (If the facility will intercept the seasonal high ground water table a treatment liner is recommended.) ---------- Treatment liner
Stormwater wetland	Bottom and sides, both cells	Low permeability liner (If the facility will intercept the seasonal high ground water table, a treatment liner is recommended.)
Sand filtration basin	Basin sides only	Treatment liner
Sand filter vault	Not applicable	No liner needed
Linear sand filter	Not applicable if in vault Bottom and sides of presettling cell if not in vault	No liner needed Low permeability or treatment liner
Media filter (in vault)	Not applicable	No liner needed
Wet vault	Not applicable	No liner needed

4.4.2 Design Criteria for Treatment Liners

This section presents the design criteria for treatment liners.

- A two-foot thick layer of soil with a minimum organic content of 5% AND a minimum cation exchange capacity (CEC) of 5 milliequivalents/100 grams can be used as a treatment layer beneath a water quality or detention facility.

- To demonstrate that in-place soils meet the above criteria, one sample per 1,000 square feet of facility area shall be tested. Each sample shall be a composite of subsamples taken throughout the depth of the treatment layer (usually two to six feet below the expected facility invert).

- Typically, side wall seepage is not a concern if the seepage flows through the same stratum as the bottom of the treatment BMP. However, if the treatment soil is an engineered soil or has very low permeability, the potential to bypass the treatment soil through the side walls may be significant. In those cases, the treatment BMP side walls may be lined with at least 18 inches of treatment soil, as described above, to prevent untreated seepage. This lesser soil thickness is based on unsaturated flow as a result of alternating wet-dry periods.
- Organic content shall be measured on a dry weight basis using ASTM D2974.
- Cation exchange capacity (CEC) shall be tested using EPA laboratory method 9081.
- Certification by a soils testing laboratory that imported soil meets the organic content and CEC criteria above shall be provided to the local approval authority.
- Animal manures used in treatment soil layers must be sterilized because of potential for bacterial contamination of the groundwater.

4.4.3 Design Criteria for Low Permeability Liner Options

This section presents the design criteria for each of the following four low permeability liner options: compacted till liners, clay liners, geomembrane liners, and concrete liners.

Compacted Till Liners

- Liner thickness shall be 18 inches after compaction.
- Soil shall be compacted to 95% minimum dry density, modified proctor method (ASTM D-1557).
- A different depth and density sufficient to retard the infiltration rate to 2.4×10^{-5} inches per minute (1×10^{-6} cm/s) may also be used instead of Criteria 1 and 2.
- Soil should be placed in 6-inch lifts.
- Soils may be used that meet the following gradation:

Table 4.3 – Compacted Till Liners

Sieve Size	Percent Passing
6-inch	100
4-inch	90
#4	70 - 100
#200	20

Clay Liners

- Liner thickness shall be 12 inches.
- Clay shall be compacted to 95% minimum dry density, modified proctor method (ASTM D-1557).
- A different depth and density sufficient to retard the infiltration rate to 2.4 x 10-5 inches per minute (1 x 10-6 cm/s) may also be used instead of the above criteria.
- The slope of clay liners must be restricted to 3H: IV for all areas requiring soil cover; otherwise, the soil layer must be stabilized by another method so that soil slippage into the facility does not occur. Any alternative soil stabilization method must take maintenance access into consideration.
- Where clay liners form the sides of ponds, the interior side slope should not be steeper than 3: 1, irrespective of fencing. This restriction is to ensure that anyone falling into the pond may safely climb out.

Geomembrane Liners

- Geomembrane liners shall be ultraviolet (UV) light resistant and have a minimum thickness of 30 mils. A thickness of 40 mils shall be used in areas of maintenance access or where heavy machinery must be operated over the membrane.
- Geomembranes shall be bedded according to the manufacturer's recommendations.
- Liners shall be installed so that they can be covered with 12 inches of top dressing forming the bottom and sides of the water quality facility, except for liner sand filters. Top dressing shall consist of 6 inches of crushed rock covered with 6 inches of native soil. The rock layer is to mark the location of the liner for future maintenance operations. As an alternative to crushed rock, 12 inches of native soil may be used if orange plastic “safety fencing” or another highly-visible, continuous marker is embedded 6 inches above the membrane.
- If possible, liners should be of a contrasting color so that maintenance workers are aware of any areas where a liner may have become exposed when maintaining the facility.
- Geomembrane liners shall not be used on slopes steeper than 5H:1V to prevent the top dressing material from slipping. Textured liners may be used on slopes up to 3H:1V upon recommendation by a geotechnical engineer that the top dressing will be stable for all site conditions, including maintenance.

Concrete Liners

- Portland cement liners are allowed irrespective of facility size, and shotcrete may be used on slopes. However, specifications must be developed by a professional engineer who certifies the liner against cracking or losing water retention ability under expected conditions of operation, including facility maintenance operations. Weight of maintenance equipment can be up to 80,000 pounds when fully loaded.
- Asphalt concrete may not be used for liners due to its permeability to many organic pollutants.
- If grass is to be grown over a concrete liner, slopes must be no steeper than 5H: IV to prevent the top dressing material from slipping.

4.5 Hydraulic Structures

4.5.1 Flow Splitter Designs

Many water quality (WQ) facilities can be designed as flow-through or on-line systems with flows above the WQ design flow or volume simply passing through the facility at a lower pollutant removal efficiency. However, it is sometimes desirable to restrict flows to WQ treatment facilities and bypass the remaining higher flows around them through off-line facilities. This can be accomplished by splitting flows in excess of the WQ design flow upstream of the facility and diverting higher flows to a bypass pipe or channel. The bypass typically enters a detention pond or the downstream receiving drainage system, depending on flow control requirements. In most cases, it is a designer's choice whether WQ facilities are designed as on-line or off-line; an exception is oil/water separators, which must be designed off-line.

A crucial factor in designing flow splitters is to ensure that low flows are delivered to the treatment facility up to the WQ design flow rate. Above this rate, additional flows are diverted to the bypass system with minimal increase in head at the flow splitter structure to avoid surcharging the WQ facility under high flow conditions.

Flow splitters are typically manholes or vaults with concrete baffles. In place of baffles, the splitter mechanism may be a half tee section with a solid top and an orifice in the bottom of the tee section. A full tee option may also be used as described below in the "General Design Criteria." Two possible design options for flow splitters are shown in Figure 4.1 and Figure 4.2 (King County). Other equivalent designs that achieve the result of splitting low flows and diverting higher flows around the facility are also acceptable.

General Design Criteria

- A flow splitter must be designed to deliver the WQ design flow rate specified in this volume to the WQ treatment facility. For the basic size sand filter, which is sized based on volume, use the WQ design flow rate to design the splitter. For the large sand filter, use the 2-year flow rate or the flow rate that corresponds with treating 95 percent of the runoff volume of a long-term time series predicted by an approved continuous runoff model.
- The top of the weir must be located at the water surface for the design flow. Remaining flows enter the bypass line. Flows modeled using a continuous simulation model should use 15-minute time steps, if available. Otherwise use 1-hour time steps.
- The maximum head must be minimized for flow in excess of the WQ design flow. Specifically, flow to the WQ facility at the 100-year water surface must not increase the design WQ flow by more than 10%.
- Either design shown in Figure 4.1 or Figure 4.2 or an equivalent design may be used.
- As an alternative to using a solid top plate in Figure 4.2, a full tee section may be used with the top of the tee at the 100-year water surface. This alternative would route emergency overflows (if the overflow pipe were plugged) through the WQ facility rather than back up from the manhole.
- Special applications, such as roads, may require the use of a modified flow splitter. The baffle wall may be fitted with a notch and adjustable weir plate to proportion runoff volumes other than high flows.
- For ponding facilities, back water effects must be included in designing the height of the standpipe in the manhole.
- Ladder or step and handhold access must be provided. If the weir wall is higher than 36 inches, two ladders, one to either side of the wall, must be used.

Materials

- The splitter baffle may be installed in a Type 2 manhole or vault.
- The baffle wall must be made of reinforced concrete or another suitable material resistant to corrosion, and have a minimum 4-inch thickness. The minimum clearance between the top of the baffle wall and the bottom of the manhole cover must be 4 feet; otherwise, dual access points should be provided.
- All metal parts must be corrosion resistant. Examples of preferred materials include aluminum, stainless steel, and plastic. Zinc and

galvanized materials are discouraged because of aquatic toxicity. Painted metal parts should not be used because of poor longevity.

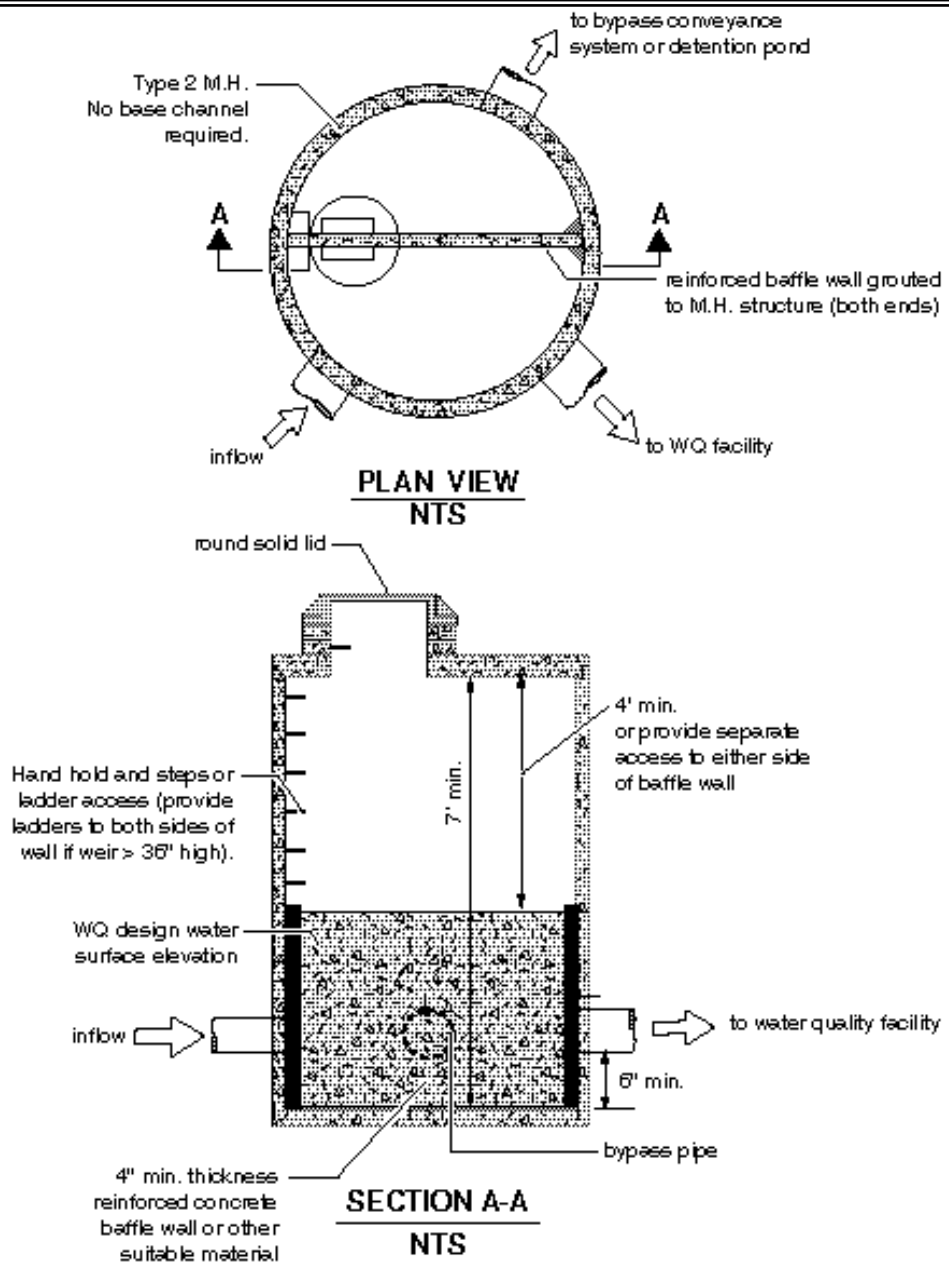

Note: The water quality discharge pipe may require an orfice plate be installed on the outlet to control the height of the design water surface (weir height). The design water surface should be set to provide a minimun headwater/diameter ratio of 2.0 on the outlet pipe.

Figure 4.1 – Flow Splitter, Option A

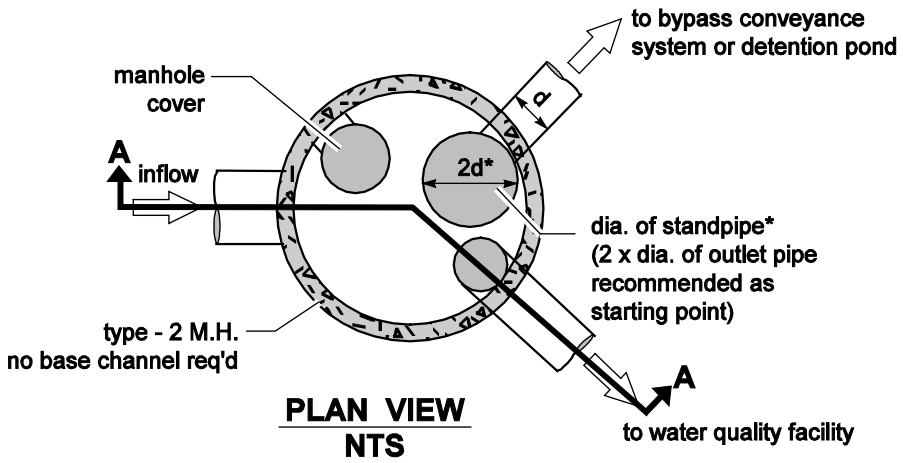

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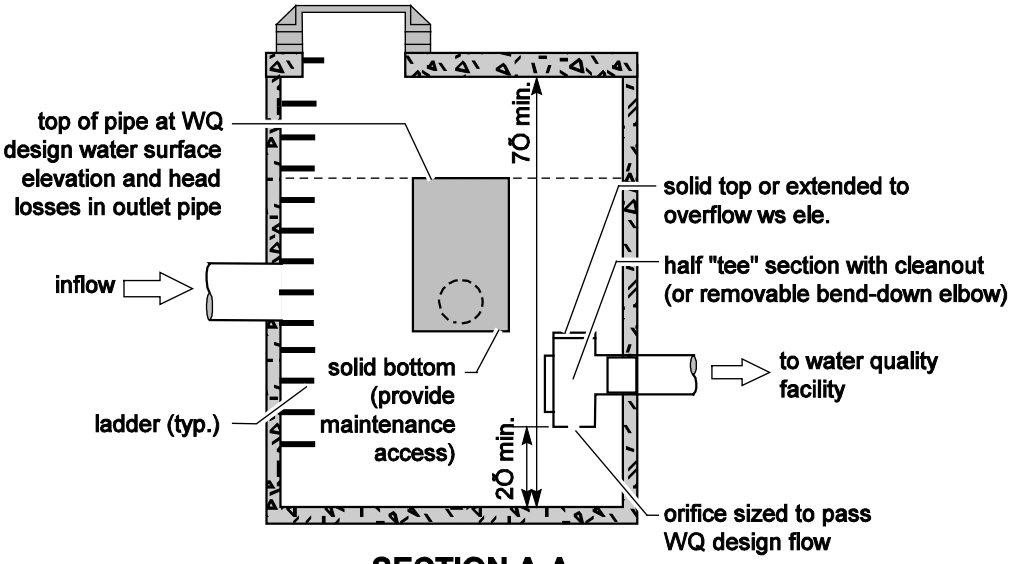

SECTION A-A
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* **NOTE:** Diameter (d) of standpipe should be large enough to minimize head above W.Q. design W.S. and to keep W.Q. design flows from increasing more than 10% during 100-year flows.

Figure 4.2 – Flow Splitter, Option B

4.5.2 Flow Spreading Options

Flow spreaders function to uniformly spread flows across the inflow portion of water quality facilities (e.g., sand filter, biofiltration swale, or filter strip). There are five flow spreader options presented in this section:

Option A – Anchored plate
Option B – Concrete sump box
Option C – Notched curb spreader
Option D – Through-curb ports
Option E – Interrupted curb

Options A through C can be used for spreading flows that are concentrated. Any one of these options can be used when spreading is required by the facility design criteria. Options A through C can also be used for unconcentrated flows, and in some cases must be used, such as to correct for moderate grade changes along a filter strip.

Options D and E are only for flows that are already unconcentrated and enter a filter strip or continuous inflow biofiltration swale. Other flow spreader options are possible with approval from the reviewing authority.

General Design Criteria

- Where flow enters the flow spreader through a pipe, it is recommended that the pipe be submerged to the extent practical to dissipate energy as much as possible.
- For higher inflows (greater than 5 cfs for the 100-yr storm), a Type 1 catch basin should be positioned in the spreader and the inflow pipe should enter the catch basin with flows exiting through the top grate. The top of the grate should be lower than the level spreader plate, or if a notched spreader is used, lower than the bottom of the v-notches.
- Table 4.4 provides general guidance for rock protection at outfalls.

Table 4.4 – Rock Protection at Outfalls					
Discharge Velocity at Design Flow in feet per second (fps)	**Required Protection Minimum Dimensions**				
	Type	**Thickness**	**Width**	**Length**	**Height**
0 – 5	Rock lining(1)	1 foot	Diameter + 6 feet	8 feet *or* 4 x diameter, whichever is greater	Crown + 1 foot
5^+ - 10	Riprap(2)	2 feet	Diameter + 6 feet *or* 3 x diameter, whichever is greater	12 feet *or* 4 x diameter, whichever is greater	Crown + 1 foot
10^+ - 20	Gabion outfall	As required	As required	As required	Crown + 1 foot
20^+	Engineered energy dissipater required				

Footnotes:

(1) **Rock lining** shall be quarry spalls with gradation as follows:

Passing 8-inch square sieve: 100%
Passing 3-inch square sieve: 40 to 60% maximum
Passing ¾-inch square sieve: 0 to 10% maximum

(2) **Riprap** shall be reasonably well graded with gradation as follows:

Maximum stone size: 24 inches (nominal diameter)
Median stone size: 16 inches
Minimum stone size: 4 inches

Note: Riprap sizing governed by side slopes on outlet channel is assumed to be approximately 3:1.

Option A -- Anchored Plate (Figure 4.3)

- An anchored plate flow spreader must be preceded by a sump having a minimum depth of 8 inches and minimum width of 24 inches. If not otherwise stabilized, the sump area must be lined to reduce erosion and to provide energy dissipation.
- The top surface of the flow spreader plate must be level, projecting a minimum of 2 inches above the ground surface of the water quality facility, or V-notched with notches 6 to 10 inches on center and 1 to 6 inches deep (use shallower notches with closer spacing). Alternative designs may also be used.
- A flow spreader plate must extend horizontally beyond the bottom width of the facility to prevent water from eroding the side slope. The horizontal extent should be such that the bank is protected for all flows up to the 100-year flow or the maximum flow that will enter the Water Quality (WQ) facility.
- Flow spreader plates must be securely fixed in place.
- Flow spreader plates may be made of either wood, metal, fiberglass reinforced plastic, or other durable material. If wood, pressure treated 4 by 10-inch lumber or landscape timbers are acceptable.
- Anchor posts must be 4-inch square concrete, tubular stainless steel, or other material resistant to decay.

Option B -- Concrete Sump Box (Figure 4.4)

- The wall of the downstream side of a rectangular concrete sump box must extend a minimum of 2 inches above the treatment bed. This serves as a weir to spread the flows uniformly across the bed.
- The downstream wall of a sump box must have "wing walls" at both ends. Side walls and returns must be slightly higher than the weir so that erosion of the side slope is minimized.
- Concrete for a sump box can be either cast-in-place or precast, but the bottom of the sump must be reinforced with wire mesh for cast-in-place sumps.
- Sump boxes must be placed over bases that consists of 4 inches of crushed rock, 5/8-inch minus to help assure the sump remains level.

Option C -- Notched Curb Spreader (Figure 4.5)

Notched curb spreader sections must be made of extruded concrete laid side-by-side and level. Typically five "teeth" per four-foot section provide good spacing. The space between adjacent "teeth" forms a v-notch.

Option D -- Through-Curb Ports (Figure 4.6)

Unconcentrated flows from paved areas entering filter strips or continuous inflow biofiltration swales can use curb ports or interrupted curbs (Option E) to allow flows to enter the strip or swale. Curb ports use fabricated openings that allow concrete curbing to be poured or extruded while still providing an opening through the curb to admit water to the WQ facility.

Openings in the curb must be at regular intervals but at least every 6 feet (minimum). The width of each curb port opening must be a minimum of 11 inches. Approximately 15 percent or more of the curb section length should be in open ports, and no port should discharge more than about 10 percent of the flow.

Option E -- Interrupted Curb (No Figure)

Interrupted curbs are sections of curb placed to have gaps spaced at regular intervals along the total width (or length, depending on facility) of the treatment area. At a minimum, gaps must be every 6 feet to allow distribution of flows into the treatment facility before they become too concentrated. The opening must be a minimum of 11 inches. As a general rule, no opening should discharge more than 10 percent of the overall flow entering the facility.

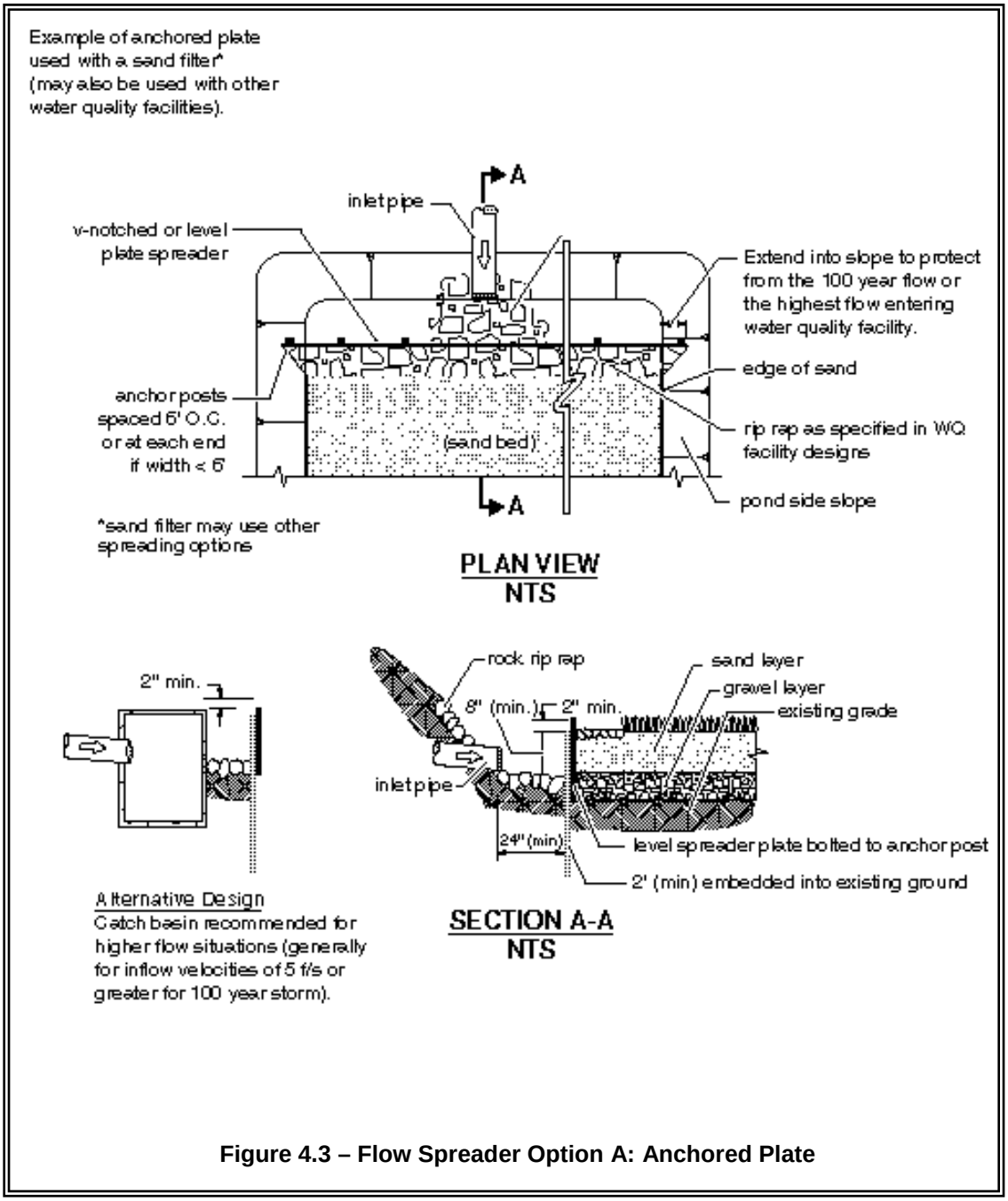

Figure 4.3 – Flow Spreader Option A: Anchored Plate

Example of a concrete sump flow spreader used with a biofiltration swale (may be used with other W.Q. facilities).

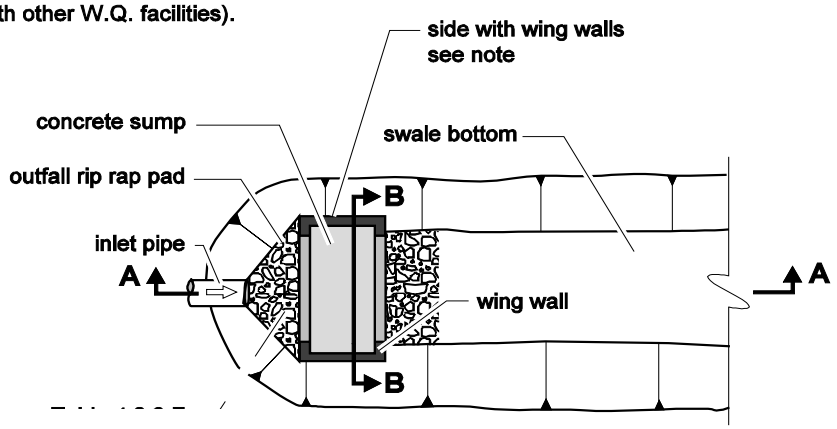

PLAN VIEW
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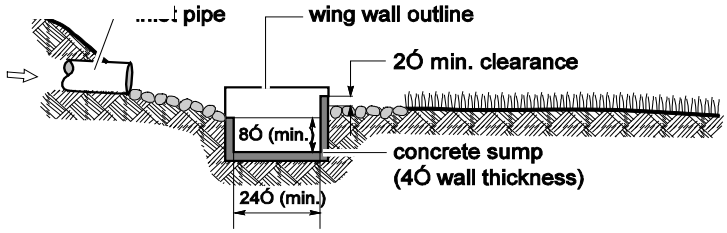

Note: Extend sides into slope. Height of side wall and wing walls must be sufficient to handle the 100 year flow or the highest flow entering the facility.

SECTION A-A
NTS

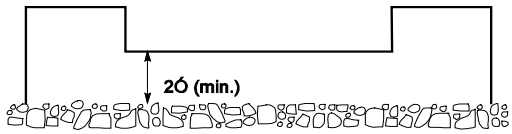

SECTION B-B
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Figure 4.4 – Flow Spreader Option B: Concrete Sump Box

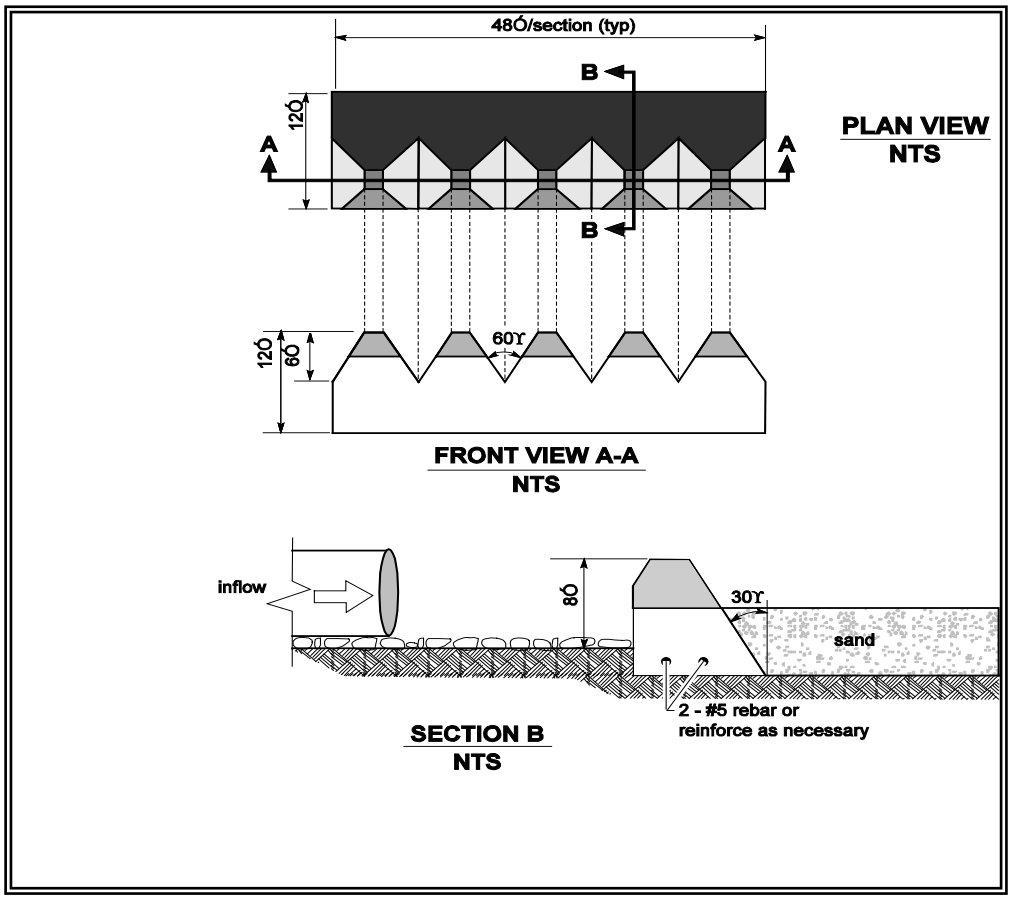

Figure 4.5 – Flow Spreader Option C: Notched Curb Spreader

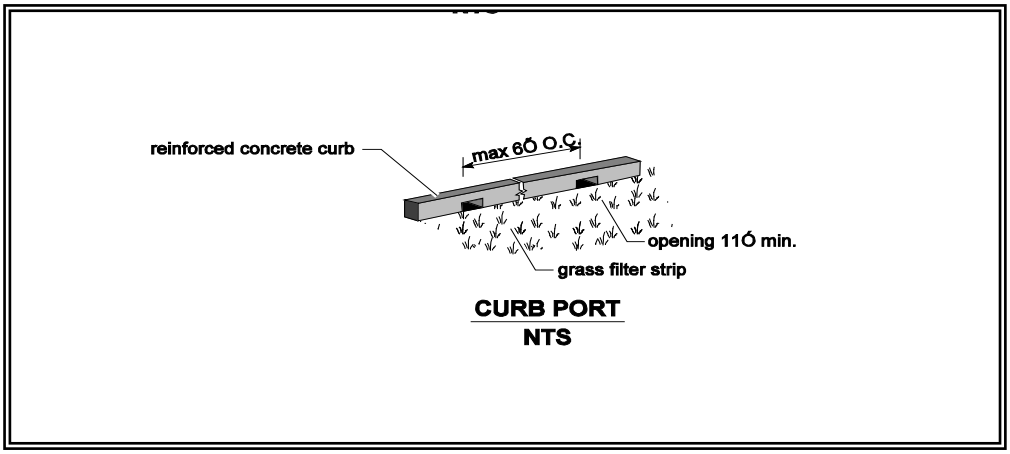

Figure 4.6 – Flow Spreader Option D: Through-Curb Port

4.5.3 Outfall Systems

Properly designed outfalls are critical to reducing the chance of adverse impacts as the result of concentrated discharges from pipe systems and culverts, both onsite and downstream. Outfall systems include rock splash pads, flow dispersal trenches, gabion or other energy dissipaters, and tightline systems. A tightline system is typically a continuous length of pipe used to convey flows down a steep or sensitive slope with appropriate energy dissipation at the discharge end.

General Design Criteria

Provided below are general design criteria for both Outfall Features and Tightline Systems.

Outfall Features

At a minimum, all outfalls must be provided with a rock splash pad (see Figure 4.7) except as specified below and in Table 4.5:

- The flow dispersal trenches shown in Figures 4.8 and 4.9 should only be used when both criteria below are met:
  1. An outfall is necessary to disperse concentrated flows across uplands where no conveyance system exists and the natural (existing) discharge is unconcentrated; and
  2. The 100-year peak discharge rate is less than or equal to 0.5 cfs.
- For freshwater outfalls with a design velocity greater than 10 fps, a gabion dissipater or engineered energy dissipater may be required. There are many possible designs.
  Note The gabion outfall detail shown in Figure 4.10 is illustrative only. A design engineered to specific site conditions must be developed.
- Tightline systems may be needed to prevent aggravation or creation of a downstream erosion problem.
- In marine waters, rock splash pads and gabion structures are not recommended due to corrosion and destruction of the structure, particularly in high energy environments. Diffuser Tee structures, such as that depicted in Figure 4.11, are also not generally recommended in or above the intertidal zone. They may be acceptable in low bank or rock shoreline locations. Stilling basins or bubble-up structures are acceptable. Generally, tightlines trenched to extreme low water or dissipation of the discharge energy above the ordinary high water line are preferred. Outfalls below extreme low water may still need an energy dissipation device (e.g., a tee structure) to prevent nearby erosion.

- Engineered energy dissipaters, including stilling basins, drop pools, hydraulic jump basins, baffled aprons, and bucket aprons, are required for outfalls with design velocity greater than 20 fps. These should be designed using published or commonly known techniques found in such references as *Hydraulic Design of Energy Dissipaters for Culverts and Channels*, published by the Federal Highway Administration of the United States Department of Transportation; *Open Channel Flow*, by V.T. Chow; *Hydraulic Design of Stilling Basins and Energy Dissipaters*, EM 25, Bureau of Reclamation (1978); and other publications, such as those prepared by the Soil Conservation Service (now Natural Resource Conservation Service).
- Alternate mechanisms may be used, such as bubble-up structures that eventually drain and structures fitted with reinforced concrete posts. If any alternate mechanisms are to be considered, they should be designed using sound hydraulic principles and consideration of ease of construction and maintenance.
- Mechanisms that reduce velocity prior to discharge from an outfall are encouraged. Some of these are drop manholes and rapid expansion into pipes of much larger size. Other discharge end features may be used to dissipate the discharge energy. An example of an end feature is the use of a Diffuser Tee with holes in the front half, as shown in Figure 4.11.

  Note: stormwater outfalls submerged in a marine environment can be subject to plugging due to biological growth and shifting debris and sediments. Therefore, unless intensive maintenance is regularly performed, they may not meet their designed function.
- New pipe outfalls can provide an opportunity for low-cost fish habitat improvements. For example, an alcove of low-velocity water can be created by constructing the pipe outfall and associated energy dissipater back from the stream edge and digging a channel, over widened to the upstream side, from the outfall to the stream (as shown in Figure 4.12). Overwintering juvenile and migrating adult salmonids may use the alcove as shelter during high flows. Potential habitat improvements should be discussed with the Washington Department of Fish and Wildlife biologist prior to inclusion in design.
- Bank stabilization, bioengineering and habitat features may be required for disturbed areas.
- Outfall structures should be located where they minimize impacts to fish, shellfish, and their habitats.
- One caution to note is that the in-stream sample gabion mattress energy dissipater may not be acceptable within the ordinary high water mark of fish-bearing waters or where gabions will be subject to abrasion from upstream channel sediments. A four-sided gabion

basket located outside the ordinary high water mark should be considered for these applications.

*Note: A Hydraulic Project Approval (Chapter 77.55 RCW) and an Army Corps of Engineers permit may be required for any work within the ordinary high water mark.*Other provisions of the RCW or the Hydraulics Code - Chapter 220-110 WAC may also apply. Contact the appropriate regional office of the State Department of Fish and Wildlife.

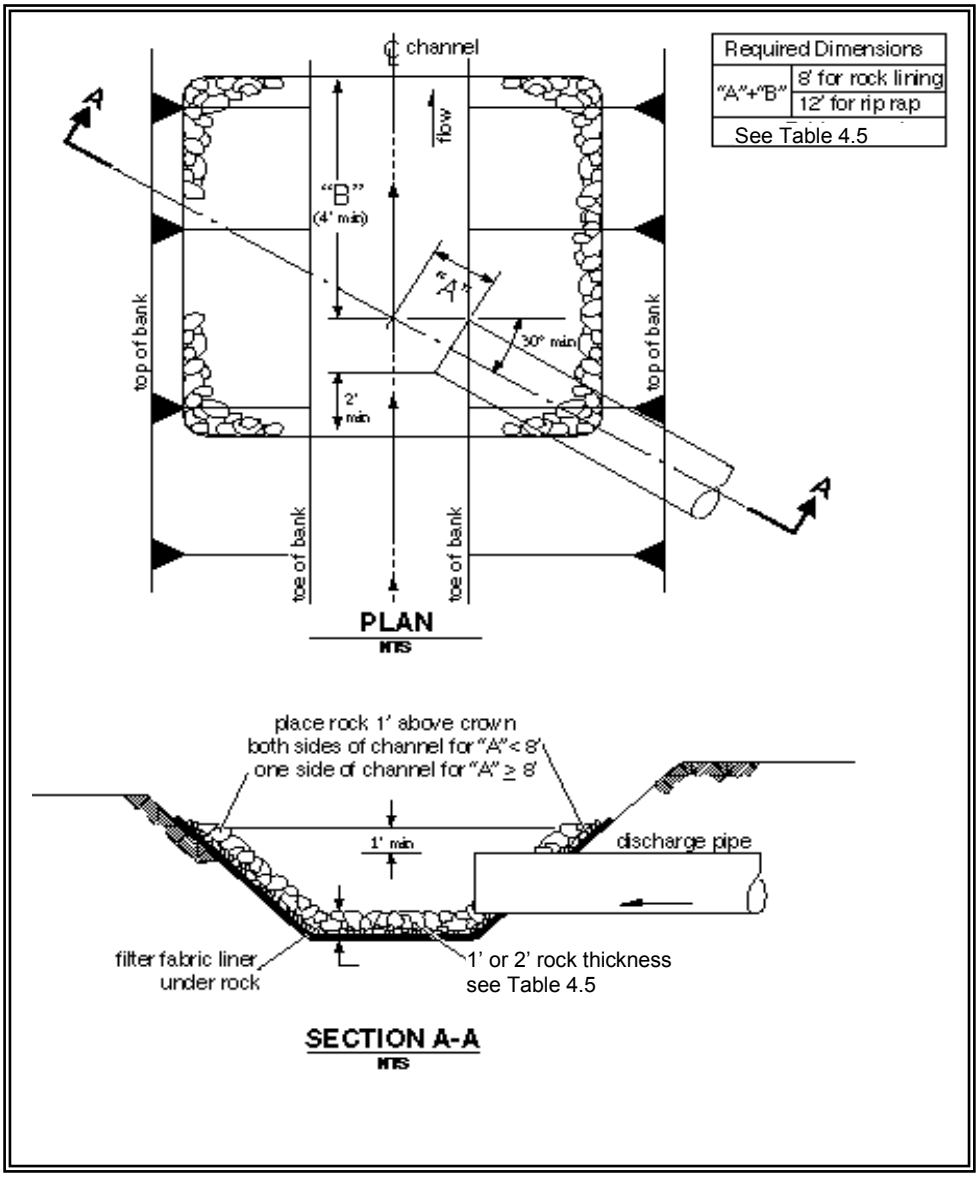

Figure 4.7 – Pipe/Culvert Outfall Discharge Protection

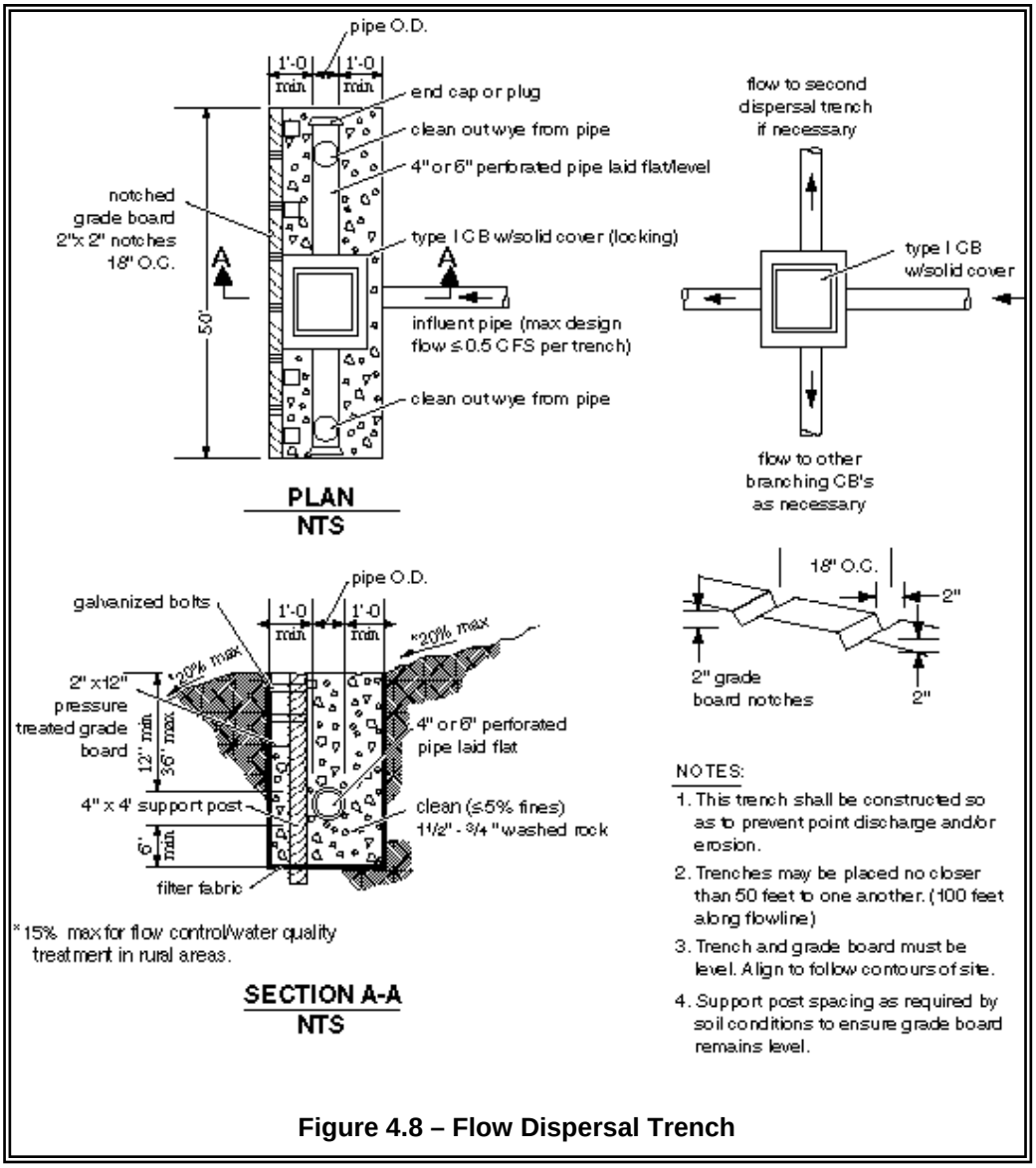

Figure 4.8 – Flow Dispersal Trench

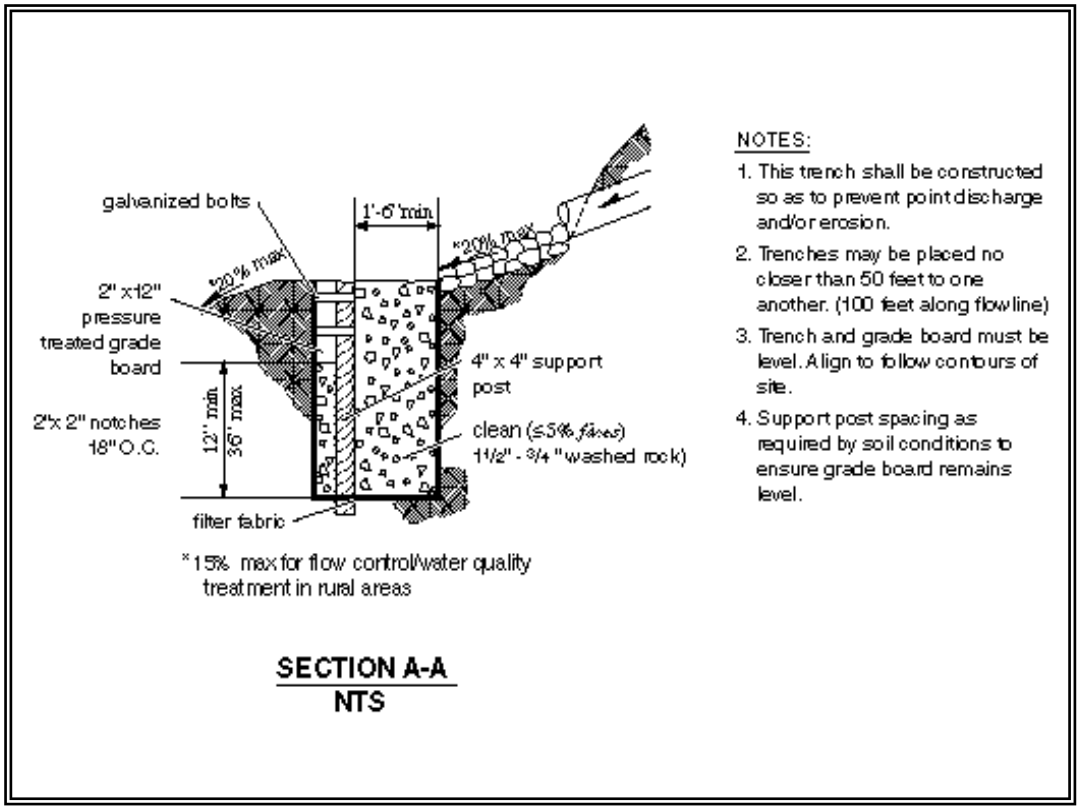

Figure 4.9 – Alternative Flow Dispersal Trench

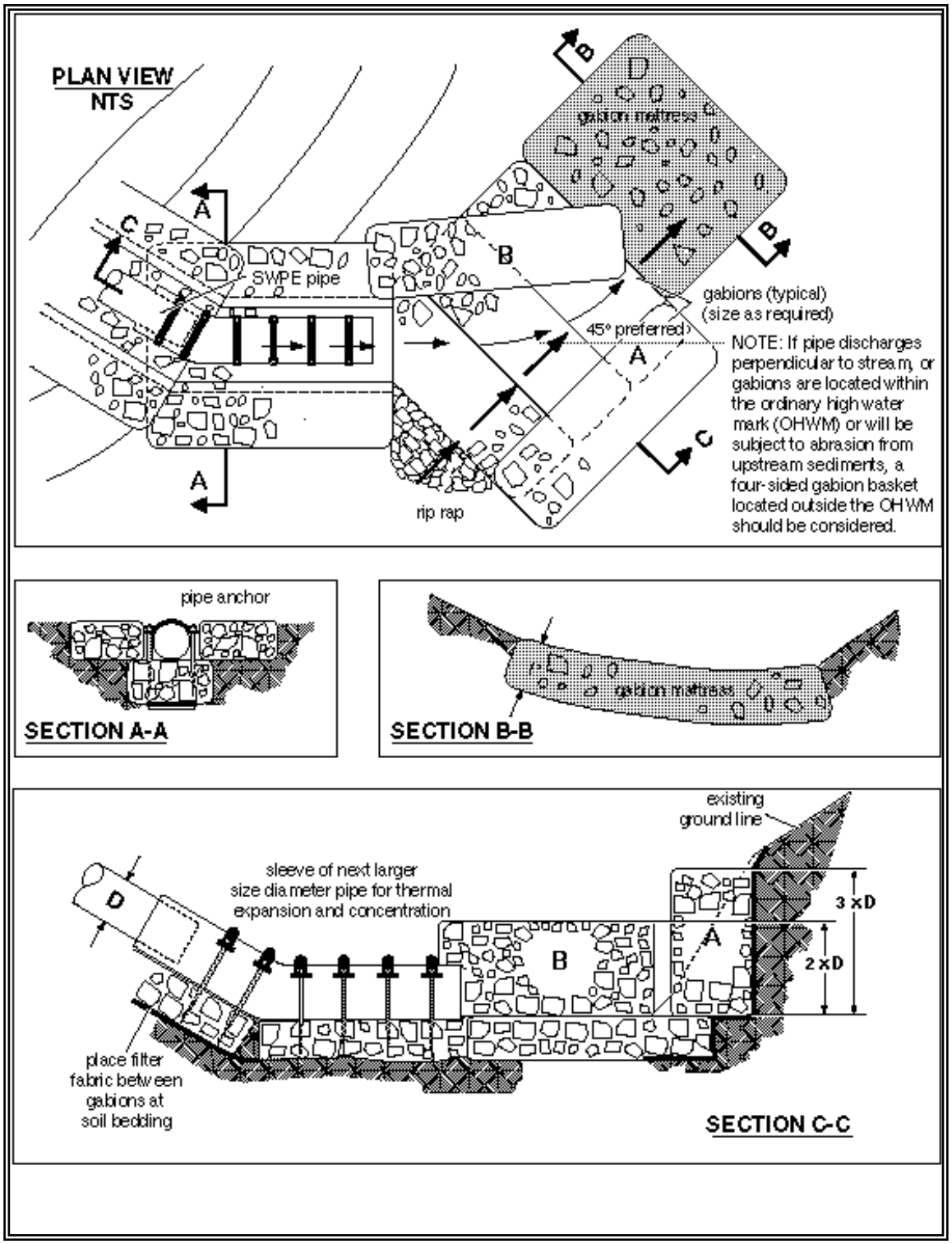

Figure 4.10 – Gabion Outfall Detail

Tightline Systems

- Outfall tightlines may be installed in trenches with standard bedding on slopes up to 20%. In order to minimize disturbance to slopes greater than 20%, it is recommended that tightlines be placed at grade with proper pipe anchorage and support.
- Except as indicated above, tightlines or conveyances that traverse the marine intertidal zone and connect to outfalls must be buried to a depth sufficient to avoid exposure of the line during storm events or future changes in beach elevation. If non-native material is used to bed the tightline, such material shall be covered with at least 3 feet of native bed material or equivalent.
- High density polyethylene pipe (HDPP) tightlines must be designed to address the material limitations, particularly thermal expansion and contraction and pressure design, as specified by the manufacturer. The coefficient of thermal expansion and contraction for solid wall polyethylene pipe (SWPE) is on the order of 0.001 inch per foot per Fahrenheit degree. Sliding sleeve connections must be used to address this thermal expansion and contraction. These sleeve connections consist of a section of the appropriate length of the next larger size diameter of pipe into which the outfall pipe is fitted. These sleeve connections must be located as close to the discharge end of the outfall system as is practical.
- Due to the ability of HDPP tightlines to transmit flows of very high energy, special consideration for energy dissipation must be made. Details of a sample gabion mattress energy dissipater have been provided as Figure 4.10. Flows of very high energy will require a specifically engineered energy dissipater structure.

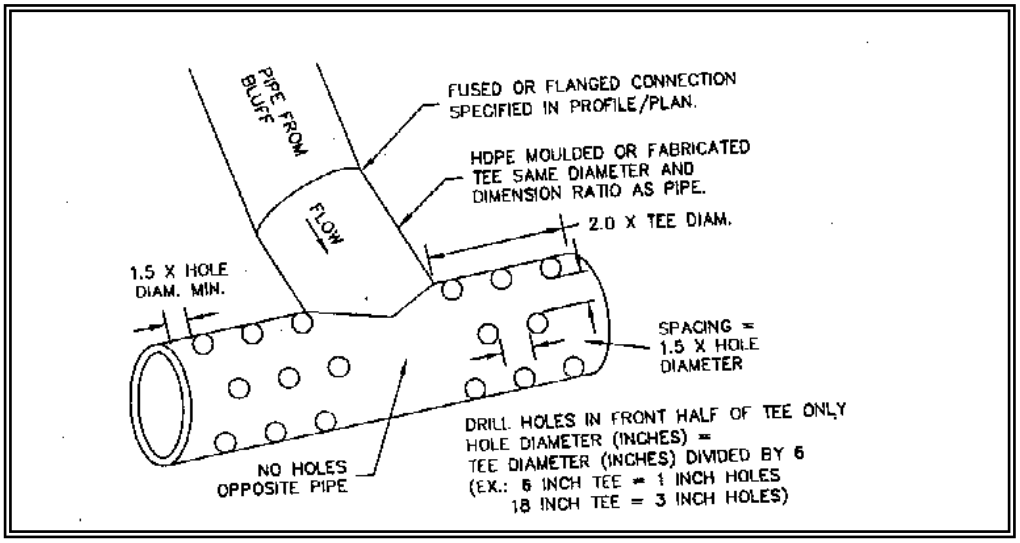

Figure 4.11 – Diffuser TEE (an example of energy dissipating end feature)

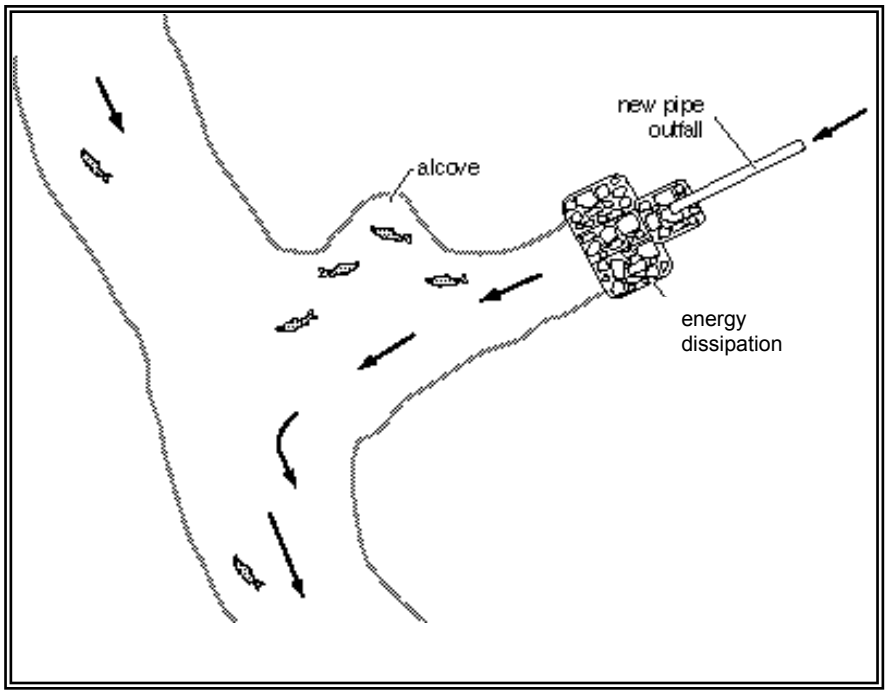

Figure 4.12 – Fish Habitat Improvement at New Outfalls

4.6 Maintenance Standards for Drainage Facilities

The facility-specific maintenance standards contained in this section are intended to be conditions for determining if maintenance actions are required as identified through inspection. They are not intended to be measures of the facility's required condition at all times between inspections. In other words, exceedence of these conditions at any time between inspections and/or maintenance does not automatically constitute a violation of these standards. However, based upon inspection observations, the inspection and maintenance schedules shall be adjusted to minimize the length of time that a facility is in a condition that requires a maintenance action.

Table 4.5 – Maintenance Standards

No. 1 – Detention Ponds

Maintenance Component	Defect	Conditions When Maintenance Is Needed	Results Expected When Maintenance Is Performed
General	Trash & Debris	Any trash and debris which exceed ~~5~~1 cubic feet per 1,000 square feet (this is about equal to the amount of trash it would take to fill up one standard size garbage can). In general, there should be no visual evidence of dumping. If less than threshold all trash and debris will be removed as part of next scheduled maintenance.	Trash and debris cleared from site.
	Poisonous Vegetation and noxious weeds	Any poisonous or nuisance vegetation which may constitute a hazard to maintenance personnel or the public. Any evidence of noxious weeds as defined by State or local regulations. (Apply requirements of adopted IPM policies for the use of herbicides).	No danger of poisonous vegetation where maintenance personnel or the public might normally be. (Coordinate with local health department) Complete eradication of noxious weeds may not be possible. Compliance with State or local eradication policies required
	Contaminants and Pollution	Any evidence of oil, gasoline, contaminants or other pollutants (Coordinate removal/cleanup with local water quality response agency).	~~No contaminants or pollutants present.~~
	Rodent Holes	Any evidence of rodent holes if facility is acting as a dam or berm, or any evidence of water piping through dam or berm via rodent holes.	Rodents destroyed and dam or berm repaired. (Coordinate with local health department; coordinate with Ecology Dam Safety Office if pond exceeds 10 acre-feet.)

No. 1 – Detention Ponds

Maintenance Component	Defect	Conditions When Maintenance Is Needed	Results Expected When Maintenance Is Performed
	Beaver Dams	Dam results in change or function of the facility.	Facility is returned to design function. (Coordinate trapping of beavers and removal of dams with appropriate permitting agencies)
	Insects	When insects such as wasps and hornets interfere with maintenance activities.	Insects destroyed or removed from site. Apply insecticides in compliance with adopted IPM policies
	Tree Growth and Hazard Trees	Tree growth does not allow maintenance access or interferes with maintenance activity (i.e., slope mowing, silt removal, vactoring, or equipment movements). If trees are not interfering with access or maintenance, do not remove If dead, diseased, or dying trees are identified (Use a certified Arborist to determine health of tree or removal requirements)	Trees do not hinder maintenance activities. Harvested trees should be recycled into mulch or other beneficial uses (e.g., alders for firewood). Remove hazard Trees
Side Slopes of Pond	Erosion	Eroded damage over 2 inches deep where cause of damage is still present or where there is potential for continued erosion. Any erosion observed on a compacted berm embankment.	Slopes should be stabilized using appropriate erosion control measure(s); e.g., rock reinforcement, planting of grass, compaction. If erosion is occurring on compacted berms a licensed civil engineer should be consulted to resolve source of erosion.
Storage Area	Sediment	Accumulated sediment that exceeds 10% of the designed pond depth unless otherwise specified or affects inletting or outletting condition of the facility.	Sediment cleaned out to designed pond shape and depth; pond reseeded if necessary to control erosion.
	Liner (If Applicable)	Liner is visible and has more than three 1/4-inch holes in it.	Liner repaired or replaced. Liner is fully covered.

No. 1 – Detention Ponds

Maintenance Component	Defect	Conditions When Maintenance Is Needed	Results Expected When Maintenance Is Performed
Pond Berms (Dikes)	Settlements	Any part of berm which has settled 4 inches lower than the design elevation. If settlement is apparent, measure berm to determine amount of settlement. Settling can be an indication of more severe problems with the berm or outlet works. A licensed civil engineer should be consulted to determine the source of the settlement.	Dike is built back to the design elevation.
	Piping	Discernable water flow through pond berm. Ongoing erosion with potential for erosion to continue. (Recommend a Goethechnical engineer be called in to inspect and evaluate condition and recommend repair of condition.	Piping eliminated. Erosion potential resolved.
Emergency Overflow/ Spillway and Berms over 4 feet in height.	Tree Growth	Tree growth on emergency spillways creates blockage problems and may cause failure of the berm due to uncontrolled overtopping. Tree growth on berms over 4 feet in height may lead to piping through the berm which could lead to failure of the berm.	Trees should be removed. If root system is small (base less than 4 inches) the root system may be left in place. Otherwise the roots should be removed and the berm restored. A licensed civil engineer should be consulted for proper berm/spillway restoration.
	Piping	Discernable water flow through pond berm. Ongoing erosion with potential for erosion to continue. (Recommend a Goethechnical engineer be called in to inspect and evaluate condition and recommend repair of condition.	Piping eliminated. Erosion potential resolved.
Emergency Overflow/ Spillway	Emergency Overflow/ Spillway	Only one layer of rock exists above native soil in area five square feet or larger, or any exposure of native soil at the top of out flow path of spillway. (Rip-rap on inside slopes need not be replaced.)	Rocks and pad depth are restored to design standards.
	Erosion	See “Side Slopes of Pond”	

No. 2 – Infiltration

Maintenance Component	Defect	Conditions When Maintenance Is Needed	Results Expected When Maintenance Is Performed
General	Trash & Debris	See "Detention Ponds" (No. 1).	See "Detention Ponds" (No. 1).
	Poisonous/Noxious Vegetation	See "Detention Ponds" (No. 1).	See "Detention Ponds" (No. 1).
	Contaminants and Pollution	See "Detention Ponds" (No. 1).	See "Detention Ponds" (No. 1).
	Rodent Holes	See "Detention Ponds" (No. 1).	See "Detention Ponds" (No. 1)
Storage Area	Sediment	Water ponding in infiltration pond after rainfall ceases and appropriate time allowed for infiltration. (A percolation test pit or test of facility indicates facility is only working at 90% of its designed capabilities. If two inches or more sediment is present, remove).	Sediment is removed and/or facility is cleaned so that infiltration system works according to design.
Filter Bags (if applicable)	Filled with Sediment and Debris	Sediment and debris fill bag more than 1/2 full.	Filter bag is replaced or system is redesigned.
Rock Filters	Sediment and Debris	By visual inspection, little or no water flows through filter during heavy rain storms.	Gravel in rock filter is replaced.
Side Slopes of Pond	Erosion	See "Detention Ponds" (No. 1).	See "Detention Ponds" (No. 1).
Emergency Overflow Spillway and Berms over 4 feet in height.	Tree Growth	See "Detention Ponds" (No. 1).	See "Detention Ponds" (No. 1).
	Piping	See "Detention Ponds" (No. 1).	See "Detention Ponds" (No. 1).
Emergency Overflow Spillway	Rock Missing	See "Detention Ponds" (No. 1).	See "Detention Ponds" (No. 1).
	Erosion	See "Detention Ponds" (No. 1).	See "Detention Ponds" (No. 1).
Pre-settling Ponds and Vaults	Facility or sump filled with Sediment and/or debris	6" or designed sediment trap depth of sediment.	Sediment is removed.

No. 3 – Closed Detention Systems (Tanks/Vaults)

Maintenance Component	Defect	Conditions When Maintenance is Needed	Results Expected When Maintenance is Performed
Storage Area	Plugged Air Vents	One-half of the cross section of a vent is blocked at any point or the vent is damaged.	Vents open and functioning.
	Debris and Sediment	Accumulated sediment depth exceeds 10% of the diameter of the storage area for 1/2 length of storage vault or any point depth exceeds 15% of diameter. (Example: 72-inch storage tank would require cleaning when sediment reaches depth of 7 inches for more than 1/2 length of tank.)	All sediment and debris removed from storage area.
	Joints Between Tank/Pipe Section	Any openings or voids allowing material to be transported into facility. (Will require engineering analysis to determine structural stability).	All joint between tank/pipe sections are sealed.
	Tank Pipe Bent Out of Shape	Any part of tank/pipe is bent out of shape more than 10% of its design shape. (Review required by engineer to determine structural stability).	Tank/pipe repaired or replaced to design.
	Vault Structure Includes Cracks in Wall, Bottom, Damage to Frame and/or Top Slab	Cracks wider than 1/2-inch and any evidence of soil particles entering the structure through the cracks, or maintenance/inspection personnel determines that the vault is not structurally sound. Cracks wider than 1/2-inch at the joint of any inlet/outlet pipe or any evidence of soil particles entering the vault through the walls.	Vault replaced or repaired to design specifications and is structurally sound. No cracks more than 1/4-inch wide at the joint of the inlet/outlet pipe.
Manhole	Cover Not in Place	Cover is missing or only partially in place. Any open manhole requires maintenance.	Manhole is closed.
	Locking Mechanism Not Working	Mechanism cannot be opened by one maintenance person with proper tools. Bolts into frame have less than 1/2 inch of thread (may not apply to self-locking lids).	Mechanism opens with proper tools.
	Cover Difficult to Remove	One maintenance person cannot remove lid after applying normal lifting pressure. Intent is to keep cover from sealing off access to maintenance.	Cover can be removed and reinstalled by one maintenance person.
	Ladder Rungs Unsafe	Ladder is unsafe due to missing rungs, misalignment, not securely attached to structure wall, rust, or cracks.	Ladder meets design standards. Allows maintenance person safe access.
Catch Basins	See “Catch Basins” (No. 5)	See “Catch Basins” (No. 5).	See “Catch Basins” (No. 5).

No. 4 – Control Structure/Flow Restrictor

Maintenance Component	Defect	Condition When Maintenance is Needed	Results Expected When Maintenance is Performed
General	Trash and Debris (Includes Sediment)	Material exceeds 25% of sump depth or 1 foot below orifice plate.	Control structure orifice is not blocked. All trash and debris removed.
	Structural Damage	Structure is not securely attached to manhole wall.	Structure securely attached to wall and outlet pipe.
		Structure is not in upright position (allow up to 10% from plumb).	Structure in correct position.
		Connections to outlet pipe are not watertight and show signs of rust.	Connections to outlet pipe are water tight; structure repaired or replaced and works as designed.
		Any holes--other than designed holes--in the structure.	Structure has no holes other than designed holes.
Cleanout Gate	Damaged or Missing	Cleanout gate is not watertight or is missing.	Gate is watertight and works as designed.
		Gate cannot be moved up and down by one maintenance person.	Gate moves up and down easily and is watertight.
		Chain/rod leading to gate is missing or damaged.	Chain is in place and works as designed.
		Gate is rusted over 50% of its surface area.	Gate is repaired or replaced to meet design standards.
Orifice Plate	Damaged or Missing	Control device is not working properly due to missing, out of place, or bent orifice plate.	Plate is in place and works as designed.
	Obstructions	Any trash, debris, sediment, or vegetation blocking the plate.	Plate is free of all obstructions and works as designed.
Overflow Pipe	Obstructions	Any trash or debris blocking (or having the potential of blocking) the overflow pipe.	Pipe is free of all obstructions and works as designed.
Manhole	See “Closed Detention Systems” (No. 3).	See “Closed Detention Systems” (No. 3).	See “Closed Detention Systems” (No. 3).
Catch Basin	See “Catch Basins” (No. 5).	See “Catch Basins” (No. 5).	See “Catch Basins” (No. 5).

No. 5 – Catch Basins

Maintenance Component	Defect	Conditions When Maintenance is Needed	Results Expected When Maintenance is performed
General	Trash & Debris	Trash or debris which is located immediately in front of the catch basin opening or is blocking inletting capacity of the basin by more than 10%.	No Trash or debris located immediately in front of catch basin or on grate opening.
		Trash or debris (in the basin) that exceeds 60 percent of the sump depth as measured from the bottom of basin to invert of the lowest pipe into or out of the basin, but in no case less than a minimum of six inches clearance from the debris surface to the invert of the lowest pipe.	No trash or debris in the catch basin.
		Trash or debris in any inlet or outlet pipe blocking more than 1/3 of its height.	Inlet and outlet pipes free of trash or debris.
		Dead animals or vegetation that could generate odors that could cause complaints or dangerous gases (e.g., methane).	No dead animals or vegetation present within the catch basin.
	Sediment	Sediment (in the basin) that exceeds 60 percent of the sump depth as measured from the bottom of basin to invert of the lowest pipe into or out of the basin, but in no case less than a minimum of 6 inches clearance from the sediment surface to the invert of the lowest pipe.	No sediment in the catch basin
	Structure Damage to Frame and/or Top Slab	Top slab has holes larger than 2 square inches or cracks wider than 1/4 inch (Intent is to make sure no material is running into basin).	Top slab is free of holes and cracks.
		Frame not sitting flush on top slab, i.e., separation of more than 3/4 inch of the frame from the top slab. Frame not securely attached	Frame is sitting flush on the riser rings or top slab and firmly attached.
	Fractures or Cracks in Basin Walls/ Bottom	Maintenance person judges that structure is unsound.	Basin replaced or repaired to design standards.
		Grout fillet has separated or cracked wider than 1/2 inch and longer than 1 foot at the joint of any inlet/outlet pipe or any evidence of soil particles entering catch basin through cracks.	Pipe is regrouted and secure at basin wall.
	Settlement/ Misalignment	If failure of basin has created a safety, function, or design problem.	Basin replaced or repaired to design standards.
	Vegetation	Vegetation growing across and blocking more than 10% of the basin opening.	No vegetation blocking opening to basin.
		Vegetation growing in inlet/outlet pipe joints that is more than six inches tall and less than six inches apart.	No vegetation or root growth present.
	Contamination and Pollution	See "Detention Ponds" (No. 1).	No pollution present.

No. 5 – Catch Basins

Maintenance Component	Defect	Conditions When Maintenance is Needed	Results Expected When Maintenance is performed
Catch Basin Cover	Cover Not in Place	Cover is missing or only partially in place. Any open catch basin requires maintenance.	Catch basin cover is closed
	Locking Mechanism Not Working	Mechanism cannot be opened by one maintenance person with proper tools. Bolts into frame have less than 1/2 inch of thread.	Mechanism opens with proper tools.
	Cover Difficult to Remove	One maintenance person cannot remove lid after applying normal lifting pressure. (Intent is keep cover from sealing off access to maintenance.)	Cover can be removed by one maintenance person.
Ladder	Ladder Rungs Unsafe	Ladder is unsafe due to missing rungs, not securely attached to basin wall, misalignment, rust, cracks, or sharp edges.	Ladder meets design standards and allows maintenance person safe access.
Metal Grates (If Applicable)	Grate opening Unsafe	Grate with opening wider than 7/8 inch.	Grate opening meets design standards.
	Trash and Debris	Trash and debris that is blocking more than 20% of grate surface inletting capacity.	Grate free of trash and debris.
	Damaged or Missing.	Grate missing or broken member(s) of the grate.	Grate is in place and meets design standards.

No. 6 – Debris Barriers (e.g., Trash Racks)

Maintenance Components	Defect	Condition When Maintenance is Needed	Results Expected When Maintenance is Performed
General	Trash and Debris	Trash or debris that is plugging more than 20% of the openings in the barrier.	Barrier cleared to design flow capacity.
Metal	Damaged/ Missing Bars.	Bars are bent out of shape more than 3 inches.	Bars in place with no bends more than 3/4 inch.
		Bars are missing or entire barrier missing.	Bars in place according to design.
		Bars are loose and rust is causing 50% deterioration to any part of barrier.	Barrier replaced or repaired to design standards.
	Inlet/Outlet Pipe	Debris barrier missing or not attached to pipe	Barrier firmly attached to pipe

No. 7 – Energy Dissipaters

Maintenance Components	Defect	Conditions When Maintenance is Needed	Results Expected When Maintenance is Performed
External:			
Rock Pad	Missing or Moved Rock	Only one layer of rock exists above native soil in area five square feet or larger, or any exposure of native soil.	Rock pad replaced to design standards.
	Erosion	Soil erosion in or adjacent to rock pad.	Rock pad replaced to design standards.
Dispersion Trench	Pipe Plugged with Sediment	Accumulated sediment that exceeds 20% of the design depth.	Pipe cleaned/flushed so that it matches design.
	Not Discharging Water Properly	Visual evidence of water discharging at concentrated points along trench (normal condition is a “sheet flow” of water along trench). Intent is to prevent erosion damage.	Trench redesigned or rebuilt to standards.
	Perforations Plugged.	Over 1/2 of perforations in pipe are plugged with debris and sediment.	Perforated pipe cleaned or replaced.
	Water Flows Out Top of “Distributor” Catch Basin.	Maintenance person observes or receives credible report of water flowing out during any storm less than the design storm or its causing or appears likely to cause damage.	Facility rebuilt or redesigned to standards.
	Receiving Area Over-Saturated	Water in receiving area is causing or has potential of causing landslide problems.	No danger of landslides.
Internal:			
Manhole/Chamber	Worn or Damaged Post, Baffles, Side of Chamber	Structure dissipating flow deteriorates to 1/2 of original size or any concentrated worn spot exceeding one square foot which would make structure unsound.	Structure replaced to design standards.
	Other Defects	See “Catch Basins” (No. 5).	See “Catch Basins” (No. 5).

No. 8 – Typical Biofiltration Swale

Maintenance Component	Defect or Problem	Condition When Maintenance is Needed	Recommended Maintenance to Correct Problem
General	Sediment Accumulation on Grass	Sediment depth exceeds 2 inches.	Remove sediment deposits on grass treatment area of the bio-swale. When finished, swale should be level from side to side and drain freely toward outlet. There should be no areas of standing water once inflow has ceased.
	Standing Water	When water stands in the swale between storms and does not drain freely.	Any of the following may apply: remove sediment or trash blockages, improve grade from head to foot of swale, remove clogged check dams, add underdrains or convert to a wet biofiltration swale.
	Flow spreader	Flow spreader uneven or clogged so that flows are not uniformly distributed through entire swale width.	Level the spreader and clean so that flows are spread evenly over entire swale width.
	Constant Baseflow	When small quantities of water continually flow through the swale, even when it has been dry for weeks, and an eroded, muddy channel has formed in the swale bottom.	Add a low-flow pea-gravel drain the length of the swale or by-pass the baseflow around the swale.
	Poor Vegetation Coverage	When grass is sparse or bare or eroded patches occur in more than 10% of the swale bottom.	Determine why grass growth is poor and correct that condition. Re-plant with plugs of grass from the upper slope: plant in the swale bottom at 8-inch intervals. Or re-seed into loosened, fertile soil.
	Vegetation	When the grass becomes excessively tall (greater than 10-inches); when nuisance weeds and other vegetation starts to take over.	Mow vegetation or remove nuisance vegetation so that flow not impeded. Grass should be mowed to a height of 3 to 4 inches. Remove grass clippings.
	Excessive Shading	Grass growth is poor because sunlight does not reach swale.	If possible, trim back over-hanging limbs and remove brushy vegetation on adjacent slopes.
	Inlet/Outlet	Inlet/outlet areas clogged with sediment and/or debris.	Remove material so that there is no clogging or blockage in the inlet and outlet area.
	Trash and Debris Accumulation	Trash and debris accumulated in the bio-swale.	Remove trash and debris from bioswale.
	Erosion/Scouring	Eroded or scoured swale bottom due to flow channelization, or higher flows.	For ruts or bare areas less than 12 inches wide, repair the damaged area by filling with crushed gravel. If bare areas are large, generally greater than 12 inches wide, the swale should be re-graded and re-seeded. For smaller bare areas, overseed when bare spots are evident, or take plugs of grass from the upper slope and plant in the swale bottom at 8-inch intervals.

No. 9 – Wet Biofiltration Swale

Maintenance Component	Defect or Problem	Condition When Maintenance is Needed	Recommended Maintenance to Correct Problem
General	Sediment Accumulation	Sediment depth exceeds 2-inches in 10% of the swale treatment area.	Remove sediment deposits in treatment area.
	Water Depth	Water not retained to a depth of about 4 inches during the wet season.	Build up or repair outlet berm so that water is retained in the wet swale.
	Wetland Vegetation	Vegetation becomes sparse and does not provide adequate filtration, OR vegetation is crowded out by very dense clumps of cattail, which do not allow water to flow through the clumps.	Determine cause of lack of vigor of vegetation and correct. Replant as needed. For excessive cattail growth, cut cattail shoots back and compost off-site. Note: normally wetland vegetation does not need to be harvested unless die-back is causing oxygen depletion in downstream waters.
	Inlet/Outlet	Inlet/outlet area clogged with sediment and/or debris.	Remove clogging or blockage in the inlet and outlet areas.
	Trash and Debris Accumulation	See "Detention Ponds" (No. 1).	Remove trash and debris from wet swale.
	Erosion/Scouring	Swale has eroded or scoured due to flow channelization, or higher flows.	Check design flows to assure swale is large enough to handle flows. By-pass excess flows or enlarge swale. Replant eroded areas with fibrous-rooted plants such as Juncus effusus (soft rush) in wet areas or snowberry (Symphoricarpos albus) in dryer areas.

No. 10 – Filter Strips

Maintenance Component	Defect or Problem	Condition When Maintenance is Needed	Recommended Maintenance to Correct Problem
General	Sediment Accumulation on Grass	Sediment depth exceeds 2 inches.	Remove sediment deposits, re-level so slope is even and flows pass evenly through strip.
	Vegetation	When the grass becomes excessively tall (greater than 10-inches); when nuisance weeds and other vegetation starts to take over.	Mow grass, control nuisance vegetation, such that flow not impeded. Grass should be mowed to a height between 3-4 inches.
	Trash and Debris Accumulation	Trash and debris accumulated on the filter strip.	Remove trash and Debris from filter.
	Erosion/Scouring	Eroded or scoured areas due to flow channelization, or higher flows.	For ruts or bare areas less than 12 inches wide, repair the damaged area by filling with crushed gravel. The grass will creep in over the rock in time. If bare areas are large, generally greater than 12 inches wide, the filter strip should be re-graded and re-seeded. For smaller bare areas, overseed when bare spots are evident.
	Flow spreader	Flow spreader uneven or clogged so that flows are not uniformly distributed through entire filter width.	Level the spreader and clean so that flows are spread evenly over entire filter width.

No. 11 – Wetponds

Maintenance Component	Defect	Condition When Maintenance is Needed	Results Expected When Maintenance is Performed
General	Water level	First cell is empty, doesn't hold water.	Line the first cell to maintain at least 4 feet of water. Although the second cell may drain, the first cell must remain full to control turbulence of the incoming flow and reduce sediment resuspension.
	Trash and Debris	Accumulation that exceeds 1 CF per 1000-SF of pond area.	Trash and debris removed from pond.
	Inlet/Outlet Pipe	Inlet/Outlet pipe clogged with sediment and/or debris material.	No clogging or blockage in the inlet and outlet piping.
	Sediment Accumulation in Pond Bottom	Sediment accumulations in pond bottom that exceeds the depth of sediment zone plus 6-inches, usually in the first cell.	Sediment removed from pond bottom.
	Oil Sheen on Water	Prevalent and visible oil sheen.	Oil removed from water using oil-absorbent pads or vactor truck. Source of oil located and corrected. If chronic low levels of oil persist, plant wetland plants such as Juncus effusus (soft rush) which can uptake small concentrations of oil.
	Erosion	Erosion of the pond's side slopes and/or scouring of the pond bottom, that exceeds 6-inches, or where continued erosion is prevalent.	Slopes stabilized using proper erosion control measures and repair methods.
	Settlement of Pond Dike/Berm	Any part of these components that has settled 4-inches or lower than the design elevation, or inspector determines dike/berm is unsound.	Dike/berm is repaired to specifications.
	Internal Berm	Berm dividing cells should be level.	Berm surface is leveled so that water flows evenly over entire length of berm.
	Overflow Spillway	Rock is missing and soil is exposed at top of spillway or outside slope.	Rocks replaced to specifications.

No. 12 – Wetvaults

Maintenance Component	Defect	Condition When Maintenance is Needed	Results Expected When Maintenance is Performed
General	Trash/Debris Accumulation	Trash and debris accumulated in vault, pipe or inlet/outlet (includes floatables and non-floatables).	Remove trash and debris from vault.
	Sediment Accumulation in Vault	Sediment accumulation in vault bottom exceeds the depth of the sediment zone plus 6-inches.	Remove sediment from vault.
	Damaged Pipes	Inlet/outlet piping damaged or broken and in need of repair.	Pipe repaired and/or replaced.
	Access Cover Damaged/Not Working	Cover cannot be opened or removed, especially by one person.	Pipe repaired or replaced to proper working specifications.
	Ventilation	Ventilation area blocked or plugged.	Blocking material removed or cleared from ventilation area. A specified % of the vault surface area must provide ventilation to the vault interior (see design specifications).
	Vault Structure Damage - Includes Cracks in Walls Bottom, Damage to Frame and/or Top Slab	Maintenance/inspection personnel determine that the vault is not structurally sound.	Vault replaced or repairs made so that vault meets design specifications and is structurally sound.
		Cracks wider than 1/2-inch at the joint of any inlet/outlet pipe or evidence of soil particles entering through the cracks.	Vault repaired so that no cracks exist wider than 1/4-inch at the joint of the inlet/outlet pipe.
	Baffles	Baffles corroding, cracking, warping and/or showing signs of failure as determined by maintenance/inspection staff.	Baffles repaired or replaced to specifications.
	Access Ladder Damage	Ladder is corroded or deteriorated, not functioning properly, not attached to structure wall, missing rungs, has cracks and/or misaligned. Confined space warning sign missing.	Ladder replaced or repaired to specifications, and is safe to use as determined by inspection personnel. Replace sign warning of confined space entry requirements. Ladder and entry notification complies with OSHA standards.

No. 13 – Sand Filters (above ground/open)

Maintenance Component	Defect	Condition When Maintenance is Needed	Results Expected When Maintenance is Performed
Above Ground (open sand filter)	Sediment Accumulation on top layer	Sediment depth exceeds 1/2-inch.	No sediment deposit on grass layer of sand filter that would impede permeability of the filter section.
	Trash and Debris Accumulations	Trash and debris accumulated on sand filter bed.	Trash and debris removed from sand filter bed.
	Sediment/ Debris in Clean-Outs	When the clean-outs become full or partially plugged with sediment and/or debris.	Sediment removed from clean-outs.
	Sand Filter Media	Drawdown of water through the sand filter media takes longer than 24-hours, and/or flow through the overflow pipes occurs frequently.	Top several inches of sand are scraped. May require replacement of entire sand filter depth depending on extent of plugging (a sieve analysis is helpful to determine if the lower sand has too high a proportion of fine material).
	Prolonged Flows	Sand is saturated for prolonged periods of time (several weeks) and does not dry out between storms due to continuous base flow or prolonged flows from detention facilities.	Low, continuous flows are limited to a small portion of the facility by using a low wooden divider or slightly depressed sand surface.
	Short Circuiting	When flows become concentrated over one section of the sand filter rather than dispersed.	Flow and percolation of water through sand filter is uniform and dispersed across the entire filter area.
	Erosion Damage to Slopes	Erosion over 2-inches deep where cause of damage is prevalent or potential for continued erosion is evident.	Slopes stabilized using proper erosion control measures.
	Rock Pad Missing or Out of Place	Soil beneath the rock is visible.	Rock pad replaced or rebuilt to design specifications.
	Flow Spreader	Flow spreader uneven or clogged so that flows are not uniformly distributed across sand filter.	Spreader leveled and cleaned so that flows are spread evenly over sand filter.
	Damaged Pipes	Any part of the piping that is crushed or deformed more than 20% or any other failure to the piping.	Pipe repaired or replaced.

No. 14 –Sand Filters (below ground/enclosed)

Maintenance Component	Defect	Condition When Maintenance is Needed	Results Expected When Maintenance is Performed
Below Ground Vault.	Sediment Accumulation on Sand Media Section	Sediment depth exceeds 1/2-inch.	No sediment deposits on sand filter section that which would impede permeability of the filter section.
	Sediment Accumulation in Pre-Settling Portion of Vault	Sediment accumulation in vault bottom exceeds the depth of the sediment zone plus 6-inches.	No sediment deposits in first chamber of vault.
	Trash/Debris Accumulation	Trash and debris accumulated in vault, or pipe inlet/outlet, floatables and non-floatables.	Trash and debris removed from vault and inlet/outlet piping.
	Sediment in Drain Pipes/Cleanouts	When drain pipes, cleanouts become full with sediment and/or debris.	Sediment and debris removed.
	Short Circuiting	When seepage/flow occurs along the vault walls and corners. Sand eroding near inflow area.	Sand filter media section re-laid and compacted along perimeter of vault to form a semi-seal. Erosion protection added to dissipate force of incoming flow and curtail erosion.
	Damaged Pipes	Inlet or outlet piping damaged or broken and in need of repair.	Pipe repaired and/or replaced.
	Access Cover Damaged/Not Working	Cover cannot be opened, corrosion/deformation of cover. Maintenance person cannot remove cover using normal lifting pressure.	Cover repaired to proper working specifications or replaced.
	Ventilation	Ventilation area blocked or plugged	Blocking material removed or cleared from ventilation area. A specified % of the vault surface area must provide ventilation to the vault interior (see design specifications).
	Vault Structure Damaged; Includes Cracks in Walls, Bottom, Damage to Frame and/or Top Slab.	Cracks wider than 1/2-inch or evidence of soil particles entering the structure through the cracks, or maintenance/inspection personnel determine that the vault is not structurally sound.	Vault replaced or repairs made so that vault meets design specifications and is structurally sound.
		Cracks wider than 1/2-inch at the joint of any inlet/outlet pipe or evidence of soil particles entering through the cracks.	Vault repaired so that no cracks exist wider than 1/4-inch at the joint of the inlet/outlet pipe.
	Baffles/Internal walls	Baffles or walls corroding, cracking, warping and/or showing signs of failure as determined by maintenance/inspection person.	Baffles repaired or replaced to specifications.
	Access Ladder Damaged	Ladder is corroded or deteriorated, not functioning properly, not securely attached to structure wall, missing rungs, cracks, and misaligned.	Ladder replaced or repaired to specifications, and is safe to use as determined by inspection personnel.

No. 15 – Stormfilter™ (leaf compost filter)

Maintenance Component	Defect	Condition When Maintenance is Needed	Results Expected When Maintenance is Performed
Below Ground Vault	Sediment Accumulation on Media.	Sediment depth exceeds 0.25-inches.	No sediment deposits which would impede permeability of the compost media.
	Sediment Accumulation in Vault	Sediment depth exceeds 6-inches in first chamber.	No sediment deposits in vault bottom of first chamber.
	Trash/Debris Accumulation	Trash and debris accumulated on compost filter bed.	Trash and debris removed from the compost filter bed.
	Sediment in Drain Pipes/Clean-Outs	When drain pipes, clean-outs, become full with sediment and/or debris.	Sediment and debris removed.
	Damaged Pipes	Any part of the pipes that are crushed or damaged due to corrosion and/or settlement.	Pipe repaired and/or replaced.
	Access Cover Damaged/Not Working	Cover cannot be opened; one person cannot open the cover using normal lifting pressure, corrosion/deformation of cover.	Cover repaired to proper working specifications or replaced.
	Vault Structure Includes Cracks in Wall, Bottom, Damage to Frame and/or Top Slab	Cracks wider than 1/2-inch or evidence of soil particles entering the structure through the cracks, or maintenance/inspection personnel determine that the vault is not structurally sound.	Vault replaced or repairs made so that vault meets design specifications and is structurally sound.
		Cracks wider than 1/2-inch at the joint of any inlet/outlet pipe or evidence of soil particles entering through the cracks.	Vault repaired so that no cracks exist wider than 1/4-inch at the joint of the inlet/outlet pipe.
	Baffles	Baffles corroding, cracking warping, and/or showing signs of failure as determined by maintenance/inspection person.	Baffles repaired or replaced to specifications.
	Access Ladder Damaged	Ladder is corroded or deteriorated, not functioning properly, not securely attached to structure wall, missing rungs, cracks, and misaligned.	Ladder replaced or repaired and meets specifications, and is safe to use as determined by inspection personnel.
Below Ground Cartridge Type	Compost Media	Drawdown of water through the media takes longer than 1 hour, and/or overflow occurs frequently.	Media cartridges replaced.
	Short Circuiting	Flows do not properly enter filter cartridges.	Filter cartridges replaced.

No. 16 – Baffle Oil/Water Separators (API Type)

Maintenance Component	Defect	Condition When Maintenance is Needed	Results Expected When Maintenance is Performed
General	Monitoring	Inspection of discharge water for obvious signs of poor water quality.	Effluent discharge from vault should be clear with out thick visible sheen.
	Sediment Accumulation	Sediment depth in bottom of vault exceeds 6-inches in depth.	No sediment deposits on vault bottom that would impede flow through the vault and reduce separation efficiency.
	Trash and Debris Accumulation	Trash and debris accumulation in vault, or pipe inlet/outlet, floatables and non-floatables.	Trash and debris removed from vault, and inlet/outlet piping.
	Oil Accumulation	Oil accumulations that exceed 1-inch, at the surface of the water.	Extract oil from vault by vactoring. Disposal in accordance with state and local rules and regulations.
	Damaged Pipes	Inlet or outlet piping damaged or broken and in need of repair.	Pipe repaired or replaced.
	Access Cover Damaged/Not Working	Cover cannot be opened, corrosion/deformation of cover.	Cover repaired to proper working specifications or replaced.
	Vault Structure Damage - Includes Cracks in Walls Bottom, Damage to Frame and/or Top Slab	See “Catch Basins” (No. 5)	Vault replaced or repairs made so that vault meets design specifications and is structurally sound.
		Cracks wider than 1/2-inch at the joint of any inlet/outlet pipe or evidence of soil particles entering through the cracks.	Vault repaired so that no cracks exist wider than 1/4-inch at the joint of the inlet/outlet pipe.
	Baffles	Baffles corroding, cracking, warping and/or showing signs of failure as determined by maintenance/inspection person.	Baffles repaired or replaced to specifications.
	Access Ladder Damaged	Ladder is corroded or deteriorated, not functioning properly, not securely attached to structure wall, missing rungs, cracks, and misaligned.	Ladder replaced or repaired and meets specifications, and is safe to use as determined by inspection personnel.

No. 17 – Coalescing Plate Oil/Water Separators

Maintenance Component	Defect	Condition When Maintenance is Needed	Results Expected When Maintenance is Performed
General	Monitoring	Inspection of discharge water for obvious signs of poor water quality.	Effluent discharge from vault should be clear with no thick visible sheen.
	Sediment Accumulation	Sediment depth in bottom of vault exceeds 6-inches in depth and/or visible signs of sediment on plates.	No sediment deposits on vault bottom and plate media, which would impede flow through the vault and reduce separation efficiency.
	Trash and Debris Accumulation	Trash and debris accumulated in vault, or pipe inlet/outlet, floatables and non-floatables.	Trash and debris removed from vault, and inlet/outlet piping.
	Oil Accumulation	Oil accumulation that exceeds 1-inch at the water surface.	Oil is extracted from vault using vactoring methods. Coalescing plates are cleaned by thoroughly rinsing and flushing. Should be no visible oil depth on water.
	Damaged Coalescing Plates	Plate media broken, deformed, cracked and/or showing signs of failure.	A portion of the media pack or the entire plate pack is replaced depending on severity of failure.
	Damaged Pipes	Inlet or outlet piping damaged or broken and in need of repair.	Pipe repaired and or replaced.
	Baffles	Baffles corroding, cracking, warping and/or showing signs of failure as determined by maintenance/inspection person.	Baffles repaired or replaced to specifications.
	Vault Structure Damage - Includes Cracks in Walls, Bottom, Damage to Frame and/or Top Slab	Cracks wider than 1/2-inch or evidence of soil particles entering the structure through the cracks, or maintenance/inspection personnel determine that the vault is not structurally sound.	Vault replaced or repairs made so that vault meets design specifications and is structurally sound.
		Cracks wider than 1/2-inch at the joint of any inlet/outlet pipe or evidence of soil particles entering through the cracks.	Vault repaired so that no cracks exist wider than 1/4-inch at the joint of the inlet/outlet pipe.
	Access Ladder Damaged	Ladder is corroded or deteriorated, not functioning properly, not securely attached to structure wall, missing rungs, cracks, and misaligned.	Ladder replaced or repaired and meets specifications, and is safe to use as determined by inspection personnel.

No. 18 – Catchbasin Inserts

Maintenance Component	Defect	Conditions When Maintenance is Needed	Results Expected When Maintenance is Performed
General	Sediment Accumulation	When sediment forms a cap over the insert media of the insert and/or unit.	No sediment cap on the insert media and its unit.
	Trash and Debris Accumulation	Trash and debris accumulates on insert unit creating a blockage/restriction.	Trash and debris removed from insert unit. Runoff freely flows into catch basin.
	Media Insert Not Removing Oil	Effluent water from media insert has a visible sheen.	Effluent water from media insert is free of oils and has no visible sheen.
	Media Insert Water Saturated	Catch basin insert is saturated with water and no longer has the capacity to absorb.	Remove and replace media insert
	Media Insert-Oil Saturated	Media oil saturated due to petroleum spill that drains into catch basin.	Remove and replace media insert.
	Media Insert Use Beyond Normal Product Life	Media has been used beyond the typical average life of media insert product.	Remove and replace media at regular intervals, depending on insert product.

Maintenance Standards to be added for newly listed stormwater facility options, including:

- Bioretention
- Compost-amended vegetated filter strips
- Permeable pavements
- Media filter drain

Maintenance standards to be identified in consideration of guidance from:

Low Impact Development Technical Guidance Manual for the Puget Sound Basin

Maintenance Standards in use by Western Washington municipalities and WSDOT

Ecology will consider suggestions submitted from commenters on this draft manual and the draft municipal stormwater permits.

Ecology is considering contracting for additional services to identify and provide training on maintenance practices for LID BMP's.

Chapter 5 - On-Site Stormwater Management

Note: Figures 5.1 through 5.5 are courtesy of King County

5.1 Purpose

This Chapter presents the methods for analysis and design of on-site stormwater management Best Management Practices (BMPs). Many of these BMPs, although being used elsewhere, are new locally. Efforts ~~are~~ have been underway to further develop these "low impact development" concepts in Western Washington. Ecology ~~will~~ has updated these BMPs ~~as local standards are established~~ and added references to the Low Impact Development Technical Guidance Manual for Puget Sound, authored by the Washington State University Cooperative Extension and published by the Puget Sound Water Quality Action Team. The document is available at the following website:

http://www.psat.wa.gov/Publications/Publications.htm

5.2 Application

The On-Site Stormwater Management BMPs presented in this Chapter ~~have application to treatment situations specified in Volume V, Chapter 3~~ help achieve compliance with Minimum Requirement #5.

On-site BMPs focus on minimization of impervious surface area, the use of infiltration, and dispersion through on-site vegetation for stormwater runoff flow control and treatment.

Most of the BMPs serve to control runoff flow rate as well as to provide runoff treatment. Non-pollution generating surfaces, such as rooftops and patios, may also use the infiltration BMPs contained in Volume 3, Section 3.1, which provide flow control only. Pollution-generating surfaces, such as driveways, small parking lots, and landscaping, must use on-site BMPs to provide some water quality treatment.

5.3 Best Management Practices for On-Site Stormwater Management

The following On-Site Stormwater Management BMPs are included in this Chapter:

Section 5.3.1 - Dispersion and Soil Quality BMPs (Required for Manual Equivalency)

BMP T5.10 Downspout Dispersion
BMP T5.11 Concentrated Flow Dispersion
BMP T5.12 Sheet Flow Dispersion
BMP T5.13 Post-Construction Soil Quality and Depth

BMP T5.14 Rain Gardens
BMP T5.15 Permeable Pavements
BMP T5.30 Full Dispersion

Section 5.3.2 - Site Design BMPs

BMP T5.20 Preserving Natural Vegetation
BMP T5.21 Better Site Design
~~BMP T5.30 Full Dispersion~~

Projects shall employ these BMPs to infiltrate, disperse, and retain stormwater runoff on site to the maximum extent practicable without causing flooding or erosion impacts. Sites that can fully infiltrate (see Volume III, Chapter 3) or fully disperse (see BMP T5.30) are not required to provide runoff treatment or flow control facilities. Full dispersion credit is limited to sites (or sub-areas of sites) with a maximum of 10% effective impervious area that is dispersed through 65% of the site maintained in natural vegetation.

Impervious surfaces that are not fully dispersed should be partially dispersed to the maximum extent practicable and then hydrologically modeled. If the model predicts that there will be a 0.1 cfs or greater increase in the 100-year return frequency flow, or if certain thresholds of impervious surfaces or converted pervious surfaces are exceeded within a threshold discharge area (see Volume 1, ~~Table 2.2~~Section 2.5.7), then a flow control facility is required. Also, a treatment facility is required if the thresholds in ~~Table 2.1~~Section 2.5.6 of Volume 1 are exceeded.

Note:

~~Sections 5.3.3. and 5.3.4. have been deleted. The reader is directed to Low Impact Development Technical Guidance Manual for Puget Sound, authored by the Washington State University Cooperative Extension and published by the Puget Sound Water Quality Action Team. The document is available at the following websites:~~

~~http://www.psat.wa.gov/Publications/Publications.htm~~

~~http://www.pierce.wsu.edu~~

~~Also,~~ Please refer ~~the reader is directed~~ to Appendix C in Volume III of this manual for ~~where~~ directions ~~are given~~ concerning flow reduction credits for using low impact development BMP's.

5.3.1 Dispersion and Soil Quality BMPs (Required for Manual Equivalency)

The following BMPs pertain to dispersion and soil quality applications.

BMP T5.10 Downspout Dispersion

Purpose and Definition

Downspout dispersion BMPs are splashblocks or gravel-filled trenches that serve to spread roof runoff over vegetated pervious areas. Dispersion attenuates peak flows by slowing entry of the runoff into the conveyance system, allows for some infiltration, and provides some water quality benefits.

Applications and Limitations

- Downspout dispersion is required on all subdivision single family lots which meet one of the following criteria:
  1. Lots greater than or equal to 22,000 square feet where downspout infiltration is not being provided according to the requirements in Volume III, Chapter 3.
  2. Lots smaller than 22,000 square feet where soils are not suitable for downspout infiltration as determined in Volume III, Chapter 3 and where the design criteria below can be met.
- All other projects required to apply Roof Downspout BMPs must provide downspout dispersion if downspout infiltration is not feasible or applicable as determined in Volume III, Chapter 3, and if the design criteria below can be met.

Flow Credit for Roof Downspout Dispersion

If roof runoff is dispersed according to the requirements of this section on single-family lots greater than 22,000 square feet, and the *vegetative flow*path* is 50 feet or larger through undisturbed native landscape or lawn/landscape area that meets BMP T5.13, the roof area may be modeled as a lawn/landscape aera. ~~designer may click on the "Credits" button in the WWHM and enter the percent of roof area that is being dispersed.~~This is done in the WWHM on the Mitigated Scenario screen by entering the roof area into one of the entry options for dispersal of impervious area runoff.

* *Vegetative flow path* is measured from the downspout or dispersion system discharge point to the downstream property line, stream, wetland, or other impervious surface.

General Design Guidelines

- Dispersion trenches designed as shown in the Figures 5.1 and 5.2 shall be used for all downspout dispersion applications except where splashblocks are allowed below. See Figure 5.3 for a typical splashblock.
- Splashblocks may be used for downspouts discharging to a vegetated flowpath at least 50 feet in length as measured from the downspout to the downstream property line, structure, sensitive steep slope, stream, wetland, or other impervious surface. Sensitive area buffers may count toward flowpath lengths. The vegetated flowpath must be covered with well-established lawn or pasture, landscaping with well-established groundcover, or native vegetation with natural groundcover. The groundcover shall be dense enough to help disperse and infiltrate flows and to prevent erosion.
- If the vegetated flowpath (measured as defined above) is less than 25 feet on a subdivision single-family lot, a perforated stub-out connection may be used in lieu of downspout dispersion (See Volume III, Chapter 3). A perforated stub-out may also be used where implementation of downspout dispersion might cause erosion or flooding problems, either on site or on adjacent lots. This provision might be appropriate, for example, for lots constructed on steep hills where downspout discharge could be cumulative and might pose a potential hazard for lower lying lots, or where dispersed flows could create problems for adjacent offsite lots. This provision does not apply to situations where lots are flat and onsite downspout dispersal would result in saturated yards.

  Note: For all other types of projects, the use of a perforated stub-out in lieu of downspout dispersion shall be as determined by the Local Plan Approval Authority.

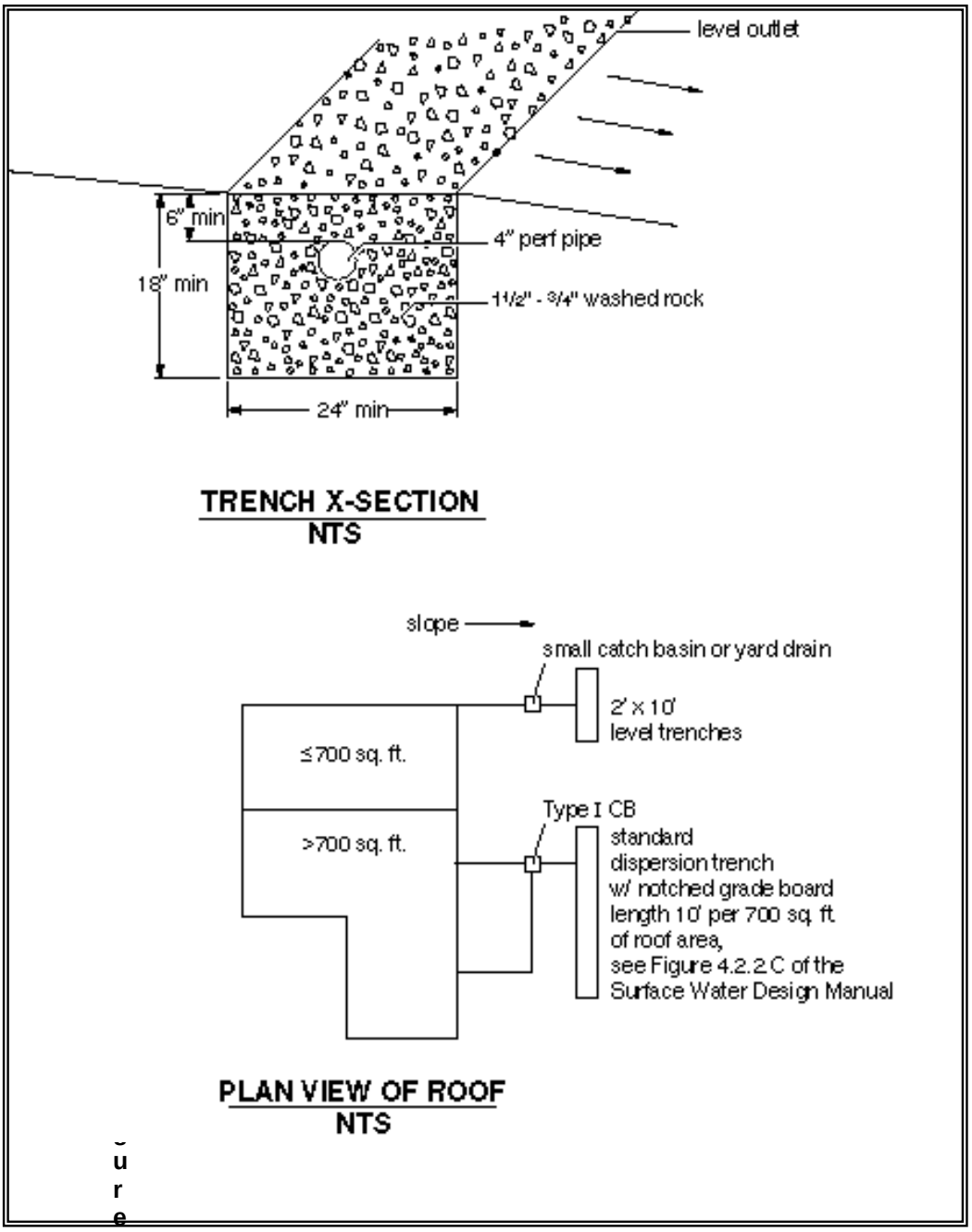

Figure 5.1 – Typical Dispersion Trench

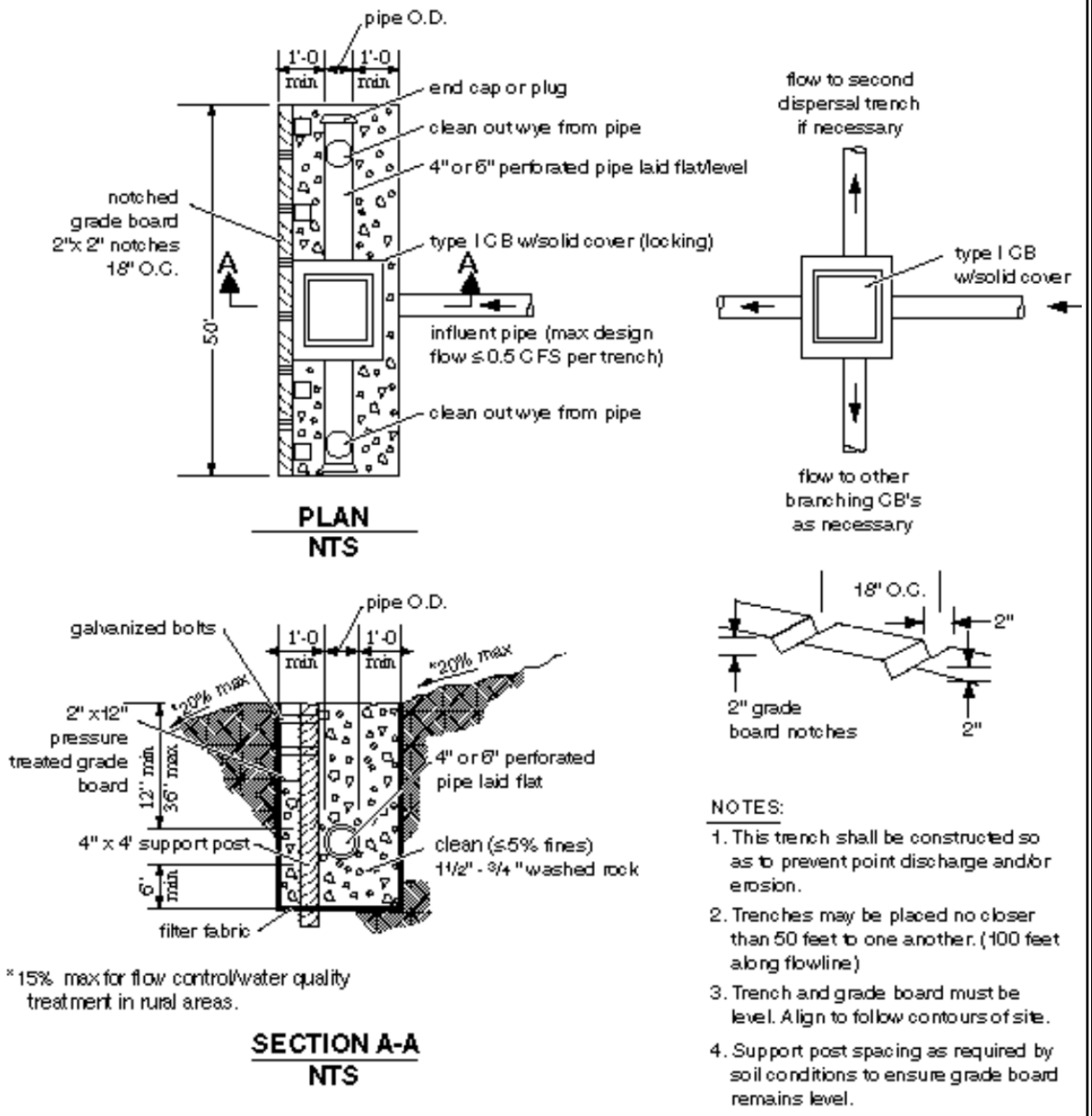

Figure 5.2 – Standard Dispersion Trench with Notched Grade Board

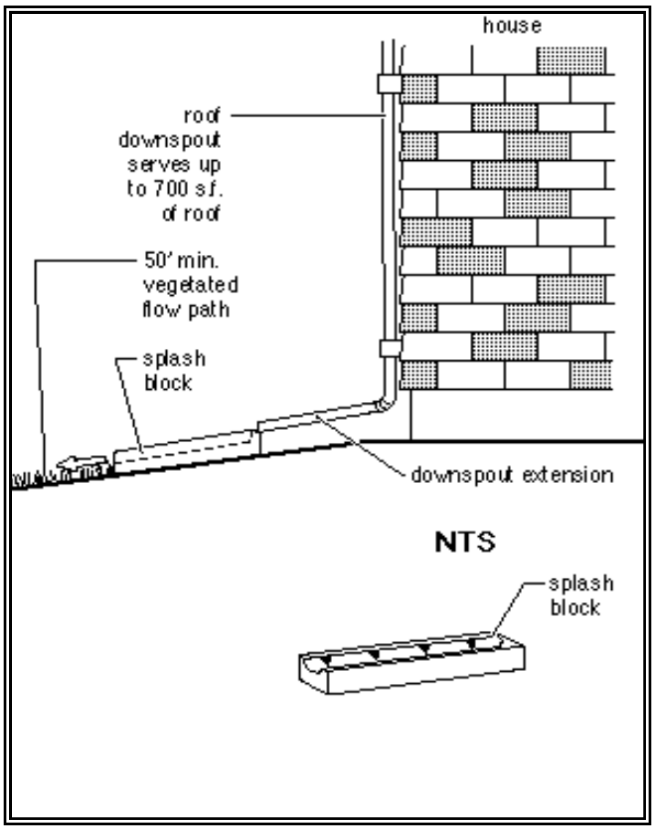

Figure 5.3 – Typical Downspout Splashblock Dispersion

Additional Design Criteria for Dispersion Trenches

- A vegetated flowpath of at least 25 feet in length must be maintained between the outlet of the trench and any property line, structure, stream, wetland, or impervious surface. A vegetated flowpath of at least 50 feet in length must be maintained between the outlet of the trench and any steep slope. Sensitive area buffers may count towards flowpath lengths.
- Trenches serving up to 700 square feet of roof area may be simple 10-foot-long by 2-foot wide gravel filled trenches as shown on Figure 5-1. For roof areas larger than 700 square feet, a dispersion trench with notched grade board as shown in Figure 5-2 may be used as approved by the Local Plan Approval Authority. The total length of this design must provide at least 10 feet of trench per 700 square feet of roof area and not exceed 50 feet.
- A setback of at least 5 feet must be maintained between any edge of the trench and any structure or property line.
- No erosion or flooding of downstream properties may result.

- Runoff discharged towards landslide hazard areas must be evaluated by a geotechnical engineer or qualified geologist. The discharge point may not be placed on or above slopes greater than 20% or above erosion hazard areas without evaluation by a geotechnical engineer or qualified geologist and jurisdiction approval.
- For sites with septic systems, the discharge point must be downgradient of the drainfield primary and reserve areas. This requirement can be waived by the jurisdiction's permit review staff if site topography will clearly prohibit flows from intersecting the drainfield.
- For purposes of maintaining adequate separation of flows discharged from adjacent dispersion devices, the outer edge of the vegetated flowpath segment for the dispersion trench must not overlap with other flowpath segments, except those associated with sheet flow from a non-native impervious surface.

Additional Design Criteria for Splashblocks

In general, if the ground is sloped away from the foundation, and there is adequate vegetation and area for effective dispersion, splashblocks will adequately disperse storm runoff. If the ground is fairly level, if the structure includes a basement, or if foundation drains are proposed, splashblocks with downspout extensions may be a better choice because the discharge point is moved away from the foundation. Downspout extensions can include piping to a splashblock/discharge point a considerable distance from the downspout, as long as the runoff can travel through a well-vegetated area as described below.

The following conditions must be met to use splashblocks:

- A vegetated flowpath of at least 50 feet must be maintained between the discharge point and any property line, structure, steep slope, stream, wetland, lake, or other impervious surface. Sensitive area buffers may count toward flowpath lengths.
- For purposes of maintaining adequate separation of flows discharged from adjacent dispersion devices, the vegetated flowpath segment for the splashblock must not overlap with other flowpath segments, except those associated with sheet flow from a non-native impervious surface.
- A maximum of 700 square feet of roof area may drain to each splashblock.
- A splashblock or a pad of crushed rock (2 feet wide by 3 feet long by 6 inches deep) shall be placed at each downspout discharge point.
- No erosion or flooding of downstream properties may result.

- Runoff discharged towards landslide hazard areas must be evaluated by a geotechnical engineer or qualified geologist. Splashblocks may not be placed on or above slopes greater than 20% or above erosion hazard areas without evaluation by a geotechnical engineer or qualified geologist and approval by the Local Plan Approval Authority.
- For sites with septic systems, the discharge point must be downslope of the primary and reserve drainfield areas. This requirement can be waived by the Local Plan Approval Authority if site topography clearly prohibits flows from intersecting the drainfield.

BMP T5.11 Concentrated Flow Dispersion

Purpose and Definition

Dispersion of concentrated flows from driveways or other pavement through a vegetated pervious area attenuates peak flows by slowing entry of the runoff into the conveyance system, allows for some infiltration, and provides some water quality benefits. See Figure 5.4.

Applications and Limitations

- Any situation where concentrated flow can be dispersed through vegetation.
- Dispersion for driveways will generally only be effective for single-family residences on large lots and in rural short plats. Lots proposed by short plats in urban areas will generally be too small to provide effective dispersion of driveway runoff.
- Figure 5.4 shows two possible ways of spreading flows from steep driveways.

Design Guidelines

- A vegetated flowpath of at least 50 feet should be maintained between the discharge point and any property line, structure, steep slope, stream, lake, wetland, lake, or other impervious surface.
- A maximum of 700 square feet of impervious area may drain to each dispersion BMP.
- A pad of crushed rock (2 feet wide by 3 feet long by 6 inches deep) shall be placed at each discharge point.
- No erosion or flooding of downstream properties may result.
- Runoff discharged towards landslide hazard areas must be evaluated by a geotechnical engineer or qualified geologist. The discharge point shall not be placed on or above slopes greater than 20% or above erosion hazard areas without evaluation by a geotechnical engineer or qualified geologist and approval by the Local Plan Approval Authority.
- For sites with septic systems, the discharge point ~~should~~ must be downgradient of the drainfield primary and reserve areas. This requirement may be waived by the Local Plan Approval Authority if site topography clearly prohibits flows from intersecting the drainfield.

Flow Credits

Where BMP T5.11 is used to disperse runoff into an undisturbed native landscape area or an area that meets BMP T5.13, and the vegetated flow path is at least 50 feet, the impervious area may be modeled as landscaped area. This is done in the WWHM ~~by~~ on the Mitigated Scenario screen by

entering the dispersed impervious area into one of the entry options for dispersal of impervious area runoff.

~~entering the impervious area into the" landscaped area" field~~.

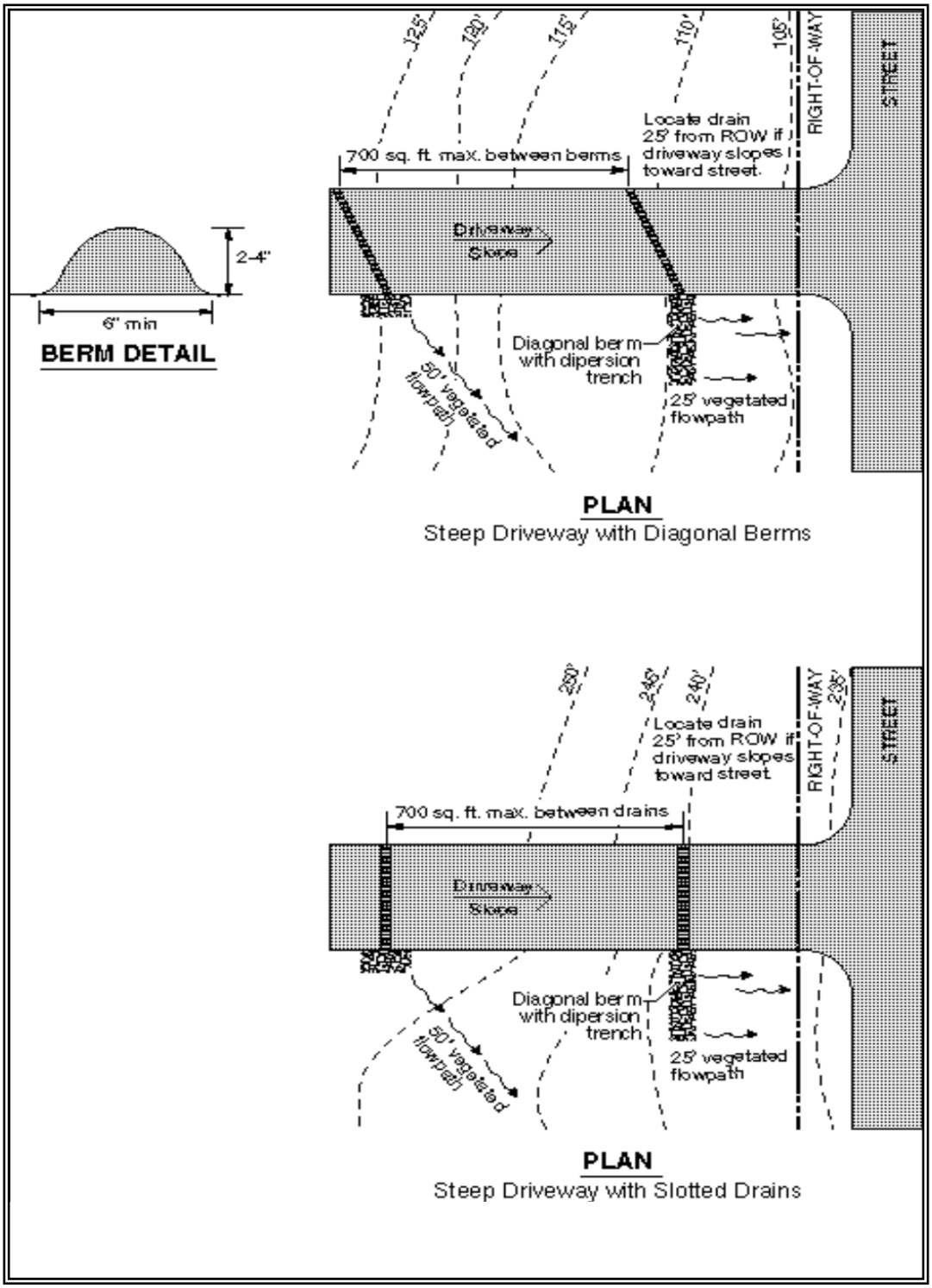

Figure 5.4 – Typical Concentrated Flow Dispersion for Steep Driveways

BMP T5.12 Sheet Flow Dispersion

Purpose and Definition

Sheet flow dispersion is the simplest method of runoff control. This BMP can be used for any impervious or pervious surface that is graded so as to avoid concentrating flows. Because flows are already dispersed as they leave the surface, they need only traverse a narrow band of adjacent vegetation for effective attenuation and treatment.

Applications and Limitations

Flat or moderately sloping (<15% slope) impervious surfaces such as driveways, sport courts, patios, and roofs without gutters; sloping cleared areas that are comprised of bare soil, non-native landscaping, lawn, and/or pasture; or any situation where concentration of flows can be avoided.

Design Guidelines

- See Figure 5.5 for details for driveways.
- A 2-foot-wide transition zone to discourage channeling should be provided between the edge of the driveway pavement and the downslope vegetation, or under building eaves. This may be an extension of subgrade material (crushed rock), modular pavement, drain rock, or other material acceptable to the Local Plan Approval Authority.
- A vegetated buffer width of 10 feet of vegetation must be provided for up to 20 feet of width of paved or impervious surface. An additional ~~5~~10 feet of width must be added for each addition 20 feet of width or fraction thereof.
- A vegetated buffer width of 25 feet of vegetation must be provided for up to 150 feet of contributing cleared area (i.e., bare soil, non-native landscaping, lawn, and/or pasture). Slopes within the 25-foot minimum flowpath through vegetation should be no steeper than 8 percent. If this criterion cannot be met due to site constraints, the 25-foot flowpath length must be increased 1.5 feet for each percent increase in slope above 8%.
- No erosion or flooding of downstream properties may result.
- Runoff discharge toward landslide hazard areas must be evaluated by a geotechnical engineer or a qualified geologist. The discharge point may not be placed on or above slopes greater than 20% or above erosion hazard areas without evaluation by a geotechnical engineer or qualified geologist and approval by the Local Plan Approval Authority.
- For sites with septic systems, the discharge point must be downgradient of the drainfield primary and reserve areas. This requirement may be waived by the Local Plan Approval Authority if site topography clearly prohibits flows from intersecting the drainfield.

Flow Credits

Where BMPT5.12 is used to disperse runoff into an -undisturbed native landscape area or an area that meets BMP T5.13, the impervious area may be modeled as landscaped area. This is done in the WWHM on the Mitigation Scenario screen by entering the dispersed impervious area into one of the entry options for dispersal of impervious area runoff. ~~by entering the impervious area into the" landscaped area" field.~~

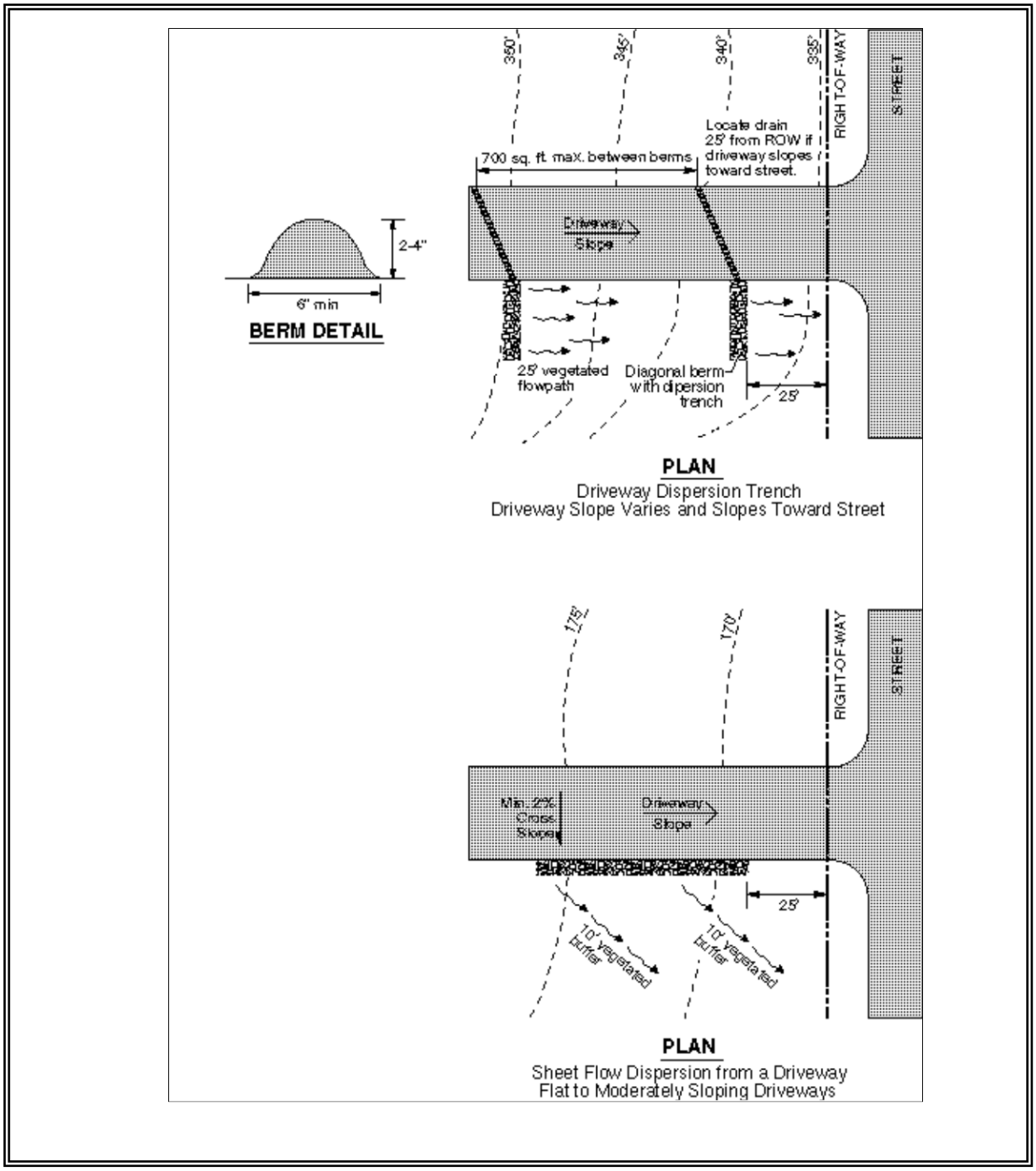

Figure 5.5 – Sheet Flow Dispersion for Driveways

BMP T5.13 Post-Construction Soil Quality and Depth

Purpose and Definition

Naturally occurring (undisturbed) soil and vegetation provide important stormwater functions including: water infiltration; nutrient, sediment, and pollutant adsorption; sediment and pollutant biofiltration; water interflow storage and transmission; and pollutant decomposition. These functions are largely lost when development strips away native soil and vegetation and replaces it with minimal topsoil and sod. Not only are these important stormwater functions lost, but such landscapes themselves become pollution- generating pervious surfaces due to increased use of pesticides, fertilizers and other landscaping and household/industrial chemicals, the concentration of pet wastes, and pollutants that accompany roadside litter.

Establishing soil quality and depth regains greater stormwater functions in the post development landscape, provides increased treatment of pollutants and sediments that result from development and habitation, and minimizes the need for some landscaping chemicals, thus reducing pollution through prevention.

Applications and Limitations

Establishing a minimum soil quality and depth is not the same as preservation of naturally occurring soil and vegetation. However, establishing a minimum soil quality and depth will provide improved on-site management of stormwater flow and water quality.

Soil organic matter can be attained through numerous materials such as compost, composted woody material, biosolids, and forest product residuals. It is important that the materials used to meet the soil quality and depth BMP be appropriate and beneficial to the plant cover to be established. Likewise, it is important that imported topsoils improve soil conditions and do not have an excessive percent of clay fines.

Design Guidelines

- Soil retention. ~~The duff layer and native topsoil should be r~~Retain~~ed~~, in an undisturbed state, the duff layer and native topsoil to the maximum extent practicable. ~~-~~In any areas requiring grading remove and stockpile the duff layer and topsoil on site in a designated, controlled area, not adjacent to public resources and critical areas, to be reapplied to other portions of the site where feasible.

- Soil quality. All areas subject to clearing and grading that have not been covered by impervious surface, incorporated into a drainage facility or engineered as structural fill or slope shall, at project completion, demonstrate the following:

  1. A topsoil layer with a minimum organic matter content of 10%~~ten percent~~ dry weight in planting beds, and 5% organic matter content in turf areas, and a pH from 6.0 to 8.0 or matching the pH of the

~~original~~ undisturbed soil. The topsoil layer shall have a minimum depth of eight inches except where tree roots limit the depth of incorporation of amendments needed to meet the criteria. Subsoils below the topsoil layer should be scarified at least 4 inches with some incorporation of the upper material to avoid stratified layers, where feasible.

2. Planting beds must be mulched with 2 inches of organic material
3. Quality of compost and other materials used to meet the organic content requirements:
   a. The organic content for "pre-approved" amendment rates can be met only using compost that meets the definition of "composted materials" in WAC 173-350-220. This code is available online at: http://www.ecy.wa.gov/programs/swfa/facilities/350.html

      The compost must also have an organic matter content of 35% to 65%, and a carbon to nitrogen ratio below 25:1.

      The carbon to nitrogen ratio may be as high as 35:1 for plantings composed entirely of plants native to the Puget Sound Lowlands region.

   b. Calculated amendment rates may be met through use of composted materials as defined above; or other organic materials amended to meet the carbon to nitrogen ratio requirements, and meeting the contaminant standards of Grade A Compost.

The resulting soil should be conducive to the type of vegetation to be established.

- Implementation Options: The soil quality design guidelines listed above can be met by using one of the methods listed below
  1. Leave undisturbed native vegetation and soil, and protect from compaction during construction
  2. Amend existing site topsoil or subsoil either at default "pre-approved" rates, or at custom calculated rates based on specifiers tests of the soil and amendment
  3. Stockpile existing topsoil during grading, and replace it prior to planting. Stockpiled topsoil must also be amended if needed to meet the organic matter or depth requirements, either at a default "pre-approved" rate or at a custom calculated rate.
  4. Import topsoil mix of sufficient organic content and depth to meet the requirements.

More than one method may be used on different portions of the same site. Soil that already meets the depth and organic matter quality standards, and is not compacted, does not need to be amended.

Planning/Permitting/Inspection/Verification Guidelines & Procedures

- Local governments are encouraged to adopt guidelines and procedures similar to those recommended in Guidelines and Resources For Implementing Soil Quality and Depth BMP T5.13 in WDOE Stormwater Management Manual for Western Washington. This document is available at http://www.soilsforsalmon.org.

Maintenance

- Establish ~~S~~soil quality and depth ~~should be established~~ toward the end of construction and once established, ~~should be~~ protect~~ed~~ from compaction, such as from large machinery use, and from erosion.
- Plans and mulch ~~S~~soil ~~should be planted and mulched~~ after installation.
- Leave ~~P~~plant debris or its equivalent ~~should be left~~ on the soil surface to replenish organic matter.
- Reduce and adjust, where possible, ~~It should be possible to reduce~~ the use of irrigation, fertilizers, herbicides and pesticides~~. These activities should be adjusted where possible~~, rather than continuing to implement formerly established practices.

Flow Reduction Credits

Areas meeting the design guidelines may be entered into approved runoff models as “Pasture” rather than “Lawn.”

Flow reduction credits can be taken in runoff modeling when BMP T5.13 is used as part of a dispersion design under the conditions described in:

BMP T5.10 Downspout Di~~v~~sp~~ersion~~

BMP T5.11 Concentrated Flow Dispersion

BMP T5.12 Sheet Flow Dispersion

Chapter III, Appendix III-C, Section 7.5: Reverse Slope Sidewalks

Chapter III, Appendix III-C, Section 7.2.4: Road projects

BMP T5.14 Rain Gardens

Purpose and Definition

Applications and Limitations

Design Guidelines

Maintenance

Reader could be directed to the latest edition of the "Rain Garden Handbook for Western Washington Homeowners," published by the Pierce County Extension Office of Washington State University.

BMP T5.15 Permeable Pavements

Purpose and Definition

Applications and Limitations

Design Guidelines

Maintenance

The design guidance from the Low Impact Development Technical Guidance Manual should be used for design details. Local governments can adopt alternative design criteria. As long as those criteria do not conflict with the critical design criteria identified in Appendix III-C, the permeable pavement may be entered into approved runoff models as indicated in Appendix III-C.

BMP T5.30 Full Dispersion

Purpose and Definition

This BMP allows for "fully dispersing" runoff from impervious surfaces and cleared areas of development sites that protect at least 65% of the site (or a threshold discharge area on the site) in a forest or native condition.

Applications and Limitations

- Rural single family residential developments should use these dispersion BMPs wherever possible to minimize effective impervious surface to less than 10% of the development site.

- Other types of development that retain 65% of the site (or a threshold discharge area on the site) in a forested or native condition may also use these BMPs to avoid triggering the flow control facility requirement.

- The preserved area may be a previously cleared area that has been replanted in accordance with native vegetation landscape specifications described within this BMP.

- The preserved area should be situated to minimize the clearing of existing forest cover, to maximize the preservation of wetlands (though the wetland area and any streams and lakes do not count toward the 65% forest or native condition area), and to buffer stream corridors.
- The preserved area should be placed in a separate tract or protected through recorded easements for individual lots.
- The preserved area should be shown on all property maps and should be clearly marked during clearing and construction on the site.
- All trees within the preserved area at the time of permit application shall be retained, aside from approved timber harvest activities and the removal of dangerous or diseased trees.
- The preserved area may be used for passive recreation and related facilities, including pedestrian and bicycle trails, nature viewing areas, fishing and camping areas, and other similar activities that do not require permanent structures, provided that cleared areas and areas of compacted soil associated with these areas and facilities do not exceed eight percent of the preserved area.
- The preserved area may contain utilities and utility easements, but not septic systems.

Minimum Design Requirements

Developments that preserve 65% of a site (or a threshold discharge area of a site) in a forested or native condition, can disperse runoff from the developed portion of the site into the native vegetation area as long as the developed areas draining to the native vegetation do not have impervious areas that exceed 10% of the entire site.

Developments that maintain ratios of:
> 65% forested or native condition; and
< 10% effective impervious surface of the area draining into the native vegetation area may disperse runoff into the native area. Examples of such ratios are:

% Native Vegetation Preserved (min. allowed)	% Effective Impervious* (max. allowed)	% Lawn/Landscape (max. allowed)*
65	10	35
60	9	40
55	8.5	45
50	8	50
45	7	55
40	6	60
35	5.5	65

* These lawn/landscape areas shall be developed using BMP T5.13. Within the context of this dispersion option, the only impervious surfaces that are ineffective are those that are routed into an appropriately sized dry well or into an infiltration basin that meets the flow control standard and does not overflow into the forested or native vegetation area.

Runoff must be dispersed into the native area in accordance with one or more of the dispersion devices, and in accordance with the design criteria and limits for those devices, cited in this BMP . Additional impervious areas are allowed, but should not drain to the native vegetation area and are subject to the thresholds, treatment and flow control requirements of this stormwater manual.

A native vegetation flow path of at least 100 feet in length (25 feet for sheet flow from a non-native pervious surface) must be available along the flowpath that runoff would follow upon discharge from a dispersion device cited in this BMP. The native vegetated flowpath must meet all of the following criteria:

- The flow path must be over native vegetated surface
- The flow path must be on-site or in an offsite trct or easement area reserved for such dispersion
- The slope of the flowpath must be no steeper than 15% for any 20-foot reach of the flowpath.
- The flowpath must be located between the dispersion device and any downstream draianage feature such as a pipe, ditch, stream, river, pond, lake, or wetland.
- The flowpaths for adjacent dispersion devices must be sufficiently spaced to prevent overlap of flows in the flowpath areas.

For sites with on-site sewage disposal systems, the discharge of runoff from dispersion devices must be located downslope of the primary and reserve drainfield areas. This requirement may be waived by the permitting jurisdiction ifsite topography clearly prevents discharged flows from intersecting the drainfield.

Dispersion devices are not allowed in critical area buffers or on slopes steeper than 20%. Dispersion devices proposed on slopes steeper than 15% or within 50 feet of a geologically hazardous area (RCW 36.70A.030(5) must be approved by a geotechnical engineer or engineering geologist.

The dispersion of runoff must not creat flooding or erosion impacts.

- **Roof Downspouts**

  Roof surfaces that comply with the downspout infiltration requirements in Volume III, Chapter 3, are considered to be "fully infiltrated" (i.e., zero percent effective imperviousness). All other roof surfaces are considered to be "fully dispersed" (i.e., at or approaching zero percent effective imperviousness) only if they are within a threshold discharge area that is or will be more than 65% forested (or native vegetative cover) and less than 10% impervious (total), AND if they comply with the downspout dispersion requirements of BMP T5.10, and have vegetated flow paths through native vegetation exceeding 100 feet.

- **Driveway Dispersion**

  Driveway surfaces are considered to be "fully dispersed" if they are within a threshold discharge area that is or will be more than 65% forested (or native vegetative cover) and less than 10% impervious (total), AND if they comply with the driveway dispersion BMPs – BMP 5.11 and BMP T5.12 - and have flow paths through native vegetation exceeding 100 feet. This also holds true for any driveway surfaces that comply with the roadway dispersion BMPs described below.

- **Roadway Dispersion BMPs**

  Roadway surfaces are considered to be "fully dispersed" if they are within a threshold discharge area that is or will be more than 65% forested (or native vegetative cover) and less than 10% impervious (total), AND if they comply with the following dispersion requirements:

  1. To the extent feasible, driveways should be dispersed to the same standards as roadways to ensure adequate water quality protection of downstream resources.
  2. The road section shall be designed to minimize collection and concentration of roadway runoff. Sheet flow over roadway fill slopes (i.e., where roadway subgrade is above adjacent right-of-way) should be used wherever possible to avoid concentration.
  3. When it is necessary to collect and concentrate runoff from the roadway and adjacent upstream areas (e.g., in a ditch on a cut slope), concentrated flows shall be incrementally discharged from the ditch via cross culverts or at the ends of cut sections. These incremental discharges of newly concentrated flows shall not exceed 0.5 cfs at any one discharge point from a ditch for the 100-year runoff event. Where flows at a particular ditch discharge point were already concentrated under existing site conditions (e.g., in a natural channel that crosses the roadway alignment), the 0.5-cfs limit would be in addition to the existing concentrated peak flows.
  4. Ditch discharge points with up to 0.2 cfs discharge for the peak 100-year flow shall use rock pads or dispersion trenches to disperse flows. Ditch discharge points with between 0.2 and 0.5 cfs discharge for the 100-year peak flow shall use only dispersion trenches to disperse flows.
  5. Dispersion trenches shall be designed to accept surface flows (free discharge) from a pipe, culvert, or ditch end, shall be aligned perpendicular to the flowpath, and shall be minimum 2 feet by 2 feet in section, 50 feet in length, filled with ¾-inch to 1½-inch washed rock, and provided with a level notched grade board (see Figure 5.2). Manifolds may be used to split flows up to 2 cfs discharge for the 100-year peak flow between up to 4 trenches. Dispersion trenches shall have a minimum spacing of 50 feet.
  6. Flowpaths from adjacent discharge points must not intersect within the 100-foot flowpath lengths, and dispersed flow from a discharge point must not be intercepted by another discharge point. To enhance the flow control and water quality effects of dispersion, the flowpath shall not exceed 15% slope, and shall be located within designated open space.

Note: Runoff may be conveyed to an area meeting these flowpath criteria.

7. Ditch discharge points shall be located a minimum of 100 feet upgradient of steep slopes (i.e., slopes steeper than 40%), wetlands, and streams.
8. Where the Local Plan Approval Authority determines there is a potential for significant adverse impacts downstream (e.g., erosive steep slopes or existing downstream drainage problems), dispersion of roadway runoff may not be allowed, or other measures may be required.

- **Cleared Area Dispersion BMPs**

The runoff from cleared areas that are comprised of bare soil, non-native landscaping, lawn, and/or pasture is considered to be "fully dispersed" if it is dispersed through at least 25 feet of native vegetation in accordance with the following criteria:

1. The contributing flowpath of cleared area being dispersed must be no more than 150 feet, AND
2. Slopes within the 25-foot minimum flowpath through native vegetation should be no steeper than 8%. If this criterion can not be met due to site constraints, the 25-foot flowpath length must be increased 1.5 feet for each percent increase in slope above 8%.

- **Native Vegetation Landscaped Areas**

This section to be completed in the final to identify critical soil, vegetation, topographic, and runoff characteristics that are typical in a native landscape. The purpose is to allow a re-claimed site to serve as the "preserved area" in a full dispersion proposal.

5.3.2 Site Design BMPs

The two BMPs in this section are general practices for design and maintenance at the site.

BMP T5.20 Preserving Natural Vegetation

Purpose and Definition

Preserving natural vegetation on-site to the maximum extent practicable will minimize the impacts of development on stormwater runoff. Preferably 65 percent or more of the development site should be protected for the purposes of retaining or enhancing existing forest cover and preserving wetlands and stream corridors.

Applications and Limitations

New development often takes place on tracts of forested land. In fact, building sites are often selected because of the presence of mature trees. However, unless sufficient care is taken and planning done, in the interval between buying the property and completing construction much of this resource is likely to be destroyed. The property owner is ultimately responsible for protecting as many trees as possible, with their understory and groundcover. This responsibility is usually exercised by agents, the planners, designers and contractors. It takes 20 to 30 years for newly planted trees to provide the benefits for which trees are so highly valued.

Forest and native growth areas allow rainwater to naturally percolate into the soil, recharging ground water for summer stream flows and reducing surface water runoff that creates erosion and flooding. Conifers can hold up to about 50 percent of all rain that falls during a storm. Twenty to 30 percent of this rain may never reach the ground but evaporates or is taken up by the tree. Forested and native growth areas also may be effective as stormwater buffers around smaller developments.

On lots that are one acre or greater, preservation of 65 percent or more of the site in natural vegetation will allow the use of full dispersion techniques presented in BMP T5.30. Sites that can fully disperse are not required to provide runoff treatment or flow control facilities.

Design Guidelines

- The preserved area should be situated to minimize the clearing of existing forest cover, to maximize the preservation of wetlands, and to buffer stream corridors.
- The preserved area should be placed in a separate tract or protected through recorded easements for individual lots.
- If feasible, the preserved area should be located downslope from the building sites, since flow control and water quality are enhanced by flow dispersion through duff, undisturbed soils, and native vegetation.
- The preserved area should be shown on all property maps and should be clearly marked during clearing and construction on the site.

Maintenance

- Vegetation and trees should not be removed from the natural growth retention area, except for approved timber harvest activities and the removal of dangerous and diseased trees.

BMP T5.21 Better Site Design

Purpose and Definition

Fundamental hydrological concepts and stormwater management concepts can be applied at the site design phase that are:

- more integrated with natural topography,
- reinforce the hydrologic cycle,
- more aesthetically pleasing, and
- often less expensive to build.

A few site planning principles help to locate development on the least sensitive portions of a site and accommodate residential land use while mitigating its impact on stormwater quality.

Design Guidelines

- **Define Development Envelope and Protected Areas -** The first step in site planning is to define the development envelope. This is done by identifying protected areas, setbacks, easements and other site features, and by consulting applicable local standards and requirements. Site features to be protected may include important existing trees, steep slopes, erosive soils, riparian areas, or wetlands.

  By keeping the development envelope compact, environmental impacts can be minimized, construction costs can be reduced, and many of the site's most attractive landscape features can be retained. In some cases, economics or other factors may not allow avoidance of all sensitive areas. In these cases, care can be taken to mitigate the impacts of development through site work and other landscape treatments.

- **Minimize Directly Connected Impervious Areas -** Impervious areas directly connected to the storm drain system are the greatest contributors to urban nonpoint source pollution. Any impervious surface that drains into a catch basin or other conveyance structure is a "directly connected impervious surface." As stormwater runoff flows across parking lots, roadways, and other paved areas, the oil, sediment, metals, and other pollutants are collected and concentrated. If this runoff is collected by a drainage structure and carried directly along impervious gutters or in sealed underground pipes, it has no opportunity for filtering by plant material or infiltration into the soil. It also increases in velocity and amount, causing increased peak-flows in the winter and decreased base-flows in the summer.

A basic site design principle for stormwater management is to minimize these directly connected impervious areas. This can be done by limiting overall impervious land coverage or by infiltrating and/or dispersing runoff from these impervious areas.

- **Maximize Permeability -** Within the development envelope, many opportunities are available to maximize the permeability of new construction. These include minimizing impervious areas, paving with permeable materials, clustering buildings, and reducing the land coverage of buildings by smaller footprints. All of these strategies make more land available for infiltration and dispersion through natural vegetation.

  Clustered driveways, small visitor parking bays and other strategies can also minimize the impact of transportation-related surfaces while still providing adequate access.

  Once site coverage is minimized through clustering and careful planning, pavement surfaces can be selected for permeability. A patio of brick-on-sand, for example, is more permeable than a large concrete slab. Engineered soil/landscape systems are permeable ground covers suitable for a wide variety of uses. Permeable/porous pavements can be used in place of traditional concrete or asphalt pavements in many low traffic applications.

  Maximizing permeability at every possible opportunity requires the integration of many small strategies. These strategies will be reflected at all levels of a project, from site planning to materials selection. In addition to the environmental and aesthetic benefits, a high-permeability site plan may allow the reduction or elimination of expensive runoff underground conveyance systems, flow control and treatment facilities, yielding significant savings in development costs.

- **Build Narrower Streets -** More than any other single element, street design has a powerful impact on stormwater quantity and quality. In residential development, streets and other transportation-related structures typically can comprise between 60 and 70 percent of the total impervious area, and, unlike rooftops, streets are almost always directly connected to the stormwater conveyance system.

  The combination of large, directly connected impervious areas, together with the pollutants generated by automobiles, makes the street network a principal contributor to stormwater pollution in residential areas.

  Street design is usually mandated by local municipal standards. These standards have been developed to facilitate efficient automobile traffic

and maximize parking. Most require large impervious land coverage. In recent years, new street standards have been gaining acceptance that meet the access requirements of local residential streets while reducing impervious land coverage. These standards generally create a new class of street that is narrower than the current local street standard, called an "access" street. An access street is intended only to provide access to a limited number of residences.

Because street design is the greatest factor in a residential development's impact on stormwater quality, it is important that designers, municipalities and developers employ street standards that reduce impervious land coverage.

- **Maximize Choices for Mobility -** Given the costs of automobile use, both in land area consumed and pollutants generated, maximizing choices for mobility is a basic principle for environmentally responsible site design. By designing residential developments to promote alternatives to automobile use, a primary source of stormwater pollution can be mitigated.

  Bicycle lanes and paths, secure bicycle parking at community centers and shops, direct, safe pedestrian connections, and transit facilities are all site-planning elements that maximize choices for mobility.

- **Use Drainage as a Design Element -** Unlike conveyance storm drain systems that hide water beneath the surface and work independently of surface topography, a drainage system for stormwater infiltration or dispersion can work with natural land forms and land uses to become a major design element of a site plan.

  By applying stormwater management techniques early in the site plan development, the drainage system can suggest pathway alignments, optimum locations for parks and play areas, and potential building sites. In this way, the drainage system helps to generate urban form, giving the development an integral, more aesthetically pleasing relationship to the natural features of the site. Not only does the integrated site plan complement the land, it can also save on development costs by minimizing earthwork and expensive drainage features.

Resource Material

Start at the Source. Residential Site Planning & Design Guidance Manual for Stormwater Quality Protection. Bay Area Stormwater Management Agencies Association. January 1997.

Site Planning for Urban Stream Protection. Center for Watershed Protection. December, 1995.

Better Site Design: A Handbook for Changing Development Rules in Your Community. Center for Watershed Protection. August 1998.

http://www.stormwatercenter.net

~~5.3.3 Other Practices~~

~~The BMPs described in this section are other general practices for on-site treatment of stormwater.~~

~~BMP T5.30 Full Dispersion~~

~~Purpose and Definition~~

~~This BMP allows for "fully dispersing" runoff from impervious surfaces and cleared areas of development sites that protect at least 65% of the site (or a threshold discharge area on the site) in a forest or native condition.~~

~~Applications and Limitations~~

- ~~Rural single family residential developments should use these dispersion BMPs wherever possible to minimize effective impervious surface to less than 10% of the development site.~~

- ~~Other types of development that retain 65% of the site (or a threshold discharge area on the site) in a forested or native condition may also use these BMPs to avoid triggering the flow control facility requirement.~~

- ~~The preserved area should be situated to minimize the clearing of existing forest cover, to maximize the preservation of wetlands (though the wetland area and any streams and lakes do not count toward the 65% forest or native condition area), and to buffer stream corridors.~~

- ~~The preserved area should be placed in a separate tract or protected through recorded easements for individual lots.~~

- ~~The preserved area should be shown on all property maps and should be clearly marked during clearing and construction on the site.~~

- ~~All trees within the preserved area at the time of permit application shall be retained, aside from approved timber harvest activities and the removal of dangerous or diseased trees.~~

- ~~The preserved area may be used for passive recreation and related facilities, including pedestrian and bicycle trails, nature viewing areas, fishing and camping areas, and other similar activities that do not require permanent structures, provided that cleared areas and areas of compacted soil associated with these areas and facilities do not exceed eight percent of the preserved area.~~

~~Design Guidelines~~

- ~~**Roof Downspouts**~~

  ~~Roof surfaces that comply with the downspout infiltration requirements in Volume III, Chapter 3, are considered to be "fully dispersed" (i.e., zero percent effective imperviousness). All other roof surfaces are considered to be "fully dispersed" (i.e., at or approaching zero percent effective imperviousness) only if they are within a threshold discharge area that is or will be more than 65% forested (or native vegetative cover) and less than 10% impervious (total), AND if they comply with the downspout dispersion requirements of BMP T5.10, and have vegetated flow paths through native vegetation exceeding 100 feet.~~

- ~~**Driveway Dispersion**~~

  ~~Driveway surfaces are considered to be "fully dispersed" if they are within a threshold discharge area that is or will be more than 65% forested (or native vegetative cover) and less than 10% impervious (total), AND if they comply with the driveway dispersion BMPs – BMP 5.11 and BMP T5.12 - and have flow paths through native vegetation exceeding 100 feet. This also holds true for any driveway surfaces that comply with the roadway dispersion BMPs described below.~~

- ~~**Roadway Dispersion BMPs**~~

  ~~Roadway surfaces are considered to be "fully dispersed" if they are within a threshold discharge area that is or will be more than 65% forested (or native vegetative cover) and less than 10% impervious (total), AND if they comply with the following dispersion requirements:~~

  1. ~~Roadway runoff dispersion is allowed only on rural neighborhood collectors and local access streets. To the extent feasible, driveways should be dispersed to the same standards as roadways to ensure adequate water quality protection of downstream resources.~~

  2. ~~The road section shall be designed to minimize collection and concentration of roadway runoff. Sheet flow over roadway fill slopes (i.e., where roadway subgrade is above adjacent right-of-way) should be used wherever possible to avoid concentration.~~

  3. ~~When it is necessary to collect and concentrate runoff from the roadway and adjacent upstream areas (e.g., in a ditch on a cut slope), concentrated flows shall be incrementally discharged from the ditch via cross culverts or at the ends of cut sections. These incremental discharges of newly concentrated flows shall not~~

~~exceed 0.5 cfs at any one discharge point from a ditch for the 100-year runoff event. Where flows at a particular ditch discharge point were already concentrated under existing site conditions (e.g., in a natural channel that crosses the roadway alignment), the 0.5-cfs limit would be in addition to the existing concentrated peak flows.~~

4. ~~Ditch discharge points with up to 0.2 cfs discharge for the peak 100-year flow shall use rock pads or dispersion trenches to disperse flows. Ditch discharge points with between 0.2 and 0.5 cfs discharge for the 100-year peak flow shall use only dispersion trenches to disperse flows.~~

5. ~~Dispersion trenches shall be designed to accept surface flows (free discharge) from a pipe, culvert, or ditch end, shall be aligned perpendicular to the flowpath, and shall be minimum 2 feet by 2 feet in section, 50 feet in length, filled with ¾-inch to 1½-inch washed rock, and provided with a level notched grade board (see Figure 5.2). Manifolds may be used to split flows up to 2 cfs discharge for the 100-year peak flow between up to 4 trenches. Dispersion trenches shall have a minimum spacing of 50 feet.~~

6. ~~After being dispersed with rock pads or trenches, flows from ditch discharge points must traverse a minimum of 100 feet of undisturbed native vegetation before leaving the project site, or entering an existing onsite channel carrying existing concentrated flows across the road alignment.~~

   ~~*Note: In order to provide the 100-foot flowpath length to an existing channel, some roadway runoff may unavoidably enter the channel undispersed. Also note that water quality treatment may be waived for roadway runoff dispersed through 100 feet of undisturbed native vegetation.*~~

7. ~~Flowpaths from adjacent discharge points must not intersect within the 100-foot flowpath lengths, and dispersed flow from a discharge point must not be intercepted by another discharge point. To enhance the flow control and water quality effects of dispersion, the flowpath shall not exceed 15% slope, and shall be located within designated open space.~~

   ~~*Note: Runoff may be conveyed to an area meeting these flowpath criteria.*~~

8. ~~Ditch discharge points shall be located a minimum of 100 feet upgradient of steep slopes (i.e., slopes steeper than 40%), wetlands, and streams.~~

9. ~~Where the Local Plan Approval Authority determines there is a potential for significant adverse impacts downstream (e.g., erosive steep slopes or existing downstream drainage problems),~~

~~dispersion of roadway runoff may not be allowed, or other measures may be required.~~

- ~~**Cleared Area Dispersion BMPs**~~

~~The runoff from cleared areas that are comprised of bare soil, non-native landscaping, lawn, and/or pasture is considered to be "fully dispersed" if it is dispersed through at least 25 feet of native vegetation in accordance with the following criteria:~~

1. ~~The contributing flowpath of cleared area being dispersed must be no more than 150 feet, AND~~
2. ~~Slopes within the 25-foot minimum flowpath through native vegetation should be no steeper than 8%. If this criterion can not be met due to site constraints, the 25-foot flowpath length must be increased 1.5 feet for each percent increase in slope above 8%.~~

Chapter 6 - Pretreatment

6.1 Purpose

This chapter presents the methods that may be used to provide pretreatment prior to basic or enhanced runoff treatment facilities. Pretreatment must be provided in the following applications:

- for sand filters ~~and media filtration~~ and infiltration BMPs to protect them from excessive siltation and debris
- where the basic treatment facility or the receiving water may be adversely affected by non-targeted pollutants (e.g., oil), or may by overwhelmed by a heavy load of targeted pollutants (e.g., suspended solids).

6.2 Application

Presettling basins are a typical pretreatment BMP used to remove suspended solids. All of the basic runoff treatment facilities may also be used for pretreatment to reduce suspended solids. Catchbasin inserts may be appropriate in some circumstances to provide oil or TSS control, depending on the type of insert. Some of the manufactured storm drain structures presented in Chapter 12 may also be used for pretreatment for oil or TSS reduction.

A detention pond sized to meet the flow control standard in Volume I may also be used to provide pretreatment for suspended solids removal.

6.3 Best Management Practices (BMPs) for Pretreatment

This Chapter has only one BMP - BMP T6.10 for presettling basins. Please use the Pretreatment link in Chapter 12 to access a listing and design criteria for various patented devices that have received a General Use Level Designation for Pretreatment through the TAPE program.

BMP T6.10 Presettling Basin

Purpose and Definition

A Presettling Basin provides pretreatment of runoff in order to remove suspended solids, which can impact other runoff treatment BMPs.

Application and Limitations

Runoff treated by a Presettling Basin may not be discharged directly to a receiving water; it must be further treated by a basic or enhanced runoff treatment BMP.

Design Criteria

1. A presettling basin shall be designed with a wetpool. The treatment volume shall be at least 30 percent of the total volume of runoff from the 6-month, 24-hour storm event.
2. If the runoff in the Presettling Basin will be in direct contact with the soil, it must be lined per the liner requirement in Section 4.4.
3. The Presettling Basin shall conform to the following:
   a) The length-to-width ratio shall be at least 3:1. Berms or baffles may be used to lengthen the flowpath.
   b) The minimum depth shall be 4 feet; the maximum depth shall be 6 feet.
4. Inlets and outlets shall be designed to minimize velocity and reduce turbulence. Inlet and outlet structures should be located at extreme ends of the basin in order to maximize particle-settling opportunities.

Site Constraints and Setbacks

Site constraints are any manmade restrictions such as property lines, easements, structures, etc. that impose constraints on development. Constraints may also be imposed from natural features such as requirements of the local government's Sensitive Areas Ordinance and Rules. These should also be reviewed for specific application to the proposed development.

All facilities shall be a minimum of 20 feet from any structure, property line, and any vegetative buffer required by the local government.

All facilities shall be 100 feet from any septic tank/drainfield (except wet vaults shall be a minimum of 20 feet).

All facilities shall be a minimum of 50 feet from any steep (greater than 15 percent) slope. A geotechnical report must address the potential impact of a wet pond on a steep slope.

Embankments that impound water must comply with the Washington State Dam Safety Regulations (Chapter 173-175 WAC). If the

impoundment has a storage capacity (including both water and sediment storage volumes) greater than 10 acre-feet (435,600 cubic feet or 3.26 million gallons) above natural ground level, then dam safety design and review are required by the Department of Ecology. See Volume III for more detail.

Chapter 7 - Infiltration and Bio-infiltration Treatment Facilities

7.1 Purpose

This Chapter provides site suitability, design, and maintenance criteria for infiltration treatment systems. Infiltration treatment Best Management Practices (BMPs) serve the dual purpose of removing pollutants (TSS, heavy metals, phosphates, and organics) ~~from stormwater~~ and recharging aquifers.

A stormwater infiltration treatment facility is an impoundment; typically a basin, trench, or bioretention ~~-infiltration~~ swale whose ~~underlying~~ soil removes pollutants from stormwater. The infiltration BMPs described in this chapter include:

BMP T7.10 Infiltration ~~b~~Basins
BMP T7.20 Infiltration ~~t~~Trenches
BMP T7.30 ~~Bio~~retention~~-infiltration~~ ~~s~~ Cells, Swales, and Planter Boxes
BMP T7.40 Compost-amended Vegetated Filter Strips

Infiltration treatment soils must contain sufficient organic matter and/or clays to sorb, decompose, and/or filter stormwater pollutants. Pollutant/soil contact time, soil sorptive capacity, and soil aerobic conditions are important design considerations.

To reduce duplication of design guidance, information regarding site criteria, infiltration rates, site suitability, and guidance of a general nature for these infiltration treatment BMPs has been moved to Chapter 3 of Volume III. Also, design details for infiltration basins and trenches have been moved to Chapter 3 of Volume III. The text in Chapter 3 has been modified to indicate where design guidance applies only to infiltration treatment systems, not infiltration facilities serving only a flow control function. Design details regarding BMP T7.30, Bioretention ~~-infiltration~~ swales and planter boxes, is retained in this chapter as the imported soil for that BMP serves primarily ~~only~~ a~~n infiltration~~ treatment function. If the exfiltrate of stormwater from the imported soil is allowed to infiltrate into the ground, the facility also serves a flow control function.

7.2 Application

These infiltration and bioretention~~-infiltration~~ treatment measures are capable of achieving the performance objectives cited in Chapter 3 for specific treatment menus. In general, these treatment techniques can capture and remove or reduce the target pollutants to levels that will not adversely affect public health or beneficial uses of surface and ground

water resources, and will not cause a violation of ground water quality standards.

Infiltration treatment systems are typically installed:

- As off-line systems, or on-line for small drainages
- As a polishing treatment for street/highway runoff after pretreatment for TSS and oil
- As part of a treatment train
- As retrofits at sites with limited land areas, such as residential lots, commercial areas, parking lots, and open space areas.
- With appropriate pretreatment for oil and silt control to prevent clogging. Appropriate pretreatment devices include a pre-settling basin, wet pond/vault, ~~biofilter,~~ constructed wetland, media filter, and oil/water separator.

An infiltration basin is preferred~~, where applicable, and where~~over a trench for ease of maintenance reasons. ~~or bio-infiltration swale cannot be sufficiently maintained.~~

7.3 General Considerations

Please refer~~ence~~ to ~~-~~Section 3.3 of Volume III.

7.4 Best Management Practices (BMPs) for Infiltration and Bio**retention**~~-infiltration~~ Treatment

The three BMPs discussed below are recognized currently as effective treatment techniques using infiltration and bioretetention~~-infiltration~~. Selection of a specific BMP should be coordinated with the Treatment Facility Menus provided in Chapter 3.

BMP T7.10 Infiltration Basins

The design criteria for infiltration basins for treatment are in the following ~~See S~~sections of Volume III:

3.3.7: Site Suitability Criteria

3.3.9: General Design, Maintenance, and Construction Criteria for Infiltration Facilities

3.3.10: Infiltration Basins~~, Chapter 3, Volume III.~~

BMP T7.20 Infiltration Trenches

The design criteria for infiltration trenches for treatment are in the following sections of Volume III:

3.3.7: Site Suitability Criteria

3.3.9: General Design, Maintenance, and Construction Criteria for Infiltration Facilities

~~See section~~ 3.3.11: Infiltration Trenches ~~, Chapter 3, Volume III.~~

BMP T7.30 Bio retention ~~infiltration Swale~~ Cells, Swales, and Planter Boxes

Purpose

To provide effective removal of many stormwater pollutants, and provide reductions in stormwater runoff quantity and surface runoff flow rates. Where the surrounding native soils have adequate infiltration rates, bioretention can be used as a primary or supplemental retention system. Where the native soils have low infiltration rates, under-drain systems can be installed and the facility used to filter pollutants and detain flows that exceed infiltration capacity of the surrounding soil. However, designs utilizing under-drains provide less flow control benefits.

Description

Bioretention areas are shallow landscaped depressions, with a designed soil mix and plants adapted to the local climate and soil moisture conditions, that receive stormwater from a small contributing area.

The terms bioretention and raingarden are sometimes used interchangeably. However, for Washington State, the term bioretention is used to describe an engineered facility that includes designed soil mixes and perhaps under-drains and control structures. The term rain garden is used to describe a landscape feature to capture stormwater on small project sites. Rain gardens have less restrictive design criteria for the soil mix and usually do not include under-drains and other control structures. Both are applications of the same LID concept and can be highly effective for reducing surface runoff and removing pollutants.

The term, bioretention, is used to describe various designs using soil and plant complexes to manage stormwater. The following terminology is used in this manual:

- *Bioretention cells*: Shallow depressions with a designed planting soil mix and a variety of plant material, including trees, shrubs, grasses, and/or other herbaceous plants. Bioretention cells may or may not have an under-drain and are not designed as a conveyance system.

- *Bioretention swales*: Incorporate the same design features as bioretention cells; however, bioretention swales are designed as part of a system that can convey stormwater when maximum ponding depth is exceeded. Bioretention swales have relatively gentle side slopes and ponding depths that are typically 6 to 12 inches.

- *Bioretention planter boxes*: Designed soil mix and a variety of plant material including trees, shrubs, grasses, and/or other herbaceous plants within a vertical walled container usually constructed from formed concrete, but could include other materials. The planter may be completely impervious and include a bottom (must include an under-drain) or have an open bottom and allow infiltration to the subgrade. These designs are often used in ultra-urban settings.

Applications and Limitations:

Because Bioretention facilities use an imported soil mix that has a moderate design infiltration rate, they are best applied for small drainages, and near the source of the stormwater. Cells may be scattered throughout a subdivision; a swale may run alongside the access road; or a series of planter boxes may serve the road . In these situations, they can but are not required to fully meet the requirement to treat 91% of the stormwater runoff file from pollution-generating surfaces. But the amount of stormwater that is predicted to pass through the soil profile may be estimated and subtracted from the 91% volume that must be treated. Downstream treatment facilities may be significantly smaller as a result.

Bioretention facilities that infiltrate into the ground can also serve a significant flow reduction function. They can, but are not required to fully meet the flow control duration standard of Minimum Requirement #7. Because they typically do not have an orifice restricting overflow or underflow discharge rates, they typically don't fully meet Minimum Requirement #7. However, their performance contributes to meeting the standard, and that can result in much smaller flow control facilities at the bottom of the project site. When used in combination with other low impact development techniques, they can also help achieve compliance with the Performance Standard option of Minimum Requirement #5.

Applications with or without under-drains vary extensively and can be applied in new development, redevelopment and retrofits.Typical applications include:

- Individual lots for rooftop, driveway, and other on-lot impervious surface.
- Shared facilities located in common areas for individual lots.
- Areas within loop roads or cul-de-sacs.
- Landscaped parking lot islands.
- Within right-of-ways along roads (often linear bioretention swales and cells).

- Common landscaped areas in apartment complexes or other multifamily housing designs.
- Planters on building roofs, patios, and as part of streetscapes.

Site Suitability:

For a listing of site conditions that can make bioretention infeasible, please refer to Appendix I-G in Volume 1. The following listing explains some of those conditions, but also includes considerations related to aesthetics or functionality.

- Site topography: Based on geotechnical concerns, infiltration on slopes greater than 10 percent should only be considered with caution. The site assessment should clearly define any landslide and erosion critical areas and coastal bluffs and appropriate setbacks provided by the local jurisdiction. Thorough geotechnical analysis should be included when considering infiltration within or near slope setbacks. Depending on adjacent infrastructure (e.g. basements and subsurface utilities) and subgrade geology, geotechnical analysis may also be necessary on relatively low gradients.
- Depth-to-hydraulic restriction layer*:* separation to a hydraulic restriction layer (rock, highly compacted soil layer or water table) is an important design consideration for infiltration and flow control performance. Contamination of groundwater is an important factor when infiltrating stormwater; however, when determining depth to the water table the primary concern in the SWMMWW is infiltration capacity (as influenced by ground water mounding) and associated flow control performance. When properly designed and constructed the BSM will provide very good water quality treatment before infiltrated stormwater reaches the subgrade and then groundwater. The following are recommended minimum separations to groundwater:
    - A minimum separation of 1 foot from the seasonal high water mark to the bottom of the bioretention area is recommended where the contributing area of the bioretention has less than 5,000 square feet of pollution-generating impervious surface; and less than 10,000 square feet of impervious surface; and less than ¾ acres of lawn. Recommended separation distances for bioretention areas with small contributing areas are less than the new Department of Ecology (Ecology) recommendation of 3 feet for two reasons: (1) bioretention soil mixes provide effective pollutant capture; and (2) hydrologic loading and potential for groundwater mounding is reduced when managing flows from smaller contributing areas in relation to bioretention area.
    - A minimum separation of 3 feet from the seasonal high water mark to the bottom of the bioretention area is recommended where the

contributing area of the bioretention area is equal to or exceeds any of the following limitations: 5,000 square feet of pollution-generating impervious surface; or 10,000 square feet of impervious surface; or ¾ acres of lawn and landscape.

- Utility conflicts: Consult local jurisdiction requirements for horizontal and vertical separation required for publicly-owned utilities, such as water and sewer. Consult the appropriate franchise utility owners for separation requirements from their utilities, which may include communications and gas. When separation requirements cannot be met, designs should include appropriate mitigation measures, such as impermeable liners over the utility, sleeving utilities, fixing known leaky joints or cracked conduits, and/or adding an underdrain to the bioretention.
- Setbacks: Consult local jurisdiction guidelines for appropriate bioretention area setbacks from wellheads, on-site sewage systems, basements, foundations, and utilities.
- Expected pollutant loading: Bioretention can provide very good water quality treatment for heavy pollutant loads associated with industrial or commercial sites. In these settings an impermeable liner between the BSM and the subgrade and an under-drain may be required due to soil and groundwater contamination concerns.
- Transportation safety: The design configuration and selected plant types should provide adequate sight distances, clear zones, and appropriate setbacks for roadway applications in accordance with local jurisdiction requirements.
- Ponding depth and surface water draw-down: Flow control needs, as well as location in the development, and mosquito breeding cycles will determine draw-down timing. For example, front yards and entrances to residential or commercial developments may require rapid surface dewatering for aesthetics.
- Impacts of surrounding activities: Human activity influences the location of the facility in the development. For example, locate bioretention areas away from traveled areas on individual lots to prevent soil compaction and damage to vegetation or provide elevated or bermed pathways in areas where foot traffic is inevitable. and provide barriers, such as wheel stops, to restrict vehicle access in roadside applications.
- Visual buffering: Bioretention facilities can be used to buffer structures from roads, enhance privacy among residences, and for an aesthetic site feature.
- Site growing characteristics and plant selection: Appropriate plants should be selected for sun exposure, soil moisture, and adjacent plant communities. Native species or hardy cultivars are recommended and

can flourish in the properly designed and placed BSM with no nutrient or pesticide inputs and 2-3 years irrigation for establishment. Invasive species control may be necessary.

~~Bio-infiltration swales, also known as Grass Percolation Areas, combine grassy vegetation and soils to remove stormwater pollutants by percolation into the ground. Their pollutant removal mechanisms include filtration, soil sorption, and uptake by vegetative root zones. Bio-infiltration swales have been used in Spokane County for many years to treat urban stormwater and recharge the ground water.~~

~~In general, bio-infiltration swales are used for treating stormwater runoff from roofs, roads and parking lots. Runoff volumes greater than water quality design volume are typically overflowed to the subsurface through an appropriate conveyance facility such as a dry well, or an overflow channel to surface water. Overflows that are directed to a surface water must meet Minimum Requirement #7 or #8 (whichever is applicable) unless the discharge is to a marine water, or qualifies for a flow control exemption in accordance with the criteria in Minimum Requirement #7.~~

~~Additiona~~l Design Criteria ~~Specific~~ for Bio~~retention~~ ~~infiltration Swales~~

Flow entrance and pretreatment:

Flow entrance design will depend on topography, flow velocities and volume entering the pretreatment and bioretention area, and site constraints. Flows should be less than 1.0 ft/second to minimize erosion potential. Landscape areas and vegetated buffer strips slow incoming flows and provide an initial settling of particulates and are the preferred type of flow entrance. Engineered flow dissipation (e.g., rock pad) should be incorporated into curb-cut or piped (concentrated) flow entrances. Six primary types of flow entrances can be used for bioretention:

- *Dispersed, low velocity flow across a landscape area:* This is the preferred method of delivering flows. Dispersed flow may not be possible given space limitations or if the facility is controlling roadway or parking lot flows where curbs are mandatory.
- *Dispersed or sheet flow across pavement or gravel and past wheel stops for parking areas.*
- *Curb cuts for roadside, driveway or parking lot areas:* Curb cuts should include rock or other erosion protection material in the channel entrance to dissipate energy. Avoid use of anglar rock or quarry spalls and instead use round (river) rock if needed. Flow entrance should drop 2 to 3 inches from curb line and provide an area for settling and periodic removal of sediment and coarse material before flow dissipates to the remainder of the cell (Prince George's County, Maryland, 2002, and U.S. Army Environmental Center and Fort Lewis, 2003). Curb cuts used for bioretention areas in high use parking

lots or roadways require special attention due to high coarse particulates and trash accumulation in the flow entrance and associated bypass of flows. The following are methods recommended for areas where heavy trash and coarse particulates are anticipated:

- Curb cut width <need recommendation on this>
- At a minimum, the flow entrance should drop 2 to 3 inches from gutter line into the bioretention area and provide an area for settling and periodic removal of debris. Consider a small forebay at the flow entrance to capture more debris and sediment load.
- Anticipate relatively more frequent inspection and maintenance for areas with large impervious areas, high traffic loads and larger debris loads.
- Avoid piped flow entrance in this setting.

- *Pipe flow entrance:* Piped entrances should include rock or other erosion protection material in the channel entrance to dissipate energy and/or flow dispersion.
- *Catch basin:* In areas with heavy sediment inputs (e.g., frequently sanded roads), catch basins can be used to settle sediment and slowly release water to the bioretention area through a grate for filtering coarse material.
- *Trench drains:* can be used to cross sidewalks or driveways where a deeper pipe conveyance creates elevation problems. Trench drains tend to clog and may require additional maintenance.

Note: Woody plants can restrict or concentrate flows and can be damaged by erosion around the root ball and should not be placed directly in the entrance flow path (Prince George's County, 2002).

Bottom area and side slopes:

Bioretention areas are highly adaptable and can fit various settings such as rural and urban roadsides, ultra urban streetscapes and parking lots by adjusting bottom area and side slope configuration. Recommended maximum and minimum dimensions include:

- Maximum planted sides slopes: 3H:1V.
- Maximum planted side slope if total cell depth is greater than 3 feet: 3H:1V. If steeper side slopes are necessary rockeries, concrete walls or soil wraps effective design tools.

- Minimum bottom width for bioretention swales: 2 feet (to prevent channelization).

Note: Bioretention areas should have a minimum shoulder of 12 inches between the road edge and beginning of the bioretention side slope where flush curbs are used. Compaction effort for the shoulder should be 90 percent Proctor.

Ponding area:

Ponding depth recommendaitons:

- Maximum ponding depth: 12 inches.
- Surface pool drawdown time: 24 hours maximum.

Surface overflow:

Surface overflow can be provided by vertical stand pipes that are connected to under-drain systems, by horizontal drainage pipes, or by armored overflow channels installed at the designed maximum ponding eluviations. Overflow conveyance structures are necessary for all bioretention facilities to safely convey flows that exceed the capacity of the facility and to protect downstream natural resources and property.

The minim freeboard from the invert of the overflow stand pipe, horizontal drainage pipe or earthen channel should be 6 inches.

Default Bioretention Soil Mix:

a. Mineral Aggregate
   Table 7.1 provides a gradation guideline for the aggregate component of a BSM specification in western Washington (Hinman, Robertson, 2007). The sand gradation below is often supplied as a well-graded utility or screened and with compost is balanced with enough fines to provide adequate water retention, hydraulic conductivities within recommended range (see below), pollutant removal and plant growth characteristics for bioretention soil mixes.

Table 7.1 – General Guideline for Mineral Aggregate Gradation

Sieve Size	Percent Passing
3/8”	100
#4	95-100
#10	75-90
#40	25-40
#100	4-10
#200	2-5

b. Compost

- Meets the definition of "composted materials" in WAC 173-350, section 220 (including contaminant levels and other standards), available online at http://www.ecy.wa.gov/programs/swfa/compost/
- Must have an organic matter content of 35-65%.
- Must have a carbon to nitrogen ratio below 25:1 (the C:N ratio may be as high as 35:1 for plantings composed entirely of plants native to the Puget Sound Lowlands region).
- Produced at a composting facility permitted by the WA Department of Ecology. A current list of permitted facilities is available at http://www.ecy.wa.gov/programs/swfa/compost/
- Stable (low oxygen use and CO_2 generation) and mature (capable of supporting plant growth) by tests shown below. This is critical to plant success in a bioretention soil mixes.
- Moisture content range: no visible free water or dust produced when handling the material.
- Tested in accordance with the U.S. Composting Council "Testing Methods for the Examination of Compost and Composting" (TMECC), as established in the Composting Council's "Seal of Testing Assurance" (STA) program. Most Washington compost facilities now use these tests.
- Screened to the size gradations for Fine Compost under TMECC test method 02.02-B (gradations are shown in the specification in Appendix)
- pH between 6.0 and 8.5 (TMECC 04.11-A)
- Manufactured inert content less that 1% by weight (TMECC 03.08-A)
- Minimum organic matter content of 40% (TMECC 05.07-A)
- Soluble salt content less than 4.0 mmhos/cm (TMECC 04.10-A)
- Maturity greater than 80% (TMECC 05.05-A "Germination and Vigor")
- Stability of 7 or below (TMECC 05.08-B "Carbon Dioxide Evolution Rate")
- Carbon to nitrogen ratio (TMECC 04.01 "Total Carbon" and 04.02D "Total Kjeldahl Nitrogen") of less than 25:1. The C:N ratio may be up to 35:1 for plantings composed entirely of Puget Sound Lowland native species and up to 40:1 for coarse compost to be used as a surface mulch (not in a soil mix).

c. Compost to aggregate ratio and organic matter content
- Compost to aggregate ratio: 60 percent mineral aggregate, 40 percent compost.
- Organic matter content: 5-8 percent by weight.
- Compost and mineral aggregate must be uniformly mixed.

Design Criteria for Custom Bioretention Soil Mixes:

Soil mixes for bioretention areas (typically composed of 60% mineral aggregate and 40% compost by volume in this region) need to balance three primary design objectives to provide optimum performance:

- Provide high enough infiltration rates to meet desired surface water drawdown and system dewatering.
- Provide infiltration rates that are not too high in order to optimize pollutant removal capability.
- Provide a growth media that supports long-term plant and soil health (Hinman, 2009).

Bioretention Soil Mixes must demonstrate compliance with the following criteria:
- CEC ≥ 5 meq/100 grams of dry soil;
- pH between 5.5 and 7.0
- 5 - 8 percent organic matter content;
- 2-5 percent fines passing the 200 sieve;
- Minimum soil depth of 18 inches
- Initial saturated hydraulic conductivity of less than 12 inches per hour
- Long-term saturated hydraulic conductivity of more than 1 inch per hour. Note: Long term shc is determined by applying the appropriate infiltration correction factors as explained below under "Determining Bioretention soil mix infiltration rate."

Soil Depth:

- Soil depth must be a minimum of 18 inches to provide water quality treatment and good growing conditions for selected plants

- A minimum depth of 24 inches should be selected for improved phosphorus and nitrogen (TKN) removal where under-drains are used.

Filter Fabrics:

Do not use filter fabrics between the subgrade and the BSM. The gradation between existing soils and BSM is not great enough to allow significant migration of fines into the BSM. Additionally, filter fabrics may clog with downward migration of fines from the BSM.

Underdrain (optional):

The area above an under-drain pipe in a bioretention area provides detention and pollutant filtering; however, only the area below the under-drain invert and above the bottom of the bioretention facility (subgrade) can be used in the WWHM or MGSFlood for dead storage volume that provides flow control benefit

Under-drain systems should only be installed when the bioretention facility is:

- Located near sensitive infrastructure (e.g., unsealed basements) and potential for flooding is likely.
- Used for filtering storm flows from gas stations or other pollutant hotspots (requires impermeable liner).
- In soils with infiltration rates that are not adequate to meet maximum pool and system dewater rates, or are below a minimum rate allowed by the local government.
- In an area that does not provide the minimum depth to high seasonal groundwater.

The under-drain can be connected to a downstream open conveyance (bioretention swale), to another bioretention cell as part of a connected treatment system, daylight to a dispersion area using an effective flow dispersion practice, or to a storm drain.

Under-drain pipe:
Under-drains should be slotted, thick-walled plastic pipe. The slot opening should be smaller than the smallest aggregate gradation for the gravel filter bed (see under-drain filter bed below) to prevent migration of material into the drain. This configuration allows for pressurized water cleaning and root cutting if necessary (personal communication, Tracy Tackett, 2004). Under-drain pipe recommendation:

- Minimum pipe diameter: 4 inches (pipe diameter will depend on hydraulic capacity required, 4 to 8 inches is common).
- Slotted subsurface drain PVC per ASTM D1785 SCH 40.
- Slots should be cut perpendicular to the long axis of the pipe and be 0.04 to 0.069 inches by 1 inch long and be spaced 0.25 inches apart (spaced longitudinally). Slots should be arranged in four rows spaced on 45-degree centers and cover ½ of the circumference of the pipe. See Filter Materials section for aggregate gradation appropriate for this slot size.
- Under-drains should be sloped at a minimum of 0.5 percent unless otherwise specified by an engineer (Low Impact Development Center, 2004).

Perforated PVC or flexible slotted HDPE pipe cannot be cleaned with pressurized water or root cutting equipment, are less durable and are not recommended. Wrapping the under-drain pipe in filter fabric increases chances of clogging and is not recommended (Low Impact Development Center, 2004). A 6-inch rigid non-perforated observation pipe or other maintenance access should be connected to the under-drain every 250 to 300 feet to provide a clean-out port, as well as an observation well to monitor dewatering rates (Prince George's County, 2002 and personal communication, Tracey Tackett, 2004).

Under-drain aggregate filter and bedding layer:
Aggregate filter and bedding layers and filter fabrics buffer the under-drain system from sediment input and clogging. When properly selected for the soil gradation, geosynthetic filter fabrics can provide adequate protection from the migration of fines. However, aggregate filter and bedding layers, with proper gradations, provide a larger surface area for protecting under-drains and are preferred.

- Guideline for under-drain aggregate filter and bedding layers with heavy walled slotted pipe (see under-drain pipe guideline above):

Sieve size	**Percent Passing**
¾ inch	100
¼ inch	30-60
US No. 8	20-50
US No. 50	3-12
US No. 200	0-1

The above gradation is a Type 26 mineral aggregate (gravel backfill for drains, City of Seattle).

- Place under-drain on a bed of the Type 26 aggregate with a minimum thickness of 6 inches and cover with Type 26 aggregate to provide a 1-foot minimum depth around the top and sides of the slotted pipe.

<figure: under-drain pipe and aggregate bed>

Orifice and other flow control structures:
Under-drains also rapidly move water out of the bioretention area and decrease detention time and flow retention. Properly designed and installed bioretention have shown very good flow control performance on soils with low infiltration rates (Hinman, 2009). Accordingly, when under-drains are used, access for adding or adjusting orifice configurations and other control structures is recommended for adaptive management and optimum performance. The minimum orifice diameter should be 0.25 inches to minimize clogging and maintenance requirements.

<figures: elevated under-drain, upturned under-drain, ILM/WSU flow control structure>

Check dams:
Check dams are necessary for reducing flow velocity and potential erosion, as well as increasing detention time and infiltration capability on sloped sites. Typical materials include concrete, wood, rock, compacted dense soil covered with vegetation, and vegetated hedge rows. Design depends on flow control goals, local regulations for structures within road right-of-ways and aesthetics. Optimum spacing is determined by flow control benefit (modeling) in relation to cost consideration. Some typical check dam designs are included in Figure XX.

<figures: check dam berms, concrete weirs and wood>

Hydraulic restriction layers:
Adjacent roads, foundations or other infrastructure may require that infiltration pathways are restricted to prevent excessive hydrologic loading. Three types of restricting layers can be incorporated into bioretention designs:

- Filter fabric can be placed along vertical walls to reduce lateral flows.
- Clay (bentonite) liners are low permeability liners. Where clay liners are used under-drain systems are necessary. See 2005 SMMWW Volume IV section 4.4.3 for guidelines.
- Geomembrane liners completely block infiltration to subgrade soils and are used for groundwater protection when bioretention facilities are installed to filter storm flows from pollutant hotspots or on sidewalls of bioretention areas to restrict lateral flows to roadbeds or

other sensitive infrastructure. Where geomembrane liners are used to line the entire facility under-drain systems are necessary. The liner should have a minimum thickness of 30 mils and be ultraviolet (UV) resistant.

Plant materials:
In general, the predominant plant material utilized in bioretention areas are facultative species adapted to stresses associated with wet and dry conditions (Prince George's County, 2002). Soil moisture conditions will vary within the facility from saturated (bottom of cell) to relatively dry (rim of cell). Accordingly, wetland plants may be used in the lower areas, if saturated soil conditions exist for appropriate periods, and drought-tolerant species planted on the perimeter of the facility or on mounded areas (see figures ???). See Appendix V - E for recommended plant species.

See also the Low Impact Development Technical Guidance Manual for the Puget Sound Basin for additional guidance on plant selection.

Mulch layer
Bioretention areas can be designed with or without a mulch layer. When used, mulch should be:

- Coarse compost in the bottom of the facilities (compost is less likely to float during cell inundation).
- Shredded or chipped hardwood or softwood on side slopes and rim area. Arborist mulch is mostly woody trimmings from trees and shrubs and is a good source of mulch material. Wood chip operations are a good source for mulch material that has more control of size distribution and consistency.
- Free of weed seeds, soil, roots and other material that is not **bole** or branch wood and bark.
- A maximum of 2 to 3 inches thick (thicker applications can inhibit proper oxygen and carbon dioxide cycling between the soil and atmosphere) (Prince George's County, 2002).

Mulch should **not** be:
- Grass clippings (decomposing grass clippings are a source of nitrogen and are not recommended for mulch in bioretention areas).
- Pure bark (bark is essentially sterile and inhibits plant establishment).

In bioretention areas where higher flow velocities are anticipated an aggregate mulch may be used to dissipate flow energy and protect

underlying BSM. Aggregate mulch varies in size and type, but 1 to 11/2 inch gravel (rounded) decorative rock is typical.

Installation

Excavation:
Soil compaction can lead to facility failure; accordingly, minimizing compaction of the base and sidewalls of the bioretention area is critical (Prince George's County, 2002). Excavation should never be allowed during wet or saturated conditions (compaction can reach depths of 2-3 feet during wet conditions and mitigationis likely not be possible). Excavation should be performed by machinery operating adjacent to the bioretention facility and no heavy equipment with narrow tracks, narrow tires, or large lugged, high pressure tires should be allowed on the bottom of the bioretention facility (Tackett, 2004). If machinery must operate in the bioretention cell for excavation, use light weight, low ground-contact pressure equipment and rip the base at completion to refracture soil to a minimum of 12 inches (Prince George's County, 2002).

Sidewalls of the facility, to the height of the grade established by the designed soil mix, can be vertical if soil stability is adequate. Exposed sidewalls should be no steeper than 3H:1V . The sidewalls and bottom should be ripped or tilled to minimum depth of 6 inches before placement of BSM. The bottom of the facility should be flat.

Soil Placement:
On-site soil mixing or placement should not be performed if BSM or subgrade soil is saturated. The bioretention soil mixture should be placed and graded by machinery operating adjacent to the bioretention facility. If machinery must operate in the bioretention cell for soil placement or soil grading, use light weight equipment with low ground-contact pressure. The soil mixture should be placed in horizontal layers not to exceed 12 inches per lift for the entire area of the bioretention facility.

Compact the BSM to a relative compaction of 80-85 percent of modified maximum dry density (ASTM D 1557). Compaction can be achieved by "boot packing" (simply walking over all areas of each lift), and then apply 0.2 inches (0.5 cm) of water per 1 inch (2.5 cm) of BSM depth. Water for settling should be applied by spraying or sprinkling.

Temporary Erosion and Sediment Control (TESC):
Controlling erosion and sediment are most difficult during clearing, grading, and construction; accordingly, minimizing site disturbance to the greatest extent practicable is the most effective sediment management. During construction:

- Bioretention facilities should not be used as sediment control facilities and all drainage should be directed away from bioretention facilities after initial rough grading. Flow can be directed away from the facility with temporary diversion swales or other approved protection (Prince George's County, 2002). If introduction of construction runoff cannot be avoided see below for guidelines.
- Construction on Bioretention facilities should not begin until all contributing drainage areas are stabilized according to erosion and sediment control BMPs and to the satisfaction of the engineer.
- If the design includes curb and gutter, the curb cuts and inlets should be blocked until BSM and mulch have been placed and planting completed (when possible), and dispersion pads are in place.

Every effort during design, construction sequencing and construction should be made to prevent sediment from entering bioretention facilities. However, bioretention areas are often distributed throughout the project area and can present unique challenges during construction. See the Low Impact Technical Guidance Manual for the Puget Sound Basin for guidelines if no other options exist and runoff during construction must be directed through the bioretention facilities.

Erosion and sediment control practices must be inspected and maintained on a regular basis.

Verification

If the material specifications for the mineral aggregate and the compost components of the default bioretention soil mix are used and verified, pre-placement laboratory analysis for saturated hydraulic conductivity of the BSM is not required. The soil need only be tested for organic content.

If an alternative bioretention mix will be used, verify the BSM criteria (2 – 5% fines, CEC > 5 meq/100 grams dry soil, 5-8% organic content, pH 5.5 – 7) through laboratory testing of the material to be used in the installation. BSM infiltration rates are determined per ASTM Designation D 2434 Standard Test Method for Permeability of Granular Soils (Constant Head) at 85 percent compaction per ASTM D 1557 (Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort). Appendix V-B, Recommended Procedures for ASTM D 2434 When Measuring Hydraulic Conductivity for Bioretention Soil Mixes provides guidelines to standardize procedures and reduce inter-laboratory variability when testing BSM's with mineral and organic material content. Determine the organic matter content before and after

permeability test using ASTM D2974 (Standard Test Method for Moisture, Ash, and Organic Matter of Peat and Other Organic Soils).

If testing infiltration rates is necessary for post-construction verification use Pilot Infiltration Test method. Do not excavate BSM (conduct test at level of finished BSM elevation), use a maximum of 6 inch ponding depth and conduct test before plants are installed.

Maintenance

Bioretention areas require annual plant, soil, and mulch layer maintenance to ensure optimum infiltration, storage, and pollutant removal capabilities. In general, bioretention maintenance requirements are typical landscape care procedures and include:

- *Watering:* Plants should be selected to be drought tolerant and not require watering after establishment (2 to 3 years). Watering may be required during prolonged dry periods after plants are established.
- *Erosion control:* Inspect flow entrances, ponding area, and surface overflow areas periodically, and replace soil, plant material, and/or mulch layer in areas if erosion has occurred. Properly designed facilities with appropriate flow velocities should not have erosion problems except perhaps in extreme events. If erosion problems occur the following should be reassessed: (1) flow volumes from contributing areas and bioretention cell sizing; (2) flow velocities and gradients within the cell; and (3) flow dissipation and erosion protection strategies in the pretreatment area and flow entrance. If sediment is deposited in the bioretention area, immediately determine the source within the contributing area, stabilize, and remove excess surface deposits.
- *Sediment removal:* Follow the maintenance plan schedule for visual inspection and remove sedimentif the volumeof the ponding area has been compromised.
- *Plant material:* Depending on aesthetic requirements, occasional pruning and removing dead plant material may be necessary. Replace all dead plants and if specific plants have a high mortality rate, assess the cause and replace with appropriate species. Periodic weeding is necessary until plants are established.
- *Weeding*: Invasive or nuisance plants should be removed regularly and not allowed to accumulate and exclude planted species. At a minimum, schedule weeding with inspections to coincide with important horticultural cycles (e.g., prior to major weed varieties dispersing seeds). Weeding should be done manually and without herbicide applications. The weeding schedule should become less frequent if the

appropriate plant species and planting density are used and the selected plants grow to capture the site and exclude undesirable weeds.

- *Nutrient and pesticides:* The soil mix and plants are selected for optimum fertility, plant establishment, and growth. Nutrient and pesticide inputs should not be required and may degrade the pollutant processing capability of the bioretention area, as well as contribute pollutant loads to receiving waters. By design, bioretention facilities are located in areas where phosphorous and nitrogen levels may be elevated and these should not be limiting nutrients. If in question, have soil analyzed for fertility.
- *Mulch:* Replace mulch annually in bioretention facilities where heavy metal deposition is high (e.g., contributing areas that include gas stations, ports and roads with high traffic loads). In residential settings or other areas where metals or other pollutant loads are not anticipated to be high, replace or add mulch as needed (likely 3 to 5 years) to maintain a 2 to 3 inch depth.
- *Soil:* Soil mixes for bioretention facilities are designed to maintain long-term fertility and pollutant processing capability. Estimates from metal attenuation research suggest that metal accumulation should not present an environmental concern for at least 20 years in bioretention systems. Replacing mulch in bioretention facilities where heavy metal deposition is likely provides an additional level of protection for prolonged performance. If in question, have soil analyzed for fertility and pollutant levels.

Determining subgrade infiltration rates

Geotechnical analysis is an important first step to develop an initial assessment of the variability of site soils, infiltration characteristics and the necessary frequency and depth of infiltration tests. See the Site Planning guidance in Chapter 3 of Volume 1.

Determining infiltration rates of the site soils is necessary to determine feasibility of designs that intend to infiltrate stormwater on-site. It is also necessary to estimate flow reduction benefits of such designs when using the Western Washington Hydrologic Model (WWHM) or MGS Flood.

The following provides recommended tests for the soils underlying bioretention areas. The test should be run at the anticipated elevation of the top of the native soil beneath the bioretention facility.

- Method 1: Small bioretention cells (bioretention facilities receiving water from 1 or 2 individual lots or < 1/4 acre of pavement or other impervious surface): Small-scale Pilot Infiltration Test (PIT). See

Volume III, Section 3.3.6 for PIT method description. Use 1 as an infiltration correction factor when entering this initial rate into the runoff model.

- Large bioretention cells (bioretention facilities receiving water from several lots or 1/4 acre or more of pavement or other impervious surface): Multiple small or one large-scale PIT. If using the small-scale test, measurements should be taken at several locations within the area of interest. After completing the infiltration test, excavate the test site at least 3 feet if variable soil conditions or seasonal high water tables are suspected. Observe whether water is infiltrating vertically or only spreading horizontally because of ground water or a restrictive soil layer. Use 1 as an infiltration correction factor when entering this initial rate into the runoff model. .
- Bioretention swales: approximately 1 small--scale PIT per 50 feet of swale.

- Method 2: Soil Grain Size Analysis Method:

This method is restricted to sites underlain with soils not consolidated by glacial advance (e.g., recessional outwash soils).

- Small bioretention cells: Use the grain size analysis method described in Section 3.3.6. based on the layer(s) identified in results of one soil test pit or boring.
- Large bioretention cells: Use the grain size analysis method based on more than one soil test pit or boring. The more test pits/borings used, and the more evidence of consistency in the soils, the less of a correction factor may be used.
- Bioretention swales: Approxmately 1 soil test pit/boring per 50 feet of swale.

Determining Bioretention soil mix infiltration rate:

Option 1: If using the BSM recommended herein, the default infiltration rate of 1.5 inches per hour or 3 inches per hour may be used. 1.5 inches per hour is used where the drainage area to the bioretention device exceeds any of the following:
10,000 sq. ft. of impervious surface
5,000 sq. ft. of pollution-generating impervious surface
¾ acres of native vegetation converted to lawn/landscaping
2.5 acres of native vegetation converted to pasture.

Use 3 inches per hour if the drainage area does not exceed any of the above-listed areas.

Option 2: If creating a custom bioretention soil mix, Use ASTM D 2434 Standard Test Method for Permeability of granular Soils (Constant Head) with a compaction rate of 85 percent using ASTM D1557 Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort. See Appendix V-B for specific procedures for conducting ASTM D 2434. If the contributing area of the bioretention cell or swale is equal to or exceeds any of the following limitations: 5,000 square feet of pollution-generating impervious surface; or 10,000 square feet of impervious surface; or ¾ acre of lawn and landscape, use 4 as the infiltration rate correction factor. If the contributing area is less than all of the above areas, use 2 as the infiltration correction factor.

BMP T7.40 Compost-amended Vegetated Filter Strips (CAVFS)

Description

The CAVFS is a variation of the basic vegetated filter strip that adds soil amendments to the roadside embankment. The soil amendments improve infiltration characteristics, increase surface roughness, and improve plant sustainability. Once permanent vegetation is established, the advantages of the CAVFS are higher surface roughness; greater retention and infiltration capacity; improved removal of soluble cationic contaminants through sorption; improved overall vegetative health; and a reduction of invasive weeds. Compost-amended systems have somewhat higher construction costs due to more expensive materials, but require less land area for runoff treatment, which can reduce overall costs.

Applications

CAVFS can be used to meet basic runoff treatment and enhanced runoff treatment objectives. It has practical application in areas where there is space for roadside embankments that can be built to the CAVFS specifications.

Soil Design Criteria

The CAVFS design incorporates compost into the native soils per the criteria in BMP T5.13 for turf areas. The goal is to create a healthy soil environment for a lush growth of turf.

Soil/Compost Mix:

- Pre-sumptive approach: Place and rototill 1.75 inches of composted material into 6.25 inches of soil (a total amended depth of about 9.5 inches, for a settled depth of 8 inches. Water or roll to compact soil to 85% maximum. Plant grass.
- Custom approach: Place and rototill the calculated amount of composted material into a depth of soil needed to achieve 8 inches of settled soil at 5% organic content. Water or roll to compact soil to 85% maximum. Plant grass. The amount of compost or other soil amendments used varies by soil type and organic matter content. If there is a good possibility that site conditions may already contain a relatively high organic content, then it may be possible to modify the pre-approved rate described above and still be able to achieve the 5% organic content target.

- The final soil mix (including compost and soil) should have an initial saturated hydraulic conductivity less than 12 inches per hour, and a minimum long-term hydraulic conductivity of 1.0 inch/hour per ASTM Designation D 2434 (Standard Test Method for Permeability of Granular Soils) at 85% compaction per ASTM Designation D 1557 (Standard Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort. Infiltration rate and hydraulic conductivity are assumed to be approximately the same in a uniform mix soil. Note: Long term shc is determined by applying the appropriate infiltration correction factors as explained under "Determining Bioretention soil mix infiltration rate" under BMP T7.30.

- The final soil mixture should have a minimum organic content of 5% by dry weight per ASTM Designation D 2974 (Standard Test Method for Moisture, Ash and Organic Matter of Peat and Other Organic Soils) (Tackett, 2004).

- Achieving the above recommendations will depend on the specific soil and compost characteristics. In general, the recommendation can be achieved with 60% to 65% loamy sand mixed with 25% to 30% compost or 30% sandy loam, 30% coarse sand, and 30% compost.
- The final soil mixture should be tested prior to installation for fertility, micronutrient analysis, and organic material content.

- Clay content for the final soil mix should be less than 5%.

- Compost must not contain biosolids, any street or highway sweepings, or any catch basin solids.

- The pH for the soil mix should be between 5.5 and 7.0 (Stenn, 2003). If the pH falls outside the acceptable range, it may be modified with lime to increase the pH or iron sulfate plus sulfur to lower the pH. The lime or iron sulfate must be mixed uniformly into the soil prior to use in LID areas (Low-Impact Development Center, 2004).

- The soil mix should be uniform and free of stones, stumps, roots, or other similar material larger than 2 inches.

- When placing topsoil, it is important that the first lift of topsoil is mixed into the top of the existing soil. This allows the roots to penetrate the underlying soil easier and helps prevent the formation of a slip plane between the two soil layers.

Soil Component:
The texture for the soil component of the LID BMP soil mix should be loamy sand (USDA Soil Textural Classification).

Compost Component:

Follow the specifications for compost in BMP T7.30 – Bioretention

Design Modeling Method

The CAVFS will have an "Element" in the approved continuous runoff models that must be used for determining the amount of water that is treated by the CAVFS.

Maintenance
Compost, as with sand filters or other filter mediums, can become plugged with fines and sediment, which may require removal and replacement. Including vegetation with compost helps prevent the medium from becoming plugged with sediment by breaking up the sediment and creating root pathways for stormwater to penetrate into the compost. It is expected that soil amendments will have a removal and replacement cycle; however, this time frame has not yet been established.

- ~~The space available for ponding water within a Bio-infiltration swale can be sized by either:~~
  - ~~Completely retaining the water quality design volume, i.e., the 91st percentile, 24-hour runoff volume indicated by an approved continuous runoff model (or, the runoff volume from a 6-month 24-hour storm). No reduction in volume is taken for any infiltration. Under this option, the overflow to a dry well or to a surface water must be above the elevation corresponding to the water quality design volume.~~
  - ~~Using the same design sizing procedures outlined in Chapter 3 of Volume III for infiltration facilities designed as treatment facilities.~~
- ~~Drawdown time for the water quality design volume: 48 hours max. See Site Suitability Criterion (SSC 4) in Section 3.3.7, Chapter 3, Volume III.~~
- ~~Swale bottom: flat with a longitudinal slope less than 1%.~~
- ~~The maximum ponded level: 6 inches.~~

- ~~Treatment soil to be at least 18 inches thick with a CEC of at least 5 meq/100 gm dry soil, organic content of at least 1%, and sufficient target pollutant loading capacity. The design soil thickness may be reduced to as low as 6 inches if appropriate performance data demonstrates that the vegetated root zone and the natural soil can be expected to provide adequate removal and loading capacities for the target pollutants. The design professional should calculate the pollutant loading capacity of the treatment soil to estimate if there is sufficient treatment soil volume for an acceptable design period. (See Criteria for Assessing the Trace Element Removal Capacity of Bio-filtration Systems, Stan Miller, Spokane County, June 2000).~~
- ~~Other combinations of treatment soil thickness, CEC, and organic content design factors can be considered if it is demonstrated that the soil and vegetation will provide a target pollutant loading capacity and performance level acceptable to the local jurisdiction.~~
- ~~The treatment zone depth of 6 inches or more should contain sufficient organics and texture to ensure good growth of the vegetation.~~
- ~~The treatment soil infiltration rate should not exceed 1-inch per hour for a treatment zone depth of 6 inches relying on the root zone to enhance pollutant removal. The Site Suitability Criteria in Section 3.3.7 of Chapter 3, Volume III must also be applied, if a design soil depth of 18 inches is used then a maximum infiltration rate of 2.4 inches per hour is applicable.~~
- ~~Use native or adapted grass should be used.~~
- ~~Pretreatment of debris, gross TSS, and oil & grease to prevent the clogging of the treatment soil and/or growth of the vegetation, where necessary.~~
- ~~Identify pollutants, particularly in industrial and commercial area runoff, that could cause a violation of Ecology's ground water quality Standards (Chapter 173-200 WAC). Include appropriate mitigation measures (pretreatment, source control, etc.) for those pollutants.~~

Chapter 8 - ~~Sand~~ Filtration Treatment Facilities

Note: Figures in Chapter 8 are courtesy of King County, except as noted

This Chapter presents criteria for the design, construction and maintenance of runoff treatment sand filters including basin, vault, and linear filters. Two Best Management Practices (BMPs) are discussed in this Chapter:

BMP T8.10 Sand Filter Basin
BMP T8.~~1~~20 Sand Filter Vault
BMP T8.~~2~~30 Linear Sand Filter
BMP ~~R~~T8.40~~7~~ – Media Filter Drain (previously referred to as the Ecology Embankment)

8.1 Purpose

To collect and treat the design runoff volume to remove TSS, phosphorous, and insoluble organics (including oils) from stormwater.

8.2 Description

A typical sand filtration system consists of a, a pretreatment system, flow spreader(s), a sand bed, and the underdrain piping. The sand filter bed includes a geotextile fabric between the sand bed and the bottom underdrain system.

An impermeable liner under the facility may also be needed if the filtered runoff requires additional treatment to remove soluble ground water pollutants, or in cases where additional ground water protection was mandated. The variations of a sand filter include a basic or large sand filter, sand filter with level spreader, sand filter vault, and linear sand filter. (Figures 8.1 through 8.7 provide examples of various sand filter configurations.)

The Media Filter Drain (MFD) has four basic components: a gravel no-vegetation zone, a grass strip, the MFD mix bed, and a conveyance system for flows leaving the MFD mix. The MFD mix is composed of gravel, perlite, dolomite, and gypsum.

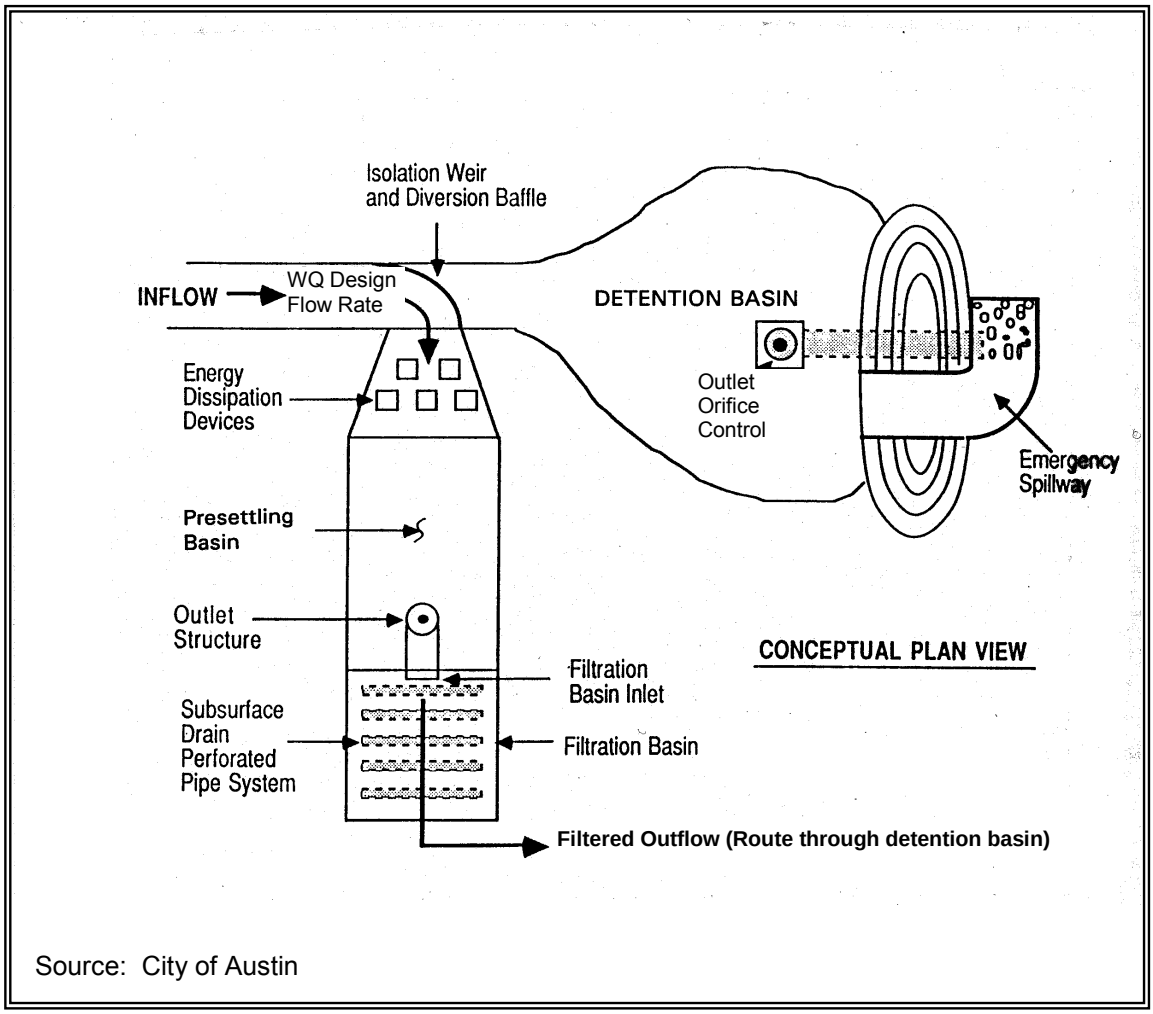

Source: City of Austin

Figure 8.1 – Sand Filtration Basin Preceded by Presettling Basin (Variation of a Basic Sand Filter)

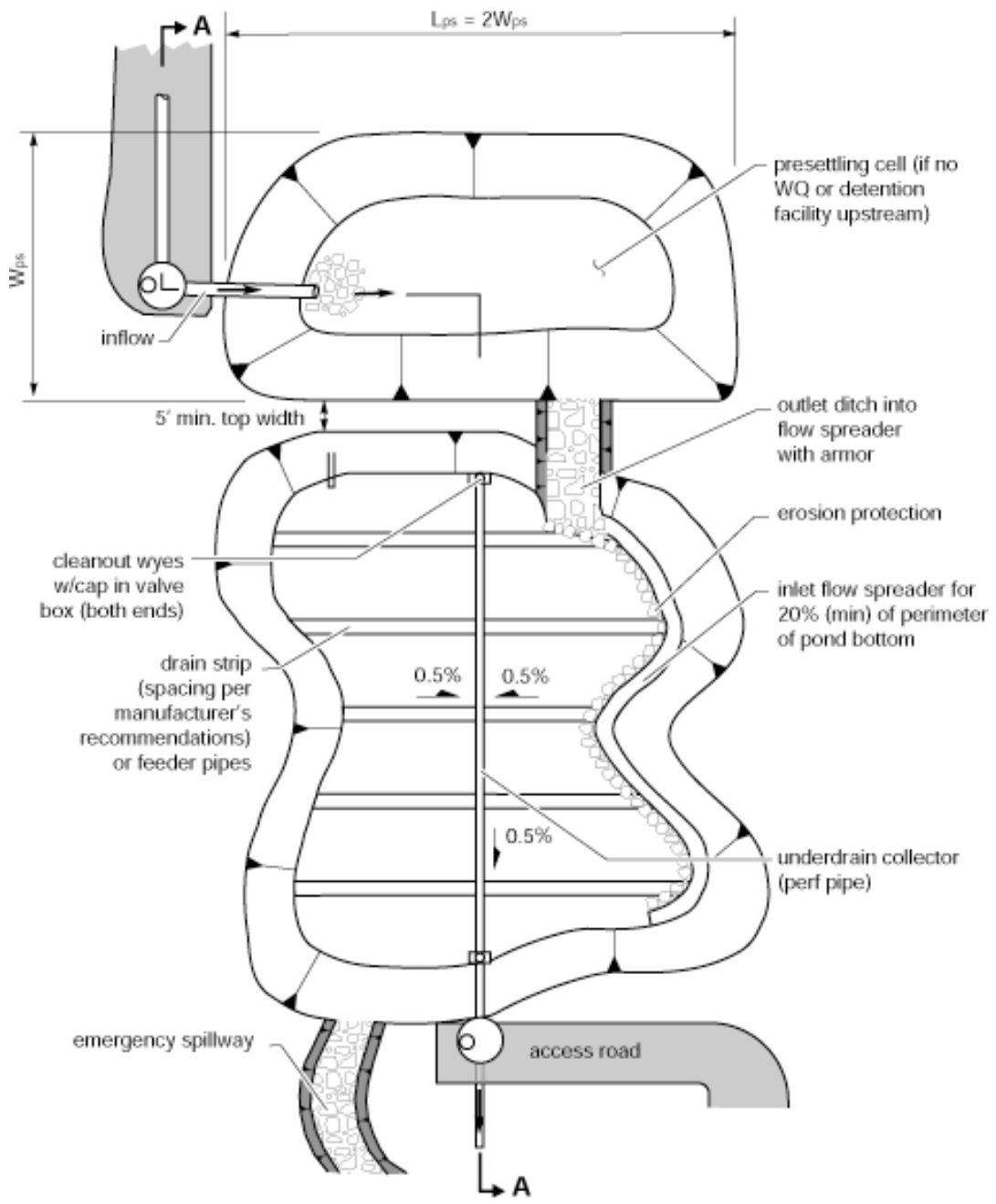

PLAN VIEW
NTS

Figure 8.2 – Sand Filter with Pretreatment Cell

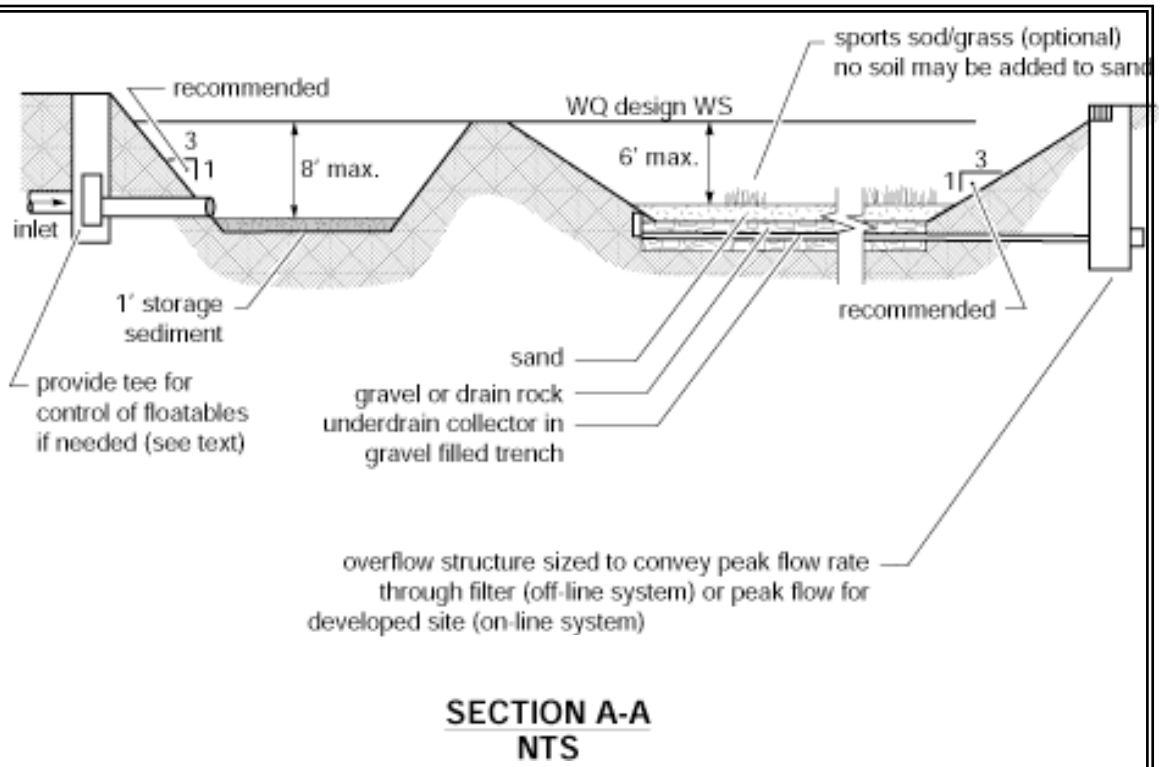

Figure 8.2 (cont) Sand Filter with Pretreatment Cell

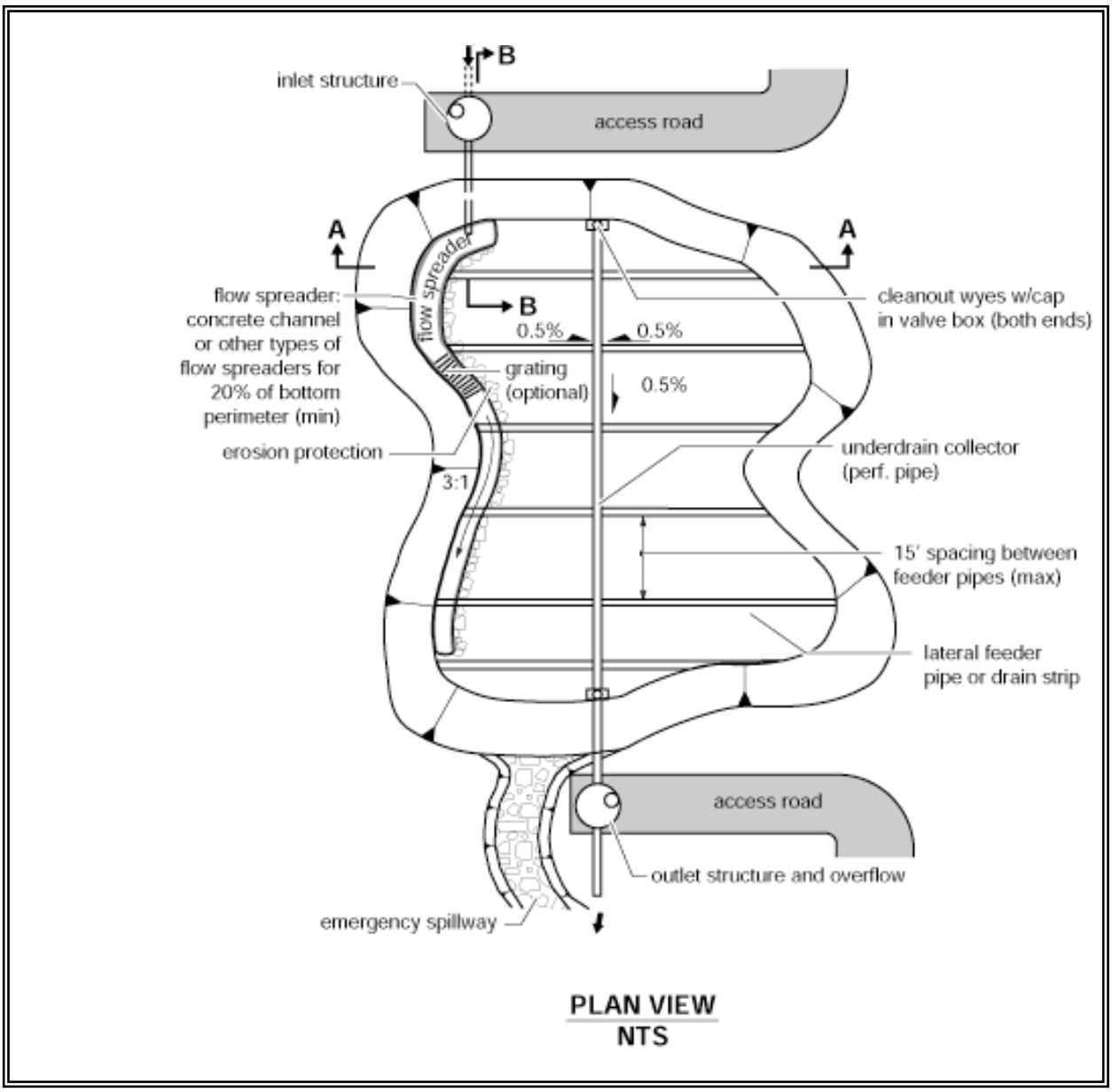

Figure 8.3 – Sand Filter with Level Spreader

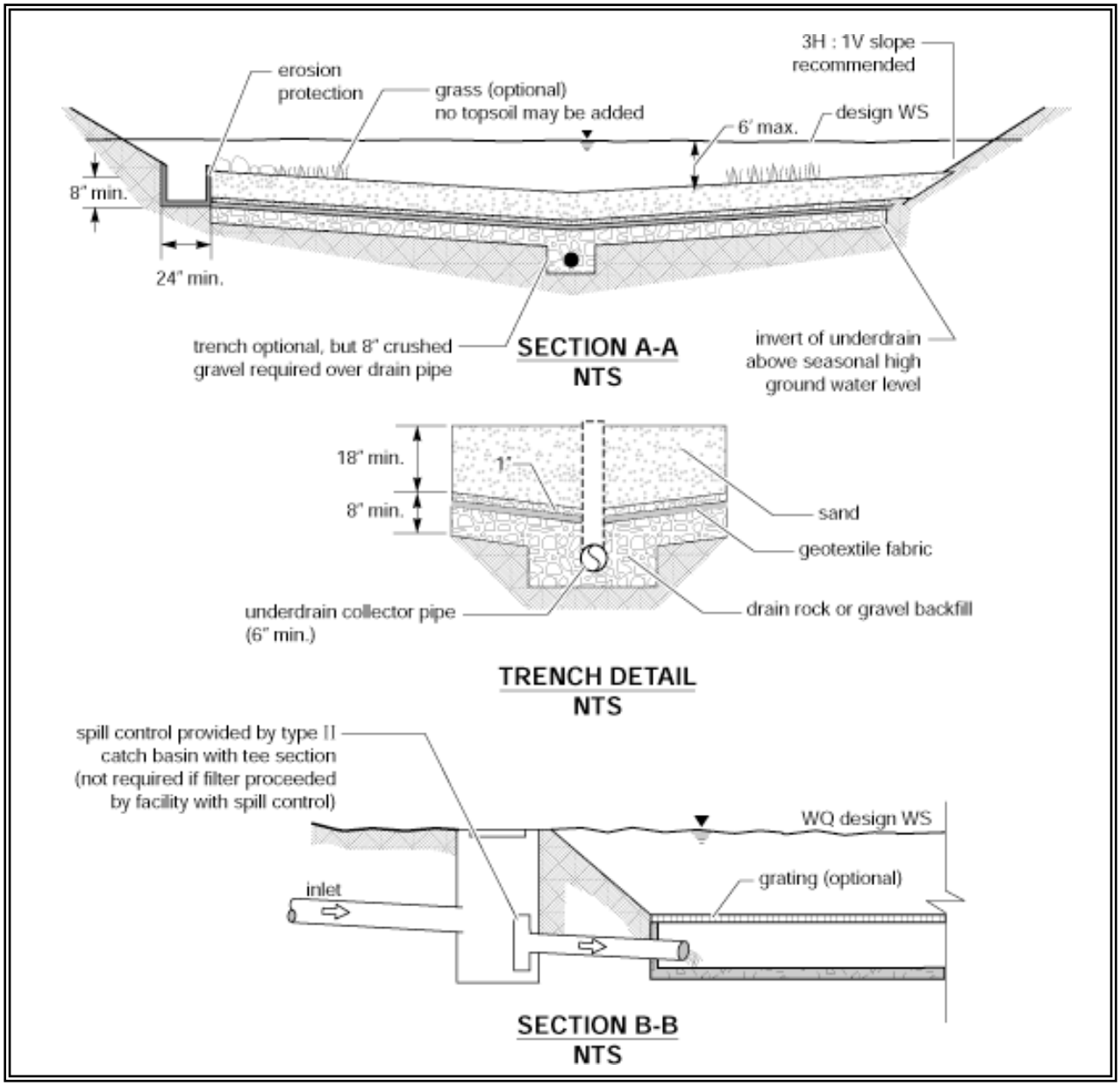

Figure 8.3 (cont) Sand Filter with Level Spreader

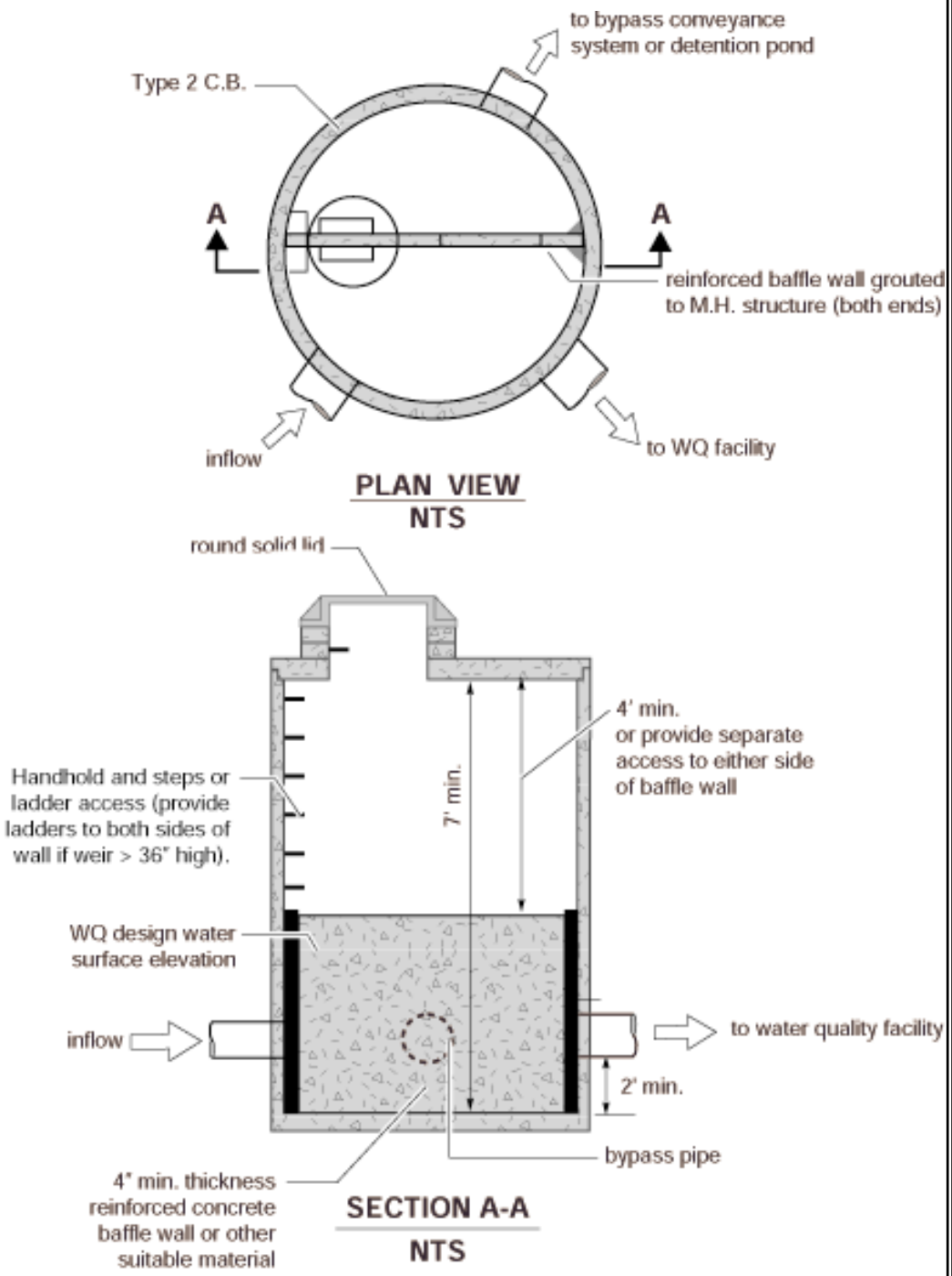

Note: The water quality discharge pipe may require an orifice plate be installed on the outlet to control the height of the design water surface (weir height). The design water surface should be set to provide a minimun headwater/diameter ratio of 2.0 on the outlet pipe.

Figure 8.4a – Flow Splitter Option A

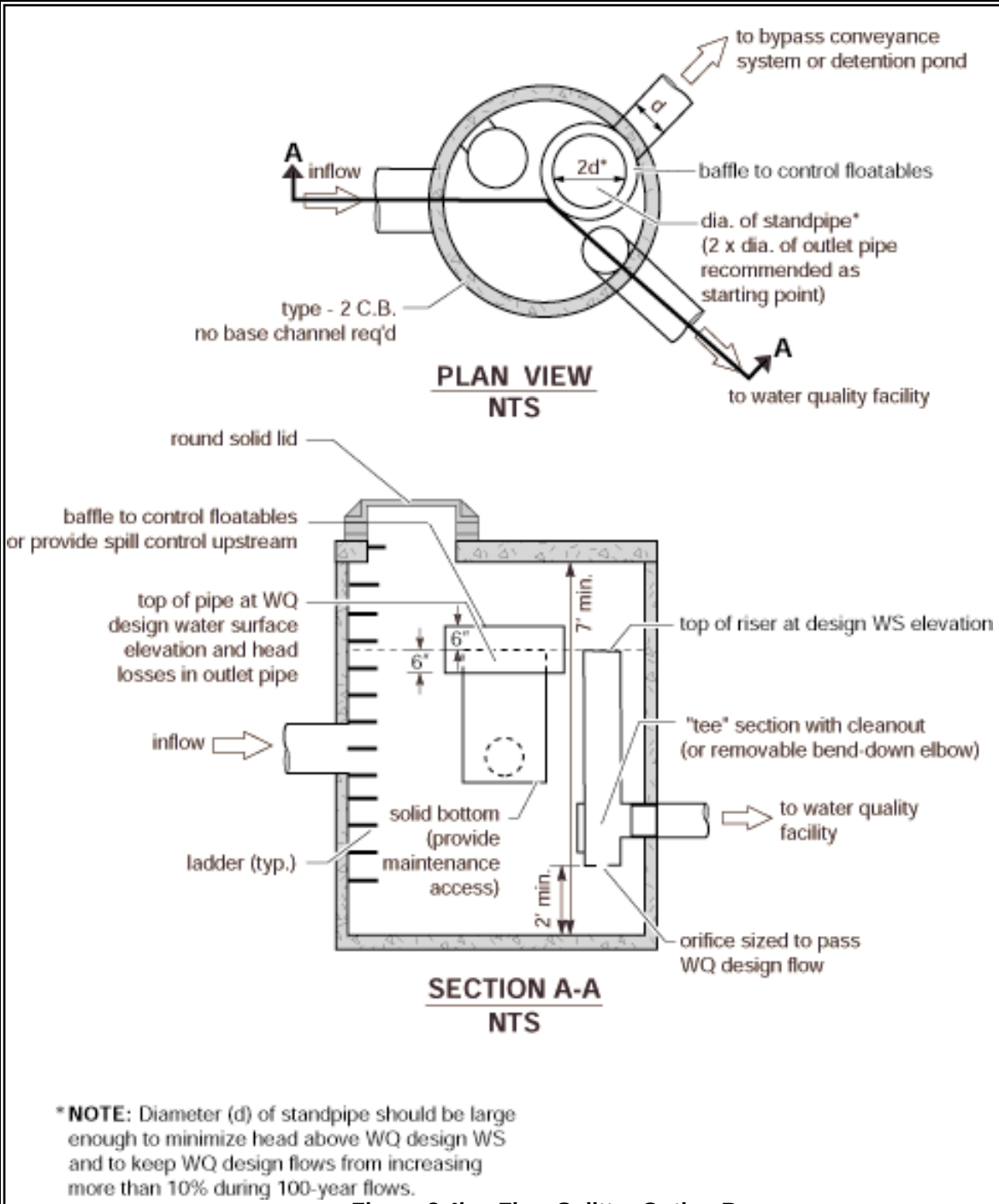

*NOTE: Diameter (d) of standpipe should be large enough to minimize head above WQ design WS and to keep WQ design flows from increasing more than 10% during 100-year flows.

Figure 8.4b – Flow Splitter Option B

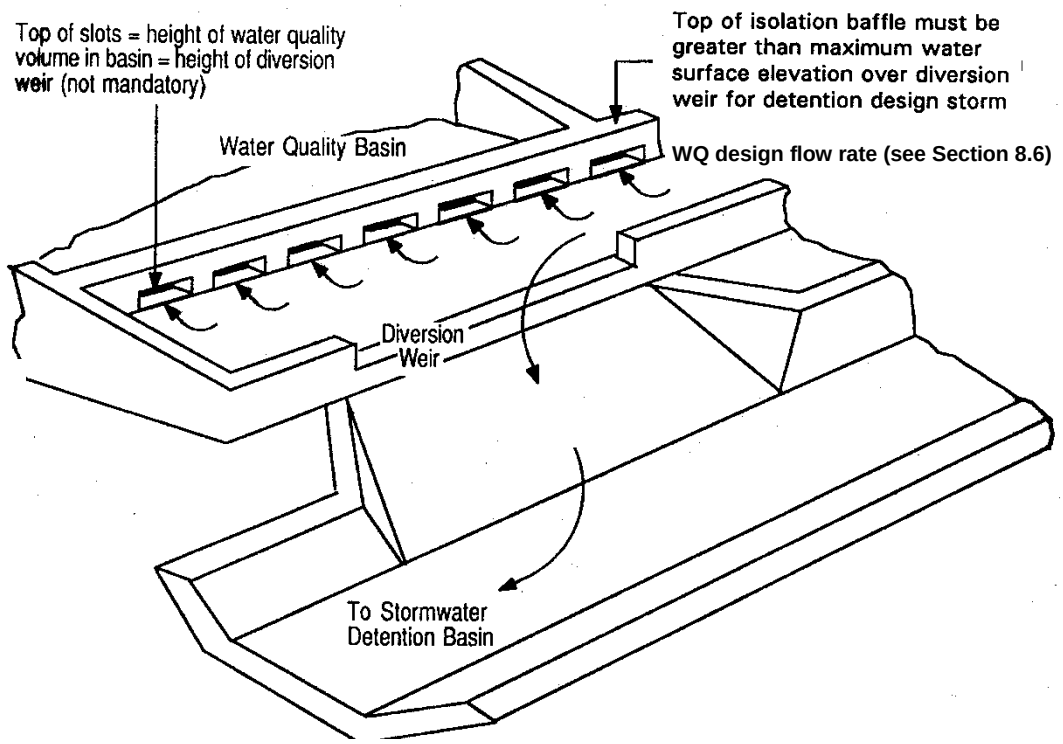

Source: City of Austin

Figure 8.5 – Example Isolation/Diversion Structure

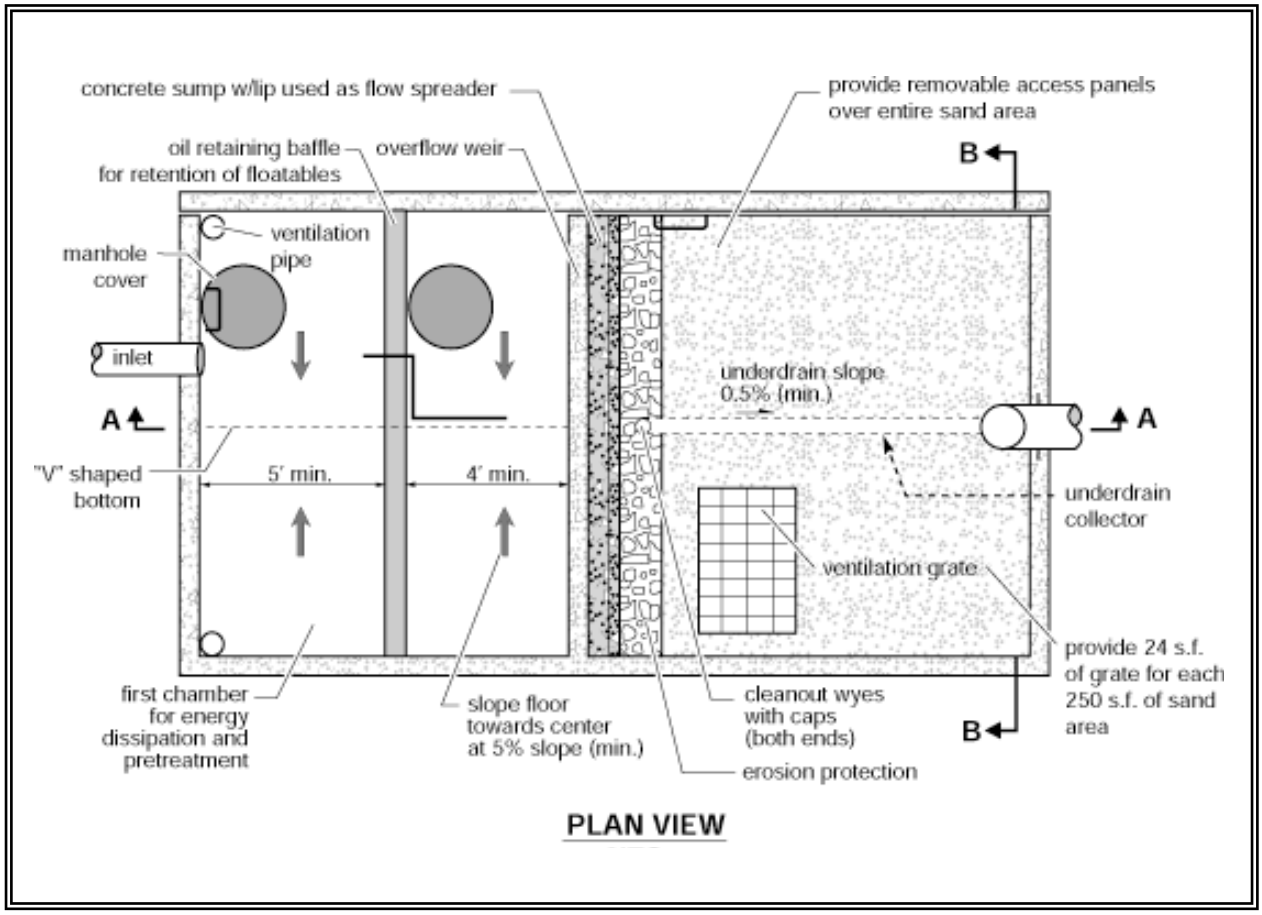

Figure 8.6a – Sand Filter Vault

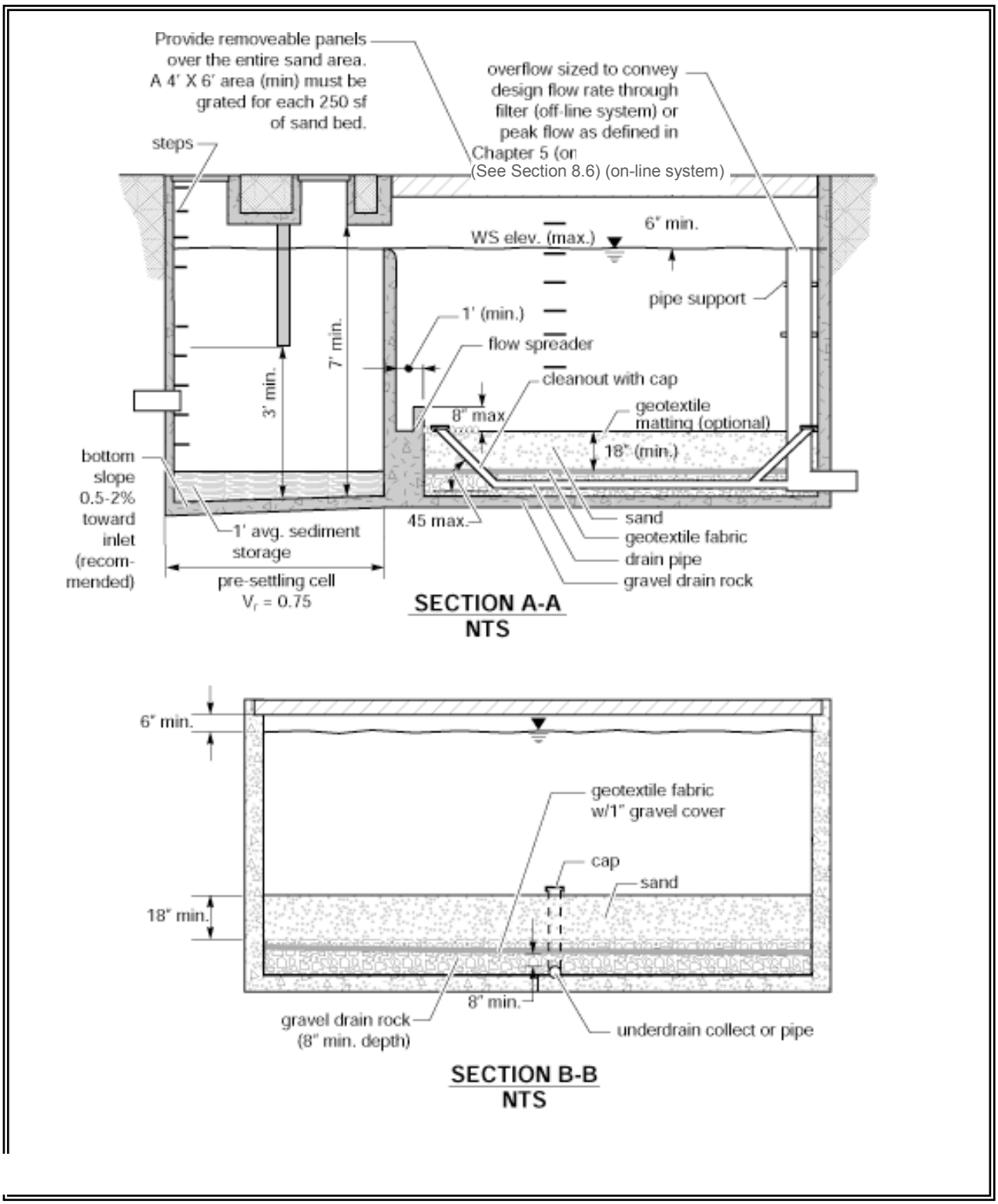

Figure 8.6b – Sand Filter Vault (cont)

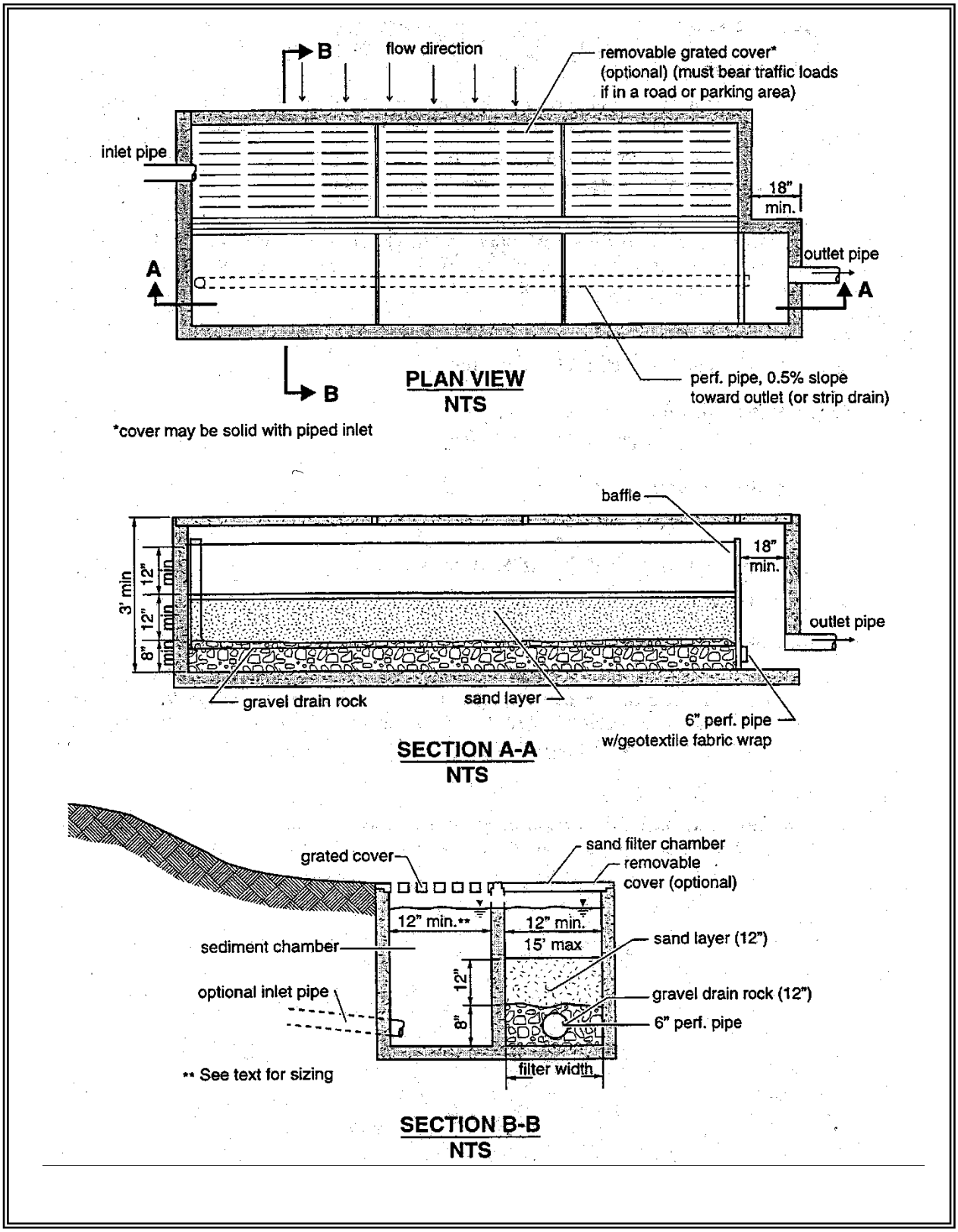

Figure 8.7 – Linear Sand Filter

8.3 Performance Objectives

Basic sand filter: Basic sand filters are expected to achieve the performance goals for Basic Treatment. Based upon experience in King County and Austin, Texas basic sand filters should be capable of achieving the following average pollutant removals:

- 80 percent TSS at influent Event Mean Concentrations (EMCs) of 30-300 mg/L, i.e., meets the Basic Treatment performance goal. ~~(King County, 1998) (Chang, 2000)~~
- O~~o~~il and grease to below 10 mg/L daily average and 15 mg/L at any time, with no ongoing or recurring visible sheen in the discharge. i.e., meets the Oil Control performance goal.

Large sand filter: Large sand filters are expected to remove at least 50 percent of the total phosphorous compounds (as TP) by collecting and treating 95% of the runoff volume (meets Phosphorus Treatment performance goal). (ASCE and WEF, 1998)

Media filter drain: Media filter drains are expected to achieve the Basic and Phosphorous Treatment performance goals quoted above. In addition it is expected to achieve the Dissolved Metals (Enhanced) Treatment goals of greater than 30% reduction of dissolved copper, and greater than 50% reduction of dissolved zinc.

8.4 Sand Filter Basin and Vault Applications and Limitations

Sand filtration can be used in most residential, commercial, and industrial developments where debris, heavy sediment loads, and oils and greases will not clog or prematurely overload the sand, or where adequate pretreatment is provided for these pollutants. Specific applications include residential subdivisions, parking lots for commercial and industrial establishments, gas stations, high-use sites, high-density multi-~~-~~family housing, roadways, and bridge decks.

Sand filters should be located off-line before or after detention (Chang, 2000). Sand filters are also suited for locations with space constraints in retrofit, and new/re-development situations. Overflow or bypass structures must be carefully designed to handle the larger storms. An off-line system is sized to treat 91% runoff volume predicted by a continuous runoff model. If a project must comply with Minimum Requirement #7, Flow Control, the flows bypassing the filter and the filter discharge must be routed to a retention/detention facility.

Pretreatment is necessary to reduce velocities to the sand filter and remove debris, floatables, large particulate matter, and oils. In high water table areas adequate drainage of the sand filter may require additional engineering analysis and design considerations. An underground filter

~~s~~should be considered in areas subject to freezing conditions~~.~~ (Urbonas, 1997).

8.5 ~~Site Suitability~~Best Management Practices

BMP T8.10 Sand Filter Basin

Description (Figures 8.1 through 8.4)

A sand filter basin is constructed so that its surface is at grade and open to the elements, much as an infiltration basin. However, instead of infiltrating into native soils, stormwater filters through a constructed sand bed with an underdrain system.

Objective, Applications and Limitations

To capture and treat the Water Quality Design Storm volume which is 91% of the total runoff volume (95% for large sand filter) as predicted by Western Washington Hydrology Model (WWHM) (or an approved, equivalent continuous runoff model). Only 9% of the total runoff volume (5% for large sand filter) would bypass or overflow from the sand filter facility. Off-line sand filters can be located either upstream or downstream of detention facilities. On-line sand filters should only be located downstream of detention to prevent exposure of the sand filter surface to high flow rates that could cause loss of media and previously removed pollutants.

Site Suitability

The following site characteristics should be considered in siting a sand filtration system:

- Space availability, including a presettling basin
- Sufficient hydraulic head, at least 4 feet from inlet to outlet
- Adequate Operation and Maintenance capability including accessibility for O & M
- Sufficient pretreatment of oil, debris and solids in the tributary runoff

~~8.6~~ Design Criteria

~~***Objective:*** To capture and treat the Water Quality Design Storm volume which is 91% of the total runoff volume (95% for large sand filter) as predicted by Western Washington Hydrology Model (WWHM) (or an approved, equivalent continuous runoff model). Only 9% of the total runoff volume (5% for large sand filter) would bypass or overflow from the sand filter facility . Off-line sand filters can be located either upstream~~

~~or downstream of detention facilities. On-line sand filters should only be located downstream of detention to prevent exposure of the sand filter surface to high flow rates that could cause loss of media and previously removed pollutants.~~

~~***Basic Sand** Filter*~~*Hydraulics*~~:~~

~~A summary of the basic sand filter design requirements are given below. For off-line facilities, a flow splitter should be designed to route the water quality design flow rate to the sand filter.~~

On-line sand filters must NOT be placed ***upstream*** of a detention facility. This is to prevent exposure of the sand filter surface to high flow rates that could cause loss of media and previously removed pollutants.

On-line sand filters placed ***downstream*** of a detention facility must be sized using a continuous runoff model (WWHM or an approved equivalent model) to filter 91% of the runoff volume.

Off-line sand filters placed ***upstream*** of a detention facility must have a flow splitter designed to send all flows at or below the 15-minute water quality flow rate, as predicted by WWHM, to the sand filter. The sand filter must be sized to filter all the runoff sent to it (no overflows from the treatment facility should occur). Note that WWHM~~2~~ allows any bypasses and the runoff filtered through the sand to be directed to the downstream detention facility.

Off-line sand filters placed ***downstream*** of a detention facility must have a flow splitter designed to send all flows at or below the 2-year flow frequency from the detention pond, as predicted by WWHM, to the treatment facility. The treatment facility must be sized to filter all the runoff sent to it (no overflows from the treatment facility should occur).

An overflow should be included in the design of the basic and large sand filter basin or vault. The overflow height should be at the maximum hydraulic head of the pond above the sand bed. On-line filters shall have overflows (primary, secondary, and emergency) in accordance with the design criteria for detention ponds ( ). For off-line filters, the overflow, and the underdrain structure must both be designed to pass the 2-year peak inflow rate, as determined using 15-minute time steps in an approved continuous runoff model.

If the drainage area maintains a base flow between storm events, it should be bypassed around the filter to keep the sand from remaining saturated for extended periods of time.

The design filtration rate shall be assumed to be 1 inch per hour. Though the sand specified below will initially infiltrate at a much higher rate, that rate will slow as the filter accumulates sediment. When the filtration rate falls to 1 inch per hour, removal of sediment is necessary to maintain rates above the rate assumed for sizing purposes.

~~*Large Sand Filter:* For a summary of the large sand filter design requirements follow the requirements for the basic sand filter except, for the percent runoff filtered, use 95% instead of 91%. .~~

Additional Design Criteria~~Information:~~

1. Runoff to be treated by the sand filter must be pretreated (e.g., presettling basin, etc. depending on pollutants) to remove debris and other solids, and oil from high use sites.

2. Inlet bypass and flow spreading structures (e.g., flow spreaders, weirs or multiple orifice openings) should be designed to capture the applicable design flow rate, minimize turbulence and to spread the flow uniformly across the surface of the sand filter. Stone riprap or other energy dissipation devices should be installed to prevent gouging of the sand medium and to promote uniform flow. Include emergency spillway or overflow structures (see Vol. III)

   a. If the sand filter is curved or an irregular shape, a flow spreader shall be provided for a minimum of 20 percent of the filter perimeter.

   b. If the length-to-width ration of the filter is 2:1 or greter, a flow spreader must be located on the longer side and for a minimum length of 20 percent of the facility perimeter.

   c. Erosion protection shall be provided along the first foot of the sand bed adjacent to the flow spreader. Geotextile weighted with sand bags at 15-foot intervals may be used. Quarry spalls may also be used.

3. The following are design criteria for the underdrain piping:

   ~~(~~T~~t~~ypes of acceptable underdrains ~~include~~:

   - ~~a~~A central collector pipe with lateral feeder pipes in an 8-inch gravel backfill or drain rock bed~~,~~. ~~or,~~
   - A central collector pipe with a geotextile drain strip in an 8-inch gravel backfill or drain rock bed~~, .or,~~
   - Longitudinal pipes in an 8-inch gravel backfill or drain rock with a collector pipe at the outlet end.

- Upstream of detention underdrain piping should be sized to handle double the two-year return frequency flow indicated by the WWHM (the doubling factor is a safety factor used in the absence of a conversion factor from the 1-hr. time step to a 15 minute time step). Downstream of detention the underdrain piping should be sized for the two-year return frequency flow indicated by the WWHM. In both instances there should be at least one (1) foot of hydraulic head above the invert of the upstream end of the collector pipe. (King County, 1998)

- Internal diameters of underdrain pipes should be a minimum of six (6) inches and two rows of ½-inch holes spaced 6 inches apart longitudinally (maximum), with rows 120 degrees apart (laid with holes downward). Maximum perpendicular distance between two feeder pipes, or the edge of the filter and a feeder pipe, must be 15 feet. All piping is to be schedule 40 PVC or greater wall thickness. Drain piping could be installed in basin and trench configurations.

- Main collector underdrain pipe should be at a slope of 0.5 percent minimum. (King County, 1998)

- A geotextile fabric (specifications in Appendix V-C) must be used between the sand layer and drain rock or gravel and placed so that 1-inch of drain rock/gravel is above the fabric. Drain rock should be 0.75-1.5 inch rock or gravel backfill, washed free of clay and organic material. (King County, 1998)

Cleanout wyes with caps or junction boxes must be provided at both ends of the collector pipes. Cleanouts must extend to the surface of the filter. A valve box must be provided for access to the cleanouts. Access for cleaning all underdrain piping should be provided. This may consist of installing cleanout ports, which tee into the underdrain system and surface above the top of the sand bed. To facilitate maintenance of the sand filter an inlet shutoff/bypass valve is recommended.

~~**Note:** Other equivalent energy dissipaters can be used if needed.~~

4. Sand specification: The sand in a filter shall be 18 inches minimum depth and must consist of a medium sand meeting the size gradation (by weight) given in Table 8.1 below. The contractor must obtain a grain size analysis from the supplier to certify that the No. 100 and No. 200 sieve requirements are met. *(Note: Standard backfill for sand drains, Wa. Std. Spec. 9-03.13, does not meet this specification and should not be used for sand filters.)*

Table 8.1 – Sand Medium Specification	
U.S. Sieve Number	**Percent Passing**
4	95-100
8	70-100
16	40-90
30	25-75
50	2-25
100	<4
200	<2

Source: King County Surface Water Design Manual, September

5. Impermeable Liners for Sand Bed Bottom: Impermeable liners are generally required for soluble pollutants such as metals and toxic organics and where the underflow could cause problems with structures. Impermeable liners may be clay, concrete or geomembrane. Clay liners should have a minimum thickness of 12 inches and meet the specifications give in Table 8.2:

Table 8.2 – Clay Liner Specifications			
Property	**Test Method**	**Unit**	**Specification**
Permeability	ASTM D-2434	cm/sec	1×10^{-6} max.
Plasticity Index of Clay	ASTM D-423 & D-424	percent	Not less than 15
Liquid Limit of Clay	ASTM D-2216	percent	Not less than 30
Clay Particles Passing	ASTM D-422	percent	Not less than 30
Clay Compaction	ASTM D-2216	percent	95% of Standard Proctor Density

Source: City of Austin, 1988

- If a geomembrane liner is used it should have a minimum thickness of 30 mils and be ultraviolet resistant. The geomembrane liner should be protected from puncture, tearing, and abrasion by installing geotextile fabric on the top and bottom of the geomembrane.

- Concrete liners may also be used for sedimentation chambers and for sedimentation and sand filtration basins less than 1,000 square feet in area. Concrete should be 5 inches thick Class A or better and should be reinforced by steel wire mesh. The steel wire mesh should be 6 gauge wire or larger and 6-inch by 6-inch mesh or smaller. An "Ordinary Surface Finish" is required. When the underlying soil is clay or has an unconfined compressive strength of 0.25 ton per square foot or less, the concrete should have a minimum 6-inch compacted aggregate base. This base must consist of coarse sand and river stone, crushed stone or equivalent with diameter of 0.75- to 1-inch.

- If an impermeable liner is not required then a geotextile fabric liner should be installed that retains the sand and meets the specifications listed in Appendix V-C unless the basin has been excavated to bedrock.

- If an impermeable liner is not provided, then an analysis should be made of possible adverse effects of seepage zones on ground water, and near building foundations, basements, roads, parking lots and sloping sites. Sand filters without impermeable liners should not be built on fill sites and should be located at least 20-foot downslope and 100-foot upslope from building foundations.

6. Include an access ramp with a slope not to exceed 7:1, or equivalent, for maintenance purposes at the inlet and the outlet of a surface filter. Consider an access port for inspection and maintenance.

7. Side slopes for earthen/grass embankments should not exceed 3:1 to facilitate mowing.

8. High groundwater may damage underground structures or affect the performance of filter underdrain systems. There should be sufficient clearance (at least 2 feet is recommended) between the seasonal high groundwater level (highest level of ground water observed) and the bottom of the sand filter to obtain adequate drainage.

~~8.7~~ *Construction Criteria*

No runoff should enter the sand filter prior to completion of construction and approval of site stabilization by the responsible inspector. Construction runoff may be routed to a pretreatment sedimentation facility, but discharge from sedimentation facilities should by-pass downstream sand filters. Careful level placement of the sand is necessary to avoid formation of voids within the sand that could lead to short-circuiting, (particularly around penetrations for underdrain cleanouts) and to prevent damage to the underlying geomembranes and underdrain system. Over-compaction should be avoided to ensure adequate filtration capacity. Sand is best placed with a low ground pressure bulldozer (4 psig or less). After the sand layer is placed water settling is recommended. Flood the sand with 10-15 gallons of water per cubic foot of sand.

~~8.8~~ *Maintenance Criteria*

Inspections of sand filters and pretreatment systems should be conducted every 6 months and after storm events as needed during the first year of operation, and annually thereafter if filter performs as designed. Repairs should be performed as necessary. Suggestions for maintenance include:

- Accumulated silt, and debris on top of the sand filter should be removed when their depth exceeds 1/2-inch. The silt should be scraped off during dry periods with steel rakes or other devices. Once sediment is removed, the design permeability of the filtration media can typically be restored by

then striating the surface layer of the media. Finer sediments that have penetrated deeper into the filtration media can reduce the permeability to unacceptable levels, necessitating replacement of some or all of the sand.

- Sand replacement frequency is not well established and will depend on suspended solids levels entering the filter (the effectiveness of the pretreatment BMP can be a significant factor).
- Frequent overflow into the spillway or overflow structure or slow drawdown are indicators of plugging problems. A sand filter should empty in 24 hours following a storm event (24 hours for the pre-settling chamber), depending on pond depth. If the hydraulic conductivity drops to one (1) inch per hour corrective action is needed, e.g.:
  - Scraping the top layer of fine-grain sediment accumulation (mid-winter scraping is suggested)
  - Removal of thatch
  - Aerating the filter surface
  - Tilling the filter surface (late-summer rototilling is suggested)
  - Replacing the top 4 inches of sand.
  - Inspecting geotextiles for clogging
- Rapid drawdown in the sand bed (greater than 12 inches per hour) indicates short-circuiting of the filter. Inspect the cleanouts on the underdrain pipes and along the base of the embankment for leakage.
- Drawdown tests for the sand bed could be conducted, as needed, during the wet season. These tests can be conducted by allowing the filter to fill (or partially fill) during a storm event, then measuring the decline in water level over a 4-8 hour period. An inlet and an underdrain outlet valve would be necessary to conduct such a test.
- Formation of rills and gullies on the surface of the filter indicates improper function of the inlet flow spreader, or poor sand compaction. Check for accumulation of debris on or in the flow spreader and refill rills and gullies with sand.
- Avoid driving heavy equipment on the filter to prevent compaction and rut formation.

BMP T8.~~1~~20 Sand Filter Vault

Description: (Figures 8.6a and 8.6b)

A sand filter vault is similar to an open sand filter except that the sand layer and underdrains are installed below grade in a vault. It consists of presettling and sand filtration cells.

Applications and Limitations

- Use where space limitations preclude above ground facilities
- Not suitable where high water table and heavy sediment loads are expected
- An elevation difference of 4 feet between inlet and outlet is needed

Design Criteria

See design criteria for sand filter basins, including: hydraulics and additional criteria.

Additional Design Criteria for Vaults (See also Section 8.6)

- Vaults may be designed as off-line systems or on-line for small drainages
- In an off-line system a diversion structure should be installed to divert the design flow rate into the sediment chamber and bypass the remaining flow to detention/retention (if necessary to meet Minimum Requirement #7), or to surface water.
- Optimize sand inlet flow distribution with minimal sand bed disturbance. A maximum of 8-inch distance between the top of the spreader and the top of the sand bed is suggested. Flows may enter the sand bed by spilling over the top of the wall into a flow spreader pad or alternatively a pipe and manifold system may be used. Any pipe and manifold system must retain the required dead storage volume in the first cell, minimize turbulence, and be readily maintainable.
- If an inlet pipe and manifold system is used, the minimum pipe size should be 8 inches. Multiple inlets are recommended to minimize turbulence and reduce local flow velocities.
- Erosion protection must be provided along the first foot of the sand bed adjacent to the spreader. Geotextile fabric secured on the surface of the sand bed, or equivalent method, may be used.
- The filter bed should consist of a sand top layer, and a geotextile fabric second layer with an underdrain system.
- Design the presettling cell for sediment collection and removal. A V-shaped bottom, removable bottom panels, or equivalent sludge

handling system should be used. One-foot of sediment storage in the presettling cell must be provided.

- The pre-settling chamber must be sealed to trap oil and trash. This chamber is usually connected to the sand filtration chamber through an invert elbow to protect the filter surface from oil and trash.
- If a retaining baffle is necessary for oil/floatables in the presettling cell, it must extend at least one foot above to one foot below the design flow water level. Provision for the passage of flows in the event of plugging must be provided. Access opening and ladder must be provided on both sides of the baffle.
- To prevent anoxic conditions, a minimum of 24 square feet of ventilation grate should be provided for each 250 square feet of sand bed surface area. For sufficient distribution of airflow across the sand bed, grates may be located in one area if the sand filter is small, but placement at each end is preferred. Small grates may also be dispersed over the entire sand bed area.
- Provision for access is the same as for wet vaults. Removable panels must be provided over the entire sand bed.
- Sand filter vaults must conform to the materials and structural suitability criteria specified for wet vaults.
- Provide a sand filter inlet shutoff/bypass valve for maintenance
- A geotextile fabric over the entire sand bed may be installed that is flexible, highly permeable, three-dimensional matrix, and adequately secured. This is useful in trapping trash and litter.

Construction Criteria

See sand filter basins, BMP T8.10 and the maintenance table in Chapter 4 of Volume V.

Maintenance Criteria

See sand filter basins, BMP T8.10 and the Maintenance Table in Chapter 4 of Volume V.

BMP T8.30 Linear Sand Filter ~~BMP T8.20 Linear Sand Filter~~

Description: (Figure 8.7)

Linear sand filters are typically long, shallow, two-celled, rectangular vaults. The first cell is designed for settling coarse particles, and the second cell contains the sand bed. Stormwater flows into the second cell via a weir section that also functions as a flow spreader.

Application and Limitations

- Applicable in long narrow spaces such as the perimeter of a paved surface.
- As a part of a treatment train as downstream of a filter strip, upstream of an infiltration system, or upstream of a wet pond or a biofilter for oil control.
- To treat small drainages (less than 2 acres of impervious area).
- To treat runoff from high-use sites for TSS and oil/grease removal, if applicable.

Additional Design Criteria for Linear Sand Filters (See Section 8.6 for design criteria applicable to all sand filter types)

- The two cells should be divided by a divider wall that is level and extends a minimum of 12 inches above the sand bed.
- Stormwater may enter the sediment cell by sheet flow or a piped inlet.
- The width of the sand cell must be 1-foot minimum to 15 feet maximum.
- The sand filter bed must be a minimum of 12 inches deep and have an 8-inch layer of drain rock with perforated drainpipe beneath the sand layer.
- The drainpipe must be 6-inch diameter minimum and be wrapped in geotextile and sloped a minimum of 0.5 percent.
- Maximum sand bed ponding depth: 1-foot.
- Must be vented as for sand filter vaults
- Linear sand filters must conform to the materials and structural suitability criteria specified for wet vaults.
- Set sediment cell width as follows:

Sand filter width, (w) inches	12-24	24-48	48-72	72+
Sediment cell width, inches	12	18	24	w/3

BMP T8.40 – Media Filter Drain (previously referred to as the Ecology Embankment)

General Description

The media filter drain (MFD), previously referred to as the *ecology embankment*, is a linear flow-through stormwater runoff treatment device that can be sited along highway side slopes (conventional design) and medians (dual media filter drains), borrow ditches, or other linear depressions. Cut-slope applications may also be considered. The media filter drain can be used where available right of way is limited, sheet flow from the highway surface is feasible, and lateral gradients are generally less than 25% (4H:1V).
Updates/changes to the use-level designation and any design changes will be posted in the
Postpublication Updates section of the HRM Resource web page.

Media filter drains (MFDs) have four basic components: a gravel no-vegetation zone, a grass strip, the MFD mix bed, and a conveyance system for flows leaving the MFD mix. This conveyance system usually consists of a gravel-filled underdrain trench or a layer of crushed surfacing base course (CSBC). This layer of CSBC must be porous enough to allow treated flows to freely drain away from the MFD mix.

Typical MFD configurations are shown in Figures 8.8, 8.9, 8.10.

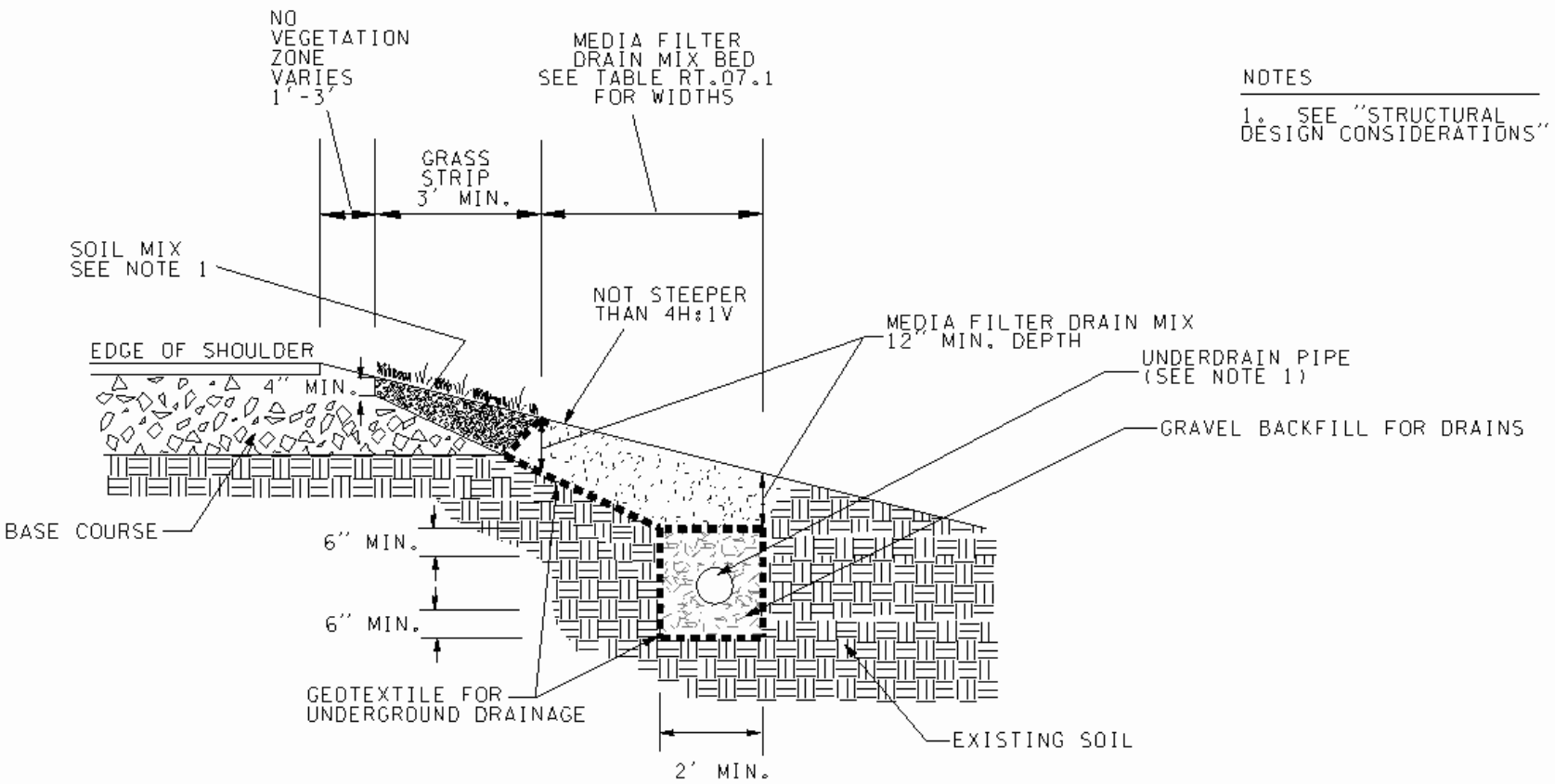

NOTES

1. SEE "STRUCTURAL DESIGN CONSIDERATIONS"

MEDIA FILTER DRAIN

SIDE SLOPE APPLICATION WITH UNDERDRAIN

NTS

THIS DRAWING IS ONLY A TEMPLATE AND SHOULD BE MODIFIED TO FIT EACH PROJECT APPLICATION

Figure 8.8 Media filter drain: Cross section

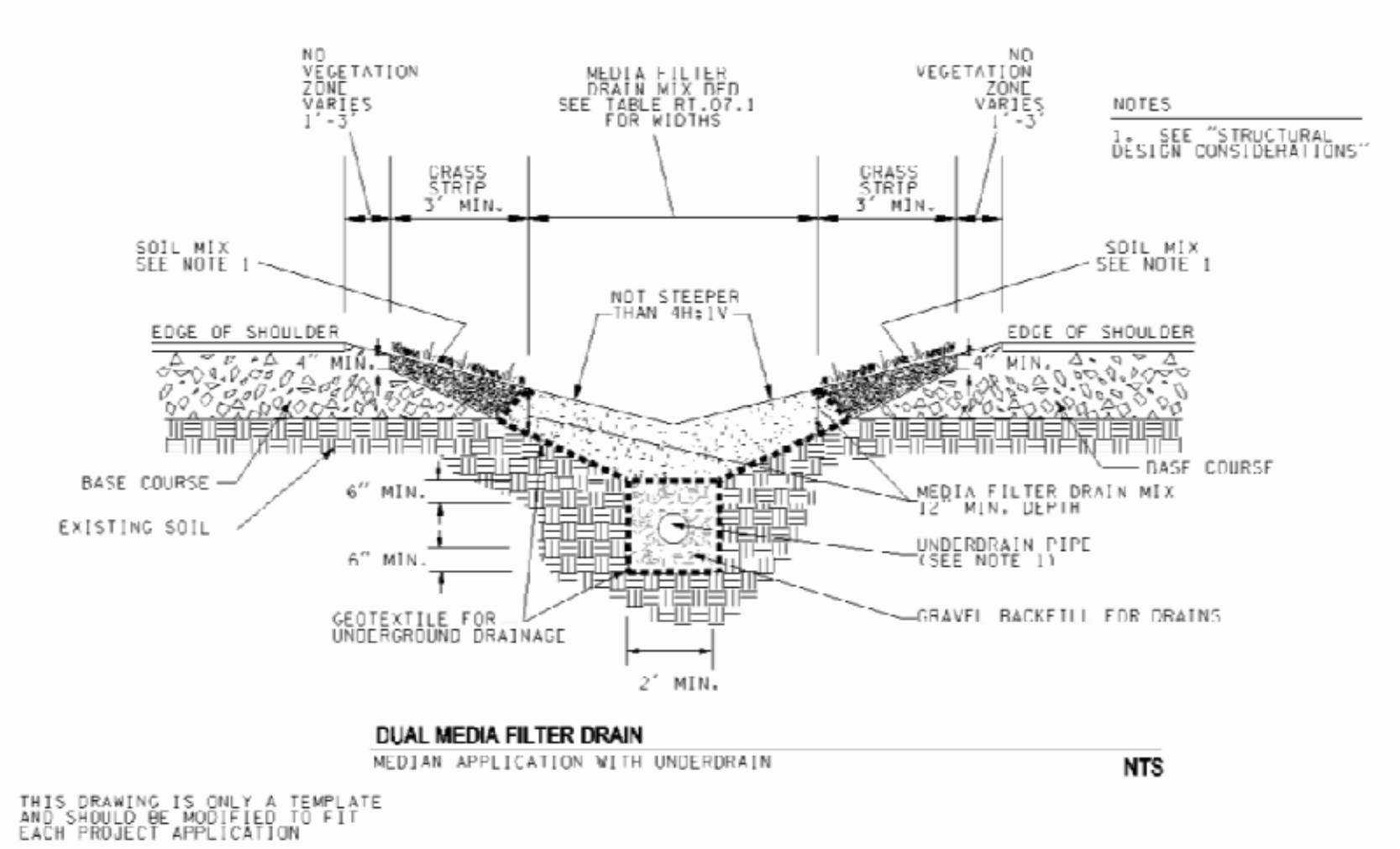

Figure 8.9 Dual media filter drain: Cross section

Functional Description

The media filter drain removes suspended solids, phosphorus, and metals from highway runoff through physical straining, ion exchange, carbonate precipitation, and biofiltration.

Stormwater runoff is conveyed to the media filter drain via sheet flow over a vegetation-free gravel zone to ensure sheet dispersion and provide some pollutant trapping. Next, a grass strip, which may be amended with compost, is incorporated into the top of the fill slope to provide pretreatment, further enhancing filtration and extending the life of the system. The runoff is then filtered through a bed of porous, alkalinity-generating granular medium—the media filter drain mix. Media filter drain mix is a fill material composed of crushed rock (sized by screening), dolomite, gypsum, and perlite. The dolomite and gypsum additives serve to buffer acidic pH conditions and exchange light metals for heavy metals. Perlite is incorporated to improve moisture retention, which is critical for the formation of biomass epilithic biofilm to assist in the removal of solids, metals, and nutrients. Treated water drains from the media filter drain mix bed into the conveyance system below the media filter drain mix. Geotextile lines the underside of the media filter drain mix bed and the conveyance system.

The underdrain trench is an option for hydraulic conveyance of treated stormwater to a desired location, such as a downstream flow control facility or stormwater outfall. The trench's perforated underdrain pipe is a protective measure to ensure free flow through the media filter drain mix. It may be possible to omit the underdrain pipe if it can be demonstrated that the pipe is not necessary to maintain free flow through the media filter drain mix and underdrain trench.

It is critical to note that water should sheet flow across the media filter drain. Channelized flows or ditch flows running down the middle of the dual media filter drain (continuous off-site inflow) should be minimized.

Applications and Limitations

In many instances, conventional runoff treatment is not feasible due to right of way constraints (such as adjoining wetlands and geotechnical considerations). The media filter drain and the dual media filter drain designs are runoff treatment options that can be sited in most right of way confined situations. In many cases, a media filter drain or a dual media filter drain can be sited without the acquisition of additional right of way needed for conventional stormwater facilities or capital-intensive expenditures for underground wet vaults.

Applications

Media Filter Drains

The media filter drain can achieve basic, phosphorus, and enhanced water quality treatment.

Since maintaining sheet flow across the media filter drain is required for its proper function, the ideal locations for media filter drains in highway settings are highway side slopes or other long, linear grades with lateral side slopes less than 4H:1V and longitudinal slopes no steeper than 5%. As side slopes approach 3H:1V, without design modifications, sloughing may become a problem due to friction limitations between the separation geotextile and underlying soils. The longest flow path from the contributing area delivering sheet flow to the media filter drain should not exceed 150 feet.

Dual Media Filter Drain for Highway Medians

The dual media filter drain is fundamentally the same as the side-slope version. It differs in siting and is more constrained with regard to drainage options. Prime locations for dual media filter drains in a highway setting are medians, roadside drainage or borrow ditches, or other linear depressions. It is especially critical for water to sheet flow across the dual media filter drain. Channelized flows or ditch flows running down the middle of the dual media filter drain (continuous off-site inflow) should be minimized.

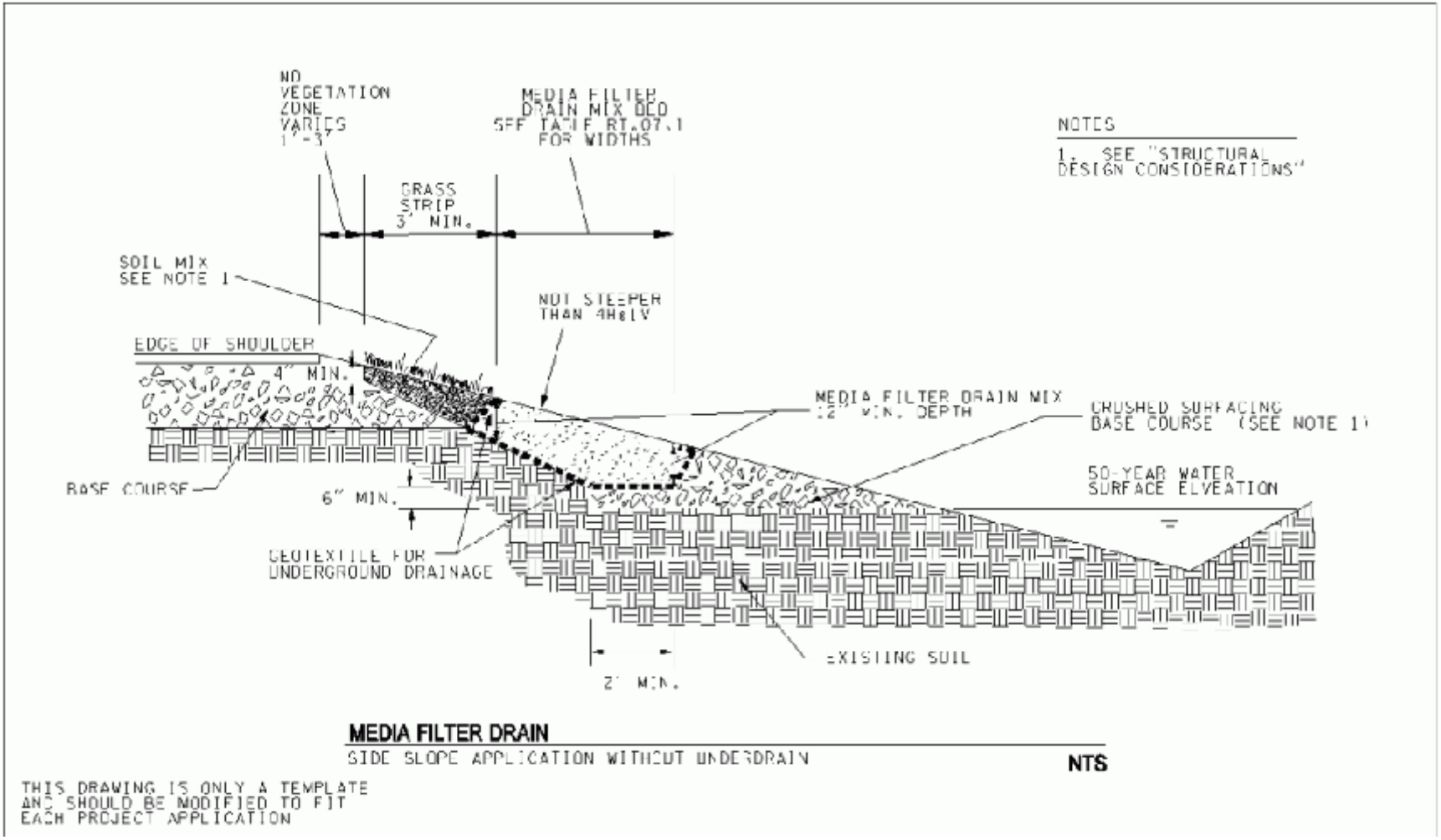

Figure 8.10 Media filter drain without underdrain trench

Limitations

Media Filter Drains

- **Steep slopes.** Avoid construction on longitudinal slopes steeper than 5%. Avoid construction on 3H:1V lateral slopes, and preferably use less than 4H:1V slopes. In areas where lateral slopes exceed 4H:1V, it may be possible to construct terraces to create 4H:1V slopes or to otherwise stabilize up to 3H:1V slopes. (For details, see *Geometry*, *Components* and *Sizing Criteria*, *Cross Section* in the Structural Design Considerations section below).

- **Wetlands.** Do not construct in wetlands and wetland buffers. In many cases, a media filter drain (due to its small lateral footprint) can fit within the highway fill slopes adjacent to a wetland buffer. In those situations where the highway fill prism is located adjacent to wetlands, an interception trench/underdrain will need to be incorporated as a design element in the media filter drain.

- **Shallow groundwater.** Mean high water table levels at the project site need to be determined to ensure the media filter drain mix bed and the underdrain (if needed) will not become saturated by shallow groundwater.

- **Unstable slopes**. In areas where slope stability may be problematic, consult a geotechnical engineer.

Dual Media Filter Drains for Highway Medians

In addition to the above limitations on the media filter drain:

- **Wetlands**. Do not construct in wetlands and wetland buffers.

- **Areas of seasonal groundwater inundations or basement flooding**. The hydraulic and runoff treatment performance of the dual media filter drain may be compromised due to backwater effects and lack of sufficient hydraulic gradient.

Design Flow Elements

Flows to Be Treated

The basic design concept behind the media filter drain and dual media filter drain is to fully filter all runoff through the media filter drain mix. Therefore, the infiltration capacity of the medium and drainage below needs to match or exceed the hydraulic loading rate.

Structural Design Considerations

Geometry

Components

No-Vegetation Zone

The no-vegetation zone (vegetation-free zone) is a shallow gravel trench located directly adjacent to the highway pavement. The no-vegetation zone is a crucial element in a properly functioning media filter drain or other BMPs that use sheet flow to convey runoff from the highway surface to the BMP. The no-vegetation zone functions as a level spreader to promote sheet flow and a deposition area for coarse sediments. The no-vegetation zone should be between 1 foot and 3 feet wide. Depth will be a function of how the roadway section is built from subgrade to finish grade; the resultant cross section will typically be triangular to trapezoidal. Within these bounds, width varies depending on maintenance spraying practices. Contact the area maintenance office for this information.

Grass Strip

The width of the grass strip is dependent on the availability of space within the highway side slope. The baseline design criterion for the grass strip within the media filter drain is a 3-foot-minimum-width, but wider grass strips are recommended if the additional space is available. The designer may consider adding aggregate to the soil mix to help minimize rutting problems from errant vehicles. The soil mix should ensure grass growth for the design life of the media filter drain.

Media Filter Drain Mix Bed

The media filter drain mix is a mixture of crushed rock (screened to 3/8" to #10 sieve), dolomite, gypsum, and perlite. The crushed rock provides the support matrix of the medium; the dolomite and gypsum add alkalinity and ion exchange capacity to promote the precipitation and exchange of heavy metals; and the perlite improves moisture retention to promote the formation of biomass within the media filter drain mix. The combination of physical filtering, precipitation, ion exchange, and biofiltration enhances the water treatment capacity of the mix. The media filter drain

mix has an estimated initial filtration rate of 50 inches per hour and a long-term filtration rate of 28 inches per hour due to siltation. With an additional safety factor, the rate used to size the length of the media filter drain should be 10 inches per hour.

Conveyance System Below Media Filter Drain Mix
The gravel underdrain trench provides hydraulic conveyance when treated runoff needs to be conveyed to a desired location such as a downstream flow control facility or stormwater outfall.

In Group C and D soils, an underdrain pipe would help to ensure free flow of the treated runoff through the media filter drain mix bed. In some Group A and B soils, an underdrain pipe may be unnecessary if most water percolates into subsoil from the underdrain trench.
The need for underdrain pipe should be evaluated in all cases. The underdrain trench should be a minimum of 2 feet wide for either the conventional or dual media filter drain.

The gravel underdrain trench may be eliminated if there is evidence to support that flows can be conveyed laterally to an adjacent ditch or onto a fill slope that is properly vegetated to protect against erosion. The media filter drain mix should be kept free draining up to the 50-year storm event water surface elevation represented in the downstream ditch.

Sizing Criteria

Width

The width of the media filter drain mix bed is determined by the amount of contributing pavement routed to the embankment. The surface area of the media filter drain mix bed needs to be sufficiently large to fully infiltrate the runoff treatment design flow rate using the long-term filtration rate of the media filter drain mix. For design purposes, a 50% safety factor is incorporated into the long-term media filter drain mix filtration rate to accommodate variations in slope, resulting in a design filtration rate of 10 inches per hour. The media filter drain mix bed should have a bottom width of at least 2 feet in contact with the conveyance system below the media filter drain mix.

Length

In general, the length of a media filter drain or dual media filter drain is the same as the contributing pavement. Any length is acceptable as long as the surface area media filter drain mix bed is sufficient to fully infiltrate the runoff treatment design flow rate.

Cross Section

In profile, the surface of the media filter drain should preferably have a lateral slope less than
4H:1V (<25%). On steeper terrain, it may be possible to construct terraces to create a 4H:1V slope, or other engineering may be employed if approved by Ecology, to ensure slope stability up to 3H:1V. If sloughing is a concern on steeper slopes, consideration should be given to incorporating permeable soil reinforcements, such as geotextiles, open-graded/ permeable pavements, or commercially available ring and grid reinforcement structures, as top layer components to the media filter drain mix bed. Consultation with a geotechnical engineer is required.

Inflow

Runoff is conveyed to a media filter drain using sheet flow from the pavement area. The longitudinal pavement slope contributing flow to a media filter drain should be less than 5%.
Although there is no lateral pavement slope restriction for flows going to a media filter drain, the designer should ensure flows remain as sheet flow.

Media Filter Drain Mix Bed Sizing Procedure

The media filter drain mix should be a minimum of 12 inches deep, including the section on top of the underdrain trench.

For runoff treatment, sizing the media filter drain mix bed is based on the requirement that the runoff treatment flow rate from the pavement area, $Q_{Highway}$, cannot exceed the long-term infiltration capacity of the media filter drain, $Q_{Infiltration}$:

$$Q_{Highway} \leq Q_{Infiltration}$$

For western Washington, $Q_{Highway}$ is the flow rate at or below which 91% of the runoff volume for the developed TDA will be treated, based on a 15-minute time step (see Section
4-3.1.1 of the Highway Runoff Manual), and can be determined using and approved continuous runoff model.

The long-term infiltration capacity of the media filter drain is based on the following equation:

$$LTIR * L * W = Q_{Infiltration}$$

$$C * SF$$

where: *LTIR* = Long-term infiltration rate of the media filter drain mix (use 10 inches per hour for design) (in/hr)

L = Length of media filter drain (parallel to roadway) (ft)

W = Width of the media filter drain mix bed (ft)

C = Conversion factor of 43200 ((in/hr)/(ft/sec))

SF = Safety Factor (equal to 1.0, unless unusually heavy sediment loading is expected)

Assuming that the length of the media filter drain is the same as the length of the contributing pavement, solve for the width of the media filter drain:

$$W \geq \frac{Q_{Highway} * C * SF}{LTIR * L}$$

Western Washington project applications of this design procedure have shown that, in almost every case, the calculated width of the media filter drain does not exceed 1.0 foot. Therefore,
Table 8.3 was developed to simplify the design steps and should be used to establish an appropriate width.

Table 8.3 – Western Washington Design Widths for Media Filter Drains

Pavement width that contributes runoff to the media filter drain	Minimum media filter drain width*
≤ 20 feet	2 feet
≥ 20 and ≤ 35 feet	3 feet
> 35 feet	4 feet

* Width does not include the required 1–3 foot gravel vegetation-free zone or the 3-foot filter strip width (see Figure 8.3).

Materials

Media Filter Drain Mix

The media filter drain mix used in the construction of media filter drains consists of the amendments listed in Table 8.4. Mixing and transportation must occur in a manner that ensures the materials are thoroughly mixed prior to placement and that separation does not occur during transportation or construction operations.

These materials should be used in accordance with the following *Standard Specifications*:

- Gravel Backfill for Drains, 9-03.12(4)

- Underdrain Pipe, 7-01.3(2)
- Construction Geotextile for Underground Drainage, 9-33.1

Crushed Surfacing Base Course (CSBC)
If the design is configured to allow the media filter drain to drain laterally into a ditch (see
Figure RT.07.3), the crushed surfacing base course below the media filter drain should conform to Section 9-03.9(3) of the *Standard Specifications*.

Berms, Baffles, and Slopes
See *Geometry*, *Components* and *Sizing Criteria*, *Cross Section* under Structural Design Considerations above.

Table 8.4 – Media filter drain mix.

Amendment	Quantity
Mineral aggregate: Crushed screenings 3/8-inch to #10 sieve Crushed screenings shall be manufactured from ledge rock, talus, or gravel in accordance with Section 3-01 of the *Standard Specifications for Road, Bridge, and Municipal Construction* (2002), which meets the following test requirements: Los Angeles Wear, 500 Revolutions 35% max. Degradation Factor 30 min. Crushed screenings shall conform to the following requirements for grading and quality: **Sieve Size — Percent Passing (by weight)** 1/2" square — 100 3/8" square — 90-100 U.S. No. 4 — 30-56 U.S. No. 10 — 0-10 U.S. No. 200 — 0-1.5 % fracture, by weight, min. 75 Static stripping test Pass The fracture requirement shall be at least one fractured face and will apply to material retained on the U.S. No. 10 if that sieve retains more than 5% of the total sample. The finished product shall be clean, uniform in quality, and free from wood, bark, roots, and other deleterious materials. Crushed screenings shall be substantially free from adherent coatings. The presence of a thin, firmly adhering film of weathered rock shall not be considered as coating unless it exists on more than 50% of the surface area of any size between successive laboratory sieves.	1 cubic yard
Perlite:	1 cubic yard per 3 cubic yards of

Horticultural grade, free of any toxic materials) 0-30% passing US No. 18 Sieve 0-10% passing US No. 30 Sieve	mineral aggregate
Dolomite: CaMg(CO3)2 (calcium magnesium carbonate) Agricultural grade, free of any toxic materials) 100% passing US No. 8 Sieve 0% passing US No. 16 Sieve	10 pounds per cubic yard of perlite
Gypsum: Noncalcined, agricultural gypsum CaSO4•2H2O (hydrated calcium sulfate) Agricultural grade, free of any toxic materials) 100% passing US No. 8 Sieve 0% passing US No. 16 Sieve	**1.5 pounds per cubic yard**

Site Design Elements

Landscaping (Planting Considerations)

Landscaping is the same as for biofiltration swales ~~(see BMP RT.04)~~ unless otherwise specified in the special provisions for the project's construction documents.

Operations and Maintenance

Maintenance will consist of routine roadside management. While herbicides must ~~will~~ not be applied directly over the media filter drain, it may be necessary to periodically control noxious weeds with herbicides in areas around the media filter drain as part of ~~WSDOT's~~a roadside management program. The use of pesticides may be prohibited if the media filter drain is in a critical aquifer recharge area for drinking water supplies. The designer should check with the local area water purveyor or local health department. Areas of the media filter drain that show signs of physical damage will be replaced by local maintenance staff in consultation with region hydraulics/water quality staff.

Signing

Nonreflective guideposts will delineate the media filter drain. This practice allows ~~WSDOT~~ personnel to identify where the system is installed and to make appropriate repairs should damage occur to the system. If the media filter drain is in a critical aquifer recharge area for drinking water supplies, signage prohibiting the use of pesticides must be provided.

Chapter 9 - Biofiltration Treatment Facilities

Note: Figures in Chapter 9 are courtesy of King County, except as noted

This Chapter addresses ~~five~~ Best Management Practices (BMPs) that are classified as biofiltration treatment facilities:

Biofilters are vegetated treatment systems (typically grass) that remove pollutants by means of sedimentation, filtration, soil sorption, and/or plant uptake. They are typically configured as swales or flat filter strips.

9.1 Purpose

The BMPs discussed in this Chapter are designed to remove low concentrations and quantities of total suspended solids (TSS), heavy metals, petroleum hydrocarbons, and/or nutrients from stormwater.

9.2 Applications

A biofilter can be used as a basic treatment BMP for contaminated stormwater runoff from roadways, driveways, parking lots, and highly impervious ultra-urban areas or as the first stage of a treatment train. In cases where hydrocarbons, high TSS, or debris would be present in the runoff, such as high-use sites, a pretreatment system for those components would be necessary. Off-line location is preferred to avoid flattening vegetation and the erosive effects of high flows. Biofilters should be considered in retrofit situations where appropriate. (Center for Watershed Protection, 1998)

9.3 Site Suitability

The following factors must be considered for determining site suitability:

- Target pollutants are amenable to biofilter treatment
- Accessibility for Operation and Maintenance
- Suitable growth environment; (soil, etc.) for the vegetation
- Adequate siting for a pre-treatment facility if high petroleum hydrocarbon levels (oil/grease) or high TSS loads could impair treatment capacity or efficiency
- If the biofilter can be impacted by snowmelts and ice, refer to Caraco and Claytor for additional design criteria (USEPA, 1997).

9.4 Best Management Practices

This Chapter presents the following Biofiltration Treatment BMPs:

BMP T9.10 – Basic Biofiltration Swale
BMP T9.20 - Wet Biofiltration Swale
BMP T9.30 – Continuous Inflow Biofiltration Swale
BMP T9.40 – Basic Filter Strip ~~& Compost-Amended Filter Strip~~
~~BMP T9.50 – Narrow Area Filter Strip~~

BMP T9.10 Basic Biofiltration Swale

Description:

Biofiltration swales are typically shaped as a trapezoid or a parabola as shown in Figure 9.1.

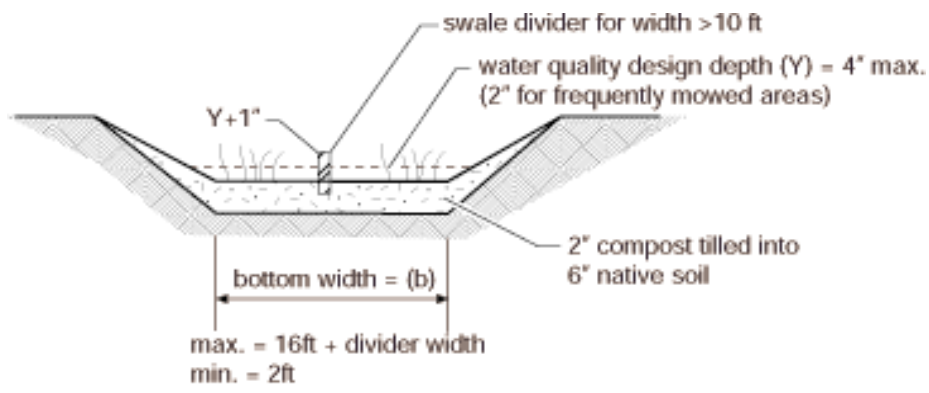

Figure 9.1 – Typical Swale Section

Limitations:

Data suggest that the performance of biofiltration swales is highly variable from storm to storm. It is therefore recommended that treatment methods providing more consistent performance, such as sand filters and wet ponds, be considered first. Swales downstream of devices of equal or greater effectiveness can convey runoff but should not be expected to offer a treatment benefit. (Horner, 2000)

Design Criteria:

- *Design criteria are specified in Table 9.1.* A 9 minute hydraulic residence time is used at a multiple of the peak 15 minute Water Quality Design Flow Rate (Q) representing 91% runoff volume as determined by the Western Washington Hydrology Model (WWHM). (See Volume I)
- Check the hydraulic capacity/stability for inflows greater than design flows. Bypass high flows, or control release rates into the biofilter, if necessary.
- Install level spreaders (min. 1-inch gravel) at the head and every 50 feet in swales of ≥4 feet width. Include sediment cleanouts (weir, settling basin, or equivalent) at the head of the biofilter as needed.
- Use energy dissipators (riprap) for increased downslopes.

***Guidance for Bypassing Off-line Facilities*:**

Most biofiltration swales are currently designed to be on-line facilities. However, an off-line design is possible. Swales designed in an off-line mode should not engage a bypass until the flow rate exceeds a value determined by multiplying Q, the off-line water quality design flow rate predicted by the WWHM, by the ratio determined in Figure 9.65b. This modified design flow rate is an estimate of the design flow rate determined by using SBUH procedures. Ecology's intent is to maintain recent biofiltration sizing recommendations (9 minutes detention at the peak design flow rate estimated by SBUH for a 6-month, 24-hour storm with a Type 1A rainfall distribution) until more definitive information is collected concerning bioswale performance. The only advantage of designing a swale to be off-line is that the stability check, which may make the swale larger, is not necessary.

Sizing Procedure for Biofiltration Swales

This guide provides biofilter swale design procedures in full detail, along with examples.

Preliminary Steps (P)

P-1 Determine the Water Quality design flow rate (Q) in 15-minute time-steps using the WWHM. Use the correct flow rate, off-line or on-line, for your design situation.

P-2 Establish the longitudinal slope of the proposed biofilter.

P-3 Select a vegetation cover suitable for the site. Refer to Tables 9.2, 9.3, and 9.4 (in text) to select vegetation for western Washington.

Design Calculations for Biofiltration Swale

There are a number of ways of applying the design procedure introduced by Chow (Chow, 1959). These variations depend on the order in which steps are performed, what constants are established at the beginning of the process and which ones are calculated, and what values are assigned to the variables selected initially.

The procedure recommended here is an adaptation appropriate for biofiltration applications of the type being installed in the Puget Sound region. This procedure reverses Chow's order, designing first for capacity and then for stability. The capacity analysis emphasizes the promotion of biofiltration, rather than transporting flow with the greatest possible hydraulic efficiency. Therefore, it is based on criteria that promote sedimentation, filtration, and other pollutant removal mechanisms. Because these criteria include a lower maximum velocity than permitted for stability, the biofilter dimensions usually do not have to be modified after a stability check.

Design Steps (D):

D-1. Select the type of vegetation, and design depth of flow (based on frequency of mowing and type of vegetation). (Table 9.1)

D-2. Select a value of Manning's n (Table 9.1 with footnote #3).

Table 9.1 – Sizing Criteria

Design parameter	BMP T 9.10-Biofiltration swale	BMP T 9.40-Filter strip
Longitudinal Slope	0.015 - 0.025[1]	0.01 - 0.15
Maximum velocity	1 ft / sec (@ K multiplied by the WQ design flow rate ; for stability, 3 ft/sec max.	0.5 ft / sec @ K multiplied by the WQ design flow rate
Maximum water depth[2]	2”- if mowed frequently; 4” if mowed infrequently	1-inch max.
Manning coefficient (22)	(0.2 – 0.3)[3](0.24 if mowed infrequently)	0.35 ~~(0.45 if compost amended, and mowed to maintain grass height ≤ 4”)~~
Bed width (bottom)	(2 - 10 ft)[4]	---
Freeboard height	0.5 ft	---
Minimum hydraulic residence time at Water Quality Design Flow Rate	9 minutes (18 minutes for continuous inflow) (See Volume I, Appendix B)	9 minutes
Minimum length	100 ft	Sufficient to achieve hydraulic residence time in the filter strip
Maximum sideslope	3 H : 1 V 4H:1V preferred	Inlet edge ≥ 1” lower than contributing paved area
Max. tributary drainage flowpath	---	150 feet
Max. longitudinal slope of contributing area	---	0.05 (steeper than 0.05 need upslope flow spreading and energy dissipation)
Max. lateral slope of contributing area	---	0.02 (at the edge of the strip inlet)

1. For swales, if the slope is less than 1.5% install an underdrain using a perforated pipe, or equivalent. Amend the soil if necessary to allow effective percolation of water to the underdrain. Install the low-flow drain 6" deep in the soil. Slopes greater than 2.5% need check dams (riprap) at vertical drops of 12-15 inches. Underdrains can be made of 6 inch Schedule 40 PVC perforated pipe with 6" of drain gravel on the pipe. The gravel and pipe must be enclosed by geotextile fabric. (See Figures 9.2 and 9.3)

2 Below the design water depth install an erosion control blanket, at least 4" of topsoil, and the selected biofiltration mix. Above the water line use a straw mulch or sod.

3. This range of Manning's n can be used in the equation; b = Qn/1.49y(1.67) s(0.5) – Zy with wider bottom width b, and lower depth, y, at the same flow. This provides the designer with the option of varying the bottom width of the swale depending on space limitations. Designing at the higher n within this range at the same flow decreases the hydraulic design depth, thus placing the pollutants in closer contact with the vegetation and the soil.

4. For swale widths up to 16 feet the cross-section can be divided with a berm (concrete, plastic, compacted earthfill) using a flow spreader at the inlet (Figure 9.4)

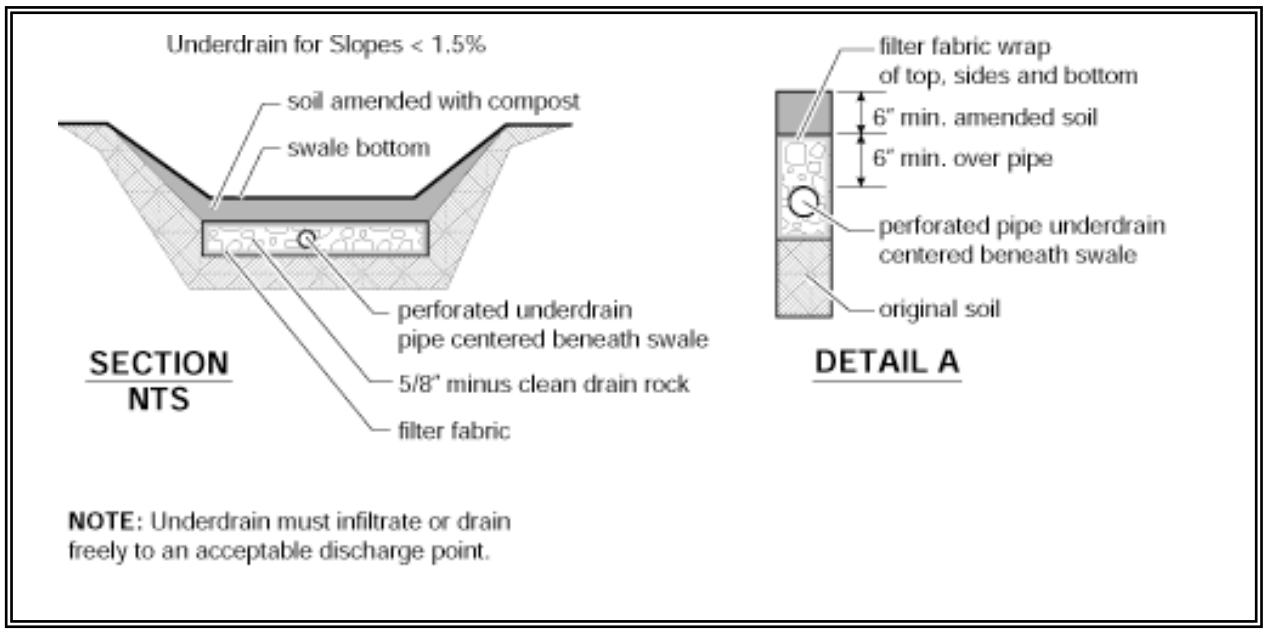

Figure 9.2 – Biofiltration Swale Underdrain Detail

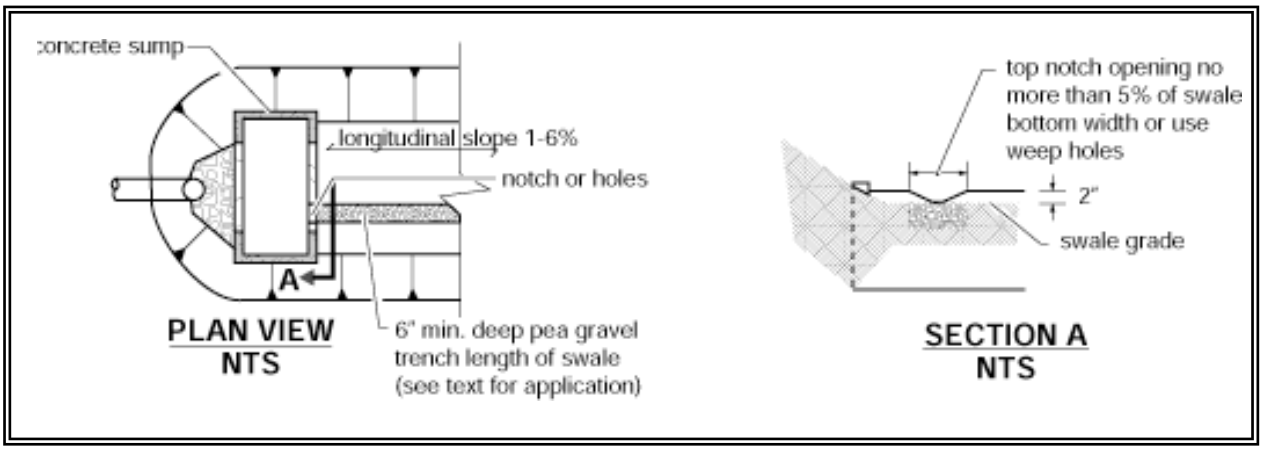

Figure 9.3 – Biofiltration Swale Low-Flow Drain Detail

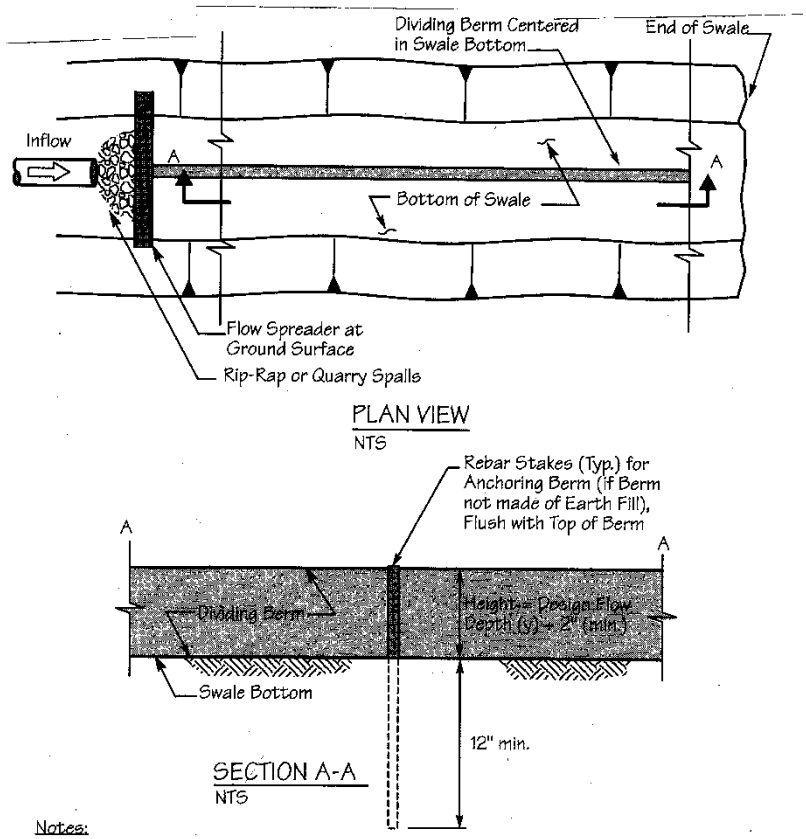

Notes:

1. Berm may be Made of Compacted Earthfill (seeded with grass), Timber, Concrete Plastic, or Similar Weather - Resistant Non - Erodible Material.
2. Rebar Stakes or Similar Berm Anchoring Materials Needed if Berm Made of Timber, Plastic, or Concrete Curbing - Stake Placement Required at Both Ends of Each Individual Member (at a minimum).

Figure 9.4 – Swale Dividing Berm

D-3. Select swale shape-typically trapezoidal or parabolic.

D-4. Use Manning's equation and first approximations relating hydraulic radius and dimensions for the selected swale shape to obtain a working value of a biofilter width dimension:

$$Q = \frac{1.49AR^{0.67}s^{0.5}}{n} \qquad (1)$$

$$A_{rectangle} = Ty \qquad (2)$$

$$R_{rectangle} = \frac{Ty}{T + 2y} \qquad (3)$$

Where:

Q = Water Quality Design flow rate in 15-minute time steps based on WWHM, (ft^3/s, cfs)
n = Manning's n (dimensionless)
s = Longitudinal slope as a ratio of vertical rise/horizontal run (dimensionless)
A = Cross-sectional area (ft^2)
R = Hydraulic radius (ft)
T = top width of trapezoid or width of a rectangle (ft)
y = depth of flow (ft)
b = bottom width of trapezoid (ft)

If equations 2 and 3 are substituted into equation 1 and solved for T, complex equations result that are difficult to solve manually. However, approximate solutions can be found by recognizing that $T >> y$ and $Z^2 >> 1$, and that certain terms are nearly negligible. The approximation solutions for rectangular and trapezoidal shapes are:

$R_{rectangle} \approx y$, $R_{trapezoid} \approx y$, $R_{parabolic} \approx 0.67y$, $R_v \approx 0.5y$

Substitute $R_{trapezoid}$ and $A_{trapezoid} = by+Zy^2$ into Equation 1, and solve for the bottom width b (trapezoidal swale):

$$b \approx \frac{2.5Qn}{1.49y^{1.67}s^{0.5}} - Zy$$

For a trapezoid, select a side slope Z of at least 3. Compute b and then top width T, where T = b + 2yZ. *(Note: Adjustment factor of 2.5 accounts for the differential between Water Quality design flow rate and the SBUH design flow. This equation is used to estimate an initial cross-sectional area. It does not affect the overall biofiltration swale size.)*

If b for a swale is greater than 10 ft, either investigate how Q can be reduced, divide the flow by installing a low berm, or arbitrarily set b = 10 ft and continue with the analysis. For other swale shapes refer to Fig. 9.5.

CHANNEL GEOMETRY

V - Shape

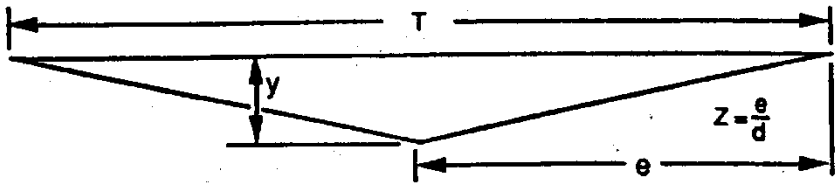

Cross-Sectional Area (A) = Zy^2
Top Width (T) = $2yZ$

Hydraulic Radius (R) = $\frac{Zy}{2\sqrt{Z^2 + 1}}$

Parabolic Shape

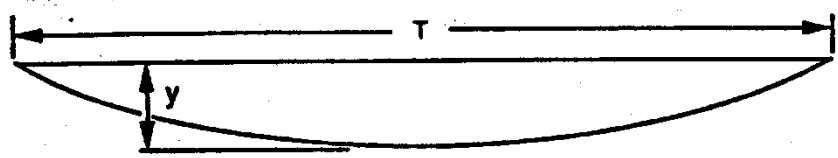

Cross-Sectional Area (A) = $\frac{2}{3}Ty$

Top Width (T) = $\frac{1.5A}{y}$

Hydraulic Radius (R) = $\frac{T^2y}{1.5T^2 + 4y^2}$

Trapezoidal Shape

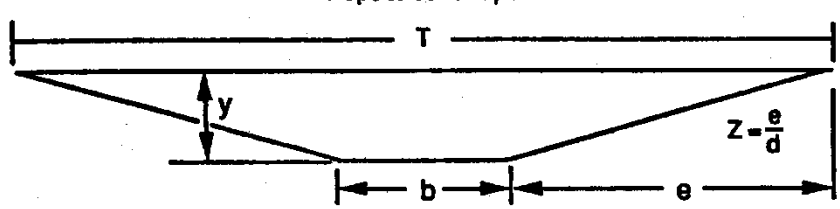

Cross-Sectional Area (A) = $by + Zy^2$
Top Width (T) = $b + 2yz$

Hydraulic Radius (R) = $\frac{by + Zy^2}{b + 2y\sqrt{Z^2 + 1}}$

Figure 9.5 – Geometric Formulas for Common Swale Shapes

Source: Livingston, et al, 1984

D-5. Compute A:

$$A_{rectangle} = Ty \quad \text{or} \quad A_{trapazoid} = by + Zy^2$$

$$A_{filter\ strip} = Ty$$

D-6. Compute the flow velocity at design flow rate:

$$V = \kappa \frac{Q}{A}$$

K = A ratio of the peak 10-minute flow predicted by SBUH to the water quality design flow rate estimated using the WWHM. The value of K is determined from Figure 9.6a for on-line facilities, or Figure 9.6b for off-line facilities.

If V >1.0 ft/sec (or V>0.5 ft/sec for a filter strip), repeat steps D-1 to D-6 until the condition is met. A velocity greater than 1.0 ft/sec was found to flatten grasses, thus reducing filtration. A velocity lower than this maximum value will allow a 9-minute hydraulic residence time criterion in a shorter biofilter. If the value of V suggests that a longer biofilter will be needed than space permits, investigate how Q can be reduced (e.g., use of low impact development BMP's), or increase y and/or T (up to the allowable maximum values) and repeat the analysis.

D-7. Compute the swale length (L, ft)

L = Vt (60 sec/min)

Where: t = hydraulic residence time (min)

Use t = 9 minutes for this calculation (use t = 18 minutes for a continuous inflow biofiltration swale). If a biofilter length is greater than the space permits, follow the advice in step D-6.

If a length less than 100 feet results from this analysis, increase it to 100 feet, the minimum allowed. In this case, it may be possible to save some space in width and still meet all criteria. This possibility can be checked by computing V in the 100 ft biofilter for t = 9 minutes, recalculating A (if V < 1.0 ft/sec) and recalculating T.

D-8. If there is still not sufficient space for the biofilter, the local government and the project proponent should consider the following solutions (listed in order of preference):

1) Divide the site drainage to flow to multiple biofilters.
2) Use infiltration to provide lower discharge rates to the biofilter (<u>only</u> if the Site Suitability Criteria in Chapter 3, Volume III are met).
3) Increase vegetation height and design depth of flow (note: the design must ensure that vegetation remains standing during design flow).

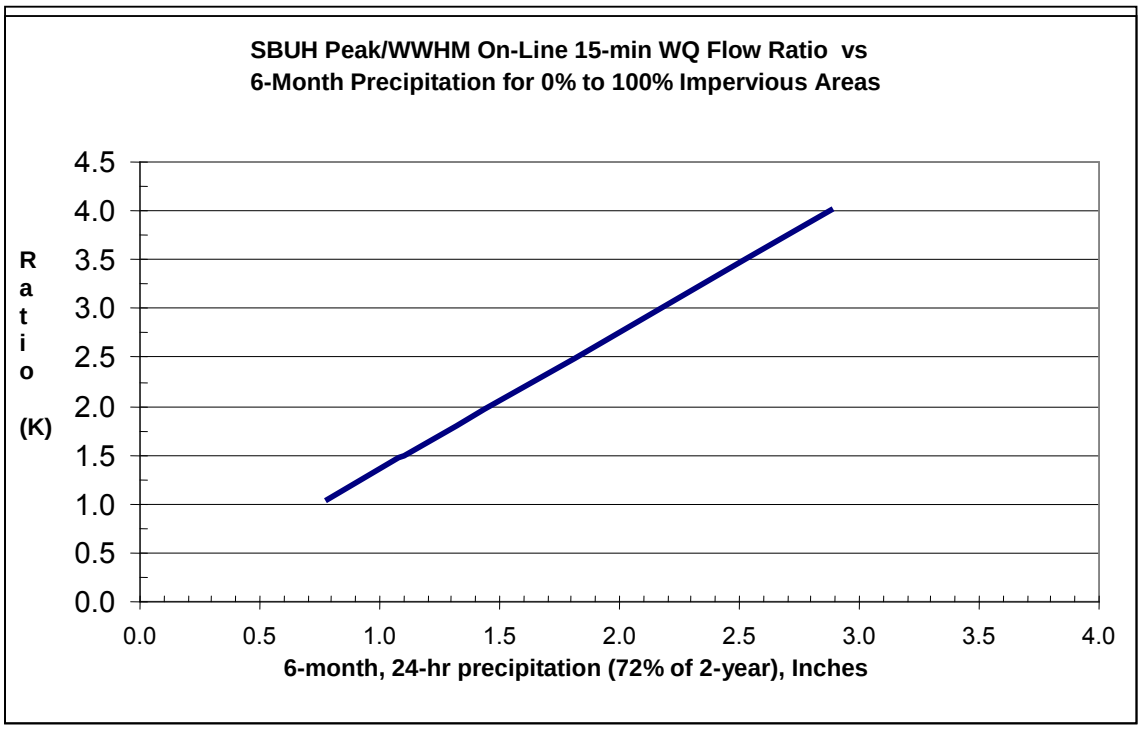

Figure 9.6a – Ratio of SBUH Peak/WQ Flow

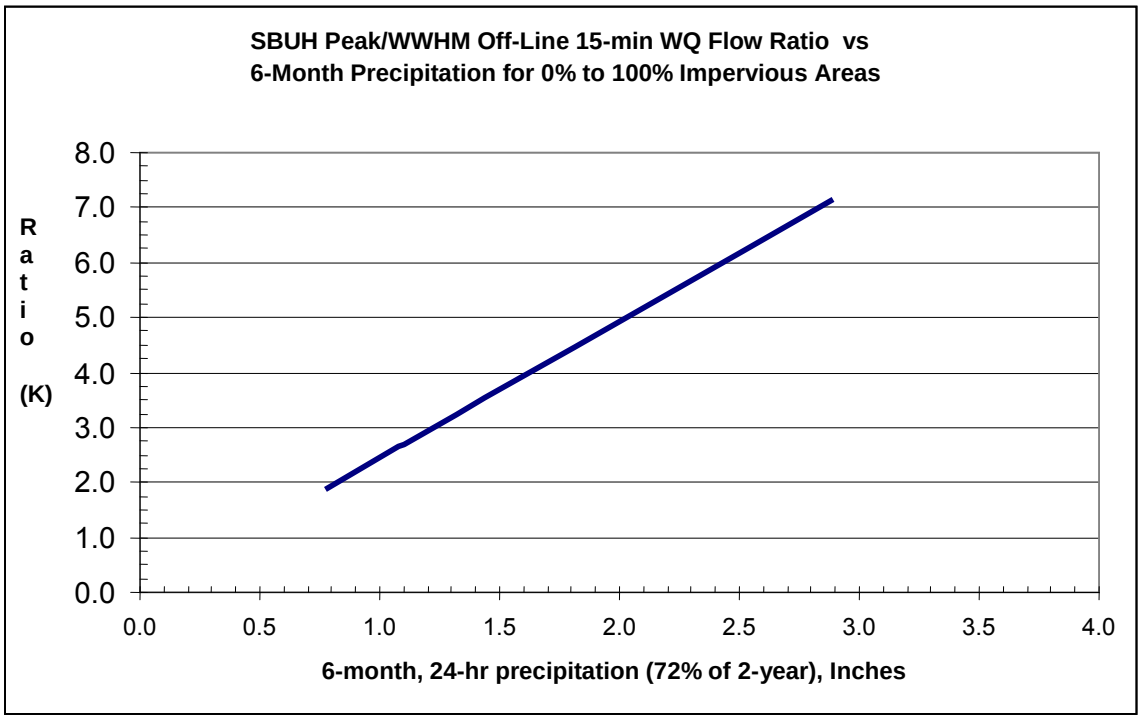

Figure 9.6b – Ratio of SBUH Peak/WQ Flow

4) Reduce the developed surface area to gain space for biofiltration.
5) Increase the longitudinal slope.

6) Increase the side slopes.
7) Nest the biofilter within or around another BMP.

Check for Stability (Minimizing Erosion)

The stability check must be performed for the combination of highest expected flow and least vegetation coverage and height. A check is not required for biofiltration swales that are located "off-line" from the primary conveyance/detention system, Maintain the same units as in the biofiltration capacity analysis.

SC-1. Perform the stability check for the 100-year, return frequency flow using 15-minute time steps using an approved continuous runoff model. Until WWHM peak flow rates in 15-minute time steps are available the designer can use the WWHM 100-yr. hourly peak flows times an adjustment factor of 1.6 to approximate peak flows in 15-minute time steps.

SC-2. Estimate the vegetation coverage ("good" or "fair") and height on the first occasion that the biofilter will receive flow, or whenever the coverage and height will be least. Avoid flow introduction during the vegetation establishment period by timing planting or bypassing.

SC-3. Estimate the degree of retardance from Table 9.2. When uncertain, be conservative by selecting a relatively low degree.

The maximum permissible velocity for erosion prevention (Vmax) is 3 feet per second.

Stability Check Steps (SC)

Table 9.2 – Guide for Selecting Degree of Retardance [(a)]

Coverage	Average Grass Height (inches)	Degree of Retardance
Good	<2	E. Very Low
	2-6	D. Low
	6-10	C. Moderate
	11-24	B. High
	>30	A. Very High
Fair	<2	E. Very Low
	2-6	D. Low
	6-10	D. Low
	11-24	C. Moderate
	>30	B. High

See Chow (1959).. In addition, Chow recommended selection of retardance C for a grass-legume mixture 6-8 inches high and D for a mixture 4-5 inches high. No retardance recommendations have appeared for emergent wetland species. Therefore, judgment must be used. Since these species generally grow less densely than grasses, using a "fair" coverage would be a reasonable approach.

SC-4. Select a trial Manning's n for the high flow condition. The minimum value for poor vegetation cover and low height (possibly, knocked from the vertical by high flow) is 0.033. A good initial choice under these conditions is 0.04.

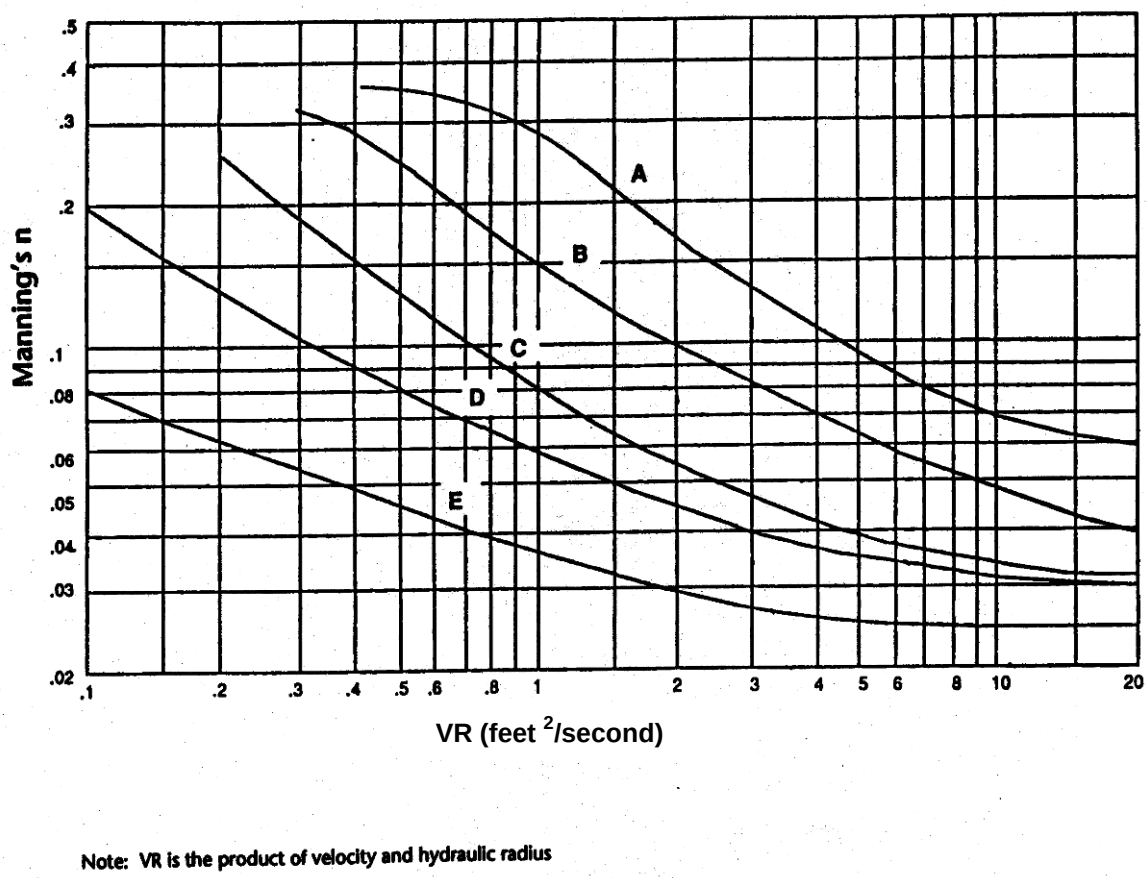

Note: VR is the product of velocity and hydraulic radius

Source: Livingston, et al, 1984

Figure 9.7 – The Relationship of Manning's n with VR for Various Degrees of Flow Retardance (A-E)

SC-5. Refer to Figure 9.7 to obtain a first approximation for VR of 3 feet/second.

SC-6. Compute hydraulic radius, R, from VR in Figure 9.7 and a Vmax

SC-7. Use Manning's equation to solve for the actual VR.

SC-8. Compare the actual VR from step SC-7 and first approximation from step SC-5. If they do not agree within 5 percent, repeat steps SC-4 to SC-8 until acceptable agreement is reached. If n<0.033 is needed to get agreement, set n = 0.033, repeat step SC-7, and then proceed to step SC-9.

SC-9. Compute the actual V for the final design conditions:

Check to be sure $V < V_{max}$ of 3 feet/second.

SC-10. Compute the required swale cross-sectional area, A, for stability:

SC-11. Compare the A, computed in step SC-10 of the stability analysis, with the A from the biofiltration capacity analysis (step D-5).

If less area is required for stability than is provided for capacity, the capacity design is acceptable. If not, use A from step SC-10 of the stability analysis and recalculate channel dimensions.

SC-12. Calculate the depth of flow at the stability check design flow rate condition for the final dimensions and use A from step SC-10.

SC-13. Compare the depth from step SC-12 to the depth used in the biofiltration capacity design (Step D-1). Use the larger of the two and add 0.5 ft. of freeboard to obtain the total depth (y_t) of the swale. Calculate the top width for the full depth using the appropriate equation.

SC-14. Recalculate the hydraulic radius: (use b from Step D-4 calculated previously for biofiltration capacity, or Step SC-11, as appropriate, and y_t = total depth from Step SC-13)

SC-15. Make a final check for capacity based on the stability check design storm (this check will ensure that capacity is adequate if the largest expected event coincides with the greatest retardance). Use Equation 1, a Manning's n selected in step D-2, and the calculated channel dimensions, including freeboard, to compute the flow capacity of the channel under these conditions. Use R from step SC-14, above, and $A = b(y_t) + Z(y_t)^2$ using b from Step D-4, D-15, or SC-11 as appropriate.

If the flow capacity is less than the stability check design storm flow rate, increase the channel cross-sectional area as needed for this conveyance. Specify the new channel dimensions.

Completion Step (CO)

CO. Review all of the criteria and guidelines for biofilter planning, design, installation, and operation above and specify all of the appropriate features for the application.

Example of Design Calculations for Biofiltration Swales

Preliminary Steps

P-1. Assume that the WWHM based Water Quality Design Flow Rate in 15 minute time-steps, Q, is 0.2 cfs. Assume an on-line facility.

P-2. Assume the slope (s) is 2 percent.

P-3. Assume the vegetation will be a grass-legume mixture and it will be infrequently mowed.

Design for Biofiltration Swale Capacity

D-1. Set winter grass height at 5" and the design flow depth (y) at 3 inches.

D-2. Use n = 0.20 to n_2 = 0.30

D-3. Base the design on a trapezoidal shape, with a side slope Z = 3.

D-4a. Calculate the bottom width, b;

Where:

n = 0.20 y = 0.25 ft
Q = 0.2 cfs s = 0.02
Z = 3

$$b \approx \frac{2.5Qn}{1.49y^{1.67}s^{0.5}} - Zy$$

$$b \approx 4.0 \text{ ft}$$

At n_2; b_2 = 6.5 feet

D-4b. Calculate the top width (T)

T = b + 2yZ = 4.0+ [2(0.25)(3)] = 5.5 feet

D-5. Calculate the cross-sectional area (A)

$A = by + Zy^2 = (4.0)(0.25) + (3)(0.25^2) = 1.19 \text{ ft}^2$

D-6. Calculate the flow velocity (V)

$$V = K\frac{Q}{A} = 0.17 \text{ ft / sec}$$

for K = 1. Actual K is determined per Figure 9.65a

0.17<1.0 ft/sec ∴ OK

D-7 Calculate the Length (L)

L = Vt(60 sec/min)

= 0.17 (9)(60)

For t = 9 min, L = 92 ft. at n; expand to a minimum of 100 foot length per design criterion

At n_2; L = 100 ft.

Note: Where b is less than the maximum value, it may be possible to reduce L by increasing b. In this case, because L is determined by the requirement for a minimum length of 100 feet, it is not possible.

Check for Channel Stability

SC-1. Base the check on passing the 100-year, return frequency flow (15 minute time steps) through a swale with a mixture of Kentucky bluegrass and tall fescue on loose erodible soil. Until WWHM peak flow rates in 15-minute time steps are available the designer can use the WWHM 100-yr. hourly peak flows times an adjustment factor of 1.6 to approximate peak flows in 15-minute time steps. Assume that the adjusted peak Q is 1.92 cfs.

SC-2. Base the check on a grass height of 3 inches with "fair" coverage (lowest mowed height and least cover, assuming flow bypasses or does not occur during grass establishment).

SC-3. From Table 9.2, Degree of Retardance = D (low)
Set V_{max} = 3 ft/sec

SC-4. Select trial Manning's n = 0.04

SC-5. From Figure 9.7, VR_{appx} = 3 ft²/s

SC-6. Calculate R

$$R = \frac{VR_{appx}}{V_{max}} = 1.0 \text{ ft}$$

SC-7. Calculate VR_{actual}

$$VR_{actual} = \frac{1.49}{n} R^{1.67} s^{0.5} = 5.25 \text{ ft}^2 / \text{sec}$$

SC-8. VR_{actual} from step SC-7 > VR_{appx} from step SC-5 by > 5%.

Select new trial n = 0.0475

Figure 9.7: VR_{appx} = 1.7 ft²/s

R = 0.57 ft.

VR_{actual} = 1.73 ft²/s (within 5% of VR_{appx} = 1.7)

SC-9. Calculate V

$$V = \frac{VR_{actual}}{R} = \frac{1.73}{0.57} = \quad 3 \ \text{ft / sec}$$

V = 3 ft/sec ≤ 3 ft/sec, Vmax ∴ OK

SC-10. Calculate Stability Area

$$A_{Stability} = \frac{Q}{} = \frac{1.92}{3} = 0.64 \ ft^2$$

SC-11. Stability Check

$A_{Stability}$ = 0.64 ft² is less than $A_{Capacity}$ from step D-5 ($A_{Capacity}$ = 1.19 ft^2). ∴OK

If $A_{Stability} > A_{Capacity}$, it will be necessary to select new trial sizes for width and flow depth (based on space and other considerations), recalculate $A_{Capacity}$, and repeat steps SC-10 and SC-11.

SC-12. Calculate depth of flow at the stability design flow rate condition using the quadratic equation solution:

$$y = \frac{-b \pm \sqrt{b^2 - 4Z(-A)}}{2Z}$$

For b = 4, y = 0.14 ft (positive root)

SC-13. Use the greater value of y from SC-12 or that assumed in D-1. In this case, the greater depth is 0.25-foot, which was the basis for the biofiltration capacity design. Add 0.5 feet freeboard to that depth.

Total channel depth = 0.75 ft

Top Width = b + 2yZ

= 4 + (2)(0.75)(3)

= 8.5 ft

SC-14. Recalculate hydraulic radius and flow rate

For b = 4 ft, y = 0.75 ft

Z = 3, s = 0.02, n = 0.2

A = by + Zy² = 4.68 ft²

R = {by + Zy²}/{b + 2y(Z² + 1)$^{0.5}$} = 0.53 ft.

SC-15. Calculate Flow Capacity at Greatest Resistance

$$Q = \frac{1.49AR^{0.67}s^{0.5}}{n} \quad = \quad 3.2 \text{ cfs}$$

Q = 3.2 cfs > 1.92 cfs $\therefore$ OK

Completion Step

CO-1. Assume 100 feet of swale length is available.

The final channel dimensions are:

Bottom width, b = 4 feet
Channel depth= 0.75 feet
Top width = b + 2yZ = 8.5 feet

No check dams are needed for a 2% slope.

Soil Criteria

- The following top soil mix at least 8-inch deep:
  - Sandy loam 60-90 %
  - Clay 0-10 %
  - Composted organic matter, 10-30 % (excluding animal waste, toxics)
- Use compost amended soil where practicable
- Till to at least 8-inch depth
- For longitudinal slopes of < 2 percent use more sand to obtain more infiltration
- If ground water contamination is a concern, seal the bed with clay or a geomembrane liner

Vegetation Criteria

- See Tables 9.3, 9.4 and 9.5 for recommended grasses, wetland plants, and groundcovers.
- Select fine, turf-forming, water-resistant grasses where vegetative growth and moisture will be adequate for growth.
- Irrigate if moisture is insufficient during dry weather season.
- Use sod with low clay content and where needed to initiate adequate vegetative growth. Preferably sod should be laid to a minimum of one-foot vertical depth above the swale bottom.
- Consider sun/shade conditions for adequate vegetative growth and avoid prolonged shading of any portion not planted with shade tolerant vegetation.

- Stabilize soil areas upslope of the biofilter to prevent erosion
- Fertilizing a biofilter should be avoided if at all possible in any application where nutrient control is an objective. Test the soil for nitrogen, phosphorous, and potassium and consult with a landscape professional about the need for fertilizer in relation to soil nutrition and vegetation requirements. If use of a fertilizer cannot be avoided, use a slow-release fertilizer formulation in the least amount needed.

Recommended grasses (see Tables 9.3 and 9.4 below)

Table 9.3 – Grass Seed Mixes Suitable for Biofiltration Swale Treatment Areas

Mix 1		Mix 2	
75-80 percent	tall or meadow fescue	60-70 percent	tall fescue
10-15 percent	seaside/colonial bentgrass	10-15 percent	seaside/colonial bentgrass
5-10 percent	Redtop	10-15 percent	meadow foxtail
		6-10 percent	alsike clover
		1-5 percent	marshfield big trefoil
		1-6 percent	Redtop

Note: *all percentages are by weight. * based on Briargreen, Inc.*

Table 9.4 – Groundcovers And Grasses Suitable for the Upper Side Slopes of a Biofiltration Swale in Western Washington

Groundcovers	
kinnikinnick*	*Arctostaphylos uva-ursi*
~~St. John's-wort~~	~~*Hypericum perforatum*~~
Epimedium	*Epimedium grandiflorum*
creeping forget-me-not	*Omphalodes verna*
--	*Euonymus lanceolata*
yellow-root	*Xanthorhiza simplissima*
--	*Genista*
white lawn clover	*Trifolium repens*
white sweet clover*	*Melilotus alba*
-------	*Rubus calycinoides*
strawberry*	*Fragaria chiloensis*
broadleaf lupine*	*Lupinus latifolius*
Grasses (drought-tolerant, minimum mowing)	
dwarf tall fescues	*Festuca* spp. (e.g., Many Mustang, Silverado)
hard fescue	*Festuca ovina duriuscula* (e.g., Reliant, Aurora)
tufted fescue	*Festuca amethystine*
buffalo grass	*Buchloe dactyloides*
red fescue*	*Festuca rubra*
tall fescue grass*	*Festuca arundinacea*
blue oatgrass	*Helictotrichon sempervirens*

Construction Criteria

The biofiltration swale should not be put into operation until areas of exposed soil in the contributing drainage catchment have been sufficiently stabilized. Deposition of eroded soils can impede the growth of grass in the swale and reduce swale treatment effectiveness. Thus, effective erosion and sediment control measures should remain in place until the swale vegetation is established (see Volume II for erosion and sediment control BMPs). Avoid compaction during construction. Grade biofilters to attain uniform longitudinal and lateral slopes

Maintenance Criteria

- Inspect biofilters at least once every 6 months, preferably during storm events, and also after storm events of > 0.5 inch rainfall/ 24 hours. Maintain adequate grass growth and eliminate bare spots.
- Mow grasses, if needed for good growth {typically maintain at 4 – 9 inches and not below design flow level (King County, 1998)}.
- Remove sediment as needed at head of the swale if grass growth is inhibited in greater than 10 percent of the swale, or if the sediment is blocking the distribution and entry of the water (King County, 1998).
- Remove leaves, litter, and oily materials, and re-seed or resod, and regrade, as needed. Clean curb cuts and level spreaders as needed.

Prevent scouring and soil erosion in the biofilter. If flow channeling occurs, regrade and reseed the biofilter, as necessary.

Maintain access to biofilter inlet, outlet, and to mowing (Figure 9.8)

- If a swale is equipped with underdrains, vehicular traffic on the swale bottom (other than grass mowing equipment) should be avoided to prevent damage to the drainpipes.

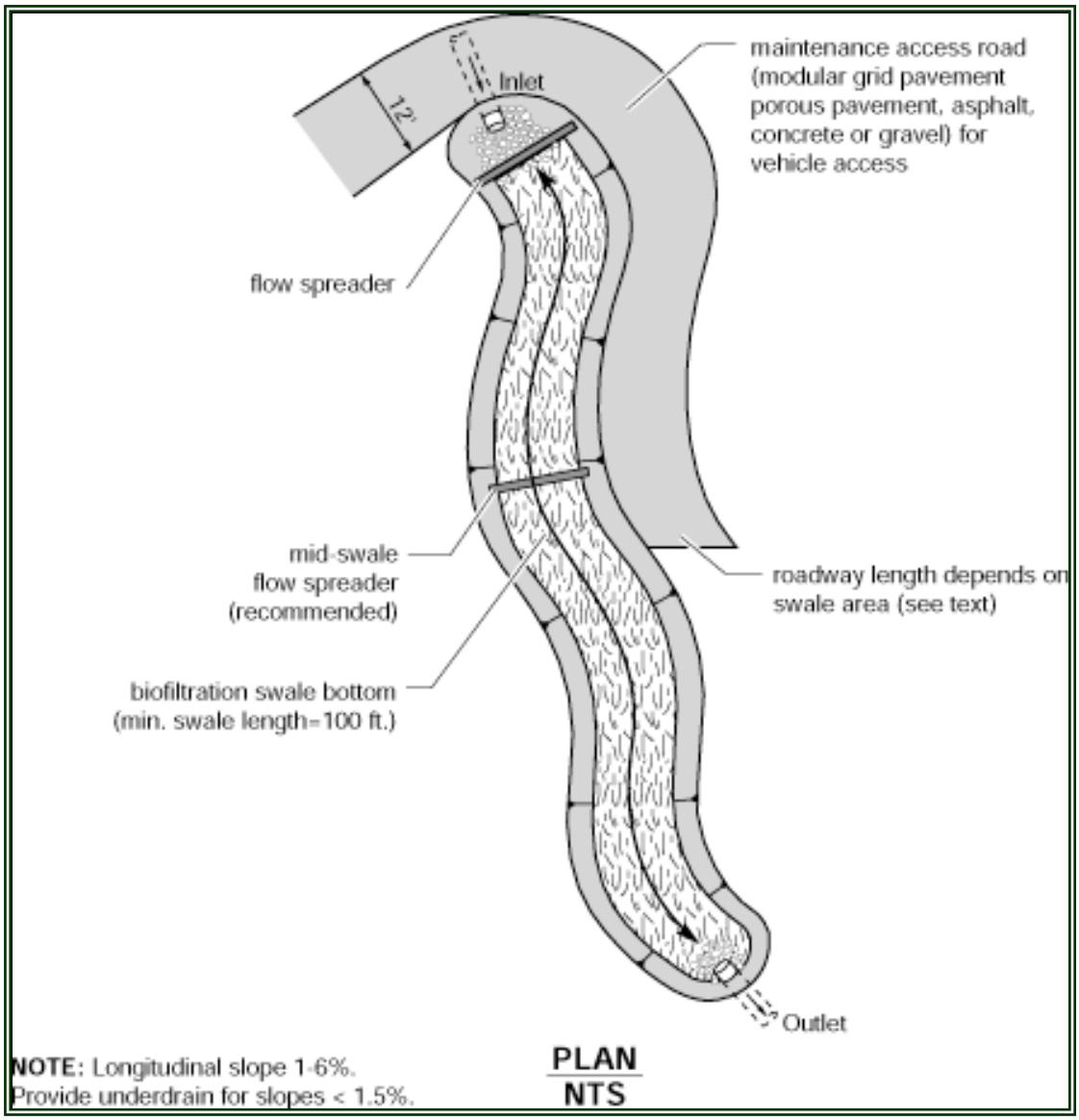

Figure 9.8 – Biofiltration Swale Access Features

BMP T9.20 Wet Biofiltration Swale

Description

A *wet biofiltration swale* is a variation of a basic biofiltration swale for use where the longitudinal slope is slight, water tables are high, or continuous low base flow is likely to result in saturated soil conditions. Where saturation exceeds about 2 weeks, typical grasses will die. Thus, vegetation specifically adapted to saturated soil conditions is needed. Different vegetation in turn requires modification of several of the design parameters for the basic biofiltration swale.

Performance Objectives

To remove low concentrations of pollutants such as TSS, heavy metals, nutrients, and petroleum hydrocarbons.

Applications/Limitations

Wet biofiltration swales are applied where a basic biofiltration swale is desired but not allowed or advisable because one or more of the following conditions exist:

- The swale is on till soils and is downstream of a detention pond providing flow control.
- Saturated soil conditions are likely because of seeps or base flows on the site.
- Longitudinal slopes are slight (generally less than 2 percent).

Design Criteria

Use the same design approach as for basic biofiltration swales except to add the following:

Adjust for extended wet season flow. If the swale will be downstream of a detention pond providing flow control, multiply the treatment area (bottom width times length) of the swale by 2, and readjust the swale length, if desired. Maintain a 5:1 length to width ratio.

Intent: An increase in the treatment area of swales following detention ponds is required because of the differences in vegetation established in a constant flow environment. Flows following detention are much more prolonged. These prolonged flows result in more stream-like conditions than are typical for other wet biofilter situations. Since vegetation growing in streams is often less dense, this increase in treatment area is needed to ensure that equivalent pollutant removal is achieved in extended flow situations.

Swale Geometry: Same as specified for basic biofiltration swales except for the following modifications:

> ***Criterion 1:*** The bottom width may be increased to 25 feet maximum, but a minimum length-to-width ratio of 5:1 must be provided. No longitudinal dividing berm is needed. *Note: The minimum swale length is still 100 feet.*
>
> ***Criterion 2:*** If longitudinal slopes are greater than 2 percent, the wet swale must be stepped so that the slope within the stepped sections averages 2 percent. Steps may be made of retaining walls, log check dams, or short riprap sections. **No underdrain or low-flow drain is required**.

High-Flow Bypass: A high-flow bypass (i.e., an off-line design) is required for flows greater than the off-line water quality design flow that has been increased by the ratio indicated in Figure 9.6~~5~~b. The bypass is necessary to protect wetland vegetation from damage. Unlike grass, wetland vegetation will not quickly regain an upright attitude after being laid down by high flows. New growth, usually from the base of the plant, often taking several weeks, is required to regain its upright form. The bypass may be an open channel parallel to the wet biofiltration swale.
Water Depth and Base Flow: Same as for basic biofiltration swales except the design water depth shall be 4 inches for all wetland vegetation selections, and **no underdrains or low-flow drains are required**.

Flow Velocity, Energy Dissipation, and Flow Spreading: Same as for basic biofiltration swales except no flow spreader is needed.

Access: Same as for basic biofiltration swales except access is only required to the inflow and the outflow of the swale; access along the length of the swale is not required. Also, wheel strips may not be used for access in the swale.

Intent: An access road is not required along the length of a wet swale because of infrequent access needs. Frequent mowing or harvesting is not desirable. In addition, wetland plants are fairly resilient to sediment-induced changes in water depth, so the need for access should be infrequent.

Soil Amendment: Same as for basic biofiltration swales.

Planting Requirements: Same as for basic biofiltration swales except for the following modifications:

1. A list of acceptable plants and recommended spacing is shown in Table 9.5. In general, it is best to plant several species to increase the

likelihood that at least some of the selected species will find growing conditions favorable.

2. A wetland seed mix may be applied by hydroseeding, but if coverage is poor, planting of rootstock or nursery stock is required. Poor coverage is considered to be more than 30 percent bare area through the upper 2/3 of the swale after four weeks.

Recommended Design Features: Same as for basic biofiltration swales

Construction Considerations: Same as for basic biofiltration swales

Maintenance Considerations: Same as for basic biofiltration swales except mowing of wetland vegetation is not required. However, harvesting of very dense vegetation may be desirable in the fall after plant die-back to prevent the sloughing of excess organic material into receiving waters. Many native *Juncus* species remain green throughout the winter; therefore, fall harvesting of *Juncus* species is not recommended.

Table 9.5 – Recommended Plants for Wet Biofiltration Swale

Common Name	Scientific Name	Spacing (on center)
Shortawn foxtail	*Alopecurus aequalis*	seed
Water foxtail	*Alopecurus geniculatus*	seed
Spike rush	*Eleocharis spp.*	4 inches
Slough sedge*	*Carex obnupta*	6 inches or seed
Sawbeak sedge	*Carex stipata*	6 inches
Sedge	*Carex* spp.	6 inches
Western mannagrass	*Glyceria occidentalis*	seed
Velvetgrass	*Holcus mollis*	seed
Slender rush	*Juncus tenuis*	6 inches
Watercress*	*Rorippa nasturtium-aquaticum*	12 inches
Water parsley*	*Oenanthe sarmentosa*	6 inches
Hardstem bulrush	*Scirpus acutus*	6 inches
Small-fruited bulrush	*Scirpus microcarpus*	12 inches

** Good choices for swales with significant periods of flow, such as those downstream of a detention facility.*

Note: Cattail (Typha latifolia) is not appropriate for most wet swales because of its very dense and clumping growth habit which prevents water from filtering through the clump.

BMP T9.30 Continuous Inflow Biofiltration Swale

Description

In situations where water enters a biofiltration swale continuously along the side slope rather than discretely at the head, a different design approach–the continuous inflow biofiltration swale–is needed. The basic swale design is modified by increasing swale length to achieve an equivalent average residence time.

Applications

A continuous inflow biofiltration swale is to be **used when inflows are not concentrated**, such as locations along the shoulder of a road without curbs. This design may also be **used where frequent, small point flows enter a swale**, such as through curb inlet ports spaced at intervals along a road, or from a parking lot with frequent curb cuts. In general, no inlet port should carry more than about 10 percent of the flow.

A continuous inflow swale is not appropriate for a situation in which significant lateral flows enter a swale at some point downstream from the head of the swale. In this situation, the swale width and length must be recalculated from the point of confluence to the discharge point in order to provide adequate treatment for the increased flows.

Design Criteria

Same as specified for **basic biofiltration swale** except for the following:

- The design flow for continuous inflow swales must include runoff from the pervious side slopes draining to the swale along the entire swale length. Therefore, they must be on-line facilities.
- If only a single design flow is used, the flow rate at the outlet should be used. The goal is to achieve an average residence time through the swale of 9 minutes as calculated using the on-line water quality design flow rate multiplied by the ratio, K, in Figure 9.6~~5~~a. Assuming an even distribution of inflow into the side of the swale double the hydraulic residence time to a minimum of 18 minutes.
- For continuous inflow biofiltration swales, interior side slopes above the WQ design treatment elevation shall be planted in grass. A typical lawn seed mix or the biofiltration seed mixes are acceptable. Landscape plants or groundcovers other than grass may not be used anywhere between the runoff inflow elevation and the bottom of the swale.**Intent:** The use of grass on interior side slopes reduces the chance of soil erosion and transfer of pollutants from landscape areas to the biofiltration treatment area.

BMP T9.40 Basic Filter Strip

Description:

A basic filter strip is flat with no side slopes (Figure 9.9). Contaminated stormwater is distributed as sheet flow across the inlet width of a biofilter strip.

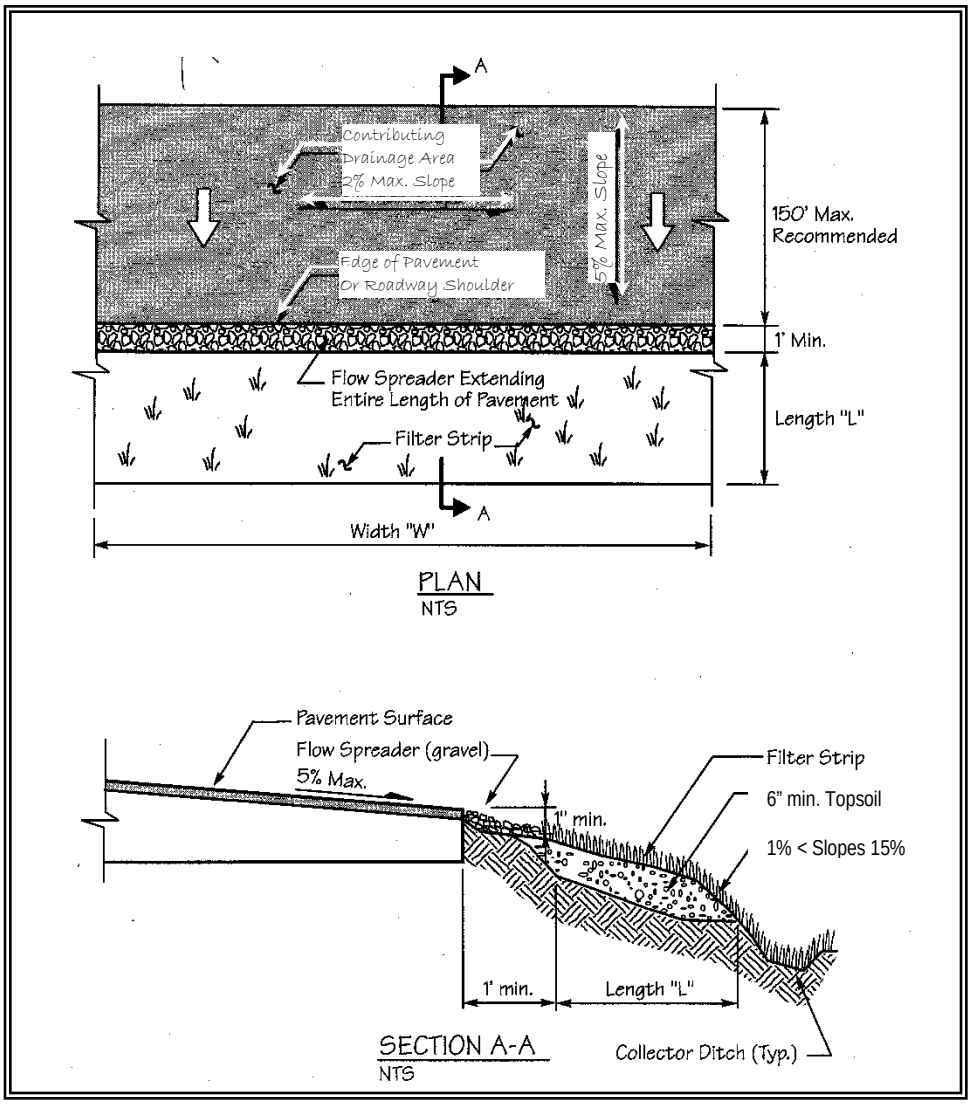

Figure 9.9 – Typical Filter Strip

Applications/Limitations:

The basic filter strip is typically used on-line and adjacent and parallel to a paved area such as parking lots, driveways, and roadways. Where a filter strip area is compost-amended to a minimum of 10% organic content in accordance with BMP T5.13; with hydroseeded grass maintained at 95% density and a 4-inch length by mowing and periodic re-seeding (possible

landscaping with herbaceous shrubs), the filter strip serves as an Enhanced Treatment option.

Design Criteria for Filter strips:

- Use the Design Criteria specified in Table 9.1
- Filter strips should only receive sheet flow.
- Use curb cuts ≥ 12-inch wide and 1-inch above the filter strip inlet.

Calculate the design flow depth using Manning's equation as follows:

$$KQ = (1.49A\ R^{0.67}\ s^{0.5})/n$$

Substituting for AR:

$$KQ = (1.49Ty^{1.67}\ s^{0.5})/n$$

Where:

$Ty = A_{rectangle,\ ft}{}^2$
$y \approx R_{rectangle}$, design depth of flow, ft. (1 inch maximum)
Q = peak Water Quality design flow rate based on WWHM, ft^3/sec (See Appendix I-B, Volume I)
K = The ratio determined by using Figure 9.6~~5~~a
n = Manning's roughness coefficient
s = Longitudinal slope of filter strip parallel to direction of flow
T = Width of filter strip perpendicular to the direction of flow, ft.
A = Filter strip inlet cross-sectional flow area (rectangular), ft^2
R = hydraulic radius, ft.

Rearranging for y:

$$y = [KQn/1.49Ts^{0.5}]^{0.6}$$
y must not exceed 1 inch

Note: As in swale design an adjustment factor of K accounts for the differential between the WWHM Water Quality design flow rate and the SBUH design flow

Calculate the design flow velocity V, ft./sec., through the filter strip:

$$V = KQ/Ty$$
V must not exceed 0.5 ft./sec

Calculate required length, ft., of the filter strip at the minimum hydraulic residence time, t, of 9 minutes:

$$\mathbf{L = tV = 540V}$$

~~BMP T9.50 Narrow Area Filter Strip~~

~~Description:~~

~~This section describes a filter strip design[1] for impervious areas with flowpaths of 30 feet or less that can drain along their widest dimension to grassy areas.~~

~~Applications/Limitations:~~

~~A narrow area filter strip could be used at roadways with limited right-of-way, or for narrow parking strips, the narrow strip. If space is available to use the basic filter strip design, that design should be used in preference to the narrow filter strip.~~

~~The treatment objectives, applications and limitations, design criteria, materials specifications, and construction and maintenance requirements set forth in the basic filter strip design apply to narrow filter strip applications.~~

~~Design Criteria:~~

~~Design criteria for narrow area filter strips are the *same as specified for basic filter strips*. The sizing of a narrow area filter strip is based on the length of flowpath draining to the filter strip and the longitudinal slope of the filter strip itself (parallel to the flowpath).~~

~~*Step 1:* Determine the length of the flowpath from the upstream to the downstream edge of the impervious area draining sheet flow to the strip. Normally this is the same as the width of the paved area, but if the site is sloped, the flow path may be longer than the width of the impervious area.~~

~~*Step 2:* Calculate the longitudinal slope of the filter strip (along the direction of unconcentrated flow), averaged over the total width of the filter strip. The minimum sizing slope is 2 percent. If the slope is less than 2 percent, use 2 percent for sizing purposes. The maximum allowable filter strip slope is 20 percent. If the slope exceeds 20 percent, the filter strip must be stepped down the slope so that the treatment areas between drop sections do not have a longitudinal slope greater than 20 percent. Drop sections must be provided with erosion protection at the base and flow spreaders to re-spread flows. Vertical drops along the slope must not exceed 12 inches in height. If this is not possible, a different treatment facility must be selected.~~

~~[1] This narrow area filter strip design method is included here because technical limitations exist in the basic design method which result in filter strips that are proportionately longer as the contributing drainage becomes narrower (a result that is counter-intuitive). Research by several parties is underway to evaluate filter strip design parameters. This research may lead to more stringent design requirements that would supersede the design criteria presented here.~~

~~*Step 3:* Select the appropriate filter strip length for the flowpath length and filter strip longitudinal slope (Steps 1 and 2 above) from the graph in Figure 9.10. The filter strip must be designed to provide this minimum length *L* along the entire stretch of pavement draining into it.~~

~~*To use the graph:* Find the length of the flowpath on one of the curves (interpolate between curves as necessary). Move along the curve to the point where the design longitudinal slope of the filter strip (x-axis) is directly below. Read the filter strip length on the y-axis which corresponds to the intersection point.~~

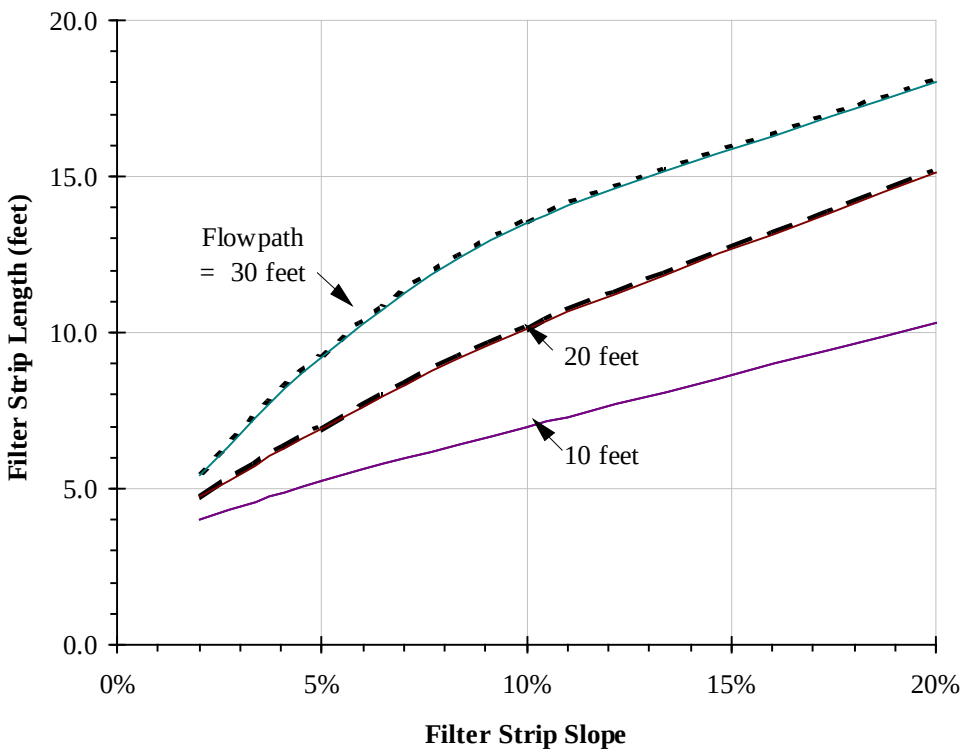

Note: minimum allowable filter strip length is 4 feet

~~**Figure 9.10 – Filter Strip Lengths for Narrow Right-of-Way**~~

Chapter 10 - Wetpool Facilities

Note: Figures in Chapter 10 are from the King County Surface Water Design Manual

10.1 Purpose

This Chapter presents the methods, criteria, and details for analysis and design of wetponds, wetvaults, and stormwater wetlands. These facilities have as a common element a permanent pool of water - the wetpool. Each of the wetpool facilities can be combined with a detention or flow control pond in a combined facility. Included are the following specific facility designs:

BMP T10.10 - Wetponds - Basic and Large
BMP T10.20 - Wetvaults
BMP T10.30 - Stormwater Wetlands
BMP T10.40 - Combined Detention and Wetpool Facilities

10.2 Application

The wetpool facility designs described for the four BMPs in this Chapter will achieve the performance objectives cited in Chapter 3 for specific treatment menus.

10.3 Best Management Practices (BMPs) for Wetpool Facilities

The four BMPs discussed below are currently recognized as effective treatment techniques using wetpool facilities. The specific BMPs that are selected should be coordinated with the Treatment Facility Menus discussed in Chapter 3.

BMP T10.10 Wetponds - Basic and Large

Purpose and Definition

A wetpond is a constructed stormwater pond that retains a permanent pool of water ("wetpool") at least during the wet season. The volume of the wetpool is related to the effectiveness of the pond in settling particulate pollutants. As an option, a shallow marsh area can be created within the permanent pool volume to provide additional treatment for nutrient removal. Peak flow control can be provided in the "live storage" area above the permanent pool. Figures 10-1a and 1b illustrates a typical wet pond BMP.

The following design, construction, and operation and maintenance criteria cover two wetpond applications - the basic wetpond and the large wetpond. Large wetponds are designed for higher levels of pollutant removal.

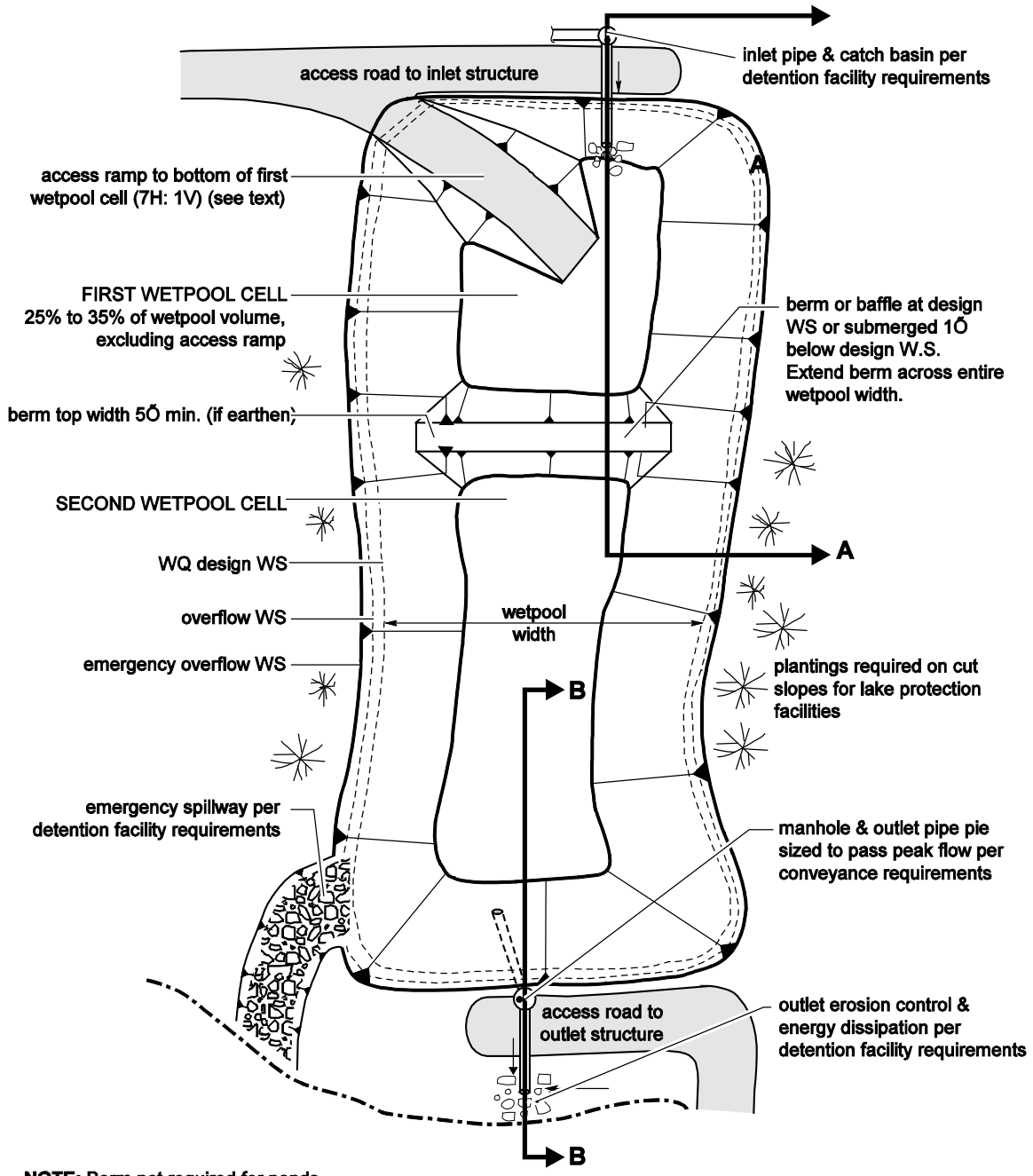

NOTE: Berm not required for ponds with length to width ratio ≥ 4:1 or if volume less than 4000 c.f.

PLAN VIEW
NTS

Figure 10.1a – Wetpond

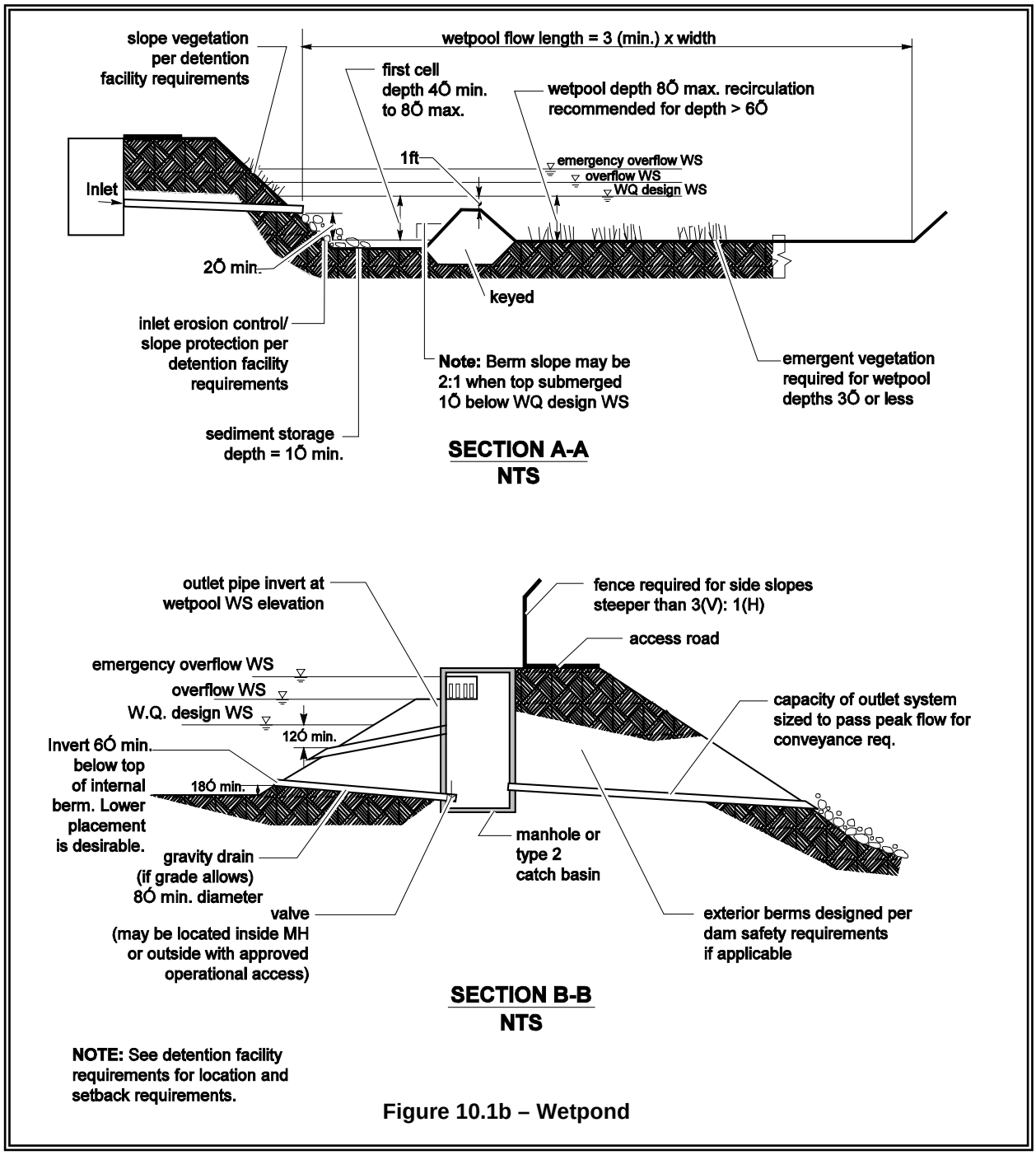

Figure 10.1b – Wetpond

Applications and Limitations

A wetpond requires a larger area than a biofiltration swale or a sand filter, but it can be integrated to the contours of a site fairly easily. In till soils, the wetpond holds a permanent pool of water that provides an attractive aesthetic feature. In more porous soils, wetponds may still be used, but water seepage from unlined cells could result in a dry pond, particularly in the summer months. Lining the first cell with a low permeability liner is one way to deal with this situation. As long as the first cell retains a

permanent pool of water, this situation will not reduce the pond's effectiveness but may be an aesthetic drawback.

Wetponds work best when the water already in the pond is moved out en masse by incoming flows, a phenomenon called "plug flow." Because treatment works on this displacement principle, the wetpool storage of wetponds may be provided below the groundwater level without interfering unduly with treatment effectiveness. However, if combined with a detention function, the live storage must be above the seasonal high groundwater level.

Wetponds may be single-purpose facilities, providing only runoff treatment, or they may be combined with a detention pond to also provide flow control. If combined, the wetpond can often be stacked under the detention pond with little further loss of development area. See BMP T10.40 for a description of combined detention and wetpool facilities.

Design Criteria

The primary design factor that determines a wetpond's treatment efficiency is the volume of the wetpool. The larger the wetpool volume, the greater the potential for pollutant removal. For a basic wetpond, the wetpool volume provided shall be equal to or greater than the total volume of runoff from the water quality design storm - the 6-month, 24-hour storm event. **Alternatively, the 91st percentile, 24-hour runoff volume indicated by an approved continuous runoff model.**
A large wetpond requires a wetpool volume at least 1.5 times larger than the total volume of runoff from the 6-month, 24-hour storm event. Also important are the avoidance of short-circuiting and the promotion of plug flow. ***Plug flow*** describes the hypothetical condition of stormwater moving through the pond as a unit, displacing the "old" water in the pond with incoming flows. To prevent short-circuiting, water is forced to flow, to the extent practical, to all potentially available flow routes, avoiding "dead zones" and maximizing the time water stays in the pond during the active part of a storm.

Design features that encourage plug flow and avoid dead zones are:

- Dissipating energy at the inlet.
- Providing a large length-to-width ratio.
- Providing a broad surface for water exchange using a berm designed as a broad-crested weir to divide the wetpond into two cells rather than a constricted area such as a pipe.
- Maximizing the flowpath between inlet and outlet, including the vertical path, also enhances treatment by increasing residence time.

Sizing Procedure

Procedures for determining a wetpond's dimensions and volume are outlined below.

Step 1: Identify required wetpool volume using the SCS (now known as NRCS) curve number equations presented in Volume III, Chapter 2, Section 2.3.2. A basic wetpond requires a volume equal to or greater than the total volume of runoff from the 6-month, 24-hour storm event. Alternatively, use the 91st percentile, 24-hour runoff volume indicated by an approved continuous runoff model. A large wetpond requires a volume at least 1.5 times the total volume of runoff from the 6-month, 24-hour storm event, or 1.5 times the 91st percentile, 24-hour runoff volume indicated by an approved continuous runoff model.

Step 2: Determine wetpool dimensions. Determine the wetpool dimensions satisfying the design criteria outlined below and illustrated in Figures 10.1a and 10.1b. A simple way to check the volume of each wetpool cell is to use the following equation:

$$V = \frac{h(A_1 + A_2)}{2}$$

where V = wetpool volume (cf)
h = wetpool average depth (ft)
A_1 = water quality design surface area of wetpool (sf)
A_2 = bottom area of wetpool (sf)

Step 3: Design pond outlet pipe and determine primary overflow water surface. The pond outlet pipe shall be placed on a reverse grade from the pond's wetpool to the outlet structure. Use the following procedure to design the pond outlet pipe and determine the primary overflow water surface elevation:

a) Use the nomographs in Figures 10.2 and 10.3 to select a trial size for the pond outlet pipe sufficient to pass the on-line WQ design flow, Q_{wq} indicated by WWHM or other approved continuous runoff model.
b) Use Figure 10.4 to determine the critical depth d_c at the outflow end of the pipe for Q_{wq}.
c) Use Figure 10.5 to determine the flow area A_c at critical depth.
d) Calculate the flow velocity at critical depth using continuity equation ($V_c = Q_{wq} / A_c$).
e) Calculate the velocity head V_H ($V_H = V_c^2 / 2g$, where g is the gravitational constant, 32.2 feet per second).
f) Determine the primary overflow water surface elevation by adding the velocity head and critical depth to the invert elevation at the outflow end of the pond outlet pipe (i.e., overflow water surface elevation = outflow invert + d_c + V_H).
g) Adjust outlet pipe diameter as needed and repeat Steps (a) through (e).

Step 4: Determine wetpond dimensions. General wetpond design criteria and concepts are shown in Figure 10.1a and 10.1b.

Wetpool Geometry

- The wetpool shall be divided into two cells separated by a baffle or berm. The first cell shall contain between 25 to 35 percent of the total wetpool volume. The baffle or berm volume shall not count as part of the total wetpool volume. The term baffle means a vertical divider placed across the entire width of the pond, stopping short of the bottom. A berm is a vertical divider typically built up from the bottom, or if in a vault, connects all the way to the bottom.

Intent: The full-length berm or baffle promotes plug flow and enhances quiescence and laminar flow through as much of the entire water volume as possible. Alternative methods to the full-length berm or baffle that provide equivalent flow characteristics may be approved on a case-by-case basis by the Local Plan Approval Authority.

- Sediment storage shall be provided in the first cell. The sediment storage shall have a minimum depth of 1-foot. A fixed sediment depth monitor should be installed in the first cell to gauge sediment accumulation unless an alternative gauging method is proposed.
- The minimum depth of the first cell shall be 4 feet, exclusive of sediment storage requirements. The depth of the first cell may be greater than the depth of the second cell.
- The maximum depth of each cell shall not exceed 8 feet (exclusive of sediment storage in the first cell). Pool depths of 3 feet or shallower (second cell) shall be planted with emergent wetland vegetation (see Planting requirements).
- Inlets and outlets shall be placed to maximize the flowpath through the facility. The ratio of flowpath length to width from the inlet to the outlet shall be at least 3:1. The ***flowpath length*** is defined as the distance from the inlet to the outlet, as measured at mid-depth. The ***width*** at mid-depth can be found as follows: width = (average top width + average bottom width)/2.
- Wetponds with wetpool volumes less than or equal to 4,000 cubic feet may be single celled (i.e., no baffle or berm is required). However, it is especially important in this case that the flow path length be maximized. The ratio of flow path length to width shall be at least 4:1 in single celled wetponds, but should preferably be 5:1.
- All inlets shall enter the first cell. If there are multiple inlets, the length-to-width ratio shall be based on the average flowpath length for all inlets.
- The first cell m~~ay~~ust be lined in accordance with the liner requirements contained in Section 4.4.

Berms, Baffles, and Slopes

- A berm or baffle shall extend across the full width of the wetpool, and tie into the wetpond side slopes. If the berm embankments are greater than 4 feet in height, the berm must be constructed by excavating a key equal to 50 percent of the embankment cross-sectional height and width. This requirement may be waived if recommended by a geotechnical engineer for specific site conditions. The geotechnical analysis shall address situations in which one of the two cells is empty while the other remains full of water.
- The top of the berm may extend to the WQ design water surface or be 1-foot below the WQ design water surface. If at the WQ design water surface, berm side slopes should be 3H:1V. Berm side slopes may be steeper (up to 2:1) if the berm is submerged 1-foot.

  Intent: Submerging the berm is intended to enhance safety by discouraging pedestrian access when side slopes are steeper than 3H:1V. An alternative to the submerged berm design is the use of barrier planting to prevent easy access to the divider berm in an unfenced wetpond.
- If good vegetation cover is not established on the berm, erosion control measures should be used to prevent erosion of the berm back-slope when the pond is initially filled.
- The interior berm or baffle may be a retaining wall provided that the design is prepared and stamped by a licensed civil engineer. If a baffle or retaining wall is used, it should be submerged one foot below the design water surface to discourage access by pedestrians.
- Criteria for wetpond side slopes are included in Section 4.3.

Embankments

Embankments that impound water must comply with the Washington State Dam Safety Regulations (Chapter 173-175 WAC). If the impoundment has a storage capacity (including both water and sediment storage volumes) greater than 10 acre-feet (435,600 cubic feet or 3.26 million gallons) above natural ground level, then dam safety design and review are required by the Department of Ecology. See Section 3.2.1 of Volume III.

Inlet and Outlet

See Figure 10.1a and 10.1b for details on the following requirements:

- The inlet to the wetpond shall be submerged with the inlet pipe invert a minimum of two feet from the pond bottom (not including sediment storage). The top of the inlet pipe should be submerged at least 1-foot, if possible.

Intent: The inlet is submerged to dissipate energy of the incoming flow. The distance from the bottom is set to minimize resuspension of settled sediments. Alternative inlet designs that accomplish these objectives are acceptable.

- An outlet structure shall be provided. Either a Type 2 catch basin with a grated opening (jail house window) or a manhole with a cone grate (birdcage) may be used (see Volume III, Figure 3.11 for an illustration). No sump is required in the outlet structure for wetponds not providing detention storage. The outlet structure receives flow from the pond outlet pipe. The grate or birdcage openings provide an overflow route should the pond outlet pipe become clogged. The overflow criteria provided below specifies the sizing and position of the grate opening.
- The pond outlet pipe (as opposed to the manhole or type 2 catch basin outlet pipe) shall be back-sloped or have a turn-down elbow, and extend 1 foot below the WQ design water surface. Note: A floating outlet, set to draw water from 1-foot below the water surface, is also acceptable if vandalism concerns are adequately addressed.

  Intent: The inverted outlet pipe provides for trapping of oils and floatables in the wetpond.
- The pond outlet pipe shall be sized, at a minimum, to pass the on-line WQ design flow. Note: The highest invert of the outlet pipe sets the WQ design water surface elevation.
- The overflow criteria for single-purpose (treatment only, not combined with flow control) wetponds are as follows:
  a) The requirement for primary overflow is satisfied by either the grated inlet to the outlet structure or by a birdcage above the pond outlet structure.
  b) The bottom of the grate opening in the outlet structure shall be set at or above the height needed to pass the WQ design flow through the pond outlet pipe. *Note: The grate invert elevation sets the overflow water surface elevation.*
  c) The grated opening should be sized to pass the 100-year design flow. The capacity of the outlet system should be sized to pass the peak flow for the conveyance requirements.
- An emergency spillway shall be provided and designed according to the requirements for detention ponds (see Section 3.2.1 of Volume III).
- The Local Plan Approval Authority may require a bypass/ shutoff valve to enable the pond to be taken offline for maintenance purposes.
- A gravity drain for maintenance is recommended if grade allows.

  Intent: It is anticipated that sediment removal will only be needed for the first cell in the majority of cases. The gravity drain is intended to

allow water from the first cell to be drained to the second cell when the first cell is pumped dry for cleaning.

- The drain invert shall be at least 6 inches below the top elevation of the dividing berm or baffle. Deeper drains are encouraged where feasible, but must be no deeper than 18 inches above the pond bottom.

  Intent: To prevent highly sediment-laden water from escaping the pond when drained for maintenance.

- The drain shall be at least 8 inches (minimum) diameter and shall be controlled by a valve. Use of a shear gate is allowed only at the inlet end of a pipe located within an approved structure.

  Intent: Shear gates often leak if water pressure pushes on the side of the gate opposite the seal. The gate should be situated so that water pressure pushes toward the seal.

- Operational access to the valve shall be provided to the finished ground surface.
- The valve location shall be accessible and well-marked with 1-foot of paving placed around the box. It must also be protected from damage and unauthorized operation.
- A valve box is allowed to a maximum depth of 5 feet without an access manhole. If over 5 feet deep, an access manhole or vault is required.
- All metal parts shall be corrosion-resistant. Galvanized materials should not be used unless unavoidable.

  Intent: Galvanized metal contributes zinc to stormwater, sometimes in very high concentrations.

Access and Setbacks

- All facilities shall be a minimum of 20 feet from any structure, property line, and any vegetative buffer required by the local government, and 100 feet from any septic tank/drainfield.
- All facilities shall be a minimum of 50 feet from any steep (greater than 15 percent) slope. A geotechnical report must address the potential impact of a wet pond on a steep slope.
- Access and maintenance roads shall be provided and designed according to the requirements for detention ponds. Access and maintenance roads shall extend to both the wetpond inlet and outlet structures. An access ramp (7H minimum:1V) shall be provided to the bottom of the first cell unless all portions of the cell can be reached and sediment loaded from the top of the pond.
- If the dividing berm is also used for access, it should be built to sustain loads of up to 80,000 pounds.

Planting Requirements

Planting requirements for detention ponds also apply to wetponds.

- Large wetponds intended for phosphorus control should not be planted within the cells, as the plants will release phosphorus in the winter when they die off.
- If the second cell of a basic wetpond is 3 feet or shallower, the bottom area shall be planted with emergent wetland vegetation. See Table 10.1 for recommended emergent wetland plant species for wetponds. Intent: Planting of shallow pond areas helps to stabilize settled sediment and prevent resuspension.

Note: The recommendations in Table 10.1 are for western Washington only. Local knowledge should be used to adapt this information if used in other areas.

- Cattails (Typha latifolia) are not recommended because they tend to crowd out other species and will typically establish themselves anyway.
- If the wetpond discharges to a phosphorus-sensitive lake or wetland, shrubs that form a dense cover should be planted on slopes above the WQ design water surface on at least three sides. For banks that are berms, no planting is allowed if the berm is regulated by dam safety requirements. The purpose of planting is to discourage waterfowl use of the pond and to provide shading. Some suitable trees and shrubs include vine maple (Acer circinatum), wild cherry (Prunus emarginata), red osier dogwood (Cornus stolonifera), California myrtle (Myrica californica), Indian plum (Oemleria cerasiformis), and Pacific yew (Taxus brevifolia) as well as numerous ornamental species.

Recommended Design Features

The following design features should be incorporated into the wetpond design where site conditions allow:

- The method of construction of soil/landscape systems can cause natural selection of specific plant species. Consult a soil restoration or wetland soil scientist for site-specific recommendations. The soil formulation will impact the plant species that will flourish or suffer on the site, and the formulation should be such that it encourages desired species and discourages undesired species.
- For wetpool depths in excess of 6 feet, it is recommended that some form of recirculation be provided in the summer, such as a fountain or aerator, to prevent stagnation and low dissolved oxygen conditions.
- A flow length-to-width ratio greater than the 3:1 minimum is desirable. If the ratio is 4:1 or greater, then the dividing berm is not required, and the pond may consist of one cell rather than two. A one-cell pond must provide at least 6-inches of sediment storage depth. A

one cell pond must also provide a minimum depth of 4 feet for the volume equivalent to the first cell of a two-cell design.

- A tear-drop shape, with the inlet at the narrow end, rather than a rectangular pond is preferred since it minimizes dead zones caused by corners.
- A small amount of base flow is desirable to maintain circulation and reduce the potential for low oxygen conditions during late summer.
- Evergreen or columnar deciduous trees along the west and south sides of ponds are recommended to reduce thermal heating, except that no trees or shrubs may be planted on berms meeting the criteria of dams regulated for safety. In addition to shade, trees and shrubs also discourage waterfowl use and the attendant phosphorus enrichment problems they cause. Trees should be set back so that the branches will not extend over the pond.

  Intent: Evergreen trees or shrubs are preferred to avoid problems associated with leaf drop. Columnar deciduous trees (e.g., hornbeam, Lombardy poplar, etc.) typically have fewer leaves than other deciduous trees.
- The number of inlets to the facility should be limited; ideally there should be only one inlet. The flowpath length should be maximized from inlet to outlet for all inlets to the facility.
- The access and maintenance road could be extended along the full length of the wetpond and could double as playcourts or picnic areas. Placing finely ground bark or other natural material over the road surface would render it more pedestrian friendly.
- The following design features should be incorporated to enhance aesthetics where possible:
  - Provide pedestrian access to shallow pool areas enhanced with emergent wetland vegetation. This allows the pond to be more accessible without incurring safety risks.
  - Provide side slopes that are sufficiently gentle to avoid the need for fencing (3:1 or flatter).
  - Create flat areas overlooking or adjoining the pond for picnic tables or seating that can be used by residents. Walking or jogging trails around the pond are easily integrated into site design.
  - Include fountains or integrated waterfall features for privately maintained facilities.
  - Provide visual enhancement with clusters of trees and shrubs. On most pond sites, it is important to amend the soil before planting since ponds are typically placed well below the native soil horizon in very poor soils. Make sure dam safety restrictions against planting do not apply.

- Orient the pond length along the direction of prevailing summer winds (typically west or southwest) to enhance wind mixing.

Construction Criteria

- Sediment that has accumulated in the pond must be removed after construction in the drainage area of the pond is complete (unless used for a liner - see below).
- Sediment that has accumulated in the pond at the end of construction may be used in excessively drained soils to meet the liner requirements if the sediment meets the criteria for low permeability or treatment liners in keeping with guidance in Chapter 4. Sediment used for a soil liner must be graded to provide uniform coverage and must meet the thickness specifications in Chapter 4. The sediment must not reduce the design volume of the pond. The pond must be over-excavated initially to provide sufficient room for the sediments to serve as a liner.

Operation and Maintenance

- Maintenance is of primary importance if wetponds are to continue to function as originally designed. A local government, a designated group such as a homeowners' association, or a property owner shall accept the responsibility for maintaining the structures and the impoundment area. A specific maintenance plan shall be formulated outlining the schedule and scope of maintenance operations.
- The pond should be inspected by the local government annually. The maintenance standards contained in Section 4.6 are measures for determining if maintenance actions are required as identified through the annual inspection.
- Site vegetation should be trimmed as necessary to keep the pond free of leaves and to maintain the aesthetic appearance of the site. Slope areas that have become bare should be revegetated and eroded areas should be regraded prior to being revegetated.
- Sediment should be removed when the 1-foot sediment zone is full plus 6 inches. Sediments should be tested for toxicants in compliance with current disposal requirements. Sediments must be disposed in accordance with current local health department requirements and the Minimum Functional Standards for Solid Waste Handling. See Volume IV, Appendix IV-G Recommendations for Management of Street Waste for additional guidance.
- Any standing water removed during the maintenance operation must be properly disposed of. The preferred disposal option is discharge to a sanitary sewer at an approved location. Other disposal options include discharge back into the wetpool facility or the storm sewer system if certain conditions are met. See Volume IV, Appendix IV-G for additional guidance.

Table 10.1 – Emergent Wetland Plant Species Recommended for Wetponds			
Species	**Common Name**	**Notes**	**Maximum Depth**
INUNDATION TO 1-FOOT			
Agrostis exarata[1]	Spike bent grass	Prairie to coast	to 2 feet
Carex stipata	Sawbeak sedge	Wet ground	
Eleocharis palustris	Spike rush	Margins of ponds, wet meadows	to 2 feet
6.1.1.1.1.1.1.1 Glyceria occidentalis	Western mannagrass	Marshes, pond margins	to 2 feet
Juncus tenuis	Slender rush	Wet soils, wetland margins	
Oenanthe sarmentosa	Water parsley	Shallow water along stream and pond margins; needs saturated soils all summer	
Scirpus atrocinctus (formerly S. cyperinus)	Woolgrass	Tolerates shallow water; tall clumps	
Scirpus microcarpus	Small-fruited bulrush	Wet ground to 18 inches depth	18 inches
Sagittaria latifolia	Arrowhead		
INUNDATION 1 TO 2 FEET			
Agrostis exarata[1]	Spike bent grass	Prairie to coast	
Alisma plantago-aquatica	Water plantain		
Eleocharis palustris	Spike rush	Margins of ponds, wet meadows	
Glyceria occidentalis	Western mannagrass	Marshes, pond margins	
Juncus effusus	Soft rush	Wet meadows, pastures, wetland margins	
Scirpus microcarpus	Small-fruited bulrush	Wet ground to 18 inches depth	18 inches
Sparganium emmersum	Bur reed	Shallow standing water, saturated soils	
INUNDATION 1 TO 3 FEET			
Carex obnupta	Slough sedge	Wet ground or standing water	1.5 to 3 feet
Beckmania syzigachne[1]	Western sloughgrass	Wet prairie to pond margins	
Scirpus acutus[2]	Hardstem bulrush	Single tall stems, not clumping	to 3 feet
Scirpus validus[2]	Softstem bulrush		
INUNDATION GREATER THAN 3 FEET			
Nuphar polysepalum	Spatterdock	Deep water	3 to 7.5 feet
Nymphaea odorata[1]	White waterlily	Shallow to deep ponds	to 6 feet

Notes:
(1) Non-native species. *Beckmania syzigachne* is native to Oregon. Native species are preferred.
(2) *Scirpus* tubers must be planted shallower for establishment, and protected from foraging waterfowl until established. Emerging aerial stems should project above water surface to allow oxygen transport to the roots.
Primary sources: Municipality of Metropolitan Seattle, *Water Pollution Control Aspects of Aquatic Plants*, 1990. Hortus Northwest, *Wetland Plants for Western Oregon*, Issue 2, 1991. Hitchcock and Cronquist, *Flora of the Pacific Northwest*, 1973.

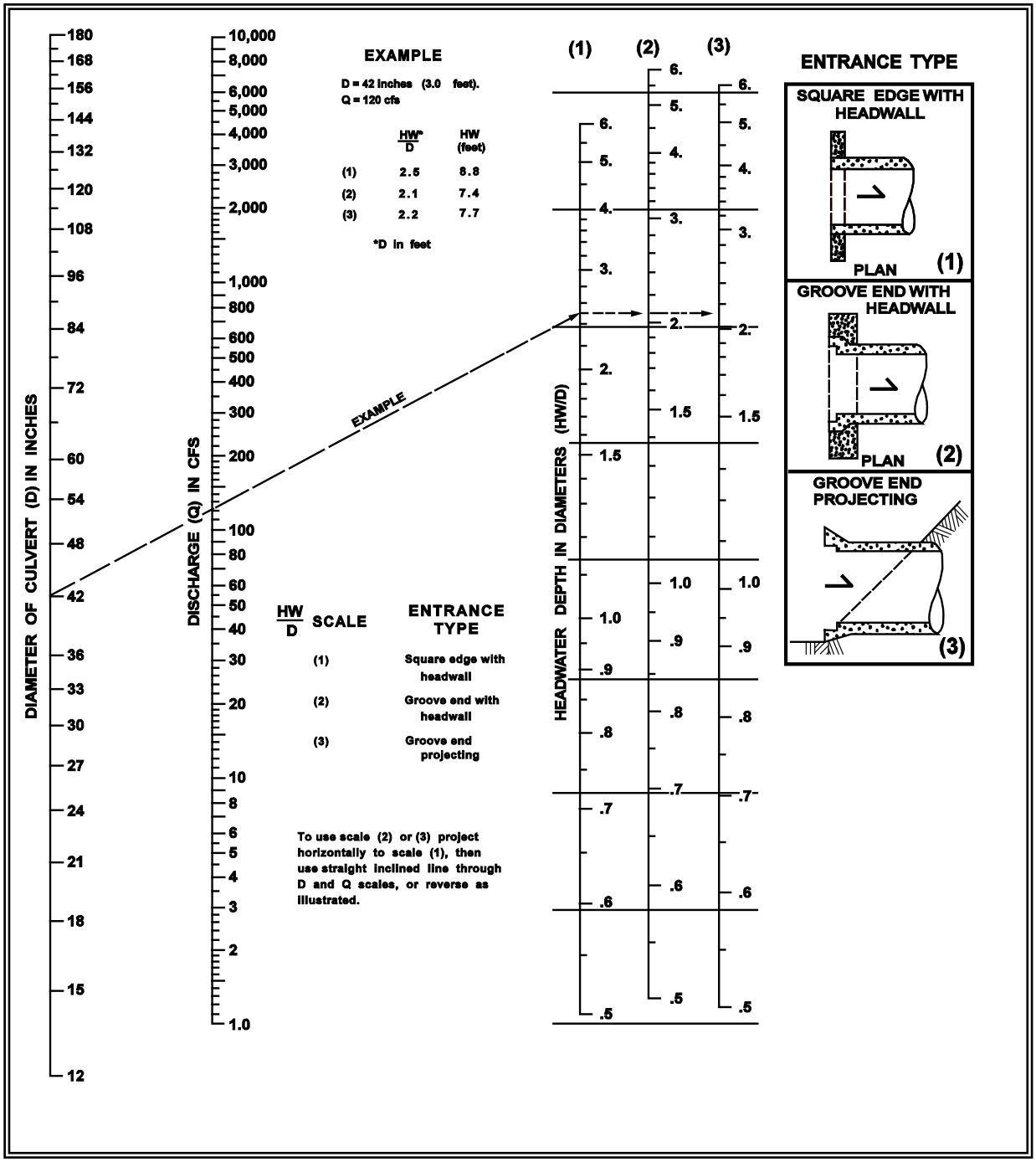

Figure 10.2 – Headwater Depth for Smooth Interior Pipe Culverts with Inlet Control

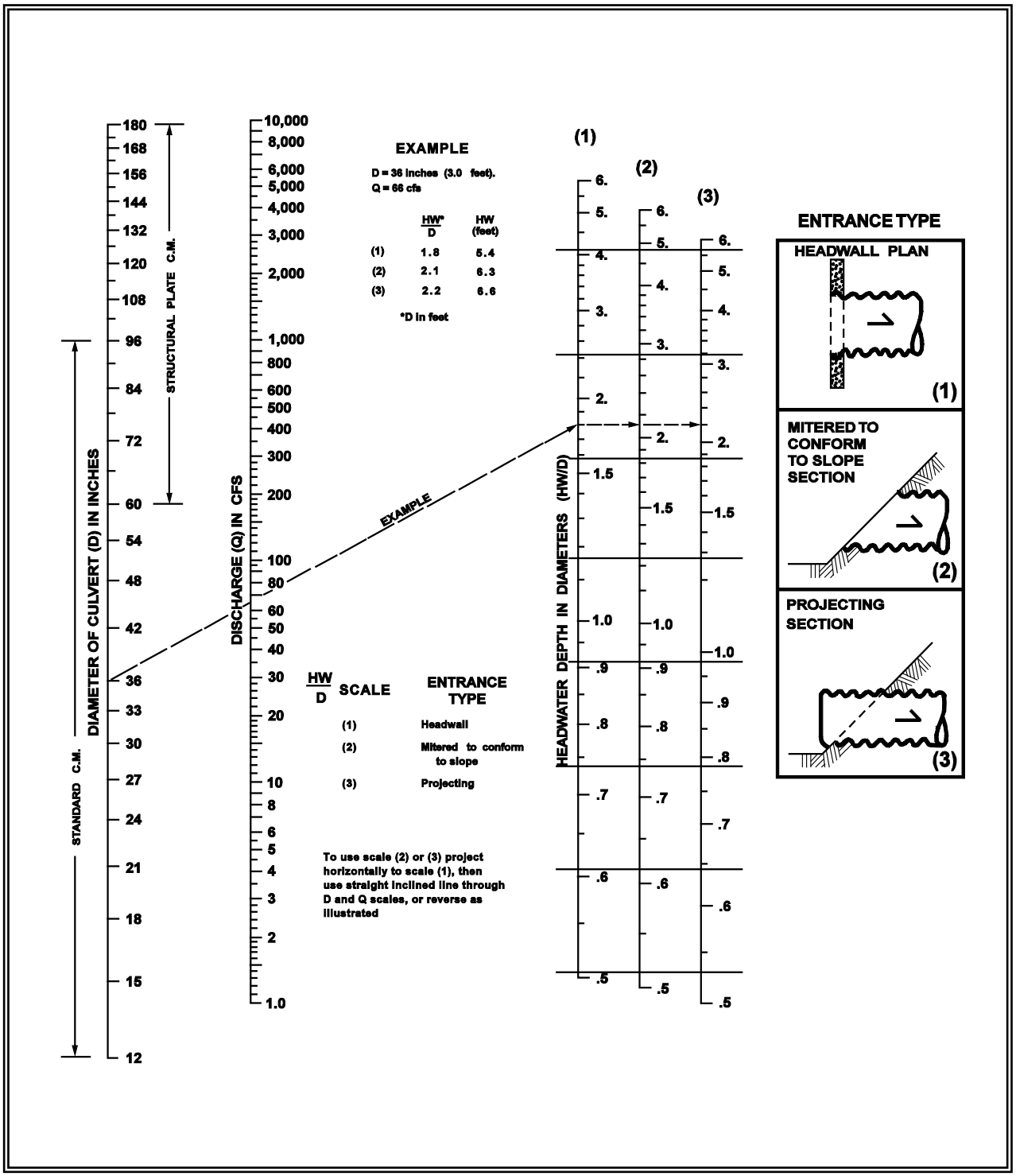

Figure 10.3 – Headwater Depth for Corrugated Pipe Culverts with Inlet Control

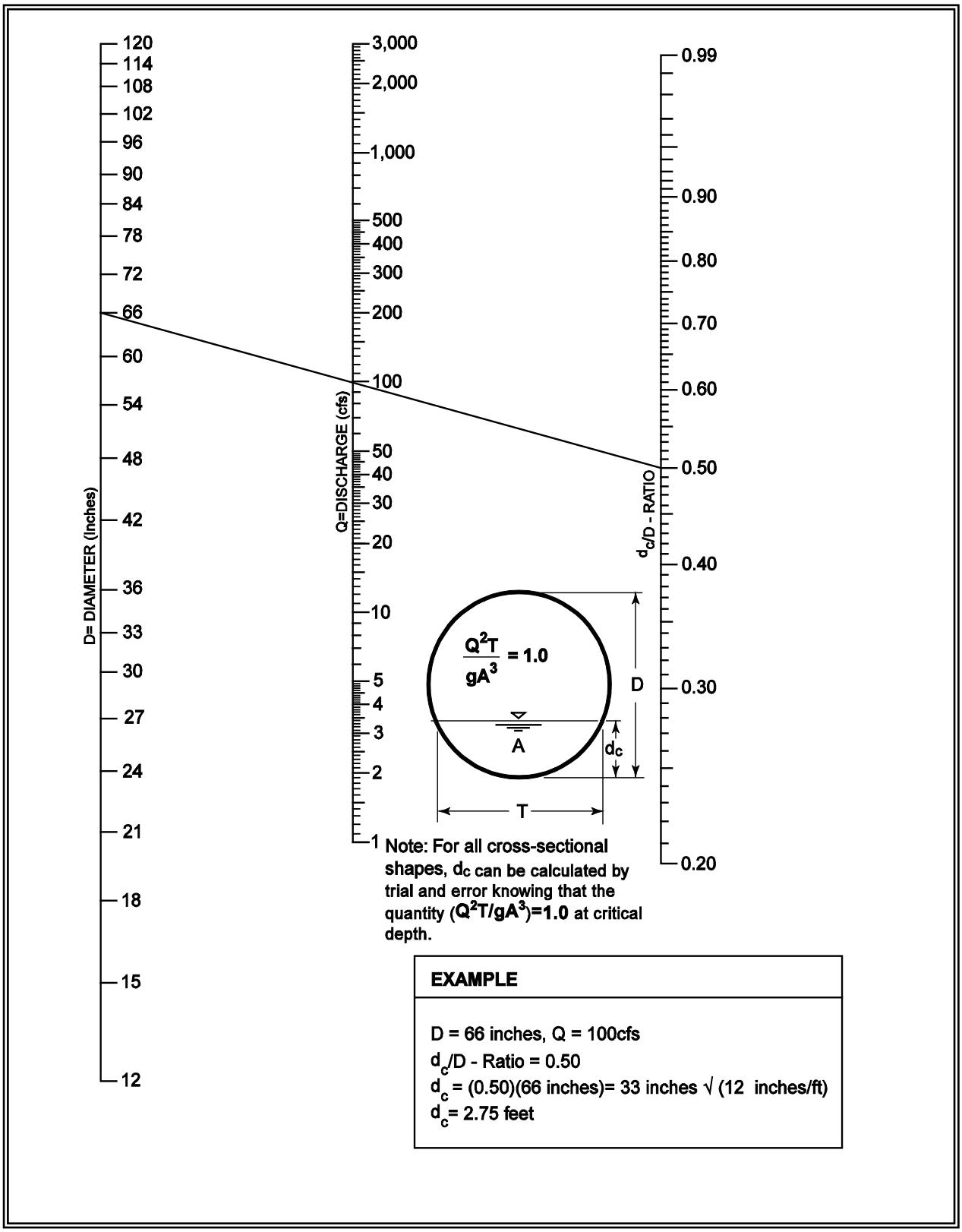

Figure 10.4 – Critical Depth of Flow for Circular Culverts

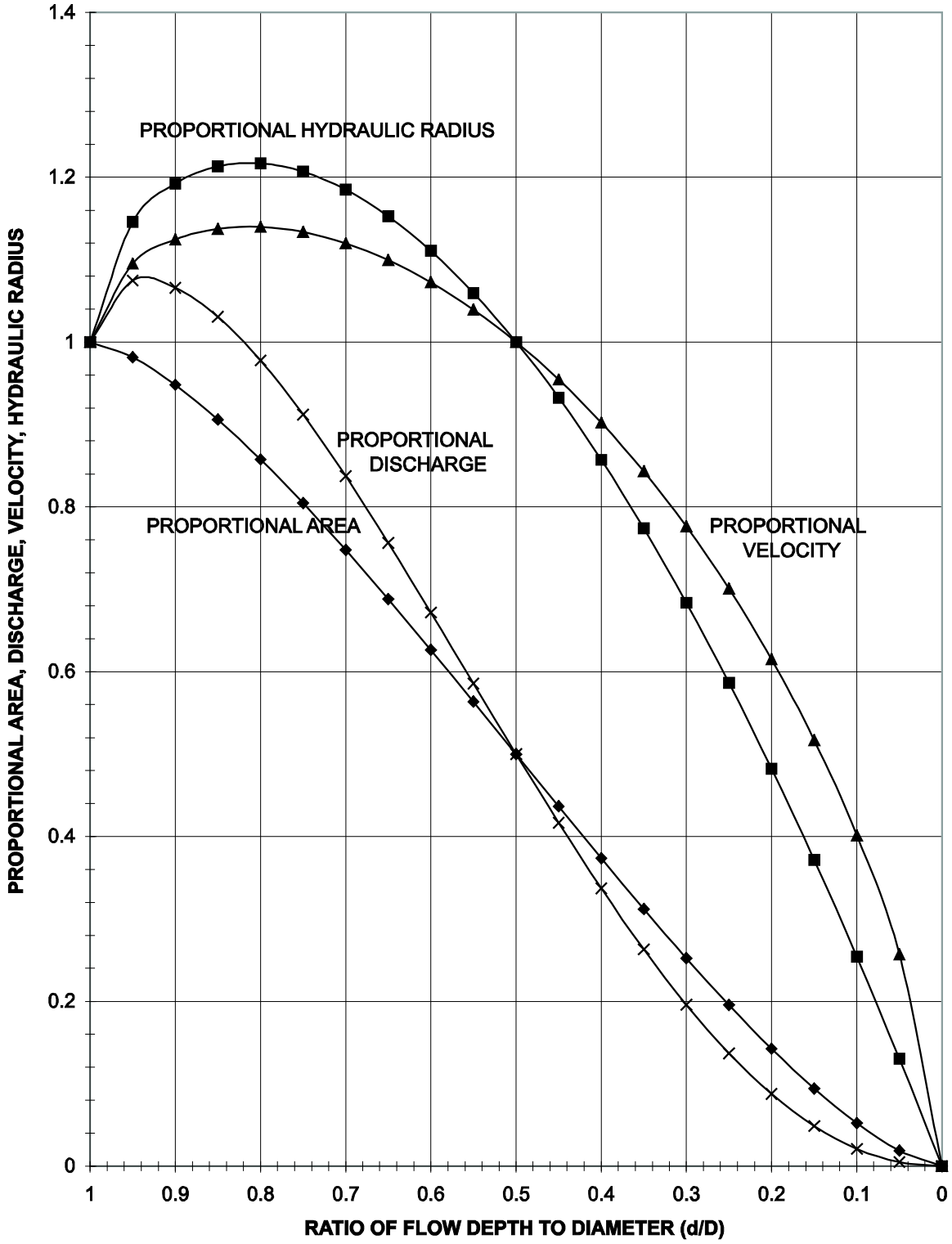

Figure 10.5 – Circular Channel Ratios

BMP T10.20 Wetvaults

Purpose and Definition

A wetvault is an underground structure similar in appearance to a detention vault, except that a wetvault has a permanent pool of water (wetpool) which dissipates energy and improves the settling of particulate pollutants (see the wetvault details in Figure 10.6). Being underground, the wetvault lacks the biological pollutant removal mechanisms, such as algae uptake, present in surface wetponds.

Applications and Limitations

A wetvault may be used for commercial, industrial, or roadway projects if there are space limitations precluding the use of other treatment BMPs. The use of wetvaults for residential development is highly discouraged. Combined detention and wetvaults are allowed; see BMP T10.40.

A wetvault is believed to be ineffective in removing dissolved pollutants such as soluble phosphorus or metals such as copper. There is also concern that oxygen levels will decline, especially in warm summer months, because of limited contact with air and wind. However, the extent to which this potential problem occurs has not been documented.

Below-ground structures like wetvaults are relatively difficult and expensive to maintain. The need for maintenance is often not seen and as a result routine maintenance does not occur.

If oil control is required for a project, a wetvault may be combined with an API oil/water separator.

Design Criteria

Sizing Procedure

As with wetponds, the primary design factor that determines the removal efficiency of a wetvault is the volume of the wetpool. The larger the volume, the higher the potential for pollutant removal. Performance is also improved by avoiding dead zones (like corners) where little exchange occurs, using large length-to-width ratios, dissipating energy at the inlet, and ensuring that flow rates are uniform to the extent possible and not increased between cells.

The sizing procedure for a wetvault is identical to the sizing procedure for a wetpond. The wetpool volume for the wetvault shall be equal to or greater than the total volume of runoff from the 6-month, 24-hour storm event. Alternatively, the 91st percentile, 24-hour runoff volume estimated by an approved continuous runoff model may be used.

Typical design details and concepts for the wetvault are shown in Figure 10.6.

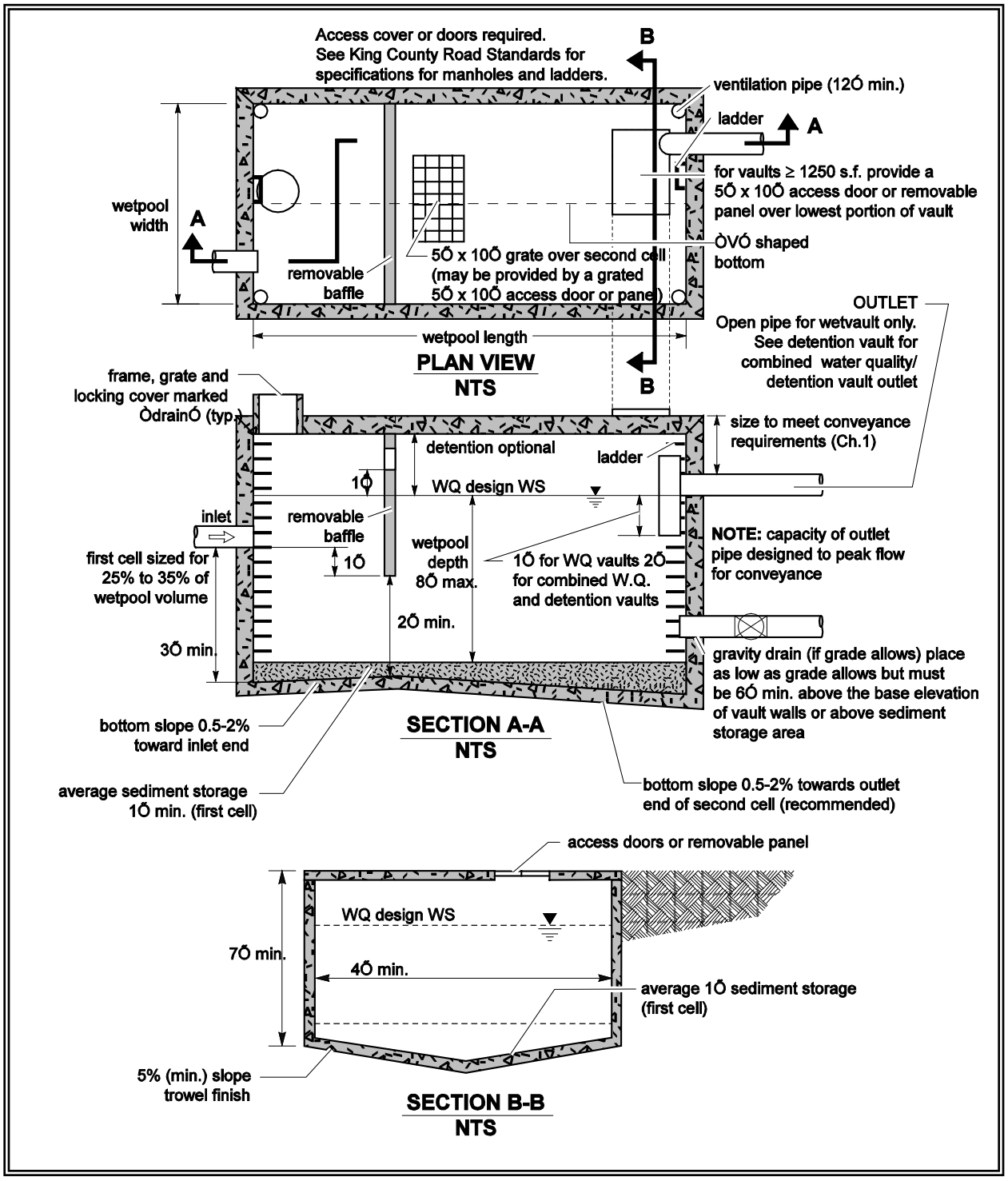

Figure 10.6 – Wetvault

Wetpool Geometry

Same as specified for wetponds (see BMP T10.10) except for the following two modifications:

- The sediment storage in the first cell shall be an average of 1-foot. Because of the v-shaped bottom, the depth of sediment storage needed above the bottom of the side wall is roughly proportional to vault width according to the schedule below:

Vault Width	Sediment Depth (from bottom of side wall)
15'	10"
20'	9"
40'	6"
60'	4"

- The second cell shall be a minimum of 3 feet deep since planting cannot be used to prevent resuspension of sediment in shallow water as it can in open ponds.

Vault Structure

- The vault shall be separated into two cells by a wall or a removable baffle. If a wall is used, a 5-foot by 10-foot removable maintenance access must be provided for both cells. If a removable baffle is used, the following criteria apply:

  1) The baffle shall extend from a minimum of 1-foot above the WQ design water surface to a minimum of 1-foot below the invert elevation of the inlet pipe.

  2) The lowest point of the baffle shall be a minimum of 2 feet from the bottom of the vault, and greater if feasible.

- If the vault is less than 2,000 cubic feet (inside dimensions), or if the length-to-width ratio of the vault pool is 5:1 or greater, the baffle or wall may be omitted and the vault may be one-celled.

- The two cells of a wetvault should not be divided into additional subcells by internal walls. If internal structural support is needed, it is preferred that post and pier construction be used to support the vault lid rather than walls. Any walls used within cells must be positioned so as to lengthen, rather than divide, the flowpath.

  Intent: Treatment effectiveness in wetpool facilities is related to the extent to which plug flow is achieved and short-circuiting and dead zones are avoided. Structural walls placed within the cells can interfere with plug flow and create significant dead zones, reducing treatment effectiveness.

- The bottom of the first cell shall be sloped toward the access opening. Slope should be between 0.5 percent (minimum) and 2 percent

(maximum). The second cell may be level (longitudinally) sloped toward the outlet, with a high point between the first and second cells. The intent of sloping the bottom is direct the sediment accumulation to the closest access point for maintenance purposes. Sloping the second cell towards the access opening for the first cell is also acceptable.

- The vault bottom shall slope laterally a minimum of 5 percent from each side towards the center, forming a broad "v" to facilitate sediment removal. Note: More than one "v" may be used to minimize vault depth.

  Exception: The Local Plan Approval Authority may allow the vault bottom to be flat if removable panels are provided over the entire vault. Removable panels should be at grade, have stainless steel lifting eyes, and weigh no more than 5 tons per panel.

- The highest point of a vault bottom must be at least 6 inches below the outlet elevation to provide for sediment storage over the entire bottom.
- Provision for passage of flows should the outlet plug shall be provided.
- Wetvaults may be constructed using arch culvert sections provided the top area at the WQ design water surface is, at a minimum, equal to that of a vault with vertical walls designed with an average depth of 6 feet.

  Intent: To prevent decreasing the surface area available for oxygen exchange.

- Wetvaults shall conform with the "Materials" and "Structural Stability" criteria specified for detention vaults in Volume III, Chapter 3.
- Where pipes enter and leave the vault below the WQ design water surface, they shall be sealed using a non-porous, non-shrinking grout.

Inlet and Outlet

- The inlet to the wetvault shall be submerged with the inlet pipe invert a minimum of 3 feet from the vault bottom. The top of the inlet pipe should be submerged at least 1-foot, if possible.

  Intent: The submerged inlet is to dissipate energy of the incoming flow. The distance from the bottom is to minimize resuspension of settled sediments. Alternative inlet designs that accomplish these objectives are acceptable.

- Unless designed as an off-line facility, the capacity of the outlet pipe and available head above the outlet pipe should be designed to convey the 100-year design flow for developed site conditions without overtopping the vault. The available head above the outlet pipe must be a minimum of 6 inches.

- The outlet pipe shall be back-sloped or have tee section, the lower arm of which should extend 1 foot below the WQ design water surface to provide for trapping of oils and floatables in the vault.
- The Local Plan Approval Authority may require a bypass/shutoff valve to enable the vault to be taken offline for maintenance.

Access Requirements

Same as for detention vaults (see Volume III, Section 3.2) except for the following additional requirement for wetvaults:

- A minimum of 50 square feet of grate should be provided over the second cell. For vaults in which the surface area of the second cell is greater than 1,250 square feet, 4 percent of the top should be grated. This requirement may be met by one grate or by many smaller grates distributed over the second cell area. Note: a grated access door can be used to meet this requirement.

  Intent: The grate allows air contact with the wetpool in order to minimize stagnant conditions which can result in oxygen depletion, especially in warm weather.

Access Roads, Right of Way, and Setbacks

Same as for detention vaults (see Volume III, Section 3.2).

Recommended Design Features

The following design features should be incorporated into wetvaults where feasible, but they are not specifically required:

- The floor of the second cell should slope toward the outlet for ease of cleaning.
- The inlet and outlet should be at opposing corners of the vault to increase the flowpath.
- A flow length-to-width ratio greater than 3:1 minimum is desirable.
- Lockable grates instead of solid manhole covers are recommended to increase air contact with the wetpool.
- Galvanized materials shall not be used unless unavoidable.
- The number of inlets to the wetvault should be limited, and the flowpath length should be maximized from inlet to outlet for all inlets to the vault.

Construction Criteria

Sediment that has accumulated in the vault must be removed after construction in the drainage area is complete. If no more than 12 inches of sediment have accumulated after the infrastructure is built, cleaning may be left until after building construction is complete. In general, sediment

accumulation from stabilized drainage areas is not expected to exceed an average of 4 inches per year in the first cell. If sediment accumulation is greater than this amount, it will be assumed to be from construction unless it can be shown otherwise.

Operation and Maintenance

- Accumulated sediment and stagnant conditions may cause noxious gases to form and accumulate in the vault. Vault maintenance procedures must meet OSHA confined space entry requirements, which include clearly marking entrances to confined space areas. This may be accomplished by hanging a removable sign in the access riser(s), just under the access lid.
- Facilities should be inspected by the local government annually. The maintenance standards contained in Section 4.6 of this volume are measures for determining if maintenance actions are required as identified through the annual inspection.
- Sediment should be removed when the 1-foot sediment zone is full plus 6 inches. Sediments should be tested for toxicants in compliance with current disposal requirements. Sediments must be disposed in accordance with current local health department requirements and the Minimum Functional Standards for Solid Waste Handling. See Volume IV, Appendix IV-G Recommendations for Management of Street Waste for additional guidance.
- Any standing water removed during the maintenance operation must be properly disposed of. The preferred disposal option is discharge to a sanitary sewer at an approved location. Other disposal options include discharge back into the wetpool facility or the storm sewer system if certain conditions are met. See Volume IV, Appendix IV-G for additional guidance.

Modifications for Combining with a Baffle Oil/Water Separator

If the project site is a high-use site and a wetvault is proposed, the vault may be combined with a baffle oil/water separator to meet the runoff treatment requirements with one facility rather than two. Structural modifications and added design criteria are given below. However, the maintenance requirements for baffle oil/water separators must be adhered to, in addition to those for a wetvault. This will result in more frequent inspection and cleaning than for a wetvault used only for TSS removal. See Chapter 11 for information on maintenance of baffle oil/water separators.

1. The sizing procedures for the baffle oil/water separator (Chapter 11) should be run as a check to ensure the vault is large enough. If the oil/water separator sizing procedures result in a larger vault size, increase the wetvault size to match.

2. An oil retaining baffle shall be provided in the second cell near the vault outlet. The baffle should not contain a high-flow overflow, or else the retained oil will be washed out of the vault during large storms.
3. The vault shall have a minimum length-to-width ratio of 5:1.
4. The vault shall have a design water depth-to-width ratio of between 1:3 to 1:2.
5. The vault shall be watertight and shall be coated to protect from corrosion.
6. Separator vaults shall have a shutoff mechanism on the outlet pipe to prevent oil discharges during maintenance and to provide emergency shut-off capability in case of a spill. A valve box and riser shall also be provided.
7. Wetvaults used as oil/water separators must be off-line and must bypass flows greater than the off-line WQ design flow multiplied by the off-line ratio indicated in Figure 9.6~~5~~b.

   Intent: This design minimizes the entrainment and/or emulsification of previously captured oil during very high flow events.

BMP T10.30 Stormwater Treatment Wetlands

Purpose and Definition

In land development situations, wetlands are usually constructed for two main reasons: to replace or mitigate impacts when natural wetlands are filled or impacted by development (mitigation wetlands), and to treat stormwater runoff (stormwater treatment wetlands). Stormwater treatment wetlands are shallow man-made ponds that are designed to treat stormwater through the biological processes associated with emergent aquatic plants (see the stormwater wetland details in Figure 10.7 and Figure 10.8.

Wetlands created to mitigate disturbance impacts, such as filling, may not also be used as stormwater treatment facilities. This is because of the different, incompatible functions of the two kinds of wetlands. Mitigation wetlands are intended to function as full replacement habitat for fish and wildlife, providing the same functions and harboring the same species diversity and biotic richness as the wetlands they replace. Stormwater treatment wetlands are used to capture and transform pollutants, just as wetponds are, and over time pollutants will concentrate in the sediment. This is not a healthy environment for aquatic life. Stormwater treatment wetlands are used to capture pollutants in a managed environment so that they will not reach natural wetlands and other ecologically important habitats. In addition, vegetation must occasionally be harvested and sediment dredged in stormwater treatment wetlands, further interfering with use for wildlife habitat.

In general, stormwater wetlands perform well to remove sediment, metals, and pollutants that bind to humic or organic acids. Phosphorus removal in stormwater wetlands is highly variable.

Applications and Limitations

This stormwater wetland design occupies about the same surface area as wetponds, but has the potential to be better integrated aesthetically into a site because of the abundance of emergent aquatic vegetation. The most critical factor for a successful design is the provision of an adequate supply of water for most of the year. Careful planning is needed to be sure sufficient water will be retained to sustain good wetland plant growth. Since water depths are shallower than in wetponds, water loss by evaporation is an important concern. Stormwater wetlands are a good WQ facility choice in areas with high winter groundwater levels.

Design Criteria

When used for stormwater treatment, stormwater wetlands employ some of the same design features as wetponds. However, instead of gravity settling being the dominant treatment process, pollutant removal mediated by aquatic vegetation and the microbiological community associated with that vegetation becomes the dominant treatment process. Thus when designing wetlands, water volume is not the dominant design criteria. Rather, factors which affect plant vigor and biomass are the primary concerns.

Sizing Procedure

Step 1: The volume of a basic wetpond is used as a template for sizing the stormwater wetland. The design volume is the total volume of runoff from the 6-month, 24-hour storm event. Alternatively, the 91st percentile, 24-hour runoff volume estimated by an approved continuous runoff model may be used.

Step 2: Calculate the surface area of the stormwater wetland. The surface area of the wetland shall be the same as the top area of a wetpond sized for the same site conditions. Calculate the surface area of the stormwater wetland by using the volume from Step 1 and dividing by the average water depth (use 3 feet).

Step 3: Determine the surface area of the first cell of the stormwater wetland. Use the volume determined from Criterion 2 under "Wetland Geometry", and the actual depth of the first cell.

Step 4: Determine the surface area of the wetland cell. Subtract the surface area of the first cell (Step 3) from the total surface area (Step 2).

Step 5: Determine water depth distribution in the second cell. Decide if the top of the dividing berm will be at the surface or submerged (designer's choice). Adjust the distribution of water depths in the second cell according to Criterion 8 under "Wetland Geometry" below. Note: This will result in a facility that holds less volume than that determined in Step 1 above. This is acceptable.

Intent: The surface area of the stormwater wetland is set to be roughly equivalent to that of a wetpond designed for the same site so as not to discourage use of this option.

Step 6: Choose plants. See Table 10.1 for a list of plants recommended for wetpond water depth zones, or consult a wetland scientist.

Wetland Geometry

1. Stormwater wetlands shall consist of two cells, a presettling cell and a wetland cell.

2. The presettling cell shall contain approximately 33 percent of the wetpool volume calculated in Step 1 above.

3. The depth of the presettling cell shall be between 4 feet (minimum) and 8 feet (maximum), excluding sediment storage.

4. One-foot of sediment storage shall be provided in the presettling cell.

5. The wetland cell shall have an average water depth of about 1.5 feet (plus or minus 3 inches).

6. The "berm" separating the two cells shall be shaped such that its downstream side gradually slopes to form the second shallow wetland cell (see the section view in Figure 10.7). Alternatively, the second cell may be graded naturalistically from the top of the dividing berm (see Criterion 8 below).

7. The top of berm shall be either at the WQ design water surface or submerged 1-foot below the WQ design water surface, as with wetponds. Correspondingly, the side slopes of the berm must meet the following criteria:

    a. If the top of berm is at the WQ design water surface, the berm side slopes shall be no steeper than 3H:1V.

    b. If the top of berm is submerged 1-foot, the upstream side slope may be up to 2H:1V. If the berm is at the water surface, then for safety reasons, its slope should be not greater than 3:1, just as the pond banks should not be greater than 3:1 if the pond is not fenced. A steeper slope (2:1 rather than 3:1) is allowable if the berm is submerged in 1 foot of water. If submerged, the berm is not considered accessible, and the steeper slope is allowable.

8. Two examples are provided for grading the bottom of the wetland cell. One example is a shallow, evenly graded slope from the upstream to the downstream edge of the wetland cell (see Figure 10.7). The second example is a "naturalistic" alternative, with the specified range of depths intermixed throughout the second cell (see Figure 10.8). A distribution of depths shall be provided in the wetland cell depending on whether the dividing berm is at the water surface or submerged (see Table 10.2 below). The maximum depth is 2.5 feet in either configuration. Other configurations within the wetland geometry constraints listed above may be approved by the Local Plan Approval Authority.

Table 10.2 – Distribution of Depths in Wetland Cell			
Dividing Berm at WQ Design Water Surface		**Dividing Berm Submerged 1-Foot**	
Depth Range (feet)	**Percent**	**Depth Range (feet)**	**Percent**
0.1 to 1	25	1 to 1.5	40
1 to 2	55	1.5 to 2	40
2 to 2.5	20	2 to 2.5	20

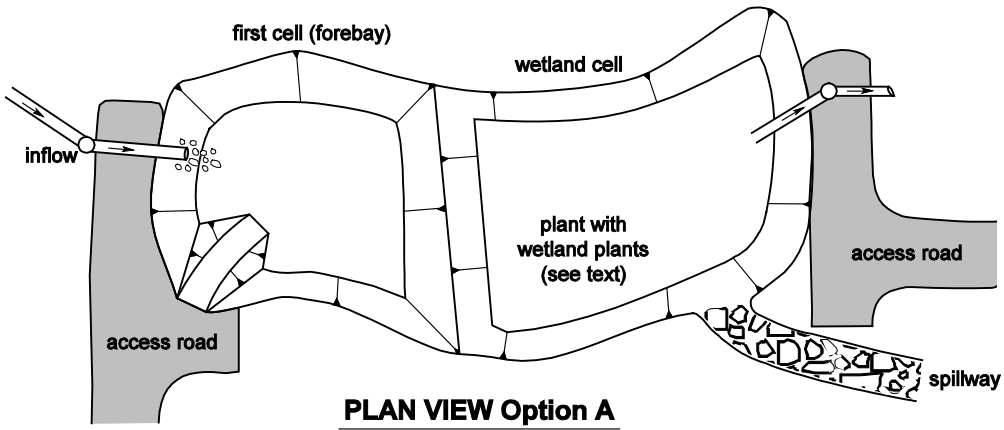

PLAN VIEW Option A
NTS

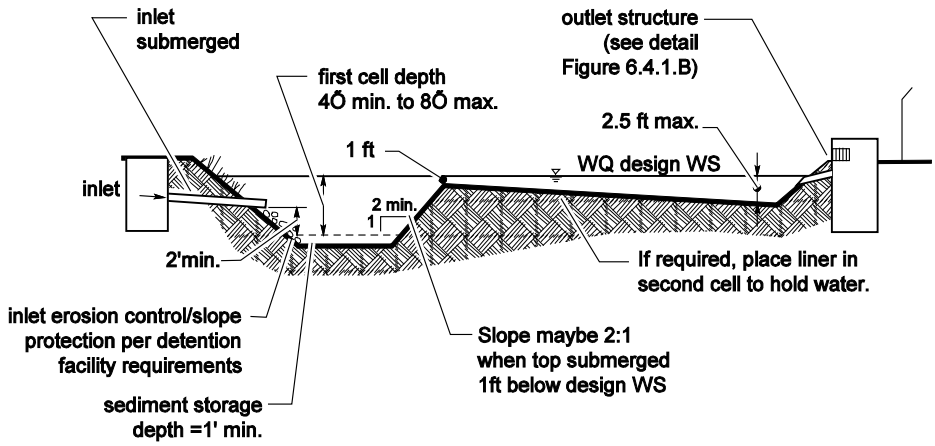

SECTION VIEW Option A
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Note: See detention facility requirements for location and setback requirements.

Figure 10.7 – Stormwater Wetland — Option One

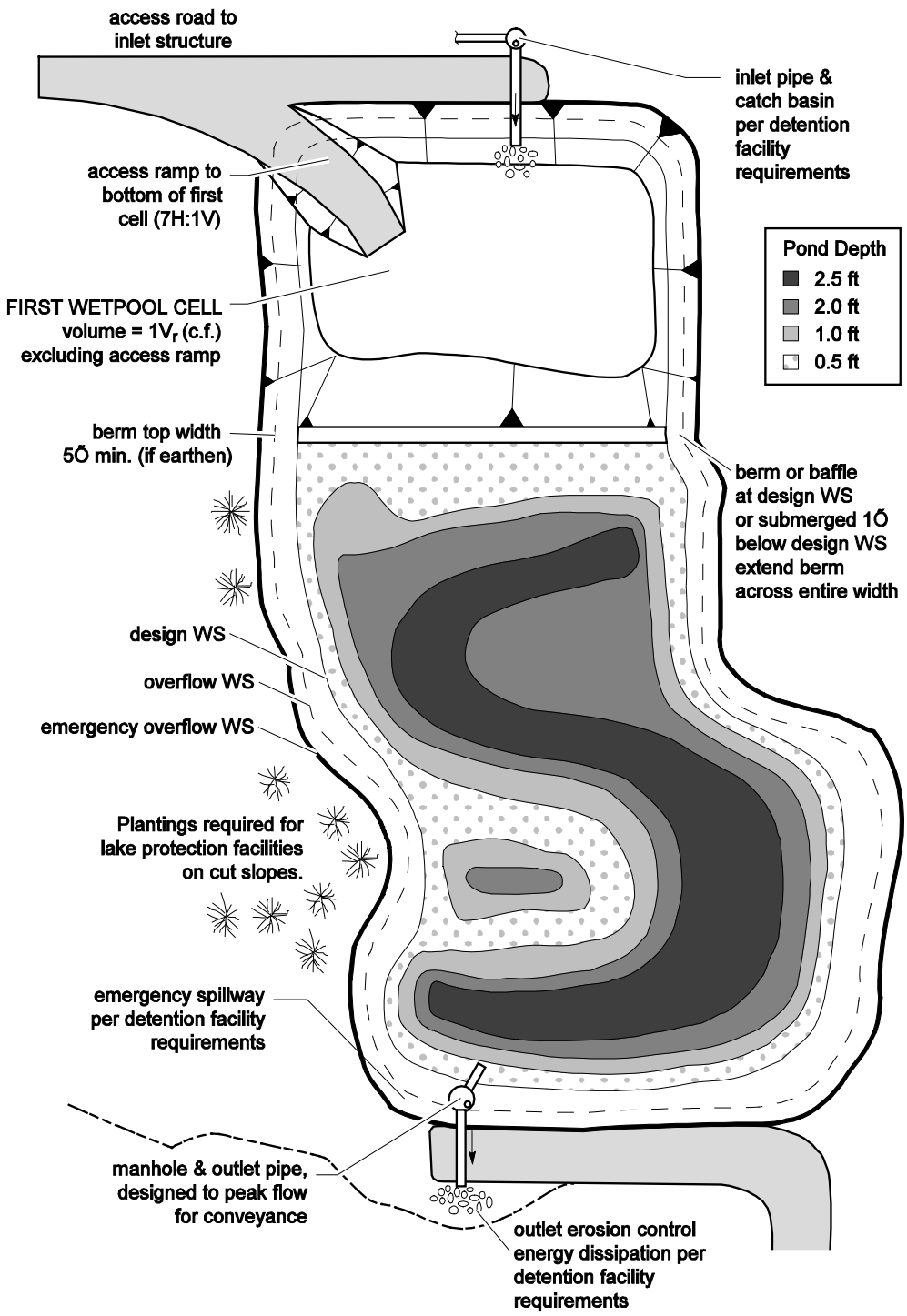

PLAN VIEW Option B

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Figure 10.8 – Stormwater Wetland — Option Two

Lining Requirements

In infiltrative soils, both cells of the stormwater wetland shall be lined. To determine whether a low-permeability liner or a treatment liner is required, determine whether the following conditions will be met. If soil permeability will allow sufficient water retention, lining may be waived.

1 The second cell must retain water for at least 10 months of the year.
2. The first cell must retain at least three feet of water year-round.
3. A complete precipitation record shall be used when establishing these conditions. Evapotranspiration losses shall be taken into account as well as infiltration losses.

Intent: Many wetland plants can adapt to periods of summer drought, so a limited drought period is allowed in the second cell. This may allow a treatment liner rather than a low permeability liner to be used for the second cell. The first cell must retain water year-round in order for the presettling function to be effective.

- If a low permeability liner is used, a minimum of 18 inches of native soil amended with good topsoil or compost (one part compost mixed with 3 parts native soil) must be placed over the liner. For geomembrane liners, a soil depth of 3 feet is recommended to prevent damage to the liner during planting. Hydric soils are not required.

The criteria for liners given in Chapter 4 must be observed.

Inlet and Outlet

Same as for wetponds (see BMP T10.10).

Access and Setbacks

- Location of the stormwater wetland relative to site constraints (e.g., buildings, property lines, etc.) shall be the same as for detention ponds (see Volume III). See Chapter 4 for typical setback requirements for WQ facilities.
- Access and maintenance roads shall be provided and designed according to the requirements for detention ponds (see Volume III). Access and maintenance roads shall extend to both the wetland inlet and outlet structures. An access ramp (7H minimum:1V) shall be provided to the bottom of the first cell unless all portions of the cell can be reached and sediment loaded from the top of the wetland side slopes.
- If the dividing berm is also used for access, it should be built to sustain loads of up to 80,000 pounds.

Planting Requirements

The wetland cell shall be planted with emergent wetland plants following the recommendations given in Table 10.1 or the recommendations of a wetland specialist. Note: Cattails (Typha latifolia) are not recommended. They tend to escape to natural wetlands and crowd out other species. In addition, the shoots die back each fall and will result in oxygen depletion in the wetpool unless they are removed.

Construction Criteria

- Construction and maintenance considerations are the same as for wetponds.
- Construction of the naturalistic alternative (Option 2) can be easily done by first excavating the entire area to the 1.5-foot average depth. Then soil subsequently excavated to form deeper areas can be deposited to raise other areas until the distribution of depths indicated in the design is achieved.

Operation and Maintenance

- Wetlands should be inspected at least twice per year during the first three years during both growing and non-growing seasons to observe plant species presence, abundance, and condition; bottom contours and water depths relative to plans; and sediment, outlet, and buffer conditions.
- Maintenance should be scheduled around sensitive wildlife and vegetation seasons.
- Plants may require watering, physical support, mulching, weed removal, or replanting during the first three years.
- Nuisance plant species should be removed and desirable species should be replanted.
- The effectiveness of harvesting for nutrient control is not well documented. There are many drawbacks to harvesting, including possible damage to the wetlands and the inability to remove nutrients in the below-ground biomass. If harvesting is practiced, it should be done in the late summer.

Resource Material

King County Surface Water Design Manual, September 1998.

Schueler, Thomas. Design of Stormwater Wetland Systems, Guidelines for Creating Diverse and Effective Stormwater Wetland Systems in the Mid-Atlantic Region, October, 1992.

Kadlec, Robert and Robert L. Knight. Treatment Wetlands. 1996.

BMP T10.40 Combined Detention and Wetpool Facilities

Purpose and Definition

Combined detention and WQ wetpool facilities have the appearance of a detention facility but contain a permanent pool of water as well. The following design procedures, requirements, and recommendations cover differences in the design of the stand-alone WQ facility when combined with detention storage. The following combined facilities are addressed:

- Detention/wetpond (basic and large)
- Detention/wetvault
- Detention/stormwater wetland.

There are two sizes of the combined wetpond, a basic and a large, but only a basic size for the combined wetvault and combined stormwater wetland. The facility sizes (basic and large) are related to the pollutant removal goals. See Chapter 3 for more information about treatment performance goals.

Applications and Limitations

Combined detention and water quality facilities are very efficient for sites that also have detention requirements. The water quality facility may often be placed beneath the detention facility without increasing the facility surface area. However, the fluctuating water surface of the live storage will create unique challenges for plant growth and for aesthetics alike.

The basis for pollutant removal in combined facilities is the same as in the stand-alone WQ facilities. However, in the combined facility, the detention function creates fluctuating water levels and added turbulence. For simplicity, the positive effect of the extra live storage volume and the negative effect of increased turbulence are assumed to balance, and are thus ignored when sizing the wetpool volume. For the combined detention/stormwater wetland, criteria that limit the extent of water level fluctuation are specified to better ensure survival of the wetland plants.

Unlike the wetpool volume, the live storage component of the facility should be provided above the seasonal high water table.

Combined Detention and Wetpond (Basic and Large)

Typical design details and concepts for a combined detention and wetpond are shown in Figures 10.9 and 10.10. The detention portion of the facility shall meet the design criteria and sizing procedures set forth in Volume 3.

Sizing Procedure

The sizing procedure for combined detention and wetponds are identical to those outlined for wetponds and for detention facilities. The wetpool volume for a combined facility shall be equal to or greater than the total volume of runoff from the 6-month, 24-hour storm event. Alternatively,

the 91st percentile, 24-hour runoff volume estimated by an approved continuous runoff model may be used to size the wetpool. Follow the standard procedure specified in Volume III to size the detention portion of the pond.

Detention and Wetpool Geometry

- The wetpool and sediment storage volumes shall not be included in the required detention volume.
- The "Wetpool Geometry" criteria for wetponds (see BMP T10.10) shall apply with the following modifications/clarifications:

Criterion 1: The permanent pool may be made shallower to take up most of the pond bottom, or deeper and positioned to take up only a limited portion of the bottom. Note, however, that having the first wetpool cell at the inlet allows for more efficient sediment management than if the cell is moved away from the inlet. Wetpond criteria governing water depth must, however, still be met. See Figure 10.11 for two possibilities for wetpool cell placement.

Intent: This flexibility in positioning cells is provided to allow for multiple use options, such as volleyball courts in live storage areas in the drier months.

Criterion 2: The minimum sediment storage depth in the first cell is 1-foot. The 6 inches of sediment storage required for detention ponds does not need to be added to this, but 6 inches of sediment storage must be added to the second cell to comply with the detention sediment storage requirement.

Berms, Baffles, and Slopes

Same as for wetponds (see BMP T10.10).

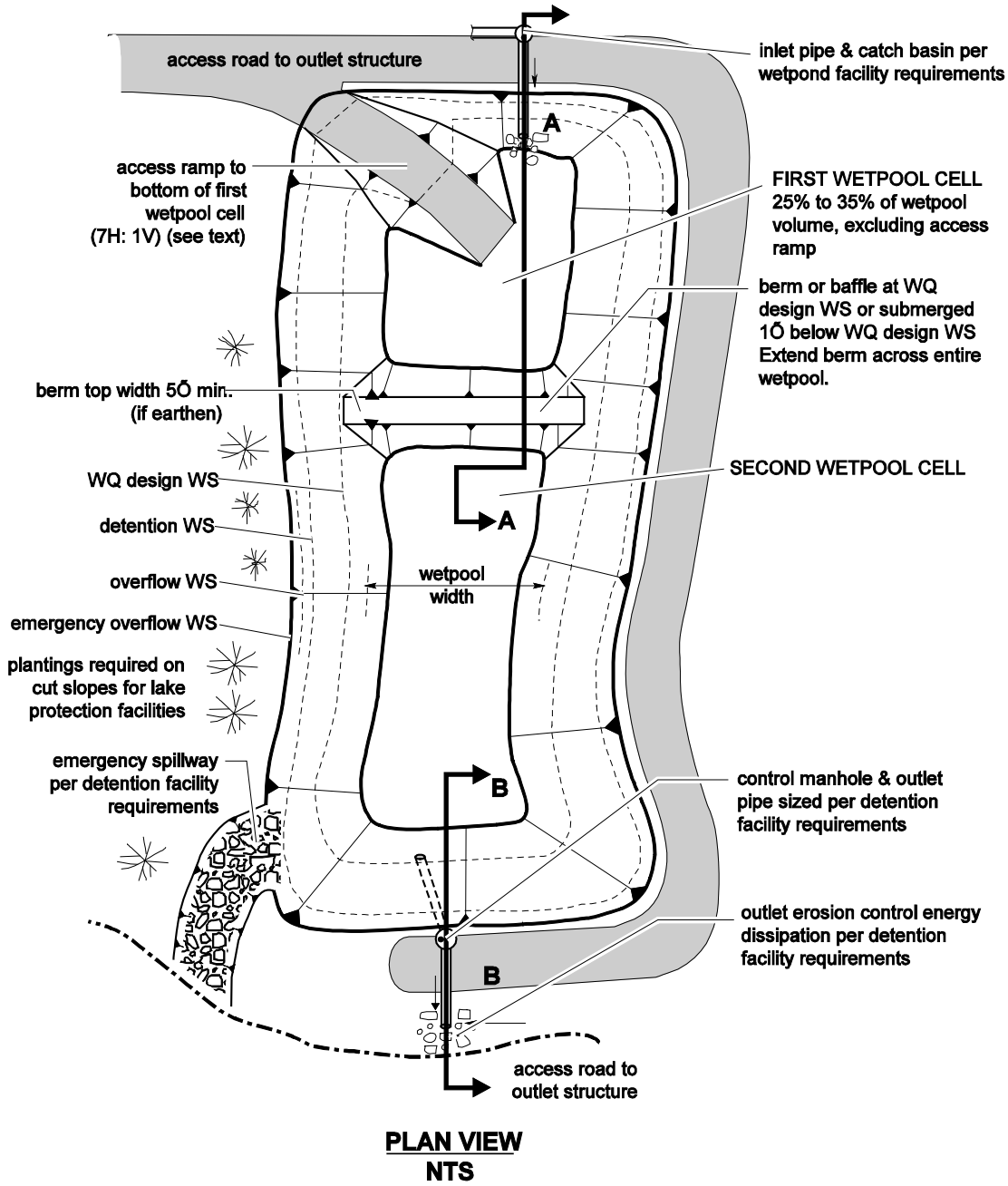

Figure 10.9 – Combined Detention and Wetpond

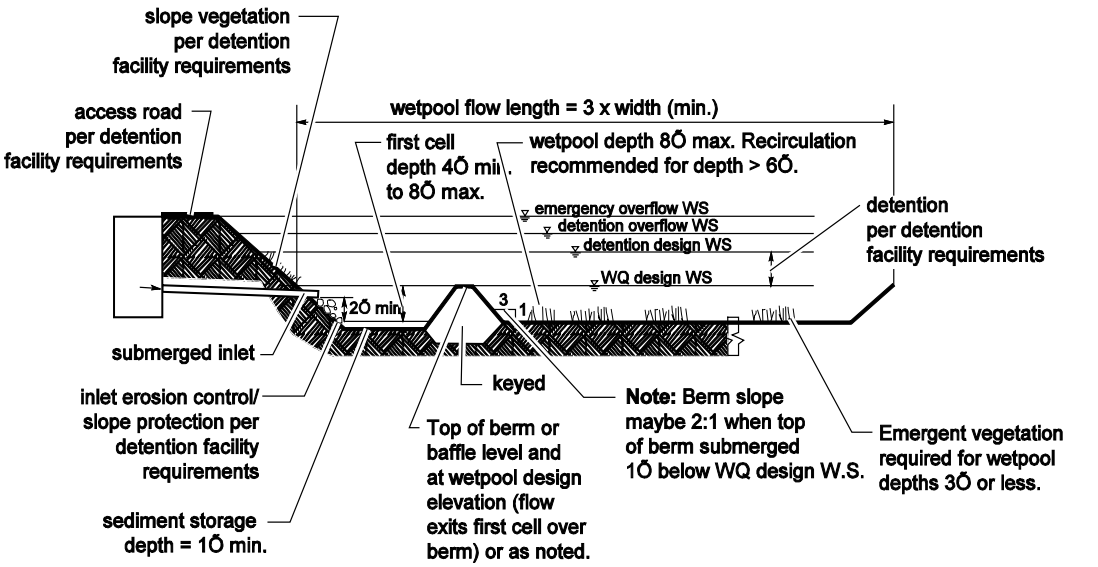

SECTION A-A
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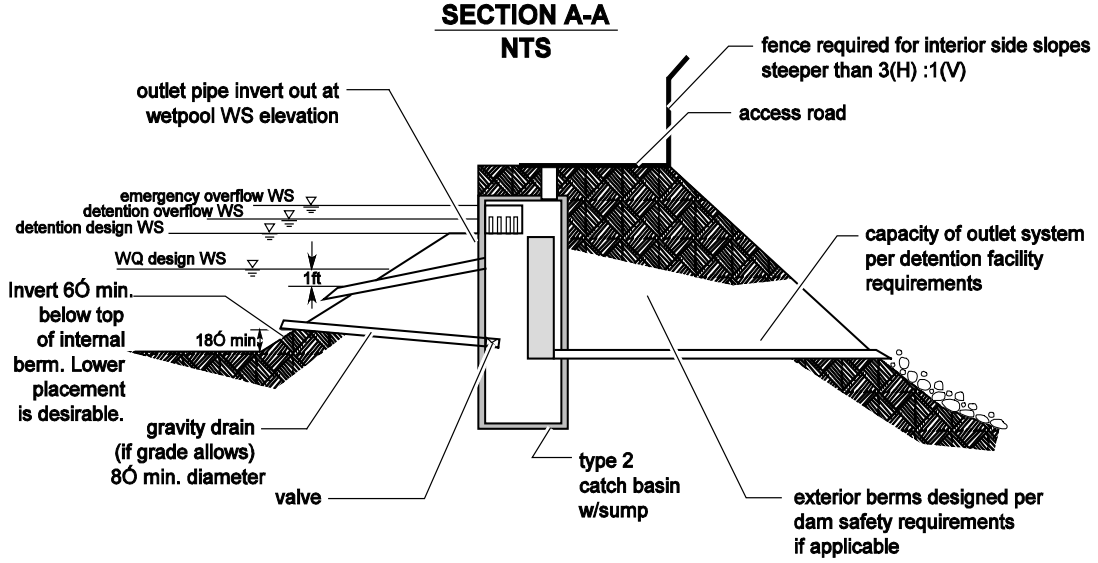

Note: See detention facility requirements for location, interior & exterior sideslopes, and setback requirements.

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Figure 10.10 – Combined Detention and Wetpond (Continued)

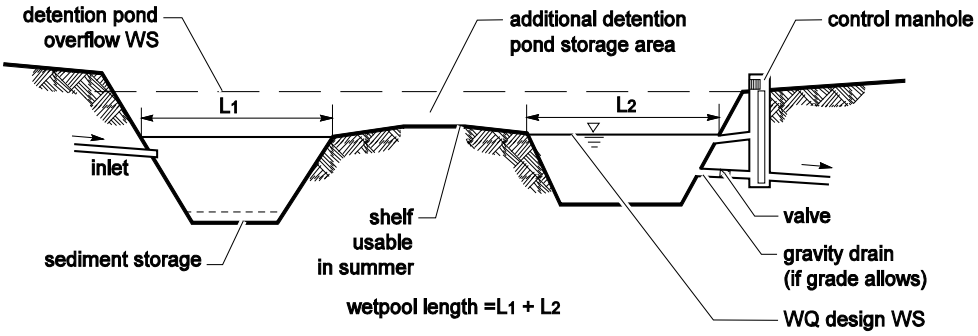

SECTION VIEW
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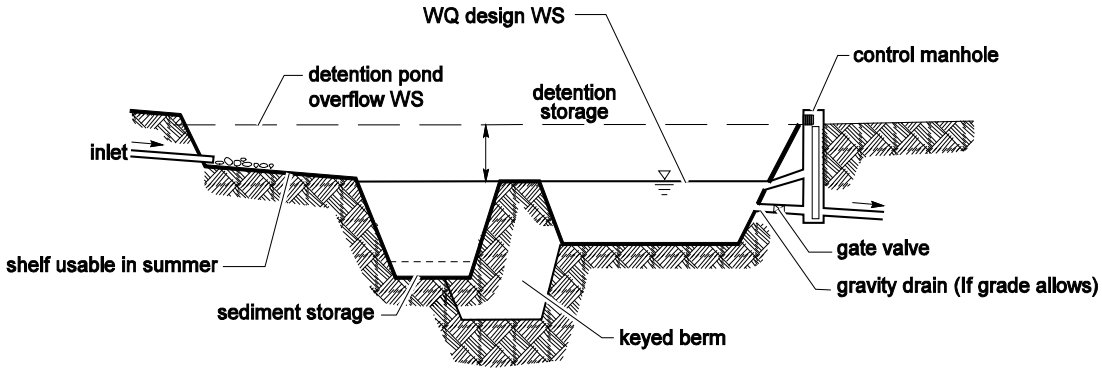

SECTION VIEW
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Note: These examples show how the combined detention/wetpool can be configured to allow for ÒshelvesÓ for joint use opportunities in dry weather. Other options may also be acceptable.

Figure 10.11 – Alternative Configurations of Detention and Wetpool Areas

Inlet and Outlet

The "Inlet and Outlet" criteria for wetponds shall apply with the following modifications:

- A sump must be provided in the outlet structure of combined ponds.
- The detention flow restrictor and its outlet pipe shall be designed according to the requirements for detention ponds (see Volume III).

Access and Setbacks

Same as for wetponds.

Planting Requirements

Same as for wetponds.

Combined Detention and Wetvault

The sizing procedure for combined detention and wetvaults is identical to those outlined for wetvaults and for detention facilities. The wetvault volume for a combined facility shall be equal to or greater than the total volume of runoff from the 6-month, 24-hour storm event. Alternatively, the 91st percentile, 24-hour runoff volume estimated by an approved continuous runoff model may be used to size the wetpool portion of vault. Follow the standard procedure specified in Volume 3 to size the detention portion of the vault.

The design criteria for detention vaults and wetvaults must both be met, except for the following modifications or clarifications:

- The minimum sediment storage depth in the first cell shall average 1-foot. The 6 inches of sediment storage required for detention vaults does not need to be added to this, but 6 inches of sediment storage must be added to the second cell to comply with detention vault sediment storage requirements.
- The oil retaining baffle shall extend a minimum of 2 feet below the WQ design water surface.

<u>Intent:</u> The greater depth of the baffle in relation to the WQ design water surface compensates for the greater water level fluctuations experienced in the combined vault. The greater depth is deemed prudent to better ensure that separated oils remain within the vault, even during storm events.

Note: If a vault is used for detention as well as water quality control, the facility may not be modified to function as a baffle oil/water separator as allowed for wetvaults in BMP T10.20. This is because the added pool fluctuation in the combined vault does not allow for the quiescent conditions needed for oil separation.

Combined Detention and Stormwater Wetland

The sizing procedure for combined detention and stormwater wetlands is identical to those outlined for stormwater wetlands and for detention facilities. Follow the procedure specified in BMP T10.30 to determine the

stormwater wetland size. Follow the standard procedure specified in Volume III to size the detention portion of the wetland.

The design criteria for detention ponds and stormwater wetlands must both be met, except for the following modifications or clarifications:

- The "Wetland Geometry" criteria for stormwater wetlands (see BMP T10.30) are modified as follows:
- The minimum sediment storage depth in the first cell is 1-foot. The 6 inches of sediment storage required for detention ponds does not need to be added to this, nor does the 6 inches of sediment storage in the second cell of detention ponds need to be added.

Intent: Since emergent plants are limited to shallower water depths, the deeper water created before sediments accumulate is considered detrimental to robust emergent growth. Therefore, sediment storage is confined to the first cell which functions as a presettling cell.

The "Inlet and Outlet" criteria for wetponds shall apply with the following modifications:

- A sump must be provided in the outlet structure of combined facilities.
- The detention flow restrictor and its outlet pipe shall be designed according to the requirements for detention ponds (see Volume III).

  The "Planting Requirements" for stormwater wetlands are modified to use the following plants which are better adapted to water level fluctuations:

Scirpus acutus (hardstem bulrush)	2 - 6' depth
Scirpus microcarpus (small-fruited bulrush)	1 - 2.5' depth
Sparganium emersum (burreed)	1 - 2' depth
Sparganium eurycarpum (burreed)	1 - 2' depth
Veronica sp. (marsh speedwell)	0 - 1' depth

  In addition, the shrub Spirea douglasii (Douglas spirea) may be used in combined facilities.

  Water Level Fluctuation Restrictions: The difference between the WQ design water surface and the maximum water surface associated with the 2-year runoff shall not be greater than 3 feet. If this restriction cannot be met, the size of the stormwater wetland must be increased. The additional area may be placed in the first cell, second cell, or both. If placed in the second cell, the additional area need not be planted with wetland vegetation or counted in calculating the average depth.

Intent: This criterion is designed to dampen the most extreme water level fluctuations expected in combined facilities to better ensure that fluctuation-tolerant wetland plants will be able to survive in the facility. It is not intended to protect native wetland plant communities and is not to be applied to natural wetlands.

Chapter 11 - Oil and Water Separators

This chapter provides a discussion of oil and water separators, including their application and design criteria. BMPs are described for baffle type and coalescing plate separators.

11.1 Purpose of Oil and Water Separators

To remove oil and other water-insoluble hydrocarbons, and settleable solids from stormwater runoff.

11.2 Description

Oil and water separators are typically the American Petroleum Institute (API) (also called baffle type) (American Petroleum Institute, 1990) or the coalescing plate (CP) type using a gravity mechanism for separation. See Figures 11.1 and 11.2. Oil removal separators typically consist of three bays; forebay, separator section, and the afterbay. The CP separators need considerably less space for separation of the floating oil due to the shorter travel distances between parallel plates. A spill control (SC) separator (Figure 11.3) is a simple catchbasin with a T-inlet for temporarily trapping small volumes of oil. The spill control separator is included here for comparison only and is not designed for, or to be used for treatment purposes.

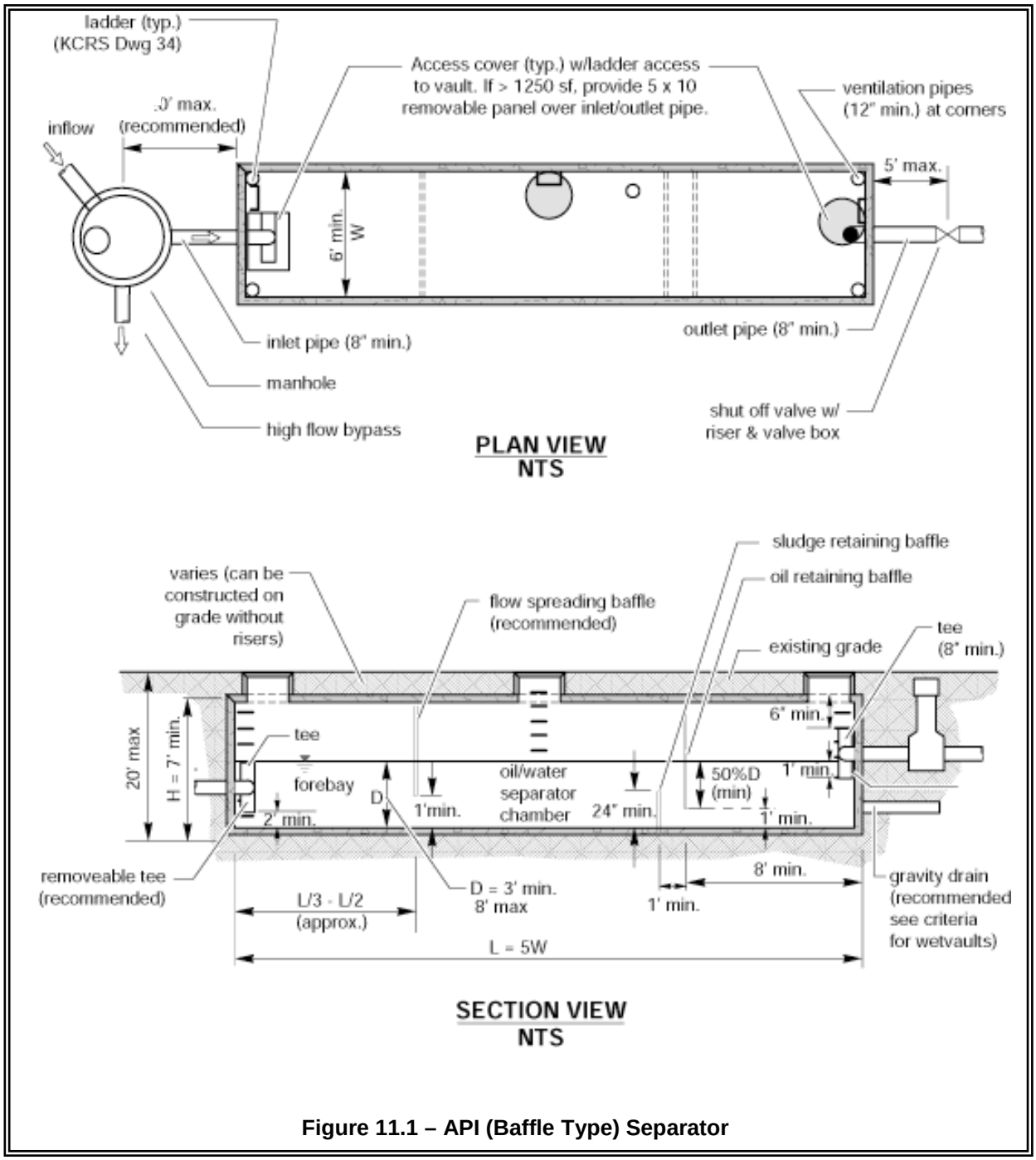

Figure 11.1 – API (Baffle Type) Separator

Source: King County (reproduced with permission)

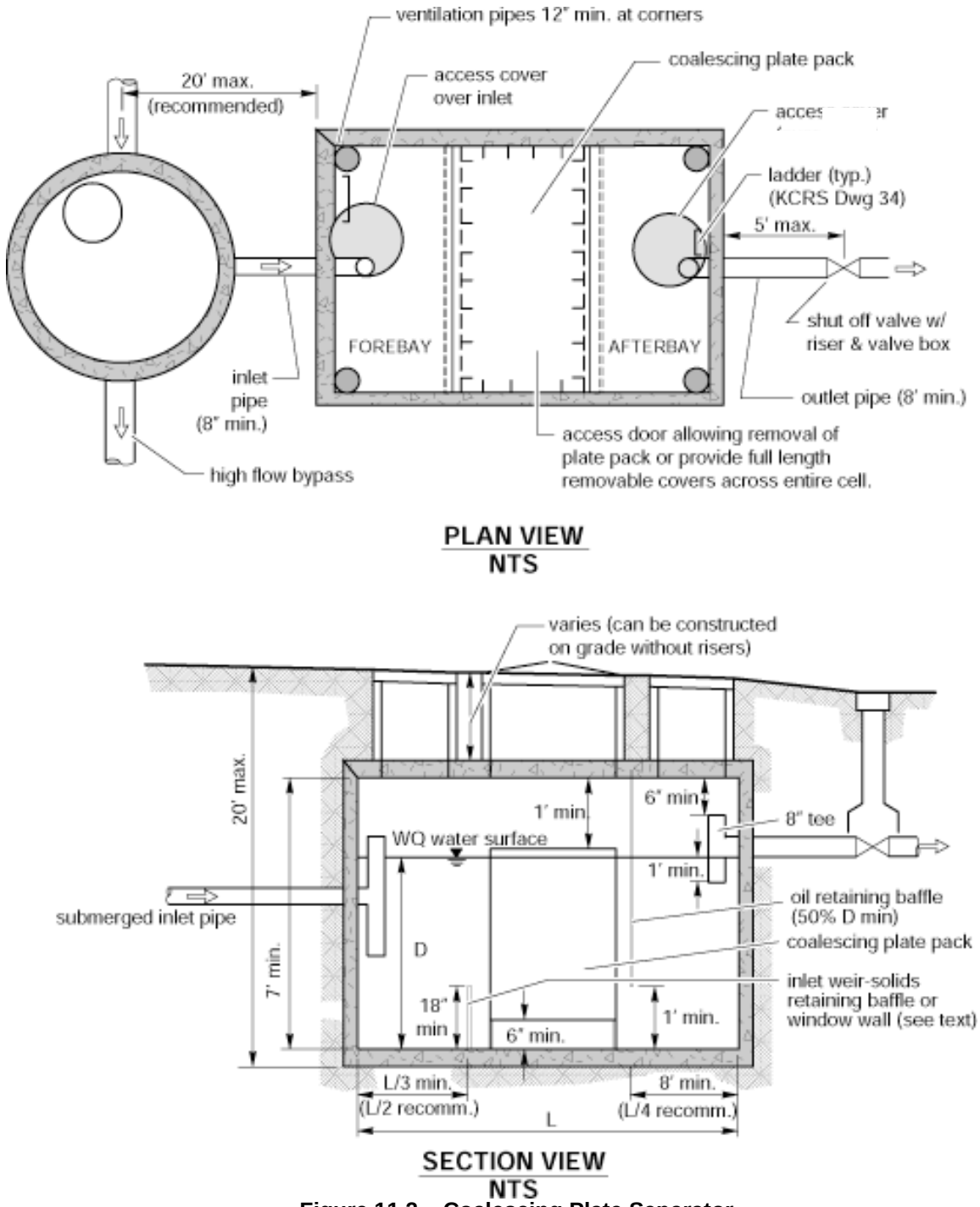

Figure 11.2 – Coalescing Plate Separator

Source: King County (reproduced with permission)

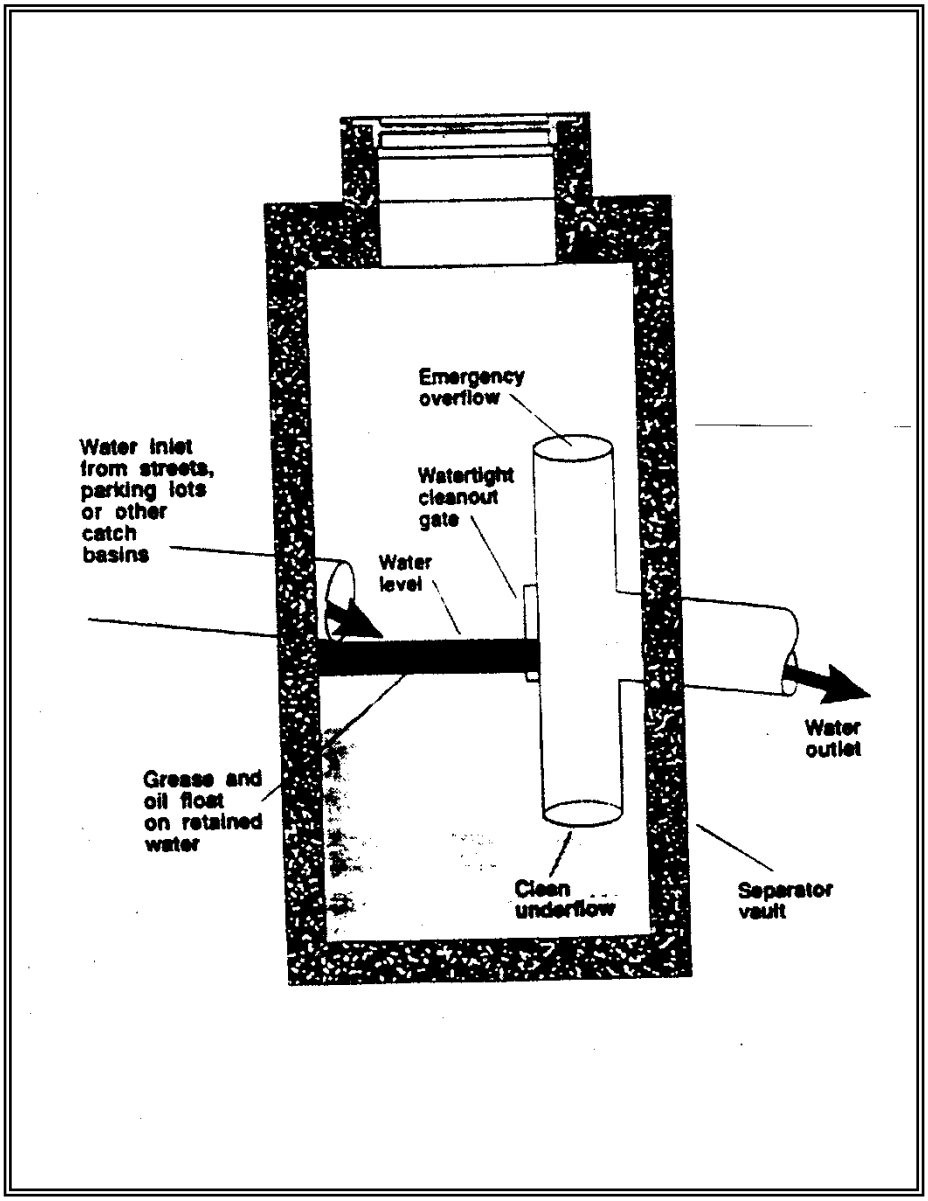

Figure 11.3 – Spill Control Separator (not for oil treatment)

Source: 1992 Ecology Manual

11.3 Performance Objectives

Oil and water separators should be designed to remove oil and TPH down to 15 mg/L at any time and 10 mg/L on a 24-hr average, and produce a discharge that does not cause an ongoing or recurring visible sheen in the stormwater discharge, or in the receiving water. (See also Chapter 3)

11.4 Applications/Limitations

The following are potential applications of oil and water separators where free oil is expected to be present at treatable high concentrations and sediment will not overwhelm the separator. (Seattle METRO, 1990; Watershed Protection Techniques, 1994; King County Surface Water Management, 1998) For low concentrations of oil, other treatments may be more applicable. These include sand filters and emerging technologies.

- Commercial and industrial areas including petroleum storage yards, vehicle maintenance facilities, manufacturing areas, airports, utility areas (water, electric, gas), and fueling stations.(King County Surface Water Management, 1998)

- Facilities that would require oil control BMPs under the high-use site threshold described in Chapter 2 including parking lots at convenience stores, fast food restaurants, grocery stores, shopping malls, discount warehouse stores, banks, truck fleets, auto and truck dealerships, and delivery services. (King County Surface Water Management, 1998)

- Without intense maintenance oil/water separators may not be sufficiently effective in achieving oil and TPH removal down to required levels.

- Pretreatment should be considered if the level of TSS in the inlet flow would cause clogging or otherwise impair the long-term efficiency of the separator.

- For inflows from small drainage areas (fueling stations, maintenance shops, etc.) a coalescing plate (CP) type separator is typically considered, due to space limitations. However, if plugging of the plates is likely, then a new design basis for the baffle type API separator may be considered on an experimental basis. (See 11.6 Design Criteria)

11.5 Site Suitability

Consider the following site characteristics:

- Sufficient land area
- Adequate TSS control or pretreatment capability
- Compliance with environmental objectives
- Adequate influent flow attenuation and/or bypass capability
- Sufficient access for operation and maintenance (O & M)

11.6 Design Criteria-General Considerations

There is concern that oil/water separators used for stormwater treatment have not performed to expectations.(Watershed Protection Techniques, 1994; Schueler, Thomas R., 1990) Therefore, emphasis should be given to proper application (see Section 11.4), design, O & M, (particularly sludge and oil removal) and prevention of CP fouling and plugging.(US Army of Engineers, 1994) Other treatment systems, such as sand filters and emerging technologies, should be considered for the removal of insoluble oil and TPH.

The following are design criteria applicable to API and CP oil/water separators:

- If practicable, determine oil/grease (or TPH) and TSS concentrations, lowest temperature, pH; and empirical oil rise rates in the runoff, and the viscosity, and specific gravity of the oil. Also determine whether the oil is emulsified or dissolved. (Washington State Department of Ecology, 1995) Do not use oil/water separators for the removal of dissolved or emulsified oils such as coolants, soluble lubricants, glycols, and alcohols.
- Locate the separator off-line and bypass the incremental portion of flows that exceed the off-line 15-minute, Water Quality design flow rate multiplied by the ratio indicated in Figure 9.5b of this Volume. If it is necessary to locate the separator on-line, try to minimize the size of the area needing oil control, and use the on-line water quality design flow rate multiplied by the ratio indicated in Figure 9.5a.
- Use only impervious conveyances for oil contaminated stormwater.
- Specify appropriate performance tests after installation and shakedown, and/or certification by a professional engineer that the separator is functioning in accordance with design objectives. Expeditious corrective actions must be taken if it is determined the separator is not achieving acceptable performance levels.

- Add pretreatment for TSS that could cause clogging of the CP separator, or otherwise impair the long-term effectiveness of the separator.

Criteria for Separator Bays:

- Size the separator bay for the Water Quality design flow rate (15 minute time step) x a correction factor ratio indicated in Figure 9.5b of this Volume (assuming an off-line facility). (See Chapter 4 of this Volume for a definition of the Water Quality Design Flow Rate.)
- To collect floatables and settleable solids, design the surface area of the forebay at ≥ 20 ft^2 per 10,000 ft^2 of area draining to the separator [(6)]. The length of the forebay should be 1/3-1/2 of the length of the entire separator. Include roughing screens for the forebay or upstream of the separator to remove debris, if needed. Screen openings should be about 3/4 inch.
- Include a submerged inlet pipe with a turn-down elbow in the first bay at least two feet from the bottom. The outlet pipe should be a Tee, sized to pass the design peak flow and placed at least 12 inches below the water surface.
- Include a shutoff mechanism at the separator outlet pipe. (King County Surface Water Management, 1998)
- Use absorbents and/or skimmers in the afterbay as needed.

Criteria for Baffles:

- Oil retaining baffles (top baffles) should be located at least at 1/4 of the total separator length from the outlet and should extend down at least 50% of the water depth and at least 1 ft. from the separator bottom.
- Baffle height to water depth ratios should be 0.85 for top baffles and 0.15 for bottom baffles.

11.7 Oil and Water Separator BMPs

Two BMPs are described in this section. BMP T11.10 for baffle type separators, and BMP T11.11 for coalescing plate separators.

BMP T11.10 API (Baffle type) Separator Bay

Design Criteria

The criteria for small drainages is based on V_h, V_t, residence time, width, depth, and length considerations. As a correction factor API's turbulence criteria is applied to increase the length.

Ecology is modifying the API criteria for treating stormwater runoff from small drainage area (fueling stations, commercial parking lots, etc.) by using the design hydraulic horizontal velocity, V_h, for the design V_h/V_t ratio rather than the API minimum of V_h/V_t = 15. The API criteria appear applicable for greater than two acres of impervious drainage area. Performance verification of this design basis must be obtained during at least one wet season using the test protocol referenced in Chapter 12 for new technologies.

The following is the sizing procedure using modified API criteria:

- Determine the oil rise rate, V_t, in cm/sec, using Stokes Law (Water Pollution Control Federation, 1985), or empirical determination, or 0.033 ft./min for 60μ oil. The application of Stokes' Law to site-based oil droplet sizes and densities, or empirical rise rate determinations recognizes the need to consider actual site conditions. In those cases the design basis would not be the 60 micron droplet size and the 0.033 ft/min. rise rate.
- Stokes Law equation for rise rate, V_t (cm/sec):

  $Vt = [(g)(\rho_w - \rho_o)(d^2)] / [(18*\mu_w)]$

  Where:
  Vt = the rise rate of the oil droplet (cm/s or ft/sec)
  g = acceleration due to gravity (cm/s² or ft/s²)
  ρ_w = density of water at the design temperature (g/cm³ or lbm/ft³)
  ρ_o = density of oil at the design temperature (g/cm³ or lbm/ft³)
  d = oil droplet diameter (cm or ft)
  μ_w = absolute viscosity of the water (g/cm·s or lbm/ft·s)

  ~~$V_t = g(\sigma_w - \sigma_o)D^2 / 18\eta_w)$~~

  ~~Where:~~

~~g = gravitational constant (981 cm/sec²)~~
~~D = diameter of the oil particle in cm.~~

~~Use~~

~~oil particle size diameter, D=60 microns (0.006 cm)~~

~~σ_w =0.999 gm/cc. at 32° F~~

~~σ_o: Select conservatively high oil density,~~

~~For example, if diesel oil @ σ_o=0.85 gm/cc and motor oil @ σ_o = 0.90 can be present then use σ_o=0.90 gm/cc~~

~~η_w = 0.017921 poise, gm/cm-sec. at T_w=32 °F, (See API Publication 421, February , 1990)~~

Use the following separator dimension criteria:

Separator water depth, d ≥3≤8 feet (to minimize turbulence) (American Petroleum Institute, 1990; US Army Corps of Engineers, 1994).

Separator width, 6-20 feet (WEF & ASCE, 1998; King County Surface Water Management, 1998)

Depth/width (d/w) of 0.3-0.5 (American Petroleum Institute, 1990)

For Stormwater Inflow from Drainages under 2 Acres:

1. Determine V_t and select depth and width of the separator section based on above criteria.

2. Calculate the minimum residence time (t_m) of the separator at depth d:

$$t_m = d/V_t$$

3. Calculate the horizontal velocity of the bulk fluid, V_h, vertical cross-sectional area, A_v, and actual design V_h/V_t (American Petroleum Institute, 1990; US Army Corps of Engineers, 1994).

   $V_h = Q/dw = Q/A_v$ (V_h maximum at < 2.0 ft/min.)(American Petroleum Institute, 1990)

   Q = (k) the ratio indicated in Figure 9.5b for the site location multiplied by he 15-minute Water Quality design flow rate in ft^3/min, at minimum residence time, t_m

   At V_h/V_t determine F, turbulence and short-circuiting factor (Appendix V-D) API F factors range from 1.28-1.74. (American Petroleum Institute, 1990)

4. Calculate the minimum length of the separator section, l(s), using:

$$l(s) = FQt_m/wd = F(V_h/V_t)d$$
$$l(t) = l(f) + l(s) + l(a)$$
$$l(t) = l(t)/3 + l(s) + l(t)/4$$

Where:

l(t) = total length of 3 bays = "L" in Figure 11.1
l(f) = length of forebay
l(a) = length of afterbay

5. Calculate $V = l(s)wd = FQt_m$, and $A_h = wl(s)$

   V = minimum hydraulic design volume
   A_h = minimum horizontal area of the separator

For Stormwater Inflow from Drainages > 2 Acres: Use $V_h = 15\ V_t$ and $d = (Q/2V_h)^{1/2}$ (with d/w = 0.5) and repeat above calculations 3- 5.

BMP T11.11 Coalescing Plate (CP) Separator Bay

Design Criteria

Calculate the projected (horizontal) surface area of plates needed using the following equation:

$A_h = Q/Vt = [Q] / [(.00386) * ((S_w - S_o)/(\mu_w))]$

Where

A_h = horizontal surface area of the plates (ft^2)
Vt = rise rate of the oil droplet (ft/min)
Q = design flowrate (ft^3/min)
S_w = specific gravity of water at the design temperature
S_o = specific gravity of oil at the design temperature
μ_w = absolute viscosity of the water (poise)

The above equation is based on an oil droplet diameter of 60 microns.

~~$A_p = Q/V_t = Q/0.00386(\sigma_w - \sigma_o/\eta_w)$~~

~~$A_p = A_a$(cosine b)~~

~~Where:~~

~~Q = k (the ratio appropriate for the project location) indicated by Figure 9.5b x the 15-minute water quality design flow rate, ft^3/min~~

~~V_t = Rise rate of 0.033 ft/min, or empirical determination, or Stokes Law based~~

~~A_p = projected surface area of the plate in ft^2; .00386 is unit conversion constant~~

~~σ_w=density of water at 32° F~~
~~σ_o= density of oil at 32° F~~
~~A_a = actual plate area in ft^2 (one side only)~~

~~b = angle of the plates with the horizontal in degrees (usually varies from 45-60 degrees).~~

~~η_w=viscosity of water at 32° F~~

- Plate spacing should be a minimum of 3/4 in (perpendicular distance between plates). (WEF & ASCE, 1998; US Army Corps of Engineers, 1994; US Air Force, 1991; Jaisinghani, R., 1979)
- Select a plate angle between 45° to 60° from the horizontal.
- Locate plate pack at least 6 inches from the bottom of the separator for sediment storage

- Add 12 inches minimum head space from the top of the plate pack and the bottom of the vault cover.

- Design inlet flow distribution and baffles in the separator bay to minimize turbulence, short-circuiting, and channeling of the inflow especially through and around the plate packs of the CP separator. The Reynolds Number through the separator bay should be <500 (laminar flow).

- Include forebay for floatables and afterbay for collection of effluent. (WEF & ASCE, 1998)

- The sediment-retaining baffle must be upstream of the plate pack at a minimum height of 18 in. (King County Surface Water Management, 1998).

- Design plates for ease of removal, and cleaning with high-pressure rinse or equivalent.

Operation and Maintenance

- Prepare, regularly update, and implement an O & M Manual for the oil/water separators.

- Inspect oil/water separators monthly during the wet season of October 1-April 30 (WEF & ASCE, 1998; Woodward-Clyde Consultants) to ensure proper operation, and, during and immediately after a large storm event of ≥1 inch per 24 hours.

- Clean oil/water separators regularly to keep accumulated oil from escaping during storms. They must be cleaned by October 15 to remove material that has accumulated during the dry season (Woodward-Clyde Consultants), after all spills, and after a significant storm. Coalescing plates may be cleaned in-situ or after removal from the separator. An eductor truck may be used for oil, sludge, and washwater removal. (King County Surface Water Management, 1998) Replace wash water in the separator with clean water before returning it to service.

- Remove the accumulated oil when the thickness reaches 1-inch. Also remove sludge deposits when the thickness reaches 6 inches (King County Surface Water Management, 1998).

- Replace oil absorbent pads before their sorbed oil content reaches capacity.

- Train designated employees on appropriate separator operation, inspection, record keeping, and maintenance procedures.

Chapter 12 - Emerging Technologies

12.1 Background

Traditional best management practices (BMPs) such as wetponds and filtration swales may not be appropriate in many situations due to size and space restraints or their inability to remove target pollutants. Because of this, the stormwater treatment industry emerged and new stormwater treatment devices are currently in development.

Emerging technologies are those new stormwater treatment devices that are continually being added to the stormwater treatment marketplace. These devices include both permanent and construction site treatment technologies. Many of these devices have not undergone complete performance testing so their performance claims cannot be verified.

12.2 Ecology Role in Evaluating Emerging Technologies

To aid local governments in selecting new stormwater treatment technologies the Department of Ecology (Ecology) developed the Technology Assessment Protocol – Ecology (TAPE) and Chemical Technology Assessment Protocol Ecology (CTAPE) protocols. These protocols provide manufacturers with guidance on stormwater monitoring so they may verify their performance claims.

As a part of this process Ecology:

- Posts information on emerging technologies at the emerging technologies website: http://www.ecy.wa.gov/programs/wq/stormwater/newtech/index.html
- Participates in all Technical Review Committee (TRC) and Chemical Technical Review Committee (CTRC) activities which include reviewing manufacturer performance data and providing recommendations on use level designations.
- Grants use level designations based on performance and other pertinent data submitted by the manufacturers and vendors.
- Provides oversight and analysis of all submittals to ensure consistency with this manual.

12.3 Evaluation of Emerging Technologies

Local governments should consider the following as they make decisions concerning the use of new stormwater treatment technologies in their jurisdiction:

Remember the Goal:

The goal of any stormwater management program or BMP is to treat and release stormwater in a manner that does not harm beneficial uses.

Exercise Reasonable Caution:

Before allowing a new technology for an application, the local government should review evaluation information based on the TAPE or CTAPE.

An emerging technology cannot be used for new or redevelopment unless this technology has a use level designation. Having a use level designation means that Ecology and the TRC or CTRC reviewed system performance data and believe the technology has the ability to provide the level of treatment claimed by the manufacturer.

To achieve the goals of the Clean Water Act and the Endangered Species Act, local governments may find it necessary to retrofit stormwater pollutant control systems for many existing stormwater discharges. In retrofit situations, the use of any BMP that makes substantial progress toward these goals is a step forward and Ecology encourages this. To the extent practical, the performance of BMPs used in retrofit situations should be evaluated using the TAPE or CTAPE protocols.

12.4 Assessing Levels of Development of Emerging Technologies

Ecology developed use level designations to assess levels of development for emerging technologies. The use level designations are based upon the quantity, quality, and type of performance data. There are three use level designations: pilot use level designation, conditional use level designation, and general use level designation.

Pilot Use Level Designation (PULD)

For technologies that have limited performance data, the pilot use level designation allows limited use to enable field testing to be conducted. Pilot use level designations may be given based solely on laboratory performance data. Pilot use level designations apply for a specified time period only. During this time period, the proponent must complete all field testing and submit a technology evaluation report (TER) to Ecology and

the TRC. Ecology will limit the number of installations to five during the pilot use level period. Local governments should not approve technologies that have a PULD for a new or redevelopment project unless Ecology has concurred in the use of the technology at that project site.

~~Local governments may allow PULD technologies to be installed if the manufacturer agrees to conduct additional field testing based on the TAPE at all sites to obtain a general use level designation.~~ Local governments covered by a municipal stormwater NPDES permit must notify Ecology in writing when a PULD technology is proposed. The form is found in Appendix C of the linked Ecology publication:

http://www.ecy.wa.gov/pubs/0210037.pdf

Conditional Use Level Designation (CULD)

For emerging technologies that have considerable performance data that was not collected per the TAPE protocol, the CULD was established. Conditional use level designations may be given if field data has been collected by a protocol that is reasonably consistent but does not necessarily fully meet the TAPE protocol. The field data must meet the statistical goals set out in the TAPE guidelines (See http://www.ecy.wa.gov/pubs/1110061.pdf) Laboratory data may be used to supplement field data. Technologies that are granted a CULD will be allowed continued use for a specified time period, during which the field testing necessary to obtain a general use level designation (GULD) must be completed and a TER must be submitted to Ecology and the TRC. Ecology will limit the number of installations to ten during the CULD period.

General Use Level Designation (GULD)

The general use level designation (GULD) confers a general acceptance for the specified applications (land uses). Technologies with a GULD may be used for new development, re-development, or retrofit situations anywhere in Washington, subject to ~~Ecology~~ conditions that Ecology places within the Use Designation document. performance data. There are three use level designations: pilot use level designation, conditional use level designation, and general use level designation.

12.5 Emerging Technologies for Stormwater Treatment and Control Options

Ecology's Emerging Technologies website lists technologies that have obtained a use level designation through the Technology Assessment Protocol – Ecology (TAPE) process. ~~This~~

Ecology certification of a product through the TAPE program does not require local jurisdictions to accept the product for use or allow use within their boundaries. In addition to Ecology certification, local jurisdiction approval is required for installation of treatment technologies with Pilot (PULD), Conditional (CULD), or General (GULD) Use Level Designations. Local jurisdictions may choose not to accept products approved through TAPE, or may require additional testing prior to consideration for local approval.

GULD - General Use Level Designation

General Use Level Designation (GULD) technologies may be used in Washington subject to use level designation conditions.

CULD - Conditional Use Level Designation

Conditional Use Level Designation (CULD) allows ~~continued~~limited use of the technology for a specified time period during which field testing must be completed by the vendor and/or developer. Not all sites using a CULD technology~~ies~~ are required to conduct field testing. Units that are in place do not have to be removed after the specified time period. Use is subject to the use level designation conditions. CULD technologies may be used at up to 10 sites in Washington until a decision is made concerning whether they qualify for a GULD.

PULD - Pilot Level Use Designation

Pilot Use Level Designation (PULD) allows limited use (up to 5 sites) of the technology to allow field testing to be conducted. PULD technologies may be installed at sites that are pre-approved by Ecology and the local government with jurisdiction provided that the vendor and/or developer agree to conduct field testing based on the TAPE.

Please note: Government entities covered by a municipal stormwater NPDES permit must notify Ecology when a PULD technology is proposed (form is available in TAPE guidance document, at: http://www.ecy.wa.gov/biblio/1110061.html)

The following subheadings link to menus of emerging treatment technologies that have completed or are engaged in the TAPE program.

Pretreatment

Pretreatment is generally applied to:

- Project sites using infiltration treatment
- Treatment systems where needed to assure and extend performance of the downstream basic or enhanced treatment facility.

Pretreatment is intended to achieve 50% removal of fine (50 micron-mean size) and 80% removal of coarse (125-micron-mean size) total suspended solids for influent concentrations greater than 100 mg/L, but less than 200 mg/L. For influent concentrations less than 100 mg/L, the facilities are intended to achieve effluent goals of 50 mg/L of fine and 20 mg/L of coarse total suspended solids.

Oil Treatment

Oil treatment is intended to achieve the goals of no ongoing or recurring visible sheen and a daily average total petroleum hydrocarbon concentration no greater than 10 mg/L with a maximum of 15 mg/L for discrete (grab) samples.

Basic Treatment

Basic treatment is intended to achieve a goal of 80% removal of total suspended solids for an influent concentration range of 100mg/L to 200 mg/L.

For influent concentration less than 100mg/L the effluent goal is 20mg/L total suspended solids.

For influent concentrations greater than 200mg/L a higher treatment goal is intended. Technologies listed in this section with a GULD designation are also approved for Pre-treatment in accordance with Volume V Section 6.2 of the Stormwater Management Manual for Western Washington (SWMMWW)and Section 5.2.1 of the Stormwater Management Manual for Eastern Washington (SWMMEW).

Enhanced Treatment

Enhanced treatment is intended to achieve a higher level of treatment than basic treatment. Enhanced treatment is targeted at removing dissolved metals.

Phosphorous Treatment

Phosphorus treatment is intended to achieve a goal of 50% total phosphorus removal for an influent concentration range of 0.1 to 0.5 mg/L as well as achieving basic treatment.

Construction Site Treatments

Construction treatment is intended to achieve the goals of a maximum of 5 NTUs above background (background of 50 NTUs or less), not more than 10% increase in turbidity where background is greater than 50 NTUs, pH of 6.5-8.5 in freshwater and 7.0-8.5 in marine water, and no visible oil sheen.

~~Chapter addresses emerging (new) technologies that have not been evaluated in sufficient detail to be acceptable for general usage in new development or redevelopment situations.~~

~~12.1 Background~~

~~It has become clear that the treatment BMPs described in Ecology's 1992 Stormwater Manual, in some situations, are either not applicable or do not provide reliable and cost-effective removal of pollutants. For these reasons a need to develop new stormwater treatment technologies has emerged in this State as well as nationwide.~~

~~Emerging technologies are new technologies that have not been evaluated using approved protocols, but for which preliminary data indicate that they may provide a desirable level of stormwater pollutant removal. Some emerging technologies have already been installed in Washington as parts of treatment trains or as stand-alone systems for specific applications. In some cases, emerging technologies are necessary to remove metals, hydrocarbons, and nutrients. Emerging technologies can also be used for retrofits and where land availability is unavailable for larger natural systems.~~

~~12.2 Ecology Role in Evaluating Emerging Technologies~~

~~Ecology currently participates in a process to evaluate emerging technologies for permanent and construction site stormwater runoff applications and to convey judgments made by local jurisdictions and others on their acceptance. Based on recommendations from Ecology's Volume V Stormwater Technical Advisory Committee (TAC), Ecology has implemented the following process:~~

- ~~Operating a web site for publishing information on emerging technologies for permanent and construction site stormwater applications and protocols (TAPE and CTAPE) used in their evaluation,~~
- ~~Participating in meetings of Technical Review Committee (TRC) and Chemical Technical Review Committee (CTRC) which will be asked to evaluate emerging technologies,~~

- ~~Based on performance and other pertinent data from vendors and manufacturers and recommendations by the review committees Ecology assesses levels of developments of emerging technologies and posts relevant decisions and supporting documentation at its stormwater web site.~~

~~12.3 Evaluation of Emerging Technologies~~

~~Local governments should consider the following as they make decisions concerning the use of new stormwater technologies in their jurisdictions:~~

~~Remember the goal:~~

~~The goal of any stormwater management program or BMP is to treat and release stormwater in a manner that does not harm beneficial uses. Compliance with water quality standards is one measure of determining whether beneficial uses will be harmed.~~

~~Exercise reasonable caution:~~

~~It is important to be cautious with the use of emerging, unproven, technologies for new development and for retrofits. Before allowing a new technology for a limited application, the local government should review evaluation information based on acceptable protocols such as Ecology's TAPE and CTAPE.~~

~~An emerging technology *must not be used* for new development sites unless there are data indicating that its performance is expected to be reasonably equivalent to the performance goals listed in Chapter 3 for the treatment type applicable to the site: Basic , Enhanced, Phosphorus, or Oil Treatment. It may also receive approval as part of a treatment train to help achieve the applicable performance goal. Local governments can refer to Ecology's web site to obtain the latest performance verification of an emerging technology.~~

~~Local governments are encouraged to:~~

- ~~Require a monitoring program, using an acceptable protocol, of those emerging technologies that have not been verified for limited or full scale statewide use at Ecology's web site.~~
- ~~Look for achieving acceptable performance objectives as specified in Chapter 3.~~

~~To achieve the goals of the Clean Water Act and the Endangered Species Act, local governments may find it necessary to retrofit stormwater pollutant control systems for many existing stormwater discharges. In retrofit situations the use of any BMPs that make substantial progress toward these goals is a step forward and is~~

~~encouraged by Ecology. To the extent practical, the performance of these BMPs should be evaluated, using approved protocols.~~

~~12.4 Acceptable Evaluation Protocols (TAPE and CTAPE)~~

~~To properly evaluate new technologies, performance data must be obtained using the Ecology approved Technology Assessment Protocol-Ecology (TAPE) and the chemical TAPE (CTAPE) or other accepted protocols. Ecology published these protocols at its web site for use by local governments, suppliers of new technologies, and consultants. They can be downloaded at http://www.ecy.wa.gov/programs/wq/stormwater/newtech/. Other acceptable protocols may also be added to Ecology's web site. Such protocols may be developed by local, state, or federal agencies.~~

~~12.5 Assessing Levels of Development of Emerging Technologies~~

~~Ecology has received many submittals from vendors to approve their new technologies for statewide applications. Technologies have been proposed for permanent and construction site applications that include cartridge filtration, vortex enhanced sedimentation, manufactured storm drain structures, electrocoagulation, chemical flocculants and upgrades of catchbasin insert technologies. Because the submittals demonstrated various stages of development Ecology decided to classify technologies depending on the adequacy of the verification testing.~~

~~To assess and classify levels of developments, Ecology is using the classification criteria given below. These criteria are included in the TAPE and CTAPE posted at Ecology's web site. Emerging technologies shall be used only within the application criteria and performance limits listed at Ecology's web site. *Pilot Level (PLD)* - Pilot studies could typically be conducted at roadway, commercial and residential sites, or specific land uses for which the system is marketed. Runoff at each site should be tested at full flow (design flow) conditions using the TAPE or CTAPE before deciding on a limited or general statewide use of the technology. The pilot studies should be conducted during dry and wet seasons.~~

- ~~*General Statewide Use (GULD)*. - To obtain general statewide acceptance the performance criteria as specified in Chapter 3 must be verified using the TAPE or CTAPE, or other acceptable protocol. Final application, design and O&M criteria, and costs must be determined. Approvals may include application as part of a treatment train and/or as a stand-alone BMP.~~

- ~~*Conditional Use Designation (CUD)*- A CUD may be granted by Ecology under the following circumstances:~~

  - ~~An emerging technology is in widespread use in the Pacific Norhtwest and/or on a national basis, and the manufacturer has performance data that does not meet approved protocols, or,~~

  - ~~An emerging technology is in limited use has limited data and is deemed to be functionally equivalent to another emerging technology for which the TRC or CTRC has recommended a Conditional or General Use Designation, and, it is likely that after completing additional laboratory and/or field testing meeting TAPE/CTAPE criteria, the technology will be awarded a GULD.~~

~~Technologies that are granted a CUD may continue to be sold subject to CUD conditions for a specified time period during which the field and laboratory testing necessary to obtain a General Use Designation must be completed.~~

~~12.6 Examples of Emerging Technologies for Stormwater Treatment and Control~~

~~***Note: The descriptions and other supplier information provided in this section should not be construed as approvals by Ecology of any of the technologies. Download information on technologies that are under review and development levels with supporting data at***~~
~~http://www.ecy.wa.gov/programs/wq/stormwater/newtech/~~

~~12.6.1 Media Filters~~

~~Introduction~~ ~~The media filter technology has been under development in the Pacific Northwest since the early 1990s. During the early stages of development, a leaf compost medium was used in fixed beds. Continued development of this technology is based on placing the media in filter cartridges (vertical media filters) instead of fixed beds, and amending the media (Varner, Phyllis, City of Bellevue, 1999) with constituents that will improve effectiveness (See Figure 12.1). Many systems have been installed in the U.S. The target pollutants for removal are: TSS, total and soluble phosphorous, total nitrogen, soluble metals, oil & grease and other organics.~~

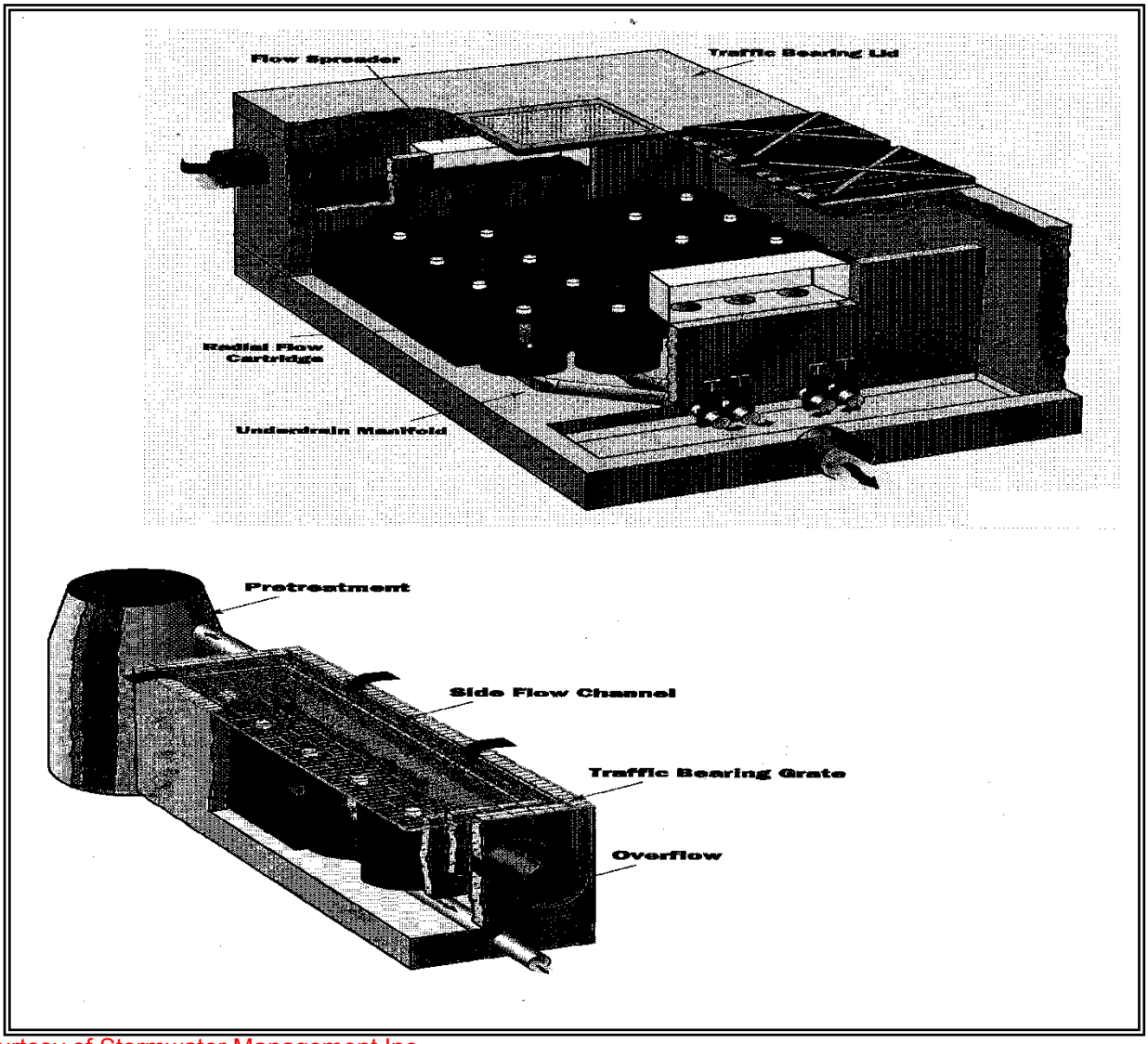

~~Courtesy of Stormwater Management Inc.~~

~~Figure 12.1 – Vertical Media Filter~~

Description:

~~The media can be housed in cartridge filters enclosed in concrete vaults, or in fixed beds such as the sand filters described in Chapter 8. An assortment of filter media are available including leaf compost, pleated fabric, activated charcoal, perlite, amended sand and perlite, and zeolite. The system functions by routing the stormwater through the filtering or sorbing medium, which traps particulates and/or soluble pollutants. (Leif, Bill, 1999; Stormwater Management Inc. , 1999)~~

Performance Objectives

~~Media can be selected for removal of TSS, oil/grease or total petroleum hydrocarbons, soluble metals, nutrients and organics. (See Chapter 4 for performance objectives)~~

Applications and limitations:

~~Typical applications and limitations include:~~

- ~~Pretreatment is required for high TSS and/or hydrocarbon loadings and debris that could cause premature failures due to clogging~~
- ~~Media filtration, such as amended sand, (Varner, Phyllis, City of Bellevue, 1999) should be considered for some enhanced treatment applications to remove soluble metals and soluble phosphates~~
- ~~These systems may be designed as on-line systems for small drainage areas, or as off-line systems.~~
- ~~For off-line applications, flows greater than the design flow shall be bypassed.~~

Site Suitability

~~Consider:~~

- ~~Space requirements~~
- ~~Design flow characteristics~~
- ~~Target pollutants~~
- ~~O & M requirements~~
- ~~Capital and annual costs~~

Design Criteria for TSS Removal)

- ~~Determine TSS loading and peak design flow rate.~~
- ~~TSS loading capacity per cartridge based on manufacturer's loading and flow design criteria to determine number and size of cartridges.~~
- ~~Evaluate for pre-treatment needs. Typically, roadways, single family dwellings, and developments with steep slopes and erodible soils need pretreatment for TSS. Developments producing sustained oil and grease loads should be evaluated for oil and grease pretreatment needs.~~
- ~~Select media based on pollutants of concern which are typically based on land use and local agency guidelines.~~

Pretreatment and Bypassing:

- ~~Use source control where feasible, including gross pollutant removal, sweeping, and spill containment~~

- ~~Maintain catchbasins as needed to minimize inlet debris that could impair the operation of the filter media.~~
- ~~Sedimentation vaults/ponds/ tanks, innovative more efficient catchbasins, oil/water separators for oil > 25 ppm, or other appropriate pre-treatment system to improve and maintain the operational efficiency of the filter media~~
- ~~Bypassing of flows above design flows should be included~~

~~***Construction***~~

- ~~A precast or cast-in-place vault is typically installed over an underdrain manifold pipe system. This is followed by installation of the cartridges.~~
- ~~Prior to cartridge installation construction sites must be stabilized to prevent erosion and solids loading.~~

~~***Maintenance***~~

- ~~Follow manufacturers O & M guidelines to maintain design flows and pollutant removals~~
- ~~Based on TSS loading and cartridge capacity calculate maintenance frequency~~

~~***Additional Applications, Limitations, Design, Construction, and Maintenance Criteria*** (See Ecology web site).~~

~~12.6.2 Amended Sand Filters~~

~~Description~~

~~The addition of media to improve the pollutant removal capabilities of basic sand filters.~~

~~Recent Performance Results~~

~~In a thorough study (Varner, Phyllis, City of Bellevue, 1999) of the performance of sand filters amended with processed steel fiber (95% sand and 5% processed steel fiber by volume), and crushed calcitic limestone (90% sand and 10% crushed calcitic limestone by volume), the City of Bellevue reported significant reductions in total phosphorus and dissolved zinc in runoff from the Lakemont residential area. Because the Lakemont filter study was a detailed, well-documented, and reviewed analysis of a full scale operation, Ecology considers this technology as sufficiently advanced in development to allow its use as an option under the Enhanced Treatment Menu and the Phosphorus Treatment Menu. Sand filters amended with one of these media should be sized using the design criteria for a basic sand filter. Ecology prefers that these amendments be tested at another location to confirm the performances achieved by the Lakemont study and to further refine the design criteria.~~

~~Bellevue experienced some reduction in infiltration in the sand filter amended with processed steel fiber due to formation of a cemented layer of ferric oxide. Filters amended with processed steel fiber may require more frequent rototilling and removal of top layers to prevent formation of a cemented layer.~~

~~12.6.3 Catch Basin Inserts (CBI)~~

~~Introduction~~

~~CBIs have been under development for many years in the Puget Sound Basin. They function similarly to media filtration except that they are typically limited by the size of the catchbasin. They also are likely to be maintenance intensive.~~

~~Description~~

~~Catch basin inserts typically consist of the following components:~~

- ~~A structure (screened box, brackets, etc.) which contains a pollutant removal medium~~
- ~~A means of suspending the structure in a catch basin~~
- ~~A filter medium such as sand, carbon, fabric, etc.~~
- ~~A primary inlet and outlet for the stormwater~~
- ~~A secondary outlet for bypassing flows that exceed the design flow rate~~

~~Applications and Limitations~~

~~By treating runoff close to its source, the volume of flow is minimized and more effective pollutant removal is therefore possible. Depending on the insert medium, removals of TSS, organics (including oils), and metals can be achieved. The main drawbacks are the limited retention capacities~~

~~and maintenance requirements on the order of once per month in the wet season to clean or replace the medium. Based on two studies of catch basin inserts,(Koon, John, Interagency Catchbasin Insert Committee, 1995; Leif, William, Snohomish County 1998) the following are potential limitations and applications for specifically designated CBIs.~~

- ~~CBIs are not recommended as a substitute for basic BMPs such as wet ponds, vaults, constructed wetlands, grass swales, sand filters or related BMPs.~~
- ~~CBIs can be used as temporary sediment control devices and pretreatment at construction sites.~~
- ~~CBIs can be considered for oil control at small sites where the insert medium has sufficient hydrocarbon loading capacity and rate of removal, and the TSS and debris will not prematurely clog the insert.~~
- ~~CBIs can be used in unpaved areas and should be considered equivalent to currently accepted inlet protection BMPs.~~
- ~~CBIs can be used when an existing catch basin lacks a sump or has an undersized sump.~~
- ~~CBIs can cause flooding when plugged.~~
- ~~CBIs may be considered in specialized small drainage applications for specific target pollutants where clogging of the medium will not be a problem.~~

~~12.6.4 Manufactured Storm Drain Structures~~

~~Most of these types of systems marketed thusfar are cylindrical in shape and are designed to fit into or adjacent to existing storm drainage systems or catch basins. The removal mechanisms include vortex-enhanced sedimentation, circular screening, and engineered designs of internal components, for large particle TSS and large oil droplets.~~

~~*1. Vortex-enhanced Sedimentation*~~

~~*Description*~~

~~Vortex-enhanced Sedimentation consists of a cylindrical vessel with tangential inlet flow which spirals down the perimeter, thus causing the heavier particles to settle. It uses a vortex-enhanced settling mechanism (swirl-concentration) to capture settleable solids, floatables, and oil and grease. This system includes a wall to separate TSS from oil. An assessment of a vortex technology with designation levels is provided at Ecology's web site at~~
~~http://www.ecy.wa.gov/programs/wq/stormwater/newtech/~~

~~*2. Vortex-enhanced Sedimentation and Media Filtration*~~

~~*Description*~~

~~This system uses a two-stage approach which includes a Swirl Concentrator followed by a filtration chamber. See Figure 12.3.~~

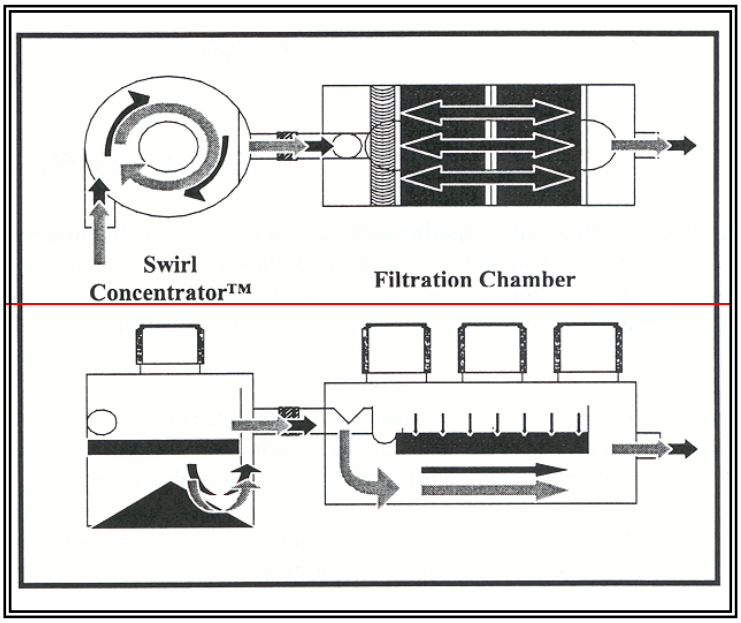

~~(Courtesy of AquaShield, Inc.)~~

~~**Figure 12.2 - Vortex-enhanced Sedimentation and Media Filtration**~~

~~*Applications, Limitations, Design, Construction, and Maintenance Criteria* (See Ecology web site).~~

~~*3. Cylindrical Screening System*~~

~~*Description*~~

~~This system is comprised of a cylindrical screen and appropriate baffles and inlet/outlet structures to remove debris, large particle TSS, and large oil droplets. It includes an overflow for flows exceeding the design flow. Sorbents can be added to the separation chamber to increase pollutant removal efficiency. See Figure 12.4.~~

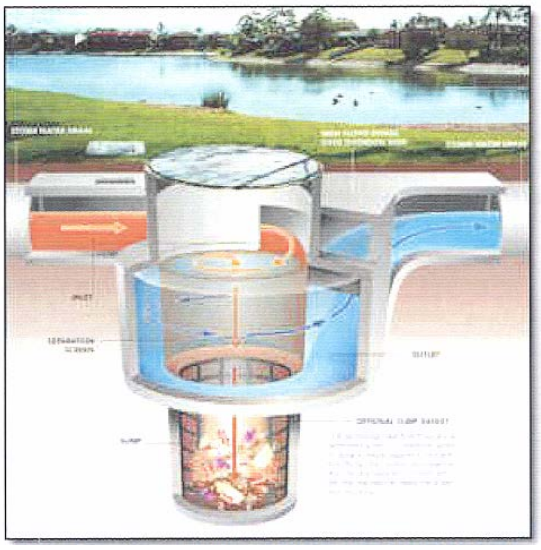

(Courtesy of CDS, Inc.)

~~**Figure 12.3 – Screen Separator**~~

~~*4. Engineered Cylindrical Sedimentation*~~

~~***Description:***~~

~~This system is comprised of an engineered internal baffle arrangement and oil/TSS storage compartment designed to provide considerably better removals of large particle TSS and oil droplets than the standard catchbasins. It includes a bypass of flows higher than design flows, thus preventing scouring of collected solids and oils during the bigger storms. See Figure 12.5.~~

~~(Courtesy of Rinker Materials Hydro conduit Division)~~

~~**Figure 12.4 – Engineered Cylindrical**~~

~~12.6.5 High Efficiency Street Sweepers~~

~~Description:~~

~~A new generation of street sweepers has been developed that utilize strong vacuums to pick-up small particulates. They include mechanical sweeping and air filtration to control air emissions to acceptable levels. At least two manufacturers market what is referred to as a *"high-efficiency"* street sweeper.~~

~~Application~~

~~High efficiency street sweepers are being marketed for roadways that are sufficiently accessible, need fine particulate removal (<250 microns), and for which a sufficient frequency of sweeping can be maintained to achieve proper removals of street dirt.~~

~~Limitations:~~

- ~~Limited field data and dependence on modeling projections~~
- ~~May not be sufficiently effective during wet conditions~~
- ~~More expensive than traditional sweepers – the cost of alternative BMPs should be compared.~~
- ~~Increased storm frequency, with short intervals between storms, results in~~ ~~**Figure 12.5 Engineered Cylindrical Sedimentation**~~
- ~~May depend on its availability, particularly during the wet season, and the need for a minimum in-place backup treatment facility.~~

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Appendix V-A
Basic Treatment Receiving Waters

1. All salt waterbodies

2.

Rivers	Upstream Point for Exemption
Baker	Anderson Creek
Bogachiel	Bear Creek
Cascade	Marblemount
Chehalis	Bunker Creek
Clearwater	Town of Clearwater
Columbia	Canadian Border
Cowlitz	Skate Creek
Elwha	Lake Mills
Green	Howard Hanson Dam
Hoh	South Fork Hoh River
Humptulips	West and East Fork Confluence
Kalama	Italian Creek
Lewis	Swift Reservoir
Muddy	Clear Creek
Nisqually	Alder Lake
Nooksack	Glacier Creek
South Fork Nooksack	Hutchinson Creek
North River	Raymond
Puyallup	Carbon River
Queets	Clearwater River
Quillayute	Bogachiel River
Quinault	Lake Quinault
Sauk	Clear Creek
Satsop	Middle and East Fork Confluence
Skagit	Cascade River
Skokomish	Vance Creek
Skykomish	Beckler River
Snohomish	Snoqualmie River
Snoqualmie	Middle and North Fork Confluence
Sol Duc	Beaver Creek
Stillaguamish	North and South Fork Confluence
North Fork Stillaguamish	Boulder River
South Fork Stillaguamish	Canyon Creek
Suiattle	Darrington
Tilton	Bear Canyon Creek
Toutle	North and South Fork Confluence
North Fork Toutle	Green River
Washougal	Washougal
White	Geenwater River
Wind	Carson
Wynoochee	Wishkah River Road Bridge

3.	Lakes	County
	Washington	King
	Sammamish	King
	Union	King
	Whatcom	Whatcom
	Silver	Cowlitz

Note: Local governments may petition for the addition of more waters to this list. The initial criteria for this list are rivers whose mean annual flow exceeds 1000 cfs, and lakes whose surface area exceeds 300 acres. Additional waters do not have to meet these criteria, but should have sufficient background dilution capacity to accommodate dissolved metals additions from build-out conditions in the watershed under the latest Comprehensive Land Use Plan and zoning regulations.

Appendix V-B ~~(Also published as Appendix III-D)~~ Recommended Procedures for ASTM D 2434 When Measuring Hdraulic Conductivity for Bioretention Soil Mixes ~~Procedure for Conducting a Pilot Infiltration Test~~

More specific standard procedures for running ASTM D 2434 have been developed by the City of Seattle in cooperation with local soils laboratories. The purpose is to reduce variability in test results that occur because of discretion in procedures. Those procedures will be inserted here.

~~The Pilot Infiltration Test (PIT) consists of a relatively large-scale infiltration test to better approximate infiltration rates for design of stormwater infiltration facilities. The PIT reduces some of the scale errors associated with relatively small-scale double ring infiltrometer or "stove-pipe" infiltration tests. It is not a standard test but rather a practical field procedure recommended by Ecology's Technical Advisory Committee.~~

~~***Infiltration Test***~~

- ~~Excavate the test pit to the depth of the bottom of the proposed infiltration facility. Lay back the slopes sufficiently to avoid caving and erosion during the test.~~
- ~~The horizontal surface area of the bottom of the test pit should be approximately 100 square feet. For small drainages and where water availability is a problem smaller areas may be considered as determined by the site professional.~~
- ~~Accurately document the size and geometry of the test pit.~~
- ~~Install a vertical measuring rod (minimum 5-ft. long) marked in half-inch increments in the center of the pit bottom.~~
- ~~Use a rigid 6-inch diameter pipe with a splash plate on the bottom to convey water to the pit and reduce side-wall erosion or excessive disturbance of the pond bottom. Excessive erosion and bottom disturbance will result in clogging of the infiltration receptor and yield lower than actual infiltration rates.~~
- ~~Add water to the pit at a rate that will maintain a water level between 3 and 4 feet above the bottom of the pit. A rotameter can be used to measure the flow rate into the pit.~~

~~***Note:*** *A water level of 3 to 4 feet provides for easier measurement and flow stabilization control. However, the depth should not exceed the proposed maximum depth of water expected in the completed facility.*~~

~~Every 15-30 min, record the cumulative volume and instantaneous flow rate in gallons per minute necessary to maintain the water level at the same point (between 3 and 4 feet) on the measuring rod.~~

~~Add water to the pit until one hour after the flow rate into the pit has stabilized (constant flow rate) while maintaining the same pond water level. (usually 17 hours)~~

~~After the flow rate has stabilized, turn off the water and record the rate of infiltration in inches per hour from the measuring rod data, until the pit is empty.~~

~~***Data Analysis***~~

~~Calculate and record the infiltration rate in inches per hour in 30 minutes or one-hour increments until one hour after the flow has stabilized.~~

~~**Note:** Use statistical/trend analysis to obtain the hourly flow rate when the flow stabilizes. This would be the lowest hourly flow rate.~~

~~Apply appropriate correction factors for site heterogeneity, anticipated level of maintenance and treatment to determine the site-specific design infiltration rate (see Table 7.3).~~

~~***Example***~~

~~The area of the bottom of the test pit is 8.5-ft. by 11.5-ft.~~

~~Water flow rate was measured and recorded at intervals ranging from 15 to 30 minutes throughout the test. Between 400 minutes and 1,000 minutes the flow rate stabilized between 10 and 12.5 gallons per minute or 600 to 750 gallons per hour, or an average of (9.8 + 12.3) / 2 = 11.1 inches per hour.~~

~~Applying a correction factor of 5.5 for gravelly sand in table 6.3 the design long-term infiltration rate becomes 2 inches per hour, anticipating adequate maintenance and pre-treatment.~~

Appendix V-C
Geotextile Specifications

Table C.1 – Geotextile Properties for Underground Drainage Geotextile Property Requirements[1]			
		Low Survivability	**Moderate Survivability**
Geotextile Property	**Test Method**	**Woven/Nonwoven**	**Woven/Nonwoven**
Grab Tensile Strength, min. in machine and x-machine direction	ASTM D4632	180 lbs/115 lbs min.	250 lbs/160 lbs min.
Grab Failure Strain, in machine and x-machine direction	ASTM D4632	<50%/>50%	<50%/>50%
Seam Breaking Strength (if seams are present)	ASTM D4632 and ASTM D4884 (adapted for grab test)	160 lbs/100 lbs min.	220 lbs/140 lbs min.
Puncture Resistance	ASTM D4833	67 lbs/40 lbs min.	80 lbs/50 lbs min.
Tear Strength, min. in machine and x-machine direction	ASTM D4533	67 lbs/40 lbs min.	80 lbs/50 lbs min.
Ultraviolet (UV) Radiation stability	ASTM D4355	50% strength retained min., after 500 hrs. in weatherometer	50% strength retained min., after 500 hrs. in weatherometer

[1] All geotextile properties are minimum average roll values (i.e., the test result for any sampled roll in a lot shall meet or exceed the values shown in the table).

Table C-2 – Geotextile for Underground Drainage Filtration Properties Geotextile Property Requirements[1]				
Geotextile Property	Test Method	Class A	Class B	Class C
AOS[2]	ASTM D4751	.43 mm max. (#40 sieve)	.25 mm max. (#60 sieve)	.18 mm max. (#80 sieve)
Water Permittivity	ASTM D4491	.5 sec -1 min.	.4 sec -1 min.	.3 sec -1 min.

[1] All geotextile properties are minimum average roll values (i.e., the test result for any sampled roll in a lot shall meet or exceed the values shown in the table).
[2] Apparent Opening Size (measure of diameter of the pores in the geotextile)

Table C-3 – Geotextile Strength Properties for Impermeable Liner Protection		
Geotextile Property	**Test Method**	**Geotextile Property Requirements[1]**
Grab Tensile Strength, min. in machine and x-machine direction	ASTM D4632	250 lbs min.
Grab Failure Strain, in machine and x-machine direction	ASTM D4632	>50%
Seam Breaking Strength (if seams are present)	ASTM D4632 and ASTM D4884 (adapted for grab test)	220 lbs min.
Puncture Resistance	ASTM D4833	125 lbs min.
Tear Strength, min. in machine and x-machine direction	ASTM D4533	90 lbs min.
Ultraviolet (UV) Radiation	ASTM D4355	50% strength stability retained min., after 500 hrs. in weatherometer

[1] All geotextile properties are minimum average roll values (i.e., the test result for any sampled roll in a lot shall meet or exceed the values shown in the table).

Applications

1. For sand filter drain strip between the sand and the drain rock or gravel layers specify Geotextile Properties for Underground Drainage, moderate survivability, Class A, from Tables 1 and 2 in the Geotextile Specifications.

2. For sand filter matting located immediately above the impermeable liner and below the drains, the function of the geotextile is to protect the impermeable liner by acting as a cushion. The specification provided below in Table 3 should be used to specify survivability properties for the liner protection application. Table 2, Class C should be used for filtration properties. Only nonwoven geotextiles are appropriate for the liner protection application.

3. For an infiltration drain specify Geotextile for Underground Drainage, low survivability, Class C, from Tables 1 and 2 in the Geotextile Specifications.

4. For a sand bed cover a geotextile fabric is placed exposed on top of the sand layer to trap debris brought in by the storm water and to protect the sand, facilitating easy cleaning of the surface of the sand layer. However, a geotextile is not the best product for this application. A polyethylene or polypropylene geonet would be better. The geonet material should have high UV resistance (90% or more strength retained after 500 hours in the weatherometer, ASTM D4355), and high permittivity (ASTM D4491, 0.8 sec. -1 or more) and percent open area (CWO-22125, 10% or more). Tensile strength should be on the order of 200 lbs grab (ASTM D4632) or more.

Courtesy of Tony Allen, Geotechnical Engineer-WSDOT

Reference for Tables 1 and 2: Section 9-33.2 "Geotextile Properties," 1998 Standard Specifications for Road, Bridge, and Municipal Construction

Appendix V-D
Turbulence and Short-Circuiting Factor

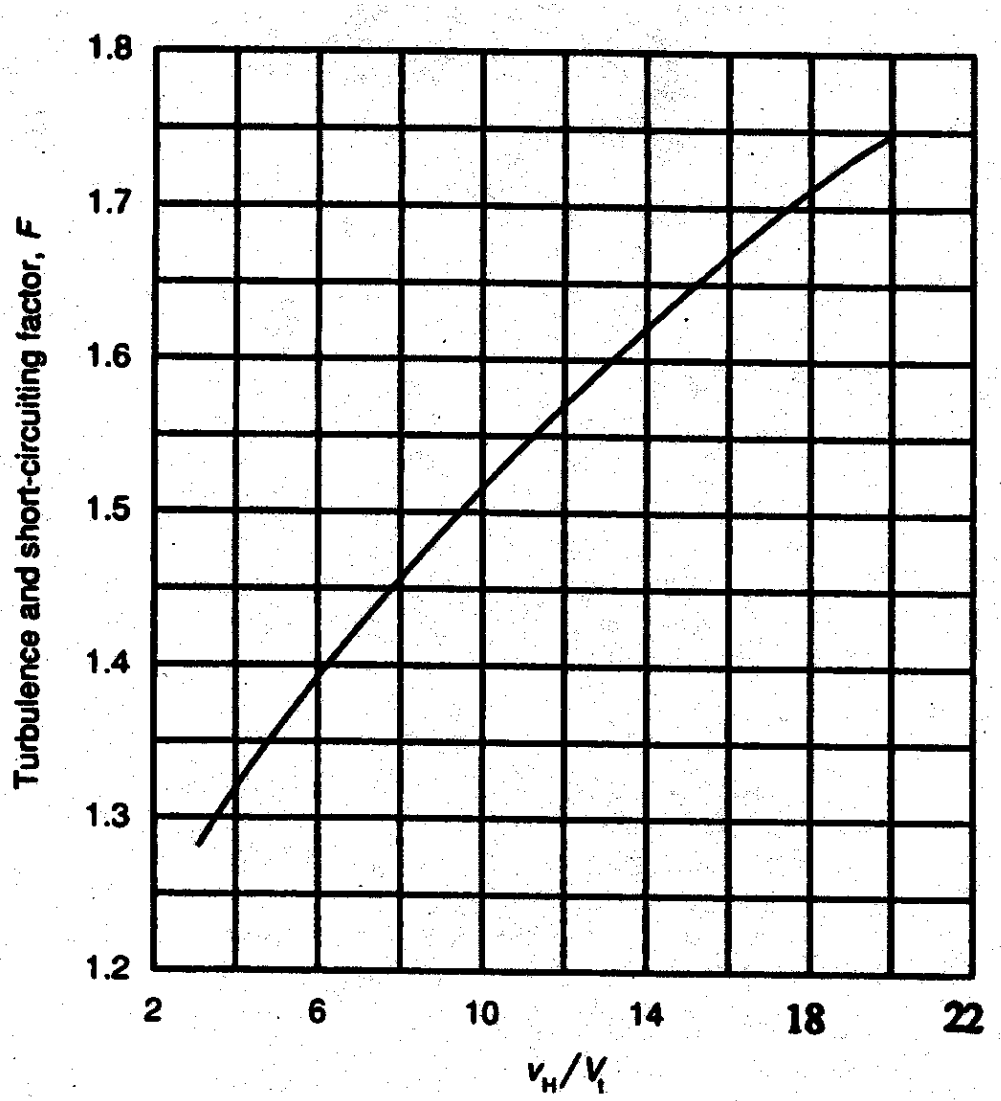

v_H/V_t	Turbulence Factor (F_t)	$F = 1.2(F_t)$
20	1.45	1.74
15	1.37	1.64
10	1.27	1.52
6	1.14	1.37
3	1.07	1.28

Figure D.1 – Recommended Values of *F* for Various Values of v_H/Vt

Appendix V-E
Recommended Bioretention Plant Species

A table of plants from the Low Impact Development Technical Guidance Manual for the Puget Sound Basin will be incorporated

68722 **Federal Register** / Vol. 64, No. 235 / Wednesday, December 8, 1999 / Rules and Regulations

ENVIRONMENTAL PROTECTION AGENCY

40 CFR Parts 9, 122 , 123, and 124

[FRL—6470–8]

RIN 2040–AC82

National Pollutant Discharge Elimination System—Regulations for Revision of the Water Pollution Control Program Addressing Storm Water Discharges

AGENCY: Environmental Protection Agency (EPA).

ACTION: Final rule.

SUMMARY: Today's regulations (Phase II) expand the existing National Pollutant Discharge Elimination System (NPDES) storm water program (Phase I) to address storm water discharges from small municipal separate storm sewer systems (MS4s) (those serving less than 100,000 persons) and construction sites that disturb one to five acres. Although these sources are automatically designated by today's rule, the rule allows for the exclusion of certain sources from the national program based on a demonstration of the lack of impact on water quality, as well as the inclusion of others based on a higher likelihood of localized adverse impact on water quality. Today's regulations also exclude from the NPDES program storm water discharges from industrial facilities that have ''no exposure'' of industrial activities or materials to storm water. Finally, today's rule extends from August 7, 2001 until March 10, 2003 the deadline by which certain industrial facilities owned by small MS4s must obtain coverage under an NPDES permit. This rule establishes a cost-effective, flexible approach for reducing environmental harm by storm water discharges from many point sources of storm water that are currently unregulated.

EPA believes that the implementation of the six minimum measures identified for small MS4s should significantly reduce pollutants in urban storm water compared to existing levels in a cost-effective manner. Similarly, EPA believes that implementation of Best Management Practices (BMP) controls at small construction sites will also result in a significant reduction in pollutant discharges and an improvement in surface water quality. EPA believes this rule will result in monetized financial, recreational and health benefits, as well as benefits that EPA has been unable to monetize. Expected benefits include reduced scouring and erosion of streambeds, improved aesthetic quality of waters, reduced eutrophication of aquatic systems, benefit to wildlife and endangered and threatened species, tourism benefits, biodiversity benefits and reduced costs for siting reservoirs. In addition, the costs of industrial storm water controls will decrease due to the exclusion of storm water discharges from facilities where there is ''no exposure'' of storm water to industrial activities and materials.

DATES: This regulation is effective on February 7, 2000. The incorporation by reference of the rainfall erosivity factor publication listed in the rule is approved by the Director of the Federal Register as of February 7, 2000. For judicial review purposes, this final rule is promulgated as of 1:00 p.m. Eastern Standard Time, on December 22, 1999 as provided in 40 CFR 23.2.

ADDRESSES: The complete administrative record for the final rule and the ICR have been established under docket numbers W–97–12 (rule) and W–97–15 (ICR), and includes supporting documentation as well as printed, paper versions of electronic comments. Copies of information in the record are available upon request. A reasonable fee may be charged for copying. The record is available for inspection and copying from 9 a.m. to 4 p.m., Monday through Friday, excluding legal holidays, at the Water Docket, EPA, East Tower Basement, 401 M Street, SW, Washington, DC. For access to docket materials, please call 202/260–3027 to schedule an appointment.

FOR FURTHER INFORMATION CONTACT: George Utting, Office of Wastewater Management, Environmental Protection Agency, Mail Code 4203, 401 M Street, SW, Washington, DC 20460; (202) 260–5816; sw2@epa.gov.

SUPPLEMENTARY INFORMATION: Entities potentially regulated by this action include:

Category	Examples of regulated entities
Federal, State, Tribal, and Local Governments.	Operators of small separate storm sewer systems, industrial facilities that discharge storm water associated with industrial activity or construction activity disturbing 1 to 5 acres.
Industry	Operators of industrial facilities that discharge storm water associated with industrial activity.
Construction Activity.	Operators of construction activity disturbing 1 to 5 acres.

This table is not intended to be exhaustive, but rather provides a guide for readers regarding entities likely to be regulated by this action. This table lists the types of entities that EPA is now aware could potentially be regulated by this action. Other types of entities not listed in the table could also be regulated. To determine whether your facility or company is regulated by this action, you should carefully examine the applicability criteria in §§ 122.26(b), 122.31, 122.32, and 123.35 of the final rule. If you have questions regarding the applicability of this action to a particular entity, consult the person listed in the preceding **FOR FURTHER INFORMATION CONTACT** section.

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I. Background

A. Proposed Rule and Pre-Proposal Outreach

On January 9, 1998 (63 FR 1536), EPA proposed to expand the National Pollutant Discharge Elimination System (NPDES) storm water program to include storm water discharges from municipal separate storm sewer systems (MS4s) and construction sites that were smaller than those previously included in the program. The proposal also addressed industrial sources that have ''no exposure'' of industrial activities and materials to storm water. Today, EPA is promulgating a final rule to implement most of the proposed revisions with minor changes based on public comments received on the proposal. Today's final rule also extends the deadline by which certain industrial facilities operated by municipalities of less than 100,000 population must be covered by a NPDES permit; the deadline is changed from August 7, 2001 until March 10, 2003.

In 1972, Congress amended the Federal Water Pollution Control Act (commonly referred to as the Clean Water Act (CWA)) to prohibit the discharge of any pollutant to waters of the United States from a point source unless the discharge is authorized by an NPDES permit. The NPDES program is a program designed to track point sources and require the implementation of the controls necessary to minimize the discharge of pollutants. Initial efforts to improve water quality under the NPDES program primarily focused on reducing pollutants in industrial process wastewater and municipal sewage. These discharge sources were easily identified as responsible for poor, often drastically degraded, water quality conditions.

As pollution control measures for industrial process wastewater and municipal sewage were implemented and refined, it became increasingly evident that more diffuse sources of water pollution were also significant causes of water quality impairment. Specifically, storm water runoff draining large surface areas, such as agricultural and urban land, was found to be a major cause of water quality impairment, including the nonattainment of designated beneficial uses.

In 1987, Congress amended the CWA to require implementation, in two phases, of a comprehensive national program for addressing storm water discharges. The first phase of the program, commonly referred to as ''Phase I,'' was promulgated on November 16, 1990 (55 FR 47990). Phase I requires NPDES permits for storm water discharge from a large number of priority sources including municipal separate storm sewer systems (''MS4s'') generally serving populations of 100,000 or more and several categories of industrial activity, including construction sites that disturb five or more acres of land.

Today's rule, which is the second phase of the storm water program, expands the existing program to include discharges of storm water from smaller municipalities in urbanized areas and from construction sites that disturb between one and five acres of land. Today's rule allows certain sources to be excluded from the national program based on a demonstrable lack of impact on water quality. The rule also allows other sources not automatically regulated on a national basis to be designated for inclusion based on increased likelihood for localized adverse impact on water quality.

Today's rule also conditionally excludes storm water discharges from industrial facilities that have ''no exposure'' of industrial activities or materials to storm water. Today's rule and the effort that led to its development are commonly referred to as ''Phase II.'' On August 7, 1995, EPA promulgated a final rule that required facilities to be regulated under Phase II to apply for a NPDES permit by August 7, 2001, unless the NPDES permitting authority designates them as requiring a permit by an earlier date. (60 FR 40230). That rule is referred to as ''the Interim Phase II Rule.'' Today's rule replaces the Interim Phase II rule.

EPA performed extensive outreach and worked with a variety of stakeholders prior to proposing today's rule. On September 9, 1992, EPA published a notice requesting information and public comment on how to prepare regulations under CWA section 402(p)(6) (see 57 FR 41344). The notice identified three sets of issues associated with developing new NPDES storm water regulations: (1) How should EPA identify unregulated sources of storm water to protect water quality, (2) what types of control strategies should EPA develop for these sources, and (3) what are appropriate deadlines for implementing new requirements. The notice recognized that potential sources for coverage under the section 402(p)(6) regulations would fall into two main categories: municipal separate storm sewer systems and individual (commercial and residential) sources. EPA received more than 130 comments on the September 9, 1992, notice. For further discussion of the comments received, see *Storm Water Discharges Potentially Addressed by Phase II of the National Pollutant Discharge Elimination System: Report to Congress* (EPA, 1995a), pp. 1–21 to 1–22, and Appendix J (which provides a detailed summary of the comments received as they relate to the specific issues raised in the notice).

In early 1993, the Rensselaerville Institute and EPA held public and expert meetings to assist in developing and analyzing options for identifying unregulated sources and possible controls. The report on the 1993 meetings identified two options that were favored by the various groups that participated. One option was a program that allowed States to select sources to be controlled in a manner consistent with criteria developed by EPA. A second option was a tiered approach under which EPA would select high priority sources for control by NPDES permits and States would select other sources for control under a State water quality program other than the NPDES program. For additional details see the ''Report on the EPA Storm Water Management Program (Rensselaerville Study),'' Appendix I of *Storm Water Discharges Potentially Addressed by Phase II of the National Pollutant Discharge Elimination System: Report to Congress* (EPA, 1995a).

EPA also conducted outreach with representatives of small entities in conjunction with the convening of a Small Business Advocacy Review Panel under the Small Business Regulatory Enforcement Fairness Act (SBREFA). This process is discussed in section IV.E of today's preamble. For additional background see the discussion in the preamble to the proposal for today's rule.

To assist EPA by providing advice and recommendations regarding the urban municipal wet weather water pollution control program, EPA established the Urban Wet Weather Flows Federal Advisory Committee (hereinafter, ''FACA Committee'') under the Federal Advisory Committee Act (FACA). The Office of Management and Budget approved the charter for the FACA Committee on March 10, 1995. The FACA Committee provided a forum for identifying and addressing issues associated with water quality impacts from storm water sources.

The FACA Committee established two subcommittees: the Storm Water Phase II FACA Subcommittee and the Sanitary Sewer Overflows (SSOs) FACA Subcommittee. Consistent with the requirements of FACA, the membership of both the FACA Committee and the subcommittees was balanced among EPA's various outside stakeholder interests, including representatives from municipalities, States, Indian Tribes, EPA, industrial and commercial sectors, agriculture, and environmental and public interest groups.

The Storm Water Phase II FACA Subcommittee (''Subcommittee'') met fourteen times between September 1995 and June 1998. The 32 Subcommittee members discussed possible regulatory frameworks at these meetings as well as during numerous other meetings and conference calls. Members of the FACA Committee provided views regarding the development of the ''no exposure'' provision and other provisions in drafts of the Phase II rule. EPA provided Subcommittee members with four successive drafts of the proposed rule and preamble, outlines of the rule, summaries of the written comments received on each draft, and documents identifying the changes made to each draft. In the course of providing input to the Committee, individual Subcommittee members provided significant input and advice that EPA considered in the context of public comments received. Ultimately, the Subcommittee did not provide a written report back to the FACA Committee, and the FACA Committee did not provide written advice and recommendations to EPA. The Agency, therefore, did not rely on group recommendations in developing today's rule, but does consider the process to have resulted in important public outreach.

B. Water Quality Concerns/ Environmental Impact Studies and Assessments

Storm water runoff from lands modified by human activities can harm surface water resources and, in turn, cause or contribute to an exceedance of water quality standards by changing natural hydrologic patterns, accelerating stream flows, destroying aquatic habitat, and elevating pollutant concentrations and loadings. Such runoff may contain or mobilize high levels of contaminants, such as sediment, suspended solids, nutrients (phosphorous and nitrogen), heavy metals and other toxic pollutants, pathogens, toxins, oxygen-demanding substances (organic material), and floatables (U.S. EPA. 1992. *Environmental Impacts of Storm Water Discharges: A National Profile.* EPA 841–R–92–001. Office of Water. Washington, DC). After a rain, storm water runoff carries these pollutants into nearby streams, rivers, lakes, estuaries, wetlands, and oceans. The highest concentrations of these contaminants often are contained in ''first flush'' discharges, which occur during the first major storm after an extended dry period (Schueler, T.R. 1994. ''First Flush of Stormwater Pollutants Investigated in Texas.'' Note 28. *Watershed Protection Techniques* 1(2)). Individually and combined, these pollutants impair water quality, threatening designated beneficial uses and causing habitat alteration or destruction.

Uncontrolled storm water discharges from areas of urban development and construction activity negatively impact receiving waters by changing the physical, biological, and chemical composition of the water, resulting in an unhealthy environment for aquatic organisms, wildlife, and humans. The following sections discuss the studies and data that address and support this finding.

Although water quality problems also can occur from agricultural storm water discharges and return flows from irrigated agriculture, this area of

concern is statutorily exempted from regulation as a point source under the Clean Water Act and is not discussed here. (See CWA section 502(14)). Other storm water sources not specifically identified in the regulations may be of concern in certain areas and can be addressed on a case-by-case (or category-by-category) basis through the NPDES designation authority preserved by CWA section 402(p)(2)(6), as well as today's rule.

1. Urban Development

Urbanization alters the natural infiltration capability of the land and generates a host of pollutants that are associated with the activities of dense populations, thus causing an increase in storm water runoff volumes and pollutant loadings in storm water discharged to receiving waterbodies (U.S. EPA, 1992). Urban development increases the amount of impervious surface in a watershed as farmland, forests, and meadowlands with natural infiltration characteristics are converted into buildings with rooftops, driveways, sidewalks, roads, and parking lots with virtually no ability to absorb storm water. Storm water and snow-melt runoff wash over these impervious areas, picking up pollutants along the way while gaining speed and volume because of their inability to disperse and filter into the ground. What results are storm water flows that are higher in volume, pollutants, and temperature than the flows in less impervious areas, which have more natural vegetation and soil to filter the runoff (U.S. EPA, 1997. *Urbanization and Streams: Studies of Hydrologic Impacts.* EPA 841–R–97-009. Office of Water. Washington, DC).

Studies reveal that the level of imperviousness in an area strongly correlates with the quality of the nearby receiving waters. For example, a study in the Puget Sound lowland ecoregion found that when the level of basin development exceeded 5 percent of the total impervious area, the biological integrity and physical habitat conditions that are necessary to support natural biological diversity and complexity declined precipitously (May, C.W., E.B. Welch, R.R. Horner, J.R. Karr, and B.W. May. 1997. *Quality Indices for Urbanization Effects in Puget Sound Lowland Streams,* Technical Report No. 154. University of Washington Water Resources Series). Research conducted in numerous geographical areas, concentrating on various variables and employing widely different methods, has revealed a similar conclusion: stream degradation occurs at relatively low levels of imperviousness, such as 10 to 20 percent (even as low as 5 to 10 percent according to the findings of the Washington study referenced above) (Schueler, T.R. 1994. ''The Importance of Imperviousness.'' *Watershed Protection Techniques* 1(3); May, C., R.R. Horner, J.R. Karr, B.W. Mar, and E.B. Welch. 1997. ''Effects Of Urbanization On Small Streams In The Puget Sound Lowland Ecoregion.'' *Watershed Protection Techniques* 2(4); Yoder, C.O., R.J. Miltner, and D. White. 1999. ''Assessing the Status of Aquatic Life Designated Uses in Urban and Suburban Watersheds.'' In *Proceedings: National Conference on Retrofits Opportunities in Urban Environments.* EPA 625–R–99–002, Washington, DC; Yoder, C.O and R.J. Miltner. 1999. ''Assessing Biological Quality and Limitations to Biological Potential in Urban and Suburban Watersheds in Ohio.'' In *Comprehensive Stormwater & Aquatic Ecosystem Management Conference Papers,* Auckland, New Zealand). Furthermore, research has indicated that few, if any, urban streams can support diverse benthic communities at imperviousness levels of 25 percent or more. An area of medium density single family homes can be anywhere from 25 percent to nearly 60 percent impervious, depending on the design of the streets and parking (Schueler, 1994).

In addition to impervious areas, urban development creates new pollution sources as population density increases and brings with it proportionately higher levels of car emissions, car maintenance wastes, pet waste, litter, pesticides, and household hazardous wastes, which may be washed into receiving waters by storm water or dumped directly into storm drains designed to discharge to receiving waters. More people in less space results in a greater concentration of pollutants that can be mobilized by, or disposed into, storm water discharges from municipal separate storm sewer systems. A modeling system developed for the Chesapeake Bay indicated that contamination of the Bay and its tributaries from runoff is comparable to, if not greater than, contamination from industrial and sewage sources (Cohn-Lee, R. and D. Cameron. 1992. ''Urban Stormwater Runoff Contamination of the Chesapeake Bay: Sources and Mitigation.'' *The Environmental Professional,* Vol. 14).

a. Large-Scale Studies and Assessments

In support of today's regulatory designation of MS4s in urbanized areas, the Agency relied on broad-based assessments of urban storm water runoff and related water quality impacts, as well as more site-specific studies. The first national assessment of urban runoff characteristics was completed for the *Nationwide Urban Runoff Program (NURP)* study (U.S. EPA. 1983. *Results of the Nationwide Urban Runoff Program, Volume 1—Final Report.* Office of Water. Washington, D.C.). The NURP study is the largest nationwide evaluation of storm water discharges, which includes adverse impacts and sources, undertaken to date.

EPA conducted the NURP study to facilitate understanding of the nature of urban runoff from residential, commercial, and industrial areas. One objective of the study was to characterize the water quality of discharges from separate storm sewer systems that drain residential, commercial, and light industrial (industrial parks) sites. Storm water samples from 81 residential and commercial properties in 22 urban/suburban areas nationwide were collected and analyzed during the 5-year period between 1978 and 1983. The majority of samples collected in the study were analyzed for eight conventional pollutants and three heavy metals.

Data collected under the NURP study indicated that discharges from separate storm sewer systems draining runoff from residential, commercial, and light industrial areas carried more than 10 times the annual loadings of total suspended solids (TSS) than discharges from municipal sewage treatment plants that provide secondary treatment. The NURP study also indicated that runoff from residential and commercial areas carried somewhat higher annual loadings of chemical oxygen demand (COD), total lead, and total copper than effluent from secondary treatment plants. Study findings showed that fecal coliform counts in urban runoff typically range from tens to hundreds of thousands per hundred milliliters of runoff during warm weather conditions, with the median for all sites being around 21,000/100 ml. This is generally consistent with studies that found that fecal coliform mean values range from 1,600 coliform fecal units (CFU)/100 ml to 250,000 cfu/100 ml (Makepeace, D.K., D.W. Smith, and S.J. Stanley. 1995. ''Urban Storm Water Quality: Summary of Contaminant Data.'' *Critical Reviews in Environmental Science and Technology* 25(2):93-139). Makepeace, et al., summarized ranges of contaminants from storm water, including physical contaminants such as total solids (76—36,200 mg/L) and copper (up to 1.41 mg/L); organic chemicals; organic compounds, such as oil and grease (up to 110 mg/L); and microorganisms.

Monitoring data summarized in the NURP study provided important information about urban runoff from residential, commercial, and light industrial areas. The study concluded that the quality of urban runoff can be affected adversely by several sources of pollution that were not directly evaluated in the study, including illicit discharges, construction site runoff, and illegal dumping. Data from the NURP study were analyzed further in the U.S. Geological Survey (USGS) Urban Storm Water Data Base for 22 Metropolitan Areas Throughout the United States study (Driver, N.E., M.H. Mustard, R.B. Rhinesmith, and R.F. Middleburg. 1985. *U.S. Geological Survey Urban Storm Water Data Base for 22 Metropolitan Areas Throughout the United States.* Report No. 85–337 USGS. Lakewood, CO). The USGS report summarized additional monitoring data compiled during the mid-1980s, covering 717 storm events at 99 sites in 22 metropolitan areas and documented problems associated with metals and sediment concentrations in urban storm water runoff. More recent reports have confirmed the pollutant concentration data collected in the NURP study (Marsalek, J. 1990. ''Evaluation of Pollutant Loads from Urban Nonpoint Sources.'' *Wat. Sci. Tech.* 22(10/11):23–30; Makepeace, et al., 1995).

Commenters argued that the NURP study does not support EPA's contention that urban activities significantly jeopardize attainment of water quality standards. One commenter argued that the NURP study and the 1985 USGS study are seriously out of date. Because they were issued 10 years or more before the implementation of the current storm water permit program, the data in those reports do not reflect conditions that exist after implementation of permits issued by authorized States and EPA for storm water from construction sites, large municipalities, and industrial activities.

In response, EPA notes that it is not relying solely on the NURP study to describe current water quality impairment. Rather, EPA is citing NURP as a source of data on typical pollutant concentrations in urban runoff. Recent studies have not found significantly different pollutant concentrations in urban runoff when compared to the original NURP data (see Makepeace, et al., 1995; Marsalek, 1990; and Pitt, et al., 1995).

America's Clean Water—the States' Nonpoint Source Assessment (Association of State and Interstate Water Pollution Control Administrators (ASIWPCA). 1985. *America's Clean Water—The States' Nonpoint Source Assessment.* Prepared in cooperation with the U.S. EPA, Office of Water, Washington, DC), a comprehensive study of diffuse pollution sources conducted under the sponsorship of the Association of State and Interstate Water Pollution Control Administrators (ASIWPCA) and EPA revealed that 38 States reported urban runoff as a major cause of designated beneficial use impairment and 21 States reported storm water runoff from construction sites as a major cause of beneficial use impairment. In addition, the 1996 305(b) Report (U.S. EPA. 1998. *The National Water Quality Inventory, 1996 Report to Congress.* EPA 841–R–97–008. Office of Water. Washington, DC), provides a national assessment of water quality based on biennial reports submitted by the States as required under CWA section 305(b) of the CWA. In the CWA 305(b) reports, States, Tribes, and Territories assess their individual water quality control programs by examining the attainment or nonattainment of the designated uses assigned to their rivers, lakes, estuaries, wetlands, and ocean shores. A designated use is the legally applicable use specified in a water quality standard for a watershed, waterbody, or segment of a waterbody. The designated use is the desirable use that the water quality should support. Examples of designated uses include drinking water supply, primary contact recreation (swimming), and aquatic life support. Each CWA 305(b) report indicates the assessed fraction of a State's waters that are fully supporting, partially supporting, or not supporting designated beneficial uses.

In their reports, States, Tribes, and Territories first identified and then assigned the sources of water quality impairment for each impaired waterbody using the following categories: industrial, municipal sewage, combined sewer overflows, urban runoff/storm sewers, agricultural, silvicultural, construction, resource extraction, land disposal, hydrologic modification, and habitat modification. The 1996 Inventory, based on a compilation of 60 individual 305(b) reports submitted by States, Tribes, and Territories, assessed the following percentages of total waters nationwide: 19 percent of river and stream miles; 40 percent of lake, pond, and reservoir acres; 72 percent of estuary square miles; and 6 percent of ocean shoreline waters. The 1996 Inventory indicated that approximately 40 percent of the Nation's assessed rivers, lakes, and estuaries are impaired. Waterbodies deemed as ''impaired'' are either partially supporting designated uses or not supporting designated uses.

The 1996 Inventory also found urban runoff/discharges from storm sewers to be a major source of water quality impairment nationwide. Urban runoff/storm sewers were found to be a source of pollution in 13 percent of impaired rivers; 21 percent of impaired lakes, ponds, and reservoirs; and 45 percent of impaired estuaries (second only to industrial discharges). In addition, urban runoff was found to be the leading cause of ocean impairment for those ocean miles surveyed.

In addition, a recent USGS study of urban watersheds across the United States has revealed a link between urban development and contamination of local waterbodies. The study found the highest levels of organic contaminants, known as polycyclic aromatic hydrocarbons (PAHs) (products of combustion of wood, grass, and fossil fuels), in the reservoirs of urbanized watersheds (U.S. Geological Survey (USGS). 1998. *Research Reveals Link Between Development and Contamination in Urban Watersheds.* USGS news release. USGS National Water-Quality Assessment Program).

Urban storm water also can contribute significant amounts of toxicants to receiving waters. Pitt, et. al. (1993), found heavy metal concentrations in the majority of samples analyzed. Industrial or commercial areas were likely to be the most significant pollutant source areas (Pitt, R., R. Field, M. Lalor, M. Brown 1993. ''Urban stormwater toxic pollutants: assessment, sources, and treatability'' *Water Environment Research,* 67(3):260–75).

b. Local and Watershed-Based Studies

In addition to the large-scale nationwide studies and assessments, a number of local and watershed-based studies from across the country have documented the detrimental effects of urban storm water runoff on water quality. A study of urban streams in Milwaukee County, Wisconsin, found local streams to be highly degraded due primarily to urban runoff, while three studies in the Atlanta, Georgia, region were characterized as being ''the first documentation in the Southeast of the strong negative relationship between urbanization and stream quality that has been observed in other ecoregions'' (Masterson, J. and R. Bannerman. 1994. ''Impacts of Storm Water Runoff on Urban Streams in Milwaukee County, Wisconsin.'' Paper presented at National Symposium on Water Quality: American Water Resources Association; Schueler, T.R. 1997. ''Fish Dynamics in Urban Streams Near Atlanta, Georgia.''

Technical Note 94. *Watershed Protection Techniques* 2(4)). Several other studies, including those performed in Arizona (Maricopa County), California (San Jose's Coyote Creek), Massachusetts (Green River), Virginia (Tuckahoe Creek), and Washington (Puget Sound lowland ecoregion), all had the same finding: runoff from urban areas greatly impair stream ecology and the health of aquatic life; the more heavily developed the area, the more detrimental the effects (Lopes, T. and K. Fossum. 1995. ''Selected Chemical Characteristics and Acute Toxicity of Urban Stormwater, Streamflow, and Bed Material, Maricopa County, Arizona.'' *Water Resources Investigations Report* 95–4074. USGS; Pitt, R. 1995. ''Effects of Urban Runoff on Aquatic Biota.'' In *Handbook of Ecotoxicology;* Pratt, J. and R. Coler. 1979. ''Ecological Effects of Urban Stormwater Runoff on Benthic Macroinvertebrates Inhabiting the Green River, Massachusetts.'' Completion Report Project No. A–094. Water Resources Research Center. University of Massachusetts at Amherst.; Schueler, T.R. 1997. ''Historical Change in a Warmwater Fish Community in an Urbanizing Watershed.'' Technical Note 93. *Watershed Protection Techniques* 2(4); May, C., R. Horner, J. Karr, B. Mar, and E. Welch. 1997. ''Effects Of Urbanization On Small Streams In The Puget Sound Lowland Ecoregion.'' *Watershed Protection Techniques* 2(4)).

Pitt and others also described the receiving water effects on aquatic organisms associated with urban runoff (Pitt, R.E. 1995. ''Biological Effects of Urban Runoff Discharges'' In *Stormwater Runoff and Receiving Systems: Impact, Monitoring, and Assessment,* ed. E.E Herricks, Lewis Publishers; Crunkilton, R., J. Kleist, D. Bierman, J. Ramcheck, and W. DeVita. 1999. ''Importance of Toxicity as a Factor Controlling the Distribution of Aquatic Organisms in an Urban Stream.'' In *Comprehensive Stormwater & Aquatic Ecosystem Management Conference Papers.* Auckland, New Zealand).

In Wisconsin, runoff samples were collected from streets, parking lots, roofs, driveways, and lawns. Source areas were broken up into residential, commercial, and industrial. Geometric mean concentration data for residential areas included total solids of about 500–800 mg/L from streets and 600 mg/L from lawns. Fecal coliform data from residential areas ranged from 34,000 to 92,000 cfu/100 mL for streets and driveways. Contaminant concentration data from commercial and industrial source areas were lower for total solids and fecal coliform, but higher for total zinc (Bannerman, R.T., D.W. Owens, R.B. Dods, and N.J. Hornewer. 1993. ''Sources of Pollutants in Wisconsin Stormwater.'' *Wat. Sci. Tech.* 28(3–5):241–59).

Bannerman, et al. also found that streets contribute higher loads of pollutants to urban storm water than any other residential development source. Two small urban residential watersheds were evaluated to determine that lawns and streets are the largest sources of total and dissolved phosphorus in the basins (Waschbusch, R.J., W.R. Selbig, and R.T. Bannerman. 1999. ''Sources of Phosphorus in Stormwater and Street Dirt from Two Urban Residential Basins In Madison, Wisconsin, 1994–95.'' *Water Resources Investigations Report* 99–4021. U.S. Geological Survey). A number of other studies have indicated that urban roadways often contain significant quantities of metal elements and solids (Sansalone, J.J. and S.G. Buchberger. 1997. ''Partitioning and First Flush of Metals in Urban Roadway Storm Water.'' *ASCE Journal of Environmental Engineering* 123(2); Sansalone, J.J., J.M. Koran, J.A. Smithson, and S.G. Buchberger. 1998. ''Physical Characteristics of Urban Roadway Solids Transported During Rain Events'' *ASCE Journal of Environmental Engineering* 124(5); Klein, L.A., M. Lang, N. Nash, and S.L. Kirschner. 1974. ''Sources of Metals in New York City Wastewater'' *J. Water Pollution Control Federation* 46(12):2653–62; Barrett, M.E, R.D. Zuber, E.R. Collins, J.F. Malina, R.J. Charbeneau, and G.H Ward., 1993. ''A Review and Evaluation of Literature Pertaining to the Quantity and Control of Pollution from Highway Runoff and Construction.'' Research Report 1943–1. Center for Transportation Research, University of Texas, Austin).

c. Beach Closings/Advisories

Urban wet weather flows have been recognized as the primary sources of estuarine pollution in coastal communities. Urban storm water runoff, sanitary sewer overflows, and combined sewer overflows have become the largest causes of beach closings in the United States in the past three years. Storm water discharges from urban areas not only pose a threat to the ecological environment, they also can substantially affect human health. A survey of coastal and Great Lakes communities reports that in 1998, more than 1,500 beach closings and advisories were associated with storm water runoff (Natural Resources Defense Council. 1999. ''A Guide to Water Quality at Vacation Beaches'' New York, NY). Other reports also document public health, shellfish bed, and habitat impacts from storm water runoff, including more than 823 beach closings/advisories issued in 1995 and more than 407 beach closing/advisories issued in 1996 due to urban runoff (Natural Resources Defense Council. 1996. *Testing the Waters Volume VI: Who Knows What You're Getting Into.* New York, NY; NRDC. 1997. *Testing the Waters Volume VII: How Does Your Vacation Beach Rate.* New York, NY; Morton, T. 1997. *Draining to the Ocean: The Effects of Stormwater Pollution on Coastal Waters.* American Oceans Campaign, Santa Monica, CA). The Epidemiological Study of Possible Adverse Health Effects of Swimming in Santa Monica Bay (Haile, R.W., et. al. 1996. ''An Epidemiological Study of Possible Adverse Health Effects of Swimming in Santa Monica Bay.'' *Final Report prepared for the Santa Monica Bay Restoration Project*) concluded that there is a 57 percent higher rate of illness in swimmers who swim adjacent to storm drains than in swimmers who swim more than 400 yards away from storm drains. This and other studies document a relationship between gastrointestinal illness in swimmers and water quality, the latter of which can be heavily compromised by polluted storm water discharges.

2. Non-Storm Water Discharges Through Municipal Storm Sewers

Studies have shown that discharges from MS4s often include wastes and wastewater from non-storm water sources. Federal regulations (§ 122.26(b)(2)) define an illicit discharge as ''* * * any discharge to an MS4 that is not composed entirely of storm water * * *,'' with some exceptions. These discharges are ''illicit'' because municipal storm sewer systems are not designed to accept, process, or discharge such wastes. Sources of illicit discharges include, but are not limited to: sanitary wastewater; effluent from septic tanks; car wash, laundry, and other industrial wastewaters; improper disposal of auto and household toxics, such as used motor oil and pesticides; and spills from roadway and other accidents.

Illicit discharges enter the system through either direct connections (e.g., wastewater piping either mistakenly or deliberately connected to the storm drains) or indirect connections (e.g., infiltration into the MS4 from cracked sanitary systems, spills collected by drain outlets, and paint or used oil dumped directly into a drain). The result is untreated discharges that contribute high levels of pollutants,

including heavy metals, toxics, oil and grease, solvents, nutrients, viruses and bacteria into receiving waterbodies. The NURP study, discussed earlier, found that pollutant levels from illicit discharges were high enough to significantly degrade receiving water quality and threaten aquatic, wildlife, and human health. The study noted particular problems with illicit discharges of sanitary wastes, which can be directly linked to high bacterial counts in receiving waters and can be dangerous to public health.

Because illicit discharges to MS4s can create severe widespread contamination and water quality problems, several municipalities and urban counties performed studies to identify and eliminate such discharges. In Michigan, the Ann Arbor and Ypsilanti water quality projects inspected 660 businesses, homes, and other buildings and identified 14 percent of the buildings as having improper storm sewer drain connections. The program assessment revealed that, on average, 60 percent of automobile-related businesses, including service stations, automobile dealerships, car washes, body shops, and light industrial facilities, had illicit connections to storm sewer drains. The program assessment also showed that a majority of the illicit discharges to the storm sewer system resulted from improper plumbing and connections, which had been approved by the municipality when installed (Washtenaw County Statutory Drainage Board. 1987. Huron River Pollution Abatement Program).

In addition, an inspection of urban storm water outfalls draining into Inner Grays, Washington, indicated that 32 percent of these outfalls had dry weather flows. Of these flows, 21 percent were determined to have pollutant levels higher than the pollutant levels expected in typical urban storm water runoff characterized in the NURP study (U.S. EPA. 1993. *Investigation of Inappropriate Pollutant Entries Into Storm Drainage Systems—A User's Guide.* EPA 600/R–92/238. Office of Research and Development. Washington, DC). That same document reports a study in Toronto, Canada, that found that 59 percent of outfalls from the MS4 had dry-weather flows. Chemical tests revealed that 14 percent of these dry-weather flows were determined to be grossly polluted.

Inflows from aging sanitary sewer collection systems are one of the most serious illicit discharge-related problems. Sanitary sewer systems frequently develop leaks and cracks, resulting in discharges of pollutants to receiving waters through separate storm sewers. These pollutants include sanitary waste and materials from sewer main construction (e.g., asbestos cement, brick, cast iron, vitrified clay). Municipalities have long recognized the reverse problem of storm water infiltration into sanitary sewer collection systems; this type of infiltration often disrupts the operation of the municipal sewage treatment plant.

The improper disposal of materials is another illicit discharge-related problem that can result in contaminated discharges from separate storm sewer systems in two ways. First, materials may be disposed of directly in a catch basin or other storm water conveyance. Second, materials disposed of on the ground may either drain directly to a storm sewer or be washed into a storm sewer during a storm event. Improper disposal of materials to street catch basins and other storm sewer inlets often occurs when people mistakenly believe that disposal to such areas is an environmentally sound practice. Part of the confusion may occur because some areas are served by combined sewer systems, which are part of the sanitary sewer collection system, and people assume that materials discharged to a catch basin will reach a municipal sewage treatment plant. Materials that are commonly disposed of improperly include used motor oil; household toxic materials; radiator fluids; and litter, such as disposable cups, cans, and fast-food packages. EPA believes that there has been increasing success in addressing these problems through initiatives such as storm drain stenciling and recycling programs, including household hazardous waste special collection days.

Programs that reduce illicit discharges to separate storm sewers have improved water quality in several municipalities. For example, Michigan's Huron River Pollution Abatement Program found the elimination of illicit connections caused a measurable improvement in the water quality of the Washtenaw County storm sewers and the Huron River (Washtenaw County Statutory Drainage Board, 1987). In addition, an illicit detection and remediation program in Houston, Texas, has significantly improved the water quality of Buffalo Bayou. Houston estimated that illicit flows from 132 sources had a flow rate as high as 500 gal/min. Sources of the illicit discharges included broken and plugged sanitary sewer lines, illicit connections from sanitary lines to storm sewer lines, and floor drain connections (Glanton, T., M.T. Garrett, and B. Goloby. 1992. The Illicit Connection: Is It the Problem? *Wat. Env. Tech.* 4(9):63–8).

3. Construction Site Runoff

Storm water discharges generated during construction activities can cause an array of physical, chemical, and biological water quality impacts. Specifically, the biological, chemical, and physical integrity of the waters may become severely compromised. Water quality impairment results, in part, because a number of pollutants are preferentially absorbed onto mineral or organic particles found in fine sediment. The interconnected process of erosion (detachment of the soil particles), sediment transport, and delivery is the primary pathway for introducing key pollutants, such as nutrients (particularly phosphorus), metals, and organic compounds into aquatic systems (Novotny, V. and G. Chesters. 1989. ''Delivery of Sediment and Pollutants from Nonpoint Sources: A Water Quality Perspective.'' *Journal of Soil and Water Conservation,* 44(6):568–76). Estimates indicate that 80 percent of the phosphorus and 73 percent of the Kjeldahl nitrogen in streams is associated with eroded sediment (U.S. Department of Agriculture. 1989. ''The Second RCA Appraisal, Soil, Water and Related Resources on Nonfederal Land in the United States, Analysis of Condition and Trends.'' Cited in Fennessey, L.A.J., and A.R. Jarrett. 1994. ''The Dirt in a Hole: a Review of Sedimentation Basins for Urban Areas and Construction Sites.'' *Journal of Soil and Water Conservation,* 49(4):317–23).

In watersheds experiencing intensive construction activity, the localized impacts of water quality may be severe because of high pollutant loads, primarily sediments. Siltation is the largest cause of impaired water quality in rivers and the third largest cause of impaired water quality in lakes (U.S. EPA, 1998). The 1996 305(b) report also found that construction site discharges were a source of pollution in: 6 percent of impaired rivers; 11 percent of impaired lakes, ponds, and reservoirs; and 11 percent of impaired estuaries. Introduction of coarse sediment (coarse sand or larger) or a large amount of fine sediment is also a concern because of the potential of filling lakes and reservoirs (along with the associated remediation costs for dredging), as well as clogging stream channels (e.g., Paterson, R.G., M.I. Luger, E.J. Burby, E.J. Kaiser, H.R. Malcolm, and A.C. Beard. 1993. ''Costs and Benefits of Urban Erosion and Sediment Control: North Carolina Experience.'' *Environmental Management* 17(2):167–78). Large inputs of coarse sediment into

stream channels initially will reduce stream depth and minimize habitat complexity by filling in pools (U.S. EPA. 1991. *Monitoring Guidelines to Evaluate Effects of Forestry Activities on Streams in the Pacific Northwest and Alaska.* EPA 910/9–91–001. Seattle, WA). In addition, studies have shown that stream reaches affected by construction activities often extend well downstream of the construction site. For example, between 4.8 and 5.6 kilometers of stream below construction sites in the Patuxent River watershed were observed to be impacted by sediment inputs (Fox, H.L. 1974. ''Effects of Urbanization on the Patuxent River, with Special Emphasis on Sediment Transport, Storage, and Migration.'' Ph.D. dissertation. Johns Hopkins University, Baltimore, MD. As Cited in Klein, R.D. 1979. ''Urbanization and Stream Quality Impairment.'' *Water Resources Bulletin* 15(4): 948–63).

A primary concern at most construction sites is the erosion and transport process related to fine sediment because rain splash, rills (i.e., a channel small enough to be removed by normal agricultural practices and typically less than 1-foot deep), and sheetwash encourage the detachment and transport of this material to waterbodies (Storm Water Quality Task Force. 1993. *California Storm Water Best Management Practice Handbooks—Construction Activity.* Oakland, CA: Blue Print Service). Construction sites also can generate other pollutants associated with onsite wastes, such as sanitary wastes or concrete truck washout.

Although streams and rivers naturally carry sediment loads, erosion from construction sites and runoff from developed areas can elevate these loads to levels well above those in undisturbed watersheds. It is generally acknowledged that erosion rates from construction sites are much greater than from almost any other land use (Novotny, V. and H. Olem. 1994. *Water Quality: Prevention, Identification, and Management of Diffuse Pollution.* New York: Van Nostrand Reinhold). Results from both field studies and erosion models indicate that erosion rates from construction sites are typically an order of magnitude larger than row crops and several orders of magnitude greater than rates from well-vegetated areas, such as forests or pastures (USDA. 1970. ''Controlling Erosion on Construction Sites.'' *Agriculture Information Bulletin,* Washington, DC; Meyer, L.D., W.H. Wischmeier, and W.H. Daniel. 1971. ''Erosion, Runoff and Revegetation of Denuded Construction Sites.'' *Transactions of the ASAE* 14(1):138–41; Owen, O.S. 1975. *Natural Resource Conservation.* New York: MacMillan. As cited in Paterson, et al., 1993).

A recent review of the efficiency of sediment basins indicated that inflows from 12 construction sites had a mean TSS concentration of about 4,500 mg/L (Brown, W.E. 1997. ''The Limits of Settling.'' Technical Note No. 83. *Watershed Protection Techniques* 2(3)). In Virginia, suspended sediment concentrations from housing construction sites were measured at 500–3,000 mg/L, or about 40 times larger than the concentrations from already-developed urban areas (Kuo, C.Y. 1976. ''Evaluation of Sediment Yields Due to Urban Development.'' Bulletin No. 98. Virginia Water Resources Research Center, Virginia Polytechnic Institute and State University, Blacksburg, VA).

Similar impacts from storm water runoff have been reported in a number of other studies. For example, Daniel, et al., monitored three residential construction sites in southeastern Wisconsin and determined that annual sediment yields were more than 19 times the yields from agricultural areas (Daniel, T.C., D. McGuire, D. Stoffel, and B. Miller. 1979. ''Sediment and Nutrient Yield from Residential Construction Sites'' *Journal of Environmental Quality* 8(3):304–08). Daniel, et al., identified total storm runoff, followed by peak storm runoff, as the most influential factors controlling the sediment loadings from residential construction sites. Daniel, et al., also found that suspended sediment concentrations were 15,000–20,000 mg/L in moderate events and up to 60,000 mg/L in larger events.

Wolman and Schick (Wolman, M.G. and A.P. Schick. 1967. ''Effects of Construction on Fluvial Sediment, Urban and Suburban Areas of Maryland.'' *Water Resources Research* 3(2): 451–64) studied the impacts of development on fluvial systems in Maryland and determined that sediment yields in areas undergoing construction were 1.5 to 75 times greater than detected in natural or agricultural catchments. The authors summarize the potential impacts of construction on sediment yields by stating that ''the equivalent of many decades of natural or even agricultural erosion may take place during a single year from areas cleared for construction'' (Wolman and Schick, 1967).

A number of studies have examined the effects of road construction on erosion rates and sediment yields. A highway construction project in West Virginia disturbed only 4.2 percent of a 4.72-square-mile basin, but resulted in a three-fold increase in suspended sediment yields (Downs, S.C. and D.H. Appel. 1986. *Progress Report on the Effects of Highway Construction on Suspended-Sediment Discharge in the Coal River and Trace Fork, West Virginia,* 1975–81. USGS Water Resources Investigations Report 84–4275. Charlestown, WV). During the largest storm event, it was estimated that 80 percent of the sediment in the stream originated from the construction site. As is often the case, the increase in suspended sediment load could not be detected further downstream, where the drainage area was more than 50 times larger (269 square miles).

Another study evaluated the effect of 290 acres of highway construction on watersheds ranging in size from 5 to 38 square miles. Suspended sediment loads in the smallest watershed increased by 250 percent, and the estimated sediment yield from the construction area was 37 tons/acre during a 2-year period (Hainly, R.A. 1980. *The Effects of Highway Construction on Sediment Discharge into Blockhouse Creek and Stream Valley Run, Pennsylvania.* USGS Water Resources Investigations Report 80–68. Harrisburg, PA). A more recent study in Hawaii showed that highway construction increased suspended sediment loads by 56 to 76 percent in three small (1 to 4 square mile) basins (Hill, B.R. 1996. *Streamflow and Suspended-Sediment Loads Before and During Highway Construction, North Halawa, Haiku, and Kamooalii Drainage Basins, Oahu, Hawaii, 1983–91.* USGS Water Resources Investigations Report 96–4259. Honolulu, HI). A 1970 study determined that sediment yields from construction areas can be as much as 500 times the levels detected in rural areas (National Association of Counties Research Foundation. 1970. *Urban Soil Erosion and Sediment Control.* Water Pollution Control Research Series, Program #15030 DTL. Federal Water Quality Administration, U.S. Department of Interior. Washington, DC)

Yorke and Herb (Yorke, T.H., and W.J. Herb. 1978. *Effects of Urbanization on Streamflow and Sediment Transport in the Rock Creek and Anacostia River Basins, Montgomery County, Maryland, 1962–74.* USGS Professional Paper 1003, Washington, DC) evaluated nine subbasins in the Maryland portion of the Anacostia watershed for more than a decade in an effort to define the impacts of changing land use/land cover on sediment in runoff. Average annual suspended sediment yields for construction sites ranged from 7 to 100 tons/acre. Storm water discharges from construction sites that occur when the land area is disturbed (and prior to

surface stabilization) can significantly impact designated uses. Examples of designated uses include public water supply, recreation, and propagation of fish and wildlife. The siltation process described previously can threaten all three designated uses by (1) depositing high concentrations of pollutants in public water supplies; (2) decreasing the depth of a waterbody, which can reduce the volume of a reservoir or result in limited use of a water body by boaters, swimmers, and other recreational enthusiasts; and (3) directly impairing the habitat of fish and other aquatic species, which can limit their ability to reproduce.

Excess sediment can cause a number of other problems for waterbodies. It is associated with increased turbidity and reduced light penetration in the water column, as well as more long-term effects associated with habitat destruction and increased difficulty in filtering drinking water. Numerous studies have examined the effect that excess sediment has on aquatic ecosystems. For example, sediment from road construction activity in Northern Virginia reduced aquatic insect and fish communities by up to 85 percent and 40 percent, respectively (Reed, J.R. 1997. ''Stream Community Responses to Road Construction Sediments.'' Bulletin No. 97. Virginia Water Resources Research Center, Virginia Polytechnic Institute, Blacksburg, VA. As cited in Klein, R.D. 1990. *A Survey of Quality of Erosion and Sediment Control and Storm Water Management in the Chesapeake Bay Watershed.* Annapolis, MD: Chesapeake Bay Foundation). Other studies have shown that fine sediment (fine sand or smaller) adversely affects aquatic ecosystems by reducing light penetration, impeding sight-feeding, smothering benthic organisms, abrading gills and other sensitive structures, reducing habitat by clogging interstitial spaces within a streambed, and reducing the intergravel dissolved oxygen by reducing the permeability of the bed material (Everest, F.H., J.C. Beschta, K.V. Scrivener, J.R. Koski, J.R. Sedell, and C.J. Cederholm. 1987. ''Fine Sediment and Salmonid Production: A Paradox.'' *Streamside Management: Forestry and Fishery Interactions,* Contract No. 57, Institute of Forest Resources, University of Washington, Seattle, WA). For example, 4.8 and 5.6 kilometers of stream below construction sites in the Patuxent River watershed in Maryland were found to have fine sediment amounts 15 times greater than normal (Fox, 1974. As cited in Klein, 1979). Benthic organisms in the streambed can be smothered by sediment deposits, causing changes in aquatic flora and fauna, such as fish species composition (Wolman and Schick, 1967). In addition, the primary cause of coral reef degradation in coastal areas is attributed to land disturbances and dredging activities due to urban development (Rogers, C.S. 1990. ''Responses of Coral Reefs and Reef Organizations to Sedimentation.'' *Marine Ecology Progress Series,* 62:185–202).

EPA believes that the water quality impact from small construction sites is as high as or higher than the impact from larger sites on a per acre basis. The concentration of pollutants in the runoff from smaller sites is similar to the concentrations in the runoff from larger sites. The proportion of sediment that makes it from the construction site to surface waters is likely the same for larger and smaller construction sites in urban areas because the runoff from either site is usually delivered directly to the storm drain network where there is no opportunity for the sediment to be filtered out.

The expected contribution of total sediment yields from small sites depends, in part, on the extent to which erosion and sedimentation controls are being applied. Because current storm water regulations are more likely to require erosion and sedimentation controls on larger sites in urban areas, smaller construction sites that lack such programs are likely to contribute a disproportionate amount of the total sediment from construction activities (MacDonald, L.H. 1997. *Technical Justification for Regulating Construction Sites 1–5 Acres in Size.* Unpublished report submitted to U.S. EPA, Washington, DC). Smaller construction sites are less likely to have an effective plan to control erosion and sedimentation, are less likely to properly implement and maintain their plans, and are less likely to be inspected (Brown, W. and D. Caraco. 1997. *Controlling Storm Water Runoff Discharges from Small Construction Sites: A National Review.* Submitted to Office of Wastewater Management, U.S. EPA, Washington, DC., by the Center for Watershed Protection, Silver Spring, MD). The proportion of sediment that makes it from the construction site to surface waters is likely the same for larger and smaller construction sites in urban areas because the runoff from either site is usually delivered directly to the storm drain network, where there is no opportunity for the sediment to be filtered out.

To confirm its belief that sediment yields from small sites are as high as or higher than the 20 to 150 tons/acre/year measured from larger sites, EPA gave a grant to the Dane County, Wisconsin Land Conservation Department, in cooperation with the USGS, to evaluate sediment runoff from two small construction sites. The first was a 0.34 acre residential lot and the second was a 1.72 acre commercial office development. Runoff from the sites was channeled to a single discharge point for monitoring. Each site was monitored before, during, and after construction.

The Dane County study found that total solids concentrations from these small sites are similar to total solids concentrations from larger construction sites. Results show that for both of the study sites, total solids and suspended solids concentrations were significantly higher during construction than either before or after construction. For example, preconstruction total solids concentrations averaged 642 mg/L during the period when ryegrass was established, active construction total solids concentrations averaged 2,788 mg/L, and post-construction total solids concentrations averaged 132 mg/L (on a pollutant load basis, this equaled 7.4 lbs preconstruction, 35 lbs during construction, and 0.6 lbs post-construction for total solids). While this site was not properly stabilized before construction, after construction was complete and the site was stabilized, post-construction concentrations were more than 20 times less than during construction. The results were even more dramatic for the commercial site. The commercial site had one preconstruction event, which resulted in total solids concentrations of 138 mg/L, while active construction averaged more than 15,000 mg/L and post-construction averaged only 200 mg/L (on a pollutant load basis, this equaled 0.3 lbs preconstruction, 490 lbs during construction, and 13.4 lbs post-construction for total solids). The active construction period resulted in more than 75 times more sediment than either before or after construction (Owens, D.W., P. Jopke, D.W. Hall, J. Balousek and A. Roa. 1999. ''Soil Erosion from Small Construction Sites.'' Draft USGS Fact Sheet. USGS and Dane County Land Conservation Department, WI). The total solids concentrations from these small sites in Wisconsin are similar to total solids concentrations from larger construction sites. For example, a study evaluating the effects of highway construction in West Virginia found that a small storm produced a sediment concentration of 7,520 mg/L (Downs and Appel, 1986).

One important aspect of small construction sites is the number of small sites relative to larger construction sites

and total land area within the watershed. Brown and Caraco surveyed 219 local jurisdictions to assess erosion and sediment control (ESC) programs. Seventy respondents provided data on the number of ESC permits for construction sites smaller than 5 acres. In 27 cases (38 percent of the respondents), more than three-quarters of the permits were for sites smaller than 5 acres; in another 18 cases (26 percent), more than half of the permits were for sites smaller than 5 acres.

In addition, data on the total acreage disturbed by smaller construction sites have been collected recently in two States (MacDonald, 1997). The most recent and complete data set is the listing of the disturbed area for each of the 3,831 construction sites permitted in North Carolina for 1994–1995 and 1995–1996. Nearly 61 percent of the sites that were 1 acre or larger were between 1.0 and 4.9 acres in size. This proportion was consistent between years. Data showed that this range of sites accounted for 18 percent of the total area disturbed by construction. The values showed very little variation between the 2 years of data. The total disturbed area for all sites over this 2-year period was nearly 33,000 acres, or about 0.1 percent of the total area of North Carolina.

EPA estimates that construction sites disturbing greater than 5 acres disturb 2.1-million acres of land (78.1 percent of the total) while sites disturbing between 1 and 5 acres of land disturb 0.5-million acres of land (19.4 percent). The remaining sites on less than 1 acres of land disturb 0.07-million acres of land (only 2.5 percent of the total). Given the high erosion rates associated with most construction sites, small construction sites can be a significant source of water quality impairment, particularly in small watersheds that are undergoing rapid development. Exempting sites under 1 acre will exclude only about 2.5 percent of acreage from program coverage, but will exclude a far higher number of sites, approximately 25 percent.

Several studies have determined that the most effective construction runoff control programs rely on local plan review and field enforcement (Paterson, R. G. 1994. ''Construction Practices: the Good, the Bad, and the Ugly.'' *Watershed Protection Techniques* 1(3)). In his review, Paterson suggests that, given the critical importance of field implementation of erosion and sediment control programs and the apparent shortcomings that exist, much more focus should be given to plan implementation.

Several commenters disputed the data presented in the proposed rule for storm water discharges from smaller construction sites. One commenter stated that EPA has not adequately explained the basis for permitting construction activity down to 1 disturbed acre. Another commenter stated that EPA did not present sufficient data on water quality impacts from construction sites disturbing less than 5 acres.

EPA believes that the data presented above sufficiently support nationwide designation of storm water discharges from construction activity disturbing more than 1 acre. Based on total disturbed land area within a watershed, the cumulative effects of numerous small construction sites can have impacts similar to those of larger sites in a particular area. In addition, waivers for storm water discharges from smaller construction activity will exclude sites not expected to impair water quality. EPA will continue to collect water quality data on construction site storm water runoff.

C. Statutory Background

In 1972, Congress enacted the CWA to prohibit the discharge of any pollutant to waters of the United States from a point source unless the discharge is authorized by an NPDES permit. Congress added CWA section 402(p) in 1987 to require implementation of a comprehensive program for addressing storm water discharges. Section 402(p)(1) required EPA or NPDES-authorized States or Tribes to issue NPDES permits for the following five classes of storm water discharges composed entirely of storm water (''storm water discharges'') specifically listed under section 402(p)(2):

(A) a discharge subject to an NPDES permit before February 4, 1987

(B) a discharge associated with industrial activity

(C) a discharge from a municipal separate storm sewer system serving a population of 250,000 or more

(D) a discharge from a municipal separate storm sewer system serving a population of 100,000 or more but less than 250,000

(E) a discharge that an NPDES permitting authority determines to be contributing to a violation of a water quality standard or a significant contributor of pollutants to the waters of the United States.

Section 402(p)(3)(A) requires storm water discharges associated with industrial activity to meet all applicable provisions of section 402 and section 301 of the CWA, including technology-based requirements and any more stringent requirements necessary to meet water quality standards. Section 402(p)(3)(B) establishes NPDES permit standards for discharges from municipal separate storm sewer systems, or MS4s. NPDES permits for discharges from MS4s (1) may be issued on a system or jurisdiction-wide basis, (2) must include a requirement to effectively prohibit non-storm water discharges into the storm sewers, and (3) must require controls to reduce pollutant discharges to the maximum extent practicable, including best management practices, and other provisions as the Administrator or the States determine to be appropriate for the control of such pollutants. At this time, EPA determines that water quality-based controls, implemented through the iterative processes described today are appropriate for the control of such pollutants and will result in reasonable further progress towards attainment of water quality standards. See sections II.L and II.H.3 of the preamble.

In CWA section 402(p)(4), Congress established statutory deadlines for the initial steps in implementing the NPDES program for storm water discharges. This section required development of NPDES permit application regulations, submission of NPDES permit applications, issuance of NPDES permits for sources identified in section 402(p)(2), and compliance with NPDES permit conditions. In addition, this section required industrial facilities and large MS4s to submit NPDES permit applications for storm water discharges by February 4, 1990. Medium MS4s were to submit NPDES permit applications by February 4, 1992. EPA and authorized NPDES States were prohibited from requiring an NPDES permit for any other storm water discharges until October 1, 1994.

Section 402(p)(5) required EPA to conduct certain studies and submit a report to Congress. This requirement is discussed in the following section.

Section 402(p)(6) requires EPA, in consultation with States and local officials, to issue regulations for the designation of additional storm water discharges to be regulated to protect water quality. It also requires EPA to extend the existing storm water program to regulate newly designated sources. At a minimum, the extension must establish (1) priorities, (2) requirements for State storm water management programs, and (3) expeditious deadlines. Section 402(p)(6) specifies that the program may include performance standards, guidelines, guidance, and management practices and treatment requirements, as

appropriate. Today's rule implements this section.

D. EPA's Reports to Congress

Under CWA section 402(p)(5), EPA, in consultation with the States, was required to conduct a study. The study was to identify unregulated sources of storm water discharges, determine the nature and extent of pollutants in such discharges, and establish procedures and methods to mitigate the impacts of such discharges on water quality. Section 402(p)(5) also required EPA to report the results of the first two components of that study to Congress by October 1, 1988, and the final report by October 1, 1989.

In March 1995, EPA submitted to Congress a report that reviewed and analyzed the nature of storm water discharges from municipal and industrialacilities that were not already regulated under the initial NPDES regulations for storm water (U.S. Environmental Protection Agency, Office of Water. 1995. *Storm Water Discharges Potentially Addressed by Phase II of the National Pollutant Discharge Elimination System Storm Water Program: Report to Congress.* Washington, D.C. EPA 833–K–94–002) (''Report''). The Report also analyzed associated pollutant loadings and water quality impacts from these unregulated sources. Based on identification of unregulated municipal sources and analysis of information on impacts of storm water discharges from municipal sources, the Report recommended that the NPDES program for storm water focus on the 405 ''urbanized areas'' identified by the Bureau of the Census. The Report further found that a number of discharges from unregulated industrial facilities warranted further investigation to determine the need for regulation. It classified these unregulated industrial discharges in two groups: Group A and Group B. Group A comprised sources that may be considered a high priority for inclusion in the NPDES program for storm water because discharges from these sources are similar or identical to already regulated sources. These ''look alike'' storm water discharge sources were not covered in the initial NPDES regulations for storm water due to the language used to define ''associated with industrial activity.'' In the initial regulations for storm water, ''industrial activity'' is identified using Standard Industrial Classification (SIC) codes. The use of SIC codes led to incomplete categorization of industrial activities with discharges that needed to be regulated to protect water quality. Group B consisted of 18 industrial sectors, which included sources that EPA expected to contribute to storm water contamination due to the activities conducted and pollutants anticipated onsite (e.g., vehicle maintenance, machinery and electrical repair, and intensive agricultural activities).

EPA reported on the latter component of the section 402(p)(5) study via President Clinton's Clean Water Initiative, which was released on February 1, 1994 (U.S. Environmental Protection Agency, Office of Water. 1994. *President Clinton's Clean Water Initiative.* Washington, D.C. EPA 800–R–94–001) (''Initiative''). The Initiative addressed a number of issues associated with NPDES requirements for storm water discharges and proposed (1) establishing a phased compliance with a water quality standards approach for discharges from municipal separate storm sewer systems with priority on controlling discharges from municipal growth and development areas, (2) clarifying that the maximum extent practicable standard should be applied in a site-specific, flexible manner, taking into account cost considerations as well as water quality effects, (3) providing an exemption from the NPDES program for storm water discharges from industrial facilities with no activities or significant materials exposed to storm water, (4) providing extensions to the statutory deadlines to complete implementation of the NPDES program for the storm water program, (5) targeting urbanized areas for the requirements in the NPDES program for storm water, and (6) providing control of discharges from inactive and abandoned mines located on Federal lands in a more targeted, flexible manner. Additionally, prior to promulgation of today's rule, section 431 of the Agency's Appropriation Act for FY 2000 (Departments of Veterans Affairs and Housing and Urban Development and Independent Agencies Appropriations Act of 2000, Public Law 106–74, section 432 (1999)) directed EPA to report on certain matters to be covered in today's rule. That report supplements the study required by CWA Section 402(p)(5). EPA is publishing the availability of that report elsewhere in this issue of the **Federal Register**.

Several commenters asserted that the Report to Congress is an inadequate basis for the designation and regulation of sources covered under today's final rule, specifically the nationwide designation of small municipal separate storm sewer systems within urbanized areas and construction activities disturbing between one and five acres.

EPA believes that it has developed an adequate record for today's regulation both through the Report to Congress and the Clean Water Initiative and through more recent activities, including the FACA Subcommittee process, regulatory notices and evaluation of comments, and recent research and analysis. EPA does not interpret the congressional reporting requirements of CWA section 402(p)(5) to be the sole basis for determining sources to be regulated under today's final rule.

EPA's decision to designate on a national basis small MS4s in urbanized areas is supported by studies that clearly show a direct correlation between urbanization and adverse water quality impacts from storm water discharges. (Schueler, T. 1987. *Controlling Urban Runoff: A Practical Manual for Planning & Designing Urban BMPs.* Metropolitan Washington Council of Governments). ''Urbanized areas''—within which all small MS4s would be covered—represent the most intensely developed and dense areas of the Nation. They constitute only two percent of the land area but 63 percent of the total population. See section I.B.1, Urban Development, above, for studies and assessments of the link between urban development and storm water impacts on water resources.

Commenters argued that the Report to Congress does not address storm water discharges from construction sites. They further argued that the designation of small construction sites per today's final rule goes beyond the President's 1994 Initiative because the Initiative only recommends requiring municipalities to implement a storm water management program to control unregulated storm water sources, ''including discharges from construction of less than 5 acres, which are part of growth, development and significant redevelopment activities.'' They point out that the Initiative provides that unregulated storm water discharges not addressed through a municipal program would not be covered by the NPDES program. Commenters assert that EPA has not developed a record independent of its section 402(p)(5) studies that demonstrates the necessity of regulating under a separate NPDES permit storm water discharges from smaller construction sites ''to protect water quality.'' EPA disagrees.

EPA evaluated the nature and extent of pollutants from construction site sources in a process that was separate and distinct from the development of the Report to Congress. Today's decision to regulate certain storm water discharges from construction sites disturbing less than 5 acres arose in part

out of the 9th Circuit remand in *NRDC* v. *EPA,* 966 F.2d 1292 (9th Cir. 1992). In that case, the court remanded portions of the Phase I storm water regulations related to discharges from construction sites. Those regulations define ''storm water discharges associated with industrial activity'' to include only those storm water discharges from construction sites disturbing 5 acres or more of total land area (see 40 CFR 122.26(b)(14)(x)). In its decision, the court concluded that the 5-acre threshold was improper because the Agency had failed to identify information ''to support its perception that construction activities on less than 5 acres are non-industrial in nature'' (966 F.2d at 1306). The court remanded the below 5 acre exemption to EPA for further proceedings (966 F.2d at 1310).

In a **Federal Register** notice issued on December 18, 1992, EPA noted that it did not believe that the Court's decision had the effect of automatically subjecting small construction sites to the existing application requirements and deadlines. EPA believed that additional notice and comment were necessary to clarify the status of these sites. The information received during the notice and comment process and additional research, as discussed in section I.B.3 Construction Site Runoff, formed the basis for the designation of construction activity disturbing between one and five acres on a nationwide basis. EPA's objectives in today's proposal include an effort to (1) address the 9th Circuit remand, (2) address water quality concerns associated with construction activities that disturb less than 5 acres of land, and (3) balance conflicting recommendations and concerns of stakeholders.

One commenter noted that EPA's proposal would fail to regulate industrial facilities identified as Group A and Group B in the March 1995 *Report to Congress.* EPA is relying on the analysis in the Report, which provided that the recommendation for coverage was meant as guidance and was not intended to be an identification of specific categories that must be regulated under Section 402(p)(6). *Report to Congress,* p. 4–1. The Report recognized the existence of limited data on which to base loadings estimates to support the nationwide designation of individual or categories of sources. *Report to Congress,* p. 4–44. Furthermore, during FACA Subcommittee discussion, EPA continued to urge stakeholders to provide further data relating to industrial and commercial storm water sources, which EPA did not receive. EPA concluded that, due to insufficient data, these sources were not appropriate for nationwide designation at this time.

E. Industrial Facilities Owned or Operated by Small Municipalities

Congress granted extensions to the NPDES permit application process for selected classes of storm water discharges associated with industrial activity. On December 18, 1991, Congress enacted the Intermodal Surface Transportation Efficiency Act (ISTEA), which postponed NPDES permit application deadlines for most storm water discharges associated with industrial activity at facilities that are owned or operated by small municipalities. EPA and States authorized to administer the NPDES program could not require any municipality with a population of less than 100,000 to apply for or obtain an NPDES permit for any storm water discharge associated with industrial activity prior to October 1, 1992, except for storm water discharges from airports, power plants, or uncontrolled sanitary landfills. See 40 CFR 122.26(e)(1); 57 FR 11524, April 2, 1992 (reservation of NPDES application deadlines for ISTEA facilities).

The facilities exempted by ISTEA discharge storm water in the same manner (and are expected to use identical processes and materials) as the industrial facilities regulated under the 1990 Phase I regulations. Accordingly, these facilities pose similar water quality problems. The extended moratorium for these facilities was necessary to allow municipalities additional time to comply with NPDES requirements. The proposal for today's rule would have maintained the existing deadline for seeking coverage under an NPDES permit (August 7, 2001).

Today's rule changes the permit application deadline for such municipally owned or operated facilities discharging industrial storm water to make it consistent with the application date for small regulated MS4s. Because EPA missed its March 1999 deadline for promulgating today's rule, and the deadline for MS4s to submit permit applications has been extended to three years and 90 days from the date of this notice, the deadline for permitting ISTEA sources has been similarly extended. The permitting of these sources is discussed below in section ''II.I.3. ISTEA Sources.''

F. Related Nonpoint Source Programs

Today's rule addresses point source discharges of storm water runoff and non-storm water discharges into MS4s. Many of these sources have been addressed by nonpoint source control programs, which are described briefly below.

In 1987, section 319 was added to the CWA to provide a framework for funding State and local efforts to address pollutants from nonpoint sources not addressed by the NPDES program. To obtain funding, States are required to submit Nonpoint Source Assessment Reports identifying State waters that, without additional control of nonpoint sources of pollution, could not reasonably be expected to attain or maintain applicable water quality standards or other goals and requirements of the CWA. States are also required to prepare and submit for EPA approval a statewide Nonpoint Source Management Program for controlling nonpoint source water pollution to navigable waters within the State and improving the quality of such waters. State program submittals must identify specific best management practices (BMPs) and measures that the State proposes to implement in the first four years after program submission to reduce pollutant loadings from identified nonpoint sources to levels required to achieve the stated water quality objectives.

State nonpoint source programs funded under section 319 can include both regulatory and nonregulatory State and local approaches. Section 319(b)(2)(B) specifies that a combination of ''nonregulatory or regulatory programs for enforcement, technical assistance, financial assistance, education, training, technology transfer, and demonstration projects' may be used, as necessary, to achieve implementation of the BMPs or measures identified in the section 319 submittals.

Section 6217 of the Coastal Zone Act Reauthorization Amendments (CZARA) of 1990 provides that States with approved coastal zone management programs must develop coastal nonpoint pollution control programs and submit them to EPA and the National Oceanic and Atmospheric Administration (NOAA) for approval. Failure to submit an approvable program will result in a reduction of Federal grants under both the Coastal Zone Management Act and section 319 of the CWA.

State coastal nonpoint pollution control programs under CZARA must include enforceable policies and mechanisms that ensure implementation of the management measures throughout the coastal management area. *EPA issued Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters* under section 6217(g) in

January 1993. The guidance identifies management measures for five major categories of nonpoint source pollution. The management measures reflect the greatest degree of pollutant reduction that is economically achievable for each of the listed sources. These management measures provide reference standards for the States to use in developing or refining their coastal nonpoint programs. A few management measures, however, contain quantitative standards that specify pollutant loading reductions. For example, the New Development Management Measure, which is applicable to construction in urban areas, requires (1) that by design or performance the average annual total suspended solid loadings be reduced by 80 percent and (2) to the extent practicable, that the pre-development peak runoff rate and average volume be maintained.

EPA and NOAA published *Coastal Nonpoint Pollution Control Program: Program Development and Approval Guidance* (1993). The document clarifies that States generally must implement management measures for each source category identified in the EPA guidance developed under section 6217(g). Coastal Nonpoint Pollution Control Programs are not required to address sources that are clearly regulated under the NPDES program as point source discharges. Specifically, such programs would not need to address small MS4s and construction sites covered under NPDES storm water permits (both general and individual).

II. Description of Program

A. Overview

1. Objectives EPA Seeks To Achieve in Today's Rule

EPA seeks to achieve several objectives in today's final rule. First, EPA is implementing the requirement under CWA section 402(p)(6) to provide a comprehensive storm water program that designates and controls additional sources of storm water discharges to protect water quality. Second, EPA is addressing storm water discharges from the activities exempted under the 1990 storm water permit application regulations that were remanded by the Ninth Circuit Court of Appeals in NRDC v. EPA, 966 F.2d 1292 (9th Circuit, 1992). These are construction activities disturbing less than 5 acres and so-called ''light'' industrial activities not exposed to storm water (see discussion of ''no exposure'' below). Third, EPA is providing coverage for the so-called ''donut holes'' created by the existing NPDES storm water program. Donut holes are geographic gaps in the NPDES storm water program's regulatory scheme. They are MS4s located within areas covered by the existing NPDES storm water program, but not currently addressed by the storm water program because it is based on political jurisdictions. Finally, EPA also is trying to promote watershed planning as a framework for implementing water quality programs where possible.

Although EPA had options for different approaches (see alternatives discussed in the January 9, 1998, proposed regulation), EPA believes it can best achieve its objectives through flexible innovations within the framework of the NPDES program. Unlike the interim section 402(p)(6) storm water regulations EPA promulgated in 1995, EPA no longer designates all of the unregulated storm water discharges for nationwide coverage under the NPDES program for storm water. The framework for today's final rule is one that balances automatic designation on a nationwide basis and locally-based designation and waivers. Nationwide designation applies to those classes or categories of storm water discharges that EPA believes present a high likelihood of having adverse water quality impacts, regardless of location. Specifically, today's rule designates discharges from small MS4s located in urbanized areas and storm water discharges from construction activities that result in land disturbance equal to or greater than one and less than five acres. As noted under Section I.B., Water Quality Concerns/Environmental Impact Studies and Assessments, these two categories of storm water sources, when unregulated, tend to cause significant adverse water quality impacts. Additional sources are not covered on a nationwide basis either because EPA currently lacks information indicating a consistent potential for adverse water quality impact or because EPA believes that the likelihood of adverse impacts on water quality is low, with some localized exceptions. Additional individual sources or categories of storm water discharges could, however, be covered under the program through a local designation process. A permitting authority may designate additional small MS4s after developing designation criteria and applying those criteria to small MS4s located outside of an urbanized area, in particular those with a population of 10,000 or more and a population density of at least 1,000. Exhibit 1 illustrates the designation framework for today's final rule.

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EXHIBIT 1.—PHASE II SOURCE DECISIONS

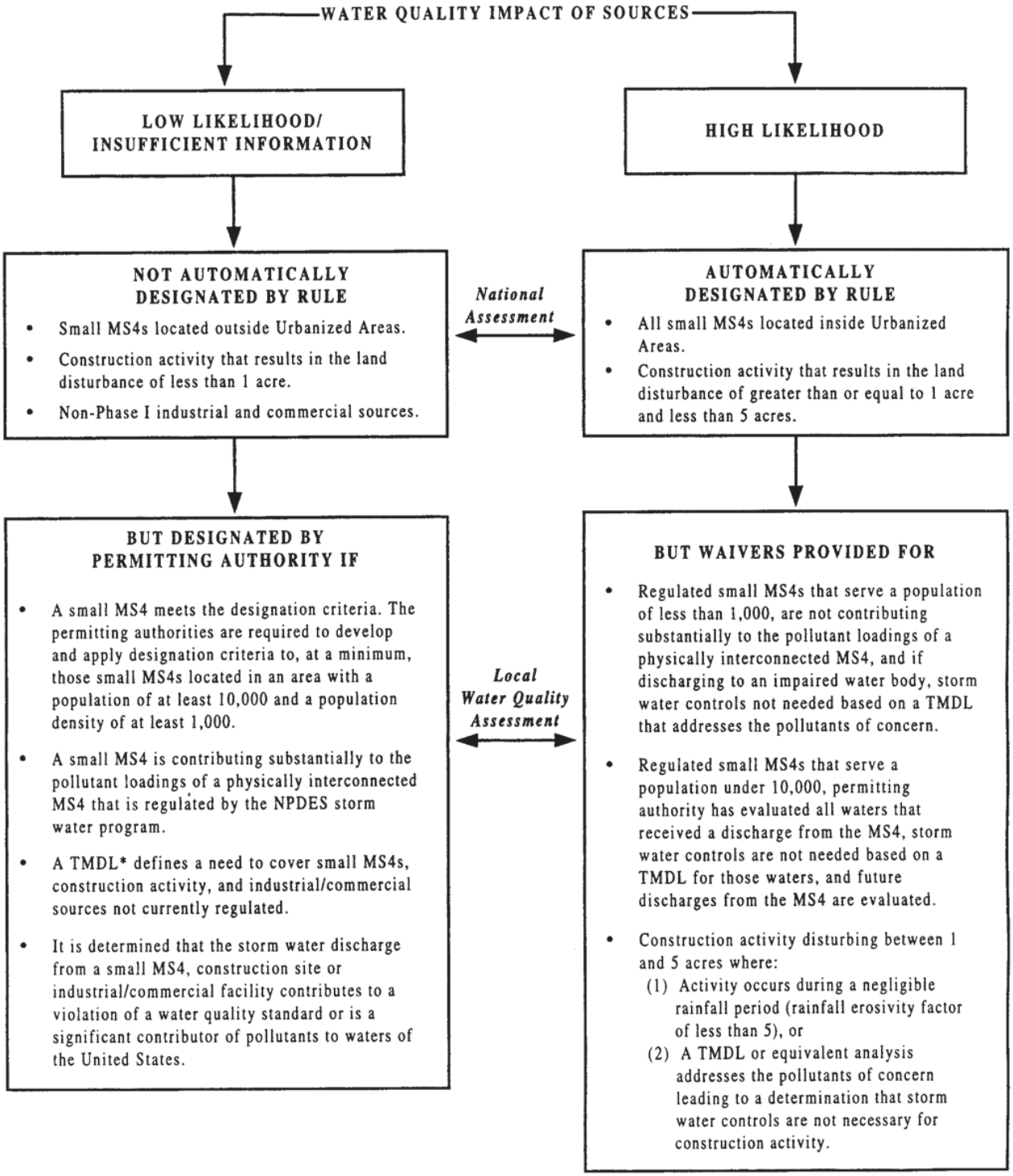

*EPA will continue to require States to comply with their Total Maximum Daily Load (TMDL) implementation schedules.

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The designation framework for today's final rule provides a significant degree of flexibility. The proposed provisions for nationwide designation of storm water discharges from construction and from small MS4s in urbanized areas allowed for a waiver of applicable requirements based on appropriate water quality conditions. Today's final rule expands and simplifies those waivers.

The permitting authority may waive the requirement for a permit for any small MS4 serving a jurisdiction with a population of less than 1,000 unless storm water controls are needed because the MS4 is contributing to a water quality impairment. The permitting authority may also waive permit coverage for MS4s serving a jurisdiction with a population of less than 10,000 if all waters that receive a discharge from the MS4 have been evaluated and discharges from the MS4 do not significantly contribute to a water quality impairment or have the potential to cause an impairment. Today's rule also allows States with a watershed permitting approach to phase in coverage for MS4s in jurisdictions with populations under 10,000.

Water quality conditions are also the basis for a waiver of requirements for storm water discharges from construction activities disturbing between one and five acres. For these small construction sources, the rule provides significant flexibility for waiving otherwise applicable regulatory requirements where a permitting authority determines, based on water quality and watershed considerations, that storm water discharge controls are not needed.

Coverage can be extended to municipal and construction sources outside the nationwide designated classes or categories based on watershed and case-by-case assessments. For the municipal storm water program, today's rule provides broad discretion to NPDES permitting authorities to develop and implement criteria for designating storm water discharges from small MS4s outside of urbanized areas. Other storm water discharges from unregulated industrial, commercial, and residential sources will not be subject to the NPDES permit requirements unless a permitting authority determines on a case-by-case basis (or on a categorical basis within identified geographic areas such as a State or watershed) that regulatory controls are needed to protect water quality. EPA believes that the flexibility provided in today's rule facilitates watershed planning.

2. General Requirements for Regulated Entities Under Today's Rule

As previously noted, today's final rule defines additional classes and categories of storm water discharges for coverage under the NPDES program. These designated dischargers are required to seek coverage under an NPDES permit. Furthermore, all NPDES-authorized States and Tribes are required to implement these provisions and make any necessary amendments to current State and Tribal NPDES regulations to ensure consistency with today's final rule. EPA remains the NPDES permitting authority for jurisdictions without NPDES authorization.

Today's final rule includes some new requirements for NPDES permitting authorities implementing the CWA section 402(p)(6) program. EPA has made a significant effort to build flexibility into the program while attempting to maintain an appropriate level of national consistency. Permitting authorities must ensure that NPDES permits issued to MS4s include the minimum control measures established under the program. Permitting authorities also have the ability to make numerous decisions including who is regulated under the program, i.e., case-by-case designations and waivers, and how responsibilities should be allocated between regulated entities.

Today's final rule extends the NPDES program to include discharges from the following: small MS4s within urbanized areas (with the exception of systems waived from the requirements by the NPDES permitting authority); other small MS4s meeting designation criteria to be established by the permitting authority; and any remaining MS4 that contributes substantially to the storm water pollutant loadings of a physically interconnected MS4 already subject to regulation under the NPDES program. Small MS4s include urban storm sewer systems owned by Tribes, States, political subdivisions of States, as well as the United States, and other systems located within an urbanized area that fall within the definition of an MS4. These include, for example, State departments of transportation (DOTs), public universities, and federal military bases.

Today's final rule requires all regulated small MS4s to develop and implement a storm water management program. Program components include, at a minimum, 6 minimum measures to address: public education and outreach; public involvement; illicit discharge detection and elimination; construction site runoff control; post-construction storm water management in new development and redevelopment; and pollution prevention and good housekeeping of municipal operations. These program components will be implemented through NPDES permits. A regulated small MS4 is required to submit to the NPDES permitting authority, either in its notice of intent (NOI) or individual permit application, the BMPs to be implemented and the measurable goals for each of the minimum control measures listed above.

The rule addresses all storm water discharges from construction site activities involving clearing, grading and excavating land equal to or greater than 1 acre and less than 5 acres, unless requirements are otherwise waived by the NPDES permitting authority. Discharges from such sites, as well as construction sites disturbing less than 1 acre of land that are designated by the permitting authority, are required to implement requirements set forth in the NPDES permit, which may reference the requirements of a qualifying local program issued to cover such discharges.

The rule also addresses certain other sources regulated under the existing NPDES program for storm water. For municipally-owned industrial sources required to be regulated under the existing NPDES storm water program but exempted from immediate compliance by the Intermodal Surface Transportation Act of 1991 (ISTEA), the rule revises the existing deadline for seeking coverage under an NPDES permit (August 7, 2001) to make it consistent with the application date for small regulated MS4s. (See section I.3. below.) The rule also provides relief from NPDES storm water permitting requirements for industrial sources with no exposure of industrial materials and activities to storm water.

3. Integration of Today's Rule With the Existing Storm Water Program

In developing an approach for today's final rule, numerous early interested stakeholders encouraged EPA to seek opportunities to integrate, where possible, the proposed Phase II requirements with existing Phase I requirements, thus facilitating a unified storm water discharge control program. EPA believes that this objective is met by using the NPDES framework. This framework is already applied to regulated storm water discharge sources and is extended to those sources designated under today's rule. This approach facilitates program consistency, public access to information, and program oversight.

EPA believes that today's final rule provides consistency in terms of program coverage and requirements for existing and newly designated sources. For example, the rule includes most of the municipal donut holes, those MS4s located in incorporated places, townships or towns with a population under 100,000 that are within Phase I counties. These MS4s are not addressed by the existing NPDES storm water program while MS4s in the surrounding county are currently addressed. In addition, the minimum control measures required in today's rule for regulated small MS4s are very similar to a number of the permit requirements for medium and large MS4s under the existing storm water program. Following today's rule, permit requirements for all regulated MS4s (both those under the existing program and those under today's rule) will require implementation of BMPs. Furthermore, with regard to the development of NPDES permits to protect water quality, EPA intends to apply the August 1, 1996, *Interim Permitting Approach for Water Quality-Based Effluent Limitations in Storm Water Permits* (hereinafter, ''Interim Permitting Approach'') (see Section II.L.1. for further description) to all MS4s covered by the NPDES program.

EPA is applying NPDES permit requirements to construction sites below 5 acres that are similar to the existing requirements for those above 5 acres and above. In addition, today's rule allows compliance with qualifying local, Tribal, or State erosion and sediment controls to meet the erosion and sediment control requirements of the general permits for storm water discharges associated with construction, both above and below 5 acres.

4. General Permits

EPA recommends using general permits for all newly regulated storm water sources under today's rule. The use of general permits, instead of individual permits, reduces the administrative burden on permitting authorities, while also limiting the paperwork burden on regulated parties seeking permit authorization. Permitting authorities may, of course, require individual permits in some cases to address specific concerns, including permit non-compliance.

EPA recommends that general permits for MS4s, in particular, be issued on a watershed basis, but recognizes that each permitting authority must decide how to develop its general permit(s). Permit conditions developed to address concerns and conditions of a specific watershed could reflect a watershed plan; such permit conditions must provide for attainment of applicable water quality standards (including designated uses), allocations of pollutant loads established by a TMDL, and timing requirements for implementation of a TMDL. If the permitting authority issues a State-wide general permit, the permitting authority may include separate conditions tailored to individual watersheds or urbanized areas. Of course, for a newly regulated MS4, modification of an existing individual MS4 permit to include the newly regulated MS4 as a ''limited co-permittee'' also remains an option.

5. Tool Box

During the FACA process, many Storm Water Phase II FACA Subcommittee representatives expressed an interest, which was endorsed by the full Committee, in having EPA develop a ''tool box'' to assist States, Tribes, municipalities, and other parties involved in the Phase II program. EPA made a commitment to work with Storm Water Phase II FACA Subcommittee representatives in developing such a tool box, with the expectation that a tool box would facilitate implementation of the storm water program in an effective and cost-efficient manner. EPA has developed a preliminary working tool box (available on EPA's web page at www.epa.gov/owm/sw/toolbox). EPA intends to have the tool box fully developed by the time of the first general permits. EPA also intends to update the tool box as resources and data become available. The tool box will include the following eight main components: fact sheets; guidances; a menu of BMPs for the six MS4 minimum measures; an information clearinghouse; training and outreach efforts; technical research; support for demonstration projects; and compliance monitoring/assistance tools. EPA intends to issue the menu of BMPs, both structural and non-structural, by October 2000. In addition, EPA will issue by October 2000 a ''model'' permit and will issue by October 2001 guidance materials on the development of measurable goals for municipal programs.

In an attempt to avoid duplication, the Agency has undertaken an effort to identify and coordinate sources of information that relate to the storm water discharge control program from both inside and outside the Agency. Such information includes research and demonstration projects, grants, storm water management-related programs, and compendiums of available documents, including guidances, related directly or indirectly to the comprehensive NPDES storm water program. Based on this effort, EPA is developing a tool box containing fact sheets and guidance documents pertaining to the overall program and rule requirements (e.g., guidance on municipal and construction programs, and permitting authority guidance on designation and waiver criteria); models of current programs aimed at assisting States, Tribes, municipalities, and others in establishing programs; a comprehensive list of reference documents organized according to subject area (e.g., illicit discharges, watersheds, water quality standards attainment, funding sources, and similar types of references); educational materials; technical research data; and demonstration project results. The information collected by EPA will not only provide the background for tool box materials, but will also be made available through an information clearinghouse on the world wide web.

With assistance from EPA, the American Public Works Association (APWA) developed a workbook and series of workshops on the proposed Phase II rule. Ten workshops were held from September 1998 through May 1999. Depending on available funding, these workshops may continue after publication of today's final rule. EPA also intends to provide training to enable regional offices to educate States, Tribes, and municipalities about the storm water program and the availability of the tool box materials.

The CWA currently provides funding mechanisms to support activities related to storm water. These mechanisms will be described in the tool box. Activities funded under grant and loan programs, which could be used to assist in storm water program development, include programs in the nonpoint source area, storm water demonstration projects, source water protection and wastewater construction projects. EPA has already provided funding for numerous research efforts in these areas, including a database of BMP effectiveness studies (described below), an assessment of technologies for storm water management, a study of the effectiveness of storm water BMPs for controlling the impacts of watershed imperviousness, protocols for wet weather monitoring, development of a dynamic model for wet weather flows, and numerous outreach projects.

EPA has entered into a cooperative agreement with the Urban Water Resources Research Council of the American Society of Civil Engineers (ASCE) to develop a scientifically-based management tool for the information

needed to evaluate the effectiveness of urban storm water runoff BMPs nationwide. The long-term goal of the National Stormwater BMP Database project is to promote technical design improvements for BMPs and to better match their selection and design to the local storm water problems being addressed. The project team has collected and evaluated hundreds of existing published BMP performance studies and created a database covering about 75 test sites. The database includes detailed information on the design of each BMP and its watershed characteristics, as well as its performance. Eventually the database will include the nationwide collection of information on the characteristics of structural and non-structural BMPs, data collection efforts (*e.g.,* sampling and flow gaging equipment), climatological characteristics, watershed characteristics, hydrologic data, and constituent data. The database will continue to grow as new BMP data become available. The initial release of the database, which includes data entry and retrieval software, is available on CD–ROM and operates on Windows®-compatible personal computers. The ASCE project team envisions that periodic updates to the database will be distributed through the Internet. The team is currently developing a system for Internet retrieval of selected database records, and this system is expected to be available in early 2000.

EPA and ASCE invite BMP designers, owners and operators to participate in the continuing database development effort. To make this effort successful, a large database is essential. Interested persons are encouraged to submit their BMP performance evaluation data and associated BMP watershed characteristics for potential entry into the database. The software included in the CD-ROM allows data providers to enter their BMP data locally, retain and edit the data as needed, and submit them to the ASCE Database Clearinghouse when ready.

To obtain a copy of the database, please contact Jane Clary, Database Clearinghouse Manager, Wright Water Engineers, Inc., 2490 W. 26th Ave., Suite 100A, Denver, CO 80211; Phone 303–480–1700; E-mail clary@wrightwater.com.

In addition, EPA requests that researchers planning to conduct BMP performance evaluations compile and collect BMP reporting information according to the standard format developed by ASCE. The format is provided with the database software and is also available on the ASCE website at www.asce.org/peta/tech/nsbd01.html.

6. Deadlines Established in Today's Action

Exhibit 2 outlines the various deadlines established under today's final rule. EPA believes that the dates allow sufficient time for completion of both the NPDES permitting authority's and the permittee's program responsibilities.

EXHIBIT 2–STORM WATER PHASE II ACTIONS DEADLINES

Activity	Deadline date
NPDES-authorized States modify NPDES program if no statutory change is required.	1 year from date of publication of today's rule in the **Federal Register**.
NPDES-authorized States modify NPDES program if statutory change is required.	2 years from date of publication of today's rule in the **Federal Register**.
EPA issues a menu of BMPs for regulated small MS4s	October 27, 2000
ISTEA sources submit permit application	3 years and 90 days from date of publication of today's rule in the **Federal Register**.
Permitting authority issues general permit(s) (if this type of permit coverage is selected).	3 years from date of publication of today's rule in the **Federal Register**.
Regulated small MS4s submit permit application:	
a. If designated under § 122.32(a)(1) unless the permitting authority has established a phasing schedule under § 123.35(d)(3).	a. 3 years and 90 days from date of publication of today's rule in the **Federal Register**.
b. If designated under § 122.32(a)(2) or §§ 122.26(a)(9)(i) (C) or (D).	b. Within 180 days of notice.
Storm water discharges associated with small construction activity submit permit application:	
a. If designated under § 122.26(b)(15)(i)	a. 3 years and 90 days from date of publication of today's rule in the **Federal Register**
b. If designated under § 122.26(b)(15)(ii)	b. Within 180 days of notice.
Permitting authority designates small MS4s under § 123.35(b)(2)	3 years from date of publication of today's rule in the **Federal Register** or 5 years from date of publication of today's rule in the **Federal Register** if a watershed plan is in place
Regulated small MS4s' program fully developed and implemented	Up to 5 years from date of permit issuance.
Reevaluation of the municipal storm water rules by EPA	13 years from date of publication of today's rule in the **Federal Register**
Permitting authority determination on a petition	Within 180 days of receipt.
Non-municipal sources designated under § 122.26(a)(9)(i) (C) or (D) submit permit application.	Within 180 days of notice.
Submission of No Exposure Certification	Every 5 years.

B. Readable Regulations

Today, EPA is finalizing new regulations in a ''readable regulation'' format. This reader-friendly, plain language approach is a departure from traditional regulatory language and should enhance the rule's readability. These plain language regulations use questions and answers, ''you'' to identify the person who must comply, and terms like ''must'' rather than ''shall'' to identify a mandate. This new format, which minimizes layers of subparagraphs, should also allow the reader to easily locate specific provisions of the regulation.

Some sections of today's final rule are presented in the traditional language and format because these sections amend existing regulations. The readable regulation format was not used in these existing provisions in an attempt to avoid confusion or disruption

of the readability of the existing regulations.

Most commenters supported EPA's use of plain language and agreed with EPA that the question and answer format makes the rule easier to understand. Three commenters thought that EPA should retain the traditional rule format. The June 1, 1998, Presidential memorandum directs all government agencies to write documents in plain language. Based on the majority of the comments, EPA has retained the plain language format used in the January 9, 1998, proposal in today's final rule.

The proposal to today's final rule included guidance as well as legal requirements. The word ''must'' indicates a requirement. Words like ''should,'' ''could,'' or ''encourage'' indicate a recommendation or guidance. In addition, the guidance was set off in parentheses to distinguish it from requirements.

EPA received numerous comments supporting the inclusion of guidance in the text of the Code of Federal Regulations (CFR), as well as comments opposing inclusion of guidance. Supporters stated that preambles and guidance documents are often not accessible when rules are implemented. Any language not included in the CFR is therefore not available when it may be most needed. Commenters that opposed including guidance in the CFR expressed the concern that any language in the rule might be interpreted as a requirement, in spite of any clarifying language. They suggested that guidance be presented in the preamble and additional guidance documents.

The majority of commenters on this issue thought that the guidance should be retained but the distinction between requirements and guidance should be better clarified. Suggestions included clarifying text, symbols, and a change from use of the word ''should'' to ''EPA recommends'' or ''EPA suggests''. EPA believes that it is important to include the guidance in the rule and agrees that the distinction between requirements and EPA recommendations must be very clear. In today's final rule, EPA has put the guidance in paragraphs entitled ''Guidance'' and replaced the word ''should'' with ''EPA recommends.'' This is intended to clarify that the recommendations contained in the guidance paragraphs are not legally binding.

C. Program Framework: NPDES Approach

Today's rule regulates Phase II sources using the NPDES permit program. EPA interprets Clean Water Act section 402(p)(6) as authorizing the Agency to develop a storm water program for Phase II sources either as part of the existing NPDES permit program or as a stand alone non-NPDES program such as a self-implementing rule. Under either approach, EPA interprets section 402(p)(6) as directing EPA to publish regulations that ''regulate'' the remaining unregulated sources, specifically to establish requirements that are federally enforceable under the CWA. Although EPA believes that it has the discretion to not require sources regulated under CWA section 402(p)(6) to be covered by NPDES permits, the Agency has determined, for the reasons discussed below, that it is most appropriate to use NPDES permits in implementing the program to address the sources designated for regulation in today's rule.

As discussed in Section II.A, Overview, EPA sought to achieve certain goals in today's final rule. EPA believes that the NPDES program best achieves EPA's goals for today's final rule for the reasons discussed below.

Requiring Phase II sources to be covered by NPDES permits helps address the consistency problems currently caused by municipal ''donut holes.'' Donut holes are gaps in program coverage where a small unregulated MS4 is located next to or within a regulated larger MS4 that is subject to an NPDES permit under the Phase I NPDES storm water program. The existence of such ''donut holes'' creates an equity problem because similar discharges may remain unregulated even though they cause or contribute to the same adverse water quality impacts. Using NPDES permits to regulate the unregulated discharges in these areas is intended to facilitate the development of a seamless regulatory program for the mitigation and control of contaminated storm water discharges in an urbanized area. For example, today's rule allows a newly regulated MS4 to join as a ''limited'' co-permittee with a regulated MS4 by referencing a common storm water management program. Such cooperation should be further encouraged by the fact that the minimum control measures required in today's rule for regulated small MS4s are very similar to a number of the permit requirements for medium and large MS4s under the Phase I storm water program. The minimum control measures applicable to discharges from smaller MS4s are described with slightly more generality than under the Phase I permit application regulations for larger MS4s, thus enabling maximum flexibility for operators of smaller MS4s to optimize efforts to protect water quality.

Today's rule also applies NPDES permit requirements to construction sites below 5 acres that are similar to the existing requirements for those 5 acres and above. In addition, the rule would allow compliance with qualifying local, Tribal, or State erosion and sediment controls to meet the erosion and sediment control requirements of the general permits for storm water discharges associated with construction, both above and below 5 acres.

Incorporating the CWA section 402(p)(6) program into the NPDES program capitalizes upon the existing governmental infrastructure for administration of the NPDES program. Moreover, much of the regulated community already understands the NPDES program and the way it works.

Another goal of the NPDES program approach is to provide flexibility in order to facilitate and promote watershed planning and sensitivity to local conditions. NPDES permits promote those goals in several ways. NPDES general permits may be used to cover a category of regulated sources on a watershed basis or within political boundaries. The NPDES permitting process provides a mechanism for storm water controls tailored on a case-by-case basis, where necessary. In addition, the NPDES permit requirements of a permittee may be satisfied by another cooperating entity. Finally, NPDES permits may incorporate the requirements of existing State, Tribal and local programs, thereby accommodating State and Tribes seeking to coordinate the storm water program with other programs, including those that focus on watershed-based nonpoint source regulation.

In promoting the watershed approach to program administration, EPA believes NPDES general permits can cover a category of dischargers within a defined geographic area. Areas can be defined very broadly to include political boundaries (e.g., county), watershed boundaries, or State or Tribal land.

NPDES permits generally require an application or a notice of intent(NOI) to trigger coverage. This information exchange assures communication between the permitting authority and the regulated community. This communication is critical in ensuring that the regulated community is aware of the requirements and the permitting authority is aware of the potential for adverse impacts to water quality from identifiable locations. The NPDES permitting process includes the public as a valuable stakeholder and ensures

that the public is included and information is made publicly available.

Another concern for EPA and several stakeholders was that the program ensure citizen participation. The NPDES approach ensures opportunities for citizen participation throughout the permit issuance process, as well as in enforcement actions. NPDES permits are also federally enforceable under the CWA.

EPA believes that the use of NPDES permits makes a significant difference in the degree of compliance with regulations in the storm water program. The NPDES program provides for public participation in the development, enforcement and revision of storm water management programs. Citizen suit enforcement has assisted in focusing attention on adverse water quality impacts on a localized, public priority basis. Citizens frequently rely on the NPDES permitting process and the availability of NOIs to track program implementation and help them enforce regulatory requirements.

NPDES permits are also advantageous to the permittee. The NPDES permit informs the permittee about the scope of what it is expected do to be in compliance with the Clean Water Act. As explained more fully in EPA's April 1995 guidance, *Policy Statement on Scope of Discharge Authorization and Shield Associated with NPDES Permits*, compliance with an NPDES permit constitutes compliance with the Clean Water Act (see CWA section 402(k)). In addition, NPDES permittees are excluded from duplicative regulatory regimes under the Resource Conservation and Recovery Act and the Comprehensive Emergency Response, Compensation and Liability Act under RCRA's exclusions to the definition of ''solid waste'' and CERCLA's exemption for ''federally permitted releases.''

EPA considered suggestions that the Agency authorize today's rule to be implemented as a self-implementing rule. This would be a regulation promulgated at the Federal, State, or Tribal level to control some or all of the storm water dischargers regulated under today's rule. Under this approach, a rule would spell out the specific requirements for dischargers and impose the restrictions and conditions that would otherwise be contained in an NPDES permit. It would be effective until modified by EPA, a State, or a Tribe, unlike an NPDES permit which cannot exceed a duration of five years. Some stakeholders believed that this approach would reduce the burden on the regulated community (e.g., by not requiring permit applications), and considerably reduce the amount of additional paperwork, staff time and accounting required to administer the proposed permit requirements.

EPA is sensitive to the interest of some stakeholders in having a streamlined program that minimizes the burden associated with permit administration and maximizes opportunities for field time spent by regulatory authorities. Key provisions in today's rule address some of these concerns by promoting a streamlined approach to permit issuance by, for example, using general permits and allowing the incorporation of existing programs. By adopting the NPDES approach rather than a self-implementing rule, today's rule also allows for consistent regulation between larger MS4s and construction sites regulated under the existing storm water management rule and smaller sources regulated under today's rule.

EPA believes that it is most appropriate to use NPDES permits to implement a program to address the sources regulated by today's rule. In addition to the reasons discussed above, NPDES permits provide a better mechanism than would a self-implementing rule for tailoring storm water controls on a case-by-case basis, where necessary. One commenter reasoned this concern could be addressed by including provisions in the regulation that allow site-specific BMPs (*i.e.,* case-by-case permits), suggesting storm water discharges that might require site-specific BMPs can be identified during the designation process of the regulatory authority. EPA believes that, in addition to its complexity, the commenter's approach lacks the other advantages of the NPDES permitting process.

A self-implementing rule would not ensure the degree of public participation that the NPDES permit process provides for the development, enforcement and revision of the storm water management program. A self-implementing rule also might not have provided the regulated community the ''permit shield'' under CWA section 402(k) that is provided by an NPDES permit. Based on all these considerations, EPA declined to adopt a self-implementing rule approach and adopted the NPDES approach.

Some State representatives sought alternative approaches for State implementation of the storm water program for Phase II sources. These State representatives asserted that a non-NPDES alternative approach best facilitated watershed management and avoided duplication and overlapping regulations. These representatives believed the NPDES approach would undercut State programs that had developed storm water controls tailored to local watershed concerns. Finally, a number of commenters expressed the view that States implement a variety of programs not based on the CWA that are effective in controlling storm water, and that EPA should provide incentives for their implementation and improvement in performance.

Throughout the development of the rule, State representatives sought alternatives to the NPDES approach for State implementation of the storm water program for Phase II sources. Discussions focused on an approach whereby States could develop an alternative program that EPA would approve or disapprove based on identified criteria, including that the alternative non-NPDES program would result in ''equivalent or better protection of water quality.'' The State representatives, however, were unable to propose or recommend criteria for gauging whether a program would provide equivalent protection. EPA also did not receive any suggestions for objective, workable criteria in response to the Agency's explicit request for specific criteria (by which EPA could objectively judge such programs) in the preamble to the proposed rule.

EPA evaluated several existing State initiatives to address storm water and found many cases where standards under State programs may be coordinated with the Federal storm water program. Where the NPDES permit is developed in coordination with State standards, there are opportunities to avoid duplication and overlapping requirements. Under today's rule, an NPDES permitting authority may include conditions in the NPDES permit that direct an MS4 to follow the requirements imposed under State standards, rather than the requirements of § 122.34(b). This is allowed as long as the State program at a minimum imposes the relevant requirements of § 122.34(b). Additional opportunities follow from other provisions in today's rule.

Seeking to further explore the feasibility of a non-NPDES approach, the Agency, after the proposal, had extensive discussions with representatives of a number of States. Discussions related specifically to possible alternatives for regulations of urban storm water discharges and MS4s specifically. The Agency also sought input on these issues from other stakeholders.

As a result of these discussions, many of the commenters provided input on issues such as: whether or not the Agency should require NPDES permits; whether location of MS4s in urbanized

areas should be the basis for designation or whether designation should be based on other determinations relating to water quality; whether States should be allowed to satisfy the conditions of the rule through the use of existing State programs; and issues concerning timing and resources for program implementation.

In response, today's rule still follows the regulatory scheme of the proposed rule, but incorporates additional flexibility to address some of the concerns raised by commenters.

In order to facilitate implementation by States that utilize a watershed permitting approach or similar approach (*i.e.,* based on a State's unified watershed assessments), today's rule allows States to phase in coverage for MS4s in jurisdictions with a population less than 10,000. Under such an approach, States could focus their resources on a rolling basis to assist smaller MS4s in developing storm water programs.

In addition, in response to concerns that the rule should not require permit coverage for MS4s that do not significantly contribute to water quality impairments, today's rule provides options for two waivers for small MS4s. The rule allows permitting authorities to exempt from the requirement for a permit any MS4 serving a jurisdiction with a population less than 1,000, unless the State determines that the MS4 must implement storm water controls because it is significantly contributing to a water quality impairment. A second waiver option applies to MS4s serving a jurisdiction with a population less than 10,000. For those MS4s, the State must determine that discharges from the MS4 do not significantly contribute to a water quality impairment, or have the potential for such an impairment, in order to provide the exemption. The State must review this waiver on a periodic basis no less frequently than once every five years.

Throughout the development of today's rule, commenters questioned whether the Clean Water Act authorized the use of the NPDES permit program, pointing out that the text of CWA 402(p)(6) does not use the word ''permit.'' Based on the absence of the word ''permit'' and the express mention of State storm water management programs, the commenters asserted that Congress did not intend for Phase II sources to be regulated using NPDES permits.

EPA disagrees with the commenters' interpretation of section 402(p)(6). Section 402(p)(6) does not preclude use of permits as part of the ''comprehensive program'' to regulate designated sources. The language provides EPA with broad discretion in the establishment of the ''comprehensive program.'' Absence of the word ''permit'' (a term that the statute does not otherwise define) does not preclude use of a permit, which is a familiar and reasonably well understood regulatory implementation vehicle. First, section 402(p)(6) says that EPA must establish a comprehensive program that ''shall, at a minimum, establish priorities, establish requirements for State stormwater management programs, and establish expeditious deadlines.'' The ''at a minimum'' language suggests that the Agency may, and perhaps should, develop a comprehensive program that does more than merely attend to these minimum criteria. Use of the term ''at a minimum'' preserves for the Agency broad discretion to establish a comprehensive program that includes use of NPDES permits.

Further, in the final sentence of the section, Congress included additional language to affirm the Agency's discretion. The final sentence clarifies that the Phase II program ''may include performance standards, guidelines, guidance, and management practices and treatment requirements, as appropriate.'' Under existing CWA programs, performance standards, (effluent limitations) guidelines, management practices, and treatment requirements are typically implemented through NPDES or dredge and fill permits.

Although EPA believes that it had the discretion to not require permits, the Agency has determined that it is reasonable to interpret section 402(p)(6) to authorize permits. Moreover, for the reasons discussed above, the Agency believes that it is appropriate to use NPDES permits in implementing today's rule.

D. Federal Role

Today's final rule describes EPA's approach to expand the existing storm water program under CWA section 402(p)(6). As in all other Federal programs, the Federal government plays an integral role in complying with, developing, implementing, overseeing, and enforcing the program. This section describes EPA's role in the revised storm water program.

1. Develop Overall Framework of the Program

The storm water discharge control program under CWA section 402(p)(6) consists of the rule, tool box, and permits. EPA's primary role is to ensure timely development and implementation of all components. Today's rule is a refinement of the first step in developing the program. EPA is fully committed to continuing to work with involved stakeholders on developing the tool box and issuing permits. As noted in today's rule, EPA will assess the municipal storm water program based on (1) evaluations of data from the NPDES municipal storm water program, (2) research concerning water quality impacts on receiving waters from storm water, and (3) research on BMP effectiveness. (Section II.H, Municipal Role, provides a more detailed discussion of this provision.)

EPA is planning to standardize minimum requirements for construction and post-construction BMPs in a new rulemaking under Title III of the CWA. While larger construction sites are already subject to NPDES permits (and smaller sites will be subject to permits pursuant to today's rule), the permits generally do not contain specific requirements for BMP design or performance. The permits require the preparation of storm water pollution prevention plans, but actual BMP selection and design is at the discretion of permittees, in conformance with applicable State and local requirements. Where there are existing State and local requirements specific to BMPs, they vary widely, and many jurisdictions do not have such requirements.

In developing these regulations, EPA intends to evaluate the inclusion of design and maintenance criteria as minimum requirements for a variety of BMPs used for erosion and sediment control at construction sites, as well as for permanent BMPs used to manage post-construction storm water discharges. The Agency plans to consider the merits and performance of all appropriate management practices (both structural and non-structural) that can be used to reduce adverse water quality impacts. EPA does not intend to require the use of particular BMPs at specific sites, but plans to assist builders and developers in BMP selection by publishing data on the performance to be expected by various BMP types. EPA would like to build upon the successes of some of the effective State and local storm water programs currently in place around the country, and to establish nation-wide criteria to support builders and local jurisdictions in appropriate BMP selection.

2. Encourage Consideration of Smart Growth Approaches

In the proposal, EPA invited comment on possible approaches for providing

incentives for local decision making that would limit the adverse impacts of growth and development on water quality. EPA asked for comments on this ''smart growth'' approach.

EPA received comments on all sides of this issue. A number of commenters supported the idea of ''smart growth'' incentives but did not present concrete ideas. Several commenters suggested ''smart growth'' criteria. States that have adopted ''smart growth'' laws were worried that EPA's focus on urbanized areas for municipal requirements could encourage development outside of designated growth areas. Today's final rule clearly allows States to expand coverage of their municipal storm water program outside of urbanized areas. In addition, the flexibility of the six municipal minimum measures should avoid encouragement of development into rural rather than urban areas. For example, as part of the post-construction minimum measure, EPA recommends that municipalities consider policies and ordinances that encourage infill development in higher density urban areas, and areas with existing infrastructure, in order to meet the measure's intent.

EPA also received several comments expressing concern that incorporating ''smart growth'' incentives threatened the autonomy of local governments. One commenter was worried that ''incentives'' could become more onerous than the minimum measures. EPA is very aware of municipal concerns about possible federal interference with local land use planning. EPA is also cognizant of the difficulty surrounding incentives for ''smart growth'' activities due to these concerns. However, the Agency believes it has addressed these concerns by proposing a flexible approach and will continue to support the concept of ''smart growth'' by encouraging policies that limit the adverse impacts of growth and development on water quality.

3. Provide Financial Assistance

Although Congress has not established a fund to fully finance implementation of the proposed extension of the existing NPDES storm water program under CWA section 402(p)(6), numerous federal financing programs (administered by EPA and other federal agencies) can provide some financial assistance. The primary funding mechanism is the Clean Water State Revolving Fund (SRF) program, which provides sources of low-cost financing for a range of water quality infrastructure projects, including storm water. In addition to the SRF, federal financial assistance programs include the Water Quality Cooperative Agreements under CWA section 104(b)(3), Water Pollution Control Program grants to States under CWA section 106, and the Transportation Equity Act for the 21st Century (TEA–21) among others. In addition, Section 319 funds may be used to fund any urban storm water activities that are not specifically required by a draft or final NPDES permit. EPA will develop a list of potential funding sources as part of the tool box implementation effort. EPA anticipates that some of these programs will provide funds to help develop and, in limited circumstances, implement the CWA section 402(p)(6) storm water discharge control program.

EPA received numerous comments that requested additional funding. Congress provided one substantial new source of potential funding for transportation related storm water projects—TEA–21. The Department of Transportation has included a number of water-related provisions in its TEA–21 planning. These include Transportation Enhancements, Environmental Restoration and Pollution Abatement, and Environmental Streamlining. More information on TEA–21 is available at the following internet sites: www.fhwa.dot.gov/tea21/outreach.htm and www.tea21.org.

4. Implement the Program in Jurisdictions Not Authorized To Administer the NPDES Program

Because today's final rule uses the NPDES framework, EPA will be the NPDES permitting authority in several States, Tribal jurisdictions, and Territories. As such, EPA will have the same responsibilities as any other NPDES permitting authority—issuing permits, designating additional sources, and taking appropriate enforcement actions—and will seek to tailor the storm water discharge control program to the specific needs in that State, Tribal jurisdiction, or Territory. EPA also plans to provide support and oversight, including outreach, training, and technical assistance to the regulated communities. Section II.G. of today's preamble provides a separate discussion related to the NPDES permitting authority's responsibilities for today's final rule.

5. Oversee State and Tribal Programs

Under the NPDES program, EPA plays an oversight role for NPDES-approved States and Tribes. In this role, EPA and the State or Tribe work together to implement, enforce, and improve the NPDES program. Part of this oversight role includes working with States and Tribes to modify their programs where programmatic or implementation concerns impede program effectiveness. This role will be vitally important when States and Tribes make adjustments to develop, implement, and enforce today's extension of the existing NPDES storm water discharge control program. In addition, States maintain a continuing planning process (CPP) under CWA section 303(e), which EPA periodically reviews to assess the program's achievements.

In its oversight role, EPA takes action to address States and Tribes who have obtained NPDES authorization but are not fulfilling their obligations under the NPDES program. If an NPDES-authorized State or Tribe fails to implement an adequate NPDES storm water program, for example, EPA typically enters into extensive discussions to resolve outstanding issues. EPA has the authority to withdraw the entire NPDES program when resolution cannot be reached. Partial program withdrawal is not provided for under the CWA except for partial approvals.

EPA is also working with the States and Tribes to improve nonpoint source management programs and assessments to incorporate key program elements. Key nonpoint source program elements include setting short and long term goals and objectives; establishing public and private partnerships; using a balanced approach incorporating Statewide and watershed-wide abatement of existing impairments; preventing future impairments; developing processes to address both impaired and threatened waters; reviewing and upgrading all program components, including program revisions on a 5-year cycle; addressing federal land management and activities inconsistent with State programs; and managing State nonpoint source management programs effectively.

In particular, EPA works with the States and Tribes to strengthen their nonpoint source pollution programs to address all significant nonpoint sources, including agricultural sources, through the CWA section 319 program. EPA is working with other government agencies, as well as with community groups, to effect voluntary changes regarding watershed protection and reduced nonpoint source pollution.

In addition, EPA and NOAA have published programmatic and technical guidance to address coastal nonpoint source pollution. Under Section 6217 of the CZARA, States are developing and implementing coastal nonpoint pollution control programs approved by EPA and NOAA.

6. Comply With Applicable Requirements as a Discharger

Today's final rule covers federally operated facilities in a variety of ways. These facilities are generally areas where people reside, such as a federal prison, hospital, or military base. It also includes federal parkways and road systems with separate storm sewer systems. Today's rule requires federal MS4s to comply with the same application deadlines that apply to regulated small MS4s generally. EPA believes that all federal MS4s serve populations of less than 100,000.

EPA received several comments that asked if individual buildings like post offices are considered to be small MS4s and thereby regulated in today's rule if they are in an urbanized area. Most of these buildings have at most a parking lot with runoff or a storm sewer that connects with a municipality's MS4. EPA does not intend that individual federal buildings be considered to be small MS4s. This is discussed in section II.H.2.b. of today's preamble.

Federal facilities can also be included under requirements addressing storm water discharges associated with small construction activities. In any case, discharges from these facilities will need to comply with all applicable NPDES requirements and any additional water quality-related requirements imposed by a State, Tribal, or local government. Failure to comply can result in enforcement actions. Federal facilities can act as models for municipal and private sector facilities and implement or test state-of-the-art management practices and control measures.

E. State Role

Today's final rule sets forth an NPDES approach for implementing the extension of the existing storm water discharge control program under CWA section 402(p)(6). State assumption of the NPDES program is voluntary, consistent with the principles of federalism. Because most States are approved to implement the NPDES program, they will tailor their storm water discharge control programs to address their water quality needs and objectives. While today's rule establishes the basic framework for the section 402(p)(6) program, States as well as Tribes (see discussion in section II.F) have an important role in fine-tuning the program to address the water quality issues within their jurisdictions. The basic framework allows for adjustments based on factors that vary geographically, including climate patterns and terrain.

Where States do not have NPDES authority, they are not required to implement the storm water discharge control program, but they may still participate in water quality protection through participation in the CWA section 401 certification process (for any permits) and through development of water quality standards and TMDLs.

1. Develop the Program

In expanding the existing NPDES program for storm water discharges, States must evaluate whether revisions to their NPDES programs are necessary. If so, modifications must be made in accordance with § 123.62. Under § 123.62, States must revise their NPDES programs within 1 year, or within 2 years if statutory changes are necessary.

Some States and departments of transportation (DOTs) commented that this timeframe is too short, anticipating that the State legislative process and the modification of regulations combined would take beyond 2 years. The deadline language in § 123.62 is not new language for the storm water discharge control program; it applies to all NPDES programs. EPA believes the vast majority of States will meet the deadline and will work with States in those cases where there may be difficulty meeting this deadline due to the timing of legislative sessions and the regulatory development process.

An authorized State NPDES program must meet the requirements of CWA section 402(b) and conform to the guidelines issued under CWA section 304(i)(2). Today's final rule under § 123.25 adds specific cross references to the storm water discharge control program components to ensure that States adequately address these requirements.

2. Comply With Applicable Requirements as a Discharger

Today's final rule covers State operated separate storm sewer systems in a variety of ways. These systems generally drain areas where people reside, such as a prison, hospital, or other populated facility. These systems are included under the definition of a regulated small MS4, which specifically identifies systems operated by State departments of transportation. Alternatively, storm water discharges from State activities may be regulated under the section addressing storm water discharges associated with small construction activities. In any case, discharges from these facilities must comply with all applicable NPDES requirements. Failure to comply can result in enforcement actions. State facilities can act as models for municipal and private sector facilities and implement or test state-of-the-art management practices and control measures.

3. Communicate With EPA

Under approved NPDES programs, States have an ongoing obligation to share information with EPA. This dialogue is particularly important in the CWA section 402(p)(6) storm water program where these governments continue to develop a great deal of the guidance and outreach related to water quality.

F. Tribal Role

The proposal to today's final rule provides background information on EPA's 1984 Indian Policy and the criteria for treatment of an Indian Tribe in the same manner as a State. Today's final rule extends the existing NPDES program for storm water discharges to two types of dischargers located in Indian country. First, the final rule designates storm water discharges from any regulated small MS4, including Tribal systems. Second, the final rule regulates discharges associated with construction activity disturbing between one and five acres of land, including sites located in Indian country. Operators in each of these categories of regulated activity must apply for coverage under an NPDES permit by 3 years and 90 days from the date of publication of today's final rule. Under existing regulations, however, EPA or an authorized NPDES Tribe may require a specified storm water discharger to apply for NPDES permit coverage before this deadline based on a determination that the discharge is contributing to a violation of a water quality standard (including designated uses) or is a significant contributor of pollutants.

Under today's rule, a Tribal governmental entity may regulate storm water discharges on its reservation in two ways—as either an NPDES-authorized Tribe or as a regulated MS4. If a Tribe is authorized to operate the NPDES program, the Tribe must implement today's final rule for the NPDES program for storm water for covered dischargers located within the EPA recognized boundaries. Otherwise, EPA is generally the permitting/program authority within Indian country. Discussions about the State Role in the preceding section also apply to NPDES authorized Tribes. For additional information on the role and responsibilities of the permitting authority in the NPDES storm water program, see § 123.35 (and Section II.G. of today's preamble) and § 123.25(a).

Under today's final rule, if the Indian reservation is located entirely or partially within an ''urbanized area,'' as defined in § 122.32(a)(1), the Tribe must obtain an NPDES permit if it operates a small MS4 within the urbanized area portion. Tribal MS4s located outside an urbanized area are not automatically covered, but may be designated by EPA pursuant to § 122.32(a)(2) of today's rule or may request designation as a regulated small MS4 from EPA. A Tribe that is a regulated MS4 for NPDES program purposes is required to implement the six minimum control measures to the extent allowable under Federal law.

The Tribal representative on the Storm Water Phase II FACA Subcommittee asked EPA to provide a list of the Tribes located in urbanized areas that would fall within the NPDES storm water program under today's final rule. In December 1996, EPA developed a list of federally recognized American Indian Areas located wholly or partially in Bureau of the Census-designated urbanized areas (see Appendix 1). Appendix 1 not only provides a listing of reservations and individual Tribes, but also the name of the particular urbanized area in which the reservation is located and an indication of whether the urbanized area contains a medium or large MS4 that is already covered by the existing Phase I regulations.

Some of the Tribes listed in Appendix 1 are only partially located in an urbanized area. If the Tribe's MS4 serves less than 1,000 people within an urbanized area, the permitting authority may waive the Tribe's MS4 storm water requirements if it meets the conditions of § 122.32(c). EPA does not have information on the Tribal populations within the urbanized areas, so it can not identify the Tribes that are eligible for a waiver. Therefore, a Tribe that believes it qualifies for a waiver should contact its permitting authority.

G. NPDES Permitting Authority's Role for the NPDES Storm Water Small MS4 Program

As noted previously, the NPDES permitting authority can be EPA or an authorized State or an authorized Tribe. The following discussion describes the role of the NPDES permitting authority under today's final rule.

1. Comply With Implementation Requirements

NPDES permitting authorities must perform certain duties to implement the NPDES storm water municipal program. Section 123.35(a) of today's final rule emphasizes that permitting authorities have existing obligations under the NPDES program. Section 123.35 focuses on specific issues related to the role of the NPDES authority to support administration and implementation of the municipal storm water program under CWA section 402(p)(6).

2. Designate Sources

Section 123.35(b) of today's final rule addresses the requirements for the NPDES permitting authority to designate sources of storm water discharges to be regulated under §§ 122.32 through 122.36. NPDES permitting authorities must develop a process, as well as criteria, to designate small MS4s. They must also have the authority to designate a small MS4 if and when circumstances that support a waiver under § 122.32(c) change. EPA may make designations if an NPDES-approved State or Tribe fails to do so.

NPDES permitting authorities must examine geographic jurisdictions that they believe should be included in the storm water discharge control program but are not located in an ''urbanized area''. Small MS4s in these areas are not designated automatically. Discharges from such areas should be brought into the program if found to have actual or potential exceedances of water quality standards, including impairment of designated uses, or other adverse impacts on water quality, as determined by local conditions or watershed and TMDL assessments. EPA's aim is to address discharges to impaired waters and to protect waters with the potential for problems. EPA encourages NPDES permitting authorities, local governments, and the interested public to work together in the context of a watershed plan to address water quality issues, including those associated with municipal storm water runoff.

EPA received comments stating that the process of developing criteria and applying it to all MS4s outside an urbanized area serving a population of 10,000 or greater and with a density of 1,000 people per square mile is too time-consuming and resource-intensive. These commenters believe that the permitting authority should decide which MS4s must be brought into the storm water discharge control program and that population and density should not be an overriding criteria. One suggested way of doing so was to only designate MS4s with demonstrated contributions to the impairment of water quality uses as shown by a TMDL. EPA disagrees with this suggestion. The TMDL process is time-consuming. MS4s outside of urbanized areas may cause water quality problems long before a TMDL is completed.

EPA believes that permitting authorities should consider the potential water quality impacts of storm water from all jurisdictions with a population of 10,000 or greater and a density of 1,000 people per square mile. EPA is using data summarized in the NURP study and in the CWA section 305(b) reports to support this approach for targeted designation outside of urbanized areas. EPA is not mandating which criteria are to be used, but has provided examples of criteria that may be useful in evaluating potential water quality impacts. EPA believes that the flexibility provided in this section of today's final rule allows the permitting authority to develop criteria and a designation process that is easy to use and protects water quality. Therefore, the provisions of § 123.35(b) remain as proposed.

a. Develop Designation Criteria

Under § 123.35(b), the NPDES permitting authority must establish designation criteria to evaluate whether a storm water discharge results in or has the potential to result in exceedances of water quality standards, including impairment of designated uses, or other significant water quality impacts, including adverse habitat and biological impacts.

EPA recommends that NPDES permitting authorities consider, in a balanced manner, certain locally-focused criteria for designating any MS4 located outside of an urbanized area on the basis of significant water quality impacts. EPA recommends consideration of criteria such as discharge to sensitive waters, high growth or growth potential, high population density, contiguity to an urbanized area, significant contribution of pollutants to waters of the United States, and ineffective control of water quality concerns by other programs. These suggested designation criteria are intended to help encourage the permitting authority to use an objective method for identifying and designating, on a local basis, sources that adversely impact water quality. More information about these criteria and the reasons why they are suggested by EPA is included in the January 9, 1998, proposal (63 FR 1561) for today's final rule.

The suggested criteria are meant to be taken in the aggregate, with a great deal of flexibility as to how each should be weighed in order to best account for watershed and other local conditions and to allow for a more tailored case-by-case analysis. The application of criteria is meant to be geographically specific. Furthermore, each criterion does not have to be met in order for a small MS4

to qualify for designation, nor should an MS4 necessarily be designated on the basis of one or two criteria alone.

EPA believes that the application of the recommended designation criteria provides an objective indicator of real and potential water quality impacts from urban runoff on both the local and watershed levels. EPA encourages the application of the recommended criteria in a watershed context, thereby allowing for the evaluation of the water quality impacts of the portions of a watershed outside of an urbanized area. For example, situations exist where the urbanized area represents a small portion of a degraded watershed, and the adjacent nonurbanized areas of the watershed have significant cumulative effects on the quality of the receiving waters.

EPA received numerous suggestions of additional criteria that should be added and reasons why some of the criteria in the proposal to today's final rule were not appropriate. EPA developed its suggested designation criteria based on findings of the NURP study and other studies that indicate pollutants of concern, including total suspended solids, chemical oxygen demand, and temperature. These criteria were the subject of considerable discussion by the Storm Water Phase II FACA Subcommittee. EPA developed them in response to recommendations from the subcommittee during development of the proposed rule. The listed criteria are only suggestions. Permitting authorities are required to develop their own criteria. EPA has not found any reason to change its suggested list of criteria and the suggestions remain as proposed.

b. Apply Designation Criteria

After customizing the designation criteria for local conditions, the permitting authority must apply such criteria, at a minimum, to any MS4 located outside of an urbanized area serving a jurisdiction with a population of at least 10,000 and a population density of 1,000 people per square mile or greater (see § 123.35(b)(2)). If the NPDES permitting authority determines that an MS4 meets the criteria, the permitting authority must designate it as a regulated small MS4. This designation must occur within 3 years of publication of today's final rule. Alternatively, the NPDES authority can designate within 5 years from the date of final regulation if the designation criteria are applied on a watershed basis where a comprehensive watershed plan exists (a comprehensive watershed plan is one that includes the equivalents of TMDLs) (see § 123.35(b)(3)). The extended 5 year deadline is intended to provide incentives for watershed-based designations. If an NPDES-authorized State or Tribe does not develop and apply designation criteria within this timeframe, then EPA has the opportunity to do so in lieu of the authorized State or Tribe.

NPDES permitting authorities can designate any small MS4, including one below 10,000 in population and 1,000 in density. EPA established the 10,000/1,000 threshold based on the likelihood of adverse water quality impacts at these population and density levels. In addition, the 1,000 persons per square mile threshold is consistent with both the Bureau of the Census definition of an ''urbanized area'' (see Section II.H.2. below) and stakeholder discussions concerning the definition of a regulated small MS4.

One commenter requested that EPA develop interim deadlines for development of designation criteria. EPA believes that the designation deadline identified in today's final rule at § 123.35(b)(3) provides States and Tribes with a flexibility that allows them to develop and apply the criteria locally in a timely fashion, while at the same time establishing an expeditious deadline.

c. Designate Physically Interconnected Small MS4s

In addition to applying criteria on a local basis for potential designation, the NPDES permitting authority must designate any MS4 that contributes substantially to the pollutant loadings of a physically interconnected municipal separate storm sewer that is regulated by the NPDES program for storm water discharges (see § 123.35(b)(4)). To be ''physically interconnected,'' the MS4 of one entity, including roads with drainage systems and municipal streets, is physically connected directly to the municipal separate storm sewer of another entity. This provision applies to all MS4s located outside of an urbanized area. EPA added this section in recognition of the concerns of local government stakeholders that a local government should not have to shoulder total responsibility for a storm water program when storm water discharges from another MS4 are also contributing pollutants or adversely affecting water quality. This provision also helps to provide some consistency among MS4 programs and to facilitate watershed planning in the implementation of the NPDES storm water program. EPA recommended physical interconnectedness in the existing NPDES storm water regulations as a factor for consideration in the designation of additional sources.

Today's final rule does not include interim deadlines for identifying physically interconnected MS4s. However, consistent with the deadlines identified in § 123.35(b)(3) of today's final rule, EPA encourages the permitting authority to make these determinations within 3 years from the date of publication of the final rule or within 5 years if the permitting authority is implementing a comprehensive watershed plan. Alternatively, the affected jurisdiction could use the petition process under 40 CFR 122.26(f) in seeking to have the permitting authority designate the contributing jurisdiction.

Several commenters expressed concerns about who could be designated under this provision (§ 123.35(b)(4)). One commenter requested that the word ''substantially'' be deleted from the rule because they believe any MS4 that contributes at all to a physically interconnected municipal separate storm sewer should be regulated. EPA believes that the word ''substantially'' provides necessary flexibility to the permitting authorities. The permitting authority can decide if an MS4 is contributing discharges to another municipal separate storm sewer in a manner that requires regulation. If the operator of a regulated municipal separate storm sewer believes that some of its pollutant loadings are coming from an unregulated MS4, it can petition the permitting authority to designate the unregulated MS4 for regulation.

d. Respond to Public Petitions for Designation

Today's final rule reiterates the existing opportunity for the public to petition the permitting authority for designation of a point source to be regulated to protect water quality. The petition opportunity also appears in existing NPDES regulations at 40 CFR 122.26(f). Any person may petition the permitting authority to require an NPDES permit for a discharge composed entirely of storm water that contributes to a violation of a water quality standard or is a significant contributor of pollutants to the waters of the United States (see § 123.32(b)). The NPDES permitting authority must make a final determination on any petition within 180 days after receiving the petition (see § 123.35(c)). EPA believes that a 180 day limit balances the public's need for a timely final determination with the NPDES permitting authority's need to prioritize its workload. If an NPDES-approved State or Tribe fails to act

within the 180-day timeframe, EPA may make a determination on the petition. EPA believes that public involvement is an important component of the NPDES program for storm water and feels that this provision encourages public participation. Section II.K, Public Involvement/Public Role, further discusses this topic.

3. Provide Waivers

Today's rule provides two opportunities for the NPDES permitting authority to exempt certain small MS4s from the need for a permit based on water quality considerations. See §§ 122.32(d) and (e). The two waiver opportunities have different size thresholds and take different approaches to considering the water quality impacts of discharges from the MS4.

In the proposal, EPA requested comment on the option of waiving coverage for all MS4s with less than 1,000 people unless the permitting authority determined that the small MS4 should be regulated based on significant adverse water quality impacts. A number of commenters supported this option. They expressed concern that compliance with the rule requirements and certification of one of the waiver provisions were both costly for very small communities. They stated that the permitting authority should identify a water quality problem before requiring compliance. Today's rule essentially adopts this alternative approach for MS4s serving a population under 1,000.

The final rule has expanded the waiver provision that EPA proposed for small MS4s with a population less than 1,000. The proposed rule would have required a small MS4 operator to certify that storm water controls are not needed based on either wasteload allocations that are part of TMDLs that address the pollutants of concern, or a comprehensive watershed plan implemented for the waterbody that includes the equivalents of TMDLs and addresses the pollutant(s) of concern. Commenters noted that the proposed waivers would be unattainable if a TMDL or equivalent analysis was required for every pollutant that could possibly be present in any amount in discharges from an MS4 regardless of whether the pollutant is causing water quality impairment. Commenters asked that EPA identify what constitutes the ''pollutant(s) of concern'' for which a TMDL or its equivalent must be developed. For example, § 122.30(c) indicates that the MS4 program is intended to control ''sediment, suspended solids, nutrients, heavy metals, pathogens, toxins, oxygen-demanding substances, and floatables.'' Commenters asked whether TMDLs or equivalent analyses have to address all of these.

EPA has revised the proposed waiver in response to these concerns. Under today's rule, NPDES permitting authorities may waive the requirements of today's rule for any small MS4 with a population less than 1,000 that does not contribute substantially to the pollutant loadings of a physically interconnected MS4, unless the small MS4 discharges pollutants that have been identified as a cause of impairment of the waters to which the small MS4 discharges. If the small MS4 does discharge pollutants that have been identified as impairing the water body into which the small MS4 discharges, the NPDES permitting authority may grant a waiver only if it determines that storm water controls are not needed based on an EPA approved or established TMDL that addresses the pollutant(s) of concern.

Unlike the proposed rule, § 122.32(d) does not allow the waiver for MS4s serving a population under 1,000 to be based on ''the equivalent of a TMDL.'' Because § 122.32(d) requires a pollutant specific analysis only for a pollutant that has been identified as a cause of impairment, a TMDL is required for such pollutant before the waiver may be granted. Once a pollutant has been identified as the cause of impairment of a water body, the State should develop a TMDL for that pollutant for that water body. Thus, § 122.32(d) takes a different approach than that taken for the waiver in § 122.32(e) for MS4s serving a population under 10,000, which can be based upon an analysis that is ''the equivalent of a TMDL.'' This is because § 122.32(d) requires an analysis to support the waiver for MS4s under 1,000 only if a waterbody to which the MS4 discharges has been identified as impaired. The § 122.32(e) waiver, on the other hand, would be available for larger MS4s but only after the State affirmatively establishes lack of impairment based upon a comprehensive analysis of smaller urban waters that might not otherwise be evaluated for the purposes of CWA section 303. Since § 122.32(e) requires the analysis of waters that have not been identified as impaired, an actual TMDL is not required and an analysis that is the equivalent of a TMDL can suffice to support the waiver.

Where a State is the NPDES permitting authority, the permitting authority is responsible for the development of the TMDLs as well as the assessment of the extent to which a small MS4's discharge contributes pollutants to a neighboring regulated system. In States where EPA is the permitting authority, EPA will use a State's TMDLs to determine whether storm water controls are required for the small MS4s.

The proposed rule would have required the operator of the small MS4 serving a population under 1,000 to certify that its discharge was covered under a TMDL that indicated that discharges from its particular system were not having an adverse impact on water quality (*i.e.,* it was either not assigned wasteload allocations under TMDLs or its discharge is within an assigned allocation). Many commenters expressed concerns that MS4 operators serving less than 1,000 persons may lack the technical capacity to certify that their discharges are not contributing to adverse water quality impacts. These commenters thought that the permitting authority should make such a certification. Today's rule provides flexibility as to how the waiver is administered. Permitting authorities are ultimately responsible for granting the waiver, but are free to determine whether or not to require small MS4 operators that are seeking waivers to submit information or a written certification.

Under § 122.32(e) a State may grant a waiver to an MS4 serving a population between 1,000 and 10,000 only if the State has made a comprehensive effort to ensure that the MS4 will not cause or contribute to water quality impairment. To grant a § 122.32(e) waiver, the NPDES permitting authority must evaluate all waters of the U.S. that receive a discharge from the MS4 and determine that storm water controls are not needed. The permitting authority's evaluation must be based on wasteload allocations that are part of an EPA approved or established TMDL or, if a TMDL has not been developed or approved, an equivalent analysis that determines sources and allocations for the pollutant(s) of concern. The pollutants of concern that the permitting authority must evaluate include biochemical oxygen demand (BOD), sediment or a parameter that addresses sediment (such as total suspended solids, turbidity or siltation), pathogens, oil and grease, and any other pollutant that has been identified as a cause of impairment of any water body that will receive a discharge from the MS4. Finally, the permitting authority must have determined that future discharges from the MS4 do not have the potential to result in exceedances of water quality standards, including impairment of designated uses, or other significant

water quality impacts, including habitat and biological impacts.

Although EPA did not propose this specific approach, the Agency did request comment on whether to increase the proposed 1,000 population threshold for a waiver. The § 122.32(e) waiver was developed in response to comments, including States' concerns that they needed greater flexibility to focus their efforts on MS4s that were causing water quality impairment. Several commenters thought that the threshold should be increased from 1,000 to 5,000 or 10,000. Others suggested additional ways of qualifying for a waiver for MS4s that discharge to waters that are not covered by a TMDL or watershed plan. EPA carefully considered all the options for expanding the waiver provisions and has decided to expand the waiver only in the very narrow circumstances described above where a comprehensive analysis has been undertaken to demonstrate that the MS4 is not causing water quality impairment.

The NPDES permitting authority can, at any time, mandate compliance with program requirements from a previously waived small MS4 if circumstances change. For example, a waiver can be withdrawn in circumstances where the permitting authority later determines that a waived small MS4's storm water discharge to a small stream will cause adverse impacts to water quality or significantly interfere with attainment of water quality standards. A ''change in circumstances'' could involve receipt of new information. Changed circumstances can also allow a regulated small MS4 operator to request a waiver at any time.

Some commenters expressed concerns about allowing any small MS4 waivers. One commenter stated that storm water pollution prevention plans are necessary to control storm water pollution and should be required from all regulated small MS4s. For the reasons stated in the Background section above, EPA agrees that the discharges from most MS4s in urbanized areas should be addressed by a storm water management program outlined in today's rule. For MS4s serving very small areas, however, the TMDL development process provides an opportunity to determine whether an MS4 serving a population less than 1,000 is having a negative impact on any receiving water that is impaired by a pollutant that the MS4 discharges. MS4s serving populations up to 10,000 may receive a waiver only if a comprehensive analysis of its impact on receiving water has been performed.

Other commenters said that waivers should not be allowed for small MS4s that discharge into another regulated MS4. These commenters stated that the word ''substantially'' should be removed from § 122.32(d)(i) so that a waiver would not be allowed for any system ''contributing to the storm water pollutant loadings of a physically interconnected regulated MS4.'' As previously mentioned under the designation discussion of section II.G.2.c, EPA believes that the word ''substantially'' provides needed flexibility to the permitting authorities. It is important to note that this is only one aspect that the permitting authority must consider when deciding on the appropriateness of a waiver.

4. Issue Permits

NPDES permitting authorities have a number of responsibilities regarding the permit process. Sections 123.35(d) through (g) ensure a certain level of consistency for permits, yet provide numerous opportunities for flexibility. NPDES permitting authorities must issue NPDES permits to cover municipal sources to be regulated under § 122.32, unless waived under § 122.32(c). EPA encourages permitting authorities to use general permits as the vehicle for permitting and regulating small MS4s. The Agency notes, however, that some operators may wish to take advantage of the option to join as a co-permittee with an MS4 regulated under the existing NPDES storm water program.

Today's final rule includes a provision, § 123.35(f), that requires NPDES permitting authorities to either include the requirements in § 122.34 for NPDES permits issued for regulated small MS4s or to develop permit limits based on a permit application submitted by a small MS4. See Section II.H.3.a, Minimum Control Measures, for more details on the actual § 122.34 requirements. See Section II.H.3.c for alternative and joint permitting options.

In an attempt to avoid duplication of effort, § 122.34(c) allows NPDES permitting authorities to include permit conditions that direct an MS4 to meet the requirements of a qualifying local, Tribal, or State municipal storm water management program. For a local, Tribal, or State program to ''qualify,'' it must impose, at a minimum, the relevant requirements of § 122.34(b). A regulated small MS4 must still follow the procedural requirements for an NPDES permit (*i.e.,* submit an application, either an individual application or an NOI under a general permit) but will instead follow the substantive pollutant control requirements of the qualifying local, Tribal, or State program.

Under § 122.35(b), NPDES permitting authorities may also recognize existing responsibilities among governmental entities for the minimum control measures in an NPDES small MS4 storm water permit. For example, the permit might acknowledge the existence of a State administered program that addresses construction site runoff and require that the municipalities only develop substantive controls for the remaining minimum control measures. By acknowledging existing programs, this provision is meant to reduce the duplication of efforts and to increase the flexibility of the NPDES storm water program.

Section 123.35(e) of today's final rule requires permitting authorities to specify a time period of up to 5 years from the issuance date of an NPDES permit for regulated small MS4 operators to fully develop and implement their storm water programs. As discussed more fully below, permitting authorities should be providing extensive support to the local governments to assist them in developing and implementing their programs.

In the proposed rule, EPA stated that the permitting authority would develop the menu of BMPs and if they failed to do so, EPA would develop the menu. Commenters felt that EPA should develop a menu of BMPs, rather than just providing guidance. In the settlement agreement for seeking an extension to the deadline for issuing today's rule, EPA committed to developing a menu of BMPs by October 27, 2000. Permitting authorities can adopt EPA's menu or develop their own. The menu itself is not intended to replace more comprehensive BMP guidance materials. As part of the tool box efforts, EPA will provide separate guidance documents that discuss the results from EPA-sponsored nationwide studies on the design, operation and maintenance of BMPs. Additionally, EPA expects that the new rulemaking on construction BMPs may provide more specific design, operation and maintenance criteria.

5. Support and Oversee the Local Programs

NPDES permitting authorities are responsible for supporting and overseeing the local municipal programs. Section 123.35(h) of today's final rule highlights issues associated with these responsibilities.

To the extent possible, NPDES permitting authorities should provide financial assistance to MS4s, which

often have limited resources, for the development and implementation of local programs. EPA recognizes that funding for programs at the State and Tribal levels may also be limited, but strongly encourages States and Tribes to provide whatever assistance is possible. In lieu of actual dollars, NPDES permitting authorities can provide cost-cutting assistance in a number of ways. For example, NPDES permitting authorities can develop outreach materials for MS4s to distribute or the NPDES permitting authority can actually distribute the materials. Another option is to implement an erosion and sediment control program across an entire State (or Tribal land), thus alleviating the need for the MS4 to implement its own program. The NPDES permitting authority must balance the need for site-specific controls, which are best handled by a local MS4, with its ability to offer financial assistance. EPA, States, Tribes, and MS4s should work as a team in making these kinds of decisions.

NPDES permitting authorities are responsible for overseeing the local programs. Permitting authorities should work with the regulated community and other stakeholders to assist in local program development and implementation. This might include sharing information, analyzing reports, and taking enforcement actions, as necessary. NPDES permitting authorities play a vital role in supporting local programs by providing technical and programmatic assistance, conducting research projects, and monitoring watersheds. The NPDES permitting authority can also assist the MS4 permittee in obtaining adequate legal authority at the local level in order to implement the local component of the CWA section 402(p)(6) program.

NPDES permitting authorities are encouraged to coordinate and utilize the data collected under several programs. States and Tribes address point and nonpoint source storm water discharges through a variety of programs. In developing programs to carry out CWA section 402(p)(6), EPA recommends that States and Tribes coordinate all of their water pollution evaluation and control programs, including the continuing planning process under CWA section 303(e), the existing NPDES program, the CZARA program, and nonpoint source pollution control programs.

In addition, NPDES permitting authorities are encouraged to provide a brief (*e.g.,* two-page) reporting format to facilitate compilation and analysis of data from reports submitted under § 122.34(g)(3). EPA intends to develop a model form for this purpose.

H. Municipal Role

1. Scope of Today's Rule

Today's final rule attempts to establish an equitable and comprehensive four-pronged approach for the designation of municipal sources. First, the approach defines for automatic coverage the municipal systems believed to be of highest threat to water quality. Second, the approach designates municipal systems that meet a set of objective criteria used to measure the potential for water quality impacts. Third, the approach designates on a case-by-case basis municipal systems that ''contribute substantially to the pollutant loadings of a physically-interconnected [regulated] MS4.'' Finally, the approach designates on a case-by-case basis, upon petition, municipal systems that ''contribute to a violation of a water quality standard or are a significant contributor of pollutants.''

Today's final rule automatically designates for regulation small MS4s located in urbanized areas, and requires that NPDES permitting authorities examine for potential designation, at a minimum, a particular subset of small MS4s located outside of urbanized areas. Today's rule also includes provisions that allow for waivers from the otherwise applicable requirements for the smallest MS4s that are not causing impairment of a receiving water body. Qualifications for the waivers vary depending on whether the MS4 serves a population under 1,000 or a population under 10,000. See §§ 122.32(d) and (e). These waivers are discussed further in section II.G.3. Any small MS4 automatically designated by the final rule or designated by the permitting authority under today's final rule is defined as a ''regulated'' small MS4 unless it receives a waiver.

In today's final rule, all regulated small MS4s must establish a storm water discharge control program that meets the requirements of six minimum control measures. These minimum control measures are public education and outreach on storm water impacts, public involvement participation, illicit discharge detection and elimination, construction site storm water runoff control, post-construction storm water management in new development and redevelopment, and pollution prevention/good housekeeping for municipal operations.

Today's rule allows for a great deal of flexibility in how an operator of a regulated small MS4 is authorized to discharge under an NPDES permit, by providing various options for obtaining permit coverage and satisfying the required minimum control measures. For example, the NPDES permitting authority can incorporate by reference qualifying State, Tribal, or local programs in an NPDES general permit and can recognize existing responsibilities among different governmental entities for the implementation of minimum control measures. In addition, a regulated small MS4 can participate in the storm water management program of an adjoining regulated MS4 and can arrange to have another governmental entity implement a minimum control measure on their behalf.

2. Municipal Definitions

a. Municipal Separate Storm Sewer Systems (MS4s)

The CWA does not define the term ''municipal separate storm sewer.'' EPA defined municipal separate storm sewer in the existing storm water permit application regulations to mean, in part, a conveyance or system of conveyances (including roads with drainage systems and municipal streets) that is ''owned or operated by a State, city, town borough, county, parish, district, association, or other public body * * * designed or used for collecting or conveying storm water which is not a combined sewer and which is not part of a Publicly Owned Treatment Works as defined at 40 CFR 122.2'' (see § 122.26(b)(8)(i)). Section 122.26 contains definitions of medium and large municipal separate storm sewer systems but no definition of a municipal separate storm sewer *system,* even though the term MS4 is commonly used. In today's rule, EPA is adding a definition of municipal separate storm sewer system and small municipal separate storm sewer system along with the abbreviations MS4 and small MS4.

The existing municipal permit application regulations define ''medium'' and ''large'' MS4s as those located in an incorporated place or county with a population of at least 100,000 (medium) or 250,000 (large) as determined by the latest Decennial Census (see §§ 122.26(b)(4) and 122.26(b)(7)). In today's final rule, these regulations have been revised to define all medium and large MS4s as those meeting the above population thresholds according to the 1990 Decennial Census.

Today's rule also corrects the titles and contents of Appendices F, G, H,& I to Part 122. EPA is adding those incorporated places and counties whose 1990 population caused them to be defined as a ''medium'' or ''large'' MS4. All of these MS4s have applied for

permit coverage so the effect of this change to the appendices is simply to make them more accurate. They will not need to be revised again because today's rule ''freezes'' the definition of ''medium'' and ''large'' MS4s at those that qualify based on the 1990 census.

EPA received several comments supporting and opposing the proposal to ''freeze'' the definitions based on the 1990 census. Commenters who disagreed with EPA's position cited the unfairness of municipalities that reach the medium or large threshold at a later date having fewer permitting requirements compared to those that were already at the population thresholds when the existing storm water regulations took effect. EPA recognizes this disparity but does not believe it is unfair, as explained in the proposed rule. The decision was based on the fact that the deadlines from the existing regulations have lapsed, and because the permitting authority can always require more from operators of MS4s serving ''newly over 100,000'' populations.

b. Small Municipal Separate Storm Sewer Systems

The proposal to today's final rule added ''the United States'' as a potential owner or operator of a municipal separate storm sewer. This addition was intended to address an omission from existing regulations and to clarify that federal facilities are, in fact, covered by the NPDES program for municipal storm water discharges when the federal facility is like other regulated MS4s. EPA received a comment that this change would cause federal facilities located in Phase 1 areas to be considered Phase 1 dischargers due to the definition of medium and large MS4s. All MS4s located in Phase 1 cities or counties are defined as Phase 1 medium or large MS4s. EPA believes that all federal facilities serve a population of under 100,000 and should be regulated as small MS4s. Therefore, in § 122.26(a)(16) of today's final rule, EPA is adding federal facilities to the NPDES storm water discharge control program by changing the proposed definition of small municipal separate storm sewer system. Paragraph (i) of this section restates the definition of municipal separate storm sewer with the addition of ''the United States'' as a owner or operator of a small municipal separate storm sewer. Paragraph (ii) repeats the proposed language that states that a small MS4 is a municipal separate storm sewer that is not medium or large.

Most commenters agreed that federal facilities should be covered in the same way as other similar MS4s. However, EPA received several comments asking whether individual federal buildings such as post offices or urban offices of the U.S. Park Service must apply for coverage as regulated small MS4s. Most of these buildings have, at most, a parking lot with runoff or a storm sewer that connects with a municipality's MS4. In § 122.26(a)(16)(iii), EPA clarifies that the definition of small MS4 does not include individual buildings. These buildings may have a municipal separate storm sewer but they do not have a ''system'' of conveyances. The minimum measures for small MS4s were written to apply to storm sewer ''systems'' providing storm water drainage service to human populations and not to individual buildings. This is true of municipal separate storm sewers from State buildings as well as from federal buildings.

There will likely be situations where the permitting authority must decide if a federal or State complex should be regulated as a small MS4. A federal complex of two or three buildings could be treated as a single building and not be required to apply for coverage. In these situations, permitting authorities will have to use their best judgment as to the nature of the complex and its storm water conveyance system. Permitting authorities should also consider whether the federal or State complex cooperates with its municipality's efforts to implement their storm water management program.

Along with the questions about individual buildings, EPA received many questions about how various provisions of the rule should be interpreted for federal and State facilities. EPA acknowledges that federal and State facilities are different from municipalities. EPA believes, however, that the minimum measures are flexible enough that they can be implemented by these facilities. As an example, DOD commenters asked about how to interpret the term ''public'' for military installations when implementing the public education measure. EPA agrees with the suggested interpretation of ''public'' for DOD facilities as ''the resident and employee population within the fence line of the facility.''

EPA also received many comments from State departments of transportation (DOTs) that suggested the ways in which they are different from municipalities and should therefore be regulated differently. Storm water discharges from State DOTs in Phase 1 areas should already be regulated under Phase I. The preamble to Phase 1 clearly states that ''all systems within a geographical area including highways and flood control districts will be covered.'' Many permitting authorities regulated State DOTs as co-permittees with the Phase 1 municipality in which the highway is located. State DOTs that are already regulated under Phase I are not required to comply with Phase II. State DOTs that are not already regulated have various options for meeting the requirements of today's rule. These options are discussed in Section II.H.3.c.iv below. Several DOTs commented that some of the minimum measures are outside the scope of their mission or that they do not have the legal authority required for implementation. EPA believes that the flexibility of the minimum measures allows them to be implemented by most MS4s, including DOTs. When a DOT does not have the necessary legal authority, EPA encourages the DOT to coordinate their storm water management efforts with the surrounding municipalities and other State agencies. Under today's rule, DOTs can use any of the options of § 122.35 to share their storm water management responsibilities. DOTs may also want to work with their permitting authority to develop a State-wide DOT storm water permit.

There are many storm water discharges from State DOTs and other State MS4s located in Phase 1 areas that were not regulated under Phase 1. Today's rule adds many more State facilities as well as all federal facilities located in urbanized areas. All of these State and federal facilities that fit the definition of a small MS4 must be covered by a storm water management program. The individual permitting authorities must decide what type of permit is most applicable.

The existing NPDES storm water program already regulates storm water from federally or State-operated industrial sources. Federal or State facilities that are currently regulated due to their industrial discharges may already be implementing some of today's rule requirements.

EPA received comments that questioned the apparent inconsistency between regulating a federal facility such as a hospital and not regulating a similar private facility. Normally, this type of private facility is regulated by the MS4. EPA believes that federal facilities are subject to local water quality regulations, including storm water requirements, by virtue of the waiver of sovereign immunity in CWA section 313. However, there are special problems faced by MS4s in their efforts to regulate federal facilities that have not been encountered in regulating

similar private facilities. To ensure comprehensive coverage, today's rule merely clarifies the need for permit coverage for these federal facilities.

i. Combined Sewer Systems (CSS). The definition of small MS4s does not include combined sewer systems. A combined sewer system is a wastewater collection system that conveys sanitary wastewater and storm water through a single set of pipes to a publicly-owned treatment works (POTW) for treatment before discharging to a receiving waterbody. During wet weather events when the capacity of the combined sewer system is exceeded, the system is designed to discharge prior to the POTW treatment plant directly into a receiving waterbody. Such an overflow is a combined sewer overflow or CSO. Combined sewer systems are not subject to existing regulations for municipal storm water discharges, nor will they be subject to today's regulations. EPA addresses combined sewer systems and CSOs in the National Combined Sewer Overflow (CSO) Control Policy issued on April 19, 1994 (59 FR 18688). The CSO Control Policy contains provisions for developing appropriate, site-specific NPDES permit requirements for combined sewer systems. CSO discharges are subject to limitations based on the best available technology economically achievable for toxic pollutants and based on the best conventional pollutant control technology for conventional pollutants. MS4s are subject to a different technology standard for all pollutants, specifically to reduce pollutants to the maximum extent practicable.

Some municipalities are served by both separate storm sewer systems and combined sewer systems. If such a municipality is located within an urbanized area, only the separate storm sewer systems within that municipality is included in the NPDES storm water program and subject to today's final rule. If the municipality is not located in an urbanized area, then the NPDES permitting authority has discretion as to whether the discharges from the separate storm sewer system is subject to today's final rule. The NPDES permitting authority will use the same process to designate discharges from portions of an MS4 for permit coverage where the municipality is also served by a combined sewer system.

EPA recognizes that municipalities that have both combined and separate storm sewer systems may wish to find ways to develop a unified program to meet all wet weather water pollution control requirements more efficiently. In the proposal to today's final rule, EPA sought comment on ways to achieve such a unified program. Many municipalities that are served by CSSs and MS4s commented that it is inequitable to force them to comply with Phase II at this time because implementation of the CSO Control Policy through their NPDES permits already imposes a significant financial burden. They requested an extension of the implementation time frame. They did not provide ideas on how to unify the two programs. EPA encourages permitting authorities to work with these municipalities as they develop and begin implementation of their CSO and storm water management programs. If both sets of requirements are carefully coordinated early, a cost-effective wet weather program can be developed that will address both CSO and storm water requirements.

ii. Owners/Operators. Several commenters mentioned the difference between the existing storm water application requirement for municipal operators and the proposed municipal requirement for owners or operators to apply. They felt that this inconsistency is confusing. The preamble to the existing regulations makes numerous references to owner/operator so there was no intent to make a clear distinction between Phase I and Phase II. Section 122.21(b) states that when the owner and operator are different, the operator must obtain the permit. MS4s often have several operators. The owner may be responsible for one part of the system and a regional authority may be responsible for other aspects. EPA proposed the ''owner or operator'' language to convey this dual responsibility. However, when the owner is responsible for some part of a storm water management plan, it is also an operator.

EPA has revised the regulation language to clarify that ''an operator'' must apply for a permit. When responsibilities for the MS4 are shared, all operators must apply.

c. Regulated Small MS4s

In today's final rule, all small MS4s located in an urbanized area are automatically designated as ''regulated'' small MS4s provided that they were not previously designated into the existing storm water program. Unlike medium and large MS4s under the existing storm water regulations, not all small MS4s are designated under today's final rule. Therefore, today's rule distinguishes between ''small'' MS4s and ''regulated small'' MS4s.

EPA's definition of ''regulated small MS4s'' in the proposal to today's rule included mention of incorporated places and counties. Along with the definition, EPA included Appendices 6 and 7 to assist in the identification of areas that would probably require coverage as ''automatically designated'' (Appendix 6) or ''potentially designated'' (Appendix 7). The definition and the appendices raised many questions about exactly who was required to comply with the proposed requirements. Commenters raised issues about the definition of ''incorporated place'' and the status of towns, townships, and other places that are not considered incorporated by the Census Bureau. They also asked about special districts, regional authorities, MS4s already regulated, and other questions in order to clarify the rule's coverage.

EPA has revised § 122.32(a) to clarify that discharges are regulated under today's rule if they are from a small MS4 that is in an urbanized area and has not received a waiver or they are designated by the permitting authority. Today's rule does not regulate the county, city, or town. Today's rule regulates the MS4. Therefore, even though a county may be listed in Appendix 6, if that county does not own or operate the municipal storm sewer systems, the county does not have to submit an application or develop a storm water management program. If another entity does own or operate an MS4 within the county, for example, a regional utility district, that other entity needs to submit the application and develop the program.

Some commenters suggested that EPA should change the rule language to specifically allow regional authorities to be the permitted entity and to allow small MS4s to apply as co-permittees. EPA believes that the best way to clarify that regional authorities can be the primary permitted entity is the change to § 122.32(a) and the explanation above. Because EPA assumes that today's regulation will be implemented through general permits, MS4s will not be co-permittees under a general permit in the same manner as under individual permits. EPA has added § 122.33(a)(4) and made a minor change to § 122.35(a) to clarify that small MS4s can work together to share the responsibilities of a storm water management program. This is discussed further in Section II.H.3.c.iv below.

The proposed rule stated that when a county or Federal Indian reservation is only partially included in an urbanized area, only MS4s in the urbanized portion of the county or Federal Indian reservation would be regulated. In the rare cases when an incorporated place is only partially included in the urbanized area, the entire incorporated place would be regulated. EPA received comments asking about towns and

townships, because they were not considered to be incorporated areas according to the Census Bureau's definition. Would the whole town/township be covered or only the part of the town/township in the urbanized area? States use many different types of systems in their geographical divisions. Some towns are similar to incorporated cities and others are large areas that are more similar to counties. Some commenters thought that the urbanized area boundary was arbitrary, and if part of a town or county was covered, it all should be covered. Other commenters noted that some townships and counties encompass very large areas of which only a small portion is urbanized. Due to the great variety of situations, EPA has decided that for all geographical entities, only MS4s in the urbanized area are automatically designated. The population densities associated with the Census Bureau's designation of urbanized areas provide the basis for designation of these areas to protect water quality. This focused designation provides for consistency and allows for flexibility on the part of the MS4 and the permitting authority. In those situations where an incorporated place or a town is not all in an ''urbanized area'', there is a good possibility that it is served by more than one MS4. In those cases where the area is served by the same MS4, it makes sense to develop a storm water program for the whole area. Permitting authorities may also decide to designate all MS4s within a county or township, if they believe it is necessary to protect water quality.

Most operators of MS4s will not need to independently determine the status of coverage under today's rule. EPA has revised the proposed Appendices 6 and 7 to include towns and townships. Therefore, these appendices will alert most MS4s as to whether they are likely to be covered under today's rule. However, each permitting authority must make the decision as to who requires coverage. Most likely, an illustrative list of the regulated areas will be published with the general permit. If not, the operator can contact its permitting authority or the Bureau of the Census to find out if their separate storm sewer systems are within an urbanized area.

i. Urbanized Area Description. Under the Bureau of the Census definition of ''urbanized area,'' adopted by EPA for the purposes of today's final rule, ''an urbanized area (UA) comprises a place and the adjacent densely settled surrounding territory that together have a minimum population of 50,000 people.'' The proposal to today's rule provided the full definition and case studies to help explain the census category of ''urbanized area.'' Appendix 2 is a simplified urbanized area illustration to help demonstrate the concept of urbanized areas in relation to today's final rule. The ''urbanized area'' is the shaded area that includes within its boundaries incorporated places, a portion of a Federal Indian reservation, portions of two counties, an entire town, and portions of another town. All small MS4s located in the shaded area are covered by the rule, unless and until waived by the permitting authority. Any small MS4s located outside of the shaded area are subject to potential designation by the permitting authority.

There are 405 urbanized areas in the United States that cover 2 percent of total U.S. land area and contain approximately 63 percent of the nation's population (see Appendix 3 for a listing of urbanized areas of the United States and Puerto Rico). These numbers include U.S. Territories, although Puerto Rico is the only territory to have Census-designated urbanized areas. Urbanized areas constitute the largest and most dense areas of settlement. The purpose of determining an ''urbanized area'' is to delineate the boundaries of development and map the actual built-up urban area. The Bureau of the Census geographers liken it to flying over an urban area and drawing a line around the boundary of the built-up area as seen from the air.

Using data from the latest decennial census, the Census Bureau applies the urbanized area definition nationwide (including U.S. Tribes and Territories) and determines which places and counties are included within each urbanized area. For each urbanized area, the Bureau provides full listings of who is included, as well as detailed maps and special CD-ROM files for use with computerized mapping systems (such as GIS). Each State's data center receives a copy of the list, and some maps, automatically. The States also have the CD–ROM files and a variety of publications available to them for reference from the Bureau of the Census. In addition, local or regional planning agencies may have urbanized area files already. New listings for urbanized areas based on the 2000 Census will be available by July/August 2001, but the more comprehensive computer files will not be available until late 2001/early 2002.

Additional designations based on subsequent census years will be governed by the Bureau of the Census' definition of an urbanized area in effect for that year. Based on historical trends, EPA expects that any area determined by the Bureau of the Census to be included within an urbanized area as of the 1990 Census will not later be excluded from the urbanized area as of the 2000 Census. However, it is important to note that even if this situation were to occur, for example, due to a possible change in the Bureau of the Census' urbanized area definition, a small MS4 that is automatically designated into the NPDES program for storm water under an urbanized area calculation for any given Census year will remain regulated regardless of the results of subsequent urbanized area calculations.

ii. Rationale for Using Urbanized Areas. EPA is using urbanized areas to automatically designate regulated small MS4s on a nationwide basis for several reasons: (1) studies and data show a high correlation between degree of development/ urbanization and adverse impacts on receiving waters due to storm water (U.S. EPA, 1983; Driver et al., 1985; Pitt, R.E. 1991. ''Biological Effects of Urban Runoff Discharges.'' Presented at the Engineering Foundation Conference: *Urban Runoff and Receiving Systems; An Interdisciplinary Analysis of Impact, Monitoring and Management,* August 1991. Mt. Crested Butte, CO. American Society of Civil Engineers, New York. 1992.; Pitt, R.E. 1995. ''Biological Effects of Urban Runoff Discharges,'' in *Storm water Runoff and Receiving Systems: Impact, Monitoring, and Assessment.* Lewis Publishers, New York.; Galli, J. 1990. *Thermal Impacts Associated with Urbanization and Storm water Management Best Management Practices.* Prepared for the Sediment and Storm water Administration of the Maryland Department of the Environment.; Klein, 1979), (2) the blanket coverage within the urbanized area encourages the watershed approach and addresses the problem of ''donut-holes,'' where unregulated areas are surrounded by areas currently regulated (storm water discharges from donut hole areas present a problem due to their contributing uncontrolled adverse impacts on local waters, as well as by frustrating the attainment of water quality goals of neighboring regulated communities), (3) this approach targets present and future growth areas as a preventative measure to help ensure water quality protection, and (4) the determination of urbanized areas by the Bureau of the Census allows operators of small MS4s to quickly determine whether they are included in the NPDES storm water program as a regulated small MS4.

Urbanized areas have experienced significant growth over the past 50 years. According to EPA calculations

based on Census data from 1980 to 1990, the national average rate of growth in the United States during that 10-year period was more than 4 percent. For the same period, the average growth within urbanized areas was 15.7 percent and the average for outside of urbanized areas was just more than 1 percent. The new development occurring in these growing areas can provide some of the best opportunities for implementing cost-effective storm water management controls.

EPA received many comments on the proposal to designate discharges based on location within urbanized areas. EPA considered numerous other approaches, several of which are discussed in the proposal to today's final rule. Several commenters wanted designation to be based on proven water quality problems rather than inclusion in an urbanized area. One commenter proposed an approach based on the CWA 303(d) listing of impaired waters and the wasteload allocation conducted under the TMDL process. (See section II.L. on the section 303(d) and TMDL process). The commenter's proposal would designate small MS4s on a case-by-case basis, covering only those discharges where receiving streams are shown to have water quality problems, particularly a failure to meet water quality standards, including designated uses. The commenter further described a non-NPDES approach where a State would require cost-effective measures based on a proportionate share under a waste load allocation, equitably allocated among all pollutant contributors. These waste load allocations would be developed with input from all stakeholders, and remedial measures would be implemented in a phased manner based on the probability of results and/or economic feasibility. The States would then periodically reassess the receiving streams to determine whether the remedial measures are working, and if not, require additional control measures using the same procedure used to establish the initial measures. What the commenter describes is almost a TMDL.

EPA considered a remedial approach based on water quality impairment and rejected it for failure to prevent almost certain degradation caused by urban storm water. EPA's main concern in opting not to take a case-by-case approach to designation was that this approach would not provide controls for storm water discharges in receiving streams until after a site-specific demonstration of adverse water quality impact. The commenter's suggestion would do nothing to prevent pollution in waters that may be meeting water quality standards, including supporting designated uses. The approach would also rely on identifying storm water management programs following comprehensive watershed plans and TMDL development. In most States, water quality assessments have traditionally been conducted for principal mainstream rivers and their major tributaries, not all surface waters. The establishment of TMDLs nationwide will take many years, and many States will conduct additional monitoring to determine water quality conditions prior to establishing TMDLs. In addition, a case-by-case approach would not address the problem of ''donut holes'' within urbanized areas and a lack of consistency among similarly situated municipal systems would remain commonplace. After careful consideration of all comments, EPA still believes that the approach in today's rule is the most appropriate to protect water quality. Protection includes prevention as well as remediation.

d. Municipal Designation by the Permitting Authority

Today's final rule also allows NPDES permitting authorities to designate MS4s that should be included in the storm water program as regulated small MS4s but are not located within urbanized areas. The final rule requires, at a minimum, that a set of designation criteria be applied to all small MS4s within a jurisdiction that serves a population of at least 10,000 and has a population density of at least 1,000. Appendix 7 to this preamble provides an illustrative list of places that the Agency anticipates meet this criteria. In addition, any small MS4 may be the subject of a petition to the NPDES permitting authority for designation. See Section II.G, NPDES Permitting Authority's Role for more details on the designation and petition processes. EPA believes that the approach of combining nationwide and local designation to determine municipal coverage balances the potential for significant adverse impacts on water quality with local watershed protection and planning efforts.

e. Waiving the Requirements for Small MS4s

Today's final rule includes some flexibility in the nationwide coverage of all small MS4s located in urbanized areas by providing the NPDES permitting authority with the discretion to waive the otherwise applicable requirements of the smallest MS4s that are not causing the impairment of a receiving water body. Qualifications for the waiver vary depending on whether the MS4 serves a population under 1,000 or a population between 1,000 and 10,000. Note that even if a small MS4 has requirements waived, it can subsequently be brought back into the program if circumstances change. See Section II.G, NPDES Permitting Authority's Role, for more details on this process.

3. Municipal Permit Requirements

a. Overview

i. Summary of Permitting Options. Today's rule outlines six minimum control measures that constitute the framework for a storm water discharge control program for regulated small MS4s that, when properly implemented, will reduce pollutants to the maximum extent practicable (MEP). These six minimum control measures are specified in § 122.34(b) and are discussed below in section ''II.H.3.b, Program Requirements-Minimum Control Measures.'' All operators of regulated small MS4s are required to obtain coverage under an NPDES permit, unless the requirement is waived by the permitting authority in accordance with today's rule. Implementation of § 122.34(b) may be required either through an individual permit or, if the State or EPA makes one available to the facility, through a general permit. The process for issuing and obtaining these permits is discussed below in section ''II.H.3.c, Application Requirements.''

As an alternative to implementing a program that complies with the requirements of § 122.34, today's rule provides operators of regulated small MS4s with the option of applying for an individual permit under § 122.26(d). The permit application requirements in § 122.26 were originally drafted to apply to medium and large MS4s. Although EPA believes that the requirements of § 122.34 provide a regulatory option that is appropriate for most small MS4s, the operators of some small MS4s may prefer more individualized requirements. This alternative permitting option for regulated small MS4s that wish to develop their own program is discussed below in section ''II.H.3.c.iii. Alternative Permit Option.'' The second alternative permitting option for regulated small MS4s is to become co-permittees with a medium or large MS4 regulated under § 122.26(d), as discussed below in section ''II.H.3.c.v. Joint Permit Programs.''

ii. Water Quality-Based Requirements. Any NPDES permit issued under today's rule must, at a minimum, require the operator to develop, implement, and

enforce a storm water management program designed to reduce the discharge of pollutants from a regulated system to the MEP, to protect water quality, and satisfy the appropriate water quality requirements of the Clean Water Act (see MEP discussion in the following section). Absent evidence to the contrary, EPA presumes that a small MS4 program that implements the six minimum measures in today's rule does not require more stringent limitations to meet water quality standards. Proper implementation of the measures will significantly improve water quality. As discussed further below, however, small MS4 permittees should modify their programs if and when available information indicates that water quality considerations warrant greater attention or prescriptiveness in specific components of the municipal program. If the program is inadequate to protect water quality, including water quality standards, then the permit will need to be modified to include any more stringent limitations necessary to protect water quality.

Regardless of the basis for the development of the effluent limitations (whether designed to implement the six minimum measures or more stringent or prescriptive limitations to protect water quality), EPA considers narrative effluent limitations requiring implementation of BMPs to be the most appropriate form of effluent limitations for MS4s. CWA section 402(p)(3)(b)(iii) expresses a preference for narrative rather than numeric effluent limits, for example, by reference to ''management practices, control techniques and system, design and engineering methods, and such other provisions as the Administrator or the State determines appropriate for the control of such pollutants.'' 33 U.S.C. 1342(p)(3)(B)(iii). EPA determines that pollutants from wet weather discharges are most appropriately controlled through management measures rather than end-of-pipe numeric effluent limitations. As explained in the Interim Permitting Policy for Water Quality-Based Effluent Limitations in Storm Water Permits, issued on August 1, 1996 [61 FR 43761 (November 26, 1996), EPA believes that the currently available methodology for derivation of numeric water quality-based effluent limitations is significantly complicated when applied to wet weather discharges from MS4s (compared to continuous or periodic batch discharges from most other types of discharge). Wet weather discharges from MS4s introduce a high degree of variability in the inputs to the models currently available for derivation of water quality based effluent limitations, including assumptions about instream and discharge flow rates, as well as effluent characterization. In addition, EPA anticipates that determining compliance with any such numeric limitations may be confounded by practical limitations in sample collection.

In the first two to three rounds of permit issuance, EPA envisions that a BMP-based storm water management program that implements the six minimum measures will be the extent of the NPDES permit requirements for the large majority of regulated small MS4s. Because the six measures represent a significant level of control if properly implemented, EPA anticipates that a permit for a regulated small MS4 operator implementing BMPs to satisfy the six minimum control measures will be sufficiently stringent to protect water quality, including water quality standards, so that additional, more stringent and/or more prescriptive water quality based effluent limitations will be unnecessary.

If a small MS4 operator implements the six minimum control measures in § 122.34(b) and the discharges are determined to cause or contribute to non-attainment of an applicable water quality standard, the operator needs to expand or better tailor its BMPs within the scope of the six minimum control measures. EPA envisions that this process will occur during the first two to three permit terms. After that period, EPA will revisit today's regulations for the municipal separate storm sewer program.

If the permitting authority (rather than the regulated small MS4 operator) needs to impose additional or more specific measures to protect water quality, then that action will most likely be the result of an assessment based on a TMDL or equivalent analysis that determines sources and allocations of pollutant(s) of concern. EPA believes that the small MS4's additional requirements, if any, should be guided by its equitable share based on a variety of considerations, such as cost effectiveness, proportionate contribution of pollutants, and ability to reasonably achieve wasteload reductions. Narrative effluent limitations in the form of BMPs may still be the best means of achieving those reductions.

See Section II.L, Water Quality Issues, for further discussion of this approach to permitting, consistent with EPA's interim permitting guidance. Pursuant to CWA section 510, States implementing their own NPDES programs may develop more stringent or more prescriptive requirements than those in today's rule.

EPA's interpretation of CWA section 402(p)(3)(B)(iii) was recently reviewed by the Ninth Circuit in *Defenders of Wildlife, et al* v. *Browner,* No. 98–71080 (September 15, 1999). The Court upheld the Agency's action in issuing five MS4 permits that included water quality-based effluent limitations. The Court did, however, disagree with EPA's interpretation of the relationship between CWA sections 301 and 402(p). The Court reasoned that MS4s are not compelled by section 301(b)(1)(C) to meet all State water quality standards, but rather that the Administrator or the State may rely on section 402(p)(3)(B)(iii) to require such controls. Accordingly, the *Defenders of Wildlife* decision is consistent with the Agency's 1996 ''Interim Permitting Policy for Water Quality-Based Effluent Limitations in Storm Water Permits.''

As noted, the 1996 Policy describes how permits would implement an iterative process using BMPs, assessment, and refocused BMPs, leading toward attainment of water quality standards. The ultimate goal of the iteration would be for water bodies to support their designated uses. EPA believes this iterative approach is consistent with and implements section 301(b)(1)(C), notwithstanding the Ninth Circuit's interpretation. As an alternative to basing these water quality-based requirements on section 301(b)(1)(C), however, EPA also believes the iterative approach toward attainment of water quality standards represents a reasonable interpretation of CWA section 402(p)(3)(B)(iii). For this reason, today's rule specifies that the ''compliance target'' for the design and implementation of municipal storm water control programs is ''to reduce pollutants to the maximum extent practicable (MEP), to protect water quality, and to satisfy the appropriate water quality requirements of the CWA.'' The first component, reductions to the MEP, would be realized through implementation of the six minimum measures. The second component, to protect water quality, reflects the overall design objective for municipal programs based on CWA section 402(p)(6). The third component, to implement other applicable water quality requirements of the CWA, recognizes the Agency's specific determination under CWA section 402(p)(3)(B)(iii) of the need to achieve reasonable further progress toward attainment of water quality standards according to the iterative BMP process, as well as the determination that State or EPA officials who establish TMDLs could allocate waste loads to

MS4s, as they would to other point sources.

EPA does not presume that water quality will be protected if a small MS4 elects not to implement all of the six minimum measures and instead applies for alternative permit limits under § 122.26(d). Operators of such small MS4s that apply for alternative permit limits under § 122.26(d) must supply additional information through individual permit applications so that the permit writer can determine whether the proposed program reduces pollutants to the MEP and whether any other provisions are appropriate to protect water quality and satisfy the appropriate water quality requirements of the Clean Water Act.

iii. *Maximum Extent Practicable.* Maximum extent practicable (MEP) is the statutory standard that establishes the level of pollutant reductions that operators of regulated MS4s must achieve. The CWA requires that NPDES permits for discharges from MS4s ''shall require controls to reduce the discharge of pollutants to the maximum extent practicable, including management practices, control techniques and system, design and engineering methods.'' CWA Section 402(p)(3)(B)(iii). This section also calls for ''such other provisions as the [EPA] Administrator or the State determines appropriate for the control of such pollutants.'' EPA interprets this standard to apply to all MS4s, including both existing regulated (large and medium) MS4s, as well as the small MS4s regulated under today's rule.

For regulated small MS4s under today's rule, authorization to discharge may be under either a general permit or individual permit, but EPA anticipates and expects that general permits will be the most common permit mechanism. The general permit will explain the steps necessary to obtain permit authorization. Compliance with the conditions of the general permit and the series of steps associated with identification and implementation of the minimum control measures will satisfy the MEP standard. Implementation of the MEP standard under today's rule will typically require the permittee to develop and implement appropriate BMPs to satisfy each of the required six minimum control measures.

In issuing the general permit, the NPDES permitting authority will establish requirements for each of the minimum control measures. Permits typically will require small MS4 permittees to identify in their NOI the BMPs to be performed and to develop the measurable goals by which implementation of the BMPs can be assessed. Upon receipt of the NOI from a small MS4 operator, the NPDES permitting authority will have the opportunity to review the NOI to verify that the identified BMPs and measurable goals are consistent with the requirement to reduce pollutants under the MEP standard, to protect water quality, and to satisfy the appropriate water quality requirements of the Clean Water Act. If necessary, the NPDES permitting authority may ask the permittee to revise their mix of BMPs, for example, to better reflect the MEP pollution reduction requirement. Where the NPDES permit is not written to implement the minimum control measures specified under § 122.34(b), for example in the case of an individual permit under § 122.33(b)(2)(ii), the MEP standard will be applied based on the best professional judgment of the permit writer.

Commenters argued that MEP is, as yet, an undefined term and that EPA needs to further clarify the MEP standards by providing a regulatory definition that includes recognition of cost considerations and technical feasibility. Commenters argued that, without a definition, the regulatory community is not adequately on notice regarding the standard with which they need to comply. EPA disagrees that affected MS4 permittees will lack notice of the applicable standard. The framework for the small MS4 permits described in this notice provides EPA's interpretation of the standard and how it should be applied.

EPA has intentionally not provided a precise definition of MEP to allow maximum flexibility in MS4 permitting. MS4s need the flexibility to optimize reductions in storm water pollutants on a location-by-location basis. EPA envisions that this evaluative process will consider such factors as conditions of receiving waters, specific local concerns, and other aspects included in a comprehensive watershed plan. Other factors may include MS4 size, climate, implementation schedules, current ability to finance the program, beneficial uses of receiving water, hydrology, geology, and capacity to perform operation and maintenance.

The pollutant reductions that represent MEP may be different for each small MS4, given the unique local hydrologic and geologic concerns that may exist and the differing possible pollutant control strategies. Therefore, each permittee will determine appropriate BMPs to satisfy each of the six minimum control measures through an evaluative process. Permit writers may evaluate small MS4 operator's proposed storm water management controls to determine whether reduction of pollutants to the MEP can be achieved with the identified BMPs.

EPA envisions application of the MEP standard as an iterative process. MEP should continually adapt to current conditions and BMP effectiveness and should strive to attain water quality standards. Successive iterations of the mix of BMPs and measurable goals will be driven by the objective of assuring maintenance of water quality standards. If, after implementing the six minimum control measures there is still water quality impairment associated with discharges from the MS4, after successive permit terms the permittee will need to expand or better tailor its BMPs within the scope of the six minimum control measures for each subsequent permit. EPA envisions that this process may take two to three permit terms.

One commenter observed that MEP is not static and that if the six minimum control measures are not achieving the necessary water quality improvements, then an MS4 should be expected to revise and, if necessary, expand its program. This concept, it is argued, must be clearly part of the definition of MEP and thus incorporated into the binding and operative aspects of the rule. As is explained above, EPA believes that it is. The iterative process described above is intended to be sensitive to water quality concerns. EPA believes that today's rule contains provisions to implement an approach that is consistent with this comment.

b. Program Requirements'Minimum Control Measures

A regulated small MS4 operator must develop and implement a storm water management program designed to reduce the discharge of pollutants from their MS4 to protect water quality. The storm water management program must include the following six minimum measures.

i. Public Education and Outreach on Storm Water Impacts. Under today's final rule, operators of small MS4s must implement a public education program to distribute educational materials to the community or conduct equivalent outreach activities about the impacts of storm water discharges on water bodies and the steps to reduce storm water pollution. The public education program should inform individuals and households about the problem and the steps they can take to reduce or prevent storm water pollution.

EPA believes that as the public gains a greater understanding of the storm water program, the MS4 is likely to gain

more support for the program (including funding initiatives). In addition, compliance with the program will probably be greater if the public understands the personal responsibilities expected of them. Well-informed citizens can act as formal or informal educators to further disseminate information and gather support for the program, thus easing the burden on the municipalities to perform all educational activities.

MS4s are encouraged to enter into partnerships with their States in fulfilling the public education requirement. It may be more cost-effective to utilize a State education program instead of numerous MS4s developing their own programs. MS4 operators are also encouraged to work with other organizations (e.g., environmental, nonprofit and industry organizations) that might be able to assist in fulfilling this requirement.

The public education program should be tailored, using a mix of locally appropriate strategies, to target specific audiences and communities (particularly minority and disadvantaged communities). Examples of strategies include distributing brochures or fact sheets, sponsoring speaking engagements before community groups, providing public service announcements, implementing educational programs targeted at school age children, and conducting community-based projects such as storm drain stenciling, and watershed and beach cleanups. Operators of MS4s may use storm water educational information provided by the State, Tribe, EPA, or environmental, public interest, trade organizations, or other MS4s. Examples of successful public education efforts concerning polluted runoff can be found in many State nonpoint source pollution control programs under CWA section 319.

The public education program should inform individuals and households about steps they can take to reduce storm water pollution, such as ensuring proper septic system maintenance, ensuring the use and disposal of landscape and garden chemicals including fertilizers and pesticides, protecting and restoring riparian vegetation, and properly disposing of used motor oil or household hazardous wastes. Additionally, the program could inform individuals and groups on how to become involved in local stream and beach restoration activities as well as activities coordinated by youth service and conservation corps and other citizen groups. Finally, materials or outreach programs should be directed toward targeted groups of commercial, industrial, and institutional entities likely to have significant storm water impacts. For example, MS4 operators should provide information to restaurants on the impact of grease clogging storm drains and to auto garages on the impacts of used oil discharges.

EPA received comments from representatives of State DOTs and U.S. Department of Defense (DOD) installations seeking exemption from the public education requirement. While today's rule does not exempt DOTs and military bases from the user education requirement, the Agency believes the flexibility inherent in the Rule addresses many of the concerns expressed by these commenters.

Certain DOT representatives commented that if their agencies were not exempt from the user education measure's requirements, they should at least be allowed to count DOT employee education as an adequate substitute. EPA supports the use of existing materials and programs, granted such materials and programs meet the rule's requirement that the MS4 user community (*i.e.,* the public) is also educated concerning the impacts of storm water discharges on water bodies and the steps to reduce storm water pollution.

Finally, certain DOD representatives requested that ''public,'' as applied to their installations, be defined as the resident and employee populations within the fence line of the facility. EPA agrees that the education effort should be directed toward those individuals who frequent the federally owned land (*i.e.,* residents and individuals who come there to work and use the MS4 facilities).

EPA also received a number of comments from municipalities stating that education would be more thorough and cost effective if accomplished by EPA on the national level. EPA believes that a collaborative State and local approach, in conjunction with significant EPA technical support, will best meet the goal of targeting, and reaching, specific local audiences. EPA technical support will include a tool box which will contain fact sheets, guidance documents, an information clearinghouse, and training and outreach efforts.

Finally, EPA received comments expressing concern that the public education program simply encourages the distribution of printed material. EPA is sensitive to this concern. Upon evaluation, the Agency made changes to the proposal's language for today's rule. The language has been changed to reflect EPA's belief that a successful program is one that includes a variety of strategies locally designed to reach specific audiences.

ii. Public Involvement/Participation. Public involvement is an integral part of the small MS4 storm water program. Accordingly, today's final rule requires that the municipal storm water management program must comply with applicable State and local public notice requirements. Section 122.34(b)(2) recommends a public participation process with efforts to reach out and engage all economic and ethnic groups. EPA believes there are two important reasons why the public should be allowed and encouraged to provide valuable input and assistance to the MS4's program.

First, early and frequent public involvement can shorten implementation schedules and broaden public support for a program. Opportunities for members of the public to participate in program development and implementation could include serving as citizen representatives on a local storm water management panel, attending public hearings, working as citizen volunteers to educate other individuals about the program, assisting in program coordination with other pre-existing programs, or participating in volunteer monitoring efforts. Moreover, members of the public may be less likely to raise legal challenges to a MS4's storm water program if they have been involved in the decision making process and program development and, therefore, internalize personal responsibility for the program themselves.

Second, public participation is likely to ensure a more successful storm water program by providing valuable expertise and a conduit to other programs and governments. This is particularly important if the MS4's storm water program is to be implemented on a watershed basis. Interested stakeholders may offer to volunteer in the implementation of all aspects of the program, thus conserving limited municipal resources.

EPA recognizes that there are a number of challenges associated with public involvement. One challenge is in engaging people in the public meeting and program design process. Another challenge is addressing conflicting viewpoints. Nevertheless, EPA strongly believes that these challenges can be addressed by use of an aggressive and inclusive program. Section II.K. provides further discussion on public involvement.

A number of municipalities sought clarification from EPA concerning what the public participation program must

actually include. In response, the actual requirements are minimal, but the Agency's *recommendations* are more comprehensive. The public participation program must only comply with applicable State and local public notice requirements. The remainder of the preamble, as well as the Explanatory Note accompanying the regulatory text, provide guidance to the MS4s concerning what elements a successful and inclusive program should include. EPA will provide technical support as part of the tool box (*i.e.,* providing model public involvement programs, conducting public workshops, *etc.*) to assist MS4 operators meet the intent of this measure.

Finally, the Agency encourages MS4s to seek public participation prior to submitting an NOI. For example, public participation at this stage will allow the MS4 to involve the public in developing the BMPs and measurable goals for their NOI.

iii. Illicit Discharge Detection and Elimination. Discharges from small MS4s often include wastes and wastewater from non-storm water ''illicit'' discharges. Illicit discharge is defined at 40 CFR 122.26(b)(2) as any discharge to a municipal separate storm sewer that is not composed entirely of storm water, except discharges pursuant to an NPDES permit and discharges resulting from fire fighting activities. As detailed below, other sources of non-storm water, that would otherwise be considered illicit discharges, do not need to be addressed unless the operator of the MS4 identifies one or more of them as a significant source of pollutants into the system. EPA's Nationwide Urban Runoff Program (NURP) indicated that many storm water outfalls still discharge during substantial dry periods. Pollutant levels in these dry weather flows were shown to be high enough to significantly degrade receiving water quality. Results from a 1987 study conducted in Sacramento, California, revealed that slightly less than one-half of the water discharged from a municipal separate storm sewer system was not directly attributable to precipitation runoff (U.S. Environmental Protection Agency, Office of Research and Development. 1993. *Investigation of Inappropriate Pollutant Entries Into Storm Drainage Systems—A User's Guide.* Washington, DC EPA 600/R–92/238.) A significant portion of these dry weather flows results from illicit and/or inappropriate discharges and connections to the municipal separate storm sewer system. Illicit discharges enter the system through either direct connections (*e.g.,* wastewater piping either mistakenly or deliberately connected to the storm drains) or indirect connections (*e.g.,* infiltration into the storm drain system or spills collected by drain inlets).

Under the existing NPDES program for storm water, permit applications for large and medium MS4s are to include a program description for effective prohibition against non-storm water discharges into their storm sewers (see 40 CFR 122.26 (d)(1)(v)(B) and (d)(1)(iv)(B)). Further, EPA believes that in implementing municipal storm water management plans under these permits, large and medium MS4 operators generally found their illicit discharge detection and elimination programs to be cost-effective. Properly implemented programs also significantly improved water quality.

In today's rule, any NPDES permit issued to an operator of a regulated small MS4 must, at a minimum, require the operator to develop, implement and enforce an illicit discharge detection and elimination program. Inclusion of this measure for regulated small MS4s is consistent with the ''effective prohibition'' requirement for large and medium MS4s. Under today's rule, the NPDES permit will require the operator of a regulated small MS4 to: (1) Develop (if not already completed) a storm sewer system map showing the location of all outfalls, and names and location of all waters of the United States that receive discharges from those outfalls; (2) to the extent allowable under State, Tribal, or local law, effectively prohibit through ordinance, or other regulatory mechanism, illicit discharges into the separate storm sewer system and implement appropriate enforcement procedures and actions as needed; (3) develop and implement a plan to detect and address illicit discharges, including illegal dumping, to the system; and (4) inform public employees, businesses, and the general public of hazards associated with illegal discharges and improper disposal of waste.

The illicit discharge and elimination program need only address the following categories of non-storm water discharges if the operator of the small MS4 identifies them as significant contributors of pollutants to its small MS4: water line flushing, landscape irrigation, diverted stream flows, rising ground waters, uncontaminated ground water infiltration (as defined at 40 CFR 35.2005(20)), uncontaminated pumped ground water, discharges from potable water sources, foundation drains, air conditioning condensation, irrigation water, springs, water from crawl space pumps, footing drains, lawn watering, individual residential car washing, flows from riparian habitats and wetlands, dechlorinated swimming pool discharges, and street wash water (discharges or flows from fire fighting activities are excluded from the definition of illicit discharge and only need to be addressed where they are identified as significant sources of pollutants to waters of the United States). If the operator of the MS4 identifies one or more of these categories of sources to be a significant contributor of pollutants to the system, it could require specific controls for that category of discharge or prohibit the discharges completely.

Several comments were received on the mapping requirements of the proposal. Most comments said that more flexibility should be given to the MS4s to determine their mapping needs, and that resources could be better spent in addressing problems once the illicit discharges are detected. EPA reviewed the mapping requirements in the proposed rule and agrees that some of the information is not necessary in order to begin an illicit discharge detection and elimination program. Today's rule requires a map or set of maps that show the locations of all outfalls and names and locations of receiving waters. Knowing the locations of outfalls and receiving waters are necessary to be able to conduct dry weather field screening for non-storm water flows and to respond to illicit discharge reports from the public. EPA recommends that the operator collect any existing information on outfall locations (*e.g.,* review city records, drainage maps, storm drain maps), and then conduct field surveys to verify the locations. It will probably be necessary to ''walk'' (*i.e.* wade small receiving waters or use a boat for larger receiving waters) the streambanks and shorelines, and it may take more than one trip to locate all outfalls. A coding system should be used to mark and identify each outfall. MS4 operators have the flexibility to determine the type (*e.g.* topographic, GIS, hand or computer drafted) and size of maps which best meet their needs. The map scale should be such that the outfalls can be accurately located. Once an illicit discharge is detected at an outfall, it may be necessary to map that portion of the storm sewer system leading to the outfall in order to locate the source of the discharge.

Several comments requested clarification of the requirement to develop and implement a plan to detect and eliminate illicit discharges. EPA recommends that plans include procedures for the following: locating priority areas; tracing the source of an illicit discharge; removing the source of the discharge; and program evaluation

and assessment. EPA recommends that MS4 operators identify priority areas (*i.e.,* problems areas) for more detailed screening of their system based on higher likelihood of illicit connections (*e.g.,* areas with older sanitary sewer lines), or by conducting ambient sampling to locate impacted reaches. Once priority areas are identified, EPA recommends visually screening outfalls during dry weather and conducting field tests, where flow is occurring, of selected chemical parameters as indicators of the discharge source. EPA's manual for investigation of inappropriate pollutant entries into the storm drainage system (EPA, 1993) suggests the following parameter list: specific conductivity, fluoride and/or hardness concentration, ammonia and/or potassium concentration, surfactant and/or fluorescence concentration, chlorine concentration, pH and other chemicals indicative of industrial sources. The manual explains why each parameter is a good indicator and how the information can be used to determine the type of source flow. The Agency is not recommending that fluoride and chlorine, generally used to locate potable water discharges, be addressed under this program, therefore a short list of parameters may include conductivity, ammonia, surfactant and pH. Some MS4s have found it useful to measure for fecal coliform or E. coli in their testing program. Observations of physical characteristics of the discharge are also helpful such as flow rate, temperature, odor, color, turbidity, floatable matter, deposits and stains, and vegetation.

The implementation plan should also include procedures for tracing the source of an illicit discharge. Once an illicit discharge is detected and field tests provide source characteristics, the next step is to determine the actual location of the source. Techniques for tracing the discharge to its place of origin may include: following the flow up the storm drainage system via observations and/or chemical testing in manholes or in open channels; televising storm sewers; using infrared and thermal photography; conducting smoke or dye tests.

The implementation plan should also include procedures for removing the source of the illicit discharge. The first step may be to notify the property owner and specify a length of time for eliminating the discharge. Additional notifications and escalating legal actions should also be described in this part of the plan.

Finally, the implementation plan should include procedures for program evaluation and assessment. Procedures could include documentation of actions taken to locate and eliminate illicit discharges such as: number of outfalls screened, complaints received and corrected, feet of storm sewers televised, numbers of discharges and quantities of flow eliminated, number of dye or smoke tests conducted. Appropriate records of such actions should be kept and should be submitted as part of the annual reports for the first permit term, as specified by the permitting authority (reports only need to be submitted in years 2 and 4 in later permits). For more on reporting requirements, see § 122.34(g).

EPA received comments regarding an MS4's legal authority beyond its jurisdictional boundaries to inspect or take enforcement against illicit discharges. EPA recognizes that illicit flows may originate in one jurisdiction and cross into one or more jurisdictions before being discharged at an outfall. In such instances, EPA expects the MS4 that detects the illicit flow to trace it to the point where it leaves their jurisdiction and notify the adjoining MS4 of the flow, and any other physical or chemical information. The adjoining MS4 should then trace it to the source or to the location where it enters their jurisdiction. The process of notifying the adjoining MS4 should continue until the source is located and eliminated. In addition, because any non-storm water discharge to waters of the U.S. through an MS4 is subject to the prohibition against unpermitted discharges pursuant to CWA section 301 (a), remedies are available under the federal enforcement provisions of CWA sections 309 and 505.

EPA requested and received comments regarding the prohibition and enforcement provision for this minimum measure. Commenters specifically questioned the proposal that the operator only has to implement the appropriate prohibition and enforcement procedures ''to the extent allowable under State or Tribal law.'' They raised concerns that by qualifying prohibition and enforcement procedures in this manner, the operator could altogether ignore this minimum measure where affirmative legal authority did not exist. Comments suggested that EPA require States to grant authority to those municipalities where it did not exist. Other comments, however, stated that municipalities cannot exercise legal authority not granted to them under State law, which varies considerably from one State to another. EPA has no intention of directing State legislatures on how to allocate authority and responsibility under State law. As noted above, there is at least one remedy (the federal CWA) to control non-storm water discharges through MS4s. If State law prevents political subdivisions from controlling discharges through storm sewers, EPA anticipates common sense will prevail to provide those MS4 operators with the ability to meet the requirements applicable for their discharges.

One comment reinforced the importance of public information and education to the success of this measure. EPA agrees and suggests that MS4 operators consider a variety of ways to inform and educate the public which could include storm drain stenciling; a program to promote, publicize, and facilitate public reporting of illicit connections or discharges; and distribution of visual and/or printed outreach materials. Recycling and other public outreach programs could be developed to address potential sources of illicit discharges, including used motor oil, antifreeze, pesticides, herbicides, and fertilizers.

EPA received comments that State DOT's lack authority to implement this measure. EPA believes that most DOTs can implement most parts of this measure. If a DOT does not have the necessary legal authority to implement any part of this measure, EPA encourages them to coordinate their storm water management efforts with the surrounding MS4s and other State agencies. Many DOTs that are regulated under Phase I of this program are co-permittees with the local regulated MS4. Under today's rule, DOTs can use any of the options of § 122.35 to share their storm water management responsibilities.

EPA received comments requesting clarification of various terms such as ''outfall'' and ''illicit discharge.'' One comment asked EPA to reinforce the point that a ''ditch'' could be considered an outfall. The term ''outfall'' is defined at 40 CFR 122.26(b)(9) as ''a point source at the point where a municipal separate storm sewer discharges to waters of the United States * * *''. The term municipal separate storm sewer is defined at 40 CFR § 122.26(b)(8) as ''a conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, or storm drains) * * *''. Following the logic of these definitions, a ''ditch'' may be part of the municipal separate storm sewer, and at the point where the ditch discharges to waters of the United States, it would be an outfall. As with any determination about jurisdictional provisions of the CWA, however, final decisions require case specific evaluations of fact.

One commenter specifically requested clarification on the relationship between the term ''illicit discharge'' and non-storm water discharges from fire fighting. The comment suggested that it would be impractical to attempt to determine whether the flow from a specific fire (*i.e.,* during a fire) is a significant source of pollution. EPA intends that MS4s will address all allowable non-storm water flows categorically rather than individually. If an MS4 is concerned that flows from fire fighting are, as a category, contributing substantial amounts of pollutants to their system, they could develop a program to address those flows prospectively. The program may include an analysis of the flow from several sources, steps to minimize the pollutant contribution, and a plan to work with the sources of the discharge to minimize any adverse impact on water quality. During the development of such a program, the MS4 may determine that only certain types of flows within a particular category are a concern, for example, fire fighting flows at industrial sites where large quantities of chemicals are present. In this example, a review of existing procedures with the fire department and/or hazardous materials team may reveal weaknesses or strengths previously unknown to the MS4 operator.

EPA received comments requesting modifications to the rule to include on-site sewage disposal systems (i.e., septic systems) in the scope of the illicit discharge program. On-site sewage disposal systems that flow into storm drainage systems are within the definition of illicit discharge as defined by the regulations. Where they are found to be the source of an illicit discharge, they need to be eliminated similar to any other illicit discharge source. Today's rule was not modified to include discharges from on-site sewage disposal systems specifically because those sources are already within the scope of the existing definition of illicit discharge.

iv. Construction Site Storm Water Runoff Control. Over a short period of time, storm water runoff from construction site activity can contribute more pollutants, including sediment, to a receiving stream than had been deposited over several decades (see section I.B.3). Storm water runoff from construction sites can include pollutants other than sediment, such as phosphorus and nitrogen, pesticides, petroleum derivatives, construction chemicals, and solid wastes that may become mobilized when land surfaces are disturbed. Generally, properly implemented and enforced construction site ordinances effectively reduce these pollutants. In many areas, however, the effectiveness of ordinances in reducing pollutants is limited due to inadequate enforcement or incomplete compliance with such local ordinances by construction site operators (Paterson, R.G. 1994. ''Construction Practices: The Good, the Bad, and the Ugly.'' *Watershed Protection Techniques* 1(2)).

Today's rule requires operators of regulated small MS4s to develop, implement, and enforce a pollutant control program to reduce pollutants in any storm water runoff from construction activities that result in land disturbance of 1 or more acres (see § 122.34(b)(4)). Construction activity on sites disturbing less than one acre must be included in the program if the construction activity is part of a larger common plan of development or sale that would disturb one acre or more.

The construction runoff control program of the regulated small MS4 must include an ordinance or other regulatory mechanism to require erosion and sediment controls to the extent practicable and allowable under State, Tribal or local law. The program also must include sanctions to ensure compliance (for example, non-monetary penalties, fines, bonding requirements, and/or permit denials for non-compliance). The program must also include, at a minimum: requirements for construction site operators to implement appropriate erosion and sediment control BMPS, such as silt fences, temporary detention ponds and diversions; procedures for site plan review by the small MS4 which incorporate consideration of potential water quality impacts; requirements to control other waste such as discarded building materials, concrete truck washout, chemicals, litter, and sanitary waste at the construction site that may adversely impact water quality; procedures for receipt and consideration of information submitted by the public to the MS4; and procedures for site inspection and enforcement of control measures by the small MS4.

Today's rule provides flexibility for regulated small MS4s by allowing them to exclude from their construction pollutant control program runoff from those construction sites for which the NPDES permitting authority has waived NPDES storm water small construction permit requirements. For example, if the NPDES permitting authority waives permit coverage for storm water discharges from construction sites less than 5 acres in areas where the rainfall erosivity factor is less than 5, then the regulated small MS4 does not have to include these sites in its storm water management program. Even if requirements for a discharge from a given construction site are waived by the NPDES permitting authority, however, the regulated small MS4 may still chose to control those discharges under the MS4's construction pollutant control program, particularly where such discharges may cause siltation problems in storm sewers. See Section II.I.1.b for more information on construction waivers by the permitting authority.

Some commenters suggested that the proposed construction minimum measure requirements went beyond the permit application requirements concerning construction for medium and large MS4s. In response, EPA has made changes to the proposed measure so that it more closely resembles the MS4 permit application requirements in existing regulations. For example, as described below, the Agency revised the proposed requirements for ''pre-construction review of site management plans'' to require ''procedures for site plan review.''

One commenter expressed concerns that addressing runoff from construction sites within urbanized areas (through the small MS4 program) differently from construction sites outside urbanized areas (which will not be covered by the small MS4 program) will encourage urban sprawl. Today's rule, together with the existing requirements, requires all construction greater than or equal to 1 acre, unless waived, to be covered by an NPDES permit whether it is located inside or outside of an urbanized area (see § 122.26(b)(15)). Today's rule does not require small MS4s to control runoff from construction sites more stringently or prescriptively than is required for construction site runoff outside urbanized areas. Therefore, today's rule imposes no substantively different onsite controls on runoff of storm water from construction sites in urbanized areas than from construction sites outside of urbanized areas.

One commenter recommended that the small MS4 construction site storm water runoff control program address all storm water runoff from construction sites, not just the runoff into the MS4. The commenter also believed that MS4s should provide clear, objective standards for all construction sites. EPA agrees. Because today's rule only regulates discharges from the MS4, the construction pollutant control measure only requires small MS4 operators to control runoff into its system. As a practical matter, however, EPA anticipates that MS4 operators will find that regulation of all construction site

runoff, whether they runoff into the MS4 or not, will prove to be the most simple and efficient program. The Agency may provide more specific criteria for construction site BMPs in the forthcoming rule being developed under CWA section 402(m). See section II.D.1 of today's rule.

One commenter stated that there is no need for penalties at the local level by the small MS4 because the CWA already imposes sufficient penalties to ensure compliance. EPA disagrees and believes that enforcement and compliance at the local level is both necessary and preferable. Examples of sanctions, some not available under the CWA, include non-monetary penalties, monetary fines, bonding requirements, and denial of future or other local permits.

One commenter recommended that EPA should not include the requirement to control pollutants other than sediment from construction sites in this measure. EPA disagrees with this comment. The requirement is to control waste that ''may cause adverse impacts on water quality.'' Such wastes may include discarded building materials, concrete truck washout, chemicals, pesticides, herbicides, litter, and sanitary waste. These wastes, when exposed to and mobilized by storm water, can contribute to water quality impairment.

The proposed rule required ''procedures for pre-construction review of site management plans.'' EPA requested comment on expanding this provision to require both review and approval of construction site storm water plans. Many commenters expressed the concern that review and approval of site plans is not only costly and time intensive, but may unnecessarily delay construction projects and unduly burden staff who administer the local program. In addition, some commenters expressed confusion whether EPA proposed pre-construction review for all site management plans or only higher priority sites. To address these comments, and be consistent with the permit application requirements for larger MS4s, EPA changed ''procedures for pre-construction review of site management plans'' to ''procedures for site plan review.'' Today's rule requires the small MS4 to develop procedures for site plan review so as to incorporate consideration of adverse potential water quality impacts. Procedures should include review of site erosion and sediment control plans, preferably before construction activity begins on a site. The objective is for the small MS4 operator and the construction site operator to address storm water runoff from construction activity early in the project design process so that potential consequences to the aquatic environment can be assessed and adverse water quality impacts can be minimized or eliminated.

One commenter requested that EPA delete the requirement for ''procedures for receipt and consideration of information submitted by the public'' because it went beyond existing storm water requirements. Another commenter stated that establishing a separate process to respond to public inquiries on a project is a burden to small communities, especially if the project has gone through an environmental review. One commenter requested clarification of this provision. EPA has retained this requirement in today's final rule to require some formality in the process for addressing public inquiries regarding storm water runoff from construction activities. EPA does not intend that small MS4s develop a separate, burdensome process to respond to every public inquiry. A small MS4 could, for example, simply log public complaints on existing storm water runoff problems from construction sites and pass that information on to local inspectors. The inspectors could then investigate complaints based on the severity of the violation and/or priority area.

One commenter believed that the proposed requirement of ''regular inspections during construction'' would require every construction project to be inspected more than once by the small MS4 during the term of a construction project. EPA has deleted the reference to ''regular inspections.'' Instead, the small MS4 will be required to ''develop procedures for site inspection and enforcement of control measures.'' Procedures could include steps to identify priority sites for inspection and enforcement based on the nature and extent of the construction activity, topography, and the characteristics of soils and receiving water quality.

In order to avoid duplication of small MS4 construction requirements with NPDES construction permit requirements, today's rule adds § 122.44(s) to recognize that the NPDES permitting authority can incorporate qualifying State, Tribal, or local erosion and sediment control requirements in NPDES permits for construction site discharges. For example, a construction site operator who complies with MS4 construction pollutant control programs that are referenced in the NPDES construction permit would satisfy the requirements of the NPDES permit. See section II.I.1.d for more information on incorporating qualifying programs by reference into NPDES construction permits. This provision has no impact on, or direct relation to, the small MS4 operator's responsibilities under the construction site storm water runoff control minimum measure. Conversely, under § 122.35(b), the permitting authority may recognize in the MS4's permit that another governmental entity, or the permitting authority itself, is responsible for implementing one or more of the minimum measures (including construction site storm water runoff control), and not include this measure in the small MS4's permit. In this case, the other governmental entity's program must satisfy all of the requirements of the omitted measure.

v. Post-Construction Storm Water Management in New Development and Redevelopment. The NURP study and more recent investigations indicate that prior planning and designing for the minimization of pollutants in storm water discharges is the most cost-effective approach to storm water quality management. Reducing pollutant concentrations in storm water after the discharge enters a storm sewer system is often more expensive and less efficient than preventing or reducing pollutants at the source. Increased human activity associated with development often results in increased pollutant loading from storm water discharges. If potential adverse water quality impacts are considered from the beginning stages of a project, new development and redevelopment provides more opportunities for water quality protection. For example, minimization of impervious areas, maintenance or restoration of natural infiltration, wetland protection, use of vegetated drainage ways, and use of riparian buffers have been shown to reduce pollutant loadings in storm water runoff from developed areas. EPA encourages operators of regulated small MS4s to identify specific problem areas within their jurisdictions and initiate innovative solutions and designs to focus attention on those areas through local planning.

In today's rule at § 122.34(b)(5), NPDES permits issued to an operator of a regulated small MS4 will require the operator to develop, implement, and enforce a program to address storm water runoff from new development and redevelopment projects that result in land disturbance of greater than or equal to one acre, including projects less than one acre that are part of a larger common plan of development or sale, that discharge into the MS4. Specifically, the NPDES permit will require the operator of a regulated small MS4 to: (1) Develop and implement

strategies which include a combination of structural and/or non-structural best management practices (BMPs) appropriate for the community; (2) use an ordinance, or other regulatory mechanism to address post-construction runoff from new development and redevelopment projects to the extent allowable under State, Tribal or local law; (3) ensure adequate long-term operation and maintenance of BMPs; and (4) ensure that controls are in place that would minimize water quality impacts. EPA intends the term ''redevelopment'' to refer to alterations of a property that change the ''footprint'' of a site or building in such a way that results in the disturbance of equal to or greater than 1 acre of land. The term is not intended to include such activities as exterior remodeling, which would not be expected to cause adverse storm water quality impacts and offer no new opportunity for storm water controls.

EPA received comments requesting guidance and clarification of the rule requirements. The scope of the comments ranged from general requests for more details on how MS4 operators should accomplish the four requirements listed above, to specific requests for information regarding transfer of ownership for structural controls, as well as ongoing responsibility for operation and maintenance. By the term ''combination'' of BMPs, EPA intends a combination of structural and/or non-structural BMPs. For this requirement, the term ''combination'' is meant to emphasize that multiple BMPs should be considered and adopted for use in the community. A single BMP generally cannot significantly reduce pollutant loads because pollutants come from many sources within a community. The BMPs chosen should: (1) Be appropriate for the local community; (2) minimize water quality impacts; and (3) attempt to maintain pre-development runoff conditions. In choosing appropriate BMPs, EPA encourages small MS4 operators to participate in locally-based watershed planning efforts which attempt to involve a diverse group of stakeholders. Each new development and redevelopment project should have a BMP component. If an approach is chosen that primarily focuses on regional or non-structural BMPs, however, then the BMPs may be located away from the actual development site (*e.g.,* a regional water quality pond).

Non-structural BMPs are preventative actions that involve management and source controls such as: (1) Policies and ordinances that provide requirements and standards to direct growth to identified areas, protect sensitive areas such as wetlands and riparian areas, maintain and/or increase open space (including a dedicated funding source for open space acquisition), provide buffers along sensitive water bodies, minimize impervious surfaces, and minimize disturbance of soils and vegetation; (2) policies or ordinances that encourage infill development in higher density urban areas, and areas with existing storm sewer infrastructure; (3) education programs for developers and the public about project designs that minimize water quality impacts; and (4) other measures such as minimization of the percentage of impervious area after development, use of measures to minimize directly connected impervious areas, and source control measures often thought of as good housekeeping, preventive maintenance and spill prevention. Detailed examples of non-structural BMPs follow.

Preserving open space may help to protect water quality as well as provide other benefits such as recharging groundwater supplies, detaining storm water, supporting wildlife and providing recreational opportunities. Although securing funding for open space acquisition may be difficult, various funding mechanisms have been used. New Jersey uses a portion of their State sales tax (voter approved for a ten year period) as a stable source of funding to finance the preservation of historic sites, open space and farmland. Colorado uses part of the proceeds from the State lottery to acquire and manage open space. Some local municipalities use a percentage of the local sales tax revenue to pay for open space acquisition (*e.g.,* Jefferson County, CO has had an open space program in place since 1977 funded by a 0.50 percent sales tax). Open space can be acquired in the form of: fee simple purchase; easements; development rights; purchase and sellback or leaseback arrangements; purchase options; private land trusts; impact fees; and land dedication requirements. Generally, fee simple purchases provide the highest level of development control and certainty of preservation, whereas the other forms of acquisition may provide less control, though they would also generally be less costly.

Cluster development, while allowing housing densities comparable to conventional zoning practice, concentrates housing units in a portion of the total site area which provides for greater open space, recreation, stream protection and storm water control. This type of development, by reducing lot sizes, can protect sensitive areas and result in less impervious surface, as well as reduce the cost for roads and other infrastructure.

Minimizing directly connected impervious areas (DCIAs) is a drainage strategy that seeks to reduce paved areas and directs storm water runoff to landscaped areas or to structural controls such as grass swales or buffer strips. This strategy can slow the rate of runoff, reduce runoff volumes, attenuate peak flows, and encourage filtering and infiltration of storm water. It can be made an integral part of drainage planning for any development (Urban Drainage and Flood Control District, Denver, CO. 1992. *Urban Storm Drainage Criteria Manual, Volume 3—Best Management Practices).* The Urban Drainage and Flood Control District manual describes three levels for minimizing DCIAs. At Level 1 all impervious surfaces are made to drain over grass-covered areas before reaching a storm water conveyance system. Level 2 adds to Level 1 and replaces street curb and gutter systems with low-velocity grass-lined swales and pervious street shoulders. In addition to Levels 1 and 2, Level 3 over-sizes swales and configures driveway and street crossing culverts to use grass-lined swales as elongated detention basins.

Structural BMPs include: (1) Storage practices such as wet ponds and extended-detention outlet structures; (2) filtration practices such as grassed swales, sand filters and filter strips; and (3) infiltration practices such as infiltration basins and infiltration trenches.

EPA recommends that small MS4 operators ensure the appropriate implementation of the structural BMPs by considering some or all of the following: (1) Pre-construction review of BMP designs; (2) inspections during construction to verify BMPs are built as designed; (3) post-construction inspection and maintenance of BMPs; and (4) sanctions to ensure compliance with design, construction or operation and maintenance (O&M) requirements of the program.

EPA cautions that certain infiltration systems such as dry wells, bored wells or tile drainage fields may be subject to Underground Injection Control (UIC) program requirements (see 40 CFR Part 144.12.). To find out more about these requirements, contact your state UIC Program, or call EPA's Safe Drinking Water Hotline at 1–800–426–4791.

In order to meet the third post-construction requirement (ensuring adequate long-term O&M of BMPs), EPA recommends that small MS4 operators evaluate various O&M management agreement options. The most common options are agreements between the

MS4 operator and another party such as post-development landowners (*e.g.,* homeowners' associations, office park owners, other government departments or entities), or regional authorities (*e.g.,* flood control districts, councils of government). These agreements typically require the post-construction property owner to be responsible for the O&M and may include conditions which: allow the MS4 operator to be reimbursed for O&M performed by the MS4 operator that is the responsibility of the property owner but is not performed; allow the MS4 operator to enter the property for inspection purposes; and in some cases specify that the property owner submit periodic reports.

In providing the guidance above, EPA intends the requirements in today's rule to be consistent with the permit application requirements for large MS4s for post-construction controls for new development and redevelopment. MS4 operators have significant flexibility both to develop this measure as appropriate to address local concerns, and to apply new control technologies as they become available. Storm water pollution control technologies are constantly being improved. EPA recommends that MS4s be responsive to these changes, developments or improvements in control technologies. EPA will provide more detailed guidance addressing the responsibility for long-term O&M of storm water controls in guidance materials. The guidance will also provide information on appropriate planning considerations, structural controls and non-structural controls. EPA also intends to develop a broad menu of BMPs as guidance to ensure flexibility to accommodate local conditions.

EPA received comments suggesting that requirements for new development be treated separately from redevelopment in the rule. The comment stressed that new development on raw land presents fewer obstacles and more opportunities to incorporate elements for preventing water quality impacts, whereas redevelopment projects are constrained by space limitations and existing infrastructure. Another comment suggested allowing waivers from the redevelopment requirements if the redevelopment does not result in additional adverse water quality impacts, and where BMPs are not technologically or economically feasible. EPA recognizes that redevelopment projects may have more site constraints which narrow the range of appropriate BMPs. Today's rule provides small MS4 operators with the flexibility to develop requirements that may be different for redevelopment projects, and may also include allowances for alternate or off-site BMPs at certain redevelopment projects. Non-structural BMPs may be the most appropriate approach for smaller redevelopment projects.

EPA received comments requesting clarification on what is meant by ''pre-development'' conditions within the context of redevelopment. Pre-development refers to runoff conditions that exist onsite immediately before the planned development activities occur. Pre-development is not intended to be interpreted as that period before any human-induced land disturbance activity has occurred.

EPA received comments on the guidance language in the proposed rule and preamble which suggest that implementation of this measure should ''attempt to maintain pre-development runoff conditions'' and that ''post-development conditions should not be different than pre-development conditions in a way that adversely affects water quality.'' Many comments expressed concern that maintaining pre-development runoff conditions is impossible and cost-prohibitive, and objected to any reference to ''flow'' or increase in volume of runoff. Other comments support the inclusion of this language in the final rule. Similar references in today's rule relating to pre-development runoff conditions are intended as *recommendations* to *attempt* to maintain pre-development runoff conditions. With these recommendations, EPA intends to prevent water quality impacts resulting from increased discharges of pollutants, which may result from increased volume of runoff. In many cases, consideration of the increased flow rate, velocity and energy of storm water discharges following development unavoidably must be taken into consideration in order to reduce the discharge of pollutants, to meet water quality standards and to prevent degradation of receiving streams. EPA recommends that municipalities consider these factors when developing their post-construction storm water management program.

Some comments said that the quoted phrases in the paragraph above are directives that imply federal land use control, which they argue is beyond the authority of the CWA. EPA recognizes that land use planning is within the authority of local governments.

EPA disagrees, however, with the implication that today's rule dictates any such land use decisions. The requirement for small MS4 operators to develop a program to address discharges resulting from new development and redevelopment is essentially a pollution prevention measure. The Rule provides the MS4 operator with flexibility to determine the appropriate BMPs to address local water quality concerns. EPA recognizes that these program goals may not be applied to every site, and expects that MS4s will develop an appropriate combination of BMPs to be applied on a site-by-site, regional or watershed basis.

vi. Pollution Prevention/Good Housekeeping for Municipal Operations. Under today's final rule, operators of MS4s must develop and implement an operation and maintenance program (''program'') that includes a training component and has the ultimate goal of preventing or reducing storm water from municipal operations (in addition to those that constitute storm water discharges associated with industrial activity). This measure's emphasis on proper O&M of MS4s and employee training, as opposed to requiring the MS4 to undertake major new activities, is meant to ensure that municipal activities are performed in the most efficient way to minimize contamination of storm water discharges.

The program must include government employee training that addresses prevention measures pertaining to municipal operations such as: parks, golf courses and open space maintenance; fleet maintenance; new construction or land disturbance; building oversight; planning; and storm water system maintenance. The program can use existing storm water pollution prevention training materials provided by the State, Tribe, EPA, or environmental, public interest, or trade organizations.

EPA also encourages operators of MS4s to consider the following in developing a program: (1) Implement maintenance activities, maintenance schedules, and long-term inspection procedures for structural and non-structural storm water controls to reduce floatables and other pollutants discharged from the separate storm sewers; (2) implement controls for reducing or eliminating the discharge of pollutants from streets, roads, highways, municipal parking lots, maintenance and storage yards, waste transfer stations, fleet or maintenance shops with outdoor storage areas, and salt/sand storage locations and snow disposal areas operated by the MS4; (3) adopt procedures for the proper disposal of waste removed from the separate storm sewer systems and areas listed above in (2), including dredge

spoil, accumulated sediments, floatables, and other debris; and (4) adopt procedures to ensure that new flood management projects are assessed for impacts on water quality and existing projects are assessed for incorporation of additional water quality protection devices or practices. Ultimately, the effective performance of the program measure depends on the proper maintenance of the BMPs, both structural and non-structural. Without proper maintenance, BMP performance declines significantly over time. Additionally, BMP neglect may produce health and safety threats, such as structural failure leading to flooding, undesirable animal and insect breeding, and odors. Maintenance of structural BMPs could include: replacing upper levels of gravel; dredging of detention ponds; and repairing of retention basin outlet structure integrity. Maintenance of non-structural BMPs could include updating educational materials periodically.

EPA emphasizes that programs should identify and incorporate existing storm water practices and training, as well as non-storm water practices or programs that have storm water pollution prevention benefits, as a means to avoid duplication of efforts and reduce overall costs. EPA recommends that MS4s incorporate these new obligations into their existing programs to the greatest extent feasible and urges States to evaluate MS4 programs with programmatic efficiency in mind. EPA designed this minimum control measure as a modified version of the permit application requirements for medium and large MS4s described at 40 CFR 122.26(d)(2)(iv), in order to provide more flexibility for these smaller MS4s. Today's requirements provide for a consistent approach to control pollutants from O&M among medium, large, and regulated small MS4s.

By properly implementing a program, operators of MS4s serve as a model for the rest of the regulated community. Furthermore, the establishment of a long-term program could result in cost savings by minimizing possible damage to the system from floatables and other debris and, consequently, reducing the need for repairs.

EPA received comments requesting clarification of what this measure requires. Certain municipalities expressed concern that the measure has the potential to impose significant costs associated with EPA's requirement that operators of MS4s consider implementing controls for reducing or eliminating the discharge of pollutants from streets, roads, highways, municipal parking lots, and salt/sand storage locations and snow disposal areas operated by the municipality. EPA disagrees that a requirement to *consider* such controls will impose considerable costs.

One commenter objected to the preamble language from the proposal suggesting that EPA does not expect the MS4 to undertake new activity. While it remains the Agency's expectation that major new activity will not be required, the MEP process should drive MS4s to incorporate the measure's obligations into their existing programs to achieve the pollutant reductions to the maximum extent practicable.

Certain commenters requested a definition for ''municipal operations.'' EPA has revised the language to more clearly define municipal operations. Questions may remain concerning whether discharges from specific municipal activities constitute discharges associated with industrial activities (requiring NPDES permit authorization according to the requirements for industrial storm water that apply in that State) or from municipal operations (subject only to the controls developed in the MS4 control program). Even though there may be different substantive requirements that apply depending on the source of the discharge, EPA has modified the deadlines for permit coverage so that all the regulated municipally owned and operated sources become subject to permit requirements on the same date. The deadline is the same for permit coverage for this minimum measure as for permit coverage for municipally owned/operated industrial sources.

c. Application Requirements

An NPDES permit that authorizes the discharge from a regulated small MS4 may take the form of either an individual permit issued to one or more facilities as co-permittees or a general permit that applies to a group of MS4s. For reasons of administrative efficiency and to reduce the paperwork burden on permittees, EPA expects that most discharges from regulated small MS4s will be authorized under general permits. These NPDES general permits will provide specific instructions on how to obtain coverage, including application requirements. Typically, such application requirements will be satisfied by the submission of a Notice of Intent (NOI) to be covered by the general permit. In this section, EPA explains the small MS4 operator's application requirements for obtaining coverage under a NPDES permit for storm water.

i. Best Management Practices and Measurable Goals, Section 122.34(d) of today's rule requires the operator of a regulated small MS4 that wishes to implement a program under § 122.34 to identify and submit to the NPDES permitting authority a list of the best management practices (''BMPs'') that will be implemented for each minimum control measure in their storm water management program. They also must submit measurable goals for the development and implementation of each BMP. The BMPs and the measurable goals must be included either in an NOI to be covered under a general permit or in an individual permit application.

The operator's submission must identify, as appropriate, the months and years in which the operator will undertake actions required to implement each of the minimum control measures, including interim milestones and the frequency of periodic actions. The Agency revised references to ''starting and completing'' actions from the proposed rule because many actions will be repetitive or ongoing. The submission also must identify the person or persons responsible for implementing or coordinating the small MS4 storm water program. See § 122.34(d). The submitted BMPs and measurable goals become enforceable according to the terms of the permit. The first permit can allow the permittee up to five years to fully implement the storm water management program.

Several commenters opposed making the measurable goals enforceable permit conditions. Some suggested that a permittee should be able to change its goals so that BMPs that are not functioning as intended can be replaced. EPA agrees that a permittee should be free to switch its BMPs and corresponding goals to others that accomplish the minimum measure or measures. The permittee is required to implement BMPs that address the minimum measures in § 122.34(b). If the permittee determines that its original combination of BMPs are not adequate to achieve the objectives of the municipal program, the MS4 should revise its program to implement BMPs that are adequate and submit to the permitting authority a revised list of BMPs and measurable goals. EPA suggests that permits describe the process for revising BMPs and measurable goals, such as whether the permittee should follow the same procedures as were required for the submission of the original NOI and whether the permitting authority's approval is necessary prior to the permittee implementing the revised

BMPs. The permittee should indicate on its periodic report whether any BMPs and measurable goals have been revised since the last periodic report.

Some commenters expressed concern that making the measurable goals enforceable would encourage the development of easily attained goals and, conversely, discourage the setting of ambitious goals. Others noted that it is often difficult to determine the pollutant reduction that can be achieved by BMPs until several years after implementation. Much of the opposition to the enforceability of measurable goals appears to have been based on a mistaken understanding that measurable goals must consist of pollutant reduction targets to be achieved by the corresponding BMPs.

Today's rule requires the operator to submit either measurable goals that serve as BMP design objectives or goals that quantify the progress of implementation of the actions or performance of the permittee's BMPs. At a minimum, the required measurable goals should describe specific actions taken by the permittee to implement each BMP and the frequency and the dates for such actions. Although the operator may choose to do so, it is not required to submit goals that measure whether a BMP or combination of BMPs is effective in achieving a specific result in terms of storm water discharge quality. For example, a measurable goal might involve a commitment to inspect a given number of drainage areas of the collection system for illicit connections by a certain date. The measurable goal need not commit to achieving a specific amount of pollutant reduction through the elimination of illicit connections. Other measurable goals could include the date by which public education materials would be developed, a certain percentage of the community participating in a clean-up campaign, the development of a mechanism to address construction site runoff, and a reduction in the percentage of imperviousness associated with new development projects.

To reduce the risk that permittees will develop inadequate BMPs, EPA intends to develop a menu of BMPs to assist the operators of regulated small MS4s with the development of municipal programs. States may also develop a menu of BMPs. Today's rule provides that the measurable goals that demonstrate compliance with the minimum control measures in §§ 122.34 (b)(3) through (b)(6) do not have to be met if the State or EPA has not issued a menu of BMPs at the time the MS4 submits its NOI. Commenters pointed out that the proposed rule would have made the measurable goals unenforceable if the menu of BMPs was not available, but the proposal was silent as to the enforceability of the implementation of BMPs. Today's rule clarifies that the operators are not free to do nothing prior to the issuance of a menu of BMPs; they still must make a good faith effort to implement the BMPs designed to comply with each measure. See § 122.34(d)(2). The operators would not, however, be liable for failure to meet its measurable goals if a menu of BMPs was not available at the time they submit their NOI.

The proposed rule provision in § 123.35 stated that the ''[f]ailure to issue the menu of BMPs would not affect the legal status of the general permit.'' This concept is included in the final rule in § 122.34(d)(2)'s clarification that the permittee still must comply with other requirements of the general permit.

Unlike the proposed rule, today's rule does not require that each BMP in the menu developed by the State or EPA be regionally appropriate, cost-effective and field-tested. Various commenters criticized those criteria as unworkable, and one described them as ''ripe for ambiguity and abuse.'' Other commenters feared that the operators of regulated small MS4s would never be required to achieve their goals until menus were developed that were cost-effective, field-tested and appropriate for every conceivable subregion.

While some municipal commenters supported the requirement that a menu of BMPs be made available that included BMPs that had been determined to be regionally appropriate, field-tested and cost-effective, others raised concerns that they would be restricted to a limited menu. Some commenters supported such a detailed menu because they thought they would only be able to select BMPs that were on the menu, while others thought that it was the permitting authority's responsibility to develop BMPs narrowly tailored to their situation. In response, EPA notes that the operators will not be restricted to implementing only, or all of, the BMPs included on the menu. Since the menu does not require permittees to implement the BMPs included on the menu, it is also not necessary to apply the public notice and other procedures that some commenters thought should be applied to the development of the menu of BMPs.

The purpose of the BMP menu is to provide guidance to assist the operators of regulated small MS4s with the development and refinement of their local program, not to limit their options. Permittees may implement BMPs other than those on the menu unless a State restricts its permittees to specific BMPs. To the extent possible, EPA will develop a menu of BMPs that describes the appropriateness of BMPs to specific regions, whether the BMPs have been field-tested, and their approximate costs. The menu, however, is not intended to relieve permittees of the need to implement BMPs that are appropriate for their specific circumstances.

If there are no known relevant BMPs for a specific circumstance, a permittee has the option of developing and implementing pilot BMPs that may be better suited to their circumstances. Where BMPs are experimental, the permittee should consider committing to measurable goals that address its schedule for implementing its selected BMPs rather than goals of achieving specific pollutant reductions. If the BMPs implemented by the permittee do not achieve the desired objective, the permittee may be required to commit to different or revised BMPs.

As stated in § 123.35(g), EPA is committed to issuing a menu of BMPs prior to the deadline for the issuance of permits. This menu would serve as guidance for all operators of regulated small MS4s nationwide. After developing the initial menu of BMPs, EPA intends to periodically modify, update, and supplement the menu of BMPs based on the assessments of the MS4 storm water program and research. States may rely on EPA's menu of BMPs or issue their own. If States develop their own menus, they would constitute additional guidance (or perhaps requirements in some States) for the operators to follow. Several commenters were confused by the proposed rule language that stated that States must provide or issue a menu of BMPs and, if they fail to do so, EPA ''may'' do so. Some read this language as not requiring either EPA or the State to develop the menu. EPA had intended that it would develop a menu and that States could either provide the EPA developed menu or one developed by the State.

EPA has dropped the proposed language that States ''must'' develop the menu of BMPs. Some commenters thought that it was inappropriate to require States to issue guidance. A menu of BMPs issued by either EPA or a permittee's State will satisfy the condition in § 122.34(d) that a regulatory authority provide a menu of BMPs. A State could require its permittees to follow its menu of BMPs provided that they are adequate to implement § 122.34(b).

Several commenters raised concerns that operators of small MS4s could be

required to submit their BMPs and measurable goals before EPA or the State has issued a menu of BMPs. EPA has assumed primary responsibility for developing a menu of BMPs to minimize the possibility of this occurring. Should a general permit be issued before a menu of BMPs is available, the permit writer would have the option of delaying the date by which the identification of the BMPs and measurable goals must be submitted to the permitting authority until some time after a menu of BMPs is available.

Several municipal commenters raised concerns that they would begin to develop a program only to be later told by the permitting authority or challenged in a citizen suit that their BMPs were inadequate. They expressed a need for certainty regarding what their permit required. Several commenters suggested that EPA require permitting authorities to approve or disapprove the submitted BMPs and measurable goals. EPA disagrees that formal approval or disapproval by the permitting authority is needed.

EPA acknowledges that the lack of a formal approval process does place on the permittee some responsibility for designing and determining the adequacy of its BMPs. Once the permittee has submitted its BMPs to the permitting authority as part of its NOI, it must implement them in order to achieve the corresponding measurable goals. EPA does not believe that this results in the uncertainty to the extent expressed by some commenters or unduly expose the permittee to the risk of citizen suit. If the permit is very specific regarding what the permittee must do, then the uncertainty is eliminated. If the permit is less prescriptive, the permittee has greater latitude in determining for itself what constitutes an adequate program. A citizen suit could impose liability on the permittee only if the program that it develops and implements clearly does not satisfy the requirements of the general permit. EPA believes today's approach strikes a balance between the competing goals of providing certainty as to what constitutes an adequate program and providing flexibility to the permittees.

Commenters were divided on whether five years was a reasonable and expeditious schedule for a MS4 to implement its program. Some thought that it was an appropriate amount of time to allow for the development and implementation of adequate programs. One questioned whether the permittee had to be implementing all of its program within that time, and suggested that there may be cases where a permitting authority would need flexibility to allow more time. One commenter suggested that five years is too long and would amount to a relaxation of implementation in their area. EPA believes it will take considerable time to complete the tasks of initially developing a program, commencing to implement it, and achieving results. EPA notes, however, that full implementation of an appropriate program must occur as expeditiously as possible, and not later than five years.

EPA solicited comment on how an NOI form might best be formatted to allow for measurable goal information (*e.g.,* through the use of check boxes or narrative descriptions) while taking into account the Agency's intention to facilitate computer tracking. All commenters supported the development of a checklist NOI, but most noted that there would need to be room for additional information to cover unusual situations. One noted that, while a summary of measurable goals might be reduced to one sheet, attachments that more fully described the program and the planned BMPs would be necessary. EPA agrees that in most cases a ''checklist'' will not be able to capture the information on what BMPs a permittee intends to implement and its measurable goals for their implementation. EPA will continue to consider whether to develop a model NOI form and make it available for permitting authorities that choose to use it. What will be required on an MS4's NOI, however, is more extensive than what is usually required on an NOI, so a ''form'' NOI for MS4s may be impractical.

ii. Individual Permit Application for a § 122.34(b) program. In some cases, an operator of a regulated small MS4s may seek coverage under an individual NPDES permit, either because it chooses to do so or because the NPDES permitting authority has not made the general permit option available to that source. For small MS4s that are to implement a § 122.34(b) program in today's rule, EPA is promulgating simplified individual permit application requirements at § 122.33(b)(2)(i). Under the simplified individual permit application requirements, the operator submits an application to the NPDES permitting authority that includes the information required under § 122.21(f) and an estimate of square mileage served by the small MS4. They are also required to supply the BMP and measurable goal information required under § 122.34(d). Consistent with CWA section 308 and analogous State law, the permitting authority could request any additional information to gain a better understanding of the system and the areas draining into the system.

Commenters suggested that the requirements of § 122.21(f) are not necessarily applicable to a small MS4. One suggested that it was not appropriate to require the following information: a description of the activities conducted by the applicant which require it to obtain an NPDES permit; the name, mailing address, and location of the facility; and up to four Standard Industrial Classification (''SIC'') codes which best reflect the principal products or services provided by the facility. In response, EPA notes that the requirements in § 122.21(f) are generic application requirements applicable to NPDES applicants. With the exception of the SIC code requirement, EPA believes that they are applicable to MS4s. In the SIC code portion of the standard application, the applicant may simply put ''not applicable.''

One commenter asked that EPA clarify whether § 122.21(f)(5)'s requirement to indicate ''whether the facility is located on Indian lands,'' referred to tribal lands, Indian country, or Indian reservations. For some local governments this is a complex issue with no easy ''yes'' or ''no'' answer. See the discussion in the Section II.F in the proposal to today's rule regarding what tribal lands are subject to the federal trust responsibility for purposes of the NPDES program.

One commenter suggested that the application should not have to list the permits and approvals required under § 122.21(f)(6). EPA notes that the applicant must only list the environmental permits that the applicant has received that cover the small MS4. The applicant is not required to list permits for other operations conducted by the small MS4 operator (*e.g.,* for an operation of an airport or landfill). Again, in most cases the applicant could respond ''not applicable'' to this portion of the application.

One commenter suggested that the topographic map requirement of § 122.21(f)(7) was completely different from, and significantly more onerous than, the mapping requirement outlined in the proposed rule at § 122.34(b)(3)(i). EPA agrees and has modified the final rule to clarify that a map that satisfies the requirements of § 122.34(b)(3)(i) also satisfies the map requirements for MS4 applicants seeking individual permits under § 122.33(b)(2)(i).

EPA is adding a new paragraph to § 122.44(k) to clarify that requirements to implement BMPs developed pursuant to CWA 402(p) are appropriate permit

conditions. While such conditions could be included under the existing provision in § 122.44(k)(3) for ''practices reasonably necessary to achieve effluent limitations and standards or to carry out the purposes and intent of the CWA,'' EPA believes it is clearer to specifically list in § 122.44(k) BMPs that implement storm water programs in light of the frequency with which they are used as effluent limitations.

iii. Alternative Permit Options/Tenth Amendment. As an alternative to implementing a program that addresses each of the six minimum measures according to the requirements of § 122.34(b), today's rule provides the operators of regulated small MS4s with the option of applying for an individual permit under existing § 122.26(d). *See* § 122.33(b)(2)(ii). If a system operator does not want to be held accountable for implementation of each of the minimum measures, an individual permit option under § 122.33(b)(2)(ii) remains available. (As explained in the next section of this preamble, § 122.35(b) also provides an opportunity for relief from permit obligations for some of the minimum measures, but that relief exists within the framework of the minimum measures.)

EPA originally drafted the individual permit application requirements in § 122.26(d) to apply to medium and large MS4s. Today's rule abbreviates the individual permit application requirements for small MS4s. Although EPA believes that the storm water management program requirements of § 122.34, including the minimum measures, provide the most appropriate means to control pollutants from most small MS4s, the Agency does recognize that the operators of some small MS4s may prefer more individualized permit requirements. Among other possible reasons, an operator may seek to avoid having to ''regulate'' third parties discharging into the separate storm sewer system. Alternatively, an operator may determine that structural controls, such as constructed wetlands, are more appropriate or effective to address the discharges that would otherwise be addressed under the construction and/or development/redevelopment measures.

Some MS4s commenters alleged that an absolute requirement to implement the minimum measures violates the Tenth Amendment to the U.S. Constitution. While EPA disagrees that requiring MS4s to implement the minimum measures would violate the Constitution, today's rule does provide small MS4s with the option of developing more individualized measures to reduce the pollutants and pollution associated with urban storm water that will be regulated under today's rule.

Some commenters specifically objected that § 122.34's minimum measures for small MS4s violate the Tenth Amendment insofar as they require the operators of MS4s to regulate third parties. The minimum measures include requirements for small MS4 operators to prohibit certain non-storm water discharges, control storm water discharges from construction greater than one acre, and take other actions to control third party sources of storm water discharges into their MS4s. Commenters also argued that it was inappropriate for EPA to require local governments to enact ordinances that will consume local revenues and put local governments in the position of bearing the political responsibility for implementing the program. One commenter argued that EPA was prohibited from conditioning the issuance of an NPDES permit upon the small MS4 operators waiving their constitutional right to be free from such requirements to regulate third parties. The Agency replies to each comment in turn.

Because the rule does rely on local governments—who operate municipal separate storm sewer systems—to regulate discharges from third parties into storm sewers, EPA acknowledges that the rule implicates the Tenth Amendment and constitutional principles of federalism. EPA disagrees, however, that today's rule is inconsistent with federalism principles. [As political subdivisions of States, municipalities enjoy the same protections as States under the Tenth Amendment.]

The Supreme Court has interpreted the Tenth Amendment to preclude federal actions that compel States or their political subdivisions to enact or administer a federal regulatory program. *See New York* v. *United States,* 505 U.S. 144 (1992); *Printz* v. *United States,* 117 S.Ct. 2365 (1997). The *Printz* case, however, did acknowledge that the restriction does not apply when federal requirements of general applicability—requirements that regulate all parties engaging in a particular activity—do not excessively interfere with the functioning of State governments when those requirements are applied to States (or their political subdivisions). *See Printz,* 117 S.Ct. at 2383.

Today's rule imposes a federal requirement of general applicability, namely, the requirement to obtain and comply with an NPDES permit, on municipalities that operate a municipal separate storm sewer system. By virtue of this rule, the permit will require the municipality/storm sewer operator to develop a storm water control program. The rule specifies the components of the control program, which are primarily ''management'-type controls, for example, municipal regulation of third party storm water discharges associated with construction, as well as development and redevelopment, when those discharges would enter the municipal system.

Unlike the circumstances reviewed in the *New York* and *Printz* cases, today's rule merely applies a generally applicable requirement (the CWA permit requirement) to municipal point sources. The CWA establishes a generally applicable requirement to obtain an NPDES permit to authorize point source discharge to waters of the United States. Because municipalities own and operate separate storm sewers, including storm sewers into which third parties may discharge pollutants, NPDES permits may require municipalities to control the discharge of pollutants into the storm sewers in the first instance. Because NPDES permits can impose end-of-pipe numeric effluent limits, narrative effluent limits in the form of ''management'' program requirements are also within the scope of Clean Water Act authority. As noted above, however, EPA believes that such narrative limitations are the most appropriate form of effluent limitation for these types of permits. For municipal separate storm sewer permits, CWA section 402(p)(3)(B)(iii) specifically authorizes ''controls to reduce pollutants to the maximum extent practicable, including management practices, control techniques and system, design and engineering methods, and such other provisions as the Administrator or the State determines appropriate for the control of such pollutants.''

The Agency did not design the minimum measures in § 122.34 to ''commandeer'' state regulatory mechanisms, but rather to reduce pollutant discharges from small MS4s. The permit requirement in CWA section 402 is a requirement of general applicability. The operator of a small MS4 that does not prohibit and/or control discharges into its system essentially accepts ''title'' for those discharges. At a minimum, by providing free and open access to the MS4s that convey discharges to the waters of the United States, the municipal storm sewer system enables water quality impairment by third parties. Section 122.34 requires the operator of a regulated small MS4 to control a third

party only to the extent that the MS4 collection system receives pollutants from that third party and discharges it to the waters of the United States. The operators of regulated small MS4s cannot passively receive and discharge pollutants from third parties. The Agency concedes that administration of a municipal program will consume limited local revenues for implementation; but those consequences stem from the municipal operator's identity as a permitted sewer system operator. The Tenth Amendment does not create a blanket municipal immunity from generally applicable requirements. Development of a program based on the minimum measures and implementation of that program should not ''excessively interfere'' with the functioning of municipal government, especially given the ''practicability'' threshold under CWA section 402(p)(3)(B)(iii).

As noted above, today's rule also allows regulated small MS4s to opt out of the minimum measures approach. The individual permit option provides for greater flexibility in program implementation and also responds to the comment about requiring a municipal permit applicant's waiver of any arguable constitutional rights. The individual permit option responds to questions about the rule's alleged unconstitutionality by more specifically focusing on the pollutants discharged from municipal point sources. Today's rule gives operators of MS4s the option to seek an individual permit that varies from the minimum measures/management approach that is otherwise specified in today's rule. Even if the minimum measures approach was constitutionally suspect, a requirement that standing alone would violate constitutional principles of federalism does not raise concerns if the entity subject to the requirement may opt for an alternative action that does not raise a federalism issue.

For municipal system operators who seek to avoid third party regulation according to all or some of the minimum measures, § 122.26(d) requires the operator to submit a narrative description of its storm water sewer system and any existing storm water control program, as well as the monitoring data to enable the permit writer to develop appropriate permit conditions. The permit writer can then develop permit conditions and limitations that vary from the six minimum measures prescribed in today's rule. The information will enable the permit writer to develop an NPDES permit that will result in pollutant reduction to the maximum extent practicable. *See NRDC* v. *EPA,* 966 F.2d at 1308, n17. If determined appropriate under CWA section 402(p)(3)(B)(iii), for example BMPs to meet water quality standards, the permit could also incorporate any more stringent or prescriptive effluent limits based on the individual permit application information.

For small MS4 operators seeking an individual permit, both Part 1 and Part 2 of the application requirements in § 122.26(d)(1) and (2) are required to be submitted within 3 years and 90 days of the date of publication of this **Federal Register** notice. Some of the information required in Part 1 will necessarily have to be developed by the permit applicant prior to the development of Part 2 of the application. The permit applicant should coordinate with its permitting authority regarding the timing of review of the information.

The operators of regulated small MS4s that apply under § 122.26(d) may apply to implement certain of the § 122.34(b) minimum control measures, and thereby focus the necessary evaluation for additional limitations on alternative controls to the § 122.34(b) measures that the small MS4 will not implement. The permit writer may determine ''equivalency'' for some or all of the minimum measures by developing a rough estimate of the pollutant reduction that would be achieved if the MS4 implemented the § 122.34 minimum measure and to incorporate that pollutant reduction estimate in the small MS4's individual permit as an effluent limitation. The Agency recognizes that, based on current information, any such estimates will probably have a wide range. Anticipation of this wide range is one of the reasons EPA believes MS4 operators need flexibility in determining the mix of BMPs (under the minimum measures) to achieve water quality objectives. Therefore, for example, if a system operator seeks to employ an alternative that involves structural controls, wide ranges will probably be associated with gross pollutant reduction estimates. Permit writers will undoubtedly develop other ways to ensure that permit limits ensure reduction of pollutants to the maximum extent practicable.

Small MS4 operators that pursue this individual permit option do not need to submit details about their future program requirements (*e.g.*, the MS4's future plans to obtain legal authority required by §§ 122.26(d)(1)(ii) and (d)(2)). A small MS4 operator might elect to supply such information if it intends for the permit writer to take those plans into account when developing the small MS4's permit conditions.

Several operators of small MS4s commented that they currently lacked the authority they would need to implement one or more of the minimum measures in § 122.34(b). Today's rule recognizes that the operators of some small MS4s might not have the authority under State law to implement one or more of the measures using, for example, an ordinance or other regulatory mechanism. To address these situations, each minimum measure in § 122.34(b) that would require the small MS4 operator to develop an ordinance or other regulatory mechanism states that the operator is only required to implement that requirement to ''the extent allowable under State, Tribal or local law.'' See § 122.34(b)(3)(ii) (illicit discharge elimination), § 122.34(b)(4)(ii) (construction runoff control) and § 122.34(b)(5)(ii) (post-construction storm water management). This regulatory language does not mean that a operator of a small MS4 with ordinance making authority can simply fail to pass an ordinance necessary for a § 122.34(b) program. The reference to ''the extent allowable under * * * local law'' refers to the local laws of *other* political subdivisions to which the MS4 operator is subject. Rather, a small MS4 operator that seeks to implement a program under section § 122.34(b) may omit a requirement to develop an ordinance or other regulatory mechanism only to the extent its municipal charter, State constitution or other legal authority prevents the operator from exercising the necessary authority. Where the operator cannot obtain the authority to implement any activity that is only required to ''the extent allowable under State, Tribal or local law,'' the operator may satisfy today's rule by administering the remaining § 122.34(b) requirements.

Finally, although today's rule provides operators of small MS4s with an option of applying for a permit under § 122.26(d), States authorized to administer the NPDES program are not required to provide this option. NPDES-authorized States could require all regulated small MS4s to be permitted under the minimum measures management approach in § 122.34 as a matter of State law. Such an approach would be deemed to be equally or more stringent than what is required by today's rule. *See* 40 CFR 123.2(i). The federalism concerns discussed above do not apply to requirements imposed by a State on its political subdivisions.

iv. Satisfaction of Minimum Measure Obligations by Another Entity. An operator of a regulated small MS4 may

satisfy the requirement to implement one or more of the six minimum measures in § 122.34(b) by having a third party implement the measure or measures. Today's rule provides a variety of means for small MS4 operators to share responsibility for different aspects of their storm water management program. The means by which the operators of various MS4s share responsibility may affect who is ultimately responsible for performance of the minimum measure and who files the periodic reports on the implementation of the minimum measure. Section 122.35 addresses these issues. The rule describes two different variants on third party implementation with different consequences if the third party fails to implement the measure.

If the permit covering the discharge from a regulated small MS4 identifies the operator as the entity responsible for a particular minimum control measure, then the operator-permittee remains responsible for the implementation of that measure even if another entity has agreed to implement the control measure. Section 122.35(a). Another party may satisfy the operator-permittee's responsibility by implementing the minimum control measure in a manner at least as stringent or prescriptive as the corresponding NPDES permit requirement. If the third party fails to do so, the operator-permittee remains responsible for its performance. The operator of the MS4 should consider entering into an agreement with the third party that acknowledges the responsibility to implement the minimum measure. The operator-permittee's NOI and its annual § 122.34(f)(3) reports submitted to the NPDES permitting authority must identify the third party that is satisfying one or more of the permit obligations. This requirement ensures that the permitting authority is aware which entity is supposed to implement which minimum measures.

If, on the other hand, the regulated small MS4's permit recognizes that an NPDES permittee other than the operator-permittee is responsible for a particular minimum control measure, then the operator-permittee is relieved from the responsibility for implementing that measure. The operator-permittee is also relieved from the responsibility for implementing any measure that the operator's permit indicates will be performed by the NPDES permitting authority. Section 122.35(b). The MS4 operator-permittee would be responsible for implementing the remaining minimum measures.

Today's final rule differs from the proposed version of § 122.35(b), which stated that, even if the third party's responsibility is recognized in the permit, the MS4 operator-permittee remained responsible for performance if the third party failed to perform the measure consistent with § 122.34(b). Under today's rule, the operator-permittee is relieved from responsibility for performance of a measure if the third party is an NPDES permittee whose permit makes it responsible for performance of the measure (including, for example, a State agency other than the State agency that issues NPDES permits) or if the third party is the NPDES permitting authority itself. Because the permitting authority is acknowledging the third party's responsibility in the permit, commenters thought that the MS4 operator-permittee should not be responsible for ensuring that the other entity is implementing the control measure properly. EPA agrees that the operator-permittee should not be conditionally responsible when the requirements are enforceable against some other NPDES permittee. If the third party fails to perform the minimum measure, the requirements will be enforceable against the third party. In addition, the NPDES permitting authority could reopen the operator-permittee's permit under § 122.62 and modify the permit to make the operator responsible for implementing the measure. A new paragraph has been added to § 122.62 to clarify that the permit may be reopened in such circumstances.

Today's rule also provides that the operator-permittee is not conditionally responsible where it is the State NPDES permitting authority itself that fails to implement the measure. The permitting authority does not need to issue a permit to itself (i.e., to the same State agency that issues the permit) for the sole purpose of relieving the small MS4 from responsibility in the event the State agency does not satisfy its obligation to implement a measure. EPA does not believe that the small MS4 should be responsible in the situation where the NPDES permit issued to the small MS4 operator recognizes that the State agency that issues the permit is responsible for implementing a measure. If the State does fail to implement the measure, the State agency could be held accountable for its commitment in the permit to implement the measure. Where the State does not fulfill its responsibility to implement a measure, a citizen also could petition for withdrawal of the State's NPDES program or it could petition to have the MS4's permit reopened to require the MS4 operator to implement the measure.

EPA notes that not every State program that addresses erosion and sediment control from construction sites will be adequate to satisfy the requirement that each regulated small MS4 have a program to the extent required by § 122.34(b)(4). For example, although all NPDES States are required to issue NPDES permits for construction activity that disturbs greater than one acre, the State's NPDES permit program will not necessarily be extensive enough to satisfy a regulated small MS4's obligation under § 122.34(b)(4). NPDES States will not necessarily be implementing all of the required elements of that minimum measure, such as procedures for site plan review in each jurisdiction required to develop a program and procedures for receipt and consideration of information submitted by the public on individual construction sites. In order for a State erosion and sediment control program to satisfy a small MS4 operator's obligation to implement § 122.34(b)(4), the State program would have to include all of the elements of that minimum measure.

Where the operator-permittee is itself performing one or more of the minimum measures, the operator-permittee remains responsible for all of the reporting requirements under § 122.34(f)(3). The operator-permittee's reports should identify each entity that is performing the control measures within the geographic jurisdiction of the regulated small MS4. If the other entity also operates a regulated MS4 and files reports on the progress of implementation of the measures within the geographic jurisdiction of the MS4, then the operator-permittee need not include that same information in its own reports.

If the other entity operates a regulated MS4 and is performing all of the minimum measures for the permittee, the permittee is not required to file the reports required by § 122.34(f)(3). This relief from reporting is specified in § 122.35(a).

Section 122.35 addresses the concerns of some commenters who sought relief for governmental facilities that are classified as small MS4s under today's rule. These facilities frequently discharge storm water through another regulated MS4 and could be regulated by that MS4's program. For example, a State owned office complex that operates its storm sewer system in an urbanized area will be regulated as an MS4 under today's rule even though its system may be subject to the storm water controls of the municipality in

which it is located. Today's rule specifically revised the definition of MS4 to recognize that different levels of government often operate MS4s and that each such separate entity (including the federal government) should be responsible for its discharges. If both MS4s agree, the downstream MS4 can develop a storm water management program that regulates the discharge from both MS4s. The upstream small MS4 operator still must submit an NOI that identifies the entity on which the upstream small MS4 operator is relying to satisfy its permit obligations. No reports are required from the upstream small MS4 operator, but the upstream operator must remain in compliance with the downstream MS4 operator's storm water management program. This option allows small MS4s to work together to develop one storm water management program that satisfies the permit obligations of both. If they cannot agree, the upstream small MS4 operator must develop its own program.

As mentioned previously, comments from federal facilities and State organizations that operate MS4s requested that their permit requirements differ from those of MS4s that are political subdivisions of States (cities, towns, counties, etc.). EPA acknowledges that there are differences; e.g., many federal and State facilities do not serve a resident population and thus might require a different approach to public education. EPA believes, however, that MS4s owned by State and federal governments can develop storm water management plans that address the minimum measures. Federal and State owned small MS4s may choose to work with adjacent municipally owned MS4s to develop a unified plan that addresses all of the required measures within the jurisdiction of all of the contiguous MS4s. The options in § 122.35 minimize the burden on small MS4s that are covered by another MS4's program.

One commenter recommended that if one MS4 discharges into a second MS4, the operator of the upstream MS4 should have to provide a copy of its NOI or permit application to the operator of the receiving MS4. EPA did not adopt this recommendation because the NOI and permit application will be publicly available; but EPA does recommend that NPDES permitting authorities consider it as a possible permit requirement. The commenter also suggested that monitoring data should be collected by the upstream MS4 and provided to the downstream MS4. EPA is not adopting such a uniform monitoring requirement because EPA believes it is more appropriate to let the MS4 operators work out the need for such data. If necessary, the downstream MS4s might want to make such data a condition to allowing the upstream MS4 to connect to its system.

v. Joint Permit Programs. Many commenters supported allowing the operators of small MS4s to apply as co-permittees so they each would not have to develop their own storm water management program. Today's rule specifically allows regulated small MS4s to join with either other small MS4s regulated under § 122.34(d) or with medium and large MS4s regulated under § 122.26(d).

As is discussed in the previous section, regulated small MS4s may indicate in their NOIs that another entity is performing one or more of its required minimum control measures. Today's rule under § 122.33(b)(1) also specifically allows the operators of regulated small MS4s to jointly submit an NOI. The joint NOI must clearly indicate which entity is required to implement which control measure in each geographic jurisdiction within the service area of the entire small MS4. The operator of each regulated small MS4 remains responsible for the implementation of each minimum measure for its MS4 (unless, as is discussed in the previous section above, the permit recognizes that another entity is responsible for completing the measure.) The joint NOI, therefore, is legally equivalent to each entity submitting its own NOI. EPA is, however, revising the rule language to specifically authorize the joint submission of NOIs in response to comments that suggested that such explicit authorization might encourage programs to be coordinated on a watershed basis.

Section 122.33(b)(2)(iii) authorizes regulated small MS4s to jointly apply for an individual permit to implement today's rule, where allowed by an NPDES permitting authority. The permit application should contain sufficient information to allow the permitting authority to allocate responsibility among the parties under one of the two permitting options in §§ 122.33(b)(2)(i) and (ii).

Section 122.33(b)(3) of today's rule also allows an operator of a regulated small MS4 to join as a co-permittee in an existing NPDES permit issued to an adjoining medium or large MS4 or source designated under the existing storm water program. This co-permittee option applies only with the agreement of all co-permittees. Under this co-permittee arrangement, the operator of the regulated small MS4 must comply with the terms and conditions of the applicable permit rather than the permit condition requirements of § 122.34 of today's rule. The regulated small MS4 that wishes to be a co-permittee must comply with the applicable requirements of § 122.26(d), but would not be required to fulfill all the permit application requirements applicable to medium and large MS4s. Specifically, the regulated small MS4 is not required to comply with the application requirements of § 122.26(d)(1)(iii) (Part 1 source identification), § 122.26 (d)(1)(iv) (Part 1 discharge characterization), and § 122.26(d)(2)(iii) (Part 2 discharge characterization data). Furthermore, the regulated small MS4 operator could satisfy the requirements in § 122.26(d)(1)(v) (Part 1 management programs) and § 122.26(d)(2)(iv) (Part 2 proposed management program) by referring to the adjoining MS4 operator's existing plan. An operator pursuing this option must describe in the permit modification request how the adjoining MS4's storm water program addresses or needs to be supplemented in order to adequately address discharges from the MS4. The request must also explain the role of the small MS4 operator in coordinating local storm water activities and describe the resources available to accomplish the storm water management plan.

EPA sought comments regarding the appropriateness of the application requirements in these subsections of § 122.26(d). One commenter stated that newly regulated smaller MS4s should not be required to meet the existing regulations' Part II application requirements under § 122.26(d) regarding the control of storm water discharges from industrial activity. EPA disagrees. The smaller MS4 operators designated for regulation in today's rule may satisfy this requirement by referencing the legal authority of the already regulated MS4 program to the extent the newly regulated MS4 will rely on such legal authority to satisfy its permit requirements. If the smaller MS4 operator plans to rely on its own legal authorities, it must identify it in the application. If the smaller MS4 operator does not elect to use its own legal authority, they may file an individual permit application for an alternate program under § 122.33(b)(2)(ii).

The explanatory language in § 122.33(b)(3) recommends that the smaller MS4s designated under today's rule identify how an existing plan ''would need to be supplemented in order to adequately address your discharges.'' One commenter suggested that this must be regulatory language and not guidance. EPA disagrees that this needs to be mandatory language.

Since many of the smaller MS4s designated today are ''donut holes'' within the geographic jurisdiction of an already regulated MS4, the larger MS4's program generally will be adequate to address the newly regulated MS4's discharges. The small MS4 applicant should consider the adequacy of the existing MS4's program to address the smaller MS4's water quality needs, but EPA is not imposing specific requirements. Where circumstances suggest that the existing program is inadequate with respect to the newly designated MS4 and the applicant does not address the issue, the NPDES permitting authority must require that the existing program be supplemented.

Commenters recommended that the application deadline for smaller MS4s designated today be extended so that existing regulated MS4s would not have to modify their permit in the middle of their permit term, provided that permit renewal would occur within a reasonable time (12 to 18 months) of the deadline. In response, EPA notes that today's rule allows operators of newly designated small MS4s up to three years and 90 days from the promulgation of today's rule to submit an application to be covered under the permit issued to an already regulated MS4. The permitting authority has a reasonable time after receipt of the application to modify the existing permit to include the newly designated source. If an existing MS4's permit is up for renewal in the near future, the operator of a newly designated small MS4 may take that into account when timing its application and the NPDES permitting authority may take that into account when processing the application.

Another commenter suggested that the rule should include a provision to allow permit application requirements for smaller MS4s designated today to be determined by the permitting authority to account for the particular needs/wants of an already regulated MS4 operator. EPA does not believe that the regulations should specifically require this approach. When negotiating whether to include a newly designated MS4 in its program, the already regulated MS4 operator may require the newly designated MS4's operator to provide any information that is necessary.

The co-permitting approach allows small MS4s to take advantage of existing programs to ease the burden of creating their own programs. The operators of regulated small MS4s, however, may find it simpler to apply for a program under today's rule, and to identify the medium or large MS4 operator that is implementing portions of its § 122.34(b) minimum measures.

d. Evaluation and Assessment

Under today's rule, operators of regulated small MS4s are required to evaluate the appropriateness of their identified BMPs and progress toward achieving their identified measurable goals. The purpose of this evaluation is to determine whether or not the MS4 is meeting the requirements of the minimum control measures. The NPDES permitting authority is responsible for determining whether and what types of monitoring needs to be conducted and may require monitoring in accordance with State/Tribe monitoring plans appropriate to the watershed. EPA does not encourage requirements for ''end-of-pipe'' monitoring for regulated small MS4s. Rather, EPA encourages permitting authorities to carefully examine existing ambient water quality and assess data needs. Permitting authorities should consider a combination of physical, chemical, and biological monitoring or the use of other environmental indicators such as exceedance frequencies of water quality standards, impacted dry weather flows, and increased flooding frequency. (Claytor, R. and W. Brown. 1996. *Environmental Indicators to Assess Storm Water Control Programs and Practices.* Center for Watershed Protection, Silver Spring, MD.) Section II.L., Water Quality Issues, discusses monitoring in greater detail.

As recommended by the Intergovernmental Task Force on Monitoring Water Quality (ITFM), the NPDES permitting authority is encouraged to consider the following watershed objectives in determining monitoring requirements: (1) To characterize water quality and ecosystem health in a watershed over time, (2) to determine causes of existing and future water quality and ecosystem health problems in a watershed and develop a watershed management program, (3) to assess progress of watershed management program or effectiveness of pollution prevention and control practices, and (4) to support documentation of compliance with permit conditions and/or water quality standards. With these objectives in mind, the Agency encourages participation in group monitoring programs that can take advantage of existing monitoring programs undertaken by a variety of governmental and nongovernental entities. Many States may already have a monitoring program in effect on a watershed basis. The ITFM report is included in the docket for today's rule (Intergovernmental Task Force on Monitoring Water Quality. 1995. *The Strategy for Improving Water-Quality Monitoring in the United States: Final Report of the Intergovernmental Task Force on Monitoring Water Quality.* Copies can be obtained from: U.S. Geological Survey, Reston, VA.).

EPA expects that many types of entities will have a role in supporting group monitoring activities—including federal agencies, State agencies, the public, and various classes or categories of point source dischargers. Some regulated small MS4s might be required to contribute to such monitoring efforts. EPA expects, however, that their participation in monitoring activities will be relatively limited. For purposes of today's rule, EPA recommends that, in general, NPDES permits for small MS4s should not require the conduct of any additional monitoring beyond monitoring that the small MS4 may be already performing. In the second and subsequent permit terms, EPA expects that some limited ambient monitoring might be appropriately required for perhaps half of the regulated small MS4s. EPA expects that such monitoring will only be done in identified locations for relatively few pollutants of concern. EPA does not anticipate ''end-of-pipe'' monitoring requirements for regulated small MS4s.

EPA received a wide range of comments on this section of the rule. Some commenters believe that EPA should require monitoring; others want a strong statement that the newly regulated small MS4s should not be required to monitor. Many commenters raised questions about exactly what EPA expects MS4s to do to evaluate and assess their BMPs. EPA has intentionally written today's rule to provide flexibility to both MS4s and permitting authorities regarding appropriate evaluation and assessment. Permitting authorities can specify monitoring or other means of evaluation when writing permits. If additional requirements are not specified, MS4s can decide what they believe is the most appropriate way to evaluate their storm water management program. As mentioned above, EPA expects that the necessity for monitoring and its extent may change from permit cycle to permit cycle. This is another reason for making the evaluation and assessment rule requirements very flexible.

i. Recordkeeping. The NPDES permitting authority is required to include at least the minimum appropriate recordkeeping conditions in each permit. Additionally, the NPDES permitting authority can specify that permittees develop, maintain, and/or

submit other records to determine compliance with permit conditions. The MS4 operator must keep these records for at least 3 years but is not required to submit records to the NPDES permitting authority unless specifically directed to do so. The MS4 operator must make the records, including the storm water management program, available to the public at reasonable times during regular business hours (see 40 CFR 122.7 for confidentiality provision). The MS4 operator is also able to assess a reasonable charge for copying and to establish advance notice requirements for members of the public.

EPA received a comment that questioned EPA's authority to require MS4s to make their records available to the public. EPA disagrees with the commenter and believes that the CWA does give EPA the authority to require that MS4 records be available. It is also more practical for the public to request records directly from the MS4 than to request them from EPA who would then make the request to the MS4. Based on comments, EPA revised the proposed rule so as not to limit the time for advance notice requirements to 2 business days.

ii. Reporting. Under today's rule, the operator of a regulated small MS4 is required to submit annual reports to the NPDES permitting authority for the first permit term. For subsequent permit terms, the MS4 operator must submit reports in years 2 and 4 unless the NPDES permitting authority requires more frequent reports. EPA received several comments supporting this timing for report submittal. Other commenters suggested that annual reports during the first permit cycle are too burdensome and not necessary. EPA believes that annual reports are needed during the first 5-year permit term to help permitting authorities track and assess the development of MS4 programs, which should be established by the end of the initial term. Information contained in these reports can also be used to respond to public inquiries.

The report must include (1) the status of compliance with permit conditions, an assessment of the appropriateness of identified BMPs and progress toward achieving measurable goals for each of the minimum control measures, (2) results of information collected and analyzed, including monitoring data, if any, during the reporting period, (3) a summary of what storm water activities the permittee plans to undertake during the next reporting cycle, and (4) a change in any identified measurable goal(s) that apply to the program elements.

The NPDES permitting authority is encouraged to provide a brief two-page reporting format to facilitate compiling and analyzing the data from submitted reports. EPA does not believe that submittal of a brief annual report of this nature is overly burdensome, and has not changed the required reporting time frame from the proposal. The permitting authority will use the reports in evaluating compliance with permit conditions and, where necessary, will modify the permit conditions to address changed conditions.

iii. Permit-As-A-Shield. Section 122.36 describes the scope of authorization (i.e. ''permit-as-a-shield'') under an NPDES permit as provided by section 402(k) of the CWA. Section 402(k) provides that compliance with an NPDES permit is deemed compliance, for purposes of enforcement under CWA sections 309 and 505, with CWA sections 301, 302, 306, 307, and 403, except for any standard imposed under section 307 for toxic pollutants injurious to human health.

EPA's Policy Statement on Scope of Discharge Authorization and Shield Associated with NPDES Permits, originally issued on July 1, 1994, and revised on April 11, 1995, provides additional information on this matter.

e. Other Applicable NPDES Requirements

Any NPDES permit issued to an operator of a regulated small MS4 must also include other applicable NPDES permit requirements and standard conditions, specifically the applicable requirements and conditions at 40 CFR 122.41 through 122.49. Reporting requirements for regulated small MS4s are governed by § 122.34 and not the existing requirements for medium and large MS4s at § 122.42(c). In addition, the NPDES permitting authority is encouraged to consult the Interim Permitting Approach, issued on August 1, 1996. The discussion on the Interim Permitting Approach in Section II.L.1, Water Quality Based Effluent Limits, provides more information. The provisions of §§ 122.41 through 122.49 establish permit conditions and limitations that are broadly applicable to the entire range of NPDES permits. These provisions should be interpreted in a manner that is consistent with provisions that address specific classes or categories of discharges. For example, § 122.44(d) is a general requirement that each NPDES permit shall include conditions to meet water quality standards. This requirement will be met by the specific approach outlined in today's rule for the implementation of BMPs. BMPs are the most appropriate form of effluent limitations to satisfy technology requirements and water quality-based requirements in MS4 permits (see the introduction to Section II.H.3, Municipal Permit Requirements, Section II.H.3.h, Reevaluation of Rule, and the discussion of the Interim Permitting Policy in Section II.L.1. below).

f. Enforceability

NPDES permits are federally enforceable. Violators may be subject to the enforcement actions and penalties described in CWA sections 309, 504, and 505 or under similar water pollution enforcement provisions of State, tribal or local law. Compliance with a permit issued pursuant to section 402 of the Clean Water Act is deemed compliance, for purposes of sections 309 and 505, with sections 301, 302, 306, 307, and 403 (except any standard imposed under section 307 for toxic pollutants injurious to human health).

g. Deadlines

Today's final rule includes ''expeditious deadlines'' as directed by CWA section 402(p)(6). In proposed § 122.26(e), the permit application for the ''ISTEA'' facilities was maintained as August 7, 2001 and the permit application deadline for storm water discharges associated with other construction activity was established as 3 years and 90 days from the final rule date. In proposed § 122.33(c)(1), operators of regulated small MS4s were required to seek permit coverage within 3 years and 90 days from the date of publication of the final rule. In proposed § 122.33(c)(2), operators of regulated small MS4s designated by the NPDES permitting authority on a local basis under § 122.32(a)(2) must seek coverage under an NPDES permit within 60 days of notice, unless the NPDES permitting authority specifies a later date.

In order to increase the clarity of today's final rule, EPA has changed the location of some of the above requirements. All application deadlines for both Phase I and Phase II are now listed or referenced in § 122.26(e). Section 122.26(e)(1) contains the deadlines for storm water associated with industrial activity. Paragraph (i) has been changed to correct a typographical error. Paragraph (ii) has been revised to reflect the changed application date for ''ISTEA'' facilities. (See discussion in section I.3, ISTEA Sources). The application deadline for storm water discharges associated with other construction activity is now in a new § 122.26(e)(8). The application deadline for regulated small MS4s

remains in § 122.33(c) because this section is written in ''readable regulation'' format, but it is also described in a new § 122.26(e)(9).

Under today's rule, permitting authorities are allowed up to 3 years to issue a general permit and MS4s designated under § 122.32(a)(1) are allowed up to 3 years and 90 days to submit a permit application. Operators of regulated small MS4s that choose to be a co-permittee with an adjoining MS4 with an existing NPDES storm water permit must apply for a modification of that permit within the same time frame. Several commenters stated that 90 days was not adequate time to submit an NOI. This might be true if facilities did not start developing their storm water program until publication of their general permit. In fact, municipalities should start developing their storm water program upon publication of today's final rule, if they have not already done so. Municipalities that are uncertain if they fall within the urbanized area should ask their permitting authority. EPA believes that municipalities should not automatically take three years and 90 days to develop a program and submit their NOI. Three years is the maximum amount of time to issue a general permit. MS4s that are automatically designated under today's rule may have less than 3 years and 90 days if the permitting authority issues a permit that requires submission of NOIs before that time. EPA encourages States to modify their NPDES program to include storm water and issue their permits as soon as possible. It is important for permitting authorities to keep their municipalities informed of their progress in developing or modifying their NPDES storm water requirements.

EPA recognizes that MS4s brought into the program due to the 2000 Census calculations do not have as much time to develop a program as those already designated from the 1990 Census. However, the official Bureau of the Census urbanized area calculation for the 2000 Census is expected to be published in the **Federal Register** in the spring of 2002, which should give the potentially affected MS4s adequate time to prepare for compliance under the applicable permit. However, if the publication of this information is delayed, MS4s in newly designated urbanized areas will have 180 days from the time the new designations are published to submit an NOI, consistent with the time frame for other regulated MS4s that are designated after promulgation of the rule.

The proposed application deadline for MS4s designated under § 122.32(a)(2) was within 60 days of notice. Many commenters stated that 60 days does not provide adequate time for the preparation of an NOI or permit application. EPA agrees that newly designated MS4s may not be aware that they might be designated since the permitting authority could take several years to develop designation criteria. EPA has decided that the application time frame for these facilities should be consistent with the 180 days allowed for facilities designated under §§ 122.26(a)(9)(i)(C) and (D). Section 122.33(c)(2) of today's final rule contains the modified time frame of 180 days to apply for coverage.

h. Reevaluation of Rule

The municipal caucus of the Storm Water Phase II FACA Subcommittee asked EPA to demonstrate its commitment to revisit the municipal requirements of today's rule and make changes where necessary after evaluating the storm water program and researching the effectiveness of municipal BMPs. In § 122.37 of today's final rule, EPA commits to revisiting the regulations for the municipal storm water discharge control program after completion of the first two permit terms. EPA intends to use this time to work closely with stakeholders on research efforts. Gathering and analyzing data related to the storm water program, including data regarding the effectiveness of BMPs, is critical to EPA's storm water program evaluation. EPA does not intend to change today's NPDES municipal storm water program until the end of this period, except under the following circumstances: a court decision requires changes; a technical change is necessary for implementation; or the CWA is modified, thereby requiring changes. After careful analysis, EPA might also consider changes from consensus-based stakeholder requests regarding requirements applicable to newly regulated MS4s. EPA will apply the August 1, 1996, Interim Permitting Approach to today's program during this interim period and encourages all permitting authorities to use this approach in municipal storm water permits for newly regulated MS4s and in determining MS4 permit requirements under a TMDL approach. After careful consideration of the data, EPA will make modifications as necessary.

EPA received comments that supported waiting two permit cycles before re-evaluating the rule and other comments that requested re-evaluation much sooner. EPA anticipates two full permit cycles are necessary to obtain enough data to significantly evaluate the rule. The re-evaluation time frame of 13 years from today remains as proposed.

I. Other Designated Storm Water Discharges

1. Discharges Associated with Small Construction Activity

Section 122.26(b)(15) of today's rule designates certain construction activities for regulation as ''storm water discharges associated with small construction activity.'' Specifically, storm water discharges from construction activity equal to or greater than 1 acre and less than 5 acres are automatically designated except in those circumstances where the operator (i.e., person responsible for discharges that might occur) certifies to the permitting authority that one of two specific waiver circumstances (described in section b. below) applies. Sites below one acre may be designated under § 122.26(b)(15)(ii) where necessary to protect water quality.

Today's rule regulates these construction-related storm water sources under CWA section 402(p)(6) to protect water quality rather than under CWA section 402(p)(2). Designation under 402(p)(6) gives States and EPA the flexibility to waive the permit requirement for construction activity that is not likely to impair water quality, and to designate additional sources below one acre that are likely to cause water quality impairment. Thus, the one acre threshold of today's rule is not an absolute threshold like the five acre threshold that applies under the existing storm water rule.

Today's rule regulating certain storm water discharges from construction activity disturbing less than 5 acres is consistent with the 9th Circuit remand in *NRDC* v. *EPA,* 966 F.2d 1292 (9th Cir. 1992). In that case, the court remanded portions of the existing storm water regulations related to discharges from construction sites. The existing Phase I regulations define ''storm water discharges associated with industrial activity'' to include storm water discharges from construction sites disturbing 5 acres or more of total land area (see 40 CFR 122.26(b)(14)(x)). In its decision, the court concluded that the 5-acre threshold was improper because the Agency had failed to identify information ''to support its perception that construction activities on less than 5 acres are non-industrial in nature'' (966 F.2d at 1306). The court remanded the exemption to EPA for further proceedings (966 F.2d at 1310). EPA's objectives in today's action include an effort to (1) address the 9th Circuit

remand to reconsider regulation of storm water discharges from construction activities that disturb less than 5 acres of land, (2) address water quality concerns associated with such activities, and (3) balance conflicting recommendations and concerns of stakeholders in the regulation of additional construction activity.

EPA responded to the Ninth Circuit's decision by designating discharges from construction activities that disturb between 1 and 5 acres as ''discharges associated with small construction activity'' under CWA section 402(p)(6), rather than as ''discharges associated with industrial activity'' under CWA section 402(p)(2)(B). Although a size criterion alone may be an indicator of whether runoff from construction sites between 1 and 5 acres is ''associated with industrial activity,'' the Agency is instead relying on a size threshold in tandem with provisions that allow for designations and waivers based on potential for ''predicted water quality impairments'' to regulate construction sites between 1 and 5 acres under CWA section 402(p)(6). This approach was chosen by the Agency for the sake of simplicity and certainty and, most importantly, to protect water quality consistent with the mandate of CWA section 402(p)(6). Today's rule also includes extended application deadlines for this new category of dischargers under the authority of CWA section 402(p)(6) (see § 122.26(e)(8) of today's rule).

In today's rule, EPA is regulating storm water discharges from additional construction sites to better protect the Nation's waters, while remaining sensitive to a concern that the Agency should not regulate discharges from construction sites that might not or do not have adverse water quality impacts. EPA believes that today's rule will successfully accomplish this objective by establishing a 1-acre threshold nationwide that includes the flexibility to allow the permitting authority to both waive requirements for discharges from sites that are not expected to cause adverse water quality impacts and to designate discharges from sites below 1-acre based on adverse water quality impacts.

In addition to the diminishing water quality benefits of regulating all sites below one acre, the Agency relied on practical considerations in establishing a one acre threshold and not setting a lower threshold. Regardless of the threshold established by EPA, a NPDES permit can only be required if a construction site has a point source discharge. A point source discharge means that pollutants are added to waters of the United States through a discernible, confined, discrete conveyance. ''Sheet flow'' runoff from a small construction site would not result in a point source discharge unless and until it channelized. As the amount of disturbed land surface decreases, precipitation is less likely to channelize and create a ''point source'' discharge (assuming the absence of steep slopes or other factors that lead to increased channelization). Categorical designation of very small sites may create confusion about applicability of the NPDES permitting program to those sites. EPA's one acre threshold reflects, in part, the need to recognize that smaller sites are less likely to result in point source discharges. Of course, the NPDES permitting authority could designate smaller sites (below one acre, assuming point source discharges occur from the smaller designated sites) for regulation if a watershed or other local assessment indicated the need to do so. The Phase II rule includes this designation authority at 40 CFR 122.26(a)(9)(i)(D) and (b)(15)(ii).

The one acre threshold also provides an administrative tool for more easily identifying those sites that are identified for coverage by the rule (but may receive a waiver) and those that are not automatically covered (but may be designated for inclusion). Although all construction sites less than five acres could have a significant water quality impact cumulatively, EPA is automatically designating for permit coverage only those storm water discharges from construction sites that disturb land equal to or greater than one acre. Categorical regulation of discharges from construction below this one acre threshold would overwhelm the resources of permitting authorities and might not yield corresponding water quality benefits. Construction activities that disturb less than one acre make up, in total, a very small percentage of the total land disturbance from construction nationwide. The one acre threshold is reasonable for accomplishing the water quality goals of CWA section 402(p)(6) because it results in 97.5% of the total acreage disturbed by construction being designated for coverage by the NPDES storm water program, while excluding from automatic coverage the numerous smaller sites that represent 24.7% of the total number of construction sites.

Some commenters believed that EPA has not adequately identified water quality problems associated with storm water discharges from construction activity disturbing less than five acres. Other commenters believed that storm water discharges from small construction activity is a significant water quality problem nationwide. Section I.B.3, Construction Site Runoff, provides a detailed discussion of adverse water quality impacts resulting from construction site storm water discharges. EPA is regulating storm water discharges from construction activity disturbing between 1 and 5 acres because the cumulative impact of many sources, and not just a single identified source, is typically the cause for water quality impairments, particularly for sediment-related water quality standards.

Several commenters requested that EPA regulate discharges from small construction activity as ''discharges associated with industrial activity'' under CWA 402(p)(4) and not, as proposed, as ''storm water discharges associated with other activity'' under CWA 402(p)(6). EPA is regulating discharges from small construction sites as ''small construction activity'' under the authority of CWA section 402(p)(6), rather than section 402(p)(4), to ensure that regulation of these sources is water quality-sensitive. CWA section 402(p)(6) affords the opportunity for designations and waivers of sources based on potential for ''predicted water quality impairments.'' Regulation of storm water ''associated with industrial activity'' does not necessarily focus regulation to protect water quality.

a. Scope

The definition of ''storm water discharges associated with small construction activity'' includes discharges from construction activities, such as clearing, grading, and excavating activities, that result in the disturbance of equal to or greater than 1 acre and less than 5 acres (see § 122.26(b)(15)(i)). Such activities could include: road building; construction of residential houses, office buildings, or industrial buildings; or demolition activity. The definition of ''storm water discharges associated with small construction activity'' also includes any other construction activity, regardless of size, designated based on the potential for contribution to a violation of a water quality standard or for significant contribution of pollutants to waters of the United States (§ 122.26(b)(15)(ii)). This designation is made by the Director, or in States with approved NPDES programs, either the Director or the EPA Regional Administrator.

For the purposes of today's rule, the definition of ''storm water discharges associated with small construction activity'' includes discharges from activities disturbing less than 1 acre if that construction activity is part of a

''larger common plan of development or sale'' with a planned disturbance of equal to or greater than 1 acre of land. A ''larger common plan of development or sale'' means a contiguous area where multiple separate and distinct construction activities are planned to occur at different times on different schedules under one plan, *e.g.*, a housing development of five ¼ acre lots (§ 122.26(b)(15)(i)).

In addition to the regulatory text for smaller construction, the Agency is also revising the existing text of § 122.26(b)(14)(x) to clarify EPA's intention regarding construction projects involving a larger common plan of development or sale ultimately disturbing 5 or more acres. Operators of such sites are required to seek coverage under an NPDES permit regardless of the number of lots in the larger plan because designation for permit coverage is based on the total amount of land area to be disturbed under the common plan. This designation attempts to address the potential cumulative effects of numerous construction activities concentrated in a given area.

Several commenters asked that EPA allow the permitting authority to set the appropriate size threshold based on water quality studies. While EPA agrees that location-specific water quality studies provide an ideal information base from which to make regulatory decisions, today's rule establishes a default standard for regulation in the absence of location-specific studies. The rule does allow for deviation from the default standard through additional designations and waivers, however, when supported by location-specific water quality information. The rule codifies the ability of permitting authorities to provide waivers for sites greater than or equal to one acre (the default standard) and designate additional discharges from small sites below one acre when location-specific information suggests that the default 1 acre standard is either unnecessary (waivers) or too limited (designations) to protect water quality.

Some commenters wanted EPA to base the regulation of storm water discharges from construction sites not only on size, but also on the duration and intensity of activity occurring on the site. EPA believes that a national 1-acre threshold, in combination with waivers and additional designations, is the most effective and simplest way to address adverse water quality impacts from storm water from small construction sites. Moreover, as discussed below, the waiver for rainfall erosivity does account for projects of limited duration. EPA believes, however, that the intensity of activity occurring on-site would be a very difficult condition to quantify.

Many commenters requested that EPA maintain the 5 acre threshold from the existing regulations, which include opportunities for site-specific designation, as the regulatory scope for regulating storm water from construction sites, *i.e.*, that the Agency not automatically regulate storm water discharges from sites less than 5 acres. Several commenters wanted construction requirements to be applied to sites smaller than 1 acre, while some commenters suggested alternative thresholds of 2 or 3 acres. The rest of the commenters supported the 1 acre threshold. None of the commenters presented any data or rationales to support a specific size threshold.

EPA examined alternative size thresholds, including 0.5 acre, 1 acre, 2 acres and 5 acres. EPA had difficulty evaluating the alternative size thresholds because, while directly proportional to the size of the disturbed site, the water quality threat posed by discharges from construction sites of differing sizes varies nationwide, depending on the local climatological, geological, geographical, and hydrological influences. In order to ensure improvements in water quality nationwide, however, today's rule does not allow various permitting authorities to establish different size thresholds except based on the waiver and designation provisions of the rule. EPA believes that the water quality impact from small construction sites is as high as or higher than the impact from larger sites on a per acre basis. By selecting the 1 acre size threshold and coupling it with waivers and additional designations, EPA is seeking to standardize improvement of water quality on a national basis while providing permitting authorities with the opportunity to designate those unregulated activities causing water quality impairments regardless of site size, as well as to waive requirements when information demonstrates that regulation is unnecessary.

EPA recognizes that the size criterion alone may not be the most ideal predictor of the need for regulation, but effective protection of water quality depends as much on simplicity in implementation as it does on the scientific information underlying the regulatory criteria. The default size criterion of 1 acre will ensure protection against adverse water quality impacts from storm water from small construction sites while not overburdening the resources of permitting authorities and the construction industry to implement the program to protect water quality in the first place.

One commenter stated a need to clarify whether routine road maintenance is considered construction activity for the purpose of today's rule. The NPDES general permit for discharges from construction sites larger than 5 acres defined ''commencement of construction'' as the *initial* disturbance of soils associated with clearing, grading, or excavating activities or other construction activities (63 FR 7913). For construction sites disturbing less than 5 acres, EPA does not consider construction activity to include *routine* maintenance performed to maintain the *original* line and grade, hydraulic capacity, or original purpose of the facility.

Two commenters believed that the Multi-Sector General Permit for storm water discharges from industrial activities (MSGP) (60 FR 50804) already applies to storm water discharges from construction activities at oil and gas exploration and production sites and asked for a clarification on this issue. Commenters also requested a single general permit to authorize both industrial storm water discharges and construction site discharges which occur at the same industrial site.

Currently, when construction activity disturbing more than 5 acres occurs on an industrial site covered by the MSGP, authorization under a separate NPDES construction permit is needed because the MSGP does not include the ''construction'' industrial sector. While the MSGP does address sediment and erosion control, it is not as specific as the NPDES general permit for storm water discharges from construction activities disturbing more than 5 acres. Though permitting authorities could conceivably develop a single general permit to authorize storm water discharges associated with construction activity at these industrial facilities, the commenter's request is not addressed by today's rulemaking. When today's rule is implemented through general permits (to be issued later), the permitting authority will have discretion whether or not to incorporate the permit requirements for both the industrial storm water discharges and construction site storm water discharges into a single general permit. This type of request should be addressed to the permitting authority.

One commenter suggested that discharges from small construction sites should be regulated through a ''self-implementing rule'' approach. While today's rule is not a self-implementing rule, it does add § 122.28(b)(2)(v), which

gives the permitting authority the discretion to authorize a construction general permit for sites less than 5 acres without submitting a notice of intent. Such non-registration general permits function similarly to self-implementing rules, but are, in fact, permits. Today's rule will be implemented through NPDES permits rather than self-implementing regulations to capitalize on the compliance, tracking, enforcement, and public participation associated with NPDES permits (see discussion in section II.C).

Other commenters believed that only the permitting authority should regulate construction site storm water discharges (under a NPDES permit) and that a small MS4 operator's regulation of storm water discharges associated with construction (under the small MS4 NPDES storm water program) is redundant. EPA disagrees that control measure implementation by the NPDES authority and the small MS4 operator is redundant. To the extent the two efforts overlap, today's rule provides for consolidation and coordination of substantive requirements via incorporation by reference permitting. Small MS4s operators may choose to impose more prescriptive requirements than an NPDES permitting authority based on localized water quality needs. In those cases, EPA intends that the substantive requirements from the small MS4 program should apply as the NPDES permit requirements for the construction site discharger. In cases where a small MS4 program does not prioritize and focus on storm water from construction sites (beyond the small MS4 minimum control measure in today's rule, which does not require the small MS4 operator to control construction site discharges in a manner as prescriptive as is expected for discharges regulated under NPDES permits), the Agency intends that the NPDES general permit will provide the substantive standards applicable to the construction site discharge. EPA does anticipate, however, that implementation of MS4 programs to address construction site runoff within their jurisdiction will enhance overall NPDES compliance by construction site dischargers. EPA also notes that under § 122.35(b), the permitting authority may recognize its own program to control storm water discharges from construction sites in lieu of requiring such a program in an MS4's NPDES permit, provided that the permitting authority's program satisfies the requirements of § 122.34(b)(4), including, for example, procedures for site plan reviews and consideration of information submitted by the public on individual construction sites in each jurisdiction required to be covered by the program.

b. Waivers

Under § 122.26(b)(15)(i) of today's rule, NPDES permitting authorities may waive today's requirement for construction site operators to obtain a permit in two circumstances. The first waiver is intended to apply where little or no rainfall is expected during the period of construction. The second waiver may be granted when a TMDL or equivalent analysis indicates that controls on construction site discharges are not needed to protect water quality.

The first waiver is based on ''low predicted rainfall erosivity'' which can be found using tables of rainfall-runoff erosivity (R) values published for each region in the U.S. R factors are published in the U.S. Department of Agriculture (USDA) Agricultural Handbook 703 (Renard, K.G., Foster, G.R., Weesies, G.A., McCool, D.K., and D.C. Yoder. 1997. *Predicting Soil Erosion by Water: A Guide to Conservation Planning with the Revised Universal Soil Loss Equation (RUSLE).* U.S. Department of Agriculture Handbook 703). The R factor varies based on the time during the year when construction activity occurs, where in the country it occurs, and how long the construction activity lasts. The permitting authority may determine, using Handbook 703, which times of year, if any, the waiver opportunity is available for construction activity. EPA will provide assistance either through computer programs or the World Wide Web on how to determine whether this waiver applies for a particular geographic area and time period. Application of this waiver for regulatory purposes will be determined by the authorized NPDES authority. This waiver is discussed further in the following section titled Rainfall-Erosivity Waiver.

The second waiver is based on a consideration of ambient water quality. This waiver is available after a State or EPA develops and implements TMDLs for the pollutant(s) of concern from storm water discharges associated with construction activity. This waiver is also available for sites discharging to non-impaired waters that do not require TMDLs, when an equivalent analysis has determined allocations for small construction sites for the pollutant(s) of concern or determined that such allocations are not needed to protect water quality based on consideration of existing in-stream concentrations, expected growth in pollutant contributions from all sources, and a margin of safety. The Agency envisions an equivalent analysis that would demonstrate that water quality is *not* threatened by storm water discharges from small construction activity. This waiver is discussed further below in the sections titled TMDL Waiver and Water Quality Issues.

The proposed rule included a waiver based on ''low predicted soil loss.'' This waiver provision would have been applicable on a case-by-case basis where the annual soil loss rate for the period of construction for a site, using the Revised Universal Soil Loss Equation (RUSLE), would be less than 2 tons/acre/year. The annual soil loss rate of less than 2 tons/acre/year would be calculated through the use of the RUSLE equation, assuming the constants of no ground cover and no runoff controls in place.

Several commenters found the low soil loss waiver too complex and impractical, and stated that expertise is not available at the local level to prepare and evaluate eligibility for the waiver. Another commenter questioned whether two tons/acre/year was an appropriate threshold for predicting adverse water quality impacts. Two other commenters said that RUSLE was never intended to predict off-site impacts and is not an indicator of potential harm to water quality. EPA agrees with the commenters on the difficulty associated with determining and implementing this waiver. Most construction site operators are not familiar with the RUSLE program, and the potential burden on the permitting authority, construction industry, USDA's Natural Resources Conservation Service and conservation districts probably would have been significant. The Agency has not included this waiver in the final rule.

Two commenters asked that EPA allow States the flexibility to develop their own waiver criteria but did not suggest how the Agency (or affected stakeholders) could evaluate the acceptability of alternative State waiver criteria. Therefore, the final rule does not provide for any such alternative waivers. If a State does seek to develop alternate waiver criteria, then EPA procedures afford the opportunity for subsequent actions, for example, under the Project XL Program in EPA's Office of Reinvention, which seeks cleaner, smarter, and cheaper solutions to environmental problems. Many commenters suggested that EPA extend these waivers to existing industrial storm water regulations for construction activity greater than 5 acres. These construction site discharges are

regulated as industrial storm water discharges under CWA 402(p)(2) and are not eligible for such water quality-based waivers.

Two commenters were concerned that waivers would create a potential for significant degradation of small streams. EPA disagrees. If small streams are threatened, the permitting authority would choose not to provide any waivers. In addition, permitting authorities may protect small streams by designating discharges from small construction activity based on the potential for contribution to a violation of a water quality standard or for significant contribution of pollutants to waters of the U.S.

Two commenters asked that the waiver options be eliminated. They felt it would create a gross inequity within the construction community if some projects will not be subject to the requirements of today's rule. While the comments may be valid, EPA disagrees that waivers should be disallowed on this basis. Construction site discharges that qualify for a waiver from permitting requirements are not expected to present a threat to water quality, which is the basis for designation and regulation under today's rule.

A number of commenters suggested additional waivers in cases where new development will result in no additional adverse impacts to water quality as compared to the existing development it replaces. EPA believes these waivers are either unworkable or unnecessary. It would be very difficult for most construction operators to determine, as well as for other stakeholders to verify, on a site-by-site basis, that there is no potential for adverse impact to water quality compared to the replaced development.

Other commenters proposed waivers in cases where a local erosion and sediment control program covers the project or a separate waiver for small linear utility projects. Instead of waivers, today's rule addresses the first suggestion through the qualifying program provision described in the section titled Cross-Referencing State/Local Erosion and Sediment Control Programs below. Today's rule provides waivers for small linear projects in so far as they satisfy conditions for low rainfall erosivity. (See § 122.26(b)(15)(i)(A).)

Other commenters suggested waivers based on distance to water body, existence of vegetated buffer around water body, slope of disturbed land, or if discharging to very large bodies of water. As a result of public outreach, EPA believes that these proposed waivers would be generally unworkable for construction site dischargers and permitting authorities because of the difficulty in applying them to all small sites.

One commenter mentioned that waivers for the R factor (rainfall-erosivity) and soil loss are effluent standards that have not been developed in accordance with sections 301 and 304 of the CWA. EPA disagrees that these sections are relevant to the designation of sources in today's rule. The waiver provisions in this section of the rule are jurisdictional because they affect the scope of the universe of entities subject to the NPDES program. Therefore, the waiver provisions are not themselves substantive control standards implemented through NPDES permits, and thus, not subject to the statutory criteria in sections 301 and 304.

Another commenter stated that waivers would allow exemptions to the technology based requirements and would thus be inconsistent with the two-fold approach of the CWA (a technology based minimum and a water quality based overlay). EPA acknowledges that the CWA does not generally provide for waivers for the Act's technology-based requirements. The waiver provisions do not create exemptions from technology-based standards that apply to NPDES dischargers; they provide exemption from the underlying requirement for an NPDES permit in the first place. Protection of water quality is the reason these smaller sites are designated for regulation under NPDES. The Act's two fold approach imposes more stringent water quality based effluent limitations when technology-based limitations applicable to regulated dischargers are insufficient to meet water quality standards. Under today's rule, water quality protection is the basis for determining which of the unregulated sources should be regulated at all. Thus, today's rule is entirely consistent with the Act's two fold approach.

i. Rainfall-Erosivity Waiver. The rainfall-erosivity waiver under § 122.26(b)(15)(i)(A) is intended to exempt the requirements for a permit when and where negligible rainfall/runoff-erosivity is expected. In the development of the Universal Soil Loss Equation, analysis of data indicated that when factors other than rainfall are held constant, soil loss is directly proportional to a rainfall factor composed of total storm kinetic energy times the maximum 30 minute intensity. The average annual sum of the storm energy and intensity values for an area comprise the R factor—the rainfall erosivity index. A detailed explanation of the R factor can be found in *Predicting Soil Erosion by Water: A Guide to Conservation Planning With the Revised Universal Soil Loss Equation (RUSLE)* (USDA, 1997).

This waiver is time-sensitive and is dependent on when during the year a construction activity takes place, how long it lasts, and the expected rainfall and intensity during that time. R factors vary based on location. EPA anticipates that this waiver opportunity responds to concerns about the requirement for a permit when it is not expected to rain, especially in the arid areas of the U.S. Under today's rule, the permitting authority could waive the requirements for a permit for time periods when the rainfall-erosivity factor (''R'' in RUSLE) is less than *five* during the period of construction. For the purposes of calculating this waiver, the period of construction activity starts at the time of initial disturbance and ends with the time of final stabilization. The operator must submit a written certification to the Director in order to apply for such a waiver. EPA believes that those areas receiving negligible rainfall during certain times of the year are unlikely to have storm events causing discharges that could adversely impact receiving streams. Consequently, BMPs would not be necessary on those smaller sites. This waiver is most applicable to projects of short duration and to the arid regions of the country where the occurrence of rainfall follows a cyclic pattern—between no rain and extremely heavy rain. EPA review of rainfall records for these areas indicates that, during periods of the year when the number of events and quantity of rain are low, storm water discharges from the smaller construction sites regulated under today's rule should be minimal.

Some commenters supported the use of the R factor as a waiver, while others felt that a waiver based on rainfall statistics ignores the fact that it may rain on any given day and it is the cumulative effect of wet weather discharges which cause water quality impairments. A commenter also asked what happens in ''El Nino'' years when significantly more rainfall than normal occurs. Another commenter also expressed concern that this waiver was not based on a measured water quality impact, but instead on an indicator of potential impact. In response to the previous comments, EPA notes that, under CWA 402(p)(6), sources are designated on their *potential* for adverse impact. Designation under the section is prospective, not retrospective or remedial only. For that reason, the waivers under today's rule also operate prospectively. EPA wanted to waive requirements for sites with little

potential to impair water quality, and the R factor is the most straightforward way to do this. The permitting authority, if electing to use waivers, could always suspend the use of waivers in certain areas or during certain times. In addition, the permitting authority may choose to use a lower R factor threshold than the one set by EPA. Application of this waiver is at the discretion of the permitting authority, subject only to the limitation that R factors cannot exceed 5.

One commenter expressed the need for EPA to provide a justification for the threshold value used for the R factor. None of the commenters included any data to show that EPA's proposed R factor of 2 was either too high or too low. EPA is using the R factor as an indicator of the potential to impact water quality. In an effort to determine which R threshold should be used, EPA conducted additional analysis of the rainfall/runoff erosivity factor for 134 sites across the country. For an R factor threshold of 5, approximately 12% of sites would be waived if the project period lasted 6 months, 27% for 3 months, 47% for 1 month, and 60% of sites would be waived if the project lasted for only 15 days. None of the 134 sites would be waived if the project lasted an entire year. For an R factor threshold of 2, approximately 9% of sites would be waived if the project period lasted 6 months, 15% for 3 months, 31% for 1 month, and 43% for 15 days. For an R factor threshold of 10, approximately 22% of sites would be waived if the project period lasted 6 months, 37% for 3 months, 60% for 1 month, and 78% for 15 days. EPA believes that an R factor of 5 is an adequate threshold to waive requirements for sites because they would not reasonably be expected to impair water quality.

EPA will develop, as part of the tool box described in section II.A.5, guidance materials and computer or web-accessible programs to assist permitting authorities and construction site discharges in determining if any resulting storm water discharges from specific projects are eligible for this waiver.

ii. Water Quality Waiver. The water quality waiver under § 122.26(b)(15)(i)(B) is available where storm water controls are not needed based on a comprehensive, location-specific evaluation of water quality needs. The waiver is available based on either an EPA-approved ''total maximum daily load'' (TMDL) under section 303(d) of the CWA that addresses the pollutant(s) of concern or, for sites discharging to non-impaired waters that do not require TMDLs, an equivalent analysis that has either determined allocations for small construction sites for the pollutant(s) of concern or determined that such allocations are not needed to protect water quality based on consideration of existing in-stream concentrations, expected growth in pollutant contributions from all sources, and a margin of safety. The pollutants of concern that must be addressed include sediment or a parameter that addresses sediment (such as total suspended solids (TSS), turbidity or siltation) and any other pollutant that has been identified as a cause of impairment of any water body that will receive a discharge from the construction activity. The operator must certify to the NPDES permitting authority that the construction activity will take place, and storm water discharges will occur, within the applicable drainage area evaluated in the TMDLs or equivalent analyses.

Today's rule modifies the approach in the proposed rule. EPA proposed to allow a waiver of permit requirements for small construction if storm water controls were determined to be unnecessary based on ''wasteload allocations that are part of 'total maximum daily loads' (TMDLs) that address the pollutants of concern,'' or ''a comprehensive watershed plan, implemented for the water body, that includes the equivalents of TMDLs, and addresses the pollutants of concern.''

Commenters asked for clarification of the terms ''comprehensive watershed plans'' and ''equivalent of TMDLs.'' EPA intended that both terms would include a comprehensive analysis that determines that controls on small construction sites are not needed based on consideration of existing in-stream concentrations, expected growth in pollutant contributions from all sources, and a margin of safety. Today's rule makes this clarification.

One commenter pointed out that there are no water quality standards for suspended solids, the major pollutant expected in discharges from construction activity. The commenter asserted that no waiver would ever be available. Another commenter noted that there are no sediment criteria developed for streams, also making this waiver useless. EPA notes that a number of States and Tribes have water quality standards that address TSS, which are narrative in form, and that may serve as a basis for water quality-based effluent limits. As efforts to identify impairments and improve water quality progress, some States may yet develop water quality standards for suspended solids. Although several TMDLs for sediment and related parameters have been established, EPA does recognize that currently it is extremely difficult to develop TMDLs for sediment. EPA is partially addressing this concern by clarifying in today's rule that the waivers may be based on a TMDL or equivalent analyses for sediment or one of the various pollutant parameters that are a proxy for sediment. These include TSS, turbidity and siltation.

Other commenters noted that this waiver was unattainable if a TMDL or equivalent analysis must be available for every pollutant that could possibly be present in any amount in discharges from small construction sites regardless of whether the pollutant is causing water quality impairment. Commenters asked that EPA identify what constitutes the ''pollutants of concern'' for which a TMDL or its equivalent must be developed. EPA has revised the proposed rule in response to these concerns.

In order for discharges from construction sites under five acres to qualify for the water quality waiver of today's rule, the construction site operator must demonstrate that storm water controls are not necessary for sediment or a parameter that addresses sediment (such as TSS, turbidity or siltation) and any other pollutant that has been identified as a cause of impairment of any water body that will receive a discharge from the construction activity. Even if the water body is not currently impaired for sediment, today's rule requires an analysis of the potential impacts of sediment because the storm water discharges from the construction activity will be a new source of loading to the water body that could constitute a new impairment. Because the water body will not necessarily have been included on a ''303(d) list'' and a TMDL will not necessarily be required, the rule continues to allow an analysis that is the equivalent of a TMDL. The designation of storm water discharges from small construction activity for regulation in today's rule is intended to control pollutants other than sediment. This waiver provision requires a TMDL or equivalent analysis for a pollutant other than gross particulates (*i.e.,* sediment and other particulate-focused pollutant parameters) only if the receiving water is currently impaired for that pollutant.

One commenter expressed the concern that construction operators will not know if they are in a watershed covered by a TMDL. To the extent this is an operator's concern, he or she could contact their NPDES permitting

authority before applying for permit coverage to determine if receiving water is subject to a TMDL. Alternatively, the permitting authority could identify the TMDL (or equivalent analysis) areas in the general permit or another operator-accessible information source.

Another commenter expressed the concern that a TMDL waiver is likely to be ineffective because the TMDL list is submitted only once every 2 years. By the time a water is listed, the activity may have been completed and stabilized. The commenter argued that, if a watershed is impaired due to sediment from construction, then storm water controls will still be needed, because small construction can only be waived when it is not identified as a source of impairment. In response, EPA notes that an analysis that is the equivalent of a TMDL (specifically, equivalent to the component of a TMDL that comprehensively analyses existing ambient conditions against the applicable water quality standards) may also provide a basis for waiver from the default 1 acre designation. Also, even if a water has been identified as impaired for sediment, it is possible that a site or category of sites may receive an allocation that is sufficiently high enough to allow discharges without storm water controls.

c. Permit Process and Administration

The operator of the construction site, as with any operator of a point source discharge, is responsible for obtaining coverage under a NPDES permit as required by § 122.21(b). The ''operator'' of the construction site, as explained in the current NPDES construction general permit, is typically the party or parties that either individually or collectively meet the following two criteria: (1) Operational control over the site specifications, including the ability to make modifications in the specifications; and (2) day-to-day operational control of those activities at the site necessary to ensure compliance with permit conditions (63 FR 7859). If more than one party meets these criteria, then each party involved would typically be a co-permittee with any other operators. The operator could be the owner, the developer, the general contractor, or individual contractor. When responsibility for operational control is shared, all operators must apply.

In today's rule, EPA is not requiring an NOI for NPDES general permits for storm water discharges from construction activities regulated by § 122.26(b)(15) if the NPDES permitting authority finds that the use of NOIs would be inappropriate (see § 122.28(b)(2)(v)). Under this approach, the NPDES permitting authority will have the discretion to decide whether or not to require NOIs for discharges from construction activity less than 5 acres. Compared to the existing storm water regulation, the permitting authority thus has increased flexibility in program implementation. EPA does recommend the use of NOIs, however because NOIs track permit coverage and provide a useful information source to prioritize inspections or enforcement. Requiring an NOI allows for greater accountability by, and tracking of, dischargers. This simple permit application and reporting mechanism also allows for better outreach to the regulated community, uses an existing and familiar mechanism, and is consistent with the existing requirements for storm water discharges from larger construction activities. Today's rule does not amend the requirement for NOIs in general permits for storm water discharges from construction activity disturbing 5 acres for more. See § 122.28(b)(2)(v).

EPA expects that the vast majority of discharges of storm water associated with small construction activity identified in § 122.26(b)(15) will be regulated through general permits. In the event that an NPDES permitting authority decides to issue an individual construction permit, however, individual application requirements for these construction site discharges are found at § 122.26(c)(1)(ii). For any discharges of storm water associated with small construction activity identified in § 122.26(b)(15) that are not authorized by a general permit, a permit application made pursuant to § 122.26(c) must be submitted to the Director by 3 years and 90 days after publication of the final rule.

Some commenters expressed concern that linear construction projects (*e.g.,* roads, highways, pipelines) that cross several jurisdictions will have to comply with multiple sets of requirements from various jurisdictions, including multiple local governments and States. EPA is limited in its options to address these concerns because the Agency cannot issue NPDES permits in States authorized to implement the NPDES program nor preempt other more stringent local and State requirements. EPA believes, however, that the option for incorporating by reference the State, Tribal or local requirements (see discussion in Section II.I.2.d., Cross-Referencing State/Local Erosion and Sediment Control Programs) should limit the administrative burden on the operator responsible for discharges from linear construction projects. If the operator were to implement the most comprehensive of the various requirements for the whole project, it could avoid confusion due to differing requirements for different sections of the project. In addition, linear utility projects, which usually have a shorter project period, are more likely to be eligible for the rainfall erosivity waiver.

One commenter stated there was no reason to delay the application period for regulated storm water discharges from small construction activities. The commenter requested that the newly regulated construction site discharges should be required to seek permit coverage within 90 days, as opposed to 3 years, of the effective date of the rule. The Agency does not accept this request. EPA anticipates that NPDES permitting authorities will need one to two years to develop adequate legal authority to implement a program to address this new category of discharges, as well as to develop and issue general permits. Moreover, to ensure effective implementation to protect water quality, regulatory authorities will need additional time to inform small construction site operators of requirements and provide guidance and training on these requirements.

Finally, EPA received a comment requesting that the three year file retention requirement be deleted for discharges from small construction sites. While EPA recognizes that the three year record retention schedule may be unnecessary for certain construction projects, the Agency has determined it is necessary to retain files after the completion of the project to ensure permit compliance, including applicable construction site stabilization enabling permit termination for such sites.

d. Cross-Referencing State, Tribal or Local Erosion and Sediment Control Programs

In developing the NPDES permit requirements for construction sites less than 5 acres, members of the Storm Water Phase II FACA Subcommittee asked EPA to try to minimize redundancy in the construction permit requirements. In response, today's rule at § 122.44(s) provides for incorporation of qualifying State, Tribal or local erosion and sediment control program requirements by reference into the NPDES permit authorizing storm water discharges from construction sites (described under §§ 122.26(b)(15) and (b)(14)(x)). The incorporation by reference approach applies not only to the newly regulated storm water discharges (from construction activity disturbing between 1 and 5 acres, including designated sites, but

excluding waived sites) but also to discharges from construction activity disturbing 5 or more acres already covered by the existing storm water regulations. For this latter category of discharges from construction activity disturbing 5 or more acres, the incorporation by reference approach requires that the pollutant control requirements from the incorporated program also satisfy the statutory standard for limitations representing application of the best available technology economically achievable (BAT) and best conventional pollutant control technology (BCT).

For permits issued for discharges from small construction activity defined under § 122.26(b)(15), a qualifying State, Tribal, or local erosion and sediment control program is one that includes the program elements described under § 122.44(s)(1). These elements include requirements for construction site operators to implement appropriate erosion and sediment control BMPs, requirements to control waste, a requirement to develop a storm water pollution prevention plan, and requirements to submit a site plan for review. A storm water pollution prevention plan includes site descriptions, descriptions of appropriate control measures, copies of approved State, Tribal or local requirements, maintenance procedures, inspection procedures, and identification of non-storm water discharges. The construction site's permit would require it to follow the requirements of the qualifying local program rather than require it to follow two different sets of requirements. If a partially-qualifying program does not have all of the elements described under § 122.44(s)(1), then the NPDES permitting authority may still incorporate language in the small construction site discharge's permit that requires the construction site operator to follow the program, but the construction site discharge permit also must incorporate the missing required elements in order to satisfy CWA requirements.

The term ''local'' refers to the geographic area of applicability, not the form of government that develops and administers the program. Thus, a qualifying federal erosion and control program, such as certain programs developed and administered by the federal Bureau of Land Management, could be a qualifying local program.

As a result of this provision, local requirements will, in effect, provide the substantive construction site erosion and sediment control requirements for the NPDES permit authorization. Therefore, by following one set of erosion and sediment control requirements, construction site operators satisfy both local and NPDES permit requirements without duplicative effort. At the same time, noncompliance with the referenced local requirements will be considered noncompliance with the NPDES permit which is federally enforceable. The NPDES permitting authority will, of course, retain the discretion to decide whether to include the alternative requirements in the general permit. EPA believes that this approach will best balance the need for consideration of specific local requirements and local implementation with the need for federal and citizen oversight, and will extend supplemental NPDES requirements to control storm water discharges from construction sites.

EPA developed the ''incorporation by reference'' approach based on implementation efforts designed by the State of Michigan. Michigan relies on localities to develop substantive controls for storm water discharges associated with construction activities on a localized basis. Localities, however, are not required to do so. In areas where the local authority does not choose to participate, the State administers the sedimentation and erosion control requirements. The State agency, as the NPDES permitting authority, receives an NOI (termed ''notice of coverage'' by Michigan) under the general permit and tracks and exercises oversight, as appropriate, over the activity causing the storm water discharge. Michigan's goal under these procedures is to utilize the existing erosion and sediment control program infrastructure authorized under State law for storm water discharge regulation. (See U.S. Environmental Protection Agency, Office of Water. January 7, 1994. Memo: From Michael B. Cook, Director OWEC, to Water Management Division Directors, Regarding the ''Approach Taken by Michigan to Regulate Storm Water Discharges from Construction Activities.'')

Most commenters supported the general concept of incorporating by reference qualifying programs. Two commenters expressed concern that different local construction requirements will create an impossible regulatory scheme for builders who work in different localities. EPA believes that allowing States to incorporate qualifying programs by reference will minimize the differences for builders who work in different areas of the State. These differences already exist, however, not only for erosion and sediment controls, but also other aspects of construction. In any event, the criteria for qualification for localized programs should provide a certain degree of standardization for various localities' requirements. EPA expects that the new rule for construction and post-construction BMPs being developed under CWA section 304(m) will also encourage standardization of local requirements. (See discussion of this new rulemaking in section II.D.1, Federal Role of this preamble).

Two commenters requested that an ''incorporation by reference'' should include permission, in writing, from the qualifying local program administrator because of a perceived extra burden on the referenced program. Any program requirements incorporated by reference in NPDES permits should already apply to construction site dischargers in the applicable area and therefore should not add any additional burden to the referenced program. EPA has left to the discretion of the permitting authority the decision on whether to seek permission from the qualifying program before cross-referencing it in an NPDES permit.

One commenter stated that a qualifying local program should require a SWPPP. The proposed rule defined the qualifying local program as a program the meets the minimum program requirements established in the proposed construction minimum control measure for small MS4s. To ensure consistency in the controls for storm water discharges between the larger, already regulated construction sites and the discharges from smaller sites that will be regulated as a result of today's rule, EPA has made a change to define a qualifying local program as one that includes the elements described in § 122.44(s)(1). Section 122.44(s)(1) requires the development and implementation of a storm water pollution prevention plan as a criterion for qualification of local programs for incorporation by reference. As noted above, if a qualifying program does not include all the elements in § 122.44(s)(1) then the permitting authority will need to specify the missing elements in order to rely on the incorporation by reference approach.

One commenter asked what happens in regard to the use of qualifying programs when a construction site operator is also the qualifying local program operator. The provision for incorporation by reference applies in this situation also. The local program operator will be required to comply with requirements it has established for others.

e. Alternative Approaches

EPA received a number of comments on alternative permitting approaches. Several commenters supported regulating discharges only from those construction sites within urbanized areas. Other commenters opposed this approach. EPA chose to address storm water discharges from construction sites located both within and outside urbanized areas because of the potential for adverse water quality impact from storm water discharges from smaller sites in all areas. Regulating only those sites within urbanized areas would have excluded a large number of potential contributors to water quality impairment and would not address large areas of new development occurring on the outer fringes of urbanized areas. In fact, designating only small construction discharges within urbanized areas might create a perverse incentive for building only outside urbanized areas. Such an incentive would be inconsistent with the Agency's intention behind designating to protect water quality. The Agency intends that designation to protect water quality in today's rule should be both remedial and preventive.

A number of commenters encouraged EPA to cover municipal construction activities under the small MS4 general permit, instead of issuing a separate NPDES construction permit to these municipal construction projects. Similarly, a number of commenters supported EPA giving industrial facilities the option of having storm water from construction activities on the site covered by the industrial storm water permit. Several other commenters found that combining multiple permit types under one general permit introduced a degree of complexity which was confusing to permittees. Permitting authorities have the option of combining MS4 and construction permits or industrial and construction permits, however, specific requirements for each would still need to be included in the permit issued. EPA agrees that this would probably result in a more complex and confusing permit compared to the existing component permits.

Several commenters supported an alternative for regulated small MS4s where a local qualified program alone, without an NPDES permit, is sufficient to enforce compliance with construction site discharge requirements. On the other hand, one commenter stated that linking the local construction erosion and sediment control program to the existing NPDES program for storm water from larger construction has driven improvements in many local programs. Another commenter stated that the potential fines under the NPDES program will encourage compliance and will be much stronger than any fines a local program may have. EPA agrees that the NPDES program is the best approach to address water quality impacts from construction sites and provides benefits such as accountability and federal enforcement.

A number of commenters supported issuing one permit for each construction company, instead of a permit for each individual construction activity (also requested for storm water discharges from the larger, already regulated construction sites). Other commenters found that a 'licensing' program for construction site operators would have many problems, including identifying who to permit and tracking information on active sites. EPA is regulating only the storm water discharges associated with construction activity from small sites, not the construction activity itself. Separate NPDES permits (either individual or general permit coverage) for construction site discharges avoid potential problems in tracking sites and operator accountability. Section 122.28(b)(2)(v) gives permitting authorities the option to issue a general permit without requiring an NOI. If an NOI is not required for each activity, permitting authorities could pursue other options such as a company-wide NOI, license instead of an NOI, or another mechanism.

2. Other Sources

In the *Storm Water Discharges Potentially Addressed by Phase II of the National Pollutant Discharge Elimination System Storm Water Program*, Report to Congress, March 1995, (''Report'') submitted by EPA pursuant to CWA section 402(p)(5), EPA examined the remaining unregulated point sources of storm water for the potential to adversely affect water quality. Due to very limited national data on which to estimate pollutant loadings on the basis of discharge categories, the discussion of the extent of unregulated storm water discharges is limited to an analysis of the number and geographic distribution of the unregulated storm water discharges. Therefore, EPA is not designating any additional unregulated point sources of storm water on a nationwide, categorical basis. Instead, the remainder of the sources will be regulated based on case-by-case post-promulgation designations by the NPDES permitting authority.

EPA did, however, evaluate a variety of categories of discharges for potential designation in the Report. EPA's efforts to identify sources and categories of unregulated storm water discharges for potential designation for regulation in today's rule started with an examination of approximately 7.7 million commercial, retail, industrial, and institutional facilities identified as ''unregulated.'' In general, the distribution of these facilities follows the distribution of population, with a large percentage of facilities concentrated within urbanized areas (see page 4-35 of the Report). This examination resulted in identification of two general classes of facilities with the potential for discharging pollutants to waters of the United States through storm water point sources.

The first group (Group A) included sources that are very similar, or identical, to regulated ''storm water discharges associated with industrial activity'' but that were not included in the existing storm water regulations because EPA used SIC codes in defining the universe of regulated industrial activities. By relying on SIC codes, a classification system created to identify industries rather than environmental impacts from these industries discharges, some types of storm water discharges that might otherwise be considered ''industrial'' were not included in the existing NPDES storm water program. The second general class of facilities (Group B) was identified on the basis of potential for activities and pollutants that could contribute to storm water contamination.

EPA estimates that Group A has approximately 100,000 facilities. Discharges from facilities in this group, which may be of high priority due to their similarity to regulated storm water discharges from industrial facilities, include, for example, auxiliary facilities or secondary activities (*e.g.,* maintenance of construction equipment and vehicles, local trucking for an unregulated facility such as a grocery store) and facilities intentionally omitted from existing storm water regulations (*e.g.,* publicly owned treatment works with a design flow of less than 1 million gallons per day, landfills that have not received industrial waste).

Group B consists of nearly one million facilities. EPA organized Group B sources into 18 sectors for the purposes of the Report. The automobile service sector (*e.g.,* gas/service stations, general automobile repair, new and used car dealerships, car and truck rental) makes up more than one-third of the total number of facilities identified in all 18 sectors.

EPA conducted a geographical analysis of the industrial and commercial facilities in Groups A and

B. The geographical analysis shows that the majority are located in urbanized areas (see Section 4.2.2, Geographic Extent of Facilities, in the Report). In general, about 61 percent of Group A facilities and 56 percent of Group B facilities are located in urbanized areas. The analysis also showed that nearly twice as many industrial facilities are found in all urbanized areas as are found in large and medium municipalities alone. Notable exceptions to this generalization included lawn/garden establishments, small unregulated animal feedlots, wholesale livestock, farm and garden machinery repair, bulk petroleum wholesale, farm supplies, lumber and building materials, agricultural chemical dealers, and petroleum pipelines, which can frequently be located in smaller municipalities or rural areas.

In identifying potential categories of sources for designation in today's notice, EPA considered designation of discharges from Group A and Group B facilities. EPA applied three criteria to each potential category in both groups to determine the need for designation: (1) The likelihood for exposure of pollutant sources included in that category, (2) whether such sources were adequately addressed by other environmental programs, and (3) whether sufficient data were available at this time on which to make a determination of potential adverse water quality impacts for the category of sources. As discussed previously, EPA searched for applicable nationwide data on the water quality impacts of such categories of facilities.

By application of the first criterion, the likelihood for exposure, EPA considered the nature of potential pollutant sources in exposed portions of such sites. As precipitation contacts industrial materials or activities, the resultant runoff is likely to mobilize and become contaminated by pollutants. As the size of these exposed areas increases, EPA expects a proportional increase in the pollutant loadings leaving the site. If EPA concluded that a category of sources has a high potential for exposure of raw materials, intermediate products, final products, waste materials, byproducts, industrial machinery, or industrial activity to rainfall, the Agency rated that category of sources as having ''high'' potential for adverse water quality impact. EPA's application of the first criterion showed that a number of Group A and B sources have a high likelihood of exposure of pollutants.

Through application of the second criterion, EPA assessed the likelihood that pollutant sources are regulated in a comprehensive fashion under other environmental protection programs, such as programs under the Resource Conservation and Recovery Act (RCRA) or the Occupational Health and Safety Act (OSHA). If EPA concluded that the category of sources was sufficiently addressed under another program, the Agency rated that source category as having ''low'' potential for adverse water quality impact. Application of the second criterion showed that some categories were likely to be adequately addressed by other programs.

After application of the third criterion, availability of nationwide data on the various storm water discharge categories, EPA concluded that available data would not support any such nationwide designations. While such data could exist on a regional or local basis, EPA believes that permitting authorities should have flexibility to regulate only those categories of sources contributing to localized water quality impairments.

EPA received comments requesting designation of additional industrial, commercial and retail sources (*e.g.* industrial activity ''look-alikes'', roads, commercial facilities and institutions, and vehicle maintenance facilities) in the final rule, because the commenters believe that the data exist to support national designation of some of these sources. Other comments were received opposing designation of any additional sources. Today's rule does not designate any additional industrial or commercial category of sources either because EPA currently lacks information indicating a consistent potential for adverse water quality impact or because of EPA's belief that the likelihood of adverse impacts on water quality is low, with some possible exceptions on a more local basis. Since the time the Agency submitted the Report, EPA has continued to seek additional data and has requested available data from the FACA members. If sufficient regional or nationwide data become available in the future, the permitting authority could at that time designate a category of sources or individual sources on a case-by-case basis. Therefore, today's rule encourages control of storm water discharges from Groups A and B through self-initiated, voluntary BMPs, unless the discharge (or category of discharges) is designated for permitting by the permitting authority. See discussion in section I.D., EPA's Reports to Congress.

3. ISTEA Sources

Provisions within the Intermodal Surface Transportation and Efficiency Act (ISTEA) of 1991 temporarily exempted storm water discharges associated with industrial activity that are owned or operated by municipalities serving populations less than 100,000 people (except for airports, power plants, and uncontrolled sanitary landfills) from the need to apply for or obtain a storm water discharge permit (section 1068(c) of ISTEA). Congress extended the NPDES permitting moratorium for these facilities to allow small municipalities additional time to comply with NPDES requirements for certain sources of industrial storm water. The August 7, 1995 storm water final rule (60 FR 40230) further extended this moratorium until August 7, 2001. However, today's rule changes this deadline so that previously exempted industrial facilities owned or operated by municipalities serving populations less than 100,000 people, must now submit an application for a permit within 3 years and 90 days from date of publication of today's rule.

EPA received comments recommending that permit requirements for municipally owned or operated industrial storm water discharges, including those previously exempt under ISTEA, be included in a single NPDES permit for all MS4 storm water discharges. The existing NPDES regulations already provide permitting authorities the ability to issue a single ''combination'' permit for MS4 discharges. However, if the permitting authorities chose to issue this type of permit, they must make sure that in doing so, they are not creating a double standard for industrial facilities covered under the combination permit versus those covered under separate general or individual permits. In order to avoid this double standard, combination permits would have to contain requirements that are the same or very similar to the requirements found in separate MS4 and industrial permits, *i.e.,* the minimum measures and other necessary requirements of an MS4 permit, and the SWPPP, monitoring and reporting requirements, and other necessary requirements of an industrial permit. If such a combined MS4 general permit were issued, the regulations require that each discharger submit NOIs for their respective discharges, except for discharges from small construction activities. Flexibility exists in developing a combination NOI which could reduce the need to submit duplicative information, *e.g.* owner/operator name and address. The combination NOI would still need to require specific information for each separate municipally owned or operated industrial location, including

construction projects disturbing 5 or more acres. The regulations at § 122.28(b)(2)(ii) list the necessary contents of an NOI, which require: the facility name, facility address, type of facility or discharge and receiving stream for each industrial discharge location. When viewed in its entirety, a combination permit, which by necessity would need to contain all elements of otherwise separate industrial and MS4 permit requirements, and require NOI information for each separate industrial activity, may have few advantages when compared to obtaining separate MS4 and industrial general permit coverage.

In order to allow the permitting authority to issue a single storm water permit for the MS4 and all municipally owned or operated industrial facilities, including those previously exempt under ISTEA, today's rule requires applications for ISTEA sources within 3 yrs and 90 days from date of publication of today's rule. The permitting authority has the ultimate decision to determine whether or not a single all-encompassing MS4 permit is appropriate.

4. Residual Designation Authority

The NPDES permitting authority's existing designation authority, as well as the petition provisions are being retained. Today's rule contains two provisions related to designation authority at §§ 122.26(a)(9)(i)(C) and (D). Subsection (C) adds designation authority where storm water controls are needed for the discharge based upon wasteload allocations that are part of TMDLs that address the pollutant(s) of concern. EPA intends that the NPDES permitting authority have discretion in the matter of designations based on TMDLs under subsection (C). Subsection (D) carries forward residual designation authority under former § 122.26(g), and has been modified to provide clarification on categorical designation. Under today's rule, EPA and authorized States continue to exercise the authority to designate remaining unregulated discharges composed entirely of storm water for regulation on a case-by-case basis (including § 123.35). Individual sources are subject to regulation if EPA or the State, as the case may be, determines that the storm water discharge from the source contributes to a violation of a water quality standard or is a significant contributor of pollutants to waters of the United States. This standard is based on the text of section CWA 402(p). In today's rule, EPA believes, as Congress did in drafting section CWA 402(p)(2)(E), that individual instances of storm water discharge might warrant special regulatory attention, but do not fall neatly into a discrete, predetermined category. Today's rule preserves the regulatory authority to subsequently address a source (or category of sources) of storm water discharges of concern on a localized or regional basis. For example, as States and EPA implement TMDLs, permitting authorities may need to designate some point source discharges of storm water on a categorical basis either locally or regionally in order to assure progress toward compliance with water quality standards in the watershed.

EPA received comments asking that § 122.26(a)(9)(i)(D) as proposed be modified to include specific language clarifying the permitting authority's ability to designate additional sources on a categorical basis as explained in the preamble to the proposed rule. One comment requested that the designation language include ''categories of sources on a Statewide basis.'' EPA agrees that the intent of the language may not have been clear regarding categorical designation. Today's rule modifies subsection (D) to clarify that the designation authority can be applied within different geographic areas to any single discharge (i.e., a specific facility), or category of discharges that are contributing to a violation of a water quality standard or are significant contributors of pollutants to waters of the United States. The added term ''within a geographic area'' allows ''State-wide'' or ''watershed-wide'' designation within the meaning of the terms.

One commenter questioned the Agency's legal authority to provide for such residual designation authority. The stakeholder argued that the lapse of the October 1, 1994, permitting moratorium under CWA section 402(p)(1) eliminated the significance of the CWA section 402(p)(2) exceptions to the moratorium, including the exception for discharges of storm water determined to be contributing to a violation of a water quality standard or a significant contributor of pollutants under CWA section 402(p)(2)(E). The stakeholder further argued that EPA's authority to designate sources for regulation under CWA section 402(p)(6) is limited to storm water discharges other than those described under CWA section 402(p)(2). Because CWA section 402(p)(2)(E) describes individually designated discharges, the stakeholder concluded that regulations under CWA section 402(p)(6) cannot provide for post-promulgation designation of individual sources. EPA disagrees.

First, as explained previously, EPA anticipates that NPDES permitting authorities may yet determine that individual unregulated point sources of storm water discharges require regulation on a case-by-case basis. This conclusion is consistent with the Congress' recognition of the potential need for such designation under the first phase of storm water regulation as described in CWA section 402(p)(2)(E). Under CWA section 402(p)(2)(E), Congress recognized the need for both EPA and the State to retain authority to regulate unregulated point sources of storm water under the NPDES permit program. Second, to the extent that CWA section 402(p)(6) requires designation of a ''category'' of sources, the permitting authority may designate such (as yet unidentified) sources as a category that should be regulated to protect water quality. Though such sources may exist and discharge today, if neither EPA nor the State/Tribal NPDES permitting authority has designated the source for regulation under CWA section 402(p)(2)(E) to date, then CWA section 402(p)(6) provides the authority to designate such sources.

The Agency can designate a category of ''not yet identified'' sources to be regulated, based on local concerns, even if data do not exist to support nationwide regulation of such sources. EPA does not interpret the language in CWA section 402(p) to preclude States from exercising designation authority under these provisions because such designation (and subsequent regulation of designated sources) is within the ''scope'' of the NPDES program.

EPA also believes that sources regulated pursuant to a State designation are part of (and regulated under) a federally approved State NPDES program, and thus subject to enforcement under CWA sections 309 and 505. Under existing NPDES State program regulations, State programs that are ''greater in scope of coverage'' are not part of the federally-approved program. By contrast, any such State regulation of sources in this ''reserved category'' will be within the scope of the federal program because today's rule recognizes the need for such post promulgation designations of unregulated point sources of storm water. Such regulation will be ''more stringent'' than the federal program rather than ''greater in scope of coverage'' (40 CFR 123.1(h)).

EPA does not interpret the congressional direction in CWA section 402(p)(6) to preclude regulation of point sources of storm water that should be regulated to protect water quality. Under CWA section 510, Congress expressly recognized and preserved the authority of States to adopt and enforce

more stringent regulation of point sources, as well as any requirement respecting the control or abatement of pollution. Section 510 applies, ''except as expressly provided'' in the CWA. CWA section 502(14) does expressly provide affirmative limitations on the regulation of certain pollutant sources through the point source control program, the NPDES permitting program. Section 502(14) excludes agricultural storm water and return flows from irrigated agriculture from the definition of point source, and section 402(l) limits applicability of the section 402 permit program for return flows from irrigated agriculture, as well as for storm water runoff from certain oil, gas, and mining operations. Unlike sections 502(14) and 402(l), EPA does not interpret CWA section 402(p)(6) as an express provision limiting the authority to designate point sources of storm water for regulation on a case-by-case basis after the promulgation of final regulations. Any source of storm water discharge is encouraged to assess its potential for storm water contamination and take preventive measures against contamination. Such proactive actions could result in the avoidance of future regulation.

One comment was received requesting clarification of the term ''non-municipal'' in § 122.26(a)(9)(ii). The commenter is concerned that the term ''non-municipal,'' in this context, implies that municipally owned or operated facilities cannot be designated. The term ''non-municipal'' in this context refers to the universe of unregulated industrial and commercial facilities that could potentially be designated according to § 122.26(a)(9)(i) authority. There is no exemption for municipally owned or operated facilities under these designation provisions.

Finally, EPA received comments and evaluated the proposal under which operators of regulated small, medium, and large MS4s would be responsible for controlling discharges from industrial and other facilities into their systems in lieu of requiring NPDES permit coverage for such facilities. EPA did not adopt this framework due to concerns with administrative and technical burden on the MS4 operators, as well as concerns about such an intergovernmental mandate.

J. Conditional Exclusion for ''No Exposure'' of Industrial Activities and Materials to Storm Water

1. Background

In 1992, the Ninth Circuit court remanded to EPA for further rulemaking, a portion of the definition of ''storm water discharge associated with industrial activity'' that excluded the category of industrial activity identified as ''light industry'' when industrial materials and/or activities were not exposed to storm water. See *NRDC* v. *EPA,* 966 F.2d 1292, 1305 (9th Cir. 1992). Today's final rule responds to that remand. In the 1990 storm water regulations, EPA excluded the light industry category from the requirement for an NPDES permit if the industrial materials and/or activities were not ''exposed'' to storm water (see § 122.26(b)(14)). The Agency had reasoned that most of the activity at these types of facilities takes place indoors and that emissions from stacks, use of unhoused manufacturing equipment, outside material storage or disposal, and generation of large amounts of dust or particles would be atypical (55 FR 48008, November 16, 1990).

The Ninth Circuit determined that the exemption was arbitrary and capricious for two reasons. First, the court found that EPA had not established a record to support its assumption that light industry that was not exposed to storm water was not ''associated with industrial activity,'' particularly when other types of industrial activity not exposed to storm water remained ''associated with industrial activity.'' The court specifically found that ''[t]o exempt these industries from the normal permitting process based on an unsubstantiated assumption about this group of facilities is arbitrary and capricious.'' Second, the court concluded that the exemption impermissibly ''altered the statutory scheme'' for permitting because the exemption relied on the unverified judgment of the light industrial facility operator to determine non-applicability of the permit application requirements. In other words, the court was critical that the operator would determine for itself that there was ''no exposure'' and then simply not apply for a permit without any further action. Without a basis for ensuring the effective operation of the permitting scheme—either that facilities would self-report actual exposure or that EPA would be required to inspect and monitor such facilities—the court vacated and remanded the rule to EPA for further rulemaking.

One of the major concerns expressed by the FACA Committee, was that EPA streamline and reinvent certain troublesome or problematic aspects of the existing permitting program for storm water discharges. One area identified was the mandatory applicability of the permitting program to all industrial facilities, even those ''light industrial'' activities that are of very low risk or of no risk to storm water contamination. Such dischargers may not have any industrial sources of storm water contamination on the plant site, yet they are still required to apply for an NPDES storm water permit and meet all permitting requirements. Examples of such facilities are a soap manufacturing plant (SIC Code 28) or hazardous waste treatment and disposal facility, where all industrial activities, even loading docks, are inside a building or under a roof.

Although they did not provide a written report, the FACA Committee members advised EPA that the existing storm water program should be revised to allow such facilities to seek an exclusion from the NPDES storm water permitting requirements. The Committee agreed that such an exclusion should also provide a strong incentive for other industrial facilities that conduct industrial activities outdoors to move the activities under cover or into buildings to prevent contamination of rainfall and storm water runoff. The committee believed that such a ''no exposure'' permit exclusion could be a valuable incentive for storm water pollution prevention.

In today's final rule, the Agency responds to both of the bases for the court's remand. The exclusion from permitting based on ''no exposure'' applies to all industrial categories listed in the existing storm water regulations except construction. The court's opinion rejected EPA's distinction between light industry and other industry, but it did not preclude an interpretation that treats all ''non-exposed'' industrial facilities in the same fashion. Presuming that an industrial facility adequately prevents exposure of industrial materials and activities to storm water, today's rule treats discharges from ''non-exposed'' industrial facilities in a manner similar to the way Congress intended for discharges from administrative buildings and parking lots. Specifically, permits will not be required for storm water discharges from these facilities on a categorical basis.

To assure that discharges from industrial facilities really are similar to discharges from administrative buildings and parking lots, and to respond to the second basis for the court's remand, the permitting exclusion is ''conditional''. The person responsible for a point source discharge from a ''no exposure'' industrial source must meet the conditions of the exclusion, and complete, sign and submit the certification to the permitting authority for tracking and

accountability purposes. EPA believes today's rule, therefore, is fully consistent with the direction provided by the court.

EPA relied upon the ''no exposure'' concept discussed by the FACA Committee in developing the ''no exposure'' provisions of today's rule. EPA is deleting the sentence regarding ''no exposure'' for the facilities in § 122.26(b)(14)(xi) and adding a new § 122.26(g) titled ''Conditional Exclusion for No Exposure of Industrial Activities to Storm Water.'' The ''no exposure'' provision will make storm water discharges from all classes of industrial facilities eligible for exclusion, except storm water discharges from regulated construction activities. Regulated construction activities cannot claim ''no exposure'' because the main pollutants of concern (*e.g.,* sediment) generally cannot entirely be sheltered from storm water.

Today's rule represents a significant expansion in the scope of the ''no exposure'' provision originally promulgated in the 1990 rule, which was only for storm water discharges from light industry. The intent of today's ''no exposure'' provision is to provide a simplified method for complying with the CWA to all industrial facilities that are entirely indoors. This includes facilities that are located within a large office building, or at which the only items permanently exposed to precipitation are roofs, parking lots, vegetated areas, and other non-industrial areas or activities.

EPA received several comments related to storm water runoff from parking lots, roof tops, lawns, and other non-industrial areas of an industrial facility. Storm water discharges from these areas, which may contain pollutants or which may result in additional storm water flows, are not directly regulated under the existing storm water permitting program because they are not ''storm water discharges associated with industrial activity''. Many comments on this issue supported maintaining the exclusion from the existing regulations for storm water permitting for discharges from administrative buildings, parking lots, and other non-industrial areas. Other comments opposed allowing the continued exclusion for discharges from non-industrial areas of the site because discharges from these areas are potentially a significant cause of receiving water impairment. These comments urged that such discharges should not be excluded from NPDES permit coverage. Today's rule does not require permit coverage for discharges from a facility's exposed areas that are separate from industrial activities such as runoff from office buildings and accompanying parking lots, lawns and other non-industrial areas. This approach is consistent with the existing storm water rules which were based on Congress's intent to exclude non-industrial areas such as ''parking lots and administrative and employee buildings.'' 133 Cong. Rec. 985 (1987). EPA also lacks data indicating that discharges from these areas at an industrial facility cause significant receiving water impairments. Therefore, the non-industrial areas at a facility do not need to be assessed as part of the ''no exposure'' certification.

EPA received comments related to industrial facilities that achieve ''no exposure'' by constructing large amounts of impervious surfaces, such as roofs, where previously there were pervious or porous surfaces into which storm water could infiltrate. Some commenters made the point that large amounts of impervious area may cause a significant increase in storm water volume flowing off the industrial facility, and thus may cause adverse receiving water impacts simply due to the increased quantity of storm water flow. Some commenters said that storm water discharges from impervious areas at an industrial facility are generally more frequent, and often larger, than discharges from the pre-existing natural surfaces. They believe that these discharges will contain pollutants typical of commercial areas and roads and are an equal threat to direct human uses of the water and can cause equal damage to aquatic life and its habitat. Other commenters believe that if Congress or EPA addresses the issue of flow, it should be addressed on a broader scale than merely through the ''no exposure'' exclusion, and that EPA has no authority under any existing legal framework to regulate flow directly. Some commenters stated that developing federal parameters for the control of water quantity, *i.e.* flow, would result in federal intrusion into land use planning, an authority that they claim is solely within the purview of State governments and their political subdivisions.

EPA is not attempting to regulate flow via the ''no exposure'' provisions. EPA does agree, however, that increases in impervious surfaces can result in increased runoff volumes from the site which in turn may increase pollutant loading. In addition, the Agency notes that in some States water quality standards include water quality criteria for flow or turbidity. Therefore, in order to provide a minimal amount of information on possible impacts from increased pollutant loading and runoff volume, EPA's ''no exposure'' certification form (see Appendix 4) asks the discharger to indicate if they have paved or roofed over a formerly exposed, pervious area in order to qualify for the ''no exposure'' exclusion. If the answer is yes, the discharger must indicate, by choosing from three possible responses, approximately how much impervious area was created to achieve ''no exposure''. The choices are: (1) less than 1 acre, (2) 1 to 5 acres, and (3) more than 5 acres. This requirement provides additional information that will aid in determining if discharges from the facility are causing adverse receiving water impacts. EPA intends to prevent water quality impacts resulting from increased discharges of pollutants, which may result from increased volume of runoff. In many cases, consideration of the increased flow rate, velocity and energy of storm water discharges, following construction of large amounts of impervious surfaces, must be taken into consideration in order to reduce the discharge of pollutants, to meet water quality standards and to prevent degradation of receiving streams. EPA recommends that dischargers consider these factors when making modifications to their site in order to qualify for the ''no exposure'' exclusion.

2. Today's Rule

In order to claim relief under the ''no exposure'' provision, the discharger of an otherwise regulated facility must submit a no exposure certification that incorporates the questions of § 122.26(g)(4)(iii) to the NPDES permitting authority once every 5 years. This provision applies across all categories of industrial activity covered by the existing program, except discharges from construction activities.

In addition to submitting a ''no exposure'' certification every 5 years, the facility must allow the NPDES permitting authority or operator of an MS4 (where there is a storm water discharge to the MS4) to inspect the facility and to make such inspection reports publicly available upon request. Also, upon request, the facility must submit a copy of the ''no exposure'' certification to the operator of the MS4 into which the facility discharges (if applicable). All ''no exposure'' certifications must be signed in accordance with the signatory requirements of § 122.22. The ''no exposure'' certification is non-transferable. In the event that the facility operator changes, the new discharger must submit a new ''no exposure'' certification.

Members of the FACA Committee urged that EPA not allow dischargers certifying ''no exposure'' to take actions to qualify for this provision that result in a net environmental detriment. In developing a regulatory implementation mechanism, however, EPA found that the phrase ''no net environmental detriment,'' was too imprecise to use within this context. Therefore, today's rule addresses this issue by requiring information that should help the permitting authority to determine whether actions taken to qualify for the exclusion interfere with the attainment or maintenance of water quality standards, including designated uses. Permitting authorities will be able, where necessary, to make a determination by evaluating the activities that changed at the industrial site to achieve ''no exposure'', and assess whether these changes cause an adverse impact on, or have the reasonable potential to cause an instream excursion of, water quality standards, including designated uses. EPA anticipates that many efforts to achieve ''no exposure'' will employ simple good housekeeping and contaminant cleanup activities. Other efforts may involve moving materials and industrial activities indoors into existing buildings or structures.

In very limited cases, industrial operators may make major changes at a site to achieve ''no exposure''. These efforts may include constructing a new building or cover to eliminate exposure or constructing structures to prevent run-on and storm water contact with industrial materials or activities. Where major changes to achieve ''no exposure'' increase the impervious area of the site, the facility operator must provide this information on the ''no exposure'' certification form as discussed above. Using this and other available data and information, permitting authorities should be able to assess whether any major change has resulted in increased pollutant concentrations or loadings, toxicity of the storm water runoff, or a change in natural hydrological patterns that would interfere with the attainment and maintenance of water quality standards, including designated uses or appropriate narrative, chemical, biological, or habitat criteria where such State or Tribal water quality standards exist. In these instances, the facility operator and their NPDES permitting authority should take appropriate actions to ensure that attainment or maintenance of water quality standards can be achieved. The NPDES permitting authority should decide if the facility must obtain coverage under an individual or general permit to ensure that appropriate actions are taken to address adverse water quality impacts.

While the intent of today's ''no exposure'' provision is to reduce the regulatory burdens on industrial facilities and government agencies, the FACA Committee suggested that the NPDES permitting authority consider a compliance assessment program to ensure that facilities that have availed themselves of this ''no exposure'' option meet the applicable requirements. Inspections could be conducted at the discretion of the NPDES authority and be coordinated with other facility inspections. EPA expects, however, that the permitting authority will conduct inspections when it becomes aware of potential water quality impacts possibly caused by the facility's storm water discharges or when requested to do so by adversely affected members of the public. The intent of this provision is that the 5 year ''no exposure'' certification be fully available to, and enforceable by, appropriate federal and State authorities under the CWA. Private citizens can enforce against facilities for discharges of storm water that are inconsistent with a ''no exposure'' certification if storm water discharges from such facilities are not otherwise permitted and in compliance with applicable requirements.

EPA received comments from owners, operators and representatives of Phase I facilities classified as ''light industry'' as defined by the regulations at § 122.26(b)(14)(xi). The comments recommended maintaining the approach of the existing regulations which does not require the discharger to submit any supporting documentation to the permitting authority in order to claim the ''no exposure'' exclusion from permitting. As discussed previously, the ''no exposure'' concept was developed in response to the Ninth Circuit court's remand of part of the existing rules back to EPA. The court found that EPA cannot rely on the ''unverified judgment'' of the facility. The comments opposing documentation did not address the ''unverified judgment'' concern.

Today's rule is a ''conditional'' exclusion from permitting which requires all categories, including the ''light industrial'' facilities that have no exposure of materials to storm water, to submit a certification to the permitting authority. Upon receipt of a complete certification, the permitting authority can review the information, or call, or inspect the facility if there are doubts about the facility's ''no exposure'' claim. Also, if the facility discharges into an MS4, the operator of the MS4 can request a copy of the certification, and can inspect the facility. The public can request a copy of the certification and/or inspection reports. In adopting these conditional ''no exposure'' provisions, the Agency addressed the Ninth Circuit court's ruling regarding the discharger's unverified judgment.

EPA received one comment requesting clarification on whether the anti-backsliding provisions in the regulations at § 122.44(l) apply to industrial facilities that are currently covered under an NPDES storm water permit, and whether such facilities could qualify for the ''no exposure'' exclusion under today's rule. The anti-backsliding provisions will not prevent most industrial facilities that can certify ''no exposure'' under today's rule from qualifying for an exclusion from permitting. The anti-backsliding provisions contain 5 exceptions that allow permits to be renewed, reissued or modified with less stringent conditions. One exception at § 122.44(l)(2)(A) allows less stringent conditions if ''material and substantial alterations or additions to the permitted facility occurred after permit issuance which justify the application of a less stringent effluent limitation.'' Section 122.44(l)(B)(1) also allows less stringent requirements if ''information is available which was not available at the time of permit issuance and which would have justified the application of less stringent effluent limitations at the time of permit issuance.'' Facility's operators who certify ''no exposure'' and submit the required information once every 5 years will have provided the permitting authority ''information that was not available at the time of permit issuance.'' Also, some facilities may, in order to achieve ''no exposure'', make ''material and substantial alterations or additions to the permitted facility.'' Therefore, most facilities covered under existing NPDES general permits for storm water (e.g., EPA's Multi-Sector General Permit) will be eligible for the conditional ''no exposure'' exclusion from permitting without concern about the anti-backsliding provisions. Such dischargers will have met one or both of the anti-backsliding exceptions detailed above. Facilities that are covered under individual permits containing numeric limitations for storm water should consult with their permitting authority to determine whether the anti-backsliding provisions will prevent them from qualifying for the exclusion from permitting (for that discharge point) based on a certification of ''no exposure''.

EPA received several comments regarding the timing of when the ''no exposure'' certification should be submitted. The proposed rule said that the ''no exposure'' certification notice must be submitted ''at the beginning of each permit term or prior to commencing discharges during a permit term.'' Some commenters interpreted this statement to mean that existing facilities can only submit the certification at the time a permit is being issued or renewed. EPA intended the phrase ''at the beginning of each permit term'' to mean ''once every 5 years'' and today's rule reflects this clarification. EPA envisions that the NPDES storm water program will be implemented primarily through general permits which are issued for a 5 year term. Likewise the ''no exposure'' certification term is 5 years. The NPDES permitting authority will maintain a simple registration list that should impose only a minor administrative burden on the permitting authority. The registration list will allow for tracking of industrial facilities claiming the exclusion. This change allows a facility to submit a ''no exposure'' certification at any time during the term of the permit, provided that a new certification is submitted every 5 years from the time it is first submitted (assuming that the facility maintains a ''no exposure'' status). Once a discharger has established that the facility meets the definition of ''no exposure'', and submits the necessary ''no exposure'' certification, the discharger must maintain their ''no exposure'' status. Failure to maintain ''no exposure'' at their facility could result in the unauthorized discharge of pollutants to waters of the United States and enforcement for violation of the CWA. Where a discharger believes that exposure could occur in the future due to some anticipated change at the facility, the discharger should submit an application and obtain coverage under an NPDES permit prior to such discharge to avoid penalties.

Where EPA is the permitting authority, dischargers may submit a ''no exposure'' certification at any time after the effective date of today's rule. Where EPA is not the permitting authority, dischargers may not be able to submit the certification until the non-federal permitting authority completes any necessary statutory or regulatory changes to adopt this ''no exposure'' provision. EPA recommends that the discharger contact the permitting authority for guidance on when the ''no exposure'' certification should be submitted.

EPA received comments on the proposed rule requirement that the discharger ''must comply immediately with all the requirements of the storm water program including applying for and obtaining coverage under an NPDES permit,'' if changes occur at the facility which cause exposure of industrial activities or materials to storm water. The comments expressed the difficultly of immediate compliance. EPA expects that most facility changes can be anticipated, therefore dischargers should apply for and obtain NPDES permit coverage in advance of changes that result in exposure to industrial activities or materials. Permitting authorities may grant additional time, on a case-by-case basis, for preparation and implementation of a storm water pollution prevention plan.

Finally, today's rule at § 122.26(g)(4) includes the information which must be included on the ''no exposure'' certification. Authorized States, Tribes or U.S. Territories may develop their own form which includes this required information, at a minimum. EPA adopted the requirements (with modification) from the draft ''No Exposure Certification Form'' published as an appendix to the proposed rule. Modifications were made to the draft form to address comments received and to streamline the required information. EPA included these certification requirements in today's rule in order to preserve its integrity. Dischargers in areas where EPA is the permitting authority should use the ''No Exposure Certification'' form included in Appendix 4.

3. Definition of ''No Exposure''

For purposes of this section, ''no exposure'' means that all industrial materials or activities are protected by a storm resistant shelter to prevent exposure to rain, snow, snowmelt, and/or runoff. Industrial materials or activities include, but are not limited to, material handling equipment or activities, industrial machinery, raw materials, intermediate products, by-products, final products, or waste products. Material handling activities include the storage, loading and unloading, transportation, or conveyance of any raw material, intermediate product, final product or waste product. However, storm resistant shelter is not required for: (1) Drums, barrels, tanks, and similar containers that are tightly sealed, provided those containers are not deteriorated and do not leak; (2) adequately maintained vehicles used in material handling; and (3) final products, other than products that would be mobilized in storm water discharge (e.g., rock salt). Each of these three exceptions to the no exposure definition are discussed in more detail below.

EPA intends the term ''storm resistant shelter'' to include completely roofed and walled buildings or structures, as well as structures with only a top cover but no side coverings, provided material under the structure is not otherwise subject to any run-on and subsequent runoff of storm water. While the Agency intends that this provision promote permanent ''no exposure'', EPA understands that certain vehicles could pass between buildings and, during passage, be exposed to rain and snow. Adequately maintained vehicles such as trucks, automobiles, forklifts, or other such general purpose vehicles at the industrial site that are not industrial machinery, and that are not leaking contaminants or are not otherwise a source of industrial pollutants, could be exposed to precipitation or runoff. Such activities alone does not prevent a discharger from being able to certify no exposure under this provision. Similarly, trucks or other vehicles awaiting maintenance at vehicle maintenance facilities, as defined at § 122.26(b)(14)(viii), that are not leaking contaminants or are not otherwise a source of industrial pollutants, are not considered exposed.

In addition, EPA recognizes that there are circumstances where permanent ''no exposure'' of industrial activities or materials is not possible. Under such conditions, materials and activities may be sheltered with temporary covers, such as tarps, between periods of permanent enclosure. The final rule does not specify every such situation. EPA intends that permitting authorities will address this issue on a case-by-case basis. Permitting authorities can determine the circumstances under which temporary structures will or will not meet the requirements of this section. Until permitting authorities specifically determine otherwise, EPA recommends application of the ''no exposure'' exclusion for temporary sheltering of industrial materials or activities only during facility renovation or construction, provided that the temporary shelter achieves the intent of this section. Moreover, ''exposure'' that results from a leak in protective covering would only be considered ''exposure'' if not corrected prior to the next storm water discharge event. EPA received one comment requesting that this allowance for temporary shelter be limited to facility renovation or construction directly related to the industrial activity requiring temporary shelter, and be scheduled to minimize the use of temporary shelter. Another comment suggested placing time limits

on the use of temporary shelter. The commenter did not recommend a specific time period, rather the comment said that renovation in some instances may take years, and that EPA should not allow temporary shelter over prolonged periods. EPA agrees that the use of temporary shelter must be related to the renovation or construction at the site, and be scheduled or designed to minimize the use of temporary shelter. Further, EPA agrees that the use of temporary shelter should be limited in duration, but does not intend to define ''temporary'' or ''prolonged period''.

Many final products are intended for outdoor use and pose little risk of storm water contamination, such as new cars. Therefore, final products, except those that can be mobilized in storm water discharge, can be ''exposed'' and still allow the discharge to certify ''no exposure''. EPA intends the term ''final products'' to mean those products that are not used in producing another product. Any product that can be used to make another product is considered an ''intermediate product.'' For example, a facility that makes horse trailers can store the finished trailers outdoors as a final product. The storage of those final products does not prevent eligibility to claim ''no exposure''. However, any facility that makes parts for the horse trailers (e.g., metal tubing, sheet metal, paint) is not eligible for the ''no exposure'' exclusion from permitting if those ''intermediate products'' are stored outdoors (i.e., ''exposed'').

EPA received comments related to materials in drums, barrels, tanks and similar containers. Some comments objected to the language in the preamble to the proposed rule that would have recommended that the ''exposure'' determination for drums and barrels be based on the ''potential to leak.'' Those comments said that all drums and barrels have the potential to leak, thereby making certification impossible. They recommended allowing outdoor storage of drums and barrels except for those that ''are leaking'' at the time of certification. Other comments suggested allowing drums and barrels to be stored outside only if the drums and barrels: are empty; have secondary containment; or there is a spill contingency plan in place. Opposing comments suggested that allowing outdoor exposure of drums and barrels, based on existing integrity and condition, is inconsistent with the ''however packaged'' proposed rule language, and also would not satisfy the Ninth Circuit remand. The comments point out that the former rule was invalidated by the court in part because it relied on the ''unverified judgment'' of the light industrial facility operator to determine the non-applicability of the permit requirements, and that allowing the facility operator to determine the condition of their drums and barrels would result in the same flaw.

In response, EPA believes that drums and barrels that are stored outdoors pose little risk of storm water contamination unless they are open, deteriorated or leaking. The Agency has modified today's rule accordingly. EPA intends the term ''open'' to mean any container that is not tightly sealed and ''sealed'' to mean banded or otherwise secured and without operational taps or valves. Drums, barrels, tanks, and similar containers may only be *stored* outdoors under this conditional exclusion. The addition of material to or withdrawing of material from these containers while outside is deemed ''exposure''. Moving the containers while outside does not create ''exposure'' provided that the containers are not open, deteriorated or leaking. In order to complete the ''no exposure'' certification, a facility operator must inspect all drums, barrels, tanks or other containers stored outside to ensure that they are not open, deteriorated, or leaking. EPA recommends that the discharger designate someone at the facility to conduct frequent inspections to verify that the drums, barrels, tanks or other containers remain in a condition such that they are not open, deteriorated or leaking. Drums, barrels, tanks or other containers stored outside that have valves which are used to put material in or take material out of the container, and that have dripped or may drip, are considered to be ''leaking'' and must be under a storm resistant shelter in order to qualify for the no exposure exclusion. Likewise, leaking pipes containing contaminants exposed to storm water are deemed ''exposed.'' If at any time drums, barrels, tanks or similar containers are opened, deteriorated or leaking, the discharger should take immediate actions to close or replace the container. Any resulting unpermitted discharge would violate the CWA. The Director, the operator of the MS4, or the municipality may inspect the facility to verify that all of the applicable areas meet the ''no exposure'' conditions as specified in the rule language. In requiring submission of the conditional ''no exposure'' certification and allowing the permitting authority and the operator of the MS4 to inspect the facility, today's rule does not rely on the unverified judgment of the facility to determine that the no exposure provision is being met.

EPA received several comments related to trash dumpsters that are located outside. The preamble to the proposed rule listed dumpsters in the same grouping as drums and barrels, which based exposure on the ''potential to leak''. Today's rule distinguishes between dumpsters and drums/barrels. In the Phase I Question and Answer document (volume 1, question 52) the Agency noted that a covered dumpster containing waste material that is kept outside is not considered ''exposed'' as long as ''the container is completely covered and nothing can drain out holes in the bottom, or is lost in loading onto a garbage truck.'' EPA affirms this approach today. Industrial refuse and industrial trash that is left uncovered is deemed ''exposed.''

For purposes of this provision, particulate matter emissions from roof stacks/vents that are regulated and in compliance under other environmental protection programs, such as air quality control programs, and that do not cause storm water contamination, are considered ''not exposed.'' EPA received comments on the phrase in the draft ''no exposure'' certification form that asked whether ''particulate emissions from roof stacks/vents not otherwise regulated, and in quantities detectable in the storm water outflow,'' are exposed to precipitation. One comment expressed concern that the phrase ''in quantities detectable in the storm water outflow'' implies that the facility must conduct monitoring prior to completing the checklist, and must continue to monitor after receiving the no exposure exclusion, in order to be able to verify compliance with the no exposure provision. Another comment said that current measurement technology allows detection of pollutants at levels that may not cause environmental harm. EPA does not intend to require monitoring of runoff from facilities with roof stacks/vents prior to or after completing and submitting the no exposure certification. EPA has thus replaced the phrase ''in quantities detectable'' with ''evident'' to convey the message that emissions from some roof stacks/vents have the potential to contaminate storm water discharges in quantities that are considered significant or that cause or contribute to a water quality standards violation. In those instances where the permitting authority determines that particulate emissions from facility roof stacks/vents are a significant contributor of pollutants or contributing to water quality violations, the permitting authority may require the discharger to apply for and obtain coverage under a

permit. Visible deposits of residuals (*e.g.*, particulate matter) near roof or side vents are considered ''exposed''. Likewise, visible ''track out'' (*i.e.*, pollutants carried on the tires of vehicles) or windblown raw materials are deemed ''exposed.''

EPA received a comment requesting an allowance under the ''no exposure'' provision for industrial facilities with several outfalls at a site where some, but not all of the outfalls drain non-exposed areas. The commenter provided an example of an industrial facility that has 5 outfalls draining different areas of the site, where two of those outfalls drain areas where industrial activities or materials are not exposed to storm water. The comment requested that the facility in this example be allowed to submit a ''no exposure'' certification in order to be relieved of permitting obligations for discharges from those two outfalls.

EPA agrees, but the comment would be implemented on an outfall-by-outfall basis in the permitting process, not through the ''no exposure'' exclusion. The ''no exposure'' provision was developed to allow exclusion from permitting of discharges from entire industrial facilities (except construction), based on a claim of ''no exposure'' for all areas of the facility where industrial materials or activities occur. Where exposure to industrial materials or activities exist at some but not all areas of the facility, the ''no exposure'' exclusion from permitting is not allowed because permit coverage is still required for storm water discharges from the exposed areas. Relief from permit requirements for outfalls draining non-exposed areas should be addressed through the permit process, in coordination with the permitting authority. Most NPDES general permits for storm water discharge provide enough flexibility to allow minimal or no requirements for non-exposed areas at industrial facilities. If the permitting authority determines that additional flexibility is needed for this scenario, the permits could be modified as necessary.

K. Public Involvement/Public Role

The Phase II FACA Subcommittee discussed the appropriate role of the public in successful implementation of a municipal storm water program. EPA believes that an educated and actively involved public is essential to a successful municipal storm water program. An educated public increases program compliance from residents and businesses as they realize their individual and collective responsibility for protecting water resources (*e.g.,* the residents and businesses could be subject to a local ordinance that prohibits dumping used oil down storm sewers). Finally, the program is also more likely to receive public support and participation when the public is actively involved from the program's inception and allowed to participate in the decision making process.

In a time of limited staff and financial resources, public volunteers offer diverse backgrounds and expertise that may be used to plan, develop, and implement a program that is tailored to local needs (*e.g.,* participate in public meetings and other opportunities for input, perform lawful volunteer monitoring, assist in program coordination with other preexisting and related programs, aid in the development and distribution of educational materials, and provide public training activities). The public's participation is also useful in the areas of information dissemination/education and reporting of violators, where large numbers of community members can be more effective than a few regulators.

The public can also petition the NPDES permitting authority to require an NPDES permit for a discharge composed entirely of storm water that contributes to a violation of a water quality standard or is a significant contributor of pollutants to waters of the United States. In evaluating such a petition, the NPDES permitting authority is encouraged to consider the set of designation criteria developed for the evaluation of small MS4s located outside of an urbanized area in places with a population of at least 10,000 and a population density of 1,000 or more. Furthermore, any person can protect water bodies by taking civil action under section 505 of the CWA against any person who is alleged to be in violation of an effluent standard or permit condition. If civil action is taken, EPA encourages citizen plaintiffs to resolve any disagreements or concerns directly with the parties involved, either informally or through any available alternative dispute resolution process.

EPA recognizes that public involvement and participation pose challenges. It requires a substantial initial investment of staff and financial resources, which could be very limited. Even with this investment, the public might not be interested in participating. In addition, public participation could slow down the decision making process. However, the benefits are numerous.

EPA encourages members of the public to contact the NPDES permitting authority or local MS4s operator for information on the municipal storm water program and ways to participate. Such information may also be available from local environmental, nonprofit and industry groups.

Some commenters stressed the need to suggest to the public that they have a responsibility to fund the municipal storm water program. While EPA believes it is important that the program be adequately funded, today's rule does not address appropriate mechanisms or levels for such funding.

EPA received comments expressing concern that considerable public involvement requirements could result in increased litigation. EPA is not convinced there is a correlation between meaningful public education programs and any increased probability of litigation.

Finally, EPA received comments stating that the Agency should not en courage volunteer monitoring unless proper procedures are followed. EPA agrees. EPA encourages only lawful monitoring, *i.e.*, obtaining the necessary approval if there is any question about lawful access to sites. Moreover, as a matter of good practice and to enhance the validity and usefulness of the results, any party, public or private, conducting water quality monitoring is encouraged to use appropriate quality control procedures and approved sampling and analytic methods.

L. Water Quality Issues

1. Water Quality Based Effluent Limits

In addition to technology based requirements, all point source discharges of industrial storm water are subject to more stringent NPDES permitting requirements when necessary to meet water quality standards. CWA sections 402(p)(3)(A) and 301(b)(1)(C). For municipal separate storm sewers, EPA or the State may determine that other permit provisions (*e.g.* one of the minimum measures) are appropriate to protect water quality and, for discharges to impaired waters, to achieve reasonable further progress toward attainment of water quality standards pending implementation of a TMDL. CWA section 402(p)(3)(B)(iii). See *Defenders of Wildlife, et al. Browner,* No. 98–71080 (9th cir., August 11, 1999). Discharges of storm water also must comply with applicable antidegradation policies and implementation methods to maintain and protect water quality. 40 CFR 131.12. Section 122.34(a) emphasizes this point by specifically noting that a storm water management program designed to reduce the discharge of pollutants from the storm sewer system ''to the maximum extent practicable'' is also designed to protect water quality.

Permits issued to non-municipal sources of storm water must include water quality-based effluent limits where necessary to meet water quality standards.

Commenters challenged EPA's interpretation of the CWA as requiring water quality-based effluent limits for MS4s when necessary to protect water quality. Commenters asserted that CWA 402(p)(3)(B), which addresses permit requirements for municipal discharges, limits the scope of municipal program requirements to an effective prohibition on non-storm water discharges to a separate storm sewer and to controls which reduce pollutants to the ''maximum extent practicable, including management practices, control techniques and system design and engineering methods.'' They asserted that the final rule should clarify that neither numeric nor narrative water quality-based limits are appropriate or authorized for MS4s.

EPA disagrees that section 402(p)(3) divests permitting authorities of the tools necessary to issue permits to meet water quality standards. Section 402(p)(3)(B)(iii) specifically preserves the authority for EPA or the State to include other provisions determined appropriate to reduce pollutants in order to protect water quality. *Defenders of Wildlife,* slip op. at 11688. Small MS4s regulated under today's rule are designated under CWA 402(p)(6) ''to protect water quality.''

Commenters argued that water quality standards, particularly numeric criteria, were not designed to address storm water discharges. The episodic nature and magnitude of storm water events, they argue, make it impossible to apply the ''end of pipe'' compliance assessment approach, for example, in the development of water quality based effluent limits.

EPA's disagrees with the commenters arguments about the inability of water quality criteria to address high flow conditions. Today's final rule does, however, address the concern that numeric effluent limits will necessitate end of pipe treatment and the need to provide a workable alternative.

Today's rule was developed under the approach outlined in the Interim Permitting Policy for Water Quality-Based Effluent Limitations in Storm Water Permits, issued on August 1, 1996. 61 FR 43761 (November 26, 1996) (the ''Interim Permitting Policy''). EPA intends to issue NPDES permits consistent with the Interim Permitting Policy, which provides as follows:

In response to recent questions regarding the type of water quality-based effluent limitations that are most appropriate for NPDES storm water permits, EPA is adopting an interim permitting approach for regulating wet weather storm water discharges. Due to the nature of storm water discharges, and the typical lack of information on which to base numeric water quality-based effluent limitations (expressed as concentration and mass), EPA will use an interim permitting approach for NPDES storm water permits.

''The interim permitting approach uses best management practices (BMPs) in first-round storm water permits, and expanded or better-tailored BMPs in subsequent permits, where necessary, to provide for the attainment of water quality standards. In cases where adequate information exists to develop more specific conditions or limitations to meet water quality standards, these conditions or limitations are to be incorporated into storm water permits, as necessary and appropriate. This interim permitting approach is not intended to affect those storm water permits that already include appropriately derived numeric water quality-based effluent limitations. Since the interim permitting approach only addresses water quality-based effluent limitations, it also does not affect technology-based effluent limitations, such as those based on effluent limitations guidelines or developed using best professional judgment, that are incorporated into storm water permits.

''Each storm water permit should include a coordinated and cost-effective monitoring program to gather necessary information to determine the extent to which the permit provides for attainment of applicable water quality standards and to determine the appropriate conditions or limitations of subsequent permits. Such a monitoring program may include ambient monitoring, receiving water assessment, discharge monitoring (as needed), or a combination of monitoring procedures designed to gather necessary information.

''This interim permitting approach applies only to EPA; however, EPA also encourages authorized States and Tribes to adopt similar policies for storm water permits. This interim permitting approach provides time, where necessary, to more fully assess the range of issues and possible options for the control of storm water discharges for the protection of water quality. This interim permitting approach may be modified as a result of the ongoing Urban Wet Weather Flows Federal Advisory Committee policy dialogue on this subject.''

One commenter challenged the Interim Permitting Policy on a procedural basis, arguing that it was published without opportunity for public notice and comment. In response, EPA notes that the Policy was included verbatim and made available for public comment in the proposal to today's final rule. Prior to that proposal, the Agency defended the application of the Policy on a case-by-case basis in individual permit proceedings. Moreover, the essential elements of the Policy—that narrative effluent limitations are the most appropriate form of effluent limitations for storm water dischargers from municipal sources—was inherent in § 122.34(a) of the proposed rule, and was the subject of extensive public comment. In any event, the Policy does not constitute a binding obligation. It is policy, not regulation.

Consistent with the recognition of data needs underlying the Policy, EPA will evaluate the small MS4 storm water regulations after the second round of permit issuance. Section 122.34(e)(2) of today's rule expressly provides that for the interim ten-year period, ''EPA strongly recommends that until the evaluation of the storm water program in § 122.37, no additional requirements beyond the minimum control measures be imposed on regulated small MS4s without the agreement of the operator of the affected small MS4, except where an approved TMDL or equivalent analysis provides adequate information to develop more specific measures to protect water quality.'' This approach addresses the concern for protecting water resources from the threat posed by storm water discharges with the important qualification that there must be adequate information on the watershed or a specific site as a basis for requiring tailored storm water controls beyond the minimum control measures. As indicated, the Interim Permitting Policy has several important limitations—it does not apply to technology-based controls or to sources that already have numeric end of pipe effluent limitations. EPA encourages authorized States and Tribes to adopt policies similar to the Interim Permitting Policy when developing storm water discharge programs. For a discussion of appropriate monitoring activities, see Section H.3.d., Evaluation and Assessment.

Where a water quality analysis indicates there is a need and basis for deriving water quality-based effluent limits in NPDES permits for storm water discharges regulated under today's rule, EPA believes that most of these cases would be satisfied by narrative effluent

limitations that require the implementation of BMPs. NPDES permit limits will in most cases continue to be based on the specific approach outlined in today's rule for the implementation of BMPs as the most appropriate form of effluent limitation to satisfy technology and water quality-based requirements. See § 122.34(a). For storm water management plans with existing BMPs, this may require further tailoring of BMPs to address the pollutant(s) of concern, the nature of the discharge and the receiving water. If the permitting authority determines that, through implementation of appropriate BMPs required by the NPDES storm water permit, the discharge has the necessary controls to provide for attainment of water quality standards, additional controls are not needed in the permit. Conversely, if a discharger (MS4, industrial or construction) fails to adopt and implement adequate BMPs, the permittee and/or the permitting authority should consider a different mix of BMPs or more specific conditions to ensure water quality protection.

Some commenters observed that there was no evidence from the experience of storm water dischargers regulated under the existing NPDES storm water program, or from studies or reports that allegedly support EPA's position, that implementation of BMPs to satisfy the six minimum control measures would meet applicable water quality standards for a regulated small MS4. In response, EPA acknowledges that the six minimum measures are intended to implement the statutory requirement to control discharges to the maximum extent practicable, and they may not result in the attainment of water quality standards in all cases. The control measures do, however, focus on and address well-documented threats to water quality associated with storm water discharges. Based on the collective expertise of the FACA Sub-committee, EPA believes that implementation of the six minimum measures will, for most regulated small MS4s, be adequate to protect water quality, and for other regulated small MS4s will substantially reduce the adverse impacts of their discharges on water quality.

Some commenters asserted that analyses of existing water quality criteria suggest that numeric criteria for aquatic life may be overprotective if applied to storm water discharges. These comments maintained that an approach that prohibits exceedance of applicable water quality criteria is unworkable. Various commenters recommended wet weather specific criteria, variances to the criteria during wet weather events, and seasonal designated uses. Other commenters noted that water quality-based effluent limits in NPDES permits have traditionally been developed based on dry weather flow conditions (*e.g.*, assuming critical low-flow conditions in the receiving water to ensure protection of aquatic life and human health). Wet weather discharges, however, typically occur under high-flow conditions in the receiving water. Assumptions regarding mass balance equations and size of mixing zones may also not be pertinent during wet weather.

EPA acknowledges the need to devise a regulatory program that is both flexible enough to accommodate the episodic nature, variability and volume of wet weather discharges and prescriptive enough to ensure protection of the water resource. EPA believes that wet weather discharges can be adequately addressed in the existing regulations through refining designated uses and assigning criteria that are tailored to the level of water quality protection described by the refined designated use.

EPA believes that lack of precision in assigning designated uses and corresponding criteria by States and Tribes, in many cases may result in application of water quality criteria that may not appropriately match the intended condition of the water body. States and Tribes have frequently designated uses without regard to site-specific wet weather conditions. Because certain uses (swimming, for example) might not exist during high-intensity storm events or in the winter, States may factor such climatic conditions and seasonal uses into their use designations with appropriate analyses. This would acknowledge that a lower level of control, at lower compliance cost, would be appropriate to protect that use. Before modifying any designated use, however, States would need to evaluate the effect of less stringent water quality criteria on protecting other uses, including any threatened or endangered species, drinking water supplies and downstream uses. EPA will further evaluate these issues in the context of the Water Quality Standards Regulation, Advance Notice of Proposed Rule Making (ANPRM), 63 FR, 36742, July 7, 1998.

One of the major themes presented by EPA in the ANPRM is that refinement in use designations and tailoring of water quality criteria to match refined use designations is an important future direction of the water quality standards program. In assigning criteria to protect general use classifications, a State or Tribe must ensure that the criteria are sufficiently protective to safeguard the full range of waters of the State, *i.e.*, criteria would be based on the most sensitive use. This approach has been disputed, especially for aquatic life uses, where evidence suggests that the general use criteria will require controls more stringent than needed to protect the existing or potential aquatic life community for a specific water body. EPA recognizes that there is a growing need to more precisely tailor use descriptions and criteria to match site-specific conditions, ensuring that uses and criteria provide an appropriate level of protection, which, to the extent possible, are not overprotective. EPA is engaged in an ongoing evaluation of its regulations in this area through the ANPRM effort. At the same time, EPA continues to encourage States and Tribes to review the applicability of the designated uses and associated criteria using existing provisions in the water quality standards regulation.

2. Total Maximum Daily Loads and Analysis To Determine the Need for Water Quality-Based Limitations

The development and implementation of total maximum daily loads (TMDLs) provide a link between water quality standards and effluent limitations. CWA section 303(d) requires States to develop TMDLs to provide more stringent water quality-based controls when technology-based controls are inadequate to achieve applicable water quality standards. A TMDL is the sum of the individual wasteload allocations for point sources and load allocations for nonpoint sources, with consideration for natural background conditions. A TMDL quantifies the maximum allowable loading of a pollutant to a water body and allocates this maximum load to contributing point and nonpoint sources so that water quality criteria will not be exceeded and designated uses will be protected. A TMDL also includes a margin of safety to account for uncertainty about the relationship between pollutant loads and water quality.

Today's final rule refers to TMDLs in several provisions. For the purpose of today's rule, EPA relies on the component of the TMDL that evaluates existing conditions and allocates loads. For discharges to waters that are not impaired and for which a TMDL has not been developed, today's rule also refers to an ''equivalent analysis.'' The discussion that follows uses the term ''TMDL'' for both.

Under revised § 122.26(a)(9)(i)(C), the permitting authority may designate

storm water discharges that require NPDES permits based on TMDLs that address the pollutants of concern. For storm water discharges associated with small construction activity, § 122.26(b)(15)(i)(B) provides a waiver provision where it may be determined that storm water controls are not needed based on TMDLs that address sediment and any other pollutants of concern. The NPDES permitting authority may waive requirements under the program for certain small MS4s within urbanized areas serving less than 1,000 persons provided that, if the small MS4 discharges any pollutant that has been identified as a cause of impairment of a water body into which it discharges, the discharge is in compliance with a wasteload allocation in a TMDL for the pollutant of concern. The permitting authority may also waive requirements for MS4s in urbanized areas serving between 1,000 and 10,000 persons, if the permitting authority determines that storm water controls are not needed, as provided in § 123.35(d)(2). See § 122.32(c).

Under CWA section 303(d), States identify which of their water bodies need TMDLs and rank them in order of priority. Generally, once a TMDL has been completed for one or more pollutants in a water body, a wasteload allocation for each point source discharging the pollutant(s) is implemented as an enforceable condition in the NPDES permit. Regulated small MS4s are essentially like other point source discharges for purposes of the TMDL process.

A TMDL and the resulting wasteload allocations for pollutant(s) of concern in a water body may not be available because the water body is not on the State's 303(d) list, the TMDL has not yet been completed, or the TMDL did not include specific pollutants of concern. In these cases, the permitting authority must determine whether point sources discharge pollutant(s) in amounts that cause, have the reasonable potential to cause, or contribute to excursions above State water quality standards, including narrative water quality criteria. This so-called ''reasonable potential'' analysis is intended to determine whether and for what pollutants water quality based effluent limits are required. The analysis is, in effect, a substitute for a similar determination that would be made as part of a TMDL, where necessary. When ''reasonable potential'' exists, regulations at § 122.44(d) require a water quality-based effluent limit for the pollutant(s) of concern in NPDES permits. The water quality-based effluent limits may be narrative requirements to implement BMPs or, where necessary, may be numeric pollutant effluent limitations.

Commenters, generally from the regulated community, objected that, due to references to the need to develop a program ''to protect water quality'' and to additional NPDES permit requirements beyond the minimum control measures based on TMDLs or their equivalent, regulated small MS4s will be subject to uncertain permit limitations beyond the six minimum control measures. Commenters also asserted that through the imposition of a wasteload allocation under a TMDL in impaired water bodies, there is a likelihood that unattainable, yet enforceable narrative and numeric standards will be imposed on regulated small MS4s.

As is discussed in the preceding section, NPDES permits must include any more stringent limitations when necessary to meet water quality standards. However, even if a regulated small MS4 is subject to water quality based effluent limits, such limits may be in the form of narrative effluent limitations that require the implementation of BMPs. As discussed earlier, EPA has adopted the Interim Permitting Policy and incorporated it in the development of today's rule to recognize the appropriateness of BMP-based limits developed on a case-by-case basis.

EPA formed a Federal Advisory Committee to provide advice to EPA on identifying water quality-limited water bodies, establishing TMDLs for them as appropriate, and developing appropriate watershed protection programs for these impaired waters in accordance with CWA section 303(d). Operating under the auspices of the National Advisory Council for Environmental Policy and Technology (NACEPT), the committee produced its *Report of the Federal Advisory Committee on the Total Maximum Daily Load (TMDL) Program* (July 1998). EPA recently published a proposed rule to implement the Report's recommendations (64 FR 46012, August 23, 1999).

3. Anti-Backsliding

In general, the term ''anti-backsliding'' refers to statutory provisions at CWA sections 303(d)(4) and 402(o) and regulatory provisions at 40 CFR 122.44(l). These provisions prohibit the renewal, reissuance, or modification of an existing NPDES permit that contain effluent limits, permit terms, limitations and conditions, or standards that are less stringent than those established in the previous permit. There are also exceptions to this prohibition known as ''antibacksliding exceptions.''

The issue of backsliding from prior permit limits, standards, or conditions is not expected to initially apply to most storm water dischargers designated under today's proposal because they generally have not been previously authorized by an NPDES permit. However, the backsliding prohibition would apply if a storm water discharge was previously covered under another NPDES permit. Also, the backsliding prohibition could apply when an NPDES storm water permit is reissued, renewed, or modified. In most cases, however, EPA does not believe that these provisions would restrict revisions to storm water NPDES permits.

One commenter questioned whether, if BMPs implemented by a regulated small MS4 operator fail to produce results in removal of pollutants and the permittee attempts to substitute a more effective BMP, the small MS4 operator could be accused of violating the anti-backsliding provisions and also be exposed to citizen lawsuits. In response, EPA notes that in such circumstances the MS4's permit has not changed and, therefore, the prohibition against backsliding is not applicable. Further, any change in the mix of BMPs that was intended to be more effective at controlling pollutants would not be considered backsliding, even if it did not include all of the previously implemented BMPs.

4. Water Quality-Based Waivers and Designations

Several sections of today's final rule refer to water quality standards in identifying those storm water discharges that are and are not required to be permitted under today's rule. As noted in § 122.30 of today's rule, CWA section 402(p)(6) requires the designation of municipal storm water sources that need to be regulated to protect water quality and the establishment of a comprehensive storm water program to regulate these sources. Requirements applicable to certain municipal sources may be waived based on the absence of demonstrable water quality impacts. Section 122.32(c). The section 402(p)(6) mandate to protect water quality also provides the basis for regulating discharges associated with small construction. See also § 122.26(b)(15)(i). Further, today's rule carries forward the existing authority for the permitting authority to designate sources of storm water discharges based upon water quality considerations. Section 122.26(a)(9)(i)(C) and (D).

As is discussed above in sections II.H.2.e (for small MS4s) and II.I.1.b.ii

(for small construction), the requirements of today's rule may be waived based on wasteload allocations that are part of ''total maximum daily loads'' (TMDLs) that address the pollutants of concern or, in the case of small construction and municipalities serving between 1,000 and 10,000 persons, the equivalents of TMDLs. One commenter stated that waivers would allow exemptions to the technology based requirements and would thus be inconsistent with the two-fold approach of the CWA (a technology based minimum and a water quality based overlay). EPA acknowledges that waivers are not allowed for other technology-based requirements under the CWA. A more flexible approach is allowed, however, for sources designated for regulation under 402(p)(6) to protect water quality. For such sources EPA may allow a waiver where it is demonstrated that an individual source does not present the threat to water quality that was the basis for EPA's designation.

III. Cost-Benefit Analysis

EPA has determined that the range of the rule's benefits exceeds the range of regulatory costs. The estimated rule costs range from $847.6 million to $981.3 million annually with corresponding estimated monetized annual benefits which range from $671.5 million to $1.628 billion, expected to exceed costs.

The rule's cost and benefit estimates are based on an annual comparison of costs and benefits for a representative year (1998) in which the rule is implemented. This differs from the approach used for the proposed rule which projected cost and benefits over three permit terms. EPA has chosen to use the current approach because it determined that the ratio of annual benefits and costs would not change significantly over time. Moreover, because there is not an initial outlay of capital costs with benefits accruing in the future (*i.e.*, benefits and costs are almost immediately at a steady state), it is not necessary to discount costs in order to account for a time differential.

EPA developed detailed estimates of the costs and benefits of complying with each of the incremental requirements imposed by the rule. The Agency used two approaches, a national water quality model and national water quality assessment, to estimate the potential benefits of the rule. Both approaches show that the benefits are likely to exceed costs.

These estimates, including descriptions of the methodology and assumptions used, are described in detail in the *Economic Analysis of the Final Phase II Rule,* which is included in the record of this rule making. Exhibit 3 summarizes costs and benefits associated with the basic elements of today's rule.

EXHIBIT 3.—COMPARISON OF ANNUAL COMPLIANCE COST AND BENEFIT ESTIMATES [1]

Monetized benefits	National water quality model (millions of 1998 dollars)	National water quality assessment (millions of 1998 dollars)
Municipal Minimum Measures		$131.0–$410.2
Controls for Construction Sites		$540.5–$686.0
Total Annual Benefits	$1,628.5	$671.5–$1,096.2

Costs	Millions of 1998 dollars [2]
Municipal Minimum Measures	$297.3
Controls/Waivers for Construction Sites	$545.0–$678.7
Federal/State Administrative Costs	$5.3
Total Annual Costs	$847.6–$981.31

[1] National level benefits are not inclusive of all categories of benefits that can be expected to result from the regulation.
[2] Total may not add due to rounding.

A. Costs

1. Municipal Costs

Initially, to determine municipal costs for the proposed rule, EPA used anticipated expenditure data included in permit applications from a sample of 21 Phase I MS4s. Certain commenters criticized the Agency for using anticipated expenditures because they could be significantly different from the actual expenditures. These commenters suggested that the Agency use the actual cost incurred by the Phase I MS4s. Other comments stated that because the Phase I MS4s, in general, are large municipalities, they may not be representative of the Phase II MS4s for estimating regulatory costs. Finally, one commenter noted that the sample of 21 municipalities used to project cost was relatively small.

To address the concerns of the commenters, EPA utilized a National Association of Flood and Stormwater Management Agencies (NAFSMA) survey of the Phase II community to obtain incremental cost estimates for Phase II municipalities. Using the list of potential Phase II designees published in the **Federal Register** (63 FR 1616), NAFSMA contacted more than 1,600 jurisdictions. The goal of the survey was to solicit information from those communities about the proposed Phase II NPDES storm water program. Several of the survey questions corresponded directly to the minimum measures required by the Phase II rule. One hundred twenty-one surveys were returned to NAFSMA and were used to develop municipal costs.

Using the NAFSMA information, EPA estimated average annual per household program costs for automatically designated municipalities. EPA also estimated an average annual per household administrative cost for municipalities to address application, record keeping, and reporting requirements of the Rule. The total average per household cost of the rule is expected to $9.16 per household.

To determine potential national level costs for municipalities, EPA multiplied the number of households (32.5 million) by the per household cost ($9.16). EPA estimates the annual cost of the Phase II municipal program at $298 million.

As an alternative method, and point of comparison, to the NAFSMA-based approach, EPA reviewed actual expenditures reported from 35 Phase I MS4s. The Agency targeted these 35 Phase I MS4s because they had participated in the NPDES program for

nearly one permit term, were smaller in size and had detailed data reflecting their actual program implementation costs. Of the 35 MS4s, appropriate cost data was only available for 26 of those MS4s. EPA analyzed the expenditure data and identified the relevant expenditures, excluding costs presented in the annual reports unrelated to the requirements of the Rule. The cost range and annual per household program costs of $9.08 are similar to those found using the NAFSMA survey data.

2. Construction Costs

In order to estimate the rule's construction-related cost on a national level (the soil and erosion controls (SEC) requirements of the rule and the potential impacts of the post-construction municipal measure on construction), EPA estimated a per site cost for sites of one, three, and five acres and multiplied these costs by the total number of estimated Phase II construction starts across these size categories.

To estimate the percentage of starts subject to the soil and erosion control requirements between 1 and 5 acres, with respect to each category of building permits (residential, commercial, *etc.*), EPA initially used data from Prince George's County (PGC), Maryland, and applied these percentages to national totals. In the proposal, EPA recognized that the PGC data may not be representative of the entire country and requested data that could be used to develop better estimates of the number of construction sites between 1 and 5 acres. EPA did not receive any substantiated national data from commenters.

In view of the unavailability of national data from commenters, EPA made extensive efforts to collect construction site data around the country. The Agency contacted more than 75 municipalities. EPA determined that 14 of the contacted municipalities had useable construction site data. Using data from these 14 municipalities, EPA developed an estimate of the percentage of construction starts on one to five acres. EPA then multiplied this percentage by the number of building permits issued nationwide to determine the total number of construction starts occurring on one to five acres. Finally, to isolate the number of construction starts incrementally regulated by Phase II, EPA subtracted the number of activities regulated under equivalent programs (*e.g.*, areas covered by the Coastal Zone Act Reauthorization Amendments of 1990, and areas covered by equivalent State level soil and erosion control requirements). Ultimately, EPA estimated that 110,223 construction starts would be incrementally covered by the rule annually.

EPA then used standard cost estimates from *Building Construction Cost Data* and *Site Work Landscape Cost Data* (R.S. Means, 1997a and 1997b) to estimate construction BMP costs for 27 model sites in a variety of typical site conditions across the United States. The model sites included three different site sizes (one, three and five acres), three slope variations (3%, 7%, and 12%), and three soil erosivity conditions (low, medium, and high). EPA chose BMP combinations appropriate to the model site conditions. Based on the assumption that any combination of site factors is equally likely to occur in a given site, EPA developed average cost of sediment and erosion control for all model sites. EPA estimated that, on average, BMPs for a 1 acre site will cost $1,206, for a 3 acre site $4,598 and for a 5 acre site $8,709.

EPA then estimated administrative costs per construction site for the following elements required under the rule: Submittal of a notice of intent for permit coverage; notification to municipalities; development of a storm water pollution prevention plan; record retention; and submittal of a notice of termination. EPA estimated the average total administrative cost per site to be $937.

EPA also considered the cost implications of NPDES permit authorities waiving the applicability of requirements to storm water discharges from small construction sites based on two different criteria involving water quality impact and low rainfall. EPA received comments stating that a waiver would require a significant investment in training or acquisition of a consultant. Based on comments received, EPA eliminated one of the waiver conditions involving low soil loss threshold because it necessitated use of the Revised Universal Soil Loss Equation which could require extensive technical expertise.

Based on the opinions of construction industry experts, EPA estimates that 15 percent of the construction sites that would otherwise be covered by today's rule will be eligible to receive waivers. Therefore, the Agency has excluded 15 percent of the construction sites when deriving costs of sediment and erosion control. The average cost for sites to qualify for the waiver is expected to be $34 per site. The construction cost analysis for the proposed rule did not include any costs for the preparation and submission of waiver applications because EPA believed those costs would be negligible. However, in response to public comments, EPA has estimated these potential costs.

EPA has also estimated the potential costs for construction site operators to implement the post-construction minimum measure. These are costs that may be incurred by construction site operators if the MS4 chooses to meet the post-construction minimum measure by requiring on-site structural, site-by-site control of post-construction runoff. Municipalities may select from an array of structural and non-structural options in implementing this measure, so the potential costs to construction operators is uncertain. Nonetheless, EPA developed average annual BMP costs for sites of one, three, five and seven acres. EPA's analysis accounted for varying levels of imperviousness that characterize residential, commercial, and institutional land uses. Nationwide, these costs are expected to range from $44 million to $178 million annually.

Finally, to establish national incremental annual costs for Phase II construction starts, EPA multiplied the total costs of compliance for the chosen site size categories by the total number of Phase II construction starts and added post-construction costs. EPA estimates the annual compliance cost to range from $545 million to $678.7 million.

B. Quantitative Benefits

In the Economic Analysis for the proposed rule, a ''top-down'' approach was used to estimate economic benefits. Under this approach, the combined economic benefits for wet weather programs were estimated first, and then were divided among various water programs on the basis of expert opinion. As a result, the benefits estimates for an individual program were rather uncertain. Moreover, this approach was inconsistent with the approach used to estimate the cost of the proposed storm water rule, which was developed using municipal-based and cost-based data to develop ''bottom-up'' costs. Therefore, EPA decided to use a ''bottom-up'' approach for estimating benefits of the Phase II rule. To adequately reflect the quantifiable benefits of the rule, EPA used two different methods: (1) National Water Quality Model and (2) National Water Quality Assessment.

To monetize benefits in both approaches, the Agency applied Carson and Mitchell's (1993) estimates of household willingness-to-pay (WTP) for water quality improvement to estimates of waters impaired by storm water discharges. Carson and Mitchell's 1993 study reports the results of their 1983 national survey of WTP for incremental

improvements in fresh water quality. Carson and Mitchell estimate the WTP for three minimum levels of fresh water quality: boatable, fishable, and sizable. EPA adjusted the WTP amounts to account for inflation, growth in real per capita income, and increased attitudes towards pollution control. The adjusted WTP amounts for improvements in fresh water quality are $210 for boatable, $158 for fishable, and $177 for sizable. A brief summary of the national water quality model and national water quality assessment approaches follow.

1. National Water Quality Model

One approach EPA used to estimate the benefits of the Phase II municipal and construction site controls was the National Water Pollution Control Assessment Model (NWPCAM). NWPCAM estimates benefits of the storm water program at the national level, including the impact on small streams. This model estimates water quality and the resultant use support for the 632,000 miles of rivers and streams in the USEPA Reach File Version 1 (RF1), which covers the continental United States. The model analyzes water quality changes by stream reach. The parameters modeled in the NWPCAM are biological oxygen demand (BOD), total suspended solids (TSS), dissolved oxygen (DO), and fecal coliforms (FC).

The model projects changes in water quality due to the Phase II municipal and construction site controls. To calculate the economic benefits of change in water quality, the number of households in the proximity of the stream reach are determined, by overlaying the model results on the 1990 Census of Populated Places and Minor Civil Divisions, and updating the population to 1998. Economic benefits are calculated using the Carson and Mitchell WTP values. The benefits are separately estimated for local and non-local waters on the basis of WTP values and proximity to water quality changes.

The value of the change in use support for local waters is greater than the value of the non-local waters because of the opportunity to use local waters by the local population. This model assumes that if improvement occurs in waters that are not close to population centers the economic value is lower. Therefore, benefits are estimated for local and non-local waters separately. This assumption is based on Carson and Mitchell's survey which asked respondents to apportion each of their stated WTP values between achieving the water quality goals in their own State and achieving those goals in the nation as a whole. On average, respondents allocated 67% of their values to achieving in-State water quality goals and the remainder to the nation as a whole. Carson and Mitchell argue that for valuing local water quality changes 67% is a reasonable upper bound for the local multiplier and 33% for the non-local water quality changes. For the purposes of this analysis, the locality is defined as urban sites and associated populations linked into the NWPCAM framework. Using this methodology, the total monetized benefits of Phase II control of urban and construction site runoff is estimated to be $1.628 billion per year. The local and non-local benefits due to Phase II controls are presented in Exhibit 4.

EXHIBIT 4.—LOCAL AND NON-LOCAL BENEFITS ESTIMATES DUE TO PHASE II CONTROLS NATIONAL WATER QUALITY MODEL ESTIMATE

Use support	Local benefits ($million/yr)	Non-local benefits [1] ($million/yr)	Total benefits ($million/yr)
Swimming, Fishing, and Boating	306.20	60.60	366.80
Fishing and Boating	395.10	51.90	447.00
Boating	700.10	114.60	814.70
Total	1401.40	227.10	1628.50

[1] To estimate non-local willingness to pay per household, the 33% of willingness is multiplied by the fraction of previously impaired national waters (in each use category) that attain the beneficial use as a result of the Phase II rule. To estimate the aggregate non-local benefits, non-local willingness to pay is multiplied with the total number of households in the US.

While the numbers of miles that are estimated to change their use support are small, the benefits estimates are quite significant. This is because urban runoff and, to a large extent, construction activity occurs where the people actually reside and the water quality changes mostly occur close to these population centers. NWPCAM indicates that changes in pollution loads have the most effect immediately downstream of pollution changes. As a result, the aggregate WTP is large because large numbers of households in these population centers are associated with the local waters that reflect improvement in designated use support.

2. National Water Quality Assessment

EPA also estimated benefits of the Phase II Storm Water program using the 1998 National Water Quality Inventory (305(b)) Report to Congress, rather than the NWPCAM as a basis for estimating impairment addressed by the rule. The Water Quality Assessment method separately estimates benefits associated with improvements to fresh water, marine water and construction site controls, and then aggregates these separate categories into an estimate of total annual benefits.

a. Municipal Measures

i. Fresh Waters Benefits

In order to develop estimates for the potential value of the municipal measures (except storm water runoff controls for construction sites), EPA applied Carson & Mitchell WTP values to estimated existing and projected future fresh water impairment. Carson & Mitchell did not evaluate marine waters, so only fresh water values were available from their research. Even though the Carson and Mitchell estimates apply to all fresh water, it is not clear how these values would be apportioned among rivers, lakes, and the Great Lakes. The 305(b) data indicate that lakes are the most impaired by urban runoff/storm sewers, followed closely by the Great Lakes, and then rivers. Therefore, EPA applied the WTP values to the categories separately and assumed that the higher resulting value for lakes represents the high end of the range (*i.e.*, assuming that lake impairment is more indicative of national fresh water impairment) and that the lower resulting value for impaired rivers represents the low end of a value range for all fresh waters (*i.e.*, assuming that river impairment is more indicative of national fresh water impairment). In addition, EPA estimated that the post-construction runoff

requirements of the municipal program might result in benefits of at least $16.8 million annually from avoided future runoff. The post-construction estimate significantly underestimates potential program benefits because it does not account for avoided hydrologic changes and resulting water quality impairment associated with increases in imperviousness from development and redevelopment. Summing the benefits across the water quality use support levels yields an estimate of benefits ranging from approximately $121.9 million to $378.2 million per year.

ii. Marine Waters Benefits

In addition to the fresh water benefits captured by the Carson and Mitchell study, EPA anticipates benefits as a result of improvements to marine waters. Sufficient methods have not been developed to quantify national-level benefits for commercial or recreational fishing. EPA used beach closure data and visitation estimates from its Beach Watch Program to estimate potential reductions in marine swimming visits due to storm water runoff contamination events in 1997. The estimated 86,100 trips that did not occur because of beach closures in coastal Phase II communities is a lower bound because it represents only those beaches that report both closures and visitation data. EPA estimates potential swimming benefits from the rule to be at least $2.1 million annually.

EPA developed an analysis of potential benefits associated with avoided health impacts from exposure to contaminants in storm sewer effluent. Based on a study of incremental illnesses found among people who swam within one yard of storm drains in Santa Monica Bay, EPA estimated a range of incremental illnesses (Haile *et al.*, 1996). Depending on assumptions made about number of exposures to contaminants and contaminant concentrations, benefits ranged from $7.0 million to $29.9 million annually.

b. Construction Benefits

The major pollutant resulting from construction activities is sediment. However, in addition to sediment, construction activities also yield pollutants such as pesticides, petroleum products, and solvents. Because circumstances will vary considerably from site to site, data is not available with which to develop estimates of benefits for each site and aggregate to obtain a national-level estimate.

In the proposed rule, EPA estimated the combined benefits of all wet weather programs, and then used expert opinions to allocate them to different individual programs. To eliminate the possible overlap between the benefits of the soil and erosion control requirements, municipal measures, and other wet weather storm water programs, EPA chose to use an approach in today's final rule that directly estimates the benefits of soil and erosion requirements.

A survey of North Carolina residents (Paterson *et al.*, 1993) indicated that households are willing to pay for erosion and sediment controls similar to those in today's rule. Based on income and other indicators, the values derived from the study are expected to be similar to values held in the rest of the country. Using the mean value of the willingness to pay of $25 per household, EPA projects annual benefits of the soil and erosion requirements to range from $540.5–$686 million.

c. Summary of Benefits From the National Water Quality Assessment

Total benefits from municipal measures and construction site controls are expected to range from $671.5 million to $1.1 billion per year, including benefits of approximately $13.7 million per year associated with small stream improvements. A summary of the potential benefits is presented in Exhibit 5.

As shown in Exhibit 5, it was not possible to monetize all categories of benefits using the WTP estimates. In particular, benefits for improving marine water quality such as fishing and passive use benefits are not included in the values used to estimate the potential benefits of the municipal minimum measures (excluding construction sites controls), and they are not estimated separately, because information is not currently available.

EXHIBIT 5.—POTENTIAL ANNUAL BENEFITS OF THE PHASE II STORM WATER RULE NATIONAL WATER QUALITY ASSESSMENT ESTIMATE

Benefit category	Annual WTP
Municipal Minimum Measures [1]	
Fresh Water Use and Passive Use [2]	$121.9–$378.2
Marine Recreational Swimming	$2.1
Human Health (Marine Waters)	$7.0–$29.9
Other Marine Use and Passive Use	(+)
Erosion and Sediment Controls for Construction Sites	
Fresh Water and Marine Use and Passive Use [3]	$540.5–$686
Total Phase II Program	
Total Use & Passive Use (Fresh Water and Marine)	>$671.5–>$1,096.2

+= positive benefits expected but not monetized.

[1] Includes water quality benefit of municipal programs, based on 80% effectiveness of municipal programs.

[2] Based on research by Carson and Mitchell (1993). Fresh water value only. Does not include commercial fishery, navigation, or diversionary (*e.g.* municipal drinking water cost savings or risk reductions) benefits. May not fully capture human health risk reduction or ecological values.

[3] Based on research by Paterson *et al.* (1993). Although the survey's description of the benefits of reducing soil erosion from construction sites included reduced dredging, avoided flooding, and water storage capacity benefits, these benefit categories may not be fully incorporated in the WTP values. Small streams may account for over 2% of total benefits.

C. Qualitative Benefits

There are additional benefits to storm water control that cannot be quantified or monetized. Thus, the current estimate of monetized benefits may understate the true value of storm water controls because it omits many ways in which society is likely to benefit from reduced storm water pollution, such as improved

aesthetic quality of waters, benefits to wildlife and to threatened and endangered species, cultural values, and biodiversity benefits.

A benefit that EPA did not monetize completely is the flood control benefits attributable to municipal storm water controls reducing downstream flooding, although flood control benefits associated with sediment and erosion control are already reflected to some extent in the construction benefits. Similarly, the Agency could not value the benefits from increased property value due to storm water controls reflected in the rule, even though a commenter suggested inclusion of these benefits in the estimates.

Moreover, while a number of commenters requested that EPA include ecological benefits, the Agency was not able to fully monetize these benefits. Urbanization usually increases the amount of sediment, nutrients, metals and other pollutants associated with land disturbance and development. Development usually not only results in a dramatic increase in the volume of water runoff, but also in a substantial decrease in that water's quality due to stream scour, runoff and dispersion of toxic pollutants, and oversiltation. These kinds of secondary benefits could not be fully reflected in the monetized benefits. EPA was able to only monetize the aquatic life support benefits for waters assumed to be impaired. Thus, only the aquatic life support benefits attributable to municipal controls, reflected through human satisfaction, are taken into account.

Reduced nutrient level is another benefit of the storm water control which is not fully captured by the economic analysis. High nutrient levels often lead to eutrophication of the aquatic system. The quality change in ecological sources as the result of storm water controls to reduce pollutants is not fully reflected in the present benefits.

D. National Economic Impact

Finally, the Agency determined that the rule will have minimal impacts on the economy or employment. This is because the final rule regulates small MS4s and construction sites under 5 acres, not the typical industrial plants or other non-construction activities that could directly impact production and thus those sectors of the economy.

Discussions with representatives within the construction industry indicate that construction costs will likely be passed on to buyers, thus not seriously affecting the housing industry directly. One commenter argued that the rule will have a negative employment effect because the builders will build fewer homes requiring less building materials as a result of the declining demand induced by the cost of the soil and erosion controls. EPA disagrees with this argument because the cost of the controls, as the percentage of the price of a median home, is negligible and will be passed on to final buyers.

Flexibility within the rule allows MS4s to tailor the storm water program requirements to their needs and financial position, minimizing impacts. For sedimentation and erosion controls on construction sites, the rule contemplates application of commonly used BMPs to reduce costs for the construction industry. Thus, the rule attempts to use existing practices to prevent pollution, which should minimize impacts on States, Tribes, municipalities and the construction industry.

Thus, EPA concludes that the effect of the rule, if any, on the national economy will be minimal. The benefits of today's rule more than offset any cost impacts on the national economy.

IV. Regulatory Requirements

A. Paperwork Reduction Act

The Office of Management and Budget (OMB) has approved some of the information collection requirements contained in this final rule (*i.e.* those found in 40 CFR 122.26(g) and 123.35(b)) under the provisions of the *Paperwork Reduction Act*, 44 U.S.C. 3501 *et seq.* and has assigned OMB control number 2040–0211.

The burden and costs described below are for the information collection, reporting, and record keeping requirements for the three year period beginning with the effective date of today's rule. Additional information collection requirements for regulated small MS4s and small construction sites will occur after this initial three year period and will be counted in a subsequent information collection requirement. The total burden of the information collection requirements for the first three years of this rule is estimated at 56,369 hours with a corresponding cost of $2,151,305 million annually. This burden and cost is for industrial facilities to complete and submit the no exposure certification, for NPDES-authorized States to process and review the no exposure certification, and for the NPDES-authorized States to develop designation criteria and assess additional MS4s outside of urbanized areas. Compliance with the applicable information collection requirements imposed under this rule are mandatory, pursuant to CWA section 402.

Exhibit 6 presents average annual burden and cost estimates for Phase II respondents for the first three years. Burden means the total time, effort, or financial resources expended by persons to generate, maintain, retain, disclose or provide information to or for a Federal agency. This includes the time needed to review instructions; develop, acquire, install, and utilize technology and systems for the purposes of collecting, validating, and verifying information, processing and maintaining information, and disclosing and providing information; adjust existing ways for complying with any previously applicable instructions and requirements; train personnel to be able to respond to a collection of information; search data sources; complete and review the collection of information; and transmit or otherwise disclose the information.

EXHIBIT 6.—AVERAGE ANNUAL BURDEN AND COST ESTIMATES FOR PHASE II RESPONDENTS

Information collection activity	A Respondents per year (projected) [1]	B Burden hours per respondent per year (predicted)	(A)×(B)=C Annual respondent burden hours (projected)	D Respondent labor cost ($/hr) (1998 $)	(C)×(D)=E Annual Cost ($) (projected)
Ind. No Expos. Facilities:[2]					
No Expos. Certification	36,377	1.0	36,377	44.35	1,613,320
Annual Subtotal			36,377		1,613,320
NPDES-Authorized States:[3]					
Designation of Addit. MS4s [4]	15	332.8	4,892	26.91	131,644

EXHIBIT 6.—AVERAGE ANNUAL BURDEN AND COST ESTIMATES FOR PHASE II RESPONDENTS—Continued

Information collection activity	A Respondents per year (projected) [1]	B Burden hours per respondent per year (predicted)	(A)×(B)=C Annual respondent burden hours (projected)	D Respondent labor cost ($/hr) (1998 $)	(C)×(D)=E Annual Cost ($) (projected)
No Exp. Cert. Proc. & Rev	30,200	0.5	15,100	26.91	406,341
Annual Subtotal			19,992		537,985
Annual Totals			56,369		2,151,305

Notes:

[1] Source: U.S. EPA, Office of Wastewater Management. Economic Analysis for the Storm Water Phase II Rule.

[2] The total number of potential no exposure respondents was divided by 5 to estimate an annual total. It was assumed that the annual number of respondents for the no exposure certification would be spread over the five year period the exclusion applies.

[3] The number of respondents in each category represents only those respondents located within the 44 NPDES-authorized States and Territories. The burden and cost estimates provided in this section are for the NPDES-authorized States in their role as the permitting authority for municipal designations and industrial no exposure.

[4] The number of respondents for this activity, 15, represents the number of NPDES-authorized States and Territories that must develop designation criteria and assess small MS4s located outside of an urbanized area for possible Phase II coverage divided by the three year ICR period.

Given the requirements of today's regulation, EPA believes there will be no capital startup and no operation and maintenance costs associated with information collection requirements of the rule.

The government burden associated with today's rule will impact State, Tribal, and Territorial governments (NPDES-authorized governmental entities) that have storm water program authority, as well as the federal government (*i.e.*, EPA), where it is the NPDES permitting authority. As of March 1999, 43 States and the Virgin Islands had NPDES authority.

The annual burden imposed upon authorized governmental entities (delegated States and the Virgin Islands) and the federal government for the next three years is estimated to be 19,992 hours ($537,985) and 4,087 hours ($115,948) respectively, for a total of 24,079 hours ($653,933). This estimate is based on the average time that governments will expend to carry out the following activities: designate additional MS4s (332.8 hours) and process and review ''no exposure'' certificates from industrial dischargers (0.5 hour).

Under the existing rule, storm water discharges from light industrial activities identified under § 122.26(b)(14)(xi) were exempted from the permit application requirements if they were not exposed to storm water. Today's rule expands the applicability of the ''no exposure'' exclusion to include all industrial activity regulated under § 122.26(b)(14) (except category (x), construction). The ''no exposure'' provision is applied through the use of a written certification process, thus representing a slight reporting burden increase for ''light'' industries with ''no exposure'.

In addition to the information collection, reporting, and record keeping burden for the next three years, today's rule contains information collection requirements that will not begin until three years or more from the effective date of today's rule. These information collection requirements were not included in the information collection request approved by OMB. EPA will submit these burden estimates for OMB approval when it submits ICR 2040–0211 to OMB for renewal in three years. The rule burdens for regulated small MS4s and small construction sites that will be included in the ICR renewal fall into three areas: application for an NPDES permit or submittal of waiver information, record keeping of storm water management activities, and submittal of reports to the permitting authority. There will also be an additional burden for the permitting authority to review this information.

An agency may not conduct or sponsor, and a person is not required to respond to a collection of information unless it displays a currently valid OMB control number. The OMB control numbers for EPA's regulations are listed in 40 CFR Part 9 and 48 CFR Chapter 15. EPA is amending the table in 40 CFR Part 9 of currently approved ICR control numbers issued by OMB for various regulations to list the first three years of information requirements contained in this final rule.

B. Executive Order 12866

Under Executive Order 12866, [58 FR 51,735 (October 4, 1993)] the Agency must determine whether the regulatory action is ''significant'' and therefore subject to OMB review and the requirements of the Executive Order. The Order defines ''significant regulatory action'' as one that is likely to result in a rule that may:

(1) have an annual effect on the economy of $100 million or more or adversely affect in a material way the economy, a sector of the economy, productivity, competition, jobs, the environment, public health or safety, or State, local, or tribal governments or communities;

(2) create a serious inconsistency or otherwise interfere with an action taken or planned by another agency;

(3) materially alter the budgetary impact of entitlements, grants, user fees, or loan programs or the rights and obligations of recipients thereof; or

(4) raise novel legal or policy issues arising out of legal mandates, the President's priorities, or the principles set forth in the Executive Order.

Pursuant to the terms of Executive Order 12866, it has been determined that this rule is a ''significant regulatory action''. As such, this action was submitted to OMB for review. Changes made in response to OMB suggestions or recommendations will be documented in the public record.

C. Unfunded Mandates Reform Act

Title II of the Unfunded Mandates Reform Act of 1995 (UMRA), Public Law 104–4, establishes requirements for Federal agencies to assess the effects of their regulatory actions on State, local, and tribal governments and the private sector. Under section 202 of the UMRA, EPA generally must prepare a written statement, including a cost-benefit analysis, for proposed and final rules with ''Federal mandates'' that may result in expenditures to State, local, and tribal governments, in the aggregate, or to the private sector, of $100 million or more in any one year. Before promulgating an EPA rule for which a

written statement is needed, section 205 of the UMRA generally requires EPA to identify and consider a reasonable number of regulatory alternatives and adopt the least costly, most cost-effective or least burdensome alternative that achieves the objectives of the rule. The provisions of section 205 do not apply when they are inconsistent with applicable law. Moreover, section 205 allows EPA to adopt an alternative other than the least costly, most cost-effective or least burdensome alternative if the Administrator publishes with the final rule an explanation why that alternative was not adopted.

EPA has determined that today's rule contains a Federal mandate that may result in expenditures of $100 million or more in any one year for both State, local, and tribal governments, in the aggregate, and the private sector. Accordingly, EPA has prepared under section 202 of the UMRA a written statement which is summarized below.

1. Summary of UMRA Section 202 Written Statement

EPA promulgates today's storm water regulation pursuant to the specific mandate of Clean Water Act section 402(p)(6), as well as sections 301, 308, 402, and 501. (33 U.S.C. sections 1342(p)(6), 1311, 1318, 1342, 1361.) Section 402(p)(6) of the CWA requires that EPA designate sources to be regulated to protect water quality and establish a comprehensive program to regulate those sources.

In the *Economic Analysis of the Final Phase II Rule* (EA), EPA describes the qualitative and monetized benefits associated with today's rule and then compares the monetized benefits with the estimated costs for the rule. EPA developed detailed estimates of the costs and benefits of complying with each of the incremental requirements imposed by the rule. These estimates, including descriptions of the methodology and assumptions used, are described in detail in the EA. The Agency used two approaches, a national water quality model and national water quality assessment, to estimate the potential benefits of the rule. Both approaches show that the benefits are likely to exceed costs. Exhibit 3 in section III of this preamble summarizes the costs and benefits associated with the basic elements of today's rule.

There are additional benefits to storm water control that cannot be quantified or monetized. Thus, the current estimate of monetized benefits may understate the true value of storm water controls because it omits many ways by which society is likely to benefit from reduced storm water pollution, such as improved aesthetic quality of waters, benefits to wildlife and to threatened and endangered species, cultural values, and biodiversity benefits.

Several commenters asserted that today's rule is an unfunded mandate and that, without funding, the monitoring of the already existing pollution control programs would suffer. In section II.D.3 of the preamble, EPA lists some of the programs that EPA anticipates may provide funds to help develop and, in limited circumstances, implement storm water management programs.

In the EA, EPA reviewed the expected effect of today's rule on the national economy. The Agency determined that the rule will have minimal impacts on the economy or employment. This is because the final rule regulates small MS4s and construction sites under 5 acres, not the typical industrial plants or other non-construction activities that could directly impact production and thus those sectors of the economy.

Discussions with representatives within the construction industry indicate that construction costs will likely be passed on to buyers, thus not seriously affecting the housing industry directly. Flexibility within the rule allows MS4s to tailor the storm water program requirements to their needs and financial position, minimizing impacts. For sedimentation and erosion controls on construction sites, the rule contemplates application of commonly used BMPs to reduce costs for the construction industry. Thus, the rule attempts to use existing practices to prevent pollution, which should minimize impacts on States, Tribes, municipalities and the construction industry.

Thus, EPA concludes that the effect of the rule, if any, on the national economy would be minimal. The benefits of today's rule more than offset any cost impacts on the national economy.

Consistent with the intergovernmental consultation provisions of section 204 of the UMRA and Executive Order 12875, ''Enhancing the Intergovernmental Partnership,'' EPA consulted with the governmental entities affected by this rule.

First, EPA provided States, Tribal and local governments with the opportunity to comment on draft alternative approaches for the proposed rule through publishing a notice requesting information and public comment in the **Federal Register** on September 9, 1992 (57 FR 41344). This notice presented a full range of regulatory alternatives. At that time, EPA received more than 130 comments, including approximately 43 percent from municipalities and 24 percent from State or Federal agencies. These comments were the genesis of many of the provisions in the today's rule, including reliance on the NPDES program framework (including general permits), providing State and local governments flexibility in selecting additional sources requiring regulation, and focusing on high priority polluters. These comments helped to focus on pollution prevention, watershed-based concerns and BMPs. They also led to certain exemptions for facilities that do not pollute national waters.

In early 1993, EPA, in conjunction with the Rensselaerville Institute, held public and expert meetings to assist in developing and analyzing options for identifying unregulated storm water sources and possible controls. These meetings provided participants an additional opportunity to provide input into the CWA section 402(p)(6) program development process. The final rule addresses several of the key concerns identified in these groups, including provisions that provide flexibility to the States to select sources to be controlled and types of permits to be issued, and flexibility to MS4s in selecting BMPs.

EPA also conducted outreach with representatives of small entities, including small government representatives, in conjunction with the convening of a Small Business Advocacy Review Panel under SBREFA which is discussed in section IV.E. of the preamble.

In addition, EPA established the Urban Wet Weather Flows Advisory Committee under the Federal Advisory Committee Act (FACA). The Urban Wet Weather Flows Advisory Committee, in turn established the Storm Water Phase II Subcommittee. Consistent with FACA, the membership of the Committee and the Storm Water Phase II Subcommittee was balanced among EPA's various outside stakeholder interests, including representatives from State governments, municipal governments (both elected officials and appointed officials) and Tribal governments, as well as industrial and commercial sectors, agriculture, environmental and public interest groups.

In general, municipal and Tribal government representatives supported the NPDES approach in today's rule for the following reasons: It will be uniformly applied on a nationwide basis; it provides flexibility to allow incorporation of State and local programs; it resolves the problem of donut holes that cause water quality impacts in urbanized areas; and it allows co-permitting of small regulated

MS4s with those regulated under the existing storm water program.

In contrast, State representatives sought alternative approaches for State implementation of the storm water program for Phase II sources. State representatives asserted that a non-NPDES alternative approach best facilitated watershed management and avoided duplication and overlapping regulations. These representatives pointed out that there are a variety of State programs—not based on the CWA—implementing effective storm water controls, and that EPA should provide incentives for their implementation and improvement in performance. EPA continues to believe that an NPDES approach is the best approach in order to adequately protect water quality. However, EPA has worked with States on an alternative approach that provides flexibility within the NPDES framework. The final rule allows States with a watershed permitting approach to phase in permit coverage for MS4s in jurisdictions with a population less than 10,000 and provides two waivers from coverage for small MS4s. This issue is discussed in section II.C of the preamble, Program Framework: NPDES Approach.

Some municipal governments objected that the rule's minimum measures for small MS4s violate the Tenth Amendment insofar as they require the operators of MS4s to regulate third parties according to the ''minimum measures'' for municipal storm water management programs. EPA disagrees that today's rule is inconsistent with Tenth Amendment principles. Permits issued under today's rule will not compel political subdivisions of States to regulate in their sovereign capacities, but rather to effectively control discharges out of their storm sewer systems in their owner/operator capacities. For MS4s that do not accept this ''default'' minimum measures-based approach (to control discharges out of the storm sewer system by exercising local powers to control discharges into the storm sewer system), today's rule allows for alternative permits through individual permit applications. EPA made revisions to the rule to allow regulated small MS4s to opt out of the minimum measures approach and instead apply for an individual permit. This issue is discussed in section II.H.3.c.iii of the preamble, Alternative Permit Option/ Tenth Amendment.

2. Selection of the Least Costly, Most Cost-Effective or Least Burdensome Alternative That Achieves the Objectives of the Statute

Today's rule evolved over time and incorporated aspects of alternatives that responded to concerns presented by the various stakeholders. A primary characteristic of today's rule is the flexibility it offers both the permitting authority and the regulated sources (small MS4s and small construction sites), by the use of general permits, implementation of BMPs suited to specific locations, and allowing MS4s to develop their own program goals.

In the administrative record supporting the proposed rule, EPA estimated ranges of costs associated with six different options, including a no action option, the proposed option, and four other options that considered various combinations of the following: Covering all the unregulated construction sites below 5 acres, all small MS4s, certain industrial and commercial activities, and all point sources. EPA developed detailed cost estimates for the incremental requirements imposed under the final regulation, and for each of the alternatives, and applied these estimates to the remaining unregulated point sources of storm water. The Agency compared the estimated annual range of costs imposed under today's rule and other major options considered. The range of values for each option included the costs for compliance, including paperwork requirements for the operators of small construction sites, industrial facilities, and MS4s and administrative costs for State and Federal NPDES permitting authorities.

Today's rule reflects the least costly option that achieves the objectives of the statute, thus meeting the requirements of section 205. EPA did not consider ''no regulation'' to be an ''option'' because it would not achieve the objectives of CWA section 402(p)(6). A portion of currently unregulated point sources of storm water need to reduce pollutants to protect water quality.

Today's rule is estimated to range in cost from $847.6 million to $981.3 million annually, although the cost estimate for the proposed rule was reported as a range of $138 to $869 million annually. That range reflected a unit cost range for the municipal minimum measures and a cost range per construction site for soil erosion control. EPA has since revised its cost analysis to allow it to report the current estimate, which is toward the high end of the original cost range. The four other regulatory options considered at proposal involved higher regulatory costs and, therefore, were not selected. These four options and their estimated costs are as follows:

(1) An option based on the August 7, 1995 direct final rule was estimated to cost between $2.2 billion and $78.9 billion per year.

(2) A ''Plan B'' option was estimated to cost between $0.6 billion and $3.2 billion per year.

(3) An option based on the September 30, 1996 draft proposed rule was estimated to cost between $0.2 billion and $3.7 billion per year.

(4) An option based on the February 13, 1997 draft proposed rule, was estimated to cost between $0.2 billion and $3.5 billion.

There are three reasons why the costs for these four options exceeded the estimated cost range for the proposed rule. The first two options regulated substantially more municipal governments. The first, third, and fourth options required industrial facilities to apply for permits. Finally, the first three options applied permit requirements to construction sites below 1 acre. Consequently, these options would be more costly than today's rule even with the revised analysis methods used to estimate costs.

3. Effects on Small Governments

Before EPA establishes any regulatory requirements that may significantly or uniquely affect small governments, including tribal governments, it must have developed under section 203 of the UMRA a small government agency plan. The plan must provide for notifying potentially affected small governments, enabling officials of affected small governments to have meaningful and timely input in the development of EPA regulatory proposals with significant Federal intergovernmental mandates, and informing, educating, and advising small governments on compliance with the regulatory requirements. EPA has determined that this rule contains no regulatory requirements that might significantly or uniquely affect small governments. Although today's rule expands the NPDES program (with modifications) to certain MS4s serving populations below 100,000 and although many MS4s are owned by small governments, EPA does not believe today's rule significantly or uniquely affects small governments. As explained in section IV.E. of the preamble, EPA today certifies that the rule will not have a significant impact on small governmental jurisdictions. In addition, the rule will not have a unique impact on small governments because the rule will affect small governments in

to the same extent as (or to a lesser extent than) larger governments that are already covered by the existing storm water rules. Thus, today's rule is not subject to the requirements of section 203 of UMRA.

Notwithstanding this finding, in developing today's rule, EPA provided notice of the requirements to potentially affected small governments; enabled officials of affected small governments to provide meaningful and timely input in the development of regulatory proposals; and informed, educated and advised small governments on compliance with the requirements.

Concerning notice, EPA provided States, local, and Tribal governments with the opportunity to comment on alternative approaches for an early draft of the proposed rule by publishing a notice requesting information and public comment in the **Federal Register** on September 9, 1992 (57 FR 41344). This notice presented a full range of regulatory alternatives. At that time, EPA received more than 130 comments, including approximately 43 percent from municipalities and 24 percent from State or Federal agencies.

The Agency also provided, through the SBREFA panel process and the FACA process, the opportunity for elected officials of small governments (and their representatives) to meaningfully participate in the development of the rule. Through such participation and exchange, EPA not only notified potentially affected small governments of requirements of the developing rule, but also allowed officials of affected small governments to have meaningful and timely input into the development of regulatory proposals.

In addition to involving municipalities in the development of the rule, EPA also continues to inform, educate, and advise small governments on compliance with the requirements of today's rule. For example, EPA supported 10 workshops, presented by the American Public Works Association from September 1998 through May 1999, designed to educate local governments on the implementation of the rule. The workshop curriculum included information on a variety of key issues such as anticipated regulatory requirements, agency reporting, best management practices, construction site controls, post construction management for new and redeveloped sites, public education and public involvement strategies, detection and control of illicit discharges, and good housekeeping practices. Moreover, EPA has prepared a series of fact sheets, available on the EPA website at www.epa.gov/owm/sw/toolbox, that explains the rule in detail.

Finally, to assist small governments in implementing the Phase II program, EPA is committed to the following: (1) developing a tool box of implementation strategies; (2) providing written technical assistance, including guidance on developing BMPs and measurable goals; and (3) compiling a comprehensive evaluation of the NPDES municipal storm water Phase II program over the next 13 years.

D. Executive Order 13132

Executive Order 13132, entitled ''Federalism'' (64 FR 43255, August 10, 1999), requires EPA to develop an accountable process to ensure ''meaningful and timely input by State and local officials in the development of regulatory policies that have federalism implications.'' ''Policies that have federalism implications'' is defined in the Executive Order to include regulations that have ''substantial direct effects on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government.'' Under Executive Order 13132, EPA may not issue a regulation that has federalism implications, that imposes substantial direct compliance costs, and that is not required by statute, unless the Federal government provides the funds necessary to pay the direct compliance costs incurred by State and local governments, or EPA consults with State and local officials early in the process of developing the proposed regulation. EPA also may not issue a regulation that has federalism implications and that preempts State law unless the Agency consults with State and local officials early in the process of developing the proposed regulation.

If EPA complies by consulting, Executive Order 13132 requires EPA to provide to the Office of Management and Budget (OMB), in a separately identified section of the preamble to the rule, a federalism summary impact statement (FSIS). The FSIS must include a description of the extent of EPA's prior consultation with State and local officials, a summary of the nature of their concerns and the agency's position supporting the need to issue the regulation, and a statement of the extent to which the concerns of State and local officials have been met. For final rules subject to Executive Order 13132, EPA also must submit to OMB a statement from the agency's Federalism Official certifying that EPA has fulfilled the Executive Order's requirements.

EPA has concluded that this final rule may have federalism implications. As discussed above in section IV.C., the rule contains a Federal mandate that may result in the expenditure by State, local and tribal governments, in the aggregate, of $100 million or more in any one year. Accordingly, the rule may have substantial direct effects on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government, as specified in Executive Order 13132. Moreover, the rule will impose substantial direct compliance costs on State or local governments. Accordingly, EPA provides the following FSIS under section 6(b) of Executive Order 13132.

1. Description of the Extent of the Agency's Prior Consultation with State and Local Governments

Although this rule was proposed long before the November 2, 1999 effective date of Executive Order 13132, EPA consulted extensively with affected State and local governments pursuant to the intergovernmental consultation provisions of Executive Order 12875, ''Enhancing the Intergovernmental Partnership'' (now revoked by Executive Order 13132) and section 204 of UMRA.

First, EPA provided State and local governments the opportunity to comment on draft alternative approaches for the proposed rule through publishing a notice requesting information and public comment in the **Federal Register** on September 9, 1992 (57 FR 41344). This notice presented a full range of regulatory alternatives. At that time, EPA received more than 130 comments, including approximately 43 percent from municipalities and 24 percent from State or Federal agencies. These comments were the genesis of many of the provisions in the today's rule, including reliance on the NPDES program framework (including general permits), providing State and local governments flexibility in selecting additional sources requiring regulation, and focusing on high priority polluters. These comments helped to focus on pollution prevention, watershed-based concerns and BMPs. They also led to certain exemptions for facilities that do not pollute national waters.

In early 1993, EPA, in conjunction with the Rensselaerville Institute, held public and expert meetings to assist in developing and analyzing options for identifying unregulated storm water sources and possible controls. These meetings provided participants an additional opportunity to provide input into the CWA section 402(p)(6) program

development process. The final rule addresses several of the key concerns identified in these groups, including provisions that provide flexibility to the States to select sources to be controlled and types of permits to be issued, and flexibility to MS4s in selecting BMPs.

EPA also conducted outreach with representatives of small entities, including small governments, in conjunction with the convening of a Small Business Advocacy Review Panel under SBREFA which is discussed in section III.F. of the preamble.

In addition, EPA established the Urban Wet Weather Flows Advisory Committee (FACA), which in turn established the Storm Water Phase II Subcommittee. Consistent with the Federal Advisory Committee Act, the membership of the Committee and the Storm Water Phase II Subcommittee was balanced among EPA's various outside stakeholder interests, including representatives from State governments, municipal governments (both elected officials and appointed officials) and Tribal governments, as well as industrial and commercial sectors, agriculture, environmental and public interest groups.

2. Summary of Nature of State and Local Government Concerns, and Statement of the Extent to Which Those Concerns Have Been Met

In general, municipal government representatives supported the NPDES approach in today's rule for the following reasons: it will be uniformly applied on a nationwide basis; it provides flexibility to allow incorporation of State and local programs; it resolves the problem of donut holes that cause water quality impacts in urbanized areas; and it allows co-permitting of small regulated MS4s with those regulated under the existing storm water program.

In contrast, State representatives sought alternative approaches for State implementation of the storm water program for Phase II sources. State representatives asserted that a non-NPDES alternative approach best facilitated watershed management and avoided duplication and overlapping regulations. These representatives pointed out that there are a variety of State programs—not based on the CWA—implementing effective storm water controls, and that EPA should provide incentives for their implementation and improvement in performance. EPA continues to believe that an NPDES approach is the best approach in order to adequately protect water quality. However, EPA has worked with States on an alternative approach that provides flexibility within the NPDES framework. The final rule allows States with a watershed permitting approach to phase in permit coverage for MS4s in jurisdictions with a population less than 10,000 and provides two waivers from coverage for small MS4s. This issue is discussed in section II.C of the preamble, Program Framework: NPDES Approach.

Some municipal governments objected that the rule's minimum measures for small MS4s violate the Tenth Amendment insofar as they require the operators of MS4s to regulate third parties according to the ''minimum measures'' for municipal storm water management programs. EPA disagrees that today's rule is inconsistent with Tenth Amendment principles. Permits issued under today's rule will not compel political subdivisions of States to regulate in their sovereign capacities, but rather to effectively control discharges out of their storm sewer systems in their owner/operator capacities. For MS4s that do not accept this ''default'' minimum measures-based approach (to control discharges out of the storm sewer system by exercising local powers to control discharges into the storm sewer system), today's rule allows for alternative permits through individual permit applications. EPA made revisions to the rule to allow regulated small MS4s to opt out of the minimum measures approach and instead apply for an individual permit. This issue is discussed in section II.H.3.c.iii of the preamble, Alternative Permit Option/ Tenth Amendment.

3. Summary of the Agency's Position Supporting the Need To Issue the Regulation

As discussed more fully in section I.B. above, today's rule is needed because uncontrolled storm water discharges from areas of urban development and construction activity have been shown to have negative impacts on receiving waters by changing the physical, biological, and chemical composition of the water, resulting in an unhealthy environment for aquatic organisms, wildlife, and people. As discussed in section II.C., the NPDES approach in today's rule is needed to ensure uniform application on a nationwide basis, to provide flexibility to allow incorporation of State and local programs, to resolve the problem of donut holes that cause water quality impacts in urbanized areas, and to allow co-permitting of small regulated MS4s with those regulated under the existing storm water program.

The draft final rule was transmitted to OMB on July 6, 1999. Because transmittal occurred before the November 2, 1999 effective date of Executive Order 13132, certification under section 8 of the Executive Order is not required.

E. Regulatory Flexibility Act (RFA), as amended by the Small Business Regulatory Enforcement Fairness Act of 1996 (SBREFA), 5 U.S.C. 601 et seq.

The RFA generally requires an Agency to prepare a regulatory flexibility analysis of any rule subject to notice and comment rulemaking requirements under the Administrative Procedure Act or any other statute unless the agency certifies that the rule will not have a significant economic impact on a substantial number of small entities. Small entities include small businesses, small organizations, and small governmental jurisdictions.

For purposes of assessing the impact of today's rule on small entities, small entity is defined as: (1) a building contractor (SIC 15) with up to $17.0 million in annual revenue; (2) a small governmental jurisdiction that is a government of a city, county, town, school district, or special district with a population of less than 50,000; and (3) a small organization that is any not-for-profit enterprise which is independently owned and operated and is not dominant in its field.

After considering the economic impacts of today's final rule on small entities, I certify that this action will not have a significant economic impact on a substantial number of small entities.

Although this final rule will not have a significant economic impact on a substantial number of small entities, EPA nonetheless has tried to reduce the impact of this rule on small entities.

For purposes of evaluating the economic impact of this rule on small governmental jurisdictions, EPA compared annual compliance costs with annual government revenues obtained from the 1992 Census of Governments, using state-specific estimates of annual revenue per capita for municipalities in three population size categories (fewer than 10,000, 10,000–25,000, and 25,000–50,000).

In order to estimate the annual compliance cost for small governmental jurisdictions, EPA used the mean variable municipal cost of $8.93 per household as calculated in a 1998 study of 121 municipalities conducted by the national Association of Flood and Stormwater Management Agencies (NAFSMA). In addition, EPA used the estimated fixed administrative costs of $1,545 per municipality for reporting,

recordkeeping, and application requirements for today's rule.

In evaluating the economic impact of this rule on small governmental jurisdictions, EPA determined that compliance costs represent more than 1 percent of estimated revenues for only 10 percent of small governments and more than 3 percent of the revenue for 0.7 percent of these entities. In both absolute and relative terms, EPA does not consider this a significant economic impact on a substantial number of small entities.

EPA normally uses the ''sales test'' for determining the economic impact on small businesses. Under a sales test, annual compliance costs are compared with the small business's total annual sales. However, the direct application of the sales test is not suitable in this case, because of the uncertainty associated with estimating the number of units an ''average'' developer/contractor develops or builds in a typical year. For this rule, EPA has approximated the sales test by estimating compliance costs for three sizes of construction sites and comparing them with a representative sale price for three building categories. Although EPA's analysis is not exactly a ''sales test,'' it is similar to the sales test, producing comparable results.

For small building contractors, EPA estimated administrative compliance costs of $870 per site for applying for coverage, reporting, record keeping, monitoring and preparing a storm water pollution prevention plan. EPA estimated compliance costs for installing soil and erosion controls as ranging from $1,206 to $8,709 per site. EPA compliance cost estimates are based on 27 theoretical model construction sites designed to mimic the mostly likely used best management practices around the country.

In evaluating the economic impact on small building contractors, EPA divided the revised compliance costs per construction start by the appropriate homes-to-site ratio for each of the three sizes of construction sites. The average compliance cost per home ranges from approximately $450 to $650. EPA concluded that compliance costs are roughly 0.22 to 0.43 percent of both the mean, $181,300, and median, $151,000, sale price of a home.

The absence of data to specifically assess annual compliance costs for building contractors as a percentage of annual sales (i.e., a very direct estimate of the impact on potentially affected small businesses) led EPA to perform additional market analysis to examine the ability of potentially affected firms to pass along regulatory costs to buyers for single-family homes constructed subject to today's rule. If the small building contractors covered by the rule are able to pass on the costs of compliance, either completely or partially, to their purchasers, then the rule's impact on these small business entities is significantly reduced. The market analysis shows that demand for homes is not overly sensitive to small changes in price, therefore builders should be able to pass on at least a significant fraction of the compliance costs to buyers.

EPA also assessed the effect of the building contractors' costs on average monthly mortgage rates and on the demand for new homes. Based on that screening analysis, EPA concludes that the costs to building contractors, and the potential changes in housing prices and monthly mortgage payments for single-family home buyers, are not expected to have a significant impact on the market for single-family houses. In both absolute and relative terms, EPA does not consider this a significant economic impact on a substantial number of small entities.

EPA also certified this rule at proposal. Even though the Agency was not required to, we convened a Small Business Advocacy Review Panel (''Panel'') in June 1997. A number of small entity representatives had already been actively involved with EPA through the FACA process, and were, therefore, broadly knowledgeable about the development of the proposed and final rules. Prior to convening the Panel, EPA consulted with the Small Business Administration to identify a group of small entity representatives to advise the Panel. The Agency distributed a briefing package describing its preliminary analysis under the RFA to the small entity representatives (as well as to representatives from OMB and SBA) and conducted two telephone conference calls and an all-day meeting at EPA Headquarters in May of 1997 with small entity representatives. With this preliminary work complete, in June 1997, EPA formally convened the SBREFA Panel, comprising representatives from OMB, SBA, EPA's Office of Water and EPA's Small Business Advocacy Chair. The Panel received written comments from small entity representatives based on their involvement in the earlier meetings, and invited additional comments.

Consistent with requirements of the RFA, the Panel evaluated the assembled materials and small-entity comments on issues related to: (1) a description and the number of small entities that would be regulated; (2) a description of the projected record keeping, reporting and other compliance requirements applicable to small entities; (3) identification of other Federal rules that may duplicate, overlap, or conflict with the proposal to the final rule; and (4) regulatory alternatives that would minimize any significant economic impact of the rule on small entities while accomplishing the stated objectives of the CWA section 402(p)(6).

On August 7, 1997, the Panel provided a Final Report (hereinafter, ''Report'') to the EPA Administrator. A copy of the Report is included in the docket for the rule. The Panel acknowledged and commended EPA's efforts to work with stakeholders, including small entities, through the FACA process. The SBREFA Panel stated that, because of EPA's extensive outreach and responsiveness in addressing stakeholder concerns, commenters during the SBREFA process raised fewer concerns than might otherwise have been expected. Based on the advice and recommendations of the Panel, today's rule includes a number of provisions designed to minimize any significant impact on small entities. (See Appendix 5).

F. National Technology Transfer And Advancement Act

Section 12(d) of the National Technology Transfer and Advancement Act of 1995 (''NTTAA''), Public Law 104–113, section 12(d) (15 U.S.C. 272 note) directs EPA to use voluntary consensus standards in its regulatory activities unless to do so would be inconsistent with applicable law or otherwise impractical. Voluntary consensus standards are technical standards (*e.g.*, materials specifications, test methods, sampling procedures, and business practices) that are developed or adopted by voluntary consensus standard bodies. The NTTAA directs EPA to provide Congress, through OMB, explanations when the Agency decides not to use available and applicable voluntary consensus standards.

This action does not mandate the use of any particular technical standards, although in designing appropriate BMPs regulated small MS4s and small construction sites are encouraged to use any voluntary consensus standards that may be applicable and appropriate. Because no specific technical standards are included in the rule, section 12(d) of the NTTAA is not applicable.

G. Executive Order 13045

Executive Order 13045: ''Protection of Children from Environmental Health Risks and Safety Risks'' (62 FR 19885, April 23, 1997) applies to any rule that: (1) Is determined to be ''economically

significant'' as defined under E.O. 12866, and (2) concerns an environmental health or safety risk that EPA has reason to believe may have a disproportionate effect on children. If the regulatory action meets both criteria, the Agency must evaluate the environmental health or safety effects of the planned rule on children, and explain why the planned regulation is preferable to other potentially effective and reasonably feasible alternatives considered by the Agency.

This final rule is not subject to E.O. 13045 because it does not concern an environmental health or safety risk that may have a disproportionate effect on children. The rule expands the scope of the existing NPDES permitting program to require small municipalities and small construction sites to regulate their storm water discharges. The rule does not itself, however, establish standards or criteria that would be included in permits for those sources. Such standards or criteria will be developed through other actions, for example, in the establishment of water quality standards or subsequently in the issuance of permits themselves. As such, today's action does not concern an environmental health or safety risk that may have a disproportionate effect on children. To the extent it does address a risk that may have a disproportionate effect on children, expanding the scope of the permitting program will have a corresponding disproportionate benefit to children to protect them from such risk.

H. Executive Order 13084

Under Executive Order 13084, EPA may not issue a regulation that is not required by statute, that significantly or uniquely affects the communities of Indian tribal governments, and that imposes substantial direct compliance costs on those communities, unless the Federal government provides the funds necessary to pay the direct compliance costs incurred by the Tribal governments, or EPA consults with those governments. If EPA complies by consulting, Executive Order 13084 requires EPA to provide to the Office of Management and Budget, in a separately identified section of the preamble to the rule, a description of the extent of EPA's prior consultation with representatives of affected Tribal governments, a summary of the nature of their concerns, and a statement supporting the need to issue the regulation. In addition, Executive Order 13084 requires EPA to develop an effective process permitting elected officials and other representatives of Indian Tribal governments ''to provide meaningful and timely input in the development of regulatory policies on matters that significantly or uniquely affect their communities.''

Today's rule does not significantly or uniquely affect the communities of Indian Tribal governments. Even though the Agency is not required to address Tribes under the Regulatory Flexibility Act, EPA used the same revenue test that was used for municipalities to assess the impact of the rule on communities of Tribal governments and determine that they will not be significantly affected. In addition, the rule will not have a unique impact on the communities of Tribal governments because small municipal governments are also covered by this rule and larger municipal governments are already covered by the existing storm water rules. Accordingly, the requirements of section 3(b) of Executive Order 13084 do not apply to this rule.

I. Congressional Review Act

The Congressional Review Act, 5 U.S.C. section 801 *et seq.*, as added by the Small Business Regulatory Enforcement Fairness Act of 1996, generally provides that before a rule may take effect, the agency promulgating the rule must submit a rule report, which includes a copy of the rule, to each House of the Congress and the Comptroller General of the United States. EPA will submit a report containing this rule and other required information to the U.S. Senate, the U.S. House of Representatives, and the Comptroller General of the United States prior to publication of the rule in the **Federal Register**. A major rule cannot take effect until 60 days after it is published in the **Federal Register**. This rule is a ''major rule'' as defined by 5 U.S.C. 804(2). This rule will be effective on February 7, 2000.

List of Subjects

40 CFR Part 9

Environmental protection, Reporting and recordkeeping requirements.

40 CFR Part 122

Administrative practice and procedure, Confidential business information, Environmental protection, Hazardous substances, Incorporation by reference, Reporting and recordkeeping requirements, Sewage disposal, Waste treatment and disposal, Water pollution control.

40 CFR Part 123

Administrative practice and procedure, Confidential business information, Hazardous materials, Indians—lands, Intergovernmental relations, Penalties, Reporting and recordkeeping requirements, Sewage disposal, Waste treatment and disposal, Water pollution control, Penalties.

40 CFR Part 124

Administrative practice and procedure, Air pollution control, Hazardous waste, Indians—lands, Reporting and recordkeeping requirements, Water pollution control, Water supply.

Dated: October 29, 1999.

Carol M. Browner,

Administrator.

Appendices to the Preamble

APPENDIX 1 TO PREAMBLE—FEDERALLY-RECOGNIZED AMERICAN INDIAN AREAS LOCATED FULLY OR PARTIALLY IN BUREAU OF THE CENSUS URBANIZED AREAS

[Based on 1990 Census data]

State	American Indian Area	Urbanized Area
AZ	Pascua Yacqui Reservation (pt.): Pascua Yacqui Tribe of Arizona	Tucson, AZ (Phase I).
AZ	Salt River Reservation (pt.): Salt River Pima-Maricopa Indian Community of the Salt River Reservation, California.	Phoenix, AZ (Phase I).
AZ	San Xavier Reservation (pt.): Tohono O'odham Nation of Arizona (formerly known as the Papago Tribe of the Sells, Gila Bend & San Xavier Reservation).	Tucson, AZ (Phase I).
CA	Augustine Reservation: Augustine Band of Cahuilla Mission of Indians of the Augustine Reservation, CA.	Indio-Coachella, CA (Phase I).
CA	Cabazon Reservation: Cabazon Band of Cahuilla Mission Indians of the Cabazon Reservation, CA.	Indio-Coachella, CA (Phase I).

APPENDIX 1 TO PREAMBLE—FEDERALLY-RECOGNIZED AMERICAN INDIAN AREAS LOCATED FULLY OR PARTIALLY IN BUREAU OF THE CENSUS URBANIZED AREAS—Continued

[Based on 1990 Census data]

State	American Indian Area	Urbanized Area
CA	Fort Yuma (Quechan) (pt.): Quechan Tribe of the Fort Yuma Indian Reservation, California & Arizona.	Yuma, AZ–CA.
CA	Redding Rancheria: Redding Rancheria of California	Redding, CA.
FL	Hollywood Reservation: Seminole Tribe	Fort Lauderdale, FL (Phase I).
FL	Seminole Trust Lands: Seminole Tribe of Florida, Dania, Big Cypress & Brighton Reservations.	Fort Lauderdale, FL (Phase I).
ID	Fort Hall Reservation and Trust Lands: Shosone-Bannock Tribes of the Fort Hall Reservation of Idaho.	Pocatello, ID.
ME	Penobscot Reservation and Trust Lands (pt.): Penobscot Tribe of Maine	Bangor, ME.
MN	Shakopee Community: Shakopee Mdewakanton Sioux Community of Minnesota (Prior Lake).	Minneapolis-St. Paul, MN (Phase I).
NM	Sandia Pueblo (pt.): Pueblo of Sandia, New Mexico	Albuquerque, NM (Phase I).
NV	Las Vegas Colony: Las Vegas Tribe of Paiute Indians of the Las Vegas Indian Colony, Nevada.	Las Vegas, NV (Phase I).
NV	Reno-Sparks Colony: Reno-Sparks Indian Colony, Nevada	Reno, NV (Phase I).
OK	Osage Reservation (pt.): Osage Nation of Oklahoma	Tulsa, OK (Phase I).
OK	Absentee Shawnee-Citizens Band of Potawatomi TJSA (pt.): Absentee-Shawnee Tribe of Indians of Oklahoma; Citizen Potawatomi Nation, Oklahoma.	Oklahoma City, OK (Phase I).
OK	Cherokee TJSA 9 (pt.): Cherokee Nation of Oklahoma; United Keetoowah Band of Cherokee Indians of Oklahoma.	Ft. Smith, AR–OK; Tulsa, OK (Phase I).
OK	Cheyenne-Arapaho TJSA (pt.): Cheyenne-Arapaho Tribes of Oklahoma	Oklahoma City, OK (Phase I).
OK	Choctaw TJSA (pt.): Choctaw Nation of Oklahoma	Ft. Smith, AR–OK (Phase I).
OK	Creek TJSA (pt.): Alabama-Quassarte Tribal Town of the Creek Nation of Oklahoma; Kialegee Tribal Town of the Creek Indian Nation of Oklahoma; Muscogee (Creek) Nation of Oklahoma; Thlopthlocco Tribal Town of the Creek Nation of Oklahoma.	Tulsa, OK (Phase I).
OK	Kiowa-Comanche-Apache-Ft. Sill Apache: Apache Tribe of Oklahoma; Comanche Indian Tribe, Oklahoma; Fort Sill Apache Tribe of Oklahoma; Kiowa Indian Tribe of Oklahoma.	Lawton, OK.
TX	Ysleta del Sur Reservation: Ysleta Del Sur Pueblo of Texas	El Paso, TX–NM (Phase I).
WA	Muckleshoot Reservation and Trust Lands (pt.): Muckleshoot Indian Tribe of the Muckleshoot Reservation.	Seattle, WA (Phase I).
WA	Puyallup Reservation and Trust Lands (pt.): Puyallup Tribe of the Puyallup Reservation, WA.	Tacoma, WA (Phase I).
WA	Yakima Reservation (pt.): Confederated Tribes and Bands of the Yakama Indian Nation of the Yakama Reservation, WA.	Yakima, WA.
WI	Oneida (West) (pt.): Oneida Tribe of Wisconsin	Green Bay, WI.

Please Note

''(pt.)'' indicates that the American Indian Area (AIA) listed is only partially located within the referenced urbanized area.

The first line under ''American Indian Area'' is the name of the federally-recognized reservation/colony/rancheria or trust land as it appears in the Bureau of the Census data. After this first line, the names of the tribes included in the AIA are listed as they appear in the Bureau of Indian Affairs' list of Federally Recognized Indian Tribes. [**Federal Register**: Nov. 13, 1996, Vol. 66, No. 220, pgs. 58211–58216]

''TJSAs'' are Tribal Jurisdiction Statistical Areas in Oklahoma that are defined in conjunction with the federally-recognized tribes in Oklahoma who have definite land areas under their jurisdiction, but do not have reservation status.

''(Phase I)'' indicates that the referenced urbanized area includes a medium or large MS4 currently regulated under the existing NPDES storm water program (i.e., Phase I). Any Tribally operated MS4 within these such urban areas would not automatically have been covered under Phase I, however.

Sources

Michael Ratcliffe, Geographic Concepts Division, Bureau of the Census, U.S. Department of Commerce.

1990 Census of Population and Housing, Summary Population and Housing Characteristics, United States. Tables 9 & 10. [1990 CPH–1–1]. Bureau of the Census, U.S. Department of Commerce.

BILLING CODE 6560–50–P

APPENDIX 2 TO PREAMBLE—URBANIZED AREA ILLUSTRATION

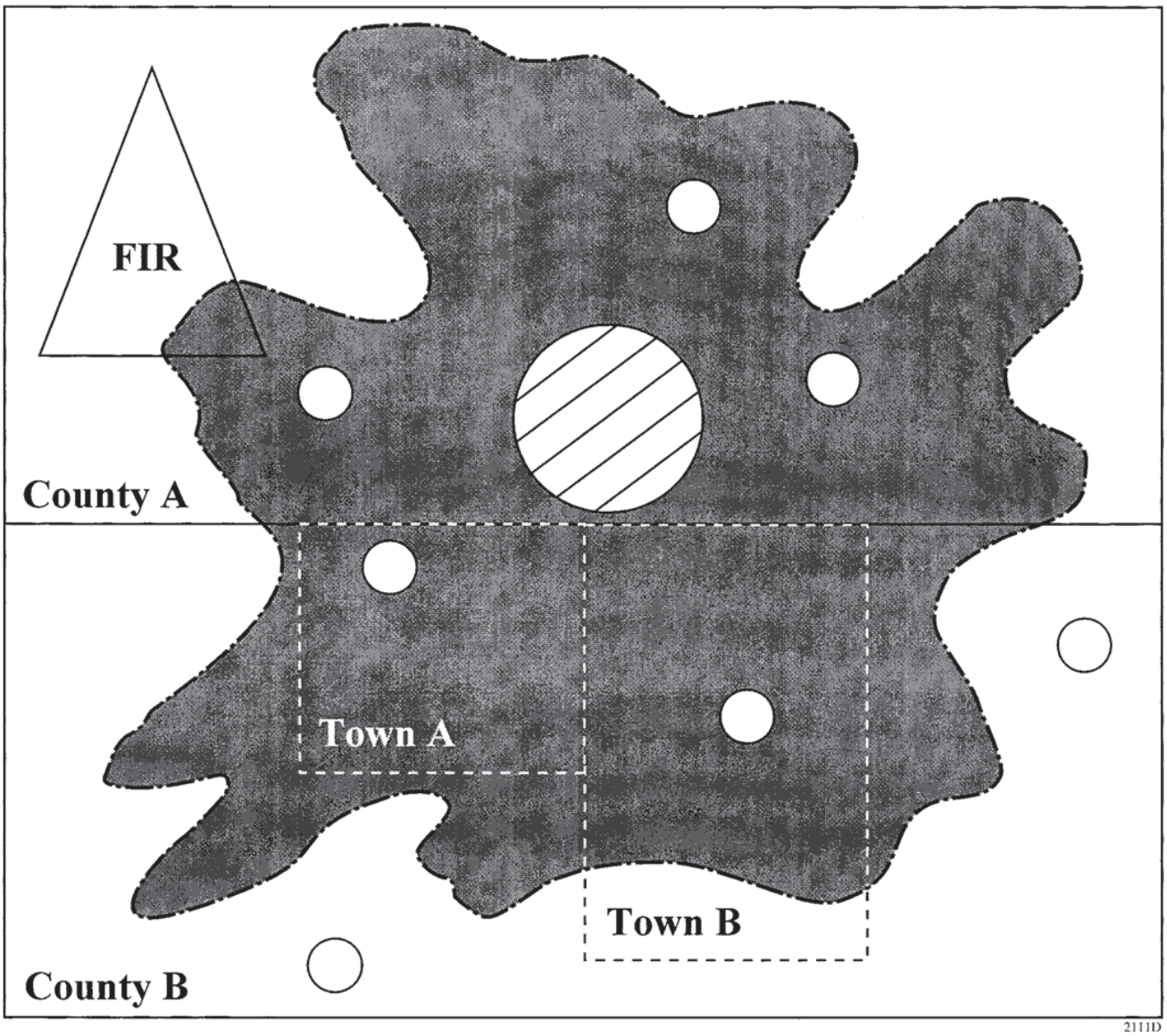

Central Place

Incorporated Place

Federal Indian Reservation (FIR)

Unincorporated "Urbanized Area" Portion of a Town (MCD) or County

Urbanized Area

Town or Township as a functioning Minor Civil Division (MCD). An MCD is the primary subdivision of a County.

County

BILLING CODE 6560–50–C

Appendix 3 to the Preamble—Urbanized Areas of the United States and Puerto Rico

(Source: 1990 Census of Population and Housing, U.S. Bureau of the Census—This list is subject to change with the Decennial Census)

Alabama

Anniston
Auburn-Opelika
Birmingham
Columbus, GA–AL
Decatur
Dothan
Florence
Gadsden
Huntsville
Mobile
Montgomery
Tuscaloosa

Alaska

Anchorage

Arizona

Phoenix
Tucson
Yuma, AZ–CA

Arkansas

Fayetteville-Springdale
Fort Smith, AR–OK
Little Rock-North Little Rock
Memphis, TN–AR–MS
Pine Bluff
Texarkana, AR–TX

California

Antioch-Pittsburgh
Bakersfield
Chico
Davis
Fairfield
Fresno
Hemet-San Jacinto
Hesperia-Apple Valley-Victorville
Indio-Coachella
Lancaster-Palmdale
Lodi
Lompoc
Los Angeles
Merced
Modesto
Napa
Oxnard-Ventura
Palm Springs
Redding
Riverside-San Bernardino
Sacramento
Salinas
San Diego
San Francisco-Oakland
San Jose
San Luis Obispo
Santa Barbara
Santa Cruz
Santa Maria
Santa Rosa
Seaside-Monterey
Simi Valley
Stockton
Vacaville
Visalia
Watsonville
Yuba City
Yuma

Colorado

Boulder
Colorado Springs
Denver
Fort Collins
Grand Junction
Greeley
Longmont
Pueblo

Connecticut

Bridgeport-Milford
Bristol
Danbury, CT–NY
Hartford-Middletown
New Britain
New Haven-Meriden
New London-Norwich
Norwalk
Springfield, MA–CT
Stamford, CT–NY
Waterbury
Worcester, MA–CT

Delaware

Dover
Wilmington, DE–NJ–MD–PA

District of Columbia

Washington, DC–MD–VA

Florida

Daytona Beach
Deltona
Fort Lauderdale-Hollywood-Pompano Beach
Fort Myers-Cape Coral
Fort Pierce
Fort Walton Beach
Gainesville
Jacksonville
Kissimmee
Lakeland
Melbourne-Palm Bay
Miami-Hialeah
Naples
Ocala
Orlando
Panama City
Pensacola
Punta Gorda
Sarasota-Bradenton
Spring Hill
Stuart
Tallahassee
Tampa-St. Petersburg-Clearwater
Titusville
Vero Beach
West Palm Beach-Boca Raton-Delray Beach
Winter Haven

Georgia

Albany
Athens
Atlanta
Augusta
Brunswick
Chattanooga
Columbus
Macon
Rome
Savannah
Warner Robins

Hawaii

Honolulu
Kailua

Idaho

Boise City
Idaho Falls
Pocatello

Illinois

Alton
Aurora
Beloit, WI–IL
Bloomington-Normal
Champaign-Urbana
Chicago, IL-Northwestern IN
Crystal Lake
Davenport-Rock Island-Moline, IA–IL
Decatur
Dubuque
Elgin
Joliet
Kankakee
Peoria
Rockford
Round Lake Beach-McHenry, IL–WI
St. Louis, MO–IL
Springfield

Indiana

Anderson
Bloomington
Chicago, IL-Northwestern IN
Elkhart-Goshen
Evansville, IN–KY
Fort Wayne
Indianapolis
Kokomo
Lafayette-West Lafayette
Louisville, KY–IN
Muncie
South Bend-Mishawaka, IN–MI
Terre Haute

Iowa

Cedar Rapids
Davenport-Rock Island-Moline, IA–IL
Des Moines
Dubuque, IA–IL–WI
Iowa City
Omaha, NE–IA
Sioux City, IA–NE–SD
Waterloo-Cedar Falls

Kansas

Kansas City, MO–KS
Lawrence
St. Joseph, MO–KS
Topeka
Wichita

Kentucky

Cincinnati, OH–KY
Clarksville, TN–KY
Evansville, IN–KY
Huntington-Ashland, WV–KY–OH
Lexington-Fayette
Louisville, KY–IN
Owensboro

Louisiana

Alexandria
Baton Rouge
Houma
Lafayette
Lake Charles
Monroe
New Orleans
Shreveport

Slidell

Maine

Bangor
Lewiston-Auburn
Portland
Portsmouth-Dover-Rochester, NH–ME

Maryland

Annapolis
Baltimore
Cumberland
Frederick
Hagerstown, MD–PA–WV
Washington, DC–MD–VA
Wilmington, DE–NJ–MD–PA

Massachusetts

Boston
Brockton
Fall River, MA–RI
Fitchburg-Leominster
Hyannis
Lawrence-Haverhill, MA–NH
Lowell, MA–NH
New Bedford
Pittsfield
Providence-Pawtucket, RI–MA
Springfield, MA–CT
Taunton
Worcester, MA–CT

Michigan

Ann Arbor
Battle Creek
Bay City
Benton Harbor
Detroit
Flint
Grand Rapids
Holland
Jackson
Kalamazoo
Lansing-East Lansing
Muskegon
Port Huron
Saginaw
South Bend-Mishawaka, IN–MI
Toledo, OH–MI

Minnesota

Duluth, MN–WI
Fargo-Moorhead, ND–MN
Grand Forks, ND–MN
La Crosse, WI–MN
Minneapolis-St.Paul
Rochester
St. Cloud

Mississippi

Biloxi-Gulfport
Hattiesburg
Jackson
Memphis, TN–AR–MS
Pascagoula

Missouri

Columbia
Joplin
Kansas City, MO–KS
St. Joseph, MO–KS
St. Louis, MO–IL
Springfield

Montana

Billings
Great Falls
Missoula

Nebraska

Lincoln
Omaha, NE–IA
Sioux City, IA–NE–SD

Nevada

Las Vegas
Reno

New Hampshire

Lawrence-Haverhill, MA–NH
Lowell, MA–NH
Manchester
Nashua
Portsmouth-Dover-Rochester, NH–ME

New Jersey

Allentown-Bethlehem-Easton, PA–NJ
Atlantic City
New York, NY-Northeastern NJ
Philadelphia, PA–NJ
Trenton, NJ–PA
Vineland-Millville
Wilmington, DE–NJ–MD–PA

New Mexico

Albuquerque
El Paso
Las Cruces
Santa Fe

New York

Albany-Schenectady-Troy
Binghamton
Buffalo-Niagara Falls
Danbury, CT–NY
Elmira
Glens Falls
Ithaca
Newburgh
New York, NY–Northeastern NJ
Poughkeepsie
Rochester
Stamford, CT–NY
Syracuse
Utica-Rome

North Carolina

Asheville
Burlington
Charlotte
Durham
Fayetteville
Gastonia
Goldsboro
Greensboro
Greenville
Hickory
High Point
Jacksonville
Kannapolis
Raleigh
Rocky Mount
Wilmington
Winston-Salem

North Dakota

Bismark
Fargo-Moorhead, ND–MN
Grand Forks, ND–MN

Ohio

Akron
Canton
Cincinnati, OH–KY
Cleveland
Columbus
Dayton
Hamilton
Huntington-Ashland, WV–KY–OH
Lima
Lorain-Elyria
Mansfield
Middletown
Newark
Parkersburg, WV–OH
Sharon, PA–OH
Springfield
Steubenville-Weirton, OH–WV–PA
Toledo, OH–MI
Wheeling, WV–OH
Youngstown-Warren

Oklahoma

Fort Smith, AR–OK
Lawton
Oklahoma City
Tulsa

Oregon

Eugene-Springfield
Longview
Medford
Portland-Vancouver, OR–WA
Salem

Pennsylvania

Allentown-Bethlehem-Easton, PA–NJ
Altoona
Erie
Hagerstown, MD–PA–WV
Harrisburg
Johnstown
Lancaster
Monessen
Philadelphia, PA–NJ
Pittsburgh
Pottstown
Reading
Scranton-Wilkes-Barre
Sharon, PA–OH
State College
Steubenville-Weirton, OH–WV–PA
Trenton, NJ–PA
Williamsport
Wilmington, DE–NJ–MD–PA
York

Rhode Island

Fall River, MA–RI
Newport
Providence-Pawtucket, RI–MA

South Carolina

Anderson
Augusta, GA–SC
Charleston
Columbia
Florence
Greenville
Myrtle Beach
Rock Hill
Spartanburg
Sumter

South Dakota

Rapid City
Sioux City, IA–NE–SD
Sioux Falls

Tennessee

Bristol, TN-Bristol, VA

Chattanooga, TN–GA
Clarksville, TN–KY
Jackson
Johnson City
Kingsport, TN–VA
Knoxville
Memphis, TN–AR–MS
Nashville

Texas

Abilene
Amarillo
Austin
Beaumont
Brownsville
Bryan-College Station
Corpus Christi
Dallas-Fort Worth
Denton
El Paso, TX–NM
Galveston
Harlingen
Houston
Killeen
Laredo
Lewisville
Longview
Lubbock
McAllen-Edinburg-Mission
Midland
Odessa
Port Arthur
San Angelo
San Antonio
Sherman-Denison
Temple
Texarkana, TX-Texarkana, AR
Texas City
Tyler
Victoria
Waco
Wichita Falls

Utah

Logan
Ogden
Provo-Orem
Salt Lake City

Vermont

Burlington

Virginia

Bristol, TN-Bristol, VA
Charlottesville
Danville
Fredericksburg
Kingsport, TN–VA
Lynchburg
Norfolk-Virginia Beach-Newport News
Petersburg
Richmond
Roanoke
Washington, DC–MD–VA

Washington

Bellingham
Bremerton
Longview, WA–OR
Olympia
Portland-Vancouver, OR–WA
Richland-Kennewick-Pasco
Seattle
Spokane
Tacoma
Yakima

West Virginia

Charleston
Cumberland, MD–WV
Hagerstown, MD–PA–WV
Huntington-Ashland, WV–KY–OH
Parkersburg, WV–OH
Steubenville-Weirton, OH–WV–PA
Wheeling, WV–OH

Wisconsin

Appleton-Neenah
Beloit, WI–IL
Duluth, MN–WI
Eau Claire
Green Bay
Janesville
Kenosha
La Crosse, WI–MN
Madison
Milwaukee
Oshkosh
Racine
Round Lake Beach-McHenry, IL–WI
Sheboygan
Wausau

Wyoming

Casper
Cheyenne

Puerto Rico

Aquadilla
Arecibo
Caguas
Cayey
Humacao
Mayaguez
Ponce
San Juan
Vega Baja-Manati

BILLING CODE 6560–50–P

Appendix 4 to the Preamble—No Exposure Certification Form

NPDES FORM 3510-11

United States Environmental Protection Agency
Washington, DC 20460

Form Approved
OMB No. 2040-0211

NO EXPOSURE CERTIFICATION for Exclusion from NPDES Storm Water Permitting

Submission of this No Exposure Certification constitutes notice that the entity identified in Section A does not require permit authorization for its storm water discharges associated with industrial activity in the State identified in Section B under EPA's Storm Water Multi-Sector General Permit due to the existence of a condition of no exposure.

A condition of no exposure exists at an industrial facility when all industrial materials and activities are protected by a storm resistant shelter to prevent exposure to rain, snow, snowmelt, and/or runoff. Industrial materials or activities include, but are not limited to, material handling equipment or activities, industrial machinery, raw materials, intermediate products, by-products, final products, or waste products. Material handling activities include the storage, loading and unloading, transportation, or conveyance of any raw material, intermediate product, final product or waste product. A storm resistant shelter is not required for the following industrial materials and activities:

- drums, barrels, tanks, and similar containers that are tightly sealed, provided those containers are not deteriorated and do not leak. "Sealed" means banded or otherwise secured and without operational taps or valves;
- adequately maintained vehicles used in material handling; and
- final products, other than products that would be mobilized in storm water discharges (e.g., rock salt).

A No Exposure Certification must be provided for each facility qualifying for the no exposure exclusion. In addition, the exclusion from NPDES permitting is available on a facility-wide basis only, not for individual outfalls. If any industrial activities or materials are or will be exposed to precipitation, the facility is not eligible for the no exposure exclusion.

By signing and submitting this No Exposure Certification form, the entity in Section A is certifying that a condition of no exposure exists at its facility or site, and is obligated to comply with the terms and conditions of 40 CFR 122.26(g).

ALL INFORMATION MUST BE PROVIDED ON THIS FORM.

Detailed instructions for completing this form and obtaining the no exposure exclusion are provided on pages 3 and 4.

A. Facility Operator Information

1. Name: _____ 2. Phone: _____

3. Mailing Address: a. Street: _____

b. City: _____ c. State: ____ d. Zip Code: _____-____

B. Facility/Site Location Information

1. Facility Name: _____

2. a. Street Address: _____

b. City: _____ c. County: _____

d. State: ____ e. Zip Code: _____-____

3. Is the facility located on Indian Lands? Yes ☐ No ☐

4. Is this a Federal facility? Yes ☐ No ☐

5. a. Latitude: ___° ___' ___" b. Longitude: ___° ___' ___"

6. a. Was the facility or site previously covered under an NPDES storm water permit? Yes ☐ No ☐

b. If yes, enter NPDES permit number: _____

7. SIC/Activity Codes: Primary: ____ Secondary (if applicable): ____

8. Total size of site associated with industrial activity: _____ acres

9. a. Have you paved or roofed over a formerly exposed, pervious area in order to qualify for the no exposure exclusion? Yes ☐ No ☐

b. If yes, please indicate approximately how much area was paved or roofed over. Completing this question does not disqualify you for the no exposure exclusion. However, your permitting authority may use this information in considering whether storm water discharges from your site are likely to have an adverse impact on water quality, in which case you could be required to obtain permit coverage.

Less than one acre ☐ One to five acres ☐ More than five acres ☐

NPDES FORM 3510-11

EPA

NO EXPOSURE CERTIFICATION for Exclusion from NPDES Storm Water Permitting

Form Approved OMB No. 2040-0211

C. Exposure Checklist

Are any of the following materials or activities exposed to precipitation, now or in the foreseeable future? (Please check either "Yes" or "No" in the appropriate box.) **If you answer "Yes" to any of these questions (1) through (11), you are not eligible for the no exposure exclusion.**

	Yes	No
1. Using, storing or cleaning industrial machinery or equipment, and areas where residuals from using, storing or cleaning industrial machinery or equipment remain and are exposed to storm water	☐	☐
2. Materials or residuals on the ground or in storm water inlets from spills/leaks	☐	☐
3. Materials or products from past industrial activity	☐	☐
4. Material handling equipment (except adequately maintained vehicles)	☐	☐
5. Materials or products during loading/unloading or transporting activities	☐	☐
6. Materials or products stored outdoors (except final products intended for outside use [e.g., new cars] where exposure to storm water does not result in the discharge of pollutants)	☐	☐
7. Materials contained in open, deteriorated or leaking storage drums, barrels, tanks, and similar containers	☐	☐
8. Materials or products handled/stored on roads or railways owned or maintained by the discharger	☐	☐
9. Waste material (except waste in covered, non-leaking containers [e.g., dumpsters])	☐	☐
10. Application or disposal of process wastewater (unless otherwise permitted)	☐	☐
11. Particulate matter or visible deposits of residuals from roof stacks and/or vents not otherwise regulated (i.e., under an air quality control permit) and evident in the storm water outflow	☐	☐

D. Certification Statement

I certify under penalty of law that I have read and understand the eligibility requirements for claiming a condition of "no exposure" and obtaining an exclusion from NPDES storm water permitting.

I certify under penalty of law that there are no discharges of storm water contaminated by exposure to industrial activities or materials from the industrial facility or site identified in this document (except as allowed under 40 CFR 122.26(g)(2)).

I understand that I am obligated to submit a no exposure certification form once every five years to the NPDES permitting authority and, if requested, to the operator of the local municipal separate storm sewer system (MS4) into which the facility discharges (where applicable). I understand that I must allow the NPDES permitting authority, or MS4 operator where the discharge is into the local MS4, to perform inspections to confirm the condition of no exposure and to make such inspection reports publicly available upon request. I understand that I must obtain coverage under an NPDES permit prior to any point source discharge of storm water from the facility.

Additionally, I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is to the best of my knowledge and belief true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Print Name: _____

Print Title: _____

Signature: _____

Date: _____

NPDES FORM 3510-11

EPA

Instructions for the NO EXPOSURE CERTIFICATION for Exclusion from NPDES Storm Water Permitting

Form Approved OMB No. 2040-0211

Who May File a No Exposure Certification

Federal law at 40 CFR Part 122.26 prohibits point source discharges of storm water associated with industrial activity to waters of the U.S. without a National Pollutant Discharge Elimination System (NPDES) permit. However, NPDES permit coverage is not required for discharges of storm water associated with industrial activities identified at 40 CFR 122.26(b)(14)(i)-(ix) and (xi) if the discharger can certify that a condition of "no exposure" exists at the industrial facility or site.

Storm water discharges from construction activities identified in 40 CFR 122.26(b)(14)(x) and (b)(15) are not eligible for the no exposure exclusion.

Obtaining and Maintaining the No Exposure Exclusion

This form is used to certify that a condition of no exposure exists at the industrial facility or site described herein. This certification is only applicable in jurisdictions where EPA is the NPDES permitting authority and must be re-submitted at least once every five years.

The industrial facility operator must maintain a condition of no exposure at its facility or site in order for the no exposure exclusion to remain applicable. If conditions change resulting in the exposure of materials and activities to storm water, the facility operator must obtain coverage under an NPDES storm water permit immediately.

Where to File the No Exposure Certification Form

Mail the completed no exposure certification form to:

Storm Water No Exposure Certification (4203)
USEPA
401 M Street, SW
Washington, D.C. 20460

Completing the Form

You must type or print, using uppercase letters, in appropriate areas only. Enter only one character per space (i.e., between the marks). Abbreviate if necessary to stay within the number of characters allowed for each item. Use one space for breaks between words. One form must be completed for each facility or site for which you are seeking to certify a condition of no exposure. Additional guidance on completing this form can be accessed through EPA's web site at www.epa.gov/owm/sw. Please make sure you have addressed all applicable questions and have made a photocopy for your records before sending the completed form to the above address.

Section A. Facility Operator Information

1. Provide the legal name of the person, firm, public organization, or any other entity that operates the facility or site described in this certification. The name of the operator may or may not be the same as the name of the facility. The operator is the legal entity that controls the facility's operation, rather than the plant or site manager.

2. Provide the telephone number of the facility operator.

3. Provide the mailing address of the operator (P.O. Box numbers may be used). Include the city, state, and zip code. All correspondence will be sent to this address.

Section B. Facility/Site Location Information

1. Enter the official or legal name of the facility or site.

2. Enter the complete street address (if no street address exists, provide a geographic description [e.g., Intersection of Routes 9 and 55]), city, county, state, and zip code. Do not use a P.O. Box number.

3. Indicate whether the facility is located on Indian Lands.

4. Indicate whether the industrial facility is operated by a department or agency of the Federal Government (see also Section 313 of the Clean Water Act).

5. Enter the latitude and longitude of the approximate center of the facility or site in degrees/minutes/seconds. Latitude and longitude can be obtained from United States Geological Survey (USGS) quadrangle or topographic maps, by calling 1-(888) ASK-USGS, or by accessing EPA's web site at http://www.epa.gov/owm/sw/industry/index.htm and selecting Latitude and Longitude Finders under the Resources/Permit section.

   Latitude and longitude for a facility in decimal form must be converted to degrees (°), minutes (′), and seconds (″) for proper entry on the certification form. To convert decimal latitude or longitude to degrees/minutes/seconds, follow the steps in the following example.

   Example: Convert decimal latitude 45.1234567 to degrees (°), minutes (′), and seconds (″).

   a) The numbers to the left of the decimal point are the degrees: 45°.

   b) To obtain minutes, multiply the first four numbers to the right of the decimal point by 0.006: 1234 x 0.006 = 7.404.

   c) The numbers to the left of the decimal point in the result obtained in (b) are the minutes: 7′.

   d) To obtain seconds, multiply the remaining three numbers to the right of the decimal from the result obtained in (b) by 0.06: 404 x 0.06 = 24.24. Since the numbers to the right of the decimal point are not used, the result is 24″.

   e) The conversion for 45.1234567 = 45° 7′ 24″.

6. Indicate whether the facility was previously covered under an NPDES storm water permit. If so, include the permit number.

7. Enter the 4-digit SIC code which identifies the facility's primary activity, and second 4-digit SIC code identifying the facility's secondary activity, if applicable. SIC codes can be obtained from the Standard Industrial Classification Manual, 1987.

8. Enter the total size of the site associated with industrial activity in acres. Acreage may be determined by dividing square footage by 43,560, as demonstrated in the following example.

   Example: Convert 54,450 ft^2 to acres

   Divide 54,450 ft^2 by 43,560 square feet per acre:
   54,450 $ft^2 \div 43{,}560\ ft^2/acre = 1.25$ acres.

9. Check "Yes" or "No" as appropriate to indicate whether you have paved or roofed over a formerly exposed, pervious area (i.e., lawn, meadow, dirt or gravel road/parking lot) in order to qualify for no exposure. If yes, also indicate approximately how much area was paved or roofed over and is now impervious area.

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Instructions for the NO EXPOSURE CERTIFICATION for Exclusion from NPDES Storm Water Permitting

Form Approved OMB No. 2040-0211

Section C. Exposure Checklist

Check "Yes" or "No" as appropriate to describe the exposure conditions at your facility. If you answer "Yes" to **ANY** of the questions (1) through (11) in this section, a potential for exposure exists at your site and you cannot certify to a condition of no exposure. You must obtain (or already have) coverage under an NPDES storm water permit. After obtaining permit coverage, you can institute modifications to eliminate the potential for a discharge of storm water exposed to industrial activity, and then certify to a condition of no exposure.

Section D. Certification Statement

Federal statutes provide for severe penalties for submitting false information on this application form. Federal regulations require this application to be signed as follows:

For a corporation: by a responsible corporate officer, which means:

(i) president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy or decision making functions for the corporation, or

(ii) the manager of one or more manufacturing, production, or operating facilities, provided the manager is authorized to make management decisions which govern the operation of the regulated facility including having the explicit or implicit duty of making major capital investment recommendations, and initiating and directing other comprehensive measures to assure long term environmental compliance with environmental laws and regulations; the manager can ensure that the necessary systems are established or actions taken to gather complete and accurate information for permit application requirements; and where authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures;

For a partnership or sole proprietorship: by a general partner or the proprietor; or

For a municipal, State, Federal, or other public facility: by either a principal executive or ranking elected official.

Paperwork Reduction Act Notice

Public reporting burden for this certification is estimated to average 1.0 hour per certification, including time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Burden means the total time, effort, or financial resources expended by persons to generate, maintain, retain, or disclose to provide information to or for a Federal agency. This includes the time needed to review instructions; develop, acquire, install, and utilize technology and systems for the purposes of collecting, validating, and verifying information, processing and maintaining information, and disclosing and providing information; adjust the existing ways to comply with any previously applicable instructions and requirements; train personnel to be able to respond to a collection of information; search data sources; complete and review the collection of information; and transmit or otherwise disclose the information. An agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a currently valid OMB control number. Send comments regarding the burden estimate, any other aspect of the collection of information, or suggestions for improving this form, including any suggestions which may increase or reduce this burden to: Director, OPPE Regulatory Information Division (2137), USEPA, 401 M Street, SW, Washington, D.C. 20460. Include the OMB control number of this form on any correspondence. Do not send the completed No Exposure Certification form to this address.

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BILLING CODE 6560–50–C

Appendix 5 to Preamble—Regulatory Flexibility for Small Entities

A. Regulatory Flexibility for Small Municipal Storm Sewer Systems (MS4s)

Different Compliance, Reporting, or Timetables That Are Responsive to Resources of Small Entities

NPDES permitting authorities can issue general permits instead of requiring individual permits. This flexibility avoids the high application costs and administrative burden associated with individual permits.

NPDES permitting authorities can specify a time period of up to five years for small MS4s to fully develop and implement their program

Analytic monitoring is not required.

After the first permit term and subsequent permit terms, submittal of a summary report is only required in years two and four (Phase I municipalities are currently required to submit a detailed report each year).

A brief reporting format is encouraged to facilitate compiling and analyzing data from submitted reports. EPA intends to develop a model form for this purpose.

NPDES Permitting Authorities can phase in permit coverage for small MS4s serving jurisdictions with a population under 10,000 on a schedule consistent with a State watershed permitting approach.

Clarifying, Consolidating, or Simplifying Compliance and Reporting Requirements

The rule avoids duplication in permit requirements by allowing NPDES permitting authorities to include permit conditions that direct an MS4 to follow the requirements of a qualifying local program rather than the requirements of a minimum measure. Compliance with these programs is considered compliance with the NPDES general permit.

The rule allows NPDES permitting authorities to recognize existing responsibilities among different municipal entities to satisfy obligations for the minimum control measures.

A further alternative allows a small MS4 to satisfy its NPDES permit obligations if another governmental entity is already implementing a minimum control measure in the jurisdiction of the small MS4. The following conditions must be met:

1. The other entity is implementing the control measure,
2. The particular control measure (or component thereof) is at least as stringent as the corrersponding NPDES permit requirement, and
3. The other entity agrees to implement the control measure on your behalf.

The rule allows a covered small MS4 to ''piggy-back'' on to the storm water management program of an adjoining Phase I MS4. A small MS4 is waived from the application requirements of § 122.26(d)(1)(iii), (iv) and (d)(2)(iii) [discharge characterization] and may satisfy the requirements of § 122.26(d)(1)(v) and (d)(2)(iv) [identifying a management plan] by referencing the adjoining Phase I MS4's storm water management plan.

The rule accommodates the use of the watershed approach through NPDES general permits that could be issued on a watershed basis. The small MS4 can develop measures that are tailored to meet their watershed requirements. The small MS4's storm water management program can tie into watershed-wide plans.

Performance Rather Than Design Standards for Small Entities

Small governmental jurisdictions whose MS4s are covered by this rule are allowed to choose the best management practices (BMPs) to be implemented and the measurable goals for each of the minimum control measures:

1. Public education and outreach on storm water impacts
2. Public Involvement/Participation
3. Illicit discharge detection and elimination

4. Construction site storm water runoff control

5. Post-construction storm water management in new development and redevelopment

6. Pollution prevention/good housekeeping for municipal operations

EPA will provide guidance and recommend, but not mandate, certain BMPs for some of the minimum control measures listed above. States can provide guidance to supplement or supplant EPA guidance.

Small MS4s can identify the measurable goals for each of the minimum control measures listed above. In their reports to the NPDES permitting authority, the small MS4s must evaluate their progress towards achievement of their identified measurable goals.

Waivers for Small Entities From Coverage

The rule allows permitting authorities to waive from coverage MS4s operated by small governmental jurisdictions located within an urbanized area and serving a population less than 1,000 people where the permitting authority has determined the MS4 is not contributing substantially to the pollutant loadings of an interconnected MS4 and, if the MS4 discharges pollutants that have been identified as a cause of impairment in the receiving water of the MS4 then the permitting authority has determined that storm water controls are not needed based on a TMDL that addresses the pollutants of concern.

The rule allows the permitting authority to waive from coverage MS4s serving a population under 10,000 where the permitting authority has evaluated all waters that receive a discharge from the MS4 and the permitting authority has determined that storm water controls are not needed based on a TMDL that addresses the pollutants of concern and future discharges do not have the potential to result in exceedances of water quality standards.

B. Regulatory Flexibility for Small Construction Activities

Different Compliance, Reporting, or Timetables That Are Responsive to Resources of Small Entities

The rule gives NPDES permitting authorities discretion not to require the submittal of a notice of intent (NOI) for coverage under a NPDES general permit, thereby reducing administrative and financial burden. All construction sites disturbing greater than 5 acres must submit an NOI.

Clarifying, Consolidating, or Simplifying Compliance and Reporting Requirements

The rule avoids duplication by allowing the NPDES permitting authority to incorporate by reference State, Tribal, or local programs under a NPDES general permit. Compliance with these programs is considered compliance with the NPDES general permit.

Performance Rather Than Design Standards for Small Entities

The operator of a covered construction activity selects and implement the BMPs most appropriate for the construction site based on the operator's storm water pollution prevention plan.

Waivers for Small Entities From Coverage

Waivers could be granted based on the use of a rainfall erosivity factor or a comprehensive analysis of water quality impacts.

(A) *Low rainfall waiver:* When the rainfall erosivity factor (''R'' from Revised Universal Soil Loss Equation) is less than 5 during the period of construction activity, a permit is not required.

(B) *Determination based on Water Quality Analysis:* The NPDES permitting authority can waive from coverage construction activities disturbing from 1 acre up to 5 acres of land where storm water controls are not needed based on:

1. A TMDL approved or established by EPA that addresses the pollutants of concern, or

2. For non-impaired waters, an equivalent analysis that determines that such allocations are not needed to protect water quality based on consideration of existing in-stream concentrations, expected growth in pollutant contributions from all sources, and a margin of safety.

C. Regulatory Flexibility for Industrial/Commercial Facilities

Waivers for Small Entities From Coverage

The rule provides a ''no-exposure'' waiver provision for Phase I industrial/commercial facilities. Qualifying facilities seeking this provision simply need to complete a self-certification form indicating that no industrial materials or activities are exposed to rain, snow, snow melt and/or runoff.

Appendix 6 of Preamble—Governmental Entities Located Fully or Partially Within an Urbanized Area

(This is a reference list only, *not* a list of all operators of small MS4s subject to §§ 122.32–122.36. For example, a listed governmental entity is only regulated if it operates a small MS4 within an ''urbanized area'' boundary as determined by the Bureau of the Census. Furthermore, entities such as military bases, large hospitals, prison complexes, universities, sewer districts, and highway departments that operate a small MS4 within an urbanized area are also subject to the permitting regulations but are not individually listed here. See § 122.26(b)(16) for the definition of a small MS4 and § 122.32(a) for the definition of a regulated small MS4.)

(Source: 1990 Census of Population and Housing, U.S. Bureau of the Census. This list is subject to change with the Decennial Census)

AL Anniston city
AL Attalla city
AL Auburn city
AL Autauga County
AL Blue Mountain town
AL Calhoun County
AL Colbert County
AL Dale County
AL Decatur city
AL Dothan city
AL Elmore County
AL Etowah County
AL Flint City town
AL Florence city
AL Gadsden city
AL Glencoe city
AL Grimes town
AL Hartselle city
AL Hobson City town
AL Hokes Bluff city
AL Houston County
AL Kinsey town
AL Lauderdale County
AL Lee County
AL Limestone County
AL Madison County
AL Midland City town
AL Montgomery County
AL Morgan County
AL Muscle Shoals city
AL Napier Field town
AL Northport city
AL Opelika city
AL Oxford city
AL Phenix City city
AL Prattville city
AL Priceville town
AL Rainbow City city
AL Russell County
AL Sheffield city
AL Southside city
AL Sylvan Springs town
AL Talladega County
AL Tuscaloosa city
AL Tuscaloosa County
AL Tuscumbia city
AL Weaver city
AR Alexander town
AR Barling city
AR Benton County
AR Cammack Village city
AR Crawford County
AR Crittenden County
AR Farmington city
AR Fayetteville city
AR Fort Smith city
AR Greenland town
AR Jacksonville city
AR Jefferson County
AR Johnson city
AR Marion city
AR Miller County
AR North Little Rock city
AR Pine Bluff city
AR Pulaski County
AR Saline County
AR Sebastian County
AR Shannon Hills city
AR Sherwood city
AR Springdale city
AR Sunset town
AR Texarkana city
AR Van Buren city
AR Washington County
AR West Memphis city
AR White Hall city
AZ Apache Junction city
AZ Chandler city
AZ El Mirage town
AZ Gilbert town
AZ Guadalupe town
AZ Maricopa County
AZ Oro Valley town
AZ Paradise Valley town
AZ Peoria city
AZ Pinal County

AZ South Tucson city
AZ Surprise town
AZ Tolleson city
AZ Youngtown town
AZ Yuma city
AZ Yuma County
CA Apple Valley town
CA Belvedere city
CA Benicia city
CA Brentwood city
CA Butte County
CA Capitola city
CA Carmel-by-the-Sea city
CA Carpinteria city
CA Ceres city
CA Chico city
CA Compton city
CA Corte Madera town
CA Cotati city
CA Davis city
CA Del Rey Oaks city
CA Fairfax town
CA Hesperia city
CA Imperial County
CA Lakewood city
CA Lancaster city
CA Larkspur city
CA Lodi city
CA Lompoc city
CA Marin County
CA Marina city
CA Marysville city
CA Merced city
CA Merced County
CA Mill Valley city
CA Monterey city
CA Monterey County
CA Morgan Hill city
CA Napa city
CA Napa County
CA Novato city
CA Pacific Grove city
CA Palm Desert city
CA Palmdale city
CA Piedmont city
CA Placer County
CA Redding city
CA Rocklin city
CA Rohnert Park city
CA Roseville city
CA Ross town
CA San Anselmo town
CA San Buenaventura (Ventura) city
CA San Francisco city
CA San Joaquin County
CA San Luis Obispo city
CA San Luis Obispo County
CA San Rafael city
CA Sand City city
CA Santa Barbara city
CA Santa Barbara County
CA Santa Cruz city
CA Santa Cruz County
CA Santa Maria city
CA Sausalito city
CA Scotts Valley city
CA Seaside city
CA Shasta County
CA Solano County
CA Sonoma County
CA Stanislaus County
CA Suisun City city
CA Sutter County
CA Tiburon town
CA Tulare County
CA Vacaville city
CA Victorville city
CA Villa Park city
CA Visalia city
CA Watsonville city
CA West Sacramento city
CA Yolo County
CA Yuba City city
CA Yuba County
CO Adams County
CO Arvada city
CO Boulder city
CO Boulder County
CO Bow Mar town
CO Broomfield city
CO Cherry Hills Village city
CO Columbine Valley town
CO Commerce City city
CO Douglas County
CO Edgewater city
CO El Paso County
CO Englewood city
CO Evans city
CO Federal Heights city
CO Fort Collins city
CO Fountain city
CO Garden City town
CO Glendale city
CO Golden city
CO Grand Junction city
CO Greeley city
CO Greenwood Village city
CO Jefferson County
CO La Salle town
CO Lakeside town
CO Larimer County
CO Littleton city
CO Longmont city
CO Manitou Springs city
CO Mesa County
CO Mountain View town
CO Northglenn city
CO Pueblo city
CO Pueblo County
CO Sheridan city
CO Thornton city
CO Weld County
CO Westminster city
CO Wheat Ridge city
CT Ansonia city
CT Avon town
CT Beacon Falls town
CT Berlin town
CT Bethel town
CT Bloomfield town
CT Bozrah town
CT Branford town
CT Bridgeport city
CT Bristol city
CT Brookfield town
CT Burlington town
CT Cheshire town
CT Cromwell town
CT Danbury city
CT Darien town
CT Derby city
CT Durham town
CT East Granby town
CT East Hartford town
CT East Haven town
CT East Lyme town
CT East Windsor town
CT Easton town
CT Ellington town
CT Enfield town
CT Fairfield County
CT Fairfield town
CT Farmington town
CT Franklin town
CT Glastonbury town
CT Greenwich town
CT Groton city
CT Groton town
CT Guilford town
CT Hamden town
CT Hartford city
CT Hartford County
CT Ledyard town
CT Lisbon town
CT Litchfield County
CT Manchester town
CT Meriden city
CT Middlebury town
CT Middlefield town
CT Middlesex County
CT Middletown city
CT Milford city (remainder)
CT Monroe town
CT Montville town
CT Naugatuck borough
CT New Britain city
CT New Canaan town
CT New Fairfield town
CT New Haven city
CT New Haven County
CT New London city
CT New London County
CT New Milford town
CT Newington town
CT Newtown town
CT North Branford town
CT North Haven town
CT Norwalk city
CT Norwich city
CT Orange town
CT Oxford town
CT Plainville town
CT Plymouth town
CT Portland town
CT Preston town
CT Prospect town
CT Rocky Hill town
CT Seymour town
CT Shelton city
CT Sherman town
CT Somers town
CT South Windsor town
CT Southington town
CT Sprague town
CT Stonington town
CT Stratford town
CT Suffield town
CT Thomaston town
CT Thompson town
CT Tolland County
CT Tolland town
CT Trumbull town
CT Vernon town
CT Wallingford town
CT Waterbury city
CT Waterford town
CT Watertown town
CT West Hartford town
CT West Haven city
CT Weston town
CT Westport town
CT Wethersfield town
CT Wilton town
CT Windham County
CT Windsor Locks town
CT Windsor town
CT Wolcott town
CT Woodbridge town

CT Woodmont borough
DE Camden town
DE Dover city
DE Kent County
DE Newark city
DE Wyoming town
FL Alachua County
FL Baldwin town
FL Bay County
FL Belleair Shore town
FL Biscayne Park village
FL Brevard County
FL Callaway city
FL Cape Canaveral city
FL Cedar Grove town
FL Charlotte County
FL Cinco Bayou town
FL Clay County
FL Cocoa Beach city
FL Cocoa city
FL Collier County
FL Daytona Beach city
FL Daytona Beach Shores city
FL Destin city
FL Edgewater city
FL El Portal village
FL Florida City city
FL Fort Pierce city
FL Fort Walton Beach city
FL Gainesville city
FL Gulf Breeze city
FL Hernando County
FL Hillsboro Beach town
FL Holly Hill city
FL Indialantic town
FL Indian Harbour Beach city
FL Indian River County
FL Indian River Shores town
FL Indian Shores town
FL Kissimmee city
FL Lazy Lake village
FL Lynn Haven city
FL Malabar town
FL Marion County
FL Martin County
FL Mary Esther city
FL Melbourne Beach town
FL Melbourne city
FL Melbourne Village town
FL Naples city
FL New Smyrna Beach city
FL Niceville city
FL Ocala city
FL Ocean Breeze Park town
FL Okaloosa County
FL Orange Park town
FL Ormond Beach city
FL Osceola County
FL Palm Bay city
FL Panama City city
FL Parker city
FL Ponce Inlet town
FL Port Orange city
FL Port St. Lucie city
FL Punta Gorda city
FL Rockledge city
FL Santa Rosa County
FL Satellite Beach city
FL Sewall's Point town
FL Shalimar town
FL South Daytona city
FL Springfield city
FL St. Johns County
FL St. Lucie County
FL St. Lucie village
FL Stuart city
FL Sweetwater city
FL Titusville city
FL Valparaiso city
FL Vero Beach city
FL Virginia Gardens village
FL Volusia County
FL Walton County
FL Weeki Wachee city
FL West Melbourne city
FL Windermere town
GA Albany city
GA Athens city
GA Bartow County
GA Brunswick city
GA Catoosa County
GA Centerville city
GA Chattahoochee County
GA Cherokee County
GA Chickamauga city
GA Clarke County
GA Columbia County
GA Conyers city
GA Dade County
GA Dougherty County
GA Douglas County
GA Douglasville city
GA Fayette County
GA Floyd County
GA Fort Oglethorpe city
GA Glynn County
GA Grovetown city
GA Henry County
GA Houston County
GA Jones County
GA Lee County
GA Lookout Mountain city
GA Mountain Park city
GA Oconee County
GA Payne city
GA Rockdale County
GA Rome city
GA Rossville city
GA Stockbridge city
GA Vernonburg town
GA Walker County
GA Warner Robins city
GA Winterville city
GA Woodstock city
IA Altoona city
IA Asbury city
IA Bettendorf city
IA Black Hawk County
IA Buffalo city
IA Carter Lake city
IA Cedar Falls city
IA Clive city
IA Coralville city
IA Council Bluffs city
IA Dallas County
IA Dubuque city
IA Dubuque County
IA Elk Run Heights city
IA Evansdale city
IA Hiawatha city
IA Iowa City city
IA Johnson County
IA Johnston city
IA Le Claire city
IA Linn County
IA Marion city
IA Norwalk city
IA Panorama Park city
IA Pleasant Hill city
IA Polk County
IA Pottawattamie County
IA Raymond city
IA Riverdale city
IA Robins city
IA Scott County
IA Sergeant Bluff city
IA Sioux City city
IA University Heights city
IA Urbandale city
IA Warren County
IA Waterloo city
IA West Des Moines city
IA Windsor Heights city
IA Woodbury County
ID Ada County
ID Ammon city
ID Bannock County
ID Bonneville County
ID Chubbuck city
ID Idaho Falls city
ID Iona city
ID Pocatello city
ID Power County
IL Addison township
IL Addison village
IL Algonquin township
IL Algonquin village
IL Alorton village
IL Alsip village
IL Alton city
IL Antioch township
IL Antioch village
IL Arlington Heights village
IL Aroma Park village
IL Aroma township
IL Aurora city
IL Aurora township
IL Avon township
IL Ball township
IL Bannockburn village
IL Barrington township
IL Barrington village
IL Bartlett village
IL Bartonville village
IL Batavia city
IL Batavia township
IL Beach Park village
IL Bedford Park village
IL Belleville city
IL Bellevue village
IL Bellwood village
IL Bensenville village
IL Benton township
IL Berkeley village
IL Berwyn city
IL Bethalto village
IL Blackhawk township
IL Bloom township
IL Bloomingdale township
IL Bloomingdale village
IL Bloomington city
IL Bloomington township
IL Blue Island city
IL Bolingbrook village
IL Bourbonnais township
IL Bourbonnais village
IL Bowling township
IL Bradley village
IL Bremen township
IL Bridgeview village
IL Bristol township
IL Broadview village
IL Brookfield village
IL Brooklyn village
IL Buffalo Grove village
IL Burbank city
IL Burnham village
IL Burr Ridge village

IL Burritt township
IL Burton township
IL Cahokia village
IL Calumet City city
IL Calumet Park village
IL Calumet township
IL Canteen township
IL Capital township
IL Carbon Cliff village
IL Carol Stream village
IL Carpentersville Village
IL Cary village
IL Caseyville township
IL Caseyville village
IL Centreville city
IL Centreville township
IL Champaign city
IL Champaign County
IL Champaign township
IL Channahon township
IL Cherry Valley township
IL Cherry Valley village
IL Chicago city
IL Chicago Heights city
IL Chicago Ridge village
IL Chouteau township
IL Cicero town
IL Cincinnati township
IL Clarendon Hills village
IL Coal Valley township
IL Coal Valley village
IL Collinsville city
IL Collinsville township
IL Colona township
IL Colona village
IL Columbia city
IL Country Club Hills city
IL Countryside city
IL Crest Hill city
IL Crestwood village
IL Crete township
IL Crete village
IL Creve Coeur village
IL Crystal Lake city
IL Cuba township
IL Curran township
IL Darien city
IL Decatur city
IL Decatur township
IL Deer Park village
IL Deerfield township
IL Deerfield village
IL Des Plaines city
IL Dixmoor village
IL Dolton village
IL Dorr township
IL Downers Grove township
IL Downers Grove village
IL Dry Grove township
IL Du Page township
IL Dundee township
IL Dunleith township
IL Dupo village
IL East Alton village
IL East Dubuque city
IL East Dundee village
IL East Hazel Crest village
IL East Moline city
IL East Peoria city
IL East St. Louis city
IL Edwardsville city
IL Edwardsville township
IL Ela township
IL Elgin city
IL Elgin township
IL Elk Grove township
IL Elk Grove Village village
IL Elm Grove township
IL Elmhurst city
IL Elmwood Park village
IL Evanston city
IL Evergreen Park village
IL Fairmont City village
IL Fairview Heights city
IL Flossmoor village
IL Fondulac township
IL Ford Heights village
IL Forest Park village
IL Forest View village
IL Forsyth village
IL Fort Russell township
IL Foster township
IL Fox Lake village
IL Fox River Grove village
IL Frankfort township
IL Frankfort village
IL Franklin Park village
IL Fremont township
IL Gardner township
IL Geneva city
IL Geneva township
IL Gilberts village
IL Glen Carbon village
IL Glen Ellyn village
IL Glencoe village
IL Glendale Heights village
IL Glenview village
IL Glenwood village
IL Godfrey township
IL Golf village
IL Grafton township
IL Grandview village
IL Granite City city
IL Grant township
IL Grayslake village
IL Green Oaks village
IL Green Rock city
IL Groveland township
IL Gurnee village
IL Hainesville village
IL Hampton township
IL Hampton village
IL Hanna township
IL Hanover Park village
IL Hanover township
IL Harlem township
IL Harristown township
IL Harristown village
IL Hartford village
IL Harvey city
IL Harwood Heights village
IL Hawthorn Woods village
IL Hazel Crest village
IL Henry County
IL Hensley township
IL Hickory Hills city
IL Hickory Point township
IL Highland Park city
IL Highwood city
IL Hillside village
IL Hinsdale village
IL Hodgkins village
IL Hoffman Estates village
IL Hollis township
IL Homer township
IL Hometown city
IL Homewood village
IL Indian Creek village
IL Indian Head Park village
IL Inverness village
IL Itasca village
IL Jarvis township
IL Jerome village
IL Jo Daviess County
IL Joliet city
IL Joliet township
IL Justice village
IL Kane County
IL Kankakee city
IL Kankakee County
IL Kankakee township
IL Kendall County
IL Kenilworth village
IL Kickapoo township
IL Kildeer village
IL La Grange Park village
IL La Grange village
IL Lake Barrington village
IL Lake Bluff village
IL Lake Forest city
IL Lake in the Hills village
IL Lake Villa township
IL Lake Villa village
IL Lake Zurich village
IL Lakemoor village
IL Lakewood village
IL Lansing village
IL Leland Grove city
IL Lemont township
IL Leyden township
IL Libertyville township
IL Libertyville village
IL Limestone township
IL Lincolnshire village
IL Lincolnwood village
IL Lindenhurst village
IL Lisle township
IL Lisle village
IL Lockport city
IL Lockport township
IL Lombard village
IL Long Creek township
IL Long Grove village
IL Loves Park city
IL Lynwood village
IL Lyons township
IL Lyons village
IL Machesney Park village
IL Macon County
IL Madison city
IL Madison County
IL Maine township
IL Markham city
IL Marquette Heights city
IL Maryville village
IL Matteson village
IL Maywood village
IL McCook village
IL McCullom Lake village
IL McHenry city
IL McHenry County
IL McHenry township
IL McLean County
IL Medina township
IL Melrose Park village
IL Merrionette Park village
IL Midlothian village
IL Milan village
IL Milton township
IL Moline city
IL Moline township
IL Monee township
IL Monroe County
IL Montgomery village
IL Moro township
IL Morton Grove village
IL Morton township
IL Morton village

IL Mount Prospect village
IL Mount Zion township
IL Mount Zion village
IL Mundelein village
IL Nameoki township
IL Naperville city
IL Naperville township
IL National City village
IL New Lenox township
IL New Lenox village
IL New Millford village
IL New Trier township
IL Newport township
IL Niles township
IL Niles village
IL Normal town
IL Normal township
IL Norridge village
IL North Aurora village
IL North Barrington village
IL North Chicago city
IL North Pekin village
IL North Riverside village
IL Northbrook village
IL Northfield township
IL Northfield village
IL Northlake city
IL Norwood Park township
IL Norwood village
IL Nunda township
IL Oak Brook village
IL Oak Forest city
IL Oak Grove village
IL Oak Lawn village
IL Oak Park village
IL Oakbrook Terrace city
IL Oakley township
IL Oakwood Hills village
IL O'Fallon city
IL O'Fallon township
IL Olympia Fields village
IL Orland Hills village
IL Orland Park village
IL Orland township
IL Oswego township
IL Oswego village
IL Otto township
IL Owen township
IL Palatine township
IL Palatine village
IL Palos Heights city
IL Palos Hills city
IL Palos Park village
IL Palos township
IL Park City city
IL Park Forest village
IL Park Ridge city
IL Pekin city
IL Pekin township
IL Peoria city
IL Peoria County
IL Peoria Heights village
IL Phoenix village
IL Pin Oak township
IL Plainfield township
IL Plainfield village
IL Pontoon Beach village
IL Posen village
IL Precinct 10
IL Prospect Heights city
IL Proviso township
IL Rich township
IL Richton Park village
IL Richwoods township
IL River Forest village
IL River Grove village
IL Riverdale village
IL Riverside township
IL Riverside village
IL Riverwoods village
IL Robbins village
IL Rochester township
IL Rock Island city
IL Rock Island County
IL Rock Island township
IL Rockdale village
IL Rockford township
IL Rockton township
IL Rockton village
IL Rolling Meadows city
IL Romeoville village
IL Roscoe township
IL Roscoe village
IL Roselle village
IL Rosemont village
IL Round Lake Beach village
IL Round Lake Heights village
IL Round Lake Park village
IL Round Lake village
IL Roxana village
IL Rutland township
IL Sangamon County
IL Sauget village
IL Sauk Village village
IL Savoy village
IL Schaumburg township
IL Schaumburg village
IL Schiller Park village
IL Shields township
IL Shiloh Valley township
IL Shiloh village
IL Shorewood village
IL Silvis city
IL Skokie village
IL Sleepy Hollow village
IL Somer township
IL South Beloit city
IL South Chicago Heights village
IL South Elgin village
IL South Holland village
IL South Moline township
IL South Rock Island township
IL South Roxana village
IL South Wheatland township
IL Southern View village
IL Spring Bay township
IL Springfield city
IL Springfield township
IL St. Charles city
IL St. Charles township
IL St. Clair County
IL St. Clair township
IL Steger village
IL Stickney township
IL Stickney village
IL Stites township
IL Stone Park village
IL Stookey township
IL Streamwood village
IL Sugar Grove township
IL Sugar Loaf township
IL Summit village
IL Sunnyside village
IL Swansea village
IL Tazewell County
IL Thornton township
IL Thornton village
IL Tinley Park village
IL Tolono township
IL Tower Lakes village
IL Tremont township
IL Troy city
IL Troy township
IL University Park village
IL Urbana city
IL Urbana township
IL Venice city
IL Venice township
IL Vernon Hills village
IL Vernon township
IL Villa Park village
IL Warren township
IL Warrenville city
IL Washington city
IL Washington Park village
IL Washington township
IL Wauconda township
IL Waukegan city
IL Waukegan township
IL Wayne township
IL West Chicago city
IL West Deerfield township
IL West Dundee village
IL West Peoria township
IL Westchester village
IL Western Springs village
IL Westmont village
IL Wheatland township
IL Wheaton city
IL Wheeling township
IL Wheeling village
IL Whitmore township
IL Will County
IL Willow Springs village
IL Willowbrook village
IL Wilmette village
IL Winfield township
IL Winfield village
IL Winnebago County
IL Winnetka village
IL Winthrop Harbor village
IL Wood Dale city
IL Wood River city
IL Wood River township
IL Woodford County
IL Woodridge village
IL Woodside township
IL Worth township
IL Worth village
IL York township
IL Zion city
IN Aboite township
IN Adams township
IN Allen County
IN Anderson city
IN Anderson township
IN Baugo township
IN Beech Grove city
IN Bloomington city
IN Bloomington township
IN Boone County
IN Buck Creek township
IN Calumet township
IN Carmel city
IN Castleton town
IN Cedar Creek township
IN Center township
IN Centre township
IN Chesterfield town
IN Chesterton town
IN Clark County
IN Clarksville town
IN Clay township
IN Clermont town
IN Cleveland township
IN Concord township
IN Country Club Heights town

IN Crown Point city
IN Crows Nest town
IN Cumberland town
IN Daleville town
IN Delaware County
IN Delaware township
IN Dyer town
IN Eagle township
IN East Chicago city
IN Edgewood town
IN Elkhart city
IN Elkhart County
IN Elkhart township
IN Evansville city
IN Fairfield township
IN Fall Creek township
IN Fishers town
IN Floyd County
IN Fort Wayne city
IN Franklin township
IN Gary city
IN German township
IN Goshen city
IN Greenwood city
IN Griffith town
IN Hamilton County
IN Hamilton township
IN Hammond city
IN Hancock County
IN Hanover township
IN Harris township
IN Harrison township
IN Hendricks County
IN Highland town
IN Hobart city
IN Hobart township
IN Homecroft town
IN Honey Creek township
IN Howard County
IN Howard township
IN Indian Village town
IN Jackson township
IN Jefferson township
IN Jeffersonville city
IN Jeffersonville township
IN Johnson County
IN Knight township
IN Kokomo city
IN Lafayette city
IN Lafayette township
IN Lake County
IN Lake Station city
IN Lawrence city
IN Lawrence township
IN Liberty township
IN Lincoln township
IN Lost Creek township
IN Madison County
IN Meridian Hills town
IN Merrillville town
IN Mishawaka city
IN Monroe County
IN Mount Pleasant township
IN Muncie city
IN Munster town
IN New Albany city
IN New Albany township
IN New Chicago town
IN New Haven city
IN New Whiteland town
IN Newburgh town
IN North Crows Nest town
IN North township
IN Ogden Dunes town
IN Ohio township
IN Osceola town
IN Osolo township
IN Otter Creek township
IN Penn township
IN Perry township
IN Pigeon township
IN Pike township
IN Pleasant township
IN Portage city
IN Portage township
IN Porter County
IN Porter town
IN Richland township
IN Riley township
IN River Forest town
IN Rocky Ripple town
IN Roseland town
IN Ross township
IN Salem township
IN Schererville town
IN Seelyville town
IN Sellersburg town
IN Selma town
IN Silver Creek township
IN South Bend city
IN Southport city
IN Speedway town
IN Spring Hill town
IN St. John town
IN St. John township
IN St. Joseph County
IN St. Joseph township
IN Sugar Creek township
IN Taylor township
IN Terre Haute city
IN Tippecanoe County
IN Tippecanoe township
IN Union township
IN Utica township
IN Van Buren township
IN Vanderburgh County
IN Vigo County
IN Wabash township
IN Warren Park town
IN Warren township
IN Warrick County
IN Washington township
IN Wayne township
IN Wea township
IN West Lafayette city
IN West Terre Haute town
IN Westchester township
IN Westfield town
IN White River township
IN Whiteland town
IN Whiting city
IN Williams Creek town
IN Woodlawn Heights town
IN Wynnedale town
IN Yorktown town
IN Zionsville town
KS Attica township
KS Bel Aire city
KS Countryside city
KS Delano township
KS Doniphan County
KS Douglas County
KS Eastborough city
KS Elwood city
KS Fairway city
KS Gypsum township
KS Haysville city
KS Johnson County
KS Kechi city
KS Kechi township
KS Lake Quivira city
KS Lawrence city
KS Leawood city
KS Lenexa city
KS Merriam city
KS Minneha township
KS Mission city
KS Mission Hills city
KS Mission township
KS Mission Woods city
KS Monticello township
KS Ohio township
KS Olathe city
KS Olathe township
KS Park City city
KS Park township
KS Prairie Village city
KS Riverside township
KS Roeland Park city
KS Salem township
KS Sedgwick County
KS Shawnee city
KS Shawnee County
KS Shawnee township
KS Soldier township
KS Tecumseh township
KS Topeka township
KS Waco township
KS Wakarusa township
KS Washington township
KS Westwood city
KS Westwood Hills city
KS Williamsport township
KS Wyandotte County
KY Alexandria city
KY Ashland city
KY Bellefonte city
KY Bellevue city
KY Boone County
KY Boyd County
KY Bromley city
KY Bullitt County
KY Campbell County
KY Catlettsburg city
KY Christian County
KY Covington city
KY Crescent Park city
KY Crescent Springs city
KY Crestview city
KY Crestview Hills city
KY Daviess County
KY Dayton city
KY Edgewood city
KY Elsmere city
KY Erlanger city
KY Fairview city
KY Flatwoods city
KY Florence city
KY Forest Hills city
KY Fort Mitchell city
KY Fort Thomas city
KY Fort Wright city
KY Fox Chase city
KY Greenup County
KY Hebron Estates city
KY Henderson city
KY Henderson County
KY Highland Heights city
KY Hillview city
KY Hunters Hollow city
KY Independence city
KY Jessamine County
KY Kenton County
KY Kenton Vale city
KY Lakeside Park city
KY Latonia Lakes city
KY Ludlow city
KY Melbourne city

KY Newport city
KY Oak Grove city
KY Owensboro city
KY Park Hills city
KY Pioneer Village city
KY Raceland city
KY Russell city
KY Silver Grove city
KY Southgate city
KY Taylor Mill city
KY Villa Hills city
KY Wilder city
KY Woodlawn city
KY Wurtland city
LA Alexandria city
LA Baker city
LA Ball town
LA Bossier City city
LA Bossier Parish
LA Broussard town
LA Caddo Parish
LA Calcasieu Parish
LA Carencro city
LA Denham Springs city
LA Houma city
LA Lafayette city
LA Lafayette Parish
LA Lafourche Parish
LA Lake Charles city
LA Livingston Parish
LA Monroe city
LA Ouachita Parish
LA Pineville city
LA Plaquemines Parish
LA Port Allen city
LA Rapides Parish
LA Richwood town
LA Scott town
LA Slidell city
LA St. Bernard Parish
LA St. Charles Parish
LA St. Tammany Parish
LA Sulphur city
LA Terrebonne Parish
LA West Baton Rouge Parish
LA West Monroe city
LA Westlake city
LA Zachary city
MA Abington town
MA Acton town
MA Acushnet town
MA Agawam town
MA Amesbury town
MA Andover town
MA Arlington town
MA Ashland town
MA Attleboro city
MA Auburn town
MA Avon town
MA Barnstable County
MA Barnstable town
MA Bedford town
MA Bellingham town
MA Belmont town
MA Berkshire County
MA Beverly city
MA Billerica town
MA Blackstone town
MA Boxborough town
MA Boylston town
MA Braintree town
MA Bridgewater town
MA Bristol County
MA Brockton city
MA Brookline town
MA Burlington town
MA Cambridge city
MA Canton town
MA Charlton town
MA Chelmsford town
MA Chelsea city
MA Chicopee city
MA Cohasset town
MA Concord town
MA Dalton town
MA Danvers town
MA Dartmouth town
MA Dedham town
MA Dennis town
MA Dighton town
MA Dover town
MA Dracut town
MA Dudley town
MA East Bridgewater town
MA East Longmeadow town
MA Easthampton town
MA Easton town
MA Essex County
MA Essex town
MA Everett city
MA Fairhaven town
MA Fall River city
MA Fitchburg city
MA Foxborough town
MA Framingham town
MA Franklin town
MA Freetown town
MA Georgetown town
MA Gloucester city
MA Grafton town
MA Granby town
MA Groton town
MA Groveland town
MA Hadley town
MA Halifax town
MA Hamilton town
MA Hampden County
MA Hampden town
MA Hampshire County
MA Hanover town
MA Hanson town
MA Haverhill city
MA Hingham town
MA Hinsdale town
MA Holbrook town
MA Holden town
MA Holliston town
MA Holyoke city
MA Hudson town
MA Hull town
MA Lanesborough town
MA Lawrence city
MA Leicester town
MA Leominster city
MA Lexington town
MA Lincoln town
MA Littleton town
MA Longmeadow town
MA Lowell city
MA Ludlow town
MA Lunenburg town
MA Lynn city
MA Lynnfield town
MA Malden city
MA Manchester town
MA Mansfield town
MA Marblehead town
MA Marlborough city
MA Mashpee town
MA Maynard town
MA Medfield town
MA Medford city
MA Medway town
MA Melrose city
MA Merrimac town
MA Methuen town
MA Middlesex County
MA Middleton town
MA Millbury town
MA Millis town
MA Millville town
MA Milton town
MA Nahant town
MA Natick town
MA Needham town
MA New Bedford city
MA Newton city
MA Norfolk town
MA North Andover town
MA North Attleborough town
MA North Reading town
MA Northampton city
MA Northborough town
MA Northbridge town
MA Norton town
MA Norwell town
MA Norwood town
MA Oxford town
MA Paxton town
MA Peabody city
MA Pembroke town
MA Pittsfield city
MA Plainville town
MA Plymouth County
MA Quincy city
MA Randolph town
MA Raynham town
MA Reading town
MA Rehoboth town
MA Revere city
MA Rockland town
MA Rockport town
MA Salem city
MA Sandwich town
MA Saugus town
MA Scituate town
MA Seekonk town
MA Sharon town
MA Shrewsbury town
MA Somerset town
MA Somerville city
MA South Hadley town
MA Southampton town
MA Southborough town
MA Southwick town
MA Springfield city
MA Stoneham town
MA Stoughton town
MA Stow town
MA Sudbury town
MA Sutton town
MA Swampscott town
MA Swansea town
MA Taunton city
MA Tewksbury town
MA Tyngsborough town
MA Uxbridge town
MA Wakefield town
MA Walpole town
MA Waltham city
MA Watertown town
MA Wayland town
MA Webster town
MA Wellesley town
MA Wenham town
MA West Boylston town
MA West Bridgewater town
MA West Springfield town

MA Westborough town
MA Westfield city
MA Westford town
MA Westminster town
MA Weston town
MA Westport town
MA Westwood town
MA Weymouth town
MA Whitman town
MA Wilbraham town
MA Williamsburg town
MA Wilmington town
MA Winchester town
MA Winthrop town
MA Woburn city
MA Worcester County
MA Wrentham town
MA Yarmouth town
MD Allegany County
MD Annapolis city
MD Bel Air town
MD Berwyn Heights town
MD Bladensburg town
MD Bowie city
MD Brentwood town
MD Brookeville town
MD Capitol Heights town
MD Cecil County
MD Cheverly town
MD Chevy Chase Section Five village
MD Chevy Chase Section Three village
MD Chevy Chase town
MD Chevy Chase Village town
MD College Park city
MD Colmar Manor town
MD Cottage City town
MD Cumberland city
MD District Heights city
MD Edmonston town
MD Elkton town
MD Fairmount Heights town
MD Forest Heights town
MD Frederick city
MD Frostburg city
MD Funkstown town
MD Gaithersburg city
MD Garrett Park town
MD Glen Echo town
MD Glenarden town
MD Greenbelt city
MD Hagerstown city
MD Highland Beach town
MD Hyattsville city
MD Kensington town
MD Landover Hills town
MD Laurel city
MD Martin's Additions village
MD Morningside town
MD Mount Rainier city
MD New Carrollton city
MD North Brentwood town
MD Riverdale town
MD Rockville city
MD Seat Pleasant city
MD Smithsburg town
MD Somerset town
MD Takoma Park city
MD University Park town
MD Walkersville town
MD Washington Grove town
MD Williamsport town
ME Androscoggin County
ME Auburn city
ME Bangor city
ME Berwick town
ME Brewer city
ME Cape Elizabeth town
ME Cumberland County
ME Eliot town
ME Falmouth town
ME Gorham town
ME Kittery town
ME Lebanon town
ME Lewiston city
ME Lisbon town
ME Old Town city
ME Orono town
ME Penobscot County
ME Penobscot Indian Island Reservation
ME Portland city
ME Sabattus town
ME Scarborough town
ME South Berwick town
ME South Portland city
ME Veazie town
ME Westbrook city
ME York County
MI Ada township
MI Allegan County
MI Allen Park city
MI Alpine township
MI Ann Arbor township
MI Auburn Hills city
MI Bangor township
MI Bath township
MI Battle Creek city
MI Bay City city
MI Bay County
MI Bedford township
MI Belleville city
MI Benton Charter township
MI Benton Harbor city
MI Berkley city
MI Berlin township
MI Berrien County
MI Beverly Hills village
MI Bingham Farms village
MI Birmingham city
MI Blackman township
MI Bloomfield Hills city
MI Bloomfield township
MI Bridgeport township
MI Brownstown township
MI Buena Vista Charter township
MI Burtchville township
MI Burton city
MI Byron township
MI Calhoun County
MI Canton township
MI Carrollton township
MI Cascade township
MI Cass County
MI Center Line city
MI Chesterfield township
MI Clarkston village
MI Clawson city
MI Clay township
MI Clayton township
MI Clinton County
MI Clinton township
MI Clio city
MI Clyde township
MI Commerce township
MI Comstock township
MI Cooper township
MI Dalton township
MI Davison city
MI Davison township
MI De Witt township
MI Dearborn city
MI Dearborn Heights city
MI Delhi Charter township
MI Delta township
MI Detroit city
MI East China township
MI East Detroit city
MI East Grand Rapids city
MI East Lansing city
MI Eaton County
MI Ecorse city
MI Emmett township
MI Erie township
MI Essexville city
MI Farmington city
MI Farmington Hills city
MI Ferndale city
MI Fillmore township
MI Flat Rock city
MI Flint township
MI Flushing city
MI Flushing township
MI Fort Gratiot township
MI Frankenlust township
MI Franklin village
MI Fraser city
MI Fruitport township
MI Gaines township
MI Garden City city
MI Genesee County
MI Genesee township
MI Georgetown township
MI Gibraltar city
MI Grand Blanc city
MI Grand Blanc township
MI Grand Rapids Charter township
MI Grandville city
MI Grosse Ile township
MI Grosse Pointe city
MI Grosse Pointe Farms city
MI Grosse Pointe Park city
MI Grosse Pointe Shores village
MI Grosse Pointe Woods city
MI Hampton township
MI Hamtramck city
MI Harper Woods city
MI Harrison township
MI Hazel Park city
MI Highland Park city
MI Highland township
MI Holland city
MI Holland township
MI Howard township
MI Hudsonville city
MI Huntington Woods city
MI Huron township
MI Independence township
MI Ingham County
MI Inkster city
MI Ira township
MI Jackson city
MI Jackson County
MI James township
MI Kalamazoo city
MI Kalamazoo County
MI Kalamazoo township
MI Keego Harbor city
MI Kent County
MI Kentwood city
MI Kimball township
MI Kochville township
MI Lake Angelus city
MI Laketon township
MI Laketown township
MI Lansing city
MI Lansing township
MI Lathrup Village city
MI Leoni township
MI Lincoln Park city

MI Lincoln township
MI Livonia city
MI Macomb County
MI Macomb township
MI Madison Heights city
MI Marysville city
MI Melvindale city
MI Meridian township
MI Milford township
MI Milton township
MI Monitor township
MI Monroe County
MI Mount Clemens city
MI Mount Morris city
MI Mount Morris township
MI Mundy township
MI Muskegon city
MI Muskegon County
MI Muskegon Heights city
MI Muskegon township
MI New Baltimore city
MI Niles city
MI Niles township
MI North Muskegon city
MI Northville city
MI Northville township
MI Norton Shores city
MI Novi city
MI Novi township
MI Oak Park city
MI Oakland Charter township
MI Oakland County
MI Orchard Lake Village city
MI Orion township
MI Oshtemo township
MI Ottawa County
MI Parchment city
MI Park township
MI Pavilion township
MI Pennfield township
MI Pittsfield township
MI Plainfield township
MI Pleasant Ridge city
MI Plymouth city
MI Plymouth township
MI Pontiac city
MI Port Huron city
MI Port Huron township
MI Portage city
MI Portsmouth township
MI Redford township
MI Richfield township
MI River Rouge city
MI Riverview city
MI Rochester city
MI Rochester Hills city
MI Rockwood city
MI Romulus city
MI Roosevelt Park city
MI Roseville city
MI Ross township
MI Royal Oak city
MI Royal Oak township
MI Saginaw city
MI Saginaw County
MI Saginaw township
MI Schoolcraft township
MI Scio township
MI Shelby township
MI Shoreham village
MI Sodus township
MI South Rockwood village
MI Southfield city
MI Southfield township
MI Southgate city
MI Spaulding township
MI Spring Arbor township
MI Springfield city
MI Springfield township
MI St. Clair city
MI St. Clair County
MI St. Clair Shores city
MI St. Clair township
MI St. Joseph Charter township
MI St. Joseph city
MI Stevensville village
MI Sullivan township
MI Summit township
MI Sumpter township
MI Superior township
MI Swartz Creek city
MI Sylvan Lake city
MI Taylor city
MI Texas township
MI Thetford township
MI Thomas township
MI Trenton city
MI Troy city
MI Utica city
MI Van Buren township
MI Vienna township
MI Walker city
MI Walled Lake city
MI Washington township
MI Washtenaw County
MI Waterford township
MI Wayne city
MI West Bloomfield township
MI Westland city
MI White Lake township
MI Whiteford township
MI Williamstown township
MI Wixom city
MI Wolverine Lake village
MI Woodhaven city
MI Wyandotte city
MI Wyoming city
MI Ypsilanti city
MI Ypsilanti township
MI Zeeland city
MI Zilwaukee city
MN Andover city
MN Anoka city
MN Anoka County
MN Apple Valley city
MN Arden Hills city
MN Benton County
MN Birchwood Village city
MN Blaine city
MN Bloomington city
MN Brooklyn Center city
MN Brooklyn Park city
MN Burnsville city
MN Carver County
MN Cascade township
MN Champlin city
MN Chanhassen city
MN Circle Pines city
MN Clay County
MN Coon Rapids city
MN Cottage Grove city
MN Credit River township
MN Crystal city
MN Dakota County
MN Dayton city
MN Deephaven city
MN Dilworth city
MN Duluth city
MN Eagan city
MN East Grand Forks city
MN Eden Prairie city
MN Excelsior city
MN Falcon Heights city
MN Farmington city
MN Fort Snelling unorg.
MN Fridley city
MN Gem Lake city
MN Golden Valley city
MN Grant township
MN Greenwood city
MN Ham Lake city
MN Haven township
MN Hennepin County
MN Hermantown city
MN Hilltop city
MN Hopkins city
MN Houston County
MN Inver Grove Heights city
MN La Crescent city
MN La Crescent township
MN Lake Elmo city
MN Lakeville city
MN Landfall city
MN Lauderdale city
MN Le Sauk township
MN Lexington city
MN Lilydale city
MN Lino Lakes city
MN Little Canada city
MN Long Lake city
MN Loretto city
MN Mahtomedi city
MN Maple Grove city
MN Maple Plain city
MN Maplewood city
MN Marion township
MN Medicine Lake city
MN Medina city
MN Mendota city
MN Mendota Heights city
MN Midway township
MN Minden township
MN Minnetonka Beach city
MN Minnetonka city
MN Minnetrista city
MN Moorhead city
MN Moorhead township
MN Mound city
MN Mounds View city
MN New Brighton city
MN New Hope city
MN Newport city
MN North Oaks city
MN North St. Paul city
MN Oakdale city
MN Oakport township
MN Olmsted County
MN Orono city
MN Osseo city
MN Plymouth city
MN Polk County
MN Prior Lake city
MN Proctor city
MN Ramsey city
MN Robbinsdale city
MN Rochester city
MN Rochester township
MN Rosemount city
MN Roseville city
MN Sartell city
MN Sauk Rapids city
MN Sauk Rapids township
MN Savage city
MN Scott County
MN Sherburne County
MN Shoreview city
MN Shorewood city
MN South St. Paul city

MN Spring Lake Park city
MN Spring Park city
MN St. Anthony city
MN St. Cloud city
MN St. Cloud township
MN St. Louis County
MN St. Paul Park city
MN Stearns County
MN Sunfish Lake city
MN Tonka Bay city
MN Vadnais Heights city
MN Victoria city
MN Waite Park city
MN Washington County
MN Wayzata city
MN West St. Paul city
MN White Bear Lake city
MN White Bear township
MN Willernie city
MN Woodbury city
MN Woodland city
MN Wright County
MO Airport Drive village
MO Airport township
MO Andrew County
MO Arnold city
MO Avondale city
MO Ballwin city
MO Battlefield town
MO Bella Villa city
MO Bellefontaine Neighbors city
MO Bellerive village
MO Bel-Nor village
MO Bel-Ridge village
MO Belton city
MO Berkeley city
MO Beverly Hills city
MO Big Creek township
MO Birmingham village
MO Black Jack city
MO Blanchette township
MO Blue Springs city
MO Blue township
MO Bonhomme township
MO Boone County
MO Boone township
MO Breckenridge Hills village
MO Brentwood city
MO Bridgeton city
MO Brooking township
MO Buchanan County
MO Calverton Park village
MO Campbell No. 1 township
MO Campbell No. 2 township
MO Carl Junction city
MO Carroll township
MO Carterville city
MO Cass County
MO Cedar township
MO Center township
MO Charlack city
MO Chesterfield city
MO Chouteau township
MO Christian County
MO Clarkson Valley city
MO Clay County
MO Clay township
MO Claycomd village
MO Clayton city
MO Clayton township
MO Cliff Village village
MO Columbia city
MO Columbia township
MO Concord township
MO Cool Valley city
MO Cottleville town
MO Cottleville township
MO Country Club Hills city
MO Country Club village
MO Country Life Acres village
MO Crestwood city
MO Creve Coeur city
MO Creve Coeur township
MO Crystal Lake Park city
MO Dardenne township
MO Dellwood city
MO Dennis Acres village
MO Des Peres city
MO Duquesne village
MO Edmundson village
MO Ellisville city
MO Fenton city
MO Ferguson city
MO Ferguson township
MO Flordell Hills city
MO Florissant city
MO Florissant township
MO Fox township
MO Friedens township
MO Frontenac city
MO Galena township
MO Gallatin township
MO Gladstone city
MO Glen Echo Park village
MO Glenaire village
MO Glendale city
MO Grandview city
MO Grantwood Village town
MO Gravois township
MO Greendale city
MO Greene County
MO Hadley township
MO Hanley Hills village
MO Harvester township
MO Hazelwood city
MO High Ridge township
MO Hillsdale village
MO Houston Lake city
MO Huntleigh city
MO Imperial township
MO Iron Gates village
MO Jackson County
MO Jasper County
MO Jefferson County
MO Jefferson township
MO Jennings city
MO Joplin city
MO Joplin township
MO Kickapoo township
MO Kimmswick city
MO Kinloch city
MO Kirkwood city
MO Ladue city
MO Lake St. Louis city
MO Lake Tapawingo city
MO Lake Waukomis city
MO Lakeshire city
MO Leawood village
MO Lee's Summit city
MO Lemay township
MO Lewis and Clark township
MO Liberty city
MO Liberty township
MO Mac Kenzie village
MO Manchester city
MO Maplewood city
MO Marlborough village
MO Maryland Heights city
MO May township
MO Meramec township
MO Midland township
MO Mineral township
MO Missouri River township
MO Missouri township
MO Moline Acres city
MO Mount Pleasant township
MO Newton County
MO Normandy city
MO Normandy township
MO North Campbell No. 1 township
MO North Campbell No. 2 township
MO North Campbell No. 3 township
MO North Kansas City city
MO North View township
MO Northmoor city
MO Northwest township
MO Northwoods city
MO Norwood Court town
MO Oakland city
MO Oakland Park village
MO Oaks village
MO Oakview village
MO Oakwood Park village
MO Oakwood village
MO O'Fallon city
MO O'Fallon township
MO Olivette city
MO Overland city
MO Pagedale city
MO Parkdale town
MO Parkville city
MO Pasadena Hills city
MO Pasadena Park village
MO Pettis township
MO Pine Lawn city
MO Platte County
MO Platte township
MO Platte Woods city
MO Pleasant Valley city
MO Prairie township
MO Queeny township
MO Randolph village
MO Raymore city
MO Raymore township
MO Raytown city
MO Redings Mill village
MO Richmond Heights city
MO Rivers township
MO Riverside city
MO Riverview village
MO Rock Hill city
MO Rock township
MO Rocky Fork township
MO Saginaw village
MO Shoal Creek Drive village
MO Shoal Creek township
MO Shrewsbury city
MO Silver Creek village
MO Sioux township
MO Sni-A-Bar township
MO Spanish Lake township
MO Spencer Creek township
MO St. Ann city
MO St. Charles city
MO St. Ferdinand township
MO St. George city
MO St. John city
MO St. Joseph city
MO St. Louis city
MO St. Peters city
MO St. Peters township
MO Sugar Creek city
MO Sunset Hills city
MO Sycamore Hills village
MO Town and Country city
MO Twin Groves township
MO Twin Oaks village
MO Unity Village village

MO University City city
MO Uplands Park village
MO Valley Park city
MO Velda Village city
MO Velda Village Hills village
MO Vinita Park city
MO Vinita Terrace village
MO Warson Woods city
MO Washington township
MO Wayne township
MO Weatherby Lake city
MO Webb City city
MO Webster Groves city
MO Wellston city
MO Wentzville township
MO Westwood village
MO Wilbur Park village
MO Wilson township
MO Winchester city
MO Windsor township
MO Woodson Terrace city
MO Zumbehl township
MS Bay St. Louis city
MS Biloxi city
MS Brandon city
MS Clinton city
MS DeSoto County
MS D'Iberville city
MS Flowood town
MS Forrest County
MS Gautier city
MS Gulfport city
MS Hancock County
MS Harrison County
MS Hattiesburg city
MS Hinds County
MS Horn Lake city
MS Jackson County
MS Lamar County
MS Long Beach city
MS Madison city
MS Madison County
MS Moss Point city
MS Ocean Springs city
MS Pascagoula city
MS Pass Christian city
MS Pearl city
MS Petal city
MS Rankin County
MS Richland city
MS Ridgeland city
MS Southaven city
MS Waveland city
MT Billings city
MT Cascade County
MT Great Falls city
MT Missoula city
MT Missoula County
MT Yellowstone County
NC Alamance County
NC Apex town
NC Archdale city
NC Asheville city
NC Belmont city
NC Belville town
NC Bessemer City city
NC Biltmore Forest town
NC Black Mountain town
NC Brookford town
NC Brunswick County
NC Buncombe County
NC Burke County
NC Burlington city
NC Cabarrus County
NC Carrboro town
NC Cary town
NC Catawba County
NC Chapel Hill town
NC China Grove town
NC Clemmons village
NC Concord city
NC Conover city
NC Cramerton town
NC Dallas town
NC Davidson County
NC Durham County
NC Edgecombe County
NC Elon College town
NC Fletcher town
NC Forsyth County
NC Garner town
NC Gaston County
NC Gastonia city
NC Gibsonville town
NC Goldsboro city
NC Graham city
NC Greenville city
NC Guilford County
NC Harnett County
NC Haw River town
NC Henderson County
NC Hickory city
NC High Point city
NC Hildebran town
NC Hope Mills town
NC Indian Trail town
NC Jacksonville city
NC Jamestown town
NC Kannapolis city
NC Landis town
NC Leland town
NC Long View town
NC Lowell city
NC Matthews town
NC McAdenville town
NC Mebane city
NC Mecklenburg County
NC Mint Hill town
NC Montreat town
NC Mount Holly city
NC Nash County
NC New Hanover County
NC Newton city
NC Onslow County
NC Orange County
NC Pineville town
NC Pitt County
NC Randolph County
NC Ranlo town
NC Rocky Mount city
NC Rowan County
NC Rural Hall town
NC Spring Lake town
NC Stallings town
NC Thomasville city
NC Union County
NC Wake County
NC Walkertown town
NC Wayne County
NC Weaverville town
NC Wilmington city
NC Winterville town
NC Woodfin town
NC Wrightsville Beach town
ND Barnes township
ND Bismarck city
ND Bismarck unorg.
ND Burleigh County
ND Captain's Landing township
ND Cass County
ND Fargo city
ND Grand Forks city
ND Grand Forks County
ND Grand Forks township
ND Hay Creek township
ND Lincoln city
ND Mandan city
ND Mandan unorg.
ND Morton County
ND Reed township
ND West Fargo city
NE Bellevue city
NE Bellevue No. 2 precinct
NE Benson precinct
NE Boys Town village
NE Chicago precinct
NE Covington precinct
NE Dakota County
NE Douglas County
NE Douglas precinct
NE Florence precinct
NE Garfield precinct
NE Gilmore No. 1 precinct
NE Gilmore No. 2 precinct
NE Gilmore No. 3 precinct
NE Grant precinct
NE Highland No. 1 precinct
NE Highland No. 2 precinct
NE Jefferson precinct
NE La Platte precinct
NE La Vista city
NE Lancaster County
NE Lancaster precinct
NE McArdle precinct
NE Millard precinct
NE Papillion city
NE Papillion No. 2 precinct
NE Pawnee precinct
NE Ralston city
NE Richland No. 1 precinct
NE Richland No. 2 precinct
NE Richland No. 3 precinct
NE Sarpy County
NE South Sioux City city
NE Union precinct
NE Yankee Hill precinct
NH Amherst town
NH Auburn town
NH Bedford town
NH Dover city
NH Durham town
NH Goffstown town
NH Hillsborough County
NH Hollis town
NH Hooksett town
NH Hudson town
NH Litchfield town
NH Londonderry town
NH Madbury town
NH Manchester city
NH Merrimack County
NH Merrimack town
NH Nashua city
NH New Castle town
NH Newington town
NH Pelham town
NH Plaistow town
NH Portsmouth city
NH Rochester city
NH Rockingham County
NH Rollinsford town
NH Rye town
NH Salem town
NH Somersworth city
NH Strafford County
NH Windham town
NJ Aberdeen township
NJ Absecon city

NJ Allendale borough
NJ Allenhurst borough
NJ Alpha borough
NJ Alpine borough
NJ Asbury Park city
NJ Atlantic City city
NJ Atlantic County
NJ Atlantic Highlands borough
NJ Audubon borough
NJ Audubon Park borough
NJ Avon-by-the-Sea borough
NJ Barrington borough
NJ Bay Head borough
NJ Bayonne city
NJ Beachwood borough
NJ Bedminster township
NJ Belleville township
NJ Bellmawr borough
NJ Belmar borough
NJ Bergenfield borough
NJ Berkeley Heights township
NJ Berkeley township
NJ Berlin borough
NJ Berlin township
NJ Bernards township
NJ Bernardsville borough
NJ Beverly city
NJ Bloomfield township
NJ Bloomingdale borough
NJ Bogota borough
NJ Boonton town
NJ Boonton township
NJ Bordentown city
NJ Bordentown township
NJ Bound Brook borough
NJ Bradley Beach borough
NJ Branchburg township
NJ Brick township
NJ Bridgewater township
NJ Brielle borough
NJ Brigantine city
NJ Brooklawn borough
NJ Buena borough
NJ Buena Vista township
NJ Burlington city
NJ Burlington County
NJ Burlington township
NJ Butler borough
NJ Byram township
NJ Caldwell Borough township
NJ Camden city
NJ Cape May County
NJ Carlstadt borough
NJ Carneys Point township
NJ Carteret borough
NJ Cedar Grove township
NJ Chatham borough
NJ Chatham township
NJ Cherry Hill township
NJ Chesilhurst borough
NJ Chester township
NJ Chesterfield township
NJ Cinnaminson township
NJ City of Orange township
NJ Clark township
NJ Clayton borough
NJ Clementon borough
NJ Cliffside Park borough
NJ Clifton city
NJ Closter borough
NJ Collingswood borough
NJ Colts Neck township
NJ Commercial township
NJ Cranford township
NJ Cresskill borough
NJ Cumberland County
NJ Deal borough
NJ Delanco township
NJ Delran township
NJ Demarest borough
NJ Denville township
NJ Deptford township
NJ Dover town
NJ Dover township
NJ Dumont borough
NJ Dunellen borough
NJ East Brunswick township
NJ East Greenwich township
NJ East Hanover township
NJ East Newark borough
NJ East Orange city
NJ East Rutherford borough
NJ Eastampton township
NJ Eatontown borough
NJ Edgewater borough
NJ Edgewater Park township
NJ Edison township
NJ Egg Harbor township
NJ Elizabeth city
NJ Elk township
NJ Elmwood Park borough
NJ Emerson borough
NJ Englewood city
NJ Englewood Cliffs borough
NJ Englishtown borough
NJ Essex Fells township
NJ Evesham township
NJ Ewing township
NJ Fair Haven borough
NJ Fair Lawn borough
NJ Fairfield township
NJ Fairview borough
NJ Fanwood borough
NJ Fieldsboro borough
NJ Florence township
NJ Florham Park borough
NJ Fort Lee borough
NJ Franklin Lakes borough
NJ Franklin township
NJ Freehold borough
NJ Freehold township
NJ Galloway township
NJ Garfield city
NJ Garwood borough
NJ Gibbsboro borough
NJ Glassboro borough
NJ Glen Ridge Borough township
NJ Glen Rock borough
NJ Gloucester City city
NJ Gloucester County
NJ Gloucester township
NJ Green Brook township
NJ Greenwich township
NJ Guttenberg town
NJ Hackensack city
NJ Haddon Heights borough
NJ Haddon township
NJ Haddonfield borough
NJ Hainesport township
NJ Haledon borough
NJ Hamilton township
NJ Hanover township
NJ Harding township
NJ Harrington Park borough
NJ Harrison town
NJ Hasbrouck Heights borough
NJ Haworth borough
NJ Hawthorne borough
NJ Hazlet township
NJ Helmetta borough
NJ Highland Park borough
NJ Highlands borough
NJ Hillsborough township
NJ Hillsdale borough
NJ Hillside township
NJ Hi-Nella borough
NJ Hoboken city
NJ Ho-Ho-Kus borough
NJ Holmdel township
NJ Hopatcong borough
NJ Hopewell township
NJ Howell township
NJ Hunterdon County
NJ Interlaken borough
NJ Irvington township
NJ Island Heights borough
NJ Jackson township
NJ Jamesburg borough
NJ Jefferson township
NJ Jersey City city
NJ Keansburg borough
NJ Kearny town
NJ Kenilworth borough
NJ Keyport borough
NJ Kinnelon borough
NJ Lakehurst borough
NJ Lakewood township
NJ Laurel Springs borough
NJ Lavallette borough
NJ Lawnside borough
NJ Lawrence township
NJ Leonia borough
NJ Lincoln Park borough
NJ Linden city
NJ Lindenwold borough
NJ Linwood city
NJ Little Falls township
NJ Little Ferry borough
NJ Little Silver borough
NJ Livingston township
NJ Loch Arbour village
NJ Lodi borough
NJ Long Branch city
NJ Longport borough
NJ Lopatcong township
NJ Lumberton township
NJ Lyndhurst township
NJ Madison borough
NJ Magnolia borough
NJ Mahwah township
NJ Manalapan township
NJ Manasquan borough
NJ Manchester township
NJ Mantoloking borough
NJ Mantua township
NJ Manville borough
NJ Maple Shade township
NJ Maplewood township
NJ Margate City city
NJ Marlboro township
NJ Matawan borough
NJ Maywood borough
NJ Medford Lakes borough
NJ Medford township
NJ Mendham borough
NJ Mendham township
NJ Mercer County
NJ Merchantville borough
NJ Metuchen borough
NJ Middlesex borough
NJ Middlesex County
NJ Middletown township
NJ Midland Park borough
NJ Millburn township
NJ Millstone borough
NJ Milltown borough
NJ Millville city
NJ Mine Hill township

NJ Monmouth Beach borough
NJ Monmouth County
NJ Monroe township
NJ Montclair township
NJ Montvale borough
NJ Montville township
NJ Moonachie borough
NJ Moorestown township
NJ Morris County
NJ Morris Plains borough
NJ Morris township
NJ Morristown town
NJ Mount Arlington borough
NJ Mount Ephraim borough
NJ Mount Holly township
NJ Mount Laurel township
NJ Mount Olive township
NJ Mountain Lakes borough
NJ Mountainside borough
NJ National Park borough
NJ Neptune City borough
NJ Neptune township
NJ Netcong borough
NJ New Brunswick city
NJ New Milford borough
NJ New Providence borough
NJ Newark city
NJ Newfield borough
NJ North Arlington borough
NJ North Bergen township
NJ North Brunswick township
NJ North Caldwell township
NJ North Haledon borough
NJ North Plainfield borough
NJ Northfield city
NJ Northvale borough
NJ Norwood borough
NJ Nutley township
NJ Oakland borough
NJ Oaklyn borough
NJ Ocean City city
NJ Ocean County
NJ Ocean Gate borough
NJ Ocean township
NJ Oceanport borough
NJ Old Bridge township
NJ Old Tappan borough
NJ Oradell borough
NJ Palisades Park borough
NJ Palmyra borough
NJ Paramus borough
NJ Park Ridge borough
NJ Parsippany-Troy Hills township
NJ Passaic city
NJ Passaic County
NJ Passaic township
NJ Paterson city
NJ Paulsboro borough
NJ Pennington borough
NJ Penns Grove borough
NJ Pennsauken township
NJ Pennsville township
NJ Pequannock township
NJ Perth Amboy city
NJ Phillipsburg town
NJ Pine Beach borough
NJ Pine Hill borough
NJ Pine Valley borough
NJ Piscataway township
NJ Pitman borough
NJ Pittsgrove township
NJ Plainfield city
NJ Pleasantville city
NJ Pohatcong township
NJ Point Pleasant Beach borough
NJ Point Pleasant borough
NJ Pompton Lakes borough
NJ Prospect Park borough
NJ Rahway city
NJ Ramsey borough
NJ Randolph township
NJ Raritan borough
NJ Readington township
NJ Red Bank borough
NJ Ridgefield borough
NJ Ridgefield Park village
NJ Ridgewood village
NJ Ringwood borough
NJ River Edge borough
NJ River Vale township
NJ Riverdale borough
NJ Riverside township
NJ Riverton borough
NJ Rochelle Park township
NJ Rockaway borough
NJ Rockaway township
NJ Rockleigh borough
NJ Roseland borough
NJ Roselle borough
NJ Roselle Park borough
NJ Roxbury township
NJ Rumson borough
NJ Runnemede borough
NJ Rutherford borough
NJ Saddle Brook township
NJ Saddle River borough
NJ Salem County
NJ Sayreville borough
NJ Scotch Plains township
NJ Sea Bright borough
NJ Sea Girt borough
NJ Seaside Heights borough
NJ Seaside Park borough
NJ Secaucus town
NJ Shamong township
NJ Shrewsbury borough
NJ Shrewsbury township
NJ Somerdale borough
NJ Somers Point city
NJ Somerset County
NJ Somerville borough
NJ South Amboy city
NJ South Belmar borough
NJ South Bound Brook borough
NJ South Brunswick township
NJ South Hackensack township
NJ South Orange Village township
NJ South Plainfield borough
NJ South River borough
NJ South Toms River borough
NJ Spotswood borough
NJ Spring Lake borough
NJ Spring Lake Heights borough
NJ Springfield township
NJ Stanhope borough
NJ Stratford borough
NJ Summit city
NJ Sussex County
NJ Tabernacle township
NJ Tavistock borough
NJ Teaneck township
NJ Tenafly borough
NJ Teterboro borough
NJ Tinton Falls borough
NJ Totowa borough
NJ Trenton city
NJ Union Beach borough
NJ Union City city
NJ Union township
NJ Upper Saddle River borough
NJ Upper township
NJ Ventnor City city
NJ Verona township
NJ Victory Gardens borough
NJ Vineland city
NJ Voorhees township
NJ Waldwick borough
NJ Wall township
NJ Wallington borough
NJ Wanaque borough
NJ Warren County
NJ Warren township
NJ Washington township
NJ Watchung borough
NJ Waterford township
NJ Wayne township
NJ Weehawken township
NJ Wenonah borough
NJ West Caldwell township
NJ West Deptford township
NJ West Long Branch borough
NJ West New York town
NJ West Orange township
NJ West Paterson borough
NJ Westampton township
NJ Westfield town
NJ Westville borough
NJ Westwood borough
NJ Wharton borough
NJ Willingboro township
NJ Winfield township
NJ Winslow township
NJ Woodbridge township
NJ Woodbury city
NJ Woodbury Heights borough
NJ Woodcliff Lake borough
NJ Woodlynne borough
NJ Wood-Ridge borough
NJ Wyckoff township
NM Bernalillo County
NM Corrales village
NM Dona Ana County
NM Las Cruces city
NM Los Ranchos de Albuquerque village
NM Mesilla town
NM Rio Rancho city
NM Sandoval County
NM Santa Fe city
NM Santa Fe County
NM Sunland Park city
NY Albany city
NY Albany County
NY Amherst town
NY Amityville village
NY Ardsley village
NY Ashland town
NY Atlantic Beach village
NY Babylon town
NY Babylon village
NY Baldwinsville village
NY Ballston town
NY Barker town
NY Baxter Estates village
NY Bayville village
NY Beacon city
NY Bedford town
NY Belle Terre village
NY Bellerose village
NY Bellport village
NY Bethlehem town
NY Big Flats town
NY Binghamton city
NY Binghamton town
NY Blasdell village
NY Boston town
NY Briarcliff Manor village
NY Brighton town
NY Brightwaters village

NY Bronxville village
NY Brookhaven town
NY Brookville village
NY Broome County
NY Brunswick town
NY Buchanan village
NY Buffalo city
NY Camillus town
NY Camillus village
NY Carmel town
NY Cayuga Heights village
NY Cedarhurst village
NY Charlton town
NY Cheektowaga town
NY Chemung County
NY Chenango town
NY Chestnut Ridge village
NY Chili town
NY Cicero town
NY Clarence town
NY Clarkstown town
NY Clay town
NY Clayville village
NY Clifton Park town
NY Clinton village
NY Cohoes city
NY Colonie town
NY Colonie village
NY Conklin town
NY Cornwall on Hudson village
NY Cornwall town
NY Cortlandt town
NY Croton-on-Hudson village
NY De Witt town
NY Deerfield town
NY Depew village
NY Dickinson town
NY Dobbs Ferry village
NY Dryden town
NY Dutchess County
NY East Fishkill town
NY East Greenbush town
NY East Hills village
NY East Rochester village
NY East Rockaway village
NY East Syracuse village
NY East Williston village
NY Eastchester town
NY Elma town
NY Elmira city
NY Elmira Heights village
NY Elmira town
NY Elmsford village
NY Endicott village
NY Erie County
NY Evans town
NY Fairport village
NY Farmingdale village
NY Fayetteville village
NY Fenton town
NY Fishkill town
NY Fishkill village
NY Floral Park village
NY Flower Hill village
NY Floyd town
NY Fort Edward town
NY Fort Edward village
NY Frankfort town
NY Freeport village
NY Garden City village
NY Gates town
NY Geddes town
NY Glen Cove city
NY Glens Falls city
NY Glenville town
NY Grand Island town
NY Grand View-on-Hudson village
NY Great Neck Estates village
NY Great Neck Plaza village
NY Great Neck village
NY Greece town
NY Green Island village
NY Greenburgh town
NY Guilderland town
NY Halfmoon town
NY Hamburg town
NY Hamburg village
NY Harrison village
NY Hastings-on-Hudson village
NY Haverstraw town
NY Haverstraw village
NY Hempstead town
NY Hempstead village
NY Henrietta town
NY Herkimer County
NY Hewlett Bay Park village
NY Hewlett Harbor village
NY Hewlett Neck village
NY Hillburn village
NY Horseheads town
NY Horseheads village
NY Hudson Falls village
NY Huntington Bay village
NY Huntington town
NY Hyde Park town
NY Irondequoit town
NY Irvington village
NY Island Park village
NY Islandia village
NY Islip town
NY Ithaca city
NY Ithaca town
NY Johnson City village
NY Kenmore village
NY Kensington village
NY Kent town
NY Kings Point village
NY Kingsbury town
NY Kirkland town
NY Kirkwood town
NY La Grange town
NY Lackawanna city
NY LaFayette town
NY Lake Grove village
NY Lake Success village
NY Lancaster town
NY Lancaster village
NY Lansing town
NY Lansing village
NY Larchmont village
NY Lattingtown village
NY Lawrence village
NY Lee town
NY Lewiston town
NY Lewiston village
NY Lindenhurst village
NY Liverpool village
NY Lloyd Harbor village
NY Lloyd town
NY Long Beach city
NY Lynbrook village
NY Lysander town
NY Malta town
NY Malverne village
NY Mamaroneck town
NY Mamaroneck village
NY Manlius town
NY Manlius village
NY Manorhaven village
NY Marcy town
NY Massapequa Park village
NY Matinecock village
NY Menands village
NY Mill Neck village
NY Mineola village
NY Minoa village
NY Monroe County
NY Montebello village
NY Montgomery town
NY Moreau town
NY Mount Kisco village
NY Mount Pleasant town
NY Mount Vernon city
NY Munsey Park village
NY Muttontown village
NY New Castle town
NY New Hartford town
NY New Hartford village
NY New Hempstead village
NY New Hyde Park village
NY New Rochelle city
NY New Square village
NY New Windsor town
NY New York Mills village
NY Newburgh city
NY Newburgh town
NY Niagara County
NY Niagara Falls city
NY Niagara town
NY Niskayuna town
NY North Castle town
NY North Greenbush town
NY North Hempstead town
NY North Hills village
NY North Syracuse village
NY North Tarrytown village
NY North Tonawanda city
NY Northport village
NY Nyack village
NY Ogden town
NY Old Brookville village
NY Old Westbury village
NY Oneida County
NY Onondaga County
NY Onondaga town
NY Orange County
NY Orangetown town
NY Orchard Park town
NY Orchard Park village
NY Oriskany village
NY Ossining town
NY Ossining village
NY Oswego County
NY Owego town
NY Oyster Bay town
NY Paris town
NY Patchogue village
NY Patterson town
NY Peekskill city
NY Pelham Manor village
NY Pelham town
NY Pelham village
NY Pendleton town
NY Penfield town
NY Perinton town
NY Philipstown town
NY Phoenix village
NY Piermont village
NY Pittsford town
NY Pittsford village
NY Plandome Heights village
NY Plandome Manor village
NY Plandome village
NY Pleasant Valley town
NY Pleasantville village
NY Poestenkill town
NY Pomona village
NY Poospatuck Reservation

NY Poquott village
NY Port Chester village
NY Port Dickinson village
NY Port Jefferson village
NY Port Washington North village
NY Poughkeepsie city
NY Poughkeepsie town
NY Pound Ridge town
NY Putnam County
NY Putnam Valley town
NY Queensbury town
NY Ramapo town
NY Rensselaer city
NY Rensselaer County
NY Riverhead town
NY Rochester city
NY Rockville Centre village
NY Rome city
NY Roslyn Estates village
NY Roslyn Harbor village
NY Roslyn village
NY Rotterdam town
NY Russell Gardens village
NY Rye Brook village
NY Rye city
NY Rye town
NY Saddle Rock village
NY Salina town
NY Sands Point village
NY Saratoga County
NY Scarsdale town
NY Scarsdale village
NY Schaghticoke town
NY Schenectady city
NY Schenectady County
NY Schodack town
NY Schroeppel town
NY Schuyler town
NY Scotia village
NY Sea Cliff village
NY Shoreham village
NY Sloan village
NY Sloatsburg village
NY Smithtown town
NY Solvay village
NY Somers town
NY South Floral Park village
NY South Glens Falls village
NY South Nyack village
NY Southampton town
NY Southport town
NY Spencerport village
NY Spring Valley village
NY Stewart Manor village
NY Stony Point town
NY Suffern village
NY Suffolk County
NY Syracuse city
NY Tarrytown village
NY Thomaston village
NY Tioga County
NY Tompkins County
NY Tonawanda city
NY Tonawanda town
NY Troy city
NY Tuckahoe village
NY Ulster County
NY Union town
NY Upper Brookville village
NY Upper Nyack village
NY Utica city
NY Valley Stream village
NY Van Buren town
NY Vestal town
NY Veteran town
NY Village of the Branch village
NY Wappinger town
NY Wappingers Falls village
NY Warren County
NY Washington County
NY Waterford town
NY Waterford village
NY Watervliet city
NY Webster town
NY Webster village
NY Wesley Hills village
NY West Haverstraw village
NY West Seneca town
NY Westbury village
NY Westchester County
NY Western town
NY Wheatfield town
NY White Plains city
NY Whitesboro village
NY Whitestown town
NY Williamsville village
NY Williston Park village
NY Woodsburgh village
NY Yonkers city
NY Yorktown town
NY Yorkville village
OH Addyston village
OH Allen County
OH Allen township
OH Amberley village
OH Amelia village
OH American township
OH Amherst city
OH Amherst township
OH Anderson township
OH Arlington Heights village
OH Auglaize County
OH Aurora city
OH Austintown township
OH Avon city
OH Avon Lake city
OH Bainbridge township
OH Barberton city
OH Batavia township
OH Bath township
OH Bay Village city
OH Beachwood city
OH Beaver township
OH Beavercreek city
OH Beavercreek township
OH Bedford city
OH Bedford Heights city
OH Bellaire city
OH Bellbrook city
OH Belmont County
OH Belpre city
OH Belpre township
OH Bentleyville village
OH Berea city
OH Bethel township
OH Bexley city
OH Blendon township
OH Blue Ash city
OH Boardman township
OH Brady Lake village
OH Bratenahl village
OH Brecksville city
OH Brice village
OH Bridgeport village
OH Brilliant village
OH Brimfield township
OH Broadview Heights city
OH Brook Park city
OH Brookfield township
OH Brooklyn city
OH Brooklyn Heights village
OH Brookside village
OH Brown township
OH Brownhelm township
OH Brunswick city
OH Brunswick Hills township
OH Butler County
OH Butler township
OH Campbell city
OH Canfield city
OH Canfield township
OH Canton city
OH Canton township
OH Carlisle township
OH Carlisle village
OH Centerville city
OH Chagrin Falls township
OH Chagrin Falls village
OH Champion township
OH Chesapeake village
OH Cheviot city
OH Chippewa township
OH Cincinnati city
OH Clark County
OH Clear Creek township
OH Clermont County
OH Cleveland city
OH Cleveland Heights city
OH Cleves village
OH Clinton township
OH Coal Grove village
OH Coitsville township
OH Colerain township
OH Columbia township
OH Concord township
OH Copley township
OH Coventry township
OH Cridersville village
OH Cross Creek township
OH Cuyahoga County
OH Cuyahoga Falls city
OH Cuyahoga Heights village
OH Deer Park city
OH Deerfield township
OH Delaware County
OH Delhi township
OH Doylestown village
OH Dublin city
OH Duchouquet township
OH East Cleveland city
OH Eastlake city
OH Eaton township
OH Elmwood Place village
OH Elyria city
OH Elyria township
OH Englewood city
OH Erie County
OH Etna township
OH Euclid city
OH Evendale village
OH Fairborn city
OH Fairfax village
OH Fairfield city
OH Fairfield County
OH Fairfield township
OH Fairlawn city
OH Fairport Harbor village
OH Fairview Park city
OH Fayette township
OH Forest Park city
OH Fort Shawnee village
OH Franklin city
OH Franklin County
OH Franklin township
OH Gahanna city
OH Garfield Heights city
OH Geauga County
OH Genoa township

OH German township
OH Girard city
OH Glendale village
OH Glenwillow village
OH Golf Manor village
OH Goshen township
OH Grand River village
OH Grandview Heights city
OH Green township
OH Green village
OH Greene County
OH Greenhills village
OH Grove City city
OH Groveport village
OH Hamilton city
OH Hamilton County
OH Hamilton township
OH Hanging Rock village
OH Hanover township
OH Harbor View village
OH Harrison township
OH Hartville village
OH Heath city
OH Highland Heights city
OH Hilliard city
OH Hills and Dales village
OH Hinckley township
OH Holland village
OH Howland township
OH Hubbard city
OH Hubbard township
OH Huber Heights city
OH Hudson township
OH Hudson village
OH Independence city
OH Ironton city
OH Island Creek township
OH Jackson township
OH Jefferson County
OH Jefferson township
OH Jerome township
OH Kent city
OH Kettering city
OH Kirtland city
OH Lake County
OH Lake township
OH Lakeline village
OH Lakemore village
OH Lakewood city
OH Lawrence County
OH Lawrence township
OH Lemon township
OH Lexington village
OH Liberty township
OH Licking County
OH Licking township
OH Lima city
OH Lima township
OH Lincoln Heights city
OH Linndale village
OH Lockland village
OH Lorain city
OH Lorain County
OH Louisville city
OH Loveland city
OH Lowellville village
OH Lucas County
OH Lyndhurst city
OH Macedonia city
OH Mad River township
OH Madeira city
OH Madison township
OH Mahoning County
OH Maineville village
OH Mansfield city
OH Maple Heights city
OH Marble Cliff village
OH Mariemont village
OH Martins Ferry city
OH Mason city
OH Massillon city
OH Maumee city
OH Mayfield Heights city
OH Mayfield village
OH McDonald village
OH Mead township
OH Medina County
OH Mentor city
OH Mentor-on-the-Lake city
OH Meyers Lake village
OH Miami County
OH Miami township
OH Miamisburg city
OH Middleburg Heights city
OH Middletown city
OH Mifflin township
OH Milford city
OH Millbury village
OH Millville village
OH Minerva Park village
OH Mingo Junction city
OH Mogadore village
OH Monclova township
OH Monroe township
OH Monroe village
OH Montgomery city
OH Montgomery County
OH Moorefield township
OH Moraine city
OH Moreland Hills village
OH Mount Healthy city
OH Munroe Falls village
OH New Miami village
OH New Middletown village
OH New Rome village
OH Newark city
OH Newark township
OH Newburgh Heights village
OH Newton township
OH Newtown village
OH Niles city
OH Nimishillen township
OH North Bend village
OH North Canton city
OH North College Hill city
OH North Olmsted city
OH North Randall village
OH North Ridgeville city
OH North Royalton city
OH Northfield Center township
OH Northfield village
OH Northwood city
OH Norton city
OH Norwich township
OH Norwood city
OH Oakwood city
OH Oakwood village
OH Obetz village
OH Ohio township
OH Olmsted Falls city
OH Olmsted township
OH Ontario village
OH Orange township
OH Orange village
OH Oregon city
OH Ottawa County
OH Ottawa Hills village
OH Painesville city
OH Painesville township
OH Palmyra township
OH Parma city
OH Parma Heights city
OH Pease township
OH Pepper Pike city
OH Perry township
OH Perrysburg city
OH Perrysburg city
OH Perrysburg township
OH Pierce township
OH Plain township
OH Pleasant township
OH Poland township
OH Poland village
OH Portage County
OH Powell village
OH Prairie township
OH Proctorville village
OH Pultney township
OH Randolph township
OH Ravenna city
OH Ravenna township
OH Reading city
OH Reminderville village
OH Reynoldsburg city
OH Richfield township
OH Richfield village
OH Richland County
OH Richmond Heights city
OH Riveredge township
OH Riverlea village
OH Riverside village
OH Rocky River city
OH Rome township
OH Ross township
OH Rossford city
OH Russell township
OH Russia township
OH Sagamore Hills township
OH Seven Hills city
OH Shadyside village
OH Shaker Heights city
OH Sharon township
OH Sharonville city
OH Shawnee Hills village
OH Shawnee township
OH Sheffield Lake city
OH Sheffield township
OH Sheffield village
OH Silver Lake village
OH Silverton city
OH Solon city
OH South Amherst village
OH South Euclid city
OH South Point village
OH South Russell village
OH Springboro city
OH Springdale city
OH Springfield city
OH Springfield township
OH St. Bernard city
OH St. Clair township
OH Stark County
OH Steubenville city
OH Steubenville township
OH Stow city
OH Strongsville city
OH Struthers city
OH Suffield township
OH Sugar Bush Knolls village
OH Sugar Creek township
OH Summit County
OH Sycamore township
OH Sylvania city
OH Sylvania township
OH Symmes township
OH Tallmadge city
OH Terrace Park village
OH The Village of Indian Hill city

OH Timberlake village
OH Trenton city
OH Trotwood city
OH Troy township
OH Trumbull County
OH Truro township
OH Turtle Creek township
OH Tuscarawas township
OH Twinsburg city
OH Twinsburg township
OH Union city
OH Union County
OH Union township
OH University Heights city
OH Upper Arlington city
OH Upper township
OH Urbancrest village
OH Valley View village
OH Valleyview village
OH Vandalia city
OH Vermilion city
OH Vermilion township
OH Violet township
OH Wadsworth city
OH Wadsworth township
OH Waite Hill village
OH Walbridge village
OH Walton Hills village
OH Warren city
OH Warren County
OH Warren township
OH Warrensville Heights city
OH Warrensville township
OH Washington County
OH Washington township
OH Wayne County
OH Wayne township
OH Weathersfield township
OH Wells township
OH West Carrollton City city
OH West Milton village
OH Westerville city
OH Westlake city
OH Whitehall city
OH Whitewater township
OH Wickliffe city
OH Willoughby city
OH Willoughby Hills city
OH Willowick city
OH Wintersville village
OH Wood County
OH Woodlawn village
OH Woodmere village
OH Worthington city
OH Wyoming city
OH Youngstown city
OK Arkoma town
OK Bethany city
OK Bixby city
OK Broken Arrow city
OK Canadian County
OK Catoosa city
OK Choctaw city
OK Cleveland County
OK Comanche County
OK Creek County
OK Del City city
OK Edmond city
OK Forest Park town
OK Hall Park town
OK Harrah town
OK Jenks city
OK Jones town
OK Lake Aluma town
OK Lawton city
OK Le Flore County
OK Logan County
OK Midwest City city
OK Moffett town
OK Moore city
OK Mustang city
OK Nichols Hills city
OK Nicoma Park city
OK Norman city
OK Oklahoma County
OK Osage County
OK Pottawatomie County
OK Rogers County
OK Sand Springs city
OK Sequoyah County
OK Smith Village town
OK Spencer city
OK The Village city
OK Tulsa County
OK Valley Brook town
OK Wagoner County
OK Warr Acres city
OK Woodlawn Park town
OK Yukon city
OR Central Point city
OR Columbia County
OR Durham city
OR Jackson County
OR Keizer city
OR King City city
OR Lane County
OR Marion County
OR Maywood Park city
OR Medford city
OR Phoenix city
OR Polk County
OR Rainier city
OR Springfield city
OR Troutdale city
OR Tualatin city
OR Wood Village city
PA Abington township
PA Adamsburg borough
PA Alburtis borough
PA Aldan borough
PA Aleppo township
PA Aliquippa city
PA Allegheny County
PA Allegheny township
PA Allen township
PA Allenport borough
PA Alsace township
PA Altoona city
PA Ambler borough
PA Ambridge borough
PA Amwell township
PA Antis township
PA Antrim township
PA Archbald borough
PA Arnold city
PA Ashley borough
PA Aspinwall borough
PA Aston township
PA Avalon borough
PA Avoca borough
PA Baden borough
PA Baldwin borough
PA Baldwin township
PA Beaver borough
PA Beaver County
PA Beaver Falls city
PA Bell Acres borough
PA Belle Vernon borough
PA Bellevue borough
PA Ben Avon borough
PA Ben Avon Heights borough
PA Bensalem township
PA Berks County
PA Bern township
PA Bethel Park borough
PA Bethel township
PA Bethlehem city
PA Bethlehem township
PA Big Beaver borough
PA Birdsboro borough
PA Birmingham township
PA Blair County
PA Blair township
PA Blakely borough
PA Blawnox borough
PA Boyertown borough
PA Brackenridge borough
PA Braddock borough
PA Braddock Hills borough
PA Bradfordwoods borough
PA Brentwood borough
PA Bridgeport borough
PA Bridgeville borough
PA Bridgewater borough
PA Brighton township
PA Bristol borough
PA Bristol township
PA Brookhaven borough
PA Brownstown borough
PA Brownsville borough
PA Brownsville township
PA Bryn Athyn borough
PA Buckingham township
PA Bucks County
PA California borough
PA Caln township
PA Cambria County
PA Camp Hill borough
PA Canonsburg borough
PA Canton township
PA Carbondale city
PA Carbondale township
PA Carnegie borough
PA Carroll township
PA Castle Shannon borough
PA Catasauqua borough
PA Cecil township
PA Center township
PA Centre County
PA Chalfant borough
PA Chalfont borough
PA Charleroi borough
PA Charlestown township
PA Chartiers township
PA Cheltenham township
PA Chester city
PA Chester County
PA Chester Heights borough
PA Chester township
PA Cheswick borough
PA Chippewa township
PA Churchill borough
PA Clairton city
PA Clarks Green borough
PA Clarks Summit borough
PA Clifton Heights borough
PA Coal Center borough
PA Coatesville city
PA Colebrookdale township
PA College township
PA Collegeville borough
PA Collier township
PA Collingdale borough
PA Columbia borough
PA Colwyn borough
PA Concord township
PA Conemaugh township
PA Conestoga township

PA Conewago township
PA Conshohocken borough
PA Conway borough
PA Coplay borough
PA Coraopolis borough
PA Courtdale borough
PA Crafton borough
PA Crescent township
PA Cumberland County
PA Cumru township
PA Daisytown borough
PA Dale borough
PA Dallas borough
PA Dallas township
PA Dallastown borough
PA Darby borough
PA Darby township
PA Daugherty township
PA Dauphin County
PA Delaware County
PA Delmont borough
PA Derry township
PA Dickson City borough
PA Donora borough
PA Dormont borough
PA Douglass township
PA Dover borough
PA Dover township
PA Downingtown borough
PA Doylestown borough
PA Doylestown township
PA Dravosburg borough
PA Duboistown borough
PA Duncansville borough
PA Dunlevy borough
PA Dunmore borough
PA Dupont borough
PA Duquesne city
PA Duryea borough
PA East Allen township
PA East Bradford township
PA East Brandywine township
PA East Caln township
PA East Conemaugh borough
PA East Coventry township
PA East Deer township
PA East Fallowfield township
PA East Goshen township
PA East Hempfield township
PA East Lampeter township
PA East Lansdowne borough
PA East McKeesport borough
PA East Norriton township
PA East Pennsboro township
PA East Petersburg borough
PA East Pikeland township
PA East Pittsburgh borough
PA East Rochester borough
PA East Taylor township
PA East Vincent township
PA East Washington borough
PA East Whiteland township
PA Easton city
PA Easttown township
PA Eastvale borough
PA Economy borough
PA Eddystone borough
PA Edgewood borough
PA Edgeworth borough
PA Edgmont township
PA Edwardsville borough
PA Elco borough
PA Elizabeth borough
PA Elizabeth township
PA Ellport borough
PA Ellwood City borough
PA Emmaus borough
PA Emsworth borough
PA Erie city
PA Erie County
PA Etna borough
PA Exeter borough
PA Exeter township
PA Export borough
PA Fairfield township
PA Fairview township
PA Fallowfield township
PA Falls township
PA Fallston borough
PA Farrell city
PA Fayette City borough
PA Fayette County
PA Fell township
PA Ferguson township
PA Ferndale borough
PA Findlay township
PA Finleyville borough
PA Folcroft borough
PA Forest Hills borough
PA Forks township
PA Forty Fort borough
PA Forward township
PA Fountain Hill borough
PA Fox Chapel borough
PA Franconia township
PA Franklin borough
PA Franklin County
PA Franklin Park borough
PA Franklin township
PA Frankstown township
PA Frazer township
PA Freedom borough
PA Freemansburg borough
PA Geistown borough
PA Glassport borough
PA Glendon borough
PA Glenfield borough
PA Glenolden borough
PA Green Tree borough
PA Greensburg city
PA Hallam borough
PA Hampden township
PA Hampton township
PA Hanover township
PA Harborcreek township
PA Harmar township
PA Harmony township
PA Harris township
PA Harrisburg city
PA Harrison township
PA Harveys Lake borough
PA Hatboro borough
PA Hatfield borough
PA Hatfield township
PA Haverford township
PA Haysville borough
PA Heidelberg borough
PA Hellam township
PA Hellertown borough
PA Hempfield township
PA Hepburn township
PA Hermitage city
PA Highspire borough
PA Hilltown township
PA Hollidaysburg borough
PA Homestead borough
PA Homewood borough
PA Hopewell township
PA Horsham township
PA Houston borough
PA Hughestown borough
PA Hulmeville borough
PA Hummelstown borough
PA Hunker borough
PA Indiana township
PA Ingram borough
PA Irwin borough
PA Ivyland borough
PA Jackson township
PA Jacobus borough
PA Jeannette city
PA Jefferson borough
PA Jenkins township
PA Jenkintown borough
PA Jermyn borough
PA Jessup borough
PA Johnstown city
PA Juniata township
PA Kenhorst borough
PA Kennedy township
PA Kilbuck township
PA Kingston borough
PA Kingston township
PA Koppel borough
PA Lackawanna County
PA Laflin borough
PA Lancaster city
PA Lancaster County
PA Lancaster township
PA Langhorne borough
PA Langhorne Manor borough
PA Lansdale borough
PA Lansdowne borough
PA Larksville borough
PA Laurel Run borough
PA Laureldale borough
PA Lawrence County
PA Lawrence Park township
PA Lebanon County
PA Leesport borough
PA Leet township
PA Leetsdale borough
PA Lehigh County
PA Lehman township
PA Lemoyne borough
PA Liberty borough
PA Limerick township
PA Lincoln borough
PA Lititz borough
PA Logan township
PA Loganville borough
PA London Britain township
PA Londonderry township
PA Lorain borough
PA Lower Allen township
PA Lower Alsace township
PA Lower Burrell city
PA Lower Chichester township
PA Lower Frederick township
PA Lower Gwynedd township
PA Lower Heidelberg township
PA Lower Macungie township
PA Lower Makefield township
PA Lower Merion township
PA Lower Moreland township
PA Lower Nazareth township
PA Lower Paxton township
PA Lower Pottsgrove township
PA Lower Providence township
PA Lower Salford township
PA Lower Saucon township
PA Lower Southampton township
PA Lower Swatara township
PA Lower Yoder township
PA Loyalsock township
PA Luzerne borough
PA Luzerne County
PA Luzerne township

PA Lycoming County
PA Lycoming township
PA Macungie borough
PA Madison borough
PA Maidencreek township
PA Malvern borough
PA Manchester township
PA Manheim township
PA Manor borough
PA Manor township
PA Marcus Hook borough
PA Marple township
PA Marshall township
PA Marysville borough
PA Mayfield borough
PA McCandless township
PA McKean township
PA McKees Rocks borough
PA McKeesport city
PA Mechanicsburg borough
PA Media borough
PA Mercer County
PA Middle Taylor township
PA Middletown borough
PA Middletown township
PA Millbourne borough
PA Millcreek township
PA Millersville borough
PA Millvale borough
PA Modena borough
PA Mohnton borough
PA Monaca borough
PA Monessen city
PA Monongahela city
PA Monroe township
PA Montgomery County
PA Montgomery township
PA Montoursville borough
PA Moon township
PA Moosic borough
PA Morrisville borough
PA Morton borough
PA Mount Lebanon township
PA Mount Oliver borough
PA Mount Penn borough
PA Mountville borough
PA Muhlenberg township
PA Munhall borough
PA Municipality of Monroeville borough
PA Municipality of Murrysville borough
PA Nanticoke city
PA Narberth borough
PA Nether Providence township
PA Neville township
PA New Brighton borough
PA New Britain borough
PA New Britain township
PA New Cumberland borough
PA New Eagle borough
PA New Galilee borough
PA New Garden township
PA New Hanover township
PA New Kensington city
PA New Sewickley township
PA New Stanton borough
PA Newell borough
PA Newport township
PA Newton township
PA Newtown borough
PA Newtown township
PA Norristown borough
PA North Belle Vernon borough
PA North Braddock borough
PA North Catasauqua borough
PA North Charleroi borough
PA North Coventry township
PA North Franklin township
PA North Huntingdon township
PA North Irwin borough
PA North Londonderry township
PA North Sewickley township
PA North Strabane township
PA North Versailles township
PA North Wales borough
PA North Whitehall township
PA North York borough
PA Northampton borough
PA Northampton County
PA Northampton township
PA Norwood borough
PA Oakmont borough
PA O'Hara township
PA Ohio township
PA Old Forge borough
PA Old Lycoming township
PA Olyphant borough
PA Ontelaunee township
PA Osborne borough
PA Paint borough
PA Paint township
PA Palmer township
PA Palmyra borough
PA Parkside borough
PA Patterson Heights borough
PA Patterson township
PA Patton township
PA Paxtang borough
PA Penbrook borough
PA Penn borough
PA Penn Hills township
PA Penn township
PA Penndel borough
PA Pennsbury Village borough
PA Pequea township
PA Perkiomen township
PA Perry County
PA Perry township
PA Peters township
PA Phoenixville borough
PA Pine township
PA Pitcairn borough
PA Pittsburgh city
PA Pittston city
PA Pittston township
PA Plains township
PA Pleasant Hills borough
PA Plum borough
PA Plymouth borough
PA Plymouth township
PA Port Vue borough
PA Potter township
PA Pottstown borough
PA Pringle borough
PA Prospect Park borough
PA Pulaski township
PA Radnor township
PA Rankin borough
PA Ransom township
PA Reading city
PA Red Lion borough
PA Reserve township
PA Richland township
PA Ridley Park borough
PA Ridley township
PA Robinson township
PA Rochester borough
PA Rochester township
PA Rockledge borough
PA Roscoe borough
PA Rose Valley borough
PA Ross township
PA Rosslyn Farms borough
PA Rostraver township
PA Royalton borough
PA Royersford borough
PA Rutledge borough
PA Salem township
PA Salisbury township
PA Scalp Level borough
PA Schuylkill township
PA Schwenksville borough
PA Scott township
PA Scranton city
PA Sewickley borough
PA Sewickley Heights borough
PA Sewickley Hills borough
PA Sewickley township
PA Shaler township
PA Sharon city
PA Sharon Hill borough
PA Sharpsburg borough
PA Sharpsville borough
PA Shenango township
PA Shillington borough
PA Shiremanstown borough
PA Silver Spring township
PA Sinking Spring borough
PA Skippack township
PA Somerset County
PA Souderton borough
PA South Abington township
PA South Coatesville borough
PA South Fayette township
PA South Greensburg borough
PA South Hanover township
PA South Heidelberg township
PA South Heights borough
PA South Huntingdon township
PA South Park township
PA South Pymatuning township
PA South Strabane township
PA South Whitehall township
PA South Williamsport borough
PA Southmont borough
PA Southwest Greensburg borough
PA Speers borough
PA Spring City borough
PA Spring Garden township
PA Spring township
PA Springdale borough
PA Springdale township
PA Springettsbury township
PA Springfield township
PA St. Lawrence borough
PA State College borough
PA Steelton borough
PA Stockdale borough
PA Stonycreek township
PA Stowe township
PA Sugar Notch borough
PA Summit township
PA Susquehanna township
PA Sutersville borough
PA Swarthmore borough
PA Swatara township
PA Swissvale borough
PA Swoyersville borough
PA Tarentum borough
PA Taylor borough
PA Telford borough
PA Temple borough
PA Thornburg borough
PA Thornbury township
PA Throop borough
PA Tinicum township
PA Towamencin township
PA Trafford borough
PA Trainer borough

PA Trappe borough
PA Tredyffrin township
PA Tullytown borough
PA Turtle Creek borough
PA Union township
PA Upland borough
PA Upper Allen township
PA Upper Chichester township
PA Upper Darby township
PA Upper Dublin township
PA Upper Gwynedd township
PA Upper Leacock township
PA Upper Macungie township
PA Upper Makefield township
PA Upper Merion township
PA Upper Milford township
PA Upper Moreland township
PA Upper Pottsgrove township
PA Upper Providence township
PA Upper Saucon township
PA Upper Southampton township
PA Upper St. Clair township
PA Upper Yoder township
PA Uwchlan township
PA Valley township
PA Vanport township
PA Verona borough
PA Versailles borough
PA Wall borough
PA Warminster township
PA Warrington township
PA Warrior Run borough
PA Warwick township
PA Washington city
PA Washington County
PA Washington township
PA Wayne township
PA Wernersville borough
PA Wesleyville borough
PA West Bradford township
PA West Brownsville borough
PA West Chester borough
PA West Conshohocken borough
PA West Deer township
PA West Earl township
PA West Easton borough
PA West Elizabeth borough
PA West Fairview borough
PA West Goshen township
PA West Hanover township
PA West Hempfield township
PA West Homestead borough
PA West Lampeter township
PA West Lawn borough
PA West Manchester township
PA West Mayfield borough
PA West Middlesex borough
PA West Mifflin borough
PA West Newton borough
PA West Norriton township
PA West Pikeland township
PA West Pittston borough
PA West Pottsgrove township
PA West Reading borough
PA West Taylor township
PA West View borough
PA West Whiteland township
PA West Wyoming borough
PA West York borough
PA Westmont borough
PA Westmoreland County
PA Westtown township
PA Wheatland borough
PA Whitaker borough
PA White Oak borough
PA White township
PA Whitehall township
PA Whitemarsh township
PA Whitpain township
PA Wilkes-Barre city
PA Wilkes-Barre township
PA Wilkins township
PA Wilkinsburg borough
PA Williams township
PA Williamsport city
PA Willistown township
PA Wilmerding borough
PA Wilson borough
PA Windber borough
PA Windsor borough
PA Windsor township
PA Worcester township
PA Wormleysburg borough
PA Wrightsville borough
PA Wyoming borough
PA Wyomissing borough
PA Wyomissing Hills borough
PA Yardley borough
PA Yatesville borough
PA Yeadon borough
PA Yoe borough
PA York city
PA York County
PA York township
PA Youngwood borough
PR Aibonita
PR Anasco
PR Aquada
PR Aquadilla
PR Aquas Buenas
PR Arecibo
PR Bayamon
PR Cabo Rojo
PR Caguas
PR Camuy
PR Canovanas
PR Catano
PR Cayey
PR Cidra
PR Dorado
PR Guaynabo
PR Gurabo
PR Hatillo
PR Hormigueros
PR Humacao
PR Juncos
PR Las Piedras
PR Loiza
PR Manati
PR Mayaguez
PR Moca
PR Naguabo
PR Naranjito
PR Penuelas
PR Ponce
PR Rio Grande
PR San German
PR San Lorenzo
PR Toa Alta
PR Toa Baja
PR Trujillo Alto
PR Vega Alta
PR Vega Baja
PR Yabucao
RI Barrington town
RI Bristol town
RI Burrillville town
RI Central Falls city
RI Coventry town
RI Cranston city
RI Cumberland town
RI East Greenwich town
RI East Providence city
RI Glocester town
RI Jamestown town
RI Johnston town
RI Lincoln town
RI Middletown town
RI Newport city
RI Newport County
RI North Kingstown town
RI North Providence town
RI North Smithfield town
RI Pawtucket city
RI Portsmouth town
RI Providence city
RI Providence County
RI Scituate town
RI Smithfield town
RI Tiverton town
RI Warren town
RI Warwick city
RI Washington County
RI West Greenwich town
RI West Warwick town
RI Woonsocket city
SC Aiken city
SC Aiken County
SC Anderson city
SC Anderson County
SC Arcadia Lakes town
SC Berkeley County
SC Burnettown town
SC Cayce city
SC Charleston city
SC Charleston County
SC City View town
SC Columbia city
SC Cowpens town
SC Darlington County
SC Dorchester County
SC Edgefield County
SC Florence city
SC Florence County
SC Folly Beach city
SC Forest Acres city
SC Fort Mill town
SC Georgetown County
SC Goose Creek city
SC Hanahan city
SC Horry County
SC Irmo town
SC Isle of Palms city
SC Lexington County
SC Lincolnville town
SC Mount Pleasant town
SC Myrtle Beach city
SC North Augusta city
SC North Charleston city
SC Pickens County
SC Pineridge town
SC Quinby town
SC Rock Hill city
SC South Congaree town
SC Spartanburg city
SC Spartanburg County
SC Springdale town
SC Sullivan's Island town
SC Summerville town
SC Sumter city
SC Sumter County
SC Surfside Beach town
SC West Columbia city
SC York County
SD Big Sioux township
SD Central Pennington unorg.
SD Lincoln County
SD Mapleton township

SD Minnehaha County
SD North Sioux City city
SD Pennington County
SD Rapid City city
SD Split Rock township
SD Union County
SD Wayne township
TN Alcoa city
TN Anderson County
TN Bartlett town
TN Belle Meade city
TN Berry Hill city
TN Blount County
TN Brentwood city
TN Bristol city
TN Carter County
TN Church Hill town
TN Clarksville city
TN Collegedale city
TN Davidson County
TN East Ridge city
TN Elizabethton city
TN Farragut town
TN Forest Hills city
TN Germantown city
TN Goodlettsville city
TN Hamilton County
TN Hawkins County
TN Hendersonville city
TN Jackson city
TN Johnson City city
TN Jonesborough town
TN Kingsport city
TN Knox County
TN Lakesite city
TN Lakewood city
TN Lookout Mountain town
TN Loudon County
TN Madison County
TN Maryville city
TN Montgomery County
TN Mount Carmel town
TN Mount Juliet city
TN Oak Hill city
TN Red Bank city
TN Ridgeside city
TN Rockford city
TN Shelby County
TN Signal Mountain town
TN Soddy-Daisy city
TN Sullivan County
TN Sumner County
TN Washington County
TN Williamson County
TN Wilson County
TX Addison city
TX Alamo city
TX Alamo Heights city
TX Allen city
TX Archer County
TX Azle city
TX Balch Springs city
TX Balcones Heights city
TX Bayou Vista village
TX Baytown city
TX Bedford city
TX Bell County
TX Bellaire city
TX Bellmead city
TX Belton city
TX Benbrook city
TX Beverly Hills city
TX Bexar County
TX Blue Mound city
TX Bowie County
TX Brazoria County
TX Brazos County
TX Brookside Village city
TX Brownsville city
TX Bryan city
TX Buckingham town
TX Bunker Hill Village city
TX Cameron County
TX Carrollton city
TX Castle Hills city
TX Cedar Hill city
TX Cedar Park city
TX Chambers County
TX Cibolo city
TX Clear Lake Shores city
TX Clint town
TX Cockrell Hill city
TX College Station city
TX Colleyville city
TX Collin County
TX Comal County
TX Combes town
TX Converse city
TX Copperas Cove city
TX Corinth town
TX Coryell County
TX Crowley city
TX Dallas County
TX Dalworthington Gardens city
TX Deer Park city
TX Denison city
TX Denton city
TX Denton County
TX DeSoto city
TX Dickinson city
TX Donna city
TX Double Oak town
TX Duncanville city
TX Ector County
TX Edgecliff village
TX Edinburg city
TX El Lago city
TX El Paso County
TX Ellis County
TX Euless city
TX Everman city
TX Farmers Branch city
TX Flower Mound town
TX Forest Hill city
TX Fort Bend County
TX Friendswood city
TX Galena Park city
TX Galveston city
TX Galveston County
TX Grand Prairie city
TX Grapevine city
TX Grayson County
TX Gregg County
TX Groves city
TX Guadalupe County
TX Haltom City city
TX Hardin County
TX Harker Heights city
TX Harlingen city
TX Harrison County
TX Hedwig Village city
TX Hewitt city
TX Hickory Creek town
TX Hidalgo County
TX Highland Park town
TX Highland Village city
TX Hill Country Village city
TX Hilshire Village city
TX Hitchcock city
TX Hollywood Park town
TX Howe town
TX Humble city
TX Hunters Creek Village city
TX Hurst city
TX Hutchins city
TX Impact town
TX Jacinto City city
TX Jefferson County
TX Jersey Village city
TX Johnson County
TX Jones County
TX Katy city
TX Kaufman County
TX Keller city
TX Kemah city
TX Kennedale city
TX Killeen city
TX Kirby city
TX Kleberg County
TX La Marque city
TX La Porte city
TX Lacy-Lakeview city
TX Lake Dallas city
TX Lake Worth city
TX Lakeside City town
TX Lakeside town
TX Lampasas County
TX Lancaster city
TX League City city
TX Leander city
TX Leon Valley city
TX Lewisville city
TX Live Oak city
TX Longview city
TX Lubbock County
TX Lumberton city
TX Martin County
TX McAllen city
TX McLennan County
TX Meadows city
TX Midland city
TX Midland County
TX Mission city
TX Missouri City city
TX Montgomery County
TX Morgan's Point city
TX Nash city
TX Nassau Bay city
TX Nederland city
TX Nolanville city
TX North Richland Hills city
TX Northcrest town
TX Nueces County
TX Odessa city
TX Olmos Park city
TX Palm Valley town
TX Palmview city
TX Pantego town
TX Parker County
TX Pearland city
TX Pflugerville city
TX Pharr city
TX Piney Point Village city
TX Port Arthur city
TX Port Neches city
TX Portland city
TX Potter County
TX Primera town
TX Randall County
TX Richardson city
TX Richland Hills city
TX River Oaks city
TX Robinson city
TX Rockwall city
TX Rockwall County
TX Rollingwood city
TX Rose Hill Acres city
TX Rowlett city

TX Sachse city
TX Saginaw city
TX San Angelo city
TX San Benito city
TX San Juan city
TX San Patricio County
TX Sansom Park city
TX Santa Fe city
TX Schertz city
TX Seabrook city
TX Seagoville city
TX Selma city
TX Shavano Park city
TX Sherman city
TX Shoreacres city
TX Smith County
TX Socorro town
TX South Houston city
TX Southside Place city
TX Spring Valley city
TX Stafford town
TX Sugar Land city
TX Sunset Valley city
TX Tarrant County
TX Taylor County
TX Taylor Lake Village city
TX Temple city
TX Terrell Hills city
TX Texarkana city
TX Texas City city
TX Tom Green County
TX Travis County
TX Tye town
TX Tyler city
TX Universal City city
TX University Park city
TX Victoria city
TX Victoria County
TX Wake Village city
TX Waller County
TX Watauga city
TX Webb County
TX Webster city
TX Weslaco city
TX West Lake Hills city
TX West University Place city
TX Westover Hills town
TX Westworth village
TX White Oak city
TX White Settlement city
TX Wichita County
TX Wichita Falls city
TX Williamson County
TX Wilmer city
TX Windcrest city
TX Woodway city
UT American Fork city
UT Bluffdale city
UT Bountiful city
UT Cache County
UT Cedar Hills town
UT Centerville city
UT Clearfield city
UT Clinton city
UT Davis County
UT Draper city
UT Farmington city
UT Farr West city
UT Fruit Heights city
UT Harrisville city
UT Highland city
UT Hyde Park city
UT Kaysville city
UT Layton city
UT Lehi city
UT Lindon city
UT Logan city
UT Mapleton city
UT Midvale city
UT Millville city
UT Murray city
UT North Logan city
UT North Ogden city
UT North Salt Lake city
UT Ogden city
UT Orem city
UT Pleasant Grove city
UT Pleasant View city
UT Providence city
UT Provo city
UT River Heights city
UT Riverdale city
UT Riverton city
UT Roy city
UT Sandy city
UT Smithfield city
UT South Jordan city
UT South Ogden city
UT South Salt Lake city
UT South Weber city
UT Springville city
UT Sunset city
UT Syracuse city
UT Uintah town
UT Utah County
UT Washington Terrace city
UT Weber County
UT West Bountiful city
UT West Jordan city
UT West Point city
UT West Valley City city
UT Woods Cross city
VA Albemarle County
VA Alexandria city
VA Amherst County
VA Bedford County
VA Botetourt County
VA Bristol city
VA Campbell County
VA Charlottesville city
VA Colonial Heights city
VA Danville city
VA Dinwiddie County
VA Fairfax city
VA Falls Church city
VA Fredericksburg city
VA Gate City town
VA Gloucester County
VA Hanover County
VA Herndon town
VA Hopewell city
VA James City County
VA Loudoun County
VA Lynchburg city
VA Manassas city
VA Manassas Park city
VA Occoquan town
VA Petersburg city
VA Pittsylvania County
VA Poquoson city
VA Prince George County
VA Richmond city
VA Roanoke city
VA Roanoke County
VA Salem city
VA Scott County
VA Spotsylvania County
VA Stafford County
VA Suffolk city
VA Vienna town
VA Vinton town
VA Washington County
VA Weber City town
VA Williamsburg city
VA York County
VT Burlington city
VT Chittenden County
VT Colchester town
VT Essex Junction village
VT Essex town
VT Shelburne town
VT South Burlington city
VT Williston town
VT Winooski city
WA Algona city
WA Auburn city
WA Beaux Arts Village town
WA Bellevue city
WA Bellingham city
WA Benton County
WA Bonney Lake city
WA Bothell city
WA Bremerton city
WA Brier city
WA Clyde Hill town
WA Cowlitz County
WA Des Moines city
WA DuPont city
WA Edmonds city
WA Everett city
WA Fife city
WA Fircrest town
WA Franklin County
WA Gig Harbor city
WA Hunts Point town
WA Issaquah city
WA Kelso city
WA Kennewick city
WA Kent city
WA Kirkland city
WA Kitsap County
WA Lacey city
WA Lake Forest Park city
WA Longview city
WA Lynnwood city
WA Marysville city
WA Medina city
WA Mercer Island city
WA Mill Creek city
WA Millwood town
WA Milton city
WA Mountlake Terrace city
WA Mukilteo city
WA Normandy Park city
WA Olympia city
WA Pacific city
WA Pasco city
WA Port Orchard city
WA Puyallup city
WA Redmond city
WA Renton city
WA Richland city
WA Ruston town
WA Selah city
WA Steilacoom town
WA Sumner city
WA Thurston County
WA Tukwila city
WA Tumwater city
WA Union Gap city
WA Vancouver city
WA West Richland city
WA Whatcom County
WA Woodway city
WA Yakima city
WA Yakima County
WA Yarrow Point town
WI Algoma town

WI Allouez village
WI Altoona city
WI Appleton city
WI Ashwaubenon village
WI Bayside village
WI Bellevue town
WI Beloit city
WI Beloit town
WI Big Bend village
WI Black Wolf town
WI Blooming Grove town
WI Brookfield city
WI Brookfield town
WI Brown County
WI Brown Deer village
WI Brunswick town
WI Buchanan town
WI Burke town
WI Butler village
WI Caledonia town
WI Calumet County
WI Campbell town
WI Cedarburg city
WI Cedarburg town
WI Chippewa County
WI Chippewa Falls city
WI Clayton town
WI Combined Locks village
WI Cudahy city
WI Dane County
WI De Pere city
WI De Pere town
WI Delafield town
WI Douglas County
WI Dunn town
WI Eagle Point town
WI Eau Claire city
WI Eau Claire County
WI Elm Grove village
WI Elmwood Park village
WI Fitchburg city
WI Fox Point village
WI Franklin city
WI Germantown town
WI Germantown village
WI Glendale city
WI Grafton town
WI Grafton village
WI Grand Chute town
WI Green Bay city
WI Greendale village
WI Greenfield city
WI Greenville town
WI Hales Corners village
WI Hallie town
WI Harmony town
WI Harrison town
WI Hobart town
WI Holmen village
WI Howard village
WI Janesville city
WI Janesville town
WI Kaukauna city
WI Kenosha city
WI Kenosha County
WI Kimberly village
WI Kohler village
WI La Crosse city
WI La Crosse County
WI La Prairie town
WI Lafayette town
WI Lannon village
WI Lima town
WI Lisbon town
WI Little Chute village
WI Madison town
WI Maple Bluff village
WI Marathon County
WI McFarland village
WI Medary town
WI Menasha city
WI Menasha town
WI Menomonee Falls village
WI Mequon city
WI Middleton city
WI Middleton town
WI Monona city
WI Mount Pleasant town
WI Muskego city
WI Neenah city
WI Neenah town
WI Nekimi town
WI New Berlin city
WI North Bay village
WI Norway town
WI Oak Creek city
WI Onalaska city
WI Onalaska town
WI Oshkosh city
WI Oshkosh town
WI Outagamie County
WI Ozaukee County
WI Pewaukee town
WI Pewaukee village
WI Pleasant Prairie town
WI Pleasant Prairie village
WI Racine city
WI Racine County
WI Rib Mountain town
WI River Hills village
WI Rock County
WI Rock town
WI Rothschild village
WI Salem town
WI Schofield city
WI Scott town
WI Sheboygan city
WI Sheboygan County
WI Sheboygan Falls city
WI Sheboygan Falls town
WI Sheboygan town
WI Shelby town
WI Shorewood Hills village
WI Shorewood village
WI Somers town
WI South Milwaukee city
WI St. Francis city
WI Stettin town
WI Sturtevant village
WI Superior city
WI Superior village
WI Sussex village
WI Thiensville village
WI Turtle town
WI Union town
WI Vandenbroek town
WI Vernon town
WI Washington County
WI Washington town
WI Waukesha city
WI Waukesha County
WI Waukesha town
WI Wausau city
WI Wauwatosa city
WI West Allis city
WI West Milwaukee village
WI Weston town
WI Westport town
WI Wheaton town
WI Whitefish Bay village
WI Wilson town
WI Wind Point village
WI Winnebago County
WV Bancroft town
WV Barboursville village
WV Belle town
WV Benwood city
WV Berkeley County
WV Bethlehem village
WV Brooke County
WV Cabell County
WV Cedar Grove town
WV Ceredo city
WV Charleston city
WV Chesapeake town
WV Clearview village
WV Dunbar city
WV East Bank town
WV Follansbee city
WV Glasgow town
WV Glen Dale city
WV Hancock County
WV Huntington city
WV Hurricane city
WV Kanawha County
WV Kenova city
WV Marmet city
WV Marshall County
WV McMechen city
WV Mineral County
WV Moundsville city
WV Nitro city
WV North Hills town
WV Ohio County
WV Parkersburg city
WV Poca town
WV Putnam County
WV Ridgeley town
WV South Charleston city
WV St. Albans city
WV Triadelphia town
WV Vienna city
WV Wayne County
WV Weirton city
WV Wheeling city
WV Wood County
WY Casper city
WY Cheyenne city
WY Evansville town
WY Laramie County
WY Mills town
WY Natrona County

Appendix 7 of Preamble—Governmental Entities (Located Outside of an Urbanized Area) That Must Be Examined By the NPDES Permitting Authority for Potential Designation Under § 123.35(b)(2)

(All listed entities have a population of at least 10,000 and a population density of at least 1,000. A listed entity would only be potentially designated if it operates a small MS4. See § 122.26(b)(16) for the definition of a small MS4.)

(This list does not include all operators of small MS4s that may be designated by the NPDES permitting authority. Operators of small MS4s in areas with populations below 10,000 and densities below 1,000 may also be designated but examination of them is not required. Also, entities such as military bases, large hospitals, prison complexes, universities, sewer districts, and highway departments that operate a small MS4 in an area listed here, or in an area otherwise designated by the NPDES permitting authority, may be designated and become subject to permitting regulations.) (Source: 1990 Census of Population and Housing, U.S. Bureau of the Census. This list is subject to change with the Decennial Census)

AL Daphne city
AL Jacksonville city
AL Selma city
AR Arkadelphia city
AR Benton city
AR Blytheville city
AR Conway city
AR El Dorado city
AR Hot Springs city
AR Magnolia city
AR Rogers city
AR Searcy city
AR Stuttgart city
AZ Douglas city
CA Arcata city
CA Arroyo Grande city
CA Atwater city
CA Auburn city
CA Banning city
CA Brawley city
CA Calexico city
CA Clearlake city
CA Corcoran city
CA Delano city
CA Desert Hot Springs city
CA Dinuba city
CA Dixon city
CA El Centro city
CA El Paso de Robles (Paso Robles) city
CA Eureka city
CA Fillmore city
CA Gilroy city
CA Grover City city
CA Hanford city
CA Hollister city
CA Lemoore city
CA Los Banos city
CA Madera city
CA Manteca city
CA Oakdale city
CA Oroville city
CA Paradise town
CA Petaluma city
CA Porterville city
CA Red Bluff city
CA Reedley city
CA Ridgecrest city
CA Sanger city
CA Santa Paula city
CA Selma city
CA South Lake Tahoe city
CA Temecula city
CA Tracy city
CA Tulare city
CA Turlock city
CA Ukiah city
CA Wasco city
CA Woodland city
CO Canon City city
CO Durango city
CO Lafayette city
CO Louisville city
CO Loveland city
CO Sterling city
FL Bartow city
FL Belle Glade city
FL De Land city
FL Eustis city
FL Haines City city
FL Key West city
FL Leesburg city
FL Palatka city
FL Plant City city
FL St. Augustine city
FL St. Cloud city
GA Americus city
GA Carrollton city
GA Cordele city
GA Dalton city
GA Dublin city
GA Griffin city
GA Hinesville city
GA Moultrie city
GA Newnan city
GA Statesboro city
GA Thomasville city
GA Tifton city
GA Valdosta city
GA Waycross city
IA Ames city
IA Ankeny city
IA Boone city
IA Burlington city
IA Fort Dodge city
IA Fort Madison city
IA Indianola city
IA Keokuk city
IA Marshalltown city
IA Mason City city
IA Muscatine city
IA Newton city
IA Oskaloosa city
IA Ottumwa city
IA Spencer city
ID Caldwell city
ID Coeur d'Alene city
ID Lewiston city
ID Moscow city
ID Nampa city
ID Rexburg city
ID Twin Falls city
IL Belvidere city
IL Canton city
IL Carbondale city
IL Centralia city
IL Charleston city
IL Danville city
IL De Kalb city
IL Dixon city
IL Effingham city
IL Freeport city
IL Galesburg city
IL Jacksonville city
IL Macomb city
IL Mattoon city
IL Mount Vernon city
IL Ottawa city
IL Pontiac city
IL Quincy city
IL Rantoul village
IL Sterling city
IL Streator city
IL Taylorville city
IL Woodstock city
IN Bedford city
IN Columbus city
IN Crawfordsville city
IN Frankfort city
IN Franklin city
IN Greenfield city
IN Huntington city
IN Jasper city
IN La Porte city
IN Lebanon city
IN Logansport city
IN Madison city
IN Marion city
IN Martinsville city
IN Michigan City city
IN New Castle city
IN Noblesville city
IN Peru city
IN Plainfield town
IN Richmond city
IN Seymour city
IN Shelbyville city
IN Valparaiso city
IN Vincennes city
IN Wabash city
IN Warsaw city
IN Washington city
KS Arkansas City city
KS Atchison city
KS Coffeyville city
KS Derby city
KS Dodge City city
KS El Dorado city
KS Emporia city
KS Garden City city
KS Great Bend city
KS Hays city
KS Hutchinson city
KS Junction City city
KS Leavenworth city
KS Liberal city
KS Manhattan city
KS McPherson city
KS Newton city
KS Ottawa city
KS Parsons city
KS Pittsburg city
KS Salina city
KS Winfield city
KY Bowling Green city
KY Danville city
KY Frankfort city
KY Georgetown city
KY Glasgow city
KY Hopkinsville city
KY Madisonville city
KY Middlesborough city
KY Murray city
KY Nicholasville city
KY Paducah city
KY Radcliff city
KY Richmond city
KY Somerset city
KY Winchester city

LA Abbeville city
LA Bastrop city
LA Bogalusa city
LA Crowley city
LA Eunice city
LA Hammond city
LA Jennings city
LA Minden city
LA Morgan City city
LA Natchitoches city
LA New Iberia city
LA Opelousas city
LA Ruston city
LA Thibodaux city
MA Amherst town
MA Clinton town
MA Milford town
MA Newburyport city
MD Aberdeen town
MD Cambridge city
MD Salisbury city
MD Westminster city
ME Waterville city
MI Adrian city
MI Albion city
MI Alpena city
MI Big Rapids city
MI Cadillac city
MI Escanaba city
MI Grand Haven city
MI Marquette city
MI Midland city
MI Monroe city
MI Mount Pleasant city
MI Owosso city
MI Sturgis city
MI Traverse City city
MN Albert Lea city
MN Austin city
MN Bemidji city
MN Brainerd city
MN Faribault city
MN Fergus Falls city
MN Hastings city
MN Hutchinson city
MN Mankato city
MN Marshall city
MN New Ulm city
MN North Mankato city
MN Northfield city
MN Owatonna city
MN Stillwater city
MN Willmar city
MN Winona city
MO Cape Girardeau city
MO Farmington city
MO Hannibal city
MO Jefferson City city
MO Kennett city
MO Kirksville city
MO Marshall city
MO Maryville city
MO Poplar Bluff city
MO Rolla city
MO Sedalia city
MO Sikeston city
MO Warrensburg city
MO Washington city
MS Brookhaven city
MS Canton city
MS Clarksdale city
MS Cleveland city
MS Columbus city
MS Greenville city
MS Greenwood city
MS Grenada city
MS Indianola city
MS Laurel city
MS McComb city
MS Meridian city
MS Natchez city
MS Starkville city
MS Vicksburg city
MS Yazoo City city
MT Bozeman city
MT Havre city
MT Helena city
MT Kalispell city
NC Albemarle city
NC Asheboro city
NC Boone town
NC Eden city
NC Elizabeth City city
NC Havelock city
NC Henderson city
NC Kernersville town
NC Kinston city
NC Laurinburg city
NC Lenoir city
NC Lexington city
NC Lumberton city
NC Monroe city
NC New Bern city
NC Reidsville city
NC Roanoke Rapids city
NC Salisbury city
NC Sanford city
NC Shelby city
NC Statesville city
NC Tarboro town
NC Wilson city
ND Dickinson city
ND Jamestown city
ND Minot city
ND Williston city
NE Beatrice city
NE Columbus city
NE Fremont city
NE Grand Island city
NE Hastings city
NE Kearney city
NE Norfolk city
NE North Platte city
NE Scottsbluff city
NJ East Windsor township
NJ Plainsboro township
NJ Bridgeton city
NJ Princeton borough
NM Alamogordo city
NM Artesia city
NM Clovis city
NM Deming city
NM Farmington city
NM Gallup city
NM Hobbs city
NM Las Vegas city
NM Portales city
NM Roswell city
NM Silver City town
NV Elko city
NY Amsterdam city
NY Auburn city
NY Batavia city
NY Canandaigua city
NY Corning city
NY Cortland city
NY Dunkirk city
NY Fredonia village
NY Fulton city
NY Geneva city
NY Gloversville city
NY Jamestown city
NY Kingston city
NY Lockport city
NY Massena village
NY Middletown city
NY Ogdensburg city
NY Olean city
NY Oneonta city
NY Oswego city
NY Plattsburgh city
NY Potsdam village
NY Watertown city
OH Alliance city
OH Ashland city
OH Ashtabula city
OH Athens city
OH Bellefontaine city
OH Bowling Green city
OH Bucyrus city
OH Cambridge city
OH Chillicothe city
OH Circleville city
OH Coshocton city
OH Defiance city
OH Delaware city
OH Dover city
OH East Liverpool city
OH Findlay city
OH Fostoria city
OH Fremont city
OH Galion city
OH Greenville city
OH Lancaster city
OH Lebanon city
OH Marietta city
OH Marion city
OH Medina city
OH Mount Vernon city
OH New Philadelphia city
OH Norwalk city
OH Oxford city
OH Piqua city
OH Portsmouth city
OH Salem city
OH Sandusky city
OH Sidney city
OH Tiffin city
OH Troy city
OH Urbana city
OH Washington city
OH Wilmington city
OH Wooster city
OH Xenia city
OH Zanesville city
OK Ada city
OK Altus city
OK Bartlesville city
OK Chickasha city
OK Claremore city
OK McAlester city
OK Miami city
OK Muskogee city
OK Okmulgee city
OK Owasso city
OK Ponca City city
OK Stillwater city
OK Tahlequah city
OK Weatherford city
OR Albany city
OR Ashland city
OR Astoria city
OR Bend city
OR City of the Dalles city
OR Coos Bay city
OR Corvallis city
OR Grants Pass city
OR Hermiston city

OR Klamath Falls city
OR La Grande city
OR Lebanon city
OR McMinnville city
OR Newberg city
OR Pendleton city
OR Roseburg city
OR Woodburn city
PA Berwick borough
PA Bloomsburg town
PA Butler city
PA Carlisle borough
PA Chambersburg borough
PA Ephrata borough
PA Hanover borough
PA Hazleton city
PA Indiana borough
PA Lebanon city
PA Meadville city
PA New Castle city
PA Oil City city
PA Pottsville city
PA Sunbury city
PA Uniontown city
PA Warren city
RI Narragansett town
SC Clemson city
SC Easley city
SC Gaffney city
SC Greenwood city
SC Newberry town
SC Orangeburg city
SD Aberdeen city
SD Brookings city
SD Huron city
SD Mitchell city
SD Vermillion city
SD Watertown city
SD Yankton city
TN Brownsville city
TN Cleveland city
TN Collierville town
TN Cookeville city
TN Dyersburg city
TN Greeneville town
TN Lawrenceburg city
TN McMinnville city
TN Millington city
TN Morristown city
TN Murfreesboro city
TN Shelbyville city
TN Springfield city
TN Union City city
TX Alice city
TX Alvin city
TX Andrews city
TX Angleton city
TX Bay City city
TX Beeville city
TX Big Spring city
TX Borger city
TX Brenham city
TX Brownwood city
TX Burkburnett city
TX Canyon city
TX Cleburne city
TX Conroe city
TX Coppell city
TX Corsicana city
TX Del Rio city
TX Dumas city
TX Eagle Pass city
TX El Campo city
TX Gainesville city
TX Gatesville city
TX Georgetown city
TX Henderson city
TX Hereford city
TX Huntsville city
TX Jacksonville city
TX Kerrville city
TX Kingsville city
TX Lake Jackson city
TX Lamesa city
TX Levelland city
TX Lufkin city
TX Mercedes city
TX Mineral Wells city
TX Mount Pleasant city
TX Nacogdoches city
TX New Braunfels city
TX Palestine city
TX Pampa city
TX Pecos city
TX Plainview city
TX Port Lavaca city
TX Robstown city
TX Rosenberg city
TX Round Rock city
TX San Marcos city
TX Seguin city
TX Snyder city
TX Stephenville city
TX Sweetwater city
TX Taylor city
TX The Colony city
TX Uvalde city
TX Vernon city
TX Vidor city
UT Brigham City city
UT Cedar City city
UT Spanish Fork city
UT Tooele city
VA Blacksburg town
VA Christiansburg town
VA Front Royal town
VA Harrisonburg city
VA Leesburg town
VA Martinsville city
VA Radford city
VA Staunton city
VA Waynesboro city
VA Winchester city
VT Rutland city
WA Aberdeen city
WA Anacortes city
WA Centralia city
WA Ellensburg city
WA Moses Lake city
WA Mount Vernon city
WA Oak Harbor city
WA Port Angeles city
WA Pullman city
WA Sunnyside city
WA Walla Walla city
WA Wenatchee city
WI Beaver Dam city
WI Fond du Lac city
WI Fort Atkinson city
WI Manitowoc city
WI Marinette city
WI Marshfield city
WI Menomonie city
WI Monroe city
WI Oconomowoc city
WI Stevens Point city
WI Sun Prairie city
WI Two Rivers city
WI Watertown city
WI West Bend city
WI Whitewater city
WI Wisconsin Rapids city
WV Beckley city
WV Bluefield city
WV Clarksburg city
WV Fairmont city
WV Martinsburg city
WV Morgantown city
WY Evanston city
WY Gillette city
WY Green River city
WY Laramie city
WY Rock Springs city
WY Sheridan city

For the reasons set forth in the preamble, chapter I of title 40 of the Code of Federal Regulations is amended as follows:

PART 9—OMB APPROVALS UNDER THE PAPERWORK REDUCTION ACT

1. The authority citation for part 9 continues to read as follows:

Authority: 7 U.S.C. 135 *et seq.*, 136–136y; 15 U.S.C. 2001, 2003, 2005, 2006, 2601–2671; 21 U.S.C. 331j, 346a, 348; 31 U.S.C. 9701; 33 U.S.C. 1251 *et seq.*, 1311, 1313d, 1314, 1318, 1321, 1326, 1330, 1342, 1344, 1345 (d) and (e), 1361; E.O. 11735, 38 FR 21243, 3 CFR, 1971–1975 Comp. p. 973; 42 U.S.C. 241, 242b, 243, 246, 300f, 300g, 300g–1, 300g–2, 300g–3, 300g–4, 300g–5, 300g–6, 300j–1, 300j–2, 300j–3, 300j–4, 300j–9, 1857 *et seq.*, 6901–6992k, 7401–7671q, 7542, 9601–9657, 11023, 11048.

2. In § 9.1 the table is amended by adding entries in numerical order under the indicated heading to read as follows:

§ 9.1 OMB approvals under the Paperwork Reduction Act.

* * * * *

40 CFR citation	OMB control No.
* * * * * *	*
EPA Administered Permit Programs: The National Pollutant Discharge Elimination System	
* * * * * *	*
122.26(g)	2040–0211
* * * * * *	*
State Permit Requirements	
* * * * * *	*
123.35(b)	2040–0211
* * * * * *	*

PART 122—EPA ADMINISTERED PERMIT PROGRAMS: THE NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM

1. The authority citation for part 122 continues to read as follows:

Authority: The Clean Water Act, 33 U.S.C. 1251 *et seq.*

2. Revise § 122.21(c)(1) to read as follows:

§ 122.21 Application for a permit (applicable to State programs, see § 123.25).

* * * * *

(c) *Time to apply.* (1) Any person proposing a new discharge, shall submit an application at least 180 days before the date on which the discharge is to commence, unless permission for a later date has been granted by the Director. Facilities proposing a new discharge of storm water associated with industrial activity shall submit an application 180 days before that facility commences industrial activity which may result in a discharge of storm water associated with that industrial activity. Facilities described under § 122.26(b)(14)(x) or (b)(15)(i) shall submit applications at least 90 days before the date on which construction is to commence. Different submittal dates may be required under the terms of applicable general permits. Persons proposing a new discharge are encouraged to submit their applications well in advance of the 90 or 180 day requirements to avoid delay. See also paragraph (k) of this section and § 122.26(c)(1)(i)(G) and (c)(1)(ii).

* * * * *

3. Amend § 122.26 as follows:

a. Revise paragraphs (a)(9), (b)(4)(i), (b)(7)(i), (b)(14) introductory text, (b)(14)(x), (b)(14)(xi);

b. Redesignate paragraph (b)(15) as paragraph (b)(20) and add new paragraphs (b)(15) through (b)(19);

c. Revise the heading for paragraph (c), the first sentence of paragraph (c)(1) introductory text, the first sentence of paragraph (c)(1)(ii) introductory text, paragraphs (e) heading and introductory text, (e)(1), (e)(5) introductory text, and (e)(5)(i);

d. Add paragraphs (e)(8) and (e)(9); and

e. Revise paragraphs (f)(4), (f)(5), and (g).

The additions and revisions read as follows:

§ 122.26 Storm water discharges (applicable to State NPDES programs, see § 123.25).

(a) * * *

(9)(i) On and after October 1, 1994, for discharges composed entirely of storm water, that are not required by paragraph (a)(1) of this section to obtain a permit, operators shall be required to obtain a NPDES permit only if:

(A) The discharge is from a small MS4 required to be regulated pursuant to § 122.32;

(B) The discharge is a storm water discharge associated with small construction activity pursuant to paragraph (b)(15) of this section;

(C) The Director, or in States with approved NPDES programs either the Director or the EPA Regional Administrator, determines that storm water controls are needed for the discharge based on wasteload allocations that are part of ''total maximum daily loads'' (TMDLs) that address the pollutant(s) of concern; or

(D) The Director, or in States with approved NPDES programs either the Director or the EPA Regional Administrator, determines that the discharge, or category of discharges within a geographic area, contributes to a violation of a water quality standard or is a significant contributor of pollutants to waters of the United States.

(ii) Operators of small MS4s designated pursuant to paragraphs (a)(9)(i)(A), (a)(9)(i)(C), and (a)(9)(i)(D) of this section shall seek coverage under an NPDES permit in accordance with §§ 122.33 through 122.35. Operators of non-municipal sources designated pursuant to paragraphs (a)(9)(i)(B), (a)(9)(i)(C), and (a)(9)(i)(D) of this section shall seek coverage under an NPDES permit in accordance with paragraph (c)(1) of this section.

(iii) Operators of storm water discharges designated pursuant to paragraphs (a)(9)(i)(C) and (a)(9)(i)(D) of this section shall apply to the Director for a permit within 180 days of receipt of notice, unless permission for a later date is granted by the Director (see § 124.52(c) of this chapter).

(b) * * *

(4) * * *

(i) Located in an incorporated place with a population of 250,000 or more as determined by the 1990 Decennial Census by the Bureau of the Census (Appendix F of this part); or

* * * * *

(7) * * *

(i) Located in an incorporated place with a population of 100,000 or more but less than 250,000, as determined by the 1990 Decennial Census by the Bureau of the Census (Appendix G of this part); or

* * * * *

(14) *Storm water discharge associated with industrial activity* means the discharge from any conveyance that is used for collecting and conveying storm

water and that is directly related to manufacturing, processing or raw materials storage areas at an industrial plant. The term does not include discharges from facilities or activities excluded from the NPDES program under this part 122. For the categories of industries identified in this section, the term includes, but is not limited to, storm water discharges from industrial plant yards; immediate access roads and rail lines used or traveled by carriers of raw materials, manufactured products, waste material, or by-products used or created by the facility; material handling sites; refuse sites; sites used for the application or disposal of process waste waters (as defined at part 401 of this chapter); sites used for the storage and maintenance of material handling equipment; sites used for residual treatment, storage, or disposal; shipping and receiving areas; manufacturing buildings; storage areas (including tank farms) for raw materials, and intermediate and final products; and areas where industrial activity has taken place in the past and significant materials remain and are exposed to storm water. For the purposes of this paragraph, material handling activities include storage, loading and unloading, transportation, or conveyance of any raw material, intermediate product, final product, by-product or waste product. The term excludes areas located on plant lands separate from the plant's industrial activities, such as office buildings and accompanying parking lots as long as the drainage from the excluded areas is not mixed with storm water drained from the above described areas. Industrial facilities (including industrial facilities that are federally, State, or municipally owned or operated that meet the description of the facilities listed in paragraphs (b)(14)(i) through (xi) of this section) include those facilities designated under the provisions of paragraph (a)(1)(v) of this section. The following categories of facilities are considered to be engaging in ''industrial activity'' for purposes of paragraph (b)(14):

* * * * *

(x) Construction activity including clearing, grading and excavation, except operations that result in the disturbance of less than five acres of total land area. Construction activity also includes the disturbance of less than five acres of total land area that is a part of a larger common plan of development or sale if the larger common plan will ultimately disturb five acres or more;

(xi) Facilities under Standard Industrial Classifications 20, 21, 22, 23, 2434, 25, 265, 267, 27, 283, 285, 30, 31 (except 311), 323, 34 (except 3441), 35, 36, 37 (except 373), 38, 39, and 4221–25;

(15) *Storm water discharge associated with small construction activity* means the discharge of storm water from:

(i) Construction activities including clearing, grading, and excavating that result in land disturbance of equal to or greater than one acre and less than five acres. Small construction activity also includes the disturbance of less than one acre of total land area that is part of a larger common plan of development or sale if the larger common plan will ultimately disturb equal to or greater than one and less than five acres. Small construction activity does not include routine maintenance that is performed to maintain the original line and grade, hydraulic capacity, or original purpose of the facility. The Director may waive the otherwise applicable requirements in a general permit for a storm water discharge from construction activities that disturb less than five acres where:

(A) The value of the rainfall erosivity factor (''R'' in the Revised Universal Soil Loss Equation) is less than five during the period of construction activity. The rainfall erosivity factor is determined in accordance with Chapter 2 of *Agriculture Handbook Number 703, Predicting Soil Erosion by Water: A Guide to Conservation Planning With the Revised Universal Soil Loss Equation (RUSLE),* pages 21–64, dated January 1997. The Director of the Federal Register approves this incorporation by reference in accordance with 5 U.S.C 552(a) and 1 CFR part 51. Copies may be obtained from EPA's Water Resource Center, Mail Code RC4100, 401 M St. S.W., Washington, DC 20460. A copy is also available for inspection at the U.S. EPA Water Docket , 401 M Street S.W., Washington, DC. 20460, or the Office of the Federal Register, 800 N. Capitol Street N.W. Suite 700, Washington, DC. An operator must certify to the Director that the construction activity will take place during a period when the value of the rainfall erosivity factor is less than five; or

(B) Storm water controls are not needed based on a ''total maximum daily load'' (TMDL) approved or established by EPA that addresses the pollutant(s) of concern or, for non-impaired waters that do not require TMDLs, an equivalent analysis that determines allocations for small construction sites for the pollutant(s) of concern or that determines that such allocations are not needed to protect water quality based on consideration of existing in-stream concentrations, expected growth in pollutant contributions from all sources, and a margin of safety. For the purpose of this paragraph, the pollutant(s) of concern include sediment or a parameter that addresses sediment (such as total suspended solids, turbidity or siltation) and any other pollutant that has been identified as a cause of impairment of any water body that will receive a discharge from the construction activity. The operator must certify to the Director that the construction activity will take place, and storm water discharges will occur, within the drainage area addressed by the TMDL or equivalent analysis.

(ii) Any other construction activity designated by the Director, or in States with approved NPDES programs either the Director or the EPA Regional Administrator, based on the potential for contribution to a violation of a water quality standard or for significant contribution of pollutants to waters of the United States.

EXHIBIT 1 TO § 122.26(B)(15).—SUMMARY OF COVERAGE OF ''STORM WATER DISCHARGES ASSOCIATED WITH SMALL CONSTRUCTION ACTIVITY'' UNDER THE NPDES STORM WATER PROGRAM

Automatic Designation: Required Nationwide Coverage.	• Construction activities that result in a land disturbance of equal to or greater than one acre and less than five acres. • Construction activities disturbing less than one acre if part of a larger common plan of development or sale with a planned disturbance of equal to or greater than one acre and less than five acres. (see § 122.26(b)(15)(i).)
Potential Designation: Optional Evaluation and Designation by the NPDES Permitting Authority or EPA Regional Administrator..	• Construction activities that result in a land disturbance of less than one acre based on the potential for contribution to a violation of a water quality standard or for significant contribution of pollutants. (see § 122.26(b)(15)(ii).)

EXHIBIT 1 TO § 122.26(B)(15).—SUMMARY OF COVERAGE OF ''STORM WATER DISCHARGES ASSOCIATED WITH SMALL CONSTRUCTION ACTIVITY'' UNDER THE NPDES STORM WATER PROGRAM—Continued

Potential Waiver: Waiver from Requirements as Determined by the NPDES Permitting Authority..	Any automatically designated construction activity where the operator certifies: (1) A rainfall erosivity factor of less than five, or (2) That the activity will occur within an area where controls are not needed based on a TMDL or, for non-impaired waters that do not require a TMDL, an equivalent analysis for the pollutant(s) of concern. (see § 122.26(b)(15)(i).)

(16) *Small municipal separate storm sewer system* means all separate storm sewers that are:

(i) Owned or operated by the United States, a State, city, town, borough, county, parish, district, association, or other public body (created by or pursuant to State law) having jurisdiction over disposal of sewage, industrial wastes, storm water, or other wastes, including special districts under State law such as a sewer district, flood control district or drainage district, or similar entity, or an Indian tribe or an authorized Indian tribal organization, or a designated and approved management agency under section 208 of the CWA that discharges to waters of the United States.

(ii) Not defined as ''large'' or ''medium'' municipal separate storm sewer systems pursuant to paragraphs (b)(4) and (b)(7) of this section, or designated under paragraph (a)(1)(v) of this section.

(iii) This term includes systems similar to separate storm sewer systems in municipalities, such as systems at military bases, large hospital or prison complexes, and highways and other thoroughfares. The term does not include separate storm sewers in very discrete areas, such as individual buildings.

(17) *Small MS4* means a small municipal separate storm sewer system.

(18) *Municipal separate storm sewer system* means all separate storm sewers that are defined as ''large'' or ''medium'' or ''small'' municipal separate storm sewer systems pursuant to paragraphs (b)(4), (b)(7), and (b)(16) of this section, or designated under paragraph (a)(1)(v) of this section.

(19) *MS4* means a municipal separate storm sewer system.

* * * * *

(c) *Application requirements for storm water discharges associated with industrial activity and storm water discharges associated with small construction activity*—(1) *Individual application.* Dischargers of storm water associated with industrial activity and with small construction activity are required to apply for an individual permit or seek coverage under a promulgated storm water general permit. * * *

* * * * *

(ii) An operator of an existing or new storm water discharge that is associated with industrial activity solely under paragraph (b)(14)(x) of this section or is associated with small construction activity solely under paragraph (b)(15) of this section, is exempt from the requirements of § 122.21(g) and paragraph (c)(1)(i) of this section. * * *

* * * * *

(e) *Application deadlines.* Any operator of a point source required to obtain a permit under this section that does not have an effective NPDES permit authorizing discharges from its storm water outfalls shall submit an application in accordance with the following deadlines:

(1) *Storm water discharges associated with industrial activity.* (i) Except as provided in paragraph (e)(1)(ii) of this section, for any storm water discharge associated with industrial activity identified in paragraphs (b)(14)(i) through (xi) of this section, that is not part of a group application as described in paragraph (c)(2) of this section or that is not authorized by a storm water general permit, a permit application made pursuant to paragraph (c) of this section must be submitted to the Director by October 1, 1992;

(ii) For any storm water discharge associated with industrial activity from a facility that is owned or operated by a municipality with a population of less than 100,000 that is not authorized by a general or individual permit, other than an airport, powerplant, or uncontrolled sanitary landfill, the permit application must be submitted to the Director by March 10, 2003.

* * * * *

(5) A permit application shall be submitted to the Director within 180 days of notice, unless permission for a later date is granted by the Director (see § 124.52(c) of this chapter), for:

(i) A storm water discharge that the Director, or in States with approved NPDES programs, either the Director or the EPA Regional Administrator, determines that the discharge contributes to a violation of a water quality standard or is a significant contributor of pollutants to waters of the United States (see paragraphs (a)(1)(v) and (b)(15)(ii) of this section);

* * * * *

(8) For any storm water discharge associated with small construction activity identified in paragraph (b)(15)(i) of this section, see § 122.21(c)(1). Discharges from these sources require permit authorization by March 10, 2003, unless designated for coverage before then.

(9) For any discharge from a regulated small MS4, the permit application made under § 122.33 must be submitted to the Director by:

(i) March 10, 2003 if designated under § 122.32(a)(1) unless your MS4 serves a jurisdiction with a population under 10,000 and the NPDES permitting authority has established a phasing schedule under § 123.35(d)(3) (see § 122.33(c)(1)); or

(ii) Within 180 days of notice, unless the NPDES permitting authority grants a later date, if designated under § 122.32(a)(2) (see § 122.33(c)(2)).

(f) * * *

(4) Any person may petition the Director for the designation of a large, medium, or small municipal separate storm sewer system as defined by paragraph (b)(4)(iv), (b)(7)(iv), or (b)(16) of this section.

(5) The Director shall make a final determination on any petition received under this section within 90 days after receiving the petition with the exception of petitions to designate a small MS4 in which case the Director shall make a final determination on the petition within 180 days after its receipt.

(g) *Conditional exclusion for ''no exposure'' of industrial activities and materials to storm water.* Discharges composed entirely of storm water are not storm water discharges associated with industrial activity if there is ''no exposure'' of industrial materials and activities to rain, snow, snowmelt and/or runoff, and the discharger satisfies the conditions in paragraphs (g)(1) through (g)(4) of this section. ''No exposure'' means that all industrial materials and activities are protected by a storm resistant shelter to prevent exposure to rain, snow, snowmelt, and/or runoff. Industrial materials or activities include, but are not limited to, material handling equipment or activities, industrial machinery, raw materials, intermediate products, by-products, final products, or waste

products. Material handling activities include the storage, loading and unloading, transportation, or conveyance of any raw material, intermediate product, final product or waste product.

(1) *Qualification.* To qualify for this exclusion, the operator of the discharge must:

(i) Provide a storm resistant shelter to protect industrial materials and activities from exposure to rain, snow, snow melt, and runoff;

(ii) Complete and sign (according to § 122.22) a certification that there are no discharges of storm water contaminated by exposure to industrial materials and activities from the entire facility, except as provided in paragraph (g)(2) of this section;

(iii) Submit the signed certification to the NPDES permitting authority once every five years;

(iv) Allow the Director to inspect the facility to determine compliance with the ''no exposure'' conditions;

(v) Allow the Director to make any ''no exposure'' inspection reports available to the public upon request; and

(vi) For facilities that discharge through an MS4, upon request, submit a copy of the certification of ''no exposure'' to the MS4 operator, as well as allow inspection and public reporting by the MS4 operator.

(2) *Industrial materials and activities not requiring storm resistant shelter.* To qualify for this exclusion, storm resistant shelter is not required for:

(i) Drums, barrels, tanks, and similar containers that are tightly sealed, provided those containers are not deteriorated and do not leak (''Sealed'' means banded or otherwise secured and without operational taps or valves);

(ii) Adequately maintained vehicles used in material handling; and

(iii) Final products, other than products that would be mobilized in storm water discharge (e.g., rock salt).

(3) *Limitations.* (i) Storm water discharges from construction activities identified in paragraphs (b)(14)(x) and (b)(15) are not eligible for this conditional exclusion.

(ii) This conditional exclusion from the requirement for an NPDES permit is available on a facility-wide basis only, not for individual outfalls. If a facility has some discharges of storm water that would otherwise be ''no exposure'' discharges, individual permit requirements should be adjusted accordingly.

(iii) If circumstances change and industrial materials or activities become exposed to rain, snow, snow melt, and/or runoff, the conditions for this exclusion no longer apply. In such cases, the discharge becomes subject to enforcement for un-permitted discharge. Any conditionally exempt discharger who anticipates changes in circumstances should apply for and obtain permit authorization prior to the change of circumstances.

(iv) Notwithstanding the provisions of this paragraph, the NPDES permitting authority retains the authority to require permit authorization (and deny this exclusion) upon making a determination that the discharge causes, has a reasonable potential to cause, or contributes to an instream excursion above an applicable water quality standard, including designated uses.

(4) *Certification.* The no exposure certification must require the submission of the following information, at a minimum, to aid the NPDES permitting authority in determining if the facility qualifies for the no exposure exclusion:

(i) The legal name, address and phone number of the discharger (see § 122.21(b));

(ii) The facility name and address, the county name and the latitude and longitude where the facility is located;

(iii) The certification must indicate that none of the following materials or activities are, or will be in the foreseeable future, exposed to precipitation:

(A) Using, storing or cleaning industrial machinery or equipment, and areas where residuals from using, storing or cleaning industrial machinery or equipment remain and are exposed to storm water;

(B) Materials or residuals on the ground or in storm water inlets from spills/leaks;

(C) Materials or products from past industrial activity;

(D) Material handling equipment (except adequately maintained vehicles);

(E) Materials or products during loading/unloading or transporting activities;

(F) Materials or products stored outdoors (except final products intended for outside use, e.g., new cars, where exposure to storm water does not result in the discharge of pollutants);

(G) Materials contained in open, deteriorated or leaking storage drums, barrels, tanks, and similar containers;

(H) Materials or products handled/stored on roads or railways owned or maintained by the discharger;

(I) Waste material (except waste in covered, non-leaking containers, e.g., dumpsters);

(J) Application or disposal of process wastewater (unless otherwise permitted); and

(K) Particulate matter or visible deposits of residuals from roof stacks/vents not otherwise regulated, i.e., under an air quality control permit, and evident in the storm water outflow;

(iv) All ''no exposure'' certifications must include the following certification statement, and be signed in accordance with the signatory requirements of § 122.22: ''I certify under penalty of law that I have read and understand the eligibility requirements for claiming a condition of ''no exposure'' and obtaining an exclusion from NPDES storm water permitting; and that there are no discharges of storm water contaminated by exposure to industrial activities or materials from the industrial facility identified in this document (except as allowed under paragraph (g)(2)) of this section. I understand that I am obligated to submit a no exposure certification form once every five years to the NPDES permitting authority and, if requested, to the operator of the local MS4 into which this facility discharges (where applicable). I understand that I must allow the NPDES permitting authority, or MS4 operator where the discharge is into the local MS4, to perform inspections to confirm the condition of no exposure and to make such inspection reports publicly available upon request. I understand that I must obtain coverage under an NPDES permit prior to any point source discharge of storm water from the facility. I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based upon my inquiry of the person or persons who manage the system, or those persons directly involved in gathering the information, the information submitted is to the best of my knowledge and belief true, accurate and complete. I am aware there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.''

4. Revise § 122.28(b)(2)(v) to read as follows:

§ 122.28 General permits (applicable to State NPDES programs, see § 123.25).

* * * * *

(b) * * *

(2) * * *

(v) Discharges other than discharges from publicly owned treatment works, combined sewer overflows, municipal

separate storm sewer systems, primary industrial facilities, and storm water discharges associated with industrial activity, may, at the discretion of the Director, be authorized to discharge under a general permit without submitting a notice of intent where the Director finds that a notice of intent requirement would be inappropriate. In making such a finding, the Director shall consider: the type of discharge; the expected nature of the discharge; the potential for toxic and conventional pollutants in the discharges; the expected volume of the discharges; other means of identifying discharges covered by the permit; and the estimated number of discharges to be covered by the permit. The Director shall provide in the public notice of the general permit the reasons for not requiring a notice of intent.

* * * * *

5. Add §§ 122.30 through 122.37 to subpart B to read as follows:

§ 122.30 What are the objectives of the storm water regulations for small MS4s?

(a) Sections 122.30 through 122.37 are written in a ''readable regulation'' format that includes both rule requirements and EPA guidance that is not legally binding. EPA has clearly distinguished its recommended guidance from the rule requirements by putting the guidance in a separate paragraph headed by the word ''guidance''.

(b) Under the statutory mandate in section 402(p)(6) of the Clean Water Act, the purpose of this portion of the storm water program is to designate additional sources that need to be regulated to protect water quality and to establish a comprehensive storm water program to regulate these sources. (Because the storm water program is part of the National Pollutant Discharge Elimination System (NPDES) Program, you should also refer to § 122.1 which addresses the broader purpose of the NPDES program.)

(c) Storm water runoff continues to harm the nation's waters. Runoff from lands modified by human activities can harm surface water resources in several ways including by changing natural hydrologic patterns and by elevating pollutant concentrations and loadings. Storm water runoff may contain or mobilize high levels of contaminants, such as sediment, suspended solids, nutrients, heavy metals, pathogens, toxins, oxygen-demanding substances, and floatables.

(d) EPA strongly encourages partnerships and the watershed approach as the management framework for efficiently, effectively, and consistently protecting and restoring aquatic ecosystems and protecting public health.

§ 122.31 As a Tribe, what is my role under the NPDES storm water program?

As a Tribe you may:

(a) Be authorized to operate the NPDES program including the storm water program, after EPA determines that you are eligible for treatment in the same manner as a State under §§ 123.31 through 123.34 of this chapter. (If you do not have an authorized NPDES program, EPA implements the program for discharges on your reservation as well as other Indian country, generally.);

(b) Be classified as an owner of a regulated small MS4, as defined in § 122.32. (Designation of your Tribe as an owner of a small MS4 for purposes of this part is an approach that is consistent with EPA's 1984 Indian Policy of operating on a government-to-government basis with EPA looking to Tribes as the lead governmental authorities to address environmental issues on their reservations as appropriate. If you operate a separate storm sewer system that meets the definition of a regulated small MS4, you are subject to the requirements under §§ 122.33 through 122.35. If you are not designated as a regulated small MS4, you may ask EPA to designate you as such for the purposes of this part.); or

(c) Be a discharger of storm water associated with industrial activity or small construction activity under §§ 122.26(b)(14) or (b)(15), in which case you must meet the applicable requirements. Within Indian country, the NPDES permitting authority is generally EPA, unless you are authorized to administer the NPDES program.

§ 122.32 As an operator of a small MS4, am I regulated under the NPDES storm water program?

(a) Unless you qualify for a waiver under paragraph (c) of this section, you are regulated if you operate a small MS4, including but not limited to systems operated by federal, State, Tribal, and local governments, including State departments of transportation; and:

(1) Your small MS4 is located in an urbanized area as determined by the latest Decennial Census by the Bureau of the Census. (If your small MS4 is not located entirely within an urbanized area, only the portion that is within the urbanized area is regulated); or

(2) You are designated by the NPDES permitting authority, including where the designation is pursuant to §§ 123.35(b)(3) and (b)(4) of this chapter, or is based upon a petition under § 122.26(f).

(b) You may be the subject of a petition to the NPDES permitting authority to require an NPDES permit for your discharge of storm water. If the NPDES permitting authority determines that you need a permit, you are required to comply with §§ 122.33 through 122.35.

(c) The NPDES permitting authority may waive the requirements otherwise applicable to you if you meet the criteria of paragraph (d) or (e) of this section. If you receive a waiver under this section, you may subsequently be required to seek coverage under an NPDES permit in accordance with § 122.33(a) if circumstances change. (See also § 123.35(b) of this chapter.)

(d) The NPDES permitting authority may waive permit coverage if your MS4 serves a population of less than 1,000 within the urbanized area and you meet the following criteria:

(1) Your system is not contributing substantially to the pollutant loadings of a physically interconnected MS4 that is regulated by the NPDES storm water program (see § 123.35(b)(4) of this chapter); and

(2) If you discharge any pollutant(s) that have been identified as a cause of impairment of any water body to which you discharge, storm water controls are not needed based on wasteload allocations that are part of an EPA approved or established ''total maximum daily load'' (TMDL) that addresses the pollutant(s) of concern.

(e) The NPDES permitting authority may waive permit coverage if your MS4 serves a population under 10,000 and you meet the following criteria:

(1) The permitting authority has evaluated all waters of the U.S., including small streams, tributaries, lakes, and ponds, that receive a discharge from your MS4;

(2) For all such waters, the permitting authority has determined that storm water controls are not needed based on wasteload allocations that are part of an EPA approved or established TMDL that addresses the pollutant(s) of concern or, if a TMDL has not been developed or approved, an equivalent analysis that determines sources and allocations for the pollutant(s) of concern;

(3) For the purpose of this paragraph (e), the pollutant(s) of concern include biochemical oxygen demand (BOD), sediment or a parameter that addresses sediment (such as total suspended solids, turbidity or siltation), pathogens, oil and grease, and any pollutant that has been identified as a cause of impairment of any water body that will receive a discharge from your MS4; and

(4) The permitting authority has determined that future discharges from your MS4 do not have the potential to result in exceedances of water quality standards, including impairment of designated uses, or other significant water quality impacts, including habitat and biological impacts.

§ 122.33 If I am an operator of a regulated small MS4, how do I apply for an NPDES permit and when do I have to apply?

(a) If you operate a regulated small MS4 under § 122.32, you must seek coverage under a NPDES permit issued by your NPDES permitting authority. If you are located in an NPDES authorized State, Tribe, or Territory, then that State, Tribe, or Territory is your NPDES permitting authority. Otherwise, your NPDES permitting authority is the EPA Regional Office.

(b) You must seek authorization to discharge under a general or individual NPDES permit, as follows:

(1) If your NPDES permitting authority has issued a general permit applicable to your discharge and you are seeking coverage under the general permit, you must submit a Notice of Intent (NOI) that includes the information on your best management practices and measurable goals required by § 122.34(d). You may file your own NOI, or you and other municipalities or governmental entities may jointly submit an NOI. If you want to share responsibilities for meeting the minimum measures with other municipalities or governmental entities, you must submit an NOI that describes which minimum measures you will implement and identify the entities that will implement the other minimum measures within the area served by your MS4. The general permit will explain any other steps necessary to obtain permit authorization.

(2)(i) If you are seeking authorization to discharge under an individual permit and wish to implement a program under § 122.34, you must submit an application to your NPDES permitting authority that includes the information required under §§ 122.21(f) and 122.34(d), an estimate of square mileage served by your small MS4, and any additional information that your NPDES permitting authority requests. A storm sewer map that satisfies the requirement of § 122.34(b)(3)(i) will satisfy the map requirement in § 122.21(f)(7).

(ii) If you are seeking authorization to discharge under an individual permit and wish to implement a program that is different from the program under § 122.34, you will need to comply with the permit application requirements of § 122.26(d). You must submit both Parts of the application requirements in §§ 122.26(d)(1) and (2) by March 10, 2003. You do not need to submit the information required by §§ 122.26(d)(1)(ii) and (d)(2) regarding your legal authority, unless you intend for the permit writer to take such information into account when developing your other permit conditions.

(iii) If allowed by your NPDES permitting authority, you and another regulated entity may jointly apply under either paragraph (b)(2)(i) or (b)(2)(ii) of this section to be co-permittees under an individual permit.

(3) If your small MS4 is in the same urbanized area as a medium or large MS4 with an NPDES storm water permit and that other MS4 is willing to have you participate in its storm water program, you and the other MS4 may jointly seek a modification of the other MS4 permit to include you as a limited co-permittee. As a limited co-permittee, you will be responsible for compliance with the permit's conditions applicable to your jurisdiction. If you choose this option you will need to comply with the permit application requirements of § 122.26, rather than the requirements of § 122.34. You do not need to comply with the specific application requirements of § 122.26(d)(1)(iii) and (iv) and (d)(2)(iii) (discharge characterization). You may satisfy the requirements in § 122.26 (d)(1)(v) and (d)(2)(iv) (identification of a management program) by referring to the other MS4's storm water management program.

(4) Guidance: In referencing an MS4's storm water management program, you should briefly describe how the existing plan will address discharges from your small MS4 or would need to be supplemented in order to adequately address your discharges. You should also explain your role in coordinating storm water pollutant control activities in your MS4, and detail the resources available to you to accomplish the plan.

(c) If you operate a regulated small MS4:

(1) Designated under § 122.32(a)(1), you must apply for coverage under an NPDES permit, or apply for a modification of an existing NPDES permit under paragraph (b)(3) of this section by March 10, 2003, unless your MS4 serves a jurisdiction with a population under 10,000 and the NPDES permitting authority has established a phasing schedule under § 123.35(d)(3) of this chapter.

(2) Designated under § 122.32(a)(2), you must apply for coverage under an NPDES permit, or apply for a modification of an existing NPDES permit under paragraph (b)(3) of this section, within 180 days of notice, unless the NPDES permitting authority grants a later date.

§ 122.34 As an operator of a regulated small MS4, what will my NPDES MS4 storm water permit require?

(a) Your NPDES MS4 permit will require at a minimum that you develop, implement, and enforce a storm water management program designed to reduce the discharge of pollutants from your MS4 to the maximum extent practicable (MEP), to protect water quality, and to satisfy the appropriate water quality requirements of the Clean Water Act. Your storm water management program must include the minimum control measures described in paragraph (b) of this section unless you apply for a permit under § 122.26(d). For purposes of this section, narrative effluent limitations requiring implementation of best management practices (BMPs) are generally the most appropriate form of effluent limitations when designed to satisfy technology requirements (including reductions of pollutants to the maximum extent practicable) and to protect water quality. Implementation of best management practices consistent with the provisions of the storm water management program required pursuant to this section and the provisions of the permit required pursuant to § 122.33 constitutes compliance with the standard of reducing pollutants to the ''maximum extent practicable.'' Your NPDES permitting authority will specify a time period of up to 5 years from the date of permit issuance for you to develop and implement your program.

(b) *Minimum control measures*—(1) *Public education and outreach on storm water impacts.* (i) You must implement a public education program to distribute educational materials to the community or conduct equivalent outreach activities about the impacts of storm water discharges on water bodies and the steps that the public can take to reduce pollutants in storm water runoff.

(ii) Guidance: You may use storm water educational materials provided by your State, Tribe, EPA, environmental, public interest or trade organizations, or other MS4s. The public education program should inform individuals and households about the steps they can take to reduce storm water pollution, such as ensuring proper septic system maintenance, ensuring the proper use and disposal of landscape and garden chemicals including fertilizers and pesticides, protecting and restoring riparian vegetation, and properly disposing of used motor oil or

household hazardous wastes. EPA recommends that the program inform individuals and groups how to become involved in local stream and beach restoration activities as well as activities that are coordinated by youth service and conservation corps or other citizen groups. EPA recommends that the public education program be tailored, using a mix of locally appropriate strategies, to target specific audiences and communities. Examples of strategies include distributing brochures or fact sheets, sponsoring speaking engagements before community groups, providing public service announcements, implementing educational programs targeted at school age children, and conducting community-based projects such as storm drain stenciling, and watershed and beach cleanups. In addition, EPA recommends that some of the materials or outreach programs be directed toward targeted groups of commercial, industrial, and institutional entities likely to have significant storm water impacts. For example, providing information to restaurants on the impact of grease clogging storm drains and to garages on the impact of oil discharges. You are encouraged to tailor your outreach program to address the viewpoints and concerns of all communities, particularly minority and disadvantaged communities, as well as any special concerns relating to children.

(2) *Public involvement/participation.* (i) You must, at a minimum, comply with State, Tribal and local public notice requirements when implementing a public involvement/participation program.

(ii) Guidance: EPA recommends that the public be included in developing, implementing, and reviewing your storm water management program and that the public participation process should make efforts to reach out and engage all economic and ethnic groups. Opportunities for members of the public to participate in program development and implementation include serving as citizen representatives on a local storm water management panel, attending public hearings, working as citizen volunteers to educate other individuals about the program, assisting in program coordination with other pre-existing programs, or participating in volunteer monitoring efforts. (Citizens should obtain approval where necessary for lawful access to monitoring sites.)

(3) *Illicit discharge detection and elimination.* (i) You must develop, implement and enforce a program to detect and eliminate illicit discharges (as defined at § 122.26(b)(2)) into your small MS4.

(ii) You must:

(A) Develop, if not already completed, a storm sewer system map, showing the location of all outfalls and the names and location of all waters of the United States that receive discharges from those outfalls;

(B) To the extent allowable under State, Tribal or local law, effectively prohibit, through ordinance, or other regulatory mechanism, non-storm water discharges into your storm sewer system and implement appropriate enforcement procedures and actions;

(C) Develop and implement a plan to detect and address non-storm water discharges, including illegal dumping, to your system; and

(D) Inform public employees, businesses, and the general public of hazards associated with illegal discharges and improper disposal of waste.

(iii) You need address the following categories of non-storm water discharges or flows (i.e., illicit discharges) only if you identify them as significant contributors of pollutants to your small MS4: water line flushing, landscape irrigation, diverted stream flows, rising ground waters, uncontaminated ground water infiltration (as defined at 40 CFR 35.2005(20)), uncontaminated pumped ground water, discharges from potable water sources, foundation drains, air conditioning condensation, irrigation water, springs, water from crawl space pumps, footing drains, lawn watering, individual residential car washing, flows from riparian habitats and wetlands, dechlorinated swimming pool discharges, and street wash water (discharges or flows from fire fighting activities are excluded from the effective prohibition against non-storm water and need only be addressed where they are identified as significant sources of pollutants to waters of the United States).

(iv) Guidance: EPA recommends that the plan to detect and address illicit discharges include the following four components: procedures for locating priority areas likely to have illicit discharges; procedures for tracing the source of an illicit discharge; procedures for removing the source of the discharge; and procedures for program evaluation and assessment. EPA recommends visually screening outfalls during dry weather and conducting field tests of selected pollutants as part of the procedures for locating priority areas. Illicit discharge education actions may include storm drain stenciling, a program to promote, publicize, and facilitate public reporting of illicit connections or discharges, and distribution of outreach materials.

(4) *Construction site storm water runoff control.* (i) You must develop, implement, and enforce a program to reduce pollutants in any storm water runoff to your small MS4 from construction activities that result in a land disturbance of greater than or equal to one acre. Reduction of storm water discharges from construction activity disturbing less than one acre must be included in your program if that construction activity is part of a larger common plan of development or sale that would disturb one acre or more. If the NPDES permitting authority waives requirements for storm water discharges associated with small construction activity in accordance with § 122.26(b)(15)(i), you are not required to develop, implement, and/or enforce a program to reduce pollutant discharges from such sites.

(ii) Your program must include the development and implementation of, at a minimum:

(A) An ordinance or other regulatory mechanism to require erosion and sediment controls, as well as sanctions to ensure compliance, to the extent allowable under State, Tribal, or local law;

(B) Requirements for construction site operators to implement appropriate erosion and sediment control best management practices;

(C) Requirements for construction site operators to control waste such as discarded building materials, concrete truck washout, chemicals, litter, and sanitary waste at the construction site that may cause adverse impacts to water quality;

(D) Procedures for site plan review which incorporate consideration of potential water quality impacts;

(E) Procedures for receipt and consideration of information submitted by the public, and

(F) Procedures for site inspection and enforcement of control measures.

(iii) Guidance: Examples of sanctions to ensure compliance include non-monetary penalties, fines, bonding requirements and/or permit denials for non-compliance. EPA recommends that procedures for site plan review include the review of individual pre-construction site plans to ensure consistency with local sediment and erosion control requirements. Procedures for site inspections and enforcement of control measures could include steps to identify priority sites for inspection and enforcement based on the nature of the construction activity, topography, and the characteristics of soils and receiving

water quality. You are encouraged to provide appropriate educational and training measures for construction site operators. You may wish to require a storm water pollution prevention plan for construction sites within your jurisdiction that discharge into your system. See § 122.44(s) (NPDES permitting authorities' option to incorporate qualifying State, Tribal and local erosion and sediment control programs into NPDES permits for storm water discharges from construction sites). Also see § 122.35(b) (The NPDES permitting authority may recognize that another government entity, including the permitting authority, may be responsible for implementing one or more of the minimum measures on your behalf.)

(5) *Post-construction storm water management in new development and redevelopment.*

(i) You must develop, implement, and enforce a program to address storm water runoff from new development and redevelopment projects that disturb greater than or equal to one acre, including projects less than one acre that are part of a larger common plan of development or sale, that discharge into your small MS4. Your program must ensure that controls are in place that would prevent or minimize water quality impacts.

(ii) You must:

(A) Develop and implement strategies which include a combination of structural and/or non-structural best management practices (BMPs) appropriate for your community;

(B) Use an ordinance or other regulatory mechanism to address post-construction runoff from new development and redevelopment projects to the extent allowable under State, Tribal or local law; and

(C) Ensure adequate long-term operation and maintenance of BMPs.

(iii) Guidance: If water quality impacts are considered from the beginning stages of a project, new development and potentially redevelopment provide more opportunities for water quality protection. EPA recommends that the BMPs chosen: be appropriate for the local community; minimize water quality impacts; and attempt to maintain pre-development runoff conditions. In choosing appropriate BMPs, EPA encourages you to participate in locally-based watershed planning efforts which attempt to involve a diverse group of stakeholders including interested citizens. When developing a program that is consistent with this measure's intent, EPA recommends that you adopt a planning process that identifies the municipality's program goals (*e.g.,* minimize water quality impacts resulting from post-construction runoff from new development and redevelopment), implementation strategies (e.g., adopt a combination of structural and/or non-structural BMPs), operation and maintenance policies and procedures, and enforcement procedures. In developing your program, you should consider assessing existing ordinances, policies, programs and studies that address storm water runoff quality. In addition to assessing these existing documents and programs, you should provide opportunities to the public to participate in the development of the program. Non-structural BMPs are preventative actions that involve management and source controls such as: policies and ordinances that provide requirements and standards to direct growth to identified areas, protect sensitive areas such as wetlands and riparian areas, maintain and/or increase open space (including a dedicated funding source for open space acquisition), provide buffers along sensitive water bodies, minimize impervious surfaces, and minimize disturbance of soils and vegetation; policies or ordinances that encourage infill development in higher density urban areas, and areas with existing infrastructure; education programs for developers and the public about project designs that minimize water quality impacts; and measures such as minimization of percent impervious area after development and minimization of directly connected impervious areas. Structural BMPs include: storage practices such as wet ponds and extended-detention outlet structures; filtration practices such as grassed swales, sand filters and filter strips; and infiltration practices such as infiltration basins and infiltration trenches. EPA recommends that you ensure the appropriate implementation of the structural BMPs by considering some or all of the following: pre-construction review of BMP designs; inspections during construction to verify BMPs are built as designed; post-construction inspection and maintenance of BMPs; and penalty provisions for the noncompliance with design, construction or operation and maintenance. Storm water technologies are constantly being improved, and EPA recommends that your requirements be responsive to these changes, developments or improvements in control technologies.

(6) *Pollution prevention/good housekeeping for municipal operations.*

(i) You must develop and implement an operation and maintenance program that includes a training component and has the ultimate goal of preventing or reducing pollutant runoff from municipal operations. Using training materials that are available from EPA, your State, Tribe, or other organizations, your program must include employee training to prevent and reduce storm water pollution from activities such as park and open space maintenance, fleet and building maintenance, new construction and land disturbances, and storm water system maintenance.

(ii) Guidance: EPA recommends that, at a minimum, you consider the following in developing your program: maintenance activities, maintenance schedules, and long-term inspection procedures for structural and non-structural storm water controls to reduce floatables and other pollutants discharged from your separate storm sewers; controls for reducing or eliminating the discharge of pollutants from streets, roads, highways, municipal parking lots, maintenance and storage yards, fleet or maintenance shops with outdoor storage areas, salt/sand storage locations and snow disposal areas operated by you, and waste transfer stations; procedures for properly disposing of waste removed from the separate storm sewers and areas listed above (such as dredge spoil, accumulated sediments, floatables, and other debris); and ways to ensure that new flood management projects assess the impacts on water quality and examine existing projects for incorporating additional water quality protection devices or practices. Operation and maintenance should be an integral component of all storm water management programs. This measure is intended to improve the efficiency of these programs and require new programs where necessary. Properly developed and implemented operation and maintenance programs reduce the risk of water quality problems.

(c) If an existing qualifying local program requires you to implement one or more of the minimum control measures of paragraph (b) of this section, the NPDES permitting authority may include conditions in your NPDES permit that direct you to follow that qualifying program's requirements rather than the requirements of paragraph (b) of this section. A qualifying local program is a local, State or Tribal municipal storm water management program that imposes, at a minimum, the relevant requirements of paragraph (b) of this section.

(d)(1) In your permit application (either a notice of intent for coverage

under a general permit or an individual permit application), you must identify and submit to your NPDES permitting authority the following information:

(i) The best management practices (BMPs) that you or another entity will implement for each of the storm water minimum control measures at paragraphs (b)(1) through (b)(6) of this section;

(ii) The measurable goals for each of the BMPs including, as appropriate, the months and years in which you will undertake required actions, including interim milestones and the frequency of the action; and

(iii) The person or persons responsible for implementing or coordinating your storm water management program.

(2) If you obtain coverage under a general permit, you are not required to meet any measurable goal(s) identified in your notice of intent in order to demonstrate compliance with the minimum control measures in paragraphs (b)(3) through (b)(6) of this section unless, prior to submitting your NOI, EPA or your State or Tribe has provided or issued a menu of BMPs that addresses each such minimum measure. Even if no regulatory authority issues the menu of BMPs, however, you still must comply with other requirements of the general permit, including good faith implementation of BMPs designed to comply with the minimum measures.

(3) Guidance: Either EPA or your State or Tribal permitting authority will provide a menu of BMPs. You may choose BMPs from the menu or select others that satisfy the minimum control measures.

(e)(1) You must comply with any more stringent effluent limitations in your permit, including permit requirements that modify, or are in addition to, the minimum control measures based on an approved total maximum daily load (TMDL) or equivalent analysis. The permitting authority may include such more stringent limitations based on a TMDL or equivalent analysis that determines such limitations are needed to protect water quality.

(2) Guidance: EPA strongly recommends that until the evaluation of the storm water program in § 122.37, no additional requirements beyond the minimum control measures be imposed on regulated small MS4s without the agreement of the operator of the affected small MS4, except where an approved TMDL or equivalent analysis provides adequate information to develop more specific measures to protect water quality.

(f) You must comply with other applicable NPDES permit requirements, standards and conditions established in the individual or general permit, developed consistent with the provisions of §§ 122.41 through 122.49, as appropriate.

(g) *Evaluation and assessment*—(1) *Evaluation.* You must evaluate program compliance, the appropriateness of your identified best management practices, and progress towards achieving your identified measurable goals.

Note to Paragraph (g)(1): The NPDES permitting authority may determine monitoring requirements for you in accordance with State/Tribal monitoring plans appropriate to your watershed. Participation in a group monitoring program is encouraged.

(2) *Recordkeeping.* You must keep records required by the NPDES permit for at least 3 years. You must submit your records to the NPDES permitting authority only when specifically asked to do so. You must make your records, including a description of your storm water management program, available to the public at reasonable times during regular business hours (see § 122.7 for confidentiality provision). (You may assess a reasonable charge for copying. You may require a member of the public to provide advance notice.)

(3) *Reporting.* Unless you are relying on another entity to satisfy your NPDES permit obligations under § 122.35(a), you must submit annual reports to the NPDES permitting authority for your first permit term. For subsequent permit terms, you must submit reports in year two and four unless the NPDES permitting authority requires more frequent reports. Your report must include:

(i) The status of compliance with permit conditions, an assessment of the appropriateness of your identified best management practices and progress towards achieving your identified measurable goals for each of the minimum control measures;

(ii) Results of information collected and analyzed, including monitoring data, if any, during the reporting period;

(iii) A summary of the storm water activities you plan to undertake during the next reporting cycle;

(iv) A change in any identified best management practices or measurable goals for any of the minimum control measures; and

(v) Notice that you are relying on another governmental entity to satisfy some of your permit obligations (if applicable).

§ 122.35 As an operator of a regulated small MS4, may I share the responsibility to implement the minimum control measures with other entities?

(a) You may rely on another entity to satisfy your NPDES permit obligations to implement a minimum control measure if:

(1) The other entity, in fact, implements the control measure;

(2) The particular control measure, or component thereof, is at least as stringent as the corresponding NPDES permit requirement; and

(3) The other entity agrees to implement the control measure on your behalf. In the reports you must submit under § 122.34(g)(3), you must also specify that you rely on another entity to satisfy some of your permit obligations. If you are relying on another governmental entity regulated under section 122 to satisfy all of your permit obligations, including your obligation to file periodic reports required by § 122.34(g)(3), you must note that fact in your NOI, but you are not required to file the periodic reports. You remain responsible for compliance with your permit obligations if the other entity fails to implement the control measure (or component thereof). Therefore, EPA encourages you to enter into a legally binding agreement with that entity if you want to minimize any uncertainty about compliance with your permit.

(b) In some cases, the NPDES permitting authority may recognize, either in your individual NPDES permit or in an NPDES general permit, that another governmental entity is responsible under an NPDES permit for implementing one or more of the minimum control measures for your small MS4 or that the permitting authority itself is responsible. Where the permitting authority does so, you are not required to include such minimum control measure(s) in your storm water management program. (For example, if a State or Tribe is subject to an NPDES permit that requires it to administer a program to control construction site runoff at the State or Tribal level and that program satisfies all of the requirements of § 122.34(b)(4), you could avoid responsibility for the construction measure, but would be responsible for the remaining minimum control measures.) Your permit may be reopened and modified to include the requirement to implement a minimum control measure if the entity fails to implement it.

§ 122.36 As an operator of a regulated small MS4, what happens if I don't comply with the application or permit requirements in §§ 122.33 through 122.35?

NPDES permits are federally enforceable. Violators may be subject to the enforcement actions and penalties described in Clean Water Act sections 309 (b), (c), and (g) and 505, or under applicable State, Tribal, or local law. Compliance with a permit issued pursuant to section 402 of the Clean Water Act is deemed compliance, for purposes of sections 309 and 505, with sections 301, 302, 306, 307, and 403, except any standard imposed under section 307 for toxic pollutants injurious to human health. If you are covered as a co-permittee under an individual permit or under a general permit by means of a joint Notice of Intent you remain subject to the enforcement actions and penalties for the failure to comply with the terms of the permit in your jurisdiction except as set forth in § 122.35(b).

§ 122.37 Will the small MS4 storm water program regulations at §§ 122.32 through 122.36 and § 123.35 of this chapter change in the future?

EPA will evaluate the small MS4 regulations at §§ 122.32 through 122.36 and § 123.35 of this chapter after December 10, 2012 and make any necessary revisions. (EPA intends to conduct an enhanced research effort and compile a comprehensive evaluation of the NPDES MS4 storm water program. EPA will re-evaluate the regulations based on data from the NPDES MS4 storm water program, from research on receiving water impacts from storm water, and the effectiveness of best management practices (BMPs), as well as other relevant information sources.)

6. In § 122.44, redesignate paragraphs (k)(2) and (k)(3) as paragraphs (k)(3) and (k)(4), remove the comma at the end of newly redesignated paragraph (k)(3) and add a semicolon in its place, and add new paragraphs (k)(2) and (s) to read as follows:

§ 122.44 Establishing limitations, standards, and other permit conditions (applicable to State NPDES programs, see § 123.25).

* * * * *

(k) * * *

(2) Authorized under section 402(p) of CWA for the control of storm water discharges;

* * * * *

(s) *Qualifying State, Tribal, or local programs.* (1) For storm water discharges associated with small construction activity identified in § 122.26(b)(15), the Director may include permit conditions that incorporate qualifying State, Tribal, or local erosion and sediment control program requirements by reference. Where a qualifying State, Tribal, or local program does not include one or more of the elements in this paragraph (s)(1), then the Director must include those elements as conditions in the permit. A qualifying State, Tribal, or local erosion and sediment control program is one that includes:

(i) Requirements for construction site operators to implement appropriate erosion and sediment control best management practices;

(ii) Requirements for construction site operators to control waste such as discarded building materials, concrete truck washout, chemicals, litter, and sanitary waste at the construction site that may cause adverse impacts to water quality;

(iii) Requirements for construction site operators to develop and implement a storm water pollution prevention plan. (A storm water pollution prevention plan includes site descriptions, descriptions of appropriate control measures, copies of approved State, Tribal or local requirements, maintenance procedures, inspection procedures, and identification of non-storm water discharges); and

(iv) Requirements to submit a site plan for review that incorporates consideration of potential water quality impacts.

(2) For storm water discharges from construction activity identified in § 122.26(b)(14)(x), the Director may include permit conditions that incorporate qualifying State, Tribal, or local erosion and sediment control program requirements by reference. A qualifying State, Tribal or local erosion and sediment control program is one that includes the elements listed in paragraph (s)(1) of this section and any additional requirements necessary to achieve the applicable technology-based standards of ''best available technology'' and ''best conventional technology'' based on the best professional judgment of the permit writer.

7. Add § 122.62(a)(14) to read as follows:

§ 122.62 Modification or revocation and reissuance of permits (applicable to State programs, see § 123.25).

* * * * *

(a) * * *

(14) For a small MS4, to include an effluent limitation requiring implementation of a minimum control measure or measures as specified in § 122.34(b) when:

(i) The permit does not include such measure(s) based upon the determination that another entity was responsible for implementation of the requirement(s); and

(ii) The other entity fails to implement measure(s) that satisfy the requirement(s).

* * * * *

8. Revise Appendices F, G, H, and I to Part 122 to read as follows:

APPENDIX F TO PART 122.—INCORPORATED PLACES WITH POPULATIONS GREATER THAN 250,000 ACCORDING TO THE 1990 DECENNIAL CENSUS BY THE BUREAU OF THE CENSUS

State	Incorporated Place
Alabama	Birmingham.
Arizona	Phoenix.
	Tucson.
California	Long Beach.
	Los Angeles.
	Oakland.
	Sacramento.
	San Diego.
	San Francisco.
	San Jose.
Colorado	Denver.
District of Columbia	
Florida	Jacksonville.
	Miami.
	Tampa.
Georgia.	Atlanta.
Illinois	Chicago.
Indiana	Indianapolis.
Kansas	Wichita.
Kentucky	Louisville.
Louisiana	New Orleans.
Maryland	Baltimore.
Massachusetts	Boston.
Michigan	Detroit.
Minnesota	Minneapolis.
	St. Paul.
Missouri	Kansas City.
	St. Louis.
Nebraska	Omaha.
New Jersey	Newark.
New Mexico	Albuquerque.
New York	Buffalo.
	Bronx Borough.
	Brooklyn Borough.
	Manhattan Borough.
	Queens Borough.
	Staten Island Borough.
North Carolina	Charlotte.
Ohio	Cincinnati.
	Cleveland.
	Columbus.
	Toledo.
Oklahoma	Oklahoma City.
	Tulsa.
Oregon	Portland.
Pennsylvania	Philadelphia.
	Pittsburgh.
Tennessee	Memphis.
	Nashville/Davidson.
Texas	Austin.
	Dallas.
	El Paso.
	Fort Worth.
	Houston.

APPENDIX F TO PART 122.—INCORPORATED PLACES WITH POPULATIONS GREATER THAN 250,000 ACCORDING TO THE 1990 DECENNIAL CENSUS BY THE BUREAU OF THE CENSUS—Continued

State	Incorporated Place
	San Antonio.
Virginia	Norfolk.
	Virginia Beach.
Washington	Seattle.
Wisconsin	Milwaukee.

APPENDIX G TO PART 122.—INCORPORATED PLACES WITH POPULATIONS GREATER THAN 100,000 BUT LESS THAN 250,000 ACCORDING TO THE 1990 DECENNIAL CENSUS BY THE BUREAU OF THE CENSUS

State	Incorporated place
Alabama	Huntsville.
	Mobile.
	Montgomery.
Alaska	Anchorage.
Arizona	Mesa.
	Tempe.
Arkansas	Little Rock.
California	Anaheim.
	Bakersfield.
	Berkeley.
	Chula Vista.
	Concord.
	El Monte.
	Escondido.
	Fremont.
	Fresno.
	Fullerton.
	Garden Grove.
	Glendale.
	Hayward.
	Huntington Beach.
	Inglewood.
	Irvine.
	Modesto.
	Moreno Valley.
	Oceanside.
	Ontario.
	Orange.
Colorado	Aurora.

APPENDIX G TO PART 122.—INCORPORATED PLACES WITH POPULATIONS GREATER THAN 100,000 BUT LESS THAN 250,000 ACCORDING TO THE 1990 DECENNIAL CENSUS BY THE BUREAU OF THE CENSUS—Continued

State	Incorporated place
	Colorado Springs.
	Lakewood.
	Pueblo.
Connecticut	Bridgeport.
	Hartford.
	New Haven.
	Stamford.
	Waterbury.
Florida	Fort Lauderdale.
	Hialeah.
	Hollywood.
	Orlando.
	St. Petersburg.
	Tallahassee.
Georgia	Columbus.
	Macon.
	Savannah.
Idaho	Boise City.
Illinois	Peoria.
	Rockford.
Indiana	Evansville.
	Fort Wayne.
	Gary.
	South Bend.
Iowa	Cedar Rapids.
	Davenport.
	Des Moines.
Kansas	Kansas City.
	Topeka.
Kentucky	Lexington-Fayette.
Louisiana	Baton Rouge.
	Shreveport.
Massachusetts	Springfield.
	Worcester.
Michigan	Ann Arbor.
	Flint.
	Grand Rapids.
	Lansing.
	Livonia.
	Sterling Heights.
	Warren.
Mississippi	Jackson.
Missouri	Independence.
	Springfield.
Nebraska	Lincoln.
Nevada	Las Vegas.
	Reno.

APPENDIX G TO PART 122.—INCORPORATED PLACES WITH POPULATIONS GREATER THAN 100,000 BUT LESS THAN 250,000 ACCORDING TO THE 1990 DECENNIAL CENSUS BY THE BUREAU OF THE CENSUS—Continued

State	Incorporated place
New Jersey	Elizabeth.
	Jersey City.
	Paterson.
New York	Albany.
	Rochester.
	Syracuse.
	Yonkers.
North Carolina	Durham.
	Greensboro.
	Raleigh.
	Winston-Salem.
Ohio	Akron.
	Dayton.
	Youngstown.
Oregon	Eugene.
Pennsylvania	Allentown.
	Erie.
Rhode Island	Providence.
South Carolina	Columbia.
Tennessee	Chattanooga.
	Knoxville.
Texas	Abilene.
	Amarillo.
	Arlington.
	Beaumont.
	Corpus Christi.
	Garland.
	Irving.
	Laredo.
	Lubbock.
	Mesquite.
	Pasadena.
	Plano.
	Waco.
Utah	Salt Lake City.
Virginia	Alexandria.
	Chesapeake.
	Hampton.
	Newport News.
	Portsmouth.
	Richmond.
	Roanoke.
Washington	Spokane.
	Tacoma.
Wisconsin	Madison.

APPENDIX H TO PART 122.—COUNTIES WITH UNINCORPORATED URBANIZED AREAS WITH A POPULATION OF 250,000 OR MORE ACCORDING TO THE 1990 DECENNIAL CENSUS BY THE BUREAU OF THE CENSUS

State	County	Unincorporated urbanized population
California	Los Angeles	886,780
	Sacramento	594,889
	San Diego	250,414
Delaware	New Castle	296,996
Florida	Dade	1,014,504
Georgia	DeKalb	448,686
Hawaii	Honolulu [1]	114,506
Maryland	Anne Arundel	344,654
	Baltimore	627,593
	Montgomery	599,028

APPENDIX H TO PART 122.—COUNTIES WITH UNINCORPORATED URBANIZED AREAS WITH A POPULATION OF 250,000 OR MORE ACCORDING TO THE 1990 DECENNIAL CENSUS BY THE BUREAU OF THE CENSUS—Continued

State	County	Unincorporated urbanized population
	Prince George's	494,369
Texas	Harris	729,206
Utah	Salt Lake	270,989
Virginia	Fairfax	760,730
Washington	King	520,468

[1] County was previously listed in this appendix; however, population dropped to below 250,000 in the 1990 Census.

APPENDIX I TO PART 122.—COUNTIES WITH UNINCORPORATED URBANIZED AREAS GREATER THAN 100,000 BUT LESS THAN 250,000 ACCORDING TO THE 1990 DECENNIAL CENSUS BY THE BUREAU OF THE CENSUS

State	County	Unincorporated urbanized population
Alabama	Jefferson	78,608
Arizona	Pima	162,202
California	Alameda	115,082
	Contra Costa	131,082
	Kern	128,503
	Orange	223,081
	Riverside	166,509
	San Bernardino	162,202
Colorado	Arapahoe	103,248
Florida	Broward	142,329
	Escambia	167,463
	Hillsborough	398,593
	Lee	102,337
	Manatee	123,828
	Orange	378,611
	Palm Beach	360,553
	Pasco	148,907
	Pinellas	255,772
	Polk	121,528
	Sarasota	172,600
	Seminole	127,873
Georgia	Clayton	133,237
	Cobb	322,595
	Fulton	127,776
	Gwinnett	237,305
	Richmond	126,476
Kentucky	Jefferson	239,430
Louisiana	East Baton Rouge	102,539
	Parish	331,307
	Jefferson Parish	.....
Maryland	Howard	157,972
North Carolina	Cumberland	146,827
Nevada	Clark	327,618
Oregon	Multnomah [1]	52,923
	Washington	116,687
South Carolina	Greenville	147,464
	Richland	130,589
Virginia	Arlington	170,936
	Chesterfield	174,488
	Henrico	201,367
	Prince William	157,131
Washington	Pierce	258,530
	Snohomish	157,218

[1] County was previously listed in this appendix; however, population dropped to below 100,000 in the 1990 Census.

PART 123—STATE PROGRAM REQUIREMENTS

1. The authority citation for part 123 continues to read as follows:

Authority: The Clean Water Act, 33 U.S.C. 1251 *et seq.*

2. Amend § 123.25 by removing the word ''and'' at the end of paragraph (a)(37), by removing the period at the end of paragraph (a)(38) and adding a semicolon in its place, and by adding paragraphs (a)(39) through (a)(45) to read as follows:

§ 123.25 Requirements for permitting.

(a) * * *

(39) § 122.30 (What are the objectives of the storm water regulations for small MS4s?);

(40) § 122.31 (For Indian Tribes only) (As a Tribe, what is my role under the NPDES storm water program?);

(41) § 122.32 (As an operator of a small MS4, am I regulated under the NPDES storm water program?);

(42) § 122.33 (If I am an operator of a regulated small MS4, how do I apply for an NPDES permit? When do I have to apply?);

(43) § 122.34 (As an operator of a regulated small MS4, what will my NPDES MS4 storm water permit require?);

(44) § 122.35 (As an operator of a regulated small MS4, may I share the responsibility to implement the minimum control measures with other entities?); and

(45) § 122.36 (As an operator of a regulated small MS4, what happens if I don't comply with the application or permit requirements in §§ 122.33 through 122.35?).

* * * * *

3. Add § 123.35 to subpart B to read as follows:

§ 123.35 As the NPDES Permitting Authority for regulated small MS4s, what is my role?

(a) You must comply with the requirements for all NPDES permitting authorities under Parts 122, 123, 124, and 125 of this chapter. (This section is meant only to supplement those requirements and discuss specific issues related to the small MS4 storm water program.)

(b) You must develop a process, as well as criteria, to designate small MS4s other than those described in § 122.32(a)(1) of this chapter, as regulated small MS4s to be covered under the NPDES storm water discharge control program. This process must include the authority to designate a small MS4 waived under paragraph (d) of this section if circumstances change. EPA may make designations under this section if a State or Tribe fails to comply with the requirements listed in this paragraph. In making designations of small MS4s, you must:

(1)(i) Develop criteria to evaluate whether a storm water discharge results in or has the potential to result in exceedances of water quality standards, including impairment of designated uses, or other significant water quality impacts, including habitat and biological impacts.

(ii) Guidance: For determining other significant water quality impacts, EPA recommends a balanced consideration of the following designation criteria on a watershed or other local basis: discharge to sensitive waters, high growth or growth potential, high population density, contiguity to an urbanized area, significant contributor of pollutants to waters of the United States, and ineffective protection of water quality by other programs;

(2) Apply such criteria, at a minimum, to any small MS4 located outside of an urbanized area serving a jurisdiction with a population density of at least 1,000 people per square mile and a population of at least 10,000;

(3) Designate any small MS4 that meets your criteria by December 9, 2002. You may wait until December 8, 2004 to apply the designation criteria on a watershed basis if you have developed a comprehensive watershed plan. You may apply these criteria to make additional designations at any time, as appropriate; and

(4) Designate any small MS4 that contributes substantially to the pollutant loadings of a physically interconnected municipal separate storm sewer that is regulated by the NPDES storm water program.

(c) You must make a final determination within 180 days from receipt of a petition under § 122.26(f) of this chapter (or analogous State or Tribal law). If you do not do so within that time period, EPA may make a determination on the petition.

(d) You must issue permits consistent with §§ 122.32 through 122.35 of this chapter to all regulated small MS4s. You may waive or phase in the requirements otherwise applicable to regulated small MS4s, as defined in § 122.32(a)(1) of this chapter, under the following circumstances:

(1) You may waive permit coverage for each small MS4s in jurisdictions with a population under 1,000 within the urbanized area where all of the following criteria have been met:

(i) Its discharges are not contributing substantially to the pollutant loadings of a physically interconnected regulated MS4 (see paragraph (b)(4) of this section); and

(ii) If the small MS4 discharges any pollutant(s) that have been identified as a cause of impairment of any water body to which it discharges, storm water controls are not needed based on wasteload allocations that are part of an EPA approved or established ''total maximum daily load'' (TMDL) that address the pollutant(s) of concern.

(2) You may waive permit coverage for each small MS4 in jurisdictions with a population under 10,000 where all of the following criteria have been met:

(i) You have evaluated all waters of the U.S., including small streams, tributaries, lakes, and ponds, that receive a discharge from the MS4 eligible for such a waiver.

(ii) For all such waters, you have determined that storm water controls are not needed based on wasteload allocations that are part of an EPA approved or established TMDL that addresses the pollutant(s) of concern or, if a TMDL has not been developed or approved, an equivalent analysis that determines sources and allocations for the pollutant(s) of concern.

(iii) For the purpose of paragraph (d)(2)(ii) of this section, the pollutant(s) of concern include biochemical oxygen demand (BOD), sediment or a parameter that addresses sediment (such as total suspended solids, turbidity or siltation), pathogens, oil and grease, and any pollutant that has been identified as a cause of impairment of any water body that will receive a discharge from the MS4.

(iv) You have determined that current and future discharges from the MS4 do not have the potential to result in exceedances of water quality standards, including impairment of designated uses, or other significant water quality impacts, including habitat and biological impacts.

(v) Guidance: To help determine other significant water quality impacts, EPA recommends a balanced consideration of the following criteria on a watershed or other local basis: discharge to sensitive waters, high growth or growth potential, high population or commercial density, significant contributor of pollutants to waters of the United States, and ineffective protection of water quality by other programs.

(3) You may phase in permit coverage for small MS4s serving jurisdictions with a population under 10,000 on a schedule consistent with a State watershed permitting approach. Under this approach, you must develop and implement a schedule to phase in permit coverage for approximately 20 percent annually of all small MS4s that qualify for such phased-in coverage. Under this option, all regulated small MS4s are required to have coverage under an NPDES permit by no later than March 8, 2007. Your schedule for phasing in permit coverage for small MS4s must be approved by the Regional Administrator no later than December 10, 2001.

(4) If you choose to phase in permit coverage for small MS4s in jurisdictions with a population under 10,000, in accordance with paragraph (d)(3) of this section, you may also provide waivers in accordance with paragraphs (d)(1) and (d)(2) of this section pursuant to your approved schedule.

(5) If you do not have an approved schedule for phasing in permit coverage, you must make a determination whether to issue an NPDES permit or allow a waiver in accordance with paragraph (d)(1) or (d)(2) of this section, for each eligible MS4 by December 9, 2002.

(6) You must periodically review any waivers granted in accordance with paragraph (d)(2) of this section to determine whether any of the information required for granting the waiver has changed. At a minimum, you must conduct such a review once every five years. In addition, you must consider any petition to review any waiver when the petitioner provides evidence that the information required for granting the waiver has substantially changed.

(e) You must specify a time period of up to 5 years from the date of permit issuance for operators of regulated small MS4s to fully develop and implement their storm water program.

(f) You must include the requirements in §§ 122.33 through 122.35 of this chapter in any permit issued for regulated small MS4s or develop permit limits based on a permit application submitted by a regulated small MS4. (You may include conditions in a regulated small MS4 NPDES permit that direct the MS4 to follow an existing qualifying local program's requirements, as a way of complying with some or all of the requirements in § 122.34(b) of this chapter. See § 122.34(c) of this chapter. Qualifying local, State or Tribal program requirements must impose, at a minimum, the relevant requirements of § 122.34(b) of this chapter.)

(g) If you issue a general permit to authorize storm water discharges from small MS4s, you must make available a menu of BMPs to assist regulated small MS4s in the design and implementation of municipal storm water management programs to implement the minimum measures specified in § 122.34(b) of this chapter. EPA plans to develop a menu of BMPs that will apply in each State or Tribe that has not developed its own menu. Regardless of whether a menu of BMPs has been developed by EPA, EPA encourages State and Tribal permitting authorities to develop a menu of BMPs that is appropriate for local conditions. EPA also intends to provide guidance on developing BMPs and measurable goals and modify, update, and supplement such guidance based on the assessments of the NPDES MS4 storm water program and research to be conducted over the next thirteen years.

(h)(1) You must incorporate any additional measures necessary to ensure effective implementation of your State or Tribal storm water program for regulated small MS4s.

(2) Guidance: EPA recommends consideration of the following:

(i) You are encouraged to use a general permit for regulated small MS4s;

(ii) To the extent that your State or Tribe administers a dedicated funding source, you should play an active role in providing financial assistance to operators of regulated small MS4s;

(iii) You should support local programs by providing technical and programmatic assistance, conducting research projects, performing watershed monitoring, and providing adequate legal authority at the local level;

(iv) You are encouraged to coordinate and utilize the data collected under several programs including water quality management programs, TMDL programs, and water quality monitoring programs;

(v) Where appropriate, you may recognize existing responsibilities among governmental entities for the control measures in an NPDES small MS4 permit (see § 122.35(b) of this chapter); and

(vi) You are encouraged to provide a brief (e.g., two page) reporting format to facilitate compiling and analyzing data from submitted reports under § 122.34(g)(3) of this chapter. EPA intends to develop a model form for this purpose.

PART 124—PROCEDURES FOR DECISIONMAKING

1. The authority citation for part 124 continues to read as follows:

Authority: Resource Conservation and Recovery Act, 42 U.S.C. 6901 *et seq.*; Safe Drinking Water Act, 42 U.S.C. 300(f) *et seq.*; Clean Water Act, 33 U.S.C. 1251 *et seq.*; Clean Air Act, 42 U.S.C. 7401 *et seq.*

2. Revise § 124.52(c) to read as follows:

§ 124.52 Permits required on a case-by-case basis.

* * * * *

(c) Prior to a case-by-case determination that an individual permit is required for a storm water discharge under this section (see § 122.26(a)(1)(v), (c)(1)(v), and (a)(9)(iii) of this chapter), the Regional Administrator may require the discharger to submit a permit application or other information regarding the discharge under section 308 of the CWA. In requiring such information, the Regional Administrator shall notify the discharger in writing and shall send an application form with the notice. The discharger must apply for a permit within 180 days of notice, unless permission for a later date is granted by the Regional Administrator. The question whether the initial designation was proper will remain open for consideration during the public comment period under § 124.11 or § 124.118 and in any subsequent hearing.

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Part II

Environmental Protection Agency

40 CFR Parts 9, 122, 123, and 124
National Pollutant Discharge Elimination System—Regulations for Revision of the Water Pollution Control Program Addressing Storm Water Discharges; Final Rule

Report to Congress on the Phase II Storm Water Regulations; Notice

ENVIRONMENTAL PROTECTION AGENCY

40 CFR Parts 9, 122 , 123, and 124

[FRL—6470–8]

RIN 2040–AC82

National Pollutant Discharge Elimination System—Regulations for Revision of the Water Pollution Control Program Addressing Storm Water Discharges

AGENCY: Environmental Protection Agency (EPA).

ACTION: Final rule.

SUMMARY: Today's regulations (Phase II) expand the existing National Pollutant Discharge Elimination System (NPDES) storm water program (Phase I) to address storm water discharges from small municipal separate storm sewer systems (MS4s) (those serving less than 100,000 persons) and construction sites that disturb one to five acres. Although these sources are automatically designated by today's rule, the rule allows for the exclusion of certain sources from the national program based on a demonstration of the lack of impact on water quality, as well as the inclusion of others based on a higher likelihood of localized adverse impact on water quality. Today's regulations also exclude from the NPDES program storm water discharges from industrial facilities that have "no exposure" of industrial activities or materials to storm water. Finally, today's rule extends from August 7, 2001 until March 10, 2003 the deadline by which certain industrial facilities owned by small MS4s must obtain coverage under an NPDES permit. This rule establishes a cost-effective, flexible approach for reducing environmental harm by storm water discharges from many point sources of storm water that are currently unregulated.

EPA believes that the implementation of the six minimum measures identified for small MS4s should significantly reduce pollutants in urban storm water compared to existing levels in a cost-effective manner. Similarly, EPA believes that implementation of Best Management Practices (BMP) controls at small construction sites will also result in a significant reduction in pollutant discharges and an improvement in surface water quality. EPA believes this rule will result in monetized financial, recreational and health benefits, as well as benefits that EPA has been unable to monetize. Expected benefits include reduced scouring and erosion of streambeds, improved aesthetic quality of waters, reduced eutrophication of aquatic systems, benefit to wildlife and endangered and threatened species, tourism benefits, biodiversity benefits and reduced costs for siting reservoirs. In addition, the costs of industrial storm water controls will decrease due to the exclusion of storm water discharges from facilities where there is "no exposure" of storm water to industrial activities and materials.

DATES: This regulation is effective on February 7, 2000. The incorporation by reference of the rainfall erosivity factor publication listed in the rule is approved by the Director of the Federal Register as of February 7, 2000. For judicial review purposes, this final rule is promulgated as of 1:00 p.m. Eastern Standard Time, on December 22, 1999 as provided in 40 CFR 23.2.

ADDRESSES: The complete administrative record for the final rule and the ICR have been established under docket numbers W–97–12 (rule) and W–97–15 (ICR), and includes supporting documentation as well as printed, paper versions of electronic comments. Copies of information in the record are available upon request. A reasonable fee may be charged for copying. The record is available for inspection and copying from 9 a.m. to 4 p.m., Monday through Friday, excluding legal holidays, at the Water Docket, EPA, East Tower Basement, 401 M Street, SW, Washington, DC. For access to docket materials, please call 202/260–3027 to schedule an appointment.

FOR FURTHER INFORMATION CONTACT: George Utting, Office of Wastewater Management, Environmental Protection Agency, Mail Code 4203, 401 M Street, SW, Washington, DC 20460; (202) 260–5816; sw2@epa.gov.

SUPPLEMENTARY INFORMATION: Entities potentially regulated by this action include:

Category	Examples of regulated entities
Federal, State, Tribal, and Local Governments.	Operators of small separate storm sewer systems, industrial facilities that discharge storm water associated with industrial activity or construction activity disturbing 1 to 5 acres.
Industry	Operators of industrial facilities that discharge storm water associated with industrial activity.
Construction Activity.	Operators of construction activity disturbing 1 to 5 acres.

This table is not intended to be exhaustive, but rather provides a guide for readers regarding entities likely to be regulated by this action. This table lists the types of entities that EPA is now aware could potentially be regulated by this action. Other types of entities not listed in the table could also be regulated. To determine whether your facility or company is regulated by this action, you should carefully examine the applicability criteria in §§ 122.26(b), 122.31, 122.32, and 123.35 of the final rule. If you have questions regarding the applicability of this action to a particular entity, consult the person listed in the preceding **FOR FURTHER INFORMATION CONTACT** section.

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I. Background

A. Proposed Rule and Pre-Proposal Outreach

On January 9, 1998 (63 FR 1536), EPA proposed to expand the National Pollutant Discharge Elimination System (NPDES) storm water program to include storm water discharges from municipal separate storm sewer systems (MS4s) and construction sites that were smaller than those previously included in the program. The proposal also addressed industrial sources that have "no exposure" of industrial activities and materials to storm water. Today, EPA is promulgating a final rule to implement most of the proposed revisions with minor changes based on public comments received on the proposal. Today's final rule also extends the deadline by which certain industrial facilities operated by municipalities of less than 100,000 population must be covered by a NPDES permit; the deadline is changed from August 7, 2001 until March 10, 2003.

In 1972, Congress amended the Federal Water Pollution Control Act (commonly referred to as the Clean Water Act (CWA)) to prohibit the discharge of any pollutant to waters of the United States from a point source unless the discharge is authorized by an NPDES permit. The NPDES program is a program designed to track point sources and require the implementation of the controls necessary to minimize the discharge of pollutants. Initial efforts to improve water quality under the NPDES program primarily focused on reducing pollutants in industrial process wastewater and municipal sewage. These discharge sources were easily identified as responsible for poor, often drastically degraded, water quality conditions.

As pollution control measures for industrial process wastewater and municipal sewage were implemented and refined, it became increasingly evident that more diffuse sources of water pollution were also significant causes of water quality impairment. Specifically, storm water runoff draining large surface areas, such as agricultural and urban land, was found to be a major cause of water quality impairment, including the nonattainment of designated beneficial uses.

In 1987, Congress amended the CWA to require implementation, in two phases, of a comprehensive national program for addressing storm water discharges. The first phase of the program, commonly referred to as "Phase I," was promulgated on November 16, 1990 (55 FR 47990). Phase I requires NPDES permits for storm water discharge from a large number of priority sources including municipal separate storm sewer systems ("MS4s") generally serving populations of 100,000 or more and several categories of industrial activity, including construction sites that disturb five or more acres of land.

Today's rule, which is the second phase of the storm water program, expands the existing program to include discharges of storm water from smaller municipalities in urbanized areas and from construction sites that disturb between one and five acres of land. Today's rule allows certain sources to be excluded from the national program based on a demonstrable lack of impact on water quality. The rule also allows other sources not automatically regulated on a national basis to be designated for inclusion based on increased likelihood for localized adverse impact on water quality.

Today's rule also conditionally excludes storm water discharges from industrial facilities that have "no exposure" of industrial activities or materials to storm water. Today's rule and the effort that led to its development are commonly referred to as "Phase II." On August 7, 1995, EPA promulgated a final rule that required facilities to be regulated under Phase II to apply for a NPDES permit by August 7, 2001, unless the NPDES permitting authority designates them as requiring a permit by an earlier date. (60 FR 40230). That rule is referred to as "the Interim Phase II Rule." Today's rule replaces the Interim Phase II rule.

EPA performed extensive outreach and worked with a variety of stakeholders prior to proposing today's rule. On September 9, 1992, EPA published a notice requesting information and public comment on how to prepare regulations under CWA section 402(p)(6) (see 57 FR 41344). The notice identified three sets of issues associated with developing new NPDES storm water regulations: (1) How should EPA identify unregulated sources of storm water to protect water quality, (2) what types of control strategies should EPA develop for these sources, and (3) what are appropriate deadlines for implementing new requirements. The notice recognized that potential sources for coverage under the section 402(p)(6) regulations would fall into two main categories: municipal separate storm sewer systems and individual (commercial and residential) sources. EPA received more than 130 comments on the September 9, 1992, notice. For further discussion of the comments received, see *Storm Water Discharges Potentially Addressed by Phase II of the National Pollutant Discharge Elimination System: Report to Congress* (EPA, 1995a), pp. 1–21 to 1–22, and Appendix J (which provides a detailed summary of the comments received as they relate to the specific issues raised in the notice).

In early 1993, the Rensselaerville Institute and EPA held public and expert meetings to assist in developing and analyzing options for identifying unregulated sources and possible controls. The report on the 1993 meetings identified two options that were favored by the various groups that participated. One option was a program that allowed States to select sources to be controlled in a manner consistent with criteria developed by EPA. A second option was a tiered approach under which EPA would select high priority sources for control by NPDES permits and States would select other sources for control under a State water quality program other than the NPDES program. For additional details see the "Report on the EPA Storm Water Management Program (Rensselaerville Study)," Appendix I of *Storm Water Discharges Potentially Addressed by Phase II of the National Pollutant Discharge Elimination System: Report to Congress* (EPA, 1995a).

EPA also conducted outreach with representatives of small entities in conjunction with the convening of a Small Business Advocacy Review Panel under the Small Business Regulatory Enforcement Fairness Act (SBREFA). This process is discussed in section IV.E of today's preamble. For additional background see the discussion in the preamble to the proposal for today's rule.

To assist EPA by providing advice and recommendations regarding the urban municipal wet weather water pollution control program, EPA established the Urban Wet Weather Flows Federal Advisory Committee (hereinafter, "FACA Committee") under the Federal Advisory Committee Act (FACA). The Office of Management and Budget approved the charter for the FACA Committee on March 10, 1995. The FACA Committee provided a forum for identifying and addressing issues associated with water quality impacts from storm water sources.

The FACA Committee established two subcommittees: the Storm Water Phase II FACA Subcommittee and the Sanitary Sewer Overflows (SSOs) FACA Subcommittee. Consistent with the requirements of FACA, the membership of both the FACA Committee and the subcommittees was balanced among EPA's various outside stakeholder interests, including representatives from municipalities, States, Indian Tribes, EPA, industrial and commercial sectors, agriculture, and environmental and public interest groups.

The Storm Water Phase II FACA Subcommittee ("Subcommittee") met fourteen times between September 1995 and June 1998. The 32 Subcommittee members discussed possible regulatory frameworks at these meetings as well as during numerous other meetings and conference calls. Members of the FACA Committee provided views regarding the development of the "no exposure" provision and other provisions in drafts of the Phase II rule. EPA provided Subcommittee members with four successive drafts of the proposed rule and preamble, outlines of the rule, summaries of the written comments received on each draft, and documents identifying the changes made to each draft. In the course of providing input to the Committee, individual Subcommittee members provided significant input and advice that EPA considered in the context of public comments received. Ultimately, the Subcommittee did not provide a written report back to the FACA Committee, and the FACA Committee did not provide written advice and recommendations to EPA. The Agency, therefore, did not rely on group recommendations in developing today's rule, but does consider the process to have resulted in important public outreach.

B. Water Quality Concerns/ Environmental Impact Studies and Assessments

Storm water runoff from lands modified by human activities can harm surface water resources and, in turn, cause or contribute to an exceedance of water quality standards by changing natural hydrologic patterns, accelerating stream flows, destroying aquatic habitat, and elevating pollutant concentrations and loadings. Such runoff may contain or mobilize high levels of contaminants, such as sediment, suspended solids, nutrients (phosphorous and nitrogen), heavy metals and other toxic pollutants, pathogens, toxins, oxygen-demanding substances (organic material), and floatables (U.S. EPA. 1992. *Environmental Impacts of Storm Water Discharges: A National Profile.* EPA 841–R–92–001. Office of Water. Washington, DC). After a rain, storm water runoff carries these pollutants into nearby streams, rivers, lakes, estuaries, wetlands, and oceans. The highest concentrations of these contaminants often are contained in "first flush" discharges, which occur during the first major storm after an extended dry period (Schueler, T.R. 1994. "First Flush of Stormwater Pollutants Investigated in Texas." Note 28. *Watershed Protection Techniques* 1(2)). Individually and combined, these pollutants impair water quality, threatening designated beneficial uses and causing habitat alteration or destruction.

Uncontrolled storm water discharges from areas of urban development and construction activity negatively impact receiving waters by changing the physical, biological, and chemical composition of the water, resulting in an unhealthy environment for aquatic organisms, wildlife, and humans. The following sections discuss the studies and data that address and support this finding.

Although water quality problems also can occur from agricultural storm water discharges and return flows from irrigated agriculture, this area of

concern is statutorily exempted from regulation as a point source under the Clean Water Act and is not discussed here. (See CWA section 502(14)). Other storm water sources not specifically identified in the regulations may be of concern in certain areas and can be addressed on a case-by-case (or category-by-category) basis through the NPDES designation authority preserved by CWA section 402(p)(2)(6), as well as today's rule.

1. Urban Development

Urbanization alters the natural infiltration capability of the land and generates a host of pollutants that are associated with the activities of dense populations, thus causing an increase in storm water runoff volumes and pollutant loadings in storm water discharged to receiving waterbodies (U.S. EPA, 1992). Urban development increases the amount of impervious surface in a watershed as farmland, forests, and meadowlands with natural infiltration characteristics are converted into buildings with rooftops, driveways, sidewalks, roads, and parking lots with virtually no ability to absorb storm water. Storm water and snow-melt runoff wash over these impervious areas, picking up pollutants along the way while gaining speed and volume because of their inability to disperse and filter into the ground. What results are storm water flows that are higher in volume, pollutants, and temperature than the flows in less impervious areas, which have more natural vegetation and soil to filter the runoff (U.S. EPA, 1997. *Urbanization and Streams: Studies of Hydrologic Impacts.* EPA 841–R–97-009. Office of Water. Washington, DC).

Studies reveal that the level of imperviousness in an area strongly correlates with the quality of the nearby receiving waters. For example, a study in the Puget Sound lowland ecoregion found that when the level of basin development exceeded 5 percent of the total impervious area, the biological integrity and physical habitat conditions that are necessary to support natural biological diversity and complexity declined precipitously (May, C.W., E.B. Welch, R.R. Horner, J.R. Karr, and B.W. May. 1997. *Quality Indices for Urbanization Effects in Puget Sound Lowland Streams,* Technical Report No. 154. University of Washington Water Resources Series). Research conducted in numerous geographical areas, concentrating on various variables and employing widely different methods, has revealed a similar conclusion: stream degradation occurs at relatively low levels of imperviousness, such as 10 to 20 percent (even as low as 5 to 10 percent according to the findings of the Washington study referenced above) (Schueler, T.R. 1994. "The Importance of Imperviousness." *Watershed Protection Techniques* 1(3); May, C., R.R. Horner, J.R. Karr, B.W. Mar, and E.B. Welch. 1997. "Effects Of Urbanization On Small Streams In The Puget Sound Lowland Ecoregion." *Watershed Protection Techniques* 2(4); Yoder, C.O., R.J. Miltner, and D. White. 1999. "Assessing the Status of Aquatic Life Designated Uses in Urban and Suburban Watersheds." In *Proceedings: National Conference on Retrofits Opportunities in Urban Environments.* EPA 625–R–99–002, Washington, DC; Yoder, C.O and R.J. Miltner. 1999. "Assessing Biological Quality and Limitations to Biological Potential in Urban and Suburban Watersheds in Ohio." In *Comprehensive Stormwater & Aquatic Ecosystem Management Conference Papers,* Auckland, New Zealand). Furthermore, research has indicated that few, if any, urban streams can support diverse benthic communities at imperviousness levels of 25 percent or more. An area of medium density single family homes can be anywhere from 25 percent to nearly 60 percent impervious, depending on the design of the streets and parking (Schueler, 1994).

In addition to impervious areas, urban development creates new pollution sources as population density increases and brings with it proportionately higher levels of car emissions, car maintenance wastes, pet waste, litter, pesticides, and household hazardous wastes, which may be washed into receiving waters by storm water or dumped directly into storm drains designed to discharge to receiving waters. More people in less space results in a greater concentration of pollutants that can be mobilized by, or disposed into, storm water discharges from municipal separate storm sewer systems. A modeling system developed for the Chesapeake Bay indicated that contamination of the Bay and its tributaries from runoff is comparable to, if not greater than, contamination from industrial and sewage sources (Cohn-Lee, R. and D. Cameron. 1992. "Urban Stormwater Runoff Contamination of the Chesapeake Bay: Sources and Mitigation." *The Environmental Professional,* Vol. 14).

a. Large-Scale Studies and Assessments

In support of today's regulatory designation of MS4s in urbanized areas, the Agency relied on broad-based assessments of urban storm water runoff and related water quality impacts, as well as more site-specific studies. The first national assessment of urban runoff characteristics was completed for the *Nationwide Urban Runoff Program (NURP)* study (U.S. EPA. 1983. *Results of the Nationwide Urban Runoff Program, Volume 1—Final Report.* Office of Water. Washington, D.C.). The NURP study is the largest nationwide evaluation of storm water discharges, which includes adverse impacts and sources, undertaken to date.

EPA conducted the NURP study to facilitate understanding of the nature of urban runoff from residential, commercial, and industrial areas. One objective of the study was to characterize the water quality of discharges from separate storm sewer systems that drain residential, commercial, and light industrial (industrial parks) sites. Storm water samples from 81 residential and commercial properties in 22 urban/suburban areas nationwide were collected and analyzed during the 5-year period between 1978 and 1983. The majority of samples collected in the study were analyzed for eight conventional pollutants and three heavy metals.

Data collected under the NURP study indicated that discharges from separate storm sewer systems draining runoff from residential, commercial, and light industrial areas carried more than 10 times the annual loadings of total suspended solids (TSS) than discharges from municipal sewage treatment plants that provide secondary treatment. The NURP study also indicated that runoff from residential and commercial areas carried somewhat higher annual loadings of chemical oxygen demand (COD), total lead, and total copper than effluent from secondary treatment plants. Study findings showed that fecal coliform counts in urban runoff typically range from tens to hundreds of thousands per hundred milliliters of runoff during warm weather conditions, with the median for all sites being around 21,000/100 ml. This is generally consistent with studies that found that fecal coliform mean values range from 1,600 coliform fecal units (CFU)/100 ml to 250,000 cfu/100 ml (Makepeace, D.K., D.W. Smith, and S.J. Stanley. 1995. "Urban Storm Water Quality: Summary of Contaminant Data." *Critical Reviews in Environmental Science and Technology* 25(2):93-139). Makepeace, et al., summarized ranges of contaminants from storm water, including physical contaminants such as total solids (76—36,200 mg/L) and copper (up to 1.41 mg/L); organic chemicals; organic compounds, such as oil and grease (up to 110 mg/L); and microorganisms.

Monitoring data summarized in the NURP study provided important information about urban runoff from residential, commercial, and light industrial areas. The study concluded that the quality of urban runoff can be affected adversely by several sources of pollution that were not directly evaluated in the study, including illicit discharges, construction site runoff, and illegal dumping. Data from the NURP study were analyzed further in the U.S. Geological Survey (USGS) Urban Storm Water Data Base for 22 Metropolitan Areas Throughout the United States study (Driver, N.E., M.H. Mustard, R.B. Rhinesmith, and R.F. Middleburg. 1985. *U.S. Geological Survey Urban Storm Water Data Base for 22 Metropolitan Areas Throughout the United States.* Report No. 85–337 USGS. Lakewood, CO). The USGS report summarized additional monitoring data compiled during the mid-1980s, covering 717 storm events at 99 sites in 22 metropolitan areas and documented problems associated with metals and sediment concentrations in urban storm water runoff. More recent reports have confirmed the pollutant concentration data collected in the NURP study (Marsalek, J. 1990. "Evaluation of Pollutant Loads from Urban Nonpoint Sources." *Wat. Sci. Tech.* 22(10/11):23–30; Makepeace, et al., 1995).

Commenters argued that the NURP study does not support EPA's contention that urban activities significantly jeopardize attainment of water quality standards. One commenter argued that the NURP study and the 1985 USGS study are seriously out of date. Because they were issued 10 years or more before the implementation of the current storm water permit program, the data in those reports do not reflect conditions that exist after implementation of permits issued by authorized States and EPA for storm water from construction sites, large municipalities, and industrial activities.

In response, EPA notes that it is not relying solely on the NURP study to describe current water quality impairment. Rather, EPA is citing NURP as a source of data on typical pollutant concentrations in urban runoff. Recent studies have not found significantly different pollutant concentrations in urban runoff when compared to the original NURP data (see Makepeace, et al., 1995; Marsalek, 1990; and Pitt, et al., 1995).

America's Clean Water—the States' Nonpoint Source Assessment (Association of State and Interstate Water Pollution Control Administrators (ASIWPCA). 1985. *America's Clean Water—The States' Nonpoint Source Assessment.* Prepared in cooperation with the U.S. EPA, Office of Water, Washington, DC), a comprehensive study of diffuse pollution sources conducted under the sponsorship of the Association of State and Interstate Water Pollution Control Administrators (ASIWPCA) and EPA revealed that 38 States reported urban runoff as a major cause of designated beneficial use impairment and 21 States reported storm water runoff from construction sites as a major cause of beneficial use impairment. In addition, the 1996 305(b) Report (U.S. EPA. 1998. *The National Water Quality Inventory, 1996 Report to Congress.* EPA 841–R–97–008. Office of Water. Washington, DC), provides a national assessment of water quality based on biennial reports submitted by the States as required under CWA section 305(b) of the CWA. In the CWA 305(b) reports, States, Tribes, and Territories assess their individual water quality control programs by examining the attainment or nonattainment of the designated uses assigned to their rivers, lakes, estuaries, wetlands, and ocean shores. A designated use is the legally applicable use specified in a water quality standard for a watershed, waterbody, or segment of a waterbody. The designated use is the desirable use that the water quality should support. Examples of designated uses include drinking water supply, primary contact recreation (swimming), and aquatic life support. Each CWA 305(b) report indicates the assessed fraction of a State's waters that are fully supporting, partially supporting, or not supporting designated beneficial uses.

In their reports, States, Tribes, and Territories first identified and then assigned the sources of water quality impairment for each impaired waterbody using the following categories: industrial, municipal sewage, combined sewer overflows, urban runoff/storm sewers, agricultural, silvicultural, construction, resource extraction, land disposal, hydrologic modification, and habitat modification. The 1996 Inventory, based on a compilation of 60 individual 305(b) reports submitted by States, Tribes, and Territories, assessed the following percentages of total waters nationwide: 19 percent of river and stream miles; 40 percent of lake, pond, and reservoir acres; 72 percent of estuary square miles; and 6 percent of ocean shoreline waters. The 1996 Inventory indicated that approximately 40 percent of the Nation's assessed rivers, lakes, and estuaries are impaired. Waterbodies deemed as "impaired" are either partially supporting designated uses or not supporting designated uses.

The 1996 Inventory also found urban runoff/discharges from storm sewers to be a major source of water quality impairment nationwide. Urban runoff/storm sewers were found to be a source of pollution in 13 percent of impaired rivers; 21 percent of impaired lakes, ponds, and reservoirs; and 45 percent of impaired estuaries (second only to industrial discharges). In addition, urban runoff was found to be the leading cause of ocean impairment for those ocean miles surveyed.

In addition, a recent USGS study of urban watersheds across the United States has revealed a link between urban development and contamination of local waterbodies. The study found the highest levels of organic contaminants, known as polycyclic aromatic hydrocarbons (PAHs) (products of combustion of wood, grass, and fossil fuels), in the reservoirs of urbanized watersheds (U.S. Geological Survey (USGS). 1998. *Research Reveals Link Between Development and Contamination in Urban Watersheds.* USGS news release. USGS National Water-Quality Assessment Program).

Urban storm water also can contribute significant amounts of toxicants to receiving waters. Pitt, et. al. (1993), found heavy metal concentrations in the majority of samples analyzed. Industrial or commercial areas were likely to be the most significant pollutant source areas (Pitt, R., R. Field, M. Lalor, M. Brown 1993. "Urban stormwater toxic pollutants: assessment, sources, and treatability" *Water Environment Research,* 67(3):260–75).

b. Local and Watershed-Based Studies

In addition to the large-scale nationwide studies and assessments, a number of local and watershed-based studies from across the country have documented the detrimental effects of urban storm water runoff on water quality. A study of urban streams in Milwaukee County, Wisconsin, found local streams to be highly degraded due primarily to urban runoff, while three studies in the Atlanta, Georgia, region were characterized as being "the first documentation in the Southeast of the strong negative relationship between urbanization and stream quality that has been observed in other ecoregions" (Masterson, J. and R. Bannerman. 1994. "Impacts of Storm Water Runoff on Urban Streams in Milwaukee County, Wisconsin." Paper presented at National Symposium on Water Quality: American Water Resources Association; Schueler, T.R. 1997. "Fish Dynamics in Urban Streams Near Atlanta, Georgia."

Technical Note 94. *Watershed Protection Techniques* 2(4)). Several other studies, including those performed in Arizona (Maricopa County), California (San Jose's Coyote Creek), Massachusetts (Green River), Virginia (Tuckahoe Creek), and Washington (Puget Sound lowland ecoregion), all had the same finding: runoff from urban areas greatly impair stream ecology and the health of aquatic life; the more heavily developed the area, the more detrimental the effects (Lopes, T. and K. Fossum. 1995. "Selected Chemical Characteristics and Acute Toxicity of Urban Stormwater, Streamflow, and Bed Material, Maricopa County, Arizona." *Water Resources Investigations Report* 95–4074. USGS; Pitt, R. 1995. "Effects of Urban Runoff on Aquatic Biota." In *Handbook of Ecotoxicology;* Pratt, J. and R. Coler. 1979. "Ecological Effects of Urban Stormwater Runoff on Benthic Macroinvertebrates Inhabiting the Green River, Massachusetts." Completion Report Project No. A–094. Water Resources Research Center. University of Massachusetts at Amherst.; Schueler, T.R. 1997. "Historical Change in a Warmwater Fish Community in an Urbanizing Watershed." Technical Note 93. *Watershed Protection Techniques* 2(4); May, C., R. Horner, J. Karr, B. Mar, and E. Welch. 1997. "Effects Of Urbanization On Small Streams In The Puget Sound Lowland Ecoregion." *Watershed Protection Techniques* 2(4)).

Pitt and others also described the receiving water effects on aquatic organisms associated with urban runoff (Pitt, R.E. 1995. "Biological Effects of Urban Runoff Discharges" In *Stormwater Runoff and Receiving Systems: Impact, Monitoring, and Assessment,* ed. E.E Herricks, Lewis Publishers; Crunkilton, R., J. Kleist, D. Bierman, J. Ramcheck, and W. DeVita. 1999. "Importance of Toxicity as a Factor Controlling the Distribution of Aquatic Organisms in an Urban Stream." In *Comprehensive Stormwater & Aquatic Ecosystem Management Conference Papers.* Auckland, New Zealand).

In Wisconsin, runoff samples were collected from streets, parking lots, roofs, driveways, and lawns. Source areas were broken up into residential, commercial, and industrial. Geometric mean concentration data for residential areas included total solids of about 500–800 mg/L from streets and 600 mg/L from lawns. Fecal coliform data from residential areas ranged from 34,000 to 92,000 cfu/100 mL for streets and driveways. Contaminant concentration data from commercial and industrial source areas were lower for total solids and fecal coliform, but higher for total zinc (Bannerman, R.T., D.W. Owens, R.B. Dods, and N.J. Hornewer. 1993. "Sources of Pollutants in Wisconsin Stormwater." *Wat. Sci. Tech.* 28(3–5):241–59).

Bannerman, et al. also found that streets contribute higher loads of pollutants to urban storm water than any other residential development source. Two small urban residential watersheds were evaluated to determine that lawns and streets are the largest sources of total and dissolved phosphorus in the basins (Waschbusch, R.J., W.R. Selbig, and R.T. Bannerman. 1999. "Sources of Phosphorus in Stormwater and Street Dirt from Two Urban Residential Basins In Madison, Wisconsin, 1994–95." *Water Resources Investigations Report* 99–4021. U.S. Geological Survey). A number of other studies have indicated that urban roadways often contain significant quantities of metal elements and solids (Sansalone, J.J. and S.G. Buchberger. 1997. "Partitioning and First Flush of Metals in Urban Roadway Storm Water." *ASCE Journal of Environmental Engineering* 123(2); Sansalone, J.J., J.M. Koran, J.A. Smithson, and S.G. Buchberger. 1998. "Physical Characteristics of Urban Roadway Solids Transported During Rain Events" *ASCE Journal of Environmental Engineering* 124(5); Klein, L.A., M. Lang, N. Nash, and S.L. Kirschner. 1974. "Sources of Metals in New York City Wastewater" *J. Water Pollution Control Federation* 46(12):2653–62; Barrett, M.E, R.D. Zuber, E.R. Collins, J.F. Malina, R.J. Charbeneau, and G.H Ward., 1993. "A Review and Evaluation of Literature Pertaining to the Quantity and Control of Pollution from Highway Runoff and Construction." Research Report 1943–1. Center for Transportation Research, University of Texas, Austin).

c. Beach Closings/Advisories

Urban wet weather flows have been recognized as the primary sources of estuarine pollution in coastal communities. Urban storm water runoff, sanitary sewer overflows, and combined sewer overflows have become the largest causes of beach closings in the United States in the past three years. Storm water discharges from urban areas not only pose a threat to the ecological environment, they also can substantially affect human health. A survey of coastal and Great Lakes communities reports that in 1998, more than 1,500 beach closings and advisories were associated with storm water runoff (Natural Resources Defense Council. 1999. "A Guide to Water Quality at Vacation Beaches" New York, NY). Other reports also document public health, shellfish bed, and habitat impacts from storm water runoff, including more than 823 beach closings/advisories issued in 1995 and more than 407 beach closing/advisories issued in 1996 due to urban runoff (Natural Resources Defense Council. 1996. *Testing the Waters Volume VI: Who Knows What You're Getting Into.* New York, NY; NRDC. 1997. *Testing the Waters Volume VII: How Does Your Vacation Beach Rate.* New York, NY; Morton, T. 1997. *Draining to the Ocean: The Effects of Stormwater Pollution on Coastal Waters.* American Oceans Campaign, Santa Monica, CA). The Epidemiological Study of Possible Adverse Health Effects of Swimming in Santa Monica Bay (Haile, R.W., et. al. 1996. "An Epidemiological Study of Possible Adverse Health Effects of Swimming in Santa Monica Bay." *Final Report prepared for the Santa Monica Bay Restoration Project*) concluded that there is a 57 percent higher rate of illness in swimmers who swim adjacent to storm drains than in swimmers who swim more than 400 yards away from storm drains. This and other studies document a relationship between gastrointestinal illness in swimmers and water quality, the latter of which can be heavily compromised by polluted storm water discharges.

2. Non-Storm Water Discharges Through Municipal Storm Sewers

Studies have shown that discharges from MS4s often include wastes and wastewater from non-storm water sources. Federal regulations (§ 122.26(b)(2)) define an illicit discharge as "* * * any discharge to an MS4 that is not composed entirely of storm water * * *," with some exceptions. These discharges are "illicit" because municipal storm sewer systems are not designed to accept, process, or discharge such wastes. Sources of illicit discharges include, but are not limited to: sanitary wastewater; effluent from septic tanks; car wash, laundry, and other industrial wastewaters; improper disposal of auto and household toxics, such as used motor oil and pesticides; and spills from roadway and other accidents.

Illicit discharges enter the system through either direct connections (e.g., wastewater piping either mistakenly or deliberately connected to the storm drains) or indirect connections (e.g., infiltration into the MS4 from cracked sanitary systems, spills collected by drain outlets, and paint or used oil dumped directly into a drain). The result is untreated discharges that contribute high levels of pollutants,

including heavy metals, toxics, oil and grease, solvents, nutrients, viruses and bacteria into receiving waterbodies. The NURP study, discussed earlier, found that pollutant levels from illicit discharges were high enough to significantly degrade receiving water quality and threaten aquatic, wildlife, and human health. The study noted particular problems with illicit discharges of sanitary wastes, which can be directly linked to high bacterial counts in receiving waters and can be dangerous to public health.

Because illicit discharges to MS4s can create severe widespread contamination and water quality problems, several municipalities and urban counties performed studies to identify and eliminate such discharges. In Michigan, the Ann Arbor and Ypsilanti water quality projects inspected 660 businesses, homes, and other buildings and identified 14 percent of the buildings as having improper storm sewer drain connections. The program assessment revealed that, on average, 60 percent of automobile-related businesses, including service stations, automobile dealerships, car washes, body shops, and light industrial facilities, had illicit connections to storm sewer drains. The program assessment also showed that a majority of the illicit discharges to the storm sewer system resulted from improper plumbing and connections, which had been approved by the municipality when installed (Washtenaw County Statutory Drainage Board. 1987. Huron River Pollution Abatement Program).

In addition, an inspection of urban storm water outfalls draining into Inner Grays, Washington, indicated that 32 percent of these outfalls had dry weather flows. Of these flows, 21 percent were determined to have pollutant levels higher than the pollutant levels expected in typical urban storm water runoff characterized in the NURP study (U.S. EPA. 1993. *Investigation of Inappropriate Pollutant Entries Into Storm Drainage Systems—A User's Guide.* EPA 600/R–92/238. Office of Research and Development. Washington, DC). That same document reports a study in Toronto, Canada, that found that 59 percent of outfalls from the MS4 had dry-weather flows. Chemical tests revealed that 14 percent of these dry-weather flows were determined to be grossly polluted.

Inflows from aging sanitary sewer collection systems are one of the most serious illicit discharge-related problems. Sanitary sewer systems frequently develop leaks and cracks, resulting in discharges of pollutants to receiving waters through separate storm sewers. These pollutants include sanitary waste and materials from sewer main construction (e.g., asbestos cement, brick, cast iron, vitrified clay). Municipalities have long recognized the reverse problem of storm water infiltration into sanitary sewer collection systems; this type of infiltration often disrupts the operation of the municipal sewage treatment plant.

The improper disposal of materials is another illicit discharge-related problem that can result in contaminated discharges from separate storm sewer systems in two ways. First, materials may be disposed of directly in a catch basin or other storm water conveyance. Second, materials disposed of on the ground may either drain directly to a storm sewer or be washed into a storm sewer during a storm event. Improper disposal of materials to street catch basins and other storm sewer inlets often occurs when people mistakenly believe that disposal to such areas is an environmentally sound practice. Part of the confusion may occur because some areas are served by combined sewer systems, which are part of the sanitary sewer collection system, and people assume that materials discharged to a catch basin will reach a municipal sewage treatment plant. Materials that are commonly disposed of improperly include used motor oil; household toxic materials; radiator fluids; and litter, such as disposable cups, cans, and fast-food packages. EPA believes that there has been increasing success in addressing these problems through initiatives such as storm drain stenciling and recycling programs, including household hazardous waste special collection days.

Programs that reduce illicit discharges to separate storm sewers have improved water quality in several municipalities. For example, Michigan's Huron River Pollution Abatement Program found the elimination of illicit connections caused a measurable improvement in the water quality of the Washtenaw County storm sewers and the Huron River (Washtenaw County Statutory Drainage Board, 1987). In addition, an illicit detection and remediation program in Houston, Texas, has significantly improved the water quality of Buffalo Bayou. Houston estimated that illicit flows from 132 sources had a flow rate as high as 500 gal/min. Sources of the illicit discharges included broken and plugged sanitary sewer lines, illicit connections from sanitary lines to storm sewer lines, and floor drain connections (Glanton, T., M.T. Garrett, and B. Goloby. 1992. The Illicit Connection: Is It the Problem? *Wat. Env. Tech.* 4(9):63–8).

3. Construction Site Runoff

Storm water discharges generated during construction activities can cause an array of physical, chemical, and biological water quality impacts. Specifically, the biological, chemical, and physical integrity of the waters may become severely compromised. Water quality impairment results, in part, because a number of pollutants are preferentially absorbed onto mineral or organic particles found in fine sediment. The interconnected process of erosion (detachment of the soil particles), sediment transport, and delivery is the primary pathway for introducing key pollutants, such as nutrients (particularly phosphorus), metals, and organic compounds into aquatic systems (Novotny, V. and G. Chesters. 1989. "Delivery of Sediment and Pollutants from Nonpoint Sources: A Water Quality Perspective." *Journal of Soil and Water Conservation,* 44(6):568–76). Estimates indicate that 80 percent of the phosphorus and 73 percent of the Kjeldahl nitrogen in streams is associated with eroded sediment (U.S. Department of Agriculture. 1989. "The Second RCA Appraisal, Soil, Water and Related Resources on Nonfederal Land in the United States, Analysis of Condition and Trends." Cited in Fennessey, L.A.J., and A.R. Jarrett. 1994. "The Dirt in a Hole: a Review of Sedimentation Basins for Urban Areas and Construction Sites." *Journal of Soil and Water Conservation,* 49(4):317–23).

In watersheds experiencing intensive construction activity, the localized impacts of water quality may be severe because of high pollutant loads, primarily sediments. Siltation is the largest cause of impaired water quality in rivers and the third largest cause of impaired water quality in lakes (U.S. EPA, 1998). The 1996 305(b) report also found that construction site discharges were a source of pollution in: 6 percent of impaired rivers; 11 percent of impaired lakes, ponds, and reservoirs; and 11 percent of impaired estuaries. Introduction of coarse sediment (coarse sand or larger) or a large amount of fine sediment is also a concern because of the potential of filling lakes and reservoirs (along with the associated remediation costs for dredging), as well as clogging stream channels (e.g., Paterson, R.G., M.I. Luger, E.J. Burby, E.J. Kaiser, H.R. Malcolm, and A.C. Beard. 1993. "Costs and Benefits of Urban Erosion and Sediment Control: North Carolina Experience." *Environmental Management* 17(2):167–78). Large inputs of coarse sediment into

stream channels initially will reduce stream depth and minimize habitat complexity by filling in pools (U.S. EPA. 1991. *Monitoring Guidelines to Evaluate Effects of Forestry Activities on Streams in the Pacific Northwest and Alaska*. EPA 910/9–91–001. Seattle, WA). In addition, studies have shown that stream reaches affected by construction activities often extend well downstream of the construction site. For example, between 4.8 and 5.6 kilometers of stream below construction sites in the Patuxent River watershed were observed to be impacted by sediment inputs (Fox, H.L. 1974. "Effects of Urbanization on the Patuxent River, with Special Emphasis on Sediment Transport, Storage, and Migration." Ph.D. dissertation. Johns Hopkins University, Baltimore, MD. As Cited in Klein, R.D. 1979. "Urbanization and Stream Quality Impairment." *Water Resources Bulletin* 15(4): 948–63).

A primary concern at most construction sites is the erosion and transport process related to fine sediment because rain splash, rills (i.e., a channel small enough to be removed by normal agricultural practices and typically less than 1-foot deep), and sheetwash encourage the detachment and transport of this material to waterbodies (Storm Water Quality Task Force. 1993. *California Storm Water Best Management Practice Handbooks—Construction Activity*. Oakland, CA: Blue Print Service). Construction sites also can generate other pollutants associated with onsite wastes, such as sanitary wastes or concrete truck washout.

Although streams and rivers naturally carry sediment loads, erosion from construction sites and runoff from developed areas can elevate these loads to levels well above those in undisturbed watersheds. It is generally acknowledged that erosion rates from construction sites are much greater than from almost any other land use (Novotny, V. and H. Olem. 1994. *Water Quality: Prevention, Identification, and Management of Diffuse Pollution*. New York: Van Nostrand Reinhold). Results from both field studies and erosion models indicate that erosion rates from construction sites are typically an order of magnitude larger than row crops and several orders of magnitude greater than rates from well-vegetated areas, such as forests or pastures (USDA. 1970. "Controlling Erosion on Construction Sites." *Agriculture Information Bulletin*, Washington, DC; Meyer, L.D., W.H. Wischmeier, and W.H. Daniel. 1971. "Erosion, Runoff and Revegetation of Denuded Construction Sites." *Transactions of the ASAE* 14(1):138–41; Owen, O.S. 1975. *Natural Resource Conservation*. New York: MacMillan. As cited in Paterson, et al., 1993).

A recent review of the efficiency of sediment basins indicated that inflows from 12 construction sites had a mean TSS concentration of about 4,500 mg/L (Brown, W.E. 1997. "The Limits of Settling." Technical Note No. 83. *Watershed Protection Techniques* 2(3)). In Virginia, suspended sediment concentrations from housing construction sites were measured at 500–3,000 mg/L, or about 40 times larger than the concentrations from already-developed urban areas (Kuo, C.Y. 1976. "Evaluation of Sediment Yields Due to Urban Development." Bulletin No. 98. Virginia Water Resources Research Center, Virginia Polytechnic Institute and State University, Blacksburg, VA).

Similar impacts from storm water runoff have been reported in a number of other studies. For example, Daniel, et al., monitored three residential construction sites in southeastern Wisconsin and determined that annual sediment yields were more than 19 times the yields from agricultural areas (Daniel, T.C., D. McGuire, D. Stoffel, and B. Miller. 1979. "Sediment and Nutrient Yield from Residential Construction Sites" *Journal of Environmental Quality* 8(3):304–08). Daniel, et al., identified total storm runoff, followed by peak storm runoff, as the most influential factors controlling the sediment loadings from residential construction sites. Daniel, et al., also found that suspended sediment concentrations were 15,000–20,000 mg/L in moderate events and up to 60,000 mg/L in larger events.

Wolman and Schick (Wolman, M.G. and A.P. Schick. 1967. "Effects of Construction on Fluvial Sediment, Urban and Suburban Areas of Maryland." *Water Resources Research* 3(2): 451–64) studied the impacts of development on fluvial systems in Maryland and determined that sediment yields in areas undergoing construction were 1.5 to 75 times greater than detected in natural or agricultural catchments. The authors summarize the potential impacts of construction on sediment yields by stating that "the equivalent of many decades of natural or even agricultural erosion may take place during a single year from areas cleared for construction" (Wolman and Schick, 1967).

A number of studies have examined the effects of road construction on erosion rates and sediment yields. A highway construction project in West Virginia disturbed only 4.2 percent of a 4.72-square-mile basin, but resulted in a three-fold increase in suspended sediment yields (Downs, S.C. and D.H. Appel. 1986. *Progress Report on the Effects of Highway Construction on Suspended-Sediment Discharge in the Coal River and Trace Fork, West Virginia*, 1975–81. USGS Water Resources Investigations Report 84–4275. Charlestown, WV). During the largest storm event, it was estimated that 80 percent of the sediment in the stream originated from the construction site. As is often the case, the increase in suspended sediment load could not be detected further downstream, where the drainage area was more than 50 times larger (269 square miles).

Another study evaluated the effect of 290 acres of highway construction on watersheds ranging in size from 5 to 38 square miles. Suspended sediment loads in the smallest watershed increased by 250 percent, and the estimated sediment yield from the construction area was 37 tons/acre during a 2-year period (Hainly, R.A. 1980. *The Effects of Highway Construction on Sediment Discharge into Blockhouse Creek and Stream Valley Run, Pennsylvania*. USGS Water Resources Investigations Report 80–68. Harrisburg, PA). A more recent study in Hawaii showed that highway construction increased suspended sediment loads by 56 to 76 percent in three small (1 to 4 square mile) basins (Hill, B.R. 1996. *Streamflow and Suspended-Sediment Loads Before and During Highway Construction, North Halawa, Haiku, and Kamooalii Drainage Basins, Oahu, Hawaii, 1983–91*. USGS Water Resources Investigations Report 96–4259. Honolulu, HI). A 1970 study determined that sediment yields from construction areas can be as much as 500 times the levels detected in rural areas (National Association of Counties Research Foundation. 1970. *Urban Soil Erosion and Sediment Control*. Water Pollution Control Research Series, Program #15030 DTL. Federal Water Quality Administration, U.S. Department of Interior. Washington, DC)

Yorke and Herb (Yorke, T.H., and W.J. Herb. 1978. *Effects of Urbanization on Streamflow and Sediment Transport in the Rock Creek and Anacostia River Basins, Montgomery County, Maryland, 1962–74*. USGS Professional Paper 1003, Washington, DC) evaluated nine subbasins in the Maryland portion of the Anacostia watershed for more than a decade in an effort to define the impacts of changing land use/land cover on sediment in runoff. Average annual suspended sediment yields for construction sites ranged from 7 to 100 tons/acre. Storm water discharges from construction sites that occur when the land area is disturbed (and prior to

surface stabilization) can significantly impact designated uses. Examples of designated uses include public water supply, recreation, and propagation of fish and wildlife. The siltation process described previously can threaten all three designated uses by (1) depositing high concentrations of pollutants in public water supplies; (2) decreasing the depth of a waterbody, which can reduce the volume of a reservoir or result in limited use of a water body by boaters, swimmers, and other recreational enthusiasts; and (3) directly impairing the habitat of fish and other aquatic species, which can limit their ability to reproduce.

Excess sediment can cause a number of other problems for waterbodies. It is associated with increased turbidity and reduced light penetration in the water column, as well as more long-term effects associated with habitat destruction and increased difficulty in filtering drinking water. Numerous studies have examined the effect that excess sediment has on aquatic ecosystems. For example, sediment from road construction activity in Northern Virginia reduced aquatic insect and fish communities by up to 85 percent and 40 percent, respectively (Reed, J.R. 1997. "Stream Community Responses to Road Construction Sediments." Bulletin No. 97. Virginia Water Resources Research Center, Virginia Polytechnic Institute, Blacksburg, VA. As cited in Klein, R.D. 1990. *A Survey of Quality of Erosion and Sediment Control and Storm Water Management in the Chesapeake Bay Watershed.* Annapolis, MD: Chesapeake Bay Foundation). Other studies have shown that fine sediment (fine sand or smaller) adversely affects aquatic ecosystems by reducing light penetration, impeding sight-feeding, smothering benthic organisms, abrading gills and other sensitive structures, reducing habitat by clogging interstitial spaces within a streambed, and reducing the intergravel dissolved oxygen by reducing the permeability of the bed material (Everest, F.H., J.C. Beschta, K.V. Scrivener, J.R. Koski, J.R. Sedell, and C.J. Cederholm. 1987. "Fine Sediment and Salmonid Production: A Paradox." *Streamside Management: Forestry and Fishery Interactions,* Contract No. 57, Institute of Forest Resources, University of Washington, Seattle, WA). For example, 4.8 and 5.6 kilometers of stream below construction sites in the Patuxent River watershed in Maryland were found to have fine sediment amounts 15 times greater than normal (Fox, 1974. As cited in Klein, 1979). Benthic organisms in the streambed can be smothered by sediment deposits, causing changes in aquatic flora and fauna, such as fish species composition (Wolman and Schick, 1967). In addition, the primary cause of coral reef degradation in coastal areas is attributed to land disturbances and dredging activities due to urban development (Rogers, C.S. 1990. "Responses of Coral Reefs and Reef Organizations to Sedimentation." *Marine Ecology Progress Series,* 62:185–202).

EPA believes that the water quality impact from small construction sites is as high as or higher than the impact from larger sites on a per acre basis. The concentration of pollutants in the runoff from smaller sites is similar to the concentrations in the runoff from larger sites. The proportion of sediment that makes it from the construction site to surface waters is likely the same for larger and smaller construction sites in urban areas because the runoff from either site is usually delivered directly to the storm drain network where there is no opportunity for the sediment to be filtered out.

The expected contribution of total sediment yields from small sites depends, in part, on the extent to which erosion and sedimentation controls are being applied. Because current storm water regulations are more likely to require erosion and sedimentation controls on larger sites in urban areas, smaller construction sites that lack such programs are likely to contribute a disproportionate amount of the total sediment from construction activities (MacDonald, L.H. 1997. *Technical Justification for Regulating Construction Sites 1–5 Acres in Size.* Unpublished report submitted to U.S. EPA, Washington, DC). Smaller construction sites are less likely to have an effective plan to control erosion and sedimentation, are less likely to properly implement and maintain their plans, and are less likely to be inspected (Brown, W. and D. Caraco. 1997. *Controlling Storm Water Runoff Discharges from Small Construction Sites: A National Review.* Submitted to Office of Wastewater Management, U.S. EPA, Washington, DC., by the Center for Watershed Protection, Silver Spring, MD). The proportion of sediment that makes it from the construction site to surface waters is likely the same for larger and smaller construction sites in urban areas because the runoff from either site is usually delivered directly to the storm drain network, where there is no opportunity for the sediment to be filtered out.

To confirm its belief that sediment yields from small sites are as high as or higher than the 20 to 150 tons/acre/year measured from larger sites, EPA gave a grant to the Dane County, Wisconsin Land Conservation Department, in cooperation with the USGS, to evaluate sediment runoff from two small construction sites. The first was a 0.34 acre residential lot and the second was a 1.72 acre commercial office development. Runoff from the sites was channeled to a single discharge point for monitoring. Each site was monitored before, during, and after construction.

The Dane County study found that total solids concentrations from these small sites are similar to total solids concentrations from larger construction sites. Results show that for both of the study sites, total solids and suspended solids concentrations were significantly higher during construction than either before or after construction. For example, preconstruction total solids concentrations averaged 642 mg/L during the period when ryegrass was established, active construction total solids concentrations averaged 2,788 mg/L, and post-construction total solids concentrations averaged 132 mg/L (on a pollutant load basis, this equaled 7.4 lbs preconstruction, 35 lbs during construction, and 0.6 lbs post-construction for total solids). While this site was not properly stabilized before construction, after construction was complete and the site was stabilized, post-construction concentrations were more than 20 times less than during construction. The results were even more dramatic for the commercial site. The commercial site had one preconstruction event, which resulted in total solids concentrations of 138 mg/L, while active construction averaged more than 15,000 mg/L and post-construction averaged only 200 mg/L (on a pollutant load basis, this equaled 0.3 lbs preconstruction, 490 lbs during construction, and 13.4 lbs post-construction for total solids). The active construction period resulted in more than 75 times more sediment than either before or after construction (Owens, D.W., P. Jopke, D.W. Hall, J. Balousek and A. Roa. 1999. "Soil Erosion from Small Construction Sites." Draft USGS Fact Sheet. USGS and Dane County Land Conservation Department, WI). The total solids concentrations from these small sites in Wisconsin are similar to total solids concentrations from larger construction sites. For example, a study evaluating the effects of highway construction in West Virginia found that a small storm produced a sediment concentration of 7,520 mg/L (Downs and Appel, 1986).

One important aspect of small construction sites is the number of small sites relative to larger construction sites

and total land area within the watershed. Brown and Caraco surveyed 219 local jurisdictions to assess erosion and sediment control (ESC) programs. Seventy respondents provided data on the number of ESC permits for construction sites smaller than 5 acres. In 27 cases (38 percent of the respondents), more than three-quarters of the permits were for sites smaller than 5 acres; in another 18 cases (26 percent), more than half of the permits were for sites smaller than 5 acres.

In addition, data on the total acreage disturbed by smaller construction sites have been collected recently in two States (MacDonald, 1997). The most recent and complete data set is the listing of the disturbed area for each of the 3,831 construction sites permitted in North Carolina for 1994–1995 and 1995–1996. Nearly 61 percent of the sites that were 1 acre or larger were between 1.0 and 4.9 acres in size. This proportion was consistent between years. Data showed that this range of sites accounted for 18 percent of the total area disturbed by construction. The values showed very little variation between the 2 years of data. The total disturbed area for all sites over this 2-year period was nearly 33,000 acres, or about 0.1 percent of the total area of North Carolina.

EPA estimates that construction sites disturbing greater than 5 acres disturb 2.1-million acres of land (78.1 percent of the total) while sites disturbing between 1 and 5 acres of land disturb 0.5-million acres of land (19.4 percent). The remaining sites on less than 1 acres of land disturb 0.07-million acres of land (only 2.5 percent of the total). Given the high erosion rates associated with most construction sites, small construction sites can be a significant source of water quality impairment, particularly in small watersheds that are undergoing rapid development. Exempting sites under 1 acre will exclude only about 2.5 percent of acreage from program coverage, but will exclude a far higher number of sites, approximately 25 percent.

Several studies have determined that the most effective construction runoff control programs rely on local plan review and field enforcement (Paterson, R. G. 1994. "Construction Practices: the Good, the Bad, and the Ugly." *Watershed Protection Techniques* 1(3)). In his review, Paterson suggests that, given the critical importance of field implementation of erosion and sediment control programs and the apparent shortcomings that exist, much more focus should be given to plan implementation.

Several commenters disputed the data presented in the proposed rule for storm water discharges from smaller construction sites. One commenter stated that EPA has not adequately explained the basis for permitting construction activity down to 1 disturbed acre. Another commenter stated that EPA did not present sufficient data on water quality impacts from construction sites disturbing less than 5 acres.

EPA believes that the data presented above sufficiently support nationwide designation of storm water discharges from construction activity disturbing more than 1 acre. Based on total disturbed land area within a watershed, the cumulative effects of numerous small construction sites can have impacts similar to those of larger sites in a particular area. In addition, waivers for storm water discharges from smaller construction activity will exclude sites not expected to impair water quality. EPA will continue to collect water quality data on construction site storm water runoff.

C. Statutory Background

In 1972, Congress enacted the CWA to prohibit the discharge of any pollutant to waters of the United States from a point source unless the discharge is authorized by an NPDES permit. Congress added CWA section 402(p) in 1987 to require implementation of a comprehensive program for addressing storm water discharges. Section 402(p)(1) required EPA or NPDES-authorized States or Tribes to issue NPDES permits for the following five classes of storm water discharges composed entirely of storm water ("storm water discharges") specifically listed under section 402(p)(2):

(A) a discharge subject to an NPDES permit before February 4, 1987

(B) a discharge associated with industrial activity

(C) a discharge from a municipal separate storm sewer system serving a population of 250,000 or more

(D) a discharge from a municipal separate storm sewer system serving a population of 100,000 or more but less than 250,000

(E) a discharge that an NPDES permitting authority determines to be contributing to a violation of a water quality standard or a significant contributor of pollutants to the waters of the United States.

Section 402(p)(3)(A) requires storm water discharges associated with industrial activity to meet all applicable provisions of section 402 and section 301 of the CWA, including technology-based requirements and any more stringent requirements necessary to meet water quality standards. Section 402(p)(3)(B) establishes NPDES permit standards for discharges from municipal separate storm sewer systems, or MS4s. NPDES permits for discharges from MS4s (1) may be issued on a system or jurisdiction-wide basis, (2) must include a requirement to effectively prohibit non-storm water discharges into the storm sewers, and (3) must require controls to reduce pollutant discharges to the maximum extent practicable, including best management practices, and other provisions as the Administrator or the States determine to be appropriate for the control of such pollutants. At this time, EPA determines that water quality-based controls, implemented through the iterative processes described today are appropriate for the control of such pollutants and will result in reasonable further progress towards attainment of water quality standards. See sections II.L and II.H.3 of the preamble.

In CWA section 402(p)(4), Congress established statutory deadlines for the initial steps in implementing the NPDES program for storm water discharges. This section required development of NPDES permit application regulations, submission of NPDES permit applications, issuance of NPDES permits for sources identified in section 402(p)(2), and compliance with NPDES permit conditions. In addition, this section required industrial facilities and large MS4s to submit NPDES permit applications for storm water discharges by February 4, 1990. Medium MS4s were to submit NPDES permit applications by February 4, 1992. EPA and authorized NPDES States were prohibited from requiring an NPDES permit for any other storm water discharges until October 1, 1994.

Section 402(p)(5) required EPA to conduct certain studies and submit a report to Congress. This requirement is discussed in the following section.

Section 402(p)(6) requires EPA, in consultation with States and local officials, to issue regulations for the designation of additional storm water discharges to be regulated to protect water quality. It also requires EPA to extend the existing storm water program to regulate newly designated sources. At a minimum, the extension must establish (1) priorities, (2) requirements for State storm water management programs, and (3) expeditious deadlines. Section 402(p)(6) specifies that the program may include performance standards, guidelines, guidance, and management practices and treatment requirements, as

appropriate. Today's rule implements this section.

D. EPA's Reports to Congress

Under CWA section 402(p)(5), EPA, in consultation with the States, was required to conduct a study. The study was to identify unregulated sources of storm water discharges, determine the nature and extent of pollutants in such discharges, and establish procedures and methods to mitigate the impacts of such discharges on water quality. Section 402(p)(5) also required EPA to report the results of the first two components of that study to Congress by October 1, 1988, and the final report by October 1, 1989.

In March 1995, EPA submitted to Congress a report that reviewed and analyzed the nature of storm water discharges from municipal and industrialacilities that were not already regulated under the initial NPDES regulations for storm water (U.S. Environmental Protection Agency, Office of Water. 1995. *Storm Water Discharges Potentially Addressed by Phase II of the National Pollutant Discharge Elimination System Storm Water Program: Report to Congress.* Washington, D.C. EPA 833–K–94–002) ("Report"). The Report also analyzed associated pollutant loadings and water quality impacts from these unregulated sources. Based on identification of unregulated municipal sources and analysis of information on impacts of storm water discharges from municipal sources, the Report recommended that the NPDES program for storm water focus on the 405 "urbanized areas" identified by the Bureau of the Census. The Report further found that a number of discharges from unregulated industrial facilities warranted further investigation to determine the need for regulation. It classified these unregulated industrial discharges in two groups: Group A and Group B. Group A comprised sources that may be considered a high priority for inclusion in the NPDES program for storm water because discharges from these sources are similar or identical to already regulated sources. These "look alike" storm water discharge sources were not covered in the initial NPDES regulations for storm water due to the language used to define "associated with industrial activity." In the initial regulations for storm water, "industrial activity" is identified using Standard Industrial Classification (SIC) codes. The use of SIC codes led to incomplete categorization of industrial activities with discharges that needed to be regulated to protect water quality. Group B consisted of 18 industrial sectors, which included sources that EPA expected to contribute to storm water contamination due to the activities conducted and pollutants anticipated onsite (e.g., vehicle maintenance, machinery and electrical repair, and intensive agricultural activities).

EPA reported on the latter component of the section 402(p)(5) study via President Clinton's Clean Water Initiative, which was released on February 1, 1994 (U.S. Environmental Protection Agency, Office of Water. 1994. *President Clinton's Clean Water Initiative.* Washington, D.C. EPA 800–R–94–001) ("Initiative"). The Initiative addressed a number of issues associated with NPDES requirements for storm water discharges and proposed (1) establishing a phased compliance with a water quality standards approach for discharges from municipal separate storm sewer systems with priority on controlling discharges from municipal growth and development areas, (2) clarifying that the maximum extent practicable standard should be applied in a site-specific, flexible manner, taking into account cost considerations as well as water quality effects, (3) providing an exemption from the NPDES program for storm water discharges from industrial facilities with no activities or significant materials exposed to storm water, (4) providing extensions to the statutory deadlines to complete implementation of the NPDES program for the storm water program, (5) targeting urbanized areas for the requirements in the NPDES program for storm water, and (6) providing control of discharges from inactive and abandoned mines located on Federal lands in a more targeted, flexible manner. Additionally, prior to promulgation of today's rule, section 431 of the Agency's Appropriation Act for FY 2000 (Departments of Veterans Affairs and Housing and Urban Development and Independent Agencies Appropriations Act of 2000, Public Law 106–74, section 432 (1999)) directed EPA to report on certain matters to be covered in today's rule. That report supplements the study required by CWA Section 402(p)(5). EPA is publishing the availability of that report elsewhere in this issue of the **Federal Register**.

Several commenters asserted that the Report to Congress is an inadequate basis for the designation and regulation of sources covered under today's final rule, specifically the nationwide designation of small municipal separate storm sewer systems within urbanized areas and construction activities disturbing between one and five acres.

EPA believes that it has developed an adequate record for today's regulation both through the Report to Congress and the Clean Water Initiative and through more recent activities, including the FACA Subcommittee process, regulatory notices and evaluation of comments, and recent research and analysis. EPA does not interpret the congressional reporting requirements of CWA section 402(p)(5) to be the sole basis for determining sources to be regulated under today's final rule.

EPA's decision to designate on a national basis small MS4s in urbanized areas is supported by studies that clearly show a direct correlation between urbanization and adverse water quality impacts from storm water discharges. (Schueler, T. 1987. *Controlling Urban Runoff: A Practical Manual for Planning & Designing Urban BMPs.* Metropolitan Washington Council of Governments). "Urbanized areas"—within which all small MS4s would be covered—represent the most intensely developed and dense areas of the Nation. They constitute only two percent of the land area but 63 percent of the total population. See section I.B.1, Urban Development, above, for studies and assessments of the link between urban development and storm water impacts on water resources.

Commenters argued that the Report to Congress does not address storm water discharges from construction sites. They further argued that the designation of small construction sites per today's final rule goes beyond the President's 1994 Initiative because the Initiative only recommends requiring municipalities to implement a storm water management program to control unregulated storm water sources, "including discharges from construction of less than 5 acres, which are part of growth, development and significant redevelopment activities." They point out that the Initiative provides that unregulated storm water discharges not addressed through a municipal program would not be covered by the NPDES program. Commenters assert that EPA has not developed a record independent of its section 402(p)(5) studies that demonstrates the necessity of regulating under a separate NPDES permit storm water discharges from smaller construction sites "to protect water quality." EPA disagrees.

EPA evaluated the nature and extent of pollutants from construction site sources in a process that was separate and distinct from the development of the Report to Congress. Today's decision to regulate certain storm water discharges from construction sites disturbing less than 5 acres arose in part

out of the 9th Circuit remand in *NRDC v. EPA*, 966 F.2d 1292 (9th Cir. 1992). In that case, the court remanded portions of the Phase I storm water regulations related to discharges from construction sites. Those regulations define "storm water discharges associated with industrial activity" to include only those storm water discharges from construction sites disturbing 5 acres or more of total land area (see 40 CFR 122.26(b)(14)(x)). In its decision, the court concluded that the 5-acre threshold was improper because the Agency had failed to identify information "to support its perception that construction activities on less than 5 acres are non-industrial in nature" (966 F.2d at 1306). The court remanded the below 5 acre exemption to EPA for further proceedings (966 F.2d at 1310).

In a **Federal Register** notice issued on December 18, 1992, EPA noted that it did not believe that the Court's decision had the effect of automatically subjecting small construction sites to the existing application requirements and deadlines. EPA believed that additional notice and comment were necessary to clarify the status of these sites. The information received during the notice and comment process and additional research, as discussed in section I.B.3 Construction Site Runoff, formed the basis for the designation of construction activity disturbing between one and five acres on a nationwide basis. EPA's objectives in today's proposal include an effort to (1) address the 9th Circuit remand, (2) address water quality concerns associated with construction activities that disturb less than 5 acres of land, and (3) balance conflicting recommendations and concerns of stakeholders.

One commenter noted that EPA's proposal would fail to regulate industrial facilities identified as Group A and Group B in the March 1995 *Report to Congress*. EPA is relying on the analysis in the Report, which provided that the recommendation for coverage was meant as guidance and was not intended to be an identification of specific categories that must be regulated under Section 402(p)(6). *Report to Congress*, p. 4–1. The Report recognized the existence of limited data on which to base loadings estimates to support the nationwide designation of individual or categories of sources. *Report to Congress*, p. 4–44. Furthermore, during FACA Subcommittee discussion, EPA continued to urge stakeholders to provide further data relating to industrial and commercial storm water sources, which EPA did not receive. EPA concluded that, due to insufficient data, these sources were not appropriate for nationwide designation at this time.

E. Industrial Facilities Owned or Operated by Small Municipalities

Congress granted extensions to the NPDES permit application process for selected classes of storm water discharges associated with industrial activity. On December 18, 1991, Congress enacted the Intermodal Surface Transportation Efficiency Act (ISTEA), which postponed NPDES permit application deadlines for most storm water discharges associated with industrial activity at facilities that are owned or operated by small municipalities. EPA and States authorized to administer the NPDES program could not require any municipality with a population of less than 100,000 to apply for or obtain an NPDES permit for any storm water discharge associated with industrial activity prior to October 1, 1992, except for storm water discharges from airports, power plants, or uncontrolled sanitary landfills. See 40 CFR 122.26(e)(1); 57 FR 11524, April 2, 1992 (reservation of NPDES application deadlines for ISTEA facilities).

The facilities exempted by ISTEA discharge storm water in the same manner (and are expected to use identical processes and materials) as the industrial facilities regulated under the 1990 Phase I regulations. Accordingly, these facilities pose similar water quality problems. The extended moratorium for these facilities was necessary to allow municipalities additional time to comply with NPDES requirements. The proposal for today's rule would have maintained the existing deadline for seeking coverage under an NPDES permit (August 7, 2001).

Today's rule changes the permit application deadline for such municipally owned or operated facilities discharging industrial storm water to make it consistent with the application date for small regulated MS4s. Because EPA missed its March 1999 deadline for promulgating today's rule, and the deadline for MS4s to submit permit applications has been extended to three years and 90 days from the date of this notice, the deadline for permitting ISTEA sources has been similarly extended. The permitting of these sources is discussed below in section "II.I.3. ISTEA Sources."

F. Related Nonpoint Source Programs

Today's rule addresses point source discharges of storm water runoff and non-storm water discharges into MS4s. Many of these sources have been addressed by nonpoint source control programs, which are described briefly below.

In 1987, section 319 was added to the CWA to provide a framework for funding State and local efforts to address pollutants from nonpoint sources not addressed by the NPDES program. To obtain funding, States are required to submit Nonpoint Source Assessment Reports identifying State waters that, without additional control of nonpoint sources of pollution, could not reasonably be expected to attain or maintain applicable water quality standards or other goals and requirements of the CWA. States are also required to prepare and submit for EPA approval a statewide Nonpoint Source Management Program for controlling nonpoint source water pollution to navigable waters within the State and improving the quality of such waters. State program submittals must identify specific best management practices (BMPs) and measures that the State proposes to implement in the first four years after program submission to reduce pollutant loadings from identified nonpoint sources to levels required to achieve the stated water quality objectives.

State nonpoint source programs funded under section 319 can include both regulatory and nonregulatory State and local approaches. Section 319(b)(2)(B) specifies that a combination of "nonregulatory or regulatory programs for enforcement, technical assistance, financial assistance, education, training, technology transfer, and demonstration projects' may be used, as necessary, to achieve implementation of the BMPs or measures identified in the section 319 submittals.

Section 6217 of the Coastal Zone Act Reauthorization Amendments (CZARA) of 1990 provides that States with approved coastal zone management programs must develop coastal nonpoint pollution control programs and submit them to EPA and the National Oceanic and Atmospheric Administration (NOAA) for approval. Failure to submit an approvable program will result in a reduction of Federal grants under both the Coastal Zone Management Act and section 319 of the CWA.

State coastal nonpoint pollution control programs under CZARA must include enforceable policies and mechanisms that ensure implementation of the management measures throughout the coastal management area. *EPA issued Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters* under section 6217(g) in

January 1993. The guidance identifies management measures for five major categories of nonpoint source pollution. The management measures reflect the greatest degree of pollutant reduction that is economically achievable for each of the listed sources. These management measures provide reference standards for the States to use in developing or refining their coastal nonpoint programs. A few management measures, however, contain quantitative standards that specify pollutant loading reductions. For example, the New Development Management Measure, which is applicable to construction in urban areas, requires (1) that by design or performance the average annual total suspended solid loadings be reduced by 80 percent and (2) to the extent practicable, that the pre-development peak runoff rate and average volume be maintained.

EPA and NOAA published *Coastal Nonpoint Pollution Control Program: Program Development and Approval Guidance* (1993). The document clarifies that States generally must implement management measures for each source category identified in the EPA guidance developed under section 6217(g). Coastal Nonpoint Pollution Control Programs are not required to address sources that are clearly regulated under the NPDES program as point source discharges. Specifically, such programs would not need to address small MS4s and construction sites covered under NPDES storm water permits (both general and individual).

II. Description of Program

A. Overview

1. Objectives EPA Seeks To Achieve in Today's Rule

EPA seeks to achieve several objectives in today's final rule. First, EPA is implementing the requirement under CWA section 402(p)(6) to provide a comprehensive storm water program that designates and controls additional sources of storm water discharges to protect water quality. Second, EPA is addressing storm water discharges from the activities exempted under the 1990 storm water permit application regulations that were remanded by the Ninth Circuit Court of Appeals in NRDC v. EPA, 966 F.2d 1292 (9th Circuit, 1992). These are construction activities disturbing less than 5 acres and so-called "light" industrial activities not exposed to storm water (see discussion of "no exposure" below). Third, EPA is providing coverage for the so-called "donut holes" created by the existing NPDES storm water program. Donut holes are geographic gaps in the NPDES storm water program's regulatory scheme. They are MS4s located within areas covered by the existing NPDES storm water program, but not currently addressed by the storm water program because it is based on political jurisdictions. Finally, EPA also is trying to promote watershed planning as a framework for implementing water quality programs where possible.

Although EPA had options for different approaches (see alternatives discussed in the January 9, 1998, proposed regulation), EPA believes it can best achieve its objectives through flexible innovations within the framework of the NPDES program. Unlike the interim section 402(p)(6) storm water regulations EPA promulgated in 1995, EPA no longer designates all of the unregulated storm water discharges for nationwide coverage under the NPDES program for storm water. The framework for today's final rule is one that balances automatic designation on a nationwide basis and locally-based designation and waivers. Nationwide designation applies to those classes or categories of storm water discharges that EPA believes present a high likelihood of having adverse water quality impacts, regardless of location. Specifically, today's rule designates discharges from small MS4s located in urbanized areas and storm water discharges from construction activities that result in land disturbance equal to or greater than one and less than five acres. As noted under Section I.B., Water Quality Concerns/Environmental Impact Studies and Assessments, these two categories of storm water sources, when unregulated, tend to cause significant adverse water quality impacts. Additional sources are not covered on a nationwide basis either because EPA currently lacks information indicating a consistent potential for adverse water quality impact or because EPA believes that the likelihood of adverse impacts on water quality is low, with some localized exceptions. Additional individual sources or categories of storm water discharges could, however, be covered under the program through a local designation process. A permitting authority may designate additional small MS4s after developing designation criteria and applying those criteria to small MS4s located outside of an urbanized area, in particular those with a population of 10,000 or more and a population density of at least 1,000. Exhibit 1 illustrates the designation framework for today's final rule.

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EXHIBIT 1.—PHASE II SOURCE DECISIONS

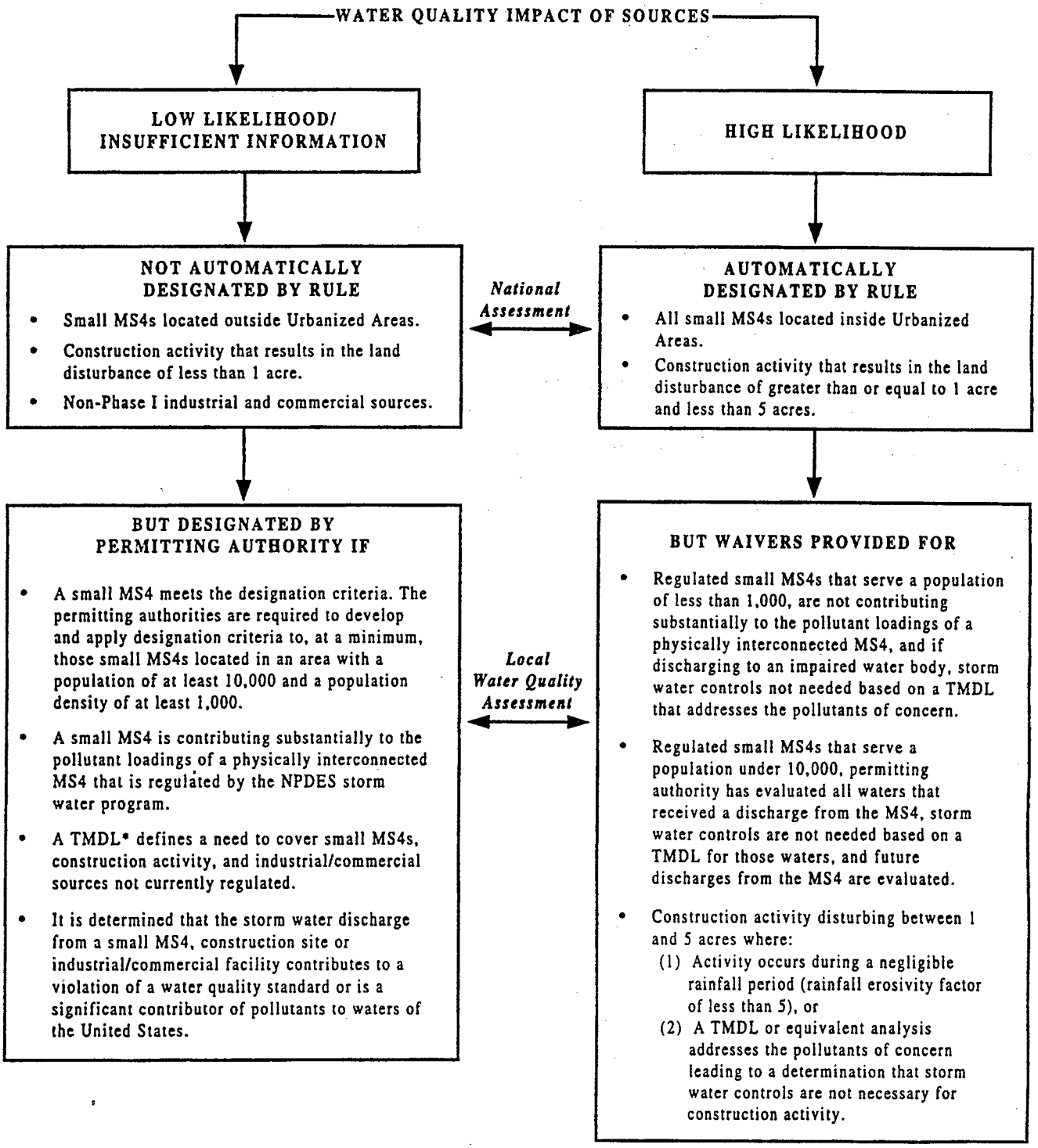

*EPA will continue to require States to comply with their Total Maximum Daily Load (TMDL) implementation schedules.

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The designation framework for today's final rule provides a significant degree of flexibility. The proposed provisions for nationwide designation of storm water discharges from construction and from small MS4s in urbanized areas allowed for a waiver of applicable requirements based on appropriate water quality conditions. Today's final rule expands and simplifies those waivers.

The permitting authority may waive the requirement for a permit for any small MS4 serving a jurisdiction with a population of less than 1,000 unless storm water controls are needed because the MS4 is contributing to a water quality impairment. The permitting authority may also waive permit coverage for MS4s serving a jurisdiction with a population of less than 10,000 if all waters that receive a discharge from the MS4 have been evaluated and discharges from the MS4 do not significantly contribute to a water quality impairment or have the potential to cause an impairment. Today's rule also allows States with a watershed permitting approach to phase in coverage for MS4s in jurisdictions with populations under 10,000.

Water quality conditions are also the basis for a waiver of requirements for storm water discharges from construction activities disturbing between one and five acres. For these small construction sources, the rule provides significant flexibility for waiving otherwise applicable regulatory requirements where a permitting authority determines, based on water quality and watershed considerations, that storm water discharge controls are not needed.

Coverage can be extended to municipal and construction sources outside the nationwide designated classes or categories based on watershed and case-by-case assessments. For the municipal storm water program, today's rule provides broad discretion to NPDES permitting authorities to develop and implement criteria for designating storm water discharges from small MS4s outside of urbanized areas. Other storm water discharges from unregulated industrial, commercial, and residential sources will not be subject to the NPDES permit requirements unless a permitting authority determines on a case-by-case basis (or on a categorical basis within identified geographic areas such as a State or watershed) that regulatory controls are needed to protect water quality. EPA believes that the flexibility provided in today's rule facilitates watershed planning.

2. General Requirements for Regulated Entities Under Today's Rule

As previously noted, today's final rule defines additional classes and categories of storm water discharges for coverage under the NPDES program. These designated dischargers are required to seek coverage under an NPDES permit. Furthermore, all NPDES-authorized States and Tribes are required to implement these provisions and make any necessary amendments to current State and Tribal NPDES regulations to ensure consistency with today's final rule. EPA remains the NPDES permitting authority for jurisdictions without NPDES authorization.

Today's final rule includes some new requirements for NPDES permitting authorities implementing the CWA section 402(p)(6) program. EPA has made a significant effort to build flexibility into the program while attempting to maintain an appropriate level of national consistency. Permitting authorities must ensure that NPDES permits issued to MS4s include the minimum control measures established under the program. Permitting authorities also have the ability to make numerous decisions including who is regulated under the program, i.e., case-by-case designations and waivers, and how responsibilities should be allocated between regulated entities.

Today's final rule extends the NPDES program to include discharges from the following: small MS4s within urbanized areas (with the exception of systems waived from the requirements by the NPDES permitting authority); other small MS4s meeting designation criteria to be established by the permitting authority; and any remaining MS4 that contributes substantially to the storm water pollutant loadings of a physically interconnected MS4 already subject to regulation under the NPDES program. Small MS4s include urban storm sewer systems owned by Tribes, States, political subdivisions of States, as well as the United States, and other systems located within an urbanized area that fall within the definition of an MS4. These include, for example, State departments of transportation (DOTs), public universities, and federal military bases.

Today's final rule requires all regulated small MS4s to develop and implement a storm water management program. Program components include, at a minimum, 6 minimum measures to address: public education and outreach; public involvement; illicit discharge detection and elimination; construction site runoff control; post-construction storm water management in new development and redevelopment; and pollution prevention and good housekeeping of municipal operations. These program components will be implemented through NPDES permits. A regulated small MS4 is required to submit to the NPDES permitting authority, either in its notice of intent (NOI) or individual permit application, the BMPs to be implemented and the measurable goals for each of the minimum control measures listed above.

The rule addresses all storm water discharges from construction site activities involving clearing, grading and excavating land equal to or greater than 1 acre and less than 5 acres, unless requirements are otherwise waived by the NPDES permitting authority. Discharges from such sites, as well as construction sites disturbing less than 1 acre of land that are designated by the permitting authority, are required to implement requirements set forth in the NPDES permit, which may reference the requirements of a qualifying local program issued to cover such discharges.

The rule also addresses certain other sources regulated under the existing NPDES program for storm water. For municipally-owned industrial sources required to be regulated under the existing NPDES storm water program but exempted from immediate compliance by the Intermodal Surface Transportation Act of 1991 (ISTEA), the rule revises the existing deadline for seeking coverage under an NPDES permit (August 7, 2001) to make it consistent with the application date for small regulated MS4s. (See section I.3. below.) The rule also provides relief from NPDES storm water permitting requirements for industrial sources with no exposure of industrial materials and activities to storm water.

3. Integration of Today's Rule With the Existing Storm Water Program

In developing an approach for today's final rule, numerous early interested stakeholders encouraged EPA to seek opportunities to integrate, where possible, the proposed Phase II requirements with existing Phase I requirements, thus facilitating a unified storm water discharge control program. EPA believes that this objective is met by using the NPDES framework. This framework is already applied to regulated storm water discharge sources and is extended to those sources designated under today's rule. This approach facilitates program consistency, public access to information, and program oversight.

EPA believes that today's final rule provides consistency in terms of program coverage and requirements for existing and newly designated sources. For example, the rule includes most of the municipal donut holes, those MS4s located in incorporated places, townships or towns with a population under 100,000 that are within Phase I counties. These MS4s are not addressed by the existing NPDES storm water program while MS4s in the surrounding county are currently addressed. In addition, the minimum control measures required in today's rule for regulated small MS4s are very similar to a number of the permit requirements for medium and large MS4s under the existing storm water program. Following today's rule, permit requirements for all regulated MS4s (both those under the existing program and those under today's rule) will require implementation of BMPs. Furthermore, with regard to the development of NPDES permits to protect water quality, EPA intends to apply the August 1, 1996, *Interim Permitting Approach for Water Quality-Based Effluent Limitations in Storm Water Permits* (hereinafter, "Interim Permitting Approach") (see Section II.L.1. for further description) to all MS4s covered by the NPDES program.

EPA is applying NPDES permit requirements to construction sites below 5 acres that are similar to the existing requirements for those above 5 acres and above. In addition, today's rule allows compliance with qualifying local, Tribal, or State erosion and sediment controls to meet the erosion and sediment control requirements of the general permits for storm water discharges associated with construction, both above and below 5 acres.

4. General Permits

EPA recommends using general permits for all newly regulated storm water sources under today's rule. The use of general permits, instead of individual permits, reduces the administrative burden on permitting authorities, while also limiting the paperwork burden on regulated parties seeking permit authorization. Permitting authorities may, of course, require individual permits in some cases to address specific concerns, including permit non-compliance.

EPA recommends that general permits for MS4s, in particular, be issued on a watershed basis, but recognizes that each permitting authority must decide how to develop its general permit(s). Permit conditions developed to address concerns and conditions of a specific watershed could reflect a watershed plan; such permit conditions must provide for attainment of applicable water quality standards (including designated uses), allocations of pollutant loads established by a TMDL, and timing requirements for implementation of a TMDL. If the permitting authority issues a State-wide general permit, the permitting authority may include separate conditions tailored to individual watersheds or urbanized areas. Of course, for a newly regulated MS4, modification of an existing individual MS4 permit to include the newly regulated MS4 as a "limited co-permittee" also remains an option.

5. Tool Box

During the FACA process, many Storm Water Phase II FACA Subcommittee representatives expressed an interest, which was endorsed by the full Committee, in having EPA develop a "tool box" to assist States, Tribes, municipalities, and other parties involved in the Phase II program. EPA made a commitment to work with Storm Water Phase II FACA Subcommittee representatives in developing such a tool box, with the expectation that a tool box would facilitate implementation of the storm water program in an effective and cost-efficient manner. EPA has developed a preliminary working tool box (available on EPA's web page at www.epa.gov/owm/sw/toolbox). EPA intends to have the tool box fully developed by the time of the first general permits. EPA also intends to update the tool box as resources and data become available. The tool box will include the following eight main components: fact sheets; guidances; a menu of BMPs for the six MS4 minimum measures; an information clearinghouse; training and outreach efforts; technical research; support for demonstration projects; and compliance monitoring/assistance tools. EPA intends to issue the menu of BMPs, both structural and non-structural, by October 2000. In addition, EPA will issue by October 2000 a "model" permit and will issue by October 2001 guidance materials on the development of measurable goals for municipal programs.

In an attempt to avoid duplication, the Agency has undertaken an effort to identify and coordinate sources of information that relate to the storm water discharge control program from both inside and outside the Agency. Such information includes research and demonstration projects, grants, storm water management-related programs, and compendiums of available documents, including guidances, related directly or indirectly to the comprehensive NPDES storm water program. Based on this effort, EPA is developing a tool box containing fact sheets and guidance documents pertaining to the overall program and rule requirements (e.g., guidance on municipal and construction programs, and permitting authority guidance on designation and waiver criteria); models of current programs aimed at assisting States, Tribes, municipalities, and others in establishing programs; a comprehensive list of reference documents organized according to subject area (e.g., illicit discharges, watersheds, water quality standards attainment, funding sources, and similar types of references); educational materials; technical research data; and demonstration project results. The information collected by EPA will not only provide the background for tool box materials, but will also be made available through an information clearinghouse on the world wide web.

With assistance from EPA, the American Public Works Association (APWA) developed a workbook and series of workshops on the proposed Phase II rule. Ten workshops were held from September 1998 through May 1999. Depending on available funding, these workshops may continue after publication of today's final rule. EPA also intends to provide training to enable regional offices to educate States, Tribes, and municipalities about the storm water program and the availability of the tool box materials.

The CWA currently provides funding mechanisms to support activities related to storm water. These mechanisms will be described in the tool box. Activities funded under grant and loan programs, which could be used to assist in storm water program development, include programs in the nonpoint source area, storm water demonstration projects, source water protection and wastewater construction projects. EPA has already provided funding for numerous research efforts in these areas, including a database of BMP effectiveness studies (described below), an assessment of technologies for storm water management, a study of the effectiveness of storm water BMPs for controlling the impacts of watershed imperviousness, protocols for wet weather monitoring, development of a dynamic model for wet weather flows, and numerous outreach projects.

EPA has entered into a cooperative agreement with the Urban Water Resources Research Council of the American Society of Civil Engineers (ASCE) to develop a scientifically-based management tool for the information

needed to evaluate the effectiveness of urban storm water runoff BMPs nationwide. The long-term goal of the National Stormwater BMP Database project is to promote technical design improvements for BMPs and to better match their selection and design to the local storm water problems being addressed. The project team has collected and evaluated hundreds of existing published BMP performance studies and created a database covering about 75 test sites. The database includes detailed information on the design of each BMP and its watershed characteristics, as well as its performance. Eventually the database will include the nationwide collection of information on the characteristics of structural and non-structural BMPs, data collection efforts (*e.g.*, sampling and flow gaging equipment), climatological characteristics, watershed characteristics, hydrologic data, and constituent data. The database will continue to grow as new BMP data become available. The initial release of the database, which includes data entry and retrieval software, is available on CD–ROM and operates on Windows®-compatible personal computers. The ASCE project team envisions that periodic updates to the database will be distributed through the Internet. The team is currently developing a system for Internet retrieval of selected database records, and this system is expected to be available in early 2000.

EPA and ASCE invite BMP designers, owners and operators to participate in the continuing database development effort. To make this effort successful, a large database is essential. Interested persons are encouraged to submit their BMP performance evaluation data and associated BMP watershed characteristics for potential entry into the database. The software included in the CD-ROM allows data providers to enter their BMP data locally, retain and edit the data as needed, and submit them to the ASCE Database Clearinghouse when ready.

To obtain a copy of the database, please contact Jane Clary, Database Clearinghouse Manager, Wright Water Engineers, Inc., 2490 W. 26th Ave., Suite 100A, Denver, CO 80211; Phone 303–480–1700; E-mail clary@wrightwater.com.

In addition, EPA requests that researchers planning to conduct BMP performance evaluations compile and collect BMP reporting information according to the standard format developed by ASCE. The format is provided with the database software and is also available on the ASCE website at www.asce.org/peta/tech/nsbd01.html.

6. Deadlines Established in Today's Action

Exhibit 2 outlines the various deadlines established under today's final rule. EPA believes that the dates allow sufficient time for completion of both the NPDES permitting authority's and the permittee's program responsibilities.

EXHIBIT 2–STORM WATER PHASE II ACTIONS DEADLINES

Activity	Deadline date
NPDES-authorized States modify NPDES program if no statutory change is required.	1 year from date of publication of today's rule in the **Federal Register.**
NPDES-authorized States modify NPDES program if statutory change is required.	2 years from date of publication of today's rule in the **Federal Register.**
EPA issues a menu of BMPs for regulated small MS4s	October 27, 2000
ISTEA sources submit permit application	3 years and 90 days from date of publication of today's rule in the **Federal Register.**
Permitting authority issues general permit(s) (if this type of permit coverage is selected).	3 years from date of publication of today's rule in the **Federal Register.**
Regulated small MS4s submit permit application:	
a. If designated under § 122.32(a)(1) unless the permitting authority has established a phasing schedule under § 123.35(d)(3).	a. 3 years and 90 days from date of publication of today's rule in the **Federal Register.**
b. If designated under § 122.32(a)(2) or §§ 122.26(a)(9)(i) (C) or (D).	b. Within 180 days of notice.
Storm water discharges associated with small construction activity submit permit application:	
a. If designated under § 122.26(b)(15)(i)	a. 3 years and 90 days from date of publication of today's rule in the **Federal Register**
b. If designated under § 122.26(b)(15)(ii)	b. Within 180 days of notice.
Permitting authority designates small MS4s under § 123.35(b)(2)	3 years from date of publication of today's rule in the **Federal Register** or 5 years from date of publication of today's rule in the **Federal Register** if a watershed plan is in place
Regulated small MS4s' program fully developed and implemented	Up to 5 years from date of permit issuance.
Reevaluation of the municipal storm water rules by EPA	13 years from date of publication of today's rule in the **Federal Register**
Permitting authority determination on a petition	Within 180 days of receipt.
Non-municipal sources designated under § 122.26(a)(9)(i) (C) or (D) submit permit application.	Within 180 days of notice.
Submission of No Exposure Certification	Every 5 years.

B. Readable Regulations

Today, EPA is finalizing new regulations in a "readable regulation" format. This reader-friendly, plain language approach is a departure from traditional regulatory language and should enhance the rule's readability. These plain language regulations use questions and answers, "you" to identify the person who must comply, and terms like "must" rather than "shall" to identify a mandate. This new format, which minimizes layers of subparagraphs, should also allow the reader to easily locate specific provisions of the regulation.

Some sections of today's final rule are presented in the traditional language and format because these sections amend existing regulations. The readable regulation format was not used in these existing provisions in an attempt to avoid confusion or disruption

of the readability of the existing regulations.

Most commenters supported EPA's use of plain language and agreed with EPA that the question and answer format makes the rule easier to understand. Three commenters thought that EPA should retain the traditional rule format. The June 1, 1998, Presidential memorandum directs all government agencies to write documents in plain language. Based on the majority of the comments, EPA has retained the plain language format used in the January 9, 1998, proposal in today's final rule.

The proposal to today's final rule included guidance as well as legal requirements. The word "must" indicates a requirement. Words like "should," "could," or "encourage" indicate a recommendation or guidance. In addition, the guidance was set off in parentheses to distinguish it from requirements.

EPA received numerous comments supporting the inclusion of guidance in the text of the Code of Federal Regulations (CFR), as well as comments opposing inclusion of guidance. Supporters stated that preambles and guidance documents are often not accessible when rules are implemented. Any language not included in the CFR is therefore not available when it may be most needed. Commenters that opposed including guidance in the CFR expressed the concern that any language in the rule might be interpreted as a requirement, in spite of any clarifying language. They suggested that guidance be presented in the preamble and additional guidance documents.

The majority of commenters on this issue thought that the guidance should be retained but the distinction between requirements and guidance should be better clarified. Suggestions included clarifying text, symbols, and a change from use of the word "should" to "EPA recommends" or "EPA suggests". EPA believes that it is important to include the guidance in the rule and agrees that the distinction between requirements and EPA recommendations must be very clear. In today's final rule, EPA has put the guidance in paragraphs entitled "Guidance" and replaced the word "should" with "EPA recommends." This is intended to clarify that the recommendations contained in the guidance paragraphs are not legally binding.

C. Program Framework: NPDES Approach

Today's rule regulates Phase II sources using the NPDES permit program. EPA interprets Clean Water Act section 402(p)(6) as authorizing the Agency to develop a storm water program for Phase II sources either as part of the existing NPDES permit program or as a stand alone non-NPDES program such as a self-implementing rule. Under either approach, EPA interprets section 402(p)(6) as directing EPA to publish regulations that "regulate" the remaining unregulated sources, specifically to establish requirements that are federally enforceable under the CWA. Although EPA believes that it has the discretion to not require sources regulated under CWA section 402(p)(6) to be covered by NPDES permits, the Agency has determined, for the reasons discussed below, that it is most appropriate to use NPDES permits in implementing the program to address the sources designated for regulation in today's rule.

As discussed in Section II.A, Overview, EPA sought to achieve certain goals in today's final rule. EPA believes that the NPDES program best achieves EPA's goals for today's final rule for the reasons discussed below.

Requiring Phase II sources to be covered by NPDES permits helps address the consistency problems currently caused by municipal "donut holes." Donut holes are gaps in program coverage where a small unregulated MS4 is located next to or within a regulated larger MS4 that is subject to an NPDES permit under the Phase I NPDES storm water program. The existence of such "donut holes" creates an equity problem because similar discharges may remain unregulated even though they cause or contribute to the same adverse water quality impacts. Using NPDES permits to regulate the unregulated discharges in these areas is intended to facilitate the development of a seamless regulatory program for the mitigation and control of contaminated storm water discharges in an urbanized area. For example, today's rule allows a newly regulated MS4 to join as a "limited" co-permittee with a regulated MS4 by referencing a common storm water management program. Such cooperation should be further encouraged by the fact that the minimum control measures required in today's rule for regulated small MS4s are very similar to a number of the permit requirements for medium and large MS4s under the Phase I storm water program. The minimum control measures applicable to discharges from smaller MS4s are described with slightly more generality than under the Phase I permit application regulations for larger MS4s, thus enabling maximum flexibility for operators of smaller MS4s to optimize efforts to protect water quality.

Today's rule also applies NPDES permit requirements to construction sites below 5 acres that are similar to the existing requirements for those 5 acres and above. In addition, the rule would allow compliance with qualifying local, Tribal, or State erosion and sediment controls to meet the erosion and sediment control requirements of the general permits for storm water discharges associated with construction, both above and below 5 acres.

Incorporating the CWA section 402(p)(6) program into the NPDES program capitalizes upon the existing governmental infrastructure for administration of the NPDES program. Moreover, much of the regulated community already understands the NPDES program and the way it works.

Another goal of the NPDES program approach is to provide flexibility in order to facilitate and promote watershed planning and sensitivity to local conditions. NPDES permits promote those goals in several ways. NPDES general permits may be used to cover a category of regulated sources on a watershed basis or within political boundaries. The NPDES permitting process provides a mechanism for storm water controls tailored on a case-by-case basis, where necessary. In addition, the NPDES permit requirements of a permittee may be satisfied by another cooperating entity. Finally, NPDES permits may incorporate the requirements of existing State, Tribal and local programs, thereby accommodating State and Tribes seeking to coordinate the storm water program with other programs, including those that focus on watershed-based nonpoint source regulation.

In promoting the watershed approach to program administration, EPA believes NPDES general permits can cover a category of dischargers within a defined geographic area. Areas can be defined very broadly to include political boundaries (e.g., county), watershed boundaries, or State or Tribal land.

NPDES permits generally require an application or a notice of intent(NOI) to trigger coverage. This information exchange assures communication between the permitting authority and the regulated community. This communication is critical in ensuring that the regulated community is aware of the requirements and the permitting authority is aware of the potential for adverse impacts to water quality from identifiable locations. The NPDES permitting process includes the public as a valuable stakeholder and ensures

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that the public is included and information is made publicly available.

Another concern for EPA and several stakeholders was that the program ensure citizen participation. The NPDES approach ensures opportunities for citizen participation throughout the permit issuance process, as well as in enforcement actions. NPDES permits are also federally enforceable under the CWA.

EPA believes that the use of NPDES permits makes a significant difference in the degree of compliance with regulations in the storm water program. The NPDES program provides for public participation in the development, enforcement and revision of storm water management programs. Citizen suit enforcement has assisted in focusing attention on adverse water quality impacts on a localized, public priority basis. Citizens frequently rely on the NPDES permitting process and the availability of NOIs to track program implementation and help them enforce regulatory requirements.

NPDES permits are also advantageous to the permittee. The NPDES permit informs the permittee about the scope of what it is expected do to be in compliance with the Clean Water Act. As explained more fully in EPA's April 1995 guidance, *Policy Statement on Scope of Discharge Authorization and Shield Associated with NPDES Permits*, compliance with an NPDES permit constitutes compliance with the Clean Water Act (see CWA section 402(k)). In addition, NPDES permittees are excluded from duplicative regulatory regimes under the Resource Conservation and Recovery Act and the Comprehensive Emergency Response, Compensation and Liability Act under RCRA's exclusions to the definition of "solid waste" and CERCLA's exemption for "federally permitted releases."

EPA considered suggestions that the Agency authorize today's rule to be implemented as a self-implementing rule. This would be a regulation promulgated at the Federal, State, or Tribal level to control some or all of the storm water dischargers regulated under today's rule. Under this approach, a rule would spell out the specific requirements for dischargers and impose the restrictions and conditions that would otherwise be contained in an NPDES permit. It would be effective until modified by EPA, a State, or a Tribe, unlike an NPDES permit which cannot exceed a duration of five years. Some stakeholders believed that this approach would reduce the burden on the regulated community (e.g., by not requiring permit applications), and considerably reduce the amount of additional paperwork, staff time and accounting required to administer the proposed permit requirements.

EPA is sensitive to the interest of some stakeholders in having a streamlined program that minimizes the burden associated with permit administration and maximizes opportunities for field time spent by regulatory authorities. Key provisions in today's rule address some of these concerns by promoting a streamlined approach to permit issuance by, for example, using general permits and allowing the incorporation of existing programs. By adopting the NPDES approach rather than a self-implementing rule, today's rule also allows for consistent regulation between larger MS4s and construction sites regulated under the existing storm water management rule and smaller sources regulated under today's rule.

EPA believes that it is most appropriate to use NPDES permits to implement a program to address the sources regulated by today's rule. In addition to the reasons discussed above, NPDES permits provide a better mechanism than would a self-implementing rule for tailoring storm water controls on a case-by-case basis, where necessary. One commenter reasoned this concern could be addressed by including provisions in the regulation that allow site-specific BMPs (*i.e.*, case-by-case permits), suggesting storm water discharges that might require site-specific BMPs can be identified during the designation process of the regulatory authority. EPA believes that, in addition to its complexity, the commenter's approach lacks the other advantages of the NPDES permitting process.

A self-implementing rule would not ensure the degree of public participation that the NPDES permit process provides for the development, enforcement and revision of the storm water management program. A self-implementing rule also might not have provided the regulated community the "permit shield" under CWA section 402(k) that is provided by an NPDES permit. Based on all these considerations, EPA declined to adopt a self-implementing rule approach and adopted the NPDES approach.

Some State representatives sought alternative approaches for State implementation of the storm water program for Phase II sources. These State representatives asserted that a non-NPDES alternative approach best facilitated watershed management and avoided duplication and overlapping regulations. These representatives believed the NPDES approach would undercut State programs that had developed storm water controls tailored to local watershed concerns. Finally, a number of commenters expressed the view that States implement a variety of programs not based on the CWA that are effective in controlling storm water, and that EPA should provide incentives for their implementation and improvement in performance.

Throughout the development of the rule, State representatives sought alternatives to the NPDES approach for State implementation of the storm water program for Phase II sources. Discussions focused on an approach whereby States could develop an alternative program that EPA would approve or disapprove based on identified criteria, including that the alternative non-NPDES program would result in "equivalent or better protection of water quality." The State representatives, however, were unable to propose or recommend criteria for gauging whether a program would provide equivalent protection. EPA also did not receive any suggestions for objective, workable criteria in response to the Agency's explicit request for specific criteria (by which EPA could objectively judge such programs) in the preamble to the proposed rule.

EPA evaluated several existing State initiatives to address storm water and found many cases where standards under State programs may be coordinated with the Federal storm water program. Where the NPDES permit is developed in coordination with State standards, there are opportunities to avoid duplication and overlapping requirements. Under today's rule, an NPDES permitting authority may include conditions in the NPDES permit that direct an MS4 to follow the requirements imposed under State standards, rather than the requirements of § 122.34(b). This is allowed as long as the State program at a minimum imposes the relevant requirements of § 122.34(b). Additional opportunities follow from other provisions in today's rule.

Seeking to further explore the feasibility of a non-NPDES approach, the Agency, after the proposal, had extensive discussions with representatives of a number of States. Discussions related specifically to possible alternatives for regulations of urban storm water discharges and MS4s specifically. The Agency also sought input on these issues from other stakeholders.

As a result of these discussions, many of the commenters provided input on issues such as: whether or not the Agency should require NPDES permits; whether location of MS4s in urbanized

areas should be the basis for designation or whether designation should be based on other determinations relating to water quality; whether States should be allowed to satisfy the conditions of the rule through the use of existing State programs; and issues concerning timing and resources for program implementation.

In response, today's rule still follows the regulatory scheme of the proposed rule, but incorporates additional flexibility to address some of the concerns raised by commenters.

In order to facilitate implementation by States that utilize a watershed permitting approach or similar approach (*i.e.*, based on a State's unified watershed assessments), today's rule allows States to phase in coverage for MS4s in jurisdictions with a population less than 10,000. Under such an approach, States could focus their resources on a rolling basis to assist smaller MS4s in developing storm water programs.

In addition, in response to concerns that the rule should not require permit coverage for MS4s that do not significantly contribute to water quality impairments, today's rule provides options for two waivers for small MS4s. The rule allows permitting authorities to exempt from the requirement for a permit any MS4 serving a jurisdiction with a population less than 1,000, unless the State determines that the MS4 must implement storm water controls because it is significantly contributing to a water quality impairment. A second waiver option applies to MS4s serving a jurisdiction with a population less than 10,000. For those MS4s, the State must determine that discharges from the MS4 do not significantly contribute to a water quality impairment, or have the potential for such an impairment, in order to provide the exemption. The State must review this waiver on a periodic basis no less frequently than once every five years.

Throughout the development of today's rule, commenters questioned whether the Clean Water Act authorized the use of the NPDES permit program, pointing out that the text of CWA 402(p)(6) does not use the word "permit." Based on the absence of the word "permit" and the express mention of State storm water management programs, the commenters asserted that Congress did not intend for Phase II sources to be regulated using NPDES permits.

EPA disagrees with the commenters' interpretation of section 402(p)(6). Section 402(p)(6) does not preclude use of permits as part of the "comprehensive program" to regulate designated sources. The language provides EPA with broad discretion in the establishment of the "comprehensive program." Absence of the word "permit" (a term that the statute does not otherwise define) does not preclude use of a permit, which is a familiar and reasonably well understood regulatory implementation vehicle. First, section 402(p)(6) says that EPA must establish a comprehensive program that "shall, at a minimum, establish priorities, establish requirements for State stormwater management programs, and establish expeditious deadlines." The "at a minimum" language suggests that the Agency may, and perhaps should, develop a comprehensive program that does more than merely attend to these minimum criteria. Use of the term "at a minimum" preserves for the Agency broad discretion to establish a comprehensive program that includes use of NPDES permits.

Further, in the final sentence of the section, Congress included additional language to affirm the Agency's discretion. The final sentence clarifies that the Phase II program "may include performance standards, guidelines, guidance, and management practices and treatment requirements, as appropriate." Under existing CWA programs, performance standards, (effluent limitations) guidelines, management practices, and treatment requirements are typically implemented through NPDES or dredge and fill permits.

Although EPA believes that it had the discretion to not require permits, the Agency has determined that it is reasonable to interpret section 402(p)(6) to authorize permits. Moreover, for the reasons discussed above, the Agency believes that it is appropriate to use NPDES permits in implementing today's rule.

D. Federal Role

Today's final rule describes EPA's approach to expand the existing storm water program under CWA section 402(p)(6). As in all other Federal programs, the Federal government plays an integral role in complying with, developing, implementing, overseeing, and enforcing the program. This section describes EPA's role in the revised storm water program.

1. Develop Overall Framework of the Program

The storm water discharge control program under CWA section 402(p)(6) consists of the rule, tool box, and permits. EPA's primary role is to ensure timely development and implementation of all components. Today's rule is a refinement of the first step in developing the program. EPA is fully committed to continuing to work with involved stakeholders on developing the tool box and issuing permits. As noted in today's rule, EPA will assess the municipal storm water program based on (1) evaluations of data from the NPDES municipal storm water program, (2) research concerning water quality impacts on receiving waters from storm water, and (3) research on BMP effectiveness. (Section II.H, Municipal Role, provides a more detailed discussion of this provision.)

EPA is planning to standardize minimum requirements for construction and post-construction BMPs in a new rulemaking under Title III of the CWA. While larger construction sites are already subject to NPDES permits (and smaller sites will be subject to permits pursuant to today's rule), the permits generally do not contain specific requirements for BMP design or performance. The permits require the preparation of storm water pollution prevention plans, but actual BMP selection and design is at the discretion of permittees, in conformance with applicable State and local requirements. Where there are existing State and local requirements specific to BMPs, they vary widely, and many jurisdictions do not have such requirements.

In developing these regulations, EPA intends to evaluate the inclusion of design and maintenance criteria as minimum requirements for a variety of BMPs used for erosion and sediment control at construction sites, as well as for permanent BMPs used to manage post-construction storm water discharges. The Agency plans to consider the merits and performance of all appropriate management practices (both structural and non-structural) that can be used to reduce adverse water quality impacts. EPA does not intend to require the use of particular BMPs at specific sites, but plans to assist builders and developers in BMP selection by publishing data on the performance to be expected by various BMP types. EPA would like to build upon the successes of some of the effective State and local storm water programs currently in place around the country, and to establish nation-wide criteria to support builders and local jurisdictions in appropriate BMP selection.

2. Encourage Consideration of Smart Growth Approaches

In the proposal, EPA invited comment on possible approaches for providing

incentives for local decision making that would limit the adverse impacts of growth and development on water quality. EPA asked for comments on this "smart growth" approach.

EPA received comments on all sides of this issue. A number of commenters supported the idea of "smart growth" incentives but did not present concrete ideas. Several commenters suggested "smart growth" criteria. States that have adopted "smart growth" laws were worried that EPA's focus on urbanized areas for municipal requirements could encourage development outside of designated growth areas. Today's final rule clearly allows States to expand coverage of their municipal storm water program outside of urbanized areas. In addition, the flexibility of the six municipal minimum measures should avoid encouragement of development into rural rather than urban areas. For example, as part of the post-construction minimum measure, EPA recommends that municipalities consider policies and ordinances that encourage infill development in higher density urban areas, and areas with existing infrastructure, in order to meet the measure's intent.

EPA also received several comments expressing concern that incorporating "smart growth" incentives threatened the autonomy of local governments. One commenter was worried that "incentives" could become more onerous than the minimum measures. EPA is very aware of municipal concerns about possible federal interference with local land use planning. EPA is also cognizant of the difficulty surrounding incentives for "smart growth" activities due to these concerns. However, the Agency believes it has addressed these concerns by proposing a flexible approach and will continue to support the concept of "smart growth" by encouraging policies that limit the adverse impacts of growth and development on water quality.

3. Provide Financial Assistance

Although Congress has not established a fund to fully finance implementation of the proposed extension of the existing NPDES storm water program under CWA section 402(p)(6), numerous federal financing programs (administered by EPA and other federal agencies) can provide some financial assistance. The primary funding mechanism is the Clean Water State Revolving Fund (SRF) program, which provides sources of low-cost financing for a range of water quality infrastructure projects, including storm water. In addition to the SRF, federal financial assistance programs include the Water Quality Cooperative Agreements under CWA section 104(b)(3), Water Pollution Control Program grants to States under CWA section 106, and the Transportation Equity Act for the 21st Century (TEA-21) among others. In addition, Section 319 funds may be used to fund any urban storm water activities that are not specifically required by a draft or final NPDES permit. EPA will develop a list of potential funding sources as part of the tool box implementation effort. EPA anticipates that some of these programs will provide funds to help develop and, in limited circumstances, implement the CWA section 402(p)(6) storm water discharge control program.

EPA received numerous comments that requested additional funding. Congress provided one substantial new source of potential funding for transportation related storm water projects—TEA-21. The Department of Transportation has included a number of water-related provisions in its TEA-21 planning. These include Transportation Enhancements, Environmental Restoration and Pollution Abatement, and Environmental Streamlining. More information on TEA-21 is available at the following internet sites: www.fhwa.dot.gov/tea21/outreach.htm and www.tea21.org.

4. Implement the Program in Jurisdictions Not Authorized To Administer the NPDES Program

Because today's final rule uses the NPDES framework, EPA will be the NPDES permitting authority in several States, Tribal jurisdictions, and Territories. As such, EPA will have the same responsibilities as any other NPDES permitting authority—issuing permits, designating additional sources, and taking appropriate enforcement actions—and will seek to tailor the storm water discharge control program to the specific needs in that State, Tribal jurisdiction, or Territory. EPA also plans to provide support and oversight, including outreach, training, and technical assistance to the regulated communities. Section II.G. of today's preamble provides a separate discussion related to the NPDES permitting authority's responsibilities for today's final rule.

5. Oversee State and Tribal Programs

Under the NPDES program, EPA plays an oversight role for NPDES-approved States and Tribes. In this role, EPA and the State or Tribe work together to implement, enforce, and improve the NPDES program. Part of this oversight role includes working with States and Tribes to modify their programs where programmatic or implementation concerns impede program effectiveness. This role will be vitally important when States and Tribes make adjustments to develop, implement, and enforce today's extension of the existing NPDES storm water discharge control program. In addition, States maintain a continuing planning process (CPP) under CWA section 303(e), which EPA periodically reviews to assess the program's achievements.

In its oversight role, EPA takes action to address States and Tribes who have obtained NPDES authorization but are not fulfilling their obligations under the NPDES program. If an NPDES-authorized State or Tribe fails to implement an adequate NPDES storm water program, for example, EPA typically enters into extensive discussions to resolve outstanding issues. EPA has the authority to withdraw the entire NPDES program when resolution cannot be reached. Partial program withdrawal is not provided for under the CWA except for partial approvals.

EPA is also working with the States and Tribes to improve nonpoint source management programs and assessments to incorporate key program elements. Key nonpoint source program elements include setting short and long term goals and objectives; establishing public and private partnerships; using a balanced approach incorporating Statewide and watershed-wide abatement of existing impairments; preventing future impairments; developing processes to address both impaired and threatened waters; reviewing and upgrading all program components, including program revisions on a 5-year cycle; addressing federal land management and activities inconsistent with State programs; and managing State nonpoint source management programs effectively.

In particular, EPA works with the States and Tribes to strengthen their nonpoint source pollution programs to address all significant nonpoint sources, including agricultural sources, through the CWA section 319 program. EPA is working with other government agencies, as well as with community groups, to effect voluntary changes regarding watershed protection and reduced nonpoint source pollution.

In addition, EPA and NOAA have published programmatic and technical guidance to address coastal nonpoint source pollution. Under Section 6217 of the CZARA, States are developing and implementing coastal nonpoint pollution control programs approved by EPA and NOAA.

6. Comply With Applicable Requirements as a Discharger

Today's final rule covers federally operated facilities in a variety of ways. These facilities are generally areas where people reside, such as a federal prison, hospital, or military base. It also includes federal parkways and road systems with separate storm sewer systems. Today's rule requires federal MS4s to comply with the same application deadlines that apply to regulated small MS4s generally. EPA believes that all federal MS4s serve populations of less than 100,000.

EPA received several comments that asked if individual buildings like post offices are considered to be small MS4s and thereby regulated in today's rule if they are in an urbanized area. Most of these buildings have at most a parking lot with runoff or a storm sewer that connects with a municipality's MS4. EPA does not intend that individual federal buildings be considered to be small MS4s. This is discussed in section II.H.2.b. of today's preamble.

Federal facilities can also be included under requirements addressing storm water discharges associated with small construction activities. In any case, discharges from these facilities will need to comply with all applicable NPDES requirements and any additional water quality-related requirements imposed by a State, Tribal, or local government. Failure to comply can result in enforcement actions. Federal facilities can act as models for municipal and private sector facilities and implement or test state-of-the-art management practices and control measures.

E. State Role

Today's final rule sets forth an NPDES approach for implementing the extension of the existing storm water discharge control program under CWA section 402(p)(6). State assumption of the NPDES program is voluntary, consistent with the principles of federalism. Because most States are approved to implement the NPDES program, they will tailor their storm water discharge control programs to address their water quality needs and objectives. While today's rule establishes the basic framework for the section 402(p)(6) program, States as well as Tribes (see discussion in section II.F) have an important role in fine-tuning the program to address the water quality issues within their jurisdictions. The basic framework allows for adjustments based on factors that vary geographically, including climate patterns and terrain.

Where States do not have NPDES authority, they are not required to implement the storm water discharge control program, but they may still participate in water quality protection through participation in the CWA section 401 certification process (for any permits) and through development of water quality standards and TMDLs.

1. Develop the Program

In expanding the existing NPDES program for storm water discharges, States must evaluate whether revisions to their NPDES programs are necessary. If so, modifications must be made in accordance with § 123.62. Under § 123.62, States must revise their NPDES programs within 1 year, or within 2 years if statutory changes are necessary.

Some States and departments of transportation (DOTs) commented that this timeframe is too short, anticipating that the State legislative process and the modification of regulations combined would take beyond 2 years. The deadline language in § 123.62 is not new language for the storm water discharge control program; it applies to all NPDES programs. EPA believes the vast majority of States will meet the deadline and will work with States in those cases where there may be difficulty meeting this deadline due to the timing of legislative sessions and the regulatory development process.

An authorized State NPDES program must meet the requirements of CWA section 402(b) and conform to the guidelines issued under CWA section 304(i)(2). Today's final rule under § 123.25 adds specific cross references to the storm water discharge control program components to ensure that States adequately address these requirements.

2. Comply With Applicable Requirements as a Discharger

Today's final rule covers State operated separate storm sewer systems in a variety of ways. These systems generally drain areas where people reside, such as a prison, hospital, or other populated facility. These systems are included under the definition of a regulated small MS4, which specifically identifies systems operated by State departments of transportation. Alternatively, storm water discharges from State activities may be regulated under the section addressing storm water discharges associated with small construction activities. In any case, discharges from these facilities must comply with all applicable NPDES requirements. Failure to comply can result in enforcement actions. State facilities can act as models for municipal and private sector facilities and implement or test state-of-the-art management practices and control measures.

3. Communicate With EPA

Under approved NPDES programs, States have an ongoing obligation to share information with EPA. This dialogue is particularly important in the CWA section 402(p)(6) storm water program where these governments continue to develop a great deal of the guidance and outreach related to water quality.

F. Tribal Role

The proposal to today's final rule provides background information on EPA's 1984 Indian Policy and the criteria for treatment of an Indian Tribe in the same manner as a State. Today's final rule extends the existing NPDES program for storm water discharges to two types of dischargers located in Indian country. First, the final rule designates storm water discharges from any regulated small MS4, including Tribal systems. Second, the final rule regulates discharges associated with construction activity disturbing between one and five acres of land, including sites located in Indian country. Operators in each of these categories of regulated activity must apply for coverage under an NPDES permit by 3 years and 90 days from the date of publication of today's final rule. Under existing regulations, however, EPA or an authorized NPDES Tribe may require a specified storm water discharger to apply for NPDES permit coverage before this deadline based on a determination that the discharge is contributing to a violation of a water quality standard (including designated uses) or is a significant contributor of pollutants.

Under today's rule, a Tribal governmental entity may regulate storm water discharges on its reservation in two ways—as either an NPDES-authorized Tribe or as a regulated MS4. If a Tribe is authorized to operate the NPDES program, the Tribe must implement today's final rule for the NPDES program for storm water for covered dischargers located within the EPA recognized boundaries. Otherwise, EPA is generally the permitting/program authority within Indian country. Discussions about the State Role in the preceding section also apply to NPDES authorized Tribes. For additional information on the role and responsibilities of the permitting authority in the NPDES storm water program, see § 123.35 (and Section II.G. of today's preamble) and § 123.25(a).

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Under today's final rule, if the Indian reservation is located entirely or partially within an "urbanized area," as defined in § 122.32(a)(1), the Tribe must obtain an NPDES permit if it operates a small MS4 within the urbanized area portion. Tribal MS4s located outside an urbanized area are not automatically covered, but may be designated by EPA pursuant to § 122.32(a)(2) of today's rule or may request designation as a regulated small MS4 from EPA. A Tribe that is a regulated MS4 for NPDES program purposes is required to implement the six minimum control measures to the extent allowable under Federal law.

The Tribal representative on the Storm Water Phase II FACA Subcommittee asked EPA to provide a list of the Tribes located in urbanized areas that would fall within the NPDES storm water program under today's final rule. In December 1996, EPA developed a list of federally recognized American Indian Areas located wholly or partially in Bureau of the Census-designated urbanized areas (see Appendix 1). Appendix 1 not only provides a listing of reservations and individual Tribes, but also the name of the particular urbanized area in which the reservation is located and an indication of whether the urbanized area contains a medium or large MS4 that is already covered by the existing Phase I regulations.

Some of the Tribes listed in Appendix 1 are only partially located in an urbanized area. If the Tribe's MS4 serves less than 1,000 people within an urbanized area, the permitting authority may waive the Tribe's MS4 storm water requirements if it meets the conditions of § 122.32(c). EPA does not have information on the Tribal populations within the urbanized areas, so it can not identify the Tribes that are eligible for a waiver. Therefore, a Tribe that believes it qualifies for a waiver should contact its permitting authority.

G. NPDES Permitting Authority's Role for the NPDES Storm Water Small MS4 Program

As noted previously, the NPDES permitting authority can be EPA or an authorized State or an authorized Tribe. The following discussion describes the role of the NPDES permitting authority under today's final rule.

1. Comply With Implementation Requirements

NPDES permitting authorities must perform certain duties to implement the NPDES storm water municipal program. Section 123.35(a) of today's final rule emphasizes that permitting authorities have existing obligations under the NPDES program. Section 123.35 focuses on specific issues related to the role of the NPDES authority to support administration and implementation of the municipal storm water program under CWA section 402(p)(6).

2. Designate Sources

Section 123.35(b) of today's final rule addresses the requirements for the NPDES permitting authority to designate sources of storm water discharges to be regulated under §§ 122.32 through 122.36. NPDES permitting authorities must develop a process, as well as criteria, to designate small MS4s. They must also have the authority to designate a small MS4 if and when circumstances that support a waiver under § 122.32(c) change. EPA may make designations if an NPDES-approved State or Tribe fails to do so.

NPDES permitting authorities must examine geographic jurisdictions that they believe should be included in the storm water discharge control program but are not located in an "urbanized area". Small MS4s in these areas are not designated automatically. Discharges from such areas should be brought into the program if found to have actual or potential exceedances of water quality standards, including impairment of designated uses, or other adverse impacts on water quality, as determined by local conditions or watershed and TMDL assessments. EPA's aim is to address discharges to impaired waters and to protect waters with the potential for problems. EPA encourages NPDES permitting authorities, local governments, and the interested public to work together in the context of a watershed plan to address water quality issues, including those associated with municipal storm water runoff.

EPA received comments stating that the process of developing criteria and applying it to all MS4s outside an urbanized area serving a population of 10,000 or greater and with a density of 1,000 people per square mile is too time-consuming and resource-intensive. These commenters believe that the permitting authority should decide which MS4s must be brought into the storm water discharge control program and that population and density should not be an overriding criteria. One suggested way of doing so was to only designate MS4s with demonstrated contributions to the impairment of water quality uses as shown by a TMDL. EPA disagrees with this suggestion. The TMDL process is time-consuming. MS4s outside of urbanized areas may cause water quality problems long before a TMDL is completed.

EPA believes that permitting authorities should consider the potential water quality impacts of storm water from all jurisdictions with a population of 10,000 or greater and a density of 1,000 people per square mile. EPA is using data summarized in the NURP study and in the CWA section 305(b) reports to support this approach for targeted designation outside of urbanized areas. EPA is not mandating which criteria are to be used, but has provided examples of criteria that may be useful in evaluating potential water quality impacts. EPA believes that the flexibility provided in this section of today's final rule allows the permitting authority to develop criteria and a designation process that is easy to use and protects water quality. Therefore, the provisions of § 123.35(b) remain as proposed.

a. Develop Designation Criteria

Under § 123.35(b), the NPDES permitting authority must establish designation criteria to evaluate whether a storm water discharge results in or has the potential to result in exceedances of water quality standards, including impairment of designated uses, or other significant water quality impacts, including adverse habitat and biological impacts.

EPA recommends that NPDES permitting authorities consider, in a balanced manner, certain locally-focused criteria for designating any MS4 located outside of an urbanized area on the basis of significant water quality impacts. EPA recommends consideration of criteria such as discharge to sensitive waters, high growth or growth potential, high population density, contiguity to an urbanized area, significant contribution of pollutants to waters of the United States, and ineffective control of water quality concerns by other programs. These suggested designation criteria are intended to help encourage the permitting authority to use an objective method for identifying and designating, on a local basis, sources that adversely impact water quality. More information about these criteria and the reasons why they are suggested by EPA is included in the January 9, 1998, proposal (63 FR 1561) for today's final rule.

The suggested criteria are meant to be taken in the aggregate, with a great deal of flexibility as to how each should be weighed in order to best account for watershed and other local conditions and to allow for a more tailored case-by-case analysis. The application of criteria is meant to be geographically specific. Furthermore, each criterion does not have to be met in order for a small MS4

to qualify for designation, nor should an MS4 necessarily be designated on the basis of one or two criteria alone.

EPA believes that the application of the recommended designation criteria provides an objective indicator of real and potential water quality impacts from urban runoff on both the local and watershed levels. EPA encourages the application of the recommended criteria in a watershed context, thereby allowing for the evaluation of the water quality impacts of the portions of a watershed outside of an urbanized area. For example, situations exist where the urbanized area represents a small portion of a degraded watershed, and the adjacent nonurbanized areas of the watershed have significant cumulative effects on the quality of the receiving waters.

EPA received numerous suggestions of additional criteria that should be added and reasons why some of the criteria in the proposal to today's final rule were not appropriate. EPA developed its suggested designation criteria based on findings of the NURP study and other studies that indicate pollutants of concern, including total suspended solids, chemical oxygen demand, and temperature. These criteria were the subject of considerable discussion by the Storm Water Phase II FACA Subcommittee. EPA developed them in response to recommendations from the subcommittee during development of the proposed rule. The listed criteria are only suggestions. Permitting authorities are required to develop their own criteria. EPA has not found any reason to change its suggested list of criteria and the suggestions remain as proposed.

b. Apply Designation Criteria

After customizing the designation criteria for local conditions, the permitting authority must apply such criteria, at a minimum, to any MS4 located outside of an urbanized area serving a jurisdiction with a population of at least 10,000 and a population density of 1,000 people per square mile or greater (see § 123.35(b)(2)). If the NPDES permitting authority determines that an MS4 meets the criteria, the permitting authority must designate it as a regulated small MS4. This designation must occur within 3 years of publication of today's final rule. Alternatively, the NPDES authority can designate within 5 years from the date of final regulation if the designation criteria are applied on a watershed basis where a comprehensive watershed plan exists (a comprehensive watershed plan is one that includes the equivalents of TMDLs) (see § 123.35(b)(3)). The extended 5 year deadline is intended to provide incentives for watershed-based designations. If an NPDES-authorized State or Tribe does not develop and apply designation criteria within this timeframe, then EPA has the opportunity to do so in lieu of the authorized State or Tribe.

NPDES permitting authorities can designate any small MS4, including one below 10,000 in population and 1,000 in density. EPA established the 10,000/1,000 threshold based on the likelihood of adverse water quality impacts at these population and density levels. In addition, the 1,000 persons per square mile threshold is consistent with both the Bureau of the Census definition of an "urbanized area" (see Section II.H.2. below) and stakeholder discussions concerning the definition of a regulated small MS4.

One commenter requested that EPA develop interim deadlines for development of designation criteria. EPA believes that the designation deadline identified in today's final rule at § 123.35(b)(3) provides States and Tribes with a flexibility that allows them to develop and apply the criteria locally in a timely fashion, while at the same time establishing an expeditious deadline.

c. Designate Physically Interconnected Small MS4s

In addition to applying criteria on a local basis for potential designation, the NPDES permitting authority must designate any MS4 that contributes substantially to the pollutant loadings of a physically interconnected municipal separate storm sewer that is regulated by the NPDES program for storm water discharges (see § 123.35(b)(4)). To be "physically interconnected," the MS4 of one entity, including roads with drainage systems and municipal streets, is physically connected directly to the municipal separate storm sewer of another entity. This provision applies to all MS4s located outside of an urbanized area. EPA added this section in recognition of the concerns of local government stakeholders that a local government should not have to shoulder total responsibility for a storm water program when storm water discharges from another MS4 are also contributing pollutants or adversely affecting water quality. This provision also helps to provide some consistency among MS4 programs and to facilitate watershed planning in the implementation of the NPDES storm water program. EPA recommended physical interconnectedness in the existing NPDES storm water regulations as a factor for consideration in the designation of additional sources.

Today's final rule does not include interim deadlines for identifying physically interconnected MS4s. However, consistent with the deadlines identified in § 123.35(b)(3) of today's final rule, EPA encourages the permitting authority to make these determinations within 3 years from the date of publication of the final rule or within 5 years if the permitting authority is implementing a comprehensive watershed plan. Alternatively, the affected jurisdiction could use the petition process under 40 CFR 122.26(f) in seeking to have the permitting authority designate the contributing jurisdiction.

Several commenters expressed concerns about who could be designated under this provision (§ 123.35(b)(4)). One commenter requested that the word "substantially" be deleted from the rule because they believe any MS4 that contributes at all to a physically interconnected municipal separate storm sewer should be regulated. EPA believes that the word "substantially" provides necessary flexibility to the permitting authorities. The permitting authority can decide if an MS4 is contributing discharges to another municipal separate storm sewer in a manner that requires regulation. If the operator of a regulated municipal separate storm sewer believes that some of its pollutant loadings are coming from an unregulated MS4, it can petition the permitting authority to designate the unregulated MS4 for regulation.

d. Respond to Public Petitions for Designation

Today's final rule reiterates the existing opportunity for the public to petition the permitting authority for designation of a point source to be regulated to protect water quality. The petition opportunity also appears in existing NPDES regulations at 40 CFR 122.26(f). Any person may petition the permitting authority to require an NPDES permit for a discharge composed entirely of storm water that contributes to a violation of a water quality standard or is a significant contributor of pollutants to the waters of the United States (see § 123.32(b)). The NPDES permitting authority must make a final determination on any petition within 180 days after receiving the petition (see § 123.35(c)). EPA believes that a 180 day limit balances the public's need for a timely final determination with the NPDES permitting authority's need to prioritize its workload. If an NPDES-approved State or Tribe fails to act

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within the 180-day timeframe, EPA may make a determination on the petition. EPA believes that public involvement is an important component of the NPDES program for storm water and feels that this provision encourages public participation. Section II.K, Public Involvement/Public Role, further discusses this topic.

3. Provide Waivers

Today's rule provides two opportunities for the NPDES permitting authority to exempt certain small MS4s from the need for a permit based on water quality considerations. See §§ 122.32(d) and (e). The two waiver opportunities have different size thresholds and take different approaches to considering the water quality impacts of discharges from the MS4.

In the proposal, EPA requested comment on the option of waiving coverage for all MS4s with less than 1,000 people unless the permitting authority determined that the small MS4 should be regulated based on significant adverse water quality impacts. A number of commenters supported this option. They expressed concern that compliance with the rule requirements and certification of one of the waiver provisions were both costly for very small communities. They stated that the permitting authority should identify a water quality problem before requiring compliance. Today's rule essentially adopts this alternative approach for MS4s serving a population under 1,000.

The final rule has expanded the waiver provision that EPA proposed for small MS4s with a population less than 1,000. The proposed rule would have required a small MS4 operator to certify that storm water controls are not needed based on either wasteload allocations that are part of TMDLs that address the pollutants of concern, or a comprehensive watershed plan implemented for the waterbody that includes the equivalents of TMDLs and addresses the pollutant(s) of concern. Commenters noted that the proposed waivers would be unattainable if a TMDL or equivalent analysis was required for every pollutant that could possibly be present in any amount in discharges from an MS4 regardless of whether the pollutant is causing water quality impairment. Commenters asked that EPA identify what constitutes the "pollutant(s) of concern" for which a TMDL or its equivalent must be developed. For example, § 122.30(c) indicates that the MS4 program is intended to control "sediment, suspended solids, nutrients, heavy metals, pathogens, toxins, oxygen-demanding substances, and floatables." Commenters asked whether TMDLs or equivalent analyses have to address all of these.

EPA has revised the proposed waiver in response to these concerns. Under today's rule, NPDES permitting authorities may waive the requirements of today's rule for any small MS4 with a population less than 1,000 that does not contribute substantially to the pollutant loadings of a physically interconnected MS4, unless the small MS4 discharges pollutants that have been identified as a cause of impairment of the waters to which the small MS4 discharges. If the small MS4 does discharge pollutants that have been identified as impairing the water body into which the small MS4 discharges, the NPDES permitting authority may grant a waiver only if it determines that storm water controls are not needed based on an EPA approved or established TMDL that addresses the pollutant(s) of concern.

Unlike the proposed rule, § 122.32(d) does not allow the waiver for MS4s serving a population under 1,000 to be based on "the equivalent of a TMDL." Because § 122.32(d) requires a pollutant specific analysis only for a pollutant that has been identified as a cause of impairment, a TMDL is required for such pollutant before the waiver may be granted. Once a pollutant has been identified as the cause of impairment of a water body, the State should develop a TMDL for that pollutant for that water body. Thus, § 122.32(d) takes a different approach than that taken for the waiver in § 122.32(e) for MS4s serving a population under 10,000, which can be based upon an analysis that is "the equivalent of a TMDL." This is because § 122.32(d) requires an analysis to support the waiver for MS4s under 1,000 only if a waterbody to which the MS4 discharges has been identified as impaired. The § 122.32(e) waiver, on the other hand, would be available for larger MS4s but only after the State affirmatively establishes lack of impairment based upon a comprehensive analysis of smaller urban waters that might not otherwise be evaluated for the purposes of CWA section 303. Since § 122.32(e) requires the analysis of waters that have not been identified as impaired, an actual TMDL is not required and an analysis that is the equivalent of a TMDL can suffice to support the waiver.

Where a State is the NPDES permitting authority, the permitting authority is responsible for the development of the TMDLs as well as the assessment of the extent to which a small MS4's discharge contributes pollutants to a neighboring regulated system. In States where EPA is the permitting authority, EPA will use a State's TMDLs to determine whether storm water controls are required for the small MS4s.

The proposed rule would have required the operator of the small MS4 serving a population under 1,000 to certify that its discharge was covered under a TMDL that indicated that discharges from its particular system were not having an adverse impact on water quality (*i.e.*, it was either not assigned wasteload allocations under TMDLs or its discharge is within an assigned allocation). Many commenters expressed concerns that MS4 operators serving less than 1,000 persons may lack the technical capacity to certify that their discharges are not contributing to adverse water quality impacts. These commenters thought that the permitting authority should make such a certification. Today's rule provides flexibility as to how the waiver is administered. Permitting authorities are ultimately responsible for granting the waiver, but are free to determine whether or not to require small MS4 operators that are seeking waivers to submit information or a written certification.

Under § 122.32(e) a State may grant a waiver to an MS4 serving a population between 1,000 and 10,000 only if the State has made a comprehensive effort to ensure that the MS4 will not cause or contribute to water quality impairment. To grant a § 122.32(e) waiver, the NPDES permitting authority must evaluate all waters of the U.S. that receive a discharge from the MS4 and determine that storm water controls are not needed. The permitting authority's evaluation must be based on wasteload allocations that are part of an EPA approved or established TMDL or, if a TMDL has not been developed or approved, an equivalent analysis that determines sources and allocations for the pollutant(s) of concern. The pollutants of concern that the permitting authority must evaluate include biochemical oxygen demand (BOD), sediment or a parameter that addresses sediment (such as total suspended solids, turbidity or siltation), pathogens, oil and grease, and any other pollutant that has been identified as a cause of impairment of any water body that will receive a discharge from the MS4. Finally, the permitting authority must have determined that future discharges from the MS4 do not have the potential to result in exceedances of water quality standards, including impairment of designated uses, or other significant

water quality impacts, including habitat and biological impacts.

Although EPA did not propose this specific approach, the Agency did request comment on whether to increase the proposed 1,000 population threshold for a waiver. The § 122.32(e) waiver was developed in response to comments, including States' concerns that they needed greater flexibility to focus their efforts on MS4s that were causing water quality impairment. Several commenters thought that the threshold should be increased from 1,000 to 5,000 or 10,000. Others suggested additional ways of qualifying for a waiver for MS4s that discharge to waters that are not covered by a TMDL or watershed plan. EPA carefully considered all the options for expanding the waiver provisions and has decided to expand the waiver only in the very narrow circumstances described above where a comprehensive analysis has been undertaken to demonstrate that the MS4 is not causing water quality impairment.

The NPDES permitting authority can, at any time, mandate compliance with program requirements from a previously waived small MS4 if circumstances change. For example, a waiver can be withdrawn in circumstances where the permitting authority later determines that a waived small MS4's storm water discharge to a small stream will cause adverse impacts to water quality or significantly interfere with attainment of water quality standards. A "change in circumstances" could involve receipt of new information. Changed circumstances can also allow a regulated small MS4 operator to request a waiver at any time.

Some commenters expressed concerns about allowing any small MS4 waivers. One commenter stated that storm water pollution prevention plans are necessary to control storm water pollution and should be required from all regulated small MS4s. For the reasons stated in the Background section above, EPA agrees that the discharges from most MS4s in urbanized areas should be addressed by a storm water management program outlined in today's rule. For MS4s serving very small areas, however, the TMDL development process provides an opportunity to determine whether an MS4 serving a population less than 1,000 is having a negative impact on any receiving water that is impaired by a pollutant that the MS4 discharges. MS4s serving populations up to 10,000 may receive a waiver only if a comprehensive analysis of its impact on receiving water has been performed.

Other commenters said that waivers should not be allowed for small MS4s that discharge into another regulated MS4. These commenters stated that the word "substantially" should be removed from § 122.32(d)(i) so that a waiver would not be allowed for any system "contributing to the storm water pollutant loadings of a physically interconnected regulated MS4." As previously mentioned under the designation discussion of section II.G.2.c, EPA believes that the word "substantially" provides needed flexibility to the permitting authorities. It is important to note that this is only one aspect that the permitting authority must consider when deciding on the appropriateness of a waiver.

4. Issue Permits

NPDES permitting authorities have a number of responsibilities regarding the permit process. Sections 123.35(d) through (g) ensure a certain level of consistency for permits, yet provide numerous opportunities for flexibility. NPDES permitting authorities must issue NPDES permits to cover municipal sources to be regulated under § 122.32, unless waived under § 122.32(c). EPA encourages permitting authorities to use general permits as the vehicle for permitting and regulating small MS4s. The Agency notes, however, that some operators may wish to take advantage of the option to join as a co-permittee with an MS4 regulated under the existing NPDES storm water program.

Today's final rule includes a provision, § 123.35(f), that requires NPDES permitting authorities to either include the requirements in § 122.34 for NPDES permits issued for regulated small MS4s or to develop permit limits based on a permit application submitted by a small MS4. See Section II.H.3.a, Minimum Control Measures, for more details on the actual § 122.34 requirements. See Section II.H.3.c for alternative and joint permitting options.

In an attempt to avoid duplication of effort, § 122.34(c) allows NPDES permitting authorities to include permit conditions that direct an MS4 to meet the requirements of a qualifying local, Tribal, or State municipal storm water management program. For a local, Tribal, or State program to "qualify," it must impose, at a minimum, the relevant requirements of § 122.34(b). A regulated small MS4 must still follow the procedural requirements for an NPDES permit (*i.e.*, submit an application, either an individual application or an NOI under a general permit) but will instead follow the substantive pollutant control requirements of the qualifying local, Tribal, or State program.

Under § 122.35(b), NPDES permitting authorities may also recognize existing responsibilities among governmental entities for the minimum control measures in an NPDES small MS4 storm water permit. For example, the permit might acknowledge the existence of a State administered program that addresses construction site runoff and require that the municipalities only develop substantive controls for the remaining minimum control measures. By acknowledging existing programs, this provision is meant to reduce the duplication of efforts and to increase the flexibility of the NPDES storm water program.

Section 123.35(e) of today's final rule requires permitting authorities to specify a time period of up to 5 years from the issuance date of an NPDES permit for regulated small MS4 operators to fully develop and implement their storm water programs. As discussed more fully below, permitting authorities should be providing extensive support to the local governments to assist them in developing and implementing their programs.

In the proposed rule, EPA stated that the permitting authority would develop the menu of BMPs and if they failed to do so, EPA would develop the menu. Commenters felt that EPA should develop a menu of BMPs, rather than just providing guidance. In the settlement agreement for seeking an extension to the deadline for issuing today's rule, EPA committed to developing a menu of BMPs by October 27, 2000. Permitting authorities can adopt EPA's menu or develop their own. The menu itself is not intended to replace more comprehensive BMP guidance materials. As part of the tool box efforts, EPA will provide separate guidance documents that discuss the results from EPA-sponsored nationwide studies on the design, operation and maintenance of BMPs. Additionally, EPA expects that the new rulemaking on construction BMPs may provide more specific design, operation and maintenance criteria.

5. Support and Oversee the Local Programs

NPDES permitting authorities are responsible for supporting and overseeing the local municipal programs. Section 123.35(h) of today's final rule highlights issues associated with these responsibilities.

To the extent possible, NPDES permitting authorities should provide financial assistance to MS4s, which

often have limited resources, for the development and implementation of local programs. EPA recognizes that funding for programs at the State and Tribal levels may also be limited, but strongly encourages States and Tribes to provide whatever assistance is possible. In lieu of actual dollars, NPDES permitting authorities can provide cost-cutting assistance in a number of ways. For example, NPDES permitting authorities can develop outreach materials for MS4s to distribute or the NPDES permitting authority can actually distribute the materials. Another option is to implement an erosion and sediment control program across an entire State (or Tribal land), thus alleviating the need for the MS4 to implement its own program. The NPDES permitting authority must balance the need for site-specific controls, which are best handled by a local MS4, with its ability to offer financial assistance. EPA, States, Tribes, and MS4s should work as a team in making these kinds of decisions.

NPDES permitting authorities are responsible for overseeing the local programs. Permitting authorities should work with the regulated community and other stakeholders to assist in local program development and implementation. This might include sharing information, analyzing reports, and taking enforcement actions, as necessary. NPDES permitting authorities play a vital role in supporting local programs by providing technical and programmatic assistance, conducting research projects, and monitoring watersheds. The NPDES permitting authority can also assist the MS4 permittee in obtaining adequate legal authority at the local level in order to implement the local component of the CWA section 402(p)(6) program.

NPDES permitting authorities are encouraged to coordinate and utilize the data collected under several programs. States and Tribes address point and nonpoint source storm water discharges through a variety of programs. In developing programs to carry out CWA section 402(p)(6), EPA recommends that States and Tribes coordinate all of their water pollution evaluation and control programs, including the continuing planning process under CWA section 303(e), the existing NPDES program, the CZARA program, and nonpoint source pollution control programs.

In addition, NPDES permitting authorities are encouraged to provide a brief (*e.g.*, two-page) reporting format to facilitate compilation and analysis of data from reports submitted under § 122.34(g)(3). EPA intends to develop a model form for this purpose.

H. Municipal Role

1. Scope of Today's Rule

Today's final rule attempts to establish an equitable and comprehensive four-pronged approach for the designation of municipal sources. First, the approach defines for automatic coverage the municipal systems believed to be of highest threat to water quality. Second, the approach designates municipal systems that meet a set of objective criteria used to measure the potential for water quality impacts. Third, the approach designates on a case-by-case basis municipal systems that "contribute substantially to the pollutant loadings of a physically-interconnected [regulated] MS4." Finally, the approach designates on a case-by-case basis, upon petition, municipal systems that "contribute to a violation of a water quality standard or are a significant contributor of pollutants."

Today's final rule automatically designates for regulation small MS4s located in urbanized areas, and requires that NPDES permitting authorities examine for potential designation, at a minimum, a particular subset of small MS4s located outside of urbanized areas. Today's rule also includes provisions that allow for waivers from the otherwise applicable requirements for the smallest MS4s that are not causing impairment of a receiving water body. Qualifications for the waivers vary depending on whether the MS4 serves a population under 1,000 or a population under 10,000. See §§ 122.32(d) and (e). These waivers are discussed further in section II.G.3. Any small MS4 automatically designated by the final rule or designated by the permitting authority under today's final rule is defined as a "regulated" small MS4 unless it receives a waiver.

In today's final rule, all regulated small MS4s must establish a storm water discharge control program that meets the requirements of six minimum control measures. These minimum control measures are public education and outreach on storm water impacts, public involvement participation, illicit discharge detection and elimination, construction site storm water runoff control, post-construction storm water management in new development and redevelopment, and pollution prevention/good housekeeping for municipal operations.

Today's rule allows for a great deal of flexibility in how an operator of a regulated small MS4 is authorized to discharge under an NPDES permit, by providing various options for obtaining permit coverage and satisfying the required minimum control measures. For example, the NPDES permitting authority can incorporate by reference qualifying State, Tribal, or local programs in an NPDES general permit and can recognize existing responsibilities among different governmental entities for the implementation of minimum control measures. In addition, a regulated small MS4 can participate in the storm water management program of an adjoining regulated MS4 and can arrange to have another governmental entity implement a minimum control measure on their behalf.

2. Municipal Definitions

a. Municipal Separate Storm Sewer Systems (MS4s)

The CWA does not define the term "municipal separate storm sewer." EPA defined municipal separate storm sewer in the existing storm water permit application regulations to mean, in part, a conveyance or system of conveyances (including roads with drainage systems and municipal streets) that is "owned or operated by a State, city, town borough, county, parish, district, association, or other public body * * * designed or used for collecting or conveying storm water which is not a combined sewer and which is not part of a Publicly Owned Treatment Works as defined at 40 CFR 122.2" (see § 122.26(b)(8)(i)). Section 122.26 contains definitions of medium and large municipal separate storm sewer systems but no definition of a municipal separate storm sewer *system*, even though the term MS4 is commonly used. In today's rule, EPA is adding a definition of municipal separate storm sewer system and small municipal separate storm sewer system along with the abbreviations MS4 and small MS4.

The existing municipal permit application regulations define "medium" and "large" MS4s as those located in an incorporated place or county with a population of at least 100,000 (medium) or 250,000 (large) as determined by the latest Decennial Census (see §§ 122.26(b)(4) and 122.26(b)(7)). In today's final rule, these regulations have been revised to define all medium and large MS4s as those meeting the above population thresholds according to the 1990 Decennial Census.

Today's rule also corrects the titles and contents of Appendices F, G, H,& I to Part 122. EPA is adding those incorporated places and counties whose 1990 population caused them to be defined as a "medium" or "large" MS4. All of these MS4s have applied for

permit coverage so the effect of this change to the appendices is simply to make them more accurate. They will not need to be revised again because today's rule "freezes" the definition of "medium" and "large" MS4s at those that qualify based on the 1990 census.

EPA received several comments supporting and opposing the proposal to "freeze" the definitions based on the 1990 census. Commenters who disagreed with EPA's position cited the unfairness of municipalities that reach the medium or large threshold at a later date having fewer permitting requirements compared to those that were already at the population thresholds when the existing storm water regulations took effect. EPA recognizes this disparity but does not believe it is unfair, as explained in the proposed rule. The decision was based on the fact that the deadlines from the existing regulations have lapsed, and because the permitting authority can always require more from operators of MS4s serving "newly over 100,000" populations.

b. Small Municipal Separate Storm Sewer Systems

The proposal to today's final rule added "the United States" as a potential owner or operator of a municipal separate storm sewer. This addition was intended to address an omission from existing regulations and to clarify that federal facilities are, in fact, covered by the NPDES program for municipal storm water discharges when the federal facility is like other regulated MS4s. EPA received a comment that this change would cause federal facilities located in Phase 1 areas to be considered Phase 1 dischargers due to the definition of medium and large MS4s. All MS4s located in Phase 1 cities or counties are defined as Phase 1 medium or large MS4s. EPA believes that all federal facilities serve a population of under 100,000 and should be regulated as small MS4s. Therefore, in § 122.26(a)(16) of today's final rule, EPA is adding federal facilities to the NPDES storm water discharge control program by changing the proposed definition of small municipal separate storm sewer system. Paragraph (i) of this section restates the definition of municipal separate storm sewer with the addition of "the United States" as a owner or operator of a small municipal separate storm sewer. Paragraph (ii) repeats the proposed language that states that a small MS4 is a municipal separate storm sewer that is not medium or large.

Most commenters agreed that federal facilities should be covered in the same way as other similar MS4s. However, EPA received several comments asking whether individual federal buildings such as post offices or urban offices of the U.S. Park Service must apply for coverage as regulated small MS4s. Most of these buildings have, at most, a parking lot with runoff or a storm sewer that connects with a municipality's MS4. In § 122.26(a)(16)(iii), EPA clarifies that the definition of small MS4 does not include individual buildings. These buildings may have a municipal separate storm sewer but they do not have a "system" of conveyances. The minimum measures for small MS4s were written to apply to storm sewer "systems" providing storm water drainage service to human populations and not to individual buildings. This is true of municipal separate storm sewers from State buildings as well as from federal buildings.

There will likely be situations where the permitting authority must decide if a federal or State complex should be regulated as a small MS4. A federal complex of two or three buildings could be treated as a single building and not be required to apply for coverage. In these situations, permitting authorities will have to use their best judgment as to the nature of the complex and its storm water conveyance system. Permitting authorities should also consider whether the federal or State complex cooperates with its municipality's efforts to implement their storm water management program.

Along with the questions about individual buildings, EPA received many questions about how various provisions of the rule should be interpreted for federal and State facilities. EPA acknowledges that federal and State facilities are different from municipalities. EPA believes, however, that the minimum measures are flexible enough that they can be implemented by these facilities. As an example, DOD commenters asked about how to interpret the term "public" for military installations when implementing the public education measure. EPA agrees with the suggested interpretation of "public" for DOD facilities as "the resident and employee population within the fence line of the facility."

EPA also received many comments from State departments of transportation (DOTs) that suggested the ways in which they are different from municipalities and should therefore be regulated differently. Storm water discharges from State DOTs in Phase 1 areas should already be regulated under Phase I. The preamble to Phase 1 clearly states that "all systems within a geographical area including highways and flood control districts will be covered." Many permitting authorities regulated State DOTs as co-permittees with the Phase 1 municipality in which the highway is located. State DOTs that are already regulated under Phase I are not required to comply with Phase II. State DOTs that are not already regulated have various options for meeting the requirements of today's rule. These options are discussed in Section II.H.3.c.iv below. Several DOTs commented that some of the minimum measures are outside the scope of their mission or that they do not have the legal authority required for implementation. EPA believes that the flexibility of the minimum measures allows them to be implemented by most MS4s, including DOTs. When a DOT does not have the necessary legal authority, EPA encourages the DOT to coordinate their storm water management efforts with the surrounding municipalities and other State agencies. Under today's rule, DOTs can use any of the options of § 122.35 to share their storm water management responsibilities. DOTs may also want to work with their permitting authority to develop a State-wide DOT storm water permit.

There are many storm water discharges from State DOTs and other State MS4s located in Phase 1 areas that were not regulated under Phase 1. Today's rule adds many more State facilities as well as all federal facilities located in urbanized areas. All of these State and federal facilities that fit the definition of a small MS4 must be covered by a storm water management program. The individual permitting authorities must decide what type of permit is most applicable.

The existing NPDES storm water program already regulates storm water from federally or State-operated industrial sources. Federal or State facilities that are currently regulated due to their industrial discharges may already be implementing some of today's rule requirements.

EPA received comments that questioned the apparent inconsistency between regulating a federal facility such as a hospital and not regulating a similar private facility. Normally, this type of private facility is regulated by the MS4. EPA believes that federal facilities are subject to local water quality regulations, including storm water requirements, by virtue of the waiver of sovereign immunity in CWA section 313. However, there are special problems faced by MS4s in their efforts to regulate federal facilities that have not been encountered in regulating

similar private facilities. To ensure comprehensive coverage, today's rule merely clarifies the need for permit coverage for these federal facilities.

i. Combined Sewer Systems (CSS). The definition of small MS4s does not include combined sewer systems. A combined sewer system is a wastewater collection system that conveys sanitary wastewater and storm water through a single set of pipes to a publicly-owned treatment works (POTW) for treatment before discharging to a receiving waterbody. During wet weather events when the capacity of the combined sewer system is exceeded, the system is designed to discharge prior to the POTW treatment plant directly into a receiving waterbody. Such an overflow is a combined sewer overflow or CSO. Combined sewer systems are not subject to existing regulations for municipal storm water discharges, nor will they be subject to today's regulations. EPA addresses combined sewer systems and CSOs in the National Combined Sewer Overflow (CSO) Control Policy issued on April 19, 1994 (59 FR 18688). The CSO Control Policy contains provisions for developing appropriate, site-specific NPDES permit requirements for combined sewer systems. CSO discharges are subject to limitations based on the best available technology economically achievable for toxic pollutants and based on the best conventional pollutant control technology for conventional pollutants. MS4s are subject to a different technology standard for all pollutants, specifically to reduce pollutants to the maximum extent practicable.

Some municipalities are served by both separate storm sewer systems and combined sewer systems. If such a municipality is located within an urbanized area, only the separate storm sewer systems within that municipality is included in the NPDES storm water program and subject to today's final rule. If the municipality is not located in an urbanized area, then the NPDES permitting authority has discretion as to whether the discharges from the separate storm sewer system is subject to today's final rule. The NPDES permitting authority will use the same process to designate discharges from portions of an MS4 for permit coverage where the municipality is also served by a combined sewer system.

EPA recognizes that municipalities that have both combined and separate storm sewer systems may wish to find ways to develop a unified program to meet all wet weather water pollution control requirements more efficiently. In the proposal to today's final rule, EPA sought comment on ways to achieve such a unified program. Many municipalities that are served by CSSs and MS4s commented that it is inequitable to force them to comply with Phase II at this time because implementation of the CSO Control Policy through their NPDES permits already imposes a significant financial burden. They requested an extension of the implementation time frame. They did not provide ideas on how to unify the two programs. EPA encourages permitting authorities to work with these municipalities as they develop and begin implementation of their CSO and storm water management programs. If both sets of requirements are carefully coordinated early, a cost-effective wet weather program can be developed that will address both CSO and storm water requirements.

ii. Owners/Operators. Several commenters mentioned the difference between the existing storm water application requirement for municipal operators and the proposed municipal requirement for owners or operators to apply. They felt that this inconsistency is confusing. The preamble to the existing regulations makes numerous references to owner/operator so there was no intent to make a clear distinction between Phase I and Phase II. Section 122.21(b) states that when the owner and operator are different, the operator must obtain the permit. MS4s often have several operators. The owner may be responsible for one part of the system and a regional authority may be responsible for other aspects. EPA proposed the "owner or operator" language to convey this dual responsibility. However, when the owner is responsible for some part of a storm water management plan, it is also an operator.

EPA has revised the regulation language to clarify that "an operator" must apply for a permit. When responsibilities for the MS4 are shared, all operators must apply.

c. Regulated Small MS4s

In today's final rule, all small MS4s located in an urbanized area are automatically designated as "regulated" small MS4s provided that they were not previously designated into the existing storm water program. Unlike medium and large MS4s under the existing storm water regulations, not all small MS4s are designated under today's final rule. Therefore, today's rule distinguishes between "small" MS4s and "regulated small" MS4s.

EPA's definition of "regulated small MS4s" in the proposal to today's rule included mention of incorporated places and counties. Along with the definition, EPA included Appendices 6 and 7 to assist in the identification of areas that would probably require coverage as "automatically designated" (Appendix 6) or "potentially designated" (Appendix 7). The definition and the appendices raised many questions about exactly who was required to comply with the proposed requirements. Commenters raised issues about the definition of "incorporated place" and the status of towns, townships, and other places that are not considered incorporated by the Census Bureau. They also asked about special districts, regional authorities, MS4s already regulated, and other questions in order to clarify the rule's coverage.

EPA has revised § 122.32(a) to clarify that discharges are regulated under today's rule if they are from a small MS4 that is in an urbanized area and has not received a waiver or they are designated by the permitting authority. Today's rule does not regulate the county, city, or town. Today's rule regulates the MS4. Therefore, even though a county may be listed in Appendix 6, if that county does not own or operate the municipal storm sewer systems, the county does not have to submit an application or develop a storm water management program. If another entity does own or operate an MS4 within the county, for example, a regional utility district, that other entity needs to submit the application and develop the program.

Some commenters suggested that EPA should change the rule language to specifically allow regional authorities to be the permitted entity and to allow small MS4s to apply as co-permittees. EPA believes that the best way to clarify that regional authorities can be the primary permitted entity is the change to § 122.32(a) and the explanation above. Because EPA assumes that today's regulation will be implemented through general permits, MS4s will not be co-permittees under a general permit in the same manner as under individual permits. EPA has added § 122.33(a)(4) and made a minor change to § 122.35(a) to clarify that small MS4s can work together to share the responsibilities of a storm water management program. This is discussed further in Section II.H.3.c.iv below.

The proposed rule stated that when a county or Federal Indian reservation is only partially included in an urbanized area, only MS4s in the urbanized portion of the county or Federal Indian reservation would be regulated. In the rare cases when an incorporated place is only partially included in the urbanized area, the entire incorporated place would be regulated. EPA received comments asking about towns and

townships, because they were not considered to be incorporated areas according to the Census Bureau's definition. Would the whole town/township be covered or only the part of the town/township in the urbanized area? States use many different types of systems in their geographical divisions. Some towns are similar to incorporated cities and others are large areas that are more similar to counties. Some commenters thought that the urbanized area boundary was arbitrary, and if part of a town or county was covered, it all should be covered. Other commenters noted that some townships and counties encompass very large areas of which only a small portion is urbanized. Due to the great variety of situations, EPA has decided that for all geographical entities, only MS4s in the urbanized area are automatically designated. The population densities associated with the Census Bureau's designation of urbanized areas provide the basis for designation of these areas to protect water quality. This focused designation provides for consistency and allows for flexibility on the part of the MS4 and the permitting authority. In those situations where an incorporated place or a town is not all in an "urbanized area", there is a good possibility that it is served by more than one MS4. In those cases where the area is served by the same MS4, it makes sense to develop a storm water program for the whole area. Permitting authorities may also decide to designate all MS4s within a county or township, if they believe it is necessary to protect water quality.

Most operators of MS4s will not need to independently determine the status of coverage under today's rule. EPA has revised the proposed Appendices 6 and 7 to include towns and townships. Therefore, these appendices will alert most MS4s as to whether they are likely to be covered under today's rule. However, each permitting authority must make the decision as to who requires coverage. Most likely, an illustrative list of the regulated areas will be published with the general permit. If not, the operator can contact its permitting authority or the Bureau of the Census to find out if their separate storm sewer systems are within an urbanized area.

i. Urbanized Area Description. Under the Bureau of the Census definition of "urbanized area," adopted by EPA for the purposes of today's final rule, "an urbanized area (UA) comprises a place and the adjacent densely settled surrounding territory that together have a minimum population of 50,000 people." The proposal to today's rule provided the full definition and case studies to help explain the census category of "urbanized area." Appendix 2 is a simplified urbanized area illustration to help demonstrate the concept of urbanized areas in relation to today's final rule. The "urbanized area" is the shaded area that includes within its boundaries incorporated places, a portion of a Federal Indian reservation, portions of two counties, an entire town, and portions of another town. All small MS4s located in the shaded area are covered by the rule, unless and until waived by the permitting authority. Any small MS4s located outside of the shaded area are subject to potential designation by the permitting authority.

There are 405 urbanized areas in the United States that cover 2 percent of total U.S. land area and contain approximately 63 percent of the nation's population (see Appendix 3 for a listing of urbanized areas of the United States and Puerto Rico). These numbers include U.S. Territories, although Puerto Rico is the only territory to have Census-designated urbanized areas. Urbanized areas constitute the largest and most dense areas of settlement. The purpose of determining an "urbanized area" is to delineate the boundaries of development and map the actual built-up urban area. The Bureau of the Census geographers liken it to flying over an urban area and drawing a line around the boundary of the built-up area as seen from the air.

Using data from the latest decennial census, the Census Bureau applies the urbanized area definition nationwide (including U.S. Tribes and Territories) and determines which places and counties are included within each urbanized area. For each urbanized area, the Bureau provides full listings of who is included, as well as detailed maps and special CD-ROM files for use with computerized mapping systems (such as GIS). Each State's data center receives a copy of the list, and some maps, automatically. The States also have the CD–ROM files and a variety of publications available to them for reference from the Bureau of the Census. In addition, local or regional planning agencies may have urbanized area files already. New listings for urbanized areas based on the 2000 Census will be available by July/August 2001, but the more comprehensive computer files will not be available until late 2001/early 2002.

Additional designations based on subsequent census years will be governed by the Bureau of the Census' definition of an urbanized area in effect for that year. Based on historical trends, EPA expects that any area determined by the Bureau of the Census to be included within an urbanized area as of the 1990 Census will not later be excluded from the urbanized area as of the 2000 Census. However, it is important to note that even if this situation were to occur, for example, due to a possible change in the Bureau of the Census' urbanized area definition, a small MS4 that is automatically designated into the NPDES program for storm water under an urbanized area calculation for any given Census year will remain regulated regardless of the results of subsequent urbanized area calculations.

ii. Rationale for Using Urbanized Areas. EPA is using urbanized areas to automatically designate regulated small MS4s on a nationwide basis for several reasons: (1) studies and data show a high correlation between degree of development/ urbanization and adverse impacts on receiving waters due to storm water (U.S. EPA, 1983; Driver et al., 1985; Pitt, R.E. 1991. "Biological Effects of Urban Runoff Discharges." Presented at the Engineering Foundation Conference: *Urban Runoff and Receiving Systems; An Interdisciplinary Analysis of Impact, Monitoring and Management,* August 1991. Mt. Crested Butte, CO. American Society of Civil Engineers, New York. 1992.; Pitt, R.E. 1995. "Biological Effects of Urban Runoff Discharges," in *Storm water Runoff and Receiving Systems: Impact, Monitoring, and Assessment.* Lewis Publishers, New York.; Galli, J. 1990. *Thermal Impacts Associated with Urbanization and Storm water Management Best Management Practices.* Prepared for the Sediment and Storm water Administration of the Maryland Department of the Environment.; Klein, 1979), (2) the blanket coverage within the urbanized area encourages the watershed approach and addresses the problem of "donut-holes," where unregulated areas are surrounded by areas currently regulated (storm water discharges from donut hole areas present a problem due to their contributing uncontrolled adverse impacts on local waters, as well as by frustrating the attainment of water quality goals of neighboring regulated communities), (3) this approach targets present and future growth areas as a preventative measure to help ensure water quality protection, and (4) the determination of urbanized areas by the Bureau of the Census allows operators of small MS4s to quickly determine whether they are included in the NPDES storm water program as a regulated small MS4.

Urbanized areas have experienced significant growth over the past 50 years. According to EPA calculations

based on Census data from 1980 to 1990, the national average rate of growth in the United States during that 10-year period was more than 4 percent. For the same period, the average growth within urbanized areas was 15.7 percent and the average for outside of urbanized areas was just more than 1 percent. The new development occurring in these growing areas can provide some of the best opportunities for implementing cost-effective storm water management controls.

EPA received many comments on the proposal to designate discharges based on location within urbanized areas. EPA considered numerous other approaches, several of which are discussed in the proposal to today's final rule. Several commenters wanted designation to be based on proven water quality problems rather than inclusion in an urbanized area. One commenter proposed an approach based on the CWA 303(d) listing of impaired waters and the wasteload allocation conducted under the TMDL process. (See section II.L. on the section 303(d) and TMDL process). The commenter's proposal would designate small MS4s on a case-by-case basis, covering only those discharges where receiving streams are shown to have water quality problems, particularly a failure to meet water quality standards, including designated uses. The commenter further described a non-NPDES approach where a State would require cost-effective measures based on a proportionate share under a waste load allocation, equitably allocated among all pollutant contributors. These waste load allocations would be developed with input from all stakeholders, and remedial measures would be implemented in a phased manner based on the probability of results and/or economic feasibility. The States would then periodically reassess the receiving streams to determine whether the remedial measures are working, and if not, require additional control measures using the same procedure used to establish the initial measures. What the commenter describes is almost a TMDL.

EPA considered a remedial approach based on water quality impairment and rejected it for failure to prevent almost certain degradation caused by urban storm water. EPA's main concern in opting not to take a case-by-case approach to designation was that this approach would not provide controls for storm water discharges in receiving streams until after a site-specific demonstration of adverse water quality impact. The commenter's suggestion would do nothing to prevent pollution in waters that may be meeting water quality standards, including supporting designated uses. The approach would also rely on identifying storm water management programs following comprehensive watershed plans and TMDL development. In most States, water quality assessments have traditionally been conducted for principal mainstream rivers and their major tributaries, not all surface waters. The establishment of TMDLs nationwide will take many years, and many States will conduct additional monitoring to determine water quality conditions prior to establishing TMDLs. In addition, a case-by-case approach would not address the problem of "donut holes" within urbanized areas and a lack of consistency among similarly situated municipal systems would remain commonplace. After careful consideration of all comments, EPA still believes that the approach in today's rule is the most appropriate to protect water quality. Protection includes prevention as well as remediation.

d. Municipal Designation by the Permitting Authority

Today's final rule also allows NPDES permitting authorities to designate MS4s that should be included in the storm water program as regulated small MS4s but are not located within urbanized areas. The final rule requires, at a minimum, that a set of designation criteria be applied to all small MS4s within a jurisdiction that serves a population of at least 10,000 and has a population density of at least 1,000. Appendix 7 to this preamble provides an illustrative list of places that the Agency anticipates meet this criteria. In addition, any small MS4 may be the subject of a petition to the NPDES permitting authority for designation. See Section II.G, NPDES Permitting Authority's Role for more details on the designation and petition processes. EPA believes that the approach of combining nationwide and local designation to determine municipal coverage balances the potential for significant adverse impacts on water quality with local watershed protection and planning efforts.

e. Waiving the Requirements for Small MS4s

Today's final rule includes some flexibility in the nationwide coverage of all small MS4s located in urbanized areas by providing the NPDES permitting authority with the discretion to waive the otherwise applicable requirements of the smallest MS4s that are not causing the impairment of a receiving water body. Qualifications for the waiver vary depending on whether the MS4 serves a population under 1,000 or a population between 1,000 and 10,000. Note that even if a small MS4 has requirements waived, it can subsequently be brought back into the program if circumstances change. See Section II.G, NPDES Permitting Authority's Role, for more details on this process.

3. Municipal Permit Requirements

a. Overview

i. Summary of Permitting Options. Today's rule outlines six minimum control measures that constitute the framework for a storm water discharge control program for regulated small MS4s that, when properly implemented, will reduce pollutants to the maximum extent practicable (MEP). These six minimum control measures are specified in § 122.34(b) and are discussed below in section "II.H.3.b, Program Requirements-Minimum Control Measures." All operators of regulated small MS4s are required to obtain coverage under an NPDES permit, unless the requirement is waived by the permitting authority in accordance with today's rule. Implementation of § 122.34(b) may be required either through an individual permit or, if the State or EPA makes one available to the facility, through a general permit. The process for issuing and obtaining these permits is discussed below in section "II.H.3.c, Application Requirements."

As an alternative to implementing a program that complies with the requirements of § 122.34, today's rule provides operators of regulated small MS4s with the option of applying for an individual permit under § 122.26(d). The permit application requirements in § 122.26 were originally drafted to apply to medium and large MS4s. Although EPA believes that the requirements of § 122.34 provide a regulatory option that is appropriate for most small MS4s, the operators of some small MS4s may prefer more individualized requirements. This alternative permitting option for regulated small MS4s that wish to develop their own program is discussed below in section "II.H.3.c.iii. Alternative Permit Option." The second alternative permitting option for regulated small MS4s is to become co-permittees with a medium or large MS4 regulated under § 122.26(d), as discussed below in section "II.H.3.c.v. Joint Permit Programs."

ii. Water Quality-Based Requirements. Any NPDES permit issued under today's rule must, at a minimum, require the operator to develop, implement, and

enforce a storm water management program designed to reduce the discharge of pollutants from a regulated system to the MEP, to protect water quality, and satisfy the appropriate water quality requirements of the Clean Water Act (see MEP discussion in the following section). Absent evidence to the contrary, EPA presumes that a small MS4 program that implements the six minimum measures in today's rule does not require more stringent limitations to meet water quality standards. Proper implementation of the measures will significantly improve water quality. As discussed further below, however, small MS4 permittees should modify their programs if and when available information indicates that water quality considerations warrant greater attention or prescriptiveness in specific components of the municipal program. If the program is inadequate to protect water quality, including water quality standards, then the permit will need to be modified to include any more stringent limitations necessary to protect water quality.

Regardless of the basis for the development of the effluent limitations (whether designed to implement the six minimum measures or more stringent or prescriptive limitations to protect water quality), EPA considers narrative effluent limitations requiring implementation of BMPs to be the most appropriate form of effluent limitations for MS4s. CWA section 402(p)(3)(b)(iii) expresses a preference for narrative rather than numeric effluent limits, for example, by reference to "management practices, control techniques and system, design and engineering methods, and such other provisions as the Administrator or the State determines appropriate for the control of such pollutants." 33 U.S.C. 1342(p)(3)(B)(iii). EPA determines that pollutants from wet weather discharges are most appropriately controlled through management measures rather than end-of-pipe numeric effluent limitations. As explained in the Interim Permitting Policy for Water Quality-Based Effluent Limitations in Storm Water Permits, issued on August 1, 1996 [61 FR 43761 (November 26, 1996), EPA believes that the currently available methodology for derivation of numeric water quality-based effluent limitations is significantly complicated when applied to wet weather discharges from MS4s (compared to continuous or periodic batch discharges from most other types of discharge). Wet weather discharges from MS4s introduce a high degree of variability in the inputs to the models currently available for derivation of water quality based effluent limitations, including assumptions about instream and discharge flow rates, as well as effluent characterization. In addition, EPA anticipates that determining compliance with any such numeric limitations may be confounded by practical limitations in sample collection.

In the first two to three rounds of permit issuance, EPA envisions that a BMP-based storm water management program that implements the six minimum measures will be the extent of the NPDES permit requirements for the large majority of regulated small MS4s. Because the six measures represent a significant level of control if properly implemented, EPA anticipates that a permit for a regulated small MS4 operator implementing BMPs to satisfy the six minimum control measures will be sufficiently stringent to protect water quality, including water quality standards, so that additional, more stringent and/or more prescriptive water quality based effluent limitations will be unnecessary.

If a small MS4 operator implements the six minimum control measures in § 122.34(b) and the discharges are determined to cause or contribute to non-attainment of an applicable water quality standard, the operator needs to expand or better tailor its BMPs within the scope of the six minimum control measures. EPA envisions that this process will occur during the first two to three permit terms. After that period, EPA will revisit today's regulations for the municipal separate storm sewer program.

If the permitting authority (rather than the regulated small MS4 operator) needs to impose additional or more specific measures to protect water quality, then that action will most likely be the result of an assessment based on a TMDL or equivalent analysis that determines sources and allocations of pollutant(s) of concern. EPA believes that the small MS4's additional requirements, if any, should be guided by its equitable share based on a variety of considerations, such as cost effectiveness, proportionate contribution of pollutants, and ability to reasonably achieve wasteload reductions. Narrative effluent limitations in the form of BMPs may still be the best means of achieving those reductions.

See Section II.L, Water Quality Issues, for further discussion of this approach to permitting, consistent with EPA's interim permitting guidance. Pursuant to CWA section 510, States implementing their own NPDES programs may develop more stringent or more prescriptive requirements than those in today's rule.

EPA's interpretation of CWA section 402(p)(3)(B)(iii) was recently reviewed by the Ninth Circuit in *Defenders of Wildlife, et al* v. *Browner*, No. 98–71080 (September 15, 1999). The Court upheld the Agency's action in issuing five MS4 permits that included water quality-based effluent limitations. The Court did, however, disagree with EPA's interpretation of the relationship between CWA sections 301 and 402(p). The Court reasoned that MS4s are not compelled by section 301(b)(1)(C) to meet all State water quality standards, but rather that the Administrator or the State may rely on section 402(p)(3)(B)(iii) to require such controls. Accordingly, the *Defenders of Wildlife* decision is consistent with the Agency's 1996 "Interim Permitting Policy for Water Quality-Based Effluent Limitations in Storm Water Permits."

As noted, the 1996 Policy describes how permits would implement an iterative process using BMPs, assessment, and refocused BMPs, leading toward attainment of water quality standards. The ultimate goal of the iteration would be for water bodies to support their designated uses. EPA believes this iterative approach is consistent with and implements section 301(b)(1)(C), notwithstanding the Ninth Circuit's interpretation. As an alternative to basing these water quality-based requirements on section 301(b)(1)(C), however, EPA also believes the iterative approach toward attainment of water quality standards represents a reasonable interpretation of CWA section 402(p)(3)(B)(iii). For this reason, today's rule specifies that the "compliance target" for the design and implementation of municipal storm water control programs is "to reduce pollutants to the maximum extent practicable (MEP), to protect water quality, and to satisfy the appropriate water quality requirements of the CWA." The first component, reductions to the MEP, would be realized through implementation of the six minimum measures. The second component, to protect water quality, reflects the overall design objective for municipal programs based on CWA section 402(p)(6). The third component, to implement other applicable water quality requirements of the CWA, recognizes the Agency's specific determination under CWA section 402(p)(3)(B)(iii) of the need to achieve reasonable further progress toward attainment of water quality standards according to the iterative BMP process, as well as the determination that State or EPA officials who establish TMDLs could allocate waste loads to

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MS4s, as they would to other point sources.

EPA does not presume that water quality will be protected if a small MS4 elects not to implement all of the six minimum measures and instead applies for alternative permit limits under § 122.26(d). Operators of such small MS4s that apply for alternative permit limits under § 122.26(d) must supply additional information through individual permit applications so that the permit writer can determine whether the proposed program reduces pollutants to the MEP and whether any other provisions are appropriate to protect water quality and satisfy the appropriate water quality requirements of the Clean Water Act.

iii. *Maximum Extent Practicable.* Maximum extent practicable (MEP) is the statutory standard that establishes the level of pollutant reductions that operators of regulated MS4s must achieve. The CWA requires that NPDES permits for discharges from MS4s "shall require controls to reduce the discharge of pollutants to the maximum extent practicable, including management practices, control techniques and system, design and engineering methods." CWA Section 402(p)(3)(B)(iii). This section also calls for "such other provisions as the [EPA] Administrator or the State determines appropriate for the control of such pollutants." EPA interprets this standard to apply to all MS4s, including both existing regulated (large and medium) MS4s, as well as the small MS4s regulated under today's rule.

For regulated small MS4s under today's rule, authorization to discharge may be under either a general permit or individual permit, but EPA anticipates and expects that general permits will be the most common permit mechanism. The general permit will explain the steps necessary to obtain permit authorization. Compliance with the conditions of the general permit and the series of steps associated with identification and implementation of the minimum control measures will satisfy the MEP standard. Implementation of the MEP standard under today's rule will typically require the permittee to develop and implement appropriate BMPs to satisfy each of the required six minimum control measures.

In issuing the general permit, the NPDES permitting authority will establish requirements for each of the minimum control measures. Permits typically will require small MS4 permittees to identify in their NOI the BMPs to be performed and to develop the measurable goals by which implementation of the BMPs can be assessed. Upon receipt of the NOI from a small MS4 operator, the NPDES permitting authority will have the opportunity to review the NOI to verify that the identified BMPs and measurable goals are consistent with the requirement to reduce pollutants under the MEP standard, to protect water quality, and to satisfy the appropriate water quality requirements of the Clean Water Act. If necessary, the NPDES permitting authority may ask the permittee to revise their mix of BMPs, for example, to better reflect the MEP pollution reduction requirement. Where the NPDES permit is not written to implement the minimum control measures specified under § 122.34(b), for example in the case of an individual permit under § 122.33(b)(2)(ii), the MEP standard will be applied based on the best professional judgment of the permit writer.

Commenters argued that MEP is, as yet, an undefined term and that EPA needs to further clarify the MEP standards by providing a regulatory definition that includes recognition of cost considerations and technical feasibility. Commenters argued that, without a definition, the regulatory community is not adequately on notice regarding the standard with which they need to comply. EPA disagrees that affected MS4 permittees will lack notice of the applicable standard. The framework for the small MS4 permits described in this notice provides EPA's interpretation of the standard and how it should be applied.

EPA has intentionally not provided a precise definition of MEP to allow maximum flexibility in MS4 permitting. MS4s need the flexibility to optimize reductions in storm water pollutants on a location-by-location basis. EPA envisions that this evaluative process will consider such factors as conditions of receiving waters, specific local concerns, and other aspects included in a comprehensive watershed plan. Other factors may include MS4 size, climate, implementation schedules, current ability to finance the program, beneficial uses of receiving water, hydrology, geology, and capacity to perform operation and maintenance.

The pollutant reductions that represent MEP may be different for each small MS4, given the unique local hydrologic and geologic concerns that may exist and the differing possible pollutant control strategies. Therefore, each permittee will determine appropriate BMPs to satisfy each of the six minimum control measures through an evaluative process. Permit writers may evaluate small MS4 operator's proposed storm water management controls to determine whether reduction of pollutants to the MEP can be achieved with the identified BMPs.

EPA envisions application of the MEP standard as an iterative process. MEP should continually adapt to current conditions and BMP effectiveness and should strive to attain water quality standards. Successive iterations of the mix of BMPs and measurable goals will be driven by the objective of assuring maintenance of water quality standards. If, after implementing the six minimum control measures there is still water quality impairment associated with discharges from the MS4, after successive permit terms the permittee will need to expand or better tailor its BMPs within the scope of the six minimum control measures for each subsequent permit. EPA envisions that this process may take two to three permit terms.

One commenter observed that MEP is not static and that if the six minimum control measures are not achieving the necessary water quality improvements, then an MS4 should be expected to revise and, if necessary, expand its program. This concept, it is argued, must be clearly part of the definition of MEP and thus incorporated into the binding and operative aspects of the rule. As is explained above, EPA believes that it is. The iterative process described above is intended to be sensitive to water quality concerns. EPA believes that today's rule contains provisions to implement an approach that is consistent with this comment.

b. Program Requirements'Minimum Control Measures

A regulated small MS4 operator must develop and implement a storm water management program designed to reduce the discharge of pollutants from their MS4 to protect water quality. The storm water management program must include the following six minimum measures.

i. Public Education and Outreach on Storm Water Impacts. Under today's final rule, operators of small MS4s must implement a public education program to distribute educational materials to the community or conduct equivalent outreach activities about the impacts of storm water discharges on water bodies and the steps to reduce storm water pollution. The public education program should inform individuals and households about the problem and the steps they can take to reduce or prevent storm water pollution.

EPA believes that as the public gains a greater understanding of the storm water program, the MS4 is likely to gain

more support for the program (including funding initiatives). In addition, compliance with the program will probably be greater if the public understands the personal responsibilities expected of them. Well-informed citizens can act as formal or informal educators to further disseminate information and gather support for the program, thus easing the burden on the municipalities to perform all educational activities.

MS4s are encouraged to enter into partnerships with their States in fulfilling the public education requirement. It may be more cost-effective to utilize a State education program instead of numerous MS4s developing their own programs. MS4 operators are also encouraged to work with other organizations (e.g., environmental, nonprofit and industry organizations) that might be able to assist in fulfilling this requirement.

The public education program should be tailored, using a mix of locally appropriate strategies, to target specific audiences and communities (particularly minority and disadvantaged communities). Examples of strategies include distributing brochures or fact sheets, sponsoring speaking engagements before community groups, providing public service announcements, implementing educational programs targeted at school age children, and conducting community-based projects such as storm drain stenciling, and watershed and beach cleanups. Operators of MS4s may use storm water educational information provided by the State, Tribe, EPA, or environmental, public interest, trade organizations, or other MS4s. Examples of successful public education efforts concerning polluted runoff can be found in many State nonpoint source pollution control programs under CWA section 319.

The public education program should inform individuals and households about steps they can take to reduce storm water pollution, such as ensuring proper septic system maintenance, ensuring the use and disposal of landscape and garden chemicals including fertilizers and pesticides, protecting and restoring riparian vegetation, and properly disposing of used motor oil or household hazardous wastes. Additionally, the program could inform individuals and groups on how to become involved in local stream and beach restoration activities as well as activities coordinated by youth service and conservation corps and other citizen groups. Finally, materials or outreach programs should be directed toward targeted groups of commercial, industrial, and institutional entities likely to have significant storm water impacts. For example, MS4 operators should provide information to restaurants on the impact of grease clogging storm drains and to auto garages on the impacts of used oil discharges.

EPA received comments from representatives of State DOTs and U.S. Department of Defense (DOD) installations seeking exemption from the public education requirement. While today's rule does not exempt DOTs and military bases from the user education requirement, the Agency believes the flexibility inherent in the Rule addresses many of the concerns expressed by these commenters.

Certain DOT representatives commented that if their agencies were not exempt from the user education measure's requirements, they should at least be allowed to count DOT employee education as an adequate substitute. EPA supports the use of existing materials and programs, granted such materials and programs meet the rule's requirement that the MS4 user community (*i.e.*, the public) is also educated concerning the impacts of storm water discharges on water bodies and the steps to reduce storm water pollution.

Finally, certain DOD representatives requested that "public," as applied to their installations, be defined as the resident and employee populations within the fence line of the facility. EPA agrees that the education effort should be directed toward those individuals who frequent the federally owned land (*i.e.*, residents and individuals who come there to work and use the MS4 facilities).

EPA also received a number of comments from municipalities stating that education would be more thorough and cost effective if accomplished by EPA on the national level. EPA believes that a collaborative State and local approach, in conjunction with significant EPA technical support, will best meet the goal of targeting, and reaching, specific local audiences. EPA technical support will include a tool box which will contain fact sheets, guidance documents, an information clearinghouse, and training and outreach efforts.

Finally, EPA received comments expressing concern that the public education program simply encourages the distribution of printed material. EPA is sensitive to this concern. Upon evaluation, the Agency made changes to the proposal's language for today's rule. The language has been changed to reflect EPA's belief that a successful program is one that includes a variety of strategies locally designed to reach specific audiences.

ii. Public Involvement/Participation. Public involvement is an integral part of the small MS4 storm water program. Accordingly, today's final rule requires that the municipal storm water management program must comply with applicable State and local public notice requirements. Section 122.34(b)(2) recommends a public participation process with efforts to reach out and engage all economic and ethnic groups. EPA believes there are two important reasons why the public should be allowed and encouraged to provide valuable input and assistance to the MS4's program.

First, early and frequent public involvement can shorten implementation schedules and broaden public support for a program. Opportunities for members of the public to participate in program development and implementation could include serving as citizen representatives on a local storm water management panel, attending public hearings, working as citizen volunteers to educate other individuals about the program, assisting in program coordination with other pre-existing programs, or participating in volunteer monitoring efforts. Moreover, members of the public may be less likely to raise legal challenges to a MS4's storm water program if they have been involved in the decision making process and program development and, therefore, internalize personal responsibility for the program themselves.

Second, public participation is likely to ensure a more successful storm water program by providing valuable expertise and a conduit to other programs and governments. This is particularly important if the MS4's storm water program is to be implemented on a watershed basis. Interested stakeholders may offer to volunteer in the implementation of all aspects of the program, thus conserving limited municipal resources.

EPA recognizes that there are a number of challenges associated with public involvement. One challenge is in engaging people in the public meeting and program design process. Another challenge is addressing conflicting viewpoints. Nevertheless, EPA strongly believes that these challenges can be addressed by use of an aggressive and inclusive program. Section II.K. provides further discussion on public involvement.

A number of municipalities sought clarification from EPA concerning what the public participation program must

actually include. In response, the actual requirements are minimal, but the Agency's *recommendations* are more comprehensive. The public participation program must only comply with applicable State and local public notice requirements. The remainder of the preamble, as well as the Explanatory Note accompanying the regulatory text, provide guidance to the MS4s concerning what elements a successful and inclusive program should include. EPA will provide technical support as part of the tool box (*i.e.,* providing model public involvement programs, conducting public workshops, *etc.*) to assist MS4 operators meet the intent of this measure.

Finally, the Agency encourages MS4s to seek public participation prior to submitting an NOI. For example, public participation at this stage will allow the MS4 to involve the public in developing the BMPs and measurable goals for their NOI.

iii. Illicit Discharge Detection and Elimination. Discharges from small MS4s often include wastes and wastewater from non-storm water "illicit" discharges. Illicit discharge is defined at 40 CFR 122.26(b)(2) as any discharge to a municipal separate storm sewer that is not composed entirely of storm water, except discharges pursuant to an NPDES permit and discharges resulting from fire fighting activities. As detailed below, other sources of non-storm water, that would otherwise be considered illicit discharges, do not need to be addressed unless the operator of the MS4 identifies one or more of them as a significant source of pollutants into the system. EPA's Nationwide Urban Runoff Program (NURP) indicated that many storm water outfalls still discharge during substantial dry periods. Pollutant levels in these dry weather flows were shown to be high enough to significantly degrade receiving water quality. Results from a 1987 study conducted in Sacramento, California, revealed that slightly less than one-half of the water discharged from a municipal separate storm sewer system was not directly attributable to precipitation runoff (U.S. Environmental Protection Agency, Office of Research and Development. 1993. *Investigation of Inappropriate Pollutant Entries Into Storm Drainage Systems—A User's Guide.* Washington, DC EPA 600/R–92/238.) A significant portion of these dry weather flows results from illicit and/or inappropriate discharges and connections to the municipal separate storm sewer system. Illicit discharges enter the system through either direct connections (*e.g.,* wastewater piping either mistakenly or deliberately connected to the storm drains) or indirect connections (*e.g.,* infiltration into the storm drain system or spills collected by drain inlets).

Under the existing NPDES program for storm water, permit applications for large and medium MS4s are to include a program description for effective prohibition against non-storm water discharges into their storm sewers (see 40 CFR 122.26 (d)(1)(v)(B) and (d)(1)(iv)(B)). Further, EPA believes that in implementing municipal storm water management plans under these permits, large and medium MS4 operators generally found their illicit discharge detection and elimination programs to be cost-effective. Properly implemented programs also significantly improved water quality.

In today's rule, any NPDES permit issued to an operator of a regulated small MS4 must, at a minimum, require the operator to develop, implement and enforce an illicit discharge detection and elimination program. Inclusion of this measure for regulated small MS4s is consistent with the "effective prohibition" requirement for large and medium MS4s. Under today's rule, the NPDES permit will require the operator of a regulated small MS4 to: (1) Develop (if not already completed) a storm sewer system map showing the location of all outfalls, and names and location of all waters of the United States that receive discharges from those outfalls; (2) to the extent allowable under State, Tribal, or local law, effectively prohibit through ordinance, or other regulatory mechanism, illicit discharges into the separate storm sewer system and implement appropriate enforcement procedures and actions as needed; (3) develop and implement a plan to detect and address illicit discharges, including illegal dumping, to the system; and (4) inform public employees, businesses, and the general public of hazards associated with illegal discharges and improper disposal of waste.

The illicit discharge and elimination program need only address the following categories of non-storm water discharges if the operator of the small MS4 identifies them as significant contributors of pollutants to its small MS4: water line flushing, landscape irrigation, diverted stream flows, rising ground waters, uncontaminated ground water infiltration (as defined at 40 CFR 35.2005(20)), uncontaminated pumped ground water, discharges from potable water sources, foundation drains, air conditioning condensation, irrigation water, springs, water from crawl space pumps, footing drains, lawn watering, individual residential car washing, flows from riparian habitats and wetlands, dechlorinated swimming pool discharges, and street wash water (discharges or flows from fire fighting activities are excluded from the definition of illicit discharge and only need to be addressed where they are identified as significant sources of pollutants to waters of the United States). If the operator of the MS4 identifies one or more of these categories of sources to be a significant contributor of pollutants to the system, it could require specific controls for that category of discharge or prohibit the discharges completely.

Several comments were received on the mapping requirements of the proposal. Most comments said that more flexibility should be given to the MS4s to determine their mapping needs, and that resources could be better spent in addressing problems once the illicit discharges are detected. EPA reviewed the mapping requirements in the proposed rule and agrees that some of the information is not necessary in order to begin an illicit discharge detection and elimination program. Today's rule requires a map or set of maps that show the locations of all outfalls and names and locations of receiving waters. Knowing the locations of outfalls and receiving waters are necessary to be able to conduct dry weather field screening for non-storm water flows and to respond to illicit discharge reports from the public. EPA recommends that the operator collect any existing information on outfall locations (*e.g.,* review city records, drainage maps, storm drain maps), and then conduct field surveys to verify the locations. It will probably be necessary to "walk" (*i.e.* wade small receiving waters or use a boat for larger receiving waters) the streambanks and shorelines, and it may take more than one trip to locate all outfalls. A coding system should be used to mark and identify each outfall. MS4 operators have the flexibility to determine the type (*e.g.* topographic, GIS, hand or computer drafted) and size of maps which best meet their needs. The map scale should be such that the outfalls can be accurately located. Once an illicit discharge is detected at an outfall, it may be necessary to map that portion of the storm sewer system leading to the outfall in order to locate the source of the discharge.

Several comments requested clarification of the requirement to develop and implement a plan to detect and eliminate illicit discharges. EPA recommends that plans include procedures for the following: locating priority areas; tracing the source of an illicit discharge; removing the source of the discharge; and program evaluation

and assessment. EPA recommends that MS4 operators identify priority areas (*i.e.*, problems areas) for more detailed screening of their system based on higher likelihood of illicit connections (*e.g.*, areas with older sanitary sewer lines), or by conducting ambient sampling to locate impacted reaches. Once priority areas are identified, EPA recommends visually screening outfalls during dry weather and conducting field tests, where flow is occurring, of selected chemical parameters as indicators of the discharge source. EPA's manual for investigation of inappropriate pollutant entries into the storm drainage system (EPA, 1993) suggests the following parameter list: specific conductivity, fluoride and/or hardness concentration, ammonia and/or potassium concentration, surfactant and/or fluorescence concentration, chlorine concentration, pH and other chemicals indicative of industrial sources. The manual explains why each parameter is a good indicator and how the information can be used to determine the type of source flow. The Agency is not recommending that fluoride and chlorine, generally used to locate potable water discharges, be addressed under this program, therefore a short list of parameters may include conductivity, ammonia, surfactant and pH. Some MS4s have found it useful to measure for fecal coliform or E. coli in their testing program. Observations of physical characteristics of the discharge are also helpful such as flow rate, temperature, odor, color, turbidity, floatable matter, deposits and stains, and vegetation.

The implementation plan should also include procedures for tracing the source of an illicit discharge. Once an illicit discharge is detected and field tests provide source characteristics, the next step is to determine the actual location of the source. Techniques for tracing the discharge to its place of origin may include: following the flow up the storm drainage system via observations and/or chemical testing in manholes or in open channels; televising storm sewers; using infrared and thermal photography; conducting smoke or dye tests.

The implementation plan should also include procedures for removing the source of the illicit discharge. The first step may be to notify the property owner and specify a length of time for eliminating the discharge. Additional notifications and escalating legal actions should also be described in this part of the plan.

Finally, the implementation plan should include procedures for program evaluation and assessment. Procedures could include documentation of actions taken to locate and eliminate illicit discharges such as: number of outfalls screened, complaints received and corrected, feet of storm sewers televised, numbers of discharges and quantities of flow eliminated, number of dye or smoke tests conducted. Appropriate records of such actions should be kept and should be submitted as part of the annual reports for the first permit term, as specified by the permitting authority (reports only need to be submitted in years 2 and 4 in later permits). For more on reporting requirements, see § 122.34(g).

EPA received comments regarding an MS4's legal authority beyond its jurisdictional boundaries to inspect or take enforcement against illicit discharges. EPA recognizes that illicit flows may originate in one jurisdiction and cross into one or more jurisdictions before being discharged at an outfall. In such instances, EPA expects the MS4 that detects the illicit flow to trace it to the point where it leaves their jurisdiction and notify the adjoining MS4 of the flow, and any other physical or chemical information. The adjoining MS4 should then trace it to the source or to the location where it enters their jurisdiction. The process of notifying the adjoining MS4 should continue until the source is located and eliminated. In addition, because any non-storm water discharge to waters of the U.S. through an MS4 is subject to the prohibition against unpermitted discharges pursuant to CWA section 301 (a), remedies are available under the federal enforcement provisions of CWA sections 309 and 505.

EPA requested and received comments regarding the prohibition and enforcement provision for this minimum measure. Commenters specifically questioned the proposal that the operator only has to implement the appropriate prohibition and enforcement procedures "to the extent allowable under State or Tribal law." They raised concerns that by qualifying prohibition and enforcement procedures in this manner, the operator could altogether ignore this minimum measure where affirmative legal authority did not exist. Comments suggested that EPA require States to grant authority to those municipalities where it did not exist. Other comments, however, stated that municipalities cannot exercise legal authority not granted to them under State law, which varies considerably from one State to another. EPA has no intention of directing State legislatures on how to allocate authority and responsibility under State law. As noted above, there is at least one remedy (the federal CWA) to control non-storm water discharges through MS4s. If State law prevents political subdivisions from controlling discharges through storm sewers, EPA anticipates common sense will prevail to provide those MS4 operators with the ability to meet the requirements applicable for their discharges.

One comment reinforced the importance of public information and education to the success of this measure. EPA agrees and suggests that MS4 operators consider a variety of ways to inform and educate the public which could include storm drain stenciling; a program to promote, publicize, and facilitate public reporting of illicit connections or discharges; and distribution of visual and/or printed outreach materials. Recycling and other public outreach programs could be developed to address potential sources of illicit discharges, including used motor oil, antifreeze, pesticides, herbicides, and fertilizers.

EPA received comments that State DOT's lack authority to implement this measure. EPA believes that most DOTs can implement most parts of this measure. If a DOT does not have the necessary legal authority to implement any part of this measure, EPA encourages them to coordinate their storm water management efforts with the surrounding MS4s and other State agencies. Many DOTs that are regulated under Phase I of this program are co-permittees with the local regulated MS4. Under today's rule, DOTs can use any of the options of § 122.35 to share their storm water management responsibilities.

EPA received comments requesting clarification of various terms such as "outfall" and "illicit discharge." One comment asked EPA to reinforce the point that a "ditch" could be considered an outfall. The term "outfall" is defined at 40 CFR 122.26(b)(9) as "a point source at the point where a municipal separate storm sewer discharges to waters of the United States * * *". The term municipal separate storm sewer is defined at 40 CFR § 122.26(b)(8) as "a conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, or storm drains) * * *". Following the logic of these definitions, a "ditch" may be part of the municipal separate storm sewer, and at the point where the ditch discharges to waters of the United States, it would be an outfall. As with any determination about jurisdictional provisions of the CWA, however, final decisions require case specific evaluations of fact.

One commenter specifically requested clarification on the relationship between the term "illicit discharge" and non-storm water discharges from fire fighting. The comment suggested that it would be impractical to attempt to determine whether the flow from a specific fire (*i.e.*, during a fire) is a significant source of pollution. EPA intends that MS4s will address all allowable non-storm water flows categorically rather than individually. If an MS4 is concerned that flows from fire fighting are, as a category, contributing substantial amounts of pollutants to their system, they could develop a program to address those flows prospectively. The program may include an analysis of the flow from several sources, steps to minimize the pollutant contribution, and a plan to work with the sources of the discharge to minimize any adverse impact on water quality. During the development of such a program, the MS4 may determine that only certain types of flows within a particular category are a concern, for example, fire fighting flows at industrial sites where large quantities of chemicals are present. In this example, a review of existing procedures with the fire department and/or hazardous materials team may reveal weaknesses or strengths previously unknown to the MS4 operator.

EPA received comments requesting modifications to the rule to include on-site sewage disposal systems (i.e., septic systems) in the scope of the illicit discharge program. On-site sewage disposal systems that flow into storm drainage systems are within the definition of illicit discharge as defined by the regulations. Where they are found to be the source of an illicit discharge, they need to be eliminated similar to any other illicit discharge source. Today's rule was not modified to include discharges from on-site sewage disposal systems specifically because those sources are already within the scope of the existing definition of illicit discharge.

iv. Construction Site Storm Water Runoff Control. Over a short period of time, storm water runoff from construction site activity can contribute more pollutants, including sediment, to a receiving stream than had been deposited over several decades (see section I.B.3). Storm water runoff from construction sites can include pollutants other than sediment, such as phosphorus and nitrogen, pesticides, petroleum derivatives, construction chemicals, and solid wastes that may become mobilized when land surfaces are disturbed. Generally, properly implemented and enforced construction site ordinances effectively reduce these pollutants. In many areas, however, the effectiveness of ordinances in reducing pollutants is limited due to inadequate enforcement or incomplete compliance with such local ordinances by construction site operators (Paterson, R.G. 1994. "Construction Practices: The Good, the Bad, and the Ugly." *Watershed Protection Techniques* 1(2)).

Today's rule requires operators of regulated small MS4s to develop, implement, and enforce a pollutant control program to reduce pollutants in any storm water runoff from construction activities that result in land disturbance of 1 or more acres (see § 122.34(b)(4)). Construction activity on sites disturbing less than one acre must be included in the program if the construction activity is part of a larger common plan of development or sale that would disturb one acre or more.

The construction runoff control program of the regulated small MS4 must include an ordinance or other regulatory mechanism to require erosion and sediment controls to the extent practicable and allowable under State, Tribal or local law. The program also must include sanctions to ensure compliance (for example, non-monetary penalties, fines, bonding requirements, and/or permit denials for non-compliance). The program must also include, at a minimum: requirements for construction site operators to implement appropriate erosion and sediment control BMPS, such as silt fences, temporary detention ponds and diversions; procedures for site plan review by the small MS4 which incorporate consideration of potential water quality impacts; requirements to control other waste such as discarded building materials, concrete truck washout, chemicals, litter, and sanitary waste at the construction site that may adversely impact water quality; procedures for receipt and consideration of information submitted by the public to the MS4; and procedures for site inspection and enforcement of control measures by the small MS4.

Today's rule provides flexibility for regulated small MS4s by allowing them to exclude from their construction pollutant control program runoff from those construction sites for which the NPDES permitting authority has waived NPDES storm water small construction permit requirements. For example, if the NPDES permitting authority waives permit coverage for storm water discharges from construction sites less than 5 acres in areas where the rainfall erosivity factor is less than 5, then the regulated small MS4 does not have to include these sites in its storm water management program. Even if requirements for a discharge from a given construction site are waived by the NPDES permitting authority, however, the regulated small MS4 may still chose to control those discharges under the MS4's construction pollutant control program, particularly where such discharges may cause siltation problems in storm sewers. See Section II.I.1.b for more information on construction waivers by the permitting authority.

Some commenters suggested that the proposed construction minimum measure requirements went beyond the permit application requirements concerning construction for medium and large MS4s. In response, EPA has made changes to the proposed measure so that it more closely resembles the MS4 permit application requirements in existing regulations. For example, as described below, the Agency revised the proposed requirements for "pre-construction review of site management plans" to require "procedures for site plan review."

One commenter expressed concerns that addressing runoff from construction sites within urbanized areas (through the small MS4 program) differently from construction sites outside urbanized areas (which will not be covered by the small MS4 program) will encourage urban sprawl. Today's rule, together with the existing requirements, requires all construction greater than or equal to 1 acre, unless waived, to be covered by an NPDES permit whether it is located inside or outside of an urbanized area (see § 122.26(b)(15)). Today's rule does not require small MS4s to control runoff from construction sites more stringently or prescriptively than is required for construction site runoff outside urbanized areas. Therefore, today's rule imposes no substantively different onsite controls on runoff of storm water from construction sites in urbanized areas than from construction sites outside of urbanized areas.

One commenter recommended that the small MS4 construction site storm water runoff control program address all storm water runoff from construction sites, not just the runoff into the MS4. The commenter also believed that MS4s should provide clear, objective standards for all construction sites. EPA agrees. Because today's rule only regulates discharges from the MS4, the construction pollutant control measure only requires small MS4 operators to control runoff into its system. As a practical matter, however, EPA anticipates that MS4 operators will find that regulation of all construction site

runoff, whether they runoff into the MS4 or not, will prove to be the most simple and efficient program. The Agency may provide more specific criteria for construction site BMPs in the forthcoming rule being developed under CWA section 402(m). See section II.D.1 of today's rule.

One commenter stated that there is no need for penalties at the local level by the small MS4 because the CWA already imposes sufficient penalties to ensure compliance. EPA disagrees and believes that enforcement and compliance at the local level is both necessary and preferable. Examples of sanctions, some not available under the CWA, include non-monetary penalties, monetary fines, bonding requirements, and denial of future or other local permits.

One commenter recommended that EPA should not include the requirement to control pollutants other than sediment from construction sites in this measure. EPA disagrees with this comment. The requirement is to control waste that "may cause adverse impacts on water quality." Such wastes may include discarded building materials, concrete truck washout, chemicals, pesticides, herbicides, litter, and sanitary waste. These wastes, when exposed to and mobilized by storm water, can contribute to water quality impairment.

The proposed rule required "procedures for pre-construction review of site management plans." EPA requested comment on expanding this provision to require both review and approval of construction site storm water plans. Many commenters expressed the concern that review and approval of site plans is not only costly and time intensive, but may unnecessarily delay construction projects and unduly burden staff who administer the local program. In addition, some commenters expressed confusion whether EPA proposed pre-construction review for all site management plans or only higher priority sites. To address these comments, and be consistent with the permit application requirements for larger MS4s, EPA changed "procedures for pre-construction review of site management plans" to "procedures for site plan review." Today's rule requires the small MS4 to develop procedures for site plan review so as to incorporate consideration of adverse potential water quality impacts. Procedures should include review of site erosion and sediment control plans, preferably before construction activity begins on a site. The objective is for the small MS4 operator and the construction site operator to address storm water runoff from construction activity early in the project design process so that potential consequences to the aquatic environment can be assessed and adverse water quality impacts can be minimized or eliminated.

One commenter requested that EPA delete the requirement for "procedures for receipt and consideration of information submitted by the public" because it went beyond existing storm water requirements. Another commenter stated that establishing a separate process to respond to public inquiries on a project is a burden to small communities, especially if the project has gone through an environmental review. One commenter requested clarification of this provision. EPA has retained this requirement in today's final rule to require some formality in the process for addressing public inquiries regarding storm water runoff from construction activities. EPA does not intend that small MS4s develop a separate, burdensome process to respond to every public inquiry. A small MS4 could, for example, simply log public complaints on existing storm water runoff problems from construction sites and pass that information on to local inspectors. The inspectors could then investigate complaints based on the severity of the violation and/or priority area.

One commenter believed that the proposed requirement of "regular inspections during construction" would require every construction project to be inspected more than once by the small MS4 during the term of a construction project. EPA has deleted the reference to "regular inspections." Instead, the small MS4 will be required to "develop procedures for site inspection and enforcement of control measures." Procedures could include steps to identify priority sites for inspection and enforcement based on the nature and extent of the construction activity, topography, and the characteristics of soils and receiving water quality.

In order to avoid duplication of small MS4 construction requirements with NPDES construction permit requirements, today's rule adds § 122.44(s) to recognize that the NPDES permitting authority can incorporate qualifying State, Tribal, or local erosion and sediment control requirements in NPDES permits for construction site discharges. For example, a construction site operator who complies with MS4 construction pollutant control programs that are referenced in the NPDES construction permit would satisfy the requirements of the NPDES permit. See section II.I.1.d for more information on incorporating qualifying programs by reference into NPDES construction permits. This provision has no impact on, or direct relation to, the small MS4 operator's responsibilities under the construction site storm water runoff control minimum measure. Conversely, under § 122.35(b), the permitting authority may recognize in the MS4's permit that another governmental entity, or the permitting authority itself, is responsible for implementing one or more of the minimum measures (including construction site storm water runoff control), and not include this measure in the small MS4's permit. In this case, the other governmental entity's program must satisfy all of the requirements of the omitted measure.

v. Post-Construction Storm Water Management in New Development and Redevelopment. The NURP study and more recent investigations indicate that prior planning and designing for the minimization of pollutants in storm water discharges is the most cost-effective approach to storm water quality management. Reducing pollutant concentrations in storm water after the discharge enters a storm sewer system is often more expensive and less efficient than preventing or reducing pollutants at the source. Increased human activity associated with development often results in increased pollutant loading from storm water discharges. If potential adverse water quality impacts are considered from the beginning stages of a project, new development and redevelopment provides more opportunities for water quality protection. For example, minimization of impervious areas, maintenance or restoration of natural infiltration, wetland protection, use of vegetated drainage ways, and use of riparian buffers have been shown to reduce pollutant loadings in storm water runoff from developed areas. EPA encourages operators of regulated small MS4s to identify specific problem areas within their jurisdictions and initiate innovative solutions and designs to focus attention on those areas through local planning.

In today's rule at § 122.34(b)(5), NPDES permits issued to an operator of a regulated small MS4 will require the operator to develop, implement, and enforce a program to address storm water runoff from new development and redevelopment projects that result in land disturbance of greater than or equal to one acre, including projects less than one acre that are part of a larger common plan of development or sale, that discharge into the MS4. Specifically, the NPDES permit will require the operator of a regulated small MS4 to: (1) Develop and implement

strategies which include a combination of structural and/or non-structural best management practices (BMPs) appropriate for the community; (2) use an ordinance, or other regulatory mechanism to address post-construction runoff from new development and redevelopment projects to the extent allowable under State, Tribal or local law; (3) ensure adequate long-term operation and maintenance of BMPs; and (4) ensure that controls are in place that would minimize water quality impacts. EPA intends the term "redevelopment" to refer to alterations of a property that change the "footprint" of a site or building in such a way that results in the disturbance of equal to or greater than 1 acre of land. The term is not intended to include such activities as exterior remodeling, which would not be expected to cause adverse storm water quality impacts and offer no new opportunity for storm water controls.

EPA received comments requesting guidance and clarification of the rule requirements. The scope of the comments ranged from general requests for more details on how MS4 operators should accomplish the four requirements listed above, to specific requests for information regarding transfer of ownership for structural controls, as well as ongoing responsibility for operation and maintenance. By the term "combination" of BMPs, EPA intends a combination of structural and/or non-structural BMPs. For this requirement, the term "combination" is meant to emphasize that multiple BMPs should be considered and adopted for use in the community. A single BMP generally cannot significantly reduce pollutant loads because pollutants come from many sources within a community. The BMPs chosen should: (1) Be appropriate for the local community; (2) minimize water quality impacts; and (3) attempt to maintain pre-development runoff conditions. In choosing appropriate BMPs, EPA encourages small MS4 operators to participate in locally-based watershed planning efforts which attempt to involve a diverse group of stakeholders. Each new development and redevelopment project should have a BMP component. If an approach is chosen that primarily focuses on regional or non-structural BMPs, however, then the BMPs may be located away from the actual development site (*e.g.*, a regional water quality pond).

Non-structural BMPs are preventative actions that involve management and source controls such as: (1) Policies and ordinances that provide requirements and standards to direct growth to identified areas, protect sensitive areas such as wetlands and riparian areas, maintain and/or increase open space (including a dedicated funding source for open space acquisition), provide buffers along sensitive water bodies, minimize impervious surfaces, and minimize disturbance of soils and vegetation; (2) policies or ordinances that encourage infill development in higher density urban areas, and areas with existing storm sewer infrastructure; (3) education programs for developers and the public about project designs that minimize water quality impacts; and (4) other measures such as minimization of the percentage of impervious area after development, use of measures to minimize directly connected impervious areas, and source control measures often thought of as good housekeeping, preventive maintenance and spill prevention. Detailed examples of non-structural BMPs follow.

Preserving open space may help to protect water quality as well as provide other benefits such as recharging groundwater supplies, detaining storm water, supporting wildlife and providing recreational opportunities. Although securing funding for open space acquisition may be difficult, various funding mechanisms have been used. New Jersey uses a portion of their State sales tax (voter approved for a ten year period) as a stable source of funding to finance the preservation of historic sites, open space and farmland. Colorado uses part of the proceeds from the State lottery to acquire and manage open space. Some local municipalities use a percentage of the local sales tax revenue to pay for open space acquisition (*e.g.*, Jefferson County, CO has had an open space program in place since 1977 funded by a 0.50 percent sales tax). Open space can be acquired in the form of: fee simple purchase; easements; development rights; purchase and sellback or leaseback arrangements; purchase options; private land trusts; impact fees; and land dedication requirements. Generally, fee simple purchases provide the highest level of development control and certainty of preservation, whereas the other forms of acquisition may provide less control, though they would also generally be less costly.

Cluster development, while allowing housing densities comparable to conventional zoning practice, concentrates housing units in a portion of the total site area which provides for greater open space, recreation, stream protection and storm water control. This type of development, by reducing lot sizes, can protect sensitive areas and result in less impervious surface, as well as reduce the cost for roads and other infrastructure.

Minimizing directly connected impervious areas (DCIAs) is a drainage strategy that seeks to reduce paved areas and directs storm water runoff to landscaped areas or to structural controls such as grass swales or buffer strips. This strategy can slow the rate of runoff, reduce runoff volumes, attenuate peak flows, and encourage filtering and infiltration of storm water. It can be made an integral part of drainage planning for any development (Urban Drainage and Flood Control District, Denver, CO. 1992. *Urban Storm Drainage Criteria Manual, Volume 3—Best Management Practices).* The Urban Drainage and Flood Control District manual describes three levels for minimizing DCIAs. At Level 1 all impervious surfaces are made to drain over grass-covered areas before reaching a storm water conveyance system. Level 2 adds to Level 1 and replaces street curb and gutter systems with low-velocity grass-lined swales and pervious street shoulders. In addition to Levels 1 and 2, Level 3 over-sizes swales and configures driveway and street crossing culverts to use grass-lined swales as elongated detention basins.

Structural BMPs include: (1) Storage practices such as wet ponds and extended-detention outlet structures; (2) filtration practices such as grassed swales, sand filters and filter strips; and (3) infiltration practices such as infiltration basins and infiltration trenches.

EPA recommends that small MS4 operators ensure the appropriate implementation of the structural BMPs by considering some or all of the following: (1) Pre-construction review of BMP designs; (2) inspections during construction to verify BMPs are built as designed; (3) post-construction inspection and maintenance of BMPs; and (4) sanctions to ensure compliance with design, construction or operation and maintenance (O&M) requirements of the program.

EPA cautions that certain infiltration systems such as dry wells, bored wells or tile drainage fields may be subject to Underground Injection Control (UIC) program requirements (see 40 CFR Part 144.12.). To find out more about these requirements, contact your state UIC Program, or call EPA's Safe Drinking Water Hotline at 1–800–426–4791.

In order to meet the third post-construction requirement (ensuring adequate long-term O&M of BMPs), EPA recommends that small MS4 operators evaluate various O&M management agreement options. The most common options are agreements between the

MS4 operator and another party such as post-development landowners (*e.g.*, homeowners' associations, office park owners, other government departments or entities), or regional authorities (*e.g.*, flood control districts, councils of government). These agreements typically require the post-construction property owner to be responsible for the O&M and may include conditions which: allow the MS4 operator to be reimbursed for O&M performed by the MS4 operator that is the responsibility of the property owner but is not performed; allow the MS4 operator to enter the property for inspection purposes; and in some cases specify that the property owner submit periodic reports.

In providing the guidance above, EPA intends the requirements in today's rule to be consistent with the permit application requirements for large MS4s for post-construction controls for new development and redevelopment. MS4 operators have significant flexibility both to develop this measure as appropriate to address local concerns, and to apply new control technologies as they become available. Storm water pollution control technologies are constantly being improved. EPA recommends that MS4s be responsive to these changes, developments or improvements in control technologies. EPA will provide more detailed guidance addressing the responsibility for long-term O&M of storm water controls in guidance materials. The guidance will also provide information on appropriate planning considerations, structural controls and non-structural controls. EPA also intends to develop a broad menu of BMPs as guidance to ensure flexibility to accommodate local conditions.

EPA received comments suggesting that requirements for new development be treated separately from redevelopment in the rule. The comment stressed that new development on raw land presents fewer obstacles and more opportunities to incorporate elements for preventing water quality impacts, whereas redevelopment projects are constrained by space limitations and existing infrastructure. Another comment suggested allowing waivers from the redevelopment requirements if the redevelopment does not result in additional adverse water quality impacts, and where BMPs are not technologically or economically feasible. EPA recognizes that redevelopment projects may have more site constraints which narrow the range of appropriate BMPs. Today's rule provides small MS4 operators with the flexibility to develop requirements that may be different for redevelopment projects, and may also include allowances for alternate or off-site BMPs at certain redevelopment projects. Non-structural BMPs may be the most appropriate approach for smaller redevelopment projects.

EPA received comments requesting clarification on what is meant by "pre-development" conditions within the context of redevelopment. Pre-development refers to runoff conditions that exist onsite immediately before the planned development activities occur. Pre-development is not intended to be interpreted as that period before any human-induced land disturbance activity has occurred.

EPA received comments on the guidance language in the proposed rule and preamble which suggest that implementation of this measure should "attempt to maintain pre-development runoff conditions" and that "post-development conditions should not be different than pre-development conditions in a way that adversely affects water quality." Many comments expressed concern that maintaining pre-development runoff conditions is impossible and cost-prohibitive, and objected to any reference to "flow" or increase in volume of runoff. Other comments support the inclusion of this language in the final rule. Similar references in today's rule relating to pre-development runoff conditions are intended as *recommendations* to *attempt* to maintain pre-development runoff conditions. With these recommendations, EPA intends to prevent water quality impacts resulting from increased discharges of pollutants, which may result from increased volume of runoff. In many cases, consideration of the increased flow rate, velocity and energy of storm water discharges following development unavoidably must be taken into consideration in order to reduce the discharge of pollutants, to meet water quality standards and to prevent degradation of receiving streams. EPA recommends that municipalities consider these factors when developing their post-construction storm water management program.

Some comments said that the quoted phrases in the paragraph above are directives that imply federal land use control, which they argue is beyond the authority of the CWA. EPA recognizes that land use planning is within the authority of local governments.

EPA disagrees, however, with the implication that today's rule dictates any such land use decisions. The requirement for small MS4 operators to develop a program to address discharges resulting from new development and redevelopment is essentially a pollution prevention measure. The Rule provides the MS4 operator with flexibility to determine the appropriate BMPs to address local water quality concerns. EPA recognizes that these program goals may not be applied to every site, and expects that MS4s will develop an appropriate combination of BMPs to be applied on a site-by-site, regional or watershed basis.

vi. Pollution Prevention/Good Housekeeping for Municipal Operations. Under today's final rule, operators of MS4s must develop and implement an operation and maintenance program ("program") that includes a training component and has the ultimate goal of preventing or reducing storm water from municipal operations (in addition to those that constitute storm water discharges associated with industrial activity). This measure's emphasis on proper O&M of MS4s and employee training, as opposed to requiring the MS4 to undertake major new activities, is meant to ensure that municipal activities are performed in the most efficient way to minimize contamination of storm water discharges.

The program must include government employee training that addresses prevention measures pertaining to municipal operations such as: parks, golf courses and open space maintenance; fleet maintenance; new construction or land disturbance; building oversight; planning; and storm water system maintenance. The program can use existing storm water pollution prevention training materials provided by the State, Tribe, EPA, or environmental, public interest, or trade organizations.

EPA also encourages operators of MS4s to consider the following in developing a program: (1) Implement maintenance activities, maintenance schedules, and long-term inspection procedures for structural and non-structural storm water controls to reduce floatables and other pollutants discharged from the separate storm sewers; (2) implement controls for reducing or eliminating the discharge of pollutants from streets, roads, highways, municipal parking lots, maintenance and storage yards, waste transfer stations, fleet or maintenance shops with outdoor storage areas, and salt/sand storage locations and snow disposal areas operated by the MS4; (3) adopt procedures for the proper disposal of waste removed from the separate storm sewer systems and areas listed above in (2), including dredge

spoil, accumulated sediments, floatables, and other debris; and (4) adopt procedures to ensure that new flood management projects are assessed for impacts on water quality and existing projects are assessed for incorporation of additional water quality protection devices or practices. Ultimately, the effective performance of the program measure depends on the proper maintenance of the BMPs, both structural and non-structural. Without proper maintenance, BMP performance declines significantly over time. Additionally, BMP neglect may produce health and safety threats, such as structural failure leading to flooding, undesirable animal and insect breeding, and odors. Maintenance of structural BMPs could include: replacing upper levels of gravel; dredging of detention ponds; and repairing of retention basin outlet structure integrity. Maintenance of non-structural BMPs could include updating educational materials periodically.

EPA emphasizes that programs should identify and incorporate existing storm water practices and training, as well as non-storm water practices or programs that have storm water pollution prevention benefits, as a means to avoid duplication of efforts and reduce overall costs. EPA recommends that MS4s incorporate these new obligations into their existing programs to the greatest extent feasible and urges States to evaluate MS4 programs with programmatic efficiency in mind. EPA designed this minimum control measure as a modified version of the permit application requirements for medium and large MS4s described at 40 CFR 122.26(d)(2)(iv), in order to provide more flexibility for these smaller MS4s. Today's requirements provide for a consistent approach to control pollutants from O&M among medium, large, and regulated small MS4s.

By properly implementing a program, operators of MS4s serve as a model for the rest of the regulated community. Furthermore, the establishment of a long-term program could result in cost savings by minimizing possible damage to the system from floatables and other debris and, consequently, reducing the need for repairs.

EPA received comments requesting clarification of what this measure requires. Certain municipalities expressed concern that the measure has the potential to impose significant costs associated with EPA's requirement that operators of MS4s consider implementing controls for reducing or eliminating the discharge of pollutants from streets, roads, highways, municipal parking lots, and salt/sand storage locations and snow disposal areas operated by the municipality. EPA disagrees that a requirement to *consider* such controls will impose considerable costs.

One commenter objected to the preamble language from the proposal suggesting that EPA does not expect the MS4 to undertake new activity. While it remains the Agency's expectation that major new activity will not be required, the MEP process should drive MS4s to incorporate the measure's obligations into their existing programs to achieve the pollutant reductions to the maximum extent practicable.

Certain commenters requested a definition for "municipal operations." EPA has revised the language to more clearly define municipal operations. Questions may remain concerning whether discharges from specific municipal activities constitute discharges associated with industrial activities (requiring NPDES permit authorization according to the requirements for industrial storm water that apply in that State) or from municipal operations (subject only to the controls developed in the MS4 control program). Even though there may be different substantive requirements that apply depending on the source of the discharge, EPA has modified the deadlines for permit coverage so that all the regulated municipally owned and operated sources become subject to permit requirements on the same date. The deadline is the same for permit coverage for this minimum measure as for permit coverage for municipally owned/operated industrial sources.

c. Application Requirements

An NPDES permit that authorizes the discharge from a regulated small MS4 may take the form of either an individual permit issued to one or more facilities as co-permittees or a general permit that applies to a group of MS4s. For reasons of administrative efficiency and to reduce the paperwork burden on permittees, EPA expects that most discharges from regulated small MS4s will be authorized under general permits. These NPDES general permits will provide specific instructions on how to obtain coverage, including application requirements. Typically, such application requirements will be satisfied by the submission of a Notice of Intent (NOI) to be covered by the general permit. In this section, EPA explains the small MS4 operator's application requirements for obtaining coverage under a NPDES permit for storm water.

i. Best Management Practices and Measurable Goals, Section 122.34(d) of today's rule requires the operator of a regulated small MS4 that wishes to implement a program under § 122.34 to identify and submit to the NPDES permitting authority a list of the best management practices ("BMPs") that will be implemented for each minimum control measure in their storm water management program. They also must submit measurable goals for the development and implementation of each BMP. The BMPs and the measurable goals must be included either in an NOI to be covered under a general permit or in an individual permit application.

The operator's submission must identify, as appropriate, the months and years in which the operator will undertake actions required to implement each of the minimum control measures, including interim milestones and the frequency of periodic actions. The Agency revised references to "starting and completing" actions from the proposed rule because many actions will be repetitive or ongoing. The submission also must identify the person or persons responsible for implementing or coordinating the small MS4 storm water program. See § 122.34(d). The submitted BMPs and measurable goals become enforceable according to the terms of the permit. The first permit can allow the permittee up to five years to fully implement the storm water management program.

Several commenters opposed making the measurable goals enforceable permit conditions. Some suggested that a permittee should be able to change its goals so that BMPs that are not functioning as intended can be replaced. EPA agrees that a permittee should be free to switch its BMPs and corresponding goals to others that accomplish the minimum measure or measures. The permittee is required to implement BMPs that address the minimum measures in § 122.34(b). If the permittee determines that its original combination of BMPs are not adequate to achieve the objectives of the municipal program, the MS4 should revise its program to implement BMPs that are adequate and submit to the permitting authority a revised list of BMPs and measurable goals. EPA suggests that permits describe the process for revising BMPs and measurable goals, such as whether the permittee should follow the same procedures as were required for the submission of the original NOI and whether the permitting authority's approval is necessary prior to the permittee implementing the revised

BMPs. The permittee should indicate on its periodic report whether any BMPs and measurable goals have been revised since the last periodic report.

Some commenters expressed concern that making the measurable goals enforceable would encourage the development of easily attained goals and, conversely, discourage the setting of ambitious goals. Others noted that it is often difficult to determine the pollutant reduction that can be achieved by BMPs until several years after implementation. Much of the opposition to the enforceability of measurable goals appears to have been based on a mistaken understanding that measurable goals must consist of pollutant reduction targets to be achieved by the corresponding BMPs.

Today's rule requires the operator to submit either measurable goals that serve as BMP design objectives or goals that quantify the progress of implementation of the actions or performance of the permittee's BMPs. At a minimum, the required measurable goals should describe specific actions taken by the permittee to implement each BMP and the frequency and the dates for such actions. Although the operator may choose to do so, it is not required to submit goals that measure whether a BMP or combination of BMPs is effective in achieving a specific result in terms of storm water discharge quality. For example, a measurable goal might involve a commitment to inspect a given number of drainage areas of the collection system for illicit connections by a certain date. The measurable goal need not commit to achieving a specific amount of pollutant reduction through the elimination of illicit connections. Other measurable goals could include the date by which public education materials would be developed, a certain percentage of the community participating in a clean-up campaign, the development of a mechanism to address construction site runoff, and a reduction in the percentage of imperviousness associated with new development projects.

To reduce the risk that permittees will develop inadequate BMPs, EPA intends to develop a menu of BMPs to assist the operators of regulated small MS4s with the development of municipal programs. States may also develop a menu of BMPs. Today's rule provides that the measurable goals that demonstrate compliance with the minimum control measures in §§ 122.34 (b)(3) through (b)(6) do not have to be met if the State or EPA has not issued a menu of BMPs at the time the MS4 submits its NOI. Commenters pointed out that the proposed rule would have made the measurable goals unenforceable if the menu of BMPs was not available, but the proposal was silent as to the enforceability of the implementation of BMPs. Today's rule clarifies that the operators are not free to do nothing prior to the issuance of a menu of BMPs; they still must make a good faith effort to implement the BMPs designed to comply with each measure. See § 122.34(d)(2). The operators would not, however, be liable for failure to meet its measurable goals if a menu of BMPs was not available at the time they submit their NOI.

The proposed rule provision in § 123.35 stated that the "[f]ailure to issue the menu of BMPs would not affect the legal status of the general permit." This concept is included in the final rule in § 122.34(d)(2)'s clarification that the permittee still must comply with other requirements of the general permit.

Unlike the proposed rule, today's rule does not require that each BMP in the menu developed by the State or EPA be regionally appropriate, cost-effective and field-tested. Various commenters criticized those criteria as unworkable, and one described them as "ripe for ambiguity and abuse." Other commenters feared that the operators of regulated small MS4s would never be required to achieve their goals until menus were developed that were cost-effective, field-tested and appropriate for every conceivable subregion.

While some municipal commenters supported the requirement that a menu of BMPs be made available that included BMPs that had been determined to be regionally appropriate, field-tested and cost-effective, others raised concerns that they would be restricted to a limited menu. Some commenters supported such a detailed menu because they thought they would only be able to select BMPs that were on the menu, while others thought that it was the permitting authority's responsibility to develop BMPs narrowly tailored to their situation. In response, EPA notes that the operators will not be restricted to implementing only, or all of, the BMPs included on the menu. Since the menu does not require permittees to implement the BMPs included on the menu, it is also not necessary to apply the public notice and other procedures that some commenters thought should be applied to the development of the menu of BMPs.

The purpose of the BMP menu is to provide guidance to assist the operators of regulated small MS4s with the development and refinement of their local program, not to limit their options. Permittees may implement BMPs other than those on the menu unless a State restricts its permittees to specific BMPs. To the extent possible, EPA will develop a menu of BMPs that describes the appropriateness of BMPs to specific regions, whether the BMPs have been field-tested, and their approximate costs. The menu, however, is not intended to relieve permittees of the need to implement BMPs that are appropriate for their specific circumstances.

If there are no known relevant BMPs for a specific circumstance, a permittee has the option of developing and implementing pilot BMPs that may be better suited to their circumstances. Where BMPs are experimental, the permittee should consider committing to measurable goals that address its schedule for implementing its selected BMPs rather than goals of achieving specific pollutant reductions. If the BMPs implemented by the permittee do not achieve the desired objective, the permittee may be required to commit to different or revised BMPs.

As stated in § 123.35(g), EPA is committed to issuing a menu of BMPs prior to the deadline for the issuance of permits. This menu would serve as guidance for all operators of regulated small MS4s nationwide. After developing the initial menu of BMPs, EPA intends to periodically modify, update, and supplement the menu of BMPs based on the assessments of the MS4 storm water program and research. States may rely on EPA's menu of BMPs or issue their own. If States develop their own menus, they would constitute additional guidance (or perhaps requirements in some States) for the operators to follow. Several commenters were confused by the proposed rule language that stated that States must provide or issue a menu of BMPs and, if they fail to do so, EPA "may" do so. Some read this language as not requiring either EPA or the State to develop the menu. EPA had intended that it would develop a menu and that States could either provide the EPA developed menu or one developed by the State.

EPA has dropped the proposed language that States "must" develop the menu of BMPs. Some commenters thought that it was inappropriate to require States to issue guidance. A menu of BMPs issued by either EPA or a permittee's State will satisfy the condition in § 122.34(d) that a regulatory authority provide a menu of BMPs. A State could require its permittees to follow its menu of BMPs provided that they are adequate to implement § 122.34(b).

Several commenters raised concerns that operators of small MS4s could be

required to submit their BMPs and measurable goals before EPA or the State has issued a menu of BMPs. EPA has assumed primary responsibility for developing a menu of BMPs to minimize the possibility of this occurring. Should a general permit be issued before a menu of BMPs is available, the permit writer would have the option of delaying the date by which the identification of the BMPs and measurable goals must be submitted to the permitting authority until some time after a menu of BMPs is available.

Several municipal commenters raised concerns that they would begin to develop a program only to be later told by the permitting authority or challenged in a citizen suit that their BMPs were inadequate. They expressed a need for certainty regarding what their permit required. Several commenters suggested that EPA require permitting authorities to approve or disapprove the submitted BMPs and measurable goals. EPA disagrees that formal approval or disapproval by the permitting authority is needed.

EPA acknowledges that the lack of a formal approval process does place on the permittee some responsibility for designing and determining the adequacy of its BMPs. Once the permittee has submitted its BMPs to the permitting authority as part of its NOI, it must implement them in order to achieve the corresponding measurable goals. EPA does not believe that this results in the uncertainty to the extent expressed by some commenters or unduly expose the permittee to the risk of citizen suit. If the permit is very specific regarding what the permittee must do, then the uncertainty is eliminated. If the permit is less prescriptive, the permittee has greater latitude in determining for itself what constitutes an adequate program. A citizen suit could impose liability on the permittee only if the program that it develops and implements clearly does not satisfy the requirements of the general permit. EPA believes today's approach strikes a balance between the competing goals of providing certainty as to what constitutes an adequate program and providing flexibility to the permittees.

Commenters were divided on whether five years was a reasonable and expeditious schedule for a MS4 to implement its program. Some thought that it was an appropriate amount of time to allow for the development and implementation of adequate programs. One questioned whether the permittee had to be implementing all of its program within that time, and suggested that there may be cases where a permitting authority would need flexibility to allow more time. One commenter suggested that five years is too long and would amount to a relaxation of implementation in their area. EPA believes it will take considerable time to complete the tasks of initially developing a program, commencing to implement it, and achieving results. EPA notes, however, that full implementation of an appropriate program must occur as expeditiously as possible, and not later than five years.

EPA solicited comment on how an NOI form might best be formatted to allow for measurable goal information (*e.g.*, through the use of check boxes or narrative descriptions) while taking into account the Agency's intention to facilitate computer tracking. All commenters supported the development of a checklist NOI, but most noted that there would need to be room for additional information to cover unusual situations. One noted that, while a summary of measurable goals might be reduced to one sheet, attachments that more fully described the program and the planned BMPs would be necessary. EPA agrees that in most cases a "checklist" will not be able to capture the information on what BMPs a permittee intends to implement and its measurable goals for their implementation. EPA will continue to consider whether to develop a model NOI form and make it available for permitting authorities that choose to use it. What will be required on an MS4's NOI, however, is more extensive than what is usually required on an NOI, so a "form" NOI for MS4s may be impractical.

ii. Individual Permit Application for a § 122.34(b) program. In some cases, an operator of a regulated small MS4s may seek coverage under an individual NPDES permit, either because it chooses to do so or because the NPDES permitting authority has not made the general permit option available to that source. For small MS4s that are to implement a § 122.34(b) program in today's rule, EPA is promulgating simplified individual permit application requirements at § 122.33(b)(2)(i). Under the simplified individual permit application requirements, the operator submits an application to the NPDES permitting authority that includes the information required under § 122.21(f) and an estimate of square mileage served by the small MS4. They are also required to supply the BMP and measurable goal information required under § 122.34(d). Consistent with CWA section 308 and analogous State law, the permitting authority could request any additional information to gain a better understanding of the system and the areas draining into the system.

Commenters suggested that the requirements of § 122.21(f) are not necessarily applicable to a small MS4. One suggested that it was not appropriate to require the following information: a description of the activities conducted by the applicant which require it to obtain an NPDES permit; the name, mailing address, and location of the facility; and up to four Standard Industrial Classification ("SIC") codes which best reflect the principal products or services provided by the facility. In response, EPA notes that the requirements in § 122.21(f) are generic application requirements applicable to NPDES applicants. With the exception of the SIC code requirement, EPA believes that they are applicable to MS4s. In the SIC code portion of the standard application, the applicant may simply put "not applicable."

One commenter asked that EPA clarify whether § 122.21(f)(5)'s requirement to indicate "whether the facility is located on Indian lands," referred to tribal lands, Indian country, or Indian reservations. For some local governments this is a complex issue with no easy "yes" or "no" answer. See the discussion in the Section II.F in the proposal to today's rule regarding what tribal lands are subject to the federal trust responsibility for purposes of the NPDES program.

One commenter suggested that the application should not have to list the permits and approvals required under § 122.21(f)(6). EPA notes that the applicant must only list the environmental permits that the applicant has received that cover the small MS4. The applicant is not required to list permits for other operations conducted by the small MS4 operator (*e.g.*, for an operation of an airport or landfill). Again, in most cases the applicant could respond "not applicable" to this portion of the application.

One commenter suggested that the topographic map requirement of § 122.21(f)(7) was completely different from, and significantly more onerous than, the mapping requirement outlined in the proposed rule at § 122.34(b)(3)(i). EPA agrees and has modified the final rule to clarify that a map that satisfies the requirements of § 122.34(b)(3)(i) also satisfies the map requirements for MS4 applicants seeking individual permits under § 122.33(b)(2)(i).

EPA is adding a new paragraph to § 122.44(k) to clarify that requirements to implement BMPs developed pursuant to CWA 402(p) are appropriate permit

conditions. While such conditions could be included under the existing provision in § 122.44(k)(3) for "practices reasonably necessary to achieve effluent limitations and standards or to carry out the purposes and intent of the CWA," EPA believes it is clearer to specifically list in § 122.44(k) BMPs that implement storm water programs in light of the frequency with which they are used as effluent limitations.

iii. Alternative Permit Options/Tenth Amendment. As an alternative to implementing a program that addresses each of the six minimum measures according to the requirements of § 122.34(b), today's rule provides the operators of regulated small MS4s with the option of applying for an individual permit under existing § 122.26(d). *See* § 122.33(b)(2)(ii). If a system operator does not want to be held accountable for implementation of each of the minimum measures, an individual permit option under § 122.33(b)(2)(ii) remains available. (As explained in the next section of this preamble, § 122.35(b) also provides an opportunity for relief from permit obligations for some of the minimum measures, but that relief exists within the framework of the minimum measures.)

EPA originally drafted the individual permit application requirements in § 122.26(d) to apply to medium and large MS4s. Today's rule abbreviates the individual permit application requirements for small MS4s. Although EPA believes that the storm water management program requirements of § 122.34, including the minimum measures, provide the most appropriate means to control pollutants from most small MS4s, the Agency does recognize that the operators of some small MS4s may prefer more individualized permit requirements. Among other possible reasons, an operator may seek to avoid having to "regulate" third parties discharging into the separate storm sewer system. Alternatively, an operator may determine that structural controls, such as constructed wetlands, are more appropriate or effective to address the discharges that would otherwise be addressed under the construction and/or development/redevelopment measures.

Some MS4s commenters alleged that an absolute requirement to implement the minimum measures violates the Tenth Amendment to the U.S. Constitution. While EPA disagrees that requiring MS4s to implement the minimum measures would violate the Constitution, today's rule does provide small MS4s with the option of developing more individualized measures to reduce the pollutants and pollution associated with urban storm water that will be regulated under today's rule.

Some commenters specifically objected that § 122.34's minimum measures for small MS4s violate the Tenth Amendment insofar as they require the operators of MS4s to regulate third parties. The minimum measures include requirements for small MS4 operators to prohibit certain non-storm water discharges, control storm water discharges from construction greater than one acre, and take other actions to control third party sources of storm water discharges into their MS4s. Commenters also argued that it was inappropriate for EPA to require local governments to enact ordinances that will consume local revenues and put local governments in the position of bearing the political responsibility for implementing the program. One commenter argued that EPA was prohibited from conditioning the issuance of an NPDES permit upon the small MS4 operators waiving their constitutional right to be free from such requirements to regulate third parties. The Agency replies to each comment in turn.

Because the rule does rely on local governments—who operate municipal separate storm sewer systems—to regulate discharges from third parties into storm sewers, EPA acknowledges that the rule implicates the Tenth Amendment and constitutional principles of federalism. EPA disagrees, however, that today's rule is inconsistent with federalism principles. [As political subdivisions of States, municipalities enjoy the same protections as States under the Tenth Amendment.]

The Supreme Court has interpreted the Tenth Amendment to preclude federal actions that compel States or their political subdivisions to enact or administer a federal regulatory program. *See New York* v. *United States,* 505 U.S. 144 (1992); *Printz* v. *United States,* 117 S.Ct. 2365 (1997). The *Printz* case, however, did acknowledge that the restriction does not apply when federal requirements of general applicability—requirements that regulate all parties engaging in a particular activity—do not excessively interfere with the functioning of State governments when those requirements are applied to States (or their political subdivisions). *See Printz,* 117 S.Ct. at 2383.

Today's rule imposes a federal requirement of general applicability, namely, the requirement to obtain and comply with an NPDES permit, on municipalities that operate a municipal separate storm sewer system. By virtue of this rule, the permit will require the municipality/storm sewer operator to develop a storm water control program. The rule specifies the components of the control program, which are primarily "management'-type controls, for example, municipal regulation of third party storm water discharges associated with construction, as well as development and redevelopment, when those discharges would enter the municipal system.

Unlike the circumstances reviewed in the *New York* and *Printz* cases, today's rule merely applies a generally applicable requirement (the CWA permit requirement) to municipal point sources. The CWA establishes a generally applicable requirement to obtain an NPDES permit to authorize point source discharge to waters of the United States. Because municipalities own and operate separate storm sewers, including storm sewers into which third parties may discharge pollutants, NPDES permits may require municipalities to control the discharge of pollutants into the storm sewers in the first instance. Because NPDES permits can impose end-of-pipe numeric effluent limits, narrative effluent limits in the form of "management" program requirements are also within the scope of Clean Water Act authority. As noted above, however, EPA believes that such narrative limitations are the most appropriate form of effluent limitation for these types of permits. For municipal separate storm sewer permits, CWA section 402(p)(3)(B)(iii) specifically authorizes "controls to reduce pollutants to the maximum extent practicable, including management practices, control techniques and system, design and engineering methods, and such other provisions as the Administrator or the State determines appropriate for the control of such pollutants."

The Agency did not design the minimum measures in § 122.34 to "commandeer" state regulatory mechanisms, but rather to reduce pollutant discharges from small MS4s. The permit requirement in CWA section 402 is a requirement of general applicability. The operator of a small MS4 that does not prohibit and/or control discharges into its system essentially accepts "title" for those discharges. At a minimum, by providing free and open access to the MS4s that convey discharges to the waters of the United States, the municipal storm sewer system enables water quality impairment by third parties. Section 122.34 requires the operator of a regulated small MS4 to control a third

party only to the extent that the MS4 collection system receives pollutants from that third party and discharges it to the waters of the United States. The operators of regulated small MS4s cannot passively receive and discharge pollutants from third parties. The Agency concedes that administration of a municipal program will consume limited local revenues for implementation; but those consequences stem from the municipal operator's identity as a permitted sewer system operator. The Tenth Amendment does not create a blanket municipal immunity from generally applicable requirements. Development of a program based on the minimum measures and implementation of that program should not "excessively interfere" with the functioning of municipal government, especially given the "practicability" threshold under CWA section 402(p)(3)(B)(iii).

As noted above, today's rule also allows regulated small MS4s to opt out of the minimum measures approach. The individual permit option provides for greater flexibility in program implementation and also responds to the comment about requiring a municipal permit applicant's waiver of any arguable constitutional rights. The individual permit option responds to questions about the rule's alleged unconstitutionality by more specifically focusing on the pollutants discharged from municipal point sources. Today's rule gives operators of MS4s the option to seek an individual permit that varies from the minimum measures/ management approach that is otherwise specified in today's rule. Even if the minimum measures approach was constitutionally suspect, a requirement that standing alone would violate constitutional principles of federalism does not raise concerns if the entity subject to the requirement may opt for an alternative action that does not raise a federalism issue.

For municipal system operators who seek to avoid third party regulation according to all or some of the minimum measures, § 122.26(d) requires the operator to submit a narrative description of its storm water sewer system and any existing storm water control program, as well as the monitoring data to enable the permit writer to develop appropriate permit conditions. The permit writer can then develop permit conditions and limitations that vary from the six minimum measures prescribed in today's rule. The information will enable the permit writer to develop an NPDES permit that will result in pollutant reduction to the maximum extent practicable. *See NRDC* v. *EPA*, 966 F.2d at 1308, n17. If determined appropriate under CWA section 402(p)(3)(B)(iii), for example BMPs to meet water quality standards, the permit could also incorporate any more stringent or prescriptive effluent limits based on the individual permit application information.

For small MS4 operators seeking an individual permit, both Part 1 and Part 2 of the application requirements in § 122.26(d)(1) and (2) are required to be submitted within 3 years and 90 days of the date of publication of this **Federal Register** notice. Some of the information required in Part 1 will necessarily have to be developed by the permit applicant prior to the development of Part 2 of the application. The permit applicant should coordinate with its permitting authority regarding the timing of review of the information.

The operators of regulated small MS4s that apply under § 122.26(d) may apply to implement certain of the § 122.34(b) minimum control measures, and thereby focus the necessary evaluation for additional limitations on alternative controls to the § 122.34(b) measures that the small MS4 will not implement. The permit writer may determine "equivalency" for some or all of the minimum measures by developing a rough estimate of the pollutant reduction that would be achieved if the MS4 implemented the § 122.34 minimum measure and to incorporate that pollutant reduction estimate in the small MS4's individual permit as an effluent limitation. The Agency recognizes that, based on current information, any such estimates will probably have a wide range. Anticipation of this wide range is one of the reasons EPA believes MS4 operators need flexibility in determining the mix of BMPs (under the minimum measures) to achieve water quality objectives. Therefore, for example, if a system operator seeks to employ an alternative that involves structural controls, wide ranges will probably be associated with gross pollutant reduction estimates. Permit writers will undoubtedly develop other ways to ensure that permit limits ensure reduction of pollutants to the maximum extent practicable.

Small MS4 operators that pursue this individual permit option do not need to submit details about their future program requirements (*e.g.*, the MS4's future plans to obtain legal authority required by §§ 122.26(d)(1)(ii) and (d)(2)). A small MS4 operator might elect to supply such information if it intends for the permit writer to take those plans into account when developing the small MS4's permit conditions.

Several operators of small MS4s commented that they currently lacked the authority they would need to implement one or more of the minimum measures in § 122.34(b). Today's rule recognizes that the operators of some small MS4s might not have the authority under State law to implement one or more of the measures using, for example, an ordinance or other regulatory mechanism. To address these situations, each minimum measure in § 122.34(b) that would require the small MS4 operator to develop an ordinance or other regulatory mechanism states that the operator is only required to implement that requirement to "the extent allowable under State, Tribal or local law." See § 122.34(b)(3)(ii) (illicit discharge elimination), § 122.34(b)(4)(ii) (construction runoff control) and § 122.34(b)(5)(ii) (post-construction storm water management). This regulatory language does not mean that a operator of a small MS4 with ordinance making authority can simply fail to pass an ordinance necessary for a § 122.34(b) program. The reference to "the extent allowable under * * * local law" refers to the local laws of *other* political subdivisions to which the MS4 operator is subject. Rather, a small MS4 operator that seeks to implement a program under section § 122.34(b) may omit a requirement to develop an ordinance or other regulatory mechanism only to the extent its municipal charter, State constitution or other legal authority prevents the operator from exercising the necessary authority. Where the operator cannot obtain the authority to implement any activity that is only required to "the extent allowable under State, Tribal or local law," the operator may satisfy today's rule by administering the remaining § 122.34(b) requirements.

Finally, although today's rule provides operators of small MS4s with an option of applying for a permit under § 122.26(d), States authorized to administer the NPDES program are not required to provide this option. NPDES-authorized States could require all regulated small MS4s to be permitted under the minimum measures management approach in § 122.34 as a matter of State law. Such an approach would be deemed to be equally or more stringent than what is required by today's rule. *See* 40 CFR 123.2(i). The federalism concerns discussed above do not apply to requirements imposed by a State on its political subdivisions.

iv. Satisfaction of Minimum Measure Obligations by Another Entity. An operator of a regulated small MS4 may

satisfy the requirement to implement one or more of the six minimum measures in § 122.34(b) by having a third party implement the measure or measures. Today's rule provides a variety of means for small MS4 operators to share responsibility for different aspects of their storm water management program. The means by which the operators of various MS4s share responsibility may affect who is ultimately responsible for performance of the minimum measure and who files the periodic reports on the implementation of the minimum measure. Section 122.35 addresses these issues. The rule describes two different variants on third party implementation with different consequences if the third party fails to implement the measure.

If the permit covering the discharge from a regulated small MS4 identifies the operator as the entity responsible for a particular minimum control measure, then the operator-permittee remains responsible for the implementation of that measure even if another entity has agreed to implement the control measure. Section 122.35(a). Another party may satisfy the operator-permittee's responsibility by implementing the minimum control measure in a manner at least as stringent or prescriptive as the corresponding NPDES permit requirement. If the third party fails to do so, the operator-permittee remains responsible for its performance. The operator of the MS4 should consider entering into an agreement with the third party that acknowledges the responsibility to implement the minimum measure. The operator-permittee's NOI and its annual § 122.34(f)(3) reports submitted to the NPDES permitting authority must identify the third party that is satisfying one or more of the permit obligations. This requirement ensures that the permitting authority is aware which entity is supposed to implement which minimum measures.

If, on the other hand, the regulated small MS4's permit recognizes that an NPDES permittee other than the operator-permittee is responsible for a particular minimum control measure, then the operator-permittee is relieved from the responsibility for implementing that measure. The operator-permittee is also relieved from the responsibility for implementing any measure that the operator's permit indicates will be performed by the NPDES permitting authority. Section 122.35(b). The MS4 operator-permittee would be responsible for implementing the remaining minimum measures.

Today's final rule differs from the proposed version of § 122.35(b), which stated that, even if the third party's responsibility is recognized in the permit, the MS4 operator-permittee remained responsible for performance if the third party failed to perform the measure consistent with § 122.34(b). Under today's rule, the operator-permittee is relieved from responsibility for performance of a measure if the third party is an NPDES permittee whose permit makes it responsible for performance of the measure (including, for example, a State agency other than the State agency that issues NPDES permits) or if the third party is the NPDES permitting authority itself. Because the permitting authority is acknowledging the third party's responsibility in the permit, commenters thought that the MS4 operator-permittee should not be responsible for ensuring that the other entity is implementing the control measure properly. EPA agrees that the operator-permittee should not be conditionally responsible when the requirements are enforceable against some other NPDES permittee. If the third party fails to perform the minimum measure, the requirements will be enforceable against the third party. In addition, the NPDES permitting authority could reopen the operator-permittee's permit under § 122.62 and modify the permit to make the operator responsible for implementing the measure. A new paragraph has been added to § 122.62 to clarify that the permit may be reopened in such circumstances.

Today's rule also provides that the operator-permittee is not conditionally responsible where it is the State NPDES permitting authority itself that fails to implement the measure. The permitting authority does not need to issue a permit to itself (i.e., to the same State agency that issues the permit) for the sole purpose of relieving the small MS4 from responsibility in the event the State agency does not satisfy its obligation to implement a measure. EPA does not believe that the small MS4 should be responsible in the situation where the NPDES permit issued to the small MS4 operator recognizes that the State agency that issues the permit is responsible for implementing a measure. If the State does fail to implement the measure, the State agency could be held accountable for its commitment in the permit to implement the measure. Where the State does not fulfill its responsibility to implement a measure, a citizen also could petition for withdrawal of the State's NPDES program or it could petition to have the MS4's permit reopened to require the MS4 operator to implement the measure.

EPA notes that not every State program that addresses erosion and sediment control from construction sites will be adequate to satisfy the requirement that each regulated small MS4 have a program to the extent required by § 122.34(b)(4). For example, although all NPDES States are required to issue NPDES permits for construction activity that disturbs greater than one acre, the State's NPDES permit program will not necessarily be extensive enough to satisfy a regulated small MS4's obligation under § 122.34(b)(4). NPDES States will not necessarily be implementing all of the required elements of that minimum measure, such as procedures for site plan review in each jurisdiction required to develop a program and procedures for receipt and consideration of information submitted by the public on individual construction sites. In order for a State erosion and sediment control program to satisfy a small MS4 operator's obligation to implement § 122.34(b)(4), the State program would have to include all of the elements of that minimum measure.

Where the operator-permittee is itself performing one or more of the minimum measures, the operator-permittee remains responsible for all of the reporting requirements under § 122.34(f)(3). The operator-permittee's reports should identify each entity that is performing the control measures within the geographic jurisdiction of the regulated small MS4. If the other entity also operates a regulated MS4 and files reports on the progress of implementation of the measures within the geographic jurisdiction of the MS4, then the operator-permittee need not include that same information in its own reports.

If the other entity operates a regulated MS4 and is performing all of the minimum measures for the permittee, the permittee is not required to file the reports required by § 122.34(f)(3). This relief from reporting is specified in § 122.35(a).

Section 122.35 addresses the concerns of some commenters who sought relief for governmental facilities that are classified as small MS4s under today's rule. These facilities frequently discharge storm water through another regulated MS4 and could be regulated by that MS4's program. For example, a State owned office complex that operates its storm sewer system in an urbanized area will be regulated as an MS4 under today's rule even though its system may be subject to the storm water controls of the municipality in

which it is located. Today's rule specifically revised the definition of MS4 to recognize that different levels of government often operate MS4s and that each such separate entity (including the federal government) should be responsible for its discharges. If both MS4s agree, the downstream MS4 can develop a storm water management program that regulates the discharge from both MS4s. The upstream small MS4 operator still must submit an NOI that identifies the entity on which the upstream small MS4 operator is relying to satisfy its permit obligations. No reports are required from the upstream small MS4 operator, but the upstream operator must remain in compliance with the downstream MS4 operator's storm water management program. This option allows small MS4s to work together to develop one storm water management program that satisfies the permit obligations of both. If they cannot agree, the upstream small MS4 operator must develop its own program.

As mentioned previously, comments from federal facilities and State organizations that operate MS4s requested that their permit requirements differ from those of MS4s that are political subdivisions of States (cities, towns, counties, etc.). EPA acknowledges that there are differences; e.g., many federal and State facilities do not serve a resident population and thus might require a different approach to public education. EPA believes, however, that MS4s owned by State and federal governments can develop storm water management plans that address the minimum measures. Federal and State owned small MS4s may choose to work with adjacent municipally owned MS4s to develop a unified plan that addresses all of the required measures within the jurisdiction of all of the contiguous MS4s. The options in § 122.35 minimize the burden on small MS4s that are covered by another MS4's program.

One commenter recommended that if one MS4 discharges into a second MS4, the operator of the upstream MS4 should have to provide a copy of its NOI or permit application to the operator of the receiving MS4. EPA did not adopt this recommendation because the NOI and permit application will be publicly available; but EPA does recommend that NPDES permitting authorities consider it as a possible permit requirement. The commenter also suggested that monitoring data should be collected by the upstream MS4 and provided to the downstream MS4. EPA is not adopting such a uniform monitoring requirement because EPA believes it is more appropriate to let the MS4 operators work out the need for such data. If necessary, the downstream MS4s might want to make such data a condition to allowing the upstream MS4 to connect to its system.

v. Joint Permit Programs. Many commenters supported allowing the operators of small MS4s to apply as co-permittees so they each would not have to develop their own storm water management program. Today's rule specifically allows regulated small MS4s to join with either other small MS4s regulated under § 122.34(d) or with medium and large MS4s regulated under § 122.26(d).

As is discussed in the previous section, regulated small MS4s may indicate in their NOIs that another entity is performing one or more of its required minimum control measures. Today's rule under § 122.33(b)(1) also specifically allows the operators of regulated small MS4s to jointly submit an NOI. The joint NOI must clearly indicate which entity is required to implement which control measure in each geographic jurisdiction within the service area of the entire small MS4. The operator of each regulated small MS4 remains responsible for the implementation of each minimum measure for its MS4 (unless, as is discussed in the previous section above, the permit recognizes that another entity is responsible for completing the measure.) The joint NOI, therefore, is legally equivalent to each entity submitting its own NOI. EPA is, however, revising the rule language to specifically authorize the joint submission of NOIs in response to comments that suggested that such explicit authorization might encourage programs to be coordinated on a watershed basis.

Section 122.33(b)(2)(iii) authorizes regulated small MS4s to jointly apply for an individual permit to implement today's rule, where allowed by an NPDES permitting authority. The permit application should contain sufficient information to allow the permitting authority to allocate responsibility among the parties under one of the two permitting options in §§ 122.33(b)(2)(i) and (ii).

Section 122.33(b)(3) of today's rule also allows an operator of a regulated small MS4 to join as a co-permittee in an existing NPDES permit issued to an adjoining medium or large MS4 or source designated under the existing storm water program. This co-permittee option applies only with the agreement of all co-permittees. Under this co-permittee arrangement, the operator of the regulated small MS4 must comply with the terms and conditions of the applicable permit rather than the permit condition requirements of § 122.34 of today's rule. The regulated small MS4 that wishes to be a co-permittee must comply with the applicable requirements of § 122.26(d), but would not be required to fulfill all the permit application requirements applicable to medium and large MS4s. Specifically, the regulated small MS4 is not required to comply with the application requirements of § 122.26(d)(1)(iii) (Part 1 source identification), § 122.26 (d)(1)(iv) (Part 1 discharge characterization), and § 122.26(d)(2)(iii) (Part 2 discharge characterization data). Furthermore, the regulated small MS4 operator could satisfy the requirements in § 122.26(d)(1)(v) (Part 1 management programs) and § 122.26(d)(2)(iv) (Part 2 proposed management program) by referring to the adjoining MS4 operator's existing plan. An operator pursuing this option must describe in the permit modification request how the adjoining MS4's storm water program addresses or needs to be supplemented in order to adequately address discharges from the MS4. The request must also explain the role of the small MS4 operator in coordinating local storm water activities and describe the resources available to accomplish the storm water management plan.

EPA sought comments regarding the appropriateness of the application requirements in these subsections of § 122.26(d). One commenter stated that newly regulated smaller MS4s should not be required to meet the existing regulations' Part II application requirements under § 122.26(d) regarding the control of storm water discharges from industrial activity. EPA disagrees. The smaller MS4 operators designated for regulation in today's rule may satisfy this requirement by referencing the legal authority of the already regulated MS4 program to the extent the newly regulated MS4 will rely on such legal authority to satisfy its permit requirements. If the smaller MS4 operator plans to rely on its own legal authorities, it must identify it in the application. If the smaller MS4 operator does not elect to use its own legal authority, they may file an individual permit application for an alternate program under § 122.33(b)(2)(ii).

The explanatory language in § 122.33(b)(3) recommends that the smaller MS4s designated under today's rule identify how an existing plan "would need to be supplemented in order to adequately address your discharges." One commenter suggested that this must be regulatory language and not guidance. EPA disagrees that this needs to be mandatory language.

Since many of the smaller MS4s designated today are "donut holes" within the geographic jurisdiction of an already regulated MS4, the larger MS4's program generally will be adequate to address the newly regulated MS4's discharges. The small MS4 applicant should consider the adequacy of the existing MS4's program to address the smaller MS4's water quality needs, but EPA is not imposing specific requirements. Where circumstances suggest that the existing program is inadequate with respect to the newly designated MS4 and the applicant does not address the issue, the NPDES permitting authority must require that the existing program be supplemented.

Commenters recommended that the application deadline for smaller MS4s designated today be extended so that existing regulated MS4s would not have to modify their permit in the middle of their permit term, provided that permit renewal would occur within a reasonable time (12 to 18 months) of the deadline. In response, EPA notes that today's rule allows operators of newly designated small MS4s up to three years and 90 days from the promulgation of today's rule to submit an application to be covered under the permit issued to an already regulated MS4. The permitting authority has a reasonable time after receipt of the application to modify the existing permit to include the newly designated source. If an existing MS4's permit is up for renewal in the near future, the operator of a newly designated small MS4 may take that into account when timing its application and the NPDES permitting authority may take that into account when processing the application.

Another commenter suggested that the rule should include a provision to allow permit application requirements for smaller MS4s designated today to be determined by the permitting authority to account for the particular needs/wants of an already regulated MS4 operator. EPA does not believe that the regulations should specifically require this approach. When negotiating whether to include a newly designated MS4 in its program, the already regulated MS4 operator may require the newly designated MS4's operator to provide any information that is necessary.

The co-permitting approach allows small MS4s to take advantage of existing programs to ease the burden of creating their own programs. The operators of regulated small MS4s, however, may find it simpler to apply for a program under today's rule, and to identify the medium or large MS4 operator that is implementing portions of its § 122.34(b) minimum measures.

d. Evaluation and Assessment

Under today's rule, operators of regulated small MS4s are required to evaluate the appropriateness of their identified BMPs and progress toward achieving their identified measurable goals. The purpose of this evaluation is to determine whether or not the MS4 is meeting the requirements of the minimum control measures. The NPDES permitting authority is responsible for determining whether and what types of monitoring needs to be conducted and may require monitoring in accordance with State/Tribe monitoring plans appropriate to the watershed. EPA does not encourage requirements for "end-of-pipe" monitoring for regulated small MS4s. Rather, EPA encourages permitting authorities to carefully examine existing ambient water quality and assess data needs. Permitting authorities should consider a combination of physical, chemical, and biological monitoring or the use of other environmental indicators such as exceedance frequencies of water quality standards, impacted dry weather flows, and increased flooding frequency. (Claytor, R. and W. Brown. 1996. *Environmental Indicators to Assess Storm Water Control Programs and Practices.* Center for Watershed Protection, Silver Spring, MD.) Section II.L., Water Quality Issues, discusses monitoring in greater detail.

As recommended by the Intergovernmental Task Force on Monitoring Water Quality (ITFM), the NPDES permitting authority is encouraged to consider the following watershed objectives in determining monitoring requirements: (1) To characterize water quality and ecosystem health in a watershed over time, (2) to determine causes of existing and future water quality and ecosystem health problems in a watershed and develop a watershed management program, (3) to assess progress of watershed management program or effectiveness of pollution prevention and control practices, and (4) to support documentation of compliance with permit conditions and/or water quality standards. With these objectives in mind, the Agency encourages participation in group monitoring programs that can take advantage of existing monitoring programs undertaken by a variety of governmental and nongovernental entities. Many States may already have a monitoring program in effect on a watershed basis. The ITFM report is included in the docket for today's rule (Intergovernmental Task Force on Monitoring Water Quality. 1995. *The Strategy for Improving Water-Quality Monitoring in the United States: Final Report of the Intergovernmental Task Force on Monitoring Water Quality.* Copies can be obtained from: U.S. Geological Survey, Reston, VA.).

EPA expects that many types of entities will have a role in supporting group monitoring activities—including federal agencies, State agencies, the public, and various classes or categories of point source dischargers. Some regulated small MS4s might be required to contribute to such monitoring efforts. EPA expects, however, that their participation in monitoring activities will be relatively limited. For purposes of today's rule, EPA recommends that, in general, NPDES permits for small MS4s should not require the conduct of any additional monitoring beyond monitoring that the small MS4 may be already performing. In the second and subsequent permit terms, EPA expects that some limited ambient monitoring might be appropriately required for perhaps half of the regulated small MS4s. EPA expects that such monitoring will only be done in identified locations for relatively few pollutants of concern. EPA does not anticipate "end-of-pipe" monitoring requirements for regulated small MS4s.

EPA received a wide range of comments on this section of the rule. Some commenters believe that EPA should require monitoring; others want a strong statement that the newly regulated small MS4s should not be required to monitor. Many commenters raised questions about exactly what EPA expects MS4s to do to evaluate and assess their BMPs. EPA has intentionally written today's rule to provide flexibility to both MS4s and permitting authorities regarding appropriate evaluation and assessment. Permitting authorities can specify monitoring or other means of evaluation when writing permits. If additional requirements are not specified, MS4s can decide what they believe is the most appropriate way to evaluate their storm water management program. As mentioned above, EPA expects that the necessity for monitoring and its extent may change from permit cycle to permit cycle. This is another reason for making the evaluation and assessment rule requirements very flexible.

i. Recordkeeping. The NPDES permitting authority is required to include at least the minimum appropriate recordkeeping conditions in each permit. Additionally, the NPDES permitting authority can specify that permittees develop, maintain, and/or

submit other records to determine compliance with permit conditions. The MS4 operator must keep these records for at least 3 years but is not required to submit records to the NPDES permitting authority unless specifically directed to do so. The MS4 operator must make the records, including the storm water management program, available to the public at reasonable times during regular business hours (see 40 CFR 122.7 for confidentiality provision). The MS4 operator is also able to assess a reasonable charge for copying and to establish advance notice requirements for members of the public.

EPA received a comment that questioned EPA's authority to require MS4s to make their records available to the public. EPA disagrees with the commenter and believes that the CWA does give EPA the authority to require that MS4 records be available. It is also more practical for the public to request records directly from the MS4 than to request them from EPA who would then make the request to the MS4. Based on comments, EPA revised the proposed rule so as not to limit the time for advance notice requirements to 2 business days.

ii. Reporting. Under today's rule, the operator of a regulated small MS4 is required to submit annual reports to the NPDES permitting authority for the first permit term. For subsequent permit terms, the MS4 operator must submit reports in years 2 and 4 unless the NPDES permitting authority requires more frequent reports. EPA received several comments supporting this timing for report submittal. Other commenters suggested that annual reports during the first permit cycle are too burdensome and not necessary. EPA believes that annual reports are needed during the first 5-year permit term to help permitting authorities track and assess the development of MS4 programs, which should be established by the end of the initial term. Information contained in these reports can also be used to respond to public inquiries.

The report must include (1) the status of compliance with permit conditions, an assessment of the appropriateness of identified BMPs and progress toward achieving measurable goals for each of the minimum control measures, (2) results of information collected and analyzed, including monitoring data, if any, during the reporting period, (3) a summary of what storm water activities the permittee plans to undertake during the next reporting cycle, and (4) a change in any identified measurable goal(s) that apply to the program elements.

The NPDES permitting authority is encouraged to provide a brief two-page reporting format to facilitate compiling and analyzing the data from submitted reports. EPA does not believe that submittal of a brief annual report of this nature is overly burdensome, and has not changed the required reporting time frame from the proposal. The permitting authority will use the reports in evaluating compliance with permit conditions and, where necessary, will modify the permit conditions to address changed conditions.

iii. Permit-As-A-Shield. Section 122.36 describes the scope of authorization (i.e. "permit-as-a-shield") under an NPDES permit as provided by section 402(k) of the CWA. Section 402(k) provides that compliance with an NPDES permit is deemed compliance, for purposes of enforcement under CWA sections 309 and 505, with CWA sections 301, 302, 306, 307, and 403, except for any standard imposed under section 307 for toxic pollutants injurious to human health.

EPA's Policy Statement on Scope of Discharge Authorization and Shield Associated with NPDES Permits, originally issued on July 1, 1994, and revised on April 11, 1995, provides additional information on this matter.

e. Other Applicable NPDES Requirements

Any NPDES permit issued to an operator of a regulated small MS4 must also include other applicable NPDES permit requirements and standard conditions, specifically the applicable requirements and conditions at 40 CFR 122.41 through 122.49. Reporting requirements for regulated small MS4s are governed by § 122.34 and not the existing requirements for medium and large MS4s at § 122.42(c). In addition, the NPDES permitting authority is encouraged to consult the Interim Permitting Approach, issued on August 1, 1996. The discussion on the Interim Permitting Approach in Section II.L.1, Water Quality Based Effluent Limits, provides more information. The provisions of §§ 122.41 through 122.49 establish permit conditions and limitations that are broadly applicable to the entire range of NPDES permits. These provisions should be interpreted in a manner that is consistent with provisions that address specific classes or categories of discharges. For example, § 122.44(d) is a general requirement that each NPDES permit shall include conditions to meet water quality standards. This requirement will be met by the specific approach outlined in today's rule for the implementation of BMPs. BMPs are the most appropriate form of effluent limitations to satisfy technology requirements and water quality-based requirements in MS4 permits (see the introduction to Section II.H.3, Municipal Permit Requirements, Section II.H.3.h, Reevaluation of Rule, and the discussion of the Interim Permitting Policy in Section II.L.1. below).

f. Enforceability

NPDES permits are federally enforceable. Violators may be subject to the enforcement actions and penalties described in CWA sections 309, 504, and 505 or under similar water pollution enforcement provisions of State, tribal or local law. Compliance with a permit issued pursuant to section 402 of the Clean Water Act is deemed compliance, for purposes of sections 309 and 505, with sections 301, 302, 306, 307, and 403 (except any standard imposed under section 307 for toxic pollutants injurious to human health).

g. Deadlines

Today's final rule includes "expeditious deadlines" as directed by CWA section 402(p)(6). In proposed § 122.26(e), the permit application for the "ISTEA" facilities was maintained as August 7, 2001 and the permit application deadline for storm water discharges associated with other construction activity was established as 3 years and 90 days from the final rule date. In proposed § 122.33(c)(1), operators of regulated small MS4s were required to seek permit coverage within 3 years and 90 days from the date of publication of the final rule. In proposed § 122.33(c)(2), operators of regulated small MS4s designated by the NPDES permitting authority on a local basis under § 122.32(a)(2) must seek coverage under an NPDES permit within 60 days of notice, unless the NPDES permitting authority specifies a later date.

In order to increase the clarity of today's final rule, EPA has changed the location of some of the above requirements. All application deadlines for both Phase I and Phase II are now listed or referenced in § 122.26(e). Section 122.26(e)(1) contains the deadlines for storm water associated with industrial activity. Paragraph (i) has been changed to correct a typographical error. Paragraph (ii) has been revised to reflect the changed application date for "ISTEA" facilities. (See discussion in section I.3, ISTEA Sources). The application deadline for storm water discharges associated with other construction activity is now in a new § 122.26(e)(8). The application deadline for regulated small MS4s

remains in § 122.33(c) because this section is written in "readable regulation" format, but it is also described in a new § 122.26(e)(9).

Under today's rule, permitting authorities are allowed up to 3 years to issue a general permit and MS4s designated under § 122.32(a)(1) are allowed up to 3 years and 90 days to submit a permit application. Operators of regulated small MS4s that choose to be a co-permittee with an adjoining MS4 with an existing NPDES storm water permit must apply for a modification of that permit within the same time frame. Several commenters stated that 90 days was not adequate time to submit an NOI. This might be true if facilities did not start developing their storm water program until publication of their general permit. In fact, municipalities should start developing their storm water program upon publication of today's final rule, if they have not already done so. Municipalities that are uncertain if they fall within the urbanized area should ask their permitting authority. EPA believes that municipalities should not automatically take three years and 90 days to develop a program and submit their NOI. Three years is the maximum amount of time to issue a general permit. MS4s that are automatically designated under today's rule may have less than 3 years and 90 days if the permitting authority issues a permit that requires submission of NOIs before that time. EPA encourages States to modify their NPDES program to include storm water and issue their permits as soon as possible. It is important for permitting authorities to keep their municipalities informed of their progress in developing or modifying their NPDES storm water requirements.

EPA recognizes that MS4s brought into the program due to the 2000 Census calculations do not have as much time to develop a program as those already designated from the 1990 Census. However, the official Bureau of the Census urbanized area calculation for the 2000 Census is expected to be published in the **Federal Register** in the spring of 2002, which should give the potentially affected MS4s adequate time to prepare for compliance under the applicable permit. However, if the publication of this information is delayed, MS4s in newly designated urbanized areas will have 180 days from the time the new designations are published to submit an NOI, consistent with the time frame for other regulated MS4s that are designated after promulgation of the rule.

The proposed application deadline for MS4s designated under § 122.32(a)(2) was within 60 days of notice. Many commenters stated that 60 days does not provide adequate time for the preparation of an NOI or permit application. EPA agrees that newly designated MS4s may not be aware that they might be designated since the permitting authority could take several years to develop designation criteria. EPA has decided that the application time frame for these facilities should be consistent with the 180 days allowed for facilities designated under §§ 122.26(a)(9)(i)(C) and (D). Section 122.33(c)(2) of today's final rule contains the modified time frame of 180 days to apply for coverage.

h. Reevaluation of Rule

The municipal caucus of the Storm Water Phase II FACA Subcommittee asked EPA to demonstrate its commitment to revisit the municipal requirements of today's rule and make changes where necessary after evaluating the storm water program and researching the effectiveness of municipal BMPs. In § 122.37 of today's final rule, EPA commits to revisiting the regulations for the municipal storm water discharge control program after completion of the first two permit terms. EPA intends to use this time to work closely with stakeholders on research efforts. Gathering and analyzing data related to the storm water program, including data regarding the effectiveness of BMPs, is critical to EPA's storm water program evaluation. EPA does not intend to change today's NPDES municipal storm water program until the end of this period, except under the following circumstances: a court decision requires changes; a technical change is necessary for implementation; or the CWA is modified, thereby requiring changes. After careful analysis, EPA might also consider changes from consensus-based stakeholder requests regarding requirements applicable to newly regulated MS4s. EPA will apply the August 1, 1996, Interim Permitting Approach to today's program during this interim period and encourages all permitting authorities to use this approach in municipal storm water permits for newly regulated MS4s and in determining MS4 permit requirements under a TMDL approach. After careful consideration of the data, EPA will make modifications as necessary.

EPA received comments that supported waiting two permit cycles before re-evaluating the rule and other comments that requested re-evaluation much sooner. EPA anticipates two full permit cycles are necessary to obtain enough data to significantly evaluate the rule. The re-evaluation time frame of 13 years from today remains as proposed.

I. Other Designated Storm Water Discharges

1. Discharges Associated with Small Construction Activity

Section 122.26(b)(15) of today's rule designates certain construction activities for regulation as "storm water discharges associated with small construction activity." Specifically, storm water discharges from construction activity equal to or greater than 1 acre and less than 5 acres are automatically designated except in those circumstances where the operator (i.e., person responsible for discharges that might occur) certifies to the permitting authority that one of two specific waiver circumstances (described in section b. below) applies. Sites below one acre may be designated under § 122.26(b)(15)(ii) where necessary to protect water quality.

Today's rule regulates these construction-related storm water sources under CWA section 402(p)(6) to protect water quality rather than under CWA section 402(p)(2). Designation under 402(p)(6) gives States and EPA the flexibility to waive the permit requirement for construction activity that is not likely to impair water quality, and to designate additional sources below one acre that are likely to cause water quality impairment. Thus, the one acre threshold of today's rule is not an absolute threshold like the five acre threshold that applies under the existing storm water rule.

Today's rule regulating certain storm water discharges from construction activity disturbing less than 5 acres is consistent with the 9th Circuit remand in *NRDC* v. *EPA*, 966 F.2d 1292 (9th Cir. 1992). In that case, the court remanded portions of the existing storm water regulations related to discharges from construction sites. The existing Phase I regulations define "storm water discharges associated with industrial activity" to include storm water discharges from construction sites disturbing 5 acres or more of total land area (see 40 CFR 122.26(b)(14)(x)). In its decision, the court concluded that the 5-acre threshold was improper because the Agency had failed to identify information "to support its perception that construction activities on less than 5 acres are non-industrial in nature" (966 F.2d at 1306). The court remanded the exemption to EPA for further proceedings (966 F.2d at 1310). EPA's objectives in today's action include an effort to (1) address the 9th Circuit

remand to reconsider regulation of storm water discharges from construction activities that disturb less than 5 acres of land, (2) address water quality concerns associated with such activities, and (3) balance conflicting recommendations and concerns of stakeholders in the regulation of additional construction activity.

EPA responded to the Ninth Circuit's decision by designating discharges from construction activities that disturb between 1 and 5 acres as "discharges associated with small construction activity" under CWA section 402(p)(6), rather than as "discharges associated with industrial activity" under CWA section 402(p)(2)(B). Although a size criterion alone may be an indicator of whether runoff from construction sites between 1 and 5 acres is "associated with industrial activity," the Agency is instead relying on a size threshold in tandem with provisions that allow for designations and waivers based on potential for "predicted water quality impairments" to regulate construction sites between 1 and 5 acres under CWA section 402(p)(6). This approach was chosen by the Agency for the sake of simplicity and certainty and, most importantly, to protect water quality consistent with the mandate of CWA section 402(p)(6). Today's rule also includes extended application deadlines for this new category of dischargers under the authority of CWA section 402(p)(6) (see § 122.26(e)(8) of today's rule).

In today's rule, EPA is regulating storm water discharges from additional construction sites to better protect the Nation's waters, while remaining sensitive to a concern that the Agency should not regulate discharges from construction sites that might not or do not have adverse water quality impacts. EPA believes that today's rule will successfully accomplish this objective by establishing a 1-acre threshold nationwide that includes the flexibility to allow the permitting authority to both waive requirements for discharges from sites that are not expected to cause adverse water quality impacts and to designate discharges from sites below 1-acre based on adverse water quality impacts.

In addition to the diminishing water quality benefits of regulating all sites below one acre, the Agency relied on practical considerations in establishing a one acre threshold and not setting a lower threshold. Regardless of the threshold established by EPA, a NPDES permit can only be required if a construction site has a point source discharge. A point source discharge means that pollutants are added to waters of the United States through a discernible, confined, discrete conveyance. "Sheet flow" runoff from a small construction site would not result in a point source discharge unless and until it channelized. As the amount of disturbed land surface decreases, precipitation is less likely to channelize and create a "point source" discharge (assuming the absence of steep slopes or other factors that lead to increased channelization). Categorical designation of very small sites may create confusion about applicability of the NPDES permitting program to those sites. EPA's one acre threshold reflects, in part, the need to recognize that smaller sites are less likely to result in point source discharges. Of course, the NPDES permitting authority could designate smaller sites (below one acre, assuming point source discharges occur from the smaller designated sites) for regulation if a watershed or other local assessment indicated the need to do so. The Phase II rule includes this designation authority at 40 CFR 122.26(a)(9)(i)(D) and (b)(15)(ii).

The one acre threshold also provides an administrative tool for more easily identifying those sites that are identified for coverage by the rule (but may receive a waiver) and those that are not automatically covered (but may be designated for inclusion). Although all construction sites less than five acres could have a significant water quality impact cumulatively, EPA is automatically designating for permit coverage only those storm water discharges from construction sites that disturb land equal to or greater than one acre. Categorical regulation of discharges from construction below this one acre threshold would overwhelm the resources of permitting authorities and might not yield corresponding water quality benefits. Construction activities that disturb less than one acre make up, in total, a very small percentage of the total land disturbance from construction nationwide. The one acre threshold is reasonable for accomplishing the water quality goals of CWA section 402(p)(6) because it results in 97.5% of the total acreage disturbed by construction being designated for coverage by the NPDES storm water program, while excluding from automatic coverage the numerous smaller sites that represent 24.7% of the total number of construction sites.

Some commenters believed that EPA has not adequately identified water quality problems associated with storm water discharges from construction activity disturbing less than five acres. Other commenters believed that storm water discharges from small construction activity is a significant water quality problem nationwide. Section I.B.3, Construction Site Runoff, provides a detailed discussion of adverse water quality impacts resulting from construction site storm water discharges. EPA is regulating storm water discharges from construction activity disturbing between 1 and 5 acres because the cumulative impact of many sources, and not just a single identified source, is typically the cause for water quality impairments, particularly for sediment-related water quality standards.

Several commenters requested that EPA regulate discharges from small construction activity as "discharges associated with industrial activity" under CWA 402(p)(4) and not, as proposed, as "storm water discharges associated with other activity" under CWA 402(p)(6). EPA is regulating discharges from small construction sites as "small construction activity" under the authority of CWA section 402(p)(6), rather than section 402(p)(4), to ensure that regulation of these sources is water quality-sensitive. CWA section 402(p)(6) affords the opportunity for designations and waivers of sources based on potential for "predicted water quality impairments." Regulation of storm water "associated with industrial activity" does not necessarily focus regulation to protect water quality.

a. Scope

The definition of "storm water discharges associated with small construction activity" includes discharges from construction activities, such as clearing, grading, and excavating activities, that result in the disturbance of equal to or greater than 1 acre and less than 5 acres (see § 122.26(b)(15)(i)). Such activities could include: road building; construction of residential houses, office buildings, or industrial buildings; or demolition activity. The definition of "storm water discharges associated with small construction activity" also includes any other construction activity, regardless of size, designated based on the potential for contribution to a violation of a water quality standard or for significant contribution of pollutants to waters of the United States (§ 122.26(b)(15)(ii)). This designation is made by the Director, or in States with approved NPDES programs, either the Director or the EPA Regional Administrator.

For the purposes of today's rule, the definition of "storm water discharges associated with small construction activity" includes discharges from activities disturbing less than 1 acre if that construction activity is part of a

"larger common plan of development or sale" with a planned disturbance of equal to or greater than 1 acre of land. A "larger common plan of development or sale" means a contiguous area where multiple separate and distinct construction activities are planned to occur at different times on different schedules under one plan, *e.g.*, a housing development of five ¼ acre lots (§ 122.26(b)(15)(i)).

In addition to the regulatory text for smaller construction, the Agency is also revising the existing text of § 122.26(b)(14)(x) to clarify EPA's intention regarding construction projects involving a larger common plan of development or sale ultimately disturbing 5 or more acres. Operators of such sites are required to seek coverage under an NPDES permit regardless of the number of lots in the larger plan because designation for permit coverage is based on the total amount of land area to be disturbed under the common plan. This designation attempts to address the potential cumulative effects of numerous construction activities concentrated in a given area.

Several commenters asked that EPA allow the permitting authority to set the appropriate size threshold based on water quality studies. While EPA agrees that location-specific water quality studies provide an ideal information base from which to make regulatory decisions, today's rule establishes a default standard for regulation in the absence of location-specific studies. The rule does allow for deviation from the default standard through additional designations and waivers, however, when supported by location-specific water quality information. The rule codifies the ability of permitting authorities to provide waivers for sites greater than or equal to one acre (the default standard) and designate additional discharges from small sites below one acre when location-specific information suggests that the default 1 acre standard is either unnecessary (waivers) or too limited (designations) to protect water quality.

Some commenters wanted EPA to base the regulation of storm water discharges from construction sites not only on size, but also on the duration and intensity of activity occurring on the site. EPA believes that a national 1-acre threshold, in combination with waivers and additional designations, is the most effective and simplest way to address adverse water quality impacts from storm water from small construction sites. Moreover, as discussed below, the waiver for rainfall erosivity does account for projects of limited duration. EPA believes, however, that the intensity of activity occurring on-site would be a very difficult condition to quantify.

Many commenters requested that EPA maintain the 5 acre threshold from the existing regulations, which include opportunities for site-specific designation, as the regulatory scope for regulating storm water from construction sites, *i.e.*, that the Agency not automatically regulate storm water discharges from sites less than 5 acres. Several commenters wanted construction requirements to be applied to sites smaller than 1 acre, while some commenters suggested alternative thresholds of 2 or 3 acres. The rest of the commenters supported the 1 acre threshold. None of the commenters presented any data or rationales to support a specific size threshold.

EPA examined alternative size thresholds, including 0.5 acre, 1 acre, 2 acres and 5 acres. EPA had difficulty evaluating the alternative size thresholds because, while directly proportional to the size of the disturbed site, the water quality threat posed by discharges from construction sites of differing sizes varies nationwide, depending on the local climatological, geological, geographical, and hydrological influences. In order to ensure improvements in water quality nationwide, however, today's rule does not allow various permitting authorities to establish different size thresholds except based on the waiver and designation provisions of the rule. EPA believes that the water quality impact from small construction sites is as high as or higher than the impact from larger sites on a per acre basis. By selecting the 1 acre size threshold and coupling it with waivers and additional designations, EPA is seeking to standardize improvement of water quality on a national basis while providing permitting authorities with the opportunity to designate those unregulated activities causing water quality impairments regardless of site size, as well as to waive requirements when information demonstrates that regulation is unnecessary.

EPA recognizes that the size criterion alone may not be the most ideal predictor of the need for regulation, but effective protection of water quality depends as much on simplicity in implementation as it does on the scientific information underlying the regulatory criteria. The default size criterion of 1 acre will ensure protection against adverse water quality impacts from storm water from small construction sites while not overburdening the resources of permitting authorities and the construction industry to implement the program to protect water quality in the first place.

One commenter stated a need to clarify whether routine road maintenance is considered construction activity for the purpose of today's rule. The NPDES general permit for discharges from construction sites larger than 5 acres defined "commencement of construction" as the *initial* disturbance of soils associated with clearing, grading, or excavating activities or other construction activities (63 FR 7913). For construction sites disturbing less than 5 acres, EPA does not consider construction activity to include *routine* maintenance performed to maintain the *original* line and grade, hydraulic capacity, or original purpose of the facility.

Two commenters believed that the Multi-Sector General Permit for storm water discharges from industrial activities (MSGP) (60 FR 50804) already applies to storm water discharges from construction activities at oil and gas exploration and production sites and asked for a clarification on this issue. Commenters also requested a single general permit to authorize both industrial storm water discharges and construction site discharges which occur at the same industrial site.

Currently, when construction activity disturbing more than 5 acres occurs on an industrial site covered by the MSGP, authorization under a separate NPDES construction permit is needed because the MSGP does not include the "construction" industrial sector. While the MSGP does address sediment and erosion control, it is not as specific as the NPDES general permit for storm water discharges from construction activities disturbing more than 5 acres. Though permitting authorities could conceivably develop a single general permit to authorize storm water discharges associated with construction activity at these industrial facilities, the commenter's request is not addressed by today's rulemaking. When today's rule is implemented through general permits (to be issued later), the permitting authority will have discretion whether or not to incorporate the permit requirements for both the industrial storm water discharges and construction site storm water discharges into a single general permit. This type of request should be addressed to the permitting authority.

One commenter suggested that discharges from small construction sites should be regulated through a "self-implementing rule" approach. While today's rule is not a self-implementing rule, it does add § 122.28(b)(2)(v), which

gives the permitting authority the discretion to authorize a construction general permit for sites less than 5 acres without submitting a notice of intent. Such non-registration general permits function similarly to self-implementing rules, but are, in fact, permits. Today's rule will be implemented through NPDES permits rather than self-implementing regulations to capitalize on the compliance, tracking, enforcement, and public participation associated with NPDES permits (see discussion in section II.C).

Other commenters believed that only the permitting authority should regulate construction site storm water discharges (under a NPDES permit) and that a small MS4 operator's regulation of storm water discharges associated with construction (under the small MS4 NPDES storm water program) is redundant. EPA disagrees that control measure implementation by the NPDES authority and the small MS4 operator is redundant. To the extent the two efforts overlap, today's rule provides for consolidation and coordination of substantive requirements via incorporation by reference permitting. Small MS4s operators may choose to impose more prescriptive requirements than an NPDES permitting authority based on localized water quality needs. In those cases, EPA intends that the substantive requirements from the small MS4 program should apply as the NPDES permit requirements for the construction site discharger. In cases where a small MS4 program does not prioritize and focus on storm water from construction sites (beyond the small MS4 minimum control measure in today's rule, which does not require the small MS4 operator to control construction site discharges in a manner as prescriptive as is expected for discharges regulated under NPDES permits), the Agency intends that the NPDES general permit will provide the substantive standards applicable to the construction site discharge. EPA does anticipate, however, that implementation of MS4 programs to address construction site runoff within their jurisdiction will enhance overall NPDES compliance by construction site dischargers. EPA also notes that under § 122.35(b), the permitting authority may recognize its own program to control storm water discharges from construction sites in lieu of requiring such a program in an MS4's NPDES permit, provided that the permitting authority's program satisfies the requirements of § 122.34(b)(4), including, for example, procedures for site plan reviews and consideration of information submitted by the public on individual construction sites in each jurisdiction required to be covered by the program.

b. Waivers

Under § 122.26(b)(15)(i) of today's rule, NPDES permitting authorities may waive today's requirement for construction site operators to obtain a permit in two circumstances. The first waiver is intended to apply where little or no rainfall is expected during the period of construction. The second waiver may be granted when a TMDL or equivalent analysis indicates that controls on construction site discharges are not needed to protect water quality.

The first waiver is based on "low predicted rainfall erosivity" which can be found using tables of rainfall-runoff erosivity (R) values published for each region in the U.S. R factors are published in the U.S. Department of Agriculture (USDA) Agricultural Handbook 703 (Renard, K.G., Foster, G.R., Weesies, G.A., McCool, D.K., and D.C. Yoder. 1997. *Predicting Soil Erosion by Water: A Guide to Conservation Planning with the Revised Universal Soil Loss Equation (RUSLE).* U.S. Department of Agriculture Handbook 703). The R factor varies based on the time during the year when construction activity occurs, where in the country it occurs, and how long the construction activity lasts. The permitting authority may determine, using Handbook 703, which times of year, if any, the waiver opportunity is available for construction activity. EPA will provide assistance either through computer programs or the World Wide Web on how to determine whether this waiver applies for a particular geographic area and time period. Application of this waiver for regulatory purposes will be determined by the authorized NPDES authority. This waiver is discussed further in the following section titled Rainfall-Erosivity Waiver.

The second waiver is based on a consideration of ambient water quality. This waiver is available after a State or EPA develops and implements TMDLs for the pollutant(s) of concern from storm water discharges associated with construction activity. This waiver is also available for sites discharging to non-impaired waters that do not require TMDLs, when an equivalent analysis has determined allocations for small construction sites for the pollutant(s) of concern or determined that such allocations are not needed to protect water quality based on consideration of existing in-stream concentrations, expected growth in pollutant contributions from all sources, and a margin of safety. The Agency envisions an equivalent analysis that would demonstrate that water quality is *not* threatened by storm water discharges from small construction activity. This waiver is discussed further below in the sections titled TMDL Waiver and Water Quality Issues.

The proposed rule included a waiver based on "low predicted soil loss." This waiver provision would have been applicable on a case-by-case basis where the annual soil loss rate for the period of construction for a site, using the Revised Universal Soil Loss Equation (RUSLE), would be less than 2 tons/acre/year. The annual soil loss rate of less than 2 tons/acre/year would be calculated through the use of the RUSLE equation, assuming the constants of no ground cover and no runoff controls in place.

Several commenters found the low soil loss waiver too complex and impractical, and stated that expertise is not available at the local level to prepare and evaluate eligibility for the waiver. Another commenter questioned whether two tons/acre/year was an appropriate threshold for predicting adverse water quality impacts. Two other commenters said that RUSLE was never intended to predict off-site impacts and is not an indicator of potential harm to water quality. EPA agrees with the commenters on the difficulty associated with determining and implementing this waiver. Most construction site operators are not familiar with the RUSLE program, and the potential burden on the permitting authority, construction industry, USDA's Natural Resources Conservation Service and conservation districts probably would have been significant. The Agency has not included this waiver in the final rule.

Two commenters asked that EPA allow States the flexibility to develop their own waiver criteria but did not suggest how the Agency (or affected stakeholders) could evaluate the acceptability of alternative State waiver criteria. Therefore, the final rule does not provide for any such alternative waivers. If a State does seek to develop alternate waiver criteria, then EPA procedures afford the opportunity for subsequent actions, for example, under the Project XL Program in EPA's Office of Reinvention, which seeks cleaner, smarter, and cheaper solutions to environmental problems. Many commenters suggested that EPA extend these waivers to existing industrial storm water regulations for construction activity greater than 5 acres. These construction site discharges are

regulated as industrial storm water discharges under CWA 402(p)(2) and are not eligible for such water quality-based waivers.

Two commenters were concerned that waivers would create a potential for significant degradation of small streams. EPA disagrees. If small streams are threatened, the permitting authority would choose not to provide any waivers. In addition, permitting authorities may protect small streams by designating discharges from small construction activity based on the potential for contribution to a violation of a water quality standard or for significant contribution of pollutants to waters of the U.S.

Two commenters asked that the waiver options be eliminated. They felt it would create a gross inequity within the construction community if some projects will not be subject to the requirements of today's rule. While the comments may be valid, EPA disagrees that waivers should be disallowed on this basis. Construction site discharges that qualify for a waiver from permitting requirements are not expected to present a threat to water quality, which is the basis for designation and regulation under today's rule.

A number of commenters suggested additional waivers in cases where new development will result in no additional adverse impacts to water quality as compared to the existing development it replaces. EPA believes these waivers are either unworkable or unnecessary. It would be very difficult for most construction operators to determine, as well as for other stakeholders to verify, on a site-by-site basis, that there is no potential for adverse impact to water quality compared to the replaced development.

Other commenters proposed waivers in cases where a local erosion and sediment control program covers the project or a separate waiver for small linear utility projects. Instead of waivers, today's rule addresses the first suggestion through the qualifying program provision described in the section titled Cross-Referencing State/Local Erosion and Sediment Control Programs below. Today's rule provides waivers for small linear projects in so far as they satisfy conditions for low rainfall erosivity. (See § 122.26(b)(15)(i)(A).)

Other commenters suggested waivers based on distance to water body, existence of vegetated buffer around water body, slope of disturbed land, or if discharging to very large bodies of water. As a result of public outreach, EPA believes that these proposed waivers would be generally unworkable for construction site dischargers and permitting authorities because of the difficulty in applying them to all small sites.

One commenter mentioned that waivers for the R factor (rainfall-erosivity) and soil loss are effluent standards that have not been developed in accordance with sections 301 and 304 of the CWA. EPA disagrees that these sections are relevant to the designation of sources in today's rule. The waiver provisions in this section of the rule are jurisdictional because they affect the scope of the universe of entities subject to the NPDES program. Therefore, the waiver provisions are not themselves substantive control standards implemented through NPDES permits, and thus, not subject to the statutory criteria in sections 301 and 304.

Another commenter stated that waivers would allow exemptions to the technology based requirements and would thus be inconsistent with the two-fold approach of the CWA (a technology based minimum and a water quality based overlay). EPA acknowledges that the CWA does not generally provide for waivers for the Act's technology-based requirements. The waiver provisions do not create exemptions from technology-based standards that apply to NPDES dischargers; they provide exemption from the underlying requirement for an NPDES permit in the first place. Protection of water quality is the reason these smaller sites are designated for regulation under NPDES. The Act's two fold approach imposes more stringent water quality based effluent limitations when technology-based limitations applicable to regulated dischargers are insufficient to meet water quality standards. Under today's rule, water quality protection is the basis for determining which of the unregulated sources should be regulated at all. Thus, today's rule is entirely consistent with the Act's two fold approach.

i. Rainfall-Erosivity Waiver. The rainfall-erosivity waiver under § 122.26(b)(15)(i)(A) is intended to exempt the requirements for a permit when and where negligible rainfall/runoff-erosivity is expected. In the development of the Universal Soil Loss Equation, analysis of data indicated that when factors other than rainfall are held constant, soil loss is directly proportional to a rainfall factor composed of total storm kinetic energy times the maximum 30 minute intensity. The average annual sum of the storm energy and intensity values for an area comprise the R factor—the rainfall erosivity index. A detailed explanation of the R factor can be found in *Predicting Soil Erosion by Water: A Guide to Conservation Planning With the Revised Universal Soil Loss Equation (RUSLE)* (USDA, 1997).

This waiver is time-sensitive and is dependent on when during the year a construction activity takes place, how long it lasts, and the expected rainfall and intensity during that time. R factors vary based on location. EPA anticipates that this waiver opportunity responds to concerns about the requirement for a permit when it is not expected to rain, especially in the arid areas of the U.S. Under today's rule, the permitting authority could waive the requirements for a permit for time periods when the rainfall-erosivity factor ("R" in RUSLE) is less than *five* during the period of construction. For the purposes of calculating this waiver, the period of construction activity starts at the time of initial disturbance and ends with the time of final stabilization. The operator must submit a written certification to the Director in order to apply for such a waiver. EPA believes that those areas receiving negligible rainfall during certain times of the year are unlikely to have storm events causing discharges that could adversely impact receiving streams. Consequently, BMPs would not be necessary on those smaller sites. This waiver is most applicable to projects of short duration and to the arid regions of the country where the occurrence of rainfall follows a cyclic pattern—between no rain and extremely heavy rain. EPA review of rainfall records for these areas indicates that, during periods of the year when the number of events and quantity of rain are low, storm water discharges from the smaller construction sites regulated under today's rule should be minimal.

Some commenters supported the use of the R factor as a waiver, while others felt that a waiver based on rainfall statistics ignores the fact that it may rain on any given day and it is the cumulative effect of wet weather discharges which cause water quality impairments. A commenter also asked what happens in "El Nino" years when significantly more rainfall than normal occurs. Another commenter also expressed concern that this waiver was not based on a measured water quality impact, but instead on an indicator of potential impact. In response to the previous comments, EPA notes that, under CWA 402(p)(6), sources are designated on their *potential* for adverse impact. Designation under the section is prospective, not retrospective or remedial only. For that reason, the waivers under today's rule also operate prospectively. EPA wanted to waive requirements for sites with little

potential to impair water quality, and the R factor is the most straightforward way to do this. The permitting authority, if electing to use waivers, could always suspend the use of waivers in certain areas or during certain times. In addition, the permitting authority may choose to use a lower R factor threshold than the one set by EPA. Application of this waiver is at the discretion of the permitting authority, subject only to the limitation that R factors cannot exceed 5.

One commenter expressed the need for EPA to provide a justification for the threshold value used for the R factor. None of the commenters included any data to show that EPA's proposed R factor of 2 was either too high or too low. EPA is using the R factor as an indicator of the potential to impact water quality. In an effort to determine which R threshold should be used, EPA conducted additional analysis of the rainfall/runoff erosivity factor for 134 sites across the country. For an R factor threshold of 5, approximately 12% of sites would be waived if the project period lasted 6 months, 27% for 3 months, 47% for 1 month, and 60% of sites would be waived if the project lasted for only 15 days. None of the 134 sites would be waived if the project lasted an entire year. For an R factor threshold of 2, approximately 9% of sites would be waived if the project period lasted 6 months, 15% for 3 months, 31% for 1 month, and 43% for 15 days. For an R factor threshold of 10, approximately 22% of sites would be waived if the project period lasted 6 months, 37% for 3 months, 60% for 1 month, and 78% for 15 days. EPA believes that an R factor of 5 is an adequate threshold to waive requirements for sites because they would not reasonably be expected to impair water quality.

EPA will develop, as part of the tool box described in section II.A.5, guidance materials and computer or web-accessible programs to assist permitting authorities and construction site discharges in determining if any resulting storm water discharges from specific projects are eligible for this waiver.

ii. Water Quality Waiver. The water quality waiver under § 122.26(b)(15)(i)(B) is available where storm water controls are not needed based on a comprehensive, location-specific evaluation of water quality needs. The waiver is available based on either an EPA-approved "total maximum daily load" (TMDL) under section 303(d) of the CWA that addresses the pollutant(s) of concern or, for sites discharging to non-impaired waters that do not require TMDLs, an equivalent analysis that has either determined allocations for small construction sites for the pollutant(s) of concern or determined that such allocations are not needed to protect water quality based on consideration of existing in-stream concentrations, expected growth in pollutant contributions from all sources, and a margin of safety. The pollutants of concern that must be addressed include sediment or a parameter that addresses sediment (such as total suspended solids (TSS), turbidity or siltation) and any other pollutant that has been identified as a cause of impairment of any water body that will receive a discharge from the construction activity. The operator must certify to the NPDES permitting authority that the construction activity will take place, and storm water discharges will occur, within the applicable drainage area evaluated in the TMDLs or equivalent analyses.

Today's rule modifies the approach in the proposed rule. EPA proposed to allow a waiver of permit requirements for small construction if storm water controls were determined to be unnecessary based on "wasteload allocations that are part of 'total maximum daily loads' (TMDLs) that address the pollutants of concern," or "a comprehensive watershed plan, implemented for the water body, that includes the equivalents of TMDLs, and addresses the pollutants of concern."

Commenters asked for clarification of the terms "comprehensive watershed plans" and "equivalent of TMDLs." EPA intended that both terms would include a comprehensive analysis that determines that controls on small construction sites are not needed based on consideration of existing in-stream concentrations, expected growth in pollutant contributions from all sources, and a margin of safety. Today's rule makes this clarification.

One commenter pointed out that there are no water quality standards for suspended solids, the major pollutant expected in discharges from construction activity. The commenter asserted that no waiver would ever be available. Another commenter noted that there are no sediment criteria developed for streams, also making this waiver useless. EPA notes that a number of States and Tribes have water quality standards that address TSS, which are narrative in form, and that may serve as a basis for water quality-based effluent limits. As efforts to identify impairments and improve water quality progress, some States may yet develop water quality standards for suspended solids. Although several TMDLs for sediment and related parameters have been established, EPA does recognize that currently it is extremely difficult to develop TMDLs for sediment. EPA is partially addressing this concern by clarifying in today's rule that the waivers may be based on a TMDL or equivalent analyses for sediment or one of the various pollutant parameters that are a proxy for sediment. These include TSS, turbidity and siltation.

Other commenters noted that this waiver was unattainable if a TMDL or equivalent analysis must be available for every pollutant that could possibly be present in any amount in discharges from small construction sites regardless of whether the pollutant is causing water quality impairment. Commenters asked that EPA identify what constitutes the "pollutants of concern" for which a TMDL or its equivalent must be developed. EPA has revised the proposed rule in response to these concerns.

In order for discharges from construction sites under five acres to qualify for the water quality waiver of today's rule, the construction site operator must demonstrate that storm water controls are not necessary for sediment or a parameter that addresses sediment (such as TSS, turbidity or siltation) and any other pollutant that has been identified as a cause of impairment of any water body that will receive a discharge from the construction activity. Even if the water body is not currently impaired for sediment, today's rule requires an analysis of the potential impacts of sediment because the storm water discharges from the construction activity will be a new source of loading to the water body that could constitute a new impairment. Because the water body will not necessarily have been included on a "303(d) list" and a TMDL will not necessarily be required, the rule continues to allow an analysis that is the equivalent of a TMDL. The designation of storm water discharges from small construction activity for regulation in today's rule is intended to control pollutants other than sediment. This waiver provision requires a TMDL or equivalent analysis for a pollutant other than gross particulates (*i.e.*, sediment and other particulate-focused pollutant parameters) only if the receiving water is currently impaired for that pollutant.

One commenter expressed the concern that construction operators will not know if they are in a watershed covered by a TMDL. To the extent this is an operator's concern, he or she could contact their NPDES permitting

authority before applying for permit coverage to determine if receiving water is subject to a TMDL. Alternatively, the permitting authority could identify the TMDL (or equivalent analysis) areas in the general permit or another operator-accessible information source.

Another commenter expressed the concern that a TMDL waiver is likely to be ineffective because the TMDL list is submitted only once every 2 years. By the time a water is listed, the activity may have been completed and stabilized. The commenter argued that, if a watershed is impaired due to sediment from construction, then storm water controls will still be needed, because small construction can only be waived when it is not identified as a source of impairment. In response, EPA notes that an analysis that is the equivalent of a TMDL (specifically, equivalent to the component of a TMDL that comprehensively analyses existing ambient conditions against the applicable water quality standards) may also provide a basis for waiver from the default 1 acre designation. Also, even if a water has been identified as impaired for sediment, it is possible that a site or category of sites may receive an allocation that is sufficiently high enough to allow discharges without storm water controls.

c. Permit Process and Administration

The operator of the construction site, as with any operator of a point source discharge, is responsible for obtaining coverage under a NPDES permit as required by § 122.21(b). The "operator" of the construction site, as explained in the current NPDES construction general permit, is typically the party or parties that either individually or collectively meet the following two criteria: (1) Operational control over the site specifications, including the ability to make modifications in the specifications; and (2) day-to-day operational control of those activities at the site necessary to ensure compliance with permit conditions (63 FR 7859). If more than one party meets these criteria, then each party involved would typically be a co-permittee with any other operators. The operator could be the owner, the developer, the general contractor, or individual contractor. When responsibility for operational control is shared, all operators must apply.

In today's rule, EPA is not requiring an NOI for NPDES general permits for storm water discharges from construction activities regulated by § 122.26(b)(15) if the NPDES permitting authority finds that the use of NOIs would be inappropriate (see § 122.28(b)(2)(v)). Under this approach, the NPDES permitting authority will have the discretion to decide whether or not to require NOIs for discharges from construction activity less than 5 acres. Compared to the existing storm water regulation, the permitting authority thus has increased flexibility in program implementation. EPA does recommend the use of NOIs, however because NOIs track permit coverage and provide a useful information source to prioritize inspections or enforcement. Requiring an NOI allows for greater accountability by, and tracking of, dischargers. This simple permit application and reporting mechanism also allows for better outreach to the regulated community, uses an existing and familiar mechanism, and is consistent with the existing requirements for storm water discharges from larger construction activities. Today's rule does not amend the requirement for NOIs in general permits for storm water discharges from construction activity disturbing 5 acres for more. See § 122.28(b)(2)(v).

EPA expects that the vast majority of discharges of storm water associated with small construction activity identified in § 122.26(b)(15) will be regulated through general permits. In the event that an NPDES permitting authority decides to issue an individual construction permit, however, individual application requirements for these construction site discharges are found at § 122.26(c)(1)(ii). For any discharges of storm water associated with small construction activity identified in § 122.26(b)(15) that are not authorized by a general permit, a permit application made pursuant to § 122.26(c) must be submitted to the Director by 3 years and 90 days after publication of the final rule.

Some commenters expressed concern that linear construction projects (*e.g.*, roads, highways, pipelines) that cross several jurisdictions will have to comply with multiple sets of requirements from various jurisdictions, including multiple local governments and States. EPA is limited in its options to address these concerns because the Agency cannot issue NPDES permits in States authorized to implement the NPDES program nor preempt other more stringent local and State requirements. EPA believes, however, that the option for incorporating by reference the State, Tribal or local requirements (see discussion in Section II.I.2.d., Cross-Referencing State/Local Erosion and Sediment Control Programs) should limit the administrative burden on the operator responsible for discharges from linear construction projects. If the operator were to implement the most comprehensive of the various requirements for the whole project, it could avoid confusion due to differing requirements for different sections of the project. In addition, linear utility projects, which usually have a shorter project period, are more likely to be eligible for the rainfall erosivity waiver.

One commenter stated there was no reason to delay the application period for regulated storm water discharges from small construction activities. The commenter requested that the newly regulated construction site discharges should be required to seek permit coverage within 90 days, as opposed to 3 years, of the effective date of the rule. The Agency does not accept this request. EPA anticipates that NPDES permitting authorities will need one to two years to develop adequate legal authority to implement a program to address this new category of discharges, as well as to develop and issue general permits. Moreover, to ensure effective implementation to protect water quality, regulatory authorities will need additional time to inform small construction site operators of requirements and provide guidance and training on these requirements.

Finally, EPA received a comment requesting that the three year file retention requirement be deleted for discharges from small construction sites. While EPA recognizes that the three year record retention schedule may be unnecessary for certain construction projects, the Agency has determined it is necessary to retain files after the completion of the project to ensure permit compliance, including applicable construction site stabilization enabling permit termination for such sites.

d. Cross-Referencing State, Tribal or Local Erosion and Sediment Control Programs

In developing the NPDES permit requirements for construction sites less than 5 acres, members of the Storm Water Phase II FACA Subcommittee asked EPA to try to minimize redundancy in the construction permit requirements. In response, today's rule at § 122.44(s) provides for incorporation of qualifying State, Tribal or local erosion and sediment control program requirements by reference into the NPDES permit authorizing storm water discharges from construction sites (described under §§ 122.26(b)(15) and (b)(14)(x)). The incorporation by reference approach applies not only to the newly regulated storm water discharges (from construction activity disturbing between 1 and 5 acres, including designated sites, but

excluding waived sites) but also to discharges from construction activity disturbing 5 or more acres already covered by the existing storm water regulations. For this latter category of discharges from construction activity disturbing 5 or more acres, the incorporation by reference approach requires that the pollutant control requirements from the incorporated program also satisfy the statutory standard for limitations representing application of the best available technology economically achievable (BAT) and best conventional pollutant control technology (BCT).

For permits issued for discharges from small construction activity defined under § 122.26(b)(15), a qualifying State, Tribal, or local erosion and sediment control program is one that includes the program elements described under § 122.44(s)(1). These elements include requirements for construction site operators to implement appropriate erosion and sediment control BMPs, requirements to control waste, a requirement to develop a storm water pollution prevention plan, and requirements to submit a site plan for review. A storm water pollution prevention plan includes site descriptions, descriptions of appropriate control measures, copies of approved State, Tribal or local requirements, maintenance procedures, inspection procedures, and identification of non-storm water discharges. The construction site's permit would require it to follow the requirements of the qualifying local program rather than require it to follow two different sets of requirements. If a partially-qualifying program does not have all of the elements described under § 122.44(s)(1), then the NPDES permitting authority may still incorporate language in the small construction site discharge's permit that requires the construction site operator to follow the program, but the construction site discharge permit also must incorporate the missing required elements in order to satisfy CWA requirements.

The term "local" refers to the geographic area of applicability, not the form of government that develops and administers the program. Thus, a qualifying federal erosion and control program, such as certain programs developed and administered by the federal Bureau of Land Management, could be a qualifying local program.

As a result of this provision, local requirements will, in effect, provide the substantive construction site erosion and sediment control requirements for the NPDES permit authorization. Therefore, by following one set of erosion and sediment control requirements, construction site operators satisfy both local and NPDES permit requirements without duplicative effort. At the same time, noncompliance with the referenced local requirements will be considered noncompliance with the NPDES permit which is federally enforceable. The NPDES permitting authority will, of course, retain the discretion to decide whether to include the alternative requirements in the general permit. EPA believes that this approach will best balance the need for consideration of specific local requirements and local implementation with the need for federal and citizen oversight, and will extend supplemental NPDES requirements to control storm water discharges from construction sites.

EPA developed the "incorporation by reference" approach based on implementation efforts designed by the State of Michigan. Michigan relies on localities to develop substantive controls for storm water discharges associated with construction activities on a localized basis. Localities, however, are not required to do so. In areas where the local authority does not choose to participate, the State administers the sedimentation and erosion control requirements. The State agency, as the NPDES permitting authority, receives an NOI (termed "notice of coverage" by Michigan) under the general permit and tracks and exercises oversight, as appropriate, over the activity causing the storm water discharge. Michigan's goal under these procedures is to utilize the existing erosion and sediment control program infrastructure authorized under State law for storm water discharge regulation. (See U.S. Environmental Protection Agency, Office of Water. January 7, 1994. Memo: From Michael B. Cook, Director OWEC, to Water Management Division Directors, Regarding the "Approach Taken by Michigan to Regulate Storm Water Discharges from Construction Activities.")

Most commenters supported the general concept of incorporating by reference qualifying programs. Two commenters expressed concern that different local construction requirements will create an impossible regulatory scheme for builders who work in different localities. EPA believes that allowing States to incorporate qualifying programs by reference will minimize the differences for builders who work in different areas of the State. These differences already exist, however, not only for erosion and sediment controls, but also other aspects of construction. In any event, the criteria for qualification for localized programs should provide a certain degree of standardization for various localities' requirements. EPA expects that the new rule for construction and post-construction BMPs being developed under CWA section 304(m) will also encourage standardization of local requirements. (See discussion of this new rulemaking in section II.D.1, Federal Role of this preamble).

Two commenters requested that an "incorporation by reference" should include permission, in writing, from the qualifying local program administrator because of a perceived extra burden on the referenced program. Any program requirements incorporated by reference in NPDES permits should already apply to construction site dischargers in the applicable area and therefore should not add any additional burden to the referenced program. EPA has left to the discretion of the permitting authority the decision on whether to seek permission from the qualifying program before cross-referencing it in an NPDES permit.

One commenter stated that a qualifying local program should require a SWPPP. The proposed rule defined the qualifying local program as a program the meets the minimum program requirements established in the proposed construction minimum control measure for small MS4s. To ensure consistency in the controls for storm water discharges between the larger, already regulated construction sites and the discharges from smaller sites that will be regulated as a result of today's rule, EPA has made a change to define a qualifying local program as one that includes the elements described in § 122.44(s)(1). Section 122.44(s)(1) requires the development and implementation of a storm water pollution prevention plan as a criterion for qualification of local programs for incorporation by reference. As noted above, if a qualifying program does not include all the elements in § 122.44(s)(1) then the permitting authority will need to specify the missing elements in order to rely on the incorporation by reference approach.

One commenter asked what happens in regard to the use of qualifying programs when a construction site operator is also the qualifying local program operator. The provision for incorporation by reference applies in this situation also. The local program operator will be required to comply with requirements it has established for others.

e. Alternative Approaches

EPA received a number of comments on alternative permitting approaches. Several commenters supported regulating discharges only from those construction sites within urbanized areas. Other commenters opposed this approach. EPA chose to address storm water discharges from construction sites located both within and outside urbanized areas because of the potential for adverse water quality impact from storm water discharges from smaller sites in all areas. Regulating only those sites within urbanized areas would have excluded a large number of potential contributors to water quality impairment and would not address large areas of new development occurring on the outer fringes of urbanized areas. In fact, designating only small construction discharges within urbanized areas might create a perverse incentive for building only outside urbanized areas. Such an incentive would be inconsistent with the Agency's intention behind designating to protect water quality. The Agency intends that designation to protect water quality in today's rule should be both remedial and preventive.

A number of commenters encouraged EPA to cover municipal construction activities under the small MS4 general permit, instead of issuing a separate NPDES construction permit to these municipal construction projects. Similarly, a number of commenters supported EPA giving industrial facilities the option of having storm water from construction activities on the site covered by the industrial storm water permit. Several other commenters found that combining multiple permit types under one general permit introduced a degree of complexity which was confusing to permittees. Permitting authorities have the option of combining MS4 and construction permits or industrial and construction permits, however, specific requirements for each would still need to be included in the permit issued. EPA agrees that this would probably result in a more complex and confusing permit compared to the existing component permits.

Several commenters supported an alternative for regulated small MS4s where a local qualified program alone, without an NPDES permit, is sufficient to enforce compliance with construction site discharge requirements. On the other hand, one commenter stated that linking the local construction erosion and sediment control program to the existing NPDES program for storm water from larger construction has driven improvements in many local programs. Another commenter stated that the potential fines under the NPDES program will encourage compliance and will be much stronger than any fines a local program may have. EPA agrees that the NPDES program is the best approach to address water quality impacts from construction sites and provides benefits such as accountability and federal enforcement.

A number of commenters supported issuing one permit for each construction company, instead of a permit for each individual construction activity (also requested for storm water discharges from the larger, already regulated construction sites). Other commenters found that a 'licensing' program for construction site operators would have many problems, including identifying who to permit and tracking information on active sites. EPA is regulating only the storm water discharges associated with construction activity from small sites, not the construction activity itself. Separate NPDES permits (either individual or general permit coverage) for construction site discharges avoid potential problems in tracking sites and operator accountability. Section 122.28(b)(2)(v) gives permitting authorities the option to issue a general permit without requiring an NOI. If an NOI is not required for each activity, permitting authorities could pursue other options such as a company-wide NOI, license instead of an NOI, or another mechanism.

2. Other Sources

In the *Storm Water Discharges Potentially Addressed by Phase II of the National Pollutant Discharge Elimination System Storm Water Program*, Report to Congress, March 1995, ("Report") submitted by EPA pursuant to CWA section 402(p)(5), EPA examined the remaining unregulated point sources of storm water for the potential to adversely affect water quality. Due to very limited national data on which to estimate pollutant loadings on the basis of discharge categories, the discussion of the extent of unregulated storm water discharges is limited to an analysis of the number and geographic distribution of the unregulated storm water discharges. Therefore, EPA is not designating any additional unregulated point sources of storm water on a nationwide, categorical basis. Instead, the remainder of the sources will be regulated based on case-by-case post-promulgation designations by the NPDES permitting authority.

EPA did, however, evaluate a variety of categories of discharges for potential designation in the Report. EPA's efforts to identify sources and categories of unregulated storm water discharges for potential designation for regulation in today's rule started with an examination of approximately 7.7 million commercial, retail, industrial, and institutional facilities identified as "unregulated." In general, the distribution of these facilities follows the distribution of population, with a large percentage of facilities concentrated within urbanized areas (see page 4-35 of the Report). This examination resulted in identification of two general classes of facilities with the potential for discharging pollutants to waters of the United States through storm water point sources.

The first group (Group A) included sources that are very similar, or identical, to regulated "storm water discharges associated with industrial activity" but that were not included in the existing storm water regulations because EPA used SIC codes in defining the universe of regulated industrial activities. By relying on SIC codes, a classification system created to identify industries rather than environmental impacts from these industries discharges, some types of storm water discharges that might otherwise be considered "industrial" were not included in the existing NPDES storm water program. The second general class of facilities (Group B) was identified on the basis of potential for activities and pollutants that could contribute to storm water contamination.

EPA estimates that Group A has approximately 100,000 facilities. Discharges from facilities in this group, which may be of high priority due to their similarity to regulated storm water discharges from industrial facilities, include, for example, auxiliary facilities or secondary activities (*e.g.*, maintenance of construction equipment and vehicles, local trucking for an unregulated facility such as a grocery store) and facilities intentionally omitted from existing storm water regulations (*e.g.*, publicly owned treatment works with a design flow of less than 1 million gallons per day, landfills that have not received industrial waste).

Group B consists of nearly one million facilities. EPA organized Group B sources into 18 sectors for the purposes of the Report. The automobile service sector (*e.g.*, gas/service stations, general automobile repair, new and used car dealerships, car and truck rental) makes up more than one-third of the total number of facilities identified in all 18 sectors.

EPA conducted a geographical analysis of the industrial and commercial facilities in Groups A and

B. The geographical analysis shows that the majority are located in urbanized areas (see Section 4.2.2, Geographic Extent of Facilities, in the Report). In general, about 61 percent of Group A facilities and 56 percent of Group B facilities are located in urbanized areas. The analysis also showed that nearly twice as many industrial facilities are found in all urbanized areas as are found in large and medium municipalities alone. Notable exceptions to this generalization included lawn/garden establishments, small unregulated animal feedlots, wholesale livestock, farm and garden machinery repair, bulk petroleum wholesale, farm supplies, lumber and building materials, agricultural chemical dealers, and petroleum pipelines, which can frequently be located in smaller municipalities or rural areas.

In identifying potential categories of sources for designation in today's notice, EPA considered designation of discharges from Group A and Group B facilities. EPA applied three criteria to each potential category in both groups to determine the need for designation: (1) The likelihood for exposure of pollutant sources included in that category, (2) whether such sources were adequately addressed by other environmental programs, and (3) whether sufficient data were available at this time on which to make a determination of potential adverse water quality impacts for the category of sources. As discussed previously, EPA searched for applicable nationwide data on the water quality impacts of such categories of facilities.

By application of the first criterion, the likelihood for exposure, EPA considered the nature of potential pollutant sources in exposed portions of such sites. As precipitation contacts industrial materials or activities, the resultant runoff is likely to mobilize and become contaminated by pollutants. As the size of these exposed areas increases, EPA expects a proportional increase in the pollutant loadings leaving the site. If EPA concluded that a category of sources has a high potential for exposure of raw materials, intermediate products, final products, waste materials, byproducts, industrial machinery, or industrial activity to rainfall, the Agency rated that category of sources as having "high" potential for adverse water quality impact. EPA's application of the first criterion showed that a number of Group A and B sources have a high likelihood of exposure of pollutants.

Through application of the second criterion, EPA assessed the likelihood that pollutant sources are regulated in a comprehensive fashion under other environmental protection programs, such as programs under the Resource Conservation and Recovery Act (RCRA) or the Occupational Health and Safety Act (OSHA). If EPA concluded that the category of sources was sufficiently addressed under another program, the Agency rated that source category as having "low" potential for adverse water quality impact. Application of the second criterion showed that some categories were likely to be adequately addressed by other programs.

After application of the third criterion, availability of nationwide data on the various storm water discharge categories, EPA concluded that available data would not support any such nationwide designations. While such data could exist on a regional or local basis, EPA believes that permitting authorities should have flexibility to regulate only those categories of sources contributing to localized water quality impairments.

EPA received comments requesting designation of additional industrial, commercial and retail sources (*e.g.* industrial activity "look-alikes", roads, commercial facilities and institutions, and vehicle maintenance facilities) in the final rule, because the commenters believe that the data exist to support national designation of some of these sources. Other comments were received opposing designation of any additional sources. Today's rule does not designate any additional industrial or commercial category of sources either because EPA currently lacks information indicating a consistent potential for adverse water quality impact or because of EPA's belief that the likelihood of adverse impacts on water quality is low, with some possible exceptions on a more local basis. Since the time the Agency submitted the Report, EPA has continued to seek additional data and has requested available data from the FACA members. If sufficient regional or nationwide data become available in the future, the permitting authority could at that time designate a category of sources or individual sources on a case-by-case basis. Therefore, today's rule encourages control of storm water discharges from Groups A and B through self-initiated, voluntary BMPs, unless the discharge (or category of discharges) is designated for permitting by the permitting authority. See discussion in section I.D., EPA's Reports to Congress.

3. ISTEA Sources

Provisions within the Intermodal Surface Transportation and Efficiency Act (ISTEA) of 1991 temporarily exempted storm water discharges associated with industrial activity that are owned or operated by municipalities serving populations less than 100,000 people (except for airports, power plants, and uncontrolled sanitary landfills) from the need to apply for or obtain a storm water discharge permit (section 1068(c) of ISTEA). Congress extended the NPDES permitting moratorium for these facilities to allow small municipalities additional time to comply with NPDES requirements for certain sources of industrial storm water. The August 7, 1995 storm water final rule (60 FR 40230) further extended this moratorium until August 7, 2001. However, today's rule changes this deadline so that previously exempted industrial facilities owned or operated by municipalities serving populations less than 100,000 people, must now submit an application for a permit within 3 years and 90 days from date of publication of today's rule.

EPA received comments recommending that permit requirements for municipally owned or operated industrial storm water discharges, including those previously exempt under ISTEA, be included in a single NPDES permit for all MS4 storm water discharges. The existing NPDES regulations already provide permitting authorities the ability to issue a single "combination" permit for MS4 discharges. However, if the permitting authorities chose to issue this type of permit, they must make sure that in doing so, they are not creating a double standard for industrial facilities covered under the combination permit versus those covered under separate general or individual permits. In order to avoid this double standard, combination permits would have to contain requirements that are the same or very similar to the requirements found in separate MS4 and industrial permits, *i.e.*, the minimum measures and other necessary requirements of an MS4 permit, and the SWPPP, monitoring and reporting requirements, and other necessary requirements of an industrial permit. If such a combined MS4 general permit were issued, the regulations require that each discharger submit NOIs for their respective discharges, except for discharges from small construction activities. Flexibility exists in developing a combination NOI which could reduce the need to submit duplicative information, *e.g.* owner/operator name and address. The combination NOI would still need to require specific information for each separate municipally owned or operated industrial location, including

construction projects disturbing 5 or more acres. The regulations at § 122.28(b)(2)(ii) list the necessary contents of an NOI, which require: the facility name, facility address, type of facility or discharge and receiving stream for each industrial discharge location. When viewed in its entirety, a combination permit, which by necessity would need to contain all elements of otherwise separate industrial and MS4 permit requirements, and require NOI information for each separate industrial activity, may have few advantages when compared to obtaining separate MS4 and industrial general permit coverage.

In order to allow the permitting authority to issue a single storm water permit for the MS4 and all municipally owned or operated industrial facilities, including those previously exempt under ISTEA, today's rule requires applications for ISTEA sources within 3 yrs and 90 days from date of publication of today's rule. The permitting authority has the ultimate decision to determine whether or not a single all-encompassing MS4 permit is appropriate.

4. Residual Designation Authority

The NPDES permitting authority's existing designation authority, as well as the petition provisions are being retained. Today's rule contains two provisions related to designation authority at §§ 122.26(a)(9)(i)(C) and (D). Subsection (C) adds designation authority where storm water controls are needed for the discharge based upon wasteload allocations that are part of TMDLs that address the pollutant(s) of concern. EPA intends that the NPDES permitting authority have discretion in the matter of designations based on TMDLs under subsection (C). Subsection (D) carries forward residual designation authority under former § 122.26(g), and has been modified to provide clarification on categorical designation. Under today's rule, EPA and authorized States continue to exercise the authority to designate remaining unregulated discharges composed entirely of storm water for regulation on a case-by-case basis (including § 123.35). Individual sources are subject to regulation if EPA or the State, as the case may be, determines that the storm water discharge from the source contributes to a violation of a water quality standard or is a significant contributor of pollutants to waters of the United States. This standard is based on the text of section CWA 402(p). In today's rule, EPA believes, as Congress did in drafting section CWA 402(p)(2)(E), that individual instances of storm water discharge might warrant special regulatory attention, but do not fall neatly into a discrete, predetermined category. Today's rule preserves the regulatory authority to subsequently address a source (or category of sources) of storm water discharges of concern on a localized or regional basis. For example, as States and EPA implement TMDLs, permitting authorities may need to designate some point source discharges of storm water on a categorical basis either locally or regionally in order to assure progress toward compliance with water quality standards in the watershed.

EPA received comments asking that § 122.26(a)(9)(i)(D) as proposed be modified to include specific language clarifying the permitting authority's ability to designate additional sources on a categorical basis as explained in the preamble to the proposed rule. One comment requested that the designation language include "categories of sources on a Statewide basis." EPA agrees that the intent of the language may not have been clear regarding categorical designation. Today's rule modifies subsection (D) to clarify that the designation authority can be applied within different geographic areas to any single discharge (i.e., a specific facility), or category of discharges that are contributing to a violation of a water quality standard or are significant contributors of pollutants to waters of the United States. The added term "within a geographic area" allows "State-wide" or "watershed-wide" designation within the meaning of the terms.

One commenter questioned the Agency's legal authority to provide for such residual designation authority. The stakeholder argued that the lapse of the October 1, 1994, permitting moratorium under CWA section 402(p)(1) eliminated the significance of the CWA section 402(p)(2) exceptions to the moratorium, including the exception for discharges of storm water determined to be contributing to a violation of a water quality standard or a significant contributor of pollutants under CWA section 402(p)(2)(E). The stakeholder further argued that EPA's authority to designate sources for regulation under CWA section 402(p)(6) is limited to storm water discharges other than those described under CWA section 402(p)(2). Because CWA section 402(p)(2)(E) describes individually designated discharges, the stakeholder concluded that regulations under CWA section 402(p)(6) cannot provide for post-promulgation designation of individual sources. EPA disagrees.

First, as explained previously, EPA anticipates that NPDES permitting authorities may yet determine that individual unregulated point sources of storm water discharges require regulation on a case-by-case basis. This conclusion is consistent with the Congress' recognition of the potential need for such designation under the first phase of storm water regulation as described in CWA section 402(p)(2)(E). Under CWA section 402(p)(2)(E), Congress recognized the need for both EPA and the State to retain authority to regulate unregulated point sources of storm water under the NPDES permit program. Second, to the extent that CWA section 402(p)(6) requires designation of a "category" of sources, the permitting authority may designate such (as yet unidentified) sources as a category that should be regulated to protect water quality. Though such sources may exist and discharge today, if neither EPA nor the State/Tribal NPDES permitting authority has designated the source for regulation under CWA section 402(p)(2)(E) to date, then CWA section 402(p)(6) provides the authority to designate such sources.

The Agency can designate a category of "not yet identified" sources to be regulated, based on local concerns, even if data do not exist to support nationwide regulation of such sources. EPA does not interpret the language in CWA section 402(p) to preclude States from exercising designation authority under these provisions because such designation (and subsequent regulation of designated sources) is within the "scope" of the NPDES program.

EPA also believes that sources regulated pursuant to a State designation are part of (and regulated under) a federally approved State NPDES program, and thus subject to enforcement under CWA sections 309 and 505. Under existing NPDES State program regulations, State programs that are "greater in scope of coverage" are not part of the federally-approved program. By contrast, any such State regulation of sources in this "reserved category" will be within the scope of the federal program because today's rule recognizes the need for such post promulgation designations of unregulated point sources of storm water. Such regulation will be "more stringent" than the federal program rather than "greater in scope of coverage" (40 CFR 123.1(h)).

EPA does not interpret the congressional direction in CWA section 402(p)(6) to preclude regulation of point sources of storm water that should be regulated to protect water quality. Under CWA section 510, Congress expressly recognized and preserved the authority of States to adopt and enforce

more stringent regulation of point sources, as well as any requirement respecting the control or abatement of pollution. Section 510 applies, "except as expressly provided" in the CWA. CWA section 502(14) does expressly provide affirmative limitations on the regulation of certain pollutant sources through the point source control program, the NPDES permitting program. Section 502(14) excludes agricultural storm water and return flows from irrigated agriculture from the definition of point source, and section 402(l) limits applicability of the section 402 permit program for return flows from irrigated agriculture, as well as for storm water runoff from certain oil, gas, and mining operations. Unlike sections 502(14) and 402(l), EPA does not interpret CWA section 402(p)(6) as an express provision limiting the authority to designate point sources of storm water for regulation on a case-by-case basis after the promulgation of final regulations. Any source of storm water discharge is encouraged to assess its potential for storm water contamination and take preventive measures against contamination. Such proactive actions could result in the avoidance of future regulation.

One comment was received requesting clarification of the term "non-municipal" in § 122.26(a)(9)(ii). The commenter is concerned that the term "non-municipal," in this context, implies that municipally owned or operated facilities cannot be designated. The term "non-municipal" in this context refers to the universe of unregulated industrial and commercial facilities that could potentially be designated according to § 122.26(a)(9)(i) authority. There is no exemption for municipally owned or operated facilities under these designation provisions.

Finally, EPA received comments and evaluated the proposal under which operators of regulated small, medium, and large MS4s would be responsible for controlling discharges from industrial and other facilities into their systems in lieu of requiring NPDES permit coverage for such facilities. EPA did not adopt this framework due to concerns with administrative and technical burden on the MS4 operators, as well as concerns about such an intergovernmental mandate.

J. Conditional Exclusion for "No Exposure" of Industrial Activities and Materials to Storm Water

1. Background

In 1992, the Ninth Circuit court remanded to EPA for further rulemaking, a portion of the definition of "storm water discharge associated with industrial activity" that excluded the category of industrial activity identified as "light industry" when industrial materials and/or activities were not exposed to storm water. See *NRDC* v. *EPA*, 966 F.2d 1292, 1305 (9th Cir. 1992). Today's final rule responds to that remand. In the 1990 storm water regulations, EPA excluded the light industry category from the requirement for an NPDES permit if the industrial materials and/or activities were not "exposed" to storm water (see § 122.26(b)(14)). The Agency had reasoned that most of the activity at these types of facilities takes place indoors and that emissions from stacks, use of unhoused manufacturing equipment, outside material storage or disposal, and generation of large amounts of dust or particles would be atypical (55 FR 48008, November 16, 1990).

The Ninth Circuit determined that the exemption was arbitrary and capricious for two reasons. First, the court found that EPA had not established a record to support its assumption that light industry that was not exposed to storm water was not "associated with industrial activity," particularly when other types of industrial activity not exposed to storm water remained "associated with industrial activity." The court specifically found that "[t]o exempt these industries from the normal permitting process based on an unsubstantiated assumption about this group of facilities is arbitrary and capricious." Second, the court concluded that the exemption impermissibly "altered the statutory scheme" for permitting because the exemption relied on the unverified judgment of the light industrial facility operator to determine non-applicability of the permit application requirements. In other words, the court was critical that the operator would determine for itself that there was "no exposure" and then simply not apply for a permit without any further action. Without a basis for ensuring the effective operation of the permitting scheme—either that facilities would self-report actual exposure or that EPA would be required to inspect and monitor such facilities—the court vacated and remanded the rule to EPA for further rulemaking.

One of the major concerns expressed by the FACA Committee, was that EPA streamline and reinvent certain troublesome or problematic aspects of the existing permitting program for storm water discharges. One area identified was the mandatory applicability of the permitting program to all industrial facilities, even those "light industrial" activities that are of very low risk or of no risk to storm water contamination. Such dischargers may not have any industrial sources of storm water contamination on the plant site, yet they are still required to apply for an NPDES storm water permit and meet all permitting requirements. Examples of such facilities are a soap manufacturing plant (SIC Code 28) or hazardous waste treatment and disposal facility, where all industrial activities, even loading docks, are inside a building or under a roof.

Although they did not provide a written report, the FACA Committee members advised EPA that the existing storm water program should be revised to allow such facilities to seek an exclusion from the NPDES storm water permitting requirements. The Committee agreed that such an exclusion should also provide a strong incentive for other industrial facilities that conduct industrial activities outdoors to move the activities under cover or into buildings to prevent contamination of rainfall and storm water runoff. The committee believed that such a "no exposure" permit exclusion could be a valuable incentive for storm water pollution prevention.

In today's final rule, the Agency responds to both of the bases for the court's remand. The exclusion from permitting based on "no exposure" applies to all industrial categories listed in the existing storm water regulations except construction. The court's opinion rejected EPA's distinction between light industry and other industry, but it did not preclude an interpretation that treats all "non-exposed" industrial facilities in the same fashion. Presuming that an industrial facility adequately prevents exposure of industrial materials and activities to storm water, today's rule treats discharges from "non-exposed" industrial facilities in a manner similar to the way Congress intended for discharges from administrative buildings and parking lots. Specifically, permits will not be required for storm water discharges from these facilities on a categorical basis.

To assure that discharges from industrial facilities really are similar to discharges from administrative buildings and parking lots, and to respond to the second basis for the court's remand, the permitting exclusion is "conditional". The person responsible for a point source discharge from a "no exposure" industrial source must meet the conditions of the exclusion, and complete, sign and submit the certification to the permitting authority for tracking and

accountability purposes. EPA believes today's rule, therefore, is fully consistent with the direction provided by the court.

EPA relied upon the "no exposure" concept discussed by the FACA Committee in developing the "no exposure" provisions of today's rule. EPA is deleting the sentence regarding "no exposure" for the facilities in § 122.26(b)(14)(xi) and adding a new § 122.26(g) titled "Conditional Exclusion for No Exposure of Industrial Activities to Storm Water." The "no exposure" provision will make storm water discharges from all classes of industrial facilities eligible for exclusion, except storm water discharges from regulated construction activities. Regulated construction activities cannot claim "no exposure" because the main pollutants of concern (*e.g.*, sediment) generally cannot entirely be sheltered from storm water.

Today's rule represents a significant expansion in the scope of the "no exposure" provision originally promulgated in the 1990 rule, which was only for storm water discharges from light industry. The intent of today's "no exposure" provision is to provide a simplified method for complying with the CWA to all industrial facilities that are entirely indoors. This includes facilities that are located within a large office building, or at which the only items permanently exposed to precipitation are roofs, parking lots, vegetated areas, and other non-industrial areas or activities.

EPA received several comments related to storm water runoff from parking lots, roof tops, lawns, and other non-industrial areas of an industrial facility. Storm water discharges from these areas, which may contain pollutants or which may result in additional storm water flows, are not directly regulated under the existing storm water permitting program because they are not "storm water discharges associated with industrial activity". Many comments on this issue supported maintaining the exclusion from the existing regulations for storm water permitting for discharges from administrative buildings, parking lots, and other non-industrial areas. Other comments opposed allowing the continued exclusion for discharges from non-industrial areas of the site because discharges from these areas are potentially a significant cause of receiving water impairment. These comments urged that such discharges should not be excluded from NPDES permit coverage. Today's rule does not require permit coverage for discharges from a facility's exposed areas that are separate from industrial activities such as runoff from office buildings and accompanying parking lots, lawns and other non-industrial areas. This approach is consistent with the existing storm water rules which were based on Congress's intent to exclude non-industrial areas such as "parking lots and administrative and employee buildings." 133 Cong. Rec. 985 (1987). EPA also lacks data indicating that discharges from these areas at an industrial facility cause significant receiving water impairments. Therefore, the non-industrial areas at a facility do not need to be assessed as part of the "no exposure" certification.

EPA received comments related to industrial facilities that achieve "no exposure" by constructing large amounts of impervious surfaces, such as roofs, where previously there were pervious or porous surfaces into which storm water could infiltrate. Some commenters made the point that large amounts of impervious area may cause a significant increase in storm water volume flowing off the industrial facility, and thus may cause adverse receiving water impacts simply due to the increased quantity of storm water flow. Some commenters said that storm water discharges from impervious areas at an industrial facility are generally more frequent, and often larger, than discharges from the pre-existing natural surfaces. They believe that these discharges will contain pollutants typical of commercial areas and roads and are an equal threat to direct human uses of the water and can cause equal damage to aquatic life and its habitat. Other commenters believe that if Congress or EPA addresses the issue of flow, it should be addressed on a broader scale than merely through the "no exposure" exclusion, and that EPA has no authority under any existing legal framework to regulate flow directly. Some commenters stated that developing federal parameters for the control of water quantity, *i.e.* flow, would result in federal intrusion into land use planning, an authority that they claim is solely within the purview of State governments and their political subdivisions.

EPA is not attempting to regulate flow via the "no exposure" provisions. EPA does agree, however, that increases in impervious surfaces can result in increased runoff volumes from the site which in turn may increase pollutant loading. In addition, the Agency notes that in some States water quality standards include water quality criteria for flow or turbidity. Therefore, in order to provide a minimal amount of information on possible impacts from increased pollutant loading and runoff volume, EPA's "no exposure" certification form (see Appendix 4) asks the discharger to indicate if they have paved or roofed over a formerly exposed, pervious area in order to qualify for the "no exposure" exclusion. If the answer is yes, the discharger must indicate, by choosing from three possible responses, approximately how much impervious area was created to achieve "no exposure". The choices are: (1) less than 1 acre, (2) 1 to 5 acres, and (3) more than 5 acres. This requirement provides additional information that will aid in determining if discharges from the facility are causing adverse receiving water impacts. EPA intends to prevent water quality impacts resulting from increased discharges of pollutants, which may result from increased volume of runoff. In many cases, consideration of the increased flow rate, velocity and energy of storm water discharges, following construction of large amounts of impervious surfaces, must be taken into consideration in order to reduce the discharge of pollutants, to meet water quality standards and to prevent degradation of receiving streams. EPA recommends that dischargers consider these factors when making modifications to their site in order to qualify for the "no exposure" exclusion.

2. Today's Rule

In order to claim relief under the "no exposure" provision, the discharger of an otherwise regulated facility must submit a no exposure certification that incorporates the questions of § 122.26(g)(4)(iii) to the NPDES permitting authority once every 5 years. This provision applies across all categories of industrial activity covered by the existing program, except discharges from construction activities.

In addition to submitting a "no exposure" certification every 5 years, the facility must allow the NPDES permitting authority or operator of an MS4 (where there is a storm water discharge to the MS4) to inspect the facility and to make such inspection reports publicly available upon request. Also, upon request, the facility must submit a copy of the "no exposure" certification to the operator of the MS4 into which the facility discharges (if applicable). All "no exposure" certifications must be signed in accordance with the signatory requirements of § 122.22. The "no exposure" certification is non-transferable. In the event that the facility operator changes, the new discharger must submit a new "no exposure" certification.

Members of the FACA Committee urged that EPA not allow dischargers certifying "no exposure" to take actions to qualify for this provision that result in a net environmental detriment. In developing a regulatory implementation mechanism, however, EPA found that the phrase "no net environmental detriment," was too imprecise to use within this context. Therefore, today's rule addresses this issue by requiring information that should help the permitting authority to determine whether actions taken to qualify for the exclusion interfere with the attainment or maintenance of water quality standards, including designated uses. Permitting authorities will be able, where necessary, to make a determination by evaluating the activities that changed at the industrial site to achieve "no exposure", and assess whether these changes cause an adverse impact on, or have the reasonable potential to cause an instream excursion of, water quality standards, including designated uses. EPA anticipates that many efforts to achieve "no exposure" will employ simple good housekeeping and contaminant cleanup activities. Other efforts may involve moving materials and industrial activities indoors into existing buildings or structures.

In very limited cases, industrial operators may make major changes at a site to achieve "no exposure". These efforts may include constructing a new building or cover to eliminate exposure or constructing structures to prevent run-on and storm water contact with industrial materials or activities. Where major changes to achieve "no exposure" increase the impervious area of the site, the facility operator must provide this information on the "no exposure" certification form as discussed above. Using this and other available data and information, permitting authorities should be able to assess whether any major change has resulted in increased pollutant concentrations or loadings, toxicity of the storm water runoff, or a change in natural hydrological patterns that would interfere with the attainment and maintenance of water quality standards, including designated uses or appropriate narrative, chemical, biological, or habitat criteria where such State or Tribal water quality standards exist. In these instances, the facility operator and their NPDES permitting authority should take appropriate actions to ensure that attainment or maintenance of water quality standards can be achieved. The NPDES permitting authority should decide if the facility must obtain coverage under an individual or general permit to ensure that appropriate actions are taken to address adverse water quality impacts.

While the intent of today's "no exposure" provision is to reduce the regulatory burdens on industrial facilities and government agencies, the FACA Committee suggested that the NPDES permitting authority consider a compliance assessment program to ensure that facilities that have availed themselves of this "no exposure" option meet the applicable requirements. Inspections could be conducted at the discretion of the NPDES authority and be coordinated with other facility inspections. EPA expects, however, that the permitting authority will conduct inspections when it becomes aware of potential water quality impacts possibly caused by the facility's storm water discharges or when requested to do so by adversely affected members of the public. The intent of this provision is that the 5 year "no exposure" certification be fully available to, and enforceable by, appropriate federal and State authorities under the CWA. Private citizens can enforce against facilities for discharges of storm water that are inconsistent with a "no exposure" certification if storm water discharges from such facilities are not otherwise permitted and in compliance with applicable requirements.

EPA received comments from owners, operators and representatives of Phase I facilities classified as "light industry" as defined by the regulations at § 122.26(b)(14)(xi). The comments recommended maintaining the approach of the existing regulations which does not require the discharger to submit any supporting documentation to the permitting authority in order to claim the "no exposure" exclusion from permitting. As discussed previously, the "no exposure" concept was developed in response to the Ninth Circuit court's remand of part of the existing rules back to EPA. The court found that EPA cannot rely on the "unverified judgment" of the facility. The comments opposing documentation did not address the "unverified judgment" concern.

Today's rule is a "conditional" exclusion from permitting which requires all categories, including the "light industrial" facilities that have no exposure of materials to storm water, to submit a certification to the permitting authority. Upon receipt of a complete certification, the permitting authority can review the information, or call, or inspect the facility if there are doubts about the facility's "no exposure" claim. Also, if the facility discharges into an MS4, the operator of the MS4 can request a copy of the certification, and can inspect the facility. The public can request a copy of the certification and/or inspection reports. In adopting these conditional "no exposure" provisions, the Agency addressed the Ninth Circuit court's ruling regarding the discharger's unverified judgment.

EPA received one comment requesting clarification on whether the anti-backsliding provisions in the regulations at § 122.44(l) apply to industrial facilities that are currently covered under an NPDES storm water permit, and whether such facilities could qualify for the "no exposure" exclusion under today's rule. The anti-backsliding provisions will not prevent most industrial facilities that can certify "no exposure" under today's rule from qualifying for an exclusion from permitting. The anti-backsliding provisions contain 5 exceptions that allow permits to be renewed, reissued or modified with less stringent conditions. One exception at § 122.44(l)(2)(A) allows less stringent conditions if "material and substantial alterations or additions to the permitted facility occurred after permit issuance which justify the application of a less stringent effluent limitation." Section 122.44(l)(B)(1) also allows less stringent requirements if "information is available which was not available at the time of permit issuance and which would have justified the application of less stringent effluent limitations at the time of permit issuance." Facility's operators who certify "no exposure" and submit the required information once every 5 years will have provided the permitting authority "information that was not available at the time of permit issuance." Also, some facilities may, in order to achieve "no exposure", make "material and substantial alterations or additions to the permitted facility." Therefore, most facilities covered under existing NPDES general permits for storm water (e.g., EPA's Multi-Sector General Permit) will be eligible for the conditional "no exposure" exclusion from permitting without concern about the anti-backsliding provisions. Such dischargers will have met one or both of the anti-backsliding exceptions detailed above. Facilities that are covered under individual permits containing numeric limitations for storm water should consult with their permitting authority to determine whether the anti-backsliding provisions will prevent them from qualifying for the exclusion from permitting (for that discharge point) based on a certification of "no exposure".

EPA received several comments regarding the timing of when the "no exposure" certification should be submitted. The proposed rule said that the "no exposure" certification notice must be submitted "at the beginning of each permit term or prior to commencing discharges during a permit term." Some commenters interpreted this statement to mean that existing facilities can only submit the certification at the time a permit is being issued or renewed. EPA intended the phrase "at the beginning of each permit term" to mean "once every 5 years" and today's rule reflects this clarification. EPA envisions that the NPDES storm water program will be implemented primarily through general permits which are issued for a 5 year term. Likewise the "no exposure" certification term is 5 years. The NPDES permitting authority will maintain a simple registration list that should impose only a minor administrative burden on the permitting authority. The registration list will allow for tracking of industrial facilities claiming the exclusion. This change allows a facility to submit a "no exposure" certification at any time during the term of the permit, provided that a new certification is submitted every 5 years from the time it is first submitted (assuming that the facility maintains a "no exposure" status). Once a discharger has established that the facility meets the definition of "no exposure", and submits the necessary "no exposure" certification, the discharger must maintain their "no exposure" status. Failure to maintain "no exposure" at their facility could result in the unauthorized discharge of pollutants to waters of the United States and enforcement for violation of the CWA. Where a discharger believes that exposure could occur in the future due to some anticipated change at the facility, the discharger should submit an application and obtain coverage under an NPDES permit prior to such discharge to avoid penalties.

Where EPA is the permitting authority, dischargers may submit a "no exposure" certification at any time after the effective date of today's rule. Where EPA is not the permitting authority, dischargers may not be able to submit the certification until the non-federal permitting authority completes any necessary statutory or regulatory changes to adopt this "no exposure" provision. EPA recommends that the discharger contact the permitting authority for guidance on when the "no exposure" certification should be submitted.

EPA received comments on the proposed rule requirement that the discharger "must comply immediately with all the requirements of the storm water program including applying for and obtaining coverage under an NPDES permit," if changes occur at the facility which cause exposure of industrial activities or materials to storm water. The comments expressed the difficultly of immediate compliance. EPA expects that most facility changes can be anticipated, therefore dischargers should apply for and obtain NPDES permit coverage in advance of changes that result in exposure to industrial activities or materials. Permitting authorities may grant additional time, on a case-by-case basis, for preparation and implementation of a storm water pollution prevention plan.

Finally, today's rule at § 122.26(g)(4) includes the information which must be included on the "no exposure" certification. Authorized States, Tribes or U.S. Territories may develop their own form which includes this required information, at a minimum. EPA adopted the requirements (with modification) from the draft "No Exposure Certification Form" published as an appendix to the proposed rule. Modifications were made to the draft form to address comments received and to streamline the required information. EPA included these certification requirements in today's rule in order to preserve its integrity. Dischargers in areas where EPA is the permitting authority should use the "No Exposure Certification" form included in Appendix 4.

3. Definition of "No Exposure"

For purposes of this section, "no exposure" means that all industrial materials or activities are protected by a storm resistant shelter to prevent exposure to rain, snow, snowmelt, and/or runoff. Industrial materials or activities include, but are not limited to, material handling equipment or activities, industrial machinery, raw materials, intermediate products, by-products, final products, or waste products. Material handling activities include the storage, loading and unloading, transportation, or conveyance of any raw material, intermediate product, final product or waste product. However, storm resistant shelter is not required for: (1) Drums, barrels, tanks, and similar containers that are tightly sealed, provided those containers are not deteriorated and do not leak; (2) adequately maintained vehicles used in material handling; and (3) final products, other than products that would be mobilized in storm water discharge (e.g., rock salt). Each of these three exceptions to the no exposure definition are discussed in more detail below.

EPA intends the term "storm resistant shelter" to include completely roofed and walled buildings or structures, as well as structures with only a top cover but no side coverings, provided material under the structure is not otherwise subject to any run-on and subsequent runoff of storm water. While the Agency intends that this provision promote permanent "no exposure", EPA understands that certain vehicles could pass between buildings and, during passage, be exposed to rain and snow. Adequately maintained vehicles such as trucks, automobiles, forklifts, or other such general purpose vehicles at the industrial site that are not industrial machinery, and that are not leaking contaminants or are not otherwise a source of industrial pollutants, could be exposed to precipitation or runoff. Such activities alone does not prevent a discharger from being able to certify no exposure under this provision. Similarly, trucks or other vehicles awaiting maintenance at vehicle maintenance facilities, as defined at § 122.26(b)(14)(viii), that are not leaking contaminants or are not otherwise a source of industrial pollutants, are not considered exposed.

In addition, EPA recognizes that there are circumstances where permanent "no exposure" of industrial activities or materials is not possible. Under such conditions, materials and activities may be sheltered with temporary covers, such as tarps, between periods of permanent enclosure. The final rule does not specify every such situation. EPA intends that permitting authorities will address this issue on a case-by-case basis. Permitting authorities can determine the circumstances under which temporary structures will or will not meet the requirements of this section. Until permitting authorities specifically determine otherwise, EPA recommends application of the "no exposure" exclusion for temporary sheltering of industrial materials or activities only during facility renovation or construction, provided that the temporary shelter achieves the intent of this section. Moreover, "exposure" that results from a leak in protective covering would only be considered "exposure" if not corrected prior to the next storm water discharge event. EPA received one comment requesting that this allowance for temporary shelter be limited to facility renovation or construction directly related to the industrial activity requiring temporary shelter, and be scheduled to minimize the use of temporary shelter. Another comment suggested placing time limits

on the use of temporary shelter. The commenter did not recommend a specific time period, rather the comment said that renovation in some instances may take years, and that EPA should not allow temporary shelter over prolonged periods. EPA agrees that the use of temporary shelter must be related to the renovation or construction at the site, and be scheduled or designed to minimize the use of temporary shelter. Further, EPA agrees that the use of temporary shelter should be limited in duration, but does not intend to define "temporary" or "prolonged period".

Many final products are intended for outdoor use and pose little risk of storm water contamination, such as new cars. Therefore, final products, except those that can be mobilized in storm water discharge, can be "exposed" and still allow the discharge to certify "no exposure". EPA intends the term "final products" to mean those products that are not used in producing another product. Any product that can be used to make another product is considered an "intermediate product." For example, a facility that makes horse trailers can store the finished trailers outdoors as a final product. The storage of those final products does not prevent eligibility to claim "no exposure". However, any facility that makes parts for the horse trailers (e.g., metal tubing, sheet metal, paint) is not eligible for the "no exposure" exclusion from permitting if those "intermediate products" are stored outdoors (i.e., "exposed").

EPA received comments related to materials in drums, barrels, tanks and similar containers. Some comments objected to the language in the preamble to the proposed rule that would have recommended that the "exposure" determination for drums and barrels be based on the "potential to leak." Those comments said that all drums and barrels have the potential to leak, thereby making certification impossible. They recommended allowing outdoor storage of drums and barrels except for those that "are leaking" at the time of certification. Other comments suggested allowing drums and barrels to be stored outside only if the drums and barrels: are empty; have secondary containment; or there is a spill contingency plan in place. Opposing comments suggested that allowing outdoor exposure of drums and barrels, based on existing integrity and condition, is inconsistent with the "however packaged" proposed rule language, and also would not satisfy the Ninth Circuit remand. The comments point out that the former rule was invalidated by the court in part because it relied on the "unverified judgment" of the light industrial facility operator to determine the non-applicability of the permit requirements, and that allowing the facility operator to determine the condition of their drums and barrels would result in the same flaw.

In response, EPA believes that drums and barrels that are stored outdoors pose little risk of storm water contamination unless they are open, deteriorated or leaking. The Agency has modified today's rule accordingly. EPA intends the term "open" to mean any container that is not tightly sealed and "sealed" to mean banded or otherwise secured and without operational taps or valves. Drums, barrels, tanks, and similar containers may only be *stored* outdoors under this conditional exclusion. The addition of material to or withdrawing of material from these containers while outside is deemed "exposure". Moving the containers while outside does not create "exposure" provided that the containers are not open, deteriorated or leaking. In order to complete the "no exposure" certification, a facility operator must inspect all drums, barrels, tanks or other containers stored outside to ensure that they are not open, deteriorated, or leaking. EPA recommends that the discharger designate someone at the facility to conduct frequent inspections to verify that the drums, barrels, tanks or other containers remain in a condition such that they are not open, deteriorated or leaking. Drums, barrels, tanks or other containers stored outside that have valves which are used to put material in or take material out of the container, and that have dripped or may drip, are considered to be "leaking" and must be under a storm resistant shelter in order to qualify for the no exposure exclusion. Likewise, leaking pipes containing contaminants exposed to storm water are deemed "exposed." If at any time drums, barrels, tanks or similar containers are opened, deteriorated or leaking, the discharger should take immediate actions to close or replace the container. Any resulting unpermitted discharge would violate the CWA. The Director, the operator of the MS4, or the municipality may inspect the facility to verify that all of the applicable areas meet the "no exposure" conditions as specified in the rule language. In requiring submission of the conditional "no exposure" certification and allowing the permitting authority and the operator of the MS4 to inspect the facility, today's rule does not rely on the unverified judgment of the facility to determine that the no exposure provision is being met.

EPA received several comments related to trash dumpsters that are located outside. The preamble to the proposed rule listed dumpsters in the same grouping as drums and barrels, which based exposure on the "potential to leak". Today's rule distinguishes between dumpsters and drums/barrels. In the Phase I Question and Answer document (volume 1, question 52) the Agency noted that a covered dumpster containing waste material that is kept outside is not considered "exposed" as long as "the container is completely covered and nothing can drain out holes in the bottom, or is lost in loading onto a garbage truck." EPA affirms this approach today. Industrial refuse and industrial trash that is left uncovered is deemed "exposed."

For purposes of this provision, particulate matter emissions from roof stacks/vents that are regulated and in compliance under other environmental protection programs, such as air quality control programs, and that do not cause storm water contamination, are considered "not exposed." EPA received comments on the phrase in the draft "no exposure" certification form that asked whether "particulate emissions from roof stacks/vents not otherwise regulated, and in quantities detectable in the storm water outflow," are exposed to precipitation. One comment expressed concern that the phrase "in quantities detectable in the storm water outflow" implies that the facility must conduct monitoring prior to completing the checklist, and must continue to monitor after receiving the no exposure exclusion, in order to be able to verify compliance with the no exposure provision. Another comment said that current measurement technology allows detection of pollutants at levels that may not cause environmental harm. EPA does not intend to require monitoring of runoff from facilities with roof stacks/vents prior to or after completing and submitting the no exposure certification. EPA has thus replaced the phrase "in quantities detectable" with "evident" to convey the message that emissions from some roof stacks/vents have the potential to contaminate storm water discharges in quantities that are considered significant or that cause or contribute to a water quality standards violation. In those instances where the permitting authority determines that particulate emissions from facility roof stacks/vents are a significant contributor of pollutants or contributing to water quality violations, the permitting authority may require the discharger to apply for and obtain coverage under a

permit. Visible deposits of residuals (*e.g.*, particulate matter) near roof or side vents are considered "exposed". Likewise, visible "track out" (*i.e.*, pollutants carried on the tires of vehicles) or windblown raw materials are deemed "exposed."

EPA received a comment requesting an allowance under the "no exposure" provision for industrial facilities with several outfalls at a site where some, but not all of the outfalls drain non-exposed areas. The commenter provided an example of an industrial facility that has 5 outfalls draining different areas of the site, where two of those outfalls drain areas where industrial activities or materials are not exposed to storm water. The comment requested that the facility in this example be allowed to submit a "no exposure" certification in order to be relieved of permitting obligations for discharges from those two outfalls.

EPA agrees, but the comment would be implemented on an outfall-by-outfall basis in the permitting process, not through the "no exposure" exclusion. The "no exposure" provision was developed to allow exclusion from permitting of discharges from entire industrial facilities (except construction), based on a claim of "no exposure" for all areas of the facility where industrial materials or activities occur. Where exposure to industrial materials or activities exist at some but not all areas of the facility, the "no exposure" exclusion from permitting is not allowed because permit coverage is still required for storm water discharges from the exposed areas. Relief from permit requirements for outfalls draining non-exposed areas should be addressed through the permit process, in coordination with the permitting authority. Most NPDES general permits for storm water discharge provide enough flexibility to allow minimal or no requirements for non-exposed areas at industrial facilities. If the permitting authority determines that additional flexibility is needed for this scenario, the permits could be modified as necessary.

K. Public Involvement/Public Role

The Phase II FACA Subcommittee discussed the appropriate role of the public in successful implementation of a municipal storm water program. EPA believes that an educated and actively involved public is essential to a successful municipal storm water program. An educated public increases program compliance from residents and businesses as they realize their individual and collective responsibility for protecting water resources (*e.g.*, the residents and businesses could be subject to a local ordinance that prohibits dumping used oil down storm sewers). Finally, the program is also more likely to receive public support and participation when the public is actively involved from the program's inception and allowed to participate in the decision making process.

In a time of limited staff and financial resources, public volunteers offer diverse backgrounds and expertise that may be used to plan, develop, and implement a program that is tailored to local needs (*e.g.*, participate in public meetings and other opportunities for input, perform lawful volunteer monitoring, assist in program coordination with other preexisting and related programs, aid in the development and distribution of educational materials, and provide public training activities). The public's participation is also useful in the areas of information dissemination/education and reporting of violators, where large numbers of community members can be more effective than a few regulators.

The public can also petition the NPDES permitting authority to require an NPDES permit for a discharge composed entirely of storm water that contributes to a violation of a water quality standard or is a significant contributor of pollutants to waters of the United States. In evaluating such a petition, the NPDES permitting authority is encouraged to consider the set of designation criteria developed for the evaluation of small MS4s located outside of an urbanized area in places with a population of at least 10,000 and a population density of 1,000 or more. Furthermore, any person can protect water bodies by taking civil action under section 505 of the CWA against any person who is alleged to be in violation of an effluent standard or permit condition. If civil action is taken, EPA encourages citizen plaintiffs to resolve any disagreements or concerns directly with the parties involved, either informally or through any available alternative dispute resolution process.

EPA recognizes that public involvement and participation pose challenges. It requires a substantial initial investment of staff and financial resources, which could be very limited. Even with this investment, the public might not be interested in participating. In addition, public participation could slow down the decision making process. However, the benefits are numerous.

EPA encourages members of the public to contact the NPDES permitting authority or local MS4s operator for information on the municipal storm water program and ways to participate. Such information may also be available from local environmental, nonprofit and industry groups.

Some commenters stressed the need to suggest to the public that they have a responsibility to fund the municipal storm water program. While EPA believes it is important that the program be adequately funded, today's rule does not address appropriate mechanisms or levels for such funding.

EPA received comments expressing concern that considerable public involvement requirements could result in increased litigation. EPA is not convinced there is a correlation between meaningful public education programs and any increased probability of litigation.

Finally, EPA received comments stating that the Agency should not en courage volunteer monitoring unless proper procedures are followed. EPA agrees. EPA encourages only lawful monitoring, *i.e.*, obtaining the necessary approval if there is any question about lawful access to sites. Moreover, as a matter of good practice and to enhance the validity and usefulness of the results, any party, public or private, conducting water quality monitoring is encouraged to use appropriate quality control procedures and approved sampling and analytic methods.

L. Water Quality Issues

1. Water Quality Based Effluent Limits

In addition to technology based requirements, all point source discharges of industrial storm water are subject to more stringent NPDES permitting requirements when necessary to meet water quality standards. CWA sections 402(p)(3)(A) and 301(b)(1)(C). For municipal separate storm sewers, EPA or the State may determine that other permit provisions (*e.g.* one of the minimum measures) are appropriate to protect water quality and, for discharges to impaired waters, to achieve reasonable further progress toward attainment of water quality standards pending implementation of a TMDL. CWA section 402(p)(3)(B)(iii). See *Defenders of Wildlife, et al. Browner*, No. 98–71080 (9th cir., August 11, 1999). Discharges of storm water also must comply with applicable antidegradation policies and implementation methods to maintain and protect water quality. 40 CFR 131.12. Section 122.34(a) emphasizes this point by specifically noting that a storm water management program designed to reduce the discharge of pollutants from the storm sewer system "to the maximum extent practicable" is also designed to protect water quality.

Permits issued to non-municipal sources of storm water must include water quality-based effluent limits where necessary to meet water quality standards.

Commenters challenged EPA's interpretation of the CWA as requiring water quality-based effluent limits for MS4s when necessary to protect water quality. Commenters asserted that CWA 402(p)(3)(B), which addresses permit requirements for municipal discharges, limits the scope of municipal program requirements to an effective prohibition on non-storm water discharges to a separate storm sewer and to controls which reduce pollutants to the "maximum extent practicable, including management practices, control techniques and system design and engineering methods." They asserted that the final rule should clarify that neither numeric nor narrative water quality-based limits are appropriate or authorized for MS4s.

EPA disagrees that section 402(p)(3) divests permitting authorities of the tools necessary to issue permits to meet water quality standards. Section 402(p)(3)(B)(iii) specifically preserves the authority for EPA or the State to include other provisions determined appropriate to reduce pollutants in order to protect water quality. *Defenders of Wildlife,* slip op. at 11688. Small MS4s regulated under today's rule are designated under CWA 402(p)(6) "to protect water quality."

Commenters argued that water quality standards, particularly numeric criteria, were not designed to address storm water discharges. The episodic nature and magnitude of storm water events, they argue, make it impossible to apply the "end of pipe" compliance assessment approach, for example, in the development of water quality based effluent limits.

EPA's disagrees with the commenters arguments about the inability of water quality criteria to address high flow conditions. Today's final rule does, however, address the concern that numeric effluent limits will necessitate end of pipe treatment and the need to provide a workable alternative.

Today's rule was developed under the approach outlined in the Interim Permitting Policy for Water Quality-Based Effluent Limitations in Storm Water Permits, issued on August 1, 1996. 61 FR 43761 (November 26, 1996) (the "Interim Permitting Policy"). EPA intends to issue NPDES permits consistent with the Interim Permitting Policy, which provides as follows:

In response to recent questions regarding the type of water quality-based effluent limitations that are most appropriate for NPDES storm water permits, EPA is adopting an interim permitting approach for regulating wet weather storm water discharges. Due to the nature of storm water discharges, and the typical lack of information on which to base numeric water quality-based effluent limitations (expressed as concentration and mass), EPA will use an interim permitting approach for NPDES storm water permits.

"The interim permitting approach uses best management practices (BMPs) in first-round storm water permits, and expanded or better-tailored BMPs in subsequent permits, where necessary, to provide for the attainment of water quality standards. In cases where adequate information exists to develop more specific conditions or limitations to meet water quality standards, these conditions or limitations are to be incorporated into storm water permits, as necessary and appropriate. This interim permitting approach is not intended to affect those storm water permits that already include appropriately derived numeric water quality-based effluent limitations. Since the interim permitting approach only addresses water quality-based effluent limitations, it also does not affect technology-based effluent limitations, such as those based on effluent limitations guidelines or developed using best professional judgment, that are incorporated into storm water permits.

"Each storm water permit should include a coordinated and cost-effective monitoring program to gather necessary information to determine the extent to which the permit provides for attainment of applicable water quality standards and to determine the appropriate conditions or limitations of subsequent permits. Such a monitoring program may include ambient monitoring, receiving water assessment, discharge monitoring (as needed), or a combination of monitoring procedures designed to gather necessary information.

"This interim permitting approach applies only to EPA; however, EPA also encourages authorized States and Tribes to adopt similar policies for storm water permits. This interim permitting approach provides time, where necessary, to more fully assess the range of issues and possible options for the control of storm water discharges for the protection of water quality. This interim permitting approach may be modified as a result of the ongoing Urban Wet Weather Flows Federal Advisory Committee policy dialogue on this subject."

One commenter challenged the Interim Permitting Policy on a procedural basis, arguing that it was published without opportunity for public notice and comment. In response, EPA notes that the Policy was included verbatim and made available for public comment in the proposal to today's final rule. Prior to that proposal, the Agency defended the application of the Policy on a case-by-case basis in individual permit proceedings. Moreover, the essential elements of the Policy—that narrative effluent limitations are the most appropriate form of effluent limitations for storm water dischargers from municipal sources—was inherent in § 122.34(a) of the proposed rule, and was the subject of extensive public comment. In any event, the Policy does not constitute a binding obligation. It is policy, not regulation.

Consistent with the recognition of data needs underlying the Policy, EPA will evaluate the small MS4 storm water regulations after the second round of permit issuance. Section 122.34(e)(2) of today's rule expressly provides that for the interim ten-year period, "EPA strongly recommends that until the evaluation of the storm water program in § 122.37, no additional requirements beyond the minimum control measures be imposed on regulated small MS4s without the agreement of the operator of the affected small MS4, except where an approved TMDL or equivalent analysis provides adequate information to develop more specific measures to protect water quality." This approach addresses the concern for protecting water resources from the threat posed by storm water discharges with the important qualification that there must be adequate information on the watershed or a specific site as a basis for requiring tailored storm water controls beyond the minimum control measures. As indicated, the Interim Permitting Policy has several important limitations—it does not apply to technology-based controls or to sources that already have numeric end of pipe effluent limitations. EPA encourages authorized States and Tribes to adopt policies similar to the Interim Permitting Policy when developing storm water discharge programs. For a discussion of appropriate monitoring activities, see Section H.3.d., Evaluation and Assessment.

Where a water quality analysis indicates there is a need and basis for deriving water quality-based effluent limits in NPDES permits for storm water discharges regulated under today's rule, EPA believes that most of these cases would be satisfied by narrative effluent

limitations that require the implementation of BMPs. NPDES permit limits will in most cases continue to be based on the specific approach outlined in today's rule for the implementation of BMPs as the most appropriate form of effluent limitation to satisfy technology and water quality-based requirements. See § 122.34(a). For storm water management plans with existing BMPs, this may require further tailoring of BMPs to address the pollutant(s) of concern, the nature of the discharge and the receiving water. If the permitting authority determines that, through implementation of appropriate BMPs required by the NPDES storm water permit, the discharge has the necessary controls to provide for attainment of water quality standards, additional controls are not needed in the permit. Conversely, if a discharger (MS4, industrial or construction) fails to adopt and implement adequate BMPs, the permittee and/or the permitting authority should consider a different mix of BMPs or more specific conditions to ensure water quality protection.

Some commenters observed that there was no evidence from the experience of storm water dischargers regulated under the existing NPDES storm water program, or from studies or reports that allegedly support EPA's position, that implementation of BMPs to satisfy the six minimum control measures would meet applicable water quality standards for a regulated small MS4. In response, EPA acknowledges that the six minimum measures are intended to implement the statutory requirement to control discharges to the maximum extent practicable, and they may not result in the attainment of water quality standards in all cases. The control measures do, however, focus on and address well-documented threats to water quality associated with storm water discharges. Based on the collective expertise of the FACA Sub-committee, EPA believes that implementation of the six minimum measures will, for most regulated small MS4s, be adequate to protect water quality, and for other regulated small MS4s will substantially reduce the adverse impacts of their discharges on water quality.

Some commenters asserted that analyses of existing water quality criteria suggest that numeric criteria for aquatic life may be overprotective if applied to storm water discharges. These comments maintained that an approach that prohibits exceedance of applicable water quality criteria is unworkable. Various commenters recommended wet weather specific criteria, variances to the criteria during wet weather events, and seasonal designated uses. Other commenters noted that water quality-based effluent limits in NPDES permits have traditionally been developed based on dry weather flow conditions (*e.g.*, assuming critical low-flow conditions in the receiving water to ensure protection of aquatic life and human health). Wet weather discharges, however, typically occur under high-flow conditions in the receiving water. Assumptions regarding mass balance equations and size of mixing zones may also not be pertinent during wet weather.

EPA acknowledges the need to devise a regulatory program that is both flexible enough to accommodate the episodic nature, variability and volume of wet weather discharges and prescriptive enough to ensure protection of the water resource. EPA believes that wet weather discharges can be adequately addressed in the existing regulations through refining designated uses and assigning criteria that are tailored to the level of water quality protection described by the refined designated use.

EPA believes that lack of precision in assigning designated uses and corresponding criteria by States and Tribes, in many cases may result in application of water quality criteria that may not appropriately match the intended condition of the water body. States and Tribes have frequently designated uses without regard to site-specific wet weather conditions. Because certain uses (swimming, for example) might not exist during high-intensity storm events or in the winter, States may factor such climatic conditions and seasonal uses into their use designations with appropriate analyses. This would acknowledge that a lower level of control, at lower compliance cost, would be appropriate to protect that use. Before modifying any designated use, however, States would need to evaluate the effect of less stringent water quality criteria on protecting other uses, including any threatened or endangered species, drinking water supplies and downstream uses. EPA will further evaluate these issues in the context of the Water Quality Standards Regulation, Advance Notice of Proposed Rule Making (ANPRM), 63 FR, 36742, July 7, 1998.

One of the major themes presented by EPA in the ANPRM is that refinement in use designations and tailoring of water quality criteria to match refined use designations is an important future direction of the water quality standards program. In assigning criteria to protect general use classifications, a State or Tribe must ensure that the criteria are sufficiently protective to safeguard the full range of waters of the State, *i.e.*, criteria would be based on the most sensitive use. This approach has been disputed, especially for aquatic life uses, where evidence suggests that the general use criteria will require controls more stringent than needed to protect the existing or potential aquatic life community for a specific water body. EPA recognizes that there is a growing need to more precisely tailor use descriptions and criteria to match site-specific conditions, ensuring that uses and criteria provide an appropriate level of protection, which, to the extent possible, are not overprotective. EPA is engaged in an ongoing evaluation of its regulations in this area through the ANPRM effort. At the same time, EPA continues to encourage States and Tribes to review the applicability of the designated uses and associated criteria using existing provisions in the water quality standards regulation.

2. Total Maximum Daily Loads and Analysis To Determine the Need for Water Quality-Based Limitations

The development and implementation of total maximum daily loads (TMDLs) provide a link between water quality standards and effluent limitations. CWA section 303(d) requires States to develop TMDLs to provide more stringent water quality-based controls when technology-based controls are inadequate to achieve applicable water quality standards. A TMDL is the sum of the individual wasteload allocations for point sources and load allocations for nonpoint sources, with consideration for natural background conditions. A TMDL quantifies the maximum allowable loading of a pollutant to a water body and allocates this maximum load to contributing point and nonpoint sources so that water quality criteria will not be exceeded and designated uses will be protected. A TMDL also includes a margin of safety to account for uncertainty about the relationship between pollutant loads and water quality.

Today's final rule refers to TMDLs in several provisions. For the purpose of today's rule, EPA relies on the component of the TMDL that evaluates existing conditions and allocates loads. For discharges to waters that are not impaired and for which a TMDL has not been developed, today's rule also refers to an "equivalent analysis." The discussion that follows uses the term "TMDL" for both.

Under revised § 122.26(a)(9)(i)(C), the permitting authority may designate

storm water discharges that require NPDES permits based on TMDLs that address the pollutants of concern. For storm water discharges associated with small construction activity, § 122.26(b)(15)(i)(B) provides a waiver provision where it may be determined that storm water controls are not needed based on TMDLs that address sediment and any other pollutants of concern. The NPDES permitting authority may waive requirements under the program for certain small MS4s within urbanized areas serving less than 1,000 persons provided that, if the small MS4 discharges any pollutant that has been identified as a cause of impairment of a water body into which it discharges, the discharge is in compliance with a wasteload allocation in a TMDL for the pollutant of concern. The permitting authority may also waive requirements for MS4s in urbanized areas serving between 1,000 and 10,000 persons, if the permitting authority determines that storm water controls are not needed, as provided in § 123.35(d)(2). See § 122.32(c).

Under CWA section 303(d), States identify which of their water bodies need TMDLs and rank them in order of priority. Generally, once a TMDL has been completed for one or more pollutants in a water body, a wasteload allocation for each point source discharging the pollutant(s) is implemented as an enforceable condition in the NPDES permit. Regulated small MS4s are essentially like other point source discharges for purposes of the TMDL process.

A TMDL and the resulting wasteload allocations for pollutant(s) of concern in a water body may not be available because the water body is not on the State's 303(d) list, the TMDL has not yet been completed, or the TMDL did not include specific pollutants of concern. In these cases, the permitting authority must determine whether point sources discharge pollutant(s) in amounts that cause, have the reasonable potential to cause, or contribute to excursions above State water quality standards, including narrative water quality criteria. This so-called "reasonable potential" analysis is intended to determine whether and for what pollutants water quality based effluent limits are required. The analysis is, in effect, a substitute for a similar determination that would be made as part of a TMDL, where necessary. When "reasonable potential" exists, regulations at § 122.44(d) require a water quality-based effluent limit for the pollutant(s) of concern in NPDES permits. The water quality-based effluent limits may be narrative requirements to implement BMPs or, where necessary, may be numeric pollutant effluent limitations.

Commenters, generally from the regulated community, objected that, due to references to the need to develop a program "to protect water quality" and to additional NPDES permit requirements beyond the minimum control measures based on TMDLs or their equivalent, regulated small MS4s will be subject to uncertain permit limitations beyond the six minimum control measures. Commenters also asserted that through the imposition of a wasteload allocation under a TMDL in impaired water bodies, there is a likelihood that unattainable, yet enforceable narrative and numeric standards will be imposed on regulated small MS4s.

As is discussed in the preceding section, NPDES permits must include any more stringent limitations when necessary to meet water quality standards. However, even if a regulated small MS4 is subject to water quality based effluent limits, such limits may be in the form of narrative effluent limitations that require the implementation of BMPs. As discussed earlier, EPA has adopted the Interim Permitting Policy and incorporated it in the development of today's rule to recognize the appropriateness of BMP-based limits developed on a case-by-case basis.

EPA formed a Federal Advisory Committee to provide advice to EPA on identifying water quality-limited water bodies, establishing TMDLs for them as appropriate, and developing appropriate watershed protection programs for these impaired waters in accordance with CWA section 303(d). Operating under the auspices of the National Advisory Council for Environmental Policy and Technology (NACEPT), the committee produced its *Report of the Federal Advisory Committee on the Total Maximum Daily Load (TMDL) Program* (July 1998). EPA recently published a proposed rule to implement the Report's recommendations (64 FR 46012, August 23, 1999).

3. Anti-Backsliding

In general, the term "anti-backsliding" refers to statutory provisions at CWA sections 303(d)(4) and 402(o) and regulatory provisions at 40 CFR 122.44(l). These provisions prohibit the renewal, reissuance, or modification of an existing NPDES permit that contain effluent limits, permit terms, limitations and conditions, or standards that are less stringent than those established in the previous permit. There are also exceptions to this prohibition known as "antibacksliding exceptions."

The issue of backsliding from prior permit limits, standards, or conditions is not expected to initially apply to most storm water dischargers designated under today's proposal because they generally have not been previously authorized by an NPDES permit. However, the backsliding prohibition would apply if a storm water discharge was previously covered under another NPDES permit. Also, the backsliding prohibition could apply when an NPDES storm water permit is reissued, renewed, or modified. In most cases, however, EPA does not believe that these provisions would restrict revisions to storm water NPDES permits.

One commenter questioned whether, if BMPs implemented by a regulated small MS4 operator fail to produce results in removal of pollutants and the permittee attempts to substitute a more effective BMP, the small MS4 operator could be accused of violating the anti-backsliding provisions and also be exposed to citizen lawsuits. In response, EPA notes that in such circumstances the MS4's permit has not changed and, therefore, the prohibition against backsliding is not applicable. Further, any change in the mix of BMPs that was intended to be more effective at controlling pollutants would not be considered backsliding, even if it did not include all of the previously implemented BMPs.

4. Water Quality-Based Waivers and Designations

Several sections of today's final rule refer to water quality standards in identifying those storm water discharges that are and are not required to be permitted under today's rule. As noted in § 122.30 of today's rule, CWA section 402(p)(6) requires the designation of municipal storm water sources that need to be regulated to protect water quality and the establishment of a comprehensive storm water program to regulate these sources. Requirements applicable to certain municipal sources may be waived based on the absence of demonstrable water quality impacts. Section 122.32(c). The section 402(p)(6) mandate to protect water quality also provides the basis for regulating discharges associated with small construction. See also § 122.26(b)(15)(i). Further, today's rule carries forward the existing authority for the permitting authority to designate sources of storm water discharges based upon water quality considerations. Section 122.26(a)(9)(i)(C) and (D).

As is discussed above in sections II.H.2.e (for small MS4s) and II.I.1.b.ii

(for small construction), the requirements of today's rule may be waived based on wasteload allocations that are part of "total maximum daily loads" (TMDLs) that address the pollutants of concern or, in the case of small construction and municipalities serving between 1,000 and 10,000 persons, the equivalents of TMDLs. One commenter stated that waivers would allow exemptions to the technology based requirements and would thus be inconsistent with the two-fold approach of the CWA (a technology based minimum and a water quality based overlay). EPA acknowledges that waivers are not allowed for other technology-based requirements under the CWA. A more flexible approach is allowed, however, for sources designated for regulation under 402(p)(6) to protect water quality. For such sources EPA may allow a waiver where it is demonstrated that an individual source does not present the threat to water quality that was the basis for EPA's designation.

III. Cost-Benefit Analysis

EPA has determined that the range of the rule's benefits exceeds the range of regulatory costs. The estimated rule costs range from $847.6 million to $981.3 million annually with corresponding estimated monetized annual benefits which range from $671.5 million to $1.628 billion, expected to exceed costs.

The rule's cost and benefit estimates are based on an annual comparison of costs and benefits for a representative year (1998) in which the rule is implemented. This differs from the approach used for the proposed rule which projected cost and benefits over three permit terms. EPA has chosen to use the current approach because it determined that the ratio of annual benefits and costs would not change significantly over time. Moreover, because there is not an initial outlay of capital costs with benefits accruing in the future (*i.e.*, benefits and costs are almost immediately at a steady state), it is not necessary to discount costs in order to account for a time differential.

EPA developed detailed estimates of the costs and benefits of complying with each of the incremental requirements imposed by the rule. The Agency used two approaches, a national water quality model and national water quality assessment, to estimate the potential benefits of the rule. Both approaches show that the benefits are likely to exceed costs.

These estimates, including descriptions of the methodology and assumptions used, are described in detail in the *Economic Analysis of the Final Phase II Rule*, which is included in the record of this rule making. Exhibit 3 summarizes costs and benefits associated with the basic elements of today's rule.

EXHIBIT 3.—COMPARISON OF ANNUAL COMPLIANCE COST AND BENEFIT ESTIMATES [1]

Monetized benefits	National water quality model (millions of 1998 dollars)	National water quality assessment (millions of 1998 dollars)
Municipal Minimum Measures		$131.0–$410.2
Controls for Construction Sites		$540.5–$686.0
Total Annual Benefits	$1,628.5	$671.5–$1,096.2

Costs	Millions of 1998 dollars [2]
Municipal Minimum Measures	$297.3
Controls/Waivers for Construction Sites	$545.0–$678.7
Federal/State Administrative Costs	$5.3
Total Annual Costs	$847.6–$981.31

[1] National level benefits are not inclusive of all categories of benefits that can be expected to result from the regulation.
[2] Total may not add due to rounding.

A. Costs

1. Municipal Costs

Initially, to determine municipal costs for the proposed rule, EPA used anticipated expenditure data included in permit applications from a sample of 21 Phase I MS4s. Certain commenters criticized the Agency for using anticipated expenditures because they could be significantly different from the actual expenditures. These commenters suggested that the Agency use the actual cost incurred by the Phase I MS4s. Other comments stated that because the Phase I MS4s, in general, are large municipalities, they may not be representative of the Phase II MS4s for estimating regulatory costs. Finally, one commenter noted that the sample of 21 municipalities used to project cost was relatively small.

To address the concerns of the commenters, EPA utilized a National Association of Flood and Stormwater Management Agencies (NAFSMA) survey of the Phase II community to obtain incremental cost estimates for Phase II municipalities. Using the list of potential Phase II designees published in the **Federal Register** (63 FR 1616), NAFSMA contacted more than 1,600 jurisdictions. The goal of the survey was to solicit information from those communities about the proposed Phase II NPDES storm water program. Several of the survey questions corresponded directly to the minimum measures required by the Phase II rule. One hundred twenty-one surveys were returned to NAFSMA and were used to develop municipal costs.

Using the NAFSMA information, EPA estimated average annual per household program costs for automatically designated municipalities. EPA also estimated an average annual per household administrative cost for municipalities to address application, record keeping, and reporting requirements of the Rule. The total average per household cost of the rule is expected to $9.16 per household.

To determine potential national level costs for municipalities, EPA multiplied the number of households (32.5 million) by the per household cost ($9.16). EPA estimates the annual cost of the Phase II municipal program at $298 million.

As an alternative method, and point of comparison, to the NAFSMA-based approach, EPA reviewed actual expenditures reported from 35 Phase I MS4s. The Agency targeted these 35 Phase I MS4s because they had participated in the NPDES program for

nearly one permit term, were smaller in size and had detailed data reflecting their actual program implementation costs. Of the 35 MS4s, appropriate cost data was only available for 26 of those MS4s. EPA analyzed the expenditure data and identified the relevant expenditures, excluding costs presented in the annual reports unrelated to the requirements of the Rule. The cost range and annual per household program costs of $9.08 are similar to those found using the NAFSMA survey data.

2. Construction Costs

In order to estimate the rule's construction-related cost on a national level (the soil and erosion controls (SEC) requirements of the rule and the potential impacts of the post-construction municipal measure on construction), EPA estimated a per site cost for sites of one, three, and five acres and multiplied these costs by the total number of estimated Phase II construction starts across these size categories.

To estimate the percentage of starts subject to the soil and erosion control requirements between 1 and 5 acres, with respect to each category of building permits (residential, commercial, *etc.*), EPA initially used data from Prince George's County (PGC), Maryland, and applied these percentages to national totals. In the proposal, EPA recognized that the PGC data may not be representative of the entire country and requested data that could be used to develop better estimates of the number of construction sites between 1 and 5 acres. EPA did not receive any substantiated national data from commenters.

In view of the unavailability of national data from commenters, EPA made extensive efforts to collect construction site data around the country. The Agency contacted more than 75 municipalities. EPA determined that 14 of the contacted municipalities had useable construction site data. Using data from these 14 municipalities, EPA developed an estimate of the percentage of construction starts on one to five acres. EPA then multiplied this percentage by the number of building permits issued nationwide to determine the total number of construction starts occurring on one to five acres. Finally, to isolate the number of construction starts incrementally regulated by Phase II, EPA subtracted the number of activities regulated under equivalent programs (*e.g.*, areas covered by the Coastal Zone Act Reauthorization Amendments of 1990, and areas covered by equivalent State level soil and erosion control requirements). Ultimately, EPA estimated that 110,223 construction starts would be incrementally covered by the rule annually.

EPA then used standard cost estimates from *Building Construction Cost Data* and *Site Work Landscape Cost Data* (R.S. Means, 1997a and 1997b) to estimate construction BMP costs for 27 model sites in a variety of typical site conditions across the United States. The model sites included three different site sizes (one, three and five acres), three slope variations (3%, 7%, and 12%), and three soil erosivity conditions (low, medium, and high). EPA chose BMP combinations appropriate to the model site conditions. Based on the assumption that any combination of site factors is equally likely to occur in a given site, EPA developed average cost of sediment and erosion control for all model sites. EPA estimated that, on average, BMPs for a 1 acre site will cost $1,206, for a 3 acre site $4,598 and for a 5 acre site $8,709.

EPA then estimated administrative costs per construction site for the following elements required under the rule: Submittal of a notice of intent for permit coverage; notification to municipalities; development of a storm water pollution prevention plan; record retention; and submittal of a notice of termination. EPA estimated the average total administrative cost per site to be $937.

EPA also considered the cost implications of NPDES permit authorities waiving the applicability of requirements to storm water discharges from small construction sites based on two different criteria involving water quality impact and low rainfall. EPA received comments stating that a waiver would require a significant investment in training or acquisition of a consultant. Based on comments received, EPA eliminated one of the waiver conditions involving low soil loss threshold because it necessitated use of the Revised Universal Soil Loss Equation which could require extensive technical expertise.

Based on the opinions of construction industry experts, EPA estimates that 15 percent of the construction sites that would otherwise be covered by today's rule will be eligible to receive waivers. Therefore, the Agency has excluded 15 percent of the construction sites when deriving costs of sediment and erosion control. The average cost for sites to qualify for the waiver is expected to be $34 per site. The construction cost analysis for the proposed rule did not include any costs for the preparation and submission of waiver applications because EPA believed those costs would be negligible. However, in response to public comments, EPA has estimated these potential costs.

EPA has also estimated the potential costs for construction site operators to implement the post-construction minimum measure. These are costs that may be incurred by construction site operators if the MS4 chooses to meet the post-construction minimum measure by requiring on-site structural, site-by-site control of post-construction runoff. Municipalities may select from an array of structural and non-structural options in implementing this measure, so the potential costs to construction operators is uncertain. Nonetheless, EPA developed average annual BMP costs for sites of one, three, five and seven acres. EPA's analysis accounted for varying levels of imperviousness that characterize residential, commercial, and institutional land uses. Nationwide, these costs are expected to range from $44 million to $178 million annually.

Finally, to establish national incremental annual costs for Phase II construction starts, EPA multiplied the total costs of compliance for the chosen site size categories by the total number of Phase II construction starts and added post-construction costs. EPA estimates the annual compliance cost to range from $545 million to $678.7 million.

B. Quantitative Benefits

In the Economic Analysis for the proposed rule, a "top-down" approach was used to estimate economic benefits. Under this approach, the combined economic benefits for wet weather programs were estimated first, and then were divided among various water programs on the basis of expert opinion. As a result, the benefits estimates for an individual program were rather uncertain. Moreover, this approach was inconsistent with the approach used to estimate the cost of the proposed storm water rule, which was developed using municipal-based and cost-based data to develop "bottom-up" costs. Therefore, EPA decided to use a "bottom-up" approach for estimating benefits of the Phase II rule. To adequately reflect the quantifiable benefits of the rule, EPA used two different methods: (1) National Water Quality Model and (2) National Water Quality Assessment.

To monetize benefits in both approaches, the Agency applied Carson and Mitchell's (1993) estimates of household willingness-to-pay (WTP) for water quality improvement to estimates of waters impaired by storm water discharges. Carson and Mitchell's 1993 study reports the results of their 1983 national survey of WTP for incremental

improvements in fresh water quality. Carson and Mitchell estimate the WTP for three minimum levels of fresh water quality: boatable, fishable, and sizable. EPA adjusted the WTP amounts to account for inflation, growth in real per capita income, and increased attitudes towards pollution control. The adjusted WTP amounts for improvements in fresh water quality are $210 for boatable, $158 for fishable, and $177 for sizable. A brief summary of the national water quality model and national water quality assessment approaches follow.

1. National Water Quality Model

One approach EPA used to estimate the benefits of the Phase II municipal and construction site controls was the National Water Pollution Control Assessment Model (NWPCAM). NWPCAM estimates benefits of the storm water program at the national level, including the impact on small streams. This model estimates water quality and the resultant use support for the 632,000 miles of rivers and streams in the USEPA Reach File Version 1 (RF1), which covers the continental United States. The model analyzes water quality changes by stream reach. The parameters modeled in the NWPCAM are biological oxygen demand (BOD), total suspended solids (TSS), dissolved oxygen (DO), and fecal coliforms (FC).

The model projects changes in water quality due to the Phase II municipal and construction site controls. To calculate the economic benefits of change in water quality, the number of households in the proximity of the stream reach are determined, by overlaying the model results on the 1990 Census of Populated Places and Minor Civil Divisions, and updating the population to 1998. Economic benefits are calculated using the Carson and Mitchell WTP values. The benefits are separately estimated for local and non-local waters on the basis of WTP values and proximity to water quality changes.

The value of the change in use support for local waters is greater than the value of the non-local waters because of the opportunity to use local waters by the local population. This model assumes that if improvement occurs in waters that are not close to population centers the economic value is lower. Therefore, benefits are estimated for local and non-local waters separately. This assumption is based on Carson and Mitchell's survey which asked respondents to apportion each of their stated WTP values between achieving the water quality goals in their own State and achieving those goals in the nation as a whole. On average, respondents allocated 67% of their values to achieving in-State water quality goals and the remainder to the nation as a whole. Carson and Mitchell argue that for valuing local water quality changes 67% is a reasonable upper bound for the local multiplier and 33% for the non-local water quality changes. For the purposes of this analysis, the locality is defined as urban sites and associated populations linked into the NWPCAM framework. Using this methodology, the total monetized benefits of Phase II control of urban and construction site runoff is estimated to be $1.628 billion per year. The local and non-local benefits due to Phase II controls are presented in Exhibit 4.

EXHIBIT 4.—LOCAL AND NON-LOCAL BENEFITS ESTIMATES DUE TO PHASE II CONTROLS NATIONAL WATER QUALITY MODEL ESTIMATE

Use support	Local benefits ($million/yr)	Non-local benefits [1] ($million/yr)	Total benefits ($million/yr)
Swimming, Fishing, and Boating	306.20	60.60	366.80
Fishing and Boating	395.10	51.90	447.00
Boating	700.10	114.60	814.70
Total	1401.40	227.10	1628.50

[1] To estimate non-local willingness to pay per household, the 33% of willingness is multiplied by the fraction of previously impaired national waters (in each use category) that attain the beneficial use as a result of the Phase II rule. To estimate the aggregate non-local benefits, non-local willingness to pay is multiplied with the total number of households in the US.

While the numbers of miles that are estimated to change their use support are small, the benefits estimates are quite significant. This is because urban runoff and, to a large extent, construction activity occurs where the people actually reside and the water quality changes mostly occur close to these population centers. NWPCAM indicates that changes in pollution loads have the most effect immediately downstream of pollution changes. As a result, the aggregate WTP is large because large numbers of households in these population centers are associated with the local waters that reflect improvement in designated use support.

2. National Water Quality Assessment

EPA also estimated benefits of the Phase II Storm Water program using the 1998 National Water Quality Inventory (305(b)) Report to Congress, rather than the NWPCAM as a basis for estimating impairment addressed by the rule. The Water Quality Assessment method separately estimates benefits associated with improvements to fresh water, marine water and construction site controls, and then aggregates these separate categories into an estimate of total annual benefits.

a. Municipal Measures

i. Fresh Waters Benefits

In order to develop estimates for the potential value of the municipal measures (except storm water runoff controls for construction sites), EPA applied Carson & Mitchell WTP values to estimated existing and projected future fresh water impairment. Carson & Mitchell did not evaluate marine waters, so only fresh water values were available from their research. Even though the Carson and Mitchell estimates apply to all fresh water, it is not clear how these values would be apportioned among rivers, lakes, and the Great Lakes. The 305(b) data indicate that lakes are the most impaired by urban runoff/storm sewers, followed closely by the Great Lakes, and then rivers. Therefore, EPA applied the WTP values to the categories separately and assumed that the higher resulting value for lakes represents the high end of the range (*i.e.*, assuming that lake impairment is more indicative of national fresh water impairment) and that the lower resulting value for impaired rivers represents the low end of a value range for all fresh waters (*i.e.*, assuming that river impairment is more indicative of national fresh water impairment). In addition, EPA estimated that the post-construction runoff

requirements of the municipal program might result in benefits of at least $16.8 million annually from avoided future runoff. The post-construction estimate significantly underestimates potential program benefits because it does not account for avoided hydrologic changes and resulting water quality impairment associated with increases in imperviousness from development and redevelopment. Summing the benefits across the water quality use support levels yields an estimate of benefits ranging from approximately $121.9 million to $378.2 million per year.

ii. Marine Waters Benefits

In addition to the fresh water benefits captured by the Carson and Mitchell study, EPA anticipates benefits as a result of improvements to marine waters. Sufficient methods have not been developed to quantify national-level benefits for commercial or recreational fishing. EPA used beach closure data and visitation estimates from its Beach Watch Program to estimate potential reductions in marine swimming visits due to storm water runoff contamination events in 1997. The estimated 86,100 trips that did not occur because of beach closures in coastal Phase II communities is a lower bound because it represents only those beaches that report both closures and visitation data. EPA estimates potential swimming benefits from the rule to be at least $2.1 million annually.

EPA developed an analysis of potential benefits associated with avoided health impacts from exposure to contaminants in storm sewer effluent. Based on a study of incremental illnesses found among people who swam within one yard of storm drains in Santa Monica Bay, EPA estimated a range of incremental illnesses (Haile *et al.*, 1996). Depending on assumptions made about number of exposures to contaminants and contaminant concentrations, benefits ranged from $7.0 million to $29.9 million annually.

b. Construction Benefits

The major pollutant resulting from construction activities is sediment. However, in addition to sediment, construction activities also yield pollutants such as pesticides, petroleum products, and solvents. Because circumstances will vary considerably from site to site, data is not available with which to develop estimates of benefits for each site and aggregate to obtain a national-level estimate.

In the proposed rule, EPA estimated the combined benefits of all wet weather programs, and then used expert opinions to allocate them to different individual programs. To eliminate the possible overlap between the benefits of the soil and erosion control requirements, municipal measures, and other wet weather storm water programs, EPA chose to use an approach in today's final rule that directly estimates the benefits of soil and erosion requirements.

A survey of North Carolina residents (Paterson *et al.*, 1993) indicated that households are willing to pay for erosion and sediment controls similar to those in today's rule. Based on income and other indicators, the values derived from the study are expected to be similar to values held in the rest of the country. Using the mean value of the willingness to pay of $25 per household, EPA projects annual benefits of the soil and erosion requirements to range from $540.5–$686 million.

c. Summary of Benefits From the National Water Quality Assessment

Total benefits from municipal measures and construction site controls are expected to range from $671.5 million to $1.1 billion per year, including benefits of approximately $13.7 million per year associated with small stream improvements. A summary of the potential benefits is presented in Exhibit 5.

As shown in Exhibit 5, it was not possible to monetize all categories of benefits using the WTP estimates. In particular, benefits for improving marine water quality such as fishing and passive use benefits are not included in the values used to estimate the potential benefits of the municipal minimum measures (excluding construction sites controls), and they are not estimated separately, because information is not currently available.

EXHIBIT 5.—POTENTIAL ANNUAL BENEFITS OF THE PHASE II STORM WATER RULE NATIONAL WATER QUALITY ASSESSMENT ESTIMATE

Benefit category	Annual WTP
Municipal Minimum Measures [1]	
Fresh Water Use and Passive Use [2]	$121.9–$378.2
Marine Recreational Swimming	$2.1
Human Health (Marine Waters)	$7.0–$29.9
Other Marine Use and Passive Use	(+)
Erosion and Sediment Controls for Construction Sites	
Fresh Water and Marine Use and Passive Use [3]	$540.5–$686
Total Phase II Program	
Total Use & Passive Use (Fresh Water and Marine)	>$671.5–>$1,096.2

+= positive benefits expected but not monetized.
[1] Includes water quality benefit of municipal programs, based on 80% effectiveness of municipal programs.
[2] Based on research by Carson and Mitchell (1993). Fresh water value only. Does not include commercial fishery, navigation, or diversionary (*e.g.* municipal drinking water cost savings or risk reductions) benefits. May not fully capture human health risk reduction or ecological values.
[3] Based on research by Paterson *et al.* (1993). Although the survey's description of the benefits of reducing soil erosion from construction sites included reduced dredging, avoided flooding, and water storage capacity benefits, these benefit categories may not be fully incorporated in the WTP values. Small streams may account for over 2% of total benefits.

C. Qualitative Benefits

There are additional benefits to storm water control that cannot be quantified or monetized. Thus, the current estimate of monetized benefits may understate the true value of storm water controls because it omits many ways in which society is likely to benefit from reduced storm water pollution, such as improved

aesthetic quality of waters, benefits to wildlife and to threatened and endangered species, cultural values, and biodiversity benefits.

A benefit that EPA did not monetize completely is the flood control benefits attributable to municipal storm water controls reducing downstream flooding, although flood control benefits associated with sediment and erosion control are already reflected to some extent in the construction benefits. Similarly, the Agency could not value the benefits from increased property value due to storm water controls reflected in the rule, even though a commenter suggested inclusion of these benefits in the estimates.

Moreover, while a number of commenters requested that EPA include ecological benefits, the Agency was not able to fully monetize these benefits. Urbanization usually increases the amount of sediment, nutrients, metals and other pollutants associated with land disturbance and development. Development usually not only results in a dramatic increase in the volume of water runoff, but also in a substantial decrease in that water's quality due to stream scour, runoff and dispersion of toxic pollutants, and oversiltation. These kinds of secondary benefits could not be fully reflected in the monetized benefits. EPA was able to only monetize the aquatic life support benefits for waters assumed to be impaired. Thus, only the aquatic life support benefits attributable to municipal controls, reflected through human satisfaction, are taken into account.

Reduced nutrient level is another benefit of the storm water control which is not fully captured by the economic analysis. High nutrient levels often lead to eutrophication of the aquatic system. The quality change in ecological sources as the result of storm water controls to reduce pollutants is not fully reflected in the present benefits.

D. National Economic Impact

Finally, the Agency determined that the rule will have minimal impacts on the economy or employment. This is because the final rule regulates small MS4s and construction sites under 5 acres, not the typical industrial plants or other non-construction activities that could directly impact production and thus those sectors of the economy.

Discussions with representatives within the construction industry indicate that construction costs will likely be passed on to buyers, thus not seriously affecting the housing industry directly. One commenter argued that the rule will have a negative employment effect because the builders will build fewer homes requiring less building materials as a result of the declining demand induced by the cost of the soil and erosion controls. EPA disagrees with this argument because the cost of the controls, as the percentage of the price of a median home, is negligible and will be passed on to final buyers.

Flexibility within the rule allows MS4s to tailor the storm water program requirements to their needs and financial position, minimizing impacts. For sedimentation and erosion controls on construction sites, the rule contemplates application of commonly used BMPs to reduce costs for the construction industry. Thus, the rule attempts to use existing practices to prevent pollution, which should minimize impacts on States, Tribes, municipalities and the construction industry.

Thus, EPA concludes that the effect of the rule, if any, on the national economy will be minimal. The benefits of today's rule more than offset any cost impacts on the national economy.

IV. Regulatory Requirements

A. Paperwork Reduction Act

The Office of Management and Budget (OMB) has approved some of the information collection requirements contained in this final rule (*i.e.* those found in 40 CFR 122.26(g) and 123.35(b)) under the provisions of the *Paperwork Reduction Act*, 44 U.S.C. 3501 *et seq.* and has assigned OMB control number 2040–0211.

The burden and costs described below are for the information collection, reporting, and record keeping requirements for the three year period beginning with the effective date of today's rule. Additional information collection requirements for regulated small MS4s and small construction sites will occur after this initial three year period and will be counted in a subsequent information collection requirement. The total burden of the information collection requirements for the first three years of this rule is estimated at 56,369 hours with a corresponding cost of $2,151,305 million annually. This burden and cost is for industrial facilities to complete and submit the no exposure certification, for NPDES-authorized States to process and review the no exposure certification, and for the NPDES-authorized States to develop designation criteria and assess additional MS4s outside of urbanized areas. Compliance with the applicable information collection requirements imposed under this rule are mandatory, pursuant to CWA section 402.

Exhibit 6 presents average annual burden and cost estimates for Phase II respondents for the first three years. Burden means the total time, effort, or financial resources expended by persons to generate, maintain, retain, disclose or provide information to or for a Federal agency. This includes the time needed to review instructions; develop, acquire, install, and utilize technology and systems for the purposes of collecting, validating, and verifying information, processing and maintaining information, and disclosing and providing information; adjust existing ways for complying with any previously applicable instructions and requirements; train personnel to be able to respond to a collection of information; search data sources; complete and review the collection of information; and transmit or otherwise disclose the information.

EXHIBIT 6.—AVERAGE ANNUAL BURDEN AND COST ESTIMATES FOR PHASE II RESPONDENTS

Information collection activity	A Respondents per year (projected) [1]	B Burden hours per respondent per year (predicted)	(A)×(B)=C Annual respondent burden hours (projected)	D Respondent labor cost ($/hr) (1998 $)	(C)×(D)=E Annual Cost ($) (projected)
Ind. No Expos. Facilities:[2]					
No Expos. Certification	36,377	1.0	36,377	44.35	1,613,320
Annual Subtotal			36,377		1,613,320
NPDES-Authorized States:[3]					
Designation of Addit. MS4s[4]	15	332.8	4,892	26.91	131,644

EXHIBIT 6.—AVERAGE ANNUAL BURDEN AND COST ESTIMATES FOR PHASE II RESPONDENTS—Continued

Information collection activity	A Respondents per year (projected) [1]	B Burden hours per respondent per year (predicted)	(A)×(B)=C Annual respondent burden hours (projected)	D Respondent labor cost ($/hr) (1998 $)	(C)×(D)=E Annual Cost ($) (projected)
No Exp. Cert. Proc. & Rev	30,200	0.5	15,100	26.91	406,341
Annual Subtotal			19,992		537,985
Annual Totals			56,369		2,151,305

Notes:

[1] Source: U.S. EPA, Office of Wastewater Management. Economic Analysis for the Storm Water Phase II Rule.

[2] The total number of potential no exposure respondents was divided by 5 to estimate an annual total. It was assumed that the annual number of respondents for the no exposure certification would be spread over the five year period the exclusion applies.

[3] The number of respondents in each category represents only those respondents located within the 44 NPDES-authorized States and Territories. The burden and cost estimates provided in this section are for the NPDES-authorized States in their role as the permitting authority for municipal designations and industrial no exposure.

[4] The number of respondents for this activity, 15, represents the number of NPDES-authorized States and Territories that must develop designation criteria and assess small MS4s located outside of an urbanized area for possible Phase II coverage divided by the three year ICR period.

Given the requirements of today's regulation, EPA believes there will be no capital startup and no operation and maintenance costs associated with information collection requirements of the rule.

The government burden associated with today's rule will impact State, Tribal, and Territorial governments (NPDES-authorized governmental entities) that have storm water program authority, as well as the federal government (*i.e.*, EPA), where it is the NPDES permitting authority. As of March 1999, 43 States and the Virgin Islands had NPDES authority.

The annual burden imposed upon authorized governmental entities (delegated States and the Virgin Islands) and the federal government for the next three years is estimated to be 19,992 hours ($537,985) and 4,087 hours ($115,948) respectively, for a total of 24,079 hours ($653,933). This estimate is based on the average time that governments will expend to carry out the following activities: designate additional MS4s (332.8 hours) and process and review "no exposure" certificates from industrial dischargers (0.5 hour).

Under the existing rule, storm water discharges from light industrial activities identified under § 122.26(b)(14)(xi) were exempted from the permit application requirements if they were not exposed to storm water. Today's rule expands the applicability of the "no exposure" exclusion to include all industrial activity regulated under § 122.26(b)(14) (except category (x), construction). The "no exposure" provision is applied through the use of a written certification process, thus representing a slight reporting burden increase for "light" industries with "no exposure'.

In addition to the information collection, reporting, and record keeping burden for the next three years, today's rule contains information collection requirements that will not begin until three years or more from the effective date of today's rule. These information collection requirements were not included in the information collection request approved by OMB. EPA will submit these burden estimates for OMB approval when it submits ICR 2040–0211 to OMB for renewal in three years. The rule burdens for regulated small MS4s and small construction sites that will be included in the ICR renewal fall into three areas: application for an NPDES permit or submittal of waiver information, record keeping of storm water management activities, and submittal of reports to the permitting authority. There will also be an additional burden for the permitting authority to review this information.

An agency may not conduct or sponsor, and a person is not required to respond to a collection of information unless it displays a currently valid OMB control number. The OMB control numbers for EPA's regulations are listed in 40 CFR Part 9 and 48 CFR Chapter 15. EPA is amending the table in 40 CFR Part 9 of currently approved ICR control numbers issued by OMB for various regulations to list the first three years of information requirements contained in this final rule.

B. Executive Order 12866

Under Executive Order 12866, [58 FR 51,735 (October 4, 1993)] the Agency must determine whether the regulatory action is "significant" and therefore subject to OMB review and the requirements of the Executive Order. The Order defines "significant regulatory action" as one that is likely to result in a rule that may:

(1) have an annual effect on the economy of $100 million or more or adversely affect in a material way the economy, a sector of the economy, productivity, competition, jobs, the environment, public health or safety, or State, local, or tribal governments or communities;

(2) create a serious inconsistency or otherwise interfere with an action taken or planned by another agency;

(3) materially alter the budgetary impact of entitlements, grants, user fees, or loan programs or the rights and obligations of recipients thereof; or

(4) raise novel legal or policy issues arising out of legal mandates, the President's priorities, or the principles set forth in the Executive Order.

Pursuant to the terms of Executive Order 12866, it has been determined that this rule is a "significant regulatory action". As such, this action was submitted to OMB for review. Changes made in response to OMB suggestions or recommendations will be documented in the public record.

C. Unfunded Mandates Reform Act

Title II of the Unfunded Mandates Reform Act of 1995 (UMRA), Public Law 104–4, establishes requirements for Federal agencies to assess the effects of their regulatory actions on State, local, and tribal governments and the private sector. Under section 202 of the UMRA, EPA generally must prepare a written statement, including a cost-benefit analysis, for proposed and final rules with "Federal mandates" that may result in expenditures to State, local, and tribal governments, in the aggregate, or to the private sector, of $100 million or more in any one year. Before promulgating an EPA rule for which a

written statement is needed, section 205 of the UMRA generally requires EPA to identify and consider a reasonable number of regulatory alternatives and adopt the least costly, most cost-effective or least burdensome alternative that achieves the objectives of the rule. The provisions of section 205 do not apply when they are inconsistent with applicable law. Moreover, section 205 allows EPA to adopt an alternative other than the least costly, most cost-effective or least burdensome alternative if the Administrator publishes with the final rule an explanation why that alternative was not adopted.

EPA has determined that today's rule contains a Federal mandate that may result in expenditures of $100 million or more in any one year for both State, local, and tribal governments, in the aggregate, and the private sector. Accordingly, EPA has prepared under section 202 of the UMRA a written statement which is summarized below.

1. Summary of UMRA Section 202 Written Statement

EPA promulgates today's storm water regulation pursuant to the specific mandate of Clean Water Act section 402(p)(6), as well as sections 301, 308, 402, and 501. (33 U.S.C. sections 1342(p)(6), 1311, 1318, 1342, 1361.) Section 402(p)(6) of the CWA requires that EPA designate sources to be regulated to protect water quality and establish a comprehensive program to regulate those sources.

In the *Economic Analysis of the Final Phase II Rule* (EA), EPA describes the qualitative and monetized benefits associated with today's rule and then compares the monetized benefits with the estimated costs for the rule. EPA developed detailed estimates of the costs and benefits of complying with each of the incremental requirements imposed by the rule. These estimates, including descriptions of the methodology and assumptions used, are described in detail in the EA. The Agency used two approaches, a national water quality model and national water quality assessment, to estimate the potential benefits of the rule. Both approaches show that the benefits are likely to exceed costs. Exhibit 3 in section III of this preamble summarizes the costs and benefits associated with the basic elements of today's rule.

There are additional benefits to storm water control that cannot be quantified or monetized. Thus, the current estimate of monetized benefits may understate the true value of storm water controls because it omits many ways by which society is likely to benefit from reduced storm water pollution, such as improved aesthetic quality of waters, benefits to wildlife and to threatened and endangered species, cultural values, and biodiversity benefits.

Several commenters asserted that today's rule is an unfunded mandate and that, without funding, the monitoring of the already existing pollution control programs would suffer. In section II.D.3 of the preamble, EPA lists some of the programs that EPA anticipates may provide funds to help develop and, in limited circumstances, implement storm water management programs.

In the EA, EPA reviewed the expected effect of today's rule on the national economy. The Agency determined that the rule will have minimal impacts on the economy or employment. This is because the final rule regulates small MS4s and construction sites under 5 acres, not the typical industrial plants or other non-construction activities that could directly impact production and thus those sectors of the economy.

Discussions with representatives within the construction industry indicate that construction costs will likely be passed on to buyers, thus not seriously affecting the housing industry directly. Flexibility within the rule allows MS4s to tailor the storm water program requirements to their needs and financial position, minimizing impacts. For sedimentation and erosion controls on construction sites, the rule contemplates application of commonly used BMPs to reduce costs for the construction industry. Thus, the rule attempts to use existing practices to prevent pollution, which should minimize impacts on States, Tribes, municipalities and the construction industry.

Thus, EPA concludes that the effect of the rule, if any, on the national economy would be minimal. The benefits of today's rule more than offset any cost impacts on the national economy.

Consistent with the intergovernmental consultation provisions of section 204 of the UMRA and Executive Order 12875, "Enhancing the Intergovernmental Partnership," EPA consulted with the governmental entities affected by this rule.

First, EPA provided States, Tribal and local governments with the opportunity to comment on draft alternative approaches for the proposed rule through publishing a notice requesting information and public comment in the **Federal Register** on September 9, 1992 (57 FR 41344). This notice presented a full range of regulatory alternatives. At that time, EPA received more than 130 comments, including approximately 43 percent from municipalities and 24 percent from State or Federal agencies. These comments were the genesis of many of the provisions in the today's rule, including reliance on the NPDES program framework (including general permits), providing State and local governments flexibility in selecting additional sources requiring regulation, and focusing on high priority polluters. These comments helped to focus on pollution prevention, watershed-based concerns and BMPs. They also led to certain exemptions for facilities that do not pollute national waters.

In early 1993, EPA, in conjunction with the Rensselaerville Institute, held public and expert meetings to assist in developing and analyzing options for identifying unregulated storm water sources and possible controls. These meetings provided participants an additional opportunity to provide input into the CWA section 402(p)(6) program development process. The final rule addresses several of the key concerns identified in these groups, including provisions that provide flexibility to the States to select sources to be controlled and types of permits to be issued, and flexibility to MS4s in selecting BMPs.

EPA also conducted outreach with representatives of small entities, including small government representatives, in conjunction with the convening of a Small Business Advocacy Review Panel under SBREFA which is discussed in section IV.E. of the preamble.

In addition, EPA established the Urban Wet Weather Flows Advisory Committee under the Federal Advisory Committee Act (FACA). The Urban Wet Weather Flows Advisory Committee, in turn established the Storm Water Phase II Subcommittee. Consistent with FACA, the membership of the Committee and the Storm Water Phase II Subcommittee was balanced among EPA's various outside stakeholder interests, including representatives from State governments, municipal governments (both elected officials and appointed officials) and Tribal governments, as well as industrial and commercial sectors, agriculture, environmental and public interest groups.

In general, municipal and Tribal government representatives supported the NPDES approach in today's rule for the following reasons: It will be uniformly applied on a nationwide basis; it provides flexibility to allow incorporation of State and local programs; it resolves the problem of donut holes that cause water quality impacts in urbanized areas; and it allows co-permitting of small regulated

MS4s with those regulated under the existing storm water program.

In contrast, State representatives sought alternative approaches for State implementation of the storm water program for Phase II sources. State representatives asserted that a non-NPDES alternative approach best facilitated watershed management and avoided duplication and overlapping regulations. These representatives pointed out that there are a variety of State programs—not based on the CWA—implementing effective storm water controls, and that EPA should provide incentives for their implementation and improvement in performance. EPA continues to believe that an NPDES approach is the best approach in order to adequately protect water quality. However, EPA has worked with States on an alternative approach that provides flexibility within the NPDES framework. The final rule allows States with a watershed permitting approach to phase in permit coverage for MS4s in jurisdictions with a population less than 10,000 and provides two waivers from coverage for small MS4s. This issue is discussed in section II.C of the preamble, Program Framework: NPDES Approach.

Some municipal governments objected that the rule's minimum measures for small MS4s violate the Tenth Amendment insofar as they require the operators of MS4s to regulate third parties according to the "minimum measures" for municipal storm water management programs. EPA disagrees that today's rule is inconsistent with Tenth Amendment principles. Permits issued under today's rule will not compel political subdivisions of States to regulate in their sovereign capacities, but rather to effectively control discharges out of their storm sewer systems in their owner/operator capacities. For MS4s that do not accept this "default" minimum measures-based approach (to control discharges out of the storm sewer system by exercising local powers to control discharges into the storm sewer system), today's rule allows for alternative permits through individual permit applications. EPA made revisions to the rule to allow regulated small MS4s to opt out of the minimum measures approach and instead apply for an individual permit. This issue is discussed in section II.H.3.c.iii of the preamble, Alternative Permit Option/ Tenth Amendment.

2. Selection of the Least Costly, Most Cost-Effective or Least Burdensome Alternative That Achieves the Objectives of the Statute

Today's rule evolved over time and incorporated aspects of alternatives that responded to concerns presented by the various stakeholders. A primary characteristic of today's rule is the flexibility it offers both the permitting authority and the regulated sources (small MS4s and small construction sites), by the use of general permits, implementation of BMPs suited to specific locations, and allowing MS4s to develop their own program goals.

In the administrative record supporting the proposed rule, EPA estimated ranges of costs associated with six different options, including a no action option, the proposed option, and four other options that considered various combinations of the following: Covering all the unregulated construction sites below 5 acres, all small MS4s, certain industrial and commercial activities, and all point sources. EPA developed detailed cost estimates for the incremental requirements imposed under the final regulation, and for each of the alternatives, and applied these estimates to the remaining unregulated point sources of storm water. The Agency compared the estimated annual range of costs imposed under today's rule and other major options considered. The range of values for each option included the costs for compliance, including paperwork requirements for the operators of small construction sites, industrial facilities, and MS4s and administrative costs for State and Federal NPDES permitting authorities.

Today's rule reflects the least costly option that achieves the objectives of the statute, thus meeting the requirements of section 205. EPA did not consider "no regulation" to be an "option" because it would not achieve the objectives of CWA section 402(p)(6). A portion of currently unregulated point sources of storm water need to reduce pollutants to protect water quality.

Today's rule is estimated to range in cost from $847.6 million to $981.3 million annually, although the cost estimate for the proposed rule was reported as a range of $138 to $869 million annually. That range reflected a unit cost range for the municipal minimum measures and a cost range per construction site for soil erosion control. EPA has since revised its cost analysis to allow it to report the current estimate, which is toward the high end of the original cost range. The four other regulatory options considered at proposal involved higher regulatory costs and, therefore, were not selected. These four options and their estimated costs are as follows:

(1) An option based on the August 7, 1995 direct final rule was estimated to cost between $2.2 billion and $78.9 billion per year.

(2) A "Plan B" option was estimated to cost between $0.6 billion and $3.2 billion per year.

(3) An option based on the September 30, 1996 draft proposed rule was estimated to cost between $0.2 billion and $3.7 billion per year.

(4) An option based on the February 13, 1997 draft proposed rule, was estimated to cost between $0.2 billion and $3.5 billion.

There are three reasons why the costs for these four options exceeded the estimated cost range for the proposed rule. The first two options regulated substantially more municipal governments. The first, third, and fourth options required industrial facilities to apply for permits. Finally, the first three options applied permit requirements to construction sites below 1 acre. Consequently, these options would be more costly than today's rule even with the revised analysis methods used to estimate costs.

3. Effects on Small Governments

Before EPA establishes any regulatory requirements that may significantly or uniquely affect small governments, including tribal governments, it must have developed under section 203 of the UMRA a small government agency plan. The plan must provide for notifying potentially affected small governments, enabling officials of affected small governments to have meaningful and timely input in the development of EPA regulatory proposals with significant Federal intergovernmental mandates, and informing, educating, and advising small governments on compliance with the regulatory requirements. EPA has determined that this rule contains no regulatory requirements that might significantly or uniquely affect small governments. Although today's rule expands the NPDES program (with modifications) to certain MS4s serving populations below 100,000 and although many MS4s are owned by small governments, EPA does not believe today's rule significantly or uniquely affects small governments. As explained in section IV.E. of the preamble, EPA today certifies that the rule will not have a significant impact on small governmental jurisdictions. In addition, the rule will not have a unique impact on small governments because the rule will affect small governments in

to the same extent as (or to a lesser extent than) larger governments that are already covered by the existing storm water rules. Thus, today's rule is not subject to the requirements of section 203 of UMRA.

Notwithstanding this finding, in developing today's rule, EPA provided notice of the requirements to potentially affected small governments; enabled officials of affected small governments to provide meaningful and timely input in the development of regulatory proposals; and informed, educated and advised small governments on compliance with the requirements.

Concerning notice, EPA provided States, local, and Tribal governments with the opportunity to comment on alternative approaches for an early draft of the proposed rule by publishing a notice requesting information and public comment in the **Federal Register** on September 9, 1992 (57 FR 41344). This notice presented a full range of regulatory alternatives. At that time, EPA received more than 130 comments, including approximately 43 percent from municipalities and 24 percent from State or Federal agencies.

The Agency also provided, through the SBREFA panel process and the FACA process, the opportunity for elected officials of small governments (and their representatives) to meaningfully participate in the development of the rule. Through such participation and exchange, EPA not only notified potentially affected small governments of requirements of the developing rule, but also allowed officials of affected small governments to have meaningful and timely input into the development of regulatory proposals.

In addition to involving municipalities in the development of the rule, EPA also continues to inform, educate, and advise small governments on compliance with the requirements of today's rule. For example, EPA supported 10 workshops, presented by the American Public Works Association from September 1998 through May 1999, designed to educate local governments on the implementation of the rule. The workshop curriculum included information on a variety of key issues such as anticipated regulatory requirements, agency reporting, best management practices, construction site controls, post construction management for new and redeveloped sites, public education and public involvement strategies, detection and control of illicit discharges, and good housekeeping practices. Moreover, EPA has prepared a series of fact sheets, available on the EPA website at www.epa.gov/owm/sw/toolbox, that explains the rule in detail.

Finally, to assist small governments in implementing the Phase II program, EPA is committed to the following: (1) developing a tool box of implementation strategies; (2) providing written technical assistance, including guidance on developing BMPs and measurable goals; and (3) compiling a comprehensive evaluation of the NPDES municipal storm water Phase II program over the next 13 years.

D. Executive Order 13132

Executive Order 13132, entitled "Federalism" (64 FR 43255, August 10, 1999), requires EPA to develop an accountable process to ensure "meaningful and timely input by State and local officials in the development of regulatory policies that have federalism implications." "Policies that have federalism implications" is defined in the Executive Order to include regulations that have "substantial direct effects on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government." Under Executive Order 13132, EPA may not issue a regulation that has federalism implications, that imposes substantial direct compliance costs, and that is not required by statute, unless the Federal government provides the funds necessary to pay the direct compliance costs incurred by State and local governments, or EPA consults with State and local officials early in the process of developing the proposed regulation. EPA also may not issue a regulation that has federalism implications and that preempts State law unless the Agency consults with State and local officials early in the process of developing the proposed regulation.

If EPA complies by consulting, Executive Order 13132 requires EPA to provide to the Office of Management and Budget (OMB), in a separately identified section of the preamble to the rule, a federalism summary impact statement (FSIS). The FSIS must include a description of the extent of EPA's prior consultation with State and local officials, a summary of the nature of their concerns and the agency's position supporting the need to issue the regulation, and a statement of the extent to which the concerns of State and local officials have been met. For final rules subject to Executive Order 13132, EPA also must submit to OMB a statement from the agency's Federalism Official certifying that EPA has fulfilled the Executive Order's requirements.

EPA has concluded that this final rule may have federalism implications. As discussed above in section IV.C., the rule contains a Federal mandate that may result in the expenditure by State, local and tribal governments, in the aggregate, of $100 million or more in any one year. Accordingly, the rule may have substantial direct effects on the States; on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government, as specified in Executive Order 13132. Moreover, the rule will impose substantial direct compliance costs on State or local governments. Accordingly, EPA provides the following FSIS under section 6(b) of Executive Order 13132.

1. Description of the Extent of the Agency's Prior Consultation with State and Local Governments

Although this rule was proposed long before the November 2, 1999 effective date of Executive Order 13132, EPA consulted extensively with affected State and local governments pursuant to the intergovernmental consultation provisions of Executive Order 12875, "Enhancing the Intergovernmental Partnership" (now revoked by Executive Order 13132) and section 204 of UMRA.

First, EPA provided State and local governments the opportunity to comment on draft alternative approaches for the proposed rule through publishing a notice requesting information and public comment in the **Federal Register** on September 9, 1992 (57 FR 41344). This notice presented a full range of regulatory alternatives. At that time, EPA received more than 130 comments, including approximately 43 percent from municipalities and 24 percent from State or Federal agencies. These comments were the genesis of many of the provisions in the today's rule, including reliance on the NPDES program framework (including general permits), providing State and local governments flexibility in selecting additional sources requiring regulation, and focusing on high priority polluters. These comments helped to focus on pollution prevention, watershed-based concerns and BMPs. They also led to certain exemptions for facilities that do not pollute national waters.

In early 1993, EPA, in conjunction with the Rensselaerville Institute, held public and expert meetings to assist in developing and analyzing options for identifying unregulated storm water sources and possible controls. These meetings provided participants an additional opportunity to provide input into the CWA section 402(p)(6) program

development process. The final rule addresses several of the key concerns identified in these groups, including provisions that provide flexibility to the States to select sources to be controlled and types of permits to be issued, and flexibility to MS4s in selecting BMPs.

EPA also conducted outreach with representatives of small entities, including small governments, in conjunction with the convening of a Small Business Advocacy Review Panel under SBREFA which is discussed in section III.F. of the preamble.

In addition, EPA established the Urban Wet Weather Flows Advisory Committee (FACA), which in turn established the Storm Water Phase II Subcommittee. Consistent with the Federal Advisory Committee Act, the membership of the Committee and the Storm Water Phase II Subcommittee was balanced among EPA's various outside stakeholder interests, including representatives from State governments, municipal governments (both elected officials and appointed officials) and Tribal governments, as well as industrial and commercial sectors, agriculture, environmental and public interest groups.

2. Summary of Nature of State and Local Government Concerns, and Statement of the Extent to Which Those Concerns Have Been Met

In general, municipal government representatives supported the NPDES approach in today's rule for the following reasons: it will be uniformly applied on a nationwide basis; it provides flexibility to allow incorporation of State and local programs; it resolves the problem of donut holes that cause water quality impacts in urbanized areas; and it allows co-permitting of small regulated MS4s with those regulated under the existing storm water program.

In contrast, State representatives sought alternative approaches for State implementation of the storm water program for Phase II sources. State representatives asserted that a non-NPDES alternative approach best facilitated watershed management and avoided duplication and overlapping regulations. These representatives pointed out that there are a variety of State programs—not based on the CWA—implementing effective storm water controls, and that EPA should provide incentives for their implementation and improvement in performance. EPA continues to believe that an NPDES approach is the best approach in order to adequately protect water quality. However, EPA has worked with States on an alternative approach that provides flexibility within the NPDES framework. The final rule allows States with a watershed permitting approach to phase in permit coverage for MS4s in jurisdictions with a population less than 10,000 and provides two waivers from coverage for small MS4s. This issue is discussed in section II.C of the preamble, Program Framework: NPDES Approach.

Some municipal governments objected that the rule's minimum measures for small MS4s violate the Tenth Amendment insofar as they require the operators of MS4s to regulate third parties according to the "minimum measures" for municipal storm water management programs. EPA disagrees that today's rule is inconsistent with Tenth Amendment principles. Permits issued under today's rule will not compel political subdivisions of States to regulate in their sovereign capacities, but rather to effectively control discharges out of their storm sewer systems in their owner/operator capacities. For MS4s that do not accept this "default" minimum measures-based approach (to control discharges out of the storm sewer system by exercising local powers to control discharges into the storm sewer system), today's rule allows for alternative permits through individual permit applications. EPA made revisions to the rule to allow regulated small MS4s to opt out of the minimum measures approach and instead apply for an individual permit. This issue is discussed in section II.H.3.c.iii of the preamble, Alternative Permit Option/ Tenth Amendment.

3. Summary of the Agency's Position Supporting the Need To Issue the Regulation

As discussed more fully in section I.B. above, today's rule is needed because uncontrolled storm water discharges from areas of urban development and construction activity have been shown to have negative impacts on receiving waters by changing the physical, biological, and chemical composition of the water, resulting in an unhealthy environment for aquatic organisms, wildlife, and people. As discussed in section II.C., the NPDES approach in today's rule is needed to ensure uniform application on a nationwide basis, to provide flexibility to allow incorporation of State and local programs, to resolve the problem of donut holes that cause water quality impacts in urbanized areas, and to allow co-permitting of small regulated MS4s with those regulated under the existing storm water program.

The draft final rule was transmitted to OMB on July 6, 1999. Because transmittal occurred before the November 2, 1999 effective date of Executive Order 13132, certification under section 8 of the Executive Order is not required.

E. Regulatory Flexibility Act (RFA), as amended by the Small Business Regulatory Enforcement Fairness Act of 1996 (SBREFA), 5 U.S.C. 601 et seq.

The RFA generally requires an Agency to prepare a regulatory flexibility analysis of any rule subject to notice and comment rulemaking requirements under the Administrative Procedure Act or any other statute unless the agency certifies that the rule will not have a significant economic impact on a substantial number of small entities. Small entities include small businesses, small organizations, and small governmental jurisdictions.

For purposes of assessing the impact of today's rule on small entities, small entity is defined as: (1) a building contractor (SIC 15) with up to $17.0 million in annual revenue; (2) a small governmental jurisdiction that is a government of a city, county, town, school district, or special district with a population of less than 50,000; and (3) a small organization that is any not-for-profit enterprise which is independently owned and operated and is not dominant in its field.

After considering the economic impacts of today's final rule on small entities, I certify that this action will not have a significant economic impact on a substantial number of small entities.

Although this final rule will not have a significant economic impact on a substantial number of small entities, EPA nonetheless has tried to reduce the impact of this rule on small entities.

For purposes of evaluating the economic impact of this rule on small governmental jurisdictions, EPA compared annual compliance costs with annual government revenues obtained from the 1992 Census of Governments, using state-specific estimates of annual revenue per capita for municipalities in three population size categories (fewer than 10,000, 10,000–25,000, and 25,000–50,000).

In order to estimate the annual compliance cost for small governmental jurisdictions, EPA used the mean variable municipal cost of $8.93 per household as calculated in a 1998 study of 121 municipalities conducted by the national Association of Flood and Stormwater Management Agencies (NAFSMA). In addition, EPA used the estimated fixed administrative costs of $1,545 per municipality for reporting,

recordkeeping, and application requirements for today's rule.

In evaluating the economic impact of this rule on small governmental jurisdictions, EPA determined that compliance costs represent more than 1 percent of estimated revenues for only 10 percent of small governments and more than 3 percent of the revenue for 0.7 percent of these entities. In both absolute and relative terms, EPA does not consider this a significant economic impact on a substantial number of small entities.

EPA normally uses the "sales test" for determining the economic impact on small businesses. Under a sales test, annual compliance costs are compared with the small business's total annual sales. However, the direct application of the sales test is not suitable in this case, because of the uncertainty associated with estimating the number of units an "average" developer/contractor develops or builds in a typical year. For this rule, EPA has approximated the sales test by estimating compliance costs for three sizes of construction sites and comparing them with a representative sale price for three building categories. Although EPA's analysis is not exactly a "sales test," it is similar to the sales test, producing comparable results.

For small building contractors, EPA estimated administrative compliance costs of $870 per site for applying for coverage, reporting, record keeping, monitoring and preparing a storm water pollution prevention plan. EPA estimated compliance costs for installing soil and erosion controls as ranging from $1,206 to $8,709 per site. EPA compliance cost estimates are based on 27 theoretical model construction sites designed to mimic the mostly likely used best management practices around the country.

In evaluating the economic impact on small building contractors, EPA divided the revised compliance costs per construction start by the appropriate homes-to-site ratio for each of the three sizes of construction sites. The average compliance cost per home ranges from approximately $450 to $650. EPA concluded that compliance costs are roughly 0.22 to 0.43 percent of both the mean, $181,300, and median, $151,000, sale price of a home.

The absence of data to specifically assess annual compliance costs for building contractors as a percentage of annual sales (i.e., a very direct estimate of the impact on potentially affected small businesses) led EPA to perform additional market analysis to examine the ability of potentially affected firms to pass along regulatory costs to buyers for single-family homes constructed subject to today's rule. If the small building contractors covered by the rule are able to pass on the costs of compliance, either completely or partially, to their purchasers, then the rule's impact on these small business entities is significantly reduced. The market analysis shows that demand for homes is not overly sensitive to small changes in price, therefore builders should be able to pass on at least a significant fraction of the compliance costs to buyers.

EPA also assessed the effect of the building contractors' costs on average monthly mortgage rates and on the demand for new homes. Based on that screening analysis, EPA concludes that the costs to building contractors, and the potential changes in housing prices and monthly mortgage payments for single-family home buyers, are not expected to have a significant impact on the market for single-family houses. In both absolute and relative terms, EPA does not consider this a significant economic impact on a substantial number of small entities.

EPA also certified this rule at proposal. Even though the Agency was not required to, we convened a Small Business Advocacy Review Panel ("Panel") in June 1997. A number of small entity representatives had already been actively involved with EPA through the FACA process, and were, therefore, broadly knowledgeable about the development of the proposed and final rules. Prior to convening the Panel, EPA consulted with the Small Business Administration to identify a group of small entity representatives to advise the Panel. The Agency distributed a briefing package describing its preliminary analysis under the RFA to the small entity representatives (as well as to representatives from OMB and SBA) and conducted two telephone conference calls and an all-day meeting at EPA Headquarters in May of 1997 with small entity representatives. With this preliminary work complete, in June 1997, EPA formally convened the SBREFA Panel, comprising representatives from OMB, SBA, EPA's Office of Water and EPA's Small Business Advocacy Chair. The Panel received written comments from small entity representatives based on their involvement in the earlier meetings, and invited additional comments.

Consistent with requirements of the RFA, the Panel evaluated the assembled materials and small-entity comments on issues related to: (1) a description and the number of small entities that would be regulated; (2) a description of the projected record keeping, reporting and other compliance requirements applicable to small entities; (3) identification of other Federal rules that may duplicate, overlap, or conflict with the proposal to the final rule; and (4) regulatory alternatives that would minimize any significant economic impact of the rule on small entities while accomplishing the stated objectives of the CWA section 402(p)(6).

On August 7, 1997, the Panel provided a Final Report (hereinafter, "Report") to the EPA Administrator. A copy of the Report is included in the docket for the rule. The Panel acknowledged and commended EPA's efforts to work with stakeholders, including small entities, through the FACA process. The SBREFA Panel stated that, because of EPA's extensive outreach and responsiveness in addressing stakeholder concerns, commenters during the SBREFA process raised fewer concerns than might otherwise have been expected. Based on the advice and recommendations of the Panel, today's rule includes a number of provisions designed to minimize any significant impact on small entities. (See Appendix 5).

F. National Technology Transfer And Advancement Act

Section 12(d) of the National Technology Transfer and Advancement Act of 1995 ("NTTAA"), Public Law 104–113, section 12(d) (15 U.S.C. 272 note) directs EPA to use voluntary consensus standards in its regulatory activities unless to do so would be inconsistent with applicable law or otherwise impractical. Voluntary consensus standards are technical standards (*e.g.*, materials specifications, test methods, sampling procedures, and business practices) that are developed or adopted by voluntary consensus standard bodies. The NTTAA directs EPA to provide Congress, through OMB, explanations when the Agency decides not to use available and applicable voluntary consensus standards.

This action does not mandate the use of any particular technical standards, although in designing appropriate BMPs regulated small MS4s and small construction sites are encouraged to use any voluntary consensus standards that may be applicable and appropriate. Because no specific technical standards are included in the rule, section 12(d) of the NTTAA is not applicable.

G. Executive Order 13045

Executive Order 13045: "Protection of Children from Environmental Health Risks and Safety Risks" (62 FR 19885, April 23, 1997) applies to any rule that: (1) Is determined to be "economically

significant" as defined under E.O. 12866, and (2) concerns an environmental health or safety risk that EPA has reason to believe may have a disproportionate effect on children. If the regulatory action meets both criteria, the Agency must evaluate the environmental health or safety effects of the planned rule on children, and explain why the planned regulation is preferable to other potentially effective and reasonably feasible alternatives considered by the Agency.

This final rule is not subject to E.O. 13045 because it does not concern an environmental health or safety risk that may have a disproportionate effect on children. The rule expands the scope of the existing NPDES permitting program to require small municipalities and small construction sites to regulate their storm water discharges. The rule does not itself, however, establish standards or criteria that would be included in permits for those sources. Such standards or criteria will be developed through other actions, for example, in the establishment of water quality standards or subsequently in the issuance of permits themselves. As such, today's action does not concern an environmental health or safety risk that may have a disproportionate effect on children. To the extent it does address a risk that may have a disproportionate effect on children, expanding the scope of the permitting program will have a corresponding disproportionate benefit to children to protect them from such risk.

H. Executive Order 13084

Under Executive Order 13084, EPA may not issue a regulation that is not required by statute, that significantly or uniquely affects the communities of Indian tribal governments, and that imposes substantial direct compliance costs on those communities, unless the Federal government provides the funds necessary to pay the direct compliance costs incurred by the Tribal governments, or EPA consults with those governments. If EPA complies by consulting, Executive Order 13084 requires EPA to provide to the Office of Management and Budget, in a separately identified section of the preamble to the rule, a description of the extent of EPA's prior consultation with representatives of affected Tribal governments, a summary of the nature of their concerns, and a statement supporting the need to issue the regulation. In addition, Executive Order 13084 requires EPA to develop an effective process permitting elected officials and other representatives of Indian Tribal governments "to provide meaningful and timely input in the development of regulatory policies on matters that significantly or uniquely affect their communities."

Today's rule does not significantly or uniquely affect the communities of Indian Tribal governments. Even though the Agency is not required to address Tribes under the Regulatory Flexibility Act, EPA used the same revenue test that was used for municipalities to assess the impact of the rule on communities of Tribal governments and determine that they will not be significantly affected. In addition, the rule will not have a unique impact on the communities of Tribal governments because small municipal governments are also covered by this rule and larger municipal governments are already covered by the existing storm water rules. Accordingly, the requirements of section 3(b) of Executive Order 13084 do not apply to this rule.

I. Congressional Review Act

The Congressional Review Act, 5 U.S.C. section 801 *et seq.*, as added by the Small Business Regulatory Enforcement Fairness Act of 1996, generally provides that before a rule may take effect, the agency promulgating the rule must submit a rule report, which includes a copy of the rule, to each House of the Congress and the Comptroller General of the United States. EPA will submit a report containing this rule and other required information to the U.S. Senate, the U.S. House of Representatives, and the Comptroller General of the United States prior to publication of the rule in the **Federal Register**. A major rule cannot take effect until 60 days after it is published in the **Federal Register**. This rule is a "major rule" as defined by 5 U.S.C. 804(2). This rule will be effective on February 7, 2000.

List of Subjects

40 CFR Part 9

Environmental protection, Reporting and recordkeeping requirements.

40 CFR Part 122

Administrative practice and procedure, Confidential business information, Environmental protection, Hazardous substances, Incorporation by reference, Reporting and recordkeeping requirements, Sewage disposal, Waste treatment and disposal, Water pollution control.

40 CFR Part 123

Administrative practice and procedure, Confidential business information, Hazardous materials, Indians—lands, Intergovernmental relations, Penalties, Reporting and recordkeeping requirements, Sewage disposal, Waste treatment and disposal, Water pollution control, Penalties.

40 CFR Part 124

Administrative practice and procedure, Air pollution control, Hazardous waste, Indians—lands, Reporting and recordkeeping requirements, Water pollution control, Water supply.

Dated: October 29, 1999.

Carol M. Browner,

Administrator.

Appendices to the Preamble

APPENDIX 1 TO PREAMBLE—FEDERALLY-RECOGNIZED AMERICAN INDIAN AREAS LOCATED FULLY OR PARTIALLY IN BUREAU OF THE CENSUS URBANIZED AREAS

[Based on 1990 Census data]

State	American Indian Area	Urbanized Area
AZ	Pascua Yacqui Reservation (pt.): Pascua Yacqui Tribe of Arizona	Tucson, AZ (Phase I).
AZ	Salt River Reservation (pt.): Salt River Pima-Maricopa Indian Community of the Salt River Reservation, California.	Phoenix, AZ (Phase I).
AZ	San Xavier Reservation (pt.): Tohono O'odham Nation of Arizona (formerly known as the Papago Tribe of the Sells, Gila Bend & San Xavier Reservation).	Tucson, AZ (Phase I).
CA	Augustine Reservation: Augustine Band of Cahuilla Mission of Indians of the Augustine Reservation, CA.	Indio-Coachella, CA (Phase I).
CA	Cabazon Reservation: Cabazon Band of Cahuilla Mission Indians of the Cabazon Reservation, CA.	Indio-Coachella, CA (Phase I).

APPENDIX 1 TO PREAMBLE—FEDERALLY-RECOGNIZED AMERICAN INDIAN AREAS LOCATED FULLY OR PARTIALLY IN BUREAU OF THE CENSUS URBANIZED AREAS—Continued

[Based on 1990 Census data]

State	American Indian Area	Urbanized Area
CA	Fort Yuma (Quechan) (pt.): Quechan Tribe of the Fort Yuma Indian Reservation, California & Arizona.	Yuma, AZ–CA.
CA	Redding Rancheria: Redding Rancheria of California	Redding, CA.
FL	Hollywood Reservation: Seminole Tribe	Fort Lauderdale, FL (Phase I).
FL	Seminole Trust Lands: Seminole Tribe of Florida, Dania, Big Cypress & Brighton Reservations.	Fort Lauderdale, FL (Phase I).
ID	Fort Hall Reservation and Trust Lands: Shosone-Bannock Tribes of the Fort Hall Reservation of Idaho.	Pocatello, ID.
ME	Penobscot Reservation and Trust Lands (pt.): Penobscot Tribe of Maine	Bangor, ME.
MN	Shakopee Community: Shakopee Mdewakanton Sioux Community of Minnesota (Prior Lake).	Minneapolis-St. Paul, MN (Phase I).
NM	Sandia Pueblo (pt.): Pueblo of Sandia, New Mexico	Albuquerque, NM (Phase I).
NV	Las Vegas Colony: Las Vegas Tribe of Paiute Indians of the Las Vegas Indian Colony, Nevada.	Las Vegas, NV (Phase I).
NV	Reno-Sparks Colony: Reno-Sparks Indian Colony, Nevada	Reno, NV (Phase I).
OK	Osage Reservation (pt.): Osage Nation of Oklahoma	Tulsa, OK (Phase I).
OK	Absentee Shawnee-Citizens Band of Potawatomi TJSA (pt.): Absentee-Shawnee Tribe of Indians of Oklahoma; Citizen Potawatomi Nation, Oklahoma.	Oklahoma City, OK (Phase I).
OK	Cherokee TJSA 9 (pt.): Cherokee Nation of Oklahoma; United Keetoowah Band of Cherokee Indians of Oklahoma.	Ft. Smith, AR–OK; Tulsa, OK (Phase I).
OK	Cheyenne-Arapaho TJSA (pt.): Cheyenne-Arapaho Tribes of Oklahoma	Oklahoma City, OK (Phase I).
OK	Choctaw TJSA (pt.): Choctaw Nation of Oklahoma	Ft. Smith, AR–OK (Phase I).
OK	Creek TJSA (pt.): Alabama-Quassarte Tribal Town of the Creek Nation of Oklahoma; Kialegee Tribal Town of the Creek Indian Nation of Oklahoma; Muscogee (Creek) Nation of Oklahoma; Thlopthlocco Tribal Town of the Creek Nation of Oklahoma.	Tulsa, OK (Phase I).
OK	Kiowa-Comanche-Apache-Ft. Sill Apache: Apache Tribe of Oklahoma; Comanche Indian Tribe, Oklahoma; Fort Sill Apache Tribe of Oklahoma; Kiowa Indian Tribe of Oklahoma.	Lawton, OK.
TX	Ysleta del Sur Reservation: Ysleta Del Sur Pueblo of Texas	El Paso, TX–NM (Phase I).
WA	Muckleshoot Reservation and Trust Lands (pt.): Muckleshoot Indian Tribe of the Muckleshoot Reservation.	Seattle, WA (Phase I).
WA	Puyallup Reservation and Trust Lands (pt.): Puyallup Tribe of the Puyallup Reservation, WA.	Tacoma, WA (Phase I).
WA	Yakima Reservation (pt.): Confederated Tribes and Bands of the Yakama Indian Nation of the Yakama Reservation, WA.	Yakima, WA.
WI	Oneida (West) (pt.): Oneida Tribe of Wisconsin	Green Bay, WI.

Please Note

"(pt.)" indicates that the American Indian Area (AIA) listed is only partially located within the referenced urbanized area.

The first line under "American Indian Area" is the name of the federally-recognized reservation/colony/rancheria or trust land as it appears in the Bureau of the Census data. After this first line, the names of the tribes included in the AIA are listed as they appear in the Bureau of Indian Affairs' list of Federally Recognized Indian Tribes. [Federal Register: Nov. 13, 1996, Vol. 66, No. 220, pgs. 58211–58216]

"TJSAs" are Tribal Jurisdiction Statistical Areas in Oklahoma that are defined in conjunction with the federally-recognized tribes in Oklahoma who have definite land areas under their jurisdiction, but do not have reservation status.

"(Phase I)" indicates that the referenced urbanized area includes a medium or large MS4 currently regulated under the existing NPDES storm water program (i.e., Phase I). Any Tribally operated MS4 within these such urban areas would not automatically have been covered under Phase I, however.

Sources

Michael Ratcliffe, Geographic Concepts Division, Bureau of the Census, U.S. Department of Commerce.

1990 Census of Population and Housing, Summary Population and Housing Characteristics, United States. Tables 9 & 10. [1990 CPH–1–1]. Bureau of the Census, U.S. Department of Commerce.

BILLING CODE 6560–50–P

004193

APPENDIX 2 TO PREAMBLE—URBANIZED AREA ILLUSTRATION

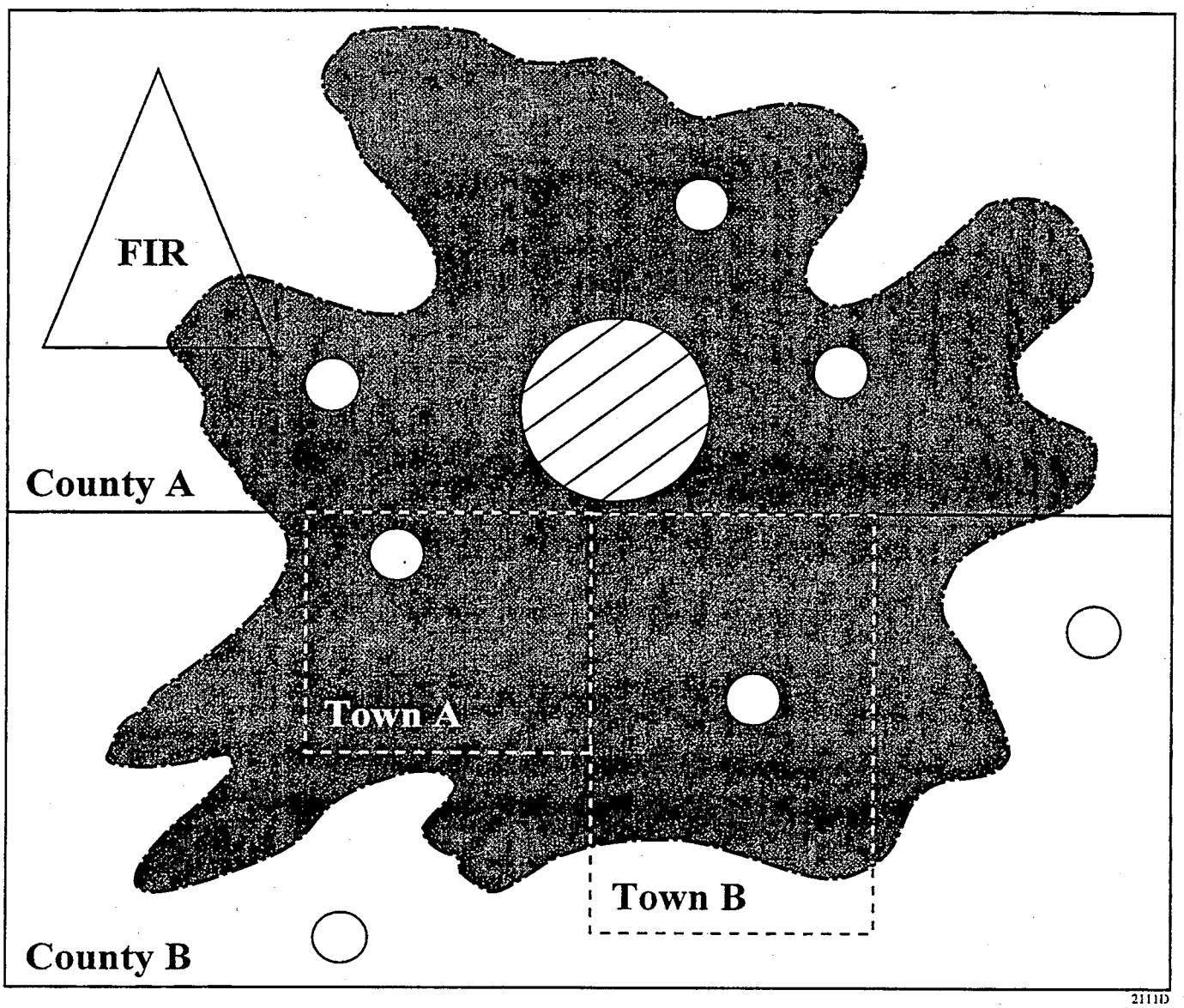

Central Place

Incorporated Place

Federal Indian Reservation (FIR)

Unincorporated "Urbanized Area" Portion of a Town (MCD) or County

Urbanized Area

Town or Township as a functioning Minor Civil Division (MCD). An MCD is the primary subdivision of a County.

County

BILLING CODE 6560–50–C

004194

Appendix 3 to the Preamble—Urbanized Areas of the United States and Puerto Rico

(Source: 1990 Census of Population and Housing, U.S. Bureau of the Census—This list is subject to change with the Decennial Census)

Alabama

Anniston
Auburn-Opelika
Birmingham
Columbus, GA–AL
Decatur
Dothan
Florence
Gadsden
Huntsville
Mobile
Montgomery
Tuscaloosa

Alaska

Anchorage

Arizona

Phoenix
Tucson
Yuma, AZ–CA

Arkansas

Fayetteville-Springdale
Fort Smith, AR–OK
Little Rock-North Little Rock
Memphis, TN–AR–MS
Pine Bluff
Texarkana, AR–TX

California

Antioch-Pittsburgh
Bakersfield
Chico
Davis
Fairfield
Fresno
Hemet-San Jacinto
Hesperia-Apple Valley-Victorville
Indio-Coachella
Lancaster-Palmdale
Lodi
Lompoc
Los Angeles
Merced
Modesto
Napa
Oxnard-Ventura
Palm Springs
Redding
Riverside-San Bernardino
Sacramento
Salinas
San Diego
San Francisco-Oakland
San Jose
San Luis Obispo
Santa Barbara
Santa Cruz
Santa Maria
Santa Rosa
Seaside-Monterey
Simi Valley
Stockton
Vacaville
Visalia
Watsonville
Yuba City
Yuma

Colorado

Boulder
Colorado Springs
Denver
Fort Collins
Grand Junction
Greeley
Longmont
Pueblo

Connecticut

Bridgeport-Milford
Bristol
Danbury, CT–NY
Hartford-Middletown
New Britain
New Haven-Meriden
New London-Norwich
Norwalk
Springfield, MA–CT
Stamford, CT–NY
Waterbury
Worcester, MA–CT

Delaware

Dover
Wilmington, DE–NJ–MD–PA

District of Columbia

Washington, DC–MD–VA

Florida

Daytona Beach
Deltona
Fort Lauderdale-Hollywood-Pompano Beach
Fort Myers-Cape Coral
Fort Pierce
Fort Walton Beach
Gainesville
Jacksonville
Kissimmee
Lakeland
Melbourne-Palm Bay
Miami-Hialeah
Naples
Ocala
Orlando
Panama City
Pensacola
Punta Gorda
Sarasota-Bradenton
Spring Hill
Stuart
Tallahassee
Tampa-St. Petersburg-Clearwater
Titusville
Vero Beach
West Palm Beach-Boca Raton-Delray Beach
Winter Haven

Georgia

Albany
Athens
Atlanta
Augusta
Brunswick
Chattanooga
Columbus
Macon
Rome
Savannah
Warner Robins

Hawaii

Honolulu
Kailua

Idaho

Boise City
Idaho Falls
Pocatello

Illinois

Alton
Aurora
Beloit, WI–IL
Bloomington-Normal
Champaign-Urbana
Chicago, IL-Northwestern IN
Crystal Lake
Davenport-Rock Island-Moline, IA–IL
Decatur
Dubuque
Elgin
Joliet
Kankakee
Peoria
Rockford
Round Lake Beach-McHenry, IL–WI
St. Louis, MO–IL
Springfield

Indiana

Anderson
Bloomington
Chicago, IL-Northwestern IN
Elkhart-Goshen
Evansville, IN–KY
Fort Wayne
Indianapolis
Kokomo
Lafayette-West Lafayette
Louisville, KY–IN
Muncie
South Bend-Mishawaka, IN–MI
Terre Haute

Iowa

Cedar Rapids
Davenport-Rock Island-Moline, IA–IL
Des Moines
Dubuque, IA–IL–WI
Iowa City
Omaha, NE–IA
Sioux City, IA–NE–SD
Waterloo-Cedar Falls

Kansas

Kansas City, MO–KS
Lawrence
St. Joseph, MO–KS
Topeka
Wichita

Kentucky

Cincinnati, OH–KY
Clarksville, TN–KY
Evansville, IN–KY
Huntington-Ashland, WV–KY–OH
Lexington-Fayette
Louisville, KY–IN
Owensboro

Louisiana

Alexandria
Baton Rouge
Houma
Lafayette
Lake Charles
Monroe
New Orleans
Shreveport

Slidell

Maine

Bangor
Lewiston-Auburn
Portland
Portsmouth-Dover-Rochester, NH–ME

Maryland

Annapolis
Baltimore
Cumberland
Frederick
Hagerstown, MD–PA–WV
Washington, DC–MD–VA
Wilmington, DE–NJ–MD–PA

Massachusetts

Boston
Brockton
Fall River, MA–RI
Fitchburg-Leominster
Hyannis
Lawrence-Haverhill, MA–NH
Lowell, MA–NH
New Bedford
Pittsfield
Providence-Pawtucket, RI–MA
Springfield, MA–CT
Taunton
Worcester, MA–CT

Michigan

Ann Arbor
Battle Creek
Bay City
Benton Harbor
Detroit
Flint
Grand Rapids
Holland
Jackson
Kalamazoo
Lansing-East Lansing
Muskegon
Port Huron
Saginaw
South Bend-Mishawaka, IN–MI
Toledo, OH–MI

Minnesota

Duluth, MN–WI
Fargo-Moorhead, ND–MN
Grand Forks, ND–MN
La Crosse, WI–MN
Minneapolis-St.Paul
Rochester
St. Cloud

Mississippi

Biloxi-Gulfport
Hattiesburg
Jackson
Memphis, TN–AR–MS
Pascagoula

Missouri

Columbia
Joplin
Kansas City, MO–KS
St. Joseph, MO–KS
St. Louis, MO–IL
Springfield

Montana

Billings
Great Falls
Missoula

Nebraska

Lincoln
Omaha, NE–IA
Sioux City, IA–NE–SD

Nevada

Las Vegas
Reno

New Hampshire

Lawrence-Haverhill, MA–NH
Lowell, MA–NH
Manchester
Nashua
Portsmouth-Dover-Rochester, NH–ME

New Jersey

Allentown-Bethlehem-Easton, PA–NJ
Atlantic City
New York, NY-Northeastern NJ
Philadelphia, PA–NJ
Trenton, NJ–PA
Vineland-Millville
Wilmington, DE–NJ–MD–PA

New Mexico

Albuquerque
El Paso
Las Cruces
Santa Fe

New York

Albany-Schenectady-Troy
Binghamton
Buffalo-Niagara Falls
Danbury, CT–NY
Elmira
Glens Falls
Ithaca
Newburgh
New York, NY–Northeastern NJ
Poughkeepsie
Rochester
Stamford, CT–NY
Syracuse
Utica-Rome

North Carolina

Asheville
Burlington
Charlotte
Durham
Fayetteville
Gastonia
Goldsboro
Greensboro
Greenville
Hickory
High Point
Jacksonville
Kannapolis
Raleigh
Rocky Mount
Wilmington
Winston-Salem

North Dakota

Bismark
Fargo-Moorhead, ND–MN
Grand Forks, ND–MN

Ohio

Akron
Canton
Cincinnati, OH–KY
Cleveland
Columbus
Dayton
Hamilton
Huntington-Ashland, WV–KY–OH
Lima
Lorain-Elyria
Mansfield
Middletown
Newark
Parkersburg, WV–OH
Sharon, PA–OH
Springfield
Steubenville-Weirton, OH–WV–PA
Toledo, OH–MI
Wheeling, WV–OH
Youngstown-Warren

Oklahoma

Fort Smith, AR–OK
Lawton
Oklahoma City
Tulsa

Oregon

Eugene-Springfield
Longview
Medford
Portland-Vancouver, OR–WA
Salem

Pennsylvania

Allentown-Bethlehem-Easton, PA–NJ
Altoona
Erie
Hagerstown, MD–PA–WV
Harrisburg
Johnstown
Lancaster
Monessen
Philadelphia, PA–NJ
Pittsburgh
Pottstown
Reading
Scranton-Wilkes-Barre
Sharon, PA–OH
State College
Steubenville-Weirton, OH–WV–PA
Trenton, NJ–PA
Williamsport
Wilmington, DE–NJ–MD–PA
York

Rhode Island

Fall River, MA–RI
Newport
Providence-Pawtucket, RI–MA

South Carolina

Anderson
Augusta, GA–SC
Charleston
Columbia
Florence
Greenville
Myrtle Beach
Rock Hill
Spartanburg
Sumter

South Dakota

Rapid City
Sioux City, IA–NE–SD
Sioux Falls

Tennessee

Bristol, TN-Bristol, VA

Chattanooga, TN–GA
Clarksville, TN–KY
Jackson
Johnson City
Kingsport, TN–VA
Knoxville
Memphis, TN–AR–MS
Nashville

Texas

Abilene
Amarillo
Austin
Beaumont
Brownsville
Bryan-College Station
Corpus Christi
Dallas-Fort Worth
Denton
El Paso, TX–NM
Galveston
Harlingen
Houston
Killeen
Laredo
Lewisville
Longview
Lubbock
McAllen-Edinburg-Mission
Midland
Odessa
Port Arthur
San Angelo
San Antonio
Sherman-Denison
Temple
Texarkana, TX-Texarkana, AR
Texas City
Tyler
Victoria
Waco
Wichita Falls

Utah

Logan
Ogden
Provo-Orem
Salt Lake City

Vermont

Burlington

Virginia

Bristol, TN-Bristol, VA
Charlottesville
Danville
Fredericksburg
Kingsport, TN–VA
Lynchburg
Norfolk-Virginia Beach-Newport News
Petersburg
Richmond
Roanoke
Washington, DC–MD–VA

Washington

Bellingham
Bremerton
Longview, WA–OR
Olympia
Portland-Vancouver, OR–WA
Richland-Kennewick-Pasco
Seattle
Spokane
Tacoma
Yakima

West Virginia

Charleston
Cumberland, MD–WV
Hagerstown, MD–PA–WV
Huntington-Ashland, WV–KY–OH
Parkersburg, WV–OH
Steubenville-Weirton, OH–WV–PA
Wheeling, WV–OH

Wisconsin

Appleton-Neenah
Beloit, WI–IL
Duluth, MN–WI
Eau Claire
Green Bay
Janesville
Kenosha
La Crosse, WI–MN
Madison
Milwaukee
Oshkosh
Racine
Round Lake Beach-McHenry, IL–WI
Sheboygan
Wausau

Wyoming

Casper
Cheyenne

Puerto Rico

Aquadilla
Arecibo
Caguas
Cayey
Humacao
Mayaguez
Ponce
San Juan
Vega Baja-Manati

BILLING CODE 6560–50–P

Appendix 4 to the Preamble—No Exposure Certification Form

NPDES FORM 3510-11

EPA

United States Environmental Protection Agency
Washington, DC 20460

Form Approved
OMB No. 2040-0211

NO EXPOSURE CERTIFICATION for Exclusion from NPDES Storm Water Permitting

Submission of this No Exposure Certification constitutes notice that the entity identified in Section A does not require permit authorization for its storm water discharges associated with industrial activity in the State identified in Section B under EPA's Storm Water Multi-Sector General Permit due to the existence of a condition of no exposure.

A condition of no exposure exists at an industrial facility when all industrial materials and activities are protected by a storm resistant shelter to prevent exposure to rain, snow, snowmelt, and/or runoff. Industrial materials or activities include, but are not limited to, material handling equipment or activities, industrial machinery, raw materials, intermediate products, by-products, final products, or waste products. Material handling activities include the storage, loading and unloading, transportation, or conveyance of any raw material, intermediate product, final product or waste product. A storm resistant shelter is not required for the following industrial materials and activities:

- drums, barrels, tanks, and similar containers that are tightly sealed, provided those containers are not deteriorated and do not leak. "Sealed" means banded or otherwise secured and without operational taps or valves;
- adequately maintained vehicles used in material handling; and
- final products, other than products that would be mobilized in storm water discharges (e.g., rock salt).

A No Exposure Certification must be provided for each facility qualifying for the no exposure exclusion. In addition, the exclusion from NPDES permitting is available on a facility-wide basis only, not for individual outfalls. If any industrial activities or materials are or will be exposed to precipitation, the facility is not eligible for the no exposure exclusion.

By signing and submitting this No Exposure Certification form, the entity in Section A is certifying that a condition of no exposure exists at its facility or site, and is obligated to comply with the terms and conditions of 40 CFR 122.26(g).

ALL INFORMATION MUST BE PROVIDED ON THIS FORM.

Detailed instructions for completing this form and obtaining the no exposure exclusion are provided on pages 3 and 4.

A. Facility Operator Information

1. Name: _____ 2. Phone: _____

3. Mailing Address: a. Street: _____

b. City: _____ c. State: ____ d. Zip Code: _____-____

B. Facility/Site Location Information

1. Facility Name: _____

2. a. Street Address: _____

b. City: _____ c. County: _____

d. State: ____ e. Zip Code: _____-____

3. Is the facility located on Indian Lands? Yes ☐ No ☐

4. Is this a Federal facility? Yes ☐ No ☐

5. a. Latitude: ___ ° ___ ' ___ " b. Longitude: ___ ° ___ ' ___ "

6. a. Was the facility or site previously covered under an NPDES storm water permit? Yes ☐ No ☐

b. If yes, enter NPDES permit number: _____

7. SIC/Activity Codes: Primary: ____ Secondary (if applicable): ____

8. Total size of site associated with industrial activity: _____ acres

9. a. Have you paved or roofed over a formerly exposed, pervious area in order to qualify for the no exposure exclusion? Yes ☐ No ☐

b. If yes, please indicate approximately how much area was paved or roofed over. Completing this question does not disqualify you for the no exposure exclusion. However, your permitting authority may use this information in considering whether storm water discharges from your site are likely to have an adverse impact on water quality, in which case you could be required to obtain permit coverage.

Less than one acre ☐ One to five acres ☐ More than five acres ☐

NPDES FORM 3510-11 | EPA

NO EXPOSURE CERTIFICATION for Exclusion from NPDES Storm Water Permitting

Form Approved OMB No. 2040-0211

C. Exposure Checklist

Are any of the following materials or activities exposed to precipitation, now or in the foreseeable future? (Please check either "Yes" or "No" in the appropriate box.) **If you answer "Yes" to any of these questions (1) through (11), you are not eligible for the no exposure exclusion.**

	Yes	No
1. Using, storing or cleaning industrial machinery or equipment, and areas where residuals from using, storing or cleaning industrial machinery or equipment remain and are exposed to storm water	☐	☐
2. Materials or residuals on the ground or in storm water inlets from spills/leaks	☐	☐
3. Materials or products from past industrial activity	☐	☐
4. Material handling equipment (except adequately maintained vehicles)	☐	☐
5. Materials or products during loading/unloading or transporting activities	☐	☐
6. Materials or products stored outdoors (except final products intended for outside use [e.g., new cars] where exposure to storm water does not result in the discharge of pollutants)	☐	☐
7. Materials contained in open, deteriorated or leaking storage drums, barrels, tanks, and similar containers	☐	☐
8. Materials or products handled/stored on roads or railways owned or maintained by the discharger	☐	☐
9. Waste material (except waste in covered, non-leaking containers [e.g., dumpsters])	☐	☐
10. Application or disposal of process wastewater (unless otherwise permitted)	☐	☐
11. Particulate matter or visible deposits of residuals from roof stacks and/or vents not otherwise regulated (i.e., under an air quality control permit) and evident in the storm water outflow	☐	☐

D. Certification Statement

I certify under penalty of law that I have read and understand the eligibility requirements for claiming a condition of "no exposure" and obtaining an exclusion from NPDES storm water permitting.

I certify under penalty of law that there are no discharges of storm water contaminated by exposure to industrial activities or materials from the industrial facility or site identified in this document (except as allowed under 40 CFR 122.26(g)(2)).

I understand that I am obligated to submit a no exposure certification form once every five years to the NPDES permitting authority and, if requested, to the operator of the local municipal separate storm sewer system (MS4) into which the facility discharges (where applicable). I understand that I must allow the NPDES permitting authority, or MS4 operator where the discharge is into the local MS4, to perform inspections to confirm the condition of no exposure and to make such inspection reports publicly available upon request. I understand that I must obtain coverage under an NPDES permit prior to any point source discharge of storm water from the facility.

Additionally, I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is to the best of my knowledge and belief true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Print Name: _____

Print Title: _____

Signature: _____

Date: _____

NPDES FORM 3510-11 | EPA

Instructions for the NO EXPOSURE CERTIFICATION for Exclusion from NPDES Storm Water Permitting

Form Approved OMB No. 2040-0211

Who May File a No Exposure Certification

Federal law at 40 CFR Part 122.26 prohibits point source discharges of storm water associated with industrial activity to waters of the U.S. without a National Pollutant Discharge Elimination System (NPDES) permit. However, NPDES permit coverage is not required for discharges of storm water associated with industrial activities identified at 40 CFR 122.26(b)(14)(i)-(ix) and (xi) if the discharger can certify that a condition of "no exposure" exists at the industrial facility or site.

Storm water discharges from construction activities identified in 40 CFR 122.26(b)(14)(x) and (b)(15) are not eligible for the no exposure exclusion.

Obtaining and Maintaining the No Exposure Exclusion

This form is used to certify that a condition of no exposure exists at the industrial facility or site described herein. This certification is only applicable in jurisdictions where EPA is the NPDES permitting authority and must be re-submitted at least once every five years.

The industrial facility operator must maintain a condition of no exposure at its facility or site in order for the no exposure exclusion to remain applicable. If conditions change resulting in the exposure of materials and activities to storm water, the facility operator must obtain coverage under an NPDES storm water permit immediately.

Where to File the No Exposure Certification Form

Mail the completed no exposure certification form to:

Storm Water No Exposure Certification (4203)
USEPA
401 M Street, SW
Washington, D.C. 20460

Completing the Form

You must type or print, using uppercase letters, in appropriate areas only. Enter only one character per space (i.e., between the marks). Abbreviate if necessary to stay within the number of characters allowed for each item. Use one space for breaks between words. One form must be completed for each facility or site for which you are seeking to certify a condition of no exposure. Additional guidance on completing this form can be accessed through EPA's web site at www.epa.gov/owm/sw. Please make sure you have addressed all applicable questions and have made a photocopy for your records before sending the completed form to the above address.

Section A. Facility Operator Information

1. Provide the legal name of the person, firm, public organization, or any other entity that operates the facility or site described in this certification. The name of the operator may or may not be the same as the name of the facility. The operator is the legal entity that controls the facility's operation, rather than the plant or site manager.

2. Provide the telephone number of the facility operator.

3. Provide the mailing address of the operator (P.O. Box numbers may be used). Include the city, state, and zip code. All correspondence will be sent to this address.

Section B. Facility/Site Location Information

1. Enter the official or legal name of the facility or site.

2. Enter the complete street address (if no street address exists, provide a geographic description [e.g., Intersection of Routes 9 and 55]), city, county, state, and zip code. Do not use a P.O. Box number.

3. Indicate whether the facility is located on Indian Lands.

4. Indicate whether the industrial facility is operated by a department or agency of the Federal Government (see also Section 313 of the Clean Water Act).

5. Enter the latitude and longitude of the approximate center of the facility or site in degrees/minutes/seconds. Latitude and longitude can be obtained from United States Geological Survey (USGS) quadrangle or topographic maps, by calling 1-(888) ASK-USGS, or by accessing EPA's web site at http://www.epa.gov/owm/sw/industry/index.htm and selecting Latitude and Longitude Finders under the Resources/Permit section.

   Latitude and longitude for a facility in decimal form must be converted to degrees (°), minutes (′), and seconds (″) for proper entry on the certification form. To convert decimal latitude or longitude to degrees/minutes/seconds, follow the steps in the following example.

   Example: Convert decimal latitude 45.1234567 to degrees (°), minutes (′), and seconds (″).

   a) The numbers to the left of the decimal point are the degrees: 45°.

   b) To obtain minutes, multiply the first four numbers to the right of the decimal point by 0.006: 1234 x 0.006 = 7.404.

   c) The numbers to the left of the decimal point in the result obtained in (b) are the minutes: 7′.

   d) To obtain seconds, multiply the remaining three numbers to the right of the decimal from the result obtained in (b) by 0.06: 404 x 0.06 = 24.24. Since the numbers to the right of the decimal point are not used, the result is 24″.

   e) The conversion for 45.1234567 = 45° 7′ 24″.

6. Indicate whether the facility was previously covered under an NPDES storm water permit. If so, include the permit number.

7. Enter the 4-digit SIC code which identifies the facility's primary activity, and second 4-digit SIC code identifying the facility's secondary activity, if applicable. SIC codes can be obtained from the Standard Industrial Classification Manual, 1987.

8. Enter the total size of the site associated with industrial activity in acres. Acreage may be determined by dividing square footage by 43,560, as demonstrated in the following example.

   Example: Convert 54,450 ft^2 to acres

   Divide 54,450 ft^2 by 43,560 square feet per acre:
   54,450 ft^2 ÷ 43,560 ft^2/acre = 1.25 acres.

9. Check "Yes" or "No" as appropriate to indicate whether you have paved or roofed over a formerly exposed, pervious area (i.e., lawn, meadow, dirt or gravel road/parking lot) in order to qualify for no exposure. If yes, also indicate approximately how much area was paved or roofed over and is now impervious area.

NPDES FORM 3510-11 | EPA

Instructions for the NO EXPOSURE CERTIFICATION for Exclusion from NPDES Storm Water Permitting

Form Approved OMB No. 2040-0211

Section C. Exposure Checklist

Check "Yes" or "No" as appropriate to describe the exposure conditions at your facility. If you answer "Yes" to **ANY** of the questions (1) through (11) in this section, a potential for exposure exists at your site and you cannot certify to a condition of no exposure. You must obtain (or already have) coverage under an NPDES storm water permit. After obtaining permit coverage, you can institute modifications to eliminate the potential for a discharge of storm water exposed to industrial activity, and then certify to a condition of no exposure.

Section D. Certification Statement

Federal statutes provide for severe penalties for submitting false information on this application form. Federal regulations require this application to be signed as follows:

For a corporation: by a responsible corporate officer, which means:

(i) president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy or decision making functions for the corporation, or

(ii) the manager of one or more manufacturing, production, or operating facilities, provided the manager is authorized to make management decisions which govern the operation of the regulated facility including having the explicit or implicit duty of making major capital investment recommendations, and initiating and directing other comprehensive measures to assure long term environmental compliance with environmental laws and regulations; the manager can ensure that the necessary systems are established or actions taken to gather complete and accurate information for permit application requirements; and where authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures;

For a partnership or sole proprietorship: by a general partner or the proprietor; or

For a municipal, State, Federal, or other public facility: by either a principal executive or ranking elected official.

Paperwork Reduction Act Notice

Public reporting burden for this certification is estimated to average 1.0 hour per certification, including time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Burden means the total time, effort, or financial resources expended by persons to generate, maintain, retain, or disclose to provide information to or for a Federal agency. This includes the time needed to review instructions; develop, acquire, install, and utilize technology and systems for the purposes of collecting, validating, and verifying information, processing and maintaining information, and disclosing and providing information; adjust the existing ways to comply with any previously applicable instructions and requirements; train personnel to be able to respond to a collection of information; search data sources; complete and review the collection of information; and transmit or otherwise disclose the information. An agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a currently valid OMB control number. Send comments regarding the burden estimate, any other aspect of the collection of information, or suggestions for improving this form, including any suggestions which may increase or reduce this burden to: Director, OPPE Regulatory Information Division (2137), USEPA, 401 M Street, SW, Washington, D.C. 20460. Include the OMB control number of this form on any correspondence. Do not send the completed No Exposure Certification form to this address.

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BILLING CODE 6560–50–C

Appendix 5 to Preamble—Regulatory Flexibility for Small Entities

A. Regulatory Flexibility for Small Municipal Storm Sewer Systems (MS4s)

Different Compliance, Reporting, or Timetables That Are Responsive to Resources of Small Entities

NPDES permitting authorities can issue general permits instead of requiring individual permits. This flexibility avoids the high application costs and administrative burden associated with individual permits.

NPDES permitting authorities can specify a time period of up to five years for small MS4s to fully develop and implement their program

Analytic monitoring is not required.

After the first permit term and subsequent permit terms, submittal of a summary report is only required in years two and four (Phase I municipalities are currently required to submit a detailed report each year).

A brief reporting format is encouraged to facilitate compiling and analyzing data from submitted reports. EPA intends to develop a model form for this purpose.

NPDES Permitting Authorities can phase in permit coverage for small MS4s serving jurisdictions with a population under 10,000 on a schedule consistent with a State watershed permitting approach.

Clarifying, Consolidating, or Simplifying Compliance and Reporting Requirements

The rule avoids duplication in permit requirements by allowing NPDES permitting authorities to include permit conditions that direct an MS4 to follow the requirements of a qualifying local program rather than the requirements of a minimum measure. Compliance with these programs is considered compliance with the NPDES general permit.

The rule allows NPDES permitting authorities to recognize existing responsibilities among different municipal entities to satisfy obligations for the minimum control measures.

A further alternative allows a small MS4 to satisfy its NPDES permit obligations if another governmental entity is already implementing a minimum control measure in the jurisdiction of the small MS4. The following conditions must be met:

1. The other entity is implementing the control measure,
2. The particular control measure (or component thereof) is at least as stringent as the corrersponding NPDES permit requirement, and
3. The other entity agrees to implement the control measure on your behalf.

The rule allows a covered small MS4 to "piggy-back" on to the storm water management program of an adjoining Phase I MS4. A small MS4 is waived from the application requirements of § 122.26(d)(1)(iii), (iv) and (d)(2)(iii) [discharge characterization] and may satisfy the requirements of § 122.26(d)(1)(v) and (d)(2)(iv) [identifying a management plan] by referencing the adjoining Phase I MS4's storm water management plan.

The rule accommodates the use of the watershed approach through NPDES general permits that could be issued on a watershed basis. The small MS4 can develop measures that are tailored to meet their watershed requirements. The small MS4's storm water management program can tie into watershed-wide plans.

Performance Rather Than Design Standards for Small Entities

Small governmental jurisdictions whose MS4s are covered by this rule are allowed to choose the best management practices (BMPs) to be implemented and the measurable goals for each of the minimum control measures:

1. Public education and outreach on storm water impacts
2. Public Involvement/Participation
3. Illicit discharge detection and elimination

4. Construction site storm water runoff control

5. Post-construction storm water management in new development and redevelopment

6. Pollution prevention/good housekeeping for municipal operations

EPA will provide guidance and recommend, but not mandate, certain BMPs for some of the minimum control measures listed above. States can provide guidance to supplement or supplant EPA guidance.

Small MS4s can identify the measurable goals for each of the minimum control measures listed above. In their reports to the NPDES permitting authority, the small MS4s must evaluate their progress towards achievement of their identified measurable goals.

Waivers for Small Entities From Coverage

The rule allows permitting authorities to waive from coverage MS4s operated by small governmental jurisdictions located within an urbanized area and serving a population less than 1,000 people where the permitting authority has determined the MS4 is not contributing substantially to the pollutant loadings of an interconnected MS4 and, if the MS4 discharges pollutants that have been identified as a cause of impairment in the receiving water of the MS4 then the permitting authority has determined that storm water controls are not needed based on a TMDL that addresses the pollutants of concern.

The rule allows the permitting authority to waive from coverage MS4s serving a population under 10,000 where the permitting authority has evaluated all waters that receive a discharge from the MS4 and the permitting authority has determined that storm water controls are not needed based on a TMDL that addresses the pollutants of concern and future discharges do not have the potential to result in exceedances of water quality standards.

B. Regulatory Flexibility for Small Construction Activities

Different Compliance, Reporting, or Timetables That Are Responsive to Resources of Small Entities

The rule gives NPDES permitting authorities discretion not to require the submittal of a notice of intent (NOI) for coverage under a NPDES general permit, thereby reducing administrative and financial burden. All construction sites disturbing greater than 5 acres must submit an NOI.

Clarifying, Consolidating, or Simplifying Compliance and Reporting Requirements

The rule avoids duplication by allowing the NPDES permitting authority to incorporate by reference State, Tribal, or local programs under a NPDES general permit. Compliance with these programs is considered compliance with the NPDES general permit.

Performance Rather Than Design Standards for Small Entities

The operator of a covered construction activity selects and implement the BMPs most appropriate for the construction site based on the operator's storm water pollution prevention plan.

Waivers for Small Entities From Coverage

Waivers could be granted based on the use of a rainfall erosivity factor or a comprehensive analysis of water quality impacts.

(A) *Low rainfall waiver:* When the rainfall erosivity factor ("R" from Revised Universal Soil Loss Equation) is less than 5 during the period of construction activity, a permit is not required.

(B) *Determination based on Water Quality Analysis:* The NPDES permitting authority can waive from coverage construction activities disturbing from 1 acre up to 5 acres of land where storm water controls are not needed based on:

1. A TMDL approved or established by EPA that addresses the pollutants of concern, or

2. For non-impaired waters, an equivalent analysis that determines that such allocations are not needed to protect water quality based on consideration of existing in-stream concentrations, expected growth in pollutant contributions from all sources, and a margin of safety.

C. Regulatory Flexibility for Industrial/Commercial Facilities

Waivers for Small Entities From Coverage

The rule provides a "no-exposure" waiver provision for Phase I industrial/commercial facilities. Qualifying facilities seeking this provision simply need to complete a self-certification form indicating that no industrial materials or activities are exposed to rain, snow, snow melt and/or runoff.

Appendix 6 of Preamble—Governmental Entities Located Fully or Partially Within an Urbanized Area

(This is a reference list only, *not* a list of all operators of small MS4s subject to §§ 122.32–122.36. For example, a listed governmental entity is only regulated if it operates a small MS4 within an "urbanized area" boundary as determined by the Bureau of the Census. Furthermore, entities such as military bases, large hospitals, prison complexes, universities, sewer districts, and highway departments that operate a small MS4 within an urbanized area are also subject to the permitting regulations but are not individually listed here. See § 122.26(b)(16) for the definition of a small MS4 and § 122.32(a) for the definition of a regulated small MS4.)

(Source: 1990 Census of Population and Housing, U.S. Bureau of the Census. This list is subject to change with the Decennial Census)

AL Anniston city
AL Attalla city
AL Auburn city
AL Autauga County
AL Blue Mountain town
AL Calhoun County
AL Colbert County
AL Dale County
AL Decatur city
AL Dothan city
AL Elmore County
AL Etowah County
AL Flint City town
AL Florence city
AL Gadsden city
AL Glencoe city
AL Grimes town
AL Hartselle city
AL Hobson City town
AL Hokes Bluff city
AL Houston County
AL Kinsey town
AL Lauderdale County
AL Lee County
AL Limestone County
AL Madison County
AL Midland City town
AL Montgomery County
AL Morgan County
AL Muscle Shoals city
AL Napier Field town
AL Northport city
AL Opelika city
AL Oxford city
AL Phenix City city
AL Prattville city
AL Priceville town
AL Rainbow City city
AL Russell County
AL Sheffield city
AL Southside city
AL Sylvan Springs town
AL Talladega County
AL Tuscaloosa city
AL Tuscaloosa County
AL Tuscumbia city
AL Weaver city
AR Alexander town
AR Barling city
AR Benton County
AR Cammack Village city
AR Crawford County
AR Crittenden County
AR Farmington city
AR Fayetteville city
AR Fort Smith city
AR Greenland town
AR Jacksonville city
AR Jefferson County
AR Johnson city
AR Marion city
AR Miller County
AR North Little Rock city
AR Pine Bluff city
AR Pulaski County
AR Saline County
AR Sebastian County
AR Shannon Hills city
AR Sherwood city
AR Springdale city
AR Sunset town
AR Texarkana city
AR Van Buren city
AR Washington County
AR West Memphis city
AR White Hall city
AZ Apache Junction city
AZ Chandler city
AZ El Mirage town
AZ Gilbert town
AZ Guadalupe town
AZ Maricopa County
AZ Oro Valley town
AZ Paradise Valley town
AZ Peoria city
AZ Pinal County

AZ South Tucson city
AZ Surprise town
AZ Tolleson city
AZ Youngtown town
AZ Yuma city
AZ Yuma County
CA Apple Valley town
CA Belvedere city
CA Benicia city
CA Brentwood city
CA Butte County
CA Capitola city
CA Carmel-by-the-Sea city
CA Carpinteria city
CA Ceres city
CA Chico city
CA Compton city
CA Corte Madera town
CA Cotati city
CA Davis city
CA Del Rey Oaks city
CA Fairfax town
CA Hesperia city
CA Imperial County
CA Lakewood city
CA Lancaster city
CA Larkspur city
CA Lodi city
CA Lompoc city
CA Marin County
CA Marina city
CA Marysville city
CA Merced city
CA Merced County
CA Mill Valley city
CA Monterey city
CA Monterey County
CA Morgan Hill city
CA Napa city
CA Napa County
CA Novato city
CA Pacific Grove city
CA Palm Desert city
CA Palmdale city
CA Piedmont city
CA Placer County
CA Redding city
CA Rocklin city
CA Rohnert Park city
CA Roseville city
CA Ross town
CA San Anselmo town
CA San Buenaventura (Ventura) city
CA San Francisco city
CA San Joaquin County
CA San Luis Obispo city
CA San Luis Obispo County
CA San Rafael city
CA Sand City city
CA Santa Barbara city
CA Santa Barbara County
CA Santa Cruz city
CA Santa Cruz County
CA Santa Maria city
CA Sausalito city
CA Scotts Valley city
CA Seaside city
CA Shasta County
CA Solano County
CA Sonoma County
CA Stanislaus County
CA Suisun City city
CA Sutter County
CA Tiburon town
CA Tulare County
CA Vacaville city
CA Victorville city
CA Villa Park city
CA Visalia city
CA Watsonville city
CA West Sacramento city
CA Yolo County
CA Yuba City city
CA Yuba County
CO Adams County
CO Arvada city
CO Boulder city
CO Boulder County
CO Bow Mar town
CO Broomfield city
CO Cherry Hills Village city
CO Columbine Valley town
CO Commerce City city
CO Douglas County
CO Edgewater city
CO El Paso County
CO Englewood city
CO Evans city
CO Federal Heights city
CO Fort Collins city
CO Fountain city
CO Garden City town
CO Glendale city
CO Golden city
CO Grand Junction city
CO Greeley city
CO Greenwood Village city
CO Jefferson County
CO La Salle town
CO Lakeside town
CO Larimer County
CO Littleton city
CO Longmont city
CO Manitou Springs city
CO Mesa County
CO Mountain View town
CO Northglenn city
CO Pueblo city
CO Pueblo County
CO Sheridan city
CO Thornton city
CO Weld County
CO Westminster city
CO Wheat Ridge city
CT Ansonia city
CT Avon town
CT Beacon Falls town
CT Berlin town
CT Bethel town
CT Bloomfield town
CT Bozrah town
CT Branford town
CT Bridgeport city
CT Bristol city
CT Brookfield town
CT Burlington town
CT Cheshire town
CT Cromwell town
CT Danbury city
CT Darien town
CT Derby city
CT Durham town
CT East Granby town
CT East Hartford town
CT East Haven town
CT East Lyme town
CT East Windsor town
CT Easton town
CT Ellington town
CT Enfield town
CT Fairfield County
CT Fairfield town
CT Farmington town
CT Franklin town
CT Glastonbury town
CT Greenwich town
CT Groton city
CT Groton town
CT Guilford town
CT Hamden town
CT Hartford city
CT Hartford County
CT Ledyard town
CT Lisbon town
CT Litchfield County
CT Manchester town
CT Meriden city
CT Middlebury town
CT Middlefield town
CT Middlesex County
CT Middletown city
CT Milford city (remainder)
CT Monroe town
CT Montville town
CT Naugatuck borough
CT New Britain city
CT New Canaan town
CT New Fairfield town
CT New Haven city
CT New Haven County
CT New London city
CT New London County
CT New Milford town
CT Newington town
CT Newtown town
CT North Branford town
CT North Haven town
CT Norwalk city
CT Norwich city
CT Orange town
CT Oxford town
CT Plainville town
CT Plymouth town
CT Portland town
CT Preston town
CT Prospect town
CT Rocky Hill town
CT Seymour town
CT Shelton city
CT Sherman town
CT Somers town
CT South Windsor town
CT Southington town
CT Sprague town
CT Stonington town
CT Stratford town
CT Suffield town
CT Thomaston town
CT Thompson town
CT Tolland County
CT Tolland town
CT Trumbull town
CT Vernon town
CT Wallingford town
CT Waterbury city
CT Waterford town
CT Watertown town
CT West Hartford town
CT West Haven city
CT Weston town
CT Westport town
CT Wethersfield town
CT Wilton town
CT Windham County
CT Windsor Locks town
CT Windsor town
CT Wolcott town
CT Woodbridge town

CT Woodmont borough
DE Camden town
DE Dover city
DE Kent County
DE Newark city
DE Wyoming town
FL Alachua County
FL Baldwin town
FL Bay County
FL Belleair Shore town
FL Biscayne Park village
FL Brevard County
FL Callaway city
FL Cape Canaveral city
FL Cedar Grove town
FL Charlotte County
FL Cinco Bayou town
FL Clay County
FL Cocoa Beach city
FL Cocoa city
FL Collier County
FL Daytona Beach city
FL Daytona Beach Shores city
FL Destin city
FL Edgewater city
FL El Portal village
FL Florida City city
FL Fort Pierce city
FL Fort Walton Beach city
FL Gainesville city
FL Gulf Breeze city
FL Hernando County
FL Hillsboro Beach town
FL Holly Hill city
FL Indialantic town
FL Indian Harbour Beach city
FL Indian River County
FL Indian River Shores town
FL Indian Shores town
FL Kissimmee city
FL Lazy Lake village
FL Lynn Haven city
FL Malabar town
FL Marion County
FL Martin County
FL Mary Esther city
FL Melbourne Beach town
FL Melbourne city
FL Melbourne Village town
FL Naples city
FL New Smyrna Beach city
FL Niceville city
FL Ocala city
FL Ocean Breeze Park town
FL Okaloosa County
FL Orange Park town
FL Ormond Beach city
FL Osceola County
FL Palm Bay city
FL Panama City city
FL Parker city
FL Ponce Inlet town
FL Port Orange city
FL Port St. Lucie city
FL Punta Gorda city
FL Rockledge city
FL Santa Rosa County
FL Satellite Beach city
FL Sewall's Point town
FL Shalimar town
FL South Daytona city
FL Springfield city
FL St. Johns County
FL St. Lucie County
FL St. Lucie village
FL Stuart city
FL Sweetwater city
FL Titusville city
FL Valparaiso city
FL Vero Beach city
FL Virginia Gardens village
FL Volusia County
FL Walton County
FL Weeki Wachee city
FL West Melbourne city
FL Windermere town
GA Albany city
GA Athens city
GA Bartow County
GA Brunswick city
GA Catoosa County
GA Centerville city
GA Chattahoochee County
GA Cherokee County
GA Chickamauga city
GA Clarke County
GA Columbia County
GA Conyers city
GA Dade County
GA Dougherty County
GA Douglas County
GA Douglasville city
GA Fayette County
GA Floyd County
GA Fort Oglethorpe city
GA Glynn County
GA Grovetown city
GA Henry County
GA Houston County
GA Jones County
GA Lee County
GA Lookout Mountain city
GA Mountain Park city
GA Oconee County
GA Payne city
GA Rockdale County
GA Rome city
GA Rossville city
GA Stockbridge city
GA Vernonburg town
GA Walker County
GA Warner Robins city
GA Winterville city
GA Woodstock city
IA Altoona city
IA Asbury city
IA Bettendorf city
IA Black Hawk County
IA Buffalo city
IA Carter Lake city
IA Cedar Falls city
IA Clive city
IA Coralville city
IA Council Bluffs city
IA Dallas County
IA Dubuque city
IA Dubuque County
IA Elk Run Heights city
IA Evansdale city
IA Hiawatha city
IA Iowa City city
IA Johnson County
IA Johnston city
IA Le Claire city
IA Linn County
IA Marion city
IA Norwalk city
IA Panorama Park city
IA Pleasant Hill city
IA Polk County
IA Pottawattamie County
IA Raymond city
IA Riverdale city
IA Robins city
IA Scott County
IA Sergeant Bluff city
IA Sioux City city
IA University Heights city
IA Urbandale city
IA Warren County
IA Waterloo city
IA West Des Moines city
IA Windsor Heights city
IA Woodbury County
ID Ada County
ID Ammon city
ID Bannock County
ID Bonneville County
ID Chubbuck city
ID Idaho Falls city
ID Iona city
ID Pocatello city
ID Power County
IL Addison township
IL Addison village
IL Algonquin township
IL Algonquin village
IL Alorton village
IL Alsip village
IL Alton city
IL Antioch township
IL Antioch village
IL Arlington Heights village
IL Aroma Park village
IL Aroma township
IL Aurora city
IL Aurora township
IL Avon township
IL Ball township
IL Bannockburn village
IL Barrington township
IL Barrington village
IL Bartlett village
IL Bartonville village
IL Batavia city
IL Batavia township
IL Beach Park village
IL Bedford Park village
IL Belleville city
IL Bellevue village
IL Bellwood village
IL Bensenville village
IL Benton township
IL Berkeley village
IL Berwyn city
IL Bethalto village
IL Blackhawk township
IL Bloom township
IL Bloomingdale township
IL Bloomingdale village
IL Bloomington city
IL Bloomington township
IL Blue Island city
IL Bolingbrook village
IL Bourbonnais township
IL Bourbonnais village
IL Bowling township
IL Bradley village
IL Bremen township
IL Bridgeview village
IL Bristol township
IL Broadview village
IL Brookfield village
IL Brooklyn village
IL Buffalo Grove village
IL Burbank city
IL Burnham village
IL Burr Ridge village

IL Burritt township
IL Burton township
IL Cahokia village
IL Calumet City city
IL Calumet Park village
IL Calumet township
IL Canteen township
IL Capital township
IL Carbon Cliff village
IL Carol Stream village
IL Carpentersville Village
IL Cary village
IL Caseyville township
IL Caseyville village
IL Centreville city
IL Centreville township
IL Champaign city
IL Champaign County
IL Champaign township
IL Channahon township
IL Cherry Valley township
IL Cherry Valley village
IL Chicago city
IL Chicago Heights city
IL Chicago Ridge village
IL Chouteau township
IL Cicero town
IL Cincinnati township
IL Clarendon Hills village
IL Coal Valley township
IL Coal Valley village
IL Collinsville city
IL Collinsville township
IL Colona township
IL Colona village
IL Columbia city
IL Country Club Hills city
IL Countryside city
IL Crest Hill city
IL Crestwood village
IL Crete township
IL Crete village
IL Creve Coeur village
IL Crystal Lake city
IL Cuba township
IL Curran township
IL Darien city
IL Decatur city
IL Decatur township
IL Deer Park village
IL Deerfield township
IL Deerfield village
IL Des Plaines city
IL Dixmoor village
IL Dolton village
IL Dorr township
IL Downers Grove township
IL Downers Grove village
IL Dry Grove township
IL Du Page township
IL Dundee township
IL Dunleith township
IL Dupo village
IL East Alton village
IL East Dubuque city
IL East Dundee village
IL East Hazel Crest village
IL East Moline city
IL East Peoria city
IL East St. Louis city
IL Edwardsville city
IL Edwardsville township
IL Ela township
IL Elgin city
IL Elgin township
IL Elk Grove township
IL Elk Grove Village village
IL Elm Grove township
IL Elmhurst city
IL Elmwood Park village
IL Evanston city
IL Evergreen Park village
IL Fairmont City village
IL Fairview Heights city
IL Flossmoor village
IL Fondulac township
IL Ford Heights village
IL Forest Park village
IL Forest View village
IL Forsyth village
IL Fort Russell township
IL Foster township
IL Fox Lake village
IL Fox River Grove village
IL Frankfort township
IL Frankfort village
IL Franklin Park village
IL Fremont township
IL Gardner township
IL Geneva city
IL Geneva township
IL Gilberts village
IL Glen Carbon village
IL Glen Ellyn village
IL Glencoe village
IL Glendale Heights village
IL Glenview village
IL Glenwood village
IL Godfrey township
IL Golf village
IL Grafton township
IL Grandview village
IL Granite City city
IL Grant township
IL Grayslake village
IL Green Oaks village
IL Green Rock city
IL Groveland township
IL Gurnee village
IL Hainesville village
IL Hampton township
IL Hampton village
IL Hanna township
IL Hanover Park village
IL Hanover township
IL Harlem township
IL Harristown township
IL Harristown village
IL Hartford village
IL Harvey city
IL Harwood Heights village
IL Hawthorn Woods village
IL Hazel Crest village
IL Henry County
IL Hensley township
IL Hickory Hills city
IL Hickory Point township
IL Highland Park city
IL Highwood city
IL Hillside village
IL Hinsdale village
IL Hodgkins village
IL Hoffman Estates village
IL Hollis township
IL Homer township
IL Hometown city
IL Homewood village
IL Indian Creek village
IL Indian Head Park village
IL Inverness village
IL Itasca village
IL Jarvis township
IL Jerome village
IL Jo Daviess County
IL Joliet city
IL Joliet township
IL Justice village
IL Kane County
IL Kankakee city
IL Kankakee County
IL Kankakee township
IL Kendall County
IL Kenilworth village
IL Kickapoo township
IL Kildeer village
IL La Grange Park village
IL La Grange village
IL Lake Barrington village
IL Lake Bluff village
IL Lake Forest city
IL Lake in the Hills village
IL Lake Villa township
IL Lake Villa village
IL Lake Zurich village
IL Lakemoor village
IL Lakewood village
IL Lansing village
IL Leland Grove city
IL Lemont township
IL Leyden township
IL Libertyville township
IL Libertyville village
IL Limestone township
IL Lincolnshire village
IL Lincolnwood village
IL Lindenhurst village
IL Lisle township
IL Lisle village
IL Lockport city
IL Lockport township
IL Lombard village
IL Long Creek township
IL Long Grove village
IL Loves Park city
IL Lynwood village
IL Lyons township
IL Lyons village
IL Machesney Park village
IL Macon County
IL Madison city
IL Madison County
IL Maine township
IL Markham city
IL Marquette Heights city
IL Maryville village
IL Matteson village
IL Maywood village
IL McCook village
IL McCullom Lake village
IL McHenry city
IL McHenry County
IL McHenry township
IL McLean County
IL Medina township
IL Melrose Park village
IL Merrionette Park village
IL Midlothian village
IL Milan village
IL Milton township
IL Moline city
IL Moline township
IL Monee township
IL Monroe County
IL Montgomery village
IL Moro township
IL Morton Grove village
IL Morton township
IL Morton village

IL Mount Prospect village
IL Mount Zion township
IL Mount Zion village
IL Mundelein village
IL Nameoki township
IL Naperville city
IL Naperville township
IL National City village
IL New Lenox township
IL New Lenox village
IL New Millford village
IL New Trier township
IL Newport township
IL Niles township
IL Niles village
IL Normal town
IL Normal township
IL Norridge village
IL North Aurora village
IL North Barrington village
IL North Chicago city
IL North Pekin village
IL North Riverside village
IL Northbrook village
IL Northfield township
IL Northfield village
IL Northlake city
IL Norwood Park township
IL Norwood village
IL Nunda township
IL Oak Brook village
IL Oak Forest city
IL Oak Grove village
IL Oak Lawn village
IL Oak Park village
IL Oakbrook Terrace city
IL Oakley township
IL Oakwood Hills village
IL O'Fallon city
IL O'Fallon township
IL Olympia Fields village
IL Orland Hills village
IL Orland Park village
IL Orland township
IL Oswego township
IL Oswego village
IL Otto township
IL Owen township
IL Palatine township
IL Palatine village
IL Palos Heights city
IL Palos Hills city
IL Palos Park village
IL Palos township
IL Park City city
IL Park Forest village
IL Park Ridge city
IL Pekin city
IL Pekin township
IL Peoria city
IL Peoria County
IL Peoria Heights village
IL Phoenix village
IL Pin Oak township
IL Plainfield township
IL Plainfield village
IL Pontoon Beach village
IL Posen village
IL Precinct 10
IL Prospect Heights city
IL Proviso township
IL Rich township
IL Richton Park village
IL Richwoods township
IL River Forest village
IL River Grove village
IL Riverdale village
IL Riverside township
IL Riverside village
IL Riverwoods village
IL Robbins village
IL Rochester township
IL Rock Island city
IL Rock Island County
IL Rock Island township
IL Rockdale village
IL Rockford township
IL Rockton township
IL Rockton village
IL Rolling Meadows city
IL Romeoville village
IL Roscoe township
IL Roscoe village
IL Roselle village
IL Rosemont village
IL Round Lake Beach village
IL Round Lake Heights village
IL Round Lake Park village
IL Round Lake village
IL Roxana village
IL Rutland township
IL Sangamon County
IL Sauget village
IL Sauk Village village
IL Savoy village
IL Schaumburg township
IL Schaumburg village
IL Schiller Park village
IL Shields township
IL Shiloh Valley township
IL Shiloh village
IL Shorewood village
IL Silvis city
IL Skokie village
IL Sleepy Hollow village
IL Somer township
IL South Beloit city
IL South Chicago Heights village
IL South Elgin village
IL South Holland village
IL South Moline township
IL South Rock Island township
IL South Roxana village
IL South Wheatland township
IL Southern View village
IL Spring Bay township
IL Springfield city
IL Springfield township
IL St. Charles city
IL St. Charles township
IL St. Clair County
IL St. Clair township
IL Steger village
IL Stickney township
IL Stickney village
IL Stites township
IL Stone Park village
IL Stookey township
IL Streamwood village
IL Sugar Grove township
IL Sugar Loaf township
IL Summit village
IL Sunnyside village
IL Swansea village
IL Tazewell County
IL Thornton township
IL Thornton village
IL Tinley Park village
IL Tolono township
IL Tower Lakes village
IL Tremont township
IL Troy city
IL Troy township
IL University Park village
IL Urbana city
IL Urbana township
IL Venice city
IL Venice township
IL Vernon Hills village
IL Vernon township
IL Villa Park village
IL Warren township
IL Warrenville city
IL Washington city
IL Washington Park village
IL Washington township
IL Wauconda township
IL Waukegan city
IL Waukegan township
IL Wayne township
IL West Chicago city
IL West Deerfield township
IL West Dundee village
IL West Peoria township
IL Westchester village
IL Western Springs village
IL Westmont village
IL Wheatland township
IL Wheaton city
IL Wheeling township
IL Wheeling village
IL Whitmore township
IL Will County
IL Willow Springs village
IL Willowbrook village
IL Wilmette village
IL Winfield township
IL Winfield village
IL Winnebago County
IL Winnetka village
IL Winthrop Harbor village
IL Wood Dale city
IL Wood River city
IL Wood River township
IL Woodford County
IL Woodridge village
IL Woodside township
IL Worth township
IL Worth village
IL York township
IL Zion city
IN Aboite township
IN Adams township
IN Allen County
IN Anderson city
IN Anderson township
IN Baugo township
IN Beech Grove city
IN Bloomington city
IN Bloomington township
IN Boone County
IN Buck Creek township
IN Calumet township
IN Carmel city
IN Castleton town
IN Cedar Creek township
IN Center township
IN Centre township
IN Chesterfield town
IN Chesterton town
IN Clark County
IN Clarksville town
IN Clay township
IN Clermont town
IN Cleveland township
IN Concord township
IN Country Club Heights town

IN Crown Point city
IN Crows Nest town
IN Cumberland town
IN Daleville town
IN Delaware County
IN Delaware township
IN Dyer town
IN Eagle township
IN East Chicago city
IN Edgewood town
IN Elkhart city
IN Elkhart County
IN Elkhart township
IN Evansville city
IN Fairfield township
IN Fall Creek township
IN Fishers town
IN Floyd County
IN Fort Wayne city
IN Franklin township
IN Gary city
IN German township
IN Goshen city
IN Greenwood city
IN Griffith town
IN Hamilton County
IN Hamilton township
IN Hammond city
IN Hancock County
IN Hanover township
IN Harris township
IN Harrison township
IN Hendricks County
IN Highland town
IN Hobart city
IN Hobart township
IN Homecroft town
IN Honey Creek township
IN Howard County
IN Howard township
IN Indian Village town
IN Jackson township
IN Jefferson township
IN Jeffersonville city
IN Jeffersonville township
IN Johnson County
IN Knight township
IN Kokomo city
IN Lafayette city
IN Lafayette township
IN Lake County
IN Lake Station city
IN Lawrence city
IN Lawrence township
IN Liberty township
IN Lincoln township
IN Lost Creek township
IN Madison County
IN Meridian Hills town
IN Merrillville town
IN Mishawaka city
IN Monroe County
IN Mount Pleasant township
IN Muncie city
IN Munster town
IN New Albany city
IN New Albany township
IN New Chicago town
IN New Haven city
IN New Whiteland town
IN Newburgh town
IN North Crows Nest town
IN North township
IN Ogden Dunes town
IN Ohio township
IN Osceola town
IN Osolo township
IN Otter Creek township
IN Penn township
IN Perry township
IN Pigeon township
IN Pike township
IN Pleasant township
IN Portage city
IN Portage township
IN Porter County
IN Porter town
IN Richland township
IN Riley township
IN River Forest town
IN Rocky Ripple town
IN Roseland town
IN Ross township
IN Salem township
IN Schererville town
IN Seelyville town
IN Sellersburg town
IN Selma town
IN Silver Creek township
IN South Bend city
IN Southport city
IN Speedway town
IN Spring Hill town
IN St. John town
IN St. John township
IN St. Joseph County
IN St. Joseph township
IN Sugar Creek township
IN Taylor township
IN Terre Haute city
IN Tippecanoe County
IN Tippecanoe township
IN Union township
IN Utica township
IN Van Buren township
IN Vanderburgh County
IN Vigo County
IN Wabash township
IN Warren Park town
IN Warren township
IN Warrick County
IN Washington township
IN Wayne township
IN Wea township
IN West Lafayette city
IN West Terre Haute town
IN Westchester township
IN Westfield town
IN White River township
IN Whiteland town
IN Whiting city
IN Williams Creek town
IN Woodlawn Heights town
IN Wynnedale town
IN Yorktown town
IN Zionsville town
KS Attica township
KS Bel Aire city
KS Countryside city
KS Delano township
KS Doniphan County
KS Douglas County
KS Eastborough city
KS Elwood city
KS Fairway city
KS Gypsum township
KS Haysville city
KS Johnson County
KS Kechi city
KS Kechi township
KS Lake Quivira city
KS Lawrence city
KS Leawood city
KS Lenexa city
KS Merriam city
KS Minneha township
KS Mission city
KS Mission Hills city
KS Mission township
KS Mission Woods city
KS Monticello township
KS Ohio township
KS Olathe city
KS Olathe township
KS Park City city
KS Park township
KS Prairie Village city
KS Riverside township
KS Roeland Park city
KS Salem township
KS Sedgwick County
KS Shawnee city
KS Shawnee County
KS Shawnee township
KS Soldier township
KS Tecumseh township
KS Topeka township
KS Waco township
KS Wakarusa township
KS Washington township
KS Westwood city
KS Westwood Hills city
KS Williamsport township
KS Wyandotte County
KY Alexandria city
KY Ashland city
KY Bellefonte city
KY Bellevue city
KY Boone County
KY Boyd County
KY Bromley city
KY Bullitt County
KY Campbell County
KY Catlettsburg city
KY Christian County
KY Covington city
KY Crescent Park city
KY Crescent Springs city
KY Crestview city
KY Crestview Hills city
KY Daviess County
KY Dayton city
KY Edgewood city
KY Elsmere city
KY Erlanger city
KY Fairview city
KY Flatwoods city
KY Florence city
KY Forest Hills city
KY Fort Mitchell city
KY Fort Thomas city
KY Fort Wright city
KY Fox Chase city
KY Greenup County
KY Hebron Estates city
KY Henderson city
KY Henderson County
KY Highland Heights city
KY Hillview city
KY Hunters Hollow city
KY Independence city
KY Jessamine County
KY Kenton County
KY Kenton Vale city
KY Lakeside Park city
KY Latonia Lakes city
KY Ludlow city
KY Melbourne city

KY Newport city
KY Oak Grove city
KY Owensboro city
KY Park Hills city
KY Pioneer Village city
KY Raceland city
KY Russell city
KY Silver Grove city
KY Southgate city
KY Taylor Mill city
KY Villa Hills city
KY Wilder city
KY Woodlawn city
KY Wurtland city
LA Alexandria city
LA Baker city
LA Ball town
LA Bossier City city
LA Bossier Parish
LA Broussard town
LA Caddo Parish
LA Calcasieu Parish
LA Carencro city
LA Denham Springs city
LA Houma city
LA Lafayette city
LA Lafayette Parish
LA Lafourche Parish
LA Lake Charles city
LA Livingston Parish
LA Monroe city
LA Ouachita Parish
LA Pineville city
LA Plaquemines Parish
LA Port Allen city
LA Rapides Parish
LA Richwood town
LA Scott town
LA Slidell city
LA St. Bernard Parish
LA St. Charles Parish
LA St. Tammany Parish
LA Sulphur city
LA Terrebonne Parish
LA West Baton Rouge Parish
LA West Monroe city
LA Westlake city
LA Zachary city
MA Abington town
MA Acton town
MA Acushnet town
MA Agawam town
MA Amesbury town
MA Andover town
MA Arlington town
MA Ashland town
MA Attleboro city
MA Auburn town
MA Avon town
MA Barnstable County
MA Barnstable town
MA Bedford town
MA Bellingham town
MA Belmont town
MA Berkshire County
MA Beverly city
MA Billerica town
MA Blackstone town
MA Boxborough town
MA Boylston town
MA Braintree town
MA Bridgewater town
MA Bristol County
MA Brockton city
MA Brookline town
MA Burlington town
MA Cambridge city
MA Canton town
MA Charlton town
MA Chelmsford town
MA Chelsea city
MA Chicopee city
MA Cohasset town
MA Concord town
MA Dalton town
MA Danvers town
MA Dartmouth town
MA Dedham town
MA Dennis town
MA Dighton town
MA Dover town
MA Dracut town
MA Dudley town
MA East Bridgewater town
MA East Longmeadow town
MA Easthampton town
MA Easton town
MA Essex County
MA Essex town
MA Everett city
MA Fairhaven town
MA Fall River city
MA Fitchburg city
MA Foxborough town
MA Framingham town
MA Franklin town
MA Freetown town
MA Georgetown town
MA Gloucester city
MA Grafton town
MA Granby town
MA Groton town
MA Groveland town
MA Hadley town
MA Halifax town
MA Hamilton town
MA Hampden County
MA Hampden town
MA Hampshire County
MA Hanover town
MA Hanson town
MA Haverhill city
MA Hingham town
MA Hinsdale town
MA Holbrook town
MA Holden town
MA Holliston town
MA Holyoke city
MA Hudson town
MA Hull town
MA Lanesborough town
MA Lawrence city
MA Leicester town
MA Leominster city
MA Lexington town
MA Lincoln town
MA Littleton town
MA Longmeadow town
MA Lowell city
MA Ludlow town
MA Lunenburg town
MA Lynn city
MA Lynnfield town
MA Malden city
MA Manchester town
MA Mansfield town
MA Marblehead town
MA Marlborough city
MA Mashpee town
MA Maynard town
MA Medfield town
MA Medford city
MA Medway town
MA Melrose city
MA Merrimac town
MA Methuen town
MA Middlesex County
MA Middleton town
MA Millbury town
MA Millis town
MA Millville town
MA Milton town
MA Nahant town
MA Natick town
MA Needham town
MA New Bedford city
MA Newton city
MA Norfolk town
MA North Andover town
MA North Attleborough town
MA North Reading town
MA Northampton city
MA Northborough town
MA Northbridge town
MA Norton town
MA Norwell town
MA Norwood town
MA Oxford town
MA Paxton town
MA Peabody city
MA Pembroke town
MA Pittsfield city
MA Plainville town
MA Plymouth County
MA Quincy city
MA Randolph town
MA Raynham town
MA Reading town
MA Rehoboth town
MA Revere city
MA Rockland town
MA Rockport town
MA Salem city
MA Sandwich town
MA Saugus town
MA Scituate town
MA Seekonk town
MA Sharon town
MA Shrewsbury town
MA Somerset town
MA Somerville city
MA South Hadley town
MA Southampton town
MA Southborough town
MA Southwick town
MA Springfield city
MA Stoneham town
MA Stoughton town
MA Stow town
MA Sudbury town
MA Sutton town
MA Swampscott town
MA Swansea town
MA Taunton city
MA Tewksbury town
MA Tyngsborough town
MA Uxbridge town
MA Wakefield town
MA Walpole town
MA Waltham city
MA Watertown town
MA Wayland town
MA Webster town
MA Wellesley town
MA Wenham town
MA West Boylston town
MA West Bridgewater town
MA West Springfield town

MA Westborough town
MA Westfield city
MA Westford town
MA Westminster town
MA Weston town
MA Westport town
MA Westwood town
MA Weymouth town
MA Whitman town
MA Wilbraham town
MA Williamsburg town
MA Wilmington town
MA Winchester town
MA Winthrop town
MA Woburn city
MA Worcester County
MA Wrentham town
MA Yarmouth town
MD Allegany County
MD Annapolis city
MD Bel Air town
MD Berwyn Heights town
MD Bladensburg town
MD Bowie city
MD Brentwood town
MD Brookeville town
MD Capitol Heights town
MD Cecil County
MD Cheverly town
MD Chevy Chase Section Five village
MD Chevy Chase Section Three village
MD Chevy Chase town
MD Chevy Chase Village town
MD College Park city
MD Colmar Manor town
MD Cottage City town
MD Cumberland city
MD District Heights city
MD Edmonston town
MD Elkton town
MD Fairmount Heights town
MD Forest Heights town
MD Frederick city
MD Frostburg city
MD Funkstown town
MD Gaithersburg city
MD Garrett Park town
MD Glen Echo town
MD Glenarden town
MD Greenbelt city
MD Hagerstown city
MD Highland Beach town
MD Hyattsville city
MD Kensington town
MD Landover Hills town
MD Laurel city
MD Martin's Additions village
MD Morningside town
MD Mount Rainier city
MD New Carrollton city
MD North Brentwood town
MD Riverdale town
MD Rockville city
MD Seat Pleasant city
MD Smithsburg town
MD Somerset town
MD Takoma Park city
MD University Park town
MD Walkersville town
MD Washington Grove town
MD Williamsport town
ME Androscoggin County
ME Auburn city
ME Bangor city
ME Berwick town
ME Brewer city
ME Cape Elizabeth town
ME Cumberland County
ME Eliot town
ME Falmouth town
ME Gorham town
ME Kittery town
ME Lebanon town
ME Lewiston city
ME Lisbon town
ME Old Town city
ME Orono town
ME Penobscot County
ME Penobscot Indian Island Reservation
ME Portland city
ME Sabattus town
ME Scarborough town
ME South Berwick town
ME South Portland city
ME Veazie town
ME Westbrook city
ME York County
MI Ada township
MI Allegan County
MI Allen Park city
MI Alpine township
MI Ann Arbor township
MI Auburn Hills city
MI Bangor township
MI Bath township
MI Battle Creek city
MI Bay City city
MI Bay County
MI Bedford township
MI Belleville city
MI Benton Charter township
MI Benton Harbor city
MI Berkley city
MI Berlin township
MI Berrien County
MI Beverly Hills village
MI Bingham Farms village
MI Birmingham city
MI Blackman township
MI Bloomfield Hills city
MI Bloomfield township
MI Bridgeport township
MI Brownstown township
MI Buena Vista Charter township
MI Burtchville township
MI Burton city
MI Byron township
MI Calhoun County
MI Canton township
MI Carrollton township
MI Cascade township
MI Cass County
MI Center Line city
MI Chesterfield township
MI Clarkston village
MI Clawson city
MI Clay township
MI Clayton township
MI Clinton County
MI Clinton township
MI Clio city
MI Clyde township
MI Commerce township
MI Comstock township
MI Cooper township
MI Dalton township
MI Davison city
MI Davison township
MI De Witt township
MI Dearborn city
MI Dearborn Heights city
MI Delhi Charter township
MI Delta township
MI Detroit city
MI East China township
MI East Detroit city
MI East Grand Rapids city
MI East Lansing city
MI Eaton County
MI Ecorse city
MI Emmett township
MI Erie township
MI Essexville city
MI Farmington city
MI Farmington Hills city
MI Ferndale city
MI Fillmore township
MI Flat Rock city
MI Flint township
MI Flushing city
MI Flushing township
MI Fort Gratiot township
MI Frankenlust township
MI Franklin village
MI Fraser city
MI Fruitport township
MI Gaines township
MI Garden City city
MI Genesee County
MI Genesee township
MI Georgetown township
MI Gibraltar city
MI Grand Blanc city
MI Grand Blanc township
MI Grand Rapids Charter township
MI Grandville city
MI Grosse Ile township
MI Grosse Pointe city
MI Grosse Pointe Farms city
MI Grosse Pointe Park city
MI Grosse Pointe Shores village
MI Grosse Pointe Woods city
MI Hampton township
MI Hamtramck city
MI Harper Woods city
MI Harrison township
MI Hazel Park city
MI Highland Park city
MI Highland township
MI Holland city
MI Holland township
MI Howard township
MI Hudsonville city
MI Huntington Woods city
MI Huron township
MI Independence township
MI Ingham County
MI Inkster city
MI Ira township
MI Jackson city
MI Jackson County
MI James township
MI Kalamazoo city
MI Kalamazoo County
MI Kalamazoo township
MI Keego Harbor city
MI Kent County
MI Kentwood city
MI Kimball township
MI Kochville township
MI Lake Angelus city
MI Laketon township
MI Laketown township
MI Lansing city
MI Lansing township
MI Lathrup Village city
MI Leoni township
MI Lincoln Park city

MI Lincoln township
MI Livonia city
MI Macomb County
MI Macomb township
MI Madison Heights city
MI Marysville city
MI Melvindale city
MI Meridian township
MI Milford township
MI Milton township
MI Monitor township
MI Monroe County
MI Mount Clemens city
MI Mount Morris city
MI Mount Morris township
MI Mundy township
MI Muskegon city
MI Muskegon County
MI Muskegon Heights city
MI Muskegon township
MI New Baltimore city
MI Niles city
MI Niles township
MI North Muskegon city
MI Northville city
MI Northville township
MI Norton Shores city
MI Novi city
MI Novi township
MI Oak Park city
MI Oakland Charter township
MI Oakland County
MI Orchard Lake Village city
MI Orion township
MI Oshtemo township
MI Ottawa County
MI Parchment city
MI Park township
MI Pavilion township
MI Pennfield township
MI Pittsfield township
MI Plainfield township
MI Pleasant Ridge city
MI Plymouth city
MI Plymouth township
MI Pontiac city
MI Port Huron city
MI Port Huron township
MI Portage city
MI Portsmouth township
MI Redford township
MI Richfield township
MI River Rouge city
MI Riverview city
MI Rochester city
MI Rochester Hills city
MI Rockwood city
MI Romulus city
MI Roosevelt Park city
MI Roseville city
MI Ross township
MI Royal Oak city
MI Royal Oak township
MI Saginaw city
MI Saginaw County
MI Saginaw township
MI Schoolcraft township
MI Scio township
MI Shelby township
MI Shoreham village
MI Sodus township
MI South Rockwood village
MI Southfield city
MI Southfield township
MI Southgate city
MI Spaulding township
MI Spring Arbor township
MI Springfield city
MI Springfield township
MI St. Clair city
MI St. Clair County
MI St. Clair Shores city
MI St. Clair township
MI St. Joseph Charter township
MI St. Joseph city
MI Stevensville village
MI Sullivan township
MI Summit township
MI Sumpter township
MI Superior township
MI Swartz Creek city
MI Sylvan Lake city
MI Taylor city
MI Texas township
MI Thetford township
MI Thomas township
MI Trenton city
MI Troy city
MI Utica city
MI Van Buren township
MI Vienna township
MI Walker city
MI Walled Lake city
MI Washington township
MI Washtenaw County
MI Waterford township
MI Wayne city
MI West Bloomfield township
MI Westland city
MI White Lake township
MI Whiteford township
MI Williamstown township
MI Wixom city
MI Wolverine Lake village
MI Woodhaven city
MI Wyandotte city
MI Wyoming city
MI Ypsilanti city
MI Ypsilanti township
MI Zeeland city
MI Zilwaukee city
MN Andover city
MN Anoka city
MN Anoka County
MN Apple Valley city
MN Arden Hills city
MN Benton County
MN Birchwood Village city
MN Blaine city
MN Bloomington city
MN Brooklyn Center city
MN Brooklyn Park city
MN Burnsville city
MN Carver County
MN Cascade township
MN Champlin city
MN Chanhassen city
MN Circle Pines city
MN Clay County
MN Coon Rapids city
MN Cottage Grove city
MN Credit River township
MN Crystal city
MN Dakota County
MN Dayton city
MN Deephaven city
MN Dilworth city
MN Duluth city
MN Eagan city
MN East Grand Forks city
MN Eden Prairie city
MN Excelsior city
MN Falcon Heights city
MN Farmington city
MN Fort Snelling unorg.
MN Fridley city
MN Gem Lake city
MN Golden Valley city
MN Grant township
MN Greenwood city
MN Ham Lake city
MN Haven township
MN Hennepin County
MN Hermantown city
MN Hilltop city
MN Hopkins city
MN Houston County
MN Inver Grove Heights city
MN La Crescent city
MN La Crescent township
MN Lake Elmo city
MN Lakeville city
MN Landfall city
MN Lauderdale city
MN Le Sauk township
MN Lexington city
MN Lilydale city
MN Lino Lakes city
MN Little Canada city
MN Long Lake city
MN Loretto city
MN Mahtomedi city
MN Maple Grove city
MN Maple Plain city
MN Maplewood city
MN Marion township
MN Medicine Lake city
MN Medina city
MN Mendota city
MN Mendota Heights city
MN Midway township
MN Minden township
MN Minnetonka Beach city
MN Minnetonka city
MN Minnetrista city
MN Moorhead city
MN Moorhead township
MN Mound city
MN Mounds View city
MN New Brighton city
MN New Hope city
MN Newport city
MN North Oaks city
MN North St. Paul city
MN Oakdale city
MN Oakport township
MN Olmsted County
MN Orono city
MN Osseo city
MN Plymouth city
MN Polk County
MN Prior Lake city
MN Proctor city
MN Ramsey city
MN Robbinsdale city
MN Rochester city
MN Rochester township
MN Rosemount city
MN Roseville city
MN Sartell city
MN Sauk Rapids city
MN Sauk Rapids township
MN Savage city
MN Scott County
MN Sherburne County
MN Shoreview city
MN Shorewood city
MN South St. Paul city

MN Spring Lake Park city
MN Spring Park city
MN St. Anthony city
MN St. Cloud city
MN St. Cloud township
MN St. Louis County
MN St. Paul Park city
MN Stearns County
MN Sunfish Lake city
MN Tonka Bay city
MN Vadnais Heights city
MN Victoria city
MN Waite Park city
MN Washington County
MN Wayzata city
MN West St. Paul city
MN White Bear Lake city
MN White Bear township
MN Willernie city
MN Woodbury city
MN Woodland city
MN Wright County
MO Airport Drive village
MO Airport township
MO Andrew County
MO Arnold city
MO Avondale city
MO Ballwin city
MO Battlefield town
MO Bella Villa city
MO Bellefontaine Neighbors city
MO Bellerive village
MO Bel-Nor village
MO Bel-Ridge village
MO Belton city
MO Berkeley city
MO Beverly Hills city
MO Big Creek township
MO Birmingham village
MO Black Jack city
MO Blanchette township
MO Blue Springs city
MO Blue township
MO Bonhomme township
MO Boone County
MO Boone township
MO Breckenridge Hills village
MO Brentwood city
MO Bridgeton city
MO Brooking township
MO Buchanan County
MO Calverton Park village
MO Campbell No. 1 township
MO Campbell No. 2 township
MO Carl Junction city
MO Carroll township
MO Carterville city
MO Cass County
MO Cedar township
MO Center township
MO Charlack city
MO Chesterfield city
MO Chouteau township
MO Christian County
MO Clarkson Valley city
MO Clay County
MO Clay township
MO Claycomd village
MO Clayton city
MO Clayton township
MO Cliff Village village
MO Columbia city
MO Columbia township
MO Concord township
MO Cool Valley city
MO Cottleville town
MO Cottleville township
MO Country Club Hills city
MO Country Club village
MO Country Life Acres village
MO Crestwood city
MO Creve Coeur city
MO Creve Coeur township
MO Crystal Lake Park city
MO Dardenne township
MO Dellwood city
MO Dennis Acres village
MO Des Peres city
MO Duquesne village
MO Edmundson village
MO Ellisville city
MO Fenton city
MO Ferguson city
MO Ferguson township
MO Flordell Hills city
MO Florissant city
MO Florissant township
MO Fox township
MO Friedens township
MO Frontenac city
MO Galena township
MO Gallatin township
MO Gladstone city
MO Glen Echo Park village
MO Glenaire village
MO Glendale city
MO Grandview city
MO Grantwood Village town
MO Gravois township
MO Greendale city
MO Greene County
MO Hadley township
MO Hanley Hills village
MO Harvester township
MO Hazelwood city
MO High Ridge township
MO Hillsdale village
MO Houston Lake city
MO Huntleigh city
MO Imperial township
MO Iron Gates village
MO Jackson County
MO Jasper County
MO Jefferson County
MO Jefferson township
MO Jennings city
MO Joplin city
MO Joplin township
MO Kickapoo township
MO Kimmswick city
MO Kinloch city
MO Kirkwood city
MO Ladue city
MO Lake St. Louis city
MO Lake Tapawingo city
MO Lake Waukomis city
MO Lakeshire city
MO Leawood village
MO Lee's Summit city
MO Lemay township
MO Lewis and Clark township
MO Liberty city
MO Liberty township
MO Mac Kenzie village
MO Manchester city
MO Maplewood city
MO Marlborough village
MO Maryland Heights city
MO May township
MO Meramec township
MO Midland township
MO Mineral township
MO Missouri River township
MO Missouri township
MO Moline Acres city
MO Mount Pleasant township
MO Newton County
MO Normandy city
MO Normandy township
MO North Campbell No. 1 township
MO North Campbell No. 2 township
MO North Campbell No. 3 township
MO North Kansas City city
MO North View township
MO Northmoor city
MO Northwest township
MO Northwoods city
MO Norwood Court town
MO Oakland city
MO Oakland Park village
MO Oaks village
MO Oakview village
MO Oakwood Park village
MO Oakwood village
MO O'Fallon city
MO O'Fallon township
MO Olivette city
MO Overland city
MO Pagedale city
MO Parkdale town
MO Parkville city
MO Pasadena Hills city
MO Pasadena Park village
MO Pettis township
MO Pine Lawn city
MO Platte County
MO Platte township
MO Platte Woods city
MO Pleasant Valley city
MO Prairie township
MO Queeny township
MO Randolph village
MO Raymore city
MO Raymore township
MO Raytown city
MO Redings Mill village
MO Richmond Heights city
MO Rivers township
MO Riverside city
MO Riverview village
MO Rock Hill city
MO Rock township
MO Rocky Fork township
MO Saginaw village
MO Shoal Creek Drive village
MO Shoal Creek township
MO Shrewsbury city
MO Silver Creek village
MO Sioux township
MO Sni-A-Bar township
MO Spanish Lake township
MO Spencer Creek township
MO St. Ann city
MO St. Charles city
MO St. Ferdinand township
MO St. George city
MO St. John city
MO St. Joseph city
MO St. Louis city
MO St. Peters city
MO St. Peters township
MO Sugar Creek city
MO Sunset Hills city
MO Sycamore Hills village
MO Town and Country city
MO Twin Groves township
MO Twin Oaks village
MO Unity Village village

MO University City city
MO Uplands Park village
MO Valley Park city
MO Velda Village city
MO Velda Village Hills village
MO Vinita Park city
MO Vinita Terrace village
MO Warson Woods city
MO Washington township
MO Wayne township
MO Weatherby Lake city
MO Webb City city
MO Webster Groves city
MO Wellston city
MO Wentzville township
MO Westwood village
MO Wilbur Park village
MO Wilson township
MO Winchester city
MO Windsor township
MO Woodson Terrace city
MO Zumbehl township
MS Bay St. Louis city
MS Biloxi city
MS Brandon city
MS Clinton city
MS DeSoto County
MS D'Iberville city
MS Flowood town
MS Forrest County
MS Gautier city
MS Gulfport city
MS Hancock County
MS Harrison County
MS Hattiesburg city
MS Hinds County
MS Horn Lake city
MS Jackson County
MS Lamar County
MS Long Beach city
MS Madison city
MS Madison County
MS Moss Point city
MS Ocean Springs city
MS Pascagoula city
MS Pass Christian city
MS Pearl city
MS Petal city
MS Rankin County
MS Richland city
MS Ridgeland city
MS Southaven city
MS Waveland city
MT Billings city
MT Cascade County
MT Great Falls city
MT Missoula city
MT Missoula County
MT Yellowstone County
NC Alamance County
NC Apex town
NC Archdale city
NC Asheville city
NC Belmont city
NC Belville town
NC Bessemer City city
NC Biltmore Forest town
NC Black Mountain town
NC Brookford town
NC Brunswick County
NC Buncombe County
NC Burke County
NC Burlington city
NC Cabarrus County
NC Carrboro town
NC Cary town
NC Catawba County
NC Chapel Hill town
NC China Grove town
NC Clemmons village
NC Concord city
NC Conover city
NC Cramerton town
NC Dallas town
NC Davidson County
NC Durham County
NC Edgecombe County
NC Elon College town
NC Fletcher town
NC Forsyth County
NC Garner town
NC Gaston County
NC Gastonia city
NC Gibsonville town
NC Goldsboro city
NC Graham city
NC Greenville city
NC Guilford County
NC Harnett County
NC Haw River town
NC Henderson County
NC Hickory city
NC High Point city
NC Hildebran town
NC Hope Mills town
NC Indian Trail town
NC Jacksonville city
NC Jamestown town
NC Kannapolis city
NC Landis town
NC Leland town
NC Long View town
NC Lowell city
NC Matthews town
NC McAdenville town
NC Mebane city
NC Mecklenburg County
NC Mint Hill town
NC Montreat town
NC Mount Holly city
NC Nash County
NC New Hanover County
NC Newton city
NC Onslow County
NC Orange County
NC Pineville town
NC Pitt County
NC Randolph County
NC Ranlo town
NC Rocky Mount city
NC Rowan County
NC Rural Hall town
NC Spring Lake town
NC Stallings town
NC Thomasville city
NC Union County
NC Wake County
NC Walkertown town
NC Wayne County
NC Weaverville town
NC Wilmington city
NC Winterville town
NC Woodfin town
NC Wrightsville Beach town
ND Barnes township
ND Bismarck city
ND Bismarck unorg.
ND Burleigh County
ND Captain's Landing township
ND Cass County
ND Fargo city
ND Grand Forks city
ND Grand Forks County
ND Grand Forks township
ND Hay Creek township
ND Lincoln city
ND Mandan city
ND Mandan unorg.
ND Morton County
ND Reed township
ND West Fargo city
NE Bellevue city
NE Bellevue No. 2 precinct
NE Benson precinct
NE Boys Town village
NE Chicago precinct
NE Covington precinct
NE Dakota County
NE Douglas County
NE Douglas precinct
NE Florence precinct
NE Garfield precinct
NE Gilmore No. 1 precinct
NE Gilmore No. 2 precinct
NE Gilmore No. 3 precinct
NE Grant precinct
NE Highland No. 1 precinct
NE Highland No. 2 precinct
NE Jefferson precinct
NE La Platte precinct
NE La Vista city
NE Lancaster County
NE Lancaster precinct
NE McArdle precinct
NE Millard precinct
NE Papillion city
NE Papillion No. 2 precinct
NE Pawnee precinct
NE Ralston city
NE Richland No. 1 precinct
NE Richland No. 2 precinct
NE Richland No. 3 precinct
NE Sarpy County
NE South Sioux City city
NE Union precinct
NE Yankee Hill precinct
NH Amherst town
NH Auburn town
NH Bedford town
NH Dover city
NH Durham town
NH Goffstown town
NH Hillsborough County
NH Hollis town
NH Hooksett town
NH Hudson town
NH Litchfield town
NH Londonderry town
NH Madbury town
NH Manchester city
NH Merrimack County
NH Merrimack town
NH Nashua city
NH New Castle town
NH Newington town
NH Pelham town
NH Plaistow town
NH Portsmouth city
NH Rochester city
NH Rockingham County
NH Rollinsford town
NH Rye town
NH Salem town
NH Somersworth city
NH Strafford County
NH Windham town
NJ Aberdeen township
NJ Absecon city

NJ Allendale borough
NJ Allenhurst borough
NJ Alpha borough
NJ Alpine borough
NJ Asbury Park city
NJ Atlantic City city
NJ Atlantic County
NJ Atlantic Highlands borough
NJ Audubon borough
NJ Audubon Park borough
NJ Avon-by-the-Sea borough
NJ Barrington borough
NJ Bay Head borough
NJ Bayonne city
NJ Beachwood borough
NJ Bedminster township
NJ Belleville township
NJ Bellmawr borough
NJ Belmar borough
NJ Bergenfield borough
NJ Berkeley Heights township
NJ Berkeley township
NJ Berlin borough
NJ Berlin township
NJ Bernards township
NJ Bernardsville borough
NJ Beverly city
NJ Bloomfield township
NJ Bloomingdale borough
NJ Bogota borough
NJ Boonton town
NJ Boonton township
NJ Bordentown city
NJ Bordentown township
NJ Bound Brook borough
NJ Bradley Beach borough
NJ Branchburg township
NJ Brick township
NJ Bridgewater township
NJ Brielle borough
NJ Brigantine city
NJ Brooklawn borough
NJ Buena borough
NJ Buena Vista township
NJ Burlington city
NJ Burlington County
NJ Burlington township
NJ Butler borough
NJ Byram township
NJ Caldwell Borough township
NJ Camden city
NJ Cape May County
NJ Carlstadt borough
NJ Carneys Point township
NJ Carteret borough
NJ Cedar Grove township
NJ Chatham borough
NJ Chatham township
NJ Cherry Hill township
NJ Chesilhurst borough
NJ Chester township
NJ Chesterfield township
NJ Cinnaminson township
NJ City of Orange township
NJ Clark township
NJ Clayton borough
NJ Clementon borough
NJ Cliffside Park borough
NJ Clifton city
NJ Closter borough
NJ Collingswood borough
NJ Colts Neck township
NJ Commercial township
NJ Cranford township
NJ Cresskill borough
NJ Cumberland County
NJ Deal borough
NJ Delanco township
NJ Delran township
NJ Demarest borough
NJ Denville township
NJ Deptford township
NJ Dover town
NJ Dover township
NJ Dumont borough
NJ Dunellen borough
NJ East Brunswick township
NJ East Greenwich township
NJ East Hanover township
NJ East Newark borough
NJ East Orange city
NJ East Rutherford borough
NJ Eastampton township
NJ Eatontown borough
NJ Edgewater borough
NJ Edgewater Park township
NJ Edison township
NJ Egg Harbor township
NJ Elizabeth city
NJ Elk township
NJ Elmwood Park borough
NJ Emerson borough
NJ Englewood city
NJ Englewood Cliffs borough
NJ Englishtown borough
NJ Essex Fells township
NJ Evesham township
NJ Ewing township
NJ Fair Haven borough
NJ Fair Lawn borough
NJ Fairfield township
NJ Fairview borough
NJ Fanwood borough
NJ Fieldsboro borough
NJ Florence township
NJ Florham Park borough
NJ Fort Lee borough
NJ Franklin Lakes borough
NJ Franklin township
NJ Freehold borough
NJ Freehold township
NJ Galloway township
NJ Garfield city
NJ Garwood borough
NJ Gibbsboro borough
NJ Glassboro borough
NJ Glen Ridge Borough township
NJ Glen Rock borough
NJ Gloucester City city
NJ Gloucester County
NJ Gloucester township
NJ Green Brook township
NJ Greenwich township
NJ Guttenberg town
NJ Hackensack city
NJ Haddon Heights borough
NJ Haddon township
NJ Haddonfield borough
NJ Hainesport township
NJ Haledon borough
NJ Hamilton township
NJ Hanover township
NJ Harding township
NJ Harrington Park borough
NJ Harrison town
NJ Hasbrouck Heights borough
NJ Haworth borough
NJ Hawthorne borough
NJ Hazlet township
NJ Helmetta borough
NJ Highland Park borough
NJ Highlands borough
NJ Hillsborough township
NJ Hillsdale borough
NJ Hillside township
NJ Hi-Nella borough
NJ Hoboken city
NJ Ho-Ho-Kus borough
NJ Holmdel township
NJ Hopatcong borough
NJ Hopewell township
NJ Howell township
NJ Hunterdon County
NJ Interlaken borough
NJ Irvington township
NJ Island Heights borough
NJ Jackson township
NJ Jamesburg borough
NJ Jefferson township
NJ Jersey City city
NJ Keansburg borough
NJ Kearny town
NJ Kenilworth borough
NJ Keyport borough
NJ Kinnelon borough
NJ Lakehurst borough
NJ Lakewood township
NJ Laurel Springs borough
NJ Lavallette borough
NJ Lawnside borough
NJ Lawrence township
NJ Leonia borough
NJ Lincoln Park borough
NJ Linden city
NJ Lindenwold borough
NJ Linwood city
NJ Little Falls township
NJ Little Ferry borough
NJ Little Silver borough
NJ Livingston township
NJ Loch Arbour village
NJ Lodi borough
NJ Long Branch city
NJ Longport borough
NJ Lopatcong township
NJ Lumberton township
NJ Lyndhurst township
NJ Madison borough
NJ Magnolia borough
NJ Mahwah township
NJ Manalapan township
NJ Manasquan borough
NJ Manchester township
NJ Mantoloking borough
NJ Mantua township
NJ Manville borough
NJ Maple Shade township
NJ Maplewood township
NJ Margate City city
NJ Marlboro township
NJ Matawan borough
NJ Maywood borough
NJ Medford Lakes borough
NJ Medford township
NJ Mendham borough
NJ Mendham township
NJ Mercer County
NJ Merchantville borough
NJ Metuchen borough
NJ Middlesex borough
NJ Middlesex County
NJ Middletown township
NJ Midland Park borough
NJ Millburn township
NJ Millstone borough
NJ Milltown borough
NJ Millville city
NJ Mine Hill township

NJ Monmouth Beach borough
NJ Monmouth County
NJ Monroe township
NJ Montclair township
NJ Montvale borough
NJ Montville township
NJ Moonachie borough
NJ Moorestown township
NJ Morris County
NJ Morris Plains borough
NJ Morris township
NJ Morristown town
NJ Mount Arlington borough
NJ Mount Ephraim borough
NJ Mount Holly township
NJ Mount Laurel township
NJ Mount Olive township
NJ Mountain Lakes borough
NJ Mountainside borough
NJ National Park borough
NJ Neptune City borough
NJ Neptune township
NJ Netcong borough
NJ New Brunswick city
NJ New Milford borough
NJ New Providence borough
NJ Newark city
NJ Newfield borough
NJ North Arlington borough
NJ North Bergen township
NJ North Brunswick township
NJ North Caldwell township
NJ North Haledon borough
NJ North Plainfield borough
NJ Northfield city
NJ Northvale borough
NJ Norwood borough
NJ Nutley township
NJ Oakland borough
NJ Oaklyn borough
NJ Ocean City city
NJ Ocean County
NJ Ocean Gate borough
NJ Ocean township
NJ Oceanport borough
NJ Old Bridge township
NJ Old Tappan borough
NJ Oradell borough
NJ Palisades Park borough
NJ Palmyra borough
NJ Paramus borough
NJ Park Ridge borough
NJ Parsippany-Troy Hills township
NJ Passaic city
NJ Passaic County
NJ Passaic township
NJ Paterson city
NJ Paulsboro borough
NJ Pennington borough
NJ Penns Grove borough
NJ Pennsauken township
NJ Pennsville township
NJ Pequannock township
NJ Perth Amboy city
NJ Phillipsburg town
NJ Pine Beach borough
NJ Pine Hill borough
NJ Pine Valley borough
NJ Piscataway township
NJ Pitman borough
NJ Pittsgrove township
NJ Plainfield city
NJ Pleasantville city
NJ Pohatcong township
NJ Point Pleasant Beach borough
NJ Point Pleasant borough
NJ Pompton Lakes borough
NJ Prospect Park borough
NJ Rahway city
NJ Ramsey borough
NJ Randolph township
NJ Raritan borough
NJ Readington township
NJ Red Bank borough
NJ Ridgefield borough
NJ Ridgefield Park village
NJ Ridgewood village
NJ Ringwood borough
NJ River Edge borough
NJ River Vale township
NJ Riverdale borough
NJ Riverside township
NJ Riverton borough
NJ Rochelle Park township
NJ Rockaway borough
NJ Rockaway township
NJ Rockleigh borough
NJ Roseland borough
NJ Roselle borough
NJ Roselle Park borough
NJ Roxbury township
NJ Rumson borough
NJ Runnemede borough
NJ Rutherford borough
NJ Saddle Brook township
NJ Saddle River borough
NJ Salem County
NJ Sayreville borough
NJ Scotch Plains township
NJ Sea Bright borough
NJ Sea Girt borough
NJ Seaside Heights borough
NJ Seaside Park borough
NJ Secaucus town
NJ Shamong township
NJ Shrewsbury borough
NJ Shrewsbury township
NJ Somerdale borough
NJ Somers Point city
NJ Somerset County
NJ Somerville borough
NJ South Amboy city
NJ South Belmar borough
NJ South Bound Brook borough
NJ South Brunswick township
NJ South Hackensack township
NJ South Orange Village township
NJ South Plainfield borough
NJ South River borough
NJ South Toms River borough
NJ Spotswood borough
NJ Spring Lake borough
NJ Spring Lake Heights borough
NJ Springfield township
NJ Stanhope borough
NJ Stratford borough
NJ Summit city
NJ Sussex County
NJ Tabernacle township
NJ Tavistock borough
NJ Teaneck township
NJ Tenafly borough
NJ Teterboro borough
NJ Tinton Falls borough
NJ Totowa borough
NJ Trenton city
NJ Union Beach borough
NJ Union City city
NJ Union township
NJ Upper Saddle River borough
NJ Upper township
NJ Ventnor City city
NJ Verona township
NJ Victory Gardens borough
NJ Vineland city
NJ Voorhees township
NJ Waldwick borough
NJ Wall township
NJ Wallington borough
NJ Wanaque borough
NJ Warren County
NJ Warren township
NJ Washington township
NJ Watchung borough
NJ Waterford township
NJ Wayne township
NJ Weehawken township
NJ Wenonah borough
NJ West Caldwell township
NJ West Deptford township
NJ West Long Branch borough
NJ West New York town
NJ West Orange township
NJ West Paterson borough
NJ Westampton township
NJ Westfield town
NJ Westville borough
NJ Westwood borough
NJ Wharton borough
NJ Willingboro township
NJ Winfield township
NJ Winslow township
NJ Woodbridge township
NJ Woodbury city
NJ Woodbury Heights borough
NJ Woodcliff Lake borough
NJ Woodlynne borough
NJ Wood-Ridge borough
NJ Wyckoff township
NM Bernalillo County
NM Corrales village
NM Dona Ana County
NM Las Cruces city
NM Los Ranchos de Albuquerque village
NM Mesilla town
NM Rio Rancho city
NM Sandoval County
NM Santa Fe city
NM Santa Fe County
NM Sunland Park city
NY Albany city
NY Albany County
NY Amherst town
NY Amityville village
NY Ardsley village
NY Ashland town
NY Atlantic Beach village
NY Babylon town
NY Babylon village
NY Baldwinsville village
NY Ballston town
NY Barker town
NY Baxter Estates village
NY Bayville village
NY Beacon city
NY Bedford town
NY Belle Terre village
NY Bellerose village
NY Bellport village
NY Bethlehem town
NY Big Flats town
NY Binghamton city
NY Binghamton town
NY Blasdell village
NY Boston town
NY Briarcliff Manor village
NY Brighton town
NY Brightwaters village

NY Bronxville village
NY Brookhaven town
NY Brookville village
NY Broome County
NY Brunswick town
NY Buchanan village
NY Buffalo city
NY Camillus town
NY Camillus village
NY Carmel town
NY Cayuga Heights village
NY Cedarhurst village
NY Charlton town
NY Cheektowaga town
NY Chemung County
NY Chenango town
NY Chestnut Ridge village
NY Chili town
NY Cicero town
NY Clarence town
NY Clarkstown town
NY Clay town
NY Clayville village
NY Clifton Park town
NY Clinton village
NY Cohoes city
NY Colonie town
NY Colonie village
NY Conklin town
NY Cornwall on Hudson village
NY Cornwall town
NY Cortlandt town
NY Croton-on-Hudson village
NY De Witt town
NY Deerfield town
NY Depew village
NY Dickinson town
NY Dobbs Ferry village
NY Dryden town
NY Dutchess County
NY East Fishkill town
NY East Greenbush town
NY East Hills village
NY East Rochester village
NY East Rockaway village
NY East Syracuse village
NY East Williston village
NY Eastchester town
NY Elma town
NY Elmira city
NY Elmira Heights village
NY Elmira town
NY Elmsford village
NY Endicott village
NY Erie County
NY Evans town
NY Fairport village
NY Farmingdale village
NY Fayetteville village
NY Fenton town
NY Fishkill town
NY Fishkill village
NY Floral Park village
NY Flower Hill village
NY Floyd town
NY Fort Edward town
NY Fort Edward village
NY Frankfort town
NY Freeport village
NY Garden City village
NY Gates town
NY Geddes town
NY Glen Cove city
NY Glens Falls city
NY Glenville town
NY Grand Island town
NY Grand View-on-Hudson village
NY Great Neck Estates village
NY Great Neck Plaza village
NY Great Neck village
NY Greece town
NY Green Island village
NY Greenburgh town
NY Guilderland town
NY Halfmoon town
NY Hamburg town
NY Hamburg village
NY Harrison village
NY Hastings-on-Hudson village
NY Haverstraw town
NY Haverstraw village
NY Hempstead town
NY Hempstead village
NY Henrietta town
NY Herkimer County
NY Hewlett Bay Park village
NY Hewlett Harbor village
NY Hewlett Neck village
NY Hillburn village
NY Horseheads town
NY Horseheads village
NY Hudson Falls village
NY Huntington Bay village
NY Huntington town
NY Hyde Park town
NY Irondequoit town
NY Irvington village
NY Island Park village
NY Islandia village
NY Islip town
NY Ithaca city
NY Ithaca town
NY Johnson City village
NY Kenmore village
NY Kensington village
NY Kent town
NY Kings Point village
NY Kingsbury town
NY Kirkland town
NY Kirkwood town
NY La Grange town
NY Lackawanna city
NY LaFayette town
NY Lake Grove village
NY Lake Success village
NY Lancaster town
NY Lancaster village
NY Lansing town
NY Lansing village
NY Larchmont village
NY Lattingtown village
NY Lawrence village
NY Lee town
NY Lewiston town
NY Lewiston village
NY Lindenhurst village
NY Liverpool village
NY Lloyd Harbor village
NY Lloyd town
NY Long Beach city
NY Lynbrook village
NY Lysander town
NY Malta town
NY Malverne village
NY Mamaroneck town
NY Mamaroneck village
NY Manlius town
NY Manlius village
NY Manorhaven village
NY Marcy town
NY Massapequa Park village
NY Matinecock village
NY Menands village
NY Mill Neck village
NY Mineola village
NY Minoa village
NY Monroe County
NY Montebello village
NY Montgomery town
NY Moreau town
NY Mount Kisco village
NY Mount Pleasant town
NY Mount Vernon city
NY Munsey Park village
NY Muttontown village
NY New Castle town
NY New Hartford town
NY New Hartford village
NY New Hempstead village
NY New Hyde Park village
NY New Rochelle city
NY New Square village
NY New Windsor town
NY New York Mills village
NY Newburgh city
NY Newburgh town
NY Niagara County
NY Niagara Falls city
NY Niagara town
NY Niskayuna town
NY North Castle town
NY North Greenbush town
NY North Hempstead town
NY North Hills village
NY North Syracuse village
NY North Tarrytown village
NY North Tonawanda city
NY Northport village
NY Nyack village
NY Ogden town
NY Old Brookville village
NY Old Westbury village
NY Oneida County
NY Onondaga County
NY Onondaga town
NY Orange County
NY Orangetown town
NY Orchard Park town
NY Orchard Park village
NY Oriskany village
NY Ossining town
NY Ossining village
NY Oswego County
NY Owego town
NY Oyster Bay town
NY Paris town
NY Patchogue village
NY Patterson town
NY Peekskill city
NY Pelham Manor village
NY Pelham town
NY Pelham village
NY Pendleton town
NY Penfield town
NY Perinton town
NY Philipstown town
NY Phoenix village
NY Piermont village
NY Pittsford town
NY Pittsford village
NY Plandome Heights village
NY Plandome Manor village
NY Plandome village
NY Pleasant Valley town
NY Pleasantville village
NY Poestenkill town
NY Pomona village
NY Poospatuck Reservation

NY Poquott village
NY Port Chester village
NY Port Dickinson village
NY Port Jefferson village
NY Port Washington North village
NY Poughkeepsie city
NY Poughkeepsie town
NY Pound Ridge town
NY Putnam County
NY Putnam Valley town
NY Queensbury town
NY Ramapo town
NY Rensselaer city
NY Rensselaer County
NY Riverhead town
NY Rochester city
NY Rockville Centre village
NY Rome city
NY Roslyn Estates village
NY Roslyn Harbor village
NY Roslyn village
NY Rotterdam town
NY Russell Gardens village
NY Rye Brook village
NY Rye city
NY Rye town
NY Saddle Rock village
NY Salina town
NY Sands Point village
NY Saratoga County
NY Scarsdale town
NY Scarsdale village
NY Schaghticoke town
NY Schenectady city
NY Schenectady County
NY Schodack town
NY Schroeppel town
NY Schuyler town
NY Scotia village
NY Sea Cliff village
NY Shoreham village
NY Sloan village
NY Sloatsburg village
NY Smithtown town
NY Solvay village
NY Somers town
NY South Floral Park village
NY South Glens Falls village
NY South Nyack village
NY Southampton town
NY Southport town
NY Spencerport village
NY Spring Valley village
NY Stewart Manor village
NY Stony Point town
NY Suffern village
NY Suffolk County
NY Syracuse city
NY Tarrytown village
NY Thomaston village
NY Tioga County
NY Tompkins County
NY Tonawanda city
NY Tonawanda town
NY Troy city
NY Tuckahoe village
NY Ulster County
NY Union town
NY Upper Brookville village
NY Upper Nyack village
NY Utica city
NY Valley Stream village
NY Van Buren town
NY Vestal town
NY Veteran town
NY Village of the Branch village
NY Wappinger town
NY Wappingers Falls village
NY Warren County
NY Washington County
NY Waterford town
NY Waterford village
NY Watervliet city
NY Webster town
NY Webster village
NY Wesley Hills village
NY West Haverstraw village
NY West Seneca town
NY Westbury village
NY Westchester County
NY Western town
NY Wheatfield town
NY White Plains city
NY Whitesboro village
NY Whitestown town
NY Williamsville village
NY Williston Park village
NY Woodsburgh village
NY Yonkers city
NY Yorktown town
NY Yorkville village
OH Addyston village
OH Allen County
OH Allen township
OH Amberley village
OH Amelia village
OH American township
OH Amherst city
OH Amherst township
OH Anderson township
OH Arlington Heights village
OH Auglaize County
OH Aurora city
OH Austintown township
OH Avon city
OH Avon Lake city
OH Bainbridge township
OH Barberton city
OH Batavia township
OH Bath township
OH Bay Village city
OH Beachwood city
OH Beaver township
OH Beavercreek city
OH Beavercreek township
OH Bedford city
OH Bedford Heights city
OH Bellaire city
OH Bellbrook city
OH Belmont County
OH Belpre city
OH Belpre township
OH Bentleyville village
OH Berea city
OH Bethel township
OH Bexley city
OH Blendon township
OH Blue Ash city
OH Boardman township
OH Brady Lake village
OH Bratenahl village
OH Brecksville city
OH Brice village
OH Bridgeport village
OH Brilliant village
OH Brimfield township
OH Broadview Heights city
OH Brook Park city
OH Brookfield township
OH Brooklyn city
OH Brooklyn Heights village
OH Brookside village
OH Brown township
OH Brownhelm township
OH Brunswick city
OH Brunswick Hills township
OH Butler County
OH Butler township
OH Campbell city
OH Canfield city
OH Canfield township
OH Canton city
OH Canton township
OH Carlisle township
OH Carlisle village
OH Centerville city
OH Chagrin Falls township
OH Chagrin Falls village
OH Champion township
OH Chesapeake village
OH Cheviot city
OH Chippewa township
OH Cincinnati city
OH Clark County
OH Clear Creek township
OH Clermont County
OH Cleveland city
OH Cleveland Heights city
OH Cleves village
OH Clinton township
OH Coal Grove village
OH Coitsville township
OH Colerain township
OH Columbia township
OH Concord township
OH Copley township
OH Coventry township
OH Cridersville village
OH Cross Creek township
OH Cuyahoga County
OH Cuyahoga Falls city
OH Cuyahoga Heights village
OH Deer Park city
OH Deerfield township
OH Delaware County
OH Delhi township
OH Doylestown village
OH Dublin city
OH Duchouquet township
OH East Cleveland city
OH Eastlake city
OH Eaton township
OH Elmwood Place village
OH Elyria city
OH Elyria township
OH Englewood city
OH Erie County
OH Etna township
OH Euclid city
OH Evendale village
OH Fairborn city
OH Fairfax village
OH Fairfield city
OH Fairfield County
OH Fairfield township
OH Fairlawn city
OH Fairport Harbor village
OH Fairview Park city
OH Fayette township
OH Forest Park city
OH Fort Shawnee village
OH Franklin city
OH Franklin County
OH Franklin township
OH Gahanna city
OH Garfield Heights city
OH Geauga County
OH Genoa township

OH German township
OH Girard city
OH Glendale village
OH Glenwillow village
OH Golf Manor village
OH Goshen township
OH Grand River village
OH Grandview Heights city
OH Green township
OH Green village
OH Greene County
OH Greenhills village
OH Grove City city
OH Groveport village
OH Hamilton city
OH Hamilton County
OH Hamilton township
OH Hanging Rock village
OH Hanover township
OH Harbor View village
OH Harrison township
OH Hartville village
OH Heath city
OH Highland Heights city
OH Hilliard city
OH Hills and Dales village
OH Hinckley township
OH Holland village
OH Howland township
OH Hubbard city
OH Hubbard township
OH Huber Heights city
OH Hudson township
OH Hudson village
OH Independence city
OH Ironton city
OH Island Creek township
OH Jackson township
OH Jefferson County
OH Jefferson township
OH Jerome township
OH Kent city
OH Kettering city
OH Kirtland city
OH Lake County
OH Lake township
OH Lakeline village
OH Lakemore village
OH Lakewood city
OH Lawrence County
OH Lawrence township
OH Lemon township
OH Lexington village
OH Liberty township
OH Licking County
OH Licking township
OH Lima city
OH Lima township
OH Lincoln Heights city
OH Linndale village
OH Lockland village
OH Lorain city
OH Lorain County
OH Louisville city
OH Loveland city
OH Lowellville village
OH Lucas County
OH Lyndhurst city
OH Macedonia city
OH Mad River township
OH Madeira city
OH Madison township
OH Mahoning County
OH Maineville village
OH Mansfield city
OH Maple Heights city
OH Marble Cliff village
OH Mariemont village
OH Martins Ferry city
OH Mason city
OH Massillon city
OH Maumee city
OH Mayfield Heights city
OH Mayfield village
OH McDonald village
OH Mead township
OH Medina County
OH Mentor city
OH Mentor-on-the-Lake city
OH Meyers Lake village
OH Miami County
OH Miami township
OH Miamisburg city
OH Middleburg Heights city
OH Middletown city
OH Mifflin township
OH Milford city
OH Millbury village
OH Millville village
OH Minerva Park village
OH Mingo Junction city
OH Mogadore village
OH Monclova township
OH Monroe township
OH Monroe village
OH Montgomery city
OH Montgomery County
OH Moorefield township
OH Moraine city
OH Moreland Hills village
OH Mount Healthy city
OH Munroe Falls village
OH New Miami village
OH New Middletown village
OH New Rome village
OH Newark city
OH Newark township
OH Newburgh Heights village
OH Newton township
OH Newtown village
OH Niles city
OH Nimishillen township
OH North Bend village
OH North Canton city
OH North College Hill city
OH North Olmsted city
OH North Randall village
OH North Ridgeville city
OH North Royalton city
OH Northfield Center township
OH Northfield village
OH Northwood city
OH Norton city
OH Norwich township
OH Norwood city
OH Oakwood city
OH Oakwood village
OH Obetz village
OH Ohio township
OH Olmsted Falls city
OH Olmsted township
OH Ontario village
OH Orange township
OH Orange village
OH Oregon city
OH Ottawa County
OH Ottawa Hills village
OH Painesville city
OH Painesville township
OH Palmyra township
OH Parma city
OH Parma Heights city
OH Pease township
OH Pepper Pike city
OH Perry township
OH Perrysburg city
OH Perrysburg city
OH Perrysburg township
OH Pierce township
OH Plain township
OH Pleasant township
OH Poland township
OH Poland village
OH Portage County
OH Powell village
OH Prairie township
OH Proctorville village
OH Pultney township
OH Randolph township
OH Ravenna city
OH Ravenna township
OH Reading city
OH Reminderville village
OH Reynoldsburg city
OH Richfield township
OH Richfield village
OH Richland County
OH Richmond Heights city
OH Riveredge township
OH Riverlea village
OH Riverside village
OH Rocky River city
OH Rome township
OH Ross township
OH Rossford city
OH Russell township
OH Russia township
OH Sagamore Hills township
OH Seven Hills city
OH Shadyside village
OH Shaker Heights city
OH Sharon township
OH Sharonville city
OH Shawnee Hills village
OH Shawnee township
OH Sheffield Lake city
OH Sheffield township
OH Sheffield village
OH Silver Lake village
OH Silverton city
OH Solon city
OH South Amherst village
OH South Euclid city
OH South Point village
OH South Russell village
OH Springboro city
OH Springdale city
OH Springfield city
OH Springfield township
OH St. Bernard city
OH St. Clair township
OH Stark County
OH Steubenville city
OH Steubenville township
OH Stow city
OH Strongsville city
OH Struthers city
OH Suffield township
OH Sugar Bush Knolls village
OH Sugar Creek township
OH Summit County
OH Sycamore township
OH Sylvania city
OH Sylvania township
OH Symmes township
OH Tallmadge city
OH Terrace Park village
OH The Village of Indian Hill city

OH Timberlake village
OH Trenton city
OH Trotwood city
OH Troy township
OH Trumbull County
OH Truro township
OH Turtle Creek township
OH Tuscarawas township
OH Twinsburg city
OH Twinsburg township
OH Union city
OH Union County
OH Union township
OH University Heights city
OH Upper Arlington city
OH Upper township
OH Urbancrest village
OH Valley View village
OH Valleyview village
OH Vandalia city
OH Vermilion city
OH Vermilion township
OH Violet township
OH Wadsworth city
OH Wadsworth township
OH Waite Hill village
OH Walbridge village
OH Walton Hills village
OH Warren city
OH Warren County
OH Warren township
OH Warrensville Heights city
OH Warrensville township
OH Washington County
OH Washington township
OH Wayne County
OH Wayne township
OH Weathersfield township
OH Wells township
OH West Carrollton City city
OH West Milton village
OH Westerville city
OH Westlake city
OH Whitehall city
OH Whitewater township
OH Wickliffe city
OH Willoughby city
OH Willoughby Hills city
OH Willowick city
OH Wintersville village
OH Wood County
OH Woodlawn village
OH Woodmere village
OH Worthington city
OH Wyoming city
OH Youngstown city
OK Arkoma town
OK Bethany city
OK Bixby city
OK Broken Arrow city
OK Canadian County
OK Catoosa city
OK Choctaw city
OK Cleveland County
OK Comanche County
OK Creek County
OK Del City city
OK Edmond city
OK Forest Park town
OK Hall Park town
OK Harrah town
OK Jenks city
OK Jones town
OK Lake Aluma town
OK Lawton city
OK Le Flore County
OK Logan County
OK Midwest City city
OK Moffett town
OK Moore city
OK Mustang city
OK Nichols Hills city
OK Nicoma Park city
OK Norman city
OK Oklahoma County
OK Osage County
OK Pottawatomie County
OK Rogers County
OK Sand Springs city
OK Sequoyah County
OK Smith Village town
OK Spencer city
OK The Village city
OK Tulsa County
OK Valley Brook town
OK Wagoner County
OK Warr Acres city
OK Woodlawn Park town
OK Yukon city
OR Central Point city
OR Columbia County
OR Durham city
OR Jackson County
OR Keizer city
OR King City city
OR Lane County
OR Marion County
OR Maywood Park city
OR Medford city
OR Phoenix city
OR Polk County
OR Rainier city
OR Springfield city
OR Troutdale city
OR Tualatin city
OR Wood Village city
PA Abington township
PA Adamsburg borough
PA Alburtis borough
PA Aldan borough
PA Aleppo township
PA Aliquippa city
PA Allegheny County
PA Allegheny township
PA Allen township
PA Allenport borough
PA Alsace township
PA Altoona city
PA Ambler borough
PA Ambridge borough
PA Amwell township
PA Antis township
PA Antrim township
PA Archbald borough
PA Arnold city
PA Ashley borough
PA Aspinwall borough
PA Aston township
PA Avalon borough
PA Avoca borough
PA Baden borough
PA Baldwin borough
PA Baldwin township
PA Beaver borough
PA Beaver County
PA Beaver Falls city
PA Bell Acres borough
PA Belle Vernon borough
PA Bellevue borough
PA Ben Avon borough
PA Ben Avon Heights borough
PA Bensalem township
PA Berks County
PA Bern township
PA Bethel Park borough
PA Bethel township
PA Bethlehem city
PA Bethlehem township
PA Big Beaver borough
PA Birdsboro borough
PA Birmingham township
PA Blair County
PA Blair township
PA Blakely borough
PA Blawnox borough
PA Boyertown borough
PA Brackenridge borough
PA Braddock borough
PA Braddock Hills borough
PA Bradfordwoods borough
PA Brentwood borough
PA Bridgeport borough
PA Bridgeville borough
PA Bridgewater borough
PA Brighton township
PA Bristol borough
PA Bristol township
PA Brookhaven borough
PA Brownstown borough
PA Brownsville borough
PA Brownsville township
PA Bryn Athyn borough
PA Buckingham township
PA Bucks County
PA California borough
PA Caln township
PA Cambria County
PA Camp Hill borough
PA Canonsburg borough
PA Canton township
PA Carbondale city
PA Carbondale township
PA Carnegie borough
PA Carroll township
PA Castle Shannon borough
PA Catasauqua borough
PA Cecil township
PA Center township
PA Centre County
PA Chalfant borough
PA Chalfont borough
PA Charleroi borough
PA Charlestown township
PA Chartiers township
PA Cheltenham township
PA Chester city
PA Chester County
PA Chester Heights borough
PA Chester township
PA Cheswick borough
PA Chippewa township
PA Churchill borough
PA Clairton city
PA Clarks Green borough
PA Clarks Summit borough
PA Clifton Heights borough
PA Coal Center borough
PA Coatesville city
PA Colebrookdale township
PA College township
PA Collegeville borough
PA Collier township
PA Collingdale borough
PA Columbia borough
PA Colwyn borough
PA Concord township
PA Conemaugh township
PA Conestoga township

PA Conewago township
PA Conshohocken borough
PA Conway borough
PA Coplay borough
PA Coraopolis borough
PA Courtdale borough
PA Crafton borough
PA Crescent township
PA Cumberland County
PA Cumru township
PA Daisytown borough
PA Dale borough
PA Dallas borough
PA Dallas township
PA Dallastown borough
PA Darby borough
PA Darby township
PA Daugherty township
PA Dauphin County
PA Delaware County
PA Delmont borough
PA Derry township
PA Dickson City borough
PA Donora borough
PA Dormont borough
PA Douglass township
PA Dover borough
PA Dover township
PA Downingtown borough
PA Doylestown borough
PA Doylestown township
PA Dravosburg borough
PA Duboistown borough
PA Duncansville borough
PA Dunlevy borough
PA Dunmore borough
PA Dupont borough
PA Duquesne city
PA Duryea borough
PA East Allen township
PA East Bradford township
PA East Brandywine township
PA East Caln township
PA East Conemaugh borough
PA East Coventry township
PA East Deer township
PA East Fallowfield township
PA East Goshen township
PA East Hempfield township
PA East Lampeter township
PA East Lansdowne borough
PA East McKeesport borough
PA East Norriton township
PA East Pennsboro township
PA East Petersburg borough
PA East Pikeland township
PA East Pittsburgh borough
PA East Rochester borough
PA East Taylor township
PA East Vincent township
PA East Washington borough
PA East Whiteland township
PA Easton city
PA Easttown township
PA Eastvale borough
PA Economy borough
PA Eddystone borough
PA Edgewood borough
PA Edgeworth borough
PA Edgmont township
PA Edwardsville borough
PA Elco borough
PA Elizabeth borough
PA Elizabeth township
PA Ellport borough
PA Ellwood City borough
PA Emmaus borough
PA Emsworth borough
PA Erie city
PA Erie County
PA Etna borough
PA Exeter borough
PA Exeter township
PA Export borough
PA Fairfield township
PA Fairview township
PA Fallowfield township
PA Falls township
PA Fallston borough
PA Farrell city
PA Fayette City borough
PA Fayette County
PA Fell township
PA Ferguson township
PA Ferndale borough
PA Findlay township
PA Finleyville borough
PA Folcroft borough
PA Forest Hills borough
PA Forks township
PA Forty Fort borough
PA Forward township
PA Fountain Hill borough
PA Fox Chapel borough
PA Franconia township
PA Franklin borough
PA Franklin County
PA Franklin Park borough
PA Franklin township
PA Frankstown township
PA Frazer township
PA Freedom borough
PA Freemansburg borough
PA Geistown borough
PA Glassport borough
PA Glendon borough
PA Glenfield borough
PA Glenolden borough
PA Green Tree borough
PA Greensburg city
PA Hallam borough
PA Hampden township
PA Hampton township
PA Hanover township
PA Harborcreek township
PA Harmar township
PA Harmony township
PA Harris township
PA Harrisburg city
PA Harrison township
PA Harveys Lake borough
PA Hatboro borough
PA Hatfield borough
PA Hatfield township
PA Haverford township
PA Haysville borough
PA Heidelberg borough
PA Hellam township
PA Hellertown borough
PA Hempfield township
PA Hepburn township
PA Hermitage city
PA Highspire borough
PA Hilltown township
PA Hollidaysburg borough
PA Homestead borough
PA Homewood borough
PA Hopewell township
PA Horsham township
PA Houston borough
PA Hughestown borough
PA Hulmeville borough
PA Hummelstown borough
PA Hunker borough
PA Indiana township
PA Ingram borough
PA Irwin borough
PA Ivyland borough
PA Jackson township
PA Jacobus borough
PA Jeannette city
PA Jefferson borough
PA Jenkins township
PA Jenkintown borough
PA Jermyn borough
PA Jessup borough
PA Johnstown city
PA Juniata township
PA Kenhorst borough
PA Kennedy township
PA Kilbuck township
PA Kingston borough
PA Kingston township
PA Koppel borough
PA Lackawanna County
PA Laflin borough
PA Lancaster city
PA Lancaster County
PA Lancaster township
PA Langhorne borough
PA Langhorne Manor borough
PA Lansdale borough
PA Lansdowne borough
PA Larksville borough
PA Laurel Run borough
PA Laureldale borough
PA Lawrence County
PA Lawrence Park township
PA Lebanon County
PA Leesport borough
PA Leet township
PA Leetsdale borough
PA Lehigh County
PA Lehman township
PA Lemoyne borough
PA Liberty borough
PA Limerick township
PA Lincoln borough
PA Lititz borough
PA Logan township
PA Loganville borough
PA London Britain township
PA Londonderry township
PA Lorain borough
PA Lower Allen township
PA Lower Alsace township
PA Lower Burrell city
PA Lower Chichester township
PA Lower Frederick township
PA Lower Gwynedd township
PA Lower Heidelberg township
PA Lower Macungie township
PA Lower Makefield township
PA Lower Merion township
PA Lower Moreland township
PA Lower Nazareth township
PA Lower Paxton township
PA Lower Pottsgrove township
PA Lower Providence township
PA Lower Salford township
PA Lower Saucon township
PA Lower Southampton township
PA Lower Swatara township
PA Lower Yoder township
PA Loyalsock township
PA Luzerne borough
PA Luzerne County
PA Luzerne township

PA Lycoming County
PA Lycoming township
PA Macungie borough
PA Madison borough
PA Maidencreek township
PA Malvern borough
PA Manchester township
PA Manheim township
PA Manor borough
PA Manor township
PA Marcus Hook borough
PA Marple township
PA Marshall township
PA Marysville borough
PA Mayfield borough
PA McCandless township
PA McKean township
PA McKees Rocks borough
PA McKeesport city
PA Mechanicsburg borough
PA Media borough
PA Mercer County
PA Middle Taylor township
PA Middletown borough
PA Middletown township
PA Millbourne borough
PA Millcreek township
PA Millersville borough
PA Millvale borough
PA Modena borough
PA Mohnton borough
PA Monaca borough
PA Monessen city
PA Monongahela city
PA Monroe township
PA Montgomery County
PA Montgomery township
PA Montoursville borough
PA Moon township
PA Moosic borough
PA Morrisville borough
PA Morton borough
PA Mount Lebanon township
PA Mount Oliver borough
PA Mount Penn borough
PA Mountville borough
PA Muhlenberg township
PA Munhall borough
PA Municipality of Monroeville borough
PA Municipality of Murrysville borough
PA Nanticoke city
PA Narberth borough
PA Nether Providence township
PA Neville township
PA New Brighton borough
PA New Britain borough
PA New Britain township
PA New Cumberland borough
PA New Eagle borough
PA New Galilee borough
PA New Garden township
PA New Hanover township
PA New Kensington city
PA New Sewickley township
PA New Stanton borough
PA Newell borough
PA Newport township
PA Newton township
PA Newtown borough
PA Newtown township
PA Norristown borough
PA North Belle Vernon borough
PA North Braddock borough
PA North Catasauqua borough
PA North Charleroi borough
PA North Coventry township
PA North Franklin township
PA North Huntingdon township
PA North Irwin borough
PA North Londonderry township
PA North Sewickley township
PA North Strabane township
PA North Versailles township
PA North Wales borough
PA North Whitehall township
PA North York borough
PA Northampton borough
PA Northampton County
PA Northampton township
PA Norwood borough
PA Oakmont borough
PA O'Hara township
PA Ohio township
PA Old Forge borough
PA Old Lycoming township
PA Olyphant borough
PA Ontelaunee township
PA Osborne borough
PA Paint borough
PA Paint township
PA Palmer township
PA Palmyra borough
PA Parkside borough
PA Patterson Heights borough
PA Patterson township
PA Patton township
PA Paxtang borough
PA Penbrook borough
PA Penn borough
PA Penn Hills township
PA Penn township
PA Penndel borough
PA Pennsbury Village borough
PA Pequea township
PA Perkiomen township
PA Perry County
PA Perry township
PA Peters township
PA Phoenixville borough
PA Pine township
PA Pitcairn borough
PA Pittsburgh city
PA Pittston city
PA Pittston township
PA Plains township
PA Pleasant Hills borough
PA Plum borough
PA Plymouth borough
PA Plymouth township
PA Port Vue borough
PA Potter township
PA Pottstown borough
PA Pringle borough
PA Prospect Park borough
PA Pulaski township
PA Radnor township
PA Rankin borough
PA Ransom township
PA Reading city
PA Red Lion borough
PA Reserve township
PA Richland township
PA Ridley Park borough
PA Ridley township
PA Robinson township
PA Rochester borough
PA Rochester township
PA Rockledge borough
PA Roscoe borough
PA Rose Valley borough
PA Ross township
PA Rosslyn Farms borough
PA Rostraver township
PA Royalton borough
PA Royersford borough
PA Rutledge borough
PA Salem township
PA Salisbury township
PA Scalp Level borough
PA Schuylkill township
PA Schwenksville borough
PA Scott township
PA Scranton city
PA Sewickley borough
PA Sewickley Heights borough
PA Sewickley Hills borough
PA Sewickley township
PA Shaler township
PA Sharon city
PA Sharon Hill borough
PA Sharpsburg borough
PA Sharpsville borough
PA Shenango township
PA Shillington borough
PA Shiremanstown borough
PA Silver Spring township
PA Sinking Spring borough
PA Skippack township
PA Somerset County
PA Souderton borough
PA South Abington township
PA South Coatesville borough
PA South Fayette township
PA South Greensburg borough
PA South Hanover township
PA South Heidelberg township
PA South Heights borough
PA South Huntingdon township
PA South Park township
PA South Pymatuning township
PA South Strabane township
PA South Whitehall township
PA South Williamsport borough
PA Southmont borough
PA Southwest Greensburg borough
PA Speers borough
PA Spring City borough
PA Spring Garden township
PA Spring township
PA Springdale borough
PA Springdale township
PA Springettsbury township
PA Springfield township
PA St. Lawrence borough
PA State College borough
PA Steelton borough
PA Stockdale borough
PA Stonycreek township
PA Stowe township
PA Sugar Notch borough
PA Summit township
PA Susquehanna township
PA Sutersville borough
PA Swarthmore borough
PA Swatara township
PA Swissvale borough
PA Swoyersville borough
PA Tarentum borough
PA Taylor borough
PA Telford borough
PA Temple borough
PA Thornburg borough
PA Thornbury township
PA Throop borough
PA Tinicum township
PA Towamencin township
PA Trafford borough
PA Trainer borough

PA Trappe borough
PA Tredyffrin township
PA Tullytown borough
PA Turtle Creek borough
PA Union township
PA Upland borough
PA Upper Allen township
PA Upper Chichester township
PA Upper Darby township
PA Upper Dublin township
PA Upper Gwynedd township
PA Upper Leacock township
PA Upper Macungie township
PA Upper Makefield township
PA Upper Merion township
PA Upper Milford township
PA Upper Moreland township
PA Upper Pottsgrove township
PA Upper Providence township
PA Upper Saucon township
PA Upper Southampton township
PA Upper St. Clair township
PA Upper Yoder township
PA Uwchlan township
PA Valley township
PA Vanport township
PA Verona borough
PA Versailles borough
PA Wall borough
PA Warminster township
PA Warrington township
PA Warrior Run borough
PA Warwick township
PA Washington city
PA Washington County
PA Washington township
PA Wayne township
PA Wernersville borough
PA Wesleyville borough
PA West Bradford township
PA West Brownsville borough
PA West Chester borough
PA West Conshohocken borough
PA West Deer township
PA West Earl township
PA West Easton borough
PA West Elizabeth borough
PA West Fairview borough
PA West Goshen township
PA West Hanover township
PA West Hempfield township
PA West Homestead borough
PA West Lampeter township
PA West Lawn borough
PA West Manchester township
PA West Mayfield borough
PA West Middlesex borough
PA West Mifflin borough
PA West Newton borough
PA West Norriton township
PA West Pikeland township
PA West Pittston borough
PA West Pottsgrove township
PA West Reading borough
PA West Taylor township
PA West View borough
PA West Whiteland township
PA West Wyoming borough
PA West York borough
PA Westmont borough
PA Westmoreland County
PA Westtown township
PA Wheatland borough
PA Whitaker borough
PA White Oak borough
PA White township
PA Whitehall township
PA Whitemarsh township
PA Whitpain township
PA Wilkes-Barre city
PA Wilkes-Barre township
PA Wilkins township
PA Wilkinsburg borough
PA Williams township
PA Williamsport city
PA Willistown township
PA Wilmerding borough
PA Wilson borough
PA Windber borough
PA Windsor borough
PA Windsor township
PA Worcester township
PA Wormleysburg borough
PA Wrightsville borough
PA Wyoming borough
PA Wyomissing borough
PA Wyomissing Hills borough
PA Yardley borough
PA Yatesville borough
PA Yeadon borough
PA Yoe borough
PA York city
PA York County
PA York township
PA Youngwood borough
PR Aibonita
PR Anasco
PR Aquada
PR Aquadilla
PR Aquas Buenas
PR Arecibo
PR Bayamon
PR Cabo Rojo
PR Caguas
PR Camuy
PR Canovanas
PR Catano
PR Cayey
PR Cidra
PR Dorado
PR Guaynabo
PR Gurabo
PR Hatillo
PR Hormigueros
PR Humacao
PR Juncos
PR Las Piedras
PR Loiza
PR Manati
PR Mayaguez
PR Moca
PR Naguabo
PR Naranjito
PR Penuelas
PR Ponce
PR Rio Grande
PR San German
PR San Lorenzo
PR Toa Alta
PR Toa Baja
PR Trujillo Alto
PR Vega Alta
PR Vega Baja
PR Yabucao
RI Barrington town
RI Bristol town
RI Burrillville town
RI Central Falls city
RI Coventry town
RI Cranston city
RI Cumberland town
RI East Greenwich town
RI East Providence city
RI Glocester town
RI Jamestown town
RI Johnston town
RI Lincoln town
RI Middletown town
RI Newport city
RI Newport County
RI North Kingstown town
RI North Providence town
RI North Smithfield town
RI Pawtucket city
RI Portsmouth town
RI Providence city
RI Providence County
RI Scituate town
RI Smithfield town
RI Tiverton town
RI Warren town
RI Warwick city
RI Washington County
RI West Greenwich town
RI West Warwick town
RI Woonsocket city
SC Aiken city
SC Aiken County
SC Anderson city
SC Anderson County
SC Arcadia Lakes town
SC Berkeley County
SC Burnettown town
SC Cayce city
SC Charleston city
SC Charleston County
SC City View town
SC Columbia city
SC Cowpens town
SC Darlington County
SC Dorchester County
SC Edgefield County
SC Florence city
SC Florence County
SC Folly Beach city
SC Forest Acres city
SC Fort Mill town
SC Georgetown County
SC Goose Creek city
SC Hanahan city
SC Horry County
SC Irmo town
SC Isle of Palms city
SC Lexington County
SC Lincolnville town
SC Mount Pleasant town
SC Myrtle Beach city
SC North Augusta city
SC North Charleston city
SC Pickens County
SC Pineridge town
SC Quinby town
SC Rock Hill city
SC South Congaree town
SC Spartanburg city
SC Spartanburg County
SC Springdale town
SC Sullivan's Island town
SC Summerville town
SC Sumter city
SC Sumter County
SC Surfside Beach town
SC West Columbia city
SC York County
SD Big Sioux township
SD Central Pennington unorg.
SD Lincoln County
SD Mapleton township

SD Minnehaha County
SD North Sioux City city
SD Pennington County
SD Rapid City city
SD Split Rock township
SD Union County
SD Wayne township
TN Alcoa city
TN Anderson County
TN Bartlett town
TN Belle Meade city
TN Berry Hill city
TN Blount County
TN Brentwood city
TN Bristol city
TN Carter County
TN Church Hill town
TN Clarksville city
TN Collegedale city
TN Davidson County
TN East Ridge city
TN Elizabethton city
TN Farragut town
TN Forest Hills city
TN Germantown city
TN Goodlettsville city
TN Hamilton County
TN Hawkins County
TN Hendersonville city
TN Jackson city
TN Johnson City city
TN Jonesborough town
TN Kingsport city
TN Knox County
TN Lakesite city
TN Lakewood city
TN Lookout Mountain town
TN Loudon County
TN Madison County
TN Maryville city
TN Montgomery County
TN Mount Carmel town
TN Mount Juliet city
TN Oak Hill city
TN Red Bank city
TN Ridgeside city
TN Rockford city
TN Shelby County
TN Signal Mountain town
TN Soddy-Daisy city
TN Sullivan County
TN Sumner County
TN Washington County
TN Williamson County
TN Wilson County
TX Addison city
TX Alamo city
TX Alamo Heights city
TX Allen city
TX Archer County
TX Azle city
TX Balch Springs city
TX Balcones Heights city
TX Bayou Vista village
TX Baytown city
TX Bedford city
TX Bell County
TX Bellaire city
TX Bellmead city
TX Belton city
TX Benbrook city
TX Beverly Hills city
TX Bexar County
TX Blue Mound city
TX Bowie County
TX Brazoria County
TX Brazos County
TX Brookside Village city
TX Brownsville city
TX Bryan city
TX Buckingham town
TX Bunker Hill Village city
TX Cameron County
TX Carrollton city
TX Castle Hills city
TX Cedar Hill city
TX Cedar Park city
TX Chambers County
TX Cibolo city
TX Clear Lake Shores city
TX Clint town
TX Cockrell Hill city
TX College Station city
TX Colleyville city
TX Collin County
TX Comal County
TX Combes town
TX Converse city
TX Copperas Cove city
TX Corinth town
TX Coryell County
TX Crowley city
TX Dallas County
TX Dalworthington Gardens city
TX Deer Park city
TX Denison city
TX Denton city
TX Denton County
TX DeSoto city
TX Dickinson city
TX Donna city
TX Double Oak town
TX Duncanville city
TX Ector County
TX Edgecliff village
TX Edinburg city
TX El Lago city
TX El Paso County
TX Ellis County
TX Euless city
TX Everman city
TX Farmers Branch city
TX Flower Mound town
TX Forest Hill city
TX Fort Bend County
TX Friendswood city
TX Galena Park city
TX Galveston city
TX Galveston County
TX Grand Prairie city
TX Grapevine city
TX Grayson County
TX Gregg County
TX Groves city
TX Guadalupe County
TX Haltom City city
TX Hardin County
TX Harker Heights city
TX Harlingen city
TX Harrison County
TX Hedwig Village city
TX Hewitt city
TX Hickory Creek town
TX Hidalgo County
TX Highland Park town
TX Highland Village city
TX Hill Country Village city
TX Hilshire Village city
TX Hitchcock city
TX Hollywood Park town
TX Howe town
TX Humble city
TX Hunters Creek Village city
TX Hurst city
TX Hutchins city
TX Impact town
TX Jacinto City city
TX Jefferson County
TX Jersey Village city
TX Johnson County
TX Jones County
TX Katy city
TX Kaufman County
TX Keller city
TX Kemah city
TX Kennedale city
TX Killeen city
TX Kirby city
TX Kleberg County
TX La Marque city
TX La Porte city
TX Lacy-Lakeview city
TX Lake Dallas city
TX Lake Worth city
TX Lakeside City town
TX Lakeside town
TX Lampasas County
TX Lancaster city
TX League City city
TX Leander city
TX Leon Valley city
TX Lewisville city
TX Live Oak city
TX Longview city
TX Lubbock County
TX Lumberton city
TX Martin County
TX McAllen city
TX McLennan County
TX Meadows city
TX Midland city
TX Midland County
TX Mission city
TX Missouri City city
TX Montgomery County
TX Morgan's Point city
TX Nash city
TX Nassau Bay city
TX Nederland city
TX Nolanville city
TX North Richland Hills city
TX Northcrest town
TX Nueces County
TX Odessa city
TX Olmos Park city
TX Palm Valley town
TX Palmview city
TX Pantego town
TX Parker County
TX Pearland city
TX Pflugerville city
TX Pharr city
TX Piney Point Village city
TX Port Arthur city
TX Port Neches city
TX Portland city
TX Potter County
TX Primera town
TX Randall County
TX Richardson city
TX Richland Hills city
TX River Oaks city
TX Robinson city
TX Rockwall city
TX Rockwall County
TX Rollingwood city
TX Rose Hill Acres city
TX Rowlett city

TX Sachse city
TX Saginaw city
TX San Angelo city
TX San Benito city
TX San Juan city
TX San Patricio County
TX Sansom Park city
TX Santa Fe city
TX Schertz city
TX Seabrook city
TX Seagoville city
TX Selma city
TX Shavano Park city
TX Sherman city
TX Shoreacres city
TX Smith County
TX Socorro town
TX South Houston city
TX Southside Place city
TX Spring Valley city
TX Stafford town
TX Sugar Land city
TX Sunset Valley city
TX Tarrant County
TX Taylor County
TX Taylor Lake Village city
TX Temple city
TX Terrell Hills city
TX Texarkana city
TX Texas City city
TX Tom Green County
TX Travis County
TX Tye town
TX Tyler city
TX Universal City city
TX University Park city
TX Victoria city
TX Victoria County
TX Wake Village city
TX Waller County
TX Watauga city
TX Webb County
TX Webster city
TX Weslaco city
TX West Lake Hills city
TX West University Place city
TX Westover Hills town
TX Westworth village
TX White Oak city
TX White Settlement city
TX Wichita County
TX Wichita Falls city
TX Williamson County
TX Wilmer city
TX Windcrest city
TX Woodway city
UT American Fork city
UT Bluffdale city
UT Bountiful city
UT Cache County
UT Cedar Hills town
UT Centerville city
UT Clearfield city
UT Clinton city
UT Davis County
UT Draper city
UT Farmington city
UT Farr West city
UT Fruit Heights city
UT Harrisville city
UT Highland city
UT Hyde Park city
UT Kaysville city
UT Layton city
UT Lehi city
UT Lindon city
UT Logan city
UT Mapleton city
UT Midvale city
UT Millville city
UT Murray city
UT North Logan city
UT North Ogden city
UT North Salt Lake city
UT Ogden city
UT Orem city
UT Pleasant Grove city
UT Pleasant View city
UT Providence city
UT Provo city
UT River Heights city
UT Riverdale city
UT Riverton city
UT Roy city
UT Sandy city
UT Smithfield city
UT South Jordan city
UT South Ogden city
UT South Salt Lake city
UT South Weber city
UT Springville city
UT Sunset city
UT Syracuse city
UT Uintah town
UT Utah County
UT Washington Terrace city
UT Weber County
UT West Bountiful city
UT West Jordan city
UT West Point city
UT West Valley City city
UT Woods Cross city
VA Albemarle County
VA Alexandria city
VA Amherst County
VA Bedford County
VA Botetourt County
VA Bristol city
VA Campbell County
VA Charlottesville city
VA Colonial Heights city
VA Danville city
VA Dinwiddie County
VA Fairfax city
VA Falls Church city
VA Fredericksburg city
VA Gate City town
VA Gloucester County
VA Hanover County
VA Herndon town
VA Hopewell city
VA James City County
VA Loudoun County
VA Lynchburg city
VA Manassas city
VA Manassas Park city
VA Occoquan town
VA Petersburg city
VA Pittsylvania County
VA Poquoson city
VA Prince George County
VA Richmond city
VA Roanoke city
VA Roanoke County
VA Salem city
VA Scott County
VA Spotsylvania County
VA Stafford County
VA Suffolk city
VA Vienna town
VA Vinton town
VA Washington County
VA Weber City town
VA Williamsburg city
VA York County
VT Burlington city
VT Chittenden County
VT Colchester town
VT Essex Junction village
VT Essex town
VT Shelburne town
VT South Burlington city
VT Williston town
VT Winooski city
WA Algona city
WA Auburn city
WA Beaux Arts Village town
WA Bellevue city
WA Bellingham city
WA Benton County
WA Bonney Lake city
WA Bothell city
WA Bremerton city
WA Brier city
WA Clyde Hill town
WA Cowlitz County
WA Des Moines city
WA DuPont city
WA Edmonds city
WA Everett city
WA Fife city
WA Fircrest town
WA Franklin County
WA Gig Harbor city
WA Hunts Point town
WA Issaquah city
WA Kelso city
WA Kennewick city
WA Kent city
WA Kirkland city
WA Kitsap County
WA Lacey city
WA Lake Forest Park city
WA Longview city
WA Lynnwood city
WA Marysville city
WA Medina city
WA Mercer Island city
WA Mill Creek city
WA Millwood town
WA Milton city
WA Mountlake Terrace city
WA Mukilteo city
WA Normandy Park city
WA Olympia city
WA Pacific city
WA Pasco city
WA Port Orchard city
WA Puyallup city
WA Redmond city
WA Renton city
WA Richland city
WA Ruston town
WA Selah city
WA Steilacoom town
WA Sumner city
WA Thurston County
WA Tukwila city
WA Tumwater city
WA Union Gap city
WA Vancouver city
WA West Richland city
WA Whatcom County
WA Woodway city
WA Yakima city
WA Yakima County
WA Yarrow Point town
WI Algoma town

WI Allouez village
WI Altoona city
WI Appleton city
WI Ashwaubenon village
WI Bayside village
WI Bellevue town
WI Beloit city
WI Beloit town
WI Big Bend village
WI Black Wolf town
WI Blooming Grove town
WI Brookfield city
WI Brookfield town
WI Brown County
WI Brown Deer village
WI Brunswick town
WI Buchanan town
WI Burke town
WI Butler village
WI Caledonia town
WI Calumet County
WI Campbell town
WI Cedarburg city
WI Cedarburg town
WI Chippewa County
WI Chippewa Falls city
WI Clayton town
WI Combined Locks village
WI Cudahy city
WI Dane County
WI De Pere city
WI De Pere town
WI Delafield town
WI Douglas County
WI Dunn town
WI Eagle Point town
WI Eau Claire city
WI Eau Claire County
WI Elm Grove village
WI Elmwood Park village
WI Fitchburg city
WI Fox Point village
WI Franklin city
WI Germantown town
WI Germantown village
WI Glendale city
WI Grafton town
WI Grafton village
WI Grand Chute town
WI Green Bay city
WI Greendale village
WI Greenfield city
WI Greenville town
WI Hales Corners village
WI Hallie town
WI Harmony town
WI Harrison town
WI Hobart town
WI Holmen village
WI Howard village
WI Janesville city
WI Janesville town
WI Kaukauna city
WI Kenosha city
WI Kenosha County
WI Kimberly village
WI Kohler village
WI La Crosse city
WI La Crosse County
WI La Prairie town
WI Lafayette town
WI Lannon village
WI Lima town
WI Lisbon town
WI Little Chute village
WI Madison town
WI Maple Bluff village
WI Marathon County
WI McFarland village
WI Medary town
WI Menasha city
WI Menasha town
WI Menomonee Falls village
WI Mequon city
WI Middleton city
WI Middleton town
WI Monona city
WI Mount Pleasant town
WI Muskego city
WI Neenah city
WI Neenah town
WI Nekimi town
WI New Berlin city
WI North Bay village
WI Norway town
WI Oak Creek city
WI Onalaska city
WI Onalaska town
WI Oshkosh city
WI Oshkosh town
WI Outagamie County
WI Ozaukee County
WI Pewaukee town
WI Pewaukee village
WI Pleasant Prairie town
WI Pleasant Prairie village
WI Racine city
WI Racine County
WI Rib Mountain town
WI River Hills village
WI Rock County
WI Rock town
WI Rothschild village
WI Salem town
WI Schofield city
WI Scott town
WI Sheboygan city
WI Sheboygan County
WI Sheboygan Falls city
WI Sheboygan Falls town
WI Sheboygan town
WI Shelby town
WI Shorewood Hills village
WI Shorewood village
WI Somers town
WI South Milwaukee city
WI St. Francis city
WI Stettin town
WI Sturtevant village
WI Superior city
WI Superior village
WI Sussex village
WI Thiensville village
WI Turtle town
WI Union town
WI Vandenbroek town
WI Vernon town
WI Washington County
WI Washington town
WI Waukesha city
WI Waukesha County
WI Waukesha town
WI Wausau city
WI Wauwatosa city
WI West Allis city
WI West Milwaukee village
WI Weston town
WI Westport town
WI Wheaton town
WI Whitefish Bay village
WI Wilson town
WI Wind Point village
WI Winnebago County
WV Bancroft town
WV Barboursville village
WV Belle town
WV Benwood city
WV Berkeley County
WV Bethlehem village
WV Brooke County
WV Cabell County
WV Cedar Grove town
WV Ceredo city
WV Charleston city
WV Chesapeake town
WV Clearview village
WV Dunbar city
WV East Bank town
WV Follansbee city
WV Glasgow town
WV Glen Dale city
WV Hancock County
WV Huntington city
WV Hurricane city
WV Kanawha County
WV Kenova city
WV Marmet city
WV Marshall County
WV McMechen city
WV Mineral County
WV Moundsville city
WV Nitro city
WV North Hills town
WV Ohio County
WV Parkersburg city
WV Poca town
WV Putnam County
WV Ridgeley town
WV South Charleston city
WV St. Albans city
WV Triadelphia town
WV Vienna city
WV Wayne County
WV Weirton city
WV Wheeling city
WV Wood County
WY Casper city
WY Cheyenne city
WY Evansville town
WY Laramie County
WY Mills town
WY Natrona County

Appendix 7 of Preamble—Governmental Entities (Located Outside of an Urbanized Area) That Must Be Examined By the NPDES Permitting Authority for Potential Designation Under § 123.35(b)(2)

(All listed entities have a population of at least 10,000 and a population density of at least 1,000. A listed entity would only be potentially designated if it operates a small MS4. See § 122.26(b)(16) for the definition of a small MS4.)

(This list does not include all operators of small MS4s that may be designated by the NPDES permitting authority. Operators of small MS4s in areas with populations below 10,000 and densities below 1,000 may also be designated but examination of them is not required. Also, entities such as military bases, large hospitals, prison complexes, universities, sewer districts, and highway departments that operate a small MS4 in an area listed here, or in an area otherwise designated by the NPDES permitting authority, may be designated and become subject to permitting regulations.) (Source: 1990 Census of Population and Housing, U.S. Bureau of the Census. This list is subject to change with the Decennial Census)

AL Daphne city
AL Jacksonville city
AL Selma city
AR Arkadelphia city
AR Benton city
AR Blytheville city
AR Conway city
AR El Dorado city
AR Hot Springs city
AR Magnolia city
AR Rogers city
AR Searcy city
AR Stuttgart city
AZ Douglas city
CA Arcata city
CA Arroyo Grande city
CA Atwater city
CA Auburn city
CA Banning city
CA Brawley city
CA Calexico city
CA Clearlake city
CA Corcoran city
CA Delano city
CA Desert Hot Springs city
CA Dinuba city
CA Dixon city
CA El Centro city
CA El Paso de Robles (Paso Robles) city
CA Eureka city
CA Fillmore city
CA Gilroy city
CA Grover City city
CA Hanford city
CA Hollister city
CA Lemoore city
CA Los Banos city
CA Madera city
CA Manteca city
CA Oakdale city
CA Oroville city
CA Paradise town
CA Petaluma city
CA Porterville city
CA Red Bluff city
CA Reedley city
CA Ridgecrest city
CA Sanger city
CA Santa Paula city
CA Selma city
CA South Lake Tahoe city
CA Temecula city
CA Tracy city
CA Tulare city
CA Turlock city
CA Ukiah city
CA Wasco city
CA Woodland city
CO Canon City city
CO Durango city
CO Lafayette city
CO Louisville city
CO Loveland city
CO Sterling city
FL Bartow city
FL Belle Glade city
FL De Land city
FL Eustis city
FL Haines City city
FL Key West city
FL Leesburg city
FL Palatka city
FL Plant City city
FL St. Augustine city
FL St. Cloud city
GA Americus city
GA Carrollton city
GA Cordele city
GA Dalton city
GA Dublin city
GA Griffin city
GA Hinesville city
GA Moultrie city
GA Newnan city
GA Statesboro city
GA Thomasville city
GA Tifton city
GA Valdosta city
GA Waycross city
IA Ames city
IA Ankeny city
IA Boone city
IA Burlington city
IA Fort Dodge city
IA Fort Madison city
IA Indianola city
IA Keokuk city
IA Marshalltown city
IA Mason City city
IA Muscatine city
IA Newton city
IA Oskaloosa city
IA Ottumwa city
IA Spencer city
ID Caldwell city
ID Coeur d'Alene city
ID Lewiston city
ID Moscow city
ID Nampa city
ID Rexburg city
ID Twin Falls city
IL Belvidere city
IL Canton city
IL Carbondale city
IL Centralia city
IL Charleston city
IL Danville city
IL De Kalb city
IL Dixon city
IL Effingham city
IL Freeport city
IL Galesburg city
IL Jacksonville city
IL Macomb city
IL Mattoon city
IL Mount Vernon city
IL Ottawa city
IL Pontiac city
IL Quincy city
IL Rantoul village
IL Sterling city
IL Streator city
IL Taylorville city
IL Woodstock city
IN Bedford city
IN Columbus city
IN Crawfordsville city
IN Frankfort city
IN Franklin city
IN Greenfield city
IN Huntington city
IN Jasper city
IN La Porte city
IN Lebanon city
IN Logansport city
IN Madison city
IN Marion city
IN Martinsville city
IN Michigan City city
IN New Castle city
IN Noblesville city
IN Peru city
IN Plainfield town
IN Richmond city
IN Seymour city
IN Shelbyville city
IN Valparaiso city
IN Vincennes city
IN Wabash city
IN Warsaw city
IN Washington city
KS Arkansas City city
KS Atchison city
KS Coffeyville city
KS Derby city
KS Dodge City city
KS El Dorado city
KS Emporia city
KS Garden City city
KS Great Bend city
KS Hays city
KS Hutchinson city
KS Junction City city
KS Leavenworth city
KS Liberal city
KS Manhattan city
KS McPherson city
KS Newton city
KS Ottawa city
KS Parsons city
KS Pittsburg city
KS Salina city
KS Winfield city
KY Bowling Green city
KY Danville city
KY Frankfort city
KY Georgetown city
KY Glasgow city
KY Hopkinsville city
KY Madisonville city
KY Middlesborough city
KY Murray city
KY Nicholasville city
KY Paducah city
KY Radcliff city
KY Richmond city
KY Somerset city
KY Winchester city

LA Abbeville city
LA Bastrop city
LA Bogalusa city
LA Crowley city
LA Eunice city
LA Hammond city
LA Jennings city
LA Minden city
LA Morgan City city
LA Natchitoches city
LA New Iberia city
LA Opelousas city
LA Ruston city
LA Thibodaux city
MA Amherst town
MA Clinton town
MA Milford town
MA Newburyport city
MD Aberdeen town
MD Cambridge city
MD Salisbury city
MD Westminster city
ME Waterville city
MI Adrian city
MI Albion city
MI Alpena city
MI Big Rapids city
MI Cadillac city
MI Escanaba city
MI Grand Haven city
MI Marquette city
MI Midland city
MI Monroe city
MI Mount Pleasant city
MI Owosso city
MI Sturgis city
MI Traverse City city
MN Albert Lea city
MN Austin city
MN Bemidji city
MN Brainerd city
MN Faribault city
MN Fergus Falls city
MN Hastings city
MN Hutchinson city
MN Mankato city
MN Marshall city
MN New Ulm city
MN North Mankato city
MN Northfield city
MN Owatonna city
MN Stillwater city
MN Willmar city
MN Winona city
MO Cape Girardeau city
MO Farmington city
MO Hannibal city
MO Jefferson City city
MO Kennett city
MO Kirksville city
MO Marshall city
MO Maryville city
MO Poplar Bluff city
MO Rolla city
MO Sedalia city
MO Sikeston city
MO Warrensburg city
MO Washington city
MS Brookhaven city
MS Canton city
MS Clarksdale city
MS Cleveland city
MS Columbus city
MS Greenville city
MS Greenwood city
MS Grenada city
MS Indianola city
MS Laurel city
MS McComb city
MS Meridian city
MS Natchez city
MS Starkville city
MS Vicksburg city
MS Yazoo City city
MT Bozeman city
MT Havre city
MT Helena city
MT Kalispell city
NC Albemarle city
NC Asheboro city
NC Boone town
NC Eden city
NC Elizabeth City city
NC Havelock city
NC Henderson city
NC Kernersville town
NC Kinston city
NC Laurinburg city
NC Lenoir city
NC Lexington city
NC Lumberton city
NC Monroe city
NC New Bern city
NC Reidsville city
NC Roanoke Rapids city
NC Salisbury city
NC Sanford city
NC Shelby city
NC Statesville city
NC Tarboro town
NC Wilson city
ND Dickinson city
ND Jamestown city
ND Minot city
ND Williston city
NE Beatrice city
NE Columbus city
NE Fremont city
NE Grand Island city
NE Hastings city
NE Kearney city
NE Norfolk city
NE North Platte city
NE Scottsbluff city
NJ East Windsor township
NJ Plainsboro township
NJ Bridgeton city
NJ Princeton borough
NM Alamogordo city
NM Artesia city
NM Clovis city
NM Deming city
NM Farmington city
NM Gallup city
NM Hobbs city
NM Las Vegas city
NM Portales city
NM Roswell city
NM Silver City town
NV Elko city
NY Amsterdam city
NY Auburn city
NY Batavia city
NY Canandaigua city
NY Corning city
NY Cortland city
NY Dunkirk city
NY Fredonia village
NY Fulton city
NY Geneva city
NY Gloversville city
NY Jamestown city
NY Kingston city
NY Lockport city
NY Massena village
NY Middletown city
NY Ogdensburg city
NY Olean city
NY Oneonta city
NY Oswego city
NY Plattsburgh city
NY Potsdam village
NY Watertown city
OH Alliance city
OH Ashland city
OH Ashtabula city
OH Athens city
OH Bellefontaine city
OH Bowling Green city
OH Bucyrus city
OH Cambridge city
OH Chillicothe city
OH Circleville city
OH Coshocton city
OH Defiance city
OH Delaware city
OH Dover city
OH East Liverpool city
OH Findlay city
OH Fostoria city
OH Fremont city
OH Galion city
OH Greenville city
OH Lancaster city
OH Lebanon city
OH Marietta city
OH Marion city
OH Medina city
OH Mount Vernon city
OH New Philadelphia city
OH Norwalk city
OH Oxford city
OH Piqua city
OH Portsmouth city
OH Salem city
OH Sandusky city
OH Sidney city
OH Tiffin city
OH Troy city
OH Urbana city
OH Washington city
OH Wilmington city
OH Wooster city
OH Xenia city
OH Zanesville city
OK Ada city
OK Altus city
OK Bartlesville city
OK Chickasha city
OK Claremore city
OK McAlester city
OK Miami city
OK Muskogee city
OK Okmulgee city
OK Owasso city
OK Ponca City city
OK Stillwater city
OK Tahlequah city
OK Weatherford city
OR Albany city
OR Ashland city
OR Astoria city
OR Bend city
OR City of the Dalles city
OR Coos Bay city
OR Corvallis city
OR Grants Pass city
OR Hermiston city

OR Klamath Falls city
OR La Grande city
OR Lebanon city
OR McMinnville city
OR Newberg city
OR Pendleton city
OR Roseburg city
OR Woodburn city
PA Berwick borough
PA Bloomsburg town
PA Butler city
PA Carlisle borough
PA Chambersburg borough
PA Ephrata borough
PA Hanover borough
PA Hazleton city
PA Indiana borough
PA Lebanon city
PA Meadville city
PA New Castle city
PA Oil City city
PA Pottsville city
PA Sunbury city
PA Uniontown city
PA Warren city
RI Narragansett town
SC Clemson city
SC Easley city
SC Gaffney city
SC Greenwood city
SC Newberry town
SC Orangeburg city
SD Aberdeen city
SD Brookings city
SD Huron city
SD Mitchell city
SD Vermillion city
SD Watertown city
SD Yankton city
TN Brownsville city
TN Cleveland city
TN Collierville town
TN Cookeville city
TN Dyersburg city
TN Greeneville town
TN Lawrenceburg city
TN McMinnville city
TN Millington city
TN Morristown city
TN Murfreesboro city
TN Shelbyville city
TN Springfield city
TN Union City city
TX Alice city
TX Alvin city
TX Andrews city
TX Angleton city
TX Bay City city
TX Beeville city
TX Big Spring city
TX Borger city
TX Brenham city
TX Brownwood city
TX Burkburnett city
TX Canyon city
TX Cleburne city
TX Conroe city
TX Coppell city
TX Corsicana city
TX Del Rio city
TX Dumas city
TX Eagle Pass city
TX El Campo city
TX Gainesville city
TX Gatesville city
TX Georgetown city
TX Henderson city
TX Hereford city
TX Huntsville city
TX Jacksonville city
TX Kerrville city
TX Kingsville city
TX Lake Jackson city
TX Lamesa city
TX Levelland city
TX Lufkin city
TX Mercedes city
TX Mineral Wells city
TX Mount Pleasant city
TX Nacogdoches city
TX New Braunfels city
TX Palestine city
TX Pampa city
TX Pecos city
TX Plainview city
TX Port Lavaca city
TX Robstown city
TX Rosenberg city
TX Round Rock city
TX San Marcos city
TX Seguin city
TX Snyder city
TX Stephenville city
TX Sweetwater city
TX Taylor city
TX The Colony city
TX Uvalde city
TX Vernon city
TX Vidor city
UT Brigham City city
UT Cedar City city
UT Spanish Fork city
UT Tooele city
VA Blacksburg town
VA Christiansburg town
VA Front Royal town
VA Harrisonburg city
VA Leesburg town
VA Martinsville city
VA Radford city
VA Staunton city
VA Waynesboro city
VA Winchester city
VT Rutland city
WA Aberdeen city
WA Anacortes city
WA Centralia city
WA Ellensburg city
WA Moses Lake city
WA Mount Vernon city
WA Oak Harbor city
WA Port Angeles city
WA Pullman city
WA Sunnyside city
WA Walla Walla city
WA Wenatchee city
WI Beaver Dam city
WI Fond du Lac city
WI Fort Atkinson city
WI Manitowoc city
WI Marinette city
WI Marshfield city
WI Menomonie city
WI Monroe city
WI Oconomowoc city
WI Stevens Point city
WI Sun Prairie city
WI Two Rivers city
WI Watertown city
WI West Bend city
WI Whitewater city
WI Wisconsin Rapids city
WV Beckley city
WV Bluefield city
WV Clarksburg city
WV Fairmont city
WV Martinsburg city
WV Morgantown city
WY Evanston city
WY Gillette city
WY Green River city
WY Laramie city
WY Rock Springs city
WY Sheridan city

For the reasons set forth in the preamble, chapter I of title 40 of the Code of Federal Regulations is amended as follows:

PART 9—OMB APPROVALS UNDER THE PAPERWORK REDUCTION ACT

1. The authority citation for part 9 continues to read as follows:

Authority: 7 U.S.C. 135 *et seq.*, 136–136y; 15 U.S.C. 2001, 2003, 2005, 2006, 2601–2671; 21 U.S.C. 331j, 346a, 348; 31 U.S.C. 9701; 33 U.S.C. 1251 *et seq.*, 1311, 1313d, 1314, 1318, 1321, 1326, 1330, 1342, 1344, 1345 (d) and (e), 1361; E.O. 11735, 38 FR 21243, 3 CFR, 1971–1975 Comp. p. 973; 42 U.S.C. 241, 242b, 243, 246, 300f, 300g, 300g–1, 300g–2, 300g–3, 300g–4, 300g–5, 300g–6, 300j–1, 300j–2, 300j–3, 300j–4, 300j–9, 1857 *et seq.*, 6901–6992k, 7401–7671q, 7542, 9601–9657, 11023, 11048.

2. In § 9.1 the table is amended by adding entries in numerical order under the indicated heading to read as follows:

§ 9.1 OMB approvals under the Paperwork Reduction Act.

* * * * *

40 CFR citation	OMB control No.
* * * * * * *	
EPA Administered Permit Programs: The National Pollutant Discharge Elimination System	
* * * * * * *	
122.26(g)	2040–0211
* * * * * * *	
State Permit Requirements	
* * * * * * *	
123.35(b)	2040–0211
* * * * * * *	

PART 122—EPA ADMINISTERED PERMIT PROGRAMS: THE NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM

1. The authority citation for part 122 continues to read as follows:

Authority: The Clean Water Act, 33 U.S.C. 1251 *et seq.*

2. Revise § 122.21(c)(1) to read as follows:

§ 122.21 Application for a permit (applicable to State programs, see § 123.25).

* * * * *

(c) *Time to apply.* (1) Any person proposing a new discharge, shall submit an application at least 180 days before the date on which the discharge is to commence, unless permission for a later date has been granted by the Director. Facilities proposing a new discharge of storm water associated with industrial activity shall submit an application 180 days before that facility commences industrial activity which may result in a discharge of storm water associated with that industrial activity. Facilities described under § 122.26(b)(14)(x) or (b)(15)(i) shall submit applications at least 90 days before the date on which construction is to commence. Different submittal dates may be required under the terms of applicable general permits. Persons proposing a new discharge are encouraged to submit their applications well in advance of the 90 or 180 day requirements to avoid delay. See also paragraph (k) of this section and § 122.26(c)(1)(i)(G) and (c)(1)(ii).

* * * * *

3. Amend § 122.26 as follows:

a. Revise paragraphs (a)(9), (b)(4)(i), (b)(7)(i), (b)(14) introductory text, (b)(14)(x), (b)(14)(xi);

b. Redesignate paragraph (b)(15) as paragraph (b)(20) and add new paragraphs (b)(15) through (b)(19);

c. Revise the heading for paragraph (c), the first sentence of paragraph (c)(1) introductory text, the first sentence of paragraph (c)(1)(ii) introductory text, paragraphs (e) heading and introductory text, (e)(1), (e)(5) introductory text, and (e)(5)(i);

d. Add paragraphs (e)(8) and (e)(9); and

e. Revise paragraphs (f)(4), (f)(5), and (g).

The additions and revisions read as follows:

§ 122.26 Storm water discharges (applicable to State NPDES programs, see § 123.25).

(a) * * *

(9)(i) On and after October 1, 1994, for discharges composed entirely of storm water, that are not required by paragraph (a)(1) of this section to obtain a permit, operators shall be required to obtain a NPDES permit only if:

(A) The discharge is from a small MS4 required to be regulated pursuant to § 122.32;

(B) The discharge is a storm water discharge associated with small construction activity pursuant to paragraph (b)(15) of this section;

(C) The Director, or in States with approved NPDES programs either the Director or the EPA Regional Administrator, determines that storm water controls are needed for the discharge based on wasteload allocations that are part of "total maximum daily loads" (TMDLs) that address the pollutant(s) of concern; or

(D) The Director, or in States with approved NPDES programs either the Director or the EPA Regional Administrator, determines that the discharge, or category of discharges within a geographic area, contributes to a violation of a water quality standard or is a significant contributor of pollutants to waters of the United States.

(ii) Operators of small MS4s designated pursuant to paragraphs (a)(9)(i)(A), (a)(9)(i)(C), and (a)(9)(i)(D) of this section shall seek coverage under an NPDES permit in accordance with §§ 122.33 through 122.35. Operators of non-municipal sources designated pursuant to paragraphs (a)(9)(i)(B), (a)(9)(i)(C), and (a)(9)(i)(D) of this section shall seek coverage under an NPDES permit in accordance with paragraph (c)(1) of this section.

(iii) Operators of storm water discharges designated pursuant to paragraphs (a)(9)(i)(C) and (a)(9)(i)(D) of this section shall apply to the Director for a permit within 180 days of receipt of notice, unless permission for a later date is granted by the Director (see § 124.52(c) of this chapter).

(b) * * *

(4) * * *

(i) Located in an incorporated place with a population of 250,000 or more as determined by the 1990 Decennial Census by the Bureau of the Census (Appendix F of this part); or

* * * * *

(7) * * *

(i) Located in an incorporated place with a population of 100,000 or more but less than 250,000, as determined by the 1990 Decennial Census by the Bureau of the Census (Appendix G of this part); or

* * * * *

(14) *Storm water discharge associated with industrial activity* means the discharge from any conveyance that is used for collecting and conveying storm

water and that is directly related to manufacturing, processing or raw materials storage areas at an industrial plant. The term does not include discharges from facilities or activities excluded from the NPDES program under this part 122. For the categories of industries identified in this section, the term includes, but is not limited to, storm water discharges from industrial plant yards; immediate access roads and rail lines used or traveled by carriers of raw materials, manufactured products, waste material, or by-products used or created by the facility; material handling sites; refuse sites; sites used for the application or disposal of process waste waters (as defined at part 401 of this chapter); sites used for the storage and maintenance of material handling equipment; sites used for residual treatment, storage, or disposal; shipping and receiving areas; manufacturing buildings; storage areas (including tank farms) for raw materials, and intermediate and final products; and areas where industrial activity has taken place in the past and significant materials remain and are exposed to storm water. For the purposes of this paragraph, material handling activities include storage, loading and unloading, transportation, or conveyance of any raw material, intermediate product, final product, by-product or waste product. The term excludes areas located on plant lands separate from the plant's industrial activities, such as office buildings and accompanying parking lots as long as the drainage from the excluded areas is not mixed with storm water drained from the above described areas. Industrial facilities (including industrial facilities that are federally, State, or municipally owned or operated that meet the description of the facilities listed in paragraphs (b)(14)(i) through (xi) of this section) include those facilities designated under the provisions of paragraph (a)(1)(v) of this section. The following categories of facilities are considered to be engaging in "industrial activity" for purposes of paragraph (b)(14):

* * * * *

(x) Construction activity including clearing, grading and excavation, except operations that result in the disturbance of less than five acres of total land area. Construction activity also includes the disturbance of less than five acres of total land area that is a part of a larger common plan of development or sale if the larger common plan will ultimately disturb five acres or more;

(xi) Facilities under Standard Industrial Classifications 20, 21, 22, 23, 2434, 25, 265, 267, 27, 283, 285, 30, 31 (except 311), 323, 34 (except 3441), 35, 36, 37 (except 373), 38, 39, and 4221–25;

(15) *Storm water discharge associated with small construction activity* means the discharge of storm water from:

(i) Construction activities including clearing, grading, and excavating that result in land disturbance of equal to or greater than one acre and less than five acres. Small construction activity also includes the disturbance of less than one acre of total land area that is part of a larger common plan of development or sale if the larger common plan will ultimately disturb equal to or greater than one and less than five acres. Small construction activity does not include routine maintenance that is performed to maintain the original line and grade, hydraulic capacity, or original purpose of the facility. The Director may waive the otherwise applicable requirements in a general permit for a storm water discharge from construction activities that disturb less than five acres where:

(A) The value of the rainfall erosivity factor ("R" in the Revised Universal Soil Loss Equation) is less than five during the period of construction activity. The rainfall erosivity factor is determined in accordance with Chapter 2 of *Agriculture Handbook Number 703, Predicting Soil Erosion by Water: A Guide to Conservation Planning With the Revised Universal Soil Loss Equation (RUSLE)*, pages 21–64, dated January 1997. The Director of the Federal Register approves this incorporation by reference in accordance with 5 U.S.C 552(a) and 1 CFR part 51. Copies may be obtained from EPA's Water Resource Center, Mail Code RC4100, 401 M St. S.W., Washington, DC 20460. A copy is also available for inspection at the U.S. EPA Water Docket , 401 M Street S.W., Washington, DC. 20460, or the Office of the Federal Register, 800 N. Capitol Street N.W. Suite 700, Washington, DC. An operator must certify to the Director that the construction activity will take place during a period when the value of the rainfall erosivity factor is less than five; or

(B) Storm water controls are not needed based on a "total maximum daily load" (TMDL) approved or established by EPA that addresses the pollutant(s) of concern or, for non-impaired waters that do not require TMDLs, an equivalent analysis that determines allocations for small construction sites for the pollutant(s) of concern or that determines that such allocations are not needed to protect water quality based on consideration of existing in-stream concentrations, expected growth in pollutant contributions from all sources, and a margin of safety. For the purpose of this paragraph, the pollutant(s) of concern include sediment or a parameter that addresses sediment (such as total suspended solids, turbidity or siltation) and any other pollutant that has been identified as a cause of impairment of any water body that will receive a discharge from the construction activity. The operator must certify to the Director that the construction activity will take place, and storm water discharges will occur, within the drainage area addressed by the TMDL or equivalent analysis.

(ii) Any other construction activity designated by the Director, or in States with approved NPDES programs either the Director or the EPA Regional Administrator, based on the potential for contribution to a violation of a water quality standard or for significant contribution of pollutants to waters of the United States.

EXHIBIT 1 TO § 122.26(B)(15).—SUMMARY OF COVERAGE OF "STORM WATER DISCHARGES ASSOCIATED WITH SMALL CONSTRUCTION ACTIVITY" UNDER THE NPDES STORM WATER PROGRAM

Automatic Designation: Required Nationwide Coverage.	• Construction activities that result in a land disturbance of equal to or greater than one acre and less than five acres. • Construction activities disturbing less than one acre if part of a larger common plan of development or sale with a planned disturbance of equal to or greater than one acre and less than five acres. (see § 122.26(b)(15)(i).)
Potential Designation: Optional Evaluation and Designation by the NPDES Permitting Authority or EPA Regional Administrator..	• Construction activities that result in a land disturbance of less than one acre based on the potential for contribution to a violation of a water quality standard or for significant contribution of pollutants. (see § 122.26(b)(15)(ii).)

EXHIBIT 1 TO § 122.26(B)(15).—SUMMARY OF COVERAGE OF "STORM WATER DISCHARGES ASSOCIATED WITH SMALL CONSTRUCTION ACTIVITY" UNDER THE NPDES STORM WATER PROGRAM—Continued

Potential Waiver: Waiver from Requirements as Determined by the NPDES Permitting Authority..	Any automatically designated construction activity where the operator certifies: (1) A rainfall erosivity factor of less than five, or (2) That the activity will occur within an area where controls are not needed based on a TMDL or, for non-impaired waters that do not require a TMDL, an equivalent analysis for the pollutant(s) of concern. (see § 122.26(b)(15)(i).)

(16) *Small municipal separate storm sewer system* means all separate storm sewers that are:

(i) Owned or operated by the United States, a State, city, town, borough, county, parish, district, association, or other public body (created by or pursuant to State law) having jurisdiction over disposal of sewage, industrial wastes, storm water, or other wastes, including special districts under State law such as a sewer district, flood control district or drainage district, or similar entity, or an Indian tribe or an authorized Indian tribal organization, or a designated and approved management agency under section 208 of the CWA that discharges to waters of the United States.

(ii) Not defined as "large" or "medium" municipal separate storm sewer systems pursuant to paragraphs (b)(4) and (b)(7) of this section, or designated under paragraph (a)(1)(v) of this section.

(iii) This term includes systems similar to separate storm sewer systems in municipalities, such as systems at military bases, large hospital or prison complexes, and highways and other thoroughfares. The term does not include separate storm sewers in very discrete areas, such as individual buildings.

(17) *Small MS4* means a small municipal separate storm sewer system.

(18) *Municipal separate storm sewer system* means all separate storm sewers that are defined as "large" or "medium" or "small" municipal separate storm sewer systems pursuant to paragraphs (b)(4), (b)(7), and (b)(16) of this section, or designated under paragraph (a)(1)(v) of this section.

(19) *MS4* means a municipal separate storm sewer system.

* * * * *

(c) *Application requirements for storm water discharges associated with industrial activity and storm water discharges associated with small construction activity*—(1) *Individual application.* Dischargers of storm water associated with industrial activity and with small construction activity are required to apply for an individual permit or seek coverage under a promulgated storm water general permit. * * *

* * * * *

(ii) An operator of an existing or new storm water discharge that is associated with industrial activity solely under paragraph (b)(14)(x) of this section or is associated with small construction activity solely under paragraph (b)(15) of this section, is exempt from the requirements of § 122.21(g) and paragraph (c)(1)(i) of this section. * * *

* * * * *

(e) *Application deadlines.* Any operator of a point source required to obtain a permit under this section that does not have an effective NPDES permit authorizing discharges from its storm water outfalls shall submit an application in accordance with the following deadlines:

(1) *Storm water discharges associated with industrial activity.* (i) Except as provided in paragraph (e)(1)(ii) of this section, for any storm water discharge associated with industrial activity identified in paragraphs (b)(14)(i) through (xi) of this section, that is not part of a group application as described in paragraph (c)(2) of this section or that is not authorized by a storm water general permit, a permit application made pursuant to paragraph (c) of this section must be submitted to the Director by October 1, 1992;

(ii) For any storm water discharge associated with industrial activity from a facility that is owned or operated by a municipality with a population of less than 100,000 that is not authorized by a general or individual permit, other than an airport, powerplant, or uncontrolled sanitary landfill, the permit application must be submitted to the Director by March 10, 2003.

* * * * *

(5) A permit application shall be submitted to the Director within 180 days of notice, unless permission for a later date is granted by the Director (see § 124.52(c) of this chapter), for:

(i) A storm water discharge that the Director, or in States with approved NPDES programs, either the Director or the EPA Regional Administrator, determines that the discharge contributes to a violation of a water quality standard or is a significant contributor of pollutants to waters of the United States (see paragraphs (a)(1)(v) and (b)(15)(ii) of this section);

* * * * *

(8) For any storm water discharge associated with small construction activity identified in paragraph (b)(15)(i) of this section, see § 122.21(c)(1). Discharges from these sources require permit authorization by March 10, 2003, unless designated for coverage before then.

(9) For any discharge from a regulated small MS4, the permit application made under § 122.33 must be submitted to the Director by:

(i) March 10, 2003 if designated under § 122.32(a)(1) unless your MS4 serves a jurisdiction with a population under 10,000 and the NPDES permitting authority has established a phasing schedule under § 123.35(d)(3) (see § 122.33(c)(1)); or

(ii) Within 180 days of notice, unless the NPDES permitting authority grants a later date, if designated under § 122.32(a)(2) (see § 122.33(c)(2)).

(f) * * *

(4) Any person may petition the Director for the designation of a large, medium, or small municipal separate storm sewer system as defined by paragraph (b)(4)(iv), (b)(7)(iv), or (b)(16) of this section.

(5) The Director shall make a final determination on any petition received under this section within 90 days after receiving the petition with the exception of petitions to designate a small MS4 in which case the Director shall make a final determination on the petition within 180 days after its receipt.

(g) *Conditional exclusion for "no exposure" of industrial activities and materials to storm water.* Discharges composed entirely of storm water are not storm water discharges associated with industrial activity if there is "no exposure" of industrial materials and activities to rain, snow, snowmelt and/or runoff, and the discharger satisfies the conditions in paragraphs (g)(1) through (g)(4) of this section. "No exposure" means that all industrial materials and activities are protected by a storm resistant shelter to prevent exposure to rain, snow, snowmelt, and/or runoff. Industrial materials or activities include, but are not limited to, material handling equipment or activities, industrial machinery, raw materials, intermediate products, by-products, final products, or waste

products. Material handling activities include the storage, loading and unloading, transportation, or conveyance of any raw material, intermediate product, final product or waste product.

(1) *Qualification.* To qualify for this exclusion, the operator of the discharge must:

(i) Provide a storm resistant shelter to protect industrial materials and activities from exposure to rain, snow, snow melt, and runoff;

(ii) Complete and sign (according to § 122.22) a certification that there are no discharges of storm water contaminated by exposure to industrial materials and activities from the entire facility, except as provided in paragraph (g)(2) of this section;

(iii) Submit the signed certification to the NPDES permitting authority once every five years;

(iv) Allow the Director to inspect the facility to determine compliance with the "no exposure" conditions;

(v) Allow the Director to make any "no exposure" inspection reports available to the public upon request; and

(vi) For facilities that discharge through an MS4, upon request, submit a copy of the certification of "no exposure" to the MS4 operator, as well as allow inspection and public reporting by the MS4 operator.

(2) *Industrial materials and activities not requiring storm resistant shelter.* To qualify for this exclusion, storm resistant shelter is not required for:

(i) Drums, barrels, tanks, and similar containers that are tightly sealed, provided those containers are not deteriorated and do not leak ("Sealed" means banded or otherwise secured and without operational taps or valves);

(ii) Adequately maintained vehicles used in material handling; and

(iii) Final products, other than products that would be mobilized in storm water discharge (e.g., rock salt).

(3) *Limitations.* (i) Storm water discharges from construction activities identified in paragraphs (b)(14)(x) and (b)(15) are not eligible for this conditional exclusion.

(ii) This conditional exclusion from the requirement for an NPDES permit is available on a facility-wide basis only, not for individual outfalls. If a facility has some discharges of storm water that would otherwise be "no exposure" discharges, individual permit requirements should be adjusted accordingly.

(iii) If circumstances change and industrial materials or activities become exposed to rain, snow, snow melt, and/or runoff, the conditions for this exclusion no longer apply. In such cases, the discharge becomes subject to enforcement for un-permitted discharge. Any conditionally exempt discharger who anticipates changes in circumstances should apply for and obtain permit authorization prior to the change of circumstances.

(iv) Notwithstanding the provisions of this paragraph, the NPDES permitting authority retains the authority to require permit authorization (and deny this exclusion) upon making a determination that the discharge causes, has a reasonable potential to cause, or contributes to an instream excursion above an applicable water quality standard, including designated uses.

(4) *Certification.* The no exposure certification must require the submission of the following information, at a minimum, to aid the NPDES permitting authority in determining if the facility qualifies for the no exposure exclusion:

(i) The legal name, address and phone number of the discharger (see § 122.21(b));

(ii) The facility name and address, the county name and the latitude and longitude where the facility is located;

(iii) The certification must indicate that none of the following materials or activities are, or will be in the foreseeable future, exposed to precipitation:

(A) Using, storing or cleaning industrial machinery or equipment, and areas where residuals from using, storing or cleaning industrial machinery or equipment remain and are exposed to storm water;

(B) Materials or residuals on the ground or in storm water inlets from spills/leaks;

(C) Materials or products from past industrial activity;

(D) Material handling equipment (except adequately maintained vehicles);

(E) Materials or products during loading/unloading or transporting activities;

(F) Materials or products stored outdoors (except final products intended for outside use, e.g., new cars, where exposure to storm water does not result in the discharge of pollutants);

(G) Materials contained in open, deteriorated or leaking storage drums, barrels, tanks, and similar containers;

(H) Materials or products handled/stored on roads or railways owned or maintained by the discharger;

(I) Waste material (except waste in covered, non-leaking containers, e.g., dumpsters);

(J) Application or disposal of process wastewater (unless otherwise permitted); and

(K) Particulate matter or visible deposits of residuals from roof stacks/vents not otherwise regulated, i.e., under an air quality control permit, and evident in the storm water outflow;

(iv) All "no exposure" certifications must include the following certification statement, and be signed in accordance with the signatory requirements of § 122.22: "I certify under penalty of law that I have read and understand the eligibility requirements for claiming a condition of "no exposure" and obtaining an exclusion from NPDES storm water permitting; and that there are no discharges of storm water contaminated by exposure to industrial activities or materials from the industrial facility identified in this document (except as allowed under paragraph (g)(2)) of this section. I understand that I am obligated to submit a no exposure certification form once every five years to the NPDES permitting authority and, if requested, to the operator of the local MS4 into which this facility discharges (where applicable). I understand that I must allow the NPDES permitting authority, or MS4 operator where the discharge is into the local MS4, to perform inspections to confirm the condition of no exposure and to make such inspection reports publicly available upon request. I understand that I must obtain coverage under an NPDES permit prior to any point source discharge of storm water from the facility. I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based upon my inquiry of the person or persons who manage the system, or those persons directly involved in gathering the information, the information submitted is to the best of my knowledge and belief true, accurate and complete. I am aware there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

4. Revise § 122.28(b)(2)(v) to read as follows:

§ 122.28 General permits (applicable to State NPDES programs, see § 123.25).

* * * * *

(b) * * *

(2) * * *

(v) Discharges other than discharges from publicly owned treatment works, combined sewer overflows, municipal

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separate storm sewer systems, primary industrial facilities, and storm water discharges associated with industrial activity, may, at the discretion of the Director, be authorized to discharge under a general permit without submitting a notice of intent where the Director finds that a notice of intent requirement would be inappropriate. In making such a finding, the Director shall consider: the type of discharge; the expected nature of the discharge; the potential for toxic and conventional pollutants in the discharges; the expected volume of the discharges; other means of identifying discharges covered by the permit; and the estimated number of discharges to be covered by the permit. The Director shall provide in the public notice of the general permit the reasons for not requiring a notice of intent.

* * * * *

5. Add §§ 122.30 through 122.37 to subpart B to read as follows:

§ 122.30 What are the objectives of the storm water regulations for small MS4s?

(a) Sections 122.30 through 122.37 are written in a "readable regulation" format that includes both rule requirements and EPA guidance that is not legally binding. EPA has clearly distinguished its recommended guidance from the rule requirements by putting the guidance in a separate paragraph headed by the word "guidance".

(b) Under the statutory mandate in section 402(p)(6) of the Clean Water Act, the purpose of this portion of the storm water program is to designate additional sources that need to be regulated to protect water quality and to establish a comprehensive storm water program to regulate these sources. (Because the storm water program is part of the National Pollutant Discharge Elimination System (NPDES) Program, you should also refer to § 122.1 which addresses the broader purpose of the NPDES program.)

(c) Storm water runoff continues to harm the nation's waters. Runoff from lands modified by human activities can harm surface water resources in several ways including by changing natural hydrologic patterns and by elevating pollutant concentrations and loadings. Storm water runoff may contain or mobilize high levels of contaminants, such as sediment, suspended solids, nutrients, heavy metals, pathogens, toxins, oxygen-demanding substances, and floatables.

(d) EPA strongly encourages partnerships and the watershed approach as the management framework for efficiently, effectively, and consistently protecting and restoring aquatic ecosystems and protecting public health.

§ 122.31 As a Tribe, what is my role under the NPDES storm water program?

As a Tribe you may:

(a) Be authorized to operate the NPDES program including the storm water program, after EPA determines that you are eligible for treatment in the same manner as a State under §§ 123.31 through 123.34 of this chapter. (If you do not have an authorized NPDES program, EPA implements the program for discharges on your reservation as well as other Indian country, generally.);

(b) Be classified as an owner of a regulated small MS4, as defined in § 122.32. (Designation of your Tribe as an owner of a small MS4 for purposes of this part is an approach that is consistent with EPA's 1984 Indian Policy of operating on a government-to-government basis with EPA looking to Tribes as the lead governmental authorities to address environmental issues on their reservations as appropriate. If you operate a separate storm sewer system that meets the definition of a regulated small MS4, you are subject to the requirements under §§ 122.33 through 122.35. If you are not designated as a regulated small MS4, you may ask EPA to designate you as such for the purposes of this part.); or

(c) Be a discharger of storm water associated with industrial activity or small construction activity under §§ 122.26(b)(14) or (b)(15), in which case you must meet the applicable requirements. Within Indian country, the NPDES permitting authority is generally EPA, unless you are authorized to administer the NPDES program.

§ 122.32 As an operator of a small MS4, am I regulated under the NPDES storm water program?

(a) Unless you qualify for a waiver under paragraph (c) of this section, you are regulated if you operate a small MS4, including but not limited to systems operated by federal, State, Tribal, and local governments, including State departments of transportation; and:

(1) Your small MS4 is located in an urbanized area as determined by the latest Decennial Census by the Bureau of the Census. (If your small MS4 is not located entirely within an urbanized area, only the portion that is within the urbanized area is regulated); or

(2) You are designated by the NPDES permitting authority, including where the designation is pursuant to §§ 123.35(b)(3) and (b)(4) of this chapter, or is based upon a petition under § 122.26(f).

(b) You may be the subject of a petition to the NPDES permitting authority to require an NPDES permit for your discharge of storm water. If the NPDES permitting authority determines that you need a permit, you are required to comply with §§ 122.33 through 122.35.

(c) The NPDES permitting authority may waive the requirements otherwise applicable to you if you meet the criteria of paragraph (d) or (e) of this section. If you receive a waiver under this section, you may subsequently be required to seek coverage under an NPDES permit in accordance with § 122.33(a) if circumstances change. (See also § 123.35(b) of this chapter.)

(d) The NPDES permitting authority may waive permit coverage if your MS4 serves a population of less than 1,000 within the urbanized area and you meet the following criteria:

(1) Your system is not contributing substantially to the pollutant loadings of a physically interconnected MS4 that is regulated by the NPDES storm water program (see § 123.35(b)(4) of this chapter); and

(2) If you discharge any pollutant(s) that have been identified as a cause of impairment of any water body to which you discharge, storm water controls are not needed based on wasteload allocations that are part of an EPA approved or established "total maximum daily load" (TMDL) that addresses the pollutant(s) of concern.

(e) The NPDES permitting authority may waive permit coverage if your MS4 serves a population under 10,000 and you meet the following criteria:

(1) The permitting authority has evaluated all waters of the U.S., including small streams, tributaries, lakes, and ponds, that receive a discharge from your MS4;

(2) For all such waters, the permitting authority has determined that storm water controls are not needed based on wasteload allocations that are part of an EPA approved or established TMDL that addresses the pollutant(s) of concern or, if a TMDL has not been developed or approved, an equivalent analysis that determines sources and allocations for the pollutant(s) of concern;

(3) For the purpose of this paragraph (e), the pollutant(s) of concern include biochemical oxygen demand (BOD), sediment or a parameter that addresses sediment (such as total suspended solids, turbidity or siltation), pathogens, oil and grease, and any pollutant that has been identified as a cause of impairment of any water body that will receive a discharge from your MS4; and

(4) The permitting authority has determined that future discharges from your MS4 do not have the potential to result in exceedances of water quality standards, including impairment of designated uses, or other significant water quality impacts, including habitat and biological impacts.

§ 122.33 If I am an operator of a regulated small MS4, how do I apply for an NPDES permit and when do I have to apply?

(a) If you operate a regulated small MS4 under § 122.32, you must seek coverage under a NPDES permit issued by your NPDES permitting authority. If you are located in an NPDES authorized State, Tribe, or Territory, then that State, Tribe, or Territory is your NPDES permitting authority. Otherwise, your NPDES permitting authority is the EPA Regional Office.

(b) You must seek authorization to discharge under a general or individual NPDES permit, as follows:

(1) If your NPDES permitting authority has issued a general permit applicable to your discharge and you are seeking coverage under the general permit, you must submit a Notice of Intent (NOI) that includes the information on your best management practices and measurable goals required by § 122.34(d). You may file your own NOI, or you and other municipalities or governmental entities may jointly submit an NOI. If you want to share responsibilities for meeting the minimum measures with other municipalities or governmental entities, you must submit an NOI that describes which minimum measures you will implement and identify the entities that will implement the other minimum measures within the area served by your MS4. The general permit will explain any other steps necessary to obtain permit authorization.

(2)(i) If you are seeking authorization to discharge under an individual permit and wish to implement a program under § 122.34, you must submit an application to your NPDES permitting authority that includes the information required under §§ 122.21(f) and 122.34(d), an estimate of square mileage served by your small MS4, and any additional information that your NPDES permitting authority requests. A storm sewer map that satisfies the requirement of § 122.34(b)(3)(i) will satisfy the map requirement in § 122.21(f)(7).

(ii) If you are seeking authorization to discharge under an individual permit and wish to implement a program that is different from the program under § 122.34, you will need to comply with the permit application requirements of § 122.26(d). You must submit both Parts of the application requirements in §§ 122.26(d)(1) and (2) by March 10, 2003. You do not need to submit the information required by §§ 122.26(d)(1)(ii) and (d)(2) regarding your legal authority, unless you intend for the permit writer to take such information into account when developing your other permit conditions.

(iii) If allowed by your NPDES permitting authority, you and another regulated entity may jointly apply under either paragraph (b)(2)(i) or (b)(2)(ii) of this section to be co-permittees under an individual permit.

(3) If your small MS4 is in the same urbanized area as a medium or large MS4 with an NPDES storm water permit and that other MS4 is willing to have you participate in its storm water program, you and the other MS4 may jointly seek a modification of the other MS4 permit to include you as a limited co-permittee. As a limited co-permittee, you will be responsible for compliance with the permit's conditions applicable to your jurisdiction. If you choose this option you will need to comply with the permit application requirements of § 122.26, rather than the requirements of § 122.34. You do not need to comply with the specific application requirements of § 122.26(d)(1)(iii) and (iv) and (d)(2)(iii) (discharge characterization). You may satisfy the requirements in § 122.26 (d)(1)(v) and (d)(2)(iv) (identification of a management program) by referring to the other MS4's storm water management program.

(4) Guidance: In referencing an MS4's storm water management program, you should briefly describe how the existing plan will address discharges from your small MS4 or would need to be supplemented in order to adequately address your discharges. You should also explain your role in coordinating storm water pollutant control activities in your MS4, and detail the resources available to you to accomplish the plan.

(c) If you operate a regulated small MS4:

(1) Designated under § 122.32(a)(1), you must apply for coverage under an NPDES permit, or apply for a modification of an existing NPDES permit under paragraph (b)(3) of this section by March 10, 2003, unless your MS4 serves a jurisdiction with a population under 10,000 and the NPDES permitting authority has established a phasing schedule under § 123.35(d)(3) of this chapter.

(2) Designated under § 122.32(a)(2), you must apply for coverage under an NPDES permit, or apply for a modification of an existing NPDES permit under paragraph (b)(3) of this section, within 180 days of notice, unless the NPDES permitting authority grants a later date.

§ 122.34 As an operator of a regulated small MS4, what will my NPDES MS4 storm water permit require?

(a) Your NPDES MS4 permit will require at a minimum that you develop, implement, and enforce a storm water management program designed to reduce the discharge of pollutants from your MS4 to the maximum extent practicable (MEP), to protect water quality, and to satisfy the appropriate water quality requirements of the Clean Water Act. Your storm water management program must include the minimum control measures described in paragraph (b) of this section unless you apply for a permit under § 122.26(d). For purposes of this section, narrative effluent limitations requiring implementation of best management practices (BMPs) are generally the most appropriate form of effluent limitations when designed to satisfy technology requirements (including reductions of pollutants to the maximum extent practicable) and to protect water quality. Implementation of best management practices consistent with the provisions of the storm water management program required pursuant to this section and the provisions of the permit required pursuant to § 122.33 constitutes compliance with the standard of reducing pollutants to the "maximum extent practicable." Your NPDES permitting authority will specify a time period of up to 5 years from the date of permit issuance for you to develop and implement your program.

(b) *Minimum control measures*—(1) *Public education and outreach on storm water impacts.* (i) You must implement a public education program to distribute educational materials to the community or conduct equivalent outreach activities about the impacts of storm water discharges on water bodies and the steps that the public can take to reduce pollutants in storm water runoff.

(ii) Guidance: You may use storm water educational materials provided by your State, Tribe, EPA, environmental, public interest or trade organizations, or other MS4s. The public education program should inform individuals and households about the steps they can take to reduce storm water pollution, such as ensuring proper septic system maintenance, ensuring the proper use and disposal of landscape and garden chemicals including fertilizers and pesticides, protecting and restoring riparian vegetation, and properly disposing of used motor oil or

household hazardous wastes. EPA recommends that the program inform individuals and groups how to become involved in local stream and beach restoration activities as well as activities that are coordinated by youth service and conservation corps or other citizen groups. EPA recommends that the public education program be tailored, using a mix of locally appropriate strategies, to target specific audiences and communities. Examples of strategies include distributing brochures or fact sheets, sponsoring speaking engagements before community groups, providing public service announcements, implementing educational programs targeted at school age children, and conducting community-based projects such as storm drain stenciling, and watershed and beach cleanups. In addition, EPA recommends that some of the materials or outreach programs be directed toward targeted groups of commercial, industrial, and institutional entities likely to have significant storm water impacts. For example, providing information to restaurants on the impact of grease clogging storm drains and to garages on the impact of oil discharges. You are encouraged to tailor your outreach program to address the viewpoints and concerns of all communities, particularly minority and disadvantaged communities, as well as any special concerns relating to children.

(2) *Public involvement/participation.* (i) You must, at a minimum, comply with State, Tribal and local public notice requirements when implementing a public involvement/participation program.

(ii) Guidance: EPA recommends that the public be included in developing, implementing, and reviewing your storm water management program and that the public participation process should make efforts to reach out and engage all economic and ethnic groups. Opportunities for members of the public to participate in program development and implementation include serving as citizen representatives on a local storm water management panel, attending public hearings, working as citizen volunteers to educate other individuals about the program, assisting in program coordination with other pre-existing programs, or participating in volunteer monitoring efforts. (Citizens should obtain approval where necessary for lawful access to monitoring sites.)

(3) *Illicit discharge detection and elimination.* (i) You must develop, implement and enforce a program to detect and eliminate illicit discharges (as defined at § 122.26(b)(2)) into your small MS4.

(ii) You must:

(A) Develop, if not already completed, a storm sewer system map, showing the location of all outfalls and the names and location of all waters of the United States that receive discharges from those outfalls;

(B) To the extent allowable under State, Tribal or local law, effectively prohibit, through ordinance, or other regulatory mechanism, non-storm water discharges into your storm sewer system and implement appropriate enforcement procedures and actions;

(C) Develop and implement a plan to detect and address non-storm water discharges, including illegal dumping, to your system; and

(D) Inform public employees, businesses, and the general public of hazards associated with illegal discharges and improper disposal of waste.

(iii) You need address the following categories of non-storm water discharges or flows (i.e., illicit discharges) only if you identify them as significant contributors of pollutants to your small MS4: water line flushing, landscape irrigation, diverted stream flows, rising ground waters, uncontaminated ground water infiltration (as defined at 40 CFR 35.2005(20)), uncontaminated pumped ground water, discharges from potable water sources, foundation drains, air conditioning condensation, irrigation water, springs, water from crawl space pumps, footing drains, lawn watering, individual residential car washing, flows from riparian habitats and wetlands, dechlorinated swimming pool discharges, and street wash water (discharges or flows from fire fighting activities are excluded from the effective prohibition against non-storm water and need only be addressed where they are identified as significant sources of pollutants to waters of the United States).

(iv) Guidance: EPA recommends that the plan to detect and address illicit discharges include the following four components: procedures for locating priority areas likely to have illicit discharges; procedures for tracing the source of an illicit discharge; procedures for removing the source of the discharge; and procedures for program evaluation and assessment. EPA recommends visually screening outfalls during dry weather and conducting field tests of selected pollutants as part of the procedures for locating priority areas. Illicit discharge education actions may include storm drain stenciling, a program to promote, publicize, and facilitate public reporting of illicit connections or discharges, and distribution of outreach materials.

(4) *Construction site storm water runoff control.* (i) You must develop, implement, and enforce a program to reduce pollutants in any storm water runoff to your small MS4 from construction activities that result in a land disturbance of greater than or equal to one acre. Reduction of storm water discharges from construction activity disturbing less than one acre must be included in your program if that construction activity is part of a larger common plan of development or sale that would disturb one acre or more. If the NPDES permitting authority waives requirements for storm water discharges associated with small construction activity in accordance with § 122.26(b)(15)(i), you are not required to develop, implement, and/or enforce a program to reduce pollutant discharges from such sites.

(ii) Your program must include the development and implementation of, at a minimum:

(A) An ordinance or other regulatory mechanism to require erosion and sediment controls, as well as sanctions to ensure compliance, to the extent allowable under State, Tribal, or local law;

(B) Requirements for construction site operators to implement appropriate erosion and sediment control best management practices;

(C) Requirements for construction site operators to control waste such as discarded building materials, concrete truck washout, chemicals, litter, and sanitary waste at the construction site that may cause adverse impacts to water quality;

(D) Procedures for site plan review which incorporate consideration of potential water quality impacts;

(E) Procedures for receipt and consideration of information submitted by the public, and

(F) Procedures for site inspection and enforcement of control measures.

(iii) Guidance: Examples of sanctions to ensure compliance include non-monetary penalties, fines, bonding requirements and/or permit denials for non-compliance. EPA recommends that procedures for site plan review include the review of individual pre-construction site plans to ensure consistency with local sediment and erosion control requirements. Procedures for site inspections and enforcement of control measures could include steps to identify priority sites for inspection and enforcement based on the nature of the construction activity, topography, and the characteristics of soils and receiving

water quality. You are encouraged to provide appropriate educational and training measures for construction site operators. You may wish to require a storm water pollution prevention plan for construction sites within your jurisdiction that discharge into your system. See § 122.44(s) (NPDES permitting authorities' option to incorporate qualifying State, Tribal and local erosion and sediment control programs into NPDES permits for storm water discharges from construction sites). Also see § 122.35(b) (The NPDES permitting authority may recognize that another government entity, including the permitting authority, may be responsible for implementing one or more of the minimum measures on your behalf.)

(5) *Post-construction storm water management in new development and redevelopment.*

(i) You must develop, implement, and enforce a program to address storm water runoff from new development and redevelopment projects that disturb greater than or equal to one acre, including projects less than one acre that are part of a larger common plan of development or sale, that discharge into your small MS4. Your program must ensure that controls are in place that would prevent or minimize water quality impacts.

(ii) You must:

(A) Develop and implement strategies which include a combination of structural and/or non-structural best management practices (BMPs) appropriate for your community;

(B) Use an ordinance or other regulatory mechanism to address post-construction runoff from new development and redevelopment projects to the extent allowable under State, Tribal or local law; and

(C) Ensure adequate long-term operation and maintenance of BMPs.

(iii) Guidance: If water quality impacts are considered from the beginning stages of a project, new development and potentially redevelopment provide more opportunities for water quality protection. EPA recommends that the BMPs chosen: be appropriate for the local community; minimize water quality impacts; and attempt to maintain pre-development runoff conditions. In choosing appropriate BMPs, EPA encourages you to participate in locally-based watershed planning efforts which attempt to involve a diverse group of stakeholders including interested citizens. When developing a program that is consistent with this measure's intent, EPA recommends that you adopt a planning process that identifies the municipality's program goals (*e.g.*, minimize water quality impacts resulting from post-construction runoff from new development and redevelopment), implementation strategies (e.g., adopt a combination of structural and/or non-structural BMPs), operation and maintenance policies and procedures, and enforcement procedures. In developing your program, you should consider assessing existing ordinances, policies, programs and studies that address storm water runoff quality. In addition to assessing these existing documents and programs, you should provide opportunities to the public to participate in the development of the program. Non-structural BMPs are preventative actions that involve management and source controls such as: policies and ordinances that provide requirements and standards to direct growth to identified areas, protect sensitive areas such as wetlands and riparian areas, maintain and/or increase open space (including a dedicated funding source for open space acquisition), provide buffers along sensitive water bodies, minimize impervious surfaces, and minimize disturbance of soils and vegetation; policies or ordinances that encourage infill development in higher density urban areas, and areas with existing infrastructure; education programs for developers and the public about project designs that minimize water quality impacts; and measures such as minimization of percent impervious area after development and minimization of directly connected impervious areas. Structural BMPs include: storage practices such as wet ponds and extended-detention outlet structures; filtration practices such as grassed swales, sand filters and filter strips; and infiltration practices such as infiltration basins and infiltration trenches. EPA recommends that you ensure the appropriate implementation of the structural BMPs by considering some or all of the following: pre-construction review of BMP designs; inspections during construction to verify BMPs are built as designed; post-construction inspection and maintenance of BMPs; and penalty provisions for the noncompliance with design, construction or operation and maintenance. Storm water technologies are constantly being improved, and EPA recommends that your requirements be responsive to these changes, developments or improvements in control technologies.

(6) *Pollution prevention/good housekeeping for municipal operations.*

(i) You must develop and implement an operation and maintenance program that includes a training component and has the ultimate goal of preventing or reducing pollutant runoff from municipal operations. Using training materials that are available from EPA, your State, Tribe, or other organizations, your program must include employee training to prevent and reduce storm water pollution from activities such as park and open space maintenance, fleet and building maintenance, new construction and land disturbances, and storm water system maintenance.

(ii) Guidance: EPA recommends that, at a minimum, you consider the following in developing your program: maintenance activities, maintenance schedules, and long-term inspection procedures for structural and non-structural storm water controls to reduce floatables and other pollutants discharged from your separate storm sewers; controls for reducing or eliminating the discharge of pollutants from streets, roads, highways, municipal parking lots, maintenance and storage yards, fleet or maintenance shops with outdoor storage areas, salt/sand storage locations and snow disposal areas operated by you, and waste transfer stations; procedures for properly disposing of waste removed from the separate storm sewers and areas listed above (such as dredge spoil, accumulated sediments, floatables, and other debris); and ways to ensure that new flood management projects assess the impacts on water quality and examine existing projects for incorporating additional water quality protection devices or practices. Operation and maintenance should be an integral component of all storm water management programs. This measure is intended to improve the efficiency of these programs and require new programs where necessary. Properly developed and implemented operation and maintenance programs reduce the risk of water quality problems.

(c) If an existing qualifying local program requires you to implement one or more of the minimum control measures of paragraph (b) of this section, the NPDES permitting authority may include conditions in your NPDES permit that direct you to follow that qualifying program's requirements rather than the requirements of paragraph (b) of this section. A qualifying local program is a local, State or Tribal municipal storm water management program that imposes, at a minimum, the relevant requirements of paragraph (b) of this section.

(d)(1) In your permit application (either a notice of intent for coverage

under a general permit or an individual permit application), you must identify and submit to your NPDES permitting authority the following information:

(i) The best management practices (BMPs) that you or another entity will implement for each of the storm water minimum control measures at paragraphs (b)(1) through (b)(6) of this section;

(ii) The measurable goals for each of the BMPs including, as appropriate, the months and years in which you will undertake required actions, including interim milestones and the frequency of the action; and

(iii) The person or persons responsible for implementing or coordinating your storm water management program.

(2) If you obtain coverage under a general permit, you are not required to meet any measurable goal(s) identified in your notice of intent in order to demonstrate compliance with the minimum control measures in paragraphs (b)(3) through (b)(6) of this section unless, prior to submitting your NOI, EPA or your State or Tribe has provided or issued a menu of BMPs that addresses each such minimum measure. Even if no regulatory authority issues the menu of BMPs, however, you still must comply with other requirements of the general permit, including good faith implementation of BMPs designed to comply with the minimum measures.

(3) Guidance: Either EPA or your State or Tribal permitting authority will provide a menu of BMPs. You may choose BMPs from the menu or select others that satisfy the minimum control measures.

(e)(1) You must comply with any more stringent effluent limitations in your permit, including permit requirements that modify, or are in addition to, the minimum control measures based on an approved total maximum daily load (TMDL) or equivalent analysis. The permitting authority may include such more stringent limitations based on a TMDL or equivalent analysis that determines such limitations are needed to protect water quality.

(2) Guidance: EPA strongly recommends that until the evaluation of the storm water program in § 122.37, no additional requirements beyond the minimum control measures be imposed on regulated small MS4s without the agreement of the operator of the affected small MS4, except where an approved TMDL or equivalent analysis provides adequate information to develop more specific measures to protect water quality.

(f) You must comply with other applicable NPDES permit requirements, standards and conditions established in the individual or general permit, developed consistent with the provisions of §§ 122.41 through 122.49, as appropriate.

(g) *Evaluation and assessment*—(1) *Evaluation.* You must evaluate program compliance, the appropriateness of your identified best management practices, and progress towards achieving your identified measurable goals.

Note to Paragraph (g)(1): The NPDES permitting authority may determine monitoring requirements for you in accordance with State/Tribal monitoring plans appropriate to your watershed. Participation in a group monitoring program is encouraged.

(2) *Recordkeeping.* You must keep records required by the NPDES permit for at least 3 years. You must submit your records to the NPDES permitting authority only when specifically asked to do so. You must make your records, including a description of your storm water management program, available to the public at reasonable times during regular business hours (see § 122.7 for confidentiality provision). (You may assess a reasonable charge for copying. You may require a member of the public to provide advance notice.)

(3) *Reporting.* Unless you are relying on another entity to satisfy your NPDES permit obligations under § 122.35(a), you must submit annual reports to the NPDES permitting authority for your first permit term. For subsequent permit terms, you must submit reports in year two and four unless the NPDES permitting authority requires more frequent reports. Your report must include:

(i) The status of compliance with permit conditions, an assessment of the appropriateness of your identified best management practices and progress towards achieving your identified measurable goals for each of the minimum control measures;

(ii) Results of information collected and analyzed, including monitoring data, if any, during the reporting period;

(iii) A summary of the storm water activities you plan to undertake during the next reporting cycle;

(iv) A change in any identified best management practices or measurable goals for any of the minimum control measures; and

(v) Notice that you are relying on another governmental entity to satisfy some of your permit obligations (if applicable).

§ 122.35 As an operator of a regulated small MS4, may I share the responsibility to implement the minimum control measures with other entities?

(a) You may rely on another entity to satisfy your NPDES permit obligations to implement a minimum control measure if:

(1) The other entity, in fact, implements the control measure;

(2) The particular control measure, or component thereof, is at least as stringent as the corresponding NPDES permit requirement; and

(3) The other entity agrees to implement the control measure on your behalf. In the reports you must submit under § 122.34(g)(3), you must also specify that you rely on another entity to satisfy some of your permit obligations. If you are relying on another governmental entity regulated under section 122 to satisfy all of your permit obligations, including your obligation to file periodic reports required by § 122.34(g)(3), you must note that fact in your NOI, but you are not required to file the periodic reports. You remain responsible for compliance with your permit obligations if the other entity fails to implement the control measure (or component thereof). Therefore, EPA encourages you to enter into a legally binding agreement with that entity if you want to minimize any uncertainty about compliance with your permit.

(b) In some cases, the NPDES permitting authority may recognize, either in your individual NPDES permit or in an NPDES general permit, that another governmental entity is responsible under an NPDES permit for implementing one or more of the minimum control measures for your small MS4 or that the permitting authority itself is responsible. Where the permitting authority does so, you are not required to include such minimum control measure(s) in your storm water management program. (For example, if a State or Tribe is subject to an NPDES permit that requires it to administer a program to control construction site runoff at the State or Tribal level and that program satisfies all of the requirements of § 122.34(b)(4), you could avoid responsibility for the construction measure, but would be responsible for the remaining minimum control measures.) Your permit may be reopened and modified to include the requirement to implement a minimum control measure if the entity fails to implement it.

§ 122.36 As an operator of a regulated small MS4, what happens if I don't comply with the application or permit requirements in §§ 122.33 through 122.35?

NPDES permits are federally enforceable. Violators may be subject to the enforcement actions and penalties described in Clean Water Act sections 309 (b), (c), and (g) and 505, or under applicable State, Tribal, or local law. Compliance with a permit issued pursuant to section 402 of the Clean Water Act is deemed compliance, for purposes of sections 309 and 505, with sections 301, 302, 306, 307, and 403, except any standard imposed under section 307 for toxic pollutants injurious to human health. If you are covered as a co-permittee under an individual permit or under a general permit by means of a joint Notice of Intent you remain subject to the enforcement actions and penalties for the failure to comply with the terms of the permit in your jurisdiction except as set forth in § 122.35(b).

§ 122.37 Will the small MS4 storm water program regulations at §§ 122.32 through 122.36 and § 123.35 of this chapter change in the future?

EPA will evaluate the small MS4 regulations at §§ 122.32 through 122.36 and § 123.35 of this chapter after December 10, 2012 and make any necessary revisions. (EPA intends to conduct an enhanced research effort and compile a comprehensive evaluation of the NPDES MS4 storm water program. EPA will re-evaluate the regulations based on data from the NPDES MS4 storm water program, from research on receiving water impacts from storm water, and the effectiveness of best management practices (BMPs), as well as other relevant information sources.)

6. In § 122.44, redesignate paragraphs (k)(2) and (k)(3) as paragraphs (k)(3) and (k)(4), remove the comma at the end of newly redesignated paragraph (k)(3) and add a semicolon in its place, and add new paragraphs (k)(2) and (s) to read as follows:

§ 122.44 Establishing limitations, standards, and other permit conditions (applicable to State NPDES programs, see § 123.25).

* * * * *

(k) * * *

(2) Authorized under section 402(p) of CWA for the control of storm water discharges;

* * * * *

(s) *Qualifying State, Tribal, or local programs.* (1) For storm water discharges associated with small construction activity identified in § 122.26(b)(15), the Director may include permit conditions that incorporate qualifying State, Tribal, or local erosion and sediment control program requirements by reference. Where a qualifying State, Tribal, or local program does not include one or more of the elements in this paragraph (s)(1), then the Director must include those elements as conditions in the permit. A qualifying State, Tribal, or local erosion and sediment control program is one that includes:

(i) Requirements for construction site operators to implement appropriate erosion and sediment control best management practices;

(ii) Requirements for construction site operators to control waste such as discarded building materials, concrete truck washout, chemicals, litter, and sanitary waste at the construction site that may cause adverse impacts to water quality;

(iii) Requirements for construction site operators to develop and implement a storm water pollution prevention plan. (A storm water pollution prevention plan includes site descriptions, descriptions of appropriate control measures, copies of approved State, Tribal or local requirements, maintenance procedures, inspection procedures, and identification of non-storm water discharges); and

(iv) Requirements to submit a site plan for review that incorporates consideration of potential water quality impacts.

(2) For storm water discharges from construction activity identified in § 122.26(b)(14)(x), the Director may include permit conditions that incorporate qualifying State, Tribal, or local erosion and sediment control program requirements by reference. A qualifying State, Tribal or local erosion and sediment control program is one that includes the elements listed in paragraph (s)(1) of this section and any additional requirements necessary to achieve the applicable technology-based standards of "best available technology" and "best conventional technology" based on the best professional judgment of the permit writer.

7. Add § 122.62(a)(14) to read as follows:

§ 122.62 Modification or revocation and reissuance of permits (applicable to State programs, see § 123.25).

* * * * *

(a) * * *

(14) For a small MS4, to include an effluent limitation requiring implementation of a minimum control measure or measures as specified in § 122.34(b) when:

(i) The permit does not include such measure(s) based upon the determination that another entity was responsible for implementation of the requirement(s); and

(ii) The other entity fails to implement measure(s) that satisfy the requirement(s).

* * * * *

8. Revise Appendices F, G, H, and I to Part 122 to read as follows:

APPENDIX F TO PART 122.—INCORPORATED PLACES WITH POPULATIONS GREATER THAN 250,000 ACCORDING TO THE 1990 DECENNIAL CENSUS BY THE BUREAU OF THE CENSUS

State	Incorporated Place
Alabama	Birmingham.
Arizona	Phoenix.
	Tucson.
California	Long Beach.
	Los Angeles.
	Oakland.
	Sacramento.
	San Diego.
	San Francisco.
	San Jose.
Colorado	Denver.
District of Columbia	
Florida	Jacksonville.
	Miami.
	Tampa.
Georgia.	Atlanta.
Illinois	Chicago.
Indiana	Indianapolis.
Kansas	Wichita.
Kentucky	Louisville.
Louisiana	New Orleans.
Maryland	Baltimore.
Massachusetts	Boston.
Michigan	Detroit.
Minnesota	Minneapolis.
	St. Paul.
Missouri	Kansas City.
	St. Louis.
Nebraska	Omaha.
New Jersey	Newark.
New Mexico	Albuquerque.
New York	Buffalo.
	Bronx Borough.
	Brooklyn Borough.
	Manhattan Borough.
	Queens Borough.
	Staten Island Borough.
North Carolina	Charlotte.
Ohio	Cincinnati.
	Cleveland.
	Columbus.
	Toledo.
Oklahoma	Oklahoma City.
	Tulsa.
Oregon	Portland.
Pennsylvania	Philadelphia.
	Pittsburgh.
Tennessee	Memphis.
	Nashville/Davidson.
Texas	Austin.
	Dallas.
	El Paso.
	Fort Worth.
	Houston.

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APPENDIX F TO PART 122.—INCORPORATED PLACES WITH POPULATIONS GREATER THAN 250,000 ACCORDING TO THE 1990 DECENNIAL CENSUS BY THE BUREAU OF THE CENSUS—Continued

State	Incorporated Place
	San Antonio.
Virginia	Norfolk.
	Virginia Beach.
Washington	Seattle.
Wisconsin	Milwaukee.

APPENDIX G TO PART 122.—INCORPORATED PLACES WITH POPULATIONS GREATER THAN 100,000 BUT LESS THAN 250,000 ACCORDING TO THE 1990 DECENNIAL CENSUS BY THE BUREAU OF THE CENSUS

State	Incorporated place
Alabama	Huntsville.
	Mobile.
	Montgomery.
Alaska	Anchorage.
Arizona	Mesa.
	Tempe.
Arkansas	Little Rock.
California	Anaheim.
	Bakersfield.
	Berkeley.
	Chula Vista.
	Concord.
	El Monte.
	Escondido.
	Fremont.
	Fresno.
	Fullerton.
	Garden Grove.
	Glendale.
	Hayward.
	Huntington Beach.
	Inglewood.
	Irvine.
	Modesto.
	Moreno Valley.
	Oceanside.
	Ontario.
	Orange.
Colorado	Aurora.

APPENDIX G TO PART 122.—INCORPORATED PLACES WITH POPULATIONS GREATER THAN 100,000 BUT LESS THAN 250,000 ACCORDING TO THE 1990 DECENNIAL CENSUS BY THE BUREAU OF THE CENSUS—Continued

State	Incorporated place
	Colorado Springs.
	Lakewood.
	Pueblo.
Connecticut	Bridgeport.
	Hartford.
	New Haven.
	Stamford.
	Waterbury.
Florida	Fort Lauderdale.
	Hialeah.
	Hollywood.
	Orlando.
	St. Petersburg.
	Tallahassee.
Georgia	Columbus.
	Macon.
	Savannah.
Idaho	Boise City.
Illinois	Peoria.
	Rockford.
Indiana	Evansville.
	Fort Wayne.
	Gary.
	South Bend.
Iowa	Cedar Rapids.
	Davenport.
	Des Moines.
Kansas	Kansas City.
	Topeka.
Kentucky	Lexington-Fayette.
Louisiana	Baton Rouge.
	Shreveport.
Massachusetts	Springfield.
	Worcester.
Michigan	Ann Arbor.
	Flint.
	Grand Rapids.
	Lansing.
	Livonia.
	Sterling Heights.
	Warren.
Mississippi	Jackson.
Missouri	Independence.
	Springfield.
Nebraska	Lincoln.
Nevada	Las Vegas.
	Reno.

APPENDIX G TO PART 122.—INCORPORATED PLACES WITH POPULATIONS GREATER THAN 100,000 BUT LESS THAN 250,000 ACCORDING TO THE 1990 DECENNIAL CENSUS BY THE BUREAU OF THE CENSUS—Continued

State	Incorporated place
New Jersey	Elizabeth.
	Jersey City.
	Paterson.
New York	Albany.
	Rochester.
	Syracuse.
	Yonkers.
North Carolina	Durham.
	Greensboro.
	Raleigh.
	Winston-Salem.
Ohio	Akron.
	Dayton.
	Youngstown.
Oregon	Eugene.
Pennsylvania	Allentown.
	Erie.
Rhode Island	Providence.
South Carolina	Columbia.
Tennessee	Chattanooga.
	Knoxville.
Texas	Abilene.
	Amarillo.
	Arlington.
	Beaumont.
	Corpus Christi.
	Garland.
	Irving.
	Laredo.
	Lubbock.
	Mesquite.
	Pasadena.
	Plano.
	Waco.
Utah	Salt Lake City.
Virginia	Alexandria.
	Chesapeake.
	Hampton.
	Newport News.
	Portsmouth.
	Richmond.
	Roanoke.
Washington	Spokane.
	Tacoma.
Wisconsin	Madison.

APPENDIX H TO PART 122.—COUNTIES WITH UNINCORPORATED URBANIZED AREAS WITH A POPULATION OF 250,000 OR MORE ACCORDING TO THE 1990 DECENNIAL CENSUS BY THE BUREAU OF THE CENSUS

State	County	Unincorporated urbanized population
California	Los Angeles	886,780
	Sacramento	594,889
	San Diego	250,414
Delaware	New Castle	296,996
Florida	Dade	1,014,504
Georgia	DeKalb	448,686
Hawaii	Honolulu [1]	114,506
Maryland	Anne Arundel	344,654
	Baltimore	627,593
	Montgomery	599,028

APPENDIX H TO PART 122.—COUNTIES WITH UNINCORPORATED URBANIZED AREAS WITH A POPULATION OF 250,000 OR MORE ACCORDING TO THE 1990 DECENNIAL CENSUS BY THE BUREAU OF THE CENSUS—Continued

State	County	Unincorporated urbanized population
	Prince George's	494,369
Texas	Harris	729,206
Utah	Salt Lake	270,989
Virginia	Fairfax	760,730
Washington	King	520,468

[1] County was previously listed in this appendix; however, population dropped to below 250,000 in the 1990 Census.

APPENDIX I TO PART 122.—COUNTIES WITH UNINCORPORATED URBANIZED AREAS GREATER THAN 100,000 BUT LESS THAN 250,000 ACCORDING TO THE 1990 DECENNIAL CENSUS BY THE BUREAU OF THE CENSUS

State	County	Unincorporated urbanized population
Alabama	Jefferson	78,608
Arizona	Pima	162,202
California	Alameda	115,082
	Contra Costa	131,082
	Kern	128,503
	Orange	223,081
	Riverside	166,509
	San Bernardino	162,202
Colorado	Arapahoe	103,248
Florida	Broward	142,329
	Escambia	167,463
	Hillsborough	398,593
	Lee	102,337
	Manatee	123,828
	Orange	378,611
	Palm Beach	360,553
	Pasco	148,907
	Pinellas	255,772
	Polk	121,528
	Sarasota	172,600
	Seminole	127,873
Georgia	Clayton	133,237
	Cobb	322,595
	Fulton	127,776
	Gwinnett	237,305
	Richmond	126,476
Kentucky	Jefferson	239,430
Louisiana	East Baton Rouge	102,539
	Parish	331,307
	Jefferson Parish	.....
Maryland	Howard	157,972
North Carolina	Cumberland	146,827
Nevada	Clark	327,618
Oregon	Multnomah [1]	52,923
	Washington	116,687
South Carolina	Greenville	147,464
	Richland	130,589
Virginia	Arlington	170,936
	Chesterfield	174,488
	Henrico	201,367
	Prince William	157,131
Washington	Pierce	258,530
	Snohomish	157,218

[1] County was previously listed in this appendix; however, population dropped to below 100,000 in the 1990 Census.

PART 123—STATE PROGRAM REQUIREMENTS

1. The authority citation for part 123 continues to read as follows:

Authority: The Clean Water Act, 33 U.S.C. 1251 *et seq.*

2. Amend § 123.25 by removing the word "and" at the end of paragraph (a)(37), by removing the period at the end of paragraph (a)(38) and adding a semicolon in its place, and by adding paragraphs (a)(39) through (a)(45) to read as follows:

§ 123.25 Requirements for permitting.

(a) * * *

(39) § 122.30 (What are the objectives of the storm water regulations for small MS4s?);

(40) § 122.31 (For Indian Tribes only) (As a Tribe, what is my role under the NPDES storm water program?);

(41) § 122.32 (As an operator of a small MS4, am I regulated under the NPDES storm water program?);

(42) § 122.33 (If I am an operator of a regulated small MS4, how do I apply for an NPDES permit? When do I have to apply?);

(43) § 122.34 (As an operator of a regulated small MS4, what will my NPDES MS4 storm water permit require?);

(44) § 122.35 (As an operator of a regulated small MS4, may I share the responsibility to implement the minimum control measures with other entities?); and

(45) § 122.36 (As an operator of a regulated small MS4, what happens if I don't comply with the application or permit requirements in §§ 122.33 through 122.35?).

* * * * *

3. Add § 123.35 to subpart B to read as follows:

§ 123.35 As the NPDES Permitting Authority for regulated small MS4s, what is my role?

(a) You must comply with the requirements for all NPDES permitting authorities under Parts 122, 123, 124, and 125 of this chapter. (This section is meant only to supplement those requirements and discuss specific issues related to the small MS4 storm water program.)

(b) You must develop a process, as well as criteria, to designate small MS4s other than those described in § 122.32(a)(1) of this chapter, as regulated small MS4s to be covered under the NPDES storm water discharge control program. This process must include the authority to designate a small MS4 waived under paragraph (d) of this section if circumstances change. EPA may make designations under this section if a State or Tribe fails to comply with the requirements listed in this paragraph. In making designations of small MS4s, you must:

(1)(i) Develop criteria to evaluate whether a storm water discharge results in or has the potential to result in exceedances of water quality standards, including impairment of designated uses, or other significant water quality impacts, including habitat and biological impacts.

(ii) Guidance: For determining other significant water quality impacts, EPA recommends a balanced consideration of the following designation criteria on a watershed or other local basis: discharge to sensitive waters, high growth or growth potential, high population density, contiguity to an urbanized area, significant contributor of pollutants to waters of the United States, and ineffective protection of water quality by other programs;

(2) Apply such criteria, at a minimum, to any small MS4 located outside of an urbanized area serving a jurisdiction with a population density of at least 1,000 people per square mile and a population of at least 10,000;

(3) Designate any small MS4 that meets your criteria by December 9, 2002. You may wait until December 8, 2004 to apply the designation criteria on a watershed basis if you have developed a comprehensive watershed plan. You may apply these criteria to make additional designations at any time, as appropriate; and

(4) Designate any small MS4 that contributes substantially to the pollutant loadings of a physically interconnected municipal separate storm sewer that is regulated by the NPDES storm water program.

(c) You must make a final determination within 180 days from receipt of a petition under § 122.26(f) of this chapter (or analogous State or Tribal law). If you do not do so within that time period, EPA may make a determination on the petition.

(d) You must issue permits consistent with §§ 122.32 through 122.35 of this chapter to all regulated small MS4s. You may waive or phase in the requirements otherwise applicable to regulated small MS4s, as defined in § 122.32(a)(1) of this chapter, under the following circumstances:

(1) You may waive permit coverage for each small MS4s in jurisdictions with a population under 1,000 within the urbanized area where all of the following criteria have been met:

(i) Its discharges are not contributing substantially to the pollutant loadings of a physically interconnected regulated MS4 (see paragraph (b)(4) of this section); and

(ii) If the small MS4 discharges any pollutant(s) that have been identified as a cause of impairment of any water body to which it discharges, storm water controls are not needed based on wasteload allocations that are part of an EPA approved or established "total maximum daily load" (TMDL) that address the pollutant(s) of concern.

(2) You may waive permit coverage for each small MS4 in jurisdictions with a population under 10,000 where all of the following criteria have been met:

(i) You have evaluated all waters of the U.S., including small streams, tributaries, lakes, and ponds, that receive a discharge from the MS4 eligible for such a waiver.

(ii) For all such waters, you have determined that storm water controls are not needed based on wasteload allocations that are part of an EPA approved or established TMDL that addresses the pollutant(s) of concern or, if a TMDL has not been developed or approved, an equivalent analysis that determines sources and allocations for the pollutant(s) of concern.

(iii) For the purpose of paragraph (d)(2)(ii) of this section, the pollutant(s) of concern include biochemical oxygen demand (BOD), sediment or a parameter that addresses sediment (such as total suspended solids, turbidity or siltation), pathogens, oil and grease, and any pollutant that has been identified as a cause of impairment of any water body that will receive a discharge from the MS4.

(iv) You have determined that current and future discharges from the MS4 do not have the potential to result in exceedances of water quality standards, including impairment of designated uses, or other significant water quality impacts, including habitat and biological impacts.

(v) Guidance: To help determine other significant water quality impacts, EPA recommends a balanced consideration of the following criteria on a watershed or other local basis: discharge to sensitive waters, high growth or growth potential, high population or commercial density, significant contributor of pollutants to waters of the United States, and ineffective protection of water quality by other programs.

(3) You may phase in permit coverage for small MS4s serving jurisdictions with a population under 10,000 on a schedule consistent with a State watershed permitting approach. Under this approach, you must develop and implement a schedule to phase in permit coverage for approximately 20 percent annually of all small MS4s that qualify for such phased-in coverage. Under this option, all regulated small MS4s are required to have coverage under an NPDES permit by no later than March 8, 2007. Your schedule for phasing in permit coverage for small MS4s must be approved by the Regional Administrator no later than December 10, 2001.

(4) If you choose to phase in permit coverage for small MS4s in jurisdictions with a population under 10,000, in accordance with paragraph (d)(3) of this section, you may also provide waivers in accordance with paragraphs (d)(1) and (d)(2) of this section pursuant to your approved schedule.

(5) If you do not have an approved schedule for phasing in permit coverage, you must make a determination whether to issue an NPDES permit or allow a waiver in accordance with paragraph (d)(1) or (d)(2) of this section, for each eligible MS4 by December 9, 2002.

(6) You must periodically review any waivers granted in accordance with paragraph (d)(2) of this section to determine whether any of the information required for granting the waiver has changed. At a minimum, you must conduct such a review once every five years. In addition, you must consider any petition to review any waiver when the petitioner provides evidence that the information required for granting the waiver has substantially changed.

(e) You must specify a time period of up to 5 years from the date of permit issuance for operators of regulated small MS4s to fully develop and implement their storm water program.

(f) You must include the requirements in §§ 122.33 through 122.35 of this chapter in any permit issued for regulated small MS4s or develop permit limits based on a permit application submitted by a regulated small MS4. (You may include conditions in a regulated small MS4 NPDES permit that direct the MS4 to follow an existing qualifying local program's requirements, as a way of complying with some or all of the requirements in § 122.34(b) of this chapter. See § 122.34(c) of this chapter. Qualifying local, State or Tribal program requirements must impose, at a minimum, the relevant requirements of § 122.34(b) of this chapter.)

(g) If you issue a general permit to authorize storm water discharges from small MS4s, you must make available a menu of BMPs to assist regulated small MS4s in the design and implementation of municipal storm water management programs to implement the minimum measures specified in § 122.34(b) of this chapter. EPA plans to develop a menu of BMPs that will apply in each State or Tribe that has not developed its own menu. Regardless of whether a menu of BMPs has been developed by EPA, EPA encourages State and Tribal permitting authorities to develop a menu of BMPs that is appropriate for local conditions. EPA also intends to provide guidance on developing BMPs and measurable goals and modify, update, and supplement such guidance based on the assessments of the NPDES MS4 storm water program and research to be conducted over the next thirteen years.

(h)(1) You must incorporate any additional measures necessary to ensure effective implementation of your State or Tribal storm water program for regulated small MS4s.

(2) Guidance: EPA recommends consideration of the following:

(i) You are encouraged to use a general permit for regulated small MS4s;

(ii) To the extent that your State or Tribe administers a dedicated funding source, you should play an active role in providing financial assistance to operators of regulated small MS4s;

(iii) You should support local programs by providing technical and programmatic assistance, conducting research projects, performing watershed monitoring, and providing adequate legal authority at the local level;

(iv) You are encouraged to coordinate and utilize the data collected under several programs including water quality management programs, TMDL programs, and water quality monitoring programs;

(v) Where appropriate, you may recognize existing responsibilities among governmental entities for the control measures in an NPDES small MS4 permit (see § 122.35(b) of this chapter); and

(vi) You are encouraged to provide a brief (e.g., two page) reporting format to facilitate compiling and analyzing data from submitted reports under § 122.34(g)(3) of this chapter. EPA intends to develop a model form for this purpose.

PART 124—PROCEDURES FOR DECISIONMAKING

1. The authority citation for part 124 continues to read as follows:

Authority: Resource Conservation and Recovery Act, 42 U.S.C. 6901 *et seq.*; Safe Drinking Water Act, 42 U.S.C. 300(f) *et seq.*; Clean Water Act, 33 U.S.C. 1251 *et seq.*; Clean Air Act, 42 U.S.C. 7401 *et seq.*

2. Revise § 124.52(c) to read as follows:

§ 124.52 Permits required on a case-by-case basis.

* * * * *

(c) Prior to a case-by-case determination that an individual permit is required for a storm water discharge under this section (see § 122.26(a)(1)(v), (c)(1)(v), and (a)(9)(iii) of this chapter), the Regional Administrator may require the discharger to submit a permit application or other information regarding the discharge under section 308 of the CWA. In requiring such information, the Regional Administrator shall notify the discharger in writing and shall send an application form with the notice. The discharger must apply for a permit within 180 days of notice, unless permission for a later date is granted by the Regional Administrator. The question whether the initial designation was proper will remain open for consideration during the public comment period under § 124.11 or § 124.118 and in any subsequent hearing.

[FR Doc. 99–29181 Filed 12–7–99; 8:45 am]
BILLING CODE 6560–50–P

ENVIRONMENTAL PROTECTION AGENCY

[FRL–6472–8]

Report to Congress on the Phase II Storm Water Regulations

AGENCY: Environmental Protection Agency (EPA).

ACTION: Notice of availability of Report to Congress.

SUMMARY: EPA submitted a Report to Congress prior to promulgation of the new Phase II storm water regulations. The Report was required in the Agency's appropriation legislation for fiscal year 2000. The appropriation legislation also requires that USEPA invite public comment on the Report. By this notice, USEPA invites public comment.

DATES: Written comments on this notice and the Report to Congress must be submitted on or before January 7, 2000.

ADDRESSES: The Report to Congress on the Phase II Storm Water Regulations is available through the Internet on the EPA Office of Wastewater Management web site at http://www.epa.gov/owm/sw/phase2. Hard copies may be obtained by contacting the U.S. EPA Water Resource Center, 401 M Street, S.W., Washington, D.C. 20460; telephone: (202) 260–7786 (24-hour voice mail), fax: (202) 260–0386, e-mail: center.resource@epa.gov. Comments should be mailed to George Utting, USEPA, Office of Wastewater Management, Mail Code 4203, 401 M Street, S.W., Washington, D.C. 20460. Comments also may be faxed to (202) 260–1460 or submitted via the Internet to sw2@epamail.epa.gov.

FOR FURTHER INFORMATION CONTACT: George Utting, Office of Wastewater Management, Mail Code 4203, 401 M Street, S.W., Washington, D.C. 20460; telephone (202) 260–9530; email: sw2@epamail.epa.gov.

SUPPLEMENTARY INFORMATION: On October 29, 1999, the Administrator of EPA signed a regulation that implements Section 402(p)(6) of the Clean Water Act. This rulemaking is referred to as the final Phase II storm water rule and is also published in today's **Federal Register**.

The Phase II storm water rule expands the existing National Pollutant Discharge Elimination System (NPDES) permitting program to address storm water runoff from construction sites between one and five acres and municipal separate storm sewer systems in urbanized areas serving populations of less than 100,000. The Phase II rule builds on the existing Phase I program, which controls storm water runoff from municipalities with populations greater than 100,000 and 11 industrial categories, including construction disturbing over five acres.

Statutory Authority

The Report to Congress on the Phase II Storm Water Regulations was required by section 431(a) of the Departments of Veterans Affairs and Housing and Urban Development and Independent Agencies Appropriations Act of 2000, Public Law 106–74 (1999) (Appropriations Act). Section 431(a) of the Appropriations Act directed EPA to submit a report that addresses the following issues with respect to the Phase II Storm Water Rule: (1) An analysis of the impact of the rule on local governments, (2) an explanation of the rationale for lowering the threshold for regulation of construction sites from 5 acres to 1 acre, (3) an explanation of why the coverage of the regulation is based on a census-determined population instead of a water quality threshold and documentation that storm water runoff is generally a problem in communities with populations of 50,000 to 100,000, and (4) information that supports the position of the Administrator that the Phase II storm water program should be administered as part of the NPDES permit program.

On October 28, 1999, EPA delivered to the Committee on Environment and Public Works in the Senate and the Committee on Transportation and Infrastructure in the House of Representatives a report that satisfied the mandate of section 431(a). Section 431(c) of the Appropriations Act directs EPA to publish the report in the **Federal Register** for public comment. By today's notice, EPA invites public comment by January 7, 2000. EPA will carefully review and evaluate comments received and determine whether the comments warrant further action.

Dated: November 4, 1999.

J. Charles Fox,

Assistant Administrator, Office of Water.

[FR Doc. 99–29301 Filed 12–7–99; 8:45 am]

BILLING CODE 6560–50–P

EPA

United States
Environmental Protection Agency
(4203)
Washington, DC 20460

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004244

STATE OF CALIFORNIA
STATE WATER RESOURCES CONTROL BOARD

ORDER: WQ 2000 - 11

In the Matter of the Petitions of
THE CITIES OF BELLFLOWER, ET AL., THE CITY OF ARCADIA, AND WESTERN STATES PETROLEUM ASSOCIATION
Review of January 26, 2000 Action of the Regional Board
and
Actions and Failures to Act
by both the
California Regional Water Quality Control Board,
Los Angeles Region and Its Executive Officer
Pursuant to Order No. 96-054,
Permit for Municipal Storm Water and Urban Run-Off Discharges Within
Los Angeles County
[NPDES NO. CAS614001]

SWRCB/OCC FILES A-1280, A-1280(a) and A-1280(b)

BY THE BOARD:

On July 15, 1996, the Los Angeles Regional Water Quality Control Board (Regional Water Board) issued a revised national pollutant discharge elimination system (NPDES) permit in Order No. 96-054 (permit) to the 85 incorporated cities and the county within Los Angeles County (the County).[1] The permit covers storm water discharges from municipal separate storm sewer systems throughout the County.[2]

[1] This was the second storm water permit adopted for Los Angeles County and its cities. The first permit was the subject of an earlier Order. (In the Matter of Natural Resources Defense Council, Inc., Order WQ 91-04). In this permit, the County is designated as the Principal Permittee, and each city is designated as a permittee. The County is required to submit various documents on behalf of all of the permittees.
[2] The Regional Water Board has since issued a separate permit for one city, Long Beach. The relevant provisions of the Long Beach permit are similar to those in Order No. 96-054.

The permit contains provisions for the regulation of storm water discharges from development planning and construction.[3] Pursuant to these provisions, the County was required to submit Standard Urban Storm Water Mitigation Plans (SUSMPs).[4] The SUSMPs are plans that designate best management practices (BMPs) that must be used in specified categories of development projects. The County submitted SUSMPs, but the Regional Water Board approved the SUSMPs only after making revisions. The Executive Officer issued the revised SUSMPs on March 8, 2000.[5]

On February 25, 2000, the State Water Resources Control Board (State Water Board or Board) received a petition for review of the actions and failures to act regarding the SUSMPs from a number of cities, the Building Industry Association of Southern California and the Building Industry Legal Defense Foundation (jointly referred to as Cities). A second petition was received from the City of Arcadia. And a third petition was received from the Western States Petroleum Association (WSPA). On April 7, 2000, the petitioners filed amendments to their petitions, concerning the March 8, 2000 issuance of the SUSMPs. The Cities' amendment also revised the list of cities included in the petition. The Cities' petition now includes 32 cities. The petitions are legally and factually related, and have therefore been consolidated for purposes of review.[6] The petitioners also requested a stay of the SUSMPs. This request was denied by letter, dated May 11, 2000.

[3] Permit, Part 2.III. These provisions focus more on post-construction impacts of development than on discharges from construction activities.
[4] Permit, Part 2.III.A.1.c.
[5] These are referred to herein as the Final SUSMPs. The Final SUSMPs also apply to Long Beach, even though it is subject to a separate permit.
[6] Cal. Code of Regs., tit. 23, section 2054.

On June 7 and 8, 2000, the Board held a hearing in Torrance. Several entities, including the petitioners, the Regional Water Board, and several environmental groups[7], were designated parties. The evidence from that hearing has been included in the record before the Board. The record for comments on the petition was kept open until the end of the hearing. The parties were allowed to submit post-hearing briefs.[8]

I. BACKGROUND

In prior Orders[9] this Board has explained the need for the municipal storm water programs and the emphasis on BMPs in lieu of numeric effluent limitations. The emphasis for preventing pollution from storm water discharges is still on the development and implementation of effective BMPs, but with the expectation that the level of effort will increase over time. In its Interim Permitting Approach[10], the United States Environmental Protection Agency (U.S. EPA) stated that first-round permits should include BMPs, and expanded or better-tailored BMPs in subsequent permits where necessary to attain water quality standards. Dischargers, consultants, and academic institutions in California and nationwide have conducted numerous studies on the effectiveness of BMPs and appropriate design standards. While many questions are still

[7] The environmental groups are Natural Resources Defense Council, Inc., Santa Monica BayKeeper, and Heal the Bay.

[8] There are several documents that were not timely received and, therefore, are not made a part of the record before the Board. The hearing notice specified that all evidence from parties must be received by May 31, 2000. The Regional Water Board submitted documents on June 6, 2000. The hearing notice specified that policy statements were due by the close of the hearing. Several comment letters were received June 12, 13, and 19, 2000. None of these submittals are a part of the record. The post-hearing briefs were subject to a 10-page limit. The environmental groups submitted objections to the post-hearing brief submitted by the Cities. First, the environmental groups challenge the length of the brief. All briefs were subject to a 10-page limit. The Cities submitted a 10-page brief, with a 22-page attachment showing extensive proposed revisions to the SUSMPs. This submittal violates the page limit, and only the brief is considered part of the record. Second, the environmental groups claim that an e-mail message referred to by the petitioners is subject to attorney-client privilege and should not have been used in this hearing. This e-mail message, from the Regional Water Board's counsel to one of its engineers, was placed in the Regional Water Board's administrative record and submitted to the State Water Board. Any privilege that may have attached to the message has been waived and no longer exists. Finally, the post-hearing brief from the City of Arcadia was received late and will not be considered. Documents submitted late for interim deadlines (such as the deadline for submitting responses to the petitions), have been included in the record.

[9] See, especially Orders WQ 91-03 (In the Matter of Citizens for a Better Environment et al.) and WQ 91-04.

[10] Interim Permitting Approach for Water Quality-Based Effluent Limitations in Storm Water Permits. (61 Federal Register 57425.)

outstanding, more is expected of municipal dischargers, and many are implementing more effective programs.

While storm water management plans are improving, our knowledge of the impacts is also growing. Urban runoff has been determined to be a significant contributor of impairment to waters throughout the state. In Los Angeles specifically, beach closures are sometimes associated with urban runoff. In adopting the SUSMPs, the Regional Water Board took note of the urgent need for preventing further pollution from urban runoff and storm water discharges.

It is important to emphasize the role of the SUSMPs within the totality of regulating storm water discharges, and the purpose of these particular control measures. The requirement to prepare SUSMPS was part of the development controls in the permit. In addition to development controls, the permit requires education, public outreach, programs to restrict illicit connections and discharges, and controls on public facilities. In the context of the entire effort required by the permit, the development controls can be seen as preventing the existing situation from becoming worse.

The Final SUSMPs include a list of mandatory BMPs for nine categories of development. There are provisions that are applicable to all categories and lists of BMPs for individual categories. Requirements applicable to all categories include provisions to limit erosion from new development and redevelopment, requirements to conserve natural areas, protection of slopes and channels, and storm drain stenciling. Examples of BMPs specific to categories of discharge include design of loading docks for commercial projects and design of fueling areas for retail gasoline outlets. In most respects, the Final SUSMPs were similar to those proposed by the County. The significant departures were the inclusion of a numeric design standard for structural or treatment control BMPs, and the inclusion of certain types of projects that were not

covered in the County's proposal. The design standard creates objective and measurable criteria for the amount of runoff that must be treated or infiltrated by BMPs.

The record indicates that the purpose of the development controls, including the SUSMPs, is not simply to prevent pollution associated with construction runoff. As the petitioners point out, construction discharges are already subject to this Board's Statewide Construction Permit. The development controls in the SUSMPs, on the other hand, focus on post-construction runoff. They are aimed at limiting not just the pollutants in runoff from the new development, but also the volume of runoff that enters the municipal storm sewer system. By limiting runoff from new development, the SUSMPs prevent increased impacts from urban runoff generally. There is adequate technical information in the record to show that by controlling the volume of runoff from new development, BMPs can be effective in reducing the discharge of pollutants in storm water runoff.

The Procedure for Adopting the SUSMPs

The permit requires a program for controls on Development Planning and Construction. It involved a number of submissions by the County in consultation with the Cities. The first step was submission of a checklist for determining priority projects and exempt projects. The checklist was due on January 30, 1998. A list of recommended BMPs for development projects was also due on that date. The SUSMPs were due within six months of approval of the BMP list, and were to incorporate BMPs for certain categories of development. Following approval of the SUSMPs, the cities and County were to implement development programs for priority projects, consistent with the BMP list and the SUSMPs.

The BMP list was not approved until April 22, 1999. Thereafter, the County submitted proposed SUSMPs on July 22, 1999. The Regional Water Board held a public workshop on

August 10, 1999. Following the workshop, the County submitted revisions to the SUSMPs on August 12, 1999. On August 16, 1999, the Regional water Board gave notice that it would discuss the SUSMPs in a public meeting on September 16, 1999. There was significant discussion at that meeting regarding the intent of the Executive Officer to approve the SUSMPs, but with revisions including a numeric design standard. At the conclusion of the meeting, the Regional Water Board members asked the Executive Officer to revise the SUSMPs and bring them back to another meeting. On December 7, 1999, the Executive Officer circulated revised SUSMPs for public review. This document incorporated a numeric design standard and made other revisions to the permittees' proposal. The Regional Water Board held a hearing on the SUSMPs on January 26, 2000. At that meeting, the Regional Water Board endorsed the SUSMPs revised by the Executive Officer, but directed him to make further changes. The Executive Officer issued the Final SUSMPs on March 8, 2000.

The Contents of the Final SUSMPs

The permit provides that the SUSMPs must incorporate the appropriate elements of the BMP list and, at a minimum, apply to seven development categories: 100-plus home subdivisions; 10-plus home subdivisions; 100,000-plus square foot commercial developments; automotive repair shops; retail gasoline outlets; restaurants; and hillside single-family dwellings.

The SUSMPs proposed by the County applied to these seven categories. Various BMPs applied to the different categories, and the SUSMPs contained narrative mitigation requirements for source control and treatment. The July proposals stated:

> "The development must be designed so as to mitigate (infiltrate and/or treat) the site runoff generated from impervious directly connected areas that may contribute pollutants of concern to the storm water conveyance system."

There were no numeric design criteria for mitigation. According to various participants, earlier County drafts had included design standards to mitigate flows from 0.6-inch storm events. But any numeric criteria had been removed from the version that was submitted.

In its revised SUSMPs, submitted on August 12, the County explained in its cover letter that the mitigation language did not mean that all runoff must be mitigated. Rather, the County's intent was to omit a numerical standard from the SUSMPs. The revised SUSMPs no longer referred to mitigation at all. Instead, the following language replaced the mitigation requirement:

> "The development must be designed so as to minimize, to the maximum extent practicable (MEP), the introduction of pollutants of concern that may result in significant impacts, generated from site runoff of directly connected impervious areas (DCIA), to the storm water conveyance system as approved by the building official."

The Final SUSMPs, as approved by the Executive Officer and the Regional Water Board, included several revisions from the County's submittal. The revision that is of greatest concern to the petitioners is the addition of Design Standards for Structural or Treatment Control BMPs.[11] The design standards require that developments subject to the SUSMPs shall be designed to mitigate storm water runoff (by treatment or infiltration) from one of the following:

> "1. The 85th percentile 24-hour runoff event determined as the maximized capture storm water volume for the area…, or
> 2. The volume of annual runoff based on unit basin storage water quality volume, to achieve 80 percent or more volume treatment…, or
> 3. The volume of runoff produced from a 0.75 inch storm event, prior to its discharge to a storm water conveyance system, or
> 4. The volume of runoff produced from a historical-record based reference 24-hour rainfall criterion for "treatment" (0.75 inch average for the Los Angeles County area) that achieves approximately the same reduction in pollutant loads achieved by the 85th percentile 24-hour runoff event."

[11] The Final SUSMPs also include the narrative language quoted from the County's August 22, 1999 proposal.

The Final SUSMPs also applied to two additional categories of development: parking lots over 5,000 square feet or with 25 or more spaces and exposed to storm water, and to developments in environmentally-sensitive areas. Other revisions included application to all projects in the categories instead of discretionary projects only and the definition of redevelopment.

II. CONTENTIONS AND FINDINGS[12]

Contention: The petitioners contend that the Regional Water Board erred in not complying with the Administrative Review Process within the permit, and acted arbitrarily and capriciously and in violation of the Clean Water Act and state law.

Finding: The permit required the County, in consultation with the cities subject to the permit, to submit SUSMPs. The permit includes some general minimum requirements for the SUSMPs.[13] The Executive Officer is granted authority to approve the SUSMPs.[14]

The permit also contains an administrative review process.[15] The permit states that the administrative review process "formalizes the procedure for review and acceptance of reports and documents" and "provides a method to resolve any differences in compliance expectations between the Regional Board and Permittees, prior to initiating enforcement action."[16] Following this introductory statement, the permit includes two procedures. The first is for review and approval or disapproval of reports and documents. The second is the dispute resolution section that must be followed prior to enforcement action.

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[12] This Order does not address all of the issues raised by the petitioners. The Board finds that the issues that are not addressed are insubstantial and not appropriate for State Water Board review. (See *People v. Barry* (1987) 194 Cal.App.3d 158, [239 Cal.Rptr. 349], Cal. Code Regs., tit. 3, § 052.)
[13] Permit, Part 2, III.A.1.c.
[14] Permit, Part 2, III.A.2.
[15] Permit, Part 2, I.G.
[16] *Id*.

The process for review of documents that are subject to the Executive Officer's approval is that the Executive Officer will notify the permittees of the results of the review and approval or disapproval within 120 days. If the Executive Officer does not do so, the permittees must notify the Regional Water Board of their intent to implement the documents without approval. The Executive Officer then has 10 days to respond, or the permittees may implement the program and the Executive Officer may not make modifications.

The dispute resolution procedure is to be used when the Executive Officer determines that a permittee's storm water program is insufficient to meet the permit's provisions. The Executive Officer must send a "Notice of Intent to Meet and Confer" with the permittee. A meet and confer period then ensues, resulting in a written "Storm Water Program Compliance Amendment (SWPCA)." The permittee is provided time to comply with the SWPCA. The Executive Officer is not allowed to take enforcement action against a permittee until the Executive Officer notifies the permittee in writing that the administrative review process has been exhausted and that a violation exists warranting enforcement.

The petitioners contend that the Executive Officer failed to notify the permittees that their SUSMPs were inadequate within 120 days of its submittal. The petitioners also argue that, by revising the SUSMPs without pursuing the dispute resolution process, the Regional Water Board "violated" the terms of the permit.

The provision for review of documents, which clearly includes the SUSMPs, requires that the Executive Officer notify the permittees of the results of the review and approval or disapproval within 120 days. The County submitted the revised SUSMPs on August 12, 1999. Within 120 days, the Regional Water Board held a workshop where staff expressed their concerns with the SUSMPs. Also within 120 days the Regional Water Board itself held a public

meeting where there was extensive discussion and concern by board members that the SUSMPs did not include a numeric standard. And, prior to any notification by the permittees that they would proceed with implementing their SUSMPs, the Regional Water Board held a hearing January 26, 2000, where it directed the Executive Officer to issue the SUSMPs with revisions. The Executive Officer did so on March 8, 2000.

It is clear from the record that the Executive Officer, and the Regional Water Board itself, did inform the permittees that the SUSMPs were inadequate. There was no requirement for a specific form for expressing disapproval of documents. The extensive discussion and meetings on the need for revisions to the SUSMPs, and the Executive Officer's approval of revised SUSMPs, plainly refutes the allegation that the Regional Water Board never notified the permittees of its disapproval of the County's proposed SUSMPs.

The permittees also claim that the Regional Water Board "violated" the permit by failing to institute the meet and confer process.[17] The dispute resolution process, which includes meet and confer, did not apply to the decision to disapprove the proposed SUSMPs. That process is only required when the Regional Water Board ultimately takes an enforcement action against a permittee. It is separate from the process for review and approval or disapproval of documents, and does not even appear to relate to possible enforcement actions for submission of inadequate documents. This is illustrated by the fact that the provision regarding documents refers to submittals from both the Principal Permittee and the individual permittees, while the dispute resolution provision refers only to the permittees. This distinction is relevant because the County is charged with submitting the documents, while the individual permittees are responsible for compliance. A fair reading of the entire section on the administrative review process is that the

[17] We note that permits are issued to permittees to allow discharges to waters of the state. It is only permittees, and not Regional Water Boards, who can be charged with violating permits.

review and approval or disapproval of documents applies to submission of documents by the County on behalf of the cities, while the dispute resolution process applies to enforcement actions against any permittees for failing to implement adequate programs.

Contention: The petitioners contend that the Regional Water Board was not authorized to revise the SUSMPs to add more stringent requirements.

Finding: The petitioners contend that the mitigation standards in the SUSMPs are more stringent than the requirement in the permit to reduce pollutants in storm water runoff to the maximum extent practicable (MEP)[18]. The issue of what level of protection constitutes MEP will be discussed *Infra*, in the discussion of the reasonableness of the numeric standards. But the petitioners also make certain procedural claims on this point. They argue that in approving the BMP list, the Regional Water Board determined that those BMPs constituted MEP and that the Board could not add additional BMPs in the SUSMPs. They also contend the Regional Water Board itself had no authority to "usurp" the Executive Officer's role in reviewing the SUSMPs.[19] Finally, the petitioners contend that the Regional Water Board was not authorized to mandate a program for the permittees without amending the permit.

The permit requires the County to submit a list of BMPs for approval. The Regional Water Board approved this list. Following approval of the list, the County was required to submit the SUSMPs, which must "incorporate the appropriate elements of the recommended BMPs list."[20] The petitioners contend that by approving the list, the Regional Water Board determined that those BMPs constituted MEP, and that under the terms of the permit the Regional Water Board could not require additional BMPs.

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[18] The technology-based standard for controls under municipal storm water permits is MEP. For a fuller discussion of this standard, see Order WQ 91-03.
[19] It is undisputed that, at its January 26, 2000 meeting, the Board directed the Executive Officer to make additional revisions to the SUSMPs.
[20] Permit, Part 2, III.A.1.c.

In addressing this contention, we face what appears to be a fundamental misunderstanding of the numeric design standards on the part of the petitioners. The design standards are objective criteria that developers must achieve in designing their BMPs. The design standards are not separate BMPs. The standards tell what magnitude of storm event the BMPs must be designed to treat or infiltrate. They do not specify the BMPs that must be employed.

The SUSMPs as submitted by the County specify BMPs for various categories of development. Many of these BMPs are designed to minimize the pollutants in storm water runoff, by reducing flow through infiltration or by treatment. Examples of BMPs proposed by the County include infiltration basins and trenches, oil/water separators, and media filtration. The County's proposed SUSMPs also included language requiring minimizing the introduction of pollutants to the storm water conveyance system. That language remains unchanged in the Final SUSMPs. The only significant difference between the two versions of the SUSMPs was that the Regional Water Board established numeric criteria for designing the BMPs.

In adopting the Final SUSMPs, the Regional Water Board based its decision on the MEP standard.[21] The Regional Water Board did not significantly revise the BMP list or specify further the actions that developers must take to comply with the SUSMPs. Thus, we find that the Regional Water Board did not inappropriately revise its determination of what constituted MEP.

The Regional Water Board is the political body responsible for water quality control in the Los Angeles region.[22] While the Regional Water Board may delegate specified powers and duties to its Executive Officer,[23] it can at any time act on its own behalf. The fact that the Board authorized its Executive Officer to approve the SUSMPs in the permit did not mean that the Board thereby denied itself the opportunity to provide direction to the Executive Officer in his

[21] Resolution R-00-02.
[22] Water Code sections 13200 and 13225.
[23] Water Code section 13223.

approval. Such an interpretation of its delegation authority would result in an improper failure of the Board to assume responsibility for water quality in the region.

We also find that the Regional Water Board was authorized to revise the SUSMPs to achieve compliance with the permit's requirements. The SUSMPs are a part of implementation of the permit. Because the permit regulates storm water discharges throughout the entire Los Angeles region and it is implemented by 85 cities and the County, it is obvious that the permit could not spell out every detail of the program for the five-year term of the permit. Instead, the implementation is through the submission, review and approval, and implementation of various programs, including the SUSMPs.[24] Where it receives a submission that it finds is not consistent with the requirements of the permit, it is reasonable for the Regional Water Board to be able to require revisions. The Regional Water Board is not required to amend the permit each time it approves a submittal or approves a submittal with revisions. On the other hand, if the Regional Water Board's action in requiring revisions is inconsistent with the terms of the permit, then the Board should not act without first amending the permit. While the Regional Water Board could have required the County to make the revisions rather than making them itself, we see no harm in the Regional Water Board's approach.

As will be discussed below, in most respects the Final SUSMPs are consistent with the permit. But there are some portions of the SUSMPs that are not consistent, and in those cases the SUSMPs provisions are further revised in this Order.

Contention: The petitioners make various procedural claims, including that they were denied due process, and that the Regional Water Board violated the Administrative Procedure

[24] A fuller discussion of the use of storm water management plans to incorporate a developing program is found in Order No. WQ 91-03.

Act, the California Environmental Quality Act (CEQA), and the California Constitution, Article XIII B, section 6 (regarding state mandates).

Finding: The petitioners point out that at the January 26, 2000 Regional Water Board hearing, there was some confusion over late changes to the SUSMPs and they contend they were not provided adequate opportunity to comment. There was significant discussion of the SUSMPs over several months. We do not agree with the petitioners that a program of this magnitude must necessarily take years to develop. But we are concerned that at the January 26, 2000 hearing, interested persons and permittees were not given adequate time to review late revisions or to comment on them. Given the intense interest in this issue, the Regional Water Board should have diverged from its strict rule limiting individual speakers to three minutes and conducted a more formal process. Such a process should provide adequate time for comment, including continuances where appropriate.[25] But to the extent the Regional Water Board's process caused any harm, this Board cured those harms. We held a two-day hearing in Los Angeles County, where all parties were allowed significant time to present their positions and testimony. In addition, we allowed the introduction of new evidence that had not been presented to the Regional Water Board. At this point, all parties have been afforded a full opportunity to review the Final SUSMPs, to present their positions and evidence, and to engage in cross-examination. The petitioners' due process rights have been protected.

The Board has already addressed the contentions regarding compliance with other laws in prior decisions. The Administrative Procedure Act exempts the adoption of permits from its requirements.[26] While the SUSMPs are not a permit, they are implementing documents for a

[25] For future adjudicative proceedings that are highly controversial or involve complex factual or legal issues, we encourage regional water boards to follow the procedures for formal hearings set forth in Cal. Code of Regs., tit. 23, section 648 et seq.

[26] Government Code section 11352; See, Order No. 95-4 (In the Matter of the City and County of San Francisco).

permit, and are therefore subject to the exemption. Moreover, they are relevant only to this permit, and are not a general rule of application. The constitutional provisions regarding state mandates also do not apply to NPDES permits.[27] As will be explained below, the SUSMPs as revised herein, are consistent with MEP and therefore are federally mandated. The provisions of CEQA requiring adoption of environmental documents also do not apply to NPDES permits.[28] Again, as an implementing document for the permit, there is no requirement for a separate CEQA analysis.[29]

Contention: The petitioners contend that the SUSMPs do not properly apply the maximum extent practicable standard.

Finding: The permit, consistent with Clean Water Act section 402(p)(3)(B)(iii), requires controls to reduce the discharge of pollutants to the maximum extent practicable, or MEP.[30] In approving the Final SUSMPs, the Regional Water Board acknowledged that one of the primary objectives of the municipal storm water program is the requirement to reduce the discharge of pollutants from storm water conveyance systems to the MEP.[31] While all parties appear to agree that the standard for the SUSMPs is MEP, they disagree about what level of effort is necessary to comply with that standard.

The petitioners approach this issue from two angles. First, they contend that the SUSMPs will not provide water quality benefits that reflect MEP. Second, they contend that there could be adverse impacts on groundwater quality that have not been adequately evaluated.

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[27] See, Order No. WQ 90-3 (In the Matter of San Diego Unified Port District).
[28] Water Code section 13389.
[29] We do note with interest the environmental groups' comment that if the permittees believed it was necessary to comply with the APA and CEQA prior to adoption of the SUSMPs, then they themselves would have violated those acts in their submissions of the proposed SUSMPs.
[30] Permit, Finding 13.
[31] Final SUSMPs, at page 2; Resolution No. R-00-02, at page 3.

Storm Water Design Standards as MEP

In adopting the Final SUSMPs, the Regional Water Board found that many rivers and streams in Los Angeles County are impaired for pollutants found in storm water and urban runoff, and that storm water runoff carries pollutants from nearly all types of developed properties.[32] Pollutant loading from the aggregate of development in the basin results in impairments from sediments, metals, complex organic compounds, oil and grease, nutrients, and pesticides.[33] The Final SUSMPs reflect two goals: to reduce the amounts of these pollutants in runoff and to reduce the ability of runoff to act as a conveyance system to deliver more pollutants to receiving waters. The Final SUSMPs, which include lists of BMPs and design standards requiring treatment or infiltration, address these two goals.

Clean Water Act section 402(p)(3)(B)(iii), which sets forth the requirements for establishing MEP in municipal storm water permits, provides that such permits "shall require controls to reduce the discharge of pollutants to the maximum extent practicable, including management practices, control techniques and system, design and engineering methods, and such other provisions as the Administrator or the State determines appropriate for the control of such pollutants." The United States Environmental Protection Agency (U.S. EPA), in a guidance document, explains that BMPs should be used in first-round storm water permits, and "expanded or better-tailored BMPs in subsequent permits, where necessary, to provide for the attainment of water quality standards."[34] The Clean Water Act, as interpreted by U.S. EPA, does require that, in a second-round permit,[35] expanded BMPs may be appropriate. In light of the number of water

[32] Resolution No. R-00-02.
[33] *Id*.
[34] Interim Permitting Approach for Water Quality-Based Effluent Limitations in Storm Water Permits, 61 Federal Register 57425 (1996).
[35] The original permit was issued in 1990. The 1996 permit is a second-round permit.

bodies impaired by runoff in Los Angeles County, it was appropriate to expand the scope of BMPs during the permit term.

The regulations implementing section 402(p) specifically require municipalities to have controls to reduce the discharge of pollutants from their storm sewer systems that "receive discharges from areas of new development and significant redevelopment," including post-construction discharges.[36] Clearly, it was appropriate for the Regional Water Board to require BMPs for new development and significant redevelopment. The permittees, who submitted their own version of SUSMPs with listed BMPs for categories of development, appear to have no real quarrel with this general mandate.

This Board has already endorsed requirements to limit the flow of the "first flush" of storm water, which may contain more significant pollutants.[37] The permittees' own version of the SUSMPs required mitigation of storm water runoff by treatment or infiltration, thus conceding the propriety of these two approaches to lessening the impact of storm water discharges. The crux of the disagreement is that the Regional Water Board added numeric design standards to establish the amount of runoff that must be treated or infiltrated, and required the mandatory application of these standards to categories of development.

The addition of measurable standards for designing the BMPs provides additional guidance to developers and establishes a clear target for the development of the BMPs. The U.S. EPA guidance manual suggests the use of design criteria and performance standards for post-construction BMPs.[38] The numeric criteria the Regional Water Board adopted essentially

[36] 40 CFR section 122.26(d)(2)(iv)(A)(2).
[37] In the Matter of National Steel and Shipbuilding Company, et al., Order WQ 98-07, at slip opinion 7.
[38] Guidance Manual for the Preparation of Part 2 of the NPDES Permit Applications for Discharges from Municipal Separate Strom Sewer Systems, at page 6-4 (November 1992).

requires that 85 percent of the runoff from the development be infiltrated or treated.[39] In adopting these standards, the Regional Water Board based its decision on a research review of standards in other states and a statistical analysis of the rainfall in the area. The standard was set to gain the maximum benefit in mitigation while imposing the least burden on developers.[40] In light of the evidence of the use of this or more stringent standards in other states, the expert testimony supporting this standard, the endorsement by U.S. EPA in its comments, and the cost-effectiveness of its implementation (discussed below), the Regional Water Board acted appropriately in determining that the standards reflect MEP.[41]

We also find that the Regional Water Board appropriately applied these standards to seven of the categories listed in the SUSMPs: single-family hillside residences, 100,000 square foot commercial developments, automotive repair shops, restaurants, home subdivisions with 10 to 99 housing units, home subdivisions with 100 or more housing units, and parking lots with 5,000 square feet or more or with 25 or more parking spaces and potentially exposed to storm water runoff.[42] These categories, except for parking lots, were already targeted for special treatment in the permit. The evidence shows that each listed category can be a significant source of pollutants and/or runoff following development. It is appropriate that the design standards apply so that BMPs for these categories of development result in the infiltration or treatment of a significant about of the runoff.

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[39] Four different methods of calculation are permitted, so the percentage of capture may vary slightly.

[40] At the hearing in this matter, Regional Water Board staff explained that the standard was set at the bottom of the "knee" of the curve where the benefits of the mitigation requirements decrease and the cost increases. Other states have set the standard higher along this curve, requiring 90 to 95 percent mitigation.

[41] This conclusion in no way departs from our acceptance of BMPs in lieu of numeric effluent limitations in storm water permits. (See, e.g., Order WQ 91-03 and Order WQ 91-04.) The numeric standard is a design standard for BMPs. It does not quantify or limit the pollutants in the effluent. It also does not specify which of the listed BMPs must be employed.

[42] As discussed below, this Board is revising the SUSMPs to delete the application of the design standards to retail gasoline outlets and to locations within or directly adjacent to or discharging directly to environmentally-sensitive areas.

Potential Impacts on Ground Water

The petitioners contend that infiltration of runoff may lead to ground water pollution, and that the Regional Water Board did not properly consider such potential impacts. The mitigation standards provide for a waiver where there is a risk of ground water contamination because a known unconfined aquifer lies beneath the land surface or an existing or potential underground source of drinking water is less than ten feet from the soil surface.[43] The Final SUSMPs also include a discussion on how to use infiltration so that the risk of contamination of groundwater is reduced, and where infiltration is not appropriate.[44]

The Regional Water Board did consider the potential impacts to groundwater from infiltration, and included appropriate limitations and guidance on its use as a BMP. These provisions will ensure adequate protection of groundwater from any adverse impacts due to infiltration.

Contention: The petitioners contend the Regional Water Board failed to show that the SUSMPs as adopted are cost-effective and that the benefits to be obtained outweigh the costs.

Finding: The petitioners refer to the Preamble to the Phase II storm water regulations[45] as the basis for their economic argument. The quoted language, however, does not wholly support the petitioners' contention. The Preamble states that President Clinton's Clean Water Initiative clarifies "that the maximum extent practicable standard should be applied in a site-specific, flexible manner, taking into account cost considerations as well as water quality effects."[46] It is clear that cost should be considered in determining MEP; this does not mean that

[43] Final SUSMP, page 14.
[44] *Id*., at page 15.
[45] 64 Federal Register 68722 and following. These regulations do not apply to the permit, but the general language on MEP is relevant to EPA's interpretation of the standard.
[46] 64 Federal Register 68722, 68732 (December 8, 1999).

the Regional Water Board must demonstrate that the water quality benefits outweigh the economic costs.

While the standard of MEP is not defined in the storm water regulations or the Clean Water Act, the term has been defined in other federal rules. Probably the most comparable law that uses the term is the Superfund legislation, or CERCLA, at section 121(b). The legislative history of CERCLA indicates that the relevant factors, to determine whether MEP is met in choosing solutions and treatment technologies, include technical feasibility, cost, and state and public acceptance.[47] Another example of a definition of MEP is found in a regulation adopted by the Department of Transportation for onshore oil pipelines. MEP is defined as to "the limits of available technology and the practical and technical limits on a pipeline operator . . . ."[48]

These definitions focus mostly on technical feasibility, but cost is also a relevant factor. There must be a serious attempt to comply, and practical solutions may not be lightly rejected. If, from the list of BMPs, a permittee chooses only a few of the least expensive methods, it is likely that MEP has not been met. On the other hand, if a permittee employs all applicable BMPs except those where it can show that they are not technically feasible in the locality, or whose cost would exceed any benefit to be derived, it would have met the standard. MEP requires permittees to choose effective BMPs, and to reject applicable BMPs only where other effective BMPs will serve the same purpose, the BMPs would not be technically feasible, or the cost would be prohibitive. Thus while cost is a factor, the Regional Water Board is not required to perform a cost-benefit analysis.

In reviewing the record, it is apparent that the Regional Water Board did evaluate the cost of the SUSMPs. While the petitioners claim there is no evidence in the record to show the

[47] 132 Cong. Rec. H 9561 (Oct. 8, 1986).
[48] 49 CFR section 194.5.

SUSMPs are necessary and cost effective, the opposite is true. The record is replete with documentation of costs of pilot mitigation projects, studies from similar programs in other states, and research studies. The Regional Water Board complied with the requirement to consider cost.

The Regional Water Board found that the cost to include BMPs that will meet the mitigation criteria will be one to two percent of the total development cost. This amount appears reasonable, especially in light of the amount of impervious surface already in Los Angeles County and the impacts on impaired water bodies. In considering the cost of compliance, it is also important to consider the costs of impairment. The beach closures in the Los Angeles region, well documented in the evidence, have reached critical proportions. These beach closures clearly have a financial impact on the area, and should be positively affected by the SUSMPs.

We do note that there could be further cost savings for developers if the permittees develop a regional solution for the problem. We recommend that the cities and the County, along with other interested agencies, work to develop regional solutions so that individual dischargers are not forced to create numerous small-scale projects. While the SUSMPs are an appropriate means of requiring mitigation of storm water discharges, we also encourage innovative regional approaches.[49]

Contention: The petitioners have raised contentions regarding details of the SUSMPs, including the amount of time allowed for inclusion of SUSMPs in local ordinances, and their application to both "discretionary" and "non-discretionary" projects. In addition, during the hearing certain ambiguities in the wording of the Final SUSMPs became apparent, including the provisions regarding redevelopment and environmentally-sensitive areas. In this portion of the

[49] We note that the SUSMPs as written do not in any way preclude the development of regional solutions approved by the Regional Water Board as a means to comply with the BMP and design standard requirements.

Order we address these issues and also the application of the design standards to retail gasoline outlets (RGOs) and the waiver funding requirements.

Finding: The testimony at the hearing in this matter revealed that there are specific provisions of the SUSMPs that create confusion as to the types of development projects subject to the mitigation design standards. The petitioners also contend that application of the standards to specific types of development either is unreasonable or is inconsistent with the terms of the permit. The specific requirements are discussed below.

Retail Gasoline Outlets

Petitioner WSPA contends that RGOs should be excluded from the SUSMPs. Its petition raised the same general contentions as the other petitioners, but at the hearing WSPA presented evidence specific to RGOs. In particular, WSPA raised questions about the propriety of applying the design standards for BMPs to RGOs. In considering this issue, we conclude that construction of RGOs is already heavily regulated and that owners may be limited in their ability to construct infiltration facilities. Moreover, in light of the small size of many RGOs and the proximity to underground tanks, treatment may not always be feasible, or safe. The mandatory BMPs that are included in the SUSMPs may be adequate to achieve MEP at RGOs, but the Regional Water Board should add additional mandatory BMPs, such as use of dry cleanup methods (e.g. sweeping) for removal of litter and debris, use of rags and absorbents for leaks and spills, restricting the practice of washing down hard surfaces unless the wash water is collected and disposed of properly, annual training of employees on proper spill cleanup and waste disposal methods, and the inclusion of BMPs to address trash receptacle areas and air/water supply

areas.[50] We conclude that because RGOs are already heavily regulated and may be limited in their ability to construct infiltration facilities or to perform treatment, they should not be subject to the BMP design standards at this time, and recommend that the Regional Water Board undertake further consideration of a threshold relative to size of the RGO, number of fueling nozzles, or some other relevant factor. This Order should not be construed to preclude inclusion of RGOs in the SUSMP design standards, with proper justification, when the permit is reissued.

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Redevelopment Projects

The SUSMPs were written to apply to new development and to some types of redevelopment in nine categories of projects. The definition of "redevelopment" reflected the intent of the Regional Water Board to define the scope of redevelopment projects subject to the requirements. That definition[51], however, was somewhat confusing, and it was apparent from testimony at the hearing that the parties had different understandings of the scope of redevelopment subject to the SUSMPs. In their post-hearing briefs, the various parties appeared to agree on the actual intent of the Regional Water Board in including redevelopment in the SUSMPs. This intent was to include redevelopment that adds or creates at least 5,000 square feet of impervious surface to the original development and, where the addition constitutes less than 50 percent of the original development, to limit the application of the BMP design standards to the addition.

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[50] These BMPs are from a list of BMPs in a publication of the California Storm Water Quality Task Force. (Best Management Practice Guide – Retail Gasoline Outlets. March 1997.) This publication includes BMPs in addition to those listed in the SUSMPs. All BMPs recommended in this publication should be mandated.

[51] The SUSMPs state: "Redevelopment" means, on an already developed site, the creation or addition of at least 5,000 square feet of impervious surfaces or the creation or addition of fifty percent or more of impervious surfaces or the making of improvements to fifty percent or more of the existing structure. Redevelopment includes, but is not limited to: the expansion of a building footprint or addition or replacement of a structure; structural development including an increase in gross floor area and/or exterior construction or remodeling; replacement of impervious surface that is not part of a routine maintenance activity; and land disturbing activities related with structural or impervious surfaces.

While some parties requested further requirements for development, it appears that the Regional Water Board's original intent was relatively simple to apply and results in a fair and appropriate application of the SUSMPs' requirements to redevelopment. Therefore, we will revise the definition in the SUSMPs accordingly.

Environmentally-Sensitive Areas

The permit required that the SUSMPs address at least seven development categories.[52] The final SUSMPs added two more categories: parking lots of 5,000 square feet or more or with 25 or more parking spaces and potentially exposed to storm water runoff; and location within or directly adjacent to an environmentally-sensitive area (ESA). The petitioners contend that the addition of ESAs was inappropriate because the permit refers only to "development categories"[53] and ESA is a location category.

Whether or not the Regional Water Board went beyond the permit's terms in including this category, we find a fundamental problem with the language of the SUSMPs regarding ESAs. All of the other categories are relatively simple to apply because they describe the types of development that fall within the category. For instance, the threshold for a commercial development is 100,000 square feet. If the development is smaller, it is not subject to the SUSMPs. But for developments within ESAs, the SUSMPs contain no threshold. This absence led to speculation by the petitioners that something as small as a new patio on a home in an ESA would make the SUSMPs applicable. The Regional Water Board, at the hearing and in its post-hearing brief, conceded that there should be some threshold. While the Regional Water Board

[52] The categories listed in the permit are: single-family hill residences, 100,000 square-foot commercial developments, automotive repair shops, retail gasoline outlets, restaurants, home subdivisions with 10 to 99 housing units, and home subdivisions with 100 or more housing units. Permit, Part 2, III.A.1.c.
[53] *Id*.

did recommend a specific threshold, we believe that it is inappropriate for this Board to add a threshold that has not been fully discussed by all interested persons.

While it may be appropriate to include more stringent controls for developments in ESAs, we also note that such developments are already subject to extensive regulation under other regulatory programs. Moreover, in light of the permit language limiting the SUSMPs to development categories, ESAs are not an appropriate category within the SUSMPs. The Regional Water Board may choose to consider the issue further when it reissues the permit.

Discretionary and Non-Discretionary, or Ministerial, Projects

The petitioners contend that the SUSMPs should apply only to projects that are considered "discretionary" within the meaning of California Environmental Quality Act (CEQA).[54] They argue that the inclusion of non-discretionary, or ministerial, projects is inconsistent with the terms of the permit.

The permit provisions on development projects do refer to "discretionary" projects in several places. The permittees are directed to develop a checklist for determining priority and exempt projects.[55] Priority projects are defined as development and redevelopment projects requiring discretionary approval, which may have a potential significant effect on storm water quality.[56] The permittees are also required to develop a BMP list.[57] In developing the SUSMPs, the permittees are required to incorporate appropriate elements of the BMP list.[58] Next, the permittees must develop a program on planning control measures for priority projects (which are limited to projects requiring discretionary approval), consistent with the list of BMPs and the

[54] Public Resources Code section 21000 *et seq*.
[55] Permit, Part 2, III.A.1.a.
[56] *Id*.
[57] Permit, Part 2, III.A.1.b.
[58] Permit, Part 2, III.A.1.c.

SUSMPs.[59] The permit further states that, in order to assure compliance with these requirements, the permittees must develop guidelines on preparing CEQA documents that link mitigation conditions to "local discretionary project approvals."[60]

Taken as a whole, the provisions of the permit appear to link the development requirements for SUSMPs to developments that receive discretionary approval by local governments, as defined in CEQA. The SUSMPs are an implementation tool for the permit and must be consistent with the permit. While the limitation of the SUSMPs to discretionary projects may not be sufficiently broad for an effective storm water control program, the Regional Water Board acted inappropriately in expanding the SUSMPs to include non-discretionary projects. The Regional Water Board may consider expanding the development controls beyond CEQA discretionary projects when it reissues the permit. But at this time, the SUSMPs must be revised so that they are limited to development projects requiring discretionary approval within the meaning of CEQA.[61]

Waiver Funding Requirement

Where a waiver is granted from the design standard requirements, the Final SUSMPs provide that the permittee must require the project proponent to transfer the cost savings to a storm water mitigation fund. The fund is to be operated by a public agency or a non-profit entity, to promote regional or alternative solutions for storm water pollution in the same storm watershed. The petitioners contend that the funding requirement will create an additional administrative burden.

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[59] Permit, Part 2, III.a.2.
[60] Permit, Part 2, III.a.3.b.
[61] We note that the Final SUSMPs already include a definition of "discretionary project" consistent with the definition in the CEQA guidelines. Final SUSMPs at page 4 of 25; Title 14, California Code of Regulations, section 15357. Apparently this definition was inadvertently retained after the Regional Water Board decided to expand the SUSMPs beyond discretionary projects.

The concept of a mitigation fund or "bank" is a positive idea for obtaining regional solutions to storm water runoff. As a long-term strategy, municipal storm water dischargers should work to establish regional mitigation facilities, which may be more cost-effective and more technically effective than mitigation structures at individual developments. But at this point there are not sufficient resources in place to require all permittees to establish such funds or to find appropriate non-profit organizations. Before mandating funding, preliminary questions should be answered, including who will manage the fund, what types of projects it will be used for, what entities can legally operate such funds, and how permittees will determine the amount of the assessments. It would be appropriate for the County to consider developing a program with the appropriate flood control agency, or as a model for the separate cities to develop. There may be suitable agencies to administer such funds, but the development of programs may take some time. The Regional Water Board should consider adopting such a program when it reissues the permit, after consultation with the appropriate local agencies.

III. CONCLUSIONS

Based on the discussion above, the Board concludes that:

1. The Regional Water Board complied with the procedural requirements of the permit, including the Administrative Review Process, in approving the Final SUSMPs.
2. The Regional Water Board was authorized to revise the SUSMPs by including more stringent requirements than the permittees had proposed.
3. The Regional Water Board complied with did not violate the Administrative Procedure Act, CEQA, or the Constitutional provisions on state mandates. The petitioners' due process rights have been protected
4. The Regional Water Board considered the costs of the SUSMPs, and acted reasonably in requiring these controls in light of the expected benefits to water quality.

5. The Final SUSMPs reflect a reasonable interpretation of development controls that achieve reduction of pollutants in storm water discharges to the maximum extent practicable.
6. The SUSMPs include adequate protections of groundwater quality from any impacts from infiltration.
7. The SUSMPs will be revised to clarify the intent of the Regional Water Board and to make them consistent with the permit. Specifically, retail gasoline outlets should not be subject to the BMP design standards because they are already heavily regulated and may be limited in their ability to construct infiltration facilities or to perform treatment. Redevelopment projects should be subject to the SUSMPs only if they result in creation or addition of 5,000 square feet of impervious surfaces. Environmentally-sensitive areas should not be listed as a category in the SUSMPs. The SUSMPs should only apply to discretionary projects. The requirement for funding by project proponents who receive waivers should be deleted. The SUSMPs will be amended as shown in the attachment to this Order.
8. In light of the revisions of the SUSMPs made by this Order, and to allow the permittees adequate time to adopt implementing ordinances, the deadline for adopting ordinances will be revised to January 15, 2001, and the effective date of the Final SUSMPs will be revised to February 15, 2001.

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IV. ORDER

IT IS HEREBY ORDERED that the Standard Urban Storm Water Mitigation Plans for Los Angeles County and Cities in Los Angeles County is revised consistent with the amendments attached hereto. In all other respects the petitions are dismissed.

CERTIFICATION

The undersigned, Administrative Assistant to the Board, does hereby certify that the foregoing is a full, true, and correct copy of an order duly and regularly adopted at a meeting of the State Water Resources Control Board held on October 5, 2000.

AYE: Arthur G. Baggett, Jr.
Mary Jane Forster
John W. Brown

NO: None

ABSENT: Peter S. Silva

ABSTAIN: None

/s/
Maureen Marché
Administrative Assistant to the Board

AMENDMENTS TO SUSMPS

[These amendments are to the Final SUSMP, as published March 8, 2000]

Page 3 of 25

First full paragraph:

All **discretionary development and redevelopment** projects that fall into one of ~~seven~~ **the following** categories are ~~identified in the Los Angeles County MS4 Permit as requiring~~ **subject to these** SUSMPs. These categories are:

- Single-family Hillside Residences
- 100,000 Square Foot Commercial Developments
- Automotive Repair Shops
- Retail Gasoline Outlets
- Restaurants
- Home Subdivisions with 10 to 99 housing units
- Home Subdivisions with 100 or more housing units
- **Parking lots 5,000 square feet or more or with 25 or more parking spaces and potentially exposed to storm water runoff**

Second full paragraph:

~~The Regional Board Executive Officer has designated two additional categories subject to SUSMP requirements for the Los Angeles County MS4 Permit. These categories are:~~

- ~~Location within or directly adjacent to or discharging directly to an environmentally sensitive area, and~~
- ~~Parking lots 5,000 square feet or more or with 25 or more parking spaces and potentially exposed to storm water runoff~~

Fourth full paragraph:

Permittees shall amend codes, if necessary, not later than ~~September 8, 2000~~ **January 15, 2001**, to give legal effect to the SUSMP requirements. The SUSMP requirements for projects identified herein shall take effect not later than ~~October 8, 2000~~ **February 15, 2001**.

Page 4 of 25

Delete definition of “Environmentally Sensitive Area”

Revise Definition of “Redevelopment”:

"Redevelopment" means, on an already developed site, the creation or addition of at least 5,000 square feet of impervious surfaces ~~or the creation or addition of fifty percent or more of impervious surfaces or the making of improvements to fifty percent or more of the existing structure~~. Redevelopment includes, but is not limited to: the expansion of a building footprint or addition or replacement of a structure; structural development including an increase in gross floor area and/or exterior construction or remodeling; replacement of impervious surface that is not part of a routing maintenance activity; and land disturbing activities related with structural or impervious surfaces. **Where redevelopment results in an increase of less than fifty percent of the impervious surfaces of a previously existing development, and the existing development was not subject to these SUSMPs, the Design Standards apply only to the addition, and not to the entire development.**

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Add to "Limited Exclusion": Retail Gasoline Outlets

Page 15 of 25

Delete the first full paragraph (storm water mitigation funding)

2000 Maryland Stormwater Design Manual Volumes I & II

Prepared By:

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MARYLAND STORMWATER DESIGN MANUAL

VOLUMES I AND II

Preface

Stormwater management has evolved dramatically in Maryland since it became the first state to adopt stormwater quality regulations some fifteen years ago. Much has been learned about what works in the field and what does not. The goal for this project is to compile this hard-won knowledge and experience into a single comprehensive design manual that is truly useful to engineers and plan reviewers who design and construct stormwater practices.

We would like to acknowledge the many people who helped us get to this point. In particular, we are grateful to the staff at the Water Management Administration of the Maryland Department of Environment who played an active role in getting the manual to this point. In particular, the patience and support of Stewart Comstock (Project Manager), Ken Pensyl, Brian Clevenger and James Tracy is gratefully acknowledged. In addition, the assistance of other MDE staff was most helpful.

The manual could never have been produced without the talents, experience and hard work of our project team partners, Environmental Quality Resources, Inc. (EQR), and Loiederman Associates, Inc (LAI). In particular, we would like to acknowledge the great contributions of Timothy Schueler, Richard Scafidi, and Joanne Reker of EQR, and Karen Carpenter, Michael Wagner, Josie Greenberg, and Cliff Deward of LAI.

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Center for Watershed Protection

2000 Maryland Stormwater Design Manual Volume I Stormwater Management Criteria

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Chapter 1.0

Introduction

1.0 Introduction and Purpose of Manual

Title 4, Subtitle 2 of the Environment Article of Annotated Code of Maryland states that "…the management of stormwater runoff is necessary to reduce stream channel erosion, pollution, siltation and sedimentation, and local flooding, all of which have adverse impacts on the water and land resources of Maryland." The program designed in the early 1980s to address this finding of the General Assembly concentrated primarily on controlling runoff increases and mitigating water quality degradation associated with new development. The counties and municipalities in Maryland are responsible for administering effective stormwater management programs that "…maintain after development, as nearly as possible the predevelopment characteristics…" These localities have performed remarkably in establishing Maryland as a national leader in stormwater management technology. Over the last 14 years, tens of thousands of best management practices (BMPs) have been constructed in an attempt to meet program mandates. However, the experience gained since Maryland's stormwater statute was enacted has identified necessary improvements and revealed a need to refocus the approach to fulfill the original intent of this essential water pollution control program.

Recently, increased emphasis on water quality, resource protection needs, increased BMP maintenance costs, and identified shortcomings in Maryland's program have all contributed to basic philosophical changes regarding stormwater management. The "Maryland Stormwater Design Manual" is an effort to incorporate the significant experiences gained by the State's stormwater community and accommodate much needed improvements for managing urban runoff. It is hoped that the design standards and environmental incentives provided below will produce better methods and advance the science of managing stormwater by relying less on single BMPs for all development projects and more on mimicking existing hydrology through total site design policies. Additionally, the inherent philosophical change should produce smaller less obtrusive facilities that are more aesthetic and less burdensome on those responsible for long-term maintenance and performance.

The purpose of this manual is threefold:

❶ to protect the waters of the State from adverse impacts of urban stormwater runoff,

❷ to provide design guidance on the most effective planning techniques, and nonstructural and structural BMPs for development sites, and

❸ to improve the quality of BMPs that are constructed in the State, specifically with regard to performance, longevity, safety, ease of maintenance, community acceptance and environmental benefit.

The BMPs and the required design criteria below represent conventional stormwater management technology for controlling runoff from new development projects. Based upon current available research, the Maryland Department of the Environment, Water Management

Administration (MDE/WMA) has evaluated each BMP group and the associated design variants and has developed standards for each so that all perform similarly. The "General Performance Standards" outlined in this manual (see Section 1.2, page 1.13) specify those criteria that were used to create runoff control options that would perform equally. The BMPs contained in this manual are by no means exclusive. MDE encourages the development of innovative practices that meet the intent of Maryland's stormwater management law and can perform according to the standards in Section 1.2. In the future, should structural or non-structural practices be developed that meet the standards specified below, MDE will approve their use for controlling new development runoff.

MDE encourages wise, environmentally sensitive site designs to reduce the generation of runoff borne pollution. Additionally, Maryland has adopted "Smart Growth" policies that are geared toward concentrating development where it currently exists thereby reducing "suburban sprawl." Therefore, redevelopment is encouraged. A stormwater management policy for redevelopment is established in the Code of Maryland Regulations (COMAR 26.17.02). Additionally, redevelopment is defined in both COMAR and this manual.

The policy required in COMAR for redevelopment basically specifies a 50% reduction in impervious surface area below existing conditions. Because this may be impractical due to site constraints, environmental site design (ESD) practices are to be used to the maximum extent practicable (MEP) to meet the equivalent in water quality control of a 50% decrease in impervious surface area. Various alternative BMPs that do not necessarily meet the performance criteria established in this manual may be implemented for redevelopment projects provided that it is demonstrated that impervious area reduction and ESD have been implemented to the MEP. These alternative BMPs may also be implemented to satisfy the pretreatment volume requirements established in Chapter 3 below. Individual project designers should contact the appropriate approval authority for the specific practices allowed for redevelopment and pretreatment purposes.

The approval of new control technologies, modifications to the practices contained in this manual, and alternative policies regarding stormwater management for new development is the responsibility of MDE. Typically, information is submitted to the WMA that describes the policy or practice. For new BMPs, monitoring data need to be submitted that demonstrate that the performance criteria in this manual can be met. WMA then reviews this material to determine if the proposed practice is appropriate for use on new development projects. Because of local variations in ownership policies, maintenance abilities, cost, design standards, hydrology, etc., information on practices to be used for redevelopment and pretreatment should be submitted to the appropriate authority for approval.

NOTE: The Maryland Stormwater Design Manual has been revised. Changes are identified as Supplements (e.g., Supp. 1) and occur throughout the design manual. When there are conflicts between supplemental and original requirements, the newest shall supersede.

Section 1.1 Why Stormwater Matters: Impact of Runoff on Maryland's Watersheds

Urban development has a profound influence on the quality of Maryland's waters. To start, development dramatically alters the local hydrologic cycle (see Figure 1.1). The hydrology of a site changes during the initial clearing and grading that occur during construction. Trees, meadow grasses, and agricultural crops that had intercepted and absorbed rainfall are removed and natural depressions that had temporarily ponded water are graded to a uniform slope. Cleared and graded sites erode, are often severely compacted, and can no longer prevent rainfall from being rapidly converted into stormwater runoff.

Figure 1.1 Water Balance at a Developed and Undeveloped Site
(Source: Schueler, 1987)

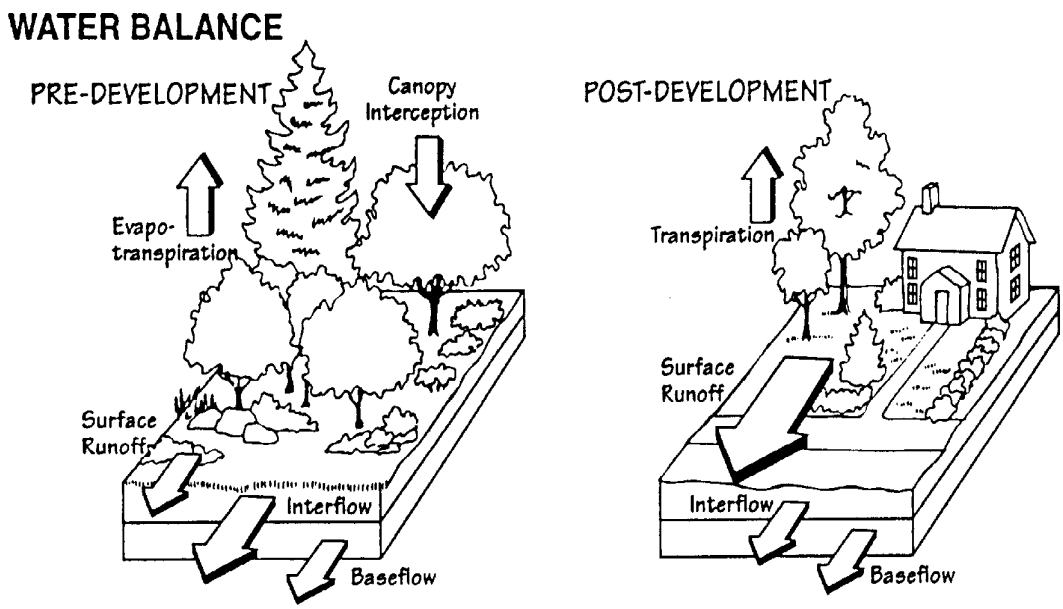

Surface runoff is minimal in an undeveloped site, but dominates the water balance at a highly impervious site.

The situation worsens after construction. Roof tops, roads, parking lots, driveways and other impervious surfaces no longer allow rainfall to soak into the ground. Consequently, most rainfall is converted directly to stormwater runoff. This phenomenon is illustrated in Figure 1.2, which shows the increase in the volumetric runoff coefficient (R_v) as a function of site imperviousness. The runoff coefficient expresses the fraction of rainfall volume that is converted into stormwater runoff. As can be seen, the volume of stormwater runoff increases sharply with impervious cover. For example, a one acre parking lot can produce 16 times more stormwater runoff than a one acre meadow each year (Schueler, 1994).

The increase in stormwater runoff can be too much for the existing natural drainage system to handle. As a result, the natural drainage system is often "improved" to rapidly collect runoff and quickly convey it away (using curb and gutter, enclosed storm sewers, and lined channels). The stormwater runoff is subsequently discharged to downstream waters such as streams, reservoirs, lakes or estuaries.

Figure 1.2 Relationship between Impervious Cover and the Volumetric Runoff Coefficient (Source: Schueler, 1987)

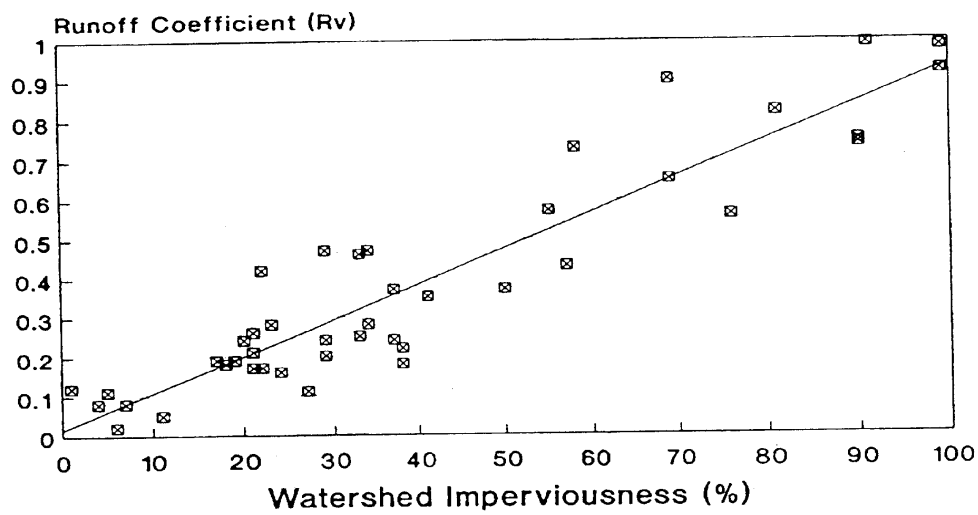

The runoff coefficient (R_v) expresses the fraction of rainfall that is converted into runoff. The data points reflect over 35 monitoring stations in the U.S.

1.1.1 Declining Water Quality

Impervious surfaces accumulate pollutants deposited from the atmosphere, leaked from vehicles, or windblown from adjacent areas. During storm events, these pollutants quickly wash off and are rapidly delivered to downstream waters. Some common pollutants found in urban stormwater runoff are profiled in Table 1.1 and include:

Nutrients. Urban runoff has elevated concentrations of both phosphorus and nitrogen, which can enrich streams, lakes, reservoirs and estuaries (known as eutrophication). In particular, excess nutrients have been documented to be a major factor in the decline of Chesapeake Bay. Excess nutrients promote algal growth that blocks sunlight from reaching underwater grasses and depletes oxygen in bottom waters. Urban runoff has been identified as a key and controllable source. Maryland has committed to reducing tributary nutrient loadings by 40% as part of the Chesapeake Bay restoration effort.

Suspended solids. Sources of sediment include washoff of particles that are deposited on impervious surfaces and the erosion of streambanks and construction sites. Both suspended and deposited sediments can have adverse effects on aquatic life in streams, lakes and estuaries. Sediments also transport other attached pollutants.

Organic Carbon. Organic matter, washed from impervious surfaces during storms, can present a problem in slower moving downstream waters. As organic matter decomposes, it can deplete dissolved oxygen in lakes and tidal waters. Low levels of oxygen in the water can have an adverse impact on aquatic life.

Bacteria. Bacteria levels in stormwater runoff routinely exceed public health standards for water contact recreation. Stormwater runoff can also lead to the closure of adjacent shellfish beds and swimming beaches and may increase the cost of treating drinking water at water supply reservoirs.

Hydrocarbons. Vehicles leak oil and grease that contain a wide array of hydrocarbon compounds, some of which can be toxic at low concentrations to aquatic life.

Trace Metals. Cadmium, copper, lead and zinc are routinely found in stormwater runoff. These metals can be toxic to aquatic life at certain concentrations and can also accumulate in the sediments of streams, lakes and the Chesapeake Bay.

Pesticides. A modest number of currently used and recently banned insecticides and herbicides have been detected in urban streamflow at concentrations that approach or exceed toxicity thresholds for aquatic life.

Chlorides. Salts that are applied to roads and parking lots in the winter months appear in stormwater runoff and meltwater at much higher concentrations than many freshwater organisms can tolerate.

Thermal Impacts. Impervious surfaces may increase temperature in receiving waters, adversely impacting aquatic life that requires cold and cool water conditions (e.g., trout).

Trash and Debris. Considerable quantities of trash and debris are washed through storm drain networks. The trash and debris accumulate in streams and lakes and detract from their natural beauty.

Table 1.1 Typical Pollutant Concentrations Found in Urban Stormwater

Typical Pollutants Found in Stormwater Runoff (Data Source)	**Units**	**Average Concentration (1)**
Total Suspended Solids (a)	mg/l	80
Total Phosphorus (b)	mg/l	0.30
Total Nitrogen (a)	mg/l	2.0
Total Organic Carbon (d)	mg/l	12.7
Fecal Coliform Bacteria (c)	MPN/100 ml	3600
E. coli Bacteria (c)	MPN/100 ml	1450
Petroleum Hydrocarbons (d)	mg/l	3.5
Cadmium (e)	ug/l	2
Copper (a)	ug/l	10
Lead (a)	ug/l	18
Zinc (e)	ug/l	140
Chlorides (f) (winter only)	mg/l	230
Insecticides (g)	ug/l	0.1 to 2.0
Herbicides (g)	ug/l	1 to 5.0

(1) these concentrations represent *mean or median* storm concentrations measured at typical sites and may be greater during individual storms. Also note that mean or median runoff concentrations from *stormwater hotspots* are 2 to 10 times higher than those shown here. Units = mg/l = milligrams/liter, µg/l = micrograms/liter, MPN = Most Probable Number.

Data Sources: (a) Schueler (1987) (b) Schueler (1995), (c) Schueler (1997), (d) Rabanal and Grizzard (1996) (e) USEPA (1983) (f) Oberts (1995) (g) Schueler, (1996)

1.1.2 Diminishing Groundwater Recharge and Quality

The slow infiltration of rainfall through the soil layer is essential for replenishing groundwater. The amount of rainfall that recharges groundwater varies, depending on the slope, soil, and vegetation. Some indication of the importance of recharge is shown in Table 1.2 which shows Natural Resources Conservation Service (NRCS) regional estimates of average annual recharge volume based on soil type.

Table 1.2 NRCS Estimates of Annual Recharge Rates, Based on Soil Type

Hydrologic Soil Group (NRCS)	**Average Annual Recharge Volume**
"A" Soils	18 inches/year
"B" Soils	12 inches/year
"C" Soils	6 inches/year
"D" Soils	3 inches/year
Average annual rainfall is about 42 inches per year across Maryland.	

Groundwater is a critical water resource across the State. Not only do many residents depend on groundwater for their drinking water, but the health of many aquatic systems is also dependent on its steady discharge. For example, during periods of dry weather, groundwater sustains flows in streams and helps to maintain the hydrology of non-tidal wetlands (Figure 1.3). Because development creates impervious surfaces that prevent natural recharge, a net decrease in groundwater recharge rates can be expected in urban watersheds. Thus, during prolonged periods of dry weather, stream flow sharply diminishes. In smaller headwater streams, the decline in stream flow can cause a perennial stream to become seasonally dry.

Figure 1.3 Decline in Stream Flow Due to Diminished Groundwater Recharge

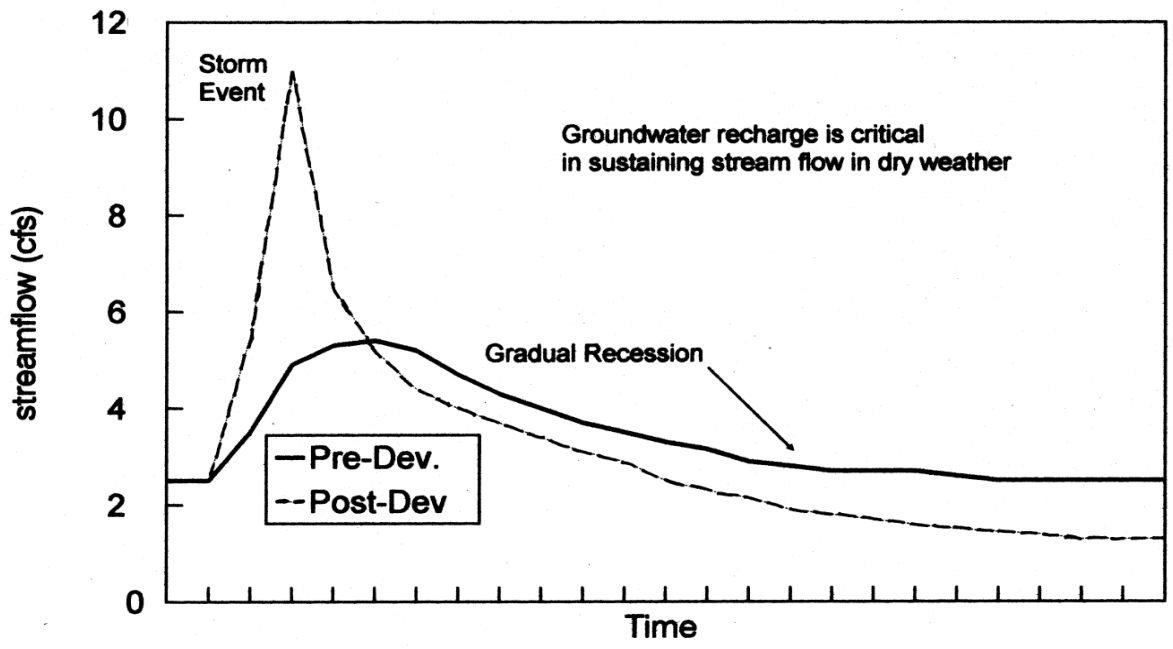

After development, stream flow declines during extended periods of dry weather because of the diminished recharge of groundwater.

Urban land uses and activities can also degrade *groundwater quality* if stormwater runoff is directed into the soil without adequate treatment. Certain land uses and activities are known to produce higher loads of metals and toxic chemicals and are designated as *stormwater hotspots*. Soluble pollutants, such as chloride, nitrate, copper, dissolved solids and some polycyclic aromatic hydrocarbons (PAH's) can migrate into groundwater and potentially contaminate wells. Stormwater runoff should never be infiltrated into the soil if a site is a designated hotspot.

1.1.3 Degradation of Stream Channels

Stormwater runoff is a powerful force that influences the geometry of streams. After development, both the frequency and magnitude of storm flows increase dramatically. Consequently, urban stream channels experience more bankfull and sub-bankfull flow events each year than they had prior to development (see Figure 1.4).

Figure 1.4 Increased Frequency of Flows Greater than the Critical Discharge Rate in a Stream Channel after Development

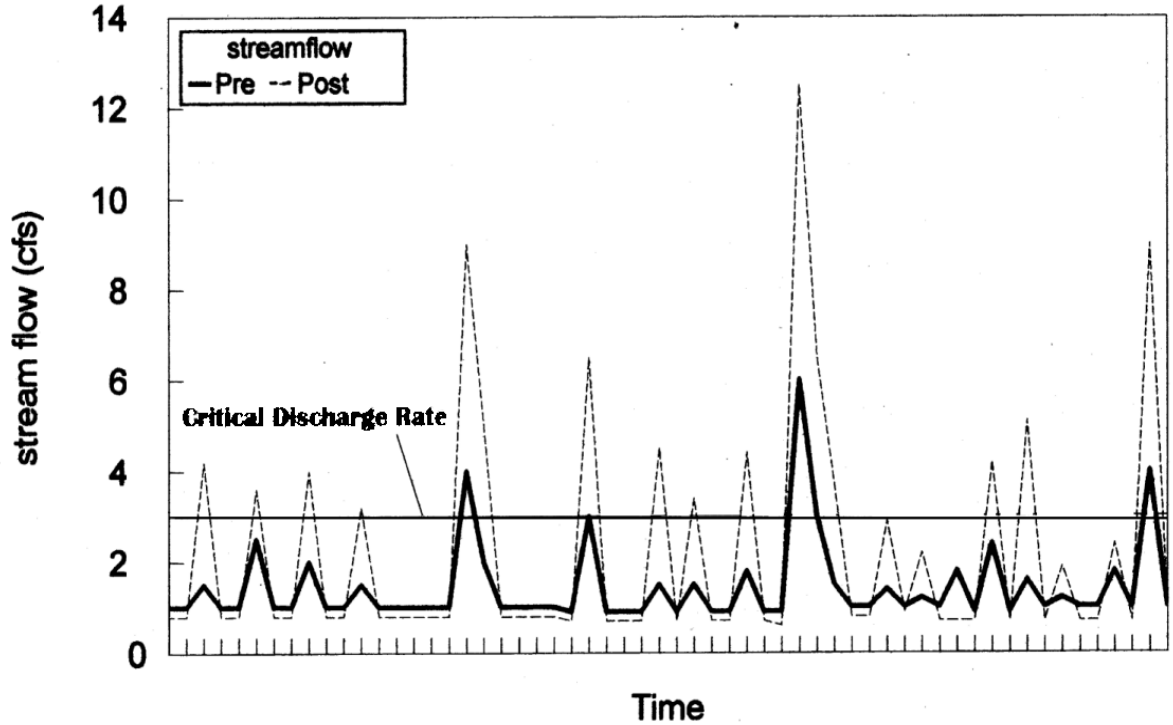

Development greatly increases the frequency that a stream exceeds the critical discharge rate (the discharge rate associated with bankfull flow) that corresponds to the onset of channel erosion and enlargement.

As a result, the stream bed and banks are exposed to highly erosive flows more frequently and for longer periods. Streams typically respond to this change by increasing cross-sectional area to handle the more frequent and erosive flows either by channel widening or down cutting, or both. This results in a highly unstable phase where the stream experiences severe bank erosion and habitat degradation. In this phase, the stream often experiences some of the following changes:

- rapid stream widening
- increased streambank and channel erosion
- decline in stream substrate quality (through sediment deposition and embedding of the substrate)
- loss of pool/riffle structure in the stream channel
- degradation of stream habitat structure

The decline in the physical habitat of the stream, coupled with lower base flows and higher stormwater pollutant loads, has a severe impact on the aquatic community. Recent research has shown the following changes in stream ecology:

- decline in aquatic insect and freshwater mussel diversity
- decline in fish diversity
- degradation of aquatic habitat

Traditionally, Maryland has attempted to provide some measure of channel protection by imposing the two-year storm peak discharge control requirement, which requires that the discharge from the two-year post development peak rates be reduced to pre development levels. However, recent research and experience indicate that the two-year peak discharge criterion is not capable of protecting downstream channels from erosion. In some cases, controlling the two-year storm may actually accelerate streambank erosion because it exposes the channel to a longer duration of erosive flows than it would have otherwise received.

1.1.4 Increased Overbank Flooding

Flow events that exceed the capacity of the stream channel spill out into adjacent floodplains. These are termed “overbank” floods and can damage property and downstream drainage structures.

While some overbank flooding is inevitable and even desirable, the historical goal of drainage design in most of Maryland has been to maintain pre development peak discharge rates for both the two and ten-year frequency storms after development, thus keeping the level of overbank flooding the same over time. This prevents costly damage or maintenance for culverts, drainage structures, and swales.

Overbank floods are ranked in terms of their statistical return frequency. For example, a flood that has a 50% chance of occurring in any given year is termed a “two-year” flood. The two-year storm is also known as the “bankfull flood,” as researchers have demonstrated that most natural stream channels in the State have just enough capacity to handle the two-year flood before spilling into the floodplain. In Maryland, about 3.0 to 3.5 inches of rain in a 24-hour period produces a two-year or bankfull flood. This rainfall depth is termed the two-year design storm.

Similarly, a flood that has a 10% chance of occurring in any given year is termed a “ten-year flood." A ten-year flood occurs when a storm event produces about 4.5 to 5.5 inches of rain in a 24 hour period. Under traditional engineering practice, most channels and storm drains in Maryland are designed with enough capacity to safely pass the peak discharge from the ten-year design storm.

Urban development increases the peak discharge rate associated with a given design storm because impervious surfaces generate greater runoff volumes and drainage systems deliver it more rapidly to a stream. The change in post development peak discharge rates that accompany development is profiled in Figure 1.5.

Figure 1.5 Change in Hydrograph following Development
(Source: Schueler, 1987)

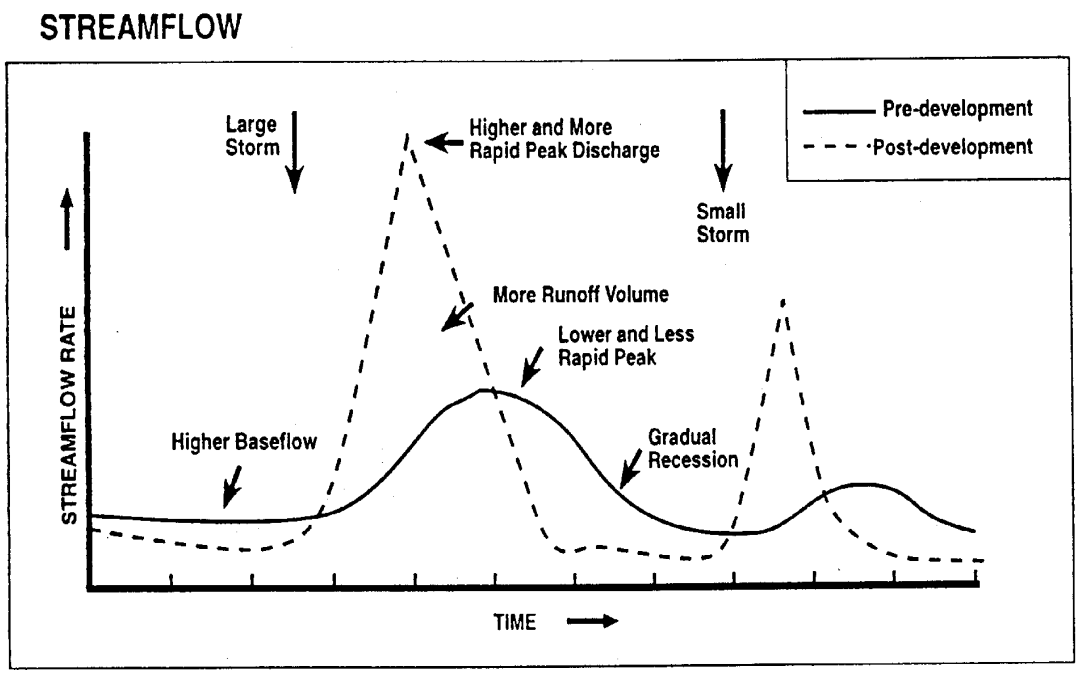

The impervious surfaces and conveyance systems of developed sites result in an earlier and higher peak discharge rate.

1.1.5 Floodplain Expansion

The level areas bordering streams and rivers are known as floodplains. Operationally, the floodplain is usually defined as the land area within the limits of the 100-year storm flow water elevation. The 100-year storm has a 1% chance of occurring in any given year and typically serves as the basis for controlling development in the State and establishing insurance rates by the Federal Emergency Management Agency. In Maryland, a 100-year flood occurs after about 7 to 8 inches of rainfall in a 24 hour period (e.g., the 100-year storm). These floods can be very destructive and can pose a threat to property and human life. Floodplains are natural flood storage areas and help to attenuate downstream flooding.

Floodplains are very important habitat areas, encompassing riparian forests, wetlands, and wildlife corridors. Consequently, all local jurisdictions in Maryland restrict or even prohibit new development within the 100-year floodplain to prevent flood hazards and conserve habitats. Nevertheless, prior development that has occurred in the floodplain remains subject to periodic flooding during these storms.

As with overbank floods, development sharply increases the peak discharge rate associated with the 100-year design storm. As a consequence, the elevation of a stream's 100 year floodplain becomes higher and the boundaries of its floodplain expand (see Figure 1.6). In some instances, property and structures that had not previously been subject to flooding are now at risk. Additionally, such a shift in a floodplain's hydrology can degrade wetlands and forest habitats.

Figure 1.6 Change in Floodplain Elevations
(Source: Schueler, 1987)

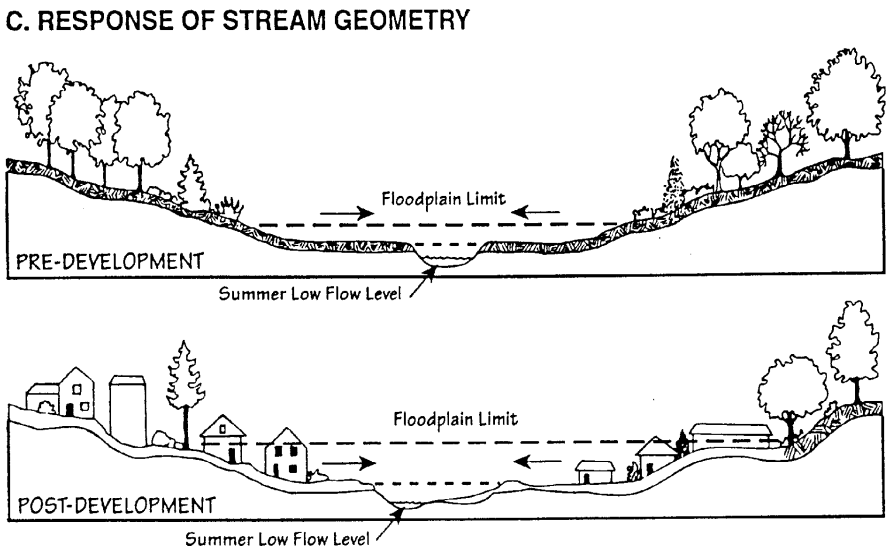

Both the elevation and the lateral boundaries of the 100-year floodplain increase when development occurs upstream.

Section 1.2 General Performance Standards for Stormwater Management in Maryland

To prevent adverse impacts of stormwater runoff, the State of Maryland has developed fourteen performance standards that must be met at development sites. These standards apply to any construction activity disturbing 5,000 or more square feet of earth. The following development activities are exempt from these performance standards in Maryland:

1. Additions or modifications to existing single family structures;
2. Developments that do not disturb more than 5000 square feet of land; or
3. Agricultural land management activities.

The following performance standards shall be addressed at all sites where stormwater management is required:

Standard No. ***1*** *Site designs shall minimize the generation of stormwater and maximize pervious areas for stormwater treatment.*

Standard No. ***2*** *Stormwater runoff generated from development and discharged directly into a jurisdictional wetland or waters of the State of Maryland shall be adequately treated.*

Standard No. ***3*** *Annual groundwater recharge rates shall be maintained by promoting infiltration through the use of structural and non-structural methods. At a minimum, the annual recharge from post development site conditions shall mimic the annual recharge from pre development site conditions.*

Standard No. ***4*** *Water quality management shall be provided through the use of ennvironmental site design practices.*

Standard No. ***5*** *Structural BMPs used for new development shall be designed to remove 80% of the average annual post development total suspended solids load (TSS) and 40% of the average annual post development total phosphorous load (TP). It is presumed that a BMP complies with this performance standard if it is:*

- *sized to capture the prescribed water quality volume (WQ_v),*
- *designed according to the specific performance criteria outlined in this manual,*
- *constructed properly, and*
- *maintained regularly.*

Standard No. ***6*** *Control of the two-year and ten-year frequency storm events is required if the local authority determines that additional stormwater management is necessary because historical flooding problems exist and downstream floodplain development and conveyance system design cannot be controlled. In addition, safe conveyance of the 100-year storm event through stormwater management practices shall be provided.*

Standard No. ***7*** *To protect stream channels from degradation, the channel protection storage volume (Cp_v) shall be based on the runoff from the one-year frequency storm event. Environmental site design practices shall be used to the maximum extent practicable to address Cp_v. Any remaining Cpv requirements shall be addressed using stormwater practices described in Chapter 3.*

Standard No. ***8*** *Stormwater discharges to critical areas with sensitive resources [e.g., cold water fisheries, shellfish beds, swimming beaches, recharge areas, water supply reservoirs, Chesapeake and Atlantic Coastal Bays Critical Area (see Appendix D.4)] may be subject to additional performance criteria or may need to utilize or restrict certain BMPs.*

Standard No. ***9*** *All stormwater management practices shall have an enforceable operation and maintenance agreement to ensure the system functions as designed.*

Standard No. ***10*** *Every BMP shall have an acceptable form of water quality pretreatment.*

Standard No. ***11*** *Redevelopment, defined as any construction, alteration or improvement on sites where existing land use is commercial, industrial, institutional or multi-family residential and site impervious area exceeds 40%, is governed by special stormwater sizing criteria depending on the amount of increase or decrease in impervious area created by the redevelopment.*

Standard No. ***12*** *Certain industrial sites are required to prepare and implement a stormwater pollution prevention plan and file a notice of intent (NOI) under the provisions of Maryland's Stormwater Industrial National Pollutant Discharge Elimination System (NPDES) general permit (a list of industrial categories subject to the pollution prevention requirement can be found in Appendix D.6). The requirements for preparing and implementing a stormwater pollution prevention plan are described in the general discharge permit available from MDE and guidance can be found in the United States Environmental Protection Agency's (EPA) document entitled, "Storm Water Management for Industrial Activities, Developing Pollution Prevention Plans and Best Management Practices" (1992). The stormwater pollution prevention plan requirement applies to both existing and new industrial sites.*

Standard No. ***13*** *Stormwater discharges from land uses or activities with higher potential for pollutant loadings, defined as hotspots in Chapter 2, may require the use of specific structural BMPs and pollution prevention practices. In addition, stormwater from a hotspot land use may not be infiltrated without proper pretreatment.*

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Standard No. ***14*** *In Maryland, local governments are usually responsible for most stormwater management review authority. Therefore, prior to design, applicants should always consult with their local reviewing agency to determine if they are subject to additional stormwater design requirements. In addition, certain earth disturbances may require NPDES construction general permit coverage from MDE (see Appendix D.7).*

Section 1.3 How to Use the Manual

The Maryland Stormwater Design Manual is provided in two volumes. This *first volume* provides designers a general overview on how to size, design, select and locate BMPs at a new development site to comply with State stormwater performance standards. The *second volume* contains appendices with more detailed information on landscaping, BMP construction specifications, step-by-step BMP design examples and other assorted design tools.

Section 1.3.1 VOLUME ONE: STORMWATER MANAGEMENT CRITERIA

The first volume of the manual is organized as follows:

Chapter 1. Introduction to the Manual.

Chapter 2. Unified Stormwater Sizing Criteria. This chapter explains the five new sizing criteria for water quality, recharge, channel protection, overbank flood control, and extreme flood management in the State of Maryland. The chapter also outlines the basis for design calculations. Three step-by-step design examples are provided to familiarize the reader with the new procedures for computing storage volumes under the five sizing criteria. The chapter also briefly outlines the six groups of acceptable BMPs that can be used to meet recharge and water quality volume sizing criteria. Acceptable BMP groups are:

- Stormwater Ponds
- Stormwater Wetlands
- Infiltration Practices
- Filtering Systems
- Open Channel Practices
- Non-structural Practices

Lastly, the chapter presents a list of land uses or site activities that have been designated as “stormwater hotspots.” If a development site is considered a “hotspot," it may have special requirements for pollution prevention and groundwater protection.

Chapter 3. Performance Criteria for Urban BMP Design. The third chapter presents specific performance criteria and guidelines for the design of five groups of structural BMPs. The performance criteria for each group of BMPs are based on six factors:

- General Feasibility
- Conveyance
- Pretreatment
- Treatment Geometry
- Landscaping
- Maintenance

In addition, Chapter 3 presents a series of schematic drawings to illustrate typical BMP designs.

Chapter 4. Guide to BMP Selection and Location in the State of Maryland

This chapter presents guidance on how to select the best BMP or group of practices at a new development site, as well as environmental and other factors to consider when actually locating each BMP. The chapter contains six comparative tables that evaluate BMPs from the standpoint of the following factors:

- Watershed Factors
- Terrain Factors
- Stormwater Treatment Suitability
- Physical Feasibility Factors
- Community and Environmental Factors
- Location and Permitting Factors

Chapter 4 is designed so that the reader can use the tables in a step-wise fashion to identify the most appropriate BMP or group of practices to use at a site.

Chapter 5. Environmental Site Design

The Stormwater Management Act of 2007 requires establishing a comprehensive process for stormwater management approval, implementing ESD to the MEP, and ensuring structural practices (Chapter 3) are used only where absolutely necessary. Implementing ESD not only reduces the impact of development on the environment, but also reduces the size and cost of stormwater practices needed at the site. The Chapter includes:

- Design Process and Planning Techniques
- ESD Sizing Criteria
- Alternative Surfaces
- Nonstructural and Micro-Scale Practices
- Redevelopment Design Process
- Special Criteria for Sensitive Waters

The chapter defines ESD and describes planning techniques and design requirements that are used to implement ESD and treat runoff at the source.

Section 1.3.2 VOLUME TWO: STORMWATER DESIGN APPENDICES

The second volume is provided separately and contains the technical information needed to actually design, landscape and construct a BMP. Volume Two is divided into four appendices, including:

Appendix A. Landscaping Guidance for Stormwater BMPs. Good landscaping can often be an important factor in the performance and community acceptance of many stormwater BMPs. The Landscaping Guide provides general background on how to determine the appropriate landscaping region and hydrologic zone in Maryland. Appendix A also includes tips on how to establish more functional landscapes within stormwater BMPs and contains an extensive list of trees, shrubs, ground covers, and wetland plants that can be used to develop an effective and diverse planting plan.

Appendix B. BMP Construction Specifications. Good designs only work if careful attention is paid to proper construction techniques and materials. Appendix B contains detailed specifications for constructing infiltration practices, filters, bioretention areas and open channels. In addition, Appendix B includes a copy of the NRCS Code 378 Standards and Specifications for Ponds.

Appendix C. Step-by-Step Design Examples. A series of design examples are provided in this appendix to help designers and plan reviewers better understand the new stormwater sizing criteria and design procedures. Step-by-step design examples are provided for a pond, a sand filter, an infiltration trench, a dry swale, and a bioretention area.

Appendix D. Assorted Design Tools. This appendix contains an assortment of design tools for stormwater management, including guidance on geotechnical testing, calculating water balance, documenting whether a site complies with the Chesapeake Bay Critical Area "10% Rule," NPDES stormwater permits, pollution prevention, design details, State Water Use Designations and other useful design information.

Appendix E. Archived Material and Supplemental Design Guidance. The last appendix contains material removed from Volume I of the Design Manual for historical purposes. The appendix also includes guidance material for associated with Design Manual supplements.

Section 1.4 Revising the Design Manual

The Maryland Stormwater Design Manual establishes minimum performance criteria that should be met by all techniques and devices used for stormwater management in Maryland. On occasion, variations or other techniques and devices may be found to function better or be more desirable for stormwater management by plan approval authorities. As stated above, MDE is responsible for approving the use of new techniques for controlling runoff from new development. If an approval authority decides it would like to utilize a revised technique or device on a regular basis, it needs to prepare a Standard and accompanying Specifications with a cover letter to be submitted to the MDE/WMA.

A subcommittee consisting of MDE technical personnel will review the revised technique or device and any supporting data submitted. When the technique or device is approved by the technical subcommittee, an approval authorization from the Director of WMA and the technical representative of the local approval authority will be issued. Once the revised or new technique or device has received approval it can be used on a regular basis within the jurisdiction. If other jurisdictions desire to utilize the same technique or device then they must seek approval from the technical subcommittee. A great amount of deviation from the methods within this design manual is not anticipated, but when better stormwater management can be achieved, revisions will generally be looked upon favorably.

Section 1.5 What's New?

This section highlights some of the new stormwater design requirements that are being introduced in the manual. It is provided to help designers understand how the new manual may affect how they prepare stormwater plans and practices. At most sites, designers shall now:

- Measure the amount of impervious cover created by the development.
- Determine if the proposed land use or activity at the site is designated as a "stormwater hotspot."
- Determine the Use Designation of the receiving water and the condition of the watershed.
- Provide a volume that mimics the natural rate of groundwater recharge using structural and/or nonstructural BMPs (Re_v).
- Implement ESD to the MEP to mimic predevelopment conditions.
- Follow a specific design process to implement a comprehensive site development plan.
- Provide water quality and recharge volume storage using approved ESD practices.
- Use ESD practices to the MEP to provide Cp_v storage. Any remaining Cp_v storage requirements must be addressed using approved BMP options that can meet pollutant removal targets.
- Ensure that the BMP selected meets specific performance criteria with respect to feasibility, conveyance, pretreatment, treatment, landscaping and maintenance.
- Follow new geotechnical testing procedures and provide the contractor with formal construction specifications.

- Consider where the BMP is located in relation to natural features and development infrastructure.
- Consider innovative site planning techniques that can reduce both the size and cost of stormwater practices.
- Include operation and maintenance information on approved stormwater management plans.

Section 1.6 Symbols and Acronyms

As an aid to the reader, the following table outlines the symbols and acronyms that are used throughout the text. In addition, a glossary is provided at the end of this volume that defines the terminology used in the text.

Table 1.3 Key Symbols and Acronyms Cited in Manual

A	drainage area	q_i	peak inflow discharge
A_f	filter bed area	q_o	peak outflow discharge
A_{sf}	surface area, sedimentation basin full	Q_p	overbank flood protection volume
A_{sp}	surface area, sedimentation basin partial	q_u	unit peak discharge
BMP	best management practice	q_p	water quality peak discharge
cfs	cubic feet per second	Re_v	recharge volume
Cp_v	channel protection storage volume (extended detention of the 1-year post development runoff)	R_v	volumetric runoff coefficient
CMP	corrugated metal pipe	R/W	right of way
CN	curve number	S	soil specific recharge factor
d_f	depth of filter bed	SD	separation distance
du	dwelling units	t_c	time of concentration
ED	24 hour drawdown of the water quality volume	t_f	time to drain filter bed
ESD	environmental site design	TP	total phosphorous
ESD_v	environmental site design storage volume	t_t	time of travel
f	soil infiltration rate	TR-20	Technical Release No. 20 Project Formulation-Hydrology, computer program
fps	feet per second	TR-55	Technical Release No. 55 Urban Unit Hydrology for Small Watersheds
h_f	head above filter bed	TSS	total suspended solids
HSG	hydrologic soil group	V_f	filter bed volume
Ia	initial abstraction	V_r	volume of runoff
I	percent impervious cover	V_s	volume of storage
k	coefficient of permeability	V_t	total volume
MEP	Maximum extent practicable	V_v	volume of voids
P_E	ESD rainfall target	WQ_v	water quality storage volume
P	precipitation depth	WSE	water surface elevation
Q_e	ESD runoff depth		
Q_f	extreme flood protection volume		

Chapter 2.0

Unified Stormwater Sizing Criteria

2.0 Unified Stormwater Sizing Criteria

This chapter presents a unified approach for sizing stormwater BMPs in the State of Maryland to meet pollutant removal goals, maintain groundwater recharge, reduce channel erosion, prevent overbank flooding, and pass extreme floods. For a summary, please consult Table 2.1 below. The remaining sections describe the five sizing criteria in detail and present guidance on how to properly compute and apply the required storage volumes.

This chapter also presents a list of acceptable BMP options that can be used to comply with the sizing criteria. Lastly, the chapter designates certain land uses as "stormwater hotspots" which restrict the use of certain BMPs and may also require a pollution prevention plan.

Table 2.1 Summary of the Statewide Stormwater Criteria

Sizing Criteria	Description of Stormwater Sizing Criteria
Water Quality Volume (WQ_v) (acre-feet)	$WQ_v = [(P)(R_v)(A)]/12$ P= rainfall depth in inches and is equal to 1.0" in the Eastern Rainfall Zone and 0.9" in the Western Rainfall Zone (Fig. 2.1), R_v = volumetric runoff coefficient, and A = area in acres.
Recharge Volume (Re_v) (acre-feet)	Fraction of WQ_v, depending on pre development soil hydrologic group. $Re_v = [(S)(R_v)(A)]/12$ S = soil specific recharge factor in inches.
Channel Protection Storage Volume (Cp_v)	Cp_v = 24 hour (12 hour in USE III and IV watersheds) extended detention of post-developed one-year, 24 hour storm event. Not required for direct discharges to tidal waters and the Eastern Shore of Maryland. (See Figure 2.4.)
Overbank Flood Protection Volume (Q_p)	Controlling the peak discharge rate from the ten-year storm event to the pre development rate (Q_{p10}) is optional; consult the appropriate review authority. For Eastern Shore: Provide peak discharge control for the two-year storm event (Q_{p2}). Control of the ten-year storm event is not required (Q_{p10}).
Extreme Flood Volume (Q_f)	Consult with the appropriate reviewing authority. Normally, no control is needed if development is excluded from 100-year floodplain and downstream conveyance is adequate.

Section 2.1 Water Quality Volume (WQ_v)

The Water Quality Volume (denoted as the WQ_v) is the storage needed to capture and treat the runoff from 90% of the average annual rainfall. In numerical terms, it is equivalent to an inch of rainfall multiplied by the volumetric runoff coefficient (R_v) and site area. The specific rainfall depth to be used depends on whether the site is located in the Eastern or Western rainfall zone of Maryland (see Figure 2.1).

The following equations are used to determine the storage volume, WQ_v (in acre-feet of storage):

$$WQ_v = \frac{(1.0)\,(R_v)(A)}{12} \quad \text{Eastern Rainfall Zone} \qquad P = 1.0 \text{ inches of rainfall}$$

$$WQ_v = \frac{(0.9)\,(R_v)(A)}{12} \quad \text{Western Rainfall Zone} \qquad P = 0.9 \text{ inches of rainfall}$$

where:
- WQ_v = water quality volume (in acre-feet)
- R_v = 0.05 + 0.009(I) where I is percent impervious cover
- A = area in acres*

Treatment of the WQ_v shall be provided at all developments where stormwater management is required. A minimum WQ_v of 0.2 inches per acre shall be met at sites or in drainage areas that have less than 15% impervious cover.

Drainage areas having no impervious cover and no proposed disturbance during development may be excluded from the WQ_v calculations. Designers are encouraged to use these areas as non-structural practices for WQ_v treatment (see Chapter 5, "Stormwater Credits for Innovative Site Planning").

The WQ_v is directly related to the amount of impervious cover created at a site. The relationship between WQ_v and impervious cover is shown in Figure 2.2.

* The water quality volume (WQ_v) is required to be controlled only for the specific project. WQ_v for offsite areas is not required (see page 2.4 "Offsite Drainage Areas")

Figure 2.1 Location of the Eastern and Western Rainfall Zones in Maryland (For use in selecting the appropriate WQ_v equation.)

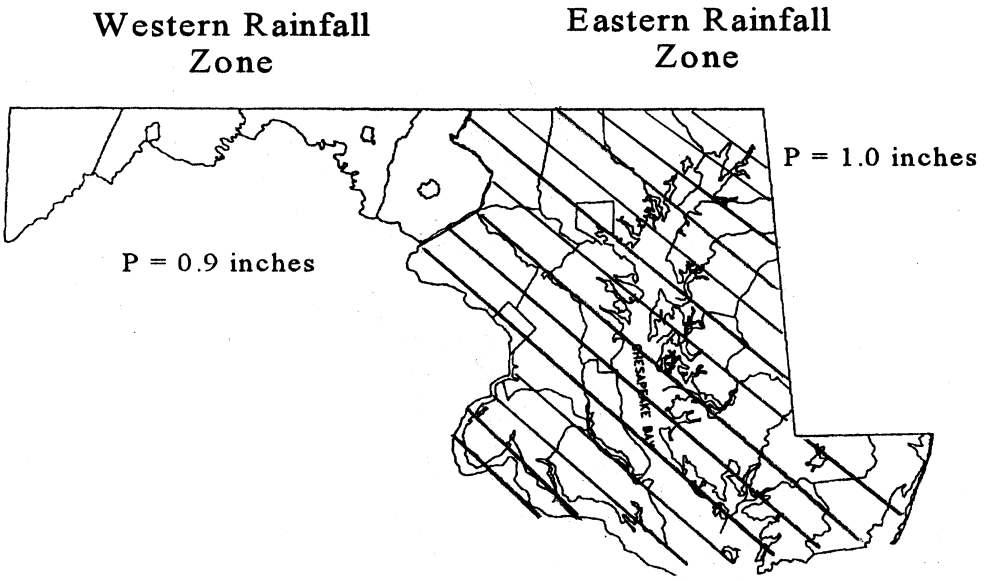

Figure 2.2 Relationship between Impervious Cover and the Water Quality Volume

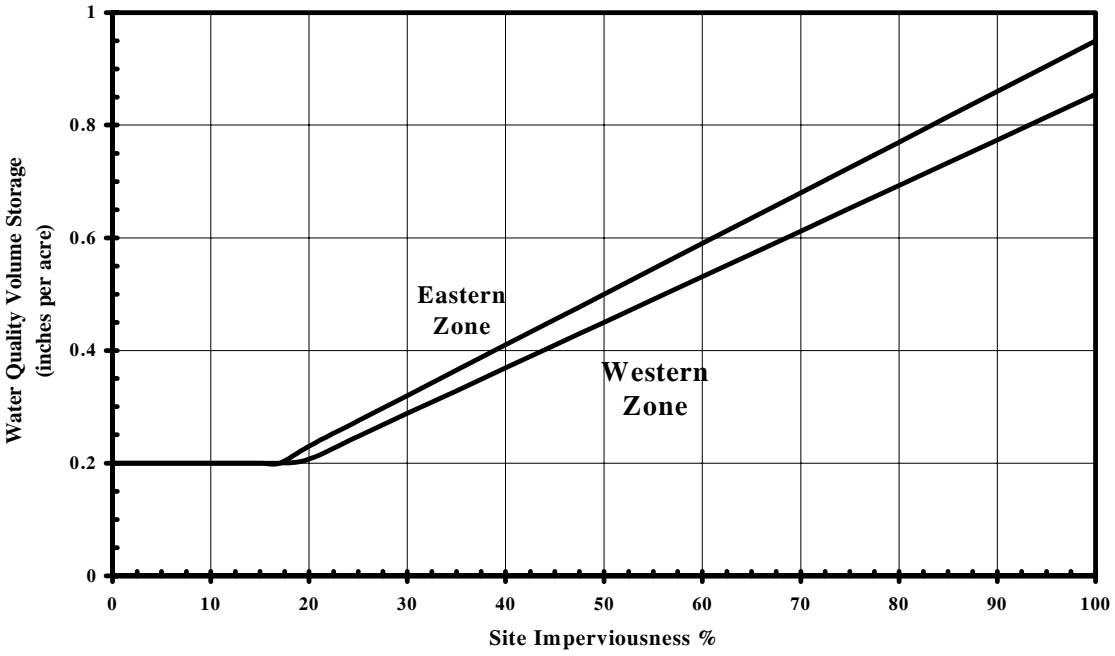

Basis for Determining Water Quality Treatment Volume

As a basis for design, the following assumptions may be made:

- **Measuring Impervious Cover**: the measured area of a site plan that does not have vegetative or permeable cover shall be considered total impervious cover. Where direct measurement of impervious cover is impractical, NRCS land use/impervious cover relationships can be used to estimate impervious cover (see Table 2.2a in TR-55, NRCS, 1986). Estimates should be based on actual land use and homogeneity.

- **Multiple Drainage Areas**: When a project contains or is divided by multiple drainage areas, the WQ_v volume shall be addressed for each drainage area. See the design examples in Chapter 2, Section 2.6.

- **Offsite Drainage Areas***:* The WQ_v shall be based on the impervious cover of the proposed site. Offsite existing impervious areas may be excluded from the calculation of the water quality volume requirements.

- **Sensitive Streams**: Consult with the appropriate local review authority to determine if a greater WQ_v is warranted to protect sensitive streams.

- **BMP Treatment**: The final WQ_v shall be treated by an acceptable BMP(s) from the list presented in Chapter 2, Section 2.7, or an equivalent practice allowed by the appropriate review authority.

- **Subtraction for Structural Practices***:* Where structural practices for treating the Re_v are employed upstream of a BMP, the Re_v may be subtracted from the WQ_v used for design.

- **Subtraction for Non-structural Practices**: Where non-structural practices are employed in the site design, the WQ_v volume can be reduced in accordance with the conditions outlined in Chapter 5.

- **Determining Peak Discharge for WQ_v Storm**: When designing flow splitters for off-line practices, consult the small storm hydrology method provided in Appendix D.10.

- **Extended Detention for Water Quality Volume**: The water quality requirement can be met by providing a 24 hour drawdown of a portion of the water quality volume (WQ_v) in conjunction with a stormwater pond or wetland system as described in Chapter 3. Referred to as ED, this is different than providing the extended detention of the one-year storm for the channel protection volume (Cp_v). The ED portion of the WQ_v may be included when routing the Cp_v.

Section 2.2 Recharge Volume Requirements (Re_v)

The criteria for maintaining recharge is based on the average annual recharge rate of the hydrologic soil group(s) (HSG) present at a site as determined from USDA, NRCS Soil Surveys or from detailed site investigations. More specifically, each specific recharge factor is based on the USDA average annual recharge volume per soil type divided by the annual rainfall in Maryland (42 inches per year) and multiplied by 90%. This keeps the recharge calculation consistent with the WQ_v methodology. Thus, an annual recharge volume requirement is specified for a site as follows:

Site Recharge Volume Requirement

$Re_v = [(S)(R_v)(A)]/12$ (percent volume method)

where: R_v = 0.05 + 0.009(I) where I is percent impervious cover

A = site area in acres

$Re_v = (S)(A_i)$ (percent area method)

where: A_i = the measured impervious cover

Hydrologic Soil Group	Soil Specific Recharge Factor (*S*)
A	0.38
B	0.26
C	0.13
D	0.07

The recharge volume is considered part of the total WQ_v that must be provided at a site and can be achieved either by a structural practice (e.g., infiltration, bioretention), a non-structural practice (e.g., buffers, disconnection of rooftops), or a combination of both.

Drainage areas having no impervious cover and no proposed disturbance during development may be excluded from the Re_v calculations. Designers are encouraged to use these areas as non-structural practices for Re_v treatment (see Chapter 5, "Stormwater Credits for Innovative Site Planning").

Note: Re_v and WQ_v are inclusive. When treated separately, the Re_v may be subtracted from the WQ_v when sizing the water quality BMP (see page 2.4, 'Subtraction for Structural Practices).

The intent of the recharge criteria is to maintain existing groundwater recharge rates at development sites. This helps to preserve existing water table elevations thereby maintaining the hydrology of streams and wetlands during dry weather. The volume of recharge that occurs on a site depends on slope, soil type, vegetative cover, precipitation and evapo-transpiration. Sites with natural ground cover, such as forest and meadow, have higher recharge rates, less runoff, and greater transpiration losses under most conditions. Because development increases impervious surfaces, a net decrease in recharge rates is inevitable.

The relationship between Re_v and site imperviousness is shown in graphical form in Figure 2.3.

Figure 2.3 Relationship between Re_v and Site Impervious Cover

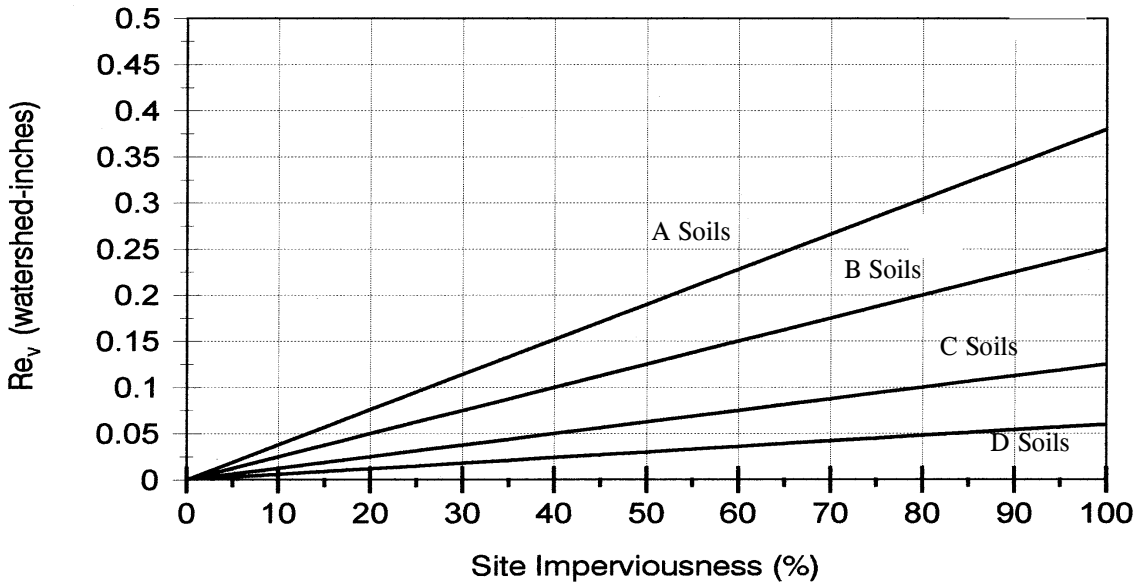

Basis for Determining Recharge Volume

- If more than one HSG is present at a site, a composite soil specific recharge factor shall be computed based on the proportion of total site area within each HSG. The recharge volume provided at the site shall be directed to the most permeable HSG available.

- The "percent volume" method is used to determine the Re_v treatment requirement when structural practices are used to provide recharge. These practices must provide seepage into the ground and may include infiltration and exfiltration structures (e.g., infiltration, bioretention, dry swales or sand filters with storage below the underdrain). Structures that require impermeable liners, intercept groundwater, or are designed for trapping sediment (e.g., forebays) may not be used. In this method, the volume of runoff treated by structural practices shall meet or exceed the computed recharge volume.

- The "percent area" method is used to determine the Re_v treatment requirements when non-structural practices are used. Under this method, the recharge requirement is evaluated by mapping the percent of impervious area that is effectively treated by an acceptable non-structural practice and comparing it to the minimum recharge requirements.

- Acceptable non-structural practices include filter strips that treat rooftop or parking lot runoff, sheet flow discharge to stream buffers, and grass channels that treat roadway runoff (see Chapter 5.)

- The recharge volume criterion does not apply to any portion of a site designated as a stormwater hotspot nor any project considered as redevelopment. In addition, the appropriate local review authority may alter or eliminate the recharge volume requirement if the site is situated on unsuitable soils (e.g., marine clays), karst or in an urban redevelopment area. In this situation, non-structural practices (percent area method) should be implemented to the maximum extent practicable and the remaining or untreated Re_v included in the WQ_v treatment.

- If Re_v is treated by structural or non-structural practices separate and upstream of the WQ_v treatment, the WQ_v is adjusted accordingly.

Section 2.3 Channel Protection Storage Volume Requirements (Cp_v)

To protect channels from erosion, **24 hour extended detention of the one-year, 24 hour storm event** (MDE, 1987) shall be provided. In Use III and IV watersheds, only 12 hours of extended detention shall be provided. The rationale for this criterion is that runoff will be stored and released in such a gradual manner that critical erosive velocities during bankfull and near-bankfull events will seldom be exceeded in downstream channels.

The Cp_v requirement does not apply to direct discharges to tidal water or Maryland's Eastern Shore (as defined in Figure 2.4) unless specified by an appropriate review authority on a case by case basis. Local governments may wish to use alternative methods to provide equivalent stream channel protection such as the Distributed Runoff Control method or bankfull capacity/duration criteria (MacRae, 1993).

The method for determining the Cp_v requirement is detailed in Appendix D.11. A detention pond or underground vault is normally needed to meet the Cp_v requirement (and subsequent Q_{p10} and Q_f criteria). Schematics of a typical design are shown in Figures 2.5.

Figure 2.4 Regions of Maryland Not Subject to the Channel Protection Requirement (Cp_v)

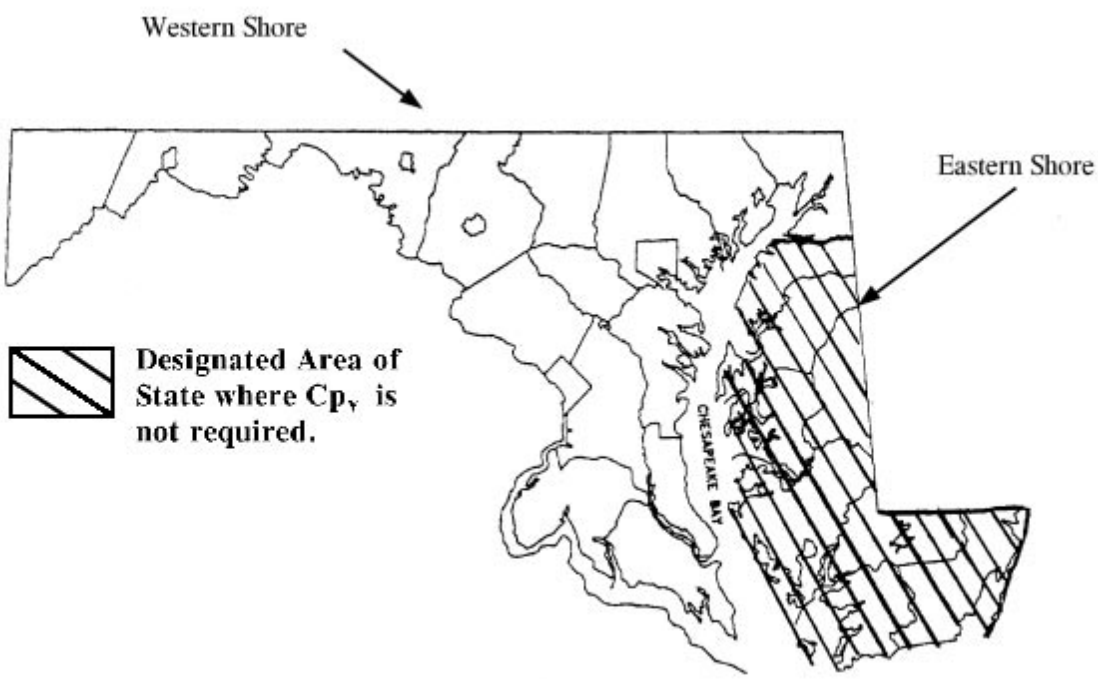

Figure 2.5 Example of Conventional Stormwater Detention Pond

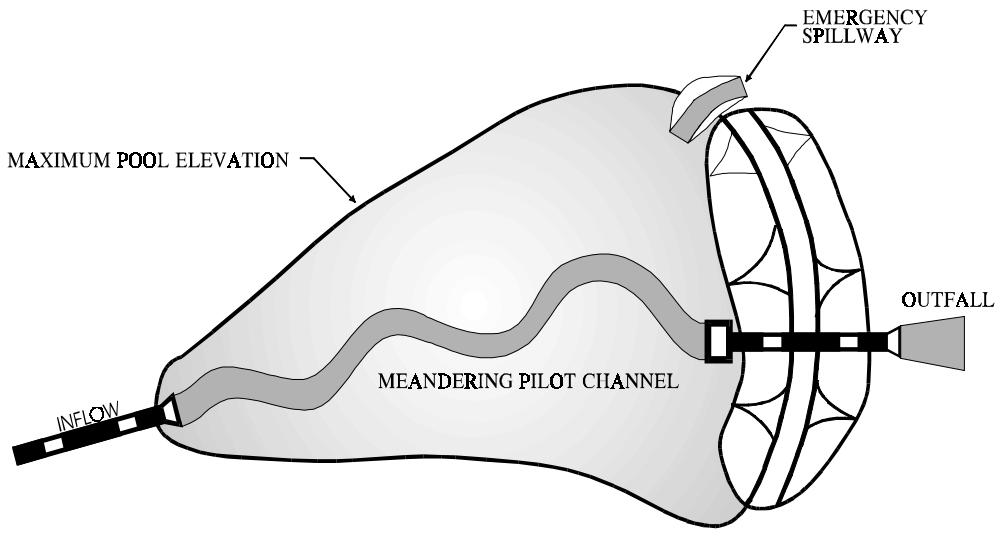

PLAN VIEW

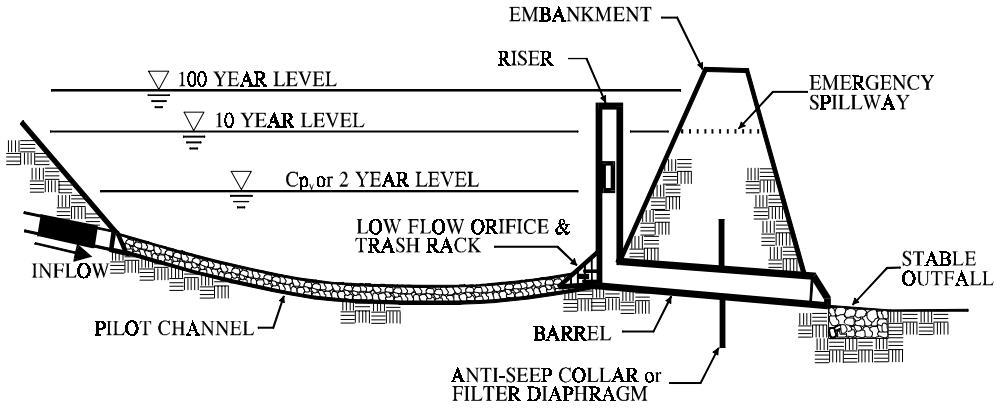

PROFILE

A typical detention facility provides channel protection control (Cp_v) and overbank flood control (Q_p) but not water quality control (WQ_v).

Basis for Determining Channel Protection Storage Volume

The following represent the minimum basis for design:

- The models TR-55 and TR-20 (or approved equivalent) shall be used for determining peak discharge rates.

- Rainfall depths for the one-year, 24 hour storm event are provided in Table 2.2.

- Off-site areas should be modeled as present land use in good condition for the one-year storm event.

- The length of overland flow used in time of concentration (t_c) calculations is limited to no more than 100 feet for post development conditions. On the Eastern Shore, the maximum distance for t_c calculations is 150 feet for the post development conditions.

- The Cp_v storage volume shall be computed using the detention lag time between hydrograph centroids developed in "Design Procedures for Stormwater Management Extended Detention Structures" (MDE, 1987) and outlined in Appendix D.11. The detention lag time (T) for the one-year storm is defined as the interval between the center of mass of the inflow hydrograph and the center of mass of the outflow hydrograph. Examples of this technique are shown in Appendix C.1 and in the design example under Section 2.6.

- Cp_v is not required at sites where the one-year post development peak discharge (q_i) is less than or equal to 2.0 cfs. A Cp_v orifice diameter (d_o) of less than 3.0" is subject to approval by the appropriate review authority and is not recommended unless an internal control for orifice protection is used (see Appendix D.8).

- Cp_v shall be addressed for the entire site. If a site consists of multiple drainage areas, Cp_v may be distributed proportionately to each drainage area.

- Extended detention storage provided for the Cp_v does not meet the WQ_v requirement (that is Cp_v and WQ_v should be treated separately).

- The stormwater storage needed for Cp_v may be provided above the WQ_v storage in stormwater ponds and wetlands; thereby meeting all storage criteria except Re_v in a single facility with appropriate hydraulic control structures for each storage requirement.

- Infiltration is not recommended for Cp_v control because of large storage requirements.

Table 2.2 Rainfall Depths Associated with the 1,2,10 and 100-year, 24-hour Storm Events

County	Rainfall Depth			
	1 yr - 24 hr	2 yr-24 hr	10 yr-24 hr	100 yr-24 hr
Allegany	2.4 inches	2.9 inches	4.5 inches	6.2 inches
Anne Arundel	2.7	3.3	5.2	7.4
Baltimore	2.6	3.2	5.1	7.1
Calvert	2.8	3.4	5.3	7.6
Caroline	2.8	3.4	5.3	7.6
Carroll	2.5	3.1	5.0	7.1
Cecil	2.7	3.3	5.1	7.3
Charles	2.7	3.3	5.3	7.5
Dorchester	2.8	3.4	5.4	7.8
Frederick	2.5	3.1	5.0	7.0
Garrett	2.4	2.8	4.3	5.9
Harford	2.6	3.2	5.1	7.2
Howard	2.6	3.2	5.1	7.2
Kent	2.7	3.3	5.2	7.4
Montgomery	2.6	3.2	5.1	7.2
Prince George's	2.7	3.3	5.3	7.4
Queen Anne's	2.7	3.3	5.3	7.5
St. Mary's	2.8	3.4	5.4	7.7
Somerset	2.9	3.5	5.6	8.1
Talbot	2.8	3.4	5.3	7.6
Washington	2.5	3.0	4.8	6.7
Wicomico	2.9	3.5	5.6	7.9
Worcester	3.0	3.6	5.6	8.1

Section 2.4 Overbank Flood Protection Volume Requirements (Q_p)

The primary purpose of the overbank flood protection volume sizing criteria is to prevent an increase in the frequency and magnitude of out-of-bank flooding generated by development (e.g., flow events that exceed the bankfull capacity of the channel and therefore must spill over into the floodplain). Overbank flood protection for the ten-year storm shall only be required if local approval authorities have no control of floodplain development, no control over infrastructure and conveyance system capacity design, or determine that downstream flooding will occur as a result of the proposed development.

For most regions of the State, the overbank flood control criteria translates to preventing the post development ten-year, 24 hour storm peak discharge rate (Q_{p10}) from exceeding the pre development peak discharge rate.

On the Eastern Shore of Maryland, the overbank flood control criteria is defined as preventing the post development two-year, 24 hour storm peak discharge rate (Q_{p2}) from exceeding the pre development peak discharge rate. The rainfall depths associated with the two and ten-year, 24 hour storm events are shown in Table 2.2.

Basis for Determining Overbank Flood Protection Volume

When addressing the overbank flooding design criteria, the following represent the minimum basis for design:

- The models TR-55 and TR-20 (or an equivalent approved by the appropriate local authority) will be used for determining peak discharge rates. The Eastern Shore Dimensionless Hydrograph may be used for sites where appropriate (see Appendix D.14). Any adjustments for unique land features such as Karst topography shall be determined by the local approving authority.

- The standard for characterizing pre development hydrologic land use for non-forested vegetated areas (including agriculture) shall be meadow in good hydrologic condition.

- Off-site areas should be modeled as "present land use condition" in good hydrologic condition for both the 2 and 10-year storm events.

- The length of overland flow used in t_c calculations is limited to no more than 150 feet for pre development conditions and 100 feet for post development conditions. On the Eastern Shore (see Figure 2.4) this maximum distance is extended to 250 feet for pre development conditions and 150 feet for post development conditions.

- Overbank flood protection does not apply to direct discharges to tidal water.

Section 2.5 Extreme Flood Volume (Q_f)

The intent of the extreme flood criteria is to (a) prevent flood damage from large storm events, (b) maintain the boundaries of the pre development 100-year Federal Emergency Management Agency (FEMA) and/or locally designated floodplain, and (c) protect the physical integrity of BMP control structures. This is typically done in two ways:

100-Year Control: requires storage to attenuate the post development 100-year, 24 hour peak discharge (Q_f) to pre development rates. The Q_f is the most stringent and expensive level of flood control and is generally not needed if the downstream development is located out of the 100-year floodplain. In many cases, the conveyance system leading to a stormwater structure is designed based on the discharge rate for the ten-year storm (Qp_{10}). In these situations, the conveyance systems may be the limiting hydrologic control.

Reserve Ultimate 100-Year Floodplain: 100-year storm control may be required by an appropriate review authority if:

- buildings or development are located within the ultimate 100-year floodplain, or
- the reviewing authority does not completely control the 100-year floodplain.

Hydraulic/hydrologic investigations may be required to demonstrate that downstream roads, bridges and public utilities are adequately protected from the Q_f storm. These investigations typically extend to the first downstream tributary of equal or greater drainage area or to any downstream dam, highway, or natural point of restricted stream flow.

Basis for Determining Extreme Flood Criteria

- Consult with the appropriate review authority to determine the analyses required for the Q_f storm.

- The same hydrologic and hydraulic methods used for overbank flood control shall be used to analyze Q_f.

- In addition, off-site areas should be modeled as “ultimate condition” when the 100-year design storm event is analyzed. Table 2.2 indicates the depth of rainfall (24 hour) associated with the 100-year storm event for all counties in the State of Maryland

Section 2.6 Design Examples: Computing Stormwater Storage Volumes

Design examples are provided only to illustrate how the five stormwater management sizing criteria are computed for hypothetical development projects. These design examples are also utilized elsewhere in the manual to illustrate structural and non-structural BMP design.

Design Example No. 1: Residential Development - Reker Meadows

Site data and the layout of the Reker Meadows subdivision are shown in Figure 2.6.

Step 1. Compute WQ_v Volume

$$WQ_v = \frac{(P)(R_v)(A)}{12}$$

Step 1a. Compute Volumetric Runoff Coefficient (R_v)

R_v = 0.05 + (0.009) (I); I = 13.8 acres/38.0 acres = 36.3%
= 0.05 + (0.009) (36.3) = 0.38

Step 1b. Determine Rainfall Zone for WQ_v Formula

Location	**Rainfall (*P*)**
Eastern Rainfall Zone	1.0 inches
Western Rainfall Zone	0.9 inches
Minimum WQv (I ≤ 15%)	0.2 inches

Because this site is located in the Western Rainfall Zone, use 0.9″ of rainfall to determine WQ_v.

Step 1c. Compute WQ_v

WQ_v = [(0.9″) (R_v) (A)]/12
= [(0.9″)(0.38)(38.0 ac)]/12
= 1.08 ac-ft

Check Minimum: [(0.2″)(38.0 ac)]/12 = 0.63 ac-ft < 1.08 ac-ft
∴ Use WQ_v = 1.08 ac-ft

Figure 2.6 Reker Meadows

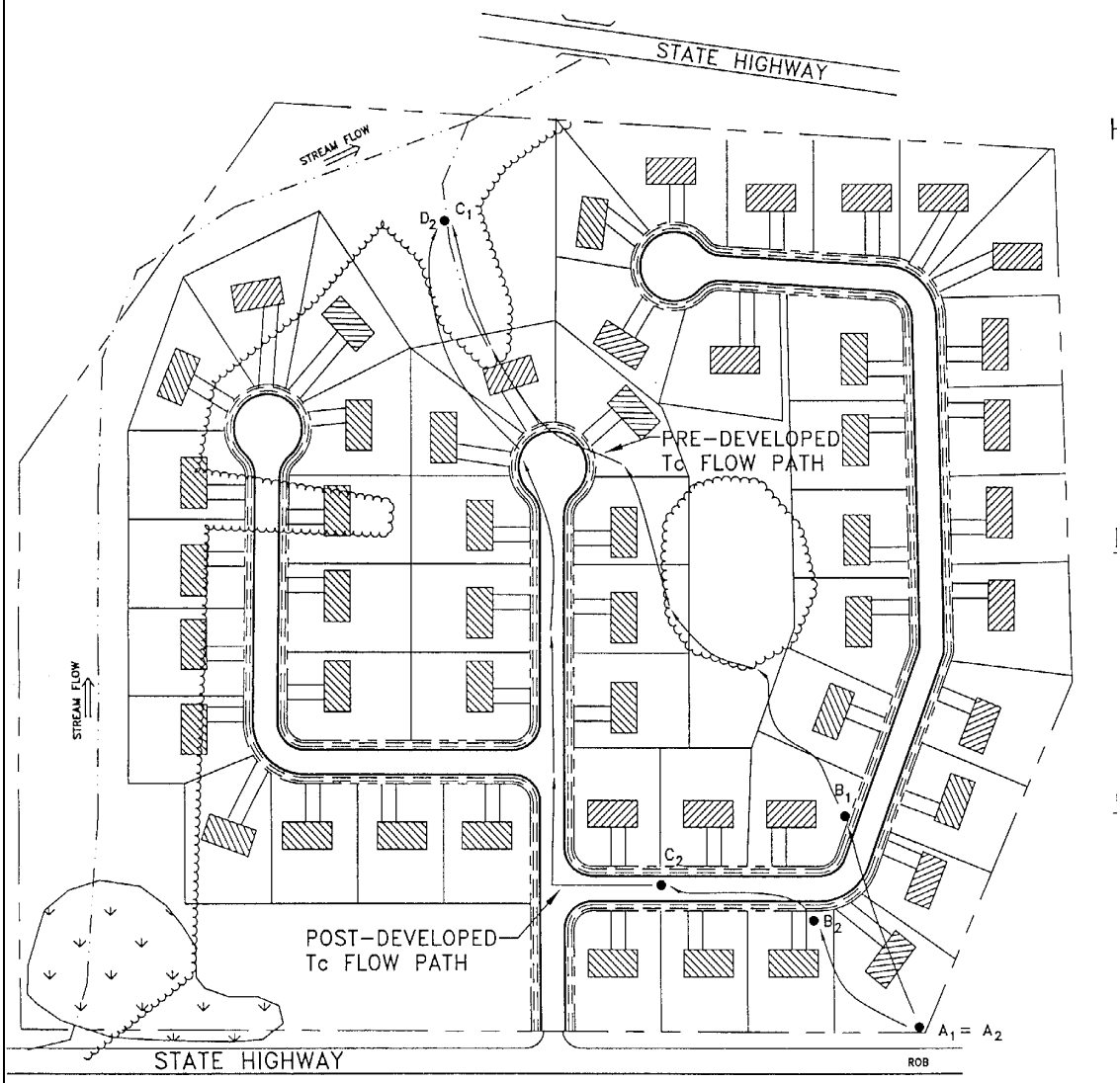

Base Data	Hydrologic Data		
Location: Frederick, MD Site Area = Total Drainage Area (A) = 38.0 ac Measured Impervious Area = 13.8 ac; I=13.8/38 = 36.3% Soils Types: 60% "B", 40% "C" Stream Use Designation – I Zoning: Residential (½ acre lots)		Pre	Post
	CN	63	78
	t_c	0.35 hr	0.19 hr

Step 2. Compute Recharge Volume (Re_v)

$$Re_v = \frac{(S)(R_v)(A)}{12}$$ (percent volume method)

or

$$Re_v = (S)(A_i)$$ (percent area method)

Step 2a. Determine Soil Specific Recharge Factor (*S*) Based on Hydrologic Soil Group

HSG	Soil Specific Recharge Factor (*S*)
A	0.38
B	0.26
C	0.13
D	0.06

Assume imperviousness is located proportionally (60/40) in B and C soils and compute a composite S:

S = (0.26)(0.60) + (0.13)(0.40) = 0.208; Use 0.208 or 20.8% of site imperviousness

Step 2b. Compute Recharge Using Percent Volume Method

Re_v = [(*S*)(*R*$_v$)(*A*)]/12
= [(0.208)(0.38)(38 ac)]/12
= 0.25 ac-ft

or

For "B" soils =[(0.26)(.38)(38 ac)]/12 × 60% = 0.19 ac-ft
For "C" soils =[(0.13)(.38)(38 ac)]/12 × 40% = .06 ac-ft

Add recharge requirement for both soils for a total volume of 0.25 ac-ft

Step 2c. Compute Recharge Using Percent Area Method

Re_v = (*S*)(*A*$_i$)
= (0.208)(13.8 ac)
= 2.87 acres

or

For "B" soils = (0.26)(13.8 ac)(60%) = 2.15 acres
For "C" soils = (0.13)(13.8 ac)(40%) = 0.72 acres
Added together = 2.87 acres of the total site impervious area needs to be treated by non-structural practices.

The Re_v requirement may be met by: a) treating 0.25 ac-ft using structural methods, b) treating 2.87 acres using non-structural methods, or c) a combination of both (e.g., 0.12 ac-ft structurally and 1.44 acres non-structurally).

Step 3. Compute Channel Protection Volume (Cp_v): (See Appendix D.11)

Step 3a. Select Cp_v Sizing Rule

For channel protection, provide 12 or 24 hours of extended detention time (*T*) for the one-year design storm event.

Use Classification	Maximum Hours Allowable
Use I (general)	24
Use II (tidal)	N/A (if direct discharge)
Use III (reproducing trout)	12
Use IV (recreational trout)	12

Given that our stream is Use I, we will use a *T* of 24 hours for the one-year design storm event.

Step 3b. Develop site hydrologic and TR-55 Input Parameters

Per attached TR-55 calculations (see Figures 2.7 and 2.8).

Condition	CN	t_c	Runoff (Q_a) 1 yr storm	Q 1-year	Q 2-year	Q 10-year	Q 100 year
		hours	*inches*	*cfs*	*cfs*	*cfs*	*cfs*
pre-developed	63	0.35	0.2	4.62	13.58	50.38	102.6
developed	78	0.19	0.8	35.0	54.94	129.96	216.30

Step 3c. Utilize MDE Method to Compute Storage Volume (Appendix D.11)

Initial abstraction (I_a) for CN of 78 is 0.564: (TR-55) [I_a = (200/CN) - 2]

I_a/P = (0.564)/2.5" = 0.226
t_c = 0.19 hours

Figure D.11.1 (App. D.11), q_u = 740 csm/in
Knowing q_u and T (extended detention time) find q_o/q_i from Figure D.11.2, "Detention Time Versus Discharge Ratios."

Peak outflow discharge/peak inflow discharge (q_o/q_i) = 0.024

With q_o/q_i, compute V_s/V_r for a Type II rainfall distribution,

$$V_s/V_r = 0.683 - 1.43(q_o/q_i) + 1.64(q_o/q_i)^2 - 0.804(q_o/q_i)^3 \text{ (App. D.11)}$$
$$V_s/V_r = 0.65$$

Therefore, V_s = 0.65(0.8″)(1/12)(38 ac) = 1.65 ac-ft

Step 3d. Define the Cp_v Release Rate

q_i is known (35.0 cfs), therefore,
$q_o = (q_o/q_i)\ q_i$ = .024 (35.0) = .84 cfs

Step 4. Compute Overbank Flood Protection Volume (Q_p):

Step 4a. Determine Appropriate Q_p Requirement

Location	Type of Peak Control
Eastern Shore	2 year/2 year
Western Shore	10 year/10 year

Because this site is located on the Western Shore, ten-year quantity peak control may be required. Assume ten-year control is needed.

Step 4b. Model Site Using TR-55 for 10 year storm

Per TR-55, Figure 6-1 (Page 6-2 of TR-55) for a Q_{in} of 130.0 cfs, and an allowable Q_{out} of 50.4 cfs, the V_s necessary for control is 2.83 ac-ft, with a developed CN of 78. (See TR-55 Worksheet 6a, Page 6-5 of TR-55). Note that there is 5.0 inches of rainfall during this event, with 2.7 inches of runoff.

Step 5. Extreme Flood Volume (Q_f)

For this example, management of Q_f is not required. However, at final design the 100-year event must be conveyed safely through the stormwater management practice. Based on field observation, downstream conveyance may require analysis for passing the 100-year event through an existing culvert.

Table 2.3 Summary of General Storage Requirements for Reker Meadows

Step	Requirement	Volume Required (ac- ft)	Notes
1.	Water Quality Volume (WQ_v)	1.08	
2.	Recharge Volume (Re_v)	.25 (or 2.87 acres)	this volume is included within the WQ_v storage
3.	Channel Protection Volume (Cp_v)	1.65	Cp_v release rate is .84 cfs
4.	Overbank Flood Protection Volume (Q_p)	2.83	10-year, in this case
5.	Extreme Flood Volume (Q_f)	N/A	provide safe passage for the 100-year event in final design

Figure 2.7: Reker Meadows – Pre Developed Conditions
(Source: TR-55 computer printouts)

```
                    RUNOFF CURVE NUMBER COMPUTATION            Version 2.00
Project : REKER MEADOWS                          User: SRC      Date: 08-01-97
County  : FREDERICK            State: MD      Checked: ____     Date: ________
Subtitle: PRE-DEVELOPED CONDITIONS
-------------------------------------------------------------------------------
                                                   Hydrologic Soil Group
         COVER DESCRIPTION                       A        B        C        D
                                                        Acres (CN)
-------------------------------------------------------------------------------
OTHER AGRICULTURAL LANDS
Meadow -cont. grass (non grazed) ----            -  22.8(58)  9.2(71)       -

Woods                              good          -        -   6.0(70)       -

Total Area (by Hydrologic Soil Group)               22.8     15.2
                                                    ====     ====
                 TOTAL DRAINAGE AREA: 38 Acres        WEIGHTED CURVE NUMBER: 63*

                      TIME OF CONCENTRATION AND TRAVEL TIME        Version 2.00
-------------------------------------------------------------------------------
Flow Type   2 year   Length   Slope  Surface   n   Area     Wp   Velocity  Time
             rain     (ft)   (ft/ft)   code       (sq/ft)  (ft)  (ft/sec)  (hr)
-------------------------------------------------------------------------------
Sheet        3.1      150      .025     F                                 0.306
Shallow Concent'd     500      0.04     U                                 0.043
                                                Time of Concentration = 0.35*
                                                                        =====
        --- Sheet Flow Surface Codes ---
    A Smooth Surface           F Grass, Dense     --- Shallow Concentrated ---
    B Fallow (No Res.)         G Grass, Burmuda   ---     Surface Codes    ---
    C Cultivated < 20 % Res.   H Woods, Light               P Paved
    D Cultivated > 20 % Res.   I Woods, Dense               U Unpaved
    E Grass-Range, Short       J Range, Natural
* - Generated for use by GRAPHIC method

                       GRAPHICAL PEAK DISCHARGE METHOD            Version 2.00
 Data: Drainage Area        :  38 * Acres
        Runoff Curve Number  :  63 *
        Time of Concentration:  0.35 * Hours
        Rainfall Type        :  II
        Pond and Swamp Area  :  NONE

=====================================================================
| Storm Number          |   1   |   2   |   3   |   4   |   5   |   6   |   7   |
|----------------------|------|------|------|------|------|------|------|
| Frequency  (yrs)      |   1   |   2   |   5   |  10   |  25   |  50   |  100  |
| 24-Hr Rainfall (in)   |  2.5  |  3.1  |   4   |   5   |  5.4  |  6.1  |   7   |
| Ia/P Ratio            | 0.47  | 0.38  | 0.29  | 0.23  | 0.22  | 0.19  | 0.17  |
| Runoff (in)           | 0.24  | 0.48  | 0.92  | 1.51  | 1.77  | 2.25  | 2.90  |
| Unit Peak Discharge   |0.504 |0.698 |0.834 |0.880 |0.894 |0.913 |0.932 |
|    (cfs/acre/in)      |      |      |      |      |      |      |      |
| Pond and Swamp Factor | 1.00  | 1.00  | 1.00  | 1.00  | 1.00  | 1.00  | 1.00  |
|    0.0% Ponds Used    |      |      |      |      |      |      |      |
|----------------------|------|------|------|------|------|------|------|
| Peak Discharge (cfs)  |   5   |  13   |  29   |  50   |  60   |  78   |  103  |
=====================================================================
* - Value(s) provided from TR-55 system routines
```

Figure 2.8: Reker Meadows –Developed Conditions
(Source: TR-55 Computer Printouts)

```
                        RUNOFF CURVE NUMBER COMPUTATION            Version 2.00
Project : REKER MEADOWS                          User: SRC      Date: 08-01-97
County  : FREDERICK            State: MD      Checked: ____     Date: ________
Subtitle: DEVELOPED CONDITIONS
--------------------------------------------------------------------------------
                                                   Hydrologic Soil Group
         COVER DESCRIPTION                       A        B        C        D
                                                          Acres (CN)
--------------------------------------------------------------------------------
FULLY DEVELOPED URBAN AREAS (Veg Estab.)
Open space (Lawns,parks etc.)
  Good condition; grass cover > 75%              -  13.0(61)  5.2(74)       -
Impervious Areas
  Paved parking lots, roofs, driveways           -   7.9(98)  5.9(98)       -
OTHER AGRICULTURAL LANDS
Woods                              good          -        -   6.0(70)       -

Total Area (by Hydrologic Soil Group)               20.9     17.1
                                                    ====     ====
                TOTAL DRAINAGE AREA: 38 Acres        WEIGHTED CURVE NUMBER: 78*

                     TIME OF CONCENTRATION AND TRAVEL TIME        Version 2.00
--------------------------------------------------------------------------------
Flow Type   2 year   Length   Slope  Surface   n   Area     Wp   Velocity  Time
             rain     (ft)   (ft/ft)   code       (sq/ft)  (ft)  (ft/sec)  (hr)
--------------------------------------------------------------------------------
Sheet        3.1      100      .025     E                                  0.152
Shallow Concent'd     300      0.02     P                                  0.029
Open Channel          600                                          16.2    0.010
                                                   Time of Concentration = 0.19*
                                                                           =====
        --- Sheet Flow Surface Codes ---
    A Smooth Surface           F Grass, Dense     --- Shallow Concentrated ---
    B Fallow (No Res.)         G Grass, Burmuda   ---     Surface Codes    ---
    C Cultivated < 20 % Res.   H Woods, Light               P Paved
    D Cultivated > 20 % Res.   I Woods, Dense               U Unpaved
    E Grass-Range, Short       J Range, Natural
* - Generated for use by GRAPHIC method

                        GRAPHICAL PEAK DISCHARGE METHOD            Version 2.00
Data: Drainage Area        :  38 * Acres
        Runoff Curve Number  :  78 *
        Time of Concentration:  0.19 * Hours
        Rainfall Type        :  II
        Pond and Swamp Area  :  NONE
=========================================================================
| Storm Number          |   1   |   2   |   3   |   4   |   5   |   6   |   7   |
|-----------------------|-------|-------|-------|-------|-------|-------|-------|
| Frequency  (yrs)      |   1   |   2   |   5   |  10   |  25   |  50   |  100  |
| 24-Hr Rainfall (in)   |  2.5  |  3.1  |   4   |   5   |  5.4  |  6.1  |   7   |
| Ia/P Ratio            | 0.23  | 0.18  | 0.14  | 0.11  | 0.10  | 0.09  | 0.08  |
|            Used       | 0.23  | 0.18  | 0.14  | 0.11  | 0.10  | 0.10  | 0.10  |
| Runoff (in)           | 0.79  | 1.20  | 1.89  | 2.71  | 3.05  | 3.67  | 4.47  |
| Unit Peak Discharge   |1.175  |1.209  |1.242  |1.264  |1.271  |1.275  |1.275  |
|    (cfs/acre/in)      |       |       |       |       |       |       |       |
| Pond and Swamp Factor| 1.00  | 1.00  | 1.00  | 1.00  | 1.00  | 1.00  | 1.00  |
|    0.0% Ponds Used    |       |       |       |       |       |       |       |
|-----------------------|-------|-------|-------|-------|-------|-------|-------|
| Peak Discharge (cfs)  |   35  |   55  |   89  |  130  |  148  |  178  |  217  |
=========================================================================
* - Value(s) provided from TR-55 system routines
```

Design Example No. 2: Commercial Development - Claytor Community Center

Site data and the layout of the Claytor Community Center are shown in Figure 2.9.

Figure 2.9 Claytor Community Center

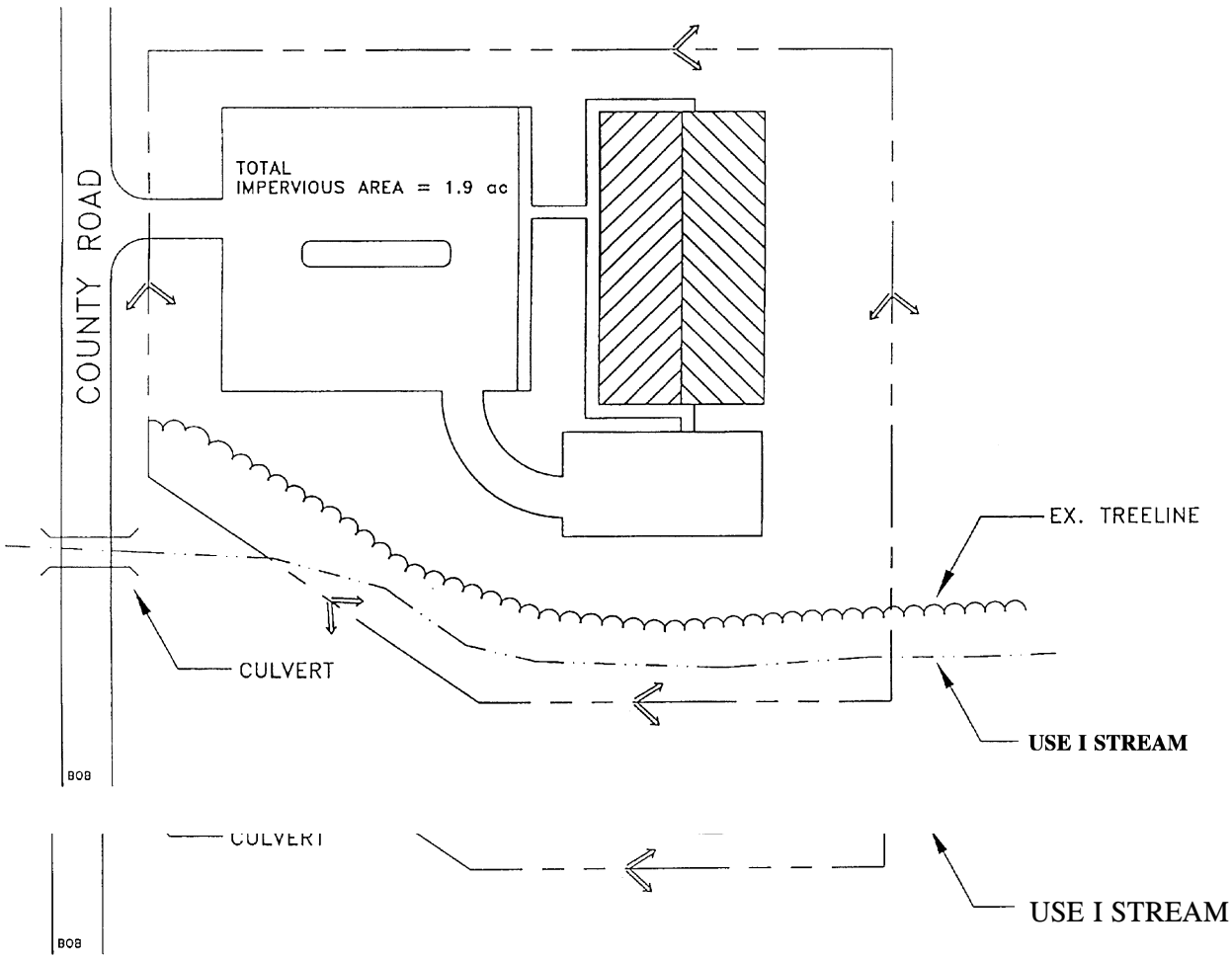

Base Data	Hydrologic Data		
Location: Easton, MD		Pre	Post
Site Area = Total Drainage Area (A) = 3.0 ac Impervious Area = 1.9 ac; I= 1.9/3.0 = 63.3% R_v = 0.05 + (63.3)(0.009) = 0.62 Soils Type "B" Stream Use Designation I	CN	57	83
	t_c	0.42 hr	0.16 hr

Step 1. Compute Water Quality Volume WQ_v

$$WQ_v = \frac{(P)(R_v)(A)}{12}$$

Step 1a. Compute Volumetric Runoff Coefficient (R_v)

$R_v = 0.05 + (0.009)\ (I);\ I = 1.9_{\text{acres}}/3.0_{\text{acres}} = 63.3\%$
$= 0.05 + (0.009)\ (63.3) = 0.62$

Step 1b. Determine Rainfall Zone for WQ_v Formula

Location	**Rainfall (*P*)**
Eastern Rainfall Zone	1.0 inches
Western Rainfall Zone	0.9 inches
Minimum WQ_v ($I \leq 15\%$)	0.2 inches

Because this site is located in the Eastern Rainfall Zone, use the 1″ of rainfall to determine WQ_v.

Step 1c. Compute WQ_v

$WQ_v = [(1.0'')(R_v)(A)]/12$
$= [(1.0'')(0.62)(3.0ac)]/12 \times (43560ft^2/acre)$
$= \underline{6752\ ft^3}$

Check Minimum: $[(0.2'')(3.0\ ac)]/12 \times (43560ft^2/acre) = 2178\ ft^3 < 6752\ ft^3$
$\therefore$ Use $WQ_v = 6752\ ft^3$

Step 2. Compute Recharge Volume (Re_v)

$$Re_v = \frac{(S)(R_v)(A)}{12}$$ (percent volume method)

or

$$Re_v = (S)(A_i)$$ (percent area method)

Step 2a. Determine Soil Specific Recharge Factor (*S*) Based on Hydrologic Soil Group

HSG	Soil Specific Recharge Factor (*S*)
A	0.38
B	0.26
C	0.13
D	0.06

Site is located within B soils, $\therefore S = 0.26$; Use 0.26 or 26%

Step 2b. Compute Recharge Using Percent Volume Method

$$Re_v = [(S)(R_v)(A)]/12$$
$$= [(0.26)(0.62)(3.0\text{ ac})]/12 \times (43560\text{ft}^2/\text{acre})$$
$$= \underline{1{,}755.5\text{ ft}^3}$$

Step 2c. Compute Recharge Using Percent Area Method

$$Re_v = (S)(A_i)$$
$$= (0.26)(1.9\text{ ac}) \times (43560\text{ft}^2/\text{acre})$$
$$= 21{,}518.6\text{ ft}^2$$

The Re_v requirement may be met by: a) treating 1,755 ft^3 using structural methods, b) treating 21,518.6 ft^2 using non-structural methods, or c) a combination of both (e.g., 580 ft^3 structurally and 14,200 ft^2 non-structurally).

Step 3. Compute Channel Protection Volume (Cp_v):

Because this site is located on the Eastern Shore (see Fig. 2.4), Cp_v is not required.

Step 4. Compute Overbank Flood Protection Volume (Q_p):

Step 4a. Determine Appropriate Q_p Requirement

Location	Type of Peak Control
Eastern Shore	2-year/2-year
Western Shore	10-year/10-year

Per attached TR-55 calculations (Figure 2.10 and 2.11)

Condition	CN	t_c	Q 1-year	Q 2-year	Q 10-year	Q 100-year
		hours	*cfs*	*cfs*	*cfs*	*cfs*
pre-developed	57	0.42	0.22	0.58	2.91	6.75
developed	83	0.16	5.08	7.11	13.97	22.69

Because this site is located on the Eastern Shore, two-year quantity peak control is required (Q_{p2}). Per TR-55, Figure 6-1 (Page 6-2 in TR-55), for a Q_{in} of 7.11 cfs, and an allowable Q_{out} of 0.58 cfs, the Vs necessary for 2-year control is 0.24 ac-ft or 10,630 ft^3, under a developed CN of 83. (See TR-55 Worksheet 6a, Page 6-5 of TR-55.) Note that there is 3.4 inches of rainfall during this event, with 1.8 inches of runoff.

Step 5. Extreme Flood Volume (Q_f):

For this example, management of Q_f is not required. However, at final design the 100-year event must be conveyed safely through the stormwater management practice and to receiving waters.

Table 2.4 Summary of General Design Information for Claytor Community Center

Step	Category	Volume Required (cubic feet)	Notes
1	Water Quality Volume (WQ_v)	6,752	
2	Recharge Volume (Re_v)	1,688	this volume can be included within the WQ_v storage
3	Channel Protection Volume (Cp_v)	N/A	not required on the Eastern Shore
4	Overbank Flood Protection Volume (Q_p)	10,630	2-year, in this case
5	Extreme Flood Volume (Q_f)	N/A	provide safe passage for the 100-year event in final design

Figure 2.10: Claytor Community Center – Pre Developed Conditions

```
                        RUNOFF CURVE NUMBER COMPUTATION            Version 2.00
Project : CLAYTOR COMMUNITY CENTER                User: SRC      Date: 07-31-97
County  : DORCHESTER            State: MD      Checked: ____     Date: ________
Subtitle: PRE-DEVELOPED
-------------------------------------------------------------------------------
                                                     Hydrologic Soil Group
         COVER DESCRIPTION                        A        B        C        D
                                                          Acres (CN)
-------------------------------------------------------------------------------
OTHER AGRICULTURAL LANDS
Meadow -cont. grass (non grazed) ----            -   2.4(58)       -        -
Woods                              good          -   0.6(55)       -        -
Total Area (by Hydrologic Soil Group)                 3
                                                    ====
                TOTAL DRAINAGE AREA: 3 Acres         WEIGHTED CURVE NUMBER: 57*

             TIME OF CONCENTRATION AND TRAVEL TIME        Version 2.00
   -----------------------------------------------------------------------------
Flow Type   2 year   Length   Slope  Surface   n   Area     Wp   Velocity  Time
             rain     (ft)   (ft/ft)   code       (sq/ft)  (ft)  (ft/sec)  (hr)
-------------------------------------------------------------------------------
Sheet        3.4      150      0.015    F                                  0.358
Shallow Concent'd     500      0.02     U                                  0.061
                                                Time of Concentration = 0.42*
                                                                         =====
        --- Sheet Flow Surface Codes ---
    A Smooth Surface           F Grass, Dense     --- Shallow Concentrated ---
    B Fallow (No Res.)         G Grass, Burmuda   ---     Surface Codes    ---
    C Cultivated < 20 % Res.   H Woods, Light               P Paved
    D Cultivated > 20 % Res.   I Woods, Dense               U Unpaved
    E Grass-Range, Short       J Range, Natural

                        GRAPHICAL PEAK DISCHARGE METHOD            Version 2.00
Data: Drainage Area        :  3 * Acres
        Runoff Curve Number  :  57 *
        Time of Concentration:  0.42 * Hours
        Rainfall Type        :  II
        Pond and Swamp Area  :  NONE
=========================================================================
| Storm Number          |   1   |   2   |   3   |   4   |   5   |   6   |   7   |
|-----------------------|-------|-------|-------|-------|-------|-------|-------|
| Frequency  (yrs)      |   1   |   2   |   5   |  10   |  25   |  50   |  100  |
| 24-Hr Rainfall (in)   |  2.8  |  3.4  |  4.6  |  5.4  |  6.2  |  6.9  |  7.8  |
| Ia/P Ratio            | 0.54  | 0.44  | 0.33  | 0.28  | 0.24  | 0.22  | 0.19  |
|            Used       | 0.50  | 0.44  | 0.33  | 0.28  | 0.24  | 0.22  | 0.19  |
| Runoff (in)           | 0.19  | 0.38  | 0.90  | 1.32  | 1.80  | 2.25  | 2.86  |
| Unit Peak Discharge   |0.392  |0.511  |0.712  |0.769  |0.796  |0.814  |0.833  |
|    (cfs/acre/in)      |       |       |       |       |       |       |       |
| Pond and Swamp Factor| 1.00  | 1.00  | 1.00  | 1.00  | 1.00  | 1.00  | 1.00  |
|    0.0% Ponds Used    |       |       |       |       |       |       |       |
|-----------------------|-------|-------|-------|-------|-------|-------|-------|
| Peak Discharge (cfs)  |   0   |   1   |   2   |   3   |   4   |   5   |   7   |
=========================================================================
* - Value(s) provided from TR-55 system routines
```

Figure 2.11: Claytor Community Center - Developed Conditions

```
                        RUNOFF CURVE NUMBER COMPUTATION            Version 2.00
Project : CLAYTOR COMMUNITY CENTER                User: SRC      Date: 07-31-97
County  : DORCHESTER           State: MD      Checked: ____     Date: ________
Subtitle: POST-DEVELOPED
--------------------------------------------------------------------------------
                                                   Hydrologic Soil Group
         COVER DESCRIPTION                       A        B        C        D
                                                         Acres (CN)
--------------------------------------------------------------------------------
FULLY DEVELOPED URBAN AREAS (Veg Estab.)
Open space (Lawns,parks etc.)
  Good condition; grass cover > 75%              -   0.5(61)       -        -
Impervious Areas
  Paved parking lots, roofs, driveways           -   1.9(98)       -        -
OTHER AGRICULTURAL LANDS
Woods                              good          -   0.6(55)       -        -

Total Area (by Hydrologic Soil Group)                 3
                                                     ====
                TOTAL DRAINAGE AREA: 3 Acres         WEIGHTED CURVE NUMBER: 83*

                     TIME OF CONCENTRATION AND TRAVEL TIME        Version 2.00
--------------------------------------------------------------------------------
Flow Type   2 year   Length   Slope  Surface   n   Area     Wp   Velocity  Time
             rain     (ft)   (ft/ft)   code       (sq/ft)  (ft)  (ft/sec)  (hr)
--------------------------------------------------------------------------------
Sheet        3.4      50       0.015    E                                  0.102
Shallow Concent'd     600      0.02     P                                  0.058
Open Channel          50                                          7.25    0.002
                                                   Time of Concentration = 0.16*
                                                                           =====
        --- Sheet Flow Surface Codes ---
    A Smooth Surface           F Grass, Dense     --- Shallow Concentrated ---
    B Fallow (No Res.)         G Grass, Burmuda   ---     Surface Codes    ---
    C Cultivated < 20 % Res.   H Woods, Light               P Paved
    D Cultivated > 20 % Res.   I Woods, Dense               U Unpaved
    E Grass-Range, Short       J Range, Natural
* - Generated for use by GRAPHIC method

                        GRAPHICAL PEAK DISCHARGE METHOD            Version 2.00
  Data: Drainage Area        :  3 * Acres
        Runoff Curve Number  :  83 *
        Time of Concentration:  0.16 * Hours
        Rainfall Type        :  II
        Pond and Swamp Area  :  NONE
=========================================================================
| Storm Number          |   1   |   2   |   3   |   4   |   5   |   6   |   7   |
|-----------------------|-------|-------|-------|-------|-------|-------|-------|
| Frequency  (yrs)      |   1   |   2   |   5   |  10   |  25   |  50   |  100  |
| 24-Hr Rainfall (in)   |  2.8  |  3.4  |  4.6  |  5.4  |  6.2  |  6.9  |  7.8  |
| Ia/P Ratio            | 0.15  | 0.12  | 0.09  | 0.08  | 0.07  | 0.06  | 0.05  |
|            Used       | 0.15  | 0.12  | 0.10  | 0.10  | 0.10  | 0.10  | 0.10  |
| Runoff (in)           | 1.29  | 1.77  | 2.81  | 3.54  | 4.28  | 4.93  | 5.79  |
| Unit Peak Discharge   |1.322  |1.342  |1.357  |1.357  |1.357  |1.357  |1.357  |
|    (cfs/acre/in)      |       |       |       |       |       |       |       |
| Pond and Swamp Factor| 1.00  | 1.00  | 1.00  | 1.00  | 1.00  | 1.00  | 1.00  |
|    0.0% Ponds Used    |       |       |       |       |       |       |       |
|-----------------------|-------|-------|-------|-------|-------|-------|-------|
| Peak Discharge (cfs)  |   5   |   7   |  11   |  14   |  17   |  20   |  24   |
=========================================================================
* - Value(s) provided from TR-55 system routines
```

Design Example No. 3: Multiple Drainage Areas – Pensyl Pointe

Site data and the layout of the Pensyl Pointe subdivision are shown in Fig. 2-12.

Step 1. Compute WQ_v Volume

$$WQ_v = \frac{(P)(R_v)(A)}{12}$$

Step 1a. Compute Runoff Coefficient

Drainage Area 1
$R_v = 0.05 + (0.009)(I)$; $I = 2.25_{\text{acres}} / 7.6_{\text{acres}} = 29.6\%$
$= 0.05 + (0.009)(29.6) = 0.32$

Drainage Area 2
$R_v = 0.05 + (0.009)(I)$; $I = 11.55_{\text{acres}} / 30.4_{\text{acres}} = 38.0\%$
$= 0.05 + (0.009)(38.0) = 0.39$
or

Total Site
$R_v = 0.05 + (0.009)(I)$; $I = 13.8_{\text{acres}} / 38.0_{\text{acres}} = 36.3\%$
$= 0.05 + (0.009)(36.3) = 0.38$

Step 1b. Determine Rainfall Zone for WQ_v Formula

Location	Formula
Eastern Rainfall Zone	1.0 inches
Western Rainfall Zone	0.9 inches
Minimum WQ_v ($I \leq 15\%$)	0.2 inches

Because this site is located in the Eastern Rainfall Zone and imperviousness exceeds 15%, use 1.0” of rainfall to determine WQ_v.

Step 1c. Compute WQ_v

Drainage Area 1
$WQ_v = [(1.0”)(R_v)(A)]/12$
$= [(1.0”)(0.32)(7.6\text{ ac})]/12$
$= \underline{0.20\text{ac-ft}}$

Figure 2.12 Pensyl Pointe

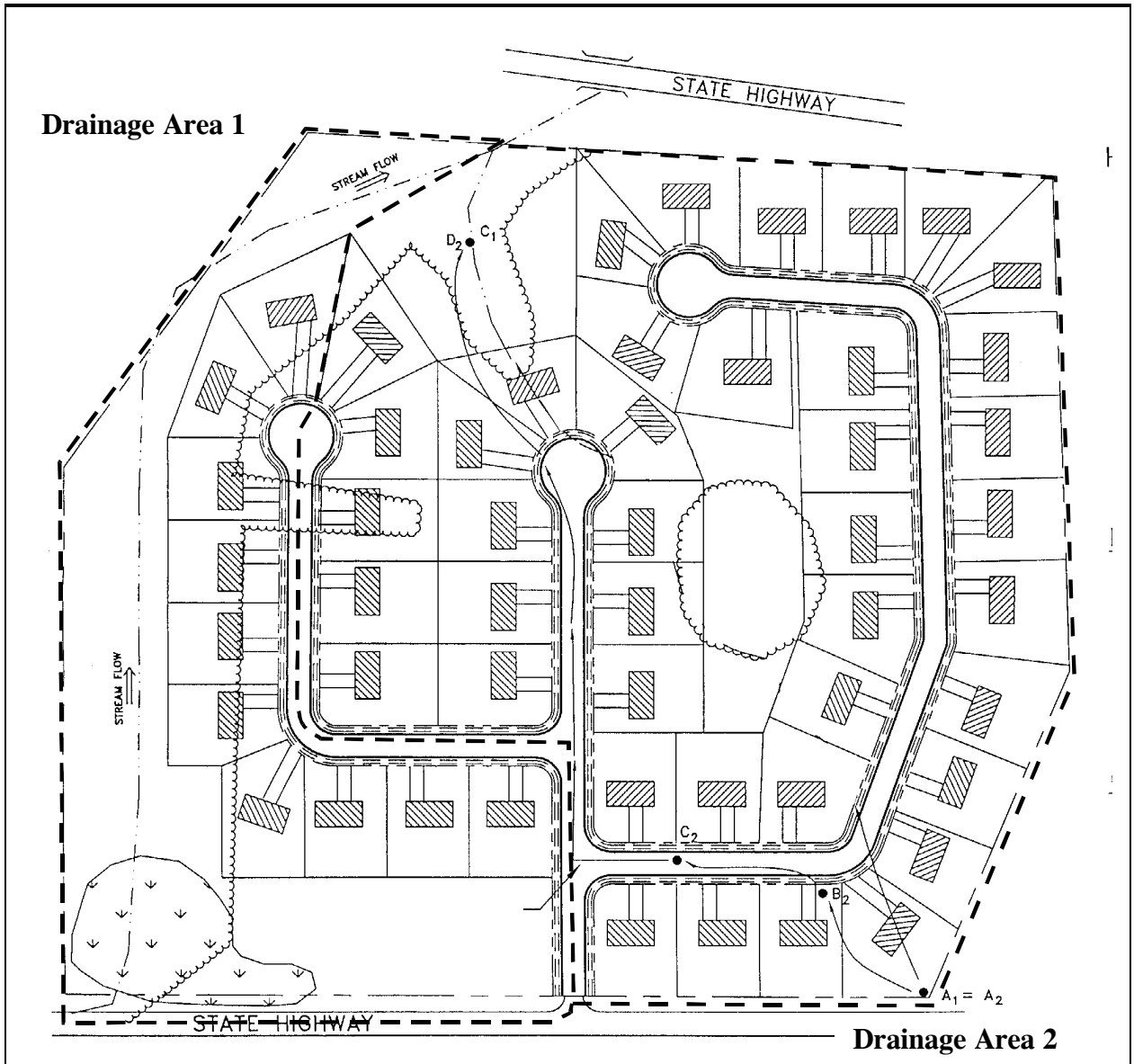

Base Data
Location: Olney, MD
Site Area = 38.0 ac
Measured Site Impervious Area = 13.8 ac; I = 13.8/38 = 36.3%
Soils Types: 60% "B", 40% C
Stream Use Designation – III, Zoning: Residential (½ acre lots)
Drainage Area (DA) 1
Area = 7.6 ac.
Measured Impervious Area = 2.25 ac; I = 2.25/7.6 = 30.0%
Drainage Area (DA) 2
Area = 30.4 ac.
Measured Impervious Area = 11.55 ac; I = 11.55/30.4 = 38.0%

Hydrologic Data
(Post-developed)

	DA 1	DA 2
CN	76	78
t_c	0.15	0.19

Drainage Area 2
WQ_v = [(1.0")(R_v)(A)]/12
= [(1.0")(0.39)(30.4 ac)]/12
= 0.99 ac-ft

or

Total Site
WQ_v = [(1.0")(R_v)(A)]/12
= [(1.0")(0.38)(38.0)]/12
= 1.20 ac-ft

Step 2. Compute Recharge Volume

Step 2a. Determine Recharge Equation Based on Hydrologic Soil Group

HSG	Soil Specific Recharge Factor (*S*)
A	0.38
B	0.26
C	0.13
D	0.06

Assume imperviousness is located proportionally (60/40) in B and C soils and compute a composite *S*:

$$S = \frac{(0.26 \times 22.8\ acres)(0.13 \times 15.2\ acres)}{38.0\,acres} = 0.208\ or\ 20.8\,\%$$

Step 2b. Compute Recharge Using Percent Volume Method

Drainage Area 1
Re_v = [(*S*)(R_v)(*A*)]/12
= [(0.208)(0.32)(7.6 ac)]/12
= 0.04 ac-ft

Drainage Area 2
Re_v = [(*S*)(R_v)(*A*)]/12
= [(0.208)(0.39)(30.4 ac)]/12
= 0.21 ac-ft

or

Total Site
$Re_v = [(S)(R_v)(A)]/12$
$= [(0.208)(0.38)(38.0\ ac)]/12$
$= \underline{0.25\ ac\text{-}ft}$

Step 2c. Compute Recharge Using Percent Area Method

Drainage Area 1
$Re_v = (S)(A_i)$
$= (0.208)(2.25\ ac)$
$= 0.47$ acres

Drainage Area 2
$Re_v = (S)(A_i)$
$= (0.208)(11.55\ ac)$
$= 2.40$ acres

or

Total Site
$Re_v = (S)(A_i)$
$= (0.208)(13.8\ ac)$
$= 2.87$ acres

The Re_v requirement may be met by: a) treating 0.25 ac-ft using structural methods, b) treating 2.87 acres using non-structural methods, or c) a combination of both (e.g., 0.19 ac-ft structurally and 0.72 acres non-structurally).

Step 3. Compute Channel Protection Volume (Cp_v):

Step 3a. Select Cp_v Sizing Rule

For channel protection, provide 12 or 24 hours of extended detention time (*T*) for the one-year design storm event.

Stream Use Designation	Maximum Hours Allowable (*T*)
Use I (general)	24
Use II (tidal)	N/A
Use III (reproducing trout)	12
Use IV (recreational trout)	12

Given that our stream is Use III, we will use a T of 12 hours for the one-year design storm event.

Step 3b. Develop site hydrologic and TR-55 Input Parameters.

Per attached TR-55 calculations (see Figures 2.13 and 2.14)

.

Drainage Area	**CN**	t_c	**Runoff (Q_a), 1 yr storm**	**Discharge (Q) 1 yr storm**
		hrs	*inches*	*cfs*
1	76	0.15	0.76	7.40
2	78	0.19	0.85	30.5

Step 3c. Utilize MDE Method to Compute Storage Volume (Appendix D.11)

Drainage Area 1

Initial abstraction (I_a) for CN of 76 is 0.63: (TR-55) [I_a = (200/CN) – 2]

I_a/P = (0.63)/2.6" = 0.24
t_c = 0.15 hours

From Figure D.11.1, q_u = 840 csm/in
Knowing q_u and T, find q_o/q_i from Figure D.11.2, "Detention Time Versus Discharge Ratios"

Peak outflow discharge/peak inflow discharge (q_o/q_i) = 0.040

With q_o/q_i, compute V_s/V_r ; for a Type II rainfall distribution,

$V_s/V_r = 0.683-1.43(q_o/q_i)+1.64(q_o/q_i)^2-0.804(q_o/q_i)^3$ (App.D.11)
$V_s/V_r = 0.62$

Therefore V_s = 0.62(0.76")(1'/12")(7.6 ac) = 0.30 ac-ft

Drainage Area 2

Initial abstraction (I_a) for CN of 78 is 0.564: (TR-55) [I_a = (200/CN) – 2]

I_a/P = (0.63)/2.6" = 0.22
t_c = 0.19 hours

From Figure D.11.1, q_u = 740 csm/in

Knowing q_u and T, find q_o/q_i from Figure D.11.2, "Detention Time Versus Discharge Ratios"
Peak outflow discharge/peak inflow discharge (q_o/q_i) = 0.050

With q_o/q_i, compute V_s/V_r ; for a Type II rainfall distribution,

$$V_s/V_r = 0.683-1.43(q_o/q_i)+1.64(q_o/q_i)^2-0.804(q_o/q_i)^3 \quad \text{(App. D.11)}$$
$$V_s/V_r = 0.61$$

Therefore V_s = 0.61(0.85")(1'/12")(30.4 ac) = 1.31 ac-ft

Step 3d. Define the Cp_v Release Rate

Drainage Area 1

q_i is known (7.4 cfs), therefore,
$q_o = (q_o/q_i)\ q_i$ = .040 (7.4 cfs) = 0.30 cfs

Drainage Area 2

q_i is known (30.5 cfs), therefore,
$q_o = (q_o/q_i)\ q_i$ = .050 (30.5 cfs) = 1.53 cfs

Step 4. Compute Overbank Flood Protection Volume (Q_p):

Step 4a. Determine Appropriate Q_p Requirement

Location	Type of Peak Control
Eastern Shore	2-year/2-year
All Other Areas	10-year/10-year *

*Varies according to local approval authority.

Because the site is located on the Western Shore, ten-year peak management for quantity control may be required. For the purpose of this example, the local approval authority has not required the ten-year peak management requirement.

Step 5. Extreme Flood Volume (Q_f)

For this example, management of Q_f is not required. However, at final design the 100-year event must be conveyed safely through any stormwater management practices. Based on field observation, downstream conveyance may require analysis for passing the 100-year event through existing infrastructure.

Table 2.5 Summary of General Storage Requirements for Pensyl Pointe

No.	Category	Volume Required		Notes
		Drainage Area 1	Drainage Area 2	
1	Water Quality Volume (WQ_v)	0.20 ac-ft	0.99 ac-ft	
2	Recharge Volume (Re_v)	0.04 ac-ft	0.21 ac-ft	this volume is included within the WQ_v storage
3	Channel Protection Volume (Cp_v)	0.30 ac-ft	1.31 ac-ft	release rates are 0.30 and 1.53 cfs, respectively.
4	Overbank Flood Protection Storage Volume (Q_p)	N/A	N/A	10-year peak management has been waived.
5	Extreme Flood Volume (Q_f)	N/A	N/A	provide safe passage for the 100-year event in final design.

Figure 2.13: Pensyl Pointe, Drainage Area 1 – Post Developed Conditions

```
              RUNOFF CURVE NUMBER COMPUTATION            Version 2.00

Project : Pensyl Pointe                        User: SRC      Date: 08-31-98
County  : Montgomery           State: MD      Checked: ____     Date: ________
Subtitle: Design Example 3
Subarea : DRAINAGE AREA 1
--------------------------------------------------------------------------------
                                                     Hydrologic Soil Group
         COVER DESCRIPTION                        A        B        C        D
                                                          Acres (CN)
--------------------------------------------------------------------------------
FULLY DEVELOPED URBAN AREAS (Veg Estab.)
Open space (Lawns,parks etc.)
  Good condition; grass cover > 75%              -    2.60(61) 1.04(74)     -

Impervious Areas
  Paved parking lots, roofs, driveways           -    1.35(98) 0.90(98)     -


OTHER AGRICULTURAL LANDS
Woods                              good           -      -      1.71(70)     -

Total Area (by Hydrologic Soil Group)                3.95     3.65
                                                     ====     ====
--------------------------------------------------------------------------------
SUBAREA: DA 1   TOTAL DRAINAGE AREA: 7.6 Acres       WEIGHTED CURVE NUMBER: 76
--------------------------------------------------------------------------------
GRAPHICAL PEAK DISCHARGE METHOD            Version 2.00


Project : Comstock Pointe                        User: SRC      Date: 08-31-98
County  : Montgomery           State: MD      Checked: ____     Date: ________
Subtitle: Design Example 3

  Data: Drainage Area        :  7.6 * Acres
        Runoff Curve Number  :  76 *
        Time of Concentration:  0.15   Hours
        Rainfall Type        :  II
        Pond and Swamp Area  :  NONE
=====================================================================
| Storm Number          |   1   |   2   |   3   |   4   |   5   |   6   |   7   |
|-----------------------|-------|-------|-------|-------|-------|-------|-------|
| Frequency  (yrs)      |   1   |   2   |   5   |  10   |  25   |  50   |  100  |
| 24-Hr Rainfall (in)   |  2.6  |  3.2  |  4.2  |  5.1  |  5.6  |  6.3  |  7.2  |
| Ia/P Ratio            | 0.24  | 0.20  | 0.15  | 0.12  | 0.11  | 0.10  | 0.09  |
|            Used       | 0.24  | 0.20  | 0.15  | 0.12  | 0.11  | 0.10  | 0.10  |
| Runoff (in)           | 0.76  | 1.15  | 1.89  | 2.62  | 3.04  | 3.64  | 4.44  |
| Unit Peak Discharge   |1.281  |1.315  |1.351  |1.371  |1.379  |1.388  |1.388  |
|    (cfs/acre/in)      |       |       |       |       |       |       |       |
| Pond and Swamp Factor| 1.00  | 1.00  | 1.00  | 1.00  | 1.00  | 1.00  | 1.00  |
|    0.0% Ponds Used    |       |       |       |       |       |       |       |
|-----------------------|-------|-------|-------|-------|-------|-------|-------|
| Peak Discharge (cfs)  |    7  |   12  |   19  |   27  |   32  |   38  |   47  |
=====================================================================
```

Figure 2.14: Pensyl Pointe, Drainage Area 2 – Post Developed Conditions

```
              RUNOFF CURVE NUMBER COMPUTATION            Version 2.00

Project : Pensyl Pointe                        User: SRC      Date: 08-31-98
County  : Montgomery           State: MD      Checked: ____     Date: ________
Subtitle: Design Example 3
Subarea : DRAINAGE AREA 2
-------------------------------------------------------------------------------
                                                   Hydrologic Soil Group
         COVER DESCRIPTION                       A        B        C        D
                                                     Acres (CN)
-------------------------------------------------------------------------------
FULLY DEVELOPED URBAN AREAS (Veg Estab.)
Open space (Lawns,parks etc.)
  Good condition; grass cover > 75%              -     10.4(61) 4.16(74)    -

Impervious Areas
  Paved parking lots, roofs, driveways           -     6.63(98) 4.92(98)    -


OTHER AGRICULTURAL LANDS
Woods                             good           -           -  4.29(70)    -



Total Area (by Hydrologic Soil Group)                 17.0     13.3
                                                      ====     ====
-------------------------------------------------------------------------------
SUBAREA: DA 2   TOTAL DRAINAGE AREA: 30.4 Acres      WEIGHTED CURVE NUMBER: 78

GRAPHICAL PEAK DISCHARGE METHOD            Version 2.00

  Data: Drainage Area        :  30.4   Acres
        Runoff Curve Number  :  78
        Time of Concentration:  0.19   Hours
        Rainfall Type        :  II
        Pond and Swamp Area  :  NONE
=====================================================================
| Storm Number          |   1   |   2   |   3   |   4   |   5   |   6   |   7   |
|-----------------------|-------|-------|-------|-------|-------|-------|-------|
| Frequency  (yrs)      |   1   |   2   |   5   |  10   |  25   |  50   |  100  |
| 24-Hr Rainfall (in)   |  2.6  |  3.2  |  4.2  |  5.1  |  5.6  |  6.3  |  7.2  |
| Ia/P Ratio            | 0.22  | 0.18  | 0.13  | 0.11  | 0.10  | 0.09  | 0.08  |
|            Used       | 0.22  | 0.18  | 0.13  | 0.11  | 0.10  | 0.10  | 0.10  |
| Runoff (in)           | 0.85  | 1.27  | 2.05  | 2.80  | 3.23  | 3.85  | 4.66  |
| Unit Peak Discharge   |1.182  |1.214  |1.247  |1.266  |1.274  |1.275  |1.275  |
|    (cfs/acre/in)      |       |       |       |       |       |       |       |
| Pond and Swamp Factor| 1.00  | 1.00  | 1.00  | 1.00  | 1.00  | 1.00  | 1.00  |
|    0.0% Ponds Used    |       |       |       |       |       |       |       |
|-----------------------|-------|-------|-------|-------|-------|-------|-------|
| Peak Discharge (cfs)  |   31  |   47  |   78  |  108  |  125  |  149  |  180  |
=====================================================================
```

Section 2.7 Acceptable Urban BMP Options

This section sets forth six acceptable groups of BMPs that can be used to meet the water quality and/or groundwater recharge volume criteria.

2.7.1 Urban BMP Groups

The dozens of different BMP designs currently used in the State of Maryland are assigned into six general categories for stormwater quality control (WQ_v and/or Re_v):

BMP Group 1 stormwater ponds
BMP Group 2 stormwater wetlands
BMP Group 3 infiltration practices
BMP Group 4 filtering practices
BMP Group 5 open channel practices
BMP Group 6 non-structural practices

Within each BMP group, detailed performance criteria are presented that govern feasibility, conveyance, pretreatment, treatment, environmental/landscaping and maintenance requirements (see Chapter 3).

To be considered an effective BMP for stand-alone treatment of WQ_v, a design shall be capable of:

1. capturing and treating the required water quality volume (WQ_v),
2. removing 80% of the TSS,
3. removing 40% of the TP, and
4. having an acceptable longevity rate in the field.

A combination of structural and/or non-structural BMPs are normally required at most development sites to meet all five stormwater sizing criteria. Documentation of the capability of the BMPs to remove TSS is provided in Appendix D.5. Guidance on selecting the most appropriate combination of BMPs is provided in Chapter 4.

BMP Group 1. Stormwater Ponds

Practices that have a combination of a permanent pool, extended detention or shallow wetland equivalent to the entire WQ_v include:

P-1 micropool extended detention pond
P-2 wet pond
P-3 wet extended detention pond

P-4 multiple pond system
P-5 pocket pond

BMP Group 2. Stormwater Wetlands

Practices that include significant shallow wetland areas to treat urban stormwater but often may also incorporate small permanent pools and/or extended detention storage to achieve the full WQ_v include:

W-1 shallow wetland
W-2 ED shallow wetland
W-3 pond/wetland system
W-4 pocket wetland

BMP Group 3. Infiltration Practices

Practices that capture and temporarily store the WQ_v before allowing it to infiltrate into the soil over a two day period include:

I-1 infiltration trench
I-2 infiltration basin

BMP Group 4. Filtering Practices

Practices that capture and temporarily store the WQ_v and pass it through a filter bed of sand, organic matter, soil or other media are considered to be filtering practices. Filtered runoff may be collected and returned to the conveyance system. Design variants include:

F-1 surface sand filter
F-2 underground sand filter
F-3 perimeter sand filter
F-4 organic filter
F-5 pocket sand filter
F-6 bioretention*

* may also be used for infiltration.

BMP Group 5. Open Channel Practices

Vegetated open channels that are explicitly designed to capture and treat the full WQ_v within dry or wet cells formed by checkdams or other means include:

O-1 dry swale
O-2 wet swale

BMP Group 6. Non-structural BMPs

Non-structural BMPs are increasingly recognized as a critical feature of stormwater BMP plans, particularly with respect to site design. In most cases, non-structural BMPs shall be combined with structural BMPs to meet all stormwater requirements. The key benefit of non-structural BMPs is that they can reduce the generation of stormwater from the site; thereby reducing the size and cost of structural BMPs. In addition, they can provide partial removal of many pollutants. The non-structural BMPs have been classified into seven broad categories. To promote greater use of non-structural BMPs, a series of credits and incentives are provided for developments that use these progressive site planning techniques in Chapter 5.

- natural area conservation
- disconnection of rooftop runoff
- disconnection of non-rooftop impervious area
- sheet flow to buffers
- open channel use
- environmentally sensitive development
- impervious cover reduction

2.7.2 Structural BMPs that do not fully meet the WQ_v Requirement

Many current and future stormwater management structures may not meet the performance criteria specified in Section 1.2 above to qualify to be used as "stand-alone" practices for full WQ_v treatment. Reasons for this include poor longevity, poor performance, inability to decrease TSS by 80% and TP by 40%, or inadequate testing. Some of these practices include:

- catch basin inserts
- dry extended detention ponds
- water quality inlets and oil/grit separators
- hydro-dynamic structures
- filter strips
- grass channels
- street sweeping

- deep sump catch basins
- dry wells
- on-line storage in the storm drain network

In some cases, these practices are appropriately used for pretreatment, to meet recharge volume (Re_v) requirements, as part of an overall BMP system, or may be applied in redevelopment situations on a case-by-case basis where other practices are not feasible.

New structural BMP designs are continually being developed, including many proprietary designs. All current and future structural practice design variants should fit in one of the six BMP groups referenced above if the intent is to use them independently to treat the full WQ_v. Current or new BMP design variants cannot be accepted for inclusion on the list until independent pollutant removal performance and monitoring data determine that they can meet the 80% TSS and 40% TP removal targets and that the new BMPs conform with local and/or State criteria for treatment, maintenance, and environmental impact.

Section 2.8 Designation of Stormwater Hotspots

A stormwater hotspot is defined as a land use or activity that generates higher concentrations of hydrocarbons, trace metals or toxicants than are found in typical stormwater runoff, based on monitoring studies. Table 2.6 provides a list of designated hotspots for the State of Maryland. If a site is designated as a hotspot, it has important implications for how stormwater is managed. First and foremost, untreated stormwater runoff from hotspots cannot be allowed to infiltrate into groundwater where it may contaminate water supplies. Therefore, the Re_v requirement is NOT applied to development sites that fit into the hotspot category (the entire WQ_v must still be treated). Second, a greater level of stormwater treatment is needed at hotspot sites to prevent pollutant washoff after construction. This typically involves preparing and implementing a ***stormwater pollution prevention plan*** that involves a series of operational practices at the site that reduces the generation of pollutants by preventing contact with rainfall.

Under EPA's NPDES stormwater program, some industrial sites are required to prepare and implement a stormwater pollution prevention plan. A list of industrial categories that are subject to the pollution prevention requirement can be found in Appendix D.6. In addition, Maryland's requirements for preparing and implementing a stormwater pollution prevention plan are also described in the general discharge permit provided in the same Appendix. The stormwater pollution prevention plan requirement applies to both existing and new industrial sites.

In addition, if a site falls into a "hotspot" category outlined in Table 2.6, a pollution prevention plan may also be required by the appropriate reviewing authority. Golf courses and commercial nurseries may also be required to implement a plan by the appropriate approval authority.

Table 2.6 Classification of Stormwater Hotspots

The following land uses and activities are deemed ***stormwater hotspots:***
► vehicle salvage yards and recycling facilities*
► vehicle service and maintenance facilities
► vehicle and equipment cleaning facilities*
► fleet storage areas (bus, truck, etc.)*
► industrial sites (for SIC codes outlined in Appendix D.6)
► marinas (service and maintenance)*
► outdoor liquid container storage
► outdoor loading/unloading facilities
► public works storage areas
► facilities that generate or store hazardous materials*
► commercial container nursery
► other land uses and activities as designated by an appropriate review authority
* stormwater pollution prevention plan implementation is required for these land uses or activities under the EPA NPDES stormwater program (see Appendix D.6).

The following land uses and activities are not normally considered hotspots:

- residential streets and rural highways
- residential development
- institutional development
- commercial and office developments
- non-industrial rooftops
- pervious areas, except golf courses and nurseries [which may need an Integrated Pest Management Plan (IPM)].

While large highways [average daily traffic volume (ADT) greater than 30,000] and retail gasoline outlet facilities are not designated as stormwater hotspots, it is important to ensure that highway and retail gasoline outlet stormwater management plans adequately protect groundwater.

Chapter 3.0

Performance Criteria for Urban BMP Design

3.0 Performance Criteria for Urban BMP Design

This chapter outlines performance criteria for five groups of structural water quality stormwater BMPs that include ponds, wetlands, infiltration practices, filtering systems and open channels.

Each set of BMP performance criteria, in turn, is based on six factors:

- General Feasibility
- Conveyance
- Pretreatment
- Treatment/Geometry
- Environmental/Landscaping
- Maintenance

One significant caveat applies to all performance criteria. The criteria represent a set of conditions that ensure an effective and durable BMP. In this chapter, *Mandatory* performance criteria are distinguished from suggested design criteria (the former is required at all sites in Maryland, while the latter are only recommended for most sites and conditions). Thus, in the text, mandatory performance criteria are indicated by *italics*, whereas suggested design criteria are shown in normal typeface.

IMPORTANT NOTES:

1) Any stormwater management BMP that uses an embankment for impounding water is required to follow the latest version of the NRCS-MD 378 Pond Code Standards And Specifications For Small Pond Design (Appendix B.1) and obtain approval from the local Soil Conservation District (SCD) or appropriate review authority.

2) In USE III watersheds, temperature increases caused by development are a primary impact to the quality of receiving waters. Stormwater BMPs may contribute to this problem. Therefore, to minimize temperature increases caused by new development in USE III watersheds, stormwater BMP designs should:
   a) Minimize permanent pools,
   b) Limit extended detention times for Cp_v to 12 hours (see Appendix D.11),
   c) Provide shading for pools and channels,
   d) Maintain existing forested buffers, and
   e) Bypass available baseflow and/or springflow.

Section 3.1 Stormwater Ponds

Definition: Practices that have a permanent pool, or a combination of extended detention or shallow wetland with a permanent pool equivalent to the entire WQ_v. Design variants include:

- P-1 micropool extended detention pond (Figure 3.1)
- P-2 wet pond (Figure 3.2)
- P-3 wet extended detention pond (Figure 3.3)
- P-4 multiple pond system (Figure 3.4)
- P-5 pocket pond (Figure 3.5)

The term "pocket" refers to a pond or wetland that has such a small contributing drainage area that little or no baseflow is available to sustain water elevations during dry weather. Instead, water elevations are heavily influenced and, in some cases, maintained by a locally high water table.

Dry extended detention ponds that have no permanent pool are not considered an acceptable option for meeting WQ_v.

Stormwater ponds may also provide storage for the Cp_v, Q_p and/or Q_f above the WQ_v storage elevation.

IMPORTANT NOTE: Any stormwater management BMP that uses an embankment for impounding water is required to follow the latest version of the NRCS-MD 378 Pond Code Standards And Specifications For Small Pond Design (Appendix B.1) and obtain approval from the local Soil Conservation District (SCD) or appropriate review authority.

P-1	**Figure 3.1** Example of "Micropool" Extended Detention Pond	P-1

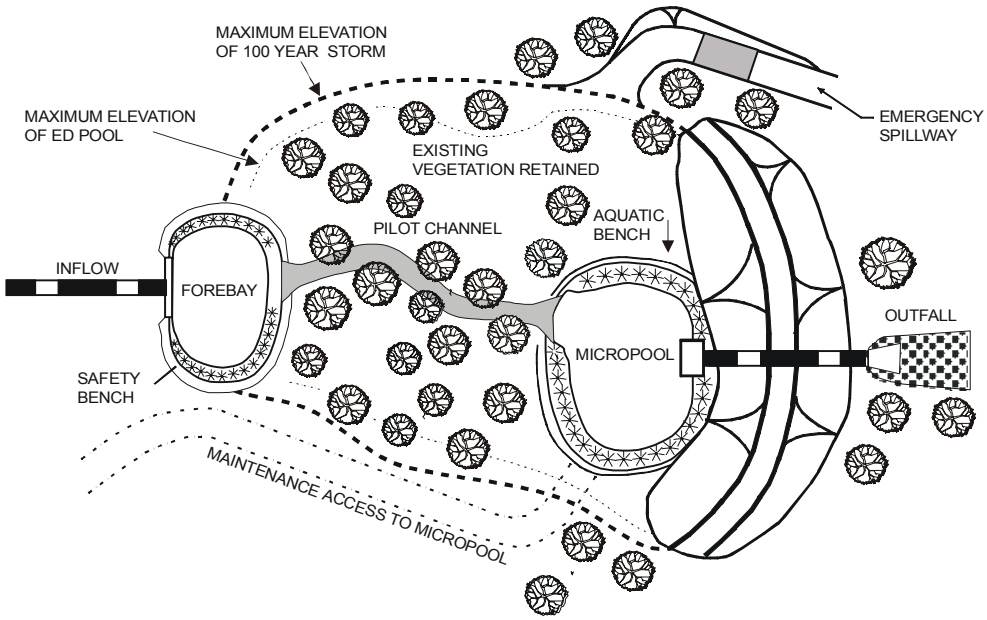

PLAN VIEW

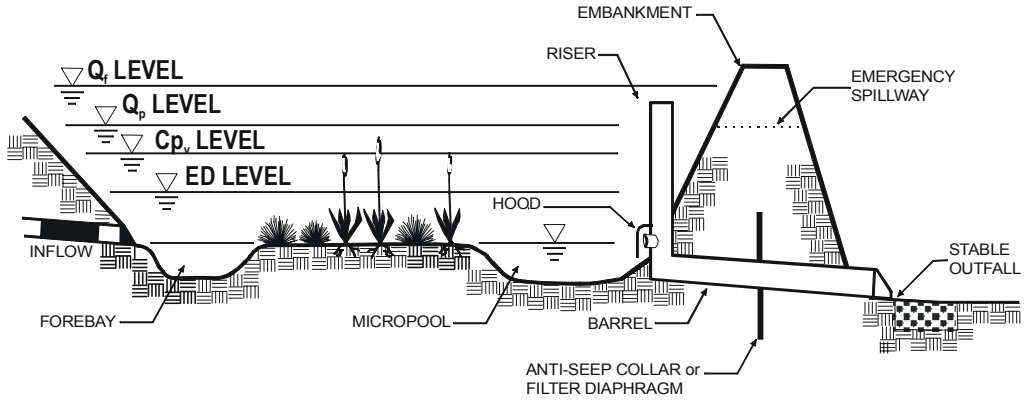

PROFILE

A micropool is provided in an extended detention pond to prevent resuspension of previously settled sediments and prevent clogging of the low flow orifice.

P-2	Figure 3.2 Example of Wet Pond	P-2

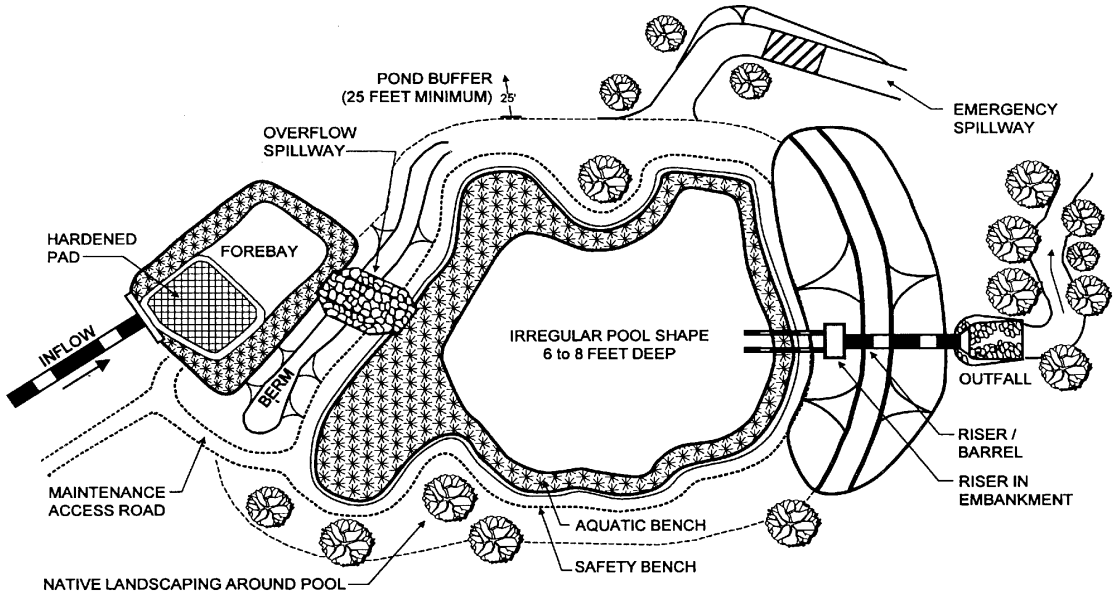

PLAN VIEW

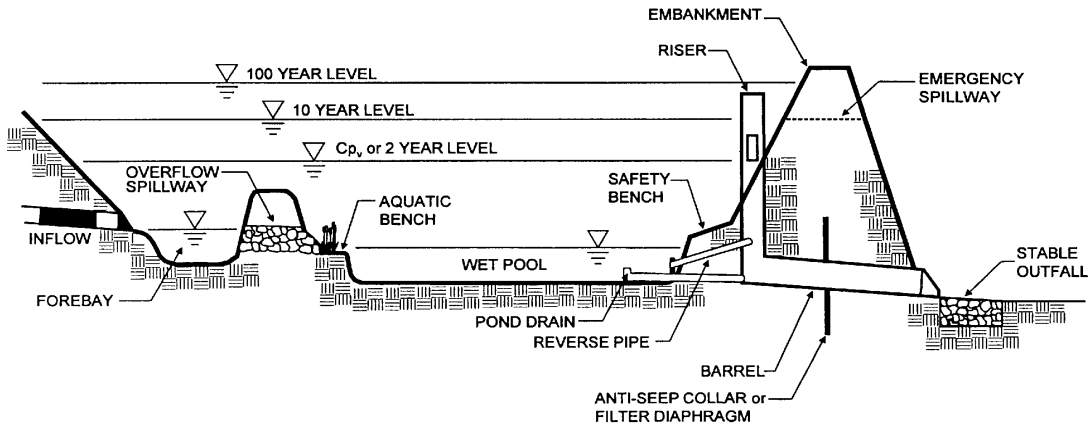

PROFILE

A wet pond provides all of water quality volume storage in a permanent pool.

P-3	**Figure 3.3** Example of Wet Extended Detention Pond	P-3

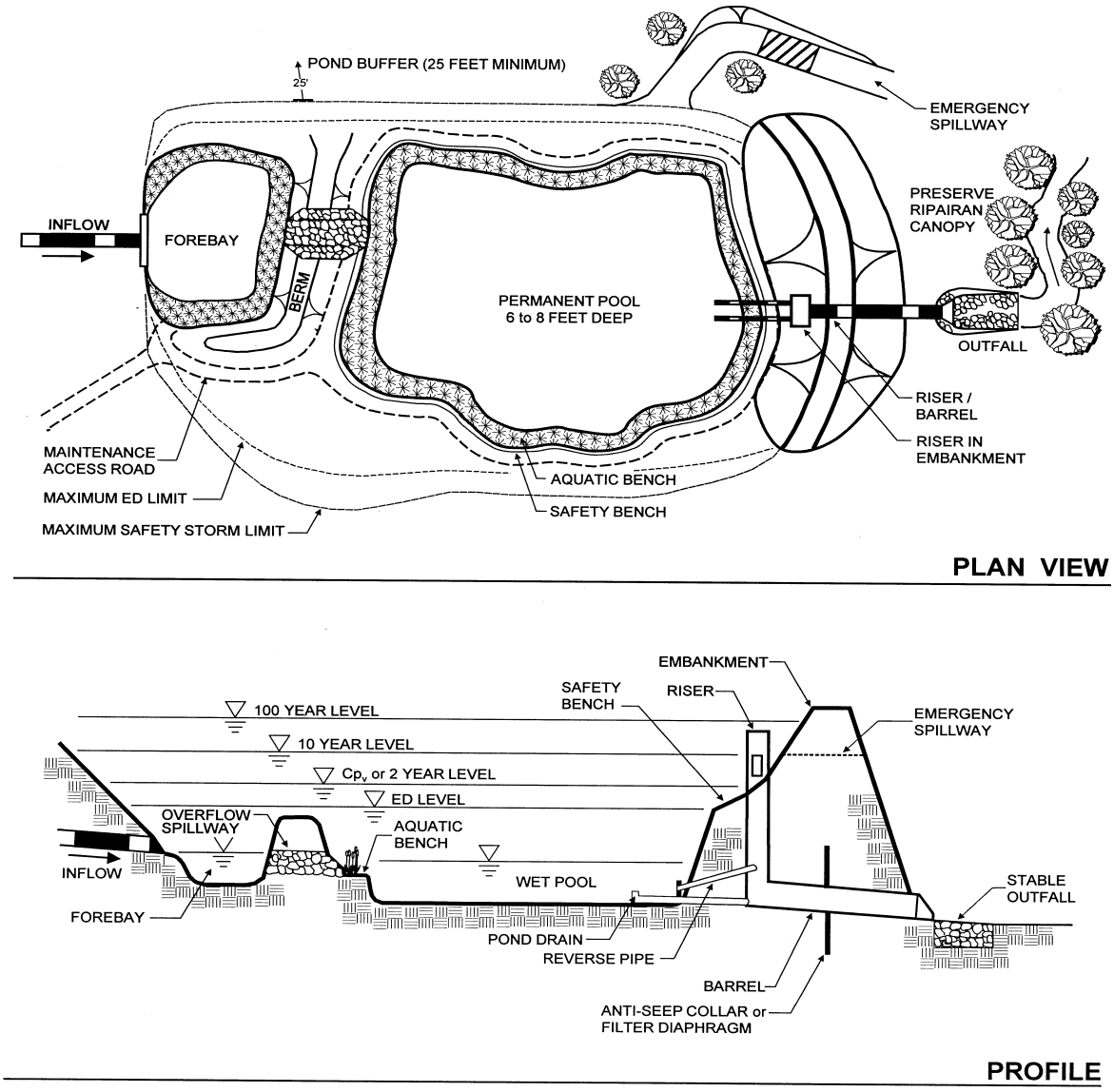

The wet ED pond provides water quality storage through a combination of permanent pool and extended detention storage.

P-4	**Figure 3.4** Example of Multiple Pond System	P-4

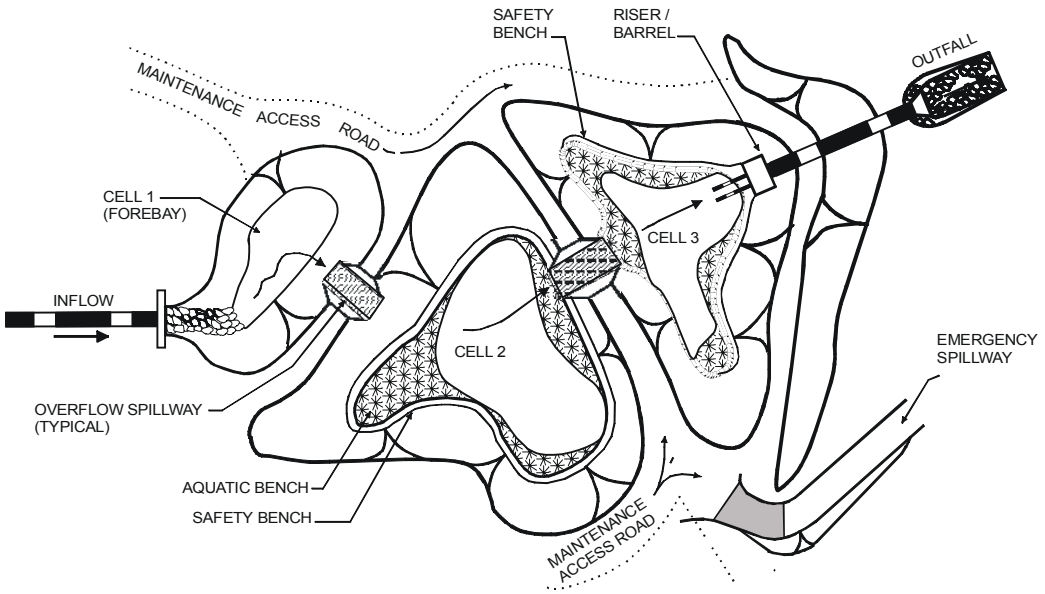

PLAN VIEW

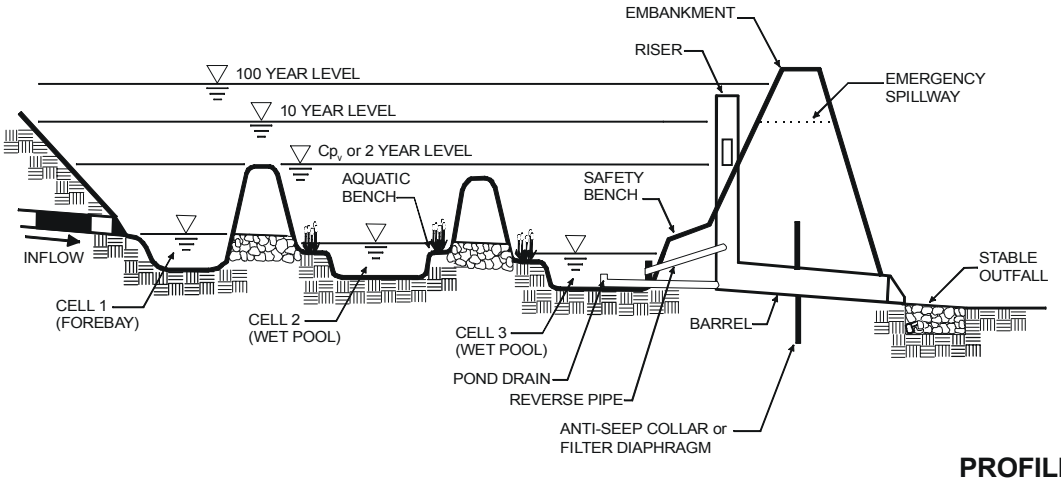

PROFILE

Multiple pond systems provide WQ_v storage in two or more cells that create longer pollutant removal pathways.

P-5	**Figure 3.5** Example of Pocket Pond	P-5

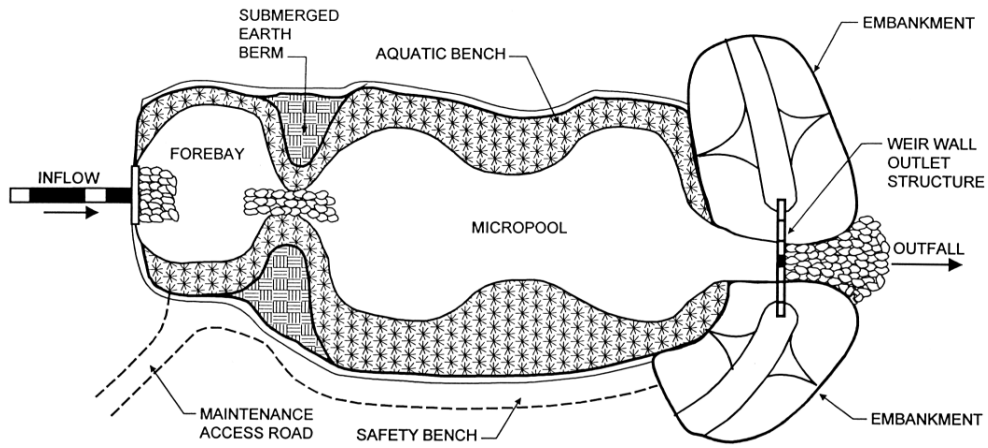

PLAN VIEW

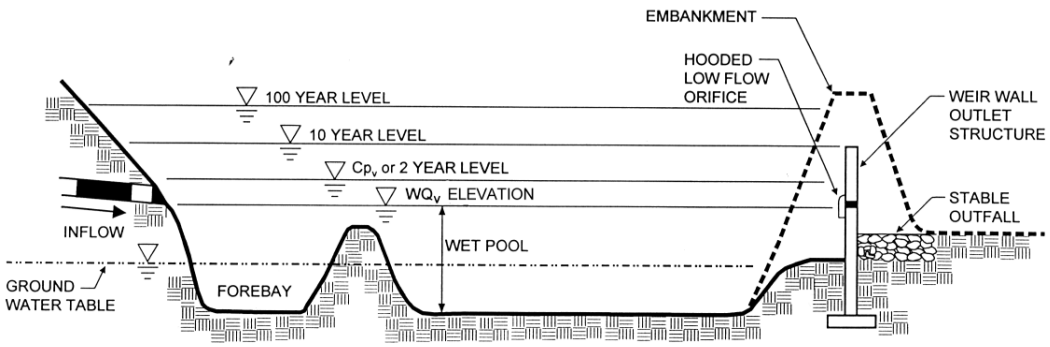

PROFILE

A high water table or groundwater interception maintains permanent pool level in a pocket pond. However, excavation to groundwater interception should be avoided where the land uses draining to the pond may contaminate drinking water supplies.

3.1.1 Pond Feasibility Criteria

Stormwater ponds shall have a minimum contributing drainage area of ten acres or more (25 or more are preferred)*, unless groundwater is confirmed as the primary water source (e.g., pocket pond).*

Stormwater ponds cannot be located within jurisdictional waters, including wetlands, without obtaining a Section 404 permit under the Clean Water Act and a State of Maryland wetlands and waterway permit (See Chapter 4, Section 4.6.).

Stormwater ponds located within USE III watersheds shall require a small pond review and approval from the MDE Dam Safety Division.

The use of stormwater ponds on coldwater streams capable of supporting trout (Use III and IV) may be prohibited. Stormwater ponds located in Use III and IV watersheds should be designed to significantly reduce and/or eliminate thermal impacts (See Chapter 4, Section 4.1).

The design and construction of stormwater management ponds are required to follow the latest version of the NRCS-MD 378 Pond Code Standards and Specifications for Small Pond Design (Appendix B.1) and obtain approval from the local Soil Conservation District (SCD) or appropriate review authority.

Pages 1 and 2 of the NRCS-MD 378 Pond Code Standards and Specifications for Small Pond Design (MD-378) describe the conditions for exemption from formal review by the local SCD. **While not required to meet all conditions of MD-378, facilities that are exempt shall be approved by the appropriate authority and conform to the following minimum design and construction criteria:**

1) *design for a stable outfall using the ten year design storm (or two year design storm if the pond is an off-line structure providing WQ_v storage only).*

2) *dams shall meet class A dam safety hazard classification,*

3) *principal spillway/riser shall provide anti-floatation, anti-vortex, and trash-rack designs.*

4) *one (1) foot of freeboard shall be provided above the design high water for the 10 year storm.*

5) *material and construction specifications for the principal spillway shall be in accordance with MD 378 code.*

6) *material and construction specifications for the embankment shall be in accordance with MD 378 code, except that fill material for the embankment shall conform to Unified Soil Classification GC, SC, SM, MH, ML, CH, or CL, and no cutoff trench is required.*

7) *woody vegetation is prohibited on the embankment.*

A pond structure requires review and approval by the MDE Dam Safety Division if any of the following conditions apply:

a) *the proposed embankment is twenty feet or greater in height from the upstream toe to the top of dam, or*

b) *the contributing drainage area is a square mile (640 acres) or greater, or*

c) *the structure is classified as "high" or "intermediate" hazard, according to the MD Dam Safety Manual, or*

d) *the proposed pond is in USE III waters.*

3.1.2 Pond Conveyance Criteria

When reinforced concrete pipe is used for the principal spillway to increase its longevity, "O-ring" gaskets (ASTM C-361) should be used to create watertight joints and should be inspected during installation.

Inlet Protection

Inlet pipes to the pond should not be fully submerged at normal pool elevations.

A forebay shall be provided at each inlet, unless the inlet provides less than 10% of the total design storm inflow to the pond.

Adequate Outfall Protection

Flared pipe sections that discharge at or near the stream invert or into a step-pool arrangement should be used at the spillway outlet.

The channel immediately below the pond outfall shall be modified to prevent erosion and conform to natural dimensions in the shortest possible distance, typically by use of large rip-rap placed over filter cloth.

A stilling basin or other outlet protection should be used to reduce flow velocities from the principal spillway to non-erosive velocities (see Appendix D.12 for critical non-erosive velocities for grass and soil).

If a pond daylights to a channel with dry weather flow, care should be taken to minimize tree clearing along the downstream channel and to reestablish a forested riparian zone in the shortest possible distance. Excessive use of rip-rap should be avoided to reduce stream warming.

Pond Liners

When a pond is located in karst topography, gravelly sands or fractured bedrock, a liner may be needed to sustain a permanent pool of water. If geotechnical tests confirm the need for a liner, acceptable options include: (a) 6 to 12 inches of clay soil (minimum 15% passing the #200 sieve and a maximum permeability of 1 x 10^{-5} cm/sec), (b) a 30 mil poly-liner, (c) bentonite, (d) use of chemical additives (see NRCS Agricultural Handbook No. 387, dated 1971, Engineering Field Manual), or (e) other suitable materials approved by the appropriate review authority.

3.1.3 Pond Pretreatment Criteria

Sediment Forebay

Each pond shall have a sediment forebay or equivalent upstream pretreatment. The forebay shall consist of a separate cell, formed by an acceptable barrier.

The forebay shall be sized to contain 0.1 inches per impervious acre of contributing drainage. The forebay storage volume counts toward the total WQ_v requirement. Exit velocities from the forebay shall be non-erosive.

Direct maintenance access for appropriate equipment shall be provided to the forebay.

The bottom of the forebay may be hardened (e.g., using concrete, paver blocks, etc.) to make sediment removal easier.

A fixed vertical sediment depth marker should be installed in the forebay to measure sediment deposition over time.

3.1.4 Pond Treatment Criteria

Minimum Water Quality Volume (WQ_v)

Ponds shall be designed to capture and treat the computed WQ_v through any combination of permanent pool, extended detention (ED) or wetland. If treated separately, the Re_v may be subtracted from the WQ_v for pond design.

It is generally desirable to provide water quality treatment off-line when topography, head and space permit (e.g., apart from stormwater quantity storage).

Water quality storage can be provided in multiple cells. Performance is enhanced when multiple treatment pathways are provided by using multiple cells, longer flowpaths, high surface area to volume ratios, complex microtopography, and/or redundant treatment methods (combinations of pool, ED, and wetland).

If ED is provided in a pond, storage for WQ_v and Cp_v shall be computed and routed separately (e.g., the WQ_v requirement cannot be met simply by providing Cp_v storage for the one-year storm).

Minimum Pond Geometry

Flowpaths from inflow points to outlets shall be maximized. Flowpaths of 1.5:1 (length relative to width) and irregular shapes are recommended.

3.1.5 Pond Landscaping Criteria

Pond Benches

The perimeter of all deep permanent pool areas (four feet or greater in depth) shall be surrounded by two benches with a combined minimum width of 15 feet:

- *A safety bench* that extends outward from the normal water edge to the toe of the pond side slope. The maximum slope of the safety bench shall be 6%.

- *An aquatic bench* that extends inward from the normal shoreline and has a maximum depth of eighteen inches below the normal pool water surface elevation. An aquatic bench is not required in forebays.

Landscaping Plan

A landscaping plan for a stormwater pond and its buffer shall be prepared to indicate how aquatic and terrestrial areas will be vegetatively stabilized and established. Landscaping guidance for stormwater ponds is provided in Appendix A.

Wherever possible, wetland plants should be encouraged in a pond design, either along the aquatic bench (fringe wetlands), the safety bench and side slopes (emergent wetlands) or within shallow areas of the pool itself.

The best elevations for establishing wetland plants, either through transplantation or volunteer colonization, are within six inches (plus or minus) of the normal pool.

The soils of a pond buffer are often severely compacted during the construction process to ensure stability. The density of these compacted soils is so great that it effectively prevents root penetration, and therefore, may lead to premature mortality or loss of vigor. Consequently, it is advisable to excavate large and deep holes around the proposed planting sites, and backfill these with uncompacted topsoil.

As a rule of thumb, planting holes should be at least six inches larger than the diameter of the rootball (of balled and burlap stock), and three inches wider for container grown stock. This practice should enable the stock to develop unconfined root systems. Avoid species that require full shade, are susceptible to winterkill, or are prone to wind damage. Extra mulching around the base of the tree or shrub is strongly recommended as a means of conserving moisture and suppressing weeds.

Pond Buffers and Setbacks

A pond buffer should be provided that extends 25 feet outward from the maximum water surface elevation of the pond. The pond buffer should be contiguous with other buffer areas that are required by existing regulations (e.g., stream buffers). An additional setback may be provided to permanent structures.

Existing trees should be preserved in the buffer area during construction. It is desirable to locate forest conservation areas adjacent to ponds. To discourage resident geese populations, the buffer can be planted with trees, shrubs and native ground covers.

Woody vegetation may not be planted on nor allowed to grow within 15 feet of the toe of the embankment and 25 feet of the principal spillway structure.

Annual mowing of the pond buffer is only required along maintenance rights-of-way and the embankment. The remaining buffer can be managed as a meadow (mowing every other year) or forest.

3.1.6 Pond Maintenance Criteria

Maintenance Measures

Maintenance responsibility for a pond and its buffer shall be vested with a responsible party by means of a legally binding and enforceable maintenance agreement that is executed as a condition of plan approval or local permitting processes.

The principal spillway shall be equipped with a trash rack that provides access for maintenance.

Sediment removal in the forebay shall occur when 50% of the total forebay capacity has been lost.

Sediments excavated from stormwater ponds that do not receive runoff from designated hotspots are not considered toxic or hazardous material and can be safely disposed by either land application or land filling. Sediment testing may be required prior to sediment disposal when a hotspot land use is present.

Sediment removed from stormwater ponds should be disposed of according to current erosion and sediment control regulations.

Maintenance Access

A maintenance right-of-way or easement shall extend to a pond from a public or private road.

Maintenance access should be at least 12 feet wide; have a maximum slope of no more than 15%; and be appropriately stabilized to withstand maintenance equipment and vehicles.

The maintenance access should extend to the forebay, safety bench, riser, and outlet and be designed to allow vehicles to turn around.

Non-clogging Low Flow Orifice

The low flow orifice shall have a minimum diameter of 3 inches and shall be adequately protected from clogging by an acceptable external trash rack. Two examples of approved external trash racks are provided in Detail No. 1 and 2 of Appendix D.8. *The low flow orifice diameter may be reduced to one inch if an internal orifice is used* (e.g., an over-perforated vertical standpipe that is protected by hardware cloth and a stone filtering jacket). A schematic design of an acceptable internal orifice protection design is provided in Detail No. 3 of Appendix D.8.

The preferred method is a submerged reverse-slope pipe that extends downward from the riser to an inflow point one foot below the normal pool elevation.

Alternative methods are to employ a broad crested rectangular, V-notch, or proportional weir, protected by a half-round corrugated metal pipe (CMP) or similar device that extends at least 12 inches below the normal pool. (See Detail No. 7 of Appendix D.8.)

The use of horizontal perforated pipe protected by geotextile and gravel is not recommended.

Vertical pipes may be used as an alternative if a permanent pool is present.

Riser

The riser shall be located within the embankment for maintenance access, safety and aesthetics.

Access to the riser is to be provided by lockable manhole covers and manhole steps within easy reach of valves and other controls. Riser openings should be fenced with pipe or rebar to prevent trash accumulation.

Pond Drain

Each pond shall have a drain pipe that can completely or partially drain the pond within 24 hours. This requirement is waived for the Lower Eastern Shore where positive drainage is difficult to achieve due to very low relief.

Care should be exercised during pond drawdowns to prevent downstream discharge of sediments or anoxic water and slope instability caused by rapid drawdown.

The approving jurisdiction shall be notified before draining a pond.

Valves

The pond drain shall be equipped with an adjustable valve (typically a handwheel activated knife or gate valve).

The pond drain should be sized one pipe size greater than the calculated design diameter.

Valve controls shall be located inside of the riser at a point where they (a) will not normally be inundated and (b) can be operated in a safe manner.

To prevent vandalism, the handwheel should be chained to a ringbolt, manhole step or other fixed object.

Safety Features

Fencing of ponds is not generally desirable but may be required by the local review authority. A preferred method is to manage the contours of the pond to eliminate dropoffs and other safety hazards.

Internal side slopes to the pond should not exceed 3:1 (h:v) and should terminate on a safety bench. Both the safety bench and the aquatic bench may be landscaped to prevent access to the pool. The bench requirement may be waived if slopes are 4:1 or gentler.

Riser openings shall not permit unauthorized access. Riser tops that are four feet or greater above the ground shall include railings for safety. Endwalls above pipe outfalls greater than 48 inches in diameter shall be fenced to prevent injury.

Warning signs prohibiting swimming and skating should be posted.

Section 3.2 Stormwater Wetlands

Definition: Practices that create shallow wetland areas to treat urban stormwater and often incorporate small permanent pools and/or extended detention storage to achieve the full WQ_v. Design variants include:

- W-1 shallow wetland (Figure 3.6)
- W-2 ED shallow wetland (Figure 3.7)
- W-3 pond/wetland system (Figure 3.8)
- W-4 pocket wetland (Figure 3.9)

Stormwater wetlands may also provide Cp_v and Q_p storage above the WQ_v storage.

IMPORTANT NOTES:

1) Except for specific minimum contributing drainage area and the use of these practices in coldwater streams (USE III AND IV), all of the pond performance criteria presented in section 3.1 also apply to the design of stormwater wetlands. Additional criteria that govern the geometry and establishment of created wetlands are presented in this section.

2) Any stormwater management BMP that uses an embankment for impounding water is required to follow the latest version of the NRCS-MD 378 Pond Code Standards And Specifications For Small Pond Design (Appendix B.1) and obtain approval from the local SCD or appropriate review authority.

W-1	**Figure 3.6** Example of Shallow Wetland	W-1

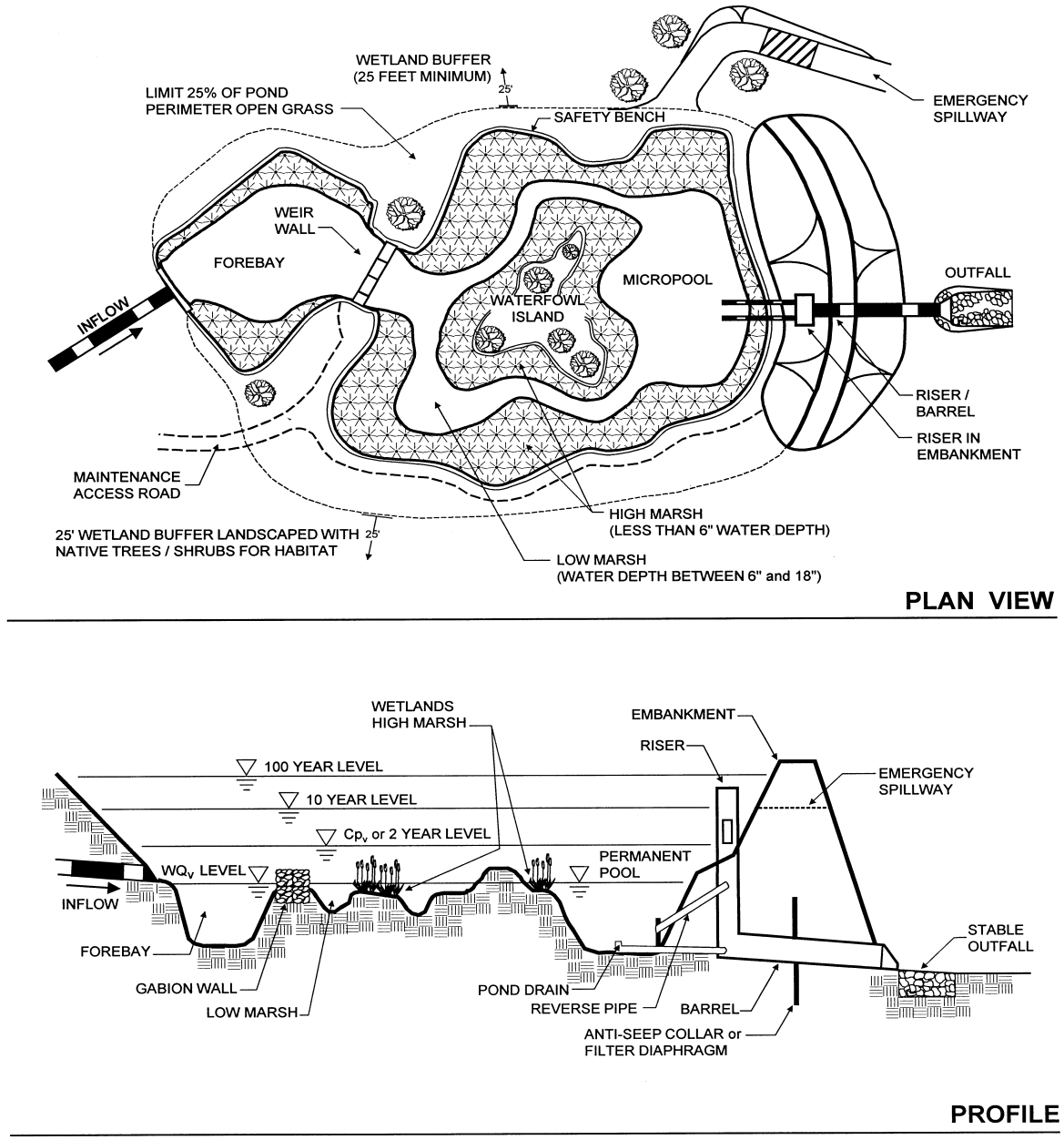

Shallow wetlands provide WQ_v in a shallow pool that has a large surface area.

W-2	**Figure 3.7** Example of Extended Detention Shallow Wetland	W-2

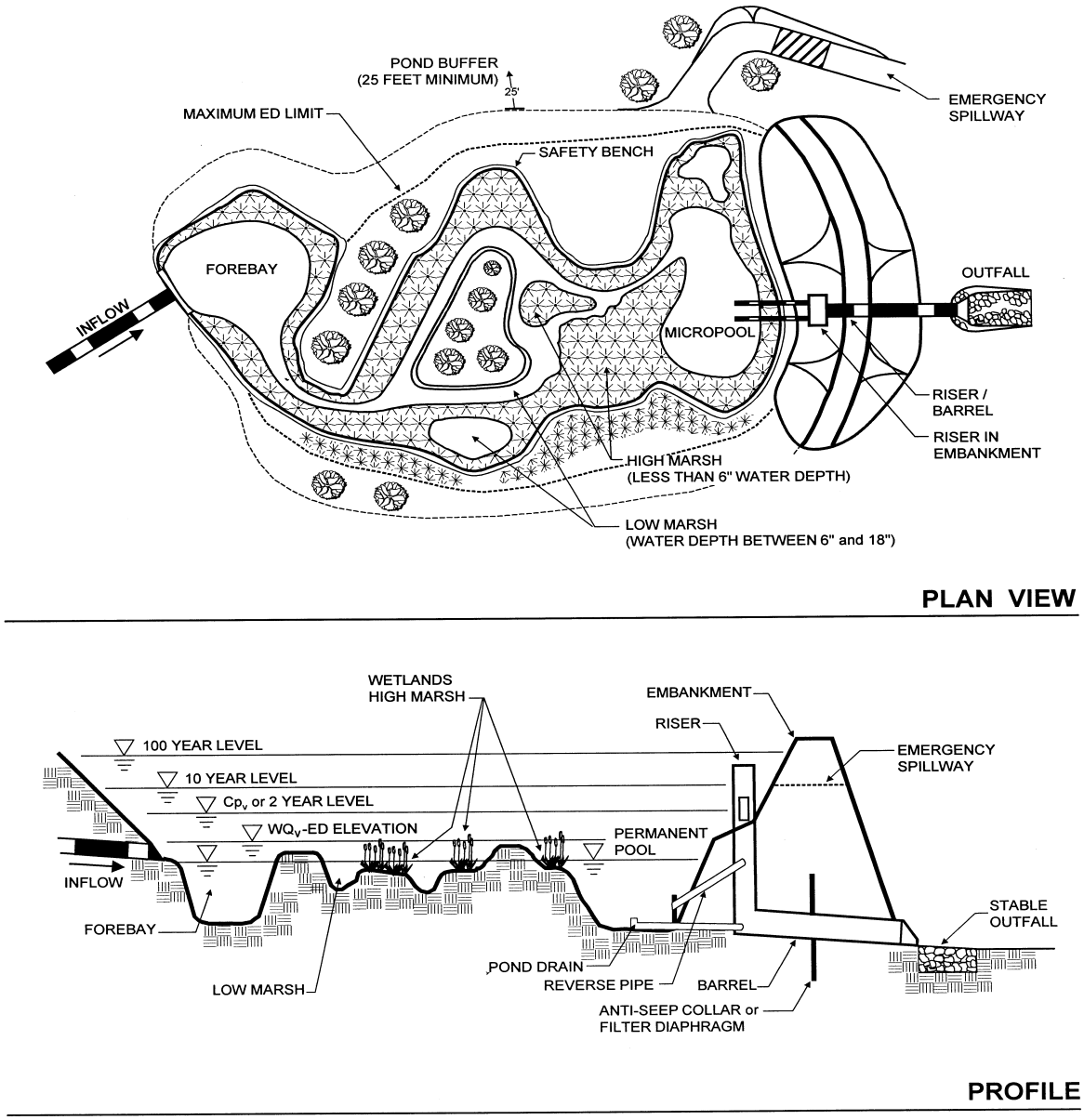

ED shallow wetlands provide water quality storage by a combination of shallow wetland pool and extended detention storage.

W-3	**Figure 3.8** Example of Pond/Wetland System	W-3

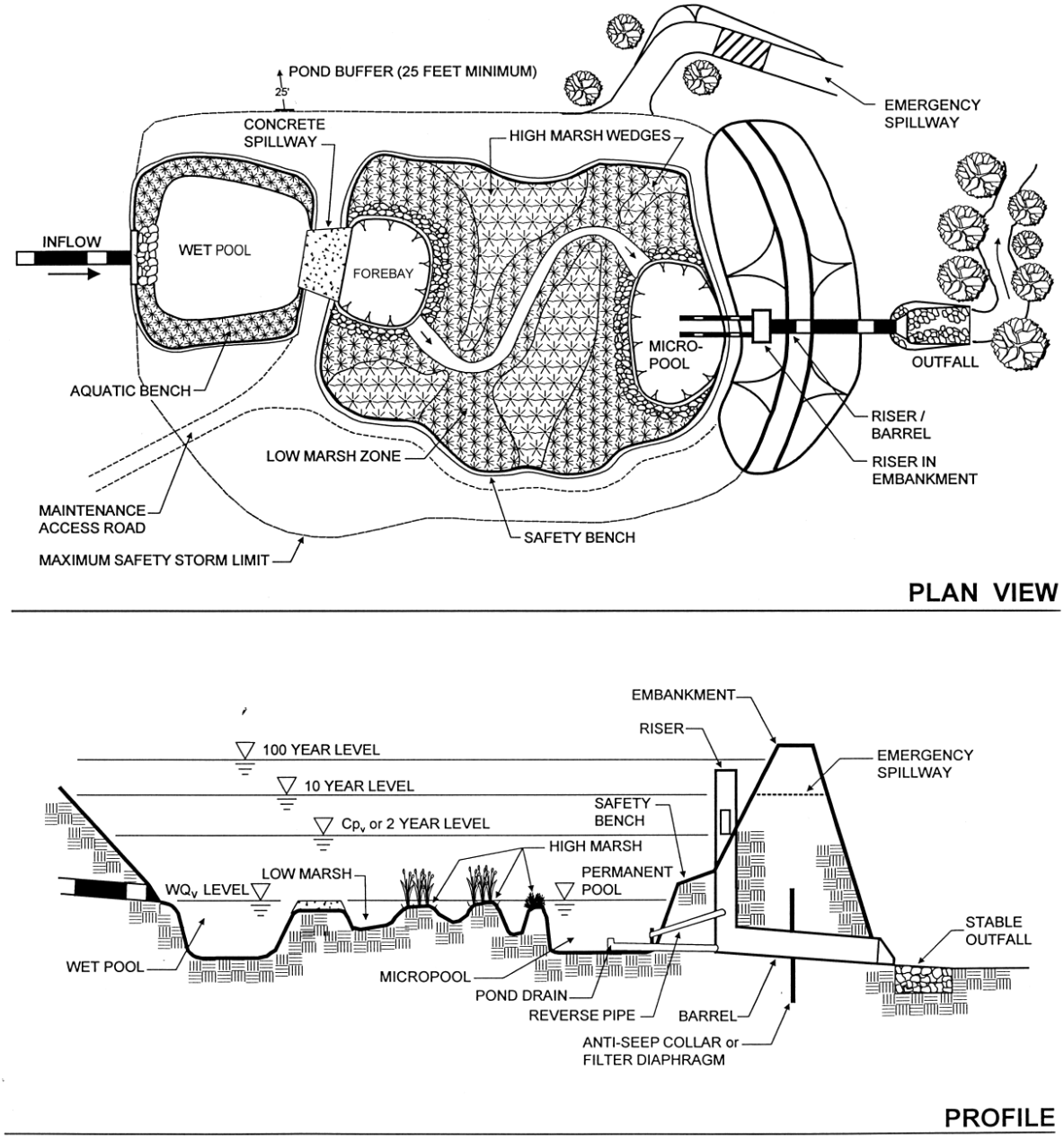

In this BMP, a deep permanent pool is placed before the shallow wetland.

W-4	**Figure 3.9** Example of Pocket Wetland	W-4

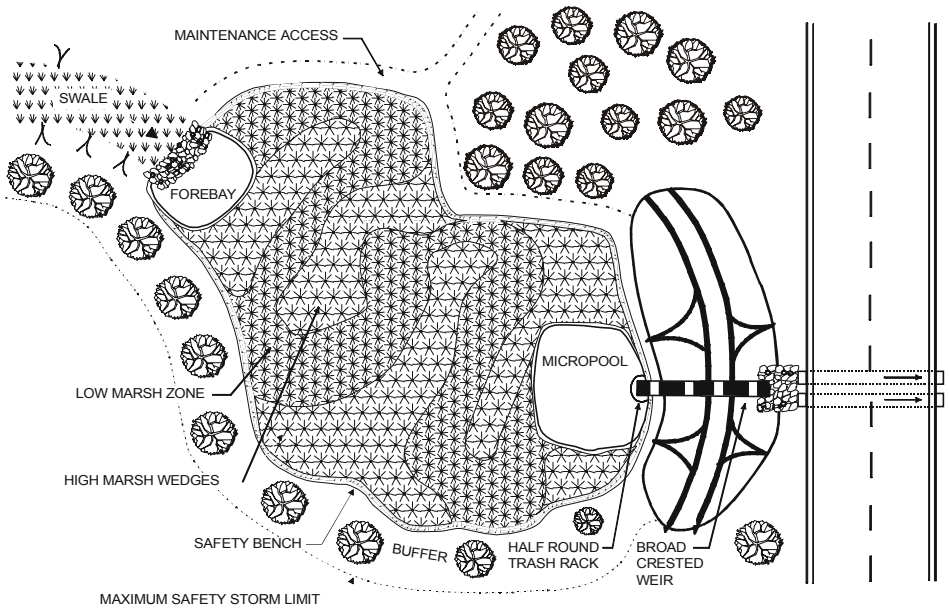

PLAN VIEW

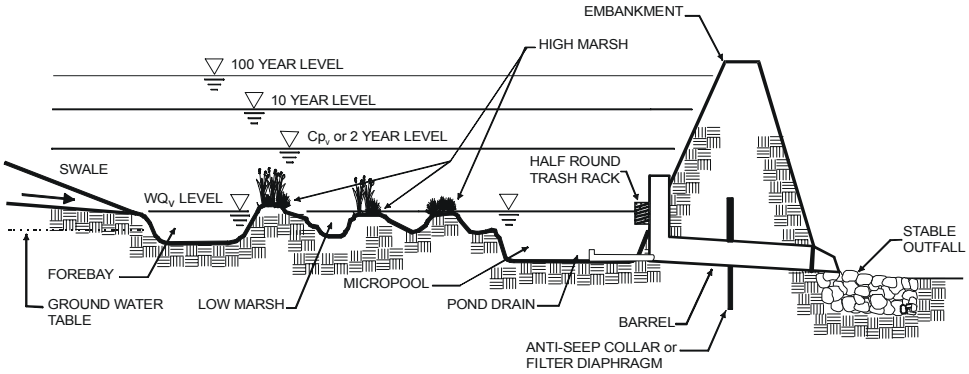

PROFILE

A high water table or groundwater interception helps maintain the shallow wetland pool in a pocket wetland.

3.2.1 Wetland Feasibility Criteria

A water balance must be performed to demonstrate that a stormwater wetland can withstand a thirty day drought at summer evaporation rates without completely drawing down. See Appendix D.3 for a shortcut assessment method for determining the adequacy of water balance.

Stormwater wetlands may not be located within jurisdictional waters, including wetlands without obtaining a Section 404 permit and/or State of Maryland wetlands and waterways permit (see Chapter 4, Section 4.6.).

In USE III watersheds, stormwater wetlands that include permanent ponds as an integral design component [e.g., pond/wetland systems (W-3)] may require a small pond review and approval from the MDE Dam Safety Division (see Appendix B.1.2).

3.2.2 Wetland Conveyance Criteria

Flowpaths from inflow points to outflow points within stormwater wetlands shall be maximized. Flowpaths of 1.5:1 (length relative to width) and irregular shapes are recommended. These paths may be achieved by constructing internal berms (e.g., high marsh wedges or rock filter cells). Microtopography is encouraged to enhance wetland diversity.

3.2.3 Wetland Pretreatment Criteria

Sediment regulation is critical to sustaining stormwater wetlands. Consequently, *a forebay shall be located at the inlet and a micropool shall be located at the outlet*. Forebays are designed in the same manner as ponds (see Section 3.1.3). A micropool is a three to six foot deep pool used to protect the low flow pipe from clogging and prevent sediment resuspension. Forebays in Use III watersheds should be designed to drain within 24 hours.

3.2.4 Wetland Treatment Criteria

The surface area of the entire stormwater wetland shall be at least one percent of the total drainage area to the facility (1.5% for the shallow wetland design).

At least 25% of the total WQ_v shall be in deepwater zones with a minimum depth of four feet (the forebay and micropool may meet this criteria). This criteria may be reduced if the wetland is located where thermal impacts are a primary concern (e.g., Use III watersheds).

A minimum of 35% of the total surface area shall have a depth of six inches or less and at least 65% of the total surface area shall be shallower than 18 inches.

The bed of the wetland should be graded to create a maximum internal flowpath and microtopography.

If extended detention is utilized in a stormwater wetland, *the ED volume shall not comprise more than 50% of the total wetland design, and the maximum water surface elevation shall not extend more than three feet above the normal pool.* Q_p and/or Cp_v storage can be provided above the maximum WQ_v elevation within the wetland.

To promote greater nitrogen removal, rock beds may be used as a medium for the growth of wetland plants. The rock should be one to three inches in diameter and placed up to the normal pool elevation. Rock beds should also be open to flow-through from either direction.

3.2.5 Wetland Landscaping Criteria

A landscaping plan shall be provided that indicates the methods used to establish and maintain wetland coverage. Minimum elements of a plan include: delineation of pondscaping zones, selection of corresponding plant species, planting configuration, and sequence for preparing wetland bed (including soil amendments, if needed).

Landscaping plans for stormwater wetlands located within Use III and IV watersheds should incorporate features and plant species commonly found in wooded wetlands.

Structures such as fascines, coconut rolls, or straw bales can be used to create shallow marsh cells in high energy areas of the stormwater wetland.

The landscaping plan should provide elements that promote greater wildlife and waterfowl use within the wetland and buffers.

A wetland buffer should extend 25 feet outward from the maximum water surface elevation with an additional 15 foot setback to structures.

Wetland Establishment Guidance

The most common and reliable technique for establishing an emergent wetland community in a stormwater wetland is to transplant nursery stock obtained from local aquatic plant nurseries. The following guidance is suggested when transplants are used to establish a wetland.

The transplanting window extends from early April to mid-June. Planting after these dates is not recommended, as the wetland plants need a full growing season to build the root reserves needed to get through the winter. If at all possible, the plants should be ordered at least three months in advance to ensure the availability of the desired species.

The optimal depth requirements for several common species of emergent wetland plants are often six inches of water or less.

To add diversity to the wetland, 5 to 7 species of emergent wetland plants should be used, drawn from the suggested species listed in Appendix A. Of these, at least three species should be selected from the "aggressive colonizer" group (e.g., bulrush, pickerelweed, arrow arum, three square and rice cutgrass) (MDE, 1986).

The wetland area should be sub-divided into separate planting zones of more or less constant depth. Approximately half the wetland surface area should be planted. One plant species should be planted within each flagged planting zone, based on their approximate depth requirements. Plants should be installed in clumps with individual plants located an average of 18 inches on center within each clump. Individual plants should be spaced 12 inches to 24 inches on center.

Post-nursery care of wetland plants is very important in the interval between delivery of the plants and their subsequent installation, as they are prone to desiccation. Stock should be frequently watered and shaded while on-site.

A wet hydroseed mix should be used to establish permanent vegetative cover in the buffer outside of the permanent pool. For rapid germination, scarify the soil to ½ inch prior to hydroseeding. Alternatively, red fescue or annual rye can be used as a temporary cover for the wet species.

Because most stormwater wetlands are excavated to deep sub-soils, they often lack the nutrients and organic matter needed to support vigorous growth of wetland plants. At these sites, three to six inches of topsoil or wetland mulch should be added to all depth zones in the wetland from one foot below the normal pool to six inches above. Wetland mulch is preferable to topsoil if it is available.

The stormwater wetland should be staked at the onset of the planting season. Depths in the wetland should be measured to the nearest inch to confirm the original planting zones. At this time, it may be necessary to modify the pondscape plan to reflect altered depths or the availability of wetland plant stock. Surveyed planting zones should be marked on an “as-built” or design plan and located in the field using stakes or flags.

The wetland drain should be fully opened at least three days prior to the planting date (which should coincide with the delivery date for the wetland plant stock).

Wetland mulch is another technique to establish a plant community that utilizes the seedbank of wetland soils to provide the propagules for marsh development. The majority of the seedbank

is contained within the upper six inches of the donor soils. The mulch is best collected at the end of the growing season. Best results are obtained when the mulch is spread 3 to 6 inches deep over the high marsh and semi-wet zones of the wetland (-6 inches to +6 inches relative to the normal pool).

Donor soils for wetland mulch shall not be removed from natural wetlands without proper permits.

3.2.6 Wetland Maintenance Criteria

If a minimum coverage of 50% is not achieved in the planted wetland zones after the second growing season, a reinforcement planting will be required

Stormwater wetlands that are created in upland areas and away from jurisdictional wetlands are not regulated under the appropriate federal and State laws as long as they are regularly maintained.

Section 3.3 Stormwater Infiltration

Definition: Practices that capture and temporarily store the WQ_v while allowing infiltration into the soil over a prescribed period. Design variants include:

- I-1 infiltration trench (Figure 3.10)
- I-2 infiltration basin (Figure 3.11)

Infiltration practices are an excellent technique for meeting the Re_v requirement and may also provide Cp_v and Q_p storage in certain limited cases.

IMPORTANT NOTE: Any stormwater management BMP that uses an embankment for impounding water is required to follow the latest version of the NRCS-MD 378 Pond Code Standards And Specifications For Small Pond Design (Appendix B.1) and obtain approval from the local SCD or appropriate review authority.

I-1	**Figure 3.10** Example of Infiltration Trench	I-1

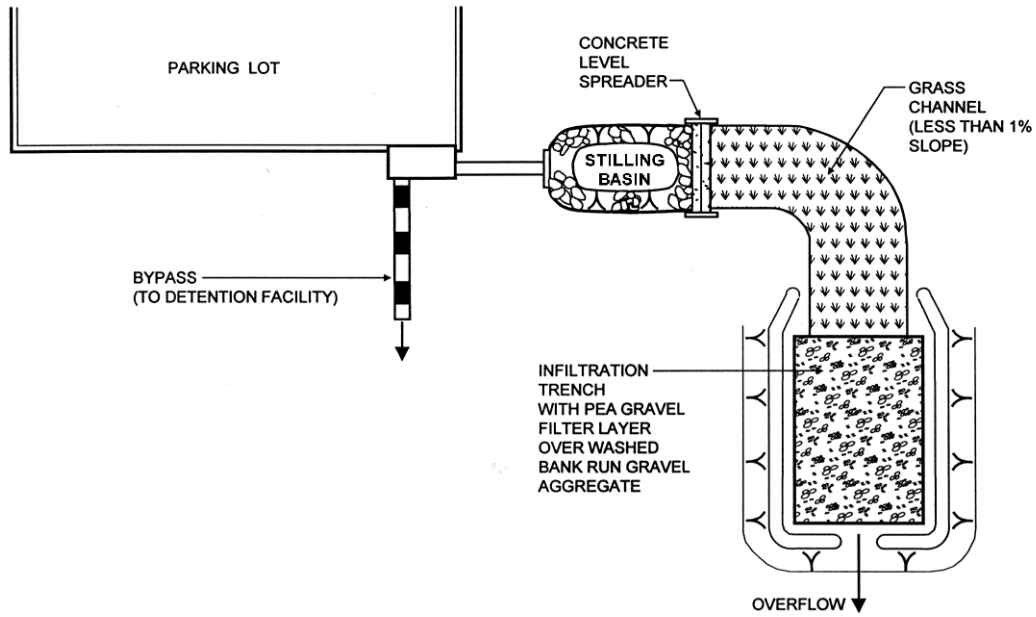

PLAN VIEW

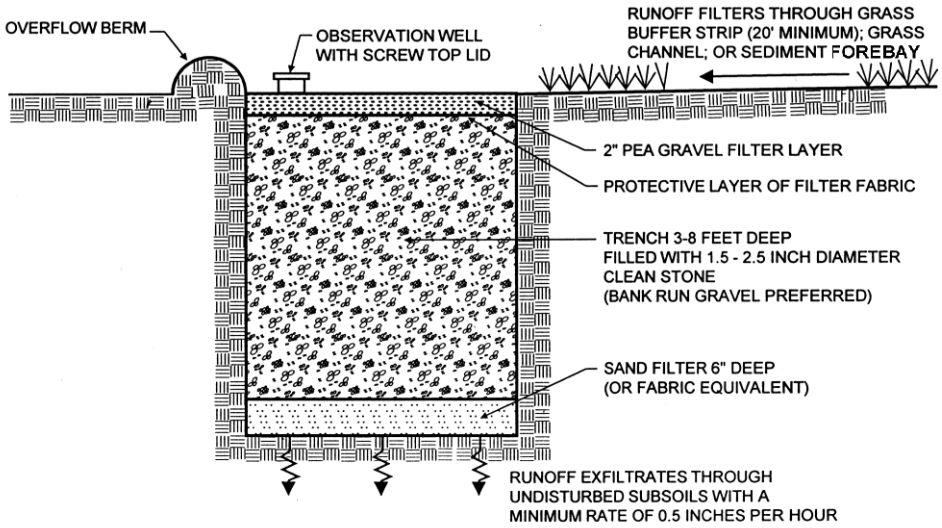

PROFILE

The infiltration trench provides Re_v and WQ_v in one location.

I-2	**Figure 3.11** Example of Infiltration Basin	I-2

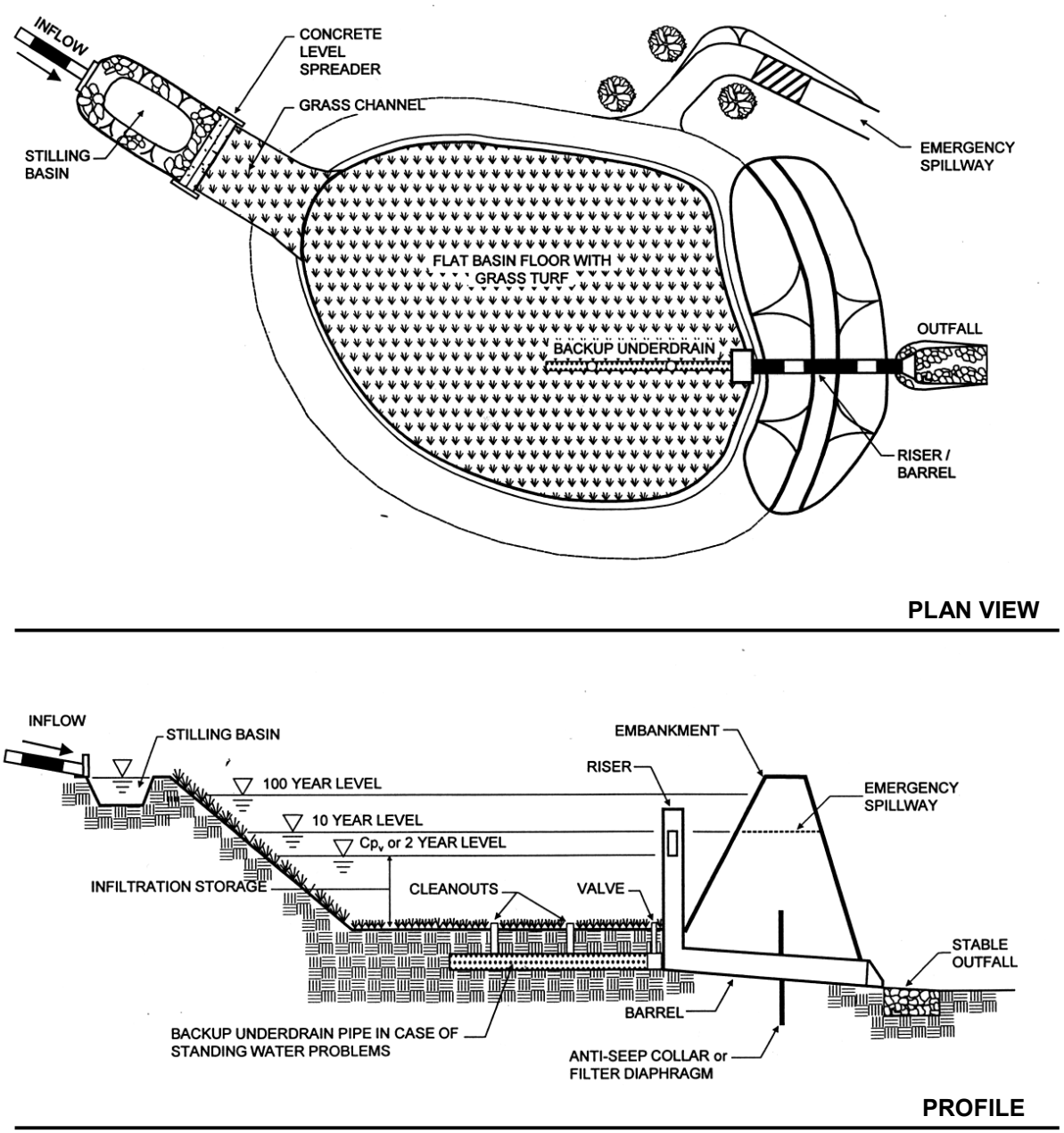

The WQ_v is retained in an infiltration basin, where it percolates through the floor of the basin in a two day period.

3.3.1 Infiltration Feasibility Criteria

To be suitable for infiltration, underlying soils shall have an infiltration rate (f) of 0.52 inches per hour or greater, as initially determined from NRCS soil textural classification and subsequently confirmed by field geotechnical tests. Approved geotechnical testing procedures for feasibility and design are outlined in Appendix D.1. The minimum geotechnical testing is one test hole per 5000 sf, with a minimum of two borings per facility (taken within the proposed limits of the facility).

Soils should also have a clay content of less than 20% and a silt/clay content of less than 40%.

Infiltration cannot be located on slopes greater than 15% or within fill soils.

To protect groundwater from possible contamination, runoff from designated hotspot land uses or activities cannot be infiltrated without proper pretreatment to remove hydrocarbons, trace metals, or toxicants. A list of designated stormwater hotspots is provided in Section 2.8.

Infiltration may be prohibited within areas of karst topography. If a site overlies karst geology, the local approval authority should be consulted for specific design requirements. Recommended procedures for determining whether a site overlies karst are provided in Appendix D.2.

The bottom of the infiltration facility shall be separated by at least four feet vertically from the seasonally high water table or bedrock layer, as documented by on-site soil testing. This distance is reduced to 2 feet on the Lower Eastern Shore (see Figure 4.1).

Infiltration facilities should be located a minimum of 100 feet horizontally from any water supply well.

The maximum contributing area to an individual infiltration practice should generally be less than 5 acres.

Infiltration practices should not be placed in locations that cause water problems to downgrade properties. Infiltration facilities should be setback 25 feet (10 feet for dry wells) down-gradient from structures.

3.3.2 Infiltration Conveyance Criteria

A conveyance system shall be included in the design of all infiltration practices in order to ensure that excess flow is discharged at non-erosive velocities.

The overland flow path of surface runoff exceeding the capacity of the infiltration system shall be evaluated to preclude erosive concentrated flow. If computed flow velocities do not exceed

the non-erosive threshold, overflow may be accommodated by natural topography (see Appendix D.12 for the critical erosive velocities for grass and soil).

All infiltration systems shall be designed to fully de-water the entire WQ_v within 48 hours after the storm event.

The truncated hydrograph method shall be used if infiltration is used to control Cp_v or Q_p (see Appendix D.13 for details on this method).

If runoff is delivered by a storm drain pipe or along the main conveyance system, the infiltration practice should be designed as an off-line practice. (See Detail No. 5, Appendix D.8 for example of an off-line infiltration practice.)

Adequate stormwater outfalls shall be provided for the overflow associated with the ten-year design storm event (non-erosive velocities on the down-slope).

3.3.3 Infiltration Pretreatment Criteria

Pretreatment Volume

A minimum of 25% of the WQ_v must be pretreated prior to entry to an infiltration facility. If the f for the underlying soils is greater than 2.00 inches per hour, 50% of the WQ_v shall be pretreated prior to entry into an infiltration facility. This can be provided by a sedimentation basin, stilling basin, sump pit or other acceptable measures. *Exit velocities from pretreatment shall be non-erosive during the two-year design storm.*

The Camp-Hazen equation (Chapter 3.4.3) may be used as an acceptable alternative for determining infiltration pretreatment requirements.

Pretreatment Techniques to Prevent Clogging

Each system shall have redundant methods to protect the long term integrity of the infiltration rate. The following techniques, at least three per trench (I-1) and two per basin (I-2), must be installed in every infiltration practice:

- *grass channel* (see Chapter 5 - Credit #5 for example computation and requirements for use)
- *grass filter strip* (minimum 20 feet and only if sheet flow is established and maintained)
- *bottom sand layer*
- *upper sand layer (6" minimum) with filter fabric at the sand/gravel interface.*
- *use of washed bank run gravel as aggregate*

The sides of infiltration trenches shall be lined with an acceptable filter fabric that prevents soil piping but has greater permeability than the parent soil (see Appendix B.2).

3.3.4 Infiltration Treatment Criteria

Infiltration practices shall be designed to exfiltrate the entire WQ_v less the pretreatment volume through the floor of each practice using the design methods outlined in Appendix D.13.

Infiltration practices are best used in conjunction with other BMPs and often downstream detention is still needed to meet the Cp_v and Q_p sizing criteria.

The construction sequence and specifications for each infiltration practice shall be followed, as outlined in Appendix B.2. Experience has shown that the longevity of infiltration practices is strongly influenced by the care taken during construction.

A porosity value "n" ($n = V_v/V_t$) of 0.40 should be used in the design of stone reservoirs for infiltration practices.

3.3.5 Infiltration Landscaping Criteria

A dense and vigorous vegetative cover shall be established over the contributing pervious drainage areas before runoff can be accepted into the facility. Infiltration trenches shall not be constructed until all of the contributing drainage area has been completely stabilized.

3.3.6 Infiltration Maintenance Criteria

Infiltration practices may not serve as a sediment control device during the site construction phase. In addition, the erosion and sediment control plan for the site must clearly indicate how sediment will be prevented from entering the infiltration site.

An observation well shall be installed in every infiltration trench, consisting of an anchored six-inch diameter perforated PVC pipe with a lockable cap. (See Detail No. 4, Appendix D.8.)

It is recommended that infiltration designs include dewatering methods in the event of failure. This can be done with underdrain pipe systems that accommodate drawdown.

Direct access shall be provided to all infiltration practices for maintenance and rehabilitation.

Infiltration practices should not be covered by an impermeable surface.

OSHA safety standards should be consulted for trench excavation.

Section 3.4 Stormwater Filtering Systems

Definition: Practices that capture and temporarily store the WQ_v and pass it through a filter bed of sand, organic matter, soil or other media. Filtered runoff may be collected and returned to the conveyance system or allowed to partially exfiltrate into the soil. Design variants include:

- F-1 surface sand filter (Figure 3.12)
- F-2 underground sand filter (Figure 3.13)
- F-3 perimeter sand filter (Figure 3.14)
- F-4 organic filter (Figure 3.15)
- F-5 pocket sand filter (Figure 3.16)
- F-6 bioretention (Figure 3.17)

Filtering systems shall not be designed to meet Cp_v or Q_p requirements except under extremely unusual conditions. Filtering practices shall generally be combined with a separate facility to provide those controls. Filtering systems may be used to meet the Re_v if designed to exfiltrate into the soil (e.g., if additional storage is provided below the invert of the underdrain).

IMPORTANT NOTE: Any stormwater management BMP that uses an embankment for impounding water is required to follow the latest version of the NRCS-MD 378 Pond Code Standards And Specifications For Small Pond Design (Appendix B.1) and obtain approval from the local Soil Conservation District (SCD) or appropriate review authority.

F-1	**Figure 3.12** Example of Surface Sand Filter	F-1

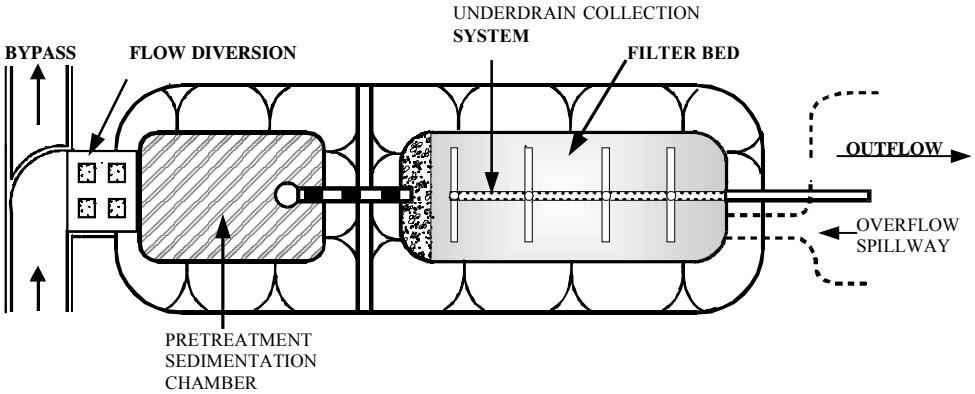

PLAN VIEW

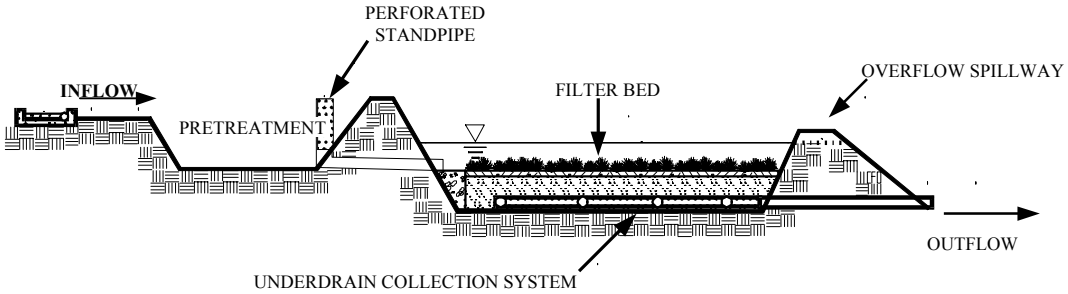

PROFILE

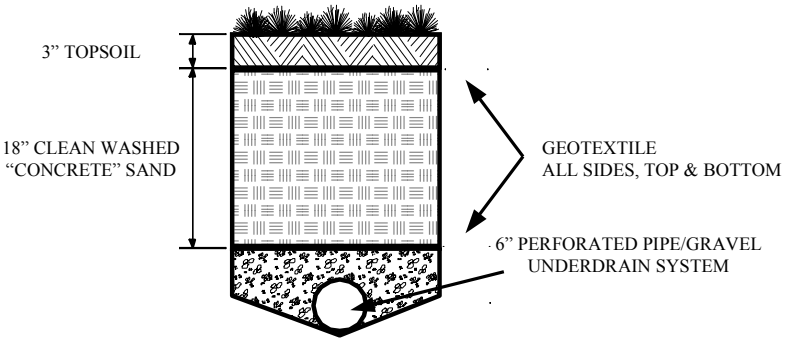

TYPICAL SECTION

Surface sand filters can treat the largest drainage area of all the filtering systems.

F-2	**Figure 3.13** Example of Underground Sand Filter	F-2

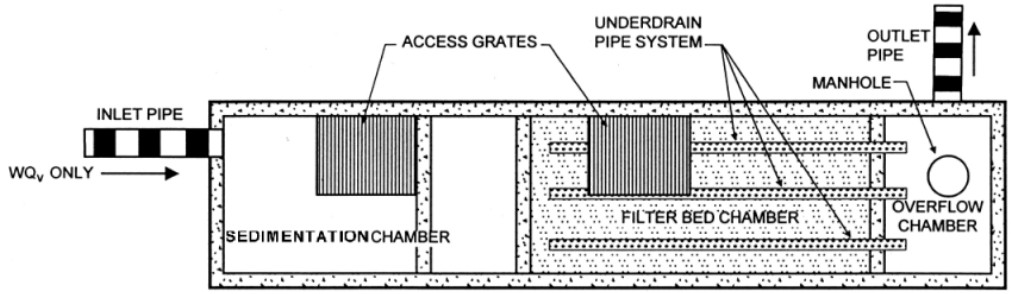

PLAN VIEW

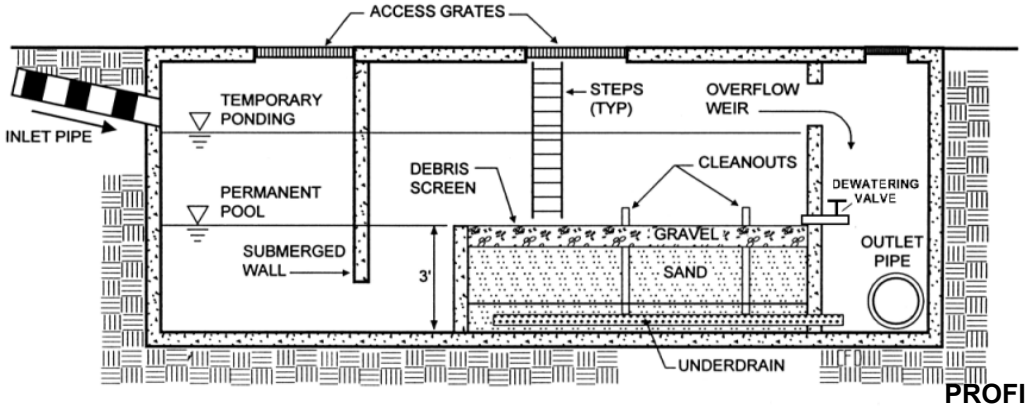

PROFILE

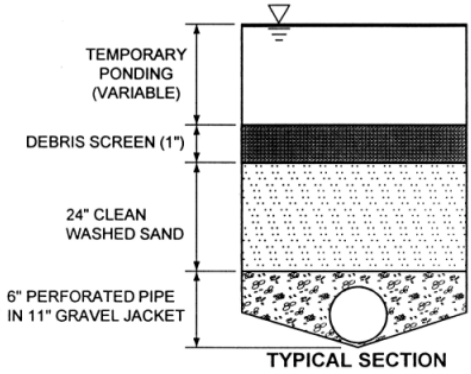

TYPICAL SECTION

The underground sand filter is an option for providing WQ_v where space is limited.

F-3	**Figure 3.14** Example of Perimeter Sand Filter	F-3

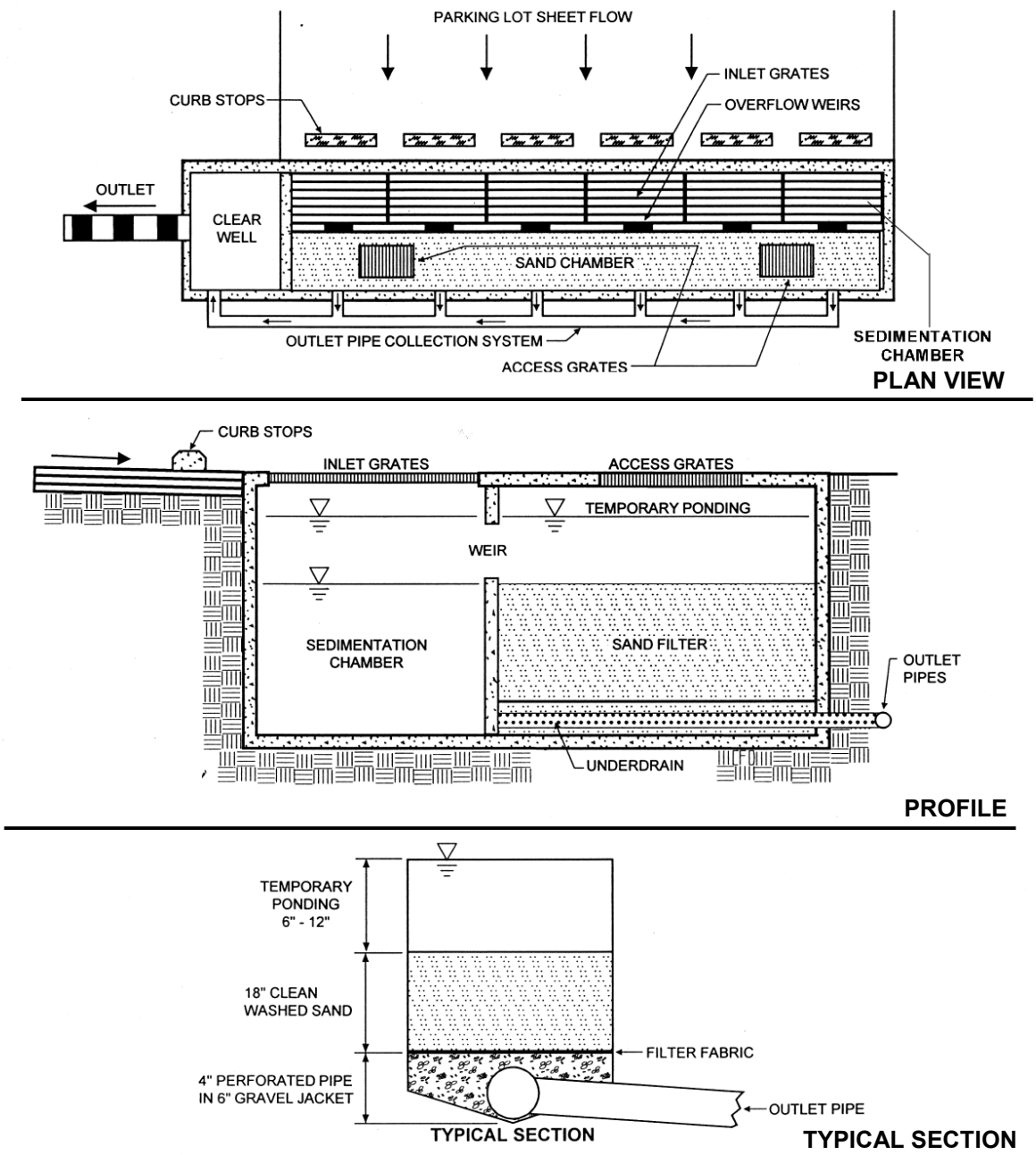

The perimeter sand filter is most practical for small sites with flat terrain or a high water table.

F-4	**Figure 3.15** Example of Organic Filter	F-4

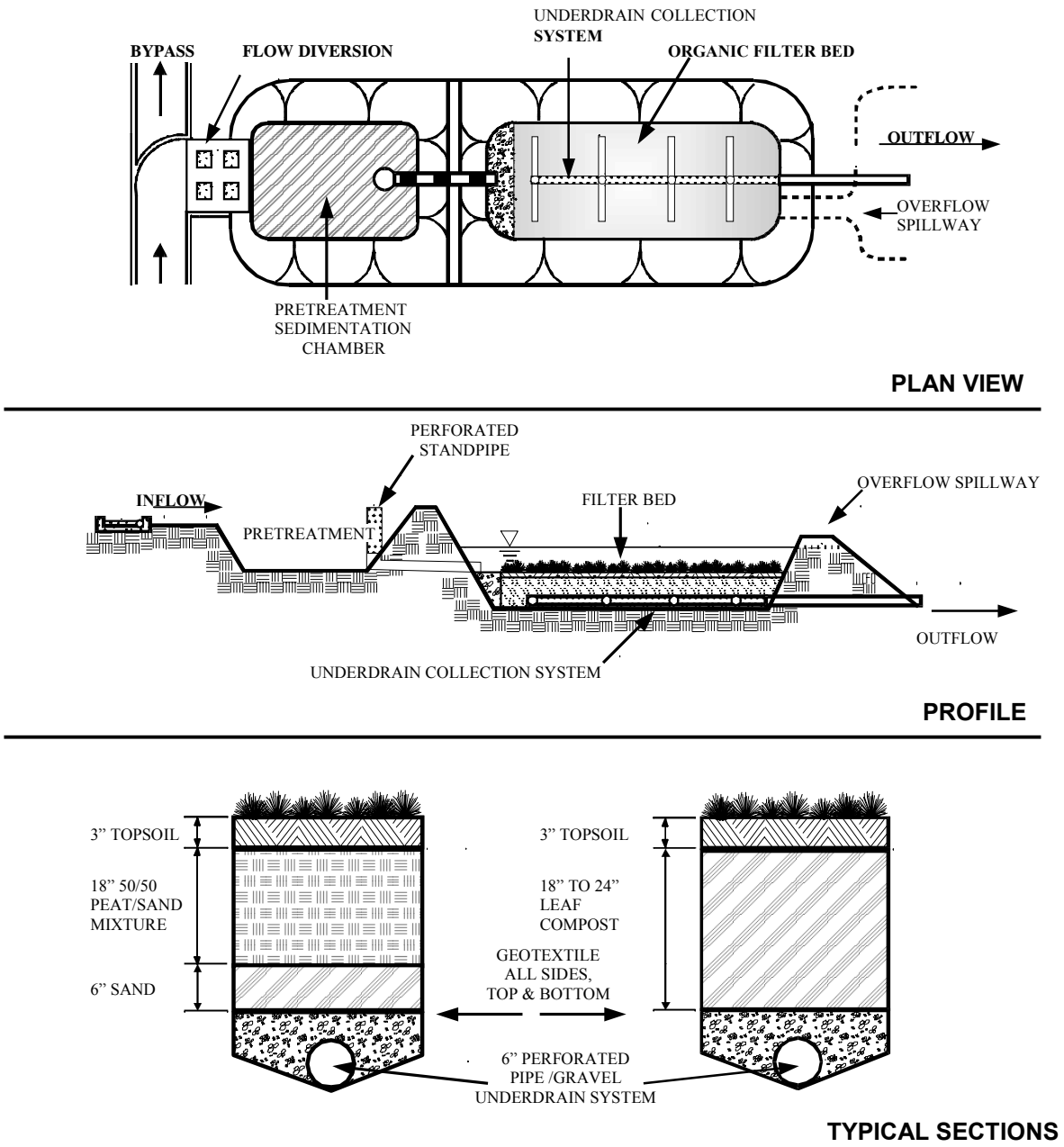

The organic filter is used when maximum nutrient or trace metal removals are desired.

F-5	**Figure 3.16** Example of Pocket Sand Filter	F-5

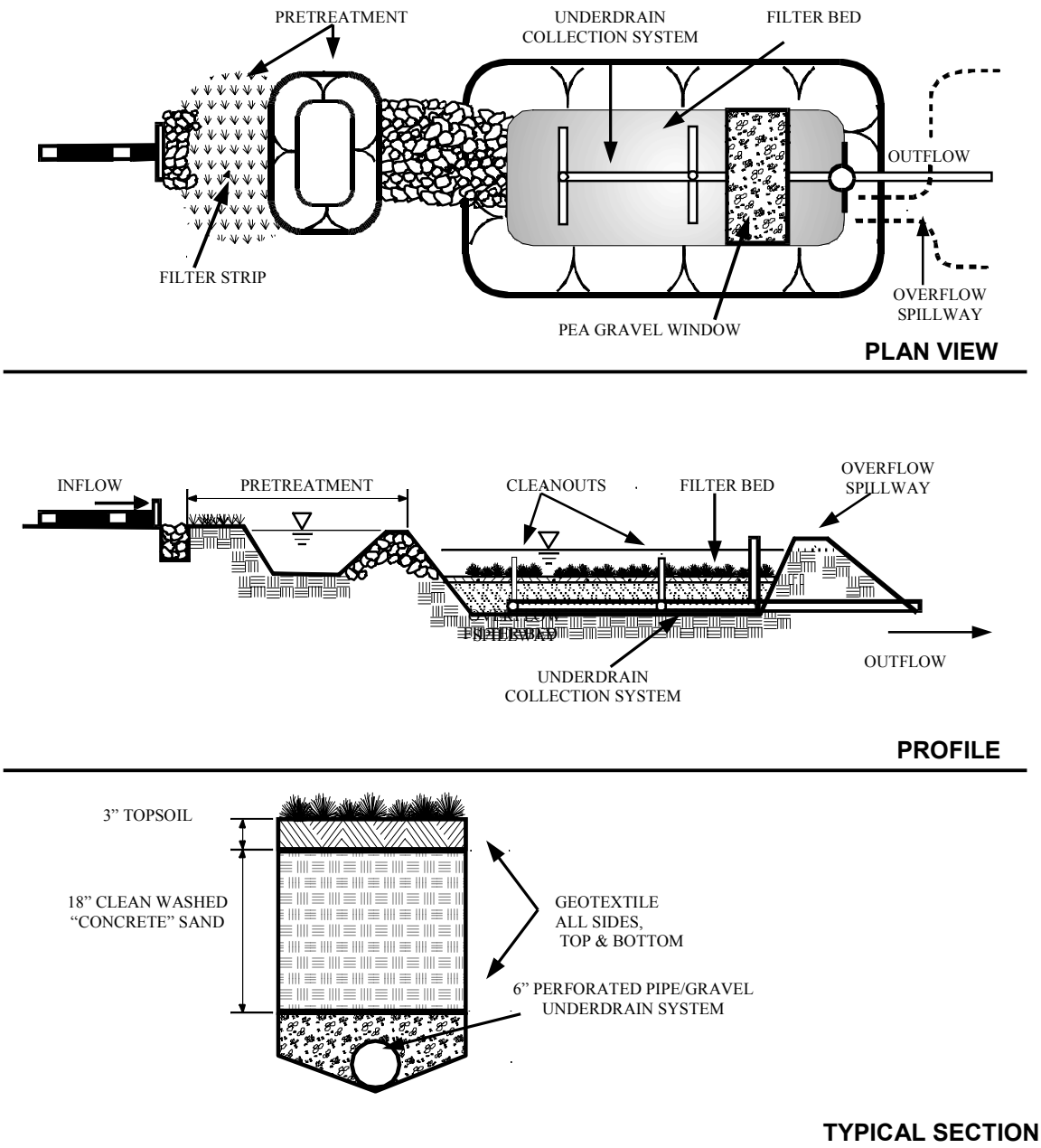

The pocket sand filter is applied to small sites where sediment loads are expected to be moderate to low. The pea gravel windows allow runoff into the filter if the surface becomes clogged.

F-6	**Figure 3.17** Example of Bioretention	F-6

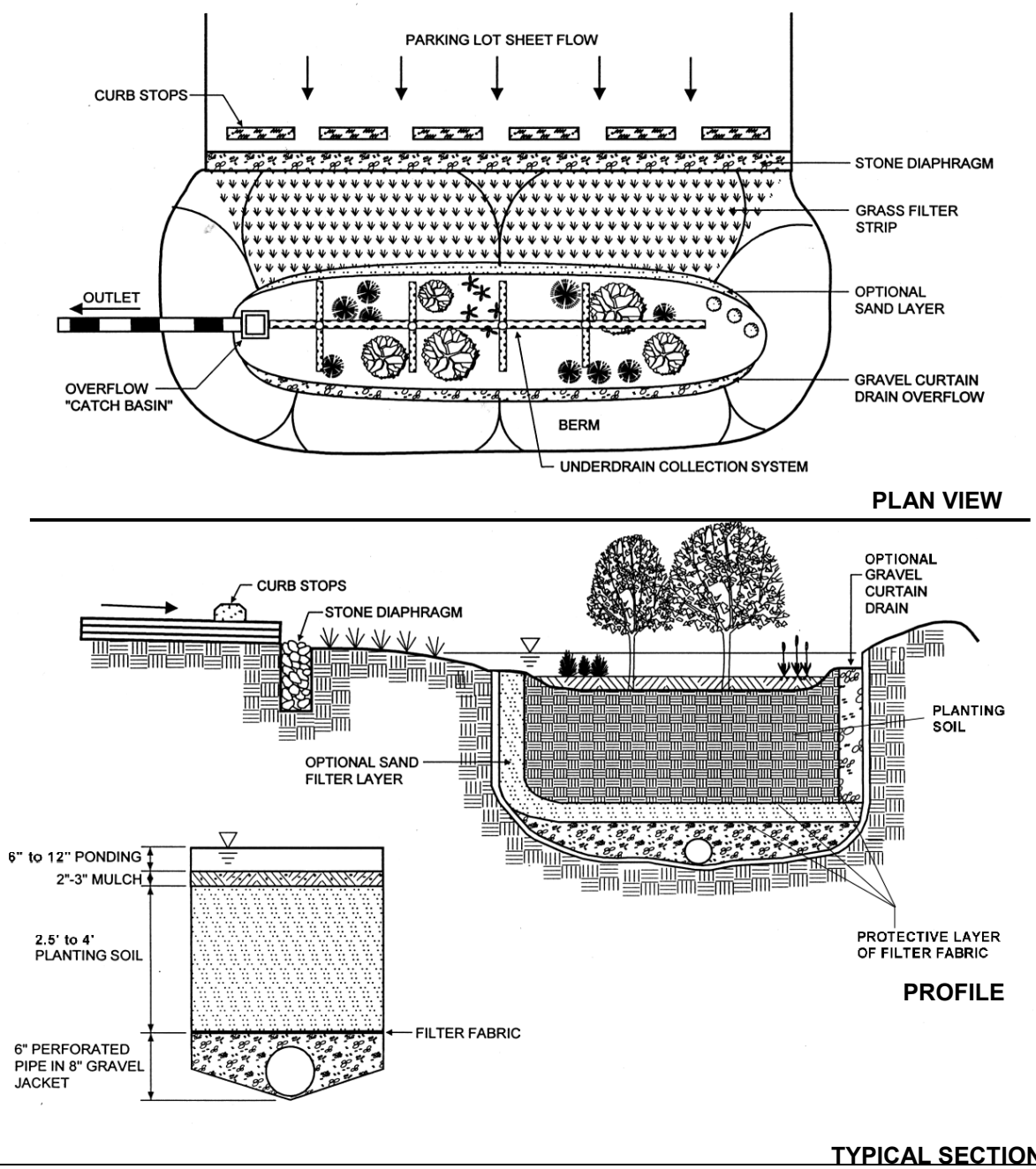

Bioretention combines open space with stormwater treatment.

3.4.1 Filtering Feasibility Criteria

Most stormwater filters normally require two to six feet of head. However, the perimeter sand filter (F-3) can be designed to function with as little as one foot of head.

The maximum contributing area to an individual stormwater filtering system is usually less than 10 acres.

Sand and organic filtering systems are generally applied to land uses with a high percentage of impervious surfaces. *Drainage areas with imperviousness less than 75% discharging to a filtering practice shall require full sedimentation pretreatment techniques (see Equation on p. 3.39).*

3.4.2 Filtering Conveyance Criteria

If runoff is delivered by a storm drain pipe or is along the main conveyance system, the filtering practice shall be designed off-line. (See Detail No. 5 in Appendix D.8.)

Overflow for the ten-year storm shall be provided to a non-erosive outlet point (e.g., prevent downstream slope erosion). See Appendix D.12 for critical non-erosive velocities for grass and soil.

A flow regulator (or flow splitter diversion structure) shall be provided to divert the WQ_v *to the filtering practice* (see Detail No. 5, Appendix D.8).

Stormwater filters shall be equipped with a minimum 4" perforated pipe underdrain (6" is preferred) in a gravel layer. A permeable filter fabric (Appendix B.3) shall be placed between the gravel layer and the filter media.

3.4.3 Filtering Pretreatment Criteria

Dry or wet pretreatment equivalent to at least 25% of the computed WQ_v *shall be provided prior to filter media.* The typical method is a sedimentation basin that has a length to width ratio of 2:1. The Camp-Hazen equation, which accounts for the effects of turbulent flow, is used to compute the required minimum surface area for sand and organic filters for pretreatment (WSDE, 1992).

The required sedimentation basin minimum surface area is computed using the following equation:

$$A_s = \frac{Q_o}{W} \times E'$$

where:

A_s = sedimentation basin surface area (ft^2)
Q_o = discharge rate from basin = (WQ_v/24 hr)
W = particle settling velocity (ft/sec)
for I ≤ 75%, use 0.0004 ft/sec (particle size=20 microns)
for I >75%use 0.0033 ft/sec (particle size=40 microns) [1]
(I = percent impervious)
E' = sediment trapping efficiency constant; for a sediment trapping efficiency (E) of 90%, E' = 2.30 [2]

1) Sites with greater than 75% imperviousness have a higher percentage of coarse-grained sediments (Shaver and Baldwin, 1991). Therefore, the target particle size for sedimentation basins may be increased to 40 microns and the surface area reduced.

2) The sediment trapping efficiency constant (E') may be calculated from the sediment trapping efficiency (E) using the following equation: $E' = -\ln [1-(E/100)]$

The equation reduces to:

A_{sf} = (0.066) (WQ_v) ft^2 for I ≤ 75%
A_{sp} = (0.0081) (WQ_v) ft^2 for I > 75%

where:

A_{sf} = sedimentation basin surface area full
A_{sp} = sedimentation basin surface area partial

Adequate pretreatment for bioretention systems (F-6) is provided when all of the following are provided: (a) 20' grass filter strip below a level spreader or optional sand filter layer, (b) gravel diaphragm and (c) a mulch layer.

3.4.4 Filtering Treatment Criteria

The entire treatment system (including pretreatment) shall temporarily hold at least 75% of the WQ_v prior to filtration.

The filter bed typically has a minimum depth of 18". *Sand filters shall have a minimum filter bed depth of 12".*

Filtering practices typically cannot provide Cp_v or Q_p under most site conditions.

The filter media shall conform to the specifications listed in Table B.3.1 (Appendix B.3).

The filter area for filter designs F-1 to F-5 shall be sized based on the principles of Darcy's Law. A coefficient of permeability (k) shall be used as follows:

Sand:	*3.5 ft/day (City of Austin 1988)*
Peat:	2.0 ft/day (Galli 1990)
Leaf compost:	*8.7 ft/day (Claytor and Schueler, 1996)*
Bioretention Soil:	*0.5 ft/day (Claytor and Schueler, 1996)*

Bioretention systems (F-6) shall consist of the following treatment components: A 2½ to 4 foot deep planting soil bed, a surface mulch layer, and a 12" deep surface ponding area.

The required filter bed area (A_f) is computed using the following equation:

$$A_f = (WQ_v)\ (d_f)\ /\ [\ (k)\ (h_f + d_f)\ (t_f)]$$

where:

A_f	= Surface area of filter bed (ft^2)
WQ_v	= water quality volume (ft^3)
d_f	= filter bed depth (ft)
k	= coefficient of permeability of filter media (ft/day)
h_f	= average height of water above filter bed (ft)
t_f	= design filter bed drain time (days)*

*1.67 days is recommended maximum for sand filters, 2.0 days for bioretention

3.4.5 Filtering Landscaping Criteria

A dense and vigorous vegetative cover shall be established over the contributing drainage area before runoff can be accepted into the facility.

Landscaping is critical to the performance and function of bioretention areas. Therefore, a landscaping plan shall be provided for bioretention areas per the guidance provided in Appendix-A.

Filters F-1, F-4 and F-5 may have a grass cover to aid in pollutant adsorption. The grass should be capable of withstanding frequent periods of inundation and drought (see Appendix A for grass species selection guide).

Planting recommendations for bioretention facilities are as follows:

- Native plant species should be specified over non-native species.
- Vegetation should be selected based on a specified zone of hydric tolerance.
- A selection of trees with an understory of shrubs and herbaceous materials should be provided.

- Woody vegetation should not be specified at inflow locations.

3.4.6 Filtering Maintenance Criteria

The sediment chamber outlet devices shall be cleaned/repaired when drawdown times within the chamber exceed 36 hours. Trash and debris shall be removed as necessary.

Sediment should be cleaned out of the sedimentation chamber when it accumulates to a depth of more than six inches. Vegetation within the sedimentation chamber should be limited to a height of 18 inches.

When the filtering capacity of the filter diminishes substantially (e.g., when water ponds on the surface of the filter bed for more than 72 hours), the top few inches of discolored material shall be removed and shall be replaced with fresh material. The removed sediments should be disposed in an acceptable manner (e.g., landfill). Silt/sediment should be removed from the filter bed when the accumulation exceeds one inch.

Organic filters (F-4) or surface sand filters (F-1) that have a grass cover should be mowed a minimum of 3 times per growing season to maintain maximum grass heights less than 12 inches.

*A drop of at least six inches shall be provided at the inlet of bioretention facilities (F-6) (*stone diaphragm*). Dead or diseased plant material shall be replaced.* Areas devoid of mulch should be re-mulched on an annual basis.

Direct maintenance access shall be provided to the pretreatment area and the filter bed.

Construction of sand filters and bioretention areas shall conform to the specifications outlined in Appendix B.3.

Section 3.5 Open Channel Systems

Definition: Vegetated open channels that are designed to capture and treat the full WQ_v within dry or wet cells formed by check dams or other means. Design variants include:

- O-1 dry swale (Figure 3.18)
- O-2 wet swale (Figure 3.19)

Open channel systems shall not be designed to meet Cp_v or Q_p requirements except under extremely unusual conditions. Open channel practices shall generally be combined with a separate facility to provide those controls. Additionally, these systems may be used to meet the Re_v if designed to exfiltrate through the soil (e.g., if additional storage is provided below the invert of the underdrain).

Grass channels (also known as biofilters) that are not designed in accordance with Section 3.5 are not considered an acceptable practice to meet the WQ_v requirements unless designed according to the criteria in Chapter 5.

IMPORTANT NOTE: Any stormwater management BMP that uses an embankment for impounding water is required to follow the latest version of the NRCS-MD 378 Pond Code Standards And Specifications For Small Pond Design (Appendix B.1) and obtain approval from the local Soil Conservation District (SCD) or appropriate review authority.

O-1	**Figure 3.18** Example of Dry Swale	O-1

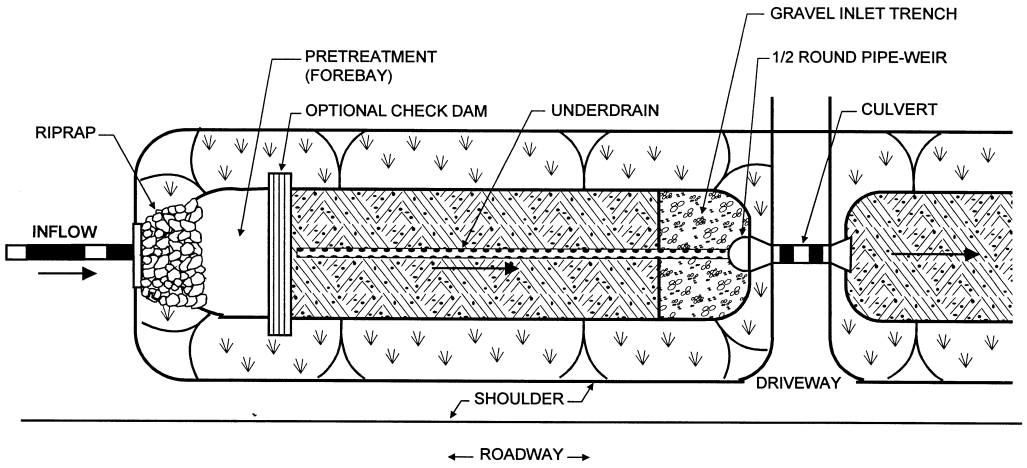

PLAN VIEW

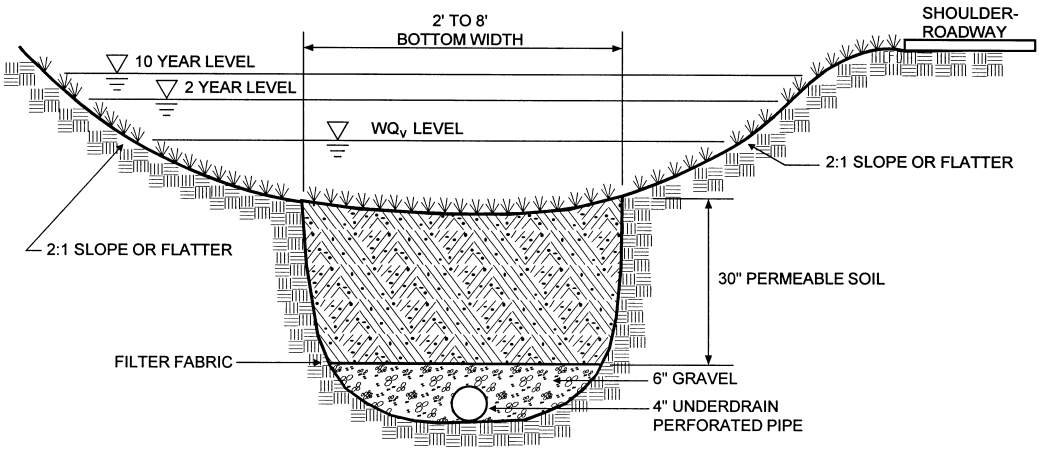

SECTION

Dry swales are used at low density residential projects or for very small impervious areas.

O-2	**Figure 3.19** Example of Wet Swale	O-2

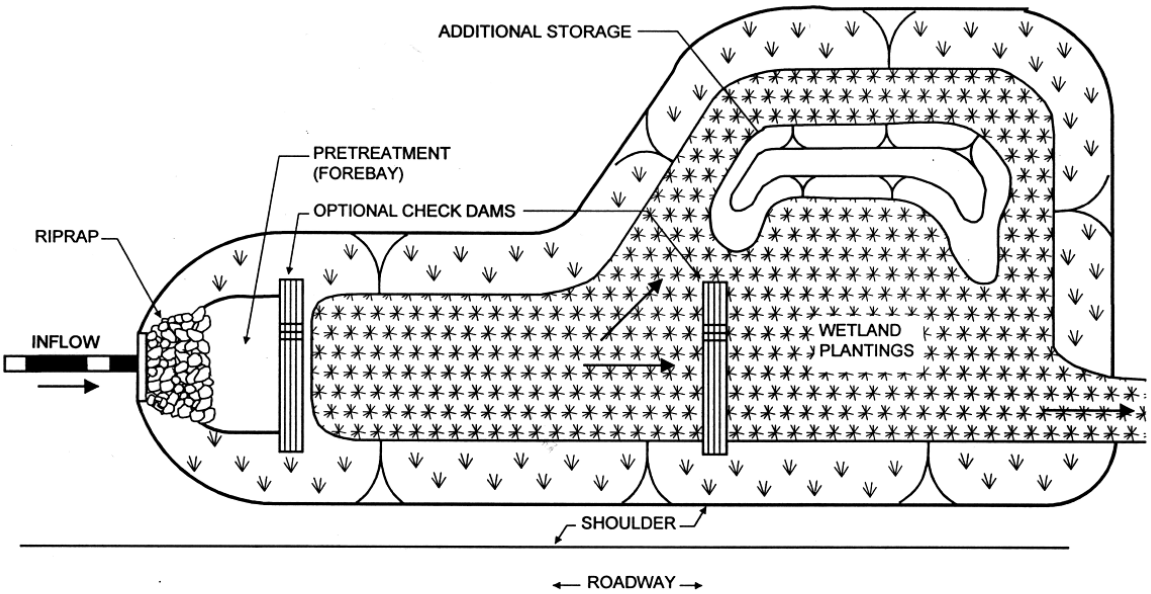

PLAN VIEW

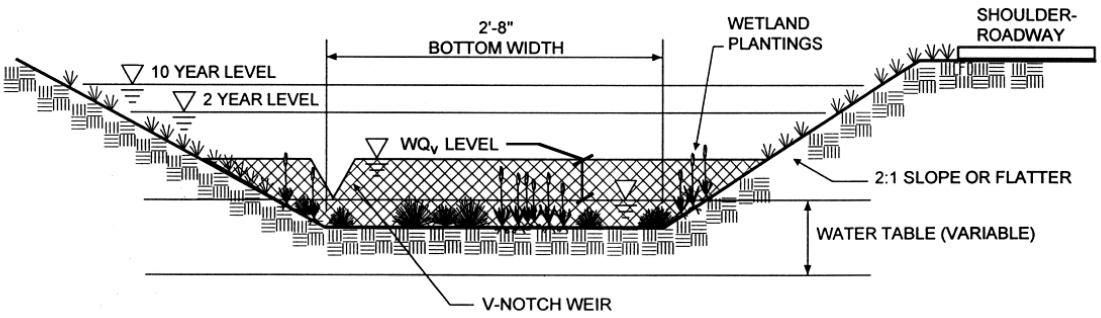

PROFILE

Wet swales are ideal for treating highway runoff in low lying or flat terrain areas.

3.5.1 Open Channel Feasibility Criteria

Open channel systems shall have longitudinal slopes less than 4.0% to qualify for WQ_v treatment.

Open channel systems, designed for WQ_v treatment, are primarily applicable for land uses such as roads, highways, residential development (dry swales only), and pervious areas.

3.5.2 Open Channel Conveyance Criteria

The peak velocity for the ten-year storm shall be non-erosive (see Appendix D.12 for critical non-erosive velocities for grass and soil) for the soil and vegetative cover provided.

Open channels shall be designed to safely convey the ten-year storm. Three inches of freeboard should be provided.

Channels should be designed with moderate side slopes (flatter than 3:1) for most conditions. *In no event may side slopes be steeper than 2:1.*

The maximum allowable ponding time within a channel shall be less than 48 hours. The minimum ponding time of 30 minutes is recommended for meeting WQ_v treatment goals.

Open channel systems which directly receive runoff from impervious surfaces may have a six inch drop onto a protected shelf (pea gravel diaphragm) to minimize clogging of the inlet.

An underdrain system shall be provided for the dry swale to ensure a maximum ponding time of 48 hours.

3.5.3 Open Channel Pretreatment Criteria

Pretreatment storage of 0.1 inch of runoff per impervious acre storage shall be provided. This storage is usually obtained by providing check dams at pipe inlets and/or driveway crossings.

A pea gravel diaphragm and gentle side slopes should be provided along the top of channels to accommodate pretreatment for lateral sheet flows.

Direct discharge of concentrated flow (e.g., by pipe) shall be pretreated.

3.5.4 Open Channel Treatment Criteria

Dry and wet swales shall be designed to temporarily store the WQ_v within the facility for a maximum 48 hour period.

Open channels shall have a bottom width no wider than 8 feet or a meandering drainage pattern shall be established to avoid gullying or channel braiding.

Dry and wet swales should maintain a maximum ponding depth of one foot at the "mid-point" of the channel profile (longitudinal dimension) and a maximum depth of 18" at the downstream end point of the channel (for storage of the WQ_v).

3.5.5 Open Channel Landscaping Criteria

Wet swales are not recommended for residential developments as they can create potential nuisance or mosquito breeding conditions.

Landscape design should specify proper grass species and wetland plants based on specific site, soils and hydric conditions present along the channel (see Appendix A).

3.5.6 Open Channel Maintenance Criteria

Open channel systems and grass filter strips should be mowed as required during the growing season to maintain grass heights in the 4 to 6 inch range. Wet swales, employing wetland vegetation or other low maintenance ground cover do not require frequent mowing of the channel.

Sediment build-up within the bottom of the channel or filter strip shall be removed when 25% of the original WQ_v has been exceeded.

Construction specifications for open channel systems are specified in Appendix B.3.

Chapter 4.0

A Guide to BMP Selection and Location in the State of Maryland

4.0 Selecting the Best BMP at a Site

This chapter outlines a process for selecting the best BMP or group of BMPs for a development site and provides guidance on factors to consider when deciding where to locate them. The process is used to screen which BMPs can meet the pollutant removal targets for the WQ_v and guides the designer through six steps that progressively screen:

- Watershed Factors
- Terrain Factors
- Stormwater Treatment Suitability
- Physical Feasibility Factors
- Community and Environmental Factors
- Locational and Permitting Factors

More detail on the step-wise screening process is provided below:

Step ❶ Watershed Factors

Is the project located in a watershed that has special design objectives or constraints that must be met? Table 4.1 outlines BMP restrictions or additional design requirements that must be considered if a project lies within the Maryland Critical Area, a cold water watershed, a sensitive watershed, an aquifer protection area, a water supply reservoir, or a shellfish/beach protection zone.

Step ❷ Terrain Factors

Is the project located in a portion of the State that has particular design constraints imposed by local terrain and or underlying geology? Table 4.2 details BMP restrictions for regions of Maryland that have karst, mountainous terrain, or low relief.

Step ❸ Stormwater Treatment Suitability

Can the BMP meet all five stormwater sizing criteria at the site or are a combination of BMPs needed? In this step, designers can screen the BMP list using Table 4.3 to determine if a particular BMP can meet the Re_v, Cp_v and/or Q_p storage requirements. In addition, Table 4.3 indicates whether a BMP is capable of treating hotspot runoff and provides comparative indexes on land consumption and safety risks that may preclude a BMP. At the end of this step, the designer can screen the BMP options down to a manageable number and determine if a single BMP or a group of BMPs is needed to meet stormwater sizing criteria at the site.

Step ❹ Physical Feasibility Factors

Are there any physical constraints at the project site that may restrict or preclude the use of a particular BMP? In this step, the designer screens the BMP list using Table 4.4 to determine if the soils, water table, drainage area, slope or head conditions present at a particular development site might limit the use of a BMP. In addition, the matrix indicates which BMP options work well in highly urban areas.

Step ❺ Community and Environmental Factors

Do the remaining BMPs have any important community or environmental benefits or drawbacks that might influence the selection process? In this step, Table 4.5 is used to compare BMP options with regard to maintenance, habitat, community acceptance, cost and other environmental factors.

Step ❻ Locational and Permitting Factors

What environmental features must be avoided or considered when locating the BMP system at a site to fully comply with local, State and federal regulations? In this step, the designer may use Table 4.6 as a checklist that asks whether any of the following are present at the site: wetlands, waters of the United States, stream or shoreline buffers, floodplains, forest conservation areas, and development infrastructure. Brief guidance is then provided on how to locate BMPs to avoid impacts to sensitive resources. If a BMP must be located within a sensitive environmental area, a brief summary of applicable permit requirements is provided.

Section 4.1 Watershed Factors

The design of urban BMPs is fundamentally influenced by the nature of the downstream water body that will be receiving the stormwater discharge. Consequently, designers must determine the Use Designation of the watershed in which their project is located prior to design (see COMAR 26.08.02.08 and Appendix D.9).

In some cases, higher pollutant removal or environmental performance is needed to fully protect aquatic resources and/or human health and safety within a particular watershed or receiving water. Therefore, a shorter list of BMPs may need to be considered for selection within these watersheds or zones. The areas of concern include:

Maryland Critical Area Intensely Developed Areas. BMPs located within the Intensely Developed Area (IDA) of the Maryland Critical Area (a zone extending 1000 feet landward from mean high tide and the landward edge of tidal wetlands) shall demonstrate compliance with the "10% Rule." The rule mandates that post development stormwater phosphorus loads must be reduced to 10% below pre development loads, using the methodology developed by Herson et al. (1994). For a summary review of the 10% Rule and updated estimates of long term phosphorus pollutant removal rates please consult Appendix D.4.

Coldwater Streams (Use III and IV). Cold and cool water streams have habitat qualities capable of supporting trout and other sensitive aquatic organisms. Therefore, the design objective for these streams is to maintain habitat quality by preventing stream warming, maintaining natural recharge, preventing bank and channel erosion, and preserving the natural riparian corridor. Techniques for accomplishing these objectives may include:

- Minimizing the creation of impervious surfaces,
- Minimizing surface areas of permanent pools,
- Preserving existing forested areas,
- Bypassing existing baseflow and/or springflow, or
- Providing shade-producing landscaping

Some BMPs can have adverse downstream impacts on cold water streams and their use is highly restricted.

Sensitive Streams (e.g., streams with a watershed impervious cover less than 15%). These streams may also possess high quality cool water or warm water aquatic resources. The design objectives are to maintain habitat quality through the same techniques used for cold water streams, with the exception that stream warming is not as severe of a design constraint. These streams may also be specially designated by local authorities.

Wellhead Protection. Areas that recharge existing public water supply wells present a unique management challenge. The key design constraint is to prevent possible groundwater contamination by preventing infiltration of hotspot runoff. At the same time, recharge of unpolluted stormwater is needed to maintain flow in streams and wells during dry weather.

Reservoir Protection (Use I-P, III-P and IV-P). Watersheds that deliver surface runoff to a public water supply reservoir or impoundment are of special concern. Depending on the treatment available at the water intake, it may be necessary to achieve a greater level of pollutant removal for the pollutants of concern such as bacteria pathogens, nutrients, sediment or metals. One particular management concern for reservoirs is ensuring that stormwater hotspots are adequately treated so that they do not contaminate drinking water.

Shellfish/Beach (Use II). Watersheds that drain to specific shellfish harvesting areas or public swimming beaches require a higher level of BMP treatment to prevent closings caused by bacterial contamination from stormwater runoff. In these watersheds, BMPs are explicitly designed to maximize bacteria removal.

Other Criteria. Designers should consult with the appropriate review authority to determine if their development project is subject to additional stormwater BMP criteria as a result of an adopted local watershed plan or protection zone.

Table 4.1 BMP Selection - Watershed Factors

BMP GROUP	CRITICAL AREA	COLD WATER	SENSITIVE STREAM	AQUIFER PROTECTION	RESERVOIR PROTECTION	SHELLFISH BEACH
Ponds	Drainage Area may limit except for P-5, P-1 has lower removal rates	Restricted (see Appendix B.1.2) Offline design recommended Maximize shading of open pool areas	Require additional storage for control of Cp_v	May require liner if A soils are present Pretreat hotspots 2-4 ft SD*	Require control of Cp_v	Moderate bacteria removal, design to prevent geese problems, provide permanent pools
Wetlands	Drainage area may limit, W-4 excepted	May be restricted (see Appendix B.1.2)	Require additional storage for control of Cp_v	May require liner if A soils are present 2-4 ft SD*	Require control of Cp_v	Provide 48 hr ED for max. bacterial dieoff
Infiltration	Often infeasible due to soils or water table in tidal areas.	OK, if site has appropriate soils	OK, if site has appropriate soils	SD* from wells and water table No untreated hotspot runoff OK to infiltrate rooftop runoff	SD* from bedrock and water table	OK, but a min. 2 to 4 ft SD* is required
Filtering Systems	OK	OK, but evaluate for stream warming	May be necessary for pretreatment	OK, if designed w/out exfiltration	May be necessary for pretreatment prior to another BMP	OK, Moderate to high bacterial removal
Open Channels	OK	OK	Should be linked w/basin to provide Cp_v	OK, but hotspot runoff must be adequately pretreated	OK, but hotspot runoff must be adequately pretreated	Poor bacterial removal for O-2

*SD = Separation Distance or distance from well or water table to BMP.

Section 4.2 Terrain Factors

Three key factors to consider are low-relief, karst and mountainous terrain. In Maryland, **Low Relief Areas** are located in the lower Eastern Shore, particularly below the Choptank River (see Figure 4.1 below). **Karst** and major carbonaceous rock areas are found in portions of Carroll, Frederick, Washington, and Garrett Counties. Mountainous areas are found in the Western part of the State. Special geotechnical testing requirements may be needed in karst areas (see Appendix D.2). The terrain regions shown on the map are approximate. Please consult with your local reviewing authority to determine if your project is subject to terrain constraints.

Figure 4.1 Map of Maryland Showing Key Terrain Factors

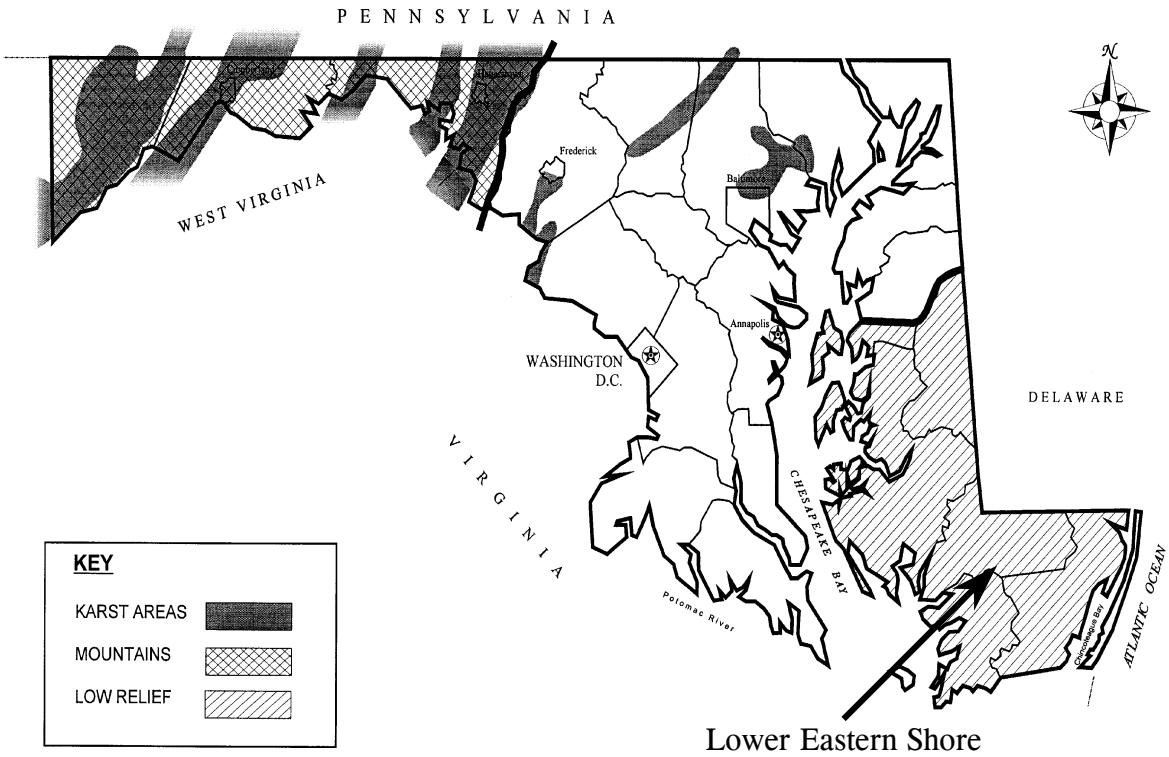

Table 4.2 BMP Selection - Terrain Factors

BMP GROUP	LOW RELIEF	KARST	MOUNTAINOUS
Ponds	Maximum normal pool depth of 4 feet (dugout)	• geotechnical tests • max ponding depth • Require poly or clay liner	Embankment heights restricted
Wetlands	OK		Embankment heights restricted
Infiltration	Minimum distance to water table of 2 feet	May be prohibited. Consult with local approval authority.	Max slope 15% trenches must have flat bottom
Filtering Systems	Several designs limited by low head (F-1 and F-2)	Require poly-liner or impermeable membrane to seal bottom	OK
Open Channels	Generally feasible due to low slopes	OK	Often infeasible in steeper slopes

Section 4.3 Stormwater Treatment Suitability

Table 4.3 examines the capability of each BMP option to meet the five stormwater treatment sizing criteria outlined in Chapter 2. Thus, it shows whether a BMP has:

Ability to Meet the Re_v. It should be noted that other practices, not on the BMP list, are capable of meeting the Re_v requirement (e.g., grass channel, filter, disconnection of rooftop runoff and other practices outlined in Chapter 5). Thus, if a BMP cannot meet the Re_v requirement, supplemental practices that can provide recharge may be needed.

Ability to Provide Cp_v. The table indicates whether the BMP can typically provide the Cp_v that is needed in some watersheds. The finding that a particular BMP cannot meet the Cp_v requirement does not necessarily imply that it should be eliminated from consideration, but is a reminder that more than one practice may be needed at a site (e.g., a bioretention area and a downstream pond).

Ability to Provide Q_{p2} and/or Q_{p10}. The table indicates whether the BMP can typically provide the Q_p criteria for the site. Again, the finding that a particular BMP cannot meet the requirement does not necessarily mean that it should be eliminated from consideration, but rather is a reminder that more than one practice may be needed at a site (e.g., a dry swale and a downstream pond)

Additional Safety Concerns. A comparative index expresses the potential need for additional safety features within a BMP. A "no" indicates no additional features are needed while a "yes" indicates deep pools may create potential safety risks. The safety factor is included at this stage of the screening process because liability and safety are a prime concern in many residential settings.

Adequate Space. This comparative index expresses how much space a BMP typically consumes at a site. A "yes" indicates that the BMP consumes a relatively small amount of land, whereas a "no" indicates the BMP may consume a relatively high fraction of land at the site. Again, this factor is included in this early screening stage because many BMPs are severely constrained by land consumption.

Ability to Accept Hotspot Runoff. This last column examines the capability of a BMP to treat runoff from designated hotspots as defined in Chapter 2. A BMP that receives hotspot runoff may have design restrictions as noted and may require additional measures to protect downstream resources from potential spills.

Table 4.3 BMP Selection - Stormwater Treatment Suitability

CODE	BMP List	Re_v Ability	Cp_v Control	Qp Control	Additional Safety Concerns	SPACE	ACCEPT HOTSPOT RUNOFF
P-1	Micropool ED	No[1]	Yes	Yes	No	Yes	Yes[3]
P-2	Wet Pond	No[1]	Yes	Yes	Yes	Varies	Yes[3]
P-3	Wet ED Pond	No[1]	Yes	Yes	Yes	Yes	Yes[3]
P-4	Multiple Pond	No[1]	Yes	Yes	Yes	No	Yes[3]
P-5	Pocket Pond	No[1]	Yes	Yes	Varies	Yes	Yes[3]
W-1	Shallow Wetland	Varies[2]	Yes	Yes	No	No	Yes[3]
W-2	ED Wetland	Varies[2]	Yes	Yes	Varies	Varies	Yes[3]
W-3	Pond/Wetland	Varies[2]	Yes	Yes	Yes	No	Yes[3]
W-4	Pocket Wetland	No	Varies	Varies	No	Varies	Yes[3]
I-1	Infiltration Trench	Yes	Varies	Varies	No	Yes	No[3]
I-2	Infiltration Basin	Yes	Varies	Varies	No	Varies	No[3]
F-1	Surface Sand Filter	Varies[2]	Varies	Varies	No	Yes	Yes[4]
F-2	Underground SF	No	No	No	Varies	Yes	Yes
F-3	Perimeter SF	No	No	No	No	Yes	Yes
F-4	Organic Filter	Varies[2]	Varies	Varies	No	Yes	Yes[4]
F-5	Pocket Sand Filter	Varies[2]	Varies	Varies	No	Yes	Yes[4]
F-6	Bioretention	Yes	Varies	Varies	No	Varies	Yes[4]
O-1	Dry Swale	Yes	No	No	No	Varies	Yes[4]
O-2	Wet Swale	No	No	No	No	Varies	No

1 Structures that require impermeable liners or that intercept groundwater may not be used for groundwater recharge.

2 Re_v may be provided by exfiltration (see Chapter 3.4).

3 Not allowed unless pretreatment to remove hydrocarbons, trace metals, and toxicants is provided.

4 Yes, but only if bottom of facility is lined with impermeable filter fabric that prevents leachate infiltration.

Section 4.4 Physical Feasibility Factors

At this point, the designer has narrowed the BMP list to a manageable size and can evaluate the remaining options given the physical conditions at a site. This table cross-references testing protocols needed to confirm physical conditions at the site. The six primary factors are:

Soils. The key evaluation factors are based on an initial investigation of the USDA hydrologic soils groups at the site. Note that more detailed geotechnical tests are usually required for infiltration feasibility and during design to confirm permeability and other factors (see Appendix D.1).

Water Table. This column indicates the minimum depth to the seasonally high water table from the bottom or floor of a BMP.

Drainage Area. This column indicates the recommended minimum or maximum drainage area that is considered suitable for the practice. If the drainage area present at a site is slightly greater than the maximum allowable drainage area for a practice, some leeway is permitted or more than one practice can be installed. The minimum drainage areas indicated for ponds and wetlands are flexible depending on water availability (baseflow or groundwater) or the mechanisms employed to prevent clogging.

Slope Restriction. This column evaluates the effect of slope on the practice. Specifically, the slope restrictions refer to how flat the area where the practice may be.

Head. This column provides an estimate of the elevation difference needed at a site (from the inflow to the outflow) to allow for gravity operation within the practice.

Ultra-Urban Sites. This column identifies BMPs that work well in the ultra-urban environment, where space is limited and original soils have been disturbed. These BMPs are frequently used at redevelopment sites.

Table 4.4 BMP Selection - Physical Feasibility

CODE	BMP LIST	SOILS	WATER TABLE	DRAINAGE AREA (Acres)	SLOPE RESTRICT.	HEAD (Ft)	ULTRA URBAN
P-1	Micropool ED	"A" Soils May Require Pond Liner "B" Soils May Require Testing	4 Feet[1] If Hotspot Or Aquifer	10 Min[2]	None	6 to 8 Ft	Not Practical
P-2	Wet Pond			25 Min[2]			
P-3	Wet ED Pond						
P-4	Multiple Pond						
P-5	Pocket Pond	OK	Below WT	5 Max[3]		4 Ft	OK
W-1	Shallow Wetland	"A" Soils May Require Liner	4 Feet[1] If Hotspot Or Aquifer	25 Min	None	3 to 5 Ft	Not Practical
W-2	ED Wetland						
W-3	Pond/Wetland						
W-4	Pocket Wetland	OK	Below WT	5 Max		2 To 3 Ft	Depends
I-1	Infiltration Trench	$f \geq 0.52$ Inch/Hr	4 Feet[1]	5 Max	Installed in No More Than 15% Slopes	1 Ft	Depends
I-2	Infiltration Basin			10 Max		3 Ft	Not Practical
F-1	Surface Sand Filter	OK	2 Feet	10 Max [3]	None	5 Ft	Depends
F-2	Underground SF			2 Max [3]		5 to 7ft	OK
F-3	Perimeter SF			2 Max [3]		2 to 3 Ft	
F-4	Organic Filter			5 Max[3]		2 to 4 Ft	
F-5	Pocket SF			5 Max [3]		2 to 5 Ft	
F-6	Bioretention	Made Soil				5 Ft	
O-1	Dry Swale	Made Soil	2 Feet	5 Max	4% Max Cross-slope	3 to 5 Ft	Not Practical
O-2	Wet Swale	OK	Below WT	5 Max		1 Ft	

Notes: OK= not restricted, WT= water table

1 Four foot separation distance is maintained to the seasonally high water table (2 feet on Lower Eastern Shore).

2 Unless adequate water balance and anti-clogging device installed

3 Drainage area can be larger in some instances

Section 4.5 Community and Environmental Factors

The fifth step assesses community and environmental factors involved in BMP selection. This table employs a comparative index approach indicating whether the BMP has a high or low benefit.

Ease of Maintenance. This column assesses the relative maintenance effort needed for a BMP in terms of three criteria: frequency of scheduled maintenance, chronic maintenance problems (such as clogging) and reported failure rates. It should be noted that **all BMPs** require routine inspection and maintenance.

Community Acceptance. This column assesses community acceptance as measured by three factors: market and preference surveys, reported nuisance problems, and visual aesthetics. It should be noted that a low rank can often be improved by a better landscaping plan.

Construction Cost. The BMPs are ranked according to their relative construction cost per impervious acre treated as determined from cost surveys and local experience.

Habitat Quality. BMPs are evaluated on their ability to provide wildlife or wetland habitat, assuming that an effort is made to landscape them appropriately. Objective criteria include size, water features, wetland features and vegetative cover of the BMP and its buffer.

Other Factors. This column indicates other considerations in BMP selection.

Table 4.5 BMP Selection - Community and Environmental Factors

CODE	BMP LIST	EASE OF MAINTENANCE	COMMUNITY ACCEPTANCE	COST (Relative To Drainage Area)	HABITAT QUALITY	OTHER FACTORS
P-1	Micropool ED	Medium	Medium	Low	Medium	Trash/debris
P-2	Wet Pond	Easy	High	Low	High	
P-3	Wet ED Pond	Easy	High	Low	High	
P-4	Multiple Pond	Easy	High	Medium	High	
P-5	Pocket Pond	Difficult	Medium	Low	Low	Drawdowns
W-1	Shallow Wetland	Medium	High	Medium	High	
W-2	ED Wetland	Medium	Medium	Medium	High	Limit ED depth
W-3	Pond/Wetland	Difficult	High	Medium	High	
W-4	Pocket Wetland	Medium	Low	Low	Medium	Drawdowns
I-1	Infiltration Trench	Difficult	High	Medium	Low	Avoid large stone
I-2	Infiltration Basin	Medium	Low	Medium	Low	Frequent pooling
F-1	Surface SF	Medium	Medium	High	Low	
F-2	Underground SF	Difficult	High	High	Low	Underground ∴Out of sight
F-3	Perimeter SF	Difficult	High	High	Low	Traffic Bearing
F-4	Organic Filter	Medium	High	High	Low	Filter Media Replacement
F-5	Pocket SF	Medium	Medium	Medium	Low	
F-6	Bioretention	Medium	Medium	Medium	Low	Landscaping
O-1	Dry Swale	Easy	High	Medium	Low	
O-2	Wet Swale	Easy	High	Low	Low	Mosquitoes Possible

Section 4.6 Checklist: Location and Permitting Factors

In the last step, a designer assesses the physical and environmental features at the site to determine the optimal location for the selected BMP or group of BMPs. The checklist below provides a condensed summary of current BMP restrictions as they relate to common site features that may be regulated under local, State or federal law. These restrictions fall into one of three general categories:

1. Locating a BMP within an area that is expressly **prohibited** by law.

2. Locating a BMP within an area that is **strongly discouraged** and is only allowed on a case by case basis. Local, State and/or federal permits shall be obtained and the applicant will need to supply additional documentation to justify locating the BMP within the regulated area.

3. BMPs must be **setback** a fixed distance from the site feature.

This checklist is only intended as a general guide to location and permitting requirements as they relate to siting stormwater BMPs. Consultation with the appropriate regulatory agency is the best strategy.

The symbol "✔" denotes when an MDE Nontidal Wetland And Waterways Permit shall be obtained.

Table 4.6 Location and Permitting Factors Checklist

SITE FEATURE	LOCATION AND PERMITTING GUIDANCE
❑ **Jurisdictional Wetland** U.S. Army Corps of Engineers Section 404 Permit and/or MDE Wetlands Permit ✔	• wetlands should be delineated prior to siting stormwater BMPs. • use of wetlands for stormwater treatment **strongly discouraged** and requires State and federal permit. • BMPs are also **restricted** in the 25 to 100 foot required wetland buffer. • buffers may be utilized as a non-structural filter strip (e.g., accept sheetflow). • must justify that no practical upland treatment alternatives exist. • stormwater must be treated prior to discharge into a wetland. • where practical, excess stormwater flows should be conveyed away from jurisdictional wetlands.
❑ **Stream Channel** (Waters of the U.S) U.S. Army Corps of Engineers (COE) Section 404 Permit MDE Wetlands and Waterways Permit ✔	• stream channels should be delineated prior to design using MDE criteria. • instream ponds require MDE review and permit. • instream ponds are **prohibited** in Use III waters. • ponds located within USE III watersheds may require small pond review and approval from the MDE Dam Safety Division. • must justify that no practical upland treatment alternatives exist. • Q_p and Cp_v treatment is preferred over WQ_v treatment. • implement measures that reduce downstream warming.
❑ **100 Year Floodplain** Local Stormwater review Authority MDE Wetlands and Waterways Permit ✔	• grading and fill for BMP construction is **strongly discouraged** within the ultimate 100 year floodplain, as delineated by FEMA flood insurance rate, FEMA flood boundary and floodway, or local floodplain maps. • floodplain fill cannot raise the floodplain water surface elevation by more than a tenth of a foot.
❑ **Stream Buffer** Check with appropriate review authority whether stream buffers are required	• consult local authority for stormwater policy. • ponds located within 100 feet of a flowing stream in a USE III watershed may require a small pond approval by the MDE Dam Safety Division • BMPs are **strongly discouraged** in the stream-side zone (within 25 feet of streambank). • consider how outfall channel will cross buffer to reach stream. • BMPs can be located within the outer portion of a buffer.

Table 4.6 Location and Permitting Factors Checklist (Continued)

SITE FEATURE	LOCATION AND PERMITTING GUIDANCE
❑ **Forest Conservation** District Forest Conservation Review Authority	• BMPs are **strongly discouraged** within Priority 1 Forest Retention Areas. • BMPs must be **setback** at least 25 feet from the critical root zone of specimen trees, or • designers should consider the effect of more frequent inundation for Q_p, Cp_v and WQ_v on existing forest stands. • BMP buffer areas are acceptable as reforestation sites if they are protected by a conservation agreement
❑ **Critical Area** Local Critical Area Review Authority	• BMPs w/in the Critical Area shoreline buffer are prohibited unless a variance is obtained from the local review authority. • BMPs are acceptable within mapped buffer exemption areas. • BMPs in the IDA must meet the 10% Rule - see Appendix D.4.
❑ **Utilities** Local Review Authority	• call Miss Utility to locate existing utilities prior to design. • note the location of proposed utilities to serve development. • BMPs are **discouraged** within utility easements or rights of way for public or private utilities.
❑ **Roads** Local DOT, DPW, or State Highway Administration	• consult local DOT or DPW for any **setback** requirement from local roads. • consult SHA for setbacks from State maintained roads. • approval must also be obtained for any stormwater discharges to a local or State-owned conveyance channel.
❑ **Structures** Local Review Authority	• consult local review authority for BMP **setbacks** from structures. • recommended *setbacks* for each BMP group are provided in the performance criteria in Chapter 3 of this manual.
❑ **Septic Drain fields**	• consult local health authority. • recommended **setback** is a minimum of 50 feet from drain field edge.
❑ **Water Wells** Local Health Authority	• 100 foot **setback** for stormwater infiltration. • 50 foot **setback** for all other BMPs. • water appropriation permit needed if well water used for water supply to a BMP.
❑ **Sinkholes**	• infiltration or pooling of stormwater near sinkholes is **prohibited.** • geotechnical testing may be required within karst areas (see Appendix D.2).

Chapter 5.0

Environmental Site Design

Section 5.0 Introduction

5.0.1 Background

The primary goal of Maryland's stormwater management program is to maintain after development, as nearly as possible, the predevelopment runoff characteristics. Traditional stormwater management strategies treat runoff to mitigate adverse water quality and/or quantity impacts associated with new development. Designs applying these strategies often combine centralized structural practices for pollutant removal with channel erosion or flood control impoundments. These designs are less able to mimic predevelopment conditions because they focus on managing large volumes of polluted stormwater rather than treating runoff closer to the source.

A comprehensive design strategy for maintaining predevelopment runoff characteristics and protecting natural resources is available. This strategy, known as Environmental Site Design or "ESD," relies on integrating site design, natural hydrology, and smaller controls to capture and treat runoff. This chapter provides the foundation to refocus stormwater design from centralized management to more effective planning and implementation of ESD.

5.0.2 Requirements of the Stormwater Management Act of 2007

The "Stormwater Management Act of 2007" (Act), requires establishing a comprehensive process for stormwater management approval, implementing ESD to the maximum extent practicable (MEP), and ensuring that structural practices (see Chapter 3) are used only where absolutely necessary. The Act also establishes several performance standards for stormwater management plans. Designers must now ensure that these plans are designed to:

- Prevent soil erosion from development projects.
- Prevent increases in nonpoint pollution.
- Minimize pollutants in stormwater runoff from both new development and redevelopment.
- Restore, enhance, and maintain chemical, physical, and biological integrity of receiving waters to protect public health and enhance domestic, municipal, recreational, industrial and other uses of water as specified by MDE.
- Maintain 100% of the average annual predevelopment groundwater recharge volume.
- Capture and treat stormwater runoff to remove pollutants.
- Implement a channel protection strategy to protect receiving streams.
- Prevent increases in the frequency and magnitude of out-of-bank flooding from large, less frequent storms.
- Protect public safety through the proper design and operation of stormwater management facilities.

The Act presents a new opportunity to improve Maryland's stormwater management program. The original Chapter 5 encouraged ESD through a series of optional credits for the design of nonstructural practices. Changes in response to the Act not only expand on the ESD practices first introduced in the Manual but also allow for planning techniques to improve implementation

NOTE: In this chapter, *italics* indicate mandatory criteria, whereas recommended criteria are shown in normal typeface.

and overall performance. The remaining sections of this chapter will further define ESD, discuss planning techniques used in its implementation, and provide design requirements for nonstructural and micro-scale practices used to treat runoff at the source. For reference purposes, the original Chapter 5 can be found in Appendix E.1.

5.0.3 Environmental Site Design

Definition

There are many stormwater design strategies that seek to replicate natural hydrology. Sometimes known as better site design, low impact development, green infrastructure, or sustainable site design, these strategies all espouse similar techniques. In each, a combination of planning techniques, alternative cover, and small-scale treatment practices is used to address impacts associated with development. For consistency, the Act adopts ESD as a more generic classification for use in Maryland.

Title 4, Subtitle 201.1(B) of the Act defines ESD as "…using small-scale stormwater management practices, nonstructural techniques, and better site planning to mimic natural hydrologic runoff characteristics and minimize the impact of land development on water resources." Under this definition, ESD includes:

- Optimizing conservation of natural features (e.g., drainage patterns, soil, vegetation).
- Minimizing impervious surfaces (e.g., pavement, concrete channels, roofs).
- Slowing down runoff to maintain discharge timing and to increase infiltration and evapotranspiration.
- Using other nonstructural practices or innovative technologies approved by MDE.

Impacts of Imperviousness

The goal of traditional site design strategies is to maximize development potential by focusing on the layout of buildings, roads, parking, and other features. Conventional development practices tend to maximize site imperviousness and contribute to many of the impacts discussed in Chapter 1. These include diminished groundwater recharge, increased flows and runoff volumes, pollutant accumulation, and elevated water temperatures.

Documentation such as the **Impacts of Impervious Cover on Aquatic Systems** (Center for Watershed Protection, 2003) and other studies of Eastern Piedmont and Coastal Plain streams in Maryland (Morgan and Cushman, 2005) and headwater streams in Montgomery County (Moore and Palmer, 2005) all indicate that stream biodiversity decreases as impervious cover increases. There is no simple formula, rule, or threshold for determining how much impervious cover may be sustained in a given watershed. Generally, stream quality and watershed health diminish when impervious cover exceeds 10% and become severely degraded beyond 25% (Center for Watershed Protection, 2003). Results from the Maryland Biological Stream Survey (MBSS) indicated that in surveyed streams, health was never good when watershed imperviousness exceeded 15%, (Boward, 1999). These studies establish a fundamental connection between impervious cover and watershed impairment.

Integrating the fundamental principles of ESD during the planning process helps minimize the adverse impacts of imperviousness. The resulting designs reduce the need for costly infrastructure and maintenance while providing treatment closer to the source. To accomplish this, the designer must consider the basic concepts found in Section 5.1, Planning Techniques.

Section 5.1 Design Process and Planning Techniques

5.1.1 Introduction

The design process described in this section will provide guidance for implementing ESD planning strategies and practices into a comprehensive site development plan. These techniques involve protecting natural resources, integrating erosion and sediment controls with stormwater management practices, minimizing site imperviousness, and using natural conveyance and ESD practices throughout the site. Applying these techniques early in the design process will ensure that all available resources have been considered in order to protect streams and waterways from the impact of land development activities. The design process will require the developer to adhere to the following procedures to achieve ESD to the MEP:

- *Following the Design Process for New Development as outlined in the step wise procedures in Figure 5.1.*
- *Developing a map that identifies natural resource areas and drainage patterns and devising strategies for protection and enhancement.*
- *Minimizing total site imperviousness by implementing clustered development and other better site design techniques.*
- *Demonstrating that all reasonable opportunities for meeting stormwater requirements using ESD have been exhausted by using natural areas and landscape features to manage runoff from impervious surfaces and that structural BMPs have been used only where absolutely necessary.*
- *Participate in the comprehensive review process for interim plans review and approval at the conceptual, site development, and final phases of project design.*
- *Integrating strategies for erosion and sediment control and stormwater management into a comprehensive development plan.*

5.1.2 Comprehensive Erosion & Sediment Control and Stormwater Management Review

The Act requires that "a comprehensive process for approving grading and sediment control plans and stormwater management plans" shall be established. Therefore, county and municipal stormwater authorities shall establish a coordinated approval process among all appropriate local agencies. Erosion and sediment control review and approval authorities [e.g., local Soil Conservation Districts(SCD)] and input from any other local agency deemed appropriate (e.g., planning and zoning, public works) shall be included. The process will be tailored to meet local initiatives and should consider the scope and extent of environmental impacts for individual site developments. Review agencies involved will provide comments and approval during each of the following phases of plan development:

1. Concept
2. Site Development
3. Final

At each phase of this review process, the designer will receive feedback provided by the agencies allowing the developer to incorporate any concerns and recommendations throughout project

planning and design. The concept plan will include site and resource mapping and protection and conservation strategies. The designer will also provide preliminary stormwater management ESD calculations. Review of the concept plan will ensure that all important resources have been mapped, protected, and all opportunities to enhance natural areas have been explored early in the design process.

The site development plan will establish the footprint of the proposed project and demonstrate the relationship between proposed impervious surfaces and the existing natural conditions identified during concept plan design. This will better protect natural resources and buffers and allow for using ESD practices throughout the site. Included in this step are the preparation of detailed designs, computations, and grading plans for a second comprehensive review and approval. This ensures that all options for implementing ESD have been exhausted. After approval from the review agencies, the applicant will then proceed with final plan preparation including the design of any structural practices needed to address remaining channel protection requirements. Final plans will go to both the stormwater and erosion and sediment control review agencies for approval.

The design process and planning techniques described in this section provide guidelines for protecting natural areas, minimizing imperviousness, using available landscaping for ESD practices, and integrating stormwater and erosion and sediment control strategies. Following this process will achieve the goal of implementing ESD to the MEP. Involving all review agencies from the beginning of site planning through the more detailed design will foster feedback and allow for a more efficient review and approval of final plans.

5.1.3 Design Process for New Development

All new development projects shall be subject to the Design Process for New Development as outlined in the step wise procedures in Figure 5.1.

As described above, the design process will require review and approval during three different phases of project planning that include the concept, site development, and final stages. Approving agencies shall use the process outlined in Figure 5.1 as an enforceable mechanism during review of the plan. Documentation that all steps were followed during project development and specific rationale to support the proposed design shall be required.

5.1.3.1 Concept Design Phase

The concept design phase is the first step in project development as shown in Figure 5.1. This step will include the following:

- Site and Resource Mapping
- Site Fingerprinting and Development Layout
- Locating ESD Practices

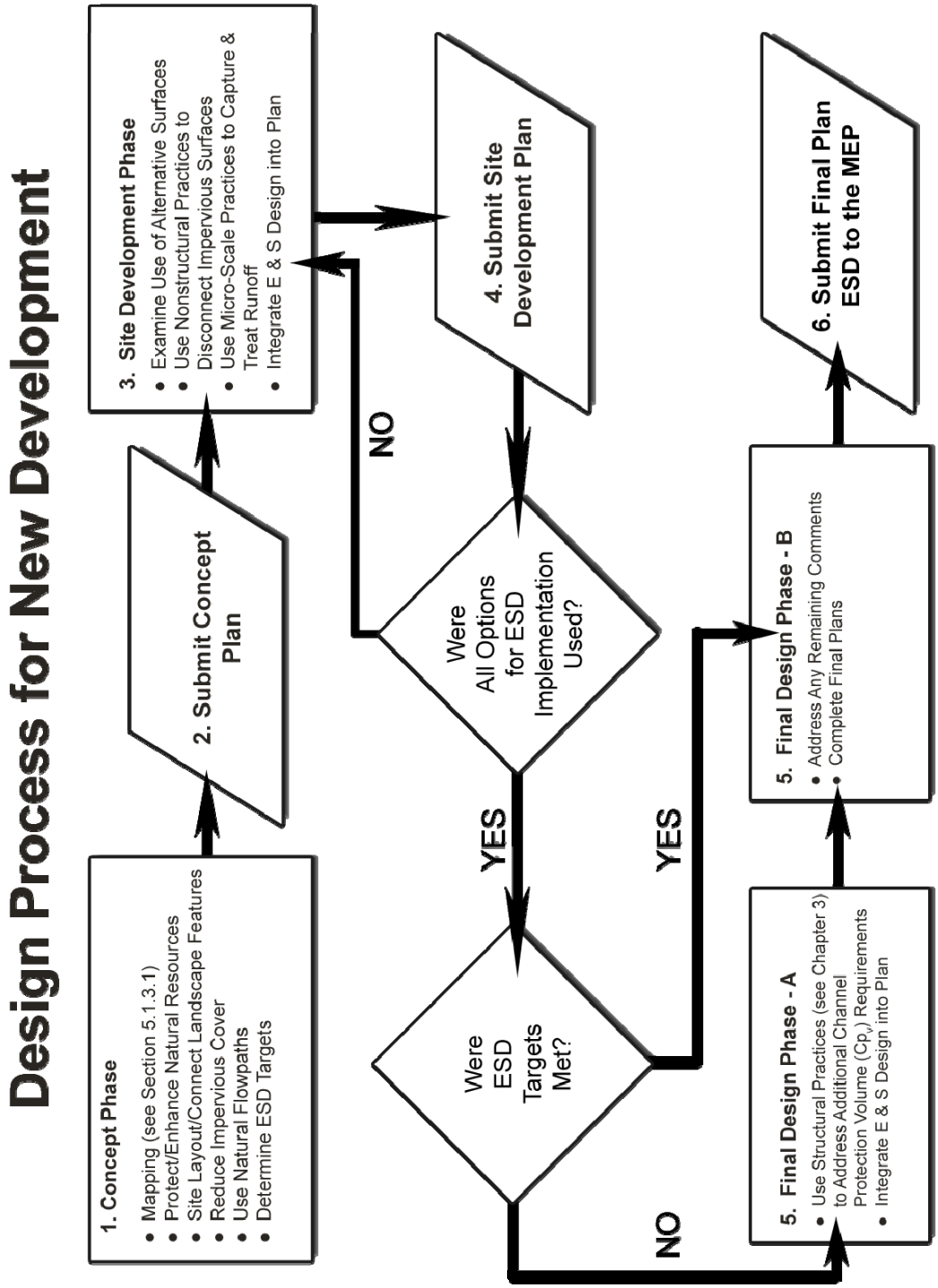

Figure 5.1 Design Process for New Development

Site and Resource Mapping

The resource mapping component will be used as a basis for all subsequent decisions during project design. During this step, the developer shall identify significant natural resources and demonstrate that these areas will be protected and preserved. Additionally, options will be evaluated to enhance important hydrologic functions. Approving authorities may require that other features be shown depending on site characteristics. This map shall be field verified by the project designer. Specific areas that should be mapped are organized by government regulatory authority in Table 5.1 below.

Table 5.1 Natural Resources and the Corresponding Regulatory Authorities:

Federal	State	Local
• Wetlands • Major waterways • Floodplains	• Tidal and nontidal wetlands • Wetlands of Special State Concern • Wetland buffers • Stream buffers • Perennial streams • Floodplains • Forests • Forest buffers • Critical Areas	• Steep slopes • Highly erodible soils • Enhanced stream buffers • Topography/slopes • Springs • Seeps • Intermittent streams • Vegetative cover • Soils • Bedrock/geology • Existing drainage areas

The mapping process will identify important natural resources as well as areas that are highly susceptible to erosion caused by construction activities. Identifying these important resources and high risk locations and protecting them from disturbance is the first step in the planning process. When steep slopes and highly erodible soils are found measures need to be taken to limit disturbance and minimize impacts. This may be done by using information developed by the local SCDs. These offices maintain lists that identify highly erodible soil map units for each county in Maryland. Additionally, steep slopes are defined as those with gradients of 20 percent or more and moderately steep slopes fall within the range of 10 to 30 percent (USDA NRCS, Soil Survey Manual, October, 1993). For the purpose of project planning, steep slopes are considered to be any mapping unit with a slope class of 15 percent or greater.

While it may not be practicable to eliminate earth disturbing activities exclusively on the basis of soil erodibility or slope alone, constraints are warranted when both steep slopes and highly erodible soils occupy the same area within the development footprint. Areas with highly erodible soils and slopes equal to or greater than 25 percent should be incorporated into adjacent buffers, remain undisturbed, protected during the construction process, and/or preserved as open space.

Strategies to protect steep slopes and highly erodible soils include:

- Identify and map all highly erodible soils and steep slopes; and
- Protect areas with highly erodible soils on slopes equal to or greater than 25 percent from earth disturbing activities.

In addition to preserving sensitive areas during disturbances, the environmental benefits of other existing natural resources should be maximized by incorporating protection strategies into the overall goals of the project. Protecting these resources up front in the planning process will allow their many functions to be utilized for infiltration, flow attenuation, groundwater recharge, flood storage, runoff reduction, nutrient cycling, air and water pollution reduction, habitat diversity, and thermal impact reduction. When ESD practices are located later in the planning process, these protected areas may be further enhanced by using them to meet stormwater requirements.

Natural resource protection and enhancement strategies include:

- Protecting large tracts of contiguous open space, forested areas, and other important resources through conservation easements.
- Identifying afforestation opportunities in open space areas and setting aside land for natural regeneration.
- Identifying important resource areas that may be expanded such as stream buffers and floodplains.
- Minimize disturbance to highly permeable soils.

Site Fingerprinting and Development Layout

After conserving and protecting sensitive resources has been addressed, the next step in the planning process involves determining the approximate location of buildings, roadways, parking lots, and other impervious areas. These site improvements should be placed at a sufficient distance to protect the conservation areas. Protecting these resources will involve enhancing or expanding forested and stream buffers of adequate widths based on site characteristics.

Minimum buffer widths may be expanded based on receiving stream characteristics, stream order, adjacent land slopes, 100-year floodplain, wetlands, mature forests, vegetative cover, depth of the groundwater table, and the presence of spring seeps and other sensitive areas. Several studies have suggested that minimum buffer widths could be based on site specific functions (Palone and Todd, 1998) including: bank stability and water temperature moderation (50 feet), nitrogen removal (100 feet), sediment removal (150 feet), or flood mitigation (200 feet). The approving agency may enhance existing buffer requirements depending upon resource protection goals identified at the local level.

After the development footprint has been established, consideration should be given to natural drainage areas and how runoff will travel over and through the site. Sheetflow and existing drainage patterns should be maintained and discharges from the site should occur at the natural location wherever possible. New drainage patterns result in concentrated flow leaving the site at

an inappropriate or unstable location, as well as creating erosion, sediment transport, and stream channel stability problems. The use of storm drains and engineered conveyance systems should be minimized by using vegetated swales and other natural systems so that forests, buffers and overland flow characteristics remain intact. Planning for on-site and off-site drainage patterns must be done early in the design process to establish a stable outfall for downstream discharges. Some of the strategies listed below can be used to establish nonstructural practices such as sheetflow to natural areas. These protection and enhancement tools, can then double as important strategies for meeting on-site stormwater requirements.

Strategies for site layout and connecting landscape features include:

- Plan the building footprint and layout to protect conservation areas.
- Evaluate opportunities to enhance/expand forested, wetland, and stream buffers.
- Grade the site so that runoff will flow from impervious areas directly to pervious areas or other natural conveyance systems.
- Maintain natural flow paths between the site and upstream and downstream systems.
- Maintain sheetflow and natural overland flow processes wherever feasible.
- Provide stable conveyance of runoff off-site.

In addition to the site fingerprinting techniques described above, other strategies may be used to protect important natural resources. One type of practice that encompasses many of these design techniques in residential developments is clustering. This practice allows for concentrating development in one area, thereby reducing the distance between individual lots, the length of subdivision roadways, and overall impervious areas. It will also allow for protecting open space and buffer areas and reduce clearing and grading in natural areas.

Commercial and industrial developments offer other opportunities to reduce impervious cover. Because parking lots are the dominant land cover for most commercial and industrial projects, designers can minimize the surface area dedicated to parking and use ESD practices in landscaped areas for stormwater treatment. Table 5.2 below provides a list of better site design techniques that may be used to reduce site imperviousness, protect environmentally sensitive areas, and provide more open space. More details and information may be found in, **Better Site Design: A Handbook for Changing Development Rules in Your Community** (Center for Watershed Protection, 1998).

Locating ESD Practices

Reducing the impervious area in residential, commercial, and industrial development enhances the space available for landscaped features (e.g., parking lot islands, medians, plazas). Many of the micro-scale practices discussed in this chapter are tailored to fit in these smaller landscaped areas. When strategies for reducing imperviousness and protecting natural resources are combined with design options that distribute ESD practices throughout a site, the resulting plans will provide an effective means to address stormwater requirements at the source. After the site footprint has been established, preliminary calculations for determining stormwater requirements using ESD can be provided and potential management areas can be identified. The concept plan shall include a drawing or sketch identifying the preliminary location of ESD practices.

Table 5.2 Summary of Site Development Strategies

Better Site Design Technique	Recommendations
Using narrower, shorter streets, rights-of-way, and sidewalks	Streets may be as narrow as 22 ft. in neighborhoods serving low traffic volumes; open space designs and clustering will reduce street lengths; rights-of-way can be reduced by minimizing sidewalk width, providing sidewalks on one side of the road, and reducing the border width between the street and sidewalks.
Cul-de-sacs	Allow smaller radii for turn arounds as low as 33 ft.; use a landscaped island in the center of the cul-de-sac and design these areas to treat stormwater runoff.
Open vegetated channels	Allow grass channels or biofilters for residential street drainage and stormwater treatment.
Parking ratios, parking codes, parking lots, and structured parking	Parking ratios should be interpreted as maximum number of spaces; use shared parking arrangements; minimum parking stall width should be less than 9 ft. and stall length less than 18 ft.; parking garages are encouraged rather than surface lots.
Parking lot runoff	Parking lots are required to be landscaped and setbacks are relaxed to allow for bioretention islands or other stormwater practices in landscaped areas.
Open space	Flexible design criteria should be provided to developers who wish to use clustered development and open space designs.
Setbacks and frontages	Relax setbacks and allow narrower frontages to reduce total road length; eliminate long driveways.
Driveways	Allow for shared driveways and alternative impervious surfaces.
Rooftop runoff	Direct to pervious surfaces.
Buffer systems	Designate a minimum buffer width and provide mechanisms for long-term protection.
Clearing and grading	Clearing, grading, and earth disturbance should be limited to that required to develop the lot.
Tree conservation	Provide long-term protection of large tracts of contiguous forested areas; promote the use of native plantings.
Conservation incentives	Provide incentives for conserving natural areas through density compensation, property tax reduction, and flexibility in the design process.

(Adapted from Center for Watershed Protection, 1998)

Review of Concept Plans

Concept plans should be submitted to the appropriate review agencies and include the information discussed above along with a narrative to support the design. The narrative should describe how important natural areas will be preserved and protected, and show how ESD may be achieved for meeting on-site stormwater requirements. Review authorities may require additional information at this phase, however, at a minimum a concept plan should include the following elements:

- A map of all site resources shown in Table 5.1.
- Field verification from the project engineer of the natural resource map.
- Proposed limits of clearing and grading.
- Location of proposed impervious areas (buildings, roadways, parking, and sidewalks).
- Location of existing and proposed utilities.
- Preliminary estimates of stormwater requirements.
- Preliminary location of ESD practices.
- Stable conveyance of stormwater at potential outfall locations.
- A narrative that supports the concept and describes how the design will achieve.
    - Natural resource protection and enhancement.
    - Maintenance of natural flow patterns.
    - Reduction of impervious areas through better site design, alternative surfaces, and nonstructural practices.
    - Integration of erosion and sediment controls into the stormwater strategy.
    - Implementation of ESD planning techniques and practices to the MEP.

County and municipal stormwater management agencies are required to have a comprehensive review process in place so that input is provided for all aspects of development project planning, design, and construction. The review of concept plans begins this process. Stormwater and erosion and sediment control authorities will collaborate to provide coordinated feedback to the designer before a project proceeds to the more detailed site development phase. This feedback will accompany the concept plan approval and should be incorporated into future submissions.

5.1.3.2 Site Development Phase

Preparation of site development plans will include more detailed designs for stormwater management and erosion and sediment control. During this phase the site footprint will be finalized with respect to the layout of buildings, roadways, parking, and other structures in order to develop more detailed design. The following plans will be required for site development review:

- Stormwater Management
- Erosion and Sediment Control
- An Overlay Showing Stormwater and Erosion and Sediment Control Practices

Stormwater Management Plans

After concept plan approval, the developer should use comments and feedback as a basis for the next design phase. When the development layout is finalized, the proposed topography may be determined and final drainage areas established. Natural features and conservation areas can be utilized to serve stormwater quantity and quality management requirements. Individual ESD locations will be determined and all alternative surfaces, nonstructural, and micro-scale practices will be finalized. When locating and sizing ESD practices, the primary objective is to manage runoff as close to its source as possible by using vegetated buffers, natural flow paths, sheetflow to natural areas, and landscape features. ESD practices are then designed according to sizing requirements specified later in this chapter and discharge computations and storage volumes

provided. Calculations and details will be submitted to the review agencies to verify the design approach. Section 5.2 provides more information on sizing requirements and design specifications for all ESD practices. A narrative will also be required to justify that the design will achieve ESD to the MEP.

Erosion and Sediment Control Plans

After concept plan approval, the final grading and proposed drainage areas during construction will also be established. This is critical to developing erosion and sediment control plans. Erosion and sediment control plans prepared at this phase will include measures for:

- Preservation
- Phasing and construction sequencing during each stage of development
- Design of sediment controls
- Stabilization strategies

Preservation

Comments received during concept plan review should be used as a basis for preparing erosion and sediment control plans. Strategies to preserve sensitive resources, ensure soil stability, and prevent erosion begin with protecting those areas during project construction. Erosion and sediment control plans should identify areas to be protected by marking the limit of disturbance, sensitive areas, buffers, and forested areas that are to be preserved or protected. In addition, infiltration and recharge areas that need to be protected from fine sediments and compaction should be identified. Plans should also note that all protected areas be marked in the field prior to any land disturbing activity.

Phasing and Sequences of Construction During Each Stage of Development

The site development plan will provide sequences of construction for each stage of development. These include initial clearing and grubbing, rough grading, site development, and final grading. Because initial and final flow patterns will not apply to all intermediate phases, these sequences should consider flow pattern changes, drainage areas, and discharge points at transitional phases of the construction process. Phased plans need to ensure that erosion and sediment controls adequately address the changing runoff patterns.

Erosion and sediment control strategies for minimizing erosion during interim grading include:

- Interim plans to address grade changes and flow patterns during clearing and grading, rough grading, site development, and final grading.
- Slope length and steepness reductions.
- Divert clean water around or through a site and discharge it to a stable outlet.

Design of Sediment Controls

Water handling practices need to provide erosion protection during site grading operations. This may be done by diverting runoff away from highly erodible soils, steep slopes, and disturbed areas by using dikes, swales, or reverse benches. Similarly, runoff can be safely conveyed from the top of slopes to a stable outfall using pipe slope drains or channels. Check dams may be needed to reduce velocities and prevent erosion. Runoff from all discharge points shall provide a stable outlet.

Stabilization Strategies

When vegetation is removed and soil disturbance occurs, the extent and duration of exposure should be minimized. All efforts should be made to delay grading operations until it is certain that final grades can be reached in as little time as possible. Where this cannot be accommodated, soils shall be stabilized within 14 days of disturbance. The extent and duration of disturbance should be limited (e.g., 72 hours) and enhanced stabilization techniques such as soil stabilization matting or turf reinforcement used on areas with highly erodible soils and slopes greater than 15 percent. Soil exposure should be shortened by the local permitting authority if warranted by site conditions.

Perimeter controls, perimeter slopes, and extreme grade modifications (e.g., slopes greater than 3:1 or where cuts and fills exceed 15 feet) require stabilization within seven days. Mass clearing and grading should be avoided with larger projects (e.g., 25 acres) being phased so disturbed areas remain exposed for the shortest time possible. All other areas should have a good cover of temporary or permanent vegetation or mulch.

Natural vegetation should be retained in an undisturbed state wherever possible. If it is not possible to retain natural vegetation, the topsoil should be salvaged, stockpiled on-site, protected from erosion, and replaced at final grade. Topsoil removal, grading, and filling reduce soil quality resulting in detrimental impacts on plant growth and increase runoff. Additionally, the removal of topsoil inhibits biological activity and reduces the supply of organic matter and plant nutrients. Similarly, unrestricted use of construction equipment can result in soil compaction.

Applicable practices include, but are not limited to, temporary and permanent seeding, sodding, mulching, plastic covering, erosion control fabrics and matting, the early application of gravel base on areas to be paved, and dust control. Soil stabilization measures should be appropriate for the time of year, site conditions, and estimated duration of use. Soil stockpiles must be stabilized, protected with sediment trapping or filtering measures, and be located away from storm drain inlets, waterways, and drainage channels. Linear construction activities, including right-of-way and easement clearing, roadway development, pipelines, and trenching for utilities shall be phased so that soils are stabilized as quickly as possible.

Strategies to limit the extent and duration that soils are exposed may include:

- Minimizing disturbed area.
- Phasing earth disturbing activities so that the smallest area is exposed for the shortest possible time.
- Salvaging topsoil for later use.
- Stabilizing as work progresses.

Overlay Plan

Many of the stormwater ESD practices deal with alternative surfaces or are nonstructural and promote hydraulic connection of impervious surfaces with natural landscape features. The practices for stormwater management and erosion and sediment control may share the same location while serving different functions. For example, swales used initially to convey sediment-laden runoff to a trap or basin during the sediment control phase could be used for water quality treatment and flow attenuation of stormwater runoff at final grade. Similarly, natural berms and vegetative buffers coupled with traditional sediment filtering controls may be integrated into the site design and meet both sediment control and stormwater management requirements.

Once the ESD practices have been located and sized appropriately, consideration to how these areas will function under proposed conditions is needed. The location of any ESD practice that requires natural infiltration needs to be identified on the plans and in the field. These areas need to be protected during construction. An overlay plan should include the location of all ESD practices to allow for efficient sediment control design and the protection of locations that will be used to treat stormwater.

An overlay plan should include:

- The location of ESD practices on the plan and in the field.
- The location of areas that must remain undisturbed, protected, or used for erosion and sediment control.
- Identifiable areas where construction equipment may compact soil and will need rehabilitation after grading operations.
- Removal of sediment from the locations of ESD practices.
- Stabilization measures needed to enhance stormwater functions.

Review of Site Development Plans

Site development plans should be submitted to the appropriate review agencies and should include a stormwater plan, erosion and sediment control plan, an overlay plan, and a narrative to support the design. Review authorities may require additional information at this phase, however, at a minimum a site development plan shall include the following:

- All of the information provided in the concept review.
- Comments received by review agencies during the concept review.

- Determination of final site layout and acreage of total impervious area on site.
- Proposed topography.
- Proposed drainage areas at all points of discharge from the site.
- Proposed stormwater volume requirements for ESD targets and quantity control.
- The location and size of ESD practices used to the MEP and all nonstructural, alternative surfaces, and micro-scale practices used.
- Proposed hydrology analysis for runoff rates, storage volumes, and discharge velocities.
- Stormwater design details and specifications.
- Discharge calculations demonstrating stable conveyance of runoff off site.
- Preliminary erosion and sediment control plans showing limits of disturbance, sensitive areas, buffers, and forests that are to be preserved, proposed phasing, construction sequencing, proposed practices, and stabilization techniques.
- An overlay plan showing the location of stormwater ESD practices and proposed erosion and sediment controls.
- A narrative to support the site development design and demonstrate that ESD will be achieved to the MEP.

Stormwater and erosion and sediment control authorities will collaborate to provide coordinated feedback to the designer before a project proceeds to the more detailed final design phase. This feedback will accompany the site development approval and should be incorporated into future submission.

5.1.3.3 Final Plan Design and Review

After site development plan approval, the developer may prepare final designs by incorporating comments from the appropriate review agencies. After all reasonable ESD options have been exhausted, structural practices may be needed (see Chapter 3) to address additional Cp_v requirements. Final plan approval shall be required for issuing local grading and building permits. Review authorities may require additional information at this phase, however, at a minimum final plans shall include the following information and meet the requirements established in COMAR 26.17.01.05 and 26.17.02 .09:

- All of the information provided in the site development review.
- Comments received by review agencies during the site development review.
- Development details and site data including site area, disturbed area, new impervious area, and total impervious area.
- Existing and proposed topography.
- Proposed drainage areas.
- Representative cross sections and details (existing and proposed structure elevations and water surface elevations).
- The location of existing and proposed structures.
- Construction specifications.
- Operation and maintenance plans.
- As-built design certification block.
- Inspection schedule.

- Easements and rights-of-way.
- Certification by the owner/developer that all construction will be done according to the plan.
- Performance bonds.
- Final erosion and sediment control plans.
- Stormwater management report including;
    - A narrative to support the final design and demonstrate that ESD will be achieved to the MEP.
    - Table showing the ESD and Unified Sizing Criteria.
    - Hydrology and hydraulic analysis of the stormwater management system for all applicable sizing criteria.
    - Final sizing calculations for stormwater controls including drainage area, storage, and discharge points.
    - Final analysis of stable conveyance to downstream discharge points.
    - Geotechnical investigations including soil maps, borings, and site-specific recommendations.

The design process described above is intended to be iterative, as comments from all review agencies are incorporated during each phase of project design. This will help local jurisdictions coordinate with other programs requiring environmental review and ensure that development plans fit priorities for resource protection, enhancement, and restoration. Many counties have performed restoration assessments on targeted watersheds. The planning process described in Figure 5.1 and above allows individual site development to be evaluated in the context of these larger resource protection efforts.

Section 5.2 Addressing the Unified Sizing Criteria

To accomplish the goal of maintaining predevelopment runoff characteristics, there must be a reasonable standard that is easily recognized, reproducible, and applied without opportunity for misrepresentation. The simplest and most effective solution is to eliminate the need for evaluating predevelopment conditions on a site-by-site basis and apply the same standard to all sites. For rainfall amounts less than two to three inches, there is little difference in the amount of runoff from most sites in undeveloped conditions although runoff amounts are lowest for woods. To best maintain predevelopment runoff characteristics, the target for ESD implementation should be "woods in good condition".

The Act requires the implementation of ESD to the MEP to mimic natural hydrologic runoff characteristics and minimize the impact of land development on water resources. While ESD may be used to address Re_v and WQ_v, limiting it to these criteria alone may not provide sufficient treatment to mimic natural hydrology for wooded conditions or address Cp_v. It may be necessary to increase the size of single ESD practices and/or connect them in series to decrease the volume of runoff to that expected from a naturally forested area. Implementing ESD to that extent may not be practicable on all projects and a minimum standard is needed. Sizing ESD practices to capture and treat both Re_v and WQ_v is a practical minimum requirement for all projects.

5.2.1 Performance Standards for Using Environmental Site Design

- *The standard for characterizing predevelopment runoff characteristics for new development projects shall be woods in good hydrologic condition;*
- *ESD shall be implemented to the MEP to mimic predevelopment conditions;*
- *As a minimum, ESD shall be used to address both Re_v and WQ_v requirements; and*
- *Channel protection obligations are met when ESD practices are designed according to the Reduced Runoff Curve Number Method described below.*

5.2.2 Environmental Site Design Sizing Criteria

The criteria for sizing ESD practices are based on capturing and retaining enough rainfall so that the runoff leaving a site is reduced to a level equivalent to a wooded site in good condition as determined using United States Department of Agriculture (USDA) Natural Resource Conservation Service (NRCS) methods (e.g., TR-55). The basic principle is that a reduced runoff curve number (RCN) may be applied to post-development conditions when ESD practices are used. The goal is to provide enough treatment using ESD practices to address Cp_v requirements by replicating an RCN for woods in good condition for the 1-year rainfall event. This eliminates the need for structural practices from Chapter 3. If the design rainfall captured and treated using ESD is short of the target rainfall, a reduced RCN may be applied to post-development conditions when addressing stormwater management requirements. The reduced RCN from Table 5.3 is calculated by subtracting the runoff treated by ESD practices from the total 1-year 24-hour design storm runoff.

Table 5.3 was developed using the "Change in Runoff Curve Number Method" (McCuen, R., MDE, 1983) to determine goals for sizing ESD practices and reducing RCNs if those goals are not met. During the planning process, site imperviousness and soil conditions are used with Table 5.3 to determine a target rainfall for sizing ESD practices. Table 5.3 is also used to determine the reduced RCNs for calculating additional stormwater management requirements if the targeted rainfall cannot be met using ESD practices.

<u>ESD Sizing Requirements:</u>
P_E = Rainfall Target from Table 5.3 used to determine ESD goals and size practices

Q_E = Runoff depth in inches that must be treated using ESD practices
= P_E x R_v; R_v = the dimensionless volumetric runoff coefficient
= 0.05 + 0.009(I) where I is percent impervious cover

ESD_v = Runoff volume (in cubic feet or acre-feet) used in the design of specific ESD practices

$$= \frac{(P_E)(R_v)(A)}{12}$$ where A is the drainage area (in square feet or acres)

5.2.3 Addressing Stormwater Management Requirements Using ESD

- **Treatment:** *ESD practices shall be used to treat the runoff from 1 inch of rainfall (i.e., P_E = 1 inch) on all new developments where stormwater management is required.*

  ESD practices shall be used to the MEP to address Cp_v (e.g., treat the runoff from the 1-year 24-hour design storm) in accordance with the following conditions:

  - *Cp_v shall be addressed on all sites including those where the 1-year post-development peak discharge (q_i) is less than or equal to 2.0 cfs.*

- *Cp_v shall be based on the runoff from the 1-year 24-hour design storm calculated using the reduced RCN (see Table 5.3). If the reduced RCN for a drainage area reflects "woods in good condition", then Cp_v has been satisfied for that drainage area.*
- *When the targeted rainfall is not met, any remaining Cp_v requirements shall be treated using structural practices described in Chapter 3.*

The runoff stored in ESD practices may be subtracted from the Overbank Flood Protection and Extreme Flood Volumes (i.e., Q_{p2}, Q_{p10}, Q_f) where these are required.

- **Practices:** *The runoff, Q_E, shall be treated by acceptable practices from the lists presented in this Chapter (see Sections 5.3 and 5.4).* Q_E may be treated using an interconnected series or "treatment train" of practices.

- **Multiple Drainage Areas:** *ESD requirements shall be addressed for the entire limit of disturbance.* When a project is divided into multiple drainage areas, ESD requirements should be addressed for each drainage area.

- **Off-Site Drainage Areas:** *ESD requirements shall be based on the drainage area to the practices providing treatment.* It is recommended that runoff from off-site areas be diverted away from or bypass ESD practices. However, if this is not feasible, then ESD practices should be based on all pervious and impervious areas located both on-site and off-site draining to them.

- **Reduced RCNs:** When using reduced RCNs, the following conditions apply:

  - ESD practices should be distributed uniformly within each drainage area.
  - Where multiple ESD practices are used within a drainage area, individual practices may be oversized on a limited scale to compensate or over manage for smaller practices. The size of any practice(s) is limited to the runoff from the 1-year 24-hour storm, Q_E, draining to it.

5.2.4 Basis for Using Table 5.3 to Determine ESD Sizing Criteria

- **Application:** *Table 5.3 shall be used to determine both the rainfall targets for sizing ESD practices and the additional stormwater management requirements if those targets are not met.*

- **Hydrologic Soil Groups:** Each chart in Table 5.3 reflects a different hydrologic soil group (HSG). Designers should use the charts that most closely match the project's soil conditions. If more than one HSG is present within a drainage area, a composite RCN may be computed based on the proportion of the drainage area within each HSG (see examples below).

- **Measuring Imperviousness:** *The measured area of a site that does not have vegetative or permeable cover shall be considered total impervious cover.* Estimates of proposed

imperviousness may be used during the planning process where direct measurements of impervious cover may not be practical. Estimates should be based on actual land use and homogeneity and may reflect NRCS land use/impervious cover relationships (see Table 2.2a in TR-55, USDA-NRCS, 1986) where appropriate. The percent imperviousness (%I) may be calculated from measurements of site imperviousness.

- **RCN*:** RCN* is an alternate method to estimate P_E when alternative surfaces (e.g., permeable pavements, green roofs) are used to reduce runoff. RCN* is a composite value for the limit of disturbance using the effective RCNs identified in Section 5.3 for each alternative surface.

- **Reduced RCNs:** Areas shown in green (right hand side) on Table 5.3 show the target RCN for "woods in good condition" for the respective HSG. Areas shown in yellow (left hand side) show the reduced RCN for each HSG that is applied to stormwater management calculations if the design rainfall is below the target.

- **Rainfall (Inches):** Target rainfall (P_E) amounts for sizing ESD practices to mimic wooded conditions for each respective HSG are located across the top of Table 5.3. These rainfall amounts are also used to determine the reduced RCNs for calculating additional stormwater management requirements if the targeted amounts cannot be met.

Table 5.3 Rainfall Targets/Runoff Curve Number Reductions used for ESD

Hydrologic Soil Group A										
%I	**RCN***	**P_E = 1"**	**1.2"**	**1.4"**	**1.6"**	**1.8"**	**2.0"**	**2.2"**	**2.4"**	**2.6"**
0%	40									
5%	43									
10%	46									
15%	48	**38**								
20%	51	40	**38**	**38**						
25%	54	41	40	39						
30%	57	42	41	39	**38**					
35%	60	44	42	40	39					
40%	61	44	42	40	39					
45%	66	48	46	41	40					
50%	69	51	48	42	41	**38**				
55%	72	54	50	42	41	39				
60%	74	57	52	44	42	40	**38**			
65%	77	61	55	47	44	42	40			
70%	80	66	61	55	50	45	40			
75%	84	71	67	62	56	48	40	**38**		
80%	86	73	70	65	60	52	44	40		
85%	89	77	74	70	65	58	49	42	**38**	
90%	92	81	78	74	70	65	58	48	42	**38**
95%	95	85	82	78	75	70	65	57	50	39
100%	98	89	86	83	80	76	72	66	59	40

Hydrologic Soil Group B										
%I	**RCN***	**P_E = 1"**	**1.2"**	**1.4"**	**1.6"**	**1.8"**	**2.0"**	**2.2"**	**2.4"**	**2.6"**
0%	61									
5%	63									
10%	65									
15%	67	**55**								
20%	68	60	**55**	**55**						
25%	70	64	61	58						
30%	72	65	62	59	**55**					
35%	74	66	63	60	56					
40%	75	66	63	60	56					
45%	78	68	66	62	58					
50%	80	70	67	64	60					
55%	81	71	68	65	61	**55**				
60%	83	73	70	67	63	58				
65%	85	75	72	69	65	60	**55**			
70%	87	77	74	71	67	62	57			
75%	89	79	76	73	69	65	59			
80%	91	81	78	75	71	66	61			
85%	92	82	79	76	72	67	62	**55**		
90%	94	84	81	78	74	70	65	59	**55**	
95%	96	87	84	81	77	73	69	63	57	
100%	98	89	86	83	80	76	72	66	59	**55**

Cp_v Addressed (RCN = Woods in Good Condition)

RCN Applied to Cp_v Calculations

Table 5.3 Runoff Curve Number Reductions used for Environmental Site Design (continued)

Hydrologic Soil Group C										
%I	**RCN***	**P_E = 1"**	**1.2"**	**1.4"**	**1.6"**	**1.8"**	**2.0"**	**2.2"**	**2.4"**	**2.6"**
0%	74									
5%	75									
10%	76									
15%	78									
20%	79	**70**								
25%	80	72	**70**	**70**						
30%	81	73	72	71						
35%	82	74	73	72	**70**					
40%	84	77	75	73	71					
45%	85	78	76	74	71					
50%	86	78	76	74	71					
55%	86	78	76	74	71	**70**				
60%	88	80	78	76	73	71				
65%	90	82	80	77	75	72				
70%	91	82	80	78	75	72				
75%	92	83	81	79	75	72				
80%	93	84	82	79	76	72				
85%	94	85	82	79	76	72				
90%	95	86	83	80	77	73	**70**			
95%	97	88	85	82	79	75	71			
100%	98	89	86	83	80	76	72	**70**		

Hydrologic Soil Group D										
%I	**RCN***	**P_E = 1"**	**1.2"**	**1.4"**	**1.6"**	**1.8"**	**2.0"**	**2.2"**	**2.4"**	**2.6"**
0%	80									
5%	81									
10%	82									
15%	83									
20%	84	**77**								
25%	85	78								
30%	85	78	**77**	**77**						
35%	86	79	78	78						
40%	87	82	81	79	**77**					
45%	88	82	81	79	78					
50%	89	83	82	80	78					
55%	90	84	82	80	78					
60%	91	85	83	81	78					
65%	92	85	83	81	78					
70%	93	86	84	81	78					
75%	94	86	84	81	78					
80%	94	86	84	82	79					
85%	95	86	84	82	79					
90%	96	87	84	82	79	**77**				
95%	97	88	85	82	80	78				
100%	98	89	86	83	80	78	**77**			

Cp_v Addressed (RCN = Woods in Good Condition)

RCN Applied to Cp_v Calculations

5.2.5 Design Examples: Computing ESD Stormwater Criteria

Design examples are provided only to illustrate how ESD stormwater sizing criteria are computed for hypothetical development projects. These design examples are also utilized elsewhere in the manual to illustrate design concepts.

Design Example No. 5.1: Residential Development – Reker Meadows

The layout of the Reker Meadows subdivision is shown in Figure 2.6.

Site Data:

Location:	Frederick County, MD
Site Area:	38.0 acres
Drainage Area:	38.0 acres
Soils:	60% B, 40% C
Impervious Area:	13.8 acres

<u>Step 1: Determine ESD Implementation Goals</u>

The following basic steps should be followed during the planning phase to develop initial targets for ESD implementation.

A. Determine Pre-Developed Conditions:

The goal for implementing ESD on all new development projects is to mimic forested runoff characteristics. The first step in this process is to calculate the RCN for "woods in good condition" for the project:

- Determine Soil Conditions and RCNs for "woods in good condition"

Soil Conditions

HSG	RCN†	Area	Percent
A	38‡	0	0%
B	55	22.8 acres	60%
C	70	15.2 acres	40%
D	77	0	0%

† RCN for "woods in good condition" (Table 2-2, TR-55)
‡ Actual RCN is less than 30, use RCN = 38

- Determine composite RCN for "woods in good condition"

$$\text{RCN}_{\text{woods}} = \frac{(55 \times 22.8\,\text{acres}) + (70 \times 15.2\,\text{acres})}{38\,\text{acres}} = 61$$

The target RCN for "woods in good condition" is 61.

B. Determine Target P_E Using Table 5.3:

P_E = Rainfall used to size ESD practices

During project planning and preliminary design, site soils and proposed imperviousness are used to determine the target P_E for sizing ESD practices to mimic wooded conditions.

- Determine Proposed Imperviousness (%I)

Proposed Impervious Area (as measured from site plans): 13.8 acres
%I = Impervious Area / Drainage Area
= 13.8 acres / 38 acres
= 36.3%;

Because %I is between 35% and 40%, both values should be checked and the more conservative result used to determine target P_E.

For this example, assume imperviousness is distributed proportionately (60/40) in B and C soils.

- Determine P_E from Table

Using %I = 35% & 40% and B Soils:

Hydrologic Soil Group B							
%I	RCN*	P_E = 1"	1.2"	1.4"	1.6"	1.8"	2.
15%	67	**55**					
20%	68	60	**55**	**55**			
25%	70	64	61	58			
30%	72	65	62	59	**55**		
35%	74	66	63	60	56		
40%	75	66	63	60	56		
45%	78	68	66	62	58		

$P_E \geq 1.8$ inches will reduce the RCN to reflect "woods in good condition" for %I = 35% & 40%

Using %I = 35% & 40% and C Soils:

Hydrologic Soil Group C							
%I	RCN*	P_E = 1"	1.2"	1.4"	1.6"	1.8"	
15%	78	**70**					
20%	79	**70**					
25%	80	72	**70**	**70**			
30%	81	73	72	71			
35%	82	74	73	72	**70**		
40%	84	77	75	73	71		
45%	85	78	76	74	71		

For %I = 35%, $P_E \geq 1.6$ inches will reduce the RCN to reflect "woods in good condition"
For %I = 40%, $P_E \geq 1.8$" to achieve the same goal.

For this project, P_E happens to be the same for both soil groups, therefore use $P_E = 1.8$ inches of rainfall as the target for ESD implementation.

C. Compute Q_E :

Q_E = Runoff depth used to size ESD practices
$Q_E = P_E$ x Rv, where
P_E = 1.8 inches
R_v = 0.05 + (0.009)(I); I = 36.3
= 0.05 + (0.009 x 36.3) = 0.38

Q_E = 1.8 inches x 0.38
= 0.68 inches

ESD targets for the Reker Meadows project:

P_E = 1.8 inches
Q_E = 0.68 inches

By using ESD practices that meet these targets, Re_v, WQ_v, and Cp_v requirements will be satisfied. Potential practices could include swales or micro-bioretention to capture and treat runoff from the roads. Likewise, raingardens and disconnection of rooftop runoff could be used to capture and treat runoff from the houses.

<u>Step 2: Determine Stormwater Management Requirements After Using ESD</u>

For this example, it is assumed that ESD techniques and practices were implemented to treat only 1.2 inches of rainfall (e.g., $P_E = 1.2$ inches) over the entire project. After all efforts to implement ESD practices have been exhausted, the following basic steps should be followed to determine how much additional stormwater management is required.

A. Calculate Reduced RCNs

P_E = Rainfall used to size ESD practices

During the planning and design processes, site soils, measured imperviousness, and P_E are used to determine reduced RCNs for calculating Cp_v requirements.

- Determine Reduced RCN for P_E = 1.2 inches

Using %I = 35% & 40%, B Soils, and P_E = 1.2 inches:

		Hydrologic Soil Group B				
%I	RCN*	P_E = 1"	1.2"	1.4"	1.6"	1.8"
15%	67	**55**				
20%	68	60	**55**	**55**		
25%	70	64	61	58		
30%	72	65	62	59	**55**	
35%	74	66	63	60	56	
40%	75	66	63	60	56	
45%	78	68	66	62	58	

For B Soils, P_E = 1.2 inches, and %I = 35% & 40%, reduced RCN = 63

Using %I = 35% & 40%, C Soils, and P_E = 1.2 inches:

		Hydrologic Soil Group C				
%I	RCN*	P_E = 1"	1.2"	1.4"	1.6"	1.8"
15%	78	**70**				
20%	79	**70**				
25%	80	72	**70**	**70**		
30%	81	73	72	71		
35%	82	74	73	72	**70**	
40%	84	77	75	73	71	
45%	85	78	76	74	71	

For C Soils, P_E = 1.2 inches, and %I = 35% & 40%, reduced RCN = 73 & 75, respectively

Use the more conservative value, 75, for calculating a composite RCN for the site.

A composite RCN may be calculated as follows:

For P_E = 1.2 inches:

$$\text{RCN} = \frac{(63 \times 22.8\,\text{acres}) + (75 \times 15.2\,\text{acres})}{38\,\text{acres}} = 67.8$$

Use 68

B. Calculate Cp_v Requirements

The composite RCN for "woods in good condition" is 61 (see Step 1A above).

The design RCN (68) does not reflect the composite RCN for "woods in good condition" (61) and, therefore Cp_v must be addressed. However, $P_E \geq 1.0$ inches and Cp_v requirements are based on the runoff from the 1-year 24-hour design storm calculated using the reduced RCN (68).

- Compute Cp_v Storage Volume

When $P_E \geq 1.0$ inches, Cpv shall be the runoff from the 1-year 24-hour design storm calculated using the reduced RCN. If the reduced RCN for a drainage area reflects "woods in good condition", then Cpv has been satisfied for that drainage area.

Calculate Cp_v using design $P_E = 1.2$ inches (RCN = 68):

$Cp_v = Q_1 \times A$

where: Q_1 is the runoff from the 1-year 24-hour design storm

$$Q_1 = \frac{(P - 0.2S)^2}{(P + 0.8S)} \qquad \text{(Equation 2.3, TR-55, USDA NRCS 1986)}$$

where: P = 1-year 24-hour design storm
S = (1000/RCN) – 10 (Equation 2-4, TR-55)
= (1000/68) – 10
= 4.7

$$Q_1 = \frac{[2.6 - (0.2x4.7)]^2}{[2.6 + (0.8x4.7)]} = \frac{2.76}{6.36} = 0.43 \text{ inches}$$

Cp_v = 0.43 inches x 38 acres
= 1.36 ac. – ft. or 59, 240 cubic feet

Cp_v Storage Requirements for Reker Meadows

Rainfall (P_E)	Additional Cp_v Required		Notes:
	(ac-ft)	(cu. ft.)	
$P_E \geq 1.8$ inches	NA	NA	Target P_E for RCN = woods
$P_E = 1.2$ inches	1.36	59,240	Design P_E
Conventional Design	1.65	71,875	from Chapter 2 (see page 2.18)

Stormwater management requirements for the Reker Meadows project include using ESD practices to treat 1.2 inches of rainfall and structural practices from Chapter 3 (e.g., shallow wetland) to treat the Cp_v of 59,240 cubic feet.

Design Example No. 5.2: Commercial Development - Claytor Community Center

The layout of the Claytor Community Center is shown in Figure 2.9.

Site Data:

Location: Dorchester County
Site Area: 3.0 acres
Drainage Area: 3.0 acres
Soils: 100% B
Impervious Area: 1.9 acres

Step 1: Determine ESD Implementation Goals

The following basic steps should be followed during the planning phase to develop initial targets for ESD implementation.

A. Determine Pre-Developed Conditions:

The goal for implementing ESD on all new development projects is to mimic forested runoff characteristics. The first step in this process is to calculate the RCN for "woods in good condition" for the project.

- Determine Soil Conditions and RCNs for "woods in good condition"

Soil Conditions

HSG	RCN†	Area	Percent
A	38‡	0	0%
B	55	3.0 acres	100%
C	70	0 acres	0%
D	77	0	0%

† RCN for "woods in good condition" (Table 2-2, TR-55)
‡ Actual RCN is less than 30, use RCN = 38

The site is entirely located in HSG B, and the target RCN for "woods in good condition" is 55.

B. Determine Target P_E Using Table 5.3

P_E = Rainfall used to size ESD practices

During the project planning and preliminary design, site soils and proposed imperviousness are used to determine target P_E for sizing ESD practices to mimic wooded conditions.

- Determine Proposed Imperviousness (%I)

Proposed Impervious Area (as measured from site plans): 1.9 acres
%I = Impervious Area / Drainage Area
= 1.9 acres / 3.0 acres
= 63.3%

Because %I is closer to 65% than 60%, use the more conservative value, 65%.

- Determine P_E from Table

Using %I = 65% & B Soils:

Hydrologic Soil Group B								
%I	RCN*	P_E = 1"	1.2"	1.4"	1.6"	1.8"	2.0"	2.2"
15%	67	**55**						
20%	68	60	**55**	**55**				
25%	70	64	61	58				
30%	72	65	62	59	**55**			
35%	74	66	63	60	56			
40%	75	66	63	60	56			
45%	78	68	66	62	58			
50%	80	70	67	64	60			
55%	81	71	68	65	61	**55**		
60%	83	73	70	67	63	58		
65%	85	75	72	69	65	60	**55**	
70%	87	77	74	71	67	62	57	

$P_E \geq 2.0$ inches will reduce the RCN to reflect "woods in good condition" for %I = 65%

For this project, use P_E = 2.0 inches

C. Compute Q_E :

Q_E = Runoff depth used to size ESD practices
Q_E = P_E x R_v, where
P_E = 2.0 inches
R_v = 0.05 + (0.009)(I); I = 63.3%
= 0.05 + (0.009 x 63.3)
= 0.62

Q_E = 2.0 inches x 0.62
= 1.24 inches

ESD targets for the Claytor Community Center project:

P_E = 2.0 inches
Q_E = 1.24 inches

By using ESD practices that meet these targets, Re_v, WQ_v, and Cp_v requirements will be satisfied. Potential practices could include permeable pavements, micro-bioretention, or landscape infiltration to capture and treat runoff from the rooftops, parking lots, and drive aisles.

Step 2. Determine Stormwater Management Requirements After Using ESD

For this example, it is assumed that ESD techniques and practices were implemented to treat only 1.6 inches of rainfall (e.g., P_E = 1.6 inches) over the entire project. After all efforts to implement ESD practices have been exhausted, the following basic steps should be followed to determine if any additional stormwater management is required.

A. Calculate Reduced RCNs

P_E = Rainfall used to size ESD practices

During the design process, site soils, measured imperviousness, and P_E are used to determine reduced RCNs for calculating Cp_v requirements.

- Determine Reduced RCN for P_E = 1.6 inches

Using %I = 65%, B Soils, and P_E = 1.6 inches:

		Hydrologic Soil Group B				
%I	RCN*	P_E = 1"	1.2"	1.4"	1.6"	1.8"
15%	67	**55**				
20%	68	60	**55**	**55**		
25%	70	64	61	58		
30%	72	65	62	59	**55**	
35%	74	66	63	60	56	
40%	75	66	63	60	56	
45%	78	68	66	62	58	
50%	80	70	67	64	60	
55%	81	71	68	65	61	**55**
60%	83	73	70	67	63	58
65%	85	75	72	69	65	60
70%	87	77	74	71	67	62

For B Soils, P_E = 1.6 inches, and %I = 65%, reduced RCN = 65

B. Calculate Cp_v Requirements

The RCN for "woods in good condition" = 55 (see Step 1A above).

The design RCN (65) does not reflect "woods in good condition" (55) and therefore Cp_v must be addressed. However, $P_E \geq 1.0$ inches, and Cp_v is based on the runoff from the 1-year 24-hour design storm calculated using the reduced RCN (65).

- Compute Cp_v Storage Volume

When $P_E \geq 1.0$ inches, Cp_v shall be the runoff from the 1-year 24-hour design storm calculated using the reduced RCN. If the reduced RCN for a drainage area reflects "woods in good condition", then Cp_v has been satisfied for that drainage area.

Calculate Cp_v using design $P_E = 1.6$ inches (RCN = 65)

$Cp_v = Q_1 \times A$

where: Q_1 = runoff from the 1-year 24-hour design storm

$$Q_1 = \frac{(P - 0.2S)^2}{(P + 0.8S)} \qquad \text{(Equation 2.3, TR-55, USDA NRCS 1986)}$$

where: P = 1-year 24-hour design storm
S = (1000/RCN) – 10 (Equation 2-4, TR-55)
= (1000/65) – 10
= 5.4

$$Q_1 = \frac{[2.8 - (0.2x5.4)]^2}{[2.8 + (0.8x5.4)]} = \frac{2.96}{7.12} = 0.42 \text{ inches}$$

Cp_v = 0.42 inches x 3.0 acres
= 0.105 ac. – ft. or 4,574 cubic feet

Cp_v Storage Requirements for Claytor Community Center

Rainfall (P_E)	Additional Cp_v Required		Notes:
	(ac-ft)	(cu. ft.)	
$P_E \geq 2.0$ inches	NA	NA	Target P_E for RCN = woods
$P_E = 1.6$ inches	0.105	4,574	Design P_E
Conventional Design	0.21	9,150	See Note Below*

***NOTE: Prior to 2009, Cp_v was not required on the Eastern Shore. However, an estimated 0.21 ac.-ft (9,150 cubic feet) would have been needed to address Cp_v in Design Example No. 2 in Chapter 2.**

Stormwater management requirements for the Claytor Community Center project include using ESD practices to treat 1.6 inches of rainfall and structural practices from Chapter 3 (e.g., shallow wetland) to treat the Cp_v of 4,574 cubic feet.

Design Example No. 5.3: Multiple Drainage Areas – Pensyl Pointe

The layout of the Pensyl Pointe subdivision is shown in Figure 2.12.

Site Data:

Location: Montgomery County, MD
Site Area: 38.0 acres
Drainage (DA) 1
- Area: 7.6 acres
- Soils: 60% B, 40% C
- Impervious Area: 2.25 acres

Drainage (DA) 2
- Area: 30.4 acres
- Soils: 60% B, 40% C
- Impervious Area: 11.55 acres

<u>Step 1: Determine ESD Implementation Goals</u>

The following basic steps should be followed during the planning phase to develop initial targets for ESD implementation.

A. Determine Pre-Developed Conditions:

The goal for implementing ESD on all new development sites is to mimic forested runoff characteristics. The first step in this process is to calculate the RCNs for "woods in good condition" for the project.

- Determine Soil Conditions and RCNs for "woods in good condition"

<u>DA 1</u>

Soil Conditions (DA 1)

HSG	RCN†	Area	Percent
A	38‡	0	0%
B	55	4.6 acres	60%
C	70	3.0 acres	40%
D	77	0	0%

† RCN for "woods in good condition" (Table 2-2, TR-55)
‡ Actual RCN is less than 30, use RCN = 38

- Determine Composite RCN for "woods in good condition" for DA 1

$$\text{RCN}_{\text{woods}} = \frac{(55 \times 4.6\text{ acres}) + (70 \times 3.0\text{ acres})}{7.6\text{ acres}} = 61$$

The target RCN for "woods in good condition" is 61

DA 2

Soil Conditions (DA 2)

HSG	RCN†	Area	Percent
A	38‡	0	0%
B	55	18.2 acres	60%
C	70	12.2 acres	40%
D	77	0	0%

† RCN for "woods in good condition" (Table 2-2, TR-55)
‡ Actual RCN is less than 30, use RCN = 38

Determine Composite RCN for "woods in good condition" for DA 2

$$\text{RCN}_{\text{woods}} = \frac{(55 \times 18.2\text{ acres}) + (70 \times 12.2\text{ acres})}{30.4\text{ acres}} = 61$$

The target RCN for "woods in good condition" is 61

B. Determine Target P_E Using Table 5.3:

P_E = Rainfall used to size ESD practices

During the planning and preliminary design processes, site soils and proposed imperviousness are used to determine target P_E for sizing ESD practices to mimic wooded conditions.

- Determine Proposed Imperviousness (%I)

DA 1

Proposed Impervious Area (as measured from site plans): 2.25 acres;
%I = Impervious Area / Drainage Area
= 2.25 acres / 7.6 acres
= 30.0%

DA 2

Proposed Impervious Area (as measured from site plans): 11.55 acres;
%I = Impervious Area / Drainage Area
= 11.55 acres / 30.4 acres
= 38.0%

Because %I is closer to 40% than 35%, use the more conservative value , 40%, to determine target P_E.

For this example, assume imperviousness in DA 1 & DA 2 is distributed proportionately (60/40) in B and C soils.

- Determine P_E from Table

DA 1

Using %I = 30% and B Soils:

		Hydrologic Soil Group B				
%I	RCN*	P_E = 1"	1.2"	1.4"	1.6"	1.8"
15%	67	**55**				
20%	68	60	**55**	**55**		
25%	70	64	61	58		
30%	72	65	62	59	**55**	
35%	74	66	63	60	56	

P ≥ 1.6 inches will reduce RCN to reflect "woods in good condition"

Using %I = 30% and C Soils:

		Hydrologic Soil Group C				
%I	RCN*	P_E = 1"	1.2"	1.4"	1.6"	1.8"
15%	78	**70**				
20%	79	**70**				
25%	80	72	**70**	**70**		
30%	81	73	72	71		
35%	82	74	73	72	**70**	
40%	84	77	75	73	71	
45%	85	78	76	74	71	

P_E ≥ 1.6 inches will reduce the RCN to reflect "woods in good condition".

For DA 1, P_E happens to be the same for both soil groups, therefore use P_E = 1.6 inches of rainfall.

DA 2

Using %I = 40% and B Soils:

Hydrologic Soil Group B							
%I	RCN*	P_E = 1"	1.2"	1.4"	1.6"	1.8"	2.0"
15%	67	**55**					
20%	68	60	**55**	**55**			
25%	70	64	61	58			
30%	72	65	62	59	**55**		
35%	74	66	63	60	56		
40%	75	66	63	60	56		
45%	78	68	66	62	58		

$P_E \geq 1.8$ inches will reduce the RCN to reflect "woods in good condition".

Using %I = 40% and C Soils:

Hydrologic Soil Group C							
%I	RCN*	P_E = 1"	1.2"	1.4"	1.6"	1.8"	2.0"
15%	78	**70**					
20%	79	**70**					
25%	80	72	**70**	**70**			
30%	81	73	72	71			
35%	82	74	73	72	**70**		
40%	84	77	75	73	71		
45%	85	78	76	74	71		

$P_E \geq 1.8$ inches will reduce the RCN to reflect "woods in good condition".

For DA 2, P_E happens to be the same for both soil groups, therefore use P_E = 1.8 inches of rainfall.

C. Compute Q_E:

DA 1

Q_E = Runoff depth used to size ESD practices
Q_E = P_E x R_v, where
P_E = 1.6 inches
R_v = 0.05 + (0.009)(I); I = 30.0%
= 0.05 + (0.009 x 30.0)
= 0.32

Q_E = 1.6 inches x 0.32
= 0.51 inches

DA 2

Q_E = Runoff depth used to size ESD practices
Q_E = P_E x R_v, where
P_E = 1.8 inches
R_v = 0.05 + (0.009)(I); I = 38.0%
= 0.05 + (0.009 x 38.0)
= 0.39

Q_E = 1.8 inches x 0.39
= 0.70 inches

ESD targets for the Pensyl Pointe project:

DA 1	**DA 2**
P_E = 1.6 inches	P_E = 1.8 inches
Q_E = 0.51 inches	Q_E = 0.70 inches

By using ESD practices that meet these targets, Re_v, WQ_v, and Cp_v requirements will be satisfied. Potential practices could include swales or micro-bioretention to capture and treat runoff from the roads. Likewise, raingardens and disconnection of runoff could be used to capture and treat runoff from the houses.

Step 2. Determine Stormwater Management Requirements After Using ESD

For this example, it is assumed that ESD techniques and practices were implemented to treat only 1.6 inches of rainfall (e.g., P_E = 1.6 inches) over the entire project. After all efforts to implement ESD practices have been exhausted, the following basic steps should be followed to determine if any additional stormwater management is required.

A. Calculate Reduced RCNs

P_E = Rainfall used to size ESD practices

During the planning and design processes, site soils, measured imperviousness, and P_E are used to determine reduced RCNs for calculating Cp_v requirements.

- Determine Reduced RCNs for P_E = 1.6 inches

DA 1

Using %I = 30%, B Soils, and P_E = 1.6 inches:

		Hydrologic Soil Group B				
%I	RCN*	P_E = 1"	1.2"	1.4"	1.6"	1.8"
15%	67	**55**				
20%	68	60	**55**	**55**		
25%	70	64	61	58		
30%	72	65	62	59	**55**	
35%	74	66	63	60	56	

For B Soils, P_E = 1.6 inches, and %I = 30%, reduced RCN = 55 (woods in good condition)

Using %I = 30%, C Soils, and P_E = 1.6 inches:

		Hydrologic Soil Group C				
%I	RCN*	P_E = 1"	1.2"	1.4"	1.6"	1.8"
15%	78	**70**				
20%	79	**70**				
25%	80	72	**70**	**70**		
30%	81	73	72	71		
35%	82	74	73	72	**70**	
40%	84	77	75	73	71	
45%	85	78	76	74	71	

For C Soils, P_E = 1.6 inches, and %I = 30%, reduced RCN = 70 (woods in good condition)

Composite RCNs may be calculated as follows:

For P_E = 1.6 inches:

$$\text{RCN} = \frac{(55 \times 4.6\text{ acres}) + (70 \times 3.0\text{ acres})}{7.6\text{ acres}} = 60.9$$

Use 61

DA 2

Using %I = 40%, B Soils, and P_E = 1.6 inches:

		Hydrologic Soil Group B				
%I	RCN*	P_E = 1"	1.2"	1.4"	1.6"	1.8"
15%	67	**55**				
20%	68	60	**55**	**55**		
25%	70	64	61	58		
30%	72	65	62	59	**55**	
35%	74	66	63	60	56	
40%	75	66	63	60	56	
45%	78	68	66	62	58	

For B Soils, P_E = 1.6 inches, and %I = 40%, reduced RCN = 56

Using %I = 40%, C Soils, and P_E = 1.6 inches:

		Hydrologic Soil Group C				
%I	RCN*	P_E = 1"	1.2"	1.4"	1.6"	1.8"
15%	78	**70**				
20%	79	**70**				
25%	80	72	**70**	**70**		
30%	81	73	72	71		
35%	82	74	73	72	**70**	
40%	84	77	75	73	71	
45%	85	78	76	74	71	

For C Soils, P_E = 1.6 inches, and %I = 40%, reduced RCN = 71

Composite RCNs may be calculated as follows:

For P_E = 1.6 inches:

$$\text{RCN} = \frac{(56 \times 18.2\ \text{acres}) + (71 \times 12.2\,\text{acres})}{30.4\,\text{acres}} = 62$$

Reduced RCNs for the Pensyl Pointe project:

	DA 1	**DA 2**
P_E = 1.6 inches	RCN = 61	RCN = 62

B. Calculate Cp_v Requirements

DA 1

The composite RCN for "woods in good condition" is 61 (see Step 1A above).

The design RCN (61) for P_E = 1.6 inches reflects "woods in good condition" and therefore Cp_v is addressed.

Cp_v Storage Requirements for Pensyl Pointe - DA 1

Rainfall (P_E)	Additional Cp_v Required		Notes:
	(ac-ft)	(cu. ft.)	
$P_E \geq 1.6$ inches	NA	NA	Target P_E for RCN = woods
$P_E = 1.6$ inches	NA	NA	Design P_E
Conventional Design	0.30	13,070	From Chapter 2 (see page 2.32)

DA 2

The composite RCN for "woods in good condition" is 61 (see Step 1A above).

The design RCN (62) does not reflect the composite RCN for "woods in good condition" (61) and Cp_v must be addressed. However, $P_E \geq 1.0$ inches, and Cp_v is based on the runoff from the 1-year 24-hour design storm calculated using the reduced RCN (62).

Calculate Cp_v using design P_E = 1.6 inches (RCN = 62)

$Cp_v = Q_1 \times A$

Where Q_1 is the runoff from the 1-year 24-hour design storm

$$Q_1 = \frac{(P - 0.2S)^2}{(P + 0.8S)} \qquad \text{(Equation 2.3, TR-55, USDA NRCS 1986)}$$

where: P = 1-year 24-hour design storm
S = (1000/RCN) – 10 (Equation 2-4, TR-55)
= (1000/62) – 10
= 6.1

$$Q_1 = \frac{[2.6 - (0.2x6.1)]^2}{[2.6 + (0.8x6.1)]} = \frac{1.90}{7.48} = 0.25 \text{ inches}$$

Cp_v = 0.25 inches x 30.4 acres
= 0.63 ac. – ft. or 27,440 cubic feet

Cp_v Storage Requirements for Pensyl Pointe – DA 2

Rainfall (P_E)	Additional Cp_v Required		Notes:
	(ac-ft)	(cu. ft.)	
$P_E \geq 1.8$ inches	NA	NA	Target P_E for RCN = woods
$P_E = 1.6$ inches	0.63	27,440	Design P_E
Conventional Design	1.31	57,065	From Chapter 2 (see page 2.33)

Stormwater management requirements for the Pensyl Pointe project include using ESD practices to treat 1.6 inches of rainfall and structural practices from Chapter 3 (e.g., shallow wetland) to treat the Cp_v of 27,440 cubic feet.

Section 5.3 Alternative Surfaces

An effective method to reduce imperviousness in residential, commercial, and industrial applications is to use more permeable alternatives. Roofs and pavements are often overlooked areas that may be replaced with more permeable surfaces. Green roofs are particularly useful alternatives for reducing impervious cover and provide much needed green space in ultra-urban or high-density developments. Whether made from porous asphalt or concrete, interlocking pavers, or reinforced turfs, permeable pavements are a cost-effective alternative for parking lot and roadway surfaces.

Alternative surface variants include:

- A-1. Green Roofs
- A-2. Permeable Pavements
- A-3. Reinforced Turf

A-1. Green Roofs

Green roofs are alternative surfaces that replace conventional construction materials and include a protective covering of planting media and vegetation. Also known as vegetated roofs, roof gardens, or eco-roofs, these may be used in place of traditional flat or pitched roofs to reduce impervious cover and more closely mimic natural hydrology. Green roofs produce less heat than conventional systems. Therefore, they may be used to help mitigate stormwater impacts and temperature increases caused by new development.

There are two basic green roof designs that are distinguished by media thickness and the plant varieties that are used. The more common or "extensive" green roof is a lightweight system where the media layer is between two and six inches thick. This limits plants to low-growing, hardy herbaceous varieties. An extensive green roof may be constructed off-site as a modular system with drainage layers, growing media, and plants installed in interlocking grids. Conventional construction methods may also be used to install each component separately.

"Intensive" green roofs have thicker soil layers (eight inches or greater) and are capable of supporting more diverse plant communities including trees and shrubs. A more robust structural loading capacity is needed to support the additional weight of the media and plants. Intensive green roofs are more complex and expensive to design, construct, and maintain, are less commonly used, and are therefore not covered here.

Applications:

Green roofs may be used to replace most conventional roofs in both new and redevelopment applications in residential, commercial, and industrial projects. Green roofs are particularly useful for reducing impervious cover in ultra-urban or high-density areas as well. Green roofs may also mitigate temperature increases on projects located in thermally sensitive watersheds.

Performance:

When designed according to the guidance provided below, the rooftop area covered by a green roof will have runoff characteristics more closely resembling grassed or open space areas. The capacity of a green roof to detain runoff is governed by planting media thickness and roof slope or "pitch." However, the RCNs shown in Table 5.4 below are used to determine how green roofs contribute to addressing the ESD Sizing Criteria.

Table 5.4 Effective RCNs for Extensive Green Roofs

Roof Thickness (in.):	2	3	4	6	8
Effective RCN:	94	92	88	85	77

Because impermeable liners are an integral component in all systems, green roofs do not provide groundwater recharge. Therefore, additional treatment is needed to compensate for the loss of recharge from rooftop areas. This is equal to Re_v for the rooftop area and may be provided in separate infiltration practices or as additional storage within downstream ESD practices.

Constraints:

The following constraints are critical when considering the use of green roofs to treat stormwater runoff:

- **Infrastructure:** The location of existing and proposed utilities (e.g., HVAC, gutters, downspouts, electricity) will influence the design and construction of green roofs.

- **Structure:** Green roofs are not suitable for use on steep roofs (> 30% or 4:12). Sloped roofs may require additional measures to prevent sliding and ensure stability. The structure must also be capable of supporting the additional weight (live and dead load) of a green roof. Typical dead load ranges from 8 to 36 lbs/ft^2. Live load is a function of rainfall retention (e.g., 1 inch of rain or 10 inches of snow equals 5.2 lbs/ft^2). For redevelopment projects and existing buildings, additional measures (e.g., trusses, joists, columns) may be needed for support.

- **Waterproofing:** Materials should be durable under the conditions associated with vegetated covers. Supplemental barrier layers may be required with waterproofing membranes that may be damaged by plant roots.

- **Drainage:** Building drainage (e.g., gutters, deck drains, scuppers) must be capable of managing large rainfall events without inundating the roof.

Design Guidance:

The following conditions should be considered when designing green roofs:

- **Conveyance:** *Runoff shall flow through and exit green roof systems in a safe and non-erosive manner*. Overflow structures should be capable of passing the 2-year 24-hour design storm without inundating the roof. A semi-rigid, plastic geocomposite drain or mat layer should be included to convey runoff to the building drainage system. Flat roof applications may require a perforated internal network to facilitate drainage of rainfall. Additionally, roof flashing should extend six inches above the media surface and be protected by counter-flashing.

  Runoff from adjacent roofs should not drain to the green roof. If bypassing a green roof is impractical, an overflow device (e.g., gutter, deck drain) should be used.

  All green roofs shall include a waterproofing system or membrane. Materials used should be durable under vegetated cover conditions and resistant to biological and root attack. A supplemental barrier may be needed to protect the waterproofing from plant roots.

- **Treatment:** Green roof systems shall meet the following conditions:
  - *Planting media shall be non-soil engineered mixes conforming to the specifications found in Appendix B.4.* Media layers should be between two to six inches thick. Dual media systems may be applied where green roof assemblies are four inches or thicker.
  - *Individual layers (e.g., root barriers, drainage mats, separation geotextiles) shall conform to the specifications found in Appendix B.4.*

Figure 5.2 Cutaway of a Typical Green Roof

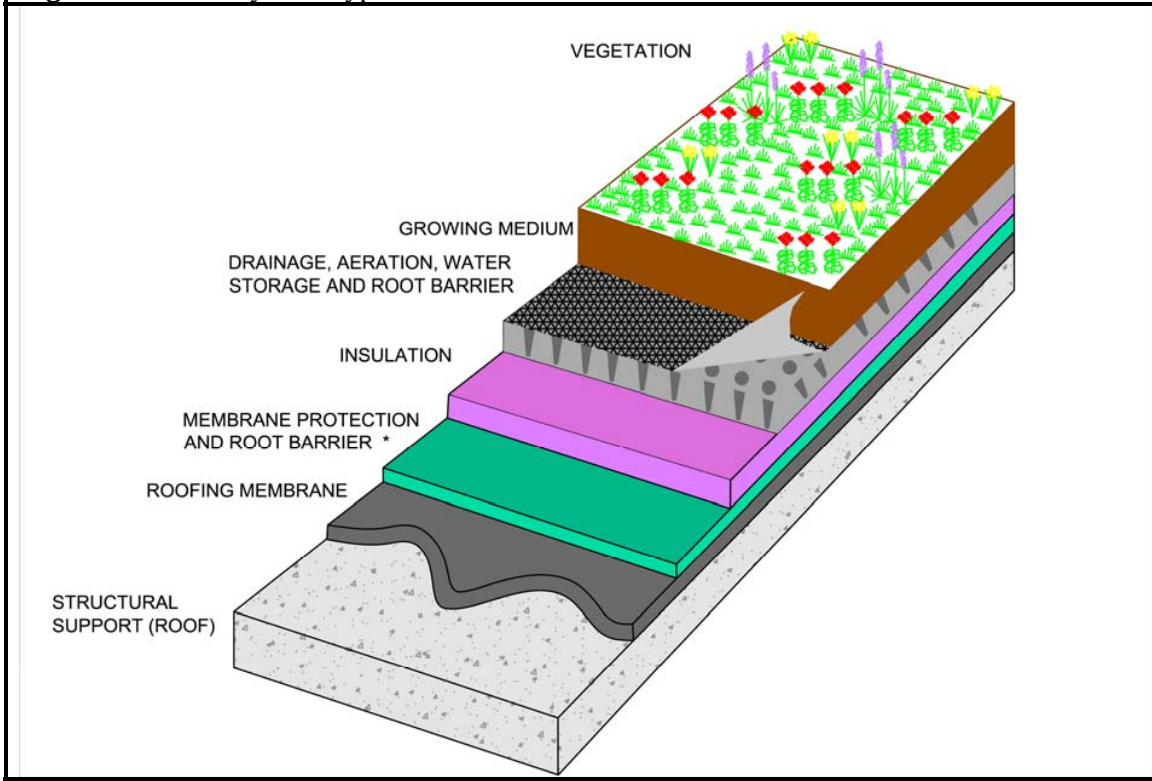

- **Structure:**
  - *The roof structure shall be capable of bearing the maximum predicted dead and live loads associated with green roof systems. Standardized media weights and procedures (e.g., ASTM E-2397-05, E-2399-05) shall be used to establish the dead load bearing capacity of the roof.*
  - *Green roofs with pitches steeper than 2:12 shall include supplemental measures (e.g., slope bars, rigid stabilization panels, reinforcing mesh) to enhance stability and prevent media sliding.*

- **Landscaping:** Vegetation is critical to the function and appearance of any green roof. Therefore landscaping plans should be provided according to the guidance in Appendix B.4.

A vigorous, drought-tolerant vegetative cover should be established using varieties of sedum, delosperma, or similar varieties native or suitable for growth in Maryland.

Construction Criteria:

The following items should be addressed during construction of projects with green roofs:

- **Waterproofing Installation:** *Measures shall be taken to prevent membrane damage during green roof installation. Any flaws, irregularities, or conditions that may cause leaks or roof damage shall be identified and repaired.* The waterproofing membrane should be visually inspected and tested for water tightness prior to installation of the planting mix.

- **Slope Stabilization Measures:** Where required, slope stabilization measures should be placed prior to green roof installation. In some situations, slope stabilization may be integrated into the roof structure.

- **Green Roof Installation:** Green roof systems should be installed according to the manufacturer's instructions. Generally, root-barrier layers, walkways, and irrigation systems should be installed first.

Inspection:

- *The following certifications shall be required during construction:*

    - *Prior to placement of the waterproofing, drainage, and treatment materials, certification that the constructed roof meets the load bearing capacity specified on the approved plans.*
    - *After its installation and prior to placement of the planting media and stock, certification regarding the water tightness of the waterproofing membrane.*

- *Regular inspections shall be made during the following stages of construction:*

    - *During placement of the waterproofing membrane.*
    - *During placement of the drainage system.*
    - *During placement of the planting media.*
    - *Upon installation of the plant material.*
    - *Before issuing use and occupancy approvals (new construction only).*
    - *During the second growing season to ensure adequate vegetation survival.*

Maintenance Criteria:

Green roofs require annual maintenance to ensure optimum performance. Typically, eighteen months are needed to establish adequate initial plant growth. Periodic irrigation may be needed during this time and basic weeding, fertilizing, and in-fill planting may be required as well. After plants are established, the roof should be inspected and light weeding performed once or twice per year.

A-2. Permeable Pavements

Permeable pavements are alternatives that may be used to reduce imperviousness. While there are many different materials commercially available, permeable pavements may be divided into three basic types: porous bituminous asphalt, pervious concrete, and permeable interlocking concrete pavements. Permeable pavements typically consist of a porous surface course and open graded stone base/subbase or sand drainage system. Stormwater drains through the surface course, is captured in the drainage system, and infiltrates into the surrounding soils. Permeable pavements significantly reduce the amount of impervious cover, provide water quality and groundwater recharge benefits, and may help mitigate temperature increases.

Applications:

Permeable pavements are effective for reducing imperviousness in pedestrian pavements, parking lots, driveways, plazas, and access roads. They may be used in both new and redevelopment applications in residential, commercial, and industrial projects. Permeable pavements are particularly useful in high-density areas where space is limited.

Performance:

When designed according to the guidance provided below, areas covered by permeable pavements will have runoff characteristics more closely resembling vegetated areas. The capacity of permeable pavements to capture and detain runoff is governed by the storage capacity, compaction of the soil subgrade, and in-situ soil properties. Consequently, RCN's applied to these systems vary with individual design characteristics. The effective RCN's shown in Table 5.5 are used when addressing the ESD Sizing Criteria.

Constraints:

The following constraints are critical when considering the use of permeable pavements to capture and treat stormwater runoff:

- **Space:** The size and distribution of paved surfaces within a project must be considered early during planning and design. Permeable pavements should not be used in areas where there are risks for foundation damage, basement flooding, interference with subsurface sewage disposal systems, or detrimental impacts to other underground structures.

- **Topography:** Runoff should sheetflow across permeable pavements. Pavement surfaces should be gradual (≤ 5%) to prevent ponding of water on the surface and within the subbase.

- **Soils:** Sandy and silty soils are critical to successful application of permeable pavements. The HSG should be A, B or C.

Subsurface water conditions (e.g., water table) will help determine the stone reservoir thickness used. The probability of practice failure increases if the reservoir intercepts groundwater. Therefore, subbase inverts should be above local groundwater tables.

- **Drainage Area:** Permeable pavements are an at-source practice for reducing the effects of impervious cover and addressing ESD criteria. As the impervious area draining to each practice increases, practice effectiveness weakens. Therefore, runoff from adjacent areas (or "run-on") should be limited.

- **Hotspot Runoff:** Permeable pavements should not be used to treat hotspots that generate higher concentrations of hydrocarbons, trace metals, or toxicants than are found in typical stormwater runoff and may contaminate groundwater.

- **Structure:** Most permeable alternatives have a lower load bearing capacity than conventional pavements. Therefore, applications should be limited to locations that do not receive heavy vehicle traffic and where sub soils are not compacted.

- **Operation:** Permeable pavements are highly susceptible to clogging and subject to owner neglect. Individual owners need to be educated to ensure that proper maintenance and winter operation activities will allow the system to function properly.

Design Guidance:

The following conditions should be considered when designing permeable pavements:

- **Conveyance:** *Runoff shall flow through and exit permeable pavements in a safe and non-erosive manner.* Permeable pavements should be designed off-line whenever possible. Runoff from adjacent areas should be diverted to a stable conveyance system. If bypassing these areas is impractical, then runoff should sheetflow onto permeable pavements.

  Pavement surfaces shall have a permeability of eight inches per hour or greater to convey water into the subbase rapidly. The slope of the permeable pavement shall be no greater than 5%. Any grade adjustments requiring fill should be accomplished using the subbase material. Permeable pavements may be placed in sloped areas by terracing levels along existing contours.

  Pavement systems should include an alternate mode for runoff to enter the subbase reservoir. In curbless designs, this may consist of a two-foot wide stone edge drain. Raised inlets may be required in curbed applications.

  The bottom of the subbase shall be level to enhance distribution and reduce ponding within the reservoir. A network of perforated pipes may be used to uniformly distribute runoff over the bed bottom. Perforated pipes may also be used to connect structures (e.g., cleanouts, inlets) located within the permeable pavement section.

All permeable pavements shall be designed to ensure that water surface elevations for the 10-year 24 hour design storm do not rise into the pavement to prevent freeze/thaw damage to the surface. Designs should include overflow structures like overdrains, inlets, edge drains, or similar devices that will convey excess runoff safely to a stable outfall.

- **Treatment:** All permeable pavement systems shall meet the following conditions:
  - *Applications that exceed 10,000 ft^2 shall be designed as infiltration practices using the design methods outlined in Appendix D.13 for infiltration trenches. A porosity (n) of 30% and an effective area of the trench (A_t) equal to 30% of the pavement surface area shall be used.*
  - *A subbase layer of a clean, open graded, washed aggregate with a porosity (n) of 30% (1.5" to 2" stone is preferred) shall be used below the pavement surface.* The subbase may be 6", 9" or 12" thick.
  - *Filter cloth shall not be used between the subbase and soil subgrade.* If needed, a 12" layer of washed concrete sand or pea gravel (⅛" to ⅜" stone) may be used to act as a bridging layer between the subbase reservoir and subsurface soils.

Table 5.5 Effective RCNs for Permeable Pavements

Subbase	Hydrologic Soil Group			
	A	**B**	**C**	**D**
6"	76[1]	84[1]	93[2]	–
9"	62[3]	65[3]	77[3]	–
12"	40	55	70	–

[1.] Design shall include 1 - 2" min. overdrain (inv. 2" below pavement base) per 750 s.f. of pavement area.

[2.] Design shall include 1 - 2" min. overdrain (inv. 2" below pavement base) per 600 s.f. of pavement area

[3.] Design shall include 1 - 3" min. overdrain (inv. 3" below pavement base) and a ½" underdrain at subbase invert.

- **Soils:**
  - *Permeable pavements shall not be installed in HSG D or on areas of compacted fill. Underlying soil types and condition shall be field-verified prior to final design.*
  - *For applications that exceed 10,000 ft^2, underlying soils shall have an infiltration rate (f) of 0.52 in/hr or greater.* This rate may be initially determined from NRCS soil textural classification and subsequently confirmed by geotechnical tests in the field as required in Chapter 3.3.1.
  - *The invert of the subbase reservoir shall be at least four feet above (two feet on the lower Eastern Shore) the seasonal high water table.*

Figure 5.3 Examples of Permeable Pavements

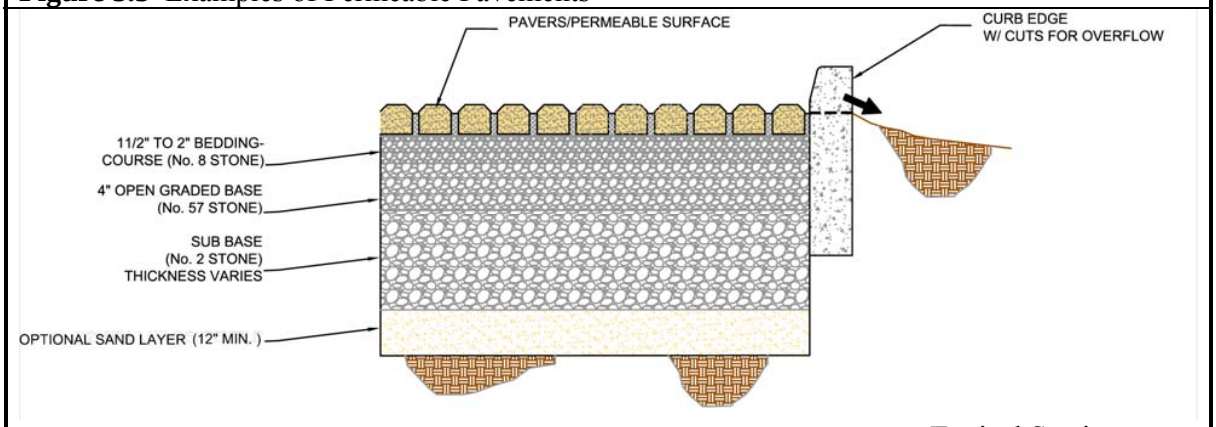

Typical Section

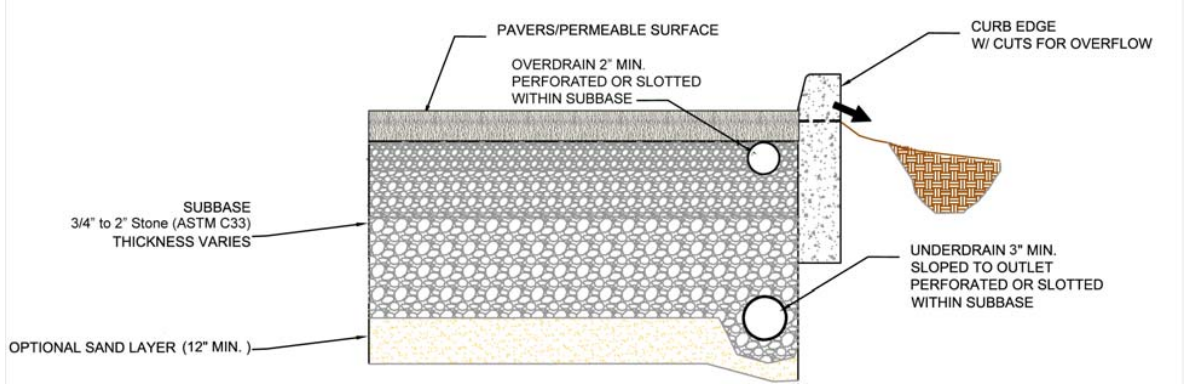

Typical Section w/Overdrain & Underdrain

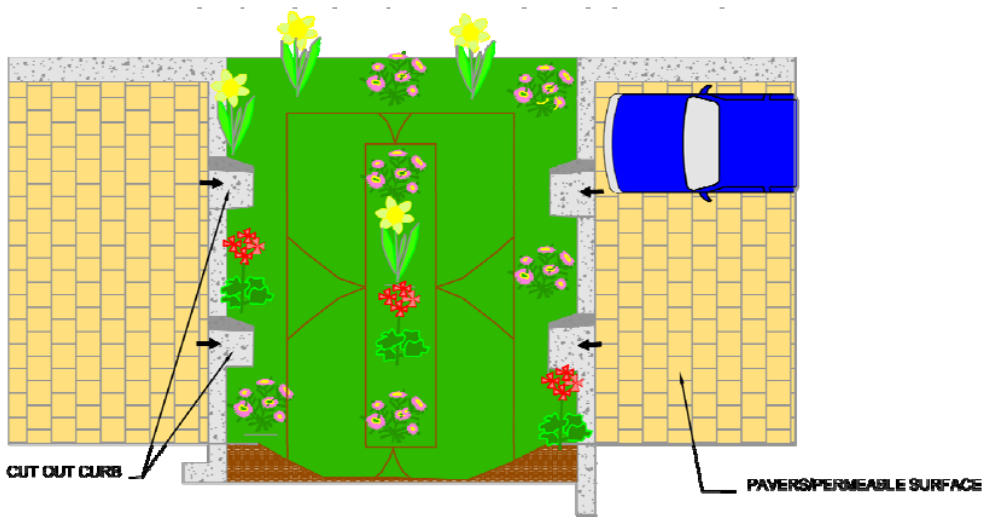

Permeable Pavement w/Micro-Bioretention - Plan View

- **Setbacks:**
  - *Permeable pavements shall be located down gradient of building structures and be setback at least 10 feet from buildings, 50 feet from confined water supply wells, 100 feet from unconfined water supply wells, and 25 feet from septic systems.*
  - Permeable pavements should also be sized and located to meet minimum local requirements for underground utility clearance.

- **Structure:** *All permeable pavement systems shall be capable of bearing the anticipated vehicle and traffic loads.* Pavement systems conforming to the specifications found in Appendix B.4 should be structurally stable for typical (e.g., light duty) applications.

- **Landscaping:** *Permeable pavement shall be identified on landscaping plans.* Trees and shrubs should not be located adjacent to asphalt and concrete if damage by root penetration and clogging from leaves is a concern.

Construction Criteria:

The following items should be addressed during construction of projects with permeable pavement:

- **Erosion and Sediment Control:** Final grading for installation should not take place until the surrounding site is stabilized. *If this cannot be accomplished, runoff from disturbed areas shall be diverted around proposed pavement locations.*

- **Soil Compaction:** *Sub soils shall not be compacted.* Construction should be performed with lightweight, wide tracked equipment to minimize compaction. Excavated materials should be placed in a contained area.

- **Distribution Systems:** *Overdrain, underdrain, and distribution pipes shall be checked to ensure that both the material and perforations meet specifications (see Appendix B.4). The upstream ends of pipes should be capped prior to installation.* All underdrain or distribution pipes used should be installed flat along the bed bottom.

- **Subbase Installation:** *Subbase aggregate shall be clean and free of fines. The subbase shall be placed in lifts and lightly rolled according to the specifications (see Appendix B.4).*

Inspection:

- *Regular inspections shall be made during the following stages of construction:*
    - *During excavation to subgrade.*
    - *During placement and backfill of any drainage or distribution system(s).*
    - *During placement of the crushed stone subbase material.*
    - *During placement of the surface material.*
    - *Upon completion of final grading and establishment of permanent stabilization.*

Maintenance Criteria:

The following procedures should be considered essential for maintaining permeable pavement systems:

- Pavements should be used only where regular maintenance can be performed. Maintenance agreements should clearly specify how to conduct routine tasks to ensure long-term performance.

- Pavement surfaces should be swept and vacuumed to reduce sediment accumulation and ensure continued surface porosity. Sweeping should be performed at least twice annually with a commercial cleaning unit. Washing systems and compressed air units should not be used to perform surface cleaning.

- Drainage pipes, inlets, stone edge drains, and other structures within or draining to the subbase should be cleaned out at regular intervals.

- Trucks and other heavy vehicles can grind dirt and grit into the porous surfaces, leading to clogging and premature failure. These vehicles should be prevented from tracking and spilling material onto the pavement.

- Deicers should be used in moderation. When used, deicers should be non-toxic and organic and can be applied either as calcium magnesium acetate or as pretreated salt. Snow plowing should be done carefully with blades set one-inch higher than normal. Plowed snow piles and snowmelt should not be directed to permeable pavement.

A-3. Reinforced Turf

Reinforced turf consists of interlocking structural units with interstitial areas for placing gravel or growing grass. These systems are suitable for light traffic loads and are commonly used for emergency vehicle access roads and overflow or occasionally used parking.

Applications:

Reinforced turf is effective for reducing imperviousness in parking lots, driveways, plazas, and access roads in both new and redevelopment applications in residential, commercial, and industrial projects. It is particularly useful in high-density areas where space is limited. Because reinforced turf is an open load-bearing matrix within a vegetated or gravel surface, runoff characteristics are similar to open space in good condition or gravel.

Performance:

When designed according to the guidance provided below, reinforced turf areas are considered as permeable surfaces. Post development RCN's for reinforced turf applications should reflect the surfacing material used (e.g., "open space in good condition" for grass).

Constraints:

The following constraints are critical when considering the use of reinforced turf to capture and treat stormwater runoff:

- **Space:** Reinforced turf works best when designed as small areas or in a series of narrow strips. The size and distribution of these surfaces within a project must be considered early during planning and design.

- **Topography:** Runoff should sheetflow onto and across reinforced turf. Contributing drainage slopes should be moderate (≤ 5%). If slopes are too steep, then level-spreading devices may be needed to redistribute flow. Turf surfaces should be gradual (≤ 4%) to prevent ponding of water within the subbase.

- **Soils:** Reinforced turf may be used in all soils but works best in sandy soils.

- **Drainage Area:** Reinforced turf is an at source practice for reducing impervious cover. As the impervious area draining to each application increases, effectiveness weakens. Therefore, runoff from adjacent areas should be limited.

- **Hotspot Runoff:** Reinforced turf should not be used to treat hotspots that generate higher concentrations of hydrocarbons, trace metals, or toxicants than are found in typical stormwater runoff and may contaminate groundwater.

- **Structure:** Most reinforced turf has a lower load bearing capacity than conventional pavements. Therefore, applications should be limited to locations that do not receive heavy vehicle traffic and where sub soils are not compacted.

- **Operation:** Reinforced turf is susceptible to owner neglect. Individual owners need to be educated to ensure that proper maintenance and winter operation activities will allow the system to function properly.

Design Guidance:

The following conditions should be considered when designing reinforced turf:

- **Conveyance:** *Runoff shall enter, flow through, and exit reinforced turf in a safe and non-erosive manner.* Reinforced turf should be designed off-line whenever possible.

  The slope of reinforced turf shall be at least 1% but no greater than 5%. Reinforced turf applications may be placed in sloped areas by terracing levels along existing contours.

- **Treatment:** All reinforced turf systems shall meet the following conditions:

  - *A subbase layer of clean, open graded stone or sand with a porosity (n) of 30% (1.5" to 2" stone is preferred) shall be used below the turf surface.* The subbase may be 6" to 12" thick.

- **Soils:**

  - *Reinforced turf shall not be placed on areas of compacted fill.*
  - Reinforced turf should be installed in HSG A. B, or C for maximum effiectiveness.

- **Setbacks:**

  - Reinforced turf should be sized and located to meet minimum local requirements for underground utility clearance.

- **Structure:** *Reinforced turf shall be capable of bearing the anticipated vehicle and traffic loads.* Systems conforming to the specifications found in Appendix B.4 should be structurally stable for typical (e.g., light duty) applications.

- **Landscaping:** *Reinforced turf shall be identified on landscaping plans.* Trees and shrubs should not be located adjacent to reinforced turf where damage by root penetration is a concern.

Construction Criteria:

The following items should be addressed during construction of projects with reinforced turf:

- **Erosion and Sediment Control:** Final grading for installation shall not take place until the surrounding site is stabilized. *If this cannot be accomplished, runoff from disturbed areas shall be diverted around proposed locations.*

- **Soil Compaction:** *Sub soils shall not be compacted*. Construction should be performed with lightweight, wide tracked equipment to minimize compaction. Excavated materials should be placed in a contained area.

- **Filter Cloth:** *Filter cloth shall not be used between the subbase and sub soils.*

- **Subbase Installation:** *The subbase shall be placed in lifts and lightly rolled according to the specifications (see Appendix B.4).* Subbase aggregate should be clean, washed, and free of fines.

Inspection:

- *Regular inspections shall be made during the following stages of construction:*

    - *During excavation to sub grade.*
    - *During placement of the subbase material.*
    - *During placement of the surface material.*
    - *Upon completion of final grading and establishment of permanent stabilization.*

Maintenance Criteria:

The following procedures should be considered essential for maintaining reinforced turf:

- Reinforced turf should be used only where regular maintenance can be performed. Maintenance agreements should clearly specify how to conduct routine tasks to ensure long-term performance of these systems.

- Drainage pipes, inlets, stone edge drains, and other structures within or draining to the subbase should be cleaned out at regular intervals.

- Trucks and other heavy vehicles can damage the interlocking matrix, leading to premature failure. These vehicles should be prevented from driving onto the turf.

- Reinforced turf should be mown regularly and clippings removed from the application area.

Section 5.4 Treatment Using Nonstructural and Micro-Scale Practices

5.4.1 Introduction

Disconnecting impervious cover and treating urban runoff closer to its source are the next steps in the design process for implementing ESD. Using nonstructural techniques (e.g., disconnection of rooftop runoff, sheetflow to conservation areas) and micro-scale practices (e.g., rain gardens, bio-swales) throughout a development is an effective way to accomplish this goal. Nonstructural practices may be used to disconnect impervious cover and direct runoff over vegetated areas to promote overland filtering and infiltration. Micro-scale practices are useful for capturing and treating runoff near the source. Whether runoff is directed over permeable areas or captured in small water quality treatment practices, there are reductions in both volume and pollutants delivered to receiving streams. Accordingly, these practices may be used to address the ESD sizing criteria when designed and implemented properly.

Nonstructural and micro-scale practices are an integral part of the ESD stormwater management plans. Therefore, the use of these practices shall be documented at the concept, site development, and final design stages and verified with “as-built” certification. If practices are not implemented as planned, then volumes used to design structural practices shall be increased appropriately to meet the ESD sizing criteria.

5.4.2 Nonstructural Practices

Nonstructural practices combine relatively simple features, grading, and landscaping to divert runoff into vegetated areas and away from conventional storm drain systems. Runoff flows over these areas, filters through the vegetation, and soaks into the ground. Runoff should be conveyed as sheetflow into and through these areas. As depth and velocity of flow increase, runoff concentrates and the ability of vegetation to filter and detain runoff diminishes rapidly. Consequently, requirements and conditions for nonstructural practices reflect the need to maintain sheetflow conditions.

Nonstructural practices include:

- N-1. Disconnection of Rooftop Runoff
- N-2. Disconnection of Non-Rooftop Runoff
- N-3. Sheetflow to Conservation Areas

N-1. Disconnection of Rooftop Runoff

Rooftop disconnection involves directing flow from downspouts onto vegetated areas where it can soak into or filter over the ground. This disconnects the rooftop from the storm drain system and reduces both runoff volume and pollutants delivered to receiving waters. To function well, rooftop disconnection is dependent on several site conditions (e.g., flow path length, soils, slopes).

Applications:

There are many opportunities for disconnecting rooftops in both new and redevelopment designs. Runoff may be directed to undisturbed natural areas (e.g., vegetated buffers) or landscaped areas (e.g., lawns, grass channels). Rooftop disconnection is possible in commercial, industrial, and residential settings given the constraints listed below.

Performance:

The P_E values shown in Table 5.6 may be applied to the ESD sizing criteria when the contributing rooftop area is adequately disconnected. Re_v requirements (see Chapter 2) are also addressed when the P_E from Table 5.6 meets or exceeds the soil specific recharge factor listed in Section 2.2.

Constraints:

The following constraints are critical when considering the use of rooftop disconnection to capture and treat stormwater runoff:

- **Space:** A permeable, vegetated treatment area equal to the flow path length must be available down gradient from the downspout to effectively disconnect rooftop runoff. Additional treatment using micro-scale practices may be used to fully meet P_E requirements.

- **Topography:** Runoff must be conveyed as sheetflow from the downspout and across open areas to maintain proper disconnection. Level spreaders may be needed at the downspout to dissipate flow. Additionally, disconnected downspouts should be located on gradual slopes (≤ 5%) and directed away from buildings to both maintain sheetflow and prevent water damage to basements and foundations. If slopes are too steep (> 5%), a series of terraces or berms may be required to maintain sheetflow. These terraces may be readily constructed of landscaping stones, timber, or earthen berms.

- **Soils:** Downspout disconnections work best in undisturbed, sandy soils that allow runoff to infiltrate. Clayey soils or soils that have been compacted by construction equipment greatly reduce the effectiveness of this practice and soil amendments may be needed.

Figure 5.4 Disconnection of Rooftop Runoff

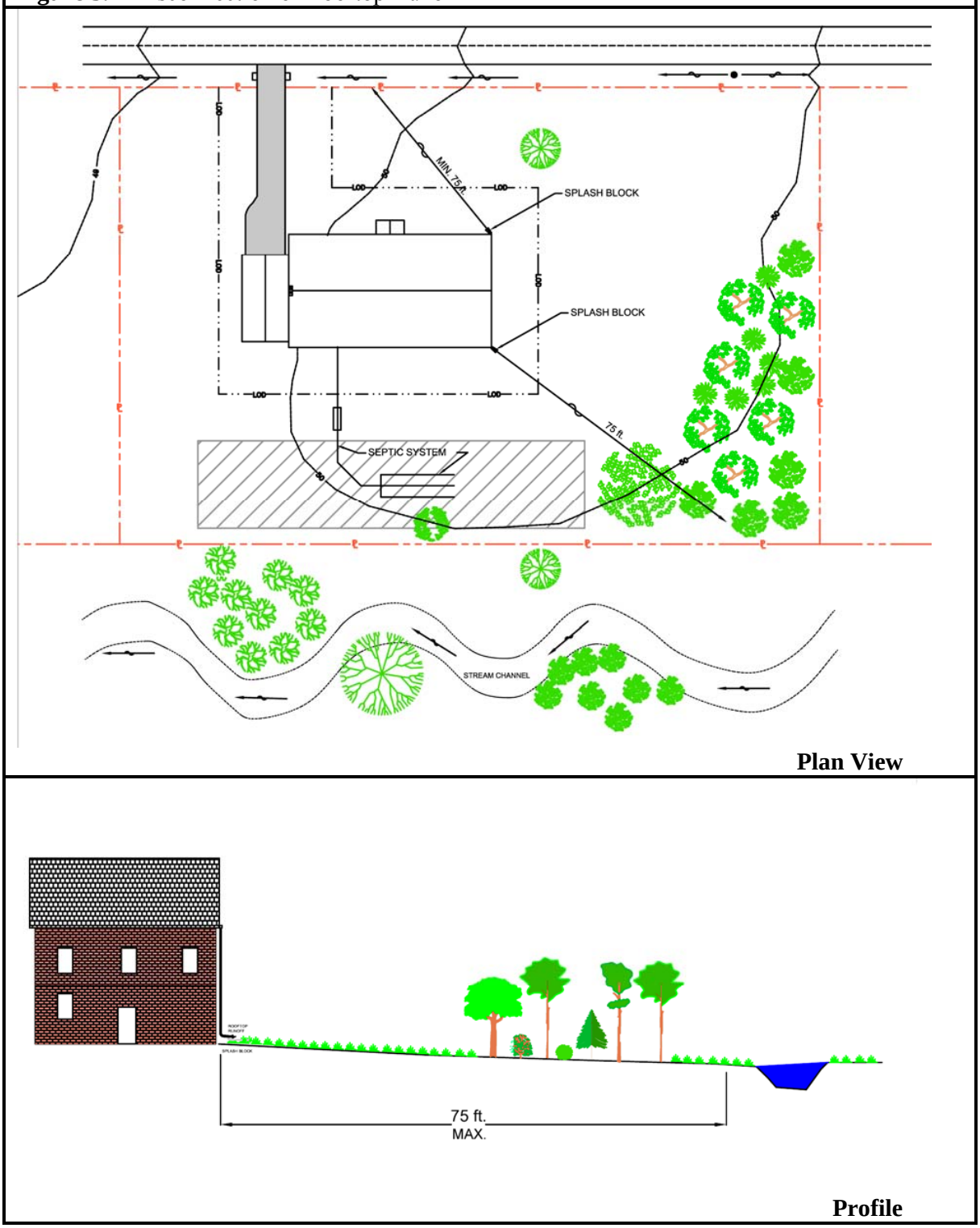

- **Drainage Area:** The rooftop area to each downspout should be small enough to prevent concentration of flow within the permeable treatment area. Disconnections may not be feasible for large rooftops or those with a limited number of downspouts.

- **Reconnections:** Disconnections are ineffective if runoff flows onto impervious areas located directly below the downspout. This practice may not be feasible if there are large areas of imperviousness close to downspouts.

Design Guidance:

The following conditions should be considered when designing rooftop disconnections:

- **Conveyance:** *Runoff from disconnected downspouts shall drain in a safe and non-erosive manner through vegetated areas to the property line or downstream BMP.*

- **Treatment:** Disconnections shall meet the following conditions:

  - *A pervious area at least 15 feet long (12 feet for Eastern Shore projects) shall be available down gradient of disconnected downspouts.* The length of the disconnection flow path may be increased up to 75 feet to address larger values of P_E as shown in Table 5.6.
  - *Disconnections shall be located on an average slope of 5% or less.* Terraces, berms, or similar grade controls may be used where average slopes exceed 5%.
  - *The drainage area to each disconnected downspout shall be 500 ft^2 or less.*
  - *Disconnected downspouts shall be at least 10 ft. from the nearest impervious surface of similar or lower elevation to prevent reconnection.*

Table 5.6. ESD Sizing Factors for Rooftop Disconnection

	Disconnection Flow Path Length (ft.)				
Western Shore	15	30	45	60	75
Eastern Shore	12	24	36	48	60
P_E (in.) =	**0.2**	**0.4**	**0.6**	**0.8**	**1.0**

- **Landscaping**: *Areas receiving disconnected rooftop runoff shall be identified and notations related to grading and construction operations included on the landscaping plans.*

  Disconnections should be directed over HSG A, B, or C (e.g., sands, sandy loams, loams). HSG D or soils that are compacted by construction equipment may need to be tilled and/or amended to increase permeability. Groundcover should be provided after any soil amendments are used. Turf grass is the most common groundcover in residential applications. However, trees and shrubs as well as other herbaceous plants will enhance infiltration and evapotranspiration of runoff.

Construction Criteria:

The following items should be addressed during the construction of projects with planned rooftop disconnections:

- **Erosion and Sediment Control**: *Erosion and sediment control practices (e.g., sediment traps) shall not be located in vegetated areas receiving disconnected runoff.*

- **Site Disturbance:** Construction vehicles and equipment should avoid areas receiving disconnected runoff to minimize disturbance and compaction. *Should areas receiving disconnected runoff become compacted, scarifying the surface or rototilling the soil to a depth of four to six inches shall be performed to ensure permeability.* Additionally, amendments may be needed for tight, clayey soils.

Inspection:

A final inspection shall be conducted before use and occupancy approval to ensure that sizing for treatment areas have been met and permanent stabilization has been established.

Maintenance Criteria:

Maintenance of areas receiving disconnected runoff is generally no different than that required for other lawn or landscaped areas. The areas receiving runoff should be protected from future compaction (e.g., by planting trees or shrubs along the perimeter). In commercial areas, foot traffic should be discouraged as well.

N-2. Disconnection of Non-Rooftop Runoff

Non-rooftop disconnection involves directing flow from impervious surfaces onto vegetated areas where it can soak into or filter over the ground. This disconnects these surfaces from the storm drain system, reducing both runoff volume and pollutants delivered to receiving waters. Non-rooftop disconnection is commonly applied to smaller or narrower impervious areas like driveways, open section roads, and small parking lots and is dependent on several site conditions (e.g., permeable flow path length, soils, slopes, compaction) to function well.

Applications:

There are many opportunities for disconnecting impervious surfaces in both new and redevelopment designs. Runoff may be directed as sheetflow to undisturbed natural areas (e.g., vegetated buffers) or landscaped areas (e.g., lawns, grass channels). Non-rooftop disconnection is possible in commercial, industrial, and residential settings given the constraints listed below.

Performance:

The P_E values shown in Table 5.7 below may be applied to the ESD sizing criteria when the contributing developed area is adequately disconnected. Re_v requirements (see Chapter 2) are also met when the P_E from Table 5.7 meets or exceeds the soil specific recharge factor listed in Section 2.2.

Constraints:

The following constraints are critical when considering the use of non-rooftop disconnection to capture and treat stormwater runoff:

- **Space:** A permeable, vegetated treatment area equal to the minimum flow path length needed for treatment must be available down gradient of the impervious cover to effectively disconnect runoff. If the flow path length is insufficient, additional treatment may be provided using micro-scale practices.

- **Topography:** Runoff must be conveyed as sheetflow onto and across open areas to maintain proper disconnection. Additionally, disconnections should be located on gradual slopes (≤ 5%) and directed away from buildings to both maintain sheetflow and prevent water damage to basements and foundations. If slopes are too steep (> 5%), a series of terraces or berms may be required to maintain sheetflow. These terraces may be readily constructed of landscaping stones or timber.

- **Soils:** Non-rooftop disconnection works best in undisturbed, sandy soils that allow runoff to infiltrate. Clayey soils or soils that have been compacted by construction greatly reduce the effectiveness of this practice.

- **Drainage Area:** The impervious area to each discharge location should be small enough to prevent flow concentration onto permeable treatment areas. Disconnections may not be feasible for large blocks of impervious cover or areas with limited discharge points.

- **Hotspot Runoff:** Disconnections should not be used to treat hotspots that generate higher concentrations of hydrocarbons, trace metals, or toxicants than are found in typical stormwater runoff and may contaminate groundwater.

Design Guidance:

The following conditions should be considered when designing non-rooftop disconnections:

- **Conveyance:** *Runoff from disconnected areas shall drain in a safe and non-erosive manner through vegetated areas to the property line or downstream BMP.*

  A 1 to 2 foot wide gravel (typ. No. 67 stone) transition strip should be provided from the disconnected area to the vegetated area to assure that runoff will flow in a safe and non-erosive manner.

- **Treatment:** Disconnections shall meet the following conditions:

  - *The flow path or "disconnection" through vegetated areas shall be at least 10 feet and shall not exceed 75 feet.* The flow path may be increased to address larger values of P_E to a maximum of 1 inch as shown in Table 5.7.
  - *The maximum contributing impervious flow path length shall be 75 feet, and the maximum contributing pervious flow path shall be 150 feet.*
  - *Disconnections shall be located on an average slope of 5% or less.* Terraces, berms, or similar grade controls may be used where average slopes exceed 5%.
  - *The drainage area to each disconnection shall be 1,000 ft^2 or less.*
  - *Disconnections shall be at least 10 ft. from the nearest impervious surface of similar or lower elevation to prevent reconnection.*

Table 5.7. ESD Sizing Factors for Non-Rooftop Disconnection

Ratio of Disconnection Length to Contributing Length					
Impervious Ratio	0.2:1	0.4:1	0.6:1	0.8:1	1:1
Pervious Ratio	0.1:1	0.2:1	0.3:1	0.4:1	0.5:1
P_E (in.) =	**0.2**	**0.4**	**0.6**	**0.8**	**1.0**

- **Landscaping**: *Areas receiving disconnected runoff shall be identified and notations related to grading and construction operations included on the landscaping plans.*

  Disconnections should be directed over HSG A, B, or C (e.g., sands, sandy loams, loams). HSG D and soils that are compacted by construction equipment may need to be tilled and/or amended to increase permeability. Groundcover vegetation should be provided after any soil

amendments are used. Turf grass is the most common groundcover in residential applications. Trees and shrubs as well as other herbaceous plants will enhance infiltration and evapotranspiration of runoff.

Construction Criteria:

The following should be addressed during construction of projects with non-rooftop disconnections:

- **Erosion and Sediment Control:** *Erosion and sediment control practices (e.g., sediment traps) shall not be located in areas designated for non-rooftop disconnections.*

- **Site Disturbance:** To minimize disturbance and compaction, construction vehicles and equipment should avoid areas receiving disconnected runoff. *Should areas receiving disconnected runoff become compacted, scarifying the surface or rototilling the soil to a depth of four to six inches shall be performed to ensure permeability.* Additionally, amendments may be needed for tight, clayey soils.

Inspection:

A final inspection shall be conducted before use and occupancy approval to ensure that adequate treatment areas and permanent stabilization has been established.

Maintenance Criteria:

Maintenance of areas receiving disconnected runoff is generally no different than that required for other lawn or landscaped areas. The areas receiving runoff should be protected from future compaction (e.g., by planting trees or shrubs along the perimeter). In commercial areas, high foot traffic should be discouraged as well.

Fig. 5.5 Non-Rooftop Disconnection

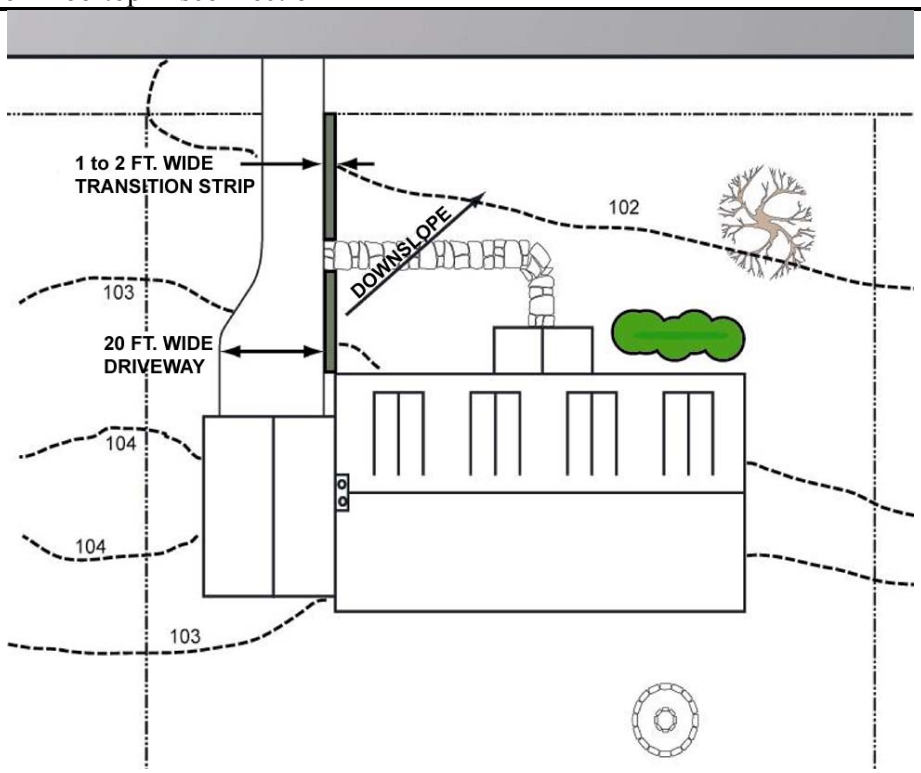

Plan View

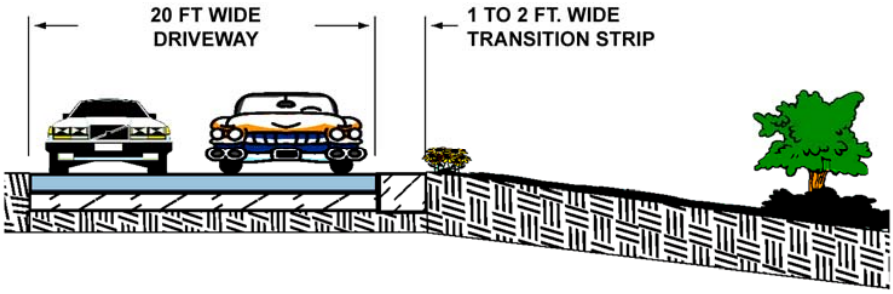

Profile

Figure 5.6 Non-Rooftop Disconnection

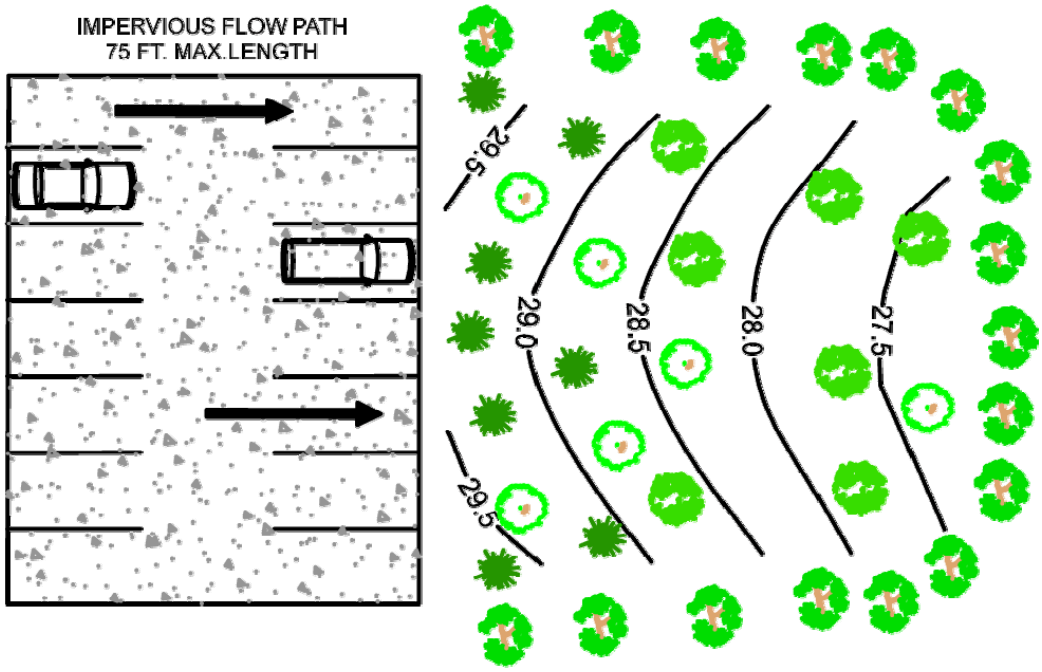

Plan View

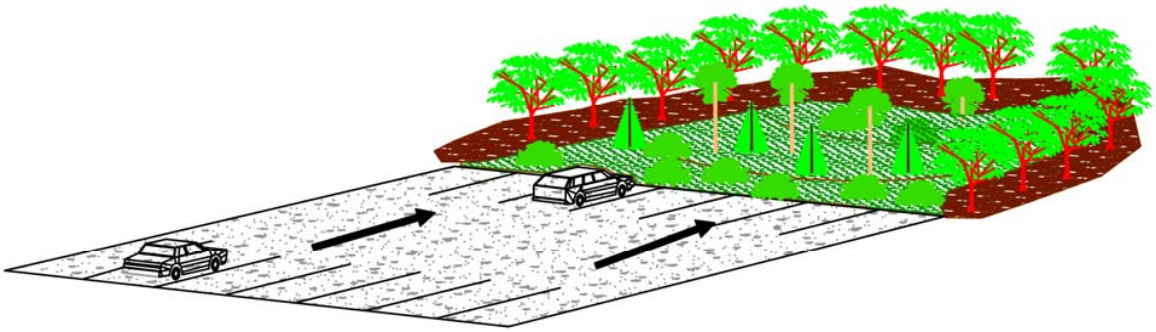

Isometric

N-3. Sheetflow to Conservation Areas

Stormwater runoff is effectively treated when flow from developed land is directed to adjacent natural areas where it can soak into or filter over the ground. To function well, this practice is dependent on several site conditions (e.g., buffer size, contributing flow path length, slopes, compaction).

Applications:

Sheetflow to conservation areas can be used in most development situations provided that site conditions allow implementation. This practice may be used wherever existing stream buffers and other natural areas are protected, expanded, or created during project planning and stormwater runoff may be directed into them, given the constraints listed below.

Performance:

The P_E values shown in Table 5.8 may be applied to the ESD sizing criteria when runoff from developed areas is directed into a conservation area meeting the criteria below. Re_v requirements (see Chapter 2) are also met for the contributing drainage area.

Constraints:

The following constraints are critical when considering the use of sheetflow to conservation areas to treat stormwater runoff:

- **Space:** Conservation areas need to be wide enough to effectively treat runoff and protect natural resources. Flow path lengths from impervious and pervious areas should be minimized to prevent concentration and erosive conditions.

- **Topography:** Runoff should enter conservation areas as sheetflow to enhance performance and prevent erosion. If slopes are too steep to maintain sheetflow (> 5%), then level-spreading devices will be needed to redistribute flow prior to entering designated buffers.

- **Hotspot Runoff:** Conservation areas should not be used to treat hotspots that generate higher concentrations of hydrocarbons, trace metals, or toxicants than are found in typical stormwater runoff and may contaminate groundwater.

- **Easements:** Public maintenance access and formal, legal protection are essential for long-term viability of conservation areas. Acceptable conservation easements, vegetation management plans, or other enforceable instruments are required to prevent encroachment by surrounding landowners minimize invasive or noxious plant growth, and protect conservation areas.

Design Guidance:

The following conditions should be considered when designing sheetflow to conservation areas:

- **Conveyance:** *Runoff from contributing areas shall sheetflow into conservation areas.* Either the average contributing overland slope should be 5% or less or a level-spreading device must be used. A boundary spreader, gravel diaphragm, or infiltration berm should be located along the upstream perimeter of the conservation area to diffuse flows from larger storms.

- **Treatment:** Designs using sheetflow to conservation areas shall meet the following conditions:

  - *Conservation areas shall be 20,000 square feet or larger to be accepted for ESD purposes.*
  - *The minimum effective width for conservation areas shall be 50 feet.* Conservation area widths may be increased to address larger values of P_E as shown in Table 5.8.
  - *The maximum P_E applied to conservation areas shall be 1.0 inch.*
  - Conservation areas may include existing natural resources, created or restored resources, or a combination of both.

Table 5.8. Sheetflow to Conservation Area Sizing Factors

Min. Width (ft) =	50	75	100
P_E (in.) =	**0.6**	**0.8**	**1.0**

Example: An existing wooded area (60 ft. wide by 250 ft. long) is placed in a conservation easement and identified as a possible area for treating stormwater runoff. While the effective width (60 ft.) is sufficient to treat the area, 15,000 square feet is less than the 20,000 square foot minimum.

To meet the minimum area requirement, the conservation area will then be expanded an additional 20 feet in width through reforestation. This increases the conservation area to 20,000 square feet. Expanding the width by 20 feet through reforestation also increases the effective width to 80 feet. Therefore, a $P_E = 0.8$ may be applied to the contributing drainage area.

- **Landscaping**: Landscaping plans should clearly specify how vegetation within buffers will be established and managed. These plans should include plants that are native or adapted to Maryland and procedures for preventing noxious or invasive plants. Managed turf (e.g., playgrounds, regularly mown and maintained open areas) is not an acceptable form of vegetation management.

Figure 5.7 Sheetflow to Conservation Areas

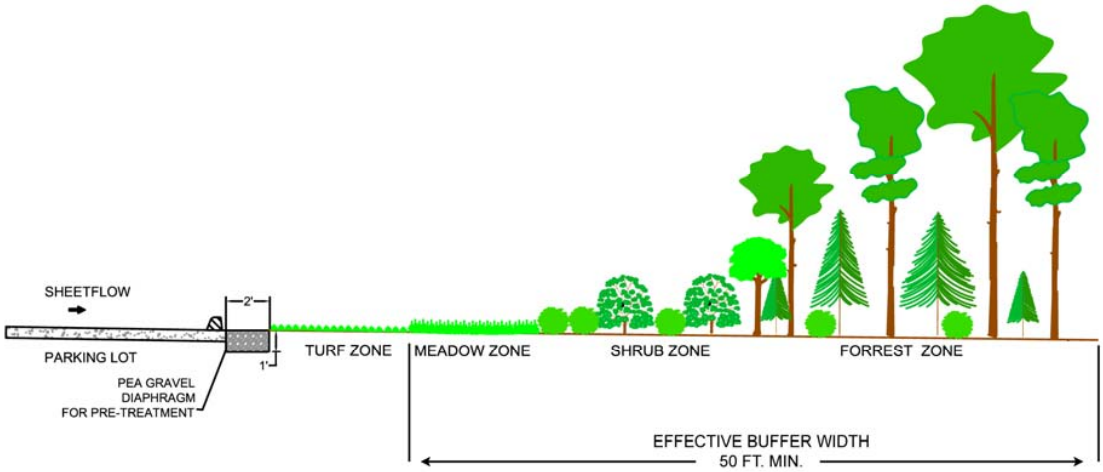

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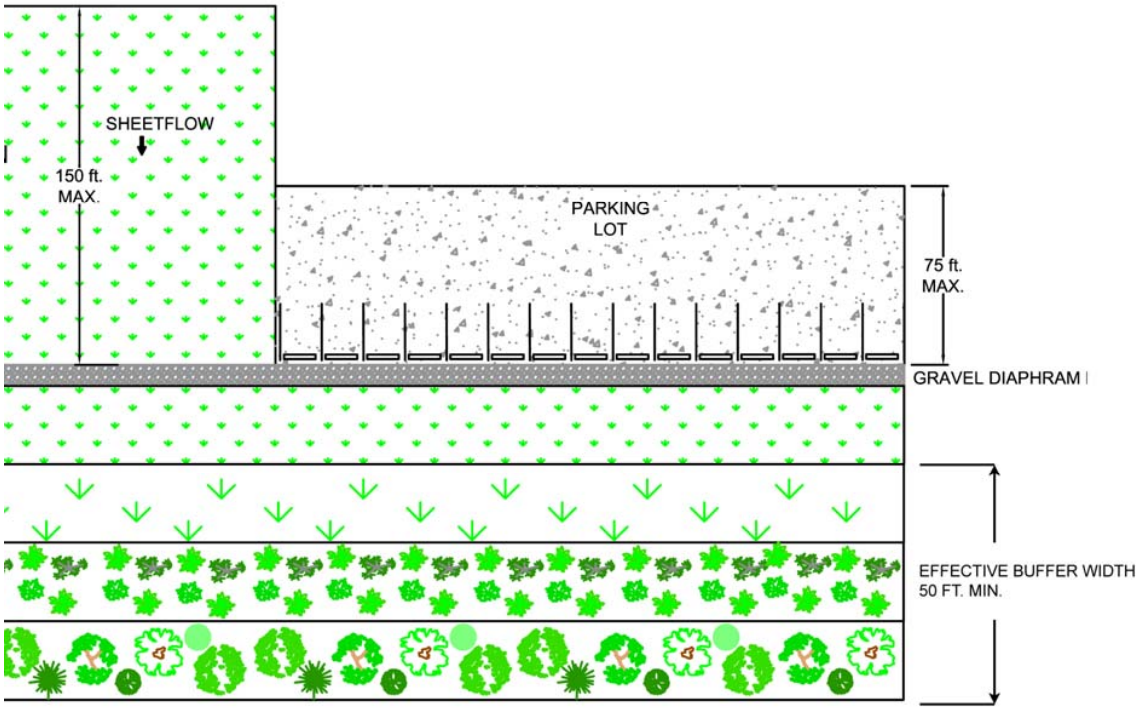

Plan View

- **Easements:** Conservation areas shall be protected by an acceptable easement or other enforceable instrument that ensures perpetual protection of the area. The easement must clearly specify how the natural area vegetation shall be managed and boundaries will be marked.

Construction Criteria:

The following should be addressed during construction of projects with sheetflow to conservation areas:

- **Erosion and Sediment Control:** *Erosion and sediment control plans shall clearly indicate where conservation areas are located and what measures will be used for protection during construction. These areas shall be clearly marked in the field and not receive sediment-laden runoff prior to project completion. Erosion and sediment control practices shall not be located within buffers.*

- **Site Disturbance:** *Buffers shall not be disturbed (i.e., cleared or graded) during construction except for temporary impacts associated with incidental utility construction or mitigation and afforestation projects. Any temporary impacts shall be immediately repaired and stabilized.*

Inspection:

- Regular inspections shall be made during the following stages of construction:

    - *During initial grading operations to ensure that buffers are clearly marked in the field.*
    - *Before use and occupancy approval to verify area measurements andensure that permanent stabilization has been established.*

Maintenance Criteria:

Conservation areas shall remain unmanaged other than routine debris removal and repairing areas of concentrated flow. Invasive and noxious plant removal and bi-annual mowing for meadow areas may be needed. Signs should be maintained and supplemental plantings performed as needed.

5.4.3 Micro-Scale Practices

Micro-scale practices are small water quality treatment devices used to capture and treat stormwater runoff from discrete impervious areas (e.g., less than one acre). These practices typically include natural systems, vegetation, and soils and may be interconnected to create a more natural drainage system. In many cases, they may resemble the larger structural practices (e.g., infiltration, filters, dry swales) described in Chapter 3. However, the design variants listed below can be distributed throughout a project to provide stormwater management at the source unlike their structural relatives that were typically used as "end-of-pipe" treatment for larger drainage areas.

Micro-scale practice variants include:

- M-1. Rainwater Harvesting
- M-2. Submerged Gravel Wetlands
- M-3. Landscape Infiltration
- M-4. Infiltration Berms
- M-5. Dry Wells
- M-6. Micro-Bioretention
- M-7. Rain Gardens
- M-8. Swales
- M-9. Enhanced Filters

Performance Standards for Micro-Scale Practices

- *Micro-scale practices used for new development shall promote runoff reduction and water quality treatment through infiltration, filtration, evapotranspiration, rainwater harvesting, or a combination of these techniques.*

- *Micro-scale filters used for new development shall be designed to promote recharge (e.g., enhanced filter) and be planted as part of the landscaping plans.*

M-1. Rainwater Harvesting (Cisterns and Rain Barrels)

Rainwater harvesting practices intercept and store rainfall for future use. Stored water may be used for outdoor landscaping irrigation, car washing, or non-potable water supply. The capture and re-use of rainwater promotes conservation, as well as reduces runoff volumes and the discharge of pollutants downstream.

Applications:

Rainwater harvesting can be applied on residential, commercial, municipal, or industrial sites. For small-scale residential applications, rain barrels are typically used to provide storage of rooftop runoff. These systems are generally designed for outdoor use. However, because water demand varies seasonally, other treatment practices may be needed for dewatering during winter months.

Larger storage tanks or cisterns are used in commercial or industrial applications. These systems use the captured rainwater for non-potable water supply, providing a year-round source. The complexity of the sizing, installation, and accessories of this type of application make it more realistic for commercial operations. Separate plumbing, pressure tanks, pumps, and backflow preventers are necessary for indoor applications.

Performance:

The pollutant removal capability of rainwater harvesting systems is directly proportional to the amount of runoff captured, stored, and re-used. Therefore, P_E for the contributing drainage area is based on the volume captured in the rainwater harvesting design. In addition, Re_v requirements may be met only when stored water is used on landscaped areas.

Constraints:

The following constraints are critical when considering the use of rainwater harvesting techniques to capture and re-use stormwater runoff:

- **Space:** Lack of space and the presence of surrounding trees can limit the opportunities for rain barrels and cisterns. Leaves and woody debris from overhead trees can clog the storage tanks or attract birds whose droppings may contaminate the tank. Space limitations can be overcome if storage is provided on the roof or underground. The proximity to building foundations also needs to be considered for dewatering and overflow conditions.

- **Topography:** Locating storage tanks in low areas may increase the volume of rainwater stored but will require pumping for distribution. To prevent erosion on steeply sloped surfaces, a bermed or concave holding area down gradient can store water for landscape irrigation.

- **Drainage Area:** The drainage area to each storage tank needs to consider year-round water demands. The drainage area to each rain barrel needs to be small enough to prevent concentrated flow during dewatering operations.

- **Operation:** Rain barrels and other storage tanks must be operated and maintained throughout the year. This includes any necessary dewatering in between rain events so that the required storage volume is available. Where freezing and ice formation are concerns, rainwater harvesting systems should be located underground or indoors.

  Rain barrels are subject to elimination and/or neglect by homeowners. Education is needed to ensure that captured runoff will flow to pervious surfaces and overall system function is sustained.

Design Guidance:

The following conditions should be considered when designing rainwater harvesting systems:

- **Conveyance:** *A stable discharge shall be provided to pervious areas for any necessary dewatering between storm events. An overflow shall be provided to pass larger storm events.* Conveyance to rainwater harvesting storage tanks consists of gutters, downspouts, and pipes. The overflow should be near the top of the storage unit and may consist of plastic hoses or similar materials to direct runoff safely to a stable outfall to down gradient properties.

- **Treatment:** Rainwater harvesting systems shall meet the following conditions:

  - *Screens and filters shall be used to remove sediment, leaves, and other debris from runoff for pretreatment and can be installed in the gutter or downspout prior to storage.*
  - *Rain barrels and cisterns shall be designed to capture at least 0.2 inches of rainfall from the contributing rooftop area. A P_E value based on the ESD_v captured and treated shall be applied to the contributing rooftop area.*
  - *Where rainwater harvesting systems are connected to indoor plumbing, the Re_v requirement shall be addressed separately.*
  - *The design shall plan for dewatering to vegetated areas.*
  - *The design of large commercial and industrial storage systems shall be based on water supply and demand calculations. Stormwater management calculations shall include the discharge rate for distribution and demonstrate that captured rainwater will be used prior to the next storm event.*
  - *Large capacity systems shall provide dead storage below the outlet and an air gap at the top of the tank.* Gravity-fed systems should provide a minimum of six inches of dead storage. For systems using a pump, the dead storage depth will be based on the pump specifications.

- **Distribution System:** Most outdoor distribution is gravity fed or can be operated with a pump. For underground tanks or cisterns, a pump, pressure tank, and backflow preventer will be needed.

- **Dewatering:** During the non-growing season, irrigation systems are typically turned off and may need to be dewatered.

- **Observation Wells:** *An observation well consisting of an anchored, perforated pipe (4" min.) shall be provided on all below-ground installations. The top of the observation well shall be at least six inches above grade.*

- **Safety:** *Above ground home storage tanks shall have secured openings small enough to prevent child entry. For underground systems, manholes shall be secured to prevent unauthorized access.*

- **Operation:** Rainwater storage designs need to consider the potential for freezing. These systems may need to be located indoors or underground below the frost line if freezing conditions are expected.

- **Mosquitoes:** Screens should be provided to prevent mosquitoes and other insects from entering the tanks.

- **Setbacks:** *Overflow devices shall be designed to avoid ponding or soil saturation within 10 ft. of building foundations.*

Construction Criteria:

The following should be addressed during construction of projects with rainwater harvesting systems:

- **Site Disturbance:** Underground storage tanks shall be placed on or in native soils. If placement on fill material is necessary, a geotechnical analysis may be required by the approving authority.

- **Storage Tanks:**

    - *Storage tanks shall be designed to be watertight and all materials should be sealed with a water safe, non-toxic substance.*
    - *Storage tanks shall be protected from direct sunlight and shall be opaque to prevent the growth of algae.*
    - *The top of underground tanks shall be beneath the frost line.*
    - Cisterns may be ordered from a manufacturer or constructed on-site. Typical materials used to construct cisterns are fiberglass, wood, metal, or reinforced concrete.
    - Rain barrels can be purchased or custom made from large, plastic (e.g., 55-gallon) drums.

Figure 5.8 Rain Barrels

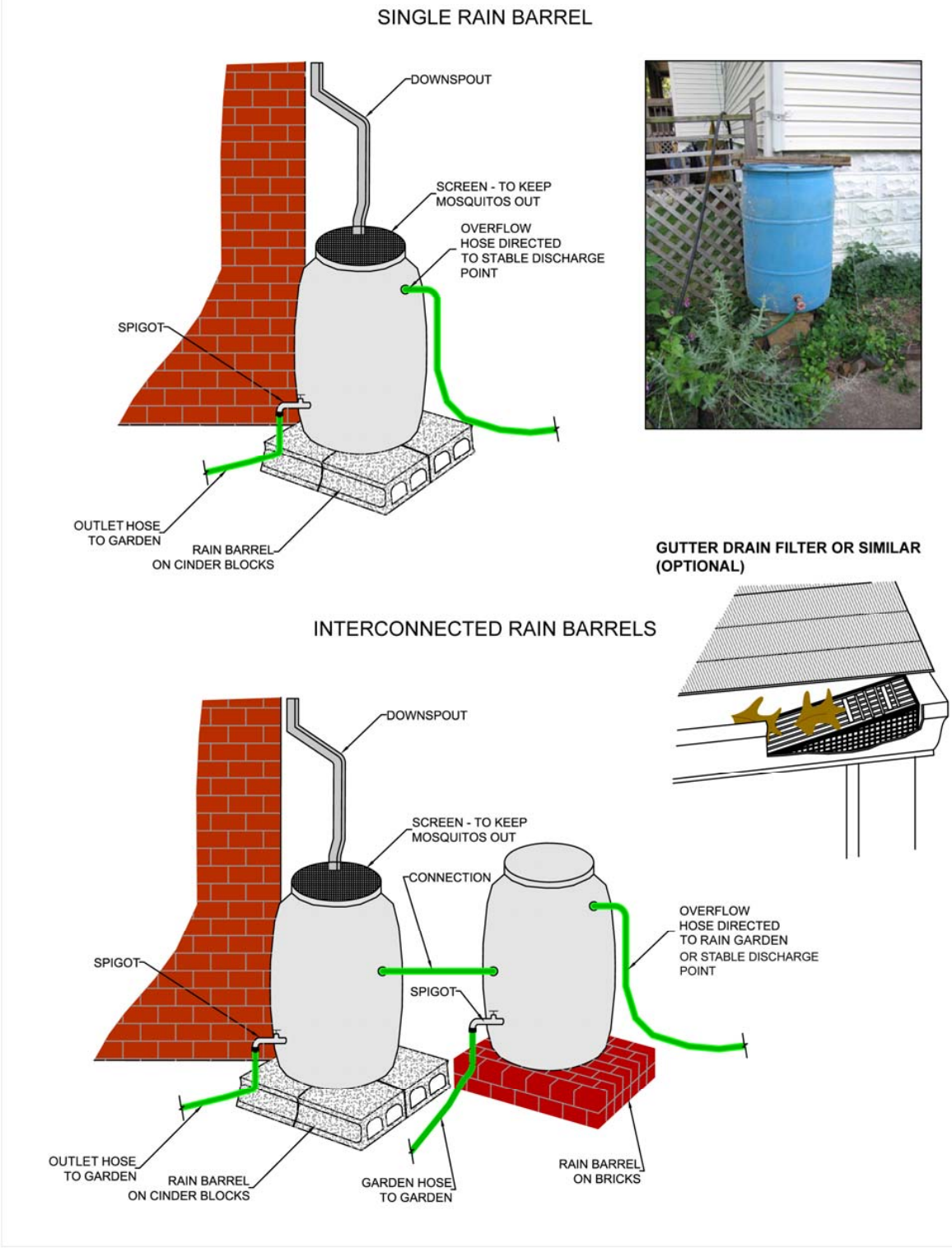

Figure 5.9 Cistern – Plan View

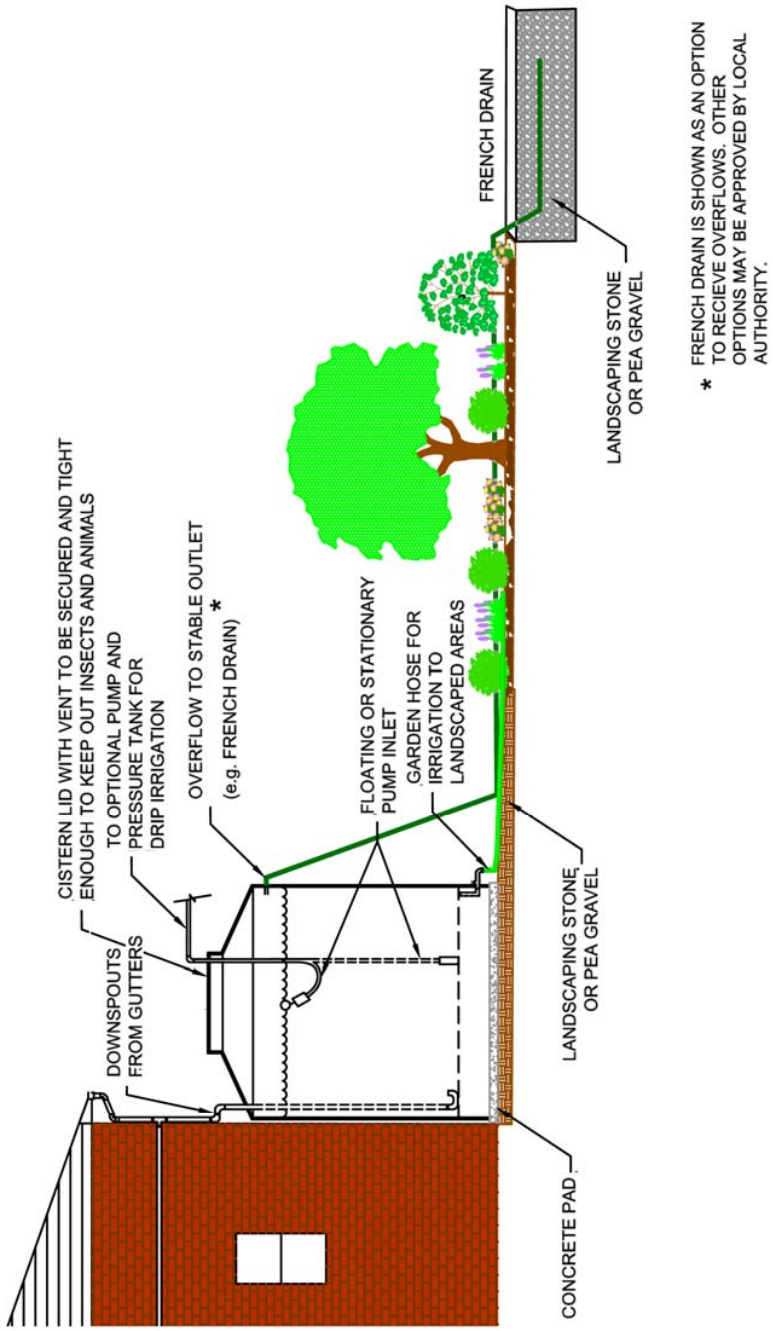

- **Pressurization:** Depending on the use of stored water, pressurization may be required. To add pressure, a pump or pressure tank can be used.

Inspection:

Prior to operation, certification shall be required that the constructed system meets the conditions specified on the approved plans. Additionally, certification regarding the water tightness of the underground storage tank shall be required after its installation.

Maintenance Criteria:

The following items should be addressed to ensure proper maintenance and long-term performance of rainwater harvesting systems:

- *Privately owned practices shall have a maintenance plan and shall be protected by easement, deed restriction, ordinance, or other legal measures preventing its neglect, adverse alteration, and removal.*

- *Access shall be provided for cleaning, inspection, and maintenance in all cisterns. A drain plug shall also be provided to allow the system to be completely emptied if needed.*

- Leaf screens, gutters, and downspouts should be cleaned to prevent clogging. Built-up debris can also foster bacterial growth in gutters and downspouts.

- Storage tank lids and mosquito screens should be inspected and cleaned.

- Damaged components should be replaced as needed.

- To avoid freezing of components, above ground systems should be disconnected, drained, and cleaned at the start of the Winter season.

- Underground system connections should be checked for frozen lines and ice blockages during Winter.

- Indoor systems may require more specific maintenance.

M-2. Submerged Gravel Wetlands

A submerged gravel wetland is a small-scale filter using wetland plants in a rock media to provide water quality treatment. Runoff drains into the lowest elevation of the wetland, is distributed throughout the system, and discharges at the surface. Pollutant removal is achieved in a submerged gravel wetland through biological uptake from algae and bacteria growing within the filter media. Wetland plants provide additional nutrient uptake and physical and chemical treatment processes allow filtering and absorption of organic matter.

Applications:

A submerged gravel wetland can be located in limited spaces, typically set aside for site landscaping such as traffic islands or roadway medians. These systems are best suited for Maryland's Eastern Shore or areas where a high water table or poorly drained soils are present. This practice is not recommended for individual lots in a residential subdivision. Depending on individual site soil characteristics, a larger drainage area may be required to maintain saturated conditions within the wetland.

Performance:

When designed according to the guidance provided below, P_E for the contributing drainage area is based on the volume captured by submerged gravel wetlands.

Constraints:

The following constraints are critical when considering the use of submerged gravel wetlands to capture and treat stormwater runoff:

- **Space:** Additional space is needed for pretreatment measures to prevent sediment or debris from entering and clogging the gravel bed.
- **Topography:** While surrounding local slopes should be relatively flat (<2%), there needs to be sufficient elevation drop to maintain positive drainage to and through the filter media.
- **Soils:** The HSG should be C or D, or a high groundwater table, hard pan, or other confining layer should be present to maintain submerged flow conditions.
- **Drainage Area:** The drainage area should be large enough (e.g., one acre) to maintain submerged flow conditions.
- **Hotspot Runoff:** Submerged gravel wetlands without a liner should not be used to treat hotspots that generate higher concentrations of hydrocarbons, trace metals, or toxicants than are found in typical stormwater runoff and may contaminate groundwater.

- **Wetland Vegetation Establishment:** Use of native wetland plant stock obtained from a local aquatic plant nursery is recommended for establishing vegetation. Design variations may use wetland mulch or topsoil on top of the gravel, which may allow for successful seed germination. However, use of the rock media for establishing wetland conditions requires specific planting stock. Frequent inspection and maintenance will be necessary until wetland plantings are well established.

Design Guidance:

The following conditions should be considered when designing submerged gravel wetlands:

- **Conveyance:** Pretreated stormwater enters via piped or overland flow and discharges into the gravel-filled chamber. A perforated pipe (4 to 6-inch preferred) at the base of the gravel layer allows for flow-through conditions and maintains a constant water surface elevation. Discharges that exceed the ESD_v exit to a stable outfall at non-erosive velocities. These systems should be located off-line.

- **Treatment:** Submerged gravel wetlands shall meet the following conditions:

  - *Pretreatment shall be provided for 10% of the total ESD_v.* An above ground forebay area or below ground pretreatment chamber may be used.
  - *Storage for 75% of ESD_v for the entire drainage area contributing to the wetland shall be provided. A P_E value based on the ESD_v captured and treated shall be applied to the contributing drainage area. Temporary ponding depth shall not be greater than the tolerance levels of the wetland vegetation.* Temporary storage of ESD_v may be provided above the gravel bed.
  - *Storage calculations shall account for the porosity of the gravel media.*
  - *The gravel substrate shall be no deeper than four feet.*
  - Surface area requirements for stormwater wetlands in Chapter 3 do not apply to this practice because pollutant removal primarily takes place within the rock media.

- **Flow Splitter:** A flow splitter should be provided to divert the ESD_v to the submerged gravel wetland (see Details No. 5 and No. 6, Appendix D.8).

- **Treatment Cells:** Multiple treatment cells are optional and may be separated by earth berms.

- **Observation Wells:** *An observation well consisting of an anchored, six-inch diameter perforated pipe shall be required. The top of the observation well shall be at least six inches above grade.*

- **Landscaping:** *A minimum of three different types of wetland species shall be provided.* Replacement plantings may be necessary.

Figure 5.10 Submerged Gravel Wetland

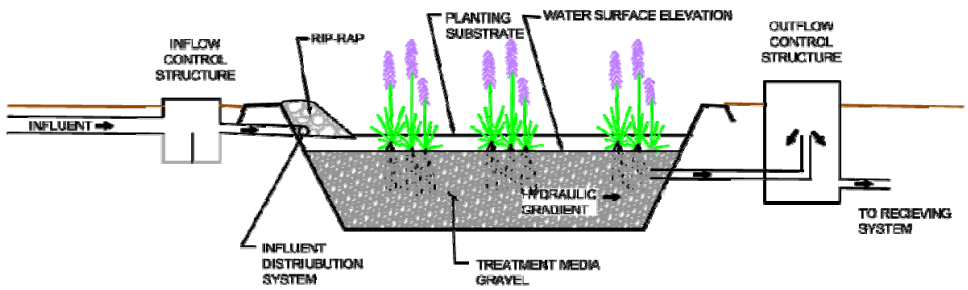

Section

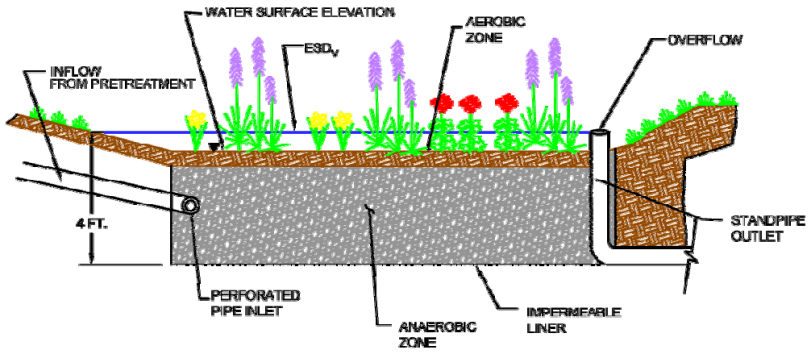

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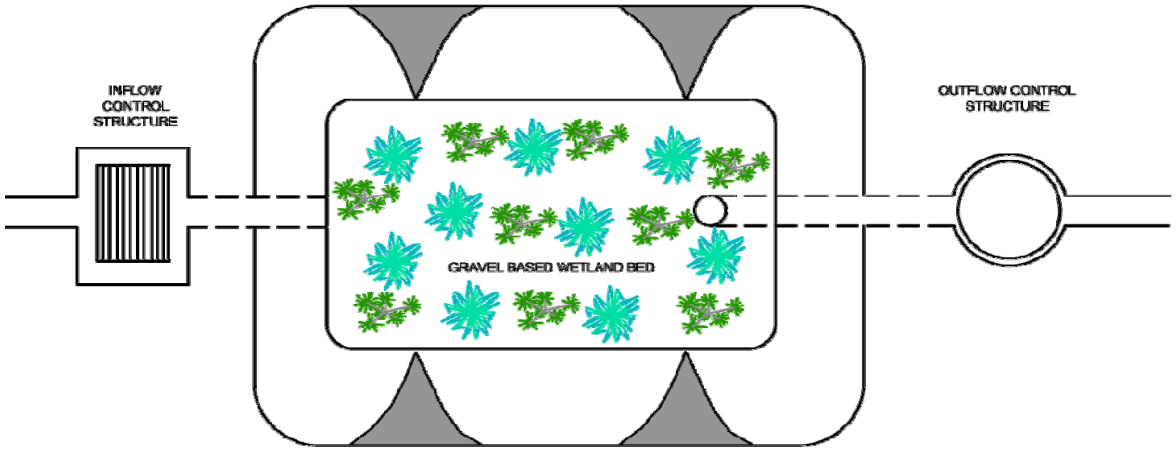

Plan View

Construction Criteria:

The following items should be addressed during the construction of projects with submerged gravel wetlands:

- **Site Disturbance:** All on-site disturbed areas should be stabilized prior to allowing runoff to enter the newly constructed wetland.

- **Erosion and Sediment Control:** *The proposed location of a submerged gravel wetland shall be protected during construction. Surface runoff shall be diverted away from the practice during grading operations. Flow splitters and other conveyance infrastructure shall be blocked.*

  Wetland construction shall be performed with lightweight, wide-tracked equipment to minimize disturbance and compaction. Excavated materials shall be placed in a contained area. Any pumping operations shall discharge filtered water to a stable outlet.

- **Gravel Media:** *The aggregate shall be composed of an 18 to 48 inch layer of clean washed, uniformly graded material with a porosity of 40%.* Rounded bank run gravel is recommended (e.g., ASTM D448 4,5, or 6 stone or equal)..

Inspection:

- Regular inspections shall be made during the following stages of construction:

  - *During excavation to subgrade.*
  - *During placement of backfill of perforated inlet pipe and observation wells.*
  - *During placement of geotextiles and all filter media.*
  - *During construction of any appurtenant conveyance systems such as diversion structures, inlets, outlets, and flow distribution structures.*
  - *Upon completion of final grading and establishment of permanent stabilization, and before allowing runoff to enter the wetland.*

Maintenance Criteria:

The following items should be addressed to ensure proper maintenance and long-term performance of submerged gravel wetlands:

- Privately *owned practices shall have a maintenance plan and shall be protected by easement, deed restriction, ordinance, or other legal measures preventing its neglect, adverse alteration, and removal.*

- During the first year of operation, inspections should be conducted after every major storm and poorly established areas revegetated.

- Sediment accumulation in the pretreatment areas should be removed as necessary.

- Signs of uneven flow distribution within the wetland may mean that the gravel or underdrain is clogged. The gravel and/or underdrain may need to be removed, cleaned, and replaced.
- A dense stand of wetland vegetation should be maintained through the life of the facility with plantings replaced as needed.
- Inlets and outlets to each submerged gravel wetland cell should be free from debris to prevent clogging.
- Erosion at inflow points should be repaired. Flow splitters should be functional to prevent bypassing of the facility.

M-3. Landscape Infiltration

Landscape infiltration utilizes on-site vegetative planting areas to capture, store, and treat stormwater runoff. Rainwater is stored initially, filters through the planting soil and gravel media below, and then infiltrates into native soils. These practices can be integrated within the overall site design by utilizing a variety of landscape features for storage and treatment of stormwater runoff. Storage may be provided in constructed planters made of stone, brick, concrete, or in natural areas excavated and backfilled with stone and topsoil.

Applications:

Landscape infiltration can be best implemented in residential and commercial land uses. Residential areas with compact housing such as clustered homes and townhouses can utilize small green spaces for landscape infiltration. Because space in these instances prevents structural pretreatment, the drainage area to these practices should be limited to less than 10,000 ft^2. Larger drainage areas may be allowed where soil testing is performed and pretreatment forebays can be implemented. Successful application is dependent upon soil type and groundwater elevation.

Performance:

The P_E values determined by Equation 5.1 may be applied to the ESD sizing criteria when landscape infiltration systems are designed according to the guidance provided below. Re_v requirements are also met when the P_E from Equation 5.1 meets or exceeds the soil specific recharge factor listed in Section 2.2.

Constraints:

The following constraints are critical when considering the use of landscape infiltration to capture and treat stormwater runoff:

- **Space:** Landscape infiltration should not be used in areas where operation may create a risk for basement flooding, interfere with subsurface sewage disposal systems, or other underground structures. The initial site planning process shall consider landscaping opportunities where these practices may be implemented.

- **Topography:** Steep terrain affects the successful performance of landscape infiltration. These practices should be constructed without a slope. If slopes entering these practices are too steep, then level-spreading devices such as check dams, terraces, or berms may be needed to maintain sheetflow.

- **Soils:** Permeable soils are critical to the successful application of landscape infiltration. The HSG should be A or B. For HSG C or D, designers should consider using practices with underdrains like micro-bioretention.

- **Drainage Area:** Drainage areas less than 10,000 ft^2 are most appropriate for landscape infiltration. Larger drainage areas may require pretreatment and soils testing to verify the infiltration rates.

- **Hotspot Runoff:** Landscape infiltration should not be used to treat hotspots that generate higher concentrations of hydrocarbons, trace metals, or toxicants than are found in typical stormwater runoff and may contaminate groundwater.

- **Infrastructure:** Landscape designers should consider overhead electrical and telecommunication lines when selecting plant materials.

Design Guidance:

The following conditions should be considered when designing landscape infiltration:

- **Conveyance:** Stormwater runoff is collected in landscaped areas where water will sheetflow across the facility, percolate through the planting media, and infiltrate into underlying soils. A flow splitter should be used to divert runoff in excess of the ESD_v away from the facility at non-erosive velocities to a stable, downstream conveyance system. If bypassing the practice is not feasible, an internal overflow devise such as an elevated yard inlet may be used.

- **Treatment:** Landscape infiltration shall meet the following design criteria:

  - *The drainage area to any individual practice shall be 10,000 ft^2 or less.*
  - *The surface area (A_t) of landscape infiltration practices shall be at least 2% of the contributing drainage area. A P_E value based on Equation 5.1 shall be applied to the contributing drainage area.*

$$P_E = 20'' \times \frac{A_f}{DA} \quad \text{(Equation 5.1)}$$

  - *Landscape infiltration facilities located in HSG B (i.e., loams, silt loams) shall not exceed 5 feet in depth. Facilities located in HSG A (i.e., sand, loamy sand, sandy loam) shall not exceed 12 feet in depth.*
  - *Landscape infiltration facilities shall be designed to fully dewater the entire ESD_v within 48 hours.* Temporary storage of the ESD_v may be provided above the facility.
  - *A 12 to 18-inch layer of planting soil shall be provided as a filtering media at the top of the facility.*
  - *A minimum 12-inch layer of gravel is required below the planting soil.*
  - *A 12-inch layer of clean sand shall be provided at the bottom to allow for a bridging medium between the existing soils and stone within the bed.*
  - *The storage volume for the ESD_v shall be determined for the entire system and includes the temporary ponding area, the soil, and the sand and gravel layers in the bottom of the facility. Storage calculations shall account for the porosity (n=0.40) of the gravel and soil media.*
  - Pretreatment measures shall be implemented along the main stormwater runoff collection system where feasible. These include installing gutter screens, a

removable filter screen on rooftop downspout pipes, a sand layer or pea gravel diaphragm at the inflow, or a two to three-inch surface mulch layer.

- **Soils:** *Landscape infiltration shall be installed in HSG A or B. The depth from the bottom of the facility to the seasonal high water table, bedrock, hard pan, or other confining layer shall be greater than or equal to four feet (two feet on the lower Eastern Shore).*

- **Flow Splitter:** A flow splitter should be provided to divert excess runoff away from landscape infiltration. An elevated yard inlet may also be used in the facility for this purpose.

- **Setbacks:**

  - *Landscape infiltration shall be located down gradient of building structures and shall be setback at least 10 feet from buildings, 50 feet from confined water supply wells, 100 feet from unconfined water supply wells, and 25 feet from septic systems.*
  - *Landscape infiltration shall be sized and located to meet minimum local requirements for clearance from underground utilities.*

- **Observation Wells:** *An observation well consisting of an anchored, perforated pipe (4" to 6" diameter) shall be provided. The top of the observation well shall be at least six inches above grade.*

- **Landscaping:** *Landscaping plans shall be provided according to the guidance in Appendix A. Plant tolerance to saturated and inundated conditions shall be considered as part of the design.* A dense and diverse planting plan will provide an aesthetically pleasing design, which will enhance property value and community acceptance.

Construction Criteria:

The following items should be addressed during construction of projects with landscape infiltration:

- **Erosion and Sediment Control:** Final grading for landscape infiltration should not take place until the surrounding site is stabilized. *If this cannot be accomplished, runoff from disturbed areas shall be diverted around the proposed location of the facility.*

- **Soil Compaction:** *Sub soils shall not be compacted.* Excavation should be conducted in dry conditions with equipment located outside of the practice to minimize bottom and sidewall compaction. Cnstruction of the should be performed with lightweight, wide-tracked equipment to minimize disturbance and compaction. Excavated materials should be placed in a contained area.

- **Planter Boxes:** Planter boxes may be made of stone, brick, or concrete.

Figure 5.11 Landscape Infiltration

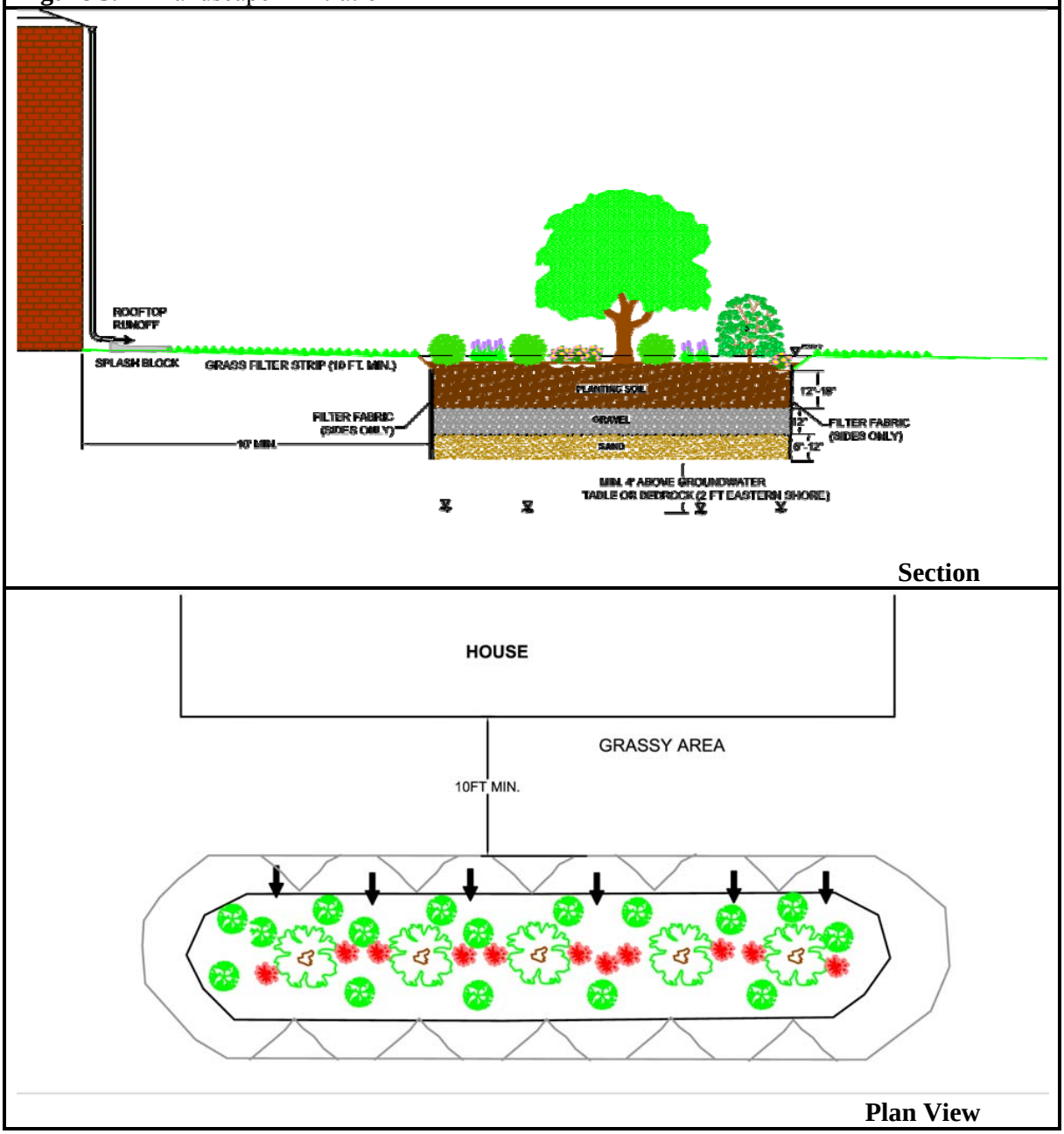

- **Filter Cloth:** *Filter cloth shall not be installed on the bottom of any landscape infiltration practice.*

  Landscape infiltration may be constructed as an excavated trench in natural ground and backfilled with sand, gravel, and planting soil. These applications should use non-woven filter cloth to line the sides of the facility to prevent clogging.

- **Gravel and Filter Media:** See Appendix B.4 for material specifications for the sand, gravel, and planting soil media.

- **Landscape Installation:** The optimum planting time is during the autumn months. Spring is also acceptable but may require watering.

Inspection:

- Regular inspections shall be made during the following stages of construction:

    - *During excavation to subgrade.*
    - *During placement of backfill and observation well.*
    - *During placement of filter fabric, soil, and gravel media.*
    - *During construction of appurtenant conveyance structures.*
    - *Upon completion of final grading and establishment of permanent stabilization.*

Maintenance Criteria:

The following items should be addressed to ensure proper maintenance and long-term performance of landscape infiltration:

- *Privately owned practices shall have a maintenance plan and shall be protected by easement, deed restriction, ordinance, or other legal measures preventing its neglect, adverse alteration, and removal.*

- During the first year of operation, inspection frequency should be after every major storm and poorly established areas revegetated.

- Sediment accumulation on the surface of the facility should be removed and the top two to three inches of surface layer replaced as needed.

- The top few inches of the planting soil should be removed and replaced when water ponds for more than 48 hours or there is algal growth on the surface of the facility.

- If standing water persists after filter media has been maintained, the gravel, soil, and sand may need to be cleaned and/or replaced.

- Occasional pruning and replacement of dead vegetation is necessary. If specific plants are not surviving, more appropriate species should be used. Watering may be required during prolonged dry periods.

M-4. Infiltration Berms

An infiltration berm is a mound of earth composed of soil and stone that is placed along the contour of a relatively gentle slope. This practice may be constructed by excavating upslope material to create a depression and storage area above a berm or earth dike. Stormwater runoff flowing downslope to the depressed area filters through the berm in order to maintain sheetflow. Infiltration berms should be used in conjunction with practices that require sheetflow (e.g., sheetflow to buffers) or in a series on steeper slopes to prevent flow concentration.

Applications:

Infiltration berms may be used on gently sloping areas in residential, commercial, open space, or wooded land use conditions. They must be installed along the contour in order to perform effectively. The purpose of this practice is to augment natural stormwater drainage functions in the landscape by promoting sheetflow and dissipating runoff velocities.

Performance:

Infiltration berms may be incorporated into the design with other practices such as disconnection of rooftop and non-rooftop runoff, sheetflow to conservation areas, or grass swales to enhance pollutant removal.

Constraints:

The following constraints are critical when considering the use of infiltration berms to treat stormwater runoff:

- **Space:** The presence of large trees may limit the use of infiltration berms along a hillside. Berms may be threaded carefully along the contour of wooded slopes in order to avoid disturbing existing vegetation.

- **Topography:** Infiltration berms should not be installed on slopes greater than 10% to prevent erosion at the upstream toe of the berm.

- **Soils:** Infiltration berms should not be installed on slopes where soils have low shear strength (or identified as “slough prone” or “landslide prone”).

- **Drainage Area:** The drainage area should be small enough to prevent flow concentration upslope of the berm.

- **Hotspot Runoff:** When infiltration berms are designed in conjunction with other infiltration practices, they should not be used to treat hotspots that generate higher concentrations of hydrocarbons, trace metals, or toxicants than found in typical stormwater runoff and may contaminate groundwater.

- **Storage Capacity:** Infiltration berms have relatively limited capacity to meet ESD_v requirements as a stand-alone practice. They may provide storage for pretreatment, address Re_v, or be incorporated within the design of other practices.

Design Guidance:

The following conditions should be considered when designing infiltration berms:

- **Conveyance:** Stormwater discharges greater than the 2-year, 24 hour design storm or other storm specified by the approval authority shall flow over the berm at non-erosive velocities. Stormwater runoff from impervious areas is intercepted by infiltration berms that are placed on the contour to prevent erosive, concentrated runoff patterns. Runoff flows to a depressed area immediately above the berm where velocities are reduced, stormwater flows through the berm, and sheetflows downslope.

- **Treatment:** Infiltration berms shall meet the following conditions:

  - *Berms shall be installed along the contour at a constant elevation and be level.*
  - *When used in a series along a slope, the elevation at the downstream toe of each berm shall be the same elevation as the crest of the next berm downslope.*
  - *The berm shall be asymmetric in shape.* The crest should be two feet wide.
  - *The berm shall be graded so that a concave shape is provided at the up gradient toe.*
  - *The design shall consider soils suitable to resist slope failure and slumping.* Side slopes should be very shallow and a ratio of 3:1 is recommended for mowed berms.
  - A berm will consist of a six-inch layer of compacted topsoil with a gravel or aggregate interior.
  - The storage volume created behind and up to the crest of the berm may be used to address pretreatment, or Re_v, or contribute to ESD_v requirements.

- **Soils:** *Subsurface soils shall be uncompacted and may need to be scarified in order to encourage infiltration.*

- **Plant Materials:** Berms should be planted with native meadow vegetation and shrubs. Turf grass may be used on berms that are to be mown.

Construction Criteria:

The following items should be addressed during construction of projects with infiltration berms:

- **Erosion and Sediment Control:** Final grading for infiltration berms should not take place until the surrounding site is stabilized. *If this cannot be accomplished, runoff from disturbed areas shall be diverted around proposed locations.*

- **Soil Compaction:** *Soils within storage areas shall not be compacted.*

Figure 5.12 Infiltration Berms

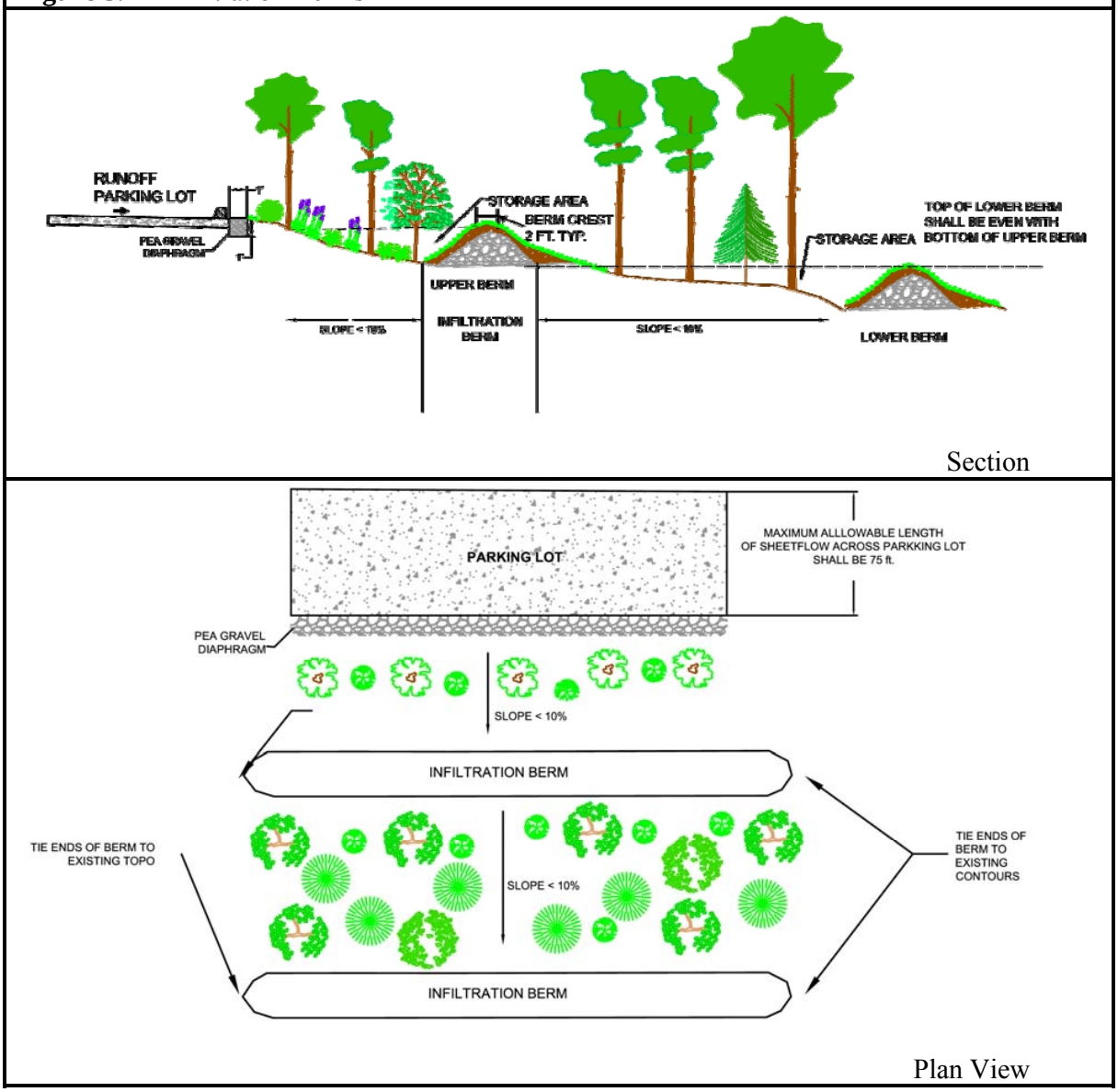

Soil Compaction: *Excavation should be conducted in dry conditions with equipment located outside of the practice to minimize bottom and sidewall compaction. Construction shall be performed with lightweight, wide-tracked equipment to minimize disturbance and compaction.* Existing soils in the location of proposed berms should be scarified to maximize infiltration.

- **Gravel and Soil Media:** See Appendix B.4.B for material specification for the gravel and planting soil media.

- **Landscape Installation:** The optimum planting time is during the Fall. Spring is also acceptable but may require watering.

- **Implementation with Other Practices:** *When infiltration berms are incorporated into a system using other practices (e.g., Disconnection of Non-Rooftop Runoff), the Construction Criteria for that practice shall also be considered.*

Inspection:

- Regular inspections shall be made during the following stages of construction:
    - *During placement of gravel media, and soil.*
    - *Upon completion of final grading and establishment of permanent stabilization.*

Maintenance Criteria:

The following items should be addressed to ensure proper maintenance and long-term performance of infiltration berms:

- Berms should be inspected regularly to ensure that ponding water does not create nuisance conditions.

- Signs of concentrated flow and other surface erosion should be repaired to promote sheetflow.

- A dense mat of vegetation should be present at all times. Vegetation should be replaced as needed.

- *When infiltration berms are incorporated in a system using other practices, the Maintenance Criteria for that practice shall also be considered.*

M-5. Dry Wells

A dry well is an excavated pit or structural chamber filled with gravel or stone that provides temporary storage of stormwater runoff from rooftops. The storage area may be constructed as a shallow trench or a deep well. Rooftop runoff is directed to these storage areas and infiltrates into the surrounding soils prior to the next storm event. The pollutant removal capability of dry wells is directly proportional to the amount of runoff that is stored and allowed to infiltrate.

Applications:

Dry wells can be used in both residential and commercial sites and are best suited for treating runoff from small drainage areas such as a single rooftop or downspout. Dry wells are not appropriate for treating runoff from large impervious areas such as a parking lot. Successful application is dependent upon soil type and groundwater elevation.

Performance:

When designed according to the guidance provided below, dry wells will provide treatment for the required ESD_v and Re_v.

Constraints:

The following constraints are critical when considering the use of dry wells to capture and infiltrate stormwater runoff:

- **Space:** Dry wells should not be used in areas where their operation may create a risk for basement flooding, interfere with subsurface sewage disposal systems, or affect other underground structures. There are limited opportunities for dry well implementation in high-density neighborhoods.

- **Topography:** Steep terrain affects the successful performance of a dry well. Installation on slopes greater than 20% should be avoided.

- **Soils:** Permeable soils are critical to the successful application of dry wells. The HSG should be A or B. For HSG C or D or compacted soils, designers should consider using practices with underdrains like micro-bioretention.

- **Drainage Area**: Small drainage areas (e.g., 500 ft^2) are most appropriate for dry well applications. Larger non-residential areas may be treated provided the dry well is sized according to the requirements for infiltration practices found in Section 3.3.

- **Hotspot Runoff:** Dry wells should not be used to treat hotspots that generate higher concentrations of hydrocarbons, trace metals, or toxicants than are found in typical stormwater runoff and may contaminate groundwater.

- **Operation:** Dry wells are subject to neglect by homeowners. Education is needed to ensure that proper maintenance will allow the system to continue to function properly.

Design Guidance:

The following conditions should be considered when designing dry wells:

- **Conveyance:** *Discharge from the overflow shall be directed to an above ground splash pad and conveyed in a non-erosive manner to a stable outfall.* Rooftop runoff is collected through gutters and downspouts and discharged directly into a dry well. The downspout extends underground and across the entire length of a dry well. An overflow pipe is also installed to pass excess runoff generated from larger storms.

- **Treatment:** Dry wells shall meet the following conditions:

  - *Pretreatment measures shall be installed to allow filtering of sediment, leaves, or other debris.* This may be done by providing gutter screens and a removable filter screen installed within the downspout pipe or other locally-approved method. The removable filter screen should be installed below the overflow outlet and easily removed so that homeowners can clean the filter.
  - *A dry well shall be designed to capture and store the ESD_v. A P_E value based on the ESD_v captured and treated shall be applied to the contributing drainage area.* The storage area for the ESD_v includes the sand and gravel layers in the bottom of the facility. Storage calculations shall account for the porosity of the gravel and sand media.
  - *The drainage area to each dry well shall not exceed 1,000 square feet.* Drainage areas should be small enough to allow infiltration into the ground within 48 hours (e.g., 500 ft^2 to each downspout). Infiltration trenches may be used to treat runoff from larger drainage areas (see Section 3.3).
  - *Dry wells located in HSG B (i.e., loams, silt loams) shall not exceed 5 feet in depth. Dry wells located in HSG A (i.e., sand, loamy sand, sandy loam) shall not exceed 12 feet in depth.*
  - The length of a dry well should be longer than the width to ensure proper water distribution and maximize infiltration.
  - *A one-foot layer of clean sand shall be provided in the bottom of a dry well to allow for bridging between the existing soils and trench gravel.*

- **Soils:** *Dry wells shall be installed in HSG A or B. The depth from the bottom of a dry well to the seasonal high water table, bedrock, hard pan, or other confining layer shall be greater than or equal to four feet (two feet on the lower Eastern Shore).*

Figure 5.13 Dry Well

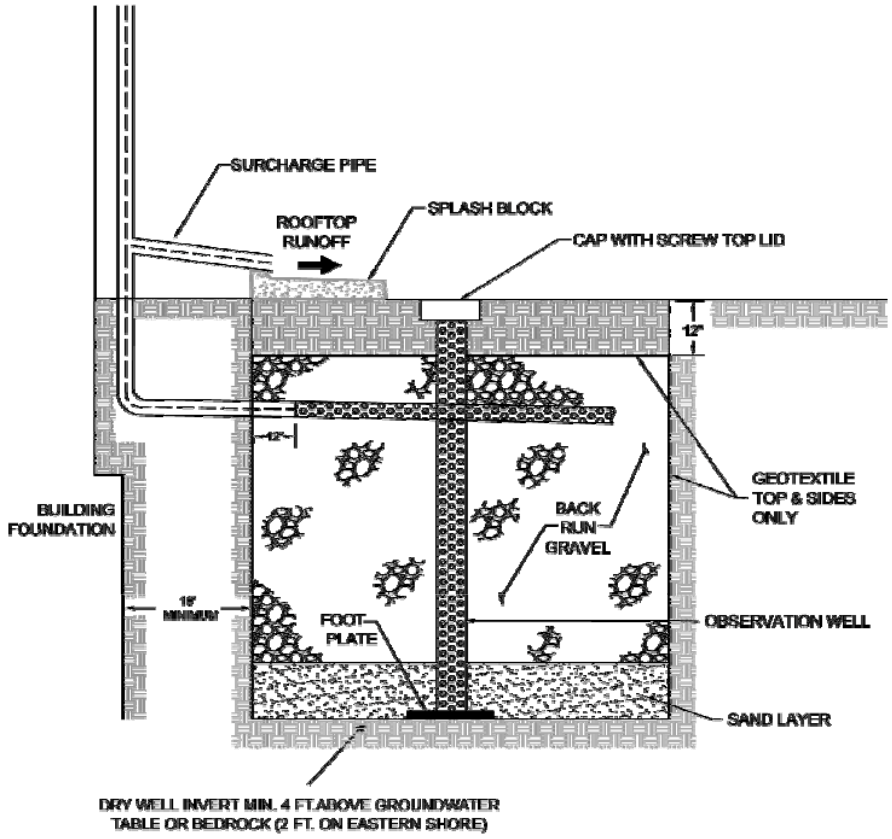

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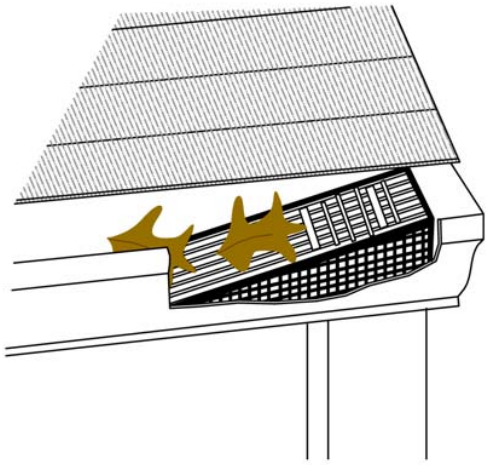

Gutter Drain Filter (Typical)

- **Setbacks:**
  - *Dry wells shall be located down gradient of building structures and shall be setback at least 10 feet from buildings, 50 feet from confined water supply wells, 100 feet from unconfined water supply wells, and 25 feet from septic systems.*
  - *Dry wells shall be setback a minimum of 100 feet from fill slopes of 15% and 200 feet from fill slopes of 25%.*

- **Observation Wells:** *An observation well consisting of an anchored, 4 to 6-inch diameter perforated pipe shall be required. The top of the observation well shall be at least six inches above grade.*

- **Underground Distribution Pipe:** This pipe (4 to 6 inch diameter) will be perforated to fill the trench along its entire length.

- **Landscaping:** *A minimum one-foot of soil cover shall be provided from the top of the trench to the ground surface elevation.* The soil should be stabilized with a dense cover of vegetation. In areas where frost heave is a concern, soil cover may need to be as much as four feet. In these cases, a geotechnical engineer should be consulted.

Construction Criteria:

The following items should be addressed during construction of projects with dry wells:

- **Erosion and Sediment Control:** Final grading for proposed dry wells should not take place until the surrounding site is completely stabilized. *If this cannot be accomplished, runoff from disturbed areas shall be diverted.*

- **Soil Compaction:** *Excavation should be conducted in dry conditions with equipment located outside of the practice to minimize bottom and sidewall compaction. Construction of a dry well shall be performed with lightweight, wide-tracked equipment to minimize disturbance and compaction. Excavated materials shall be placed in a contained area.*

- **Underground Chamber:** A subsurface prefabricated chamber may be used.

- **Dry Well Bottom:** *The bottom shall be as level as possible to minimize pooled water in small areas that may reduce overall infiltration and longevity.*

- **Filter Cloth:** *Filter cloth shall not be installed on the bottom of the well.* Non-woven filter cloth should be used to line the top and sides of the dry well to prevent the pore space between the stones from being blocked by the surrounding native material.

- **Gravel Media:** *The aggregate shall be composed of an 18 to 48-inch layer of clean washed, open graded material with 40% porosity* (e.g., ASTM D448 4,5, or 6 stone or equal).

Inspection:

- Regular inspections shall be made during the following stages of construction:
    - *During excavation to subgrade.*
    - *During placement of backfill and perforated inlet pipe and observation well.*
    - *During placement of geotextiles and all filter media.*
    - *During construction of the appurtenant conveyance.*
    - *Upon completion of final grading and establishment of permanent stabilization.*

Maintenance Criteria:

The following items should be addressed to ensure proper maintenance and long-term performance of dry wells:

- *Privately owned practices shall have a maintenance plan and shall be protected by easement, deed restriction, ordinance, or other legal measures preventing its neglect, adverse alteration, and removal.*

- *Dry wells shall be inspected and cleaned annually.* This includes pipes, gutters, downspouts, and all filters.

- Ponding, standing water, or algal growth on the top of a dry well may indicate failure due to sedimentation in the gravel media. If water ponds for more than 48 hours after a major storm or more than six inches of sediment has accumulated, the gravel media should be excavated and replaced.

M-6. Micro-Bioretention

Micro-bioretention practices capture and treat runoff from discrete impervious areas by passing it through a filter bed mixture of sand, soil, and organic matter. Filtered stormwater is either returned to the conveyance system or partially infiltrated into the soil. Micro-bioretention practices are versatile and may be adapted for use anywhere there is landscaping.

Applications:

Micro-bioretention is a multi-functional practice that can be easily adapted for new and redevelopment applications in commercial and industrial projects. Stormwater runoff is stored temporarily and filtered in landscaped facilities shaped to take runoff from various sized impervious areas. Micro-bioretention provides water quality treatment, aesthetic value, and can be applied as concave parking lot islands, linear roadway or median filters, terraced slope facilities, residential cul-de-sac islands, and ultra-urban planter boxes.

Performance:

The P_E values determined by Equation 5.2 may be applied to the ESD sizing criteria when micro-bioretention systems are designed according to the guidance provided below. Re_v requirements are also met when the P_E from Equation 5.2 meets or exceeds the soil specific recharge factor listed in Section 2.2.

Constraints:

The following constraints are critical when considering the use of micro-bioretention to capture and treat stormwater runoff:

- **Space:** The surface area of a typical micro-bioretention filter is dependent on the area of the contributing imperviousness. The size and distribution of open areas within a project (e.g., parking lot islands, landscaped areas) must be considered early during a project's planning and design if these practices are considered.

- **Topography:** Slopes of contributing areas and filter beds should be gradual (< 5%). If slopes are too steep, then level-spreading devices may be needed to redistribute flow prior to filtering. If slopes within micro-bioretention practice are too steep, then a series of check dams, terraces, or berms may be needed to maintain sheetflow internally.

  There should also be an elevation difference between the inflow and outflow of a micro-bioretention practice to allow flow through the filter. This difference is critical when designing downstream conveyance systems (e.g., grass channels, storm drains).

- **Soils:** Soil conditions are a crucial determining factor for micro-bioretention because specific applications will be affected. When located in sandier soils, these practices may be used to promote recharge (see M-3, Landscape Infiltration). If clayey soils are encountered,

an underdrain system may be needed to convey water downstream. Also, elevated groundwater may limit filter bed thickness and excavated applications.

Subsurface water conditions (e.g., water table) will help determine the thickness of filter beds used. The probability of practice failure increases if the filter bed intercepts groundwater. Therefore, micro-bioretention practice inverts should be above local groundwater tables.

- **Drainage Area:** The drainage area to micro-bioretention practices should be limited. As the impervious area draining to each practice exceeds ½ acre, practice effectiveness weakens and larger systems designed according to Chapter 3 should be considered.

- **Hotspot Runoff:** Micro-bioretention practices that are designed to promote infiltration of runoff into the ground should not be used to treat hotspots that generate higher concentrations of hydrocarbons, trace metals, or toxicants than are typically found in stormwater runoff and may contaminate groundwater.

- **Infrastructure:** The location of existing and proposed buildings and utilities (e.g., water supply wells, sewer, storm drains, electricity) will influence the design and construction of micro-bioretention. Landscape designers should also consider overhead electrical and telecommunication lines when selecting trees to be planted.

Design Guidance:

The following conditions should be considered when designing micro-bioretention practices:

- **Conveyance:** Micro-bioretention systems should be designed off-line whenever possible. A flow splitter should be used to divert excess runoff away from the filter media to a stable, downstream conveyance system. If bypassing a micro-bioretention practice is impractical, an internal overflow device (e.g., elevated yard inlet) may be used.

  Runoff shall enter, flow through, and exit micro-bioretention practices in a safe and non-erosive manner. Inflow may be through depressed curbs with wheel stops, curb cuts, or conveyed directly using downspouts, covered drains, or catch basins. Depending on site layout and the size and shape of the impervious area being treated, overflow structures should be located to maximize internal flow paths through the filter media. An underdrain system may be necessary to discharge treated stormwater safely downstream. Underdrains may be interconnected to other micro-scale practices as part of a treatment system or directly to the storm drain.

- **Treatment**: Micro-bioretention practices shall meet the following conditions:

  - *The drainage area to any individual practice shall be 20,000 ft^2 or less.*
  - *Micro-bioretention practices shall capture and store at least 75% of the ESD_v.*
  - *The surface area (A_f) of micro-bioretention practices shall be at least 2% of the contributing drainage area. A P_E value based on Equation 5.2 shall be applied to the contributing drainage area.* Temporary storage of the ESD_v may be provided above the facility with a surface ponding depth of 12 inches or less.

$$P_E = 15'' \times \frac{A_f}{DA} \quad \text{(Equation 5.2)}$$

  - *Filter beds shall be between 24 and 48 inches deep.*
  - *Filter beds shall not intercept groundwater. If designed as infiltration practices, filter bed inverts shall be separated at least four feet vertically (two feet on the lower Eastern shore) from the seasonal high water table.*
  - A surface mulch layer (maximum 2 to 3 inches thick) should be provided to enhance plant survival and inhibit weed growth.
  - *The filtering media or planting soil, mulch, and underdrain systems shall conform to the specifications found in Appendix B.4.*

- **Setbacks:**

  - Micro-bioretention practices should be located down gradient and setback at least 10 feet from structures. Micro-bioretention variants (e.g., planter boxes) that must be located adjacent to structures should include an impermeable liner.
  - *Micro-bioretention practices shall be located at least 30 feet from water supply wells and 25 feet from septic systems. If designed to infiltrate, then the practice shall be located at least 50 feet from confined water supply wells and 100 feet from unconfined water supply wells.*
  - *Micro-bioretention practices shall be sized and located to meet minimum local requirements for clearance from underground utilities.*
  - *Any trees planted in micro-bioretention practices shall be located to avoid future problems with overhead electrical and telecommunication lines.*

- **Landscaping:** *Landscaping plans shall be provided according to the guidance in Appendix A.* Vegetation is critical to the function and appearance of any micro-bioretention system. Native and adapted plants are preferred, hardier, and usually require minimal nutrient or pesticide application. Also, aesthetically pleasing landscape designs generally enhance property value and community acceptance.

Figure 5.14 Micro-Bioretention (Variation 1 - Parking Lot)

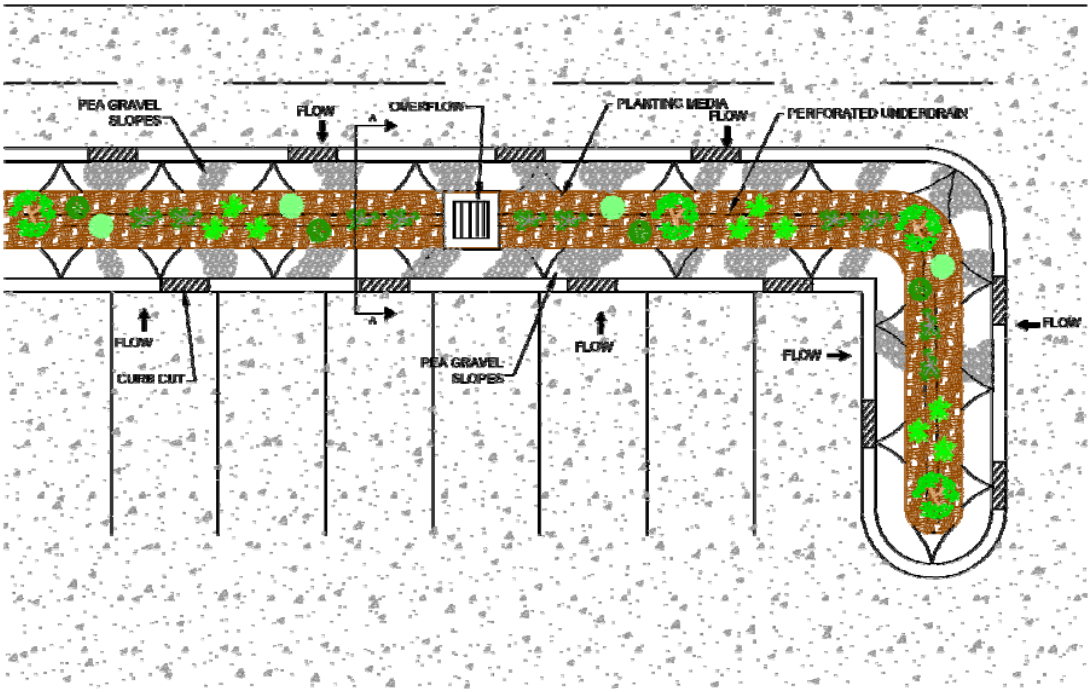

Plan View

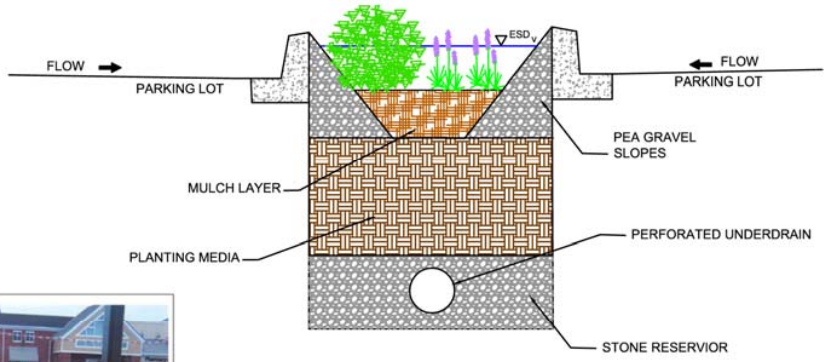

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Figure 5.15 Micro-Bioretention (Variation 2 - Parking Lot)

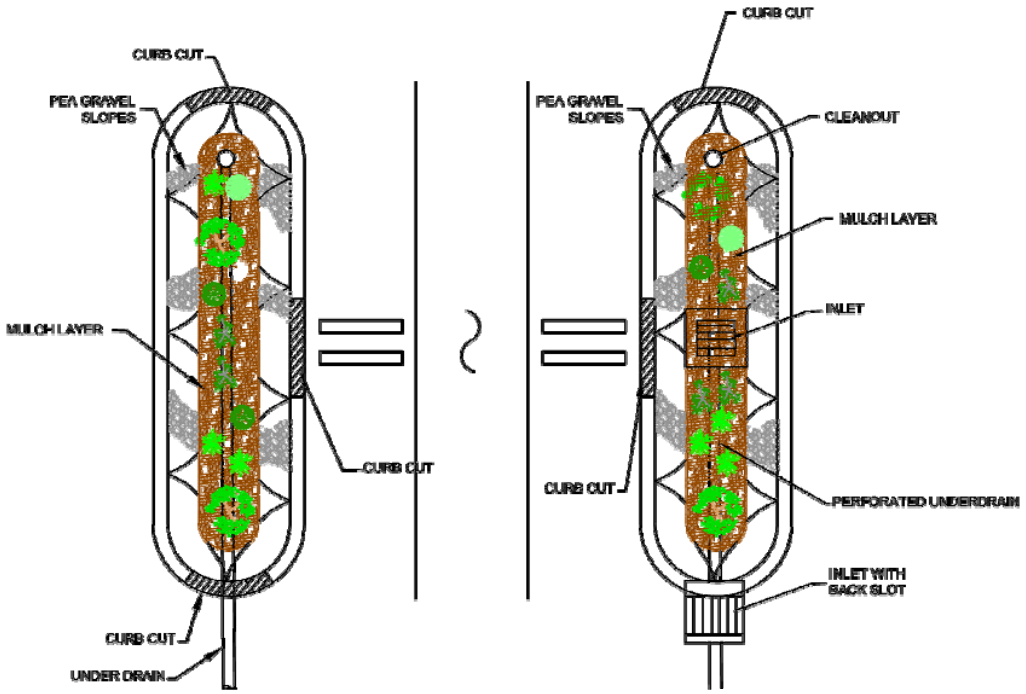

Plan View

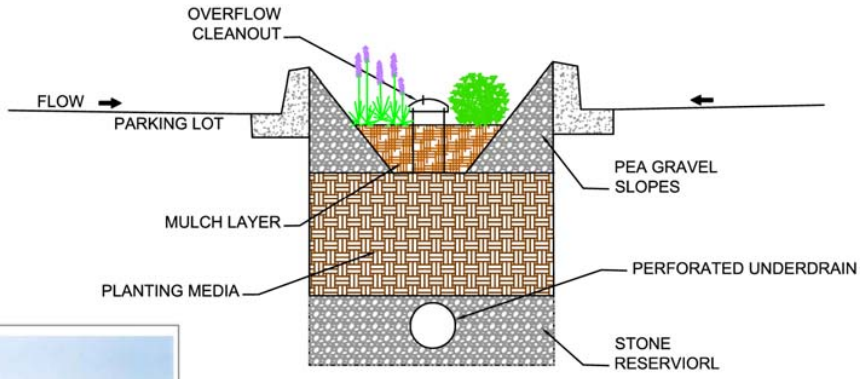

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Figure 5.16 Micro-Bioretention (Variation 3)

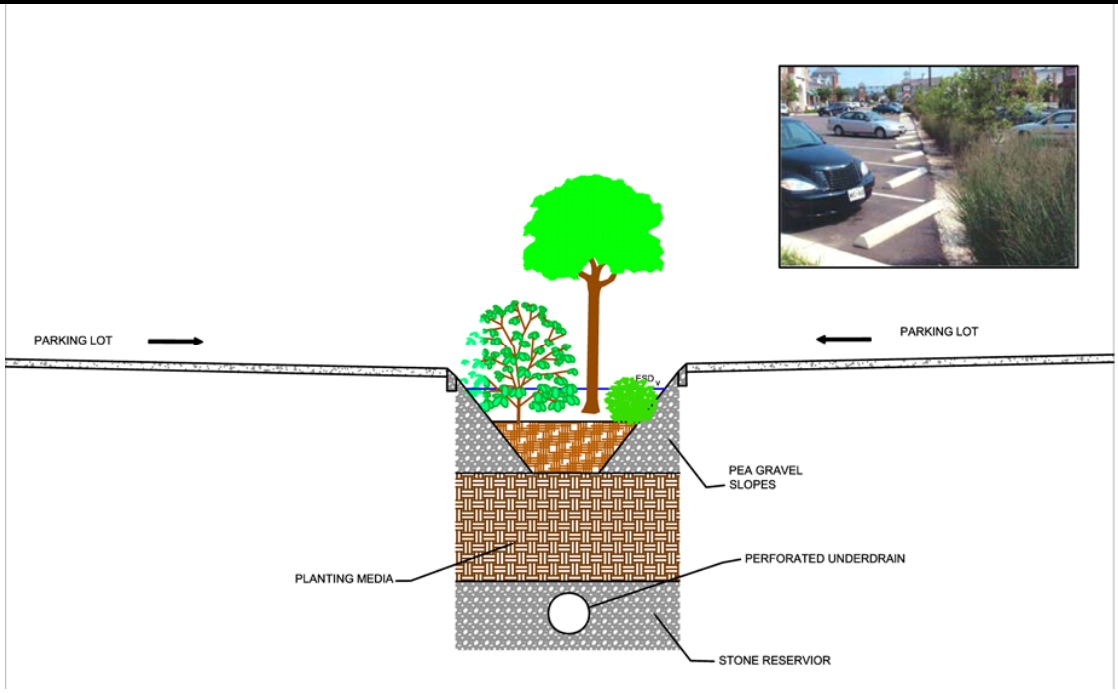

Profile

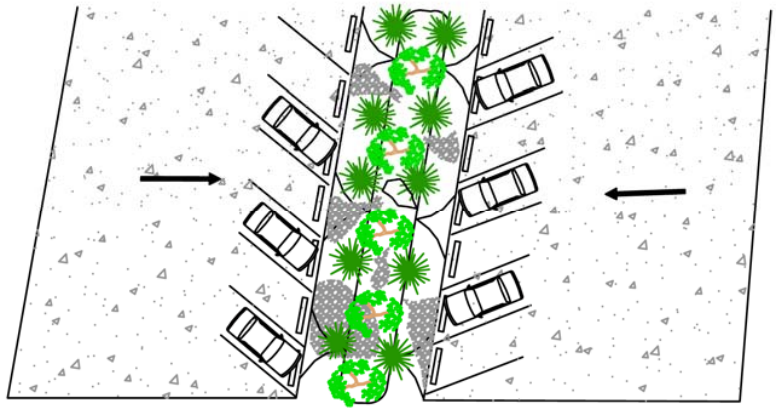

Plan View

Construction Criteria:

The following items should be addressed during construction of projects with micro-bioretention:

- **Erosion and Sediment Control:** Micro-bioretention practices should not be constructed until the contributing drainage area is stabilized. *If this is impractical, runoff from disturbed*

areas shall be diverted away and no sediment control practices shall be used near the proposed location.

- **Soil Compaction:** Excavation should be conducted in dry conditions with equipment located outside of the practice to minimize bottom and sidewall compaction. Only lightweight, low ground-contact equipment should be used within micro-bioretention practices and the bottom scarified before installing underdrains and filtering media.

- **Underdrain Installation:** Gravel for the underdrain system should be clean, washed, and free of fines. Underdrain pipes should be checked to ensure that both the material and perforations meet specifications. The upstream ends of the underdrain pipe should be capped prior to installation.

- **Filter Media Installation:** Bioretention soils may be mixed on-site before placement. However, soils should not be placed under saturated conditions. The filter media should be placed and graded using excavators or backhoes operating adjacent to the practice and be placed in horizontal layers (12 inches per lift maximum). Proper compaction of the media will occur naturally. Spraying or sprinkling water on each lift until saturated may quicken settling times.

- **Landscape Installation:** The optimum planting time is during the Fall. Spring planting is also acceptable but may require watering.

Inspection:

- Regular inspections shall be made during the following stages of construction:

  - *During excavation to subgrade and placement and backfill of underdrain systems.*
  - *During placement of filter media.*
  - *During construction of appurtenant conveyance.*
  - *Upon completion of final grading and establishment of permanent stabilization.*

Maintenance Criteria:

The following items should be addressed to ensure proper maintenance and long-term performance of micro-bioretention practices:

- *Privately owned practices shall have a maintenance plan and shall be protected by easement, deed restriction, ordinance, or other legal measures preventing its neglect, adverse alteration, and removal.*

- The top few inches of filter media should be removed and replaced when water ponds for more than 48 hours. Silts and sediment should be removed from the surface of the filter bed when accumulation exceeds one inch.

- Where practices are used to treat areas with higher concentrations of heavy metals (e.g., parking lots, roads), mulch should be replaced annually. Otherwise, the top two to three inches should be replaced as necessary.

- Occasional pruning and replacement of dead vegetation is necessary. If specific plants are not surviving, more appropriate species should be used. Watering may be required during prolonged dry periods.

M-7. Rain Gardens

A rain garden is a shallow, excavated landscape feature or a saucer-shaped depression that temporarily holds runoff for a short period of time. Rain gardens typically consist of an absorbent-planted soil bed, a mulch layer, and planting materials such as shrubs, grasses, and flowers. An overflow conveyance system is included to pass larger storms. Captured runoff from downspouts, roof drains, pipes, swales, or curb openings temporarily ponds and slowly filters into the soil over 24 to 48 hours.

Applications:

Rain gardens can be primary or secondary practices on residential, commercial, industrial, or institutional sites. This practice is typically used to treat runoff from small impervious areas like rooftops, driveways, and sidewalks. Rain gardens can also be used in retrofitting and redevelopment applications and in series where existing slopes require energy dissipation.

Performance:

The P_E values determined by Equation 5.3 may be applied to the ESD sizing criteria when rain gardens are designed according to the guidance provided below. Re_v requirements are also met when the P_E from Equation 5.3 meets or exceeds the soil specific recharge factor listed in Section 2.2.

Constraints:

The following constraints are critical when considering the use of rain gardens to capture and treat stormwater runoff:

- **Topography:** Rain gardens require relatively flat slopes (< 5%) to accommodate runoff filtering through the system. Some design modifications can address this constraint through the use of infiltration berms, terracing, and timber or block retaining walls on moderate slopes.

- **Soils:** Clayey soils or soils that have been compacted by construction equipment greatly reduce the effectiveness of this practice. Loosening of compacted soils may improve drainage capability.

- **Drainage Area:** The drainage area to a rain garden should be relatively small, typically less than 2,000 square feet.

- **Infrastructure:** The location of existing and proposed buildings and utilities (e.g., water supply wells, sewer, storm drains, electricity) will influence rain garden design and construction. Landscape designers should also consider overhead electrical and telecommunication lines when selecting trees to be planted.

- **Location:**
  - Lot-by-lot use of rain gardens is not recommended in residential subdivisions due to removal by homeowners. If used on a lot-by-lot basis, educating the homeowners will be needed to prevent removal.
  - Rain garden excavation in areas with heavy tree cover may damage adjacent tree root systems.

Design Guidance:

The following conditions should be considered when designing rain gardens:

- **Conveyance:** *Runoff shall enter, flow through, and exit rain gardens in a safe and non-erosive manner. Energy dissipation shall be provided for downspout discharges using a plunge area, rocks, splash blocks, stone dams, etc. Runoff shall enter a rain garden at the surface through grass swales and/or a gravel bed.* A minimum internal slope of one percent should be maintained and a shallow berm surrounding the rain garden is recommended to avoid short-circuiting. For sloped applications, a series of rain gardens can be used as "scalloped" terraces to convey water non-erosively.

- **Treatment:** Rain gardens shall meet the following conditions:
  - *The drainage area to a rain garden serving a single lot in a residential subdivision shall be 2,000 ft² or less. The maximum drainage area to a rain garden for all other applications shall be 10,000 ft^2.* Micro-bioretention (M-6) or bioretention (F-6) should be considered when these requirements are exceeded.
  - *The surface area (A_f) of rain gardens shall be at least 2% of the contributing drainage area. A P_E value based on Equation 5.3 shall be applied to the contributing drainage area.* Temporary storage of the ESD_v may be provided above the facility with a surface ponding depth of 6 inches or less.

$$P_E = 10'' \times \frac{A_f}{DA} \quad \text{(Equation 5.3)}$$

  - Excavated rain gardens work best where HSG A and B are prevalent. In areas of HSG C and D, at-grade applications or soil amendments should be considered.
  - *A minimum six to twelve-inch layer of planting soil shall be provided.*
  - *A mulch layer two to three inches deep shall be applied to the planting soil to maintain soil moisture and to prevent premature clogging.*
  - *The planting soil and mulch shall conform to the specifications found in Appendix B.4.*

- **Landscaping**: *Landscaping plans shall clearly specify how vegetation will be established and managed.* A rain garden should be located in full to partial sun, at least two feet above the seasonal high water table and be 12 to 18 inches deep. Plants selected for use in a rain garden should tolerate both saturated and dry conditions and be native or adapted to

Maryland. Neatly trimmed shrubs, a crisp lawn edge, stone retaining walls, and other devices can be used to keep a rain garden neat and visually appealing.

Construction Criteria:

The following items should be addressed during the construction of projects with rain gardens:

- **Erosion and Sediment Control:** *Rain gardens shall not be constructed until the contributing drainage area is stabilized.* During construction, runoff should be diverted and the use of heavy equipment avoided to minimize compaction.

- **Planting Soil:** Planting soil should be mixed on-site prior to installation. If poor soils are encountered beneath the rain garden, a four-inch layer of washed gravel (⅛ to ⅜ inch gravel preferred) may be used below the planting soil mix.

- **Landscape Installation:** The optimum planting time is during the Fall. Spring planting is also acceptable but may require watering.

Inspection:

- Regular inspections shall be made during the following stages of construction:

    - *During excavation to subgrade and placement of planting soil.*
    - *Upon completion of final grading and establishment of permanent stabilization.*

Maintenance Criteria: The following items should be addressed to ensure proper maintenance and long-term performance of rain gardens:

- *Privately owned practices shall have a maintenance plan and be protected by easement, deed restriction, ordinance, or other legal measures preventing its neglect, adverse alteration, and removal.*

- Rain garden maintenance is generally no different than that required of other landscaped areas.

- The top few inches of the planting soil should be removed and replaced when water ponds for more than 48 hours. Silts and sediment should be removed from the surface of the bed as needed.

- Where practices are used to treat areas with higher concentrations of heavy metals (e.g., parking lots, roads), mulch should be replaced annually. Otherwise, the top two to three inches should be replaced as necessary.

- Occasional pruning and replacement of dead vegetation is necessary. If specific plants are not surviving, more appropriate species should be used. Watering may be required during prolonged dry periods.

Figure 5.17 Rain Garden

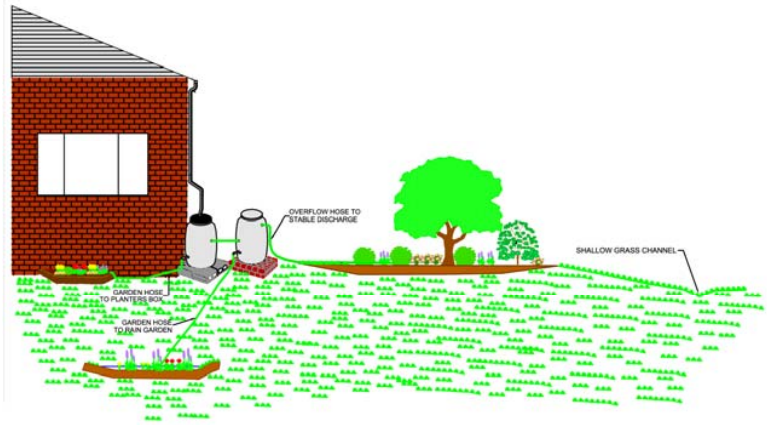

Section

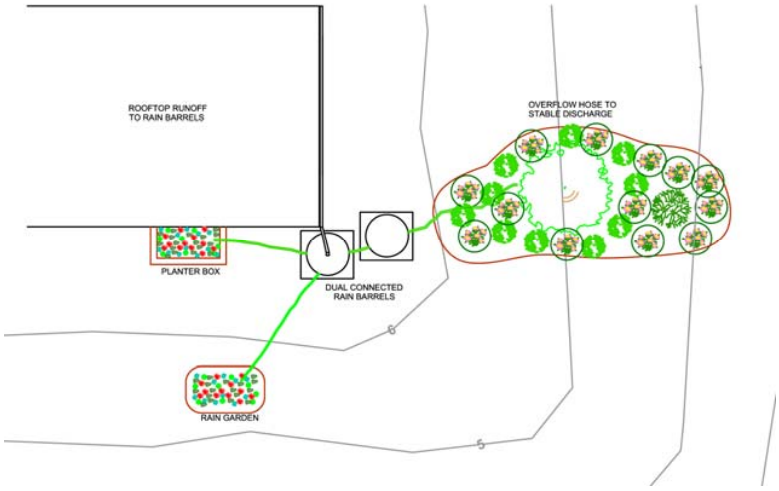

Plan View

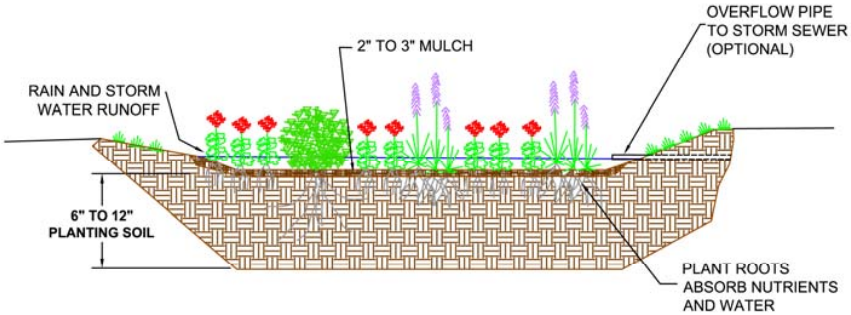

Section

M-8. Swales

Swales are channels that provide conveyance, water quality treatment, and flow attenuation of stormwater runoff. Swales provide pollutant removal through vegetative filtering, sedimentation, biological uptake, and infiltration into the underlying soil media. Three design variants covered in this section include grass swales, wet swales, and bio-swales. Implementation of each is dependent upon site soils, topography, and drainage characteristics.

Applications:

Swales can be used for primary or secondary treatment on residential, commercial, industrial, or institutional sites. Swales can also be used for retrofitting and redevelopment. The linear structure allows use in place of curb and gutter along highways, residential roadways, and along property boundaries. Wet swales are ideal for treating highway runoff in low-lying or flat terrain with high groundwater. Bio-swales can be used in all soil types due to the use of an underdrain. Grass swales are best suited along highway and roadway projects.

Performance:

The P_E values determined by the equations 5.2 and 5.3 (reprinted below) may be applied to the ESD sizing criteria when grass swales and bio-swales are designed according to the guidance provided below. For wet swales, P_E for the contributing drainage area is based on the volume captured. Re_v requirements are also met when the applicable P_E meets or exceeds the soil specific recharge factor listed in Section 2.2.

Swales should not be designed to meet Q_p or Q_f requirements except under extremely unusual conditions. Swales may be used to convey runoff for these larger storm events however, the ESD_v should be treated separately. This can be accomplished with a flow splitter or diversion so that the entire design storm is passed safely.

Constraints:

The following constraints are critical when considering the use of swales to capture and treat stormwater runoff:

- **Topography:** Steep slopes will increase velocity, erosion, and sediment deposition thus shortening the design life of the swale.

- **Soils:** Design variants are dependent upon soil types. Grass swales work best in HSG A, B, or C and wet swales are best suited for HSG C or D. Bio-swales typically include an underdrain and may be installed in all soil types. Extreme temperatures and frozen ground need to be considered when calculating design volumes.

- **Drainage Area:** The drainage area contributing to all design variants should be less than one acre. Practices in Chapter 3 should be considered for larger drainage areas.

- **Hotspot Runoff:** Swales should not be used to treat hotspots that generate higher concentrations of hydrocarbons, trace metals, or toxicants than are found in typical stormwater runoff and may contaminate groundwater.

- **Location:** The location of swales needs to be considered carefully. Wet swales are not recommended for residential developments due to the potential nuisance or mosquito breeding conditions. Swales along roadways can be damaged by off-street parking and are susceptible to winter salt applications. Also, the choice of vegetation and landscaping can be limited in adjacent areas.

Design Guidance:

The following conditions should be considered when designing swales:

- **Conveyance:** Stormwater discharged into and through swales needs to be non-erosive. Sheetflow should be promoted wherever possible using precise grading, level earthen weirs, or pea gravel diaphragms. If concentrated flow is delivered from curb cuts or storm drain pipes, some form of energy dissipation (e.g., plunge pools or rip-rap) is needed.

- **Treatment:** All swales shall meet the following criteria:

  - *Swales shall have a bottom width between two and eight feet.*
  - *The channel slope shall be less than or equal to 4.0%.*
  - *The maximum flow velocity for the ESD_v shall be less than or equal to 1.0 fps.*
  - *Swales shall be designed to safely convey the 10-year, 24-hour storm at a non-erosive velocity with at least six inches of freeboard.*
  - *Channel side slopes shall be 3:1 or flatter.*
  - *A thick vegetative cover shall be provided for proper function.*

  The following criteria apply to each specific design variant:

  Grass swales: *Grass swales shall be used for linear applications (e.g., roadways) only, and shall be as long as the treated surface. The surface area (A_f) of the swale bottom shall be at least 2% of the contributing drainage area, and a P_E value based on Equation 5.3 shall be applied to the contributing drainage area.* The maximum flow depth for ESD_v treatment should be 4 inches, and the channel should have a roughness coefficient (Manning's *n*) value of 0.15. This can be accomplished by either maintaining vegetation height equal to the flow depth or using energy dissipaters like check dams, infiltration berms, or riffle/pool combinations.

  $$P_E = 10'' \times \frac{A_f}{DA} \quad \text{(Equation 5.3)}$$

  Bio-swales: *The surface area (A_f) of the bio-swale bottom shall be at least 2% of the contributing impervious area and a P_E value based on Equation 5.2 shall be applied to the contributing drainage area. Bio-swales shall be designed to temporarily store at least 75%*

of the ESD_v. A two to four-foot deep layer of filter media shall be provided in the swale bottom. Underdrains shall be provided in HSG C or D and shall conform to the specifications found in Appendix B.4. The use of underdrains is recommended for all applications.

$$P_E = 15'' \times \frac{A_f}{DA} \quad \text{(Equation 5.2)}$$

Wet swales: *Wet swales shall be designed to store at least 75% of the ESD_v. A P_E value equivalent to the volume captured and treated shall be applied to the contributing drainage area*. Wet swales should be installed in areas with a high groundwater table and check dams or weirs may be used to enhance storage.

- **Check Dams**: Check dams or weirs may be used to enhance storage and channel roughness or provide grade control in steeper applications. Where used, these structures should be anchored into the swale wall and notched to allow passage of larger design storms with a minimum six-inch freeboard. Plunge pools or other energy dissipation may be required where the elevation difference between the tops of weirs to the downstream channel invert is a concern.

- **Landscaping**: *Landscaping plans shall specify proper grass or wetland plantings based on the design variant chosen and anticipated hydrologic conditions along the channel (see Appendix A).* Native species are best for survival and enhancing bio-diversity and wildlife.

Construction Criteria:

Construction specifications for swales can be found in Appendix B.3. In addition, the following items should be addressed during the construction of projects with swales:

- **Erosion and Sediment Control:** Swales are often used for conveying runoff to sediment trapping devices during site construction. Care should be taken to ensure proper construction where stormwater management swales are used for this purpose. After the drainage area is completely stabilized, accumulated sediment should be removed and the swale excavated to the required dimensions. Any required infrastructure (e.g., check dams, underdrains) may then be installed, the bottom and side slopes scarified, and a good stand of vegetation established.

Inspection:

- Regular inspections shall be made during the following stages of construction:
    - *During placement and backfill of underdrains and the installation of diaphragms, forebays, check dams, or weirs.*
    - *Upon completion of final grading and establishment of permanent stabilization.*

Figure 5.18 Bio-Swale

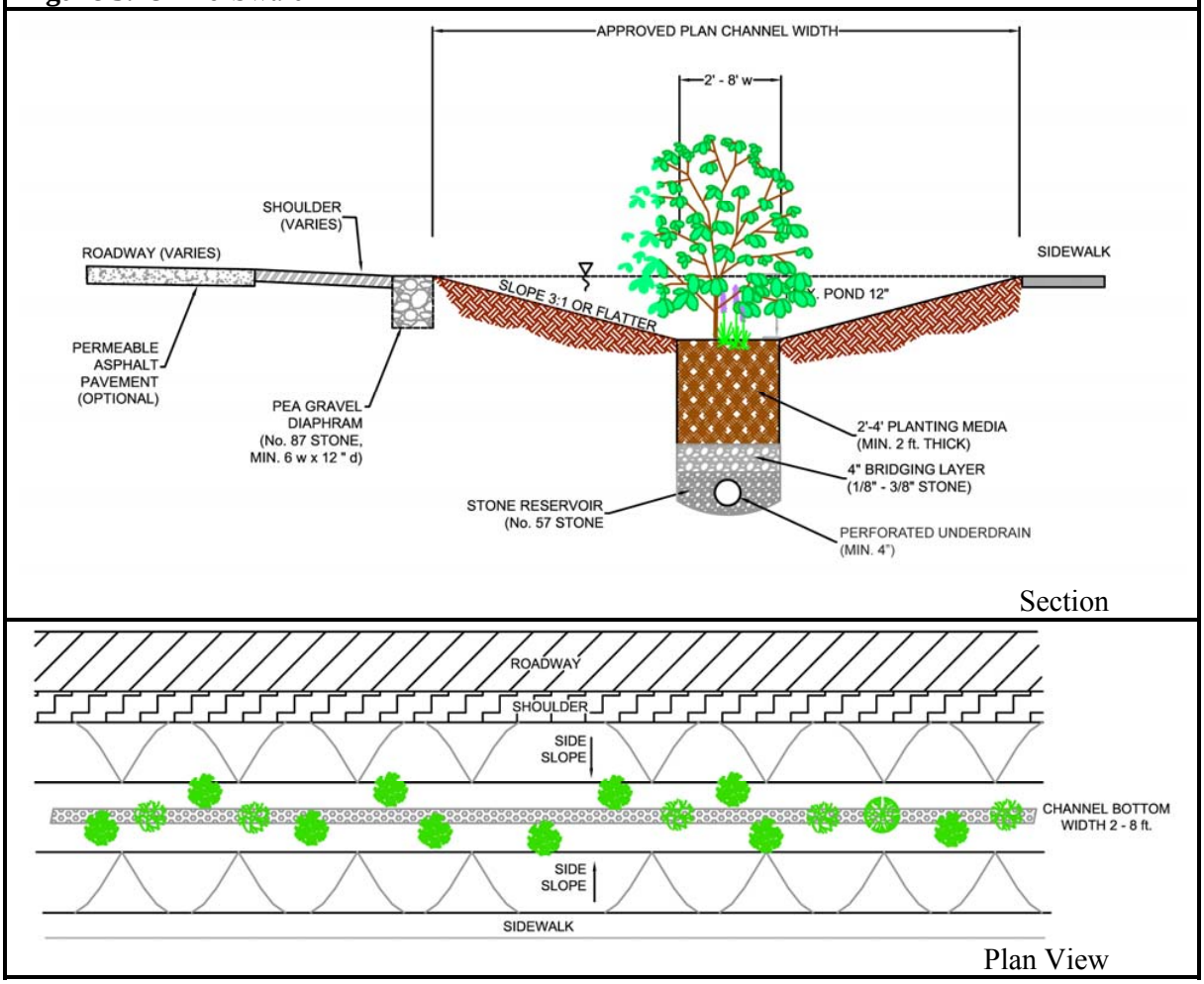

Maintenance Criteria:

The following items should be addressed to ensure proper maintenance and long-term performance of swales:

- For grassed swales, regular mowing (at least bi-annually) is critical in order to reduce competition from weeds and irrigation may be needed during dry weather to establish vegetation. Sparsely vegetated areas need to be re-seeded to maintain dense coverage.

- If water does not drain within 48 hours, the bottom soil should be tilled and revegetated.

- Inspections should be performed once a year to assess slope integrity, vegetative health, soil stability, compaction, erosion, ponding, and sedimentation. Periodic removal of sediment, litter, or obstructions should be done as needed. Eroded side slopes and the swale bottom should be repaired and stabilized where needed.

Figure 5.19 Wet Swale

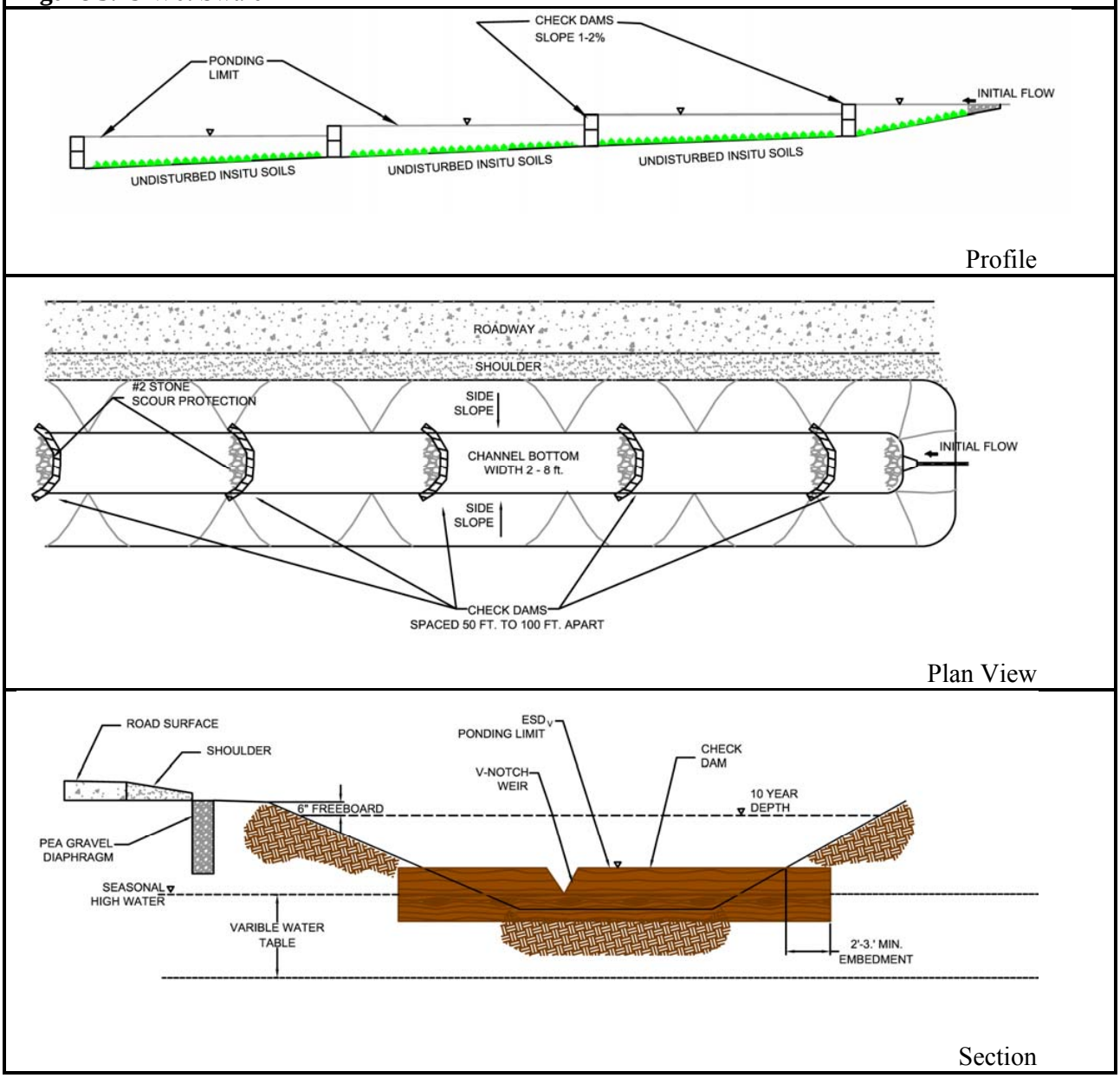

M-9. Enhanced Filters

An enhanced filter is a modification applied to specific practices (e.g., micro-bioretention) to provide water quality treatment and groundwater recharge in a single facility. This design variant uses a stone reservoir under a conventional filtering device to collect runoff, remove nutrients, and allow infiltration into the surrounding soil.

Applications:

The structural stormwater filtering systems in Chapter 3 and the micro-filtering structures above can be modified relatively easily for most development projects. Depending on soil conditions, a stone reservoir can be sized appropriately to provide Re_v for the drainage area to the system. These practices are subject to the same constraints and design requirements as conventional and micro-scale filters.

Performance:

When designed according to the guidance provided below, enhanced filters may be used to address Re_v for the contributing impervious area using the percent volume method. When coupled with other properly designed structural or micro-scale practices, the combined system will address the ESD sizing criteria.

Constraints:

The following constraints are critical when considering the use of enhanced filters to capture and treat stormwater runoff:

- **Space:** The surface area of a typical enhanced filter is dependent on the design of the practice above. Similarly, the size and distribution of open areas within a project (e.g., parking lot islands, landscaped areas) must be considered early during a project's planning and design if these practices are used.

  Enhanced filters should not be used in areas where their operation may create a risk for basement flooding, interfere with subsurface sewage disposal systems, or affect other underground structures.

- **Soils:** Soil conditions are important when designing enhanced filters. Local soil type is a primary factor for determining Re_v and in sizing the stone reservoir.

  Subsurface water conditions (e.g., water table) will help determine the stone reservoir thickness used. The probability of practice failure increases if the reservoir intercepts groundwater. Therefore, enhanced filter practice inverts should be above local groundwater tables.

- **Hotspot Runoff:** Enhanced filters should not be used to treat hotspots that generate higher concentrations of hydrocarbons, trace metals, or toxicants than are found in typical stormwater runoff and may contaminate groundwater.

- **Infrastructure:** The location of existing and proposed buildings and utilities (e.g., water supply wells, sewer, storm drains, electricity) will influence the design and construction of enhanced filters.

Design Guidance:

The following conditions should be considered when designing enhanced filters:

- **Conveyance:** *Runoff shall enter the stone reservoir in a safe and non-erosive manner.* Typically, runoff flows through the upper scale practice, into the stone reservoir and infiltrates into the ground. As the reservoir fills, an underdrain system is used to discharge treated stormwater safely downstream. Underdrains may be connected to other micro-scale practices or open or closed storm drain systems.

  All structural and micro-scale filters should be designed off-line whenever possible. A flow splitter should be used to divert excess runoff away from the filter media to a stable, downstream conveyance system. If bypassing these practices is impractical, internal overflow devices (e.g., elevated yard inlet) may be used.

- **Treatment:** Enhanced filters shall meet the following conditions:

  - *Enhanced filters shall be coupled with properly designed filters to address both ESD and Re_v requirements.*
  - *At a minimum, enhanced filter reservoirs shall be designed to store the Re_v.* The stone reservoir volume is equal to the surface area multiplied by depth divided by the porosity (*n*) of the stone [Volume = Surface Area (ft^2) x Depth (ft) x 0.4].
  - *When using Variation A, the stone reservoir* (#57 stone preferred) *shall be at least 12 inches thick below the underdrain.*
  - A 12-inch layer of sand or pea gravel (⅛ to ⅜ inch stone) may be used to act as a bridging layer between the stone reservoir and subsurface soils.
  - *The invert of the stone reservoir shall be separated at least four feet (two feet on the lower Eastern Shore) from the seasonal high water table.*

- **Setbacks:**

  - *Enhanced filters shall be located at least 25 feet from septic systems, 100 feet from unconfined water supply wells, and 50 feet from confined water supply wells.*

  - *Enhanced filters shall be sized and located to meet minimum local requirements for clearance (both vertical and horizontal) from sewer and water lines. Designs may need to include special protection if underground utilities cross through enhanced filters.*

- **Observation Wells:** *An observation well consisting of an anchored, 4 to 6-inch diameter perforated pipe shall be provided. The top of the observation well shall be at least six inches above grade.*

Construction Criteria:

The following items should be addressed during the construction of projects with enhanced filtering practices:

- **Erosion and Sediment Control:** *Enhanced filters shall not be used as sediment control practices (e.g., sediment traps).* Enhanced filters should not be constructed until the contributing drainage area is stabilized. *Construction runoff shall be directed away after initial rough grading.*

- **Soil Compaction:** Existing soils in the location of enhanced filters should be scarified to maximize infiltration. Construction shall be performed with lightweight, wide-tracked equipment to minimize disturbance and compaction.

- **Reservoir Installation:** Stone for the reservoir system should be clean, washed, and free of fines. Stone should be placed in horizontal layers (six inches per lift maximum) over the entire area of the practice using excavators or backhoes operating adjacent to the practice.

Inspection:

- Regular inspections shall be made during the following stages of construction:

    - *During excavation to subgrade.*
    - *During placement of gravel, and installation of underdrain systems and observation wells.*
    - *At all stages required for the ESD practice located above the enhanced filter.*

Maintenance Criteria:

Enhanced filters require minimal maintenance in addition to that needed for the practice above to ensure optimum performance. Generally, maintenance is the same as that used to keep the primary practice in good condition. Additional measures include making sure there is no water in the observation well. The presence of water 48 hours after a rain event indicates that the enhanced filter may be clogged and need replacement.

Figure 5.20 Enhanced Filters

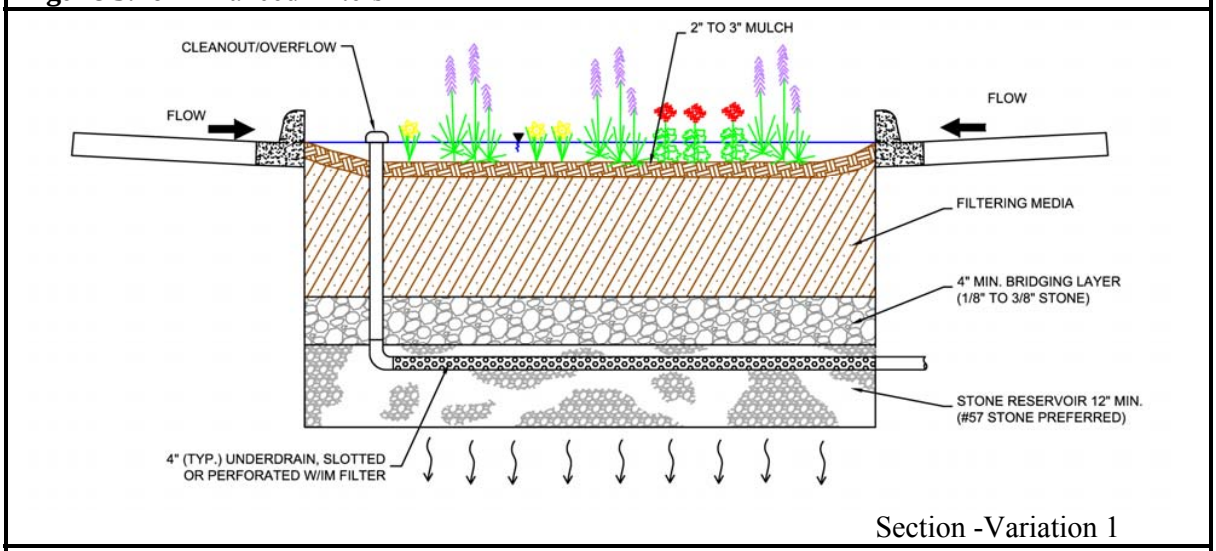

Section -Variation 1

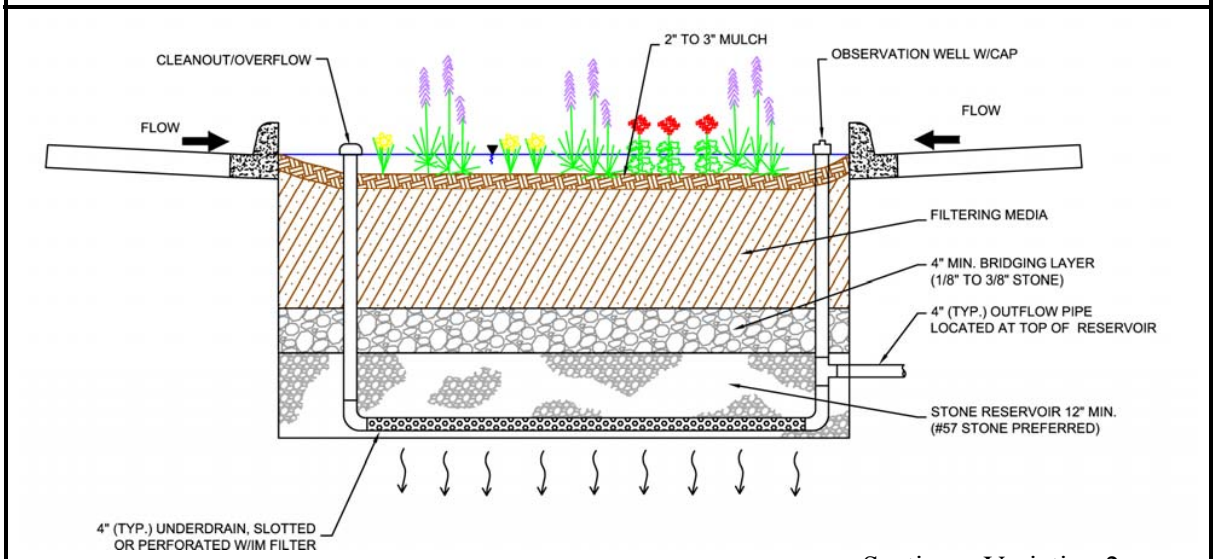

Section – Variation 2

Section 5.5 Redevelopment

5.5.1 Introduction

Redevelopment is defined as any construction, alteration, or improvement performed on sites where the existing land use is commercial, industrial, institutional, or multifamily residential and existing site impervious area exceeds 40%. The term "site" is defined as **a** single tract, lot, parcel of land, or combination of tracts, lots, parcels of land that are in one ownership, or are contiguous and in diverse ownership where development is to be performed as part of a unit, subdivision or project. Therefore, when the total site impervious area under existing conditions exceeds the 40% threshold, redevelopment requirements will apply. When calculating site imperviousness, the local approving agency may allow lands protected by forest preservation, conservation easements, or other mechanism to be subtracted from the total site area. This will create incentive to preserve and protect natural resources in redevelopment projects.

5.5.2 Redevelopment Policy

As described above, the 40% site impervious area threshold will determine whether a project will be regulated as new development or redevelopment. When redevelopment requirements apply, all existing impervious areas located within a project's limit of disturbance (LOD) are required for management. Because redevelopment projects present a wide range of constraints and limitations, the policy below allows for flexibility and an evaluation of options that can work in conjunction with broader watershed goals and local initiatives.

1. Stormwater management shall be addressed for redevelopment according to the following criteria:

    a. Reduce existing impervious area within the LOD by at least 50%; or
    b. Implement ESD practices to the MEP to provide water quality treatment for at least 50% of existing impervious area within the LOD; or
    c. Use a combination of impervious area reduction and ESD implementation for at least 50% of existing impervious areas.

2. Alternative stormwater management measures may be used to meet the requirements above provided that the developer satisfactorily demonstrates to the approving authority that impervious area reduction and ESD have been implemented to the MEP. Alternative stormwater management measures include but are not limited to:

    a. An on-site structural BMP; or
    b. An off-site structural BMP to provide water quality treatment for an area equal to or greater than 50% of existing impervious areas; or
    c. A combination of impervious area reduction, ESD implementation, and on-site or off-site structural BMP for an area equal to or greater than 50% of existing impervious area within the LOD.

3. An approving agency may develop separate programmatic policies for providing water quality treatment for redevelopment projects when the above requirements cannot be met. These policies shall be reviewed and approved by MDE and may include but are not limited to:

    a. Retrofitting existing structural BMPs;
    b. Stream restoration;
    c. Trading policies that involve other pollution control programs; or
    d. Watershed management plans.

4. Stormwater management shall be addressed according to new development requirements for any net increase in impervious area.

5.5.3 Management Considerations

Stormwater management requirements for redevelopment will apply to existing impervious areas within the project LOD. Impervious area is defined as any surface that does not allow stormwater to infiltrate into the ground. As a matter of policy, if gravel is compacted to the point where it will no longer infiltrate, then it is impervious. Any gravel driveway or parking area that is regularly used is likely to become impervious over time. However, a gravel road that is infrequently used may be considered pervious. These determinations should be done on a case-by-case basis.

Alternative surfaces may be used to meet redevelopment requirements. However, when designing to meet runoff reduction requirements the appropriate curve number should be used according to the design specifications in this Chapter. These practices however, are not considered permeable surfaces, and may be regulated differently by other State and local programs.

Redevelopment activities may occur on a site where a BMP is providing treatment for existing impervious areas. These BMPs shall be inspected and their performance verified. The requirements described in 5.5.2 apply to existing impervious areas that are not treated by BMPs meeting current design standards. Existing BMPs may be retrofitted to current standards and treat additional impervious areas to meet redevelopment requirements.

5.5.4 Design Process for Redevelopment

All redevelopment projects shall be subject to the Design process for Redevelopment as outlined in the step wise procedures in Figure 5.21.

Section 5.1 of this chapter describes the design process for all development in Maryland that includes a comprehensive review and approval of concept, site development, and final plans by the local review agencies. These procedures will also apply to redevelopment projects and the guidance provided in Section 5.1 of this chapter should be referenced for more specific detail at each step and for a check list of items required for interim reviews. The process described below outlines the steps in Figure 5.21 and will highlight considerations specific to the design of a

redevelopment project. Approving agencies shall use the process outlined in Figure 5.21 as an enforceable mechanism during review of the plan. Documentation that all steps were followed during project development and specific rationale to support the proposed design shall be required.

Step 1. Concept Phase: Develop a site map and assess existing natural resources as described in Section 5.1.3.1. Existing buildings, impervious areas, utilities, storm drain systems, neighboring properties, and all environmental and infrastructure constraints are identified. Opportunities to reduce existing and proposed impervious cover by using site design techniques and alternative surfaces are evaluated. The approximate locations of proposed impervious areas are identified and opportunities for using ESD practices are evaluated. Additionally the developer shall provide a narrative to the appropriate review agencies to support the design for concept approval.

Step 2. Submit Concept Plan: Approval agencies provide review and comment back to the developer. Concept plan approval must be given by the appropriate review agencies before proceeding to the site development phase.

Step 3. Site Development Phase: Incorporate comments from review agencies and finalize proposed site layout indicating how existing and proposed impervious areas are hydrologically connected to landscaped features (e.g., islands, vegetated planters, and green spaces). Evaluate opportunities for implementing ESD practices on open space and landscaped areas for storage, filtration, infiltration, and water quality treatment of stormwater runoff. Develop an erosion and sediment control plan and an overlay plan. Provide a narrative to the appropriate review agencies to support the design for site development approval.

Step 4. Submit Site Development Plan: Approval agencies provide review and comment on the site development plan back to the developer. All reasonable options for meeting stormwater management requirements using ESD planning techniques and practices have been exhausted. Approval agencies will provide comments and suggestions for final design. These may include potential management strategies in the event that stormwater requirements cannot be met using ESD. Site development plan approval must be given by the appropriate review agencies before proceeding to final design.

Step 5A. Final Design Phase – A: After all reasonable ESD options have been exhausted, evaluate alternative management strategies including on-site and off-site structural BMPs and design according to Chapter 3. Review agencies should provide guidance on acceptable stormwater treatment measures that may include retrofit projects, stream restoration, pollution trading, watershed management plans, or other approved practices.

Step 5B. Final Design Phase – B: Finalize plans and address any remaining comments from the appropriate review agencies.

Step 6. Submit Final Plans: Final stormwater management and erosion and sediment control plans are submitted for approval. The designer needs to demonstrate that on-site ESD practices have been implemented to the MEP.

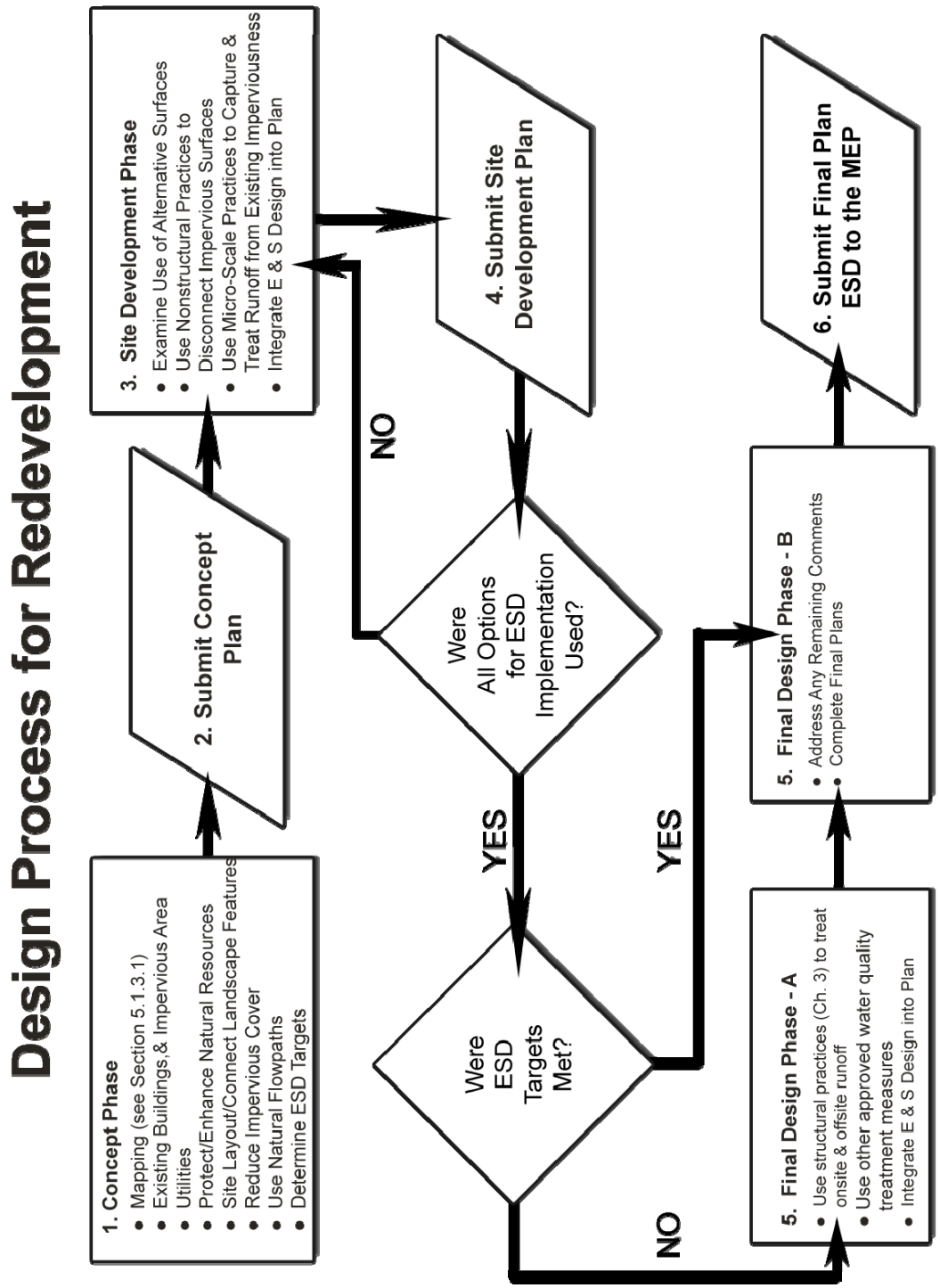

Figure 5.21 Design Process for Redevelopment

Section 5.6 Special Criteria for Sensitive Waters

5.6.1 Introduction

In Maryland, there are several different types of sensitive watersheds, each with unique features or regulatory requirements. In some watersheds, enhanced pollutant removal may be needed to protect drinking water supply or shellfish harvesting. In others, temperature increases caused by new development may need to be mitigated to preserve coldwater habitat. In addition to these special needs, there are numerous State programs (e.g., Critical Areas, Wetlands and Waterways, Forest Conservation) that regulate activities within receiving waters. This section presents additional criteria that should be considered when designing projects in sensitive watersheds. This section also identifies requirements from other State regulatory programs that will influence ESD implementation.

5.6.2 Water Quality Standards

The purpose of Maryland's water quality standards is to protect, maintain, and improve surface water quality. Two of the components of these standards are the Designated Uses and water quality criteria to protect them. Each major stream segment in Maryland is assigned one of the following Designated Uses:

- USE I & I-P: Water Contact Recreation and Protection of Nontidal Warmwater Aquatic Life where P indicates public water supply or reservoir protection areas.
- USE II & II-P: Support of Estuarine and Marine Aquatic Life and Shellfish Harvesting
- USE III & III-P: Nontidal Cold Water
- USE IV & IV-P: Recreational Trout Waters

For each designated use, specific water quality criteria are designed to protect aquatic life and human health. Typically, there are numeric criteria for toxics, dissolved oxygen, bacteria, and temperature (e.g., 5 mg/l for dissolved oxygen). There are also narrative standards that are used for other pollutants (e.g., oil, grease, odor) where specific values are impractical. For the majority of Maryland's waters, these criteria represent minimum standards for the support of balanced indigenous populations and contact recreation commonly known as "fishable/swimmable." For higher quality waters that exceed fishable/swimmable standards, the existing water quality conditions must be maintained.

5.6.3 ESD Implementation and Watershed Use

Stormwater management decisions are influenced by the nature and quality of the receiving waters. Therefore, Designated Uses should be identified during the initial site and resource mapping steps. In most cases, the majority of water quality concerns in a given watershed can be addressed through the use of ESD to the MEP. For example, maximizing the use of ESD is a critical component of any approval for additional discharges to higher quality waters identified in Maryland's Tier II Antidegradation Policy. However, in Use III and IV, ESD implementation alone may not be sufficient to maintain critical in-stream temperatures.

5.6.4 At-Source Techniques for Mitigating Thermal Impacts

Temperature increases caused by development impact the quality of coldwater streams. Temperatures should not exceed 68º F in Use III and 75º F in Use IV streams or the ambient water temperature, whichever is greater. The lethal temperatures for brook, and brown and rainbow trout are 72º and 82º F, respectively. Therefore, one of the primary design objectives is to prevent stream warming and maintain habitat quality for coldwater aquatic life. Implementing ESD to the MEP, including using infiltration where appropriate, will help mitigate many of the thermal impacts associated with development. However, additional techniques may be needed to limit thermal impacts at the source.

In a study prepared for MDE in 1990 by the Metropolitan Washington Council of Governments, it was determined that "[i]mperviousness together with local meteorological conditions had the largest influence on urban stream temperatures" (Thermal Impacts Associated with Urbanism and Stormwater Best Management Practices, John Galli, 1990). This study reported that as watershed imperviousness increased, progressively smaller rainfall depths were needed to produce large stream temperature fluctuations. Clearly, reducing imperviousness will help reduce thermal impacts and techniques for accomplishing this are listed in Section 5.1.

The color of impervious surfaces also affects temperature increases. Darker surfaces like asphalt pavement or shingles absorb solar radiation, elevating temperatures as this energy is transferred as heat to surrounding areas, including stormwater runoff. Lighter colored materials like grey or white concrete reflect solar radiation resulting in less elevated temperatures. A material's ability to reflect solar heat is measured as its Solar Reflectance Index or "SRI" and varies from 0 (a black surface) to 100 (a white surface) and above. In thermally-sensitive watersheds, designers should consider using materials with SRI values greater than 29 (see Table 5.9) for paving and steep-sloped (≥2:12) roofing, and materials with SRI values greater than 78 for low-sloped (≤2:12) roofing.

Table 5.9 Solar Reflectance Indices (SRI) for Typical Paving & Roofing Materials

Paving Materials:	**Condition**	**SRI**
Asphalt	New	0
	Weathered	6
Gray Concrete	New	35
	Weathered	29
White Concrete	New	86
	Weathered	45
Roofing Materials:		
Gray Asphalt Shingles		22
Gray EPDM (Rubber)		21
Light Gravel on Built-Up Roof		37
White-Coated Gravel on a Built-Up Roof		79
White EPDM (Rubber)		84
White PVC		104

Source: LEED®-NC for New Construction Reference Guide Ver. 2.2 (USGBC, October 2005)

Another option for mitigating thermal impacts at the source is to shade buildings and paved areas from the sun. Trees, large shrubs, and non-invasive vines on trellises can be used to screen these areas from the sun and cool the air through evapotranspiration. The full benefits of shading may not be realized until the trees and shrubs mature. Depending on the age and type of plants used, this may be several years. In the interim, any receiving waters may be degraded and resources lost as a result of temperature increases. When using this technique, designers should strive to provide shade within five years of project completion.

5.6.5 Additional Techniques for Mitigating Thermal Impacts

While thermal impacts are primarily caused by increases in impervious area, stormwater management practices, including ESD techniques, may contribute to the problem. When designing these techniques for use in coldwater areas, minimizing temperature increases is a primary concern. The following techniques will help reduce thermal impacts associated with ESD practices:

- Maximize the infiltration capacity of each practice. Increasing infiltration reduces the amount of surface runoff and lowers the thermal energy flowing into coldwater streams.

- Design filtering practices (e.g., micro-bioretention) so that underdrains are at least four feet below the surface. Soil temperatures at this depth are cooler and fluctuate little in response to surface weather conditions. As runoff flows through, thermal energy is dissipated and effluent temperatures are decreased.

  If overflow and conveyance connection constraints limit underdrain depth, use the enhanced filter option 2 (see M-9, Section 5.4.3). In this variant, the perforated underdrain is located at the bottom of a stone reservoir and below the outlet pipe. As the water surface elevation within the reservoir rises above the invert of the outlet pipe, cooler water is siphoned from the bottom.

- Use shade-producing plants in landscaped practices. As discussed above, trees, shrubs, and non-invasive vines on trellises can be used to screen impervious areas from the sun.

5.6.6 Other Resources

In addition to the various Designated Uses, designers must also consider sensitive conditions and design requirements associated with other programs that regulate development activities related to critical resources. Similar to water quality concerns, most of these may also be addressed through the use of ESD to the MEP. However, there are additional concerns like buffer widths, construction materials used, or wetland types that may need to be considered. This section identifies some of these program-specific requirements.

Wetlands & Waterways

Wetlands are essential natural resources that provide fish and wildlife habitat, flood protection, and water quality enhancement. These sensitive areas are impacted by even the smallest of changes in hydrology or water quality. For this reason, stormwater management measures should not be located within nontidal wetlands and their buffers, tidal wetlands, and 100-year floodplains. This includes many of the ESD techniques listed in this Chapter. If stormwater management facilities must be located within these areas, State and federal permits are required.

In addition to the above restrictions, runoff from new development and redevelopment must be treated prior to discharging directly into jurisdictional wetlands or waters of the State. In most cases, using ESD to MEP will provide adequate treatment and meet this requirement. Where discharges are permitted, there are additional concerns. When implementing ESD within areas of sensitive wetlands with unusual or unique plant communities like bogs, Delmarva bays, or Wetlands of Special State Concern, designers should incorporate features and materials that complement or mimic local natural conditions. For example, bogs are nutrient-deficient, acidic environments where runoff pH is critical. In these areas, designers should specify the use of native or locally available materials that are acidic (pH < 7) like granite or sandstone instead of limestone or marble (pH > 7) for riprap in conveyance channels and energy dissipaters. Likewise, landscaping should promote native plants that match both the conditions found within ESD practices and local wetland communities.

In addition to using local or native materials and plants, designers should consider how runoff is conveyed to wetlands. Storm drainage systems are usually designed to discharge directly into wetlands and/or floodplains. This approach minimizes the ecological interaction that occurs between wetland areas and adjacent buffers. Using more natural channel designs (e.g., coastal plains outfalls, step/pool systems, bioswales) or promoting sheetflow to convey runoff from ESD practices into wetlands connects and promotes interaction within these areas

Maryland's Critical Areas

Maryland's Critical Area Act recognizes that the land immediately surrounding the Chesapeake and Atlantic Coastal Bays and their tributaries has the greatest potential to affect water quality and wildlife habitat. Therefore, all land within 1,000 feet of tidal waters or adjacent tidal wetlands is designated as the "Critical Area." While the State Critical Area Commission provides oversight and reviews some development projects, each appropriate County and municipality enforces this law.

All development located within the Critical Area must address additional criteria. Some provisions of these criteria, like those relating to the protection of habitat, are applied uniformly throughout the Critical Area. Others provisions that may impact ESD implementation are related to water quality and site imperviousness and are specific to land classifications discussed below.

Within the Critical Area, land is designated as either Intensely Developed Area, Limited Development Area, or Resource Conservation Area (IDA, LDA, & RCA, respectively) based on uses that existed at the time the local programs were adopted. The IDAs are those areas of concentrated development where there is little natural habitat. Any new development and redevelopment projects within the IDA must include stormwater management practices to reduce post-development phosphorus loads to at least 10% below pre-developed levels. Commonly known as the 10% Rule, this requirement may be addressed using many of the ESD practices described in this Chapter or by using structural practices found in Chapter 3. While implementing ESD to the MEP should meet or exceed phosphorus reduction requirements in most cases, applicants may be required to use the Critical Areas methodology to demonstrate compliance with the 10% Rule as part of the plan approval process. Additional guidance for addressing the 10% Rule within the IDA may be found in the **Critical Area 10% Rule Guidance Manual** (MDNR, 2003).

LDAs are those regions where development density is low to moderate and wildlife habitat is not dominated by agriculture, wetlands, forests, or other natural areas. Similarly, RCAs are characterized by the dominance of agriculture or protected resources like forests or wetlands. Within these areas, new development or redevelopment must address standard water quality requirements, conserve natural areas, and incorporate corridors to connect wildlife and plant habitat. To accomplish these goals, imperviousness, alternative surfaces, or "lot coverage" is generally limited to 15% of the property or project area. There are also strict limits on clearing of existing woodland or forests. All clearing of these areas requires at least a 1:1 replacement.

To protect habitat, a forested buffer is required on all new development in all three land designations. Extending a minimum of 100 feet from the Mean High Water Line of tidal waters or the landward edge of tidal wetlands and tributary streams, this buffer acts as a water quality filter and protects important riparian habitat within the Critical Area. This distance may be expanded to include adjacent sensitive areas like hydric or highly erodible soils or steep slopes. If it is within a subdivision in the RCA, the minimum width of the buffer is 200 feet. Disturbance associated with new development is generally prohibited within the buffer, and, accordingly, stormwater practices (e.g., micro-scale practices, structural facilities) cannot be located within it.

Forest Conservation Act

The Maryland Forest Conservation Act (FCA) was enacted in 1991 to minimize the loss of forests during land development. As a result, identifying and protecting forests is an integral part of the development process. The primary areas targeted for protection include forests adjacent to streams or wetlands, located on steep slopes, or within or adjacent to forest blocks or wildlife corridors. Any activity requiring a subdivision application, grading permit, or erosion and sediment control plan approval on areas exceeding 40,000 square feet is subject to the FCA and a Forest Conservation Plan may be required. The Forest Conservation Plan includes a map and narrative that describes how existing forested and sensitive areas will be protected, if afforestation will be required, and how any replanted trees will be protected. While implementation is not directly affected by the FCA, trees may be planted within ESD practices and associated buffers located adjacent to critical habitat, steeply sloping ground and highly

erodible soils, large forest tracts, 50-foot stream buffers, or similar areas. Additionally, landscaping within ESD practices may be used to meet afforestation requirements when it exceeds 2,500 square feet, is at least 35 feet wide and protected by an approved landscape management plan.

Glossary

G

Glossary

G.1 Glossary

Portions of this glossary were adapted from the "*1994 Maryland Standards and Specifications for Soil Erosion and Sediment Control*" produced by the Maryland Department of the Environment, Water Management Administration.

ANTI-SEEP COLLAR - An impermeable diaphragm usually of sheet metal or concrete constructed at intervals within the zone of saturation along the conduit of a principal spillway to increase the seepage length along the conduit and thereby prevent piping or seepage.

ANTI-VORTEX DEVICE - A device designed and placed on the top of a riser or the entrance of a pipe to prevent the formation of a vortex in the water at the entrance.

AQUATIC BENCH - A bench which is located around the inside perimeter of a permanent pool and is normally vegetated with aquatic plants; the goal is to provide pollutant removal and enhance safety in areas using stormwater pond BMP's.

AQUIFER – A porous water bearing geologic formation generally restricted to materials capable of yielding an appreciable supply of water

"AS-BUILT" - Drawing or certification of conditions as they were actually constructed.

BAFFLES - Guides, grids, grating or similar devices placed in a pond to deflect or regulate flow and create a longer flow path.

BANKFULL FLOW - The condition where streamflow fills a stream channel to the top of the bank and at a point where the water begins to overflow onto a floodplain.

BARREL - The closed conduit used to convey water under or through an embankment; part of the principal spillway.

BASE FLOW - The stream discharge from groundwater.

BERM - A shelf that breaks the continuity of a slope; a linear embankment or dike.

BEST MANAGEMENT PRACTICE (BMP) - A structural or non-structural device designed to temporarily store or treat stormwater runoff in order to mitigate flooding, reduce pollution and provide other amenities.

BIORETENTION - A water quality practice that utilizes landscaping and soils to treat urban stormwater runoff by collecting it in shallow depressions before filtering through a fabricated planting soil media.

BUFFER – Zone of variable width located along both sides of a natural feature (e.g., stream or forested area) and designed to provide a protective area along a corridor.

CHANNEL - A natural stream that conveys water; a ditch or channel excavated for the flow of water.

CHANNEL PROTECTION VOLUME (Cp_v) - A design criteria which requires 24 hour detention of the one year post-developed, 24 hour storm event for the control of stream channel erosion and is calculated according to Appendix D.11.

CHANNEL STABILIZATION - Erosion prevention and stabilization of velocity distribution in a channel using jetties, drops, revetments, structural linings, vegetation and other measures.

CHECK DAM - A small dam constructed in a gully or other small watercourse to decrease flow velocity (by reducing the channel gradient), minimize scour, and promote deposition of sediment.

CHUTE - A high velocity, open channel for conveying water to a lower level without erosion.

CLAY (SOILS) - 1. A mineral soil separate consisting of particles less than 0.002 millimeter in equivalent diameter. 2. A soil texture class. 3. (Engineering) A fine grained soil (more than 50 percent passing the No. 200 sieve) that has a high plasticity index in relation to the liquid limit. (Unified Soil Classification System)

COCONUT ROLLS - Also known as coir rolls, these are rolls of natural coconut fiber designed to be used for streambank stabilization.

COMPACTION (SOILS) - Any process by which the soil grains are rearranged to decrease void space and bring them in closer contact with one another, thereby increasing the weight of solid material per unit of volume, increasing the shear and bearing strength and reducing permeability.

CONDUIT - Any channel intended for the conveyance of water, whether open or closed.

CONTOUR - 1. An imaginary line on the surface of the earth connecting points of the same elevation. 2. A line drawn on a map connecting points of the same elevation.

CORE TRENCH - A trench, filled with relatively impervious material intended to reduce seepage of water through porous strata.

CRADLE - A structure usually of concrete shaped to fit around the bottom and sides of a conduit to support the conduit, increase its strength and, in dams, to fill all voids between the underside of the conduit and the soil.

CREST - 1. The top of a dam, dike, spillway or weir, frequently restricted to the overflow portion. 2. The summit of a wave or peak of a flood.

CRUSHED STONE - Aggregate consisting of angular particles produced by mechanically crushing rock.

CURVE NUMBER (CN) - A numerical representation of a given area's hydrologic soil group, plant cover, impervious cover, interception and surface storage derived in accordance with Natural Resources Conservation Service methods. This number is used to convert rainfall depth into runoff volume.

CUT - Portion of land surface or area from which earth has been removed or will be removed by excavation; the depth below original ground surface to excavated surface.

CUT-AND-FILL - Process of earth moving by excavating part of an area and using the excavated material for adjacent embankments or fill areas.

CUTOFF - A wall or other structure, such as a trench, filled with relatively impervious material

intended to reduce seepage of water through porous strata.

CZARA - Acronym used for the Coastal Zone Act Reauthorization Amendments of 1990. These amendments sought to address the nonpoint source pollution issue by requiring states to develop coastal nonpoint pollution control programs in order to receive federal funds.

DAM - A barrier to confine or raise water for storage or diversion, to create a hydraulic head, to prevent gully erosion, or for retention of soil, sediment or other debris.

DETENTION - The temporary storage of stormwater runoff in a BMP with the goals of controlling peak discharge rates and providing gravity settling of pollutants.

DETENTION STRUCTURE – A permanent structure for the temporary storage of runoff that is designed to not create a permanent pool of water.

DIKE - An embankment to confine or control water, for example, one built along the banks of a river to prevent overflow to lowlands; a levee.

DISTRIBUTED RUNOFF CONTROL (DRC) - A stream channel protection criteria which utilizes a non-uniform distribution of the storage-stage-discharge relationship within a BMP to minimize the change in channel erosion potential from pre-developed to developed conditions.

DISTURBED AREA - An area in which the natural vegetative soil cover has been removed or altered and, therefore, is susceptible to erosion.

DIVERSION - A channel with a supporting ridge on the lower side constructed across the slope to divert water to areas where it can be used or disposed of safely. Diversions differ from terraces in that they are individually designed.

DRAINAGE - 1. The removal of excess surface water or ground water from land by means of surface or subsurface drains. 2. Soil characteristics that affect natural drainage.

DRAINAGE AREA (WATERSHED) – That area contributing runoff to a single point measured in a horizontal plane, which is enclosed by a ridge line.

DROP STRUCTURE - A structure for dropping water to a lower level and dissipating surplus energy; a fall.

DRY SWALE - An open drainage channel explicitly designed to detain and promote the filtration of stormwater runoff through an underlying fabricated soil media.

EMERGENCY SPILLWAY - A dam spillway, constructed in natural ground, that is to discharge flow in excess of the principal spillway design discharge.

ENERGY DISSIPATOR - A designed device such as an apron of rip-rap or a concrete structure placed at the end of a conduit for the purpose of reducing the velocity, energy and turbulence of the discharged water.

EROSION - 1. The process by which the land surface is worn away by the action of water, wind, ice, or gravity. 2. Detachment and movement of soil or rock fragments by water, wind, ice or gravity. The following terms are used to describe different types of water erosion:

Accelerated erosion - Erosion much more rapid than normal, natural or geologic erosion, primarily as a result of the influence of the activities of man or, in some cases, of other animals or natural catastrophes that expose base surfaces.

Gully erosion - The erosion process whereby water accumulates in narrow channels and removes the soil from this narrow area to considerable depths ranging from 1 or 2 feet to as much as 75 to 100 feet.

Rill erosion - An erosion process in which numerous small channels only several inches deep are formed. See rill.

Sheet erosion - The spattering of small soil particles caused by the impact of raindrops on wet soils. The loosened and spattered particles may or may not subsequently be removed by surface runoff.

EROSIVE VELOCITIES - Velocities of water that are high enough to wear away the land surface. Exposed soil will generally erode faster than stabilized soils. Erosive velocities will vary according to the soil type, slope, structural, or vegetative stabilization used to protect the soil.

EXFILTRATION - The downward movement of water through the soil; the downward flow of runoff from the bottom of an infiltration BMP into the soil.

EXTENDED DETENTION - A stormwater design feature that provides for the gradual release of a volume of water in order to increase settling of pollutants and protect downstream channels from frequent storm events.

EXTREME FLOOD VOLUME (Q_f) - The storage volume required to control those infrequent but large storm events in which overbank flows reach or exceed the boundaries of the 100-year floodplain.

FILTER BED - The section of a constructed filtration device that houses the filter media and the outflow pipe.

FILTER FENCE - A geotextile fabric designed to trap sediment and filter runoff.

FILTER MEDIA - The sand, soil, or other organic material in a filtration device used to provide a permeable surface for pollutant and sediment removal.

FILTER STRIP - A strip of permanent vegetation above ponds, diversions and other structures to retard the flow of runoff, causing deposition of transported material, thereby reducing sedimentation.

FINES (SOIL) - Generally refers to the silt and clay size particles in soil.

FLOODPLAIN - Areas adjacent to a stream or river that are subject to flooding or inundation during a storm event that occurs, on average, once every 100 years (or has a likelihood of occurrence of 1/100 in any given year).

FLOW SPLITTER - An engineered, hydraulic structure designed to divert a percentage of storm flow to a BMP located out of the primary channel, or to direct stormwater to a parallel pipe system or to bypass a portion of baseflow around a BMP.

FOREBAY - Storage space located near a stormwater BMP inlet that serves to trap incoming coarse sediments before they accumulate in the main treatment area.

FREEBOARD (HYDRAULICS) - The distance between the maximum water surface elevation anticipated in design and the top of retaining banks or structures. Freeboard is provided to prevent overtopping due to unforeseen conditions.

FRENCH DRAIN - A type of drain consisting of an excavated trench filled with pervious material, such as coarse sand, gravel or crushed stone; water percolates through the voids in this material and flows to an outlet.

GABION - A flexible woven wire basket composed of rectangular cells filled with small stones. Gabions may be assembled into many types of structures such as revetments, retaining walls, channel liners, drop structures and groins.

GABION MATTRESS - A thin gabion, usually six or nine inches thick, used to line channels for erosion control.

GRADE - 1. The slope or finished surface of a road, channel, canal bed, roadbed, top of embankment, bottom of excavation, or natural ground; any surface prepared for the support of construction, like paving or laying a conduit. 2. To finish the surface of a canal bed, roadbed, top of embankment or bottom of excavation.

GRASS CHANNEL - An open vegetated channel used to convey runoff and to provide treatment by filtering pollutants and sediments.

GRAVEL - 1. Aggregate consisting of mixed sizes of 1/4 inch to 3 inches which normally occur in or near old streambeds and have been worn smooth by the action of water. 2. A soil having particle sizes, according to the Unified Soil Classification System, ranging from the No. 4 sieve size, angular in shape, as produced by mechanical crushing.

GRAVEL DIAPHRAGM - A stone trench filled with small, river-run gravel used as pretreatment and inflow regulation in stormwater filtering systems.

GRAVEL FILTER - Washed and graded sand and gravel aggregate placed around a drain or well screen to prevent the movement of fine materials from the aquifer into the drain or well.

GRAVEL TRENCH - A shallow excavated channel backfilled with gravel and designed to provide temporary storage and permit percolation of runoff into the soil substrate.

GROUND COVER - Plants which are low-growing and provide a thick growth which protects the soil as well as providing some beautification of the area occupied.

GULLY - A channel or miniature valley cut by concentrated runoff through which water commonly flows during and immediately after heavy rains or snow melt. The distinction between gully and rill is one of depth. A gully is sufficiently deep such that it would not be obliterated by normal tillage operations, whereas a rill is of lesser depth and would be smoothed by ordinary farm tillage or grading activities.

HEAD (HYDRAULICS) - 1. The height of water above any plane of reference. 2. The energy, either kinetic or potential, possessed by each unit weight of a liquid expressed as the vertical height through which a unit weight would have to fall to release the average energy possessed. Used in various terms such as pressure head, velocity head, and head loss.

HERBACEOUS PERENNIAL (PLANTS) - A plant whose stems die back to the ground each year.

HIGH MARSH - A pondscaping zone within a stormwater wetland that exists from the surface of the normal pool to a six inch depth and typically contains the greatest density and diversity of emergent wetland plants.

HIGH MARSH WEDGES - Slices of shallow wetland (less than or equal to 6 inches) dividing a stormwater wetland.

HOTSPOT - Area where land use or activities generate highly contaminated runoff, with concentrations of pollutants in excess of those typically found in stormwater.

HYDRAULIC GRADIENT - The slope of the hydraulic grade line. That includes static and potential head.

HYDRODYNAMIC STRUCTURE – An engineered structure to separate sediments and oils from stormwater runoff using gravitational separation and/or hydraulic flow.

HYDROGRAPH - A graph showing variation in stage (depth) or discharge of a stream of water over a period of time.

HYDROLOGIC SOIL GROUP (HSG) - A Natural Resource Conservation Service classification system in which soils are categorized into four runoff potential groups. The groups range from A soils, with high permeability and little runoff production, to D soils, which have low permeability rates and produce much more runoff.

HYDROSEED – An application of seed or other material applied with forced water in order to revegetate.

IMPERVIOUS COVER (I) - Those surfaces in the landscape that cannot infiltrate rainfall consisting of building rooftops, pavement, sidewalks, driveways, etc..

INDUSTRIAL STORMWATER PERMIT - An NPDES permit issued to an identified land use that regulates the pollutant levels associated with industrial stormwater discharges or specifies on-site pollution control strategies.

INFILTRATION RATE (f) - The rate at which stormwater percolates into the subsoil measured in inches per hour.

INFLOW PROTECTION - A water handling device used to protect the transition area between any water conveyance (dike, swale, or swale dike) and a sediment trapping device.

KARST GEOLOGY - Regions that are characterized by formations underlain by carbonate rock and typified by the presence of limestone caverns and sinkholes.

LEVEL SPREADER - A device for distributing stormwater uniformly over the ground surface as sheet flow to prevent concentrated, erosive flows and promote infiltration.

MANNING'S FORMULA (HYDRAULICS) - A formula used to predict the velocity of water flow in an open channel or pipeline:

$$V = \frac{1.486}{n} r^{2/3} s^{1/2}$$

Where V is the mean velocity of flow in feet per second; *r* is the hydraulic radius; *s* is the slope of the energy gradient or for assumed uniform flow the slope of the channel, in feet per foot; and n is the roughness coefficient or retardance factor of the channel lining.

MICROPOOL - A smaller permanent pool which is incorporated into the design of larger stormwater ponds to avoid resuspension of particles and minimize impacts to adjacent natural features.

MICROTOPOGRAPHY - The complex contours along the bottom of a shallow wetland system, providing greater depth variation that increases the wetland plant diversity and increases the surface area to volume ratio.

MULCH - Covering on the soil surface to protect and enhance certain characteristics, such as water retention qualities.

MUNICIPAL STORMWATER PERMIT - An NPDES permit issued to municipalities to regulate discharges from municipal separate storm sewers for compliance with EPA regulations.

NPDES - Acronym for the National Pollutant Discharge Elimination System, which regulates point source discharges.

NON-STRUCTURAL BMPs - Stormwater runoff treatment techniques which use natural measures to reduce pollution levels, do not require extensive construction efforts and/or promote pollutant reduction by eliminating the pollutant source.

NITROGEN-FIXING (BACTERIA) - Bacteria having the ability to fix atmospheric nitrogen, making it available for use by plants.

NORMAL DEPTH - Depth of flow in an open conduit during uniform flow for any given conditions.

OUTFALL - The point where water discharges from a conduit, stream, or drain.

OFF-LINE - A management system designed to control a storm event by diverting a percentage of stormwater events from a stream or storm drainage system.

ON-LINE - A management system designed to control stormwater in its original stream or drainage channel.

ONE YEAR STORM - A stormwater event which occurs on average once every year or statistically has a 100% chance on average of occurring in a given year.

ONE HUNDRED YEAR STORM - An extreme flood event which occurs on average once every 100 years or statistically has a 1% chance on average of occurring in a given year.

OPEN CHANNEL - Also known as swale, grass channel, and biofilter. This system is used for the conveyance, retention, infiltration and filtration of stormwater runoff.

OUTLET - The point at which water discharges from such things as a stream, river, lake, tidal basin, pipe, channel or drainage area.

OUTLET CHANNEL - A waterway constructed or altered primarily to carry water from man-made structures such as terraces, subsurface drains, diversions and impoundments.

OVERBANK FLOOD PROTECTION VOLUME (Q_p) – The volume controlled by structural practices to prevent an increase in the frequency of out of bank flooding generated by development.

PEAK DISCHARGE RATE - The maximum instantaneous rate of flow during a storm, usually in reference to a specific design storm event.

PERCENT AREA METHOD - Technique used to evaluate the compliance of a non-structural BMP for meeting recharge requirements by calculating the percent of impervious area effectively treated and comparing to a minimum recharge target percentage for the various soil groups.

PERCENT VOLUME METHOD - Procedure used with structural BMPs to evaluate compliance with recharge requirements by assuring that the volume of runoff treated by the practice exceeds the computed recharge volume.

PERMANENT SEEDING - The establishment of perennial vegetation which may remain for many years.

PERMEABILITY - The rate of water movement through a soil column under saturated conditions.

PERMEABLE COVER – Those surfaces in the landscape consisting of open space, forested areas, meadows, etc. that infiltrate rainfall.

PERMISSIBLE VELOCITY (HYDRAULICS) - The highest average velocity at which water may be carried safely in a channel or other conduit. The highest velocity that can exist through a substantial length of a conduit and not cause scour of the channel. A safe, non-eroding or allowable velocity

pH - A number denoting the common logarithm of the reciprocal of the hydrogen ion concentration. A pH of 7.0 denotes neutrality, higher values indicate alkalinity, and lower values indicate acidity.

PIPING - Removal of soil material through subsurface flow channels.

PLUGS - Pieces of turf or sod, usually cut with a round tube, which can be used to propagate the turf or sod by vegetative means.

POCKET POND - A stormwater pond designed for treatment of small drainage area (< 5 acres) runoff and which has little or no baseflow available to maintain water elevations and relies on groundwater to maintain a permanent pool.

POCKET WETLAND - A stormwater wetland design adapted for the treatment of runoff from small drainage areas (< 5 acres) and which has little or no baseflow available to maintain water elevations and relies on groundwater to maintain a permanent pool.

POND BUFFER - The area immediately surrounding a pond which acts as a filter to remove pollutants and provide infiltration of stormwater prior to reaching the pond. Provides a separation barrier to adjacent development.

POND DRAIN - A pipe or other structure used to drain a permanent pool within a specified time period.

PONDSCAPING - Landscaping around stormwater ponds which emphasizes using native vegetative species to meet specific design intentions. Species are selected for up to six zones in the pond and its surrounding buffer based on their ability to tolerate inundation and/ or soil saturation.

POROSITY (*n*) - Ratio of pore volume to total volume.

PRETREATMENT - Techniques employed in stormwater BMPs to provide storage or filtering to help trap coarse materials and other pollutants before they enter the system.

PRINCIPAL SPILLWAY - The primary pipe or weir which carries baseflow and storm flow through a dam embankment.

RECHARGE RATE - Annual amount of rainfall which contributes to groundwater as a function of hydrologic soil group.

RECHARGE VOLUME (Re_v) – The portion of the water quality volume (WQ_v) used to maintain groundwater recharge rates at development sites.

REDEVELOPMENT - Any construction, alteration, or improvement exceeding five thousand square feet of land disturbance performed on sites where existing land use is commercial, industrial, institutional, or multifamily residential.

RETENTION - The amount of precipitation on a drainage area that does not escape as runoff. It is the difference between total precipitation and total runoff.

REVERSE-SLOPE PIPE - A pipe which draws from below a permanent pool extending in a reverse angle up to the riser and determines the water elevation of the permanent pool.

RIGHT-OF-WAY - Right of passage, as over another's property. A route that is lawful to use. A strip of land acquired for transport, conveyance or utility construction.

RIP-RAP - Broken rock, cobbles, or boulders placed on earth surfaces, such as the face of a dam or the bank of a stream, for protection against the action of water (waves); also applies to brush or pole mattresses or brush and stone, or similar materials used for soil erosion control.

RISER - A vertical pipe or structure which extends from the bottom of a pond and houses the control devices (weirs/orifices) to achieve the discharge rates for specified designs.

ROUGHNESS COEFFICIENT (HYDRAULICS) - A factor in velocity and discharge formulas representing the effect of channel roughness on energy losses in flowing water. Manning's "n" is a commonly used roughness coefficient.

RUNOFF (HYDRAULICS) - That portion of the precipitation on a drainage area that is discharged from the area in the stream channels. Types include surface runoff, groundwater runoff or seepage.

SAFETY BENCH - A relatively flat area above the permanent pool and surrounding a stormwater pond designed to provide a separation to adjacent slopes.

SAND - 1. (Agronomy) A soil particle between 0.05 and 2.0 millimeters in diameter. 2. A soil textural class. 3. (Engineering) According to the Unified Soil Classification System, a soil particle larger than the No. 200 sieve (0.074mm) and passing the No. 4 sieve (approximately 1/4 inch).

SEDIMENT – Soils or other surficial materials transported or deposited by the action of wind, water, ice, or gravity as a product of erosion.

SEEPAGE - 1. Water escaping through or emerging from the ground. 2. The process by which water percolates through soil.

SEEPAGE LENGTH - In sediment basins or ponds, the length along the pipe and around the anti-seep collars that is within the zone of saturation through an embankment.

SETBACKS - The minimum distance requirements for locating certain structures in relation to roads, wells, septic fields, or other structures.

SHEET FLOW - Water, usually storm runoff, flowing in a thin layer over the ground surface.

SIDE SLOPES (ENGINEERING) - The slope of the sides of a channel, dam or embankment. It is customary to name the horizontal distance first, as 1.5 to 1, or frequently, 1 ½: 1, meaning a horizontal distance of 1.5 feet to 1 foot vertical.

SILT - 1. (Agronomy) A soil separate consisting of particles between 0.05 and 0.002 millimeter in equivalent diameter. 2. A soil textural class. 3. (Engineering) According to the Unified Soil Classification System a fine grained soil (more than 50 percent passing the No. 200 sieve) that has a low plasticity index in relation to the liquid limit.

SOIL TEST – 1. Physical analysis of soil properties such as grain size, plasticity, or texture. 2. Chemical analysis of soil to determine the need for fertilizers or amendments for species of plant being grown.

SPILLWAY - An open or closed channel, or both, used to convey excess water from a reservoir. It may contain gates, either manually or automatically controlled to regulate the discharge of excess water.

STABILIZATION - Providing vegetative and/or structural measures that will reduce or prevent erosion.

STAGE (HYDRAULICS) - The variable water surface or the water surface elevation above any chosen datum.

STILLING BASIN - An open structure or excavation at the foot of an outfall, conduit, chute, drop, or spillway to reduce the energy of the descending stream of water.

STORMWATER FILTERING - Stormwater treatment methods which utilize an artificial media to filter out pollutants entrained in urban runoff.

STORMWATER PONDS - A land depression or impoundment created for the detention or retention of stormwater runoff.

STORMWATER WETLANDS - Shallow, constructed pools that capture stormwater and allow for the growth of characteristic wetland vegetation.

STREAM BUFFERS - Zones of variable width which are located along both sides of a stream and are designed to provided a protective natural area along a stream corridor.

STRUCTURAL BMPs - Devices which are constructed to provide temporary storage and treatment of stormwater runoff.

SUBGRADE - The soil prepared and compacted to support a structure or a pavement system.

TAILWATER - Water, in a river or channel, immediately downstream from a structure.

TECHNICAL RELEASE No. 20 (TR-20) - A Soil Conservation Service (now NRCS) watershed hydrology computer model that is used to compute runoff volumes and provide routing of storm events through stream valleys and/or ponds.

TECHNICAL RELEASE No. 55 (TR-55) - A watershed hydrology model developed by the Soil Conservation Service (now NRCS) used to calculate runoff volumes and provide a simplified routing for storm events through stream valleys and/or ponds.

TEMPORARY SEEDING - A seeding which is made to provide temporary cover for the soil while waiting for further construction or other activity to take place.

TEN-YEAR STORM - The 24 hour storm event which exceeds bankfull capacity and occurs on average once every ten years (or has a likelihood of occurrence of 1/10 in a given year).

TIME OF CONCENTRATION (t_c) - Time required for water to flow from the most remote point of a watershed, in a hydraulic sense, to the outlet.

TOE (OF SLOPE) - Where the slope stops or levels out. Bottom of the slope.

TOE WALL - Downstream wall of a structure, usually to prevent flowing water from eroding under the structure.

TOPSOIL - Fertile or desirable soil material used for the preparation of a seedbed.

TOTAL PHOSPHORUS (TP) – The total amount of phosphorus that is contained within the water column.

TOTAL SUSPENDED SOLIDS (TSS) - The total amount of particulate matter that is suspended in the water column.

TRASH RACK - Grill, grate or other device installed at the intake of a channel, pipe, drain or spillway for the purpose of preventing oversized debris from entering the structure.

TRUNCATED HYDROGRAPH - A method of computing the required design infiltration storage volume utilizing the differences from post-developed and pre-developed hydrograph volumes over a specific time frame.

TWO-YEAR STORM - The 24 hour storm event which exceeds bankfull capacity and occurs on average once every two years (or has a likelihood of occurrence of 1/2 in a given year).

ULTIMATE CONDITION - Full watershed build-out based on existing zoning.

ULTRA-URBAN - Densely developed urban areas in which little pervious surface exists.

VELOCITY HEAD - Head due to the velocity of a moving fluid, equal to the square of the mean velocity divided by twice the acceleration due to gravity (32.16 feet per second per second)[$v^2/2g$].

VOLUMETRIC RUNOFF COEFFICIENT (R_v) - The value that is applied to a given rainfall volume to yield a corresponding runoff volume based on the percent impervious cover in a drainage basin.

WATER QUALITY VOLUME (WQ_v) - The volume needed to capture and treat 90% of the average annual stormwater runoff volume equal to 1" (or 0.9" in Western Rainfall Zone) times the volumetric runoff coefficient (R_v) times the site area.

WATER SURFACE PROFILE - The longitudinal profile assumed by the surface of a stream flowing in an open channel; the hydraulic grade line.

WATER USE DESIGNATION - State of Maryland water use classification for the protection of resources (i.e., Use I-contact recreational use, Use II-shellfish harvest waters, Use III-natural trout waters, Use IV-recreational trout waters).

WEDGES - Design feature in stormwater wetlands that increases flow path length to provide for extended detention and treatment of runoff.

WET SWALE - An open drainage channel or depression, explicitly designed to retain water or intercept groundwater for water quality treatment.

WETTED PERIMETER - The length of the wetted surface of the channel.

WING WALL – Side wall extensions of a structure used to prevent sloughing of banks or channels.

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Article 142

Feature article from Watershed Protection Techniques. 1(4): 166-172

Assessing the Potential for Urban Watershed Restoration

After many years of neglect and abuse, urban streams and rivers have recently become the focus of restoration efforts throughout many parts of the country. For example, Barth *et al.* (1994) identified over 50 urban watershed programs that have been organized in the last few years. Communities increasingly recognize the value of healthy aquatic systems within urban areas and are taking steps to improve the quality of degraded streams. The motivating factors underlying each program vary. For some, the goal is to improve water quality to receiving waters. In others, the objective is to enhance the urban environment and provide recreational areas. Others seek to recover aquatic diversity within urban streams. These emerging urban watershed restoration efforts are unique in that they target stormwater treatment and habitat enhancement to rehabilitate urban streams.

While many communities now share the goal of urban watershed restoration, they may not always be sure how to go about it, or whether it is really an achievable goal. This article summarizes some of the experience of the last five years in the Mid-Atlantic region. We present a detailed method to assess and identify restoration opportunities and analyze, at subwatershed scale, whether restoration is possible.

Watershed Restoration Feasibility

Before spending millions of dollars and countless hours of staff time, watershed managers must ask a simple question: *Can the watershed really be restored?* We can always do some things to improve water quality to the receiving waters or enhance stream corridor aesthetics, but we must also realize that certain constraints exist within the urban environment that may make complete restoration extremely difficult, if not impossible.

For example, in the ultra-urban setting, where impervious cover exceeds 60 to 70%, most streams may have been previously piped. These areas are going to be next to impossible to restore. Other key criteria that must be considered are identified in Table 1. Although a negative response to a single criteria probably will not make restoration infeasible, a negative response to several criteria may well signal that watershed restoration is not feasible.

In our view, there are essentially three types of urban stream restoration possible. The first is a watershed where it is feasible to at least partially restore a native biological community within the stream. The second is a watershed that acts primarily as a conduit for stormwater runoff, where it is only possible to reduce pollutants to the receiving water body, and few opportunities exist to restore the stream. The third is a watershed where both pollutant load reductions and stream restoration are not feasible, and restoration is limited to stream corridor management. This article presents a restoration process for the first type of system. For those areas where meaningful stream restoration is not attainable, some of the following process may still be useful.

Before discussing a watershed restoration process, it is useful to establish the concept of watershed scale (Figure 1). An urban watershed may be several square miles in area and consist of several major stream systems. A subwatershed usually encompasses first or second order tributaries to the main stream and has a drainage area of approximately 1,000 to 1,500 acres (this can vary depending on regional differences). A subwatershed then consists of several catchments, which usually have drainage areas between 50 and 500 acres.

Meaningful watershed restoration must be conducted at the subwatershed scale for several reasons. First, not all subwatersheds within an urban watershed will have the same level of impervious cover, and therefore impacts and restoration opportunities often

Table 1: Subwatershed Restoration Screening Criteria: Is Restoration Feasible?

- Are stream valley parks present within the subwatershed?
- Is there available public or military land?
- Are the streams and waterways open channels?
- Is prior biological data available for the stream?
- Does the local government have a small-scale GIS database of watershed information?
- Does the subwatershed have a moderate impervious cover (i.e., less than 60 %)?
- Does the local government have a stream buffer program?
- Have stormwater detention structures been historically installed in the subwatershed?
- Are there existing floodways within the subwatershed?

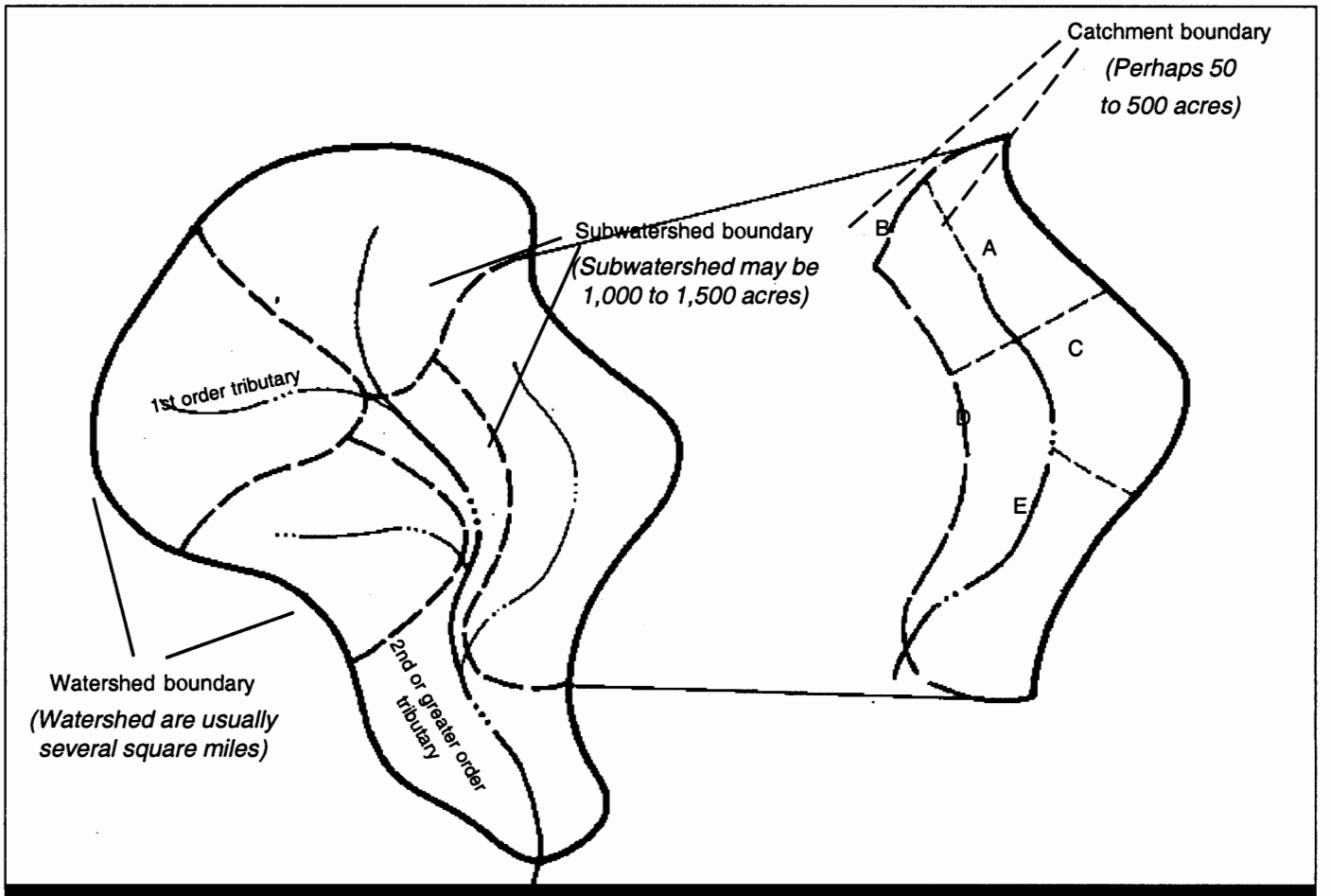

Figure 1: Watershed Scale: Watershed, Subwatershed, and Catchment

differ between subwatersheds. Second, it is easier to identify structural restoration sites and other opportunities at the subwatershed level. Third, local neighborhoods often fall within the scale of the subwatershed, making it easier to target pollution prevention efforts. Finally, and perhaps most importantly, the subwatershed scale is small enough to accurately measure the percentage of subwatershed area that can be treated by stormwater retrofits. We refer to this as the "control area." This concept is extremely important when choosing priority subwatersheds for restoration.

Watershed restoration usually takes decades to implement, whereas subwatershed efforts can be accomplished in shorter time periods. Some subwatersheds may receive stream restoration, while others may receive only corridor management measures. Therefore, by concentrating on one subwatershed at a time, we can measure improvement to that aquatic system while still contributing improvements to the watershed as a whole.

Watershed managers should keep several principles in mind when embarking on a watershed restoration effort. First, urban watershed restoration is primarily a question of what is possible. When striving to restore basic ecological functions to the aquatic environment, watershed managers need to look at current and past land use and stream quality to set realistic and achievable goals for the future. Another prerequisite is to establish a partnership approach. Many different agencies, organizations, and professionals will need to coordinate together to implement projects. A successful restoration plan will require strong fiscal and staff commitments. Some past efforts have failed because inadequate resources were available to complete the effort. Watershed restoration can also involve substantial change within the community. A strong educational program that involves local residents early in the restoration process can help explain the purpose of projects and provide support for the most intrusive changes.

Urban Watershed Restoration Process

The following process identifies a three-pronged approach to watershed restoration through **stormwater retrofitting, pollution prevention**, and **stream en-**

hancement. This process is recommended to achieve realistic improvements in aquatic communities for urban streams within the subwatershed context. Table 2 highlights the major components of the watershed restoration process.

The restoration process begins with an analysis of existing stream channel and subwatershed conditions. Several alternative stream assessment techniques are available to evaluate existing conditions. Stream characterization studies that identify biological communities such as macroinvertebrates or fish may be conducted. Land use assessments that measure impervious cover or percent industrial/commercial land may also be appropriate. Chemical water quality monitoring data may be collected or physical stream geometry parameters may be studied. The more detailed the assessment, the more useful it will be in developing a restoration plan. However, since most programs have limited money, an assessment that quickly provides information and identifies problem areas is most practical. A review of any past monitoring data (physical, chemical and biological) coupled with a rapid watershed wide monitoring protocol, such as the Rapid Stream Assessment Technique (RSAT) (Galli, 1993) is an ideal tool for documenting existing conditions and identifying problem areas.

Urban Watershed Retrofit Process

Once an analysis of existing conditions has been completed, a structural retrofit inventory is conducted. This process involves identifying subwatersheds, locating candidate retrofit sites and determining how much area within the subwatersheds can be controlled.

1. Desktop Survey of Potential Candidate Stormwater Practice Sites

The first step of the process consists of identifying candidate retrofit sites through a desktop survey. To begin, the watershed is subdivided into subwatersheds that range from 1,000 to 1,500 acres in size. This unit forms the fundamental basis for further restoration analysis. Subwatersheds, in turn, are subdivided into individual catchments ranging from 50 to 500 acres in size. Once these drainage units are mapped, low altitude color areal photographs are used to locate potential retrofit sites. Several additional mapping sources are also needed to select candidate sites, including the following:

- Topography (usually at a scale of 1"=200' or finer)
- Impervious cover based on land use/zoning maps
- Property ownership (usually available through tax maps)
- Open space parcels (using a recent aerial photograph and land use maps)
- Existing drainage network (including storm drainage pipes and open channels)

The best potential retrofit sites are usually located adjacent to existing engineered or natural channels, at the outfall of a storm drainage pipe or within an existing older stormwater management facility. Undeveloped parkland and open space areas, golf courses, wide floodplains, highway rights-of-way, and parking lot edges are also good places to look (see article 143 for more information on the details of stormwater retrofitting).

Good potential retrofit sites generally have the following characteristics:

- Within an existing open area (not forested and not occupied by existing structures)
- Has sufficient runoff storage capacity for the tributary catchment
- Feasible to divert stormwater to potential facility
- The site should have a drainage area large enough to make a meaningful contribution to the water quality of the catchment

2. Comprehensive Field Survey of Candidate Stormwater Practice Sites

Candidate retrofit sites meeting the desktop criteria are then field verified using a retrofit inventory sheet (RIS). The RIS includes site-specific information on location, ownership, approximate drainage area, utility locations, etc. An appropriate stormwater retrofit to meet the site specific constraints is identified in the field.

Table 2: Watershed Restoration Process

- Create intergovernmental/partnership agreements where necessary
- Conduct watershed assessment
  - Monitoring
  - Mapping
  - Stream reconnaissance
- Perform subwatershed delineations
- Characterize subwatershed conditions
- Evaluate candidate retrofit opportunities
- Conduct informational workshops and review retrofit opportunities with resident groups
- Assess stream restoration opportunities
- Assemble restoration opportunities into inventory
- Perform pollution prevention opportunity surveys
- Select priority subwatershed for demonstration projects
- Rank individual projects
- Develop comprehensive watershed/subwatershed plan
- Incorporate public involvement and active participation
- Initiate project implementation
- Evaluate restoration efforts

Table 3: Sample Retrofit Scoring System	
Description	Score
Pollutant Load Reduction (1 - 10 points)	
Storage	
0.00 -0.25 ac-ft	1 pt
0.26 - 1.00 ac-ft	2 pt
1.01 - 2.00 ac-ft	3 pt
2.01 - 4.00 ac-ft	4 pt
4.01 or more	5 pt
Pollutant Load Reduction (1 - 10 points)	
0% - 10%	1 pt
11% - 30%	2 pt
31% - 40%	3 pt
41% - 50%	4 pt
51% or more	5 pt
Stream Restoration Score (1 - 5 points)	
Directly reduces downstream velocities	1 pt
Provides extended detention control for subbankfull floods	2 pt
Provides habitat or supports fishery reintroduction	3 to 5 pt
Cost Score (1 - 5 points)	
Construction cost estimated at less than $10,000	5 pt
Between $10,001 and $25,000	4 pt
Between $25,001 and $50,000	3 pt
Between $50,001 and $100,000	2 pt
More than $100,000	1 pt
Ease of Implementation Score (1 - 5 points)	
Publicly owned site	2 pt
Access and staging are good or excellent	1 pt
Existing maintenance authority is in place	1 pt
No major wetland permits or other approvals needed	1 pt
Public Benefit (1 - 5 points)	
Site located in priority watershed	1 pt
Benefits small scale citizen habitat project	1 pt
Provides community visibility or amenity	1 pt
Provides environmental education/monitoring opportunity	1 pt
Supports a partnership effort	1 pt

Note: Sample scoring system based on Mid-Atlantic region. Scouring parameters and point ranges may vary from region to region.

In addition, the investigator verifies approximate wetland limits, notes stream conditions, and potential conflicts with or limitations from utility crossings, construction and maintenance access. Potential conflicts with sensitive resources and adjacent land uses are cataloged, available storage estimated, and a preliminary concept sketch is prepared. Photographs are also be taken of the site and vicinity. It is helpful to prepare a field package before visiting each site. The field package contains background information each candidate site, such as topographic maps, storm drainage network wetland maps, and any utility information.

3. Subwatershed Inventory

Once the field investigation is complete, each feasible retrofit site is cataloged in a retrofit inventory. The concept sketches are refined and site specific information added. A preliminary cost estimate is prepared and the RIS is finalized. Often, more than one type of stormwater practice may be designated as suitable for a particular location.

The completed inventory is then used to compute the amount of area controlled within the subwatershed. The total area of the subwatershed draining to proposed retrofit sites is used to select priority subwatersheds for restoration implementation. A sample scoring system (Table 3) provides watershed managers with a tool for allocating resources and developing an implementation approach for construction of specific projects. Scoring parameters can be modified for regional differences or to place extra emphasis on a particular issue of concern.

In some watersheds, prioritizing restoration efforts can be targeted by estimating urban pollutant loads to receiving waters, to identify which land uses within subwatersheds are contributing the greatest load to the receiving waters. In other watersheds, efforts are targeted on the basis of a stream quality ranking system that incorporates parameters such as habitat value and stream geometry.

Watershed Source Control through Pollution Prevention

The second major component of watershed restoration involves identifying and implementing source control measures within selected subwatersheds. Controlling pollution at its source must be a major objective. The best structural stormwater practice retrofits have pollutant removal efficiencies ranging from 40% to 80%, but still discharge some pollutants downstream (Schueler, 1994). Even the best stormwater retrofit program usually cannot control 100% of the subwatershed area. The goal of source control is to prevent pollutants from entering the storm drain network in the first place. The biggest challenge for watershed managers is that an effective source control requires changing people's

behavior. Therefore, efforts geared towards watershed education and behavior modification are likely to have big payoffs.

A good method to identify source control opportunities targets the major land uses within a subwatershed (industrial land uses, which are permitted under the NPDES program, may be handled separately). Where possible, commercial property owners should be identified. Once this is done, business coalitions throughout the subwatershed can be formed for distinct commercial clusters, or by grouping similar businesses together (e.g., vehicle maintenance, food service, warehouse, general retail, etc.)

A random non-regulatory field survey of commercial properties should be conducted to identify evidence of pollutants entering storm drains. Field investigators should look for the presence or absence of pollution prevention practices. The type of practices identified will depend to some extent on the type of business. The type of source control practices to look for are listed in Table 4. The survey should document the location and name of the business, owner information, approximate site area, and approximate impervious area.

Once the survey is complete, business coalition representatives should be selected to help administer the source control program. Informational flyers, targeted at specific businesses (such as automotive-related services), can be distributed to the coalition representatives. The local coalitions will be responsible for implementation of good housekeeping practices, monitoring compliance, and reporting results. Local governments may consider incentives to promote participation in this type of a program, such as special tax incentives, advertising subsidies for environmentally friendly businesses, or special subsidies for stormwater practice implementation.

A residential source control program involves a general review of the residential housekeeping of the watershed. A survey of subwatershed general conditions is conducted, and restoration opportunities targeting specific areas for reducing pollutants are identified (Table 5).

Once the residential survey is complete, homeowner associations and other community involvement groups are contacted to inform their members about the things they can do to reduce pollutants in the streams. Public attitude surveys are one way to assess citizen knowledge of watershed problems and to raise public awareness about watershed restoration issues (Smith *et al.*, 1994). Informational flyers on proper lawn care, auto care, disposal of yard wastes, and recycling of used oil and antifreeze are often included in public education programs. Stream stewardship can also be fostered by storm drain stenciling programs, neighborhood stream clean-up efforts, tree planting days and resident monitoring programs.

Urban Stream Enhancement Procedures

For those subwatersheds where biological diversity is to be enhanced, it is critical to assess the condition of the instream aquatic habitat. In many urban streams, the physical changes to channel geometry and habitat are so severe that few places remain to accommodate aquatic life. In order to restore diverse aquatic community, it is often necessary to physically reconstruct instream habitat structure.

A number of habitat-enhancement tools may be used to re-construct in-stream habitat, depending on the conditions of the stream in question. Pool/riffle sequences may be re-established, fish cover may be provided, channel morphology stabilized, fish barriers removed, and streamside areas revegetated. Several habitat enhancement techniques are presented in Table 6 and discussed in greater detail in article 144 to 150.

Before specific habitat enhancement techniques are proposed, it is necessary to know where and when they are appropriate for the stream. Much of this work can be accomplished during the existing stream condition assessments. Using the RSAT method, for example, field investigators can identify enhancement opportunities while documenting existing conditions.

Using RSAT, the stream network is divided into reach lengths and two to three assessments are conducted over each reach. The segments are evaluated for the following parameters: riparian cover condition, presence and severity of streambank erosion, pool/riffle quality, substrate condition, channel debris, condition of adjacent floodplain, presence of fish barriers, evi-

Table 4: Pollution Prevention, Commercial Properties

Check for the Following Good Housekeeping Measures

- Covered material storage or material stored inside
- Covered dumpster & no dumpster spillage
- Maintenance of vehicles inside
- Floor drains connected to sanitary sewer system
- Aboveground storage tanks with secondary containment
- Vehicle washing and steam cleaning using specified wash systems and connected to sanitary sewer
- Covered loading docks
- Covered vehicle refueling areas
- Absence of trash and debris
- Absence of eroded areas and lack of bare surfaces
- Adequate maintenance of BMPs
- Disconnected impervious surfaces

Table 5: Pollution Prevention Survey, Residential Areas

- Condition of storm drainage system (outfall, catchbasins)
- Condition of roadway surfaces
- Are storm drain inlets and catchbasins stenciled?
- Condition of pervious areas (needless turf, erosion areas, etc.)?
- Condition of residential lawn quality (is there evidence of excessive use of fertilizer?)
- Are there many vacant lots with local dumping of lawn refuge and other trash and debris?
- Is there evidence of substantial residential auto care and car washing?
- Are there opportunities for reforestation/revegetation?
- Identify candidates for stream stewardship

dence of exposed or leaking sanitary sewers, visible water quality impairment. In addition, adjacent land uses and property ownership, access points for heavy equipment, and presence of adjacent wetlands are documented.

The Cost of Urban Watershed Restoration

To date, there have been relatively few urban watershed restoration plans completed and even fewer that have been implemented. There is almost no data on the costs to implement a complete urban watershed restoration plan. One estimate, dating to the early 1990s, put restoration efforts within the Anacostia River Watershed at between approximately one-half to one million dollars per square mile of area (ART, 1992). Clearly, more information is necessary to approximate urban watershed restoration costs.

We can gain some information by looking at the costs of individual practices. For example, structural retrofits can range in cost from as little as $10,000 for minor modifications to an existing stormwater pond to as much as $750,000, or more for complete design and construction of a major wet, extended detention facility (Karouna, 1989). The implementation of a public outreach program for a moderately sized subwatershed in Prince George's County, Maryland costs approximately $30,000 annually (Paul, 1995). The cost to area businesses to implement and maintain pollution prevention practices might vary from a few hundred dollars to several thousand dollars per business per year, depending on the type of business. Stream enhancement projects can range in cost from a few thousand dollars for projects relying on donated plant materials and volunteer labor to $500,000 per mile for complete reconstruction of the stream channel geometry, bank stabilization and riparian revegetation (Black and Veatch, 1994).

Conclusion

Human activity has impacted the biological integrity and physical characteristics of many urban stream systems. Watershed restoration provides an opportunity to undo many past mistakes; however, many activities have created situations where complete restoration to pre-human conditions is impossible. A realistic program which recognizes limitations of a restoration program and targets a specific approach is essential. Watershed managers must recognize when to attempt comprehensive watershed restoration and when to pursue strictly stream corridor management strategies. An effective watershed restoration program is most likely to reach successful results when conducted at the subwatershed scale.

A comprehensive watershed restoration plan incorporates several complementary aspects. Stormwater retrofits can mitigate altered stormwater runoff and reduce pollutant loads, but cannot revive an aquatic system by themselves. Pollution prevention helps reduce pollutants at the source but does not affect the peak flows and erosive conditions in the stream. Stream habitat restoration may provide increased stream channel stability and create conditions where aquatic species might prosper, but without reductions in pollutant load, biological diversity is not likely to improve. Urban watershed restoration must be looked at in a comprehensive manner where each element plays a role in producing conditions where the aquatic community and humans can live side by side.

Table 6: Urban Stream Restoration Goals

Urban Stream Restoration Goals	Techniques/Methods
Control Urban Hydrologic Regime	■ Upstream structural retrofits ■ Parallel pipe systems
Remove Urban Pollutants	■ Source control pollution prevention efforts ■ Upstream structural retrofits ■ Increased/enhanced stream buffers ■ Elimination of illicit connections ■ Erosion & sediment controls
Restore Instream Habitat Structure	■ Create pools/riffles ■ Confine and deepen low flow channels ■ Provide structural complexity ■ Provide in-stream fish cover
Stabilize Channel Morphology	■ Enhance channel geometry (length to width ratio, meander patterns, etc. ■ Stabilize severe bank erosion ■ Stabilize channel and bed to accommodate bank full discharge
Replace/Augment Riparian Cover	■ Provide enhanced tree canopy over headwater streams ■ Stabilize stream banks ■ Provide instream overhead cover ■ Revegetate stream banks and buffers
Protect Critical Stream Substrates	■ Erosion and sediment controls ■ Riffle creation ■ Mechanical stream substrate cleanout ("Mudsucker") ■ Enhance steam buffers
Recolonize Stream Community	■ Remove fish migration barriers ■ Selectively reintroduce pre-disturbance native fish community (where appropriate)

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for which a license or permit is sought. The Regional Administrator may, and upon request shall, also advise licensing and permitting agencies as to the status of compliance by dischargers with the conditions and requirements of applicable water quality standards. In cases where an activity for which a license or permit is sought will affect water quality, but for which there are no applicable water quality standards, the Regional Administrator may advise licensing or permitting agencies with respect to conditions of such license or permit to achieve compliance with the purpose of the Act.

PART 122—EPA ADMINISTERED PERMIT PROGRAMS: THE NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM

Subpart A—Definitions and General Program Requirements

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122.44 Establishing limitations, standards and other permit conditions (applicable to State NPDES programs, see §123.25).
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122.64 Termination of permits (applicable to State programs, see §123.25).

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APPENDIX B TO PART 122 [RESERVED]

APPENDIX C TO PART 122—CRITERIA FOR DETERMINING A CONCENTRATED AQUATIC ANIMAL PRODUCTION FACILITY (§ 122.24)
APPENDIX D TO PART 122—NPDES PERMIT APPLICATION TESTING REQUIREMENTS (§ 122.21)
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APPENDIX J TO PART 122—NPDES PERMIT TESTING REQUIREMENTS FOR PUBLICLY OWNED TREATMENT WORKS (§ 122.21(j))

AUTHORITY: The Clean Water Act, 33 U.S.C. 1251 *et seq.*

SOURCE: 48 FR 14153, Apr. 1, 1983, unless otherwise noted.

Subpart A—Definitions and General Program Requirements

§ 122.1 Purpose and scope.

(a) *Coverage.* (1) The regulatory provisions contained in this part and parts 123, and 124 of this chapter implement the National Pollutant Discharge Elimination System (NPDES) Program under sections 318, 402, and 405 of the Clean Water Act (CWA) (Public Law 92–500, as amended, 33 U.S.C. 1251 *et seq.*)

(2) These provisions cover basic EPA permitting requirements (this part 122), what a State must do to obtain approval to operate its program in lieu of a Federal program and minimum requirements for administering the approved State program (part 123 of this chapter), and procedures for EPA processing of permit applications and appeals (part 124 of this chapter).

(3) These provisions also establish the requirements for public participation in EPA and State permit issuance and enforcement and related variance proceedings, and in the approval of State NPDES programs. These provisions carry out the purposes of the public participation requirements of part 25 of this chapter, and supersede the requirements of that part as they apply to actions covered under this part and parts 123, and 124 of this chapter.

(4) Regulatory provisions in Parts 125, 129, 133, 136 of this chapter and 40 CFR subchapter N and subchapter O of this chapter also implement the NPDES permit program.

(5) Certain requirements set forth in parts 122 and 124 of this chapter are made applicable to approved State programs by reference in part 123 of this chapter. These references are set forth in § 123.25 of this chapter. If a section or paragraph of part 122 or 124 of this chapter is applicable to States, through reference in § 123.25 of this chapter, that fact is signaled by the following words at the end of the section or paragraph heading: (Applicable to State programs, see § 123.25 of this chapter). If these words are absent, the section (or paragraph) applies only to EPA administered permits. Nothing in this part and parts 123, or 124 of this chapter precludes more stringent State regulation of any activity covered by the regulations in 40 CFR parts 122, 123, and 124, whether or not under an approved State program.

(b) *Scope of the NPDES permit requirement.* (1) The NPDES program requires permits for the discharge of ''pollutants'' from any ''point source'' into ''waters of the United States.'' The terms ''pollutant'', ''point source'' and ''waters of the United States'' are defined at § 122.2.

(2) The permit program established under this part also applies to owners or operators of any treatment works treating domestic sewage, whether or not the treatment works is otherwise required to obtain an NPDES permit, unless all requirements implementing section 405(d) of the CWA applicable to the treatment works treating domestic sewage are included in a permit issued under the appropriate provisions of subtitle C of the Solid Waste Disposal Act, Part C of the Safe Drinking Water Act, the Marine Protection, Research, and Sanctuaries Act of 1972, or the Clean Air Act, or under State permit

programs approved by the Administrator as adequate to assure compliance with section 405 of the CWA.

(3) The Regional Administrator may designate any person subject to the standards for sewage sludge use and disposal as a ''treatment works treating domestic sewage'' as defined in § 122.2, where the Regional Administrator finds that a permit is necessary to protect public health and the environment from the adverse effects of sewage sludge or to ensure compliance with the technical standards for sludge use and disposal developed under CWA section 405(d). Any person designated as a ''treatment works treating domestic sewage'' shall submit an application for a permit under § 122.21 within 180 days of being notified by the Regional Administrator that a permit is required. The Regional Administrator's decision to designate a person as a ''treatment works treating domestic sewage'' under this paragraph shall be stated in the fact sheet or statement of basis for the permit.

[NOTE TO § 122.1: Information concerning the NPDES program and its regulations can be obtained by contacting the Water Permits Division(4203), Office of Wastewater Management, U.S.E.P.A., Ariel Rios Building, 1200 Pennsylvania Avenue, NW., Washington, DC 20460 at (202) 260–9545 and by visiting the homepage at *http://www.epa.gov/owm/*]

[65 FR 30904, May 15, 2000, as amended at 72 FR 11211, Mar. 12, 2007]

§ 122.2 Definitions.

The following definitions apply to parts 122, 123, and 124. Terms not defined in this section have the meaning given by CWA. When a defined term appears in a definition, the defined term is sometimes placed in quotation marks as an aid to readers.

Administrator means the Administrator of the United States Environmental Protection Agency, or an authorized representative.

Animal feeding operation is defined at § 122.23.

Applicable standards and limitations means all State, interstate, and federal standards and limitations to which a ''discharge,'' a ''sewage sludge use or disposal practice,'' or a related activity is subject under the CWA, including ''effluent limitations,'' water quality standards, standards of performance, toxic effluent standards or prohibitions, ''best management practices,'' pretreatment standards, and ''standards for sewage sludge use or disposal'' under sections 301, 302, 303, 304, 306, 307, 308, 403 and 405 of CWA.

Application means the EPA standard national forms for applying for a permit, including any additions, revisions or modifications to the forms; or forms approved by EPA for use in ''approved States,'' including any approved modifications or revisions.

Approved program or *approved State* means a State or interstate program which has been approved or authorized by EPA under part 123.

Aquaculture project is defined at § 122.25.

Average monthly discharge limitation means the highest allowable average of ''daily discharges'' over a calendar month, calculated as the sum of all ''daily discharges'' measured during a calendar month divided by the number of ''daily discharges'' measured during that month.

Average weekly discharge limitation means the highest allowable average of ''daily discharges'' over a calendar week, calculated as the sum of all ''daily discharges'' measured during a calendar week divided by the number of ''daily discharges'' measured during that week.

Best management practices (''BMPs'') means schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the pollution of ''waters of the United States.'' BMPs also include treatment requirements, operating procedures, and practices to control plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage.

BMPs means ''best management practices.''

Class I sludge management facility means any POTW identified under 40 CFR 403.8(a) as being required to have an approved pretreatment program (including such POTWs located in a State that has elected to assume local program responsibilities pursuant to 40 CFR 403.10(e)) and any other treatment

works treating domestic sewage classified as a Class I sludge management facility by the Regional Administrator, or, in the case of approved State programs, the Regional Administrator in conjunction with the State Director, because of the potential for its sludge use or disposal practices to adversely affect public health and the environment.

Bypass is defined at § 122.41(m).

Concentrated animal feeding operation is defined at § 122.23.

Concentrated aquatic animal feeding operation is defined at § 122.24.

Contiguous zone means the entire zone established by the United States under Article 24 of the Convention on the Territorial Sea and the Contiguous Zone.

Continuous discharge means a ''discharge'' which occurs without interruption throughout the operating hours of the facility, except for infrequent shutdowns for maintenance, process changes, or other similar activities.

CWA means the Clean Water Act (formerly referred to as the Federal Water Pollution Control Act or Federal Water Pollution Control Act Amendments of 1972) Public Law 92–500, as amended by Public Law 95–217, Public Law 95–576, Public Law 96–483 and Public Law 97–117, 33 U.S.C. 1251 *et seq*.

CWA and regulations means the Clean Water Act (CWA) and applicable regulations promulgated thereunder. In the case of an approved State program, it includes State program requirements.

Daily discharge means the ''discharge of a pollutant'' measured during a calendar day or any 24-hour period that reasonably represents the calendar day for purposes of sampling. For pollutants with limitations expressed in units of mass, the ''daily discharge'' is calculated as the total mass of the pollutant discharged over the day. For pollutants with limitations expressed in other units of measurement, the ''daily discharge'' is calculated as the average measurement of the pollutant over the day.

Direct discharge means the ''discharge of a pollutant.''

Director means the Regional Administrator or the State Director, as the context requires, or an authorized representative. When there is no ''approved State program,'' and there is an EPA administered program, ''Director'' means the Regional Administrator. When there is an approved State program, ''Director'' normally means the State Director. In some circumstances, however, EPA retains the authority to take certain actions even when there is an approved State program. (For example, when EPA has issued an NPDES permit prior to the approval of a State program, EPA may retain jurisdiction over that permit after program approval, see § 123.1.) In such cases, the term ''Director'' means the Regional Administrator and not the State Director.

Discharge when used without qualification means the ''discharge of a pollutant.''

Discharge of a pollutant means:

(a) Any addition of any ''pollutant'' or combination of pollutants to ''waters of the United States'' from any ''point source,'' or

(b) Any addition of any pollutant or combination of pollutants to the waters of the ''contiguous zone'' or the ocean from any point source other than a vessel or other floating craft which is being used as a means of transportation.

This definition includes additions of pollutants into waters of the United States from: surface runoff which is collected or channelled by man; discharges through pipes, sewers, or other conveyances owned by a State, municipality, or other person which do not lead to a treatment works; and discharges through pipes, sewers, or other conveyances, leading into privately owned treatment works. This term does not include an addition of pollutants by any ''indirect discharger.''

Discharge Monitoring Report (''DMR'') means the EPA uniform national form, including any subsequent additions, revisions, or modifications for the reporting of self-monitoring results by permittees. DMRs must be used by ''approved States'' as well as by EPA. EPA will supply DMRs to any approved State upon request. The EPA national forms may be modified to substitute the State Agency name, address, logo, and other similar information, as appropriate, in place of EPA's.

DMR means ''Discharge Monitoring Report.''

Draft permit means a document prepared under § 124.6 indicating the Director's tentative decision to issue or deny, modify, revoke and reissue, terminate, or reissue a ''permit.'' A notice of intent to terminate a permit, and a notice of intent to deny a permit, as discussed in § 124.5, are types of ''draft permits.'' A denial of a request for modification, revocation and reissuance, or termination, as discussed in § 124.5, is not a ''draft permit.'' A ''proposed permit'' is not a ''draft permit.''

Effluent limitation means any restriction imposed by the Director on quantities, discharge rates, and concentrations of ''pollutants'' which are ''discharged'' from ''point sources'' into ''waters of the United States,'' the waters of the ''contiguous zone,'' or the ocean.

Effluent limitations guidelines means a regulation published by the Administrator under section 304(b) of CWA to adopt or revise ''effluent limitations.''

Environmental Protection Agency (''EPA'') means the United States Environmental Protection Agency.

EPA means the United States ''Environmental Protection Agency.''

Facility or activity means any NPDES ''point source'' or any other facility or activity (including land or appurtenances thereto) that is subject to regulation under the NPDES program.

Federal Indian reservation means all land within the limits of any Indian reservation under the jurisdiction of the United States Government, notwithstanding the issuance of any patent, and including rights-of-way running through the reservation.

General permit means an NPDES ''permit'' issued under § 122.28 authorizing a category of discharges under the CWA within a geographical area.

Hazardous substance means any substance designated under 40 CFR part 116 pursuant to section 311 of CWA.

Indian country means:

(1) All land within the limits of any Indian reservation under the jurisdiction of the United States Government, notwithstanding the issuance of any patent, and, including rights-of-way running through the reservation;

(2) All dependent Indian communities with the borders of the United States whether within the originally or subsequently acquired territory thereof, and whether within or without the limits of a state; and

(3) All Indian allotments, the Indian titles to which have not been extinguished, including rights-of-way running through the same.

Indian Tribe means any Indian Tribe, band, group, or community recognized by the Secretary of the Interior and exercising governmental authority over a Federal Indian reservation.

Indirect discharger means a nondomestic discharger introducing ''pollutants'' to a ''publicly owned treatment works.''

Individual control strategy is defined at 40 CFR 123.46(c).

Interstate agency means an agency of two or more States established by or under an agreement or compact approved by the Congress, or any other agency of two or more States having substantial powers or duties pertaining to the control of pollution as determined and approved by the Administrator under the CWA and regulations.

Major facility means any NPDES ''facility or activity'' classified as such by the Regional Administrator, or, in the case of ''approved State programs,'' the Regional Administrator in conjunction with the State Director.

Maximum daily discharge limitation means the highest allowable ''daily discharge.''

Municipality means a city, town, borough, county, parish, district, association, or other public body created by or under State law and having jurisdiction over disposal of sewage, industrial wastes, or other wastes, or an Indian tribe or an authorized Indian tribal organization, or a designated and approved management agency under section 208 of CWA.

Municipal separate storm sewer system is defined at § 122.26 (b)(4) and (b)(7).

National Pollutant Discharge Elimination System (NPDES) means the national program for issuing, modifying, revoking and reissuing, terminating, monitoring and enforcing permits, and imposing and enforcing pretreatment requirements, under sections 307, 402,

318, and 405 of CWA. The term includes an ''approved program.''

New discharger means any building, structure, facility, or installation:

(a) From which there is or may be a ''discharge of pollutants;''

(b) That did not commence the ''discharge of pollutants'' at a particular ''site'' prior to August 13, 1979;

(c) Which is not a ''new source;'' and

(d) Which has never received a finally effective NDPES permit for discharges at that ''site.''

This definition includes an ''indirect discharger'' which commences discharging into ''waters of the United States'' after August 13, 1979. It also includes any existing mobile point source (other than an offshore or coastal oil and gas exploratory drilling rig or a coastal oil and gas developmental drilling rig) such as a seafood processing rig, seafood processing vessel, or aggregate plant, that begins discharging at a ''site'' for which it does not have a permit; and any offshore or coastal mobile oil and gas exploratory drilling rig or coastal mobile oil and gas developmental drilling rig that commences the discharge of pollutants after August 13, 1979, at a ''site'' under EPA's permitting jurisdiction for which it is not covered by an individual or general permit and which is located in an area determined by the Regional Administrator in the issuance of a final permit to be an area or biological concern. In determining whether an area is an area of biological concern, the Regional Administrator shall consider the factors specified in 40 CFR 125.122(a) (1) through (10).

An offshore or coastal mobile exploratory drilling rig or coastal mobile developmental drilling rig will be considered a ''new discharger'' only for the duration of its discharge in an area of biological concern.

New source means any building, structure, facility, or installation from which there is or may be a ''discharge of pollutants,'' the construction of which commenced:

(a) After promulgation of standards of performance under section 306 of CWA which are applicable to such source, or

(b) After proposal of standards of performance in accordance with section 306 of CWA which are applicable to such source, but only if the standards are promulgated in accordance with section 306 within 120 days of their proposal.

NPDES means ''National Pollutant Discharge Elimination System.''

Owner or operator means the owner or operator of any ''facility or activity'' subject to regulation under the NPDES program.

Permit means an authorization, license, or equivalent control document issued by EPA or an ''approved State'' to implement the requirements of this part and parts 123 and 124. ''Permit'' includes an NPDES ''general permit'' (§ 122.28). Permit does not include any permit which has not yet been the subject of final agency action, such as a ''draft permit'' or a ''proposed permit.''

Person means an individual, association, partnership, corporation, municipality, State or Federal agency, or an agent or employee thereof.

Point source means any discernible, confined, and discrete conveyance, including but not limited to, any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, landfill leachate collection system, vessel or other floating craft from which pollutants are or may be discharged. This term does not include return flows from irrigated agriculture or agricultural storm water runoff. (See § 122.3).

Pollutant means dredged spoil, solid waste, incinerator residue, filter backwash, sewage, garbage, sewage sludge, munitions, chemical wastes, biological materials, radioactive materials (except those regulated under the Atomic Energy Act of 1954, as amended (42 U.S.C. 2011 *et seq.*)), heat, wrecked or discarded equipment, rock, sand, cellar dirt and industrial, municipal, and agricultural waste discharged into water. It does not mean:

(a) Sewage from vessels; or

(b) Water, gas, or other material which is injected into a well to facilitate production of oil or gas, or water derived in association with oil and gas production and disposed of in a well, if the well used either to facilitate production or for disposal purposes is approved by authority of the State in

which the well is located, and if the State determines that the injection or disposal will not result in the degradation of ground or surface water resources.

NOTE: Radioactive materials covered by the Atomic Energy Act are those encompassed in its definition of source, byproduct, or special nuclear materials. Examples of materials not covered include radium and accelerator-produced isotopes. See *Train* v. *Colorado Public Interest Research Group, Inc.*, 426 U.S. 1 (1976).

POTW is defined at § 403.3 of this chapter.

Primary industry category means any industry category listed in the NRDC settlement agreement (*Natural Resources Defense Council et al.* v. *Train,* 8 E.R.C. 2120 (D.D.C. 1976), *modified* 12 E.R.C. 1833 (D.D.C. 1979)); also listed in appendix A of part 122.

Privately owned treatment works means any device or system which is (a) used to treat wastes from any facility whose operator is not the operator of the treatment works and (b) not a ''POTW.''

Process wastewater means any water which, during manufacturing or processing, comes into direct contact with or results from the production or use of any raw material, intermediate product, finished product, byproduct, or waste product.

Proposed permit means a State NPDES ''permit'' prepared after the close of the public comment period (and, when applicable, any public hearing and administrative appeals) which is sent to EPA for review before final issuance by the State. A ''proposed permit'' is not a ''draft permit.''

Publicly owned treatment works is defined at 40 CFR 403.3.

Recommencing discharger means a source which recommences discharge after terminating operations.

Regional Administrator means the Regional Administrator of the appropriate Regional Office of the Environmental Protection Agency or the authorized representative of the Regional Administrator.

Schedule of compliance means a schedule of remedial measures included in a ''permit'', including an enforceable sequence of interim requirements (for example, actions, operations, or milestone events) leading to compliance with the CWA and regulations.

Secondary industry category means any industry category which is not a ''primary industry category.''

Secretary means the Secretary of the Army, acting through the Chief of Engineers.

Septage means the liquid and solid material pumped from a septic tank, cesspool, or similar domestic sewage treatment system, or a holding tank when the system is cleaned or maintained.

Sewage from vessels means human body wastes and the wastes from toilets and other receptacles intended to receive or retain body wastes that are discharged from vessels and regulated under section 312 of CWA, except that with respect to commercial vessels on the Great Lakes this term includes graywater. For the purposes of this definition, ''graywater'' means galley, bath, and shower water.

Sewage Sludge means any solid, semi-solid, or liquid residue removed during the treatment of municipal waste water or domestic sewage. Sewage sludge includes, but is not limited to, solids removed during primary, secondary, or advanced waste water treatment, scum, septage, portable toilet pumpings, type III marine sanitation device pumpings (33 CFR part 159), and sewage sludge products. Sewage sludge does not include grit or screenings, or ash generated during the incineration of sewage sludge.

Sewage sludge use or disposal practice means the collection, storage, treatment, transportation, processing, monitoring, use, or disposal of sewage sludge.

Silvicultural point source is defined at § 122.27.

Site means the land or water area where any ''facility or activity'' is physically located or conducted, including adjacent land used in connection with the facility or activity.

Sludge-only facility means any ''treatment works treating domestic sewage'' whose methods of sewage sludge use or disposal are subject to regulations promulgated pursuant to section 405(d) of the CWA and is required to obtain a permit under § 122.1(b)(2).

Standards for sewage sludge use or disposal means the regulations promulgated pursuant to section 405(d) of the CWA which govern minimum requirements for sludge quality, management practices, and monitoring and reporting applicable to sewage sludge or the use or disposal of sewage sludge by any person.

State means any of the 50 States, the District of Columbia, Guam, the Commonwealth of Puerto Rico, the Virgin Islands, American Samoa, the Commonwealth of the Northern Mariana Islands, the Trust Territory of the Pacific Islands, or an Indian Tribe as defined in these regulations which meets the requirements of § 123.31 of this chapter.

State Director means the chief administrative officer of any State or interstate agency operating an ''approved program,'' or the delegated representative of the State Director. If responsibility is divided among two or more State or interstate agencies, ''State Director'' means the chief administrative officer of the State or interstate agency authorized to perform the particular procedure or function to which reference is made.

State/EPA Agreement means an agreement between the Regional Administrator and the State which coordinates EPA and State activities, responsibilities and programs including those under the CWA programs.

Storm water is defined at § 122.26(b)(13).

Storm water discharge associated with industrial activity is defined at § 122.26(b)(14).

Total dissolved solids means the total dissolved (filterable) solids as determined by use of the method specified in 40 CFR part 136.

Toxic pollutant means any pollutant listed as toxic under section 307(a)(1) or, in the case of ''sludge use or disposal practices,'' any pollutant identified in regulations implementing section 405(d) of the CWA.

Treatment works treating domestic sewage means a POTW or any other sewage sludge or waste water treatment devices or systems, regardless of ownership (including federal facilities), used in the storage, treatment, recycling, and reclamation of municipal or domestic sewage, including land dedicated for the disposal of sewage sludge. This definition does not include septic tanks or similar devices. For purposes of this definition, ''domestic sewage'' includes waste and waste water from humans or household operations that are discharged to or otherwise enter a treatment works. In States where there is no approved State sludge management program under section 405(f) of the CWA, the Regional Administrator may designate any person subject to the standards for sewage sludge use and disposal in 40 CFR part 503 as a ''treatment works treating domestic sewage,'' where he or she finds that there is a potential for adverse effects on public health and the environment from poor sludge quality or poor sludge handling, use or disposal practices, or where he or she finds that such designation is necessary to ensure that such person is in compliance with 40 CFR part 503.

TWTDS means ''treatment works treating domestic sewage.''

Upset is defined at § 122.41(n).

Variance means any mechanism or provision under section 301 or 316 of CWA or under 40 CFR part 125, or in the applicable ''effluent limitations guidelines'' which allows modification to or waiver of the generally applicable effluent limitation requirements or time deadlines of CWA. This includes provisions which allow the establishment of alternative limitations based on fundamentally different factors or on sections 301(c), 301(g), 301(h), 301(i), or 316(a) of CWA.

Waters of the United States or *waters of the U.S.* means:

(a) All waters which are currently used, were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide;

(b) All interstate waters, including interstate ''wetlands;''

(c) All other waters such as intrastate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, ''wetlands,'' sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds the use, degradation, or destruction of which would affect or

could affect interstate or foreign commerce including any such waters:

(1) Which are or could be used by interstate or foreign travelers for recreational or other purposes;

(2) From which fish or shellfish are or could be taken and sold in interstate or foreign commerce; or

(3) Which are used or could be used for industrial purposes by industries in interstate commerce;

(d) All impoundments of waters otherwise defined as waters of the United States under this definition;

(e) Tributaries of waters identified in paragraphs (a) through (d) of this definition;

(f) The territorial sea; and

(g) ''Wetlands'' adjacent to waters (other than waters that are themselves wetlands) identified in paragraphs (a) through (f) of this definition.

Waste treatment systems, including treatment ponds or lagoons designed to meet the requirements of CWA (other than cooling ponds as defined in 40 CFR 423.11(m) which also meet the criteria of this definition) are not waters of the United States. This exclusion applies only to manmade bodies of water which neither were originally created in waters of the United States (such as disposal area in wetlands) nor resulted from the impoundment of waters of the United States. [See Note 1 of this section.] Waters of the United States do not include prior converted cropland. Notwithstanding the determination of an area's status as prior converted cropland by any other federal agency, for the purposes of the Clean Water Act, the final authority regarding Clean Water Act jurisdiction remains with EPA.

Wetlands means those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas.

Whole effluent toxicity means the aggregate toxic effect of an effluent measured directly by a toxicity test.

NOTE: At 45 FR 48620, July 21, 1980, the Environmental Protection Agency suspended until further notice in § 122.2, the last sentence, beginning ''This exclusion applies . . .'' in the definition of ''Waters of the United States.'' This revision continues that suspension.[1]

(Clean Water Act (33 U.S.C. 1251 *et seq.*), Safe Drinking Water Act (42 U.S.C. 300f *et seq.*), Clean Air Act (42 U.S.C. 7401 *et seq.*), Resource Conservation and Recovery Act (42 U.S.C. 6901 *et seq.*))

[48 FR 14153, Apr. 1, 1983, as amended at 48 FR 39619, Sept. 1, 1983; 50 FR 6940, 6941, Feb. 19, 1985; 54 FR 254, Jan. 4, 1989; 54 FR 18781, May 2, 1989; 54 FR 23895, June 2, 1989; 58 FR 45039, Aug. 25, 1993; 58 FR 67980, Dec. 22, 1993; 64 FR 42462, Aug. 4, 1999; 65 FR 30905, May 15, 2000]

§ 122.3 Exclusions.

The following discharges do not require NPDES permits:

(a) Any discharge of sewage from vessels, effluent from properly functioning marine engines, laundry, shower, and galley sink wastes, or any other discharge incidental to the normal operation of a vessel. This exclusion does not apply to rubbish, trash, garbage, or other such materials discharged overboard; nor to other discharges when the vessel is operating in a capacity other than as a means of transportation such as when used as an energy or mining facility, a storage facility or a seafood processing facility, or when secured to a storage facility or a seafood processing facility, or when secured to the bed of the ocean, contiguous zone or waters of the United States for the purpose of mineral or oil exploration or development.

(b) Discharges of dredged or fill material into waters of the United States which are regulated under section 404 of CWA.

(c) The introduction of sewage, industrial wastes or other pollutants into publicly owned treatment works by indirect dischargers. Plans or agreements to switch to this method of disposal in the future do not relieve dischargers of the obligation to have and comply with permits until all discharges of pollutants to waters of the United States are eliminated. (See also § 122.47(b)). This

[1] EDITORIAL NOTE: The words ''This revision'' refer to the document published at 48 FR 14153, Apr. 1, 1983.

exclusion does not apply to the introduction of pollutants to privately owned treatment works or to other discharges through pipes, sewers, or other conveyances owned by a State, municipality, or other party not leading to treatment works.

(d) Any discharge in compliance with the instructions of an On-Scene Coordinator pursuant to 40 CFR part 300 (The National Oil and Hazardous Substances Pollution Contingency Plan) or 33 CFR 153.10(e) (Pollution by Oil and Hazardous Substances).

(e) Any introduction of pollutants from non point-source agricultural and silvicultural activities, including storm water runoff from orchards, cultivated crops, pastures, range lands, and forest lands, but not discharges from concentrated animal feeding operations as defined in § 122.23, discharges from concentrated aquatic animal production facilities as defined in § 122.24, discharges to aquaculture projects as defined in § 122.25, and discharges from silvicultural point sources as defined in § 122.27.

(f) Return flows from irrigated agriculture.

(g) Discharges into a privately owned treatment works, except as the Director may otherwise require under § 122.44(m).

(h) The application of pesticides consistent with all relevant requirements under FIFRA (i.e., those relevant to protecting water quality), in the following two circumstances:

(1) The application of pesticides directly to waters of the United States in order to control pests. Examples of such applications include applications to control mosquito larvae, aquatic weeds, or other pests that are present in waters of the United States.

(2) The application of pesticides to control pests that are present over waters of the United States, including near such waters, where a portion of the pesticides will unavoidably be deposited to waters of the United States in order to target the pests effectively; for example, when insecticides are aerially applied to a forest canopy where waters of the United States may be present below the canopy or when pesticides are applied over or near water for control of adult mosquitoes or other pests.

(i) Discharges from a water transfer. Water transfer means an activity that conveys or connects waters of the United States without subjecting the transferred water to intervening industrial, municipal, or commercial use. This exclusion does not apply to pollutants introduced by the water transfer activity itself to the water being transferred.

[48 FR 14153, Apr. 1, 1983, as amended at 54 FR 254, 258, Jan. 4, 1989; 71 FR 68492, Nov. 27, 2006; 73 FR 33708, June 13, 2008]

§ 122.4 Prohibitions (applicable to State NPDES programs, see § 123.25).

No permit may be issued:

(a) When the conditions of the permit do not provide for compliance with the applicable requirements of CWA, or regulations promulgated under CWA;

(b) When the applicant is required to obtain a State or other appropriate certification under section 401 of CWA and § 124.53 and that certification has not been obtained or waived;

(c) By the State Director where the Regional Administrator has objected to issuance of the permit under § 123.44;

(d) When the imposition of conditions cannot ensure compliance with the applicable water quality requirements of all affected States;

(e) When, in the judgment of the Secretary, anchorage and navigation in or on any of the waters of the United States would be substantially impaired by the discharge;

(f) For the discharge of any radiological, chemical, or biological warfare agent or high-level radioactive waste;

(g) For any discharge inconsistent with a plan or plan amendment approved under section 208(b) of CWA;

(h) For any discharge to the territorial sea, the waters of the contiguous zone, or the oceans in the following circumstances:

(1) Before the promulgation of guidelines under section 403(c) of CWA (for determining degradation of the waters of the territorial seas, the contiguous zone, and the oceans) unless the Director determines permit issuance to be in the public interest; or

(2) After promulgation of guidelines under section 403(c) of CWA, when insufficient information exists to make a reasonable judgment whether the discharge complies with them.

(i) To a new source or a new discharger, if the discharge from its construction or operation will cause or contribute to the violation of water quality standards. The owner or operator of a new source or new discharger proposing to discharge into a water segment which does not meet applicable water quality standards or is not expected to meet those standards even after the application of the effluent limitations required by sections 301(b)(1)(A) and 301(b)(1)(B) of CWA, and for which the State or interstate agency has performed a pollutants load allocation for the pollutant to be discharged, must demonstrate, before the close of the public comment period, that:

(1) There are sufficient remaining pollutant load allocations to allow for the discharge; and

(2) The existing dischargers into that segment are subject to compliance schedules designed to bring the segment into compliance with applicable water quality standards. The Director may waive the submission of information by the new source or new discharger required by paragraph (i) of this section if the Director determines that the Director already has adequate information to evaluate the request. An explanation of the development of limitations to meet the criteria of this paragraph (i)(2) is to be included in the fact sheet to the permit under § 124.56(b)(1) of this chapter.

[48 FR 14153, Apr. 1, 1983, as amended at 50 FR 6940, Feb. 19, 1985; 65 FR 30905, May 15, 2000]

§ 122.5 Effect of a permit.

(a) *Applicable to State programs, see § 123.25.* (1) Except for any toxic effluent standards and prohibitions imposed under section 307 of the CWA and ''standards for sewage sludge use or disposal'' under 405(d) of the CWA, compliance with a permit during its term constitutes compliance, for purposes of enforcement, with sections 301, 302, 306, 307, 318, 403, and 405 (a)–(b) of CWA. However, a permit may be modified, revoked and reissued, or terminated during its term for cause as set forth in §§ 122.62 and 122.64.

(2) Compliance with a permit condition which implements a particular ''standard for sewage sludge use or disposal'' shall be an affirmative defense in any enforcement action brought for a violation of that ''standard for sewage sludge use or disposal'' pursuant to sections 405(e) and 309 of the CWA.

(b) *Applicable to State programs, See § 123.25.* The issuance of a permit does not convey any property rights of any sort, or any exclusive privilege.

(c) The issuance of a permit does not authorize any injury to persons or property or invasion of other private rights, or any infringement of State or local law or regulations.

[48 FR 14153, Apr. 1, 1983, as amended at 54 FR 18782, May 2, 1989]

§ 122.6 Continuation of expiring permits.

(a) *EPA permits.* When EPA is the permit-issuing authority, the conditions of an expired permit continue in force under 5 U.S.C. 558(c) until the effective date of a new permit (see § 124.15) if:

(1) The permittee has submitted a timely application under § 122.21 which is a complete (under § 122.21(e)) application for a new permit; and

(2) The Regional Administrator, through no fault of the permittee does not issue a new permit with an effective date under § 124.15 on or before the expiration date of the previous permit (for example, when issuance is impracticable due to time or resource constraints).

(b) *Effect.* Permits continued under this section remain fully effective and enforceable.

(c) *Enforcement.* When the permittee is not in compliance with the conditions of the expiring or expired permit the Regional Administrator may choose to do any or all of the following:

(1) Initiate enforcement action based upon the permit which has been continued;

(2) Issue a notice of intent to deny the new permit under § 124.6. If the permit is denied, the owner or operator would then be required to cease the activities authorized by the continued

permit or be subject to enforcement action for operating without a permit;

(3) Issue a new permit under part 124 with appropriate conditions; or

(4) Take other actions authorized by these regulations.

(d) *State continuation.* (1) An EPA-issued permit does not continue in force beyond its expiration date under Federal law if at that time a State is the permitting authority. States authorized to administer the NPDES program may continue either EPA or State-issued permits until the effective date of the new permits, if State law allows. Otherwise, the facility or activity is operating without a permit from the time of expiration of the old permit to the effective date of the State-issued new permit.

[48 FR 14153, Apr. 1, 1983, as amended at 50 FR 6940, Feb. 19, 1985]

§ 122.7 Confidentiality of information.

(a) In accordance with 40 CFR part 2, any information submitted to EPA pursuant to these regulations may be claimed as confidential by the submitter. Any such claim must be asserted at the time of submission in the manner prescribed on the application form or instructions or, in the case of other submissions, by stamping the words ''confidential business information'' on each page containing such information. If no claim is made at the time of submission, EPA may make the information available to the public without further notice. If a claim is asserted, the information will be treated in accordance with the procedures in 40 CFR part 2 (Public Information).

(b) *Applicable to State programs, see § 123.25.* Claims of confidentiality for the following information will be denied:

(1) The name and address of any permit applicant or permittee;

(2) Permit applications, permits, and effluent data.

(c) *Applicable to State programs, see § 123.25.* Information required by NPDES application forms provided by the Director under § 122.21 may not be claimed confidential. This includes information submitted on the forms themselves and any attachments used to supply information required by the forms.

Subpart B—Permit Application and Special NPDES Program Requirements

§ 122.21 Application for a permit (applicable to State programs, see § 123.25).

(a) *Duty to apply.* (1) Any person who discharges or proposes to discharge pollutants or who owns or operates a ''sludge-only facility'' whose sewage sludge use or disposal practice is regulated by part 503 of this chapter, and who does not have an effective permit, except persons covered by general permits under § 122.28, excluded under § 122.3, or a user of a privately owned treatment works unless the Director requires otherwise under § 122.44(m), must submit a complete application to the Director in accordance with this section and part 124 of this chapter. The requirements for concentrated animal feeding operations are described in § 122.23(d).

(2) *Application Forms:* (i) All applicants for EPA-issued permits must submit applications on EPA permit application forms. More than one application form may be required from a facility depending on the number and types of discharges or outfalls found there. Application forms may be obtained by contacting the EPA water resource center at (202) 260–7786 or Water Resource Center, U.S. EPA, Mail Code 4100, 1200 Pennsylvania Ave., NW., Washington, DC 20460 or at the EPA Internet site *www.epa.gov/owm/npdes.htm.* Applications for EPA-issued permits must be submitted as follows:

(A) All applicants, other than POTWs and TWTDS, must submit Form 1.

(B) Applicants for new and existing POTWs must submit the information contained in paragraph (j) of this section using Form 2A or other form provided by the director.

(C) Applicants for concentrated animal feeding operations or aquatic animal production facilities must submit Form 2B.

(D) Applicants for existing industrial facilities (including manufacturing facilities, commercial facilities, mining activities, and silvicultural activities), must submit Form 2C.

(E) Applicants for new industrial facilities that discharge process wastewater must submit Form 2D.

(F) Applicants for new and existing industrial facilities that discharge only nonprocess wastewater must submit Form 2E.

(G) Applicants for new and existing facilities whose discharge is composed entirely of storm water associated with industrial activity must submit Form 2F, unless exempted by §122.26(c)(1)(ii). If the discharge is composed of storm water and non-storm water, the applicant must also submit, Forms 2C, 2D, and/or 2E, as appropriate (in addition to Form 2F).

(H) Applicants for new and existing TWTDS, subject to paragraph (c)(2)(i) of this section must submit the application information required by paragraph (q) of this section, using Form 2S or other form provided by the director.

(ii) The application information required by paragraph (a)(2)(i) of this section may be electronically submitted if such method of submittal is approved by EPA or the Director.

(iii) Applicants can obtain copies of these forms by contacting the Water Management Divisions (or equivalent division which contains the NPDES permitting function) of the EPA Regional Offices. The Regional Offices' addresses can be found at §1.7 of this chapter.

(iv) Applicants for State-issued permits must use State forms which must require at a minimum the information listed in the appropriate paragraphs of this section.

(b) *Who applies?* When a facility or activity is owned by one person but is operated by another person, it is the operator's duty to obtain a permit.

(c) *Time to apply*. (1) Any person proposing a new discharge, shall submit an application at least 180 days before the date on which the discharge is to commence, unless permission for a later date has been granted by the Director. Facilities proposing a new discharge of storm water associated with industrial activity shall submit an application 180 days before that facility commences industrial activity which may result in a discharge of storm water associated with that industrial activity. Facilities described under §122.26(b)(14)(x) or (b)(15)(i) shall submit applications at least 90 days before the date on which construction is to commence. Different submittal dates may be required under the terms of applicable general permits. Persons proposing a new discharge are encouraged to submit their applications well in advance of the 90 or 180 day requirements to avoid delay. See also paragraph (k) of this section and §122.26(c)(1)(i)(G) and (c)(1)(ii).

(2) *Permits under section 405(f) of CWA*. All TWTDS whose sewage sludge use or disposal practices are regulated by part 503 of this chapter must submit permit applications according to the applicable schedule in paragraphs (c)(2)(i) or (ii) of this section.

(i) A TWTDS with a currently effective NPDES permit must submit a permit application at the time of its next NPDES permit renewal application. Such information must be submitted in accordance with paragraph (d) of this section.

(ii) Any other TWTDS not addressed under paragraph (c)(2)(i) of this section must submit the information listed in paragraphs (c)(2)(ii)(A) through (E) of this section to the Director within 1 year after publication of a standard applicable to its sewage sludge use or disposal practice(s), using Form 2S or another form provided by the Director. The Director will determine when such TWTDS must submit a full permit application.

(A) The TWTDS's name, mailing address, location, and status as federal, State, private, public or other entity;

(B) The applicant's name, address, telephone number, and ownership status;

(C) A description of the sewage sludge use or disposal practices. Unless the sewage sludge meets the requirements of paragraph (q)(8)(iv) of this section, the description must include the name and address of any facility where sewage sludge is sent for treatment or disposal, and the location of any land application sites;

(D) Annual amount of sewage sludge generated, treated, used or disposed (estimated dry weight basis); and

(E) The most recent data the TWTDS may have on the quality of the sewage sludge.

(iii) Notwithstanding paragraphs (c)(2)(i) or (ii) of this section, the Director may require permit applications from any TWTDS at any time if the Director determines that a permit is necessary to protect public health and the environment from any potential adverse effects that may occur from toxic pollutants in sewage sludge.

(iv) Any TWTDS that commences operations after promulgation of an applicable ''standard for sewage sludge use or disposal'' must submit an application to the Director at least 180 days prior to the date proposed for commencing operations.

(d) *Duty to reapply*. (1) Any POTW with a currently effective permit shall submit a new application at least 180 days before the expiration date of the existing permit, unless permission for a later date has been granted by the Director. (The Director shall not grant permission for applications to be submitted later than the expiration date of the existing permit.)

(2) All other permittees with currently effective permits shall submit a new application 180 days before the existing permit expires, except that:

(i) The Regional Administrator may grant permission to submit an application later than the deadline for submission otherwise applicable, but no later than the permit expiration date; and

(3) [Reserved]

(e) *Completeness*. (1) The Director shall not issue a permit before receiving a complete application for a permit except for NPDES general permits. An application for a permit is complete when the Director receives an application form and any supplemental information which are completed to his or her satisfaction. The completeness of any application for a permit shall be judged independently of the status of any other permit application or permit for the same facility or activity. For EPA administered NPDES programs, an application which is reviewed under § 124.3 of this chapter is complete when the Director receives either a complete application or the information listed in a notice of deficiency.

(2) A permit application shall not be considered complete if a permitting authority has waived application requirements under paragraphs (j) or (q) of this section and EPA has disapproved the waiver application. If a waiver request has been submitted to EPA more than 210 days prior to permit expiration and EPA has not disapproved the waiver application 181 days prior to permit expiration, the permit application lacking the information subject to the waiver application shall be considered complete.

(f) *Information requirements*. All applicants for NPDES permits, other than POTWs and other TWTDS, must provide the following information to the Director, using the application form provided by the Director. Additional information required of applicants is set forth in paragraphs (g) through (k) of this section.

(1) The activities conducted by the applicant which require it to obtain an NPDES permit.

(2) Name, mailing address, and location of the facility for which the application is submitted.

(3) Up to four SIC codes which best reflect the principal products or services provided by the facility.

(4) The operator's name, address, telephone number, ownership status, and status as Federal, State, private, public, or other entity.

(5) Whether the facility is located on Indian lands.

(6) A listing of all permits or construction approvals received or applied for under any of the following programs:

(i) Hazardous Waste Management program under RCRA.

(ii) UIC program under SDWA.

(iii) NPDES program under CWA.

(iv) Prevention of Significant Deterioration (PSD) program under the Clean Air Act.

(v) Nonattainment program under the Clean Air Act.

(vi) National Emission Standards for Hazardous Pollutants (NESHAPS) preconstruction approval under the Clean Air Act.

(vii) Ocean dumping permits under the Marine Protection Research and Sanctuaries Act.

(viii) Dredge or fill permits under section 404 of CWA.

(ix) Other relevant environmental permits, including State permits.

(7) A topographic map (or other map if a topographic map is unavailable) extending one mile beyond the property boundaries of the source, depicting the facility and each of its intake and discharge structures; each of its hazardous waste treatment, storage, or disposal facilities; each well where fluids from the facility are injected underground; and those wells, springs, other surface water bodies, and drinking water wells listed in public records or otherwise known to the applicant in the map area.

(8) A brief description of the nature of the business.

(g) *Application requirements for existing manufacturing, commercial, mining, and silvicultural dischargers.* Existing manufacturing, commercial mining, and silvicultural dischargers applying for NPDES permits, except for those facilities subject to the requirements of § 122.21(h), shall provide the following information to the Director, using application forms provided by the Director.

(1) *Outfall location.* The latitude and longitude to the nearest 15 seconds and the name of the receiving water.

(2) *Line drawing.* A line drawing of the water flow through the facility with a water balance, showing operations contributing wastewater to the effluent and treatment units. Similar processes, operations, or production areas may be indicated as a single unit, labeled to correspond to the more detailed identification under paragraph (g)(3) of this section. The water balance must show approximate average flows at intake and discharge points and between units, including treatment units. If a water balance cannot be determined (for example, for certain mining activities), the applicant may provide instead a pictorial description of the nature and amount of any sources of water and any collection and treatment measures.

(3) *Average flows and treatment.* A narrative identification of each type of process, operation, or production area which contributes wastewater to the effluent for each outfall, including process wastewater, cooling water, and stormwater runoff; the average flow which each process contributes; and a description of the treatment the wastewater receives, including the ultimate disposal of any solid or fluid wastes other than by discharge. Processes, operations, or production areas may be described in general terms (for example, ''dye-making reactor'', ''distillation tower''). For a privately owned treatment works, this information shall include the identity of each user of the treatment works. The average flow of point sources composed of storm water may be estimated. The basis for the rainfall event and the method of estimation must be indicated.

(4) *Intermittent flows.* If any of the discharges described in paragraph (g)(3) of this section are intermittent or seasonal, a description of the frequency, duration and flow rate of each discharge occurrence (except for stormwater runoff, spillage or leaks).

(5) *Maximum production.* If an effluent guideline promulgated under section 304 of CWA applies to the applicant and is expressed in terms of production (or other measure of operation), a reasonable measure of the applicant's actual production reported in the units used in the applicable effluent guideline. The reported measure must reflect the actual production of the facility as required by § 122.45(b)(2).

(6) *Improvements.* If the applicant is subject to any present requirements or compliance schedules for construction, upgrading or operation of waste treatment equipment, an identification of the abatement requirement, a description of the abatement project, and a listing of the required and projected final compliance dates.

(7) *Effluent characteristics.* (i) Information on the discharge of pollutants specified in this paragraph (g)(7) (except information on storm water discharges which is to be provided as specified in § 122.26). When ''quantitative data'' for a pollutant are required, the applicant must collect a sample of effluent and analyze it for the pollutant in accordance with analytical methods approved under Part 136 of this chapter unless use of another method is required for the pollutant under 40 CFR subchapters N or O. When no analytical method is approved under Part 136 or required under subchapters N or O, the applicant may use any suitable method

but must provide a description of the method. When an applicant has two or more outfalls with substantially identical effluents, the Director may allow the applicant to test only one outfall and report that quantitative data as applying to the substantially identical outfall. The requirements in paragraphs (g)(7)(vi) and (vii) of this section state that an applicant must provide quantitative data for certain pollutants known or believed to be present do not apply to pollutants present in a discharge solely as the result of their presence in intake water; however, an applicant must report such pollutants as present. When paragraph (g)(7) of this section requires analysis of pH, temperature, cyanide, total phenols, residual chlorine, oil and grease, fecal coliform (including *E. coli*), and Enterococci (previously known as fecal streptococcus at § 122.26 (d)(2)(iii)(A)(3)), or volatile organics, grab samples must be collected for those pollutants. For all other pollutants, a 24-hour composite sample, using a minimum of four (4) grab samples, must be used unless specified otherwise at 40 CFR Part 136. However, a minimum of one grab sample may be taken for effluents from holding ponds or other impoundments with a retention period greater than 24 hours. In addition, for discharges other than storm water discharges, the Director may waive composite sampling for any outfall for which the applicant demonstrates that the use of an automatic sampler is infeasible and that the minimum of four (4) grab samples will be a representative sample of the effluent being discharged. Results of analyses of individual grab samples for any parameter may be averaged to obtain the daily average. Grab samples that are not required to be analyzed immediately (see Table II at 40 CFR 136.3 (e)) may be composited in the laboratory, provided that container, preservation, and holding time requirements are met (see Table II at 40 CFR 136.3 (e)) and that sample integrity is not compromised by compositing.

(ii) *Storm water discharges*. For storm water discharges, all samples shall be collected from the discharge resulting from a storm event that is greater than 0.1 inch and at least 72 hours from the previously measurable (greater than 0.1 inch rainfall) storm event. Where feasible, the variance in the duration of the event and the total rainfall of the event should not exceed 50 percent from the average or median rainfall event in that area. For all applicants, a flow-weighted composite shall be taken for either the entire discharge or for the first three hours of the discharge. The flow-weighted composite sample for a storm water discharge may be taken with a continuous sampler or as a combination of a minimum of three sample aliquots taken in each hour of discharge for the entire discharge or for the first three hours of the discharge, with each aliquot being separated by a minimum period of fifteen minutes (applicants submitting permit applications for storm water discharges under § 122.26(d) may collect flow-weighted composite samples using different protocols with respect to the time duration between the collection of sample aliquots, subject to the approval of the Director). However, a minimum of one grab sample may be taken for storm water discharges from holding ponds or other impoundments with a retention period greater than 24 hours. For a flow-weighted composite sample, only one analysis of the composite of aliquots is required. For storm water discharge samples taken from discharges associated with industrial activities, quantitative data must be reported for the grab sample taken during the first thirty minutes (or as soon thereafter as practicable) of the discharge for all pollutants specified in § 122.26(c)(1). For all storm water permit applicants taking flow-weighted composites, quantitative data must be reported for all pollutants specified in § 122.26 except pH, temperature, cyanide, total phenols, residual chlorine, oil and grease, fecal coliform, and fecal streptococcus. The Director may allow or establish appropriate site-specific sampling procedures or requirements, including sampling locations, the season in which the sampling takes place, the minimum duration between the previous measurable storm event and the storm event sampled, the minimum or maximum level of precipitation required for an appropriate storm event, the form of precipitation sampled

(snow melt or rain fall), protocols for collecting samples under part 136 of this chapter, and additional time for submitting data on a case-by-case basis. An applicant is expected to ''know or have reason to believe'' that a pollutant is present in an effluent based on an evaluation of the expected use, production, or storage of the pollutant, or on any previous analyses for the pollutant. (For example, any pesticide manufactured by a facility may be expected to be present in contaminated storm water runoff from the facility.)

(iii) *Reporting requirements*. Every applicant must report quantitative data for every outfall for the following pollutants:

Biochemical Oxygen Demand (BOD5)
Chemical Oxygen Demand
Total Organic Carbon
Total Suspended Solids
Ammonia (as N)
Temperature (both winter and summer)
pH

(iv) The Director may waive the reporting requirements for individual point sources or for a particular industry category for one or more of the pollutants listed in paragraph (g)(7)(iii) of this section if the applicant has demonstrated that such a waiver is appropriate because information adequate to support issuance of a permit can be obtained with less stringent requirements.

(v) Each applicant with processes in one or more primary industry category (see appendix A of this part) contributing to a discharge must report quantitative data for the following pollutants in each outfall containing process wastewater:

(A) The organic toxic pollutants in the fractions designated in table I of appendix D of this part for the applicant's industrial category or categories unless the applicant qualifies as a small business under paragraph (g)(8) of this section. Table II of appendix D of this part lists the organic toxic pollutants in each fraction. The fractions result from the sample preparation required by the analytical procedure which uses gas chromatography/mass spectrometry. A determination that an applicant falls within a particular industrial category for the purposes of selecting fractions for testing is not conclusive as to the applicant's inclusion in that category for any other purposes. See Notes 2, 3, and 4 of this section.

(B) The pollutants listed in table III of appendix D of this part (the toxic metals, cyanide, and total phenols).

(vi)(A) Each applicant must indicate whether it knows or has reason to believe that any of the pollutants in table IV of appendix D of this part (certain conventional and nonconventional pollutants) is discharged from each outfall. If an applicable effluent limitations guideline either directly limits the pollutant or, by its express terms, indirectly limits the pollutant through limitations on an indicator, the applicant must report quantitative data. For every pollutant discharged which is not so limited in an effluent limitations guideline, the applicant must either report quantitative data or briefly describe the reasons the pollutant is expected to be discharged.

(B) Each applicant must indicate whether it knows or has reason to believe that any of the pollutants listed in table II or table III of appendix D of this part (the toxic pollutants and total phenols) for which quantitative data are not otherwise required under paragraph (g)(7)(v) of this section are discharged from each outfall. For every pollutant expected to be discharged in concentrations of 10 ppb or greater the applicant must report quantitative data. For acrolein, acrylonitrile, 2,4 dinitrophenol, and 2-methyl-4, 6 dinitrophenol, where any of these four pollutants are expected to be discharged in concentrations of 100 ppb or greater the applicant must report quantitative data. For every pollutant expected to be discharged in concentrations less than 10 ppb, or in the case of acrolein, acrylonitrile, 2,4 dinitrophenol, and 2-methyl-4, 6 dinitrophenol, in concentrations less than 100 ppb, the applicant must either submit quantitative data or briefly describe the reasons the pollutant is expected to be discharged. An applicant qualifying as a small business under paragraph (g)(8) of this section is not required to analyze for pollutants listed in table II of appendix D of this part (the organic toxic pollutants).

(vii) Each applicant must indicate whether it knows or has reason to believe that any of the pollutants in table V of appendix D of this part (certain hazardous substances and asbestos) are discharged from each outfall. For every pollutant expected to be discharged, the applicant must briefly describe the reasons the pollutant is expected to be discharged, and report any quantitative data it has for any pollutant.

(viii) Each applicant must report qualitative data, generated using a screening procedure not calibrated with analytical standards, for 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD) if it:

(A) Uses or manufactures 2,4,5-trichlorophenoxy acetic acid (2,4,5,-T); 2-(2,4,5-trichlorophenoxy) propanoic acid (Silvex, 2,4,5,-TP); 2-(2,4,5-trichlorophenoxy) ethyl, 2,2-dichloropropionate (Erbon); O,O-dimethyl O-(2,4,5-trichlorophenyl) phosphorothioate (Ronnel); 2,4,5-trichlorophenol (TCP); or hexachlorophene (HCP); or

(B) Knows or has reason to believe that TCDD is or may be present in an effluent.

(8) *Small business exemption*. An application which qualifies as a small business under one of the following criteria is exempt from the requirements in paragraph (g)(7)(v)(A) or (g)(7)(vi)(A) of this section to submit quantitative data for the pollutants listed in table II of appendix D of this part (the organic toxic pollutants):

(i) For coal mines, a probable total annual production of less than 100,000 tons per year.

(ii) For all other applicants, gross total annual sales averaging less than $100,000 per year (in second quarter 1980 dollars).

(9) *Used or manufactured toxics*. A listing of any toxic pollutant which the applicant currently uses or manufactures as an intermediate or final product or byproduct. The Director may waive or modify this requirement for any applicant if the applicant demonstrates that it would be unduly burdensome to identify each toxic pollutant and the Director has adequate information to issue the permit.

(10) [Reserved]

(11) *Biological toxicity tests*. An identification of any biological toxicity tests which the applicant knows or has reason to believe have been made within the last 3 years on any of the applicant's discharges or on a receiving water in relation to a discharge.

(12) *Contract analyses*. If a contract laboratory or consulting firm performed any of the analyses required by paragraph (g)(7) of this section, the identity of each laboratory or firm and the analyses performed.

(13) *Additional information*. In addition to the information reported on the application form, applicants shall provide to the Director, at his or her request, such other information as the Director may reasonably require to assess the discharges of the facility and to determine whether to issue an NPDES permit. The additional information may include additional quantitative data and bioassays to assess the relative toxicity of discharges to aquatic life and requirements to determine the cause of the toxicity.

(h) *Application requirements for manufacturing, commercial, mining and silvicultural facilities which discharge only non-process wastewater*. Except for stormwater discharges, all manufacturing, commercial, mining and silvicultural dischargers applying for NPDES permits which discharge only non-process wastewater not regulated by an effluent limitations guideline or new source performance standard shall provide the following information to the Director, using application forms provided by the Director:

(1) *Outfall location*. Outfall number, latitude and longitude to the nearest 15 seconds, and the name of the receiving water.

(2) *Discharge date* (for new dischargers). Date of expected commencement of discharge.

(3) *Type of waste*. An identification of the general type of waste discharged, or expected to be discharged upon commencement of operations, including sanitary wastes, restaurant or cafeteria wastes, or noncontact cooling water. An identification of cooling water additives (if any) that are used or expected to be used upon commencement of operations, along with their

composition if existing composition is available.

(4) *Effluent characteristics.* (i) Quantitative data for the pollutants or parameters listed below, unless testing is waived by the Director. The quantitative data may be data collected over the past 365 days, if they remain representative of current operations, and must include maximum daily value, average daily value, and number of measurements taken. The applicant must collect and analyze samples in accordance with 40 CFR Part 136. When analysis of pH, temperature, residual chlorine, oil and grease, or fecal coliform (including *E. coli*), and Enterococci (previously known as fecal streptococcus) and volatile organics is required in paragraphs (h)(4)(i)(A) through (K) of this section, grab samples must be collected for those pollutants. For all other pollutants, a 24-hour composite sample, using a minimum of four (4) grab samples, must be used unless specified otherwise at 40 CFR Part 136. For a composite sample, only one analysis of the composite of aliquots is required. New dischargers must include estimates for the pollutants or parameters listed below instead of actual sampling data, along with the source of each estimate. All levels must be reported or estimated as concentration and as total mass, except for flow, pH, and temperature.

(A) Biochemical Oxygen Demand (BOD_5).

(B) Total Suspended Solids (TSS).

(C) Fecal Coliform (if believed present or if sanitary waste is or will be discharged).

(D) Total Residual Chlorine (if chlorine is used).

(E) Oil and Grease.

(F) Chemical Oxygen Demand (COD) (if non-contact cooling water is or will be discharged).

(G) Total Organic Carbon (TOC) (if non-contact cooling water is or will be discharged).

(H) Ammonia (as N).

(I) Discharge Flow.

(J) pH.

(K) Temperature (Winter and Summer).

(ii) The Director may waive the testing and reporting requirements for any of the pollutants or flow listed in paragraph (h)(4)(i) of this section if the applicant submits a request for such a waiver before or with his application which demonstrates that information adequate to support issuance of a permit can be obtained through less stringent requirements.

(iii) If the applicant is a new discharger, he must complete and submit Item IV of Form 2e (see § 122.21(h)(4)) by providing quantitative data in accordance with that section no later than two years after commencement of discharge. However, the applicant need not complete those portions of Item IV requiring tests which he has already performed and reported under the discharge monitoring requirements of his NPDES permit.

(iv) The requirements of parts i and iii of this section that an applicant must provide quantitative data or estimates of certain pollutants do not apply to pollutants present in a discharge solely as a result of their presence in intake water. However, an applicant must report such pollutants as present. Net credit may be provided for the presence of pollutants in intake water if the requirements of § 122.45(g) are met.

(5) *Flow.* A description of the frequency of flow and duration of any seasonal or intermittent discharge (except for stormwater runoff, leaks, or spills).

(6) *Treatment system.* A brief description of any system used or to be used.

(7) *Optional information.* Any additional information the applicant wishes to be considered, such as influent data for the purpose of obtaining ''net'' credits pursuant to § 122.45(g).

(8) *Certification.* Signature of certifying official under § 122.22.

(i) *Application requirements for new and existing concentrated animal feeding operations and aquatic animal production facilities.* New and existing concentrated animal feeding operations (defined in § 122.23) and concentrated aquatic animal production facilities (defined in § 122.24) shall provide the following information to the Director, using the application form provided by the Director:

(1) For concentrated animal feeding operations:

(i) The name of the owner or operator;

(ii) The facility location and mailing addresses;

(iii) Latitude and longitude of the production area (entrance to production area);

(iv) A topographic map of the geographic area in which the CAFO is located showing the specific location of the production area, in lieu of the requirements of paragraph (f)(7) of this section;

(v) Specific information about the number and type of animals, whether in open confinement or housed under roof (beef cattle, broilers, layers, swine weighing 55 pounds or more, swine weighing less than 55 pounds, mature dairy cows, dairy heifers, veal calves, sheep and lambs, horses, ducks, turkeys, other);

(vi) The type of containment and storage (anaerobic lagoon, roofed storage shed, storage ponds, underfloor pits, above ground storage tanks, below ground storage tanks, concrete pad, impervious soil pad, other) and total capacity for manure, litter, and process wastewater storage(tons/gallons);

(vii) The total number of acres under control of the applicant available for land application of manure, litter, or process wastewater;

(viii) Estimated amounts of manure, litter, and process wastewater generated per year (tons/gallons);

(ix) Estimated amounts of manure, litter and process wastewater transferred to other persons per year (tons/gallons); and

(x) A nutrient management plan that at a minimum satisfies the requirements specified in §122.42(e), including, for all CAFOs subject to 40 CFR part 412, subpart C or subpart D, the requirements of 40 CFR 412.4(c), as applicable.

(2) For concentrated aquatic animal production facilities:

(i) The maximum daily and average monthly flow from each outfall.

(ii) The number of ponds, raceways, and similar structures.

(iii) The name of the receiving water and the source of intake water.

(iv) For each species of aquatic animals, the total yearly and maximum harvestable weight.

(v) The calendar month of maximum feeding and the total mass of food fed during that month.

(j) *Application requirements for new and existing POTWs.* Unless otherwise indicated, all POTWs and other dischargers designated by the Director must provide, at a minimum, the information in this paragraph to the Director, using Form 2A or another application form provided by the Director. Permit applicants must submit all information available at the time of permit application. The information may be provided by referencing information previously submitted to the Director. The Director may waive any requirement of this paragraph if he or she has access to substantially identical information. The Director may also waive any requirement of this paragraph that is not of material concern for a specific permit, if approved by the Regional Administrator. The waiver request to the Regional Administrator must include the State's justification for the waiver. A Regional Administrator's disapproval of a State's proposed waiver does not constitute final Agency action, but does provide notice to the State and permit applicant(s) that EPA may object to any State-issued permit issued in the absence of the required information.

(1) *Basic application information.* All applicants must provide the following information:

(i) *Facility information.* Name, mailing address, and location of the facility for which the application is submitted;

(ii) *Applicant information.* Name, mailing address, and telephone number of the applicant, and indication as to whether the applicant is the facility's owner, operator, or both;

(iii) *Existing environmental permits.* Identification of all environmental permits or construction approvals received or applied for (including dates) under any of the following programs:

(A) Hazardous Waste Management program under the Resource Conservation and Recovery Act (RCRA), Subpart C;

(B) Underground Injection Control program under the Safe Drinking Water Act (SDWA);

(C) NPDES program under Clean Water Act (CWA);

(D) Prevention of Significant Deterioration (PSD) program under the Clean Air Act;

(E) Nonattainment program under the Clean Air Act;

(F) National Emission Standards for Hazardous Air Pollutants (NESHAPS) preconstruction approval under the Clean Air Act;

(G) Ocean dumping permits under the Marine Protection Research and Sanctuaries Act;

(H) Dredge or fill permits under section 404 of the CWA; and

(I) Other relevant environmental permits, including State permits;

(iv) *Population*. The name and population of each municipal entity served by the facility, including unincorporated connector districts. Indicate whether each municipal entity owns or maintains the collection system and whether the collection system is separate sanitary or combined storm and sanitary, if known;

(v) *Indian country*. Information concerning whether the facility is located in Indian country and whether the facility discharges to a receiving stream that flows through Indian country;

(vi) *Flow rate*. The facility's design flow rate (the wastewater flow rate the plant was built to handle), annual average daily flow rate, and maximum daily flow rate for each of the previous 3 years;

(vii) *Collection system*. Identification of type(s) of collection system(s) used by the treatment works (i.e., separate sanitary sewers or combined storm and sanitary sewers) and an estimate of the percent of sewer line that each type comprises; and

(viii) *Outfalls and other discharge or disposal methods*. The following information for outfalls to waters of the United States and other discharge or disposal methods:

(A) For effluent discharges to waters of the United States, the total number and types of outfalls (e.g, treated effluent, combined sewer overflows, bypasses, constructed emergency overflows);

(B) For wastewater discharged to surface impoundments:

(*1*) The location of each surface impoundment;

(*2*) The average daily volume discharged to each surface impoundment; and

(*3*) Whether the discharge is continuous or intermittent;

(C) For wastewater applied to the land:

(*1*) The location of each land application site;

(*2*) The size of each land application site, in acres;

(*3*) The average daily volume applied to each land application site, in gallons per day; and

(*4*) Whether land application is continuous or intermittent;

(D) For effluent sent to another facility for treatment prior to discharge:

(*1*) The means by which the effluent is transported;

(*2*) The name, mailing address, contact person, and phone number of the organization transporting the discharge, if the transport is provided by a party other than the applicant;

(*3*) The name, mailing address, contact person, phone number, and NPDES permit number (if any) of the receiving facility; and

(*4*) The average daily flow rate from this facility into the receiving facility, in millions of gallons per day; and

(E) For wastewater disposed of in a manner not included in paragraphs (j)(1)(viii)(A) through (D) of this section (e.g., underground percolation, underground injection):

(*1*) A description of the disposal method, including the location and size of each disposal site, if applicable;

(*2*) The annual average daily volume disposed of by this method, in gallons per day; and

(*3*) Whether disposal through this method is continuous or intermittent;

(2) *Additional Information*. All applicants with a design flow greater than or equal to 0.1 mgd must provide the following information:

(i) *Inflow and infiltration*. The current average daily volume of inflow and infiltration, in gallons per day, and steps the facility is taking to minimize inflow and infiltration;

(ii) *Topographic map*. A topographic map (or other map if a topographic map is unavailable) extending at least one mile beyond property boundaries of

the treatment plant, including all unit processes, and showing:

(A) Treatment plant area and unit processes;

(B) The major pipes or other structures through which wastewater enters the treatment plant and the pipes or other structures through which treated wastewater is discharged from the treatment plant. Include outfalls from bypass piping, if applicable;

(C) Each well where fluids from the treatment plant are injected underground;

(D) Wells, springs, and other surface water bodies listed in public records or otherwise known to the applicant within ¼ mile of the treatment works' property boundaries;

(E) Sewage sludge management facilities (including on-site treatment, storage, and disposal sites); and

(F) Location at which waste classified as hazardous under RCRA enters the treatment plant by truck, rail, or dedicated pipe;

(iii) *Process flow diagram or schematic.* (A) A diagram showing the processes of the treatment plant, including all bypass piping and all backup power sources or redundancy in the system. This includes a water balance showing all treatment units, including disinfection, and showing daily average flow rates at influent and discharge points, and approximate daily flow rates between treatment units; and

(B) A narrative description of the diagram; and

(iv) *Scheduled improvements, schedules of implementation.* The following information regarding scheduled improvements:

(A) The outfall number of each outfall affected;

(B) A narrative description of each required improvement;

(C) Scheduled or actual dates of completion for the following:

(*1*) Commencement of construction;

(*2*) Completion of construction;

(*3*) Commencement of discharge; and

(*4*) Attainment of operational level;

(D) A description of permits and clearances concerning other Federal and/or State requirements;

(3) *Information on effluent discharges.* Each applicant must provide the following information for each outfall, including bypass points, through which effluent is discharged, as applicable:

(i) *Description of outfall.* The following information about each outfall:

(A) Outfall number;

(B) State, county, and city or town in which outfall is located;

(C) Latitude and longitude, to the nearest second;

(D) Distance from shore and depth below surface;

(E) Average daily flow rate, in million gallons per day;

(F) The following information for each outfall with a seasonal or periodic discharge:

(*1*) Number of times per year the discharge occurs;

(*2*) Duration of each discharge;

(*3*) Flow of each discharge; and

(*4*) Months in which discharge occurs; and

(G) Whether the outfall is equipped with a diffuser and the type (e.g., high-rate) of diffuser used;

(ii) *Description of receiving waters.* The following information (if known) for each outfall through which effluent is discharged to waters of the United States:

(A) Name of receiving water;

(B) Name of watershed/river/stream system and United States Soil Conservation Service 14-digit watershed code;

(C) Name of State Management/River Basin and United States Geological Survey 8-digit hydrologic cataloging unit code; and

(D) Critical flow of receiving stream and total hardness of receiving stream at critical low flow (if applicable);

(iii) *Description of treatment.* The following information describing the treatment provided for discharges from each outfall to waters of the United States:

(A) The highest level of treatment (e.g., primary, equivalent to secondary, secondary, advanced, other) that is provided for the discharge for each outfall and:

(*1*) Design biochemical oxygen demand (BOD_5 or $CBOD_5$) removal (percent);

(*2*) Design suspended solids (SS) removal (percent); and, where applicable,

(*3*) Design phosphorus (P) removal (percent);

(*4*) Design nitrogen (N) removal (percent); and

(*5*) Any other removals that an advanced treatment system is designed to achieve.

(B) A description of the type of disinfection used, and whether the treatment plant dechlorinates (if disinfection is accomplished through chlorination);

(4) *Effluent monitoring for specific parameters.* (i) As provided in paragraphs (j)(4)(ii) through (x) of this section, all applicants must submit to the Director effluent monitoring information for samples taken from each outfall through which effluent is discharged to waters of the United States, except for CSOs. The Director may allow applicants to submit sampling data for only one outfall on a case-by-case basis, where the applicant has two or more outfalls with substantially identical effluent. The Director may also allow applicants to composite samples from one or more outfalls that discharge into the same mixing zone;

(ii) All applicants must sample and analyze for the pollutants listed in Appendix J, Table 1A of this part;

(iii) All applicants with a design flow greater than or equal to 0.1 mgd must sample and analyze for the pollutants listed in Appendix J, Table 1 of this part. Facilities that do not use chlorine for disinfection, do not use chlorine elsewhere in the treatment process, and have no reasonable potential to discharge chlorine in their effluent may delete chlorine from Table 1;

(iv) The following applicants must sample and analyze for the pollutants listed in Appendix J, Table 2 of this part, and for any other pollutants for which the State or EPA have established water quality standards applicable to the receiving waters:

(A) All POTWs with a design flow rate equal to or greater than one million gallons per day;

(B) All POTWs with approved pretreatment programs or POTWs required to develop a pretreatment program;

(C) Other POTWs, as required by the Director;

(v) The Director should require sampling for additional pollutants, as appropriate, on a case-by-case basis;

(vi) Applicants must provide data from a minimum of three samples taken within four and one-half years prior to the date of the permit application. Samples must be representative of the seasonal variation in the discharge from each outfall. Existing data may be used, if available, in lieu of sampling done solely for the purpose of this application. The Director should require additional samples, as appropriate, on a case-by-case basis.

(vii) All existing data for pollutants specified in paragraphs (j)(4)(ii) through (v) of this section that is collected within four and one-half years of the application must be included in the pollutant data summary submitted by the applicant. If, however, the applicant samples for a specific pollutant on a monthly or more frequent basis, it is only necessary, for such pollutant, to summarize all data collected within one year of the application.

(viii) Applicants must collect samples of effluent and analyze such samples for pollutants in accordance with analytical methods approved under 40 CFR Part 136 unless an alternative is specified in the existing NPDES permit. When analysis of pH, temperature, cyanide, total phenols, residual chlorine, oil and grease, fecal coliform (including *E. coli*), or volatile organics is required in paragraphs (j)(4)(ii) through (iv) of this section, grab samples must be collected for those pollutants. For all other pollutants, 24-hour composite samples must be used. For a composite sample, only one analysis of the composite of aliquots is required.

(ix) The effluent monitoring data provided must include at least the following information for each parameter:

(A) Maximum daily discharge, expressed as concentration or mass, based upon actual sample values;

(B) Average daily discharge for all samples, expressed as concentration or mass, and the number of samples used to obtain this value;

(C) The analytical method used; and

(D) The threshold level (i.e., method detection limit, minimum level, or other designated method endpoints) for the analytical method used.

(x) Unless otherwise required by the Director, metals must be reported as total recoverable.

(5) *Effluent monitoring for whole effluent toxicity*. (i) All applicants must provide an identification of any whole effluent toxicity tests conducted during the four and one-half years prior to the date of the application on any of the applicant's discharges or on any receiving water near the discharge.

(ii) As provided in paragraphs (j)(5)(iii)–(ix) of this section, the following applicants must submit to the Director the results of valid whole effluent toxicity tests for acute or chronic toxicity for samples taken from each outfall through which effluent is discharged to surface waters, except for combined sewer overflows:

(A) All POTWs with design flow rates greater than or equal to one million gallons per day;

(B) All POTWs with approved pretreatment programs or POTWs required to develop a pretreatment program;

(C) Other POTWs, as required by the Director, based on consideration of the following factors:

(*1*) The variability of the pollutants or pollutant parameters in the POTW effluent (based on chemical-specific information, the type of treatment plant, and types of industrial contributors);

(*2*) The ratio of effluent flow to receiving stream flow;

(*3*) Existing controls on point or nonpoint sources, including total maximum daily load calculations for the receiving stream segment and the relative contribution of the POTW;

(*4*) Receiving stream characteristics, including possible or known water quality impairment, and whether the POTW discharges to a coastal water, one of the Great Lakes, or a water designated as an outstanding natural resource water; or

(*5*) Other considerations (including, but not limited to, the history of toxic impacts and compliance problems at the POTW) that the Director determines could cause or contribute to adverse water quality impacts.

(iii) Where the POTW has two or more outfalls with substantially identical effluent discharging to the same receiving stream segment, the Director may allow applicants to submit whole effluent toxicity data for only one outfall on a case-by-case basis. The Director may also allow applicants to composite samples from one or more outfalls that discharge into the same mixing zone.

(iv) Each applicant required to perform whole effluent toxicity testing pursuant to paragraph (j)(5)(ii) of this section must provide:

(A) Results of a minimum of four quarterly tests for a year, from the year preceding the permit application; or

(B) Results from four tests performed at least annually in the four and one half year period prior to the application, provided the results show no appreciable toxicity using a safety factor determined by the permitting authority.

(v) Applicants must conduct tests with multiple species (no less than two species; e.g., fish, invertebrate, plant), and test for acute or chronic toxicity, depending on the range of receiving water dilution. EPA recommends that applicants conduct acute or chronic testing based on the following dilutions:

(A) Acute toxicity testing if the dilution of the effluent is greater than 1000:1 at the edge of the mixing zone;

(B) Acute or chronic toxicity testing if the dilution of the effluent is between 100:1 and 1000:1 at the edge of the mixing zone. Acute testing may be more appropriate at the higher end of this range (1000:1), and chronic testing may be more appropriate at the lower end of this range (100:1); and

(C) Chronic testing if the dilution of the effluent is less than 100:1 at the edge of the mixing zone.

(vi) Each applicant required to perform whole effluent toxicity testing pursuant to paragraph (j)(5)(ii) of this section must provide the number of chronic or acute whole effluent toxicity tests that have been conducted since the last permit reissuance.

(vii) Applicants must provide the results using the form provided by the Director, or test summaries if available and comprehensive, for each whole effluent toxicity test conducted pursuant to paragraph (j)(5)(ii) of this section for which such information has not been reported previously to the Director.

(viii) Whole effluent toxicity testing conducted pursuant to paragraph (j)(5)(ii) of this section must be conducted using methods approved under 40 CFR part 136. West coast facilities in Washington, Oregon, California, Alaska, Hawaii, and the Pacific Territories are exempted from 40 CFR part 136 chronic methods and must use alternative guidance as directed by the permitting authority.

(ix) For whole effluent toxicity data submitted to the Director within four and one-half years prior to the date of the application, applicants must provide the dates on which the data were submitted and a summary of the results.

(x) Each POTW required to perform whole effluent toxicity testing pursuant to paragraph (j)(5)(ii) of this section must provide any information on the cause of toxicity and written details of any toxicity reduction evaluation conducted, if any whole effluent toxicity test conducted within the past four and one-half years revealed toxicity.

(6) *Industrial discharges.* Applicants must submit the following information about industrial discharges to the POTW:

(i) Number of significant industrial users (SIUs) and categorical industrial users (CIUs) discharging to the POTW; and

(ii) POTWs with one or more SIUs shall provide the following information for each SIU, as defined at 40 CFR 403.3(v), that discharges to the POTW:

(A) Name and mailing address;

(B) Description of all industrial processes that affect or contribute to the SIU's discharge;

(C) Principal products and raw materials of the SIU that affect or contribute to the SIU's discharge;

(D) Average daily volume of wastewater discharged, indicating the amount attributable to process flow and non-process flow;

(E) Whether the SIU is subject to local limits;

(F) Whether the SIU is subject to categorical standards, and if so, under which category(ies) and subcategory(ies); and

(G) Whether any problems at the POTW (e.g., upsets, pass through, interference) have been attributed to the SIU in the past four and one-half years.

(iii) The information required in paragraphs (j)(6)(i) and (ii) of this section may be waived by the Director for POTWs with pretreatment programs if the applicant has submitted either of the following that contain information substantially identical to that required in paragraphs (j)(6)(i) and (ii) of this section.

(A) An annual report submitted within one year of the application; or

(B) A pretreatment program;

(7) *Discharges from hazardous waste generators and from waste cleanup or remediation sites.* POTWs receiving Resource Conservation and Recovery Act (RCRA), Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), or RCRA Corrective Action wastes or wastes generated at another type of cleanup or remediation site must provide the following information:

(i) If the POTW receives, or has been notified that it will receive, by truck, rail, or dedicated pipe any wastes that are regulated as RCRA hazardous wastes pursuant to 40 CFR part 261, the applicant must report the following:

(A) The method by which the waste is received (i.e., whether by truck, rail, or dedicated pipe); and

(B) The hazardous waste number and amount received annually of each hazardous waste;

(ii) If the POTW receives, or has been notified that it will receive, wastewaters that originate from remedial activities, including those undertaken pursuant to CERCLA and sections 3004(u) or 3008(h) of RCRA, the applicant must report the following:

(A) The identity and description of the site(s) or facility(ies) at which the wastewater originates;

(B) The identities of the wastewater's hazardous constituents, as listed in Appendix VIII of part 261 of this chapter; if known; and

(C) The extent of treatment, if any, the wastewater receives or will receive before entering the POTW;

(iii) Applicants are exempt from the requirements of paragraph (j)(7)(ii) of this section if they receive no more than fifteen kilograms per month of hazardous wastes, unless the wastes are

acute hazardous wastes as specified in 40 CFR 261.30(d) and 261.33(e).

(8) *Combined sewer overflows*. Each applicant with combined sewer systems must provide the following information:

(i) *Combined sewer system information*. The following information regarding the combined sewer system:

(A) *System map*. A map indicating the location of the following:

(*1*) All CSO discharge points;

(*2*) Sensitive use areas potentially affected by CSOs (e.g., beaches, drinking water supplies, shellfish beds, sensitive aquatic ecosystems, and outstanding national resource waters); and

(*3*) Waters supporting threatened and endangered species potentially affected by CSOs; and

(B) *System diagram*. A diagram of the combined sewer collection system that includes the following information:

(*1*) The location of major sewer trunk lines, both combined and separate sanitary;

(*2*) The locations of points where separate sanitary sewers feed into the combined sewer system;

(*3*) In-line and off-line storage structures;

(*4*) The locations of flow-regulating devices; and

(*5*) The locations of pump stations;

(ii) *Information on CSO outfalls*. The following information for each CSO discharge point covered by the permit application:

(A) *Description of outfall*. The following information on each outfall:

(*1*) Outfall number;

(*2*) State, county, and city or town in which outfall is located;

(*3*) Latitude and longitude, to the nearest second; and

(*4*) Distance from shore and depth below surface;

(*5*) Whether the applicant monitored any of the following in the past year for this CSO:

(*i*) Rainfall;

(*ii*) CSO flow volume;

(*iii*) CSO pollutant concentrations;

(*iv*) Receiving water quality;

(*v*) CSO frequency; and

(*6*) The number of storm events monitored in the past year;

(B) *CSO events*. The following information about CSO overflows from each outfall:

(*1*) The number of events in the past year;

(*2*) The average duration per event, if available;

(*3*) The average volume per CSO event, if available; and

(*4*) The minimum rainfall that caused a CSO event, if available, in the last year;

(C) *Description of receiving waters*. The following information about receiving waters:

(*1*) Name of receiving water;

(*2*) Name of watershed/stream system and the United States Soil Conservation Service watershed (14-digit) code (if known); and

(*3*) Name of State Management/River Basin and the United States Geological Survey hydrologic cataloging unit (8-digit) code (if known); and

(D) *CSO operations*. A description of any known water quality impacts on the receiving water caused by the CSO (e.g., permanent or intermittent beach closings, permanent or intermittent shellfish bed closings, fish kills, fish advisories, other recreational loss, or exceedance of any applicable State water quality standard);

(9) *Contractors*. All applicants must provide the name, mailing address, telephone number, and responsibilities of all contractors responsible for any operational or maintenance aspects of the facility; and

(10) *Signature*. All applications must be signed by a certifying official in compliance with § 122.22.

(k) *Application requirements for new sources and new discharges*. New manufacturing, commercial, mining and silvicultural dischargers applying for NPDES permits (except for new discharges of facilities subject to the requirements of paragraph (h) of this section or new discharges of storm water associated with industrial activity which are subject to the requirements of § 122.26(c)(1) and this section (except as provided by § 122.26(c)(1)(ii)) shall provide the following information to the Director, using the application forms provided by the Director:

(1) *Expected outfall location*. The latitude and longitude to the nearest 15

seconds and the name of the receiving water.

(2) *Discharge dates*. The expected date of commencement of discharge.

(3) *Flows, sources of pollution, and treatment technologies*—(i) *Expected treatment of wastewater*. Description of the treatment that the wastewater will receive, along with all operations contributing wastewater to the effluent, average flow contributed by each operation, and the ultimate disposal of any solid or liquid wastes not discharged.

(ii) *Line drawing*. A line drawing of the water flow through the facility with a water balance as described in § 122.21(g)(2).

(iii) *Intermittent flows*. If any of the expected discharges will be intermittent or seasonal, a description of the frequency, duration and maximum daily flow rate of each discharge occurrence (except for stormwater runoff, spillage, or leaks).

(4) *Production*. If a new source performance standard promulgated under section 306 of CWA or an effluent limitation guideline applies to the applicant and is expressed in terms of production (or other measure of operation), a reasonable measure of the applicant's expected actual production reported in the units used in the applicable effluent guideline or new source performance standard as required by § 122.45(b)(2) for each of the first three years. Alternative estimates may also be submitted if production is likely to vary.

(5) *Effluent characteristics*. The requirements in paragraphs (h)(4)(i), (ii), and (iii) of this section that an applicant must provide estimates of certain pollutants expected to be present do not apply to pollutants present in a discharge solely as a result of their presence in intake water; however, an applicant must report such pollutants as present. Net credits may be provided for the presence of pollutants in intake water if the requirements of § 122.45(g) are met. All levels (except for discharge flow, temperature, and pH) must be estimated as concentration and as total mass.

(i) Each applicant must report estimated daily maximum, daily average, and source of information for each outfall for the following pollutants or parameters. The Director may waive the reporting requirements for any of these pollutants and parameters if the applicant submits a request for such a waiver before or with his application which demonstrates that information adequate to support issuance of the permit can be obtained through less stringent reporting requirements.

(A) Biochemical Oxygen Demand (BOD).

(B) Chemical Oxygen Demand (COD).

(C) Total Organic Carbon (TOC).

(D) Total Suspended Solids (TSS).

(E) Flow.

(F) Ammonia (as N).

(G) Temperature (winter and summer).

(H) pH.

(ii) Each applicant must report estimated daily maximum, daily average, and source of information for each outfall for the following pollutants, if the applicant knows or has reason to believe they will be present or if they are limited by an effluent limitation guideline or new source performance standard either directly or indirectly through limitations on an indicator pollutant: all pollutants in table IV of appendix D of part 122 (certain conventional and nonconventional pollutants).

(iii) Each applicant must report estimated daily maximum, daily average and source of information for the following pollutants if he knows or has reason to believe that they will be present in the discharges from any outfall:

(A) The pollutants listed in table III of appendix D (the toxic metals, in the discharge from any outfall: Total cyanide, and total phenols);

(B) The organic toxic pollutants in table II of appendix D (except bis (chloromethyl) ether, dichlorofluoromethane and trichlorofluoromethane). This requirement is waived for applicants with expected gross sales of less than $100,000 per year for the next three years, and for coal mines with expected average production of less than 100,000 tons of coal per year.

(iv) The applicant is required to report that 2,3,7,8 Tetrachlorodibenzo-P-Dioxin (TCDD) may be discharged if he

uses or manufactures one of the following compounds, or if he knows or has reason to believe that TCDD will or may be present in an effluent:

(A) 2,4,5-trichlorophenoxy acetic acid (2,4,5-T) (CAS #93–76–5);

(B) 2-(2,4,5-trichlorophenoxy) propanoic acid (Silvex, 2,4,5-TP) (CAS #93–72–1);

(C) 2-(2,4,5-trichlorophenoxy) ethyl 2,2-dichloropropionate (Erbon) (CAS #136–25–4);

(D) 0,0-dimethyl 0-(2,4,5-trichlorophenyl) phosphorothioate (Ronnel) (CAS #299–84–3);

(E) 2,4,5-trichlorophenol (TCP) (CAS #95–95–4); or

(F) Hexachlorophene (HCP) (CAS #70–30–4);

(v) Each applicant must report any pollutants listed in table V of appendix D (certain hazardous substances) if he believes they will be present in any outfall (no quantitative estimates are required unless they are already available).

(vi) No later than two years after the commencement of discharge from the proposed facility, the applicant is required to complete and submit Items V and VI of NPDES application Form 2c (see §122.21(g)). However, the applicant need not complete those portions of Item V requiring tests which he has already performed and reported under the discharge monitoring requirements of his NPDES permit.

(6) *Engineering Report*. Each applicant must report the existence of any technical evaluation concerning his wastewater treatment, along with the name and location of similar plants of which he has knowledge.

(7) *Other information*. Any optional information the permittee wishes to have considered.

(8) *Certification*. Signature of certifying official under §122.22.

(l) *Special provisions for applications from new sources*. (1) The owner or operator of any facility which may be a new source (as defined in §122.2) and which is located in a State without an approved NPDES program must comply with the provisions of this paragraph (l)(1).

(2)(i) Before beginning any on-site construction as defined in §122.29, the owner or operator of any facility which may be a new source must submit information to the Regional Administrator so that he or she can determine if the facility is a new source. The Regional Administrator may request any additional information needed to determine whether the facility is a new source.

(ii) The Regional Administrator shall make an initial determination whether the facility is a new source within 30 days of receiving all necessary information under paragraph (l)(2)(i) of this section.

(3) The Regional Administrator shall issue a public notice in accordance with §124.10 of this chapter of the new source determination under paragraph (l)(2) of this section. If the Regional Administrator has determined that the facility is a new source, the notice shall state that the applicant must comply with the environmental review requirements of 40 CFR 6.600 through 6.607.

(4) Any interested party may challenge the Regional Administrator's initial new source determination by requesting review of the determination under §124.19 of this chapter within 30 days of the public notice of the initial determination. If all interested parties agree, the Environmental Appeals Board may defer review until after a final permit decision is made, and consolidate review of the determination with any review of the permit decision.

(m) *Variance requests by non-POTWs*. A discharger which is not a publicly owned treatment works (POTW) may request a variance from otherwise applicable effluent limitations under any of the following statutory or regulatory provisions within the times specified in this paragraph:

(1) *Fundamentally different factors*. (i) A request for a variance based on the presence of ''fundamentally different factors'' from those on which the effluent limitations guideline was based shall be filed as follows:

(A) For a request from best practicable control technology currently available (BPT), by the close of the public comment period under §124.10.

(B) For a request from best available technology economically achievable

(BAT) and/or best conventional pollutant control technology (BCT), by no later than:

(*1*) July 3, 1989, for a request based on an effluent limitation guideline promulgated before February 4, 1987, to the extent July 3, 1989 is not later than that provided under previously promulgated regulations; or

(*2*) 180 days after the date on which an effluent limitation guideline is published in the FEDERAL REGISTER for a request based on an effluent limitation guideline promulgated on or after February 4, 1987.

(ii) The request shall explain how the requirements of the applicable regulatory and/or statutory criteria have been met.

(2) *Non-conventional pollutants.* A request for a variance from the BAT requirements for CWA section 301(b)(2)(F) pollutants (commonly called ''non-conventional'' pollutants) pursuant to section 301(c) of CWA because of the economic capability of the owner or operator, or pursuant to section 301(g) of the CWA (provided however that a § 301(g) variance may only be requested for ammonia; chlorine; color; iron; total phenols (4AAP) (when determined by the Administrator to be a pollutant covered by section 301(b)(2)(F)) and any other pollutant which the Administrator lists under section 301(g)(4) of the CWA) must be made as follows:

(i) For those requests for a variance from an effluent limitation based upon an effluent limitation guideline by:

(A) Submitting an initial request to the Regional Administrator, as well as to the State Director if applicable, stating the name of the discharger, the permit number, the outfall number(s), the applicable effluent guideline, and whether the discharger is requesting a section 301(c) or section 301(g) modification or both. This request must have been filed not later than:

(*1*) September 25, 1978, for a pollutant which is controlled by a BAT effluent limitation guideline promulgated before December 27, 1977; or

(*2*) 270 days after promulgation of an applicable effluent limitation guideline for guidelines promulgated after December 27, 1977; and

(B) Submitting a completed request no later than the close of the public comment period under § 124.10 demonstrating that the requirements of § 124.13 and the applicable requirements of part 125 have been met. Notwithstanding this provision, the complete application for a request under section 301(g) shall be filed 180 days before EPA must make a decision (unless the Regional Division Director establishes a shorter or longer period).

(ii) For those requests for a variance from effluent limitations not based on effluent limitation guidelines, the request need only comply with paragraph (m)(2)(i)(B) of this section and need not be preceded by an initial request under paragraph (m)(2)(i)(A) of this section.

(3)–(4) [Reserved]

(5) *Water quality related effluent limitations.* A modification under section 302(b)(2) of requirements under section 302(a) for achieving water quality related effluent limitations may be requested no later than the close of the public comment period under § 124.10 on the permit from which the modification is sought.

(6) *Thermal discharges.* A variance under CWA section 316(a) for the thermal component of any discharge must be filed with a timely application for a permit under this section, except that if thermal effluent limitations are established under CWA section 402(a)(1) or are based on water quality standards the request for a variance may be filed by the close of the public comment period under § 124.10. A copy of the request as required under 40 CFR part 125, subpart H, shall be sent simultaneously to the appropriate State or interstate certifying agency as required under 40 CFR part 125. (See § 124.65 for special procedures for section 316(a) thermal variances.)

(n) *Variance requests by POTWs.* A discharger which is a publicly owned treatment works (POTW) may request a variance from otherwise applicable effluent limitations under any of the following statutory provisions as specified in this paragraph:

(1) *Discharges into marine waters.* A request for a modification under CWA section 301(h) of requirements of CWA section 301(b)(1)(B) for discharges into marine waters must be filed in accordance with the requirements of 40 CFR part 125, subpart G.

(2) [Reserved]

(3) *Water quality based effluent limitation*. A modification under CWA section 302(b)(2) of the requirements under section 302(a) for achieving water quality based effluent limitations shall be requested no later than the close of the public comment period under § 124.10 on the permit from which the modification is sought.

(o) *Expedited variance procedures and time extensions*. (1) Notwithstanding the time requirements in paragraphs (m) and (n) of this section, the Director may notify a permit applicant before a draft permit is issued under § 124.6 that the draft permit will likely contain limitations which are eligible for variances. In the notice the Director may require the applicant as a condition of consideration of any potential variance request to submit a request explaining how the requirements of part 125 applicable to the variance have been met and may require its submission within a specified reasonable time after receipt of the notice. The notice may be sent before the permit application has been submitted. The draft or final permit may contain the alternative limitations which may become effective upon final grant of the variance.

(2) A discharger who cannot file a timely complete request required under paragraph (m)(2)(i)(B) or (m)(2)(ii) of this section may request an extension. The extension may be granted or denied at the discretion of the Director. Extensions shall be no more than 6 months in duration.

(p) *Recordkeeping*. Except for information required by paragraph (d)(3)(ii) of this section, which shall be retained for a period of at least five years from the date the application is signed (or longer as required by 40 CFR part 503), applicants shall keep records of all data used to complete permit applications and any supplemental information submitted under this section for a period of at least 3 years from the date the application is signed.

(q) *Sewage sludge management*. All TWTDS subject to paragraph (c)(2)(i) of this section must provide the information in this paragraph to the Director, using Form 2S or another application form approved by the Director. New applicants must submit all information available at the time of permit application. The information may be provided by referencing information previously submitted to the Director. The Director may waive any requirement of this paragraph if he or she has access to substantially identical information. The Director may also waive any requirement of this paragraph that is not of material concern for a specific permit, if approved by the Regional Administrator. The waiver request to the Regional Administrator must include the State's justification for the waiver. A Regional Administrator's disapproval of a State's proposed waiver does not constitute final Agency action, but does provide notice to the State and permit applicant(s) that EPA may object to any State-issued permit issued in the absence of the required information.

(1) *Facility information*. All applicants must submit the following information:

(i) The name, mailing address, and location of the TWTDS for which the application is submitted;

(ii) Whether the facility is a Class I Sludge Management Facility;

(iii) The design flow rate (in million gallons per day);

(iv) The total population served; and

(v) The TWTDS's status as Federal, State, private, public, or other entity;

(2) *Applicant information*. All applicants must submit the following information:

(i) The name, mailing address, and telephone number of the applicant; and

(ii) Indication whether the applicant is the owner, operator, or both;

(3) *Permit information*. All applicants must submit the facility's NPDES permit number, if applicable, and a listing of all other Federal, State, and local permits or construction approvals received or applied for under any of the following programs:

(i) Hazardous Waste Management program under the Resource Conservation and Recovery Act (RCRA);

(ii) UIC program under the Safe Drinking Water Act (SDWA);

(iii) NPDES program under the Clean Water Act (CWA);

(iv) Prevention of Significant Deterioration (PSD) program under the Clean Air Act;

(v) Nonattainment program under the Clean Air Act;

(vi) National Emission Standards for Hazardous Air Pollutants (NESHAPS) preconstruction approval under the Clean Air Act;

(vii) Dredge or fill permits under section 404 of CWA;

(viii) Other relevant environmental permits, including State or local permits;

(4) *Indian country*. All applicants must identify any generation, treatment, storage, land application, or disposal of sewage sludge that occurs in Indian country;

(5) *Topographic map*. All applicants must submit a topographic map (or other map if a topographic map is unavailable) extending one mile beyond property boundaries of the facility and showing the following information:

(i) All sewage sludge management facilities, including on-site treatment, storage, and disposal sites; and

(ii) Wells, springs, and other surface water bodies that are within ¼ mile of the property boundaries and listed in public records or otherwise known to the applicant;

(6) *Sewage sludge handling*. All applicants must submit a line drawing and/or a narrative description that identifies all sewage sludge management practices employed during the term of the permit, including all units used for collecting, dewatering, storing, or treating sewage sludge, the destination(s) of all liquids and solids leaving each such unit, and all processes used for pathogen reduction and vector attraction reduction;

(7) *Sewage sludge quality*. The applicant must submit sewage sludge monitoring data for the pollutants for which limits in sewage sludge have been established in 40 CFR part 503 for the applicant's use or disposal practices on the date of permit application.

(i) The Director may require sampling for additional pollutants, as appropriate, on a case-by-case basis;

(ii) Applicants must provide data from a minimum of three samples taken within four and one-half years prior to the date of the permit application. Samples must be representative of the sewage sludge and should be taken at least one month apart. Existing data may be used in lieu of sampling done solely for the purpose of this application;

(iii) Applicants must collect and analyze samples in accordance with analytical methods approved under SW–846 unless an alternative has been specified in an existing sewage sludge permit;

(iv) The monitoring data provided must include at least the following information for each parameter:

(A) Average monthly concentration for all samples (mg/kg dry weight), based upon actual sample values;

(B) The analytical method used; and

(C) The method detection level.

(8) *Preparation of sewage sludge*. If the applicant is a ''person who prepares'' sewage sludge, as defined at 40 CFR 503.9(r), the applicant must provide the following information:

(i) If the applicant's facility generates sewage sludge, the total dry metric tons per 365-day period generated at the facility;

(ii) If the applicant's facility receives sewage sludge from another facility, the following information for each facility from which sewage sludge is received:

(A) The name, mailing address, and location of the other facility;

(B) The total dry metric tons per 365-day period received from the other facility; and

(C) A description of any treatment processes occurring at the other facility, including blending activities and treatment to reduce pathogens or vector attraction characteristics;

(iii) If the applicant's facility changes the quality of sewage sludge through blending, treatment, or other activities, the following information:

(A) Whether the Class A pathogen reduction requirements in 40 CFR 503.32(a) or the Class B pathogen reduction requirements in 40 CFR 503.32(b) are met, and a description of any treatment processes used to reduce pathogens in sewage sludge;

(B) Whether any of the vector attraction reduction options of 40 CFR 503.33(b)(1) through (b)(8) are met, and

a description of any treatment processes used to reduce vector attraction properties in sewage sludge; and

(C) A description of any other blending, treatment, or other activities that change the quality of sewage sludge;

(iv) If sewage sludge from the applicant's facility meets the ceiling concentrations in 40 CFR 503.13(b)(1), the pollutant concentrations in §503.13(b)(3), the Class A pathogen requirements in §503.32(a), and one of the vector attraction reduction requirements in §503.33(b)(1) through (b)(8), and if the sewage sludge is applied to the land, the applicant must provide the total dry metric tons per 365-day period of sewage sludge subject to this paragraph that is applied to the land;

(v) If sewage sludge from the applicant's facility is sold or given away in a bag or other container for application to the land, and the sewage sludge is not subject to paragraph (q)(8)(iv) of this section, the applicant must provide the following information:

(A) The total dry metric tons per 365-day period of sewage sludge subject to this paragraph that is sold or given away in a bag or other container for application to the land; and

(B) A copy of all labels or notices that accompany the sewage sludge being sold or given away;

(vi) If sewage sludge from the applicant's facility is provided to another ''person who prepares,'' as defined at 40 CFR 503.9(r), and the sewage sludge is not subject to paragraph (q)(8)(iv) of this section, the applicant must provide the following information for each facility receiving the sewage sludge:

(A) The name and mailing address of the receiving facility;

(B) The total dry metric tons per 365-day period of sewage sludge subject to this paragraph that the applicant provides to the receiving facility;

(C) A description of any treatment processes occurring at the receiving facility, including blending activities and treatment to reduce pathogens or vector attraction characteristic;

(D) A copy of the notice and necessary information that the applicant is required to provide the receiving facility under 40 CFR 503.12(g); and

(E) If the receiving facility places sewage sludge in bags or containers for sale or give-away to application to the land, a copy of any labels or notices that accompany the sewage sludge;

(9) *Land application of bulk sewage sludge*. If sewage sludge from the applicant's facility is applied to the land in bulk form, and is not subject to paragraphs (q)(8)(iv), (v), or (vi) of this section, the applicant must provide the following information:

(i) The total dry metric tons per 365-day period of sewage sludge subject to this paragraph that is applied to the land;

(ii) If any land application sites are located in States other than the State where the sewage sludge is prepared, a description of how the applicant will notify the permitting authority for the State(s) where the land application sites are located;

(iii) The following information for each land application site that has been identified at the time of permit application:

(A) The name (if any), and location for the land application site;

(B) The site's latitude and longitude to the nearest second, and method of determination;

(C) A topographic map (or other map if a topographic map is unavailable) that shows the site's location;

(D) The name, mailing address, and telephone number of the site owner, if different from the applicant;

(E) The name, mailing address, and telephone number of the person who applies sewage sludge to the site, if different from the applicant;

(F) Whether the site is agricultural land, forest, a public contact site, or a reclamation site, as such site types are defined under 40 CFR 503.11;

(G) The type of vegetation grown on the site, if known, and the nitrogen requirement for this vegetation;

(H) Whether either of the vector attraction reduction options of 40 CFR 503.33(b)(9) or (b)(10) is met at the site, and a description of any procedures employed at the time of use to reduce vector attraction properties in sewage sludge; and

(I) Other information that describes how the site will be managed, as specified by the permitting authority.

(iv) The following information for each land application site that has

been identified at the time of permit application, if the applicant intends to apply bulk sewage sludge subject to the cumulative pollutant loading rates in 40 CFR 503.13(b)(2) to the site:

(A) Whether the applicant has contacted the permitting authority in the State where the bulk sewage sludge subject to § 503.13(b)(2) will be applied, to ascertain whether bulk sewage sludge subject to § 503.13(b)(2) has been applied to the site on or since July 20, 1993, and if so, the name of the permitting authority and the name and phone number of a contact person at the permitting authority;

(B) Identification of facilities other than the applicant's facility that have sent, or are sending, sewage sludge subject to the cumulative pollutant loading rates in § 503.13(b)(2) to the site since July 20, 1993, if, based on the inquiry in paragraph (q)(iv)(A), bulk sewage sludge subject to cumulative pollutant loading rates in § 503.13(b)(2) has been applied to the site since July 20, 1993;

(v) If not all land application sites have been identified at the time of permit application, the applicant must submit a land application plan that, at a minimum:

(A) Describes the geographical area covered by the plan;

(B) Identifies the site selection criteria;

(C) Describes how the site(s) will be managed;

(D) Provides for advance notice to the permit authority of specific land application sites and reasonable time for the permit authority to object prior to land application of the sewage sludge; and

(E) Provides for advance public notice of land application sites in the manner prescribed by State and local law. When State or local law does not require advance public notice, it must be provided in a manner reasonably calculated to apprize the general public of the planned land application.

(10) *Surface disposal.* If sewage sludge from the applicant's facility is placed on a surface disposal site, the applicant must provide the following information:

(i) The total dry metric tons of sewage sludge from the applicant's facility that is placed on surface disposal sites per 365-day period;

(ii) The following information for each surface disposal site receiving sewage sludge from the applicant's facility that the applicant does *not* own or operate:

(A) The site name or number, contact person, mailing address, and telephone number for the surface disposal site; and

(B) The total dry metric tons from the applicant's facility per 365-day period placed on the surface disposal site;

(iii) The following information for each active sewage sludge unit at each surface disposal site that the applicant owns or operates:

(A) The name or number and the location of the active sewage sludge unit;

(B) The unit's latitude and longitude to the nearest second, and method of determination;

(C) If not already provided, a topographic map (or other map if a topographic map is unavailable) that shows the unit's location;

(D) The total dry metric tons placed on the active sewage sludge unit per 365-day period;

(E) The total dry metric tons placed on the active sewage sludge unit over the life of the unit;

(F) A description of any liner for the active sewage sludge unit, including whether it has a maximum permeability of 1×10^{-7} cm/sec;

(G) A description of any leachate collection system for the active sewage sludge unit, including the method used for leachate disposal, and any Federal, State, and local permit number(s) for leachate disposal;

(H) If the active sewage sludge unit is less than 150 meters from the property line of the surface disposal site, the actual distance from the unit boundary to the site property line;

(I) The remaining capacity (dry metric tons) for the active sewage sludge unit;

(J) The date on which the active sewage sludge unit is expected to close, if such a date has been identified;

(K) The following information for any other facility that sends sewage sludge to the active sewage sludge unit:

(*1*) The name, contact person, and mailing address of the facility; and

(*2*) Available information regarding the quality of the sewage sludge received from the facility, including any treatment at the facility to reduce pathogens or vector attraction characteristics;

(L) Whether any of the vector attraction reduction options of 40 CFR 503.33(b)(9) through (b)(11) is met at the active sewage sludge unit, and a description of any procedures employed at the time of disposal to reduce vector attraction properties in sewage sludge;

(M) The following information, as applicable to any ground-water monitoring occurring at the active sewage sludge unit:

(*1*) A description of any ground-water monitoring occurring at the active sewage sludge unit;

(*2*) Any available ground-water monitoring data, with a description of the well locations and approximate depth to ground water;

(*3*) A copy of any ground-water monitoring plan that has been prepared for the active sewage sludge unit;

(*4*) A copy of any certification that has been obtained from a qualified ground-water scientist that the aquifer has not been contaminated; and

(N) If site-specific pollutant limits are being sought for the sewage sludge placed on this active sewage sludge unit, information to support such a request;

(11) *Incineration.* If sewage sludge from the applicant's facility is fired in a sewage sludge incinerator, the applicant must provide the following information:

(i) The total dry metric tons of sewage sludge from the applicant's facility that is fired in sewage sludge incinerators per 365-day period;

(ii) The following information for each sewage sludge incinerator firing the applicant's sewage sludge that the applicant does *not* own or operate:

(A) The name and/or number, contact person, mailing address, and telephone number of the sewage sludge incinerator; and

(B) The total dry metric tons from the applicant's facility per 365-day period fired in the sewage sludge incinerator;

(iii) The following information for each sewage sludge incinerator that the applicant owns or operates:

(A) The name and/or number and the location of the sewage sludge incinerator;

(B) The incinerator's latitude and longitude to the nearest second, and method of determination;

(C) The total dry metric tons per 365-day period fired in the sewage sludge incinerator;

(D) Information, test data, and documentation of ongoing operating parameters indicating that compliance with the National Emission Standard for Beryllium in 40 CFR part 61 will be achieved;

(E) Information, test data, and documentation of ongoing operating parameters indicating that compliance with the National Emission Standard for Mercury in 40 CFR part 61 will be achieved;

(F) The dispersion factor for the sewage sludge incinerator, as well as modeling results and supporting documentation;

(G) The control efficiency for parameters regulated in 40 CFR 503.43, as well as performance test results and supporting documentation;

(H) Information used to calculate the risk specific concentration (RSC) for chromium, including the results of incinerator stack tests for hexavalent and total chromium concentrations, if the applicant is requesting a chromium limit based on a site-specific RSC value;

(I) Whether the applicant monitors total hydrocarbons (THC) or Carbon Monoxide (CO) in the exit gas for the sewage sludge incinerator;

(J) The type of sewage sludge incinerator;

(K) The maximum performance test combustion temperature, as obtained during the performance test of the sewage sludge incinerator to determine pollutant control efficiencies;

(L) The following information on the sewage sludge feed rate used during the performance test:

(*1*) Sewage sludge feed rate in dry metric tons per day;

(*2*) Identification of whether the feed rate submitted is average use or maximum design; and

(*3*) A description of how the feed rate was calculated;

(M) The incinerator stack height in meters for each stack, including identification of whether actual or creditable stack height was used;

(N) The operating parameters for the sewage sludge incinerator air pollution control device(s), as obtained during the performance test of the sewage sludge incinerator to determine pollutant control efficiencies;

(O) Identification of the monitoring equipment in place, including (but not limited to) equipment to monitor the following:

(*1*) Total hydrocarbons or Carbon Monoxide;

(*2*) Percent oxygen;

(*3*) Percent moisture; and

(*4*) Combustion temperature; and

(P) A list of all air pollution control equipment used with this sewage sludge incinerator;

(12) *Disposal in a municipal solid waste landfill*. If sewage sludge from the applicant's facility is sent to a municipal solid waste landfill (MSWLF), the applicant must provide the following information for each MSWLF to which sewage sludge is sent:

(i) The name, contact person, mailing address, location, and all applicable permit numbers of the MSWLF;

(ii) The total dry metric tons per 365-day period sent from this facility to the MSWLF;

(iii) A determination of whether the sewage sludge meets applicable requirements for disposal of sewage sludge in a MSWLF, including the results of the paint filter liquids test and any additional requirements that apply on a site-specific basis; and

(iv) Information, if known, indicating whether the MSWLF complies with criteria set forth in 40 CFR part 258;

(13) *Contractors*. All applicants must provide the name, mailing address, telephone number, and responsibilities of all contractors responsible for any operational or maintenance aspects of the facility related to sewage sludge generation, treatment, use, or disposal;

(14) *Other information*. At the request of the permitting authority, the applicant must provide any other information necessary to determine the appropriate standards for permitting under 40 CFR part 503, and must provide any other information necessary to assess the sewage sludge use and disposal practices, determine whether to issue a permit, or identify appropriate permit requirements; and

(15) *Signature*. All applications must be signed by a certifying official in compliance with § 122.22.

[Note 1: At 46 FR 2046, Jan. 8, 1981, the Environmental Protection Agency suspended until further notice § 122.21(g)(7)(v)(A) and the corresponding portions of Item V-C of the NPDES application Form 2C as they apply to coal mines. This suspension continues in effect.]

[Note 2: At 46 FR 22585, Apr. 20, 1981, the Environmental Protection Agency suspended until further notice § 122.21(g)(7)(v)(A) and the corresponding portions of Item V-C of the NPDES application Form 2C as they apply to:

a. Testing and reporting for all four organic fractions in the Greige Mills Subcategory of the Textile Mills industry (subpart C—Low water use processing of 40 CFR part 410), and testing and reporting for the pesticide fraction in all other subcategories of this industrial category.

b. Testing and reporting for the volatile, base/neutral and pesticide fractions in the Base and Precious Metals Subcategory of the Ore Mining and Dressing industry (subpart B of 40 CFR part 440), and testing and reporting for all four fractions in all other subcategories of this industrial category.

c. Testing and reporting for all four GC/MS fractions in the Porcelain Enameling industry.

This revision continues that suspension.][1]

[Note 3: At 46 FR 35090, July 1, 1981, the Environmental Protection Agency suspended until further notice § 122.21(g)(7)(v)(A) and the corresponding portions of Item V-C of the NPDES application Form 2C as they apply to:

a. Testing and reporting for the pesticide fraction in the Tall Oil Rosin Subcategory (subpart D) and Rosin-Based Derivatives Subcategory (subpart F) of the Gum and Wood Chemicals industry (40 CFR part 454), and testing and reporting for the pesticide and base-neutral fractions in all other subcategories of this industrial category.

b. Testing and reporting for the pesticide fraction in the Leather Tanning and Finishing, Paint and Ink Formulation, and Photographic Supplies industrial categories.

c. Testing and reporting for the acid, base/neutral and pesticide fractions in the Petroleum Refining industrial category.

d. Testing and reporting for the pesticide fraction in the Papergrade Sulfite subcategories (subparts J and U) of the Pulp and Paper industry (40 CFR part 430); testing and

reporting for the base/neutral and pesticide fractions in the following subcategories: Deink (subpart Q), Dissolving Kraft (subpart F), and Paperboard from Waste Paper (subpart E); testing and reporting for the volatile, base/neutral and pesticide fractions in the following subcategories: BCT Bleached Kraft (subpart H), Semi-Chemical (subparts B and C), and Nonintegrated-Fine Papers (subpart R); and testing and reporting for the acid, base/neutral, and pesticide fractions in the following subcategories: Fine Bleached Kraft (subpart I), Dissolving Sulfite Pulp (subpart K), Groundwood-Fine Papers (subpart O), Market Bleached Kraft (subpart G), Tissue from Wastepaper (subpart T), and Nonintegrated-Tissue Papers (subpart S).

e. Testing and reporting for the base/neutral fraction in the Once-Through Cooling Water, Fly Ash and Bottom Ash Transport Water process wastestreams of the Steam Electric Power Plant industrial category.

This revision continues that suspension.][1]

(r) *Application requirements for facilities with cooling water intake structures*—(1)(i) *New facilities with new or modified cooling water intake structures.* New facilities (other than offshore oil and gas extraction facilities) with cooling water intake structures as defined in part 125, subpart I, of this chapter must submit to the Director for review the information required under paragraphs (r)(2) (except (r)(2)(iv)), (3), and (4) of this section and § 125.86 of this chapter as part of their application. New offshore oil and gas extraction facilities with cooling water intake structures as defined in part 125, subpart N, of this chapter that are fixed facilities must submit to the Director for review the information required under paragraphs (r)(2) (except (r)(2)(iv)), (3), and (4) of this section and § 125.136 of this chapter as part of their application. New offshore oil and gas extraction facilities that are *not* fixed facilities must submit to the Director for review only the information required under paragraphs (r)(2)(iv), (r)(3) (except (r)(3)(ii)), and § 125.136 of this chapter as part of their application. Requests for alternative requirements under § 125.85 or § 125.135 of this chapter must be submitted with your permit application.

(ii) *Phase II existing facilities.* Phase II existing facilities as defined in part 125, subpart J, of this chapter must submit to the Director for review the information required under paragraphs (r)(2), (3), and (5) of this section and all applicable provisions of § 125.95 of this chapter as part of their application except for the Proposal for Information Collection which must be provided in accordance with § 125.95(b)(1).

(2) *Source water physical data.* These include:

(i) A narrative description and scaled drawings showing the physical configuration of all source water bodies used by your facility, including areal dimensions, depths, salinity and temperature regimes, and other documentation that supports your determination of the water body type where each cooling water intake structure is located;

(ii) Identification and characterization of the source waterbody's hydrological and geomorphological features, as well as the methods you used to conduct any physical studies to determine your intake's area of influence within the waterbody and the results of such studies;

(iii) Locational maps; and

(iv) For new offshore oil and gas facilities that are not fixed facilities, a narrative description and/or locational maps providing information on predicted locations within the waterbody during the permit term in sufficient detail for the Director to determine the appropriateness of additional impingement requirements under § 125.134(b)(4).

(3) *Cooling water intake structure data.* These include:

(i) A narrative description of the configuration of each of your cooling water intake structures and where it is located in the water body and in the water column;

(ii) Latitude and longitude in degrees, minutes, and seconds for each of your cooling water intake structures;

(iii) A narrative description of the operation of each of your cooling water intake structures, including design intake flows, daily hours of operation, number of days of the year in operation and seasonal changes, if applicable;

(iv) A flow distribution and water balance diagram that includes all sources of water to the facility, recirculating flows, and discharges; and

(v) Engineering drawings of the cooling water intake structure.

[1] EDITORIAL NOTE: The words ''This revision'' refer to the document published at 48 FR 14153, Apr. 1, 1983.

(4) Source water baseline biological characterization data. This information is required to characterize the biological community in the vicinity of the cooling water intake structure and to characterize the operation of the cooling water intake structures. The Director may also use this information in subsequent permit renewal proceedings to determine if your Design and Construction Technology Plan as required in § 125.86(b)(4) or § 125.136(b)(3) of this chapter should be revised. This supporting information must include existing data (if they are available). However, you may supplement the data using newly conducted field studies if you choose to do so. The information you submit must include:

(i) A list of the data in paragraphs (r)(4)(ii) through (vi) of this section that are not available and efforts made to identify sources of the data;

(ii) A list of species (or relevant taxa) for all life stages and their relative abundance in the vicinity of the cooling water intake structure;

(iii) Identification of the species and life stages that would be most susceptible to impingement and entrainment. Species evaluated should include the forage base as well as those most important in terms of significance to commercial and recreational fisheries;

(iv) Identification and evaluation of the primary period of reproduction, larval recruitment, and period of peak abundance for relevant taxa;

(v) Data representative of the seasonal and daily activities (e.g., feeding and water column migration) of biological organisms in the vicinity of the cooling water intake structure;

(vi) Identification of all threatened, endangered, and other protected species that might be susceptible to impingement and entrainment at your cooling water intake structures;

(vii) Documentation of any public participation or consultation with Federal or State agencies undertaken in development of the plan; and

(viii) If you supplement the information requested in paragraph (r)(4)(i) of this section with data collected using field studies, supporting documentation for the Source Water Baseline Biological Characterization must include a description of all methods and quality assurance procedures for sampling, and data analysis including a description of the study area; taxonomic identification of sampled and evaluated biological assemblages (including all life stages of fish and shellfish); and sampling and data analysis methods. The sampling and/or data analysis methods you use must be appropriate for a quantitative survey and based on consideration of methods used in other biological studies performed within the same source water body. The study area should include, at a minimum, the area of influence of the cooling water intake structure.

(5) *Cooling water system data.* Phase II existing facilities as defined in part 125, subpart J of this chapter must provide the following information for each cooling water intake structure they use:

(i) A narrative description of the operation of the cooling water system, its relationship to cooling water intake structures, the proportion of the design intake flow that is used in the system, the number of days of the year the cooling water system is in operation and seasonal changes in the operation of the system, if applicable; and

(ii) Design and engineering calculations prepared by a qualified professional and supporting data to support the description required by paragraph (r)(5)(i) of this section.

[48 FR 14153, Apr. 1, 1983]

EDITORIAL NOTE: For FEDERAL REGISTER citations affecting § 122.21, see the List of CFR Sections Affected, which appears in the Finding Aids section of the printed volume and on GPO Access.

EFFECTIVE DATE NOTE: At 72 FR 37109, July 9, 2007, § 122.21(r)(1)(ii) and (r)(5) were suspended.

§ 122.22 Signatories to permit applications and reports (applicable to State programs, see § 123.25).

(a) *Applications.* All permit applications shall be signed as follows:

(1) *For a corporation.* By a responsible corporate officer. For the purpose of this section, a responsible corporate officer means: (i) A president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who perfoms similar policy- or decision-

making functions for the corporation, or (ii) the manager of one or more manufacturing, production, or operating facilities, provided, the manager is authorized to make management decisions which govern the operation of the regulated facility including having the explicit or implicit duty of making major capital investment recommendations, and initiating and directing other comprehensive measures to assure long term environmental compliance with environmental laws and regulations; the manager can ensure that the necessary systems are established or actions taken to gather complete and accurate information for permit application requirements; and where authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures.

NOTE: EPA does not require specific assignments or delegations of authority to responsible corporate officers identified in § 122.22(a)(1)(i). The Agency will presume that these responsible corporate officers have the requisite authority to sign permit applications unless the corporation has notified the Director to the contrary. Corporate procedures governing authority to sign permit applications may provide for assignment or delegation to applicable corporate positions under § 122.22(a)(1)(ii) rather than to specific individuals.

(2) *For a partnership or sole proprietorship*. By a general partner or the proprietor, respectively; or

(3) *For a municipality, State, Federal, or other public agency*. By either a principal executive officer or ranking elected official. For purposes of this section, a principal executive officer of a Federal agency includes: (i) The chief executive officer of the agency, or (ii) a senior executive officer having responsibility for the overall operations of a principal geographic unit of the agency (e.g., Regional Administrators of EPA).

(b) All reports required by permits, and other information requested by the Director shall be signed by a person described in paragraph (a) of this section, or by a duly authorized representative of that person. A person is a duly authorized representative only if:

(1) The authorization is made in writing by a person described in paragraph (a) of this section;

(2) The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity such as the position of plant manager, operator of a well or a well field, superintendent, position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters for the company, (A duly authorized representative may thus be either a named individual or any individual occupying a named position.) and,

(3) The written authorization is submitted to the Director.

(c) *Changes to authorization*. If an authorization under paragraph (b) of this section is no longer accurate because a different individual or position has responsibility for the overall operation of the facility, a new authorization satisfying the requirements of paragraph (b) of this section must be submitted to the Director prior to or together with any reports, information, or applications to be signed by an authorized representative.

(d) *Certification*. Any person signing a document under paragraph (a) or (b) of this section shall make the following certification:

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

(Clean Water Act (33 U.S.C. 1251 *et seq.*), Safe Drinking Water Act (42 U.S.C. 300f *et seq.*), Clean Air Act (42 U.S.C. 7401 *et seq.*), Resource Conservation and Recovery Act (42 U.S.C. 6901 *et seq.*))

[48 FR 14153, Apr. 1, 1983, as amended at 48 FR 39619, Sept. 1, 1983; 49 FR 38047, Sept. 29, 1984; 50 FR 6941, Feb. 19, 1985; 55 FR 48063, Nov. 16, 1990; 65 FR 30907, May 15, 2000]

§ 122.23 Concentrated animal feeding operations (applicable to State NPDES programs, see § 123.25).

(a) *Scope*. Concentrated animal feeding operations (CAFOs), as defined in

paragraph (b) of this section or designated in accordance with paragraph (c) of this section, are point sources, subject to NPDES permitting requirements as provided in this section. Once an animal feeding operation is defined as a CAFO for at least one type of animal, the NPDES requirements for CAFOs apply with respect to all animals in confinement at the operation and all manure, litter, and process wastewater generated by those animals or the production of those animals, regardless of the type of animal.

(b) Definitions applicable to this section:

(1) *Animal feeding operation* (''AFO'') means a lot or facility (other than an aquatic animal production facility) where the following conditions are met:

(i) Animals (other than aquatic animals) have been, are, or will be stabled or confined and fed or maintained for a total of 45 days or more in any 12-month period, and

(ii) Crops, vegetation, forage growth, or post-harvest residues are not sustained in the normal growing season over any portion of the lot or facility.

(2) *Concentrated animal feeding operation* (''CAFO'') means an AFO that is defined as a Large CAFO or as a Medium CAFO by the terms of this paragraph, or that is designated as a CAFO in accordance with paragraph (c) of this section. Two or more AFOs under common ownership are considered to be a single AFO for the purposes of determining the number of animals at an operation, if they adjoin each other or if they use a common area or system for the disposal of wastes.

(3) The term *land application area* means land under the control of an AFO owner or operator, whether it is owned, rented, or leased, to which manure, litter or process wastewater from the production area is or may be applied.

(4) *Large concentrated animal feeding operation* (''Large CAFO''). An AFO is defined as a Large CAFO if it stables or confines as many as or more than the numbers of animals specified in any of the following categories:

(i) 700 mature dairy cows, whether milked or dry;

(ii) 1,000 veal calves;

(iii) 1,000 cattle other than mature dairy cows or veal calves. Cattle includes but is not limited to heifers, steers, bulls and cow/calf pairs;

(iv) 2,500 swine each weighing 55 pounds or more;

(v) 10,000 swine each weighing less than 55 pounds;

(vi) 500 horses;

(vii) 10,000 sheep or lambs;

(viii) 55,000 turkeys;

(ix) 30,000 laying hens or broilers, if the AFO uses a liquid manure handling system;

(x) 125,000 chickens (other than laying hens), if the AFO uses other than a liquid manure handling system;

(xi) 82,000 laying hens, if the AFO uses other than a liquid manure handling system;

(xii) 30,000 ducks (if the AFO uses other than a liquid manure handling system); or

(xiii) 5,000 ducks (if the AFO uses a liquid manure handling system).

(5) The term *manure* is defined to include manure, bedding, compost and raw materials or other materials commingled with manure or set aside for disposal.

(6) *Medium concentrated animal feeding operation* (''Medium CAFO''). The term Medium CAFO includes any AFO with the type and number of animals that fall within any of the ranges listed in paragraph (b)(6)(i) of this section and which has been defined or designated as a CAFO. An AFO is defined as a Medium CAFO if:

(i) The type and number of animals that it stables or confines falls within any of the following ranges:

(A) 200 to 699 mature dairy cows, whether milked or dry;

(B) 300 to 999 veal calves;

(C) 300 to 999 cattle other than mature dairy cows or veal calves. Cattle includes but is not limited to heifers, steers, bulls and cow/calf pairs;

(D) 750 to 2,499 swine each weighing 55 pounds or more;

(E) 3,000 to 9,999 swine each weighing less than 55 pounds;

(F) 150 to 499 horses;

(G) 3,000 to 9,999 sheep or lambs;

(H) 16,500 to 54,999 turkeys;

(I) 9,000 to 29,999 laying hens or broilers, if the AFO uses a liquid manure handling system;

(J) 37,500 to 124,999 chickens (other than laying hens), if the AFO uses other than a liquid manure handling system;

(K) 25,000 to 81,999 laying hens, if the AFO uses other than a liquid manure handling system;

(L) 10,000 to 29,999 ducks (if the AFO uses other than a liquid manure handling system); or

(M) 1,500 to 4,999 ducks (if the AFO uses a liquid manure handling system); and

(ii) Either one of the following conditions are met:

(A) Pollutants are discharged into waters of the United States through a man-made ditch, flushing system, or other similar man-made device; or

(B) Pollutants are discharged directly into waters of the United States which originate outside of and pass over, across, or through the facility or otherwise come into direct contact with the animals confined in the operation.

(7) *Process wastewater* means water directly or indirectly used in the operation of the AFO for any or all of the following: spillage or overflow from animal or poultry watering systems; washing, cleaning, or flushing pens, barns, manure pits, or other AFO facilities; direct contact swimming, washing, or spray cooling of animals; or dust control. Process wastewater also includes any water which comes into contact with any raw materials, products, or byproducts including manure, litter, feed, milk, eggs or bedding.

(8) *Production area* means that part of an AFO that includes the animal confinement area, the manure storage area, the raw materials storage area, and the waste containment areas. The animal confinement area includes but is not limited to open lots, housed lots, feedlots, confinement houses, stall barns, free stall barns, milkrooms, milking centers, cowyards, barnyards, medication pens, walkers, animal walkways, and stables. The manure storage area includes but is not limited to lagoons, runoff ponds, storage sheds, stockpiles, under house or pit storages, liquid impoundments, static piles, and composting piles. The raw materials storage area includes but is not limited to feed silos, silage bunkers, and bedding materials. The waste containment area includes but is not limited to settling basins, and areas within berms and diversions which separate uncontaminated storm water. Also included in the definition of production area is any egg washing or egg processing facility, and any area used in the storage, handling, treatment, or disposal of mortalities.

(9) *Small concentrated animal feeding operation* (''Small CAFO''). An AFO that is designated as a CAFO and is not a Medium CAFO.

(c) *How may an AFO be designated as a CAFO?* The appropriate authority (*i.e.*, State Director or Regional Administrator, or both, as specified in paragraph (c)(1) of this section) may designate any AFO as a CAFO upon determining that it is a significant contributor of pollutants to waters of the United States.

(1) *Who may designate?*—(i) *Approved States.* In States that are approved or authorized by EPA under Part 123, CAFO designations may be made by the State Director. The Regional Administrator may also designate CAFOs in approved States, but only where the Regional Administrator has determined that one or more pollutants in the AFO's discharge contributes to an impairment in a downstream or adjacent State or Indian country water that is impaired for that pollutant.

(ii) *States with no approved program.* The Regional Administrator may designate CAFOs in States that do not have an approved program and in Indian country where no entity has expressly demonstrated authority and has been expressly authorized by EPA to implement the NPDES program.

(2) In making this designation, the State Director or the Regional Administrator shall consider the following factors:

(i) The size of the AFO and the amount of wastes reaching waters of the United States;

(ii) The location of the AFO relative to waters of the United States;

(iii) The means of conveyance of animal wastes and process waste waters into waters of the United States;

(iv) The slope, vegetation, rainfall, and other factors affecting the likelihood or frequency of discharge of animal wastes manure and process waste waters into waters of the United States; and

(v) Other relevant factors.

(3) No AFO shall be designated under this paragraph unless the State Director or the Regional Administrator has conducted an on-site inspection of the operation and determined that the operation should and could be regulated under the permit program. In addition, no AFO with numbers of animals below those established in paragraph (b)(6) of this section may be designated as a CAFO unless:

(i) Pollutants are discharged into waters of the United States through a manmade ditch, flushing system, or other similar manmade device; or

(ii) Pollutants are discharged directly into waters of the United States which originate outside of the facility and pass over, across, or through the facility or otherwise come into direct contact with the animals confined in the operation.

(d) *Who must seek coverage under an NPDES permit?*—(1) *Permit Requirement.* The owner or operator of a CAFO must seek coverage under an NPDES permit if the CAFO discharges or proposes to discharge. A CAFO proposes to discharge if it is designed, constructed, operated, or maintained such that a discharge will occur. Specifically, the CAFO owner or operator must either apply for an individual NPDES permit or submit a notice of intent for coverage under an NPDES general permit. If the Director has not made a general permit available to the CAFO, the CAFO owner or operator must submit an application for an individual permit to the Director.

(2) *Information to submit with permit application or notice of intent.* An application for an individual permit must include the information specified in § 122.21. A notice of intent for a general permit must include the information specified in §§ 122.21 and 122.28.

(3) *Information to submit with permit application.* A permit application for an individual permit must include the information specified in § 122.21. A notice of intent for a general permit must include the information specified in §§ 122.21 and 122.28.

(e) *Land application discharges from a CAFO are subject to NPDES requirements.* The discharge of manure, litter or process wastewater to waters of the United States from a CAFO as a result of the application of that manure, litter or process wastewater by the CAFO to land areas under its control is a discharge from that CAFO subject to NPDES permit requirements, except where it is an agricultural storm water discharge as provided in 33 U.S.C. 1362(14). For purposes of this paragraph, where the manure, litter or process wastewater has been applied in accordance with site specific nutrient management practices that ensure appropriate agricultural utilization of the nutrients in the manure, litter or process wastewater, as specified in § 122.42(e)(1)(vi)–(ix), a precipitation-related discharge of manure, litter or process wastewater from land areas under the control of a CAFO is an agricultural stormwater discharge.

(1) For unpermitted Large CAFOs, a precipitation-related discharge of manure, litter, or process wastewater from land areas under the control of a CAFO shall be considered an agricultural stormwater discharge only where the manure, litter, or process wastewater has been land applied in accordance with site-specific nutrient management practices that ensure appropriate agricultural utilization of the nutrients in the manure, litter, or process wastewater, as specified in § 122.42(e)(1)(vi) through (ix).

(2) Unpermitted Large CAFOs must maintain documentation specified in § 122.42(e)(1)(ix) either on site or at a nearby office, or otherwise make such documentation readily available to the Director or Regional Administrator upon request.

(f) *When must the owner or operator of a CAFO seek coverage under an NPDES permit?* Any CAFO that is required to seek permit coverage under paragraph (d)(1) of this section must seek coverage when the CAFO proposes to discharge, unless a later deadline is specified below.

(1) *Operations defined as CAFOs prior to April 14, 2003.* For operations defined as CAFOs under regulations that were

in effect prior to April 14, 2003, the owner or operator must have or seek to obtain coverage under an NPDES permit as of April 14, 2003, and comply with all applicable NPDES requirements, including the duty to maintain permit coverage in accordance with paragraph (g) of this section.

(2) *Operations defined as CAFOs as of April 14, 2003, that were not defined as CAFOs prior to that date.* For all operations defined as CAFOs as of April 14, 2003, that were not defined as CAFOs prior to that date, the owner or operator of the CAFO must seek to obtain coverage under an NPDES permit by February 27, 2009.

(3) *Operations that become defined as CAFOs after April 14, 2003, but which are not new sources.* For a newly constructed CAFO and for an AFO that makes changes to its operations that result in its becoming defined as a CAFO for the first time after April 14, 2003, but is not a new source, the owner or operator must seek to obtain coverage under an NPDES permit, as follows:

(i) For newly constructed operations not subject to effluent limitations guidelines, 180 days prior to the time CAFO commences operation;

(ii) For other operations (*e.g.*, resulting from an increase in the number of animals), as soon as possible, but no later than 90 days after becoming defined as a CAFO; or

(iii) If an operational change that makes the operation a CAFO would not have made it a CAFO prior to April 14, 2003, the operation has until February 27, 2009, or 90 days after becoming defined as a CAFO, whichever is later.

(4) *New sources.* The owner or operator of a new source must seek to obtain coverage under a permit at least 180 days prior to the time that the CAFO commences operation.

(5) *Operations that are designated as CAFOs.* For operations designated as a CAFO in accordance with paragraph (c) of this section, the owner or operator must seek to obtain coverage under a permit no later than 90 days after receiving notice of the designation.

(g) *Duty to maintain permit coverage.* No later than 180 days before the expiration of the permit, or as provided by the Director, any permitted CAFO must submit an application to renew its permit, in accordance with §122.21(d), unless the CAFO will not discharge or propose to discharge upon expiration of the permit.

(h) *Procedures for CAFOs seeking coverage under a general permit.* (1) CAFO owners or operators must submit a notice of intent when seeking authorization to discharge under a general permit in accordance with §122.28(b). The Director must review notices of intent submitted by CAFO owners or operators to ensure that the notice of intent includes the information required by §122.21(i)(1), including a nutrient management plan that meets the requirements of §122.42(e) and applicable effluent limitations and standards, including those specified in 40 CFR part 412. When additional information is necessary to complete the notice of intent or clarify, modify, or supplement previously submitted material, the Director may request such information from the owner or operator. If the Director makes a preliminary determination that the notice of intent meets the requirements of §§122.21(i)(1) and 122.42(e), the Director must notify the public of the Director's proposal to grant coverage under the permit to the CAFO and make available for public review and comment the notice of intent submitted by the CAFO, including the CAFO's nutrient management plan, and the draft terms of the nutrient management plan to be incorporated into the permit. The process for submitting public comments and hearing requests, and the hearing process if a request for a hearing is granted, must follow the procedures applicable to draft permits set forth in 40 CFR 124.11 through 124.13. The Director may establish, either by regulation or in the general permit, an appropriate period of time for the public to comment and request a hearing that differs from the time period specified in 40 CFR 124.10. The Director must respond to significant comments received during the comment period, as provided in 40 CFR 124.17, and, if necessary, require the CAFO owner or operator to revise the nutrient management plan in order to be granted permit coverage. When the Director authorizes coverage for the

CAFO owner or operator under the general permit, the terms of the nutrient management plan shall become incorporated as terms and conditions of the permit for the CAFO. The Director shall notify the CAFO owner or operator and inform the public that coverage has been authorized and of the terms of the nutrient management plan incorporated as terms and conditions of the permit applicable to the CAFO.

(2) *For EPA-issued permits only*. The Regional Administrator shall notify each person who has submitted written comments on the proposal to grant coverage and the draft terms of the nutrient management plan or requested notice of the final permit decision. Such notification shall include notice that coverage has been authorized and of the terms of the nutrient management plan incorporated as terms and conditions of the permit applicable to the CAFO.

(3) Nothing in this paragraph (h) shall affect the authority of the Director to require an individual permit under § 122.28(b)(3).

(i) *No discharge certification option*. (1) The owner or operator of a CAFO that meets the eligibility criteria in paragraph (i)(2) of this section may certify to the Director that the CAFO does not discharge or propose to discharge. A CAFO owner or operator who certifies that the CAFO does not discharge or propose to discharge is not required to seek coverage under an NPDES permit pursuant to paragraph (d)(1) of this section, provided that the CAFO is designed, constructed, operated, and maintained in accordance with the requirements of paragraphs (i)(2) and (3) of this section, and subject to the limitations in paragraph (i)(4) of this section.

(2) *Eligibility criteria*. In order to certify that a CAFO does not discharge or propose to discharge, the owner or operator of a CAFO must document, based on an objective assessment of the conditions at the CAFO, that the CAFO is designed, constructed, operated, and maintained in a manner such that the CAFO will not discharge, as follows:

(i) The CAFO's production area is designed, constructed, operated, and maintained so as not to discharge. The CAFO must maintain documentation that demonstrates that:

(A) Any open manure storage structures are designed, constructed, operated, and maintained to achieve no discharge based on a technical evaluation in accordance with the elements of the technical evaluation set forth in 40 CFR 412.46(a)(1)(i) through (viii);

(B) Any part of the CAFO's production area that is not addressed by paragraph (i)(2)(i)(A) of this section is designed, constructed, operated, and maintained such that there will be no discharge of manure, litter, or process wastewater; and

(C) The CAFO implements the additional measures set forth in 40 CFR 412.37(a) and (b);

(ii) The CAFO has developed and is implementing an up-to-date nutrient management plan to ensure no discharge from the CAFO, including from all land application areas under the control of the CAFO, that addresses, at a minimum, the following:

(A) The elements of § 122.42(e)(1)(i) through (ix) and 40 CFR 412.37(c); and

(B) All site-specific operation and maintenance practices necessary to ensure no discharge, including any practices or conditions established by a technical evaluation pursuant to paragraph (i)(2)(i)(A) of this section; and

(iii) The CAFO must maintain documentation required by this paragraph either on site or at a nearby office, or otherwise make such documentation readily available to the Director or Regional Administrator upon request.

(3) *Submission to the Director*. In order to certify that a CAFO does not discharge or propose to discharge, the CAFO owner or operator must complete and submit to the Director, by certified mail or equivalent method of documentation, a certification that includes, at a minimum, the following information:

(i) The legal name, address and phone number of the CAFO owner or operator (see § 122.21(b));

(ii) The CAFO name and address, the county name and the latitude and longitude where the CAFO is located;

(iii) A statement that describes the basis for the CAFO's certification that it satisfies the eligibility requirements

identified in paragraph (i)(2) of this section; and

(iv) The following certification statement: ''I certify under penalty of law that I am the owner or operator of a concentrated animal feeding operation (CAFO), identified as [Name of CAFO], and that said CAFO meets the requirements of 40 CFR 122.23(i). I have read and understand the eligibility requirements of 40 CFR 122.23(i)(2) for certifying that a CAFO does not discharge or propose to discharge and further certify that this CAFO satisfies the eligibility requirements. As part of this certification, I am including the information required by 40 CFR 122.23(i)(3). I also understand the conditions set forth in 40 CFR 122.23(i)(4), (5) and (6) regarding loss and withdrawal of certification. I certify under penalty of law that this document and all other documents required for this certification were prepared under my direction or supervision and that qualified personnel properly gathered and evaluated the information submitted. Based upon my inquiry of the person or persons directly involved in gathering and evaluating the information, the information submitted is to the best of my knowledge and belief true, accurate and complete. I am aware there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.''; and

(v) The certification must be signed in accordance with the signatory requirements of 40 CFR 122.22.

(4) *Term of certification*. A certification that meets the requirements of paragraphs (i)(2) and (i)(3) of this section shall become effective on the date it is submitted, unless the Director establishes an effective date of up to 30 days after the date of submission. Certification will remain in effect for five years or until the certification is no longer valid or is withdrawn, whichever occurs first. A certification is no longer valid when a discharge has occurred or when the CAFO ceases to meet the eligibility criteria in paragraph (i)(2) of this section.

(5) *Withdrawal of certification*.(i) At any time, a CAFO may withdraw its certification by notifying the Director by certified mail or equivalent method of documentation. A certification is withdrawn on the date the notification is submitted to the Director. The CAFO does not need to specify any reason for the withdrawal in its notification to the Director.

(ii) If a certification becomes invalid in accordance with paragraph (i)(4) of this section, the CAFO must withdraw its certification within three days of the date on which the CAFO becomes aware that the certification is invalid. Once a CAFO's certification is no longer valid, the CAFO is subject to the requirement in paragraph (d)(1) of this section to seek permit coverage if it discharges or proposes to discharge.

(6) *Recertification*.A previously certified CAFO that does not discharge or propose to discharge may recertify in accordance with paragraph (i) of this section, except that where the CAFO has discharged, the CAFO may only recertify if the following additional conditions are met:

(i) The CAFO had a valid certification at the time of the discharge;

(ii) The owner or operator satisfies the eligibility criteria of paragraph (i)(2) of this section, including any necessary modifications to the CAFO's design, construction, operation, and/or maintenance to permanently address the cause of the discharge and ensure that no discharge from this cause occurs in the future;

(iii) The CAFO has not previously recertified after a discharge from the same cause;

(iv) The owner or operator submits to the Director for review the following documentation: a description of the discharge, including the date, time, cause, duration, and approximate volume of the discharge, and a detailed explanation of the steps taken by the CAFO to permanently address the cause of the discharge in addition to submitting a certification in accordance with paragraph (i)(3) of this section; and

(v) Notwithstanding paragraph (i)(4) of this section, a recertification that meets the requirements of paragraphs (i)(6)(iii) and (i)(6)(iv) of this section shall only become effective 30 days from the date of submission of the recertification documentation.

(j) *Effect of certification*. (1) An unpermitted CAFO certified in accordance with paragraph (i) of this section is presumed not to propose to discharge. If such a CAFO does discharge, it is not in violation of the requirement that CAFOs that propose to discharge seek permit coverage pursuant to paragraphs (d)(1) and (f) of this section, with respect to that discharge. In all instances, the discharge of a pollutant without a permit is a violation of the Clean Water Act section 301(a) prohibition against unauthorized discharges from point sources.

(2) In any enforcement proceeding for failure to seek permit coverage under paragraphs (d)(1) or (f) of this section that is related to a discharge from an unpermitted CAFO, the burden is on the CAFO to establish that it did not propose to discharge prior to the discharge when the CAFO either did not submit certification documentation as provided in paragraph (i)(3) or (i)(6)(iv) of this section within at least five years prior to the discharge, or withdrew its certification in accordance with paragraph (i)(5) of this section. Design, construction, operation, and maintenance in accordance with the criteria of paragraph (i)(2) of this section satisfies this burden.

[68 FR 7265, Feb. 12, 2003, as amended at 71 FR 6984, Feb. 10, 2006; 72 FR 40250, July 24, 2007; 73 FR 70480, Nov. 20, 2008]

§ 122.24 Concentrated aquatic animal production facilities (applicable to State NPDES programs, see § 123.25).

(a) *Permit requirement*. Concentrated aquatic animal production facilities, as defined in this section, are point sources subject to the NPDES permit program.

(b) *Definition*. *Concentrated aquatic animal production facility* means a hatchery, fish farm, or other facility which meets the criteria in appendix C of this part, or which the Director designates under paragraph (c) of this section.

(c) *Case-by-case designation of concentrated aquatic animal production facilities*. (1) The Director may designate any warm or cold water aquatic animal production facility as a concentrated aquatic animal production facility upon determining that it is a significant contributor of pollution to waters of the United States. In making this designation the Director shall consider the following factors:

(i) The location and quality of the receiving waters of the United States;

(ii) The holding, feeding, and production capacities of the facility;

(iii) The quantity and nature of the pollutants reaching waters of the United States; and

(iv) Other relevant factors.

(2) A permit application shall not be required from a concentrated aquatic animal production facility designated under this paragraph until the Director has conducted on-site inspection of the facility and has determined that the facility should and could be regulated under the permit program.

[48 FR 14153, Apr. 1, 1983, as amended at 65 FR 30907, May 15, 2000]

§ 122.25 Aquaculture projects (applicable to State NPDES programs, see § 123.25).

(a) *Permit requirement*. Discharges into aquaculture projects, as defined in this section, are subject to the NPDES permit program through section 318 of CWA, and in accordance with 40 CFR part 125, subpart B.

(b) *Definitions*. (1) *Aquaculture project* means a defined managed water area which uses discharges of pollutants into that designated area for the maintenance or production of harvestable freshwater, estuarine, or marine plants or animals.

(2) *Designated project area* means the portions of the waters of the United States within which the permittee or permit applicant plans to confine the cultivated species, using a method or plan or operation (including, but not limited to, physical confinement) which, on the basis of reliable scientific evidence, is expected to ensure that specific individual organisms comprising an aquaculture crop will enjoy increased growth attributable to the discharge of pollutants, and be harvested within a defined geographic area.

§ 122.26 Storm water discharges (applicable to State NPDES programs, see § 123.25).

(a) *Permit requirement.* (1) Prior to October 1, 1994, discharges composed entirely of storm water shall not be required to obtain a NPDES permit except:

(i) A discharge with respect to which a permit has been issued prior to February 4, 1987;

(ii) A discharge associated with industrial activity (see § 122.26(a)(4));

(iii) A discharge from a large municipal separate storm sewer system;

(iv) A discharge from a medium municipal separate storm sewer system;

(v) A discharge which the Director, or in States with approved NPDES programs, either the Director or the EPA Regional Administrator, determines to contribute to a violation of a water quality standard or is a significant contributor of pollutants to waters of the United States. This designation may include a discharge from any conveyance or system of conveyances used for collecting and conveying storm water runoff or a system of discharges from municipal separate storm sewers, except for those discharges from conveyances which do not require a permit under paragraph (a)(2) of this section or agricultural storm water runoff which is exempted from the definition of point source at § 122.2.

The Director may designate discharges from municipal separate storm sewers on a system-wide or jurisdiction-wide basis. In making this determination the Director may consider the following factors:

(A) The location of the discharge with respect to waters of the United States as defined at 40 CFR 122.2.

(B) The size of the discharge;

(C) The quantity and nature of the pollutants discharged to waters of the United States; and

(D) Other relevant factors.

(2) The Director may not require a permit for discharges of storm water runoff from the following:

(i) Mining operations composed entirely of flows which are from conveyances or systems of conveyances (including but not limited to pipes, conduits, ditches, and channels) used for collecting and conveying precipitation runoff and which are not contaminated by contact with or that have not come into contact with, any overburden, raw material, intermediate products, finished product, byproduct, or waste products located on the site of such operations, except in accordance with paragraph (c)(1)(iv) of this section.

(ii) All field activities or operations associated with oil and gas exploration, production, processing, or treatment operations or transmission facilities, including activities necessary to prepare a site for drilling and for the movement and placement of drilling equipment, whether or not such field activities or operations may be considered to be construction activities, except in accordance with paragraph (c)(1)(iii) of this section. Discharges of sediment from construction activities associated with oil and gas exploration, production, processing, or treatment operations or transmission facilities are not subject to the provisions of paragraph (c)(1)(iii)(C) of this section.

NOTE TO PARAGRAPH (a)(2)(ii): EPA encourages operators of oil and gas field activities or operations to implement and maintain Best Management Practices (BMPs) to minimize discharges of pollutants, including sediment, in storm water both during and after construction activities to help ensure protection of surface water quality during storm events. Appropriate controls would be those suitable to the site conditions and consistent with generally accepted engineering design criteria and manufacturer specifications. Selection of BMPs could also be affected by seasonal or climate conditions.

(3) *Large and medium municipal separate storm sewer systems.* (i) Permits must be obtained for all discharges from large and medium municipal separate storm sewer systems.

(ii) The Director may either issue one system-wide permit covering all discharges from municipal separate storm sewers within a large or medium municipal storm sewer system or issue distinct permits for appropriate categories of discharges within a large or medium municipal separate storm sewer system including, but not limited to: all discharges owned or operated by the same municipality; located within the same jurisdiction; all discharges within a system that discharge to the same watershed; discharges

within a system that are similar in nature; or for individual discharges from municipal separate storm sewers within the system.

(iii) The operator of a discharge from a municipal separate storm sewer which is part of a large or medium municipal separate storm sewer system must either:

(A) Participate in a permit application (to be a permittee or a co-permittee) with one or more other operators of discharges from the large or medium municipal storm sewer system which covers all, or a portion of all, discharges from the municipal separate storm sewer system;

(B) Submit a distinct permit application which only covers discharges from the municipal separate storm sewers for which the operator is responsible; or

(C) A regional authority may be responsible for submitting a permit application under the following guidelines:

(*1*) The regional authority together with co-applicants shall have authority over a storm water management program that is in existence, or shall be in existence at the time part 1 of the application is due;

(*2*) The permit applicant or co-applicants shall establish their ability to make a timely submission of part 1 and part 2 of the municipal application;

(*3*) Each of the operators of municipal separate storm sewers within the systems described in paragraphs (b)(4) (i), (ii), and (iii) or (b)(7) (i), (ii), and (iii) of this section, that are under the purview of the designated regional authority, shall comply with the application requirements of paragraph (d) of this section.

(iv) One permit application may be submitted for all or a portion of all municipal separate storm sewers within adjacent or interconnected large or medium municipal separate storm sewer systems. The Director may issue one system-wide permit covering all, or a portion of all municipal separate storm sewers in adjacent or interconnected large or medium municipal separate storm sewer systems.

(v) Permits for all or a portion of all discharges from large or medium municipal separate storm sewer systems that are issued on a system-wide, jurisdiction-wide, watershed or other basis may specify different conditions relating to different discharges covered by the permit, including different management programs for different drainage areas which contribute storm water to the system.

(vi) Co-permittees need only comply with permit conditions relating to discharges from the municipal separate storm sewers for which they are operators.

(4) *Discharges through large and medium municipal separate storm sewer systems.* In addition to meeting the requirements of paragraph (c) of this section, an operator of a storm water discharge associated with industrial activity which discharges through a large or medium municipal separate storm sewer system shall submit, to the operator of the municipal separate storm sewer system receiving the discharge no later than May 15, 1991, or 180 days prior to commencing such discharge: the name of the facility; a contact person and phone number; the location of the discharge; a description, including Standard Industrial Classification, which best reflects the principal products or services provided by each facility; and any existing NPDES permit number.

(5) *Other municipal separate storm sewers.* The Director may issue permits for municipal separate storm sewers that are designated under paragraph (a)(1)(v) of this section on a system-wide basis, jurisdiction-wide basis, watershed basis or other appropriate basis, or may issue permits for individual discharges.

(6) *Non-municipal separate storm sewers.* For storm water discharges associated with industrial activity from point sources which discharge through a non-municipal or non-publicly owned separate storm sewer system, the Director, in his discretion, may issue: a single NPDES permit, with each discharger a co-permittee to a permit issued to the operator of the portion of the system that discharges into waters of the United States; or, individual permits to each discharger of storm water associated with industrial activity through the non-municipal conveyance system.

(i) All storm water discharges associated with industrial activity that discharge through a storm water discharge system that is not a municipal separate storm sewer must be covered by an individual permit, or a permit issued to the operator of the portion of the system that discharges to waters of the United States, with each discharger to the non-municipal conveyance a co-permittee to that permit.

(ii) Where there is more than one operator of a single system of such conveyances, all operators of storm water discharges associated with industrial activity must submit applications.

(iii) Any permit covering more than one operator shall identify the effluent limitations, or other permit conditions, if any, that apply to each operator.

(7) *Combined sewer systems.* Conveyances that discharge storm water runoff combined with municipal sewage are point sources that must obtain NPDES permits in accordance with the procedures of §122.21 and are not subject to the provisions of this section.

(8) Whether a discharge from a municipal separate storm sewer is or is not subject to regulation under this section shall have no bearing on whether the owner or operator of the discharge is eligible for funding under title II, title III or title VI of the Clean Water Act. *See* 40 CFR part 35, subpart I, appendix A(b)H.2.j.

(9)(i) On and after October 1, 1994, for discharges composed entirely of storm water, that are not required by paragraph (a)(1) of this section to obtain a permit, operators shall be required to obtain a NPDES permit only if:

(A) The discharge is from a small MS4 required to be regulated pursuant to §122.32;

(B) The discharge is a storm water discharge associated with small construction activity pursuant to paragraph (b)(15) of this section;

(C) The Director, or in States with approved NPDES programs either the Director or the EPA Regional Administrator, determines that storm water controls are needed for the discharge based on wasteload allocations that are part of ''total maximum daily loads'' (TMDLs) that address the pollutant(s) of concern; or

(D) The Director, or in States with approved NPDES programs either the Director or the EPA Regional Administrator, determines that the discharge, or category of discharges within a geographic area, contributes to a violation of a water quality standard or is a significant contributor of pollutants to waters of the United States.

(ii) Operators of small MS4s designated pursuant to paragraphs (a)(9)(i)(A), (a)(9)(i)(C), and (a)(9)(i)(D) of this section shall seek coverage under an NPDES permit in accordance with §§122.33 through 122.35. Operators of non-municipal sources designated pursuant to paragraphs (a)(9)(i)(B), (a)(9)(i)(C), and (a)(9)(i)(D) of this section shall seek coverage under an NPDES permit in accordance with paragraph (c)(1) of this section.

(iii) Operators of storm water discharges designated pursuant to paragraphs (a)(9)(i)(C) and (a)(9)(i)(D) of this section shall apply to the Director for a permit within 180 days of receipt of notice, unless permission for a later date is granted by the Director (see §124.52(c) of this chapter).

(b) *Definitions.* (1) *Co-permittee* means a permittee to a NPDES permit that is only responsible for permit conditions relating to the discharge for which it is operator.

(2) *Illicit discharge* means any discharge to a municipal separate storm sewer that is not composed entirely of storm water except discharges pursuant to a NPDES permit (other than the NPDES permit for discharges from the municipal separate storm sewer) and discharges resulting from fire fighting activities.

(3) *Incorporated place* means the District of Columbia, or a city, town, township, or village that is incorporated under the laws of the State in which it is located.

(4) *Large municipal separate storm sewer system* means all municipal separate storm sewers that are either:

(i) Located in an incorporated place with a population of 250,000 or more as determined by the 1990 Decennial Census by the Bureau of the Census (Appendix F of this part); or

(ii) Located in the counties listed in appendix H, except municipal separate

storm sewers that are located in the incorporated places, townships or towns within such counties; or

(iii) Owned or operated by a municipality other than those described in paragraph (b)(4) (i) or (ii) of this section and that are designated by the Director as part of the large or medium municipal separate storm sewer system due to the interrelationship between the discharges of the designated storm sewer and the discharges from municipal separate storm sewers described under paragraph (b)(4) (i) or (ii) of this section. In making this determination the Director may consider the following factors:

(A) Physical interconnections between the municipal separate storm sewers;

(B) The location of discharges from the designated municipal separate storm sewer relative to discharges from municipal separate storm sewers described in paragraph (b)(4)(i) of this section;

(C) The quantity and nature of pollutants discharged to waters of the United States;

(D) The nature of the receiving waters; and

(E) Other relevant factors; or

(iv) The Director may, upon petition, designate as a large municipal separate storm sewer system, municipal separate storm sewers located within the boundaries of a region defined by a storm water management regional authority based on a jurisdictional, watershed, or other appropriate basis that includes one or more of the systems described in paragraph (b)(4) (i), (ii), (iii) of this section.

(5) *Major municipal separate storm sewer outfall* (or ''major outfall'') means a municipal separate storm sewer outfall that discharges from a single pipe with an inside diameter of 36 inches or more or its equivalent (discharge from a single conveyance other than circular pipe which is associated with a drainage area of more than 50 acres); or for municipal separate storm sewers that receive storm water from lands zoned for industrial activity (based on comprehensive zoning plans or the equivalent), an outfall that discharges from a single pipe with an inside diameter of 12 inches or more or from its equivalent (discharge from other than a circular pipe associated with a drainage area of 2 acres or more).

(6) *Major outfall* means a major municipal separate storm sewer outfall.

(7) *Medium municipal separate storm sewer system* means all municipal separate storm sewers that are either:

(i) Located in an incorporated place with a population of 100,000 or more but less than 250,000, as determined by the 1990 Decennial Census by the Bureau of the Census (Appendix G of this part); or

(ii) Located in the counties listed in appendix I, except municipal separate storm sewers that are located in the incorporated places, townships or towns within such counties; or

(iii) Owned or operated by a municipality other than those described in paragraph (b)(7) (i) or (ii) of this section and that are designated by the Director as part of the large or medium municipal separate storm sewer system due to the interrelationship between the discharges of the designated storm sewer and the discharges from municipal separate storm sewers described under paragraph (b)(7) (i) or (ii) of this section. In making this determination the Director may consider the following factors:

(A) Physical interconnections between the municipal separate storm sewers;

(B) The location of discharges from the designated municipal separate storm sewer relative to discharges from municipal separate storm sewers described in paragraph (b)(7)(i) of this section;

(C) The quantity and nature of pollutants discharged to waters of the United States;

(D) The nature of the receiving waters; or

(E) Other relevant factors; or

(iv) The Director may, upon petition, designate as a medium municipal separate storm sewer system, municipal separate storm sewers located within the boundaries of a region defined by a storm water management regional authority based on a jurisdictional, watershed, or other appropriate basis that includes one or more of the systems described in paragraphs (b)(7) (i), (ii), (iii) of this section.

(8) *Municipal separate storm sewer* means a conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, manmade channels, or storm drains):

(i) Owned or operated by a State, city, town, borough, county, parish, district, association, or other public body (created by or pursuant to State law) having jurisdiction over disposal of sewage, industrial wastes, storm water, or other wastes, including special districts under State law such as a sewer district, flood control district or drainage district, or similar entity, or an Indian tribe or an authorized Indian tribal organization, or a designated and approved management agency under section 208 of the CWA that discharges to waters of the United States;

(ii) Designed or used for collecting or conveying storm water;

(iii) Which is not a combined sewer; and

(iv) Which is not part of a Publicly Owned Treatment Works (POTW) as defined at 40 CFR 122.2.

(9) *Outfall* means a *point source* as defined by 40 CFR 122.2 at the point where a municipal separate storm sewer discharges to waters of the United States and does not include open conveyances connecting two municipal separate storm sewers, or pipes, tunnels or other conveyances which connect segments of the same stream or other waters of the United States and are used to convey waters of the United States.

(10) *Overburden* means any material of any nature, consolidated or unconsolidated, that overlies a mineral deposit, excluding topsoil or similar naturally-occurring surface materials that are not disturbed by mining operations.

(11) *Runoff coefficient* means the fraction of total rainfall that will appear at a conveyance as runoff.

(12) *Significant materials* includes, but is not limited to: raw materials; fuels; materials such as solvents, detergents, and plastic pellets; finished materials such as metallic products; raw materials used in food processing or production; hazardous substances designated under section 101(14) of CERCLA; any chemical the facility is required to report pursuant to section 313 of title III of SARA; fertilizers; pesticides; and waste products such as ashes, slag and sludge that have the potential to be released with storm water discharges.

(13) *Storm water* means storm water runoff, snow melt runoff, and surface runoff and drainage.

(14) *Storm water discharge associated with industrial activity* means the discharge from any conveyance that is used for collecting and conveying storm water and that is directly related to manufacturing, processing or raw materials storage areas at an industrial plant. The term does not include discharges from facilities or activities excluded from the NPDES program under this part 122. For the categories of industries identified in this section, the term includes, but is not limited to, storm water discharges from industrial plant yards; immediate access roads and rail lines used or traveled by carriers of raw materials, manufactured products, waste material, or by-products used or created by the facility; material handling sites; refuse sites; sites used for the application or disposal of process waste waters (as defined at part 401 of this chapter); sites used for the storage and maintenance of material handling equipment; sites used for residual treatment, storage, or disposal; shipping and receiving areas; manufacturing buildings; storage areas (including tank farms) for raw materials, and intermediate and final products; and areas where industrial activity has taken place in the past and significant materials remain and are exposed to storm water. For the purposes of this paragraph, material handling activities include storage, loading and unloading, transportation, or conveyance of any raw material, intermediate product, final product, by-product or waste product. The term excludes areas located on plant lands separate from the plant's industrial activities, such as office buildings and accompanying parking lots as long as the drainage from the excluded areas is not mixed with storm water drained from the above described areas. Industrial facilities (including industrial facilities that are federally, State, or municipally owned or operated that meet the description of the facilities listed in paragraphs (b)(14)(i) through (xi) of this

section) include those facilities designated under the provisions of paragraph (a)(1)(v) of this section. The following categories of facilities are considered to be engaging in ''industrial activity'' for purposes of paragraph (b)(14):

(i) Facilities subject to storm water effluent limitations guidelines, new source performance standards, or toxic pollutant effluent standards under 40 CFR subchapter N (except facilities with toxic pollutant effluent standards which are exempted under category (xi) in paragraph (b)(14) of this section);

(ii) Facilities classified as Standard Industrial Classifications 24 (except 2434), 26 (except 265 and 267), 28 (except 283), 29, 311, 32 (except 323), 33, 3441, 373;

(iii) Facilities classified as Standard Industrial Classifications 10 through 14 (mineral industry) including active or inactive mining operations (except for areas of coal mining operations no longer meeting the definition of a reclamation area under 40 CFR 434.11(1) because the performance bond issued to the facility by the appropriate SMCRA authority has been released, or except for areas of non-coal mining operations which have been released from applicable State or Federal reclamation requirements after December 17, 1990) and oil and gas exploration, production, processing, or treatment operations, or transmission facilities that discharge storm water contaminated by contact with or that has come into contact with, any overburden, raw material, intermediate products, finished products, byproducts or waste products located on the site of such operations; (inactive mining operations are mining sites that are not being actively mined, but which have an identifiable owner/operator; inactive mining sites do not include sites where mining claims are being maintained prior to disturbances associated with the extraction, beneficiation, or processing of mined materials, nor sites where minimal activities are undertaken for the sole purpose of maintaining a mining claim);

(iv) Hazardous waste treatment, storage, or disposal facilities, including those that are operating under interim status or a permit under subtitle C of RCRA;

(v) Landfills, land application sites, and open dumps that receive or have received any industrial wastes (waste that is received from any of the facilities described under this subsection) including those that are subject to regulation under subtitle D of RCRA;

(vi) Facilities involved in the recycling of materials, including metal scrapyards, battery reclaimers, salvage yards, and automobile junkyards, including but limited to those classified as Standard Industrial Classification 5015 and 5093;

(vii) Steam electric power generating facilities, including coal handling sites;

(viii) Transportation facilities classified as Standard Industrial Classifications 40, 41, 42 (except 4221–25), 43, 44, 45, and 5171 which have vehicle maintenance shops, equipment cleaning operations, or airport deicing operations. Only those portions of the facility that are either involved in vehicle maintenance (including vehicle rehabilitation, mechanical repairs, painting, fueling, and lubrication), equipment cleaning operations, airport deicing operations, or which are otherwise identified under paragraphs (b)(14) (i)–(vii) or (ix)–(xi) of this section are associated with industrial activity;

(ix) Treatment works treating domestic sewage or any other sewage sludge or wastewater treatment device or system, used in the storage treatment, recycling, and reclamation of municipal or domestic sewage, including land dedicated to the disposal of sewage sludge that are located within the confines of the facility, with a design flow of 1.0 mgd or more, or required to have an approved pretreatment program under 40 CFR part 403. Not included are farm lands, domestic gardens or lands used for sludge management where sludge is beneficially reused and which are not physically located in the confines of the facility, or areas that are in compliance with section 405 of the CWA;

(x) Construction activity including clearing, grading and excavation, except operations that result in the disturbance of less than five acres of total land area. Construction activity also includes the disturbance of less than five acres of total land area that is a

part of a larger common plan of development or sale if the larger common plan will ultimately disturb five acres or more;

(xi) Facilities under Standard Industrial Classifications 20, 21, 22, 23, 2434, 25, 265, 267, 27, 283, 285, 30, 31 (except 311), 323, 34 (except 3441), 35, 36, 37 (except 373), 38, 39, and 4221–25;

(15) *Storm water discharge associated with small construction activity* means the discharge of storm water from:

(i) Construction activities including clearing, grading, and excavating that result in land disturbance of equal to or greater than one acre and less than five acres. Small construction activity also includes the disturbance of less than one acre of total land area that is part of a larger common plan of development or sale if the larger common plan will ultimately disturb equal to or greater than one and less than five acres. Small construction activity does not include routine maintenance that is performed to maintain the original line and grade, hydraulic capacity, or original purpose of the facility. The Director may waive the otherwise applicable requirements in a general permit for a storm water discharge from construction activities that disturb less than five acres where:

(A) The value of the rainfall erosivity factor (''R'' in the Revised Universal Soil Loss Equation) is less than five during the period of construction activity. The rainfall erosivity factor is determined in accordance with Chapter 2 of *Agriculture Handbook Number 703, Predicting Soil Erosion by Water: A Guide to Conservation Planning With the Revised Universal Soil Loss Equation (RUSLE)*, pages 21–64, dated January 1997. The Director of the Federal Register approves this incorporation by reference in accordance with 5 U.S.C 552(a) and 1 CFR part 51. Copies may be obtained from EPA's Water Resource Center, Mail Code RC4100, 401 M St. SW, Washington, DC 20460. A copy is also available for inspection at the U.S. EPA Water Docket , 401 M Street SW, Washington, DC 20460, or at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, call 202–741–6030, or go to: *http://www.archives.gov/federal_register/code_of_federal_regulations/ibr_locations.html*. An operator must certify to the Director that the construction activity will take place during a period when the value of the rainfall erosivity factor is less than five; or

(B) Storm water controls are not needed based on a ''total maximum daily load'' (TMDL) approved or established by EPA that addresses the pollutant(s) of concern or, for non-impaired waters that do not require TMDLs, an equivalent analysis that determines allocations for small construction sites for the pollutant(s) of concern or that determines that such allocations are not needed to protect water quality based on consideration of existing in-stream concentrations, expected growth in pollutant contributions from all sources, and a margin of safety. For the purpose of this paragraph, the pollutant(s) of concern include sediment or a parameter that addresses sediment (such as total suspended solids, turbidity or siltation) and any other pollutant that has been identified as a cause of impairment of any water body that will receive a discharge from the construction activity. The operator must certify to the Director that the construction activity will take place, and storm water discharges will occur, within the drainage area addressed by the TMDL or equivalent analysis.

(ii) Any other construction activity designated by the Director, or in States with approved NPDES programs either the Director or the EPA Regional Administrator, based on the potential for contribution to a violation of a water quality standard or for significant contribution of pollutants to waters of the United States.

EXHIBIT 1 TO § 122.26(B)(15)—SUMMARY OF COVERAGE OF ''STORM WATER DISCHARGES ASSOCIATED WITH SMALL CONSTRUCTION ACTIVITY'' UNDER THE NPDES STORM WATER PROGRAM

Automatic Designation: Required Nationwide Coverage.	• Construction activities that result in a land disturbance of equal to or greater than one acre and less than five acres.

EXHIBIT 1 TO § 122.26(B)(15)—SUMMARY OF COVERAGE OF ''STORM WATER DISCHARGES ASSOCIATED WITH SMALL CONSTRUCTION ACTIVITY'' UNDER THE NPDES STORM WATER PROGRAM—Continued

	• Construction activities disturbing less than one acre if part of a larger common plan of development or sale with a planned disturbance of equal to or greater than one acre and less than five acres. (see § 122.26(b)(15)(i).)
Potential Designation: Optional Evaluation and Designation by the NPDES Permitting Authority or EPA Regional Administrator.	• Construction activities that result in a land disturbance of less than one acre based on the potential for contribution to a violation of a water quality standard or for significant contribution of pollutants. (see § 122.26(b)(15)(ii).)
Potential Waiver: Waiver from Requirements as Determined by the NPDES Permitting Authority..	Any automatically designated construction activity where the operator certifies: (1) A rainfall erosivity factor of less than five, or (2) That the activity will occur within an area where controls are not needed based on a TMDL or, for non-impaired waters that do not require a TMDL, an equivalent analysis for the pollutant(s) of concern. (see § 122.26(b)(15)(i).)

(16) *Small municipal separate storm sewer system* means all separate storm sewers that are:

(i) Owned or operated by the United States, a State, city, town, borough, county, parish, district, association, or other public body (created by or pursuant to State law) having jurisdiction over disposal of sewage, industrial wastes, storm water, or other wastes, including special districts under State law such as a sewer district, flood control district or drainage district, or similar entity, or an Indian tribe or an authorized Indian tribal organization, or a designated and approved management agency under section 208 of the CWA that discharges to waters of the United States.

(ii) Not defined as ''large'' or ''medium'' municipal separate storm sewer systems pursuant to paragraphs (b)(4) and (b)(7) of this section, or designated under paragraph (a)(1)(v) of this section.

(iii) This term includes systems similar to separate storm sewer systems in municipalities, such as systems at military bases, large hospital or prison complexes, and highways and other thoroughfares. The term does not include separate storm sewers in very discrete areas, such as individual buildings.

(17) *Small MS4* means a small municipal separate storm sewer system.

(18) *Municipal separate storm sewer system* means all separate storm sewers that are defined as ''large'' or ''medium'' or ''small'' municipal separate storm sewer systems pursuant to paragraphs (b)(4), (b)(7), and (b)(16) of this section, or designated under paragraph (a)(1)(v) of this section.

(19) *MS4* means a municipal separate storm sewer system.

(20) *Uncontrolled sanitary landfill* means a landill or open dump, whether in operation or closed, that does not meet the requirements for runon or runoff controls established pursuant to subtitle D of the Solid Waste Disposal Act.

(c) *Application requirements for storm water discharges associated with industrial activity and storm water discharges associated with small construction activity*—(1) *Individual application.* Dischargers of storm water associated with industrial activity and with small construction activity are required to apply for an individual permit or seek coverage under a promulgated storm water general permit. Facilities that are required to obtain an individual permit or any dischage of storm water which the Director is evaluating for designation (see § 124.52(c) of this chapter) under paragraph (a)(1)(v) of this section and is not a municipal storm sewer, shall submit an NPDES application in accordance with the requirements of § 122.21 as modified and supplemented by the provisions of this paragraph.

(i) Except as provided in § 122.26(c)(1)(ii)–(iv), the operator of a storm water discharge associated with industrial activity subject to this section shall provide:

(A) A site map showing topography (or indicating the outline of drainage areas served by the outfall(s) covered in the application if a topographic map is unavailable) of the facility including: each of its drainage and discharge structures; the drainage area of each storm water outfall; paved areas and buildings within the drainage area of each storm water outfall, each past or present area used for outdoor storage or disposal of significant materials, each existing structural control measure to reduce pollutants in storm water runoff, materials loading and access areas, areas where pesticides, herbicides, soil conditioners and fertilizers are applied, each of its hazardous waste treatment, storage or disposal facilities (including each area not required to have a RCRA permit which is used for accumulating hazardous waste under 40 CFR 262.34); each well where fluids from the facility are injected underground; springs, and other surface water bodies which receive storm water discharges from the facility;

(B) An estimate of the area of impervious surfaces (including paved areas and building roofs) and the total area drained by each outfall (within a mile radius of the facility) and a narrative description of the following: Significant materials that in the three years prior to the submittal of this application have been treated, stored or disposed in a manner to allow exposure to storm water; method of treatment, storage or disposal of such materials; materials management practices employed, in the three years prior to the submittal of this application, to minimize contact by these materials with storm water runoff; materials loading and access areas; the location, manner and frequency in which pesticides, herbicides, soil conditioners and fertilizers are applied; the location and a description of existing structural and nonstructural control measures to reduce pollutants in storm water runoff; and a description of the treatment the storm water receives, including the ultimate disposal of any solid or fluid wastes other than by discharge;

(C) A certification that all outfalls that should contain storm water discharges associated with industrial activity have been tested or evaluated for the presence of non-storm water discharges which are not covered by a NPDES permit; tests for such non-storm water discharges may include smoke tests, fluorometric dye tests, analysis of accurate schematics, as well as other appropriate tests. The certification shall include a description of the method used, the date of any testing, and the on-site drainage points that were directly observed during a test;

(D) Existing information regarding significant leaks or spills of toxic or hazardous pollutants at the facility that have taken place within the three years prior to the submittal of this application;

(E) Quantitative data based on samples collected during storm events and collected in accordance with § 122.21 of this part from all outfalls containing a storm water discharge associated with industrial activity for the following parameters:

(*1*) Any pollutant limited in an effluent guideline to which the facility is subject;

(*2*) Any pollutant listed in the facility's NPDES permit for its process wastewater (if the facility is operating under an existing NPDES permit);

(*3*) Oil and grease, pH, BOD5, COD, TSS, total phosphorus, total Kjeldahl nitrogen, and nitrate plus nitrite nitrogen;

(*4*) Any information on the discharge required under § 122.21(g)(7)(vi) and (vii);

(*5*) Flow measurements or estimates of the flow rate, and the total amount of discharge for the storm event(s) sampled, and the method of flow measurement or estimation; and

(*6*) The date and duration (in hours) of the storm event(s) sampled, rainfall measurements or estimates of the storm event (in inches) which generated the sampled runoff and the duration between the storm event sampled and the end of the previous measurable (greater than 0.1 inch rainfall) storm event (in hours);

(F) Operators of a discharge which is composed entirely of storm water are exempt from the requirements of § 122.21 (g)(2), (g)(3), (g)(4), (g)(5), (g)(7)(iii), (g)(7)(iv), (g)(7)(v), and (g)(7)(viii); and

(G) Operators of new sources or new discharges (as defined in § 122.2 of this part) which are composed in part or entirely of storm water must include estimates for the pollutants or parameters listed in paragraph (c)(1)(i)(E) of this section instead of actual sampling data, along with the source of each estimate. Operators of new sources or new discharges composed in part or entirely of storm water must provide quantitative data for the parameters listed in paragraph (c)(1)(i)(E) of this section within two years after commencement of discharge, unless such data has already been reported under the monitoring requirements of the NPDES permit for the discharge. Operators of a new source or new discharge which is composed entirely of storm water are exempt from the requirements of § 122.21 (k)(3)(ii), (k)(3)(iii), and (k)(5).

(ii) An operator of an existing or new storm water discharge that is associated with industrial activity solely under paragraph (b)(14)(x) of this section or is associated with small construction activity solely under paragraph (b)(15) of this section, is exempt from the requirements of § 122.21(g) and paragraph (c)(1)(i) of this section. Such operator shall provide a narrative description of:

(A) The location (including a map) and the nature of the construction activity;

(B) The total area of the site and the area of the site that is expected to undergo excavation during the life of the permit;

(C) Proposed measures, including best management practices, to control pollutants in storm water discharges during construction, including a brief description of applicable State and local erosion and sediment control requirements;

(D) Proposed measures to control pollutants in storm water discharges that will occur after construction operations have been completed, including a brief description of applicable State or local erosion and sediment control requirements;

(E) An estimate of the runoff coefficient of the site and the increase in impervious area after the construction addressed in the permit application is completed, the nature of fill material and existing data describing the soil or the quality of the discharge; and

(F) The name of the receiving water.

(iii) The operator of an existing or new discharge composed entirely of storm water from an oil or gas exploration, production, processing, or treatment operation, or transmission facility is not required to submit a permit application in accordance with paragraph (c)(1)(i) of this section, unless the facility:

(A) Has had a discharge of storm water resulting in the discharge of a reportable quantity for which notification is or was required pursuant to 40 CFR 117.21 or 40 CFR 302.6 at anytime since November 16, 1987; or

(B) Has had a discharge of storm water resulting in the discharge of a reportable quantity for which notification is or was required pursuant to 40 CFR 110.6 at any time since November 16, 1987; or

(C) Contributes to a violation of a water quality standard.

(iv) The operator of an existing or new discharge composed entirely of storm water from a mining operation is not required to submit a permit application unless the discharge has come into contact with, any overburden, raw material, intermediate products, finished product, byproduct or waste products located on the site of such operations.

(v) Applicants shall provide such other information the Director may reasonably require under § 122.21(g)(13) of this part to determine whether to issue a permit and may require any facility subject to paragraph (c)(1)(ii) of this section to comply with paragraph (c)(1)(i) of this section.

(2) [Reserved]

(d) *Application requirements for large and medium municipal separate storm sewer discharges*. The operator of a discharge from a large or medium municipal separate storm sewer or a municipal separate storm sewer that is designated by the Director under paragraph (a)(1)(v) of this section, may submit a jurisdiction-wide or system-wide permit application. Where more than one public entity owns or operates a municipal separate storm sewer within a geographic area (including adjacent

or interconnected municipal separate storm sewer systems), such operators may be a coapplicant to the same application. Permit applications for discharges from large and medium municipal storm sewers or municipal storm sewers designated under paragraph (a)(1)(v) of this section shall include;

(1) *Part 1.* Part 1 of the application shall consist of;

(i) *General information.* The applicants' name, address, telephone number of contact person, ownership status and status as a State or local government entity.

(ii) *Legal authority.* A description of existing legal authority to control discharges to the municipal separate storm sewer system. When existing legal authority is not sufficient to meet the criteria provided in paragraph (d)(2)(i) of this section, the description shall list additional authorities as will be necessary to meet the criteria and shall include a schedule and commitment to seek such additional authority that will be needed to meet the criteria.

(iii) *Source identification.* (A) A description of the historic use of ordinances, guidance or other controls which limited the discharge of nonstorm water discharges to any Publicly Owned Treatment Works serving the same area as the municipal separate storm sewer system.

(B) A USGS 7.5 minute topographic map (or equivalent topographic map with a scale between 1:10,000 and 1:24,000 if cost effective) extending one mile beyond the service boundaries of the municipal storm sewer system covered by the permit application. The following information shall be provided:

(*1*) The location of known municipal storm sewer system outfalls discharging to waters of the United States;

(*2*) A description of the land use activities (e.g. divisions indicating undeveloped, residential, commercial, agricultural and industrial uses) accompanied with estimates of population densities and projected growth for a ten year period within the drainage area served by the separate storm sewer. For each land use type, an estimate of an average runoff coefficient shall be provided;

(*3*) The location and a description of the activities of the facility of each currently operating or closed municipal landfill or other treatment, storage or disposal facility for municipal waste;

(*4*) The location and the permit number of any known discharge to the municipal storm sewer that has been issued a NPDES permit;

(*5*) The location of major structural controls for storm water discharge (retention basins, detention basins, major infiltration devices, etc.); and

(*6*) The identification of publicly owned parks, recreational areas, and other open lands.

(iv) *Discharge characterization.* (A) Monthly mean rain and snow fall estimates (or summary of weather bureau data) and the monthly average number of storm events.

(B) Existing quantitative data describing the volume and quality of discharges from the municipal storm sewer, including a description of the outfalls sampled, sampling procedures and analytical methods used.

(C) A list of water bodies that receive discharges from the municipal separate storm sewer system, including downstream segments, lakes and estuaries, where pollutants from the system discharges may accumulate and cause water degradation and a brief description of known water quality impacts. At a minimum, the description of impacts shall include a description of whether the water bodies receiving such discharges have been:

(*1*) Assessed and reported in section 305(b) reports submitted by the State, the basis for the assessment (evaluated or monitored), a summary of designated use support and attainment of Clean Water Act (CWA) goals (fishable and swimmable waters), and causes of nonsupport of designated uses;

(*2*) Listed under section 304(l)(1)(A)(i), section 304(l)(1)(A)(ii), or section 304(l)(1)(B) of the CWA that is not expected to meet water quality standards or water quality goals;

(*3*) Listed in State Nonpoint Source Assessments required by section 319(a) of the CWA that, without additional action to control nonpoint sources of pollution, cannot reasonably be expected to attain or maintain water

quality standards due to storm sewers, construction, highway maintenance and runoff from municipal landfills and municipal sludge adding significant pollution (or contributing to a violation of water quality standards);

(*4*) Identified and classified according to eutrophic condition of publicly owned lakes listed in State reports required under section 314(a) of the CWA (include the following: A description of those publicly owned lakes for which uses are known to be impaired; a description of procedures, processes and methods to control the discharge of pollutants from municipal separate storm sewers into such lakes; and a description of methods and procedures to restore the quality of such lakes);

(*5*) Areas of concern of the Great Lakes identified by the International Joint Commission;

(*6*) Designated estuaries under the National Estuary Program under section 320 of the CWA;

(*7*) Recognized by the applicant as highly valued or sensitive waters;

(*8*) Defined by the State or U.S. Fish and Wildlife Services's National Wetlands Inventory as wetlands; and

(*9*) Found to have pollutants in bottom sediments, fish tissue or biosurvey data.

(D) *Field screening*. Results of a field screening analysis for illicit connections and illegal dumping for either selected field screening points or major outfalls covered in the permit application. At a minimum, a screening analysis shall include a narrative description, for either each field screening point or major outfall, of visual observations made during dry weather periods. If any flow is observed, two grab samples shall be collected during a 24 hour period with a minimum period of four hours between samples. For all such samples, a narrative description of the color, odor, turbidity, the presence of an oil sheen or surface scum as well as any other relevant observations regarding the potential presence of non-storm water discharges or illegal dumping shall be provided. In addition, a narrative description of the results of a field analysis using suitable methods to estimate pH, total chlorine, total copper, total phenol, and detergents (or surfactants) shall be provided along with a description of the flow rate. Where the field analysis does not involve analytical methods approved under 40 CFR part 136, the applicant shall provide a description of the method used including the name of the manufacturer of the test method along with the range and accuracy of the test. Field screening points shall be either major outfalls or other outfall points (or any other point of access such as manholes) randomly located throughout the storm sewer system by placing a grid over a drainage system map and identifying those cells of the grid which contain a segment of the storm sewer system or major outfall. The field screening points shall be established using the following guidelines and criteria:

(*1*) A grid system consisting of perpendicular north-south and east-west lines spaced ¼ mile apart shall be overlayed on a map of the municipal storm sewer system, creating a series of cells;

(*2*) All cells that contain a segment of the storm sewer system shall be identified; one field screening point shall be selected in each cell; major outfalls may be used as field screening points;

(*3*) Field screening points should be located downstream of any sources of suspected illegal or illicit activity;

(*4*) Field screening points shall be located to the degree practicable at the farthest manhole or other accessible location downstream in the system, within each cell; however, safety of personnel and accessibility of the location should be considered in making this determination;

(*5*) Hydrological conditions; total drainage area of the site; population density of the site; traffic density; age of the structures or buildings in the area; history of the area; and land use types;

(*6*) For medium municipal separate storm sewer systems, no more than 250 cells need to have identified field screening points; in large municipal separate storm sewer systems, no more than 500 cells need to have identified field screening points; cells established by the grid that contain no storm sewer segments will be eliminated from consideration; if fewer than 250 cells in medium municipal sewers are created,

and fewer than 500 in large systems are created by the overlay on the municipal sewer map, then all those cells which contain a segment of the sewer system shall be subject to field screening (unless access to the separate storm sewer system is impossible); and

(*7*) Large or medium municipal separate storm sewer systems which are unable to utilize the procedures described in paragraphs (d)(1)(iv)(D) (*1*) through (*6*) of this section, because a sufficiently detailed map of the separate storm sewer systems is unavailable, shall field screen no more than 500 or 250 major outfalls respectively (or all major outfalls in the system, if less); in such circumstances, the applicant shall establish a grid system consisting of north-south and east-west lines spaced ¼ mile apart as an overlay to the boundaries of the municipal storm sewer system, thereby creating a series of cells; the applicant will then select major outfalls in as many cells as possible until at least 500 major outfalls (large municipalities) or 250 major outfalls (medium municipalities) are selected; a field screening analysis shall be undertaken at these major outfalls.

(E) *Characterization plan*. Information and a proposed program to meet the requirements of paragraph (d)(2)(iii) of this section. Such description shall include: the location of outfalls or field screening points appropriate for representative data collection under paragraph (d)(2)(iii)(A) of this section, a description of why the outfall or field screening point is representative, the seasons during which sampling is intended, a description of the sampling equipment. The proposed location of outfalls or field screening points for such sampling should reflect water quality concerns (*see* paragraph (d)(1)(iv)(C) of this section) to the extent practicable.

(v) *Management programs*. (A) A description of the existing management programs to control pollutants from the municipal separate storm sewer system. The description shall provide information on existing structural and source controls, including operation and maintenance measures for structural controls, that are currently being implemented. Such controls may include, but are not limited to: Procedures to control pollution resulting from construction activities; floodplain management controls; wetland protection measures; best management practices for new subdivisions; and emergency spill response programs. The description may address controls established under State law as well as local requirements.

(B) A description of the existing program to identify illicit connections to the municipal storm sewer system. The description should include inspection procedures and methods for detecting and preventing illicit discharges, and describe areas where this program has been implemented.

(vi) *Fiscal resources*. (A) A description of the financial resources currently available to the municipality to complete part 2 of the permit application. A description of the municipality's budget for existing storm water programs, including an overview of the municipality's financial resources and budget, including overall indebtedness and assets, and sources of funds for storm water programs.

(2) *Part 2*. Part 2 of the application shall consist of:

(i) *Adequate legal authority*. A demonstration that the applicant can operate pursuant to legal authority established by statute, ordinance or series of contracts which authorizes or enables the applicant at a minimum to:

(A) Control through ordinance, permit, contract, order or similar means, the contribution of pollutants to the municipal storm sewer by storm water discharges associated with industrial activity and the quality of storm water discharged from sites of industrial activity;

(B) Prohibit through ordinance, order or similar means, illicit discharges to the municipal separate storm sewer;

(C) Control through ordinance, order or similar means the discharge to a municipal separate storm sewer of spills, dumping or disposal of materials other than storm water;

(D) Control through interagency agreements among coapplicants the contribution of pollutants from one portion of the municipal system to another portion of the municipal system;

(E) Require compliance with conditions in ordinances, permits, contracts or orders; and

(F) Carry out all inspection, surveillance and monitoring procedures necessary to determine compliance and noncompliance with permit conditions including the prohibition on illicit discharges to the municipal separate storm sewer.

(ii) *Source identification*. The location of any major outfall that discharges to waters of the United States that was not reported under paragraph (d)(1)(iii)(B)(*1*) of this section. Provide an inventory, organized by watershed of the name and address, and a description (such as SIC codes) which best reflects the principal products or services provided by each facility which may discharge, to the municipal separate storm sewer, storm water associated with industrial activity;

(iii) *Characterization data*. When ''quantitative data'' for a pollutant are required under paragraph (d)(2)(iii)(A)(*3*) of this section, the applicant must collect a sample of effluent in accordance with 40 CFR 122.21(g)(7) and analyze it for the pollutant in accordance with analytical methods approved under part 136 of this chapter. When no analytical method is approved the applicant may use any suitable method but must provide a description of the method. The applicant must provide information characterizing the quality and quantity of discharges covered in the permit application, including:

(A) Quantitative data from representative outfalls designated by the Director (based on information received in part 1 of the application, the Director shall designate between five and ten outfalls or field screening points as representative of the commercial, residential and industrial land use activities of the drainage area contributing to the system or, where there are less than five outfalls covered in the application, the Director shall designate all outfalls) developed as follows:

(*1*) For each outfall or field screening point designated under this subparagraph, samples shall be collected of storm water discharges from three storm events occurring at least one month apart in accordance with the requirements at §122.21(g)(7) (the Director may allow exemptions to sampling three storm events when climatic conditions create good cause for such exemptions);

(*2*) A narrative description shall be provided of the date and duration of the storm event(s) sampled, rainfall estimates of the storm event which generated the sampled discharge and the duration between the storm event sampled and the end of the previous measurable (greater than 0.1 inch rainfall) storm event;

(*3*) For samples collected and described under paragraphs (d)(2)(iii)(A)(*1*) and (A)(*2*) of this section, quantitative data shall be provided for: the organic pollutants listed in Table II; the pollutants listed in Table III (toxic metals, cyanide, and total phenols) of appendix D of 40 CFR part 122, and for the following pollutants:

Total suspended solids (TSS)
Total dissolved solids (TDS)
COD
BOD_5
Oil and grease
Fecal coliform
Fecal streptococcus
pH
Total Kjeldahl nitrogen
Nitrate plus nitrite
Dissolved phosphorus
Total ammonia plus organic nitrogen
Total phosphorus

(*4*) Additional limited quantitative data required by the Director for determining permit conditions (the Director may require that quantitative data shall be provided for additional parameters, and may establish sampling conditions such as the location, season of sample collection, form of precipitation (snow melt, rainfall) and other parameters necessary to insure representativeness);

(B) Estimates of the annual pollutant load of the cumulative discharges to waters of the United States from all identified municipal outfalls and the event mean concentration of the cumulative discharges to waters of the United States from all identified municipal outfalls during a storm event (as described under §122.21(c)(7)) for BOD_5, COD, TSS, dissolved solids, total nitrogen, total ammonia plus organic nitrogen, total phosphorus, dissolved phosphorus, cadmium, copper, lead,

and zinc. Estimates shall be accompanied by a description of the procedures for estimating constituent loads and concentrations, including any modelling, data analysis, and calculation methods;

(C) A proposed schedule to provide estimates for each major outfall identified in either paragraph (d)(2)(ii) or (d)(1)(iii)(B)(*1*) of this section of the seasonal pollutant load and of the event mean concentration of a representative storm for any constituent detected in any sample required under paragraph (d)(2)(iii)(A) of this section; and

(D) A proposed monitoring program for representative data collection for the term of the permit that describes the location of outfalls or field screening points to be sampled (or the location of instream stations), why the location is representative, the frequency of sampling, parameters to be sampled, and a description of sampling equipment.

(iv) *Proposed management program.* A proposed management program covers the duration of the permit. It shall include a comprehensive planning process which involves public participation and where necessary intergovernmental coordination, to reduce the discharge of pollutants to the maximum extent practicable using management practices, control techniques and system, design and engineering methods, and such other provisions which are appropriate. The program shall also include a description of staff and equipment available to implement the program. Separate proposed programs may be submitted by each coapplicant. Proposed programs may impose controls on a systemwide basis, a watershed basis, a jurisdiction basis, or on individual outfalls. Proposed programs will be considered by the Director when developing permit conditions to reduce pollutants in discharges to the maximum extent practicable. Proposed management programs shall describe priorities for implementing controls. Such programs shall be based on:

(A) A description of structural and source control measures to reduce pollutants from runoff from commercial and residential areas that are discharged from the municipal storm sewer system that are to be implemented during the life of the permit, accompanied with an estimate of the expected reduction of pollutant loads and a proposed schedule for implementing such controls. At a minimum, the description shall include:

(*1*) A description of maintenance activities and a maintenance schedule for structural controls to reduce pollutants (including floatables) in discharges from municipal separate storm sewers;

(*2*) A description of planning procedures including a comprehensive master plan to develop, implement and enforce controls to reduce the discharge of pollutants from municipal separate storm sewers which receive discharges from areas of new development and significant redevelopment. Such plan shall address controls to reduce pollutants in discharges from municipal separate storm sewers after construction is completed. (Controls to reduce pollutants in discharges from municipal separate storm sewers containing construction site runoff are addressed in paragraph (d)(2)(iv)(D) of this section;

(*3*) A description of practices for operating and maintaining public streets, roads and highways and procedures for reducing the impact on receiving waters of discharges from municipal storm sewer systems, including pollutants discharged as a result of deicing activities;

(*4*) A description of procedures to assure that flood management projects assess the impacts on the water quality of receiving water bodies and that existing structural flood control devices have been evaluated to determine if retrofitting the device to provide additional pollutant removal from storm water is feasible;

(*5*) A description of a program to monitor pollutants in runoff from operating or closed municipal landfills or other treatment, storage or disposal facilities for municipal waste, which shall identify priorities and procedures for inspections and establishing and implementing control measures for such discharges (this program can be coordinated with the program developed under paragraph (d)(2)(iv)(C) of this section); and

(*6*) A description of a program to reduce to the maximum extent practicable, pollutants in discharges from municipal separate storm sewers associated with the application of pesticides, herbicides and fertilizer which will include, as appropriate, controls such as educational activities, permits, certifications and other measures for commercial applicators and distributors, and controls for application in public right-of-ways and at municipal facilities.

(B) A description of a program, including a schedule, to detect and remove (or require the discharger to the municipal separate storm sewer to obtain a separate NPDES permit for) illicit discharges and improper disposal into the storm sewer. The proposed program shall include:

(*1*) A description of a program, including inspections, to implement and enforce an ordinance, orders or similar means to prevent illicit discharges to the municipal separate storm sewer system; this program description shall address all types of illicit discharges, however the following category of non-storm water discharges or flows shall be addressed where such discharges are identified by the municipality as sources of pollutants to waters of the United States: water line flushing, landscape irrigation, diverted stream flows, rising ground waters, uncontaminated ground water infiltration (as defined at 40 CFR 35.2005(20)) to separate storm sewers, uncontaminated pumped ground water, discharges from potable water sources, foundation drains, air conditioning condensation, irrigation water, springs, water from crawl space pumps, footing drains, lawn watering, individual residential car washing, flows from riparian habitats and wetlands, dechlorinated swimming pool discharges, and street wash water (program descriptions shall address discharges or flows from fire fighting only where such discharges or flows are identified as significant sources of pollutants to waters of the United States);

(*2*) A description of procedures to conduct on-going field screening activities during the life of the permit, including areas or locations that will be evaluated by such field screens;

(*3*) A description of procedures to be followed to investigate portions of the separate storm sewer system that, based on the results of the field screen, or other appropriate information, indicate a reasonable potential of containing illicit discharges or other sources of non-storm water (such procedures may include: sampling procedures for constituents such as fecal coliform, fecal streptococcus, surfactants (MBAS), residual chlorine, fluorides and potassium; testing with fluorometric dyes; or conducting in storm sewer inspections where safety and other considerations allow. Such description shall include the location of storm sewers that have been identified for such evaluation);

(*4*) A description of procedures to prevent, contain, and respond to spills that may discharge into the municipal separate storm sewer;

(*5*) A description of a program to promote, publicize, and facilitate public reporting of the presence of illicit discharges or water quality impacts associated with discharges from municipal separate storm sewers;

(*6*) A description of educational activities, public information activities, and other appropriate activities to facilitate the proper management and disposal of used oil and toxic materials; and

(*7*) A description of controls to limit infiltration of seepage from municipal sanitary sewers to municipal separate storm sewer systems where necessary;

(C) A description of a program to monitor and control pollutants in storm water discharges to municipal systems from municipal landfills, hazardous waste treatment, disposal and recovery facilities, industrial facilities that are subject to section 313 of title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA), and industrial facilities that the municipal permit applicant determines are contributing a substantial pollutant loading to the municipal storm sewer system. The program shall:

(*1*) Identify priorities and procedures for inspections and establishing and implementing control measures for such discharges;

(*2*) Describe a monitoring program for storm water discharges associated

with the industrial facilities identified in paragraph (d)(2)(iv)(C) of this section, to be implemented during the term of the permit, including the submission of quantitative data on the following constituents: any pollutants limited in effluent guidelines subcategories, where applicable; any pollutant listed in an existing NPDES permit for a facility; oil and grease, COD, pH, BOD_5, TSS, total phosphorus, total Kjeldahl nitrogen, nitrate plus nitrite nitrogen, and any information on discharges required under §122.21(g)(7) (vi) and (vii).

(D) A description of a program to implement and maintain structural and non-structural best management practices to reduce pollutants in storm water runoff from construction sites to the municipal storm sewer system, which shall include:

(*1*) A description of procedures for site planning which incorporate consideration of potential water quality impacts;

(*2*) A description of requirements for nonstructural and structural best management practices;

(*3*) A description of procedures for identifying priorities for inspecting sites and enforcing control measures which consider the nature of the construction activity, topography, and the characteristics of soils and receiving water quality; and

(*4*) A description of appropriate educational and training measures for construction site operators.

(v) *Assessment of controls*. Estimated reductions in loadings of pollutants from discharges of municipal storm sewer constituents from municipal storm sewer systems expected as the result of the municipal storm water quality management program. The assessment shall also identify known impacts of storm water controls on ground water.

(vi) *Fiscal analysis*. For each fiscal year to be covered by the permit, a fiscal analysis of the necessary capital and operation and maintenance expenditures necessary to accomplish the activities of the programs under paragraphs (d)(2) (iii) and (iv) of this section. Such analysis shall include a description of the source of funds that are proposed to meet the necessary expenditures, including legal restrictions on the use of such funds.

(vii) Where more than one legal entity submits an application, the application shall contain a description of the roles and responsibilities of each legal entity and procedures to ensure effective coordination.

(viii) Where requirements under paragraph (d)(1)(iv)(E), (d)(2)(ii), (d)(2)(iii)(B) and (d)(2)(iv) of this section are not practicable or are not applicable, the Director may exclude any operator of a discharge from a municipal separate storm sewer which is designated under paragraph (a)(1)(v), (b)(4)(ii) or (b)(7)(ii) of this section from such requirements. The Director shall not exclude the operator of a discharge from a municipal separate storm sewer identified in appendix F, G, H or I of part 122, from any of the permit application requirements under this paragraph except where authorized under this section.

(e) *Application deadlines*. Any operator of a point source required to obtain a permit under this section that does not have an effective NPDES permit authorizing discharges from its storm water outfalls shall submit an application in accordance with the following deadlines:

(1) *Storm water discharges associated with industrial activity*. (i) Except as provided in paragraph (e)(1)(ii) of this section, for any storm water discharge associated with industrial activity identified in paragraphs (b)(14)(i) through (xi) of this section, that is not part of a group application as described in paragraph (c)(2) of this section or that is not authorized by a storm water general permit, a permit application made pursuant to paragraph (c) of this section must be submitted to the Director by October 1, 1992;

(ii) For any storm water discharge associated with industrial activity from a facility that is owned or operated by a municipality with a population of less than 100,000 that is not authorized by a general or individual permit, other than an airport, powerplant, or uncontrolled sanitary landfill, the permit application must be submitted to the Director by March 10, 2003.

(2) For any group application submitted in accordance with paragraph (c)(2) of this section:

(i) *Part 1.* (A) Except as provided in paragraph (e)(2)(i)(B) of this section, part 1 of the application shall be submitted to the Director, Office of Wastewater Enforcement and Compliance by September 30, 1991;

(B) Any municipality with a population of less than 250,000 shall not be required to submit a part 1 application before May 18, 1992.

(C) For any storm water discharge associated with industrial activity from a facility that is owned or operated by a municipality with a population of less than 100,000 other than an airport, powerplant, or uncontrolled sanitary landfill, permit applications requirements are reserved.

(ii) Based on information in the part 1 application, the Director will approve or deny the members in the group application within 60 days after receiving part 1 of the group application.

(iii) *Part 2.* (A) Except as provided in paragraph (e)(2)(iii)(B) of this section, part 2 of the application shall be submittted to the Director, Office of Wastewater Enforcement and Compliance by October 1, 1992;

(B) Any municipality with a population of less than 250,000 shall not be required to submit a part 1 application before May 17, 1993.

(C) For any storm water discharge associated with industrial activity from a facility that is owned or operated by a municipality with a population of less than 100,000 other than an airport, powerplant, or uncontrolled sanitary landfill, permit applications requirements are reserved.

(iv) *Rejected facilities.* (A) Except as provided in paragraph (e)(2)(iv)(B) of this section, facilities that are rejected as members of the group shall submit an individual application (or obtain coverage under an applicable general permit) no later than 12 months after the date of receipt of the notice of rejection or October 1, 1992, whichever comes first.

(B) Facilities that are owned or operated by a municipality and that are rejected as members of part 1 group application shall submit an individual application no later than 180 days after the date of receipt of the notice of rejection or October 1, 1992, whichever is later.

(v) A facility listed under paragraph (b)(14) (i)–(xi) of this section may add on to a group application submitted in accordance with paragraph (e)(2)(i) of this section at the discretion of the Office of Water Enforcement and Permits, and only upon a showing of good cause by the facility and the group applicant; the request for the addition of the facility shall be made no later than February 18, 1992; the addition of the facility shall not cause the percentage of the facilities that are required to submit quantitative data to be less than 10%, unless there are over 100 facilities in the group that are submitting quantitative data; approval to become part of group application must be obtained from the group or the trade association representing the individual facilities.

(3) For any discharge from a large municipal separate storm sewer system;

(i) Part 1 of the application shall be submitted to the Director by November 18, 1991;

(ii) Based on information received in the part 1 application the Director will approve or deny a sampling plan under paragraph (d)(1)(iv)(E) of this section within 90 days after receiving the part 1 application;

(iii) Part 2 of the application shall be submitted to the Director by November 16, 1992.

(4) For any discharge from a medium municipal separate storm sewer system;

(i) Part 1 of the application shall be submitted to the Director by May 18, 1992.

(ii) Based on information received in the part 1 application the Director will approve or deny a sampling plan under paragraph (d)(1)(iv)(E) of this section within 90 days after receiving the part 1 application.

(iii) Part 2 of the application shall be submitted to the Director by May 17, 1993.

(5) A permit application shall be submitted to the Director within 180 days of notice, unless permission for a later date is granted by the Director (see §124.52(c) of this chapter), for:

(i) A storm water discharge that the Director, or in States with approved NPDES programs, either the Director or the EPA Regional Administrator, determines that the discharge contributes to a violation of a water quality standard or is a significant contributor of pollutants to waters of the United States (see paragraphs (a)(1)(v) and (b)(15)(ii) of this section);

(ii) A storm water discharge subject to paragraph (c)(1)(v) of this section.

(6) Facilities with existing NPDES permits for storm water discharges associated with industrial activity shall maintain existing permits. Facilities with permits for storm water discharges associated with industrial activity which expire on or after May 18, 1992 shall submit a new application in accordance with the requirements of 40 CFR 122.21 and 40 CFR 122.26(c) (Form 1, Form 2F, and other applicable Forms) 180 days before the expiration of such permits.

(7) The Director shall issue or deny permits for discharges composed entirely of storm water under this section in accordance with the following schedule:

(i)(A) Except as provided in paragraph (e)(7)(i)(B) of this section, the Director shall issue or deny permits for storm water discharges associated with industrial activity no later than October 1, 1993, or, for new sources or existing sources which fail to submit a complete permit application by October 1, 1992, one year after receipt of a complete permit application;

(B) For any municipality with a population of less than 250,000 which submits a timely Part I group application under paragraph (e)(2)(i)(B) of this section, the Director shall issue or deny permits for storm water discharges associated with industrial activity no later than May 17, 1994, or, for any such municipality which fails to submit a complete Part II group permit application by May 17, 1993, one year after receipt of a complete permit application;

(ii) The Director shall issue or deny permits for large municipal separate storm sewer systems no later than November 16, 1993, or, for new sources or existing sources which fail to submit a complete permit application by November 16, 1992, one year after receipt of a complete permit application;

(iii) The Director shall issue or deny permits for medium municipal separate storm sewer systems no later than May 17, 1994, or, for new sources or existing sources which fail to submit a complete permit application by May 17, 1993, one year after receipt of a complete permit application.

(8) For any storm water discharge associated with small construction activities identified in paragraph (b)(15)(i) of this section, see §122.21(c)(1). Discharges from these sources require permit authorization by March 10, 2003, unless designated for coverage before then.

(9) For any discharge from a regulated small MS4, the permit application made under §122.33 must be submitted to the Director by:

(i) March 10, 2003 if designated under §122.32(a)(1) unless your MS4 serves a jurisdiction with a population under 10,000 and the NPDES permitting authority has established a phasing schedule under §123.35(d)(3) (see §122.33(c)(1)); or

(ii) Within 180 days of notice, unless the NPDES permitting authority grants a later date, if designated under §122.32(a)(2) (see §122.33(c)(2)).

(f) *Petitions.* (1) Any operator of a municipal separate storm sewer system may petition the Director to require a separate NPDES permit (or a permit issued under an approved NPDES State program) for any discharge into the municipal separate storm sewer system.

(2) Any person may petition the Director to require a NPDES permit for a discharge which is composed entirely of storm water which contributes to a violation of a water quality standard or is a significant contributor of pollutants to waters of the United States.

(3) The owner or operator of a municipal separate storm sewer system may petition the Director to reduce the Census estimates of the population served by such separate system to account for storm water discharged to combined sewers as defined by 40 CFR 35.2005(b)(11) that is treated in a publicly owned treatment works. In municipalities in which combined sewers are operated, the Census estimates of

population may be reduced proportional to the fraction, based on estimated lengths, of the length of combined sewers over the sum of the length of combined sewers and municipal separate storm sewers where an applicant has submitted the NPDES permit number associated with each discharge point and a map indicating areas served by combined sewers and the location of any combined sewer overflow discharge point.

(4) Any person may petition the Director for the designation of a large, medium, or small municipal separate storm sewer system as defined by paragraph (b)(4)(iv), (b)(7)(iv), or (b)(16) of this section.

(5) The Director shall make a final determination on any petition received under this section within 90 days after receiving the petition with the exception of petitions to designate a small MS4 in which case the Director shall make a final determination on the petition within 180 days after its receipt.

(g) *Conditional exclusion for ''no exposure'' of industrial activities and materials to storm water*. Discharges composed entirely of storm water are not storm water discharges associated with industrial activity if there is ''no exposure'' of industrial materials and activities to rain, snow, snowmelt and/or runoff, and the discharger satisfies the conditions in paragraphs (g)(1) through (g)(4) of this section. ''No exposure'' means that all industrial materials and activities are protected by a storm resistant shelter to prevent exposure to rain, snow, snowmelt, and/or runoff. Industrial materials or activities include, but are not limited to, material handling equipment or activities, industrial machinery, raw materials, intermediate products, by-products, final products, or waste products. Material handling activities include the storage, loading and unloading, transportation, or conveyance of any raw material, intermediate product, final product or waste product.

(1) *Qualification*. To qualify for this exclusion, the operator of the discharge must:

(i) Provide a storm resistant shelter to protect industrial materials and activities from exposure to rain, snow, snow melt, and runoff;

(ii) Complete and sign (according to § 122.22) a certification that there are no discharges of storm water contaminated by exposure to industrial materials and activities from the entire facility, except as provided in paragraph (g)(2) of this section;

(iii) Submit the signed certification to the NPDES permitting authority once every five years;

(iv) Allow the Director to inspect the facility to determine compliance with the ''no exposure'' conditions;

(v) Allow the Director to make any ''no exposure'' inspection reports available to the public upon request; and

(vi) For facilities that discharge through an MS4, upon request, submit a copy of the certification of ''no exposure'' to the MS4 operator, as well as allow inspection and public reporting by the MS4 operator.

(2) *Industrial materials and activities not requiring storm resistant shelter*. To qualify for this exclusion, storm resistant shelter is not required for:

(i) Drums, barrels, tanks, and similar containers that are tightly sealed, provided those containers are not deteriorated and do not leak (''Sealed'' means banded or otherwise secured and without operational taps or valves);

(ii) Adequately maintained vehicles used in material handling; and

(iii) Final products, other than products that would be mobilized in storm water discharge (e.g., rock salt).

(3) *Limitations*. (i) Storm water discharges from construction activities identified in paragraphs (b)(14)(x) and (b)(15) are not eligible for this conditional exclusion.

(ii) This conditional exclusion from the requirement for an NPDES permit is available on a facility-wide basis only, not for individual outfalls. If a facility has some discharges of storm water that would otherwise be ''no exposure'' discharges, individual permit requirements should be adjusted accordingly.

(iii) If circumstances change and industrial materials or activities become exposed to rain, snow, snow melt, and/or runoff, the conditions for this exclusion no longer apply. In such cases, the discharge becomes subject to enforcement for un-permitted discharge. Any conditionally exempt discharger who

anticipates changes in circumstances should apply for and obtain permit authorization prior to the change of circumstances.

(iv) Notwithstanding the provisions of this paragraph, the NPDES permitting authority retains the authority to require permit authorization (and deny this exclusion) upon making a determination that the discharge causes, has a reasonable potential to cause, or contributes to an instream excursion above an applicable water quality standard, including designated uses.

(4) *Certification*. The no exposure certification must require the submission of the following information, at a minimum, to aid the NPDES permitting authority in determining if the facility qualifies for the no exposure exclusion:

(i) The legal name, address and phone number of the discharger (see § 122.21(b));

(ii) The facility name and address, the county name and the latitude and longitude where the facility is located;

(iii) The certification must indicate that none of the following materials or activities are, or will be in the foreseeable future, exposed to precipitation:

(A) Using, storing or cleaning industrial machinery or equipment, and areas where residuals from using, storing or cleaning industrial machinery or equipment remain and are exposed to storm water;

(B) Materials or residuals on the ground or in storm water inlets from spills/leaks;

(C) Materials or products from past industrial activity;

(D) Material handling equipment (except adequately maintained vehicles);

(E) Materials or products during loading/unloading or transporting activities;

(F) Materials or products stored outdoors (except final products intended for outside use, e.g., new cars, where exposure to storm water does not result in the discharge of pollutants);

(G) Materials contained in open, deteriorated or leaking storage drums, barrels, tanks, and similar containers;

(H) Materials or products handled/stored on roads or railways owned or maintained by the discharger;

(I) Waste material (except waste in covered, non-leaking containers, e.g., dumpsters);

(J) Application or disposal of process wastewater (unless otherwise permitted); and

(K) Particulate matter or visible deposits of residuals from roof stacks/vents not otherwise regulated, i.e., under an air quality control permit, and evident in the storm water outflow;

(iv) All ''no exposure'' certifications must include the following certification statement, and be signed in accordance with the signatory requirements of § 122.22: ''I certify under penalty of law that I have read and understand the eligibility requirements for claiming a condition of ''no exposure'' and obtaining an exclusion from NPDES storm water permitting; and that there are no discharges of storm water contaminated by exposure to industrial activities or materials from the industrial facility identified in this document (except as allowed under paragraph (g)(2)) of this section. I understand that I am obligated to submit a no exposure certification form once every five years to the NPDES permitting authority and, if requested, to the operator of the local MS4 into which this facility discharges (where applicable). I understand that I must allow the NPDES permitting authority, or MS4 operator where the discharge is into the local MS4, to perform inspections to confirm the condition of no exposure and to make such inspection reports publicly available upon request. I understand that I must obtain coverage under an NPDES permit prior to any point source discharge of storm water from the facility. I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based upon my inquiry of the person or persons who manage the system, or those persons directly involved in gathering the information, the information submitted is to the best of my knowledge and belief true, accurate and complete. I am aware there are significant penalties for submitting false

information, including the possibility of fine and imprisonment for knowing violations.''

[55 FR 48063, Nov. 16, 1990]

EDITORIAL NOTE: For FEDERAL REGISTER citations affecting § 122.26, see the List of CFR Sections Affected, which appears in the Finding Aids section of the printed volume and on GPO Access.

§ 122.27 Silvicultural activities (applicable to State NPDES programs, see § 123.25).

(a) *Permit requirement*. Silvicultural point sources, as defined in this section, as point sources subject to the NPDES permit program.

(b) *Definitions*. (1) *Silvicultural point source* means any discernible, confined and discrete conveyance related to rock crushing, gravel washing, log sorting, or log storage facilities which are operated in connection with silvicultural activities and from which pollutants are discharged into waters of the United States. The term does not include non-point source silvicultural activities such as nursery operations, site preparation, reforestation and subsequent cultural treatment, thinning, prescribed burning, pest and fire control, harvesting operations, surface drainage, or road construction and maintenance from which there is natural runoff. However, some of these activities (such as stream crossing for roads) may involve point source discharges of dredged or fill material which may require a CWA section 404 permit (See 33 CFR 209.120 and part 233).

(2) *Rock crushing and gravel washing facilities* means facilities which process crushed and broken stone, gravel, and riprap (See 40 CFR part 436, subpart B, including the effluent limitations guidelines).

(3) *Log sorting and log storage facilities* means facilities whose discharges result from the holding of unprocessed wood, for example, logs or roundwood with bark or after removal of bark held in self-contained bodies of water (mill ponds or log ponds) or stored on land where water is applied intentionally on the logs (wet decking). (See 40 CFR part 429, subpart I, including the effluent limitations guidelines).

§ 122.28 General permits (applicable to State NPDES programs, see § 123.25).

(a) *Coverage*. The Director may issue a general permit in accordance with the following:

(1) *Area*. The general permit shall be written to cover one or more categories or subcategories of discharges or sludge use or disposal practices or facilities described in the permit under paragraph (a)(2)(ii) of this section, except those covered by individual permits, within a geographic area. The area should correspond to existing geographic or political boundaries such as:

(i) Designated planning areas under sections 208 and 303 of CWA;

(ii) Sewer districts or sewer authorities;

(iii) City, county, or State political boundaries;

(iv) State highway systems;

(v) Standard metropolitan statistical areas as defined by the Office of Management and Budget;

(vi) Urbanized areas as designated by the Bureau of the Census according to criteria in 30 FR 15202 (May 1, 1974); or

(vii) Any other appropriate division or combination of boundaries.

(2) *Sources*. The general permit may be written to regulate one or more categories or subcategories of discharges or sludge use or disposal practices or facilities, within the area described in paragraph (a)(1) of this section, where the sources within a covered subcategory of discharges are either:

(i) Storm water point sources; or (ii) One or more categories or subcategories of point sources other than storm water point sources, or one or more categories or subcategories of ''treatment works treating domestic sewage'', if the sources or ''treatment works treating domestic sewage'' within each category or subcategory all:

(A) Involve the same or substantially similar types of operations;

(B) Discharge the same types of wastes or engage in the same types of sludge use or disposal practices;

(C) Require the same effluent limitations, operating conditions, or standards for sewage sludge use or disposal;

(D) Require the same or similar monitoring; and (E) In the opinion of the

Director, are more appropriately controlled under a general permit than under individual permits.

(3)*Water quality-based limits*. Where sources within a specific category or subcategory of dischargers are subject to water quality-based limits imposed pursuant to § 122.44, the sources in that specific category or subcategory shall be subject to the same water quality-based effluent limitations.

(4) *Other requirements*. (i) The general permit must clearly identify the applicable conditions for each category or subcategory of dischargers or treatment works treating domestic sewage covered by the permit.

(ii) The general permit may exclude specified sources or areas from coverage.

(b) *Administration*—(1) *In general*. General permits may be issued, modified, revoked and reissued, or terminated in accordance with applicable requirements of part 124 of this chapter or corresponding State regulations. Special procedures for issuance are found at § 123.44 of this chapter for States.

(2) *Authorization to discharge, or authorization to engage in sludge use and disposal practices*. (i) Except as provided in paragraphs (b)(2)(v) and (b)(2)(vi) of this section, dischargers (or treatment works treating domestic sewage) seeking coverage under a general permit shall submit to the Director a written notice of intent to be covered by the general permit. A discharger (or treatment works treating domestic sewage) who fails to submit a notice of intent in accordance with the terms of the permit is not authorized to discharge, (or in the case of sludge disposal permit, to engage in a sludge use or disposal practice), under the terms of the general permit unless the general permit, in accordance with paragraph (b)(2)(v) of this section, contains a provision that a notice of intent is not required or the Director notifies a discharger (or treatment works treating domestic sewage) that it is covered by a general permit in accordance with paragraph (b)(2)(vi) of this section. A complete and timely, notice of intent (NOI), to be covered in accordance with general permit requirements, fulfills the requirements for permit applications for purposes of §§ 122.6, 122.21 and 122.26.

(ii) The contents of the notice of intent shall be specified in the general permit and shall require the submission of information necessary for adequate program implementation, including at a minimum, the legal name and address of the owner or operator, the facility name and address, type of facility or discharges, and the receiving stream(s). General permits for storm water discharges associated with industrial activity from inactive mining, inactive oil and gas operations, or inactive landfills occurring on Federal lands where an operator cannot be identified may contain alternative notice of intent requirements. All notices of intent shall be signed in accordance with § 122.22. Notices of intent for coverage under a general permit for concentrated animal feeding operations must include the information specified in § 122.21(i)(1), including a topographic map.

(iii) General permits shall specify the deadlines for submitting notices of intent to be covered and the date(s) when a discharger is authorized to discharge under the permit;

(iv) General permits shall specify whether a discharger (or treatment works treating domestic sewage) that has submitted a complete and timely notice of intent to be covered in accordance with the general permit and that is eligible for coverage under the permit, is authorized to discharge, (or in the case of a sludge disposal permit, to engage in a sludge use or disposal practice), in accordance with the permit either upon receipt of the notice of intent by the Director, after a waiting period specified in the general permit, on a date specified in the general permit, or upon receipt of notification of inclusion by the Director. Coverage may be terminated or revoked in accordance with paragraph (b)(3) of this section.

(v) Discharges other than discharges from publicly owned treatment works, combined sewer overflows, municipal separate storm sewer systems, primary industrial facilities, and storm water discharges associated with industrial activity, may, at the discretion of the Director, be authorized to discharge

under a general permit without submitting a notice of intent where the Director finds that a notice of intent requirement would be inappropriate. In making such a finding, the Director shall consider: the type of discharge; the expected nature of the discharge; the potential for toxic and conventional pollutants in the discharges; the expected volume of the discharges; other means of identifying discharges covered by the permit; and the estimated number of discharges to be covered by the permit. The Director shall provide in the public notice of the general permit the reasons for not requiring a notice of intent.

(vi) The Director may notify a discharger (or treatment works treating domestic sewage) that it is covered by a general permit, even if the discharger (or treatment works treating domestic sewage) has not submitted a notice of intent to be covered. A discharger (or treatment works treating domestic sewage) so notified may request an individual permit under paragraph (b)(3)(iii) of this section.

(vii) A CAFO owner or operator may be authorized to discharge under a general permit only in accordance with the process described in §122.23(h).

(3) *Requiring an individual permit*. (i) The Director may require any discharger authorized by a general permit to apply for and obtain an individual NPDES permit. Any interested person may petition the Director to take action under this paragraph. Cases where an individual NPDES permit may be required include the following:

(A) The discharger or ''treatment works treating domestic sewage'' is not in compliance with the conditions of the general NPDES permit;

(B) A change has occurred in the availability of demonstrated technology or practices for the control or abatement of pollutants applicable to the point source or treatment works treating domestic sewage;

(C) Effluent limitation guidelines are promulgated for point sources covered by the general NPDES permit;

(D) A Water Quality Management plan containing requirements applicable to such point sources is approved;

(E) Circumstances have changed since the time of the request to be covered so that the discharger is no longer appropriately controlled under the general permit, or either a temporary or permanent reduction or elimination of the authorized discharge is necessary;

(F) Standards for sewage sludge use or disposal have been promulgated for the sludge use and disposal practice covered by the general NPDES permit; or

(G) The discharge(s) is a significant contributor of pollutants. In making this determination, the Director may consider the following factors:

(*1*) The location of the discharge with respect to waters of the United States;

(*2*) The size of the discharge;

(*3*) The quantity and nature of the pollutants discharged to waters of the United States; and

(*4*) Other relevant factors;

(ii) *For EPA issued general permits only*, the Regional Administrator may require any owner or operator authorized by a general permit to apply for an individual NPDES permit as provided in paragraph (b)(3)(i) of this section, only if the owner or operator has been notified in writing that a permit application is required. This notice shall include a brief statement of the reasons for this decision, an application form, a statement setting a time for the owner or operator to file the application, and a statement that on the effective date of the individual NPDES permit the general permit as it applies to the individual permittee shall automatically terminate. The Director may grant additional time upon request of the applicant.

(iii) Any owner or operator authorized by a general permit may request to be excluded from the coverage of the general permit by applying for an individual permit. The owner or operator shall submit an application under §122.21, with reasons supporting the request, to the Director no later than 90 days after the publication by EPA of the general permit in the FEDERAL REGISTER or the publication by a State in accordance with applicable State law. The request shall be processed under part 124 or applicable State procedures. The request shall be granted by issuing of any individual permit if

the reasons cited by the owner or operator are adequate to support the request.

(iv) When an individual NPDES permit is issued to an owner or operator otherwise subject to a general NPDES permit, the applicability of the general permit to the individual NPDES permittee is automatically terminated on the effective date of the individual permit.

(v) A source excluded from a general permit solely because it already has an individual permit may request that the individual permit be revoked, and that it be covered by the general permit. Upon revocation of the individual permit, the general permit shall apply to the source.

(c) *Offshore oil and gas facilities* (Not applicable to State programs). (1) The Regional Administrator shall, except as provided below, issue general permits covering discharges from offshore oil and gas exploration and production facilities within the Region's jurisdiction. Where the offshore area includes areas, such as areas of biological concern, for which separate permit conditions are required, the Regional Administrator may issue separate general permits, individual permits, or both. The reason for separate general permits or individual permits shall be set forth in the appropriate fact sheets or statements of basis. Any statement of basis or fact sheet for a draft permit shall include the Regional Administrator's tentative determination as to whether the permit applies to ''new sources,'' ''new dischargers,'' or existing sources and the reasons for this determination, and the Regional Administrator's proposals as to areas of biological concern subject either to separate individual or general permits. For Federally leased lands, the general permit area should generally be no less extensive than the lease sale area defined by the Department of the Interior.

(2) Any interested person, including any prospective permittee, may petition the Regional Administrator to issue a general permit. Unless the Regional Administrator determines under paragraph (c)(1) of this section that no general permit is appropriate, he shall promptly provide a project decision schedule covering the issuance of the general permit or permits for any lease sale area for which the Department of the Interior has published a draft environmental impact statement. The project decision schedule shall meet the requirements of § 124.3(g), and shall include a schedule providing for the issuance of the final general permit or permits not later than the date of the final notice of sale projected by the Department of the Interior or six months after the date of the request, whichever is later. The Regional Administrator may, at his discretion, issue a project decision schedule for offshore oil and gas facilities in the territorial seas.

(3) Nothing in this paragraph (c) shall affect the authority of the Regional Administrator to require an individual permit under § 122.28(b)(3)(i) (A) through (G).

(Clean Water Act (33 U.S.C. 1251 *et seq.*), Safe Drinking Water Act (42 U.S.C. 300f *et seq.*), Clean Air Act (42 U.S.C. 7401 *et seq.*), Resource Conservation and Recovery Act (42 U.S.C. 6901 *et seq.*))

[48 FR 14153, Apr. 1, 1983, as amended at 48 FR 39619, Sept. 1, 1983; 49 FR 38048, Sept. 26, 1984; 50 FR 6940, Feb. 19, 1985; 54 FR 18782, May 2, 1989; 55 FR 48072, Nov. 16, 1990; 57 FR 11412 and 11413, Apr. 2, 1992; 64 FR 68841, Dec. 8, 1999; 65 FR 30908, May 15, 2000; 68 FR 7268, Feb. 12, 2003; 73 FR 70483, Nov. 20, 2008]

§ 122.29 New sources and new dischargers.

(a) *Definitions*. (1) *New source* and *new discharger* are defined in § 122.2. [See Note 2.]

(2) *Source* means any building, structure, facility, or installation from which there is or may be a discharge of pollutants.

(3) *Existing source* means any source which is not a new source or a new discharger.

(4) *Site* is defined in § 122.2;

(5) *Facilities or equipment* means buildings, structures, process or production equipment or machinery which form a permanent part of the new source and which will be used in its operation, if these facilities or equipment are of such value as to represent a substantial commitment to construct. It excludes facilities or equipment used in connection with feasibility, engineering, and design studies regarding the source or water pollution treatment for the source.

(b) *Criteria for new source determination.* (1) Except as otherwise provided in an applicable new source performance standard, a source is a ''new source'' if it meets the definition of ''new source'' in § 122.2, and

(i) It is constructed at a site at which no other source is located; or

(ii) It totally replaces the process or production equipment that causes the discharge of pollutants at an existing source; or

(iii) Its processes are substantially independent of an existing source at the same site. In determining whether these processes are substantially independent, the Director shall consider such factors as the extent to which the new facility is integrated with the existing plant; and the extent to which the new facility is engaged in the same general type of activity as the existing source.

(2) A source meeting the requirements of paragraphs (b)(1) (i), (ii), or (iii) of this section is a new source only if a new source performance standard is independently applicable to it. If there is no such independently applicable standard, the source is a new discharger. See § 122.2.

(3) Construction on a site at which an existing source is located results in a modification subject to § 122.62 rather than a new source (or a new discharger) if the construction does not create a new building, structure, facility, or installation meeting the criteria of paragraph (b)(1) (ii) or (iii) of this section but otherwise alters, replaces, or adds to existing process or production equipment.

(4) Construction of a new source as defined under § 122.2 has commenced if the owner or operator has:

(i) Begun, or caused to begin as part of a continuous on-site construction program:

(A) Any placement, assembly, or installation of facilities or equipment; or

(B) Significant site preparation work including clearing, excavation or removal of existing buildings, structures, or facilities which is necessary for the placement, assembly, or installation of new source facilities or equipment; or

(ii) Entered into a binding contractual obligation for the purchase of facilities or equipment which are intended to be used in its operation with a reasonable time. Options to purchase or contracts which can be terminated or modified without substantial loss, and contracts for feasibility engineering, and design studies do not constitute a contractual obligation under the paragraph.

(c) *Requirement for an environmental impact statement.* (1) The issuance of an NPDES permit to new source:

(i) By EPA may be a major Federal action significantly affecting the quality of the human environment within the meaning of the National Environmental Policy Act of 1969 (NEPA), 33 U.S.C. 4321 *et seq.* and is subject to the environmental review provisions of NEPA as set out in 40 CFR part 6, subpart F. EPA will determine whether an Environmental Impact Statement (EIS) is required under § 122.21(l) (special provisions for applications from new sources) and 40 CFR part 6, subpart F;

(ii) By an NPDES approved State is not a Federal action and therefore does not require EPA to conduct an environmental review.

(2) An EIS prepared under this paragraph shall include a recommendation either to issue or deny the permit.

(i) If the recommendation is to deny the permit, the final EIS shall contain the reasons for the recommendation and list those measures, if any, which the applicant could take to cause the recommendation to be changed;

(ii) If the recommendation is to issue the permit, the final EIS shall recommend the actions, if any, which the permittee should take to prevent or minimize any adverse environmental impacts;

(3) The Regional Administrator, to the extent allowed by law, shall issue, condition (other than imposing effluent limitations), or deny the new source NPDES permit following a complete evaluation of any significant beneficial and adverse impacts of the proposed action and a review of the recommendations contained in the EIS or finding of no significant impact.

(d) *Effect of compliance with new source performance standards.* (The provisions of this paragraph do not apply to existing sources which modify their pollution control facilities or construct

new pollution control facilities and achieve performance standards, but which are neither new sources or new dischargers or otherwise do not meet the requirements of this paragraph.)

(1) Except as provided in paragraph (d)(2) of this section, any new discharger, the construction of which commenced after October 18, 1972, or new source which meets the applicable promulgated new source performance standards before the commencement of discharge, may not be subject to any more stringent new source performance standards or to any more stringent technology-based standards under section 301(b)(2) of CWA for the soonest ending of the following periods:

(i) Ten years from the date that construction is completed;

(ii) Ten years from the date the source begins to discharge process or other nonconstruction related wastewater; or

(iii) The period of depreciation or amortization of the facility for the purposes of section 167 or 169 (or both) of the Internal Revenue Code of 1954.

(2) The protection from more stringent standards of performance afforded by paragraph (d)(1) of this section does not apply to:

(i) Additional or more stringent permit conditions which are not technology based; for example, conditions based on water quality standards, or toxic effluent standards or prohibitions under section 307(a) of CWA; or

(ii) Additional permit conditions in accordance with § 125.3 controlling toxic pollutants or hazardous substances which are not controlled by new source performance standards. This includes permit conditions controlling pollutants other than those identified as toxic pollutants or hazardous substances when control of these pollutants has been specifically identified as the method to control the toxic pollutants or hazardous substances.

(3) When an NPDES permit issued to a source with a ''protection period'' under paragraph (d)(1) of this section will expire on or after the expiration of the protection period, that permit shall require the owner or operator of the source to comply with the requirements of section 301 and any other then applicable requirements of CWA immediately upon the expiration of the protection period. No additional period for achieving compliance with these requirements may be allowed except when necessary to achieve compliance with requirements promulgated less than 3 years before the expiration of the protection period.

(4) The owner or operator of a new source, a new discharger which commenced discharge after August 13, 1979, or a recommencing discharger shall install and have in operating condition, and shall ''start-up'' all pollution control equipment required to meet the conditions of its permits before beginning to discharge. Within the shortest feasible time (not to exceed 90 days), the owner or operator must meet all permit conditions. The requirements of this paragraph do not apply if the owner or operator is issued a permit containing a compliance schedule under § 122.47(a)(2).

(5) After the effective date of new source performance standards, it shall be unlawful for any owner or operator of any new source to operate the source in violation of those standards applicable to the source.

[48 FR 14153, Apr. 1, 1983, as amended at 49 FR 38048, Sept. 26, 1984; 50 FR 4514, Jan. 31, 1985; 50 FR 6941, Feb. 19, 1985; 65 FR 30908, May 15, 2000]

§ 122.30 What are the objectives of the storm water regulations for small MS4s?

(a) Sections 122.30 through 122.37 are written in a ''readable regulation'' format that includes both rule requirements and EPA guidance that is not legally binding. EPA has clearly distinguished its recommended guidance from the rule requirements by putting the guidance in a separate paragraph headed by the word ''guidance''.

(b) Under the statutory mandate in section 402(p)(6) of the Clean Water Act, the purpose of this portion of the storm water program is to designate additional sources that need to be regulated to protect water quality and to establish a comprehensive storm water program to regulate these sources. (Because the storm water program is part of the National Pollutant Discharge

Elimination System (NPDES) Program, you should also refer to § 122.1 which addresses the broader purpose of the NPDES program.)

(c) Storm water runoff continues to harm the nation's waters. Runoff from lands modified by human activities can harm surface water resources in several ways including by changing natural hydrologic patterns and by elevating pollutant concentrations and loadings. Storm water runoff may contain or mobilize high levels of contaminants, such as sediment, suspended solids, nutrients, heavy metals, pathogens, toxins, oxygen-demanding substances, and floatables.

(d) EPA strongly encourages partnerships and the watershed approach as the management framework for efficiently, effectively, and consistently protecting and restoring aquatic ecosystems and protecting public health.

[64 FR 68842, Dec. 8, 1999]

§ 122.31 As a Tribe, what is my role under the NPDES storm water program?

As a Tribe you may:

(a) Be authorized to operate the NPDES program including the storm water program, after EPA determines that you are eligible for treatment in the same manner as a State under §§ 123.31 through 123.34 of this chapter. (If you do not have an authorized NPDES program, EPA implements the program for discharges on your reservation as well as other Indian country, generally.);

(b) Be classified as an owner of a regulated small MS4, as defined in § 122.32. (Designation of your Tribe as an owner of a small MS4 for purposes of this part is an approach that is consistent with EPA's 1984 Indian Policy of operating on a government-to-government basis with EPA looking to Tribes as the lead governmental authorities to address environmental issues on their reservations as appropriate. If you operate a separate storm sewer system that meets the definition of a regulated small MS4, you are subject to the requirements under §§ 122.33 through 122.35. If you are not designated as a regulated small MS4, you may ask EPA to designate you as such for the purposes of this part.); or

(c) Be a discharger of storm water associated with industrial activity or small construction activity under §§ 122.26(b)(14) or (b)(15), in which case you must meet the applicable requirements. Within Indian country, the NPDES permitting authority is generally EPA, unless you are authorized to administer the NPDES program.

[64 FR 68842, Dec. 8, 1999]

§ 122.32 As an operator of a small MS4, am I regulated under the NPDES storm water program?

(a) Unless you qualify for a waiver under paragraph (c) of this section, you are regulated if you operate a small MS4, including but not limited to systems operated by federal, State, Tribal, and local governments, including State departments of transportation; and:

(1) Your small MS4 is located in an urbanized area as determined by the latest Decennial Census by the Bureau of the Census. (If your small MS4 is not located entirely within an urbanized area, only the portion that is within the urbanized area is regulated); or

(2) You are designated by the NPDES permitting authority, including where the designation is pursuant to §§ 123.35(b)(3) and (b)(4) of this chapter, or is based upon a petition under § 122.26(f).

(b) You may be the subject of a petition to the NPDES permitting authority to require an NPDES permit for your discharge of storm water. If the NPDES permitting authority determines that you need a permit, you are required to comply with §§ 122.33 through 122.35.

(c) The NPDES permitting authority may waive the requirements otherwise applicable to you if you meet the criteria of paragraph (d) or (e) of this section. If you receive a waiver under this section, you may subsequently be required to seek coverage under an NPDES permit in accordance with § 122.33(a) if circumstances change. (See also § 123.35(b) of this chapter.)

(d) The NPDES permitting authority may waive permit coverage if your MS4 serves a population of less than 1,000 within the urbanized area and you meet the following criteria:

(1) Your system is not contributing substantially to the pollutant loadings

of a physically interconnected MS4 that is regulated by the NPDES storm water program (see § 123.35(b)(4) of this chapter); and

(2) If you discharge any pollutant(s) that have been identified as a cause of impairment of any water body to which you discharge, storm water controls are not needed based on wasteload allocations that are part of an EPA approved or established ''total maximum daily load'' (TMDL) that addresses the pollutant(s) of concern.

(e) The NPDES permitting authority may waive permit coverage if your MS4 serves a population under 10,000 and you meet the following criteria:

(1) The permitting authority has evaluated all waters of the U.S., including small streams, tributaries, lakes, and ponds, that receive a discharge from your MS4;

(2) For all such waters, the permitting authority has determined that storm water controls are not needed based on wasteload allocations that are part of an EPA approved or established TMDL that addresses the pollutant(s) of concern or, if a TMDL has not been developed or approved, an equivalent analysis that determines sources and allocations for the pollutant(s) of concern;

(3) For the purpose of this paragraph (e), the pollutant(s) of concern include biochemical oxygen demand (BOD), sediment or a parameter that addresses sediment (such as total suspended solids, turbidity or siltation), pathogens, oil and grease, and any pollutant that has been identified as a cause of impairment of any water body that will receive a discharge from your MS4; and

(4) The permitting authority has determined that future discharges from your MS4 do not have the potential to result in exceedances of water quality standards, including impairment of designated uses, or other significant water quality impacts, including habitat and biological impacts.

[64 FR 68842, Dec. 8, 1999]

§ 122.33 If I am an operator of a regulated small MS4, how do I apply for an NPDES permit and when do I have to apply?

(a) If you operate a regulated small MS4 under § 122.32, you must seek coverage under a NPDES permit issued by your NPDES permitting authority. If you are located in an NPDES authorized State, Tribe, or Territory, then that State, Tribe, or Territory is your NPDES permitting authority. Otherwise, your NPDES permitting authority is the EPA Regional Office.

(b) You must seek authorization to discharge under a general or individual NPDES permit, as follows:

(1) If your NPDES permitting authority has issued a general permit applicable to your discharge and you are seeking coverage under the general permit, you must submit a Notice of Intent (NOI) that includes the information on your best management practices and measurable goals required by § 122.34(d). You may file your own NOI, or you and other municipalities or governmental entities may jointly submit an NOI. If you want to share responsibilities for meeting the minimum measures with other municipalities or governmental entities, you must submit an NOI that describes which minimum measures you will implement and identify the entities that will implement the other minimum measures within the area served by your MS4. The general permit will explain any other steps necessary to obtain permit authorization.

(2)(i) If you are seeking authorization to discharge under an individual permit and wish to implement a program under § 122.34, you must submit an application to your NPDES permitting authority that includes the information required under §§ 122.21(f) and 122.34(d), an estimate of square mileage served by your small MS4, and any additional information that your NPDES permitting authority requests. A storm sewer map that satisfies the requirement of § 122.34(b)(3)(i) will satisfy the map requirement in § 122.21(f)(7).

(ii) If you are seeking authorization to discharge under an individual permit and wish to implement a program that is different from the program under § 122.34, you will need to comply with the permit application requirements of § 122.26(d). You must submit both Parts of the application requirements in §§ 122.26(d)(1) and (2) by March 10, 2003. You do not need to submit the information required by §§ 122.26(d)(1)(ii) and (d)(2) regarding

your legal authority, unless you intend for the permit writer to take such information into account when developing your other permit conditions.

(iii) If allowed by your NPDES permitting authority, you and another regulated entity may jointly apply under either paragraph (b)(2)(i) or (b)(2)(ii) of this section to be co-permittees under an individual permit.

(3) If your small MS4 is in the same urbanized area as a medium or large MS4 with an NPDES storm water permit and that other MS4 is willing to have you participate in its storm water program, you and the other MS4 may jointly seek a modification of the other MS4 permit to include you as a limited co-permittee. As a limited co-permittee, you will be responsible for compliance with the permit's conditions applicable to your jurisdiction. If you choose this option you will need to comply with the permit application requirements of § 122.26, rather than the requirements of § 122.34. You do not need to comply with the specific application requirements of § 122.26(d)(1)(iii) and (iv) and (d)(2)(iii) (discharge characterization). You may satisfy the requirements in § 122.26 (d)(1)(v) and (d)(2)(iv) (identification of a management program) by referring to the other MS4's storm water management program.

(4) Guidance: In referencing an MS4's storm water management program, you should briefly describe how the existing plan will address discharges from your small MS4 or would need to be supplemented in order to adequately address your discharges. You should also explain your role in coordinating storm water pollutant control activities in your MS4, and detail the resources available to you to accomplish the plan.

(c) If you operate a regulated small MS4:

(1) Designated under § 122.32(a)(1), you must apply for coverage under an NPDES permit, or apply for a modification of an existing NPDES permit under paragraph (b)(3) of this section by March 10, 2003, unless your MS4 serves a jurisdiction with a population under 10,000 and the NPDES permitting authority has established a phasing schedule under § 123.35(d)(3) of this chapter.

(2) Designated under § 122.32(a)(2), you must apply for coverage under an NPDES permit, or apply for a modification of an existing NPDES permit under paragraph (b)(3) of this section, within 180 days of notice, unless the NPDES permitting authority grants a later date.

[64 FR 68843, Dec. 8, 1999]

§ 122.34 As an operator of a regulated small MS4, what will my NPDES MS4 storm water permit require?

(a) Your NPDES MS4 permit will require at a minimum that you develop, implement, and enforce a storm water management program designed to reduce the discharge of pollutants from your MS4 to the maximum extent practicable (MEP), to protect water quality, and to satisfy the appropriate water quality requirements of the Clean Water Act. Your storm water management program must include the minimum control measures described in paragraph (b) of this section unless you apply for a permit under § 122.26(d). For purposes of this section, narrative effluent limitations requiring implementation of best management practices (BMPs) are generally the most appropriate form of effluent limitations when designed to satisfy technology requirements (including reductions of pollutants to the maximum extent practicable) and to protect water quality. Implementation of best management practices consistent with the provisions of the storm water management program required pursuant to this section and the provisions of the permit required pursuant to § 122.33 constitutes compliance with the standard of reducing pollutants to the ''maximum extent practicable.'' Your NPDES permitting authority will specify a time period of up to 5 years from the date of permit issuance for you to develop and implement your program.

(b) *Minimum control measures*—(1) *Public education and outreach on storm water impacts.* (i) You must implement a public education program to distribute educational materials to the community or conduct equivalent outreach activities about the impacts of storm

water discharges on water bodies and the steps that the public can take to reduce pollutants in storm water runoff.

(ii) Guidance: You may use storm water educational materials provided by your State, Tribe, EPA, environmental, public interest or trade organizations, or other MS4s. The public education program should inform individuals and households about the steps they can take to reduce storm water pollution, such as ensuring proper septic system maintenance, ensuring the proper use and disposal of landscape and garden chemicals including fertilizers and pesticides, protecting and restoring riparian vegetation, and properly disposing of used motor oil or household hazardous wastes. EPA recommends that the program inform individuals and groups how to become involved in local stream and beach restoration activities as well as activities that are coordinated by youth service and conservation corps or other citizen groups. EPA recommends that the public education program be tailored, using a mix of locally appropriate strategies, to target specific audiences and communities. Examples of strategies include distributing brochures or fact sheets, sponsoring speaking engagements before community groups, providing public service announcements, implementing educational programs targeted at school age children, and conducting community-based projects such as storm drain stenciling, and watershed and beach cleanups. In addition, EPA recommends that some of the materials or outreach programs be directed toward targeted groups of commercial, industrial, and institutional entities likely to have significant storm water impacts. For example, providing information to restaurants on the impact of grease clogging storm drains and to garages on the impact of oil discharges. You are encouraged to tailor your outreach program to address the viewpoints and concerns of all communities, particularly minority and disadvantaged communities, as well as any special concerns relating to children.

(2) *Public involvement/participation*. (i) You must, at a minimum, comply with State, Tribal and local public notice requirements when implementing a public involvement/ participation program.

(ii) Guidance: EPA recommends that the public be included in developing, implementing, and reviewing your storm water management program and that the public participation process should make efforts to reach out and engage all economic and ethnic groups. Opportunities for members of the public to participate in program development and implementation include serving as citizen representatives on a local storm water management panel, attending public hearings, working as citizen volunteers to educate other individuals about the program, assisting in program coordination with other pre-existing programs, or participating in volunteer monitoring efforts. (Citizens should obtain approval where necessary for lawful access to monitoring sites.)

(3) *Illicit discharge detection and elimination*. (i) You must develop, implement and enforce a program to detect and eliminate illicit discharges (as defined at §122.26(b)(2)) into your small MS4.

(ii) You must:

(A) Develop, if not already completed, a storm sewer system map, showing the location of all outfalls and the names and location of all waters of the United States that receive discharges from those outfalls;

(B) To the extent allowable under State, Tribal or local law, effectively prohibit, through ordinance, or other regulatory mechanism, non-storm water discharges into your storm sewer system and implement appropriate enforcement procedures and actions;

(C) Develop and implement a plan to detect and address non-storm water discharges, including illegal dumping, to your system; and

(D) Inform public employees, businesses, and the general public of hazards associated with illegal discharges and improper disposal of waste.

(iii) You need address the following categories of non-storm water discharges or flows (i.e., illicit discharges) only if you identify them as significant contributors of pollutants to your small MS4: water line flushing, landscape irrigation, diverted stream flows,

rising ground waters, uncontaminated ground water infiltration (as defined at 40 CFR 35.2005(20)), uncontaminated pumped ground water, discharges from potable water sources, foundation drains, air conditioning condensation, irrigation water, springs, water from crawl space pumps, footing drains, lawn watering, individual residential car washing, flows from riparian habitats and wetlands, dechlorinated swimming pool discharges, and street wash water (discharges or flows from fire fighting activities are excluded from the effective prohibition against non-storm water and need only be addressed where they are identified as significant sources of pollutants to waters of the United States).

(iv) Guidance: EPA recommends that the plan to detect and address illicit discharges include the following four components: procedures for locating priority areas likely to have illicit discharges; procedures for tracing the source of an illicit discharge; procedures for removing the source of the discharge; and procedures for program evaluation and assessment. EPA recommends visually screening outfalls during dry weather and conducting field tests of selected pollutants as part of the procedures for locating priority areas. Illicit discharge education actions may include storm drain stenciling, a program to promote, publicize, and facilitate public reporting of illicit connections or discharges, and distribution of outreach materials.

(4) *Construction site storm water runoff control.* (i) You must develop, implement, and enforce a program to reduce pollutants in any storm water runoff to your small MS4 from construction activities that result in a land disturbance of greater than or equal to one acre. Reduction of storm water discharges from construction activity disturbing less than one acre must be included in your program if that construction activity is part of a larger common plan of development or sale that would disturb one acre or more. If the NPDES permitting authority waives requirements for storm water discharges associated with small construction activity in accordance with § 122.26(b)(15)(i), you are not required to develop, implement, and/or enforce a program to reduce pollutant discharges from such sites.

(ii) Your program must include the development and implementation of, at a minimum:

(A) An ordinance or other regulatory mechanism to require erosion and sediment controls, as well as sanctions to ensure compliance, to the extent allowable under State, Tribal, or local law;

(B) Requirements for construction site operators to implement appropriate erosion and sediment control best management practices;

(C) Requirements for construction site operators to control waste such as discarded building materials, concrete truck washout, chemicals, litter, and sanitary waste at the construction site that may cause adverse impacts to water quality;

(D) Procedures for site plan review which incorporate consideration of potential water quality impacts;

(E) Procedures for receipt and consideration of information submitted by the public, and

(F) Procedures for site inspection and enforcement of control measures.

(iii) Guidance: Examples of sanctions to ensure compliance include non-monetary penalties, fines, bonding requirements and/or permit denials for non-compliance. EPA recommends that procedures for site plan review include the review of individual pre-construction site plans to ensure consistency with local sediment and erosion control requirements. Procedures for site inspections and enforcement of control measures could include steps to identify priority sites for inspection and enforcement based on the nature of the construction activity, topography, and the characteristics of soils and receiving water quality. You are encouraged to provide appropriate educational and training measures for construction site operators. You may wish to require a storm water pollution prevention plan for construction sites within your jurisdiction that discharge into your system. See § 122.44(s) (NPDES permitting authorities' option to incorporate qualifying State, Tribal and local erosion and sediment control programs into NPDES permits for storm water discharges from construction sites).

Also see §122.35(b) (The NPDES permitting authority may recognize that another government entity, including the permitting authority, may be responsible for implementing one or more of the minimum measures on your behalf.)

(5) *Post-construction storm water management in new development and redevelopment.* (i) You must develop, implement, and enforce a program to address storm water runoff from new development and redevelopment projects that disturb greater than or equal to one acre, including projects less than one acre that are part of a larger common plan of development or sale, that discharge into your small MS4. Your program must ensure that controls are in place that would prevent or minimize water quality impacts.

(ii) You must:

(A) Develop and implement strategies which include a combination of structural and/or non-structural best management practices (BMPs) appropriate for your community;

(B) Use an ordinance or other regulatory mechanism to address post-construction runoff from new development and redevelopment projects to the extent allowable under State, Tribal or local law; and

(C) Ensure adequate long-term operation and maintenance of BMPs.

(iii) Guidance: If water quality impacts are considered from the beginning stages of a project, new development and potentially redevelopment provide more opportunities for water quality protection. EPA recommends that the BMPs chosen: be appropriate for the local community; minimize water quality impacts; and attempt to maintain pre-development runoff conditions. In choosing appropriate BMPs, EPA encourages you to participate in locally-based watershed planning efforts which attempt to involve a diverse group of stakeholders including interested citizens. When developing a program that is consistent with this measure's intent, EPA recommends that you adopt a planning process that identifies the municipality's program goals (*e.g.*, minimize water quality impacts resulting from post-construction runoff from new development and redevelopment), implementation strategies (e.g., adopt a combination of structural and/or non-structural BMPs), operation and maintenance policies and procedures, and enforcement procedures. In developing your program, you should consider assessing existing ordinances, policies, programs and studies that address storm water runoff quality. In addition to assessing these existing documents and programs, you should provide opportunities to the public to participate in the development of the program. Non-structural BMPs are preventative actions that involve management and source controls such as: policies and ordinances that provide requirements and standards to direct growth to identified areas, protect sensitive areas such as wetlands and riparian areas, maintain and/or increase open space (including a dedicated funding source for open space acquisition), provide buffers along sensitive water bodies, minimize impervious surfaces, and minimize disturbance of soils and vegetation; policies or ordinances that encourage infill development in higher density urban areas, and areas with existing infrastructure; education programs for developers and the public about project designs that minimize water quality impacts; and measures such as minimization of percent impervious area after development and minimization of directly connected impervious areas. Structural BMPs include: storage practices such as wet ponds and extended-detention outlet structures; filtration practices such as grassed swales, sand filters and filter strips; and infiltration practices such as infiltration basins and infiltration trenches. EPA recommends that you ensure the appropriate implementation of the structural BMPs by considering some or all of the following: pre-construction review of BMP designs; inspections during construction to verify BMPs are built as designed; post-construction inspection and maintenance of BMPs; and penalty provisions for the noncompliance with design, construction or operation and maintenance. Storm water technologies are constantly being improved, and EPA recommends that your requirements be responsive to these changes, developments or improvements in control technologies.

(6) *Pollution prevention/good housekeeping for municipal operations.* (i) You must develop and implement an operation and maintenance program that includes a training component and has the ultimate goal of preventing or reducing pollutant runoff from municipal operations. Using training materials that are available from EPA, your State, Tribe, or other organizations, your program must include employee training to prevent and reduce storm water pollution from activities such as park and open space maintenance, fleet and building maintenance, new construction and land disturbances, and storm water system maintenance.

(ii) Guidance: EPA recommends that, at a minimum, you consider the following in developing your program: maintenance activities, maintenance schedules, and long-term inspection procedures for structural and nonstructural storm water controls to reduce floatables and other pollutants discharged from your separate storm sewers; controls for reducing or eliminating the discharge of pollutants from streets, roads, highways, municipal parking lots, maintenance and storage yards, fleet or maintenance shops with outdoor storage areas, salt/sand storage locations and snow disposal areas operated by you, and waste transfer stations; procedures for properly disposing of waste removed from the separate storm sewers and areas listed above (such as dredge spoil, accumulated sediments, floatables, and other debris); and ways to ensure that new flood management projects assess the impacts on water quality and examine existing projects for incorporating additional water quality protection devices or practices. Operation and maintenance should be an integral component of all storm water management programs. This measure is intended to improve the efficiency of these programs and require new programs where necessary. Properly developed and implemented operation and maintenance programs reduce the risk of water quality problems.

(c) If an existing qualifying local program requires you to implement one or more of the minimum control measures of paragraph (b) of this section, the NPDES permitting authority may include conditions in your NPDES permit that direct you to follow that qualifying program's requirements rather than the requirements of paragraph (b) of this section. A qualifying local program is a local, State or Tribal municipal storm water management program that imposes, at a minimum, the relevant requirements of paragraph (b) of this section.

(d)(1) In your permit application (either a notice of intent for coverage under a general permit or an individual permit application), you must identify and submit to your NPDES permitting authority the following information:

(i) The best management practices (BMPs) that you or another entity will implement for each of the storm water minimum control measures at paragraphs (b)(1) through (b)(6) of this section;

(ii) The measurable goals for each of the BMPs including, as appropriate, the months and years in which you will undertake required actions, including interim milestones and the frequency of the action; and

(iii) The person or persons responsible for implementing or coordinating your storm water management program.

(2) If you obtain coverage under a general permit, you are not required to meet any measurable goal(s) identified in your notice of intent in order to demonstrate compliance with the minimum control measures in paragraphs (b)(3) through (b)(6) of this section unless, prior to submitting your NOI, EPA or your State or Tribe has provided or issued a menu of BMPs that addresses each such minimum measure. Even if no regulatory authority issues the menu of BMPs, however, you still must comply with other requirements of the general permit, including good faith implementation of BMPs designed to comply with the minimum measures.

(3) Guidance: Either EPA or your State or Tribal permitting authority will provide a menu of BMPs. You may choose BMPs from the menu or select others that satisfy the minimum control measures.

(e)(1) You must comply with any more stringent effluent limitations in

your permit, including permit requirements that modify, or are in addition to, the minimum control measures based on an approved total maximum daily load (TMDL) or equivalent analysis. The permitting authority may include such more stringent limitations based on a TMDL or equivalent analysis that determines such limitations are needed to protect water quality.

(2) Guidance: EPA strongly recommends that until the evaluation of the storm water program in § 122.37, no additional requirements beyond the minimum control measures be imposed on regulated small MS4s without the agreement of the operator of the affected small MS4, except where an approved TMDL or equivalent analysis provides adequate information to develop more specific measures to protect water quality.

(f) You must comply with other applicable NPDES permit requirements, standards and conditions established in the individual or general permit, developed consistent with the provisions of §§ 122.41 through 122.49, as appropriate.

(g) *Evaluation and assessment*—(1) *Evaluation*. You must evaluate program compliance, the appropriateness of your identified best management practices, and progress towards achieving your identified measurable goals.

NOTE TO PARAGRAPH (g)(1): The NPDES permitting authority may determine monitoring requirements for you in accordance with State/Tribal monitoring plans appropriate to your watershed. Participation in a group monitoring program is encouraged.

(2) *Recordkeeping*. You must keep records required by the NPDES permit for at least 3 years. You must submit your records to the NPDES permitting authority only when specifically asked to do so. You must make your records, including a description of your storm water management program, available to the public at reasonable times during regular business hours (see § 122.7 for confidentiality provision). (You may assess a reasonable charge for copying. You may require a member of the public to provide advance notice.)

(3) *Reporting*. Unless you are relying on another entity to satisfy your NPDES permit obligations under § 122.35(a), you must submit annual reports to the NPDES permitting authority for your first permit term. For subsequent permit terms, you must submit reports in year two and four unless the NPDES permitting authority requires more frequent reports. Your report must include:

(i) The status of compliance with permit conditions, an assessment of the appropriateness of your identified best management practices and progress towards achieving your identified measurable goals for each of the minimum control measures;

(ii) Results of information collected and analyzed, including monitoring data, if any, during the reporting period;

(iii) A summary of the storm water activities you plan to undertake during the next reporting cycle;

(iv) A change in any identified best management practices or measurable goals for any of the minimum control measures; and

(v) Notice that you are relying on another governmental entity to satisfy some of your permit obligations (if applicable).

[64 FR 68843, Dec. 8, 1999]

§ 122.35 As an operator of a regulated small MS4, may I share the responsibility to implement the minimum control measures with other entities?

(a) You may rely on another entity to satisfy your NPDES permit obligations to implement a minimum control measure if:

(1) The other entity, in fact, implements the control measure;

(2) The particular control measure, or component thereof, is at least as stringent as the corresponding NPDES permit requirement; and

(3) The other entity agrees to implement the control measure on your behalf. In the reports you must submit under § 122.34(g)(3), you must also specify that you rely on another entity to satisfy some of your permit obligations. If you are relying on another governmental entity regulated under section 122 to satisfy all of your permit obligations, including your obligation to file periodic reports required by § 122.34(g)(3), you must note that fact in your NOI, but you are not required to file the periodic reports. You remain

responsible for compliance with your permit obligations if the other entity fails to implement the control measure (or component thereof). Therefore, EPA encourages you to enter into a legally binding agreement with that entity if you want to minimize any uncertainty about compliance with your permit.

(b) In some cases, the NPDES permitting authority may recognize, either in your individual NPDES permit or in an NPDES general permit, that another governmental entity is responsible under an NPDES permit for implementing one or more of the minimum control measures for your small MS4 or that the permitting authority itself is responsible. Where the permitting authority does so, you are not required to include such minimum control measure(s) in your storm water management program. (For example, if a State or Tribe is subject to an NPDES permit that requires it to administer a program to control construction site runoff at the State or Tribal level and that program satisfies all of the requirements of § 122.34(b)(4), you could avoid responsibility for the construction measure, but would be responsible for the remaining minimum control measures.) Your permit may be reopened and modified to include the requirement to implement a minimum control measure if the entity fails to implement it.

[64 FR 68846, Dec. 8, 1999]

§ 122.36 As an operator of a regulated small MS4, what happens if I don't comply with the application or permit requirements in §§ 122.33 through 122.35?

NPDES permits are federally enforceable. Violators may be subject to the enforcement actions and penalties described in Clean Water Act sections 309 (b), (c), and (g) and 505, or under applicable State, Tribal, or local law. Compliance with a permit issued pursuant to section 402 of the Clean Water Act is deemed compliance, for purposes of sections 309 and 505, with sections 301, 302, 306, 307, and 403, except any standard imposed under section 307 for toxic pollutants injurious to human health. If you are covered as a co-permittee under an individual permit or under a general permit by means of a joint Notice of Intent you remain subject to the enforcement actions and penalties for the failure to comply with the terms of the permit in your jurisdiction except as set forth in § 122.35(b).

[64 FR 68847, Dec. 8, 1999]

§ 122.37 Will the small MS4 storm water program regulations at §§ 122.32 through 122.36 and § 123.35 of this chapter change in the future?

EPA will evaluate the small MS4 regulations at §§ 122.32 through 122.36 and § 123.35 of this chapter after December 10, 2012 and make any necessary revisions. (EPA intends to conduct an enhanced research effort and compile a comprehensive evaluation of the NPDES MS4 storm water program. EPA will re-evaluate the regulations based on data from the NPDES MS4 storm water program, from research on receiving water impacts from storm water, and the effectiveness of best management practices (BMPs), as well as other relevant information sources.)

[64 FR 68847, Dec. 8, 1999]

Subpart C—Permit Conditions

§ 122.41 Conditions applicable to all permits (applicable to State programs, see § 123.25).

The following conditions apply to all NPDES permits. Additional conditions applicable to NPDES permits are in § 122.42. All conditions applicable to NPDES permits shall be incorporated into the permits either expressly or by reference. If incorporated by reference, a specific citation to these regulations (or the corresponding approved State regulations) must be given in the permit.

(a) *Duty to comply*. The permittee must comply with all conditions of this permit. Any permit noncompliance constitutes a violation of the Clean Water Act and is grounds for enforcement action; for permit termination, revocation and reissuance, or modification; or denial of a permit renewal application.

(1) The permittee shall comply with effluent standards or prohibitions established under section 307(a) of the Clean Water Act for toxic pollutants

and with standards for sewage sludge use or disposal established under section 405(d) of the CWA within the time provided in the regulations that establish these standards or prohibitions or standards for sewage sludge use or disposal, even if the permit has not yet been modified to incorporate the requirement.

(2) The Clean Water Act provides that any person who violates section 301, 302, 306, 307, 308, 318 or 405 of the Act, or any permit condition or limitation implementing any such sections in a permit issued under section 402, or any requirement imposed in a pretreatment program approved under sections 402(a)(3) or 402(b)(8) of the Act, is subject to a civil penalty not to exceed $25,000 per day for each violation. The Clean Water Act provides that any person who *negligently* violates sections 301, 302, 306, 307, 308, 318, or 405 of the Act, or any condition or limitation implementing any of such sections in a permit issued under section 402 of the Act, or any requirement imposed in a pretreatment program approved under section 402(a)(3) or 402(b)(8) of the Act, is subject to criminal penalties of $2,500 to $25,000 per day of violation, or imprisonment of not more than 1 year, or both. In the case of a second or subsequent conviction for a negligent violation, a person shall be subject to criminal penalties of not more than $50,000 per day of violation, or by imprisonment of not more than 2 years, or both. Any person who *knowingly* violates such sections, or such conditions or limitations is subject to criminal penalties of $5,000 to $50,000 per day of violation, or imprisonment for not more than 3 years, or both. In the case of a second or subsequent conviction for a knowing violation, a person shall be subject to criminal penalties of not more than $100,000 per day of violation, or imprisonment of not more than 6 years, or both. Any person who knowingly violates section 301, 302, 303, 306, 307, 308, 318 or 405 of the Act, or any permit condition or limitation implementing any of such sections in a permit issued under section 402 of the Act, and who knows at that time that he thereby places another person in imminent danger of death or serious bodily injury, shall, upon conviction, be subject to a fine of not more than $250,000 or imprisonment of not more than 15 years, or both. In the case of a second or subsequent conviction for a knowing endangerment violation, a person shall be subject to a fine of not more than $500,000 or by imprisonment of not more than 30 years, or both. An organization, as defined in section 309(c)(3)(B)(iii) of the CWA, shall, upon conviction of violating the imminent danger provision, be subject to a fine of not more than $1,000,000 and can be fined up to $2,000,000 for second or subsequent convictions.

(3) Any person may be assessed an administrative penalty by the Administrator for violating section 301, 302, 306, 307, 308, 318 or 405 of this Act, or any permit condition or limitation implementing any of such sections in a permit issued under section 402 of this Act. Administrative penalties for Class I violations are not to exceed $10,000 per violation, with the maximum amount of any Class I penalty assessed not to exceed $25,000. Penalties for Class II violations are not to exceed $10,000 per day for each day during which the violation continues, with the maximum amount of any Class II penalty not to exceed $125,000.

(b) *Duty to reapply*. If the permittee wishes to continue an activity regulated by this permit after the expiration date of this permit, the permittee must apply for and obtain a new permit.

(c) *Need to halt or reduce activity not a defense*. It shall not be a defense for a permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.

(d) *Duty to mitigate*. The permittee shall take all reasonable steps to minimize or prevent any discharge or sludge use or disposal in violation of this permit which has a reasonable likelihood of adversely affecting human health or the environment.

(e) *Proper operation and maintenance*. The permittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the permittee to achieve compliance with the conditions

of this permit. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures. This provision requires the operation of back-up or auxiliary facilities or similar systems which are installed by a permittee only when the operation is necessary to achieve compliance with the conditions of the permit.

(f) *Permit actions*. This permit may be modified, revoked and reissued, or terminated for cause. The filing of a request by the permittee for a permit modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance does not stay any permit condition.

(g) *Property rights*. This permit does not convey any property rights of any sort, or any exclusive privilege.

(h) *Duty to provide information*. The permittee shall furnish to the Director, within a reasonable time, any information which the Director may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit or to determine compliance with this permit. The permittee shall also furnish to the Director upon request, copies of records required to be kept by this permit.

(i) *Inspection and entry*. The permittee shall allow the Director, or an authorized representative (including an authorized contractor acting as a representative of the Administrator), upon presentation of credentials and other documents as may be required by law, to:

(1) Enter upon the permittee's premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of this permit;

(2) Have access to and copy, at reasonable times, any records that must be kept under the conditions of this permit;

(3) Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this permit; and

(4) Sample or monitor at reasonable times, for the purposes of assuring permit compliance or as otherwise authorized by the Clean Water Act, any substances or parameters at any location.

(j) *Monitoring and records*. (1) Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity.

(2) Except for records of monitoring information required by this permit related to the permittee's sewage sludge use and disposal activities, which shall be retained for a period of at least five years (or longer as required by 40 CFR part 503), the permittee shall retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this permit, and records of all data used to complete the application for this permit, for a period of at least 3 years from the date of the sample, measurement, report or application. This period may be extended by request of the Director at any time.

(3) Records of monitoring information shall include:

(i) The date, exact place, and time of sampling or measurements;

(ii) The individual(s) who performed the sampling or measurements;

(iii) The date(s) analyses were performed;

(iv) The individual(s) who performed the analyses;

(v) The analytical techniques or methods used; and

(vi) The results of such analyses.

(4) Monitoring must be conducted according to test procedures approved under 40 CFR Part 136 unless another method is required under 40 CFR subchapters N or O.

(5) The Clean Water Act provides that any person who falsifies, tampers with, or knowingly renders inaccurate any monitoring device or method required to be maintained under this permit shall, upon conviction, be punished by a fine of not more than $10,000, or by imprisonment for not more than 2 years, or both. If a conviction of a person is for a violation committed after a first conviction of such person under this paragraph, punishment is a fine of not more than $20,000 per day of violation, or by imprisonment of not more than 4 years, or both.

(k) *Signatory requirement.* (1) All applications, reports, or information submitted to the Director shall be signed and certified. (See § 122.22)

(2) The CWA provides that any person who knowingly makes any false statement, representation, or certification in any record or other document submitted or required to be maintained under this permit, including monitoring reports or reports of compliance or non-compliance shall, upon conviction, be punished by a fine of not more than $10,000 per violation, or by imprisonment for not more than 6 months per violation, or by both.

(l) *Reporting requirements*—(1) *Planned changes.* The permittee shall give notice to the Director as soon as possible of any planned physical alterations or additions to the permitted facility. Notice is required only when:

(i) The alteration or addition to a permitted facility may meet one of the criteria for determining whether a facility is a new source in § 122.29(b); or

(ii) The alteration or addition could significantly change the nature or increase the quantity of pollutants discharged. This notification applies to pollutants which are subject neither to effluent limitations in the permit, nor to notification requirements under § 122.42(a)(1).

(iii) The alteration or addition results in a significant change in the permittee's sludge use or disposal practices, and such alteration, addition, or change may justify the application of permit conditions that are different from or absent in the existing permit, including notification of additional use or disposal sites not reported during the permit application process or not reported pursuant to an approved land application plan;

(2) *Anticipated noncompliance.* The permittee shall give advance notice to the Director of any planned changes in the permitted facility or activity which may result in noncompliance with permit requirements.

(3) *Transfers.* This permit is not transferable to any person except after notice to the Director. The Director may require modification or revocation and reissuance of the permit to change the name of the permittee and incorporate such other requirements as may be necessary under the Clean Water Act. (See § 122.61; in some cases, modification or revocation and reissuance is mandatory.)

(4) *Monitoring reports.* Monitoring results shall be reported at the intervals specified elsewhere in this permit.

(i) Monitoring results must be reported on a Discharge Monitoring Report (DMR) or forms provided or specified by the Director for reporting results of monitoring of sludge use or disposal practices.

(ii) If the permittee monitors any pollutant more frequently than required by the permit using test procedures approved under 40 CFR Part 136, or another method required for an industry-specific waste stream under 40 CFR subchapters N or O, the results of such monitoring shall be included in the calculation and reporting of the data submitted in the DMR or sludge reporting form specified by the Director.

(iii) Calculations for all limitations which require averaging of measurements shall utilize an arithmetic mean unless otherwise specified by the Director in the permit.

(5) *Compliance schedules.* Reports of compliance or noncompliance with, or any progress reports on, interim and final requirements contained in any compliance schedule of this permit shall be submitted no later than 14 days following each schedule date.

(6) *Twenty-four hour reporting.* (i) The permittee shall report any noncompliance which may endanger health or the environment. Any information shall be provided orally within 24 hours from the time the permittee becomes aware of the circumstances. A written submission shall also be provided within 5 days of the time the permittee becomes aware of the circumstances. The written submission shall contain a description of the noncompliance and its cause; the period of noncompliance, including exact dates and times, and if the noncompliance has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance.

(ii) The following shall be included as information which must be reported within 24 hours under this paragraph.

(A) Any unanticipated bypass which exceeds any effluent limitation in the permit. (See § 122.41(g).

(B) Any upset which exceeds any effluent limitation in the permit.

(C) Violation of a maximum daily discharge limitation for any of the pollutants listed by the Director in the permit to be reported within 24 hours. (See § 122.44(g).)

(iii) The Director may waive the written report on a case-by-case basis for reports under paragraph (l)(6)(ii) of this section if the oral report has been received within 24 hours.

(7) *Other noncompliance*. The permittee shall report all instances of noncompliance not reported under paragraphs (l) (4), (5), and (6) of this section, at the time monitoring reports are submitted. The reports shall contain the information listed in paragraph (l)(6) of this section.

(8) *Other information*. Where the permittee becomes aware that it failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application or in any report to the Director, it shall promptly submit such facts or information.

(m) *Bypass*—(1) *Definitions*. (i) *Bypass* means the intentional diversion of waste streams from any portion of a treatment facility.

(ii) *Severe property damage* means substantial physical damage to property, damage to the treatment facilities which causes them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production.

(2) *Bypass not exceeding limitations*. The permittee may allow any bypass to occur which does not cause effluent limitations to be exceeded, but only if it also is for essential maintenance to assure efficient operation. These bypasses are not subject to the provisions of paragraphs (m)(3) and (m)(4) of this section.

(3) *Notice*—(i) *Anticipated bypass*. If the permittee knows in advance of the need for a bypass, it shall submit prior notice, if possible at least ten days before the date of the bypass.

(ii) *Unanticipated bypass*. The permittee shall submit notice of an unanticipated bypass as required in paragraph (l)(6) of this section (24-hour notice).

(4) *Prohibition of bypass*. (i) Bypass is prohibited, and the Director may take enforcement action against a permittee for bypass, unless:

(A) Bypass was unavoidable to prevent loss of life, personal injury, or severe property damage;

(B) There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate back-up equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass which occurred during normal periods of equipment downtime or preventive maintenance; and

(C) The permittee submitted notices as required under paragraph (m)(3) of this section.

(ii) The Director may approve an anticipated bypass, after considering its adverse effects, if the Director determines that it will meet the three conditions listed above in paragraph (m)(4)(i) of this section.

(n) *Upset*—(1) *Definition*. *Upset* means an exceptional incident in which there is unintentional and temporary noncompliance with technology based permit effluent limitations because of factors beyond the reasonable control of the permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation.

(2) *Effect of an upset*. An upset constitutes an affirmative defense to an action brought for noncompliance with such technology based permit effluent limitations if the requirements of paragraph (n)(3) of this section are met. No determination made during administrative review of claims that noncompliance was caused by upset, and

before an action for noncompliance, is final administrative action subject to judicial review.

(3) *Conditions necessary for a demonstration of upset.* A permittee who wishes to establish the affirmative defense of upset shall demonstrate, through properly signed, contemporaneous operating logs, or other relevant evidence that:

(i) An upset occurred and that the permittee can identify the cause(s) of the upset;

(ii) The permitted facility was at the time being properly operated; and

(iii) The permittee submitted notice of the upset as required in paragraph (1)(6)(ii)(B) of this section (24 hour notice).

(iv) The permittee complied with any remedial measures required under paragraph (d) of this section.

(4) *Burden of proof.* In any enforcement proceeding the permittee seeking to establish the occurrence of an upset has the burden of proof.

(Clean Water Act (33 U.S.C. 1251 *et seq.*), Safe Drinking Water Act (42 U.S.C. 300f *et seq.*), Clean Air Act (42 U.S.C. 7401 *et seq.*), Resource Conservation and Recovery Act (42 U.S.C. 6901 *et seq.*))

[48 FR 14153, Apr. 1, 1983, as amended at 48 FR 39620, Sept. 1, 1983; 49 FR 38049, Sept. 26, 1984; 50 FR 4514, Jan. 31, 1985; 50 FR 6940, Feb. 19, 1985; 54 FR 255, Jan. 4, 1989; 54 FR 18783, May 2, 1989; 65 FR 30908, May 15, 2000; 72 FR 11211, Mar. 12, 2007]

§ 122.42 Additional conditions applicable to specified categories of NPDES permits (applicable to State NPDES programs, see § 123.25).

The following conditions, in addition to those set forth in § 122.41, apply to all NPDES permits within the categories specified below:

(a) *Existing manufacturing, commercial, mining, and silvicultural dischargers.* In addition to the reporting requirements under § 122.41(1), all existing manufacturing, commercial, mining, and silvicultural dischargers must notify the Director as soon as they know or have reason to believe:

(1) That any activity has occurred or will occur which would result in the discharge, on a routine or frequent basis, of any toxic pollutant which is not limited in the permit, if that discharge will exceed the highest of the following ''notification levels'':

(i) One hundred micrograms per liter (100 μg/l);

(ii) Two hundred micrograms per liter (200 μg/l) for acrolein and acrylonitrile; five hundred micrograms per liter (500 μg/l) for 2,4-dinitrophenol and for 2-methyl-4,6-dinitrophenol; and one milligram per liter (1 mg/l) for antimony;

(iii) Five (5) times the maximum concentration value reported for that pollutant in the permit application in accordance with § 122.21(g)(7); or

(iv) The level established by the Director in accordance with § 122.44(f).

(2) That any activity has occurred or will occur which would result in any discharge, on a non-routine or infrequent basis, of a toxic pollutant which is not limited in the permit, if that discharge will exceed the highest of the following ''notification levels'':

(i) Five hundred micrograms per liter (500 μg/l);

(ii) One milligram per liter (1 mg/l) for antimony;

(iii) Ten (10) times the maximum concentration value reported for that pollutant in the permit application in accordance with § 122.21(g)(7).

(iv) The level established by the Director in accordance with § 122.44(f).

(b) *Publicly owned treatment works.* All POTWs must provide adequate notice to the Director of the following:

(1) Any new introduction of pollutants into the POTW from an indirect discharger which would be subject to section 301 or 306 of CWA if it were directly discharging those pollutants; and

(2) Any substantial change in the volume or character of pollutants being introduced into that POTW by a source introducing pollutants into the POTW at the time of issuance of the permit.

(3) For purposes of this paragraph, adequate notice shall include information on (i) the quality and quantity of effluent introduced into the POTW, and (ii) any anticipated impact of the change on the quantity or quality of effluent to be discharged from the POTW.

(c) *Municipal separate storm sewer systems.* The operator of a large or medium municipal separate storm sewer

system or a municipal separate storm sewer that has been designated by the Director under §122.26(a)(1)(v) of this part must submit an annual report by the anniversary of the date of the issuance of the permit for such system. The report shall include:

(1) The status of implementing the components of the storm water management program that are established as permit conditions;

(2) Proposed changes to the storm water management programs that are established as permit condition. Such proposed changes shall be consistent with §122.26(d)(2)(iii) of this part; and

(3) Revisions, if necessary, to the assessment of controls and the fiscal analysis reported in the permit application under §122.26(d)(2)(iv) and (d)(2)(v) of this part;

(4) A summary of data, including monitoring data, that is accumulated throughout the reporting year;

(5) Annual expenditures and budget for year following each annual report;

(6) A summary describing the number and nature of enforcement actions, inspections, and public education programs;

(7) Identification of water quality improvements or degradation;

(d) *Storm water discharges*. The initial permits for discharges composed entirely of storm water issued pursuant to §122.26(e)(7) of this part shall require compliance with the conditions of the permit as expeditiously as practicable, but in no event later than three years after the date of issuance of the permit.

(e) *Concentrated animal feeding operations (CAFOs)*. Any permit issued to a CAFO must include the requirements in paragraphs (e)(1) through (e)(6) of this section.

(1) *Requirement to implement a nutrient management plan*. Any permit issued to a CAFO must include a requirement to implement a nutrient management plan that, at a minimum, contains best management practices necessary to meet the requirements of this paragraph and applicable effluent limitations and standards, including those specified in 40 CFR part 412. The nutrient management plan must, to the extent applicable:

(i) Ensure adequate storage of manure, litter, and process wastewater, including procedures to ensure proper operation and maintenance of the storage facilities;

(ii) Ensure proper management of mortalities (*i.e.*, dead animals) to ensure that they are not disposed of in a liquid manure, storm water, or process wastewater storage or treatment system that is not specifically designed to treat animal mortalities;

(iii) Ensure that clean water is diverted, as appropriate, from the production area;

(iv) Prevent direct contact of confined animals with waters of the United States;

(v) Ensure that chemicals and other contaminants handled on-site are not disposed of in any manure, litter, process wastewater, or storm water storage or treatment system unless specifically designed to treat such chemicals and other contaminants;

(vi) Identify appropriate site specific conservation practices to be implemented, including as appropriate buffers or equivalent practices, to control runoff of pollutants to waters of the United States;

(vii) Identify protocols for appropriate testing of manure, litter, process wastewater, and soil;

(viii) Establish protocols to land apply manure, litter or process wastewater in accordance with site specific nutrient management practices that ensure appropriate agricultural utilization of the nutrients in the manure, litter or process wastewater; and

(ix) Identify specific records that will be maintained to document the implementation and management of the minimum elements described in paragraphs (e)(1)(i) through (e)(1)(viii) of this section.

(2) *Recordkeeping requirements*. (i) The permittee must create, maintain for five years, and make available to the Director, upon request, the following records:

(A) All applicable records identified pursuant paragraph (e)(1)(ix) of this section;

(B) In addition, all CAFOs subject to 40 CFR part 412 must comply with

record keeping requirements as specified in §412.37(b) and (c) and §412.47(b) and (c).

(ii) A copy of the CAFO's site-specific nutrient management plan must be maintained on site and made available to the Director upon request.

(3) *Requirements relating to transfer of manure or process wastewater to other persons*. Prior to transferring manure, litter or process wastewater to other persons, Large CAFOs must provide the recipient of the manure, litter or process wastewater with the most current nutrient analysis. The analysis provided must be consistent with the requirements of 40 CFR part 412. Large CAFOs must retain for five years records of the date, recipient name and address, and approximate amount of manure, litter or process wastewater transferred to another person.

(4) *Annual reporting requirements for CAFOs*. The permittee must submit an annual report to the Director. The annual report must include:

(i) The number and type of animals, whether in open confinement or housed under roof (beef cattle, broilers, layers, swine weighing 55 pounds or more, swine weighing less than 55 pounds, mature dairy cows, dairy heifers, veal calves, sheep and lambs, horses, ducks, turkeys, other);

(ii) Estimated amount of total manure, litter and process wastewater generated by the CAFO in the previous 12 months (tons/gallons);

(iii) Estimated amount of total manure, litter and process wastewater transferred to other person by the CAFO in the previous 12 months (tons/gallons);

(iv) Total number of acres for land application covered by the nutrient management plan developed in accordance with paragraph (e)(1) of this section;

(v) Total number of acres under control of the CAFO that were used for land application of manure, litter and process wastewater in the previous 12 months;

(vi) Summary of all manure, litter and process wastewater discharges from the production area that have occurred in the previous 12 months, including date, time, and approximate volume; and

(vii) A statement indicating whether the current version of the CAFO's nutrient management plan was developed or approved by a certified nutrient management planner; and

(viii) The actual crop(s) planted and actual yield(s) for each field, the actual nitrogen and phosphorus content of the manure, litter, and process wastewater, the results of calculations conducted in accordance with paragraphs (e)(5)(i)(B) and (e)(5)(ii)(D) of this section, and the amount of manure, litter, and process wastewater applied to each field during the previous 12 months; and, for any CAFO that implements a nutrient management plan that addresses rates of application in accordance with paragraph (e)(5)(ii) of this section, the results of any soil testing for nitrogen and phosphorus taken during the preceding 12 months, the data used in calculations conducted in accordance with paragraph (e)(5)(ii)(D) of this section, and the amount of any supplemental fertilizer applied during the previous 12 months.

(5) *Terms of the nutrient management plan*. Any permit issued to a CAFO must require compliance with the terms of the CAFO's site-specific nutrient management plan. The terms of the nutrient management plan are the information, protocols, best management practices, and other conditions in the nutrient management plan determined by the Director to be necessary to meet the requirements of paragraph (e)(1) of this section. The terms of the nutrient management plan, with respect to protocols for land application of manure, litter, or process wastewater required by paragraph (e)(1)(viii) of this section and, as applicable, 40 CFR 412.4(c), must include the fields available for land application; field-specific rates of application properly developed, as specified in paragraphs (e)(5)(i) through (ii) of this section, to ensure appropriate agricultural utilization of the nutrients in the manure, litter, or process wastewater; and any timing limitations identified in the nutrient management plan concerning land application on the fields available for land application. The terms must address rates of application using one of the following two approaches, unless

the Director specifies that only one of these approaches may be used:

(i) *Linear approach.* An approach that expresses rates of application as pounds of nitrogen and phosphorus, according to the following specifications:

(A) The terms include maximum application rates from manure, litter, and process wastewater for each year of permit coverage, for each crop identified in the nutrient management plan, in chemical forms determined to be acceptable to the Director, in pounds per acre, per year, for each field to be used for land application, and certain factors necessary to determine such rates. At a minimum, the factors that are terms must include: The outcome of the field-specific assessment of the potential for nitrogen and phosphorus transport from each field; the crops to be planted in each field or any other uses of a field such as pasture or fallow fields; the realistic yield goal for each crop or use identified for each field; the nitrogen and phosphorus recommendations from sources specified by the Director for each crop or use identified for each field; credits for all nitrogen in the field that will be plant available; consideration of multi-year phosphorus application; and accounting for all other additions of plant available nitrogen and phosphorus to the field. In addition, the terms include the form and source of manure, litter, and process wastewater to be land-applied; the timing and method of land application; and the methodology by which the nutrient management plan accounts for the amount of nitrogen and phosphorus in the manure, litter, and process wastewater to be applied.

(B) Large CAFOs that use this approach must calculate the maximum amount of manure, litter, and process wastewater to be land applied at least once each year using the results of the most recent representative manure, litter, and process wastewater tests for nitrogen and phosphorus taken within 12 months of the date of land application; or

(ii) *Narrative rate approach.* An approach that expresses rates of application as a narrative rate of application that results in the amount, in tons or gallons, of manure, litter, and process wastewater to be land applied, according to the following specifications:

(A) The terms include maximum amounts of nitrogen and phosphorus derived from all sources of nutrients, for each crop identified in the nutrient management plan, in chemical forms determined to be acceptable to the Director, in pounds per acre, for each field, and certain factors necessary to determine such amounts. At a minimum, the factors that are terms must include: the outcome of the field-specific assessment of the potential for nitrogen and phosphorus transport from each field; the crops to be planted in each field or any other uses such as pasture or fallow fields (including alternative crops identified in accordance with paragraph (e)(5)(ii)(B) of this section); the realistic yield goal for each crop or use identified for each field; and the nitrogen and phosphorus recommendations from sources specified by the Director for each crop or use identified for each field. In addition, the terms include the methodology by which the nutrient management plan accounts for the following factors when calculating the amounts of manure, litter, and process wastewater to be land applied: Results of soil tests conducted in accordance with protocols identified in the nutrient management plan, as required by paragraph (e)(1)(vii) of this section; credits for all nitrogen in the field that will be plant available; the amount of nitrogen and phosphorus in the manure, litter, and process wastewater to be applied; consideration of multi-year phosphorus application; accounting for all other additions of plant available nitrogen and phosphorus to the field; the form and source of manure, litter, and process wastewater; the timing and method of land application; and volatilization of nitrogen and mineralization of organic nitrogen.

(B) The terms of the nutrient management plan include alternative crops identified in the CAFO's nutrient management plan that are not in the planned crop rotation. Where a CAFO includes alternative crops in its nutrient management plan, the crops must be listed by field, in addition to the crops identified in the planned crop rotation for that field, and the nutrient

management plan must include realistic crop yield goals and the nitrogen and phosphorus recommendations from sources specified by the Director for each crop. Maximum amounts of nitrogen and phosphorus from all sources of nutrients and the amounts of manure, litter, and process wastewater to be applied must be determined in accordance with the methodology described in paragraph (e)(5)(ii)(A) of this section.

(C) For CAFOs using this approach, the following projections must be included in the nutrient management plan submitted to the Director, but are not terms of the nutrient management plan: The CAFO's planned crop rotations for each field for the period of permit coverage; the projected amount of manure, litter, or process wastewater to be applied; projected credits for all nitrogen in the field that will be plant available; consideration of multiyear phosphorus application; accounting for all other additions of plant available nitrogen and phosphorus to the field; and the predicted form, source, and method of application of manure, litter, and process wastewater for each crop. Timing of application for each field, insofar as it concerns the calculation of rates of application, is not a term of the nutrient management plan.

(D) CAFOs that use this approach must calculate maximum amounts of manure, litter, and process wastewater to be land applied at least once each year using the methodology required in paragraph (e)(5)(ii)(A) of this section before land applying manure, litter, and process wastewater and must rely on the following data:

(*1*) A field-specific determination of soil levels of nitrogen and phosphorus, including, for nitrogen, a concurrent determination of nitrogen that will be plant available consistent with the methodology required by paragraph (e)(5)(ii)(A) of this section, and for phosphorus, the results of the most recent soil test conducted in accordance with soil testing requirements approved by the Director; and

(*2*) The results of most recent representative manure, litter, and process wastewater tests for nitrogen and phosphorus taken within 12 months of the date of land application, in order to determine the amount of nitrogen and phosphorus in the manure, litter, and process wastewater to be applied.

(6) *Changes to a nutrient management plan*. Any permit issued to a CAFO must require the following procedures to apply when a CAFO owner or operator makes changes to the CAFO's nutrient management plan previously submitted to the Director:

(i) The CAFO owner or operator must provide the Director with the most current version of the CAFO's nutrient management plan and identify changes from the previous version, except that the results of calculations made in accordance with the requirements of paragraphs (e)(5)(i)(B) and (e)(5)(ii)(D) of this section are not subject to the requirements of paragraph (e)(6) of this section.

(ii) The Director must review the revised nutrient management plan to ensure that it meets the requirements of this section and applicable effluent limitations and standards, including those specified in 40 CFR part 412, and must determine whether the changes to the nutrient management plan necessitate revision to the terms of the nutrient management plan incorporated into the permit issued to the CAFO. If revision to the terms of the nutrient management plan is not necessary, the Director must notify the CAFO owner or operator and upon such notification the CAFO may implement the revised nutrient management plan. If revision to the terms of the nutrient management plan is necessary, the Director must determine whether such changes are substantial changes as described in paragraph (e)(6)(iii) of this section.

(A) If the Director determines that the changes to the terms of the nutrient management plan are not substantial, the Director must make the revised nutrient management plan publicly available and include it in the permit record, revise the terms of the nutrient management plan incorporated into the permit, and notify the owner or operator and inform the public of any changes to the terms of the nutrient management plan that are incorporated into the permit.

(B) If the Director determines that the changes to the terms of the nutrient management plan are substantial, the Director must notify the public and make the proposed changes and the information submitted by the CAFO owner or operator available for public review and comment. The process for public comments, hearing requests, and the hearing process if a hearing is held must follow the procedures applicable to draft permits set forth in 40 CFR 124.11 through 124.13. The Director may establish, either by regulation or in the CAFO's permit, an appropriate period of time for the public to comment and request a hearing on the proposed changes that differs from the time period specified in 40 CFR 124.10. The Director must respond to all significant comments received during the comment period as provided in 40 CFR 124.17, and require the CAFO owner or operator to further revise the nutrient management plan if necessary, in order to approve the revision to the terms of the nutrient management plan incorporated into the CAFO's permit. Once the Director incorporates the revised terms of the nutrient management plan into the permit, the Director must notify the owner or operator and inform the public of the final decision concerning revisions to the terms and conditions of the permit.

(iii) Substantial changes to the terms of a nutrient management plan incorporated as terms and conditions of a permit include, but are not limited to:

(A) Addition of new land application areas not previously included in the CAFO's nutrient management plan. Except that if the land application area that is being added to the nutrient management plan is covered by terms of a nutrient management plan incorporated into an existing NPDES permit in accordance with the requirements of paragraph (e)(5) of this section, and the CAFO owner or operator applies manure, litter, or process wastewater on the newly added land application area in accordance with the existing field-specific permit terms applicable to the newly added land application area, such addition of new land would be a change to the new CAFO owner or operator's nutrient management plan but not a substantial change for purposes of this section;

(B) Any changes to the field-specific maximum annual rates for land application, as set forth in paragraphs (e)(5)(i) of this section, and to the maximum amounts of nitrogen and phosphorus derived from all sources for each crop, as set forth in paragraph (e)(5)(ii) of this section;

(C) Addition of any crop or other uses not included in the terms of the CAFO's nutrient management plan and corresponding field-specific rates of application expressed in accordance with paragraph (e)(5) of this section; and

(D) Changes to site-specific components of the CAFO's nutrient management plan, where such changes are likely to increase the risk of nitrogen and phosphorus transport to waters of the U.S.

(iv) *For EPA-issued permits only*. Upon incorporation of the revised terms of the nutrient management plan into the permit, 40 CFR 124.19 specifies procedures for appeal of the permit decision. In addition to the procedures specified at 40 CFR 124.19, a person must have submitted comments or participated in the public hearing in order to appeal the permit decision.

[48 FR 14153, Apr. 1, 1983, as amended at 49 FR 38049, Sept. 26, 1984; 50 FR 4514, Jan. 31, 1985; 55 FR 48073, Nov. 16, 1990; 57 FR 60448, Dec. 18, 1992; 68 FR 7268, Feb. 12, 2003; 71 FR 6984, Feb. 10, 2006; 72 FR 40250, July 24, 2007; 73 FR 70483, Nov. 20, 2008]

§ 122.43 Establishing permit conditions (applicable to State programs, see § 123.25).

(a) In addition to conditions required in all permits (§§ 122.41 and 122.42), the Director shall establish conditions, as required on a case-by-case basis, to provide for and assure compliance with all applicable requirements of CWA and regulations. These shall include conditions under §§ 122.46 (duration of permits), 122.47(a) (schedules of compliance), 122.48 (monitoring), and for EPA permits only 122.47(b) (alternates schedule of compliance) and 122.49 (considerations under Federal law).

(b)(1) For a State issued permit, an applicable requirement is a State statutory or regulatory requirement which

takes effect prior to final administrative disposition of a permit. For a permit issued by EPA, an applicable requirement is a statutory or regulatory requirement (including any interim final regulation) which takes effect prior to the issuance of the permit. Section 124.14 (reopening of comment period) provides a means for reopening EPA permit proceedings at the discretion of the Director where new requirements become effective during the permitting process and are of sufficient magnitude to make additional proceedings desirable. For State and EPA administered programs, an applicable requirement is also any requirement which takes effect prior to the modification or revocation and reissuance of a permit, to the extent allowed in § 122.62.

(2) New or reissued permits, and to the extent allowed under § 122.62 modified or revoked and reissued permits, shall incorporate each of the applicable requirements referenced in §§ 122.44 and 122.45.

(c) *Incorporation*. All permit conditions shall be incorporated either expressly or by reference. If incorporated by reference, a specific citation to the applicable regulations or requirements must be given in the permit.

[48 FR 14153, Apr. 1, 1983, as amended at 65 FR 30908, May 15, 2000]

§ 122.44 Establishing limitations, standards, and other permit conditions (applicable to State NPDES programs, see § 123.25).

In addition to the conditions established under § 122.43(a), each NPDES permit shall include conditions meeting the following requirements when applicable.

(a)(1) *Technology-based effluent limitations and standards* based on: effluent limitations and standards promulgated under section 301 of the CWA, or new source performance standards promulgated under section 306 of CWA, on case-by-case effluent limitations determined under section 402(a)(1) of CWA, or a combination of the three, in accordance with § 125.3 of this chapter. For new sources or new dischargers, these technology based limitations and standards are subject to the provisions of § 122.29(d) (protection period).

(2) *Monitoring waivers for certain guideline-listed pollutants*. (i) The Director may authorize a discharger subject to technology-based effluent limitations guidelines and standards in an NPDES permit to forego sampling of a pollutant found at 40 CFR Subchapter N of this chapter if the discharger has demonstrated through sampling and other technical factors that the pollutant is not present in the discharge or is present only at background levels from intake water and without any increase in the pollutant due to activities of the discharger.

(ii) This waiver is good only for the term of the permit and is not available during the term of the first permit issued to a discharger.

(iii) Any request for this waiver must be submitted when applying for a reissued permit or modification of a reissued permit. The request must demonstrate through sampling or other technical information, including information generated during an earlier permit term that the pollutant is not present in the discharge or is present only at background levels from intake water and without any increase in the pollutant due to activities of the discharger.

(iv) Any grant of the monitoring waiver must be included in the permit as an express permit condition and the reasons supporting the grant must be documented in the permit's fact sheet or statement of basis.

(v) This provision does not supersede certification processes and requirements already established in existing effluent limitations guidelines and standards.

(b)(1) *Other effluent limitations and standards* under sections 301, 302, 303, 307, 318 and 405 of CWA. If any applicable toxic effluent standard or prohibition (including any schedule of compliance specified in such effluent standard or prohibition) is promulgated under section 307(a) of CWA for a toxic pollutant and that standard or prohibition is more stringent than any limitation on the pollutant in the permit, the Director shall institute proceedings under these regulations to modify or revoke and reissue the permit to conform to the toxic effluent standard or prohibition. See also § 122.41(a).

(2) *Standards for sewage sludge use or disposal* under section 405(d) of the CWA unless those standards have been included in a permit issued under the appropriate provisions of subtitle C of the Solid Waste Disposal Act, Part C of Safe Drinking Water Act, the Marine Protection, Research, and Sanctuaries Act of 1972, or the Clean Air Act, or under State permit programs approved by the Administrator. When there are no applicable standards for sewage sludge use or disposal, the permit may include requirements developed on a case-by-case basis to protect public health and the environment from any adverse effects which may occur from toxic pollutants in sewage sludge. If any applicable standard for sewage sludge use or disposal is promulgated under section 405(d) of the CWA and that standard is more stringent than any limitation on the pollutant or practice in the permit, the Director may initiate proceedings under these regulations to modify or revoke and reissue the permit to conform to the standard for sewage sludge use or disposal.

(3) Requirements applicable to cooling water intake structures under section 316(b) of the CWA, in accordance with part 125, subparts I, J, and N of this chapter.

(c) *Reopener clause:* For any permit issued to a treatment works treating domestic sewage (including ''sludge-only facilities''), the Director shall include a reopener clause to incorporate any applicable standard for sewage sludge use or disposal promulgated under section 405(d) of the CWA. The Director may promptly modify or revoke and reissue any permit containing the reopener clause required by this paragraph if the standard for sewage sludge use or disposal is more stringent than any requirements for sludge use or disposal in the permit, or controls a pollutant or practice not limited in the permit.

(d) *Water quality standards and State requirements:* any requirements in addition to or more stringent than promulgated effluent limitations guidelines or standards under sections 301, 304, 306, 307, 318 and 405 of CWA necessary to:

(1) Achieve water quality standards established under section 303 of the CWA, including State narrative criteria for water quality.

(i) Limitations must control all pollutants or pollutant parameters (either conventional, nonconventional, or toxic pollutants) which the Director determines are or may be discharged at a level which will cause, have the reasonable potential to cause, or contribute to an excursion above any State water quality standard, including State narrative criteria for water quality.

(ii) When determining whether a discharge causes, has the reasonable potential to cause, or contributes to an in-stream excursion above a narrative or numeric criteria within a State water quality standard, the permitting authority shall use procedures which account for existing controls on point and nonpoint sources of pollution, the variability of the pollutant or pollutant parameter in the effluent, the sensitivity of the species to toxicity testing (when evaluating whole effluent toxicity), and where appropriate, the dilution of the effluent in the receiving water.

(iii) When the permitting authority determines, using the procedures in paragraph (d)(1)(ii) of this section, that a discharge causes, has the reasonable potential to cause, or contributes to an in-stream excursion above the allowable ambient concentration of a State numeric criteria within a State water quality standard for an individual pollutant, the permit must contain effluent limits for that pollutant.

(iv) When the permitting authority determines, using the procedures in paragraph (d)(1)(ii) of this section, that a discharge causes, has the reasonable potential to cause, or contributes to an in-stream excursion above the numeric criterion for whole effluent toxicity, the permit must contain effluent limits for whole effluent toxicity.

(v) Except as provided in this subparagraph, when the permitting authority determines, using the procedures in paragraph (d)(1)(ii) of this section, toxicity testing data, or other information, that a discharge causes, has the reasonable potential to cause, or contributes to an in-stream excursion above a narrative criterion within an

applicable State water quality standard, the permit must contain effluent limits for whole effluent toxicity. Limits on whole effluent toxicity are not necessary where the permitting authority demonstrates in the fact sheet or statement of basis of the NPDES permit, using the procedures in paragraph (d)(1)(ii) of this section, that chemical-specific limits for the effluent are sufficient to attain and maintain applicable numeric and narrative State water quality standards.

(vi) Where a State has not established a water quality criterion for a specific chemical pollutant that is present in an effluent at a concentration that causes, has the reasonable potential to cause, or contributes to an excursion above a narrative criterion within an applicable State water quality standard, the permitting authority must establish effluent limits using one or more of the following options:

(A) Establish effluent limits using a calculated numeric water quality criterion for the pollutant which the permitting authority demonstrates will attain and maintain applicable narrative water quality criteria and will fully protect the designated use. Such a criterion may be derived using a proposed State criterion, or an explicit State policy or regulation interpreting its narrative water quality criterion, supplemented with other relevant information which may include: EPA's Water Quality Standards Handbook, October 1983, risk assessment data, exposure data, information about the pollutant from the Food and Drug Administration, and current EPA criteria documents; or

(B) Establish effluent limits on a case-by-case basis, using EPA's water quality criteria, published under section 304(a) of the CWA, supplemented where necessary by other relevant information; or

(C) Establish effluent limitations on an indicator parameter for the pollutant of concern, provided:

(*1*) The permit identifies which pollutants are intended to be controlled by the use of the effluent limitation;

(*2*) The fact sheet required by § 124.56 sets forth the basis for the limit, including a finding that compliance with the effluent limit on the indicator parameter will result in controls on the pollutant of concern which are sufficient to attain and maintain applicable water quality standards;

(*3*) The permit requires all effluent and ambient monitoring necessary to show that during the term of the permit the limit on the indicator parameter continues to attain and maintain applicable water quality standards; and

(*4*) The permit contains a reopener clause allowing the permitting authority to modify or revoke and reissue the permit if the limits on the indicator parameter no longer attain and maintain applicable water quality standards.

(vii) When developing water quality-based effluent limits under this paragraph the permitting authority shall ensure that:

(A) The level of water quality to be achieved by limits on point sources established under this paragraph is derived from, and complies with all applicable water quality standards; and

(B) Effluent limits developed to protect a narrative water quality criterion, a numeric water quality criterion, or both, are consistent with the assumptions and requirements of any available wasteload allocation for the discharge prepared by the State and approved by EPA pursuant to 40 CFR 130.7.

(2) Attain or maintain a specified water quality through water quality related effluent limits established under section 302 of CWA;

(3) Conform to the conditions to a State certification under section 401 of the CWA that meets the requirements of § 124.53 when EPA is the permitting authority. If a State certification is stayed by a court of competent jurisdiction or an appropriate State board or agency, EPA shall notify the State that the Agency will deem certification waived unless a finally effective State certification is received within sixty days from the date of the notice. If the State does not forward a finally effective certification within the sixty day period, EPA shall include conditions in the permit that may be necessary to meet EPA's obligation under section 301(b)(1)(C) of the CWA;

(4) Conform to applicable water quality requirements under section 401(a)(2)

of CWA when the discharge affects a State other than the certifying State;

(5) Incorporate any more stringent limitations, treatment standards, or schedule of compliance requirements established under Federal or State law or regulations in accordance with section 301(b)(1)(C) of CWA;

(6) Ensure consistency with the requirements of a Water Quality Management plan approved by EPA under section 208(b) of CWA;

(7) Incorporate section 403(c) criteria under part 125, subpart M, for ocean discharges;

(8) Incorporate alternative effluent limitations or standards where warranted by ''fundamentally different factors,'' under 40 CFR part 125, subpart D;

(9) Incorporate any other appropriate requirements, conditions, or limitations (other than effluent limitations) into a new source permit to the extent allowed by the National Environmental Policy Act, 42 U.S.C. 4321 *et seq.* and section 511 of the CWA, when EPA is the permit issuing authority. (See § 122.29(c)).

(e) *Technology-based controls for toxic pollutants.* Limitations established under paragraphs (a), (b), or (d) of this section, to control pollutants meeting the criteria listed in paragraph (e)(1) of this section. Limitations will be established in accordance with paragraph (e)(2) of this section. An explanation of the development of these limitations shall be included in the fact sheet under § 124.56(b)(1)(i).

(1) Limitations must control all toxic pollutants which the Director determines (based on information reported in a permit application under § 122.21(g)(7) or in a notification under § 122.42(a)(1) or on other information) are or may be discharged at a level greater than the level which can be achieved by the technology-based treatment requirements appropriate to the permittee under § 125.3(c) of this chapter; or

(2) The requirement that the limitations control the pollutants meeting the criteria of paragraph (e)(1) of this section will be satisfied by:

(i) Limitations on those pollutants; or

(ii) Limitations on other pollutants which, in the judgment of the Director, will provide treatment of the pollutants under paragraph (e)(1) of this section to the levels required by § 125.3(c).

(f) *Notification level.* A ''notification level'' which exceeds the notification level of § 122.42(a)(1)(i), (ii) or (iii), upon a petition from the permittee or on the Director's initiative. This new notification level may not exceed the level which can be achieved by the technology-based treatment requirements appropriate to the permittee under § 125.3(c)

(g) *Twenty-four hour reporting.* Pollutants for which the permittee must report violations of maximum daily discharge limitations under § 122.41(1)(6)(ii)(C) (24-hour reporting) shall be listed in the permit. This list shall include any toxic pollutant or hazardous substance, or any pollutant specifically identified as the method to control a toxic pollutant or hazardous substance.

(h) *Durations* for permits, as set forth in § 122.46.

(i) *Monitoring requirements.* In addition to § 122.48, the following monitoring requirements:

(1) To assure compliance with permit limitations, requirements to monitor:

(i) The mass (or other measurement specified in the permit) for each pollutant limited in the permit;

(ii) The volume of effluent discharged from each outfall;

(iii) Other measurements as appropriate including pollutants in internal waste streams under § 122.45(i); pollutants in intake water for net limitations under § 122.45(f); frequency, rate of discharge, etc., for noncontinuous discharges under § 122.45(e); pollutants subject to notification requirements under § 122.42(a); and pollutants in sewage sludge or other monitoring as specified in 40 CFR part 503; or as determined to be necessary on a case-by-case basis pursuant to section 405(d)(4) of the CWA.

(iv) According to test procedures approved under 40 CFR Part 136 for the analyses of pollutants or another method is required under 40 CFR subchapters N or O. In the case of pollutants for which there are no approved

methods under 40 CFR Part 136 or otherwise required under 40 CFR subchapters N or O, monitoring must be conducted according to a test procedure specified in the permit for such pollutants.

(2) Except as provided in paragraphs (i)(4) and (i)(5) of this section, requirements to report monitoring results shall be established on a case-by-case basis with a frequency dependent on the nature and effect of the discharge, but in no case less than once a year. For sewage sludge use or disposal practices, requirements to monitor and report results shall be established on a case-by-case basis with a frequency dependent on the nature and effect of the sewage sludge use or disposal practice; minimally this shall be as specified in 40 CFR part 503 (where applicable), but in no case less than once a year.

(3) Requirements to report monitoring results for storm water discharges associated with industrial activity which are subject to an effluent limitation guideline shall be established on a case-by-case basis with a frequency dependent on the nature and effect of the discharge, but in no case less than once a year.

(4) Requirements to report monitoring results for storm water discharges associated with industrial activity (other than those addressed in paragraph (i)(3) of this section) shall be established on a case-by-case basis with a frequency dependent on the nature and effect of the discharge. At a minimum, a permit for such a discharge must require:

(i) The discharger to conduct an annual inspection of the facility site to identify areas contributing to a storm water discharge associated with industrial activity and evaluate whether measures to reduce pollutant loadings identified in a storm water pollution prevention plan are adequate and properly implemented in accordance with the terms of the permit or whether additional control measures are needed;

(ii) The discharger to maintain for a period of three years a record summarizing the results of the inspection and a certification that the facility is in compliance with the plan and the permit, and identifying any incidents of non-compliance;

(iii) Such report and certification be signed in accordance with § 122.22; and

(iv) Permits for storm water discharges associated with industrial activity from inactive mining operations may, where annual inspections are impracticable, require certification once every three years by a Registered Professional Engineer that the facility is in compliance with the permit, or alternative requirements.

(5) Permits which do not require the submittal of monitoring result reports at least annually shall require that the permittee report all instances of noncompliance not reported under § 122.41(l) (1), (4), (5), and (6) at least annually.

(j) *Pretreatment program for POTWs.* Requirements for POTWs to:

(1) Identify, in terms of character and volume of pollutants, any Significant Industrial Users discharging into the POTW subject to Pretreatment Standards under section 307(b) of CWA and 40 CFR part 403.

(2)(i) Submit a local program when required by and in accordance with 40 CFR part 403 to assure compliance with pretreatment standards to the extent applicable under section 307(b). The local program shall be incorporated into the permit as described in 40 CFR part 403. The program must require all indirect dischargers to the POTW to comply with the reporting requirements of 40 CFR part 403.

(ii) Provide a written technical evaluation of the need to revise local limits under 40 CFR 403.5(c)(1), following permit issuance or reissuance.

(3) For POTWs which are ''sludge-only facilities,'' a requirement to develop a pretreatment program under 40 CFR part 403 when the Director determines that a pretreatment program is necessary to assure compliance with Section 405(d) of the CWA.

(k) *Best management practices (BMPs)* to control or abate the discharge of pollutants when:

(1) Authorized under section 304(e) of the CWA for the control of toxic pollutants and hazardous substances from ancillary industrial activities;

(2) Authorized under section 402(p) of the CWA for the control of storm water discharges;

(3) Numeric effluent limitations are infeasible; or

(4) The practices are reasonably necessary to achieve effluent limitations and standards or to carry out the purposes and intent of the CWA.

NOTE TO PARAGRAPH (k)(4): Additional technical information on BMPs and the elements of BMPs is contained in the following documents: Guidance Manual for Developing Best Management Practices (BMPs), October 1993, EPA No. 833/B–93–004, NTIS No. PB 94–178324, ERIC No. W498); Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices, September 1992, EPA No. 832/R–92–005, NTIS No. PB 92–235951, ERIC No. N482); Storm Water Management for Construction Activities, Developing Pollution Prevention Plans and Best Management Practices: Summary Guidance, EPA No. 833/R–92–001, NTIS No. PB 93–223550; ERIC No. W139; Storm Water Management for Industrial Activities, Developing Pollution Prevention Plans and Best Management Practices, September 1992; EPA 832/R–92–006, NTIS No. PB 92–235969, ERIC No. N477; Storm Water Management for Industrial Activities, Developing Pollution Prevention Plans and Best Management Practices: Summary Guidance, EPA 833/R–92–002, NTIS No. PB 94–133782; ERIC No. W492. Copies of those documents (or directions on how to obtain them) can be obtained by contacting either the Office of Water Resource Center (using the EPA document number as a reference) at (202) 260–7786; or the Educational Resources Information Center (ERIC) (using the ERIC number as a reference) at (800) 276–0462. Updates of these documents or additional BMP documents may also be available. A list of EPA BMP guidance documents is available on the OWM Home Page at *http://www.epa.gov/owm*. In addition, States may have BMP guidance documents.

These EPA guidance documents are listed here only for informational purposes; they are not binding and EPA does not intend that these guidance documents have any mandatory, regulatory effect by virtue of their listing in this note.

(l) *Reissued permits*. (1) Except as provided in paragraph (l)(2) of this section when a permit is renewed or reissued, interim effluent limitations, standards or conditions must be at least as stringent as the final effluent limitations, standards, or conditions in the previous permit (unless the circumstances on which the previous permit was based have materially and substantially changed since the time the permit was issued and would constitute cause for permit modification or revocation and reissuance under § 122.62.)

(2) In the case of effluent limitations established on the basis of Section 402(a)(1)(B) of the CWA, a permit may not be renewed, reissued, or modified on the basis of effluent guidelines promulgated under section 304(b) subsequent to the original issuance of such permit, to contain effluent limitations which are less stringent than the comparable effluent limitations in the previous permit.

(i) Exceptions—A permit with respect to which paragraph (l)(2) of this section applies may be renewed, reissued, or modified to contain a less stringent effluent limitation applicable to a pollutant, if—

(A) Material and substantial alterations or additions to the permitted facility occurred after permit issuance which justify the application of a less stringent effluent limitation;

(B)(*1*) Information is available which was not available at the time of permit issuance (other than revised regulations, guidance, or test methods) and which would have justified the application of a less stringent effluent limitation at the time of permit issuance; or

(*2*) The Administrator determines that technical mistakes or mistaken interpretations of law were made in issuing the permit under section 402(a)(1)(b);

(C) A less stringent effluent limitation is necessary because of events over which the permittee has no control and for which there is no reasonably available remedy;

(D) The permittee has received a permit modification under section 301(c), 301(g), 301(h), 301(i), 301(k), 301(n), or 316(a); or

(E) The permittee has installed the treatment facilities required to meet the effluent limitations in the previous permit and has properly operated and maintained the facilities but has nevertheless been unable to achieve the previous effluent limitations, in which case the limitations in the reviewed, reissued, or modified permit may reflect the level of pollutant control actually achieved (but shall not be less stringent than required by effluent

guidelines in effect at the time of permit renewal, reissuance, or modification).

(ii) *Limitations.* In no event may a permit with respect to which paragraph (l)(2) of this section applies be renewed, reissued, or modified to contain an effluent limitation which is less stringent than required by effluent guidelines in effect at the time the permit is renewed, reissued, or modified. In no event may such a permit to discharge into waters be renewed, issued, or modified to contain a less stringent effluent limitation if the implementation of such limitation would result in a violation of a water quality standard under section 303 applicable to such waters.

(m) *Privately owned treatment works.* For a privately owned treatment works, any conditions expressly applicable to any user, as a limited co-permittee, that may be necessary in the permit issued to the treatment works to ensure compliance with applicable requirements under this part. Alternatively, the Director may issue separate permits to the treatment works and to its users, or may require a separate permit application from any user. The Director's decision to issue a permit with no conditions applicable to any user, to impose conditions on one or more users, to issue separate permits, or to require separate applications, and the basis for that decision, shall be stated in the fact sheet for the draft permit for the treatment works.

(n) *Grants.* Any conditions imposed in grants made by the Administrator to POTWs under sections 201 and 204 of CWA which are reasonably necessary for the achievement of effluent limitations under section 301 of CWA.

(o) *Sewage sludge.* Requirements under section 405 of CWA governing the disposal of sewage sludge from publicly owned treatment works or any other treatment works treating domestic sewage for any use for which regulations have been established, in accordance with any applicable regulations.

(p) *Coast Guard.* When a permit is issued to a facility that may operate at certain times as a means of transportation over water, a condition that the discharge shall comply with any applicable regulations promulgated by the Secretary of the department in which the Coast Guard is operating, that establish specifications for safe transportation, handling, carriage, and storage of pollutants.

(q) *Navigation.* Any conditions that the Secretary of the Army considers necessary to ensure that navigation and anchorage will not be substantially impaired, in accordance with § 124.59 of this chapter.

(r) *Great Lakes.* When a permit is issued to a facility that discharges into the Great Lakes System (as defined in 40 CFR 132.2), conditions promulgated by the State, Tribe, or EPA pursuant to 40 CFR part 132.

(s) *Qualifying State, Tribal, or local programs.* (1) For storm water discharges associated with small construction activity identified in § 122.26(b)(15), the Director may include permit conditions that incorporate qualifying State, Tribal, or local erosion and sediment control program requirements by reference. Where a qualifying State, Tribal, or local program does not include one or more of the elements in this paragraph (s)(1), then the Director must include those elements as conditions in the permit. A qualifying State, Tribal, or local erosion and sediment control program is one that includes:

(i) Requirements for construction site operators to implement appropriate erosion and sediment control best management practices;

(ii) Requirements for construction site operators to control waste such as discarded building materials, concrete truck washout, chemicals, litter, and sanitary waste at the construction site that may cause adverse impacts to water quality;

(iii) Requirements for construction site operators to develop and implement a storm water pollution prevention plan. (A storm water pollution prevention plan includes site descriptions, descriptions of appropriate control measures, copies of approved State, Tribal or local requirements, maintenance procedures, inspection procedures, and identification of non-storm water discharges); and

(iv) Requirements to submit a site plan for review that incorporates consideration of potential water quality impacts.

(2) For storm water discharges from construction activity identified in § 122.26(b)(14)(x), the Director may include permit conditions that incorporate qualifying State, Tribal, or local erosion and sediment control program requirements by reference. A qualifying State, Tribal or local erosion and sediment control program is one that includes the elements listed in paragraph (s)(1) of this section and any additional requirements necessary to achieve the applicable technology-based standards of ''best available technology'' and ''best conventional technology'' based on the best professional judgment of the permit writer.

[48 FR 14153, Apr. 1, 1983]

EDITORIAL NOTE: For FEDERAL REGISTER citations affecting § 122.44, see the List of CFR Sections Affected, which appears in the Finding Aids section of the printed volume and on GPO Access.

§ 122.45 Calculating NPDES permit conditions (applicable to State NPDES programs, see § 123.25).

(a) *Outfalls and discharge points.* All permit effluent limitations, standards and prohibitions shall be established for each outfall or discharge point of the permitted facility, except as otherwise provided under § 122.44(k) (BMPs where limitations are infeasible) and paragraph (i) of this section (limitations on internal waste streams).

(b) *Production-based limitations.* (1) In the case of POTWs, permit effluent limitations, standards, or prohibitions shall be calculated based on design flow.

(2)(i) Except in the case of POTWs or as provided in paragraph (b)(2)(ii) of this section, calculation of any permit limitations, standards, or prohibitions which are based on production (or other measure of operation) shall be based not upon the designed production capacity but rather upon a reasonable measure of actual production of the facility. For new sources or new dischargers, actual production shall be estimated using projected production. The time period of the measure of production shall correspond to the time period of the calculated permit limitations; for example, monthly production shall be used to calculate average monthly discharge limitations.

(ii)(A)(*1*) The Director may include a condition establishing alternate permit limitations, standards, or prohibitions based upon anticipated increased (not to exceed maximum production capability) or decreased production levels.

(*2*) *For the automotive manufacturing industry* only, the Regional Administrator shall, and the State Director may establish a condition under paragraph (b)(2)(ii)(A)(*1*) of this section if the applicant satisfactorily demonstrates to the Director at the time the application is submitted that its actual production, as indicated in paragraph (b)(2)(i) of this section, is substantially below maximum production capability and that there is a reasonable potential for an increase above actual production during the duration of the permit.

(B) If the Director establishes permit conditions under paragraph (b)(2)(ii)(A) of this section:

(*1*) The permit shall require the permittee to notify the Director at least two business days prior to a month in which the permittee expects to operate at a level higher than the lowest production level identified in the permit. The notice shall specify the anticipated level and the period during which the permittee expects to operate at the alternate level. If the notice covers more than one month, the notice shall specify the reasons for the anticipated production level increase. New notice of discharge at alternate levels is required to cover a period or production level not covered by prior notice or, if during two consecutive months otherwise covered by a notice, the production level at the permitted facility does not in fact meet the higher level designated in the notice.

(*2*) The permittee shall comply with the limitations, standards, or prohibitions that correspond to the lowest level of production specified in the permit, unless the permittee has notified the Director under paragraph (b)(2)(ii)(B)(*1*) of this section, in which case the permittee shall comply with

the lower of the actual level of production during each month or the level specified in the notice.

(*3*) The permittee shall submit with the DMR the level of production that actually occurred during each month and the limitations, standards, or prohibitions applicable to that level of production.

(c) *Metals*. All permit effluent limitations, standards, or prohibitions for a metal shall be expressed in terms of ''total recoverable metal'' as defined in 40 CFR part 136 unless:

(1) An applicable effluent standard or limitation has been promulgated under the CWA and specifies the limitation for the metal in the dissolved or valent or total form; or

(2) In establishing permit limitations on a case-by-case basis under § 125.3, it is necessary to express the limitation on the metal in the dissolved or valent or total form to carry out the provisions of the CWA; or

(3) All approved analytical methods for the metal inherently measure only its dissolved form (*e.g.*, hexavalent chromium).

(d) *Continuous discharges*. For continuous discharges all permit effluent limitations, standards, and prohibitions, including those necessary to achieve water quality standards, shall unless impracticable be stated as:

(1) Maximum daily and average monthly discharge limitations for all dischargers other than publicly owned treatment works; and

(2) Average weekly and average monthly discharge limitations for POTWs.

(e) *Non-continuous discharges*. Discharges which are not continuous, as defined in § 122.2, shall be particularly described and limited, considering the following factors, as appropriate:

(1) Frequency (for example, a batch discharge shall not occur more than once every 3 weeks);

(2) Total mass (for example, not to exceed 100 kilograms of zinc and 200 kilograms of chromium per batch discharge);

(3) Maximum rate of discharge of pollutants during the discharge (for example, not to exceed 2 kilograms of zinc per minute); and

(4) Prohibition or limitation of specified pollutants by mass, concentration, or other appropriate measure (for example, shall not contain at any time more than 0.1 mg/1 zinc or more than 250 grams (¼ kilogram) of zinc in any discharge).

(f) *Mass limitations*. (1) All pollutants limited in permits shall have limitations, standards or prohibitions expressed in terms of mass except:

(i) For pH, temperature, radiation, or other pollutants which cannot appropriately be expressed by mass;

(ii) When applicable standards and limitations are expressed in terms of other units of measurement; or

(iii) If in establishing permit limitations on a case-by-case basis under § 125.3, limitations expressed in terms of mass are infeasible because the mass of the pollutant discharged cannot be related to a measure of operation (for example, discharges of TSS from certain mining operations), and permit conditions ensure that dilution will not be used as a substitute for treatment.

(2) Pollutants limited in terms of mass additionally may be limited in terms of other units of measurement, and the permit shall require the permittee to comply with both limitations.

(g) *Pollutants in intake water*. (1) Upon request of the discharger, technology-based effluent limitations or standards shall be adjusted to reflect credit for pollutants in the discharger's intake water if:

(i) The applicable effluent limitations and standards contained in 40 CFR subchapter N specifically provide that they shall be applied on a net basis; or

(ii) The discharger demonstrates that the control system it proposes or uses to meet applicable technology-based limitations and standards would, if properly installed and operated, meet the limitations and standards in the absence of pollutants in the intake waters.

(2) Credit for generic pollutants such as biochemical oxygen demand (BOD) or total suspended solids (TSS) should not be granted unless the permittee demonstrates that the constituents of the generic measure in the effluent are

substantially similar to the constituents of the generic measure in the intake water or unless appropriate additional limits are placed on process water pollutants either at the outfall or elsewhere.

(3) Credit shall be granted only to the extent necessary to meet the applicable limitation or standard, up to a maximum value equal to the influent value. Additional monitoring may be necessary to determine eligibility for credits and compliance with permit limits.

(4) Credit shall be granted only if the discharger demonstrates that the intake water is drawn from the same body of water into which the discharge is made. The Director may waive this requirement if he finds that no environmental degradation will result.

(5) This section does not apply to the discharge of raw water clarifier sludge generated from the treatment of intake water.

(h) *Internal waste streams.* (1) When permit effluent limitations or standards imposed at the point of discharge are impractical or infeasible, effluent limitations or standards for discharges of pollutants may be imposed on internal waste streams before mixing with other waste streams or cooling water streams. In those instances, the monitoring required by § 122.48 shall also be applied to the internal waste streams.

(2) Limits on internal waste streams will be imposed only when the fact sheet under § 124.56 sets forth the exceptional circumstances which make such limitations necessary, such as when the final discharge point is inaccessible (for example, under 10 meters of water), the wastes at the point of discharge are so diluted as to make monitoring impracticable, or the interferences among pollutants at the point of discharge would make detection or analysis impracticable.

(i) *Disposal of pollutants into wells, into POTWs or by land application.* Permit limitations and standards shall be calculated as provided in § 122.50.

[48 FR 14153, Apr. 1, 1983, as amended at 49 FR 38049, Sept. 26, 1984; 50 FR 4514, Jan. 31, 1985; 54 FR 258, Jan. 4, 1989; 54 FR 18784, May 2, 1989; 65 FR 30909, May 15, 2000]

§ 122.46 Duration of permits (applicable to State programs, see § 123.25).

(a) NPDES permits shall be effective for a fixed term not to exceed 5 years.

(b) Except as provided in § 122.6, the term of a permit shall not be extended by modification beyond the maximum duration specified in this section.

(c) The Director may issue any permit for a duration that is less than the full allowable term under this section.

(d) A permit may be issued to expire on or after the statutory deadline set forth in section 301(b)(2) (A), (C), and (E), if the permit includes effluent limitations to meet the requirements of section 301(b)(2) (A), (C), (D), (E) and (F), whether or not applicable effluent limitations guidelines have been promulgated or approved.

(e) A determination that a particular discharger falls within a given industrial category for purposes of setting a permit expiration date under paragraph (d) of this section is not conclusive as to the discharger's inclusion in that industrial category for any other purposes, and does not prejudice any rights to challenge or change that inclusion at the time that a permit based on that determination is formulated.

[48 FR 14153, Apr. 1, 1983, as amended at 49 FR 31842, Aug. 8, 1984; 50 FR 6940, Feb. 19, 1985; 60 FR 33931, June 29, 1995]

§ 122.47 Schedules of compliance.

(a) *General (applicable to State programs, see § 123.25).* The permit may, when appropriate, specify a schedule of compliance leading to compliance with CWA and regulations.

(1) *Time for compliance.* Any schedules of compliance under this section shall require compliance as soon as possible, but not later than the applicable statutory deadline under the CWA.

(2) The first NPDES permit issued to a new source or a new discharger shall contain a schedule of compliance only when necessary to allow a reasonable opportunity to attain compliance with requirements issued or revised after commencement of construction but less than three years before commencement of the relevant discharge. For recommencing dischargers, a schedule of compliance shall be available only when necessary to allow a reasonable opportunity to attain compliance with

requirements issued or revised less than three years before recommencement of discharge.

(3) *Interim dates.* Except as provided in paragraph (b)(1)(ii) of this section, if a permit establishes a schedule of compliance which exceeds 1 year from the date of permit issuance, the schedule shall set forth interim requirements and the dates for their achievement.

(i) The time between interim dates shall not exceed 1 year, except that in the case of a schedule for compliance with standards for sewage sludge use and disposal, the time between interim dates shall not exceed six months.

(ii) If the time necessary for completion of any interim requirement (such as the construction of a control facility) is more than 1 year and is not readily divisible into stages for completion, the permit shall specify interim dates for the submission of reports of progress toward completion of the interim requirements and indicate a projected completion date.

NOTE: Examples of interim requirements include: (a) Submit a complete Step 1 construction grant (for POTWs); (b) let a contract for construction of required facilities; (c) commence construction of required facilities; (d) complete construction of required facilities.

(4) *Reporting.* The permit shall be written to require that no later than 14 days following each interim date and the final date of compliance, the permittee shall notify the Director in writing of its compliance or noncompliance with the interim or final requirements, or submit progress reports if paragraph (a)(3)(ii) is applicable.

(b) *Alternative schedules of compliance.* An NPDES permit applicant or permittee may cease conducting regulated activities (by terminating of direct discharge for NPDES sources) rather than continuing to operate and meet permit requirements as follows:

(1) If the permittee decides to cease conducting regulated activities at a given time within the term of a permit which has already been issued:

(i) The permit may be modified to contain a new or additional schedule leading to timely cessation of activities; or

(ii) The permittee shall cease conducting permitted activities before non-compliance with any interim or final compliance schedule requirement already specified in the permit.

(2) If the decision to cease conducting regulated activities is made before issuance of a permit whose term will include the termination date, the permit shall contain a schedule leading to termination which will ensure timely compliance with applicable requirements no later than the statutory deadline.

(3) If the permittee is undecided whether to cease conducting regulated activities, the Director may issue or modify a permit to contain two schedules as follows:

(i) Both schedules shall contain an identical interim deadline requiring a final decision on whether to cease conducting regulated activities no later than a date which ensures sufficient time to comply with applicable requirements in a timely manner if the decision is to continue conducting regulated activities;

(ii) One schedule shall lead to timely compliance with applicable requirements, no later than the statutory deadline;

(iii) The second schedule shall lead to cessation of regulated activities by a date which will ensure timely compliance with applicable requirements no later than the statutory deadline.

(iv) Each permit containing two schedules shall include a requirement that after the permittee has made a final decision under paragraph (b)(3)(i) of this section it shall follow the schedule leading to compliance if the decision is to continue conducting regulated activities, and follow the schedule leading to termination if the decision is to cease conducting regulated activities.

(4) The applicant's or permittee's decision to cease conducting regulated activities shall be evidenced by a firm public commitment satisfactory to the Director, such as a resolution of the board of directors of a corporation.

[48 FR 14153, Apr. 1, 1983, as amended at 49 FR 38050, Sept. 26, 1984; 50 FR 6940, Feb. 19, 1985; 54 FR 18784, May 2, 1989; 65 FR 30909, May 15, 2000]

§ 122.48 Requirements for recording and reporting of monitoring results (applicable to State programs, see § 123.25).

All permits shall specify:

(a) Requirements concerning the proper use, maintenance, and installation, when appropriate, of monitoring equipment or methods (including biological monitoring methods when appropriate);

(b) Required monitoring including type, intervals, and frequency sufficient to yield data which are representative of the monitored activity including, when appropriate, continuous monitoring;

(c) Applicable reporting requirements based upon the impact of the regulated activity and as specified in § 122.44. Reporting shall be no less frequent than specified in the above regulation.

[48 FR 14153, Apr. 1, 1983; 50 FR 6940, Feb. 19, 1985]

§ 122.49 Considerations under Federal law.

The following is a list of Federal laws that may apply to the issuance of permits under these rules. When any of these laws is applicable, its procedures must be followed. When the applicable law requires consideration or adoption of particular permit conditions or requires the denial of a permit, those requirements also must be followed.

(a) The *Wild and Scenic Rivers Act*, 16 U.S.C. 1273 *et seq*. section 7 of the Act prohibits the Regional Administrator from assisting by license or otherwise the construction of any water resources project that would have a direct, adverse effect on the values for which a national wild and scenic river was established.

(b) The *National Historic Preservation Act of 1966*, 16 U.S.C. 470 *et seq*. section 106 of the Act and implementing regulations (36 CFR part 800) require the Regional Administrator, before issuing a license, to adopt measures when feasible to mitigate potential adverse effects of the licensed activity and properties listed or eligible for listing in the National Register of Historic Places. The Act's requirements are to be implemented in cooperation with State Historic Preservation Officers and upon notice to, and when appropriate, in consultation with the Advisory Council on Historic Preservation.

(c) The *Endangered Species Act*, 16 U.S.C. 1531 *et seq*. section 7 of the Act and implementing regulations (50 CFR part 402) require the Regional Administrator to ensure, in consultation with the Secretary of the Interior or Commerce, that any action authorized by EPA is not likely to jeopardize the continued existence of any endangered or threatened species or adversely affect its critical habitat.

(d) The *Coastal Zone Management Act*, 16 U.S.C. 1451 *et seq*. section 307(c) of the Act and implementing regulations (15 CFR part 930) prohibit EPA from issuing a permit for an activity affecting land or water use in the coastal zone until the applicant certifies that the proposed activity complies with the State Coastal Zone Management program, and the State or its designated agency concurs with the certification (or the Secretary of Commerce overrides the State's nonconcurrence).

(e) The *Fish and Wildlife Coordination Act*, 16 U.S.C. 661 *et seq*., requires that the Regional Administrator, before issuing a permit proposing or authorizing the impoundment (with certain exemptions), diversion, or other control or modification of any body of water, consult with the appropriate State agency exercising jurisdiction over wildlife resources to conserve those resources.

(f) *Executive orders*. [Reserved]

(g) The National Environmental Policy Act, 42 U.S.C. 4321 *et seq*., may require preparation of an Environmental Impact Statement and consideration of EIS-related permit conditions (other than effluent limitations) as provided in § 122.29(c).

(Clean Water Act (33 U.S.C. 1251 *et seq*.), Safe Drinking Water Act (42 U.S.C. 300f *et seq*.), Clean Air Act (42 U.S.C. 7401 *et seq*.), Resource Conservation and Recovery Act (42 U.S.C. 6901 *et seq*.))

[48 FR 14153, Apr. 1, 1983, as amended at 48 FR 39620, Sept. 1, 1983; 49 FR 38050, Sept. 26, 1984]

§ 122.50 Disposal of pollutants into wells, into publicly owned treatment works or by land application (applicable to State NPDES programs, see § 123.25).

(a) When part of a discharger's process wastewater is not being discharged into waters of the United States or contiguous zone because it is disposed into a well, into a POTW, or by land application thereby reducing the flow or level of pollutants being discharged into waters of the United States, applicable effluent standards and limitations for the discharge in an NPDES permit shall be adjusted to reflect the reduced raw waste resulting from such disposal. Effluent limitations and standards in the permit shall be calculated by one of the following methods:

(1) If none of the waste from a particular process is discharged into waters of the United States, and effluent limitations guidelines provide separate allocation for wastes from that process, all allocations for the process shall be eliminated from calculation of permit effluent limitations or standards.

(2) In all cases other than those described in paragraph (a)(1) of this section, effluent limitations shall be adjusted by multiplying the effluent limitation derived by applying effluent limitation guidelines to the total waste stream by the amount of wastewater flow to be treated and discharged into waters of the United States, and dividing the result by the total wastewater flow. Effluent limitations and standards so calculated may be further adjusted under part 125, subpart D to make them more or less stringent if discharges to wells, publicly owned treatment works, or by land application change the character or treatability of the pollutants being discharged to receiving waters. This method may be algebraically expressed as:

$$P = \frac{E \times N}{T}$$

where P is the permit effluent limitation, E is the limitation derived by applying effluent guidelines to the total wastestream, N is the wastewater flow to be treated and discharged to waters of the United States, and T is the total wastewater flow.

(b) Paragraph (a) of this section does not apply to the extent that promulgated effluent limitations guidelines:

(1) Control concentrations of pollutants discharged but not mass; or

(2) Specify a different specific technique for adjusting effluent limitations to account for well injection, land application, or disposal into POTWs.

(c) Paragraph (a) of this section does not alter a discharger's obligation to meet any more stringent requirements established under §§ 122.41, 122.42, 122.43, and 122.44.

[48 FR 14153, Apr. 1, 1983, as amended at 49 FR 38050, Sept. 26, 1984]

Subpart D—Transfer, Modification, Revocation and Reissuance, and Termination of Permits

§ 122.61 Transfer of permits (applicable to State programs, see § 123.25).

(a) *Transfers by modification.* Except as provided in paragraph (b) of this section, a permit may be transferred by the permittee to a new owner or operator only if the permit has been modified or revoked and reissued (under § 122.62(b)(2)), or a minor modification made (under § 122.63(d)), to identify the new permittee and incorporate such other requirements as may be necessary under CWA.

(b) *Automatic transfers.* As an alternative to transfers under paragraph (a) of this section, any NPDES permit may be automatically transferred to a new permittee if:

(1) The current permittee notifies the Director at least 30 days in advance of the proposed transfer date in paragraph (b)(2) of this section;

(2) The notice includes a written agreement between the existing and new permittees containing a specific date for transfer of permit responsibility, coverage, and liability between them; and

(3) The Director does not notify the existing permittee and the proposed new permittee of his or her intent to modify or revoke and reissue the permit. A modification under this subparagraph may also be a minor modification under § 122.63. If this notice is not received, the transfer is effective on the date specified in the agreement

mentioned in paragraph (b)(2) of this section.

§ 122.62 Modification or revocation and reissuance of permits (applicable to State programs, see § 123.25).

When the Director receives any information (for example, inspects the facility, receives information submitted by the permittee as required in the permit (see § 122.41), receives a request for modification or revocation and reissuance under § 124.5, or conducts a review of the permit file) he or she may determine whether or not one or more of the causes listed in paragraphs (a) and (b) of this section for modification or revocation and reissuance or both exist. If cause exists, the Director may modify or revoke and reissue the permit accordingly, subject to the limitations of § 124.5(c), and may request an updated application if necessary. When a permit is modified, only the conditions subject to modification are reopened. If a permit is revoked and reissued, the entire permit is reopened and subject to revision and the permit is reissued for a new term. See § 124.5(c)(2). If cause does not exist under this section or § 122.63, the Director shall not modify or revoke and reissue the permit. If a permit modification satisfies the criteria in § 122.63 for ''minor modifications'' the permit may be modified without a draft permit or public review. Otherwise, a draft permit must be prepared and other procedures in part 124 (or procedures of an approved State program) followed.

(a) *Causes for modification*. The following are causes for modification but not revocation and reissuance of permits except when the permittee requests or agrees.

(1) *Alterations*. There are material and substantial alterations or additions to the permitted facility or activity (including a change or changes in the permittee's sludge use or disposal practice) which occurred after permit issuance which justify the application of permit conditions that are different or absent in the existing permit.

NOTE: Certain reconstruction activities may cause the new source provisions of § 122.29 to be applicable.

(2) *Information*. The Director has received new information. Permits may be modified during their terms for this cause only if the information was not available at the time of permit issuance (other than revised regulations, guidance, or test methods) and would have justified the application of different permit conditions at the time of issuance. For NPDES general permits (§ 122.28) this cause includes any information indicating that cumulative effects on the environment are unacceptable. For new source or new discharger NPDES permits §§ 122.21, 122.29), this cause shall include any significant information derived from effluent testing required under § 122.21(k)(5)(vi) or § 122.21(h)(4)(iii) after issuance of the permit.

(3) *New regulations*. The standards or regulations on which the permit was based have been changed by promulgation of amended standards or regulations or by judicial decision after the permit was issued. Permits may be modified during their terms for this cause only as follows:

(i) For promulgation of amended standards or regulations, when:

(A) The permit condition requested to be modified was based on a promulgated effluent limitation guideline, EPA approved or promulgated water quality standards, or the Secondary Treatment Regulations under part 133; and

(B) EPA has revised, withdrawn, or modified that portion of the regulation or effluent limitation guideline on which the permit condition was based, or has approved a State action with regard to a water quality standard on which the permit condition was based; and

(C) A permittee requests modification in accordance with § 124.5 within ninety (90) days after FEDERAL REGISTER notice of the action on which the request is based.

(ii) For judicial decisions, a court of competent jurisdiction has remanded and stayed EPA promulgated regulations or effluent limitation guidelines, if the remand and stay concern that portion of the regulations or guidelines on which the permit condition was based and a request is filed by the permittee in accordance with § 124.5 within ninety (90) days of judicial remand.

(iii) For changes based upon modified State certifications of NPDES permits, see § 124.55(b).

(4) *Compliance schedules*. The Director determines good cause exists for modification of a compliance schedule, such as an act of God, strike, flood, or materials shortage or other events over which the permittee has little or no control and for which there is no reasonably available remedy. However, in no case may an NPDES compliance schedule be modified to extend beyond an applicable CWA statutory deadline. See also § 122.63(c) (minor modifications) and paragraph (a)(14) of this section (NPDES innovative technology).

(5) When the permittee has filed a request for a variance under CWA section 301(c), 301(g), 301(h), 301(i), 301(k), or 316(a) or for ''fundamentally different factors'' within the time specified in § 122.21 or § 125.27(a).

(6) *307(a) toxics*. When required to incorporate an applicable 307(a) toxic effluent standard or prohibition (see § 122.44(b)).

(7) *Reopener*. When required by the ''reopener'' conditions in a permit, which are established in the permit under § 122.44(b) (for CWA toxic effluent limitations and Standards for sewage sludge use or disposal, see also § 122.44(c)) or 40 CFR 403.18(e) (Pretreatment program).

(8)(i) *Net limits*. Upon request of a permittee who qualifies for effluent limitations on a net basis under § 122.45(g).

(ii) When a discharger is no longer eligible for net limitations, as provided in § 122.45(g)(1)(ii).

(9) *Pretreatment*. As necessary under 40 CFR 403.8(e) (compliance schedule for development of pretreatment program).

(10) *Failure to notify*. Upon failure of an approved State to notify, as required by section 402(b)(3), another State whose waters may be affected by a discharge from the approved State.

(11) *Non-limited pollutants*. When the level of discharge of any pollutant which is not limited in the permit exceeds the level which can be achieved by the technology-based treatment requirements appropriate to the permittee under § 125.3(c).

(12) *Notification levels*. To establish a ''notification level'' as provided in § 122.44(f).

(13) *Compliance schedules*. To modify a schedule of compliance to reflect the time lost during construction of an innovative or alternative facility, in the case of a POTW which has received a grant under section 202(a)(3) of CWA for 100% of the costs to modify or replace facilities constructed with a grant for innovative and alternative wastewater technology under section 202(a)(2). In no case shall the compliance schedule be modified to extend beyond an applicable CWA statutory deadline for compliance.

(14) For a small MS4, to include an effluent limitation requiring implementation of a minimum control measure or measures as specified in § 122.34(b) when:

(i) The permit does not include such measure(s) based upon the determination that another entity was responsible for implementation of the requirement(s); and

(ii) The other entity fails to implement measure(s) that satisfy the requirement(s).

(15) To correct technical mistakes, such as errors in calculation, or mistaken interpretations of law made in determining permit conditions.

(16) When the discharger has installed the treatment technology considered by the permit writer in setting effluent limitations imposed under section 402(a)(1) of the CWA and has properly operated and maintained the facilities but nevertheless has been unable to achieve those effluent limitations. In this case, the limitations in the modified permit may reflect the level of pollutant control actually achieved (but shall not be less stringent than required by a subsequently promulgated effluent limitations guideline).

(17) *Nutrient Management Plans*. The incorporation of the terms of a CAFO's nutrient management plan into the terms and conditions of a general permit when a CAFO obtains coverage under a general permit in accordance with §§ 122.23(h) and 122.28 is not a cause for modification pursuant to the requirements of this section.

(18) *Land application plans.* When required by a permit condition to incorporate a land application plan for beneficial reuse of sewage sludge, to revise an existing land application plan, or to add a land application plan.

(b) *Causes for modification or revocation and reissuance.* The following are causes to modify or, alternatively, revoke and reissue a permit:

(1) Cause exists for termination under § 122.64, and the Director determines that modification or revocation and reissuance is appropriate.

(2) The Director has received notification (as required in the permit, see § 122.41(l)(3)) of a proposed transfer of the permit. A permit also may be modified to reflect a transfer after the effective date of an automatic transfer (§ 122.61(b)) but will not be revoked and reissued after the effective date of the transfer except upon the request of the new permittee.

[48 FR 14153, Apr. 1, 1983, as amended at 49 FR 25981, June 25, 1984; 49 FR 37009, Sept. 29, 1984; 49 FR 38050, Sept. 26, 1984; 50 FR 4514, Jan. 31, 1985; 51 FR 20431, June 4, 1986; 51 FR 26993, July 28, 1986; 54 FR 256, 258, Jan. 4, 1989; 54 FR 18784, May 2, 1989; 60 FR 33931, June 29, 1995; 64 FR 68847, Dec. 8, 1999; 65 FR 30909, May 15, 2000; 70 FR 60191, Oct. 14, 2005; 73 FR 70485, Nov. 20, 2008]

§ 122.63 Minor modifications of permits.

Upon the consent of the permittee, the Director may modify a permit to make the corrections or allowances for changes in the permitted activity listed in this section, without following the procedures of part 124. Any permit modification not processed as a minor modification under this section must be made for cause and with part 124 draft permit and public notice as required in § 122.62. Minor modifications may only:

(a) Correct typographical errors;

(b) Require more frequent monitoring or reporting by the permittee;

(c) Change an interim compliance date in a schedule of compliance, provided the new date is not more than 120 days after the date specified in the existing permit and does not interfere with attainment of the final compliance date requirement; or

(d) Allow for a change in ownership or operational control of a facility where the Director determines that no other change in the permit is necessary, provided that a written agreement containing a specific date for transfer of permit responsibility, coverage, and liability between the current and new permittees has been submitted to the Director.

(e)(1) Change the construction schedule for a discharger which is a new source. No such change shall affect a discharger's obligation to have all pollution control equipment installed and in operation prior to discharge under § 122.29.

(2) Delete a point source outfall when the discharge from that outfall is terminated and does not result in discharge of pollutants from other outfalls except in accordance with permit limits.

(f) [Reserved]

(g) Incorporate conditions of a POTW pretreatment program that has been approved in accordance with the procedures in 40 CFR 403.11 (or a modification thereto that has been approved in accordance with the procedures in 40 CFR 403.18) as enforceable conditions of the POTW's permits.

(h) Incorporate changes to the terms of a CAFO's nutrient management plan that have been revised in accordance with the requirements of § 122.42(e)(6).

[48 FR 14153, Apr. 1, 1983, as amended at 49 FR 38051, Sept. 26, 1984; 51 FR 20431, June 4, 1986; 53 FR 40616, Oct. 17, 1988; 60 FR 33931, June 29, 1995; 73 FR 70485, Nov. 20, 2008]

§ 122.64 Termination of permits (applicable to State programs, see § 123.25).

(a) The following are causes for terminating a permit during its term, or for denying a permit renewal application:

(1) Noncompliance by the permittee with any condition of the permit;

(2) The permittee's failure in the application or during the permit issuance process to disclose fully all relevant facts, or the permittee's misrepresentation of any relevant facts at any time;

(3) A determination that the permitted activity endangers human health or the environment and can only be regulated to acceptable levels by permit modification or termination; or

(4) A change in any condition that requires either a temporary or permanent reduction or elimination of any discharge or sludge use or disposal practice controlled by the permit (for example, plant closure or termination of discharge by connection to a POTW).

(b) The Director shall follow the applicable procedures in part 124 or part 22 of this chapter, as appropriate (or State procedures equivalent to part 124) in terminating any NPDES permit under this section, except that if the entire discharge is permanently terminated by elimination of the flow or by connection to a POTW (but not by land application or disposal into a well), the Director may terminate the permit by notice to the permittee. Termination by notice shall be effective 30 days after notice is sent, unless the permittee objects within that time. If the permittee objects during that period, the Director shall follow part 124 of this chapter or applicable State procedures for termination. Expedited permit termination procedures are not available to permittees that are subject to pending State and/or Federal enforcement actions including citizen suits brought under State or Federal law. If requesting expedited permit termination procedures, a permittee must certify that it is not subject to any pending State or Federal enforcement actions including citizen suits brought under State or Federal law. State-authorized NPDES programs are not required to use part 22 of this chapter procedures for NPDES permit terminations.

[48 FR 14153, Apr. 1, 1983; 50 FR 6940, Feb. 19, 1985, as amended at 54 FR 18784, May 2, 1989; 65 FR 30909, May 15, 2000]

APPENDIX A TO PART 122—NPDES PRIMARY INDUSTRY CATEGORIES

Any permit issued after June 30, 1981 to dischargers in the following categories shall include effluent limitations and a compliance schedule to meet the requirements of section 301(b)(2)(A), (C), (D), (E) and (F) of CWA, whether or not applicable effluent limitations guidelines have been promulgated. See §§122.44 and 122.46.

Industry Category

Adhesives and sealants
Aluminum forming
Auto and other laundries
Battery manufacturing
Coal mining
Coil coating
Copper forming
Electrical and electronic components
Electroplating
Explosives manufacturing
Foundries
Gum and wood chemicals
Inorganic chemicals manufacturing
Iron and steel manufacturing
Leather tanning and finishing
Mechanical products manufacturing
Nonferrous metals manufacturing
Ore mining
Organic chemicals manufacturing
Paint and ink formulation
Pesticides
Petroleum refining
Pharmaceutical preparations
Photographic equipment and supplies
Plastics processing
Plastic and synthetic materials manufacturing
Porcelain enameling
Printing and publishing
Pulp and paper mills
Rubber processing
Soap and detergent manufacturing
Steam electric power plants
Textile mills
Timber products processing

APPENDIX B TO PART 122 [RESERVED]

APPENDIX C TO PART 122—CRITERIA FOR DETERMINING A CONCENTRATED AQUATIC ANIMAL PRODUCTION FACILITY (§122.24)

A hatchery, fish farm, or other facility is a concentrated aquatic animal production facility for purposes of §122.24 if it contains, grows, or holds aquatic animals in either of the following categories:

(a) Cold water fish species or other cold water aquatic animals in ponds, raceways, or other similar structures which discharge at least 30 days per year but does not include:

(1) Facilities which produce less than 9,090 harvest weight kilograms (approximately 20,000 pounds) of aquatic animals per year; and

(2) Facilities which feed less than 2,272 kilograms (approximately 5,000 pounds) of food during the calendar month of maximum feeding.

(b) Warm water fish species or other warm water aquatic animals in ponds, raceways, or other similar structures which discharge at least 30 days per year, but does not include:

(1) Closed ponds which discharge only during periods of excess runoff; or

(2) Facilities which produce less than 45,454 harvest weight kilograms (approximately 100,000 pounds) of aquatic animals per year.

''Cold water aquatic animals'' include, but are not limited to, the *Salmonidae* family of fish; e.g., trout and salmon.

''Warm water aquatic animals'' include, but are not limited to, the *Ameiuride*, *Centrarchidae* and *Cyprinidae* families of fish; e.g., respectively, catfish, sunfish and minnows.

APPENDIX D TO PART 122—NPDES PERMIT APPLICATION TESTING REQUIREMENTS (§ 122.21)

TABLE I—TESTING REQUIREMENTS FOR ORGANIC TOXIC POLLUTANTS BY INDUSTRIAL CATEGORY FOR EXISTING DISCHARGERS

Industrial category	GC/MS Fraction [1]			
	Volatile	Acid	Base/neutral	Pesticide
Adhesives and Sealants	2	2	2	
Aluminum Forming	2	2	2	
Auto and Other Laundries	2	2	2	2
Battery Manufacturing	2		2	
Coal Mining	2	2	2	2
Coil Coating	2	2	2	
Copper Forming	2	2	2	
Electric and Electronic Components	2	2	2	2
Electroplating	2	2	2	
Explosives Manufacturing		2	2	
Foundries	2	2	2	
Gum and Wood Chemicals	2	2	2	2
Inorganic Chemicals Manufacturing	2	2	2	
Iron and Steel Manufacturing	2	2	2	
Leather Tanning and Finishing	2	2	2	2
Mechanical Products Manufacturing	2	2	2	
Nonferrous Metals Manufacturing	2	2	2	2
Ore Mining	2	2	2	2
Organic Chemicals Manufacturing	2	2	2	2
Paint and Ink Formulation	2	2	2	2
Pesticides	2	2	2	2
Petroleum Refining	2	2	2	2
Pharmaceutical Preparations	2	2	2	
Photographic Equipment and Supplies	2	2	2	2
Plastic and Synthetic Materials Manufacturing	2	2	2	2
Plastic Processing	2			
Porcelain Enameling	2		2	2
Printing and Publishing	2	2	2	2
Pulp and Paper Mills	2	2	2	2
Rubber Processing	2	2	2	
Soap and Detergent Manufacturing	2	2	2	
Steam Electric Power Plants	2	2	2	
Textile Mills	2	2	2	2

TABLE I—TESTING REQUIREMENTS FOR ORGANIC TOXIC POLLUTANTS BY INDUSTRIAL CATEGORY FOR EXISTING DISCHARGERS—Continued

Industrial category	GC/MS Fraction [1]			
	Volatile	Acid	Base/neutral	Pesticide
Timber Products Processing	2	2	2	2

[1] The toxic pollutants in each fraction are listed in Table II.
[2] Testing required.

TABLE II—ORGANIC TOXIC POLLUTANTS IN EACH OF FOUR FRACTIONS IN ANALYSIS BY GAS CHROMATOGRAPHY/MASS SPECTROSCOPY (GS/MS)

Volatiles

1V acrolein
2V acrylonitrile
3V benzene
5V bromoform
6V carbon tetrachloride
7V chlorobenzene
8V chlorodibromomethane
9V chloroethane
10V 2-chloroethylvinyl ether
11V chloroform
12V dichlorobromomethane
14V 1,1-dichloroethane
15V 1,2-dichloroethane
16V 1,1-dichloroethylene
17V 1,2-dichloropropane
18V 1,3-dichloropropylene
19V ethylbenzene
20V methyl bromide
21V methyl chloride
22V methylene chloride
23V 1,1,2,2-tetrachloroethane
24V tetrachloroethylene
25V toluene
26V 1,2-trans-dichloroethylene
27V 1,1,1-trichloroethane
28V 1,1,2-trichloroethane
29V trichloroethylene
31V vinyl chloride

Acid Compounds

1A 2-chlorophenol
2A 2,4-dichlorophenol
3A 2,4-dimethylphenol
4A 4,6-dinitro-o-cresol
5A 2,4-dinitrophenol
6A 2-nitrophenol
7A 4-nitrophenol
8A p-chloro-m-cresol
9A pentachlorophenol
10A phenol
11A 2,4,6-trichlorophenol

Base/Neutral

1B acenaphthene
2B acenaphthylene
3B anthracene

4B benzidine
5B benzo(a)anthracene
6B benzo(a)pyrene
7B 3,4-benzofluoranthene
8B benzo(ghi)perylene
9B benzo(k)fluoranthene
10B bis(2-chloroethoxy)methane
11B bis(2-chloroethyl)ether
12B bis(2-chloroisopropyl)ether
13B bis (2-ethylhexyl)phthalate
14B 4-bromophenyl phenyl ether
15B butylbenzyl phthalate
16B 2-chloronaphthalene
17B 4-chlorophenyl phenyl ether
18B chrysene
19B dibenzo(a,h)anthracene
20B 1,2-dichlorobenzene
21B 1,3-dichlorobenzene
22B 1,4-dichlorobenzene
23B 3,3′-dichlorobenzidine
24B diethyl phthalate
25B dimethyl phthalate
26B di-n-butyl phthalate
27B 2,4-dinitrotoluene
28B 2,6-dinitrotoluene
29B di-n-octyl phthalate
30B 1,2-diphenylhydrazine (as azobenzene)
31B fluroranthene
32B fluorene
33B hexachlorobenzene
34B hexachlorobutadiene
35B hexachlorocyclopentadiene
36B hexachloroethane
37B indeno(1,2,3-cd)pyrene
38B isophorone
39B napthalene
40B nitrobenzene
41B N-nitrosodimethylamine
42B N-nitrosodi-n-propylamine
43B N-nitrosodiphenylamine
44B phenanthrene
45B pyrene
46B 1,2,4-trichlorobenzene

Pesticides

1P aldrin
2P alpha-BHC
3P beta-BHC
4P gamma-BHC
5P delta-BHC
6P chlordane
7P 4,4′-DDT
8P 4,4′-DDE
9P 4,4′-DDD
10P dieldrin
11P alpha-endosulfan
12P beta-endosulfan
13P endosulfan sulfate
14P endrin
15P endrin aldehyde
16P heptachlor
17P heptachlor epoxide
18P PCB-1242
19P PCB-1254
20P PCB-1221
21P PCB-1232
22P PCB-1248
23P PCB-1260
24P PCB-1016
25P toxaphene

TABLE III—OTHER TOXIC POLLUTANTS (METALS AND CYANIDE) AND TOTAL PHENOLS

Antimony, Total
Arsenic, Total
Beryllium, Total
Cadmium, Total
Chromium, Total
Copper, Total
Lead, Total
Mercury, Total
Nickel, Total
Selenium, Total
Silver, Total
Thallium, Total
Zinc, Total
Cyanide, Total
Phenols, Total

TABLE IV—CONVENTIONAL AND NONCONVENTIONAL POLLUTANTS REQUIRED TO BE TESTED BY EXISTING DISCHARGERS IF EXPECTED TO BE PRESENT

Bromide
Chlorine, Total Residual
Color
Fecal Coliform
Fluoride
Nitrate-Nitrite
Nitrogen, Total Organic
Oil and Grease
Phosphorus, Total
Radioactivity
Sulfate
Sulfide
Sulfite
Surfactants
Aluminum, Total
Barium, Total
Boron, Total
Cobalt, Total
Iron, Total
Magnesium, Total
Molybdenum, Total
Manganese, Total
Tin, Total
Titanium, Total

TABLE V—TOXIC POLLUTANTS AND HAZARDOUS SUBSTANCES REQUIRED TO BE IDENTIFIED BY EXISTING DISCHARGERS IF EXPECTED TO BE PRESENT

Toxic Pollutants

Asbestos

Hazardous Substances

Acetaldehyde
Allyl alcohol
Allyl chloride
Amyl acetate
Aniline
Benzonitrile

Benzyl chloride
Butyl acetate
Butylamine
Captan
Carbaryl
Carbofuran
Carbon disulfide
Chlorpyrifos
Coumaphos
Cresol
Crotonaldehyde
Cyclohexane
2,4-D (2,4-Dichlorophenoxy acetic acid)
Diazinon
Dicamba
Dichlobenil
Dichlone
2,2-Dichloropropionic acid
Dichlorvos
Diethyl amine
Dimethyl amine
Dintrobenzene
Diquat
Disulfoton
Diuron
Epichlorohydrin
Ethion
Ethylene diamine
Ethylene dibromide
Formaldehyde
Furfural
Guthion
Isoprene
Isopropanolamine Dodecylbenzenesulfonate
Kelthane
Kepone
Malathion
Mercaptodimethur
Methoxychlor
Methyl mercaptan
Methyl methacrylate
Methyl parathion
Mevinphos
Mexacarbate
Monoethyl amine
Monomethyl amine
Naled
Napthenic acid
Nitrotoluene
Parathion
Phenolsulfanate
Phosgene
Propargite
Propylene oxide
Pyrethrins
Quinoline
Resorcinol
Strontium
Strychnine
Styrene
2,4,5-T (2,4,5-Trichlorophenoxy acetic acid)
TDE (Tetrachlorodiphenylethane)
2,4,5-TP [2-(2,4,5-Trichlorophenoxy) propanoic acid]
Trichlorofan
Triethanolamine dodecylbenzenesulfonate
Triethylamine
Trimethylamine
Uranium
Vanadium
Vinyl acetate
Xylene
Xylenol
Zirconium

[Note 1: The Environmental Protection Agency has suspended the requirements of §122.21(g)(7)(ii)(A) and Table I of Appendix D as they apply to certain industrial categories. The suspensions are as follows:

a. At 46 FR 2046, Jan. 8, 1981, the Environmental Protection Agency suspended until further notice §122.21(g)(7)(ii)(A) as it applies to coal mines.

b. At 46 FR 22585, Apr. 20, 1981, the Environmental Protection Agency suspended until further notice §122.21(g)(7)(ii)(A) and the corresponding portions of Item V-C of the NPDES application Form 2c as they apply to:

1. Testing and reporting for all four organic fractions in the Greige Mills Subcategory of the Textile Mills industry (Subpart C—Low water use processing of 40 CFR part 410), and testing and reporting for the pesticide fraction in all other subcategories of this industrial category.

2. Testing and reporting for the volatile, base/neutral and pesticide fractions in the Base and Precious Metals Subcategory of the Ore Mining and Dressing industry (subpart B of 40 CFR part 440), and testing and reporting for all four fractions in all other subcategories of this industrial category.

3. Testing and reporting for all four GC/MS fractions in the Porcelain Enameling industry.

c. At 46 FR 35090, July 1, 1981, the Environmental Protection Agency suspended until further notice §122.21(g)(7)(ii)(A) and the corresponding portions of Item V-C of the NPDES application Form 2c as they apply to:

1. Testing and reporting for the pesticide fraction in the Tall Oil Rosin Subcategory (subpart D) and Rosin-Based Derivatives Subcategory (subpart F) of the Gum and Wood Chemicals industry (40 CFR part 454), and testing and reporting for the pesticide and base/netural fractions in all other subcategories of this industrial category.

2. Testing and reporting for the pesticide fraction in the Leather Tanning and Finishing, Paint and Ink Formulation, and Photographic Supplies industrial categories.

3. Testing and reporting for the acid, base/neutral and pesticide fractions in the Petroleum Refining industrial category.

4. Testing and reporting for the pesticide fraction in the Papergrade Sulfite subcategories (subparts J and U) of the Pulp and Paper industry (40 CFR part 430); testing and reporting for the base/neutral and pesticide fractions in the following subcategories: Deink (subpart Q), Dissolving Kraft (subpart

F), and Paperboard from Waste Paper (subpart E); testing and reporting for the volatile, base/neutral and pesticide fractions in the following subcategories: BCT Bleached Kraft (subpart H), Semi-Chemical (subparts B and C), and Nonintegrated-Fine Papers (subpart R); and testing and reporting for the acid, base/neutral, and pesticide fractions in the following subcategories: Fine Bleached Kraft (subpart I), Dissolving Sulfite Pulp (subpart K), Groundwood-Fine Papers (subpart O), Market Bleached Kraft (subpart G), Tissue from Wastepaper (subpart T), and Nonintegrated-Tissue Papers (subpart S).

5. Testing and reporting for the base/neutral fraction in the Once-Through Cooling Water, Fly Ash and Bottom Ash Transport Water process wastestreams of the Steam Electric Power Plant industrial category.

This revision continues these suspensions.]*

For the duration of the suspensions, therefore, Table I effectively reads:

TABLE I—TESTING REQUIREMENTS FOR ORGANIC TOXIC POLLUTANTS BY INDUSTRY CATEGORY

Industry category	GC/MS fraction [2]			
	Volatile	Acid	Neutral	Pesticide
Adhesives and sealants	(1)	(1)	(1)	
Aluminum forming	(1)	(1)	(1)	
Auto and other laundries	(1)	(1)	(1)	(1)
Battery manufacturing	(1)		(1)	
Coal mining				
Coil coating	(1)	(1)	(1)	
Copper forming	(1)	(1)	(1)	
Electric and electronic compounds	(1)	(1)	(1)	(1)
Electroplating	(1)	(1)	(1)	
Explosives manufacturing		(1)	(1)	
Foundries	(1)	(1)	(1)	
Gum and wood (all subparts except D and F)	(1)	(1)		
Subpart D—tall oil rosin	(1)	(1)	(1)	
Subpart F—rosin-based derivatives	(1)	(1)	(1)	
Inorganic chemicals manufacturing	(1)	(1)	(1)	
Iron and steel manufacturing	(1)	(1)	(1)	
Leather tanning and finishing	(1)	(1)	(1)	
Mechanical products manufacturing	(1)	(1)	(1)	
Nonferrous metals manufacturing	(1)	(1)	(1)	(1)
Ore mining (applies to the base and precious metals/Subpart B)		(1)		
Organic chemicals manufacturing	(1)	(1)	(1)	(1)
Paint and ink formulation	(1)	(1)	(1)	
Pesticides	(1)	(1)	(1)	(1)
Petroleum refining	(1)			
Pharmaceutical preparations	(1)	(1)	(1)	
Photographic equipment and supplies	(1)	(1)	(1)	
Plastic and synthetic materials manufacturing	(1)	(1)	(1)	(1)
Plastic processing	(1)			
Porcelain enameling.				
Printing and publishing	(1)	(1)	(1)	(1)
Pulp and paperboard mills—see footnote [3].				
Rubber processing	(1)	(1)	(1)	
Soap and detergent manufacturing	(1)	(1)	(1)	
Steam electric power plants	(1)	(1)		
Textile mills (Subpart C—Greige Mills are exempt from this table)	(1)	(1)	(1)	
Timber products processing	(1)	(1)	(1)	(1)

[1] Testing required.
[2] The pollutants in each fraction are listed in Item V-C.
[3] Pulp and Paperboard Mills:

	Subpart [3]	GS/MS fractions			
		VOA	Acid	Base/neutral	Pesticides
	A	2	(1)	2	(1)
	B	2	(1)	2	2
	C	2	(1)	2	2
	D	2	(1)	2	2
	E	(1)	(1)	2	(1)
	F	(1)	(1)	2	2
	G	(1)	(1)	2	2
	H	(1)	(1)	2	2
	I	(1)	(1)	2	2
	J	(1)	(1)	(1)	2
	K	(1)	(1)	2	2
	L	(1)	(1)	2	2
	M	(1)	(1)	2	2
	N	(1)	(1)	2	2
	O	(1)	(1)	2	2
	P	(1)	(1)	2	2
	Q	(1)	(1)	2	(1)
	R	2	(1)	2	2
	S	(1)	(1)	2	(1)
	T	(1)	(1)	2	(1)
	U	(1)	(1)	(1)	2

[1] Must test.
[2] Do not test unless "reason to believe" it is discharged.
[3] Subparts are defined in 40 CFR Part 430.

[48 FR 14153, Apr. 1, 1983, as amended at 49 FR 38050, Sept. 26, 1984; 50 FR 6940, Feb. 19, 1985]

*Editorial Note: The words "This revision" refer to the document published at 48 FR 14153, Apr. 1, 1983.

APPENDIX E TO PART 122—RAINFALL ZONES OF THE UNITED STATES

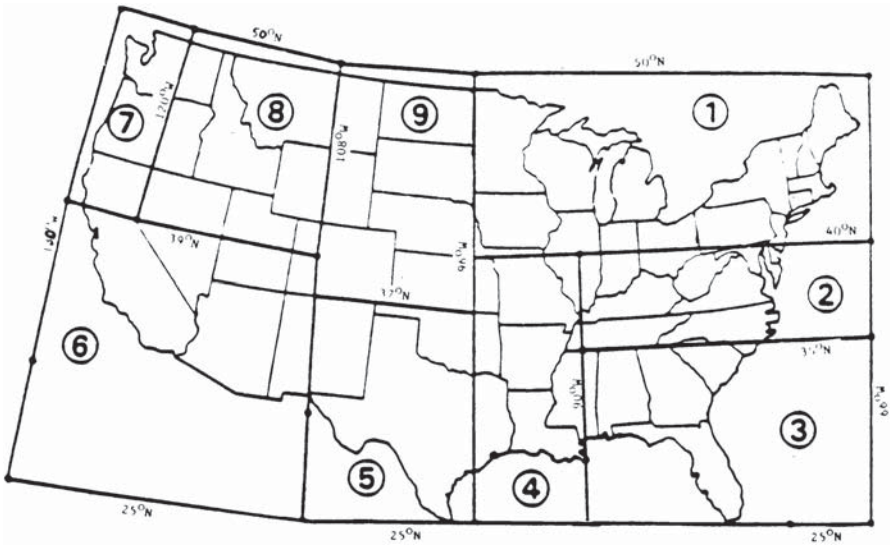

Not Shown: Alaska (Zone 7); Hawaii (Zone 7); Northern Mariana Islands (Zone 7); Guam (Zone 7); American Samoa (Zone 7); Trust Territory of the Pacific Islands (Zone 7); Puerto Rico (Zone 3) Virgin Islands (Zone 3).

Source: Methodology for Analysis of Detention Basins for Control of Urban Runoff Quality, prepared for U.S. Environmental Protection Agency, Office of Water, Nonpoint Source Division, Washington, DC, 1986.

[55 FR 48073, Nov. 16, 1990]

APPENDIX F TO PART 122—INCORPORATED PLACES WITH POPULATIONS GREATER THAN 250,000 ACCORDING TO THE 1990 DECENNIAL CENSUS BY THE BUREAU OF THE CENSUS

State	Incorporated Place
Alabama	Birmingham.
Arizona	Phoenix.
	Tucson.
California	Long Beach.
	Los Angeles.
	Oakland.
	Sacramento.
	San Diego.
	San Francisco.
	San Jose.
Colorado	Denver.
District of Columbia..	
Florida	Jacksonville.
	Miami.
	Tampa.
Georgia.	Atlanta.
Illinois	Chicago.
Indiana	Indianapolis.
Kansas	Wichita.
Kentucky	Louisville.
Louisiana	New Orleans.
Maryland	Baltimore.
Massachusetts	Boston.
Michigan	Detroit.
Minnesota	Minneapolis.
	St. Paul.
Missouri	Kansas City.
	St. Louis.
Nebraska	Omaha.
New Jersey	Newark.
New Mexico	Albuquerque.
New York	Buffalo.
	Bronx Borough.
	Brooklyn Borough.
	Manhattan Borough.
	Queens Borough.
	Staten Island Borough.
North Carolina	Charlotte.
Ohio	Cincinnati.
	Cleveland.
	Columbus.
	Toledo.
Oklahoma	Oklahoma City.
	Tulsa.
Oregon	Portland.
Pennsylvania	Philadelphia.
	Pittsburgh.
Tennessee	Memphis.
	Nashville/Davidson.
Texas	Austin.
	Dallas.
	El Paso.
	Fort Worth.

State	Incorporated Place
	Houston.
	San Antonio.
Virginia	Norfolk.
	Virginia Beach.
Washington	Seattle.
Wisconsin	Milwaukee.

[64 FR 68847, Dec. 8, 1999, as amended at 67 FR 47152, July 17, 2002]

APPENDIX G TO PART 122—INCORPORATED PLACES WITH POPULATIONS GREATER THAN 100,000 BUT LESS THAN 250,000 ACCORDING TO THE 1990 DECENNIAL CENSUS BY THE BUREAU OF THE CENSUS

State	Incorporated place
Alabama	Huntsville.
	Mobile.
	Montgomery.
Alaska	Anchorage.
Arizona	Mesa.
	Tempe.
Arkansas	Little Rock.
California	Anaheim.
	Bakersfield.
	Berkeley.
	Chula Vista.
	Concord.
	El Monte.
	Escondido.
	Fremont.
	Fresno.
	Fullerton.
	Garden Grove.
	Glendale.
	Hayward.
	Huntington Beach.
	Inglewood.
	Irvine.
	Modesto.
	Moreno Valley.
	Oceanside.
	Ontario.
	Orange.
Colorado	Aurora.
	Colorado Springs.
	Lakewood.
	Pueblo.
Connecticut	Bridgeport.
	Hartford.
	New Haven.
	Stamford.
	Waterbury.
Florida	Fort Lauderdale.
	Hialeah.
	Hollywood.
	Orlando.
	St. Petersburg.
	Tallahassee.
Georgia	Columbus.
	Macon.
	Savannah.
Idaho	Boise City.
Illinois	Peoria.
	Rockford.
Indiana	Evansville.
	Fort Wayne.
	Gary.
	South Bend.
Iowa	Cedar Rapids.
	Davenport.
	Des Moines.
Kansas	Kansas City.
	Topeka.
Kentucky	Lexington-Fayette.
Louisiana	Baton Rouge.
	Shreveport.
Massachusetts	Springfield.
	Worcester.
Michigan	Ann Arbor.
	Flint.
	Grand Rapids.
	Lansing.
	Livonia.
	Sterling Heights.
	Warren.
Mississippi	Jackson.
Missouri	Independence.
	Springfield.
Nebraska	Lincoln.
Nevada	Las Vegas.
	Reno.
New Jersey	Elizabeth.
	Jersey City.
	Paterson.
New York	Albany.
	Rochester.
	Syracuse.
	Yonkers.
North Carolina	Durham.
	Greensboro.
	Raleigh.
	Winston-Salem.
Ohio	Akron.
	Dayton.
	Youngstown.
Oregon	Eugene.
Pennsylvania	Allentown.
	Erie.
Rhode Island	Providence.
South Carolina	Columbia.
Tennessee	Chattanooga.
	Knoxville.
Texas	Abilene.
	Amarillo.
	Arlington.
	Beaumont.
	Corpus Christi.
	Garland.
	Irving.
	Laredo.
	Lubbock.
	Mesquite.
	Pasadena.
	Plano.
	Waco.
Utah	Salt Lake City.
Virginia	Alexandria.
	Chesapeake.
	Hampton.
	Newport News.
	Portsmouth.
	Richmond.
	Roanoke.
Washington	Spokane.
	Tacoma.
Wisconsin	Madison.

[64 FR 68848, Dec. 8, 1999]

APPENDIX H TO PART 122—COUNTIES WITH UNINCORPORATED URBANIZED AREAS WITH A POPULATION OF 250,000 OR MORE ACCORDING TO THE 1990 DECENNIAL CENSUS BY THE BUREAU OF THE CENSUS

State	County	Unincorporated urbanized population
California	Los Angeles	886,780
	Sacramento	594,889
	San Diego	250,414
Delaware	New Castle	296,996
Florida	Dade	1,014,504
Georgia	DeKalb	448,686
Hawaii	Honolulu [1]	114,506
Maryland	Anne Arundel	344,654
	Baltimore	627,593
	Montgomery	599,028
	Prince George's	494,369
Texas	Harris	729,206
Utah	Salt Lake	270,989
Virginia	Fairfax	760,730
Washington	King	520,468

[1] County was previously listed in this appendix; however, population dropped to below 250,000 in the 1990 Census.

[64 FR 68848, Dec. 8, 1999]

APPENDIX I TO PART 122—COUNTIES WITH UNINCORPORATED URBANIZED AREAS GREATER THAN 100,000, BUT LESS THAN 250,000 ACCORDING TO THE 1990 DECENNIAL CENSUS BY THE BUREAU OF THE CENSUS

State	County	Unincorporated urbanized population
Alabama	Jefferson	78,608
Arizona	Pima	162,202
California	Alameda	115,082
	Contra Costa	131,082
	Kern	128,503
	Orange	223,081
	Riverside	166,509
	San Bernardino	162,202
Colorado	Arapahoe	103,248
Florida	Broward	142,329
	Escambia	167,463
	Hillsborough	398,593
	Lee	102,337
	Manatee	123,828
	Orange	378,611
	Palm Beach	360,553
	Pasco	148,907
	Pinellas	255,772
	Polk	121,528
	Sarasota	172,600
	Seminole	127,873
Georgia	Clayton	133,237
	Cobb	322,595
	Fulton	127,776
	Gwinnett	237,305
	Richmond	126,476
Kentucky	Jefferson	239,430
Louisiana	East Baton Rouge	102,539
	Parish	331,307
	Jefferson Parish.	
Maryland	Howard	157,972
North Carolina	Cumberland	146,827
Nevada	Clark	327,618
Oregon	Multnomah [1]	52,923
	Washington	116,687
South Carolina	Greenville	147,464
	Richland	130,589
Virginia	Arlington	170,936
	Chesterfield	174,488
	Henrico	201,367
	Prince William	157,131
Washington	Pierce	258,530
	Snohomish	157,218

[1] County was previously listed in this appendix; however, population dropped to below 100,000 in the 1990 Census.

[64 FR 68849, Dec. 8, 1999]

APPENDIX J TO PART 122—NPDES PERMIT TESTING REQUIREMENTS FOR PUBLICLY OWNED TREATMENT WORKS (§ 122.21(j))

TABLE 1A—EFFLUENT PARAMETERS FOR ALL POTWS

Biochemical oxygen demand (BOD–5 or CBOD–5)
Fecal coliform
Design Flow Rate
pH
Temperature
Total suspended solids

TABLE 1—EFFLUENT PARAMETERS FOR ALL POTWS WITH A FLOW EQUAL TO OR GREATER THAN 0.1 MGD

Ammonia (as N)
Chlorine (total residual, TRC)
Dissolved oxygen
Nitrate/Nitrite
Kjeldahl nitrogen
Oil and grease
Phosphorus
Total dissolved solids

TABLE 2—EFFLUENT PARAMETERS FOR SELECTED POTWS

Hardness
Metals (total recoverable), cyanide and total phenols
Antimony
Arsenic
Beryllium
Cadmium
Chromium
Copper
Lead
Mercury
Nickel
Selenium
Silver
Thallium

Zinc
Cyanide
Total phenolic compounds
Volatile organic compounds
Acrolein
Acrylonitrile
Benzene
Bromoform
Carbon tetrachloride
Chlorobenzene
Chlorodibromomethane
Chloroethane
2-chloroethylvinyl ether
Chloroform
Dichlorobromomethane
1,1-dichloroethane
1,2-dichloroethane
Trans-1,2-dichloroethylene
1,1-dichloroethylene
1,2-dichloropropane
1,3-dichloropropylene
Ethylbenzene
Methyl bromide
Methyl chloride
Methylene chloride
1,1,2,2-tetrachloroethane
Tetrachloroethylene
Toluene
1,1,1-trichloroethane
1,1,2-trichloroethane
Trichloroethylene
Vinyl chloride
Acid-extractable compounds
P-chloro-m-creso
2-chlorophenol
2,4-dichlorophenol
2,4-dimethylphenol
4,6-dinitro-o-cresol
2,4-dinitrophenol
2-nitrophenol
4-nitrophenol
Pentachlorophenol
Phenol
2,4,6-trichlorophenol
Base-neutral compounds
Acenaphthene
Acenaphthylene
Anthracene
Benzidine
Benzo(a)anthracene
Benzo(a)pyrene
3,4 benzofluoranthene
Benzo(ghi)perylene
Benzo(k)fluoranthene
Bis (2-chloroethoxy) methane
Bis (2-chloroethyl) ether
Bis (2-chloroisopropyl) ether
Bis (2-ethylhexyl) phthalate
4-bromophenyl phenyl ether
Butyl benzyl phthalate
2-chloronaphthalene
4-chlorophenyl phenyl ether
Chrysene
Di-n-butyl phthalate
Di-n-octyl phthalate
Dibenzo(a,h)anthracene
1,2-dichlorobenzene
1,3-dichlorobenzene
1,4-dichlorobenzene
3,3-dichlorobenzidine
Diethyl phthalate
Dimethyl phthalate
2,4-dinitrotoluene
2,6-dinitrotoluene
1,2-diphenylhydrazine
Fluoranthene
Fluorene
Hexachlorobenzene
Hexachlorobutadiene
Hexachlorocyclo-pentadiene
Hexachloroethane
Indeno(1,2,3-cd)pyrene
Isophorone
Naphthalene
Nitrobenzene
N-nitrosodi-n-propylamine
N-nitrosodimethylamine
N-nitrosodiphenylamine
Phenanthrene
Pyrene
1,2,4,-trichlorobenzene

[65 FR 42469, Aug. 4, 2000]

PART 123—STATE PROGRAM REQUIREMENTS

Subpart A—General

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123.1 Purpose and scope.
123.2 Definitions.
123.3 Coordination with other programs.

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123.21 Elements of a program submission.
123.22 Program description.
123.23 Attorney General's statement.
123.24 Memorandum of Agreement with the Regional Administrator.
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123.26 Requirements for compliance evaluation programs.
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123.28 Control of disposal of pollutants into wells.
123.29 Prohibition.
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123.31 Requirements for eligibility of Indian Tribes.
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123.35 As the NPDES Permitting Authority for regulated small MS4s, what is my role?

Article 66

Feature article from Watershed Protection Techniques. 3(3): 695-706

Stormwater Strategies for Arid and Semi-Arid Watersheds

Water supply and flood control have traditionally dominated watershed planning in arid and semi-arid climates. Until recent years, stormwater quality has simply not been much of a priority for water resource managers in the west. This situation is changing rapidly, as fast-growing communities are responding to both emerging water quality problems and new federal regulations. In particular, larger cities in the west have gradually been dealing with stormwater quality to meet the requirements of the first phase of EPA's municipal stormwater National Pollutant Discharge Elimination System (NPDES) program. Soon, thousands more smaller communities will need to develop stormwater quality programs when the second phase of this national stormwater regulatory program is rolled out later this year.

At first glance, it seems ludicrous to consider managing the quality of stormwater in arid regions where storms are such a rare and generally welcome event— sort of like selling combs at a bald convention. The urban water resources of the southwest, however, are strongly influenced by stormwater runoff and by the watershed development that increases it. Indeed, the flow of many urban streams in the southwest is generated almost entirely by human activity: by urban storm flow, irrigation return flow and wastewater effluent. Thus, the quality of both surface water and groundwater in urbanizing areas of arid and semi-arid regions of the southwest is strongly shaped by urbanization.

For purposes of this article, arid watersheds are defined as those that receive less than 15 inches of rain each year. Semi-arid watersheds get between 15 and 35 inches of rainfall, and have a distinct dry season where evaporation greatly exceeds rainfall. In contrast, humid watersheds are defined as those that get at least 35 inches of rain each year, and often much more. There are many arid and semi-arid watersheds, most of which are located in fast growing regions of the western United States (Figure 1). Low annual rainfall, extensive droughts, high intensity storms and high evaporation rates are characteristic of these watersheds, and present many challenges to the stormwater manager. [Note: in some arid and semi-arid watersheds, most precipitation falls as snow and evaporation rates are much lower. These watersheds are found in portions of Alaska and at higher elevations of the Rocky Mountains and Sierra Nevada. Guidance on stormwater strategies for these dry but cold watersheds can be found in Caraco and Claytor (1997)].

Figure 1: Distribution of Rainfall in the United States

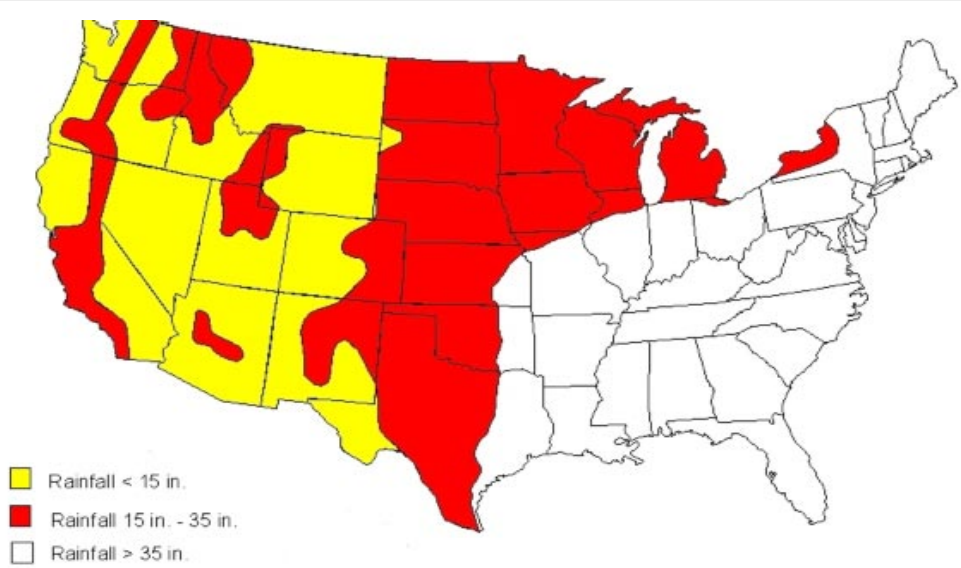

Article 46

Feature article from Watershed Protection Techniques. 3(2): 633-646

The Benefits of Better Site Design in Residential Subdivisions

Though they may not realize it, site planners have an excellent opportunity to reduce storm water runoff and pollutant export simply by changing the way they lay out new residential subdivisions. Planners that employ open space design techniques can collectively reduce the amount of impervious cover, increase the amount of natural land conserved, and improve the performance of stormwater treatment practices at new residential developments.

Simply put, open space designs concentrate density on one portion of a site in order to conserve open space elsewhere by relaxing lot sizes, frontages, road sections, and other subdivision geometry. While site designs that employ these techniques go by many different names, such as clustering or conservation design, they all incorporate some or all of the following better site design techniques:

- Using narrower, shorter streets and rights-of-way
- Applying smaller lots and setbacks and narrow frontages to preserve significant open space
- Reducing the amount of site area devoted to residential lawns
- Spreading stormwater runoff over pervious surfaces
- Using open channels rather than curb and gutter
- Protecting stream buffers
- Enhancing the performance of septic systems, when applicable

In this article, we examine some of the benefits of employing better site design techniques as they apply to residential subdivisions. The analysis utilizes a simple spreadsheet computer model to compare actual residential sites constructed in the 1990s using conventional design techniques with the same sites "redesigned" utilizing better site design techniques. For each development scenario, site characteristics such as total impervious and vegetative cover, infrastructure quantities, and type of stormwater management practice are estimated.

The Simplified Urban Nutrient Output Model (SUNOM) was used to perform a comparative analysis for two subdivisions that span a wide range of residential density (see Table X). The first is a large-lot subdivision known as Duck Crossing, and the second is a medium-density subdivision known as Stonehill Estates. In each case, the model was used to simulate five different development scenarios:

- Pre-developed conditions
- Conventional design without stormwater practices
- Conventional design with stormwater practices
- Open space design without stormwater practices
- Open space design with stormwater practices

This article compares the hydrology, nutrient export, and development cost for these sites under both conventional and open space design, and with and without stormwater treatment. The article also summarizes other research on the benefits of open space design and discusses the implications it can have for the watershed manager.

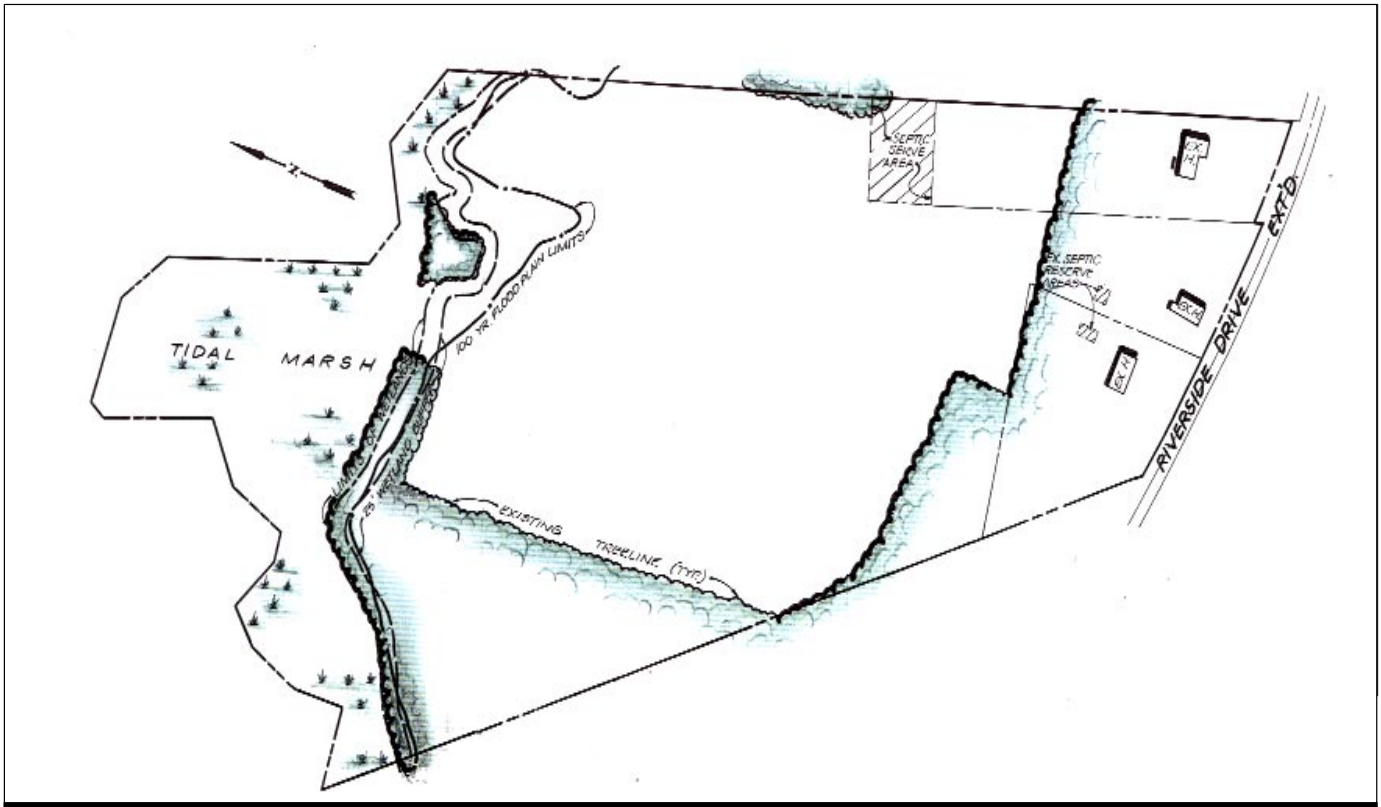

Figure 1: Predevelopment Conditions at the Duck Crossing Site

Duck Crossing - A Low-Density Residential Subdivision

Duck Crossing is a large-lot residential development located in Wicomico County on Maryland's Eastern Shore. Prior to development, the low gradient coastal plain site contained a mix of tidal and non-tidal wetlands, natural forest, and meadow (Figure 1). Its sandy soils were highly permeable (hydrologic soil group A). Three existing homes were located on the parcel, which relied on septic systems for on-site sewage disposal. The existing septic systems discharged a considerable nutrient load to shallow groundwater.

A conventional large-lot subdivision of eight single family homes was constructed on the 24-acre site in the early 1990s. The subdivision is reasonably typical of rural residential development along the Chesapeake Bay waterfront during this era (Figure 2). Each new lot ranged from three to five acres in size, and was set back several hundred feet from an access road. The access road was 30 feet wide and terminated in a large diameter cul-de-sac. Sidewalks were located on both sides of the street. Each lot was served by a conventional septic system with a primary and reserve field of about 10,000 square feet. Stormwater management consisted of curb and gutters that conveyed runoff into a storm drain system that, in turn, discharged to a small dry pond (designed for the water quality volume, only).

The entire site was privately owned, with the exception of the tidal marsh, which was protected under state and federal wetland laws and represented the only common open space on the site. As a result of construction, the existing meadow was entirely converted to lawn, and the impervious cover for the site increased to slightly over 8%.

Open Space Design for Duck Crossing

The critical ingredient of the open space redesign was a reduction in lot size from several acres to about 30,000 square feet. This enabled about 74% of the site to be protected and managed as common open space, which included most of the existing forest, wetlands and meadow (Figure 3). Consequently, only 19% of the site was managed as turf, nearly all of which was located on the private lots.

The open space redesign at Duck Crossing also incorporated a narrower access road (20 feet wide) along with shorter, shared driveways that served six of the eight lots. The road turnaround was designed as a loop rather than a cul-de-sac bulb. Also, a wood chip trail system was provided through the open space instead of sidewalks along the road. Each home site was carefully located away from sensitive natural areas and the 100-year flood plain. Taken together, these better site design techniques reduced impervious cover for

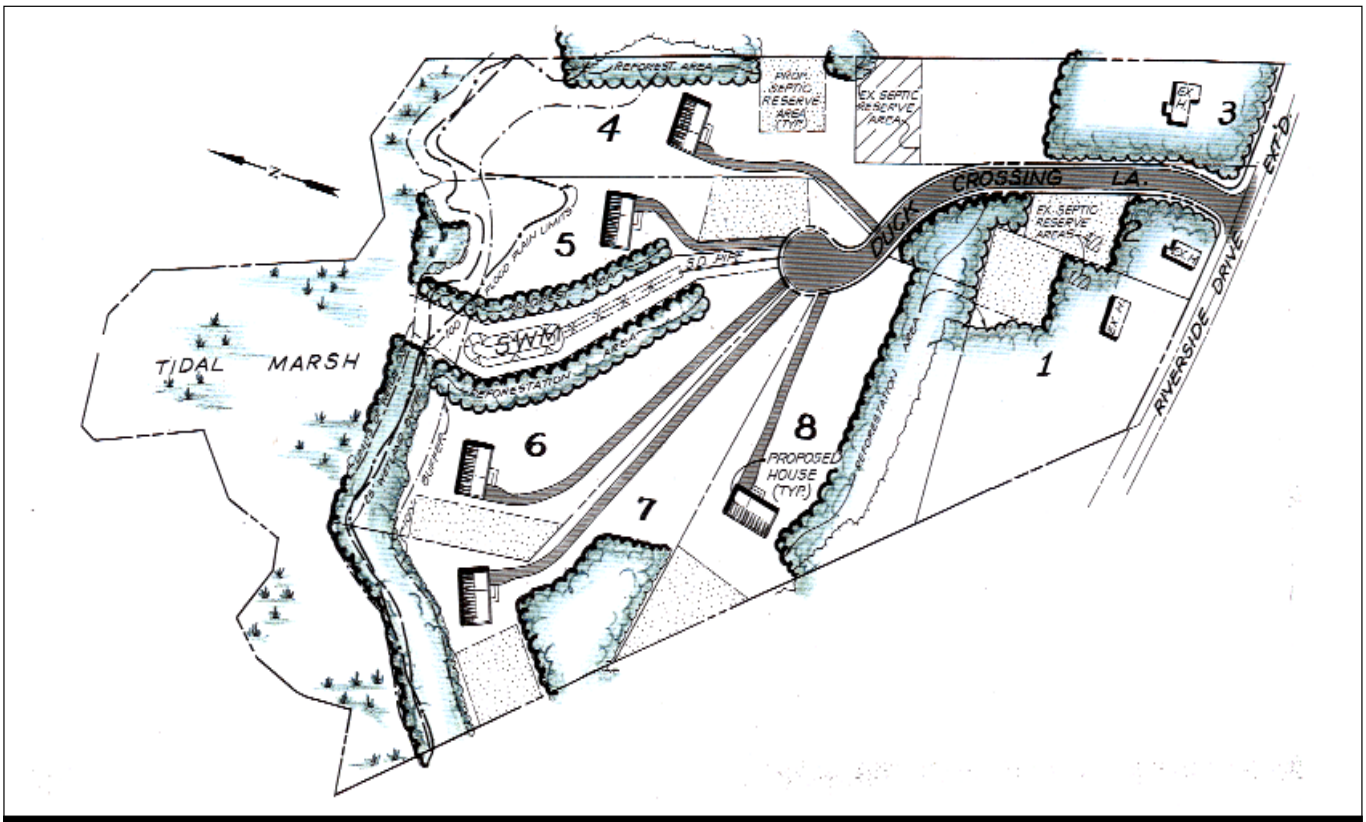

Figure 2: The Low-Density Conventional Subdivision Built at Duck Crossing (eight lots)

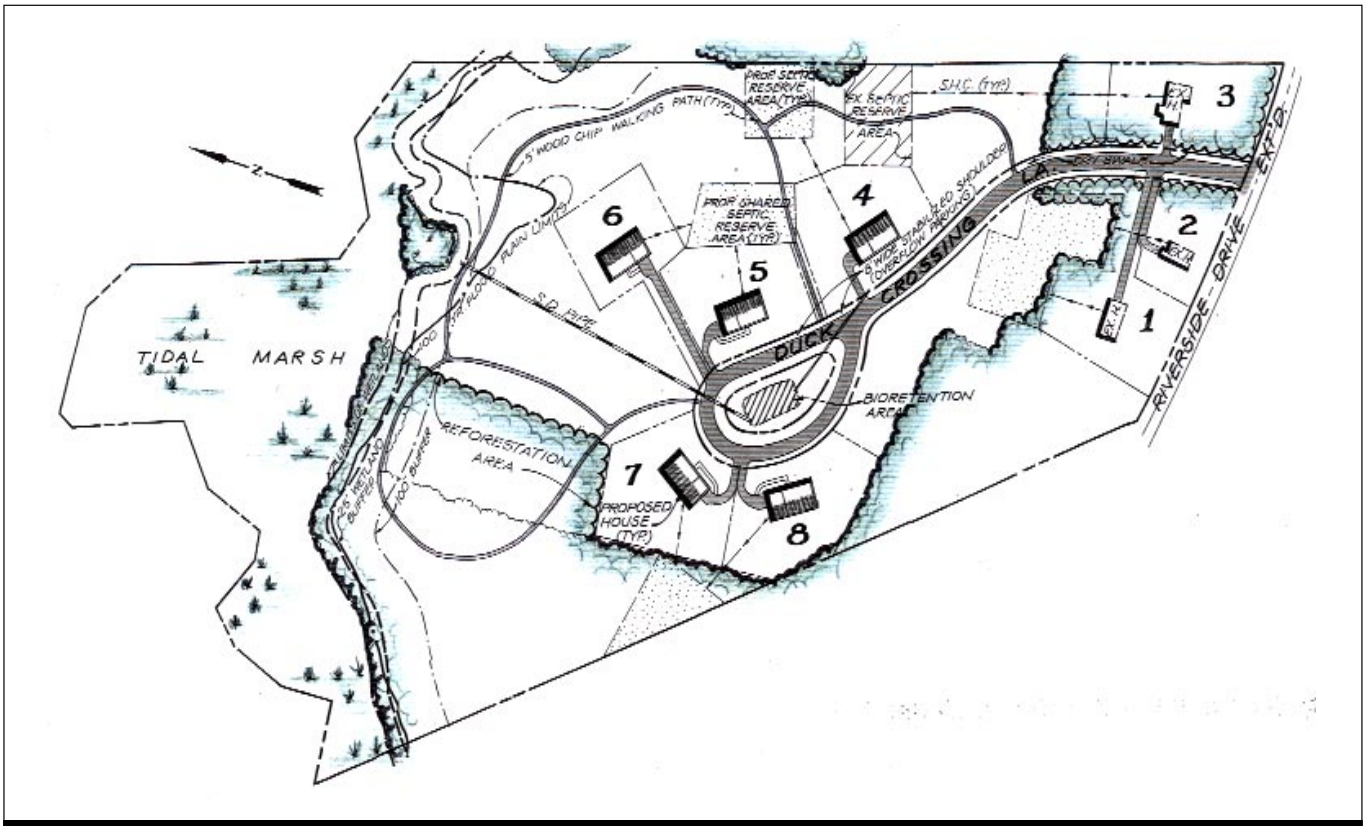

Figure 3: The Open Space Subdivision That Could Have Been Built at Duck Crossing (eight lots)

the site by about a third compared to the conventional design (from 8% to 5%).

The redesigned stormwater conveyance system utilized dry swales rather than a curb and gutter system, and featured the use of bioretention areas in the roadway loop to treat stormwater quality. This combination of stormwater practices provided greater pollutant removal through filtration and infiltration.

One of the most important objectives in the redesign strategy was to improve the location and performance of the septic systems that dispose of wastewater at the site. Home sites were oriented to be near soils that were most suitable for septic system treatment. In addition, six homes shared three common septic fields located within open space rather than on individual private lots. Lastly, given the permeability of the soils, advanced re-circulating sand filters were installed to provide better nutrient removal than could be achieved by conventional septic systems.

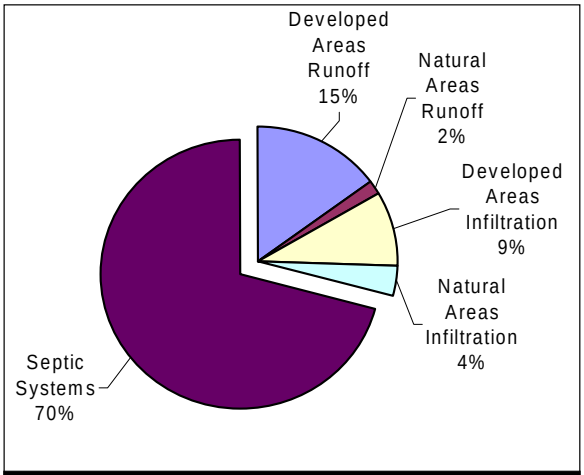

Figure 4: Nitrogen Load Distribution From the Conventional Design of Duck Crossing, Without Stormwater Practices

Comparative Hydrology for Duck Crossing

Given its low impervious cover and permeable soils, the water balance at Duck Crossing was dominated by infiltration, even after development. The comparative hydrology under the five development scenarios is presented in Table 1. As might be expected, the conventional design yielded the greatest volume of surface runoff and the least amount of infiltration. The open space design produced about 25% less annual surface runoff and 12% more infiltration than the conventional design, but did not come close to replicating pre-development conditions. The use of stormwater practices did not materially change the water balance under either the conventional or open space design at Duck Crossing (see Table 1).

Comparative Nutrient Output at Duck Crossing

Nutrient export at Duck Crossing was dominated more by subsurface water movement than by surface runoff. Indeed, stormwater runoff seldom comprised more than 15% of the annual nitrogen or phosphorus load from this lightly developed site. The SUNOM model indicated that the major source of nutrients was subsurface discharges from septic systems, which typically accounted for 60 to 80% of the total load in every development scenario (see Figure 4).

The open space design sharply reduced nutrient export, primarily because re-circulating sand filters were used in the shared septic systems and helped to reduce (but not eliminate) subsurface nutrient discharge. The other elements of the open space design (reduced impervious cover, reduced lawn cover, and multiple stormwater practices) also helped to reduce nutrient export, but by a much smaller amount. The comparative nutrient export from each Duck Crossing development scenario is detailed in Figure 5.

Comparative Cost of Development

The cost to build infrastructure for the open space design was estimated to be 25% less than the conventional design at Duck Crossing, due primarily to the necessity for less road paving, sidewalks, and curbs and gutters. Even when higher costs were factored in for the more sophisticated stormwater and on-site wastewater treatment used in the open space design, the total cost was still 12% lower than the conventional design. In addition, the open space design had seven fewer

Table 1: Annual Water Budget of Duck Crossing

		Pre-Developed	Conventional Design	Open Space Design
Runoff (inches/year)	no practice	2.3	4.8	3.9
	practices	- -	4.8	3.7
Infiltration (inches/year)	no practice	18.2	15.3	17.0
	practices	- -	15.3	17.2

acres that needed to be cleared and graded, or served by erosion and sediment controls, compared to the conventional design (these costs are not currently evaluated by the SUNOM model). Overall, the SUNOM model estimated that the conventional design at Duck Crossing had a total infrastructure cost of $143,600, compared to $126,400 for the open space design.

Summary

The comparative results for the Duck Crossing redesign analysis are summarized in Figure 6. The open space design increased natural area conservation and reduced impervious cover, stormwater runoff, nutrient export, and development costs compared to the conventional subdivision design.

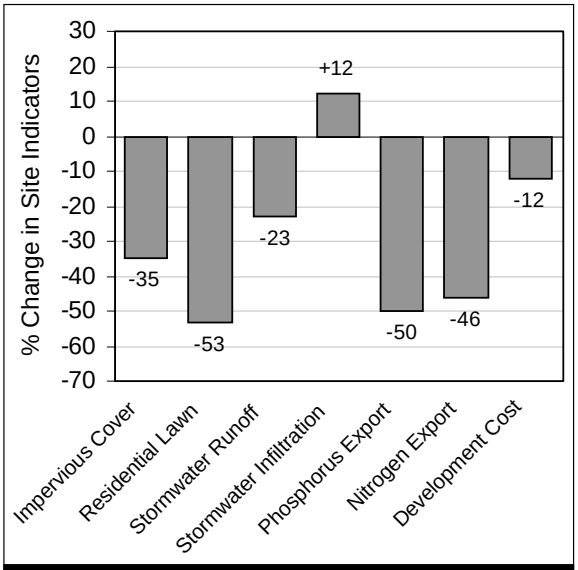

Figure 6: Percentage Change in Key Site Conditions From a Conventional Design to an Open Space Design, Both With Stormwater Practices

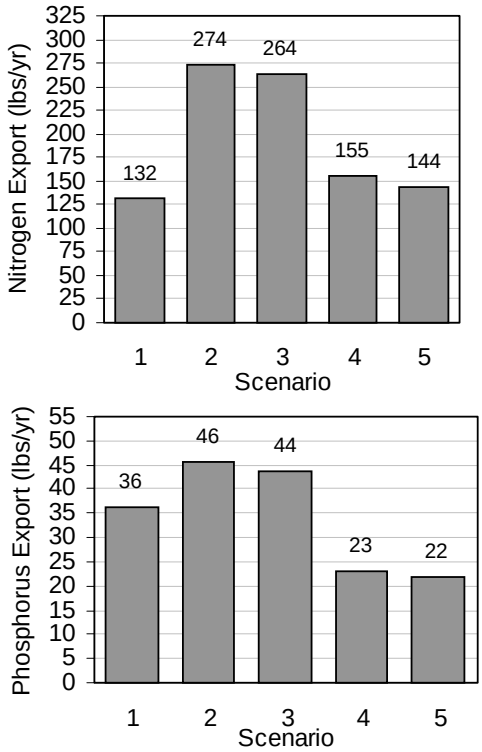

1 - Pre-Developed Conditions
2 - Conventional Design (no practices)
3 - Conventional Design (with practices)
4 - Open Space Design (no practices)
5 - Open Space Design (with practices)

Figure 5: Annual Nitrogen and Phosphorus Loads for Each Development Scenario at Duck Crossing

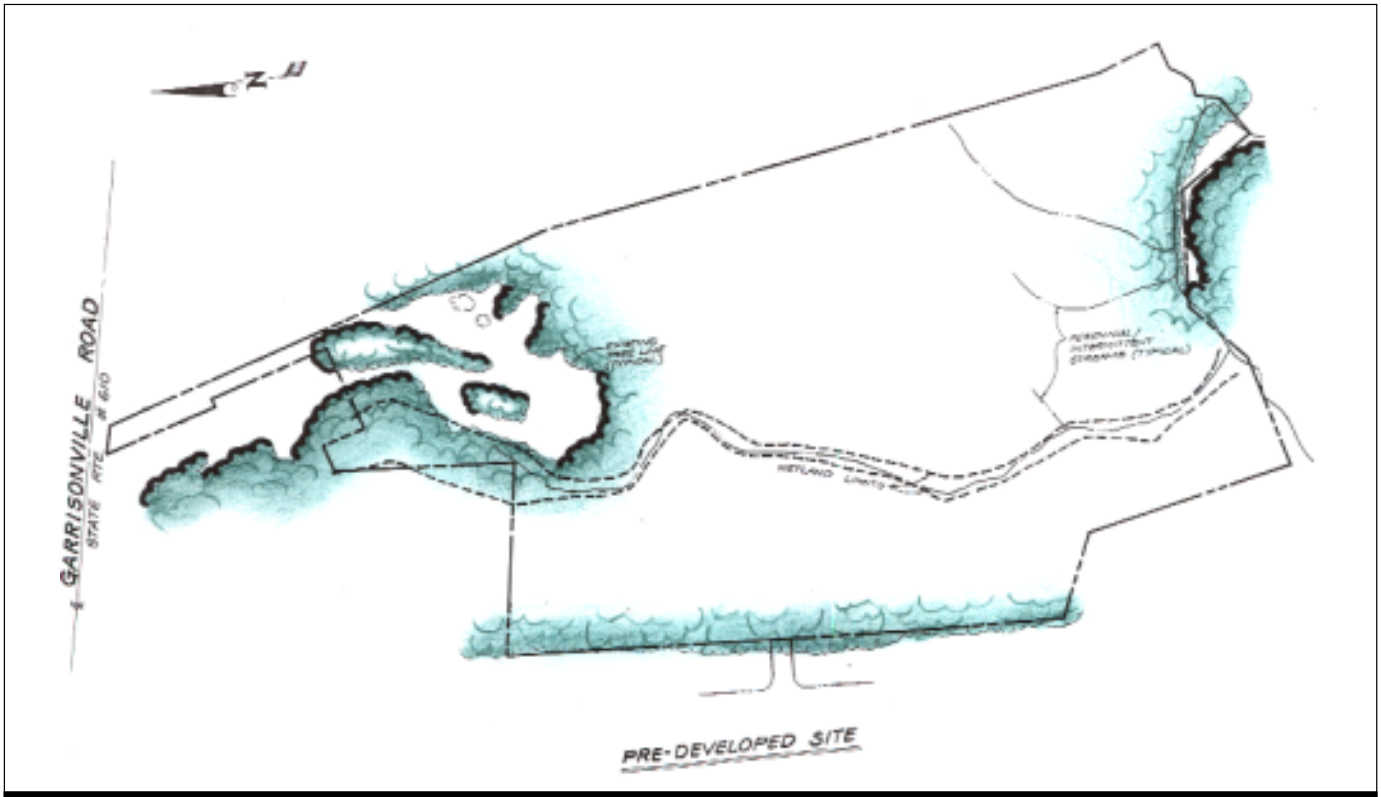

Figure 7: Predevelopment Conditions at the Stonehill Estates Site

Stonehill Estates - A Medium-Density Residential Subdivision

Stonehill Estates, located near Fredericksburg, Virginia, is situated in the rolling terrain of the Piedmont. The undeveloped parcel was 45 acres in size, nearly all of which was mature hardwood forest (Figure 7). An intermittent stream bisected the site, discharging into a perennial stream near the southern edge of the parcel. Roughly 3.6 acres of forested wetlands were found along the stream corridors, and an extensive floodplain was located along the perennial stream. Soils at the site were primarily silt loams and were moderately permeable (hydrologic soil groups C and D).

The site was highly attractive for development, given the excellent access provided by two existing roads, both of which had public water and sewer lines that could be easily tapped to serve the new subdivision. The conventional design was zoned for three dwelling units per acre. After unbuildable lands were excluded, the parcel yielded a total of 108 house lots, each of which was about 9,000 square feet in size (Figure 8). The subdivision design typifies medium-density residential subdivisions developed in the last two decades in the Mid-Atlantic region, where lots sizes were uniform in size and shape and homes were set back a generous and fixed distance from the street. The design utilized a mix of wide and moderate street sections (34 feet and 26 feet), and included six large diameter cul-de-sacs for turnarounds. Sidewalks were generally installed on both sides of the street.

The stormwater management system for the conventional design represents the typical "pipe and pond" approach utilized in many medium-density residential subdivisions. Street runoff was conveyed by curbs and gutters into a storm drain system that discharged into the intermittent stream channel, and then traveled downstream to a dry extended detention pond. The pond was primarily designed to control flooding, but also provided some limited removal of stormwater pollutants.

Interestingly, about 25% of the site was reserved as open space in the conventional design at Stonehill Estates. Nearly all of these lands were unbuildable because of environmental and site constraints (e.g., floodplains, steep slopes, wetlands, and stormwater facilities), and the resulting open space was highly fragmented. Even so, about a fourth of the forested wetlands were impacted by two roads crossing over the intermittent stream. Almost 90% of the original forest cover was cleared as a result of the conventional design, and was replaced by lawns and impervious cover. Overall, about 60% of the site was converted to lawns, and another 27% was converted to impervious cover.

Figure 8: The Conventional Subdivision Design That Was Built at Stonehill Estates (108 lots)

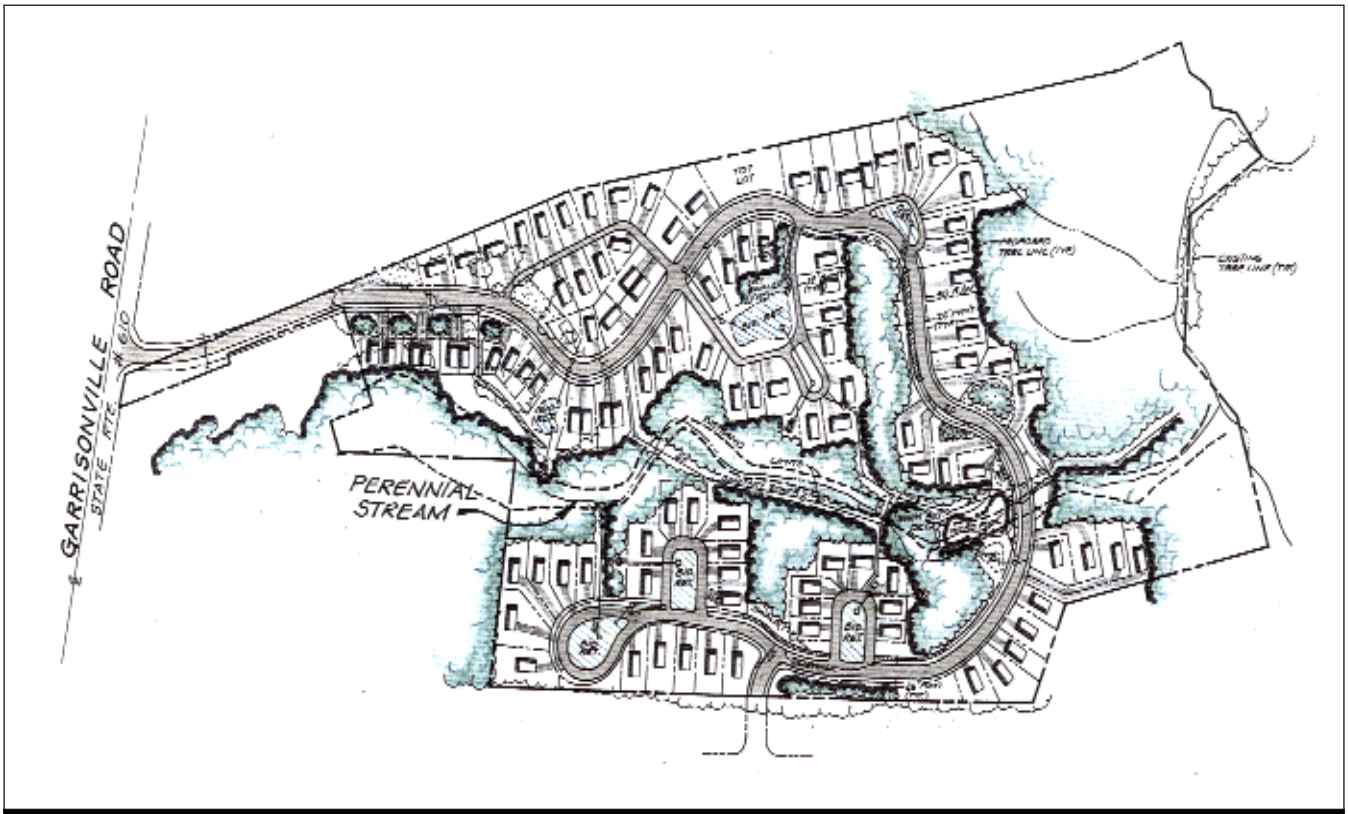

Figure 9: The Open Space Subdivision That Could Have Been Built at Stonehill Estates (108 lots)

Open Space Design for Stonehill Estates

In the redesign analysis, Stonehill Estates was designed to incorporate many of the open space design techniques advocated by Arendt (1994). The resulting design retained the same number of lots as the conventional design, but had a much different layout (Figure 9). The average lot size declined from about 9,000 square feet in the conventional design to 6,300 square feet in the open space design. This reduced lot size allowed about 44% of the site to be protected as open space, most of which was managed as a single unit that included an extensive natural buffer along the perennial and intermittent stream corridor.

The basic open space layout was augmented by several other better site design practices, including narrower streets, shorter driveways, and fewer sidewalks. Loop roads were used as an alternative to cul-de-sacs. In some portions of the site, irregularly shaped lots and shared driveways were used to reduce overall road length. Each individual lot was located adjacent to open space, so that the more compact open space lots would not feel as crowded. As a result of these techniques, the open space design for Stonehill Estates reduced impervious cover from 27% to 20%. In addition, lawn cover declined from 60% to 30% of the total site area.

The innovative stormwater collection system utilized dry swales rather than storm drains in gently sloping portions of the site. The dry swales and several bioretention areas located in loop turnarounds were used to initially treat stormwater quality. Each of these practices then discharged to a small micro-pool detention pond, whose embankment was created by the single road crossing over the intermittent stream.

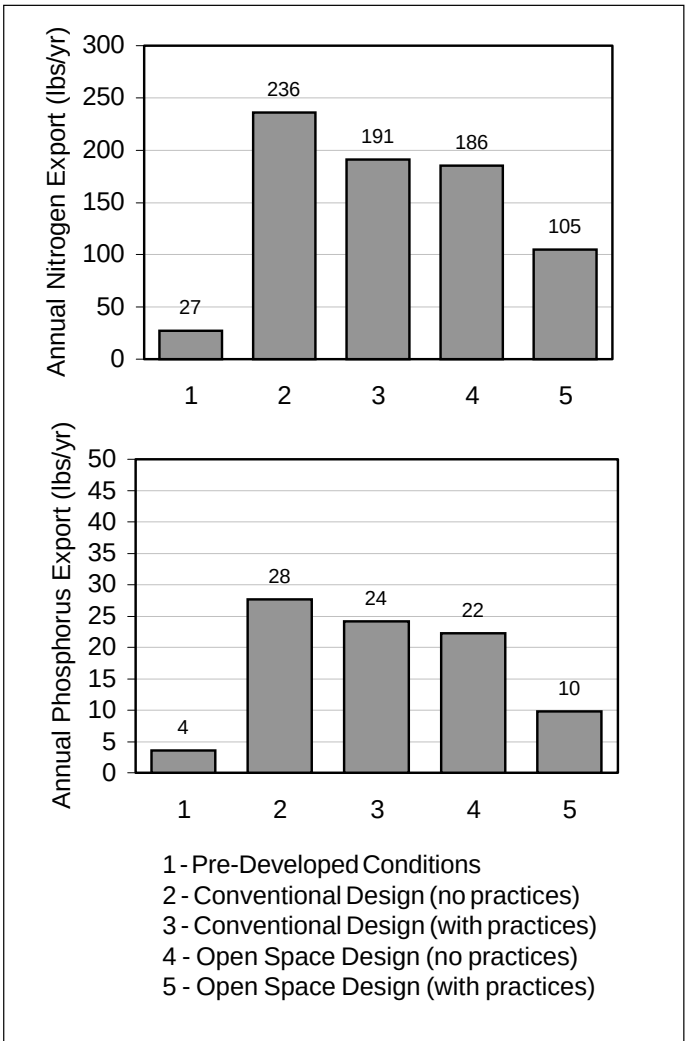

Figure 10: Annual Nitrogen and Phosphorus Loads for Each Stonehill Estates Development Scenario

Table 2: Comparative Hydrology of Stonehill Estates

		Pre-Developed	Conventional Design	Open Space Design
Runoff (inches/year)	no practice	2.1	10.6	8.8
	practices	n/a	10.6	8.0
Infiltration (inches/year)	no practice	4.9	3.1	4.0
	practices	n/a	3.1	4.8

Comparative Hydrology

Prior to its development, the highly wooded site produced very little surface runoff, but because of relatively tight soils, generated only a modest amount of infiltration. However, after the site was converted into the conventional subdivision, surface runoff increased by a factor of five, and infiltration was reduced by about 40% (Table 2). In contrast, the open space design worked to reduce stormwater runoff and increase stormwater infiltration compared to the conventional design, although it did not come close to replicating the original hydrology of the forested site (Table 2).

Comparative Nutrient Output

As might be expected, the conversion of the forest into a conventional subdivision greatly increased nutrient export from the site; the model indicated that annual phosphorus and nitrogen export would increase by a factor of seven and nine, respectively, after development (see Figure 10). Unlike Duck Crossing, nutrient export at Stonehill Estates was dominated by stormwater runoff after development. The SUNOM model indicated that stormwater runoff contributed about 94% of the annual nutrient export from the site, with subsurface water movement adding only 6% to the total export. Nutrient loads were not greatly reduced by the dry extended detention pond installed at the conventional subdivision; the model indicated that nutrient

Table 3: Redesign Analyses Comparing Impervious Cover and Stormwater Runoff from Conventional and Open Space Subdivisions

Residential Subdivision	Original Zoning for Subdivision	Impervious Cover at the Site			Reduction in Stormwater Runoff (%)
		Conventional Design	Open Space Design	Net Change	
Remlik Hall [1]	5 acre lots	5.4 %	3.7%	- 31%	20%
Tharpe Knoll [2]	1 acre lots	13%	7%	- 46%	44%
Chapel Run [2]	‰ acre lots	29%	17%	- 41%	31%
Pleasant Hill [2]	‰ acre lots	26%	11%	- 58%	54%
Prairie Crossing [3]	‰ to 1/3 acre lots	20%	18%	- 20%	66%
Buckingham Greene [2]	1/8 acre lots	23%	21%	- 7%	8%
Belle-Hall [4]	High Density	35%	20%	- 43%	31%

Sources: [1] Maurer, 1996; [2] DE DNREC, 1997; [3] Dreher, 1994; and [4] SCCCL, 1995.

export from the conventional design would still be six to seven times greater than the pre-development condition even with this stormwater treatment practice.

In contrast, the open space design resulted in greater nutrient reduction (Figure 10). For example, the open space design scenario *without* stormwater practices produced a lower nutrient load than the conventional design scenario *with* stormwater practices. This was primarily due to lower impervious cover associated with the open space design. When the open space design was combined with more sophisticated stormwater practices (i.e., bioretention, dry swales and wet ponds), nutrient export was half that of the conventional design. It is interesting to note, however, that even when the most innovative site design and stormwater techniques were applied to the site, nutrient export was still three to four times greater than that produced by the forest prior to development.

Infrastructure Costs

The total cost to build infrastructure at Stonehill Estates was about 20% less for the open space design than for the conventional design. Considerable savings were realized in the form of less road paving and shorter lengths of sidewalks, water and sewer lines and curbs and gutters. The cost difference between the open space and conventional designs would have been greater were it not for the fact that higher costs were incurred for the more sophisticated stormwater practices used in the open space design. It was estimated that the infrastructure cost for the conventional design was $1.54 million, compared to $1.24 million for the open space design.

Summary

The comparative results for the Stonehill Estates redesign analysis are summarized in Figure 11. The open space design reduced impervious cover, natural area conversion, stormwater runoff, nutrient export and development costs compared to the conventional subdivision design.

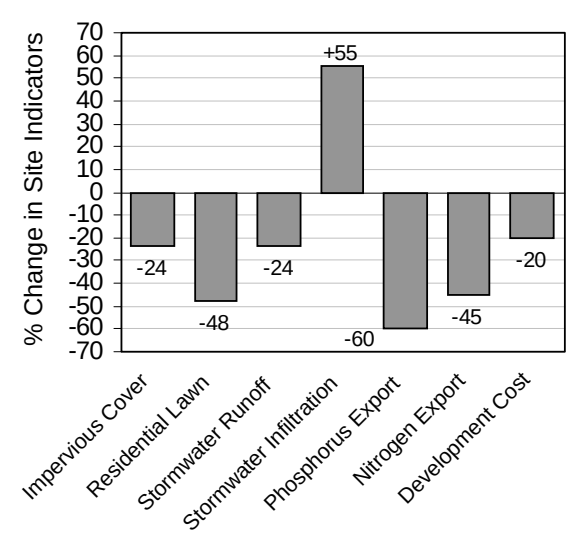

Figure 11: Change in Site From a Conventional Design to an Open Space Design, Both With Stormwater Practices

Table 4: Projected Construction Cost Savings for Open Space Designs from Redesign Analyses		
Residential Development	**Construction Savings**	**Notes**
Remlik Hall [1]	52%	Includes costs for engineering, road construction, and obtaining water and sewer permits
Tharpe Knoll [2]	56%	Includes roads and stormwater management
Chapel Run [2]	64%	Includes roads, stormwater management, and reforestation
Pleasant Hill [2]	43%	Includes roads, stormwater management, and reforestation
Buckingham Greene[2]	63%	Includes roads and stormwater management
Sources:[1] Maurer, 1996; [2] DE DNREC, 1997		

Other Redesign Research

Several other researchers have employed redesign comparisons to demonstrate the benefits of open space subdivisions, over a wide range of base lot sizes. The results are shown in Table 3. It should be recognized that each study used slightly different models and assumptions, and as such, strict comparisons should be avoided. The redesign comparisons clearly show that open space designs can sharply reduce impervious cover and stormwater runoff while accommodating the same number of dwelling units, at least to base lot sizes of an eighth of an acre. The reductions in impervious cover and runoff range from 7 to 65%. The ability of open space design to reduce impervious cover starts to diminish for residential zones that exceed densities of four dwelling units per acre.

These studies reinforce the conclusion that open space designs are usually less expensive to build than conventional subdivisions. The projected construction cost savings associated with open space designs ranged from 40 to 66% (Table 4). Most of the cost savings were due to reduced need for road building and stormwater conveyance. In another study, Liptan and Brown (1996) reported that open space design produced infrastructure construction costs savings of $800 per home in a California subdivision.

Numerous economic studies have shown that well-designed and marketed open space designs are very desirable to home buyers and very profitable for developers. Strong evidence indicates that open space subdivisions sell faster, produce better cashflow, yield a higher return on investment and appreciate faster than their traditional counterparts (Arendt *et al.*, 1994, Ewing, 1996, NAHB, 1997, ULI, 1988. CWP, 1998a, and Porter, 1988). While open space designs are often perceived as applying only to upscale and affluent consumers, several successful open space subdivisions have been built for moderate to lower income buyers. Both ULI (1988) and Ewing (1996) report that open space designs can be an effective tool to promote affordable housing within local communities.

The relatively high demand for open space designs reflects two important economic trends. The first trend is that the tastes and preferences of many new home buyers are gradually changing. Recent market surveys indicate that home buyers increasingly desire natural areas, smaller lawns, better pedestrian access, wildlife habitat and open space in the communities they choose to live in. The second trend is that open space developments that can provide these amenities seldom comprise more than 5% of the new housing offered in most communities. Consequently, there appears to be a large and relatively untapped potential demand for more open space developments. Other compelling benefits of open space design are detailed in CWP (1998a) and Schueler (1995).

Evaluating the Quality of Individual Open Space Developments

In the real world, site designers must satisfy a wide range of economic objectives, and water quality or resource protection is usually not on the top of the list. It is certainly possible to design a lousy open space design, and communities should expect a wide range in the quality of open space designs they review. How can a community objectively evaluate the quality of individual open space design proposals, and differentiate poor or mediocre projects from the good and outstanding ones?

Table 5: Sample Evaluation Criteria for the Quantity and Quality of Open Space Development (Conservation Fund, 1999)

Points Achieved by the Development	Percent of Open Space Achieved for Different Residential Zones				
	More than 4 units per acre	From 2 to 4 units per acre	From 1 to 2 units per acre	From 0.5 to 1 unit per acre	less than ‰ unit per acre
-2	0 to 9%	less than 15%	15 to 24%	25 to 34%	less than 40%
-1	10 to 14%	15 to 24%	25 to 34%	35 to 49%	less than 50%
0	15 to 24%	25 to 34%	35 to 49%	50 to 59%	less than 60%
+1	25 to 30%	35 to 40%	50 to 55%	60 to 70%	less than 70%
+2	more than 30%	more than 40%	more than 55%	more than 70%	more than 80%

The total open space achieved by the site is computed using the following formula:

$$\frac{A(0.2) + B(0.2) + C(0.5) + D}{E} \times 100$$

A = open space acres in managed landscape *B = open space acres in annual crops*
C = open space acres in perennial crops *D = open space acres in native vegetation*
E = total undeveloped acres in open space

Nerenberg and Freil (1999) have recently developed a simple rating system to evaluate the quality of individual open space design proposals. The rating system, known as the Conservation Development Evaluation System (CeDES), was developed in consultation with a host of planning agencies and organizations. The CeDES employs 10 core criteria to test how well a proposed open space design reduces impervious cover, minimizes grading, prevents soil loss, reduces and treats stormwater, manages open space, protects sensitive areas, and conserves trees or native vegetation. Each of the 10 core criteria has a quantitative benchmark for comparison. An example of one benchmark that rates the quantity and quality of open space is provided in Table 5. A full description of the CeDES rating can be found in Conservation Fund (1999).

Based on the total score achieved under the 10 core criteria, an open space design project can earn anywhere from zero "oak leaves" up to four "oak leaves." The more oak leaves earned, the better the quality of the proposed project. Based on initial testing, the CeDES seems to do a good job of sorting the poor projects from the outstanding ones. While the CeDES is intended for use as a tool for local development review, it can also be used as a marketing tool to let home buyers know how green their new subdivision actually is.

Implications for the Watershed Manager

The redesign comparisons have several implications for the watershed manager. First, they offer compelling quantitative evidence that open space design can sharply reduce stormwater and nutrient export from new development, and as such, can serve as an effective tool for watershed protection. It is interesting to note that open space design, by itself, produced nutrient reductions roughly equivalent to those achieved by structural stormwater practices. In other words, nutrient export from open space designs *without* stormwater treatment was comparable to the conventional designs *with* stormwater treatment. When open space design were combined with effective stormwater treatment, nutrient loads were sharply reduced, but were still greater than pre-development conditions.

A second, more troubling implication is that it may well be impossible to achieve a strict goal of no increase in nutrient load for new development, even when the best site design and most sophisticated stormwater practices are applied. A handful of communities have adopted stormwater criteria that mandate that no net increase in phosphorus load occur as a result of development, but as the redesign comparisons in this article show, such criteria are not likely to be actually achieved. Thus, if nutrient loads are capped in a watershed, managers may need to remove pollutants at existing developments with stormwater retrofits in order to offset increases in nutrient loads produced by new development.

The redesign research also has some implications for watershed-based zoning. Quite simply, a shift from conventional to open space design can reduce the impervious cover of many residential zoning categories by as much as 30 to 40%. In some watersheds, an aggressive shift to open space design in new residential zones is an essential strategy to meet an impervious cover cap for protecting sensitive or impacted streams.

Another notable finding is that large lot subdivisions have the potential to generate the same unit area nutrient export as higher density subdivisions. The

high nutrient loading from large lot developments in unsewered areas is attributed to subsurface discharges from septic systems. From a nutrient management standpoint, it may be more cost effective to regulate septic system performance than stormwater performance in very low density residential subdivisions located on permeable soils.

Lastly, watershed managers have only a few tools at their disposal that offer developers a real chance to save money. The economic evidence clearly suggests that open space design is such a tool, and has potential to either reduce the cost of development, or at least offset the cost of other watershed protection measures. However, despite its economic and environmental benefits, open space design is not a development option in many communities, nor is it widely used by most developers even when available. Many communities will need to fundamentally change their local development rules in order to make open space design an attractive development option.

Site planning roundtables that involve the local players that shape new residential development, described later in this issue, are an effective way to bring this change about. The ultimate goal is to make open space design a "by-right" form of development, so that its design, review and approval are just as easy and certain as a conventional subdivision. Who knows, the day may come when a special exception or permit is needed to build a conventional subdivision. ***- JAZ***

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Description of the Simplified Urban Nutrient Output Model

The basic tool used in the redesign analysis was a spreadsheet model known as the Simplified Urban Nutrient Output Model (SUNOM). The SUNOM model computes the annual hydrologic budget, nutrient export and infrastructure cost for individual development sites, using simple input variables that can be easily derived or measured from any site engineering plan.

The first step in applying the SUNOM model is to measure the fraction of the site in each of six categories of surface cover: impervious surfaces, lawns, forests/wetlands, meadow, open water, and stormwater treatment areas. In the next step, the user measures key infrastructure variables from the site plan including the length of roads, sidewalks, water and sewer utilities, curb and gutter, and storm drain pipes (in some cases, widths or diameters are needed as well). Basic soil type data is then collected, in order to classify soils according to the hydrologic soil group(s) present on the pervious surfaces of the site. Lastly, basic data is assembled on the size and type of stormwater practices and septic systems, when present. Depending on the size and complexity of the plan, it typically takes about a day to derive all the necessary inputs to operate the model.

Estimating Hydrology for the Site

SUNOM operates based on a simplified water balance. Rainfall can take several different pathways once it reaches the ground surface. A fraction of the rainfall leaves the site directly as stormwater runoff, while the remainder infiltrates into the subsurface soils (storage in surface depressions or interception by the tree canopy interception is ignored in the model, since they are a small and often temporary component of the annual water balance). Once water infiltrates into the soil, much of it returns to the atmosphere through evapotranspiration. The remainder moves to shallow ground water, is transported as interflow, or recharges deeper groundwater. The SUNOM model does not differentiate between these three final destinations, but simply computes the total volume of subsurface infiltration. The water budget can be adjusted further if lawn irrigation or septic system effluent is expected to contribute "outside" water to the development site.

Surface runoff from all surfaces is calculated using a volumetric runoff coefficient that is closely related to impervious cover. Resulting runoff quantities are normalized to runoff inches over the entire site (Schueler, 1987). Surface runoff from natural cover and turf are computed assuming that these areas are one percent impervious (NVPDC, 1980), but these values can be changed to reflect the prevailing soil type or soil compaction (see article 36).

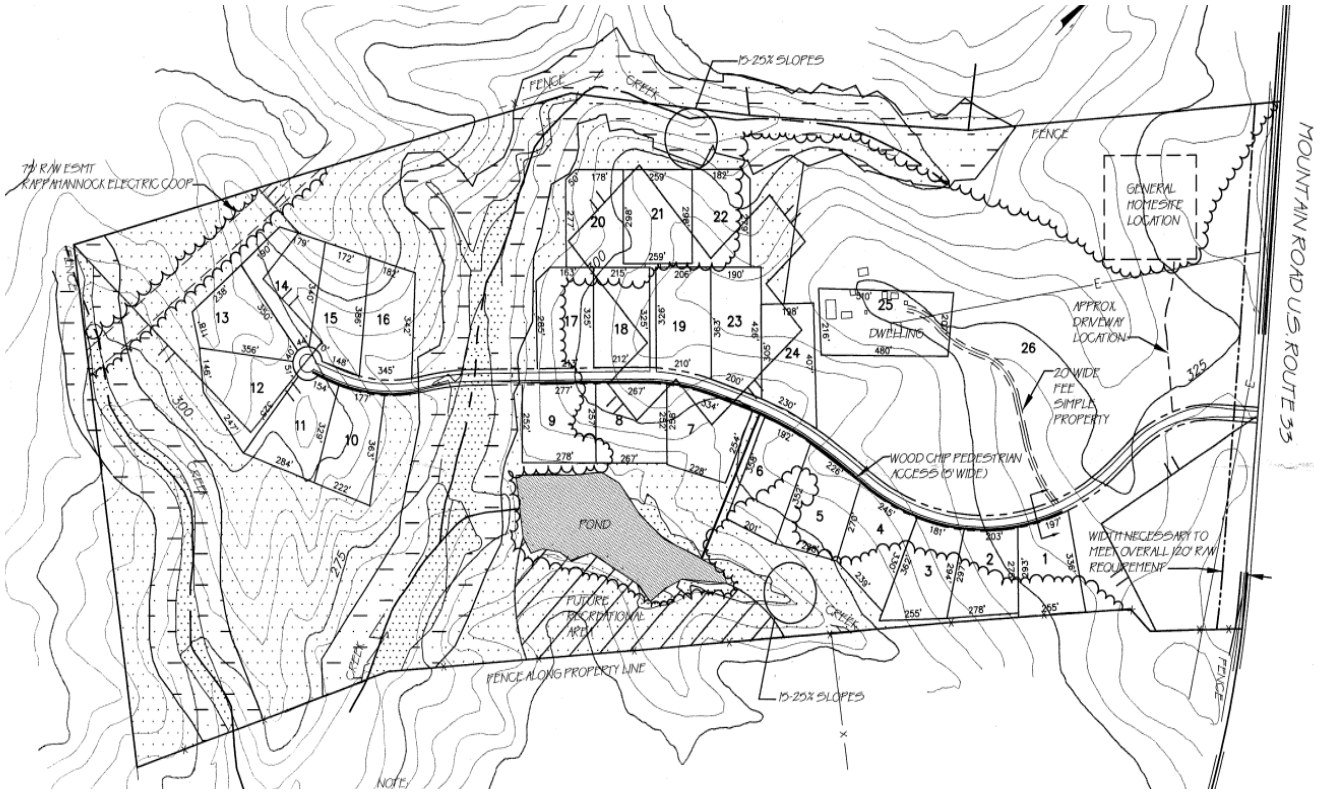

Figure 1: The SUNOM Model Operates Using Basic Site Variables That Can Be Easily Derived From Most Site Plan Submittals

Estimating infiltration is a somewhat trickier affair. For the purposes of the model, total infiltration is defined as the sum of subsurface infiltration plus septic infiltration. Subsurface infiltration is estimated based on annual infiltration volume for the prevailing hydrologic soil group of the pervious area, which can be adjusted for soil compaction. The annual volume of subsurface infiltration is calculated without estimating its final destination (i.e., quick interflow, deep recharge, shallow groundwater). Once annual stormwater runoff and subsurface infiltration volumes are calculated, they can be checked against an annual evapotranspiration volume to ensure that the overall water balance is reasonable.

Annual septic system infiltration is calculated under the assumption that entire wastewater flow into a septic system infiltrates to the subsurface. The volume of this wastewater flow, in site-inches, is derived as a function of the number of individuals using each septic system multiplied by their per capita annual water use. Some stormwater practices can take surface runoff and convert it into subsurface infiltration. The model accounts for this by deducting the fraction of treated runoff volume that is infiltrated back into the soil from the annual stormwater runoff volume and adding it to the infiltration volume.

Calculation of Nutrient Loads

This module computes nutrient loads for each of the types of surface cover present at a site by multiplying its computed stormwater runoff and subsurface infiltration volume by a median nutrient concentration. For stormwater flows, the mean concentrations are derived based on national stormwater monitoring data or single land use or source area marketing data. Subsurface nutrient concentrations for natural areas are estimated based on measured baseflow concentrations from adjacent undeveloped receiving waters. Median nutrient concentrations from published sources were used to characterize the subsurface concentrations from turf areas. In the case of septic systems, typical per capita septic loads, along with septic efficiencies, were used to characterize this nutrient loading source.

The total annual nutrient load for a development site is then computed as the sum of the stormwater runoff load, and the subsurface infiltration load from natural areas, turf, and septic systems. Surface stormwater loads are adjusted to reflect pollutant reduction by stormwater practices if they are present. The spreadsheet contains typical nutrient removal rates for many common stormwater practices (seearticle 64). Subsurface infiltration loads can also be adjusted to reflect the use of innovative septic system technology with higher nutrient removal capability. Default data are provided in the SUNOM model for all nutrient concentration and removal parameters, but the user can also supply their own estimates if better local or regional data are available.

Development Cost

The SUNOM modules computes the cost of building the infrastructure to serve a new development. The module calculates these costs based on the dimensions of the infrastructure that are specified in the development plan, and supplied as model input (e.g., length and area of roads, length and diameter of pipe). These units of infrastructure are then multiplied by unit costs that were derived for the mid-Atlantic region. The SUNOM model can estimate the following component costs: paving for roads or parking lots, curb and gutter, sidewalks, stormwater conveyance, utilities, landscaping, reforestation, septic systems and other necessary elements for site construction. Stormwater treatment costs are calculated as a function of the volume of stormwater runoff treated by the practice using predictive equations developed by the Center (see article 68). At this time, the SUNOM model does not estimate engineering or permitting costs, nor does it itemize costs related to clearing, grading and erosion and sediment control, but these enhancements can be added by the user.

Appropriate Use of the SUNOM Model

The SUNOM model is basically a simple accounting tool to track the annual runoff, nutrient loads, and total infrastructure costs from four kinds of surface cover in a development plan. The model is most appropriately used as a tool to compare how these factors change in response to different development scenarios. These "redesign" scenarios help demonstrate the costs and benefits of better site design. As with any empirical model, it is very important to make sure that parameter values are sensible and regionally appropriate. The user should always check whether default infiltration rates, nutrient concentrations, removal rates and unit costs make sense given local conditions. The SUNOM model is intended to serve as a planning model rather than an engineering model. More detailed simulation models or monitoring may be required to give the precise and accurate predictions needed for actual engineering design at a given development site. More extensive documentation on the model is contained in Appendix A of CWP, 1998. We are continually improving the SUNOM model, and the most recent version, which utilizes a Microsoft Excel spreadsheet, is available through the Center at a nominal charge.

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VOLUME I

NONPOINT SOURCE PROGRAM STRATEGY AND IMPLEMENTATION PLAN, 1998-2013 (PROSIP)

State Water Resources Control Board
California Coastal Commission

JANUARY 2000

EXECUTIVE SUMMARY

The *Plan for California's Nonpoint Source Pollution Control Program* (Program Plan) is the first significant upgrade of California's Nonpoint Source (NPS) Pollution Control Program (NPS Program) since its inception in 1988. California is required to have its Program conform to the Clean Water Act (CWA) and section 6217 of the Coastal Zone Act Reauthorization Amendments of 1990 (CZARA). The lead State agencies for upgrading the Program are the State Water Resources Control Board (SWRCB) (designated lead water quality agency), the nine Regional Water Quality Control Boards (RWQCBs), and the California Coastal Commission (CCC) (designated lead coastal zone management agency). The Program Plan will be submitted for approval to the U.S. Environmental Protection Agency (USEPA) and the National Oceanic and Atmospheric Administration (NOAA), the lead federal agencies that administer the CWA and the Coastal Zone Management Act (CZMA) respectively.

Finding solutions to NPS pollution poses unique challenges. Although the SWRCB and CCC have lead roles in developing and coordinating the implementation of the Program, they are not solely responsible for solving the problem. Over 20 other State agencies have authorities, programs, or responsibilities relating to the control of NPS pollution. Coordinating and focusing such a large number of entities to produce an effective NPS program in a state as large and geomorphologically diverse as California poses unique and difficult challenges. While increased use of regulatory authorities can help to address certain categories of NPS pollution (such as the relatively recent effort to issue permits for the most significant municipal storm water discharges), California will need to rely on a wide range of tools, activities, and authorities to address NPS pollution statewide. Initially, implementation will focus significant resources on management measures (MMs) identified as primary and secondary in Table 8, on retooling the Program's infrastructure, and on institutionalizing Program processes and mechanisms to make certain the State meets the commitments made in the Program Plan.

The State is committed to implementing the 61 NPS MMs by 2013 consistent with Federal Administrative Guidance (USEPA and NOAA, 1998), the Three-Tiered Approach adopted in the Nonpoint Source Management Plan, November 1988 (1988 Plan), and priorities identified in the Watershed Management Initiative (WMI) Chapters. The WMI, approved by the SWRCB in 1995, is used to help the SWRCB meet its goal to provide water resource protection, enhancement, and restoration. WMI uses an integrated planning approach to create and implement unique solutions for each watershed. Each RWQCB and the SWRCB revises its WMI Chapter annually to reflect changing priorities and conditions in the State's watersheds. Revisions currently underway will ensure that the WMI chapters and RWQCBs' actions are consistent with the Program Plan's goal of implementing all MMs by 2013.

Total Maximum Daily Loads (TMDLs) are another implementation planning tool that will enhance the State's ability to foster implementation of appropriate NPS MMs. By providing watershed-specific information, TMDLs will help target specific sources and corresponding corrective measures and will provide a framework for using more stringent approaches that may be necessary to achieve water quality goals and maintain beneficial uses.

During the Fifteen-Year Strategy, the RWQCBs have committed to the development of 138 technical TMDLs and their associated implementation plans (see Appendix C). The commitment of financial and staff resources to this effort will be influential in addressing the State's effectiveness in controlling NPS problems.

NPS pollution, also known as polluted runoff, is the leading cause of water quality impairments in California and in the Nation. NPSs, including natural sources, are the major contributors of pollution to impacted streams, lakes, wetlands, estuaries, marine waters, and ground water basins in California and are important contributors of pollution to harbors and bays (SWRCB, 1998). Unlike pollution from distinct, identifiable point sources (e.g., industrial or waste water treatment plant discharge pipes), NPS pollution comes from many diffuse sources. Rainfall, snowmelt, or irrigation water that moves over and through the ground results in NPS pollution. As the runoff moves, it picks up and carries away natural and human-made pollutants and deposits them into lakes, rivers, wetlands, ground water, and other inland and coastal waters.

The Program's roots were established in 1988 when the SWRCB adopted and the USEPA approved the original plan for the 1988 Plan (SWRCB, 1988) in response to CWA section 319. In 1990 Congress identified NPS pollution as a significant factor contributing to coastal water degradation, noting the link between coastal water quality and land use activities. In response, Congress amended the CZMA by passing CZARA. CZARA requires the lead water quality agency and coastal zone management agencies to jointly develop and submit a coastal nonpoint pollution control program (CNPCP).

In February 1994, the SWRCB initiated a comprehensive review of the Program using technical advisory committees (TACs) for ten categories of NPS pollution. Over 150 people participated in the TACs as public and private representatives for irrigated agriculture, nutrient application, pesticide application, confined animal facilities, grazing, urban runoff, on-site sewage disposal systems, boating and marinas, hydromodification and wetlands, and abandoned mines. The TACs presented their recommendations to the SWRCB in 1995 (SWRCB, 1994 a-i).

In lieu of a separate program for the coastal zone, the State decided to satisfy CZARA requirements on a statewide basis. As required by statute, in September 1995, the SWRCB and CCC submitted California's initial CZARA response to USEPA and NOAA. The response included two documents: *California's Coastal Nonpoint Pollution Control Submittal*, detailing the State's existing programs related to NPS pollution management, and the *Initiatives in Nonpoint Source Management*, based on the recommendations of the TACs.

USEPA and NOAA released draft findings and conditions for the State's September 1995 submittal in October 1996. In August 1997, the SWRCB, CCC, USEPA Region 9, and USEPA and NOAA headquarters staffs negotiated the *Action Plan* which outlined a framework and activities for the State to achieve both an approvable program consistent with CZARA and an *"enhanced status"* Program by addressing the nine key elements in the USEPA's *Nonpoint Source Program and Grants Guidance of 1997 and Future Years*. In July 1998, USEPA and NOAA issued their Final Findings and Conditional Approval for California's submittal. Consistent with the *Action Plan* and final administrative changes to CNPCP guidance issued in October 1998, for final approval the State must: (1) adopt MMs consistent with the *Guidance Specifying Management Measures for Sources of Nonpoint Pollution to Coastal Waters* (USEPA, 1993); (2) identify back-up and enforceable policies and mechanisms for the MMs; (3) demonstrate the ability for widespread implementation of the MMs; and (4) address the nine key elements.

The Program Plan is the State's final submittal intended to satisfy the CWA section 319(h) requirements for "an upgraded program" and the CZARA requirements for a CNPCP. The Program Plan achieves this goal by providing a single unified, coordinated statewide approach to dealing with NPS pollution structured around 61 MMs. MMs serve as general goals for the control and prevention of polluted runoff. Site-specific management practices (MPs) are then used to achieve the goals of each management measure. Implementation of MMs will occur using a fifteen-year strategy with three nested five-year implementation plans. The fifteen-year strategy and each five-year implementation plan use an iterative program process. The program process includes: (1) assessing Program activities; (2) targeting efforts; (3) planning activities based on Program goals and objectives; (4) coordinating the efforts of federal, State, and local agencies and stakeholders; (5) implementing coordinated actions; (6) tracking and monitoring the results of implemented actions; and (7) reporting on Program results. The Program Plan is designed to be flexible and adaptable over time.

Specifically, the Program Plan:

1. Adopts 61 MMs as goals for six NPS categories (agriculture, forestry, urban areas, marinas and recreational boating, hydromodification, and wetlands/riparian areas/vegetated treatment systems);
2. Provides a fifteen-year strategy for fully implementing the MMs;
3. Continues use of the "Three-Tiered Approach" for addressing NPS pollution problems (Tier 1: Self-Determined Implementation of Management Practices [formerly referred to as "voluntary" implementation]; Tier 2: Regulatory Based Encouragement of Management Practices; and Tier 3: Effluent Limitations and Enforcement Actions). Senate Bill 227 (California Water Code [CWC] section 13369) requires the SWRCB to develop by February 1, 2001, guidance for describing the process by which the SWRCB and RWQCBs will enforce the Program Plan;
4. Provides the first of three five-year implementation plans targeting activities for specific MMs consistent with State and regional priorities in specific watersheds and also establishes mechanisms for: (a) coordination among agencies; (b) participation by the public; (c) assistance technically and financially; (d) adoption of additional MMs as goals, if needed; and; (e) monitoring and reporting of program effectiveness;
5. Promotes long-term interagency coordination among State agencies of the California Environmental Protection Agency and Resources Agency as well as other local, State, and federal agencies;
6. Identifies back-up authorities and enforceable policies and mechanisms for the 61 MMs adopted by the State; and
7. Relies on the use of existing authorities and regulatory processes to achieve implementation but allows for the adoption of the MMs as regulation after each five-year cycle if adequate progress in NPS pollution control has not been demonstrated.

Program accountability is critical to reassure the public of the State's commitment to deal with the NPS pollution problem. The Program Plan contains actions that will result in consistent and timely evaluation and reporting of the Program's progress in effectively dealing with NPS pollution. This includes annual, biennial, and five-year reporting cycles and the use of Internet-based interactive information tools. Also important is greater public participation through: (1) development of the five-year implementation plans; (2) tracking the implementation of and assessing effectiveness of

MMs; (3) use of public reports; (4) expanded volunteer monitoring and education programs; (5) use of the Internet; and, (6) expansion of public outreach workshops.

The Program Plan also contains a Memorandum of Understanding (MOU) between the SWRCB and CCC. Although the two agencies have worked side-by-side to complete this document, the MOU commits the agencies to continue implementing the Program Plan after it is adopted by the SWRCB and CCC and approved by the federal agencies. Actions in the first five-year implementation plan require the SWRCB and CCC to review and update existing Management Agency Agreements and MOUs as appropriate and to develop others as needed. This aspect is important because the success of this Program Plan is dependent on the active participation of other government agencies with NPS responsibilities and private partners with significant influences over land use practices.

TABLE ES-1

SUMMARY OF MAJOR TASKS THAT THE NPS PROGRAM LEAD AGENCIES SEEK TO COMPLETE AS OF 2003

	Plan section
A. Assess Program Activities	
• The State will continue use of the State's Water Quality Assessment (WQA) as the primary tool for assessing NPS pollution statewide. **By August 1, 2001**, the SWRCB will provide WQA data prepared pursuant to CWA sections 305(b) and 303(d) on the Internet for public reference and to help monitor and track the effectiveness of the NPS Program. The data, included on the Geographically-based Water Body System (GeoWBS) database, will identify water body size, degree to which beneficial uses are supported, affected beneficial uses, pollutants, and pollution sources.	II-B
• **By August 1, 2001**, the State with the assistance of University of California, Davis's Information Center for the Environment (UCD ICE) will complete development of a database that will enable State agencies to geographically track implementation of MMs and MPs.	II-G
B. Target Efforts	
• **On even-numbered years** or as required by the USEPA, the SWRCB will prepare the CWA section 303(d) and TMDL priority lists that will assist the State in targeting priorities by water body, geographic region, pollutant, etc. • **By December 31, 2000**, the Critical Coastal Area (CCA) Committee will develop an initial list of CCAs where targeted implementation of MMs will occur.	II-C
C. Plan Activities Based on Program Goals and Objectives	
• **By July 1, 2000** and annually thereafter, the SWRCB, CCC, and RWQCBs will prepare joint annual workplans for NPS Program activities to include information on use of funding sources (including bond funds). • **By July 1, 2000**, the CCC will update its in-house Procedural Guidance Manual to reflect newest development of NPS MMs and to provide guidance for updates and amendments to local coastal programs (LCPs) and development of new LCPs. • Pursuant to the **schedules listed in Appendix C**, the RWQCBs will develop TMDLs.	II-D & Apx C
D. Coordinate Efforts of Federal, State, and Local Agencies and Stakeholders	
• **By January 31, 2000**, the SWRCB and CCC will sign an MOU designed to enhance coordination between these agencies. • **By July 1, 2000**, the SWRCB and CCC will convene the initial meeting of the Interagency Coordinating Committee (IACC). **By September 30, 2000** the CCC and SWRCB will convene the initial meeting of the CCA Committee. • **By July 1, 2000**, the SWRCB and CCC will initiate the development of five-year implementation plans for the California Environmental Protection Agency (Cal/EPA), California Resources Agency (Cal/RA), and other agencies with a goal of completing 50 to 100 percent of these plans by December 31, 2000. • **By July 1, 2000**, the SWRCB and CCC will begin the process to update existing Memorandums of Understanding/Management Agency Agreements (MOUs/MAAs) (e.g., agreements with the State Board of Forestry/Department of Forestry, Department of Pesticide Regulation, and Department of Food and Agriculture) and develop new MOUs/MAAs with other agencies as needed. **By August 1, 2003**, the SWRCB and CCC will prepare a schedule for completing any necessary remaining MOUs/MAAs.	II-E

	Plan section
E. Implement Coordinated Actions • **By July 1999 and each year thereafter**, the SWRCB and RWQCBs will support activities using CWA section 319(h) funds to implement the CAMMPR MMs. • **By February 2001**, the SWRCB will develop guidance to be used by the SWRCB and RWQCBs in establishing the process by which the SWRCB and RWQCBs will enforce their authorities as outlined in this Program Plan (CWC §13369). • **By July 1, 2002**, the State will prepare California MM implementation guidance. Links to existing guidance for implementation of MMs and MPs will be provided on the NPS Program website(s) in the interim (examples of existing guidance used in California include Natural Resources Conservation Service (NRCS) technical guides and Storm Water Quality Task Force Manuals). • Pursuant to the **schedules listed in Appendix C**, the RWQCBs will begin implementation of TMDL implementation plans.	II-F
F. Track and Monitor Results of Implemented Actions • By **November 30, 2000**, the SWRCB will assess and report to the Legislature on the SWRCB's and RWQCBs' current surface water quality monitoring programs for the purpose of designing a proposal for a comprehensive surface water quality monitoring program for the State (as provided for in CWC §13192). • By **January 1, 2001**, the SWRCB will prepare and submit to the Legislature a report that proposes the implementation of a comprehensive program to monitor the quality of State coastal watersheds, bays, estuaries, and coastal waters and their marine resources for pollutants (as provided for in CWC §13181[c]).	II-G
G. Report on Program Results • **By August 1, 2000 and annually thereafter**, the SWRCB will submit to the Legislature and make available to the public, copies of and a summary of information in all SWRCB and RWQCB reports that contain information related to NPS pollution and that the SWRCB or RWQCB are required to prepare in the previous fiscal year pursuant to CWA sections 303, 305(b), and 319 and CZARA section 6217. (CWC §13369[b]) • **By August 1, 2001 and August 1, 2003**, the SWRCB and CCC will complete biennial reports, for evaluation by USEPA and NOAA as well as other agencies and the public, regarding the State's progress in implementing the NPS Program.*	II-G

* The reports to be produced in 2001 and 2003 will provide details to address questions such as:

1. Have the activities identified in the five-year plans been completed and have the associated performance measures been achieved?
2. Has an MM implementation tracking system been established? Based on that system, what is the extent of MM implementation for all source categories throughout the State?
3. Has the IACC become active and successful in fostering implementation?
4. Has the SWRCB/RWQCBs published NPS enforcement guidance in 2001 as per CWC section 13369(a)(2)(B)?
5. Has the technical assistance to land owners and managers been improved through the issuance of technical guides, information sharing, "field-level" assistance and/or other activities?
6. Have other State and federal agencies and non-governmental entities become involved in implementing the NPS Program? Where necessary, have formal agreements been established to enhance the effectiveness of these partnerships?
7. Has the planning process for the next five-year plan (2003-2008) been established to achieve more specific plans that include measurable objectives and that involve a wide range of key stakeholders?
8. Have adequate efforts been made to identify funding needs and mechanisms to ensure continuing MM implementation and Program Plan success?

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VOLUME I

NONPOINT SOURCE PROGRAM STRATEGY AND IMPLEMENTATION PLAN, 1998-2013 (PROSIP)

I. NONPOINT SOURCE PROGRAM OVERVIEW

A. Vision and Goals

Since 1991, staffs of the State Water Resources Control Board (SWRCB), California Coastal Commission (CCC), and nine Regional Water Quality Control Boards (RWQCBs), in coordination with other agency staffs and the public, have conducted a comprehensive inquiry into the future direction of California's Nonpoint Source Pollution Control Program (Program). This inquiry shows clearly that Californians have invested significant resources to address nonpoint source (NPS) pollution and improve water quality; however, NPSs continue to be a major contributor of pollution to State waters.

The *Plan for California's Nonpoint Source Pollution Control Program* (Program Plan) is intended to focus and expand the State's efforts over the next 15 years to prevent and control NPS pollution. The vision of the NPS Program is to reduce and prevent NPS pollution so that the waters of California support a diversity of biological, educational, recreational, and other beneficial uses. The NPS Program addresses both surface and ground water quality. The goals of California's NPS Program are the following:

Track, Monitor, Assess, and Report Program Activities

- Improve monitoring and assessment of State water quality and the effectiveness of management practices (MPs) that are implemented to prevent and control NPS pollution.
- Ensure consistent, accurate reporting and dissemination of information related to water quality and related environmental data, sources of NPS pollutants, and pollution control and prevention activities.

Target Program Activities

- Manage NPS pollution, where feasible, at the watershed level—including pristine areas and watersheds that contain water bodies on the Clean Water Act (CWA) section 303(d) list—where local stewardship and site-specific MPs can be implemented through comprehensive watershed protection or restoration plans.
- Apply previous experiences to future decisions (e.g., through the use of pilot projects and the incorporation of "lessons learned").

Coordinate with Public and Private Partners in All Aspects of the Program

- Build the NPS Program upon a foundation of public involvement and support and encourage public participation throughout all stages of the NPS Program.
- Encourage innovative approaches to NPS pollution control and prevention through interagency, interdisciplinary, and volunteer activities.

- Strive to make regulatory, planning, and monitoring processes and programs more effective, efficient, and user-friendly and to coordinate related programs to avoid duplication where possible.

Provide Financial and Technical Assistance and Education

- Enhance the leadership roles of the SWRCB, RWQCBs, CCC, and other agencies in providing local governments and the public with technical and financial assistance and educational programs related to NPS pollution control, land use management, and watershed management.
- Support applied research to expand NPS Program implementation (e.g., development of improved, cost-effective MPs, and environmentally friendly products).

Implement Management Measures

- Ensure the protection and restoration of State's water quality, existing and potential beneficial uses, critical coastal areas (CCAs), and pristine areas by implementing management measures (MMs) to prevent and control NPS pollution. All MMs will be implemented, where needed, by 2013.[1] MMs serve as general goals for the control and prevention of polluted runoff. Site-specific MPs are then used to achieve the goals of each MM.
- Target implementation of MMs using a combination of non-regulatory activities and enforceable policies and mechanisms with self-determined cooperation preferred over prescriptive measures.

To ensure that the NPS Program goals are met, the SWRCB, CCC, and RWQCBs have already taken the following steps: (1) developed MMs that are appropriate for implementation in California and (2) prepared an iterative Fifteen-Year Program Strategy (Strategy) and Five-Year Implementation Plan (1998-2003) (Implementation Plan).

Additional steps in California's long-term strategy and initial short-term plan that are needed are:

- Adoption of NPS MMs by the SWRCB and CCC as goals or through a rulemaking process, as necessary, to ensure that they are implemented statewide by the year 2013;
- Establish and enter into the first five-year plan all relevant information for each process element for primary and secondary MMs by July 1, 2000, with the exception of numeric program performance measures. Numeric program performance measures will be established for each primary and secondary MM in the first five-year plan by October 1, 2000. The revised five-year plan will be distributed to the public by November 1, 2000.

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[1] MMs are identified in Volume II of this Program Plan: *California's Management Measures for Polluted Runoff* (CAMMPR). CAMMPR identifies MMs for five land-use categories: (1) agriculture, (2) forestry (silviculture), (3) urban areas, (4) marinas and recreational boating, and (5) hydromodification. MMs specific to wetlands, riparian areas, and vegetated treatment systems are also identified. CAMMPR has been reviewed by other agencies with authorities and programs that are critical to addressing NPS pollution. Additional workshops were held in Southern and Northern California to solicit public input.

- Publication of an MMs Guidance document that includes examples of MPs that achieve the goals of each MM;
- Building a foundation for agencies with authorities related to the NPS Program to coordinate and collaborate in problem solving, implementing MMs, monitoring, and assessing program success (e.g., review and revise existing agency agreements or develop new agency agreements; convene an interagency committee or similar working forum);
- Increased funding and enhanced education to foster implementation of MMs statewide; and
- Conducting a workshop and reporting every two years (biennially) on the status of the NPS Program.

B. History

Nonpoint Source Water Quality Issues in California

California is a geomorphologically diverse state with 1,609 miles of shoreline and more than 200,000 miles of rivers and streams; 1.6 million acres of lakes and reservoirs; 645,000 acres of estuaries, harbors, and bays; and 275,000 acres of wetlands. California also contains more than 100 million acres of land, almost half of which (44.6 percent) is owned and/or overseen by the federal government (e.g., the U.S. Forest Service [USFS] and Bureau of Land Management [BLM]).

NPS pollution, also known as polluted runoff, is the leading cause of water quality impairments in California and nationally. NPSs, including natural sources, are the major contributors of pollution to impacted streams, lakes, wetlands, estuaries, marine waters, and ground water basins in California and are important contributors of pollution to harbors and bays (SWRCB, 1998). Unlike pollution from distinct, identifiable point sources (e.g., a discharge pipe), NPS pollution comes from many diffuse sources. It is caused by rainfall, snowmelt, or irrigation water that moves over and through the ground. As the runoff moves, it picks up and carries away natural and human-made pollutants and deposits them into lakes, rivers, wetlands, ground water, and other inland and coastal waters.

Adverse effects of point sources of pollution (e.g., those subject to National Pollutant Discharge Elimination System [NPDES] or Waste Discharge Permits [WDRs]) and NPSs of pollution on coastal areas include closures of beaches and shellfish harvest areas due to contamination (see Table 1). In 1998, causes of California beach closings or advisories included: (1) elevated bacteria levels—1,395 events; (2) sewage spills—1,607 events; and (3) rain related events—2,222 events (rain events include combined sewer overflows, storm water runoff, storm drains, and floods) (Natural Resources Defense Council [NRDC], 1999). Data from the *National Shellfish Register* reveal that in 1995, the most recent year that data are available, shellfish harvesting was prohibited at 9,000 out of 24,000 acres (38 percent) of harvesting areas in California due to water quality concerns (National Oceanic and Atmospheric Administration [NOAA], 1997). Table 2 contains 1995 pollution source data for harvesting waters in the State of California and in the Nation.

TABLE 1. CALIFORNIA BEACH CLOSING AND ADVISORY (C/A) COMPARISONS: 1991-1998 (NRDC, 1999)

Year	Beach days affected by C/A lasting less than 6 weeks	Number of Extended C/A (lasting 6-12 weeks)	Number of Permanent C/A (lasting more than 12 weeks)
1998	at least 3,273	30	12
1997	at least 1,141	1	37
1996	at least 1,061	7	9
1995	at least 1,305	3	11
1994	at least 910	2	6
1993	at least 1,397	2	2
1992	at least 609	2	1
1991	at least 745	1	5

TABLE 2. PRINCIPAL OR CONTRIBUTING FACTORS IN HARVEST-LIMITED SHELLFISH GROWING AREAS NATIONALLY, 1995 (NOAA, 1997)

Type	**%** (total is > 100% as areas can be affected by a combination of sources)
Urban runoff	40
Unidentified sources upstream of coastal watersheds	39
Wildlife	38
Individual waste water treatment systems (e.g., septic tanks)	32
Waste water treatment plants	24
Agricultural runoff	17
Marinas	17
Boating	13
Industrial facilities	9
Combined sewer overflows	7
Direct discharges	4
Feedlots	3

The major sources of NPS pollution in California are related to land use activities that occur throughout watersheds and include: (1) agriculture, (2) forestry (silviculture), (3) urban runoff, (e.g., from construction sites, roads and highways, septic systems), (4) marinas and boats, (5) hydromodification activities, and (6) resource extraction (e.g., mining) (see Table 3). Atmospheric deposition is also a source of NPS pollution. Examples of pollutants associated with specific land use activities include:

- Excess pesticides and fertilizers from agricultural lands, urban lawns, and parks;
- Oil, grease, heavy metals, and chemicals from urban streets, parking lots, and industrial sites;
- Sediment from improperly managed construction sites, crop and forest lands, abandoned roads, and eroding streambanks;
- Bacteria and nutrients from livestock, pet wastes, and faulty septic systems; and
- Other pollutants (e.g., salt from irrigation practices, acid from abandoned mines).

Agency Roles in Program Development and Implementation

The NPS Program's roots were established in 1988 when the SWRCB adopted and the U.S. Environmental Protection Agency (USEPA) approved the original plan, the NPS Management Plan, November 1988 (1988 Plan) (SWRCB, 1988), in response to CWA section 319. CWA section 319 required states to develop assessment reports that described the state's NPS problems and to establish an NPS management program to control or prevent the problems. The 1988 Plan identified projected and proposed activities to initiate the NPS Program and both to measurably improve water quality and the implementation of best MPs.

After passage of CWA section 319, Congress determined that additional efforts were needed to protect coastal waters from NPS pollution and subsequently enacted the Coastal Zone Act Reauthorization Amendments of 1990 (CZARA). In passing CZARA, Congress noted the link between coastal water quality and land use activities and directed states to improve state and local efforts to manage land use activities that degrade coastal waters and coastal habitats (USEPA and NOAA, 1993). CZARA section 6217 requires coastal states to: (1) identify land uses which individually or cumulatively may cause or contribute significantly to a degradation of coastal waters; (2) identify "Critical Coastal Areas" and identify and implement additional measures where necessary to achieve and maintain water quality in such areas; (3) identify and adopt MMs to prevent and control NPS pollution; (4) provide technical assistance to local governments and the public to implement the MMs; (5) provide opportunities for public participation in Coastal Nonpoint Source Pollution Control Program (CNPCP) development and implementation; (6) enhance cooperation between the states' land and water use agencies; and (7) identify a program area sufficient to control NPS pollution affecting coastal waters. In addition, CZARA amended section 306 of the Coastal Zone Management Act (CZMA) requiring that " … the management program contains enforceable policies and mechanisms to implement the applicable requirements of the Coastal Nonpoint Pollution Control Program of the State required by section 6217 …." (CZMA section 306[d][16]).

TABLE 3. EXTENT OF CALIFORNIA WATER BODIES AFFECTED BY VARIOUS LAND PRACTICES

	Surface water (SW) bodies (acres)							rivers/ streams (miles)	ground water (square miles)*
	bays/ harbors	estuaries	lakes/ reservoirs	saline lakes	wetlands fresh	wetlands tidal	Total SW bodies		
(Total acres/miles assessed)	(497,000)	(79,000)	(741,000)	(433,000)	(67,000)	(71,000)	(1,889,000)	(17,000)	(64,000)
Agriculture	237,000	59,000	40,000	352,000	51,000	57,000	796,000	4,000	16,875
Forestry	(nd)	(nd)	121,000	(nd)	12,000	(nd)	133,000	1,900	(nd)
Urban Runoff	198,000	58,000	130,000	(nd)	1,300	57,000	444,000	1,800	842
Construction	(nd)	(nd)	149,000	56,000	1,220	(nd)	206,000	800	(nd)
Highways and Roads	(nd)	(nd)	145,000	(nd)	(nd)	(nd)	145,000	300	(nd)
Marinas	(nd)	(nd)	121,000	(nd)	(nd)	(nd)	121,000	(nd)	(nd)
Hydromodification	170,000	56,000	141,000	165,000	27,000	57,000	616,000	1,100	3,418
Resource Extraction	288,000	51,000	109,000	(nd)	(nd)	(nd)	448,000	1,500	8,166
Septage Disposal	(nd)	(nd)	(nd)	(nd)	(nd)	(nd)	(nd)	(nd)	15,436

Source: *1998 California CWA Section 305(b) Report on Water Quality. Extent of SW bodies that are partially or not supporting beneficial uses* (figures rounded to nearest thousand, where appropriate). (nd) = no data or unknown.

*The 1*998 CWA Section 305(b) Report* states that 22,053 of 63,581 square miles of ground water (35 percent) are impaired (note: a ground water basin may be polluted by more than one source).

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In February 1994, the SWRCB initiated a comprehensive review of the NPS Program using technical advisory committees (TACs) for ten NPS categories. Over 150 people participated in the TACs as public and private representatives for irrigated agriculture, nutrient application, pesticide application, confined animal facilities, grazing, urban runoff, on-site sewage disposal systems (OSDSs), boating and marinas, hydromodification and wetlands, and abandoned mines. The TACs presented their recommendations to the SWRCB in 1995. Common themes expressed in the TAC Reports include the following:

- Self-determined cooperation is preferred over prescriptive measures;
- Public education should be enhanced so that individuals can take responsibility for preventing and controlling NPS pollution;
- NPS pollution should be managed on a watershed scale where local stewardship and problem-responsive measures can be devised through comprehensive watershed protection plans;
- The State should provide for comprehensive and directed technical assistance to local groups and individuals; and
- Activities of resource management agencies should be better coordinated.

In September 1995, the SWRCB and CCC submitted California's initial response to CZARA to USEPA and NOAA—the lead federal agencies that administer the CWA and CZMA, respectively. California's submittal package included two documents: *California's Coastal Nonpoint Pollution Control Submittal* (SWRCB and CCC, 1995) and *Initiatives in Nonpoint Source Management* (Initiatives Document) (SWRCB, 1995).[2] In July 1998, USEPA and NOAA issued their Final Findings and Conditional Approval for California's submittal.

The SWRCB, RWQCBs, and CCC are committed to enhancing the NPS Program to further protect water quality and to address the federal findings and conditions. The revised NPS Program incorporates MMs into the Program Plan to help coordinate agency and individual actions. Volume II of the Program Plan—*California Management Measures for Polluted Runoff* (CAMMPR)—identifies 61 MMs with related State authorities for NPS pollution prevention and control in California (Table 4).[3] Staffs from the SWRCB, CCC, USEPA, and other agencies held initial meetings to review and refine CAMMPR and to identify actions to implement MMs over the next five to 15 years. Staff workshops to solicit public input were also held in Southern and Northern California in December 1998 and July 1999.

The SWRCB and CCC, in coordination with the nine RWQCBs, are the lead State agencies in California for the development and implementation of the Program Plan.

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[2] *California's Coastal Nonpoint Pollution Control Submittal* (SWRCB and CCC, 1995) details California's existing programs related to the management of NPS pollution. The *Initiatives in Nonpoint Source Management* (SWRCB, 1995), which is based on the TACs' recommendations, recognizes the need to continue and build upon the collaborative work initiated by the TACs.

[3] These MMs are based on the *Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters* (g-Guidance) (USEPA, 1993).

TABLE 4. CALIFORNIA NONPOINT SOURCE MANAGEMENT MEASURES

(1) AGRICULTURE

A. Erosion and Sediment Control
B. Confined Animal Facilities Wastewater and Runoff
C. Nutrient Management
D. Pesticide Management
E. Grazing Management
F. Irrigation Water Management
G. Education/Outreach

(2) FORESTRY (SILVICULTURE)

A. Preharvest Planning
B. Streamside Management Areas
C. Road Construction/Reconstruction
D. Road Management
E. Timber Harvesting
F. Site Preparation and Forest Regeneration
G. Fire Management
H. Revegetation of Disturbed Areas
I. Forest Chemical Management
J. Wetlands Forest
K. Postharvest Evaluation
L. Education/Outreach

(3) URBAN AREAS

3.1 Runoff from Developing Areas
A. Watershed Protection
B. Site Development
C. New Development
3.2 Runoff from Construction Sites
A. Construction Site Erosion and Sediment Control
B. Construction Site Chemical Control
3.3 Runoff from Existing Development
A. Existing Development
3.4 On-site Disposal Systems
A. New On-site Disposal Systems
B. Operating On-site Disposal Systems
3.5 Transportation Development: Roads, Highways, and Bridges
A. Planning, Siting, and Developing Roads and Highways
B. Bridges
C. Construction Projects
D. Construction Site Chemical Control
E. Operation and Maintenance
F. Road, Highway, and Bridge Runoff Systems
3.6 Education/Outreach
A. Pollution Prevention/Education--General Sources

(4) MARINAS & RECREATIONAL BOATING

4.1 Assessment, Siting, and Design
A. Water Quality Assessment
B. Marina Flushing
C. Habitat Assessment
D. Shoreline Stabilization
E. Storm Water Runoff
F. Fuel Station Design
G. Sewage Facilities
H. Waste Management Facilities
4.2 Operation and Maintenance
A. Solid Waste Control
B. Fish Waste Control
C. Liquid Material Control
D. Petroleum Control
E. Boat Cleaning and Maintenance
F. Maintenance of Sewage Facilities
G. Boat Operation
4.3 Education/Outreach
A. Public Education

(5) HYDROMODIFICATION

5.1 Channelization and Channel Modification
A. Physical and Chemical Characteristics of Surface Waters
B. Instream and Riparian Habitat Restoration
5.2 Dams
A. Erosion and Sediment Control
B. Chemical and Pollutant Control
C. Protection of Surface Water Quality and Instream and Riparian Habitat
5.3 Streambank and Shoreline Erosion
A. Eroding Streambanks and Shorelines
5.4 Education/Outreach
A. Educational Programs

(6) WETLANDS, RIPARIAN AREAS, AND VEGETATED TREATMENT SYSTEMS

A. Protection of Wetlands and Riparian Areas
B. Restoration of Wetlands and Riparian Areas
C. Vegetated Treatment Systems
D. Education/Outreach

The roles of the SWRCB and CCC are outlined in the Memorandum of Understanding (MOU) between those two agencies. The role of all of the State and federal partners is to:

- Implement the 61 MMs by 2013. Activities to support implementation will be included by the RWQCBs in the WMI chapters and by the State agencies in their five year implementation plans. Implementation of the MMs will also be incorporated into the NPS updates of the basin plans and other enforceable policy tools.
- Track implementation and effectiveness by MM and source category and provide this information to the SWRCB as part of the monitoring and assessment strategy.
- Actively participate in biennial and five-year program reviews, as well as new goal-setting activities, including the development of five-year implementation plans.
- Coordinate with the SWRCB in developing guidance as required by section 13369 of the California Water Code (CWC) to be used by the SWRCB and the RWQCBs to enforce the Program Plan.
- Coordinate NPS-related planning, assessment, and regulatory activities.
- Support statewide initiatives to implement the MMs.

California must enhance the NPS Program to remain eligible for funding for water quality and coastal protection by USEPA and NOAA. Implementation of the NPS Program is primarily supported by grants from USEPA under CWA section 319(h), approximately $10.6 million in Federal Fiscal Year (FFY) 1999. To continue to receive this level of funding--an increase of about $5.3 million from FFY 1998--the State must continue to protect and restore water quality and develop an effective NPS Program that complies with both the CWA and CZMA. Implementation of the Program Plan will occur through 2013 (within 15 years of the July 1998 federal conditional approval by USEPA and NOAA pursuant to CZARA).

C. Program Infrastructure

Program infrastructure refers to the structure of the program, its components, and how they interact in a systematic process to achieve the program's goals. The Program Plan has three major components: (1) an overall long-term Fifteen-Year Program Strategy (Strategy); (2) three five-year implementation plans nested within the Strategy; and (3) 61 MMs. Running through and connecting these major components is a sequential iterative process that begins with assessing the program, identifying pollutant sources, and determining condition of water bodies and ends with reporting program results. It begins again with assessment activities (see Figure 1). The Program Plan infrastructure is designed to produce a dynamic program that is responsive to changing conditions during its fifteen-year life.

Program Process

For the Program Plan to produce a living, responsive program that is useful throughout its fifteen-year duration, previous experience (e.g., in implementing MMs) must be integrated into present and future planning and implementation efforts. Figure 1 depicts the Program Plan’s iterative model. At any time during the fifteen-year life of the

FIGURE 1. NPS PROGRAM PROCESS

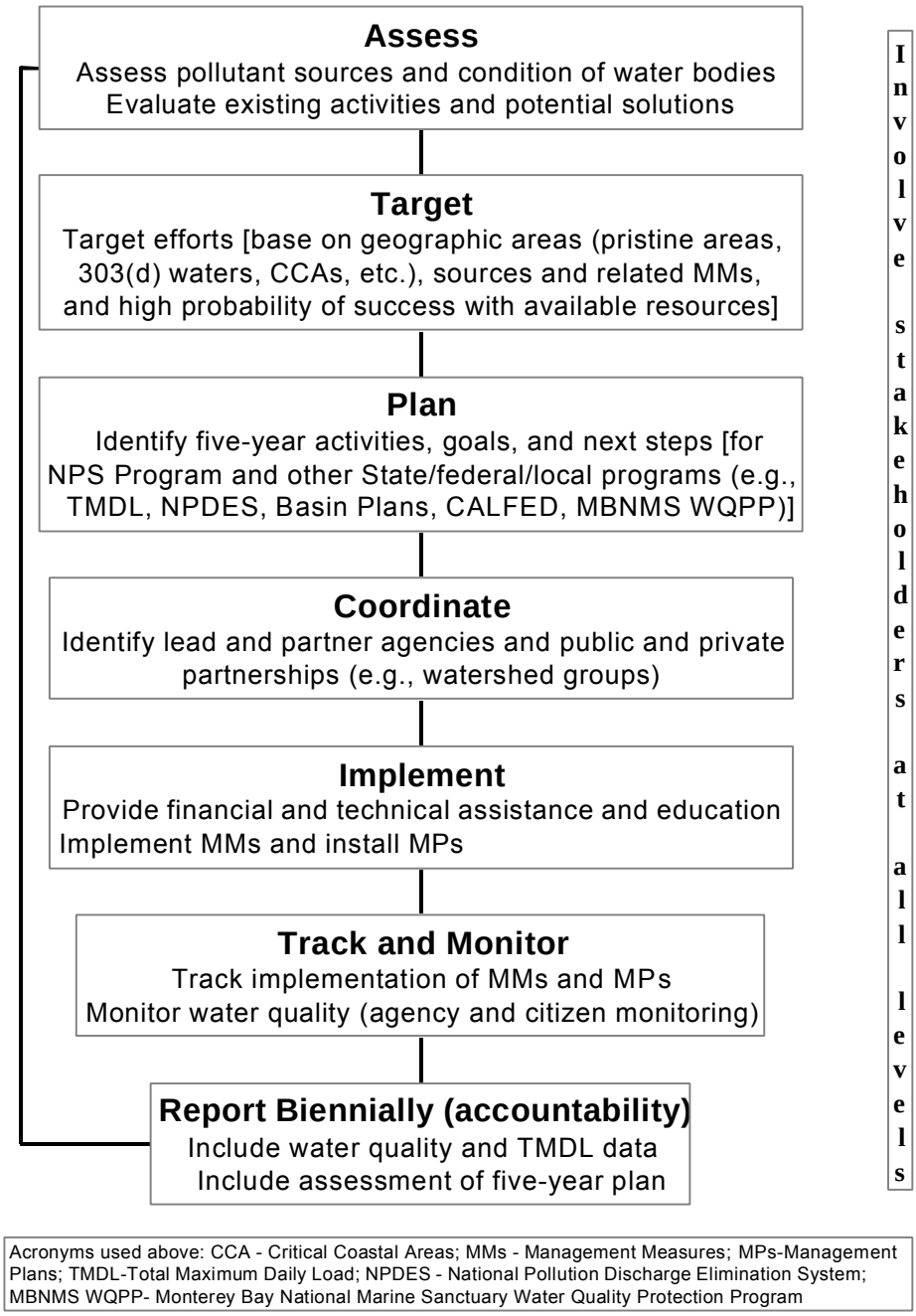

Acronyms used above: CCA - Critical Coastal Areas; MMs - Management Measures; MPs-Management Plans; TMDL-Total Maximum Daily Load; NPDES - National Pollution Discharge Elimination System; MBNMS WQPP- Monterey Bay National Marine Sanctuary Water Quality Protection Program

Program Plan, agencies and other stakeholders should be able to: (1) assess the present Program's activities; (2) target efforts; (3) plan future actions based on past and present goals and objectives; (4) coordinate federal, State, and local agencies' and stakeholders' efforts; (5) implement collaborated actions; (6) obtain data on water quality and implementation effectiveness from tracking and assessment documentation, Total Maximum Daily Loads (TMDLs), and other agency and citizen monitoring programs; and (7) return to Step 1 to reassess the NPS Program's progress and effectiveness.

Fifteen-Year Program Strategy

The Strategy, described later in this document, outlines how California will seek to achieve the vision and goals of the NPS Program. Specifically, the State will use the "Three-Tiered Approach" of broad-based local stewardship backed up by regulatory authority under the Porter-Cologne Water Quality Control Act (Porter-Cologne Act) with other local, State, and federal authorities serving as additional enforceable and/or back-up authorities. Recommendations from the TACs and from additional agency and stakeholder meetings convened by the SWRCB and CCC in 1998 and 1999 are a central part of the NPS Program.

The Strategy includes elements prescribed in federal guidance (NOAA and USEPA, 1993 and USEPA, 1996), including:

- A process to implement MMs to help coordinate agency and individual actions rather than focus on individual practices or separate programs;
- Actions related to administrative coordination, technical and financial assistance, public participation, critical coastal areas (CCAs), additional MMs as goals, and monitoring;
- A strategy for and evaluation of back-up authorities;
- A process to track implementing actions to assess Program progress and effectiveness; and
- The "nine key elements" of a dynamic and effective NPS management program. (See Appendix A.)

Five-Year Implementation Plans

Nested within the Strategy are three five-year implementation plans that describe the who, what, where, when and how of Program implementation. In each five-year implementation plan, California will target implementation actions where the NPS Program can make a difference in correcting current and potential problems.

Targeting involves a balance between the need to implement NPS controls broadly and the need to address priority water quality problems in specific watersheds. Targeting also allows the State to use limited resources efficiently and to ensure that actions are tailored to match the diversity of California's climate and land use activities. With climate ranging from rain forest in the north to desert in the south, different approaches are needed to manage NPS pollution in the State. In establishing

targets, the State will address both pollution prevention and water quality improvement goals, including the protection of exceptional inland and coastal areas that are threatened by reasonably predictable increases in pollution loadings from new or expanding NPSs.

Each implementation plan will identify a set of MMs on which to target NPS Program efforts during the five-year time period. The implementation plans will also identify a series of actions related to (1) assessing water quality conditions and/or institutional efforts; (2) targeting implementation based on geographic regions or other criteria; (3) performing planning activities; (4) coordinating public and private efforts; (5) implementing the targeted MMs; and (6) obtaining data on water quality and implementation effectiveness. The Plans will also identify agencies responsible for MM implementation and will include actions, performance measures, and milestones.

Phased Approach to Managing Nonpoint Source Pollution

The State is committed to implementing the 61 NPS MMs by 2013, consistent with Federal Administrative Guidance (USEPA and NOAA, 1998) and the Three-Tiered Approach adopted in the 1988 Plan. The implementing agencies will increase the use of regulatory authorities as necessary to ensure implementation is achieved. In accordance with CWC section 13369, the SWRCB will develop on or before February 1, 2001 guidance to be used by the SWRCB and RWQCBs in establishing the process by which the SWRCB and RWQCBs will enforce their authorities as outlined in this Program Plan.

Initially the State is adopting the 61 MMs contained in CAMMPR as goals. MM implementation will be achieved through a set of activities outlined in each five-year implementation plan and will rely on existing local, State, and federal authorities and private efforts. At the end of each five-year implementation cycle, the State will evaluate and report on the effectiveness of the Program Plan to achieve the stated goals. Success will be determined by (1) the degree to which the performance measures have been met; (2) geographic extent of MM implementation; (3) selected evaluation of MPs used to implement MMs; and (4) analysis of available water quality information in those areas where implementation has occurred. Based on this evaluation, the SWRCB and CCC, in coordination with the RWQCBs and other appropriate agencies, will make public their findings and recommendations for the next five-year cycle. Depending on the degree of success, the State may choose to maintain the in-place efforts, modify, or add MMs and/or actions for each target MM. In cases where adequate progress is clearly not being made, the State will consider rulemaking to ensure successful implementation of specific MMs. Implementation of MMs in additional watersheds and water bodies will also take place as new geographic areas with NPS pollution are identified and targeted.

D. Legal Framework

Introduction

This section describes California's legal framework for implementing the NPS Program. The framework is based on two primary federal laws—the CWA and CZMA—and State and local law. In California, the Porter-Cologne Act is the principal State law governing water quality in California, and it provides the primary back-up authority to implement the NPS MMs. However, other State and local authorities are also critical components of the legal framework that address NPS pollution in California. In addition to the Porter-Cologne Act, this section describes the California Coastal Act (Coastal Act), the California Environmental Quality Act (CEQA), and the California Planning, Zoning and Development Law. Additional details on these and other authorities that are part of this framework are identified in Volume II: CAMMPR. Details on the SWRCB's and CCC's statutory authority for addressing NPSs are included in Appendix B—Legal Opinions.

Federal Laws

The Federal Water Pollution Control Act Amendments of 1972 and 1987, known as the CWA (33 United States Code [USC] §§1251 et seq.), are the principal federal statutes for water quality protection. In California, the SWRCB and nine RWQCBs administer many of the CWA's provisions. The CWA requires the State to adopt water quality standards and to submit those standards for approval by the USEPA. For point source discharges to surface water, the CWA authorizes USEPA or approved states to administer the NPDES Program. CWA section 303(d) requires states to list surface waters not attaining (or not expected to attain) water quality standards after the application of technology-based effluent limits, and states must perform a TMDL for all waters on the CWA section 303(d) list. The CWA also establishes a loan program—the State Revolving (SRF)—for the construction of water quality projects, including NPS projects.

In the 1987 CWA Amendments, Congress added CWA section 319 (33 USC §1329) which required states (1) to develop Assessment Reports that described the states' NPS problems, (2) to establish Management Programs to address these problems, and (3) to provide funding to support implementation of the Programs. California's *Nonpoint Source Management Plan* (SWRCB, 1988) outlined a general approach to address persistent NPS problems using education and outreach, financial and technical assistance, and regulatory authorities when necessary. To enhance activities to address NPS water pollution, states are currently encouraged to upgrade their NPS programs. In 1996, USEPA issued CWA section 319 program guidance that identified "nine key elements" that must be addressed to receive USEPA approval for upgraded NPS Plans (See Appendix A). Pursuant to the 1998 Clean Water Action Plan (CWAP), states with upgraded NPS Programs will receive increased funding based on a federal appropriation for State NPS Programs above $100 million. For California to receive additional funding in FFY 2000 and beyond, USEPA must certify that California's NPS Program has been upgraded consistent with the "nine key elements."

The CZMA of 1972 (16 USC §§1451 et seq.) established a national framework for effective management, protection, development, and beneficial use of the coastal zone. Pursuant to the CZMA, California prepared the California Coastal Management Program (CCMP) which was approved by NOAA. The bulk of California's coast is within the jurisdiction of the CCC pursuant to the Coastal Act of 1976 (Public Resources Code [PRC] §§30000 et seq.), while the San Francisco Bay Conservation and Development Commission (SFBCDC) has jurisdiction in San Francisco Bay (SFB) pursuant to the McAteer-Petris Act (MPA) (Government Code §§66600 et seq.). The State Coastal Conservancy (SCC) is a third partner agency in the CCMP.

Recognizing that the CZMA did not specifically mention water quality, in 1990 Congress amended CZMA section 306(d)(16)(16 USC §1455[d][16]) and added section 6217 (16 USC §1455b) to focus on NPS pollution problems and the protection of coastal waters. CZARA section 6217 requires state coastal zone management (CZM) agencies, in coordination with state water quality agencies, to develop and implement MMs to restore and protect coastal waters from adverse impacts of NPS pollution. Similarly, CZMA section 306(d)(16)(16 USC §1455[d][16]) requires that state CZM programs contain enforceable policies and mechanisms to implement applicable requirements of CZARA section 6217. To achieve these goals, states were directed to coordinate and integrate their existing CZM and water quality plans and programs, including the states' NPS management plans.

Porter-Cologne Water Quality Control Act (Porter-Cologne Act)

The Porter-Cologne Act is the principal law governing water quality regulation in California. It establishes a comprehensive program to protect water quality and the beneficial uses of water. The Porter-Cologne Act applies to surface waters, wetlands, and ground water and to both point and NPSs of pollution. Pursuant to the Porter-Cologne Act (CWC section 13000), it is the policy of the State:

- That the quality of all the waters of the State shall be protected,
- That all activities and factors affecting the quality of water shall be regulated to attain the highest water quality within reason, and
- That the State must be prepared to exercise its full power and jurisdiction to protect the quality of water in the State from degradation.

The Porter-Cologne Act established nine RWQCBs and the SWRCB which are charged with implementing its provisions and which have primary responsibility for protecting water quality in California. The SWRCB provides program guidance and oversight, allocates funds, and reviews RWQCB decisions. In addition, the SWRCB allocates rights to the use of surface water. The RWQCBs have responsibility for individual permitting, inspection, and enforcement actions within each of nine hydrologic regions. The SWRCB and RWQCBs have numerous NPS-related activities, including problem monitoring and assessment, planning, financial assistance, and regulatory and non-regulatory management.

The RWQCBs regulate discharges under the Porter-Cologne Act primarily through issuance of NPDES and WDR permits. Anyone discharging or proposing to discharge

materials that could affect water quality (other than to a community sanitary sewer system regulated by an NPDES permit) must file a report of waste discharge. The SWRCB and the RWQCBs can make their own investigations or may require dischargers to carry out water quality investigations and report on water quality issues. The Porter-Cologne Act provides several options for enforcing WDRs and other orders, including cease and desist orders, cleanup and abatement orders, administrative civil liability orders, civil court actions, and criminal prosecutions.

The Porter-Cologne Act also implements many provisions of the federal CWA, such as the NPDES permitting program. Section 401 of the CWA gives the SWRCB the authority to review any proposed federally permitted or federally licensed activity which may impact water quality and to certify, condition, or deny the activity if it does not comply with State water quality standards. If the SWRCB imposes a condition on its certification, those conditions must be included in the federal permit or license.

Except for dredge and fill activities, injection wells, and solid waste disposal sites, WDRs may not "specify the design, location, type of construction or particular manner in which compliance may be had" (Porter-Cologne Act section 13360). Thus, WDRs ordinarily specify the allowable discharge concentration or load or the resulting condition of the receiving water, rather than the manner by which those results are to be achieved. However, RWQCBs may impose discharge prohibitions and other limitations on the volume, characteristics, area, or timing of discharges and can set discharge limitations such that the only practical way to comply is to use MPs. RWQCBs can also waive WDRs for a specific discharge or category of discharges on the condition that MMs identified in an SWRCB or RWQCB approved water quality management plan are followed.

The Porter-Cologne Act also requires adoption of water quality control plans (WQCPs) which contain the guiding policies of water pollution management in California. There are a number of statewide WQCPs adopted by the SWRCB. In addition, regional WQCPs, commonly referred to as basin plans, have been adopted by each of the RWQCBs. All basin plans identify the existing and potential beneficial uses of waters of the State and establish water quality objectives to protect these uses. The basin plans also contain implementation, surveillance, and monitoring plans. WQCPs include enforceable prohibitions against certain types of discharges, including those that may pertain to NPSs. Basin plans have been adopted for each of the nine RWQCBs as delineated in Table 5.

Table 5. RWQCB Numerical Designations

1	North Coast
2	San Francisco Bay
3	Central Coast
4	Los Angeles
5	Central Valley
6	Lahontan
7	Colorado River Basin
8	Santa Ana
9	San Diego

Portions of WQCPs are also subject to review by USEPA. When approved by USEPA, the water quality objectives and beneficial use designations become water quality standards under the CWA. In most cases, water quality objectives contained in a WQCP are not directly enforceable unless implemented through WDRs or water right permits.

California Coastal Act

The State Legislature enacted the California Coastal Act (PRC §30000 et seq.) (Coastal Act) to provide for the conservation and planned development of the State's coastline. The Coastal Act mandates the protection and restoration of coastal waters pursuant to several sections in the PRC. Mandated activities include:

- To carry out a public education program to promote coastal conservation.
- To maintain, enhance, and, where feasible, restore marine resources.
- To maintain and, where feasible, restore biological productivity and the quality of coastal waters, streams, wetlands, estuaries, and lakes through, among other means, minimizing adverse effects of wastewater discharges and entrainment, controlling runoff, preventing depletion of ground water supplies and substantial interference with surface water flow, encouraging wastewater reclamation, maintaining natural vegetation buffer areas that protect riparian habitats, and minimizing alteration of natural streams.
- To protect against spillage of crude oil, gas, petroleum products, or hazardous wastes.
- To limit the alteration of wetlands, coastal waters, and estuaries and provide for feasible mitigation measures to minimize adverse environmental effects.
- To phase out or upgrade, where feasible, existing marine structures causing water stagnation contributing to pollution problems and fish kills.
- To limit hydromodification of rivers and streams. Channelization, dams, and other substantial alterations of rivers and streams shall incorporate best mitigation measures feasible.
- To protect environmentally sensitive habitat areas (ESHAs). Site and design new development in areas adjacent to ESHAs to prevent significant adverse impacts.
- To protect long-term productivity of soils and timberlands.
- To site and design new development so as to not have significant adverse impacts either individually or cumulatively on coastal resources.
- To minimize alteration of natural landforms.
- To assure that new development is stable, has structural integrity, and does not contribute significantly to erosion.
- To control impacts of dredging in specified port areas.
- To minimize harmful effects to coastal waters, including water quality, from fill within ports.
- To locate, design, and construct port-related development to minimize substantial environmental impacts and protect beneficial uses.

In carrying out the mandates of the Coastal Act, the CCC certifies local coastal programs (LCPs) prepared by local governments (§30500). The CCC also certifies plans prepared by port districts (§30711 et seq.), colleges and universities (§30605), and proponents of public works projects (§30605). In addition, the CCC approves coastal development permits (CDPs), energy projects, and federal (federally approved, conducted, or funded)

projects consistent with the Coastal Act policies. The Coastal Act also contains several means to deter and discipline violators of its provisions. In order to prevent imminent or further damage of coastal resources, the Executive Director of the SWRCB or the CCC can issue a cease and desist order to any party that is undertaking a development without a permit or in a manner inconsistent with the terms of a previously issued permit (§§ 30809 and 30810). The CCC can also order the restoration of a site (§ 30811). Civil liability fines for violations of the Coastal Act are specified in sections 30820, 30821.6, and 30822. In practice, the CCC protects water quality primarily through: (1) managing coastal development that generates runoff or creates spills; (2) assisting local coastal governments and other agencies to address land-use and development activities that may produce NPS pollution; and (3) implementing educational and technical assistance programs.

California Environmental Quality Act (CEQA)

California is one of 20 states with an environmental impact assessment law modeled after the National Environmental Policy Act (NEPA). The SWRCB, RWQCBs, and all State and local government agencies must comply with CEQA. CEQA applies to discretionary activities proposed to be carried out by government agencies, including approval of permits and other entitlements. CEQA has six objectives: (1) to disclose to decision-makers and the public the significant environmental effects of proposed activities; (2) to identify ways to avoid or reduce environmental damage; (3) to prevent environmental damage by requiring implementation of feasible alternatives or mitigation measures; (4) to disclose to the public reasons for agency approvals of projects with significant environmental effects; (5) to foster interagency coordination; and 6) to enhance public participation.

CEQA sets forth procedural requirements to ensure that the objectives are accomplished and also contains substantive provisions requiring agencies to avoid or mitigate, when feasible, impacts disclosed in an Environmental Impact Report (EIR). In addition, CEQA sets forth a series of sweeping policy statements encouraging environmental protection. These policies have led the courts to interpret CEQA "so as to afford the fullest possible protection to the environment within the reasonable scope of the statutory language." (*Friends of Mammoth v. Board of Supervisors [1972] 8 Cal 3d 247, 259, 104 Cal. Rptr. 761*.)

Planning, Zoning, and Development Laws

The legal framework within which California cities and counties exercise local planning and land use functions that can play a critical role in addressing NPS pollution is provided in the California Planning and Zoning Law (Government Code §§65000 et seq.) and the Subdivision Map Act (SbMA) (Government Code §§66410 et seq.), as well as in the Coastal Act.

Under State planning law, each city or county must adopt a comprehensive, long-term general plan for the physical development of the city or county and any land outside its jurisdiction which bears relation to its planning. Pursuant to Government Code section 65302, general plans must contain seven elements: (1) land use, (2) circulation,

(3) housing, (4) conservation, (5) open space, (6) noise, and (7) safety. The following elements are the most relevant to NPS pollution prevention and control:

- Land Use. Designates categories such as housing, industry, and natural resources, including density and intensity of use.
- Conservation. Applies to conservation, development, and use of natural resources (e.g., soils, forests, rivers and other water bodies, and harbors). May also cover watershed protection, land or water reclamation, prevention or control of the pollution of streams and other coastal waters, regulation of land uses along stream channels and in other areas required to implement the conservation plan (e.g., buffer areas), to control or correct soil erosion, and for flood control.
- Open Space. Applies to preservation of natural resources, including fish and wildlife habitat, rivers, streams, bays and estuaries, and open space.
- Circulation. Plans infrastructure, including water, sewage, and storm drainage.

While the general plan is a long-range look at the future of a community, a zoning ordinance spells out the immediate allowable uses for each property in the community. Each property in the community is assigned a "zone" listing the kinds of uses that will be allowed on that land (e.g., single family residential, multi-family residential, neighborhood commercial, light industrial, agricultural, etc.) and setting development standards (e.g., minimum lot size, maximum building height, minimum front-yard depth). The distribution of residential, commercial, industrial, and other zones is based on the pattern of land uses established in the community's general plan. Zoning is adopted by ordinance and carries the weight of local law. All local governments use some form of a permitting process whereby a permit is issued for a specific project and can be conditioned based on conformance with the zoning ordinance.

Subdivision regulation, like zoning, is an exercise of police power and is a principal instrument for implementing a general plan. The SbMA (Government Code §§66410 et seq.) sets forth other mandates that must be followed for subdivision processing.

The local government's corporate and police powers and zoning and subdivision ordinances are tools commonly used to implement general plans. Preferential assessment of real property can also offer landowners an economic incentive for keeping their land in agricultural, timber, or open space uses. This can serve to implement the land use, open space, and conservation elements of a general plan by reserving areas designated for agriculture, timber, open space, scenic resources, and natural resource use.

The Coastal Act also requires cities and counties that are located wholly or partially in the coastal zone to have an "eighth element" (the LCP) for that portion of the local government's jurisdiction in the coastal zone. When an LCP is certified by the CCC as being consistent with the goals and policies of the Coastal Act, coastal permit authority for that area is delegated to the local government. However, development in State tidelands, submerged lands, and public trust lands continues to require a permit from the CCC, and certain types of local government decisions on coastal permits made under certified LCPs may be appealed to the CCC.

SWRCB Antidegradation Policy

A key policy of California's water quality program is the State's Antidegradation Policy. This policy, formally known as the *Statement of Policy with Respect to Maintaining High Quality Waters in California* (SWRCB Resolution No. 68-16), restricts degradation of surface and ground waters. In particular, this policy protects water bodies where existing quality is higher than necessary for the protection of beneficial uses.

Under the Antidegradation Policy, any actions that can adversely affect water quality in all surface and ground waters must: (1) be consistent with maximum benefit to the people of the State; (2) not unreasonably affect present and anticipated beneficial use of the water; and (3) not result in water quality less than that prescribed in water quality plans and policies. Furthermore, any actions that can adversely affect surface waters are also subject to the Federal Antidegradation Policy (40 Code of Federal Regulations [CFR], § 131.12) developed under the CWA.

E. Stakeholder Roles in Program Development and Implementation

NPS pollution control is the shared responsibility of both public and private interests. Ultimately all of us—agencies, landowners and land operators, and the general public—contribute to and must help to control NPS pollution.

The CWA and CZARA are the legal foundation for California's current strategy to prevent and control NPS pollution. Therefore, the SWRCB, RWQCBs, and the CCC are the lead agencies for developing the program and coordinating its implementation.

However, the management of land and water uses in California is conducted by numerous local, State, and federal agencies with independent or, in some cases, overlapping authorities and programs. These agencies may be broadly categorized as management agencies, regulatory agencies, land use agencies, or assistance agencies (Table 6). Some agencies' authorities and programs are limited to specific NPS categories (e.g., Department of Boating and Waterways [DBW], Board of Forestry [BOF]); other agencies have broad authority to protect resources (Table 7).

F. Scope and Schedule

California intends to implement a comprehensive statewide program under the CWA and CZMA rather than develop a separate new program for the coastal zone. This will allow the State (1) to protect water quality through a single upgraded NPS program, (2) to use resources more effectively, (3) to eliminate the potential for regulatory inequities that might occur if special zones are created, and (4) to enhance agency coordination. The Strategy is based on implementation of MMs through regulatory and non-regulatory activities including education and outreach, public participation, and technical and financial assistance and the use and coordination of enforceable authorities and programs where self-determined efforts are insufficient to restore and protect State waters.

TABLE 6. CATEGORIES OF IMPLEMENTING AGENCIES

Federal and State Land Management and Regulatory Agencies	This category comprises federal and State agencies that have the authority to implement MPs statewide. Such authority derives either from the agency's management responsibility for publicly owned or controlled land or its regulatory authority. For example, large portions of the State are managed by federal regulators or land and water managers (e.g., USEPA, NOAA, BLM, National Park Service, U.S. Army Corps of Engineers [USACOE], U.S. Fish and Wildlife Service [USFWS], U.S. Forest Service [USFS], and Federal Energy Regulatory Commission[FERC]). When such agencies have the capability to act effectively in their areas of jurisdiction as a lead NPS management agency, the SWRCB may seek formal agreements—e.g., Management Agency Agreements, Memoranda of Agreement (MAA), or MOU—that contain NPS controls.
Federal and State Assistance Agencies	This category comprises agencies that can provide technical or financial assistance to support implementation of MPs. These agencies include the Natural Resources Conservation Service (NRCS), SCC, and University of California Cooperative Extension (UCCE). They assist landowners and land managers to voluntarily implement MPs and help identify appropriate MPs for RWQCB or management agency enforcement. For example, SCC programs are directed at preserving coastal agriculture, resolving coastal land use issues, restoring and enhancing natural resources, developing urban water fronts, acquiring significant coastal sites, providing public access to and along the shoreline, and assisting local governments and nonprofit organizations. One action of the Program is for the SWRCB to seek agreement with these agencies so that they could target technical and financial resources to high priority NPS problems. Currently, the CCC works with the SCC to ensure that the watershed protection work reflects priorities of the Program Plan.
Local Land Use Agencies	This category comprises agencies (e.g., counties, cities, and some special districts) that have the authority to enforce implementation of MPs locally. Local government is the principal land use planning authority in the State. County and city government and special districts often institute the first tier of management requirements for a specific parcel of land. When such agencies have the capability of acting effectively in their jurisdictional areas as lead NPS management agencies, RWQCBs may seek formal agreements that provide for NPS control.
Local Assistance Agencies	This category comprises local agencies and special districts that provide technical or financial assistance to support implementation of MPs. These agencies assist landowners and land managers to voluntarily implement MPs and to help identify appropriate MPs for RWQCB or management agency enforcement. One action of the Program is for the RWQCBs to seek agreements with these agencies so that they can target technical and financial resources to high priority NPS problems.

TABLE 7. IMPLEMENTING AGENCIES FOR CALIFORNIA'S NONPOINT SOURCE MANAGEMENT MEASURES

Agencies	Management Measures*					
	AGR	FOR	URB	MAR	HYD	WET
California Environmental Protection Agency (Cal/EPA)						
1. State Water Resources Control Board (SWRCB)	✓	✓	✓	✓	✓	✓
2. Regional Water Quality Control Boards (9) (RWQCB)	✓	✓	✓	✓	✓	✓
3. California Integrated Waste Management Board (CIWMB)			✓	✓		
4. Department of Pesticide Regulation (CDPR)	✓	✓	✓			
5. Department of Toxic Substances Control (DTSC)			✓	✓		
California Resources Agency (Cal/RA)						
6. California Coastal Commission (CCC)	✓	✓	✓	✓	✓	✓
7. Delta Protection Commission	✓					
8. Department of Boating and Waterways (DBW)				✓		
9. Department of Conservation (DOC)	✓					
10. Department of Fish and Game (DFG)	✓	✓	✓	✓	✓	✓
11. Department of Forestry and Fire Protection (CDF)		✓				
12. Board of Forestry(BOF)		✓				
13. Department of Parks and Recreation (DPR)	✓	✓	✓	✓	✓	✓
14. Department of Water Resources (DWR)	✓		✓		✓	✓
15. San Francisco Bay Conservation and Development Commission (SFBCDC)			✓	✓	✓	✓
16. Santa Monica Mountains Conservancy			✓			✓
17. State Coastal Conservancy (SCC)					✓	✓
18. State Lands Commission (SLC)	✓	✓		✓		✓
19. Wildlife Conservation Board (WCB)					✓	✓
Other State, Regional and Local						
20. Department of Food and Agriculture (DFA)	✓					
21. Department of Health Services (DHS)	✓	✓	✓	✓	✓	✓
22. Department of Transportation (Cal/Trans)			✓			
23. University of California Cooperative Extension (UCCE)	✓	✓	✓	✓	✓	✓
Local Governments	✓	✓	✓	✓	✓	✓
Resource Conservation Districts (RCDs)	✓	✓	✓		✓	✓
Federal						
Bureau of Land Management (BLM)	✓					
National Oceanic and Atmospheric Administration (NOAA)	✓	✓	✓	✓	✓	✓
• Monterey Bay National Marine Sanctuary (MBNMS)	✓		✓	✓	✓	✓
Natural Resources Conservation Service (NRCS)	✓					
U.S. Army Corps of Engineers (USACOE)				✓	✓	✓
U.S. Coast Guard (USCG)				✓		
U.S. Environmental Protection Agency (USEPA)	✓	✓	✓	✓	✓	✓
• San Francisco Bay (SFB), Santa Monica Bay (SMB), and Morro Bay National Estuary Programs (NEPs)	✓		✓	✓	✓	✓
U.S. Forest Service		✓				

* In this table, AGR = Agriculture; FOR = Forestry; URB = Urban; MAR = Marinas and Recreational Boating; HYD = Hydromodification; WET = Wetlands and Riparian Areas.

The assessment of implementation efforts conducted pursuant to each five-year implementation plan will occur on a regular basis in three distinct stages, with the SWRCB and CCC reporting on these efforts every two years (biennially). This process is detailed below and shown in Figure 2.

FIGURE 2. CALIFORNIA NPS POLLUTION CONTROL PROGRAM: A FIFTEEN-YEAR STRATEGY WITH THREE FIVE-YEAR IMPLEMENTATION PLANS

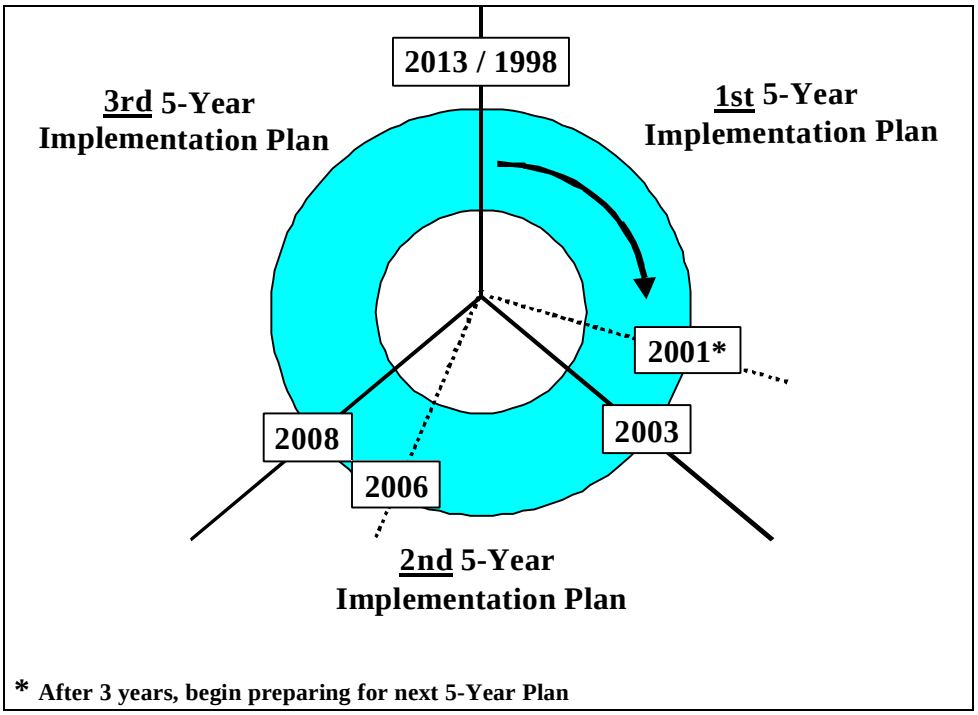

First Five-Year Implementation Plan (1998 - 2003) (Implementation Plan)

This document contains the first implementation plan which identifies an initial set of targeted MMs and describes NPS Program activities through June 2003 (five years after the July 1998 USEPA and NOAA Conditional Approval of the State's submittal pursuant to CZARA). In this Implementation Plan, the SWRCB and CCC have developed a plan to implement the MMs and achieve Program goals. In 2001, the SWRCB, RWQCBs, and CCC, in coordination with other agencies and the public, will begin reviewing implementation actions to assess the State's progress and effectiveness. At this time, the State will also start developing the next five-year implementation plan. Achieving designated milestones and meeting identified objectives will serve as a basis for evaluating progress. In 2003, California will report on the State's progress in meeting its milestones and objectives for the first five-year period.

Second Five-Year Implementation Plan (2003 – 2008)

Implementation of the second five-year implementation plan will occur from July 2003 through June 2008. The second five-year implementation plan will: (1) provide for the continued implementation of the initial set of actions and MMs, including increasing use

of regulatory actions if necessary; (2) outline steps to improve and expedite program implementation determined to be appropriate in light of the review and evaluation; (3) target approximately half of the remaining NPS MMs, plus any additional MMs deemed necessary; and (4) include actions and milestones to ensure implementation of these MMs. In 2006, the State will again review and evaluate implementation to assess progress and effectiveness.

Third Five-Year Implementation Plan (2008 – 2013)

Implementation of the third five-year implementation plan is expected to begin in July 2008 and continue through June 2013. The third five-year implementation plan will: (1) provide for continued implementation of actions and NPS MMs as necessary; (2) target the remaining NPS MMs for implementation, plus any additional MMs deemed necessary; and (3) include actions and milestones to ensure implementation of these MMs.

II. FIFTEEN YEAR PROGRAM STRATEGY

A. Introduction

The Strategy describes how the vision and goals of NPS pollution prevention and control will be realized by utilizing the components of the Program process. The Program process begins with "assessing" the impact of NPS pollution on water quality. NPS issues are identified for waters across the State either individually or collectively. A thorough assessment allows the State to proceed to the second component, "targeting" appropriate human, financial, and technical resources into geographic areas and NPS MMs requiring immediate attention.

The State will fully address the NPS issues from multiple fronts. The "planning" component will take advantage of the numerous programs and tools already in place. Use of existing programs reduces duplicative efforts and benefits from the expertise already accumulated at different institutional levels. Based on previous success stories and lessons learned, the State can begin to identify and plan to use new approaches to address remaining NPS problems.

The complexity of the issues makes effective "coordination" of the various activities imperative. The State will therefore foster interagency cooperation and facilitate public participation through the establishment of formal agreements and formation of an Interagency Coordinating Committee (IACC).

Effective "implementation" of NPS MMs will rely on a "three-tiered approach," with an emphasis on self-determined cooperation of the stakeholders. Applicable regulatory programs and authorities will be invoked in the case of persistent NPS water quality problems and/or stakeholder resistance to self-determined implementation of MMs.

The final element of the Program process consists of "tracking" implementation of MMs, "monitoring" MP effectiveness, "assessing" program success, and "reporting" program progress. Again, participation of the stakeholders at this step will ensure the dissemination of lessons learned and will continue program success. These lessons learned will become the backbone of future decisions both within the Strategy and the subsequent five-year implementation plan.

These components make up an evolving and iterative process repeated in each of the three five-year implementation plan cycles. It is expected that by the end of the fifteen year duration of the Program Plan all the identified MMs for the prevention and control of NPS pollution will have been implemented in the appropriate watersheds and will have improved the quality of the State's waters.

B. Assessing the Problem

California will continue to use the State's Water Quality Assessment (WQA) as the primary tool for assessing NPS pollution statewide.[4] Pursuant to CWA section 305(b), this information is reported to USEPA every two years and is used to develop the CWA section 303(d) list of waters that do not meet water quality standards with technology-based pollution controls.[5] Assessment of waters used as drinking water will also be enhanced by the DHS's new Drinking Water Source Assessment and Protection (DWSAP) Program.[6]

These assessment systems support the NPS Program by identifying, individually and collectively, which waters are impacted by NPS pollution. This assists the NPS Program in targeting future actions and determining their effectiveness. To improve the usefulness of these assessment systems, the NPS Program will:

- Ensure that monitoring data from the Program is incorporated into the WQA,
- Support the development and improvement of a geographically-based assessment system, Geo Water Body System (GeoWBS)[7],
- Support efforts to provide consistency in listing impairments,
- Improve consistency in the definitions of specific sources of pollution,
- Promote public access to the WQA and its underlying data, and
- Seek funding to increase the quality and quantity of water quality monitoring.

These assessment systems also will be utilized to monitor and track the effectiveness of the NPS Program and are discussed in that context in subsequent sections of the Strategy (see Part II, Section G—*Track, Monitor, Assess, and Report*).

C. Targeting Efforts

Introduction

High quality water resources are of significant economic, social, and ecological value in California; however, the amount of available public funds is inadequate to address all the

[4] This compilation of water quality information, provided by the RWQCBs, synthesizes the results of monitoring programs conducted by dischargers, landowners, community members, and local, State, and federal agencies. The WQA reports on the degree to which these waters support their beneficial uses, such as municipal drinking water supply, recreational activities, or cold water fisheries.

[5] A total of 1,700 water bodies was assessed in the 1998 CWA section 305(b) Report. Of these, 509 surface waters did not meet water quality standards. The RWQCBs specified 392 water bodies (77 percent) as directly impacted by NPS pollution. The categorical sources (e.g., agriculture, urban, forestry, marinas) of the NPS pollution were identified for 173 surface water bodies. The categorical sources were not identified by the Los Angeles and San Diego RWQCBs. The identification of sources is not required by the CWA when listing waters as impaired.

[6] DHS, as required by the Safe Drinking Water Act Amendment of 1996, recently submitted to USEPA and received approval (April 1999) for the DWSAP Program. DHS will identify and assess all potential sources of contaminants, including NPS pollutants, for public drinking water systems in California. A report outlining the findings will be provided to customers of each system.

[7] The information in the WQA is stored in the SWRCB's GeoWBS database. The GeoWBS database identifies the water body size, the degree to which beneficial uses are supported, the affected beneficial uses, the pollutants, and the pollution sources.

existing water pollution sources all at once at every location in the State. The concept of targeting focuses State resources on specific actions or pollutants within limited geographic regions and improves the likelihood of achieving measurable water quality improvements. Actions that lead to water quality benefits can in turn increase public support of NPS pollution control programs and ensure that the public is more closely attuned to overall water quality goals. Such a change in attitude with a corresponding increase in pollution control knowledge and skill is a primary ingredient of lasting water resource protection.

In order to make the Strategy most effective, efforts must be targeted from both a water resources (e.g., water quality, geographic, or watershed area) and economic resources perspective. To achieve the overall objective to improve water quality, the Program Plan will target efforts towards accomplishing the following goals:

- Coordinate NPS pollution control implementation efforts to target both:
  1. MMs for agriculture, forestry, urban areas, marinas and recreational boating, and hydromodification in riparian corridors and wetlands, and
  2. Geographic regions, with a focus on the most impaired areas, areas most in need of protection, and areas where significant existing efforts or increased stakeholder participation are underway to prevent and control NPS pollution.
- Apply project resources to clearly specified, realistic goals and objectives (e.g., to efforts that will result in a high probability of success with available resources and funding).
- Protect and restore valuable resources from increased NPS pollution associated with changes in land use.

All targeting efforts will coordinate with existing State and federal programs that focus on water resources in general and NPS problems in particular. To increase stakeholder support of the prioritized efforts, public involvement needs to be directly incorporated into the targeting process. The following sources of information were used for targeting resources and priorities within the first five-year plan:

- Stakeholder interpretation of NPS priorities;
- Impaired waters as identified on the CWA section 303(d) list and TMDL priority lists; and
- Delineation of critical coastal areas and identification of additional MMs.

Stakeholder Involvement in Prioritization

In order to receive direct input from stakeholders concerning current and future efforts of the NPS Program, staffs of the SWRCB and the CCC held workshops in December 1998 and July 1999 (each series consisting of one workshop in the northern and southern parts of the State). In addition, a questionnaire was sent to over 200 stakeholders (including the RWQCBs and 17 other State agencies) requesting identification of “priority” MMs and program categories (e.g., administrative coordination, public participation, monitoring, and technical assistance) that need to be addressed during the first five-year

implementation plan. The questionnaire results and comments from these opportunities for stakeholder involvement were used to target the initial activities outlined in the first five-year implementation plan.

The targeting efforts were also supplemented through the use of the reports developed by the NPS TACs (SWRCB, 1994a-i; SWRCB, 1995 a-b). The active involvement of the different representatives in the TACs ensured that priorities were given to the MMs and geographic areas with which those most intimately familiar with the NPS pollution issues, the stakeholders, expressed the most concern. For example, all the identified MMs for agriculture, the single most significant contributor of NPS pollution to the Nation's water bodies, have been targeted for implementation during the first five years. On the other hand, the recommendation for installation of pumpout facilities, during the first implementation cycle, at marinas on the Tomales Bay, an important shellfish production location, demonstrates the Program's focus on protecting areas with critical coastal-dependent industries.

Target Impaired Waters

CWA section 303(d)(1)(A) requires states to identify surface waters within their boundaries where numeric or narrative water quality objectives are not being maintained and/or beneficial uses are not fully protected after application of technology-based controls. Each state is also required to establish a priority ranking for such waters, taking into account the severity of the pollution and the beneficial uses to be made of the waters.

For those surface water bodies identified and prioritized above, section 303(d)(1)(C) requires that each state establish TMDLs for those pollutants identified under CWA section 304(a)(2) as suitable for TMDL development correlated with the achievement of water quality objectives. A TMDL is a numeric target which when achieved will result in attainment of water quality standards. The TMDL includes allocations (e.g., allowable pollutant loading) for both point and NPSs. The loadings are established with consideration given to seasonal variations of pollutant loadings and a margin of safety which takes into account any lack of knowledge concerning the relationship between effluent limitations and water quality.

The CWA section 303(d) and TMDL priority lists are developed biennially on even-numbered years. The RWQCBs first assess available data to develop the list. The assessment includes: (1) re-examining the water bodies previously listed under CWA section 303(d); (2) reviewing existing monitoring information; (3) soliciting additional information from other State and federal agencies; and (4) encouraging public participation. The CWA section 303(d) and TMDL priority lists are approved through a public noticing and hearing process at each RWQCB and the SWRCB. USEPA reviews the State's CWA section 303(d) and TMDL priority lists and either approves or disapproves them. If the lists are disapproved, USEPA proposes a modified list with a 30-day comment period. The USEPA's final list then becomes the State's list for the next two years.

The first five-year implementation plan made extensive use of the CWA section 303(d) list to prioritize its tasks. Several impaired water bodies have been targeted for TMDL development. Examples are abundant in the agriculture and forestry categories. Specifically, 33 water bodies have been targeted for nutrient (agriculture – nutrient management) TMDL development by 2003. The load allocations determined for NPSs at the end of the TMDL development process will help guide the selection of best management practices (BMPs) for implementation in the future to ensure NPS pollution prevention and control.

Critical Coastal Area Designation

Special coastal habitats (e.g., wetlands, tide pools, creeks, and lagoons) continue to be threatened from the impacts to water quality that accompany new and existing development. California recognizes that special coastal resources require special care and attention. The intent of CCA designation, therefore, is to direct needed attention to coastal areas of special biological, social, and environmental significance and to provide an impetus for these areas to receive special support and resources.

Pursuant to federal guidance (NOAA and USEPA, 1993), factors in identifying CCAs include:

- The nature and proximity of contaminant sources to the coastal area;
- Physical and biological characteristics of adjacent lands that will cause NPS problems;
- Important biological features;
- Characteristics of land use changes; and
- Extent to which the above effects can be prevented or reduced by implementation of additional MMs.

Federal guidance provides the states with flexibility in their approach to identifying CCAs.[8] California will use a combination of approaches in delineating CCAs. First, the State will designate special sections within the California coastal zone as CCAs. These include ESHAs currently designated in California's CZM program, as well as areas adjacent to Areas of Special Biological Significance (ASBS), California's National Estuarine Research Reserves (NERRs), NEPs, and National Marine Sanctuaries. Within these areas the CCC will use its existing authority under the CCMP to ensure that all appropriate MMs are implemented and, where appropriate, that additional MMs are

[8] A state can take one or both of the following approaches:

1. A state can establish the CCA as a strip of land along the portion(s) of the shoreline adjacent to threatened or impaired coastal waters. Within this area, special controls such as setbacks and low-density zoning can be employed to protect coastal waters.
2. A state can rely on site specific evaluations to determine the extent of a CCA. Under this approach, states may include broader geographic areas in the CCA designation, starting with shoreline segments adjacent to threatened or impaired coastal waters and extending inland to encompass significant coastal features or resources further inland. These broader areas may include entire watersheds or portions of watersheds adjacent to coastal waters and may encompass significant biological features such as wetlands.

developed to protect these coastal waters. Second, agency and public actions will be coordinated to protect the adjacent portions of the inland watersheds that impact the environmental processes within the coastal zone.

To coordinate the actions within the CCAs, the Program Plan will establish an interagency committee (CCA Committee)--led by the CCC in coordination with the SCC, SWRCB, six coastal RWQCBs, and the public--to identify CCAs and develop additional MMs necessary to protect these areas. The CCC and SWRCB have identified several initial goals for CCA designation and implementation.

First, the CCA Committee will evaluate the need for and the implementation of additional MMs to protect and restore coastal waters within CCAs. The Committee will work closely with appropriate agencies and researchers to develop additional MMs that address the issues that threaten or impact the designated CCAs. For the portions of CCAs within the coastal zone, the CCC will include additional MMs, when appropriate, in future coastal development permits and future Local Coastal Program (LCP) amendments associated with these areas. Further discussion of the development of additional MMs for CCAs is provided in Part II, Section H: *Overall Program Assessment—Refining the Program*.

Second, the CCA Committee will seek to channel appropriate NPS Program and agency resources to areas of special concern that may not fall within the initial stages of the Program Plan's other NPS activities. The Committee will act as an advocate for the prioritization, funding, and implementation of projects that can achieve measurable water quality improvements within and in watershed areas adjacent to CCAs. For example, the CCC will support and coordinate the implementation of additional MMs in the watersheds impacting CCAs by: (1) working directly with the appropriate agencies; (2) identifying and targeting resources for implementation in sensitive coastal habitats that can achieve prescribed water quality goals and in sensitive coastal habitats that are of regional concern but not a priority under other water quality designations (threatened or impaired); and (3) expanding participation in education and restoration programs.

This designation will help the State to protect pristine, threatened, and impaired waters that may be degraded by new or substantially expanding land use near the coastal zone by coordinating additional agencies and initiating special programs. Because CCA designation is a continuing process, sensitive coastal habitats that may become threatened by new or expanding development can be targeted as a priority in the future.

Finally, CCA designation will provide resources to special coastal areas which do not achieve priority ranking within other sections of this plan and will therefore provide solutions to program deficits rather than create an additional designation using the same review criteria.

Results of Targeting Efforts

One of the goals of the Program is to implement all of the MMs over the next fifteen years. Although the Strategy targets specific MMs during each five-year

implementation plan, in any given year efforts will be ongoing for each MM throughout the State. Some of the MMs implemented during the first implementation cycle will undoubtedly require continued attention long past the initial five years. Similarly, sustained NPS pollution prevention and control efforts may be needed for certain geographic areas beyond the first five years. During the assessment processes in 2001 and 2006, these MMs and areas will be identified and incorporated into the subsequent implementation cycle.

In targeting MMs and geographic areas during the first five-year implementation cycle, special consideration was also given to dovetailing with existing programs. For example, in providing technical support to cities in the development of urban runoff plans, the State will build upon and expand upon the use of the Model Urban Runoff Program (MURP). MURP was originally developed for the Cities of Monterey and Santa Cruz. Taking advantage of existing NPS programs such as MURP will avoid duplicative efforts.

Depending on its relative priority, each MM for each five-year implementation cycle was targeted as either primary, secondary, or tertiary. In designating the targeting level for each MM, consideration was given also to the extent that specific actions are currently being implemented to address the NPS source. For example, urban runoff poses a considerable problem in California but was designated at the secondary and tertiary targeting level because of the existing NPDES Stormwater Program. At the conclusion of each five-year implementation cycle, the MMs targeted at the primary level will be evaluated using the following criteria: (1) the degree to which performance measures have been met; (2) geographic extent of MM implementation; (3) selected evaluation of MPs to implement the MMs; and (4) analysis of available water quality information in those areas where implementation has occurred. Depending on the degree of success, the State will determine whether to: (1) maintain the in-place efforts; (2) modify or add MMs and/or actions for each primary level MM; or (3) consider whether rulemaking is necessary to ensure successful implementation. The targeted MMs for the Strategy and each five-year implementation plan are presented in Table 8.

D. Planning

Introduction

To maintain the Program Plan as a working document, it will be continually updated, decisions will be re-evaluated, and priorities will be re-targeted based on updated information, pilot projects, and lessons learned. An important part of the updating process is integrating the Program Plan with existing federal and State plans and programs that impact NPS pollution control. The following sections provide a brief description of these plans and programs and how the Program Plan will integrate with them.

1988 NPS Plan

The CWA was amended in 1987 to include a new section 319 titled “Nonpoint Source Management Program.” CWA section 319 required states to develop a management program describing the measures the State will take to address NPS pollution. Pursuant

TABLE 8 – SUMMARY OF TARGETED MANAGEMENT MEASURES FOR FIFTEEN-YEAR STRATEGY AND FIVE-YEAR IMPLEMENTATION PLANS

Management Measures	Targeting Level for Each Five Year Implementation Plan		
	1998-2003	2003-2008	2008-2013
1. Agriculture			
A. Erosion and Sediment Control	P	P	P
B. Confined Animal Facilities Wastewater and Runoff	P	P	P
C. Nutrient Management	P	P	P
D. Pesticide Management	P	P	P
E. Grazing Management	P	P	P
F. Irrigation Water Management	S	P	P
G. Education/Outreach	P	P	P
2. Forestry (Silviculture)			
A. Preharvest	P	P	P
B. Streamside Management Areas	P	P	P
C. Road Construction/Reconstruction	P	P	P
D. Road Management	P	P	P
E. Timber Harvesting	P	P	P
F. Site Preparation and Forest Regeneration	P	P	P
G. Fire Management	S	P	P
H. Revegetation of Disturbed Areas	P	P	P
I. Forest Chemical Management	S	S	P
J. Wetlands Forest	T	P	P
K. Postharvest Evaluation	P	P	P
L. Education/Outreach	P	P	P
3. Urban Areas			
3.1 Runoff from Developing Areas			
A. Watershed Protection	S*	P	P
B. Site Development	S*	P	P
C. New Development	S*	P	P
3.2 Runoff from Construction Sites			
A. Construction Site Erosion/Sediment Control	T*	S*	P
B. Construction Site Chemical Control	T*	S*	P
3.3 Runoff from Existing Development			
A. Existing Development	S*	P	P
3.4 On-site Disposal Systems			
A. New On-site Disposal	S*	P	P
B. Operating On-site Disposal Systems	S*	P	P
3.5 Transportation Development: Roads, Highways, and Bridges			
A. Planning, Siting, and Developing Roads and Highways	T*	S*	P
B. Bridges	T*	S*	P
C. Construction Projects	T*	S*	P
D. Construction Site Chemical Control	T*	S*	P
E. Operation and Maintenance	T*	S*	P
F. Road, Highway, and Bridge Runoff Systems	T*	S*	P
3.6 Education/Outreach			
A. Pollution Prevention/Education: General Sources	P	P	P

Management Measures	Targeting Level for Each Five Year Implementation Plan		
	1998-2003	2003-2008	2008-2013
4. Marinas and Recreational Boating			
4.1 Assessment, Siting, and Design			
A. Water Quality Assessment	P	P	P
B. Marina Flushing	T	S	P
C. Habitat Assessment	S	P	P
D. Shoreline Stabilization	S	P	P
E. Storm Water Runoff	S	P	P
F. Fuel Station Design	S	P	P
G. Sewage Facilities	P	P	P
H. Waste Management Facilities	P	P	P
4.2 Operations and Maintenance			
A. Solid Waste Control	P	P	P
B. Fish Waste Control	T	S	P
C. Liquid Material Control	S	P	P
D. Petroleum Control	P	P	P
E. Boat Cleaning and Maintenance	P	P	P
F. Maintenance of Sewage Facilities	P	P	P
G. Boat Operation	T	S	P
4.3 Education/Outreach			
A. Public Education	P	P	P
5. Hydromodification			
5.1 Channelization and Channel Modification			
A. Physical and Chemical Characteristics of Surface Waters	S	P	P
B. Instream and Riparian Habitat Restoration	S	P	P
5.2 Dams			
A. Erosion and Sediment Control	T	S	P
B. Chemical and Pollutant Control	T	S	P
C. Protection of Surface Water Quality and Instream and Riparian Habitat	T	S	P
5.3 Streambank and Shoreline Erosion			
A. Eroding Streambanks and Shorelines	S	P	
5.4 Education/Outreach			
A. Educational Programs	P	P	P
6. Wetlands, Riparian Areas and Vegetated Treatment Systems			
A. Protection of Wetlands and Riparian Areas	S	P	P
B. Restoration of Wetlands and Riparian Areas	S	P	P
C. Vegetated Treatment Systems	T	S	P
D. Education/Outreach	P	P	P

Legend:
P – primary
S – secondary
T – tertiary

* The Program Plan will implement the Urban MMs through the coordination and expansion of in-place activities including the Phase I and Phase II Storm Water Programs, the Cal/Trans Stormwater Permit, LCP amendments, CDPs and/or MURP.

to these requirements, the SWRCB developed the 1988 Plan which outlined the steps to initiate systematic management of NPS pollution in California. The 1988 Plan emphasized the following characteristics of an effective management program: (1) developing an explicit long-term commitment by the SWRCB and RWQCBs; (2) coordinating existing SWRCB and RWQCB NPS related programs; (3) using more effectively RWQCB regulatory authorities coupled with non-regulatory programs; (4) improving the linkages among local, State, and federal agencies that have authorities to address NPS pollution; and (5) enhancing funding sources. Key elements of the 1988 Plan were the: (1) development of management options to address NPS pollution (the three-tiered approach); (2) establishment of the NPS Management Information System (NPSMIS); and (3) phased implementation of the 1988 Plan.

The Strategy builds on the lessons learned in the implementation of the 1988 Plan by maintaining and/or expanding those elements that were successful and deleting or altering those that did not achieve the goals of the 1988 Plan. The Strategy maintains the "three-tiered approach" and commits to expanding application of the "tiers" pursuant to the requirements of section 13369(a)(2)(B) of the CWC. The NPSMIS will be expanded through contracts with the University of California at Davis-Information Center for the Environment (UCD-ICE) to develop relational databases and geography-based information systems. The phased implementation program in the 1988 Plan was expanded to include a commitment from the SWRCB to consider adopting the MMs as regulation if clear progress is not being made in their implementation.

Water Quality Control Plans

In California, the RWQCBs and SWRCB are responsible for the development of statewide and regional WQCPs, respectively. Pursuant to section 13240 of the Porter-Cologne Act, each of the State's nine RWQCBs must formulate and adopt regional WQCPs (basin plans) for all surface and ground waters within their respective regions. Porter-Cologne Act section 13170 allows the SWRCB to adopt statewide WQCPs for waters for which water quality standards are required by the CWA. The statewide plans, when adopted, supersede any basin plan requirements for the same waters to the extent of any conflict.

Basin Plans

Section 13241 of the Porter-Cologne Act requires that each basin plan: (1) designate beneficial uses; (2) establish water quality objectives that protect the designated beneficial uses; and (3) provide an implementation plan for achieving the water quality objectives. The implementation plan for achieving water quality objectives must include, but is not limited to: (1) a description of the nature of the actions which are necessary to achieve the water quality objectives; (2) a time schedule for the actions to be taken; and (3) a description of the monitoring and surveillance to be undertaken to determine compliance with objectives.

As part of the "continuing planning process," components of the basin plan are reviewed as new information and data become available or as specific needs arise. Comprehensive updates of the basin plan occur in response to State and federal

legislative requirements and as funding becomes available. All of the RWQCB basin plans were completely updated in 1995. In addition, the basin plan provides consistent long term standards and program guidance for the RWQCB.

Section 13240 of the Porter-Cologne Act directs the SWRCB and the RWQCBs to periodically review and update basin plans. Furthermore, CWA section 303(c) directs states to review water quality standards every three years (triennial review) and, as appropriate, modify and adopt new standards. In the triennial review process, basin planning issues are formally identified and ranked during the public hearing process. These and other modifications to the basin plan are implemented through basin plan amendments which must be reviewed by the RWQCB and the SWRCB in a public review process specified. Following adoption by the RWQCB, basin plan amendments and supporting documents are submitted to the SWRCB for review and approval. All basin plan amendments approved by the SWRCB after June 1, 1992 must also be reviewed by the State Office of Administrative Law (OAL). In addition, the USEPA must review and approve those basin plan amendments that involve changes in State standards for surface water quality to ensure such changes do not conflict with federal regulations.

The basin plans will be one of the most effective instruments for integrating the Program Plan. Many of the critical elements for implementing the NPS Program are required by statute to be incorporated into the basin plan. The SWRCB and RWQCBs can use their planning authority to prevent NPS pollution and implement MMs. Implementation programs within the basin plan can implement MMs through several approaches. The implementation plans can recommend that NPS dischargers carry out specific BMPs in order to achieve water quality standards. The implementation programs can also waive regulation of categories of NPS pollution discharges on condition that the dischargers implement specific MMs or BMPs. Alternatively, an implementation program can prohibit NPS discharges either entirely or partially, in certain areas or under certain conditions. The conditions can include compliance with appropriate MMs and applicable BMPs.

Inland Surface Waters Plan/Enclosed Bays and Estuaries Plan

The SWRCB is in the process of developing a new Inland Surface Waters Plan (ISWP) and Enclosed Bays and Estuaries Plan (EBEP) to reinstate the two plans it rescinded in response to an adverse court ruling in 1994. The SWRCB is generally authorized to adopt WQCPs under the Porter-Cologne Act (§13170) and is specifically mandated to adopt the EBEP (CWC §13391). Once adopted and in effect, the ISWP and EBEP will complement the California Ocean Plan (Ocean Plan) by establishing statewide water quality standards and implementation measures for controlling discharges of toxic pollutants to non-ocean surface waters of the State.

The SWRCB is developing the ISWP and EBEP in two phases. In Phase 1, the SWRCB will adopt the Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California (Policy). The Policy (adopted pursuant to CWC §13140) will establish statewide toxicity requirements and provisions to implement water quality standards for priority toxic pollutants in waste

discharges. The adoption of water quality standards for priority toxic pollutants for all waters of the United States is mandated by federal CWA section 303(c)(2)(B) in accordance with implementing regulations (40 CFR 131). The vast majority of these standards will be promulgated for the State in the USEPA California Toxics Rule (CTR). Together, the CTR and the Policy will be the basis for establishing water quality-based effluent limitations and other permit requirements for priority pollutants and whole effluent toxicity in NPDES permits and other WDRs. Thus, the standards and implementation provisions established by the CTR and the Policy will function as replacements for the ISWP and EBEP until they are established in their entirety in Phase 2. In Phase 2, the SWRCB will combine the Policy provisions with State-adopted water quality standards for priority pollutants and other pollutants of concern to produce a new ISWP and EBEP. Other issues, such as toxicity testing and the evaluation of standards for effluent-dependent and agricultural drainage-dominated water bodies, will also be addressed in the future.

Currently, the USEPA expects to promulgate the CTR in December 1999. In November 1999, the SWRCB released a revised draft of the Policy and supporting documents for a second public review prior to an SWRCB workshop in December 1999. The Policy will be considered for adoption at a SWRCB meeting in early 2000. The Policy will become effective upon approval by the OAL in the spring of 2000. After the ISWP and EBEP are adopted, the plans will be periodically reviewed and, as appropriate, revised (generally every three years) in accordance with CWC section 13240 and CWA section 303(c)(1). These triennial reviews involve public hearings prior to adoption of amendments by the SWRCB.

California Ocean Plan

The 1997 Ocean Plan states that the SWRCB "finds and declares that protection of the quality of the ocean waters for use and enjoyment by the people of the State requires control of the discharge of waste to ocean waters in accordance with the provisions contained" in the Ocean Plan. State law (CWC §13170.2) requires that the Ocean Plan be reviewed at least every three years to guarantee that current standards are adequate and are not allowing degradation to marine species or posing a threat to public health. As defined by the Ocean Plan, "waste includes a discharger's total discharge, of whatever origin, i.e., gross, not net, discharge." Section 13170.2 of the CWC requires the SWRCB to adopt and review the Ocean Plan.

The Ocean Plan applies in its entirety to point source discharges to the ocean. NPS discharges are subject to the sections of the Ocean Plan covering beneficial uses, water quality objectives, general requirements, and discharge prohibitions. For NPSs of waste discharge to the ocean, "compliance with water quality objectives, in all cases, shall be determined by direct measurements in the receiving waters." The Ocean Plan is not applicable to discharges to enclosed bays and estuaries, inland waters, vessel wastes, or control of dredging materials. The SWRCB may make exceptions to the Ocean Plan in compliance with CEQA and a public hearing and in concurrence with the USEPA, provided that two conditions are met: (1) the exception will not compromise protection of ocean waters for beneficial uses and (2) the public interest will be served.

The Ocean Plan was established in 1972 and has been amended in 1978, 1983, 1988, 1990, and 1997. Draft amendments were made public in October 1998, public hearings on the draft were held in December 1998, and staff is currently responding to comments made during the hearings. It is anticipated that revised draft amendments will be submitted for SWRCB approval in May 2000. As part of the required review of current standards, a triennial review of the Ocean Plan, public hearings were held in September and October 1998. The public identified 35 specific issues that needed review. Staff subsequently prepared a Triennial Review Workplan, describing 22 high priority issues that the SWRCB approved on July 15, 1999 and submitted to the USEPA. The issue "Regulatory Control of Nonpoint Source Control" was reviewed by staff of the Division of Water Quality's NPS Section prior to SWRCB approval of the Workplan.

Bays and Estuaries Toxic Hot Spot Cleanup Plan

The purpose of this program was to implement the Bay Protection and Toxic Cleanup Program (BPTCP), which was established by the State Legislature in 1989. The BPTCP had four major goals: (1) to provide protection of present and future beneficial uses of the bays and estuarine waters of California; (2) to identify and characterize toxic hot spots; (3) to plan for toxic hot spot cleanup or other remedial or mitigation actions; and (4) to develop prevention and control strategies for toxic pollutants that will prevent creation of new toxic hot spots or the perpetuation of existing toxic hot spots in the bays and estuaries of the State.

The six coastal RWQCBs involved in the BPTCP conducted extensive water and sediment quality monitoring in the enclosed bays and estuaries of the State over a period of eight years. The monitoring data provided information on the chemistry (types and amounts of toxicants), toxicity, and benthic integrity of sediments. An assessment of monitoring data using a weight-of-evidence approach resulted in the designation of 48 toxic hot spots, 22 of which were ranked as high priority based on the guidance developed by the SWRCB. The RWQCBs developed regional toxic hot spot cleanup plans for the high priority hot spots.

The BPTCP concluded in June 1999 with the adoption of the statewide Toxic Hot Spot Cleanup Plan by the SWRCB. The Cleanup Plan includes: (1) a priority listing of all toxic hot spots; (2) description of each toxic hot spot including a characterization of the pollutants present at the site; (3) assessment of the most likely source or sources of pollutants; (4) estimate of the total costs to implement the cleanup plan; (5) estimate of the costs that can be recovered from parties responsible for the discharge of pollutants that have accumulated in sediments; (6) preliminary assessment of the actions required to remedy or restore a toxic hot spot; (7) a two-year expenditure schedule plan; and (8) findings on the need to establish a toxic hot spot cleanup program.

Depending on the source and areal extent of the known hot spot, the actions to remediate the sites include: (1) better characterization of the sites and problem, (2) institutional controls/education, (3) dredging, capping, a combination of dredging and capping, (4) source control watershed management, and (5) implementation of a no-action alternative. In order to prevent the further pollution or creation of known toxic hot spots, the cleanup plan requires RWQCBs to reevaluate WDRs in compliance with CWC section 13395. The re-evaluation consists of: (1) an assessment of whether the discharge may influence the creation or further pollution of the known toxic hot spot, (2) an assessment of which WDRs need to be modified to improve environmental conditions at the known toxic hot spot, and (3) a schedule for completion of any WDR modifications deemed appropriate.

Development of Total Maximum Daily Loads

Section 303(d)(1)(C) of the CWA requires the State to establish TMDLs for "303(d) listed water bodies" for those pollutants determined by USEPA to be suitable for TMDL measurement. The TMDL program provides an assessment and planning framework for identifying load reductions or other actions needed to attain water quality standards. The planning process for TMDL development is divided into two parts. Part 1 establishes and apportions the allowable level(s) of pollution in the water body (or watershed) necessary to achieve water quality standards. The recommended methods for achieving the necessary reductions in pollutant loadings are detailed in the second part of this process--the TMDL implementation plan.

Part 1 – Developing the TMDL

This process establishes the maximum allowable amount of pollution (for parameters of concern) and allocates this among the existing and potential sources. The allocation of pollutants is distributed among both point source and NPS discharges. This quantitative assessment includes determining the following components:

- Loading capacity--The greatest amount of loading that a water body can receive without violating water quality standards.
- Load allocation--The portion of a receiving water's loading capacity that is attributed either to one of its existing or future NPSs of pollution or to natural background sources.
- Wasteload allocation--The portion of a receiving water's loading capacity that is allocated to one of its existing or future point sources of pollution.
- Margin of safety--The portion of a receiving water's loading capacity that accounts for the uncertainty of the relationship between the pollutant loads and the quality of the receiving water.
- Seasonal variation--The influence of seasonally-dependent factors (e.g., flow volume) on the receiving water's loading capacity.
- TMDL--The sum of the individual wasteload allocations for point sources, load allocations for NPSs and natural background, and the margin of safety. The TMDL can be expressed in terms of either mass per time, toxicity, or other appropriate measures that relate to the State's water quality standard. In practice, allocations are not typically assigned on a daily basis but instead are monthly, seasonal, or annual. In most cases mass load is utilized as the metric

for the allocations. In some cases (e.g., pathogen problems), other measurable features are used to express the allowable amount of pollution.

Load allocations for NPS and/or natural background may range from reasonably accurate estimates to gross allotments, depending on the availability of data and the techniques used for predicting the loading. As such, a phased approach to TMDL development is often used where estimates are based on limited information. Using the phased approach provides a TMDL that includes monitoring requirements and a schedule for reassessing TMDL allocations to ensure attainment of water quality standards.

Part 2 – Developing the TMDL Implementation Plan

Once a TMDL or phased TMDL has been established, an implementation plan must be developed. The State (acting through the RWQCB) must implement the TMDL and must incorporate the TMDL into the appropriate basin plan. Section 13242 of the Porter-Cologne Act requires that a plan of implementation be incorporated into the basin plan. The implementation plan must include: (1) a description of the nature of the actions necessary to achieve the water quality objectives, including recommendations for appropriate action by any entity, public or private; (2) a time schedule for the actions to be taken; and (3) a description of the monitoring and surveillance to be undertaken to determine compliance with the objectives. Incorporating the TMDL into the basin plan requires approval by the SWRCB and approval of any regulatory provisions by OAL.

The RWQCBs make use of the NPDES permitting process to limit effluent from point source discharges consistent with the wasteload allocations. In the case of NPSs, the RWQCBs rely on the implementation of NPS controls, such as the MMs and associated MPs, and the application of a wide range of State programs and enforcement authorities.

During the Strategy, the RWQCBs have committed to the development of 138 TMDLs and their associated implementation plans (see Appendix C). The commitment of financial and staff resources to this effort will be influential in addressing the State's effectiveness in controlling NPS problems.

In summary, TMDLs are planning tools that will enhance the State's ability to foster implementation of appropriate NPS MMs. By providing watershed-specific information, TMDLs will help target specific sources and corresponding corrective measures and will provide a framework for using more stringent approaches that may be necessary to achieve water quality goals and maintain beneficial uses.

Watershed Management Initiative

The watershed Management Initiative (WMI) was approved in 1995 by the SWRCB as part of its Strategic Plan. It was developed to help the SWRCB meet its goal to provide water resource protection, enhancement, and restoration while balancing economic and environmental impacts. The WMI uses an integrated planning approach to create and implement unique solutions for each watershed that consider all local conditions and pollution sources and rely on the input and involvement of local stakeholders. It is not a regulatory program and has no statutory mandate.

Watersheds are identified and prioritized primarily on the basis of water quality. Watershed management strategies have been developed for over 40 watersheds at the nine RWQCBs. These strategies are contained in the Integrated Plan for implementation of the WMI. This Integrated Plan is updated annually in November to reflect changing priorities and conditions in the State's watersheds. The 1998-99 State budget bill included funding for ten WMI coordinators to carry out the WMI. There is one coordinator at each of the nine RWQCBs and one at the SWRCB. The WMI relies on the existing authority of the SWRCB and RWQCBs, including the Porter-Cologne Act and the Federal CWA.

The WMI is consistent with the overall scheme of the Program Plan. Similar to the CWA section 303(d) list described above, prioritization of the watersheds helps the Program Plan in targeting areas with serious water quality issues. Moreover, the watershed management strategies were developed with considerations for local environmental and economic conditions. Consequently, in accordance with the NPS Plan's emphasis on self-determination and the voluntary approach, stakeholder involvement in the implementation of the management strategies is not only critical but feasible. Future annual updating of the management strategies will incorporate RWQCBs' activities identified in the five year implementation plans to support implementation of the Program Plan and make use of the MMs contained in the CAMMPR document of this Program Plan. Implementation of these strategies in targeted watershed will complement the NPS work being performed under other parts of the Program Plan and ensure the full implementation of all MMs in 15 years.

Community-Based Watershed Plans

Community-based watershed plans refer to a wide range of plans and activities that are being undertaken throughout California. These plans and activities are focused on specific geographic areas and involve strong local leadership and diverse stakeholders. Community-based watershed plans have as their premise that many water quality and ecosystem problems are best solved at the watershed level rather than at a statewide or individual discharger level.

Community-based watershed plans are a key component to implementing the MMs. Many of the community-based watershed plans and activities that are underway address NPS pollution. The SWRCB and RWQCBs have supported these plans through financial and technical assistance. Currently, several State agencies, in conjunction with the California Biodiversity Council (CBC) and the Cal/RA, are considering how to

establish a statewide framework to more fully support community-based watershed plans and activities.

The SWRCB and the RWQCBs will continue to support watershed plans to foster implementation of the MMs. This is consistent with the federal CWAP that directs new CWA section 319(h) funding to supporting watershed restoration action strategies (WRASs). The intent of this requirement is to ensure that the activities supported by these funds are part of a comprehensive effort that has the community and technical support necessary to achieve significant environmental results. A wide range of community-based watershed plans will be considered to qualify as WRASs. For example, a local watershed stewardship plan, a Coordinated Resource Management and Planning Program (CRMP), or a Comprehensive Conservation and Management Plan prepared under section 320 of the CWA will all be considered to qualify as a WRAS.

Coastal CPR Plan

The CCC's *Plan for Controlling Polluted Runoff* (Coastal CPR Plan) outlines the CCC's authorities to address polluted runoff and identifies actions with timelines and milestones to achieve the CCC's objective to reduce polluted runoff. The Coastal CPR Plan specifies the CCC's role in addressing polluted runoff within the confines of existing budgets, staffing, and statutory authority. The four program enhancements that comprise the Coastal CPR Plan are developed from the CCC's existing and newly developed tools and programs related to the management of polluted runoff. They include:
(1) implementation of MMs through planning, regulation, and technical assistance;
(2) administrative coordination; (3) public participation and education; and (4) funding.
Implementation of the Coastal CPR Plan helps to direct CCC staff efforts to prevent and control polluted runoff, thus leading to improved coastal water quality and enhanced coastal resources and uses.

Many of the actions identified in the Coastal CPR Plan are incorporated into the Program Plan. These actions are expected to help facilitate implementation of the NPS Program, as well as to improve the coastal program's overall treatment of water quality-related issues.

General Plans

The general plan is a local government's basic planning document. Under State planning law, each city or county must adopt a comprehensive, long-term general plan for the physical development of the city or county and any land outside its jurisdiction that bears relation to its planning. General plans must contain seven elements: (1) land use, (2) circulation, (3) housing, (4) conservation, (5) open space, (6) noise, and (7) safety. The following elements are the most relevant to NPS pollution prevention and control:

1. Land Use--Designates categories such as housing, industry, and natural resources, including density and intensity of use.
2. Conservation--Applies to conservation, development, and use of natural resources (e.g., soils, forests, rivers and other water bodies, and harbors). May also cover watershed protection, land or water reclamation, prevention or control of the

pollution of streams and other coastal waters, regulation of land uses along stream channels and in other areas required to implement the conservation plan (e.g., buffer areas), control or correction of soil erosion, and flood control.

3. Open Space--Applies to preservation of natural resources, including fish and wildlife habitat, rivers, streams, bays and estuaries, and open space.
4. Circulation--Plans infrastructure, including water, sewage, and storm drainage.

Local Coastal Programs

In carrying out its objectives and policies, the Coastal Act (PRC §§30000 et seq.) delegates to local governments specified authority to regulate coastal development.[9] The Coastal Act directs each of the 73 cities and counties lying wholly or partly within the coastal zone to prepare for review and certification by the CCC an LCP for the local government's portion of the coastal zone. Through LCP development, the Coastal Act provides a means to manage coastal resources of State, regional, and national significance in ways that respect special circumstances in each locality. The CCC works with local governments to tailor LCPs to reflect local issues and concerns while simultaneously meeting the statewide goals and policies of the Coastal Act.

An LCP consists of a local government's land use plans (LUPs), zoning ordinances, zoning district maps, and, within sensitive coastal resource areas, other implementing actions which, when taken together, meet the requirements of and implement the provisions and policies of the Coastal Act at the local level (PRC §30108.6). The LUP is the relevant portion of a local government's general plan or local coastal element which is sufficiently detailed to indicate the kinds, location, and intensity of land uses, the applicable resource protection and development policies, and, where necessary, a listing of implementing actions (PRC §30108.5). Most key land use and policy decisions are made in the LUP stage. The standard of review of the LCP Implementation Plan is that it conforms with and is adequate to carry out the certified LUP.

Upon LCP certification, a local government can issue permits for such development in the coastal zone as is consistent with LCP policies; alternatively, a local government conditionally approves or denies a coastal development permit application if the proposed development is inconsistent with the LCP. However, certain actions taken by a local government on a CDP application may be appealed to the CCC. The CCC hears appeals, and the standard of review is the certified LCP and the public access policies of the Coastal Act. And, because a CDP is either approved or denied depending on its conformity to a certified LCP, it is imperative that all appropriate NPS MMs are identified and included in the certification process.

The CCC water quality staff will update the in-house *Procedural Guidance Manual: Addressing Polluted Runoff in the California Coastal Zone* to reflect the newest development in NPS MMs. This manual is extensively utilized by the CCC staff in

[9] The Coastal Act declares that "to achieve maximum responsiveness to local conditions, accountability, and public accessibility, it is necessary to rely heavily on local government and local land use planning procedures and enforcement" (PRC §30004).

reviewing LCPs and CDP applications. The CCC's water quality staff will also conduct training of its planners in use of the manual and in screening for NPS components in LCPs, Local Coastal Program Amendments (LCPAs), and CDPs. The initial training will be conducted by December 2000, with a refresher training every year thereafter. Currently, the CCC staff are routinely requesting applicants of development permits not already subject to NPDES permit requirements to submit Erosion & Sediment and Chemical Control Plans for the construction phase when appropriate. In addition, a polluted runoff control plan with regular BMP maintenance and inspection is required of most development proposals as well. These efforts will achieve tangible water quality benefits in the field.

Coastal Act section 30519.5 requires the CCC to conduct periodic reviews of certified LCPs to evaluate whether or not the LCPs are being implemented by the local governments in a manner that conforms to the Coastal Act. The periodic reviews also provide a means to ensure that the LCPs reflect new information (such as new MMs) and changing conditions regarding NPS pollution prevention and control and help local governments respond to post-certification NPS issues that develop over time in targeted areas.

Lastly, the CCC can also effect implementation of the NPS Program through either:
(1) the regular LCP amendment process initiated by the local governments or
(2) providing grant incentives to encourage appropriate NPS-related amendments to LCPs.

In short, the CCC will review all new LCPs, LCPAs, and CDP applications brought before it for appropriate NPS pollution prevention and control activities.

Annual Workplans

Each year since 1990, the SWRCB and RWQCBs have developed detailed annual workplans as part of the grant application to USEPA for CWA section 319(h) funding. In addition to satisfying federal funding requirements, the plans served as short-term planning and budgeting tools for the SWRCB and RWQCBs. Annual workplans are detailed, tasked-oriented documents. This Program Plan is not intended to replace annual workplans. In fact, good annual workplans are more important than ever if California is to achieve the goals and objectives set forth in the Program Plan. Annual workplans will continue to be used to plan, coordinate, budget, track, and report on each year's NPS-related work.

Beginning with Fiscal Year 2000 (July 1, 2000), the SWRCB, RWQCBs, and CCC will begin jointly developing a single annual workplan that focuses on implementing MMs. The workplan will detail all major tasks proposed for the coming year including those that support activities outlined in the State NPS Plan. Annual workplans will cover all federal and State (including bond funds) funding sources, fees, and any other sources including private commitments. Other State agencies and private entities will be encouraged to join in the process. This widespread participation is crucial if the State is

to accurately evaluate and report the large number of efforts underway dealing with NPS pollution.

The State is faced with mounting annual, biennial, and five-year State and federal reporting requirements. To simplify reporting efforts, the SWRCB and CCC will develop a single, standardized report format (Figure 3) for use by all participants. The form will need to satisfy federal grant program requirements, be consistent with the five-year plans, and provide sufficient information so that information is usable in a program tracking database such as the one currently under development at UCD ICE. Another consideration is that it has an Internet-compatible file format to ensure electronic sharing over and posting on the Internet. One of the most important functions of the standardized report format is to simplify the task and thereby improve the State's ability to document and report its yearly progress in managing NPS pollution.

Regulatory Plans (National Pollution Discharge Elimination System)

While different legal authorities may apply to different situations, the goals of the NPS Program are complementary to the goals of the storm water regulatory programs that address urban runoff.[10] The two-phased program under CWA section 402(p) requires NPDES permits for storm water discharges. In California, the federal NPDES Program is administered by the SWRCB and the RWQCBs. Since 1990, Phase I regulations have required NPDES permits for storm water discharges from:

1. Municipal separate storm sewer systems serving populations greater than 100,000,
2. Specific industrial activities, and
3. Construction activities disturbing land of five or more acres.

Phase I requires that individual NPDES permits be issued for municipalities greater than 100,000ff In practice, the RWQCBs include many municipalities in urbanized areas with populations less than 100,000 in the Phase I programs. Individual municipal NPDES permits require implementation of structural and nonstructural control measures to reduce pollutant loads from industrial, commercial, and residential areas. The SWRCB elected to adopt a statewide NPDES General Permit requiring the development and implementation of a Storm Water Pollution Prevention Plan (SWPPP) for all construction and certain industry-related discharges.

Implementation of the NPDES Phase II Program will expand the existing program to include all municipalities within urbanized areas and small municipalities outside of urbanized areas with a population of at least 10,000 and a population density of at least 1,000 persons per square mile. The program will also expand to include construction sites that disturb between one and five acres. All activities under Phase I and II of the NPDES permit regulations will be required to prepare a SWPPP to demonstrate how MMs will be used to protect water quality degradation.

[10] The 1987 CWA Amendments, which added section 319 related to NPS programs, also expanded the application of regulatory authority under CWA section 402 to prevent and control NPS pollution from certain urban areas and industrial activities. CZARA section 6217 also requires states to implement MMs to control NPS pollution, including urban runoff, to coastal waters.

FIGURE 3. STANDARDIZED REPORT FORM

DRAFT SAMPLE

California Nonpoint Source Pollution Control Program
Annual Workplan for FY 1999

Agency: *Cal/EPA* **Department/Board:** *SWRCB*

Division/Program: *DWQ/NPS*

Contact:

Management Measure Category: *3.5 Transportation Development*

Management Measure Title: *3.5A Planning, Siting, and Developing Roads and Highways*

Process Element: *Assess Problem*

Actions/Statements: *Conduct a consistency analysis of Cal/Trans' statewide storm water permit.*

Geographic Area: *Statewide*

Funding Sources and Amount: *CWA 319(h) and General Fund*

Performance Measures: *Upgrade NPDES permit.*

Annual Progress Report: *The SWRCB approved a statewide storm water permit for CalTrans in August 1999 that includes management measures consistent with the Program Plan.*

Involve Stakeholders in Planning Process (Public Participation)

The Program Plan identifies numerous mechanisms for stakeholder participation in the planning and implementation of Tier 1 activities. To ensure that stakeholders have both the representation and buy-in necessary for Tier 1 to truly be effective, the State recognizes the need for public participation in every step of the planning and implementation process. Public input will be included in plan development, targeting resources, planning five-year activities, coordinating partnerships, implementing MMs, and monitoring success. This coordination will be achieved from direct comments provided by the public during the decision making and planning process. The most effective first step will be to establish the IACC and include a public representative on the Assessment TAC to participate in problem solving activities. In addition, the Program Plan has to establish a role for public participation in, among others, the State WQA (statewide citizen monitoring network), CCAs designation and implementation, specific work groups (e.g., CRMP), tracking MM implementation and effectiveness, and in developing additional MMs.

The first five-year review period will be a critical point for stakeholder involvement and public comments. The public will be invited to participate in the review of the first five-year plan assessment and in the development of future priorities and objectives. This process will be obtained best through the establishment of review committees (identified by the TACs) to review the Program Plan's effectiveness as outlined in the five-year report. From these comments, the State hopes to increase MM implementation and streamline Tier 1 activities.

E. Coordinating with Agencies and Key Stakeholders

Building cooperative partnerships among agencies at every institutional level, as well as with stakeholders, is essential to the success of a sustainable effort to protect and restore the quality and environment of the State's waters. In order for the NPS Program to be successful, we need to ensure that the roles and responsibilities of stakeholders and agencies with authorities to implement the MMs are clarified and executed. Specific objectives include:

- Establishing coordination mechanisms to enhance implementation of the five-year implementation plans,
- Fostering effective partnerships and collaboration among State, regional, and local agencies and non-governmental organizations (NGOs)—including CRMPs, officials responsible for habitat protection, land use programs and permitting, water quality permitting and enforcement, and public health and safety—to implement all appropriate MMs, and
- Making available for public review and comment by January 1, 2001, a draft of the enforcement guidance required pursuant to Porter-Cologne Act section 13369.

We will use the example of marina and boating activities to illustrate the complex partnerships required in implementing the appropriate MMs. In addition to the CCC and SWRCB, numerous agencies have regulatory jurisdiction and non-regulatory oversight of California's water quality management efforts related to marina and boating activities (Table 9). Although agency jurisdiction overlaps in many cases, the goal of these agencies is to prevent NPS pollution before it happens. (For a more complete list of

agency authorities related to the various NPS categories, the reader is referred to Volume II-CAMMPR of the Program Plan.)

For example, the RWQCBs, DFG, DHS, DTSC, and USCG all play an important role in regulating both the amount and type of wastes that enter California's waterways. The RWQCBs are the primary State agencies with water quality authority, which ranges from water quality planning to issuing permits for discharges of pollutants to State waters. Most RWQCBs use voluntary/cooperative management efforts for marina and boater NPS pollution control, although boat yards are regulated under a permit system. The DFG also has broad water quality authority and in addition to the USCG is the

TABLE 9 AGENCY PARTICIPATION IN MARINA AND BOATING ACTIVITIES

	Sewage	Bottom Paints/ Cleaning Material	Hazardous Waste	Oil/Fuel	Debris/ Solid Waste	Storm Water Runoff	Education
RWQCBs	X	X	X	X	X	X	
CCC				X	X		X
CIWMB				X	X		
DBW	X						X
DFG	X	X	X	X	X		
DHS	X		X	X	X	X	
DTSC		X	X	X			
UCCE		X	X	X			X
MBNMS (NOAA)	X	X	X	X	X	X	X
NEPs (USEPA)	X	X	X	X	X	X	X
USCG	X		X	X	X		X

agency most likely to be on site at a marina. Its focus is on preventing pollution that harms fish and wildlife resources, especially discharges of oil and petroleum products. The DFG Office of Spill Prevention and Response (OSPR) is charged with oil spill prevention and response. The DHS also regulates the discharge of sewage, other waste, or effluent, while the DTSC regulates the storage, transport, and disposal of all hazardous wastes. The USCG implements federal laws related to garbage and sewage disposal.

In addition to the agencies listed above, DPR, SLC, SFBCDC, and CCC have leasing or permitting authority over many marinas. CCC, DBW, CIWMB, UCCE, MBNMS, and San Francisco Bay and Santa Monica Bay NEPs provide various levels of technical, financial, and/or educational assistance.

Many efforts related to marinas and recreational boating are coordinated through interagency and public committees, such as the California Clean Boating Network (CCBN) for Northern and Southern California (except San Diego County) and the Boating Safety and Environment Education Committee in San Diego. In 1995, a number

of pollution educators, including agency, industry, and environmental representatives, came together to create the CCBN as a result of a recommendation by the Marina and Recreational Boating TAC (SWRCB, 1994e) and to assist boaters and marina managers. The purpose of the CCBN is to promote environmentally sound boating education efforts and to improve communication and coordination between marina and boating pollution educators in California. Examples of CCBN activities to support this purpose include, but are not limited to:

- Sharing information and developing expertise on current environmentally sound boating issues;
- Identifying funding sources for marina and boater pollution education projects;
- Providing a forum to allow cooperation on funding source proposals;
- Assisting in the dissemination of materials;
- Providing feedback on draft materials;
- Providing a forum for feedback on the impact that education is having on the identified audience;
- Sharing methodology for education, outreach, and the evaluation of materials;
- Reviewing existing programs and identifying where additional effort is needed; and
- Developing a strategy to implement the additional efforts.

While the CCBN supports the efforts of its member organizations by sharing information, networking, and providing expertise, the CCBN has lost its program funding to conduct education regarding environmentally sound boating practices. In fact, educational efforts in the State regarding environmentally sound boating are largely funded by short-term grants. No State agency has assumed programmatic responsibility for a permanent education and outreach effort akin to the boating safety education program of the DBW.

As the CCC is now completing a three-year statewide grant, funded by the CIWMB, to promote environmentally sound boating, the CCC acknowledges the need for a permanent boater education program to be implemented by an appropriate State agency. The CCC will work with the DBW, SWRCB, and RWQCBs to identify the appropriate agency for implementing a permanent education program as outlined in the Implementation Plan. Once an appropriate agency is identified, the State will work to develop a long-term funding structure and implementation strategies.

Formal Coordination through Memoranda of Understanding and Management Agency Agreements[11]

The State will formalize connections between the lead and enforcing agencies through the letter from Cal/EPA and Cal/RA, asking each agency, department, State boards, and RWQCBs to prepare a five-year implementation plan. The State will also enhance

[11] Under the CWA and the State's Porter-Cologne Act, the SWRCB is given the authority and responsibility to develop and certify water quality management plans (including BMPs, implementation procedures, and management agency implementation responsibilities), to designate management agencies for plan implementation, and to execute MAAs setting forth management agency commitments to its implementation responsibilities. SWRCB encourages this management agency approach where it offers a viable alternative to direct SWRCB/RWQCB regulation in controlling NPS pollution and achieving compliance with the State's water quality standards. Where reasonably implemented by the management agency, the SWRCB will typically waive direct regulation under its own authority.

coordination by developing a formal agreement (MOU) between the lead agencies (SWRCB and CCC) responsible for the Program Plan's implementation. While the key elements of the NPS Program have been developed through a cooperative partnership without a formal agreement, an MOU would serve to clarify roles and responsibilities of each agency over the next 15 years. This MOU will be submitted with the Program Plan for approval by the SWRCB and CCC. (See Appendix D).

The State will ensure that agencies with the ability to implement aspects of the Program Plan are effectively linked with the lead agencies by developing (or revising) MOUs or MAAs. MOUs and MAAs between the lead agencies and several implementing agencies already exist (Table 10). Additional MOUs/MAAs will be encouraged as a mechanism for officially designating other agencies with the responsibility and authority to implement aspects of the Program Plan. The State will revise existing or add additional MOUs/MAAs that support the implementation of MMs in accordance with the MMs' priorities. This approach is consistent with the Program Plan's phased approach and recognizes resource limitations.

TABLE 10. SUMMARY OF EXISTING MAAS AND MOUS

TYPE OF DOCUMENT	SIGNATORY AGENCY	GENERAL PURPOSE	DATE SIGNED
MOU	California Association of Resource Conservation Districts (CARCD)	Coordination of erosion control and water quality protection	1984
	Soil Conservation Service (SCS) (renamed NRCS)	Planning/technical assistance for water quality policies and activities	1990
	U.S. Bureau of Reclamation (USBR), USFWS, SCS (renamed NRCS), USGS, DWR, DFG, DFA	Implementation of San Joaquin Valley Drain Program	1991
	NOAA, USEPA, Association of Monterey Bay Area Governments (AMBAG), Cal/EPA, SWRCB, CCC, RWQCB 2 and 3	Develop and implement the MBNMS WQPP	1992
	BLM	Coordination of NPS policies and activities	1993
	DFA	Regulation of fertilizer and soil amendments	1998
Water Quality Management Plan (WQMP)/MAA	USFS	Control of NPS activities and pollution on National Forest System Lands	1981
	BOF, CDF	Control of NPS pollution from timber operations on nonfederal lands	1988
	CDPR	Control of pesticide pollution	1997
WQMP	None; cooperative program with technical assistance by UCCE and NRCS, support by CARCD, industry/professional associations	NPS control on private rangeland	1995
"Partnership Agreement" of CA Dairy Quality Assurance Program	14 dairy industry organizations, and state and federal agencies	Coordinated environmental stewardship for dairy waste management	1998

The SWRCB and CCC are committed to formalizing interagency agreements. In 2000-2001, the SWRCB and CCC will initiate reviews of existing MOUs/MAAs and will work with other agencies to identify opportunities for new agreements. The review will address such issues as existing limitations related to Program implementation and will determine the appropriate mechanisms for correcting concerns. The SWRCB and CCC will subsequently develop those MOUs/MAAs that are identified as being feasible and necessary to ensure the implementation of the priority measures identified in the first five-year plan. Specifically, the SWRCB and CCC will update existing or develop new MOUs/MAAs with the BLM, CDPR, and NRCS by December 31, 2001. In addition, by December 31, 2001, the SWRCB and CCC will develop a schedule for updating or developing additional MOUs/MAAs that are necessary to fulfill the goals and objectives of the Program Plan.

For example, beginning in 2000, the SWRCB will work with the USFS to revise the USFS WQMP called for under the MAA between the SWRCB and the USFS[12]. The USFS has recently undertaken a significant review of its BMPs. These new BMPs adequately implement the MMs of the Program Plan. The USFS has initiated a collaborative effort to incorporate new information into national forest management of the Sierra Nevada National Forests. This effort, known as the Sierra Nevada Framework for Conservation and Collaboration, includes updates to forest plans to address problems in aquatic, riparian, and meadow systems, among other ecosystems. An Aquatic Conservation Strategy has been proposed to maintain and restore the ecological integrity of these systems. The WQMP for National Forest System Lands and the MAA between the USFS and the SWRCB should be modified to: (1) include the Aquatic Conservation Strategy; (2) improve the coordination and collaboration of restoration projects in these systems; and (3) include performance measures that can be used to track project/program effectiveness.

The SWRCB and the CDPR will revise their MAA so that the WQMP includes commitments to implement MMs for which CDPR has regulatory authority.

The SWRCB and the BLM are working to finalize a WQMP and MAA. In 1992, the SWRCB and BLM entered into an MOU (SWRCB Resolution No. 92-26) and agreed to pursue development of an MAA for NPS pollution control program on BLM lands. While that MAA is not yet in place, during the last year, BLM has shown renewed interest in completing the work. This effort should be completed prior to the year 2003. The WQMP with BLM should focus on (1) implementation and adaptive management of the rangeland standards and guidelines; (2) development and certification of BMPs and implementation measures for other NPSs of pollution on BLM lands; (3) evaluation and review of rangeland MPs; and (4) an annual assessment process with environmental and operational measures of success.

[12] Currently, the only federal agency with management agency status in California is the USFS. In 1981, the SWRCB certified a WQMP for National Forest System Lands, designated USFS as management agency for plan implementation, and executed an MAA with USFS. The WQMP and MAA currently provide for: (1) development and implementation of SWRCB-certified BMPs; (2) early State involvement in review of USFS projects; (3) monitoring and adaptive management of BMP effectiveness and implementation; and (4) annual meetings to maintain coordination and communication.

BLM and the SWRCB have worked together to avoid and reduce NPS pollution from BLM–owned land. BLM controls domestic livestock grazing on public lands through designated grazing allotments. In 1998 BLM developed standards for rangeland health and guidelines for livestock management. SWRCB worked with BLM to ensure that these rangeland standards and guidelines would (1) comprise BMPs; (2) conform with the (g) guidance MMs and the BMPs set forth in the SWRCB's 1995 Rangeland WQMP for private rangelands; and (3) achieve compliance with California's water quality standards. Implementation of the BLM standards and guidelines began earlier in 1999.

Strong stewardship by landowners is a critical mechanism for implementing MMs, and the NRCS is a key agency providing financial and technical assistance to those landowners. The SWRCB and NRCS staffs have agreed that an MOU between the agencies would greatly improve the technical assistance aspects of the NPS Program. NRCS (formerly the Soil Conservation Service) and the SWRCB have an existing MOU dated July 31, 1990, outlining planning and technical assistance related to water quality policies and activities. This MOU will be updated to address NRCS's role in the Program Plan (e.g., assisting landowners in voluntarily implementing Resource Management Systems [RMS] or MMs) and to affirm the SWRCB's commitment to work through a self-determined approach (Tier 1) as a valuable step in achieving clean water goals. The new MOU will also address the use of NRCS technical guidance materials (e.g., Field Office Technical Guide[FOTG]) in planning and installing resource MMs.

The SWRCB and the CCC are leading an effort to develop MOUs/MAAs among the agencies in Cal/EPA and Cal/RA. The purpose of these formal agreements is to develop commitments to implement MMs (e.g., develop five-year implementation plans for their agencies or establish NPS pollution control elements to existing workplans). The SWRCB has contracted with the CCC to facilitate the completion of these agency-specific five-year implementation plans. The SWRCB has authority to require agencies to provide technical reports (Porter-Cologne Act §13165), and this authority could be used if cooperative approaches are ineffectual. The five-year implementation plans would contain components such as:

1. Implementation of all identified NPS MMs for which they have authorities and are targeted in the Program Plan by 2013;
2. Tracking of implementation and effectiveness by MM and source category and providing this information to the SWRCB as part of the monitoring and assessment strategy; and
3. Participation in regular program reviews as well as new goal-setting activities, including development of the five-year implementation plans and coordination of planning, assessment, and regulation activities with the SWRCB, CCC, and RWQCBs.

Coordination Through Interagency Forums

In addition to using formal agreements to establish coordination, the SWRCB and CCC will establish an IACC to provide a regular working forum to collaborate in implementation and problem solving. We currently envision several roles for the IACC. First, where programmatic or policy conditions present problems for watershed

management, the SWRCB and CCC, through the IACC, will act as a conduit for addressing and resolving those problems. The IACC will also be asked to evaluate agency functions and to recommend improvements that can benefit water quality on a statewide basis for various categories of activities. The IACC will be the primary forum for coordinating program activities of the lead and implementing agencies. Second, SWRCB and CCC staffs will work with the IACC to identify those agencies willing to become partners in interagency technical assistance teams. For these teams to function optimally, they must have broad-based support. Allowing agencies to assist with and utilize the functions of the teams will provide a powerful mechanism for improving coordination. Third, the SWRCB and CCC staffs will request the IACC to establish TACs in four major issue areas--assessment, technical assistance, education, and regulation. The role of these committees will be to identify opportunities for improved coordination and instances where impediments to effective management occur and to devise responses to move toward enhanced performance and management. Staff will work with the committees to ensure that the problems facing watershed groups are clearly understood and to provide a vehicle for implementing changes in State activities.

The lead agencies will work with the CBC to define the appropriate complementary roles of the CBC and the IACC. The CBC is comprised of 15 State agencies, the University of California (UC), CARCDs, and nine regional associations of county supervisors. The CBC was formed to improve coordination and cooperation among the various resource management and environmental protection agencies at federal, State, and local levels.

Interagency Initiatives and Public/Private Partnerships

Because stewardship is a fundamental principle upon which the NPS Program is based, we need to encourage collaborative relationships that include a broad range of groups. SWRCB, RWQCB, and CCC staffs will work with watershed groups and CRMPs to promote coordinated resource management and planning through the active participation of all stakeholders in a given watershed. The lead agencies encourage the participation of all relevant agencies and stakeholders in watershed management. There are a number of collaborative efforts in which the lead agencies are either currently active or will become active. As part of the effort to improve coordination, staff will work with the following efforts:

- Federal CWAP.
- CBC—Watersheds and Resource Assessment Initiatives.
- Implementation of Farm Bill Conservation Programs (including USDA, NRCS Locally-Led Conservation, Stream Corridor Restoration, Conservation Buffers, Salmon Restoration, and Air Quality Initiatives).
- The Environmental Stewardship component of the California Dairy Quality Assurance Program. This partnership among 14 entities including various State and federal agencies, UC, and representatives of the California dairy industry develops a voluntary, cooperative government and industry education and certification program. The program core components include: (1) education workshops for producers; (2) the creation of Environmental Stewardship Farm Management Plans specific to each dairy; and (3) on-site evaluation by a third party.
- The Range Management Advisory Committee of the BOF.

- Cal/RA's effort to inventory wetland and riparian areas statewide and to maintain data on projects subject to CWA section 401 certification.
- Cal/RA's efforts to establish a definition for riparian areas in consultation with other affected agencies.
- The California Aquatic Bioassessment Workgroup, chaired by staff from the DFG. SWRCB and RWQCB staffs have: (1) trained community members in bioassessment; (2) designed regional bioassessment monitoring programs; and (3) participated in the development and review of bioassessment methods and metrics.
- The California Watershed Project Inventory (Project Inventory) at UCD ICE. The SWRCB has provided significant financial support to this database of watershed projects. Currently, the SWRCB and UCD ICE are expanding the database to link MMs, agencies, and authorities to the Project Inventory.
- Certified Crop Advisor Program.
- CRMP groups throughout California.
- CALWATER watershed mapping initiative.
- CALFED Bay Delta Initiative/Program.
- Lake Tahoe Initiative.
- MBNMS WQPP.
- Southern California Beach Water Quality Workgroup.
- Southern California Coastal Water Research Project.

Review of Federal Projects and Programs

CWA section 319 authorizes and requires each state to review federal activities to ensure consistency with the state's NPS management program. The CWA also directs federal agencies to accommodate the concerns of each state. [13] While the 1988 Plan noted that federal consistency[14] would focus on the actions of three federal agencies (USACOE, USBR, and FERC), the SWRCB, and RWQCBs routinely review: (1) financial and technical assistance programs; (2) development activities; (3) environmental impact statements; and (4) monitoring programs from numerous federal agencies. The CCC has a similar federal consistency process under the CZMA (see Appendix B). The State Clearinghouse acts as the coordinating and notification agency for routing projects to appropriate State agencies. Many federal agencies directly notify State agencies of appropriate federal projects and programs through periodic NEPA reporting procedures or regional collaborative efforts.

The federal programs requiring review for NPS issues are listed in Table 11. The primary lead agency that reviews projects with statewide impact will be the SWRCB.

[13] This requirement is spelled out in Executive Order 12372 of July 14, 1982 (Federal Register Vol. 47, No. 137).

[14] The general process for review of federal projects, as outlined in this Executive Order, is: (1) State develops a list of federal assistance programs and development projects it will review; (2) State clearinghouse routes federal project information to appropriate State agency for review; (3) State agency reviews projects and provides timely comments to the federal agency; (4) federal agency reviews comments and accommodates concerns where possible; and (5) if concerns cannot be addressed, a timely explanation will be provided. Where the State cannot resolve federal consistency issues to its satisfaction, it requests USEPA assistance to help resolve the issues.

TABLE 11. LIST OF FEDERAL AGENCIES' PROGRAMS AND PROJECTS SUBJECT TO STATE REVIEW

U.S. BUREAU OF LAND MANAGEMENT
Watershed Projects
Mineral Exploration and Development
Oil and Gas Leasing
ORV Activities
Timber Activities
Grazing Allotment/Grazing Management/Permits Issuance
Chemicals/Pesticides
Area Analysis/Cumulative Impacts
Wetlands Protection
Riparian Management Plans
Hydrologic Modifications
Transportation Plans
U.S. DEPARTMENT OF DEFENSE
Natural Resource Management Plans and Projects
Military Construction Projects
Facilities Development Plans and Projects
Land and Water-Based Military Training Plans and Exercises
Environmental Restoration Projects
Spoil Disposal
Open Water Disposal Sites
FEDERAL ENERGY REGULATORY COMMISSION
Dam Relicensing
U.S. FOREST SERVICE
Forest Management Plans
Timber Sales
Grazing Allotments
NATIONAL MARINE FISHERIES SERVICE
Fisheries Management Plan
Habitat Conservation Plans
NATURAL RESOURCE CONSERVATION SERVICE
Environmental Quality Incentives Program (EQIP)
Wetland Reserves Program
Wetland Conservation
Forestry Incentives Program
NATIONAL PARK SERVICE
National Park Seashore Management and Proposed Acquisitions
Wildlife Management
Grazing Management
Abandoned Mines Management
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
Coastal Management Programs
U.S. BUREAU OF RECLAMATION
Irrigation Development
U.S. ARMY CORPS OF ENGINEERS
Permits for Dredged or Fill Material
U.S. FISH AND WILDLIFE SERVICE
Management of National Wildlife Refuges and Proposed Acquisitions
Habitat Conservation Plans

The appropriate RWQCBs will review local and regional projects. The CCC will also review programs in the coastal zone as defined in the Coastal Act. These State agencies will work with USEPA staffs who are liaisons with these federal agencies to ensure compliance with the CWA.

When project-by-project review and intervention by USEPA staff are insufficient to abate NPS pollution, the lead agencies will negotiate revisions to existing formal agreements or develop new agreements. If formal agreements are ineffectual, the SWRCB or RWQCBs can require federal agencies to provide NPS pollution prevention reports under their authority (Porter-Cologne Act §13267).

F. Implement Actions

The Three-Tiered Approach Overview

Originally adopted in the 1988 Plan , the "three-tiered approach" remains a cornerstone of the NPS Program. The "three-tiered approach" utilizes three different options of enforceable policies and mechanisms under the Porter-Cologne Act to ensure water quality objectives are achieved. The options are presented in order of increasing stringency. Through the "three-tiered approach," the NPS Program recognizes that many NPS problems are best addressed through the self-determined cooperation of stakeholders (Tier 1). However, persistent NPS water quality problems not effectively resolved through self-determined actions will be addressed through applicable regulatory programs and authorities (Tier 2 and Tier 3).

In general, which option is used depends on factors such as:

- Persistence of water quality impairments;
- Whether timely implementation of MMs and MPs is being achieved; or
- Whether the Tier 1 approach is being utilized effectively.

In practice, the RWQCBs will determine which or what combination of the three options will be used to address any given NPS problem. Sequential movement through the tiers (e.g., Tier 1 to Tier 2 to Tier 3) is not required of the RWQCBs. Depending on the water quality impacts and severity of the NPS problem, the RWQCBs may move directly to the enforcement actions specified in Tier 3. Pursuant to CWC section 13369(a)(2)(B), the SWRCB will develop, by February 1, 2001, guidance to be used by the SWRCB and RWQCBs for moving through the "three-tiered" process.

All three options implement BMPs. BMPs include, but are not limited to, structural and nonstructural controls and operation and maintenance procedures. BMPs can be applied before, during, and after pollution producing activities to reduce or eliminate the introduction of pollutants into receiving waters. BMPs are means of achieving certain MMs. For example, seeding and mulching of steep slopes at a construction site would be structural BMPs for achieving the MM of erosion control.

Tier One: Self-Determined Implementation of Management Practices

Since its inception in 1988, the "self-determined" or "voluntary approach" to the implementation of BMPs has been central to discussions of the NPS Program. The terms "voluntary" and the "voluntary approach" have been a popular concept grounded in the historic notions of autonomy and self-determination. The definition

of "autonomy" also refers to the concept of "moral independence," implying that autonomy also carries with it responsibility and accountability. This is especially critical in situations where individual actions may conflict with the public good.

As a concept the term "voluntary approach" is as important for what it does not mean as for what it does. Compliance with the CWA, CZARA, CWC, and the Porter-Cologne Act is not a voluntary choice. It is the responsibility of the SWRCB and the RWQCBs to see that these laws are enforced. The concept of "self-determined implementation" of NPS control measures was developed to acknowledge the potential capability of landowners and resource managers to develop and implement workable solutions to NPS pollution control and to afford them the opportunity to solve their own problems before more stringent regulatory actions are taken.

Property owners and/or managers may implement BMPs through their own initiative or self-determination. Implementation could occur for economic reasons and/or through awareness of environmental benefits. Self-determined implementation can be encouraged through education, training, financial assistance, technical assistance, and demonstration projects. A self-determined approach would take advantage of the expertise and incentives offered by a variety of existing local, State, and federal programs that are geared to promoting private actions which could have water quality benefits. Lead agencies for these programs include the DOC NRCS, Farm Services Agency (FSA), RCDs, and the UCCE.

Tier Two: Regulatory-Based Encouragement of Management Practices

In general, the Porter-Cologne Act constrains RWQCBs from specifying the manner of compliance with water quality standards. However, RWQCBs have two ways to use their regulatory authorities to encourage implementation of BMPs.

First, RWQCBs may encourage the use of BMPs by waiving adoption of WDRs on condition that dischargers comply with this requirement. Alternatively, the SWRCB and the RWQCBs may enforce BMPs indirectly by entering into MAAs with other agencies that have the authority to enforce BMPs. Such authority derives either from the agency's regulatory authority or its management responsibility for publicly owned or controlled land. MAAs will include (or reference) specific, acceptable BMPs and their means of implementation. Both the SWRCB and the RWQCBs may enter into MAAs. The SWRCB will develop MAAs, where appropriate, with State and federal agencies having statewide jurisdiction, such as the BLM or Cal/Trans. For example,

the SWRCB has existing MAAs with the USFS and with the BOF and CDF. SWRCB MAAs will specify acceptable BMPs and how they will be implemented. Formal agreements between the SWRCB and other agencies pertaining to the prevention and abatement of NPS pollution will be referenced in RWQCB basin plans and will become the primary basis for RWQCB determination of compliance with State requirements. RWQCBs will seek agreements, where appropriate, with local agencies, such as cities and counties. For example, RWQCBs have existing MAAs with counties concerning regulation of on-site wastewater disposal systems. RWQCB MAAs may also reference BMPs that have been adopted into basin plans.

RWQCBs will generally refrain from imposing effluent requirements on dischargers who are implementing BMPs in accordance with a waiver of WDRs, an approved MAA, or other SWRCB or RWQCB formal action. Once the SWRCB or RWQCB has formally approved BMPs, they will become the primary mechanism for meeting water quality standards. While compliance with BMP requirements cannot excuse a violation of water quality standards, the RWQCBs may rely on their implementation of BMPs to demonstrate compliance with standards.

Implementation of BMPs will normally include: (1) specific site conditions; (2) monitoring to assure that practices are properly applied and are effective; (3) immediate mitigation of a problem where the practices are not effective (including regulatory action, if necessary); and (4) improvement of an approved BMP or implementation of additional BMPs when needed to resolve a deficiency.

RWQCBs have discretion in deciding what BMPs to encourage through conditional waiver of WDRs or inclusion in RWQCB MAAs. RWQCBs need not adopt BMPs into basin plans for these purposes but may do so to facilitate regionwide application. The SWRCB will encourage reasonable consistency among the RWQCBs in choosing BMPs by: (1) transferring information among RWQCBs on effective (or ineffective) practices; (2) reviewing amendments to basin plans; and (3) making determinations as the appeal agency for RWQCB decisions.

Tier Three: Effluent Limitations and Enforcement

RWQCBs can enforce requirements on any proposed or existing waste discharge, including NPS discharges. Although RWQCBs cannot specify the manner of compliance with waste discharge limitations (with certain exceptions), in appropriate cases the RWQCBs can set limitations at a level that, in practice, requires implementation of BMPs.

While many of the NPS Program activities support and promote self-determined implementation, the SWRCB and RWQCBs have a wide array of enforcement mechanisms at their disposal that also will be utilized. Enforcement actions may be considered to address many circumstances including, but not limited to, the following: (1) violation of an effluent limit, receiving water limit, or discharge prohibition contained in an order or basin plan adopted by the SWRCB or an RWQCB; (2) an unauthorized spill, leak, fill, or other discharge; and (3) failure to perform an action

required by the SWRCB or an RWQCB, such as submittal of a self-monitoring or technical report or completion of a clean-up task by a specified deadline.

It is important to note that enforcement of State water quality statutes is not solely the purview of the SWRCB and RWQCBs and their staffs. State law allows members of the public to petition the SWRCB to review permitting and enforcement actions or inactions by the RWQCB. In addition, the CWC provides for public participation in the issuance of orders, policies, and WQCPs.

The SWRCB and RWQCBs have a variety of enforcement tools to use in response to noncompliance by dischargers. An enforcement action is any formal or informal action taken to address an incidence of actual or threatened noncompliance with existing regulations or provisions designed to protect water quality.

Formal Enforcement: Formal enforcement actions fall into two basic categories: those that direct future actions by dischargers and those that address past violations. Actions that generally direct future action include notices to comply, imposition of time schedules, and issuance of cease and desist orders (CDOs) and cleanup and abatement orders (CAOs). Actions taken to address past violations can also include CAOs, rescission of WDRs, administrative civil liability (ACL), and referral to the attorney general (AG) or district attorney (DA). In some instances, both types are used concurrently to deal with a specific violation (e.g., discharger has had past violations but has not yet corrected the problem).

Any person adversely affected by an action or failure to act by an RWQCB may petition the SWRCB to review the decision. The petition must be received by the SWRCB within 30 days of the RWQCB action or refusal to act or 60 days after a request has been made to the RWQCB to act. In addition, the SWRCB may review, at any time and on its own motion, any action or failure to act by an RWQCB, including planning actions.

Informal Enforcement: For minor violations, the first step is usually informal enforcement action. The discharger is informed of the specific violations and is provided information as to how and why the violations occurred and how and when the discharge must come back into compliance. This step can be deleted for significant violations, such as repeated or intentional illegal discharges and falsified reports.

The notice of violation (NOV) letter is also an informal enforcement action. The purpose of a NOV letter is to bring a violation to the discharger's attention and to give the discharger an opportunity to correct the violation before formal enforcement actions are taken. Continued noncompliance should trigger formal enforcement action. An NOV letter is signed by the RWQCB Executive Officer and covers the following points: (1) description of specific violations; (2) summary of applicable enforcement options (including maximum ACL); and (3) a request for a written response.

Time Schedule Order: Pursuant to CWC section 13300, actual or threatened discharges of waste in violation of requirements can result in imposition of a time schedule which sets forth the actions a discharger shall take to correct or prevent the violation.

Cease and Desist Orders: CDOs are adopted pursuant to CWC sections 13301-13303. They are normally issued to dischargers regulated by WDRs and often remain in force for years. CDOs are typically issued to regulate dischargers with chronic non-compliance problems. These problems are rarely amenable to a short-term solution. Often, compliance involves extensive capital improvements or operational changes. The CDO will usually set a compliance schedule, including interim deadlines (if appropriate), interim effluent limits (if appropriate), and a final compliance date. CDOs may also include restrictions on additional service connections (referred to as a "connection ban") to community sewer systems. These have been applied to sanitary sewer systems but can be applied to storm sewer systems as well. Violations of CDOs should trigger further enforcement in the form of an ACL or referral to the AG for injunctive relief or monetary remedies.

Cleanup and Abatement Orders (CAO): CAOs are adopted pursuant to CWC section 13304. They are generally issued to dischargers that are not being regulated by WDRs. With the exception of ground water cleanup, CAOs are typically short-lived enforcement orders. CAOs are issued through an RWQCB action or by the Executive Officer under delegation from the RWQCB Members pursuant to CWC section 13223. Executive Officer-issued CAOs should be used when speed is important, such as when a major spill or treatment plant upset has occurred and waiting until the RWQCB can meet to approve a CAO would be inappropriate. Violations of CAOs should trigger further enforcement in the form of an ACL or referral to the AG for injunctive relief or monetary remedies.

Prohibitions: Basin plans may set forth appropriate prohibitions for various categories of NPS pollution. In some cases, these prohibitions are written to allow application of the prohibition to be waived during planning and permitting of projects or activities covered by a water quality management plan. A prohibition allows an RWQCB to take direct and immediate enforcement action through issuance of CAOs, even in the absence of WDRs. Therefore, it allows RWQCBs to respond in a timely manner where NPS pollution generated by certain activities is creating an emergency or a problem which is not otherwise being remedied in an adequate or timely manner.

Modification or Rescission of Waste Discharge Requirements: In accordance with the provisions of the CWC, and in the case of NPDES permits, the RWQCB may modify or rescind WDRs in response to violations. Rescission of WDRs generally is not an appropriate enforcement response where the discharger is unable to prevent the discharge as in the case of a wastewater treatment plant.

Referrals to the Attorney General or District Attorney: The RWQCB can refer violations to the AG or ask the appropriate county DA to seek civil or criminal penalties. In either case, a Superior Court judge will be asked to impose civil or criminal penalties. In some cases, the RWQCB may find it appropriate to request the U.S. Attorney's Office to review potential violations of federal environmental statutes, including the CWA, Migratory Bird Treaty Act, or the Resource Conservation and Recovery Act (RCRA). Enforcement actions taken by the RWQCB are civil actions. In cases where there is reason to believe that specific individuals or entities have engaged in criminal conduct, the RWQCB or Executive Officer may request that the DA pursue criminal actions. Under criminal law, individual persons, as well as responsible parties in public agencies and business entities, may be subject to fines or imprisonment.

Administrative Civil Liability

ACL means monetary assessments imposed by an RWQCB. These actions are intended to address past violations. If the underlying problem has not been corrected, the ACL action should be accompanied by an RWQCB order to compel future work by the discharger (e.g., CAO or CDO). The CWC authorizes ACLs in several circumstances, summarized in Table 12:

TABLE 12. POTENTIAL MONETARY ASSESSMENTS IMPOSED BY AN RWQCB

CWC Section	Type of Violation
13261	Failure to furnish report of waste discharge or to pay required fees.
13265	Unauthorized discharge of waste.
13268	Failure to furnish technical report.
13308	Failure to comply with time schedule.
13350	Intentional or negligent violation of CDO or CAO; violation of WDRs; or RWQCB prohibition which results in pollution or unauthorized release of any petroleum product.
13385	Violation of NPDES Permit, Basin Plan Prohibition, etc.

A summary of the “three-tiered approach,” including practical examples of its application in California, is presented in Table 13.

Implement TMDLs

The development and implementation of TMDLs for NPS impaired water bodies are expected to enhance our ability to address NPS problems, consistent with the three-tiered approach described above. Along with the TMDL, the State will develop implementation plans that describe specific measures needed to achieve the point and nonpoint allocations established by the TMDL. For point sources, the allocations will be implemented through NPDES permits while NPS allocations are implemented through a wider range of authorities and programs, including the use of applicable State enforcement authorities. Therefore, TMDLs are expected to promote the

implementation of the appropriate MMs that will achieve timely water quality improvements that have not been achieved through the other approaches.

TMDLs will provide a more detailed approach to ensuring the implementation of the appropriate NPS MMs and will provide a better framework for "triggering" more stringent implementation. For example, TMDLs will (1) establish goals to judge the performance of management programs; (2) create the ability to better assess the effectiveness and appropriateness of MPs individually and collectively; (3) provide a basis for determining when to use more stringent management options (e.g., WDRs or other enforcement authorities); and (4) assist in prioritizing State's staff and financial resources when pursuing corrective actions.

Implement MMs in Regulation

NPDES – Storm Water

The two-phased program under CWA section 402(p) requires NPDES permits for storm water discharges. In California, the federal NPDES Program is administered by the SWRCB through the nine RWQCBs. Since 1990, Phase I regulations have required NPDES permits for storm water discharges for:

- Municipal separate storm sewer systems serving populations greater than 100,000,
- Specific industrial activities, and
- Construction activities disturbing land of five or more acres.

Phase I requires that individual NPDES permits be issued for municipalities greater than 100,000 (in practice, the RWQCBs include many municipalities in urbanized areas with populations less than 100,000 in the Phase I programs). Individual municipal NPDES permits require implementation of structural and nonstructural control measures to reduce pollutant loads from industrial, commercial, and residential areas. Implementation of the NPDES Phase II Program will expand the existing program to include all municipalities within urbanized areas and small municipalities outside of urbanized areas with a population of at least 10,000 and a population density of at least 1,000 persons per square mile. The program will also expand to include construction sites that disturb between one and five acres.

California's current and developing approaches to addressing urban runoff are and will be consistent with both the NPDES and NPS Programs. In the interest of consistency and comprehensiveness, the SWRCB and RWQCBs will ensure the implementation of urban MMs in areas and activities currently regulated by the NPDES Phase I Permit Program by incorporating the MMs into existing NPDES permits as the permits are renewed (at five-year intervals). Similarly, the SWRCB and RWQCBs will ensure that the NPDES Phase II permits will serve as the enforceable authorities to implement the urban MMs in areas and activities covered under Phase II. As lead agencies for the NPS Program, the SWRCB, RWQCBs, and CCC will ensure that all NPS MMs not covered by the NPDES Phase I or Phase II permits are implemented through other mechanisms identified within the NPS Program Plan.

TABLE 13. DESCRIPTION AND USE OF THE THREE-TIERED APPROACH

Tier	Description of Approach	Examples of the Three-Tiered Approach in Action
Tier One: Self-determined Implementation of Best Management Practices	Landowners and resource managers implement MMs/BMPs to achieve water quality standards. The RWQCBs may rely on implementation of MMs and BMPs to demonstrate compliance with, but cannot excuse violation of, water quality standards. Self-determined implementation is encouraged through incentives and technical assistance offered by State and federal programs that promote resource stewardship to achieve water quality benefits and to comply with statutory requirements. Agencies that provide such programs include the SWRCB, RWQCBs, DOC, NRCS, FSA, RCDs, and UCCE. Self-determined implementation is encouraged through the recognition by landowners and resource managers that this tier allows the discharger more "self-determination" in complying with statutory requirements than the more-stringent Tiers Two and Three.	• Financial support for local watershed stewardship projects (CWA §319) • EQIP cost-share for implementation • Sacramento Watershed Program fostering stewardship • Urban pesticide committee education efforts • Workshops promoting the Rangeland WQMP
Tier Two: Regulatory- Based Encouragement of Management Practices	There are two ways that RWQCBs can use their regulatory authorities provided by the Porter-Cologne Act to encourage implementation of MMs/MPs. First, RWQCBs may work with landowners and resource managers to waive the adoption of WDRs or a waste discharge prohibition on the condition that MMs and BMPs will be implemented to correct or prevent NPS pollutant(s) of concern. Second, the SWRCB and RWQCBs may enforce MMs and BMPs by entering into MAAs with other agencies that have authority to enforce the implementation of appropriate MMs and BMPs.	• MAAs with BOF/CDF, USFS, and CDPR • Marin County Stormwater Program (RWQCB-2) • Channel Islands National Park – improved grazing practices (RWQCB-3) • Required submittal of agricultural drainage operation plans (RWQCB-5) • Agricultural Nutrient Management Plans-Newport Bay (RWQCB-8)
Tier Three Effluent Limitations and Enforcement	RWQCBs can adopt and enforce requirements on any proposed or existing waste discharge, including discharges from NPSs. Although RWQCBs are generally precluded from specifying the manner of compliance with waste discharge limitations, in appropriate cases limitations may be set at a level which, in practice, requires implementation of MMs and BMPs. In addition, the SWRCB and RWQCBs have a variety of enforcement tools—such as CDOs and ACLs—that can be used in response to noncompliance.	• WDRs for commercial nurseries – Newport Bay (RWQCB-8) • WDR for selenium for San Joaquin River (RWQCB-5) • Permitted storm water programs • Erosion Control – Lake Tahoe (RWQCB-6) • WDRs for dairies

Provide Financial and Technical Assistance

Introduction

Strong stewardship by local stakeholders is critical to ensuring the successful implementation of the MMs identified in the five-year plans. Self-determined implementation can be encouraged through technical assistance provided by both State and local entities. A priority in the Implementation Plan is for the SWRCB and CCC to provide comprehensive technical assistance to local groups and landowners. The State will identify additional agencies and develop agreements (MOUs) to significantly increase the ease of acquiring and disseminating the most accurate and current information possible. A goal of the SWRCB and CCC is to provide each stakeholder with the information they require by coordinating efforts throughout the State.

Funding (Financial Assistance)

The Program will depend largely on funding received through the CWA section 319(h), State appropriations, and the contributions of other entities, including local governments, nongovernmental organizations, and private individuals. Unless additional funds are made available, it is possible that some of the activities contained within this Program Plan will not be completed as proposed. It is anticipated that implementation difficulties related to funding limitations will be identified and addressed as provided for through periodic program reviews.

Available Program funding will be directed at supporting activities that implement the MMs as identified in CAMMPR. Projects and staff positions at the SWRCB and RWQCBs funded under the CWA section 319(h) must support the implementation of MMs. This change will be included in the next CWA section 319(h) grant cycle (FFY 2000).

Federal Funding

USEPA provides annual funding to the SWRCB for implementation of the NPS program, pursuant to the CWA section 319. Since section 319 was established by the reauthorization of the CWA in 1987, California has received over $40 million to support the State's NPS program. In 1999, the federal allocation to support State NPS programs under CWA section 319(h) was significantly increased in recognition that many of the most serious remaining water quality problems are associated with NPS pollution. California's CWA section 319(h) funding level was increased from $5.7 million in 1998 to $10.3 million in 1999.

In California, the CWA section 319(h) funds have generally been divided between supporting State staff activities at the RWQCBs and the SWRCB and funding NPS implementation projects. As the lead water quality agency in California, the SWRCB receives the CWA section 319(h) funding from USEPA through a cooperative agreement. The SWRCB and the RWQCBs prepare annual workplans for USEPA approval to specify the activities that

will be supported through these CWA section 319(h) funds. CWA section 319(h) funding is primarily for implementation activities; therefore, at least 80 percent of all CWA section 319(h) funds must be spent on implementation, while no more than 20 percent may be allocated to planning and program development activities.

NPS projects have been selected based on a competitive process administered by the SWRCB and RWQCBs. Generally, an annual Request for Proposals (RFP) is issued for projects that will reduce or prevent NPS pollution to ground and surface waters. Eligible projects include the implementation of MPs, TMDL implementation, technology transfer, demonstration projects, pollution prevention, technical assistance, volunteer monitoring, and public education. Nonprofit organizations, local government agencies, including special districts (e.g., RCDs or water districts), and educational institutions are the recipients of these funds.

Another important source of funding for NPS projects is the SRF. The SRF is a low interest loan program established by the CWA to fund a wide range of water quality projects, including the same types of projects that are eligible for section 319(h) funding. Traditionally, the SRF and its predecessor, the Clean Water Grant Program, have been used to fund publicly-owned treatment works (POTWs) for sanitary sewer systems. However, the amendments to the CWA that established the SRF allowed for expanded uses of the SRF beyond the traditional POTW project. Capitalization for the SRF comes from an annual federal appropriation, 20 percent of State matching funds and loan repayments that revolve back into the SRF. Current assets (loans and cash) in California exceed $1 billion. The utilization of these assets offers one of the best avenues for funding the implementation of NPS MMs and related watershed implementation efforts.

To date, California has been a national leader in using the SRF to fund a wide variety of expanded use projects. Examples of types of expanded use projects that have been funded include:

- Stream restoration,
- Irrigated agricultural BMPs (improved methods of irrigation to reduce salt and selenium loads to the receiving water),
- Animal feeding operation BMPs (on-site improvements at small dairies that do not meet the USEPA definition of a point source),
- A vineyard to demonstrate BMPs and sustainable viticulture,
- Forestry BMPs (removal of dead and dying trees in the Lake Tahoe Basin),
- On-site septic system rehabilitation,
- Storm water treatment (including wetlands treatment),
- Wetlands preservation,
- Marina education and improvements,

- Water quality enhancements to flood control, and
- Estuary enhancement.

Using the fund to address all types of water quality issues regardless of whether it is a POTW, NPS, etc., is beneficial. In so doing, the SRF will help to foster the watershed approach. The SWRCB (who administers the SRF) is currently developing a formal policy regarding the funding of expanded use projects, including NPS projects. Once this policy is adopted, the expanded use projects will be given appropriate consideration in comparison to the traditional POTW projects.

State Funding

State funds have been earmarked for NPS Program development and implementation. These funds support SWRCB staff to develop MMs, the Strategy, and the Implementation Plan; develop and oversee formal agreements and informal partnerships; provide technical assistance; and provide public participation, education, and outreach. Additional funds are earmarked to develop and implement a program to track the effectiveness of MMs.

Currently, State monies fund NPS pollution prevention and reduction efforts at the SWRCB and RWQCBs in four of the six management categories: agriculture, forestry, hydromodification, and wetlands/riparian areas. Through State General Funds, the SWRCB and the RWQCBs update and revise basin plans regarding the effects of subsurface agricultural drainage on the State's waters. Staff also review forestry activities to ensure control of NPS pollution. Primary activities include: (1) the review of timber harvest plans, (2) consultation with federal agencies on silviculture, mining and grazing on forest lands, (3) evaluation of corrective actions, (4) development of water quality criteria and guidelines for treatment and disposal, (5) regulatory actions, (6) laboratory quality assurance, and (7) coordination of data management. The SWRCB and the RWQCBs administer the water quality certification program authorized through the CWA section 401. CWA section 401 requires that any applicant for a federal license or permit to conduct any activity which may result in a discharge to navigable waters obtain a certification from the State that the discharge will comply with the applicable provisions of CWA sections 1311, 1312, 1313, 1316, and 1317 (essentially State water quality standards). Generally speaking, CWA section 401 applies to dredge and/or fill permits issued by the USACOE, pursuant to CWA section 404 or hydropower generation facility licenses issued by the FERC.

Starting in 1999, the baseline allocation of the SWRCB has been augmented by $3.9 million to develop TMDLs, a necessary first step in reducing NPS pollution in impaired watersheds. While these funds will not support implementation of TMDLs, SWRCB and RWQCB staffs will participate in

stewardship groups and assist community-based watershed monitoring programs.

Funds are also provided to on-the-ground pollution prevention and reduction activities through two funding sources: the Delta Tributary Watershed Program and the Agricultural Drainage Management Program (ADMP) authorized under Proposition 204. The Delta Tributary Watershed Program was awarded, on a one-time basis, $14.5 million for rehabilitation projects in the watersheds tributary to the Sacramento-San Joaquin Rivers Delta or the Trinity River. Most of these projects will begin in 1999 or early 2000. Of the $30 million set aside for the ADMP, $27.5 million was for low interest loans and $2.5 million was for the nonfederal share of a project specific to the Salton Sea. The loan fund can be used for the treatment, storage, conveyance, reduction, or disposal of agricultural drainage water that if discharged untreated would pollute California's waters.

Request for Proposals

Each year the SWRCB and USEPA release RFPs for watershed planning and implementation projects to reduce, eliminate, or prevent water pollution and to enhance water quality. The RFP contains information concerning project requirements, anticipated funding levels, the review process, and selection criteria, and an application form is included that serves as the proposal. Funds made available are typically offered under the authority of Federal CWA section 205(j) Water Quality Planning and Assessment or CWA section 319(h) NPS Implementation Programs. However, in 1997 and 1998, the SWRCB offered $15 million made available through Proposition 204, the 1996 Bond Act.

The SWRCB and RWQCBs view the funding of projects consistent with priorities identified in the RFPs as an important tool in managing NPS pollution. Beginning with the calendar year 2000, RFP projects must implement actions that achieve NPS MMs goals and objectives to receive funding.

The funds contracted out under the RFPs represent half of the federal NPS funds California receives. The Program recognized several years ago the need to better track and evaluate the effectiveness of these projects. Working with UCD ICE, the State is working (1) to promote information exchange and coordination among watershed groups; (2) to geographically track the implementation of MMs; and (3) to determine the effectiveness of CWA section 205(j) and 319(h) projects in protecting beneficial uses and improving water quality. Effective with the 1999 RFP, all selected projects' contractors must complete a one page contract summary (format provided by SWRCB) within three months of the contract execution. The SWRCB will make the summaries available to the public, including posting them on the SWRCB's NPS web site. At the completion of each funded project prior to final

payment, all projects must complete a project survey form supplied by the SWRCB. At the same time, SWRCB and RWQCB staffs may survey project location and aerial extent using global position equipment. The information gathered will be entered into an internet-accessible geographic information system (GIS) and be provided as part of the required annual, biennial, and five-year cycle reports. In addition, information concerning each CWA section 319(h) funded project is being entered into a USEPA mandated tracking system known as the Grants Reporting and Tracking System (GRTS) to further aid in fiscal management, accountability, and the exchange of information.

Through these RFPs, the SWRCB, RWQCBs, and USEPA, Region 9, are encouraging watershed management as a means to ensure high quality waters, maximize the use of limited resources, and develop partnerships among all stakeholders of watersheds to address water quality issues. In this respect, grants offered through RFPs are being integrated under the SWRCB's and RWQCB's WMI to ensure the most efficient use of the funds. Local stewardship and partnerships among governmental agencies and private interests are vital parts of the type of watershed management envisioned. Involvement of stakeholders throughout a watershed is a critical feature of watershed management that will provide for sustained, long-term improvements in the beneficial uses of water and water quality. Implementation activities identified in a watershed management plan or similar comprehensive efforts to achieve sustained improvements in water quality and natural resources are a priority. CWA section 205(j) provides water quality planning funds, and CWA section 319(h) provides NPS implementation funds. The funds provided via RFPs are not intended to be used as the sole or principal source of support for local resource management.

Other Agencies Sources

Collaboration with the MBNMS

The CCC and MBNMS WQPP are working to develop coordinated grants among numerous nonprofit organizations improving water quality and restoration. This coordination of funding is intended to help nonprofit organizations obtain grant assistance, coordinate the expertise of the numerous groups working on NPS pollution, and identify a regional framework to guide future projects.

Technical Assistance

Introduction

The SWRCB, RWQCBs, and CCC recognize that individuals, watershed groups, and communities have varying levels of technical and financial capabilities related to water quality protection and restoration and the protection of beneficial uses. In particular, the level of expertise available at the local and/or watershed level during project planning, design, and

implementation can have a significant effect on the time and effort needed to implement practices to address NPS pollution. Technical and financial assistance is needed for those who plan and manage resources (e.g., planners, forest managers, public works staff, harbor masters, watershed groups) and those whose activities alter the landscape or affect the water column (e.g., farmers, road builders, boat hull cleaners).

Types of technical assistance include MP manuals, training, assistance in developing ordinances and regulations, modeling to predict and assess the effectiveness of any additional NPS MMs, and the development and management of databases to track implementation of MMs, monitoring data, and land use changes. Technical assistance also includes demonstration projects and other innovations to protect water quality and designated uses. Financial assistance includes both grants and low-interest loans.

Goals

A priority goal of the NPS Program is to provide technical and financial assistance to local governments and the public in assessing watershed conditions and implementing applicable MMs to address identified problems. The NPS management agencies will also work with other federal, State, and local agencies, as well as other private experts where feasible, and will encourage them to use their expertise. Specific objectives include:

- Conducting an ongoing assessment of training and technical and financial assistance needs;
- Providing for the transfer of information on technical and financial assistance including available tools, training courses, grant and loan opportunities, and contact information;
- Improving technical tools;
- Providing technical training for resource managers, landowners and land operators, and the public; and
- Providing financial assistance for on-the-ground implementation of MMs and MPs for each land use sector (i.e., agriculture, forestry, urban, marinas, hydromodification, and wetlands).

The NPS Program will also support technical and financial assistance efforts within other agencies. Examples of existing technical assistance efforts include:

- UCCE and NRCS currently provide technical assistance to the livestock industry and rangeland owners and managers through the California Rangeland Water Quality Management Program (CRWQMP);
- The California Stormwater Quality Task Force (SWQTF) provides assistance to municipal agencies and other dischargers subject to existing storm water permits, while the MURP has been developed to help smaller municipalities (less than 100,000 in population) develop runoff control

programs to protect water quality and prepare for pending storm water permits;

- The MURP has been developed to help smaller municipalities (less than 100,000 in population) develop runoff control programs to protect water quality and prepare for pending storm water permits;
- The CCBN and San Diego Safe Boating and Environment Coalition are devoted to identifying education and technical assistance needs regarding environmentally sound boating and to providing networking opportunities;
- The SWRCB TMDL Program is focusing technical assistance efforts on assessing water conditions and, to the maximum extent practicable, on working with local interests on the collaborative identification of: (1) watershed problems, (2) desired future conditions, (3) numeric targets, (4) allocations of allowable pollution, and (5) implementation.
- The CCC is committed to make available and provide training for use of its Watershed Analysis Tool for Environmental Review (WATER). WATER is a GIS-based analysis tool that connects land use information to water quality in watersheds of the Monterey Bay area, and thus enabling selection of the appropriate MMs for implementation in those particular watersheds. The CCC's permit tracking system also provides a valuable tool for tracking land use activities.
- The NPS Program's future efforts in identifying and mapping CCAs will allow the implementing agencies to direct their resources to coastal areas faced with water quality threats that accompany new and existing development.

Actions

The SWRCB, RWQCBs, and CCC are committed to providing technical and financial assistance through 2013. New and changing needs and opportunities will be identified annually and outlined in each five-year implementation plan. Beginning in State FY 1999-2000, the SWRCB and RWQCBs will provide CWA section 319(h) grants for projects that implement NPS MMs and/or provide for watershed restoration. In State FY 1999-2000, the CCC approved $500,000 in local assistance grants to LCP work programs for eight coastal cities and counties, all of which include NPS requirements or guidelines.

In the short term, the SWRCB has identified the provision of technical assistance as a priority objective in the 1999 CWA section 319(h) RFP. The CCC identified technical and financial assistance as a priority for the State FY 1999-2000 CZMA grants workplan (the CCC is providing funding for projects that develop technical assistance tools, such as technical guidance and model ordinances). The SWRCB and USEPA are also investigating using the Clean Water SRF—a permanent source of low-interest funding for high-priority water quality projects—for addressing a variety of other NPS and estuary water quality issues. Other actions are identified in the Implementation Plan.

G. Track, Monitor, Assess, and Report

The NPS Program must establish mechanisms to determine success in achieving short- and long-term goals. We must:

- Track MM implementation,
- Monitor the program's effectiveness in controlling pollution,
- Assess success in achieving our objectives and milestones, and
- Report on program effectiveness.

Our efforts to demonstrate program effectiveness are guided by existing federal and State requirements. Section 319(b) of the CWA specifies the minimum contents of State NPS management programs including "*(viii) A description of the monitoring and other evaluation programs that the State will conduct to help determine short- and long-term program effectiveness.*" Federal guidance also requires the states to periodically review and evaluate NPS management programs using environmental and functional measures of success and to revise NPS assessment and management programs at least every five years[15]. Section 6217 of CZARA requires monitoring techniques to evaluate the success of the MMs in reducing pollution loads and improving water quality.[16] A monitoring program will also help fulfill the legislative mandate of the Comprehensive Coastal Monitoring Strategy required by Assembly Bill (AB) 1429. It stated, in part: "Sound water quality management decisions require a solid base of information collected from a variety of sources … improved monitoring, or in some cases improved coordination of existing programs, will be necessary for the State of California to achieve a systematic understanding of NPS pollution and to measure the effect of efforts to reduce this water pollution source."

A comprehensive monitoring strategy for the NPS program will soon be complete. This strategy will be designed to provide objective, quantified answers to broad management questions. These questions are then refined into more discrete monitoring objectives that will shape the design of specific monitoring programs. The monitoring strategy will focus primarily on answering the first two questions posed below while coordinating with other monitoring programs to effectively answer all questions.

1. *Are MPs to reduce polluted runoff being implemented (Tracking or Implementation Monitoring[17])?* Our efforts will focus on tracking MM implementation and determine

[15] In 1996, USEPA released a CWA section 319(h) guidance document requiring states to upgrade their NPS programs consistent with nine key elements in order to achieve "*Enhanced Benefit Status.*" In a January 1999 memorandum, J. Charles Fox, USEPA Assistant Administrator, reiterated the requirement and outlined the process for approval of upgraded NPS Programs.

[16] NOAA and USEPA in accordance with these statutory mandates provide additional specifics for the monitoring and tracking of MMs in their January 1993 Coastal Nonpoint Pollution Control Program – Program Development and Approval Guidance.

[17] Implementation monitoring assesses whether activities were carried out as planned. It does not necessarily include water quality measurements. Our efforts to track whether BMPs were performed follow under this type of monitoring.

whether practices are implemented in accordance with relevant standards and specifications.

2. *Are the MPs effective in avoiding or minimizing pollution generation (Effectiveness Monitoring[18], Compliance Monitoring[19])?* We will develop a monitoring strategy that measures the effectiveness of MPs for agriculture, forestry, urban sources, and marinas.

3. *Is water quality being protected and are narrative and numerical water quality criteria being achieved (Baseline Monitoring[20], Compliance Monitoring)?* We will coordinate with ongoing regional monitoring efforts and point-source compliance monitoring to identify impairments and determine the extent, causes, and sources of impairment.

4. *Is reasonable progress being made toward reducing NPS polluted runoff?* We will review tracking and monitoring information through external review committees and TACs and assess the state of the Program.

Implementation of the MMs through MPs can be considered a "technology-based" approach to NPS pollution control. Application of MPs will reduce NPS pollutant loadings and improve water quality. As such, tracking the extent of MM implementation (and the associated MPs) will provide the initial measure of NPS Program success. Due to the areal extent and scale of NPS problems, improvements in water quality will take time. Ultimately, however, the long-term success of the NPS Program must be measured by corresponding improvements in water quality. This water quality-based approach to assessing success will be accomplished through the SWRCB's development of a comprehensive surface water quality program, to the extent that funds are available, by January 1, 2001, pursuant to section 13181(c)(1) of the Porter-Cologne Act. The comprehensive water quality program will address, among other issues, the following:

- To the extent possible, a determination regarding the extent to which existing water quality objectives are being met;
- To the extent possible, a determination regarding the sources of pollution in areas where objectives, standards, and guidelines are not being met; and
- Methods for determining the degree of improvement or degradation in coastal water quality over time.

Prior to development of the comprehensive monitoring program, the SWRCB will, pursuant to section 13192 of the Porter-Cologne Act, on or before November 30, 2000, assess and report on the SWRCB's and RWQCBs' current surface water quality monitoring programs. Important elements to be considered in this report include, but are not limited to, the following:

[18] Effective monitoring evaluates whether the specified activities (e.g., individual management practices, timber sale, construction project) had the desired effect. Monitoring definitions are described further in USEPA (1991).

[19] Compliance monitoring evaluates whether a water quality standard is being met.

[20] Baseline monitoring characterizes existing water quality conditions and establishes a database for planning or future comparisons. Continued baseline monitoring may become trend monitoring.

- The physical, chemical, biological, and other parameters that a comprehensive water quality monitoring program should collect and evaluate in order to determine ambient water quality; and
- A strategy for assessing and characterizing discharges from NPS pollution.

In addition, the SWRCB, pursuant to Porter-Cologne Act section 13181(b)(1), will prepare and complete an inventory of existing water quality and monitoring activities within State coastal watersheds, bays, estuaries, and coastal waters, by January 1, 2000, to the extent that funds are available for this purpose.

Tracking Management Measure Implementation

Tracking MM implementation is the simpler, more straightforward component of the monitoring strategy. The MMs are directly implemented on ground via MPs. MPs are implemented by the landowner or user because of their stewardship approach to land use; it makes business sense; or it is in response to regulatory pressures or requirements, such as to meet waste discharge or other permit requirements.

This tracking program will be broad-based and inclusive of all MM categories and water bodies in California. A tracking program is currently being designed to identify:

- What MMs are implemented,
- Where MMs are implemented,
- Who is implementing them,
- When they are implemented,
- Why they are being implemented (e.g., because of self-interest, regulatory-encouragement, or regulation), and
- Which agencies and programs are supporting implementation?

The tracking program will also include specific performance measures and goals that can be used at the end of the five-year period to determine the scope and extent of MM implementation. Combined with the effectiveness monitoring (described below), it will allow us to gauge the success of program implementation efforts. An example of a performance measure would be "the number of approved farm plans which implement relevant agricultural measures." Examples of performance goals would be (1) "to have in place approved farm plans for 80 percent of the farms in each watershed" or (2) "implement agricultural MMs or MPs on 80 percent of farm lands in each watershed." The five-year review will be comprehensive in scope, addressing all of the measures and broken out on a watershed basis, to the extent possible. The measures and goals will be developed through an interagency effort which will include public involvement, such as the IACC and the Assessment TAC.

The State recognized several years ago the need to better track and evaluate the effectiveness of these projects. Through contracts with UCD ICE, the State is working to: (1) promote information exchange and coordination among watershed groups;

(2) geographically track the implementation of MMs; and (3) determine the effectiveness of CWA sections 205(j) and 319(h) projects in protecting beneficial uses and improving water quality. All selected projects must complete a one-page contract summary which the SWRCB will make available to the public. At the completion of each funded project, all projects must complete a project survey form and agency staff may survey the project location and determine the aerial extent of MM implementation. The information gathered will be entered into an internet-accessible GIS and be provided as part of the required annual, biennial, and five-year cycle reports.

This MM information will augment information already collected for watershed projects in California. Data on the over 1,000 conservation, mitigation, and restoration projects being developed and implemented throughout California resides on-line in the Natural Resource Project Inventory (NRPI). NRPI is a cooperative data-collection effort of environmental scientists at the UCD-ICE and over 30 private, State, federal, and international organizations interested in environmental protection[21]. The goal of NRPI is to make project and group information accessible to anyone who wants to review current activities in their region or statewide.

NRPI is an expansion of previous inventories such as the California Watershed Projects Inventory (CWPI) supported by the USEPA, the SWRCB, and Cal/RA and the California Ecological Restoration Projects Inventory (CERPI) supported by the USEPA, the Society for Ecological Restoration, and DOC. NRPI also integrates newer efforts, such as the Biological Resource Division's Mendocino Coast Metadata Inventory and the California Interagency Noxious Weeds Coordinating Committee's Noxious Weeds Projects Inventory. Environmental planning activities and agreements such as Habitat Conservation Plans, Natural Community Conservation Plans, and other resource-based plans will also be candidates for the NRPI database[22]. Beginning with the 1998 CWA sections 205 (j) and 319 (h) grant projects, all project contractors are now required, prior to final payment, to complete a post-project survey form that the SWRCB will provide to ICE for inclusion in NRPI.

Because of ICE's long history of developing and applying natural resource science to environmental issues, computer resource infrastructure, and the synergistic effect of so many participating agencies, the SWRCB has committed to use NRPI as the primary means to track implementation of MMs. In the spring of 1999, the SWRCB executed a contract with ICE to modify NRPI's data structure and to redesign the reporting form used to inventory projects to capture information specific to the implementation of the MMs and to further populate the database. Information collected from all participating

[21] NRPI is supported by the CBC whose 37 members include nine regional associations of county supervisors, 15 State agencies, UC, and the CARCD. Each of these members has designated one expert to bring in data from his or her respective agency. This information is then entered into the NRPI database/web page designed and hosted by the ICE. Participation by the CBC signatories is augmented by a growing list of data contributors including UCCE, the CRMP Council, and the Klamath Watershed Coordination Group.

[22] The NRPI structure will allow core searches of all underlying inventories at the same time. Each NRPI record points to the separate underlying inventory for more detailed information. The inventories also exist separately and can be searched independently. Each dataset will also be referenced spatially in a GIS, allowing the creation of dynamic maps of projects, groups, and datasets.

entities will include such items as implementing programs, authorities, MMs, and graphic coordinates. Modifications will also include a link to the SWRCB's GeoWBS which contains the CWA section 303(d) Impaired Water Body List.

Besides the NRPI, the CCC also has a system for tracking permitted land use activities. Currently, there is a wetland-specific component contained in the more general Permit Tracking System. The CCC is prepared to develop similar runoff-specific tracking elements to allow for the tracking of MM implementation for preventing and controlling NPS pollution.

Monitoring the Effectiveness of Management Practices

With the tracking system underway, the next component of the monitoring strategy is documenting and evaluating the effectiveness of the NPS pollution control practices. Establishing the effectiveness of the State's efforts to control NPS pollution will be a long-term, complicated, and expensive commitment for the following reasons:

- Nature of the NPSs of pollution are typically diffuse and difficult to define.
- NPS pollutants are varied and include sediment, nutrients, pathogens, salts, toxic substances, petroleum products, and pesticides.
- NPS pollution is extensive and spread over the entire State (155,000 square miles) and is not limited to specific outfalls. There are over 4,000 water bodies listed in the SWRCB's GeoWBS, of which 480 are listed as impaired.
- Watersheds are complex, and multiple sources within a watershed may contribute to the same pollutant.
- There is usually a substantial lag time between implementation of MPs and response in the watershed.
- The need for water quality monitoring, both qualitative and quantitative, is extensive.
- There are limited resources for water quality assessment.
- Regulatory authority is complex. Over 31 State agencies have NPS regulatory authorities and programs.

However, determining MM effectiveness is critical to understanding how MPs avoid pollution generation and improve water quality. The lead agencies are currently designing this component of the monitoring strategy. In the spring of 1999, the SWRCB executed a contract with UCD to develop a comprehensive monitoring program to assess the functioning of MPs. The comprehensive monitoring program will:

- Establish criteria to assess the functioning of MPs;
- Monitor practices in each major pollution source category (i.e., agriculture, forestry, urban sources, marinas, and hydromodification);
- Monitor long-term at least one watershed within the jurisdiction of each of the nine RWQCBs;
- Integrate NPS monitoring with other monitoring programs, including citizen monitoring programs; and
- Report monitoring information to all interested parties.

The Program Plan's monitoring will focus primarily on the on-site evaluation of MP effectiveness and their ability to avoid pollution generation. Pollution control success criteria will be developed for each major pollution source category (i.e., agriculture, forestry, urban sources, marinas, and hydromodification). These criteria will be grounded in simple, empirical observations of the effectiveness of MMs performed by landowners or community members. UCD will review potential indicators and develop a preliminary list of criteria. These criteria will be reviewed by panels of agency, industry, and community members. A suite of candidate measures will be tested in the field during the pilot phase of the monitoring program (year 2000). This pilot phase, called the Functioning Assessment Criteria Test (FACT), will be implemented by UCD with the support of community volunteers, landowners, and qualified monitoring experts. From FACT's success we will develop a broader effectiveness-monitoring program that will evaluate all MM sectors by the year 2013.

The RWQCBs are currently targeting two impaired water bodies per year in each region for developing TMDLs. Following TMDL development and adoption into the basin plan, the RWQCBs will begin TMDL implementation. We will target our NPS monitoring in those watersheds where NPS pollution is a significant contributor to water quality impairment. Monitoring will need to continue in these watersheds over many years to accurately document changes in pollutant loads and the effectiveness of MPs. The lead agencies will work with other agencies, key stakeholders, and citizen monitoring programs to craft a long-term monitoring strategy. At a minimum, the strategy should be designed to implement base-line monitoring one watershed per region per year for ten years.

Various effectiveness-monitoring programs are ongoing and will be evaluated during the pilot phase (FACT) so that the most beneficial comprehensive strategy can be developed. Furthermore, these monitoring programs will be augmented rather than replaced. This is particularly true in the forestry arena where the proper implementation and effectiveness of forestry MPs is being evaluated by the Monitoring Study Group (MSG). This MSG was created by the California BOF to determine how effective the Forest Practice Rules (FPR) are in protecting water quality. The CDF implemented hillslope monitoring in 1996 on 50 randomly selected Timber Harvesting Plans (THPs) in Humboldt and Mendocino Counties to provide information on forest practices within the range of Coho salmon. The program expanded in 1997 and 1998 to evaluate THPs throughout the State. Evaluation of 150 THPs occurred in areas with the greatest risk to water quality—roads, skid trails, landings, watercourse crossings, and watercourse and

lake protection zones (WLPZs). In total, approximately 150 FPR requirements were evaluated. From this monitoring study, forestry regulators will determine whether erosion problems on hillslopes were due to improperly implemented FPRs or the inadequacy of the FPRs.

In the agricultural arena, the Dairy Quality Assurance Project has developed a method for measuring the effectiveness of dairy nutrient MPs. The crux of the method is dairy inspections by certified third party inspectors. The method of inspections is under development and will be assessed for possible use in evaluating other MMs.

Since our effectiveness monitoring will focus primarily on the on-site evaluation of MPs, we must coordinate with other monitoring programs to ensure an accurate assessment of the effects of NPS pollution on aquatic resources. A blend of monitoring programs to achieve multiple objectives will be the most effective long-term monitoring strategy. This blending of objectives can only occur through active program coordination. First, a subcommittee of the IACC will focus on assessment to improve interagency coordination of monitoring programs. Second, the SWRCB and RWQCB staffs will continue intra-agency coordination through the Monitoring and Assessment Team. Third, SWRCB and RWQCB staffs will continue to work on existing monitoring programs such as: (1) the Comprehensive Coastal Monitoring Strategy; (2) CALFED's Comprehensive Monitoring, Assessment, and Research program on the San Francisco Bay-Delta; (3) the Regional Monitoring Program of the San Francisco Bay; (4) the Central Coast Regional Monitoring Program; (5) the Sacramento River Toxic Pollutant Control Program; (6) the Southern California Bight Program; (7) U.S. Geological Survey's (USGS) National Water Quality Assessment Program (NAWQA); and (8) USGS's National Irrigation Water Quality Program.

An example of specific questions being posed for State monitoring include measuring the effectiveness of MPs to reduce contamination of surface and ground waters by synthetic pesticides and fertilizers. The State will work with CDPR, U.S. Department of Agriculture (USDA) (NRCS, USFS, FSA, and RCD), the agricultural community, agricultural producers, researchers, and other public interests to design a set of trials to compare movement of nutrients and pesticides both before and after implementation.

Because of the emphasis in the NPS Program on self-determined pollution prevention, landowners, farmers, ranchers, boat owners, and community members will often monitor the effectiveness of their own practices, interpret the results, and, if necessary, modify their practices. In the next 15 years, SWRCB and RWQCB staffs will improve community-based watershed monitoring efforts by: (1) developing and reviewing new methods for monitoring MM implementation and effectiveness; (2) disseminating quality assurance requirements; and (3) increasing training opportunities. Technical resources will be developed and distributed statewide. These include standard monitoring protocols, quality assurance plans, guidance on how to start a community-based monitoring program, and data storage and retrieval mechanisms. Monitoring protocols will be designed to evaluate MP effectiveness and optimize data comparability between watersheds. However, efforts will be made to tailor protocols to stakeholder needs and geographical diversity. Guidance on quality assurance will identify the data

quality needs of important programs such as TMDLs. Training in monitoring design, monitoring techniques, data interpretation, quality assurance, and database management will continue. The SWRCB and RWQCB staffs will continue to support regional steering committees that foster partnerships among local, State, and federal governments and business, industry, and volunteer groups. If funding permits, the SWRCB will develop a statewide small grants program to support volunteer monitoring efforts.

The SWRCB and RWQCBs will work to resolve concerns about confidentiality of data collected voluntarily by landowners on their own practices. Sharing data will be beneficial in transferring knowledge about the success of certain practices. However, landowners may fear that regulators may use data to require additional monitoring or permit MPs. These concerns should be aired and addressed through discussions with agency staff, landowners, and appropriate industry representatives. Hopefully, successful solutions, such as the third party inspections developed in the Dairy Quality Assurance Project, can be achieved.

Resource needs identified by this work will form the basis for future resource requests to the State. SWRCB and RWQCB resources are inadequate for statewide comprehensive water quality monitoring. SWRCB is working to procure funding for those currently unfunded monitoring and assessment activities that are of central importance to the SWRCB's programs. The funding strategy will seek to fund key activities that meet multiple program mandates. This selection of the activities to be funded is based on overlapping needs for data that can best be addressed by an integrated monitoring and assessment effort. One of the key activities identified by management is to develop a compliance-monitoring program for NPS pollutants. We will seek a broad base of funding support from federal, State, and local government sources.

Assessing Internal Program

Evaluating the success of the NPS Program will include the elements of tracking and monitoring noted above. However, it will also include a systematic evaluation of whether we have achieved the short- and long-term goals of the program. To do this, staffs from the SWRCB, CCC, and other agencies will participate in the Assessment TAC to conduct biennial reviews and report on issues such as:

1. Completion of the activities identified in the five-year implementation plans and the attainment of their associated performance measures;
2. Performance of the system(s) (e.g., NRPI and the CCC's permit tracking system) used to track the implementation of MMs;
3. Effectiveness of the implemented MMs;
4. Involvement of the appropriate federal and State agencies in implementing the Program Plan and the mechanisms of agency participation (e.g., MOUs/MAAs [see Table 10]);
5. Public participation;
6. Coordination of agency and public activities via the IACC;
7. Identification of additional needs for public education and technical assistance;

8. Evaluation of the overall program performance and the program's ability to stay on schedule for full implementation of all identified MMs by 2013; and
9. Recommendations for program improvement.

In addition, the biennial review/workshop will discuss funding for implementation of the Program Plan. Issues to be discussed will include, but are not limited to, the following: (1) significant funding needs integral to the success of the Program Plan; (2) an analysis of funding mechanisms that can be used to continue needed MM development and research; (3) monitoring activities; and (4) long-term funding such as CWA section 319(h) grants, the State budget process, and statewide initiatives.

Reporting Program Effectiveness

The monitoring data will need to be routinely interpreted, assessed, and reported to the community of resource managers, landowners, farmers, ranchers, industry, and environmentalists who are interested in NPS pollution prevention. In this way, the reviewing audience can use the information on effectiveness of MMs to redesign and retest those practices.

Three separate reporting efforts are integral to the NPS Program. First, SWRCB and the CCC will provide biennial reports of its progress in meeting its objectives and performance measures. These reports will assess program success and recommend modifications to MMs and their implementation. These reports will be available to the public, implementing agencies, the Legislature, USEPA, and NOAA. Second, the SWRCB and RWQCBs provide a performance report semi-annually to USEPA. This performance report covers NPS activities funded by CWA section 319(h) funds. The report lists major accomplishments, describes progress towards future accomplishments, and accounts for tasks that are behind schedule. The third report is the annual progress report on NPS programs and projects funded by CWA section 319(h). This report, authored by SWRCB and RWQCBs, focuses on the progress made in meeting milestones identified in the annual CWA section 319(h) workplan.

The State will improve the on-line inventories of watershed projects (e.g., NRPI, CWPI) and monitoring programs. Efforts will ensure that the NPS monitoring program data are integrated into the comprehensive, user-friendly water quality database system called "System for Water Information Management" (SWIM) that is being developed by the SWRCB. The ultimate goal of SWIM is an on-line accessible database of real monitoring results. These data will be accessible for public and agency use and will enable participants to have equal use of data in developing comments and revising strategies.

H. Overall Program Assessment - Refining the Program

Making the Program information available for external review not only bestows a certain degree of credibility to the Program, it also enables public participation in the periodic assessment and refinement processes. Public involvement is encouraged through the Assessment TAC created by the IACC. The Assessment TAC will then cooperate with

the other TACs (Technical Assistance, Education, and Regulation) to propose modifications to the NPS Program which may include:

- Shifts in Program efforts (e.g., additional target watersheds and additional MMs),
- Strengthening individual NPS-related programs (e.g., expediting MM implementation and increasing enforcement, when appropriate),
- Improving agency coordination,
- Increasing public education and participation, and
- Increasing funding.

Modifying and Adding Additional Management Measures

One of the biggest challenges facing the NPS Program is providing for the implementation of "additional MMs" where water quality is impaired or threatened even after the implementation of California's MM goals. It is important for California to identify waters that are not attaining or maintaining applicable water quality standards and to identify and develop additional MMs to address persistent water quality problems.

Goals

Our overall goal is to develop a continuing process for identifying and implementing additional MMs that include milestones for implementation, evaluation, and, as necessary, revision. These additional MMs will be developed when needed to attain and maintain water quality standards.

New Management Measures

In developing the Program Plan, California identified the following additional MMs:

- Education MMs for Agriculture, Forestry, Hydromodification, and Wetlands. California added Education/Outreach MMs to reflect the State's intention to promote public awareness and involvement in controlling NPS pollution (the g-Guidance included education MMs for the urban and marinas sectors only). Nearly all of the TACs recommended that California enhance public education so that individuals can take responsibility and make the cooperative approach work.
- Post-Harvest Evaluation for Forestry. The post-harvest evaluation for forestry will help evaluate the successful implementation of the State's forest practice requirements. From this evaluation, appropriate changes to or oversight of the requirements can be developed. This evaluation of the forest practice requirements has been initiated and is described in the Monitoring Section.
- Marina Solid Waste Facilities. In addition to operating and maintaining these facilities, there is a need to support the installation of waste management facilities.

Process for Developing Additional Management Measures

California will conduct the following activities related to additional MMs:

- Ensure agency and public participation in developing and implementing the additional MMs.

- Coordinate review of CZARA section 6217(g) MMs and identify an initial set of additional MMs that are applicable for implementation in California.
- Involve the Assessment and/or Technical Assistance TACs, created by the IACC, to identify and recommend additional MMs.
- Develop a process for identifying and implementing additional MMs to address "additional" pollutant sources (e.g., resource extraction and abandoned mines, pitch canker [forestry], water conservation, and aerial deposition).
- Implement additional MMs in next five-year implementation plan.
- Track MM and MP implementation and review and assess effectiveness.
- Implement a long-term strategy for addressing pollution from active and inactive mines. (Active and abandoned mines are a significant source of NPS pollution as shown in Table 3 and discussed below.)

Abandoned Mines

Introduction

The SWRCB is the lead agency for control of water pollution by any source, including abandoned mines. However, there is no specific, comprehensive program at either a State or federal level for cleaning up abandoned and inactive non-coal mines. Rather, abandoned and inactive mine cleanup is carried out under a variety of State, federal, and local programs.

Over a century of mining since 1849 has left California with literally tens of thousands of small abandoned "hardrock" mines. Although not significant polluters individually, they often contribute cumulatively to chronic toxicity in affected watersheds via metals loading. Similarly, abandoned hydraulic placer gold mines and abandoned aggregate mines degrade aquatic habitat via excessive sediment loading. Again, the most serious sites are usually handled directly (e.g., Malakoff Diggings State Park, a historic hydraulic mining site, is under WDRs for sediment discharge), but the cumulative effects of smaller sites are not even addressed.

A few mine cleanups have been carried out under the Federal Superfund Program pursuant to California's Title 27 Program, which regulates waste discharges to land, and California's Surface Mining and Reclamation Program. For the most part, the worst abandoned mines are being cleaned up under the Federal Superfund Program. USEPA is also considering listing additional abandoned mines on the National Priority List in the future, but these would be sites that cause serious environmental problems or pose a substantial threat to human health. In a few instances, RWQCBs have tried to affect cleanup of abandoned mines by placing them under WDRs pursuant to Title 27.

The main barrier to a comprehensive program for abandoned mines is liability. Under the federal CWA, a third party can sue an agency or private party that

performs abatement work at an abandoned mine if the discharge from the mine continues to violate the CWA (refer to the Penn Mine lawsuit). California recently passed legislation that provides protection for "Good Samaritan" cleanup under State law. Efforts over the last few years to amend federal law to provide similar protection have failed (although these efforts continue). Thus, liability is the main barrier to a comprehensive program for cleaning up abandoned mines.

Goals

- Continue to regulate the most prodigiously polluting abandoned mines under the appropriate programs.
- Support efforts to resolve the liability issue, the main impediment to a coordinated effort to clean up abandoned mines.
- Develop strategies and measures for abating chronic toxicity and habitat degradation from the cumulative effects of numerous small sites.

Actions – Characterization and Cleanup

The SWRCB and RWQCBs have identified approximately 40 mines that cause serious water quality problems resulting from acid mine drainage and acute mercury loading. Additionally, within the last year, State and federal agencies have realized that drainage structures and sluices associated with abandoned hydraulic gold mines are a potential source of mercury to waters of the State. Mercury from these abandoned mines poses a serious potential threat to coastal waters because mercury transported from these sites may bioaccumulate in fish. To that end, State and federal agencies are collaborating with local entities to investigate mercury loading from abandoned hydraulic mine sites in the Bear and South Fork Yuba watersheds. This effort is being supported by State funds (Proposition 204 Grant, bond money) as well as by federal and local matching funds. The investigation could serve as a model for additional investigations of watersheds affected by hydraulic mining.

The DOC is inventorying abandoned mines statewide and is anticipating that there will be at least 20,000 sites. To manage this inventory, DOC developed a relational database that records the salient features found at abandoned mines. Because the SWRCB participated in developing the database, features that contribute to water quality degradation are incorporated into the database. DOC is incorporating existing inventory information and is coordinating data gathering efforts with other State and federal agencies. DOC intends to distribute the database and supporting software to State and federal agencies that are responsible for regulating abandoned mines. When that distribution occurs, the SWRCB and RWQCBs will have a powerful new tool for tracking work performed at abandoned mines, evaluating regional clean-up efforts in affected watersheds, and evaluating the impact abandoned mines have on watersheds.

As a land-managing agency, the USFS also has a rigorous abandoned mine reclamation program. The program includes: (1) a regionwide inventory of abandoned mines; (2) documentation of location; (3) types of environmental and/or resource problems evident; (4) rehabilitation measures required; and (5) potential sources of funding. The USFS has worked with various RWQCBs on numerous occasions in the rehabilitation of old mine sites. Restoration funding has come from appropriated USFS funds, the Comprehensive Environmental Response and Compensation Liability Act (CERCLA), and RCRA sources. In addition, BLM has begun formulating an abandoned mine reclamation program.

Actions - Water Quality Standards for Abandoned Mine Cleanup

The SWRCB has undertaken various efforts to manage the quality of the State's waters. The goal of CWC section 13000 is " … to attain the highest water quality that is reasonable, considering all demands being made and to be made ... and the total values involved ... ." Similarly, the Federal Water Pollution Control Act, United States Code (USC) Title A3, section 1251, aims, among other goals, to restore and maintain chemical, physical, and biological integrity of the Nation's waters by eliminating the discharge of pollutants. Such goals are fairly general and pragmatic.

Assuming that the liability issues are resolved soon, applying these general goals to both prodigiously polluting abandoned and inactive mines (which tend to be large sites) and watersheds affected by numerous small abandoned and inactive mines would be a major challenge for the following reasons. First, agreement must be reached on what is the highest water quality that is reasonable. This requires a statement on what natural conditions may have existed before mining to serve as a general guide in restoring the chemical, physical, and biological integrity of the affected waters. Second, the total values involved must be determined, recognizing that large abandoned mines are inherently costly to clean up and that the State's fiscal resources are limited.

Projects for restoring grossly polluting sites should have specific clean-up objectives and water quality goals. These site-specific goals for each site will differ depending on the magnitude of the pollution problem, clean-up technology, and cost of abatement.

Efforts for restoring watersheds affected by numerous small sites must take a different tack because it is unlikely that small sites would ever be evaluated individually by regulating agencies. Agreement on water quality and beneficial uses of an affected watershed would have to be reached first. Next, the contribution of similar pollutants from other sources would have to be considered in the context of how much benefit would be gained by cleaning up small abandoned mines. Last, it would be unrealistic to expect restoration

efforts at small sites to meet specific water quality goals because most efforts would likely be limited to "low-tech" earth moving and revegetation projects.

The measure of success for such efforts would necessarily be an overall improvement of the targeted watershed. That would necessitate a carefully thought out watershed monitoring program.

It is important to keep in mind that reclamation goals for both individual abandoned mines and watersheds affected by numerous abandoned mines must be established pragmatically to ensure that the best possible improvement in overall basin water quality is achieved for a given expenditure. All interested parties must be willing to accept that this may not necessarily achieve background conditions.

Resource Extraction

Introduction

Resource extraction (i.e., aggregate and metal mining) operations are regulated locally by State administered programs and by State and federal programs when they occur on federal land (although State programs have primacy). Extraction operations become water quality concerns when they:

- Have discharges that could impair water quality (e.g., cyanide heap leach gold mines); or
- Could impair beneficial uses (e.g., water quality, habitat) resulting from extracting resources (usually aggregate) from within or nearby stream channels.

All active mining projects must comply with the Surface Mining and Reclamation Act (SMARA). The goal of SMARA is to have mined lands "reclaimed" to a beneficial end use. Local Enforcement Agencies (LEAs), usually counties, implement SMARA. The DOC's Office of Mine Reclamation provides technical support to LEAs and has limited enforcement authority.

Mining projects that could impair water quality and/or beneficial uses of waters of the State may also be subject to regulations administered by RWQCBs (Title 27 of the California Code of Regulations [CCR], NPDES and Stormwater) or subject to conditions under the CWA section 401 Water Quality Certification Program (WQCrP) administered by the RWQCBs and initiated when there is a federal permit or license required (such as the USACOE's section 404 Program).

On the federal level, both the BLM and USFS have reclamation programs. The objectives of the federal programs are to minimize the environmental impacts resulting from mining activities and to ensure that disturbed lands are returned to uses consistent with long-term forest land and resource

management plans. Reclamation is an integral part of Plans of Operation submitted by proponents of mining on public domain lands that propose surface disturbances. The reclamation requirements included in the Plans of Operation include measurable performance standards. Reclamation bonds, sureties, or other financial guarantees are commonly required for all mineral activity requiring a Plan of Operation. All lands disturbed by mineral activities must be reclaimed to a condition consistent with resource management plans, including State air and water quality requirements.

Traditionally, each State regulatory program functions independently of one another even though some have overlapping regulatory authority. State agencies are beginning to recognize, however, that conflicts often arise when resource extraction operations are regulated by independently functioning programs with overlapping authority. Moreover, agencies are beginning to realize that the cumulative effects of multiple resource extraction operations within a given area cannot be anticipated when regulatory programs address each project individually. For example, the cumulative effects on beneficial uses of four or five instream aggregate operations in the same stream might be detrimental even though each individual operation is complying with conditions of their permit. Clearly, as society's demand for resources such as aggregate grows, the cumulative effects of these operations must be taken into account.

Goals

- Continue to regulate extraction operations for active resources under current programs.
- Work toward coordinating better among local, State, and federal entities that implement regulatory programs so that the regulatory goals of each applicable program are met.
- Begin evaluating extraction operations that occur within or near active stream courses in the context of their cumulative effect on their watershed.
- Develop MPs for alleviating cumulative detrimental effects of multiple resource extraction operations.

Actions

Agencies are making greater efforts to avoid conflicts stemming from overlapping regulatory programs. For example, DOC acted on a recommendation from the SWRCB that SWRCB and RWQCB staffs be invited to SMARA workshops. These workshops provide an opportunity for DOC, SWRCB, and RWQCB staffs to learn where areas of conflict are likely to arise. SWRCB and RWQCB staffs regularly meet with USFS staff to ensure that resource extraction operations comply with State programs.

Cumulative effects of resource extraction operations are also beginning to be addressed on a watershed basis. Although the reason for these efforts vary (e.g., a concern that threatened species listing will force onerous regulations on landowners, efforts to preserve fragile or unique habitats), the result is that extraction activities are beginning to be evaluated within the larger context of their watershed effects.

As the cumulative effects of multiple resource extraction operations are determined, SWRCB and RWQCB will work with local, private, and federal interests to formulate MPs for protecting the overall health of a watershed. Projecting into the future, we can anticipate that these MPs likely will be based on site-specific studies sponsored by State and federal agencies via grants.

Critical Coastal Areas Management Measures

The primary goal of CCA designation is to channel program resources to protect special coastal habitats from NPS pollution degradation through the implementation of additional MMs. CCAs will be designated in areas of the California coastal zone (1) in which new or substantially expanding land uses may cause or contribute to the impairment of coastal water quality and (2) that contain or are adjacent to threatened or impaired coastal waters.[23]

Where appropriate, additional MMs will be developed that address these site-specific concerns and which protect and restore the habitats for which the CCA designation was established.

The CCA Committee will first identify MMs within CAMMPR for immediate implementation in the CCAs. This will be accomplished through utilizing lessons learned, the existing monitoring programs, and the understanding of site-specific concerns and the threat of new development. For example, the CCA Committee could use the CCC's Permit Tracking System (PTS) for analyzing the cause-and-effect relationship between land use MPs and water quality. This would allow for the identification of the most effective MMs for immediate implementation in the CCAs. The anticipated development of runoff-specific tracking elements for the CCC's PTS would further accelerate and facilitate the MM identification process. Moreover, the statewide NPS Program's efforts in developing an effectiveness monitoring program will also assist in identifying and channeling appropriate resources to the implementation of appropriate MMs in the CCAs.

New and innovative MMs will be developed when needed to provide additional protection for the CCAs from NPS pollution degradation. The CCA Committee will work with appropriate agencies and researchers to develop these additional MMs with special considerations for the physical and biological characteristics of the CCAs and the nature of contamination in the adjacent threatened or impaired coastal waters.

[23] For federal approval of its NPS Program, California must identify and map CCAs to protect against current and anticipated NPS pollution problems (CZARA section 6217[b][2]).

Determining Need for Additional Regulations

During program assessment, it may be determined that current efforts to prevent and control NPS pollution are not sufficient to protect water quality and safeguard beneficial uses. Additional regulations may therefore be necessary to reinforce the implementing agencies' abilities in fully implementing NPS MMs and enforcing against NPS violations. In considering additional regulations, the Regulation TAC, in cooperation with the Assessment and Technical TACs, will perform the following activities:

- Invite the involvement of experts and all agencies with jurisdictions over NPS issues;
- Encourage public participation and input;
- Review all existing applicable regulations of the agencies to avoid duplicative regulations;
- Conduct research on lessons learned and other states' experiences;
- Create technologically-defensible and economically-feasible regulations that will accomplish the objective of preventing and controlling NPS pollution; and
- Ensure regulation adoption by the lead agencies and approval by OAL.

III. FIVE-YEAR IMPLEMENTATION PLAN

A. Introduction/Structure

The Implementation Plan describes in detail the actions to be taken for the period of 1998 to 2003. Specific MMs within the six identified NPS categories (Agriculture, Forestry, Urban Areas, Marinas and Recreational Boating Activities, Hydromodification, and Wetlands/Riparian Areas/Vegetated Treatment Systems), CCAs, and Program monitoring are identified.

Based on past agency experiences, the CWA section 303(d) and TMDL priority lists, a survey of the stakeholders, and recommendations from the previous NPS TACs, the lead agencies have targeted specific geographic areas and NPS MMs for implementation in this first five-year cycle. The areas selected either have the most impaired water bodies or face immediate water quality threats from new and/or expanding development. Depending on their relative priority, the MMs were targeted as either primary, secondary, or tertiary. The Implementation Plan only addresses those MMs targeted at the primary and secondary level for the first five-year cycle. The MMs chosen are those determined to be the most effective and appropriate for California. The CCAs will be addressed based on a year to year review of potential environmental degradation of sensitive coastal resources such as those previously identified as ESHAs and special areas including California's NERRs, NEPs, and National Marine Sanctuaries (NMSs).

Seven process elements are prescribed for each of the MM categories. They are to: (1) assess problems; (2) target resources; (3) plan activities; (4) coordinate with agencies and the public; (5) implement MMs; (6) track and monitor actions; and (7) report on the effectiveness of the Program Plan. These steps are essential to ensuring effective and efficient implementation of the MMs which will enable the Strategy to achieve the defined goals of preventing and controlling NPS pollution. The Implementation Plan also identifies parties/agencies responsible for performing the activities. Funding sources and milestones to be achieved by the end of the five-year period are identified as well. The implementation timelines are realistic estimates but may change due to changes in agency coordination, funding, new information, and public cooperation.

Certain process elements for some of the targeted MM categories have not been completed due to the lack of information at this time. All relevant information for each process element for each primary and secondary MM will be established and entered into the first five-year plan by July 1, 2000, with the exception of numeric program performance measures. Numeric program performance measures will be established for each primary and secondary MM in the first five-year plan by October 1, 2000. If more data, another agency commitment, or some other piece of information is needed in order to fill in a particular piece of the matrix, the steps that will be taken to fill in that missing information will be described. The revised five-year plan will be distributed to the public (as an addendum to the Program Plan) by November 1, 2000.

Beginning in 2001, biennial reports will be completed for evaluation by the USEPA and NOAA, as well as other agencies and the public regarding the State's progress in

implementing the NPS Program. The reports to be produced in 2001 and 2003 will provide details to address questions such as:

1. Have the activities identified in the five-year plans been completed and have the associated performance measures been achieved?
2. Has an MM implementation tracking system been established? Based on that system, what is the extent of MM implementation for all source categories throughout the State?
3. Has the IACC become active and successful in fostering implementation?
4. Has the SWRCB/RWQCBs published NPS enforcement guidance in 2001 as per CWC section 13369(a)(2)(B)?
5. Has the technical assistance to landowners and managers been improved through the issuance of technical guides, information sharing, "field-level" assistance and/or other activities?
6. Have other State and federal agencies and non-governmental entities become involved in implementing the NPS Program? Where necessary, have formal agreements been established to enhance the effectiveness of these partnerships?
7. Has the planning process for the next five-year plan (2003-2008) been established to achieve more specific plans that include measurable objectives and that involve a wide range of key stakeholders?
8. Have adequate efforts been made to identify funding needs and mechanisms to ensure continuing MM implementation and Program Plan success?

In 2001, the SWRCB, RWQCBs, and CCC, in coordination with the new TACs to be established by the IACC, will begin developing the next five-year implementation plan. The five-year implementation plan for 2003 to 2008 will outline: (1) strategies to complete the unfinished tasks from the first five years; (2) rectify the NPS program's shortfalls identified in the assessment process; (3) implement an additional set of MMs; and (4) expand the geographic coverage of the NPS Program.

B. Agriculture

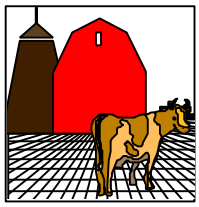

The SWRCB, CCC, and other State agencies have identified seven MMs to address agricultural NPSs of pollution that affect State waters. The agricultural MMs include practices and plans installed under various NPS programs in California, including systems of practices commonly used and recommended by the USDA as components of RMS, WQMPs, and Agricultural Waste Management Systems. These RMSs are planned by individual farmers and ranchers using an objective-driven planning process outlined in the NRCS National Planning Procedures Handbook. The RMSs are designed to achieve sustainable use of the different natural resource areas—soil, water, air, plants, animals, and human considerations.

California's MMs to address agricultural sources of NPS pollution in California:

1A. Erosion and Sediment Control
1B. Facility Wastewater and Runoff from Confined Animal Facilities
1C. Nutrient Management
1D. Pesticide Management
1E. Grazing Management
1F. Irrigation Water Management
1G. Education/Outreach

According to USEPA (1993), agriculture contributes more than half of the pollution entering the Nation's water bodies; recent studies have identified it as the greatest source of water pollution in the United States. The primary agricultural NPS pollutants are nutrients, sediment, animal wastes, pesticides, and salts. Agricultural activities may also affect habitat through physical disturbances caused by livestock or equipment or through the management of water.

Management Measures:

Erosion and Sediment Control. MM 1A addresses NPS problems associated with soil erosion and sedimentation. Where erosion and sedimentation from agricultural lands affect coastal waters and/or State's inland water bodies, landowners shall design and install or shall apply a combination of practices to reduce solids and associated pollutants in runoff during all but the larger storms. Alternatively, landowners may apply the erosion component of an RMS as defined in the NRCS FOTG. The NRCS FOTG contains standards and specifications for installing these practices.

Facility Wastewater and Runoff from Confined Animal Facilities. Pursuant to MM 1B, facility wastewater and contaminated runoff from confined animal facilities must be contained at all times. Storage facilities should be of adequate capacity to allow for proper wastewater use and should be constructed so they prevent seepage to ground water, and stored runoff and accumulated solids from the facility shall be managed through a waste use system that is consistent with MM 1C or shall be removed from the site.

Nutrient Management. MM 1C addresses the development and implementation of comprehensive nutrient management plans for areas where nutrient runoff is a problem affecting coastal waters and/or water bodies listed as impaired by nutrients. Such plans would include: (1) a plant tissue analysis to determine crop nutrient needs; (2) crop nutrient budget; (3) identification of the types, amounts, and timing of nutrients necessary to produce a crop based on realistic crop yield expectations; (4) identification of hazards to the site and adjacent environment; (5) soil sampling and tests to determine crop nutrient needs; and (6) proper calibration of nutrient equipment. When manure from confined animal facilities is to be used as a soil amendment and/or is disposed of on land, the plan shall discuss steps to assure that subsequent irrigation of that land does not leach excess nutrients to surface or ground water.

Pesticide Management. Implementation of MM 1D is intended to reduce contamination of surface water and ground water from pesticides. Implementation of this measure will primarily occur through cooperation with the CDPR as provided in a MAA with the SWRCB. Elements of this measure include: (1) development and adoption of reduced risk pest management strategies (including reductions in pesticide use); (2) evaluation of pest, crop, and field factors; (3) use of Integrated Pest Management (IPM); (4) consideration of environmental impacts in choice of pesticides; (5) calibration of equipment; and (6) use of anti-backflow devices. IPM is a key component of pest control. IPM strategies include evaluating pest problems in relation to cropping history and previous pest control measures and applying pesticides only when an economic benefit will be achieved. When used, pesticides should be selected based on their effectiveness to control target pests and environmental impacts such as their persistence, toxicity, and leaching potential.

Grazing Management. MM 1E is intended to protect sensitive areas (including streambanks, lakes, wetlands, estuaries, and riparian zones) by reducing direct loadings of animal wastes and sediment. This may include restricting or rotationally grazing livestock in sensitive areas by providing fencing, livestock stream crossings, and locating salt, shade, and alternative drinking sources away from sensitive areas. Upland erosion can be reduced by, among other methods: (1) maintaining the land consistent with the California Rangeland WQMP or BLM and Forest Service activity plans or (2) applying the range and pasture components of an RMS (NRCS FOTG). This may include prescribed grazing, seeding, gully erosion control, such as grade stabilization structures and ponds, and other critical area treatment.

Irrigation Water Management. MM 1F promotes effective irrigation while reducing pollutant delivery to surface and ground waters. Pursuant to this measure, irrigation water would be applied uniformly based on an accurate measurement of crop water needs and the volume of irrigation water applied, considering limitations raised by such issues as water rights, pollutant concentrations, water delivery restrictions, salt control, wetland, water supply, and frost/freeze temperature management. Additional precautions would apply when chemicals are applied through irrigation.

Education/Outreach. The goals of MM 1G are to implement pollution prevention and education programs to reduce NPS pollutants generated from the following activities where applicable:

1. Activities that cause erosion and loss of sediment on agricultural land and land that is converted from other land uses to agricultural land;
2. Activities that cause discharge from confined animal facilities to surface waters;
3. Activities that cause excess delivery of nutrients and/or leaching of nutrients;
4. Activities that cause contamination of surface water and ground water from pesticides;
5. Grazing activities that cause physical disturbance to sensitive areas and the discharge of sediment, animal waste, nutrients, and chemicals to surface waters;
6. Irrigation activities that cause NPS pollution of surface and ground waters.

Management Measure Category: Agriculture

Management Measure Title: 1A – Erosion and Sediment Control

Management Measures Targeting Level: Primary

Objectives:

1. By the year 2002, develop MAA and WQMP with BLM.
2. By the year 2003, sediment/erosion control guidelines for six watersheds. Begin implementation of those guidelines.
3. By the year 2003, implement interagency streamlined permit process in 50 watersheds.

Process Element	Actions/ Statements	Lead Agency	Geographic Area	Potential Funding	Performance Measures	Years 98	99	00	01	02	Notes
Assess	To be completed as specified in Part III.A. – Introduction /Structure.										
Target	To be completed as specified in Part III.A. – Introduction /Structure.										
Plan	Develop resource management plans.	RWQCB 3, County Farm Bureau	RWQCB 3	CWA §319, USDA EQIP, California Farm Bureau (CFB), and partner's funds		x	x	x	x	x	
	Direct grant funds and cost sharing opportunities to projects that implement MPs.	RWQCB 3 RWQCB 7	Lands in irrigated agriculture and grazing throughout the Regions 3 and 7	CWA §319	Implementation of at least one new project each year	x	x	x	x	x	
Plan	Develop TMDLs for CWA §303(d) listed waters.	RWQCB 3 RWQCB 7 RWQCB 8	Lower Salinas River, Lower Pajaro River, Morro Bay Watershed, Salton Sea Transboundary Watershed, Newport Bay Watershed	CWA §319, CWA §104, CWA §106, General Fund (funding fairly secure for development through 2001)	Adopted TMDL according to established schedule; implementation of practices per the TMDL	x	x	x	x	x	

004801

Process Element	Actions/ Statements	Lead Agency	Geographic Area	Potential Funding	Performance Measures	Years 98	99	00	01	02	Notes
	Quantify measures to reduce impacts from erosion and sedimentation.	NRCS, RWQCB 4	Ventura County	CWA §319 TMDL	Agreement of stakeholders on top ten measures that should be implemented			x	x	x	As needed-rotate between watersheds with agricultural issues. Coordinate with TMDLs
	Work with stakeholders to develop watershed management plan (includes erosion control element)	RWQCB 5	Cache Creek	NPS, CALFED, other				x	x		
		RWQCB 5, local agency	West side tribs. Sacramento R.	CWA §319; Prop. 204	Educational workshops and public meetings						
	Develop MAA and WQMP with BLM.	SWRCB BLM	Statewide	Agency baseline	MAA and WQMP		x	x	x		
Coordinate	Promote interagency coordination to improve information transfer and to provide a singular agency perspective.	RWQCB 1	Russian, Gualala, Garcia, and Navarro Rivers	CWA §319	Number of interagency network sessions, outreach--see Outreach and Education		x	x	x		
	Participate in TACs for Cottonwood Creek	RWQCB 5; local agency	West side tribs. Sacramento R.	CWA §319	Attendance at meetings	x	x	x			
Coordinate	Coordinate stakeholders for implementation of MMs.	RWQCB 4	Ventura County	CWA §319 TMDL	Number of meetings for consensus of stakeholders, MOUs/MAAs	x	x	x	x	x	As needed-rotate between watersheds with agricultural issues Coordinate with TMDLs

004802

Process Element	Actions/ Statements	Lead Agency	Geographic Area	Potential Funding	Performance Measures	Years 98	99	00	01	02	Notes
	Participation at interagency and watershed group meetings	RWQCB 3, Farm Bureaus, NRCS, local Conservation Districts, MBNMS WQPP, UCCE	Lands with irrigated agriculture and grazing throughout the region	CWA §319, USDA, EQIP, CFB, Guadalupe oil field settlement funds	Development and implementation of plans on recorded number of acres.		x	x	x	x	
Implement	Implement resource management plans.	RWQCB 3, County Farm Bureau (CFB), MBNMS WQPP, UCCE	Lands in irrigated agriculture and grazing throughout RWQCB 3	CWA §319, USDA EQIP, CFB, and partner's funds			x	x	x	x	
	.	RWQCB 3, RWQCB 2, CFB, MBNMS-WQPP, NRCS	Lower Salinas River, Lower Pajaro River, Pescadero and lands in irrigated agriculture and grazing throughout RWQCB 3	CWA §319, USDA-EQIP, CFB, and MBNMS			x	x	x	x	
Implement	Implement strategies for protection of resources from agricultural pollution, including erosion, in cooperation with the MBNMS WQPP.	RWQCB 3 MBNMS CCC SWRCB	Central Coast	CWA §319	Complete final WQPP agriculture plans by summer 1999 and begin implementation.	x	x	x	x	x	Ongoing activity Includes all NPSs impacting MBNMS watersheds
	Implement CFB's NPS Initiative pilot projects	RWQCB 7, CFB, NRCS	Lands in irrigated agriculture and grazing throughout RWQCB 7	CWA §319, USDA-EQIP, and CFB,			x	x	x	x	

004803

Process Element	Actions/ Statements	Lead Agency	Geographic Area	Potential Funding	Performance Measures	Years 98	99	00	01	02	Notes
	Implement TMDLs for CWA §303(d) listed waters.	RWQCB 3 RWQCB 7	Lower Salinas River, Lower Pajaro River, Morro Bay Watershed, Salton Sea Transboundary Watershed	CWA §319, CWA §104, CWA §106, General Fund (funding fairly secure for development through 2001)	Adopted TMDL according to established schedule; implementation of practices per the TMDL	x	x	x	x	x	
	Implement Erosion and Sediment (E&S) Control Plans to protect water quality standards.	NRCS RWQCB 4	Ventura County	CWA §319 TMDL	Number of Erosion and Sediment Control Plans implemented				x	x	As needed-rotate between watersheds with agricultural issues. Coordinate with TMDLs
	Promote hillside vineyard management practices to reduce erosion/sedimentation and improve riparian function and fish habitat.	RWQCB 1	Russian, Gualala, Garcia, and Navarro Rivers	CWA §319	Number of interagency network sessions, outreach--see Outreach and Education		x	x	x		
	Participate in implementation of CFB NPS Initiative pilot projects.	RWQCB 7, CFB, NRCS	Salton Sea Transboundary Watershed	CWA §319 EQIP, CFB		x	x	x	x	x	
	Implement BMPs for flood and sediment control	RWQCB 5	Salt and Sand Creek	NPS	Implementation of projects, field days	x	x				
Implement	Implement sediment and erosion control demonstration program	RWQCB 5, local agency	Cache Creek	Prop. 204	Construction of gravel bar(s)		x	x	x		
	Prepare education and outreach material for erosion control techniques	RWQCB 5, local agency	Cache Creek	Prop. 204	Preparation and distribution booklet; field tours		x	x	x		

004804

Process Element	Actions/ Statements	Lead Agency	Geographic Area	Potential Funding	Performance Measures	Years 98	99	00	01	02	Notes
	Implement model, interagency streamlined permit process piloted in Elkhorn Slough in other watersheds Statewide.	NRCS, DFG, RWQCBs, CCC, Sustainable Conservation, MBNMS WQPP	Elkhorn Slough, Morro Bay, Salinas River watersheds	Various sources	50 projects in five years	x	x	x	x	x	In 1998, 20 projects were implemented in Elkhorn Slough, Morro Bay, and Salinas River. Projects are scheduled to begin in FY 99-00.
	Implement management measures/practices to reduce sedimentation.	RWQCB 5, local agency	Panoche and Silver Creek, Arroyo Passajero	CWA §319				x	x	x	
Track and Monitor	Monitor long-term sediment management strategies	RWQCB 5, local agency	Union School Slough	CWA §319, CALFED			x	x	x	x	
Report Biennially	To be completed as specified in Part III.A. – Introduction /Structure.										

004805

Management Measure Category: Agriculture

Management Measure Title: 1B – Facility Wastewater and Runoff from Confined Animal Facilities (all units)

Management Measure Targeting Level: Primary

Objectives:

1. By the year 2000, develop statewide strategy for Animal Feeding Operations (AFO).
2. By the year 2002, complete dairy waste management training for 50 percent of dairy produces in RWQCBs 1 and 5.
3. By the year 2003, inspect all AFO facilities in the RWQCB 5-Central Valley and RWQCB 8-Chino Basin.

Process Element	Actions/ Statements	Lead Agency	Geographic Area	Potential Funding	Performance Measures	Years					Notes
						98	99	00	01	02	
Assess	Conduct surface and ground water quality monitoring to assess current and historic dairy waste impacts.	RWQCB 8	Chino Basin, Lake Elsinore/San Jacinto watershed		Database	x	x	x	x		
Target	To be completed as specified in Part III.A. – Introduction /Structure.										
Plan	Quantify nutrient load and propose reductions.	USEPA, SWRCB, RWQCB 4	RWQCB 4	Basin Planning , CWA §104 and §106 TMDL funds	Technical TMDLs			x	x	x	TMDLs for nutrients are scheduled for different watersheds each year
	Update nutrient reduction goals of RWQCB 4 Basin Plan.	RWQCB 4	RWQCB 4		Update plan by 7/2001		x	x	x		Triennial review and TMDL implementation, as required
	Foster grant program for NPS control on dairies.	RWQCB 1	Humboldt WMA	CWA §319	Number of projects		x	x	x	x	
	Develop manure removal strategies.	Local dairy agencies, RWQCB 8, Orange County Sanitation District (OCWD)	Chino Basin, San Jacinto Watershed		Reduction in manure remaining in Chino Basin	x	x	x			

004806

Process Element	Actions/ Statements	Lead Agency	Geographic Area	Potential Funding	Performance Measures	Years 98	99	00	01	02	Notes
Plan	Work with USEPA and NRCS on development of the joint unified AFO National Strategy. Target EQIP funding to needed projects through participation on the State Technical Committee.	NRCS SWRCB USEPA RWQCBs	Statewide	Current staff, EQIP	Annual list of priority areas, number of plans produced	x	x	x	x	x	Ongoing activity
	Develop statewide strategy for AFO.	SWRCB	Statewide	Baseline	Statewide strategy		x	x			
Coordinate	Coordinate statewide and regional dairy waste management activities to develop more cohesive regulatory framework through monthly Interagency Confined Animal Coordination Group meetings and quarterly RWQCB roundtable meetings.	SWRCB	Statewide	CWA §319 Current staff	Monthly meeting summaries	x	x	x	x	x	Ongoing activity.-most significant impacts are in the San Joaquin Valley and Chino Basin
	Support and participate in Sonoma-Marin Animal Waste Committee, Dairy Waste Management Partnership Agreement (California Dairy Quality Assurance Program), and producer training through UC.	SWRCB	Statewide with emphasis on Regions 1 and 5	TSCA grant CWA §319 Current staff	Under the Partnership Agreement, complete dairy waste management training for 50 percent of producers in two years. Perform 1,000 independent evaluations in four years.	x	x	x	x	x	On going activity Also supports process element of implementation
Implement	Work with USEPA and NRCS on implementation of the joint unified AFOs National Strategy. Target EQIP funding to needed projects through participation on the State Technical Committee.	NRCS SWRCB EPA RWQCBs	Statewide	Current staff, EQIP	Annual list of priority areas, number of plans developed	x	x	x	x	x	Ongoing activity Also supports process element of implementation
	Implement updated dairy general NPDES permit.	RWQCB 8	RWQCB 8		Implement updated permit	x	x	x	x	x	
	Educate dairy industry on NPS impacts and control, foster stewardship ethic, develop self-regulatory body	RWQCB 1	Humboldt WMA	CWA §319	No. of participants, No. of projects, strategy with corrective actions		x	x	x	x	
	Address known dischargers in violation of water quality standards through increased use of regulatory authorities: - more inspections - increase number of inspections - consider issuing a general WDR in Central Valley.	SWRCB RWQCBs	Central Valley, Chino Basin, San Jacinto Watershed	General Fund, NPDES/WDR permit funds	Inspect 25 percent of all facilities annually		x	x	x	x	Ongoing activity

004807

Process Element	Actions/ Statements	Lead Agency	Geographic Area	Potential Funding	Performance Measures	Years 98 99 00 01 02	Notes
Track and Monitor	To be completed as specified in Part III.A. – Introduction /Structure.						
Report Biennially	To be completed as specified in Part III.A. – Introduction /Structure.						

004808

Management Measure Category: Agriculture

Management Measure Title: 1C – Nutrient Management

Management Measure Targeting Level: Primary

Objectives:

1. By the year 2003, develop regional numeric nutrient criteria and incorporate into Basin Plans.
2. By the year 2003, develop and implement standards for heavy metals in organic and inorganic fertilizers.
3. By the year 2003, develop nutrient management guidelines in nine watersheds. Begin implementation of those guidelines.

Process Element	Actions/ Statements	Lead Agency	Geographic Area	Potential Funding	Performance Measures	Years 98	99	00	01	02	Notes
Assess	Thirty-five (35) water bodies listed for nutrients with agricultural sources of sediment on CWA §303(d) list.	RWQCBs	Statewide	Current staff	CWA §303(d) list	x					
	For watersheds with limited information, inspect irrigated agriculture and grazing areas for nutrient discharges.	RWQCB 3	Lands with irrigated agriculture or grazing uses	New	Number of watersheds inspected per year	x	x		x	x	
Target	Thirty-three (33) water bodies targeted for nutrient TMDLs by year 2003.	SWRCB	Statewide	Current staff	TMDL schedule						
	Identify additional high quality water bodies in need of protection.										
Plan	Develop regional numeric nutrient criteria in cooperation with USEPA, RWQCBs, and Nutrient Criteria Team.	USEPA, SWRCB, RWQCBs	Statewide	CWA §319(h) grant	Develop regional criteria by 2000. Incorporate into basin plans by 2003	x	x	x	x	x	
	Evaluate and modify as appropriate for incorporation into basin plans.										
	Develop standards for heavy metals in organic and inorganic fertilizers.	DFA and SWRCB	Statewide		Standards	x	x	x			
	Develop TMDLs and associated implementation plans for CWA §303(d) listed water bodies.	RWQCB 1	Laguna de Santa Rosa, Scott River, Shasta River, Stemple Creek		TMDLs, implementation plans	x	x	x	x	x	

004809

Process Element	Actions/ Statements	Lead Agency	Geographic Area	Potential Funding	Performance Measures	Years 98	99	00	01	02	Notes
Plan		RWQCB 3	L. Pajaro River, L. Salinas River, Monterey Bay and Morro Bay watersheds		TMDLs, implementation plans	x	x	x	x	x	
		RWQCB 5	Stockton and SJ Delta	State and federal TMDL funds	Validation of dissolved oxygen (DO) model; definition biochemical oxygen demand (BOD) and nutrient sources; determination of sediment load			x	x	x	TMDL for DO
	Develop nutrient management plans	RWQCB 8, Orange Cnty. Farm Bureau (OCFB), UCCE	Newport Bay watershed	CWA §319(h) funds	No. of nutrient management plans		x	x	x	x	Requirement of Newport Bay TMDL
Coordinate	Develop MOU or MAA with other regulatory agencies to control nutrients.	SWRCB, RWQCBs, NRCS	Statewide	Current							
	Coordinate with CFB, NRCD, agricultural groups, and educational institutions about appropriate level of nutrient applications for specific crops.	RWQCB 4	Ventura County	New	Guidance document on nutrient application rates						
	Coordination with stakeholders occurs during all phases of program.	See lead agency per process	Statewide	Current staff		x	x	x	x	x	
Implement	Regulate fertilizer materials and soil amendments pursuant to interagency MOU.	DFA DTSC CIWMB SWRCB	Statewide	Baseline	Measures specified in MOU	x	x	x	x	x	
	Implement CFB's NPS Initiative pilot projects	RWQCB 3, CFB, MBNMS-WQPP, NRCS	Upper and Lower Salinas River, Lower Pajaro River, and lands irrigated by agriculture and grazing throughout RWQCB 3	CWA §319, USDA-EQIP, CFB, and MBNMS			x	x	x	x	

004810

Process Element	Actions/ Statements	Lead Agency	Geographic Area	Potential Funding	Performance Measures	Years 98	99	00	01	02	Notes
Implement	Implement strategies for protection of resources from agricultural pollution, including nutrients, in cooperation with the MBNMS WQPP.	RWQCB 3 MBNMS CCC SWRCB	Central Coast	CWA §319	Complete final WQPP agriculture plan by summer 1999 and begin implementation.	x	x	x	x	x	Ongoing activity Includes all NPSs impacting MBNMS watersheds
	Implement plans and specific MPs.										
	Implement TMDLs for CWA §303(d) listed water bodies.	RWQCB 1	Laguna de Santa Rosa, Scott River, Shasta River, Stemple Creek			x	x	x	x	x	
		RWQCB 3	L. Pajaro River, L. Salinas River, Monterey Bay and Morro Bay watersheds			x	x	x	x	x	
	Implement nutrient management plans	RWQCB 8, OCFB, UCCE	Newport Bay watershed	CWA §319(h) funds	Nutrient reduction from agr. lands to meet load locations		x	x	x	x	Requirement of Newport Bay TMDL
	Update WDRs for commercial nurseries	RWQCB 8	Newport Bay watershed	?	Updated WDRs for commercial nurseries		x	x	x	x	Requirement of Newport Bay TMDL
	Conduct research, outreach, and education for the regulated community through the Fertilizer Research and Education Program.	CDFA	Statewide	CWA §319(h)	Number of workshops; Number of publications		x	x	x	x	Ongoing activity
	Restore riparian areas – replace orchard with riparian vegetation	RWQB 5, local agencies	Phelan Island	CWA §319(h)	Replacement of orchards	x	x	x			
	Program for alternative practices for prunes	RWQB 5, local agencies	Phelan Island	CWA §319(h)	Education workshops; field meetings	x	x	x			
Track and Monitor	See monitoring and tracking sections of Fifteen-Year Strategy and Five-Year Plan.					x	x	x	x	x	

004811

Process Element	Actions/ Statements	Lead Agency	Geographic Area	Potential Funding	Performance Measures	Years 98	99	00	01	02	Notes
Track and Monitor	Implement nutrient monitoring program to evaluate TMDL compliance.	RWQCBs	See list of TMDL implemented water bodies (above)			x	x	x	x	x	
	Develop and implement nutrient monitoring program	RWQCB 8	Newport Bay watershed	CWA §319(h)	Comprehensive nutrient monitoring program for evaluation of TMDL compliance		x	x	x	x	Requirement of Newport Bay TMDL
Report Biennially	See effectiveness and reporting sections of Fifteen-Year Strategy and Five-Year Plan.				Biannual NPS Report				x		

004812

Management Measure Category: Agriculture

Management Measure Title: 1D – Pesticide Management

Management Measures Targeting Level: Primary

Objectives:

1. By the year 2000, complete and begin implementation of a WQPP for agricultural pesticides in the MBNMS.
2. By the year 2002, develop and begin implementation of effective pesticide control program in Newport Bay Watershed as part of TMDL.
3. By the year 2003, develop a total of six TMDLs for pesticides in RWQCB 5.

Process Element	Actions/ Statements	Lead Agency	Geographic Area	Potential Funding	Performance Measures	Years 98	99	00	01	02	Notes
Assess	To be completed as specified in Part III.A. – Introduction /Structure.										
Target	To be completed as specified in Part III.A. – Introduction /Structure.										
Plan	Develop strategies for protection of resources from agricultural pollution, including pesticides, in cooperation with the MBNMS WQPP.	RWQCB 3 MBNMS CCC SWRCB	Central Coast	CWA §319	Complete final WQPP agriculture plan by summer 1999 and begin implementation.	x	x	x	x	x	Ongoing activity. Includes all NPSs impacting sanctuary watersheds
	Identify pesticide impairment to beneficial uses/water quality; develop effective pesticide control program through TMDL development and implementation.	RWQCB 8, local agencies	Newport Bay watershed	To be determined	Toxics TMDL	x	x	x	x		Toxics TMDL to be approved by the State by January 2002
	Analyze irrigation return water.	RWQCB 4	Ventura County		Collect and analyze as necessary for pesticide TMDLs			x	x	x	
	Coordinate with WMI and TMDL units to document levels of pesticides in receiving waters.	RWQCB 4 CDPR	RWQCB 4		Number of watersheds reviewed. Summary of findings		x	x	x	x	
Plan	Participate in the Sacramento River Watershed program to develop an organophosphate pesticide management strategy.	RWQCB 5S CDPR	Sacramento River Watershed	Sacramento River Watershed Project, CWA §319	Determine diazinon loading and toxicity evaluation	x	x	x			May extend to 2002. Will help TMDL development for diazinon.

004813

Process Element	Actions/ Statements	Lead Agency	Geographic Area	Potential Funding	Performance Measures	Years 98	99	00	01	02	Notes
	Develop TMDL for diazinon.	RWQCB 5S CDPR	Delta, Sacramento River, and San Joaquin River	Federal, CALFED	TMDL	x	x	x	x	x	
	Develop TMDL for chlorpyrifos.	RWQCB 5S CDPR	Delta and San Joaquin River	Federal, CALFED	TMDL	x	x	x	x	x	
	Develop water quality objectives for rice pesticides.	RWQCB 5S CDPR	Sacramento River	To be determined.	Water quality objectives						While work is a high priority, work cannot proceed without funding.
Coordinate	Prevent and mitigate threats to water quality from pesticides through coordination with the RWQCBs and implementation of the MAA and Pesticide WQMP with the CDPR.	SWRCB RWQCBs CDPR	Statewide	CWA §319	Conduct semi-annual technical briefings with CDPR and RWQCB staffs	x	x	x	x	x	Ongoing activity – RWQCB and CDPR staff work together as needed on indiv. pesticide TMDLs
	Review the control/eradication program for red imported fire ants (RIFA) in southern California in coordination with DFA, CDPR, and the RWQCBs.	CDPR, SWRCB, RWQCB 8, local agencies	Statewide Newport Bay Watershed	CWA §319	Comprehensive monitoring program for evaluation of impacts from RIFA eradication program	x	x	x	x		This may be an ongoing activity if eradication is not effective.
	Minimize/avoid NPS pollution in pest eradication programs. Consult with RWQCBs and SWRCB when developing programs.	DFA	Statewide		Consultation	x	x	x	x	x	
Implement	Implement strategies for protection of resources from agricultural pollution, including pesticides, in cooperation with the MBNMS WQPP.	RWQCB 3 MBNMS CCC SWRCB	Central Coast	CWA §319	Complete final WQPP agriculture plan by summer 1999 and begin implementation.	x	x	x	x	x	Ongoing activity. Includes all NPSs impacting sanctuary watersheds.
Implement	Enforce water quality standards.	RWQCB 4	RWQCB 4		Number of Enforcement Actions	x	x	x	x	x	

004814

Process Element	Actions/ Statements	Lead Agency	Geographic Area	Potential Funding	Performance Measures	Years 98	99	00	01	02	Notes
	Prevent aquatic toxicity from organophosphate pesticide residues through voluntary efforts to monitor for compliance with water quality standards.	CDPR, RWQCB 5, RWQCB 8	Sacramento River and San Joaquin River Watersheds; Newport Bay watershed	CDPR Regulation Fund, General Fund	Monitoring data		x	x	x	x	If by the year 2001-2002 use-season aquatic toxicity persists, CDPR will impose regulatory controls to lower dormant spray residues to acceptable levels.
	Reduce pesticides in both agricultural and urban surface water through local outreach to promote MPs that reduce pesticide runoff and through CDPR's registration process. Fund and assist in pesticide control applicator and grower training promoting pesticide management. Mitigate impacts through self-regulation as well as regulatory authorities of CDPR, SWRCB, and RWQCB.	CDPR, RWQCB 5, RWQCB 8, SWRCB	Statewide, with initial emphasis beginning with the San Joaquin River, Orestimba Creek, Sacramento River, Sacramento Slough, Wadsworth Canal, Colusa Basin Drain, Butte Slough; Newport Bay watershed	CALFED, CDPR Regulation Fund, General Fund, and Environmental License Fund	Number of pesticides evaluated in the registration process Number of pesticide control applicators and growers trained Decreases in OP pesticides use as reported in CDPR's pesticide use report database and corresponding increases in the use of lower risk pesticide control products. Descreases in surface water toxicity due to OP pesticides.		x	x	x	x	
Implement	Prevent pesticide contamination of ground water through education, modeling, and monitoring. Components include voluntary wellhead protection stewardship programs with the County Agricultural Commissioners; CDPR's registration process in which potential adverse effects to ground water quality are evaluated; and creation of Pesticide Management Zones (PMZs) which restrict or prohibit use when criteria are met.	CDPR, County Agriculture Commission	Statewide	CDPR Regulation Fund, General Fund	Number of pesticides evaluated in the registration process Number of PMZs created		x	x	x	x	Ongoing program

004815

Process Element	Actions/ Statements	Lead Agency	Geographic Area	Potential Funding	Performance Measures	Years 98	99	00	01	02	Notes
	Form alliances with the regulated community to jointly focus on reducing environmental risks while providing pest management solutions using IPM applied research, demonstration, implementation, and outreach.	CDPR	Statewide	CDPR Regulation Fund	Number of alliances		x	x	x	x	
	Provide grants for applied research focused on IPM practices and technologies.	CDPR	Statewide	Food Safety Fund	Number of grants Amount of grants		x	x	x	x	
	Reduce rice pesticide loading in the Sacramento and San Joaquin Rivers by managing water in treated fields so that discharges of pesticides into surface waters do not impair beneficial uses.	CDPR, SWRCB, RWQCB 5	Sacramento River and San Joaquin River Watersheds	CDPR Regulation Fund, General Fund	Documentation of loadings		x	x	x	x	
Track and Monitor	Coordinate water quality sampling program for RIFA program.	CDPR, SWRCB, RWQCB 8, local agencies	Statewide, Newport Bay Watershed	CWA §319	Comprehensive monitoring program for evaluation of impacts from RIFA eradication program	x	x	x	x		This may be an ongoing activity if eradication is not effective
	Work with CDPR and RWQCBs to target funds for monitoring for TMDL development.	CDPR, SWRCB, RWQCBs	Statewide	CDPR	Monitoring agreements		x	x	x	x	CDPR has received approximately $800,000 per year to do this monitoring.
Report Biennially	To be completed as specified in Part III.A. – Introduction /Structure.										

004816

Management Measure Category: Agriculture

Management Measure Title: 1E – Grazing Management

Management Measure Targeting Level: **Primary**

Objectives:

1. By the year 2000, develop MAA or MOU between SWRCB and BLM to implement CWA section 319 consistency review.
2. By the year 2003, complete rangeland WQMPs for two million acres throughout California.
3. By the year 2003, develop TMDLs with rangeland load allocation and implementation plans in two watersheds in RWQCB 1 and three watersheds in RWQCB 3.

Process Element	Actions/ Statements	Lead Agency	Geographic Area	Potential Funding	Performance Measures	Years 98	99	00	01	02	Notes
Assess	To be completed as specified in Part III.A. – Introduction /Structure.										
Target	To be completed as specified in Part III.A. – Introduction /Structure.										
Plan	Provide financial support for rangeland water quality workshops held by UC.	UCD Range and Agronomy, SWRCB	Statewide	CWA §319	Complete rangeland WQMPs for 500,000 acres each year.	x	x	x	x	x	Ongoing activity
	Participate in the MBNMS WQPP to develop strategies for protection of MBNMS resources from agricultural pollution, including rangeland.	RWQCB 3, MBNMS, CCC, SWRCB	Central Coast	CWA §319	Complete final WQPP agriculture plan by summer of 1999 and begin implementation	x	x	x	x	x	Ongoing activity, includes all NPSs impacting MBNMS watersheds
	Develop TMDLs for CWA §303(d) listed waters.	RWQCB 3	Lower Salinas River, Lower Pajaro River, Morro Bay Watershed	CWA §319, CWA §104, CWA §106, General Fund (funding fairly secure for development through 2001)	Adopted TMDL according to established schedule Implementation of practices per the TMDL	x	x	x	x	x	

004817

Process Element	Actions/ Statements	Lead Agency	Geographic Area	Potential Funding	Performance Measures	Years 98	99	00	01	02	Notes
Coordinate	Participate in the Range Management Advisory Committee to the BOF.	BOF/CDF, SWRCB	Statewide			x	x	x	x	x	Ongoing activity
	Implement CWA §319 consistency review in cooperation with BLM and other federal agencies.	BLM, SWRCB	Statewide	CWA §319	MAA or MOU	x	x	x			Includes all NPSs impacting BLM lands
	Participate on stakeholder technical advisory committee	RWQCB 5	Upper Pit River	NPS Program			x	x			
Implement	Participate in implementation of CFB NPS Initiative pilot projects, MBNMS WQPP Action Plan for Agriculture.	RWQCB 3, CFB, MBNMS, NRCS	Upper and Lower Salinas River, Lower Pajaro River	CWA §319, EQIP, Farm Bureau, MBNMS		x	x	x	x	x	
	Direct grant funds and cost sharing opportunities to projects that implement MPs.	RWQCB 3	Lands in irrigated agriculture and grazing throughout RWQCB 3	CWA §319	Implementation of at least one new project each year	x	x	x	x	x	
		RWQCB 5	Central Valley				x	x	x	x	
	Inspect areas with irrigated agriculture and grazing for sediment discharges and recommend or require abatement or new practices as appropriate.	RWQCB 3	Lands in irrigated agriculture and grazing throughout RWQCB 3	CWA §319, General Funds (funding not secure)	Number of inspections each year; number of inspection reports; implementation recommendations made in reports	x	x	x	x	x	
	Implement TMDLs for 303(d) listed waters.	RWQCB 1	Humboldt WMA Garcia River Watershed	CWA §319	Number of ranch plans per acres, monitoring plan, Number of sites monitored, data report		x	x	x	x	
		RWQCB 3	Lower Salinas River, Lower Pajaro River, Morro Bay Watershed	CWA §319, CWA §104, CWA §106, General Fund (funding fairly secure for development through 2001)	Adopted TMDL according to established schedule Implementation of practices per the TMDL	x	x	x	x	x	

004818

Process Element	Actions/ Statements	Lead Agency	Geographic Area	Potential Funding	Performance Measures	Years 98	99	00	01	02	Notes
Implement	Participate in the MBNMS WQPP to implement strategies for protection of MBNMS resources from agricultural pollution, including rangeland.	RWQCB 3 MBNMS CCC SWRCB	Central Coast	CWA §319	Complete final WQPP agriculture plan by summer 1999 and begin implementation.	x	x	x	x	x	Ongoing activity. Includes all NPSs impacting MBNMS watersheds
	Provide technical assistance to implement NPS Program for livestock grazing	RWQCB 5	Central Valley	NPS Program	Organized talk, field tours, individual meetings		x	x			
	Restoration project relying on BMP implementation (e.g. livestock enclosure fencing, stream channel erosion control measures, riparian revegetation)	RWQCB 5	Upper Pit River	NPS Program	Implementation of BMPs		x	x			
	Program for schools to initiate a watershed education program	RWCB5	Upper Pit River	NPS Program	Establish “river center”		x	x			Only partially funded
Track and Monitor	Resurvey participants in rangeland water quality workshops to determine extent of implementation of ranch water quality MPs.	UCCE	Statewide	CWA §319	Annual summary of level of implementation		x	x	x	x	
Report Biennially	To be completed as specified in Part III.A. – Introduction /Structure.										

004819

Management Measure Category: Agriculture

Management Measure Title: 1F – Irrigation Water Management

Management Measure Targeting Level: Secondary

Objectives:

1. By the year 2003, implement MMs to mitigate or reduce impacts from irrigation waters and drainage discharges.

Process Element	Actions/ Statements	Lead Agency	Geographic Area	Potential Funding	Performance Measures	Years 98	99	00	01	02	Notes
Assess	Coordinate with WMI and TMDL units to document levels of use and associated impacts to beneficial uses.	RWQCB 4	RWQCB 4		Basin Plan updates/TMDL assessments		x	x	x	x	
	Coordinate TMDL unit work with stakeholders to document levels of use and associated impacts to beneficial uses.	RWQCB 8	Newport Bay watershed				x	x	x	x	
Target	To be completed as specified in Part III.A. – Introduction /Structure.										
Implement	Coordinate with CFB, NRCS, agricultural groups, and educational institutions to promote appropriate irrigation techniques.	NRCS RWQCB	Ventura County	CWA §319	Number of stakeholder meetings		x	x	x	x	
	Quantify measures to reduce impacts from irrigation waters.	Agriculture groups	Ventura County; Newport Bay watershed	CWA §319	Documentation of selected (preferred) measures			x	x	x	RWQCB will coordinate as necessary for completion of TMDLs.
Plan	Develop methods and practices to manage and reduce toxic elements in drainage water.	DWR, DFA, SWRCB	San Joaquin Valley	Proposition 204 funds transfer	Documentation of feasible methods		x	x	x	x	Six-year program with funding under Proposition 204
	Conduct environmental planning for San Luis Drain.	SWRCB, Westlands Water District, USBR	San Joaquin Valley	Agricultural stakeholders	MOU, environmental documentation, discharge permit		x	x	x	x	
	Develop Basin Plan amendment for salt and boron for lower San Joaquin River	RWQCB 5	San Joaquin River	NPS Program	Basin Plan amendment		x	x			

004820

Process Element	Actions/ Statements	Lead Agency	Geographic Area	Potential Funding	Performance Measures	Years 98	99	00	01	02	Notes
Plan	Develop TMDL for salt and boron in San Joaquin River	RWQCB 5	San Joaquin River	NPS Program				x	x		
	Administer grant to evaluate implementation of economic incentives	RWQCB 5	San Joaquin River	NPS Program	Meetings; final report	x	x	x			
	Develop TMDL for selenium in San Joaquin River	RWQCB 5	San Joaquin River	NPS Program				x	x		
Coordinate	Hold bimonthly RWQCB Irrigated Agriculture Roundtable for information and strategy exchange.	SWRCB	RWQCBs 3, 5, 7	Baseline	Recommendations to SWRCB for NPS management of irrigated agriculture		x	x	x	x	Ongoing
	Participate in the San Joaquin Valley Drainage Implementation Program (SJVDIP).	DWR	San Joaquin Valley	Proposition 204 funds transfer	Revised drainage MP		x	x			
	Participate in stakeholder meetings on salt and boron implementation control plan	RWQCB 5	San Joaquin River	NPS Program	Meeting attendance		x	x	x	x	
Implement	Implement salt and boron control program	RWQCB 5	San Joaquin River	NPS Program				x	x	x	
	Real time management of salt in San Joaquin River	RWQCB 5	San Joaquin River	CALFED			x	x	x	x	
Track and Monitor	Perform effectiveness monitoring for salt and boron control program	RWQCB 5	San Joaquin River	NPS Program	Prepare and issue monitoring orders; receive and review monitoring reports			x	x	x	
	Real time management of salt in San Joaquin River	RWQCB 5	San Joaquin River	CALFED			x	x	x	x	
Report Biennially	To be completed as specified in Part III.A. – Introduction /Structure.										

004821

C. Forestry

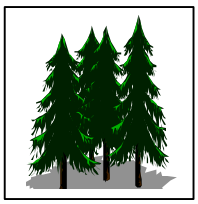

There are 12 MMs to address various phases of forestry operations relevant to controlling NPSs of pollution that affect State waters. The forestry MMs are for the most part a system of practices used and recommended by the BOF and CDF in rules or guidance.

Silviculture contributes pollution to 17 percent of the polluted rivers and 21 percent of the polluted lakes in California (SWRCB, 1996). Without adequate controls, forestry operations may degrade the characteristics of waters that receive drainage from forest lands. For example (1) sediment concentrations can increase due to accelerated erosion, (2) water temperatures can increase due to removal of over-story riparian shade, (3) dissolved oxygen can be depleted due to the accumulation of slash and other organic debris, and (4) concentrations of organic and inorganic chemicals can increase due to harvesting and fertilizers and pesticides.

California's MMs to address silvicultural sources of nonpoint pollution:

2A. Preharvest Planning
2B. Streamside Management Areas
2C. Road Construction/Reconstruction
2D. Road Management
2E. Timber Harvesting
2F. Site Preparation/Forest Regeneration
2G. Fire Management
2H. Revegetation of Disturbed Areas
2I. Forest Chemical Management
2J. Wetlands Forest
2K. Postharvest Evaluation
2L. Education/Outreach

Management Measures:

Preharvest Planning. Silvicultural activities shall be planned to reduce potential delivery of pollutants to surface waters. Components of MM 2A address aspects of forestry operations, including: the timing, location, and design of harvesting and road construction; site preparation; identification of sensitive or high-erosion risk areas; and the potential for cumulative water quality impacts.

Streamside Management Areas (SMAs). SMAs protect against soil disturbance and reduce sediment and nutrient delivery to waters from upland activities. MM 2B is intended to safeguard vegetated buffer areas along surface waters to protect the water quality of adjacent streams.

Road Construction/Reconstruction. MM 2C requires that road construction/reconstruction shall be conducted so as to reduce sediment generation and delivery. This can be accomplished by following, among other means, preharvest plan layouts and designs for road systems, incorporating adequate drainage structures, properly installing stream crossings, avoiding road construction in SMAs, removing debris from streams, and stabilizing areas of disturbed soil such as road fills.

Road Management. MM 2D describes how to manage roads to prevent sedimentation, minimize erosion, maintain stability, and reduce the risk that drainage structures and stream crossings will fail or become less effective. Components of this measure include inspections and maintenance actions to prevent erosion of road surfaces and to ensure the effectiveness of stream-crossing structures. The measure also addresses appropriate methods for closing roads that are no longer in use.

Timber Harvesting. MM 2E addresses skid trail location and drainage, management of debris and petroleum, and proper harvesting in SMAs. Timber harvesting practices that protect water quality and soil productivity also have economic benefits by reducing the length of roads and skid trails, reducing equipment and road maintenance costs, and providing better road protection.

Site Preparation and Forest Regeneration. Impacts of mechanical site preparation and regeneration operations—particularly in areas that have steep slopes or highly erodible soils or where the site is located in close proximity to a water body—can be reduced by confining runoff on site. MM 2F addresses keeping slash material out of drainageways, operating machinery on contours, timing of activities, and protecting ground cover in ephemeral drainage areas and SMAs. Careful regeneration of harvested forest lands is important in protecting water quality from disturbed soils.

Fire Management. MM 2G requires that prescribed fire practices for site preparation and methods to suppress wildfires should be conducted as feasible in a manner that limits loss of soil organic matter and litter and that reduces the potential for runoff and erosion. Prescribed fires on steep slopes or adjacent to streams and that remove forest litter down to mineral soil are most likely to impact water quality.

Revegetation of Disturbed Areas. MM 2H addresses the rapid revegetation of areas disturbed during timber harvesting and road construction—particularly areas within harvest units or road systems where mineral soil is exposed or agitated (e.g., road cuts, fill slopes, landing surfaces, cable corridors, or skid trails) with special priority for SMAs and steep slopes near drainageways.

Forest Chemical Management. Application of pesticides, fertilizers, and other chemicals used in forest management should not lead to surface water contamination. Pesticides must be properly mixed, transported, loaded, and applied; and their containers must be disposed of properly. Fertilizers must also be properly handled and applied since they also may be toxic depending on concentration and exposure. Components of MM 2I include applications by skilled workers according to label instructions, careful prescription of the type and amount of chemical to be applied, use of buffer areas for surface waters to prevent direct application or deposition, and spill contingency planning.

Wetland Forest Management. Forested wetlands provide many beneficial water quality functions and provide habitat for aquatic life. Under MM 2J, activities in wetland forests shall be conducted to protect the aquatic functions of forested wetlands.

Postharvest Evaluation. The goals of MM 2K are to incorporate postharvest monitoring, including: (a) implementation monitoring to determine if the operation was conducted according to specifications and (b) effectiveness monitoring after at least one winter period to determine if the specified operation prevented or minimized discharges.

Education/Outreach. The goals of MM 2L are to implement pollution prevention and education programs to reduce NPS pollutants generated from applicable silvicultural activities.

Management Measure Category: Forestry

Management Measure Title: Applicable to all MMs

Management Measure Targeting Level: All MMs are designated at the primary level, except for 2G-Fire Management and 2I-Forest Chemical Management which are at the secondary level and 2J-Wetlands Forest which is at the tertiary level.

Objectives:

1. By year 2001, adopt FPR to address watercourse and lake protection zones, roads and landings, exempt and emergency timber operations, mass wasting, and cumulative watershed effects.
2. By year 2003, increase agency staffing, broaden enforcement authority, increase review of THPs, and monitor effectiveness of MPs.

Process Element	Actions/ Statements	Lead Agency	Geographic Area	Potential Funding	Performance Measures	Years 98	99	00	01	02	Notes
Assess	A number of water bodies are identified on the CWA §303(d) list as having silvicultural activities that contribute to water quality impairments.	RWQCBs (excluding RWQCB 8)	Statewide	Current Staff	CWA §303(d) list	x		x		x	
Target	Of the impaired waters noted above, a number of water bodies are targeted for TMDL development by year 2003.	RWQCBs (excluding RWQCB 8)	Statewide	Current Staff	TMDL schedule	x		x		x	
Plan	Review the following issues and prepare recommendations that amend FPR: • Watersheds with ESA or CWA §303(d) listings, • Mass wasting, • Cumulative effects, • Scientific validity of rules for protection of ESA-listed salmonids, • Methodology for watershed assessment and cumulative effects assessment.	CDF, CDMG UC	Statewide, especially North Coast	State	Set of FPR amendments sent to BOF Amendments to CDF administrative manual	x	x				
	Propose modifications of the FPR to the BOF to address TMDLs and requirements of CZARA.	SWRCB RWQCB	Statewide	Budget Change Proposal (BCP) 99-00	Submit proposed FPR package to BOF	x	x	x			

004824

Process Element	Actions/ Statements	Lead Agency	Geographic Area	Potential Funding	Performance Measures	Years 98	99	00	01	02	Notes
	Adopt FPR amendments.	BOF	Statewide	State	FPR adopted by BOF FPR approved by OAL FPR become effective		x	x x x	x x x	 x	Rules cannot become effective until calendar year following OAL approval.
	Prepare and adopt watershed assessment and MP for Jackson State Forest.	CDF RWQCB 1	North Coast	State	Watershed assessment and MP	x	x				Coordinate with Noyo River TMDL.
Coordinate	Ongoing activity as part of FPR adoption	BOF	Statewide	State		x	x	x	x		
	Public review of proposed FPR amendments.	BOF	Statewide	State	Public comments	x	x	x			
Implement	Prepare budget for additional State agency staff to implement and enforce FPR.	CDF DFG RWQCB 1	Statewide, especially North Coast	State	Budgets submitted and approved Additional staff hired and trained	x	 x			x	Enhanced MMs implementation
	Implement amended FPR.	CDF	Statewide	State						x	
	Support legislation giving CDF civil administrative authority and substantial penalties to enforce FPR.	SWRCB CDF	Statewide	State	New statues enacted		x				Enhanced MMs enforcement.
	Implement watershed assessment and MP for Jackson State Forest.	CDF RWQCB 1	North Coast	State	Implementation of MP			x			
	Implement projects to reduce fuel loads	RWQCB 5, local agencies	Willow and Stockton Creek watersheds; American River Watershed	Prop 204			x	x	x		
Track and Monitor	Conduct statewide implementation/ effectiveness monitoring program.	CDF	Statewide	State	Monitor 50 sites per year Provide biennial reports to BOF	x x	x	x x	x	x x	

004825

Process Element	Actions/ Statements	Lead Agency	Geographic Area	Potential Funding	Performance Measures	Years 98	99	00	01	02	Notes
	Develop and implement administrative and repeated monitoring components.	BOF	Statewide	State	Develop new components Implement new components		x	x	x	x	Administrate = how well did planning evaluate potential impact? Repeated = re-monitor sites after stressing events
	Monitor implementation of MP in Jackson State Forest.	CDF RWQCB 1	North Coast	State	Monitoring of management plan, including instream trend and project monitoring			x	x	x	Instream monitoring component supplements hillslope component
	Monitor effects of hand application herbicides on surface water.	RWQCB 1	North Coast	General Fund	Monitor ten sites per year		x	x	x		
	Increase review of THPs.	RWQCB 1	North Coast	BCP 99-00	25 percent of THPs will be reviewed		x	x	x	x	
Report Biennially	To be completed as specified in Part III.A. – Introduction /Structure										

004826

D. Urban Areas

The SWRCB, CCC, and other State agencies have identified 15 MMs to address urban NPSs of pollution that affect State waters. With approximately 80 percent of the nation's population living in coastal areas, controlling polluted runoff in urban areas is a challenge. Negative impacts of urbanization on coastal and estuarine waters are well documented in a number of sources, including California's CWA section 305(b) and section 319 reports and the Nationwide Urban Runoff Program.

California's MMs to address urban sources of nonpoint pollution:

3.1 Runoff from Developing Areas
- A. Watershed Protection
- B. Site Development
- C. New Development

3.2 Runoff from Construction Sites
- A. Construction Site Erosion and Sediment Control
- B. Construction Site Chemical Control

3.3 Runoff from Existing Development
- A. Existing Development

3.4 On-site Disposal Systems (OSDSs)
- A. New OSDSs
- B. Operating OSDSs

3.5 Transportation Development (Roads, Highways, and Bridges)
- A. Planning, Siting, and Developing Roads and Highways
- B. Bridges
- C. Construction Projects
- D. Chemical Control
- E. Operation and Maintenance
- F. Road, Highway, and Bridge Runoff Systems

3.6 Education/Outreach
- A. Pollution Prevention/Education: General Sources

Major pollutants found in runoff from urban areas include sediment, nutrients, oxygen-demanding substances, road salts, heavy metals, petroleum hydrocarbons, pathogenic bacteria, and viruses. Suspended sediments constitute the largest mass of pollutant loadings to receiving waters from urban areas. Construction is a major source of sediment erosion. Petroleum hydrocarbons result mostly from automobile sources. Nutrient and bacterial sources include garden fertilizers, leaves, grass clippings, pet wastes, and faulty septic tanks. As population densities increase, a corresponding increase occurs in pollutant loadings generated from human activities. Many of these pollutants enter surface waters via runoff without undergoing treatment.

Urban runoff management requires that several objectives be pursued simultaneously. These objectives include the following (American Public Works Association, 1981):

- Protection and restoration of surface waters by the minimization of pollutant loadings and negative impacts resulting from urbanization;
- Protection of environmental quality and social well-being;
- Protection of natural resources, e.g., wetlands and other important aquatic and terrestrial ecosystems;
- Minimization of soil erosion and sedimentation problems;
- Maintenance of the predevelopment hydrologic conditions;
- Protection of ground water resources;
- Control and management of runoff to reduce or prevent flooding; and
- Management of aquatic and riparian resources for active and passive.

Management Measures:

The control of urban NPS pollution requires the use of two primary strategies: (1) the prevention of pollutant loadings and (2) the treatment of unavoidable loadings. California's urban MMs are organized to parallel the land use development process in order to address the prevention and treatment of NPS pollution loadings during all phases of urbanization. This strategy relies primarily on the watershed approach, which focuses on pollution prevention and source reduction practices. Emphasizing pollution prevention and source reduction practices over treatment practices is favored because conducting education practices and incorporating pollution prevention practices into project planning and design activities are generally more effective, require less maintenance, and are more cost-effective in the long term than treatment strategies. Treatment strategies should only be used to address unavoidable loadings or where they are truly cost-effective.

The major opportunities to control NPS loadings occur during the following three stages of development: (1) the siting and design phase, (2) the construction phase, and (3) the post-development phase. Before development occurs, land in a watershed is available for a number of pollution prevention and treatment options, such as setbacks, buffers, or open space requirements, as well as wet ponds or constructed urban runoff wetlands that can provide treatment of the inevitable runoff and associated pollutants. In addition, siting requirements and restrictions and other land use ordinances, which can be highly effective, are more easily implemented during this period. After development occurs, these options may no longer be practicable or cost-effective. MMs 3.1A through 3.1C address the strategies and practices that can be used during the initial phase of the urbanization process.

The control of construction-related sediment loadings is critical to maintaining water quality. The implementation of proper erosion and sediment control practices during the construction stage can significantly reduce sediment loadings to surface waters. MMs 3.2A and 3.2B address construction-related practices.

After development has occurred, lack of available land severely limits the implementation of cost-effective treatment options. MM 3.6A focuses on improving controls for existing surface water runoff through pollution prevention to mitigate NPSs of pollution generated from on-going domestic and commercial activities.

Management Measure Category: 3.1 – Urban Areas

Management Measure Title: 3.1 – Runoff from Developing Areas; 3.1A - Watershed Protection; 3.1B - Site Development; and 3.1C - New Development

Management Measure Targeting Level: Secondary

Objectives:

1. Provide general goals for State and local agencies to use in developing comprehensive watershed protection programs for guiding future development and land use activities in a manner that will prevent and mitigate the effects of NPS pollution.
2. Reduce the generation of NPS pollutants and mitigate the impacts of urban runoff and associated pollutants that result from new development or redevelopment.

Process Element	Actions/ Statements	Lead Agency	Geographic Area	Potential Funding	Performance Measures	Years 98	99	00	01	02	Notes
Assess	Develop watershed task forces and coordinate task force efforts with RWQCB programs.	RWQCB 4	Los Angeles Region		• Quarterly meetings • WMI Chapters		x	x	x	x	As needed for WMI and TMDL development and implementation
	Conduct more intensive site-specific evaluations of impacts of Cal/Trans and local government road maintenance practices.	RWQCB 6	Regionwide		Inspections	x	x	x	x	x	
Target	Target applicable MMs through the WMI implementation plans.	SWRCB RWQCBs	Statewide	Current staff	Include MMs in WMI implementation plans	x	x	x	x	x	
	Support the Urban Pesticide Committee (UPC) in its role in coordinating activities of the SF Bay Area and Central Valley agencies and other entities interested in OP pesticides in urban creeks	RWQCB 2, RWQCB 5	Urban areas in SF Bay Area and Central Valley	NPS Program, TMDL funding, and BCPs	Funding of RWQCB staff to conduct UPC meetings and coordinate agency activities			x	x	x	

004829

Process Element	Actions/ Statements	Lead Agency	Geographic Area	Potential Funding	Performance Measures	Years 98	99	00	01	02	Notes
Plan	Promote watershed planning and the development of regional watershed MPs that include MMs, and foster implementation of these plans.	SWRCB, SCC, CCC, local and regional entities, RCDs, Governor's Office of Planning and Research	Regional Watersheds	CWA §§205j and 319 SB 271 DOC Division Of Land Resources Protection grant program	Development of at least five watershed plans that include MMs and provide for their implementation by 2002. Upgrade CEQA checklist and General Plan guidelines and provide training to local government staffs. Include CAMMPR in the Office of Planning and Research: A Guide to Planning in California. Integrate MMs into Basin Plans as needed.	x	x	x	x	x	
	Review project plans for road construction and maintenance.	RWQCB 6	Region wide		Inspections	x	x	x	x	x	
Coordinate	Provide technical support to cities in development of Urban Runoff Plans using the Model Urban Runoff Program (MURP).	SWRCB, RWQCBs (excluding RWQCB 8), CCC	Statewide (watershed based)	CWA 319 Local governments	Distribute MURP to all Phase II NPDES cities and other local governments on request Develop a CAMMPR guidance module for USEPA sponsored NPDES permit writers conference Host a MURP seminar at the League of Cities Planners Institute	x	x	x	x	x	
	Work with municipalities to develop appropriate grading ordinances aimed at controlling impacts from new development.	RWQCB 3, CCC, MBNMS WQPP in Central Coast RWQCB 6	MBNMS Regionwide	NPDES Storm Water—Non Chapter 15	Grading ordinances	x	x	x	x	x	

004830

Process Element	Actions/ Statements	Lead Agency	Geographic Area	Potential Funding	Performance Measures	Years 98	99	00	01	02	Notes
Coordinate	Coordinate with developer and regulatory agencies, erosion standards for development.	Local planning agencies, RWQCB 4	Los Angeles Region		Reduction in number of erosion and sedimentation complaints by 50 percent	x	x	x	x	x	
	Conduct BMP workshops for local developers	RWQCB 6, RWQCB 8	Regionwide	NPDES Storm Water—Non Chapter 15	Workshops	x	x	x	x	x	
Implement	Incorporate applicable MMs into NPDES permits that come up for review	SWRCB, RWQCBs, SWQTF	Statewide (watershed based)	NPDES	Incorporation of MMs into NPDES permits that come up for renewal Develop a CAMMPR guidance module for USEPA-sponsored NPDES permit writer's conference.	x	x	x	x	x	
	Review new LCPs, LCPAs, and CDP applications brought before it for appropriate NPS pollution prevention and control.	CCC	Coastal Zone	BCPs		x	x	x	x	x	
	Implement Water Quality Protection Program for Monterey Bay National Marine Sanctuary.	MBNMS WQPP CCC RWQCBs 2 and 3	MBNMS	BCPs CWA §319 NOAA	WQPP Structural and nonstructural controls pilot program (to include elements such as erosion and sedimentation controls, regional urban runoff management strategy, technical training, and public education)		x	x	x	x	
	Work with cities and counties to implement MURP.	CCC, RWQCB 2 and 3, MBNMS WQPP	MBNMS and region wide	BCPs, CWA §319, Local governments	MURP implementation in three new cities or counties			x	x	x	

004831

Process Element	Actions/ Statements	Lead Agency	Geographic Area	Potential Funding	Performance Measures	Years 98	99	00	01	02	Notes
Implement	Enforce sites where erosion and sedimentation are uncontrolled.	RWQCB 4	Los Angeles Region			x	x	x	x	x	
	Citizen's Monitoring Program	RWQCB 5	Sacramento River Watershed	NPS Program	Convening workshops		x	x	x		
	Through the UPC, assist municipalities in addressing OP pesticide TMDLs by coordinating work needed to be performed as part of TMDL elements (e.g., source identification, implementation). Work with CDPR through the UPC and in developing urban OP pesticide TMDLs.	RWQCB 2, RWQCB 3	Urban areas in SF Bay Area and Central Valley	NPS Program, TMDL funding	Active participation of CDPR, municipalities and other interested entities (e.g., pesticide registrants, UC Departments) in UPC			x	x	x	
Track and Monitor	Incorporate applicable MMs into Urban TMDL development strategies and implementation plans.	RWQCBs	Watershed Management Areas (WMAs) CWA §303(d) listed water bodies	State and Federal	To be determined			x	x	x	
	Permit tracking five-year review.	RWQCBs (excluding RWQCB 8), CCC	Statewide by Region	State and one-time grant	Increased use of MM and number of WQ issues reviewed in permits					x	To complete performance measures review, one-time funding will be necessary.
Report Biennially	To be completed as specified in Part III.A. – Introduction /Structure										

004832

Management Measure Category: Urban Areas

Management Measure Title: 3.4 – On-site Disposal Systems; 3.4A – New On-site Disposal Systems; and 3.4B – Operating On-site Disposal Systems

Management Measure Targeting Level: Secondary

Objectives:

1. Improve coordination among State agencies and between State and local agencies in all matters dealing with OSDS.
2. Develop a consistent statewide and/or regional approach to policy interpretation, regulation, implementation, and development of standards for OSDS to support regional and/or local regulation.
3. Provide financial, technical, and educational assistance to help ensure that OSDSs are located, designed, installed, operated, inspected, and maintained to prevent the discharge of pollutants onto surface water and into ground water.
4. Provide financial and technical assistance for and educational information on "alternative" OSDS technologies (i.e., other than conventional gravity septic tank-leachfield systems).

Process Element	Actions/ Statements	Lead Agency	Geographic Area	Potential Funding	Performance Measures	Years 98	99	00	01	02	Notes
Assess	To be completed as specified in Part III.A. – Introduction /Structure										
Target	Provide loans or grants to counties for upgrades to individual systems.	SWRCB, local municipalities	Statewide	SRF loans	Loans provided and individual systems upgraded				x	x	OSDS TAC Recommendation
Plan	Establish uniform statewide standards for minimum criteria for OSDS siting and design (appropriate additional criteria will depend on local geographical and topographical conditions and level of protection required for regional beneficial uses).	SWRCB	Statewide	Proposed BCP	Minimum criteria						OSDS TAC Recommendation
	Review local OSDS-related policies and ordinances of local governments within one or more regions (e.g., within the MBNMS) and evaluate these planning and implementation mechanisms for regional consistency and effectiveness.	CCC in coordination with SWRCB, RWQCBs, and others (excluding. RWQCB 8)	Identified CCAs (e.g., the MBNMS)	CZMA or CWA grants	Matrix and analysis of ordinances, policies, criteria, etc.		x				Modeled after similar recommended action in MBNMS (WQPP) Urban Action Plan

004833

Process Element	Actions/ Statements	Lead Agency	Geographic Area	Potential Funding	Performance Measures	Years 98	99	00	01	02	Notes
Coordinate	Assign or redirect SWRCB and/or RWQCB staffs to support OSDS activities.	SWRCB, RWQCBs in coordination with other agencies that have related/ overlapping authority	Statewide	BCPs or redirection of staff; MOUs with other agencies	New OSDS Unit at the SWRCB	x	x	x	x	x	Recommendation in NPS Initiatives Report and OSDS TAC Report
	Develop a Memorandum of Agreement (MOA) between public agencies that operate facilities that use OSDS (e.g., Cal/Trans, DPR, Dept. of Corrections) and the SWRCB, RWQCBs, and local health departments to ensure that the public facilities meet the same technical standards and achieve the same level of scrutiny as other OSDSs.	SWRCB	Statewide	General Funds	MOA		x				Pointed out as a problem in the OSDS TAC report
	Establish a State and/or regional center for the coordination and advancement of OSDS research and development to provide education and training to educators, designers, installers, and regulators of OSDS.	Sea Grant or NEP	Statewide; begin in pilot project area (e.g., CCA or NEP such as SMB NEP)	General Fund appropriated through new legislation	Facility with training materials and website					x	Model after program in Buzzards Bay Project National Estuary Program See also OSDS TAC Report Stakeholder recommendation (Heal the Bay [HTB])
	Develop a program to provide homeowner education and to encourage or require appropriate system operation and maintenance.	Nonprofit in coordination with SWRCB, RWQCBs, (excluding RWQCB 8) local municipalities	Statewide	CWA §319	HomeASyst program developed and used in a reported number of homes.					x	OSDS TAC Recommendation (Can model after the "HomeASyst" program for OSDSs that is implemented in North Carolina and other states)

004834

Process Element	Actions/ Statements	Lead Agency	Geographic Area	Potential Funding	Performance Measures	Years 98	99	00	01	02	Notes
Implement	Provide assistance to local developers in achieving the stated OSDS MM objectives.	SWRCB, RWQCBs (excluding RWQCB 8) in coordination with other agencies that have related/ overlapping authority	Statewide	BCPs or redirection of staff; MOUs with other agencies	New OSDS Unit at the SWRCB	x	x	x	x	x	Recommendation in NPS Initiatives Report and OSDS TAC Report
	Prepare clear and formal guidance concerning the application of existing SWRCB policies as they relate to OSDS.	SWRCB	Statewide	General Funds BCP	Guidance memorandum Update the Minimum Guidelines for the Control of Individual Wastewater Treatment and Disposal Systems by including non-standard systems		x				Recommendation in NPS Initiatives Report and OSDS TAC Report Refers to SWRCB Resolutions No. 68-16 and 88-63 RWQCB 2 suggestion
	Provide technical assistance and oversight on siting and proper application of alternative technology.	SWRCB and RWQCBs	Statewide	General funds	Distribution and Implementation of California On-Site Sewage Disposal System Ordinance, 3/99			x		x	Recommendation in NPS Initiatives Report and OSDS TAC Report
	Adopt statewide performance standards for all OSDSs within the coastal zone by January 2001.	DHS with SWRCB, CCC	Statewide	General Funds	Standards for WDRs			x			See potential requirements in AB 885
	Achieve compliance with above standards within 3 years after adoption of OSDS performance standards.	SWRCB	Statewide	General Funds	Use of 3-tier authority or enforcement actions					x	See potential requirements in AB 885
	Provide technical assistance for assessing cumulative impacts of OSDS and aid local agencies in the development of procedures for addressing cumulative impacts.	SWRCB, RWQCBs, and CCC in coordination with a local government	Pilot project in a critical coastal area (MBNMS or San Luis Obispo County?)	NOAA funds	Development of watershed modeling and cumulative assessment tools (GIS, etc.)			x	x		Recommendation in NPS Initiatives Report and OSDS TAC Report Coordinate with CCC ReCAP Project?

004835

Process Element	Actions/ Statements	Lead Agency	Geographic Area	Potential Funding	Performance Measures	Years 98	99	00	01	02	Notes
Implement	Develop a uniform standard of practice for the inspection of OSDS and pumping of tanks if necessary during real estate transfers or property refinancing.	SWRCB, RWQCB (excluding RWQCB 8)	Statewide							x	OSDS TAC Recommendation
	Establish a State and/or regional center for the coordination and advancement of OSDS research and development (including alternative systems).	Sea Grant or NEP	Statewide; begin in pilot project area (e.g., CCA or NEP such as SMB NEP)	General Fund appropriated through new legislation	Facility with training materials and website					x	Model after program in Buzzards Bay Project NEP See also OSDS TAC Report Stakeholder recommendation (HTB)
	Develop consistent inspection and reporting protocols and certification of inspection forms for septic tank pumpers.	SWRCB, RWQCB (excluding RQWCB 8)	Statewide							x	OSDS TAC recommendation
	Develop data management systems to provide better tracking of inspection, maintenance, and performance information for OSDSs.	SWRCB, RWQCB (excluding RQWCB 8)	Statewide							x	OSDS TAC recommendation
	Provide technical assistance for siting new on-site systems to ensure that (1) suitable septage disposal facilities are available for existing and proposed OSDSs and (2) construction standards were met during and after installation.	SWRCB, RWQCB (excluding RQWCB 8), CCC	Statewide			x	x	x	x	x	
	Develop and implement a program for annual inspection and certification of on-site system compliance to determine that the systems are operating in a manner that protects water quality.	SWRCB, RWQCB	Statewide			x	x	x	x	x	Trigger if other actions do not occur Stakeholder recommendation (HTB)

004836

Process Element	Actions/ Statements	Lead Agency	Geographic Area	Potential Funding	Performance Measures	Years 98	99	00	01	02	Notes
Implement	Review and update the waiver resolutions.	RWQCB 2	Marin, Alameda, Contra Costa, San Mateo, Napa, Solano, Sonoma, Santa Clara Counties	BCP	Update two waiver resolutions per year for eight counties						
	Develop requirements for OSDS-maintenance-related activities (e.g., septic tank pump, switching of leachfields), where appropriate, based on occupancy patterns.	SWRCB, RWQCB (excluding RQWCB 8)	Statewide	Current staff	Guidelines	x		x		x	Stakeholder recommendation (HTB)
Track and Monitor	Support the development of improved OSDS inspection and maintenance practices.										OSDS TAC recommendation
	Evaluate the adequacy of local oversight programs which have been under waiver resolutions with the RWQCB.	RWQCB 2	Marin, Alameda, Contra Costa, San Mateo, Napa, Solano, Sonoma, Santa Clara Counties	BCP	Produce two Evaluation Reports per year for eight counties with findings and recommendations		x	x	x	x	RWQCB 2 suggestion
	Develop a mechanism to track effectiveness and implementation of urban BMPs for OSDSs and sediment/erosion control.	SWQTF	Regional	Contract staff					x		SWQTF subcommittee
Report Biennially	To be completed as specified in Part III.A. – Introduction /Structure										

004837

Management Measure Category: Urban Area

Management Measure Title: 3.6A - Education and Outreach

Management Measure Targeting Level: Primary

Objectives:

1. Implement educational programs to provide greater understanding of watersheds.
2. Raise awareness of and increase the use of applicable urban MMs and MPs where needed to control and prevent adverse impacts to surface and ground water.
3. Involve the general public in coastal and watershed protection programs.
4. Improve watershed education in public schools.
5. Improve NPS practitioners' ability to support community-based watershed management.

Process Element	Actions/ Statements	Lead Agency	Geographic Area	Potential Funding	Performance Measures	Years 98	99	00	01	02	Notes
Assess	To be completed as specified in Part III.A. – Introduction /Structure										
Target	To be completed as specified in Part III.A. – Introduction /Structure										
Plan	Develop urban pesticide control education program.	Local agencies, RWQCBs 2, 4, and 8	Newport Bay, SFB, Los Angeles County	CWA §319	Pesticide control program Household pesticide media campaign			x	x	x	RWQCB 8 suggestion SWQTF/Public Information Public Participation (PIPP) Committee
	Develop and implement a watershed and polluted runoff component into the Adopt-A-Highway Program.	Cal/Trans	Statewide	Cal/Trans	Pollution prevention information given to every Adopt-A-Highway participant			x	x	x	Adopt-A-Highway is currently a Coastal Cleanup Coordinating partner

004838

Process Element	Actions/ Statements	Lead Agency	Geographic Area	Potential Funding	Performance Measures	Years 98	99	00	01	02	Notes
Plan	Outreach and education under WMI—stakeholder meetings and workshops.	RWQCB 6	WMI target watersheds (Truckee, Upper Truckee, Carson, Owens, Mojave River watersheds)	CWA §§104/106, 319 Program Cost Account (PCA) 111 (WMI)		x	x	x	x	x	
	Public education—plan and participate in activities such as Air Faire, Truckee River Days, Earth Day, National Wetlands Month; place educational exhibits and make presentations at public schools and in other public places.	RWQCB 6 local agencies	Regionwide	CWA §§104/106, 319 PCA 111 (WMI)		x	x	x	x	x	
Coordinate	Coordinate and participate in training sessions, workshops, and community events.	SWRCB, RWQCBs, CCC	Regional	Current staff	List of events participated in	x	x	x	x	x	RWQCB 3 suggestion
	Integrate watershed and polluted runoff information into public information provided by the CCC's General Education Program.	CCC	Statewide	Current staff	Information on the CCC web page, including links to education and water quality programs, and list of contacts	x	x				
				CCC license plate	Chapter(s) in Coastal Resources Guide and/or Coastal Access Guide(s)					x	CCC's Coastal CPR Plan
	Provide watershed and polluted runoff information at coastal access points—such as State Parks, piers, beaches locations.	DPR, CCC	Statewide	State Parks current staff SCC CCC license plate	Posting of information in existing displays and, where feasible, installation of additional displays Conduct talks with park visitors Conduct special community education events at parks	x	x	x	x	x	CCC's Coastal CPR Plan DPR suggestion
Implement	Implement education component of MURP—a joint project by the City of Watsonville, MBNMS, and CCC.	MBNMS, CCC	Monterey Bay	Cal/RA, CCC current staff	Local education program		x	x			CCC's Coastal CPR Plan
	In public schools, participate in Adopt-a-Watershed and other watershed-awareness activities.	RWQCB 6, local agencies	Regionwide with focus in WMI target watersheds	CWA §§104/106, 319 PCA 111 (WMI)		x	x	x	x	x	

004839

Process Element	Actions/ Statements	Lead Agency	Geographic Area	Potential Funding	Performance Measures	Years 98	99	00	01	02	Notes
Implement		RWQCB 8, local agencies	Regionwide with focus in WMI target watersheds	CWA §§104/106, 319 PCA 436 (NPS)		x	x	x	x	x	
	Use the RWQCB's table top watershed model to demonstrate the water quality impacts from development activities.	RWQCB 6	Regionwide with focus in WMI target watersheds	CWA §§104/106, 319 PCA 111 (WMI)		x	x	x	x	x	
	Prepare newspaper articles and press releases to increase public awareness of watershed issues.	RWQCB 6	Regionwide with focus in WMI target watersheds	CWA §§104/106, 319 PCA 111 (WMI)		x	x	x	x	x	
	Integrate watershed and polluted runoff information into the CCC's General Education Programs and applicable publications.	CCC	Statewide	CCC license plate	Chapter in Save Our Seas Program and SEA Camp curriculum(s)	x	x	x	x	x	CCC's Coastal CPR Plan
	Integrate watershed and polluted runoff information into the CCCs General Education Programs and applicable publications.	CCC	Statewide	CCC license plate	Field monitoring guide for Adopt-A-Beach programs Integrate watershed and polluted runoff messages into Coastal Cleanup media		x	x	x	x	CCC's Coastal CPR Plan
	Distribute a Polluted Runoff Edition of the SCC's magazine *Coast & Ocean*.	SCC	Statewide	SCC	An edition of *Coast & Ocean*			x			Suggested at meeting with SCC
	Support financially the development, distribution, and implementation of K-12 watershed education curriculum.	SWRCB	Statewide	CWA §319	Complete K-12 Watershed Curriculum	x	x	x	x	x	Urban TAC recommendation
	Provide training in use of watershed curricula and development of watershed education programs to teachers and administrators.	SWRCB through Adopt-A-Watershed	Statewide	SRF loan CWA §319	Training for 300 teachers or administrators per year	x	x	x	x	x	Urban TAC recommendation
	Distribute watershed/water quality K-12 appropriate curricula.	SWRCB via Adopt-A-Watershed	Statewide	SRF loan CWA §319	2500 copies per year	x	x	x	x	x	Urban TAC recommendation
	Sacramento River Watershed Program, Public Outreach and Education Subcommittee.	RWQCB 5	Northern Central Valley	Congressional Appropriations	Workshops Technical documents Watershed brochure		x	x	x	x	

004840

Process Element	Actions/ Statements	Lead Agency	Geographic Area	Potential Funding	Performance Measures	Years 98	99	00	01	02	Notes
Implement	Conduct Placer County RCD bioassessment and training seminars and related activities.	Placer County RWQCB 5	Northern Central Valley	CWA §319(h)	Conduct bioassessment training Conduct seminars on sedimentation		x	x			See grant for details.
	Assess watershed and polluted runoff educational programs in California, including public awareness baseline and follow-up surveys and evaluate their effectiveness	CCC	Statewide	CWA §319 CCC License Plate funds Other government or corporate grants	Guide to programs and effectiveness Marine and Coastal Educational Resources Directory		x	x	x	x	CCC's Coastal CPR Plan
Track and Monitor	Assess watershed and polluted runoff educational programs in California, including public awareness baseline and follow-up surveys and evaluate their effectiveness.	CCC	Statewide	California Department of Education Cal/RA	Compendium of State agency programs related to NPS/CZARA Program				x		Most NPS/CZARA State agency partners are involved in California Environmental Education Interagency Network (CEEIN)
Report Biennially	To be completed as specified in Part III.A. – Introduction /Structure										

004841

E. Marinas and Recreational Boating Management Measures[24]

Recreational boating and marinas are increasingly popular uses of coastal areas and inland surface water bodies (e.g., lakes and delta). And, they are an important means of public access, and California must balance the need for protecting the environment and the need to provide adequate public access (USEPA, 1993). Because marinas and boats are located at the water's edge, pollutants generated from these sources are less likely to be buffered or filtered by natural processes. When boating and adjunct activities (e.g., marinas and boat maintenance areas) are poorly planned or managed, they may pose a threat to water quality and the health of aquatic systems and may pose other environmental hazards. Sources of pollution associated with marinas and boating include:

- Poorly flushed waterways;
- Pollutants discharged from boats (recreational boats, commercial boats, and "live-aboards");
- Pollutants carried in storm water runoff;
- Physical alteration of wetlands and of shellfish/ other benthic communities during construction of marinas, ramps, and related facilities;
- Pollutants generated from boat maintenance activities on land and in the water.

California's marina and recreational boating MMs:

4.1 Assessment, Siting and Design
- A. Water Quality Assessment
- B. Marina Flushing
- C. Habitat Assessment
- D. Shoreline Stabilization
- E. Storm Water Runoff
- F. Fueling Station Design
- G. Sewage Facilities
- H. Waste Management Facilities

4.2 Operation and Maintenance
- A. Solid Waste Control
- B. Fish Waste Control
- C. Liquid Material Control
- D. Petroleum Control
- E. Boat Cleaning and Maintenance
- F. Maintenance of Sewage Facilities
- G. Boat Operation

4.3 Education/Outreach
- A. Public Education

There are 16 MMs to address marina and boating sources of nonpoint pollution. Effective implementation of these MMs can (1) avoid impacts associated with siting marinas and boat maintenance areas, (2) ensure the best available design and construction practices (for new and expanding facilities), (3) ensure appropriate operation and maintenance practices to prevent and/or reduce the delivery of NPS pollutants to State waters, and (4) encourage the development and use of effective pollution control and education efforts. The MMs cover the following operations and facilities:

- Any facility that contains ten or more slips, piers where ten or more boats may tie up, or any facility where a boat for hire is docked;
- Any residential or planned community marina with ten or more slips;
- Any mooring field where ten or more boats are moored;
- Public or commercial boat ramps;
- Boat maintenance or repair yards that are adjacent to the water and any federal, State, or local facility that involves recreational boat maintenance or repair on or adjacent to the water.

The Implementation Plan involves targeting implementation of six of the 16 marina and boating MMs, specifically those measures for water quality assessment, sewage facilities, boat cleaning and maintenance, hazardous waste

[24] Commercial and military ports are not targeted in this Program Plan because they are subject to the storm water NPDES permits regulating industrial and construction activities. Commercial ports are also required to submit a port master plan (PMP) for certification by the CCC. The PMP must include the conditions contained in Coastal Act section 30711. An NPS-related condition is "an estimate of the effect of development on habitat areas and the marine environment, a review of existing water quality, habitat areas, and quantitative and qualitative biological inventories, and proposals to minimize and mitigate any substantial adverse impact." Section 30711 further states that, "each city, county, or city and county which has a port within its jurisdiction shall incorporate the certified [PMP] in its [LCP]." In addition, activities in military ports are subject to federal consistency review by the CCC, affording the State an opportunity to ensure that appropriate NPS pollution prevention and control measures are in place. Ports located in the San Francisco Bay are under the jurisdiction of SFBCDC and subject to regulations of the MPA.

management, and public education. These MMs and related actions were identified by representatives of the marina and boating community at four meetings held between December 1998 and April 1999 and by the SWRCB, RWQCBs, and CCC. The 1994 Marina TAC Report provided additional recommendations. The 16 MMs are summarized below.

Assessment, Siting, And Design Management Measures:

41.A **Water Quality Assessment.** Consider impacts to water quality in siting and designing new and expanding marinas.

41.B **Marina Flushing.** Site and design marinas to provide for maximum flushing and circulation of surface waters, which can reduce the potential for water stagnation, maintain biological productivity, and reduce the potential for toxic accumulation in bottom sediment.

41.C **Habitat Assessment.** Site and design marinas to protect against adverse impacts on fish and shellfish, aquatic vegetation, and important locally, State, or federally designated habitat areas.

41.D **Shoreline Stabilization.** Stabilize shorelines where shoreline erosion is a pollution problem.

41.E **Storm Water Runoff.** Implement runoff control strategies to remove at least 80 percent of suspended solids from storm water runoff coming from boat maintenance areas (some boatyards may conform to this provision through NPDES permits).

41.F **Fueling Station Design.** Locate and design fueling stations to contain accidental fuel spills in a limited area; and provide fuel containment equipment and spill contingency plans to ensure quick spill response.

41.G **Sewage Facilities.** Install pump out, pump station, and restroom facilities at new and expanding marinas where needed to prevent sewage discharges directly to State waters.

41.H **Waste Management Facilities.** Install facilities at new and expanding marinas where needed for the proper recycling or disposal of solid wastes (e.g., oil filters, lead acid batteries, used absorbent pads, spent zinc anodes, and fish waste as applicable) and liquid materials (e.g., fuel, oil, solvents, antifreeze, and paints).

Operation And Maintenance Management Measures:

4.2A **Solid Waste Control.** Properly dispose of solid wastes produced by the operation, cleaning, maintenance, and repair of boats to limit entry of these wastes to surface waters.

4.2B **Fish Waste Control.** Promote sound fish waste management where fish waste is an NPS problem through a combination of fish cleaning restrictions, education, and proper disposal.

4.2C **Liquid Material Control.** Provide and maintain the appropriate storage, transfer, containment, and disposal facilities for liquid materials commonly used in boat maintenance; and encourage recycling of these materials.

4.2D **Petroleum Control.** Reduce the amount of fuel and oil that leaks from fuel tanks and tank air vents during the refueling and operation of boats.

4.2E **Boat Cleaning and Maintenance.** Minimize the use of potentially harmful hull cleaners and bottom paints and prohibit discharges of these substances to State waters.

4.2F **Maintenance of Sewage Facilities.** Maintain pumpout facilities in operational condition and encourage their use so as to prevent and control untreated sewage discharges to surface waters.

4.2G **Boat Operation.** Prevent turbidity and physical destruction of shallow-water habitat resulting from boat wakes and prop wash.

Education and Outreach Management Measures:

4.3A **Public Education.** Institute public education, outreach, and training programs to prevent and control improper disposal of pollutants into State waters.

Management Measure Category: Marinas and Recreational Boating

Management Measure Title: 4.1A--Water Quality Assessment

Management Measure Targeting Level: Primary

Objectives:

1. By the year 2003, determine baseline water quality conditions in at least 50 percent of California's marinas in targeted geographical regions.

Process Element	Actions/ Statements	Lead Agency	Geographic Area	Potential Funding	Performance Measures	Years 98	99	00	01	02	Notes
Assess	Inventory existing data on water quality conditions at marinas to identify levels and potential sources of priority pollutants/stressors such as metals (e.g., copper, lead, tributyltin [TBT]), pathogens/high coliform counts, and other pollutants associated with boat discharges/vessel wastes and other recreational boating-related operations).	CCC, RWQCBs	Statewide	CWA §319 or CZMA §6217	Compilation of data from 1998 CWA §303(d) list, §305(b) report, and other sources.		x				Marina TAC and attendees of 1998-1999 stakeholder meetings identified the need for State to provide baseline data to aid in assessing the effectiveness of implementing MPs.
Target	To be completed as specified in Part III.A. – Introduction /Structure										
Plan	To be completed as specified in Part III.A. – Introduction /Structure										
Coordinate	Provide water quality data to marinas (port captains, harbor masters, lessors, marina owners, etc.) and the public to help identify baseline conditions.	RWQCBs, SWRCB	MBNMS and San Francisco, Tomales, Morro, Santa Monica, and San Diego Bays, Anaheim Bay and Hunting-ton Harbor Marin County (as pilot project in RWQCB 2).	To be determined. BCP	Water quality assessment reports developed and provided to marina operators and for the boating community						Sources of data may include NPDES permits, CWA §401 certifications, CEQA reports, State Mussel Watch Program, and regional surveys (e.g., Coordinated Monitoring Program of the Comprehensive Management Plan for San Diego Bay)

004844

Process Element	Actions/ Statements	Lead Agency	Geographic Area	Potential Funding	Performance Measures	Years 98	99	00	01	02	Notes
Implement	Establish baseline water quality data at marinas.	RWQCBs, SWRCB	MBNMS and San Francisco, Tomales, Morro, Santa Monica, and San Diego Bays	To be determined.	See above Plans to establish baseline data at marinas		x		 x	x x	
		RWQCB 8 with SWRCB, SCCWRP, DFG (Mussel Watch data), and other entities	Lower Newport Bay and Anaheim/ Huntington Harbor	SWRCB BCP for additional funding SWRCB grant to SCC Wetlands Restoration Project (WRP) Current funds	On-line searchable water quality database	x	x	x	x	x	Limited data are available from BPTCP program; need to update and conduct additional monitoring
Track and Monitor	To be completed as specified in Part III.A. – Introduction /Structure										
Report Biennially	To be completed as specified in Part III.A. – Introduction /Structure										

004845

Management Measure Category: Marinas and Recreational Boating

Management Measure Title: 4.1G and 4.2F--Sewage Facilities Siting, Design, and Maintenance

Management Measure Targeting Level: Primary

Objectives:

1. By the year 2003, establish regional standards for the minimum number of sewage facilities (e.g., fixed, mobile, and/or floating pump outs, dump stations, and restrooms) per recreational vessel in the MBNMS, San Francisco, Tomales, Morro, Santa Monica, and San Diego Bays, and SFB Delta.
2. Provide for the installation and maintenance of an adequate number of sewage facilities in the above-listed regions, and increase accessibility to and use of all facilities.

Process Element	Actions/ Statements	Lead Agency	Geographic Area	Potential Funding	Performance Measures	Years					Notes
						98	99	00	01	02	
Assess	Identify water bodies on CWA §303(d) list that are listed for bacteria (or other indicators related to vessel sewage) and that are potentially affected by discharges at marinas.	SWRCB	Statewide assessment		Data provided to marina operators (port captains, harbormasters, lessors, marina owners, etc.) and public		x				See also actions for water quality assessment (MM 4.1A)
	Assess effectiveness of current vessel sewage waste programs in selected regions.	MBNMS WQPP	MBNMS		Assessment and recom-mendations for changes to current program						
		San Francisco Estuary Project (SFEP)	SFB								
		Morro Bay NEP	Morro Bay								
		SMB NEP	Santa Monica Bay								
		Orange County, City of Newport Beach, RWQCB 8	Lower Newport Bay				x	x			Requirement of Newport Bay fecal coliform TMDL
	Assess whether or not adequate enforcement powers exist for and are being implemented by federal, State, and/or local enforcement personnel.	SWRCB, RWQCBs, DBW	Statewide by region	CWA §319	Assessment and recommendations for new laws if needed			x			Recommendation from 2/99 CCBN meeting

004846

Process Element	Actions/ Statements	Lead Agency	Geographic Area	Potential Funding	Performance Measures	Years					Notes
						98	99	00	01	02	
Target	Expand educational programs aimed at marina operators to (a) promote a better understanding of the need to construct and maintain vessel sewage pump out facilities, (b) get commitment to construct new pump outs; and (c) provide assistance in applying for Clean Vessel Act (CVA) grant funds.	DBW	Statewide by region	CVA	Workshops and education materials	x	x	x	x	x	Recommendation in SFEP letter (1/99)
	Identify future sources of funding for installation of sewage pump out facilities pending reauthorization of CVA.	DBW	Statewide	Current staff	Support for funding in CVA reauthorization		x				
Plan	Establish minimum standards defining what constitutes an "adequate" number of pump outs, dump stations, and/or restroom facilities.	RWQCBs (excluding RWQCB 8) and DBW (coordinate with permit and leasing agencies and regional entities [e.g., MBNMS and NEPs])	Statewide by region (e.g., MBNMS, Santa Monica Bay, Morro Bay, and SFB NEPs, San Diego Bay)	CVA, CWA §319	MOA among SWRCB, RWQCBs, and DBW establishing minimum standards for regions		x	x			Recommendation in 1/19/99 letter from SFEP DBW guidelines are one station per 300 boats—California currently has 125 stations for 85,000+ boats (or less than one station per 680 boats)
Coordinate	Establish agreements regarding the lead or shared responsibility for inspection of pump out facilities.	RWQCBs (excluding RWQCB 8) and local health departments	Statewide by region	Agency General Funds	MAAs or MOUs with appropriate agencies		x	x	x		Recommendation in Marina TAC and Initiatives in NPS Mgmt.
	Establish clear lines of authority for enforcement of violations	RWQCBs and local governments	Statewide by region	Agency General Funds	MAAs by region			x			Recommendation in SFEP letter (1/99)

004847

Process Element	Actions/ Statements	Lead Agency	Geographic Area	Potential Funding	Performance Measures	Years 98	99	00	01	02	Notes
Coordinate	Develop and regularly maintain a vessel sewage information clearinghouse to include: • BMPs; • Guidance on how to comply with federal, State, and local laws and regulations; • Examples of effective pump out operations currently used around the State; • Referrals to sources of reliable information.	DBW	Statewide	CVA, CWA §319, and other grants as applicable	Internet web site with information and links to other sites (DBW, UC Sea Grant, USCG Auxiliary, etc.)	x	x	x	x	x	Marina TAC recommendation
Implement	Meet minimum standards through: (a) Financial incentives (e.g., grants to marinas; launch ramp grants to provide dump stations);	DBW	Statewide by region	CVA, CWA §319	Meet standards in target regions by 2003		x	x	x	x	Marina TAC recommendation
	(b) Permit and lease conditions through permit issuance and renewal as appropriate.	City and county government, and other permit and lessor agencies (e.g., CCC, BCDC, SLC, DPR)	Statewide by region	Agency General Funds			x	x	x	x	Marina TAC recommendation
	(c) Recommend or require as necessary that commercial entities install pump out facilities.	RWQCB 2, Marin County Parks and Recreation Department, DPR, and National Park Service	Tomales Bay, Marin County	BCP	Assist commercial entities in applying for CVA grants Install pump out facilities			x x	x x	x x	
	(d) Instigate enforcement program and effectively enforce violations	RWQCBs and local gov'ts	Statewide by region	Agency General Funds		x	x	x	x	x	

Process Element	Actions/ Statements	Lead Agency	Geographic Area	Potential Funding	Performance Measures	Years					Notes
						98	99	00	01	02	
Track and Monitor	Pursue a water quality indicator test specific for human pathogens (e.g., evaluate utility of switching from total and fecal coliform indicators to enterococcus as an indicator of public health risk related to vessel sewage).	SWRCB (Ocean Plan Unit staff)	Statewide	Current staff	Address issue in Ocean Plan Triennial Review			x			Marina TAC recommendation
Report Biennially	To be completed as specified in Part III.A. – Introduction /Structure										

004849

Management Measure Category: Marinas and Recreational Boating

Management Measure Title: 4.2E--Boat Cleaning and Maintenance

Management Measure Targeting Level: Primary

Objectives:

1. By the year 2003, develop and establish programs to implement BMPs for underwater hull cleaning and maintenance in 50 percent of marinas in the MBNMS and San Francisco, Morro, Santa Monica, and San Diego Bays.
2. Increase the availability and promote the use of financially feasible hull paints and cleaning materials whose contents are less toxic or that break down to non-toxic levels quickly within the marine environment, and decrease the use and release to State waters of toxic recreational boating hull paints (e.g., TBT and copper-based paints).

Process Element	Actions/ Statements	Lead Agency	Geographic Area	Potential Funding	Performance Measures	Years					Notes
						98	99	00	01	02	
Assess	Identify water bodies on CWA §303(d) list that are listed for copper, tributyltin, detergents (or other indicators related to boat cleaning and maintenance) and that are potentially affected by discharges at marinas.	SWRCB	Statewide assessment		Data provided to marina operators (port captains, harbormasters, lessors, marina owners, etc.) and public		x				See also actions for water quality assessment (MM 4.1A)
Target	Develop education program where divers who clean boats inform boat owners that they work in the water so please do not pollute, and divers provide information about less toxic bottom paints.	Dive groups	Statewide	CWA §319	Educational materials		x	x	x	x	Recommendations from Marina TAC and 12/98 marina stakeholder meeting
Plan	To be completed as specified in Part III.A. – Introduction /Structure										
Coordinate	Develop model ordinances and provide training for local enforcement personnel.	CCC	Statewide by region	To be determined	Training component for local enforcement personnel			x	x	x	Recommendation from 2/99 CCBN meeting
	Develop and regularly maintain a "clearinghouse" of boat cleaning and maintenance information such as: • Boat cleaning and maintenance BMPs; • A shopping guide for non-toxic paints, cleaners, solvents, etc.; • Guidance on how to comply with local, State, and federal laws and regulations; • Referrals to other sources of reliable information.	CCC (coordinate with CCBN)	Statewide	CCC general funds; CWA §319 and other grants as applicable	Internet web site with information and links to other sites (DBW, UC Sea Grant, USCG Auxiliary, etc.)		x			x	Marina TAC recommendation (The CCBN web page provides information at http://ceres.ca.gov/coastalcomm/ccbn/ccbndx.html)

004850

Process Element	Actions/ Statements	Lead Agency	Geographic Area	Potential Funding	Performance Measures	Years 98	99	00	01	02	Notes
Implement	Implement short-course hull-cleaning training and certification programs and policies using a 2-tier program based on: Tier 1: Self-certification program approved by SWRCB and CCC with specific targets (e.g., 75 percent of boat cleanings in region done by certified divers after four years); Tier 2: Regional certification (trigger to develop regional certification would be if self-certification program fails to meet identified targets).	RWQCBs (excluding RWQCB 8) or regional entity such as the MBNMS WQPP (coordinate with diver trade associations)	Regionally in State, beginning in San Diego, MBNMS, and SFB NEP	CWA §319 Federal dollars passed through NMSs or NEPs	Training and certification program initiated in 1+ regions 95 percent of marinas in above regions certify divers 75 percent of boat cleanings in region done by certified divers			x x	x		Recommended by Marina TAC, 12/98 marina stakeholder meeting, and MBNMS WQPP. In addition, a strategy in WQPP Action Plan III (Marinas & Boating) is to initiate a regional certification program.
	Promote the use of non-toxic products and target toxic products: (a) Hold a conference addressing recreational boating hull paints;	UC San Diego Cooperative Extension Sea Grant	Statewide	CWA §319, Sea Grant	Conference, with recom-mendations added to five-year plan		x	x			Recommendation from 12/98 marina stakeholder meeting
	(b) Work with manufacturers, distributors and USEPA to increase research and development and speed up the review and release to market of financially-feasible, non-toxic marine products;	SWRCB and DTSC (coordinate with NMMA)	Statewide	To be determined.	50 percent increase in alternative products in stores		x	x	x		Recommendation from 12/98 marina stakeholder meeting
	(c) Compile a list of options for less toxic products and distribute them through marinas, boatyards, and marine products stores;	CCBN	Statewide	CWA §319, Sea Grant	List of options		x	x	x	x	Strategy in MBNMS WQPP Action Plan III (Marinas and Boating)
	(d) Phase out of the use of toxic hull paints on State and local agency- owned vessels regardless of size;	Cal/RA and Cal/EPA	Statewide	General funds	Certifications by agencies		x	x	x	x	Recommendation from 12/98 marina stakeholder meeting
	(e) Recommend measures to reduce the transport of toxics into State waters from boats that have TBT or other toxic hull paints applied out-of-State;	SWRCB USEPA	California-Mexico border issue	To be determined	Recommendations added to five-year plan		x	x	x	x	Marina TAC recommendation

004851

Process Element	Actions/ Statements	Lead Agency	Geographic Area	Potential Funding	Performance Measures	Years 98	99	00	01	02	Notes
Implement	(f) Assess and promote stripping and refinishing technologies that reduce emissions and discharges, as well as regional guidelines for hull paint preparation to reduce premature detachment from hulls;	Port captains and harbor masters, boatyards	MBNMS pilot project and Statewide	To be determined	Clean technologies manual and guidelines		x	x	x	x	Strategy in MBNMS WQPP Action Plan III (Marinas & Boating)
	(g) Develop legislation that prohibits the sale and use of toxic hull paints, as necessary after a thorough analysis of situation.	SWRCB SCC	Statewide	To be determined	Passage of new legislation					x	Trigger, if toxic paints still widely applied and financially feasible alternatives are available
Track and Monitor	To be completed as specified in Part III.A. – Introduction /Structure										
Report Biennially	To be completed as specified in Part III.A. – Introduction /Structure										

004852

Management Measure Category: Marinas and Recreational Boating

Management Measure Title: 4.1H, 4.2A, and 4.2C--Hazardous and Toxic Materials Management

Management Measure Targeting Level: Primary for 4.1H-Waste Management Facilities and 4.2A-Solid Waste Control

Secondary for 4.2C-Liquid Material Control

Objectives:

1. Resolve potential regulatory and liability issues that currently discourage many harbor districts and marinas from taking a more active role in hazardous waste management.
2. Develop convenient disposal options for boaters that allow for the drop off and collection of hazardous wastes in marinas and harbors.
3. By the year 2003, develop and implement one or more pilot Temporary Waste Collection Program(s) where 100 percent of marinas in the pilot region(s) are included as collection points during the regular recruitment of common household hazardous wastes by municipalities and counties.

Process Element	Actions/ Statements	Lead Agency	Geographic Area	Potential Funding	Performance Measures	Years 98	99	00	01	02	Notes
Assess	Assess existing hazardous waste disposal and used oil recycling services available to California boaters in order to identify gaps in service.	CCC, SFEP, and Santa Monica Bay Restoration Project	Statewide by region	CIWMB	Report to CIWMB and public	x	x	x			A survey of marinas in Northern and Southern California has been conducted by the CCC's BCGC.
Target	To be completed as specified in Part III.A. – Introduction /Structure										
Plan	To be completed as specified in Part III.A. – Introduction /Structure										
Coordinate	To be completed as specified in Part III.A. – Introduction /Structure										
Implement	Resolve issues discouraging harbors and marinas from temporarily storing hazardous and toxic materials generated by boaters (such as waste oil, batteries, paints, solvents, antifreeze, detergents, and contaminated fuels) until pickup and/or recycling by local waste management agencies. (For example, investigate the possibility of obtaining categorical exemptions for harbors for periodic collection and/or transport of small quantities of hazardous materials.)	DTSC, City and County Household Hazardous Waste (HHW) agencies	MBNMS pilot project and Statewide	CWA §319	MOA (e.g., between DTSC, HHW agencies, RWQCBs, SWRCB, and Port Captains and Harbor Masters Association) or new legislation			x			Recommendations from Marina TAC, 12/98 and 1/99 marina stakeholder meetings, and MBNMS WQPP Action Plan III (Marinas & Boating)

004853

Process Element	Actions/ Statements	Lead Agency	Geographic Area	Potential Funding	Performance Measures	Years 98	99	00	01	02	Notes
Implement	Coordinate waste disposal and recycling programs to include marinas as a collection point during the regular recruitment of common household hazardous wastes. Key steps may include: • Plan development of temporary waste collection program that includes recycling programs for waste oil and batteries; • Obtain funding; • Develop sites; • Establish procedures to handle materials at collection points within designated harbors and marinas; • Implement pickup services program; and • Implement education programs.	City and County Environ-mental Health and HHW Departments (coordinate with waste management districts and port captains and harbor masters; in MBNMS coordinate with WQPP)	MBNMS pilot project and Statewide	SWRCB, DTSC, and/or CIWMB grants			x	x	x	x	Marina TAC recommendation (Marina TAC identified waste oil and batteries as the two most voluminous hazardous wastes) See also Strategy M.4 in MBNMS WQPP Action Plan III (Marinas & Boating)
Track and Monitor	To be completed as specified in Part III.A. – Introduction /Structure										
Report Biennially	To be completed as specified in Part III.A. – Introduction /Structure										

004854

Management Measure Category: Marinas and Recreational Boating

Management Measure Title: 4.3--Education/Outreach

Management Measure Targeting Level: Primary

Objectives:

1. Communicate to boaters and owners/operators of marinas and boatyards the environmental and economic impacts of pollution; identify and increase the awareness and use of MMs and BMPs where needed to prevent and control adverse impacts associated with marinas and boats.
2. Enhance and coordinate State educational, technical and financial assistance, and enforcement programs to assist the boating community's efforts to implement MMs to prevent and control polluted runoff from marinas, boat yards, and boating activities.

Process Element	Actions/ Statements	Lead Agency	Geographic Area	Potential Funding	Performance Measures	Years 98	99	00	01	02	Notes
Assess	Assess existing pollution prevention and control programs regionally and/or statewide.	DBW CCC	Statewide								
	Assess existing efforts to develop coordinated regional or watershed-based public education and outreach programs related to marina and boat-related activities; identify educational/outreach program needs statewide and expand and build upon effective efforts.	CCBN	Statewide by region	CIWMB, CWA §319, CVA funds, CCC license plate funds, UC Coop. Ext., and other sources		x	x	x	x	x	Marina TAC recommendation. The CCBN is comprised of agency, public and private members.
Target	To be completed as specified in Part III.A. – Introduction /Structure										
Plan	To be completed as specified in Part III.A. – Introduction /Structure										
Coordinate	Continue implementation of the CCC's BCGC, which includes the facilitation of the California CCBN as a forum to conduct public outreach, manage marina and boating impacts, and participate in the development and implementation of NPS MMs and NPS Program strategies and action plans.	CCC	Statewide	CIWMB	Conduct BCGC; develop action plan for the future	x	x				The CCC's BCGC is currently funded through April 2000 only.

004855

Process Element	Actions/ Statements	Lead Agency	Geographic Area	Potential Funding	Performance Measures	Years 98	99	00	01	02	Notes
Implement		CCC	Statewide	CIWMB	Marina and Boater education materials including: • 60,000 California Boater kits • Pollution Solutions binders • Catalog of Marina and Boater education materials	x	x	x			To date 30,000 California Boater kits have been developed and are being distributed at boat shows, in dock walking programs, and through marine dealerships. The kits contain a "Quick Reference Clean Green Boating" placard and other materials on environmentally sound boating practices.
		CCC	Statewide	CIWMB	Volunteer "Dockwalking" training in Northern and Southern California		x	x			Focuses on training trainers. Approximately 100 people attended an April 1999 dock walking training in SFB area. An additional training in San Diego/ Los Angeles regions is planned in 1999.
		CCC	Statewide	CIWMB	Conferences	x	x	x	x	x	Partnering with local agencies, the CCC co-hosted two conferences in 1998 addressing boat pollution reduction strategies

004856

Process Element	Actions/ Statements	Lead Agency	Geographic Area	Potential Funding	Performance Measures	Years 98	99	00	01	02	Notes
Implement		CCC	Southern California	CIWMB	Research of target groups in Southern California		x				
	Conduct education workshop.	SFEP, RWQCB 2	Marin County	BCP	Education brochure and workshop		x				
	Post-educational information at boat ramps and other areas.	DPR, DBW, CCC, Santa Monica Bay Restoration Project	Statewide	CIWMB, SCC, CCC license plate	Posting of information in existing displays; installation of new displays	x	x				To date, CCC has installed more than 250 signs around the State to date.
Track and Monitor	To be completed as specified in Part III.A. – Introduction /Structure										
Report Biennially	To be completed as specified in Part III.A. – Introduction /Structure										

004857

F. Hydromodification Management Measures

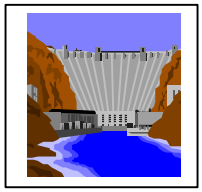

The SWRCB, CCC, and other State agencies have identified seven MMs to address hydromodification sources of nonpoint pollution affecting State waters. Hydromodification includes modification of stream and river channels, dams and water impoundments, and streambank/shoreline erosion.

California's MMs to address sources of nonpoint pollution related to hydromodification activities:

5.1 Channelization/Channel Modification
- A. Physical and Chemical Characteristics of Surface Waters
- B. Instream and Riparian Habitat Restoration

5.2 Dams
- A. Erosion and Sediment Control
- B. Chemical and Pollutant Control
- C. Protection of Surface Water Quality & Instream and Riparian Habitat

5.3 Streambank and Shoreline Erosion
- A. Eroding Streambanks & Shorelines

5.4 Education/Outreach
- A. Educational Programs

Channel modification activities are undertaken in rivers or streams to straighten, enlarge, deepen, or relocate the channel. These activities can affect water temperature, change the natural supply of fresh water to a water body, and alter rates and paths of sediment erosion, transport, and deposition. Hardening the banks of waterways with shoreline protection or armor also accelerates the movement of surface water and pollutants from the upper reaches of watersheds into coastal waters. Channelization can also reduce the suitability of instream and streamside habitat for fish and wildlife by depriving wetlands and estuarine shorelines of enriching sediments, affecting the ability of natural systems to filter pollutants, and interrupting the life stages of aquatic organisms (USEPA, 1993).

Dams can adversely impact hydrology and the quality of surface waters and riparian habitat in the waterways where the dams are located. A variety of impacts can result from the siting, construction, and operation of these facilities. For example, improper siting of dams can inundate both upstream and downstream areas of a waterway. Dams reduce downstream flows, thus depriving wetlands and riparian areas of water. During dam construction, removal of vegetation and disturbance of underlying sediments can increase turbidity and cause excessive sedimentation in the waterway.

The erosion of shorelines and streambanks is a natural process that can have either beneficial or adverse impacts on riparian habitat. Excessively high sediment loads resulting from erosion can smother submerged aquatic vegetation, cover shellfish beds and tidal flats, fill in riffle pools, and contribute to increased levels of turbidity and nutrients.

Management Measures:

Channelization/Channel Modification. California's MMs for channelization and channel modification promote the evaluation of channelization and channel modification projects. Channels should be evaluated as a part of the watershed planning and design processes, including watershed changes from new development in urban areas, agricultural drainage, or forest clearing. The purpose of the evaluation is to determine whether resulting NPS changes to surface water quality or instream and riparian habitat can be expected and whether these changes will have a detrimental (or negative) impact. Existing channelization and channel modification projects can be evaluated to determine the NPS impacts and benefits associated with the projects. Modifications to existing projects, including operation and maintenance or management, can also be evaluated to determine the possibility of improving some or all of the impacts without changing the existing benefits or creating additional problems. In both new and existing channelization and channel modification projects, evaluation of benefits and/or problems will be site specific.

Dams. The second category of MMs addresses NPS pollution associated with dams. Dams are defined as constructed impoundments that are either: (1) 25 feet or more in height *and* greater than 15 acre-feet in capacity or (2) six feet or more in height *and* greater than 50 acre-feet in capacity. MMs 5.2A and 5.2B address two problems associated with dam construction: (1) increases in sediment delivery downstream resulting from construction and operation activities and (2) spillage of chemicals and other pollutants to the waterway during construction and operation. MM 5.2C addresses the impacts of reservoir releases on the quality of surface waters and instream and riparian habitat downstream.

Streambank and Shoreline Erosion. The third category of hydromodification measures addresses the stabilization of eroding streambanks and shorelines in areas where streambank and shoreline erosion creates a polluted runoff problem. Bioengineering methods such as marsh creation and vegetative bank stabilization are preferred. Streambank and shoreline features that have the potential to reduce polluted runoff shall be protected from impacts, including erosion and sedimentation resulting from uses of uplands or adjacent surface waters. This MM does not imply that all shoreline and streambank erosion must be controlled; the measure applies to eroding shorelines and streambanks that constitute an NPS problem in surface waters.

Education/Outreach. MMs 5.4A focuses on the development and implementation of pollution prevention and education programs for agency staffs and the public, as well as the promotion of assistance tools that emphasize restoration and low-impact development. Education, technical assistance, incentives, and other means can be used to promote projects that: (1) reduce NPS pollutants, (2) retain or reestablish natural hydrologic functions (e.g., channel restoration projects and low-impact development projects), and/or (3) prevent and restore adverse effects of hydromodification activities.

Management Measure Category: Hydromodification

Management Measure Titles: 5.1 – Channelization/Channel Modification; 5.3 – Streambank and Shoreline Erosion; and 5.4-Education/Outreach (Hydromodification)

Management Measure Targeting Level: Primary for MM 5.4-Education/Outreach and secondary for all others.

Objectives:

1. By the year 2001, implement CWA §401 certification program regulations to delegate program authority to the RWQCBs.
2. By the year 2002, develop a technical assistance manual that will assist local governments and small businesses with guidelines for designing projects to avoid wetlands and riparian areas.
3. By the year 2001, adopt general WDRs that prescribe channel maintenance activities with minimal threat to water quality.

Process Element	Actions/ Statements	Lead Agency	Geographic Area	Potential Funding	Performance Measures	Years 98	99	00	01	02	Notes
Assess	To be completed as specified in Part III.A. – Introduction /Structure										
Target	To be completed as specified in Part III.A. – Introduction /Structure										
Plan	Ensure compliance with CEQA and Porter-Cologne Act when certifying nationwide permits.	USACOE/ SWRCB	Statewide	State Fee	Certification of selected activities	x	x	x	x	x	
	Develop regulations that delegate CWA §401 authority to RWQCBs.	SWRCB	Statewide	State Fee, Grants, BCP	Implementation	x	x	x			
	Develop CEQA guidelines for wetlands and watershed analysis (e.g. an appendix to CEQA guidelines).	SWRCB, CCC, Office of Planning and Research	Statewide	State Fee, Grants, BCP	Modified CEQA guidelines	x	x	x	x	x	
	Develop a technical assistance program for project design that will include guidelines for designing projects to avoid wetlands and riparian areas.	SWRCB	Statewide	State Fee	Guidance to RWQCBs and local government on MPs, model ordinance provisions, methods of establishing setbacks	x	x	x	x		
	Participate in regional floodplain planning activities, such as Bay Area Wetlands Planning Group (BAWPG).	Various	Regional	CWA §319	Statewide application of regional initiatives	x	x	x	x	x	

004860

Process Element	Actions/ Statements	Lead Agency	Geographic Area	Potential Funding	Performance Measures	Years 98	99	00	01	02	Notes
Plan	• Develop a framework linking stream, hydrological, and ecological functions to beneficial uses, • Develop criteria for protecting ecological functions and other beneficial uses of streams, • Prepare staff report for Basin Plan Amendment • Draft Stream Protection Policy	RWQCB 2	Regionwide		• A report linking beneficial uses to stream functions specific to the Bay Area • Outline criteria for protecting beneficial uses of streams specific to the Bay Area • Draft staff report to initiate Basin Planning process • Draft Stream Protection Policy	x x x x	x x x x	x x x x	x x x x	x x x x	
Coordinate	Establish formal agreements between agencies on program-level issues in order to streamline the permitting process and better protect resources.	SWRCB, RWQCBs, DFG, CCC, USACOE, USEPA, USFWS	Statewide	State Fee, Grants, BCP	Joint application forms, consolidated permits, MOUs or MAAs	x	x	x	x	x	
	Participate in USEPA Floodplain Management Group to develop guidance on floodplain management.	USEPA	Statewide	CWA §319	Guidance	x	x	x	x	x	
	Work cooperatively with USACOE on modifying and improving emergency permits.	USACOE/ SWRCB	Statewide	State Fee	Certification of Emergency Permits	x	x	x	x	x	
	Coordinate wetlands-related projects in southern California with the work of the wetlands recovery project.	SCC, RWQCB 8	Southern California	?	Include projects in WRP database	x	x	x	x	x	
	Conduct stakeholder workshops.				Convene a technical forum and summary of comments from workshops	x	x	x	x	x	
Implement	Education (see actions under Urban, Education MM)					x	x	x	x	x	

004861

Process Element	Actions/ Statements	Lead Agency	Geographic Area	Potential Funding	Performance Measures	Years 98	99	00	01	02	Notes
Implement	Assist entities engaged in hydromodification activities by disseminating up-to-date technical information on: flood management methods which preserve natural riparian values; construction and long-term maintenance costs of traditional and alternative flood management approaches; setbacks in floodplains and designating floodways; examples of existing ordinances and policies which minimize the need for channelization and channel hardening.	SWRCB	Statewide	State Fee, Grants, BCP	Technical Documents	x	x	x	x	x	
	a) Adopt general WDRs that prescribe MPs for various channel maintenance activities that pose minimal threat to water quality. b) Initiate enforcement actions when necessary.	RWQCB 2, SWRCB, Bay Area Storm Water Management Agencies Association (BASMAA), USACOE	Regionwide	CWA §319, CWA §104	a. Attend monthly meetings to identify MPs with associated channel maintenance activities b. Adopt general WDRs by RWQCB 2	x	x	x			
	Construct wetlands improvements	RWQCB 5 and local agencies	Cache Creek	Prop. 204			x	x	x		
Track and Monitor	Monitor for water quality improvement resulting from wetlands improvements	RWQCB 5 and local agencies	Cache Creek	Prop. 204			x	x	x		
Report Biennially	To be completed as specified in Part III.A. – Introduction /Structure										

004862

G. Wetlands, Riparian Areas, and Vegetated Treatment Systems

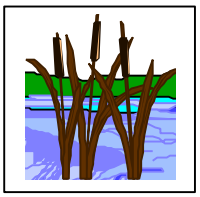

The SWRCB, CCC, and other State agencies have identified four MMs to promote the protection and restoration of wetlands and riparian areas and the use of vegetated treatment systems as means to control NPSs of pollution. Wetlands and riparian areas reduce polluted runoff by filtering out runoff-related contaminants, such as sediment, nitrogen, and phosphorus, thus maintaining the water quality benefits of these areas is important. These areas also help to attenuate flows from higher-than-average storm events. This protects downstream areas from adverse impacts, such as channel scour, erosion, and temperature and chemical fluctuations. Changes in hydrology, substrate, geochemistry, or species composition can impair the ability of wetland or riparian areas to filter out excess sediment and nutrients and therefore can result in deteriorated water quality. The following activities can cause such impairment: drainage of wetlands for cropland, overgrazing, hydromodification, highway construction, deposition of dredged material, and excavation for ports and marinas.

California's MMs to protect and restore wetlands and riparian areas and use vegetated treatment systems as means to control pollution from nonpoint sources:

6A. Protection of Wetlands & Riparian Areas

6B. Restoration of Wetlands & Riparian Areas

6C. Vegetated Treatment Systems

6D. Education/Outreach

Management Measures:

6A **Protection of Wetlands/Riparian Areas.** Implementation of MM 6A is intended to protect the existing water quality improvement functions of wetlands and riparian areas as a component of NPS Programs.

6B **Restoration of Wetlands/Riparian Areas.** Restoration of wetlands and riparian areas (MM 6B) refers to the recovery of a range of functions that existed previously by reestablishing hydrology, vegetation, and structure characteristics. Damaged or destroyed wetland and riparian areas should be restored where restoration of such systems will significantly abate polluted runoff.

6C **Vegetated Treatment Systems.** MM 6C promotes the installation of vegetated treatment systems (e.g., artificial or constructed wetlands) in areas where these systems will serve a polluted runoff-abatement function. Vegetated filter strips and engineered wetlands remove sediment and other pollutants from runoff and wastewater and prevent pollutants from entering adjacent water bodies. Removal typically occurs through filtration, deposition, infiltration, absorption, adsorption, decomposition, and volatilization.

6D **Education/Outreach.** MM 6D promotes the establishment of programs to develop and disseminate scientific information on wetlands and riparian areas and to develop greater public and agency staff understanding of natural hydrologic systems—including their functions and values, how they are lost, and the choices associated with their protection and restoration.

Wetlands, Riparian Areas, and Vegetated Treatment Systems

Management Measure Titles: 6A - Protection of Wetlands and Riparian Areas; 6B - Restoration of Wetlands and Riparian Areas; and 6D - Education/Outreach (Wetlands)

Management Measure Target Level: Primary for MM 6D and secondary for all others.

Objectives:

1. By the year 2001, implement CWA§401 certification program regulations to delegate program authority to the RWQCBs.
2. By the year 2002, develop a technical assistance manual that will assist local governments and small business with guidelines for designing projects to avoid wetlands and riparian areas.

Process Element	Actions/ Statements	Lead Agency	Geographic Area	Potential Funding	Performance Measures	Years 98	99	00	01	02	Notes
Assess	To be completed as specified in Part III.A. – Introduction /Structure										
Target	To be completed as specified in Part III.A. – Introduction /Structure										
Plan	Ensure compliance with CEQA and Porter-Cologne Act when certifying nationwide permits.	USACOE/ SWRCB	Statewide	State Fee	Certification of selected activities	x	x	x	x	x	
	Develop regulations that delegate CWA §401 authority to RWQCBs.	SWRCB	Statewide	State Fee, Grants, BCP	Implementation	x	x	x	x	x	
	Develop CEQA guidelines for wetlands and watershed analysis (e.g., an appendix to CEQA guidelines).	SWRCB, CCC, Office of Planning and Research	Statewide	State Fee, Grants, BCP	Modified CEQA guidelines	x	x	x			
	Develop a technical assistance program for project design that will include guidelines for designing projects to avoid wetlands and riparian areas.	SWRCB	Statewide	State Fee	Guidance to RWQCBs and local government on MPs, model ordinance provisions, methods of establishing setbacks	x	x	x	x		
	Participate in regional floodplain planning activities, such as BAWPG.	Various	Regional	CWA §319	Statewide application of regional initiatives	x	x	x	x	x	

004864

Process Element	Actions/ Statements	Lead Agency	Geographic Area	Potential Funding	Performance Measures	Years 98	99	00	01	02	Notes
Coordinate	Establish formal agreements between agencies on program-level issues in order to streamline the permitting process and better protect resources.	SWRCB, RWQCBs, DFG, CCC, USACOE, USEPA, U.S. Fish and Wildlife Service (USFWS)	Statewide	State Fee, Grants, BCP	Joint application forms, consolidated permits, MOUs or MAAs	x	x	x	x	x	
	Participate in USEPA Floodplain Management Group to develop guidance on floodplain management.	USEPA	Statewide	CWA §319	Guidance	x	x	x	x	x	
	Coordinate wetlands-related projects in Southern California with the work of the wetlands recovery project.	SCC	Southern California	?	Include projects in WRP database	x	x	x	x	x	
Implement	Education (see actions under Urban, Education MM)					x	x	x	x	x	
	Provide financial assistance to encourage environmentally friendly floodplain management.	SWRCB	Statewide	SRF	Various	x	x	x	x	x	
	Provide incentives for flood management approaches that minimize the need for channelization and channel hardening.	SWRCB	Statewide	State Fee, Grants, BCP	Regulatory flexibility, expedited permit review, and waived or reduced fees			x	x	x	
Track and Monitor	To be completed as specified in Part III.A. – Introduction /Structure										
Report Biennially	To be completed as specified in Part III.A. – Introduction /Structure										

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H. Critical Coastal Area

Actions

An initial task in the Strategy and the Implementation Plan is to create the CCA Interagency Committee to complete a list of criteria and methods for CCA designation. The Committee will consider the factors listed in the Strategy, as well as other criteria used by other programs to identify sensitive coastal areas. While CCA delineation will be based on special water quality concerns and may deviate from other classifications, the final CCA recommendation to be used by the CCC and SWRCB will fully consider other existing programs. Other programs that will be used to help designate CCAs include the ASBS, NERRs, the MBNMS WQPP, university research programs, TMDLs, and regional monitoring efforts. CCA designation will provide resources to special coastal areas which do not achieve priority ranking within other sections of this plan and will therefore provide solutions to program deficits.

In addition to creating a committee to identify CCA criteria, the Implementation Plan will include these specific actions:

1. Identify and map CCAs using newly developed criteria.
2. Dedicate funding and other resources to areas in which new or substantially expanding land uses may cause or contribute to the impairment of water quality within CCAs.
3. Increase public interest in protecting special coastal habitats by implementing additional MMs, supporting public education and outreach, and continuing local watershed restoration and research efforts within the CCAs.

CCA Coordination

The renewed emphasis by local governments and stakeholders on watershed-scale resource management (including the offshore marine component of watersheds) has provided California with initial information to help identify CCAs and apply additional MMs to these areas. Related programs from which to gain information include:

- The SWRCB has designated CWA section 319(h) funds for restoration efforts in watersheds with impaired water quality or impaired aquatic communities.
- The SWRCB, through the WQCP for the Ocean Plan, designates ASBS in State tidelands and submerged lands and can limit or prohibit discharges in their general proximity.
- The SWRCB BPTCP (CWC §§13390-13396) has identified numerous toxic coastal sediment deposits from urban and agricultural runoff.
- The CCC, RWQCB 4, and other entities are developing a long-term MP for the dredging and disposal of contaminated sediments for coastal waters adjacent to Los Angeles County. This plan must include components for watershed management and source reduction.
- The Cal/RA is leading a statewide work group to identify and coordinate offshore Marine Management Areas, which may be linked to adjacent CCAs.
- The MBNMS WQPP is developing a water quality plan that, when completed, may provide a mechanism to apply additional MMs to CCAs within watersheds draining to Monterey Bay.
- If a TMDL is completed within a designated CCA, the TMDL and CCA activities will be coordinated to help determine if additional MMs are needed.

Management Measure Category: Critical Coastal Areas

Objectives:

1. Identify and map initial list of CCAs.
2. Develop an ongoing process to identify CCAs and additional NPS MMs to implement as necessary in CCAs.
3. Provide information on CCAs (areas adjacent to impaired, threatened, and/or pristine coastal waters, including ocean waters that fail to attain or maintain Ocean Plan water quality standards) to local, State, and regional decision makers and the public.
4. Review water quality and land use data every two years as part of the CWA §305(b) WQAP.
5. Review the effectiveness of existing MM implementation in CCAs and identify and implement additional MMs as needed to protect and restore CCAs.
6. Update CCA list, maps, and watershed information at least every two years and report on implementation efforts at public hearings every two years.

Process Element	Actions/ Statements	Lead Agency	Geographic Area	Potential Funding	Performance Measures	Years 98	99	00	01	02	Notes
Assess	Convene a workgroup or use existing interagency forums, whose mission is to develop a process to identify CCAs and to identify and provide for the implementation of additional MMs in CCAs.	CCC SWRCB	Statewide	Current Staff (CZARA)	Workgroup meetings and process		x		x		The State will provide opportunities for public participation in the development of this process.
	Review the effectiveness of existing MMs in CCAs.	CCC, RWQCBs	Regional	Special Grants Mitigation Funds	Regional assessment of CCA WQ issues.		x	x		x	

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Process Element	Actions/ Statements	Lead Agency	Geographic Area	Potential Funding	Performance Measures	Years 98	99	00	01	02	Notes
Target	Identify and map CCA watersheds, including corresponding: • Areas of regional significance. • Special coastal habitats not a priority within other sections of this plan. • Coastal and ocean waters threatened by reasonably foreseeable increases in pollution loading. • Coastal and ocean waters not meeting water quality standards. • Coastal and ocean waters designated to prohibit degradation of water quality. • Pristine coastal waters.	CCC and SWRCB with RWQCBs	Watersheds that classify as CCAs pursuant to CZARA §6217(b)(2)	Current Staff (CZARA)	CCA list with maps available on Internet Review of CCA list and updates as needed		x		x x		As conditioned in the USEPA/NOAA Findings, CCAs include areas within the MBNMS and areas covered by NPDES storm water permits. The SWRCB and CCC will review lists and maps at public hearings.
Plan	Identify and implement applicable MMs to protect or restore water quality in coastal and ocean waters adjacent to CCAs.	CCC RWQCBs	CCAs	CZARA CWA §319	Implementation strategies and reports on status of implementation.				x	x	
Coordinate	Create CCA work groups to identify available resources and future needs.	CCC, RWQCBs	Coastal California	Current agency resources	Regional and site specific coordination agreements and resource allocation.			x	x		
	Identify key nonprofit and community groups for collaboration on regional CCA classification and review.	CCC CCA Committee	Regional	Current Staff	Number of participating nonprofit/community groups		x	x	x		

004868

Process Element	Actions/ Statements	Lead Agency	Geographic Area	Potential Funding	Performance Measures	Years 98	99	00	01	02	Notes
Coordinate	Convene public review of CCA implementation projects.	CCC RWQCBs	Regional	Current Staff Implementation Grants	Public Comments					x	
Implement	Work with local researchers and agencies to develop Additional MMs.	CCC CCA Committee	Regional and statewide	Special Grants	Modified and New MMs			x	x	x	
	Support funding of additional MM implementation.	CCC SWRCB	CCAs	Special Grants	Additional MM implementation		x	x	x	x	
Track and Monitor	Provide summaries of water quality and land use information for each identified CCA.	RWQCBs, CCC.	CCAs	Current Staff Special Grants	Summaries with data/maps			x		x	
Report Biennially	Provide information on CCA efforts to local, State, and regional decision-makers, regional review committee, and the public.	CCC RWQCBs	Statewide	Current Staff	Meeting presentations			x		x	
	Update CCA list, maps, and watershed information at least every two years, and report on implementation efforts and committee meetings.	CCC, RWQCBs	Statewide	Current Staff (CZARA)	Updated CCA lists and maps Reports of implementation on web site			x		x	

004869

I. Monitoring

Objectives

A. Evaluate the effectiveness of specific MMs or BMPs in improving water quality or achieving water quality standards.
B. Maximize usefulness of monitoring by coordinating effectiveness monitoring with other monitoring programs.
C. Improve usefulness of community-based watershed monitoring efforts by developing and reviewing new methods for ambient and effectiveness monitoring, disseminating quality assurance requirements, and increasing training opportunities.
D. Improve data acquisition, evaluation, and access.

Objective		Actions	Lead Agency	Geographic Area	Potential Funding	Performance Measures	Years: 98	99	00	01	02	Notes
MONITORING EFFECTIVENESS OF BEST MANAGEMENT PRACTICES												
A	1.	Design and implement a monitoring strategy to evaluate effectiveness of BMPs statewide that will:										
		a. Create criteria to assess functioning of BMPs used to reduce pollution from agriculture, forestry, urban practices, and marinas.	SWRCB UCD	Statewide	State	Functioning assessment criteria		x	x			
		b. Develop protocols and quality assurance methods for BMP functioning assessment criteria.	SWRCB UCD	Statewide	State	Written protocols, QA Plan		x				
		c. Monitor functioning of one BMP per sector (agriculture, forestry, urban practices, and marinas) in at least two watersheds.	SWRCB UCD	Statewide	State	Monitoring data		x				
		d. Develop database on BMP effectiveness.	SWRCB UCD	Statewide	State	Database		x				
		e. Develop and implement a monitoring strategy to monitor effectiveness of BMPs in reducing NPS pollution. Design a strategy that links to regional/local ambient or project monitoring.	SWRCB, RWQCBs, UCD	Statewide	State	Monitoring strategy, Monitor 9 key watersheds statewide, Report on effectiveness of BMPs			x			
		f. Evaluate and report effectiveness of rangeland BMPs.	RWQCB 3	Morro Bay	CWA §319 National Monitoring Program	Report						
		g Disseminate statewide knowledge of BMP effectiveness.	RWQCB 3	Morro Bay	CWA §319 National Monitoring Program	National Conference					x	

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COORDINATION OF MONITORING PROGRAMS												
B	2.	Coordinate BMP effectiveness monitoring with existing monitoring programs (e.g. Mussel Watch, Toxic Substances Monitoring Program, TMDL monitoring, CALFED, USGS, DWR, MBNMS) to better assess reductions in NPS pollution.	SWRCB, RWQCBs (Monitoring Team) UC Davis	Statewide	Current Staff	Regional or watershed-based monitoring strategies		x	x	x	x	Initiatives recommendation
		a. Pilot monitoring strategy in nine key watersheds statewide.	SWRCB, RWQCBs	Statewide	Current Staff CWA §319	Nine monitoring programs				x	x	
	3.	Design and implement ambient monitoring and data evaluation efforts:										
		a. Implement coastal monitoring plan in Central Coast Region.	RWQCB 3	Central Coast Region	Current Staff, State	Monitoring report	x	x	x	x	x	
		b. Coordinate and assist SCC WRP coastal monitoring activities.	Local agencies, RWQCB 4, RWQCB 8 RWQCB 9, USEPA	Southern Coastal areas	To be determined	Coastal monitoring data	x	x	x	x		
		c. Develop and implement watershed-monitoring programs for support of CWA §§305(b) and 303(d) assessments using community partnerships.	RWQCBs	Statewide	To be determined	Monitoring programs, water quality data	x	x	x	x	x	Selected watersheds every two years
		d. Monitor pathogens weekly at popular beaches with summertime urban runoff inputs.	DHS, County Health Departments	Beaches with flowing storm drains and high visitor use	State General Fund	All beaches with flowing storm drains and high visitor use monitored	x	x	x	x	x	Funding secure for FY 98-99 only
	4.	Improve knowledge of NPS contributions to impaired water bodies:										
		a. Monitor pathogens in shellfish areas and upland watersheds to determine sources of contamination.	RWQCBs	Humboldt Bay, Morro Bay, Tomales Bay, North San Diego County	State	Monitoring reports	x	x	x			Funding secure for FY 98-99, FY 99-00 only
		b. Implement monitoring program for TMDL development.	RWQCB 8	Lake Elsinore, Big Bear Lake	To be determined	TMDLs		x	x	x		
		c. Review TMDL compliance monitoring data.	RWQCB 8	Newport Bay	CWA §104/106	Evaluation of TMDL compliance	x	x	x	x	x	Nutrient TMDL, sediment TMDL and fecal coliform TMDL

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B, C, D	5.	Improve understanding of the effects of NPS pollution on the biological integrity of streams:											
		a. Use DFG's Bioassessment Protocols to assess and evaluate water quality and establish baseline water quality and trend information. Link to GIS layers.	SWRCB and DFG	Statewide	BCP, CWA §319	Baseline agency monitoring and trend data on GIS layers Web accessible	x	x	x	x	x	Statewide coordination of program needed.
		b. Provide a California bioassessment lab to serve as a source of reference information for bioassessments, including internet and web site.	SWRCB	Statewide	BCP, CWA §319	Reference information available online and at California bioassessment lab Provide information for development of biological criteria	x	x	x	x	x	
B, C, D	6.	Train community members in bioassessment procedures and sedimentation issues.	RWQCBs, RCDs, nonprofit groups	Statewide	CWA §319 grants, e.g. Placer County RCD	# of trainings	x	x	x			
COMMUNITY-BASED WATERSHED MONITORING													
C	7.	Establish a Technical Advisory Council to review and recommend monitoring protocols and quality assurance measures.	SWRCB, CARCDs, volunteer monitoring organizations	Statewide	CWA §319	Written review of protocols	x	x	x	x	x	
	8.	Develop and disseminate revised monitoring protocols for community-based monitoring methods. Focus on methods that track implementation or effectiveness of MMs.	SWRCB, UCD, DFG	Statewide	Current Staff, CWA §319	Monitoring protocols, Specialized regional keys for bioassessment.	x	x	x	x	x	
	9.	Develop generic quality assurance plans for monitoring methods.	SWRCB	Statewide	Current staff, BCP	QA plans	x	x	x	x	x	
C, D	10.	Establish regional watershed assessment and monitoring resource centers. Provide technical support, information, and training to NPS practitioners, landowners, and community groups.	Numerous	SFB area, Sacramento watershed, Los Angeles Basin, San Diego, Lake Tahoe	CWA §319 funds, municipal storm water programs, private foundations	Ten trainings per year	x	x	x	x	x	

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C, D	11.	Train landowners, community groups, and RCD staff in appropriate watershed monitoring methods.	SWRCB, CARCDs, volunteer monitoring organizations	Statewide	CWA §319	Three trainings per year	x	x	x	x	x	
B, C, D	12.	Establish Sanctuary Citizen Watershed Monitoring Network to link 15 existing monitoring groups; provide standardized training and data sharing.	RWQCB 3, MBNMS WQPP, SWRCB, nonprofit groups	MBNMS	CWA §319	Regional protocols and guidebook; two trainings per year, shared data and equipment	x	x	x	x	x	
	13.	Direct, facilitate, and support technical development and application of citizen monitoring data.	SWRCB, volunteer monitoring organizations	Statewide	BCP, CWA §319	Baseline citizen biological monitoring and trend data with Quality Assessment Quality Control (QAQC).	x	x	x	x	x	
DATA ACCESS												
D	14.	Populate the statewide SWIM with data from NPS watershed assessments and community-based monitoring.	SWRCB (Information Management Team) RWQCBs	Statewide	State staff	Ten monitoring projects per year		x	x	x	x	
	15.	Enable public access to SWIM.	SWRCB (Information Management. Team) RWQCBs	Statewide	State staff, EMPACT	On-line database of discharger, agency and community-based monitoring data				x	x	
D	16.	Populate existing on-line databases (e.g., California Coastal Water Quality Monitoring Inventory, 305b, Surf Your Watershed) with data.	SWRCB, RWQCBs	Statewide	State staff, EMPACT	Up-to-date meta-data for major monitoring programs, Two on-line databases linked to SWIM					x	

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APPENDICES

APPENDIX A. MEETING FEDERAL REQUIREMENTS

Federal Requirements Under Section 319 Of CWA
Check List on Nine Key Elements

Index for the Nine Key Elements of an Effective NPS Program as described in the USEPA NPS Program and Grants Guidance for Fiscal Years 1997 and Future Years (May 1996)

1. ***The State program contains explicit short- and long-term goals, objectives, and strategies to protect surface and ground water.***

a.	The California program includes a Vision Statement.	1
b.	California has specified MMs as long-term goals to be implemented by 2013 directed toward the expeditious achievement and maintenance of beneficial uses of water.	CAMMPR, 1
c.	Short-term (e.g., 1-5 year) objectives and activities have been specified for implementing the MMs that are linked to the vision statement.	86
d.	The California program addresses both surface and ground water.	1
e.	California has identified performance measures that will be used to assess the State's success in achieving its goals and objectives.	86
f.	Implementation strategies have been prepared that identify activities and the expected effects of those activities on water resources.	86, WMI Chapters

2. ***The State strengthens its working partnerships and linkages with appropriate State, Tribal, regional, and local entities (including conservation flood control districts), private sector groups, citizens groups, industry groups, and Federal agencies.***

a.	The State relies on several statewide partnerships to provide for input and recommendations from representatives of federal, State, Tribal, and local agencies, private sector groups, and citizens groups, regarding NPS program direction, project selection, and other similar aspects of program administration.	45
b.	These partnerships meet regularly and promote collaborative and inclusive decision making.	50
c.	The State program specifies procedures to provide for periodic public input into the program.	45
d.	California's program actively supports broad-based local watershed efforts that incorporate a variety of organizations and interests into the implementation of NPS activities.	39
e.	The State uses its partnerships effectively to promote comprehensive solutions that avoid the transfer of problems among environmental media.	51

3. ***The State uses a balanced approach that emphasizes both statewide NPS programs and on-the-ground management of individual watersheds where waters are impaired and threatened.***

a.	The SWRCB and RWQCBs' WMI document is a multi-year work plan that contains NPS implementation actions directed at both specific priority watersheds and activities of a statewide nature.	39
b.	The SWRCB/RWQCBs prepare annual work plans for CWA Section 319 funding, consistent with the WMI document that contains NPS implementation actions directed at both specific priority watersheds and activities of a statewide nature.	42
c.	The CCC has prepared a Polluted Run-off Strategy that is a multi-year work plan that contains NPS implementation actions directed at both specific priority watersheds and activities of a wider scope, consistent with its jurisdiction.	40
d.	State tracks both statewide activities and watershed projects.	71
e.	State has institutionalized its program beyond the annual implementation of CWA section 319 funded activities and projects.	Vol. I
f.	State uses an integrated watershed approach for assessment, protection, and remediation that is well integrated with other water or natural resource programs.	24
g.	Each of the nine RWQCBs adopt Basin Plans that identify existing and potential beneficial uses, establish basin specific water quality objectives, contain implementation, surveillance and monitoring plans, and include enforceable prohibitions against certain types of discharges.	33

4. ***The State program (a) abates known water quality impairments from NPS pollution and (b) prevents significant threats to water quality from present and future activities.***

a.	State has comprehensively characterized water quality impairments and threats throughout the State which are caused or significantly contributed to by NPSs.	25
b.	State program addresses all significant NPS categories and subcategories and promotes pollution prevention through the implementation of appropriate MMs.	CAMMPR
c.	State program has identified specific programs to abate pollution from categories of NPSs which cause or substantially contribute to the impairments identified in its assessments.	CAMMPR
d.	State has identified specific programs to prevent future water quality impairments and threats that are likely to be caused by NPS pollution.	19 CAMMPR

5. ***The State program identifies waters and their watersheds impaired by NPS pollution and identifies important unimpaired waters that are threatened or otherwise at risk. Further, the State establishes a process to progressively address these identified waters by conducting more detailed watershed assessments and developing watershed implementation plans, and then by implementing the plans.***

a.	State water quality assessments (including those performed under CWA sections 305[b], 319[a], 303[d], 314, and others), along with the California Unified Watershed Assessment, form the basis for the identification of the State's planned NPS activities and projects.	25
b.	State activities focus on remediating the identified impairments and threats and on protecting the identified at-risk waters.	25
c.	State has provided for public participation in the overall identification of problems to be addressed in the State program and in the establishment of a process to progressively address these problems.	19, 26
d.	State NPS priorities are communicated to, consistent with, and reflected in program planning and implementation activities by other water resource management agencies operating within the State.	45
e.	State revises its identification of waters and revisits its process for progressively addressing these problems periodically (e.g., once every five years).	9

6. ***The State reviews, upgrades, and implements all program components required by section 319(b) of the CWA, and establishes flexible, targeted, and iterative approaches to achieve and maintain beneficial uses of water as expeditiously as practicable. The State programs include:***
   - ***A mix of water quality-based and/or technology-based programs designed to achieve and maintain beneficial uses of water; and***
   - ***A mix of regulatory, nonregulatory, financial, and technical assistance as needed to achieve and maintain beneficial uses of water as expeditiously as practicable.***

a.	The State program identifies MMs to control NPSs of pollution focusing on measures which will be effective to address the most prevalent types of NPS pollution.	CAMMPR
b.	Identification of regulatory and nonregulatory programs to achieve implementation of the measures.	24
c.	Processes used to coordinate and, where appropriate, integrate various programs used to implement NPS controls in the State.	45
d.	Five-year implementation plans with goals, objectives, and milestones for program implementation and a process to revise these implementation plans twice by 2013.	86
e.	A legal opinion describing the State authorities available for implementing the MMs.	Appendix: Legal opinion
f.	Sources of funding from federal (other than CWA section 319), State, local, and private sources.	62
g.	Monitoring and other evaluation programs to help determine short- and long-term program effectiveness.	69
h.	The State program also incorporates/coordinates with existing baseline requirements established by other applicable federal or State laws to the extent that they are relevant.	30, 45 CAMMPR

7. ***The State identifies federal lands and activities which are not managed consistently with State NPS program objectives. Where appropriate, the State seeks USEPA assistance to help resolve issues.***

a.	The State works with federal agencies to resolve potential inconsistencies among federal programs and activities and the State programs.	52
b.	Where the State cannot resolve federal consistency issues to its satisfaction, it requests USEPA assistance to help resolve the issues.	52
c.	The State coordinates with federal agencies to promote consistent activities and programs and to develop and implement joint or complementary activities and programs.	47

8. ***The State manages and implements its NPS Program efficiently and effectively, including necessary financial management.***

a.	The State fosters plans for watershed projects and statewide activities that are well-designed with sufficient detail to assure effective implementation.	65
b.	The State's watershed projects focus on the critical areas and critical sources within those areas that are contributing to NPS problems.	65
c.	State implements its activities and projects, including all tasks and outputs, in a timely manner.	69
d.	State has established systems to assure that the State meets its reporting obligations.	77
e.	State utilizes the GRTS effectively.	65
f.	State has developed and uses a fiscal accounting system capable of tracking expenditures of both CWA section 319 funds and nonfederal matching funds.	42
g.	NPS projects include appropriate monitoring and/or environmental indicators to gauge effectiveness.	65

9. ***The State periodically reviews and evaluates its NPS management program using environmental and functional measures of success and revises its NPS assessment and its management program at least every five years.***

	Page #
a. The State has and uses a process to periodically assess both improvements in water quality and new impairments or threats.	69
b. The State uses a feedback loop based on monitoring and other evaluative information to assess the effectiveness of the program in meeting its goals and objectives, revises its activities, and tailors its annual workplans, as appropriate, in light of its review.	9
c. The State's annual report successfully portrays the State's progress in meeting milestones, implementing BMPs, and achieving water quality goals.	77

Federal Requirements Under Section 6217 Of CZARA
Check List On Conditions

Index for the section 6217 CZARA Conditions for Program Approval for the California Coastal NPS Program as described in the Program Findings and Conditions issued by USEPA/NOAA, July 1998.

1. Include NPS MMs in conformity with the Guidance Specifying MMs for Sources of Nonpoint Pollution in Coastal Waters (EPA, January 1993), issued under the authority of Section 6217(g) of the Coastal Zone Act Reauthorization Amendments of 1990.

	Page #
a. MMs have been adopted by the SWRCB and CCC for agriculture, forestry, urban areas, marinas and recreational boating, hydromodification, and wetlands and riparian areas.	CAMMPR
b. The State Porter-Cologne Act provides authorities that will be used, as necessary, to implement the MMs, in conformity with CZARA requirements for enforceable policies and mechanisms (see #2 below).	CAMMPR
c. The State and local authorities and programs being used to implement the MMs are clearly described.	CAMMPR, 24
d. Implementation strategies have been developed to implement the MMs statewide by 2013.	24

2. Identify authorities that can be used to prevent nonpoint pollution and require management measure implementation, as necessary.

	Page #
a. The Chief Counsels of the SWRCB and the CCC have prepared legal opinions concerning their respective authorities to implement the MMs for each of the appropriate source categories.	Appendix: Legal Opinions
b. For each of the source categories, the NPS Plan provides a description of the voluntary or incentive-based programs, including the methods for tracking implementation of MMs and evaluating those programs that the State will use to encourage implementation of the MMs.	CAMMPR CZARA Submittal (1995)
c. A description of the mechanisms or processes that link the implementing agencies for each of the source categories with the enforcement agencies and a commitment to use the existing enforcement authorities, where necessary, is included in the State program.	Appendix

3. Prepare a fifteen-year program strategy that briefly describes the State's overall approach and schedule to ensure implementation of the MMs and improve water quality within 15 years of the date of conditional approval.

	Page #
a. California's NPS Program Plan has been "upgraded" to include a Strategy.	24
b. The goal of the NPS Program is to implement the MMs by 2013 (within 15 years of the date of federal conditional approval pursuant to CZARA).	1
c. The program has a process whereby the State will determine the need to use a backup authority and/or to adopt additional enforceable policies and mechanisms to ensure implementation of the MMs within 15 years.	54, 85

4. Nested within the longer-term Strategy, prepare a five-year implementation plan that provides more specifics for achieving full implementation of the MMs.

	Page #
a. The Implementation Plan is more specific than and nested within the longer term Strategy for achieving full implementation of the MMs.	86
b. The Implementation Plan describes when, where, and how program implementation will occur, including mechanisms for tracking and monitoring implementation.	159
c. The Implementation Plan contains interim milestones and benchmarks, including a time frame; and will be updated, as necessary, but at least every five years. Achieving the milestones and benchmarks of these plans will serve as a basis for evaluating progress in achieving program implementation goals.	86
d. The Implementation Plan is designed to ensure adequate progress in achieving the Strategy and is integrated and consolidated with other federal and State water quality programs.	86

5. Common program elements required by CZARA (technical assistance, critical coastal areas, additional MMs, administrative coordination, and monitoring) should be included in the 15-Year Program Strategy and Implementation Plan.

	Page #
a. The program includes mechanisms for ensuring coordination among State agencies and between State and local officials with a role in the implementation of the MMs.	45
b. The program includes activities to provide technical assistance to local governments and the public for implementing MMs.	62
c. A process has been developed to provide for the identification of critical coastal areas.	28
d. The program includes an additional management measure process for developing and revising MMs to be applied in critical coastal areas and in areas where necessary to attain and maintain water quality standards. In addition, the State has described a process to identify additional MMs for forestry necessary to attain and maintain water quality standards.	78, 111
e. California includes in its program a monitoring element to enable the State to assess over time the extent to which implementation of MMs is reducing pollution loads and improving water quality.	69

APPENDIX B. LEGAL OPINIONS

STATE WATER RESOURCES CONTROL BOARD
CHIEF COUNSEL'S STATEMENT
FOR THE
CALIFORNIA'S NONPOINT SOURCE POLLUTION CONTROL PROGRAM

NOVEMBER 1999

CHIEF COUNSEL'S STATEMENT

I hereby certify that in my opinion the State of California can use the Porter-Cologne Water Quality Control Act[25] as a backup authority in the California's NPS Pollution Control Program to prevent nonpoint source pollution and to ensure management measure implementation. This authority can be used to address nonpoint source pollution due to agricultural operations, urban sources, marinas, hydromodification activities and wetlands. This authority is described below.

I. INTRODUCTION

In 1990 Congress enacted legislation requiring states with approved coastal zone management programs to prepare and submit a coastal nonpoint pollution control program to the United States Environmental Protection Agency (EPA) and the National Oceanic and Atmospheric Administration (NOAA) for approval.[26] The program's purpose was to restore and protect coastal waters through the implementation of management measures for nonpoint pollution sources. To further this effort, EPA was directed to develop management measure guidance.[27] State programs had to provide for implementation of management measures in conformity with this guidance, referred to as the (g) guidance.[28]

In September 1995, California submitted its program, a joint effort of the California Coastal Commission and the State Water Resources Control Board (State Water Board), to EPA and NOAA. For five nonpoint pollution sources, agricultural operations, urban sources, marinas, hydromodification activities and wetlands, the state proposed voluntary or incentive-based programs to implement the (g) guidance management measures. The state identified the Porter-Cologne Water Quality Control Act (Porter-Cologne) as a backup enforcement authority to ensure management measure implementation.[29]

In 1998 EPA and NOAA conditionally approved California's program.[30] For final program approval, EPA and NOAA require a legal opinion from the State Water Board's

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[25] Wat. Code §13000 et seq.

[26] Section 6217 of the Coastal Zone Act Reauthorization Amendments of 1990 (CZARA), 16 U.S.C. §1455b.

[27] *Id*. §6217(g), 16 U.S.C. §1455b(g).

[28] *Id*. §6217(b), 16 U.S.C. §1455b(b). See Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters, EPA, 840-B-92-002 (January 1993) (Management Measure Guidance).

[29] The state also identified Porter-Cologne as a backup authority to implement the forestry management measures. EPA and NOAA found that California's program includes management measures for forestry activities in conformity with the (g) guidance and enforceable policies and mechanisms for implementation. However, the state program needs more management measures. See *infra*, fn. 6.

[30] Letter, dated June 30, 1998, to Rusty Areias, Chairman, California Coastal Commission, and John Caffrey, former Chairman, State Water Board, from Jeffrey R. Benoit, Director, Office of Ocean and Coastal Resource Management, NOAA, and Felicia Marcus, Regional Administrator, EPA Region 9, transmitting Findings for the California Coastal Nonpoint Program.

Chief Counsel that Porter-Cologne can be used as a backup authority to prevent nonpoint pollution and to ensure management measure implementation[31] for these five sources.[32]

The following discussion addresses this issue. The discussion begins with an overview of Porter-Cologne. It then addresses three specific questions raised by EPA and NOAA regarding Porter-Cologne's use as a backup authority.

II. OVERVIEW OF PORTER-COLOGNE

Porter-Cologne is the primary water quality control law for California. In addition, the act authorizes the state to implement the federal Clean Water Act.[33] Porter-Cologne applies broadly to all state waters, including surface waters, wetlands, and groundwater.[34] Its provisions reflect the legislative intent that activities and factors that could affect the quality of state waters "be regulated to attain the highest water quality that is reasonable . . . ."[35] Porter-Cologne applies to both point and nonpoint sources.[36]

Porter-Cologne is administered regionally, within a framework of statewide coordination and policy.[37] The state is divided into nine regions, each governed by a regional water quality control board (Regional Water Board).[38] The State Water Board oversees and guides the Regional Water Boards through several activities. The State Water Board adopts state policy for water quality control, statewide water quality control plans, and regulations that are binding on the Regional Water Boards.[39] In addition, the State Water Board must approve regional water

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[31] The state program has identified 61 management measures for six categories, including agriculture, forestry, urban areas, marinas, hydromodification, and wetlands. These measures are nearly identical to the (g) guidance management measures. The state measures are included in a draft document, dated June 3, 1999, entitled California's Nonpoint Source Pollution Control Program, Vol. II: California Management Measures for Polluted Runoff.

[32] See Final Administrative Changes to the Coastal Nonpoint Pollution Control Program Guidance for section 6217 of [CZARA] (Oct. 1998). This document states that NOAA and EPA will approve those program elements for which the states have proposed voluntary or incentive-based programs, backed by existing state enforcement authority, if the states provide a legal opinion that such authorities can be used to prevent nonpoint pollution and require management measure implementation. The states must also describe the voluntary or incentive-based programs, including the methods for tracking those programs, and the processes that link the implementing agency with the enforcement agency.

[33] 33 U.S.C. §1251 et seq.; see Wat. Code §§13160, 13160.1, 13170, 13370-13389.

[34] See Wat. Code §§13000, 13050(e).

[35] *Id*. §13000.

[36] See *Lake Madrone Water District* v. *State Water Resources Control Board* (1989) 209 Cal.App.3d 163, 171-175, 256 Cal.Rptr. 894 (*Lake Madrone)*; *Tahoe-Sierra Preservation Council* v. *State Water Resources Control Board* (1989) 210 Cal.App.3d 1421, 1435, 259 Cal.Rptr. 132; 63 Ops.Cal.Atty.Gen. 51, 53-359 (1980) *(Tahoe-Sierra).*

[37] See Wat. Code §13000.

[38] *Id*. §§13200, 13201.

[39] See *id*. §§1058, 13140-13147, 13170.

quality control plans before they become effective.[40] The State Water Board also adopts statewide general permits.[41] They review Regional Water Board decisions on petitions for review.[42] Finally, the State Water Board exercises budgetary control over the Regional Water Boards and provides centralized legal services to the Regional Water Boards.[43]

A. Planning

Porter-Cologne addresses two primary functions - planning and waste discharge regulation. Porter-Cologne's planning authority extends to any activity or factor which may affect water quality.[44] These factors include, for example, not only waste discharges, but also saline intrusion, reduction of waste assimilative capacity caused by reduction in water quantity, hydrogeologic modifications, and watershed management projects.[45]

Both the State and the Regional Water Boards plan for water quality control. The State Water Board is charged with adopting state policy for water quality control.[46] These policies contain principles and guidelines for long range resource planning, including ground and surface water management.[47] They also contain water quality objectives at key locations for planning and operation of water resource development projects and for water quality control activities.[48] Since 1968 the State Water Board has adopted 13 policies.[49]

In addition to the State Water Board-adopted policies, Porter-Cologne establishes state policy for the coastal marine environment.[50] This policy states that wastewater discharges must be treated to protect present and future beneficial uses, and, where feasible, to restore past

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[40] *Id*. §13245.

[41] See *id*. §§13263(I), 13377; 40 C.F.R. §122.28; Cal. Code Regs., tit. 23, §2235.2.

[42] See Wat. Code §13320; Cal. Code Regs., tit. 23, §§2050-2068.

[43] See Wat. Code §§186, 13168.

[44] See *id*. §13000, 13050(I), 13140, 13142, 13241.

[45] See discussion in Chief Counsel's Statement for the State Nonpoint Source Management Program Administered by the [State Water Board] and the [Regional Water Boards] (October 1988), pp. C-1 through C-2.

[46] Wat. Code §§13140-13142.

[47] *Id.* §13142.

[48] *Ibid*.

[49] These policies cover enclosed bays and estuaries, the use and disposal of inland waters used for powerplant cooling, water quality control, maintaining high quality waters, water reclamation, shredder waste disposal, the underground storage tank pilot program, sources of drinking water, enforcement, investigation and cleanup and abatement of discharges under Water Code section 13304, municipal solid waste, guidance on development of regional toxic hot spot cleanup plans, and pollutant policy for the San Francisco Bay-Delta.

[50] Wat. Code §13142.5.

beneficial uses of the receiving waters.[51] Highest priority must be given to improving or eliminating discharges that adversely affect wetlands, estuaries, and other biologically sensitive areas, important water contact areas, shellfish areas, and ocean areas subject to massive waste discharge.[52]

The State Water Board can also adopt water quality control plans for waters requiring water quality standards under the Clean Water Act (essentially surface waters)[53] and must adopt a water quality control plan for ocean waters and for enclosed bays and estuaries.[54] Water quality control plans designate beneficial uses of water, establish water quality objectives to protect those uses, and contain a program to implement the objectives.[55] The beneficial use designations and water quality objectives together constitute water quality standards for purposes of the Clean Water Act.[56] The program of implementation must describe the nature of actions that are necessary to meet the objectives, including recommendations for action by both private and public entities.[57] The program also includes a time schedule and describes proposed surveillance activities to assess compliance with objectives.[58]

Water quality control plans can prohibit the discharge of waste, or certain types of waste, in specified areas or under certain conditions.[59] The Ocean Plan,[60] for example, prohibits the discharge of waste to 34 coastal "areas of special biological significance".[61]

In addition to the Ocean Plan, current State Water Board-adopted plans include the Thermal Plan,[62] which addresses temperature control in coastal, interstate, estuarine and bay waters, and the Delta Plan,[63] covering San Francisco Bay and the Sacramento-San Joaquin Delta.

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[51] *Ibid.*

[52] *Ibid.*

[53] See 33 U.S.C. §§1313, 1362.

[54] Wat. Code §§13170, 13170.2, 13391. The State Water Board has adopted an ocean plan, entitled Water Quality Control Plan, Ocean Waters of California (1997) (Ocean Plan). The State Water Board adopted a plan for enclosed bays and estuaries in 1991. This plan was rescinded in 1991 in response to an adverse ruling in litigation filed to invalidate the plan. See State Water Board Res. No. 94-87.

[55] Wat. Code §13050(j).

[56] See 40 C.F.R. §131.3(i).

[57] Wat. Code §13242.

[58] *Ibid*.

[59] *Id*. §13243.

[60] See *supra*, fn. 27.

[61] Ocean Plan, *supra*, fn. 30, ch. V, B; see State Water Board publication entitled "Areas of Special Biological Significance", August, 1998.

[62] Water Quality Control Plan for the Control of Temperature in the Coastal and Interstate Waters and Enclosed Bays and Estuaries of California (September 18, 1975).

[63] Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary (May 22, 1995).

Plans adopted by the State Water Board supersede any Regional Water Board-adopted plans to the extent of any conflict.[64]

Each Regional Water Board must adopt a water quality control plan for waters within the region.[65] The regional plans must conform with state policy for water quality control,[66] and they must be approved by the State Water Board.[67]

Both state policy for water quality control and state and regional water quality control plans are binding on other state agencies, departments, and boards, unless they are otherwise directed or authorized by statute.[68] In the latter case, they must notify the State or Regional Water Board of their authority for not complying.[69]

B. Waste Discharge Control

1. Permitting

Porter-Cologne also establishes a program to regulate waste discharges that could affect water quality.[70] This program is the principal way that state water quality control policies and plans are implemented. The program covers waste discharges to land as well as to surface and groundwaters.[71] Any person discharging or proposing to discharge waste that could affect water quality must file a report of waste discharge with the Regional Water Board, unless the Regional Water Board waives the filing.[72] A report is also required if the discharger proposes a material change in the character, volume, or location of a discharge.[73] The Regional Water Board must then issue waste discharge requirements to the discharger, unless requirements are waived.[74] The requirements must implement applicable state policies and state and regional water quality control plans.[75] The requirements can also prohibit the discharge of waste or certain types of waste, either under certain conditions or in specified areas.[76]

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[64] Wat. Code §13170.

[65] *Id*. §§13240-13247.

[66] *Id*. §13240.

[67] *Id*. §§13245, 13246.

[68] *Id*. §§13146, 13247.

[69] *Ibid.*

[70] See *id*. §§13260-13274; 13376-13384.

[71] See *id*., §§13050(e), 13260(a), 13263(a).

[72] See *id*. §§13260, 13269, 13376. Persons discharging into a community sewer system are excepted from this requirement.

[73] See *id*. §13264.

[74] See *id*. §§13263, 13269, 13377.

[75] *Id*. §§13263, 13377; see id. §13240.

[76] *Id*. §13243.

The activities subject to regulation under waste discharge requirements include both point and nonpoint source discharges. Under the Clean Water Act, the point source discharge of pollutants to surface waters must be regulated under a National Pollutant Discharge Elimination System (NPDES) permit.[77] A point source is a discernible, confined and discrete conveyance, such as a pipe, ditch, or channel, but excluding irrigated agricultural return flows and agricultural storm water discharges.[78] Waste discharge requirements for point source pollutant discharges to surface waters serve as NPDES permits for purposes of the Clean Water Act.[79]

Nonpoint pollution sources generally are sources that don't meet the definition of a point source. Nonpoint source pollution typically results from land runoff, precipitation, atmospheric deposition, drainage, seepage, or hydrologic modification.[80] The term "discharge of waste" in Porter-Cologne covers nonpoint, as well as point, sources of pollution.[81]

"Waste" is broadly defined in Porter-Cologne to include sewage and "any and all other waste substances, liquid, solid, gaseous, or radioactive, associated with human habitation, or of human or animal origin, or from any producing, manufacturing, or processing operation . . . ." This definition includes all Attorney General interpretations of the terms "sewage", "industrial waste", and "other wastes" under Porter-Cologne's predecessor legislation.[82] The Attorney General had interpreted the latter terms to include wastes from a variety of activities typically considered nonpoint, such as:

° drainage, flow, or seepage containing debris or eroded earth from logging operations;[83]

° garbage disposal;[84]

° drainage, flow or seepage containing garbage, ashes, mixed refuse, or solid industrial waste from inactive or closed dumps;[85]

° return irrigation or drainage water from agricultural operations;[86]

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[77] See 33 U.S.C. §§1311, 1342.

[78] *Id*. §1362(14).

[79] Wat. Code §13374.

[80] See Management Measure Guidance, *supra*, fn. 4, p. 1-1.

[81] See *supra*, fn. 11.

[82] *Lake Madrone, supra*, fn. 11, 209 Cal.App. 3d at 169, 256 Cal.Rptr. 894; see Recommended Changes in Water Quality Control, Final Report of the Study Panel to the California State Water Resources Control Board, Study Project, Water Quality Control Program (1969) (Final Report), App. A, p. 23.

[83] 27 Ops.Cal.Atty.Gen. 182, 184 (1956).

[84] 16 Ops.Cal.Atty.Gen. 125, 126-30 (1950).

[85] 27 Ops.Cal.Atty.Gen. 182, 184 (1956).

[86] *Ibid*.

° pesticides improperly applied to waters of the state, or which find their way into waters of the state after application;[87]

° changes in the physical or chemical characteristics of receiving waters caused by extraction of minerals from a streambed;[88] and

° dumping of earth moved from construction operations, or drainage of wastewater from construction sites.[89]

These examples indicate that discharges of waste are not limited to waste disposal but also include releases of pollutants as part of other activities.[90] Hydrological or hydrogeological modifications, for example, that cause the release of wastes into state waters may be regulated under waste discharge requirements.

On the other hand, the Attorney General has concluded that salt water intrusion and reductions in waste assimilative capacity caused by diversions which reduce water quantity are not discharges of waste.[91] These activities may, however, be addressed in state policy for water quality control and state or regional water quality control plans, which are binding on other state agencies.[92]

The Regional Water Boards are primarily responsible for issuing waste discharge requirements and NPDES permits. Waste discharge requirements may be either individual or general, for a category of discharges.[93] The Regional Water Boards may, likewise, adopt either individual or general NPDES permits.[94]

The State Water Board can issue or modify Regional Water Board-adopted waste discharge requirements in response to a petition for review of the requirements.[95] The State Water Board can also issue general waste discharge requirements.[96] The State Water Board has used this authority, for example, to adopt general requirements for small domestic wastewater

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[87] 43 Ops. Cal.Atty.Gen. 302, 304 (1964).

[88] 32 Ops.Cal.Atty.Gen. 139, 140-41 (1958).

[89] 16 Ops.Cal.Atty.Gen. 125, 130-31 (1950).

[90] See e.g., *Lake Madrone, supra*, fn. 11 (release of accumulated sediment from a dam held a discharge of waste). See also discussion in Sawyer, *State Regulation of Groundwater Pollution Caused by Changes in Groundwater Quantity or Flow* (1988) Pacific L.J. 1267, 1273-1275.

[91] See 44 Ops.Cal.Atty.Gen. 126, 128 (1964).

[92] See *id*. at 128-130.

[93] See Wat. Code §13263(a) & (i).

[94] See 40 C.F.R. §122.28; *id*. §13377; Cal. Code Regs., tit. 14, §§2235.l & 2235.2.

[95] See Wat. Code §13320(c).

[96] See Wat. Code §13263(i). See also section 13274, which requires the State Water Board or a Regional Water Board to adopt general waste discharge requirements for sewage sludge and other biological solids.

systems.[97] Like the Regional Water Boards, the State Water Board has independent authority to issue individual and general NPDES permits. The State Water Board has issued several general NPDES permits, including two covering stormwater discharges from industrial sources[98] and construction sites,[99] respectively.

2. Investigations

Both the State and Regional Water Boards have broad powers to investigate water quality.[100] They can investigate water quality in connection with any action authorized or required under Porter-Cologne, including the development or review of water quality control plans or waste discharge requirements.[101] Their investigative powers include the authority to conduct sampling; inspect facilities, records, and monitoring equipment; and issue subpoenas for the production of evidence.[102]

The State and Regional Water Boards can require state and local agencies to investigate and report on any technical factors involved in water quality control.[103] In addition, they can require any person who has discharged, discharges, proposes to discharge or is suspected of discharging waste, whether from a point or a nonpoint source, to monitor and report information.[104]

The Regional Water Boards are primarily responsible for inspecting regulated facilities.[105] The State Water Board can enter and inspect a non-NPDES facility in response to a petition for review.[106] The State Water Board also has independent authority to enter and inspect facilities covered under the NPDES permit program.[107]

Recent amendments to Porter-Cologne impose specific responsibilities on the State Water Board with respect to investigating coastal water quality.[108] Subject to the availability of funds, the State Water Board must prepare a report for the Legislature that proposes implementing a

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[97] See General Waste Discharge Requirements for Discharges to Land by Small Domestic Wastewater Treatment Systems, Water Quality Order No. 97-10 DWQ.

[98] Waste Discharge Requirements (WDRS) for Discharges of Storm Water Associated with Industrial Activities Excluding Construction Activities, NPDES General Permit No. CAS000001, Water Quality Order No. 97-03-DWQ.

[99] Waste Discharge Requirements (WDRS) for Discharges of Storm Water Runoff Associated with Construction Activity, NPDES General Permit No. CAS000002, Order No. 92-08 DWQ.

[100] See Wat. Code §§183, 186, 13163, 13267(a),. 13383.

[101] See *ibid.*

[102] See *id*. §§183, 186, 1080, 13221, 13267, 13383.

[103] See *id*. §§13165 & 13225(c).

[104] See *id*. §§13267 & 13383.

[105] See *ibid.*

[106] See *id*. §13320(c).

[107] See *id*. §13383.

[108] *Id*. §13181, added by Stats. 1997, c. 899, §2.

comprehensive program to monitor the quality of coastal watersheds, bays, estuaries, and their marine resources. The pollutants targeted for monitoring include, at a minimum, bacteria and viruses, petroleum hydrocarbons, heavy metals, and pesticides.[109] The program must include an identification of pollution sources and estimates of total pollutant discharges, to the extent possible, recommended actions that should be undertaken to maintain and improve coastal water quality, and other information.[110]

3. Enforcement

The Regional Water Boards also have primary authority for enforcement. They may choose from a variety of enforcement options.[111] These include notices to comply for minor violations,[112] time schedule orders,[113] cleanup and abatement orders,[114] cease and desist orders,[115] administrative civil liability orders,[116] and referrals to the Attorney General for injunctive relief and civil and criminal penalties.[117] The Regional Water Boards can use their enforcement authority to respond to unauthorized discharges, discharges in violation of waste discharge requirements or prohibitions, discharges that cause or threaten to cause pollution or nuisance, and violations of monitoring or reporting requirements.[118]

The State Water Board is authorized to take enforcement action in certain instances, although the State Water Board normally defers to the appropriate Regional Water Board. The State Water Board can take enforcement action in the first instance for NPDES-related violations.[119] For non-NPDES violations, the State Water Board can use the same enforcement tools as the Regional Water Boards in response to a petition for review of a Regional Water Board action.[120] The State Water Board can also issue notices to comply for minor violations.[121]

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[109] *Ibid*.

[110] *Ibid*. The State Water Board is in the process of contracting with the Southern California Coastal Water Research Project to prepare the report.

[111] See generally Water Quality Enforcement Policy and implementing guidance, State Water Board Res. No. 96-030, as amended by Resolution No. 97-085.

[112] Wat. Code §§13399-13399.2.

[113] *Id*. §§13300, 13308.

[114] *Id*. §13304.

[115] *Id*. §13301.

[116] *Id*. §§13261, 13265, 13268, 13323-13327, 13350, 13385, 13399.33.

[117] *Id*. §§13261, 13264, 13265, 13268, 13271, 13272, 13304, 13331, 13340, 13350, 13385-13387.

[118] *Ibid*.

[119] See *id*. §§13385 & 13386.

[120] See *id*. §13320(c).

[121] See *id*. §13399.2.

C. Other Programs

In addition to the specific planning and waste discharge control provisions discussed above, Porter-Cologne contains other water quality control programs. Chapter 5.6 establishes a program to identify and cleanup toxic hot spots in the state's bays, estuaries, and coastal waters.[122] Toxic hot spots include sites impaired by nonpoint, as well as point, sources of toxic pollution.[123] Plans to remediate these sites can include, in addition to remedial actions, measures to prevent toxic pollution, such as best management practices to address nonpoint pollution sources.

Porter-Cologne addresses a variety of other subjects, including: onsite, subsurface disposal systems;[124] drainage from abandoned mines;[125] storm water enforcement;[126] discharges of methyl tertiary-butyl ether (MTBE) to drinking water sources;[127] regulation of the use of recycled water;[128] waste discharges from houseboats;[129] and the construction and abandonment of water wells, cathodic protection wells and groundwater monitoring wells.[130] Porter-Cologne also contains several programs to provide grants or loans for water quality facilities and programs.[131]

D. Clean Water Act Authority

The State Water Board is "the state water pollution control agency" for all purposes stated in the Clean Water Act.[132] Thus, the State Water Board is authorized to fulfill the state's responsibilities to adopt water quality standards for surface waters, to develop a nonpoint source management program, and to establish total maximum daily loads (TMDLs) for impaired waterbodies.[133]

While the Regional Water Boards typically adopt water quality control plans for waters within their regions, Porter-Cologne specifically authorizes the State Water Board to adopt plans for surface waters that supersede any conflicting regional plans. In addition, the State Water

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[122] See *id*. §§13390-13396.5.

[123] See *id*. §13391.5(e); State Water Board's Water Quality Control Policy for Guidance on the Development of Regional Toxic Hot Spot Cleanup Plans (1998).

[124] See Wat. Code §§13280-13284.

[125] See *id*. §§13397-13398.9.

[126] See *id*. §§13399.25-13399.43.

[127] See *id*. §13285.

[128] See *id*. §§13500-13554.3.

[129] See *id*. §§13800-13806.

[130] See *id*. §§13900-13908.

[131] See *id*. §§13400-13433, 13475-13485.

[132] *Id*. §13160.

[133] See 33 U.S.C. §§1313, 1329; Wat. Code §§13170, 13170.2, 13240-13247.

Board can issue water quality certifications under section 401[134] of the act.[135] The State Water Board can accept federal capitalization grants for a state/federal revolving fund loan program to finance construction of publicly owned sewage treatment works,[136] implement the state's nonpoint source management program under section 319,[137] and develop and implement the national estuary program under section 320[138] of the Clean Water Act.[139]

Chapter 5.5 of Porter-Cologne authorizes the State and Regional Water Boards to carry out the NPDES permit program.[140] Chapter 5.5 applies to point source discharges to surface waters, introduction of pollutants into publicly owned treatment works, use and disposal of sewage sludge, and disposal of pollutants into wells.[141]

III. QUESTIONS

A. Question: Can Porter-Cologne be used to (1) prevent nonpoint source pollution and (2) require the implementation of management measures?

Response: Yes, Porter-Cologne can be used to generally prevent nonpoint source pollution and to specifically implement, either directly or indirectly, the (g) guidance management measures. The following discussion describes the State and Regional Water Boards' authority to prevent pollution, methods that they can use to both prevent pollution and require management measure implementation, and the potential impacts of Water Code section 13360.

l. Authority to Prevent Pollution

Porter-Cologne can unquestionably be used to prevent nonpoint source pollution. Under the Dickey Act,[142] the predecessor to Porter-Cologne, the Regional Water Boards' jurisdiction to regulate waste discharges, depended, in part, on whether the discharge created or threatened to create a "condition of pollution".[143] "Pollution" meant a water quality impairment that "does not create an actual hazard to the public health" but that does "adversely and unreasonably affect

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[134] 33 U.S.C. §1341.

[135] *Ibid.*; see Cal. Code Regs., tit. 14, §§3855-3859.

[136] See 33 U.S.C. §§1381-1387.

[137] *Id*. §1329.

[138] *Id*. §1330.

[139] See Wat. Code §§13475-13485.

[140] See *id*. §§13370-13388.

[141] See *id*. §§13370, 13370.5, 13373, 13376, 13377, 13382, 13383.

[142] Stats. 1949, ch. 1549, as amended. The Dickey Act, originally called the "Water Pollution Control Act", became the "Water Quality Control Act" in 1965. Stats. 1965, ch. 1657.

[143] See 48 Ops.Cal.Atty.Gen. 30, 33-34 (1966), construing former Water Code §13053.

such waters" for beneficial use, or that "adversely and unreasonably affect[s] the ocean waters and bays of the state devoted to public recreation."[144]

The Regional Water Boards'[145] jurisdiction to regulate waste discharges under Porter-Cologne is much broader. The Regional Water Boards do not have to find that a discharge, if unregulated, would create or threaten to create pollution. They can regulate any actual or proposed waste discharge that "could affect" the quality of state waters.[146] Further, they do not have to authorize use of the full waste assimilation capacities of the receiving waters.[147] Rather, they can maintain a margin of safety in waste discharge requirements to assure protection of all beneficial uses.[148]

2. Methods

The State and Regional Water Boards can use Porter-Cologne to generally prevent nonpoint source pollution and to specifically require management measure implementation. There are several ways that this can be done.

(a) Nonpoint Source Management Plan

Under its Porter-Cologne authority, the State Water Board has adopted a Nonpoint Source Management Plan (1988) (NPS Plan). The plan describes a three-tiered management approach to address nonpoint source pollution. The plan focuses on implementation of best management practices as the primary way to meet water quality standards.

The first management tier relies on the dischargers' voluntary implementation of best management practices. The second tier is regulatory encouragement of best management practices. "Encouragement" is through two mechanisms. The State and Regional Water Boards can waive waste discharge requirements on condition that dischargers comply with best management practices. Alternatively, where other agencies can require implementation of best management practices, the boards can enter into agreements with those agencies in which the agencies agree to exercise their authority. In the third tier, the State and Regional Water Boards adopt waste discharge requirements.

The NPS Plan's intent is to prevent nonpoint source pollution through the three-tiered approach. The plan can be used to directly implement the (g) guidance management measures in

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[144] Former Wat. Code §13005, Stats. 1919, ch. 1549, as amended.

[145] References to the Regional Water Boards in Part III of this statement include the State Water Board, where appropriate. See Part II of this statement for a discussion of the respective authorities of the State and Regional Water Boards.

[146] See Wat. Code §§13260, 13263.

[147] See *id*. §13263(b).

[148] Final Report, *supra*, fn. 58, App. A, p. 59.

the first and second tiers. The third tier, likewise, can be used to directly or indirectly implement the measures.

To the extent authorized by Water Code section 13360, as discussed below, waste discharge requirements can directly require implementation of the management measures if the management measures implement applicable water quality standards. Waste discharge requirements can also indirectly implement the measures by prohibiting or regulating a nonpoint source activity in such a manner that the discharger must implement the management measures in order to comply. Additionally, waste discharge requirements can, in lieu of establishing effluent limitations, require a discharger to develop and implement a plan, such as a stormwater pollution prevention plan, containing best management practices or other measures, to ensure compliance with applicable water quality standards. The requirements can mandate that the discharger consider the (g) guidance management measures, along with other relevant material, in developing the plan.

(b) Waste Discharge Requirements

Waste discharge requirements issued under Porter-Cologne prevent pollution by implementing applicable water quality control plans and policies. Under Porter-Cologne, "pollution" is an alteration of water quality by waste that unreasonably affects the waters for beneficial uses.[149] Waste discharge requirements must implement the applicable water quality control plan, including the designated beneficial uses and the water quality objectives required to protect those uses.[150] Thus, a discharge that complies with waste discharge requirements should not alter water quality in a manner that causes pollution.

Nonpoint source discharges can be regulated under waste discharge requirements, either individually or as a group. The requirements can directly or indirectly implement the (g) guidance management measures, as described in the above discussion on the NPS Plan.

(c) Waivers

The Regional Water Boards can also use their waiver authority to prevent pollution and implement the management measures. The Regional Water Boards can waive regulation of nonpoint source discharges, either on an individual basis or for a category of discharges.[151] A waiver must be in the public interest, and it is conditional and may be terminated at any time.[152] The Regional Water Boards can waive waste discharge requirements for nonpoint source discharges, either individually or as a group, on condition that the dischargers comply with

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[149] See Wat. Code §13050(l)(1). "Pollution" also includes water quality alterations that unreasonably affect facilities that serve beneficial uses.

[150] *Id* §13263(a).

[151] *Id*. §13269(a).

[152] *Ibid*.

specified best management practices designed to achieve water quality standards. In particular, a waiver for a nonpoint source category could be conditioned on compliance with the applicable (g) guidance management measures, provided that the management measures implemented applicable water quality standards.

(d) Water Quality Certification

The State Water Board certifies activities requiring a water quality certification under section 401 of the Clean Water Act. This section requires applicants for federal licenses or permits to obtain state certification that any discharge of pollutants to surface waters from a proposed activity will comply with the Clean Water Act, including applicable water quality standards. As long as an activity will result in a discharge to surface waters, the State Water Board can use its certification authority to prevent nonpoint source pollution associated with the activity. The State Water Board can include conditions on the entire activity to protect water quality standards, including beneficial uses.[153] In particular, in appropriate cases the State Water Board can condition a section 401 certification on compliance with management measures implementing water quality standards.

(e) Plans and Policies

In addition, the State Water Board and Regional Water Boards can use their planning authority to prevent nonpoint source pollution and to implement the management measures. The State Water Board can adopt state policy for water quality control, and both the State and Regional Water Boards can adopt water quality control plans that address this type of pollution. Both policies and plans are binding on other state agencies.

Water quality control plans must include an implementation program to achieve water quality objectives. Implementation programs can prevent nonpoint source pollution and implement the management measures through several approaches. The programs can recommend that nonpoint source dischargers carry out specific best management practices, including the management measures, in order to achieve water quality standards. The programs can also waive regulation of categories of nonpoint source discharges on condition that the dischargers implement specific best management practices, such as the measures. Alternatively, an implementation program can prohibit nonpoint source discharges, either entirely or partially, in certain areas or under certain conditions. The conditions can include compliance with appropriate best management practices, including the applicable management measures.

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[153] See *PUD No. 1 of Jefferson County v. Washington Dept. of Ecology* (1994) 511 U.S. 700, 114 S. Ct. 1900.

(f) Investigatory Powers

The State and Regional Water Boards can use their broad investigatory authority to foster nonpoint source pollution prevention. Both the State and Regional Water Boards can investigate the scope, causes, and sources of nonpoint source pollution, and potential practices or control measures to prevent it. They can also require that state or local agencies or dischargers conduct this type of investigation. The State and Regional Water Boards can use information obtained from these investigations to, for example, encourage voluntary implementation of best management practices by dischargers, to encourage state or local agencies that regulate nonpoint source activities to require best management practices, or to develop appropriate planning or regulatory programs addressing nonpoint source pollution.

In addition, the State and Regional Water Boards can use their investigatory powers to directly require implementation of several of the management measures. As discussed below, some management measures requires plans, such as erosion control plans.

(g) Enforcement Authority

The Regional Water Boards can use their enforcement authority to require cleanup, abatement, and remediation of sites adversely impacted by nonpoint source pollution, including wetlands and riparian areas.[154] They can also impose administrative civil liability on this basis.[155] The Regional Water Boards can encourage dischargers to consider, as environmental credit projects reducing an administrative civil liability assessment, projects that protect and restore sensitive areas, such as wetlands and riparian areas.[156]

(h) Regulations

As an additional tool, the State Water Board can adopt regulations covering categories of nonpoint source discharges. The State Water Board, for example, has adopted regulations covering waste discharges from confined animal facilities[157] and mining activities.[158] To the extent authorized by Water Code section 13360, as discussed below, the State Water Board can adopt regulations for categories of nonpoint source dischargers, requiring implementation of measures that are appropriate to implement applicable water quality standards.

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[154] See *id*. §13304.

[155] See *id*. §§13350, 13385.

[156] See Guidance to Implement the Water Quality Enforcement Policy, State Water Board (April 1996), pp. 22-23.

[157] See Cal. Code Regs., tit. 27, §§22560 - 22565.

[158] See *id*., §§22470-22510.

(i) Other programs

Finally, Porter-Cologne is currently being used to prevent or to remediate nonpoint source pollution in two specific programs. The Regional Water Boards are developing TMDLs for impaired waterbodies within their regions. Many of the TMDLs address ongoing nonpoint source pollution, and these TMDLs include implementation programs to bring the nonpoint source dischargers into compliance with water quality standards. The North Coast Regional Water Board, for example, adopted a sediment TMDL that prohibits the discharge of controllable sources of sediment unless the discharger agrees to implement certain best management practices, to monitor, and to comply with other requirements. In appropriate cases, a TMDL could require that affected nonpoint source dischargers implement applicable management measures in order to achieve water quality standards.

The Bay Protection and Toxic Cleanup Program also addresses nonpoint, as well as point, source pollution. Some of the Regional Water Boards have proposed best management practices as the recommended action to remediate ongoing nonpoint source pollution. The Regional Water Boards could implement the (g) guidance management measures in appropriate cases under this program.

3. Water Code section 13360

(1) Section 13360

Under certain circumstances, Porter-Cologne restricts the State and Regional Water Boards' ability to require dischargers to implement specific practices. Under Water Code section 13360, the boards may not "specify the design, location, type of construction, or particular manner" of compliance with waste discharge requirements or other orders, and dischargers can comply "in any lawful manner."[159] This restriction "is a shield against unwarranted interference with the ingenuity of the party subject to waste discharge requirements", who can "elect between available strategies to comply with the standard."[160]

On the other hand, section 13360 is not violated if, under present technology and the laws of nature, there is only one way to comply with the standard.[161] Thus, for example, a water quality control plan could legally prohibit surface runoff from new development in amounts

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[159] Wat. Code §13360.

[160] *Tahoe-Sierra , supra*, fn. 11, 210 Cal.App.3d at 1438-1439, 259 Cal.Rptr. 132.

[161] *Ibid*.; see *Pacific Water Conditioning assn., Inc. v. City Council* (1977) 73 Cal.App.3d 546, 554, 140 Cal.Rptr. 812, 816-17.

exceeding the runoff that would occur if certain impervious coverage limitations were met.[162] It did not matter that the only practical way to comply with the prohibition was to comply with the coverage limitations.[163]

Water Code section 13360 also contains several exceptions. It does not apply to discharges of waste to injection wells.[164] Likewise, the restrictions do not apply to the discharge of solid waste to disposal sites. Waste discharge requirements for these sites can require the construction of dikes, installation of drainage facilities, and other similar measures.[165]

(2) Application to Management Measures

Water Code section 13360 does not restrict management measure implementation. The extent of its applicability depends on the type of measure in question. The management measures fall into several categories. They range from measures requiring plans on how to control nonpoint source pollution to measures that are more prescriptive.

Some management measures require plans. For example, nutrient management plans are required for agricultural activities and erosion and sediment control plans and chemical control plans for construction sites less than 5 acres.[166] Water Code section 13360's restrictions do not apply to this type of management measure. The measures do not dictate the manner of compliance with waste discharge requirements or other board orders, but rather require dischargers to submit plans addressing specific pollution problems. The Regional Water Boards can directly implement this type of management measure under their investigative authority. As discussed previously,[167] they can require anyone who has discharged, discharges, proposes to discharge, or is suspected of discharging waste to file technical or monitoring program reports. They can also require state and local agencies to submit technical reports on water quality control, even though those entities are not waste dischargers. The only restriction is that the burden of preparing the reports bear a reasonable relationship to the need for and the benefits to be obtained from the reports.[168]

Some management measures specify an end result to be achieved. To illustrate, an urban management measure for new development requires that, after construction is completed and a site is permanently stabilized, average annual total suspended solids (TSS) loadings be reduced

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[162] *Tahoe-Sierra*, *supra*, fn. 11.

[163] *Ibid.*

[164] Wat. Code §13360(a)(2).

[165] *Id.* §13360(a)(1).

[166] Management Measure Guidance, *supra*, fn. 4, pp. 2-52, 4-63, 4-83.

[167] See Part II, B.2 of this Statement.

[168] Wat. Code §§13165, 13225(c), 13267(b).

by 80 percent or to a level no greater than predevelopment loadings.[169] This can be accomplished by either design or performance. The Regional Water Boards can ensure that this type of management measure is implemented without violating Water Code section 13360 because the measure dictates the end result but leaves the method of compliance up to the site developer.

Other management measures prescribe both the end result and the means of achieving it. This is typified by the agricultural management measure for grazing.[170] Part of this measure seeks to protect sensitive areas, such as streambanks and wetlands, from physical disturbance and direct loading of animal wastes and sediment, by one or more of five options. These include excluding livestock, providing stream crossings or hardened watering access for drinking, and others. The Regional Water Boards can require implementation of this measure, by adding a sixth option allowing a discharger to demonstrate that some other alternative would achieve the same end result, i.e. protection of sensitive areas from adverse, water quality-related, grazing impacts. Alternatively, the Regional Water Boards could indirectly ensure implementation of the management measure by adopting a prohibition against waste discharge in sensitive areas.

Still other management measures require development of watershed protection programs. For example, an urban management measure requires development of a watershed protection program for new development.[171] The program aims at avoiding the conversion, to the extent practicable, of areas particularly susceptible to erosion and sediment loss, preserving areas that provide important water quality benefits, and siting development to protect, to the extent practicable, the natural integrity of waterbodies and natural drainage systems. This type of management measure does not violate Water Code section 13360. It dictates only the end result, e.g., a watershed protection program that achieves several goals. Also, the State and Regional Water Boards would likely implement this management measure by promoting local or regional watershed efforts. Alternatively, the State Water Board could adopt state policy or the State and Regional Water Board could adopt water quality control plan provisions implementing this management measure. Water Code section 13360, on the other hand, only applies to waste discharge requirements or orders issued to waste dischargers.[172]

B. Question: Please describe any other aspect of state law, either contained in Porter-Cologne or in other authorities, that would limit or preclude the use of Porter-Cologne to regulate nonpoint source pollution. Is Porter-Cologne limited in its application to particular sources or geographic areas? Is it otherwise limited?

Response: The nonpoint sources for which California seeks to use Porter-Cologne as a backup authority are subject to Porter-Cologne. Porter-Cologne is not limited in its application,

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[169] Management Measure Guidance, *supra*, fn. 4, p. 4-12.

[170] *Id*. at p. 2-73.

[171] *Id*. at p. 4-36.

[172] See *People v. Barry* (1987) , 194 Cal.App.3d 158, 180-181, 239 Cal.Rptr. 349, 363-364.

geographically or otherwise, to these sources. Under Porter-Cologne, the State and Regional Water Boards can regulate any activity that results in a waste discharge that can affect water quality. Activities that affect water quality, but that do not involve a waste discharge, can be addressed under the State and Regional Water Board's broad planning authority. The five nonpoint sources for which the state intends to use Porter-Cologne as a backup authority are discussed below.

(1) Agricultural Activities

The (g) guidance lists pollutants that cause agricultural nonpoint source pollution. These include: nutrients, sediments, animal wastes, salts, pesticides, and habitat impacts due to grazing.[173] The Regional Water Boards can clearly regulate the discharge of pollutants from agricultural activities, including those listed, that can affect water quality. Likewise, the Regional Water Boards can regulate grazing or other agricultural activities that directly or indirectly cause the release of pollutants, such as sediments or animal wastes, that can affect water quality.

Porter-Cologne's legislative history indicates that the act was not meant to limit the Regional Water Boards' preexisting authority under the Dickey Act to regulate the discharge of agricultural wastes.[174] Further, "waste" for purposes of regulation under Porter-Cologne was meant to include all materials that the Attorney General had concluded were "waste" under the Dickey Act.[175] These materials included irrigation return flows and drainage water from agricultural activities, pesticides, herbicides, and other agricultural chemicals. The legislative history also indicates that, while these wastes are clearly subject to regulation, the Regional Water Boards can choose to waive waste discharge requirements, either with or without conditions, for agricultural operations where a waiver is not against the public interest.[176]

In addition to regulating waste discharges, the State and Regional Water Boards can address any activity or factor affecting water quality in their planning capacities.[177] They are not restricted to addressing only the impacts of waste discharge. State agencies, departments, and boards must comply with state policy for water quality control and statewide and regional water quality control plans, unless otherwise directed by statute. In addition, water quality control plans can contain recommendations for action by any entity, public or private. Before implementing any agricultural water quality control plan, however, the Regional Water Boards have to indicate an estimate of the total cost of the program and identify potential sources of financing.[178]

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[173] Management Measure Guidance, *supra*, fn. 4, pp. 2-4 through 2-11.

[174] Journal of the California Assembly 2679 (Reg. Sess. 1969).

[175] See discussion in Section II. B. 1. of this statement.

[176] See fn. 150, *supra*.

[177] See discussion in Section II.A. of this statement.

[178] Wat. Code §13141.

(2) Urban Sources

The (g) guidance addresses six major categories of urban nonpoint pollution.[179] These include runoff from developing areas, construction sites, and existing development. Onsite disposal systems; general sources, such as households, commercial sites and landscaping; and roads, highways and bridges are also included. The principal pollutants found in urban runoff are sediments, nutrients, oxygen-demanding substances, pathogens, salts, hydrocarbons, heavy metals, and toxic substances.[180]

Urban runoff containing wastes, such as those listed, is clearly subject to regulation under Porter-Cologne. "Waste" is broadly defined in Porter-Cologne, and the term has specifically been construed to include these types of waste.[181] The State and Regional Water Boards have already adopted NPDES permits for some types of urban runoff; and the State Water Board has adopted general waste discharge requirements for small domestic wastewater systems.

In addition, the State and Regional Water Boards can use their planning authority to address urban runoff on a watershed basis. This authority has been used, for example, to regulate activities causing erosion that add silt to Lake Tahoe and its tributaries.[182]

(3) Marinas

The (g) guidance also contains management measures for nonpoint source pollution from marinas and recreational boating.[183] Nonpoint source pollution identified with this category includes water column toxicity, low dissolved oxygen, metals and petroleum hydrocarbons, as well as disruption of sediment and habitat, and shoaling and shoreline erosion.[184]

As stated previously, the Porter-Cologne definition of "waste" is broad. It would include any pollutants from marinas that enter surface waters through boat discharges, spills, or storm water runoff.[185] Shoreline erosion caused by the construction or expansion of a marina is also

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[179] Management Measure Guidance, *supra*, fn. 4, pp. 4-1 through 4-2.

[180] *Id*. at 4-7 through 4-9.

[181] See discussion in Section II.B.1 of this statement. See also *Lake Madrone*, *supra*, fn. 11, 209 Cal.App.3d at 168-171, 256 Cal.Rptr. 894 (concentrated silt and sediment associated with human habitation); 16 Ops.Cal.Atty.Gen. 112 (1950) (sewage from privately-operated sewage disposal devices, such as septic tanks and cesspools); 16 Ops.Cal.Atty.Gen. 125 (1950) (drainage of wastewater from construction sites); 27 Ops.Cal.Atty.Gen. 182 (1956) (drainage, flow, or seepage into surface waters of materials from completed operations).

[182] See *Tahoe-Sierra*, *supra*, fn. 11.

[183] Porter-Cologne is not listed as a backup authority for the boat operation management measure.

[184] Management Measure Guidance, *supra*, fn. 4, pp. 5-3 through 5-7.

[185] See discussion in Section II.B.1 of this Statement.

subject to regulation as a waste discharge because the activity causes the release of sediments. Additionally, if marina construction requires a federal permit, such as a dredge and fill permit under section 404 of the Clean Water Act,[186] the applicant will have to obtain a section 401 certificate from the state. The State Water Board can condition a certification, if appropriate, to address both the point and nonpoint source impacts of the project.

In addition, state law specifically authorizes the Regional Water Boards to require marinas to install vessel pumpout facilities.[187] State law also requires that vessel pumpout facilities be operated and maintained to prevent sewage discharges to state waters.[188] They must be maintained in good working order and regularly cleaned.[189]

In addition to regulating waste discharges, the State and Regional Water Boards can address any marina or boating activities that affect water quality but that do not involve a waste discharge under their planning authority.[190] For example, they could address the marina flushing management measure in a water quality control plan and include recommendations for appropriate action by affected agencies.

(4) Hydromodification

The hydromodification management measure addresses nonpoint source pollution from channelization and channel modifications, dams, and streambank and shoreline erosion.[191] The state has identified Porter-Cologne as a backup authority for channelization and channel modification and streambank and shoreline erosion.

In general, channelization and channel modifications can change sediment supply, reduce freshwater availability, accelerate the delivery of pollutants, cause a loss of contact with overbank areas, and adversely impact instream and riparian habitat.[192] Streambank and shoreline erosion can likewise adversely impact instream and riparian habitat and contribute to increased levels of turbidity and nutrients.[193]

Under Porter-Cologne, the Regional Water Boards can regulate any channelization or channel modification projects that cause a waste discharge, either as a result of construction or operation.[194] Similarly, they can regulate any activities that cause streambank or shoreline

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[186] 33 U.S.C. §1344.

[187] Harb. & Nav. Code §§775-786; see Cal. Code Regs., tit. 23, §§2831-2836.

[188] Harb. & Nav. Code §777; see Cal. Code Regs., tit. 23, §§2827-2829.

[189] *Ibid.*

[190] See discussion in Section II.A. of this Statement.

[191] Management Measure Guidance, *supra*, fn. 4, p. 6-2.

[192] *Id.*, pp. 6-4 through 6-7.

[193] *Id.*, pp. 6-57 through 6-58.

[194] See discussion in Section II.B.1 of this Statement.

erosion, resulting in the release of sediments or other wastes to state waters. The State Water Board can condition a section 401 water quality certificate for a federally-permitted activity involving a surface water discharge to address both the activity's point and nonpoint source impacts. The State and Regional Water Boards can address any other activities that affect water quality, but that do not entail a waste discharge, under their broad planning authority.[195]

(5) Wetlands

The (g) guidance contains management measures for categories of nonpoint sources. The management measures for wetlands promote protecting and restoring wetlands and riparian areas and using vegetated treatment systems to control nonpoint source pollution from these sources. The Regional Water Boards can use their Porter-Cologne authority to regulate any activities that result in a waste discharge to wetlands or riparian areas.[196] Where past waste discharges have adversely impacted wetland areas, they can issue enforcement orders requiring restoration.[197] The Regional Water Boards can also promote the protection and restoration of wetlands and the use of engineered vegetated treatment systems as supplemental environmental credit projects mitigating administrative civil liability assessments.[198] Finally, the State and Regional Water Boards can use their broad planning authority to address the protection and restoration of wetlands and to promote the use of vegetated treatment systems.[199]

C. Question: Will it be necessary for the state to issue regulations prior to using its Porter-Cologne authority to ensure implementation of the management measures?

Response: No, regulations are not necessary. The (g) guidance management measures vary from requirements for reports and watershed management plans to more prescriptive requirements. The appropriate Porter-Cologne response will also vary. If the State or Regional Water Boards choose to implement one or more of the management measures through their planning authority or regulations, they will have to comply with the state Administrative Procedure Act (APA).[200] Unlike the adoption of formal regulations, however, the APA contains special, abbreviated procedures for the adoption or amendment of plans, policies and guidelines.[201] If the State or Regional Water Boards choose other implementation alternatives, they will not have to comply with the APA.

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[195] See discussion in Section II.A. of this Statement.

[196] See discussion in Section II.B.1 of this Statement.

[197] See, e.g., Wat. Code §13304. See also State Water Board Order WQ 90-5, upholding a San Francisco Bay Regional Water Board order requiring a discharger to mitigate for losses of wetland habitat.

[198] See discussion in Guidance to Implement the Water Quality Enforcement Policy, State Water Board (April 1996), pp. 22-23.

[199] See discussion in Section II.A. of this Statement.

[200] See Gov. Code §111340 et seq.

[201] Compare Gov. Code §11353 with §11346 et seq.

As explained previously, the State Water Board's Nonpoint Source Management Plan lays out a three-tiered management approach to nonpoint pollution regulation.[202] In the first tier, the State and Regional Water Boards will encourage affected discharger groups to voluntarily implement applicable management measures. This can be done through, for example, funding and education. These activities are voluntary and can be accomplished without formal rulemaking.

The second tier is regulatory encouragement - through adoption of conditional waivers or management agency agreements with other enforcement agencies. Waivers may be either individual or general. The Regional Water Boards can waive waste discharge requirements for an individual discharger, on condition that the discharger comply with appropriate management measures; and this does not require a water quality control plan amendment.[203] Typically, the Regional Water Boards adopt waivers for classes of dischargers, and these waivers are included in the applicable water quality control plans. As stated previously, the adoption or amendment of water quality control plans, policies, or guidelines is subject to abbreviated, APA rulemaking procedures.[204] Alternatively, the State and Regional Water Boards can enter into management agency agreements with agencies with enforcement authority over the nonpoint sources. These agreements can ensure management measure implementation, and they do not require a water quality control plan amendment.

In the third tier, the State and Regional Water Boards adopt waste discharge requirements. The adoption of waste discharge requirements, either individual or general, is not subject to the APA's rulemaking requirements.[205] Waste discharge requirements can directly or indirectly require compliance with applicable management measures in appropriate cases.[206] If appropriate, general waste discharge requirements can be adopted to ensure management measure implementation on a regionwide or statewide basis.

Some management measures require submission of plans, such as erosion and sediment control plans. The Regional Water Boards can implement these measures under their existing Porter-Cologne investigative powers, without undertaking a rulemaking.[207]
Likewise, if the Regional Water Boards choose to adopt enforcement orders to address, for example, wetland or riparian areas degraded by waste discharges, the Regional Water Boards will not have to undertake formal rulemaking.

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[202] See discussion in Section III.A.2.(a) of this Statement.

[203] See Gov. Code §11352.

[204] See *id*. §11353, which contain special procedures for State and Regional Water Board plans, policies, and guidelines.

[205] See *id*. §11352(b).

[206] See discussion in Section III.A.2.(a) & (b).

[207] See Wat. Code §§13165, 13225(c), 13267, 13383. See also Gov. Code §11342(g), defining "regulation" as a rule, regulation, order, or standard of general application.

On the other hand, the Regional Water Boards are currently engaged in developing TMDLs for impaired waterbodies, many of which are impaired by nonpoint sources. These TMDLs can be used as a vehicle to implement appropriate management measures. The TMDLs have to be included in the state's water quality management plan under the Clean Water Act; they will, therefore, necessarily result in water quality control plan amendments.[208]

IV. CONCLUSION

In sum, the State and Regional Water Boards have broad-reaching power under Porter-Cologne to prevent nonpoint source pollution. In their planning capacity, they can address all activities and factors that may affect water quality, including nonpoint source activities. They can also directly regulate all waste discharges, both point and nonpoint source, that may affect the quality of state waters. In addition to preventing nonpoint source pollution, the State and Regional Water Boards can ensure implementation of the management measures through several mechanisms. Finally, the State and Regional Water Boards are not required to undertake rulemaking before implementing the measures.

Date: _____

_____
William R. Attwater
Chief Counsel
California State Water Resources
Control Board

[208] 33 U.S.C. §1313(d).

CALIFORNIA COASTAL COMMISSION
CHIEF COUNSEL'S STATEMENT
FOR THE
CALIFORNIA'S NONPOINT SOURCE POLLUTION CONTROL PROGRAM

NOVEMBER 1999

STATE OF CALIFORNIA – THE RESOURCES AGENCY GRAY DAVIS, *Governor*

CALIFORNIA COASTAL COMMISSION
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MEMORANDUM

October 21, 1999

TO: Peter Douglas, Executive Director
Jaime Kooser, Deputy Director

FROM: Ralph Faust, Chief Counsel
Dorothy Dickey, Deputy Chief Counsel

SUBJECT: **Enforceability of Nonpoint Source Pollution Control Program**

We are writing to address the scope of the Coastal Commission's authority to enforce the nonpoint source pollution control provisions of the Coastal Zone Management Act. (16 U.S.C. § 1451 *et seq*.) Section 6217 of that Act provides that each state "for which a management program has been approved pursuant to section 306 of the Coastal Zone Management Act … shall prepare and submit to the Secretary and the Administrator a Coastal Nonpoint Pollution Control Program for approval pursuant to this section." (16 U.S.C. § 1455b.) The Coastal Zone Management Act explains that the "purpose of the program shall be to develop and implement management measures for nonpoint source pollution to restore and protect coastal waters, working in conjunction with other State and local authorities." (16 U.S.C. § 1455b(a)(1).) You have asked whether the Commission can enforce those nonpoint pollution control provisions.

The Coastal Commission implements the policies of California's Coastal Act. (Public Resources Code § 30000 *et seq.*) A central focus of the Coastal Act is the protection and, where feasible, restoration, of coastal water quality. The Act includes numerous enforceable policies that are directed toward that objective. For example, section 30230 provides that:

> *Marine resources shall be maintained, enhanced, and where feasible, restored. Special protection shall be given to areas and species of special biological or economic significance. Uses of the marine environment shall be carried out in a manner that will sustain the biological productivity of coastal waters and that will maintain healthy populations of all species of marine organisms adequate for long-term commercial, recreational, scientific, and educational purposes.*

The Commission is required specifically to control runoff in section 30231:

> *The biological productivity and the quality of coastal waters, streams, wetlands, estuaries, and lakes appropriate to maintain optimum*

> *populations of marine organisms and for the protection of human health shall be maintained and, where feasible, restored through, among other means, minimizing adverse effects of waste water discharges and entrainment, controlling runoff, preventing depletion of ground water supplies and substantial interference with surface water flow, encouraging waste water reclamation, maintaining natural vegetation buffer areas that protect riparian habitats, and minimizing alteration of natural streams.*

In addition, Coastal Act policies limit development in numerous other ways to protect water quality. (See Attachment 1.)

The Commission implements these protective policies as it undertakes its three major regulatory tasks. Its first regulatory responsibility is to review and certify plans that address how development will occur along the California coast. Most of those plans are developed by local governments and are called "local coastal programs". (Public Resources Code § 30500 *et seq.*) Plans are also prepared by port districts (Public Resources Code § 30711 *et seq.*), colleges and universities (Public Resources Code § 30605) and proponents of public works projects (*id.*).

The Commission reviews those plans to determine whether they are consistent with applicable policies of the Coastal Act, including those related to water quality. If the Commission determines that a plan is not consistent with the policies of the Coastal Act, it is required to deny certification of the plan. In that event the Commission generally suggests modifications to the plan that the local government or other plan proponent could adopt.[209] Once the plan has been modified to incorporate the changes identified by the Commission, it can be resubmitted to the Commission for certification. Following certification by the Commission of a plan, any amendments to the plan must be submitted to the Commission. Until the Commission certifies an amendment, the measure has no legal effect for purposes of the Coastal Act.

The Commission has the authority to enforce Coastal Act provisions relating to water quality, including nonpoint source pollution. As described above, the Commission is required to refuse to certify plans and amendments which it determines do not meet the Coastal Act's water quality requirements. The Commission is additionally authorized to identify appropriate changes to those plans and amendments to bring them into conformity with the Coastal Act's water quality provisions. Such changes may include nonpoint source pollution management measures necessary to bring a plan or amendment into conformity with Coastal Act provisions relating to water quality.

The Commission's second regulatory task is to review applications for coastal development permits. The Coastal Act provides that any person who wishes to pursue "development" in the

[209] The procedures for processing those modifications differ depending on the type of plan reviewed by the Commission. A discussion of the specific procedural mechanisms involved is beyond the scope of this memo.

coastal zone must obtain a coastal development permit. (Public Resources Code § 30600.) "Development" is broadly defined in Public Resources Code § 30106 to mean:

> *"… on land, in or under water, the placement or erection of any solid material or structure; discharge or disposal of any dredged material or of any gaseous, liquid, solid, or thermal waste; grading, removing, dredging, mining, or extraction of any materials; change in the density or intensity of use of land, including, but not limited to, subdivision pursuant to the Subdivision Map Act (commencing with Section 66410 of the Government Code), and any other division of land, including lot splits, except where the land division is brought about in connection with the purchase of such land by a public agency for public recreational use; change in the intensity of use of water, or of access thereto; construction, reconstruction, demolition, or alteration of the size of any structure, including any facility of any private, public, or municipal utility; and the removal or harvesting of major vegetation other than for agricultural purposes, kelp harvesting, and timber operations which are in accordance with a timber harvesting plan submitted pursuant to the provisions of the Z'berg-Nejedly Forest Practice Act of 1973 (commencing with Section 4511).*
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> *As used in this section, "structure" includes, but is not limited to, any building, road, pipe, flume, conduit, siphon, aqueduct, telephone line, and electrical power transmission and distribution line."*

The Commission performs its permit review function with respect to development within the coastal zone until the Commission has certified a local coastal program for each coastal city and county or a port master plan for that jurisdiction. (Public Resources Code §§ 30600(c), 30715(a).) In determining whether or not to approve a particular coastal development permit application, the Commission applies the Coastal Act's policies concerning coastal protection, which include the policies to protect coastal water quality that are cited above. (Public Resources Code §§ 30604, 30715(a).) As a condition of approving coastal development permit applications, the Commission may impose conditions to prevent and mitigate nonpoint source pollution in order to implement those water quality requirements.[210]

After the Commission has certified a local coastal program, it delegates coastal development permitting authority to the local government. (Public Resources Code § 30519(a).) The Commission retains permitting jurisdiction over development proposed on tidelands, submerged

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[210] The Coastal Act does not authorize the Commission to require a coastal development permit for the "removal or harvesting of major vegetation … for agricultural purposes, kelp harvesting and timber operations which are in accordance with a timber harvesting plan submitted pursuant to the provisions of the Z'berg-Nejedly Forest Practice Act of 1973…." (Public Resources Code § 30106.) Nevertheless, the Commission is authorized to regulate other development activities related to agriculture and forestry. As a condition of approval of such development, the Commission may require that nonpoint source pollution control measures be undertaken in order to find that the development meets Coastal Act water quality standards.

lands and public trust lands. (Public Resources Code § 30519(b).) Similarly, the Commission delegates coastal development authority to a port once the Commission has certified the port's master plan. (Public Resources Code § 30519(b).)

Local governments' and ports' decisions concerning applications for coastal development permits may be appealed to the Coastal Commission in certain instances. (Public Resources Code §§ 30603, 30715.) The standard of review for permit decisions after the Commission has certified a local coastal program or a port master plan is the certified program or plan. (Public Resources Code §§ 30604(b), 30715.5.) The Commission's actions on appeals are also governed by the certified program or plan. (*Id.*) As noted above, those planning documents must meet the Coastal Act's standards concerning water quality, including nonpoint source pollution. Thus, when the Commission, a local government or a port makes a decision on whether to issue a coastal development permit after the Commission has certified such a plan or program, the permitting agency must determine whether the proposed development will comply with the policies and standards set forth in its plan or program, including those related to water quality. If the Commission or other permitting agency determines that the proposed development will not comply with those standards, it may impose conditions on the project to bring it into compliance with the standards in the plan or program, including any management measures to prevent or mitigate nonpoint source pollution. Alternatively, the Commission or other permitting agency may deny the development.

The applicable requirements concerning water quality are found in the Coastal Act. Thus, a coastal development permit application may not be approved unless it complies with the water quality requirements contained in the Coastal Act or in certified plans and programs.

The Coastal Commission's third major regulatory responsibility is federal consistency review under the Coastal Zone Management Act. (16 U.S.C. § 1451 *et seq.*) The Commission reviews activities conducted by the federal government, federally issued licenses and permits, plans for exploration and production of the outer continental shelf, and federally funded activities. (16 U.S.C. § 1456.) The Commission reviews each proposed activity to determine whether it is consistent with the California Coastal Management Program. The Program includes the Coastal Act and those local coastal programs that have been formally approved by the Office of Ocean and Coastal Resource Management for incorporation into the State's program. The Commission must determine that the proposed activity is consistent with those policies and standards, including any required nonpoint source pollution control measures.

As noted above, the Coastal Act includes policies to protect coastal water quality. Therefore, in performing federal consistency review, the Commission is authorized to apply those water quality standards and to "disagree" or "object" as appropriate to those activities and projects that do not comply with those standards. (*Id.*, 15 C.F.R. §§ 930.32(a), 930.39, 930.42, 930.79.)

For the reasons set forth above, we conclude that the Coastal Commission has adequate legal authority under the Coastal Act to enforce water quality requirements related to nonpoint source pollution.

Attachment

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ATTACHMENT 1

Coastal Act Policies Relevant to the Control of Polluted Runoff

§	Summary of Coastal Act Policy
30012	Carry out a public education program to promote coastal conservation.
30230	Maintain, enhance, and where feasible restore marine resources.
30231	Maintain and, where feasible, restore biological productivity and the quality of coastal waters, streams, wetlands, estuaries and lakes through, among other means, minimizing adverse effects of waste water discharges and entrainment, controlling runoff, preventing depletion of ground water supplies and substantial interference with surface water flow, encouraging waste water reclamation, maintaining natural vegetation buffer areas that protect riparian habitats, and minimizing alteration of natural streams.
30232	Protect against the spillage of crude oil, gas, petroleum products, or hazardous wastes.
30233	Limit the alteration of wetlands, coastal waters, estuaries; provide for feasible mitigation measures to minimize adverse environmental effects.
30235	Phase out or upgrade where feasible existing marine structures causing water stagnation contributing to pollution problems and fish kills.
30236	Limit hydromodification of rivers and streams; channelizations, dams, other substantial alterations of rivers and streams shall incorporate best mitigation measures feasible.
30240	Protect environmentally sensitive habitat areas (ESHAs). Site and design new development in areas adjacent to ESHAs to prevent significant adverse impacts.
30243	Protect long-term productivity of soils and timberlands.
30250	Site and design new development so as to not have significant adverse impacts, either individually or cumulatively, on coastal resources.
30251	Minimize alteration of natural land forms.
30253	Assure that new development is stable, has structural integrity, and does not contribute significantly to erosion.
30705	Control impacts of dredging in specified port areas.
30706 (b)	Minimize harmful effects to coastal waters, including water quality, from the nature, location, and extent of any fill (seaward of the mean high tide line within the jurisdiction of ports), including disposal of dredge spoils, and minimize reductions of volume, surface area, or circulation of water.
30708 (a) and (d)	Locate, design, and construct all port-related development so as to (a) minimize substantial environmental impacts and (d) provide for other beneficial uses consistent with the public trust, including, but not limited to, recreation and wildlife habitat uses, to the extent feasible.

APPENDIX C. SCHEDULE OF TMDLS BY CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARDS

(NOTE: The following tables were developed from information submitted by the RWQCBs for inclusion in the CWA section 303(d) TMDL priority list and their respective chapters of the 1999 WMI Integrated Plan. The tables represent those TMDLs that the RWQCBs have identified with initial development or completion occurring during the first five-year implementation cycle (1998-2003) of the Program Plan.)

Table C1. Scheduled Development of TMDLs by North Coast Regional Water Quality Control Board (RWQCB1)

Waterbody	Stressor	Completion Date		Implement Actions	Stressor Source Category					
		Technical Report	Implementation Plan		Agriculture	Forestry	Urban	Marinas	Hydromod-ification	Not identified
Noyo River	Sediment	1999	1999			x				
Estero Americano	Nutrients	1997			x					
Garcia River	Sediment	2000	2000		x	x	x			
	Temperature						x			
Navarro River	Sediment		2000							
	Temperature		2000							
Americano Creek	Nutrients	1997			x					
Mattole River	Sediment	2001	2002			x				
	Temperature		2002							
Ten Mile River	Sediment		2000							
Redwood Creek	Sediment		1998							
Elk River	Sediment	2009				x				
Albion River	Sediment	2000	2001			x				
Big River	Sediment	2001				x				
South Fork Trinity River	Sediment		1998							
Beaughton Creek	Unpermitted discharge of waste		1998							
Eel River	Sediment		1999-2006							
	Temperature		1999-2006							
Van Duzen River	Sediment		1999							
Trinity River	Sediment	2001								
Gualala River	Sediment	1999	2000			x				

004913

Table C2. Scheduled Development of TMDLs by San Francisco Bay Regional Water Quality Control Board (RWQCB2)

Waterbody	Stressor	Completion Date		Implement Actions	Stressor Source Category					
		Technical Report	Implementation Plan		Agriculture	Forestry	Urban	Marinas	Hydromod-ification	Not identified
South San Francisco Bay	Exotic Species		2001					x		
	Mercury		2003							x
	PCBs		2003							
Central San Francisco Bay	Exotic Species		2001					x		
	Mercury		2003							x
	PCBs		2003							
Lower San Francisco Bay	Exotic Species		2001					x		
	Mercury		2003							x
	PCBS		2003							
Carquinez Strait	Exotic Species		2001					x		
	Mercury		2003							x
	PCBs		2003							
Napa River	Siltation		2003		x		x			
San Pablo Bay	Exotic Species		2001					x		
	Mercury		2003							x
	PCBs		2003							
Suisun Bay	Exotic Species		2001					x		
	Mercury		2003							x
	PCBs		2003							
Richardson Bay	Exotic Species		2001					x		
	Mercury		2003							x
	PCBs		2003							x
Delta	Exotic Species		2001					x		
	Mercury		2003							x

004914

Table C3. Scheduled Development of TMDLs by Central Coast Regional Water Quality Control Board (RWQCB3)

Waterbody	Stressor	Completion Date		Implement Actions	Stressor Source Category					
		Technical Report	Implementation Plan		Agriculture	Forestry	Urban	Marinas	Hydromod-ification	Not identified
Morro Bay	Metals	2000						x		
	Pathogens	2000			x		x			
	Sedimentation/ Siltation	1999			x		x			
Old Salinas River Estuary	Nutrients	2003	2006		x					
	Pesticides	2003	2006		x					
Las Tablas Creek	Mercury	2000			x					
Salinas River Lagoon (North)	Nutrients	2003	2006							x
	Pesticides	2003	2006		x					
	Siltation	2001	2004		x					
Salinas River Lagoon (South)	Nutrients	2003	2006		x					
	Pesticides	2003	2006		x					
	Salinity/TDS/ Chlorides	2003	2006		x					
Tembladero Slough	Nutrients	2003	2006		x					
	Pesticides	2003	2006		x					
Pajaro River	Nutrients	2001	2004		x					
	Siltation	2001	2004		x					
Las Tablas Creek, North Fork	Mercury	2000								
Salinas River	Siltation	2001	2004		x		x			
	Nutrients	2003	2006		x					
	Pesticides/	2003	2006		x					
	Salinity	2003	2006		x					
	Priority Pollutants									
Espinosa Slough	Nutrients	2003	2006		x					
	Pesticides/Priority Organics	2003	2006		x					
Carbonera Creek	Pathogens	2001	2004							x
	Siltation	2000	2003		x					
	Nutrients	2000								x
Lompico Creek	Pathogens	2001	2004				x			
	Siltation	2000	2003		x					
	Nutrients	2000					x			

004915

Waterbody	Stressor	Completion Date		Implement Actions	Stressor Source Category					
		Technical Report	Implementation Plan		Agriculture	Forestry	Urban	Marinas	Hydromod-ification	Not identified
San Lorenzo River Estuary	Pathogens	2001	2004							
	Siltation	2000	2003						x	
Hernadez Reservoir	Mercury	2003	2006							
Lompico Creek	Nutrients						x			
Llagas Creek	Nutrients	2001	2004		x					
	Siltation	2001	2004		x				x	
Pajaro River	Nutrients	2001	2004		x		x			
	Siltation	2001	2004		x		x		x	
Rider Gulch Creek	Siltation	2001	2004		x					
San Benito River	Siltation	2001	2004		x					
Shingle Mill Creek	Nutrients	2001	2004				x			
	Siltation	2001	2004				x			
Watsonville Slough	Oil and Grease	2003	2006							x
	Pathogens	2003	2006							x
	Pesticides	2003	2006				x			
	Siltation	2001	2004				x			
	Metals	2003								
Chorro Creek	Metals	2000								
	Nutrients	2000			x					
	Siltation	2000			x		x		x	
San Luis Obispo Creek	Nutrients	2000	2003		x					
	Pathogens	2000								
	Priority Pollutants	2001								
Arroyo Burro Creek	Pathogens	2011	2014							
Las Tablas Creek, South Fork	Mercury	2000								
Nacimiento Reservoir	Mercury	2000								
Los Osos Creek	Nutrients	2000			x					
	Siltation	1999			x		x		x	
	Priority Organics	2000								
Valencia Creek	Siltation	2001								
Salinas River	Nutrients	2003								
Salinas River	Pesticides/Priority Organics	2003								
	Salinity	2003								
	Siltation	2001								
Clear Creek	Mercury	2003								
Hernandez Reservoir	Mercury	2003								
San Benito River	Siltation	2001								

004916

Waterbody	Stressor	Completion Date		Implement Actions	Stressor Source Category					
		Technical Report	Implementation Plan		Agriculture	Forestry	Urban	Marinas	Hydromod-ification	Not identified
San Lorenzo River	Nutrients	2000					x			
	Siltation	2000								
	Pathogens	2001					x			
San Lorenzo Creek	Nutrients						x			
	Siltation	2000	2003			x				

Table C4. Scheduled Development of TMDLs by Los Angeles Regional Water Quality Control Board (RWQCB4)

Waterbody	Stressor	Completion Date		Implement Actions	Stressor Source Category					
		Technical Report	Implementation Plan		Agriculture	Forestry	Urban	Marinas	Hydromodi-fication	Not identified
Arroyo Conejo North Fork	Nitrogen	00/01	01/02	01/02						x
Arroyo Las Posas (Reaches 1&2)	Pesticides	02/03	03/04	03/04						x
Arroyo Simi (Reach 1)	Metals	04/05	05/06	05/06						x
Ballona Creek	Trash	00/01	01/02	02/03						x
	Metals	02/03	03/04	03/04						x
	Pesticides	02/03	03/04	03/04						x
Ballona Estuary	Coliform	02/03	03/04	03/04						x
Cabrillo Pier area	Pathogens	00/01	02/03	03/04						x
Conejo Creek	Nitrogen	00/01	01/02	01/02						x
Fox Barranca	Salts	04/05	05/06	05/06						x
Lake Calabasas	Nutrients	00/01	01/02	02/03						x
Los Angeles River (Reaches 1 - 5)	Nitrogen (effects)	01/02	02/03	02/03						x
	Trash	99/00	00/01	00/01						x
Los Angeles River (Reaches 1,2,4, & 6)	Coliform	00/01	01/02	01/02						x
Los Angeles River (Rchs 1,2, & 4)	Metals	02/03	03/04	03/04						x
Los Angeles River (Reach 5)	Pesticides	04/05	05/06	05/06						x
Marina del Rey Harbor – Back Basins	PCBs	03/04	04/05	04/05						x
	Pesticides	03/04	04/05	04/05						x
	Metals	03/04	04/05	04/05						x
Marina del Rey Harbor Beach	Coliform	01/02	02/03	02/03						x
McGrath Beach	Coliform	99/00	01/02	02/03						x
Medea Creek (Reaches 1 & 2)	Coliform	00/01	01/02	02/03						x

004917

Waterbody	Stressor	Completion Date		Implement Actions	Stressor Source Category					
		Technical Report	Implementation Plan		Agriculture	Forestry	Urban	Marinas	Hydromodi-fication	Not identified
Revlon Slough	Pesticides	01/02	02/03	02/03						x
San Gabriel River East Fork	Trash	99/00	99/00	99/00						x
San Gabriel River(Reach 2)	Coliform	02/03	03/04	04/05						x
San Gabriel River (Reaches 1,2, & 3)	Nitrogen	01/02	02/03	02/03						x
San Jose Creek (Reach 1)	Metals	04/05	05/06	05/06						x
Santa Clara River (Reaches 3,7, & 8)	Chloride	99/00	99/00	99/00						x
	Nitrogen	99/00	01/02	02/03						x
Santa Monica Bay (Greater) beaches	Pathogens	00/01	01/02	02/03						x
Santa Monica Bay Nearshore/Offshore	Metals	02/03	03/04	03/04						x
	Chlordane	04/05	05/06	05/06						x

Table C5. Scheduled Development of TMDLs by Central Valley Regional Water Quality Control Board (RWQCB5)

Waterbody	Stressor	Completion Date		Implement Actions	Stressor Source Category					
		Technical Report	Implementation Plan		Agriculture	Forestry	Urban	Marinas	Hydromod-ification	Not identified
Delta Waterways	Chlorpyrifos	2002	2004		x					
	Diazinon	2002	2004		x					
	Mercury	2002	2004							
Feather River	Diazinon	2002	2004		x					
Sacramento River, Lower	Diazinon	2002	2004		x					
	Mercury	2002	2004							
Berryessa Lake	Mercury	2002	2004							
Cache Creek	Mercury	2002	2004							
Sulfur Creek	Mercury	2002	2004		x					
Harley Gulch	Mercury	2002	2004							
Mud Slough	Selenium	1997	1999		x					
San Joaquin River	Selenium	1997	1999		x					
	Boron				x					
	Electrical Conductivity				x					
	Chlorpyrifos	2002	2004		x					
	Diazinon	2002	2004		x					
Little Grizzly Creek	Copper	2002								
	Zinc	2002								

004918

Waterbody	Stressor	Completion Date		Implement Actions	Stressor Source Category					
		Technical Report	Implementation Plan		Agriculture	Forestry	Urban	Marinas	Hydromod-ification	Not identified
Stanislaus River (Lower)	Diazinon	2002	2004		x					
Clear Lake	Mercury	2002	2004							
Tuolumne River (Lower)	Diazinon	2002	2004		x					

Table C6. Scheduled Development of TMDLs by Lahontan Regional Water Quality Control Board (RWQCB6)

Waterbody	Stressor	Completion Date		Implement Actions	Stressor Source Category					
		Technical Report	Implementation Plan		Agriculture	Forestry	Urban	Marinas	Hydromod-ification	Not identified
Aspen Creek	Metals									x
Bear Creek	Sedimentation/ Siltation								x	
Blackwood Creek	Sedimentation/ Siltation					x	x		x	
Bodie Creek	Metals									x
Bridgeport Res	Nutrients				x					
Bronco Creek	Sedimentation/ Siltation									x
Bryant Creek	Metals									x
Carson River, East Fork	Nutrients				x					
Cottonwood Creek	Water/Flow Variability									
Eagle Lake	Org. enrichment/ Low D.O.				x		x			
East Walker River	Sedimentation/ Siltation				x		x			
Gray Creek	Sedimentation/ Siltation									x
Heavenly Valley Creek.	Sediment						x			
Indian Creek	Habitat Alterations				x					
Lake Tahoe	Nutrients					x	x	x	x	
Lee Vining Creek	Flow Alterations									
Mammoth Creek	Metals									x
Mill Creek	Flow Alterations									

004919

Waterbody	Stressor	Completion Date		Implement Actions	Stressor Source Category					
		Technical Report	Implementation Plan		Agriculture	Forestry	Urban	Marinas	Hydromod-ification	Not identified
Monitor Creek	Metals									x
Mono Lake	Salinity/TDS/ Chlorides									
Owens River	Habitat Alterations									
Pine Creek	Siltation				x					
Pleasant Valley Reservoir	Org. Enrichment/ Low D.O.				x					
Snow Creek	Habitat Alterations						x			
Squaw Creek	Siltation	2002					x			
Susan River	Unknown Toxicity				x		x			
Topaz Lake	Sedimentation/ Siltation				x					
Ward Creek	Sedimentation/ Siltation						x			
West Walker River	Sedimentation/ Siltation				x					
Wolf Creek	Sedimentation/ Siltation				x					

Table C7. Scheduled Development of TMDLs by Colorado River Regional Water Quality Control Board (RWQCB7)

Waterbody	Stressor	Completion Date		Implement Actions	Stressor Source Category					
		Technical Report	Implementation Plan		Agriculture	Forestry	Urban	Marinas	Hydromod-ification	Not identified
Alamo River	Siltation	2000	2001		x					
Imperial Valley Drains	Silt	2000	2011		x					
New River	Silt	2002	2003		x					
Salton Sea	Salt	2001								

004920

Table C8. Scheduled Development of TMDLs by Santa Ana Regional Water Quality Control Board (RWQCB8)

Waterbody	Stressor	Completion Date		Implement Actions	Stressor Source Category					
		Technical Report	Implementation Plan		Agriculture	Forestry	Urban	Marinas	Hydromod-ification	Not identified
Big Bear Lake and tributaries	Metals	07/03	01/04	12/04						x
	Nutrients	07/03	01/04	12/04			x			
Canyon Lake	Nutrients	06/02	01/03	12/03						x
	Pathogens	06/02	01/03	12/03						x
Lake Elsinore	Nutrients	06/02	01/03	12/03						x
	Siltation	06/02	01/03	12/03						x
Newport Bay (Lower)	Metals	01/01	01/01	12/01				x		
	Nutrients	12/98	12/98	12/98	x					
	Pathogens	12/98	03/99	12/99						x
	Pesticides	01/01	01/01	12/01	x					
	Pr. Organics	01/01	01/01	12/01						x
	Sediment	12/98	12/98	12/98	x		x		x	
Newport Bay (Upper)	Metals	01/01	01/01	12/01						x
	Nutrients	12/98	12/98	12/98	x					
	Pathogens	12/98	03/99	12/99						x
	Pesticides	01/01	01/01	12/01	x					
	Sediment	12/98	12/98	12/98	x		x		x	
San Diego Creek (Reach 1 & 2)	Metals	01/01	01/01	12/01						x
	Pesticides	01/01	01/01	12/01						x
	Sediment	12/98	12/98	12/98	x		x		x	

004921

Table C9. Scheduled Development of TMDLs by San Diego Regional Water Quality Control Board (RWQCB9)

Waterbody	Stressor	Completion Date		Implement Actions	Stressor Source Category					
		Technical Report	Implementation Plan		Agriculture	Forestry	Urban	Marinas	Hydromod-ification	Not identified
Aliso Creek	Coliform	07/02	07/02	07/02						x
Aqua Hedionda Lagoon	Coliform	07/03	07/09	07/09						x
	Sediment	07/03	07/07	07/07						x
Buena Vista Lagoon	Sediment	07/03	07/07	07/07						x
Chollas Creek	Coliform	07/00	07/03	07/03						x
	Metals	05/00	07/00	12/00						x
	Toxicity	05/00	07/00	12/00						x
Formosa Slough	Nutrients	07/03	07/08	07/08						x
Guajome Lake	Nutrients	07/05	07/11	07/11						x
Loma Alta Slough	Coliform	07/03	07/09	07/09						x
	Nutrients	07/03	07/09	07/09						x
Los Penasquitos Lagoon	Sediment	07/03	07/08	07/08						x
Mission Bay	Coliform	07/03	07/08	07/08						x
	Lead	07/03	07/08	07/08						x
	Nutrients	07/03	07/08	07/08						x
Pacific Ocean (Laguna Beach)	Coliform	07/10	07/10	07/10						x
Pacific Ocean (Aliso HAS)	Coliform	07/02	07/02	07/02						x
Pacific Ocean (Dana Point HSA)	Coliform	07/10	07/10	07/10						x
Pacific Ocean (L. San Juan Ck.)	Coliform	07/10	07/10	07/10						x
Pacific Ocean (Sn Clemente HA)	Coliform	07/10	07/10	07/10						x
Pacific Ocean (San Luis Rey HU)	Coliform	07/03	07/09	07/09						x
Pacific Ocean (Loma Alta Ck HA)	Coliform	07/03	07/09	07/09						x
Pacific Ocean (Bna Vsta Ck HA)	Coliform	07/03	07/09	07/09						x
Pacific Ocean (San Marcos Ck HA)	Coliform	07/03	07/09	07/09						x
Pacific Ocean (Escondido Ck HA)	Coliform	07/03	07/09	07/09						x
Pacific Ocean (San Dieguito HU)	Coliform	07/03	07/09	07/09						x
Pacific Ocean (San Marcos Ck HA)	Coliform	07/03	07/09	07/09						x
Pacific Ocean (San Diego HU)	Coliform	07/03	07/09	07/09						x
Pacific Ocean (Coronado HA)	Coliform	07/03	07/09	07/09						x
Pacific Ocean (Tijuana HU)	Coliform	07/11	07/11	07/11						x
Rainbow Creek	Nutrients	03/00	05/00	10/00						x
San Diego Bay (Nr. 24th Street)	Toxicity	07/03	07/03	07/03						x
San Diego Bay (Shoreline)	Coliform	07/03	07/09	07/09						x
San Diego Bay (Nr. Chollas Crk.)	Toxicity	05/00	07/00	12/00						x
San Diego Bay (Naval Air Station)	Toxicity	07/03	07/03	07/03						x
San Diego Bay (7th St. Channel)	Toxicity	06/00	11/00	06/01						x

004922

Waterbody	Stressor	Completion Date		Implement Actions	Stressor Source Category					
		Technical Report	Implementation Plan		Agriculture	Forestry	Urban	Marinas	Hydromod-ification	Not identified
San Diego Bay (Nr. Coronado Br.)	Toxicity	07/03	07/03	07/03						x
San Diego Bay (Submarine Base)	Toxicity	07/03	07/03	07/03						x
San Diego Bay (Shelter Island)	Toxicity	06/00	11/00	06/01						x
San Diego Bay (Nr. Grape Street)	Toxicity	07/03	07/03	07/03						x
San Diego Bay (Downtown Pier)	Toxicity	07/03	07/03	07/03						x
San Elijo Lagoon	Nutrients	07/03	07/09	07/09						x
	Coliform	07/03	07/09	07/09						x
	Sediment	07/03	07/07	07/07						x
San Juan Creek (Lower)	Coliform	07/10	07/10	07/10						x
San Juan Creek (Mouth)	Coliform	07/10	07/10	07/10						x
Santa Margarita Lagoon	Nutrients	07/05	07/05	07/05						x
Tecolote Creek	Coliform	07/03	07/09	07/09						x
	Metals	07/03	07/08	07/08						x
	Toxicity	07/03	07/08	07/08						x
Tijuana River	Coliform	07/11	07/11	07/11						x
	Metals	07/11	07/11	07/11						x
	Nutrients	07/11	07/11	07/11						x
	Organics	07/11	07/11	07/11						x
	Pesticides	07/11	07/11	07/11						x
	Trash	07/11	07/11	07/11						x
Tijuana River Estuary	Coliform	07/11	07/11	07/11						x
	Metals	07/11	07/11	07/11						x
	Nutrients	07/11	07/11	07/11						x
	Pesticides	07/11	07/11	07/11						x
	Trash	07/11	07/11	07/11						x

004923

APPENDIX D. MEMORANDUM OF UNDERSTANDING BETWEEN THE STATE WATER RESOURCES CONTROL BOARD AND THE CALIFORNIA COASTAL COMMISSION

This Memorandum of Understanding (MOU) is between the State Water Resources Control Board (SWRCB) and the California Coastal Commission (CCC). The SWRCB is part of the California Environmental Protection Agency (Cal/EPA), and the CCC is part of the California Resources Agency.

AGENCIES AGREE AS FOLLOWS:

A. PURPOSE

The purpose of this MOU is to promote protection of (1) water quality and (2) the uses and resources dependent on clean water from the potential adverse effects of nonpoint source (NPS) pollution. The SWRCB and CCC concur that the State will benefit from a unified and cooperative program to protect and restore water quality.

B. AUTHORITY

The authority of the SWRCB and CCC are defined by federal and State law described as follows:

1. The SWRCB and CCC, in coordination with the nine Regional Water Quality Control Boards (RWQCBs), are the lead State agencies in California for the development and implementation of the *Plan for California's Nonpoint Source Pollution Control Program: 1998-2013* (Program Plan) which has been prepared pursuant to the Federal Clean Water Act section 319 (33 U.S.C. §1329) and Coastal Zone Management Act section 6217 (16 U.S.C. §1455b).

2. The SWRCB and the RWQCBs are the State agencies with primary responsibility for coordination and control of water quality throughout California. The SWRCB and RWQCBs are the State agencies authorized under the Clean Water Act and State law to designate beneficial uses of the State's waters and establish water quality objectives for protecting those uses. The SWRCB and RWQCBs have a variety of regulatory powers under which they investigate water quality issues; adopt water quality control plans, regulations, and policies; prohibit waste discharges in certain areas; and issue permits regulating waste discharges affecting water quality. The SWRCB is required to provide information to the public regarding water quality issues. The SWRCB also administers several loan and grant programs for the protection of water quality, including the NPS grant program under the Federal Clean Water Act section 319 (33 U.S.C. §1329). RWQCBs also have the authority to order cleanup of waste discharges and to take enforcement actions against waste dischargers, including imposing administrative civil liability.

3. The CCC has the primary responsibility for implementation of the California Coastal Act and has been designated the State coastal zone planning and management agency for any and all purposes and may exercise any and all powers set forth in the Federal Coastal Zone Management Act of 1972 (16 U.S.C. §1451, et seq.) and any amendments thereto or other federal laws that relate to the planning or management of the coastal zone. The California Coastal Act mandates the protection and restoration of coastal waters. The CCC certifies local coastal programs and approves coastal development permits, energy projects, and federal projects within the Coastal Zone in accordance with water quality policies in the California Coastal Act. The CCC protects water quality through the management of development that generates runoff, creates spills, or otherwise affects water quality. The CCC also implements educational and technical assistance programs and coordinates with other agencies to address land-use and development activities that may generate polluted runoff.

4. According to Public Resources Code section 30400, in the absence of specific authorization by law or by agreement with the CCC, no State agency shall exercise any powers or carry out any duties or responsibilities established by the California Coastal Act or by the Federal Coastal Zone Management Act of 1972 or any amendment thereto.

5. According to Public Resources Code section 30412, the CCC, subject to limited exceptions regarding wastewater treatment plants, shall not modify, adopt conditions, or take any action in conflict with any determination by the SWRCB or any RWQCB in matters relating to water quality or the administration of water rights.

C. IMPLEMENTATION

Effective implementation of the Program Plan requires continued collaboration between the SWRCB and CCC. The SWRCB and the CCC therefore agree to:

1. To continue to work cooperatively to implement the Program Plan;
2. To be partners in the administrative coordination of California's Nonpoint Source Pollution Control Program (NPS Program);
    a. The SWRCB and CCC will be joint partners in developing, implementing, and participating in interagency coordinating committees;
    b. The SWRCB will act as the lead coordinating agency with Cal/EPA members; the CCC will act as the lead coordinating agency with Resources Agency members;
    c. The SWRCB will serve as the liaison with the U.S. Environmental Protection Agency (USEPA); the CCC will serve as the liaison with the National Oceanic and Atmospheric Administration (NOAA);

3. To implement and to track the implementation of applicable management measures and management practices related to NPS pollution prevention and control;
4. To modify or add to the Program Plan, including the actions identified in the Five-Year Implementation Plans (Volume 1) and the management measures in California Management Measures for Polluted Runoff (CAMMPR) (Volume 2), in a joint effort;
5. To meet on a regular basis (quarterly) to assess Program implementation, to discuss existing and proposed projects of mutual interest, and to consider changes to the Program Plan or MOU;
6. To have staff and management actively participate in regular updates on implementation of the Plan and identify concerns regarding the coordination and control of water quality due to changes in laws, regulations, policies, water quality control plans, or local coastal programs;
7. To work cooperatively through the legislative process to the extent permitted by law and Governor's Office procedures to further the NPS Program;
8. To work cooperatively in the budgetary process to support NPS Program activities;
9. To jointly convene public workshops to develop the next Five-Year Implementation Plan, no later than three years after the effective date of each Five-Year Implementation Plan;
10. To report biennially on program effectiveness;
11. To improve communication with the members of the CCC, SWRCB, and RWQCBs by:

    a. SWRCB staff and CCC staff jointly presenting an annual status report to the CCC and the SWRCB Members regarding the NPS program;

    b. SWRCB and RWQCB staffs consulting with CCC staff regarding NPS projects implemented or ordered by the SWRCB or a RWQCB requiring a coastal development permit issued or reviewed by the CCC. CCC staff will brief Commission Members in advance and take other actions needed to expedite a decision on the project. CCC staff will consult with SWRCB and RWQCB staffs regarding any of their projects that require SWRCB approval; and SWRCB and RWQCB staffs will brief SWRCB Members in advance and take other actions needed to expedite a SWRCB decision on the project.

D. RESERVATION OF AUTHORITY

Nothing herein shall be construed in any way as limiting the authority of the SWRCB or CCC in carrying out their respective legal responsibilities for management, regulation, coordination, and control of water quality or land uses affecting water quality.

Nothing herein shall be construed to prohibit the establishment of MOUs/Management Agency Agreements/Memoranda of Agreements with State or other agencies by either the SWRCB or CCC.

E. MODIFICATION OR RECISION

This MOU shall become effective upon the date of final signature and shall continue in effect until modified by the mutual written consent of both parties or until terminated by either party upon a 30-day advance written notice to the other party.

State Water Resources Control Board
Approves

_____
Walt Pettit, Executive Director
February 2, 2000

California Coastal Commission
Approves

_____
Peter M. Douglas, Executive Director
February 2, 2000

California Environmental Protection Agency
Concurs

_____
Winston Hickox
Agency Secretary
February 2, 2000

California Resources Agency
Concurs

_____
Mary Nichols
Secretary for Resources
February 2, 2000

APPENDIX E. LIST OF ACRONYMS

1988 Plan – Nonpoint Source Management Plan, November 1988
AB – Assembly Bill
ACL – Administrative Civil Liability
ADMP – Agriculture Drainage Management Plan
AFO – Animal Feeding Operations
AG – Attorney General
AMBAG - Association of Monterey Bay Area Governments
ARS – Agricultural Research Service
ASBS – Areas of Special Biological Significance
Basin Plan – Regional Water Quality Control Plans
BASMAA – Bay Area Stormwater Management Agencies Association
BAWPG – Bay Area Wetlands Planning Group
BCGC – Boating and Clean Green Campaign
BCP – Budget Change Proposal
BIOS – Biologically Integrated Orchard Systems
BLM – U.S. Bureau of Land Mangement
BMP – Best Management Practices
BOF – Board of Forestry
BPTCP – Bay Protection and Toxic Cleanup Program
Cal/EPA – California Environmental Protection Agency
CALFED – CALFED Bay-Delta Program
Cal/RA – California Resources Agency
Cal/Trans – California Department of Transportation
CAMMPR – Volume II: California Management Measures for Polluted Runoff
CAO – Cleanup and Abatement Orders
CARCD – California Association of Resource Conservation Districts
CBC – California Biodiversity Council
CCA – Critical Coastal Area
CCBN – California Clean Boating Network
CCC – California Coastal Commission
CCR – California Code of Regulations
CCMP – California Coastal Management Program
CDF – California Department of Forestry and Fire Protection
CDO – cease and desist orders
CDP – Coastal Development Permit
CDPR – Department of Pesticide Regulation
CEEIN – California Environmental Education Interagency Network
CEQA – California Environmental Quality Act
CERCLA – Comprehensive Environmental Response and Compensation Liability Act
CERPI – California Ecological Restoration Projects Inventory
CESA – California Endangered Species Act
CFB – California Farm Bureau
CFR – Code of Federal Regulations
CIWMB – California Integrated Waste Management Board
CNPCP – Coastal Nonpoint Source Pollution Control Program
Coastal Act – California Coastal Act
CPR Plan –*Plan for Controlling Polluted Runoff*
CRMP – Coordinated Resource Management and Planning Program
CRWQMP – California Rangeland Water Quality Management Plan
CTR – California Toxics Rule
CVA – Clean Vessel Act
CWA - Clean Water Act
CWAP – Clean Water Action Plan
CWC – California Water Code
CWPI – California Watershed Project Inventory
CZARA Coastal Zone Act Reauthorization Amendments of 1990
CZM – Coastal Zone Management
CZMA – Coastal Zone Management Act
CZTA – Coastal Zone Treatment Areas
DA – District Attorney
DBW – Department of Boating and Waterways
DFA – Department of Food and Agriculture
DFG – Department of Fish and Game
DHS – Department of Health Services
DOC – Department of Conservation
DPR - Department of Parks and Recreation
DTSC – Department of Toxic Substance Control
DWR – Department of Water Resources
DWSAP – Drinking Water Source Assessment and Protection
EBEP – Enclosed Bays and Estuaries Plan
EIR – Environmental Impact Report
EQIP – Environmental Quality Incentives Program
ESA – Endangered Species Act
ESHA – Environmentally Sensitive Habitat Area
FACT – Functioning Assessment Criteria Test
FERC – Federal Energy Regulatory Commission
FOTG – Field Office Technical Guide

FPR – Forest Practice Rules
FSA – Farm Services Agency
FY – Fiscal Year
g-Guidance – Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters (CZARA §6217[g])
GeoWBS – Geographically-based Water Body System
GIS – Geographic Information System
GRTS – Grants Reporting and Tracking System
HHW – Household Hazardous Waste
HTB – Heal the Bay
IACC – Interagency Coordinating Committee
Implementation Plan – Five-Year Implementation Plan (1998-2003)
IPM – Integrated Pest Management
ISWP – Inland Surface Waters Plan
LCP – Local Coastal Program
LCPA – Local Coastal Program Amendment
LEA – local enforcement agency
LUP – land use plan
MAA – Management Agency Agreement
MBNMS - Monterey Bay National Marine Sanctuary
MM – management measure
MOA - Memorandum of Agreement
MOU – Memorandum of Understanding
MP – management practices
MPA – MacAteer-Petris Act
MSG – Monitoring Study Group
MURP – Model Urban Runoff Program
NAWQA – National Water Quality Assessment Program
NEP - National Estuary Program
NEPA – National Environmental Policy Act
NERR - National Estuarine Research Reserve
NGO – non-governmental organization
NMS - National Marine Sanctuary
NOAA – National Oceanic and Atmospheric Administration
NOV – Notice of violation
NPDES – National Pollutant Discharge Elimination System
NPS – nonpoint source
NPS MIS – NPS Management Information System
NRCS – Natural Resources Conservation Service
NRDC – Natural Resources Defense Council
NRPI – Natural Resources Project Inventory
OAL – State Office of Administrative Law
Ocean Plan – California Ocean Plan
OCWD – Orange County Water District
OSDS – On-site Disposal System
OSPR – DFG/Oil Spill Prevention and Response
PCA – Program Cost Account
PIPP – Public Information Public Participation Committee of the SWQTF
PMP – portmaster plan
PMZ – Pesticide Management Zone
Policy – Policy for Implementation of Toxics Standards for Inland Surface Water, Enclosed Bays, and Estuaries of California
Porter-Cologne Act - Porter Cologne Water Quality Control Act
POTWs – publicly owned treatment works
PRC – Public Resources Code
Program – NPS Pollution Control Program
Program Plan – *Plan for California's Nonpoint Source Pollution Control Program 1998-2013*
PROSIP – Volume I: Nonpoint Source Program Strategy and Implementation Plan, 1998-2013
PTS – Permit Tracking System
QA/QC – Quality Assessment/Quality Control
RCDs –Resource Conservation Districts
RCRA – Resource Conservation and Recovery Act
ReCAP – CCC's Regional Cumulative Assessment Program
RFP – Request for Proposal
RIFA – red imported fire ants
RMS – Resource Management Systems
RWQCB – Regional Water Quality Control Board
SbMA – Subdivision Map Act

SCC – State Coastal Conservancy
SFB – San Francisco Bay
SFBCDC - San Francisco Bay Conservation and Development Commission
SFEP – San Francisco Estuary Project
SJVDIP – San Joaquin Valley Drainage Implementation Program
SLC – State Lands Commission
SMA – Streamside Management Areas
SMARA – Surface Mining and Reclamation Act
SMB – Santa Monica Bay
SRF – State Revolving Fund
Strategy – Fifteen-Year Program Strategy
SWIM – System for Water Information Management
SWPPP – Storm Water Pollution Prevention Program
SWQTF – Stormwater Quality Task Force

SWRCB – State Water Resources Control Board
TAC – Technical Advisory Committee
TBT - tributyltin
THP – Timber Harvesting Plan
TMDL – Total Maximum Daily Load
TSCA Toxic Substances Control Act
TSS – Total Suspended Solids

UC – University of California
UCCE University of California Cooperative Extension
UCD ICE – University of California, Davis, Information Center for the Environment
USBR – U. S. Bureau of Reclamation
USC – United States Code
USCG – U.S. Coast Guard
USACOE – U.S. Army Corps of Engineers
USDA – U. S. Department of Agriculture
USEPA – U. S. Environmental Protection Agency
USFS – U.S. Forest Service
USFWS - U.S. Fish and Wildlife Service
USGS – U. S. Geological Survey
WATER – Watershed Analysis Tool for Environmental Review
WCB – Wildlife Conservation Board
WCL – Wildlife Conservation Law of 1947
WDR – Waste Discharge Requirement
WLPZ – Watercourse and Lake Protection Zone
WMA – Watershed Management Areas
WMI – Watershed Management Initiative
WQA – Water Quality Assessment
WQCP – Water Quality Control Plans
WQCrP – Water Quality Certification Program
WQMP – Water Quality Management Plan
WQPP - Water Quality Protection Program
WRAS – Watershed Restoration Action Strategy
WRP – Wetlands Research Project

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EXECUTIVE SUMMARY

The purpose of this document is to comply with Regional Water Quality Control Board Orders 96-31 (Santa Ana Region) and 96-03 (San Diego Region), which require the submittal of an Annual Progress Report. The discussion below describes the purpose of each section of the report as well as the key accomplishments for the reporting period.

In order to help clarify how the Permittees have implemented the various portions of the DAMP, the format of the 2000-2001 annual status report has been modified to reflect the established format of the DAMP. In doing so, the reporting format will now allow for an easier comparison of the specific DAMP requirements and the accomplishments of the Permittees.

Program Management

Sections 1 and 2 provide background information on the development and implementation of the Orange County NPDES Stormwater Program including permit and annual status reporting requirements, program management structure and activities, and a fiscal analysis and summary of the Permittees compliance activities.

- In compliance with the Second Term Permits, the Permittees submitted a Report of Waste Discharge (ROWD) to both Regional Boards in September 2000. The ROWD consisted of two volumes. The first volume was a summary of all the program activities that had been accomplished over the permit term and the second volume was the submittal of a 2000 update of the DAMP as the proposed plan for the Third Term Permit period.

- Overall, the 2000 DAMP included approximately 70 performance commitments to help provide consistency among the programs, clarify requirements for permit compliance and measure performance.

- During the reporting period, the Permittees established two sub-committees; one to address the countywide public education efforts and one to address the authorized inspector duties under the water quality ordinance and accompanying enforcement consistency guide.

- The Permittees also re-established the New Development/Construction Task Force to address and oversee the revisions to the New Development/Significant Redevelopment Program (2000 DAMP Appendix G) and the Public Works Construction Program (2000 DAMP Appendix H).

- The total shared costs for the reporting period were $941,534. Shared costs are those that fund activities performed by the County of Orange on behalf of the Permittees as Principal Permittee for the NPDES permits, under the stormwater program's Implementation Agreement.

- The total individual costs for the reporting period were $8,279,715 for costs attributable to the DAMP and $49,756,798 for costs attributable to pre-existing programs. Individual costs are those incurred by each municipality through implementation of the various Best Management Practices (BMPs) discussed in the DAMP.

Plan Development

Section 3 provides information on the Permittees approach to stormwater management and BMP selection and implementation.

- In December of 2000, the Orange County Board of Supervisors approved an additional allocation of $1,000,000 in matching grant funds for the Urban Water Runoff Grant program to encourage cities countywide to continue to work on structural improvements for water quality. As a result, twenty Permittees were each awarded matching grant funds for various structural BMP projects.

Legal Authority

Section 4 provides information on the establishment of adequate legal authority to regulate the discharge of pollutants to the municipal storm drain systems. No changes to the existing legal authority were made during the reporting period.

Public Agency Activities

Section 5 provides information on the Permittees' public agency activities that are widely recognized as effective BMPs for pollutant control. These activities include litter control, solid waste collection/recycling, drainage facility maintenance, catch basin stenciling, street sweeping, hazardous materials management/environmental performance reporting, household hazardous waste collection, emergency spill response and fertilizer and pesticide management.

- The Permittees have installed twelve trash and debris booms in a number of flood control channels and harbors to remove floatable materials.

- Thirty-four Permittees reported the removal of over 7,380 cubic yards and over 24,600 tons of material from approximately 215 miles of storm drains and almost 27,000 drain inlets. The method of removal is generally spilt between the use of vacuum trucks and hand crews.

- Seven Permittees have implemented a total of twenty-eight drainage system diversions for dry weather flows to the sanitary sewer system. The total set up cost for these diversions were over $750,000. Combined, over 100 million gallons of urban runoff were diverted per month at a total cost of $86,000 per month, typically for a six-month period during the dry season.

- Twenty-three Permittees reported re-stenciling over 12,000 catch basins, thirty-two percent (32%) of the total inventory of 37,000 drain inlets. In addition to the traditional stenciling of catch basins with paint, the Permittees approved the use of a custom-made high-impact plastic marker. Seven Permittees purchased over 7,300 of the markers and several more Permittees were planning on purchasing them during the next reporting year.

- Thirty Permittees reported removing over 33,000 tons and 38,000 cubic yards of material using a fleet of sweepers consisting of thirty two mechanical broom sweepers, sixty one vacuum sweepers, two regenerative air sweepers and five vacuum/broom assisted sweepers.

- The Permittees have reduced pollutant discharges from their fixed facilities. In 1996-1997 the Permittees identified a total of 94 municipal facilities with 244 significant issues for corrective action. This has decreased to 30 facilities and a total of 41 significant issues, either newly identified or currently being corrected, by the Permittees by the end of 2000-2001 reporting period.

- County residents dropped off a total of 2,768,154 pounds of household hazardous waste at the four IWMD collection centers. This waste would otherwise have posed a serious threat to human health and the environment if disposed of incorrectly.

- Ten Permittees reported separate household hazardous waste collection efforts which brought in an additional 426,676 pounds of waste. These efforts included three waste oil collection initiatives and seven programs involving household hazardous waste collection days.

- Thirty-one Permittees reported that approximately 430,000 lbs of nitrogen and 110,000 lbs of phosphorus were applied to approximately 5,478 acres of public land. This baseline data will assist the Permittees in the future in determining the effectiveness of additional fertilizer management program BMPs.

- The Permittees reported that approximately 25,000 pounds of active pesticide ingredients were applied on approximately 10,400 acres of public lands, which included the application of 7.9 lbs, 22.8 lbs respectively, of the insecticides chlorpyrifos and diazinon. This baseline data will assist the Permittees in the future in determining the effectiveness of additional pesticide management program BMPs.

- Twenty-seven (80%) of the permittees reported implementing Integrated Pest Management techniques as recommended in the Management Guidelines for Fertilizer and Pesticides.

- The Permittees, through the Principal Permittee, entered into an agreement with the State of California Department of Pesticide Regulation (DPR) to jointly fund a study of organophosphate pesticides in runoff from residential neighborhoods. This study is designed to gather data on urban pesticides in irrigation and storm water runoff from residential neighborhoods.

- The Principal Permittee entered into a five year agreement with the University of California Cooperative Extension program to conduct studies and implement water quality improvement programs related to fertilizer and pesticide applications.

- The Principal Permittee developed and conducted a public agency training program to address a broad range of public agency activities that could result in unanticipated water quality impacts.

Public Information/Education

Section 6 provides information on the countywide and local public education efforts.

- The Permittees, through the Principal Permittee, awarded a public education contract to complete the following items during the next reporting year: conducting a survey to identify and more fully understand the current level of general knowledge held by people in Orange County, utilize the survey results to develop the campaign goals, determine the key messages and community outreach activities and strategies, preparing a master timeline, create a brand name for the program, develop website materials and develop a model watershed program.

- The Permittees established a Public Education Committee in order to help provide regional consistency and oversight for the stormwater public education efforts.

- The Public Education Committee developed five new public education brochures and is in the process of developing four additional brochures and a series of three posters to address various residential and business practices that may contribute to water quality impairments.

- The Principal Permittee distributed approximately 42,000 brochures, magnets, flyers and/or bookmarks to the Permittees, various agencies and private companies, participated in four public outreach events and began to coordinate additional public education outreach efforts with a number of agencies.

- Fourteen Permittees reported enhancing local materials and/or conducting their own initiatives including the City of Laguna Niguel which is initiating planning on the development of an Aliso Watershed Education Facility.

- Eighteen Permittees reported sponsoring and/or attending public outreach events and nine Permittees reported utilizing a variety of interactive public education displays at those events.

- In July 2000, during the annual County Fair, the Principal Permittee and Orange County Sanitation District conducted informal urban runoff awareness surveys. Two of the key findings were that sixty four percent of the respondents understood that the storm drain and sewer systems were not part of the same underground drain system and seventy four percent of the respondents understood that the water that flows into the storm drain system is not tested and filtered to remove wastes before they flow to the ocean.

New Development

Section 7 provides information on the new development and significant redevelopment program.

- The Permittees re-established the New Development/Construction Task Force to assist in updating the New Development and Public Works Construction program elements of the DAMP.

- The Permittees approved 382 Water Quality Management Plans (WQMPs) covering a total of 5,200 acres. Since the implementation of the program in 1997, a total of 1,482 WQMPs have been approved, covering 15,859 acres which represents approximately 4.2% of the area within Orange County subject to the NDPES Stormwater Permit. This is consistent with the incremental implementation of BMPs over the life of development envisaged by the Clean Water Act.

Construction

Section 8 provides information on the program to implement and maintain structural and nonstructural BMPs to reduce pollutants in storm water runoff from construction sites.

- The Permittees reported that they collectively issued almost 25,000 building permits and 1,103 grading permits and that there were 113 construction sites greater than five acres countywide. They collectively issued a total of 491 stop work notices issued with five sites receiving more than one stop work notice.

Industrial Discharger Identification

Section 9 provides information on the Permittees' efforts to identify industrial stormwater dischargers in Orange County and to notify them of State industrial stormwater permitting requirements.

- The Principal Permittee coordinated with and trained various public agency organizations that have existing facility inspectors in the field to assist with the identification of problematic industrial sites and to encourage agency participation in implementing the stormwater program.

Detection/Elimination of Illegal Discharges and Illicit Connections

Section 10 provides information on elimination of illegal discharges and efforts to identify and eliminate illicit connections to the storm drain system through routine facility inspections.

- The Permitttees established an Authorized Inspectors Committee in order to help provide regional consistency and oversight to the response to water pollution incidents.

- The Principal Permittee and Orange County Sanitation District began coordinating a sewage spill prevention and response demonstration project. The project is called the "Tustin Area Spill Control Demonstration Project" (TASC) and includes portions of the City of Tustin and the unincorporated area of North Tustin.

- The Permittees conducted four sub-regional source identification and/or surveillance activities. Two of the four studies were conducted at commercial/industrial parks and two others were conducted in high-density restaurant/dining areas of coastal Orange County.

- The Permittees reported a total of 1,002 water pollution incidents consisting of 300 notifications, 316 complaints, 387 response requests and 54 referrals to other agencies. The Principal Permittee received approximately one-third (318) of the total.

- The Permittees reported a total of 606 enforcement actions. This total constituted 278 educational letters, 277 administrative enforcement actions and 35 criminal enforcement actions. The criminal enforcement actions include citations/fines as well as criminal charges being filed.

- Five Permittees reported undertaking ten enforcement cases. Of these, two involved residents and eight involved businesses. One of the cases was dismissed and the remaining are in progress.

- The Permittees reported finding 19 undocumented and potentially illicit connections to the storm drain system. Residential yard drains constituted the majority of these connections. The connections were either permitted or disconnected

Water Quality Monitoring Program

Section 11 provides information on the implementation of the water quality monitoring program as well as the data analyses. During the current monitoring year:

- "Warm Spot" long-term trends monitoring continued through this monitoring year and included the initiation of source identification studies at Lane Channel, Prima Deshecha and Segunda Deshecha Channels. Recent data that were gathered from the Rhine Channel in the Lower Newport, Bonita Canyon Channel and the Agua Chinon Wash indicate that concentrations of their respective "Warm Spot" pollutants may be declining.

- The third in a series of intensive nutrient load studies was conducted in May 2001 in the San Diego Creek / Peters Canyon Wash watershed. The information gathered in these three studies was valuable in assessing the contributions of nutrients from various tributary sources during three different months during the Nutrient TMDL summer season. From these studies it was also shown how effective the Irvine Ranch Water District's Nutrient Removal Wetlands are and that compliance with the December 31, 2002 target of the nutrient TMDL is being achieved.

- The concentrations of dissolved trace metals in stormwater runoff samples collected from the channels and harbors were compared to the California Toxics Rule guidance criteria for acute and chronic toxicity. Of the seven metals analyzed, dissolved copper exceeded the guidance criteria most often. In the next monitoring year aquatic toxicity testing will be conducted to determine if these concentrations of copper are actually having a toxic effect in the channels and their receiving waters.

- Water quality monitoring in the East Costa Mesa stormdrain, a model urban stormwater channel, found fewer concentrations of diazinon in the weekly samples that exceeded toxicity criteria (LC_{50}) for microinvertibrates (*Ceriodaphnia*) compared to the prior year.

Newport Bay Watershed

Section 12 provides information on the Newport Bay watershed which has been the focus of local efforts to improve water quality and restore Bay habitat since the late 1970's.

- In cooperation with the watershed permittees, the Principal Permittee implemented the Regional Nutrient Monitoring Program, conducted the monitoring and data analyses and prepared a report entitled the "Regional Nutrient Monitoring Program for the Newport Bay 2000-2001".

- The Newport Watershed Permittees are currently supporting studies, modeling and monitoring in the Bay with other stakeholders that are expected to result in the development of an implementation plan for the fecal coliform TMDL.

- The Watershed Permittees are currently working with the California Department of Pesticide Regulation to conduct a pesticide study element of an intensive residential water use and runoff investigation in selected neighborhoods within the City of Irvine.

- Two debris/trash containment systems were constructed and installed in the El Modena-Irvine Channel and the Peters Canyon Wash Channel, which are tributary to San Diego Creek, in August 1999. The results of the study and analyses were included in the report entitled "Debris Characterization Study" July 2000.

Water Quality Planning Initiatives

Section 13 provides information on the water quality planning inititatives and efforts that are currently underway in a number of watersheds.

- The Permittees reported participating in at least nine different initiatives within four different watersheds. The intiatives include four Army Corps of Engineers watershed studies, three retrofitting projects with incorporated water quality enhancements, and two water quality monitoring investigations and research studies.

Assessment of BMP Effectiveness

Section 14 provides information on the assessment of BMP effectiveness.

- The Principal Permittee, agreed to participate with the Southern California Coastal Water Research Project (SCCWRP), in their submittal of a Proposition 13 grant application to conduct scientifically credible and biologically relevant effectiveness monitoring of various types of BMPs being implemented in urban areas.

- The San Joaquin Marsh Pond Demonstration Project. Installed and monitored by the Irvine Ranch Water District, has been reducing nutrient loading in San Diego Creek since 1998. Total nitrogen reduction has ranged from 7-10 mg as N/l during the spring, summer and fall months to a reduction of 5 mg as N/l or less during January.

Assessment of Management Program Modifications

Section 15 provides information on the assessment of any stormwater management program modifications made to comply with Clean Water Act requirements to reduce the discharge of pollutants to the maximum extent practicable.

- In February 2001 a cooperative agreement was approved by the 3 Regional Boards, the Southern California counties and cities with Municipal NPDES permits, and the Southern California Coastal Water Research Project to develop and implement a prioritized research agenda with the assistance of water quality/resource management/regulatory experts, to better understand urban stormwater impact and control practices.

Workplan

Section 16 describes the proposed implementation of the DAMP for 2001/2002 and is consistent with the program changes proposed in the Report of Waste Discharge and draft DAMP submitted in September 2000.

1.0 INTRODUCTION

1.1 Background

The 1972 Federal Water Pollution Control Act, subsequently known as the Clean Water Act (CWA), established the NPDES permitting program. As a result of court decisions and the overriding need to clarify the stormwater permitting requirements, the CWA required the Environmental Protection Agency (EPA) to issue regulations to be effective by 1983 that included stormwater runoff from rainfall. Congress passed a Clean Water Act Amendment in 1987, the Water Quality Act, which brought stormwater discharges into the NPDES Program. EPA issued subsequent regulations on November 16, 1990.

In response to those regulations, in 1990 the County of Orange (subsequently singularly referred to as the Principal Permittee), the Orange County Flood Control District and the 31 incorporated cities (all three collectively referred to as Permittees) obtained NPDES Stormwater Permits No. CA 8000180 and No. CA 0108740 (subsequently referred to as the First Term Permits) from the Santa Ana and San Diego Regional Water Quality Control Boards (subsequently referred to as the Santa Ana Board, the San Diego Board or collectively as the Regional Boards). In 1996, the First Term Permits were replaced by Permit Nos. CAS0108740 and CAS618030 (subsequently referred to as the Second Term Permits).

The specific water pollutant control program elements of the Orange County NPDES Stormwater Program are documented in the 1993 Drainage Area Management Plan (DAMP), which has served as the Permittees' primary policy and implementation document regarding compliance with the NPDES Stormwater permits. The main objective of the DAMP is to fulfill the commitment of the Permittees to present a plan that satisfies NPDES permit requirements and to evaluate the impacts of urban stormwater quality on the beneficial uses. The 1993 DAMP was originally completed through a process that involved public and private sector input and public review through the California Environmental Quality Act (CEQA) process and was formally approved in June of 1994 by the Santa Ana Regional Board and in 1996 by the San Diego Board.

In compliance with the Second Term Permits, the Permittees submitted a Report of Waste Discharge to both Regional Boards in September 2000, six months prior to the expiration of the Santa Ana Region permit and almost a year prior to the expiration of the San Diego permit. The Report of Waste Discharge (ROWD) consisted of two volumes. The first volume was a summary of all the program activities that had been accomplished over the permit term and the second volume was the submittal of a 2000 update of the DAMP (subsequently referred to as 2000 DAMP) as the proposed plan for the upcoming 2001 – 2006 permit period (subsequently referred to as the Third Term Permit).

The September 2000 update of the DAMP was completed to incorporate the programs developed since 1993 and provide a programmatic foundation for future activities. The plan proposes a wide range of continuing and enhanced Best Management Practices (BMPs) and control techniques, which will be implemented and reported on over the third term permit.

Within each section of the DAMP, there is a discussion of:

- The regulatory requirements;
- The development of the program element;
- The implementation of that element;
- The modification of that element for the next permit period; and, for the first time
- The inclusion of specific performance commitments.

In order to develop an effective NPDES Stormwater Program, careful consideration has been given to the objectives and appropriateness of each element. The performance commitments for each program element were developed and are included within each section of the DAMP to help provide consistency among the programs, clarify requirements for permit compliance and measure performance.

Some of the key performance commitments included in the DAMP and that will be reported on in future annual status reports are:

- Systematic watershed assessments to evaluate opportunities to configure or reconfigure channel segments to address the impacts of urban water quality on beneficial uses;
- An evaluation of extending the Environmental Performance Reporting Program into contracts, leases and municipal field operations;
- Formalized training elements;
- The establishment of a public education committee to support implementation of the educational strategy;
- Re-establishment of the New Development Task Force to evaluate the need to revise Appendix G based on the updated California Stormwater BMP Manuals;
- The establishment of a new development/significant redevelopment Water Quality Management Plan (WQMP) verification program;
- The establishment of an authorized inspector committee to coordinate training and enforcement under the Water Quality Ordinance;
- An evaluation of the need to revise the procedures and practices for sewage spill response; and
- A re-evaluation and revision of the water quality monitoring program.

1.2 NPDES Permit Requirements

The Second Term Permits, issued by the Santa Ana Regional Board in March 1996 and by the San Diego Regional Board in August 1996, require the Permittees to:

1. Prohibit illicit/illegal discharges from entering into the municipal stormwater conveyance systems and require controls to reduce the discharge of pollutants to the maximum extent practicable;

2. Develop and implement Best Management Practices (BMPs) to control/reduce the discharge of pollutants to waters of the United States to the maximum extent practicable (MEP), and

The Permits also require the Permittees to prepare an Annual Progress Report for submittal to the Regional Boards and United States Environmental Protection Agency (USEPA) Region IX no later than November 15 of each year. This Annual Progress Report presents an analysis and assessment of permit compliance activities for the period July 1, 2000 to June 30, 2001, as required by the permits.

In order to help clarify how the Permittees have implemented the various portions of the DAMP, the format of the 2000-2001 annual status report has been modified to reflect the established format of the DAMP. In doing so, the reporting format will now allow for an easier comparison of the specific DAMP requirements and the accomplishments of the Permittees. The permits collectively require the report to include the following:

- A fiscal analysis report (Section 2.0);

- A review of the status of program implementation and compliance with the schedules contained in the Order (Sections 3.0 – 15.0);

- An assessment of the control measures established under the illicit discharge elimination program and the Drainage Area Management Plan (DAMP) (Section 10.0);

- A summary and analysis of monitoring results from the previous year and any changes to the monitoring program for the following year (Section 11.0);

- An assessment of any stormwater management program modifications made to comply with the Clean Water Act requirements to reduce the discharge of pollutants to the maximum extent practicable (MEP). (Section 15.0);

- Major changes in any previously submitted plan/policies (Section 15.0); and

- A description of the proposed implementation of the DAMP for the next year running from July 1, 2001 through June 30, 2002 (Section 16.0).

2.0 PROGRAM MANAGEMENT

2.1 Introduction

During the first term permit, in order to more effectively carry out the requirements of the Orange County Stormwater Program, the Permittees agreed that the County of Orange would be the Principal Permittee and the Orange County Flood Control District and the incorporated cities would be Permittees on the permit.

The Permittees collectively refer to the County of Orange, the Orange County Flood Control District, and the cities of Anaheim, Brea, Buena Park, Costa Mesa, Cypress, Dana Point, FountainValley, Fullerton, Garden Grove, Huntington Beach, Irvine, Laguna Beach, Laguna Hills, Laguna Niguel, La Habra, La Palma, Lake Forest, Los Alamitos, Mission Viejo, Newport Beach, Orange, Placentia, San Clemente, San Juan Capistrano, Santa Ana, Seal Beach, Stanton, Tustin, Villa Park, Westminster and Yorba Linda. The cities of Laguna Woods and Rancho Santa Margarita were recently incorporated and were added to the Second Term Permit by the San Diego Regional Board. The new cities of Laguna Woods and Aliso Viejo will be added to the Third Term Permit for the Santa Ana Region and the San Diego Region, respectively.

The designation of the County of Orange as the Principal Permittee has been in effect since the First Term Permit and has provided for cost effective management of the overall stormwater program by combining resources to complete those activities which benefit all the Permittees. A more detailed discussion of the management tasks is provided below.

2.2 Major Management Activities

2.2.1 Decision Making

General Permittee Committee

The General Permittee Committee provides the overall program guidance with designated representatives from each Permittee. The Permittees update their General Permittee representatives contact list annually (**Table 2.1**). In 2000/01, the General Permittee Committee met seven (7) times throughout the year to discuss various local, regional or statewide stormwater quality issues (**Table 2.2**). Twenty-three (23) of the Permittees were represented at over 80% of the meetings (**Figure 2.1**).

During the First and Second Term Permit periods, the designated Permittee representatives provided the overall guidance to the NPDES Stormwater Program. During the Third Term Permit period this group will continue to function in the same manner, and will subsequently be referred to as the Permittee Committee. This Committee shall periodically evaluate the need for creating standing sub-committees and ad hoc committees required to accomplish the objectives of the NPDES Stormwater Program.

Technical Advisory Committee (TAC)

The TAC is comprised of a City Engineer, or selected representative, from each of the five County Supervisorial Districts and a representative from the Principal Permittee serve in a program advisory role to the General Permittee Committee. The Technical Advisory Committee (TAC) will continue as a standing committee for policy direction, program development and implementation. The TAC is comprised of one City Engineer, or selected representative, from each of the County Supervisorial Districts and a representative from the County of Orange.

Sub-Committees

During the reporting period, the Permittees established two sub-committees; one to address the countywide public education efforts (Section 6.2) and one to address the authorized inspector duties (Section 10.1) under the water quality ordinance and accompanying enforcement consistency guide. The sub-committees meet on a quarterly basis and provide recommendations to the TAC and subsequently the General Permittee Committee. (**Figure 2.2**)

The Permittees also re-established the New Development/Construction Task Force to address and oversee the revisions to the New Development/Significant Redevelopment Program (2000 DAMP Appendix G) and the Public Works Construction Program (2000 DAMP Appendix H). The Task Force will meet about every other month for the next year and a half and report back to the TAC and subsequently the General Permittee Committee.

2.2.2 Agreement For Program Implementation

The agreement underpinning County and city cooperation is the NPDES Stormwater Permit Implementation Agreement (subsequently referred to as the Implementation Agreement) which establishes the responsibilities of the Permittees with respect to compliance with the NPDES Stormwater Permits issued by the Regional Boards. The Implementation Agreement also establishes a funding mechanism for the shared costs of the NPDES Stormwater Program based on each municipality's area and resident population and includes a provision that allows newly incorporated cities to become additional parties to the Agreement.

This agreement, originally entered into in December of 1990, was amended in October of 1993 to include two additional Permittees (Laguna Hills and Lake Forest) and formally establish the TAC. During the next year it will be updated to include the newly incorporated cities of Aliso Viejo, Laguna Woods and Rancho Santa Margarita and to address other programmatic changes as a result of the Third Term Permit requirements.

During the past year, this agreement has been utilized for funding watershed studies or planning initiatives that have focused on specific water body impairments. The Permittees in the Talbert/Lower Santa Ana River, Newport and Aliso Creek watersheds have used the agreement in this manner (Section 2.3.1).

2.2.3 NPDES Permit Responsibilities

The responsibilities of the Principal and Permittees are defined within the Implementation Agreement, the NPDES permits, or as otherwise identified within separate funding Agreements. The Principal Permittee has no regulatory authority over the Permittees. Each Permittee is responsible for implementing the NPDES Stormwater Program within their jurisdiction.

The main responsibilities of the Permittees includes:

- Reviewing, approving and commenting on budgets, plans, strategies, management programs and monitoring programs developed by the Principal Permittee or any sub-committee;
- Implementing the various stormwater management programs as outlined in the Permit and the Drainage Area Management Plan (DAMP) within their jurisdiction;
- Coordinating among internal departments and agencies, as appropriate, to facilitate the implementation of the Permit and the DAMP;
- Responding to/or arranging for response to emergency situations, such as accidental spills, leaks, illegal discharges/illicit connections, etc., to prevent or reduce the discharge of pollutants to the storm drain systems and water of the U.S. within its jurisdiction;
- Conducting inspections of and performing maintenance on the infrastructure within its jurisdiction;
- Participating in the General Permittee meetings or any sub-committee meetings; and
- Preparing and submitting all reports or requests of information to the Principal Permittee in a timely fashion

The role of the Principal Permittee is the same as the other Permittees with the addition of certain overall programmatic and management responsibilities including:

- Initiating, developing and coordinating any area-wide programs and activities necessary to comply with the Permit;
- Developing and implementing mechanisms, performance standards, etc., to promote uniform and consistent implementation of BMPs among the permittees;
- Monitoring the implementation of the plans and programs required by the Permit and determining their effectiveness in protecting beneficial uses;
- Providing administrative and technical support and informing the Permittees and the TAC of the progress of other pertinent municipal programs, pilot projects, research studies, etc.;
- Representing the NDPES Stormwater Program before appropriate agencies;
- Developing and executing inter-governmental agreements necessary for program implementation;
- Conducting chemical and biological water quality monitoring;
- Cooperating in watershed management programs and regional and/or statewide monitoring;
- Preparing and submitting unified reports, plans and programs as required by the Permit including the annual status report;
- Developing budgets and fiscal analyses; and
- Coordinating the program with affected local government agencies.

2.2.4 NPDES Permit Reporting Requirements

All NPDES submittals are produced under the auspices of the Permittee Committee and the TAC before submission to the Regional Boards. The required submittals include, but are not limited to, Annual Status Reports which are due on November 15 of each year and any other requirements specified by the Regional Boards pursuant to permit conditions, California Water Code Sections 13225, 13267 or other regulatory provisions.

As stated above, in compliance with the Second Term Permits, the 2000 DAMP was submitted as the proposed plan for the Report of Waste Discharge in September 2000. The plan proposed a wide range of continuing and enhanced Best Management Practices (BMPs) and control techniques including almost seventy (70) new performance commitments.

The Third Term permits, which will be adopted during the 2001-2002 reporting period, will include additional program requirements that the Permittees have to develop and implement. As such, the annual reporting requirements are expected to increase significantly in the next annual report as the program evolves from the Second Term Permit to the Third Term Permit.

2.2.5 Program Representation

The Principal Permittee represents the Orange County Permittees on the California Storm Water Quality Task Force (SWQTF), the Water Resources Committee of the American Public Works Association (APWA), Southern California Chapter and other stormwater forums. Updates on the activities of these organizations or upcoming workshops are provided to the Permittees on a regular basis.

California Storm Water Quality Task Force (SWQTF)

The California Storm Water Quality Task Force (SWQTF) was formed in 1989 to serve as an advisory body and provide guidance to the State Water Resources Control Board on stormwater quality program issues. The Task Force is primarily comprised of agencies, organizations and individuals responsible for and/or interested in the implementation of municipal stormwater management programs in California, though industrial stormwater interests are also active participants. Since its' inception, the SWQTF has fulfilled this role, and at the same time has evolved into the leading organization in California dealing with stormwater quality issues.

The SWQTF coordinates general meetings every other month where a wide variety of stormwater related issues are discussed and presented to the general members. The bi-monthly meetings bring together a broad audience with interest in stormwater quality issues, including NPDES permitted municipal agencies, state and federal regulators, agencies that will be subject to the Phase II storm water regulations, industrial and construction site owners, consultants and environmental organizations.

The general meeting topics for the reporting period included:

- Coordinated Stormwater Monitoring;
- Ocean and Beach Studies;
- Total Maximum Daily Loads – Stormwater Perspective;
- Stormwater Management and Water Quality Issues;
- Stormwater Pollutants of Concern: Beyond Baseline; and
- Aerial Deposition: Lessons for Stormwater Managers.

In addition to coordinating the general meetings where a wide variety of stormwater related issues are discussed and presented, the Executive Committee also provides recommendations to various state and federal agencies whose policies or regulatory authority may impact stormwater management programs.

The Executive Committee is comprised of seventeen members, including eleven municipal representatives, two industrial representatives and four at-large members. The Executive Committee approves work products generated by the work groups, sets Task Force priorities, identifies issues of concern, appoints committees and work groups, updates the State Board on key issues and establishes the agenda for the General Meetings.

Some of the major accomplishments of the Executive Committee for the reporting period included:

- Actions regarding pesticide re-registration of Diazinon and Chlorpyrifos;
- Providing comments on Total Maximum Daily Load (TMDL) issues;
- Providing comments on the State General Construction permit modifications;
- Raising funds and establishing the consultant contract for the update of the 1993 Best Management Practices (BMP) handbooks for industrial, construction and municipal activities;
- Tracking legislation on stormwater issues;
- Establishment of the Task Force web page; and
- Outreach to the Phase II communities.

Water Resources Committee of the American Public Works Association (APWA), Southern California Chapter

The mission of the APWA Water Resources Committee is to recommend and advance APWA policies and positions regarding legislation and regulations that affect public works practices in the disciplines of water resources management; provide forums for APWA members to exchange ideas, technologies, and information on public works practices; address water resources issues including laws, regulations, and services to the public; identify and promote research needed to advance public works practices in the area of water resources management; and enhance service to APWA members by providing educational opportunities, information exchange, and representation.

Consistent with this mission, the Water Resources Committee has taken a lead role in providing education and training to the public, private sectors, state and federal regulators on various aspects of the water quality management programs under the federal Clean Water Act. Since 1988, this committee has conducted a series of workshops on stormwater and watershed management programs. These workshops have discussed the objectives and requirements of these programs and presented practical information to assist in developing and implementing compliance programs.

The Southern California Chapter of the Water Resources Committee consists of the stormwater program managers from the counties of Orange, Riverside, San Bernardino and Los Angeles, city representatives as well as representatives of several consulting firms who have assisted with the development of the stormwater implementation programs.

The two workshops that were coordinated and sponsored during the reporting period were:

- U.S Army Corps of Engineers Wetland Permits: The new Nationwide Regulations and How They Affect You; (approximately 125 participants) and
- Clean Water Act Impacts on New Development (approximately 200 participants).

The Water Environment Research Foundation - Stormwater Research Program

In early June 2001 the Principal Permittee attended a meeting that WERF convened in Chicago to discuss their involvement in the stormwater research issues. Attendees, including stormwater program managers and regulatory agencies from across the country, provided feedback on creating a stormwater research program and identified current and future research needs. Program managers in attendance gave short presentations about their local programs and a summary of stormwater management efforts in their region or state.

Among the many vital research topics identified were the effectiveness of various BMPs, methods to mitigate the impacts of urban runoff, land use practices the value of current water quality monitoring techniques and the elements of effective stormwater management.

2.2.6 Coordination With Other Agencies

Southern California Counties

Successful implementation of the NPDES Stormwater Program requires cooperation and coordination with other public agencies or organizations within and adjacent to Orange County that have programs or activities that have an impact on stormwater quality. During the Second Term Permit period, a significant example of such an approach was the joint participation with Riverside, Orange and San Bernardino Counties in the Bight 98' regional monitoring program, which was coordinated by SCCWRP. This represented a collective opportunity for the three Counties to cooperatively participate in an integrated watershed monitoring program and meet a common permit objective (Section 15.1).

This coordination on monitoring has further developed into a region-wide monitoring and research cooperative program with the neighboring counties, SCCWRP and the three Regional Boards and will be implemented during the Third Term Permit period. (Section 15.2).

Cal Trans

The Principal Permittee has also actively coordinated with Cal Trans through respective attendance at NPDES meetings. This joint participation has allowed for the sharing of information and resources and has provided for a greater understanding of the respective programs and challenges.

Phase II Agencies

The Permittees also anticipate that there may be additional opportunities for cooperative efforts with other stormwater dischargers that may be permitted separately under Phase II of the federal stormwater regulations. These dischargers include federal and state lands, including, but not limited to, military bases, national forest, hospitals, colleges and universities, and highways; utilities and special districts; Native American tribal lands; non-urbanized areas; and agricultural lands.

Orange County Agencies

During the Orange County Fair in July 2000, the County of Orange Public Facilities and Resources Department, Integrated Waste Management Department, Health Care Agency and Orange County Sanitation District coordinated their efforts to provide a unified message in all four booths to fair goers regarding the proper disposal of waste materials, recognizing that this single issue effects all four programs. This message was conveyed through similar signs, an interactive bingo game, prizes and a follow up survey (Section 6.4.2 and 6.4.3).

2.3 Budget/Fiscal Analysis

This Section presents a fiscal summary and analysis of the Permittee activities undertaken in order to comply with the Second Term Permits. Information on the funding sources used by each Permittee are also presented. The costs and funding sources for each Permittee are summarized in **Tables 2.3 through 2.107**. "Capital costs" refers to expenditures for land, large equipment, and structures. "Operations and Maintenance costs" refers to normal costs of operation including the cost of keeping equipment and facilities in working order.

The sum of the capital and operations and maintenance costs is the total cost that each Permittee has incurred individually to meet the requirements of the Second Term Permits. The total cost to the Permittee is comprised of shared costs and individual costs. The historical shared and individual costs for 1990-1991 through 2001-2002 are presented in **Figure 2.3**.

In addition, the last part of this section presents additional shared costs incurred by various watershed Permittees for specific waterbody impairments that are being addressed.

2.3.1 Shared Costs

Shared costs are those that fund activities performed by the County of Orange on behalf of the Permittees as Principal Permittee for the NPDES permits, under the stormwater program's Implementation Agreement. Each municipality's contribution to the shared costs is determined by a formula established in the Implementation Agreement, based on the population and land area of each jurisdiction. These activities include compliance program management, the water quality monitoring program and public education.

Program management activities handled by the County include development and execution of intergovernmental agreements, representation of the Permittees at meetings with other organizations, preparation of compliance reports, budgets and other program documentation, representation of the program before appropriate agencies such as the Regional Water Quality Control Boards and the State Water Resources Control Board, procurement and subsequent coordination of consultant studies and coordination with city NPDES representatives.

FY 2000/01

The actual shared program expenditures for the 2000/01 fiscal year were $941,534.

FY 2001/02

The projected-shared cost expenditures for the 2001/02 fiscal year, as approved by the Permittees, are $1,610,910.

It should be noted that these estimated costs do not include costs for those program elements that may be further enhanced or added to the stormwater program as a result of additional Third Term Permit requirements.

Additional Watershed Shared Costs

During the reporting year, additional shared costs were incurred due to the need to conduct various watershed specific investigations. These additional costs were determined by utilizing a supplemental budget, which was prepared in accordance with the terms of the Implementation Agreement. The specific projects are discussed further in Section 13.3 and Section 13.4.

The watersheds that utilized the agreements include:

Watershed	Supplemental Budget
• Talbert/Lower Santa Ana River Watershed 13267 Directive UCI Study	$145,400
• Aliso Creek Watershed 13225 Directive Aliso Creek Directive Monitoring	$83,400

It should also be noted that the Huntington, Newport and Aliso Creek Watersheds utilized other specific cooperative watershed agreements in order to address specific water quality concerns or issues within their jurisdictions.

2.3.2 Individual Costs

Individual costs are those incurred by each municipality through implementation of the various Best Management Practices (BMPs) discussed in the DAMP. These BMPs, as discussed in the subsequent sections of this report, include a wide range of activities, such as street sweeping, litter control and emergency spill response, facility inspection, drain inlet/catchbasin stenciling and dissemination of public education materials.

During the First Term Permit, the financial reporting tables that were developed included pre-existing and attributable to DAMP categories for reporting the capital and operations and maintenance costs. While those categories made sense and were able to be distinguished from one another, the continued evolution of the stormwater program elements has now made it much more difficult to distinguish the differences between those categories. As such, beginning with the 2001/02 annual status report, the total costs for the individual programs will no longer distinguish between the pre-existing and attributable to DAMP program elements.

FY 2000/01

The individual costs incurred by each Permittee vary widely for each municipal activity identified as a BMP. This variation reflects a number of factors, including area, population and land use. These costs are detailed for each Permittee in **Tables 2.3 through 2.107** and are presented separately as costs incurred specifically to implement DAMP programs and as costs incurred for previously existing programs that meet DAMP objectives.

In 2000/01, the total cost of the activities undertaken by the Permittees implementing the DAMP programs within their jurisdictions is:

- Individual Costs attributable to the DAMP $8,279,715
- Pre-Existing Programs $49,756,798

FY 2001/02

In 2001/02, the total cost of the activities estimated to be undertaken by the Permittees implementing the DAMP programs within their jurisdictions are:

- Individual Costs attributable to the DAMP $17,085,390
- Pre-Existing Programs $54,067,667

It should be noted that these estimated costs do not include costs for those program elements that may be further enhanced or added to the stormwater program as a result of additional Third Term Permit requirements.

2.3.3 Funding Sources

Funding sources to implement DAMP programs, including existing programs that meet DAMP objectives, include both general and specific funds, taxes, maintenance and user fees, and grants. Since certain DAMP elements were implemented by volunteer groups like the Boy Scouts of America and Surfrider (i.e. storm drain stenciling) no fiscal value was attributed to these contributions.

The funding source breakdown for the reporting period is as follows:

- General Fund 67%
- Gas Tax 8%
- Special District 5%
- Sanitation Fee 5%
- Others 4%
- Sewer/SD Fee 4%
- Separate Utility 3%
- Utility Tax 2%
- Water Fund 1%

Table 2.1
NPDES General Permittee Representatives

Permittee	Primary Representative	Department	Phone Number	Did this change from the prior reporting period?	
				Y	N
Anaheim	Keith Linker	Public Works	(714) 765-6821	X	
	Craig Allen	Public Works	(714) 765-6860		
Brea	Sam Hanna	Engineering	(714) 990-7660		X
	Phil Wray	Engineering	(714) 990-7763		
Buena Park	Paul DePietro	Public Works	(714) 562-3650		X
	Doug Brodowski	Public Works	(714) 562-3652		
Costa Mesa	Maher Nawar	Public Services	(714) 754-5248		X
	Susan Santoro	Public Services	(714) 754-5066		
Cypress	Gonzalo Vazquez	Public Works	(714) 229-6752		X
Dana Point	Cindy Asher	Public Works	(949) 248-3571		X
	Bob Warren	Public Works	(949) 248-3554		
Fountain Valley	William R. Ault	Public Works	(714) 593-4434		X
	Steven M. Hauerwaas	Public Works	(714) 593-4441		
Fullerton	Ron Wallin	Engineering	(714) 738-6853		X
	Gene Viramontes	Maintenance	(714) 738-6897		
Garden Grove	Maria Stipe	Public Works	(714) 741-5554		X
Huntington Beach	Geraldine Lucas	Public Works	(714) 375-8494	X	
	Eric Charlonne	Public Works	(714) 536-5430		
Irvine	Mike Loving	Public Works	(949) 724-6315		X
	Richard Monroe	Public Works	(949) 724-6406		
La Habra	Delfino Consunji	Public Works	(562) 905-9720	X	
	Paul Hamilton	Public Works	(562) 905-9792		
La Palma	Ismile H. Noorbaksh, P.E.	Public Works	(714) 690-3310		X
Laguna Beach	Derek Wieske	Public Works	(949) 497-0792		X
	Mark Trestik	Public Works	(949) 497-0300		
Laguna Hills	Kenneth H. Rosenfield	Public Services	(949) 707-2655		X
	Jo Claudio	Public Services	(949) 707-2657		
Laguna Niguel	Jean Jambon	Public Works	(949) 362-4345		X
Laguna Woods	Leslie Keane	City Manager	(949) 452-0600	N/A	
	Lauren Barr	Planning	(949) 452-0600		

Table 2.1
NPDES General Permittee Representatives

Permittee	Primary Representative	Department	Phone Number	Did this change from the prior reporting period?	
				Y	N
Lake Forest	Ted Simon	Public Works	(949) 461-3488	X	
	Javier Peraza	Public Works	(949) 461-3498		
Los Alamitos	Michael Kim	Engineering	(562) 431-3538 x 101		X
	Dave Cox	Public Services	(562) 431-3538 x 105		
Mission Viejo	Richard Schlesinger	Public Works	(949) 470-3079		X
	Loren Anderson	Public Works	(949) 470-3078		
Newport Beach	Dave Kiff	City Manager	(949) 644-3002	X	
Orange	Harry Thomas	Public Works	(714) 744-5545	X	
	James Bisetti	Public Works	(714) 744-5551		
Placentia	Christopher Becker	Public Works	(714) 993-8245		X
	Geoff Cobbett	Public Works	(714) 238-2421		
Rancho Santa Margarita	Tom Wheeler	Engineering	(949) 635-1800	X	
	Carolyn Lacanilao	Engineering	(949) 635-1800		
San Clemente	Tom Bonigut	Engineering	(949) 361-6187	X	
	Elizabeth Clatfelder	Utilities	(949) 361-6354		
San Juan Capistrano	William M. Huber	Engineering & Bldg	(949) 443-6336		X
	Sam Shoucair	Engineering & Bldg	(949) 443-6355		
Santa Ana	Souri Amirani	Public Works	(714) 647-5640		X
	Harry Chin	Public Works	(714) 647-5641		
Seal Beach	George Bernard	Public Works	(562) 431-2527		X
	Assistant City Engineer	Public Works	(562) 431-2527		
Stanton	Michael Kim	Engineering	(714) 379-9222x204		X
Tustin	Rick Yee	Public Works	(714) 573-3175	X	
	Mr. Dana Kasdan	Public Works	(714) 573-3171		
Villa Park	Warren W. Repke, PE	Engineering	(714) 998-1500	X	
	Fred Maley	City Manager	(714) 998-1500		
Westminster	Ziad Mazboudi	Public Works	(714) 898-3311 x 215		X
	Marwan Youssef	Public Works	(714) 898-3311 x 219		
Yorba Linda	Chris Johansen	Engineering	(714) 961-7170		X
County of Orange	Karen Ashby	PFRD/Watershed & Coastal Resources	(714) 567-6297		X

Indicates Alternate Representative

Table 2.2
General Permittee Committee Meeting Representation

Permittee	July 20, 2000	August 22, 2000	December 19, 2000	February 22, 2001	April 19, 2001	May 24, 2001	June 28, 2001
Anaheim	X	X	X	X	X	X	X
Brea	X	X	X	X	X	X	X
Buena Park	X	X		X	X	X	X
Costa Mesa	X	X	X	X	X	X	X
Cypress	X	X		X	X	X	X
Dana Point	X	X	X	X	X	X	X
Fountain Valley						X	
Fullerton	X			X		X	
Garden Grove	X	X	X	X	X	X	X
Huntington Beach	X	X	X		X	X	X
Irvine	X	X	X	X	X	X	X
La Habra	X	X		X	X	X	X
La Palma	X	X	X	X	X	X	X
Laguna Beach	X	X	X	X	X	X	X
Laguna Hills	X	X	X	X	X	X	X
Laguna Niguel		X		X	X	X	
Laguna Woods							
Lake Forest	X	X	X	X		X	X
Los Alamitos						X	
Mission Viejo		X	X	X	X		
Newport Beach						X	
Orange					X	X	X
Placentia							
Rancho Santa Margarita	X	X	X	X	X	X	
San Clemente	X	X	X	X	X	X	X
San Juan Capistrano	X	X	X	X	X	X	X
Santa Ana	X	X	X	X	X	X	X
Seal Beach	X	X	X	X		X	X
Stanton						X	
Tustin	X	X	X	X	X	X	X
Villa Park	X			X			
Westminster	X	X	X	X	X	X	X
Yorba Linda	X	X	X	X	X	X	X
County of Orange	X	X	X	X	X	X	X

Table 2.3

City of Anaheim
Fiscal Analysis Summary

CAPITAL COSTS
(land, large equipment, and structures)

DAMP Cost Elements		2000/01 FY Costs		Projected 2001/02 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$0	$0	$0	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$0	$0	$0
	Recycling	$0	$30,075	$0	$60,150
	Drainage Facility Maintenance	$17,047	$0	$0	$0
	Catch Basin Stenciling	$0	$0	$0	$0
	Street Sweeping	$0	$0	$0	$0
	Environmental Performance	$31,273	$0	$0	$0
	Public Property & Street Chemical Spill Response	$0	$0	$0	$0
	Pesticide & Fertilizer Management	$0	$0	$0	$0
PUBLIC INFORMATION (DAMP Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	$0	$0	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$0	$0	$0	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$0	$0	$0	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$0	$0	$0	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$0	$0	$0
TOTALS		$48,320	$30,075	$0	$60,150

Table 2.4

City of Anaheim
Fiscal Analysis Summary

OPERATIONS AND MAINTENANCE

DAMP Cost Elements		2000/01 FY Costs		Projected 2001/02 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$33,458	$189,598	$34	$193,390
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$635,884	$0	$649,898
	Recycling	$0	$14,418,624	$0	$14,706,996
	Drainage Facility Maintenance	$0	$249,774	$0	$254,769
	Catch Basin Stenciling	$9,850	$0	$400	$0
	Street Sweeping	$0	$3,059,065	$0	$3,120,146
	Environmental Performance	$11,753	$0	$12,000	$0
	Public Property & Street Chemical Spill Response	$0	$0	$0	$0
	Pesticide & Fertilizer Management	$12,947	$0	$20,000	$0
PUBLIC INFORMATION (DAMP Section 6.0)	Nonpoint Source Pollution Awareness	$12,386	$0	$14,851	$0
	Household Hazardous Waste Collection	$0	$505,567	$0	$515,678
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$9,721	$1,721	$9,721	$1,721
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$0	$0	$0	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$95,000	$0	$400,000	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$33,000	$0	$47,162	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$0	$0	$0
TOTALS		$218,115	$19,060,233	$504,168	$19,442,598

Table 2.5

City of Anaheim
Fiscal Analysis Summary

FUNDING SOURCES

DAMP FUNDING SOURCES	FUNDING PERCENTAGES	
	FISCAL YEAR 2000/01	FISCAL YEAR 2001/02 (Projected)
GENERAL FUND	1%	2%
UTILITY TAX/CHARGES	0%	0%
SEPARATE UTILITY BILLING ITEM	0%	0%
GAS TAX	0%	0%
SPECIAL DISTRICT FUND	0%	0%
OTHERS (Specify)	0%	0%
User Fees for Recycling and Hazardous Waste Collection	0%	0%
Integrated Waste Management	0%	0%
Interest Earnings	0%	0%
Sanitation Fee	0%	0%
Benefit assessment	0%	0%
Fleet Maintenance Fund	0%	0%
Community Services District	0%	0%
Used Oil Grant	0%	0%
Water Fund	0%	0%
Sewer & Storm Drain Maintenance Fee	99%	98%
TOTALS (must add up to 100%)	100%	100%

Table 2.6

City of Brea
Fiscal Analysis Summary

CAPITAL COSTS
(land, large equipment, and structures)

DAMP Cost Elements		2000/01 FY Costs		Projected 2001/02 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$0	$0	$0	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$0	$0	$0
	Recycling	$0	$0	$0	$0
	Drainage Facility Maintenance	$0	$138,292	$135,600	$150,000
	Catch Basin Stenciling	$0	$0	$0	$0
	Street Sweeping	$0	$0	$0	$190,700
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$0	$0	$0	$0
	Pesticide & Fertilizer Management	$0	$0	$0	$0
PUBLIC INFORMATION (DAMP Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	$0	$0	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$0	$0	$0	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$0	$0	$0	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$0	$0	$0	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$0	$0	$0
TOTALS		$0	$138,292	$135,600	$340,700

Table 2.7

City of Brea
Fiscal Analysis Summary

OPERATIONS AND MAINTENANCE

DAMP Cost Elements		2000/01 FY Costs		Projected 2001/02 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$0	$0	$0	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$0	$0	$0
	Recycling	$0	$0	$0	$0
	Drainage Facility Maintenance	$0	$138,408	$0	$251,882
	Catch Basin Stenciling	$2,700	$0	$3,200	$0
	Street Sweeping	$0	$312,175	$0	$327,050
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$0	$0	$0	$0
	Pesticide & Fertilizer Management	$0	$3,000	$0	$3,300
PUBLIC INFORMATION (DAMP Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	$0	$0	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$0	$0	$0	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$0	$0	$0	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$0	$0	$0	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$0	$60,000	$0
TOTALS		$2,700	$453,583	$63,200	$582,232

Table 2.8

City of Brea
Fiscal Analysis Summary

FUNDING SOURCES

DAMP FUNDING SOURCES	FUNDING PERCENTAGES	
	FISCAL YEAR 2000/01	FISCAL YEAR 2001/02 (Projected)
GENERAL FUND	5%	5%
UTILITY TAX/CHARGES	20%	20%
SEPARATE UTILITY BILLING ITEM	25%	25%
GAS TAX	0%	0%
SPECIAL DISTRICT FUND	50%	50%
OTHERS (Specify)	0%	0%
User Fees for Recycling and Hazardous Waste Collection	0%	0%
Integrated Waste Management	0%	0%
Interest Earnings	0%	0%
Sanitation Fee	0%	0%
Benefit assessment	0%	0%
Fleet Maintenance Fund	0%	0%
Community Services District	0%	0%
Used Oil Grant	0%	0%
Water Fund	0%	0%
Sewer & Storm Drain Maintenance Fee	0%	0%
TOTALS (must add up to 100%)	100%	100%

Table 2.9

City of Buena Park
Fiscal Analysis Summary

CAPITAL COSTS
(land, large equipment, and structures)

DAMP Cost Elements		2000/01 FY Costs		Projected 2001/02 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$0	$0	$0	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$0	$0	$0
	Recycling	$0	$0	$0	$0
	Drainage Facility Maintenance	$0	$0	$0	$0
	Catch Basin Stenciling	$0	$0	$0	$0
	Street Sweeping	$0	$0	$0	$0
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$0	$0	$0	$0
	Pesticide & Fertilizer Management	$0	$0	$0	$0
PUBLIC INFORMATION (DAMP Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	$0	$0	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$0	$0	$0	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$0	$0	$0	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$0	$0	$0	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$0	$0	$0
TOTALS		$0	$0	$0	$0

Table 2.10

City of Buena Park
Fiscal Analysis Summary

OPERATIONS AND MAINTENANCE

DAMP Cost Elements		2000/01 FY Costs		Projected 2001/02 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$0	$0	$0	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$0	$0	$0
	Recycling	$0	$0	$0	$0
	Drainage Facility Maintenance	$0	$10,500	$0	$10,500
	Catch Basin Stenciling	$0	$0	$0	$10,000
	Street Sweeping	$0	$201,265	$0	$221,000
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$0	$0	$0	$4,500
	Pesticide & Fertilizer Management	$0	$17,850	$0	$18,000
PUBLIC INFORMATION (DAMP Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	$0	$0	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$0	$0	$0	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$0	$0	$0	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$0	$0	$0	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$0	$0	$0
TOTALS		$0	$229,615	$0	$264,000

Table 2.11

City of Buena Park
Fiscal Analysis Summary

FUNDING SOURCES

DAMP FUNDING SOURCES	FUNDING PERCENTAGES	
	FISCAL YEAR 2000/01	FISCAL YEAR 2001/02 (Projected)
GENERAL FUND	100%	100%
UTILITY TAX/CHARGES	0%	0%
SEPARATE UTILITY BILLING ITEM	0%	0%
GAS TAX	0%	0%
SPECIAL DISTRICT FUND	0%	0%
OTHERS (Specify)	0%	0%
User Fees for Recycling and Hazardous Waste Collection	0%	0%
Integrated Waste Management	0%	0%
Interest Earnings	0%	0%
Sanitation Fee	0%	0%
Benefit assessment	0%	0%
Fleet Maintenance Fund	0%	0%
Community Services District	0%	0%
Used Oil Grant	0%	0%
Water Fund	0%	0%
Sewer & Storm Drain Maintenance Fee	0%	0%
TOTALS (must add up to 100%)	100%	100%

Table 2.12

City of Costa Mesa
Fiscal Analysis Summary

CAPITAL COSTS
(land, large equipment, and structures)

DAMP Cost Elements		2000/01 FY Costs		Projected 2001/02 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$0	$0	$0	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$0	$0	$0
	Recycling	$0	$0	$0	$0
	Drainage Facility Maintenance	$0	$0	$0	$0
	Catch Basin Stenciling	$0	$0	$0	$0
	Street Sweeping	$0	$115,000	$0	$115,000
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$0	$0	$0	$0
	Pesticide & Fertilizer Management	$0	$0	$0	$0
PUBLIC INFORMATION (DAMP Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	$0	$0	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$0	$0	$0	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$0	$0	$0	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$0	$0	$0	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$0	$0	$0
TOTALS		$0	$115,000	$0	$115,000

Table 2.13

City of Costa Mesa
Fiscal Analysis Summary

OPERATIONS AND MAINTENANCE

DAMP Cost Elements		2000/01 FY Costs		Projected 2001/02 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$25,000	$0	$25,000	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$149,181	$0	$160,000
	Recycling	$0	$112,998	$0	$123,430
	Drainage Facility Maintenance	$0	$50,238	$0	$73,140
	Catch Basin Stenciling	$0	$0	$0	$0
	Street Sweeping	$0	$549,972	$0	$365,120
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$0	$25,000	$0	$25,000
	Pesticide & Fertilizer Management	$0	$44,951	$0	$50,000
PUBLIC INFORMATION (DAMP Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	$0	$0	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$0	$5,000	$0	$5,000
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$0	$5,000	$0	$5,000
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$0	$0	$0	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$0	$0	$0
TOTALS		$0	$942,340	$25,000	$806,690

Table 2.14

City of Costa Mesa
Fiscal Analysis Summary

FUNDING SOURCES

DAMP FUNDING SOURCES	FUNDING PERCENTAGES	
	FISCAL YEAR 2000/01	FISCAL YEAR 2001/02 (Projected)
GENERAL FUND	100%	100%
UTILITY TAX/CHARGES	0%	0%
SEPARATE UTILITY BILLING ITEM	0%	0%
GAS TAX	0%	0%
SPECIAL DISTRICT FUND	0%	0%
OTHERS (Specify)	0%	0%
User Fees for Recycling and Hazardous Waste Collection	0%	0%
Integrated Waste Management	0%	0%
Interest Earnings	0%	0%
Sanitation Fee	0%	0%
Benefit assessment	0%	0%
Fleet Maintenance Fund	0%	0%
Community Services District	0%	0%
Used Oil Grant	0%	0%
Water Fund	0%	0%
Sewer & Storm Drain Maintenance Fee	0%	0%
TOTALS (must add up to 100%)	100%	100%

Table 2.15

City of Cypress
Fiscal Analysis Summary

CAPITAL COSTS
(land, large equipment, and structures)

DAMP Cost Elements		2000/01 FY Costs		Projected 2001/02 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$0	$0	$0	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$0	$0	$0
	Recycling	$0	$0	$0	$0
	Drainage Facility Maintenance	$0	$0	$0	$0
	Catch Basin Stenciling	$0	$0	$0	$0
	Street Sweeping	$0	$0	$0	$0
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$0	$0	$0	$0
	Pesticide & Fertilizer Management	$0	$0	$0	$0
PUBLIC INFORMATION (DAMP Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	$0	$0	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$0	$0	$0	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$0	$0	$0	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$0	$0	$0	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$0	$0	$0
TOTALS		$0	$0	$0	$0

Table 2.16

City of Cypress
Fiscal Analysis Summary

OPERATIONS AND MAINTENANCE
(land, large equipment, and structures)

DAMP Cost Elements		2000/01 FY Costs		Projected 2001/02 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$0	$2,500	$0	$2,500
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$0	$0	$0
	Recycling	$0	$23,657	$0	$27,598
	Drainage Facility Maintenance	$0	$112,870	$0	$187,941
	Catch Basin Stenciling	$0	$0	$0	$800
	Street Sweeping	$0	$181,337	$0	$202,206
	Environmental Performance	$0	$0	$0	$800
	Public Property & Street Chemical Spill Response	$0	$1,000	$0	$1,000
	Pesticide & Fertilizer Management	$0	$7	$0	$110
PUBLIC INFORMATION (DAMP Section 6.0)	Nonpoint Source Pollution Awareness	$2,000	$0	$2,000	$0
	Household Hazardous Waste Collection	$13,344	$0	$11,000	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$0	$38,791	$0	$21,716
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$0	$38,791	$0	$21,716
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$1,100	$0	$2,100	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$0	$0	$0
TOTALS		$16,444	$398,953	$15,100	$466,387

Table 2.17

City of Cypress
Fiscal Analysis Summary

FUNDING SOURCES

DAMP FUNDING SOURCES	FUNDING PERCENTAGES	
	FISCAL YEAR 2000/01	FISCAL YEAR 2001/02 (Projected)
GENERAL FUND	100%	100%
UTILITY TAX/CHARGES	0%	0%
SEPARATE UTILITY BILLING ITEM	0%	0%
GAS TAX	0%	0%
SPECIAL DISTRICT FUND	0%	0%
OTHERS (Specify)	0%	0%
User Fees for Recycling and Hazardous Waste Collection	0%	0%
Integrated Waste Management	0%	0%
Interest Earnings	0%	0%
Sanitation Fee	0%	0%
Benefit assessment	0%	0%
Fleet Maintenance Fund	0%	0%
Community Services District	0%	0%
Used Oil Grant	0%	0%
Water Fund	0%	0%
Sewer & Storm Drain Maintenance Fee	0%	0%
TOTALS (must add up to 100%)	100%	100%

Table 2.18

City of Dana Point
Fiscal Analysis Summary

CAPITAL COSTS
(land, large equipment, and structures)

DAMP Cost Elements		2000/01 FY Costs		Projected 2001/02 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$0	$0	$0	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$0	$0	$0
	Recycling	$0	$0	$0	$0
	Drainage Facility Maintenance	$0	$0	$0	$0
	Catch Basin Stenciling	$0	$0	$0	$0
	Street Sweeping	$0	$0	$0	$0
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$0	$0	$0	$0
	Pesticide & Fertilizer Management	$0	$0	$0	$0
PUBLIC INFORMATION (DAMP Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	$0	$0	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$0	$0	$0	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$0	$0	$0	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$0	$0	$0	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$0	$0	$0
TOTALS		$0	$0	$0	$0

Table 2.19

City of Dana Point
Fiscal Analysis Summary

OPERATIONS AND MAINTENANCE

DAMP Cost Elements		2000/01 FY Costs		Projected 2001/02 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$5,600	$12,298	$8,000	$12,429
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$5,589	$22,355	$11,966	$47,685
	Recycling	$0	$0	$0	$0
	Drainage Facility Maintenance	$65,145	$75,309	$121,920	$143,920
	Catch Basin Stenciling	$0	$6,034	$4,375	$10,744
	Street Sweeping	$59,305	$48,759	$99,047	$59,049
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$0	$0	$0	$0
	Pesticide & Fertilizer Management	$0	$45,422	$0	$45,422
PUBLIC INFORMATION (DAMP Section 6.0)	Nonpoint Source Pollution Awareness	$60,000	$0	$50,000	$0
	Household Hazardous Waste Collection	$0	$0	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$3,800	$0	$4,000	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$4,000	$12,000	$4,500	$12,000
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$0	$0	$8,757	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$0	$0	$0
TOTALS		$203,439	$222,177	$312,565	$331,249

Table 2.20

City of Dana Point
Fiscal Analysis Summary

FUNDING SOURCES

DAMP FUNDING SOURCES	FUNDING PERCENTAGES	
	FISCAL YEAR 2000/01	FISCAL YEAR 2001/02 (Projected)
GENERAL FUND	100%	100%
UTILITY TAX/CHARGES	0%	0%
SEPARATE UTILITY BILLING ITEM	0%	0%
GAS TAX	0%	0%
SPECIAL DISTRICT FUND	0%	0%
OTHERS (Specify)	0%	0%
User Fees for Recycling and Hazardous Waste Collection	0%	0%
Integrated Waste Management	0%	0%
Interest Earnings	0%	0%
Sanitation Fee	0%	0%
Benefit assessment	0%	0%
Fleet Maintenance Fund	0%	0%
Community Services District	0%	0%
Used Oil Grant	0%	0%
Water Fund	0%	0%
Sewer & Storm Drain Maintenance Fee	0%	0%
TOTALS (must add up to 100%)	100%	100%

Table 2.21

City of Fountain Valley
Fiscal Analysis Summary

CAPITAL COSTS
(land, large equipment, and structures)

DAMP Cost Elements		2000/01 FY Costs		Projected 2001/02 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$0	$0	$0	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$0	$0	$0
	Recycling	$0	$0	$0	$0
	Drainage Facility Maintenance	$0	$80,000	$200,000	$1,230,000
	Catch Basin Stenciling	$0	$0	$0	$0
	Street Sweeping	$0	$0	$0	$0
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$0	$0	$0	$0
	Pesticide & Fertilizer Management	$0	$0	$0	$0
PUBLIC INFORMATION (DAMP Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	$0	$0	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$0	$0	$0	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$0	$0	$0	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$0	$0	$295,000	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$175,000	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$10,000	$0	$0	$0
TOTALS		$10,000	$80,000	$670,000	$1,230,000

Table 2.22

City of Fountain Valley
Fiscal Analysis Summary

OPERATIONS AND MAINTENANCE

DAMP Cost Elements		2000/01 FY Costs		Projected 2001/02 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$23,569	$0	$26,438	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$61,929	$0	$61,929
	Recycling	$0	$457,574	$0	$457,574
	Drainage Facility Maintenance	$0	$180,401	$0	$198,016
	Catch Basin Stenciling	$2,100	$0	$2,100	$0
	Street Sweeping	$288,811	$0	$291,180	$0
	Environmental Performance	$10,000	$0	$10,000	$0
	Public Property & Street Chemical Spill Response	$0	$0	$0	$0
	Pesticide & Fertilizer Management	$205,366	$0	$213,581	$0
PUBLIC INFORMATION (DAMP Section 6.0)	Nonpoint Source Pollution Awareness	$1,000	$0	$1,000	$0
	Household Hazardous Waste Collection	$26,000	$0	$26,000	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$6,160	$0	$6,106	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$4,724	$0	$4,913	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$9,487	$0	$9,866	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$10,000	$0	$0	$0
TOTALS		$587,217	$699,904	$591,184	$717,519

Table 2.23

City of Fountain Valley
Fiscal Analysis Summary

FUNDING SOURCES

DAMP FUNDING SOURCES	FUNDING PERCENTAGES	
	FISCAL YEAR 2000/2001	FISCAL YEAR 2001/02 (Projected)
GENERAL FUND	95%	95%
UTILITY TAX/CHARGES	0%	0%
SEPARATE UTILITY BILLING ITEM	0%	0%
GAS TAX	1%	1%
SPECIAL DISTRICT FUND	0%	0%
OTHERS (Specify)	4%	4%
User Fees for Recycling and Hazardous Waste Collection	0%	0%
Integrated Waste Management	0%	0%
Interest Earnings	0%	0%
Sanitation Fee	0%	0%
Benefit assessment	0%	0%
Fleet Maintenance Fund	0%	0%
Community Services District	0%	0%
Used Oil Grant	0%	0%
Water Fund	0%	0%
Sewer & Storm Drain Maintenance Fee	0%	0%
TOTALS (must add up to 100%)	100%	100%

Table 2.24

City of Fullerton
Fiscal Analysis Summary

CAPITAL COSTS
(land, large equipment, and structures)

DAMP Cost Elements		2000/01 FY Costs		Projected 2001/02 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$0	$0	$0	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$0	$0	$0
	Recycling	$0	$0	$0	$0
	Drainage Facility Maintenance	$0	$0	$0	$0
	Catch Basin Stenciling	$0	$0	$0	$0
	Street Sweeping	$0	$0	$0	$0
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$0	$0	$0	$0
	Pesticide & Fertilizer Management	$0	$0	$0	$0
PUBLIC INFORMATION (DAMP Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	$0	$0	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$0	$0	$0	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$0	$0	$0	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$0	$0	$0	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$0	$0	$0
TOTALS		$0	$0	$0	$0

Table 2.25

City of Fullerton
Fiscal Analysis Summary

OPERATIONS AND MAINTENANCE

DAMP Cost Elements		2000/01 FY Costs		Projected 2001/02 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$0	$0	$0	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$7,987	$0	$76,530
	Recycling	$0	$0	$0	$0
	Drainage Facility Maintenance	$0	$464,795	$0	$502,210
	Catch Basin Stenciling	$0	*	$0	*
	Street Sweeping	$0	$478,640	$0	$519,130
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$0	$95,070	$0	$90,380
	Pesticide & Fertilizer Management	$134,405	$0	$136,710	$0
PUBLIC INFORMATION (DAMP Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	$0	$0	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$0	$0	$0	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$0	$0	$0	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$0	$0	$0	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$0	$0	$0
TOTALS		$134,405	$1,046,492	$136,710	$1,188,250

* Included in the above costs

Table 2.26

City of Fullerton
Fiscal Analysis Summary

FUNDING SOURCES

DAMP FUNDING SOURCES	FUNDING PERCENTAGES	
	FISCAL YEAR 2000/01	FISCAL YEAR 2001/02 (Projected)
GENERAL FUND	0%	0%
UTILITY TAX/CHARGES	0%	0%
SEPARATE UTILITY BILLING ITEM	0%	0%
GAS TAX	0%	0%
SPECIAL DISTRICT FUND	11%	10%
OTHERS (Specify)	89%	90%
User Fees for Recycling and Hazardous Waste Collection	0%	0%
Integrated Waste Management	0%	0%
Interest Earnings	0%	0%
Sanitation Fee	0%	0%
Benefit assessment	0%	0%
Fleet Maintenance Fund	0%	0%
Community Services District	0%	0%
Used Oil Grant	0%	0%
Water Fund	0%	0%
Sewer & Storm Drain Maintenance Fee	0%	0%
TOTALS (must add up to 100%)	100%	100%

Table 2.27

City of Garden Grove
Fiscal Analysis Summary

CAPITAL COSTS
(land, large equipment, and structures)

DAMP Cost Elements		2000/01 FY Costs		Projected 2001/02 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$0	$0	$0	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$0	$0	$0
	Recycling	$0	$0	$0	$0
	Drainage Facility Maintenance	$0	$0	$0	$0
	Catch Basin Stenciling	$0	$0	$0	$0
	Street Sweeping	$0	$0	$0	$0
	Environmental Performance	$0	$0	$44,400	$0
	Public Property & Street Chemical Spill Response	$0	$0	$0	$0
	Pesticide & Fertilizer Management	$0	$0	$0	$0
PUBLIC INFORMATION (DAMP Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	$0	$0	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$0	$0	$0	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$0	$0	$0	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$0	$0	$0	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$0	$0	$0
TOTALS		$0	$0	$44,400	$0

Table 2.28

City of Garden Grove
Fiscal Analysis Summary

OPERATIONS AND MAINTENANCE

DAMP Cost Elements		2000/2001 FY Costs		Projected 2001/02 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$5,648	$0	$44,032	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$0	$0	$0
	Recycling	$0	$34,980	$0	$78,860
	Drainage Facility Maintenance	$0	$218,346	$0	$191,568
	Catch Basin Stenciling	$0	$0	$600	$0
	Street Sweeping	$0	$461,124	$0	$502,358
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$0	$87,857	$0	$82,039
	Pesticide & Fertilizer Management	$5,000	$0	$5,500	$0
PUBLIC INFORMATION (DAMP Section 6.0)	Nonpoint Source Pollution Awareness	$5,000	$0	$5,000	$0
	Household Hazardous Waste Collection	$0	$54,398	$0	$50,028
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$6,679	$0	$6,000	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$3,817	$0	$40,000	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$2,400	$0	$5,000	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$1,200	$0	$2,000	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$70,000	$0	$200,000	$0
TOTALS		$99,744	$856,705	$308,132	$904,853

Table 2.29

City of Garden Grove
Fiscal Analysis Summary

FUNDING SOURCES

DAMP FUNDING SOURCES	FUNDING PERCENTAGES	
	FISCAL YEAR 2000/01	FISCAL YEAR 2001/02 (Projected)
GENERAL FUND	44%	51%
UTILITY TAX/CHARGES	0%	0%
SEPARATE UTILITY BILLING ITEM	0%	0%
GAS TAX	23%	19%
SPECIAL DISTRICT FUND	1%	1%
OTHERS (Specify)	2%	8%
User Fees for Recycling and Hazardous Waste Collection	0%	0%
Integrated Waste Management	0%	0%
Interest Earnings	0%	0%
Sanitation Fee	0%	0%
Benefit assessment	0%	0%
Fleet Maintenance Fund	0%	0%
Community Services District	0%	0%
Used Oil Grant	6%	4%
Water Fund	24%	17%
Sewer & Storm Drain Maintenance Fee	0%	0%
TOTALS (must add up to 100%)	100%	100%

Table 2.30

City of Huntington Beach
Fiscal Analysis Summary

CAPITAL COSTS
(land, large equipment, and structures)

DAMP Cost Elements		2000/01 FY Costs		Projected 2001/02 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$0	$0	$0	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$0	$0	$0
	Recycling	$0	$0	$0	$0
	Drainage Facility Maintenance	$0	$0	$0	$0
	Catch Basin Stenciling	$0	$0	$0	$0
	Street Sweeping	$0	$0	$0	$0
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$0	$0	$0	$0
	Pesticide & Fertilizer Management	$0	$0	$0	$0
PUBLIC INFORMATION (DAMP Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	$0	$0	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$0	$0	$0	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$0	$0	$0	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$0	$0	$0	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$7,500	$0	$150,000	$0
TOTALS		$7,500	$0	$150,000	$0

Table 2.31

City of Huntington Beach
Fiscal Analysis Summary

OPERATIONS AND MAINTENANCE

DAMP Cost Elements		2000/01 FY Costs		Projected 2001/02 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$85,000	$900,000	$100,000	$900,000
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$15,000	$0	$15,000
	Recycling	$0	$2,000,000	$0	$2,000,000
	Drainage Facility Maintenance	$50,000	$750,000	$150,000	$750,000
	Catch Basin Stenciling	$1,000	$0	$1,000	$0
	Street Sweeping	$0	$1,200,000	$100,000	$1,450,000
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$40,000	$1,300,000	$40,000	$1,300,000
	Pesticide & Fertilizer Management	$3,500	$0	$3,500	$0
PUBLIC INFORMATION (DAMP Section 6.0)	Nonpoint Source Pollution Awareness	$15,000	$0	$50,000	$0
	Household Hazardous Waste Collection	$0	*	$0	*
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$10,000	$0	$10,000	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$15,000	$0	$15,000	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$5,000	$0	$75,000	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$25,000	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$0	$0	$0
TOTALS		$224,500	$6,165,000	$569,500	$6,415,000

* Included in recycling costs

Table 2.32

City of Huntington Beach
Fiscal Analysis Summary

FUNDING SOURCES

DAMP FUNDING SOURCES	FUNDING PERCENTAGES	
	FISCAL YEAR 2000/01	FISCAL YEAR 2001/02 (Projected)
GENERAL FUND	100%	100%
UTILITY TAX/CHARGES	0%	0%
SEPARATE UTILITY BILLING ITEM	0%	0%
GAS TAX	0%	0%
SPECIAL DISTRICT FUND	0%	0%
OTHERS (Specify)	0%	0%
User Fees for Recycling and Hazardous Waste Collection	0%	0%
Integrated Waste Management	0%	0%
Interest Earnings	0%	0%
Sanitation Fee	0%	0%
Benefit assessment	0%	0%
Fleet Maintenance Fund	0%	0%
Community Services District	0%	0%
Used Oil Grant	0%	0%
Water Fund	0%	0%
Sewer & Storm Drain Maintenance Fee	0%	0%
TOTALS (must add up to 100%)	100%	100%

Table 2.33

City of Irvine
Fiscal Analysis Summary

CAPITAL COSTS
(land, large equipment, and structures)

DAMP Cost Elements		2000/01 FY Costs		Projected 2001/02 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$0	$0	$0	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$0	$0	$0
	Recycling	$0	$0	$0	$0
	Drainage Facility Maintenance	$0	$0	$0	$0
	Catch Basin Stenciling	$0	$0	$0	$0
	Street Sweeping	$0	$0	$0	$0
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$0	$0	$0	$0
	Pesticide & Fertilizer Management	$0	$0	$30,000[1]	$0
PUBLIC INFORMATION (DAMP Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	$0	$0	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$0	$0	$0	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$0	$0	$0	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$0	$0	$0	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$0	$0	$0
TOTALS		$0	$0	$30,000	$0

1) Paint and paint spray equipment for making soccer lines instead of herbicide applications

Table 2.34

City of Irvine
Fiscal Analysis Summary

OPERATIONS AND MAINTENANCE

DAMP Cost Elements		2000/01 FY Costs		Projected 2001/02 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$0	$0	$0	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$30,000	$0	$30,000
	Recycling	$0	$0	$0	$0
	Drainage Facility Maintenance	$0	$526,781	$0	$625,979
	Catch Basin Stenciling	$0	$3,500	$0	$3,500
	Street Sweeping	$0	$683,936	$0	$810,969
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$0	$5,000	$0	$5,000
	Pesticide & Fertilizer Management	$0	$0	$35,000 *	$0
PUBLIC INFORMATION (DAMP Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	$0	$0	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$0	$0	$0	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$0	$0	$0	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$0	$0	$0	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$0	$0	$0
TOTALS		$0	$1,249,217	$35,000	$1,475,448

* Labor cost to spray paint versus applying herbicide on soccer field; increase in soil testing prior to fertilizer applications.

Table 2.35

City of Irvine
Fiscal Analysis Summary

FUNDING SOURCES

DAMP FUNDING SOURCES	FUNDING PERCENTAGES	
	FISCAL YEAR 2000/01	FISCAL YEAR 2001/02 (Projected)
GENERAL FUND	100%	100%
UTILITY TAX/CHARGES	0%	0%
SEPARATE UTILITY BILLING ITEM	0%	0%
GAS TAX	0%	0%
SPECIAL DISTRICT FUND	0%	0%
OTHERS (Specify)	0%	0%
User Fees for Recycling and Hazardous Waste Collection	0%	0%
Integrated Waste Management	0%	0%
Interest Earnings	0%	0%
Sanitation Fee	0%	0%
Benefit assessment	0%	0%
Fleet Maintenance Fund	0%	0%
Community Services District	0%	0%
Used Oil Grant	0%	0%
Water Fund	0%	0%
Sewer & Storm Drain Maintenance Fee	0%	0%
TOTALS (must add up to 100%)	100%	100%

Table 2.36

City of La Habra
Fiscal Analysis Summary

CAPITAL COSTS
(land, large equipment, and structures)

DAMP Cost Elements		2000/01 FY Costs		Projected 2001/02 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$0	$0	$0	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$0	$0	$0
	Recycling	$0	$0	$0	$0
	Drainage Facility Maintenance	$0	$0	$3,000,000	$0
	Catch Basin Stenciling	$0	$0	$0	$0
	Street Sweeping	$0	$0	$0	$0
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$0	$0	$0	$0
	Pesticide & Fertilizer Management	$0	$0	$0	$0
PUBLIC INFORMATION (DAMP Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	$0	$0	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$40,000	$6,000	$40,000	$6,000
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$0	$20,000	$0	$20,000
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$0	$0	$0	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$200,000	$0	$200,000
TOTALS		$40,000	$226,000	$3,040,000	$226,000

Table 2.37

City of La Habra
Fiscal Analysis Summary

OPERATIONS AND MAINTENANCE

DAMP Cost Elements		2000/01 FY Costs		Projected 2001/02 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$0	$0	$0	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$0	$0	$0
	Recycling	$0	$0	$0	$0
	Drainage Facility Maintenance	$12,000	$0	$12,000	$10,000
	Catch Basin Stenciling	$600	$0	$600	$0
	Street Sweeping	$0	$200,000	$0	$200,000
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$0	$0	$0	$0
	Pesticide & Fertilizer Management	$0	$3,300	$0	$4,000
PUBLIC INFORMATION (DAMP Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	$0	$0	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$0	$0	$0	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$0	$0	$0	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$0	$0	$0	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$0	$0	$0
TOTALS		$12,600	$203,300	$12,600	$214,000

Table 2.38

City of La Habra
Fiscal Analysis Summary

FUNDING SOURCES

DAMP FUNDING SOURCES	FUNDING PERCENTAGES	
	FISCAL YEAR 2000/01	FISCAL YEAR 2001/02 (Projected)
GENERAL FUND	100%	100%
UTILITY TAX/CHARGES	0%	0%
SEPARATE UTILITY BILLING ITEM	0%*	0%
GAS TAX	0%	0%
SPECIAL DISTRICT FUND	0%	0%
OTHERS (Specify)	0%	0%
User Fees for Recycling and Hazardous Waste Collection	0%	0%
Integrated Waste Management	0%	0%
Interest Earnings	0%	0%
Sanitation Fee	0%	0%
Benefit assessment	0%	0%
Fleet Maintenance Fund	0%	0%
Community Services District	0%	0%
Used Oil Grant	0%	0%
Water Fund	0%	0%
Sewer & Storm Drain Maintenance Fee	0%	0%
TOTALS (must add up to 100%)	100%	100%

* Recycling is part of customer billing.

Table 2.39

City of La Palma
Fiscal Analysis Summary

CAPITAL COSTS
(land, large equipment, and structures)

DAMP Cost Elements		2000/01 FY Costs		Projected 2001/02 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$0	$0	$0	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$0	$0	$0
	Recycling	$0	$0	$0	$0
	Drainage Facility Maintenance	$0	$0	$0	$0
	Catch Basin Stenciling	$0	$0	$0	$500
	Street Sweeping	$0	$2,000	$0	$2,000
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$0	$0	$0	$0
	Pesticide & Fertilizer Management	$0	$1,500	$0	$1,500
PUBLIC INFORMATION (DAMP Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	$0	$0	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$0	$0	$0	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$0	$0	$0	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$0	$0	$0	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$0	$0	$0
TOTALS		$0	$3,500	$0	$4,000

Table 2.40

City of La Palma
Fiscal Analysis Summary

OPERATIONS AND MAINTENANCE

DAMP Cost Elements		2000/01 FY Costs		Projected 2001/02 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$0	$0	$0	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$0	$0	$0
	Recycling	$0	$0	$0	$0
	Drainage Facility Maintenance	$0	$55,100	$0	$52,900
	Catch Basin Stenciling	$0	$0	$0	$0
	Street Sweeping	$0	$74,000	$0	$74,000
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$0	$0	$0	$0
	Pesticide & Fertilizer Management	$0	$12,000	$0	$12,000
PUBLIC INFORMATION (DAMP Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	$0	$0	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$0	$0	$0	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$0	$0	$0	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$0	$0	$0	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$0	$0	$0
TOTALS		$0	$141,100	$0	$138,900

Table 2.41

City of La Palma
Fiscal Analysis Summary

FUNDING SOURCES

DAMP FUNDING SOURCES	FUNDING PERCENTAGES	
	FISCAL YEAR 2000/01	FISCAL YEAR 2001/02 (Projected)
GENERAL FUND	85%	85%
UTILITY TAX/CHARGES	0%	0%
SEPARATE UTILITY BILLING ITEM	0%	0%
GAS TAX	15%	15%
SPECIAL DISTRICT FUND	0%	0%
OTHERS (Specify)	0%	0%
User Fees for Recycling and Hazardous Waste Collection	0%	0%
Integrated Waste Management	0%	0%
Interest Earnings	0%	0%
Sanitation Fee	0%	0%
Benefit assessment	0%	0%
Fleet Maintenance Fund	0%	0%
Community Services District	0%	0%
Used Oil Grant	0%	0%
Water Fund	0%	0%
Sewer & Storm Drain Maintenance Fee	0%	0%
TOTALS (must add up to 100%)	100%	100%

Table 2.42

City of Laguna Beach
Fiscal Analysis Summary

CAPITAL COSTS
(land, large equipment, and structures)

DAMP Cost Elements		2000/01 FY Costs		Projected 2001/02 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$0	$0	$0	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$0	$0	$0
	Recycling	$0	$0	$0	$0
	Drainage Facility Maintenance	$0	$0	$0	$63,600
	Catch Basin Stenciling	$0	$0	$0	$0
	Street Sweeping	$0	$0	$0	$0
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$0	$0	$0	$0
	Pesticide & Fertilizer Management	$0	$0	$0	$3,000
PUBLIC INFORMATION (DAMP Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	$0	$0	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$0	$0	$0	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$0	$0	$0	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$0	$0	$0	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$165,000	$0	$850,000
TOTALS		$0	$165,000	$0	$916,600

Table 2.43

City of Laguna Beach
Fiscal Analysis Summary

OPERATIONS AND MAINTENANCE

DAMP Cost Elements		2000/01 FY Costs		Projected 2001/02 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$0	$0	$0	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$0	$0	$0
	Recycling	$0	$455,487	$0	$469,670
	Drainage Facility Maintenance	$0	$100,000	$0	$104,000
	Catch Basin Stenciling	$0	$0	$10,000	$0
	Street Sweeping	$0	$122,000	$96,000	$127,400
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$0	$0	$0	$0
	Pesticide & Fertilizer Management	$0	$56,000	$0	$57,500
PUBLIC INFORMATION (DAMP Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	$0	$0	$0	$62,000
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$0	$0	$0	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$0	$0	$0	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$0	$0	$0	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$0	$0	$0
TOTALS		$0	$733,487	$106,000	$820,570

Table 2.44

City of Laguna Beach
Fiscal Analysis Summary

FUNDING SOURCES

DAMP FUNDING SOURCES	FUNDING PERCENTAGES	
	FISCAL YEAR 2000/01	FISCAL YEAR 2001/02 (Projected)
GENERAL FUND	90%	90%
UTILITY TAX/CHARGES	0%	0%
SEPARATE UTILITY BILLING ITEM	0%	0%
GAS TAX	0%	0%
SPECIAL DISTRICT FUND	0%	0%
OTHERS (Specify)	10%	10%
User Fees for Recycling and Hazardous Waste Collection	0%	0%
Integrated Waste Management	0%	0%
Interest Earnings	0%	0%
Sanitation Fee	0%	0%
Benefit assessment	0%	0%
Fleet Maintenance Fund	0%	0%
Community Services District	0%	0%
Used Oil Grant	0%	0%
Water Fund	0%	0%
Sewer & Storm Drain Maintenance Fee	0%	0%
TOTALS (must add up to 100%)	100%	100%

Table 2.45

City of Laguna Hills
Fiscal Analysis Summary

CAPITAL COSTS
(land, large equipment, and structures)

DAMP Cost Elements		2000/01 FY Costs		Projected 2001/02 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$0	$0	$0	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$0	$0	$0
	Recycling	$0	$0	$0	$0
	Drainage Facility Maintenance	$0	$0	$0	$0
	Catch Basin Stenciling	$0	$0	$0	$0
	Street Sweeping	$0	$0	$0	$0
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$0	$0	$0	$0
	Pesticide & Fertilizer Management	$0	$0	$0	$0
PUBLIC INFORMATION (DAMP Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	$0	$0	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$0	$0	$0	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$0	$0	$0	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$0	$0	$0	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$0	$0	$0
TOTALS		$0	$0	$0	$0

Table 2.46

City of Laguna Hills
Fiscal Analysis Summary

OPERATIONS AND MAINTENANCE

DAMP Cost Elements		2000/01 FY Costs		Projected 2001/02 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$6,645	$81,187	$0	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$0	$0	$0
	Recycling	$0	$0	$0	$0
	Drainage Facility Maintenance	$24,745	$82,698	$0	$0
	Catch Basin Stenciling	$634	$0	$0	$0
	Street Sweeping	$0	$0	$0	$0
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$0	$0	$0	$0
	Pesticide & Fertilizer Management	$0	$47,425	$0	$0
PUBLIC INFORMATION (DAMP Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	$0	$0	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$0	$0	$0	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$0	$0	$0	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$0	$0	$0	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$0	$0	$0
TOTALS		$32,024	$211,310	$0	$0

Table 2.47

City of Laguna Hills
Fiscal Analysis Summary

FUNDING SOURCES

DAMP FUNDING SOURCES	FUNDING PERCENTAGES	
	FISCAL YEAR 2000/01	FISCAL YEAR 2001/02 (Projected)
GENERAL FUND	100%	0%
UTILITY TAX/CHARGES	0%	0%
SEPARATE UTILITY BILLING ITEM	0%	0%
GAS TAX	0%	0%
SPECIAL DISTRICT FUND	0%	0%
OTHERS (Specify)	0%	0%
User Fees for Recycling and Hazardous Waste Collection	0%	0%
Integrated Waste Management	0%	0%
Interest Earnings	0%	0%
Sanitation Fee	0%	0%
Benefit assessment	0%	0%
Fleet Maintenance Fund	0%	0%
Community Services District	0%	0%
Used Oil Grant	0%	0%
Water Fund	0%	0%
Sewer & Storm Drain Maintenance Fee	0%	0%
TOTALS (must add up to 100%)	100%	0%

Table 2.48

City of Laguna Niguel
Fiscal Analysis Summary

CAPITAL COSTS
(land, large equipment, and structures)

DAMP Cost Elements		2000/01 FY Costs		Projected 2001/02 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$0	$0	$0	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$0	$0	$0
	Recycling	$0	$0	$0	$0
	Drainage Facility Maintenance	$17,500	$15,000	$40,000	$25,000
	Catch Basin Stenciling	$0	$0	$0	$0
	Street Sweeping	$0	$0	$0	$0
	Environmental Performance	$94,000	$0	$100,000	$0
	Public Property & Street Chemical Spill Response	$0	$0	$0	$0
	Pesticide & Fertilizer Management	$0	$0	$0	$0
PUBLIC INFORMATION (DAMP Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	$0	$0	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$0	$0	$0	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$0	$0	$0	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$3,000	$0	$15,000	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$0	$0	$0
TOTALS		$114,500	$15,000	$155,000	$25,000

Table 2.49

City of Laguna Niguel
Fiscal Analysis Summary

OPERATIONS AND MAINTENANCE

DAMP Cost Elements		2000/01 FY Costs		Projected 2001/02 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$50,000	$2,000	$140,000	$2,000
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$7,800	$0	$7,800
	Recycling	$0	$0	$0	$0
	Drainage Facility Maintenance	$17,500	$0	$70,000	$0
	Catch Basin Stenciling	$2,000	$0	$4,000	$0
	Street Sweeping	$18,900	$62,755	$88,145	$62,755
	Environmental Performance	$30,000	$0	$104,000	$0
	Public Property & Street Chemical Spill Response	$0	$1,000	$0	$1,500
	Pesticide & Fertilizer Management	$0	$1,000	$0	$1,000
PUBLIC INFORMATION (DAMP Section 6.0)	Nonpoint Source Pollution Awareness	$12,000	$0	$9,000	$0
	Household Hazardous Waste Collection	$0	*	*	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$0	*	*	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$0	$0	$0	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$19,200	$0	$40,000	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$62,000	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$0	$0	$0
TOTALS		$149,600	$74,555	$517,145	$75,055

* Yes (no cost)

Table 2.50

City of Laguna Niguel
Fiscal Analysis Summary

FUNDING SOURCES

DAMP FUNDING SOURCES	FUNDING PERCENTAGES	
	FISCAL YEAR 2000/01	FISCAL YEAR 2001/02 (Projected)
GENERAL FUND	20%	77.55%
UTILITY TAX/CHARGES	0%	0%
SEPARATE UTILITY BILLING ITEM	0%	0%
GAS TAX	65%	0%
SPECIAL DISTRICT FUND	0%	0%
OTHERS (Specify)	0%	0%
User Fees for Recycling and Hazardous Waste Collection	0%	0%
Integrated Waste Management	0%	0%
Interest Earnings	0%	0%
Sanitation Fee	0%	0%
Benefit assessment	0%	0%
Fleet Maintenance Fund	0%	0%
Community Services District	15%	22.45%
Used Oil Grant	0%	0%
Water Fund	0%	0%
Sewer & Storm Drain Maintenance Fee	0%	0%
TOTALS (must add up to 100%)	100%	100%

Table 2.51

City of Laguna Woods
Fiscal Analysis Summary

CAPITAL COSTS
(land, large equipment, and structures)

DAMP Cost Elements		2000/01 FY Costs		Projected 2001/02 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$0	$0	$0	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$0	$0	$0
	Recycling	$0	$0	$0	$0
	Drainage Facility Maintenance	$0	$0	$0	$0
	Catch Basin Stenciling	$0	$0	$0	$0
	Street Sweeping	$0	$0	$0	$0
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$0	$0	$0	$0
	Pesticide & Fertilizer Management	$0	$0	$0	$0
PUBLIC INFORMATION (DAMP Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	$0	$0	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$0	$0	$0	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$0	$0	$0	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$0	$0	$0	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$0	$0	$0
TOTALS		$0	$0	$0	$0

Table 2.52

City of Laguna Woods
Fiscal Analysis Summary

OPERATIONS AND MAINTENANCE

DAMP Cost Elements		2000/01 FY Costs		Projected 2001/02 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$320	$2,120	$1,341	$7,106
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$1,277	$0	$0	$7,417
	Recycling	$0	$0	$0	$0
	Drainage Facility Maintenance	$4,886	$1,093	$1,661	$7,589
	Catch Basin Stenciling	$0	$0	$0	$0
	Street Sweeping	$3,414	$12,189	$3,414	$12,189
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$0	$0	$0	$0
	Pesticide & Fertilizer Management	$0	$0	$0	$0
PUBLIC INFORMATION (DAMP Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	$0	$0	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$0	$0	$0	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$0	$0	$0	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$6,879	$0	$0	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$0	$0	$0
TOTALS		$16,776	$15,402	$6,416	$34,301

Table 2.53

City of Laguna Woods
Fiscal Analysis Summary

FUNDING SOURCES

DAMP FUNDING SOURCES	FUNDING PERCENTAGES	
	FISCAL YEAR 2000/01	FISCAL YEAR 2001/02 (Projected)
GENERAL FUND	100%	87%
UTILITY TAX/CHARGES	0%	0%
SEPARATE UTILITY BILLING ITEM	0%	0%
GAS TAX	0%	0%
SPECIAL DISTRICT FUND	0%	0%
OTHERS (Specify)	0%	13%
User Fees for Recycling and Hazardous Waste Collection	0%	0%
Integrated Waste Management	0%	0%
Interest Earnings	0%	0%
Sanitation Fee	0%	0%
Benefit assessment	0%	0%
Fleet Maintenance Fund	0%	0%
Community Services District	0%	0%
Used Oil Grant	0%	0%
Water Fund	0%	0%
Sewer & Storm Drain Maintenance Fee	0%	0%
TOTALS (must add up to 100%)	100%	100%

Table 2.54

City of Lake Forest
Fiscal Analysis Summary

CAPITAL COSTS
(land, large equipment, and structures)

DAMP Cost Elements		2000/01 FY Costs		Projected 2001/02 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$0	$0	$0	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$0	$0	$0
	Recycling	$0	$0	$0	$0
	Drainage Facility Maintenance	$0	$0	$0	$0
	Catch Basin Stenciling	$0	$0	$0	$0
	Street Sweeping	$0	$0	$0	$0
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$0	$0	$0	$0
	Pesticide & Fertilizer Management	$0	$0	$0	$0
PUBLIC INFORMATION (DAMP Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	$0	$0	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$0	$0	$0	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$0	$0	$0	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$0	$0	$0	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$0	$0	$0
TOTALS		$0	$0	$0	$0

Table 2.55

City of Lake Forest
Fiscal Analysis Summary

OPERATIONS AND MAINTENANCE

DAMP Cost Elements		2000/01 FY Costs		Projected 2001/02 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$3,400	$14,000	$3,600	$15,000
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$8,000	$25,000	$10,000	$30,000
	Recycling	$60,000	$0	$65,000	$0
	Drainage Facility Maintenance	$10,000	$70,000	$10,000	$70,000
	Catch Basin Stenciling	$0	$0	$0	$0
	Street Sweeping	$60,000	$160,000	$75,000	$200,000
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$20,000	$0	$20,000	$0
	Pesticide & Fertilizer Management	$2,000	$10,000	$2,000	$12,000
PUBLIC INFORMATION (DAMP Section 6.0)	Nonpoint Source Pollution Awareness	$18,000	$0	$10,000	$0
	Household Hazardous Waste Collection	$20,000	$0	$22,000	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$0	$0	$0	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$5,000	$0	$5,000	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$0	$0	$0	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$0	$0	$0
TOTALS		$206,400	$279,000	$222,600	$327,000

Table 2.56

City of Lake Forest
Fiscal Analysis Summary

FUNDING SOURCES

DAMP FUNDING SOURCES	FUNDING PERCENTAGES	
	FISCAL YEAR 2000/01	FISCAL YEAR 2001/02 (Projected)
GENERAL FUND	10%	10%
UTILITY TAX/CHARGES	0%	0%
SEPARATE UTILITY BILLING ITEM	0%	0%
GAS TAX	90%	90%
SPECIAL DISTRICT FUND	0%	0%
OTHERS (Specify)	0%	0%
User Fees for Recycling and Hazardous Waste Collection	0%	0%
Integrated Waste Management	0%	0%
Interest Earnings	0%	0%
Sanitation Fee	0%	0%
Benefit assessment	0%	0%
Fleet Maintenance Fund	0%	0%
Community Services District	0%	0%
Used Oil Grant	0%	0%
Water Fund	0%	0%
Sewer & Storm Drain Maintenance Fee	0%	0%
TOTALS (must add up to 100%)	100%	100%

Table 2.57

City of Los Alamitos
Fiscal Analysis Summary

CAPITAL COSTS
(land, large equipment, and structures)

DAMP Cost Elements		2000/01 FY Costs		Projected 2001/02 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$0	$0	$0	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$0	$0	$0
	Recycling	$0	$0	$0	$0
	Drainage Facility Maintenance	$0	$0	$0	$0
	Catch Basin Stenciling	$0	$0	$0	$0
	Street Sweeping	$0	$0	$0	$0
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$0	$0	$0	$0
	Pesticide & Fertilizer Management	$0	$0	$0	$0
PUBLIC INFORMATION (DAMP Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	$0	$0	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$0	$0	$0	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$0	$0	$0	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$0	$0	$0	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$0	$0	$0
TOTALS		$0	$0	$0	$0

Table 2.58

City of Los Alamitos
Fiscal Analysis Summary

OPERATIONS AND MAINTENANCE

DAMP Cost Elements		2000/01 FY Costs		Projected 2001/02 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$0	$0	$0	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$0	$0	$0
	Recycling	$0	$0	$0	$0
	Drainage Facility Maintenance	$0	$5,000	$0	$5,000
	Catch Basin Stenciling	$0	$0	$0	$0
	Street Sweeping	$0	$51,000	$0	$51,800
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$0	$1,500	$0	$5,000
	Pesticide & Fertilizer Management	$0	$5,000	$0	$5,000
PUBLIC INFORMATION (DAMP Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	$0	$0	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$0	$0	$0	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$0	$0	$0	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$0	$0	$0	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$0	$0	$0
TOTALS		$0	$62,500	$0	$66,800

Table 2.59

City of Los Alamitos
Fiscal Analysis Summary

FUNDING SOURCES

DAMP FUNDING SOURCES	FUNDING PERCENTAGES	
	FISCAL YEAR 2000/01	FISCAL YEAR 2001/02 (Projected)
GENERAL FUND	100%	100%
UTILITY TAX/CHARGES	0%	0%
SEPARATE UTILITY BILLING ITEM	0%	0%
GAS TAX	0%	0%
SPECIAL DISTRICT FUND	0%	0%
OTHERS (Specify)	0%	0%
User Fees for Recycling and Hazardous Waste Collection	0%	0%
Integrated Waste Management	0%	0%
Interest Earnings	0%	0%
Sanitation Fee	0%	0%
Benefit assessment	0%	0%
Fleet Maintenance Fund	0%	0%
Community Services District	0%	0%
Used Oil Grant	0%	0%
Water Fund	0%	0%
Sewer & Storm Drain Maintenance Fee	0%	0%
TOTALS (must add up to 100%)	100%	100%

Table 2.60

City of Mission Viejo
Fiscal Analysis Summary

CAPITAL COSTS
(land, large equipment, and structures)

DAMP Cost Elements		2000/01 FY Costs		Projected 2001/02 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$0	$0	$0	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$0	$0	$0
	Recycling	$0	$0	$0	$0
	Drainage Facility Maintenance	$0	$0	$0	$0
	Catch Basin Stenciling	$0	$0	$0	$0
	Street Sweeping	$0	$0	$0	$0
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$0	$0	$0	$0
	Pesticide & Fertilizer Management	$0	$0	$0	$0
PUBLIC INFORMATION (DAMP Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	$0	$0	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$5,000	$0	$5,000	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$20,000	$0	$15,000	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$0	$0	$0	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$5,000	$0	$20,000	$0
TOTALS		$30,000	$0	$40,000	$0

Table 2.61

City of Mission Viejo
Fiscal Analysis Summary

OPERATIONS AND MAINTENANCE

DAMP Cost Elements		2000/01 FY Costs		Projected 2001/02 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$64,373	$0	$335,000	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$10,000	$20,000	$20,000	$20,000
	Recycling	$0	$0	$0	$0
	Drainage Facility Maintenance	$105,362	$316,088	$454,578	$454,578
	Catch Basin Stenciling	$0	$0	$50,000	$0
	Street Sweeping	$0	$297,970	$27,408	$297,970
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$0	$0	$0	$5,000
	Pesticide & Fertilizer Management	$0	$0	$0	$0
PUBLIC INFORMATION (DAMP Section 6.0)	Nonpoint Source Pollution Awareness	$0	$5,000	$10,000	$0
	Household Hazardous Waste Collection	$0	$70,000	$0	$70,000
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$10,000	$0	$10,000	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$10,000	$0	$10,000	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$0	$0	$0	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$10,000	$0	$10,000	$0
TOTALS		$209,735	$709,058	$926,986	$847,548

Table 2.62

City of Mission Viejo
Fiscal Analysis Summary

FUNDING SOURCES

DAMP FUNDING SOURCES	**FUNDING PERCENTAGES**	
	FISCAL YEAR 2000/01	FISCAL YEAR 2001/02 (Projected)
GENERAL FUND	90%	90%
UTILITY TAX/CHARGES	0%	0%
SEPARATE UTILITY BILLING ITEM	0%	0%
GAS TAX	10%	10%
SPECIAL DISTRICT FUND	0%	0%
OTHERS (Specify)	0%	0%
User Fees for Recycling and Hazardous Waste Collection	0%	0%
Integrated Waste Management	0%	0%
Interest Earnings	0%	0%
Sanitation Fee	0%	0%
Benefit assessment	0%	0%
Fleet Maintenance Fund	0%	0%
Community Services District	0%	0%
Used Oil Grant	0%	0%
Water Fund	0%	0%
Sewer & Storm Drain Maintenance Fee	0%	0%
TOTALS (must add up to 100%)	100%	100%

Table 2.63

City of Newport Beach
Fiscal Analysis Summary

CAPITAL COSTS
(land, large equipment, and structures)

DAMP Cost Elements		2000/01 FY Costs		Projected 2001/02 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$0	$0	$0	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$0	$0	$0
	Recycling	$0	$0	$0	$0
	Drainage Facility Maintenance	$0	$0	$0	$0
	Catch Basin Stenciling	$0	$0	$0	$0
	Street Sweeping	$0	$0	$0	$0
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$0	$0	$0	$0
	Pesticide & Fertilizer Management	$0	$0	$0	$0
PUBLIC INFORMATION (DAMP Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	$0	$0	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$0	$0	$0	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$0	$0	$0	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$0	$0	$0	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$0	$0	$0
TOTALS		$0	$0	$0	$0

Table 2.64

City of Newport Beach
Fiscal Analysis Summary

OPERATIONS AND MAINTENANCE

DAMP Cost Elements		2000/01 FY Costs		Projected 2001/02 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$0	$0	$0	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$0	$0	$0
	Recycling	$0	$0	$0	$0
	Drainage Facility Maintenance	$0	$0	$0	$0
	Catch Basin Stenciling	$0	$0	$0	$0
	Street Sweeping	$0	$0	$0	$0
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$0	$0	$0	$0
	Pesticide & Fertilizer Management	$0	$0	$0	$0
PUBLIC INFORMATION (DAMP Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	$0	$0	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$0	$0	$0	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$0	$0	$0	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$0	$0	$0	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$0	$0	$0
TOTALS		$0	$0	$0	$0

Table 2.65

City of Newport Beach
Fiscal Analysis Summary

FUNDING SOURCES

DAMP FUNDING SOURCES	FUNDING PERCENTAGES	
	FISCAL YEAR 2000/01	FISCAL YEAR 2001/02 (Projected)
GENERAL FUND	0%	0%
UTILITY TAX/CHARGES	0%	0%
SEPARATE UTILITY BILLING ITEM	0%	0%
GAS TAX	0%	0%
SPECIAL DISTRICT FUND	0%	0%
OTHERS (Specify)	0%	0%
User Fees for Recycling and Hazardous Waste Collection	0%	0%
Integrated Waste Management	0%	0%
Interest Earnings	0%	0%
Sanitation Fee	0%	0%
Benefit assessment	0%	0%
Fleet Maintenance Fund	0%	0%
Community Services District	0%	0%
Used Oil Grant	0%	0%
Water Fund	0%	0%
Sewer & Storm Drain Maintenance Fee	0%	0%
TOTALS (must add up to 100%)	0%	0%

Table 2.66

City of Orange
Fiscal Analysis Summary

CAPITAL COSTS
(land, large equipment, and structures)

DAMP Cost Elements		2000/01 FY Costs		Projected 2001/02 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$0	$0	$0	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$0	$0	$0
	Recycling	$25,000	$0	$25,000	$0
	Drainage Facility Maintenance	$0	$0	$0	$0
	Catch Basin Stenciling	$115 [1]	$0	$150 [1]	$0
	Street Sweeping	$0	$138,000	$0	$150,000
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$0	$34,500	$0	$25,000
	Pesticide & Fertilizer Management	$10,000	$22,000	$10,000	$22,000
PUBLIC INFORMATION (DAMP Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	$1,500 [2]	$0	$1,500 [2]	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$5,000 [3]	$0	$5,000 [3]	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$5,000 [3]	$0	$5,000 [3]	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$22,800 [4]	$0	$25,000 [4]	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$10,000 [5]	$0	$10,000 [5]	$0
TOTALS		$79,415	$194,500	$81,650	$197,000

1) Program complete. A few "reapplications" and new basins required.
2) Non Grant reimbursement costs for Used Oil Recycling.
3) Increased costs of inspections to ensure building plans meet NPDES requirements.
4) Increase due to increase in inspections.
5) Plaza Project

Table 2.67

City of Orange
Fiscal Analysis Summary

OPERATIONS AND MAINTENANCE

DAMP Cost Elements		2000/01 FY Costs		Projected 2001/02 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$35,000	$6,000	$35,000	$6,000
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$75,000	$0	$75,000
	Recycling	$0	$2,250,000	$0	$2,250,000
	Drainage Facility Maintenance	$0	$216,000	$0	$216,000
	Catch Basin Stenciling	$0	$250 [1]	$0	$250 [1]
	Street Sweeping	$0	$660,000	$0	$660,000
	Environmental Performance	$21,000 [2]	$114,800 [2]	$0	$115,000 [2]
	Public Property & Street Chemical Spill Response	$0	$64,500	$0	$65,000
	Pesticide & Fertilizer Management	$0	$15,500	$0	$15,000
PUBLIC INFORMATION (DAMP Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	$110,500	$2,500	$110,000	$3,000
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$0	$0	$0	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$20,000	$0	$0	$22,000
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$0	$0	$0	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$11,000	$0	$11,000
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$0	$0	$0
TOTALS		$186,500	$3,415,550	$145,000	$3,438,250

1) Program complete. Some new stencils applied.

2) Grant funds

Table 2.68

City of Orange
Fiscal Analysis Summary

FUNDING SOURCES

DAMP FUNDING SOURCES	FUNDING PERCENTAGES	
	FISCAL YEAR 2000/01	FISCAL YEAR 2001/02 (Projected)
GENERAL FUND	0%	0%
UTILITY TAX/CHARGES	0%	0%
SEPARATE UTILITY BILLING ITEM	0%	0%
GAS TAX	0%	0%
SPECIAL DISTRICT FUND	0%	0%
OTHERS (Specify)	0%	0%
User Fees for Recycling and Hazardous Waste Collection	0%	0%
Integrated Waste Management	15%	15%
Interest Earnings	0%	0%
Sanitation Fee	75%	75%
Benefit assessment	0%	0%
Fleet Maintenance Fund	10%	10%
Community Services District	0%	0%
Used Oil Grant	0%	0%
Water Fund	0%	0%
Sewer & Storm Drain Maintenance Fee	0%	0%
TOTALS (must add up to 100%)	100%	100%

Table 2.69

City of Placentia
Fiscal Analysis Summary

CAPITAL COSTS
(land, large equipment, and structures)

DAMP Cost Elements		2000/01 FY Costs		Projected 2001/02 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$2,575	$0	$3,000	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$1,339	$0	$1,400
	Recycling	*	$0	*	$0
	Drainage Facility Maintenance	$0	$6,695	$0	$7,500
	Catch Basin Stenciling	$0	$0	$0	$0
	Street Sweeping	$30,900	$30,900	$45,000	$10,500
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$0	$0	$0	$0
	Pesticide & Fertilizer Management	$0	$4,635	$0	$5,000
PUBLIC INFORMATION (DAMP Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	$0	$0	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$1,030	$0	$1,030	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$0	$0	$0	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$1,030	$0	$1,030	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$1,030	$0	$1,030	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$0	$0	$0
TOTALS		$36,565	$43,569	$51,090	$24,400

* Private Contractor

Table 2.70

City of Placentia
Fiscal Analysis Summary

OPERATIONS AND MAINTENANCE

DAMP Cost Elements		2000/01 FY Costs		Projected 2001/02 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$25,750	$0	$2,800	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$20,600	$0	$20,750	$0
	Recycling	*	$0	*	$0
	Drainage Facility Maintenance	$6,180	$6,180	$7,000	$7,000
	Catch Basin Stenciling	$0	$0	$0	$0
	Street Sweeping	$103,000	$0	$105,000	$0
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$0	$20,600	$0	$20,600
	Pesticide & Fertilizer Management	$0	$3,090	$0	$3,090
PUBLIC INFORMATION (DAMP Section 6.0)	Nonpoint Source Pollution Awareness	$1,545	$0	$1,545	$0
	Household Hazardous Waste Collection	$0	$7,210	$0	$7,210
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$1,545	$0	$1,545	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$6,180	$0	$7,000	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$8,240	$0	$8,240	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$10,300	$5,150	$10,300	$5,150
TOTALS		$183,340	$42,230	$164,180	$43,050

* Private

Table 2.71

City of Placentia
Fiscal Analysis Summary

FUNDING SOURCES

DAMP FUNDING SOURCES	FUNDING PERCENTAGES	
	FISCAL YEAR 2000/01	FISCAL YEAR 2001/02 (Projected)
GENERAL FUND	33%	33%
UTILITY TAX/CHARGES	34%	34%
SEPARATE UTILITY BILLING ITEM	0%	0%
GAS TAX	33%	33%
SPECIAL DISTRICT FUND	0%	0%
OTHERS (Specify)	0%	0%
User Fees for Recycling and Hazardous Waste Collection	0%	0%
Integrated Waste Management	0%	0%
Interest Earnings	0%	0%
Sanitation Fee	0%	0%
Benefit assessment	0%	0%
Fleet Maintenance Fund	0%	0%
Community Services District	0%	0%
Used Oil Grant	0%	0%
Water Fund	0%	0%
Sewer & Storm Drain Maintenance Fee	0%	0%
TOTALS (must add up to 100%)	100%	100%

Table 2.72

City of Rancho Santa Margarita
Fiscal Analysis Summary

CAPITAL COSTS
(land, large equipment, and structures)

DAMP Cost Elements		2000/01 FY Costs		Projected 2001/02 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$0	$0	$0	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$0	$0	$0
	Recycling	$0	$0	$0	$0
	Drainage Facility Maintenance	$11,103	$0	$0	$0
	Catch Basin Stenciling	$0	$0	$30,000	$0
	Street Sweeping	$2,051	$0	$0	$0
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$0	$0	$0	$0
	Pesticide & Fertilizer Management	$964	$0	$0	$0
PUBLIC INFORMATION (DAMP Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	$0	$0	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$0	$0	$0	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$0	$0	$0	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$0	$0	$0	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$0	$0	$0
TOTALS		$14,118	$0	$30,000	$0

Table 2.73

City of Rancho Santa Margarita
Fiscal Analysis Summary

OPERATIONS AND MAINTENANCE

DAMP Cost Elements		2000/01 FY Costs		Projected 2001/02 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$3,827	$21,463	$50,000	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$0	$0	$0
	Recycling	$0	$0	$10,400	$0
	Drainage Facility Maintenance	$8,420	$21,463	$140,680	$0
	Catch Basin Stenciling	$0	$0	$0	$0
	Street Sweeping	$0	$42,319	$70,000	$0
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$0	$0	$0	$0
	Pesticide & Fertilizer Management	$0	$9,732	$0	$0
PUBLIC INFORMATION (DAMP Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	$0	$0	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$0	$0	$0	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$0	$0	$0	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$0	$0	$0	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$0	$0	$0
TOTALS		$12,247	$94,977	$271,080	$0

Table 2.74

City of Rancho Santa Margarita
Fiscal Analysis Summary

FUNDING SOURCES

DAMP FUNDING SOURCES	FUNDING PERCENTAGES	
	FISCAL YEAR 2000/01	FISCAL YEAR 2001/02 (Projected)
GENERAL FUND	0%	100%
UTILITY TAX/CHARGES	0%	0%
SEPARATE UTILITY BILLING ITEM	0%	0%
GAS TAX	0%	0%
SPECIAL DISTRICT FUND	0%	0%
OTHERS (Specify)	*	0%
User Fees for Recycling and Hazardous Waste Collection	0%	0%
Integrated Waste Management	0%	0%
Interest Earnings	0%	0%
Sanitation Fee	0%	0%
Benefit assessment	0%	0%
Fleet Maintenance Fund	0%	0%
Community Services District	0%	0%
Used Oil Grant	0%	0%
Water Fund	0%	0%
Sewer & Storm Drain Maintenance Fee	0%	0%
TOTALS (must add up to 100%)	0%	100%

* All services provided and funded by the County of Orange per the Revenue Neutrality Agreement.

Table 2.75

City of San Clemente
Fiscal Analysis Summary

CAPITAL COSTS
(land, large equipment, and structures)

DAMP Cost Elements		2000/01 FY Costs		Projected 2001/02 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$0	$0	$0	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$0	$0	$0
	Recycling	$0	$0	$0	$0
	Drainage Facility Maintenance	$0	$0	$0	$0
	Catch Basin Stenciling	$0	$0	$12,000	$0
	Street Sweeping	$0	$0	$0	$0
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$0	$0	$0	$0
	Pesticide & Fertilizer Management	$0	$0	$0	$0
PUBLIC INFORMATION (DAMP Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	$0	$0	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$0	$0	$0	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$0	$0	$0	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$0	$0	$0	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$0	$0	$0
TOTALS		$0	$0	$12,000	$0

Table 2.76

City of San Clemente
Fiscal Analysis Summary

OPERATIONS AND MAINTENANCE

DAMP Cost Elements		2000/01 FY Costs		Projected 2001/02 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$242,900	$0	$311,530	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$78,549	$0	$81,440	$0
	Recycling	$49,080	$0	$48,960	$0
	Drainage Facility Maintenance	$122,217	$0	$130,682	$0
	Catch Basin Stenciling	$17,163	$0	$18,447	$0
	Street Sweeping	$123,330	$0	$139,800	$0
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$0	$0	$0	$0
	Pesticide & Fertilizer Management	$0	$0	$0	$0
PUBLIC INFORMATION (DAMP Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	$0	$0	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$0	$0	$0	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$0	$0	$0	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$51,489	$0	$55,341	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$0	$0	$0
TOTALS		$684,728	$0	$786,200	$0

Table 2.77

City of San Clemente
Fiscal Analysis Summary

FUNDING SOURCES

DAMP FUNDING SOURCES	FUNDING PERCENTAGES	
	FISCAL YEAR 2000/01	FISCAL YEAR 2001/02 (Projected)
GENERAL FUND	22%	26%
UTILITY TAX/CHARGES	0%	0%
SEPARATE UTILITY BILLING ITEM	76% [1]	71% [1]
GAS TAX	0%	0%
SPECIAL DISTRICT FUND	0%	0%
OTHERS (Specify)	0%	0%
User Fees for Recycling and Hazardous Waste Collection	0%	0%
Integrated Waste Management	0%	0%
Interest Earnings	2%	3%
Sanitation Fee	0%	0%
Benefit assessment	0%	0%
Fleet Maintenance Fund	0%	0%
Community Services District	0%	0%
Used Oil Grant	0%	0%
Water Fund	0%	0%
Sewer & Storm Drain Maintenance Fee	0%	0%
TOTALS (must add up to 100%)	100%	100%

1) Drainage fee

Table 2.78

City of San Juan Capistrano
Fiscal Analysis Summary

CAPITAL COSTS
(land, large equipment, and structures)

DAMP Cost Elements		2000/01 FY Costs		Projected 2001/02 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$0	$0	$0	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$0	$0	$0
	Recycling	$0	$0	$0	$0
	Drainage Facility Maintenance	$0	$0	$0	$0
	Catch Basin Stenciling	$0	$0	$0	$0
	Street Sweeping	$0	$0	$0	$0
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$0	$0	$0	$0
	Pesticide & Fertilizer Management	$0	$0	$0	$0
PUBLIC INFORMATION (DAMP Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	$0	$0	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$0	$0	$0	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$0	$0	$0	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$0	$0	$0	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$10,000	$0	$10,000	$0
TOTALS		$10,000	$0	$10,000	$0

Table 2.79

City of San Juan Capistrano
Fiscal Analysis Summary

OPERATIONS AND MAINTENANCE

DAMP Cost Elements		2000/01 FY Costs		Projected 2001/02 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$55,000	$0	$80,000	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$2,000	$16,000	$2,000	$16,000
	Recycling	*	*	*	*
	Drainage Facility Maintenance	$8,000	$18,500	$8,000	$18,500
	Catch Basin Stenciling	$2,000	$0	$1,000	$1,000
	Street Sweeping	$7,000	$69,000	$7,000	$71,000
	Environmental Performance	$105,000	$0	$180,000	$180,000
	Public Property & Street Chemical Spill Response	$500	$1,500	$500	$1,500
	Pesticide & Fertilizer Management	$0	$11,000	$0	$11,000
PUBLIC INFORMATION (DAMP Section 6.0)	Nonpoint Source Pollution Awareness	$100	$0	$100	$100
	Household Hazardous Waste Collection	$0	$0	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$2,000	$0	$3,000	$3,000
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$2,000	$0	$3,000	$3,000
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$15,000	$0	$0	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$2,000	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$700	$0	$700	$700
TOTALS		$199,300	$116,000	$287,300	$305,800

* Contracted

Table 2.80

City of San Juan Capistrano
Fiscal Analysis Summary

FUNDING SOURCES

DAMP FUNDING SOURCES	FUNDING PERCENTAGES	
	FISCAL YEAR 2000/01	FISCAL YEAR 2001/02 (Projected)
GENERAL FUND	94%	96%
UTILITY TAX/CHARGES	3%	2%
SEPARATE UTILITY BILLING ITEM	0%	0%
GAS TAX	3%	2%
SPECIAL DISTRICT FUND	0%	0%
OTHERS (Specify)	0%	0%
User Fees for Recycling and Hazardous Waste Collection	0%	0%
Integrated Waste Management	0%	0%
Interest Earnings	0%	0%
Sanitation Fee	0%	0%
Benefit assessment	0%	0%
Fleet Maintenance Fund	0%	0%
Community Services District	0%	0%
Used Oil Grant	0%	0%
Water Fund	0%	0%
Sewer & Storm Drain Maintenance Fee	0%	0%
TOTALS (must add up to 100%)	100%	100%

Table 2.81

City of Santa Ana
Fiscal Analysis Summary

CAPITAL COSTS
(land, large equipment, and structures)

DAMP Cost Elements		2000/01 FY Costs		Projected 2001/02 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$0	$0	$0	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$0	$0	$0
	Recycling	$0	$0	$0	$0
	Drainage Facility Maintenance	$0	$0	$0	$0
	Catch Basin Stenciling	$0	$0	$0	$0
	Street Sweeping	$0	$135,000	$0	$0
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$0	$0	$0	$0
	Pesticide & Fertilizer Management	$0	$0	$0	$0
PUBLIC INFORMATION (DAMP Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	$0	$0	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$0	$0	$0	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$0	$0	$0	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$0	$0	$0	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$0	$0	$0
TOTALS		$0	$135,000	$0	$0

Table 2.82

City of Santa Ana
Fiscal Analysis Summary

OPERATIONS AND MAINTENANCE

DAMP Cost Elements		2000/01 FY Costs		Projected 2001/02 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$45,000	$0	$150,000	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0 [1]	$0 [1]	$0 [1]	$0 [1]
	Recycling	$0 [1]	$0 [1]	$0 [1]	$0 [1]
	Drainage Facility Maintenance	$0	$44,470	$0	$75,000
	Catch Basin Stenciling	$4,492	$0	$5,000	$0
	Street Sweeping	$0	$3,579,000	$0	$3,630,000
	Environmental Performance	$13,312	$39,937	$13,312	$39,937
	Public Property & Street Chemical Spill Response	$0	$1,712,475	$0	$1,795,115
	Pesticide & Fertilizer Management	$0	$283,000	$0	$302,000
PUBLIC INFORMATION (DAMP Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	$0 [1]	$0 [1]	$0 [1]	$0 [1]
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$11,500	$0	$11,800	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$6,800	$0	$7,000	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$0 [2]	$0 [2]	$0 [2]	$0 [2]
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$0	$0	$0
TOTALS		$81,104	$5,658,882	$187,112	$5,842,052

1) Supported by user fees

2) Routine housekeeping

Table 2.83

City of Santa Ana
Fiscal Analysis Summary

FUNDING SOURCES

DAMP FUNDING SOURCES	FUNDING PERCENTAGES	
	FISCAL YEAR 2000/01	FISCAL YEAR 2001/02 (Projected)
GENERAL FUND	10%	10%
UTILITY TAX/CHARGES	0%	0%
SEPARATE UTILITY BILLING ITEM	0%	0%
GAS TAX	0%	0%
SPECIAL DISTRICT FUND	0%	0%
OTHERS (Specify)	5%	5%
User Fees for Recycling and Hazardous Waste Collection	0%	0%
Integrated Waste Management	0%	0%
Interest Earnings	0%	0%
Sanitation Fee	85%	85%
Benefit assessment	0%	0%
Fleet Maintenance Fund	0%	0%
Community Services District	0%	0%
Used Oil Grant	0%	0%
Water Fund	0%	0%
Sewer & Storm Drain Maintenance Fee	0%	0%
TOTALS (must add up to 100%)	100%	100%

Table 2.84

City of Seal Beach
Fiscal Analysis Summary

CAPITAL COSTS
(land, large equipment, and structures)

DAMP Cost Elements		2000/01 FY Costs		Projected 2001/02 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$0	$0	$0	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$7,000	$0	$7,000
	Recycling	$0	$166,000	$0	$167,000
	Drainage Facility Maintenance	$0	$50,000	$0	$52,000
	Catch Basin Stenciling	$0	$3,940	$0	$3,940
	Street Sweeping	$0	$87,098	$0	$87,098
	Environmental Performance	$3,000	$1,200	$3,000	$1,200
	Public Property & Street Chemical Spill Response	$500	$0	$500	$0
	Pesticide & Fertilizer Management	$0	$2,000	$0	$2,000
PUBLIC INFORMATION (DAMP Section 6.0)	Nonpoint Source Pollution Awareness	$500	$0	$500	$0
	Household Hazardous Waste Collection	$1,400	$0	$1,400	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$1,000	$0	$1,000	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$0	$0	$0	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$10,000	$0	$10,000	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$1,000	$0	$1,000	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$500	$0	$500	$0
TOTALS		$17,900	$317,238	$17,900	$320,238

Table 2.85

City of Seal Beach
Fiscal Analysis Summary

OPERATIONS AND MAINTENANCE

DAMP Cost Elements		2000/01 FY Costs		Projected 2001/02 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$0	$0	$0	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$0	$0	$0
	Recycling	$0	$0	$0	$0
	Drainage Facility Maintenance	$0	$0	$0	$0
	Catch Basin Stenciling	$0	$1,200	$0	$1,200
	Street Sweeping	$0	$0	$0	$0
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$0	$0	$0	$0
	Pesticide & Fertilizer Management	$0	$0	$0	$0
PUBLIC INFORMATION (DAMP Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	$0	$0	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$0	$0	$0	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$0	$0	$0	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$0	$0	$0	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$0	$0	$0
TOTALS		$0	$1,200	$0	$1,200

Table 2.86

City of Seal Beach
Fiscal Analysis Summary

FUNDING SOURCES

DAMP FUNDING SOURCES	FUNDING PERCENTAGES	
	FISCAL YEAR 2000/01	FISCAL YEAR 2001/02 (Projected)
GENERAL FUND	100%	100%
UTILITY TAX/CHARGES	0%	0%
SEPARATE UTILITY BILLING ITEM	0%	0%
GAS TAX	0%	0%
SPECIAL DISTRICT FUND	0%	0%
OTHERS (Specify)	0%	0%
User Fees for Recycling and Hazardous Waste Collection	0%	0%
Integrated Waste Management	0%	0%
Interest Earnings	0%	0%
Sanitation Fee	0%	0%
Benefit assessment	0%	0%
Fleet Maintenance Fund	0%	0%
Community Services District	0%	0%
Used Oil Grant	0%	0%
Water Fund	0%	0%
Sewer & Storm Drain Maintenance Fee	0%	0%
TOTALS (must add up to 100%)	100%	100%

Table 2.87

City of Stanton
Fiscal Analysis Summary

CAPITAL COSTS
(land, large equipment, and structures)

DAMP Cost Elements		2000/01 FY Costs		Projected 2001/02 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$0	$0	$0	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$0	$0	$0
	Recycling	$0	$0	$0	$0
	Drainage Facility Maintenance	$0	$0	$0	$0
	Catch Basin Stenciling	$0	$0	$0	$0
	Street Sweeping	$0	$0	$0	$0
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$0	$0	$0	$0
	Pesticide & Fertilizer Management	$0	$0	$0	$0
PUBLIC INFORMATION (DAMP Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	$0	$0	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$0	$0	$0	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$0	$0	$0	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$0	$0	$0	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$0	$0	$0
TOTALS		$0	$0	$0	$0

Table 2.88

City of Stanton
Fiscal Analysis Summary

OPERATIONS AND MAINTENANCE

DAMP Cost Elements		2000/01 FY Costs		Projected 2001/02 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$0	$0	$0	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$0	$0	$0
	Recycling	$0 [1]	$0	$0 [1]	$0
	Drainage Facility Maintenance	$2,700	$2,700	$2,700	$2,700
	Catch Basin Stenciling	$1,000	$0	$1,000	$0
	Street Sweeping	$93,000	$93,000	$93,000	$93,000
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$11,200 [2]	$0	$1,000	$0
	Pesticide & Fertilizer Management	$0 [3]	$0	$0 [3]	$0
PUBLIC INFORMATION (DAMP Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	$0	$0	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$0	$0	$0	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$500	$0	$500	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$0	$0	$0	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$500	$0	$500	$0
TOTALS		$108,900	$95,700	$98,700	$95,700

1) Contracted to CR & R

2) Private Property Owner reimbursed $10,000 to the City of Stanton for clean up of used motor oil spill at 10471 Magnolia Avenue.

3) Contracted out.

Table 2.89

City of Stanton
Fiscal Analysis Summary

FUNDING SOURCES

DAMP FUNDING SOURCES	**FUNDING PERCENTAGES**	
	FISCAL YEAR 2000/2001	FISCAL YEAR 2001/02 (Projected)
GENERAL FUND	100%	100%
UTILITY TAX/CHARGES	0%	0%
SEPARATE UTILITY BILLING ITEM	0%	0%
GAS TAX	0%	0%
SPECIAL DISTRICT FUND	0%	0%
OTHERS (Specify)	0%	0%
User Fees for Recycling and Hazardous Waste Collection	0%	0%
Integrated Waste Management	0%	0%
Interest Earnings	0%	0%
Sanitation Fee	0%	0%
Benefit assessment	0%	0%
Fleet Maintenance Fund	0%	0%
Community Services District	0%	0%
Used Oil Grant	0%	0%
Water Fund	0%	0%
Sewer & Storm Drain Maintenance Fee	0%	0%
TOTALS (must add up to 100%)	100%	100%

Table 2.90

City of Tustin
Fiscal Analysis Summary

CAPITAL COSTS
(land, large equipment, and structures)

DAMP Cost Elements		2000/01 FY Costs		Projected 2001/02 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$0	$0	$0	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$22,700	$0	$0	$0
	Recycling	$0	$0	$0	$0
	Drainage Facility Maintenance	$0	$0	$43,000	$0
	Catch Basin Stenciling	$0	$0	$0	$0
	Street Sweeping	$0	$0	$185,000	$0
	Environmental Performance	$331,500	$0	$0	$0
	Public Property & Street Chemical Spill Response	$0	$0	$0	$0
	Pesticide & Fertilizer Management	$0	$0	$0	$0
PUBLIC INFORMATION (DAMP Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	$0	$0	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$0	$0	$0	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$0	$0	$0	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$0	$0	$0	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$0	$0	$0
TOTALS		$354,200	$0	$228,000	$0

Table 2.91

City of Tustin
Fiscal Analysis Summary

OPERATIONS AND MAINTENANCE

DAMP Cost Elements		2000/2001 FY Costs		Projected 2001/02 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$34,000 [1]	$0	$35,000 [1]	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$70,000	$0	$72,000
	Recycling	$0	$0	$0	$0
	Drainage Facility Maintenance	$0	$56,000	$0	$58,000
	Catch Basin Stenciling	$6,000	$0	$6,200	$0
	Street Sweeping	$0	$235,000 [2]	$0	$242,000 [2]
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$0	$15,000 [4]	$0	$15,500 [4]
	Pesticide & Fertilizer Management	$0	$78,000	$0	$80,000
PUBLIC INFORMATION (DAMP Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	$0	$34,000 [3]	$0	$35,000 [3]
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$0	$0	$0	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$0	$0	$0	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$0	$0	$0	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$0	$0	$0
TOTALS		$40,000	$488,000	$41,200	$502,500

1) Includes costs for staff training and consultant services

2) Estimate includes driver labor costs and equipment supplies. Estimate does not include equipment maintenance or fuel costs.

3) Estimate includes $21,000 in funding from a State of California used oil recycling block grant. In previous reporting years, the City did not include the block grant in this item. The Funding Source table also reflects the inclusion of the used oil block grant in this reporting year.

4) Includes Hazardous Materials Management.

Table 2.92

City of Tustin
Fiscal Analysis Summary

FUNDING SOURCES

DAMP FUNDING SOURCES	FUNDING PERCENTAGES	
	FISCAL YEAR 2000/01	FISCAL YEAR 2001/02 (Projected)
GENERAL FUND	100%	100%
UTILITY TAX/CHARGES	0%	0%
SEPARATE UTILITY BILLING ITEM	0%	0%
GAS TAX	0%	0%
SPECIAL DISTRICT FUND	0%	0%
OTHERS (Specify)	0%	0%
User Fees for Recycling and Hazardous Waste Collection	0%	0%
Integrated Waste Management	0%	0%
Interest Earnings	0%	0%
Sanitation Fee	0%	0%
Benefit assessment	0%	0%
Fleet Maintenance Fund	0%	0%
Community Services District	0%	0%
Used Oil Grant	0%	0%
Water Fund	0%	0%
Sewer & Storm Drain Maintenance Fee	0%	0%
TOTALS (must add up to 100%)	100%	100%

Table 2.93

City of Villa Park
Fiscal Analysis Summary

CAPITAL COSTS
(land, large equipment, and structures)

DAMP Cost Elements		2000/01 FY Costs		Projected 2001/02 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$0	$0	$0	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$0	$0	$0
	Recycling	$0	$0	$0	$0
	Drainage Facility Maintenance	$0	$0	$0	$0
	Catch Basin Stenciling	$0	$0	$0	$0
	Street Sweeping	$0	$0	$0	$0
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$0	$0	$0	$0
	Pesticide & Fertilizer Management	$0	$0	$0	$0
PUBLIC INFORMATION (DAMP Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	$0	$0	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$0	$0	$0	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$0	$0	$0	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$0	$0	$0	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$0	$0	$0
TOTALS		$0	$0	$0	$0

Table 2.94

City of Villa Park
Fiscal Analysis Summary

OPERATIONS AND MAINTENANCE

DAMP Cost Elements		2000/01 FY Costs		Projected 2001/02 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$0	$0	$0	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$0	$0	$0
	Recycling	$0	$0	$0	$0
	Drainage Facility Maintenance	$0	$0	$0	$0
	Catch Basin Stenciling	$0	$0	$0	$0
	Street Sweeping	$0	$0	$0	$0
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$0	$0	$0	$0
	Pesticide & Fertilizer Management	$0	$0	$0	$0
PUBLIC INFORMATION (DAMP Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	$0	$0	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$0	$0	$0	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$0	$0	$0	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$0	$0	$0	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$0	$0	$0
TOTALS		$0	$0	$0	$0

Table 2.95

City of Villa Park
Fiscal Analysis Summary

FUNDING SOURCES

DAMP FUNDING SOURCES	FUNDING PERCENTAGES	
	FISCAL YEAR 2000/01	FISCAL YEAR 2001/02 (Projected)
GENERAL FUND	0%	0%
UTILITY TAX/CHARGES	0%	0%
SEPARATE UTILITY BILLING ITEM	0%	0%
GAS TAX	0%	0%
SPECIAL DISTRICT FUND	0%	0%
OTHERS (Specify)	0%	0%
User Fees for Recycling and Hazardous Waste Collection	0%	0%
Integrated Waste Management	0%	0%
Interest Earnings	0%	0%
Sanitation Fee	0%	0%
Benefit assessment	0%	0%
Fleet Maintenance Fund	0%	0%
Community Services District	0%	0%
Used Oil Grant	0%	0%
Water Fund	0%	0%
Sewer & Storm Drain Maintenance Fee	0%	0%
TOTALS (must add up to 100%)	0%	0%

Table 2.96

City of Westminster
Fiscal Analysis Summary

CAPITAL COSTS
(land, large equipment, and structures)

DAMP Cost Elements		2000/01 FY Costs		Projected 2001/02 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$0	$0	$0	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$0	$0	$0
	Recycling	$0	$0	$0	$0
	Drainage Facility Maintenance	$0	$0	$0	$0
	Catch Basin Stenciling	$0	$0	$0	$0
	Street Sweeping	$0	$0	$0	$0
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$0	$0	$0	$0
	Pesticide & Fertilizer Management	$0	$0	$0	$0
PUBLIC INFORMATION (DAMP Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	$0	$0	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$0	$0	$0	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$0	$0	$0	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$0	$0	$0	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$0	$0	$0
TOTALS		$0	$0	$0	$0

Table 2.97

City of Westminster
Fiscal Analysis Summary

OPERATIONS AND MAINTENANCE

DAMP Cost Elements		2000/01 FY Costs		Projected 2001/02 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$31,314	$0	$50,000	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$0	$0	$0
	Recycling	$0	$0	$0	$0
	Drainage Facility Maintenance	$0	$5,400	$0	$5,500
	Catch Basin Stenciling	$7,000	$0	$7,000	$0
	Street Sweeping	$0	$245,000	$0	$250,000
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$10,748	$0	$13,000	$0
	Pesticide & Fertilizer Management	$0	$79,000	$0	$80,000
PUBLIC INFORMATION (DAMP Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	$0	$0	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$5,000	$0	$10,000	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$10,000	$0	$16,000	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$0	$0	$0	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$15,000	$0	$25,000	$0
TOTALS		$79,062	$329,400	$121,000	$335,500

Table 2.98

City of Westminster
Fiscal Analysis Summary

FUNDING SOURCES

DAMP FUNDING SOURCES	FUNDING PERCENTAGES	
	FISCAL YEAR 2000/01	FISCAL YEAR 2001/02 (Projected)
GENERAL FUND	100%	100%
UTILITY TAX/CHARGES	0%	0%
SEPARATE UTILITY BILLING ITEM	0%	0%
GAS TAX	0%	0%
SPECIAL DISTRICT FUND	0%	0%
OTHERS (Specify)	0%	0%
User Fees for Recycling and Hazardous Waste Collection	0%	0%
Integrated Waste Management	0%	0%
Interest Earnings	0%	0%
Sanitation Fee	0%	0%
Benefit assessment	0%	0%
Fleet Maintenance Fund	0%	0%
Community Services District	0%	0%
Used Oil Grant	0%	0%
Water Fund	0%	0%
Sewer & Storm Drain Maintenance Fee	0%	0%
TOTALS (must add up to 100%)	100%	100%

Table 2.99

City of Yorba Linda
Fiscal Analysis Summary

CAPITAL COSTS
(land, large equipment, and structures)

DAMP Cost Elements		2000/01 FY Costs		Projected 2001/02 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$0	$0	$0	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$0	$0	$0
	Recycling	$0	$0	$0	$0
	Drainage Facility Maintenance	$0	$0	$0	$0
	Catch Basin Stenciling	$0	$0	$0	$0
	Street Sweeping	$0	$0	$0	$0
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$0	$0	$0	$0
	Pesticide & Fertilizer Management	$0	$0	$0	$0
PUBLIC INFORMATION (DAMP Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	$0	$0	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$0	$0	$0	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$0	$0	$3,000	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$0	$0	$0	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$0	$1,000	$0
TOTALS		$0	$0	$4,000	$0

Table 2.100

City of Yorba Linda
Fiscal Analysis Summary

OPERATIONS AND MAINTENANCE

DAMP Cost Elements		2000/01 FY Costs		Projected 2001/02 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$0	$0	$0	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$12,000	$0	$13,000	$0
	Recycling	$10,000	$0	$11,000	$0
	Drainage Facility Maintenance	$25,000	$0	$27,000	$0
	Catch Basin Stenciling	$5,000	$0	$5,000	$0
	Street Sweeping	$97,600	$55,000	$97,600	$55,000
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$0	$0	$0	$0
	Pesticide & Fertilizer Management	$5,000	$5,000	$5,000	$5,000
PUBLIC INFORMATION (DAMP Section 6.0)	Nonpoint Source Pollution Awareness	$2,000	$0	$2,000	$0
	Household Hazardous Waste Collection	$2,000	$0	$2,000	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$3,500	$1,000	$4,500	$1,000
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$2,500	$0	$5,000	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$3,000	$0	$3,000	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$2,000	$0	$2,000	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$8,000	$0	$8,000	$0
TOTALS		$177,600	$61,000	$185,100	$61,000

Table 2.101

City of Yorba Linda
Fiscal Analysis Summary

FUNDING SOURCES

DAMP FUNDING SOURCES	**FUNDING PERCENTAGES**	
	FISCAL YEAR 2000/01	FISCAL YEAR 2001-02 (Projected)
GENERAL FUND	75%	75%
UTILITY TAX/CHARGES	0%	0%
SEPARATE UTILITY BILLING ITEM	0%	0%
GAS TAX	0%	0%
SPECIAL DISTRICT FUND	0%	0%
OTHERS (Specify)	0%	0%
User Fees for Recycling and Hazardous Waste Collection	0%	0%
Integrated Waste Management	0%	0%
Interest Earnings	0%	0%
Sanitation Fee	0%	0%
Benefit assessment	2%	2%
Fleet Maintenance Fund	0%	0%
Community Services District	0%	0%
Used Oil Grant	0%	0%
Water Fund	0%	0%
Sewer & Storm Drain Maintenance Fee	23%	23%
TOTALS (must add up to 100%)	100%	100%

Table 2.102

County of Orange/OCFCD
Fiscal Analysis Summary

CAPITAL COSTS
(land, large equipment, and structures)

DAMP Cost Elements		2000/01 FY Costs		Projected 2001/02 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$0	$0	$0	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$0	$0	$0
	Recycling	$0	$0	$0	$0
	Drainage Facility Maintenance	$0	$0	$0	$0
	Catch Basin Stenciling	$0	$0	$0	$0
	Street Sweeping	$0	$0	$0	$0
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$0	$0	$0	$0
	Pesticide & Fertilizer Management	$0	$0	$0	$0
PUBLIC INFORMATION (DAMP Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	$0	$0	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$0	$0	$0	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$0	$0	$0	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$0	$0	$0	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$0	$1,950,000	$0
TOTALS		$0	$0	$1,950,000	$0

Table 2.103

County of Orange/OCFCD
Fiscal Analysis Summary

OPERATIONS AND MAINTENANCE

DAMP Cost Elements		2000/01 FY Costs		Projected 2001/02 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$338,237	$339,437	$349,163	$329,254
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$947,750	$0	$1,353,928
	Recycling	$0	$0	$0	$0
	Drainage Facility Maintenance	$160,422	$1,484,284	$349,797	$1,598,574
	Catch Basin Stenciling	$15,224	$0	$11,987	$0
	Street Sweeping	$148,968	$41,542	$217,980	$61,053
	Environmental Performance	N/A	N/A	N/A	N/A
	Public Property & Street Chemical Spill Response	$143,520	$143,520	$143,520	$143,520
	Pesticide & Fertilizer Management	$0	$1,280,221	$125,000	$1,378,798
PUBLIC INFORMATION (DAMP Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	$0	$0	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$1,196,760	$0	$1,196,760	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$975,000	$0	$975,000	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$180,080	$0	$193,946	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$105,310	$0	$113,419	$0
WATER QUALITY MONITORING		$362,196	$0	$120,000	$0
TOTALS		$3,625,717	$4,236,754	$3,796,572	$4,865,127

Table 2.104

County of Orange/OCFCD
Fiscal Analysis Summary

FUNDING SOURCES

DAMP FUNDING SOURCES	FUNDING PERCENTAGES	
	FISCAL YEAR 2000/01	FISCAL YEAR 2001/02 (Projected)
GENERAL FUND	0%	0%
UTILITY TAX/CHARGES	0%	0%
SEPARATE UTILITY BILLING ITEM	0%	0%
GAS TAX	17%	17.7%
SPECIAL DISTRICT FUND	83%	82.3%
OTHERS (Specify)	0%	0%
User Fees for Recycling and Hazardous Waste Collection	0%	0%
Integrated Waste Management	0%	0%
Interest Earnings	0%	0%
Sanitation Fee	0%	0%
Benefit assessment	0%	0%
Fleet Maintenance Fund	0%	0%
Community Services District	0%	0%
Used Oil Grant	0%	0%
Water Fund	0%	0%
Sewer & Storm Drain Maintenance Fee	0%	0%
TOTALS (must add up to 100%)	100%	100%

Table 2.105

Grand Totals
Fiscal Analysis Summary

CAPITAL COSTS
(land, large equipment, and structures)

DAMP Cost Elements		2000/01 FY Costs		Projected 2001/02 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$2,575	$0	$3,000	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$22,700	$8,339	$0	$8,400
	Recycling	$25,000	$196,075	$25,000	$227,150
	Drainage Facility Maintenance	$45,650	$289,987	$3,418,600	$1,528,100
	Catch Basin Stenciling	$115	$3,940	$42,150	$4,440
	Street Sweeping	$32,951	$507,998	$230,000	$555,298
	Environmental Performance	$459,773	$1,200	$147,400	$1,200
	Public Property & Street Chemical Spill Response	$500	$34,500	$500	$25,000
	Pesticide & Fertilizer Management	$10,964	$30,135	$40,000	$33,500
PUBLIC INFORMATION (DAMP Section 6.0)	Nonpoint Source Pollution Awareness	$500	$0	$500	$0
	Household Hazardous Waste Collection	$2,900	$0	$2,900	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$52,030	$6,000	$52,030	$6,000
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$25,000	$20,000	$23,000	$20,000
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$36,830	$0	$346,030	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$2,030	$0	$177,030	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$43,000	$365,000	$2,141,500	$1,050,000
TOTALS		$762,518	$1,463,174	$6,649,640	$3,459,088

Table 2.106

Grand Totals
Fiscal Analysis Summary

OPERATIONS AND MAINTENANCE

DAMP Cost Elements		2000/01 FY Costs		Projected 2001/02 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$1,114,041	$1,570,603	$1,746,938	$1,467,679
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$138,015	$2,083,886	$159,156	$2,623,187
	Recycling	$119,080	$19,753,320	$135,360	$20,114,128
	Drainage Facility Maintenance	$622,577	$5,262,398	$1,486,018	$5,875,266
	Catch Basin Stenciling	$76,763	$10,984	$131,909	$27,494
	Street Sweeping	$1,003,328	$13,176,048	$1,510,574	$13,665,195
	Environmental Performance	$191,065	$154,737	$319,312	$335,737
	Public Property & Street Chemical Spill Response	$225,968	$3,474,022	$218,020	$3,560,654
	Pesticide & Fertilizer Management	$368,218	$2,010,498	$546,291	$2,083,220
PUBLIC INFORMATION (DAMP Section 6.0)	Nonpoint Source Pollution Awareness	$129,031	$5,000	$155,496	$100
	Household Hazardous Waste Collection	$171,844	$673,675	$171,000	$742,916
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$1,266,665	$46,512	$1,273,432	$32,437
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$1,065,521	$55,791	$1,092,913	$63,716
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$396,875	$0	$801,250	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$141,510	$11,000	$253,581	$11,000
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$486,696	$5,150	$434,500	$5,850
TOTALS		$7,517,197	$48,293,624	$10,435,750	$50,608,579

Table 2.107

Grand Totals
Fiscal Analysis Summary

FUNDING SOURCES

DAMP FUNDING SOURCES	FUNDING PERCENTAGES	
	FISCAL YEAR 2000/01	FISCAL YEAR 2001/02 (Projected)
GENERAL FUND	67%	69%
UTILITY TAX/CHARGES	2%	2%
SEPARATE UTILITY BILLING ITEM	3%	3%
GAS TAX	8%	6%
SPECIAL DISTRICT FUND	5%	5%
OTHERS (Specify)	4%	4%
User Fees for Recycling and Hazardous Waste Collection	0%	0%
Integrated Waste Management	0%	0%
Interest Earnings	0%	0%
Sanitation Fee	5%	5%
Benefit assessment	0%	0%
Fleet Maintenance Fund	0%	0%
Community Services District	0%	1%
Used Oil Grant	0%	0%
Water Fund	1%	1%
Sewer & Storm Drain Maintenance Fee	4%	4%
TOTALS (must add up to 100%)	100%	100%

Figure 2.1
General Permittee Meeting Attendance

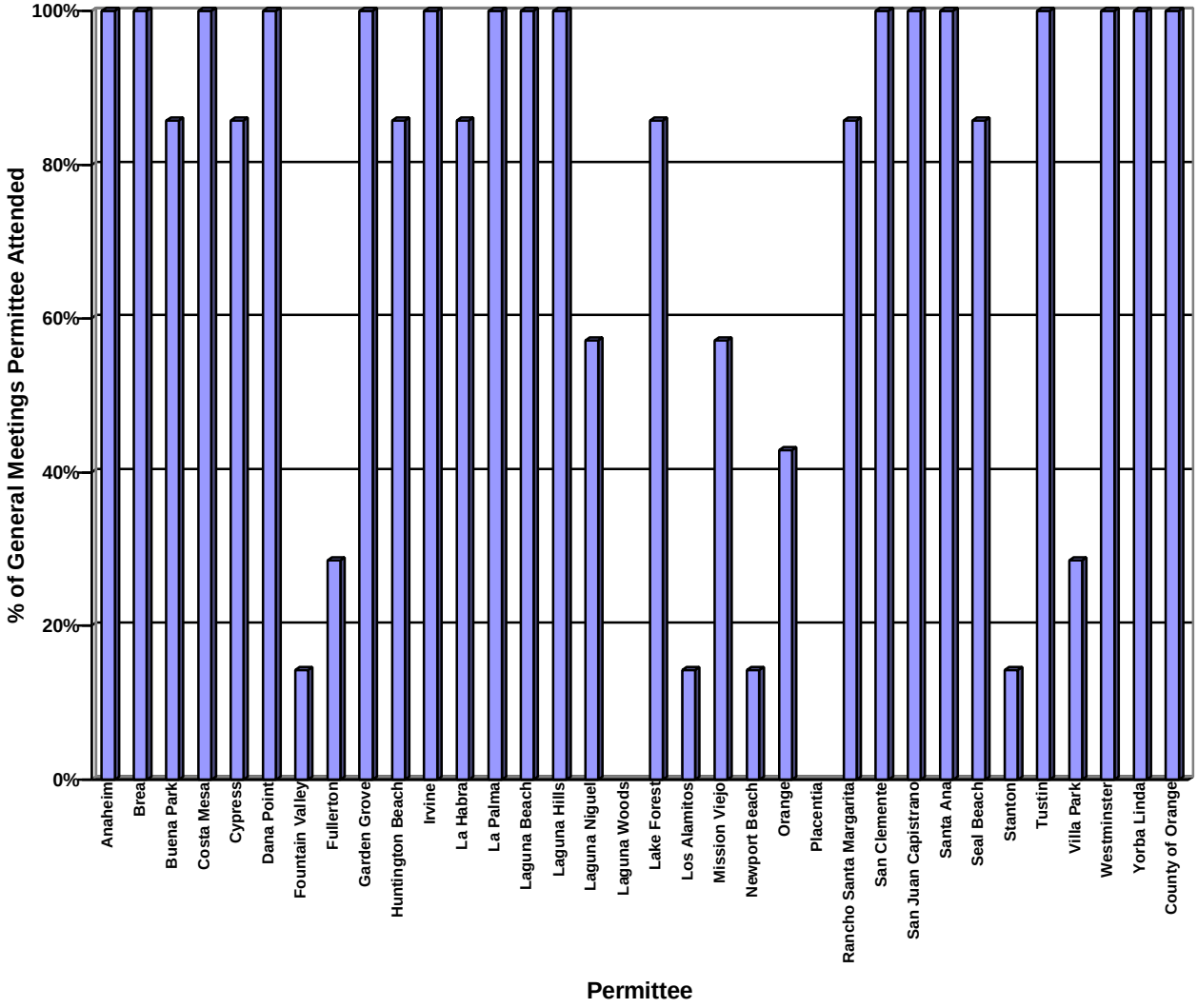

Figure 2.2
Orange County Stormwater Program Management Structure

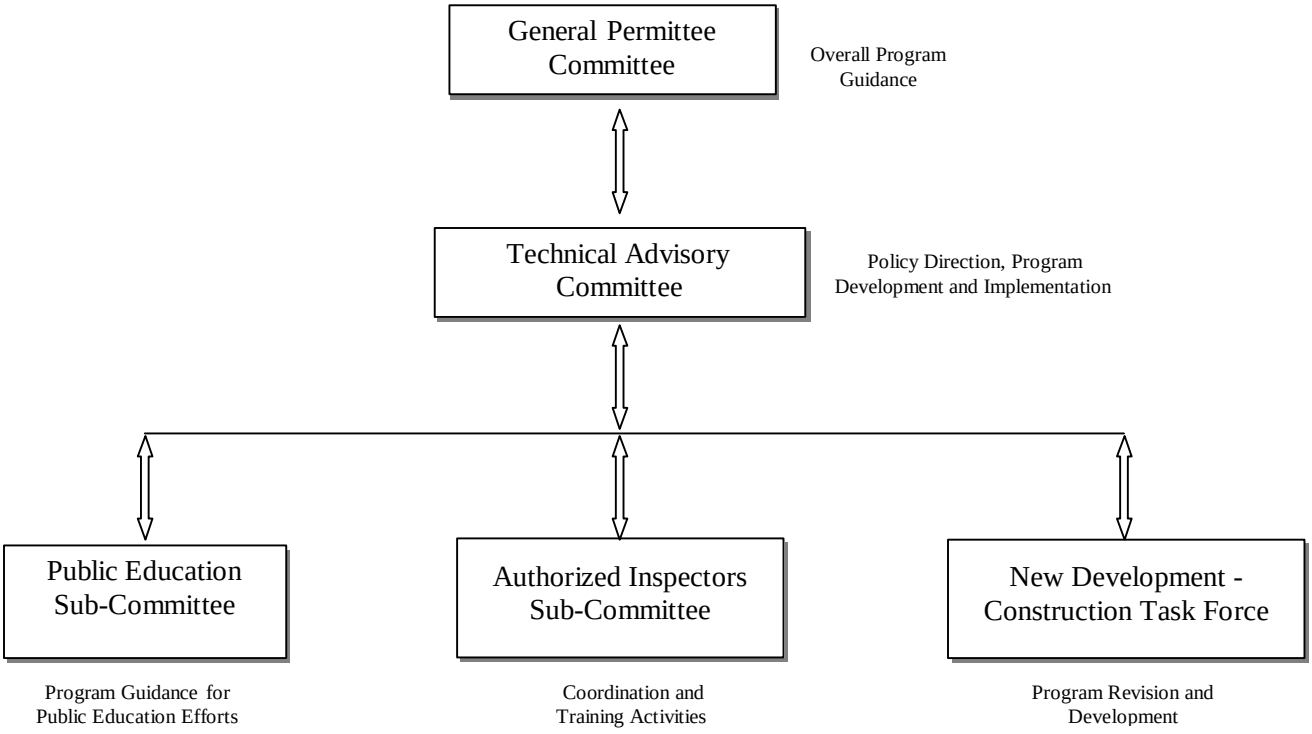

Figure 2.3
Annual Municipal Stormwater Program Costs (1990-2002)

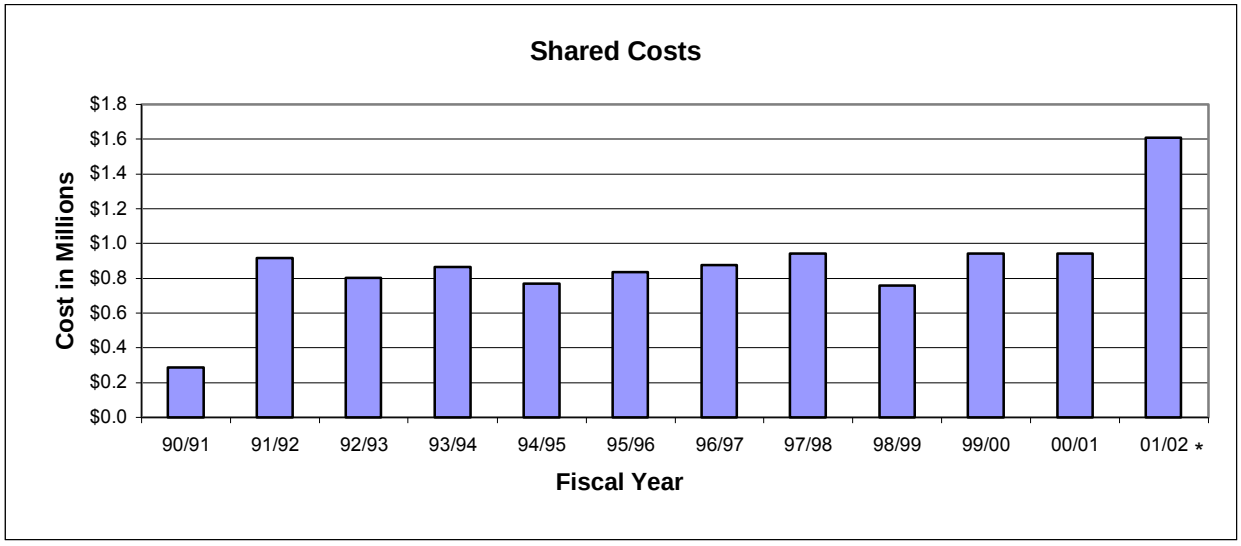

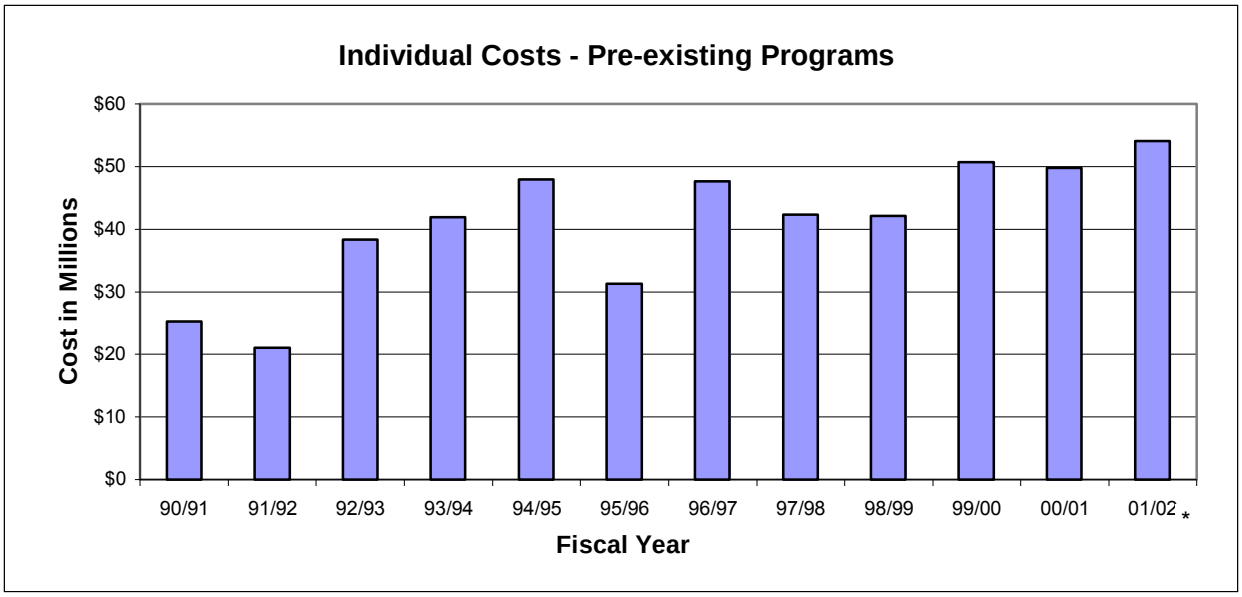

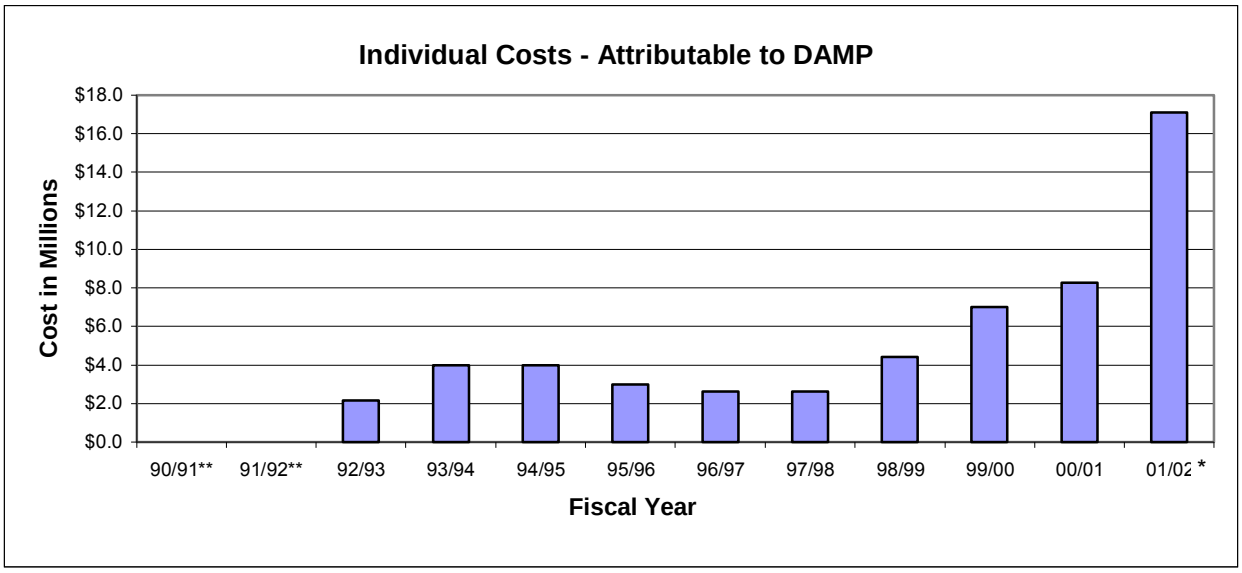

*Estimated Costs
** All Costs Attributable to Pre-Existing Programs

3.0 PLAN DEVELOPMENT

3.1 Introduction

As reflected within the DAMP, the Permittees have, during the First and Second Permit terms, developed and enhanced a comprehensive approach to storm water management. As such, the DAMP continues to evolve as the management foundation for the storm water compliance program, as evidenced by the new sections and commitments in the draft 2000 DAMP that was submitted as part of the 2000 Report of Waste Discharge.

The water quality planning process, referred to throughout the DAMP is a systematic and detailed evaluation of the impacts of urban stormwater quality on beneficial uses to determine or validate that actual impairments exist that warrant corrective action. The DAMP also sets forth a programmatic countywide approach for urban stormwater management by:

- Establishing a baseline set of BMPs that are applicable to all areas that are proven and cost-effective;
- Focusing on solving water quality problems in receiving waters ;
- Prioritizing waterbodies for corrective action with those listed as impaired as having a higher priority; and
- Promoting watershed-level approach and regional BMPs that may also address non-urban sources.

This programmatic approach utilizes information obtained from the countywide baseline water quality monitoring program (Section 11.0) and from the additional water quality planning initiatives being conducted in several of the watersheds to determine those with beneficial use impairments attributable to urban stormwater. Once a water quality problem is identified, the Permittees intend to evaluate the need for additional or new Best Management Practices (BMPs) in order to effectively address the problem through the process outlined in this section. Since the field of stormwater quality is a dynamic one, it is necessary for the Permittees to continue this systematic and iterative process of revising, adding or deleting BMPs as necessary in order to maintain a successful and responsive NPDES Stormwater Program.

Overall, the DAMP programs fall into two general categories, prevention-oriented programs and removal-oriented programs. The removal oriented programs include structural BMPs identified through the water quality planning process and site specific special BMPs.

3.2 Methodology for Examining BMP Retrofit Opportunities

Watersheds determined to require additional BMPs will be surveyed for potential retrofitting. Where retrofitting opportunities are found new structural BMPs will be considered, using the principles of Maximum Extent Practicable (MEP). Existing flood control, retarding, sediment control, water conservation, recreation, habitat, and greenbelt facilities will be evaluated in terms of their potential for modification to provide water quality benefits.

In 1997-98, the feasibility of incorporating these types of retrofits to optimize beneficial use attainment began to be addressed in the context of the long-term water quality planning initiatives being conducted within Orange County, a number of which are in cooperation with the Army Corps of Engineers (Section 13.0).

3.3 BMP Selection and Implementation

3.3.1 Current BMPs

The Permittees have historically conducted activities that provide ancillary water quality benefits (street sweeping, catch basin cleaning etc.). During the First and Second Term Permits, the Permittees developed and implemented additional BMPs as a result of the commitments within the 1993 DAMP and to meet the objectives of the NPDES Stormwater Program. The updated 2000 DAMP recognizes the importance of continuing the BMPs that have been initiated and includes almost seventy (70) new commitments for BMPs to enhance these countywide efforts.

3.3.2 Selecting New BMPs

Although the DAMP provides for the implementation of a successful NPDES Stormwater Program through the BMPs that have already been developed and implemented, the Permittees recognize that the field of stormwater quality is highly dynamic and that the BMPs within the DAMP must be revised, deleted or added to in order for the program to remain successful. In addition, water quality problems caused by urban stormwater that are identified either through the water quality monitoring program or the water quality planning process may elevate the need for additional or new BMPs to be implemented in order to effectively address the problem.

New candidate BMPs can be prevention or removal oriented and are generally identified from:

- A review of technical literature (such as the ASCE/EPA database);
- A review of existing control programs;
- Demonstration or research projects;
- Input from consulting firms and municipalities already involved in new BMP implementation; or
- Other sources.

New structural BMPs, chosen for broad implementation, should be selected from candidate BMPs that have been field-tested and evaluated as to their pollutant removal efficiency and cost effectiveness. They should also be planned and located to maximize their cost-effectiveness.

California Stormwater BMP Handbooks

As previously mentioned in Section 2.2.5, one of the major undertakings of the SWQTF this year was securing enough funding to update the 1993 California Stormwater Best Management Practices Handbooks (Handbooks). The Handbooks were first published in 1993 and have since become a key source of guidance on the selection, design and implementation of stormwater BMPs.

However, since 1993 there have been extensive changes that affect the management of stormwater quality in California. The body of knowledge related to BMP performance has increased considerably and there are now many proprietary BMPs available. As a result, the Handbooks are going to be revised and updated so that they can continue to be a key source of stormwater quality management guidance for California's unique climatic and water quality conditions. Once updated, the handbooks will be available on the Internet with downloadable text and graphics, allowing current information to be maintained on costs, maintenance and performance.

Recognizing the importance of the update of these manuals, the Permittees contributed financially to the update. During the reporting period, funds were raised, the Request for Proposals was completed and contract awarded. It is expected that the manuals will be completed by September of 2002.

3.3.3 BMPs Implemented – Local Efforts During FY 2000/01

In an effort to complement the countywide BMPs and the watershed initiative BMPs, during the reporting period, many Permittees began to select and implement additional BMPs to enhance their local efforts. This section summarizes those activities.

During 2000/01, thirteen Permittees reported the selection and/or implementation of additional BMPs to enhance their local efforts. The Permittees generally identified their new BMPs from one or more of the following sources of information (**Table 3.1**):

- A review of technical literature (12 Permittees);
- A review of existing control programs (5 Permittees);
- Demonstration or research projects (7 Permittees);
- Input from consulting firms and municipalities already involved in control program implementation (13 Permittees);

Six Permittees reported that they had implemented new non-structural (prevention oriented) BMPs during the reporting period **(Table 3.2**). These BMPs were public education based and included water quality awareness brochures, posters, flyers, newsletters, educational letters and the development of water quality websites. These local public education efforts are further detailed in Section 6.2.2.

Thirteen Permittees reported that they had implemented new structural (removal oriented) BMPs during the reporting period (**Tables 3.2 and 3.3**). The BMPs selected and/or implemented included catch basin inserts, stormwater treatment units (CDS) and litter control devices.

The selections are as follows:

- Eleven Permittees installed over 1,000 catch basin filters throughout their jurisdictions. Dana Point, Mission Viejo and Orange also reported that they were or will be conducting some type of water quality evaluation of their BMPs.
- Three Permittees reported the use of nine (9) Stormwater Treatment Continuos Deflection Systems (CDS) units. Anaheim reported that it was conducting visual evaluations of its CDS unit and tracking the amount and type of trash that is being collected.
- Laguna Niguel and the County of Orange reported the installation of litter control devices, which consisted of screens and trash and debris booms. The County of Orange also completed an analysis of the materials removed from its' debris booms under a 319(h) grant and reported the results as a part of the final study report "Upper Newport Bay Water Quality Enhancement Project – Final Report" in May 2001.

Additional BMPs that were installed individually or collectively, as part of an overall watershed effort, are further detailed in Section 13.0.

Urban Runoff Grant

In 1999 the Orange County Board of Supervisors approved a $250,000 pilot program to encourage stormwater diversions/filters for coastal cities to reduce urban runoff impacts on coastal water quality. Due to the success of the program and the number of cities who applied for the money, in December of 2000, the Board of Supervisors approved an additional allocation of $1,000,000 in matching grant funds for the Urban Water Runoff Grant program to encourage cities countywide rather than just coastal cities to continue to work on structural improvements for water quality.

The criteria for the grants was that the projects had to:

- Result in a reduction of pollutants from the storm drain systems; and
- Be designed, permitted and constructed within a short timeframe.

At the request of the Permittees and the TAC, assistance was provided to the permittees in selecting cost-effective projects both in the Permittee Committee and through a Workshop that was held in April. The workshop was entitled "Storm Drain Retrofits as Structural Controls for Stormwater: What Do We Know?" and featured speakers who have had first hand experience with evaluations of storm drain inlet and in-line retrofit projects (**Figure 3.1**). Fourteen Permittees reported that they attended this workshop, which was also open to regulatory agencies and the private sector.

Twenty (20) Permittees were each awarded over $29,000 of matching grant funds for various structural BMP projects (**Table 3.4**), which included:

- BMPs for enhancing local efforts (installation of catch basin inserts and storm water treatment units);
- BMPs for the Environmental Performance Reporting Program (corporate yard upgrades); and
- BMPs for several water quality planning initiatives (Aliso Creek Watershed Projects).

Cal Trans BMP Retrofit Pilot Studies

Cal Trans is currently testing a wide variety of structural BMPs for facilities and highway runoff. The goal of the BMP Retrofit Pilot Studies is to determine the cost-effectiveness and water quality benefits of structural BMPs when retrofitted in existing facilities.

The highlights of the studies, which should be completed by the Fall of 2001, include:

- Thirty three (33) locations are being retrofitted with thirty nine (39) structural BMPs of different types – an unprecedented scale for studying stormwater treatment technologies
- Automated monitoring stations are being installed for each BMP site
- Pollutants being monitored in stormwater include suspended solids, metals, nutrients and organics
- A comprehensive operations and maintenance program that maintains the BMPs at peak performance
- Monitoring results that will indicate the pollutant removal effectiveness of each of the BMPs

In September of 2000, Cal Trans sponsored a workshop that provided insights into these studies as well as current BMP developments. Four Permittees reported that they attended this workshop.

3.4 Assessment of BMP Effectiveness

There are generally two accepted methodologies for assessing the performance of the BMP effectiveness: conventional monitoring (such as water quality monitoring) and non-conventional monitoring.

The California Stormwater Best Management Practices (BMP) Handbooks (1993) define “non-conventional monitoring” as the enumeration of some indicator other than water quality data to infer pollution reduction or water quality improvement. Examples cited include surveys of public opinion to demonstrate increasing environmental awareness, monitoring of the amount of used oil being delivered to household hazardous waste collection centers, etc.

An accurate, quantifiable assessment of the cumulative effectiveness of current BMPs is difficult for a variety of reasons that include:

1. Non-structural BMPs began to be implemented prior to the stormwater mandate, meaning no "baseline" monitoring data representative of "pre-BMP" conditions can be identified;

2. The BMPs identified in the DAMP are being implemented incrementally on a countywide basis. Since, to date, no watershed has been uniquely subject to a single BMP, the influence of an individual BMP upon the overall surface water quality cannot be readily determined yet;

3. There is considerable variability in water quality data that complicates any statistical correlation of the data with storm frequency, storm length and intensity, land use, or land management practices. This is even more compounded by storm seasons in recent years that have varied much in their intensity, duration and volume;

4. Many of the BMPs identified in the DAMP are implemented to address the issues associated with a specific land use. However, since the land uses are so blended within the watersheds, it has not proven possible to characterize the effects of those specific BMPs; and

5. Factors other than chemical water quality may be more directly responsible for impairment of beneficial uses, yet all these factors combine in their effects and are difficult to separate one from another.

Assessing the cumulative effect of BMPs employed countywide on the water quality of receiving waterbodies may take a number of years. There are however, a number of programs that are currently contributing to the assessment of individual project BMP performance. The Permittees will continue to assess and evaluate the data from these and other studies in order to try and determine the overall effectiveness of the implementation of the BMPs on the water quality within Orange County (Section 6.4.5 and Section 14.0).

Table 3.1
Methods of Selecting New BMPs

Permittee	A review of technical literature	A review of existing control programs	Demonstration or research projects	Input from consulting firms and municipalities already involved in control program implementation	Other sources
Anaheim	X	X	X	X	
Dana Point	X	X	X	X	
Laguna Beach	X			X	
Laguna Hills	X			X	
Laguna Niguel	X		X	X	
Laguna Woods	X			X	
Mission Viejo	X			X	
Newport Beach			X	X	
Orange	X	X	X	X	
San Clemente	X	X		X	
San Juan Capistrano	X		X	X	
Seal Beach	X	X		X	X
County of Orange	X		X	X	X

Table 3.2
New Structural or Non-Structural BMPs Selected and Implemented

Permittee	Structural BMPs				Non-Structural BMPs	
	Catch Basin Inserts	Stormwater Treatment Units (CDS)	Litter Control	Other: (please specify)	Public Awareness Survey	Other: (please specify)
Anaheim		X		X (miscellaneous)		
Dana Point	X					Water Quality Awareness Brochure
Laguna Beach		X				Distributed posters & mailed educational letter
Laguna Hills	X					No Information provided
Laguna Niguel			X			Newsletter "Up the Creek"
Laguna Woods	X					Public Awareness Campaign
Mission Viejo	X					Flyers at public counter, quarterly outlook newsletter
Newport Beach	X					WQ Web site, mailer to residents
Orange	X					
San Clemente	X					
San Juan Capistrano	X					
Seal Beach	X	X				
County of Orange	X		X			

Table 3.3
New Structural BMP/Implementation Information

Permittee	Type of BMP	Manufacturer	When Implemented	Number Implemented	Type of Evaluations Being Conducted	Comments:
Anaheim	Stormwater Treatment Unit (CDS)	CDS Technologies	January 1, 2001	1	Visual Evaluations; amount and type of trash is being tracked	Installed on Disneyland Drive near Downtown Disney overpass walkway
Dana Point	Catch Basin Inserts Catch Basin Inserts	Pac Tec, Inc. Kristar, Inc.	July-Sept 2000 July-Sept 2000	356 152	Monitoring, testing, and maintenance Monitoring, testing, and maintenance	Developed inventory of catch basins; what type of filters were installed; when serviced; how much materia collected; evaluation of effectiveness of filters
Laguna Beach	Stormwater Treatment Unit (CDS)	CDS Technologies	May 1, 2001	2	None	2 low flow diversion structures and Continuous Deflective Separation units were installed at intersections of Barranca Ramp/Cliff Drive & Cleo Street/Ocean Front as part of City's Urban Runoff Diversion Program.
Laguna Hills	Catch Basin Inserts	REM, Inc.	November 8, 2000	17	None	
Laguna Niguel	Screens	United Pumping	June 1, 2001	12	Visual monitoring	
Laguna Woods	Catch Basin Inserts		June 22, 2005	8	None occurring (on private property)	New shopping center development was conditioned to place filter inserts in parking lot catch basins.
Mission Viejo	Catch Basin Inserts	United Stormwater	Under Construction	10	Pending	
Newport Beach	Catch Basin Inserts	Fossil Filter	Spring 2001	15	Visual	
Orange	Catch Basin Inserts		November 1, 2000		Visual	
San Clemente	Catch Basin Inserts	Drainpac	FY 2001	458	None	
San Juan Capistrano	Catch Basin Inserts					Not yet implemented. Four developments/projects to install retention basins at all locations
Seal Beach	Stormwater Treatment Unit (CDS) Catch Basin Inserts	Stormceptor Flow Guard	October 2000-October 2001 June 1, 2001	6 1	None (not installed yet) None (not installed yet)	
County of Orange	Trash/Debris Booms Catch Basin Inserts	Fossil Filter		16	None (not installed yet)	County staff currently tracking total amounts removed from 5 trash and debris booms and have conducted a trash and debris study to determine types of materials captured as a part of a 319H Grant. Contract for Catch Basin Inserts is currently being negotiated.

Table 3.4
2000 Urban Runoff Grant Funding

Permittees	Local Efforts	Environmental Performance Reporting Program	Water Quality Planning Initiative
Anaheim	Stormwater Treatment Unit		
Brea	Catch Basin Inserts		
Cypress		Corporate Yard Modification	
Dana Point	Stormwater Treatment Unit		
Fountain Valley	Catch Basin Inserts		
Garden Grove		Corporate Yard Modification	
Huntington Beach		Street Modification Equipment	
Irvine	Stormwater Treatment Unit		
La Habra		Corporate Yard Modification	
Laguna Hills			Aliso Creek Watershed Projects
Laguna Niguel			Aliso Creek Watershed Projects
Los Alamitos	Catch Basin Inserts		
Mission Viejo			Aliso Creek Watershed Projects
Placentia	Catch Basin Inserts		
Rancho Santa Margarita		Storm Drain Stenciling and Maintenance	
San Clemente	Stormwater Treatment Unit		
Seal Beach	Catch Basin Inserts		
Tustin	Catch Basin Inserts		
Westminster		Corporate Yard Modification	
OCFCD			Aliso Creek Watershed Projects

Figure 3.1

STORM DRAIN RETROFITS AS STRUCTURAL CONTROLS FOR STORMWATER: WHAT DO WE KNOW?

CITY OF IRVINE COUNCIL CHAMBERS
ONE CIVIC CENTER PLAZA
IRVINE, CALIFORNIA 92606
April 18, 2001

08:30 - 08:35 Welcome
Karen Ashby, County of Orange/Public Facilities and Resources Department

Session 1 - Evaluations of Storm Drain Inlet and In-Line Retrofits

08:35 - 09:00 "Use of Inserts For Trash and Litter"
John L. Hunter, Hunter Kennedy

09:00 - 09:30 "Investigation of Structural Control Measures for New Development"
Bob Smith, Larry Walker Associates

09:30 - 10:00 "Drain Inlet Inserts - Better Than Nothing?"
Scott Taylor, RBF Consulting

10:00 - 10:30 Break

Session 2 - Case Studies

10:30 - 11:00 "Santa Monica Bay Area Municipal Storm Water/Urban Runoff Pilot Project - Evaluation of Potential Catch Basin Retrofits"
Nancy Gardiner, URS Greiner Woodward Clyde

11:00 - 11:30 "Catch Basin & Inline BMP Retrofits - Learning to Walk Again, Step by Step"
Bill Buol, Neal Shapiro, City of Santa Monica

11:30 - 12:00 "City of Dana Point - Storm Drain Inlet Filter System"
Steve Avila/Cindy Asher, City of Dana Point

12:00 - 12:15 " Where Do We Go From Here?"

The workshop is free, however interested parties must reserve a space.
For more information please contact Karen Ashby, County of Orange at (714) 567-6297

LEGAL AUTHORITY

4.1 Introduction

The NPDES Permits require implementation of a program to reduce pollutants in storm water discharges from commercial, industrial, and residential areas to the MEP. Central to this program is the establishment, by each municipality, of adequate legal authority to regulate the discharge of pollutants to the municipal separate storm sewer.

4.2 Authority to Control Pollutant Discharges

Although adequate legal authority existed for most potential pollutant discharges at the inception of the stormwater program, in 1993, the Permittees determined that a Model Water Quality Ordinance should be prepared to provide a more uniform Countywide approach and to provide a legal underpinning to the entire NPDES Stormwater Program.

Subsequently, all of the Permittees adopted the Water Quality Ordinance and corresponding Enforcement Consistency Guide and provided certifications regarding this to the Regional Boards in Fiscal Year 1997-98. In addition, each Permittee has designated the Authorized Inspector(s) responsible for enforcing the Ordinance. The Authorized Inspector is the person designated investigate compliance with, detect violations of and/or take actions pursuant to the Ordinance.

The detection, elimination and enforcement activities undertaken by the Permittees are described further in Section 10. In addition to prohibiting unpermitted discharges, the Water Quality Ordinance also provides for requiring BMPs in new development and significant redevelopment (see Section 7.0). During the reporting period, no changes were made to the Ordinance.

5.0 PUBLIC AGENCY ACTIVITIES

5.1 Introduction

The DAMP recognizes that there are many existing and enhanced public agency activities that contribute to the control of urban stormwater pollution. Consequently, a major part of the DAMP implementation involves instituting regular documentation of such activities for the purpose of non-conventional BMP effectiveness monitoring.

Over the second permit term, this data has yielded information on the extent of BMP implementation and the volume of specific pollutants that are being diverted from the storm drain system.

5.2 Municipal Government Activities

All of the Permittees routinely conduct preventive maintenance activities that are widely recognized as effective BMPs for pollutant control. These activities include litter control, solid waste collection/recycling, drainage facility maintenance, catch basin stenciling, street sweeping, hazardous materials management/environmental performance reporting, household hazardous waste collection, emergency spill response and fertilizer and pesticide management.

The Second Term Permit requires an annual evaluation of these activities and, where appropriate, improvements or new practices implemented to further reduce the amount of pollutants discharged into the storm drain system. An important component of this evaluation process is the documentation and collection of data related to these selected activities.

5.2.1 Litter Control

Litter control is an important element in the diversion of trash and other materials from the storm drain system. Although most Permittees historically viewed litter control as a public service program (i.e., preventing visual blight, etc.), rather than as a pollution control problem, they now consider it equally important as a visual indicator of water quality.

As such, all Permittees now have the legal authority to control littering in public areas either through the Water Quality Ordinance or existing municipal code sections. Littering on private property is usually treated as a nuisance to be corrected by the property owner after notice of complaint is sent. Other DAMP-recognized elements of litter control include provision of trash receptacles and special clean-up events **(Table 5.1)**.

During the 2000/01 reporting period, Twenty three Permittees reported that they organized community/neighborhood clean-up programs, twenty nine Permittees reported that they conduct or facilitate special or bulky item pickups and twenty eight reported that trash receptacles are maintained in public areas.

Additional local efforts included the placement of doggie bags for dog waste at the city dog park in Laguna Beach, Laguna Niguel and Mission Viejo, coordinated volunteer groups to clean litter in Garden Grove and the organization of Neighborhood Enhancement Programs by the City of Orange, where each year they specifically target certain areas within the city for litter clean-up. Several other cities reported organizing, or participating in, initiatives related to litter control such as "Make A Difference Day" and "Coastal Clean-Up Day".

Trash and Debris Booms

In addition to the efforts described above, trash and debris booms have been installed in a number of flood control channels and harbors to remove floatable material. **Table 5.2** provides a summary of the trash and debris booms currently deployed and several that are in the design phase and will be installed in the near future. To date, the booms have proven effective in reducing the amount of floatable material especially during the first rains of the storm season when accumulated debris finds its way into the ocean's waters. A total of 17.63 tons of trash and debris was removed from Principal Permittee maintained booms. A brief description of booms currently deployed or being installed is provided below.

- *Seal Beach*

A boom was initially installed and maintained by the Orange County Flood Control District in Federal Channel located near the intersection of the 22 and 405 freeways.

A second boom is being planned for a location within the San Gabriel River. The City of Seal Beach received Coastal Conservancy funding for the conceptual design, environmental, and permitting portions of this project. Construction would be funded through a multi-jurisdictional application for Proposition 13 monies. The project is still in the planning stages and the location has not been determined.

- *East Garden Grove-Wintersburg Trash Booms*

One boom in the East Garden Grove-Wintersburg Channel that was installed near Farm Bridge at Pacific Coast Highway has been effective in the removal of trash and debris entering Huntington Harbour.

A second boom is planned for another location within the East Garden Grove-Wintersburg Channel. In June 2001, the Water Quality Committee of the City Managers Association selected a debris boom on the East Garden Grove-Wintersburg Channel as one of the projects to explore as a joint city-county grant request. The location for this boom has not been determined.

- *Huntington Watershed*

Debris booms have been deployed at three locations in the Huntington watershed. The booms are located in the Bolsa Chica Channel at: 1) upstream of Edinger, 2) at the confluence of Westminster Channel and 3) at Seabring Ave.

- *Talbert/Lower Santa Ana River Watershed*

A debris boom was installed upstream of Hamilton in the Greenville Banning Channel/Lower Santa Ana River.

- *Upper Newport Bay*

The City of Newport Beach, in the 1980s, installed a log boom made of telephone poles connected together with chains in the Upper Newport Bay to reduce the amount of trash and debris entering Newport Harbor. Three years ago the boom was damaged by the El Nino rainstorms and was replaced by a new conventional trash debris boom. The City's Harbor Resources Division, inspects the boom weekly and periodically performs maintenance on the boom. The amount of trash and debris in Newport Harbor has been reduced significantly since the installation of this boom.

Another boom is located upstream of Newport Bay in the Santa Ana-Delhi Channel. This boom, installed and maintained by the OCFCD, has been in operation for many years effectively removing trash and debris flowing into Upper Newport Bay.

- *Newport Watershed*

In 1999, the Principal Permittee received a Clean Water Act 319(h) grant to implement additional trash and vegetative debris booms in the watershed and focus on enhanced source control measures. The additional debris booms were installed in El Modena-Irvine and Peters Canyon Channel. One of the grant tasks required the characterization of debris collected by the trash and debris booms and the comparison of the results with similar data obtained from the existing debris boom located on the Santa Ana-Delhi channel.

The results of the debris characterization study at the Santa Ana Delhi Channel indicate that the percent composition of the trash and debris were similar for each of the storms. The study showed that the adjusted (excluding the weight of water and sediment) composition percentage of organic and plastic categories averaged 47% and 34%, respectively.

The remaining five categories (glass, rubber, metal, paper, cloth, misc.) averaged less than 20% (**Table 5.3 and Figure 5.1)**. These results provide the basis for targeting source control measures for trash and debris reduction in the Santa Ana-Delhi watershed on organics and plastics. An additional detailed discussion of these activities and the final report are included in Section 12.3.3.

Coastal Cleanup Day

Every year the California Coastal Commission sponsors a Coastal Cleanup Day to help cleanup the trash and debris that accumulates along the coastline, fouling the beaches and tidal zone **(Table 5.4)**. During the first cleanup day in Orange County in 1996, 4,649 volunteers collected 38,906 pounds of trash and 3,914 pounds of recyclables (9.2 pounds/person). In 2000, 3,750 volunteers joined in and collected 55,051 pounds of trash and 4,862 pounds of recyclables (16 pounds/person).

5.2.2 Solid Waste Collection/Recycling

The Permittees have solid waste collection programs for public, residential, commercial and industrial areas. The Permittees recognize that the public must be encouraged to properly dispose of their trash and educated that the storm drain is not a waste receptacle. The Permittees conduct public education outreach through a variety of methods including community newsletters, radio and television public service announcements, brochures and utility bill inserts. Many Permittees have combined the recycling, litter control and hazardous materials disposal messages (Section 6.0).

During the First Term Permit, the Permittees reported the solid waste collection data that they were separately required to collate under the requirements of Assembly Bill (AB) 939. Since these reporting requirements have changed, the Permittees no longer provide the specific AB 939 information.

In the 2000/01 reporting period, thirty-two Permittees reported the collection of over 3.7 million tons of solid waste **(Table 5.5)**.

In addition, the Permittees reported on the types of solid waste and recycling education materials made available to the public and the frequency with which they were distributed or broadcast (**Tables 5.6 – 5.8**)

- Fourteen Permittees reported that they broadcast public service announcements via television or radio;
- Twenty four Permittees indicated that they distributed community newsletters with solid waste/recycling articles;
- Twenty nine Permittees reported the distribution of recycling brochures;
- Seventeen Permittees reported the distribution of utility bill inserts containing information regarding recycling and/or proper waste disposal at least annually;
- Nineteen Permittees reported additional distribution methods for their solid waste/recycling information including presentations, websites and various outreach events. Examples include Brea, which reported conducting a presentation to 900 students and Anaheim which reported purchasing and providing books to libraries promoting recycling.

Examples of recycling public education materials are included in **Appendix C.** Reflected in the program materials is that fact that many jurisdictions have combined the recycling, litter control and hazardous materials disposal messages.

5.2.3 Drainage Facility Maintenance

Maintenance

During the First and Second Term Permit periods, the Permittees developed and implemented drainage facility inspection and maintenance procedures and created inspection logsheets in order to document the total volume of material removed from their facilities and the percentages of each type of material. Through their routine inspections, the Permittees also notify the appropriate Authorized Inspectors of any evidence of chemical contamination or suspected illegal discharges (Section 10.2.3).

The Permittees inspect the drainage system within their jurisdictions routinely and clean out accumulated debris on an as-needed basis. Removal of accumulated debris and sediment is carried out either manually or by mechanical methods using flushing in emergency situations only.

In the 2000/01 reporting period, thirty-four Permittees reported the removal of over 7,380 cubic yards and over 24,600 tons of material from approximately 215 miles of storm drains and almost 27,000 drain inlets (**Table 5.9**). The method of removal is generally equally spilt between the use of vacuum trucks and hand crews.

Debris characterization varied significantly between jurisdictions but averaged about 40% soil, 37% vegetation, 11% paper, 5% plastic, and 6% other.

By removing this amount of material from the catch basin inlets and stormdrain system, the Permittees made a significant contribution in preventing the passage of these materials in downstream receiving waters.

Drainage Facility Changes

The NPDES permit requires that the Permittees provide information regarding any significant changes to the storm drain systems, outfalls, detention or retention basins, dams or other controls, including map updates of the storm drain system. Nine Permittees reported approximately twenty-eight changes to their municipal storm drain systems that had been initiated or completed during 2000/01 (**Table 5.10**). The Permittees also provide the Principal Permittee with drainage facility map updates on a continual basis.

Low Flow Diversions

The Permittees have implemented a limited number of drainage system diversions for dry weather flows to the sanitary sewer system at several coastal locations during various periods throughout the year. The systems diverted include Talbert Channel/Lower Santa Ana River pump stations and channels, Newport Dunes, Buck Gully, Aliso Creek mouth and J03P02 subwatershed, and various Laguna Beach, Dana Point and San Clemente coastal storm drains.

Seven Permittees have implemented a total of twenty-eight drainage system diversions for dry weather flows to the sanitary sewer system (**Table 5.11**). The total set up cost for these diversions were over $750,000. Combined, over 100 million gallons of urban runoff were diverted per month at a total cost $86,000 per month. In addition to those diversions that are already in place, four Permittees are evaluating the feasibility of establishing an additional eighteen diversions (**Table 5.12**).

Additional information regarding the current low flow diversions is detailed below.

a) Talbert/Lower Santa Ana River Watershed

Elevated bacteria indicator levels in the surfzone off Huntington State Beach in 1999 were attributed, in part, to the storm drain system of the Talbert/Lower Santa Ana River Watershed. As part of an early action plan, all storm drain and pump station discharges in this watershed were temporarily diverted during the summer months of 2000. This action plan was implemented again during the summer months of 2001.

As an added measure to prevent bacteria in the Santa Ana River from impacting Huntington State Beach, low flow runoff from the Talbert - Lower Santa Ana River Watershed was diverted to the sanitary sewer at four locations during the summer months. These locations are:

- The Santa Ana River just upstream of Talbert Avenue;
- The Greenville Banning Channel upstream of Hamilton Avenue;
- Talbert Channel just upstream of Yorktown Avenue; and
- The Huntington Beach pump station on Huntington Beach Channel just downstream of Adams Avenue.

In addition to the County diversions, the City of Huntington Beach also diverted its nine pump stations' dry weather flows throughout the year. These pump stations divert water from the Huntington Beach Channel, Talbert Channel and the Santa Ana River.

b) Newport Dunes

Elevated bacteria indicator levels in the Back Bay/Newport Dunes resort area also lead to the diversion of the Back Bay drain during the summer months when the resort area has a high number of people who utilize the area. The Newport Dunes diversion was completed on County lease property. As a result, the continuous postings and closures have been reduced to a few infrequent postings.

c) Buck Gully

The Buck Gully diversion project was completed in 2000/01 in an effort to decrease the amount of low flow pollutants in a small creek directly tributary to the ocean in an area of frequent recreation.

d) Aliso Creek Mouth and J03P02 Storm Drain

In the State Water Quality Assessment the lower mile of Aliso Creek is listed as impaired for the presence of elevated levels of fecal coliform. Pursuant to a 205(j) grant the Principal Permittee initiated a water quality planning study. One of the results of the study was the identification of elevated fecal coliform levels at a number of additional areas along Aliso Creek and its tributaries. One storm drain, identified as J03P02, which exhibited elevated fecal coliform levels, was issued a Clean Up and Abatement Order in December 1999 by the San Diego Board.

As an early action, the flows from J03P02 were temporarily diverted during the summer months to the sanitary sewer by the City of Laguna Niguel. The City of Laguna Niguel currently directs the flows from J03P02 through a Clear Creek water treatment system before discharging the treated effluent to Sulphur Creek. Eventhough the Clear Creek system effectively decreases the bacterial concentrations within the dry weather flows, this is only a temporary demonstration project. Future plans for this sub-watershed includes a natural system called WETCAT (Wetlands Capture and Treatment).

The purpose of the WETCAT project is to finalize a system of three constructed wetlands and an inlet/piping system that will capture and treat 100% of the low-flow and first-flush runoff from the entire watershed. Completion of the constructed elements of the system is targeted for summer 2002, with monitoring ongoing until March 2004.

As a further step, during the summer of 2000, the Principal Permittee and the Aliso Water Management Agency installed, operated and maintained a diversion project to remove summer flows in Aliso Creek from an area immediately upstream of Aliso Beach. This diversion project utilizes a summer-season-only sand berm to allow pumping of creek water to an adjacent ocean outfall line.

e) Laguna Beach Coastal Storm Drains

The City of Laguna Beach installed their first diversion in 1987. To date, the City has installed eight nuisance flow diversion systems, which collect and divert low flow runoff from approximately 1,150 urban acres of the City into the sewer system. Ten more systems are currently under design (one being a re-design). Further, the City has conditioned some private developers to install diversion systems prior to final inspection. Upon completion of these systems, runoff from over 60% of the City's urban acres will be diverted to the City's sewer system. By the year 2007 the diversions will cover 2,130 (85%) of the 2,500 total urban acres in Laguna Beach.

f) Dana Point Coastal Storm Drains

The City of Dana Point, working with the South Coast Water District, designed and constructed their first Urban Low Flow Diversion Project (ULFDP) in the spring of 2000. This project constructed low flow interceptor basins upstream of the new peak flow catch basins constructed by the city. Observation of the diversion system over the summer season indicated that the grates are effectively intercepting irrigation water and other low flow constituents. Catch basin filters in the new peak flow basins immediately downstream are intercepting large floating trash and other macro pollutants.

In addition, four additional low flow diversion projects are planned. The Alipaz Storm Drain Project and the Del Obispo Park Storm Drain Projects are two projects that incorporate a CDS (swirl-type) separator unit followed by low-flow diversion to the sanitary sewer. The Alipaz Project is scheduled to begin construction in Spring/Summer 2002. The Del Obispo Project is scheduled for construction in fall 2002.

The other two projects direct low flows to the sanitary sewer without a CDS unit. The first project, called the Urban Runoff Diversion Project (URDP), will collect multiple pipe discharges from above Coast Highway and divert the low flows to an existing sanitary sewer that currently lacks sufficient flow to be self-cleaning. The URDP is scheduled for construction in summer 2002. The last project, the Phase II Master Plan Improvements, brings flow down Palisades Drive from Camino Capistrano to a low flow diversion on Coast Highway. Construction is scheduled to begin in the late Summer/ Early Fall 2002.

g) San Clemente Coastal Storm Drains

The City of San Clemente, completed their first low flow diversion projects in the summer of 2001. The Linda Lane channel is diverted near Via Mecha and the Los Lobos Channel is diverted northeast of Plaza a La Playa.

5.2.4 Drain Inlet/Catch Basin Stenciling

The goal of the stenciling program is to label and subsequently maintain those labels on over 37,000 stormdrain catch basins located throughout Orange County. Initially the label was comprised of "No Dumping - Drains To Ocean" written in 3" black letters on either the top of the curb or the curb face adjacent to the inlet. This format was later revised to 3" blue letters on a white background.

Due to the desire among a number of Permittees to use an additional type of application that would not require as much maintenance as the stenciling, an alternative was researched. The Permittees determined that the Das Curb Markers, a high-impact plastic marker applied with an adhesive, would provide a more permanent type of application. In order to maintain the regional consistency, a custom marker was created to reflect the approved design of the stencil (**Figure 5.2**). Seven Permittees purchased over 7,300 of the markers and several more Permittees were planning on purchasing them during the next reporting year.

In the 2000/01 reporting period, twenty three Permittees reported re-stenciling over 12,000 catch basins, thirty two percent (32%) of the total inventory of 37,000 drain inlets **(Table 5.13)**. However, it should be noted that the catch basins only need to be re-stenciled when the labeling is no longer legible. The use of more permanent markers such as the curb markers and various plastic or ceramic markers will likely reduce the amount of maintenance necessary to maintain the labels.

Most Permittees use the recommended stencil: "No Dumping - Drains To Ocean". There are, however, a few variations. Newport Beach also uses "No Dumping - Drains to Bay" depending on the storm drain's receiving water, Laguna Beach designed its own logo to accompany the phrase: “Keep It Clean – Drains To Ocean”, and Tustin uses “Do Not Dump – Drains To Ocean”.

During 2000/01 the Permittees began to start using more permanent types of markers for the stenciling of their storm drains. Twenty one Permittees reported using spray paint (only seventeen of those exclusively), six reported using curb markers, five reported using adhesives and three reported using a heat application. Twenty-two Permittees reported using blue letters on a white background and six Permittees still reported using the black letters either on a white background or on the concrete.

Cypress and Dana Point reported reaching out to their communities to encourage Homeowner’s Associations and other owners of privately- held catch basins to participate in stenciling and maintenance. Still others noted an apparent decrease in the amount of litter in the catch basins since the initiation of stenciling programs.

Three Permittees reported using volunteer resources to re-stencil over 1,000 catch basins. Fullerton and Lake Forest utilized the Boy Scouts and San Clemente received assistance from the Orange County Conservation Corps.

5.2.5 Street Sweeping

All Permittees maintain street sweeping programs in residential, commercial and/or industrial areas. In 1993 the Permittees compiled information regarding their existing street sweeping schedules and practices and subsequently changed elements of their programs such as the types of sweepers purchased, the frequency of sweeping, and the use of parking restrictions in order for the street sweeping program to aid in water quality improvements.

During the Second Term Permit period, the Principal Permittee, with approval of the TAC, recommended that the Permittees apply a standard of pollutant control removal effectiveness in the purchase of new street sweeper equipment. This recommendation was based upon a preponderance of research literature suggesting that regenerative air sweepers are superior to vacuum and mechanical broom sweepers in performance. The research is not, however, unequivocal.

During 2000/01, thirty Permittees reported using a fleet of street sweepers consisting of thirty two (32) mechanical broom sweepers, sixty one (61) vacuum sweepers, 2 regenerative air sweepers and 5 vacuum and broom assisted sweepers (**Table 5.14**). It is expected that, over the next permit period, these numbers will continue to change as Permittees replace older equipment.

The Permittees reported that monthly sweeping of residential, commercial, and industrial public street areas was the minimum frequency, however most conducted weekly or bi-weekly sweeping. In fact, fifteen Permittees reported a sweeping frequency of twice weekly or greater for at least one of the three designated areas **(Table 5.14)**.

Twenty-three Permittees reported the use of parking restrictions to improve street sweeping effectiveness. Thirty three Permittees noted visual inspection of streets to verify street sweeper effectiveness, with twenty eight Permittees indicating that their street sweeping equipment is monitored for adherence to manufacturer's specifications for optimal performance (**Table 5.15**). In addition, several Permittees noted that they actively encourage citizen comment on their street sweeping programs and will repeat the sweeping of an area when a complaint is received.

The Permittees reported removing over 33,000 tons and 38,000 cubic yards of material with the sweepers (**Table 5.16**).

5.2.6 Hazardous Materials Management/Environmental Performance Reporting

Prior to 1997, the Permittees annually reviewed their hazardous materials management practices. Specific information was submitted in the annual reports regarding product substitution, structural modifications to storage areas, elimination of hazardous waste streams, installation of a clarifier for site drainage, the use of off-site facilities for vehicle cleaning, employee training, and site audits.

The Second Term Permit required the Permittees to prepare an Environmental Performance Reporting Program and include in subsequent Annual Reports a discussion of the actions taken by the Permittees to eliminate pollutant discharges at public agency facilities. This program was implemented in 1997 and was applied to municipal facilities whose operations include hazardous materials storage, waste storage, and vehicle and equipment maintenance. Permittee facility operators were required to:

1. Determine which operations are the most significant contributors to stormwater pollution; and then to
2. Identify significant issues at each facility and develop and implement action plans to control the discharge of pollutants.

The program is iterative, involving an annual evaluation of municipal facility environmental performance and the implementation of corrective actions until all identified significant issues are addressed.

The action plans that have been developed by the Permittees to address the significant issues have demonstrated a commitment by the Permittees to implement both structural and non-structural controls. This program has been applied to approximately 400 fixed municipal facilities **Table 5.17**.

Since the inception of the program the Permittees have been committed to reducing the pollutants from their fixed facilities. This is evidenced by the 94 municipal facilities and 244 significant issues identified during the first year of the program decreasing to 30 facilities and a total of 41 significant issues either newly identified or currently being corrected by the Permittees at the end of 2000/01 reporting period **(Table 5.18A and Figure 5.3**).

The initial compilation of the significant issues and action plans identified at each facility were provided in the 1996/97 report. In that initial report eight Permittees reported no significant issues for any of their facilities, primarily due to the fact that they are either smaller jurisdictions or they contract out the majority of their municipal activities.

In 1997/98 the Permittees completed 158 (65%) of the 244 significant issues action plans identified in the 1996/97 report. Ten new significant issues were identified during this reporting period bringing the total number of outstanding issues to 96. At the end of 1997/98 the number of facilities with significant issues was 98, and eight Permittees were able to report no significant issues at any of their facilities.

In 1998/99 the Permittees completed 25 (26%) of the 96 remaining significant issues action plans identified in the 1997/98 report. Three new significant issues were identified during this reporting period bringing the total number of outstanding issues to 74 from 58 facilities. At the end of 1998/1999, fifteen Permittees were able to report the completion of all outstanding significant issues.

In 1999/2000 the Permittees completed 29 (39%) of the 74 remaining significant issues action plans identified in the 1998/99 report. Two new significant issues were identified during this reporting period bringing the total number of outstanding issues to 47 from 46 facilities. At the end of 1999/2000, eighteen Permittees were able to report the completion of all outstanding significant issues.

In 2000/01 the Permittees completed 28 (60%) of the 47 remaining significant issues action plans identified in the 1999/2000 report. Twenty-two new significant issues were identified during this reporting period bringing the total number of outstanding issues to 41 from 30 facilities. At the end of 2000/2001, nineteen Permittees were able to report the completion of all outstanding significant issues **(Table 5.18B)**.

Some examples of action plans completed during the last reporting period include:

- Cypress constructed a roof and containment berm for the material storage area of its Corporation Yard facility;
- Costa Mesa completed an industrial waste system at its Corporation Yard facility;
- Seal Beach constructed a roof and containment berm for two materials storage areas; and
- Santa Ana relocated storage drums at its Corporation Yard facility to a covered area.

Of the 41 significant issues that still need to be resolved, the majority (80%) require the implementation of structural controls. For example, the City of Anaheim is in the process of constructing a storage area roof for the bunkers at its Streets and Sanitation facility, while the City of Yorba Linda is installing a containment berm for the fuel dispensing area of its Corporation Yard facility. New end dates have been provided for instances in which the implementation of the control will extend beyond the previous end date provided.

The completed Significant Issues Action Plans forms are included in **Appendix A.**

5.2.7 Household Hazardous Waste Collection

Collection Centers

Orange County has an effective household hazardous waste collection program administered by the Integrated Waste Management Department (IWMD). The program comprises four sites (Anaheim, Huntington Beach, San Juan Capistrano, and Irvine) that operate 5 days per week for a total of 259 days per center (excluding partial or full day closures due to rainy weather).

During the 2000/01 reporting period most Permittees reported that through their trash collection services and various public education initiatives residents are directed to use these IWMD facilities for disposal of their household hazardous waste (**Table 5.19**).

Table 5.20 includes the quantities of the various types of household hazardous waste dropped off by County residents at the four IWMD collection centers. A total of 2,768,154 pounds of household hazardous waste was collected in 2000/01. The amount of household hazardous waste collected and properly disposed of is encouraging since these materials can pose a serious threat to human health and the environment if disposed of incorrectly.

Household Hazardous Waste Events

In 2000/01, ten Permittees reported separate household hazardous waste collection efforts, which brought in an additional 426,676 pounds of waste. This amount is more than double what the permittees collected in 1999/00. These efforts included three waste oil collection initiatives (Garden Grove, Orange, and Santa Ana) and seven programs involving household hazardous waste collection days (Costa Mesa, Fountain Valley, La Habra, Laguna Beach, Lake Forest, Mission Viejo, and Placentia) **(Table 5.21).**

Oil Recycling

All Permittees and the County's Health Care Agency currently implement used oil recycling programs. These programs involve comprehensive public outreach including television and newspaper advertising, displays at community events, and the distribution, at no cost to residents, of used oil containers. In addition, some Permittees also conduct household hazardous round-ups or drop off events for their residents.

The public outreach efforts associated with the used oil recycling programs are comprehensive as is reflected in the public education materials that have been developed and distributed**.** Several Permittees also reported advertising the locations of used oil collection centers as well as participating in various used oil recycling programs and/or grants.

In 1999/00, the Permittees updated and distributed the used oil collection brochures for North, Central and South Orange County. The brochure provides information regarding locations within each city that will accept used motor oil and information regarding the proper disposal of oil filters. In 2000/01, 24 Permittees reported that they received a Used Oil Recycling grant.

5.2.8 Emergency Spill Response

The Permittees have all enacted the authority to control releases to the storm drain system through a common Water Quality Ordinance and each Permittee has designated the Authorized Inspector(s) responsible for enforcing the Ordinance (Sections 4.0 and 10.0).

Emergency responses to water pollution incidents are routinely undertaken by Permittee Authorized Inspector staff as well as various fire and police departments. Depending upon the type and cause of the incident, the Authorized Inspector may pursue a variety of administrative or criminal enforcement actions as they are outlined within the Water Quality Ordinance and accompanying Enforcement Consistency Guide.

5.2.9 Fertilizer and Pesticide Management

Overapplication, poorly timed applications, or off-target application of fertilizers can result in nutrients moving off the intended site and into water bodies where they can cause ecological impairment. Careful fertilizer application using techniques such as calibration of application equipment, adapting irrigation scheduling or method, delaying applications prior to storm events, and avoiding application to impermeable surfaces such as sidewalks and roads will reduce the likelihood that excess fertilizer will be carried from the intended site of application. Additionally, correct choice of fertilizer formulation and application rates based on soil or plant tests and the growth stage of the plant will result in improved plant health without overapplication of fertilizers.

Similarly, pesticides (insecticides, rodenticides, fungicides, molluscicides, and herbicides) must be applied with care to reduce off-site movement. The selection of pesticides must be based on proper identification of the pest and whether they control only the intended organisms causing the pest problem. Non-target application or off-site movement of pesticides can result in disruption of ecosystem, loss of beneficial organisms, and injury to landscape plants. Humans and wildlife can be detrimentally affected by both acute and chronic exposure to pesticides. Pests are best managed using an integrated system of tactics that include biological, mechanical, physical, cultural, and chemical control. This system known as integrated pest management, or IPM, relies on careful monitoring of the plants to identify when a chemical or other control action should be taken. When pesticides are applied, the one least disruptive to the environment is considered first and applied only to the sites where the pest is found. As with fertilizers, equipment must be calibrated in order to ensure that the correct amount is applied.

During the First Term Permit period, a model plan, entitled "Management Guidelines for use of Fertilizers and Pesticides", was developed to provide guidelines for application methods for fertilizers and pesticides, surface runoff minimization, accident mitigation and IPM. The Permittees subsequently implemented this model plan.

During this reporting period, the Permittees received an extensive questionnaire in order to assess the extent of the implementation of the guidelines. The questionnaire provided a method to track future changes in management practices and management measures by the Permittees and the effects of these changes on overall fertilizer and pesticide use.

Fertilizer Management

Each year of established landscape requires 1-3 lbs of nitrogen per 1000 sq. ft. while turfgrass requires from 3-8 lbs per 1000 sq ft. depending on the type of grass and if it is a cool or warm season (The California Master Gardner Handbook, University of California Cooperative Extension, Division of Agriculture and Natural Resources, Editor: Dennis Pittenger). One lb/1000 ft^2 is equivalent to 44lb/acre and 8 lb /1000ft^2 is equivalent to 352 lb/acre.

Thirty one of the Permittees provided actual fertilizer use data and reported that approximately 430,000 lbs of nitrogen and 110,000 lbs of phosphorus were reported applied to approximately 5,478 acres of public land during 2000/01 **(Table 5.22 and 5.23)**. Fertilizers are typically applied to landscape (trees, shrubs, groundcovers, and vines) and to turfgrass.

The number of pounds of actual nitrogen and phosphorus applied per acre by each permittee is shown in **Figure 5.4** and **Figure 5.5**, respectively.

Forty-seven percent of the permittees responded that a contractor or both a contractor and the permittee determine fertilizer application rates and the timing of fertilizer applications (**Table 5.24**). **Figure 5.6** details who determines how much fertilizer to apply and when for each individual permittee.

Regardless of who determines the rate and timing of fertilizer applications, 53% of the permittees conducted soil tests to determine baseline nutrient levels in the soil and of those permittees, 78% of them performed a soil test at least once a year (**Table 5.25**). Soil tests, with proper interpretation, results in better fertilizer management decisions by permittees and/or contractors. In addition, 79% performed regular equipment calibration to ensure the proper application rate.

The use of organic or slow-release fertilizers increased 34% over last year with 78% of the permittees utilizing these types of fertilizers.

Pesticide Management

The Permittees reported that, during 2000-2001, pesticides were applied on approximately 10,400 acres of public lands (**Table 5.26**).

In order to provide a more accurate account of the actual amount of pesticide applied to the public lands, the pounds of active ingredient (AI) were calculated for each pesticide. During the reporting period, a minimum of 25,000 pounds (AI) of pesticides was applied by permittees (**Tables 5.27 - 5.32**).

The total pounds (AI) of each pesticide category that were applied during the reporting period are as follows:

- Herbicides - 23,428 lbs (**Table 5.27 & Figure 5.7**);
- Rodenticides - 660 lbs **(Table 5.28 & Figure 5.8)**;
- Fungicides - 652 lbs **(Table 5.29 & Figure 5.9);**
- Insecticides - 227 lbs (**Table 5.30 & Figure 5.10);**
- Molluscides - 114 lbs **(Table 5.31 & Figure 5.11)**; and
- Plant Growth Regulators - 67 lbs (**Table 5.32 & Figure 5.12)**.

The herbicide active ingredient glyphosate accounted for 56% (14,088 pounds) of the total pounds of pesticide applied by permittees last year. In addition, the permittees reported the application of 7.9 lbs of the insecticide chlorpyrifos and 22.8 lbs of the insecticide diazinon.

Thirty-six percent of the permittees leave pesticide decisions to contractors while 32% of the permittees determine the types of pesticides that will be applied within their jurisdiction **(Table 5.33 and Figure 5.13**). The remaining permittees determine pesticide applications based on a combination of the permittee, the contractor, or another source such as a consultant.

A breakdown of who applies insecticides, herbicides, and fungicides is shown in **Figures 5.14 – 5.16**. Fifty-four percent of the permittees rely on a contractor to apply insecticides, 45% to apply herbicides, and 53% to apply fungicides. The percent of permittees applying these pesticides themselves is below 30% in all three of these categories.

Fifty-four percent of the permittees reported that more than 50% of their pesticide handling personnel possess a Qualified Applicators License (QAL) or a Pest Control Advisor (PCA) license (**Table 5.34**). It should be noted that at the minimum, all Permittees require either a QAL or equivalent County training for pesticide applicator personnel. Additional training is provided to pesticide handlers by 83% of the permittees. Some of this training is a requirement of maintaining a QAL or PCA license.

The calibration of pesticide application equipment is an important routine task implemented by 80% of the permittees. Although no spills of pesticides were reported, 100% of the reporting permittees reported implementing an accident mitigation plan in case of a spill.

Integrated Pest Management (IPM)

Twenty-seven (eighty percent) of the permittees reported implementing IPM techniques as recommended in the Management Guidelines for Fertilizer and Pesticides. In addition, twenty four Permittees also keep records of pest occurrences and the actions that were taken to correct the problem and twenty two feel that they are utilizing more IPM techniques than they had been previously (**Table 5.35 and Figure 5.17**).

An important component of an IPM program is the monitoring and identification of pests. The most common pests that the Permittees monitor for are insects (59%), weeds (35%), and vertebrates (38%). In addition, some permittees monitor for fungal plant diseases (15%) and/or snails (mollusks) (6%) (**Table 5.36 and Figure 5.18**).

The majority of permittees identified pests on their own (76%), from a book (65%), or consulted a Pest Control Advisor (79%). A smaller percentage consulted with the Agricultural Commissioner's Office in Orange County (53%); an important resource to utilize due to the increased rate of exotic pest introductions into California (**Table 5.37 and Figure 5.19**).

Specific alternatives to the use of pesticides includes(**Table 5.38 and Figure 5.20)**:

- Mechanical weed removal (79%);
- Non-chemical weed control techniques such as hand weeding (82%);
- The use of natural predators and parasites (21%);
- Utilizing mulch to suppress weed growth and reduce water loss from the soil surface (76%);
- Maintenance of the irrigation system to avoid stress and disease promoted by over or under watering (71%); and
- The removal of diseased plants to reduce the presence of disease causing agents such as fungal spores (74% of permittees).

Forty-four percent of the permittees also reported using "reduced" risk pesticides. "Reduced" risk pesticides are generally those that are highly selective, less toxic to non-target organisms, and have a short half-life. Examples of 'reduced" risk pesticides are insecticidal soaps and horticultural oils.

Assistance From the State of California Department of Pesticide Regulation

In June 2001, the County entered into an agreement with the State of California Department of Pesticide Regulation (DPR) to jointly fund a study of organophosphate pesticides in runoff from residential neighborhoods.

This study is designed to gather data on urban pesticides in irrigation and storm water runoff from residential neighborhoods. The monitoring portion of the study is expected to begin in December of 2000 and continue through March 2003. This multi-year study will provide baseline residential runoff data during both dry and wet-weather periods.

The study will also attempt to measure the effectiveness of runoff management practices on the test neighborhoods. Monitoring results from the study will allow the Santa Ana Regional Water Quality Control Board to more effectively complete the Source Allocation and Implementation Plan elements of its TMDL program for toxics for the Newport Bay watershed. The residential test areas also offer an opportunity for future test-implementation of a more pesticide-specific educational program.

Assistance From the University of California and the Cooperative Extension Program

In June 2001, the County entered into a five-year agreement with the University of California Cooperative Extension program to conduct water quality monitoring studies and implement water quality improvement programs in areas where the University has special expertise, particularly related to fertilizer and pesticide applications. The work will focus on, but not be restricted to, the impairments to the beneficial uses in the Newport Bay watershed that have resulted in the recent development of Total Maximum Daily Loads (TMDLs).

The tasks that were completed during 2000-2001 include:

- Reaching a formal agreement between the University and the County and developing a scope of work;
- Establishing the physical and personnel resources necessary to support the countywide fertilizer and pesticide initiative; and
- Providing input on and coordinating the revision the Fertilizer/Pesticide portion of the annual status report in order obtain better data from which management decisions can be made and future data compared to.

The first task that will be completed during 2001-2002 will be the submittal of a detailed description of tasks, which will better define how the following will be completed:

- NPDES annual status report questionnaire analysis;
- Fertilizer and pesticide management survey;
- Revision of the "Management Guidelines for Use of Fertilizers and Pesticides" and training;
- Peters Canyon Wash baseline water quality study; and
- UC Master Gardener water quality public outreach program

Training Provided

In October and November of 2000 the University of California Cooperative Extension and the San Diego County Flower and Plan Association sponsored a Pesticide Safety Training workshop for English and Spanish speaking employees. The first part of the two-part program was conducted in an interactive classroom, format covering topics from the pesticide safety information series. The second part featured in-depth discussions and hands-on breakout sessions on safety equipment, respirator fit testing, mixing and loading, leaks and spills and pesticide labels. Following the training, the employer received a tailored written program including a disciplinary policy.

Pesticide Brochure

As a result of the 319(h) Implementation Grant for the Newport Bay watershed, a brochure focusing on pesticide applications to residential areas was developed entitled "Keeping Pest Control Products Out of Creeks, Rivers and the Ocean". Sixty thousand copies of this brochure have been printed and will be distributed to Newport Bay watershed cities and other areas of the county as well (Section 6.2.1).

5.3 Training

5.3.1 General Stormwater Training

The Permittees reported attending numerous workshops or training opportunities that were provided throughout the reporting period (**Table 5.39**). The attendance included:

- In-house training of municipal staff (two Permittees);
- Cal Trans Stormwater Treatment and Practices workshop (four Permittees);
- Storm Drain Retrofits as Structural Controls for Stormwater (fourteen Permittees); and
- Urban Stormwater Conference (six Permittees).

5.3.2 Public Agency Training

Public agency staff conduct a number of activities at both fixed facilities and out in the field that could negatively impact water quality including painting, street cleaning, channel and pump station maintenance, etc. Therefore it is imperative that the employees be provided with training opportunities to ensure that the employees are educated regarding proper water quality awareness, protocol and stewardship.

Pollution Prevention Training

As a result of an Administrative Civil Liability (ACL) Complaint, the County of Orange agreed to develop a public agency training program to address a broad range of public agency activities that could result in unanticipated water quality impacts.

The training program developed addresses many aspects of water quality, including spill response, spill prevention, water quality law, the regulatory framework, pollution prevention, the storm drain and sanitary sewer system, types of pollutants, types of discharges, proper disposal of chemicals and trash, stormwater quality, source reduction, general water quality awareness and proper reporting procedure **(Appendix B**).

Aspects of the presentation include a question and answer session, informal dialogue conducive to active audience participation, and several water quality quizzes. Quizzes focused on pollution recognition, spill prevention, the storm drain and sewer system, water quality law and environmental framework.

In addition to the presentation, all those in attendance received pocket-sized "Personal Guides" and a poster for surface water protection and spill prevention. The pocket guides are compact and weather resistant, and designed to be used in the field. The pocket guide acts as a reminder to field crews to "think, be prepared, know, act and communicate" when addressing all activities with the potential to impact the water quality. The pocket guides also include contact information for County Authorized Inspectors if a question should ever arise amongst public agency employees and field workers **(Appendix B**).

The County held multiple training sessions and invited Permittee personnel from key municipal departments such as Public Works, Engineering, Transportation and Parks.

Two general training sessions were held on mornings and afternoons of August 23rd and August 28th 2000 for a total of four training sessions. The morning sessions were provided for the County of Orange Operation and Maintenance, Harbors, Beaches and Parks and Engineering staff and the afternoon sessions were also provided for the equivalent departments within the cities. Eleven Permittees attended the training.

On January 25, 2001 two additional training sessions were conducted. The morning session was a general training for the key departments within the municipalities and the afternoon session was a "train-the-trainers" session so that the key staff could take the training materials back to their respective jurisdictions and conduct further training. The morning session was attended by thirteen Permittees and the afternoon "train-the-trainers" session was attended by six Permittees.

5.3.3 Other Training

In addition to the above mentioned training, the Permittees also reported attending a variety of other training opportunities that may provide ancillary to water quality **(Table 5.40**).

Table 5.1
Elements of Litter Control

Permittee	Litter Ordinance	Clean-Up Programs	Special or Bulky Item Pickup	Public Trash Receptacles	Other
Anaheim	X	X	X	X	
Brea	X			X	Mail Inserts
Buena Park	X	X	X	X	
Costa Mesa	X	X	X	X	
Cypress	X		X	X	
Dana Point		X	X	X	Twice weekly litter pick up
Fountain Valley	X	X	X	X	
Fullerton			X	X	Litter and debris removed from roadsides where accumulation is known and predictable; rubbish disposal and collection ordinance allows for an unlimited amount of containers/receptacles per residence.
Garden Grove	X	X	X	X	Volunteer clean-up days, contractual street sweeping, trash service
Huntington Beach	X	X	X	X	Street Services Department picks up large items illegally dumped, cleans fence lines and dead end streets, sidewalks for debris.
Irvine			X	X	Contract for regularly scheduled litter control
La Habra	X	X	X	X	
La Palma	X			X	
Laguna Beach	X	X	X	X	Coastal Cleanup event; dog waste bag dispensers installed at Dog Park, Alta Laguna Park, & Moulton Meadows; public trash receptacles in business district
Laguna Hills	X	X	X	X	Daily litter pick up in parks.
Laguna Niguel	X	X		X	Litter Control is incorporated into the water quality ordinance. City provides trash receptacles at all city parks, all bus stops with benches, and the city also provides doggie bags for dog waste at the city dog park.
Laguna Woods	X				

Table 5.1
Elements of Litter Control

Permittee	Litter Ordinance	Clean-Up Programs	Special or Bulky Item Pickup	Public Trash Receptacles	Other
Lake Forest		X	X		
Los Alamitos			X		
Mission Viejo	X	X	X	X	Dog Waste Dispenser units
Newport Beach	X	X	X	X	Continued operation of trash boom near Newport Aquatic Center, on-water trash pick-up by City Staff.
Orange	X	X	X	X	City organizes NEP (Neighborhood Enhancement Programs) to target specific areas for litter cleanup and utilize young people ordered by courts to perform community service in lieu of other punishment. City street sweeping and storm channel maintenance efforts also ensure pickup of litter for proper disposal.
Placentia	X	X	X	X	
Rancho Santa Margarita		X			
San Clemente	X	X	X	X	
San Juan Capistrano	X		X	X	
Santa Ana	X	X	X	X	
Seal Beach	X	X	X	X	
Stanton			X		
Tustin	X		X	X	City also requires landscaping contracotrs to include litter pick-up in their activities.
Villa Park	X	X	X	X	
Westminster			X	X	Make a Difference Day
Yorba Linda	X	X	X	X	Special Holiday Collection from December 26, 2000 to January 9, 2001.
County of Orange	X	X	X	X	Trash and debris booms in five locations.

Table 5.2

Debris Booms In Orange County

Watershed/Area	Channel/Bay	Location	Installed & Maintained by	Status
Seal Beach	Federal Channel	Near 22 Fwy & 405 Fwy	County of Orange	In operation
	San Gabriel River	To be determined	City of Seal Beach	Preliminary design
East Garden Grove-Wintersburg	East Garden Grove-Wintersberg Channel	@ Farm bridge, P.C.H.	County of Orange	In operation
	East Garden Grove-Wintersberg Channel	To be determined	N/A	N/A
Huntington Watershed	Bolsa Chica Channel	Upstream of Edinger	County of Orange	In operation
	Bolsa Chica Channel	@ the confluence of Westminster	County of Orange	In operation
	Bolsa Chica Channel	@ Seabring Ave.	County of Orange	In operation
Talbert/Lower Santa Ana River Watershed	Greenville-Banning Channel	Upstream of Hamilton in the Greenville Banning Channel	County of Orange	In operation
Upper Newport Bay	Upper Newport Bay	Near Sunset Aquatic Center	City of Newport Beach	In operation since 1980s replaced in 1997
	Santa Ana-Delhi Channel	Downstream of Mesa Dr.	County of Orange	In operation
Newport Watershed	El Modena-Irvine Channel	@ confluence of Peters Canyon Channel	County of Orange	In operation
	Peters Canyon Channel	@ confluence of El Modena-Irvine Channel	County of Orange	In operation
Aliso Creek Watershed	Norco Channel	@ La Paz	County of Orange	To be installed

Table 5.3

Adjusted Percent Composition

	Storm Date								
Date	2/8/99	3/11/99	3/15/99	3/26/99	4/7/99	4/12/99	2/21/00*	10/27/00	Average
Location	S.A-D	S.A-D	S.A-D	S.A-D	S.A-D	S.A-D	S.A-D	E M-I	
Rainfall (in.)	0.16	0.12	0.24	0.56	0.43	0.12	1.06	1.01	0.4625
Organic**	42.8%	36.5%	56.1%	56.1%	48.7%	55.3%	35.2%	17.8%	43.6%
Plastic**	34.6%	46.6%	31.4%	27.6%	22.3%	32.4%	43.4%	48.1%	35.8%
Glass	2.4%	0.0%	3.6%	2.4%	1.9%	1.3%	9.8%	5.0%	3.3%
Rubber	2.3%	2.3%	2.5%	4.0%	3.0%	2.9%	5.8%	16.3%	4.9%
Metal	2.8%	13.2%	3.4%	7.7%	2.2%	6.4%	4.4%	6.1%	5.8%
Paper	1.8%	1.4%	1.4%	1.3%	0.7%	1.6%	0.6%	1.4%	1.3%
Cloth	0.3%	0.0%	1.5%	0.9%	0.4%	0.0%	0.8%	5.3%	1.2%
Other	13.0%	0.0%	0.0%	0.0%	20.8%	0.0%	0.0%	0.0%	4.2%

* data extrapolated from 15 bags sampled of 184 total
** data adjusted for sediment weight
S.A-D -- Santa Ana-Delhi
E M-I -- El Modena-Irvine

Table 5.4
California Coastal Commission Clean Up Day - Orange County Totals, 1996-2000

		1996	1997	1998	1999	2000
	Volunteers	4,649	4,052	3,310	4,382	3,750
	Trash (lbs)	38,906	41,114	67,112	65,900	55,051
	Recyclables (lbs)	3,914	4,211	1,243	8,841	3,914
	Total (lbs)	42,820	45,325	68,355	74,741	58,965
Top Five Items Collected	**Cigarette Butts**	N/A	N/A	5,720	14,587	N/A
	Foamed Plastic Pieces	N/A	N/A	4,361	9,650	N/A
	Plastic Pieces	N/A	N/A	1,360	4,630	N/A
	Paper Pieces	N/A	N/A	1,188	5,288	N/A
	Plastic Food Bags/Wrappers	N/A	N/A	1,360	5,621	N/A

Data obtained from http://www.coastal.ca.gov/publiced/pendx.html

Table 5.5
Solid Waste Collection

Permittee	Total Quantity of Solid Waste Collected (in Tons)	Comments
Anaheim	337,045	
Brea	68,110	
Buena Park	115,000	
Costa Mesa	321,568	Estimated tonnage includes the commercial and residential waste landfilled and diverted
Cypress	50,122	
Dana Point	52,130	Includes 12,330 tons of recyclables
Fountain Valley	64,000	
Fullerton	143,697	
Garden Grove	366,047	
Huntington Beach	263,721	
Irvine	341,503	
La Habra	76,000	
La Palma	15,000	
Laguna Beach	45,825	
Laguna Hills	42,000	
Laguna Niguel	31,608	
Laguna Woods	Unknown	City will adopt its SREE later this month and solid waste information will be available. City inherited trash franchises issued by the County and will not be able to intervene until 2005.
Lake Forest	68,702	
Los Alamitos	19,503	
Mission Viejo	174,087	
Newport Beach	No Report	
Orange	215,607	Includes % diversion of 55, 421 tons. City reports this to state in compliance with AB 939 requirements.
Placentia	56,838	
Rancho Santa Margarita	41,112	
San Clemente	82,630	
San Juan Capistrano	66,710	
Santa Ana	358,170	
Seal Beach	30,029	
Stanton	30,675	
Tustin	58,787	
Villa Park	6,000	
Westminster	36,000	
Yorba Linda	39,500	
County of Orange	142,015	

Total tons of solid waste collected **3,759,741**

Table 5.6
Frequency of Solid Waste/Recycling Public Service Announcements

Permittee	Television	Radio
Anaheim	Annually	
Brea	Annually, or as needed by contractor	
Costa Mesa	Quarterly	
Cypress	Ongoing	
Garden Grove	406 times during the year (3 PSA series focusing on recycling were aired for 48 weeks, 7 times each week; 1 stormwater PSA was aired for 10 weeks, 7 times each week)	
Huntington Beach	Ongoing	
Irvine	Cable TV ad promoting recycling at City parks ran over 8 month period	
Mission Viejo	Daily	
Orange	Ongoing	When event is scheduled
Rancho Santa Margarita	3 months (Summer)	
Seal Beach	Annually	
Tustin	Many during January, February, and March	
Yorba Linda	Continuous	
County of Orange	Regularly on local stations	

Table 5.7
Distribution Frequency of Solid Waste/Recycling Newsletters

Permittee	Frequency	Name of Newsletter
Anaheim	————	*Recycle Anaheim*
Brea	Annually	*Brea Line*
Costa Mesa	Quarterly	*Costa Mesa Community Newsletter*
Cypress	Quarterly	*Cypress City News*
Dana Point	Quarterly	*Dana Point Recreation Services & City Guide; Recycle News*
Fountain Valley	Quarterly	*Fountain Pen*
Fullerton	Quarterly	*Focus on Fullerton*
Garden Grove	Annually	*Recycle Garden Grove* (Sanitary District Newsletter)
Huntington Beach	Quarterly	*Sands*
Irvine	Bimonthly	*Watch Tower Times*
La Habra	Seasonally	*La Habra Journal*
La Palma	————	*La Palman*
Laguna Beach	Biannually	*Laguna Beach Recycling News*
Laguna Niguel	Quarterly	*Up The Creek*
Laguna Woods	Quarterly	*Wood Works*
Lake Forest	Annually	*The Leaflet*
Mission Viejo	Quarterly	*City Outlook*
Orange	Ongoing	
Placentia	Quarterly	*The Placentia Quarterly*
San Clemente	Quarterly	*Recycling News*
Seal Beach	————	*The Sun*
Westminster	Seasonally	*Westminster City Newsletter and Recreation Program*
Yorba Linda	Semi-annual	*Recycle Yorba Linda*
County of Orange	Annually	

Table 5.8
Frequency of Solid Waste/Recycling Brochures, Utility Bill Inserts and Other Distribution Methods

Permittee	Recycling Brochures	Utility Bill Inserts	Other Methods
Anaheim	Ongoing		Magnets (developed & provided); purchase, provide books to libraries (Ongoing)
Brea	Biannually, or as needed by contractor	Ongoing	Presentation to 900 students
Buena Park		Biannually	
Costa Mesa	Ongoing		
Cypress	Ongoing		City website (Ongoing)
Dana Point	Ongoing		Recycling video & special events (Quarterly)
Fountain Valley	Ongoing	Annually	Planet MRF Recycling Children's Workbook (Ongoing)
Fullerton	Ongoing		
Garden Grove	Ongoing	Biannually	
Huntington Beach	Ongoing	Seasonally	Material Recovery Facility Tours (Bimonthly)
Irvine	Outreach events	Annually	City website (Ongoing)
La Habra	Annually	Ongoing	OC Fair; I Love La Habra Fair Booth; Corn Festival Booth; Recycling assemblies at grade school (Ongoing)
La Palma	Ongoing		
Laguna Beach	Annually	Annually	
Laguna Hills	Quarterly		Brochures available at Public Counter (Ongoing)
Laguna Niguel	Ongoing		
Lake Forest	Ongoing	Annually	
Mission Viejo	Ongoing	Quarterly	Event advertising, notices, flyers, articles, info regarding curbside trash collection (Ongoing)
Newport Beach	Annually		Recycled oil info to commercial areas (Annually)
Orange	Ongoing	Annually	Coordinating with other groups (Ongoing)
Placentia	Annually		Also presented in annual Recycle Placentia Newsletter produced by Placentia Disposal (Annually)
Rancho Santa Margarita	Biannually	Quarterly	
San Clemente	Ongoing	Biannually	Website www.cty.org/san-clemente (Ongoing)
San Juan Capistrano		Quarterly	
Santa Ana	Annually	Biannually	Information sheets; newsletter; brochure (Ongoing)
Seal Beach	Biannually		
Stanton			Door Hanger (Annually)
Tustin	Ongoing		Handouts (Ongoing)
Villa Park	Ongoing	Ongoing	
Westminster	Annually		Code enforcement brochures, Guest lecture-Community group (Annually)
Yorba Linda	Ongoing		
County of Orange	Ongoing and at Outreach Events	Quarterly	Educational programs, awards programs, Cycler presentations, Community involvement (Ongoing)

Table 5.9
Drainage Facility Maintenance - Debris Removal

Permittee	Total Length of Channel/Pipe Cleaned (in miles)	Number of Catchbasins Cleaned (note units)	Total Volume Removed From Facilities		Material/Debris Characterization (as a percentage of total removed)					Method of Removal		
			Cu Yards	Tons	Soil	Vegetation	Paper	Plastic	Other	Vacuum Truck	Hand Crews	Other
Anaheim	48.24	5,531		1,480	20	70	5	5		95%	5%	
Brea	0	2,500		2	3	80	10	7	0			
Buena Park	0.02	25	2		50	10	20	10	10	10%	90%	
Costa Mesa	1.52	1,100		82	65	25	5	5	0	99%	1%	
Cypress	0.39	487		0.73	0	50	50	0	0	75%	25%	
Dana Point	0.20	189	43.28		90	3	3	2	2	100%		
Fountain Valley	0.50	1,965		419	12	63	18	4	3	95%	5%	
Fullerton	50	2,262	2,029		5	60	15	10	10	70%	25%	5%
Garden Grove	29.02	775	325	85	40	25	25	5	5		100%	
Huntington Beach	7.2	1,651		37.4	30	30	20	10	10	15%	85%	
Irvine	0.66	856		20.5	40	15	15	15	15	75%	25%	
La Habra	2.65	488		1	0	50	40	10			100%	
La Palma	5.24	180	15		40	30	5	5	20		100%	
Laguna Beach	0.47	617	98		52	38			10	5%	95%	
Laguna Hills	0	189	1,120		90	3	3	2	2	100%		
Laguna Niguel	0.94	741	206		46	42	5	5	2	1%	99%	
Laguna Woods	4.15	30	89		90	3	3	2	2	100%		
Lake Forest		304	5		15	80	3	2	0	100%		
Los Alamitos	1.25	40	5		20	20	20	20	20			
Mission Viejo	4.28	218	925		40	50	1	4	5	90%	10%	
Newport Beach		1,286		333	Not Reported							
Orange	7.5	766	1,755			50	1	1	48			
Placentia	0.05	207	5		30	20	50				100%	
Rancho Santa Margarita	0	106	126		90	3	3	2	2	100%		
San Clemente	17.4	477	21		70	20	7	2	1	65%	35%	
San Juan Capistrano		151			30	50	15	5		100%		
Santa Ana	4.58	427	293		1	96	1	1	1 (misc.)		100%	
Seal Beach		197	Not Reported							100%		
Stanton		170	Not Reported									
Tustin	0	540		2	80	15	2	2	1		100%	
Villa Park	0.40	95	270		52	45	1	1	1		50%	50%
Westminster	0.83	744		9	3	95	1	1	0	60%	40%	
Yorba Linda	0.66	315	50		70	20	5	5				
County of Orange	26.14	1,320		22,155	77	20	1	1	1	100%		
Totals	**214.29**	**26,949**	**7,382**	**24,627**								

Table 5.10
Storm Drain System Changes

Facility	Reach Changed	Type of Change	Date
City of Dana Point			
M00-P01	Calle Naranja & Calle Monterey	SD, CB	June 22, 2005
M00-P01	Calle Loma (Camino Capistrano to Avenida Las Palmas)	SD, CB	June 22, 2005
M00-P05	Camino Capistrano @ Camino De Estrella	SD, CB	June 22, 2005
M00-S01	Camino Capistrano (Mira Costa to Via Bella)	SD, CB	June 22, 2005
	Pacific Coast Hwy, 550 ft north of Del Obispo to Crystal Lantern	SD, CB	June 23, 2005
	Crystal Lantern, Manzanita Dr. to PCH	SD, CB	June 23, 2005
	Capistrano By the Sea from Village Drive northerly (Tract 15405)	SD, CB	In Construction
City of Garden Grove			
	Lampson Avenue Stormdrain	SD (From Arrowhead to Haga)	August 1, 2000
	Westminster Avenue Stormdrain	SD (From Taft to Euclid)	June 1, 2001
City of Huntington Beach			
Shields Pump Station	C05 to pump station	SD (36" to 60")	October 15, 2000
Slater Channel	Goldenwest to Springdale	OC	June 26, 2001
Goldenwest	C05 to Norma	SD	June 29, 2001
Broadway Complex	Palm Ave. to Silent Harbor Drive	SD (New 54" line)	June, 2001
City of Laguna Beach			
	From Ocean Front to outfall (approx 60")	66" RCP on Cleo Street	March 1, 2001

Table 5.10
Storm Drain System Changes

Facility	Reach Changed	Type of Change	Date
City of San Clemente			
New drain tributary to M02	Tract 15854	SD (New: 592 ft of 48")	July 1, 2000
New drain tributary to M02	Tract 13898	SD (New: 342 ft of 42")	July 1, 2000
New drain tributary to M02	Tract 14224	SD (New: 318 ft of 42")	July 1, 2000
New drain tributary to M02	Tract 15561	SD (New: 99 ft of 42")	July 1, 2000
New drain tributary to M02	Tract 15562	SD (New: 1,320 ft of 42")	July 1, 2000
New drain tributary to M02	Tract 15870	SD (New: 749 ft of 42")	July 1, 2000
Local drain lateral to M02	Near Calle Valle & Bonito	SD (Replaced existing 24" pipe w/ approx 900 ft of 48")	August 1, 2000
New drain tributary to M02	Tract 15863 & 15866	SD (New: 520 ft of 42", 200 ft of 48")	February 1, 2001
New drain tributary to M02	Tentative Tract 15561 & 15562	SD (New: 155 ft of 42", 720 ft of 48", 91 ft of 54", 271 ft of 60", 412 ft of 66")	November 1, 2001
City of San Juan Capistrano			
	Storm drain facility, Oso Road	SD (Replacement of two 24" diameter SD lines with one 54" diameter SD line)	February 1, 2001
City of Stanton			
C02	Western Avenue south of Katella	RCP (48" CMP to 48" RCP-U/S outlet to D/S outlet)	June 22, 2005
City of Yorba Linda			
	Santa Fe Street	SD	June 22, 2005
County of Orange			
L03B02	Galivan Basin	OC (Creek channel vertical wall and spillway constructed)	January 1, 2000
A03	At Knott Avenue, from 350' d/s Western Ave. to 150' u/s of Brea Blvd.	OC (Enhanced capacity of channel by improving both sides)	2000-01

SD = Storm Drain Extension, Addition or Replacement
CB = New Catch Basin
JS = Junction Structure
IS = Inlet Structure
RR = Rip Rap
OC = Open Channel Construction
BC = Box Culvert
SB = Stilling Basin
MC = Miscellaneous Construction
RCP = Reinforced Concrete Pipe

Table 5.11
Dry Weather Diversions

Permittees	Date Started	Channel Name	Location of Diversion	Costs for Diversion		Amount of Flow (Gallons Per Month)	Total Cost Per Month
				Setup Costs	Per Gallon Costs		
Dana Point	Spring 2000		Camino de Estrella	$25,000			
Huntington Beach	July 1, 1999	Huntington Beach (D01)	Atlanta Flood Station	$429	$0.000063	15,120,000	$953
		"	Newland Flood Station	$750	$0.000063	8,640,000	$544
	July 1, 1999	Talbert Channel (D02)	Banning Flood Station	$750	$0.000063	8,640,000	$544
	February 1, 2000	Talbert Channel (D02)	Flounder Flood Station	$3,000	$0.000063	2,160,000	$136
		"	Yorktown Flood Station	$3,000	$0.000063	2,160,000	$136
		"	Indianapolis Flood Station	$1,500	$0.000063	4,320,000	$272
		"	Adams Flood Station	$3,000	$0.000063	2,160,000	$136
	February 1, 2000	Santa Ana River (E01)	Hamilton Flood Station	$1,500	$0.000063	4,320,000	$272
		"	Meredith Flood Station	$750	$0.000063	8,640,000	$544
Laguna Beach	1987	Laguna Canyon (I02)	Laguna Canyon Rd @ Forest Ave.	$15,000	$0.00014	4,200,000	$567
	1997	Bluebird Canyon (I00P03)	Bluebird Cyn. Dr @ Coast Hwy	$30,000	$0.00169	900,000	$1,521
	1997	Hobo Canyon	Dumond Dr./ Victoria Beach	$10,000	$0.00259	150,000	$389
	1998	Local Flow	Fisherman's Cove	$10,000	$0.00267	60,000	$160
	1998	Local Flow	El Paseo @ Laguna Ave.	$30,000	$0.00245	300,000	$735
	1999	Local Flow	5th Ave. @ Coast Hwy	$10,000	$0.00404	60,000	$242
	2001	Local Flow	Barranca St. @ Cliff Dr.	$85,000	$0.00233	225,000	$524
	2001	Local Flow	Cleo St. @ Gaviota Dr.	$85,000	$0.00147	1,050,000	$1,544
Laguna Niguel	May 31, 2000	Sulphur Creek (J03P02)	Sulphur Creek/Aliso Creek Confluence	$40,000	$0.000664	5,235,180	$3,476
Newport Beach	March 1, 2001	Dunes West	Newport Dunes	$60,000	$0.0042	259,200	$1,089
	July 1, 2001	Buck Gully	Corona Del Mar	$23,000	$0.0005	5,184,000	$2,592
San Clemente	August 1, 2001	Marquita (M00S07)	Linda Lane at Via Mecha	$40,000	$0.00285	420,000	$1,197
	August 1, 2001	Los Lobos (M00S04)	N of Plaza a La Playa/200 ft. E of Railroad	$5,000	$0.0017	870,000	$1,479
County of Orange	May 1, 2001	Santa Ana River (E01)	U/S Talbert	$70,731	$0.00250	8,854,633	$22,137
	May 1, 2001	Talbert Channel (D02)	At Yorktown	$76,607	$0.00569	3,595,083	$20,456
	May 1, 2001	Greenville-Banning (D03)	U/S Hamilton	$85,334	$0.00382	6,437,867	$24,593
	May 1, 2001	Huntington Beach (D01)	Pump Station, D/S Adams Ave.	*			
	May 1, 2001	Aliso Creek (J01)	At Mouth Diversion	$35,000	$0.0050	7,021,821	$174
			Grand Totals	**$750,351**	**$0.0449**	**100,982,784**	**$86,412**

* Diversion was not pumped to the sanitary sewer and setup costs were allocated last fiscal year. Therefore, there are no costs associated with it.

Table 5.12
Additional Drainage Facility Sewer Diversions For Dry Weather Flows

Permittees	Channel	Location	Status
Dana Point	San Juan Creek (L01)	Alipaz Street between Stonehill Dr. & Del Obispo	In design, nearing construction
		Coast Highway between Camino Capistrano & Doheny Park Rd.	In design, nearing construction
	San Juan Creek (L01)	South of Del Obispo adjacent to Del Obispo Park	Preliminary Design
		Coast Highway North of Palisades Drive	In design
Laguna Beach	Local flow	Jasmine St @ Cliff Dr.	Being Designed, construction anticipated in 2002
	Local flow	Anita St @ Gaviota Dr.	Being Designed, construction anticipated in 2002
	Local flow	Oak St. @ Gaviota Dr.	Being Designed, construction anticipated in 2002
	Local flow	Ocean Way @ Pearl St.	Being Designed, construction anticipated in 2002
	Local flow	Dumond Dr. @ Ward's Terrace	Being Designed, construction anticipated in 2002
	Local flow	Cliff Dr. @ Myrtle St.	Being Designed, construction anticipated in 2002
	Local flow	1165 Gaviota Dr.	Being Designed, construction anticipated in 2002
	Local flow	Cress St. @ Gaviota Dr.	Being Designed, construction anticipated in 2002
	Local flow	Mountain Rd. @ Gaviota Dr.	Being Designed, construction anticipated in 2002
	Local flow	Cliff Dr. @ Aster St.	Being Designed, construction anticipated in 2002
Newport Beach	Newport Dunes storm drains	Newport Dunes	Planned for 01-02
	Carnation Ave Storm Drain	Harbor Patrol Beach	Planned for 01-02
San Clemente	Prima Deshecha Canada (M01)	Approx 150 yds U/S of outlet @ Poche Beach	Evaluation is continuing in coordination with County
	Cristianitos Creek Tributary	East end of Avenida Pico	Evaluation is continuing (developer initiative)

Table 5.13
Drain Inlet Stenciling

Permittee	Total Number of Catch Basins	# Of Basins Re-Stenciled 2000-2001	Phrase Used *	Color Scheme Used	Type of Application Used					Volunteer Organizations	
					Spray Paint	Curb Markers	Heat	Adhesives	Other:	Name	# of Basins Re-Stenciled
Anaheim	3,500	2,400		Blue Letters	100						
Brea	2,500	500		Blue on White			94	6			
Buena Park	791	0	Not Reported								
Costa Mesa	1,300	0		Blue on White		100					
Cypress	501	0		Black on White	100						
Dana Point	407	284		Black letters	100						
Fountain Valley	738	660		Blue on White	100						
Fullerton	1,684	500		Black Letters	100					Boy Scouts of America, Eagle Scout Projects	Approx 500
Garden Grove	775	0		Blue Letters on Concrete	100						
Huntington Beach	1,682	1,651		White Letters	100						
Irvine	3,116	377		Blue on White	30		70				
La Habra	552	16		Blue on White	100						
La Palma	180	0	Not Reported								
Laguna Beach	806	0	"Keep It Clean-Drains to Ocean"	Blue on White				33			
Laguna Hills	513	13		Black Letters	100						
Laguna Niguel	1,035	80		Blue Letters on Concrete	99.5	0.5					
Laguna Woods	60	60 *		Blue on White				100			
Lake Forest	438	60		Blue on White	100					Boy Scouts	50
Los Alamitos	80	25		Blue on White	100						
Mission Viejo	2,000	0		In Development		100					
Newport Beach	2,298	1,149	"No Dumping Drains to Bay"	Blue on White	50		50				
Orange	3,100	0		Blue on White				100			
Placentia	240	0		Blue on White	100						
Rancho Santa Margarita	120	0	Not Reported								
San Clemente	1,974	477		Black Letters	100					OC Conservation Corps	477
San Juan Capistrano	850	850		Blue on White		100					
Santa Ana	1,530	672		Blue on White	100						
Seal Beach	197	197		Blue on White				100			
Stanton	170	170		Black Letters	100						
Tustin	660	105	"Do Not Dump-Drains to Ocean"	Blue on White	100						
Villa Park	170	0	Not Reported								
Westminster	744	744		Blue on White	100						
Yorba Linda	1,164	240		Blue on White	73	27					
County of Orange	1,237	994		Blue on White		100					
Totals	**37,112**	**12,224**									

* Phrase used is "No Dumping Drains to Ocean" unless otherwise noted.

Table 5.14
Street Sweeping Practices

Permittee	Type of Sweeper			Frequency		
	Brush	Vacuum	Other	Commercial	Industrial	Residential
Anaheim	3	14		W	W	W
Brea	Not Reported			W	W	W
Buena Park		3		BW	W	W
Costa Mesa		5		W	W	W
Cypress	1	2		W	W	W
Dana Point		1		W	N/A	W
Fountain Valley	3			W	W	W
Fullerton		5		W	W	W
Garden Grove		3		W	BW	BW
Huntington Beach		4		BW	BW	BW
Irvine	2	1		BW	BW	BW
La Habra		2		W	W	W
La Palma	1	1		W	W	W
Laguna Beach	2			D	N/A	BW
Laguna Hills		1		W	W	BW
Laguna Niguel			2 Regenerative Air Sweepers	BW	BW	W
Laguna Woods	Not Reported			W	W	W
Lake Forest			3 Vacuum, brush & broom assisted trucks	W	W	W
Los Alamitos		1		W	W	W
Mission Viejo		1	2 Broom assisted, vacuum trucks	W	W	BW
Newport Beach	Not Reported			D	N/A	W
Orange	4	3		BW	BW	W
Placentia		2		BW	BW	BW
Rancho Santa Margarita	1			N/A		
San Clemente	Not Reported			W	W	M
San Juan Capistrano		1		D	BW	BW
Santa Ana	11			D	W	W
Seal Beach	1	1		W	W	W
Stanton		1		W	W	W
Tustin	2	2		W	W	W
Villa Park	1			N/A	N/A	BW
Westminster		2		BW	BW	BW
Yorba Linda		2		W	W	BW
County of Orange		3		BW	BW	BW
Totals	**32**	**61**	**7**			

D: Daily Frequency
W: Weekly Frequency
BW: Every Other Week
A: Annually
M: Monthly Frequency
BM: Every Other Month
BA: Every Other Year
O: On-Going
Q: Quarterly
N/A: Not Applicable

Table 5.15
Street Sweeping Practices To Ensure Effectiveness

Permittee	Parking Restrictions	Monitoring Frequency of Equipment Maintenance Activities	Streets Inspected For Effectiveness	
			Frequency	Visual Inspection
Anaheim	X	D	D	X
Brea		M	W	Supervisor, crew leader, sweeper operator and mechanics
Buena Park	X		W	X
Costa Mesa	X	O	D	X
Cypress	X	M	O	City relies on phone calls from residents who may observe performance of street sweeper as it travels through the neighborhood.
Dana Point	X	BM	W	X
Fountain Valley	X	D	D	X
Fullerton	X	D	D	X
Garden Grove	X	D	D	X
Huntington Beach	X	D	D	X
Irvine		D	D	X
La Habra		BW	D	X
La Palma	X	W	W	X
Laguna Beach	X	D	D	X
Laguna Hills		M	W	X
Laguna Niguel			M	X
Laguna Woods	X		W	X
Lake Forest		O	O	X
Los Alamitos	X		Q	X
Mission Viejo		D	D	X
Newport Beach	X		D	X
Orange	X	D	D	X
Placentia		D	O	X
Rancho Santa Margarita		M	M	X
San Clemente	X	D	D	X
San Juan Capistrano	X	BW	BW	X
Santa Ana	X	W	W	X
Seal Beach	X	M	M	Leadman who investigates any reported problems.
Stanton	X	W	W	X
Tustin	X	D	W	X
Villa Park	Not Reported			
Westminster	X	W	W	X
Yorba Linda		A	W	X
County of Orange	X	M	M	X

D: Daily Frequency
W: Weekly Frequency
BW: Every Other Week
M: Monthly Frequency
BM: Every Other Month
BA: Every Other Year
O: On-Going
Q: Quarterly

Table 5.16
Volume of Street Sweeping Material Collected

Permittee	Commercial				Industrial				Residential			
	Total	% Soil	% Leaves	% Trash/Debris	Total	% Soil	% Leaves	% Trash/Debris	Total	% Soil	% Leaves	% Trash/Debris
Anaheim	4,441 tons											
Brea	320 cu yds/month, 20% Soil, 40% Leaves, 40% Trash/Debris											
Buena Park	3.5 tons	10	70	20	1.5 tons	10	70	20	30 tons	10	70	20
Costa Mesa	416 tons	50	40	10	130 tons	Not Reported			130 tons	Not Reported		
Cypress	40 cu yds	10	70	20	Included with Commercial	10	80	10	Included with Commercial	10	80	10
Dana Point	155.9 tons	30	20	50	Not Reported				363.7 tons	10	80	10
Fountain Valley	213 tons	13	46	15	109 tons	13	46	15	1,790 tons	13	46	15
Fullerton	2,113 cu yds	5	5	90	214 cu yds	5	5	90	7,831 cu yds	70	70	25
Garden Grove	720 tons	33	33	34	360 tons	33	33	34	1,260 tons	33	33	34
Huntington Beach	98 tons	5	75	20	156 tons	5	65	30	3,246 tons	5	85	10
Irvine	300 tons	10	30	60	830 tons	10	20	70	924 tons	30	40	30
La Habra		5	65	30		5	65	30		1	85	14
La Palma	4-5 cu yds	40	30	30	4-5 cu yds	40	30	30	4-5 cu yds	40	30	30
Laguna Beach	685 cu yds	10	30	60	Included with Commercial				1364 cu yds	10	30	60
Laguna Hills	334.9 tons	25	60	15	Included with Commercial				219.6 tons	25	70	5
Laguna Niguel	67.7 tons	75	21	4	34.5 tons	75	21	4	285.5 tons	75	21	4
Laguna Woods	Not Reported											
Lake Forest	810 tons											
Los Alamitos	Not Reported											
Mission Viejo	919.2 tons (Total for calendar year 2000)											
Newport Beach	3,811 tons											
Orange	16,500 cu yds											
Placentia	1,040 tons	30	40	30	Included with Commercial	30	40	30	Included with Commercial	25	50	15-25
Rancho Santa Margarita	Not Reported											
San Clemente	364 cu yds	2	20	78	273 cu yds	2	20	78	1,080 cu yds	5	45	50
San Juan Capistrano	Not Reported											
Santa Ana	2 cu yds	85	12	3	16 cu yds	85	12	3	36.4 cu yds	60	30	10
Seal Beach	2,400 cu yds											
Stanton	2 tons				2 tons				8 tons			
Tustin	8,000 tons											
Villa Park	Not Reported											
Westminster	510 cu yds	5	5	90	159 cu yds	5	5	90	2,516 cu yds	5	15	80
Yorba Linda	761.5 tons											
County of Orange	1,216.5 tons											

Table 5.17
Municipal Facilities

City of Anaheim	
Anaheim Hills Golf Course	Fire Station No. 8
Anaheim Hills Yard	Fire Station No. 9
Anaheim Parking Plant	Fire Station No. 10
Arrowhead Pond of Anaheim	Fire Training Center
Boysen Park/Urban Foresty	Fleet Maintenance
Brookhurst Park	La Palma Park
Convention Center	Lenair Water Treatment Plant
Dad Miller Golf Course	Maxwell Park
Edison Int'l Field of Anaheim	Modjeska Park
Facility Maintenance	Pearson Park
Fire Station No. 1	Peralta Park
Fire Station No. 2	Streets & Sanitation No. 28
Fire Station No. 3	Toyon Park
Fire Station No. 4	Twila Reid Park
Fire Station No. 5	Utility Service Center
Fire Station No. 6	Wells, Reservoirs & Pump Stations
Fire Station No. 7	Yorba Park

City of Brea	
Municipal Plunge	Service Center

City of Buena Park
Vehicle Maintenance Yard

City of Costa Mesa	
City Hall	Fire Station No. 6
Downtown Community College	Lion's Park
Fire Station No. 1	New Corporation Yard
Fire Station No. 2	Old Corporation yard
Fire Station No. 3	Police Department
Fire Station No. 4	Public Golf Course & Country Club
Fire Station No. 5	

City of Cypress	
Police Department/Civic Center	Civic Center

Table 5.17
Municipal Facilities

City of Dana Point	
City Plaza/Dana Point City Hall	Del Obispo Community Center

City of Fountain Valley	
City Hall	Public Landscape Division Facility
City Yard	Recreation Center
Community Center	Streets Division Facility
Corporation Yard	Vehicle Maintenance Garage
Fire Station No. 1	Ward Sewage Lift Station
Fire Station No. 2	Water Division Facility
Police Station	

City of Fullerton	
Basque Yard	Fire Station No. 5
Fire Station No. 1	Fire Station No. 6
Fire Station No. 2	Independence Park
Fire Station No. 3	Main Plant
Fire Station No. 4	Police Department

City of Garden Grove	
City Hall	Fire Station No. 7
Fire Station No. 2	Municipal Service Center
Fire Station No. 3	Police & Fire Station
Fire Station No. 4	Willowick Golf Course
Fire Station No. 5	Woodbury Park
Fire Station No. 6	

City of Huntington Beach	
19001 Huntington Street	Joint Powers Train Center
Beach Maintenance Yard	Murdy Fire Station
Beach Maintenance Yard Offices and Garage	Park Maintenance Facility
Corporate Yard	Park, Tree & Maintenance Facility
D.W. Kiser Corporation Yard	Warner Fire Station
Gothard Fire Station	Water Operations & Warehouse

Table 5.17
Municipal Facilities

City of Irvine	
Alderwood Park	Hoeptner Park
Alton Athletic Park	Irvine Child Development Center
Animal Care Center	Irvine Civic Center
Blue Gum Park	Irvine Transportation Center
Bommer Canyon Cattle Camp	Meadowwood Park
Brywood Park	Northwood Community Park
Canyon Park	Operation Support Facility
Carrowood Park	Orchard Park
Central Bank (Dog Park)	Pepperwood Park
Chaparral Park	Pinewood Park
Citrusglen Park	Plaza Park
College Park	Presley Park
Col. Bill Barber Marine Corps Memorial Park	Ranch Park
Comstock Park	Rancho Senior Center
Coralwood Park	Raquet Club Park
Deerfield Community Park	San Carlo Park
Dovecreek Park	San Leandro Park
Flagstone Park	San Marco Park
Harvard Athletic Park	Silkwood Park
Harvard Skate Park	Sycamore Park
Heritage Park & Athletic Fields	Turtle Rock Community Park & Nature Center
Heritage Park & Aquatics Complex	Univ. Community Park Adventure Playground
Heritage Park Child Care Center	Valencia Park
Heritage Park Community Center	Willows Park
Heritage Park Fine Arts Center	Windrow Community Park
Hicks Canyon Park	Woodbridge Community Park & Sr. Center

City of Los Alamitos
No Identified Facilities

City of La Habra	
Police Station	Public Works Yard

City of La Palma	
City Yard & Pump Station	Dumpster Facility
Walker Well & Pump Station	Fire Station No. 2
City Hall Corporate Yard	Nursery

City of Laguna Hills
No Identified Facilities

City of Laguna Niguel
Crown Valley Community Park

City of Laguna Woods
No Identified Facilities

Table 5.17
Municipal Facilities

City of Lake Forest	
No Identified Facilities	

City of Mission Viejo	
Felipe Tennis Complex	Montanoso Recreation Center
Marguerite Recreation Center	Norman P. Murray Community & Sr. Center
Marguerite Tennis Center	Sierra Recreation Center
Mission Viejo Animal Center & Pet Bath	World Cup Soccer Center
Mission Viejo Library	

City of Newport Beach	
Big Canyon Resevoir	Newport Beach Lifeguard Office
General Services Yard	Newport Beach Police Department
Newport Beach City Hall	Utilities Yard
Newport Beach Fire Station	

City of Orange	
Corporation Yard	Police Department
Fire Station No. 1	Water Division (Public Works)

City of Placentia
Placentia City Corporation Yard

City of Rancho Santa Margarita
No Identified Facilities

City of San Clemente	
Maint. Service Fuel Island & Parking Structure	Utilities Division Materials Storage Area
Municipal Golf Course Offices & Garage	

City of San Juan Capistrano
City Hall Maintenance Yard

City of Santa Ana
Corporation Yard

City of Seal Beach	
Beverly Manor	Navy Reservoir (City Owned) on Navy Base
Beverly Manor Resevoir & Well	Public Works Yard/Garage
Bolsa Chica	Seal Beach Lifeguard Headquarters
First Street Beach Maintenance Shop	

Table 5.17
Municipal Facilities

City of Stanton	
10652 Bell Street	Orange County Fire Department

City of Tustin
Corporate Yard

City of Villa Park	
17855 Santiago Boulevard	10821 Lincoln Street

City of Westminster
Corporation Yard

City of Yorba Linda	
Bryant Ranch Historical House	Community Center
City Yard	Field House
City Library	Police Annex Building

County of Orange	
Aliso and Wood Canyons Wilderness Park	Yorba Regional Park
Carbon Canyon Park	Central Utility Facility
Caspers Wilderness Park	Health Care Complex
Craig Regional Park	Katella Yard
Laguna Niguel Regional Park	South Coastal Operations
Mason Regional Park	Fruit Street: Transportation
Mile Square Regional Park	Fruit Street: Facility Operations
Irvine Regional Park	SA Civic Ctr, Public Offices Complex, Civic Center Garage
Limestone-Whiting Ranch	SOC Regional Civic Center, Vehicle Maintenance
O'Neill Regional Park	Manchester Complex: Lacy Jail
Peters Canyon Regional Park	Sheriff Forensic Sciences Building
Reilly Wilderness Park	Sheriff-Coroner Civic Center
Santiago Oaks Regional Park	

Table 5.18 (A)
Environmental Performance Reporting 1996-2001

Permittee	1996/1997		1997/1998				1998/1999				1999/2000				2000/2001				
	New Significant Issues	Total Number of Facilities With Significant Issues	Existing Significant Issues	Total Number of Facilities With Significant Issues	New Significant Issues	Significant Issues Resolved	Existing Significant Issues	Total Number of Facilities With Significant Issues	New Significant Issues	Significant Issues Resolved	Existing Significant Issues	Total Number of Facilities With Significant Issues	New Significant Issues	Significant Issues Resolved	Existing Significant Issues	Total Number of Facilities With Significant Issues	New Significant Issues	Significant Issues Resolved	Existing Significant Issues 2000/01
Anaheim	83	24	83	24		68	15	13		1	14	13		12	2	6	6		8
Brea	3	1	3	1			3	1		3						1	1		1
Buena Park	5	1	5	1		4	1	1	1	1	1				1	1			1
Costa Mesa	14	10	14	10		12	2	2			2	2			2	1	1	2	1
Cypress	5	1	5	1			5	1			5	1	2	2	5	1	1	5	1
Dana Point																			
Fountain Valley	10	3	10	3		2	8	2			8	2			8			8	
Fullerton	1	1	1	1		1													
Garden Grove	12	10	12	10		1	11	10			11	10		10	1	1			1
Hunt. Beach	27	9	27	9	2	12	17	8		6	11	7		3	8	4		3	5
Irvine	1	1	1	1		1													
La Habra	5	1	5	1		2	3	1			3	1		1	2	1			2
La Palma	2	2	2	2			2	2		2									
Laguna Beach				4	4		4	4		1	3	3			3	2		1	2
Laguna Hills																			
Laguna Niguel																			
Laguna Woods																			
Lake Forest																			
Los Alamitos	1	1	1	1		1													
Mission Viejo																			
Newport Beach	5	3	5	3		5													
Orange	6	4	6	4		6													
Placentia	4	1	4	1		4													
Rancho Santa Margarita																			
San Clemente																1	1		1
S.J. Capistrano																1	2		2
Santa Ana	5	1	5	1		4	1	1	2	1	2	1			2			2	
Seal Beach	5	4	5	4	1	1	5				5				5			5	
Stanton	5	1	5	1		4	1	1			1	1			1	1			1
Tustin	3	1	3	1		0	3	1		2	1	1			1			1	
Villa Park	7	2	7	2		3	4	2			4	2			4	2			4
Westminster	5	1	5	1		4	1	1		1									
Yorba Linda	2	1	2	1		0	2	1			2	1			2	1		1	1
County of Orange	28	10	28	10	3	23	8	6		7	1	1		1		6	10		10
Total	244	94	244	98	10	158	96	58	3	25	74	46	2	29	47	30	22 *	28	41

= Facilities meet all Environmental Performance Reporting Criteria

* 4 Significant Issues were not reported in 99/00 (Anaheim, 3, and Cypress, 1)

Table 5.18 (B)
2000/01 Environmental Performance Report Significant Issues Action Plan Updates

Location	Significant Issue	Type Of Control	ACTION 1	ACTION 2	ACTION 3	START DATE	END DATE	Action Plan Complete & Revised End Date
City of Anaheim								
Boysen Park/Urban Forestry	Waste Storage	Non-structural	Purchase containers			12/1/97	12/31/01	No - 12/31/01
La Palma Park	Waste Storage	Non-structural	Purchase containers			12/1/97	12/31/01	No - 12/31/01
Streets & Sanitation #28	Material Storage	Structural	Install clarifier for Asphaltt/Dirt storage area			11/24/97	6/30/02	No - 6/30/02 Permanent metal roof to be installed instead of clarifier.
	General Stormwater Runoff	Structural	Install Clarifier for General Stormwater Runnoff			11/24/97	6/30/02	No - 6/30/02 Catch basin filter to be installed instead of clarifier.
Utility Service Center	Waste Storage	Non-structural	Evaluate feasibility of providing covered storage for hazardous waste			11/1/01	5/1/02	New
	Material Storage	Non-structural	Determination if stormwater runoff from material storage areas contain high levels of sediments or other "contaminants"			11/1/01	5/1/02	New
Wells, Reservoirs and Pumpstations	Spills Outside Containment	Non-structural	Investigate the feasibility of providing additional containment for entire tank system including piping.			11/1/01	5/1/02	New
Yorba Park	Waste Storage	Non-structural	Purchase containers			12/1/97	12/31/01	No - 12/31/01
City of Brea								
Service Center	General Stormwater Runoff	Non-structural	Design Project-Additional asphalt paving, storm drain catch basins and lighting facilities			5/1/02	10/1/02	New
City of Buena Park								
Vehicle Maintenance Yard	Small Spills	Structural	Construct Berm			5/1/98	No Date Reported	No - Specifics under review
City of Costa Mesa								
New Corporation Yard	Material Storage	Structural	Develop industrial waste system			12/1/00	12/15/00	Yes
	Material Storage	Structural	Place permanent covers over outdoor material storage areas	Request informal quotes from 3 manufacturers	Award Contract	3/1/02	6/30/02	New
Old Corporation Yard	Small & Large Spills	Structural	Construct roof for paint cleaning area & fence			No Date Reported	10/1/00	Yes - Ongoing
City of Cypress								
Corporation Yard	Waste Storage	Structural	Provide covered storage area for paint			2/1/98	1/1/01	Yes
	Leakage from Fluid Transfer Areas	Structural	Construct berm around perimeter of fluid storage area			11/1/00	1/1/01	Yes - Drum leak containment system purchased
	Small Spills	Non-structural	Relocate landscape equipment to cover			2/1/98	8/1/00	Yes
	Material Storage	Structural	Install roof over storage area			9/1/98	7/1/02	No - 7/1/02 Runoff berms placed at base of stroage bins canopy more than likely to be funded fiscal year 2001-02
	Vehicle/Equipment Washing	Non-structural	Increase frequency of vehicle maintenance			9/1/00	Ongoing	Yes - Ongoing
	Leakage from Storage Containers	Structural	Install berm around fluid drums in garage			9/1/00	9/30/00	Yes
City of Dana Point - No Exisitng Significant Issues								
City of Fountain Valley - No Existing Significant Issues								
Fire Station #2	Material Storage	Structural	Install Clarifier and roof cover			10/1/99	10/1/99	Yes - Facility relocated 12/99
City Yard	Material Storage	Structural	Install Clarifier and roof cover			4/1/98	10/1/98	Yes - Facility relocated 12/99
	Equipment/Vehicle Washing	Structural	Install Clarifier and roof cover			4/1/97	10/1/98	Yes - Facility relocated 12/99
	Waste Storage	Structural	Install Clarifier and roof cover			4/1/98	10/1/98	Yes - Facility relocated 12/99
	Leakage from Fluid Transfer Areas	Structural	Install Clarifier and roof cover			4/1/97	10/1/98	Yes - Facility relocated 12/99
	Small Spills	Structural	Install Clarifier and roof cover			6/1/98	6/1/99	Yes - Facility relocated 12/99
	Material Storage	Structural	Install Clarifier and roof cover			6/1/98	10/1/98	Yes - Facility relocated 12/99
	Vehicle/Equipment Washing	Structural	Install roof			6/1/98	6/1/99	Yes - Facility relocated 12/99

Table 5.18 (B)
2000/01 Environmental Performance Report Significant Issues Action Plan Updates

Location	Significant Issue	Type Of Control	ACTION 1	ACTION 2	ACTION 3	START DATE	END DATE	Action Plan Complete & Revised End Date
City of Fullerton - No Exisitng Significant Issues								
City of Garden Grove								
City Hall	Small Spills	Structural	Replace generator			TBD	12/22/05	No -12/22/25
City of Huntington Beach								
19001 Huntington Street	Waste Storage	Structural	Construct Roof For Fluoride Bulk Storage Area			1/1/98	12/1/1998 (Pending funding)	Yes - Action item is being deleted. Tanks are equipped with secondary containment, all stormwater runoff has been eliminated.
	Waste Storage	Structural	Relocate and construct covered storage area			1/1/00	12/1/01 (Funding needed)	No - 12/1/01 Project is contingent on Water Master Plan reservoir improvements.
Civic Center (& Police Dept.)	Waste Storage	Structural	Construct roof and berm	Add lids on bins		10/1/01	In Progress	No - in progress
	Vehicle/Equipment Washing	Structural	Construct vehicle washing bay			N/A	N/A	Yes - Item deleted. Contractor pressure washing vehicles with less than 2 gallons per car. Wash water reduced or virtually eliminated.
Joint Powers Train Center	Waste Storage	Structural	Construct Roof	Revised - Bins equipped with sealable lids		12/1/98	12/1/99	No
	Waste Storage	Non-structural	Provide spill clean up materials			11/15/97	On going	Yes - Ongoing
Park Maintenance Facility	Waste Storage	Structural	Construct berm			11/15/97	7/1/02	No - 7/1/02 City is evaluating other alternatives, including constructing a roof
	Large Spills	Structural	Construct roof			11/15/97	On going	No - Pending funding
City of Irvine - No Existing Significant Issues								
City of Los Alamitos - No Existing Significant Issues								
City of La Habra								
Public Works Yard	Equipment/Vehicle Washing	Structural	Install clarifier at wash rack			4/1/02	7/1/02	No - 7/1/02
	Waste Storage	Structural	Install oil/water separator at shop			4/1/02	7/1/02	No - 7/1/02
City of La Palma - No Existing Significant Issues								
City of Laguna Beach								
City Hall & Corporate Yard	Equipment/Vehicle Washing	Non-structural	Identify Improvements needed	Design structural controls (clarifier, settling basin, drain to sewer	Install structural controls	7/1/00	6/31/02	No - 6/30/02
Fire Station Two	Equipment/Vehicle Washing	Non-structural	Identify Improvements needed			1/1/99	7/1/03	No - 7/1/03 Vehicles are being washed at a separate facility while consultant designs system and until construction is completed
Nursery	Material Storage	Non-structural	Identify Improvements needed			1/1/99	10/1/00	Yes
City of Laguna Hills - No Existing Significant Issues								
City of Laguna Niguel - No Existing Significant Issues								
City of Laguna Woods - No Existing Significant Issues								
City of Lake Forest - No Existing Significant Issues								
City of Mission Viejo - No Existing Significant Issues								
City of Newport Beach - No Existing Significant Issues								
City of Orange - No Existing Significant Issues								
City of Placentia - No Existing Significant Issues								
City of Rancho Santa Margarita - No Existing Significant Issues								
City of San Clemente								
Utilities Division Materials Storage Area	Material Storage	Structural	Construct Retention Berm around Asphalt, Sand, Road Base, and Excavation storage bins	Tarpaulin Cover		9/4/01	9/26/01	New

Table 5.18 (B)
2000/01 Environmental Performance Report Significant Issues Action Plan Updates

Location	Significant Issue	Type Of Control	ACTION 1	ACTION 2	ACTION 3	START DATE	END DATE	Action Plan Complete & Revised End Date
City of San Juan Capistrano								
City Hall Maintenance Yard (Public Works/Utility Yard)	Material Storage	Structural	Design & installation of overhead covers fo asphalt storage area			FY 01-02	6/30/02	New
	Leakage from Fluid Transfer Areas	Structural	Design & installation of overhead covers fo fuel pumps			FY 01-02	6/30/02	New
City of Santa Ana - No Existing Significant Issues								
Corporation Yard	Material Storage	Structural	Construct a roof & containment berm	Train employees		1/5/98	Ongoing	Yes - Training Ongoing/Material relocated t covered area and placed in containment
	Leakage from Fluid Transfer Areas	Structural	Move drums to covered area & add containment berms	Train employees		1/1/00	Ongoing	Yes - Training Ongoing/Chemical Transfer areas relocated to covered area and placed in containment
City of Seal Beach - No Existing Significant Issues								
Beverly Manor	Material Storage	Structural	Construct a containment berm & roof			11/15/97	7/1/00	Yes
	Leakage from Fluid Transfer Areas	Structural	Construct a containment berm			11/15/97	7/1/00	Yes
Bolsa Chica	Material Storage	Structural	Construct a containment berm & roof			11/15/97	7/1/00	Yes
Public Works Yard/Garage	Leakage from Fluid Transfer Areas	Structural	Remove underground storage tanks			11/15/97	1/1/99	Yes
Seal Beach Lifeguard Headquarters	Leakage from Fluid Transfer Areas	Structural	Construct Containment Berm	Train Personnel		1/1/98	7/1/98	Yes
City of Stanton								
10652 Bell Street	Material Storage	Non-structural	Increase inspections of storage area	Train employees		11/15/97	On going	No - Enclosed storage pad with block on three sides and placed concrete on half of storage floor
City of Tustin - No Existing Significant Issues								
Corporate Yard	Waste Storage	Structural	Temporarily use sandbags as berms	Design/install canopy; Obtain wastewater discharge permit for wash rack discharge to sanitary sewer		7/1/00	7/1/01	Yes
City of Villa Park								
17855 Santiago Boulevard	Equipment/Vehicle Washing	Structural	Construct a containment berm, remove pump	Reduce size of on-site storage containers		1/1/98	1/1/05	No - 1/1/05 Still need berm
	Leakage from Fluid Transfer Areas	Structural	Remove gasoline pump, install clarifier	Construct a containment berm, effluent to sewer		1/1/99	1/1/02	No - 1/1/02 Pump and tank removed
	Waste Storage	Structural	Construct a containment berm & roof			1/1/99	1/1/02	No - 1/1/02
18021 Lincoln Street	Waste Storage	Structural	Cover waste bins			1/1/00	12/1/00	No - 12/1/00
City of Westminster - No Existing Significant Issues								
City of Yorba Linda								
City Yard	Small & Large Spills	Structural	Construct a containment berm			5/1/02	6/1/02	No-Construction delayed due to adjacent building remodel
	Small & Large Spills	Non-structural	Purchase spill clean up materials	Train employees, inspect daily, sweep		10/3/97	On going	Yes - On going
County of Orange								
Fruit Street: Transportation	Small & Large Spills	Non-structural	Purchase spill kit			10/26/01	11/30/01	New
Katella Yard	Waste Storage	Non-structural	Supervisor retrain staff	Ensure sufficient amount of collection barrels		11/9/01	11/30/01	New
	Equipment/Vehicle Washing	Non-structural	Sweep parking lots as needed	Dry season berm on sweeper debris bin	Regulate watering and fertilizing practices	11/13/01	Ongoing	New
Los Pinos Conservation Camp	Small & Large Spills	Non-structural	Purchase Spill Kits			12/1/01	On going	New
Manchester Complex: Lacy Jail	Equipment/Vehicle Washing	Non-structural	Relocate wash site			1/1/02	12/1/02	New
	Material Storage	Structural	Reseal overflow subcontainer to prevent water seepage	Hire vendor to reseal		8/6/01	1/1/02	New
O'Neill Regional Park	Small & Large Spills	Structural	Place Concrete berm to contain fuel spill			11/1/01	2/1/01	New
	Equipment/Vehicle Washing	Structural	Create vehicle wash area with runoff basin drain to shower system			Unknown	Unknown	New
	Waste Storage	Structural	Place asphalt berm to retain spills from trailor septic tank spills	Install a drain to sewer when park is connected		12/1/01	1/1/02	New
Sheriff-Coroner Civic Center	Equipment/Vehicle Washing	Structural	Write procedures for main jail maintenance crew			1/1/02	4/1/02	New

Table 5.19
Household Hazardous Waste Management Activities

Permittee	Does The City Collect Household Hazardous Waste?	City Household Hazardous Waste Examples	Does the City Have or Participate in a Used Oil Grant?	Types of Materials Collected	Does The City Refer Residents to the County Collection Centers?
Aliso Viejo					
Anaheim	No	----------	No Report	----------	Yes
Brea	No	----------	No	----------	Yes
Buena Park	No	----------	July 2001 - June 2003	----------	Yes
Costa Mesa	Yes	Roundups	July 2000 - July 2001	Household Hazardous Waste	Yes
Cypress	No	----------	July 2000 - July 2001	----------	Yes
Dana Point	No	----------	July 2000 - July 2001	----------	Yes
Fountain Valley	No	Drop Off Location	July 1997 - June 2002	Household Hazardous Waste	Yes
Fullerton	No	----------	July 1997 - July 2001	----------	Yes
Garden Grove	Yes	Door to Door	July 2000 - June 2003	Used Oil	Yes
Huntington Beach	No	----------	July 2000 - June 2001	----------	Yes
Irvine	No	----------	July 2000 - July 2001	----------	Yes
La Habra	Yes	Drop Off Location	July 2000 - June 2003	Household Hazardous Waste	Yes
La Palma	No	----------	No	----------	Yes
Laguna Beach	Bi-annually	Door to Door	July 1999 - June 2001	Household Hazardous Waste	Yes
Laguna Hills	No	----------	July 1997 - July 2003	----------	Yes
Laguna Niguel	No	----------	July 2000 - July 2001	----------	Yes
Laguna Woods			July 1999 - June 2002		
Lake Forest	Yes	Roundups	June 1997 - June 2004	Household Hazardous Waste	Yes
Los Alamitos	No	----------	No	----------	No
Mission Viejo	Yes	Drop Off Location	July 2000 - June 2003	Household Hazardous Waste	Yes
Newport Beach	No	----------	No	----------	Yes
Orange	Yes	Used Oil Pick-Up	July 2000 - July 2001	Used Oil	Yes
Placentia	Yes	Drop Off Location	July 2000 - July 2001	Household Hazardous Waste	Yes
Rancho Santa Margarita					
San Clemente	No	----------	May 2001 - May 2006	----------	Yes
San Juan Capistrano	No	----------	No	----------	Yes
Santa Ana	Yes	Drop Off Location	January 2000 - July 2002	Used Oil	Yes
Seal Beach	No	----------	July 1997 - July 2002	----------	Yes
Stanton	No	----------	July 2000 - July 2001	----------	Yes
Tustin	No	----------	July 1997 - July 2002	----------	Yes
Villa Park	No Report				
Westminster	No	----------	June 1997 - June 2000	----------	Yes
Yorba Linda	No	----------	No	----------	Yes
County of Orange	Operate Collection Centers	Drop Off Location	June 2000 - June 2003	Household Hazardous Waste	Yes

Table 5.20
2000/01 Integrated Waste Management
Household Hazardous Waste Program Collection Totals

Category	Type Of Waste	Collection Center Waste Volumes Collected (pounds)			
		Anaheim	Huntington Beach	Irvine	San Juan Capistrano
1. Flammable & Poison	Flammable Solid/Liquic	144,044	153,135	82,343	67,800
	Bulked Flammable Liquids	0	0	0	0
	Oil-Base Paint	184,273	180,779	106,513	86,558
	Poison (Excl aerosols)	39,006	31,118	20,326	16,000
	Reactive & Explosive	10	10	0	0
	Subtotal	**367,333**	**365,042**	**209,182**	**170,358**
2. Acid	Inorganic Acid	4,200	4,319	2,611	2,000
	Organic Acid	4,600	5,000	1,200	1,400
	Subtotal	**8,800**	**9,319**	**3,811**	**3,400**
3. Base	Inorganic Base	1,213	919	811	600
	Organic Base	5,613	6,800	3,200	4,000
	Subtotal	**6,826**	**7,719**	**4,011**	**4,600**
4. Oxidizer	Neutral Oxidizer	613	1,119	611	600
	Organic Peroxides	10	10	10	10
	Oxidizing Acid	200	0	0	0
	Oxidizing Base	200	200	200	400
	Subtotal	**1,023**	**1,329**	**821**	**1,010**
5. PCB -containing	PCB Containing Paint	0	0	0	0
	Other PCB Waste	0	0	0	0
	Subtotal	**0**	**0**	**0**	**0**
6. Aerosol	Corrosive Aerosols	400	1,200	200	200
	Flammable Aerosols	26,525	34,249	14,516	11,400
	Poison Aerosols	2,200	3,200	1,600	1,200
	Subtotal	**29,125**	**38,649**	**16,316**	**12,800**
7. Reclaimable	Antifreeze	23,324	27,192	14,825	6,775
	Car Batteries	83,960	121,360	53,640	41,600
	Fluorescent Bulbs	886	352	274	138
	Latex Paint	158,211	183,982	129,293	85,000
	Motor Oil/Oil Products	187,459	162,386	84,261	54,825
	Oil Filters	4,600	3,000	2,000	1,200
	Mercury (Metallic)	10	10	20	20
	Subtotal	**458,450**	**498,282**	**284,313**	**189,558**
8. Other	Medical Waste	0	0	0	0
	Household Batteries	2,150	1,800	2,280	500
	Other	3,424	32,741	22,682	10,400
	Subtotal	**5,574**	**34,541**	**24,962**	**10,900**
9. Asbestos		0	0	0	100
	Subtotal	**0**	**0**	**0**	**100**
	Collection Center Totals	**877,131**	**954,881**	**543,416**	**392,726**
	Grand Total Collected	**2,768,154**			

Table 5.21
Permittee Household Hazardous Waste Program Collection Efforts

Category	Type Of Waste	Garden Grove	Orange	Santa Ana	Costa Mesa	Fountain Valley	La Habra (temporary event)	Laguna Beach	Lake Forest	Mission Viejo	Placentia
		Oil Collection			HHW Roundup/Event						
1. Flammable & Poison	Flammable Solid/Liquid	0	0	0	6,934	200	2,710	15,940	1,788	5,027	612
	Bulked Flammable Liquids	0	0	0	0	0	510	0	0	810	0
	Oil-Base Paint	0	0	0	8,902	332	8,840	16,975	8,000	32,900	876
	Poison (Excl aerosols)	0	0	0	221	0	300	1,094	697	3,259	3
	Reactive & Explosive	0	0	0	0	0	0	0	0	0	0
	Subtotal	**0**	**0**	**0**	**16,057**	**532**	**12,360**	**34,009**	**10,485**	**41,996**	**1,491**
2. Acid	Inorganic Acid	0	0	0	234	0	340	664	162	713	8
	Organic Acid	0	0	0	0	0	0	0	0	155	0
	Subtotal	**0**	**0**	**0**	**234**	**0**	**340**	**664**	**162**	**868**	**8**
3. Base	Inorganic Base	0	0	0	269	0	450	1,013	159	795	43
	Organic Base	0	0	0	30	0	0	113	0	0	6
	Subtotal	**0**	**0**	**0**	**299**	**0**	**450**	**1,126**	**159**	**795**	**49**
4. Oxidizer	Neutral Oxidizer	0	0	0	4	0	60	9	0	0	1
	Organic Peroxides	0	0	0	15	0	10	266	4	4	1
	Oxidizing Acid	0	0	0	42	0	0	136	7	146	9
	Oxidizing Base	0	0	0	27	0	60	59	79	90	3
	Subtotal	**0**	**0**	**0**	**88**	**0**	**130**	**470**	**90**	**240**	**14**
5. PCB -containing	PCB Containing Paint	0	0	0	0	0	0	0	0	0	0
	Other PCB Waste	0	0	0	0	0	0	0	0	0	0
	Subtotal	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
6. Aerosol	Corrosive Aerosols	0	0	0	21	0	0	208	43	108	1
	Flammable Aerosols	0	0	0	655	19	750	1,032	460	1,578	45
	Poison Aerosols	0	0	0	172	4	0	503	0	143	8
	Subtotal	**0**	**0**	**0**	**848**	**23**	**750**	**1,743**	**503**	**1,829**	**54**
7. Reclaimable	Antifreeze	128	0	0	788	24	765	688	0	826	104
	Car Batteries (Avg 30 Lbs)	177	0	0	1,935	460	3,960	3,109	4,000	7,413	414
	Fluorescent Bulbs	0	0	0	0	0	0	0	0	0	0
	Latex Paint	0	0	0	10,838	1,794	3,536	26,116	9,260	23,840	1012
	Motor Oil/Oil Products (1 gal = 8.34 Lbs)	29,586	30,500	94,325	7,675	791	2,295	3,324	3,385	7,976	6288
	Oil Filters (Avg 1 Lbs)	967	1,023	3,692	106	0	0	30	0	0	193
	Mercury (Metallic)	0	0	0	0	0	5	0	1	9	0
	Subtotal	**30,858**	**31,523**	**98,017**	**21,342**	**3,069**	**10,561**	**33,267**	**16,646**	**40,064**	**8,011**
8. Other	Medical Waste	0	0	0	0	0	0	0	0	0	0
	Household Batteries	0	0	0	43	0	0	204	90	53	0
	Other	0	1,127	0	0	0	1,100	0	445	1,377	0
	Subtotal	**0**	**1,127**	**0**	**43**	**0**	**1,100**	**204**	**535**	**1,430**	**0**
9. Asbestos		**0**	**0**	**0**	**0**	**0**	**0**	**0**	**13**	**0**	**0**
	Collection Center Totals	**30,858**	**32,650**	**98,017**	**38,911**	**3,624**	**25,691**	**71,483**	**28,593**	**87,222**	**9,627**
	Grand Total Collected	**426,676**									

Category 1-7(Latex Paint)
Referred citizens to approved
dump centers for proper
disposal

Table 5.22
Permittee Fertilizer Application

Permittee	Brand Name	Amount Applied (lbs)	NPK Analysis					Estimated?	
			Nitrogen	Phosphorous	Potassium	N(lbs)	P(lbs)	Yes	No
Anaheim	Best Turf Super	3150	16	6	8	504	189		X
	Nitro King	100	33	10	19	33	10		X
	Turf Partner	200	15	4	6	30	8		X
	Nitro King	300	37	0	0	111	0		X
	Nitra King	5400	22	3	9	1188	162		X
	Turf Supreme	7680	16	6	8	1228.8	460.8		X
	Nitra King	5580	22	3	9	1227.6	167.4		X
	Sul Ammonium	450	21	0	0	94.5	0		X
	Ammonia Nitrate	1254	34	0	0	426.36	0		X
	Grow Power	200	5	3	1	10	6		X
	Grow Power Plus	350	5	3	1	17.5	10.5		X
	Best Tri-Kote	800	42	0	0	336	0		X
	Scotts Fertilizer	525	32	3	10	168	15.75		X
	Scotts Fairway	100	36	3	7	36	3		X
	Nutriculture	365	10	20	30	36.5	73		X
	Scotts Fairway	100	30	3	9	30	3		X
	Scotts Starter	650	19	25	5	123.5	162.5		X
	Nutriculture	125	28	8	18	35	10		X
	Best Cote	37370	15	5	17	5605.5	1868.5		X
	Scotts Greens	500	26	4	12	130	20		X
	Scotts Greens/Fung II	490	14	3	3	68.6	14.7		X
	Plant Marvel	5325	28	8	18	1491	426		X
	Parx IBDY	600	25	4	8	150	24		X
	Calcium Nitrate	2700	15	0	0	405	0		X
	Nitra King	8190	22	3	9	1801.8	245.7		X
	Best Starter	550	6	20	20	33	110		X
	Pollyon	1700	0	0	46	0	0		X
	Lesco Pro Turf	6230	21	7	14	1308.3	436.1		X
	Lesco Pro Emerg.	38950	19	3	7	7400.5	1168.5		X
	Best	150	16	6	8	24	9		X
	Lesco Pro Turf	800	5	0	26	40	0		X
	Lesco Pro Turf	14300	25	4	11	3575	572		X
	Lesco Potassium	8.5 gals	0	0	25	0	0		X
	Scotts Fertilizer	100	28	5	12	28	5		X
	Scotts Fertilizer	350	14	3	14	49	10.5		X
	Lesco Pro Turf	300	19	0	19	57	0		X
	Lesco Novex	500	18	2	18	90	10		X
	Lesco Pro Turf	3800	21	7	13	798	266		X
	Turf Supreme	2000	16	6	8	320	120		X
	Nitra King	200	22	3	9	44	6		X
	Sul Ammonium	600	21	0	0	126	0		X
	Best Fertilizer	600	21	0	0	126	0		X
	Best 16-6-8	400	16	6	8	64	24		X
	Calcium Nitrate	200	20	0	0	40	0		X
	Ammonium	200	22	0	0	44	0		X
	Gro-Power	100	0	0	0	0	0		X
						29454.46	**6616.95**		
Brea	Turf Royale	5000	21	7	14	1050	350		X
	Best with Trimek	1000	16	6	8	160	60		X
	Best Super From	400	9	9	9	36	36		X
						1246	**446**		
Buena Park	Turf Supreme	271161	16	6	8	43385.76	16269.66	N/A	N/A
						43385.76	**16269.66**		
Costa Mesa	Turf Royale	1000	21	7	14	210	70	X	
	Turf Supreme	10000	16	6	8	1600	600	X	
	Sulfur Coat Urea	500	31	0	0	155	0	X	
	Ammonia Nitrate	1000	34	0	0	340	0	X	
	Best 15-15-15	1000	15	15	15	150	150	X	
	Best 25-5-5	8000	25	25	25	2000	2000	X	
	Milorganite 6-2-0	10000	6	2	0	600	200	X	
						5055	**3020**		
Cypress	Turf Royal	750	21	14	7	157.5	105		X
						157.5	**105**		

Table 5.22
Permittee Fertilizer Application

Permittee	Brand Name	Amount Applied (lbs)	NPK Analysis					Estimated?	
			Nitrogen	Phosphorous	Potassium	N(lbs)	P(lbs)	Yes	No
Dana Point	Best 16-6-8	20000	16	6	8	3200	1200		X
	Calcium Nitrate	4000	16	6	8	640	240		X
	Ammonium	4000	22	0	0	880	0		X
	Gro-Power	4000	0	0	0	0	0		X
						4720	**1440**		
Fountain Valley	Best/Triple 15	75	15	15	15	11.25	11.25		X
	Greenway Biotech Pro Golf	12000	16	8	4	1920	960		X
	Best/Super Turf	3750	25	5	5	937.5	187.5		X
						2868.75	**1158.75**		
Fullerton	Turf Supreme	2200	16	6	8	352	132		X
						352	**132**		
Garden Grove	Best 6-20-20 Preplant	1500	6	20	20	90	300		X
	Best Turf Supreme	16000	16	6	8	2560	960		X
	Best Nitra King	8000	22	3	9	1760	240		X
	Agriform 20-10-5	92	20	10	5	18.4	9.2	X	
	Best Super Turf	6000	20	5	5	1200	300		X
						5628.4	**1809.2**		
Huntington Beach	Super Iron	3350	9	9	9	301.5	301.5	X	
	Turf Supreme & Trimac	300	16	6	8	48	18	X	
	Scott Pro Turf	55000	36	3	7	19800	1650	X	
	Nitraking	10000	22	3	9	2200	300	X	
	Turf Supreme	49400	16	6	8	7904	2964	X	
	Calcium	800	15	5	0	120	40	X	
						30373.5	**5273.5**		
Irvine	Ammonium Nitrate	10,200	37	0	0	3774	0		X
	Ammonium Nitrate	18600	34	0	0	6324	0		X
	Ammonium Sulphate	80500	21	0	0	16905	0		X
	Best Turf Supreme	102600	16	8	8	16416	8208		X
	Gro-More	45	20	20	20	9	9		X
	Pre-M Plus Fertilizer	800	0	0	7	0	0		X
	Sulphur Coated Urea	47000	39	0	0	18330	0		X
	Triple 20	15	20	20	20	3	3		X
	Triple 9	11150	0	9	9	0	1003.5		X
	Sequester Fe 13.2%	2.5	0	0	0	0	0		X
	FeRROMEC	12.75	15	0	0	1.9125	0		X
						61762.913	**9223.5**		
La Habra	Best Turf Supreme 16-6-8	3000	16	6	8	480	180		X
	Best Nitraking 22-3-3	1000	22	3	3	220	30		X
	BestTurf Supreme 16-68 w/ trimmer	500	16	6	8	80	30		X
	Turf Supreme	3700	16	6	8	592	222		X
	16-6-8	120	16	6	8	19.2	7.2		X
	Organic Mulch	1,253 yards	N/A	N/A	N/A				X
	BestTurf Supreme	2350	16	6	8	376	141		X
	Best Tri-Cote Sulfur Coated Urea	2300	42	0	0	966	0		X
						2733.2	**610.2**		
La Palma	Supreme Turf (Best Cote)	8,000	20	10	10	1600	800		X
						1600	**800**		
Laguna Beach	Nitro King (Turf)	2350	16	16	8	376	376	X	
	Turf Supreme	2350	16	16	8	376	376	X	
	Gro-More	200	20	20	20	40	40		X
	Gro-Power	300	16	6	8	48	18		X
						840	**810**		

Table 5.22
Permittee Fertilizer Application

Permittee	Brand Name	Amount Applied (lbs)	NPK Analysis					Estimated?	
			Nitrogen	Phosphorous	Potassium	N(lbs)	P(lbs)	Yes	No
Laguna Hills	Ammonium Sulfate	12000	21	0	0	2520	0		X
	Pro Balance	9000	15	15	15	1350	1350		X
	Nitra King	12000	22	3	5	2640	360		X
	Turf Gold	2000	21	3	5	420	60		X
	Turf Supreme	6000	16	6	8	960	360		X
	Sulfurcoated Urea	2000	37	0	0	740	0		X
	Best Tabs	345	20	10	5	69	34.5		X
	Soil Buster	18000	2	5	2	360	900		X
	Roots	66 gals	0	2	4	0	11		X
	Plus Trimeo	2000	16	6	8	320	120		X
						9379	**3195.5**		
Laguna Niguel	Super Turf	11300	20	10	10	2260	1130		X
	Best	28200	16	6	8	4512	1692		X
	Ammonium Sulfate	50737	21	0	0	10654.77	0		X
	Turf Gold	16305	22	5	5	3587.1	815.25		X
	Nitra King	41398	22	3	9	9107.56	1241.94		X
	Ammonium Nitrate	750	34	0	0	255	0		X
	Grow Power	82646	6	2	4	4958.76	1652.92		X
						35335.19	**6532.11**		
Laguna Woods	Best Turf Supreme	4000	16	6	8	640	240	X	
	Best 15 15 15	1500	15	15	15	225	225	X	
						865	**465**		
Lake Forest	Turf Supreme	180000	16	6	8	28800	10800		X
						28800	**10800**		
Los Alamitos	Scotts 26-4-4 w/ 24D Fertilizer	N/A	26	4	4			N/A	N/A
	Best	2,000	25	5	5	500	100		
						500	**100**		
Mission Viejo	Grow Power	8000	5	3	1	400	240		X
	Best Sulfate of Ammonium	113236	21	0	0	23779.56	0		X
	Best Nitra King	171274	22	3	9	37680.28	5138.22		X
	Best Fairway 36	1000	24	4	8	240	40		X
	Best Super Iron	52200	9	9	9	4698	4698		X
	Best Triple Pro	600	15	15	15	90	90		X
	Best Turf Supreme	17000	16	6	8	2720	1020		X
	Best Polyon	2000	42	0	0	840	0		X
	Best Soil Buster	24500	2	5	0	490	1225		X
						70937.84	**12451.22**		
Newport Beach	No Report								
Orange	Turf Supreme	3750	15	6	8	562.5	225	X	
	Nitro King	2150	21	7	14	451.5	150.5	X	
	Best	400	16	6	8	64	24	X	
						1078	**399.5**		
Placentia	Turf Supreme	10000	16	6	8	1600	600		X
	Nitra King	2000	22	3	9	440	60		X
	Super Turf	2000	25	5	5	500	100		X
						2540	**760**		
Rancho Santa Margarita	No Report								
San Clemente	Nitra Turf	4000	22	3	9	880	120		X
	Turf Supreme	4640	16	6	8	742.4	278.4		X
	Ammonium Sulfate	2100	21	0	0	441	0		X
	Super Iron	2200	9	9	9	198	198		X
	Pro Green	6000	12	4	6	720	240		X
	Potassium Nitrate	1000	13.75	0	46	137.5	0	X	
	Calcium Nitrate	2800	15.5	0	0	434	0	X	
	Ferrous Sulfate	400	0	0	0	0	0	X	
	Urea	300	34	0	0	102	0	X	
	Lesco 22-5-7	2000	22	5	7	440	100	X	
	Scotts 34-00	8000	34	0	0	2720	0	X	
						6814.9	**936.4**		

Table 5.22
Permittee Fertilizer Application

Permittee	Brand Name	Amount Applied (lbs)	NPK Analysis					Estimated?	
			Nitrogen	Phosphorous	Potassium	N(lbs)	P(lbs)	Yes	No
San Juan Capistrano	0-16-9	11 gal	0	16	9	0	14.7		X
	20-20-20	63	20	20	20	12.6	12.6		X
	Ammonium Nitrate	2800	34	20	20	952	560		X
	Iron	45 gal	n/a	n/a	n/a				X
	Nitroform	357	38	0	0	135.66	0		X
	Turf Mark	22 gal	n/a	n/a	n/a				X
	Urea	4147	46	0	0	1907.62	0		X
	Turf Supreme	36000	16	6	8	5760	2160		X
	Ammonium Sulfate	6000	21	0	0	1260	0		X
						8927.62	**2160**		
Santa Ana	Turf Supreme	67050	16	8	8	10728	5364		X
	Ammonium Sulfate	12600	20	0	0	2520	0		X
	Nitra King	26550	22	3	9	5841	796.5		X
	Sulfur Coated Urea	4400	42	0	0	1848	0		X
	Soil Buste Gypsum	5600	N/A	N/A	N/A				X
						20937	**6160.5**		
Seal Beach	Super Turf	2000	25	5	5	500	100		X
						500	**100**		
Stanton	Best Ammonium Sulfate	3500	21	0	0	735	0		X
	Best Turf Supreme	3500	16	6	8	560	210		X
						1295	**210**		
Tustin	Calcium Nitrate	2560	15	0	0	384	0		X
	Growth Product	3000	30	6	6	900	180		X
	Lesco	13000	16	6	8	2080	780	X	
	Lesco	13000	21	7	14	2730	910	X	
	Lesco	12000	13	13	13	1560	1560	X	
						7654	**3430**		
Villa Park	No Report								
Westminster	Super Turf	2050	16	8	4	328	164		X
	Rose Food	125	9	9	9	11.25	11.25		X
	Weed Control Lawn Food	1000	12	4	4	120	40		X
						459.25	**215.25**		
Yorba Linda	39-0-0	3000	39	0	0	1170	0		X
	46-0-0	4300	46	0	0	1978	0		X
	21-7-14	3250	21	7	14	682.5	227.5		X
	9-9-9 11	2100	9	9	11	189	189		X
	Turf Supreme	47000	16	6	8	7520	2820		X
	Nitra King	9000	22	3	9	1980	270		X
	34-0-0	6000	34	0	0	2040	0		X
	Super Iron	4000	9	9	9	360	360		X
	20-20-20	5000	20	20	20	1000	1000		X
	Triple Pro	1000	15	15	15	150	150		X
	Bests 16-6-8	2800	16	6	8	448	168		X
	Calcium Nitrate	6000	15	0	0	900	0		X
	Triple Twelve	8000	12	12	12	960	960		X
	Scott's	7000	22	10	10	1540	700		X
	Turf Supreme	12000	40	10	10	4800	1200		X
	Turf Supreme	12000	10	8	15	1200	960		X
						26917.5	**9004.5**		
County of Orange	GB Starter Fertilizer	500	25	5	5	125	25		X
	Starter Fertilizer	150	6	20	20	9	30		X
	Turf Royale Fertilizer	17750	21	7	14	3727.5	1242.5		X
	Turf Supreme	56300	16	6	8	9008	3378		X
	Super Turf	15000	25	5	5	3750	750		X
	Crown Royale	750	15	15	15	112.5	112.5		X
	Super Iron Plant Food	750	9	9	9	67.5	67.5		X
	Ortho Rose Pride Sys	12	8	12	4	0.96	1.44		X
	Agri Form Tablets	67	20	10	5	13.4	6.7		X
	Super Thrive	1 gal	N/A	N/A	N/A				X
	Calcium Nitrate	300	15	0	0	45	0		X
	Cocoa Mulch	30 cu ft	3	1	3				X
						16858.86	**5613.64**		

429,977 **110,248**

Table 5.23
Acreage of Fertilizer Application

Permittee	Land treated with fertilizers? (in acres)
Anaheim	90
Brea	75
Buena Park	166
Costa Mesa	200
Cypress	3.5
Dana Point	50
Fountain Valley	200
Fullerton	50
Garden Grove	160
Huntington Beach	521
Irvine	660
La Habra	136
La Palma	30
Laguna Beach	30
Laguna Hills	125
Laguna Niguel	151
Laguna Woods	5
Lake Forest	175
Los Alamitos	27
Mission Viejo	950
Newport Beach	No Report
Orange	188.38
Placentia	140
Rancho Santa Margarita	0
San Clemente	242
San Juan Capistrano	82
Santa Ana	70
Seal Beach	14
Stanton	16
Tustin	43
Villa Park	No Report
Westminster	18
Yorba Linda	380
County of Orange	480
Total	5,477.88

Table 5.24
Permittee Determination of Application Rates

Permittee	Determines application rates or timing			Determines application methods		
	City Personnel (%)	Contractor (%)	Both (%)	City Personnel (%)	Contractor (%)	Both (%)
Anaheim			100			100
Brea	100			100		
Buena Park	100			100		
Costa Mesa	100			15	85	
Cypress	100			100		
Dana Point		100			100	
Fountain Valley	100			100		
Fullerton	90	10		90	10	
Garden Grove	85	15		75	25	
Huntington Beach	100			100		
Irvine	100			50	50	
La Habra	100			100		
La Palma	100			100		
Laguna Beach	100			100		
Laguna Hills		100			100	
Laguna Niguel	100				100	
Laguna Woods		100			100	
Lake Forest	50	50			100	
Los Alamitos	100			100		
Mission Viejo	100			100		
Newport Beach	No Report			No Report		
Orange	100			100		
Placentia			100			100
Rancho Santa Margarita	No Report			No Report		
San Clemente	100			100		
San Juan Capistrano	75	25			100	
Santa Ana	75	25		75	25	
Seal Beach	100			100		
Stanton		100			100	
Tustin	85	15		40	60	
Villa Park	No Report			No Report		
Westminster	100			100		
Yorba Linda		95	5		100	
County of Orange	100			100		

Table 5.25
Fertilizer Compatibility and Organic/Slow Release Use

Permittee	Soils tested for compatibility with nutrient levels		Indicate the frequency			Were organic or slow release fert used?	Were they used more than last year?	
	Yes	No	1-3x per year	> 3x per year	Other: (specify)	Yes	Yes	No
Anaheim	X		X			X		X
Brea		X						X
Buena Park		X						X
Costa Mesa	X		X			X	X	
Cypress		X				X	X	
Dana Point	X		X			X		X
Fountain Valley	X		X			X		X
Fullerton	X		X					X
Garden Grove	X		X			X	X	
Huntington Beach	X		X			X		X
Irvine	X			X		X	X	
La Habra		X				X	X	
La Palma		X				X		X
Laguna Beach		X				X	X	
Laguna Hills	X			X		X	X	
Laguna Niguel	X				Every 2 yrs	X	X	
Laguna Woods		X						X
Lake Forest	X		X			X		X
Los Alamitos		X				X		X
Mission Viejo	X				As needed	X		X
Newport Beach	Not Reported					Not Reported		
Orange		X						X
Placentia		X				X		X
Rancho Santa Margarita		X						X
San Clemente	X		X			X		X
San Juan Capistrano	X		X			X	X	
Santa Ana	X		X			X		X
Seal Beach	X		X			X		X
Stanton		X				X		X
Tustin	X		X			X		X
Villa Park	Not Reported					Not Reported		
Westminster		X						X
Yorba Linda	X		X			X	X	
County of Orange		X				X	X	

Table 5.26
Acreage of Pesticide Application

Permittees	Acres Treated with Pesticides
Anaheim	817
Brea	82
Buena Park	155
Costa Mesa	250
Cypress	30
Dana Point	No Report
Fountain Valley	200
Fullerton	130
Garden Grove	130
Huntington Beach	737
Irvine	774
La Habra	136
La Palma	5
Laguna Beach	20
Laguna Hills	313.1
Laguna Niguel	151
Laguna Woods	5
Lake Forest	175
Los Alamitos	25
Mission Viejo	950
Newport Beach	No Report
Orange	28
Placentia	100
Rancho Santa Margarita	47.2
San Clemente	242
San Juan Capistrano	173
Santa Ana	400
Seal Beach	0
Stanton	16
Tustin	38.43
Villa Park	No Report
Westminster	103
Yorba Linda	21
County of Orange	4,145
Totals	**10,399**

Table 5.27
Permittee Herbicide Application

Permittee	Brand Name	EPA REG NO.	ACTIVE INGREDIENT (A.I.)	% A.I.	Amount Applied (Lbs)	Amount Applied (Gal)	Total Lbs AI Applied
Anaheim	Aquashade	33068-1-AA	Acid Blue 9	23.63	32		7.56
	Aquashade	33068-1-AA	Acid Yellow 23	2.39	32		0.76
	Chipco 26GT Flo	264-480-ZA	Iprodione	23.3		21.3	9.93
	Cutrine Plus	8959-10 AA	Copper Ethanolamine Complexes	9		2.5	0.20
	Dissolve	228-265-AA	Dicloroprop	23.8	2.6		0.62
	Dissolve	228-265-AA	MCPP	24.2	2.6		0.63
	Drexel MSMA	19713-42-AA	MSMA	47.6		0.3	0.86
	Fusilade II	10182-393	Fluazifop-P-butyl	24.5		0.375	0.18
	Manage	524-465-AA	Halosulfuron	75	0.75		0.56
	MCPP	228-192	Dimethylamine	26		0.46	0.28
	Proturf Fertilizer Plus Dicot Weed Control III	538-186	2,4-D	1.22	100		1.22
	Proturf Fertilizer Plus Dicot Weed Control III	538-186	Dicamba	0.08	100		0.08
	Proturf Fertilizer Plus Dicot Weed Control III	538-186	MCPP	1.22	100		1.22
	Roundup	524-308-AA	Glyphosate	41		3.4	5.58
	Roundup Pro	524-475	Glyphosate	41		24.2	39.69
	Surflan A.S.	62719-113	Oryzalin	40.4		0.3125	0.51
	Weed-hoe	50534-6-ZA-17545	MSMA	48.3		0.16	0.46
						Total	**70.33**
Brea	Roundup	524-308-AA	Glyphosate	41		61	100.04
	Surflan A.S.	1471-113	Oryzalin	40.4		18.2	29.41
						Total	**129.45**
Buena Park	Fusilade 4E	10182-67-AA	Fluazifop-P-butyl	46.5		50	46.50
	Roundup Pro	524-475	Glyphosate	41		250	410.00
	Roundup Prodry	524-505	Glyphosate	71.4	3.1		2.21
	Surflan A.S.	62719-112	Oryzalin	40.4		17.5	28.28
						Total	**486.99**
Costa Mesa	Cutrine Plus	8959-10 AA	Copper Ethanolamine Complexes	9		10	0.81
	Dimension	707-245	DITHIOPYR	12.7		5	0.64
	DIMENSION 270-G	7100-375	DITHIOPYR	0.27	1500		4.05
	Drexel MSMA	19713-42-AA	MSMA	47.6		14	39.98
	Fusilade II	10182-393	Fluazifop-P-butyl	24.5		2	0.98
	Lontrel	62719-305	Clopyralid	40.9		7	8.59
	Roundup Pro	524-475	Glyphosate	41		100	164.00
	Snapshot 2.5 TG	62719-175	Isoxaben	0.5	500		2.50
	Snapshot 2.5 TG	62719-175	Trifluralin	2	500		10.00
	TruPower	228-323-AA	Clopyralid	5.2		10	0.19
	TruPower	228-323-AA	Dicamba	4.7		10	0.17
	TruPower	228-323-AA	MCPA	48.1		10	18.04
						Total	**249.95**
Cypress	Roundup Pro	524-475	Glyphosate	41		21.9	35.92
						Total	**35.92**
Dana Point	Garlon 4	62719-40	Triclopyr	61.6		1.13	2.78
	Lontrel	62719-305	Clopyralid	40.9		1	1.23
	Pendulum WDG	241-340-AA	Pendimethalin	60	29		17.40
	Reward Aquatic and Noncrop	10182-353-ZA	Diquat dibromide	36.4		7.9	10.73
	Rodeo	524-343	Glyphosate	53.8		1.2	3.39
	Roundup Pro	524-475	Glyphosate	41		34.75	56.99
	Telar Herbicide	352-404-ZC	Chlorsulfuron	75	0.03		0.02
	Turflon Ester	62719-257	Triclopyr	61.6		14	34.50
						Total	**127.04**
Fountain Valley	Fusilade 2000	10182-104-AA	Fluazifop-P-butyl	13		2	0.26
	Gallery 75 Dry Flowable	62719-145	Isoxaben	75	5		3.75
	Manage	524-465-AA	Halosulfuron	75	0.225		0.17
	Pendulum WDG	241-268-ZA	Pendimethalin	60	21		12.60
	Pennant	100-691-AA	Metolachlor	86.4		2.5	17.28
	Reward Aquatic and Noncrop	10182-353-ZA	Diquat dibromide	36.4		3	4.07
	Ronstar 50 WSP	264-538	Oxadiazon	50	76		38.00
	Roundup Pro	524-475	Glyphosate	41		108	177.12
	Surflan A.S.	62719-113	Oryzalin	40.4		25	40.40
						Total	**293.65**

Table 5.27
Permittee Herbicide Application

Permittee	Brand Name	EPA REG NO.	ACTIVE INGREDIENT (A.I.)	% A.I.	Amount Applied (Lbs)	Amount Applied (Gal)	Total Lbs AI Applied
Fullerton	Cool Power Selective Herbicide	228- 317-AA- 17545	Dicamba	3.6		0.078	0.00
	Cool Power Selective Herbicide	228- 317-AA- 17547	MCPA	56.1		0.078	0.13
	Cool Power Selective Herbicide	228- 317-AA- 17546	Triclopyr	5		0.078	0.00
	Cutrine Plus Granular Algaecide	8959-12	Copper Ethanolamine Complexes	3.7	60		2.22
	Fusilade II	10182-393	Fluazifop-P-butyl	24.5		0.05	0.02
	Manage	524-465-AA	Halosulfuron	75	0.125		0.09
	Ronstar 50 WSP	264-538	Oxadiazon	50	4		2.00
	Ronstar G	264-445 -AA	Oxadiazon	2	4		0.08
	Roundup Pro	524-475	Glyphosate	41		257.5	422.30
	Surflan A.S.	62719-113	Oryzalin	40.4		83.5	134.94
						Total	**561.79**
Garden Grove	Manage	524-465-AA	Halosulfuron	75	0.04		0.03
	Oust Herbicide	325-401-ZA	Sulfometuron Methyl	75			
	Roundup Pro	524-475	Glyphosate	41		94.25	154.57
	Simazine 90	19713- 252-AA	Simazine	90	212		190.80
	Sim-trol 9DF	35915-12-60063	Simazine	90	10		9.00
	Surflan A.S.	1471-113	Oryzalin	40.4		3.9	6.30
	Turflon Ester	62719-258	Triclopyr	61.6		3.5	8.62
						Total	**369.33**
Huntington Beach	Aquamaster	524-342-ZF	Glyphosate	53.8		0.5	1.41
	Barricade 65WG	100-834-AA	Prodiamine	65	15		9.75
	Fusilade 2000	10182-104-AA	Fluazifop-P-butyl	13		0.3	0.04
	Gallery 75 Dry Flowable	62719-146	Isoxaben	75	137.5		103.13
	Gallery 75 Dry Flowable	62719-145	Isoxaben	75	40.5		30.38
	Manage	524-465-AA	Halosulfuron	75	0.22		0.17
	Reward Landscape	10182-404-ZA	Diquat dibromide	37.3		1.25	1.74
	Trimec Plus	2217-709-ZA	2, 4-D	5.8		0.5	0.01
	Trimec Plus	2217-709-ZA	Dicamba	1.5		0.5	0.00
	Trimec Plus	2217-709-ZA	MCPP	2.9		0.5	0.00
	Trimec Plus	2217-709-ZA	MSMA	18		0.5	0.16
						Total	**146.79**
Irvine	Aquashade	33068-1-AA	Acid Blue 9	23.63	158.56		37.47
	Aquashade	33068-1-AA	Acid Yellow 23	2.39	158.56		3.79
	Barricade 65WG	55947-43	Prodiamine	65	5		3.25
	Cutrine Plus	8959-10 AA	Copper Ethanolamine Complexes	9		80	6.48
	Dimension	707-245	Dithiopyr	12.7		17.5	2.22
	Diuron 80	19713- 274-AA	Diuron	80	12		9.60
	Fusilade II	10182-393	Fluazifop-P-butyl	24.5		0.19	0.09
	Garlon 4	62719-40	Triclopyr	61.6		16	39.42
	Glyphos	524- 445-AA- 4787	Glyphosate	41		5.3	8.69
	Goal 1.3E	707-174	Oxyfluorfen	19.4		3.5	0.88
	Honcho	524- 445-ZE	Glyphosate	41		8.25	13.53
	Mecomec 4	2217-674	Potassium Salt	45.1		15.75	28.41
	Oust Herbicide	325-401-ZA	Sulfometuron Methyl	75	6.3125		4.73
	Pendulum 3.3EC	241-341-ZC	Pendimethalin	37.4		21.6	26.66
	Pre-M Plus Fertilizer	10404-82	Pendimethalin	0.86			0.00
	Reward Landscape	10182-404-ZA	Diquat dibromide	37.3		0.32	0.45
	Rodeo	524-343	Glyphosate	53.8		8	22.60
	Ronstar G	264-445 -AA	Oxadiazon	2	631		12.62
	Roundup Pro	524-475	Glyphosate	41		278.2	456.25
	Scythe	53219-7	Pelargonic Acid	60		2.5	6.30
	Telar DF Herbicide	352-522	Chlorsulfuron	75	0.375		0.28
	Trimec	2217-517-ZA	2, 4-D	30.6		71.7	53.53
	Trimec	2217-517-ZA	Dicamba	2.8		71.7	0.44
	Trimec	2217-517-ZA	MCPP	16.3		71.7	15.19
	Triplet Selective Herbicide	228-264-AA	2, 4-D	30.6		10.3	8.86
	Triplet Selective Herbicide	228-264-AA	Dicamba	2.8		10.3	0.07
	Triplet Selective Herbicide	228-264-AA	MCPP	8.2		10.3	0.63
	Turflon Ester	62719-258	Triclopyr	61.6		2.3	5.67
						Total	**768.13**

Table 5.27
Permittee Herbicide Application

Permittee	Brand Name	EPA REG NO.	ACTIVE INGREDIENT (A.I.)	% A.I.	Amount Applied (Lbs)	Amount Applied (Gal)	Total Lbs AI Applied
La Habra	Orthro Weed B-Gon	2217- 570-ZD- 239	2, 4-D	31		1	0.27
	Orthro Weed B-Gon	2217- 570-ZD- 239	Dicamba	1.3		1	0.00
	Orthro Weed B-Gon	2217- 570-ZD- 239	MCPP	10.6		1	0.03
	Pendulum WDG	241-340-AA	Pendimethalin	60	16.5		9.90
	Rodeo	524-343	Glyphosate	53.8		0.3	0.85
	Roundup Pro	524-475	Glyphosate	41		63.5	104.14
	Roundup Pro	524-475	Glyphosate	41		17.5	28.70
	Spectracide Pro Broadleaf	2217- 694-AA- 8845	2, 4-D	30.6		1	0.75
	Spectracide Pro Broadleaf	2217- 694-AA- 8845	Dicamba	2.8		1	0.01
	Spectracide Pro Broadleaf	2217- 694-AA- 8845	MCPP	16.3		1	0.21
	Surflan A.S.	62719-113	Oryzalin	40.4		18.35	29.65
	Trimec	2217-517-ZA	2, 4-D	30.6		10	7.47
	Trimec	2217-517-ZA	Dicamba	2.8		10	0.06
	Trimec	2217-517-ZA	MCPP	16.3		10	2.12
	Weed-hoe	50534-6-ZA-17545	MSMA	48.3		1	2.90
						Total	**187.05**
La Palma	Roundup Pro	524-475	Glyphosate	41		2.1	3.44
						Total	**3.44**
Laguna Beach	Fusilade II	10182-393	Fluazifop-P-butyl	24.5		0.015	0.01
	Garlon 4	62719-40	Triclopyr	61.6		0.078	0.19
	Ronstar G	264-445 -AA	Oxadiazon	2	300		6.00
	Roundup Pro	524-475	Glyphosate	41		16.8	27.55
						Total	**33.75**
Laguna Hills	Barricade 65WG	100-834-AA	Prodiamine	65	60		39.00
	Fusilade II	10182-393	Fluazifop-P-butyl	24.5		4	1.96
	Oust Herbicide	325-401-ZA	Sulfometuron Methyl	75	15.93		11.95
	Pendulum WDG	241-340-AA	Pendimethalin	60	38		22.80
	Reward Aquatic and Noncrop	10182-353-ZA	Diquat dibromide	36.4		0.21	0.29
	Rodeo	524-343	Glyphosate	53.8		9.53	26.92
	Roundup Pro	524-475	Glyphosate	41		93.55	153.42
	Telar Herbicide	352-404-ZC	Chlorsulfuron	75	3.04		2.28
	Turflon Ester	62719-258	Triclopyr	61.6		14	34.50
	Weedone LV4	264- 20-ZA	2,4-D Butoxyethanol ester	60.8			
	XL 2G	62719-136-AA	Benefin	1	22,000		220.00
	XL 2G	62719-136-AA	Oryzalin	1	22,000		220.00
						Total	**733.11**
Laguna Niguel	Confront	62719-92	Clopyralid	12.1		0.002	0.00
	Confront	62719-92	Triclopyr	33		0.002	0.00
	Dimension 270-G	7100-375	Dithiopyr	0.27	45.87		0.12
	Fusilade II	10182-393	Fluazifop-P-butyl	24.5		0.006	0.00
	Helena Brand MSMA Plus H.C.	5905-164	MSMA	47.6		0.66	1.88
	Pendulum 3.3EC	241-341-ZC	Pendimethalin	37.4		0.004	0.00
	Ronstar G	264-445 -AA	Oxadiazon	2	26.16		0.52
	Roundup Pro	524-475	Glyphosate	41		14.3	23.45
	Treflan 5G	62719-98	Trifluralin	5	1704		85.20
	Trimec	2217-543-ZA	2, 4-D	25.9		11	5.78
	Trimec	2217-543-ZA	Dicamba	2.8		11	0.06
	Trimec	2217-543-ZA	MCPP	13.9		11	1.65
						Total	**118.69**
Laguna Woods	Roundup Pro	524-475	Glyphosate	41		1000	1640.00
						Total	**1640.00**
Lake Forest	Dimension 270-G	7100-375	Dithiopyr	0.27	4000		10.80
	Fusilade II	10182-393	Fluazifop-P-butyl	24.5		3	1.47
	Roundup Pro	524-475	Glyphosate	41		60	98.40
	Turflon Ester	62719-258	Triclopyr	61.6		3	7.39
						Total	**118.06**
Mission Viejo	Fusilade 2000	10182-104-AA	Fluazifop-P-butyl	13		7	0.91
	Pre-M 3.3 EC	241- 360-AA- 10404	Pendimethalin	38.4		5	6.34
	Ronstar G	359-659-AA	Oxadiazon	2	6000		120.00
	Roundup Pro	524-475	Glyphosate	41		147	241.08
	Triplet W.S.	228-283-ZA	2, 4-D	60.2	0.12		0.07
	Triplet W.S.	228-283-ZA	Dicamba	6	0.12		0.01
	Triplet W.S.	228-283-ZA	MCPP	24.2	0.12		0.03
	Turflon Ester	62719-258	Triclopyr	61.6		31	76.38
	Weed-hoe	50534-6-ZA-17545	MSMA	48.3		22	63.76
	XL 2G	62719-136	Benefin	1	12000		120.00
	XL 2G	62719-136	Oryzalin	1	12000		120.00
						Total	**748.57**

Table 5.27
Permittee Herbicide Application

Permittee	Brand Name	EPA REG NO.	ACTIVE INGREDIENT (A.I.)	% A.I.	Amount Applied (Lbs)	Amount Applied (Gal)	Total Lbs AI Applied
Orange	Dimension	707-245	Dithiopyr	12.7		250	31.75
	Fusilade II	10182-393	Fluazifop-P-butyl	24.5		10	4.90
	Manage	524-465-AA	Halosulfuron	75	0.5		0.38
	Reward Aquatic and Noncrop	10182-353-ZA	Diquat dibromide	36.4		16	21.72
	Roundup Pro	524-475	Glyphosate	41		938	1538.32
	Snapshot 2.5 TG	62719-175	Isoxaben	0.5	50		0.25
	Snapshot 2.5 TG	62719-175	Trifluralin	2	50		1.00
	Trimec	2217-517-ZA	2, 4-D	30.6		450	335.99
	Trimec	2217-517-ZA	Dicamba	2.8		450	2.77
	Trimec	2217-517-ZA	MCPP	16.3		450	95.36
	Turflon Ester	62719-258	Triclopyr	61.6		880	2168.32
						Total	**4200.75**
Placentia	Fusilade II	10182-393	Fluazifop-P-butyl	24.5		0.07	0.03
	Manage	524-465-AA	Halosulfuron	75	0.125		0.09
	Roundup Pro	524-475	Glyphosate	41		10	16.40
	Surflan A.S.	1471-113	Oryzalin	40.4		3	4.85
						Total	**21.38**
Rancho Santa Margarita	Oust Herbicide	325-401-ZA	Sulfometuron Methyl	75	0.06		0.05
	Rodeo	524-343	Glyphosate	53.8		0.1	0.28
	Roundup Pro	524-475	Glyphosate	41		12.63	20.71
						Total	**21.04**
San Clemente	Fusilade II	10182-393	Fluazifop-P-butyl	24.5		3.25	1.59
	Gallery 75 Dry Flowable	62719-145	Isoxaben	75	3		2.25
	Lontrel	62719-305	Clopyralid	40.9		6	7.36
	MCPP	228-192	Dimethylamine	26		2	1.20
	Proturf Weedgrass Control	538-193	Pendamethalin	1.71	5000		85.50
	Ronstar G	264-445 -AA	Oxadiazon	2	880		17.60
	Roundup Pro	524-475	Glyphosate	41		73.3	120.21
	Surflan A.S.	62719-113	Oryzalin	40.4		20.7	33.45
						Total	**269.16**
San Juan Capistrano	Fusilade II	10182-393	Fluazifop-P-butyl	24.5		1	0.49
	Kerb 50W in WS pouches	707-159-AA	Propyzamide	51	3		1.53
	Lontrel	62719-305	Clopyralid	40.9		3	3.68
	Manage	524-465-AA	Halosulfuron	75	0.01		0.01
	Pendulum WDG	241-340-AA	Pendimethalin	60	148		88.80
	Reward Landscape	10182-404-ZA	Diquat dibromide	37.3		5	6.96
	Rodeo	524-343	Glyphosate	53.8		20	56.49
	Roundup Pro	524-475	Glyphosate	41		103	168.92
	Triplet SF	228-312-AA	2, 4-D	30.6		12	10.32
	Triplet SF	228-312-AA	Dicamba	2.8		12	0.09
	Triplet SF	228-312-AA	MCPP	8.2		12	0.74
	Turflon Ester	62719-258	Triclopyr	61.6		0.08	0.20
	weed stopper	54705-5	Oryzalin	40.4		2	3.23
	Weed-hoe	50534-6-ZA-17545	MSMA	48.3		0.3	0.87
						Total	**342.32**
Santa Ana	Cutrine Plus	8959-10 AA	Copper Ethanolamine Complexes	9		54	4.37
	Fusilade 2000	10182-104-AA	Fluazifop-P-butyl	13		4	0.52
	Reward Aquatic and Noncrop	10182-353-ZA	Diquat dibromide	36.4		315	427.68
	Rodeo	524-343	Glyphosate	53.8		16.5	46.60
	Roundup Pro	524-475	Glyphosate	41		7.9	12.96
	Turflon Ester	62719-258	Triclopyr	61.6		1.3	3.20
	weed stopper	54705-5	Oryzalin	40.4		2.4	3.88
						Total	**499.22**
Seal Beach	Roundup Pro	524-475	Glyphosate	41		20	32.80
						Total	**32.80**
Tustin	Fusilade II	10182-393	Fluazifop-P-butyl	24.5		2	0.98
	Manage	524-465-AA	Halosulfuron	75	0.3		0.23
	Roundup Pro	524-475	Glyphosate	41		102.5	168.10
	Scythe	53219-7	Pelargonic Acid	60		13.75	34.65
	Surflan A.S.	62719-113	Oryzalin	40.4		13.75	22.22
	Turflon Ester	62719-258	Triclopyr	61.6		3.75	9.24
						Total	**235.42**

Table 5.27
Permittee Herbicide Application

Permittee	Brand Name	EPA REG NO.	ACTIVE INGREDIENT (A.I.)	% A.I.	Amount Applied (Lbs)	Amount Applied (Gal)	Total Lbs AI Applied
Westminster	Fusilade 2000	10182-104-AA	Fluazifop-P-butyl	13		0.06	0.01
	Rodeo	524-343	Glyphosate	53.8		1.85	5.23
	Roundup Pro	524-475	Glyphosate	41		77.88	127.72
						Total	**132.96**
Yorba Linda	Banvel	55947-1	Dicamba	60.2		0.5	1.72
	Barricade 65WG	100-834-AA	Prodiamine	65	4		2.60
	Fusilade 2000	10182-104-AA	Fluazifop-P-butyl	13		15	1.95
	Fusilade II	10182-393	Fluazifop-P-butyl	24.5		11.6	5.68
	Lontrel	62719-305	Clopyralid	40.9		0.25	0.31
	Manage	524-465-AA	Halosulfuron	75	0.0001		0.00
	Mecomec 2.5 Turf Herbicide	33955-483-AA-2217	MCPP	31.1		2	1.56
	Ronstar G	264-445 -AA	Oxadiazon	2	4475		89.50
	Roundup Pro	524-475	Glyphosate	41		136	223.04
	Trimec	2217-517-ZA	2, 4-D	30.6		7	5.23
	Trimec	2217-517-ZA	Dicamba	2.8		7	0.04
	Trimec	2217-517-ZA	MCPP	16.3		7	1.48
	Turf Fertilizer Plus Pre-emergent Weed Control	538-213	Pendamethalin	0.75	700		5.25
	Turflon Ester	62719-258	Triclopyr	61.6		4.5	11.09
						Total	**349.45**
County of Orange	Cutrine Plus	8959-10 AA	Copper Ethanolamine Complexes	9		85.38	6.92
	Garlon 4	62719-40	Triclopyr	61.6		36.3	89.44
	Gas Cartridge	56228-2-AA	Carbon, Sodium Nitrate	28,53			
	Oust Herbicide	325-401-ZA	Sulfometuron Methyl	75	82.5		61.88
	Pendulum WDG	241-340-AA	Pendimethalin	60	4776.4		2865.84
	Reward Aquatic and Noncrop	10182-353-ZA	Diquat dibromide	36.4		135.75	184.31
	Rodeo	524-343	Glyphosate	53.8		1106.7	3125.87
	Roundup Pro	524-475	Glyphosate	41		2440.2	4001.93
	Stomp 3.3EC	241-341-AA	Pendimethalin	37.4		76.5	94.42
	Surflan A.S.	62719-113	Oryzalin	40.4		9.25	14.95
	Telar Herbicide	352-404-ZC	Chlorsulfuron	75	74.19		55.64
	Weedone LV4	264- 20-ZA	2,4-D Butoxyethanol ester	60.8			
						Total	**10501.19**

Total **23,427.73**

Table 5.28
Permittee Rodenticide Application

Permittee	Brand Name	EPA REG NO.	ACTIVE INGREDIENT (A.I.)	% A.I.	Amount Applied (Lbs)	Amount Applied (Gal)	Total Lbs AI Applied
Anaheim	Fumitoxin Tablets	5857-1-ZB	Aluminum Phosphide	55	119		65.450
	Fumitoxin Tablets	72959-1	Aluminum Phosphide	55	1		0.550
	Ramick Green	2393- 498-AA	Diphacinone	0.005	3		0.000
	Rodent Bait Diphacinone	10965-50001-ZA	Diphacinone	0.005	20		0.001
						Total	**66.001**
Dana Point	Farnam Just One Bite Rat & Mouse Bait	7173-188	Bromadiolone	0.005	163		0.008
	Fumitoxin Tablets	5857-1-ZB	Aluminum Phosphide	55	5		2.750
						Total	**2.758**
Fountain Valley	Fumitoxin Tablets	5857-1-ZB	Aluminum Phosphide	55	46		25.300
						Total	**25.300**
Fullerton	Gopher getter II	36029-50003-AA	Chlolophacinone	0.05	187.5		0.094
	Wilco Ground Squirrel Bai	36029-50004-AA	Chlorophacinone	0.005	290		0.015
						Total	**0.108**
Garden Grove	Fumitoxin Tablets	5857-1-ZB	Aluminum Phosphide	55	4		2.200
						Total	**2.200**
Huntington Beach	Farnam Just One Bite Rat and Mouse Bait	7173-188	Bromadiolone	0.005	5		0.000
	Fumitoxin Tablets	5857-1-ZB	Aluminum Phosphide	55	10		5.500
	Gopher Getter I	36029-50003-AA	Chlolophacinone	0.005	6.375		0.000
	Rozol	7173-151-AA	Chlolophacinone	0.005	10		0.001
						Total	**5.501**
Irvine	Ditrac All-Weather Blox	12455-80-AA	Diphacinone	0.005	23		0.001
	Fumitoxin	5857-1-ZB	Aluminum Phosphide	55	114.5		62.975
	Generation Pellets	7173-205	Difethialone	0.0025	0.11		0.000
	Rodent Bait Diphacinone	10965-50003-ZA	Diphacinone	0.01	4		0.000
	Rodent Bait Zinc Phosphide	10965-50014-ZA	Zinc Phosphide	1	2.7		0.027
						Total	**63.004**
La Habra	Fumitoxin Tablets	5857-1-ZB	Aluminum Phosphide	55	6.53		3.592
	TEATON Answer for the control of pocket gophers	56-57	Diphacinone	0.005	20		0.001
						Total	**3.593**
Laguna Beach	Ramick Green	2393- 498-AA	Diphacinone	0.005	55		0.003
						Total	**0.003**
Laguna Hills	Fumitoxin Tablets	5857-1-ZB	Aluminum Phosphide	55	7		3.850
	Giant Destroyer	10551-1	Carbon	8.7	150		13.050
	Giant Destroyer	10551-1	Sodium Nitrate	46.2	150		69.300
	Giant Destroyer	10551-1	Sulfur	34.8	150		52.200
	Gopher Getter I	36029-50005-AA	Chlolophacinone	0.005	16		0.001
	Gopher getter I	36029-50003-AA	Chlolophacinone	0.05	150		0.075
	ZP Rodent Bait AG	12455-17-AA	Zinc Phosphide	2	38.25		0.765
						Total	**139.241**
Laguna Niguel	Fumitoxin Tablets	5857-1-ZB	Aluminum Phosphide	55			
	Gopher getter I	36029-50003-AA	Chlolophacinone	0.05	2		0.001
						Total	**0.001**
Lake Forest	Giant Destroyer	10551-1	Carbon	8.7	220		19.140
	Giant Destroyer	10551-1	Sodium Nitrate	46.2	220		101.640
	Giant Destroyer	10551-1	Sulfur	34.8	220		76.560
						Total	**197.340**
Orange	Fumitoxin Tablets	5857-1-ZB	Aluminum Phosphide	55			
						Total	**0.000**
San Clemente	Farnam Just One Bite Rat & Mouse Bait Bar	7173-189	Bromadiolone	0.005	9.7		0.000
	Fumiphos 60% Aluminum Phosphide Fumigant Tablets	30574-11-AA	Aluminum Phosphide	60	11.17		6.702
	P.C.Q. Rodent Bait	12455-50003-AA	Diphacinone	0.01	69.1		0.007
						Total	**6.709**
San Juan Capistrano	Farnam Just One Bite Rat & Mouse Bait Bar	7173-188	Bromadiolone	0.005	12		0.001
	Fumitoxin Tablets	5857-1-ZB	Aluminum Phosphide	55	29		15.950
	Gopher Getter I	36029-50005-AA	Chlolophacinone	0.005	12		0.001
						Total	**15.951**

Table 5.28
Permittee Rodenticide Application

Permittee	Brand Name	EPA REG NO.	ACTIVE INGREDIENT (A.I.)	% A.I.	Amount Applied (Lbs)	Amount Applied (Gal)	Total Lbs AI Applied
Stanton	Fumitoxin	5857-1-ZB	Aluminum Phosphide	55	2.015		1.108
						Total	**1.108**
Westminster	Fumitoxin Tablets	5857-1-ZB	Aluminum Phosphide	55	3.92		2.156
						Total	**2.156**
Yorba Linda	Fumitoxin Tablets	5857-1-ZB	Aluminum Phosphide	55	5		2.750
	Gopher Getter I	36029-50005-AA	Chlolophacinone	0.005	75		0.004
	P.C.Q. Rodent Bait	12455-50003-AA	Diphacinone	0.01	50		0.005
	ZP Rodent Bait AG	12455-17-AA	Zinc Phosphide	2	15		0.300
						Total	**3.059**
County of Orange	Fumitoxin Tablets	5857-1-ZB	Aluminum Phosphide	55	187.65		103.208
	Gopher Getter I	36029-50004-AA	Chlolophacinone	0.005	257		0.013
	Gopher Getter I	36029-50005-AA	Chlolophacinone	0.005	203.7		0.010
	ZP Rodent Bait AG	12455-17-AA	Zinc Phosphide	2	1112.5		22.250
						Total	**125.481**

Total **659.513**

Table 5.29
Permittee Fungicide Application

Permittee	Brand Name	EPA REG NO.	ACTIVE INGREDIENT (A.I.)	% A.I.	Amount Applied (Lbs)	Amount Applied (Gal)	Total Lbs A.I. Applied
Anaheim	3336 WP Turf	1001-63-AA	Thiophanate-methyl	50	43.75		21.88
	Banner MAXX	100-741-ZA	Propiconzale	14.3		3.1	0.58
	Bayleton 25 Turf And Ornamental Fungicide	3125-318-ZA	Triadimefon	25	25.5		6.38
	Chipco Aliette	264-515-ZA	Fosetyl-AL	80		1.7	6.12
	Confront	62719-92	Clopyralid	12.1		0.47	0.04
	Confront	62719-92	Triclopyr	33		0.47	0.35
	Daconil Weatherstik	50534-209-10182	Chlorothalonil	54		71.5	231.66
	Dimension	707-245	Dithiopyr	12.7		14	1.78
	Dissolve	228-265-AA	2,4-D	46.96	2.6		1.22
	Distance	1021- 1728-AA- 59639	Pyriproxyfen	0.5	4		0.02
	Eagle WSP Turf and Ornamental Fungicide	707-232	Myclobutanil	40	84		33.60
	Fore Floxl	707-156-ZE	Mancozeb	37		40.4	59.79
	Heritage	10182-408-AA	Azoxystrobin	50	13.4		6.70
	Manicure 6	50534-202-ZA-10182	Chlorothalonil	54		10	32.40
	Prostar 50WP	45639-153-AA	Flutolanil	50.3	21		10.56
	ProTurf FF II	538-108	PCNB	15.4	840		129.36
	Spotrete-F	1001-11-ZA	Thiram	42		23.8	39.98
	Subdue MAXX	100-796-ZA	Mefenoxam	22		1.2	0.53
						Total	**582.94**
Garden Grove	Agri-Strep Type D	618-28-AA	Streptomycin	21.2	1.5		0.32
	Nutra-Spray Copper Bordeaux	1148-50020-AA	Copper Sulfate	12.5	15		1.88
						Total	**2.19**
Irvine	Aliette	264-467-AA	Fosetyl-AL	80	5		4.00
	Bayleton 50 Turf And Ornamental Fungicide	3125-491-AA	Triadimefon	50	0.125		0.06
	Spotrete-F	1001-11-ZA	Thiram	42		2.5	4.20
						Total	**8.26**
Mission Viejo	Subdue MAXX	100-796-ZA	Mefenoxam	22		0.25	0.11
						Total	**0.11**
San Clemente	3336 F	1001- 69-AA	Thiophanate-methyl	42.5		3	5.23
	Banner MAXX	100-741-ZA	Propiconzale	14.3		12	2.23
	Chipco 26GT Flo	264-480-ZA	Iprodione	23.3		1.5	0.70
	Daconil Weatherstik	50534-209-10182	Chlorothalonil	54		2.5	8.10
	Eagle WSP Turf and Ornamental Fungicide	707-232	Myclobutanil	40	5		2.00
	Fore	707-87	Mancozeb	80	44		35.20
	Heritage	10182-408-AA	Azoxystrobin	50	3.5		1.75
						Total	**55.21**
San Juan Capistrano	Bayleton 25 Turf And Ornamental Fungicide	3125-318-ZA	Triadimefon	25	13		3.25
	Fungo Flo	58185-33	Thiophanate-methyl	46.2		0.08	0.17
	Subdue 2E	100-619-AA	Metalaxyl	25.1		0.2	0.10
						Total	**3.52**
Santa Ana	Subdue Granular	100-676-AA	Metalaxyl	2	1		0.02
						Total	**0.02**
Tustin	Daconil Zn	50534-211-10182	Chlorothalonil	38.5		0.03	0.05
						Total	**0.05**
Westminster	Banner MAXX	100-741-ZA	Propiconzale	14.3		0.625	0.12
	Subdue MAXX	100-796-ZA	Mefenoxam	22		0.02	0.01
						Total	**0.12**
						Total	**652**

Table 5.30
Permittee Insecticide Application

Permittee	Brand Name	EPA REG NO.	ACTIVE INGREDIENT (A.I.)	% A.I.	Amount Applied (Lbs)	Amount Applied (Gal)	Total Lbs AI Applied
Anaheim	Award	100-722-AA	Fenoxycarb	1	200		2.000
	Deltagard T&O Granular Insecticide	432-836-ZA	Deltamethrin	0.1	80		0.080
	Demand CS	10182- 361-AA	Lamda Cyhalothrin	9.7		24	2.328
	Drione Insecticide	4816-353-AA	Piperonyl Butoxide	10	1		0.100
	Drione Insecticide	4816-353-AA	Pyrethrins	1	1		0.010
	Drione Insecticide	4816-353-AA	Silica Aerogel	40	1		0.400
	Dursban Pro	62719-166	Chlorpyrifos	23.5		4.6	2.162
	Dylox 80 Turf And Ornamental Insecticide	3125-184-ZA	Trichlorfon	80	20		16.000
	Empire 20	62719-88	Chlorpyrifos	20		9.7	3.298
	Insect Control Roach Bait	64248-11	Fipronil	0.05	10		0.005
	Insect Control Roach Killer Bait	64248-14	Fipronil	0.01	3		0.000
	Merit 75 WP	3125-421-AA	Imidacloprid	75	1.06		0.795
	Merit 75 WSP Insecticide	3125-439-AA	Imidacloprid	75	1.5		1.125
	Orthene	59639-26	Acephate	75	3.125		2.344
	Prentox Pyronyl Crop Spray	655-489	Pipernyl Butoxide	60		0.23	0.690
	Prentox Pyronyl Crop Spray	655-489	Pyrethrins	6		0.23	0.007
	Prescription Treatment Brand 565 Plus Xlo Pressurized Contact Insecticide Formula 1	499-310-ZA	Piperonil Butoxide	1		1.82	0.001
	Prescription Treatment Brand 565 Plus Xlo Pressurized Contact Insecticide Formula 2	499-310-ZA	D-Trans Allerthrin	0.25		1.82	0.000
	Prescription Treatment Brand 565 Plus Xlo Pressurized Contact Insecticide Formula 3	499-310-ZA	Pyrethrins	0.25		1.82	0.009
	Prescription Treatment Brand 565 Plus Xlo Pressurized Contact Insecticide Formula 4	499-310-ZA	N-Octyl Bicycloheptene Dicarboximide	1		1.82	0.001
	Prescription Treatment Brand CY-Kick CS	499-304-ZC	Cyfluthrin	6		60	1.800
	Suspend SC	432-763-ZA	Deltamethrin	4.75	130		6.175
	Tempo 20 WP Insecticide	3125-380-AA	Cyfluthrin	20	0.022		0.004
	Tempo 20 WP Insecticide in Packets	3125-377-AA	Cyfluthrin	20	0.0441		0.009
	Tempo SC Ultra	3125-498-AA	Beta-Cyfluthrin	11.8		6	1.416
						Total	**40.760**
Dana Point	Astro Insecticide	279-3141-AA	Permethrin	36.8		0.094	0.111
	Metasystox-R 2 Ornamental Insecticide	3125-111-ZA	Oxydemeton-methyl	25		0.39	0.195
	Orthene Turf, Tree, & Ornamental WSP	59639-88	Acephate	75	1		0.750
						Total	**1.056**
Fountain Valley	Award	100-722-AA	Fenoxycarb	1	2		0.020
						Total	**0.020**
Fullerton	Orthene Turf & Lawn WSP	59639-26	Orthene	25	1		0.250
						Total	**0.250**
Garden Grove	Dursban 50W	62719-72	Chlorpyrifos	50	0.5		0.250
						Total	**0.250**

Table 5.30
Permittee Insecticide Application

Permittee	Brand Name	EPA REG NO.	ACTIVE INGREDIENT (A.I.)	% A.I.	Amount Applied (Lbs)	Amount Applied (Gal)	Total Lbs AI Applied
Huntington Beach	Merit 75 WP	3125-421-AA	Imidacloprid	75	0.28125		0.211
	Morestan 4 Ornamental Miticide	3125-381-AA	Oxythioquinox	38.4		0.03125	0.048
	M-Pede	53219-6	Potash soap	49		2	3.528
	Orthene Turf, Tree, & Ornamental WSP	59639-91	Acephate	97	5.5		5.335
	Pyrenone Crop Spray Insecticide	4816-490-ZB	Piperonyl Butoxide	60		0.25	0.750
	Pyrenone Crop Spray Insecticide	4816-490-ZB	Pyrethrins	6		0.25	0.008
	Sunspray or Perscription Ultrafine oil	862-23	Petroleum Distillates, Refined	98.8		0.035	0.235
	Talstar Lawn & Tree Flowable Insecticide/Miticide	279-3162-AA	Bifenthrin	7.9		0.5	0.026
	Tempo 20 WP Insecticide	3125-380-AA	Cyfluthrin	20	0.0625		0.013
						Total	**10.153**
Irvine	Amdro Pro	241-322-AA	Hydramethylnon	0.73	1		0.007
	Astro Insecticide	279-3141-AA	Permethrin	36.8		0.3125	0.368
	Avid 0.15EC	100-896-AA	Avermectin	2		0.7	0.002
	Award	100-722-AA	Fenoxycarb	1	5		0.050
	Dragnet FT Termiticide/Insecticide	279-3062-ZB	Permethrin	36.8		0.25	0.294
	Dursban 50W	62719-72	Chlorpyrifos	50	1.5		0.750
	Dursban Pro	62719-166	Chlorpyrifos	23.5		0.12	0.056
	Greyhound	69117-2	Avermectin	1.9		5.45	0.016
	Hexygon	10163-240-AA	Hexythiazox	50	2.5		1.250
	Knox Out 2FM Insecticide	4581-335-AA	Diazinon	23	10		2.300
	Maxforce	64248-6-ZA	Hydramethylnon	1	4		0.040
	Merit 75 WSP Insecticide	3125-439-AA	Imidacloprid	75	3		2.250
	Metasystox-R	10163-220-AA	Oxydemeton-methyl	25		1.9	0.903
	M-Pede	53219-6	Potash soap	49		1	1.764
	Orthene Turf, Tree, & Ornamental WSP	59639-91	Acephate	97	4		3.880
	Purge CB-40	9444-41	Dicarboximide	1		0.0125	0.000
	Purge CB-40	9444-41	Piperonyl Butoxide	1		0.0125	0.000
	Purge CB-40	9444-41	Pyrethrins	0.5		0.0125	0.000
	Sunspray or Perscription Ultrafine oil	862-23	Petroleum Distillates, Refined	98.8		10	67.184
	Talstar Termiticide/Insecticide	279-3206-AA	Bifenthrin	7.9		0.672	0.035
	Tempo 20 WP Insecticide	3125-380-AA	Cyfluthrin	20	0.62		0.124
						Total	**81.274**
La Habra	Control Granular Insect Bait	64248-6	Hydramethylnon	1	4.1		0.041
	Merit 75 WP	3125-421-AA	Imidacloprid	75	0.125		0.094
	M-Pede	53219-6	Potash soap	49		1	1.764
	Orthene Turf, Tree, & Ornamental WSP	59639-26	Acephate	75	0.6875		0.516
	Ortho Diazinon	239- 2643-AA	Diazinon	22.4		0.125	0.053
	Saf-T-Side	48813-1-ZD-54705	Petroleum Oil	80		1.5	7.080
	Talstar Lawn & Tree Flowable Insecticide/Miticide	279-3162-AA	Bifenthrin	7.9		0.25	0.013
						Total	**9.561**
Laguna Hills	Ornamental WSP	59639-26	Acephate	75	8		6.000
						Total	**6.000**
Laguna Niguel	Talstar Lawn & Tree Flowable Insecticide/Miticide	279-3162-AA	Bifenthrin	7.9		0.004	0.000
						Total	**0.000**

Table 5.30
Permittee Insecticide Application

Permittee	Brand Name	EPA REG NO.	ACTIVE INGREDIENT (A.I.)	% A.I.	Amount Applied (Lbs)	Amount Applied (Gal)	Total Lbs AI Applied
Lake Forest	Diazinon 4E	100-463-AA-65783	Diazinon	47.5		1	1.900
	Greenlight Diazinon granules	869-139	Diazinon	5	200		10.000
						Total	**11.900**
Mission Viejo	Amdro Pro	241-322-AA	Hydramethylnon	0.73	1		0.007
	Dursban Pro	62719-166	Chlorpyrifos	23.5		7	3.290
	Greenlight Diazinon granules	869-139	Diazinon	5	30		1.500
	Orthene Turf, Tree, & Ornamental WSP	59639-26	Acephate	75	15		11.250
	Talstar CA Granular Insecticide	279-3168-ZA	Bifenthrin	0.2	50		0.100
	Talstar Lawn & Tree Flowable Insecticide/Miticide	279-3162-AA	Bifenthrin	7.9		0.12	0.006
						Total	**16.154**
Orange	Avid 0.15EC	100-896-AA	Avermectin	2		38	0.114
	Merit 75 WSP Insecticide	3125-439-AA	Imidacloprid	75	4.69		3.518
	Orthene Turf Tree, & Ornamental WSP	59639-26	Acephate	75			
						Total	**3.632**
San Clemente	Merit 75 WSP Insecticide	3125-439-AA	Imidacloprid	75	3.5		2.625
						Total	**2.625**
San Juan Capistrano	Imicide	7946-16	Imidicloprid	10		4	0.360
	Merit 75 WP	3125-421-AA	Imidacloprid	75	0.8		0.600
	M-Pede	53219-6	Potash soap	49		8	14.112
	Orthene Turf, Tree, & Ornamental Spray 97	59639-88	Acephate	75	7		5.250
						Total	**20.322**
Santa Ana	ALGAECIDE	8959-12	Complexes	3.7	403		14.911
						Total	**14.911**
Stanton	Dust	769-692	Diazinon	2	0.125		0.003
	Garden Insect Control	769-631	Diazinon	5	1		0.050
	Dursban 50W	62719-72	Chlorpyrifos	50	0.5		0.250
	Dursban Pro	62719-166	Chlorpyrifos	23.5		0.07	0.033
	Insect Control Roach Killer Bait	64248-14	Fipronil	0.01	0.5625		0.000
	Prescription Treatment Brand ULP BD-300 Contact Insecticide Formula 1	499-450-AA	Piperonil Butoxide	6		0.07	0.002
	Prescription Treatment Brand ULP BD-300 Contact Insecticide Formula 2	499-450-AA	Pyrethrins	3		0.07	0.000
	Prescription Treatment Brand ULP BD-300 Contact Insecticide Formula 3	499-450-AA	N-Octyl Bicycloheptene Dicarboximide	10		0.07	0.004
	Seige Gel	241-313-ZA	Hydramethylnon	2	0.5		0.010
	Talstar Termiticide/Insecticide	279-3206-AA	Bifenthrin	7.9		0.078	0.004
						Total	**0.356**
Tustin	Talstar Lawn & Tree Flowable Insecticide/Miticide	279-3162-AA	Bifenthrin	7.9		1	0.053
						Total	**0.053**
Yorba Linda	Diazinon AG 500 Insecticide	37404-41-AA	Diazinon	48		2	3.840
						Total	**3.840**
County of Orange	Award	100-722-AA	Fenoxycarb	1	23.2		0.232
	Diazinon 4 EC	279-2945-ZA	Diazinon	48		1.65	3.168
						Total	**3.400**

Total **226.516**

Table 5.31
Permittee Molluscide Application

Permittee	Brand Name	EPA REG NO.	ACTIVE INGREDIENT (AI)	% A.I.	Amount Applied (Lbs)	Amount Applied (Gal)	Total Lbs AI Applied
Fountain Valley	First Choice Sluggo Snail/Slug Bait	67702-3-AA-11656	Iron Phosphate	1	8.5		0.09
						Total	**0.09**
Huntington Beach	Clean Crop Metaldehyde	5481-103-34704	Metaldehyde	7.5	13.625		1.02
	Deadline bullets	64864-2	Metaldehyde	4	10		0.40
						Total	**1.42**
Irvine	Deadline T&O	64864-38	Metaldehyde	4	2		0.08
						Total	**0.08**
La Palma	Deadline bullets	64864-2	Metaldehyde	4	75		3.00
						Total	**3.00**
Laguna Beach	Clean crop metaldehyde	5481-91	Metaldehyde	3.5	412		14.42
						Total	**14.42**
Laguna Hills	Clean Crop Metaldehyde	5481-103-34704	Metaldehyde	7.5	200		15.00
						Total	**15.00**
Laguna Niguel	Clean Crop Metaldehyde	5481-103-34704	Metaldehyde	7.5	416		31.20
						Total	**31.20**
Santa Ana	Clean crop metaldehyde	5481-91	Metaldehyde	3.5	75		2.63
						Total	**2.63**
Tustin	Clean crop metaldehyde	5481-91	Metaldehyde	3.5	240		8.40
						Total	**8.40**
Yorba Linda	Clean crop metaldehyde	5481-91	Metaldehyde	3.5	600		21.00
	Deadline	64864-2-AA	Metaldehyde	4	417		16.68
						Total	**37.68**
						Total	**113.91**

Table 5.32
Permittee Plant Growth Regulator Application

Permittee	Brand Name	EPA REG NO.	ACTIVE INGREDIENT (A.I.)	% A.I.	Amount Applied (Lbs)	Amount Applied (Gal)	Total Lbs A.I. Applied
Anaheim	Primo Liquid	100-729-AA	Trinexapac-ethyl	12		0.6	0.072
	Primo MAXX	100-937-AA	Trinexapac-ethyl	11.3		1.1	0.124
						Total	**0.196**
Costa Mesa	Florel	264-543-AA-54705	Ethephon	3.9		2	0.026
	Maintain CF125	69361-6	Methyl-2,7-Dichloro-9 Hydroxyfluorene-9-Carboxylate	16		2	0.320
	Maintain CF126	69361-6	Flurecol-Methy	2.1		2	0.042
	Maintain CF127	69361-6	Chlorflurenol Methyl Este	8.8		2	0.176
						Total	**0.564**
Cypress	Embark 2-S	2217- 759-AA	Mefluidide	28		0.19	0.106
						Total	**0.106**
Fountain Valley	Embark 2-S	2217- 759-AA	Mefluidide	29		3	1.740
	Primo Liquid	100-729-AA	Trinexapac-ethyl	12		1.5	0.180
						Total	**1.920**
Irvine	Atrimmec	2217-777	Dikegulac-sodium	19.5		65.5	21.330
	Embark	2217- 759-AA	Mefluidide	28		3	1.680
						Total	**23.010**
San Clemente	Primo MAXX	100-937-AA	Trinexapac-ethyl	11.3		7.3	0.825
						Total	**0.825**
Tustin	Embark 2-S	2217- 759-AA	Mefluidide	30		5	3.000
						Total	**3.000**
Yorba Linda	Atrimmec	2217-776	Dikegulac-sodium	18.5		60	18.537
	Embark 2-S	2217- 759-AA	Mefluidide	31		30	18.600
						Total	**37.137**

Total **66.758**

Table 5.33
Pesticide Application Decisions

Permittee	General Pesticide Application			Insecticide Application		Herbicide Application		Fungicide Application	
	Permittee	Contractor	Other	Permittee	Contractor	Permittee	Contractor	Permittee	Contractor
Anaheim	50	50		50	50	50	50	50	50
Brea					100	100			
Buena Park		100					100		
Costa Mesa	90	10				20	80		
Cypress	10		90						
Dana Point									
Fountain Valley	100			100		90	10	100	
Fullerton	100			100		100			
Garden Grove	48	50	2		100	75	25		
Huntington Beach	90	10		90	10	90	10	90	10
Irvine	0.1	99.9			100	0.1	99.9		100
La Habra	50	50			100		100		
La Palma	100			30	70	100			
Laguna Beach	100			80	20	100			
Laguna Hills	20	80			100		100		100
Laguna Niguel		100			100		100		
Laguna Woods		100			100		100		100
Lake Forest		100			100		100		100
Los Alamitos	100								
Mission Viejo	100				100		100		100
Newport Beach									
Orange		100		100		100		100	
Placentia	50	50			100	50	50		100
Rancho Santa Margarita		100					100		
San Clemente	80	20		41	59	41	59	41	59
San Juan Capistrano		100			100		100		100
Santa Ana	75	25		75	25	75	25	75	25
Seal Beach	100			100		100		100	
Stanton		100			100		100		
Tustin	55	45			100		100		100
Villa Park									
Westminster	100			100		100		100	
Yorba Linda		100			100		100		100
County of Orange	100			100		100			

Table 5.34
Pesticide Applicator Personnel

Permittee	Pest Personnel with QAL or PCA license	Formal Training		Calibration		Spill Procedures	
		Yes	No	Yes	No	Yes	No
Anaheim	50	X		X		X	
Brea	20	X			X	X	
Buena Park		No Report					
Costa Mesa	90	X		X		X	
Cypress	100	X		X		X	
Dana Point	95	X		X		X	
Fountain Valley	100	X		X		X	
Fullerton	10	X		X		X	
Garden Grove	8	X		X		X	
Huntington Beach	100		X	X		X	
Irvine	20	X		X		X	
La Habra	50	X		X		X	
La Palma	25	X		X		X	
Laguna Beach	100	X		X		X	
Laguna Hills	5	X		X		X	
Laguna Niguel	6	X		X		X	
Laguna Woods	100		X	X		X	
Lake Forest	100	X		X		X	
Los Alamitos	14	X					
Mission Viejo						X	
Newport Beach		No Report					
Orange				X		X	
Placentia	10	X		X		X	
Rancho Santa Margarita	100		X	X		X	
San Clemente	75	X		X		X	
San Juan Capistrano	50	X		X		X	
Santa Ana	25	X		X		X	
Seal Beach	25	X		X		X	
Stanton	10	X		X		X	
Tustin		No Report					
Villa Park			X			X	
Westminster	90	X		X		X	
Yorba Linda	49	X		X		X	
County of Orange	95	X		X		X	

Table 5.35
IPM Implementation and Selection

Permittee	Implement IPM Techniques		Keep Records of Pest Occurrences		Increased use of IPM Management Techniques utilized?	
	Yes	No	Yes	No	Yes	No
Anaheim	X		X		X	
Brea	X		X		X	
Buena Park		X		X		X
Costa Mesa	X		X		X	
Cypress	X		X		X	
Dana Point	X		X			X
Fountain Valley	X		X		X	
Fullerton	X		X		X	
Garden Grove	X		X		X	
Huntington Beach	X		X		X	
Irvine	X		X		X	
La Habra	X		X			X
La Palma		X		X		X
Laguna Beach	X		X		X	
Laguna Hills	X		X		X	
Laguna Niguel	X				X	
Laguna Woods	X		X			X
Lake Forest	X		X		X	
Los Alamitos		X				
Mission Viejo	X			X	X	
Newport Beach	Not Reported		Not Reported		Not Reported	
Orange		X	X			X
Placentia	X			X	X	
Rancho Santa Margarita	X		X		X	
San Clemente	X		X		X	
San Juan Capistrano	X		X		X	
Santa Ana	X		X		X	
Seal Beach	X		X		X	
Stanton	X		X			X
Tustin		X		X		X
Villa Park	X			X		X
Westminster		X		X		X
Yorba Linda	X		X		X	
County of Orange	X		X		X	

Table 5.36
Pest Monitoring

Permittee	Insects	Weeds	Vertebrates	Fungi	Mollusks	None
Anaheim	X					
Brea			X			
Buena Park			X			
Costa Mesa	X					
Cypress		X				
Dana Point			X			
Fountain Valley	X	X	X	X	X	
Fullerton	X	X				
Garden Grove	X	X	X			
Huntington Beach	X					
Irvine						X
La Habra	X	X	X			
La Palma	X					
Laguna Beach	X				X	
Laguna Hills	X	X		X		
Laguna Niguel	X		X			
Laguna Woods						X
Lake Forest	X	X	X	X		
Los Alamitos						X
Mission Viejo	X	X	X	X		
Newport Beach						
Orange	X					
Placentia	X	X	X			
Rancho Santa Margarita		X				
San Clemente	X			X		
San Juan Capistrano	X	X				
Santa Ana	X					
Seal Beach	X		X			
Stanton			X			
Tustin						X
Villa Park						X
Westminster						X
Yorba Linda	X		X			
County of Orange		X				

Table 5.37
Pest Identification

Permittee	From Own Experience	From Book or Pamphlet	Pest Control Advisor	Farm Advisor	Ag. Commissioner's Office	Commercial Diagnostic Laboratory
Anaheim	X		X		X	
Brea	X		X			
Buena Park	X		X	X	X	
Costa Mesa	X	X	X			
Cypress	X	X	X		X	
Dana Point			X			
Fountain Valley	X	X	X		X	
Fullerton	X	X	X		X	
Garden Grove	X	X	X		X	
Huntington Beach	X	X	X		X	
Irvine	X	X	X		X	X
La Habra		X	X			
La Palma	X	X	X	X	X	
Laguna Beach	X	X	X			
Laguna Hills	X	X	X	X	X	X
Laguna Niguel	X	X	X			X
Laguna Woods					X	
Lake Forest	X	X	X		X	
Los Alamitos	No Report					
Mission Viejo	X	X	X		X	X
Newport Beach	No Report					
Orange	X					
Placentia	X		X			
Rancho Santa Margarita	X	X	X		X	
San Clemente	X	X	X	X	X	X
San Juan Capistrano	X	X	X			X
Santa Ana	X	X	X		X	X
Seal Beach	X	X	X		X	
Stanton			X			
Tustin	No Report					
Villa Park	No Report					
Westminster	X	X				
Yorba Linda	X	X	X			
County of Orange	X	X	X		X	

Table 5.38
IPM Techniques Implemented

Permittee	Mechanical Weed Removal	Hand Weeding	Non-Chemical Weed Control	Removal of Diseased or Infested Plants	Evaluate Irrigation System	Use "Soft" or "Reduced-risk" Pesticides	Natural Predators or Parasites	Mulches
Anaheim	X	X	X	X	X			X
Brea	X	X	X	X	X	X		X
Buena Park	X	X	X					
Costa Mesa	X	X	X	X	X			X
Cypress	X	X	X	X				X
Dana Point	X	X	X	X	X	X	X (unknown)	X
Fountain Valley	X	X	X	X	X	X		X
Fullerton	X	X	X	X	X			X
Garden Grove	X	X	X	X	X			X
Huntington Beach	X	X	X	X	X	X	X (psyllaephgaus bliteus)	X
Irvine	X	X	X	X	X	X		X
La Habra	X	X	X			X		X
La Palma	X	X	X	X	X			X
Laguna Beach	X	X	X	X	X	X		X
Laguna Hills	X	X	X	X	X	X	X (parasitic wasp-psyllid)	X
Laguna Niguel	X	X	X	X	X			X
Laguna Woods		X	X	X	X			X
Lake Forest	X	X	X	X	X			X
Los Alamitos	No Report							
Mission Viejo	X	X	X	X	X	X	X (Idioporus)	X
Newport Beach	No Report							
Orange	No Report							
Placentia	X	X	X	X	X			X
Rancho Santa Margarita	No Report							
San Clemente	X	X	X	X	X	X		X
San Juan Capistrano	X	X	X	X	X			X
Santa Ana	X	X	X	X	X	X	X (lady beetles)	X
Seal Beach	X	X	X	X	X	X	X	X
Stanton	X	X	X					
Tustin	No Report							
Villa Park	No Report							
Westminster	X	X	X	X	X	X		
Yorba Linda	X	X	X	X	X	X	X (not known)	X
County of Orange	X	X	X	X	X	X		X

Table 5.39
General Training

In-House NPDES Awareness Training

Date: July 13, 2000

Permittee	Name	Department
San Juan Capistrano	William Huber	Engineering & Bldg
	City Maintenance Staff	Public Works

In-House Training on Storm Water Quality Issues

Date: August 8, 2000

Permittee	Name	Department
San Juan Capistrano	Richard Watson	Richard Watson & Assoc.
	City Code Enforcement Staff	Engineering & Bldg
	City Building Inspectors	Engineering & Bldg

Urban Stormwater Runoff

Date: August 15 & 16, 2000

Permittee	Name	Department
Orange	Jim Devore	Public Works
County of Orange	Matthew Blinstrub	Planning and Dev. Services

Pollution Control and Spill Prevention Techniques

Sponsored By: County of Orange

Dates: August 23 & 28, 2000; January 25, 2001

Permittee	Name	Department
Cypress	Gonzalo Vazquez	Public Works
Dana Point	Cindy Asher	Public Works
	Gabe Tinoco	Public Works
	Andrea Brone	Public Works
Garden Grove	Maria Stipe	Public Works
La Habra	Paul Hamilton	Public Works
	Alan Leung	Public Works
Laguna Beach	Derek Wieske	Public Works
	Mike Phillips	Public Works
Laguna Hills	Vince Cardona	Public Services
Laguna Niguel	Jean Jambon	Public Works
	Bill Crider	Public Works
Placentia	All Public Works staff	Public Works
San Clemente	Tom Bonigut	Engineering
	Richard Aguilar	Maintenance Svs
	Craig Hunn	Maintenance Svs
Santa Ana	Harry Chin	Public Works
Tustin	Keith Linker	Public Works
Westminster	Ziad Mazboudi	Public Works
County of Orange	Public Works Staff	PFRD, Operations, and HBP

Table 5.39
General Training

Storm Water Treatment and Practices

Sponsored By: Caltrans

Date: September 21, 2000

Permittee	Name	Department
Costa Mesa	Maher Nawar	Public Services
Dana Point	Cindy Asher	Public Works
	Steve Avila	Public Works
San Clemente	Tom Bonigut	Engineering
	Ben Parker	Engineering
County of Orange	Karen Ashby	PFRD/Watershed & Coastal Resources

Focus on Water Orange County Annual Conference, Newport, CA

Date: October 2, 2000

Permittee	Name	Department
Fountain Valley	Mark Lewis	Public Works
	William Ault	Public Works
	Bob Kellison	Public Works
	Steven Hauerwaas	Public Works

Participating in the NPDES Permitting Process, A Workshop

Date: October 25 & 26, 2000

Permittee	Name	Department
County of Orange	Matt Tucker	PFRD/Watershed & Coastal Resources

"Training the Trainers" Citizen Monitoring Training

Date: November 16 & 17, 2000

Permittee	Name	Department
County of Orange	Matt Tucker	PFRD/Watershed & Coastal Resources

Table 5.39
General Training

NPDES Storm Water Training

Date: December 6, 2000

Permittee	Name	Department
Tustin	Keith Linker	Public Works
	Chuck Defruiter	Community Development
	Jerry Otteson	Public Works
	Richard Millan	Community Development
	Karen Peterson	Community Development
	BJ Azarvand	Community Development
	Minoo Ashabi	Community Development
	Lori Ludi	Community Development
	Nick Anderson	Community Development
	Robin Mundy	Community Development
	Ricardo Lazaro	Community Development
	Mark Trestik	Public Works
	Michael Martin	Public Works
	Ron Schultz	Public Works
	Dana Kasdan	Public Works
	Jon Draugelis	Public Works

Cal. State Fullerton Conference "OC's Coastal Crisis" (O.C. League of Cities)

Date: January 5, 2001

Permittee	Name	Department
Laguna Beach	Mike Phillips	Public Works

Storm Drain Retrofits as Structural Controls for Stormwater, Irvine

Sponsored By: County of Orange

Date: April 18, 2001

Permittee	Name	Department
Cypress	Gonzalo Vazquez	Public Works
Garden Grove	Richard Gosselin	Public Works
Irvine	Mike Loving	Public Works
	Alex DeHaro	Public Works
La Habra	Paul Hamilton	Public Works
	Tina Truebe	Public Works
Laguna Beach	Derek Wieske	Public Works
Laguna Niguel	Jean Jambon	Public Works
Lake Forest	Ted Simon	Public Works
Mission Viejo	Richard Schlesinger	Public Works
Rancho Santa Margarita	Carolyn Lacanilao	Engineering
San Clemente	Tom Bonigut	Engineering
San Juan Capistrano	Sam Shoucair	Engineering & Bldg
Santa Ana	Harry Chin	Public Works
Westminster	Marwan Youssef	Public Works
	Dave Sanchez	Public Works
	Chris Johansen	Public Works
County of Orange	Mathew Blinstrub	Planning and Dev. Services
	Duc Nguyen	PFRD/Watershed and Coastal Resources

Table 5.39
General Training

Urban Stormwater Conference, Ontario, Ca.

Date: June 14 & 15, 2001

Permittee	Name	Department
Brea	Phil Wray	Engineering
	Chris Kelly	Development Services
Fountain Valley	Steven Hauerwaas	Public Works
Huntington Beach	David Webb	Public Works
	Geraldine Lucas	Public Works
Mission Viejo	Richard Schlesinger	Public Works
	Dennis Wilberg	Public Works
San Juan Capistrano	William Huber	Engineering & Bldg
Yorba Linda	Chris Johansen	Engineering

Compliance and Regulations for NPDES Program

Date: June 27, 2001

Permittee	Name	Department
Costa Mesa	Maher Nawar	Public Services

Table 5.40
Other Training

Urban Runoff-BMP Prep

Date: November 1, 2000

Permittee	Name	Department
Orange	Bob Knaak	Public Works
	Jim Devore	Public Works

So. Ca. Waste Management Forum, Industry Hills

Date: November, 2000

Permittee	Name	Department
Cypress	Gonzalo Vazquez	Public Works

Used Oil Recycling Forum, Ontario

Date: February, 2001

Permittee	Name	Department
Cypress	Gonzalo Vazquez	Public Works

Watershed Planning

March 23, 2001

Permittee	Name	Department
Huntington Beach	Geraldine Lucas	Public Works

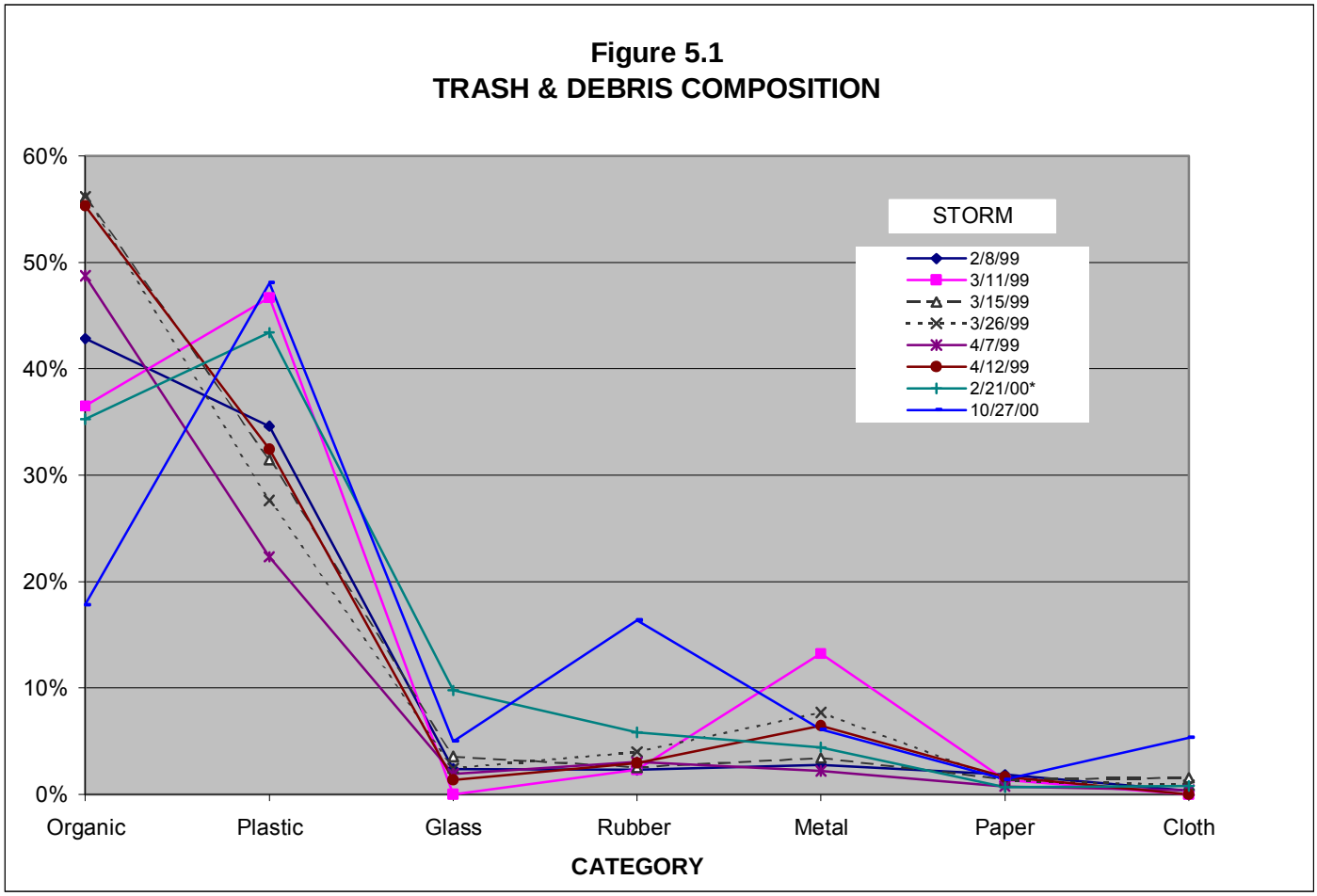
Figure 5.1
TRASH & DEBRIS COMPOSITION
60%
50%
40%
30%
20%
10%
0%
STORM
2/8/99
3/11/99
3/15/99
3/26/99
4/7/99
4/12/99
2/21/00*
10/27/00
Organic
Plastic
Glass
Rubber
Metal
Paper
Cloth
CATEGORY

Figure 5.2
Storm Drain Stencil

Figure 5.3
Environmental Performance Reporting Program 1996-2001

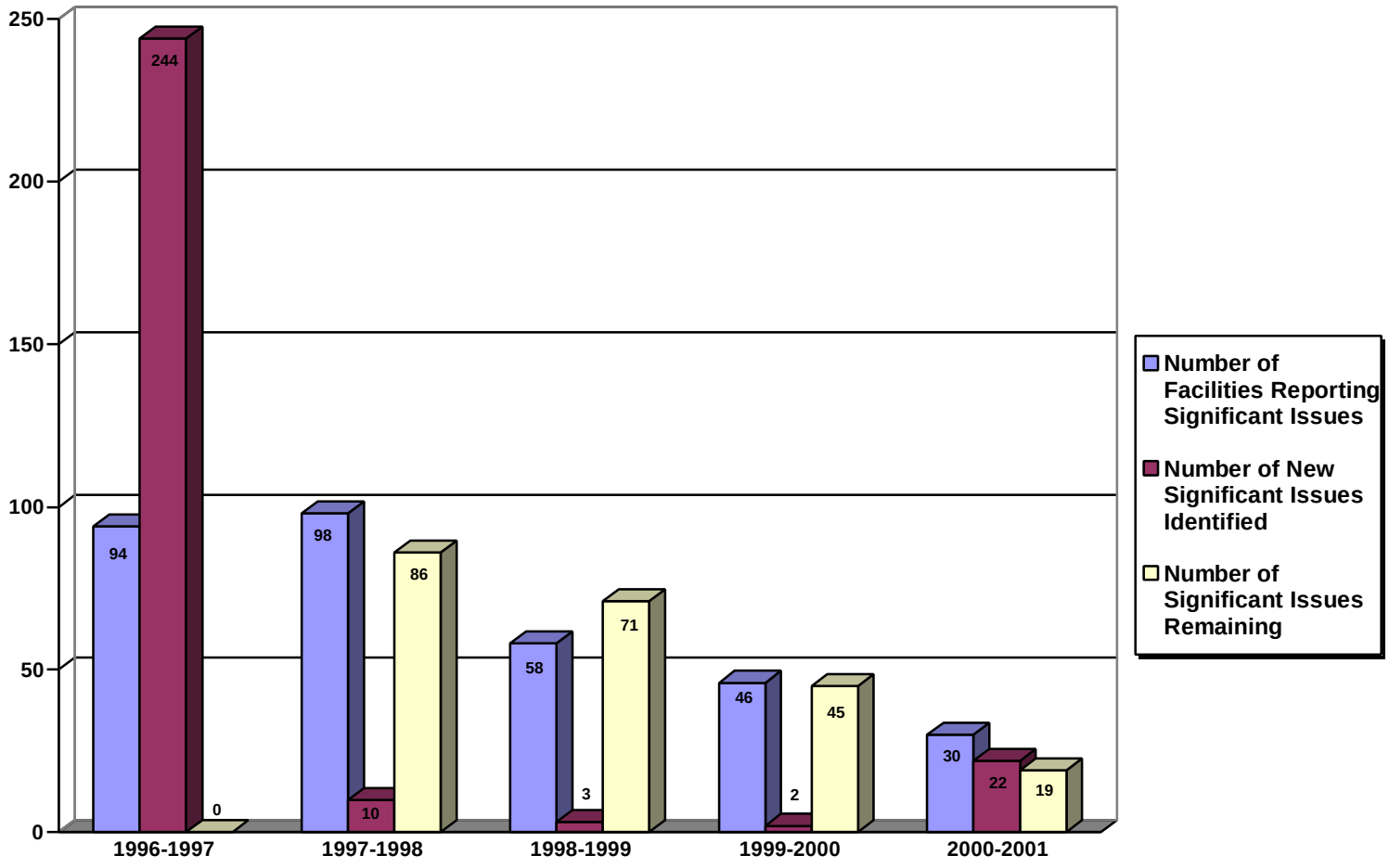

Figure 5.4
Total Pounds per Acre of Nitrogen Applied by Each Permittee (2000-2001)

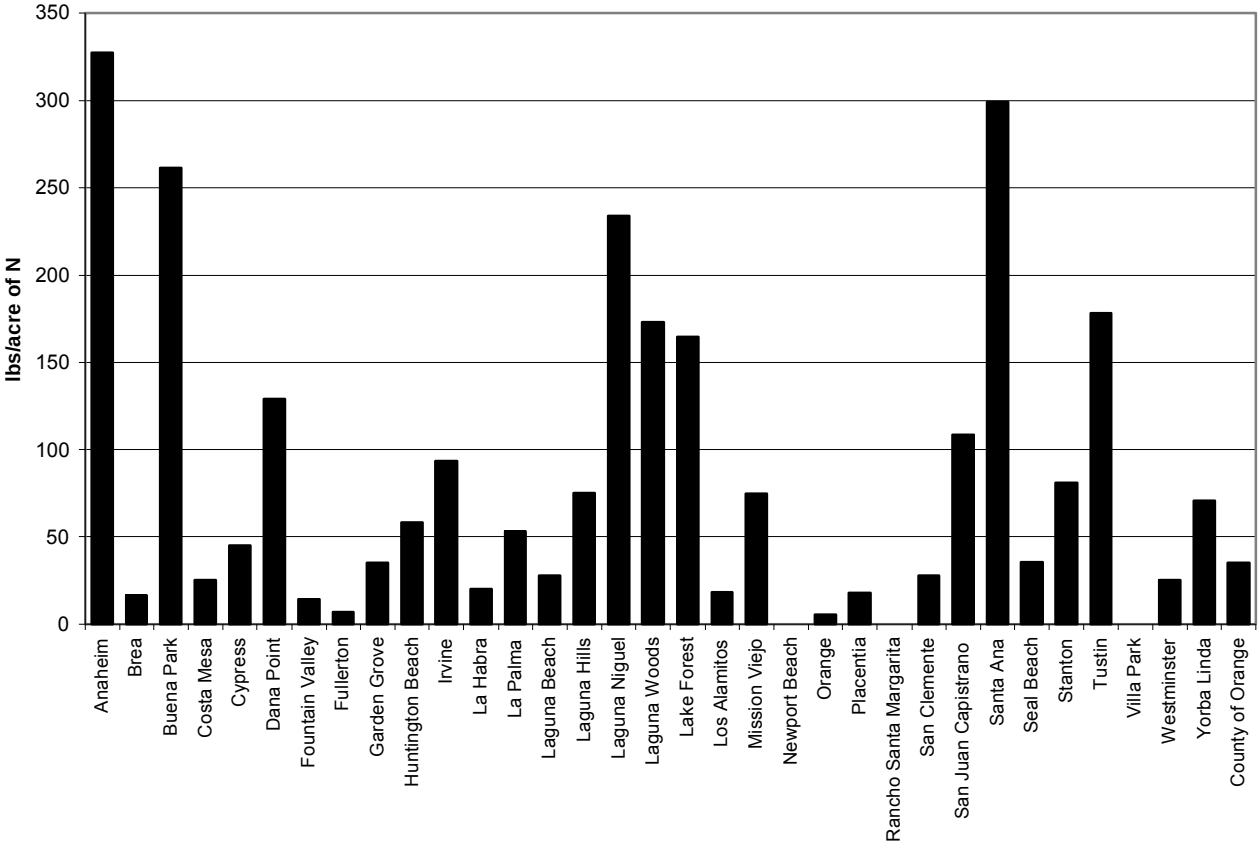

Figure 5.5
Total Pounds Per Acre of Phosphorus Applied by Each Permittee (2000-2001)

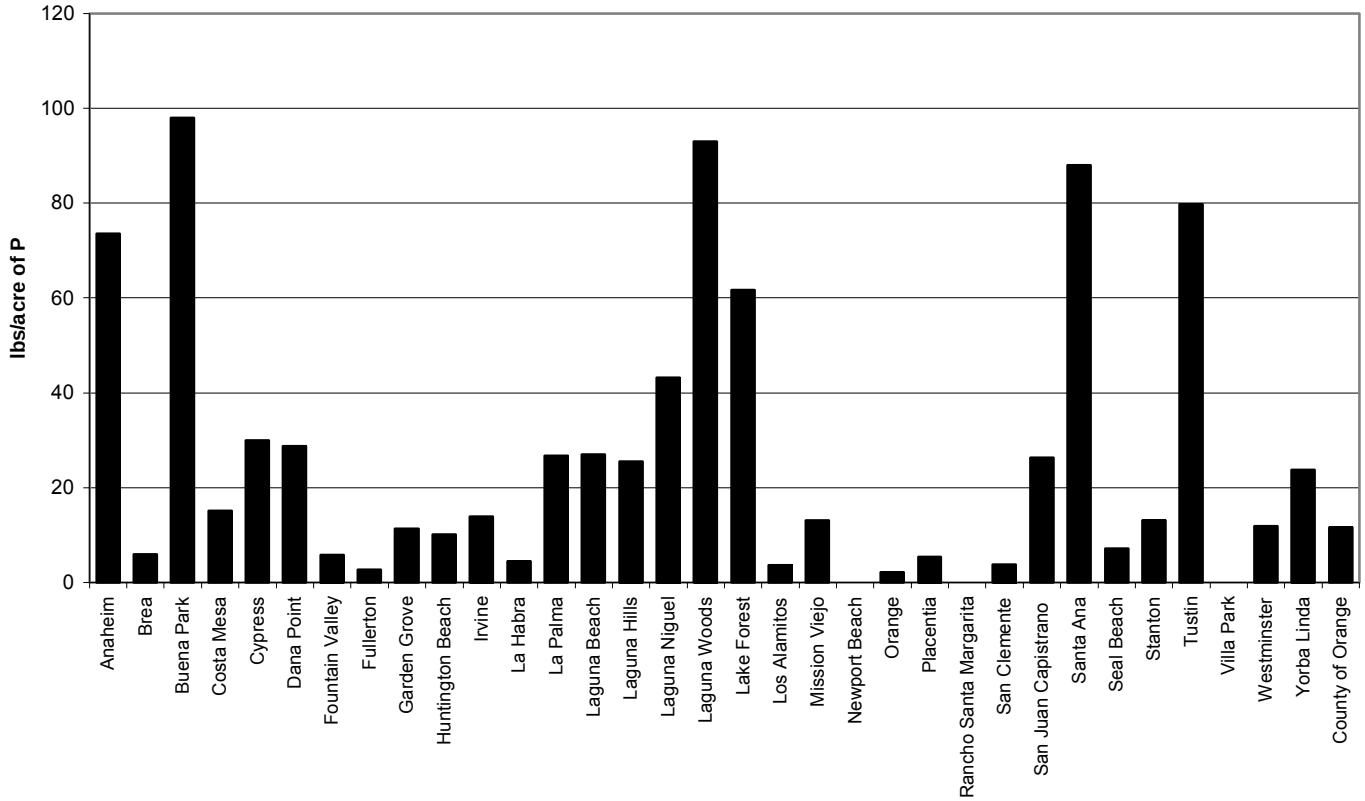

Figure 5.6
Determination of Application Rates or Timing

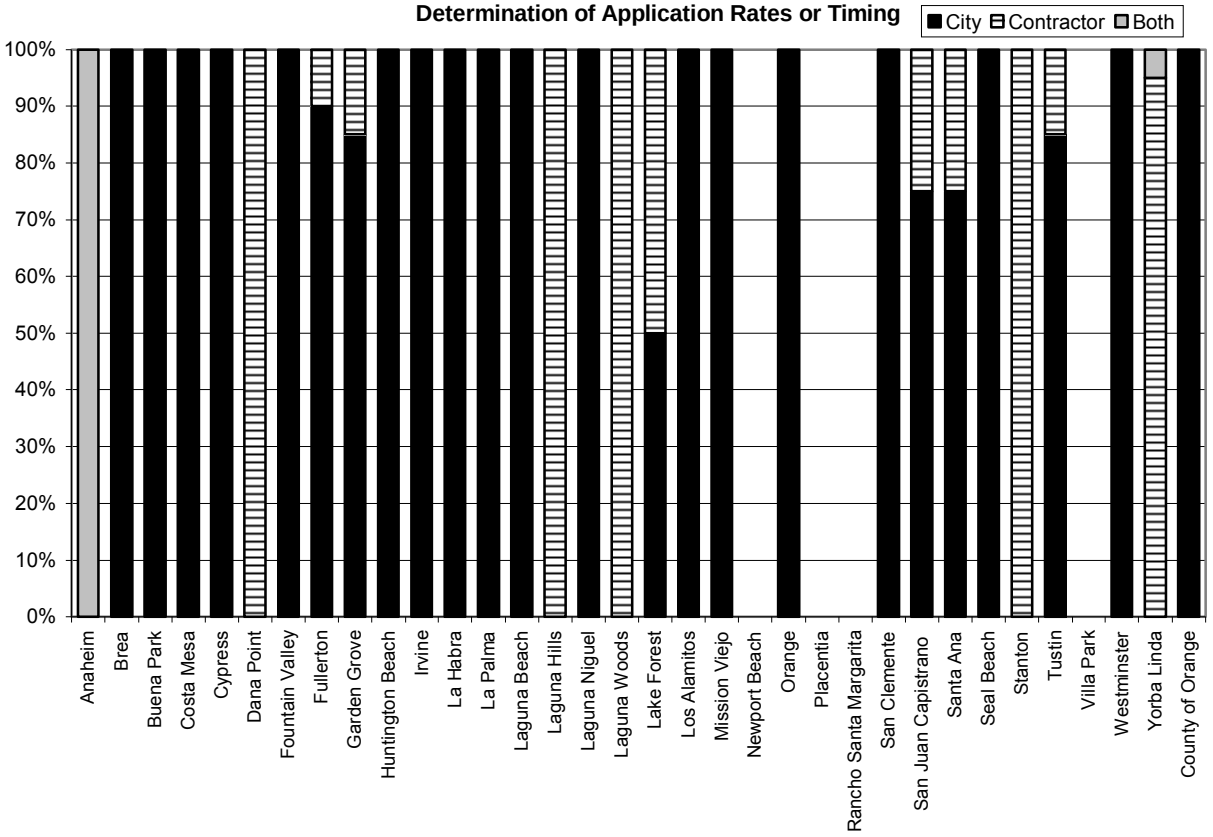

Figure 5.7
Permittee Herbicide Application

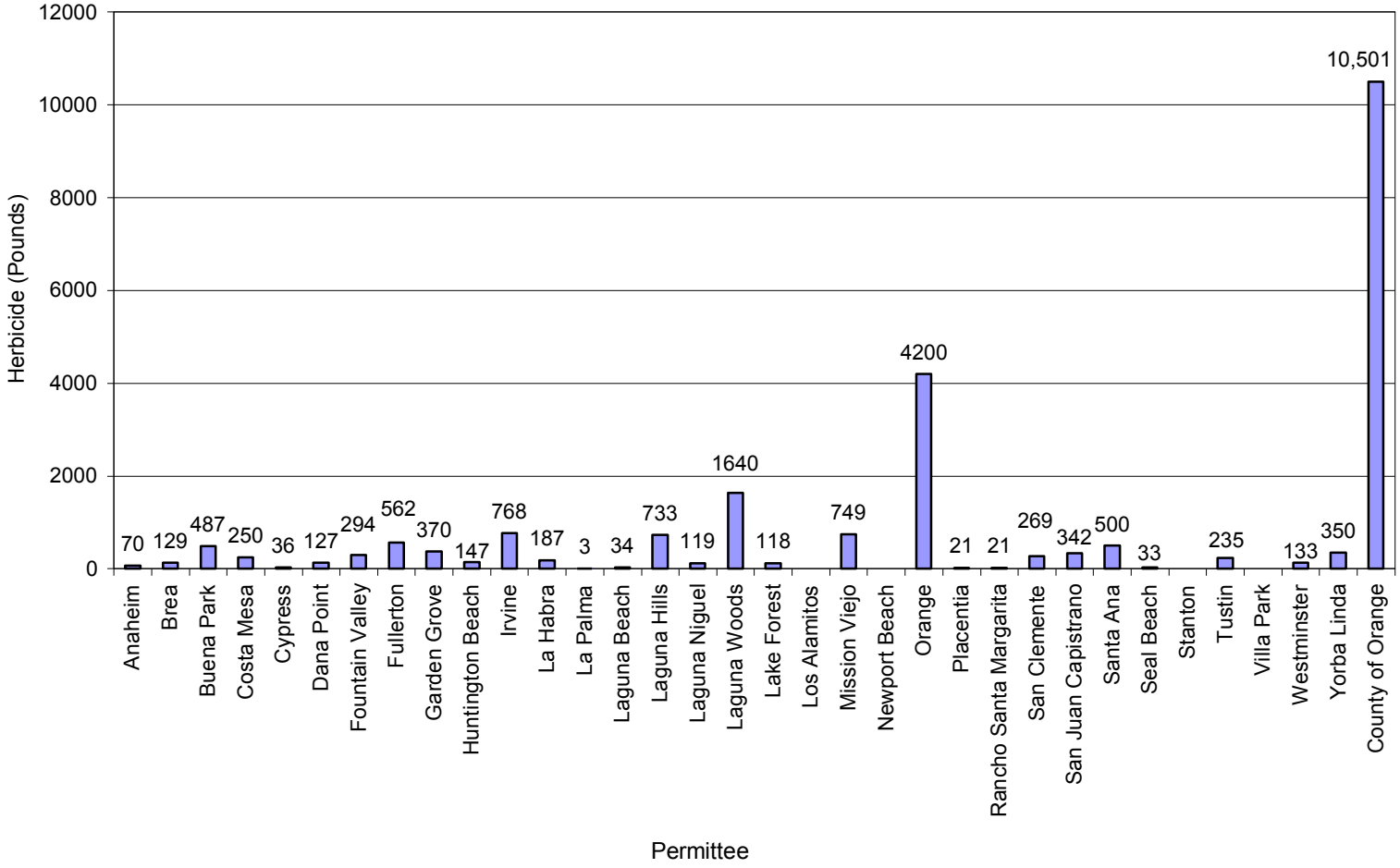

Figure 5.8
Permittee Rodenticide Application

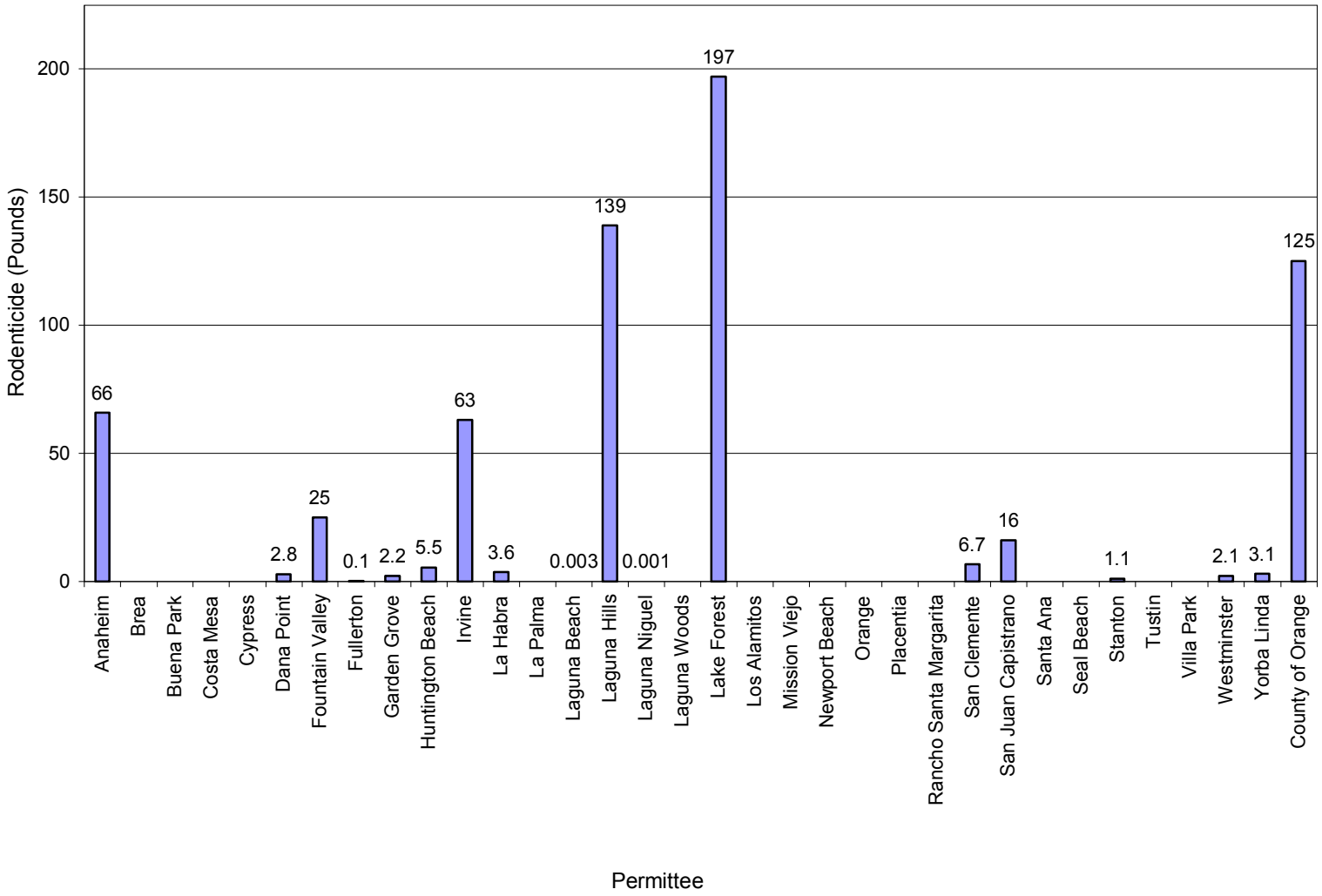

Figure 5.9
Permittee Fungicide Application

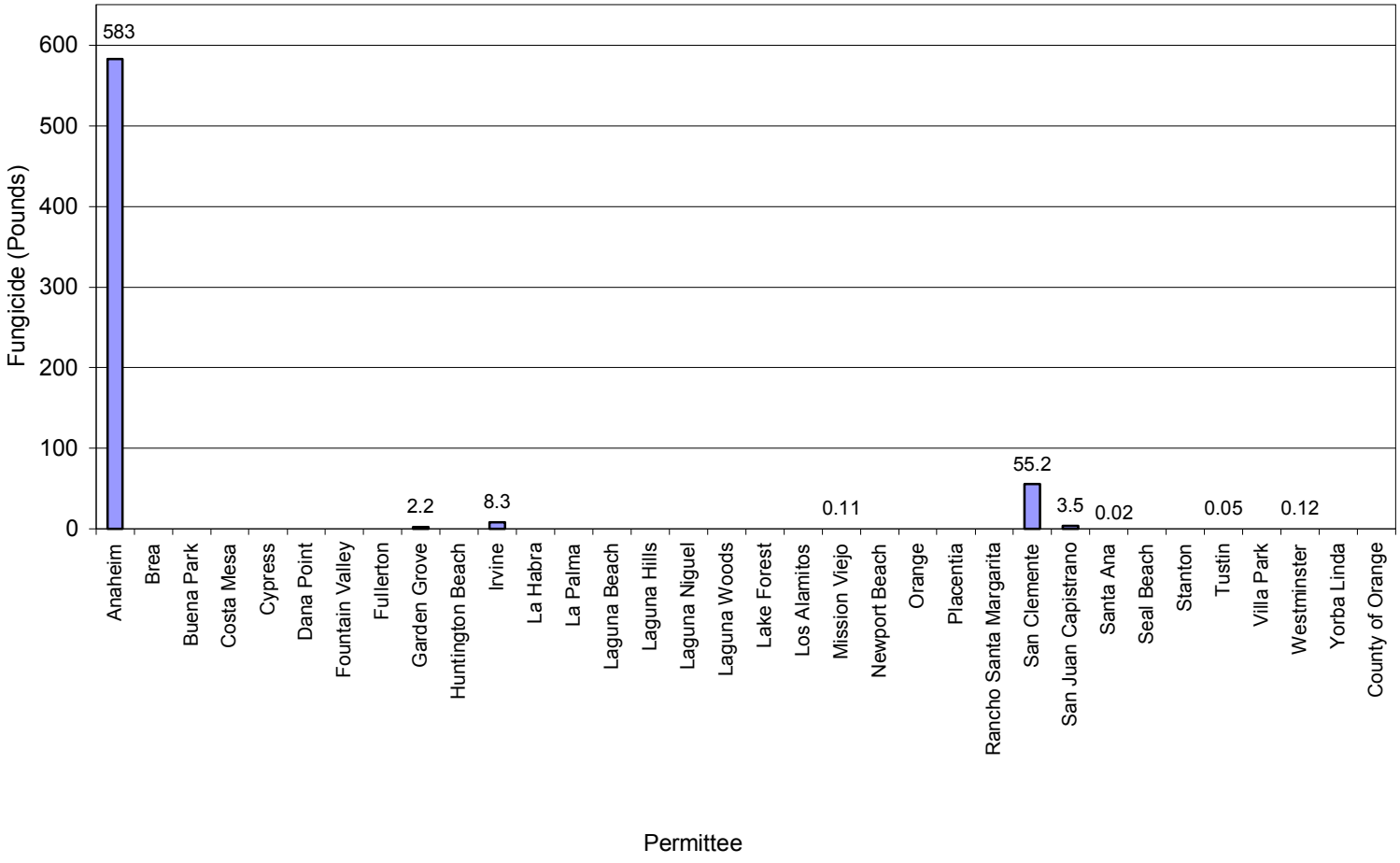

Figure 5.10
Permittee Insecticide Application

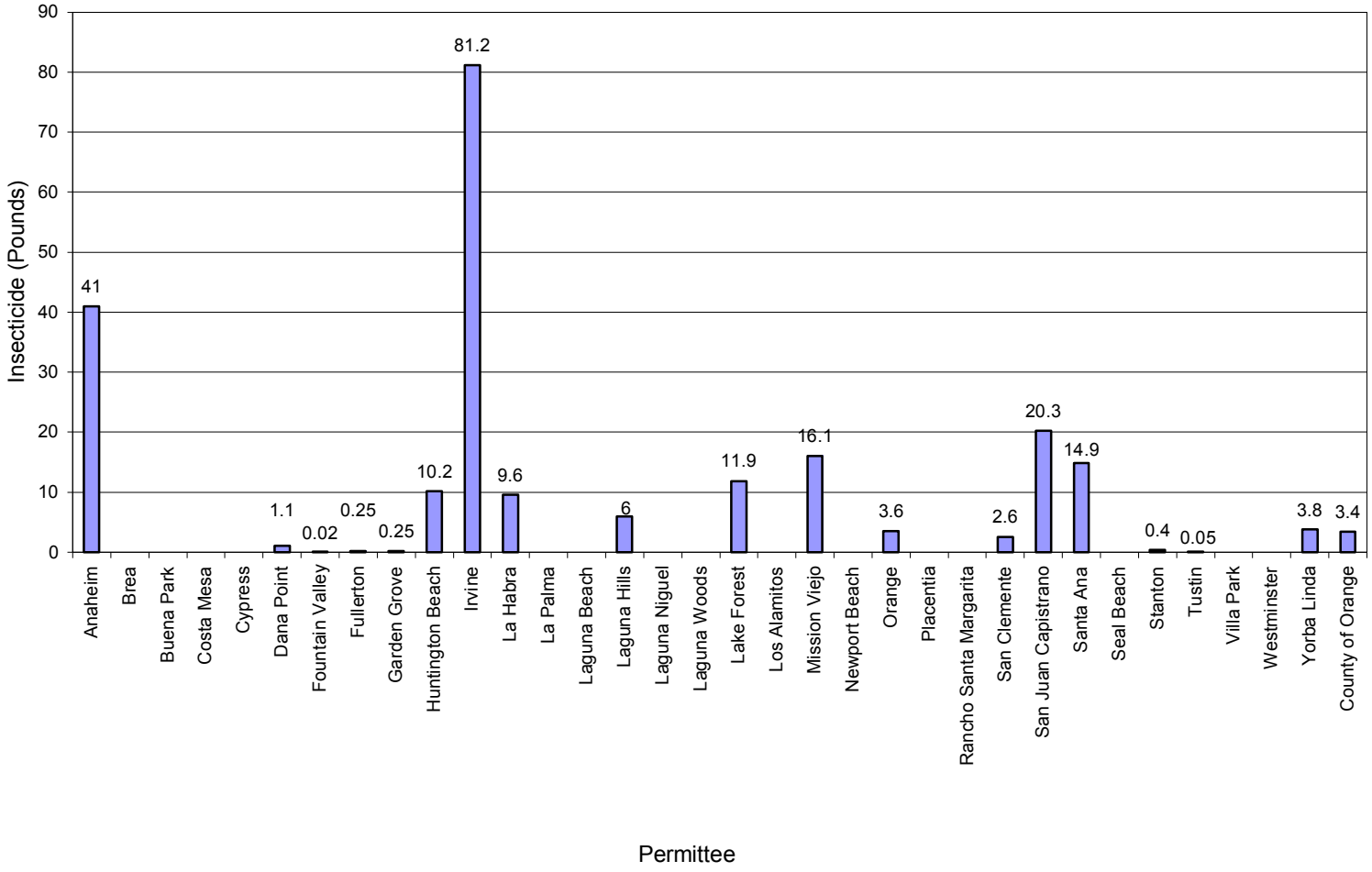

Figure 5.11
Permittee Molluscide Application

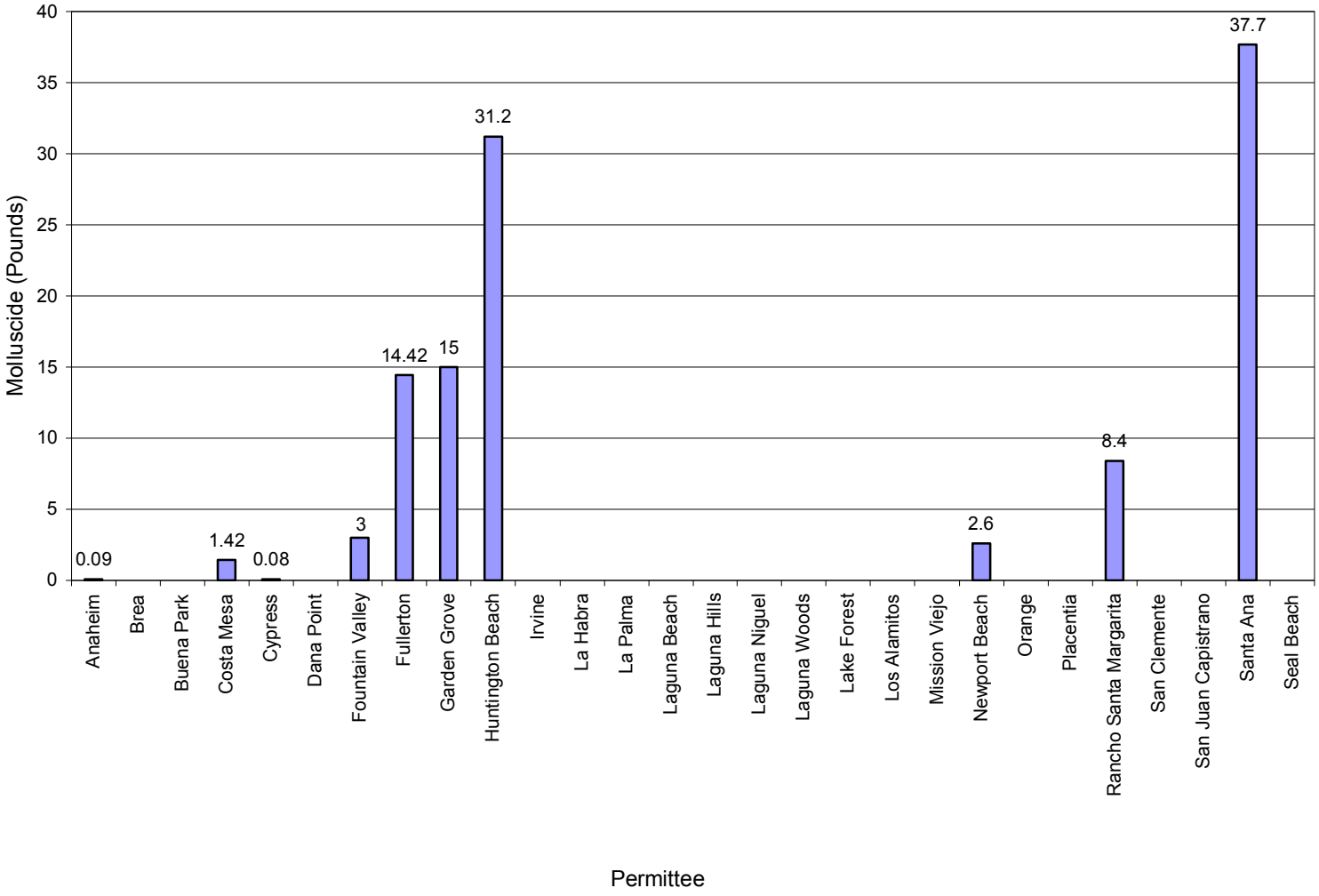

Figure 5.12
Permittee Plant Growth Regulator Application

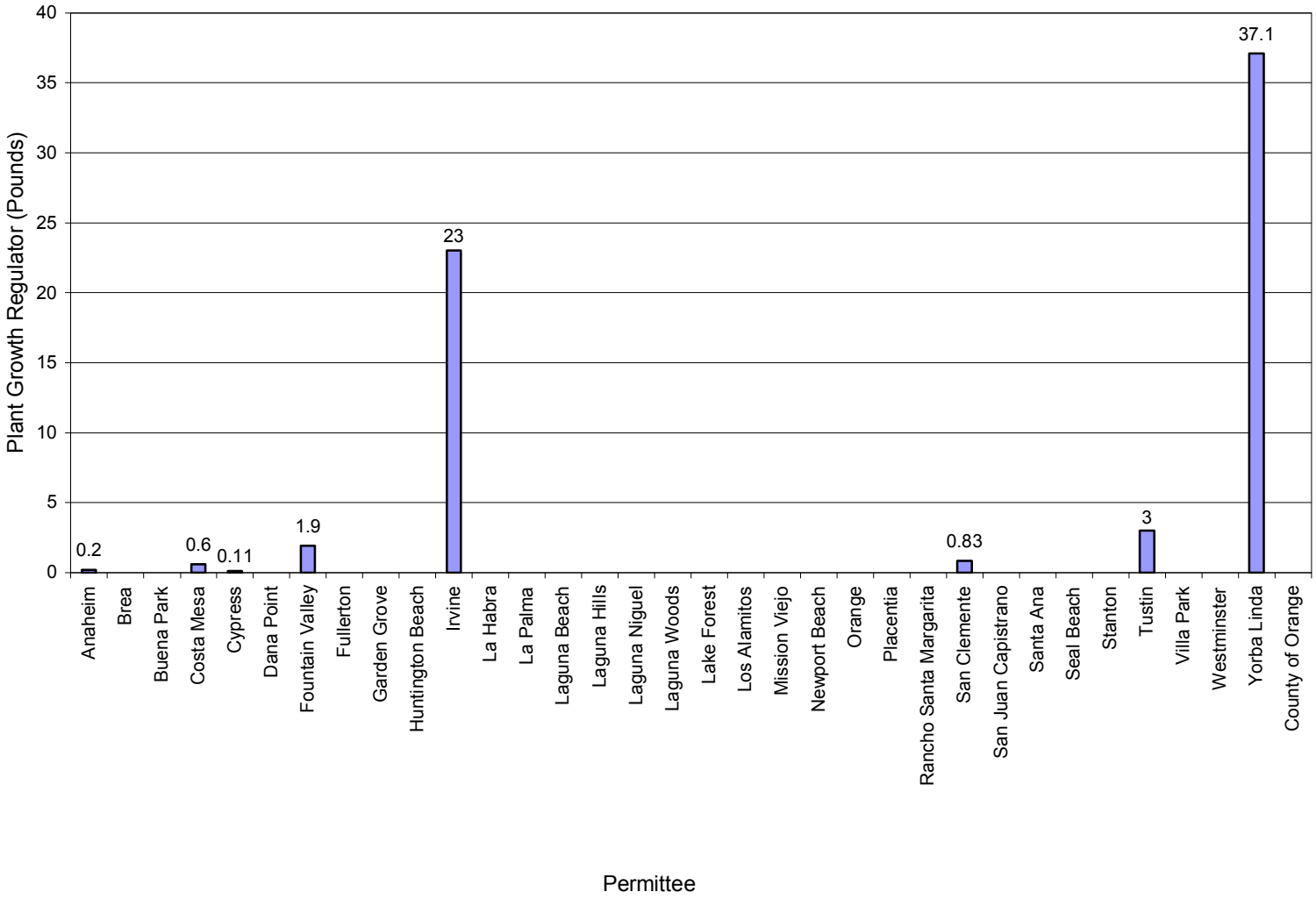

Figure 5.13
Determination of Type of Pesticide Application

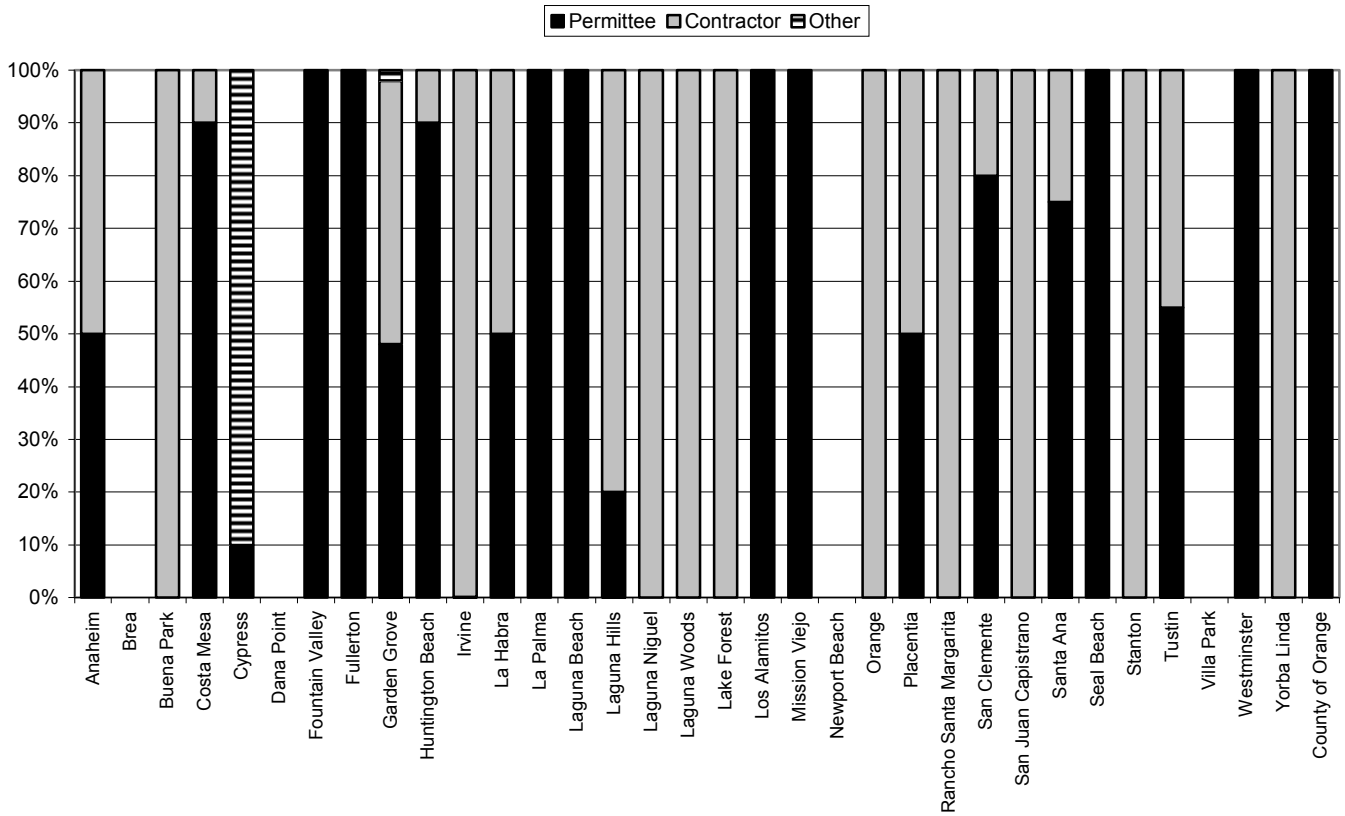

Figure 5.14
Percent of Insecticides Applied by the Permittee and/or Contractor

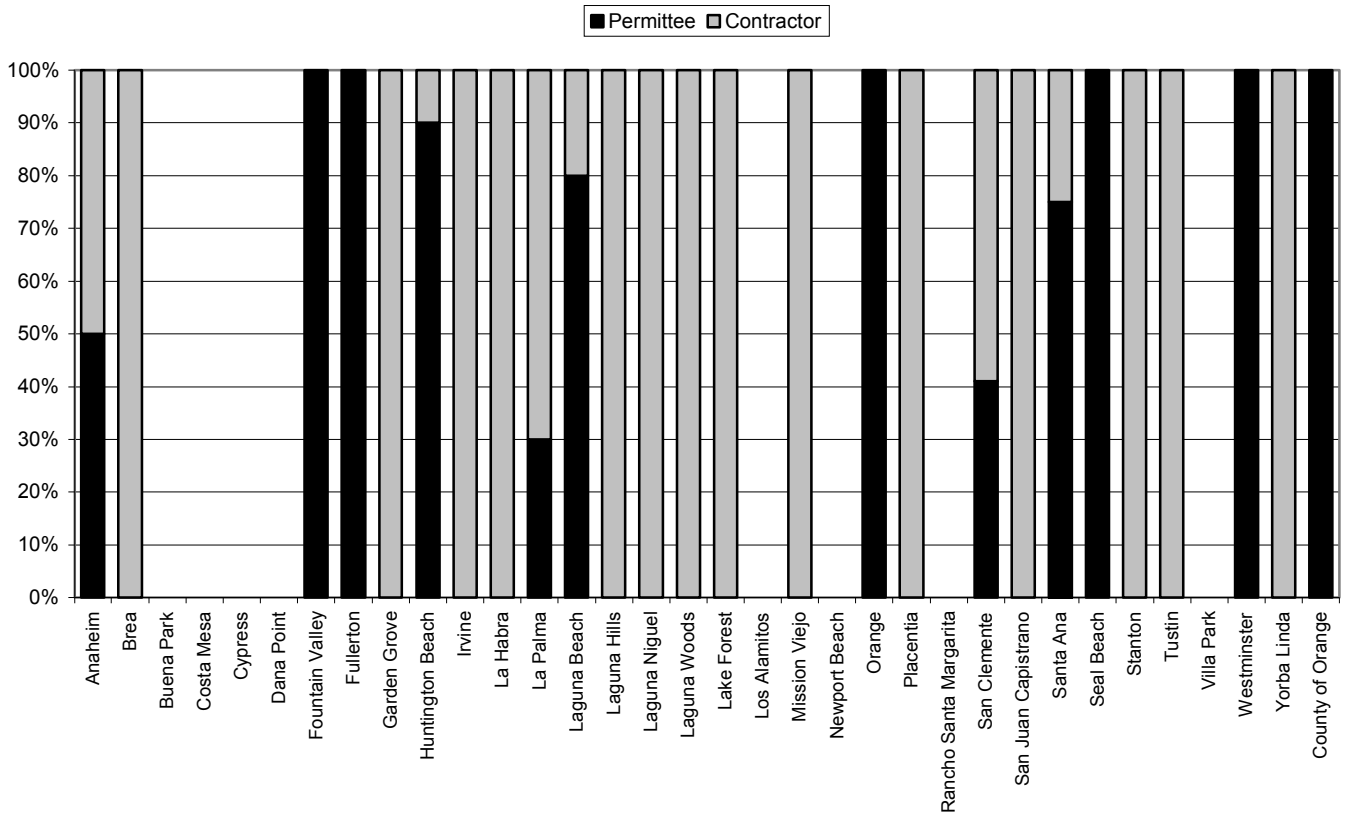

Figure 5.15
Percentage of Herbicides Applied by Permittee and/or Contractor

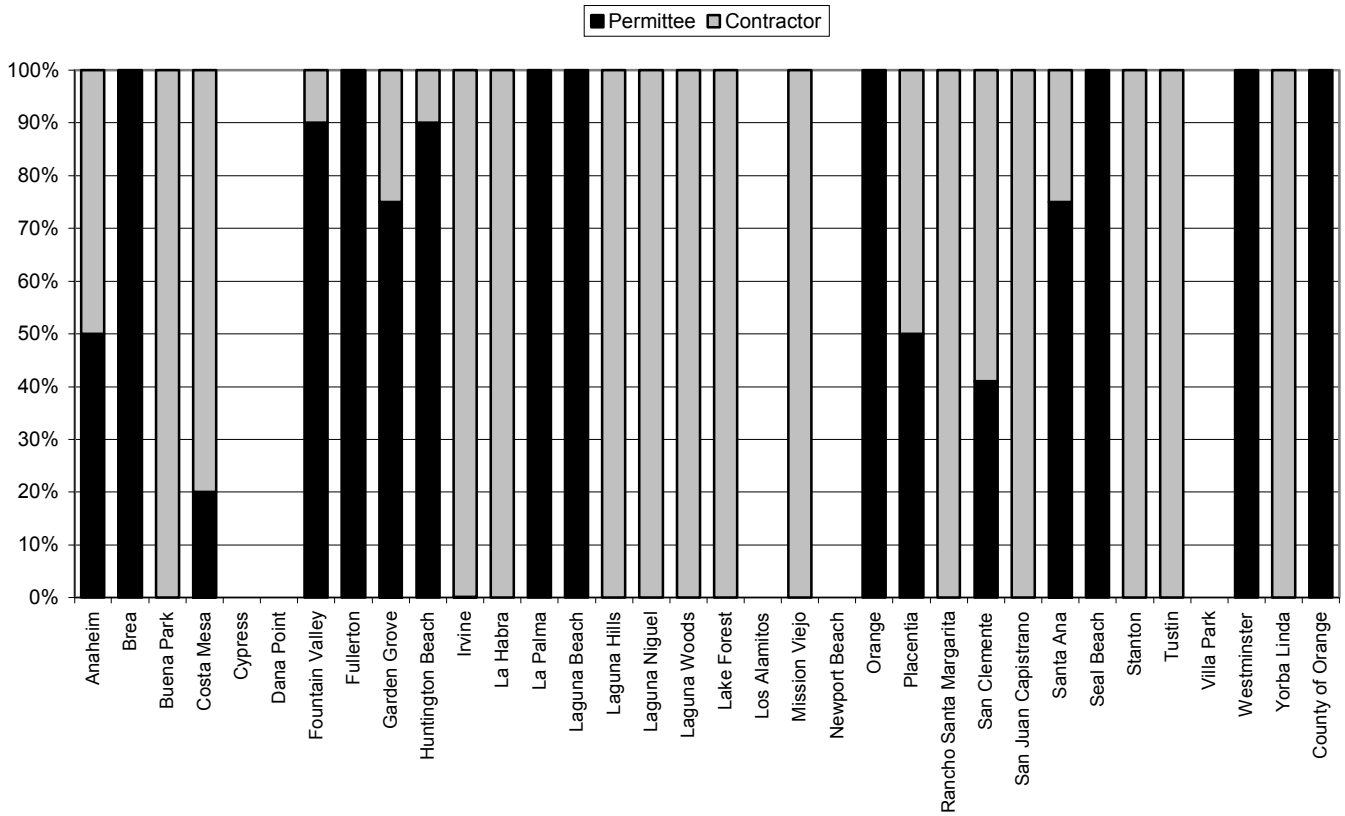

Figure 5.16
Percentage of Fungicides Applied by Permittee and/or Contractor

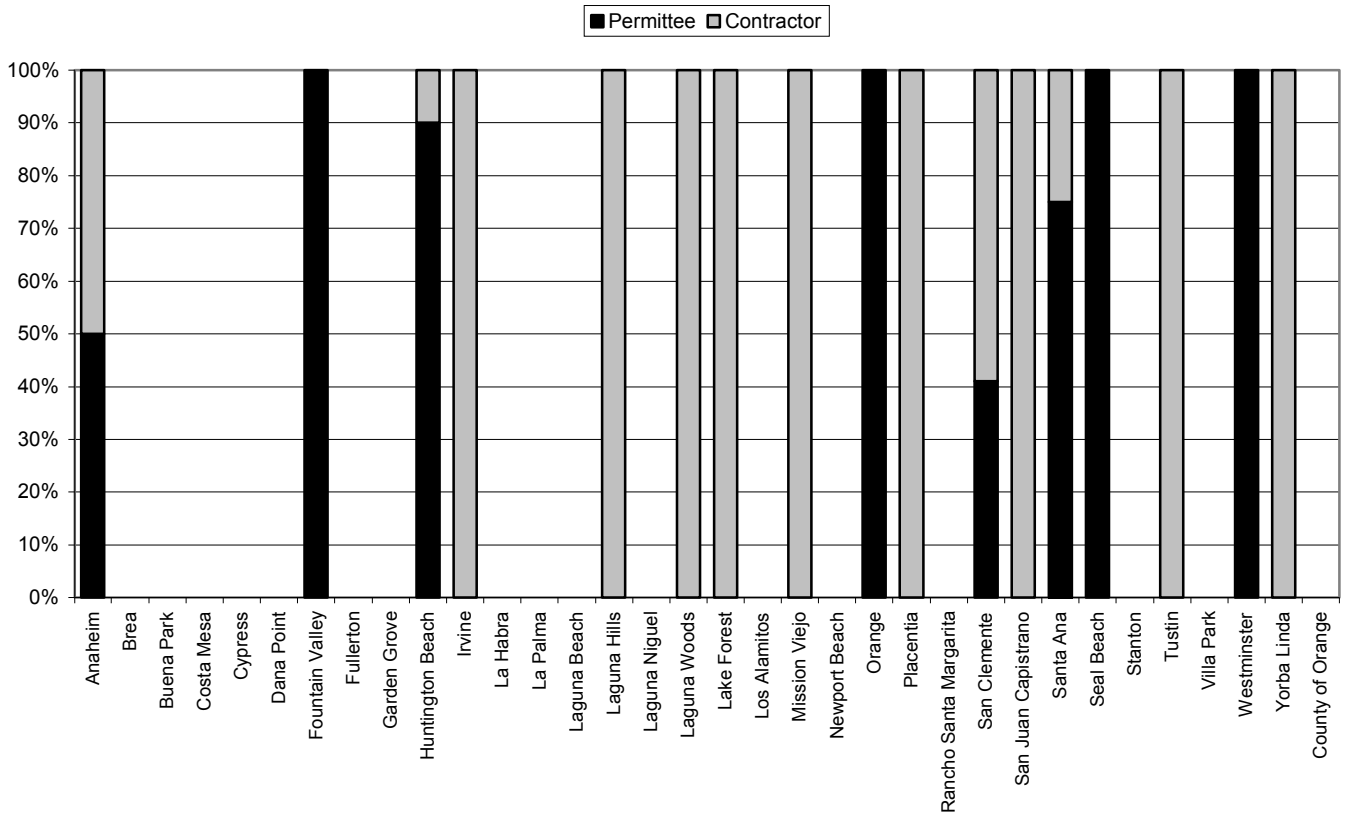

Figure 5.17
IPM Implementation and Selection

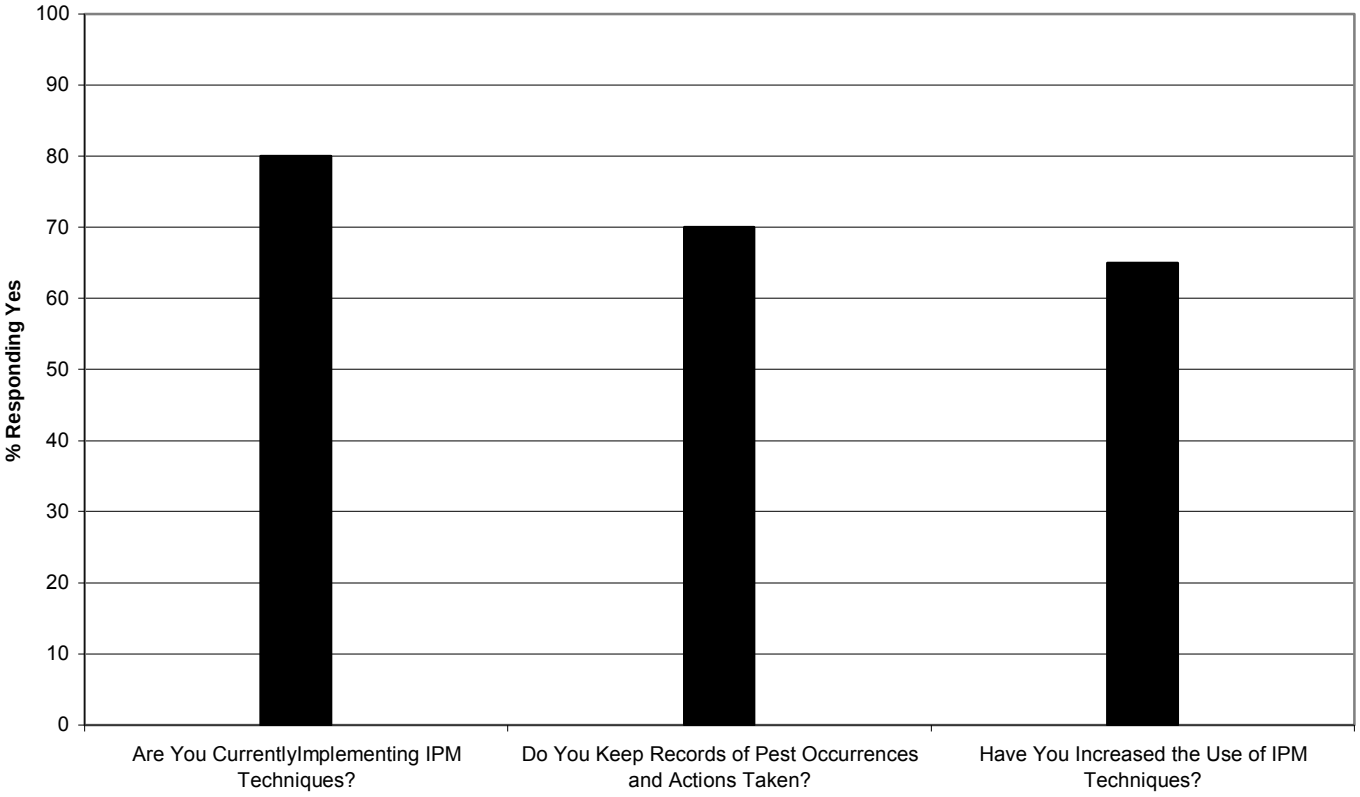

Figure 5.18
Pest Monitoring In Orange County

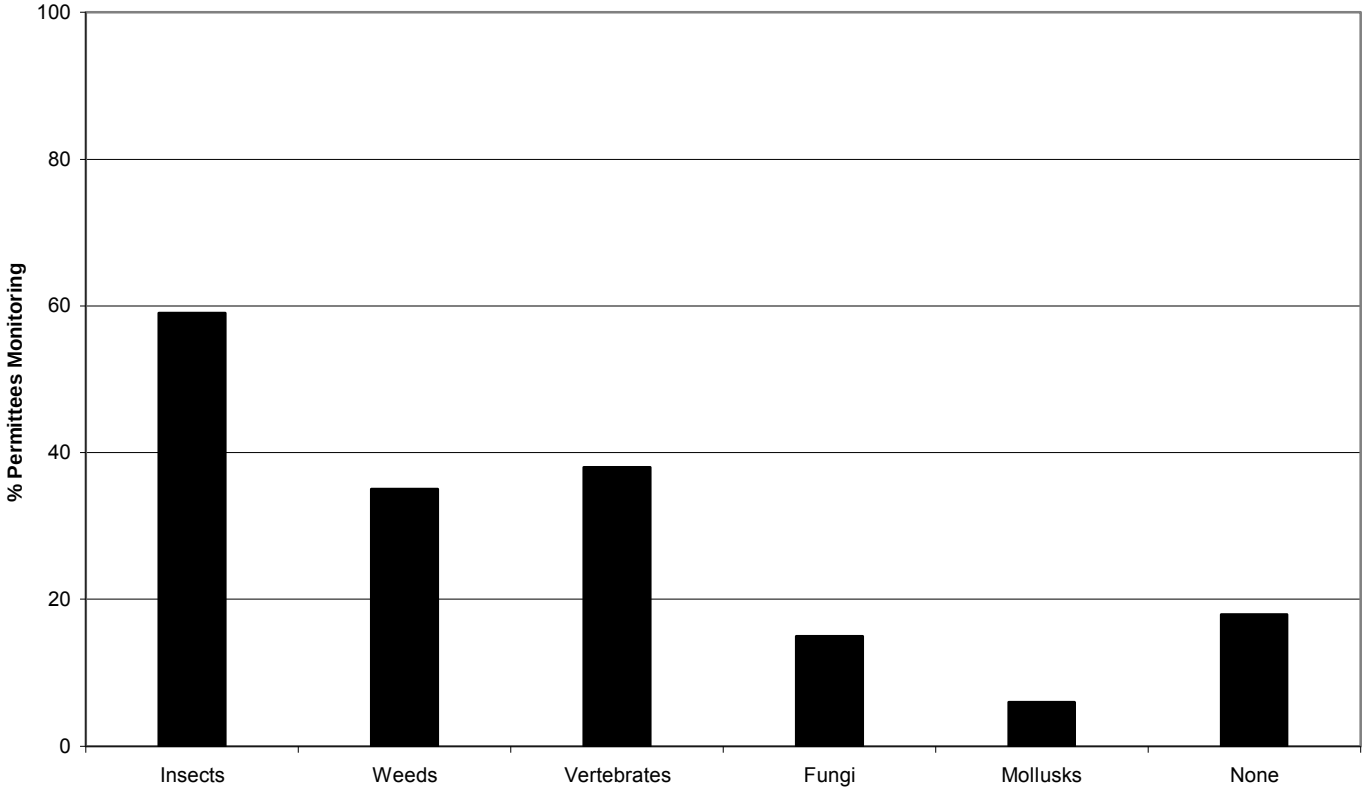

Figure 5.19
Pests Identification

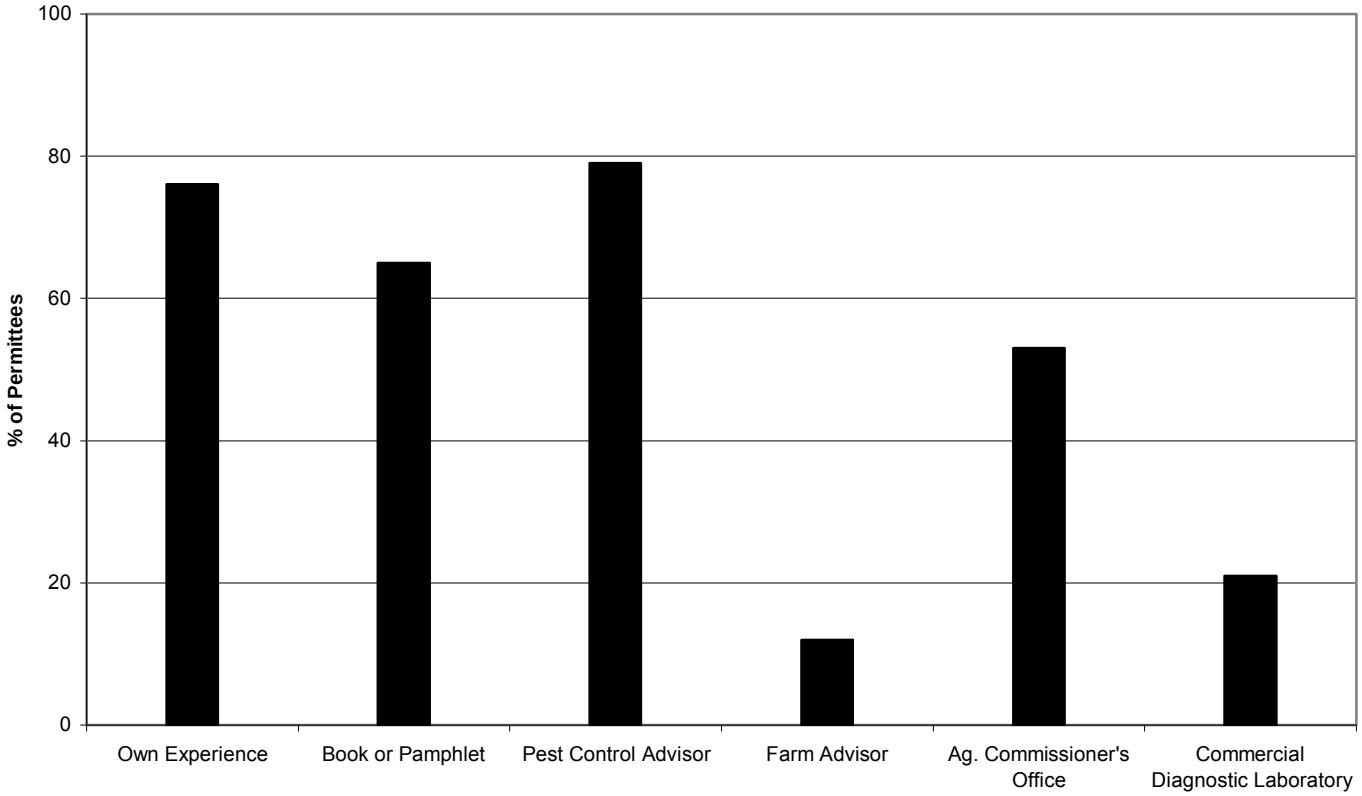

Figure 5.20
IPM Techniques Implemented

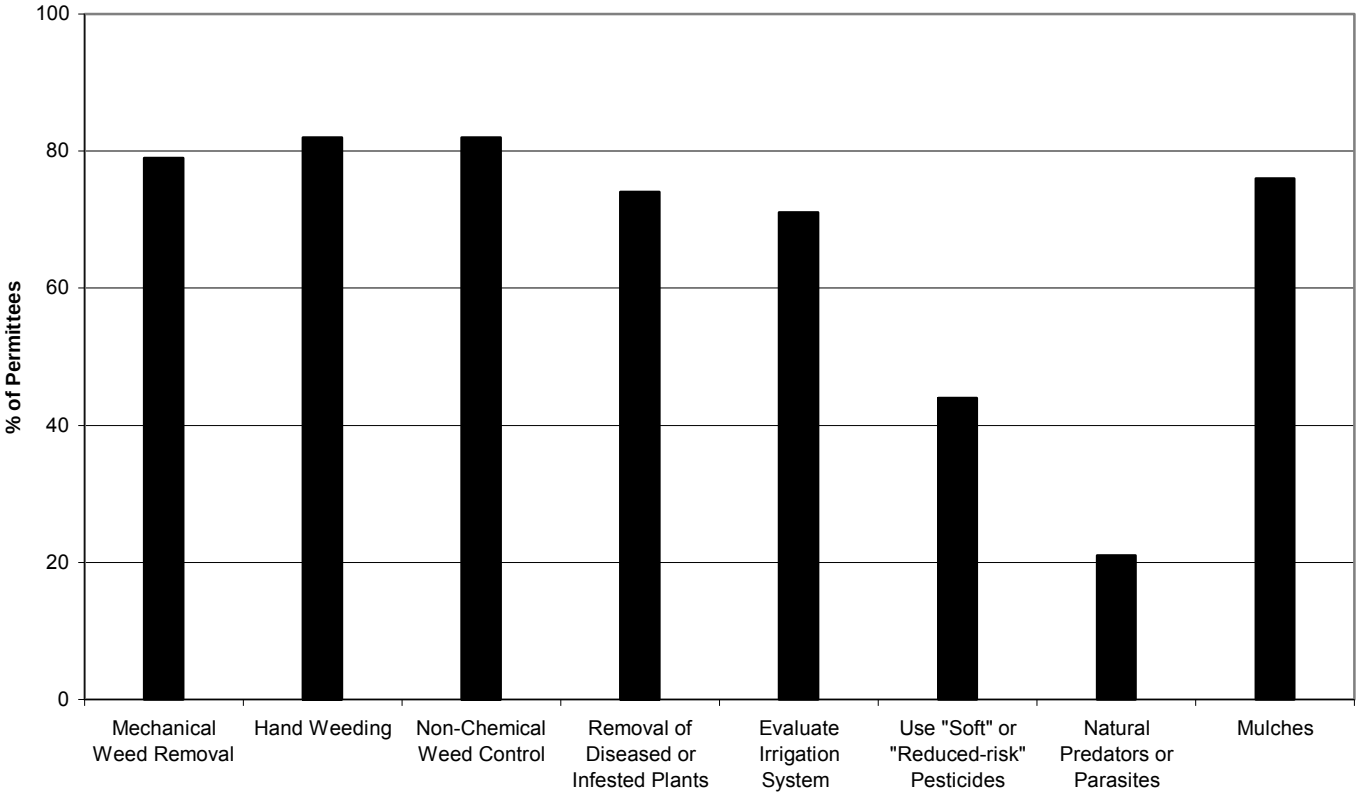

6.0 PUBLIC INFORMATION/EDUCATION

Public education is an essential part of a BMP program. Developing programs to inform and involve the public can be an effective method for controlling nonpoint source pollution. When a community has a clear idea where the pollution comes from, how it can affect them and what they can do to prevent those affects, it will be more willing to support and participate in program implementation.

6.1 Program Development

During the First and Second Term Permits, the public education program mainly consisted of: the development and distribution of public service announcements, brochures and other related materials; incorporation of storm water pollution prevention features into community outreach events such as the Orange County Fair; school demonstrations; speaking engagements; monitoring coordination with schools and universities; the development of a 24 hour water pollution problem reporting hotline; and the coordination with other agencies running public information programs such as water districts, sanitation districts, fire departments and community and environmental groups.

During 1998/99 the Permittees developed a long term NPDES public and business education strategy. The strategy was finalized in September 1999 and began to be implemented in 1999/2000. The Permittees will complete a public awareness survey by December 2001 to determine the effectiveness of the public and business education strategy to date and to provide direction to the overall program for the Third Term Permit period. The results of this survey should be available for inclusion in the 2002 Annual Status Report

In late 1999, the Permittees developed a comprehensive long-term NPDES public and business education strategy (subsequently referred to as the Public Education Program) in order to effectively educate the public and targeted business groups about the effects of stormwater pollution and encourage their participation in the protection of surface waters. The Final Report entitled “Recommendations for Expanding the Orange County Stormwater Program’s Public and Business Education Outreach Program”, includes a comprehensive planning approach and "tool box" of implementable educational elements based upon the desired direction of the program.

In early 2001, based upon the recommendations of the Final Report, the Permittees developed the next scope of work, issued a statement of qualifications, selected a consultant and awarded the contract.

The elements identified within the scope of work that will be developed and implemented during the upcoming year (2001-2002) include:

- Conducting a survey to identify and more fully understand the current level of general knowledge held by people in Orange County
- Utilizing the survey results to develop the campaign goals
- Determining the key messages and community outreach activities and strategies
- Preparing a master timeline
- Creating a brand name for the program
- Developing website materials and
- Developing a model watershed program

The Public Education Program serves as an integral planning tool and presents an overall universal formula for developing and implementing various outreach campaigns. The formula can be applied to multi-year comprehensive outreach programs or short targeted outreach activities and will be utilized in the following areas in the upcoming years:

a) Countywide Public Education Program

This element will address the sources, pathways and impacts of stormwater pollution and provide common-sense BMPs that can be implemented to reduce pollutant discharges.

b) Focus on watershed specific water quality problems

This element will enhance regional information to address specific urban water quality problems within a watershed such as bacteria levels within Aliso Creek and nutrients within the Newport Bay watershed.

c) Focus on particular constituents causing water quality problems countywide

This element will address urban chemicals/materials of concern such as pesticides, fertilizers, automotive fluids, trash and debris, cleaners, solvents, paints, pool chemicals, household hazardous waste, sediment, etc. and will provide BMP guidance for proper use, clean up and disposal.

d) Focus on business practices or activities causing water quality problems countywide

This element will address targeted businesses of concern such as mobile businesses, gas stations, automotive service centers, restaurants, etc. and will provide BMP guidance for their related business activities.

6.2 Program Implementation

During the First and Second Term Permit periods the Principal Permittee took the lead in developing a regional awareness program and provided the Permittees with copies of educational materials for distribution to the public. The public education program consisted of public, business and household hazardous waste elements. The Permittees were encouraged, but not required, to enhance the information provided with educational efforts more specific to local issues of importance related to water quality.

Other County agencies also provide information to the public that aids in controlling stormwater pollution. The County of Orange/HCA manages the county's used oil program that encourages the recycling of used motor oil and filters. The program assists the NPDES Stormwater Program by eliminating the number of incidents of people dumping used oil down the storm drain system. The County of Orange/IWMD manages the household hazardous waste program. The Department utilizes a variety of educational materials to recommend alternatives to hazardous products as well as proper disposal of household hazardous waste.

To assist in the implementation of the public education program, promote regional consistency and coordinate the multiple educational efforts underway, the Permittees participated in several public education committees.

Public Education Committee

In order to help provide regional consistency and oversight for the stormwater public education efforts, one of the performance commitments in the updated 2000 draft DAMP was to establish a public education committee.

This committee was established in March 2001 and meets quarterly to discuss the public education efforts, available countywide and local public education materials, upcoming public education events, other available public education materials and to update committee members on the progress of the California Storm Water Quality Task Force Public Information and Public Participation Work Group (PI/PP).

To date the committee has had participation from fifteen Permittees and Santa Ana Regional Board staff and met in March and June 2001 **(Table 6.1**).

The committee focused on the following areas:

- Public and business education strategy;
- Updated 2000 DAMP public education commitments;
- Draft permit requirements;
- Available/upcoming countywide public education materials;
- Modifications to the educational materials (bilingual);
- Upcoming public education events; and
- SWQTF PI/PP Meetings

California Storm Water Quality Task Force Public Information/Public Participation (PI/PP) Work Group

The California Storm Water Quality Task Force Public Information and Public Participation Work Group (PIPP) is comprised of representatives from stormwater programs, government agencies and consultant organizations involved in stormwater outreach efforts throughout the state. The work group meets bi-monthly to share stormwater related outreach information, materials, experiences and ideas. To encourage participation from all interested parties, meeting locations alternate between Southern and Northern California.

During 2001 the Principal Permittee co-chaired the PI/PP. The main goal for the work group during 2001 was the creation of an orientation package that would provide new attendees with an understanding of what the group has accomplished over the years and a basic understanding of the public education efforts that are already underway within the state.

6.2.1 Principal Permittee Regional Efforts

Countywide Education

The specific countywide education efforts that have taken place over the past year include:

1. Upon request, approximately 42,000 brochures, magnets, flyers and/or bookmarks were distributed to the Permittees, various agencies and private companies. **Table 6.2** presents all of the educational materials and how many were distributed. Of the brochures that were distributed, approximately 70% were provided to the Permittees and the remaining 30% to the private sector.

2. Staff participated in several public outreach events including the Children's Drinking Water Festival, Festival of the Whales/Ocean Awareness Day, Tierra Nativa and the Orange County Fair.

a) Children's Drinking Water Festival

The Children's Drinking Water Festival is an annual event that teaches two-to-three thousand 1st through 4th graders about water and the environment. The Principal Permittee has participated in this educational event each spring for the past four years. The booth, "Water Chemistry", teaches the students the importance of Chemistry in helping solve water quality problems. This message is conveyed through the use of displays, brochures, experiments and discussions with the students.

b) Festival of the Whales/Ocean Awareness Day

Staff participated in the annual Festival of the Whales/Ocean Awareness Day in March 2001 in Dana Point. The event educates the public about many environmental concerns regarding sea life. An informational booth was set up to teach the public about urban runoff and other water quality related issues.

c) Tierra Nativa

Staff participated in the annual "Tierra Nativa-Celebration of the Native Land" in April 2001 in Mission Viejo. Approximately 2,000 people attended the event. An informational booth was set up to teach the public about urban runoff and other water quality related issues.

d) Orange County Fair

The Principal Permittee participated in the annual Orange County Fair in July 2000 in Costa Mesa. The event was attended by thousands of people. An informational booth was set up to teach the public about urban runoff and other water quality related issues.

For this specific event, the efforts were coordinated with the County of Orange/HCA, County of Orange/IWMD and Orange County Sanitation for a comprehensive "Environmental Partners" public education effort aimed at educating the public about the proper disposal of wastes. This effort merged several similar messages about proper waste disposal.

As a part of this coordinated effort, the Principal Permittee and the Orange County Sanitation District conducted public awareness surveys with a number of fair goers. The results are presented in Section 6.4.2 and Section 6.4.3.

3. During 1999-2000 the Permittees participated in the LA Times in Education Program. This environmental study unit, which was distributed to approximately 180 schools, included newspaper-based lessons, classroom explorations and the opportunity for students and their families to participate in a survey to help Orange County understand how pesticides move through our watersheds.

Ultimately, 775 completed surveys were returned, representing eight different watersheds. The survey results provided the County with valuable information regarding the publics practices, perception and management of pesticides and will help to direct the County's future public outreach pesticide campaign to the appropriate sectors of the public. The survey results are discussed more fully in Section 6.4.4;

4. The Principal Permittee began discussions with Orange County Health Care Agency (HCA) staff to coordinate their efforts so that HCA restaurant inspectors could distribute the "Water Quality Guidelines for Exterior Restaurant Cleaning Operations" while conducting their scheduled restaurant inspections at approximately 11,300 restaurants countywide. As a result, staff will forward these brochures to HCA in the upcoming year.

5. The Principal Permittee began discussions with the Green Restaurant Association (GRA) of Newport Beach, to coordinate their efforts so that the GRA volunteers could distribute the "Water Quality Guidelines for Exterior Restaurant Cleaning Operations" while conducting their restaurant audits. As a result, staff forwarded 200 of these brochures to GRA.

6. Trails4All was established in 1992 as the Trails Council of Orange County. Incorporated as a 501(C) nonprofit organization in 1995, their purpose is to assist in coordinating volunteer trail projects and to raise funds to support volunteer groups that undertake those projects.

   During the reporting period, the Principal Permittee assisted Trails4All in coordinating the "Inner Coastal & Watershed Cleanup Day" in Orange County. This event is held in conjunction with the "Coastal Cleanup Day" each September and brings together volunteers to collect trash and debris and help restore trails within the Talbert/Greenville Banning Channel, Los Alamitos/East Garden Grove/Bolsa Chica, Lower Santa Ana River & Santiago Creek, San Diego Creek, Aliso Creek and San Juan Creek watersheds.

7. The Permittees continued to participate in the American Oceans Campaign stormwater resources web page at www.americanoceans.org/runoff/epa.htm; by sending any additional newly created public education materials to the organization for placement on the web page. **(Figure 6.1**)

8. The Permittee continued to publicize the 24-hr telephone line for inquiries about stormwater and public education material as well as water pollution complaints;

9. A downloadable version of the updated 2000 Drainage Area Management Plan (DAMP) was placed on the Santa Ana Regional Water Control Board's website.

10. The Principal Permittee participated as presenters at a number of workshops or seminars addressing stormwater management issue

11. The Principal Permittee provided Urban Run-Off 101 and Watershed 202 presentations, which illustrate how the County is responding to problems in our watersheds. The presentation covers such topics as water quality, habitat protection and stream stability issues with examples of short, medium and long-term solutions.

    a) "Urban Run-Off 101"

    This presentation provides fundamental information for those without the basic understanding of what urban run-off is and distinguishes the differences between point source and non-point source pollution. It also presents information on water quality regulations, regulators, stakeholders and solutions to water pollution problems (**Appendix D**).

    b) "Watershed 202"

    Building upon the foundation put down by "Urban Run-Off 101", this presentation specifically targets each of Orange County's thirteen watersheds and outlines major projects underway including grants, construction, wetland and stream bank restoration, water quality studies, diversions, storm drain filter programs, TMDL programs and water bonds. **(Appendix E**).

12. The Principal Permittee developed its first "advertorial" to reach the public through the newspaper. The "advertorial" contains key messages on water quality and water pollution and was estimated to be read by 830,000 readers. The "advertorial" was part of a special "Earth Day" section of the April 20, 2000 edition of the Orange County Register.

Watershed Specific Public Education

The additional watershed specific education efforts that have taken place over the past year include:

1. The Principal Permittee participated in discussions about building a watershed educational center in the Santiago Oaks Regional Park which would utilize a series of interactive exhibits to better inform park visitors about various watershed messages including drinking water systems, sanitation systems, various water resource programs (groundwater) and the storm drain/stormwater conveyance system. The center may also feature exhibits devoted to urban runoff to help promote public awareness concerning the connection between the ocean and storm drain system and things that they can do to prevent pollution.

Pollutant Specific Education

The additional pollutant specific education efforts that have taken place over the past year include:

1. Pesticide Brochure – 319(h) Implementation Grant, Upper Newport Bay Water Quality Enhancement Project

   As a result of the 319(h) Implementation Grant, source control efforts were focused on the role of organophosphate pesticides in aquatic toxicity in the Newport Bay watershed, particularly on urban residential uses of these chemicals.

   Part of the urban residential source control program was the development of an Upper Newport Bay watershed version of a brochure entitled "Keeping Pest Control Products Out of Creeks, Rivers and the Ocean" developed originally by the industry group CURES (Coalition For Urban/Rural Environment Stewardship). Sixty thousand copies of this brochure have been printed and will be distributed to Newport Bay watershed cities.

2. The Principal Permittee is currently developing a Pet Care Activities Brochure that is intended to inform the public about the need to pick-up after their pets and care for them without impacting the environment.

Business Specific Education

During the First and Second Term Permits, the business education program mainly consisted of the development and distribution of formal BMP guidance for certain potentially polluting business activities including mobile detailing, pool maintenance activities, automotive service center and restaurant cleaning operations; and outreach to business associations.

The additional business specific education efforts that have taken place over the past year include:

1. Grocery Store Exterior Cleaning Practices - An educational letter and BMP guidelines addressing exterior cleaning practices were distributed to the corporate headquarters and 148 individual grocery stores of the five largest grocery store chains that are located within Orange County **(Appendix F)**.

2. Pressure Washing Companies – An educational letter and BMP guidelines addressing pressure washing activities were distributed to 36 companies residing within Orange, Los Angeles, San Bernardino and Riverside Counties **(Appendix G)**.

3. Exterior Restaurant Cleaning Guidelines – A brochure was developed to address those general types of business activities that may pose a threat to water quality and suggest BMPs that can be implemented to reduce the impact on the environment.

4. General Business Practices Brochure – A brochure is being developed to address those general types of business activities that may pose a threat to water quality and suggest BMPs that can be implemented to reduce the impact on the environment.

5. Carpet Cleaning Brochure – A brochure is being developed to address carpet cleaning activities that may pose a threat to water quality and suggest BMPs that can be implemented to reduce the impact on the environment.

6. Equestrian/Livestock Brochure – A brochure is being developed to address those horse and livestock activities that may pose a threat to water quality and suggest BMPs that can be implemented to reduce the impact on the environment.

7. BMP Posters –A series of three posters are being developed to address activities associated with automotive repair shops, gasoline stations and restaurants that may pose a threat to water quality and suggest BMPs that can be implemented to reduce the impact on the environment. The posters will be bilingual, full color and weather resistant so that they may be posted in the workplace as a guide for employees.

6.2.2 Local Efforts

In 2000/01 all Permittees made the countywide educational materials available to their residents at public facilities such as city halls, libraries, fire stations, etc.

In addition many Permittees developed and distributed their own materials to the general public. In 2000/01, fourteen Permittees reported enhancing local materials and/or conducting their own initiatives **(Table 6.3).** Examples include the following:

1. Dana Point developed the “Protecting the Ocean” brochure in an effort to protect the local ocean water quality in English and Spanish;

2. Fountain Valley provided waste reduction and litter control slides before movies at the local theaters;

3. Laguna Hills reported the development and distribution of public education literature expanding upon the County’s “The Ocean Begins at Your Front Door” brochure;

4. Laguna Woods developed a flyer about water quality and hazardous material disposal which was mailed to all residents and distributed to all businesses within the city;

5. Mission Viejo developed a series of brochures which focused on specific activities including painting, roadwork and paving, concrete and mortar application, home improvements, auto maintenance, general construction, landscaping gardening and pest control, food service and heavy equipment/earth moving activities;

6. Santa Ana produced waste disposal and recycling information in English, Spanish, and Vietnamese; and

7. Seal Beach developed a construction and demolition recycling guides.

In addition to the above-mentioned efforts, Laguna Niguel reported initiating planning on the development of an Aliso Watershed Education Facility. The facility is intended to physically demonstrate principles of sustainable landscape and architectural design that residents might incorporate in remodeling their own homes. A nomination letter was signed in June to the State Parks Department seeking Proposition 12 grant funding for up to $500,000.

Ten Permittees also reported that they have initiated or completed the development of local websites to display information regarding storm drains, water quality, and/or recycling.

During the reporting period, eighteen Permittees also reported sponsoring and/or attending public outreach events (**Table 6.4**) and nine Permittee reported utilizing a variety of interactive public education displays at those events (**Table 6.5**).

Key events included:

- Anaheim Environmental Faire, City of Anaheim – City Staffed information booth and provided brochures on litter control;
- Orange County Fair, City of Costa Mesa – City provided recycling, proper waste disposal, and anti-litter information. Distributed "The Ocean Begins at Your Front Door" brochures;
- Cypress Community Festival, City of Cypress – City distributed used oil recycling containers, oil recycling information, water quality information, and premiums including stormwater magnets;
- Ocean Awareness Day, City of Dana Point – City demonstrated how the recently installed storm drain filters catch sediment, trash and other contaminants;
- Clean-Up Days, City of La Habra – City provided large trash bins for residents to drop off large trash items/handed out brochures and used oil containers;
- Trails-4-All Clean-Up, City of Laguna Hills – City distributed public education materials; and answered water quality questions from the public;
- And, Tierra Nativa, City of Mission Viejo – City hosts and organized the environmental and cultural event.

6.3 Volunteer Monitoring

During the Second Term Permit period, the Principal Permittee continued its volunteer monitoring program. During the permit period, several students/interns, one under the direction of Dr. Prem Saint of the California State University at Fullerton, have been instrumental in:

- Collecting and submitting water quality samples for various compliance activities;
- Gathering and analyzing trash/debris and sedimentation data;
- Quantifying and characterizing the types of trash/debris that were collected a debris boom during storm flows;
- Maintenance of the field equipment and scientific instruments they used; and
- Preparation of statistical reporting spreadsheets.

6.4 Public Awareness Surveys

In an effort to better understand the public's awareness regarding water quality issues, several surveys have been conducted. The surveys have incorporated a number of questions relating to pesticide, herbicide and fertilizer use, the sewer and stormdrain system and the public's overall awareness of the County's public outreach campaign. The results may assist the stormwater program managers in determining what additional efforts need to be conducted and where focused efforts should take place.

In addition to previously completed surveys, the Permittees will be conducting another, more thorough public awareness survey during 2001/02.

6.4.1 1994 Stormwater Pollution Prevention and Flood Awareness Survey

In 1994 the University of California at Irvine (UCI) conducted a public education survey on behalf of the NPDES Stormwater Program as a part of the Orange County Annual Survey. This survey was co-directed by Mark Baldassare and Cheryl Katz of the University of California, Irvine. The Stormwater Pollution Prevention and Flood Awareness Survey comprised 10 questions on topics such as awareness and knowledge. The intent of the survey was to gather information on the public's perception regarding storm water.

For this telephone survey, random samples of 1,000 Orange County adults were interviewed over the period August 19-29, 1994. The sampling error was three percent for the total sample.

The key results of this survey were:

- Eighty-six percent say it is illegal to throw materials into the storm drain. However, nearly half of Orange county adults believe that the storm drain system and the sewer system are the same (44%) and that the water in storm drains is filtered and tested before it leaves the system (48%). Older Anglo, South County and higher socioeconomic status residents tend to know more about stormwater pollution.

- Thirty-three percent have seen public service announcements on television about dumping in storm drains, while 8 percent have seen brochures and 60 percent have noticed the "No Dumping" messages stenciled on curbs or storm drains. The study notes that, in general, exposure to announcements and warning signs on curbs lead to greater awareness of stormwater pollution prevention.

The main finding of the survey was that the public assumed that storm water was being treated. As a result of that finding, an effort was made to stencil storm water inlets with a uniform message throughout the county that informs the public that storm water drains directly to the ocean.

6.4.2 2000 County of Orange Fair Survey

In July 2000, during the annual County Fair, the Principal Permittee conducted an informal urban runoff awareness survey (**Figure 6.2**). The survey incorporated six questions that were generally focused around basic awareness issues such as the difference between the storm drain and the sewer system and perceptions of current environmental problems. The questions were selected based on the public education Final Report that was completed in 2000. Two hundred and thirty-seven people completed the survey.

The key results of the survey were:

- Sixty four percent of the respondents understood that the storm drain and sewer systems were not part of the same underground drain system;

- Seventy four percent of the respondents understood that the water that flows into the storm drain system is not tested and filtered to remove wastes before they flow to the ocean;

- Nearly all of the respondents understood that the water that flows into the storm drain system ends up at the ocean;

- Eighty nine percent of those surveyed had observed that the storm drains are stenciled with a "No Dumping – Drains to Ocean"; and

- All respondents believed that there is a pollution problem in Orange County.

6.4.3 2000 Orange County Sanitation District Fair Survey

In July 2000, during the annual County Fair, the Orange County Sanitation District also conducted an informal survey entitled, "We're Fired Up About Protecting Our Coastal Water Survey 2000" that incorporated a number of questions regarding the storm drain system and urban runoff. **(Figure 6.3).** The survey incorporated two questions that were generally focused around basic awareness issues such as the difference between the storm drain and the sewer system and perceptions of current environmental problems. Approximately 100 people completed the survey.

The key results of the survey were:

- Sixty two percent of the respondents understood that the storm drain and sewer systems were not part of the same underground drain system; and

- Seventy five percent of those surveyed understood the water that enters the storm drain system flows straight to the ocean and does not go to a wastewater treatment plant.

6.4.4 LA Times In Education Survey

In 1999, in coordination with *The Los Angeles Times'*, Time in Education program, the Principal Permittee contributed to a pesticide/herbicide watershed based survey of secondary school students of Orange County. The survey was created to help the County understand how, when and where the general public is using pesticides and herbicides within its borders. Countywide data was tabulated and compared to two County watersheds, San Diego Creek (SDC) and Newport Bay (NB). Surveys were ultimately returned from eight watersheds.

The most central topics presented to those surveyed were form of pesticide, time of application, disposal, frequency of application and area of application.

Eighty-six percent of the pesticides/herbicides listed by those surveyed were a liquid state pest (ants, flees, weeds, moths, flies, insects, et cetera) control. The liquid form pest control (pesticides/herbicides) is more readily available to be "picked-up" by rain, irrigation or runoff, contributing to toxicity in waterbodies (streams, rivers, lakes, estuaries, and/or harbors).

Nearly twelve percent of those surveyed in "All Other" watersheds coincide pesticide/herbicide application with precipitation or irrigation. Nearly 18 percent of those surveyed within the SDC and NB watersheds coincide pesticide/herbicide application with precipitation or irrigation.

Only 4.8 percent (All Other watersheds) and 4.4 percent (SDC + NB) of those surveyed dispose of unused pesticides/herbicides directly into a catch basin or storm drain.

Forty percent (All Other watersheds) and 47.8 percent (SDC + NB) of those surveyed dispose of unused pesticides/herbicides in areas that are exposed to precipitation and/or wind.

The main finding of the survey was that the public, overwhelming uses liquid bases pesticides and herbicides. The survey also revealed that the public has increased its knowledge about urban runoff issues and their awareness of the connectivity between the ocean and storm drain system.

6.4.5 Survey Conclusions

Although the results from the informal surveys conducted in 2000 are very similar, when compared to the 1994 UCI survey, some general conclusions can be made:

- Between 1994 and 2000, an additional 8% of those surveyed understood that the storm drain and sewer systems were not part of the same underground drain system;

- Between 1994 and 2000, an additional 22% of those surveyed understood that the water that flows into the storm drain system is not tested and filtered to remove wastes before they flow to the ocean; and

- Between 1994 and 2000, an additional 29% of those surveyed had observed that the storm drains are stenciled with a "No Dumping – Drains to Ocean.

This apparent increase in public awareness may be a result of effective current and past, large-scale multi-agency, multi-city and County Stormwater education programs promoting the connection, and disconnection, between storm drains, the sewer system and water quality.

However, it should again be noted that, since the two 2000 public awareness surveys were informal, additional, more scientific, conclusions would not be able to be made until the conclusion of the 2001-2002 scientific survey.

Table 6.1
Public Education Committee

Permittees	Public Education Committee Participant			Meeting Date Attended	
	Name	Department	Phone Number	March 15, 2001	June 14, 2001
Anaheim	Rod Hallok	Public Works	(714) 765-6881	X	X
Brea	Beatrice Ramirez	Engineering	(714) 990-7672	X	X
Costa Mesa	Maher Nawar	Public Works	(714) 754-5248	X	X
Dana Point	Cindy Asher	Public Works	(949) 248-3571	X	
Irvine	Mike Loving	Public Works	(949) 725-6315	X	X
Mission Viejo	Richard Schlesinger	Public Works	(949) 470-3079		
Rancho Santa Margarita	Tom Wheeler	Engineering	(949) 635-1800	X	
San Clemente	Tom Bonigut	Engineering	(949) 361-6187	X	X
San Juan Capistrano	William Huber	Engineering & Building	(949) 443-6336	X	X
Santa Ana	Souri Amirani	Public Works	(714) 647-5640	X	X
Stanton	Michael Kim	Engineering	(714) 379-9222x203		
Tustin	Keith Linker	Public Works	(714) 573-3175	X	X
Westminster	Ziad Mazboudi	Public Works	(714) 898-3311x215	X	X
Yorba Linda	Chris Johansen	Engineering	(714) 961-7170	X	X
County of Orange	Karen Ashby	PFRD/Watershed and Coastal Resources	(714) 567-6297	X	X
	Matt Tucker	PFRD/Watershed and Coastal Resources	(714) 567-6342	X	X

Table 6.2
Countywide Public Educational Materials

Public Education Item	Number Distributed
"The Ocean Begins At Your Front Door" (Brochure)	14,542
"Do You Know Where the Water in Your Storm Drain Goes?" (Brochure)	12,445
Water Pollution Problem Reporting Hotline Magnets	8,312
"Keep Gutters Clean For Those Downstream" Bookmarks	1,576
"Waste Oil Collection Centers" Brochure	2,964
"Mobile Detailing and the Water Quality Act" (Brochure)	738
"Pool Maintenance and the Water Quality Act" (Brochure)	1,178
"Water Quality Guidelines for Exterior Restaurant Operations" (Brochure)	200

Countywide Public Educational Materials in Development

Public Education Item	Date
"Water Quality Guidelines for Carpet Cleaning" (Brochure)	December, 2001
"Water Quality Guidelines for Pet Care Activities" (Brochure)	December, 2001
"Water Quality Guidelines for Horse & Livestock Activities" (Brochure)	December, 2001
"Water Quality Guidelines for General Business Practices" (Brochure)	January, 2002
BMP Poster for Food/Restaurant Industry	January, 2002
BMP Poster for Gas Station Operations	January, 2002
BMP Poster for Auto Repair Industry	January, 2002

Table 6.3
Public Education Outreach Materials and Websites

Permittees	Materials Developed During This Fiscal Year	Website address
Anaheim	"The Ocean Begins at Your Front Door" Brochure Revision	http://www.anaheim.net/publicworks/index.html
Brea	2 coloring pages and coloring/activity book (in progress)	
Costa Mesa	Flyer for Home Pick-Up Program and HHW; Ads in Booster Books for local high schools to publicize recycling; Home-generated Sharps Recycling Program.	
Cypress		http://www.ci.cypress.ca.us
Dana Point	"Dana Point Is Protecting Our Ocean" (English & Spanish)	http://www.danapoint.org (still under construction)
Fountain Valley	Stormwater Pollution brochure for businesses, Stormwater Pollution brochure for residents, Hazardous waste pollution, Xeriscaping brochure	http://www.fountainvalley.org
Garden Grove	Painting, Food Service Industry, Fresh Concrete and Mortar Application, General Construction and Site Supervision, Heavy Equipment and Earth Moving Activities, Landscaping, Gardening and Pest Control, Home Repair and Remodeling, Automotive Maintenance and Car Care, Roadwork and Paving	
Irvine	Residential "Cart" Recycling Prog. Brochure; Apartment Recycling Brochure; Used Oil Recycling Program Pens & Pencils; Used Oil Program Brochures; Used oil Program billing inserts; Used Oil/HHW educational Wheels; Parks Recycling Brochure; Household	http://www.cityofirvine.org
Lake Forest	Newspaper advertisement for Earth Day, City Newsletter Advertisement	http://www.lakeforest.ca.us/leaflet
Mission Viejo	Roadwork and Paving; Home Repair and Remodeling; Painting; Landscaping, Gardening, and Pest Control; Heavy Equipment and Earth-Moving Activities; Food Service Industries; General Construction and Site Supervision: Fresh Concrete and Mortar Application; Automotive Maintenance and Car Care	
Newport Beach		http://www.city.newport-beach.ca.us
Orange	Let's Recycle; Orange Recycles; HHW Home Pick-Up Program; Recycling Reference Card; Composting	
San Clemente		http://www.cty.org/san-clemente
San Juan Capistrano	Press Releases	
Seal Beach	Construction and Demolition Recycling Guide	http://www.sb-publicworks.com
Tustin	Newsletter to inform public about recycling & other waste management and disposal issues	
Westminster	Articles in City Newsletters; County Environmental, Brochures available in City Hall Lobby.	
County of Orange		Website under development 2001/02

Table 6.4
Public Education Outreach Events

Permittees	Name of Event	Focus of Event	Date of Event	Staff Attended		Sponsoring Organization	# Attended	What did you do?
Anaheim	Anaheim Environmental Faire	Environmental and Recycling Issues	September 1, 2000	Marcia Myers		City of Anaheim	400	Staffed info booth and provided brochures on litter control
	Transportation Faire	Transportation related issues	October 1, 2000	Marcia Myers	Suzanne Rogers	City of Anaheim	400	Staffed info booth and provided brochures on litter control
	Anaheim Employees Family Day	Community and City Activities	February 1, 2001	Marcia Myers	Suzanne Rogers	City of Anaheim	100	Staffed info booth and provided brochures on litter control
Costa Mesa	Orange County Fairgrounds	Public Awareness/Education	July 14-30, 2000	Donna Theriault	Tom Fauth	OC Integrated Waste Management Department	17,000	Provided recycling, proper waste disposal, and anti-litter information. Distributed "The Ocean Begins at Your Front Door" brochures.
Cypress	Cypress Community Festival	Used Oil Recycling/Hazmat Info	June 22, 2000	Various staff members		Public Works Department	20,000	Distribute used oil recycling containers, oil recycling information, water quality information, and premiums including Stormwater Magnets.
Dana Point	Ocean Awareness Day	Ocean Water Quality	March 4, 2001	Cindy Asher	Steve Avila	City contributed booth and provided educational material along with some funding for The Whale Festival, where Ocean Awareness Day is a special event.	Approx 1,000	Demonstrated how the recently installed storm drain filters catch sediment, trash, contaminants, etc, and the effectiveness of the City's street sweeping program.
Fountain Valley	City Summer Showcase	Community summer festival showcasing City departments and functions	July 19, 2001	Steve Hauerwaas	Mark Lewis, Jose Alire	City Sponsored	3,000	Met with residents, promoted NPDES information, distributed material
Garden Grove	Annual Public Works Open House	Public Education for City Programs	October 7, 2000	Maria Stipe	Jim Yasutake, Hermilio Hernandez	Sponsored by the City and staffed by City employees and volunteers	1000	Distributed Storm Water Program brochures and magnets, and encouraged participation in an interactive educational activity.
Huntington Beach	Public Works Open House	Public Information	May 19, 2001	Geraldine Lucas	Eric Charlonne, Todd Broussard	City of Huntington Beach	2,000	CDS demonstration, sanitary sewer camera video, water quality brochures and posters
Irvine	"Let's Talk Irvine"	Promoting citizen involvement in City issues	May 9, 15, 29, June 5, 11, 19, 2001	Public Information Office & City Council		City Sponsored	20-30 residents per gathering	Led discussions about neighborhood issues. Packets containing the water quality brochure were disseminated.
La Habra	Clean-Up Days	Pick up large items/community relations	Oct. 21, 2000; April 21, 2001; Feb. 7, 2001	Public Works Staff		City of La Habra	N/A	Provided large trash bins for residents to drop off large trash items/handed out brochures and used oil containers

Table 6.4
Public Education Outreach Events

Permittees	Name of Event	Focus of Event	Date of Event	Staff Attended		Sponsoring Organization	# Attended	What did you do?
Laguna Beach	Water Quality Workshop	Public Awareness	June 9, 2001	Derek Wieske	Mike Phillips	City Council	25-30	Staff and Council member listened to public input
Laguna Hills	Trails-4-All Trail Clean Up	Litter clean up. Aliso Creek Trail	September, 2000	Vince Cardona		Trails-4-All Sponsors	100 (approx)	Distribute public education materials; answer water quality questions
Laguna Niguel	Volunteer Connection Day	Drought tolerant plants, runoff minimizing design	April 1, 2001	Nancy Palmer	Grethin Nalcolm	City of Laguna Niguel	50-60	Organized volunteers to install plants & runoff-minimizing hardscape & erosion control in the City Botanical Gardens
Mission Viejo	Tierra Nativa	Earth Day/environmental awareness	April 28, 2001	Keith Rattay, Organizer	Entire Public Works Staff	City organizes and holds the entire event.	2,000	Water Quality Booth
Newport Beach	Public Works Open House	All Things Public Works	May 19, 2001	Steve Luy		By the City	300-400	Had Water Quality Awareness Table
Orange	Street Fair	Community Party	September, 2000	John Loertscher-Primary	100s of city staff involved	Private/city partnership	100,000+	Displays of water conservation, used-oil, composting, stormwater protection, etc.
San Juan Capistrano	City Hall Student Tours	City Government	4 visits from July 2000 to June 2001	Nancy Barney, Mgmt Analyst	Sam Shoucair, Senior Engineer	City	Approx. 200 Students (3rd-4th Grade)	Discussion of Storm Water and Urban Runoff Pollution; as well as demonstration of storm water drainage process by Engineering Staff
Westminster	Chamber of Commerce, City Hall meet	Educating businesses on City hall functions, important rules "such as NPDES" they should be aware of	April 25, 2001	Ziad Mazboudi	Brad Fowler	Local radio and newspaper	100+	Represented the Public Works Department and provided flyers on storm water and spill prevention.
County of Orange	Festival of the Whales	Ocean Pollution Awareness	March 1, 2001	Matt Tucker		City of Dana Point	100	Staffed booth, had questions and answers with prizes for correcct answers and provided brochures
	City of Mission Viejo's Tierra Nativa-Celebration of the Native Land	Earth Day/environmental awareness	April 28, 2001	Grant Sharp		City of Mission Viejo hosted and coordinated the event	2000	Information booth with approximately 100 magnets, 50 "Do You Know Where the Water in Your Stormdrain Goes" and 50 "The Ocean Begins At Your Front Door" were distributed.
	Children's Water Festival	Educating children about Water Quality issues	May 1, 2001	Matt Tucker		OC Water District and private companies	2000	Demonstrated water chemistry to approximately 500 children.

Table 6.5
Public Education Outreach
Interactive Displays

Permittees	Interactive Display Description
Dana Point	United Storm Water (City's contractor for storm drain filters) brought a glassed in display that shows how the filters are mounted and how they capture contaminants.
Garden Grove	Children fished for sea life prizes through holes cut into a large mural board depicting an ocean scene and storm drain marked "No Dumping Drains to Ocean"
Huntington Beach	CDS water flow model was used to demonstrate the operation of a structural stormwater BMP.
Irvine	Wheel of Fortune to promote public awareness of water quality issues. Participants asked basic questions about water quality. Correct answer yielded a prize.
La Habra	City used a robot, "Cycler" to promote recycling to the residents.
Mission Viejo	Photos of violations were displayed.
San Juan Capistrano	Poster size version of "The Ocean Begins…" brochure and abstract demonstration using PVC pipe and slotted crate to show pipelines
Tustin	City provides turning wheel of information at the public counter which includes brochures from County and Calif Waste Management Board
County of Orange	The Enviroscape Coastal Model

Figure 6.1
www.americanoceans.org/runoff/epa.htm;

Orange County - 714-567-6371 - www.oc.ca.gov/pfrd/ - bookmark - "Keep Gutters Clean for those Downstream"; brochure - "Do You Know Where the Water in Your Storm Drain Goes? To the Ocean"; brochure - "The Ocean Begins At Your Front Door"

Orange County - 714-567-6371 - www.oc.ca.gov/pfrd/ brochure - "Pool Maintenace and the Water Quality Act"; brochure - "Mobile Detailing and the Water Quality Act"

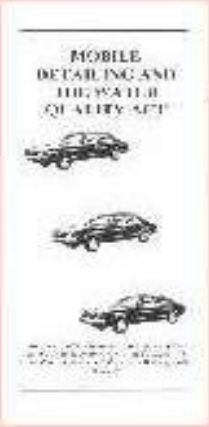

Figure 6.2

County of Orange
Public Facilities & Resources Department
Urban Runoff Survey- July 2000

Please take a few moments to complete this questionnaire.
Deposit it in the box provided

1. The storm drain system and the sewer system are part of the same underground drain system.

   True___ False___

2. The water and other substances that flow through the storm drain system are tested and filtered to remove wastes before they are discharged from the system.

   True___ False___

3. Where does the water that flows into the storm drain system ultimately end up?

   _____

4. Have you noticed that storm drains are stenciled with a "No Dumping-Drains to Ocean" or similar phrase?

   Yes___ No___

5. Is there a pollution problem in Orange County?

   Yes___ No___

6. Please indicate your level of concern for the following consequences of storm water pollution. (on a scale of 1 to 5 : 5 is high , 1 is low)

   _____Harmful to fish & wildlife
   _____A health problem for humans who are in the water
   _____A health problem for surfers only
   _____A health problem because the fish is unsafe to eat
   _____Clogged catch basins cause local flooding
   _____Clogged catch basins cause foul odors
   _____Clogged catch basins attract vermin
   _____Clogged catch basins are unsightly

7. Do you have any other concerns? (use the back of this sheet if you need more room)

Figure 6.3

Orange County Sanitation District
We're Fired Up About Protecting Our Coastal Water Survey 2000

1. What are three things that would harm the environment or the sewer system if you put them down your household drain?
   - ❑ oil
   - ❑ paint
   - ❑ chemicals
2. Who is responsible for maintaining large sewer trunklines in Orange County?
   - ❑ Home Owners All
   - ❑ Cities Not sure
   - ❑ OCSD
3. What city do you live in?
4. Do you have an ultra-low-flush toilet?
   - ❑ Yes No answer Not sure
   - ❑ No Septic Tank
5. The sewer system and the storm drain system are part of the same underground system here in Orange County. **True / False / Not Sure**
6. In most cases, where does water go that flows into a storm drain?
   - ❑ Straight into the ocean No answer
   - ❑ A wastewater treatment plant
7. Who is responsible for surfzone monitoring from Bolsa Chica to Corona Del Mar?
   - ❑ Lifeguards No answer
   - ❑ OCSD
   - ❑ OC Health Department
   - ❑ All of the above
8. What agency is responsible for posting ocean and bay closures or advisories?
   - ❑ Orange County Sanitation District
   - ❑ Lifeguards
   - ❑ Orange County Health Care Agency
9. What is the most important thing you can do to protect our water resources?

Thanks for helping to protect our environment.

7.0 NEW DEVELOPMENT

7.1 Requirements

The federal regulations specify that drainage area management plans include "a description of planning procedures including a comprehensive master plan to develop, implement, and enforce controls to reduce the discharge of pollutants...from areas of new development and significant redevelopment." These regulatory requirements necessitated the development of a program to ensure that storm water quality management is considered during a project's planning phase, implemented during construction, and ultimately maintained for the life of the project.

In 1993, the New Development/Construction Task Force, comprised of representatives from the Principal Permittee, Building Industry Association (BIA), Association of General Contractors (AGC) and Civil Engineers & Land Surveyors of California (CELSOC), completed a report that provides the basis for requiring the incorporation of structural and non-structural Best Management Practices (BMPs) into new development and significant redevelopment. The report, entitled "Best Management Practices For New Development Including Nonresidential Construction Projects (1-5 acres)" (DAMP Appendix G), involved additional contributions on specific BMPs from the Western States Petroleum Association (WSPA), Food Sanitation Advisory Council (FSAC), and Orange County's sanitary districts.

At the end of this process, the Permittees had developed an effective and flexible program for new development and significant redevelopment that allowed a strong focus to be placed on constituents of concern identified through the monitoring program and water quality planning process.

In 1997 the Permittees certified that they were implementing Appendix G. Since that time, the Permittees and development industry have gained considerable experience in implementing over a thousand Water Quality Management Plans (WQMPs) countywide. Tables 1 and 2 of Appendix G provide an outline of standard practice site specific structural and non-structural BMPs for special developments such as residential, industrial, retail/office centers, restaurants, warehouses/grocery, fuel dispensing areas and vehicle repair/maintenance facilities

In 2000, as a part of the third term permit renewal process, the Permittees recognized the need to move beyond the initial efforts and proposed that the New Development/Construction Task Force be re-established in order to assist in updating the New Development and Public Works Construction elements of the DAMP.

In early 2001, the TAC and the Permittees began the process of re-establishing the Task Force. During the initial meetings of the Permittees, it was determined that the membership of the Task Force should be primarily made up of individuals with a technical background and knowledge that they would be able to provide on either the controls themselves or the impact of their implementation on the community.

Harry Thomas, with the City of Orange, was elected as the Chair of the Task Force and the Task Force members that were identified include the following:

Permittees	Additional Members
County of Orange	Building Industry Assoc.
City of Anaheim	Association of General Contractors
City of Brea	American Society of Civil Engineers
City of Irvine	Orange County Water District
City of Laguna Beach	Orange County Sanitation District
City of San Clemente	South OC Wastewater Authority
City of San Juan Capistrano	American Planners Association
City of Westminster	Vector Control District
	Natural Resources Conservation District
	California Association of Community Managers
	Western States Petroleum Association
	Food Sanitation Advisory Council
	Non-Affiliated Experts

During 2001-2002 the main objectives of the Task Force will be to convene the Task Force, obtain a consultant to assist with the revision of the program elements and begin the process of reviewing and revising the New Development/Significant Redevelopment and Public Works Construction elements of the stormwater program.

7.2 Educational Outreach on New Development Requirements

The Principal Permittee has provided training to other Permittee planning staffs to facilitate uniform countywide implementation of the requirements of Appendix G. The Permittees continue to provide educational brochures and Appendix G with its attachments to assist developers and contractors with the NPDES program. During 2000/01 approximately 3,100 public education brochures were directly requested and distributed by developers within Orange County.

In addition, several Permittees reported working closely with developers and contractors in an effort to educate them about stormwater BMPs and various other water quality/runoff issues. In limited instances, Principal Permittee staff also provided third party review of Water Quality Management Plans.

7.3 Implementation

During the reporting period the Permittees approved 382 Water Quality Management Plans (WQMPs) covering a total of 5,200 acres. Since the implementation of the program in 1997, a total of 1,482 WQMPs have been approved, covering 15,859 acres which represents approximately 4.2% of the area within Orange County subject to the NDPES Stormwater Permit **(Table 7.1**). This is consistent with the incremental implementation of BMPs over the life of development envisaged by the Clean Water Act.

During the reporting period, the structural controls (**Table 7.2**) used most often were:

- Catch basin stenciling (3,744);
- Common area efficient irrigation (300);
- Common area landscape design (294); and
- Filtration (247).

During the reporting period, the non-structural controls **(Table 7.3**) used most often were:

- BMP Maintenance (301);
- Education for new property occupiers (292);
- Common area landscape management (286); and
- Common area litter control (279).

The report also recognizes that "Special" structural BMPs, specifically, engineered facilities designed to address specific pollutant problems, may be required through a new development runoff management plan, CEQA process, or similar water quality planning process. Examples of “special” structural BMPs that have been implemented include catch basin filters, stormwater treatment units (CDS), and storm drain filters **(Table 7.4).** The targeted constituents include pollutants in nuisance flows, non-point source pollution, litter, and hydrocarbons.

7.4 Training

The Permittees reported attending numerous workshops or training opportunities that were provided throughout the reporting period (**Table 7.5**). The new development training opportunities included:

- APWA’s Clean Water Act Impacts on New Development (sixteen Permittees); and
- BMPs and Water Quality Enforcement for New Development (one Permittee).

Table 7.1
Total WQMPs Approved and Acreage for Fiscal Years 1996-2001

Permittee	# WQMPs approved	Acreage covered by WQMPs
Anaheim	68	60
Brea	18	59.1
Buena Park	11	18
Costa Mesa	68	268
Cypress	17	80
Dana Point	6	51.1
Fountain Valley	8	43.9
Fullerton	13	950.6
Garden Grove	51	117
Hunt. Beach	72	446
Irvine	278	4,497.5
La Habra	38	18
La Palma	0	0
Laguna Beach	1	20
Laguna Hills	2	1.4
Laguna Niguel	8	265.3
Laguna Woods	0	0
Lake Forest	64	415.6
Los Alamitos	5	8
Mission Viejo	101	430
Newport Beach	0	0
Orange	10	868
Placentia	5	50
Rancho Santa Margarita	6	33
San Clemente	35	1,399
S.J. Capistrano	25	177
Santa Ana	85	421.6
Seal Beach	1	157
Stanton	2	0.5
Tustin	17	281.9
Villa Park	No Report	
Westminster	30	95.3
Yorba Linda	8	419
County of Orange	421	4,206.95
Total	1,474	15,859

Table 7.2
2000-2001 WQMP Structural Controls Summary

Permittee	# WQMPs approved	Acreage covered by WQMPs	Structural Controls Implemented															
			S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	S13	S14	S15	S16
Anaheim	17	60	17	17	17			17							8	3	2	3
Brea	8	59.1	2	3	2			1	1						8		1	2
Buena Park	7	12	4	5	4		2	4							2	1		
Costa Mesa	24	53	10	16	16	2	3	9		4				5	13	2	5	3
Cypress	13	55	5	8	9	1		5		1					6		2	1
Dana Point	1	19.1	1	1	1									1	10		1	10
Fountain Valley	2	9.9	6	6	5			3							8		8	8
Fullerton	6	485.6	5	6	6	1		3	1	2	1	1		1	6		2	3
Garden Grove	11	29	9	10	10	3	7	10	4	4	3	3	3	4	4	3	2	5
Hunt. Beach	17	55	16	17	17		2	13	1		1	1	1	1	13		22	51
Irvine	117	1971.5	75	77	76	14	5	29	8	1	2	2	2	22	65	6	38	12
La Habra	5	18				6		8							17	5		
La Palma																		
Laguna Beach																		
Laguna Hills	1	0.4	1								1	1						
Laguna Niguel	3	153.25	2	3	3			1							3			
Laguna Woods			3	3	3			1						1	60 *		8	9
Lake Forest	25	152.55	20	22	22		2	23	3	1	1	1	1	3	22	4	16	23
Los Alamitos	2	3	1	3	3			2							80			
Mission Viejo	11	40	11	11	11		4	11							11	2	5	8
Newport Beach																		
Orange	4	288						4			1	1			3,100			
Placentia			5											2	25			
Rancho Santa Margarita	6	33	3	5	5	1	3	5	1	3	1	1	1	1	4	2	2	3
San Clemente	13	455	11	12	12			5	1	3				3	11	3	10	6
S.J. Capistrano	13	64		12	8			10							9			0
Santa Ana	19	81.6	10	16	17		5	17		3	4	4			10			2
Seal Beach																		
Stanton	2	0.5	3	2	2			2	1	1					1		1	
Tustin	7	108.9	4	6	5		1	4	2		2	2	2		36		6	5
Villa Park																		
Westminster	7	27.29	2	4	4			2			2	2			6			
Yorba Linda	4	418	14	1	1		1	3		1	2	1	1	4	6		3	
County of Orange	37	544.95	7	34	35	3	7	11	1	1	1	1	1	5	200	1	5	32
Total	**382**	**5197.64**	**247**	**300**	**294**	**31**	**42**	**203**	**24**	**25**	**22**	**21**	**12**	**53**	**3,744**	**32**	**139**	**186**

S1 = Filtration
S2 = Common Area Efficient Irrigation
S3 = Common Area Landscape Design
S4 = Community Car Wash Racks
S5 = Wash Water Controls Food Prep Areas
S6 = Trash Container Areas
S7 = Self-Contained Areas Washing/Steam Cleaning
S8 = Outdoor Storage
S9 = Motor Fuel Concrete Dispensing Areas
S10 = Motor Fuel Dispensing Area Canopy
S11 = Motor Fuel Interruptable Drainage
S12 = Energy Dissipator
S13 = Catch Basin Stenciling
S14 = Diversion of Loading Dock Drainage
S15 = Inlet Trash Racks
S16 = Water Quality Inlets
U = Unknown
* Installed by the end of October

Table 7.3
2000-2001 WQMP Non-Structural Control Summary

Permittee	# WQMPs approved	Acreage covered by WQMPs	Non-Structural Controls Implemented															
			N1	N2	N3	N4	N5	N6	N7	N8	N9	N10	N11	N12	N13	N14	N15	N16
Anaheim	17	60	17	17	17	17	17	17	17		7	7	17	17	6	17	17	
Brea	8	59.1	3	2	2	2	2		1				3	4	1	3	2	1
Buena Park	7	12	3	5	4	4			2		1	2	5	5	1	1	4	3
Costa Mesa	24	53	15	12	16	16	5	1	3		2	5	14	13		10	10	
Cypress	13	55	9	6	8	4	1		3		2	2	7	6	1	7	7	1
Dana Point	1	19.1	1	1	1	1							1			1	1	
Fountain Valley	2	9.9	2	2	2	2							2	2	1	1	2	
Fullerton	6	485.6	6	6	6	6	2	1	2		2	2	5	4	1	6	5	
Garden Grove	11	29	8	10	9	11	6	6	7	6	6	6	11	10	6	6	9	3
Huntington Beach	17	55	17	16	17	17	3	1	4	1	3	5	14	13	6	16	17	2
Irvine	117	1971.5	76	80	77	81	16	8	17	3	16	25	70	56	9	75	75	8
La Habra	5	18				7									1			
La Palma																		
Laguna Beach																		
Laguna Hills	1	0.4		1					1	1	1			1				
Laguna Niguel	3	153.25	3	3	3	3							1	1		3	3	
Laguna Woods			1		1								1			1	1	1
Lake Forest	25	152.55	24	24	23	25	9	6	12	1	7	10	24	24	6	22	24	4
Los Alamitos	2	3						2		1							1	
Mission Viejo	11	40	11		11	8	11				11		11	11		11	11	
Newport Beach																		
Orange	4	288			2				2	1				8			1	1
Placentia					3	5			5			5	5	1		25	5	
Rancho Santa Margarita	6	33	5	6	4	6	2	2	3	1	2	2	6	6	4	5	5	
San Clemente	13	455	12	12	12	12	5	3	4		5	5	12	10	3	11	12	3
San Juan Capistrano	13	64	12	5	5	2												
Santa Ana	19	81.6	16	3	15	19	5		5		5	5	18	19	2	10	18	
Seal Beach																		
Stanton	2	0.5	2	2	2	2	1	1	1		1	2	2	3		3	2	1
Tustin	7	108.9	7	6	6	7	2	2	4	2	2	4	7	5		6	7	3
Villa Park																		
Westminster	7	27.29	4	6	4	6	3	3	3	2	2	2	6	4	1	6	4	
Yorba Linda	4	418	1	1		1	1	1	1	1	1	1	1	1	1	1		
County of Orange	37	544.95	37	34	36	37	1		3		1	2	36	28	2	29	33	1
Total	**382**	**5197.64**	**292**	**260**	**286**	**301**	**92**	**54**	**100**	**20**	**77**	**92**	**279**	**252**	**52**	**276**	**276**	**32**

N1 = Education POA
N2 = Activity Restrictions
N3 = Common Area Landscape Mgmt.
N4 = BMP Maintenance
N5 = Title 22 CCR Compliance
N6 = Local Industrial Permit Compliance
N7 = Spill Contingency Plan
N8 = Underground Storage Tank Compliance
N9 = Hazardous Materials Disclosure Compliance
N10 = Uniform Fire Code Implementation
N11 = Common Area Litter Control
N12 = Employee Training
N13 = Housekeeping of Loading Docks
N14 = Common Area Catch Basin Inspection
N15 = Street Sweeping
N16 = Commercial Vehicle Washing
U = Unknown

Table 7.4
Special Structural BMPs

Permittees	Name of Project	Watershed affected	Special BMP Required	Targeted Pollutant of Concern
Dana Point	Capistrano By The Sea	San Juan Creek	Storm Drain Filters	Pollutants contained in nuisance flows
Huntington Beach	Huntington Beach Baptist Church	Talbert	Rock Percolation System	Oil/grease from parking lot
Laguna Beach	Treasure Island Resort complex	Hobo Canyon	Installation of CDS unit	Non point source pollution on site
	Bluebird Condominiums	Bluebird Canyon	Installation of CDS unit	Non point source pollution on site
Seal Beach	Kitchell Development	San Gabriel River	CDS units (Stormceptors)	Trash, Litter
	Kitchell Development	San Gabriel River	Catch Basin Filters	Hydro Carbons
County of Orange	Park Power Lost Adventure Corn Maze Project	Aliso Creek	Straw bales	Erosion/Sediment

Table 7.5
New Development/Significant Redevelopment and Construction Training

Clean Water Action Plans, General Const. Activities-Storm Water Permitting

Date: September, 2000

Permittee	Name	Department
Orange	Dan Vu	Public Works
	Jim Devore	Public Works
	Bob Knaak	Public Works

BMPs and Water Quality Enforcement for New/Redevelopment

Date: Winter 2001

Permittee	Name	Department
County of Orange	Matt Tucker	PFRD/Environmental Resources

Construction Site Storm Water Management Short Course for Field Staff

Date: April 26, 2001

Permittee	Name	Department
County of Orange	Grant Sharp	PFRD/Environmental Resources

Clean Water Act Impacts on New Development

Sponsored By: APWA

Date: May 31, 2001

Permittee	Name	Department
Anaheim	Rod Hallok	Public Works/St. & San
Buena Park	Jacquelynn Niemi	Public Works
Costa Mesa	Maher Nawar	Public Services
Dana Point	Angela Duzich	Code Enforcement
Fullerton	Virginia Viado	Development Svs
Irvine	Mike Loving	Public Works
Laguna Beach	Derek Wieske	Public Works
Laguna Niguel	Jeff Gibson	Planning Division
Mission Viejo	Richard Schlesinger	Public Works
Rancho Santa Margarita	Carolyn Lacanilao	Engineering
San Clemente	Tom Bonigut	Engineering
San Juan Capistrano	William Huber	Engineering & Bldg
Santa Ana	Harry Chin	Public Works
Villa Park	Warren Repke	City Engineer
Westminster	Ziad Mazboudi	Public Works
County of Orange	Pat Munoz	Subdivision/Grading SCRB
	Jeff Ferrier	Subdivision/Grading SCRB
	Grant Sharp	PFRD/Environmental Resources
	Karen Ashby	PFRD/Environmental Resources

8.0 CONSTRUCTION

8.1 Introduction

Concern over construction sites as a major source of sediment and other pollutants is addressed in the federal regulations, which require a description of a program to implement and maintain structural and nonstructural BMPs to reduce pollutants in storm water runoff from construction sites.

Such a program is to include procedures for site planning that incorporate consideration of potential water-quality impacts; requirements for nonstructural and structural BMPs; procedures for identifying priorities for inspecting sites and enforcing control measures that consider the nature of the construction activity, topography, and the characteristics of soils and receiving water quality; and appropriate educational and training measures.

In addition to sediment, activities and materials used on construction sites may be a source of pollutants such as paints, lacquers, and primers; herbicides and pesticides; landscaping and soil stabilization residues; soaps and detergents; wood preservatives; equipment fuels, lubricants, coolants, and hydraulic fluids; and cleaning solvents.

These pollutants can leak from heavy equipment, be spilled, or can be eroded by rain from exposed stockpiles. Once released, they may adsorb onto sediment particles and can be transported into the aquatic environment, where they may become available to enter aquatic food chains, cause fish toxicity problems, contribute to algal blooms, impair recreational uses, and degrade drinking water sources.

Sediment controls for construction activity directly impacting a watercourse should address sediment transport issues in the watercourse so that the natural quantity of sediment is not significantly changed. Contaminated sediment must be prevented from reaching the watercourse.

Permittee initiatives relating to the control of sediment and related pollutants are based upon established programs that involve implementation of both source control and treatment control measures at construction sites and within certain portions of the San Diego Creek watershed.

8.2 Public Works Construction Practices

All public works construction contracts administered by the Permittees are governed by "Standard Specifications for Public Works Construction" (subsequently referred to as the Green Book). Green Book Section 7 - "Responsibilities of the Contractor" imposes specific construction practices, which are included within DAMP Appendix H as Best Management Practices for public works construction. In general, the Green Book requires the Contractor has to keep informed of, and at all times observe and comply with state and federal laws and county and municipal ordinances and regulations.

Certain public works construction contracts administered by the Permittees may include Special Provisions as required by the Permittees and approved municipal sediment control Standard Plans. Applicable Special Provisions and Standard Plans are hereby included as Best Management Practices for public works construction.

Since the problem of construction site erosion and sediment loss has long been recognized by the Permittees, their grading ordinances and codes, the Green Book, and Public Works construction specifications already contain requirements for construction practices for erosion control.

In addition, as a result of the Second Term Permits, if the Permittees have construction projects that may result in the land disturbance of five (5) acres or more, they must comply with the State General Construction Permit requirements.

During the First Term Permit period the Best Management Practices For Public Works Construction report was developed and incorporated as part of the DAMP (Appendix H). This Appendix applies to Permittee public works construction projects and requires that such activities will implement non-structural and structural BMPs to control contaminated stormwater run-off.

At a minimum BMP selection for public works projects shall be consistent with the Construction Permit and Green Book standards for site maintenance and environmental protection. In 1997 the Permittees certified to the Regional Boards that the Appendix H guidelines or their equivalent were being implemented.

In 1999/00 the Permittees were surveyed regarding the need to revise the grading and erosion control ordinances. As a result of the survey, it was determined that a model grading and erosion control ordinance may need to be developed in order to reflect and incorporate the current requirements contained in the State General Construction permit, the adopted Water Quality Ordinances and the Green Book. This will be a focus in the third permit term.

In 1999/00 the Permittees were requested to report the following information: the number of grading and construction permits issued, the number of sites greater than five acres, the number of site inspections conducted and the number of citations issued. Although the Permittees were not able to provide all of the information because of variations in the way the data is collected and stored, they were able to report on a number of the items requested.

In 2000/01 the Permittees reported that they collectively issued almost 25,000 building permits and 1,103 grading permits (**Table 8.1**). They also reported that there were 113 construction sites greater than five acres countywide and that there were a total of 491 stop work notices issued with five sites receiving more than one stop work notice (**Table 8.2**).

In addition, the Permittees work closely with developers in an effort to reduce contaminants associated with construction and stress to developers the importance of reducing the loads of sediment, paint, chemicals and other pollutants that are derived from construction sites during precipitation events or general construction activities.

8.3 Permittee Oversight of Private Construction Practices

The Permittees enforce grading codes on private construction practices designed to protect slopes from erosion and failure. These codes are also designed to protect watercourses and adjacent property from the effects of eroded soil or blowing dust. These codes will be evaluated and revised as needed in the Third Term Permit period to ensure consistency with other regulatory documents such as the Construction Permit and local Water Quality Ordinance. The Permittees also require applicants for grading permits >5 acres to provide proof of coverage under the General Construction Permit as well as the inclusion of special construction notes on building and grading plans for commercial sites between 1-5 acres (Section 7.2 and Appendix G**).**

Grading, construction and building inspectors ensure compliance with local grading codes as part of their present jobs.

8.4 Newport Bay/San Diego Creek Sediment Control Programs

The Permittees have established programs and practices to control sediment and related pollutants through both source control (erosion control) and treatment control measures (sediment control) at construction sites. A special focus exists in the Newport Bay/San Diego Creek watershed due to its impaired status due to excess sediment (Section 12.2.2).

8.5 Training

The Permittees reported attending numerous workshops or training opportunities that were provided throughout the reporting period (**Table 7.5**). The construction training opportunities included:

- Clean Water Action Plans and General Construction Permitting (one Permittee); and
- Construction Site Stormwater Management Short Course (one Permittee).

Table 8.1
Construction Permits Issued

Permittee	Grading Permits Issued	Building Permits Issued Where the Exterior Footprint is Affected
Anaheim	50	1,696
Brea	20	
Buena Park	16	
Costa Mesa	24	262
Cypress	20	1,126
Dana Point	4	121
Fountain Valley	14	79
Fullerton	40	
Garden Grove	46	582
Huntington Beach	64	222
Irvine	112	2,006
La Habra	7	
La Palma		
Laguna Beach		815
Laguna Hills	8	136
Laguna Niguel	9	869
Laguna Woods	1	1
Lake Forest	35	51
Los Alamitos	4	4
Mission Viejo	15	
Newport Beach		
Orange	11	93
Placentia		269
Rancho Santa Margarita	27	200
San Clemente	248	936
San Juan Capistrano	2	
Santa Ana	42	1,873
Seal Beach		
Stanton	10	29
Tustin	10	139
Villa Park		
Westminster	17	153
Yorba Linda	20	1,760
County of Orange	227	11,462
Total	1,103	24,884

Table 8.2
Construction Activities Summary

Permittee	Sites Greater Than 5 Acres	Stop Work Notices Issued			Sites That Received More Than 1 Stop Work Notice
		Total	For Grading	For Construction	
Anaheim	14				
Brea					
Buena Park	4				
Costa Mesa	4				
Cypress	4	37	2	35	
Dana Point		7	1	6	1
Fountain Valley	1				
Fullerton	6				
Garden Grove	2				
Huntington Beach	3	17	2	15	1
Irvine	13	14			
La Habra					
La Palma					
Laguna Beach	1	300		300	
Laguna Hills		23	3	20	
Laguna Niguel	2	2	2		
Laguna Woods	1				
Lake Forest	4	17	2	15	
Los Alamitos	4				
Mission Viejo	3				
Newport Beach					
Orange	1				
Placentia		38	6	32	
Rancho Santa Margarita	10	2	2		1
San Clemente	25				
San Juan Capistrano					
Santa Ana	4	20		20	
Seal Beach					
Stanton					
Tustin		2		2	1
Villa Park					
Westminster	3				
Yorba Linda	4				
County of Orange		12	12		1
Total	**113**	**491**	**32**	**445**	**5**

9.0 INDUSTRIAL DISCHARGER IDENTIFICATION

9.1 Introduction

During the First Term Permit, the objective of the Industrial Discharger Identification element was to identify industrial stormwater dischargers in Orange County and to notify them of State industrial stormwater permitting requirements. This element provided coordination between the Permittees and industrial dischargers so that industries may comply with the separate requirements of the local NPDES and Statewide General Industrial (SWRCB Order No. 97-03 DWQ, NPDES General Permit No. CAS000001, subsequently referred to as the Industrial Permit) and General Construction Permits.

9.2 Program Implementation

In 1992 a central database was developed which consolidated the 40 CFR 122.26 (a) (4) notifications, current NPDES permit holders and industries whose Standard Industrial Classification (SIC) codes were identified by the State Water Resources Control Board as requiring coverage under the Industrial Permit. The database provided the basis for a single notification to all the identified industrial facilities informing the facilities' staff of the existence of the NPDES stormwater program and possible industrial permit application requirements.

This early program commitment was completed in 1992 by the Principal Permittee with the distribution of educational flyers to more than 10,000 potentially-affected industrial businesses in Orange County. More than 7,000 flyers were also sent to construction-related businesses in Orange County to notify them of the obligations under the General Construction Permit.

Subsequently, in 1997-98 and in 1999-00 the Principal Permittee distributed additional guidance for the cleaning of automotive service centers to over 2,100 businesses, which included some industrial facilities subject to the Industrial Permit. These initial guidance materials have also been used as the basis for additional public education efforts (Section 6.2.1).

Within DAMP Appendix G, the Permittees established a requirement that applicants for grading permits > 5 acres provide proof of coverage under the Construction Permit. Since a similar mechanism does not currently exist for the Industrial Permit due to lack of a common permitting trigger, in 1999/00 the Permittees were surveyed regarding their ability to identify new businesses by Standard Industrial Classification (SIC) codes in order to be able to identify those businesses that are subject to the Industrial Activities Storm Water General Permit.

As a result of the survey, fifteen Permittees indicated that they currently had a business licensing or similar mechanism in place that would facilitate this type of notification. The remaining Permittees do not have such a mechanism and are continuing to determine the ways in which they will be able to notify businesses within jurisdiction. This will be a focus in the Third permit term.

9.3 Management of Significant Industrial Discharges

The Permittees already identify large industrial facilities where hazardous/toxic substances are stored, used, manufactured or disposed of, as well as local landfills, hazardous waste disposal, treatment, and recovery facilities, and any known spills, leaks or other problems in their municipal area. A number of Permittees that perform annual fire code inspections coincidentally examine site pollution issues.

Management of the significant industrial discharges is accomplished through various coordinated efforts. One of these efforts is a training program that is provided by the Principal Permittee to various public agencies such as the sanitation districts, Health Care Agency, Fire Department Fire Prevention Officers and Agricultural Commissioner field inspectors to encourage their participation in implementing the stormwater program while conducting their own scheduled inspections (Section 10.2.1).

10.0 DETECTION/ELIMINATION OF ILLEGAL DISCHARGES AND ILLICIT CONNECTIONS

10.1 Introduction

Illegal discharges and illicit connections can be sources of contamination within municipality stormwater drainage systems.

An illegal discharge is any intentional discharge to a municipal separate storm sewer that is not composed entirely of stormwater and that is not covered by an NPDES permit. An illegal discharge refers to the disposal of non-stormwater materials such as paint or waste oil into the storm drain or the discharge of waste streams containing pollutants to the storm drain.

An illicit connection to the storm drain system is an undocumented and/or unpermitted physical connection from a facility to the storm drain system. The First Term Permit required the Permittees to undertake programs to identify and eliminate illicit connections to the storm drain system. The Permittees developed a facility inspection and documentation program to identify such connections however; almost none were identified during the multi-year effort.

An effective program to reduce or eliminate these types of discharges and connections needs to inform the public of the detrimental effects of illegal discharges on water quality, have a process for detecting and eliminating illicit connections and have a program to respond to, investigate and clean up illegal discharges.

This section includes a discussion of the specific requirements for legal authority to control pollutant contributions to the storm drain system, the use of this authority to eliminate illegal discharges and efforts to identify and eliminate illicit connections to the storm drain system through routine facility inspections.

Authorized Inspectors Committee

In order to help provide regional consistency and oversight to the response to water pollution incidents, one of the performance commitments in the updated 2000 draft DAMP was to establish an authorized inspectors committee.

This committee was established in February 2001 and meets quarterly to discuss the responsibilities of authorized inspectors, types of training and resources available, ongoing or new issues relating to the enforcement of water pollution laws and regulations as well as provide an opportunity to profile cases or incidents. Meeting participants are encouraged to suggest topics for training discussion that can help them perform their duties more effectively.

To date the committee has had participation from twenty-seven Permittees and the Santa Ana and San Diego Regional Board staff. The Orange County committee met in February and May 2001 **(Table 10.1**).

The committee has focused on the following areas:

- Implementation of the Water Quality Ordinance and Enforcement Consistency Guide;
- Orange County Hazardous Materials Strike Force;
- Enforcement letters and public education information;
- Case profile on Construction Circle, in Irvine;
- Implementation of the Notice of Non-Compliance, Administrative Compliance Order, and Cease and Desist Order forms; and
- Roundtable discussions of current cases.

10.2 Detection/Elimination of Illegal Discharges

The Permittees have a number of programs that have facilitated the detection of sources of illegal discharges. These programs include industrial facility inspection, drainage facility inspection, water quality monitoring, and the wide distribution of public education materials that provide phone numbers and encourage the reporting of spills.

10.2.1 Industrial Facility Inspection

A number of public agencies routinely conduct inspections of industrial facilities in Orange County. These agencies and their areas of responsibility include the following:

- The Orange County Health Care Agency regulates the storage and disposal of hazardous wastes. Approximately 6,200 businesses are inspected annually to ensure proper waste management.

- The Fire Departments in Orange County regulate the storage of hazardous materials through disclosure ordinances such as OCC Sec 4-3-200-300 and Article 80 of the Fire Code. This regulation involves inspection at approximately 6,300 business.

- Agricultural chemicals, notably pesticides, are regulated by the Agriculture Commissioner through the State Agriculture Code (CCR Title 3, Sec. 6000 et seq.). The Commissioner's office performs facility inspections at about 200 facilities/year out of a total of approximately 700 facilities that use/store pesticides. The Commissioners office also initiates enforcement action for non-compliance.

- Discharges to the sanitary sewers are mostly regulated by the Orange County Sanitation District and the Aliso Water Management Agency/South East Regional Reclamation Authority who routinely conduct pre-treatment facility inspections at over 500 sites.

Routine coordination with staff of these inspection programs occurs through the Orange County Hazardous Materials Strike Force and the annual Stormwater Awareness training developed conducted by the Principal Permittee **(Appendix H**). These coordination efforts ensure that the staff of these inspection programs is cognizant of stormwater issues and regularly notify the Principal Permittee of situations that may present a source of water pollution.

During the reporting period, the Principal Permittee received 142 calls from the existing facility inspectors regarding water pollution complaints.

10.2.2 Tustin Area Spill Control Demonstration (TASC) Project

During the reporting period, the Principal Permittee and Orange County Sanitation District began coordinating a sewage spill prevention and response demonstration project. The project is called the "Tustin Area Spill Control Demonstration Project" (TASC) and includes portions of the City of Tustin and the unincorporated area of North Tustin. This geographical area was chosen due to the high number of "preventable" small sewage spills (those that occur in small diameter pipes and are less than 1,000 gallons) that occur primarily as a result of grease or root blockages.

During 2000-2001 the project team met several times, developed the main objectives, identified short and long term workplan elements and completed several sub tasks to immediately facilitate improved coordination between the two agencies.

The main objectives of the project are to:

- Prevent spills;
- Improve interagency coordination in response to spills; and
- Develop predictive tools to aid in determining the impact of a spill to the receiving waters.

The workplan for the project includes:

- Preparation of a GIS base map detailing the project area, flood control channels, sewer lines, manholes and sewage spills
- Identification of trouble areas
- Additional coordinated efforts with Orange County Health Care Agency (HCA) and City of Tustin staff
- Spill dispersion modeling effort with SCCWRP
- Pre-staging materials at key containment areas
- Investigation of other types of containment materials (i.e. in-stream bladders)
- Spill response training and coordinated responses
- Development of integrated response procedures
- Mutual aid agreements

10.2.3 Drainage Facility Inspection

Through routine maintenance activities within the municipal storm drain system, Permittee field personnel continue to report suspected problems and/or discharges to the system. During the reporting period, the Principal Permittee received 96 calls from their inspectors.

10.2.4 Countywide Reconnaissance Monitoring

During the First Term Permit and part of the Second Term Permit the Permittees conducted field screening/reconnaissance every year which included conducting a site investigations and chemical analyses once during dry weather and once during storm events. While the primary objective of this component of the water quality monitoring program was to detect gross contamination from illegal discharges through field analyses, minimal incidences were detected.

New monitoring program objectives set in the Second Term Permit prompted a re-evaluation of the monitoring program starting in 1997. In May 1999, a final report outlining a new monitoring program that addressed the requirements of this permit was submitted to the Regional Boards and the program was implemented.

The reconnaissance and source identification section of the new water quality monitoring program addresses the need to determine if an identified water quality problem is the result of an illicit connection or illegal discharge through a series of source identification studies. If problems are found they are referred to the Permittees' Authorized Inspectors. These source identification studies include investigations to determine the sources of pollutants impacting warm spots and critical aquatic resources, monitor intermittent illegal discharges recorded in the Principal Permittee's Pollution, Notification, Incident and Reporting (PNIR) database.

During the reporting period, the Principal Permittee's Authorized Inspectors conducted four source identification/surveillance activities. Two of the four source identification studies were conducted at commercial/industrial parks and two others were conducted in high-density restaurant/dining areas of coastal Orange County.

The objectives of the activities are three-fold:

- Determine which residents/businesses in the area are contributing to water quality violations;
- Implement appropriate follow up educational and/or enforcement actions; and
- Conduct proactive education with the residents/businesses by emphasizing proper best management practices and suggesting ways in which they can conduct business without impacting water quality.

Construction Circle, Irvine

The Construction Circle area within the City of Irvine is a high-density commercial/industrial park with over forty businesses including concrete plants, equipment rental yards and a waste management company. Eight of the concrete manufacturing companies are also regulated under the State General Permit for Industrial Activities.

The area encompasses 0.1 acres and drains to Peters Canyon Wash (F06) through two separate storm drains that are located on the north and south ends of the circle. (**Figure 10.1**). Over the years, the area has been the source of over 30 water pollution complaints/problems involving over twenty businesses. The main source of the water pollution problems has been the result of "cleaning" activities. Due to the continuing water quality problems in the area, City of Irvine, County and Santa Ana Regional Board staff coordinated their efforts to perform a multi-agency surveillance of the area.

In an effort to determine the most effective times for the surveillance activities, water quality monitoring was conducted from June 19 – June 30, 2000. Over this time period, samples were collected every hour and analyzed for pH, electrical conductivity, TSS, Turbidity, Calcium, and TDS.

The results indicated that there were re-occurring elevated pH levels in the early morning and late afternoon hours (**Figure 10.2**). Due to the fact that concrete mix exhibits an elevated pH and there were a number of large concrete manufacturers in the Circle, the high pH levels in the storm drain system were attributed to the practice of washing down concrete trucks before and after the trucks were deployed to the field.

In addition, the City of Irvine videotaped the northern storm drain before and after the surveillance activities to document the amount of material that had been washed down into the storm drain system.

From November 6-10, 2001, the City of Irvine, County, and Santa Ana Regional Board staff conducted early morning and late afternoon surveillance activities and additional water quality monitoring in order to determine which businesses may be violating the water quality ordinance and State General permit and what effect those discharges had on the receiving water.

As a result of the daily, pre-dawn and late afternoon surveillance activities, the following number of water pollution incidents were observed:

- Monday, November 6, eighteen incidents;
- Tuesday, November 7, nine incidents;
- Wednesday, November 8, six incidents;
- Thursday, November 9, no incidents.

The water pollution incidents primarily involved the tracking of water and materials from the concrete facilities, wastewater runoff from the cement truck and equipment washing and general housekeeping issues. As a result of these activities, the Regional Board issued two Notices of Violation and one Notice of Non-Compliance and the City of Irvine sent educational letters to eight of the businesses within the industrial park discussing proper BMP implementation and potential fines for non-compliance.

On November 29, 2000, the City of Irvine hosted a workshop for the Construction Circle businesses in order to discuss relevant water quality regulations, the results of the surveillance activities and appropriate BMPs for the business owners **(Appendix I).** Fifty people from thirty-two companies attended the workshop.

As a follow up to the initial surveillance activities, an additional surveillance effort was conducted from June 13–15, 2001. The conditions along Construction Circle had significantly improved, and, in fact, only one facility was cited as a result of discolored water draining off their facility. Previous activities, such as the tacking of materials and the washing of cement trucks and equipment, were not observed.

Orange Avenue, Lake Forest

Orange Avenue, in the City of Lake Forest, is a high density automotive repair strip mall with thirteen business including paint and body shops, front-end service, transmission repair, engine rebuilders, oil and filter service stations and retail tire stores. The area ultimately drains to Aliso Creek (J01) through a storm drain located on the south end of the auto park (**Figure 10.3).**

From 1998 to 2000, this area has been the source of seven water pollution complaints/problems involving five businesses. As a result of the high number of water pollution incidents, Orange Avenue was designated for surveillance activities in May 2001. The main source of the water pollution problems has been the result of activities such as the flushing of radiators, soapy wastewater and engine degreasing. Due to the continuing water quality problems in the area, County staff performed a surveillance of the area.

In an effort to determine the most effective times for the surveillance activities, water quality monitoring was conducted downstream of the strip mall from June 5-8, 2001. Samples were collected every hour and analyzed for pH, TSS, TDS, electrical conductivity, total petroleum hydrocarbons, metals, and oil and grease.

During this same time period, City of Lake Forest contract staff and County Authorized Inspectors concurrently conducted surveillance activities within the area. Neither the water quality monitoring nor the surveillance activities identified any illegal discharges from the businesses in the area.

As a follow up to these activities, an educational packet was mailed to the thirteen businesses and the property owner of the Orange Avenue auto park, on July 3, 2001. Contents of the packet included County educational material such as water quality awareness brochures, contact information for County Authorized Inspectors, and notification regarding the potential for additional enforcement action if future water pollution incidents occur within the auto park.

Subsequent to the investigation and mass mailing of educational and enforcement information, there have been no further water pollution incidents reported at the Orange Avenue auto park.

Dana Point Harbor, Dana Point

The Dana Point Harbor embarcadero area has thirteen restaurants or markets. The area drains directly to Dana Point Harbor (**Figure 10.4).**

In an effort to reduce bacteriological levels and other pollutants associated with food service related facilities such as restaurants, County staff conducted an audit of the restaurant and market area on June 23, 2000.

The unannounced "knock-and-talk" audit was primarily conducted with the owners or restaurant managers and generally targeted typical food service related business practices that have historically had the highest threat to water quality, such as the washing of floor mats, the disposal of grease and mop water and the "cleaning" of trash bin areas. During the audit, problem areas or practices were identified and BMPs recommended.

As a follow up to the audit, an educational packet was mailed to the thirteen restaurants on July 3, 2001. The packet contained County water quality awareness brochures and clean restaurant guidelines, County Authorized Inspector and City official contact information and a formal letter explaining that future water quality violations may result in additional enforcement action. Subsequent to the audits, there have been no additional water pollution incidents reported at either area.

Peters Landing, Sunset Beach/Huntington Beach

The Peters Landing area is in the City of Huntington Beach and County unincorporated area and has approximately eighteen restaurants, cafes, pizzerias and grills. The area drains directly to Huntington Harbor (**Figure 10.5).**

In an effort to reduce bacteriological levels and other pollutants associated with food service related facilities such as restaurants, City of Huntington Beach and County staff conducted a coordinated audit of the Peters Landing and Sunset Beach area restaurants and eateries in their respective jurisdictions in June 2001.

The unannounced “knock-and-talk” audit was primarily conducted with the owners or restaurant managers and generally targeted typical food service related business practices that have historically had the highest threat to water quality, such as the washing of floor mats, the disposal of grease and mop water and the “cleaning” of trash bin areas. During the audit, problem areas or practices were identified and BMPs recommended.

As a follow up to the audit, an educational packet was mailed to the thirteen restaurants on July 3, 2001. The packet contained County water quality awareness brochures and clean restaurant guidelines, County Authorized Inspector and City official contact information and a formal letter explaining that future water quality violations may result in additional enforcement action.

10.2.5 Water Pollution Problem Reporting

The public reporting of spills is facilitated by a listing of:

- Permittee business telephone numbers in materials produced and distributed by the NPDES Stormwater Program's public education activities (brochures and magnets).
- The 24 hour water pollution problem reporting hotline and corresponding e-mail address in materials produced and distributed by the NPDES Stormwater Program's public education activities
- The Principal Permittee's water pollution telephone number in the Orange County "white page" telephone directories

10.3 Elimination of Illegal Discharges

10.3.1 Investigations

Investigations of water pollution incidents are routinely undertaken by Permittee Authorized Inspectors and various fire and police departments.

Although investigations may be unilateral efforts, more serious incidents are typically coordinated with federal, state, and local agencies through the Orange County Hazardous Materials Strike Force. The Strike Force is headed by the Orange County District Attorney's Office and includes representatives of a wide variety of local, regional, and state agencies. In addition, the Permittees also coordinate with Regional Board staff on an ongoing basis with a particular focus on facilities regulated by an NPDES permit.

During the 2000/01 reporting period, the Permittees reported a total of 1,002 water pollution incidents. This total consisted of 300 Notifications, 316 Complaints and 387 Response Requests and 54 referrals to other agencies (**Table 10.2**). It should be noted that the referrals to other agencies may result in the double reporting due to the process by which the numbers were tallied.

Figure 10.6 illustrates the sources of water pollution incident reports received by the Principal Permittee with the cities and the public/businesses constituting over 50% of the sources and **Figure 10.7** illustrates the types of materials involved **(Table 10.3).**

The Principal Permittee incidents constituted approximately one third (318) of the total. The number of incidents addressed by the Principal Permittee illustrates its countywide role as the local agency with primary responsibility for surface water pollution investigations.

10.3.2 Enforcement

Enforcement activities are undertaken according to the Water Quality Ordinance and accompanying Enforcement Consistency Guide. Water pollution cases may be handled administratively or in more serious instances, have been prepared for prosecution by the Orange County District Attorney who may prosecute under the applicable sections of the Water Quality Ordinance, State Fish and Game Code, State Water Code, Uniform Fire Code, and Penal Code that address pollutant discharges.

The Permittees have formerly designated the staff responsible for carrying out the enforcement services according to the Enforcement Consistency Guide and update these designations every year **(Tables 10.4 and 10.5**). The Permittees will continue to have responsibility for water pollution enforcement within their jurisdiction unless that authority has been designated to the Orange County Flood Control District.

Commencing with the 1999/00 reporting period, the Permittees began to provide a summary of the enforcement actions that have been taken against offenders within their jurisdiction. This information includes the types and total numbers of the various enforcement actions that have been taken against the violators, the number of repeat violators and the incremental enforcement actions taken against them, and additional information regarding any prosecutions that are either currently underway of that have been settled.

As provided for in the Enforcement Consistency Guide, when selecting enforcement options, it is important that the Permittees ensure that violations of a similar nature are subjected to similar types of enforcement remedies. The Permittees have five types of remedies including educational letters, Notices of Noncompliance, Administrative Compliance Orders, Cease and Desist Orders and commencement of other civil or criminal enforcement action.

The Enforcement Consistency Guide provides a framework to the Permittees for selecting the type of enforcement that should be pursued. Some of the factors that influence this decision include the duration and significance of the violation of threat, the cooperativeness and willingness of the responsible party to remedy the conditions, whether the incident is isolated or re-occurring and whether the violation or threat will affect or harm human health or the environment.

The Permittees reported a total of 606 enforcement actions during the reporting period (**Table 10.6**). This total constituted 278 educational letters, 277 administrative enforcement actions and 35 criminal enforcement actions. The criminal enforcement actions include citations/fines as well as criminal charges being filed.

Table 10.7 provides a summarization of the enforcement cases undertaken by five Permittees. A total of ten cases were reported. Of these, two involved residents and eight involved businesses. One of the cases was dismissed and the remaining are in progress.

10.4 Detection/Elimination of Illicit Connections

An illicit connection to the storm drain system is an undocumented and/or unpermitted physical connection from a facility to the storm drain system. The First Term Permit required the Permittees to undertake programs to identify and eliminate illicit connections to the storm drain system. In response, the Permittees developed a facility inspection and documentation program to identify such connections.

The Second Term Permit required the Permittees to certify the completion of the reconnaissance of the storm drain system by February 28, 1997, and, in instances where illicit connections are detected, a schedule be provided for their elimination. The Reconnaissance Survey Report of February 1997, reported finding two illicit connections countywide and inspection of drainage facilities is now conducted as part of routine maintenance.

Any illicit connection identified during routine inspections is investigated by the affected Permittee. Appropriate actions are then taken to approve undocumented connections by permit procedure and/or pursue removal of those connections that are determined to be illicit connections and not permissible.

During the reporting period, the Permittees reported finding 19 illicit connections to the storm drain system. Residential yard drains constituted the majority of these connections. The illicit connections were either permitted or disconnected. **(Table 10.8)**.

Compliance with established regulations on obtaining encroachment permits before installation of drains is enforced. Owners of existing drains without appropriate permits are notified to comply. For those drains where the owner is unresponsive or cannot be identified, each Permittee is responsible for deciding whether to formally accept the connection as part of their public drainage system or cap it off.

10.5 Training

The Permittees reported attending numerous workshops or training opportunities that were provided throughout the reporting period (**Table 10.9**). The spill response training opportunities included:

- In-house training (one Permittee);
- Orange County Sanitation District Sewage Spill Response Workshop (seven Permittees); and
- 8 hour HAZWOPER training (one Permittee).

Table 10.1
Authorized Inspector Meetings

Permittees	Meeting Date Attended	
	February 14, 2001	May 15, 2001
Anaheim	X	X
Brea	X	X
Buena Park		
Costa Mesa	X	X
Cypress	X	
Dana Point	X	X
Fountain Valley		
Fullerton	X	X
Garden Grove		X
Huntington Beach	X	X
Irvine	X	X
La Habra	X	X
La Palma		
Laguna Beach	X	X
Laguna Hills	X	X
Laguna Niguel	X	X
Laguna Woods		
Lake Forest		
Los Alamitos	X	X
Mission Viejo		X
Newport Beach	X	X
Orange	X	X
Placentia		
Rancho Santa Margarita		X
San Clemente		X
San Juan Capistrano		X
Santa Ana	X	X
Seal Beach	X	
Stanton	X	X
Tustin	X	X
Villa Park		
Westminster	X	X
Yorba Linda		X
County of Orange/OCFCD	X	X

Table 10.2
Investigation Summary

Permittees	Total Incidents Reported			
	Notification	Complaint	Response Request	Referral to County of Orange
Anaheim		16		
Brea	6	3	2	1
Buena Park	8			
Costa Mesa	16	4	3	
Cypress		7		
Dana Point			2	
Fountain Valley		3	34	
Fullerton			5	10
Garden Grove	7	15	1	2
Huntington Beach	16	14	134	12
Irvine	18	55 *	4	7
La Habra			16	0
La Palma				
Laguna Beach			45	1
Laguna Hills			1	
Laguna Niguel	5	11	11	1
Laguna Woods	2	2		
Lake Forest	Included with County of Orange			
Los Alamitos	3	1	2	2
Mission Viejo	16	19	15	3
Newport Beach				
Orange	16	3	5	
Placentia	1			
Rancho Santa Margarita		4		
San Clemente		6	16	
San Juan Capistrano		9	9	
Santa Ana	3	2	28	14
Seal Beach				
Stanton	1	1	1	
Tustin		6	7	1
Villa Park		3		
Westminster	7	10		
Yorba Linda	0	25		
County of Orange/OCFCD	175	97	46	
Totals	**300**	**316**	**387**	**54**

* Does not include Joint Surveillance and Enforcement Activity of Construction Circle on Nov. 6-9, 2000 with County and RWQCB-
36 Educational Interviews, 13 Educational Letters

Table 10.3
PNIR Waste Categories

Materials Involved in Water Pollution Incidents					
Inorganic	Paint	Petroleum Products	Sewage	Miscellaneous	Unidentified
Acids	Dry Scrapings/Residuals	Automotive Fluids	Greywater/Sewage	Animal Waste/Remains	Liquid
Bases	Latex	Crude Oil	Odor	Carpet Cleaning Washwater	Material
Chemicals	Mixtures	Degreasers		Chemicals	Residue
Metals	Oil Based	Diesel		Construction Runoff	Solid
Process Solutions/Wastewater	Wastewater	Gasoline		Dye	Did Not Observe
		Hydraulic Fluid		Ethylene Glycol	
		Jet Fuel		Fire Supression Runoff	
		Miscellaneous		Food Process Wastewater	
		Odor		Grease	
		Sheen		Green Waste/Material	
		Waste Oil/Mixture		Miscellaneous	
				Odor	
				Pool Wastewater	
				Process Wastewater	
				Detergents/Washwater	
				Trash/Debris	
				Silt/Mud	
				Surface/Groundwater	

Table 10.4
City To Provide ALL Services
2000-2001 Designated Authorized Inspector(s)

City	24 Hour Response Number	City Designated Authorized Inspectors		
		Name	Department	Phone
Costa Mesa	Communications Division 714-754-5250	Tom Banks Sandra Benson Ed Petros	Public Serv. Construction Mgr Public Serv./Project Admin. Private Right of Way	714-754-5222 714-754-5059 714-754-5295
Irvine	Irvine Police Department 949-724-7200	Jan Helf Terry Trytten Sue Irvine Manuel Garcia Mel Harwell Mike Tajiachi	Community Development Community Development Community Development Community Development Community Development Community Development	949-724-6326 949-724-6329 949-724-6400 949-724-6333 949-724-6333 949-724-6324
Laguna Beach	949-497-0701	Mike Phillips	Public Works	949-497-0390
Newport Beach	Newport Beach P.D. 949-644-3711	Jim Sinasek Lloyd Whisenant Wes Armand	Planning Police Harbor Resources	949-644-3215 949-644-3652 949-644-3043
Orange	Orange Water Department 714-538-1961	John Loertscher George Pedroza Jim Wood	Public Works Public Works Public Works	714-532-6455 714-532-6461 714-532-6480
San Clemente	City Dispatch 949-366-1553	John Bressan Mike Parness	Utilities City Manager	949-361-6150 949-361-6150
Westminster	Westminster P.D. 898-3311 x421 898-3315	Vicki Morgan Jeff Jones	Sr. Code Enforcement Officer Code Enforcement Officer	714-898-3311x276 714-898-3311x206
County of Orange	Environmental Resources 714-567-6363	Karen Ashby Duc Nguyen Grant Sharp Matt Tucker Lane Waldner Bruce Moore	Environmental Resources Environmental Resources Environmental Resources Environmental Resources Environmental Resources Environmental Resources	714-567-6297 714-567-6339 714-567-6392 714-567-6342 714-567-6370 714-567-6373

As of 11/7/01

Table 10.5

City To Provide SOME Services
2000-2001 Designated Authorized Inspector(s)

City	24 Hour Number	City Designated Authorized Inspectors		
		Name	Department	Phone
Anaheim		Code Enforcement Division During Normal Work Hours 714-765-5158		
		Al Bradley	Dan Dominguez	David Gensler
		Mark Ilagan	Lee Kull	Matt Letteriello
		Ken Marsh	Chris Martel	Chet Panique
		Arlene Ruelaz-Hernandez	Bill Small	Richard Steenbergen
		Denny Tucker	Max Wilson	
		Code Enforcement After Normal Work Hours		
	Pager 714-346-9939	Richard LaRochelle	Code Enforcement Supervisor	714-765-5158 x4413
	Pager 714-346-9935	John Polle	Code Enforcement Manager	714-765-5158 x5190
	Pager 714-346-9930	Roger Bennion	Code Enforcement Supervisor	714-765-5158 x4470
	Pager 714-346-9924	Fred Fix	Senior Code Enforcement Officer	714-765-5158 x4471
	Pager 714-346-4617	Don Yourstone	Senior Code Enforcement Officer	714-765-5158 x4451
	Pager 714-346-9929	Linda Eaves	Senior Code Enforcement Officer	714-765-5158 x4472
Brea		Roger Gary	Building	714-990-7139
		Richard Mitchell	Building	714-990-7769
Cypress		Gonzalo Vasquez	Public Works	714-229-6752
Dana Point		Bob Warren	Director of Public Works	949-248-3554
Fountain Valley		Steven Hauerwaas	Public Works	714-593-4441
Fullerton	Fullerton Police Department	Gene Viramontes	Street Superintendent	714-738-6725
	714-738-6715	Rocco Grimaldi	Police Department	714-738-6897
Garden Grove		Les M. Jones, II	Public Works/Director	714-741-5378
Huntington Beach		George Munsey	Fire Dept/Captain	714-536-5411
		Tom Shaw	Fire Dept/Captain	714-536-5411
		Frank Mead	Fire Dept/Captain	714-536-5411
		Mike Strange	Community Dev/Sr. Planner	714-536-5253
		Chuck Burney	Fire Department	714-536-5979
		David Webb	Public Works	714-375-5077
		Geraldine Lucas	Public Works	714-375-8494
		Bill Hosband	Fire Dept-Hazmat Specialist	714-536-5469
		Duane Wentworth	Public Works Inspector	714-392-4005
		Vic Galich	Public Works Inspector	714-392-8874
		Jeff Gibbons	Public Works Inspector	714-401-5008
		Ken Bazal	Public Works Inspector	714-392-4002
		Garry Harrison	Public Works Inspector	714-392-4002
La Habra		Martin Pastucha	Public Works	562-905-9792
		Delfino Consunji	Public Works	562-905-9720
		Paul Hamilton	Public Works	562-905-9792
		Gary Sims	Fire Department	562-905-9618
Laguna Niguel		Jean Jambon	Public Works Inspector	949-362-4345
Los Alamitos		Michael M. Kim	Public Services/City Engineer	562-431-3538x100
		David Cox	Public Services/Superintendent	562-431-3538x105
Mission Viejo		Donna Haskill	Code Enforcement	949-470-3055
		Karen Rottmann	Code Enforcement	949-470-3055
		Cuong Troung	Code Enforcement	949-470-3055
San Juan Capistrano		William Huber	Engineering and Building	949-443-6336
Seal Beach		Steve Stockett	Public Works Supervisor	562-493-8660
Stanton		Mike Kim	Engineering/Public Works	714-379-9222 x204
		Craig Stubbe	Public Works	714-379-9222 x202
Tustin		Tim D. Serlet	Dir. Of PW/City Engineer	714-573-3150
		Scott Reekstin	Community Development	714-573-3016
Villa Park		Tim DeTurk	Sup. Of Ops (Serrano Water)	714-538-0079
Yorba Linda		Chris Johansen	Engineering	714-961-7170

As of 11/7/01

Table 10.6
Enforcement Summary

Permittee	Administrative Enforcement				Criminal Enforcement			Total
	Education Letter (EL)	NON	ACO	CDO	Mis	Inf	IOC	
Anaheim	1	12						13
Brea	1	1						2
Buena Park								
Costa Mesa	2				1		1	4
Cypress	3							3
Dana Point	18	52		2	1			73
Fountain Valley	5		5					10
Fullerton					20	1		21
Garden Grove	15	2						17
Huntington Beach	2							2
Irvine	14	18	33	4				69
La Habra								16
La Palma	1							1
Laguna Beach		69						69
Laguna Hills	1							1
Laguna Niguel	11	2						13
Laguna Woods	1	1						2
Lake Forest	Included with County of Orange							
Los Alamitos	3		1					4
Mission Viejo	20	12						32
Newport Beach								
Orange	16							16
Placentia								
Rancho Santa Margarita	4							4
San Clemente	6							6
San Juan Capistrano	29	16						45
Santa Ana	25	31	2					58
Seal Beach								
Stanton								
Tustin		9	2				3	14
Villa Park	3	2		1	1			7
Westminster	12							12
Yorba Linda	15				1			16
County of Orange/OCFCD	70				6			76
Total	**278**	**227**	**43**	**7**	**30**	**1**	**4**	**606**

NON = Notice of Noncompliance
ACO = Administrative Compliance Order
CDO = Cease and Desist Order

Mis = Misdemeanor
Inf = Infraction
IOC = Issuance of Citation

Table 10.7
Enforcement Cases

Permittees	Resident	Business	Repeat Offender/ Egregious Act		Pollutant of Concern	Nature of Violation	Status of Judgement/Settlement	Nature of Judgement/Settlement
			Yes	No				
Costa Mesa	X		X		Sump Pump draining into Alley	Illegal discharge of runoff water from sump to adjacent alley	Dismissed	Not Applicable
Dana Point		X	X		Gunite & concrete	Discharging into storm drain	Criminal complaint filed (misdemeanor) - Superior Court	Still Open
Villa Park	X		X		"Diatomaceous Earth"	Twice dumping of pool backwash	Pending	Still Open
Yorba Linda		X		X	Dirt/Debris	Potential storm water runoff into storm drain	In progress	Still Open
County of Orange/OCFCD		X			Miscellaneous		Case Pending	Still Open
		X	X		Miscellaneous	Discharge of contaminants to state waters	Case Pending	Still Open
		X			Miscellaneous	Discharge of contaminants to state waters	Case Pending	Still Open
		X			Miscellaneous	Discharge of contaminants to state waters	Case Pending	Still Open
		X			Sediment	Discharge of contaminants to state waters	Case Pending	Still Open
		X			Sediment	Discharge of contaminants to state waters	Case Pending	Still Open

Table 10.8
Detection and Elimination of Illicit Connections to Storm Drain Systems

Permittee	Illicit Connections Found	Type of Connection	Resulting Action
Anaheim	1	Pipe through curb	Pump disconnected
Brea			
Buena Park			
Costa Mesa			
Cypress			
Dana Point			
Fountain Valley			
Fullerton			
Garden Grove			
Huntington Beach			
Irvine			
La Habra			
La Palma			
Laguna Beach			
Laguna Hills			
Laguna Niguel			
Laguna Woods			
Lake Forest			
Los Alamitos			
Mission Viejo			
Newport Beach			
Orange			
Placentia			
Rancho Santa Margarita			
San Clemente			
San Juan Capistrano			
Santa Ana			
Seal Beach			
Stanton			
Tustin			
Villa Park			
Westminster			
Yorba Linda			
County of Orange/OCFCD	18	Yard Drains	Permitting
Total	**19**		

Table 10.9
Spill Response Training

In-House Training on Agency Code Enforcement Responsibilities & Signs of Violations

Date: September 19, 2000

Permittee	Name	Department
San Juan Capistrano	Richard Watson	Richard Watson & Assoc.
	City Code Enforcement Staff	Engineering & Bldg
	City Building Inspectors	Engineering & Bldg

Sewage Spill and Response Workshop

Sponsored By: County of Orange Sanitation District

Date: September 26, 2000

Permittee	Name	Department
Dana Point	Gabe Tinoco	Public Works
	Andrea Brone	Public Works
Fountain Valley	Steven Hauerwaas	Public Works
	James Sharp	Public Works
	Pat Dahany	Public Works
Garden Grove	Brent Hayes	Public Works
	Garry Kaye	Public Works
	Boyd Conkle	Public Works
	Eric Kaiser	Public Works
	Debra Rose	Public Works
	Ernie Rios	Public Works
	Ed Carney	Public Works
	Alex Valenzuela	Public Works
Huntington Beach	Chris Gray	Street Services
	Rick Kuliemba	Street Services
	Jason Churchill	Street Services
	Al Enright	Street Services
Westminster	Ziad Mazboudi	Public Works
Yorba Linda	Jack Baecker	Public Works
	Armondo Jaime	Public Works

Table 10.9
Spill Response Training

Spill Response Workshop

Sponsored By: County of Orange Sanitation District

Date: October 1, 2000

Permittee	Name	Department
Laguna Beach	Mike Phillips	Public Works

Environmental Training and Compliance, Inc.

Date: October 4, 2000

Permittee	Name	Department
County of Orange	Karen Ashby	PFRD/Environmental Resources
	Duc Nguyen	PFRD/Environmental Resources
	Lane Waldner	PFRD/Environmental Resources
	Bruce Moore	PFRD/Environmental Resources
	Matt Tucker	PFRD/Environmental Resources
	Grant Sharp	PFRD/Environmental Resources

Figure 10.1

Countywide Reconnaissance Monitoring
Construction Circle, Irvine
June, November 2000 & June 2001

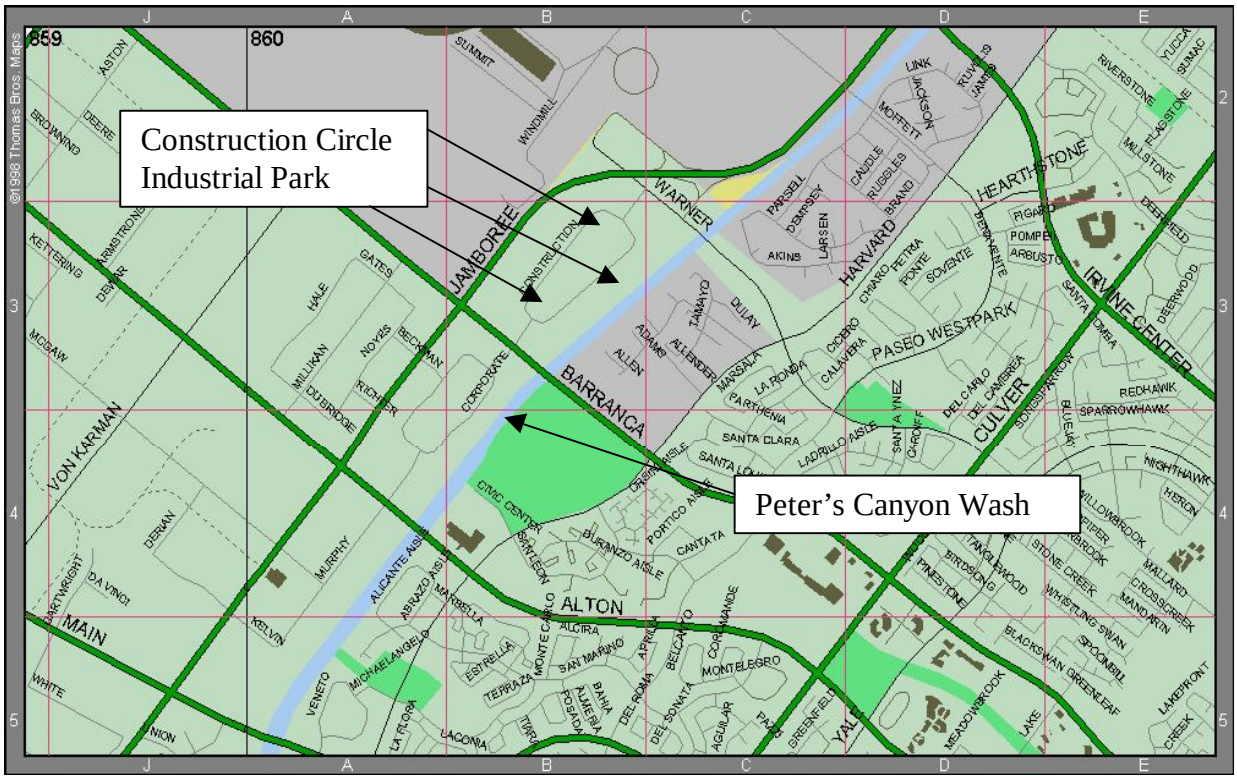

Figure 10.2
Peter's Canyon Wash Study (pH Levels)

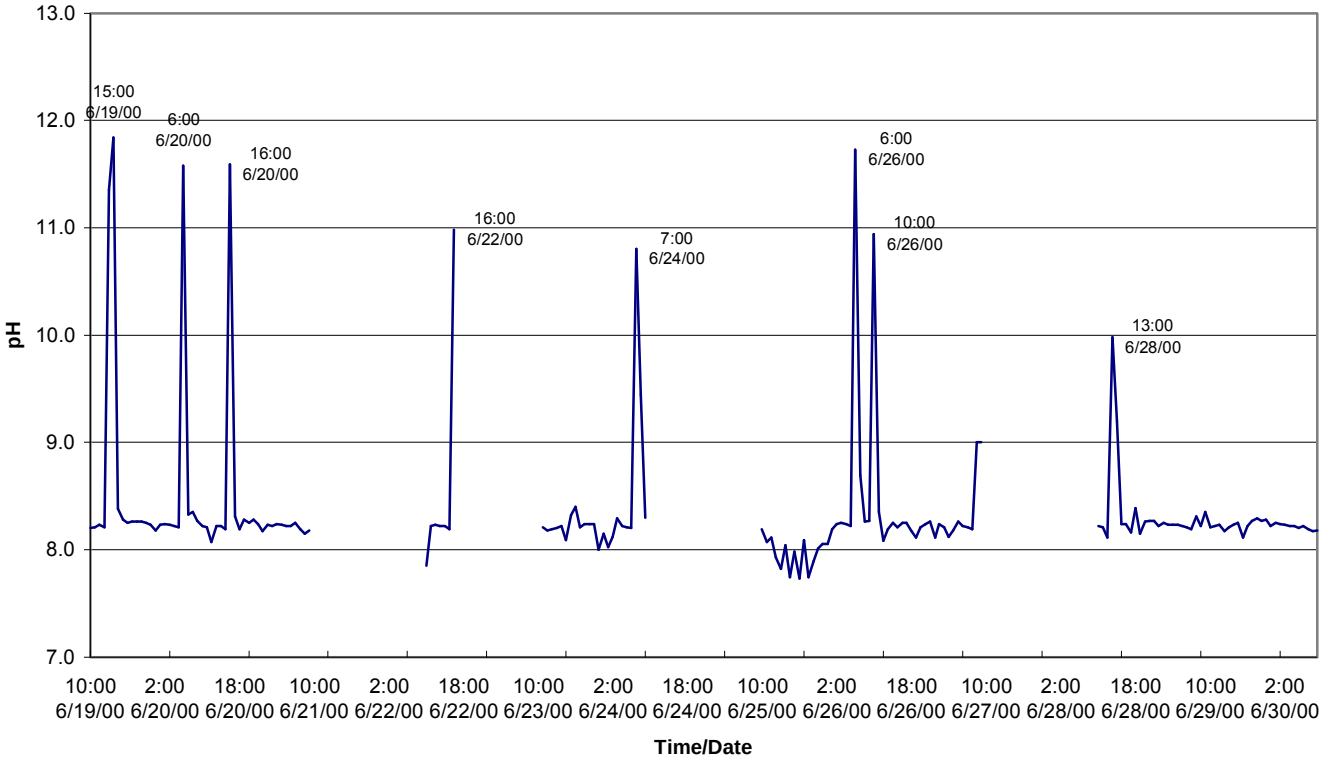

Figure 10.3

Countywide Reconnaissance Monitoring
Orange Avenue, Lake Forest
May 2001

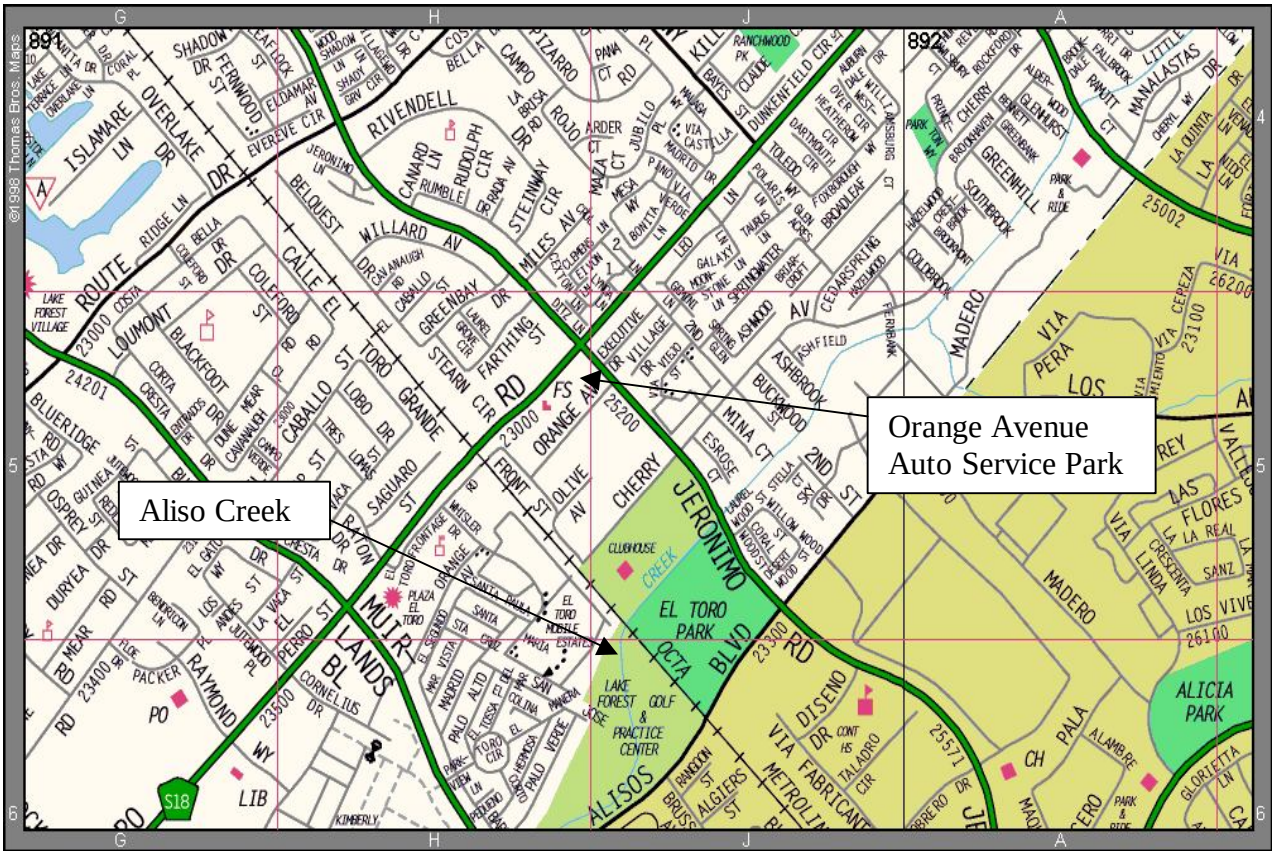

Figure 10.4

Countywide Reconnaissance Monitoring
Dana Point Harbor, Dana Point
June 23, 2000

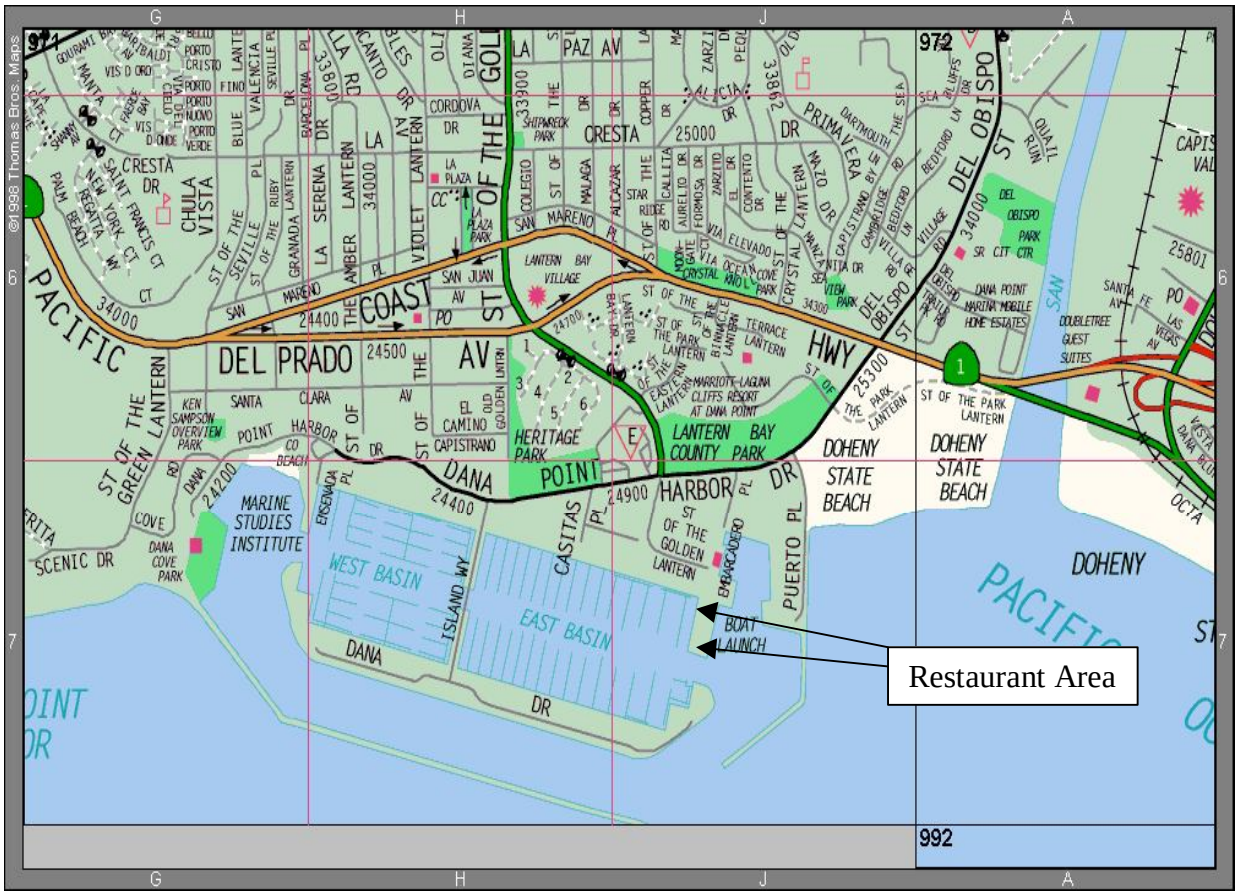
©1996 Thomas Bros. Maps
PACIFIC COAST HWY
DEL PRADO
DANA POINT HARBOR
WEST BASIN
EAST BASIN
BOAT LAUNCH
Restaurant Area
LANTERN BAY COUNTY PARK
HERITAGE PARK
MARINE STUDIES INSTITUTE
DOHENY STATE BEACH
DOHENY
PACIFIC
DANA COVE PARK
SCENIC DR
DANA DR
ISLAND WY
CASITAS PL
PUERTO PL
EMBARCADERO
CRESTA DR
PRIMAVERA
DEL OBISPO ST
LA PLAZA PARK
LANTERN BAY VILLAGE
MARRIOTT LAGUNA CLIFFS RESORT AT DANA POINT
DOUBLETREE GUEST SUITES
DANA POINT MARINA MOBILE HOME ESTATES
DEL OBISPO PARK
KEN SAMPSON OVERVIEW PARK
CHULA VISTA
SAN MARENO
SAN JUAN
PAZ AV
CORDOVA DR
EL CAMINO CAPISTRANO
SANTA CLARA
POINT HARBOR
ST OF THE GREEN LANTERN
ST OF THE GOLDEN LANTERN
ST OF THE PARK LANTERN
ST OF THE EASTERN LANTERN
ST OF THE BLUE LANTERN
ST OF THE VIOLET LANTERN
ST OF THE AMBER LANTERN
ST OF THE SEVILLE
ST OF THE RUBY LANTERN
ST OF THE GRANADA LANTERN
ST OF THE COLEGIO
ST OF THE MALAGA
ST OF THE ALCAZAR
ST OF THE CRYSTAL LANTERN
ST OF THE TERRACE LANTERN
ST OF THE PARK LANTERN
ST OF THE PARK LANTERN
ST OF THE PARK

Figure 10.5

Countywide Reconnaissance Monitoring
Peters Landing, Sunset Beach/Huntington Beach
June 2001

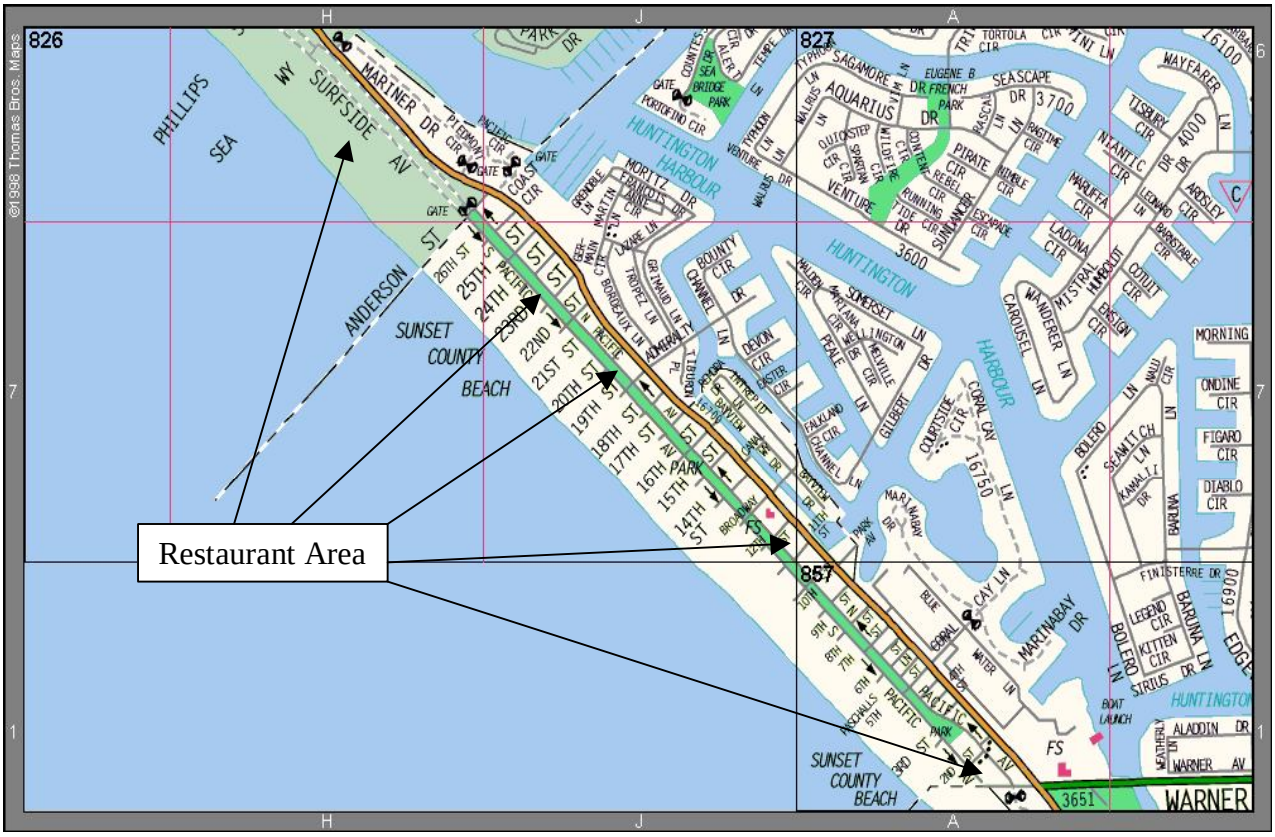

Figure 10.6

Water Pollution Incidents

Notification Sources (2000-2001)

Total of 407 Incidents

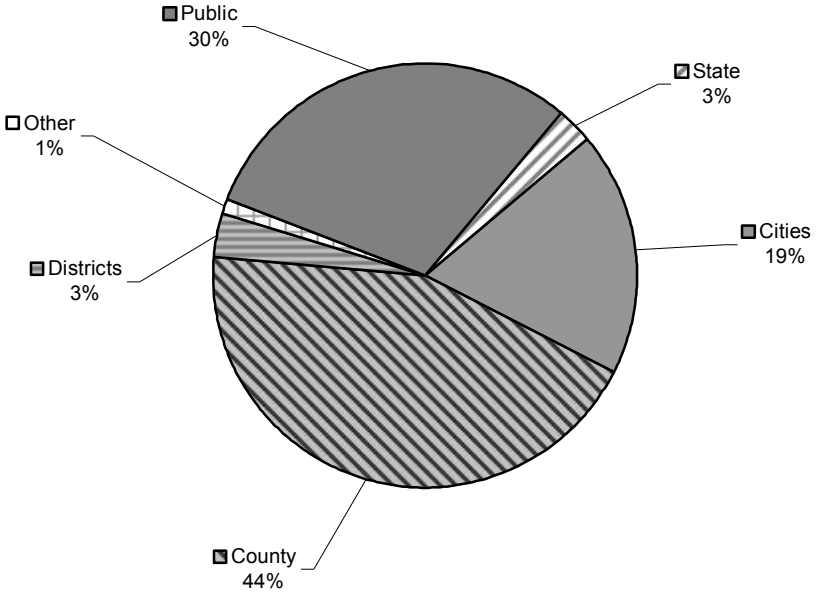

Figure 10.7

Water Pollution Incidents

Types of Materials (FY 2000-2001)

Total of 407 Incidents

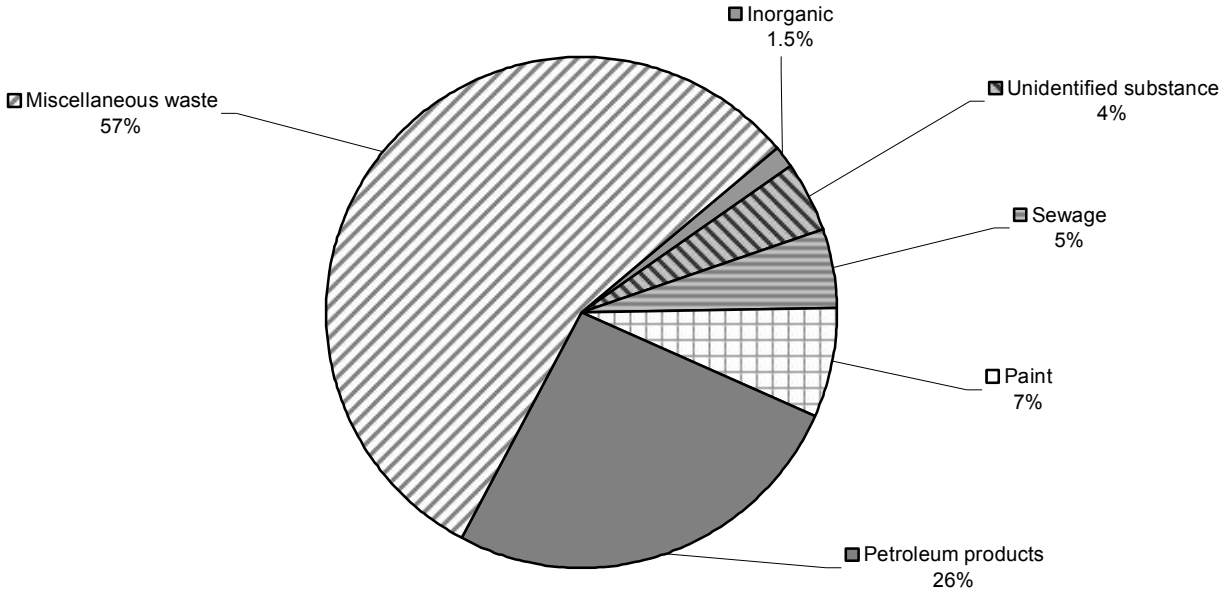

11.0 WATER QUALITY MONITORING SUMMARY AND ANALYSES

11.1 Introduction

In response to the First Term Permits, the Permittees developed and implemented a water quality monitoring program (1993 DAMP Appendix K) to aid in the detection and control of illicit connections and illegal discharges to the municipal storm drain systems and to meet other program performance objectives. The monitoring program focused on estimating pollutant loads in urban stormwater runoff, tracked compliance with water quality objectives, searched for source of pollutants and addressed impacts on areas of special concern.

In response to the Second Term Permits, the Permittees conducted a two year re-evaluation and revision of the water quality monitoring program in order to re-focus the efforts to determine the role, if any, of urban stormwater discharges to the impairment of beneficial uses and to provide technical information to support an effective urban stormwater management program to reduce the beneficial use impairments determined to be associated with urban stormwater (2000 DAMP Appendix K).

The Permittees also initiated several water quality planning efforts, conducted additional water quality evaluations in response to technical requests from the Regional Boards and participated in various regional research and/or monitoring programs. The combination of these efforts will aid the Permittees in determining the extent and degree of the relationship between urban stormwater runoff and impairment of beneficial uses within the aquatic resources of Orange County.

11.2 Program Development

11.2.1 Pre-NPDES Water Quality Monitoring

From 1973 to 1990, the Principal Permittee conducted routine water quality monitoring on drainage facilities which are tributary to water bodies identified as waters of the state by the Regional Boards. The receiving waters were also monitored routinely to assess the chronic effects on established beneficial uses.

When the monitoring program was initiated in 1973, monthly nutrient and trace element sampling was performed at several locations. Sediment samples were collected semiannually to assess the impact of contaminant deposition and adsorption. Additional constituents such as mercury, selenium, DDT, PCBs and radioactivity were also evaluated on a semiannual basis to address public concerns regarding the pollution threat from these constituents.

11.2.2 First Term Permit Water Quality Monitoring

In order to bring the pre-NPDES water quality monitoring program into conformance with the 1990 federal NPDES regulations and the First Term Permit objectives (Section 11.2), field screening to detect gross contamination was added to the program and the number of sampling sites in the channels and receiving waters were increased in order to better assess the amount and type of contamination in the storm drain system.

The First Term Permit water quality monitoring program consisted of field screening (channels only); dry-weather and storm sampling and a receiving water program

11.2.3 Second Term Permit Water Quality Monitoring

While the First Term Permit monitoring program produced useful information, the Permittees recognized (as has the rest of the nation) the high degree of uncertainty regarding the link between urban stormwater runoff and actual impairment of beneficial uses within the aquatic resources of Orange County.

Therefore, in response to the Second Term Permit objectives, the Permittees conducted a systematic re-evaluation of the water quality monitoring program which led to a re-statement of the monitoring program's primary goals. The primary and parallel goals of the monitoring program were re-stated as:

- To determine the role, if any, of urban stormwater discharges in the impairment of beneficial uses; and
- To provide technical information to support effective urban stormwater management program actions to reduce the beneficial use impairment determined to be associated with urban stormwater.

In order to organize the vast array of monitoring activities needed to carry out the objectives and goals, the Permittees identified three separate key elements within the Final Monitoring Program (May 1999).

These three key elements are:

- A focus on known sites (or Warm Spots) where constituents are substantially above system-wide averages;
- A parallel (and somewhat overlapping) focus on areas of critical aquatic concern (herein referred to as critical aquatic resources or CARs); and
- A countywide reconnaissance program to identify specific sources of contamination from sub-watershed areas as well as specific land use investigations in order to evaluate the effectiveness of a variety of BMPs

The Final Monitoring Program includes an underlying rationale for each monitoring element, a discussion of how monitoring data will be used in decision-making, identification of potential links to other relevant monitoring programs being carried out by other agencies, a description of the basic monitoring design, identification of additional study design steps, and a description of anticipated monitoring activities.

These monitoring elements include many locations from the pre-NPDES and First Term Permit water quality monitoring programs that were of value because of the length of their historical record. Each key element of the Final Monitoring Program contains a description of the monitoring activities proposed to accomplish the objectives described above, as well as a

description of the process for making decisions about how the monitoring program will respond to incoming data over time. This process can be used at any time throughout the life of the monitoring program to re-evaluate the direction of the program, or to reassess the appropriate allocation of resources within the program.

The Final Monitoring Program and subsequent elements utilize a five year timeline (1998/99 - 2002/03) for addressing the goals/objectives associated with each task. This timeline is reflective of the dynamic nature of the monitoring program and the fact that many of the objectives will require a substantial investment of resources before they are finalized.

The data presented in this section are the result of the water quality monitoring conducted from July 1, 2000 to July 1, 2001. More detailed information specific to data from prior years can be found in each of the prior annual reports and the two prior Reports of Waste Discharge.

11.2.4 Additional Local Water Quality Monitoring

Eight Permittees reported conducting water quality monitoring in addition to that conducted by the Principal Permittee on behalf of the Permittees.

All of these Permittees reported conducting analyses for bacteriological components including total coliform, fecal coliform, enterococcus and E. Coli (**Table 11.1**) and three Permittees reported conducting monitoring in response to the Aliso Creek Watershed Directive. Newport Beach reported conducting analyses for specific viruses and Huntington Beach, San Clemente and Seal Beach reported conducting analyses for a number of additional constituents to help characterize the water quality of various waterbodies.

11.3 Monitoring Approach

The Final Monitoring Program, described in Section 11.2.3 established three processes for selecting monitoring sites:

A list of the CARs, including inland streams, bays, harbors, estuaries, and coastal waters, was compiled and ranked according to several criteria including 303(d) listing, community interest, and beneficial uses (**Table 11.2**). A summary of the priority rankings is found in **Table 11.3**. The CARs receiving the highest ranking were prioritized for study during the term of the Final Monitoring Program. The monitoring parameters that were proposed for the CARs investigations arose from mining information from several studies conducted by the Principal Permittee and others. The available information at the time that the program was designed can be found in **Table 11.4. Table 11.5** is a summary of the information found in the sources from **Table 11.4**. The CARs monitoring program is an adaptive process driven by the the on-going analysis of data gathered from this and other programs.

Figure 11.1 is the timeline that was developed for implementation of the studies of specific CARs. It should be noted that the Santa Ana Delhi and Costa Mesa Channels, although not CARs, are included in the timeline because information from these channels is an important component in the assessment of the impacts on the Upper Newport Bay.

The CARs selected for intensive study during this reporting year were the San Diego Creek Watershed, the Upper Newport Bay, the Lower Newport Bay, and Aliso Creek. A baseline monitoring program is being maintained for the other CARs until they are selected for focused studies in the future.

The NPDES water and sediment quality data from 1991-97 was statistically evaluated to identify areas where the mean concentrations of constituents of concern were above countywide averages. These areas, designated as Warm Spots, were selected if their site mean concentration of a specific pollutant of concern was either (1) greater than two standard deviations above the systemwide mean (including all similar monitoring sites such as channels or harbor locations), or (2) three interquartile ranges above the third quartile. The database of each Warm Spot was further evaluated using power analyses to determine the frequency of annual monitoring that would be needed to detect statistically significant trends in the constituent of concern that led to the Warm Spot designation.

The Warm Spots include Bonita Creek, Lane Channel, Agua Chinon Wash, Central Irvine Channel, Hicks Canyon Wash, Hines Channel, Sulphur Creek, Prima Deschecha Channel, Segunda Deschecha Channel, the Rhine Channel in the Lower Newport Bay, and Christiana Bay in Huntington Harbour. **Table 11.6** is a list of the Warm Spots and the frequencies of monitoring that were calculated to detect significant trends. **Figure 11.2** is a timeline that was developed for monitoring Warm Spots in order to identify the sources of constituents that resulted in their respective Warm Spot designations.

The countywide Pollution, Notification, Investigation, and Response (PNIR) database maintained by Principal Permittee water pollution staff was interrogated to identify channels or drainage areas that had high incidences of water pollution activity during the period from 1991 through 1998. From these database evaluations was created a priority list for reconnaissance and source evaluation studies. Areas targeted for study during this reporting year included Construction Circle Drain which flows to Peters Canyon Wash and J01P05 (drainage for El Toro Auto Center) which flows to Aliso Creek.

Figure 11.3 is a timeline showing the implementation schedule of all three elements of the Final Monitoring Program.

11.3.1 Incorporation of the Nutrient Total Maximum Daily Load (TMDL) Regional Monitoring Program

At the direction of the Santa Ana Regional Board, a Regional Monitoring Program (RMP) for the San Diego Creek Nutrient TMDL was initiated in February of 2000. The chemical monitoring for this program includes many of the same sites in the Newport Bay and watershed as the Final Monitoring Program. Monitoring frequencies for some of the sites were increased as a result of the RMP and orthophosphate was been added to the suite of nutrient analyses. The Final Monitoring Program and the RMP are intended to complement each other. Therefore the chemical data from both programs will be included in this report.

Table 11.7 is compilation of the Warm Spots and CARs from the Final Monitoring Program and the RMP sites that were monitored during this reporting year. **Table 11.8** shows the monitoring frequencies of the Final Monitoring Program with the RMP additions in bold letters. If a monitoring location is within a designated "Water of the State" the beneficial uses for waterbody can be found **Table 11.9**. **Appendix J** contains the location maps of channels that were monitored with automatic samplers and continuously monitoring streamgauges.

11.4 Description of Monitoring Procedures

The following are brief descriptions of the procedures used during this reporting period.

11.4.1 Time-composite Sampling

Time-composite sampling is the primary method of monitoring the concentration and load of constituents in streams, creeks, and drainage channels. This type of sampling is conducted with automatic samplers that consist of programmable pumps (peristaltic) which transport water from the channel to a collection reservoir in the autosampler base. The collection reservoir can be a single large composite bottle or a series of up to 24 bottles. The autosampler program can be modified to vary sample volumes and frequency of collection. In the Final Monitoring Program, 24 discrete sample bottles are used in each autosampler base.

For dry weather discharge evaluations, the automatic samplers are programmed to collect a discrete sample once an hour for a 24-hour period. During storms, sampling is initiated when the water level in the channel rises above a triggering device hardwired to the autosampler. The frequency of collection during the first hour of the storm is set at 1 sample/15 minutes. After the fifth sample is collected at the one-hour mark, the collection frequency is decreased to once every 2 hours. A storm event sampling spans approximately 96 hours to allow comparison of the data to 96-hour guidance criteria for chronic aquatic toxicity from the California Toxics Rule (CTR). Autosampler maintenance is performed periodically to change bottles, icepacks, and power supplies.

The first five samples collected during a storm are composited and represent the first flush. The concentrations of dissolved heavy metals in this sample can be compared to acute toxicity criteria. The remaining bi-hourly storm samples are used to prepare composite samples that are representative of the subsequent parts of the storm. The discrete samples used to prepare each composite sample are selected using the stage hydrograph for the channel or by evaluating the electrical conductivities of the discrete samples. Using the hydrograph from the the Principal Permittee's Automated Local Evaluation in Real Time (ALERT) system, samples collected beyond the first flush and representing the storm peak and recession are composited into a single sample. Storms spanning multiple days may be broken up into two or more composite samples.

In the absence of a streamgauge hydrograph for the sampled channel, the conductivity of each discrete sample (in order of collection) is measured. Changes in conductivity usually denote the beginning or end of storm runoff. After the "first flush" of a storm, conductivities tend to immediately decrease during the rise of the storm hydrograph and slowly rise after the recession.

Sample appearance (turbidity or fluvial sediment) can also be used in the compositing process. Storm samples tend to be more turbid and contain more fluvial sediment. Using these electroanalytical measurements and visual observations as a guide, composite samples can be prepared to evaluate various parts of a storm.

Composite samples are analyzed for pH, electrical conductivity, turbidity, nitrate, ammonia, total Kjehldahl Nitrogen (TKN), phosphate, total suspended and settleable solids, volatile suspended solids, and total recoverable and dissolved copper, chromium, lead, cadmium, zinc, silver and nickel (see **Appendix K**). The frequency of time composite monitoring is dependent on whether the waterbody is designated as a Water of the State. Waters of the State are monitored monthly and during storms. Other waterbodies are monitored during storms only.

Time composite monitoring is supported by the Principal Permittee's precipitation and streamgaging network which consists of recording and/or transmitting ALERT gages. Mechanical recording raingages are weighing bucket type. Accumulated rainfall is recorded in analog format on drum charts. The ALERT precipitation gages are tipping bucket type with dataloggers. Data are recorded and transmitted in digital format; sensitivity is 1 mm (0.04 inches) of accumulated rainfall.

The Principal Permittee uses several types of streamgauges to monitor changes in water level. The oldest design is the stilling well with water level float; the newer types are manometer gages or pressure transducers. Data (water level versus time) are recorded on stripcharts. The ALERT interface to these gages consists of a connection from the recorder chart drive to an ALERT shaft encoder. ALERT information is recorded on a datalogger and transmitted to the Principal Permittee Katella yard base station in digital format. Sensitivity of the transmitted and recorded ALERT record is user-variable with the greatest sensitivity being a change in water level of 0.01 feet.

11.4.2 Harbor/Bay Monitoring

Harbor/bay monitoring is conducted semiannually and during storms (see **Appendix L**). Monthly sampling in the Upper Newport Bay is also conducted to evaluate nutrient loading from the San Diego Creek. Monthly monitoring of nitrogen and phosphorus in the sediments of the Upper Newport Bay was added in 1999/2000 reporting period to assist with the CARs evaluation. The semiannual monitoring includes sampling for nutrients in the water column, and trace metals and organic contaminants in the sediments (See Section 11.4.3). Storm monitoring consists of surface water sampling for nutrient concentrations and depth-integrated sampling to evaluate the magnitude of heavy metal contamination in the water column.

11.4.3 Semiannual Sediment Sampling

On a semiannual schedule, sediment samples are collected from the channels and several locations in the harbors and bays (see **Table 11.8**) to evaluate concentrations of copper, chromium, cadmium, lead, zinc, silver, nickel, chlorinated hydrocarbon and organophosphate pesticides, herbicides, PCBs, and Polynuclear Aromatic Hydrocarbons (PAHs). The data from these samplings is contained in **Appendix M**.

11.5 Methods of Data Analysis

Acute and chronic aquatic toxicity criteria from the CTR were used as guidance to evaluate dissolved metals data collected from storm channels and harbors. Water quality criteria from the CTR and other sources are presented in **Table 11.10.**

Sediment quality criteria from the National Oceanographic and Atmospheric Administration's (NOAA) Effects Range database were used as guidance to evaluate the toxicity of sediments in the harbors and bays. The Southern California Coastal Water Research Project's (SCCWRP) iron normalization procedure was also used evaluate harbor sediment quality relative to statistically predicted anthropogenic amounts of trace metals. A summary of the sediment guidance criteria is found in **Table 11.11.**

11.5.1 Comparison to Water Quality Guidance

California Water Code Section 13170 authorizes the State Water Resources Control Board (SWRCB) to adopt water quality control plans for waters where standards are required by the Federal Clean Water Act (CWA) and its 1987 amendments, the Water Quality Act (WQA). According to Section 303(c)(2)(B) of the CWA, these plans must contain water quality objectives for priority pollutants that could be reasonably expected to affect the beneficial uses of the waters of the State.

On March 2, 2000, the State adopted the United States Environmental Protection Agency's (USEPA) Rules establishing numeric water quality criteria for priority toxic pollutants (commonly referred to as the CTR) for the State of California. The CTR sets criteria for dissolved heavy metals in freshwater that are based on water hardness and separate criteria for saltwater. The dissolved metals data were compared to the acute and chronic criteria for guidance purposes. **Table 11.12** presents these guidance criteria for freshwater relative to water hardness.

According to the CTR, for waters with a hardness of 400 mg/l or less as calcium carbonate, the actual ambient hardness of the surface water shall be used in those equations. For waters with a hardness of over 400 mg/l as calcium carbonate, a hardness of 400 mg/l as calcium carbonate shall be used with a default Water-Effect Ratio (WER) of 1, or the actual hardness of the ambient surface water shall be used with a WER. For this reporting period the former method was used. The saltwater guidance criteria are found in **Table 11.10**.

In applying the CTR criteria to freshwater, if the time period to which the guidance applies is less than the length of the sampled period, a measured concentration greater than that guidance value will constitute an exceedance. For example, if the 1-hour guidance for lead (at a hardness of 100 mg/L as $CaCO_3$) is 65 μg/L, a concentration of 68 μg/L during a 24-hour period will be considered an exceedance of the guidance criterion.

In computing the mean concentration during a sampled period with multiple composite samples, values below the detection limit were assumed to be zero. This assumption allows for a more

consistent evaluation from year to year as detection limits are lowered with alternative methods of analysis or new technology. The assumption also gives greater confidence to a designation of an exceedance of a guidance criterion as it reduces the likelihood that the exceedance was caused by an erroneous estimation of a non-detected value. During this monitoring year the low detection limits achieved by the contract laboratory did not make this approach an issue except for a few instances where the calculated criterion for silver was lower than the detection limit of 2 μg/L.

With respect to the saltwater guidance from the CTR, the average concentrations of dissolved metals in depth-integrated samplings from each 4-day storm monitoring of the Harbors and Bays were compared to the 4-day guidance criteria. The dissolved metals concentrations in each grab sample were compared to the 1-hr acute toxicity guidance criteria. There is no chronic guidance criterion for silver so only the acute criterion was used. Since total chromium was analyzed only the Chromium III criteria were used.

11.5.2 Mass Load Calculations

Mass loads were calculated using chemical and hydrographic data. **Appendix J** contains watershed maps for all of the channels monitored to date, with automatic samplers. On each map, the watershed boundary upstream of the monitoring site, hydrographic (water level station) and representative precipitation station are shown. Water level records from streamgaging stations at or near the sampling site were processed using Western Hydrologic Software. Water levels from the station's continuous stripchart recorder were digitized and converted to discharge rates using stage-discharge relationships (channel ratings). The digitized streamflow record was converted to ASCII format and imported to a Microsoft Excel file. Graphs of time vs. water level stage are contained in **Appendix N**. The total discharge in acre-feet during each sampled period was computed. By multiplying the total water discharge per sampled period by the pollutant concentration of the composite sample from the period and applying the proper conversion factors (acre-feet to lbs. of water), a mass load in pounds or tons of contaminant was calculated. For data reported as ND (non-detected), one-half of reported laboratory detection limits were used in the calculations. **Appendix O** contains the mass load data from each monitored storm. **Table 11.13** is an annual summary.

11.5.3 Event Mean Concentrations (EMCs)

Event mean pollutant concentrations were calculated to produce a site mean EMC that could be used in the estimation of the mass loads from unsampled storms. To calculate the EMC of a monitored storm the sum of the mass load from each composite sampling during a storm was divided by the total sampled volume of water during the same period. After applying the appropriate conversion factors, an event mean concentration in mg/L or ? g/L was calculated. The site mean EMCs were updated each year (**Appendix P**) with the EMC data from that year. **Table 11.14** contains the calculated EMCs of each monitored storm during the 2000-01 season.

11.5.4 Statistical Methods

Site mean EMCs were used to estimate mass loads from unsampled storms. To estimate these

mass loads, the site mean EMC for a stormwater contaminant from a particular station was multiplied by the total annual volume of water discharged during unsampled storms, and the appropriate conversion factors. The site mean EMC was calculated from the set of calculated EMCs from each sampled storm from the beginning of the NPDES program. Only EMCs in which the 75-120% of the total storm runoff volume was sampled were used in the calculation. Each year the site means were updated with the data from that year.

The distribution of each EMC dataset was first evaluated for normality using the W Test developed by Shapiro and Wilk (1965). The W statistic was compared to a tabled value for a given value of α. To calculate W, the data from each station was first ordered from smallest to largest to obtain the sample order statistics $x_1 \leq x_2 \ldots \leq x_n$. k was then calculated from n where:

$$k = \frac{n}{2} \text{ if n is even or}$$

$$k = \frac{n-1}{2} \text{ if n is odd}$$

$$W = \frac{1}{d}\left[\sum_{i=1}^{k} a_i \left(x_{(n-i+1)} - x_i\right)\right]^2$$

where $$d = \sum_{i=1}^{n} (x_i - \bar{x})^2 = \sum_{i=1}^{n} x_i^2 - \frac{1}{n}\left(\sum_{i=1}^{n} x_i\right)^2$$

Values of a_i were found in Table A61. If the calculated W was less than the tabled value at the α (0.05) significance level, the null hypothesis was rejected and the distribution was considered normal. If the distribution was not normal at the α significance level the data was log-transformed and the W test was repeated to test for log-normality. If the distribution was not lognormal, the dataset was inspected for possible outliers. The Dixon test (for n < 25) was used to determine if the suspected points were outliers to a normal distribution. The procedure was performed as follows:

The dataset was ordered from smallest to largest that is $X_1 < X_2 < X_3 < \ldots X_n$. The Dixon ratio r, which is a function of n was calculated.

Number of Points	**Ratio Calculated**
n = 3 to 7	r_{10}
n = 8 to 10	r_{11}
n = 11 to 13	r_{21}
n = 14 to 25	r_{22}

1Gilbert, Richard O. Statistical Methods of Environmental Pollution Monitoring, 1987. Van Nostrand Reinhold, p259.

Depending on which point was suspected of being the outlier, the ratio was calculated in the following manner:

r	**If X_n is Suspect**	**If X_1 is Suspect**
r_{10}	$(X_n-X_{n-1})/(X_n-X_1)$	$(X_2-X_1)/(X_n-X_1)$
r_{11}	$(X_n-X_{n-1})/(X_n-X_2)$	$(X_2-X_1)/(X_{n-1}-X_1)$
r_{21}	$(X_n-X_{n-2})/(X_n-X_2)$	$(X_3-X_1)/(X_{n-1}-X_1)$
r_{22}	$(X_n-X_{n-2})/X_n-X_3)$	$(X3-X_1)/X_{n-2}-X_1)$

Using Table A.72, the calculated ratio was compared to the critical value at a confidence level of 95%. If the calculated value was greater than the tabled value the suspected point was rejected and the distribution was retested to confirm normality.

For normal distributions the mean is calculated as the arithmetic mean, that is

$$\bar{x} = \frac{1}{n}\sum_{i=1}^{n} x_i$$

the confidence limits for the mean of a normal distribution with unknown variance is given by

$$\bar{x} - t_{(1-\alpha/2,n-1)}\frac{s}{\sqrt{n}} \le \mu \le \bar{x} + t_{(1-\alpha/2,n-1)}\frac{s}{\sqrt{n}}$$

where *s* is the standard deviation of the dataset and $t_{(1-\alpha/2,n-1)}$ is from table A23. Using $\alpha = 0.05$ the upper and lower limits are calculated. The true mean μ will occur outside of this range 5% of the time.

For lognormal distributions the arithmetic mean and standard deviation of the log-transformed data were first computed. The estimate of the mean is given by the minimum variance unbiased estimate μ_1 which is defined as

$$\mu_1 = [\exp(\bar{x})]\Psi_n\left(\frac{s^2}{2}\right)$$

where $\Psi_n(t)$ is the infinite series defined by

2Taylor, John Keenan. Statistical Techniques for Data Analysis, 1990. Lewis Publishers, Inc., p168.
3Gilbert, Richard O. Statistical Methods of Environmental Pollution Monitoring, 1987. Van Nostrand Reinhold, p255.

$$\Psi_n(t) = 1 + \frac{(n+1)t}{n} + \frac{(n+1)^3 t^2}{2!n^2(n+1)} + \frac{(n-1)^5 t^3}{3!n^3(n+1)(n+3)} + \frac{(n-1)^7 t^4}{4!n^4(n+1)(n+3)(n+5)} + \bullet\bullet\bullet$$

$\frac{s^2}{2}$ is substituted for t and values for Ψ_n are calculated using formulas in a Microsoft EXCEL 7.0 spreadsheet.

The lower confidence limit of the mean is given by

$$LL_\alpha = \exp\left(\bar{x} + 0.5s^2 + \frac{sH_\alpha}{\sqrt{n-1}}\right)$$

and the upper limit is given by

$$UL_{1-\alpha} = \exp\left(\bar{x} + 0.5s^2 + \frac{sH_{1-\alpha}}{\sqrt{n-1}}\right)$$

The values of H_α and $H_{1-\alpha}$ were found in Table A10 - A134

The sample median of each normal distribution was calculated by first ordering the sample population from smallest to largest.

$$\text{sample median} = x_{(n-1)/2} \quad \text{if n is odd}$$

$$= \frac{1}{2}\left(x_{(n/2)} + x_{(n+2)/2}\right) \quad \text{if n is even}$$

The true median of a lognormal distribution can be estimated by

$$M_2 = \exp(\bar{x})\Psi_n(t)$$

where $\Psi_n(t)$ is the infinite series described above. In this case the value of $t = -s^2/[2(n-1)]$.

11.5.5 Assessing Anthropogenic Influence in Harbor Sediments

The Southern California Coastal Water Research Project (SCCWRP) database for iron normalization5 was used to determine the presence of anthropogenic enrichment in sediments collected from Orange County harbors. SCCWRP developed regression equations for the each

4Gilbert, Richard O. Statistical Methods of Environmental Pollution Monitoring, 1987. Van Nostrand Reinhold, pp264-265.
5 Southern California Coastal Water Research Project. Annual Report,1996. Southern California Coastal Water Research Project Authority, pp68-76.

relationship between a heavy metal and the percentage of iron in sediments collected from non-impacted sites in the Southern California Bight. 99% confidence limits (2 standard deviations) were calculated for each regression equation. Concentrations of heavy metals greater than the upper confidence limits are considered to be the result of anthropogenic enrichment.

11.6 Analysis of Data

The Final Monitoring Program included a series of tables and figures outlining expected progress over the five-year term of the permit. These provide a framework for assessing the Program's current status and its progress toward completing the planned activities. The following sections briefly describe Program status with respect to each of the three major Program components, warm spots trend monitoring, critical aquatic resources monitoring and assessment, and reconnaissance and source identification.

Figure 11.4 shows the total annual rainfall at three sites in Orange County during the last six seasons. **Figure 11.5** shows the accumulated rainfall per season measured at the Principal Permittee gauge in Santa Ana. As can be seen by the 2000/01 season graph, more than 85% of this monitoring year's precipitation occurred during the period from January 9th to the end of February. With this relatively short rainy season, completion of all intended stormwater monitoring from **Table 11.8** was not accomplished.

11.6.1 Warm Spot Monitoring

The Final Monitoring Program is generally on track with the categories of activities and the timelines listed in **Figure 11.3**. Stations were prioritized and sampling frequencies established as part of the monitoring program design. Long-term trends monitoring is ongoing and some source identification studies have been undertaken. Monitoring data are analyzed and evaluated each year, although a full trends analysis will not be repeated until the end of the five-year period. The power analyses indicated that trends would only be apparent after several additional years of monitoring data were available. The following paragraphs provide additional detail on the specifics of trend monitoring and source identification efforts at the Warm Spots. Each site is listed followed by the constituent(s) of concern that caused it be listed as a Warm Spot.

Rattlesnake Canyon Wash – total suspended solids and metals in stormwater

Rattlesnake Canyon Wash was designated as Warm Spot because of high concentrations of total suspended solids and total recoverable lead in stormwater samples. Subsequent to the development of the Final Monitoring Program Rattlesnake Canyon Wash was rerouted to intersect with an underground section of Peters Canyon Channel upstream of the Peters Canyon / Hicks Canyon Wash confluence. The site on Bryan Avenue to which the Warm Spot designation was assigned does not receive runoff from this channel in its present configuration. With its new configuration sampling would be extremely difficult and trend analysis relative to its former configuration would not be meaningful. This Warm Spot is no longer monitored.

Lane Channel – total dissolved solids

Lane Channel was designated as a Warm Spot because of high electrical conductivity measurements (a surrogate measurement of total dissolved solids) in dry-weather discharges. The summary of the initial phase of the investigation for sources of high total dissolved solids in Lane Channel can be found in **Appendix Q**. The findings of the investigation were as follows:

- High TDS concentrations (determined by electrical conductivity measurements) were found in the discharges from several tributaries to Lane Channel.
- The greatest conductivity was measured in the discharge from a 36" pipe approximately 3/8 mile upstream of LANF08 (Lane Channel at Jamboree).
- The flowrate and the average conductivity of the discharge from the 36" pipe however did not totally account for the high conductivity readings at LANF08. The flowrate from the pipe was approximately 1/10 of the usual dry weather flowrate at LANF08.
- A 24-hr sampling of this 36" pipe showed that the high electrical conductivity in the discharge was periodic, occurring approximately every 4-5 hours.
- The soils comprising the earthen walls of Lane Channel were not contributing significantly to the high TDS levels.
- The discharge from the 36" pipe contained large amounts of sulfate, chloride, sodium, and magnesium.

The results suggest that the high dissolved solids concentrations found in Lane Channel are from multiple sources. Additional investigation would be required to isolate these sources.

Segunda Deschecha Channel – total dissolved solids

Segunda Deschecha Channel has been investigated for elevated levels of total dissolved solids (TDS) in the water at the sampling point. These elevated levels were initially thought to be a function of the tide. Data from the Field Screening Program (1991-97) was compared to the tidal stage at the time of sampling (**Figure 11.6**). It was determined that the high conductivity (a monitoring parameter proportional to TDS) in the channel was not a function of the tide.

The next phase in the investigation included hourly monitoring of the conductivity for 24-hour periods. From October 1999 through June 2001, the hourly conductivity of fourteen 24-hour periods was monitored in the Segunda Deschecha Channel. **Figure 11.7** is a plot of the hourly measurements from each sampling. The average of all hourly measurements is shown in **Figure 11.8**. It appears that the peak conductivity occurred in the evening about 10 PM.

Prima Deschecha Channel – total dissolved solids

Prima Deschecha Channel has also been investigated for high levels of total dissolved solids. The same hourly conductivity analysis described above was performed on the Prima Deschecha Channel with ten 24-hour samplings conducted from December 1999 to June 2001. **Figure 11.9** is a plot of the hourly conductivity measurements from each sampling. **Figure 11.10** is plot of the average conductivity during each hour from the ten samplings. **Figure 11.10** also contains

the average hourly discharge rate measured in Prima Deschecha Channel between September 13 and October 3, 2001. **Figure 11.10** shows that the electrical conductivity and the flowrate are inversely proportional to each other suggesting that the high conductivity in Prima Deschecha Channel is a natural condition that is diluted by urban runoff. In the upcoming year, similar flow measurements will be conducted in Segunda Deschecha Channel to verifying that the same relationship exists for this channel.

Bonita Canyon Channel – metals in stormwater

Bonita Channel Channel was designated as a Warm Spot because of high levels of total recoverable nickel in its stormwater discharge. No source identification has been carried out, but this site has been added to the sediment TMDL program. A streamgauge has been installed and is currently being maintained by the USGS under contract to the Principal Permittee. The annual average total suspended solids and total recoverable nickel, copper, and chromium concentrations were plotted in **Figure 11.11**. Even including data from the El Niño season (1997/98) it appears that the levels of these constituents have decreased from the high levels from during 1993/94 and 1995/95 seasons.

Rhine Channel – copper in sediments

The Rhine Channel in Lower Newport Bay was designated as a Warm Spot because of high concentrations of copper in the bottom sediments. It is believed that these elevated levels of copper are the product of past activities of the boatyards in the immediate area. The boatyards carry out maintenance activities and have related discharge permits, but samples have not been collected to confirm this supposition. The data from LNBRIN is plotted in **Figure 11.12**. The concentration of copper in the sediments during the last three seasons is much lower than during the period from 1992 to 1998.

Agua Chinon and Hicks Canyon Wash – DDT in sediments

Agua Chinon Wash and Hicks Canyon Wash were designated as Warm Spots because of high concentrations of DDT metabolites in the bottom sediments of these creeks. The sources of these high concentrations have not been investigated. It is assumed that these legacy pesticides are in the soils of the agricultural areas in the watershed and enter the drainage system after large storms or development of these agricultural areas. From **Figure 11.13** it appears that the concentrations of these compounds in the sediments of Agua Chinon Wash have decreased since the 1996/97 season. In Hicks Canyon Wash however, the recent concentrations have not exhibited the same declining pattern.

Central Irvine and Hines Nursery Channels – nitrates

Central Irvine and Hines Nursery Channels have been investigated for high levels of nitrate in dry-weather samples. Efforts in the Central Irvine Channel are part of the last three intensive nutrient studies in Peters Canyon Wash and the nutrient TMDL program. The current emphasis has been on intensified monitoring, on a bi-weekly schedule, to better understand the temporal pattern of discharges. This information is intended, in part, to help focus subsequent source

identification efforts on periods when discharge levels are highest. The situation is the same for Hines Channel, which is a tributary to Central Irvine Channel and also part of the TMDL monitoring program.

11.6.3 Critical Aquatic Resources (CARs) Monitoring

The CARs element is generally on track with the categories of activities and timelines listed in **Figure 11.3**. Baseline monitoring has been carried out as specified in **Table 11.8**, with the exception that Huntington Harbor was not sampled during this monitoring period because of the low number of storms.

The Final Monitoring Program envisioned that the CARs would fulfill a broader impact assessment role that would involve filling important data gaps and collecting and integrating data from all sources to develop a more complete picture of impacts on aquatic resources.

The following are summaries of the activities conducted in the CARs (from **Figure 11.1**) during the reporting period.

Upper Newport Bay tributaries

The Upper Newport Bay and its tributaries were assigned the top monitoring priority in the Final Monitoring Program. The monitoring of these areas included routine NPDES and TMDL sampling as described in **Table 11.8.**

Monitoring in the Upper Newport Bay and San Diego Creek also includes separate, but related studies to evaluate the trapping efficiency of the basins in the Upper Bay, assess toxicity in the Upper Bay, and evaluate the efficiency of the Irvine Ranch Water District's nutrient removal ponds.

The mass loads of nutrients and total recoverable metals were calculated for each storm monitored for which there was water quality and flowrate information. In the Upper Newport Bay watershed loads were calculated for sampled stormwater runoff in Santa Ana-Delhi Channel, El Modena Irvine Channel, Lane Channel, Peters Canyon Wash, San Diego Creek at Harvard Avenue, and San Diego Creek at Campus Drive. The mass load information for each sample from every storm is contained in **Appendix O**. The total annual stormwater discharge volumes from Santa Ana-Delhi Channel, Peters Canyon Wash, San Diego Creek at Harvard, and San Diego Creek at Campus Drive were calculated from Principal Permittee's streamgaging records. Using these volumes and the updated site mean EMCs from **Appendix P** the unsampled stormwater loads from each of these channels was estimated. **Table 11.15** includes a summary of the sampled and unsampled loads from the Newport Watershed.

The direct impacts on the Upper Newport Bay from its tributaries have not been measured by the Final Monitoring Program. Ideally monitoring would be conducted within the areas defined by the respective channel's stormwater plume during a representative storm (e.g. 2-yr or 5-yr return frequency). This monitoring would consist of aqueous toxicity testing during storms and sediment toxicity testing during dry weather conditions. Since monitoring thus far has only

involved sampling of the channels, the impacts on the Bay can only be estimated by comparing the concentration concentrations of known toxicants in the freshwater discharges to saltwater toxicity criteria. Using this approach leads to a large margin of safety as mixing zone considerations are not taken into account. The results of this type of evaluation are only used to prioritize sites for further testing. The intent in the following year is to monitor toxicity in both the freshwater discharge and the receiving water of these channels.

For channels discharging directly to the Newport Bay, dissolved metal concentrations were compared to the guidance criteria for saltwater from the CTR. Out of 47 stormwater samples, 46 exceeded the acute toxicity guidance criterion for copper and six exceeded the acute toxicity guidance criterion for zinc. Of the 10 composite storm periods that were evaluated against the chronic toxicity guidance criteria for the protection of saltwater aquatic life, all exceeded the guidance criterion for copper. **Table 11.16** is a summary of exceedances relative to the CTR that were found in the storm channels during this monitoring year.

Santa Ana Delhi Channel

Figure 11.1 shows monitoring and assessment efforts at Santa Ana Delhi Channel extending throughout the permit period. Santa Ana Delhi was added to the sediment TMDL monitoring program, in order to help quantify the amount of sediment impacting Upper Newport Bay. It is also part of the nutrient TMDL program, and is therefore being monitored at levels above those proposed in the Final Monitoring Program.

Costa Mesa Channel

The Costa Mesa Channel was selected as a model urban runoff site because its watershed is approximately one square mile in area and has predominately urban land uses within it. It is sampled weekly for metals, nutrients, and bacteria and monthly for organophosphate pesticides. Monitoring at this site will be determined largely by requirements of the nutrient, pathogen, and toxics TMDLs.

With respect to the monitoring results from this reporting year and recognizing the discussion above, all of the stormwater concentrations and 39 of 40 dry weather concentration of dissolved copper in Costa Mesa Channel would exceed the CTR acute toxicity criteria for saltwater at the interface of the channel and the Upper Newport Bay. Since the average dry-weather discharge rate of the Costa Mesa Channel is very low, the impact on the Bay due to copper is likely to be negligible.

Figure 11.14 is plot of the fecal coliform concentration in Costa Mesa Channel throughout the year. As can be seen from the graph the fecal coliform concentration were extremely variable with a range of <2 to 240,000 MPN / 100 ml and a logmean of approximately 5,400 MPN / 100 ml. These results are similar to the 1999/00 reporting period.

Diazinon was found above the detection limit (0.05 μg/l) of the laboratory in nearly every sample collected from Costa Mesa Channel. Contrary to last year when over one third of the samples had concentrations greater than the LC_{50} for the freshwater toxicity testing organism

*Ceriodaphnia dubia*6 only about 10% were greater than the LC_{50} this year. **Figure 11.15** is a summary of the diazinon sampling. Chlorpyrifos was not detected (<0.05 μg/L) in any sample from this reporting period.

San Diego Creek and its tributaries

In addition to the routine monitoring in the watershed, three annual intensive nutrient studies have been carried out in tributaries to Peters Canyon Wash, which has been identified as a major source of nutrients. The purpose of these studies was to help develop a nutrients mass balance for this portion of the system.

During the 2000/2001 reporting year, the third intensive study was conducted. The first was conducted at the end of the summer season in 1999 (September 1999) and the second was conducted at the beginning (June 2000) of the 2000 summer season. In the 1999 and 2000 studies, the average daily total nitrogen loads measured in San Diego Creek at Campus Drive were used to estimate the TMDL summer season (April 1 – September 30) load. These two estimates were below the TMDL targets for December 31, 2002 and December 31, 2007. Examination of the weekly monitoring data from Campus Drive during the 1999/00 season however, showed that the greatest load during the summer season occurred in April and May.

The objective of the 2001 study was to quantify the loads from the Peters Canyon Wash tributaries during the period of greatest load. The 2001 study spanned eight days from May 15-22, 2001. As in the previous two studies this study utilized automatic sampling and continuous flow monitoring equipment to quantify the nitrogen and phosphate loads contributed by tributaries of Peters Canyon Wash. Automatic samplers were also used to quantify the load from San Diego Creek at Harvard Avenue and Campus Drive. The findings of the 2001 study were:

- The average daily water discharge rate in San Diego Creek at Campus Drive was 8.94 cfs compared to 11.16 cfs in June 2000 and 7.81 cfs in September 1999. The sum of the average discharges from all measured upstream inputs in 2001 was 12.18 cfs, approximately 36% higher than measured at Campus Drive. During the May 2001 study, it appeared that water was by-passing the low-flow channel at Campus Drive. The area on the west side of the low-flow channel beneath Campus Drive was completely submerged. The amount of water bypassing the low-flow channel during this period however was not quantified.

- The average discharge rate at Peters Canyon Wash at Barranca Parkway was 6.73 cfs compared to 6.59 cfs in June 2000 and 5.61 cfs in September 1999. The sum of the average discharges from all upstream measured inputs to Peters Canyon Wash was 6.24 cfs, approximately 7% less than measured at Barranca Parkway.

- Of the Peters Canyon Wash tributaries, the Santa Ana – Santa Fe Channel showed the greatest change in average discharge rate from study to study. The rate increased from 0.89 cfs in September 1999 to 1.78 cfs in June 2000, and then decreased to 0.97 cfs in May 2001. The flowrate in San Diego Creek at Culver Drive increased from 0.73 cfs in June 2000 to

6 Lee, G. Fred, Evaluation Monitoring Report for San Diego Creek, 1998, Table 6-3.

2.23 cfs in May 2001.

- Hicks Canyon Wash and Central Irvine Channel showed the greatest increase in the average nitrate nitrogen concentration from June 2000 study to the May 2001 study. The average concentration at Hicks Canyon Wash increased from 2.2 to 48.5 mg/L while the average concentration in the Central Irvine Channel increased from 17.9 to 45.3 mg/L. In San Diego Creek at Campus Drive the average concentration in the June 2000 study was 2.8 mg/L and the average concentration in the May 2001 study was 7.6 mg/L. In the discharge from the Irvine Ranch Water District's treatment wetlands the average concentration increased from 0.62 in the June 2000 study to 5.7 mg/L in the May 2001 study.

- In the May 2001 study, the average nitrate nitrogen load transported by Peters Canyon Wash, measured at Barranca Parkway, was 571 lbs/day compared to the June 2000 study value of 328 lbs/day. The sum of the average loads from the monitoring points upstream of Barranca Parkway in the May 2001 study was 552 lbs/day. These findings are inconsistent with what was observed in the previous two studies where the sum of the loads upstream were approximately 20% higher than measured at Barranca Parkway. In the previous reports it was hypothesized that the reduction in load was probably due to assimilation by the higher order plants and attached algae in Peters Canyon Wash. Generally, the amount of algae observed in the channels during the May 2001 study was much less than in the previous two studies. Little or no rooted vegetation was observed in the reaches of Peters Canyon Wash where rooted plants were observed in the September 1999 and June 2000 study.

- The greatest contributors to the nitrate nitrogen load in Peters Canyon Wash were the Central Irvine Channel (139 lbs/day), Hicks Canyon Wash (99.8 lbs/day), Valencia Channel (74.3 lbs/day), Santa Ana – Santa Fe Channel (74.1 lbs/day), Como Storm Channel (62.3 lbs/day) and the Warner Drain (53.2 lbs/day). The load measured in Hicks Canyon Wash was approximately 92 lbs/day greater than measured in June 2000.

- The average daily nitrate nitrogen load measured in San Diego Creek at Campus Drive was 370 lbs/day compared to 169 lbs/day in June 2000 and 382 lbs/day in September 1999. The sum of the average daily nitrate loads measured at Peters Canyon Wash at Barranca Parkway, San Diego Creek at Harvard Avenue, the net load from the Irvine Ranch Water District's wetlands and the estimated loads for Lane, Barranca, San Joaquin, and Sand Canyon Channels was 794 lbs/day. Assuming that the flow rate of the water by-passing the low-flow channel at Campus Drive is equal to the difference between the sum of the upstream flowrates and the flowrate measured at Campus Drive the corrected nitrate nitrogen load for Campus Drive would be 504 lbs/day.

- As in the previous two studies, the Irvine Ranch Water District (IRWD) was diverting water from San Diego Creek through its constructed wetlands to reduce the nitrate load in the creek. The quality and volume of the water diverted from and returned to the Creek was monitored by IRWD. The average pumping rate from the Creek (May 15-22, 2001) was 6.70 cfs. The average return rate to the creek was 6.47 cfs yielding a net removal of 0.23 cfs.

  The mean nitrate nitrogen load pumped from the Creek was 393 lbs/day as NO_3. The mean

nitrate nitrogen load returned to the Creek was 194 lbs/day. The IRWD Wetland Treatment Project removed on average, 199 lbs/day of nitrate nitrogen or about 51% of nitrate nitrogen pumped into the wetlands. The total nitrogen removal efficiency of the wetlands was about 41%. With respect to concentrations, the efficiencies for nitrate and total nitrogen reduction were 45% and 34% respectively. The efficiencies observed in the May 2001 study were lower than in the September 1999 and June 2000 studies. The efficiency of the wetlands is proportional to temperature. The first two studies were conducted during the summer when temperatures were higher and the removal efficiency of the wetlands was greater.

- The average daily Total Nitrogen (TN) loads from San Diego Creek at Campus Drive, Peters Canyon Wash at Barranca Pkwy and San Diego Creek at Harvard Avenue were 503, 647, and 224 lbs/day, respectively.

- The average daily total phosphate (as P) loads from San Diego Creek at Campus Drive, Peters Canyon Wash at Barranca Parkway and San Diego Creek at Harvard Avenue were 12.1, 14.3, and 1.16 lbs/day, respectively. The tributaries that contributed the greatest phosphate load to Peters Canyon Channel during the May 2001 study were Hicks Canyon Wash (7.28), El Modena Irvine (1.78) and the Central Irvine Channel (7.86). San Joaquin Channel (1.33 lbs/day) contributed the greatest phosphate load to reach 1 of San Diego Creek.

- Data from the UC Cooperative Extension indicate that no commercial agricultural fields were present in the watersheds of Como, Santa Ana–Santa Fe, Valencia, and Warner Storm Channels. These channels however continue to discharge high levels of nitrates, which are assumed to from groundwater.

- Using data from this study the projected total nitrogen load at Campus Drive between April 1st and September 30th would be 92,200 pounds. Using the adjusted flowrate for Campus Drive the load would be 125,000 pounds. Both of these estimates are well below the December 31, 2002 target of 200,000 pounds.

The complete reports for the 2001 study can be found in **Appendix R**.

Newport Bay

The Newport Bay was sampled during three storms during the current monitoring year. The dissolved metals data from each storm were compared to water quality guidance criteria (acute and chronic toxicity) from the CTR. During the October 2000 storm the acute (instantaneous concentration >3.1 μg/L) and chronic (4-day average concentration >4.8 μg/L) guidance criteria for copper were exceeded at all locations in the Upper and Lower Bays. The chronic criterion for nickel (4-day average concentration > 8.2 μg/L) was exceeded at all locations in the Upper and Lower Bays. During storm in January 2001 the acute and chronic toxicity guidelines for copper were exceeded in both the Upper and Lower Bays. During the March 2001 storm there were no exceedances of the metals criteria in the Lower Bay. In the Upper Bay, at all stations, the chronic toxicity criterion for nickel, the acute criterion for copper, and the chronic criterion for copper were exceeded. In the next monitoring year a contract for toxicity testing will be established to

determine if these metal concentrations cause toxicity to test organisms that would indicate an impact on Bay organisms.

In addition to nutrient and heavy metal monitoring, bacteriological sampling was also conducted during the storm samplings in January and March 2001. **Figures 11.16** and **11.17** show the concentrations of total and fecal coliform bacteria at the water surface of each the monitoring locations during these storms. In the January storm, over three inches of rainfall occurred prior to the first day of sampling and prior to the second day of sampling. Generally, the bacterial concentrations were high for the first two samplings (**Figure 11.16)** and decreased in the third sampling. In the March event measureable rainfall occurred on or before each day of sampling. Because the total amount of rainfall was small (~0.4") the concentrations of fecal coliform bacteria generally decreased from sampling to sampling.

Dry weather monitoring of bacteriological quality was also conducted in the Upper Newport Bay. **Figure 11.18** shows the total and fecal coliform concentrations at four Upper Bay stations during the year. As in last years data the concentrations of bacteria are generally greatest near the mouth of San Diego Creek.

Time series plots of the tributary discharge, precipitation and tide stage during each monitored storm can be found in **Appendix S**.

In February of 2000, the Regional Monitoring Program (RMP) for the Nutrient TMDL was initiated. Chemical sampling for nutrients during storms and dry weather was conducted according to the frequencies outlined in RMP report. The data from the 2000/01 reporting period is contained in **Appendix T.**

Lower Newport Bay

There have been no efforts to date focused on Lower Newport Bay.

Aliso Creek

Extensive studies are being carried out in Aliso Creek to better characterize patterns of bacterial contamination, identify sources of this contamination, and assess options for source reduction and/or treatment. These studies were initiated as the result of a directive from the San Diego Regional Board. The results of these studies can be found in the first and second quarterly progress reports submitted to the San Diego Regional Board on July 30, 2001 and October 31, 2002, respectively.

Dana Point Harbor

Dana Point Harbor was monitored during two storms. During both of these storms the dissolved nickel concentration exceeded the chronic toxicity guidance criterion (8.4 μg/L) for saltwater from the CTR. None of the concentrations of the grab samples used to compute these 4-day averages were above the acute toxicity guidance criterion (74 μg/L) from the CTR. Focused studies in the Harbor are not slated to begin until the 2002/03 monitoring year.

San Juan Creek

The focused studies on San Juan Creek are slated to begin during the next monitoring year. The Orange County Health Care Agency with assistance from researchers from the University of South Florida is currently conducting a bacterial source tracking study in the San Juan Creek watershed. Antibiotic resistance analysis is being used to characterize the sources of bacteria from several stormdrains discharging to the Creek.

11.6.4 Reconnaissance

The Reconnaissance Program was developed to aid in source identification in areas of known water pollution problems. The Program is proceeding with the categories of activities and timelines listed in **Figure 11.3**. Stations were prioritized as part of the monitoring program design. Site-specific designs have been established and source identification conducted as each site is addressed.

The impact of the Construction Circle drain on Peters Canyon Wash was evaluated in a cooperative investigation with Region 8 (see Section 10 for details). The reconnaissance of the automotive repair complex on Orange Avenue in Lake Forest has also been completed (Section 10). The other four sites listed in the Final Monitoring Program have been slated for completion in the upcoming year. The full list of sites will therefore be completed ahead of schedule.

BMP evaluation was identified as a part of the Reconnaissance Program. The context of BMP evaluation was further defined in a collaborative assessment of research needs conducted with the Southern California Coastal Water Research Project (SCCWRP), Southern California Counties, and three Regional Boards. This group identified BMP effectiveness evaluation as a priority area of study and recommended the development of a regionally consistent, standardized framework for such assessments. The Final Monitoring Program's commitment in this area will therefore focus on supporting and participating in a regional research project. The Principal Permittee is working with SCCWRP on a BMP evaluation program with grant funding under Proposition 13, which may be integrated into this effort.

11.6.5 Semiannual Sediment Sampling

Samples of bottom sediment from several watershed and harbor/bay locations were collected in the fall/winter of 2000 and the spring/summer of 2001. These samples were analyzed for trace metals, iron, chlorinated hydrocarbon pesticides, selected herbicides, and particle size distribution. One monitoring location in Dana Point Harbor was also monitored for polynuclear aromatic hydrocarbons (PAHs).

The database for harbor and bay sediments was evaluated using NOAA's guidance criteria for sediment toxicity. These criteria are used by SCCWRP in assessing toxicity of sediments collected from the Southern California Bight. Concentrations of metals and organic compounds from Newport Bay, Huntington Harbor, and Dana Point Harbor were compared to NOAA's Effects Range Median (ER-M). An ER-M is a predicted concentration at which half the test

organisms in a toxicity test would show a toxic effect. No exceedances of the ER-Ms for metals or organic compounds were found in the samples collected during this reporting period.

SCCWRP's iron normalization procedure was again used to determine the presence of trace metal enrichment in the sediments from the bays and harbors. Using the regression equations and prediction intervals (**Table 11.11**) it was determined that every monitoring site in Newport Bay (Upper and Lower), Huntington Harbour, and Dana Point Harbor were anthropogenically (caused by the actions of man) enriched with zinc. All monitoring locations in Dana Point Harbor showed enrichment with copper and the locations near the outlets of the stormdrains showed enrichment with lead. Every location in Huntington Harbour and Bolsa Bay showed enrichment with lead. The monitoring locations near the outlets of Bolsa Chica Channel and the Sunset Channel also showed enrichment with copper. The Rhine Channel in the Lower Newport Bay showed enrichment with copper, lead, and zinc. As in the previous reporting year, the furthest upstream sampling point in the Upper Newport Bay (UNBJAM) showed the least anthropogenic influence of any harbor/bay monitoring location.

11.7 Quality Assurance / Quality Control

The quality of data produced by each of the three contractor laboratories was evaluated by submitting quality control samples with environmental samples. Most of the samples submitted were synthetic, comprised of aliquots of prepared standard solutions in nanopure water matrices. Quality Control sample conductivities were adjusted to levels similar to environmental samples with Ultrex grade sodium chloride. These synthetic samples were used to assess the accuracy of each laboratory. Replicate samples were also submitted to evaluate the precision of the laboratories.

The contractor laboratories conduct internal quality control programs utilizing certified reference materials (CRMs), spiked and replicate samples.

The results of the quality assurance program with the contract laboratory are summarized in **Appendix U.** The allowable range of percent recovery for synthetic and samples is set at 70 - 130 for concentrations above 5 times the detection limit. For replicate samples in which the highest reported value exceeded 5 times the detection limit, the allowable range was set at 75-125 percent. For blank sample analyses the allowable range was the detection limit (dl) to 3(dl). Those results outside these ranges are boxed in the appendix.

Generally, the analytical performance of each laboratory was acceptable. Ten of the 70 analyses for TKN in synthetic samples produced results outside acceptable range of recovery. In nine of ten samples the reported recovery was lower than acceptable suggesting a systematic rather than random error. Since all but two of the 70 results for ammonia analyses were in the acceptable range it appears that the TKN problem may have been in the digestion step.

Nine replicate samples for nutrient analyses and one replicate sample for trace metals analyses were submitted to the contract laboratories. One TKN and one total phosphate result were outside the allowable range or error.

Several samples were submitted for nutrient and trace element analyses to evaluate contamination by sampling or sample processing equipment. To prepare these equipment blanks either ultrapure water or a synthetically prepared sample was allowed to contact one or more pieces of sampling or sample processing equipment including ISCO sample bottles, ISCO strainer lines, ISCO internal pump tubing, and polycarbonate composite basins. Samples from the deionized water system and ultrapure water storage carboys were also submitted for analyses. None of the results of these analyses were outside the allowable range of error.

Table 11.1
Additional Local Water Quality Monitoring

Permittees	Objective	# of Locations	Sampling Frequency	Constituents Sampled	Results & Analysis Summary
Dana Point	Determine water quality in Salt Creek and try to identify possible sources of pollutants originating in City.	10	Once a week for 5 weeks	Total coliforms, Fecal coliforms, Escherichia coliforms and Enterococcus	Specific sources of pollutants have not been identified. Testing shows evidence of bacterial contamination coming through the storm drains. Further testing planned to clean up discharge coming from mouth of Salt Creek during dry weather to Rec 1 level.
Huntington Beach	Identify pollutants found in stormwater pump stations	8	Various	Total coliform, fecal coliform, enterococcus, TSS, pH, turbidity, 1,1,2 Trichloroethane, 1,1-Dichloroethane, and others	Since the results are from pump stations, they are not a surprise. They are considered high. Most, at this time, are being diverted to the Sanitation District.
Laguna Niguel	SDRWQCB, Aliso Creek Directive	15	Weekly	Total coliform, Fecal coliform, E. coli, and Enterococcus	Results and analysis are provided to the SDRWQCB on a quarterly basis.
Laguna Woods	SDRWQCB, Aliso Creek Directive	3	Randomly, 11 days per month	Total coliform, fecal coliform, and Enterococci bacteria.	Significant rain events appeared to increase coliform levels in the creek. On most occassions, elevated bacterial levels would occur for several days after a rainstorm, and then drop to more typical levels. Exceedences were concluded to be a combination of inputs from upstream of the Leisure World Community and from the community itself.
Lake Forest	SDRWQCB, Aliso Creek Directive	7	Once per month	Fecal coliform	
Newport Beach	Determining the sources of bacteria in West Newport storm drains	10	Weekly for 10 weeks	Fecal coliform, total coliform, enterococcus	The City has embarked upon an extensive water quality testing program to better determine the sources and contributors to excessive bacteria in Newport Bay.
	Determining whether or not swimmers contribute to bacteria problems in Newport Bay	4	4 times per day for 4 days	Fecal coliform, total coliform, enterococcus	
	Looking for viruses and coliphage in tributaries to Newport Bay	6	Weekly for 3 weeks	Fecal coliform, enteric viruses, adenoviruses, total coliform, coliphage, enterococcus	
San Clemente	Obtain basic dry-weather flow & water quality data at selected locations	5	Single grab samples	flow rate, pH, specific conductance, total dissolved solids, total suspended solids, total organic carbon, oil & grease, total petroleum hydrocarbons, phosphate, nitrate, total coliforms, fecal coliforms, and enterococci	The data was collected to compare with the Basin Plan to see what the current status was. No formal analysis of the results was completed. The results were comparable to what was expected.
Seal Beach	Chemical Analysis of stormwater	5	Once	Mercury, Metals, Coliforn, Fecal Coliform	Collecting baseline results

Table 11.2
Ranking of Critical Aquatic Resources

SITE	CRITERIA									
	303(d) listed	Community interest	Aquatic habitat	Wildlife habitat	Designated reserve	Contact recreation	Non-contact recreation	Utility resource	Urban impact	Total
Enclosed Bays and Estuaries										
Upper Newport Bay	XX	XX	X	X	X	X	X		X	10
Lower Newport Bay	XX	XX	X	X		X	X		X	9
Talbert Channel		XX	X	X	X	X	X		X	8
Bolsa Bay		XX	X	X	X	X	X		X	8
Sunset Aquatic/ Anaheim Bay / Huntington Harbour	XX	XX	X	X		X	X		X	9
Dana Point Harbor		XX	X	X		X	X		X	7
Coastal Resources										
Irvine Coast Marine Life Refuge		XX	X	X	X	X	X		X	8
Laguna Beach	XX	XX				X	X		X	7
Laguna Beach Marine Life Refuge		X	X		X	X	X		X	6
Newport Marine Life Refuge		X	X	X	X	X	X		X	7
Aliso Beach	XX	XX				X	X		X	7
Aliso Creek Mouth	XX	XX	X	X		X	X		X	9
Niguel Marine Life Refuge		X	X		X	X	X		X	6
Doheny Beach	XX	XX				X	X		X	7
Doheny Beach Marine Life Refuge		X	X		X	X	X		X	6
Inland Surface Waters										
Aliso Creek	XX	XX	X	X		X	X		X	9
Laguna Canyon Channel		XX		X		X	X	X	X	7
Oso Creek			X	X		X	X	X	X	6
Prima Desheca			X	X		X	X	X	X	6
San Diego Creek, Reach 1	XX	XX	X	X		X	X		X	9
San Diego Creek, Reach 2	XX	XX	X	X		X	X	X	X	10
San Juan Creek	XX	XX	X	X		X	X	X	X	10
San Juan Creek, Lower	XX	XX	X	X		X	X		X	9
Santa Ana River								X	X	2
Santiago Creek, Reach 4	XX		X	X		X	X	X		7
Segunda Desheca			X	X		X	X			4
Serrano Creek		XX	X	X		X	X		X	7
Silverado Creek	XX		X	X		X	X	X		7
Trabuco Creek			X	X		X	X	X	X	6

Scoring of candidate monitoring sites on each of several subjective criteria and Basin Plan beneficial uses that reflect habitat value and human us. Cells with more than one "X" indicate heavier weighting for that site on that criterion.

Table 11.3
Summary of Ranking Critical Aquatic Resources

Number of "X"s	Candidate sites
	First priority
9 - 10	San Diego Creek, Reach 1& Reach 2
10	San Juan Creek
10	Upper Newport Bay
9	Aliso Creek
9	Aliso Creek Mouth
9	Lower Newport Bay
9	San Juan Creek, Lower
9	Sunset Aquatic/Anaheim Bay/Huntington Harbour
7	*Dana Point Harbor (DPH)
	Second priority
8	Bolsa Bay
8	Irvine Coast Marine Life Refuge
8	Talbert Channel
7	Aliso Beach
7	Doheny Beach
7	Laguna Beach
7	Laguna Canyon Channel
7	Newport Marine Life Reserve
7	Santiago Creek, Reach 4
7	Serrano Creek
7	Silverado Creek
	Third priority
6	Doheny Beach Marine Life Refuge
6	Laguna Beach Marine Life Refuge
6	Niguel Marine Life Reserve
6	Oso Creek
6	Prima Desheca
6	Trabuco Creek
4	Segunda Desheca
2	Santa Ana River, Reach 2

Results of the ranking exercise for candidate monitoring sites. Overall ranking was based simply on the number of "X"s in each row of Table 11.1. * Dana Point Harbor is included as a first priority site because of the extensive amount of human use and community interest.

Table 11.4
Sources of Information Used for Critical Aquatic Resource Impact Assesment

	Study/Location	Agency	Funded by	Duration	Data
1	UNB Algal Studies	UCLA	IRWD	1996-	Salinity, nutrients, algal biomass
2	Newport Marine Life Reserve W'shed Studies	RiverTech	The Irvine Company		Nutrients
3	Newport Marine Life Reserve Offshore Studies	Dr. Ford, Cal State U. San Diego	The Irvine Company		Growth rate of kelp
4	Santa Ana River, Reach 1	SCCWRP	CSDOC	10/97-10/98	TSS, priority pollutants (organics, etc.)
5	Southern California Bight Pilot Project	SCCWRP	POTWs	1994, 1998	Chemical, biological, and toxicity samples
6	Basin Study, Santa Ana River (Imp. Hwy)	OC Water District & USGS	OCWD & USGS	10/95 - 9/99	Nitrates, organics
7	State Mussel Watch (UNB, DP, Huntington Harbor)	Ca. Dept. of Fish & Game	Reg'l Board	1977-	Toxics (trace metals, synthetic organics)
8	Toxic Substances Monitoring Program	Ca. Dept. of Fish & Game	Reg'l Board	1989	Toxics (trace metals, synthetic organics)
9	TMDL studies	Reg'l Board	Reg'l Board	1997	TMDLs on nutrients
10	TMDL studies	Reg'l Board	Reg'l Board		TMDLs on sediments
11	NB Plant Survey	Dr. Alex Horne, UC Berkeley	IRWD	1996	Plants
12	Coastal bacteria (coast)	County Environmental Health	County	1977-	Bacteria
13	Coastal bacteria (Aliso Creek, Laguna Beach)	Aliso Water Management Agency (AWMA)	AWMA	NPDES permit term	Bacteria
14	Coastal bacteria (San Juan Creek)	Southeast Regional Reclamation Authority (SERRA)	SERRA	NPDES permit term	Bacteria
15	Coastal bacteria (Santa Ana River)	County Sanitation Districts of Orange County (CSDOC)	CSDOC	NPDES permit term	Bacteria
16	Talbert Channel Conservancy	Cal State Long Beach			Polychaete taxonomy
17	Evaluation Monitoring Program (UNB w'shed)	Dr. Fred Lee, Transportation Corridor Agencies (TCA)		1997-2000	Toxicity
18	SD Creek Sediment Monitoring Program	Orange County Environmental Resources Section	County, Cities of Irvine, Tustin, & Newport Beach, Irvine Company	1987-	Transported sediment, channel profiling, bathymetric survey of NB
19	San Diego Creek/NB model	Resource Management Associates	County, City of Newport Beach, Army Corps of Engineers	1997-	Sediment transport model with potential for expansion into water quality model
20	Orange County Municipal NPDES Stormwater Program	Orange County Environmental Resources Section	County, Flood Control District, Cities	1991 -	Water and sediment quality data
21	Chemistry, Toxicity and Benthic Community Conditions in Sediments of Selected Southern California Bays and Estuaries	NOAA, SWRCB, USEPA, DFG, UCSC, CSUSJ	NOAA, SWRCB, USEPA, DFG	1997	Sediment quality data
22	Maintenance of trash/debris booms in Orange County flood control channels	Orange County PFRD/PW/OPS	County	Ongoing	Debris boom maintenance, debris disposal costs
23	Maintenance of Newport Dunes Aquatic Park	Newport Dunes Aquatic Park	Newport Dunes Aquatic Park	Ongoing	Algae removal costs
24	Debris removal in Huntington Harbour	G.H. Boston Company	City of Huntington Beach	Ongoing	Debris volumes
25	Debris removal in Newport Bay	City of Newport Beach Public Works	City of Newport Beach	Ongoing	Algae and debris volumes
26	Maintenance dredging in County facilites	Contractor administration by County Coastal Facilities	County	Ongoing	Sediment testing results, biological resources
27	Fish trawling in Newport Bay	Orange Coast College	Orange Coast College	Ongoing	Population distribution of fish
28	Army Corps of Engineers Reconnaissance Study - Aliso Creek	Army Corps of Engineers	Army Corps of Engineers, Cities, County, Water Districts	1998 - 2001	Create integrated watershed management plan.

Table 11.5
Critical Aquatic Resources Preliminary Impact Assessment

Resource	Beneficial use(s)	Available Indicators of probable impact	Source of Indicator From Table 10	Constituents of concern	Possible Sources
San Diego Creek, Reach 1 & 2	Aquatic habitat	Elevated toxics in fish tissue	8	Toxaphene, Dacthal, Diazinon, Oxidizon, Total DDT, Group A, Cd, Se, Zn	Urban runoff, agriculture
		Bioaccumulation	7	Chlorpyrifos, Oxidizon, Toxaphene, Total Chlordane, Total DDT, Dieldrin, Total PCB, Total PAH, Cd	Urban runoff, agriculture
	Wildlife habitat	Water quality	17,20	Diazinon, Chlorpyrifos, nutrients	Urban runoff, agriculture
		Sedimentation	18,19,26	Sediment	Channel erosion, construction, agriculture
		Wildlife changes			Urbanization, urban runoff
		Vegetation changes			Urban runoff, channel erosion, flowrate
	Recreation/ aesthetics	Algal blooms	20	Nutrients	Urban runoff, agriculture
		Elevated levels of bacteria	12		Urban runoff, wildlife, sewer overflows / line breaks
San Juan Creek & Lower	Recreation/ aesthetics	Beach closures	12, 14	Bacteria	Urban runoff, wildlife, sewer overflows / line breaks
	Groundwater Recharge	Water quality	14,20	Total Dissolved Solids	Urban runoff
Upper Newport Bay	Aquatic habitat	Elevated toxics in fish tissue	8	Cu, Hg, Pb, Total DDT	Urban runoff, recreational boating
		Water quality	17,20	Diazinon, Chlorpyrifos, nutrients	Urban runoff, agriculture, open space
		Sediment contamination	5,20,21,26	Total DDT	Urban runoff, agriculture, boatyards
		Bioaccumulation	7	Chlorpyrifos, Toxaphene, Total Chlordane, Total DDT, Dichlorobenzophenone, Dicofol, Dieldrin, Total PCB, Total PAH, Cu, Hg	Urban runoff, agriculture
	Wildlife habitat	Sedimentation	18,19,26	Sediment	Channel erosion, construction, agriculture
		Loss/change of species diversity	26,27	Toxics, DO, nutrients, sediment, species composition	Urban runoff, agriculture, open space
		Sediment contamination	20,21,26	Total Chlordane, Total DDT, DDE	Urban runoff, agriculture, boatyards
	Recreation/ aesthetics	Algal blooms	11,23,25	Nutrients	Urban runoff, agriculture
		Trash and debris	22	Trash and debris	Urban, natural
		Beach closures	12	Bacteria	Urban runoff, POTW discharge/line breaks
Aliso Creek & Mouth	Aquatic/ riparian habitat	Bank erosion	28	Flowrate	Urban development
		Loss of riparian vegetation	28	Flowrate	Urban development
	Recreation/ aesthetics	Beach closures	12,13,33	Bacteria	Urban runoff, sewer overflows / line breaks
Lower Newport Bay	Aquatic habitat	Bioaccumulation	7	Chlorpyrifos, Dacthal, Heptachlor Epoxide, Toxaphene, Total Chlordane, Total DDT, Dieldrin, Total PCB, Total PAH, Al, As, Cd, Cu, Cr, Hg, Mn, Pb, Se, Zn	Urban runoff, agriculture,boatyards, recreational boating
		Sediment contamination	5,20,21,26	Total Chlordane, Total DDT, Cu, Hg	Urban runoff, agriculture
	Recreation/ aesthetics	Algal blooms	11,25	Nutrients	Urban runoff, agriculture
		Trash and debris	25	Trash and debris	Urban, natural
		Complaints	12,20,25	Trash and debris, nutrients, bacteria	Urban, natural, agriculture, open space
Sunset Aquatic/Anaheim Bay/Huntington Harbour	Aquatic habitat	Bioaccumulation	7	Chlorpyrifos, Dacthal, Heptachlor Epoxide,Oxidizon, Toxaphene, Total Chlordane, Total DDT, Dieldrin, Total PCB, Total PAH, Al, As, Cd, Cu, Cr, Mn, Pb, Se, Zn	Urban runoff, agriculture
		Elevated toxics in fish tissue	8	Total Chlordane, Total DDT, Total PCB, Total PAH	Urban runoff, agriculture
		Sedimentation	26	Sediment	Agricultural runoff
		Loss/change of species diversity	5,26	Sediment, disturbance	Agricultural runoff, dredging
		Sediment contamination	5,20,26	DDE	Urban runoff, agriculture
		Water quality	20	Metals, nutrients	Urban runoff, agriculture
	Recreation/ aesthetics	Trash and debris	22,24	Trash and debris	Urban runoff
		Beach closures	12	Bacteria	Urban runoff, wildlife, sewer overflows / line breaks
Dana Point Harbor	Recreation/ aesthetics	Beach closures	12	Bacteria	Urban runoff, wildlife, sewer overflows / line breaks
	Aquatic habitat	Bioaccumulation	7	Total Chlordane, Total PCB, Al, Cd, Cu, Zn	Urban runoff, recreational boating
		Sediment contamination	5,20,21,26	Total Chlordane, Cu	Urban runoff, recreational boating

Bioaccumulation - toxics found in filter feeding invertibrates such as mussels
bacteria - pathogenic indicator organisms
Group A chemicals - includes aldrin,dieldrin, endrin, heptachlor, heptachlor epoxide, chlordane (total), hexachlorocyclohexane (total), endosulfan, toxaphene

Table 11.6
Warm Spot Constituents of Concern and Trend Monitoring Frequencies

				from Power Analyses			
Warm Spot	**Location**	**STORET Code**	**Constituent(s) of Concern**	**Trend Detectable**	**Monitoring Frequency samples/yr**	**term (years)**	**min. reduction to show signifcant trend**
Bonita Creek	u/s F05 conf.	BCF04	Ni Ni(s)	N N	(12) (2)		
Lane Channel	u/s Jamboree	LANF08	EC(d)	Y	10	5,10	28,13
Agua Chinon Wash	@ Irvine Ctr. Dr.	ACWF18	DDE(s), DDT(s)	N	(2)		
Central Irvine Channel	@ East Yale Loop	CICF25	NO_3(d)	?	20	20	78
Rattlesnake Canyon Wash	@ Bryan Ave.	RCWF26	TSS Pb	 Y	 20	 20	 70
Hicks Canyon Wash	@ Culver Dr.	HCWF27	DDE(s)	N	(2)		
Hines Channel	@ Bryan / Jeffrey	HINF28	NO_3(d)	Y	20	10,20	50,35
Sulphur Creek	d/s Sulphur Cr. Reservoir	SCDAM	Cd(s)	N	(2)		
Prima Deshecha Channel	@ Calle Vista Grande	PDCM01	EC(d) Cd Ni	Y Y Y	10 20 20	10,20 10,20 10,20	42,29 50,33 53,37
Segunda Deshecha Channel	@ El Camino Real	SDCM02	EC(d)	?	10	20	75
Lower Newport Bay	@ the Rhine Channel	LNBRIN	Cu(s)	?	5	20	85
Huntington Harbour	@ Christiana Bay	HUNCRB	Pb(s)	?	5	20	68

(s) sediment concentrations; (d) dry weather measurements; all others stormwater concentrations
(#) - frequency not based on power analyses

Table 11.7
NPDES and TMDL Monitoring Locations

	Warm Spot	CAR	TMDL	Waterbody	Location of Site	Station Code
Upper Newport Bay Watershed			X	El Modena Irvine Channel	at Michelle Dr.	MIRF07
			X	Lane Channel	at Jamboree Blvd.	LANF08
	X		X	Agua Chinon Wash	at Pacifica	ACWF18
	X			Central Irvine Channel	at I-5 Fwy.	CICF25
	X			Hines Nursery Channel	at Trabuco / Jefferey	HINF28
				Hicks Canyon Wash	at Culver Dr.	HCWF27
			X	Bonita Canyon Wash	u/s University Ave.	BCF04
		X	X	San Diego Creek	at Campus Dr.	SDMF05
		X	X	San Diego Creek	at Harvard Ave.	WYLSED
			X	Peters Canyon Wash	at Barranca Pkwy.	BARSED
			X	Costa Mesa Channel	at Westcliff Dr.	CMCG02
			X	Santa Ana Delhi Channel	u/s Irvine Ave.	SADF01
		X		San Juan Creek	at Ortega Hwy. In Caspers Park	SJOL01
		X			at La Novia	SJNL01
		X		Aliso Creek	in Laguna / Wood Canyon Wilderness Park	ACJ01
	X			Prima Deschecha Channel	at Calle Vista Grande	PDCM01
	X			Segunda Deschecha Channel	at El Camino Real	SDCM02
	X			Sulphur Creek	d/s Sulphur Creek dam	SCDAM
Upper Newport Bay		X	X		Unit I in-bay basin	UNBJAM
		X	X	Narrows	d/s Unit II In-bay basin	UNBSDC
		X	X	North Star Beach		UNBNSB
		X	X		at PCH bridge	UNBCHB
Lower Newport Bay		X	X	Turning Basin		LNBTUB
	X	X	X	Rhine Channel		LNBRIN
		X	X	Harbor Island Reach		LNBHIR
Sunset Aquatic Park / Anaheim Bay / Huntington Harbour		X		Sunset Aquatic Park	Near U.S. Navy bouys	HUNSUN
		X		Huntington Harbour	approx. 1/4 mi. d/s Bolsa Chica Ch. Mouth	HUNBCC
		X		Huntington Harbour	d/s Warner Ave. near HH Yacht Club dock	HUNWAR
	X	X		Christiana Bay	near outlet of Sunset Channel	HUNCRB
		X		Anaheim Bay	between two breakwaters	HUNHAR
		X		Bolsa Bay	off pier	BBOLR
Dana Point Harbor		X		East Basin	near outlet of 60" RCP	DAPTEB
		X		West Basin	near outlet of 51" RCP	DAPTWB
		X		Launch Ramp	near outlet of 18" RCP	DAPTLB
		X			near boatyard	DAPTLR
		X		Harbor Entrance	between two breakwaters	DAPTHE

Table 11.8
NPDES and TMDL Monitoring Frequencies

Station Code	Nutrients (aq)	Nutrients (sed)	Trace (aq)	Trace (sed)	PHP (s)	PAH (s)	Other Interest
MIRF07	**m/st**						
LANF08	**m/st**						EC(m)
ACWF18	**m/st**				semi		
CICF25	biweekly						
HINF28	biweekly						
HCWF27					semi		
BCF04	**m/st**		st(12)	semi			
SDMF05	w/st		st	semi	semi		op pest (m)
WYLSED	**biweekly**/st		st	semi	semi		
BARSED	**biweekly/st**						
CMCG02	w/st		w/st				bacteria (w/st), op pest (m)
SADF01	**biweekly/st**		st				
SJOL01	m/st		st	semi	semi		
SJNL01	m/st		st	semi	semi		
ACJ01	m/st		st	semi	semi		
PDCM01			st(20)				EC(m)
SDCM02							EC(m)
SCDAM				semi			
UNBJAM	m(s**,m,b**)/st	m	st	semi	semi		bacteria (m/st), debris (st)
UNBSDC	m(s**,m,b**)/st	m	st	semi	semi		bacteria (m/st), debris (st)
UNBNSB	m(s**,m,b**)/st	m	st				bacteria (m/st), debris (st)
UNBCHB	m(s,**m,b**)	m	st				bacteria (m/st), debris (st)
LNBTUB	st		st	semi	semi		
LNBRIN	st		st	5	semi		
LNBHIR	**m(s,m,b**)/st		st	semi	semi		
HUNSUN	semi/st		st				
HUNBCC	semi/st		st	semi	semi		
HUNWAR	semi/st		st	semi	semi		
HUNCRB	semi/st		st	5	semi		
HUNHAR	st		st				
BBOLR	semi/st		st	semi	semi		
DAPTEB	semi/st		st	semi	semi	semi	
DAPTWB	semi/st		st	semi	semi		
DAPTLB	semi/st		st	semi	semi		
DAPTLR	st		st	semi	semi		
DAPTHE	st		st				

(s,m,b) surface, middepth, bottom
s(12) storm sampling - 12 total composite samples per year
bold - nutrient TMDL additions including orthophosphate

Table 11.9
Beneficial Uses of Monitored Waterbodies

Bay/Harbor	Station Codes		MUN	AGR	IND	PROC	GWR	NAV	POW	REC1	REC2	COMM	WARM	LWARM	COLD	BIOL	WILD	RARE	SPWN	MAR	SHEL	EST
Anaheim Bay - Outer	HUNHAR		+					X		X	X					X	X	X	X	X		
Anaheim Bay - Seal Beach Nat'l Wildlife Refuge	HUNSUN		+							X[1]	X					X	X	X	X	X		X
Sunset Bay - Huntington Harbor	HUNBCC, HUNCRB HUNWAR		+					X		X	X	X					X	X	X	X		
Bolsa Chica Ecological Reserve	BBOLR		+							X	X					X	X	X	X	X		X
Upper Newport Bay	UNBJAM, UNBSDC UNBBCW, UNBNSB UNBNDB, UNBCHB		+							X	X	X				X	X	X	X	X	X	X
Lower Newport Bay	LNBTUB, LNBTRI, LNBRIN, LNBHIR LNBHAR		+					X		X	X	X					X	X	X	X	X	
Dana Point Harbor	DAPTLB, DAPTLR DAPTEB, DAPTWB DAPTHE				X			X		X	X	X					X	X	X	X	X	

Channel	Station Code	Watershed	MUN	AGR	IND	PROC	GWR	NAV	POW	REC1	REC2	COMM	WARM	LWARM	COLD	BIOL	WILD	RARE	SPWN	MAR	SHEL	EST
Santa Ana Delhi	SADF01	Upper Newport Bay																				
Bonita Canyon Channel	BCF04	Upper Newport Bay	+				I			I	I		I									
San Diego Creek - Harvard	WYLSED	Upper Newport Bay	+				I			I	I		I				I					
San Diego Creek - Campus	SDMF05	Upper Newport Bay	+							X[2]	X		X				X					
Peters Canyon Wash	BARSED	Upper Newport Bay	+				I			I	I		I									
Sand Canyon Wash	SCCF15	Upper Newport Bay	+				I			I	I		I									
Bee Canyon Channel	BEEF17	Upper Newport Bay	+				I			I	I		I									
Agua Chinon Wash	ACWF18	Upper Newport Bay	+				I			I	I		I									
Serrano Creek	SERF19	Upper Newport Bay	+				I			I	I		I									
Rattlesnake Canyon Wash	RCWF26	Upper Newport Bay	+				I			I	I		I									
Hicks Canyon Wash	HCWF27	Upper Newport Bay	+				I			I	I		I									
E. Costa Mesa Channel	CMCG02	Upper Newport Bay																				
Santa Isabella Channel	SICG03	Upper Newport Bay																				
Big Canyon Wash	BCWG04	Upper Newport Bay																				
Laguna Canyon	LCW102	South County	+	X						O	X		X				X					
Aliso Creek Channel	ACJ01	South County	+	X						O	X		X				X					
Sulphur Creek Channel	SCDAM	South County	+	X						O	X		X				X					
San Juan Creek - La Novia Ave	SJNL01	South County	+	X	X					X	X		X		X		X					
San Juan Creek - Ortega	SJOL01	South County	+	X	X					X	X		X		X		X					
Trabuco Creek	TCOL02	South County	+	X	X					X	X		X		X		X					
Oso Creek	OSOL03	South County	+	X	X					X	X		X		X		X					
Prima Deschecha	PDCM01	South County	+	X						O	X		X				X					
Segunda Deschecha	SDCM02	South County	+	X						O	X		X				X					
Santa Ana River - Imperial	SARIMP	Santa Ana River	+				X			X	X		X				X	X				
Santa Ana River - 5th Street	SARE01	Santa Ana River	+							X[2]	X		I				I					
Santiago Creek	SANE08	Santa Ana River	X				X			X[3]	X		X				X					
Silverado Creek	SILE17	Santa Ana River	X				X			I	I		I				I	I				

X - Present or Potential Beneficial Use
1 - No access per agency with jurisdiction (U.S. Navy)
2 - Access Prohibited in all or part by PFRD
I - Intermittent Beneficial Use
* - Excepted from MUN
o - Potential Beneficial Use
This information was taken from the 1994 update of the beneficial uses & water quality objectives for the San Diego Region and the 1995 Santa Ana River Basin Plan update.

Table 11.10
Applicable Water Quality Guidance for the Protection of Aquatic Life

Water Quality Measurement	California Toxics Rule (CTR) Freshwater dissolved metals (Guidance only) H=ln(water hardness in mg/L as $CaCO_3$)	CTR Saltwater Dissolved metals	Ocean Plan Toxic Mat. Limits Total metals	Region 8/9 Basin Plans
Lead ug/L H=ln Hardness	4 day =[1.462-0.146H][exp(1.273H-4.705)] 1 hour =[1.462-0.146H][exp(1.273H-1.460)]	4day = 8.1 1hr = 210	Daily max = 8 Inst. max = 20	
Cadmium ug/L	4 day = [1.107-0.042H][exp(0.7852H-2.715)] 1 hour = [1.137-0.042H][exp(1.128H-3.6867)]	4day = 9.3 1hr =42	Daily max = 4 Inst. max = 10	
Hexavalent Chromium ug/L		4day = 50 1hr = 1100	Daily max = 8 Inst. max = 20	
Nickel ug/L	4 day = 0.997[exp(0.846H+0.0584)] 1 hour = 0.998[exp(0.846H + 2.255)]	4day = 8.2 1hr = 74	Daily max = 60 Inst. max = 150	
Copper ug/L	4 day = 0.96[exp(0.8545H-1.702)] 1 hour = 0.96[exp(0.9422H-1.70)]	4day = 3.1 1hr = 4.8	Daily max = 12 Inst. max = 30	
Silver ug/L	1 hour = 0.85[exp(1.72H-6.52)]	1hr = 1.9	Daily max = 2.8 Inst. max = 7	
Zinc ug/L	4 day = 0.986[exp(0.8473H+0.884)] 1 hour = 0.978[exp(0.8473H+0.884)]	4 day = 81 1 hr = 90	Daily max = 80 Inst. max = 200	
Turbidity				Natural Max. increase 0-50 NTU 20% over natural 50-100 NTU 10 NTU >100 NTU 10% over natural
pH				6.5 - 8.5 freshwater 7.0 - 8.5 saltwater
Dissolved Oxygen				>5.0 mg/L MAR & WARM >6.0 mg/L COLD
Unionized Ammonia*				0.025 in receiving waters

$$* \text{ [Unionized Ammonia]} = \frac{[NH3\text{-}N]}{10^{(pka-pH)} + 1}$$

$$\text{where } pka = 0.09018 + \frac{2729.92}{T}$$

NH3-N = Total Ammonia as N
T = water temperature in Kelvin (C + 273.16)
pH = water pH

For example : at 20 C and pH 8.0 divide the ammonia nitrogen value by 26.25 to obtain unionized ammonia.
at 25 C and pH 9.0 divide by 2.76.

Table 11.11
Guidance Criteria for Harbor Sediment Evaluation

NOAA's Screening Concentrations

Metals (ppm)	ER-L	ER-M
Cadmium	1.2	9.6
Chromium	81	370
Copper	34	270
Lead	46.7	218
Nickel	20.9	51.6
Silver	1.0	3.7
Zinc	150	410
Organics (ppb)		
Acenaphthene	16	500
Acenaphthylene	44	640
Anthracene	85.3	1100
Fluorene	19	540
2-Methyl naphthalene	70	670
Naphthalene	160	2100
Phenanthrene	240	1500
Low molecular weight PAH	552	3160
Benzo(a)anthracene	261	1600
Benzo(a)pyrene	430	1600
Chrysene	384	2800
Dibenzo(a,h)anthracene	63.4	260
Fluoranthene	600	5100
Pyrene	665	2600
High molecular weight PAH	1700	9600
Total PAH	4022	44792
p,p' -DDE	2.2	27
Total DDT	1.58	46.1
Total PCBs	22.7	180

ER-L - Effects Range Low

The ERL represents the concentration corresponding to the 10th percentile in toxicity testing. No effects are likely below the ER-L.

ER-M - Effects Range Median

The ERM represents the concentration corresponding to the 50th percentile or median value. Effects are likely above the ER-M.

SCCWRP Iron Normalization Regression Coefficients

Iron (% dry) versus	Sample Size	r^2	Slope (m)	Intercept (b)	± 99% Prediction Interval
Cadmium (μg/dry g)	83	0.734	0.0978	0.0055	0.1274
Chromium (μg/dry g)	88	0.882	16.50	-0.021	11.56
Copper (μg/dry g)	96	0.833	7.40	-2.01	6.50
Lead (μg/dry g)	103	0.738	4.350	0.0836	5.199
Nickel (μg/dry g)	110	0.533	9.850	-0.407	19.596
Silver (μg/dry g)	99	0.581	0.0795	-0.0183	0.1426
Zinc (μg/dry g)	88	0.967	31.50	-1.95	15.45

Table 11.12 California Toxics Rule for Dissolved Metals in Freshwater

HARDNESS mg/L as CaCO3	ln Hardness	Lead 1 hr µg/L	Lead 4 day µg/L	Cadmium 1 hr µg/L	Cadmium 4 day µg/L	Chromium III 1 hr µg/L	Chromium III 4 day µg/L	Nickel 1 hr µg/L	Nickel 4 day µg/L	Copper 1 hr µg/L	Copper 4 day µg/L	Silver inst µg/L	Zinc 1 hr µg/L	Zinc 4 day µg/L
10	2.30	4.91	0.19	0.35	0.41	83.25	27.00	67	7	1.54	1.25	0.07	17	17
20	3.00	10.79	0.42	0.74	0.68	146.86	47.64	120	13	2.95	2.26	0.22	30	30
30	3.40	17.04	0.66	1.16	0.92	204.70	66.40	169	19	4.32	3.20	0.43	42	43
40	3.69	23.51	0.92	1.58	1.14	259.09	84.05	216	24	5.67	4.09	0.71	54	54
50	3.91	30.14	1.17	2.01	1.34	311.04	100.90	260	29	6.99	4.95	1.05	65	66
60	4.09	36.88	1.44	2.45	1.53	361.14	117.15	304	34	8.31	5.79	1.43	76	77
70	4.25	43.71	1.70	2.90	1.72	409.73	132.91	346	38	9.60	6.60	1.87	87	87
80	4.38	50.61	1.97	3.35	1.90	457.08	148.27	388	43	10.89	7.40	2.35	97	98
90	4.50	57.57	2.24	3.80	2.07	503.37	163.29	428	48	12.17	8.18	2.88	107	108
100	4.61	64.58	2.52	4.26	2.24	548.74	178.00	468	52	13.44	8.96	3.45	117	118
110	4.70	71.63	2.79	4.73	2.40	593.29	192.46	508	56	14.70	9.72	4.06	127	128
120	4.79	78.72	3.07	5.20	2.56	637.11	206.67	546	61	15.96	10.47	4.72	137	138
130	4.87	85.83	3.34	5.67	2.72	680.28	220.67	585	65	17.21	11.21	5.42	146	148
140	4.94	92.97	3.62	6.14	2.87	722.84	234.48	622	69	18.45	11.94	6.15	156	157
150	5.01	100.13	3.90	6.62	3.02	764.86	248.11	660	73	19.69	12.66	6.93	165	167
160	5.08	107.31	4.18	7.10	3.17	806.38	261.58	697	77	20.93	13.38	7.74	175	176
170	5.14	114.50	4.46	7.58	3.31	847.43	274.90	734	81	22.16	14.09	8.59	184	185
180	5.19	121.70	4.74	8.06	3.45	888.04	288.07	770	86	23.38	14.80	9.48	193	194
190	5.25	128.92	5.02	8.55	3.60	928.25	301.11	806	90	24.60	15.50	10.41	202	204
200	5.30	136.14	5.31	9.03	3.73	968.07	314.03	842	93	25.82	16.19	11.37	211	213
210	5.35	143.37	5.59	9.52	3.87	1007.54	326.84	877	97	27.04	16.88	12.36	220	222
220	5.39	150.61	5.87	10.02	4.01	1046.67	339.53	912	101	28.25	17.57	13.39	229	230
230	5.44	157.85	6.15	10.51	4.14	1085.48	352.12	947	105	29.46	18.25	14.45	237	239
240	5.48	165.10	6.43	11.00	4.27	1123.98	364.61	982	109	30.66	18.92	15.55	246	248
250	5.52	172.34	6.72	11.50	4.40	1162.19	377.00	1017	113	31.86	19.59	16.68	255	257
260	5.56	179.59	7.00	12.00	4.53	1200.13	389.31	1051	117	33.06	20.26	17.85	263	265
270	5.60	186.84	7.28	12.50	4.66	1237.80	401.53	1085	121	34.26	20.93	19.04	272	274
280	5.63	194.09	7.56	13.00	4.78	1275.23	413.67	1119	124	35.46	21.59	20.27	280	283
290	5.67	201.34	7.85	13.50	4.91	1312.41	425.73	1153	128	36.65	22.24	21.53	289	291
300	5.70	208.58	8.13	14.01	5.03	1349.36	437.72	1186	132	37.84	22.90	22.83	297	300
310	5.74	215.83	8.41	14.51	5.16	1386.09	449.63	1219	135	39.02	23.55	24.15	306	308
320	5.77	223.07	8.69	15.02	5.28	1422.60	461.48	1253	139	40.21	24.20	25.51	314	317
330	5.80	230.31	8.97	15.53	5.40	1458.91	473.25	1286	143	41.39	24.84	26.89	322	325
340	5.83	237.54	9.26	16.04	5.52	1495.02	484.97	1319	146	42.57	25.48	28.31	331	333
350	5.86	244.77	9.54	16.55	5.64	1530.94	496.62	1351	150	43.75	26.12	29.76	339	341

For Hardness > 400 use Water Effects Ratio

Table 11.12 California Toxics Rule for Dissolved Metals in Freshwater

HARDNESS mg/L as CaCO3	ln Hardness	Lead 1 hr µg/L	Lead 4 day µg/L	Cadmium 1 hr µg/L	Cadmium 4 day µg/L	Chromium III 1 hr µg/L	Chromium III 4 day µg/L	Nickel 1 hr µg/L	Nickel 4 day µg/L	Copper 1 hr µg/L	Copper 4 day µg/L	Silver inst µg/L	Zinc 1 hr µg/L	Zinc 4 day µg/L
360	5.89	252.00	9.82	17.06	5.76	1566.67	508.21	1384	154	44.93	26.76	31.24	347	350
370	5.91	259.22	10.10	17.57	5.88	1602.22	519.74	1416	157	46.10	27.39	32.74	355	358
380	5.94	266.43	10.38	18.09	5.99	1637.60	531.22	1449	161	47.28	28.02	34.28	363	366
390	5.97	273.64	10.66	18.60	6.11	1672.81	542.64	1481	164	48.45	28.65	35.85	371	374
400	5.99	280.85	10.94	19.12	6.22	1707.86	554.01	1513	168	49.62	29.28	37.44	379	382
410	6.02	288.04	11.22	19.64	6.34	1742.75	565.33	1545	172	50.79	29.90	39.07	387	390
420	6.04	295.24	11.50	20.15	6.45	1777.49	576.60	1577	175	51.95	30.53	40.72	395	399
430	6.06	302.42	11.78	20.67	6.56	1812.07	587.82	1608	179	53.12	31.15	42.40	403	407
440	6.09	309.60	12.06	21.19	6.67	1846.52	598.99	1640	182	54.28	31.76	44.11	411	415
450	6.11	316.77	12.34	21.71	6.79	1880.82	610.12	1671	186	55.44	32.38	45.85	419	423
460	6.13	323.93	12.62	22.23	6.90	1914.98	621.20	1703	189	56.60	32.99	47.62	427	430
470	6.15	331.09	12.90	22.76	7.01	1949.01	632.24	1734	193	57.76	33.61	49.41	435	438
480	6.17	338.24	13.18	23.28	7.12	1982.90	643.23	1765	196	58.92	34.22	51.23	443	446
490	6.19	345.38	13.46	23.81	7.22	2016.67	654.19	1796	200	60.07	34.82	53.08	450	454
500	6.21	352.51	13.74	24.33	7.33	2050.32	665.10	1827	203	61.23	35.43	54.96	458	462
510	6.23	359.64	14.01	24.86	7.44	2083.84	675.98	1858	206	62.38	36.03	56.86	466	470
520	6.25	366.75	14.29	25.38	7.55	2117.25	686.81	1889	210	63.53	36.64	58.80	474	478
530	6.27	373.86	14.57	25.91	7.65	2150.54	697.61	1920	213	64.68	37.24	60.75	481	485
540	6.29	380.96	14.85	26.44	7.76	2183.71	708.37	1950	217	65.83	37.84	62.74	489	493
550	6.31	388.05	15.12	26.97	7.87	2216.78	719.10	1981	220	66.98	38.44	64.75	497	501
560	6.33	395.14	15.40	27.50	7.97	2249.73	729.79	2011	223	68.13	39.03	66.79	504	509
570	6.35	402.21	15.67	28.03	8.07	2282.58	740.45	2041	227	69.27	39.63	68.85	512	516
580	6.36	409.27	15.95	28.56	8.18	2315.33	751.07	2072	230	70.42	40.22	70.94	520	524
590	6.38	416.33	16.22	29.09	8.28	2347.97	761.66	2102	233	71.56	40.81	73.06	527	532
600	6.40	423.38	16.50	29.63	8.38	2380.52	772.21	2132	237	72.70	41.40	75.20	535	539
610	6.41	430.41	16.77	30.16	8.49	2412.96	782.74	2162	240	73.84	41.99	77.37	542	547
620	6.43	437.44	17.05	30.69	8.59	2445.31	793.23	2192	243	74.98	42.58	79.57	550	554
630	6.45	444.46	17.32	31.23	8.69	2477.56	803.70	2222	247	76.12	43.17	81.79	557	562
640	6.46	451.47	17.59	31.76	8.79	2509.73	814.13	2252	250	77.26	43.75	84.03	565	569
650	6.48	458.47	17.87	32.30	8.89	2541.80	824.53	2281	253	78.40	44.33	86.30	572	577
660	6.49	465.46	18.14	32.84	8.99	2573.78	834.91	2311	257	79.53	44.92	88.60	580	585
670	6.51	472.45	18.41	33.38	9.09	2605.68	845.25	2341	260	80.67	45.50	90.92	587	592
680	6.52	479.42	18.68	33.91	9.19	2637.48	855.57	2370	263	81.80	46.08	93.27	595	599
690	6.54	486.38	18.95	34.45	9.29	2669.21	865.86	2400	267	82.93	46.66	95.64	602	607
700	6.55	493.33	19.22	34.99	9.39	2700.85	876.13	2429	270	84.07	47.23	98.04	609	614
710	6.57	500.28	19.50	35.53	9.49	2732.41	886.37	2458	273	85.20	47.81	100.46	617	622

For Hardness > 400 use Water Effects Ratio

Table 11.12 California Toxics Rule for Dissolved Metals in Freshwater

HARDNESS mg/L as CaCO3	ln Hardness	Lead 1 hr µg/L	Lead 4 day µg/L	Cadmium 1 hr µg/L	Cadmium 4 day µg/L	Chromium III 1 hr µg/L	Chromium III 4 day µg/L	Nickel 1 hr µg/L	Nickel 4 day µg/L	Copper 1 hr µg/L	Copper 4 day µg/L	Silver inst µg/L	Zinc 1 hr µg/L	Zinc 4 day µg/L
720	6.58	507.21	19.77	36.07	9.59	2763.89	896.58	2488	276	86.33	48.38	102.90	624	629
730	6.59	514.13	20.04	36.61	9.68	2795.29	906.76	2517	280	87.46	48.96	105.37	631	637
740	6.61	521.05	20.30	37.15	9.78	2826.61	916.92	2546	283	88.59	49.53	107.87	639	644
750	6.62	527.95	20.57	37.70	9.88	2857.86	927.06	2575	286	89.71	50.10	110.39	646	651
760	6.63	534.85	20.84	38.24	9.97	2889.03	937.17	2604	289	90.84	50.67	112.93	653	659
770	6.65	541.73	21.11	38.78	10.07	2920.12	947.26	2633	292	91.96	51.24	115.50	661	666
780	6.66	548.60	21.38	39.33	10.17	2951.15	957.32	2662	296	93.09	51.81	118.09	668	673
790	6.67	555.47	21.65	39.87	10.26	2982.10	967.36	2691	299	94.21	52.38	120.71	675	681
800	6.68	562.32	21.91	40.42	10.36	3012.98	977.38	2719	302	95.34	52.94	123.35	682	688
810	6.70	569.17	22.18	40.96	10.45	3043.79	987.37	2748	305	96.46	53.51	126.01	690	695
820	6.71	576.00	22.45	41.51	10.55	3074.53	997.35	2777	308	97.58	54.07	128.70	697	703
830	6.72	582.82	22.71	42.05	10.64	3105.20	1007.30	2805	312	98.70	54.63	131.41	704	710
840	6.73	589.64	22.98	42.60	10.74	3135.81	1017.22	2834	315	99.82	55.19	134.15	711	717
850	6.75	596.44	23.24	43.15	10.83	3166.35	1027.13	2863	318	100.94	55.76	136.91	718	724
860	6.76	603.24	23.51	43.70	10.92	3196.83	1037.02	2891	321	102.06	56.32	139.69	726	731
870	6.77	610.02	23.77	44.24	11.02	3227.24	1046.88	2919	324	103.18	56.87	142.49	733	739
880	6.78	616.79	24.04	44.79	11.11	3257.59	1056.73	2948	327	104.29	57.43	145.32	740	746
890	6.79	623.56	24.30	45.34	11.20	3287.88	1066.55	2976	331	105.41	57.99	148.17	747	753
900	6.80	630.31	24.56	45.89	11.29	3318.10	1076.36	3004	334	106.53	58.55	151.05	754	760
910	6.81	637.05	24.83	46.44	11.39	3348.27	1086.14	3033	337	107.64	59.10	153.95	761	767
920	6.82	643.78	25.09	46.99	11.48	3378.37	1095.91	3061	340	108.76	59.66	156.87	768	774
930	6.84	650.51	25.35	47.55	11.57	3408.42	1105.66	3089	343	109.87	60.21	159.81	775	782
940	6.85	657.22	25.61	48.10	11.66	3438.40	1115.38	3117	346	110.98	60.76	162.78	782	789
950	6.86	663.92	25.87	48.65	11.75	3468.33	1125.09	3145	349	112.09	61.32	165.77	789	796
960	6.87	670.61	26.13	49.20	11.84	3498.21	1134.78	3173	352	113.21	61.87	168.78	796	803
970	6.88	677.30	26.39	49.76	11.93	3528.02	1144.45	3201	356	114.32	62.42	171.82	803	810
980	6.89	683.97	26.65	50.31	12.02	3557.78	1154.11	3229	359	115.43	62.97	174.88	810	817
990	6.90	690.63	26.91	50.86	12.11	3587.49	1163.74	3257	362	116.54	63.51	177.96	817	824
1000	6.91	697.28	27.17	51.42	12.20	3617.14	1173.36	3284	365	117.64	64.06	181.06	824	831

For Hardness > 400 use Water Effects Ratio

Table 11.13
Massloads for Sampled Storms: 2000-2001 Season

STATION	Samples	Volume ac-ft	Storm Volume	NO3 tons	NH3 tons	TKN tons	PO4 tons	oP tons	TSS tons	VSS tons	Cd lbs	Cr lbs	Cu lbs	Pb lbs	Ni lbs	Ag lbs	Zn lbs
Anaheim Barber City Channel																	
Oct 11-14, 2000	45	36.1	30.0	0.13	0.00077	0.029	0.0125	0.00084	0.67	0.36	0.052	0.90	3.95	1.1	0.81	0.098	19.9
Peters Canyon Wash at Barranca Parkway																	
Oct 11-14, 2000	55	46.0	25.0	2.58	0.017	0.19	0.084	0.0119	2.43	2.11	0.064	0.68	2.52	0.26	0.39	0.13	4.9
Oct 27-31, 2000	53	271.9	266.1	12.50	0.13	1.06	1.30	0.19	131.55	18.57	0.70	13.0	50.2	6.9	8.1	0.72	87.8
Jan 8-9, 2001	13	13.8	16.9	0.39	0.021	0.12	0.080	0.0059	10.86	1.99	0.09	0.78	3.15	1.39	1.00	0.038	14.6
Jan 10-12, 2001	23	1757	1768	38.22	0.63	4.78	7.30	1.05	715.83	95.48	7.2	76.4	152.7	57.3	71.6	4.8	524.9
Jan 24-28, 2001	53	372.7	366.9	27.92	0.18	0.62	0.84	0.15	86.01	11.64	0.54	4.3	15.9	7.3	8.7	1.0	73.4
Mar 6-10, 2001	53	139.6	164.3	13.20	0.016	0.28	0.28	0.040	31.09	3.87	0.35	2.9	5.6	2.3	2.3	0.38	26.5
Costa Mesa Channel																	
Oct 10-15, 2000	61	0.17	0.10	0.00208	0.000081	0.00152	0.00068	0.00017	0.007	0.005	0.000	0.002	0.027	0.004	0.007	0.000	0.11
Oct 26-30, 2000	26	406.1	414.4	2.899	0.100	1.084	0.864	0.192	23.8	11.5	0.54	10.3	33.4	10.7	6.3	2.6	187.7
Jan 8-12, 2001	43	954	1195	4.454	0.398	1.821	2.577	0.522	45.6	19.4	1.4	10.8	55.9	19.0	6.0	2.7	249.7
Jan 24-28, 2001	42	214	215	9.249	0.147	0.537	0.422	0.089	12.041	3.798	0.26	2.1	13.6	5.8	3.1	0.5	64.8
Lane Channel																	
Oct 27-31, 2000	53	4.9	4.8	0.089	0.0014	0.0119	0.0078	0.00101	0.66	0.12	0.026	0.12	0.40	0.15	0.10	0.012	2.0
Jan 8-12, 2001	52	9.5	9.8	0.092	0.0055	0.020	0.015		1.82	0.32	0.018	0.14	0.96	0.32	0.24	0.026	3.5
Jan 24-27, 2001	37	3.2	3.6	0.046	0.0019	0.0087	0.0036	0.00058	0.26	0.05	0.005	0.04	0.23	0.08	0.073	0.009	0.91
El Modena-Irvine Channel																	
Feb 13-15, 2001	28	26.2	748.9	0.43	0.0021	0.088	0.040	0.0094	0.73	0.178	0.036	0.28	1.02	0.15	0.17	0.071	2.15
Feb 20-22, 2001	23	9.23	297.8	0.0046	1.25E-05	0.00085	0.000306	0.000076	0.0025	0.0025							
Feb 23-26, 2001	36	292.3	297.8	1.15	0.04	0.34	0.44	0.0029	22.39	2.30	0.40	3.2	10.7	3.2	1.6	0.79	36.4
Santa Ana Delhi Channel																	
Oct 27-31, 2000	54	354.7	356.2	5.61	0.08	0.74	0.57	0.079	28.33	7.55	0.5	9.6	26.0	11.1	2.7	0.96	98.5
Jan 8-12, 2001	51	1390	1421	12.16	0.67	3.53	2.36	0.44	235.14	54.98	2.2	19.4	118.9	74.2	21.7	3.8	502.4
Jan 24-28, 2001	53	306	302	5.09	0.16	0.73	0.29	0.043	31.48	7.72	0.41	3.3	17.3	12.2	5.0	0.81	78.8
Mar 6-10, 2001	53	104.7	125.0	1.82	0.0050	0.16	0.052	0.006	2.79	0.74	0.14	1.1	3.4	0.71	0.61	0.28	10.5
San Diego Creek at Campus																	
Oct 10-14, 2000	56	118.2	113.8	5.55	0.046	0.41	0.200	0.017	18.4	2.64	0.16	1.3	5.9	0.85	1.3	0.32	29.6
Oct 26-30, 2000	44	1624	1648	51.76	0.47	5.93	6.12	0.69	986	123	4.38	77.5	112.2	46.8	55.9	4.41	454.2
Jan 8-12, 2001	29	5490	5663	109.38	2.56	23.99	29.09	2.90	6,366	630	37.5	319.4	611.0	263.8	291.6	13.9	2,360.8
Jan 24-28, 2001	43	1105	1107	34.82	0.71	3.94	2.52	0.46	208	27.6	1.5	12.0	43.4	14.6	24.1	3.00	149.7
Mar 6-10, 2001	37	207.5	581.6	9.51	0.008	0.41	0.034	0.009	12.4	1.46	0.27	2.2	3.5	0.6	1.08	0.54	11.7
San Diego Creek at Harvard																	
Oct 26-31, 2000	56	450.1	826.4	16.61	0.05	1.49	1.41	0.14	297	35	1.9	22.1	35.2	11.2	13.9	1.1	108.3
Jan 8-12, 2001	45	2098	2192	50.44	0.90	5.93	9.80	1.13	2,170	234	15.3	120.0	196.5	76.3	114.5	5.5	763.7
Jan 24-28, 2001	53	286.0	295.1	13.15	0.22	0.99	0.85		115	14.9	0.94	7.1	15.2	5.4	8.76	0.78	60.0
Mar 6-7, 2001	18	187.3	193.8	4.61	0.019	0.38	0.56	0.077	73	10.1	0.61	5.0	10.7	3.0	6.58	0.51	35.5

Table 11.14
EMCs of Sampled Storms : 2000-2001 Season

STATION	Samples	Volume ac-ft	Storm Volume	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L
Anaheim Barber City Channel																
Oct 11-14, 2000	45	36.1	30.0							0.53	9.20	40.35	11.43	8.22	1.00	203.12
Peters Canyon Wash at Barranca Parkway																
Oct 11-14, 2000	55	46.0	25.0	41.22	0.28	3.10	1.35	38.83	33.80	0.51	5.47	20.11	2.08	3.14	1.00	39.06
Oct 27-31, 2000	53	271.9	266.1	33.84	0.36	2.88	3.52	356.07	50.26	0.95	17.59	67.90	9.33	10.92	0.98	118.80
Jan 8-9, 2001	13	13.8	16.9	20.87	1.14	6.45	4.26	578.49	106.20	2.38	20.71	84.01	36.98	26.57	1.00	390.24
Jan 10-12, 2001	23	1757	1768	16.01	0.27	2.00	3.06	299.89	40.00	1.50	15.99	31.99	12.00	14.99	1.00	109.96
Jan 24-28, 2001	53	372.7	366.9	55.13	0.36	1.23	1.65	169.86	23.00	0.53	4.22	15.70	7.17	8.55	1.00	72.50
Mar 6-10, 2001	53	139.6	164.3	69.59	0.08	1.46	1.48	163.93	20.42	0.93	7.56	14.87	6.08	5.95	1.00	69.98
Costa Mesa Channel																
Oct 10-15, 2000	61	0.17	0.10	9.20	0.36	6.71	2.99	31.74	23.01	0.55	4.37	59.83	7.94	15.76	1.00	239.60
Oct 26-30, 2000	26	406.1	414.4	5.25	0.18	1.97	1.57	43.22	20.92	0.49	9.37	30.30	9.72	5.70	2.31	170.11
Jan 8-12, 2001	43	954	1195	3.44	0.31	1.41	1.99	35.20	14.97	0.53	4.17	21.55	7.31	2.31	1.05	96.34
Jan 24-28, 2001	42	214	215	31.75	0.50	1.84	1.45	41.34	13.04	0.45	3.61	23.43	9.89	5.24	0.90	111.30
Lane Channel																
Oct 27-31, 2000	53	4.9	4.8	13.45	0.21	1.79	1.18	99.79	18.12	1.96	9.27	30.52	11.26	7.87	0.94	147.69
Jan 8-12, 2001	52	9.5	9.8	7.13	0.43	1.54	1.17	141.11	24.93	0.69	5.37	37.14	12.55	9.22	1.00	136.14
Jan 24-27, 2001	37	3.2	3.6	10.47	0.44	2.00	0.82	60.48	12.40	0.52	4.08	26.42	8.83	8.44	1.00	105.10
El Modena-Irvine Channel																
Feb 13-15, 2001	28	26.2	748.9	12.08	0.06	2.47	1.13	20.38	5.00	0.50	4.00	14.38	2.10	2.36	1.00	30.14
Feb 20-22, 2001	23	9.23	297.8	0.36	0.00	0.07	0.02	0.20	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Feb 23-26, 2001	36	292.3	297.8	2.90	0.09	0.85	1.10	56.37	5.78	0.50	4.00	13.51	4.08	2.04	1.00	45.81
Santa Ana Delhi Channel																
Oct 27-31, 2000	54	354.7	356.2	11.64	0.16	1.54	1.18	58.79	15.67	0.51	9.99	26.93	11.57	2.85	1.00	102.18
Jan 8-12, 2001	51	1390	1421	6.44	0.36	1.87	1.25	124.55	29.12	0.59	5.14	31.49	19.66	5.75	1.00	133.07
Jan 24-28, 2001	53	306	302	12.26	0.39	1.75	0.71	75.80	18.60	0.49	3.92	20.80	14.64	6.00	0.98	94.87
Mar 6-10, 2001	53	104.7	125.0	12.83	0.03	1.15	0.36	19.63	5.21	0.50	4.00	11.80	2.49	2.14	1.00	36.75
San Diego Creek at Campus																
Oct 10-14, 2000	56	118.2	113.8	34.58	0.29	2.58	1.24	114.80	16.45	0.50	4.00	18.50	2.66	4.12	1.00	92.13
Oct 26-30, 2000	44	1624	1648	23.46	0.21	2.69	2.77	447.11	55.70	0.99	17.55	25.42	10.59	12.67	1.00	102.92
Jan 8-12, 2001	29	5490	5663	14.67	0.34	3.22	3.90	853.48	84.42	2.51	21.41	40.96	17.69	19.55	0.93	158.26
Jan 24-28, 2001	43	1105	1107	23.19	0.48	2.63	1.68	138.62	18.40	0.50	4.00	14.46	4.87	8.04	1.00	49.85
Mar 6-10, 2001	37	207.5	581.6	33.72	0.03	1.46	0.12	44.00	5.16	0.48	3.84	6.28	1.13	1.92	0.96	20.82
San Diego Creek at Harvard																
Oct 26-31, 2000	56	450.1	826.4	27.17	0.09	2.43	2.31	484.95	57.88	1.56	18.10	28.80	9.19	11.40	0.87	88.57
Jan 8-12, 2001	45	2098	2192	17.70	0.32	2.08	3.44	761.36	82.26	2.68	21.06	34.48	13.39	20.09	0.96	133.98
Jan 24-28, 2001	53	286.0	295.1	33.85	0.58	2.56	2.18	296.86	38.24	1.21	9.13	19.57	6.96	11.28	1.00	77.21
Mar 6-7, 2001	18	187.3	193.8	18.11	0.08	1.49	2.18	287.89	39.75	1.19	9.84	20.93	5.97	12.93	1.00	69.82

Table 11.15
Total Stormwater Loads from the Newport Bay Watershed

PERIOD	Vol. Storm ac-ft	Vol. Sampled ac-ft	NO3 tons	PO4 tons	TSS tons	Cu lbs	Pb lbs	Zn lbs
Santa Ana Delhi Channel								
Oct 27-31, 2000	356.2	354.7	5.61	0.568	28.33	26.0	11.15	98.5
Jan 8-12, 2001	1420.9	1389.5	12.16	2.365	235.14	118.9	74.23	502.4
Jan 24-28, 2001	301.8	305.6	5.09	0.294	31.48	17.3	12.16	78.8
Mar 6-10, 2001	125.0	104.7	1.82	0.052	2.79	3.4	0.71	10.5
Total Sampled Load		2154.6	24.69	3.28	297.7	165.5	98.25	690.1
Annual Stormwater Volume	4,980	Site Mean EMC	7.8	2.3	232.4	42.5	35.2	193.3
Calc. Unsampled Load	2,826		29.8	8.6	892.6	327	271	1485
Sampled+Unsampled Load			54.5	11.9	1,190.4	492	369	2,175
Peters Canyon Wash								
Oct 11-14, 2000	25.0	46.0	2.58	0.084	2.43	2.5	0.26	4.9
Oct 27-31, 2000	266.1	271.9	12.50	1.302	131.55	50.2	6.89	87.8
Jan 8-9, 2001	16.9	13.8	0.39	0.080	10.86	3.2	1.39	14.6
Jan 10-12, 2001	1768.0	1756.9	38.22	7.303	715.83	152.7	57.27	524.9
Jan 24-28, 2001	366.9	372.7	27.92	0.836	86.01	15.9	7.26	73.4
Mar 6-10, 2001	164.3	139.6	13.20	0.281	31.09	5.6	2.31	26.5
Total Sampled Load		2600.9	94.8	9.9	977.8	230.1	75.4	732.2
Annual Stormwater Volume	7,546	Site Mean EMC	29.4	2.9	668.6	47.0	20.9	166.1
Calc. Unsampled Load	4,945		197.9	19.7	4,494	632	281	2232
Sampled+Unsampled Load			292.7	29.5	5,472	862	356	2,964
San Diego Creek at Campus Drive								
Oct 10-14, 2000	113.8	118.2	5.55	0.20	18.43	5.9	0.85	29.6
Oct 26-30, 2000	1647.7	1624.0	51.76	6.12	986.48	112.2	46.75	454.2
Jan 8-12, 2001	5663.2	5489.6	109.38	29.09	6,366	611.0	263.85	2,360.8
Jan 24-28, 2001	1107.5	1105.1	34.82	2.52	208	43.4	14.61	149.7
Mar 6-10, 2001	581.6	207.5	9.51	0.03	12.41	3.5	0.64	11.7
Total Sampled Load		8544.4	211.02	37.95	7,591	776.1	326.7	3,006.0
Annual Stormwater Volume	19,797	Site Mean EMC	17.5	4.3	1,003.6	40.7	28.2	160.7
Calc. Unsampled Load	11,253		268.2	66.1	15,349	1244	861	4914
Sampled+Unsampled Load			479.2	104.1	22,940	2,020	1,188.0	7,920
San Diego Creek at Harvard Avenue								
Oct 26-31, 2000	826.4	450.1	16.61	1.41	296.56	35.2	11.24	108.3
Jan 8-12, 2001	2192.2	2097.7	50.44	9.80	2,170	196.5	76.33	763.7
Jan 24-28, 2001	295.1	286.0	13.15	0.85	115.35	15.2	5.41	60.0
Mar 6-7, 2001	193.8	187.3	4.61	0.56	73.27	10.7	3.04	35.5
Total Sampled Load		3021.1	84.8	12.6	2655.1	257.6	96.0	967.6
Annual Stormwater Volume	8,918	Site Mean EMC	17.9	5.4	1353.5	43.6	19.4	185.2
Calc. Unsampled Load	5,897		143.1	43.3	10,846	698	311	2,969
Sampled+Unsampled Load			227.9	55.9	13,502	956	407	3,937
Bolsa Chica Channel								
Annual Stormwater Volume	5,173	Site Mean EMC	8.6	2.1	247.7	33.4	25.0	171.7
Annual Load			60.5	14.5	1,741	470	351	2,414
Westminster Channel								
Annual Stormwater Volume	1,881	Site Mean EMC	7.1	1.6	176.7	47.9	28.3	170.0
Annual Load			18.2	4.2	452	245	145	869
Anaheim Barber City Channel (w/o Mar - Jun, 2001)								
Annual Stormwater Volume	4,551	Site Mean EMC	6.7	1.3	74.7	41.0	18.9	179.1
Annual Load			41.4	8.1	462	507	233	2,216
Oso Creek								
Annual Stormwater Volume	8,965	Site Mean EMC	4.7	2.8	450.0	23.7	6.9	87.6
Annual Load			56.8	34.6	5,482	577	169	2,136

Table 11.16
Evaluation of Dissolved Metals in Channels to CTR

													At point of discharge to receiving water									
			Freshwater										Saltwater									San Diego Creek
			n		> Criteria								> Criteria									> Criteria*
			Acute	Chronic	Acute				Chronic				Acute					Chronic				Acute or Chronic
Station Code	**Channel**				**Cd**	**Cu**	**Ag**	**Zn**	**Cd**	**Pb**	**Ni**	**Cu**	**Cd**	**Cu**	**Ni**	**Ag**	**Zn**	**Cd**	**Cu**	**Ni**	**Zn**	
ABCC03	Anaheim Barber City	**S**	4	0										4			1					
ACJ01	Aliso Creek	**S**	26	5										17		1			5	5		
ACWF18	Agua Chinon Wash	**S**	1	0																		
BARSED	Peters Canyon Wash	**S**	16	4																		None
BCF04	Bonita Canyon	**S**	11	2																		None
CMCG02	Costa Mesa	**S**	15	2		7	1	5				1		15		1	4		2			
	Costa Mesa	**D**	40	0										39		2						
LANF08	Lane	**S**	12	1																		None
MIRF07	El Modena Irvine	**S**	7	1	1	2						1										None
PDCM01	Prima Deschecha	**S**	21	3	8				3		2		2	14	13		4	3	2	3	1	
RCWF26	Rattlesnake Canyon Wash	**S**	1	0																		
SADF01	Santa Ana Delhi	**S**	15	4		2						1		15			2		4			
SDMF05	San Diego Creek @ Campus	**S**	16	4		1								15					4			None
SJNL01	San Juan Creek @ La Novia	**S**	14	3										8					3	1		None
SJOL01	San Juan Creek @ Ortega	**S**	3	0										1								None
WYLSED	San Diego Creek @ Harvard	**S**	14	3																		
	Totals	**S**	**176**	**32**	**9**	**12**	**1**	**5**	**3**	**0**	**2**	**3**	**2**	**89**	**13**	**2**	**11**	**3**	**20**	**9**	**1**	**0**
		D	**40**	**0**	**0**	**0**	**0**	**0**					**0**	**39**	**0**	**2**	**0**					

Not Applicable
n = Number of observations
S = Stormwater sampling
D = Dry weather sampling
Freshwater evaluation included comparison to CTR criteria for Cd, Cu, Cr III, Pb, Ni, Ag, Zn
Evaluation of discharges to saltwater included comparison to CTR criteria for Cd, Cu, Pb, Ni, Ag, Zn
*Using freshwater criteria and average hardness of 421 mg/L for San Diego Creek

Figure 11.1
Critical Aquatic Resources Monitoring Timeline

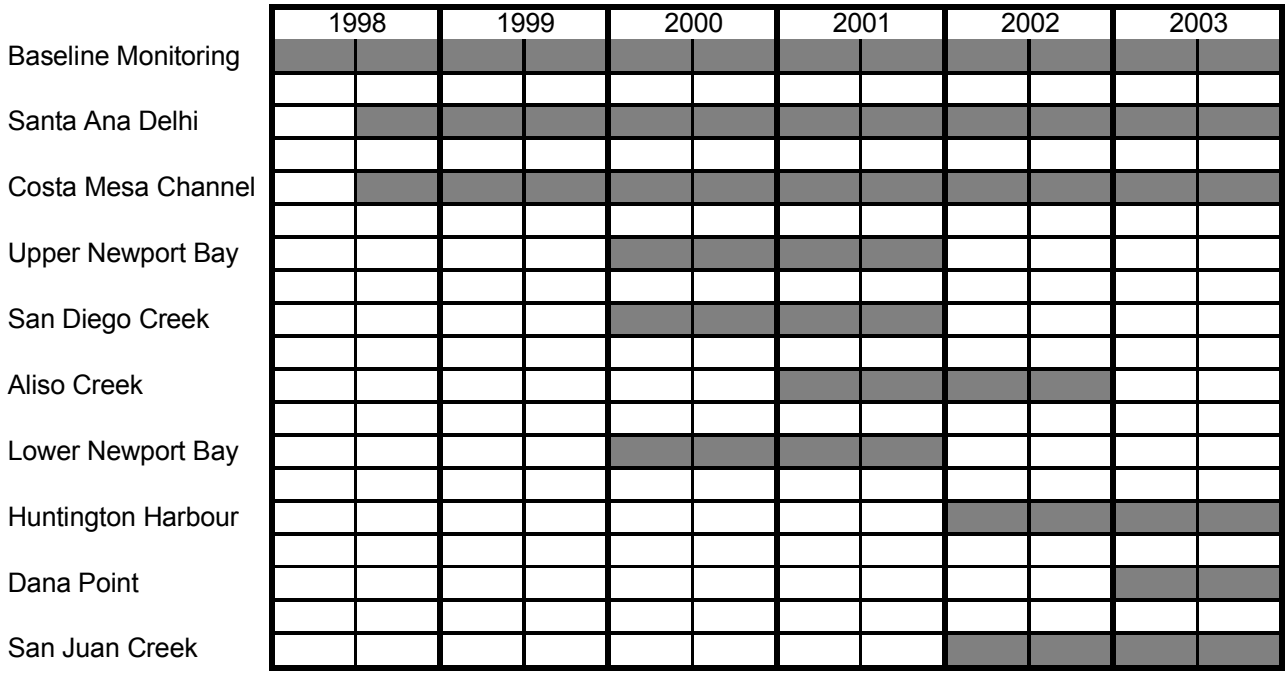

Monitoring year = July 1 of prior year - June 30 of reporting year

Figure 11.2
Warm Spot Monitoring Timeline

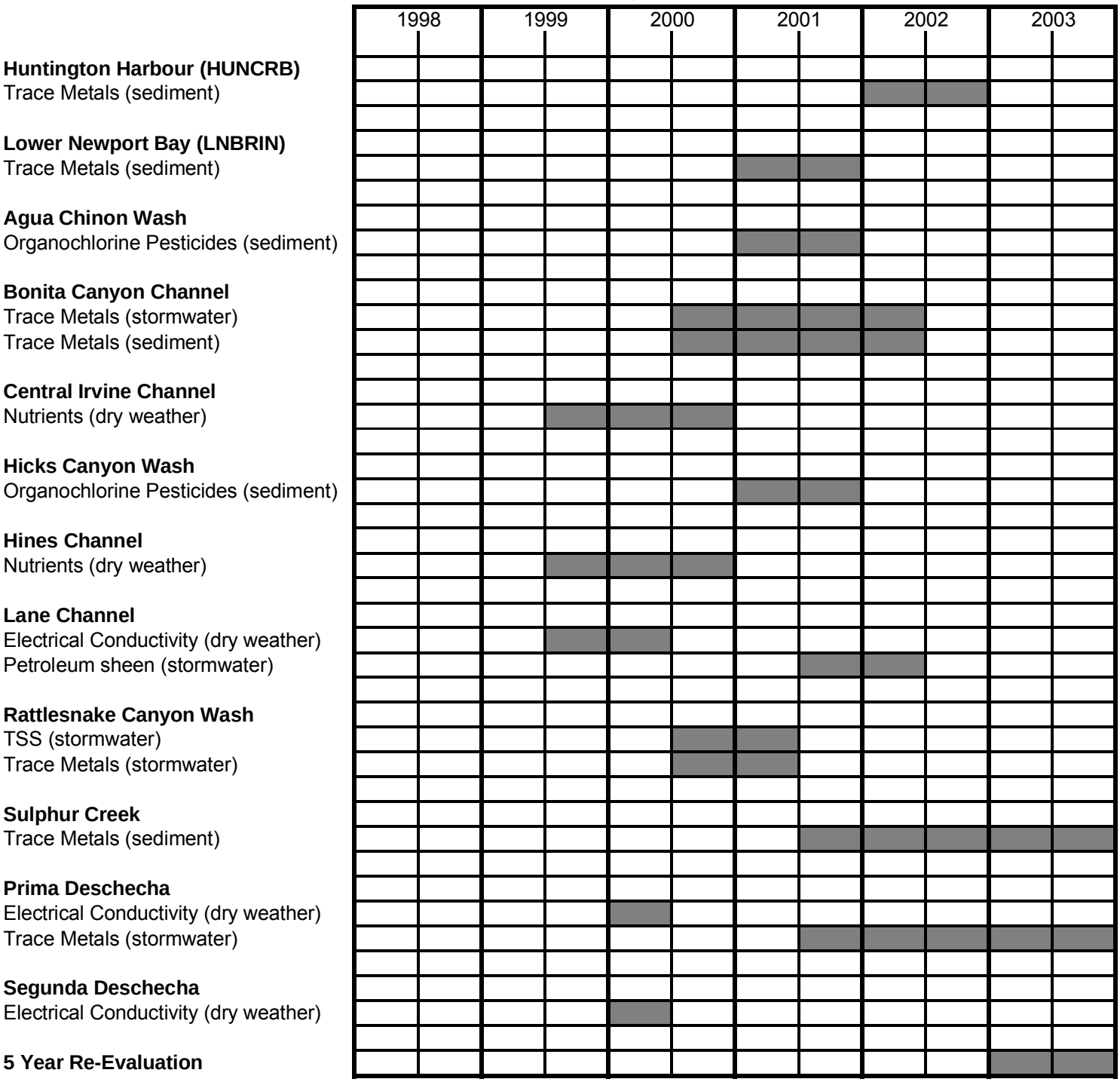

Figure 11.3
Water Quality Monitoring Program Timeline

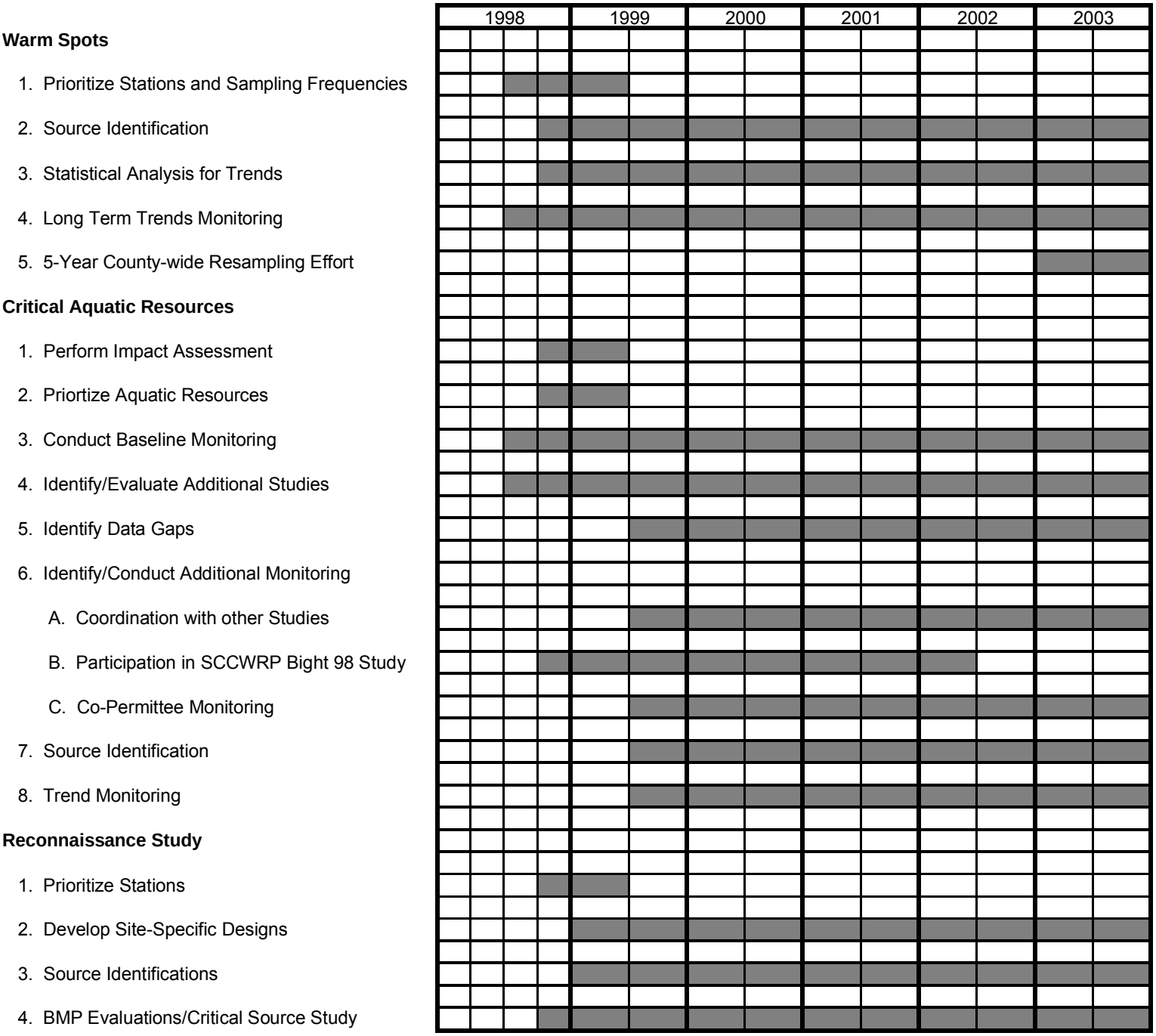

Figure 11.4

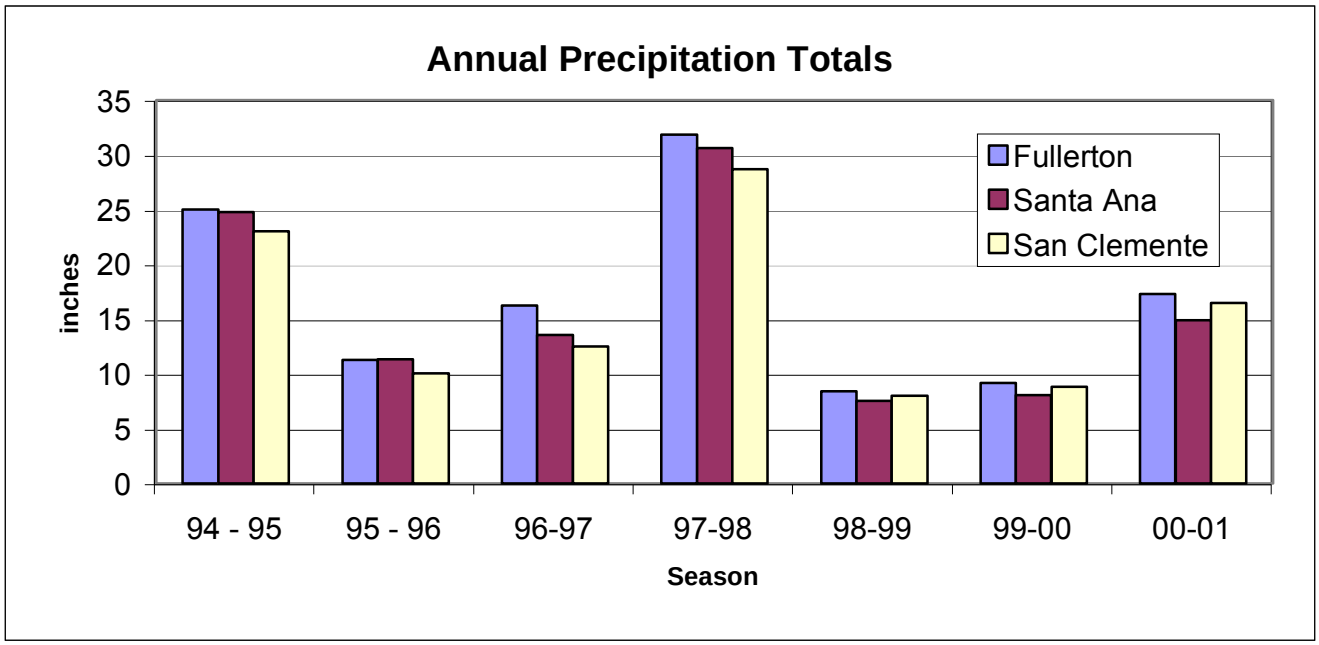

Season = July 1 - June 30

Figure 11.5
Annual Accumulated Rainfall in Santa Ana

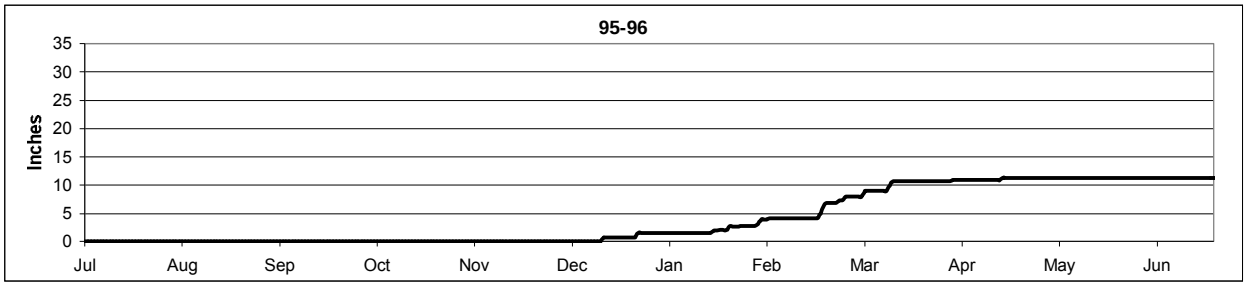

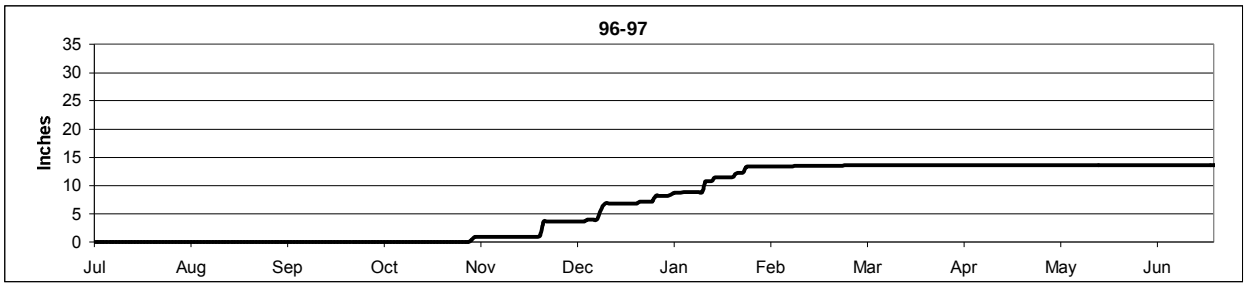

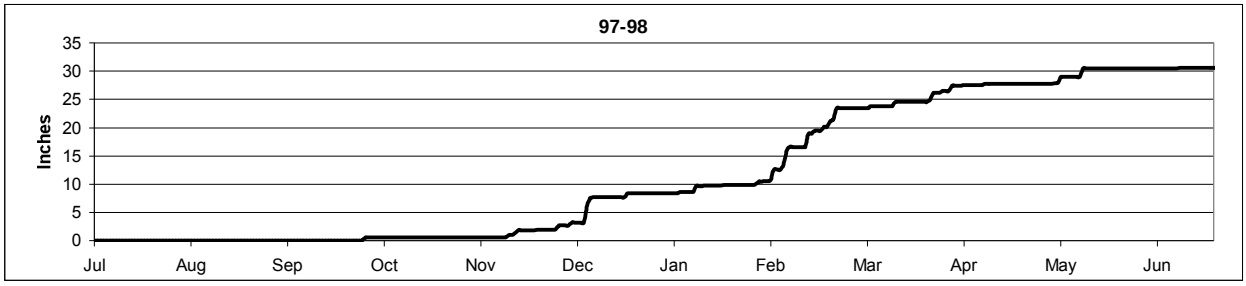

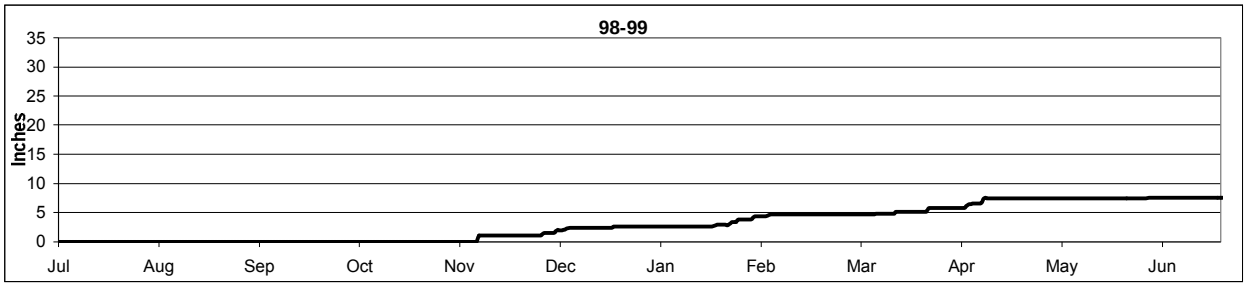

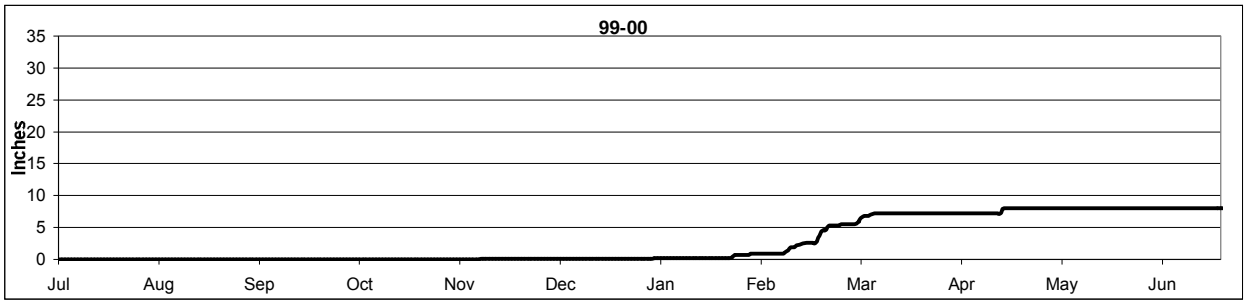

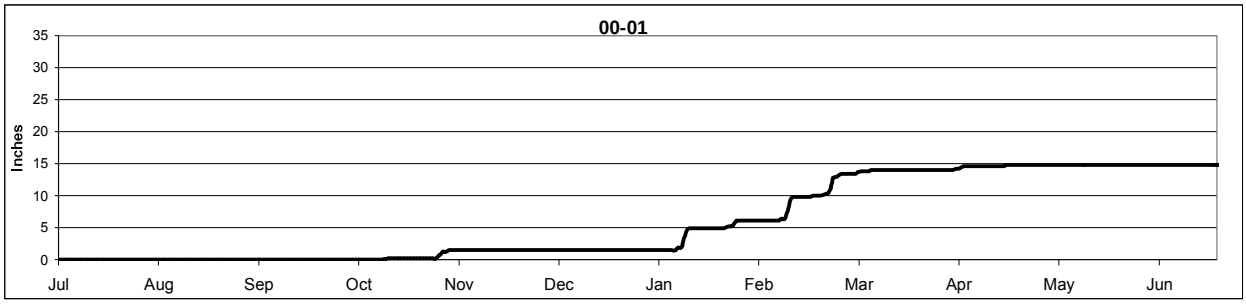

Figure 11.6
Tide Stage during Electrical Conductivity Measurements
in Segunda Deschecha Channel

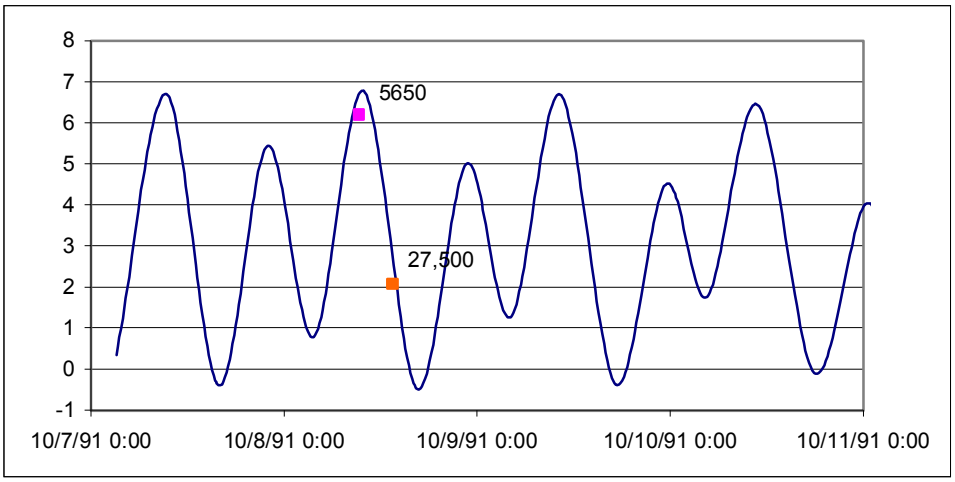

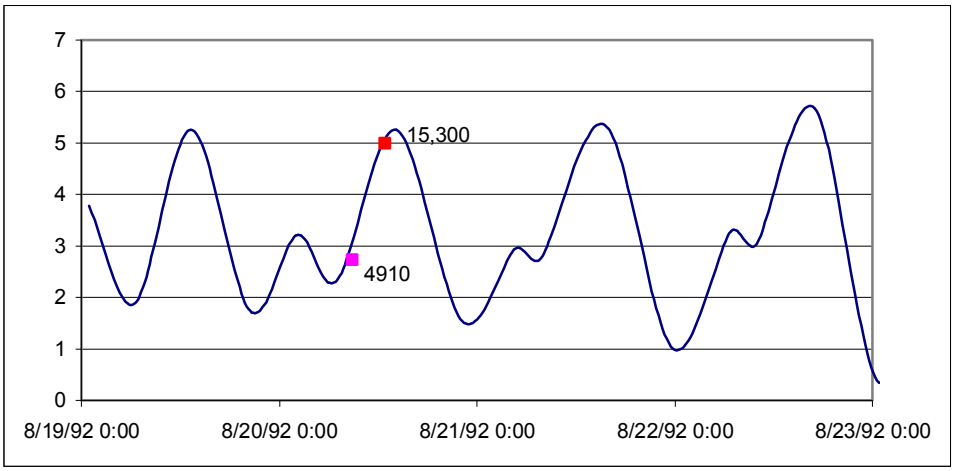

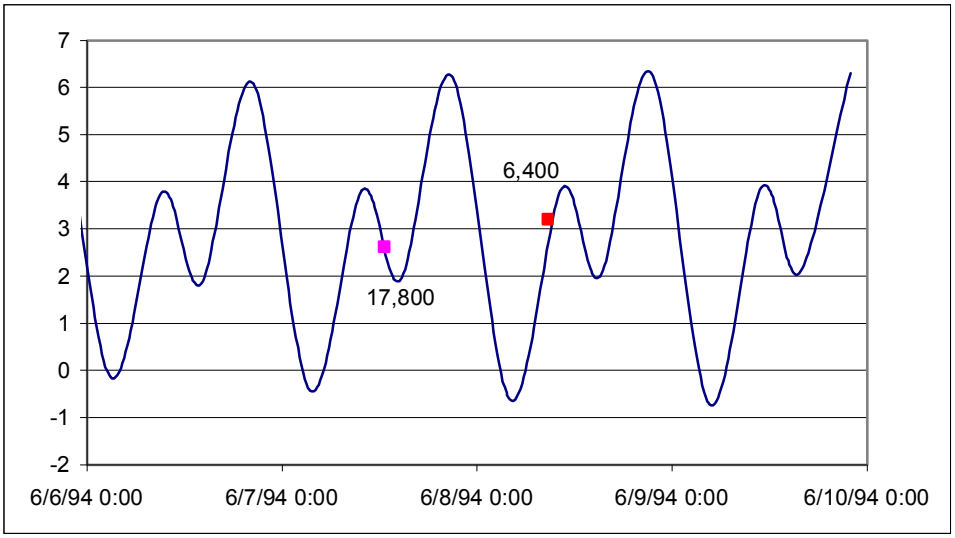

Figure 11.6
Tide Stage during Electrical Conductivity Measurements
in Segunda Deschecha Channel

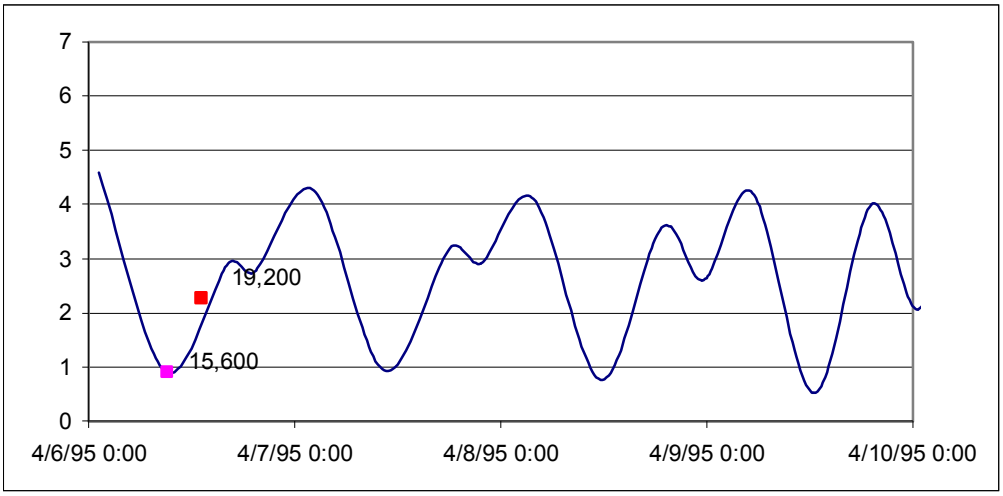

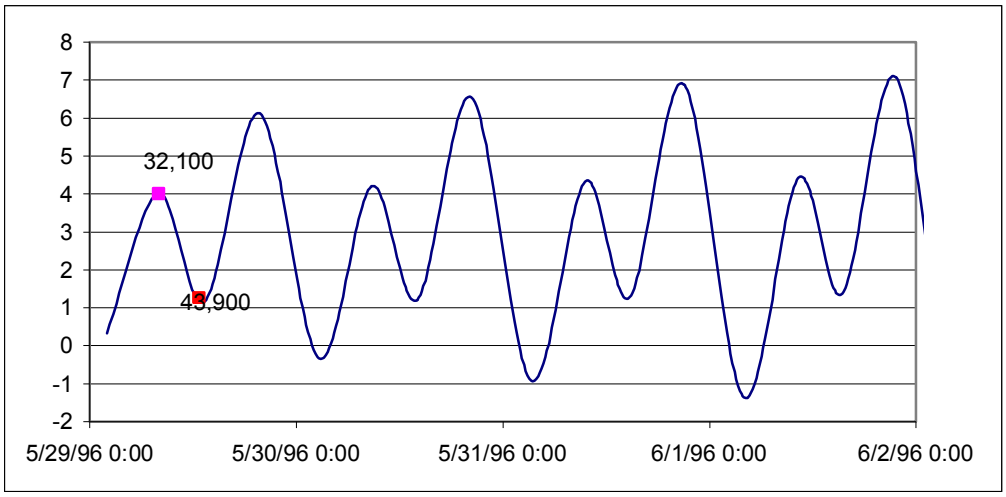

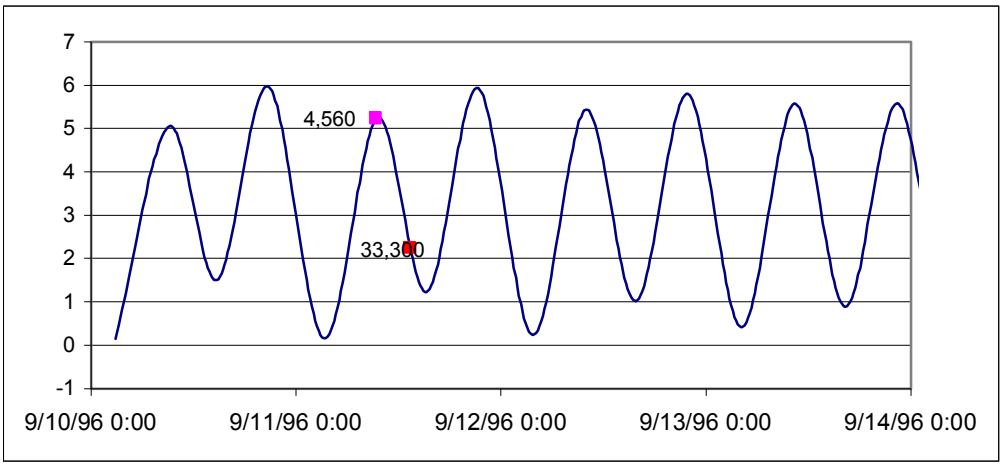

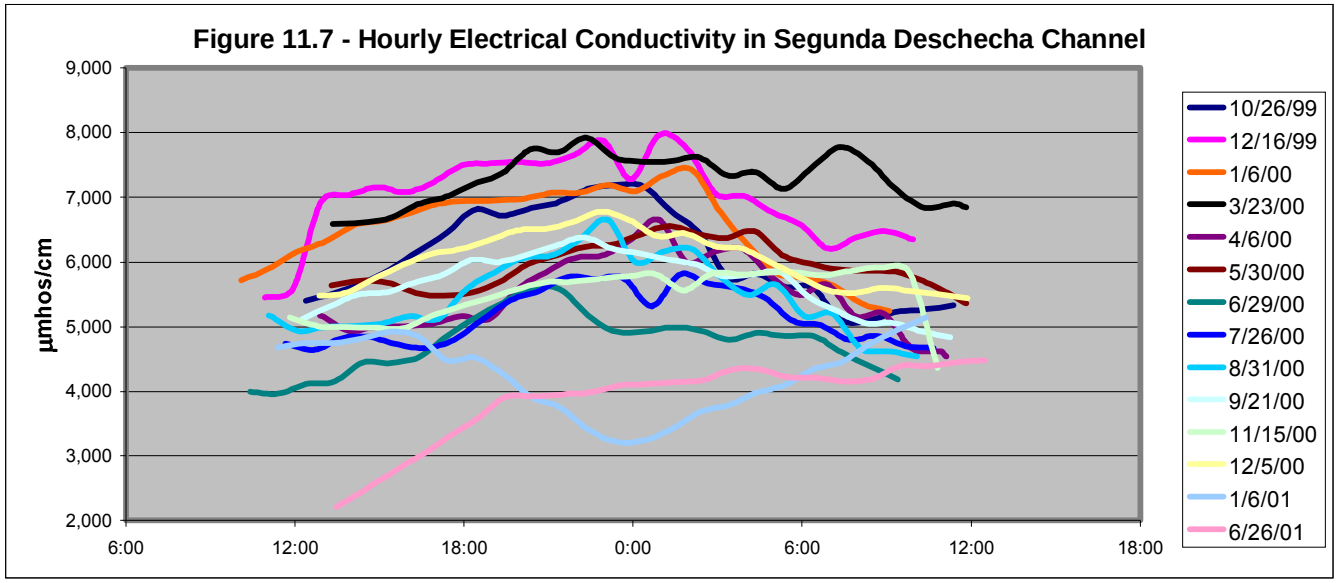
Figure 11.7 - Hourly Electrical Conductivity in Segunda Deschecha Channel
µmhos/cm
9,000
8,000
7,000
6,000
5,000
4,000
3,000
2,000
6:00
12:00
18:00
0:00
6:00
12:00
18:00
10/26/99
12/16/99
1/6/00
3/23/00
4/6/00
5/30/00
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12/5/00
1/6/01
6/26/01

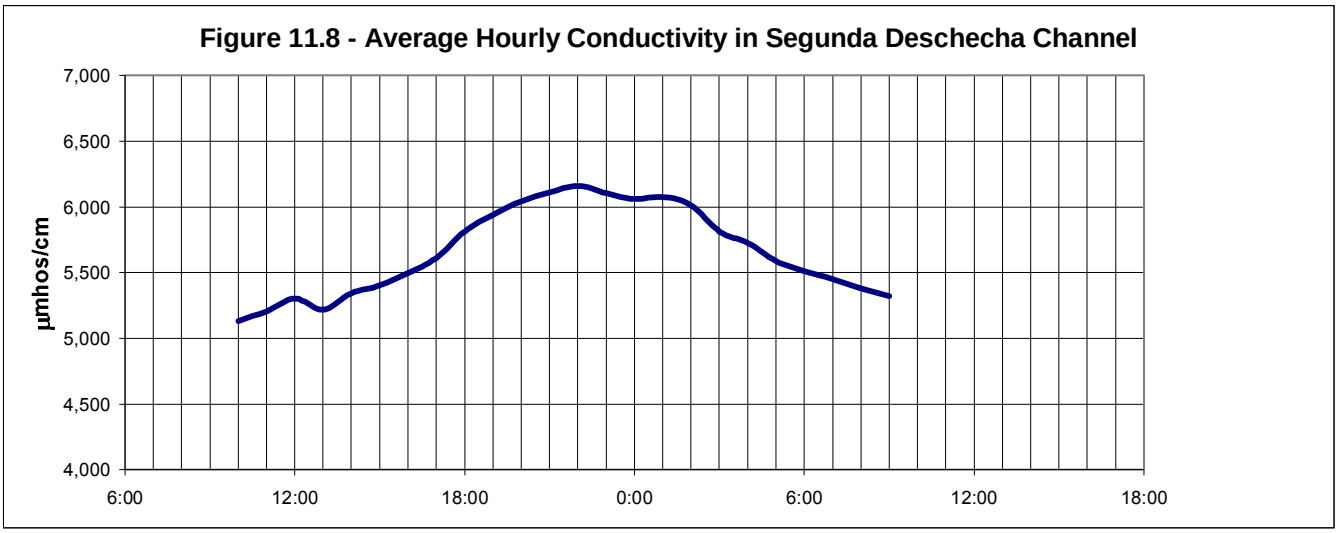
Figure 11.8 - Average Hourly Conductivity in Segunda Deschecha Channel
µmhos/cm
7,000
6,500
6,000
5,500
5,000
4,500
4,000
6:00
12:00
18:00
0:00
6:00
12:00
18:00

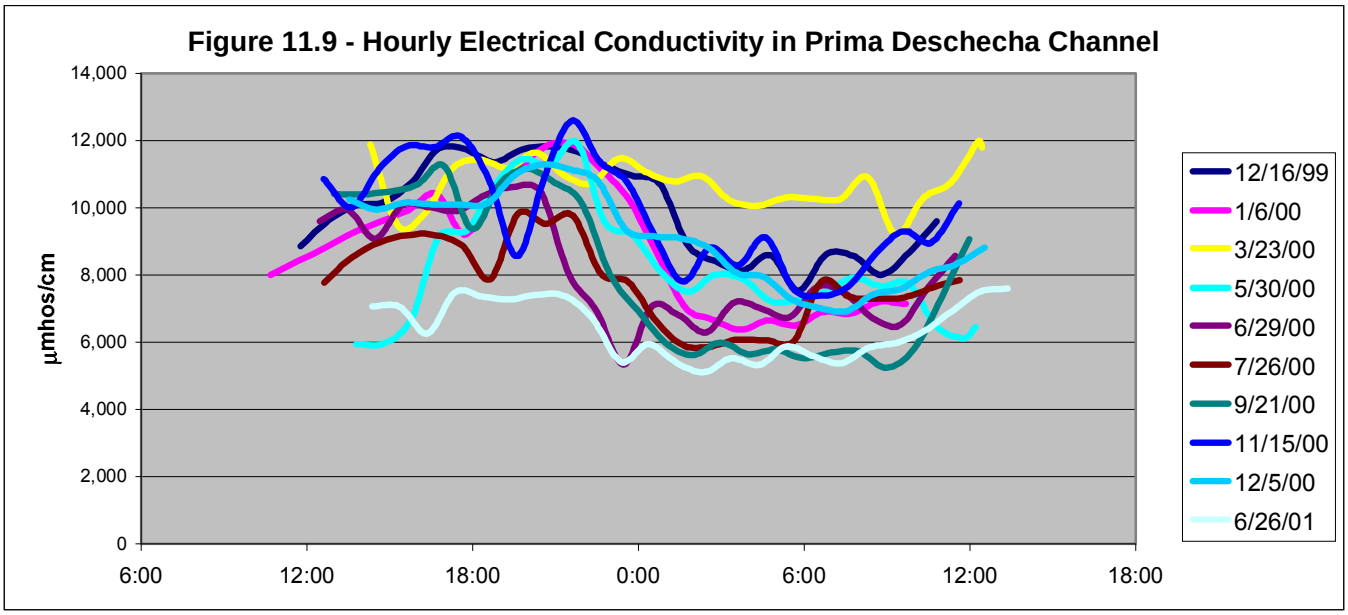
Figure 11.9 - Hourly Electrical Conductivity in Prima Deschecha Channel
µmhos/cm
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
6:00
12:00
18:00
0:00
6:00
12:00
18:00
12/16/99
1/6/00
3/23/00
5/30/00
6/29/00
7/26/00
9/21/00
11/15/00
12/5/00
6/26/01

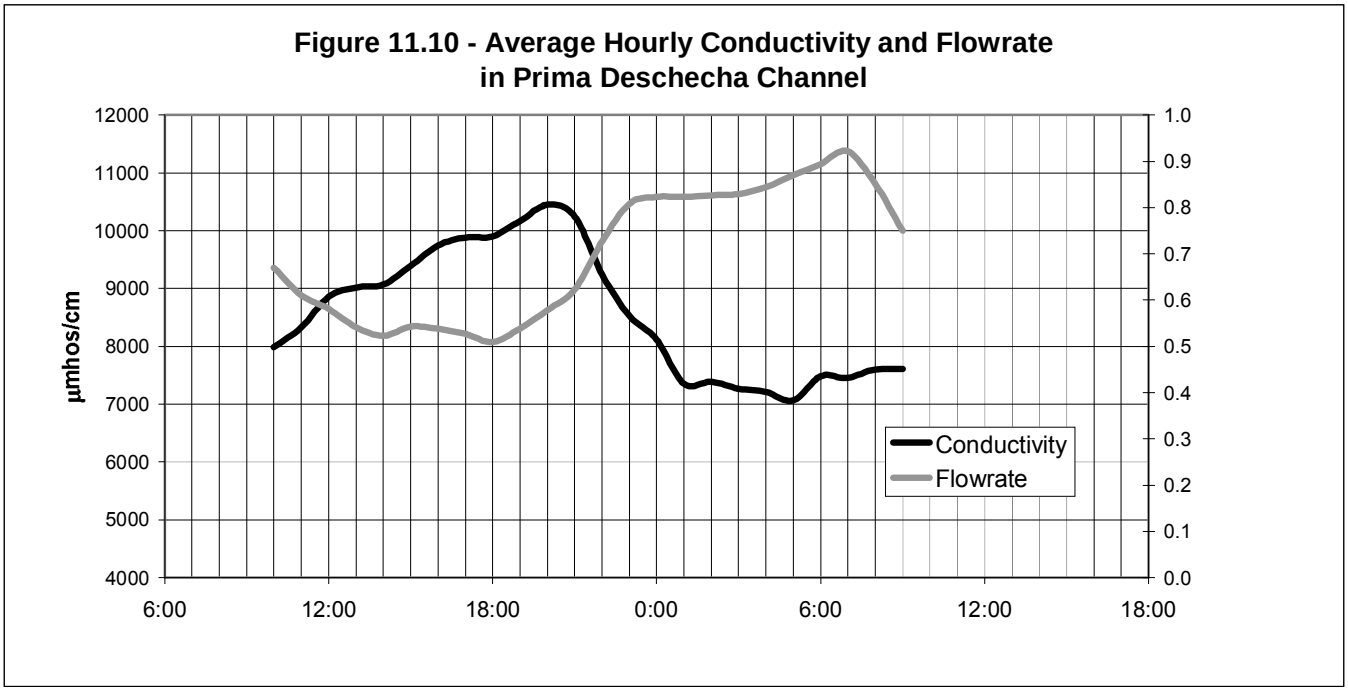
Figure 11.10 - Average Hourly Conductivity and Flowrate
in Prima Deschecha Channel
µmhos/cm
12000
11000
10000
9000
8000
7000
6000
5000
4000
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
6:00
12:00
18:00
0:00
6:00
12:00
18:00
Conductivity
Flowrate

Figure 11.11
TSS and Total Recoverable Metals in Stormwater
at Bonita Canyon Channel

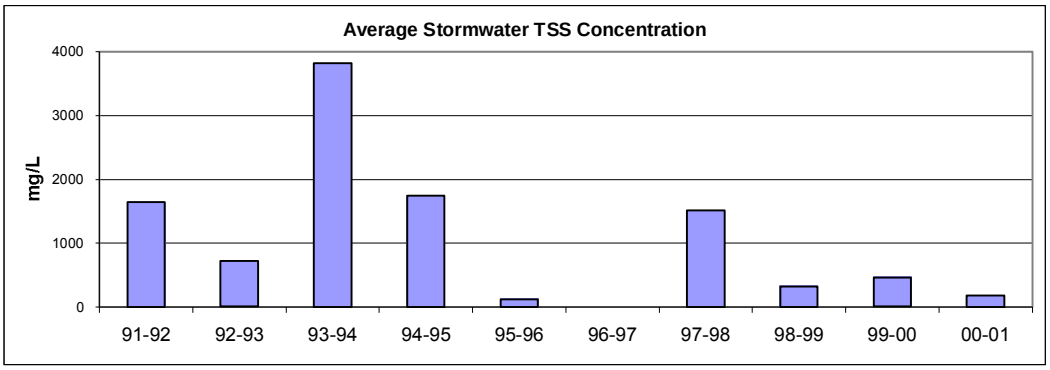

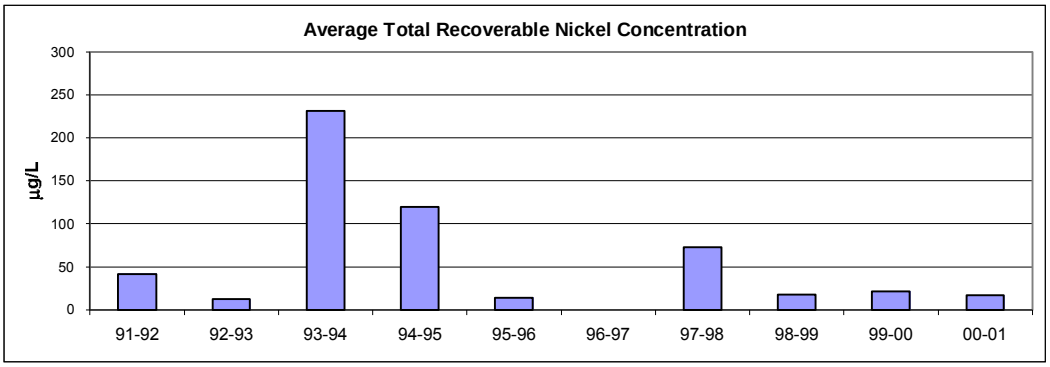

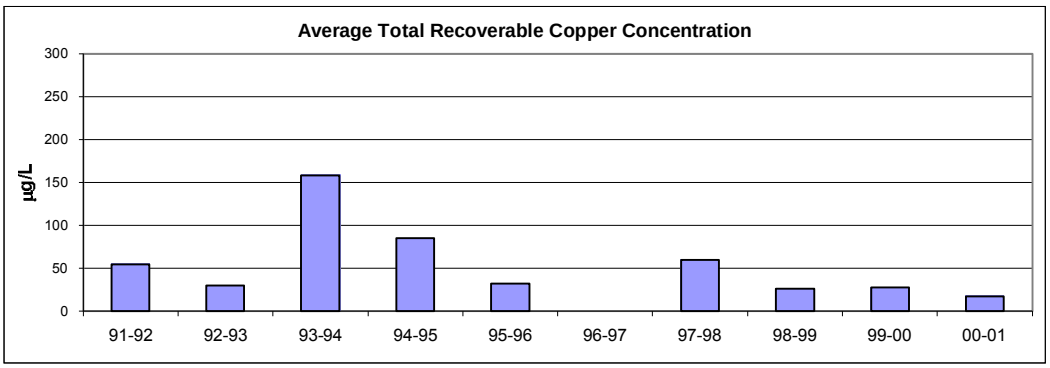

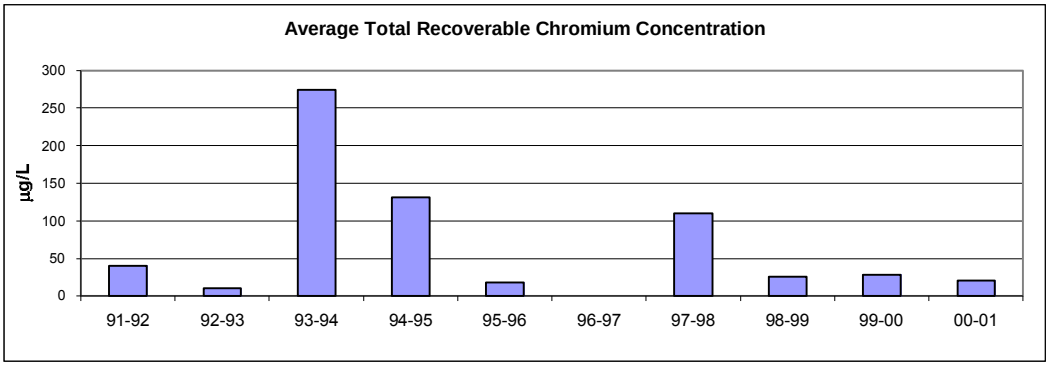

No samples collected in 1996/97 season

Figure 11.12

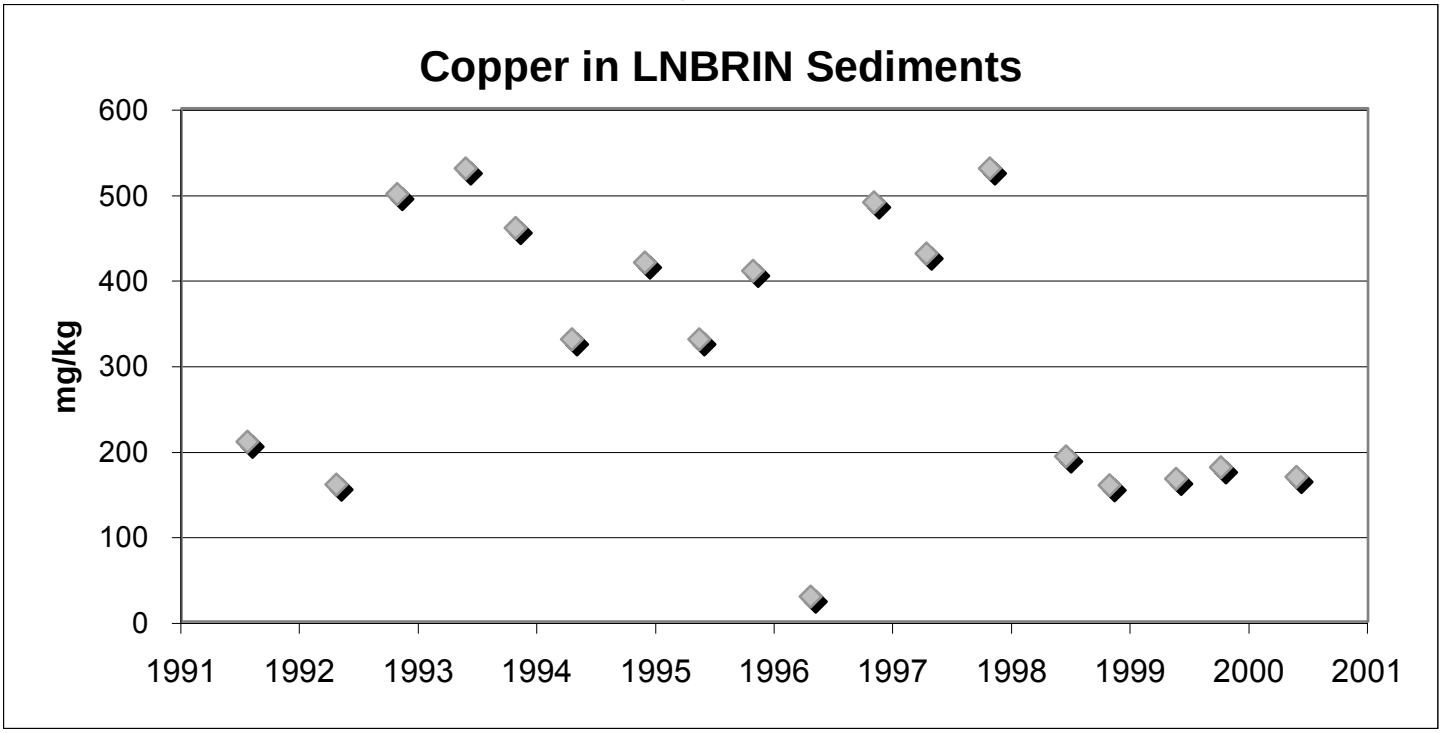
Copper in LNBRIN Sediments
mg/kg
600
500
400
300
200
100
0
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001

Figure 11.13
DDD and DDT in Sediments of Agua Chinon and Hicks Canyon Channels

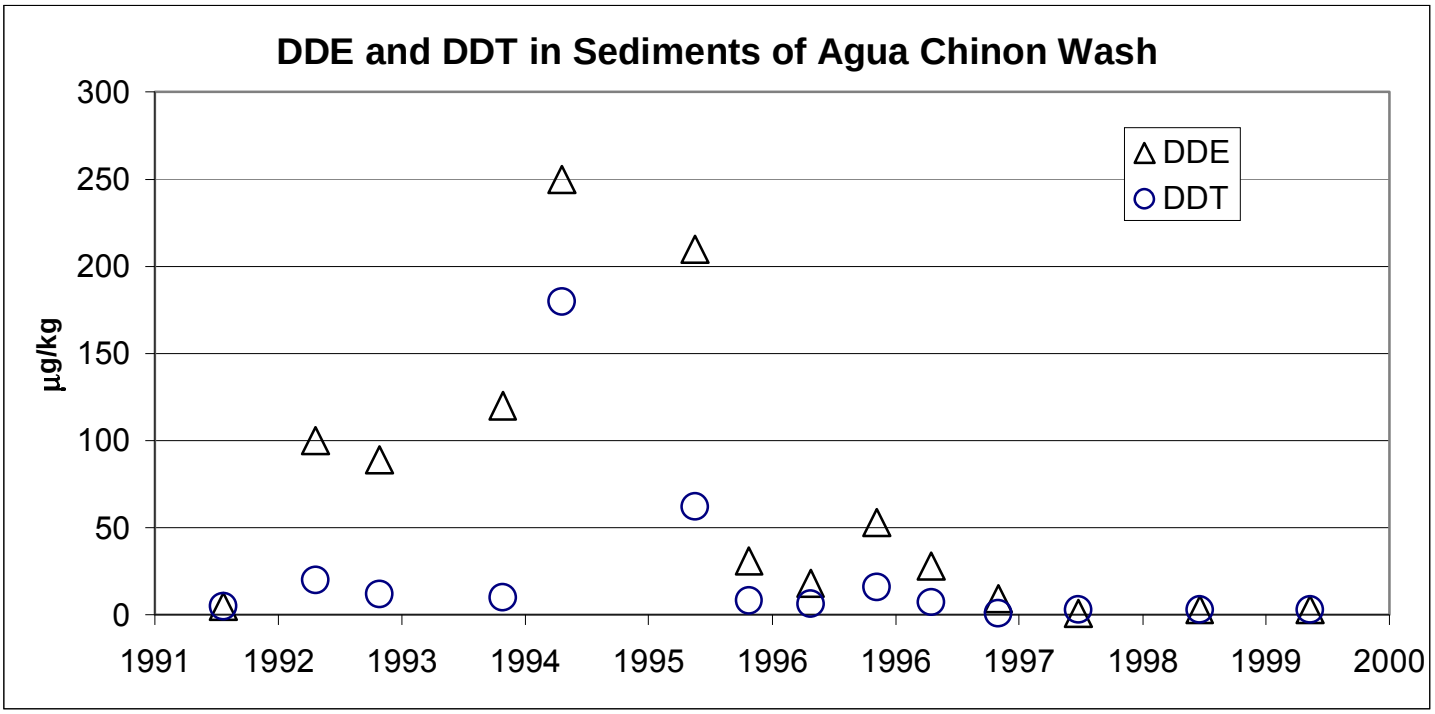

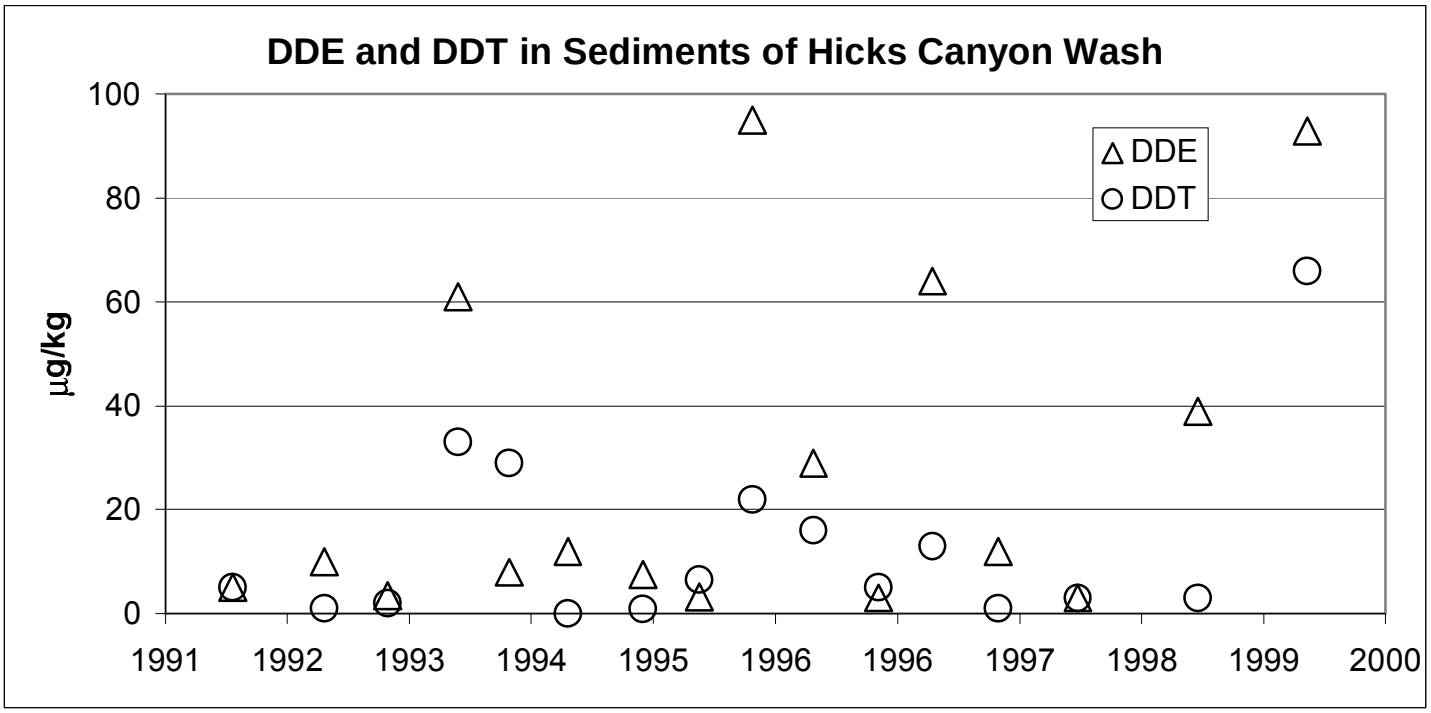

Figure 11.14
Fecal Coliform Concentration in Costa Mesa Channel

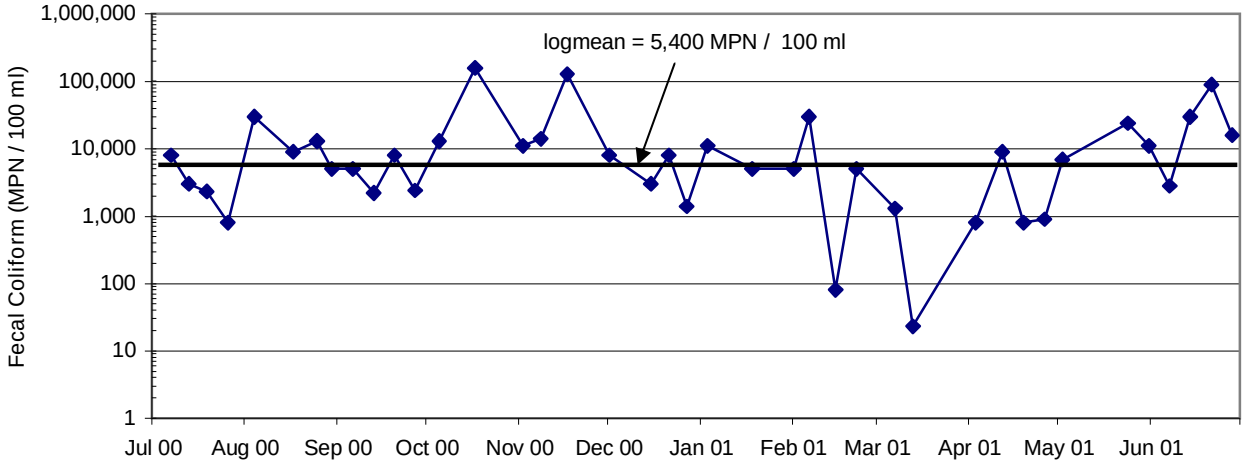

Figure 11.15
Diazinon Concentration in Costa Mesa Channel

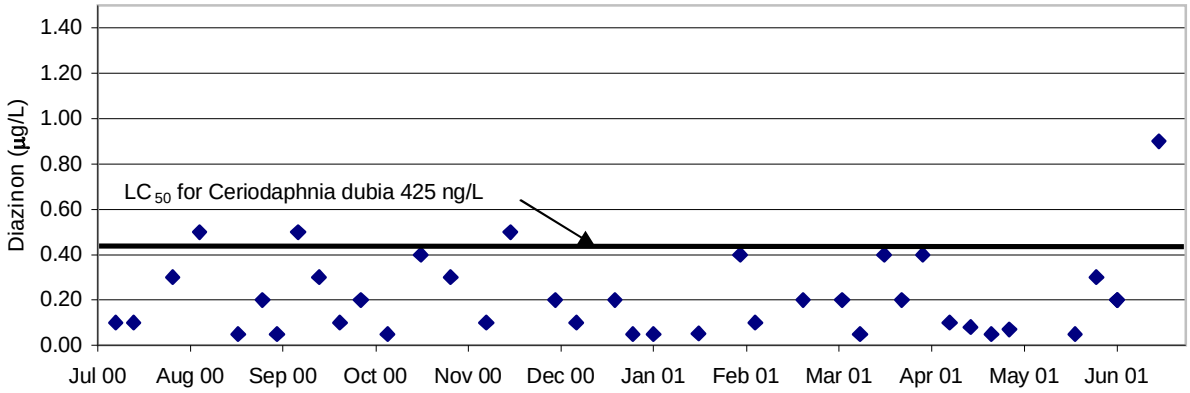

Figure 11.16
Bacteriological Sampling in Upper Newport Bay
Storm of 1/11/01 - 1/15/01

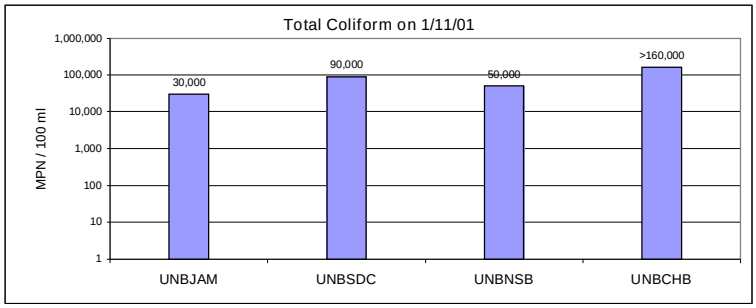

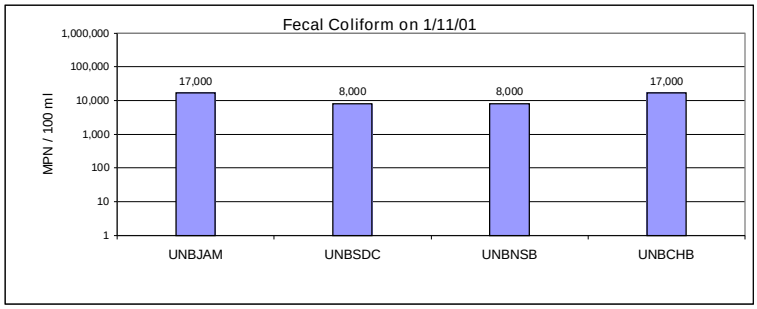

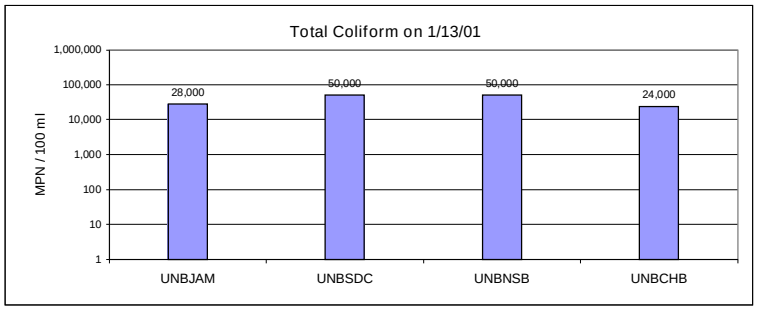

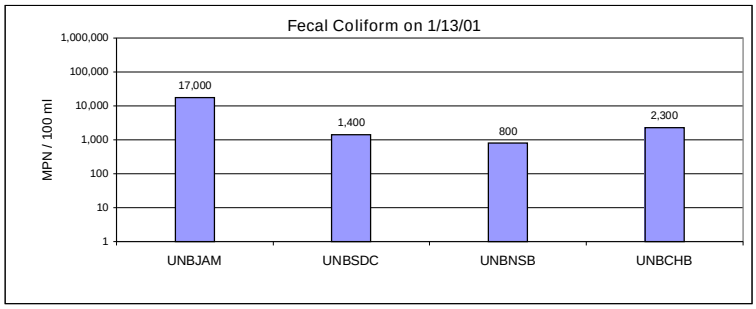

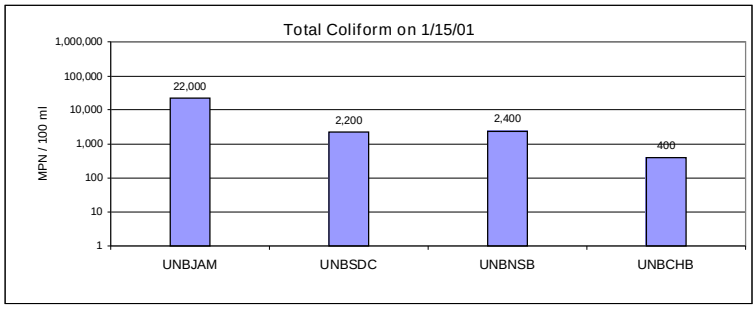

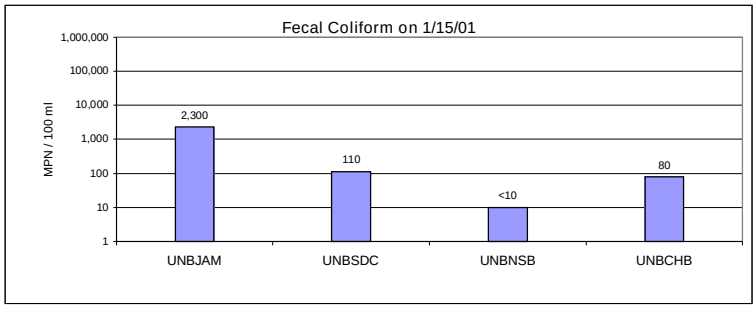

Sampled at surface

Figure 11.17
Bacteriological Sampling in Upper Newport Bay
Storm of 3/6/01 - 3/10/01

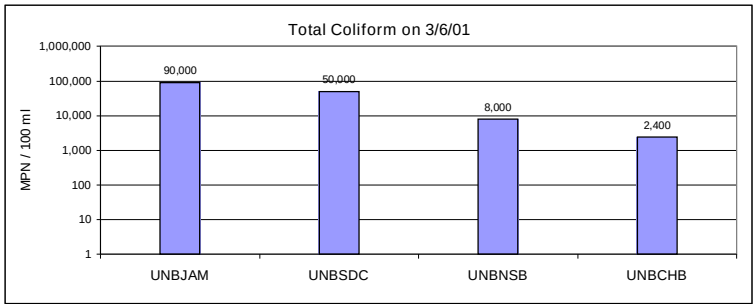

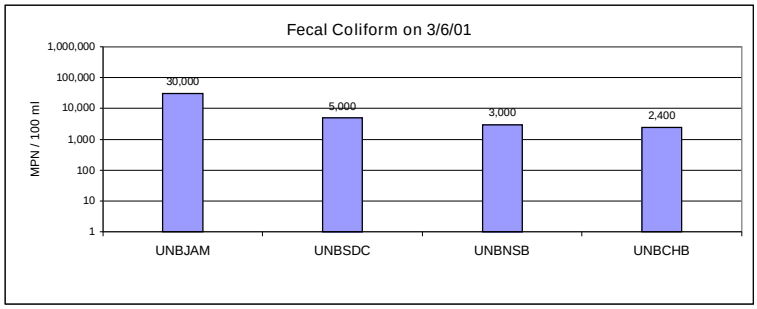

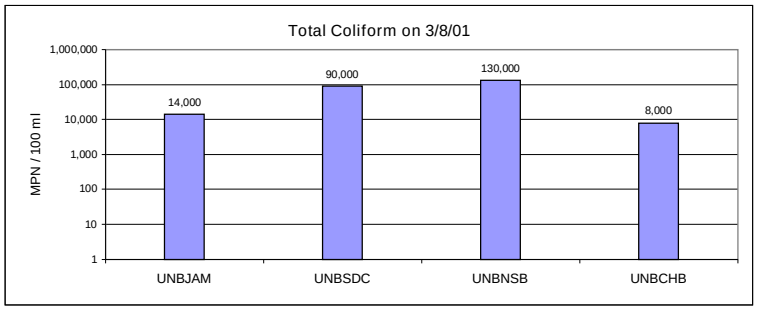

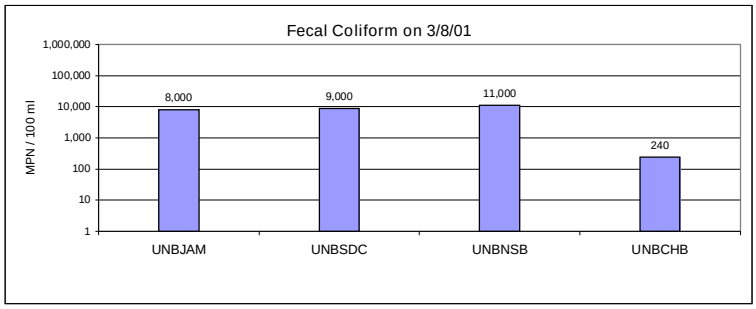

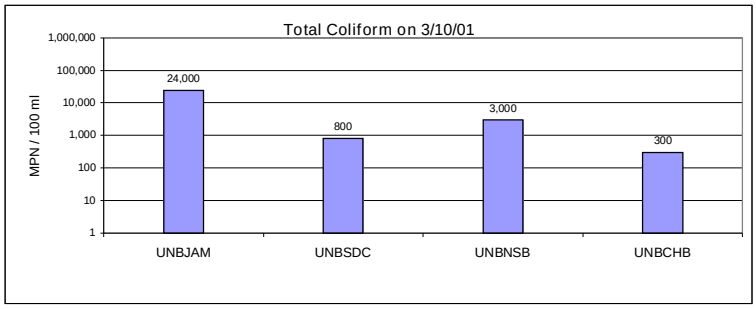

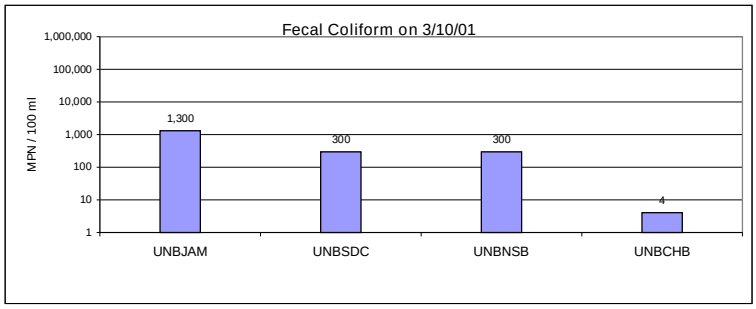

Sampled at surface

Figure 11.18
Dry Weather Bacteriological Concentrations in Upper Newport Bay

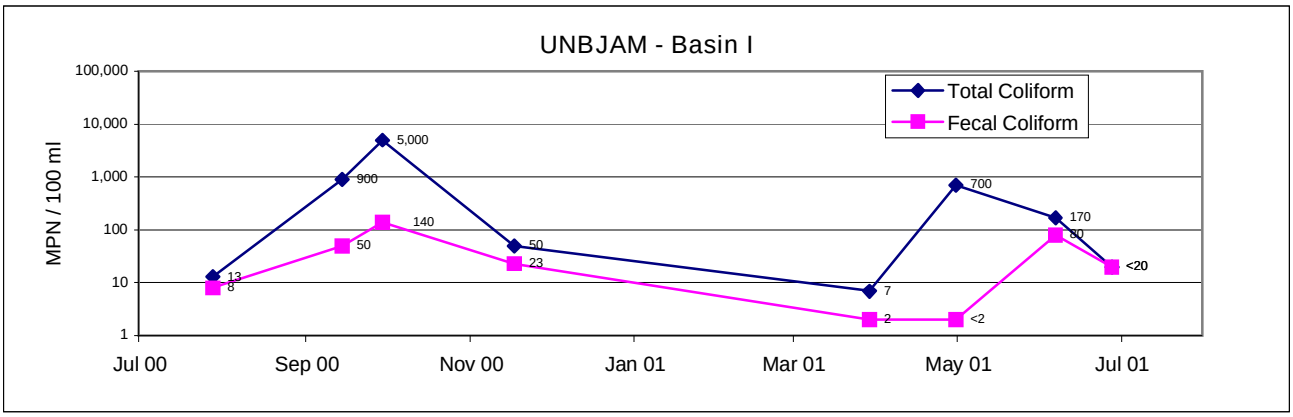

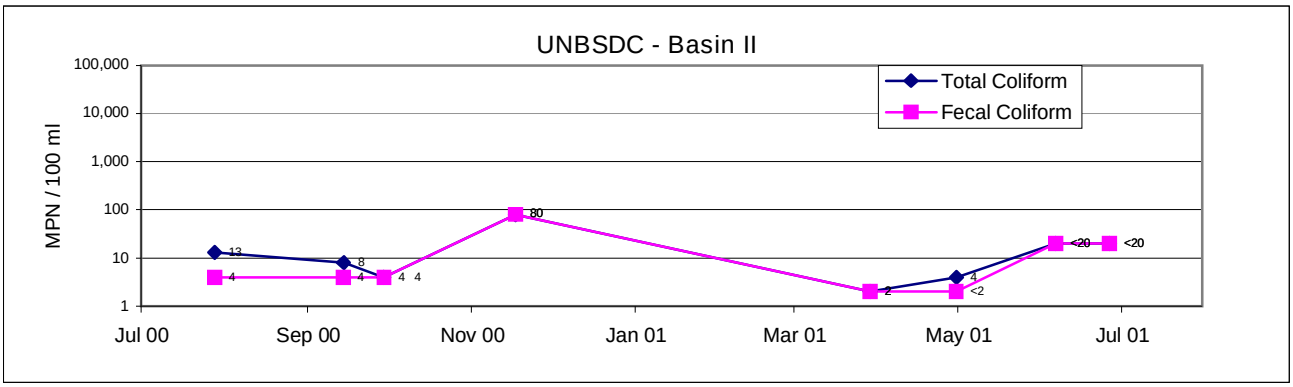

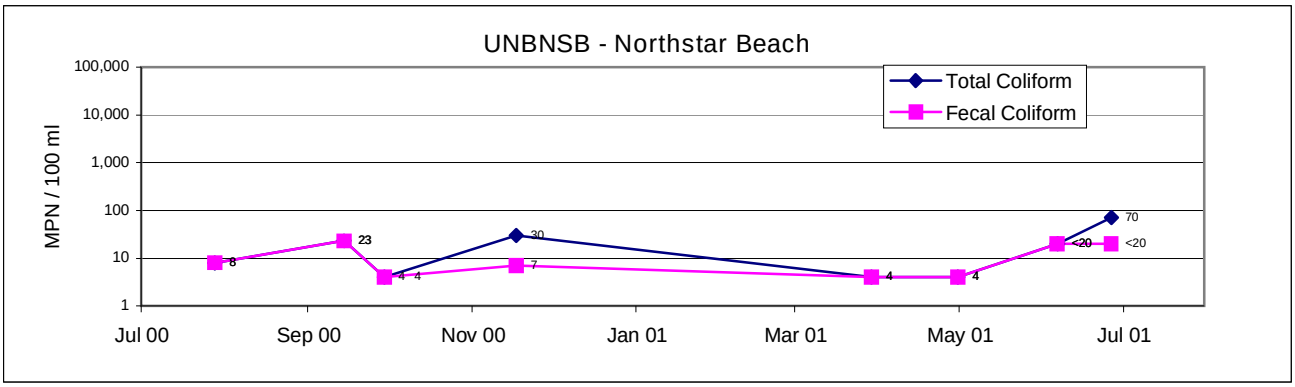

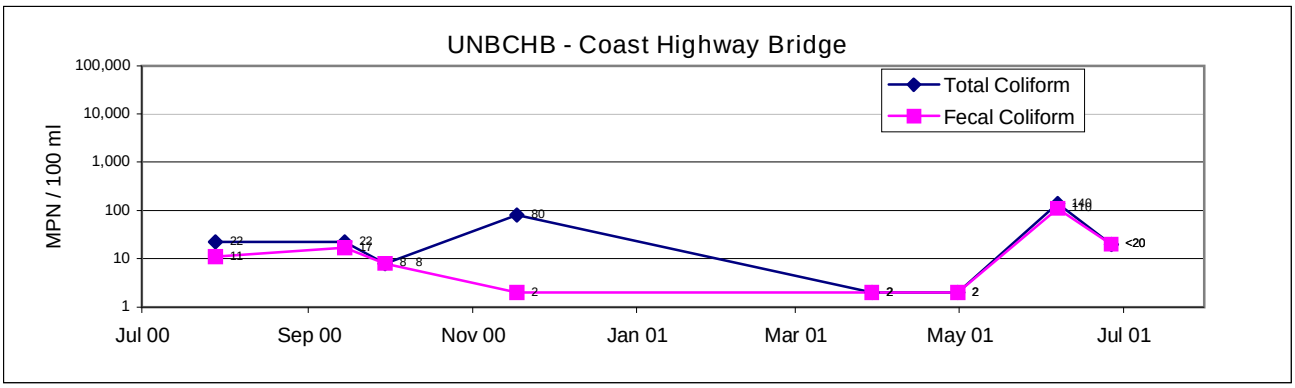

Sampled at surface

12.0 NEWPORT BAY WATERSHED

12.1 Introduction

The Newport Bay Watershed (**Figure 12.1**) has been the focus of local efforts to improve water quality and restore Bay habitat since the late 1970's. Early efforts were initiated under the planning authority of CWA Section 208 to reduce the impacts of excessive sediment on the Bay through the development and implementation of areawide plans.

Other water quality problems were subsequently identified including an over-abundance of algae attributable to excess nutrients from San Diego Creek (**Figure 12.2**), sanitary quality associated with contact recreation and shellfish harvesting, aquatic life toxicity to organisms and excessive bioaccumulation of toxic substances in fish tissues. Based on these identified problems, the Santa Ana Board listed Newport Bay and portions of San Diego Creek as impaired on the CWA 303(d) list.

The Newport Watershed Permittees (comprising all or portions of the County of Orange, the Orange County Flood Control District and the cities of Costa Mesa, Irvine, Laguna Hills, Laguna Woods, Lake Forest, Newport Beach, Orange, Santa Ana and Tustin) have, to different degrees, participated since the late 1970's in cooperative actions with other agency stakeholders and the principal landowner to study and implement solutions to the problems in Newport Bay. A watershed Executive Committee was formed in the mid 1980's comprising representatives from the Newport Watershed Permittees and other stakeholders in order to focus the watershed decision making. This Committee initially had responsibility for sediment control issues and has subsequently broadened its membership and focus to include other water quality and watershed restoration issues.

The commitment of the Executive Committee to solving problems in the Newport Bay watershed lead to the initiation in the late 1990's of planning level reconnaissance and feasibility studies in both the Bay and watershed with the Corps of Engineers. These studies have shown a federal interest in restoring the Bay and watershed and are expected to result in multiple projects over the third permit term that will result in improved habitat and water quality.

Complementary studies have also been undertaken with funding from the California Coastal Conservancy, State Water Resources Control Board, EPA and the Permittees to further refine the understanding of sediment processes, toxicity sources, nutrient load allocations, and human health risks associated with fecal coliform levels in Newport Bay. These studies, along with others planned, will influence the projects implemented out of the Corps process and represent a significant part of the watershed strategy to address water quality problems and meet Total Maximum Daily Load (TMDL) reduction targets. The TMDL specifies the maximum load of a specified pollutant that can be discharged to San Diego Creek and/or Newport Bay while assuring that water quality objectives for these waters are met.

12.2 Newport Bay/San Diego Creek Watershed TMDLs

The Santa Ana Board has adopted TMDLs for sediment, nutrients and fecal coliform as amendments to its Water Quality Control Plan attributing in each case part of the load allocation to urban areas. Following state ratification of the amendments, the Santa Ana Board issued requests for monitoring and technical reports to the Newport Watershed Permittees pursuant to its authority under Section 13267 of the State Water Code. In the case of the nutrient TMDL the Santa Ana Board cited the terms of the NPDES Stormwater Permit as the basis of enforcement of the request.

12.2.1 Urban Nutrient TMDL

Background

During 1998/99 the Regional Water Quality Control Board, Santa Ana Region amended the Basin Plan to establish a TMDL for nutrient discharges in the Newport Bay/San Diego Creek Watershed. The nutrient TMDL establishes targets for reducing the annual loading of nitrogen and phosphorus to Newport Bay by 50% and meeting the numeric and narrative water quality objectives by 2012. To achieve these targets, the TMDL establishes a number of interim targets requiring a 30% and 50% reduction in nutrients in summer flows by 2002 and 2007, respectively, and a 50% reduction in non-storm winter flows by 2012.

The nutrient TMDL identifies five principal sources of nutrients that are assigned waste load and load allocations:

- Nurseries
- Silverado Constructors ETC
- Urban runoff
- Agricultural discharges
- Undefined sources

Compliance Studies

In response to the 13267 letter from the Regional Board, the "Newport Bay Watershed Urban Nutrient TMDL Technical Report" was prepared and submitted in September 1999 in order to provide:

- An analysis of whether the DAMP should be revised to prevent continuing or recurring beneficial use impairments and exceedances of water quality objectives related to urban nutrients, and if a revision is recommended, a workplan and schedule to revise the DAMP;

- A plan and schedule for achieving the short and long term nutrient load reduction targets; and

- A plan and schedule for evaluating the effectiveness of urban runoff nutrient control actions implemented in the Newport Bay Watershed.

The report included an analysis of the DAMP and a workplan for addressing the remaining elements of the request. Although the watershed permittees believe that the programs within the DAMP are achieving their intended goal of reducing pollutants in the Newport Watershed, it was recognized that further investigations needed to be completed in some BMP areas that could potentially result in further enhancement of nutrient reductions.

In addition, in order to evaluate compliance with the nutrient load allocation and evaluate the potential and actual effectiveness of control actions, it was proposed that several model watersheds be established and monitored. One such area, the East Costa Mesa Channel watershed, was established with monitoring commencing in 1998/99.

The Newport Watershed Permittees have evaluated compliance with the TMDL targets (Newport Bay Watershed Urban TMDL Compliance Evaluation, Tetra Tech, July 2000). The report indicated significant compliance with the 2002 targets and slight nutrient loads in excess of the future targets. It concluded that current programs are working and that further minor program revisions will achieve all TMDL targets.

Monitoring Studies

The findings of the compliance studies are further supported by nutrient loading studies that were conducted by the Principal Permittee in September 1999, June 2000, and May 2001 (**Appendix R**). These studies demonstrate compliance with the December 2002 target based on extrapolation of the data collected to date (see also Section 11).

In February 2000, the Principal Permittee on behalf of the Watershed permittees, initiated the Regional Nutrient Monitoring Program (RMP) for the Newport Bay and its watershed pursuant to the requirements established by the Santa Ana Regional Board (Resolution 99-77 to establish an RMP pursuant to the TMDL) (**Appendix R**).

The RMP is a coordinated program among the stakeholders designed to assess the attainment of the nutrient TMDL goals. The objectives of the monitoring program are to quantify three measures of nutrient TMDL progress: 1) the seasonal nutrient loading from the watershed; 2) the nutrient concentration in San Diego Creek, Reaches 1 and 2; and 3) the extent, magnitude, and duration of algal blooms in San Diego Creek and Newport Bay. The RMP monitoring is conducted according to the outline presented in the Regional Water Quality Control Board Staff Report for Resolution 99-77.

Under the RMP, monitoring was conducted at nine sites in the Upper Newport Bay watershed and five sites in the Newport Bay. Automatic samplers were used to collect composite samples at eight of the nine watershed sites. The site at Agua Chinon was grab sampled because shifting bed material and low channel discharge rates hampered automatic sampling. The five locations in the Newport Bay were grab sampled. Subsurface samples were collected using an ISCO peristaltic pump, tygon tubing and a weighted sample strainer. The RMP also requires the quantification of algal biomass and species composition within the Bay to evaluate receiving water impacts of nutrient loading.

The results of the RMP are presented in **Appendix T**.

12.2.2 Urban Sediment TMDL

Upper Newport Bay consists of approximately 752 acres of marine and terrestrial habitat that is managed by the California Department of Fish and Game. The San Diego Creek is the primary tributary to Upper Newport Bay and has a watershed area of about 118 sq. mi. consisting of natural foothills, agricultural and the urbanized communities of Irvine, Lake Forest, Newport Beach, Tustin, and unincorporated Orange County. Storm runoff from these areas discharges into the Bay. Over the years as a result of sediment transport in San Diego Creek and its tributaries, the Upper Bay began to fill with sediment.

Under Section 208 of the 1972 Federal Clean Water Act , a comprehensive plan was developed to address the erosion and siltation issues. The 1983 plan known as the "San Diego Creek Comprehensive Stormwater Sedimentation Control Plan" consisted of several elements:

-The development of Agricultural Best Mangement Practices to reduce sediment erosion from agricultural lands,

-The development of Construction Best Management Practices to control sediment from construction sites,

-The construction of three in-channel basins in the lower end of San Diego Creek to capture coarser sediment before they enter the Bay,

-In-bay basins located in the Upper Newport Bay to capture fine particles,

-Foothill basins to contain sediments produced by erosion in the foothills,

-Channel stabilization to reduce the erosion of earthen channels and,

-A sediment monitoring program to evaluate the performance of the Plan and determine the annual sediment load entering the Upper Bay from San Diego Creek.

In response to Section 303(d) of the Clean Water Act, the State of California approved the TMDL allocation for sediment in the Newport Bay Watershed in March 1999. The objectives of the TMDL are to reduce the annual average sediment load in the San Diego Creek watershed from a total of 250,000 tons per year to 125,000 tons per year, thereby reducing the sediment load to Newport Bay to 62,500 tons per year within 10 years (a 50% reduction), and to lower the frequency of dredging within the Bay.

On November 19, 1999, the Santa Ana Board subsequently adopted Monitoring and Reporting Program No. 99-74 which requires monitoring and reporting in accordance with the requirements of the sediment TMDL.

To implement the sediment TMDL, a Cooperative Agreement entitled "Newport Bay/San Diego Creek Watershed Sediment Control Monitoring and In-Channel Maintenance Program" was executed on April 20, 1999. The Agreement between the County of Orange, The Irvine Company and the cities of Newport Beach, Irvine, Tustin and Lake Forest, provides a funding base for the implementing the various components of the sediment TMDL and in-channel basin maintenance programs.

To comply with the sediment TMDL, an annual report has to be submitted to the Santa Ana Board by November 15 of each year verifying that the basins have at least 50% capacity and an annual compilation of sediment monitoring data and TMDL compliance analysis is required by December 31 of each year. These submittals were made separately during the reporting period and are not included in this report.

12.2.3 Urban Fecal Coliform TMDL

The fecal coliform TMDL establishes a long-term, prioritized, phased approach of meeting recreational contact and shellfish harvesting standards in Newport Bay. The Newport Watershed Permittees are currently supporting studies, modeling and monitoring in the Bay with other stakeholders that are expected to result in the development of an implementation plan. No urban area control programs are anticipated until the completion of the current study period although increased public and business education may be implemented. The TMDL may be adjusted, as appropriate, based upon completion of specified studies.

To date, work has been carried out in a collaborative manner by the Newport Watershed Permittees with technical support from the Irvine Ranch Water District and their consultants, Eisenberg, Olivieri, and Associates (EOA) and Resource Management Associates (RMA). During the reporting period, work continued on the study by EOA with the following objectives:

- To characterize the existing relative risk to public health posed by exposure to pathogens derived from human sources via recreational contact in Newport Bay;

- To provide estimates of the relative risk associated with alternative levels of exposure and/or water quality (due to structural or programmatic changes) and compare those results with the results representing existing conditions; and

- To integrate the results of the health risk assessment with the potential costs associated with implementing control alternatives that may lead to water quality improvements and reductions in public health risk.

The expected completion date for this analysis is December 2001. The next phase in the TMDL process is to assess shellfish harvesting as an existing and potential beneficial use with the following objectives:

- To identify historic areas of bivalve mollusk shellfishing in Newport Bay and to document the degree of the beneficial use;

- To establish the existing level of the shellfishing resource in Newport Bay;
- To characterize current levels of shellfish collection (for consumption and bait) as a beneficial use in Newport Bay;
- To investigate impediments to, and the possibility of enhancing, the potential for increased levels of shellfish collection in Newport Bay; and
- To document the results of the investigation in a manner that will be useful to the Santa Ana Board for decision-making purposes.

12.2.4 Urban Toxicity TMDL

The toxicity TMDL for the watershed is currently being developed and will address a variety of toxicity and bioaccumulation problems resulting from current and past practices. The Newport Watershed Permittees are currently supporting studies and monitoring in the watershed with other stakeholders that are expected to result in the development of an appropriate TMDL. No urban area control programs are anticipated until the completion of the current period of TMDL development although early public and business education has been implemented with the printing of a brochure on appropriate pesticide usage.

Upper Newport Bay Watershed Toxicity Studies

In November 1998, the Principal Permittee together with its grant submittal partner, the Transportation Corridor Agencies, received a 319(h) implementation grant to identify sources of toxicity in San Diego Creek and Upper Newport Bay. Studies were conducted from 1998-2000 and a final report entitled *Upper Newport Bay Water Quality Enhancement Project* was completed in May 2001. As part of the study, forensic evaluation monitoring was conducted to identify sources of toxicity and bioaccumulatable chemicals at 10 locations that were selected to obtain stormwater runoff from several limited land use activities (residential, agriculture, open space and commercial nurseries) in the watershed upstream of the sampling locations. Stormwater runoff from all of the sampled watersheds showed high levels of aquatic life toxicity.

Based on the results of this study and the previously conducted Upper Newport Bay/San Diego Creek Watershed 205(j) Water Quality Planning Grant project, it is evident that in order to properly regulate aquatic life toxicity in urban and agricultural stormwater runoff, there is a need to determine what the stormwater runoff-associated toxicity means to the impairment of the beneficial uses of fresh and marine waterbodies. This will require detailed multi-year projects examining how organism assemblages are impacted by toxic pulses of pesticides.

Prior sampling of stormwater runoff showed that certain heavy metals, such as copper, found in tributaries of Upper Newport Bay were above water quality objectives. This led to a comprehensive sampling (ten stations) of Upper Newport Bay tributaries during the February 12 and 21, 2000, stormwater runoff events and the May 31, 2000, dry weather flow sampling. The samples were analyzed for selected heavy metals. The Upper Newport Bay tributary

concentrations of copper, zinc, lead, nickel, arsenic, mercury and silver were all below the California Toxics Rule (CTR) criteria for aquatic life toxicity in all samples.

The concentrations of selenium found in watershed tributaries of Upper Newport Bay exceeded the CTR criteria of 5 µg/L total selenium during stormwater runoff and dry weather flow. As a result, there is a potential for selenium to be causing water quality problems in fish and waterfowl associated with Upper Newport Bay tributaries. At this time, there is no information on the concentrations of selenium in Upper Newport Bay. Studies are needed to determine whether the concentrations within Bay waters and sediments are sufficient and in appropriate chemical forms (i.e., bioavailable) to be adverse to fish and other aquatic life, including waterfowl, associated with Upper Newport Bay.

Most of the arsenic concentrations found in the Upper Newport Bay tributaries were below the recently adopted (now rescinded) US EPA drinking water maximum contaminant level (MCL) of 10 µg/L (it should be noted that the Upper Newport Bay tributaries are not designated for water supply use). They were also below the concentrations of arsenic that could be toxic to aquatic life. However, the concentrations of arsenic found in Upper Newport Bay tributaries consistently exceeded the human health criteria for Water Plus Organisms (0.018 µg/L) and Organisms Only (0.14 µg/L).

A more comprehensive study of the potential for excessive bioaccumulation of arsenic in edible aquatic life taken from Upper Newport Bay tributaries and the Bay would need to be conducted to determine if edible tissues represent a threat to human health for those who consume the organisms as food. Studies of this type could be the first phase of the TMDL that is to be developed to control arsenic in Upper Newport Bay tributaries and within the Bay.

Copper concentrations in the Upper Newport Bay tributaries for the February 12 and 21, and May 31 sampling dates were below the National Recommended Water Quality Criteria (April 1999) at all sites except Site 9 in the East Costa Mesa Channel. The water quality significance of copper discharged to Upper Newport Bay from its tributaries is an area that needs attention. The OCPFRD (1999) and Santa Ana Board (2000) sampling of Upper Newport Bay waters has shown that, at times, the copper present in these waters exceeds the CTR criterion for marine waters.

There is need to evaluate whether these exceedances reflect an adverse impact to aquatic life, especially since marine waters such as those of Upper Newport Bay contain substantial concentrations of constituents (organics) which detoxify copper.

Pesticide Study With Department of Pesticide Regulation

The Permittees are currently working with the California Department of Pesticide Regulation to develop a pesticide study element of an intensive residential water use and runoff investigation in selected neighborhoods within the City of Irvine. This program is anticipated to be initiated in early 2001.

12.3 Additional Watershed Efforts

A number of additional watershed efforts and enhancement projects are being undertaken to improve or rehabilitate water quality or habitat within the watershed.

12.3.1 Newport Bay/San Diego Creek Watershed Study

The Army Corps of Engineers is conducting a study to develop a comprehensive framework to improve the health of the Newport Bay and San Diego Creek watershed. The process takes advantage of an alliance of 14 regulatory, resource management and elected officials working to address the protection and enhancement of watershed habitats, flood protection, water quality improvements, and reduction of erosion and sedimentation.

The draft Baseline Conditions Report (F-3 Milestone) for the Newport Bay/San Diego Creek Watershed Management Study has been prepared. The report summarizes the findings, results and data collected for the baseline (existing) conditions pertaining to hydrology, hydraulics, sedimentation, groundwater, geology, soils, economics, and the environmental setting. The Baseline Conditions Report is the first report in a series of deliverables for the Newport Bay/San Diego Creek Watershed Management Study, leading to a Final Feasibility Report and a Watershed Management Plan.

12.3.2 Newport Bay Eco-system Restoration Project

A Feasibility Study and accompanying EIR/EIS have been completed for Upper Newport Bay that describe the interdisciplinary planning and public involvement process that was used to identify the problems and opportunities; analyze baseline conditions; formulate, evaluate and compare alternative plans; further refine and delineate the most feasible alternatives; and finally, select a recommended plan.

Hydrodynamic and sediment transport models and the Orange County Geographical Information System (GIS) database were used to predict habitat changes within Upper Newport Bay for the future without project conditions and alternative conditions.

A modified Habitat Evaluation Procedure was used to compare habitat and species value of existing conditions, future without project conditions and alternative conditions. Several combinations of sediment basins were studied using numerical models, average storm inflows and varying storm inflows to compare the performance of six alternative designs. These alternatives were developed in coordination with the Habitat Evaluation Group (HEG) which included representatives from the resources agencies, Corps of Engineers, the County, cities and interested citizens. The study objective established by the HEG was to minimize the loss of any habitat type to a 10% change from existing conditions, and a no net loss of salt marsh habitat. Also the Environmental Protection Agency and the Santa Ana Board established sediment TMDL criteria that played an important role in the design of the sediment basins; especially, in designing the basins so that a less frequent maintenance interval of approximately every twenty years could be achieved. Thus, the overall goal of the project is to control the deposition of sediment in the Ecological Reserve while maintaining a balance of open water, mudflat and marsh areas.

Detailed analyses showed that Alternative 6 provided the most average annual benefits to species

and habitats in the ecological reserve, best met the study objectives and goals, had the lowest average annual cost per habitat unit and thus was selected as the recommended plan and the locally preferred plan. This alternative includes expanding and deepening the two In-Bay Basins, and relocating a tern island from the upper basin (Unit I/III) to the lower basin (Unit II). Restoration measures include wetlands creation along Northstar Beach, Shellmaker Island and a section of the northwestern edge of the upper basin. Side channels would be restored around a least tern island in the upper basin, New Island, Middle Island and Shellmaker Island. The total volume of material to be dredged from the Upper Bay is approximately 2.1 million cubic yards. The dredged material would be disposed of at the EPA designated dumpsite LA-3, located approximately four miles southwest of the Newport Harbor entrance.

The cost apportionment for this ecosystem restoration project require Federal interests to provide 65% of the total costs, and the local sponsors to pay 35% of the total cost which is estimated to be $32,475,000. The Federal share is $21,109,000 and the local share is $11,366,000. The local share is proposed to be paid entirely from a Proposition 12 grant administered by the California Coastal Conservancy.

12.3.3 Upper Newport Bay Water Quality Enhancement Project-Trash and Debris Containment Projects

Two debris/trash containment systems were constructed and installed in the El Modena-Irvine Channel and the Peters Canyon Wash Channel, which are tributary to San Diego Creek, in August 1999. Subsequent to the installation of the new containment systems, a maintenance plan was developed and implemented and 10.8 tons of debris was contained and removed from the date of installation through January 2001.

The debris characterization study to determine the source of the trash and debris flowing into San Diego Creek (from the El Modina-Irvine and Peters Canyon Wash channels) compared to the data collected from the Santa Ana-Delhi and containment systems resulted in the following:

- The amount of organic materials found at El Modena-Irvine (18%) was significantly less than the average (47%) at Santa Ana-Delhi.

- The amount of plastic materials found at El Modena-Irvine (48%) was higher than the average (34%) at Santa Ana-Delhi.

- The composition of rubber materials for El Modena-Irvine (16%) is much higher than the average for Santa Ana-Delhi (4.9%).

Based on the debris characterization study information, the sources of trash and debris flowing into Newport Bay cannot, at this time, be attributed to a specific activity or geographic area. Therefore, a general public education campaign would be the most effective source control program for reducing trash and debris in the watershed. The results of the study and analyses were included in the report entitled "Debris Characterization Study" July 2000 **(Appendix V**).

12.3.4 Reconstruction of Sediment Basin and Weir in Lower San Diego Creek

This Proposition 13 grant project would correct current deficiencies in the trapping efficiency of the sediment basins in the lower San Diego Creek during larger magnitude storm events, resulting in protection of the habitat and navigation uses of Newport Bay and load reductions required by the sediment TMDL. It will also, as a consequence reduce nutrients (especially phosphorus) which are bound to a sediment, contributing to load reductions required by the nutrient TMDL.

Three in-channel sediment basins were constructed in San Diego Creek in the 1980s and 1990s as part of a Section 208 water quality planning effort to address excess sediment loads entering Newport Bay. Subsequently, a sediment TMDL was approved in 1998 establishing sediment load reduction targets for the Creek and Newport Bay over a ten-year period.

In July 2000, in a report entitled "Enhancement Plan for Lower San Diego Creek" the operation of the basins was evaluated and deficiencies were identified in their sediment trapping efficiency during larger storm events. Through the use of a computer simulation model of the hydraulic and sediment transport characteristics of San Diego Creek it was determined that a significant scour potential exists in the basins during the larger magnitude storm events limiting the effectiveness of sediment trapping during the most critical sediment transport periods.

The Plan analyzed alternatives and recommended three changes to modify the existing weir at Jamboree Road: to reduce the low flow notch, modify the invert and basin elevation of the In-Channel Basin 2, and design and construct a drop structure at the upper end of In-Channel basin 2. The project would implement these changes, which, coupled with diligent maintenance, are expected to reduce the annual sediment loading to Newport Bay by approximately 50 percent and assist in achieving related nutrient loading reductions.

12.3.5 Urban Nutrient Source Identification and BMP Evaluation

This Proposition 13 grant project will asses urban nutrient sources in the Newport Bay watershed that are contributing to excess algae growth and oxygen depletion in the Bay and evaluate BMPs that can be implemented to reduce urban nutrient loads required by the adopted nutrient TMDL.

12.3.6 Serrano Creek Stabilization

The project would stabilize Serrano Creek where erosion of up to 25 feet of depth has occurred over the past decade. During the 1997-1998 stormwater event, an estimated 400,000 cubic yards of sediment eroded from the creek banks, washing into the Upper Newport Bay. The project also addresses: the loss of important native vegetation (which has adversely affected the native animal population), poor water quality due to increased volume of urban water runoff, decreased vegetative cover causing higher creek water temperatures and exacerbating algae growth, and eroding banks where the rapidly incising creek has undercut levees and threatened adjacent homes.

In 2000, Dr. Howard Chang conducted fluvial and hydraulic analyses of Serrano Creek from Bake Parkway to Trabuco Road using the FLUVIAL-12 model and evaluated creek stabilization and protection alternatives. An HEC-RAS hydraulic analysis was conducted and a report prepared defining the parameters for design of stabilization/protection work including scour depths, top of protection elevations and flow velocities.

Building upon Dr. Chang's analysis, a concept plan for Serrano Creek between Bake Parkway and Trabuco was developed by the Principal Permittee working very closely with the City of Lake Forest, the Army Corps of Engineers and a local nonprofit organization, the Serrano Creek Conservancy.

The "Serrano Creek Conceptual Plan" (December 2000) identifies stream stabilization work for the Bake Parkway to Trabuco Road reach of Serrano Creek. The 28 elements of work include: rock stabilization structures, rock slope protection, recreating with fill material the area of Serrano Creek Park lost during El Nino storms, bendway weirs and rock vanes, toe extensions of existing gunite and rock stream banks, and creek revegetation with native plant species.

The total cost of this stabilization work is estimated to be $3,542,000. Of the 28 work elements, 20 have the highest priority and are estimated to cost $2,578,300. Existing grant funding of $926,600 is available for these elements. This year, two important grants were received: a Proposition 13 grant of $570,000 and a Southern California Wetlands Recovery grant of $500,000. An additional $581,700 is needed to complete design and construction of the work in this reach.

12.3.7 Newport Bay Eelgrass

This is a cooperative project with the Army Corps of Engineers and the City of Newport Beach to restore eelgrass beds at up to ten locations in Newport Bay as a pilot project to demonstrate that the water quality has improved sufficiently to support restoration. It will also provide for the establishment of mitigation areas for future projects proposed for Newport Bay.

The City, Fish and Wildlife Service, and National Marine Fisheries have not yet been able to agree to the terms of a "Safe Harbor Agreement" that is intended to delineate navigation areas that could be maintained without additional mitigation requirements, if eelgrass is present.

Figure 12.1

Newport Bay Watershed

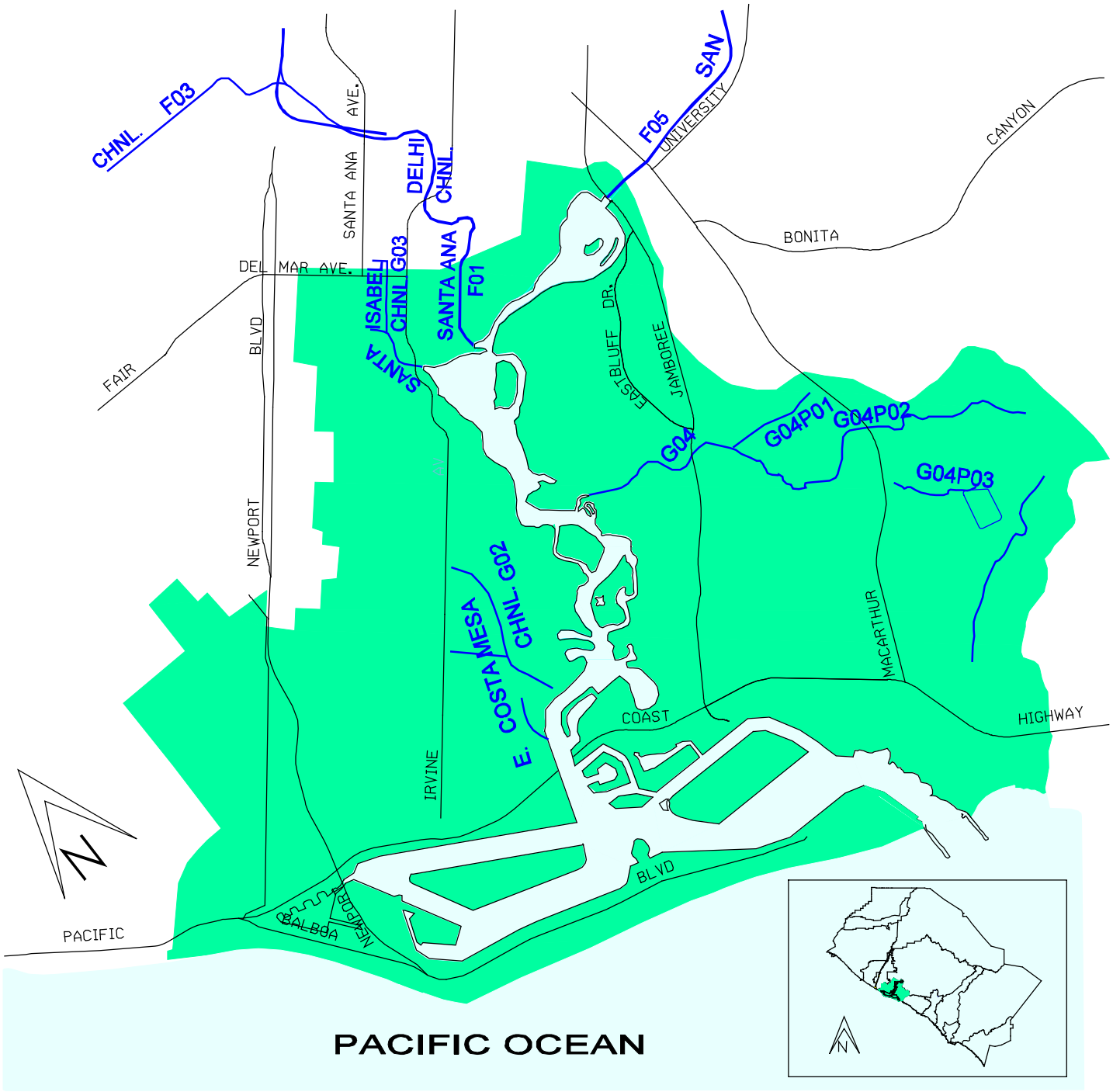

Figure 12.2

San Diego Creek Watershed

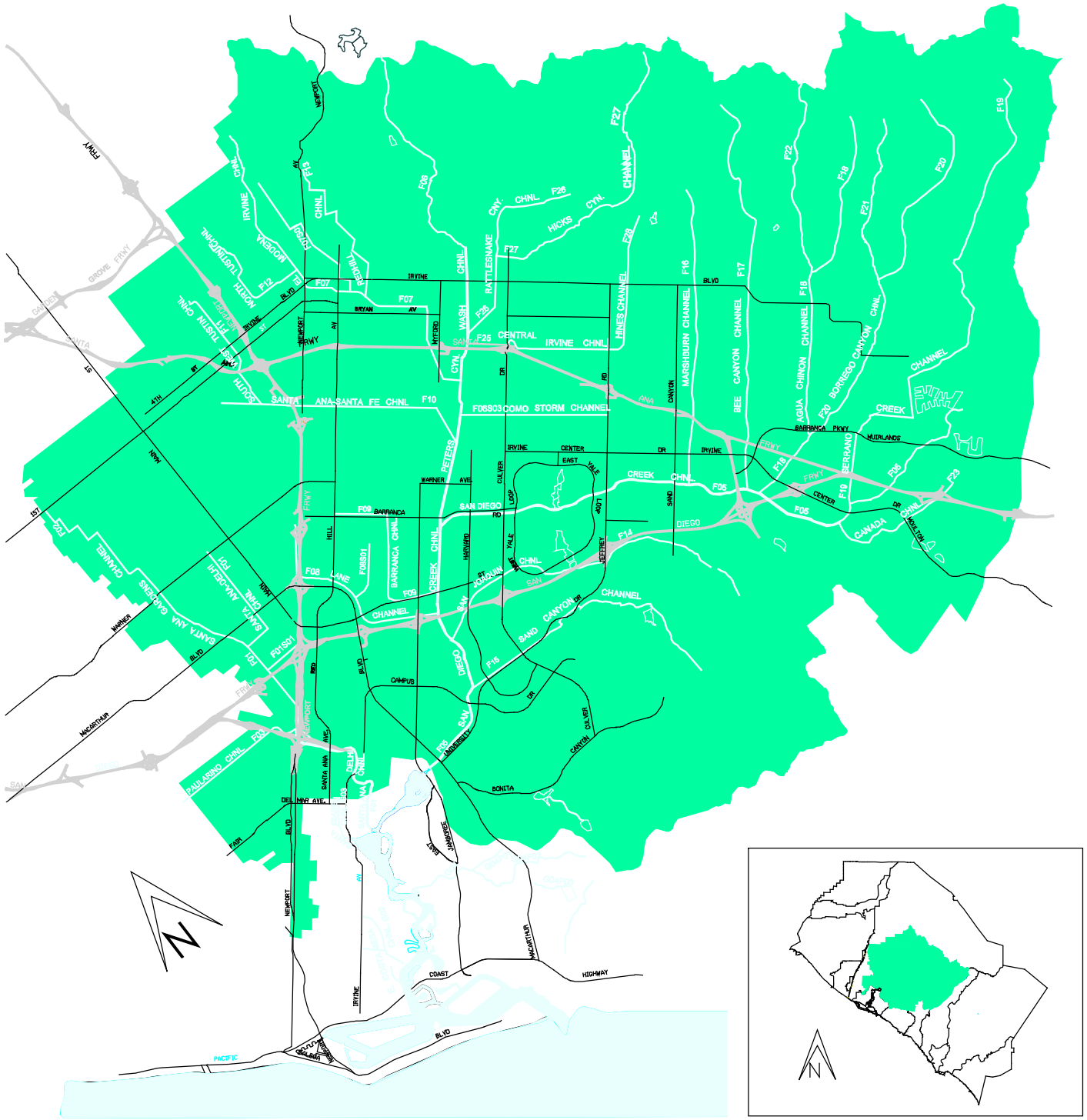

13.0 WATER QUALITY PLANNING INITIATIVES

During the Second Term Permit period, the Permittees initiated several water quality planning efforts. These priority water quality planning initiatives are intended to identify and better understand site-specific urban water quality problems in a number of watersheds.

13.1 San Gabriel River Watershed

13.1.1 Coyote Creek Watershed

The Army Corps of Engineers is undertaking a comprehensive study of the Coyote Creek watershed in order to develop a rehabilitation plan and identify projects for flood control, ecosystem restoration, recreation, water quality and shoreline protection. The study is estimated to cost $1,842,000 and will take approximately 40 months to complete.

The Coyote Creek reconnaissance study was initiated on February 1, 2001. The bulk of reconnaissance study efforts for the preparation of the Water Resources Development Act (WRDA) Section 905(b) analysis was conducted during the annual South Pacific Division Conference held June 4-7, 2001. The reconnaissance study resulted in the finding that there is a federal interest in continuing the study into the cost-shared feasibility phase. Project stakeholders are currently being identified and a project management plan is currently being prepared.

13.1.2 Los Alamitos Watershed

The Los Alamitos Pump Station was constructed in 1958 to pump storm water from low-lying marshlands up to the San Gabriel River. Significant modifications to the pump station facility were made in 1980. Due to this facility's age, a further upgrading of the pump station is being planned by the Orange County Flood Control District and water quality improvements to the pump station retarding basin are being investigated as an addition to the project.

13.2 Westminster Watershed

The Army Corps of Engineers is undertaking a comprehensive study of the Westminster watershed including the East Garden Grove-Wintersburg and the Bolsa Chica Channels in order to develop a rehabilitation plan that will address flood control, ecosystem restoration, recreation, water quality and shoreline protection. The study is estimated to cost a total of $2,135,000 and will take approximately three years to complete.

The Westminster reconnaissance study was initiated on February 1, 2001. The bulk of reconnaissance study efforts for the preparation of the WRDA Section 905(b) analysis was conducted during the annual South Pacific Division Conference held June 4-7, 2001. The reconnaissance study resulted in the finding that there is a federal interest in continuing the study into the cost-shared feasibility phase. A project management plan is currently being prepared.

13.3 Talbert/Lower Santa Ana River Watershed

13.3.1 Watershed Studies

Elevated bacteria indicator levels in the surf zone off Huntington State Beach in 1999 were attributed, in part, to the storm drain system of the Talbert/Lower Santa Ana River Watershed. In response to a Section 13267 letter from the Regional Board, the Talbert/Lower Santa Ana River Watershed Permittees (the County of Orange, Orange County Flood Control District, and the cities of Costa Mesa, Fountain Valley, Huntington Beach, Newport Beach and Santa Ana) committed to conducting monitoring investigations and research studies in conjunction with the University of California Irvine and the National Water Research Institute. These studies have been initiated and have subsequently expanded to include watershed-scale monitoring and investigations, including extensive dispersion monitoring in the surf zone.

Phase II of the studies were completed and reported in December 2000 *Final Report: Huntington Beach Water Quality Investigation Phase II: An Analysis of Ocean, Surf Zone, Watershed, Sediment, and Groundwater Data Collected From June 1998 through September 2000*. Phase III is currently being conducted in both dry and wet weather conditions.

Urban sources are being addressed through a revision of current BMPs pursuant to the water quality planning process. As part of an early action plan, all storm drain and pump station discharges in this watershed have been temporarily diverted during the summer months and permanent diversions are being designed.

13.3.2 Coastal Studies

The Orange County Shoreline Study is intended to enlist federal support in solving the bacteriological problem along the Orange County shoreline including the Talbert / Lower Santa Ana River outlets. As proposed to Congress, the Army Corps of Engineers would look at the lower reach of the Santa Ana River and Talbert Channel, the surf zone from Newport Harbor Entrance to Bolsa Chica and the near shore zone out to the 60 meter contour line. The Corps would look at the data accumulated under the Phase I through III efforts of the OCSD, the City of Huntington Beach, and the County of Orange; fill in the data gaps; and develop a numerical model that predicts the circulation and dispersion of pollutants from various sources under various scenarios.

13.4 Aliso Creek Watershed

13.4.1 Aliso Creek Watershed Study

The Army Corps of Engineers is undertaking a comprehensive study of the Aliso Creek watershed in order to develop a rehabilitation plan that will provide stream stability, habitat restoration, flood and embankment protection, and improved water quality. The draft watershed management plan, the draft watershed feasibility report (with proposed projects), and the draft environmental document and schedules for implementation projects will be completed in late 2001.

13.4.2 Water Quality Planning Study

The lower mile of Aliso Creek is listed as impaired for the presence of elevated levels of fecal coliform. Pursuant to a 205(j) grant, the Principal Permittee initiated a water quality planning study. The study was completed in June 2000 and identified elevated fecal coliform levels at a number of points along Aliso Creek and in its tributaries as one of its findings.

One storm drain (identified as J03P02) exhibited higher fecal coliform levels than the rest and was issued a Clean Up Abatement Order by the San Diego Regional Board arguing violations of the NPDES Stormwater Permit. The Order, as one action, assigns additional monitoring requirements to the J03P02 Permittees (the County of Orange, Orange County Flood Control District, and City of Laguna Niguel).

Three projects identified in the *205(j) Water Quality Planning Study* were submitted for grant funding under Proposition 13 and were approved.

1. Dairy Fork Biofiltration Basin

This project will enhance water quality through the design and construction of an in-line vegetated treatment system (although some off-line functions may be evaluated in the design process). Vegetated treatment systems are a recognized non-point source pollution management measure. The treatment system will consist of a series of three flow-through biofilters constructed of large rock, which will serve to slow down and filter the water in Dairy Fork. The biofilters will act by providing a surface for algae to grow on, which will then uptake nutrients and adsorb bacteria leaving sediment to settle out behind the filters.

2. Munger Creek Filtration Basin

This project is an in-line low flow infiltration/biofiltration basin at the outlet of Munger Storm Drain. The infiltration basin is a recognized non-point source pollution management measure and will reduce bacteria, nutrient and sediment loads, and potentially, water temperatures.

3. JO3P02 Storm Drain Treatment System

A third project, put forward by the City of Laguna Niguel, the WETCAT System for J03P02 was also approved for Proposition 13 funding. It provides for a series of wetland improvements in the J03P02 draw system.

The 205(j) water quality planning study was completed in June 2000 and coupled with the Army Corps of Engineers Feasibility Study will provide the first comprehensive restoration plan for an entire watershed in Orange County with subsequent project implementation over a multi-year period. As an early action, the flows from Lower Aliso Creek and J03P02 were temporarily diverted during the summer months of 2000 to the sanitary sewer. In 2001, the City of Laguna Niguel installed a Creek Treatment System as a demonstration project, returning treated bacteria-free water from J03P02 back into the creek system.

13.4.3 Aliso Creek Directive

On March 2, 2001 the San Diego Board issued a written directive pursuant to California Water Code Section 13225 to the County of Orange, Orange County Flood Control District and the Aliso Creek watershed cities (Watershed Permittees). The directive found that the Watershed Permittees may be discharging waste with high bacteria levels from municipal storm drain outfalls into Aliso Creek and its tributaries. As a result the Watershed Permittees were directed to conduct an evaluation of the relative contribution of the urban stormwater discharges to the impairment of beneficial uses or the exceedances of water quality objectives and, where necessary, take appropriate measures to eliminate the sources of pollution.

The first milestones for the Permittees included submitting a proposal for an alternative monitoring strategy by March 31, 2001 and initiating weekly sampling within the watershed during the week of April 1. The alternative monitoring plan was submitted to the San Diego Board and on April 5th, the San Diego Board responded that the alternative monitoring plan would be accepted provided that Enterococcus is included in the list of indicators to be monitored weekly. The Board further supported and commended the watershed permittees for voluntarily initiating a watershed-based receiving waters monitoring program at key sites within the watershed. The intensive 10-week water quality-monitoring program commenced on April 9th.

The watershed permittees also met the second milestone, which was the submittal of an Initial Report by April 30, 2001. The Initial Report contained a brief summary of all investigations conducted to date by each watershed permittee to address the persistence, the significance, and to the extent feasible, the causes of the impairment or exceedance of water quality objectives and the technical and economic feasibility of control actions available to the permittees to reduce or eliminate the impairment or exceedance as well as some Geographic Information System maps.

The first Quarterly Progress Report was submitted to the San Diego Board on July 31, 2001. This report presented the results of the first ten weeks of monitoring at the 35 storm drains and in the Creek itself. The results indicated that elevated levels of fecal coliform bacteria were present in many of the storm drains with varying impact on the quality of the water in the Creek. Proposed second quarter actions for the period July 1st to September 30, 2001 included: 1) continued monitoring at the present locations; 2) installation of temporary stream gauges at several locations on Aliso Creek; 3) inventorying areas of recreation in the Creek; and 4) preliminary bacterial source identification investigations by each municipality on at least one storm drain that exhibited a significant impact on the Creek.

Figure 13.1

Watersheds of Orange County

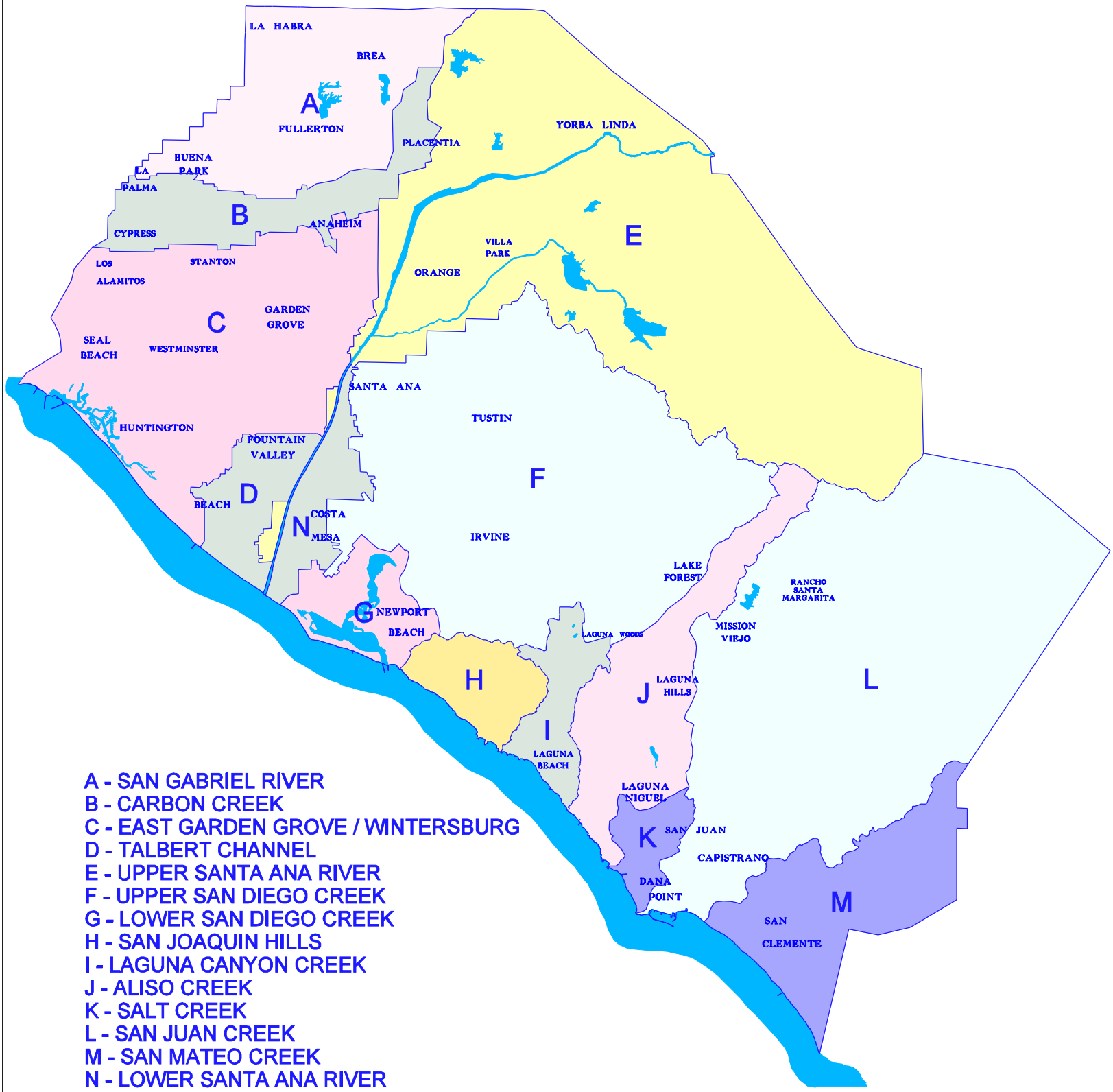

14.0 ASSESSMENT OF BMP EFFECTIVENESS

There are generally two accepted methodologies for assessing the performance of BMP effectiveness: conventional monitoring (such as water quality monitoring) and non-conventional monitoring.

Assessing the cumulative effect of BMPs employed countywide on the water quality of receiving waterbodies may take a number of years. There are however, a number of programs that are currently contributing to the assessment of individual project BMP performance. The Permittees will continue to assess and evaluate the data from these and other studies in order to try and determine the overall effectiveness of the implementation of the BMPs on the water quality within Orange County.

14.1 Conventional Monitoring

The Permittees have been implementing a water quality monitoring program since the Regional Boards approved the program in January 1991. In accordance with the requirements of the initial permit, one specific objective of this program is to evaluate the effectiveness of pollution prevention and correction methods. The channel monitoring element, additional information on specific monitoring programs dealing with BMP implementation, and effectiveness on individual development projects of the monitoring program are discussed in Section 11.0 directly addressing this objective.

Data from the channel monitoring program discussed in Section 11.0 highlights the broad spatial differences with regard to suspended/settleable solids, nutrient loading and potential for aquatic toxicity due to dissolved metals in channels draining predominantly urban watersheds. Aquatic toxicity guidance criteria were provided by the CTR. The spatial variations in water quality may be interpreted as reflecting differences in watershed land uses, imperviousness and the very low hardness of rainwater draining off into flood control facilities.

In the context of stormwater quality management, the use of CTR criteria exceedances as an indicator of adverse impact will need to be validated since it is now recognized that water quality is only one of many determinants that include water temperature, habitat, bank stability, etc., of beneficial use attainment.

14.2 Effectiveness of Pollution Prevention and Correction Measures

Even though there is some difficulty in assessing the cumulative effect of BMPs employed countywide on the water quality of receiving waterbodies, there are a number of programs that are contributing to the assessment of individual project BMP performance. There are also monitoring programs in place that are intended to measure the quality of runoff from individual project sites. The following discussion provides information on some of these programs.

Evaluation of BMP Effectiveness

The County of Orange cooperated with the Southern California Coastal Water Research Project (SCCWRP), in the submittal of a Proposition 13 grant application to conduct scientifically credible and biologically relevant effectiveness monitoring of various types of BMPs being implemented in urban areas. The project will coordinate with the local agencies in Los Angeles and Orange counties to assess BMP performance with respect to water quality indicators such as toxicity, pesticides and biologically available metals. This project will improve water quality statewide by providing agencies with the information needed to identify effective BMPs.

Las Flores Storm Water Quality Basins

The Las Flores community, located easterly of Mission Viejo, has two water quality basins that were constructed in the early 1990's by the Santa Margarita Company to treat the first flush (1/2" of rain) effects of urban runoff from the 592 acre planned development. The conditions of approval for the development called for the developer to begin monitoring wet and dry weather runoff from the community once the tributary area to each basin was 50% complete.

The northwest water quality basin (8 ac-ft volume) has been treating wet and dry weather runoff from 189 acres of the development for the past three storm seasons. Analysis of grab samples taken from the inlet and outlet of the basin has thus far provided inconclusive results on the basin's effectiveness.

Newport Coast Golf Course and Muddy Canyon Studies

In 1992, The Irvine Company initiated a water quality monitoring program to assess the runoff from Pelican Hills Golf Course as part of the condition of approval for the project. For the monitoring program, stations were located on land, in the surf zone and in the offshore subtidal areas. Additional stations were also located southerly of the golf course as reference control monitoring sites for comparison with the runoff stations.

The monitoring program included chemical monitoring for nutrients (nitrate and phosphate) and a marine ecological component conducted in the ocean's waters in the 1995-1996 storm season to assess the runoff's impact on three indicator plants (Eisenia, Egregia and Phyllospadix) that are known to react quickly to increased nutrient levels by increasing their growth rates. The ecological study also evaluated animal epibionts living on these plants.

The general conclusions of the study found that the nutrient levels measured at the fresh water monitoring stations were reduced to such low concentrations by the time they reached the surf and subtidal stations that there were no significant differences between the runoff monitoring stations and the reference control stations. The low levels of nutrients from the golf course may be partially attributed to computer controlled fertilizer rates and efficient irrigation.

Additional studies of the Newport Coast development have been proposed for the winter-spring period of 1999-2000 in Muddy Canyon. This initial data collection will provide baseline information on the storm runoff from Muddy Canyon and will likely be repeated as project build out occurs providing information on the impact of the development and the effectiveness of the BMPs implemented.

Newport Bay Watershed Nitrate Reduction

Newport Bay currently faces an eutrophication problem due primarily to the excessive use of nutrients in the watershed. The nutrient loads (nitrate) reaching Newport Bay reached a peak of approximately 1.6 million pounds in 1985-1986. At that point the nitrate loads reaching the Bay began to decrease reaching an annual average of just over 0.8 million pounds (50% reduction) from 1990 to 1997. This reduction can be attributed to many changes including the use of drip irrigation on agricultural areas owned by The Irvine Company, increased runoff controls at the watershed's major nurseries, climatic conditions that lower perennial groundwater input to the storm channels and the conversion of agricultural fields to urban and other uses that result in less nutrient runoff.

One project potentially contributing to a further reduction of nitrate is the San Joaquin Marsh Pond Demonstration Project. Installed and monitored by the Irvine Ranch Water District, these ponds have been supplied with water from San Diego Creek from June 1998 to the present. Total nitrogen reduction (difference between the influent total nitrogen and the pond effluent total nitrogen returned to the creek) has ranged from 7-10 mg as N/l during the spring, summer and fall months to a reduction of 5mg as N/l or less during January. The variability of nitrogen reduction was dependent upon temperature. Total nitrogen removal (difference in mass of total nitrogen entering the ponds and leaving the ponds) over the 405 day monitoring period was 51 tons. This equates to 46 tons annually, or 252 pounds of nitrogen removed per day.

San Joaquin Hills Transportation Corridor – Compost Stormwater Filters

The San Joaquin Hills Transportation Corridor (SR-73) was originally constructed by the Transportation Corridor Agency in 1997, which included the construction of forty compost storm water filters (CSFs) along the corridor to fulfill the storm water mitigation requirements in the Runoff Management Plan.

The CSFs are open-aired, rectangular in shape, made of concrete and are divided into a number of different cells. Treatment of the storm water is through layers of compost material that acts as a filter. The treated water is removed from the basins by underdrain pipes surrounded by rock and filter fabric below the compost material.

To assess the treatment efficiency of these filters, Caltrans initiated a study during 1998-1999. One CSF was located in North Hollywood at a maintenance yard and the second was the Bonita Canyon filter located off the San Joaquin Hills Corridor in Orange County. The recently concluded study (*Caltrans Compost Stormwater Filters Bonita Canyon & North Hollywood Maintenance Yard, Storm Water Monitoring 1997/1998 Wet Season*, June 10, 1998) provides only one season's worth of monitoring but generally seems consistent with a similar type tested by the product manufacturer Stormwater Management, in the early 1990's.

The results of the study for the five (5) storms monitored in 1997-1998 show event mean concentration reductions for motor oil, diesel, and oil and grease ranging from 14 % to 64 %; fecal coliform (80%), Chemical Oxygen Demand (32%), metal removal (chromium, copper, lead, nickel and zinc) ranging from 33 to 72% and removal efficiencies of 72% for total suspended solids. The results also show that there was an increase in the effluent concentrations for total dissolved solids (24%) and nutrients (nitrate, nitrite, total phosphorous, total Kjeldahl nitrogen (TKN), dissolved phosphorous) ranging from 133% (TKN) to 1633% (dissolved phosphorous). The adverse reactions indicate that there were ongoing reactions in the basin that added to the effluent concentration of these water quality parameters.

Eastern Transportation Corridor Denitrification Treatment Facility

In order to reduce the nutrient and sediment loading into Newport Bay, a groundwater de-nitrification treatment facility was constructed along Walnut Avenue in the City of Irvine. This facility collects the shallow groundwater via an underdrain system along an 8,000-ft long section of the Eastern Transportation Corridor and treats it using the Biofor® biological nitrate removal system. After the groundwater is treated it is discharged back into Peters Canyon Wash and the filter backwash is discharged to the Orange County Sanitation District sewer system via an existing Irvine Ranch Water District sewer connection line.

Beginning in June 2001, monthly monitoring indicates that the average concentrations of biochemical oxygen demand, total suspended solids, and nitrogen are within the allowable discharge limits. In addition, there was no apparent evidence of foam, odor or color changes due to the process.

City of Irvine Oil/Water Separators

The City of Irvine has installed two oil/water separators to treat water at their City Hall and Operations Support Fueling Facility. The results of two tests indicated that the oil/water separator is removing diesel fuel, gasoline and oil and grease to limits below detection where the initial amount was measurable. In addition, a new fueling system installed concurrently with the separators has reduced operator drive off with the pump engaged. The combination of the oil/water separators and the new fueling system has reduced contaminant levels to non-measurable amounts.

15.0 ASSESSMENT OF MANAGEMENT PROGRAM MODIFICATIONS

The permits require assessment of any stormwater management program modifications made to comply with Clean Water Act requirements to reduce the discharge of pollutants to the maximum extent practicable.

In 2001- 2002, the following program modifications were initiated, continued or completed:

- Participation on the Steering Committee for the regional Southern California Coastal Research Water Project (SCCWRP) 1998 Southern California Bight Study which released the sediment toxicity report during the reporting period; and

- Participation in the Regional Research/Monitoring program that is being coordinated with the neighboring counties, the City of Long Beach, SCCWRP and the three Southern California Regional Boards.

15.1 1998 Southern California Bight Regional Monitoring Project (Bight '98)

The NPDES Stormwater Permits issued to Riverside, Orange and San Bernardino Counties by the Santa Ana Board encouraged the implementation of "an integrated watershed monitoring program" which could be developed cooperatively by the three counties. The Bight ‘98 regional monitoring program, which was coordinated by SCCWRP, represented a unique opportunity for the three Counties to cooperatively participate in an integrated watershed monitoring program, obtain meaningful information on the ecological effects of stormwater discharges, and meet a common permit objective.

Bight ’98 is a continuation of the successful cooperative regional-scale monitoring begun in Southern California in 1994. Bight’98 built upon the previous successes and expanded on the 1994 survey by including more participants, sampling more habitats, and measuring more parameters. More than fifty organizations, including international and volunteer organizations participated in this project.

The inclusion of new participants (e.g. Orange, Riverside and San Bernardino County Stormwater Programs) provided several benefits. Cooperative interactions among many organizations with different perspectives and interests, including a combination of regulators and dischargers, ensures that an appropriate set of regional-scale questions were addressed by the study. The additional resources brought by new participants also expand the number of habitats and indicators that were sampled. Sampling for Bight’98 included all of the areas sampled in 1994, plus a new focus on nearshore habitats (bays, harbors and beaches) and offshore islands. Bight’98 also coordinated with a Mexican program to characterize the condition of Southern California Bight (SCB) coastal waters south of the US border. The new indicators that were measured included shoreline microbiology, biomarkers and new chemical measures.

The Bight ’98 Survey was organized into three technical components:

1) Coastal ecology

The overall goal of the coastal ecology component of Bight ’98 was to assess the condition of the bottom environment and the health of the biological resources in the SCB. To accomplish this goal, Bight’98 focused on four objectives:

1. Estimate the extent and magnitude of ecological change in the SCB,

2. Compare conditions among selected geographic regions of the SCB,

3. Assess the relationship between biological responses and contaminant exposure, and

4. Describe historical trends at selected sites.

Monitoring for the coastal ecology component included fish trawls, benthic invertebrate taxonomy, and assessments of sediment chemistry and toxicity.

2) Shoreline microbiology

More than 80,000 bacteriological samples are collected annually in Southern California, representing roughly half of the total bacteriological monitoring conducted in the United States. Despite this impressive amount of monitoring, these data are difficult to integrate towards a regional assessment of water quality because they are collected by 22 different organizations, many of which have different sampling strategies and different data management systems. Additionally, the monitoring programs focus sampling in known “problem areas”, which does not allow assessment of typical shoreline water quality. To address these limitations, all of the organizations that conduct routine monitoring in the SCB pooled their efforts to conduct an integrated survey to assess the overall water quality of the Southern California shoreline during the summer of 1998.

3) Water quality

The Water Quality component of Bight ’98 included four objectives:

1. Determine the spatial extent and distribution of surface runoff from shoreline sources in the coastal ocean,

2. Evaluate the contribution of surface runoff to the physical, chemical and biological characteristics of the coastal ecosystem,

3. Evaluate and compare the contributions of surface runoff and publicly-owned treatment works inputs into the coastal ocean, and

4. Develop tools for integrated assessment of water quality using *in situ* and remotely sensed data sets.

Monitoring in Orange County included a coastal microbiological assessment, monitoring in the Lower Newport Bay, Dana Point Harbor and Huntington Harbour, and monitoring of the impacts of the Santa Ana River and Aliso Creek.

The results of the shoreline microbiology component and the sediment toxicity evaluation are available from SCCWRP's website at http://www.sccwrp.org. The water quality, invertebrate taxonomy and fish assemblage data will be released in the near future.

15.2 Regional Research Monitoring Program

During 1997-1998 the Permittees began evaluating the applicability of the monitoring and information synthesis approaches being developed for the U.S. EPA's Rouge River National Demonstration Project. As a result of that evaluation, discussions commenced with the neighboring counties, SCCWRP and the three Regional Boards in establishing a Southern California Stormwater Monitoring/Research Cooperative Program.

The objective of the Program is to have an initial five-year period of study with commitments established through subsequent implementation agreements and/or federal, state, or organizational grants. The key focus of the program is to develop improved methodologies and assessment tools to more effectively understand urban municipal stormwater and non-stormwater (anthropogenic) impacts to receiving waters from a management perspective. These issues cross local political boundaries and agency jurisdictions thereby representing a need for the agencies to interact cooperatively to resolve important stormwater-related problems at regional scales.

In February 2001 a cooperative agreement in the amount of $123,000 was executed between the following parties:

- Orange County
- Los Angeles County
- San Diego County
- Ventura Flood Control District
- Riverside County Flood Control and Water Conservation District
- San Bernardino County Flood Control District
- City of Long Beach
- Los Angeles Regional Water Quality Control Board
- Santa Ana Regional Water Quality Control Board
- San Diego Regional Water Quality Control Board; and
- Southern California Coastal Water Research Project (SCCWRP)

The initial project entails the development and prioritization of a research agenda with the assistance of water quality/resource management/regulatory experts. This initial project will be completed in 2001-2002 and will be coordinated by SCCWRP. The research agenda will provide a list of proposed projects, designed by the water quality/resource management/regulatory experts,

which shall form the focus of the research/monitoring program for the collaborating stormwater discharge and regulating agencies in Southern California.

The scope of work involves four main tasks.

1. Assemble the panel of experts to design the research agenda. The panel of experts will be a diverse group of technical specialists in a variety of stormwater disciplines.
2. Convene the experts though a workshop format. The workshop will be preceded with a white paper that defines the research/monitoring needs of stormwater managers in Southern California.
3. Detail the research agenda produced by the expert panel. The research agenda will be documented in a draft report and will include a technical prioritization of scientific projects, the technical tasks necessary to address each research project, a proposed schedule for implementing these research tasks, and estimated costs for each research project. The draft report shall also be submitted to an oversight Steering Committee in an oral format.
4. Incorporate comments from the draft and oral reports, and uses the Steering Committee to rank the research projects for management needs. It is this ranked research agenda by the Steering Committee that is intended to become the research/monitoring focus over the next five years.

The following list of research/monitoring topics are examples of the types of research/monitoring projects that will be considered by the expert panel. If feasible, the expert panel will create a research/monitoring study design that will attempt to answer these management questions:

- What are the most appropriate monitoring designs to assess stormwater discharges, potential water quality impacts, and the effectiveness of stormwater management programs?

- What standardized field and laboratory protocols are appropriate for urban stormwater monitoring in Southern California?

- Which toxicity tests should be used to evaluate the toxicity of urban pollutants of concern in the stormwater runoff of Southern California?

- Do dissolved heavy metals in stormwater runoff cause toxicity in receiving waters and how do we measure these forms of dissolved heavy metals?

- What improvements can be made to current methodologies for identifying unknown toxicants in urban runoff, or are there alternative methodologies that can be developed?

- Can biological indicators be used to assess the health of inland surface and coastal waters in Southern California? Can biocriteria be developed?

- How do the physical characteristics of urban stormwater discharges (e.g., flow rate, volume, temperature, etc.) affect the beneficial uses of receiving water bodies?

- How can pollutant fate, transport and dispersion studies be used to evaluate transitory/intermittent stormwater impacts? Are there models that can be used or developed to help management efforts?

- How can advances in information technology be used in monitoring, modeling and information exchange?

- How effective are various BMPs for improving stormwater quality for particular parameters at local scales? Can sensitivity analysis be used to evaluate which BMPs are most efficient for improving stormwater quality at the watershed scale?

- What are the appropriate pathogens and/or pathogen indicators that should be measured in stormwater discharges? How do these measures relate to human health risk?

- What issues are not covered by this list? Are there additional questions of management concern in the Southern California Region?

16.0 WORKPLAN

16.1 Introduction

This section describes the objectives of the DAMP, the BMPs that have been developed, implemented or proposed during the First, Second and upcoming Third Term Permits and the workplan for the 2000-2001 reporting period.

16.2 Objectives of the Drainage Area Management Plan

The main objectives of the DAMP are to fulfill the commitment of the Permittees to present a plan that satisfies NPDES permit requirements and to evaluate the impacts of urban stormwater quality on the beneficial uses.

The April 1993 version of the DAMP was prepared in compliance with the specific requirements of the First Term Permit. The September 2000 draft update of the DAMP was prepared to incorporate the programs developed since 1993 and was submitted concurrently as Volume II of the Report of Waste Discharge on September 1, 2000. The plan proposes a wide range of continuing and enhanced BMPs and control techniques, which will be implemented during the upcoming Third Term Permit period.

The 2000 DAMP, once finalized, is intended to serve as the principal policy and guidance document for the countywide NPDES Stormwater Program. The 2000 DAMP describes the programs that will serve to:

1. Provide the framework for the program management activities and plan development;

2. Provide the legal authority for prohibiting unpermitted discharges to the storm drain system and for requiring BMPs in new development and significant redevelopment;

3. Improve existing pollution prevention and removal BMPs to further reduce the amount of pollutants entering the storm drain system;

4. Educate the public about the issue of urban stormwater and non-stormwater pollution and obtain their support in implementing pollution prevention BMPs;

5. Ensure that all new development and significant redevelopment incorporates appropriate post construction nonstructural and structural BMPs and evaluate "special" structural BMPs to address specific water quality problems as identified through the water quality planning process;

6. Ensure that construction sites implement pollutant control practices that address control of construction related pollutants including erosion and sediment control and on-site hazardous materials and waste management;

7. Identify industrial stormwater dischargers in Orange County and notify them of State

Industrial stormwater permit requirements;

8. Detect and eliminate unpermitted discharges and illegal connections to the municipal storm drain system;

9. Conduct a stormwater monitoring program to identify areas with water quality problems, to assist in the prioritization of watersheds for analysis and planning, and to assist in the prioritization of pollutants to facilitate the development of specific controls to address these problems; and

10. Address the special focus within the Newport Bay/San Diego Creek watershed due to its impaired status and the resulting development of TMDLs for sediment, nutrients, bacteria and toxicity.

16.3 2001-2002 Workplan

During 2001-2002 the Permittees will continue to work with Regional Board staff so that mutually agreeable Third Term Permits can be adopted as well as begin to focus their efforts on the development and implementation of the performance commitments that were presented in the updated draft 2000 DAMP.

Although the workplan may be modified based upon the final language in the permits when they are adopted, the anticipated workplan for 2001-2002 is based upon the performance commitments within the updated draft 2000 DAMP and includes the following:

1. Permittee Committee

During the First and Second Term Permit periods, the designated Permittee representatives provided the overall guidance to the NPDES Stormwater Program, including votes where necessary. During the Third Term Permit period this group will continue to function in the same manner, and will subsequently be referred to as the Permittee Committee. This Committee shall periodically evaluate the need for creating standing sub-committees and ad hoc committees required to accomplish the objectives of the NPDES Stormwater Program.

During 2001-2002 the Permittees will initiate or complete the following:

- Each Permittee will provide the contact information for their primary and alternate representatives to the Principal Permittee; and
- The Principal Permittee shall coordinate and conduct at least six General Permittee meetings during the year (likely bi-monthly) and each Permittee shall be represented by either the designated representative or alternate at a minimum of eighty-percent (5 meetings) of the meetings.

2. Implementation Agreement Revision

The agreement underpinning County and city cooperation is the NPDES Stormwater Permit Implementation Agreement (subsequently referred to as the Implementation Agreement) which establishes the responsibilities of each Permittee with respect to compliance with the NPDES Stormwater Permits issued by the Regional Boards. The Implementation Agreement also establishes a funding mechanism for the shared costs of the NPDES Stormwater Program based on each municipality's area and resident population and includes a provision that allows newly incorporated cities to become additional parties to the Agreement.

During 2001-2002 the Permittees will initiate or complete the following:

- By July 1, 2002 the implementation agreement will be amended to include the newly incorporated cities of Aliso Viejo, Laguna Woods and Rancho Santa Margarita. The Implementation Agreement may be further evaluated at that time to determine whether any changes are appropriate to the decision making committee structure or if the countywide cost shared formula should form the basis for watershed specific planning and improvement programs.

3. Identification of BMP Retrofit Opportunities

Water quality problems are identified through the baseline countywide water quality monitoring program and other water quality assessments. Watersheds determined to require additional BMPs will be surveyed for potential retrofitting. Existing flood control, retarding, sediment control, water conservation, recreation, habitat, and greenbelt facilities will be evaluated in terms of their potential for modification to provide water quality benefits and in the context of the water quality planning process.

During 2001-2002 the Permittees will initiate or complete the following:

- The Permittees shall assess the watersheds on a rolling priority basis to evaluate the urban impacts on the water quality and the opportunities to configure or reconfigure channel segments in order to optimize beneficial use attainment.

4. Public Agency Activities

All of the Permittees routinely conduct preventive maintenance activities that are widely recognized as effective BMPs for pollutant control. These activities include litter control, solid waste collection/recycling, drainage facility maintenance, catch basin, stenciling, street sweeping, hazardous materials management/environmental performance reporting, household hazardous waste collection, emergency spill response and fertilizer and pesticide management.

During 2001-2002 the Permittees will initiate or complete the following:

- The Principal Permittee shall develop model maintenance procedures for public agency activities (such as street sweeping, catch basin stenciling, drainage facility maintenance) by November 15, 2002;
- The Principal Permittee shall develop and distribute BMP guidance for public agency and contract field operations and maintenance staff to ensure that they are familiar with, understand, and implement appropriate pollution prevention measures, react quickly to contain spills and report illegal discharges to the appropriate responder by November 15, 2002;
- The Permittees will evaluate the need for additional drainage facility diversions for dry weather flows based on data from the water quality monitoring program and water quality planning process;
- Consider pollutant removal effectiveness (including macro and particulate pollutant removal information, which may be obtained from manufacturer specifications, technical documents, etc.) when purchasing street sweeping equipment or contracting for these services;
- The Principal Permittee shall provide training on implementing the environmental performance reporting program;
- The Permittees' fixed corporation yard facility managers shall conduct quarterly environmental performance reporting program inspections every year beginning January 2002;
- The Permittees will evaluate the feasibility of applying the Environmental Performance Reporting Program to municipal maintenance contracts, leases and field maintenance operations by November 15, 2002; and
- Revise the Management Guidelines for Use of Fertilizers and Pesticides, taking into account the nutrient and toxicity findings from the Newport Bay watershed and develop training materials.

4. Public and Business Education Program

In late 1999, the Permittees developed a comprehensive long-term NPDES public and business education strategy (subsequently referred to as the Public Education Program) in order to effectively educate the public and targeted business groups about the effects of stormwater pollution and encourage their participation in the protection of surface waters. The Public Education Program includes a comprehensive planning approach and "tool box" of implementable educational elements based upon the desired direction of the program.

During 2001-2002 the Permittees will initiate or complete the following:

- The Principal Permittee shall coordinate and conduct at least four Public Education committee meetings during the year (quarterly) and each Permittee shall be represented by either the designated representative or alternate at a minimum of fifty percent (2 meetings) of the meetings;
- By July 1, 2002, the Principal Permittee will have conducted a public awareness survey to determine the effectiveness of the public and business education strategy to date and to provide direction to the overall program education strategy for the upcoming Third Term

Permit period;

- By July 1, 2002 the Principal Permittee will have developed the campaign goals, determined the key messages and community outreach activities and strategies, prepared a master timeline, created a "brand" name for the Stormwater program and determined the educational messages;
- Each Permittee shall conduct a mass distribution, through any appropriate media, of stormwater public educational information to their residents each reporting year so that at least 90% of their residents receive the information by the end of the permit term;
- Each Permittee shall sponsor or staff a stormwater table or booth for at least one community, regional or countywide outreach event (such as a fair, festival or exposition, program or similar event) each reporting year;
- Each Permittee shall provide stormwater program outreach to all municipal staff at least once per reporting year. Outreach via a flyer, brochure or newsletter may be distributed with paychecks; and
- The Principal Permittee, with Public Education Committee support, shall develop BMP guidance for restaurants, automotive service centers and gasoline stations and provide it to existing industrial facility inspectors (**Section 10.3.1**) for distribution to the businesses they inspect by July 1, 2002.

6. New Development/Significant Re-Development

The Permittees have developed and implemented an effective and flexible program for new development and significant redevelopment that allows focus to be placed on constituents of concern identified through the monitoring program and water quality planning process.

During 2001-2002 the Permittees will initiate or complete the following:

- The New Development and Construction Task Force will be re-established to provide direction for the revision of the new development/significant re-development program (DAMP Appendix G);
- The Permittees shall revise their program by July 1, 2003 based upon consideration of the following:
    a) The current New Development/Significant Redevelopment Program (DAMP Appendix G) and the available results of the implementation review;
    b) The SUSMP requirements in Los Angeles, Ventura and San Diego counties;
    c) The Start At The Source design and planning approach utilized in the San Francisco Bay Area; and
    d) The inclusion of more specificity in non-structural and structural routine BMPs including design criteria/standard plans for some BMPs

- The Permittees shall, in addition to requiring that developers provide proof of NOI for the General Construction Permit where the development is greater than five (5) acres, communicate to the developer that their Stormwater Pollution Prevention Plan (SWPPP) should be completed and onsite before any activity commences.

7. Public Works Construction

Concern over construction sites as a major source of sediment and other pollutants is addressed in the federal regulations, which require a description of a program to implement and maintain structural and nonstructural BMPs to reduce pollutants in storm water runoff from construction sites.

During 2001-2002 the Permittees will initiate or complete the following:

- By July 1, 2002 the Principal Permittee shall develop model ordinance language and the Permittees shall subsequently revise their current grading/erosion control ordinances to ensure that they are consistent with related regulatory documents such as the State General Construction Permit and Permittee Water Quality Ordinance.
- The New Development and Construction Task Force shall provide guidance for the revision of the public works construction program (DAMP Appendix H), taking into consideration the specific construction site issues in the Newport Bay/San Diego Creek watershed.

8. Existing Industrial Facility Inspection

A number of public agencies routinely conduct inspections of industrial facilities in Orange County. The agencies include Orange County Health Care Agency, the Fire Departments, the Orange County Agricultural Commissioner's Office and sanitation districts.

During 2001-2002 the Permittees will initiate or complete the following:

- Stormwater quality awareness training will be provided to the staff of existing industrial inspection programs. The training will include the dissemination of the new BMP guidelines developed for restaurants, automotive service centers and gasoline stations;
- The Principal Permittee shall coordinate and conduct at least four Authorized Inspectors committee meetings during the year (quarterly) and each Permittee shall be represented by either the designated representative or alternate at a minimum of fifty percent (2 meetings) of the meetings; and
- The Principal Permittee shall develop and distribute an electronic database for water pollution incident reporting and tracking to the Permittees Authorized Inspectors by July 1, 2002.

9. Water Quality Monitoring

In response to the Second Term Permits, the Permittees conducted a two year re-evaluation and revision of the water quality monitoring program in order to re-focus the efforts to determine the role, if any, of urban stormwater discharges to the impairment of beneficial uses and to provide technical information to support an effective urban stormwater management program to reduce the beneficial use impairments determined to be associated with urban stormwater. This effort resulted in the Final Water Quality Monitoring Plan (99-04 Plan) which was submitted to the Regional Boards in May 1999.

The Permittees also initiated several water quality planning efforts, conducted additional water quality evaluations in response to technical requests from the Regional Boards and participated in various regional research and/or monitoring programs. The combination of these efforts will aid the Permittees in determining the extent and degree of the relationship between urban stormwater runoff and impairment of beneficial uses within the aquatic resources of Orange County.

During 2001-2002 the Permittees will initiate or complete the following:

- Revise the water quality monitoring program and associated timelines annually. These changes may be due to necessary timeline adjustments, newly identified water quality problems or information gained through experience or the research/monitoring programs;
- Participate in the Southern California Stormwater Monitoring/Research Cooperative Program. The key focus of the program is to develop the methodologies and assessment tools to more effectively understand urban municipal stormwater and non-stormwater impacts to receiving waters;
- Conduct a dissolved metals toxicity study in several receiving water mixing zones; and
- Address potential illicit dischargers identified within the final water quality monitoring plan.

The efforts will focus on the following area:

1. Orange Avenue, City of Lake Forest (J01P32)
2. Collins Channel (near Katella), City of Orange
3. Greenville Banning Channel (near Gisler)
4. Fairview Channel (u/s confluence with Greenville Banning)

APPENDIX F

GROCERY STORE LETTER, CONTROL OF WASH WATER RUNOFF

005339
Vicki L. Wilson, Director

COUNTY OF ORANGE

PUBLIC FACILITIES & RESOURCES DEPARTMENT

Environmental Resources
1750 S. Douglass Road
Anaheim, CA 92806

Telephone: (714) 567-6363
Fax: (714) 567-6220

February 13, 2002

To: Orange County Grocery Store Managers

Subject: Control of Wash Water Runoff

Dear Sir or Madam:

This letter is being sent to the main grocery store chains within Orange County, to draw the attention of store managers to the need to eliminate the discharge of pollutants resulting from the cleaning of sidewalks, parking lots, loading docks and common areas and to explain why these discharges are of concern to municipalities in Orange County.

In 1990, pursuant to the federal Water Quality Act, Orange County's municipalities received National Pollutant Discharge Elimination System (NPDES) permits. These NPDES permits require the municipalities to eliminate non-stormwater discharges to their storm drain systems and reduce the discharge of pollutants in stormwater runoff to the maximum extent practicable. As a consequence of these requirements, Orange County's municipalities must address the routine disposal of cleaning water runoff to the street and storm drain.

Pressure washing or other cleaning actions may results in runoff containing food wastes, trash and debris, detergents, caustic cleaning agents, oils and grease and heavy metals. Consequently, eliminating the discharge of this runoff to the street or storm drain will make a significant contribution towards protecting the creeks, rivers, streams and sensitive receiving waters that ultimately receive all runoff from the municipal storm drain system.

The proper management of this runoff can also help ensure that regulatory intervention to protect sensitive receiving waters and the municipal storm drain system is avoided. The State Fish and Game Code, State Water Code and local Water Quality Ordinances enforced by this Department and the cities of Orange County all include provisions that prohibit unpermitted disposal of wastes to the municipal storm drain system and surface waters. It is important to remember that your business is responsible for all facility runoff.

A number of businesses already practice "zero discharge" cleaning methods or have arranged with sewering agencies for the direct disposal of their waste to the sanitary sewer. If you have external cleaning conducted at your facility and have not previously addressed the manner in which the runoff is disposed of, the attached guidelines prepared by this Department in collaboration with the Regional Water Quality Control Boards, should be helpful to you.

Please direct any questions regarding this letter to Karen Ashby at (714) 567-6297.

Very truly yours,

Chris Crompton, Manager
Environmental Resources

Distribution

Attachment: Guidelines for Pressure Wash Service- Control of Wash Water Runoff

cc: Mark Smythe, Regional Water Quality Control Board - Region 8
Bob Morris, Regional Water Quality Control Board, Region 9
Eugene Bromley, USEPA Region IX
Co-Permittee Cities

GUIDELINES FOR PRESSURE WASHING RUNOFF

For Grocery Store Sidewalks, Parking Lots, Loading Docks and Common Areas

- If hot water, soap or any other cleaning agent is used, block the storm drain and collect water/waste and discharge to the sanitary sewer (with the approval of the local sanitation district).

- If only cold tap water with no cleaning agent is used, then the following Best Management Practices (BMPs) must be implemented before pressure washing:

  - Prior to washing, clean and/or sweep all large debris from the area

  - Clean any oil/auto fluid spills with an appropriate dry method, such as kitty litter or other absorbent, and dispose of appropriately,

  - To the extent practicable, the cleaning water runoff must be directed to vegetative or unpaved areas where it would percolate,

  - If visual observation of the wash water indicates contamination (cloudy, colored, presence of suspended solids), additional Best Management Practices such as temporary retention of wash water (sandbags around storm drain inlets) or filtration methods must be implemented prior to discharge.

For further information, please contact:

Karen Ashby, County of Orange, PFRD/Stormwater Section. Tel. (714) 567-6297
Mark Smythe, Regional Water Quality Control Board - Santa Ana Region. Tel. (909) 782-4998
Bob Morris, Regional Water Quality Control Board – San Diego Region. Tel. (858) 467-2962

Corporate Headquarters

Albertson's General Office
250 Park Center Blvd.
Boise, ID 83706

Ralph's Grocery Company (Food 4 Less Company)
PO Box 54143
Los Angeles, CA 90054
(310)884-9000

Actual Address:
1100 West Artesia Blvd.
Compton, CA 90220

Stater Brother's Corporate Headquarters
PO Box 150
Colton, CA 92324

Safeway (Vons and Pavilions) Corporate Headquarters
5918 Stoneridge Mall Rd.
Pleasanton CA, 94588-3229

Vons and Pavilions Company Headquarters
PO Box 513338
Los Angeles, CA 90051-1338

Super Market Addresses and Phone Numbers

Albertson's
2523 Eastbluff Dr
Newport Beach, CA 92660
(949) 717-6659

Albertson's
1835 Newport Blvd # C
Costa Mesa, CA 92627
(949) 722-1750

Albertson's
3100 W Balboa Blvd
Newport Beach, CA 92663
(949) 675-1040

Albertson's
1020 Irvine Ave
Newport Beach, CA 92660
(949) 642-2211

Albertson's
2300 Harbor Blvd # C
Costa Mesa, CA 92626
(949) 515-7227

Albertson's
2300 C Harbor Blvd
Costa Mesa, CA 92626
(714) 438-1110

Albertson's
1175 Baker St # B
Costa Mesa, CA 92626
(714) 545-4676

Albertson's
804 E Avenida Pico
San Clemente, CA 92673
(949) 492-1755

Albertson’s
616 Camino De Los Mares
San Clemente, CA 92673
(949) 496-8283

Pavilions
1000 Bayside Dr
Newport Beach, CA 92660
(949) 760-0975

Pavilions
3433 Via Lido
Newport Beach, CA 92663
(949) 675-3791

Ralphs Grocery Co
380 E 17th St
Costa Mesa, CA 92627
(949) 645-8282

Ralphs Grocery Co
638 Camino De Los Mares
San Clemente, CA 92673
(949) 496-8616

Ralphs Grocery Co
903 S El Camino Real
San Clemente, CA 92672
(949) 361-8729

Ralphs Grocery Co
31874 Del Obispo St
San Juan Capistrano, CA 92675
(949) 661-6101

Ralphs Grocery Co
2555 Eastbluff Dr
Newport Beach, CA 92660
(949) 644-2060

Ralphs Grocery Co
2660 San Miguel Dr
Newport Beach, CA 92660
(949) 644-7992

Ralphs Grocery Co
1150 Irvine Ave
Newport Beach, CA 92660
(949) 646-1411

Stater Bros Markets
1175 Baker St # C
Costa Mesa, CA 92626
(714) 540-7488

Stater Bros Markets
2180 Newport Blvd
Costa Mesa, CA 92627
(949) 646-2324

Albertson's
23072 Alicia Pkwy
Mission Viejo, CA 92692
(949) 583-7337

Albertson's
33601 Del Obispo St
Dana Point, CA 92629
(949) 496-7900

Albertson's
25872 Muirlands Blvd
Mission Viejo, CA 92691
(949) 455-1961

Pavilions
26022 Marguerite Pkwy
Mission Viejo, CA 92692
(949) 582-0672

Albertson's
33601 Del Obispo St
Dana Point, CA 92629
(949) 496-7900

Pavilions
24 Monarch Bay Plz
Dana Point, CA 92629
(949) 661-0653

Albertson's
30922 S Coast Hwy
Laguna Beach, CA 92651
(949) 499-1733

Ralphs Grocery Co
25104 Marguerite Pkwy
Mission Viejo, CA 92692
(949) 830-3065

Ralphs Grocery Co
24871 Del Prado
Dana Point, CA 92629
(949) 661-4145

Ralphs Grocery Co
700 S Coast Hwy
Laguna Beach, CA 92651
(949) 497-6410

Vons Co
2701 Harbor Blvd
Costa Mesa, CA 92626
(714) 751-4270

Vons Co
185 E 17th St
Costa Mesa, CA 92627
(949) 548-8911

Vons Co
32401 Camino Capistrano
San Juan Capistrano, CA 92675
(949) 661-7594

Vons Co
28751 Los Alisos Blvd
Mission Viejo, CA 92692
(949) 380-1596

Albertson's
9300 Toledo Way
Irvine, CA 92618
(949) 855-9400

Albertson's
3825 Alton Pkwy
Irvine, CA 92606
(949) 476-1922

Albertson's
4541 Campus Dr
Irvine, CA 92612
(949) 854-8282

Albertson's
3931 Irvine Blvd
Irvine, CA 92602
(714) 734-5655

Pavilions
4730 Barranca Pkwy
Irvine, CA 92604
(949) 559-6001

Ralphs Grocery Co
5331 University Dr
Irvine, CA 92612
(949) 786-0770

Ralphs Grocery Co
5345 Alton Pkwy
Irvine, CA 92604
(949) 552-0597

Vons Co
4800 Irvine Blvd
Irvine, CA 92620
(714) 838-6534

Albertsons
13270 Newport Ave
Tustin, CA 92780
(714) 832-8953

Ralphs Grocery Co
13321 Jamboree Rd
Tustin, CA 92782
(714) 544-0491

Ralphs Grocery Co
1114 Irvine Blvd
Tustin, CA 92780
(714) 544-1794

Ralphs Grocery Co
14551 Red Hill Ave
Tustin, CA 92780
(714) 731-9021

Stater Bros Market
14171 Red Hill Ave
Tustin, CA 92780
(714) 544-1812

Vons Co
17662 17th St
Tustin, CA 92780
(714) 832-0883

Vons Co
550 E 1st St
Tustin, CA 92780
(714) 832-9996

Albertson's
770 S Harbor Blvd
Santa Ana, CA 92704
(714) 839-5982

Albertson's
3329 S Bristol St
Santa Ana, CA 92704
(714) 557-9015

Food 4 less
2140 S Bristol St
Santa Ana, CA 92704
(714) 545-4406

Food 4 Less
1900 N Grand Ave
Santa Ana, CA 92705
(714) 542-2361

Food 4 Less
315 E 1st St
Santa Ana, CA 92701
(714) 972-1997

Food 4 Less
2009 W 1st St
Santa Ana, CA 92703
(714) 569-0757

Lucky Center Market
3502 W 5th St
Santa Ana, CA 92703
(714) 554-8732

Ralphs Grocery Co
2741 W Macarthur Blvd
Santa Ana, CA 92704
(714) 751-6255

Stater Bros Market
2603 W 17th St
Santa Ana, CA 92706
(714) 554-4462

Stater Bros Market
1230 E Mcfadden Ave
Santa Ana, CA 92705
(714) 543-4555

Stater Bros Market
2360 N Tustin Ave
Santa Ana, CA 92705
(714) 543-9034

Stater Bros Market
2630 W Edinger Ave
Santa Ana, CA 92704
(714) 546-9410

Vons Co
3650 S Bristol St
Santa Ana, CA 92704
(714) 540-0510

Albertson's
16061 Brookhurst St
Fountain Valley, CA 92708
(714) 531-0417

Albertson's
18579 Brookhurst St
Fountain Valley, CA 92708
(714) 963-7503

Ralphs Grocery Co
18405 Brookhurst St
Fountain Valley, CA 92708
(714) 964-7566

Ralphs Grocery Co
9091 Garfield Ave
Fountain Valley, CA 92708
(714) 963-5668

Stater Bros Market
11085 Warner Ave
Fountain Valley, CA 92708
(714) 775-6343

Albertson's
19640 Beach Blvd
Huntington Beach, CA 92648
(714) 964-7979

Albertson's
9051 Atlanta Ave
Huntington Beach, CA 92646
(714) 962-8145

Albertson's
16600 Bolsa Chica St
Huntington Beach, CA 92649
(714) 846-9431

Albertson's
7212 Edinger Ave
Huntington Beach, CA 92647
(714) 842-4020

Albertson's
708 Yorktown Ave
Huntington Beach, CA 92648
(714) 536-8816

Ralphs Grocery Co
16821 Algonquin St
Huntington Beach, CA 92649
(714) 846-0656

Ralphs Grocery Co
21431 Brookhurst St
Huntington Beach, CA 92646
(714) 964-4459

Ralphs Grocery Co
5241 Warner Ave
Huntington Beach, CA 92649
(714) 377-0024

Ralphs Grocery Co
6942 Warner Ave
Huntington Beach, CA 92647
(714) 842-4471

Stater Bros
10114 Adams Ave
Huntington Beach, CA 92646
(714) 963-0949

Stater Bros
7101 Warner Ave
Huntington Beach, CA 92647
(714) 841-3612

Vons Co
5922 Edinger Ave
Huntington Beach, CA 92649
(714) 846-6356

Vons Co
8891 Atlanta Ave
Huntington Beach, CA 92646
(714) 960-4747

Albertson's
12412 Seal Beach Blvd
Seal Beach, CA 90740
(562) 431-2113

Pavilions
1101 Pacific Coast Hwy
Seal Beach, CA 90740
(562) 598-4251

Albertson's
940 N Tustin St
Orange, CA 92867
(714) 633-2570

Albertson's
8440 E Chapman Ave
Orange, CA 92869
(714) 771-6996

Ralphs Grocery Co
1435 W Chapman Ave
Orange, CA 92868
(714) 634-2904

Ralphs Grocery Co
1411 N Tustin St
Orange, CA 92867
(714) 532-1032

Ralphs Grocery Co
17801 Santiago Blvd
Orange, CA 92861
(714) 998-0041

Ralphs Grocery Co
2620 E Chapman Ave
Orange, CA 92869
(714) 289-4450

Stater Bros Food Crt
3325 E Chapman Ave
Orange, CA 92869
(714) 997-7445

Stater Bros Markets
1800 E Collins Ave
Orange, CA 92867
(714) 538-5550

Vons Co
4637 E Chapman Ave
Orange, CA 92869
(714) 639-0815

Vons Co
2684 N Tustin St
Orange, CA 92865
(714) 637-6651

Albertson's
21500 Yorba Linda Blvd
Yorba Linda, CA 92887
(714) 693-7488

Stater Bros Markets
18527 Yorba Linda Blvd
Yorba Linda, CA 92886
(714) 777-3893

Vons Co
20445 Yorba Linda Blvd
Yorba Linda, CA 92886
(714) 777-0781

Vons Co
4848 Valley View Ave
Yorba Linda, CA 92886
(714) 579-3760

Ralphs Grocery Co
710 N Rose Dr
Placentia, CA 92870
(714) 524-3984

Stater Bros
1111 E Imperial Hwy
Placentia, CA 92870
(714) 528-6997

Vons Co
1820 N Placentia Ave
Placentia, CA 92870
(714) 993-4042

Albertson's
9822 Katella Ave
Anaheim, CA 92804
(714) 636-1872

Food 4 Less
88 E Orangethorpe Ave
Anaheim, CA 92801
(714) 870-9103

Food 4 Less
1616 W Katella Ave
Anaheim, CA 92802
(714) 539-7497

Food 4 Less
121 N Beach Blvd
Anaheim, CA 92801
(714) 952-5044

Ralphs Grocery Co
1020 N Euclid St
Anaheim, CA 92801
(714) 535-9016

Ralphs Grocery Co
915 S Brookhurst St
Anaheim, CA 92804
(714) 635-3670

Ralphs Grocery Co
2394 W Lincoln Ave
Anaheim, CA 92801
(714) 991-5320

Stater Bros Markets
3430 W Lincoln Ave
Anaheim, CA 92801
(714) 827-9800

Vons Co
130 W Lincoln Ave
Anaheim, CA 92805
(714) 535-2288

Pavilions
9852 Chapman Ave
Garden Grove, CA 92841
(714) 537-3770

Ralphs Grocery Co
12051 Euclid St
Garden Grove, CA 92840
(714) 636-6523

Stater Bros Markets
8888 Chapman Ave
Garden Grove, CA 92841
(714) 539-6556

Vons Co
11861 Valley View St
Garden Grove, CA 92845
(714) 889-9955

Vons Co
12961 Chapman Ave
Garden Grove, CA 92840
(714) 750-3663

Vons Co
11322 Los Alamitos Blvd
Los Alamitos, CA 90720
(562) 493-3567

Albertson's
6755 Westminster Blvd
Westminster, CA 92683
(714) 898-3668

Pavilions
16450 Beach Blvd
Westminster, CA 92683
(714) 842-8515

Albertson's
7050 Katella Ave
Stanton, CA 90680
(714) 897-5657

Ralphs Grocery Co
15471 Brookhurst St
Westminster, CA 92683
(714) 531-3980

Food 4 Less
12840 Beach Blvd
Stanton, CA 90680
(714) 895-1972

Stater Bros Markets
14600 Brookhurst St
Westminster, CA 92683
(714) 531-2996

Ralphs Grocery Co
12875 Beach Blvd
Stanton, CA 90680
(714) 891-0222

Stater Bros Markets
8522 Westminster Blvd
Westminster, CA 92683
(714) 892-1861

Ralphs Grocery Co
1305 W Whittier Blvd
La Habra, CA 90631
(562) 694-6397

Ralphs Grocery Co
4033 Ball Rd
Cypress, CA 90630
(714) 827-7947

Ralphs Grocery Co
2231 W La Habra Blvd
La Habra, CA 90631
(562) 691-0638

Stater Bros
10051 Valley View St
Cypress, CA 90630
(562) 929-1878

Stater Bros
851 N Harbor Blvd
La Habra, CA 90631
(562) 694-3896

Albertson's
7910 Katella Ave
Stanton, CA 90680
(714) 890-3366

Vons Co
2101 W Imperial Hwy
La Habra, CA 90631
(562) 905-2800

Albertson's
2500 E Imperial Hwy # 158
Brea, CA 92821
(714) 671-1180

Ralphs Grocery Co
305 W Imperial Hwy
Brea, CA 92821
(714) 529-4505

Ralphs Grocery Co
2465 E Imperial Hwy
Brea, CA 92821
(714) 672-9072

Vons Co
780 N Brea Blvd
Brea, CA 92821
(714) 529-4941

Albertson's
1930 N Placentia Ave
Fullerton, CA 92831
(714) 792-2880

Albertson's
120 N Raymond Ave
Fullerton, CA 92831
(714) 870-7713

Albertson's
4100 N Harbor Blvd
Fullerton, CA 92835
(714) 738-7200

Albertson's
333 N Euclid St
Fullerton, CA 92832
(714) 871-8725

Albertson's
914 W Orangethorpe Ave
Fullerton, CA 92832
(714) 870-0071

Pavilions
1885 N Euclid St
Fullerton, CA 92835
(714) 526-2560

Ralphs Grocery Co
1121 N Harbor Blvd
Fullerton, CA 92832
(714) 992-2590

Ralphs Grocery Co
3330 Yorba Linda Blvd
Fullerton, CA 92831
(714) 524-2040

Ralphs Grocery Co
1701 W Orangethorpe Ave
Fullerton, CA 92833
(714) 738-0984

Stater Bros
1040 E Bastanchury Rd
Fullerton, CA 92835
(714) 257-0460

Albertson's
6565 Knott Ave
Buena Park, CA 90620
(714) 739-2200

Albertson's
6931 La Palma Ave
Buena Park, CA 90620
(714) 522-1054

Albertson's
8880 Valley View St
Buena Park, CA 90620
(714) 236-8200

Albertson's
8060 Dale St
Buena Park, CA 90620
(714) 828-5550

Ralphs Grocery Co
6080 Ball Rd
Buena Park, CA 90620
(714) 527-0381

Ralphs Grocery Co
5400 Beach Blvd
Buena Park, CA 90621
(714) 522-7710

Stater Bros Food Crt
7511 Orangethorpe Ave
Buena Park, CA 90621
(714) 522-1222

Ralphs Grocery Co
5420 La Palma Ave
La Palma, CA 90623
(714) 761-2968

APPENDIX G

PRESSURE WASHING BUSINESS LETTER, CONTROL OF WASH WATER RUNOFF

005355
Vicki L. Wilson, Director

COUNTY OF ORANGE

PUBLIC FACILITIES & RESOURCES DEPARTMENT

Environmental Resources
1750 S. Douglass Road
Anaheim, CA 92806

Telephone: (714) 567-6363
Fax: (714) 567-6220

June 1, 2001

To: Pressure Washing Businesses Managers/Owners

Subject: Control of Wash Water Runoff

Dear Sir or Madam:

This letter is being sent to pressure washing businesses to draw the attention of managers/owners to the need to eliminate the discharge of pollutants resulting from the pressure washing of vehicle maintenance areas, buildings, sidewalks, parking lots, loading docks, common areas, etc. and to explain why these discharges are of concern to municipalities in Orange County.

In 1990, pursuant to the federal Water Quality Act, Orange County's municipalities received National Pollutant Discharge Elimination System (NPDES) permits. These NPDES permits require the municipalities to eliminate non-stormwater discharges to their storm drain systems and reduce the discharge of pollutants in stormwater runoff to the maximum extent practicable. As a consequence of these requirements, Orange County's municipalities must address the routine disposal of cleaning water runoff to the street and storm drain.

Pressure washing or other cleaning actions may result in runoff containing sediment and trash debris, detergents, caustic cleaning agents, oils and grease and heavy metals. Consequently, eliminating the discharge of this runoff to the street or storm drain will make a significant contribution towards protecting the creeks, rivers, streams and sensitive receiving waters that ultimately receive all runoff from the municipal storm drain system.

The proper management of this runoff can also help ensure that regulatory intervention to protect sensitive receiving waters and the municipal storm drain system is avoided. The State Fish and Game Code, State Water Code and local Water Quality Ordinances enforced by this Department and the cities of Orange County all include provisions that prohibit unpermitted disposal of wastes to the municipal storm drain system and surface waters.

A number of pressure washing businesses already practice "zero discharge" cleaning methods or follow the proper steps for the direct disposal of their waste to the sanitary sewer. If you have not previously considered arranging for the appropriate disposal of your cleaning water runoff, the attached guidelines prepared by this Department in collaboration with the Regional Water Quality Control Boards, should be helpful to you.

Please direct any questions regarding this letter to Karen Ashby at (714) 567-6297.

Very truly yours,

Chris Crompton, Manager
Environmental Resources

Distribution

Attachment: Guidelines For Pressure Wash Service- Control of Wash Water Runoff

cc: Mark Smythe, Regional Water Quality Control Board - Region 8
Bob Morris, Regional Water Quality Control Board, Region 9
Eugene Bromley, USEPA Region IX
Permittee Cities

GUIDELINES FOR PRESSURE WASHING SERVICE

Pressure Washing of Vehicle Maintenance Areas & Fuel Dispensing Areas

- Block the storm drain and collect water/waste for disposal to the sanitary sewer (with the prior approval of the local sanitation district).

Pressure Washing Buildings, Sidewalks, Parking Lots, Loading Docks and Common Areas

- If hot water, soap or any other cleaning agent is used, block the storm drain and collect water/waste and discharge to the sanitary sewer (with the approval of the local sanitation district).

- If only cold tap water with no cleaning agent is used, then the following Best Management Practices (BMPs) must be implemented before pressure washing:

  - Prior to washing, clean and/or sweep all large debris from the area, and

  - Clean any oil/auto fluid spills with an appropriate dry method, such as kitty litter or other absorbent, and dispose of appropriately,

  - To the extent practicable, the cleaning water runoff must be directed to vegetative or unpaved areas where it would percolate,

  - If visual observation of the runoff indicates contamination (cloudy, colored, presence of suspended solids), additional Best Management Practices such as temporary retention of runoff (sandbags around storm drain inlets) or filtration methods must be implemented prior to discharge.

For further information, please contact:

Karen Ashby, County of Orange, PFRD/Stormwater Section. Tel. (714) 567-6297
Mark Smythe, Regional Water Quality Control Board - Santa Ana Region. Tel. (909) 782-4998
Bob Morris, Regional Water Quality Control Board – San Diego Region. Tel. (858) 467-2962

Pressure Washers in L.A., Riverside, Orange, and San Bernardino Counties

Pro-Coast Systems
15392 Assembly Ln # D
Huntington Beach, CA 92649
(714) 899-9236

Washers Pressure Doctors
17140 Elm St
Huntington Beach, CA 92647
(714) 847-5746

Rani's High Pressure Water
10662 Desser Ln
Anaheim, CA 92804
(714) 484-8633

TnT Powerwashing
2515 W Winston Rd # 12
Anaheim, CA 92804
(714) 821-8150

D & J's Powerhouse
9850 Garfield Ave # 83
Huntington Beach, CA 92646
(714) 964-5972

Universal Pressure Washing
2208 S Vern St
Anaheim, CA 92802
(714) 740-0911

O C Pressure Cleaning Srv
400 S Flower St # 63
Orange, CA 92868
(714) 329-3525

Superior Pressure Washing
203 E Adele St # B
Anaheim, CA 92805
(714) 956-3285

Tsunami Powerwash
2811 E Puritan Pl
Anaheim, CA 92806
(714) 225-0071

American Powerwash
1300 Bristol St N # 100
Newport Beach, CA 92660
(949) 261-7238

Extreme Clean
24520 Avenida De Marcia
Yorba Linda, CA 92887
(714) 692-9251

Pressure Master
1900 W Colegrove Ave
Montebello, CA 90640
(323) 722-7621

H 2O Pressure Washing
6172 Whittier Blvd
Los Angeles, CA 90022
(323) 728-2847

A New Touch Pressure Cleaning
28891 Oakview Ln
Trabuco Canyon, CA 92679
(949) 888-7517

Coastal Powerwashing
47 Calle Verano
Rancho Santa Margarita, CA 92688
(949) 713-3589

Pressure Works
1829 Fir St
Corona, CA 92882
(909) 734-9629

Hydrotek Powerwash
6 Columbus
Laguna Beach, CA 92677
(949) 495-3461

Pacific West Maintenance
1023 Crenshaw Blvd
Los Angeles, CA 90019
(323) 634-0630

Es Svc
937 La Salle Cir
Corona, CA 92879
(909) 738-4741

Sign Sidewalk Pressure Washing
(Address Unavailable)
Claremont, CA 91711
(909) 624-8238

Mo Betta Pressure Washing
241 Avenida Pelayo # 4
San Clemente, CA 92672
(949) 492-7203

LC Spray Co
6768 Western Ave
Riverside, CA 92505
(909) 785-6995

Whitewater Wash and Detail
227 La Paloma # C
San Clemente, CA 92672
(949) 481-5639

Deck Doctor
132 Strand St
Santa Monica, CA 90405
(310) 581-5221

Deck Doctor
2301 Ocean Ave
Santa Monica, CA 90405
(310) 581-5221

Under Pressure Enterprises
2965 Cody Ct
Riverside, CA 92503
(909) 785-0752

Alpha Cleaning Services
3240 Triumph Ln
Ontario, CA 91764
(909) 484-6989

Geyser Equipment
6692 Van Buren Blvd
Riverside, CA 92503
(909) 509-9269

Acme Pressure Washing
5426 Colfax Ave
North Hollywood, CA 91601
(818) 487-8086

Pressure King
6226 Craner Ave # 4
North Hollywood, CA 91606
(818) 985-3090

All American Pressure Washers
7251 Varna Ave
North Hollywood, CA 91605
(818) 503-3979

DC Building Maintenance
18809 Napa St
Northridge, CA 91324
(818) 885-6034

RB Maintenance
PO Box 3755
Chatsworth, CA 91313
(818) 347-5889

Advantage Pressure Wash
22186 Carhart Ave
Grand Terrace, CA 92313
(909) 783-1900

Modern Powerwash
15476 Canyonstone Dr
Moreno Valley, CA 92551
(909) 247-8816

Blue Water Pressure Washing Co
36615 Little Sycamore St
Palmdale, CA 93552
(661) 285-2564

APPENDIX I

CONSTRUCTION CIRCLE LETTER

Community Development Department

City of Irvine, One Civic Center Plaza, P.O. Box 19575, Irvine, California 92623-9575 (949) 724-6000

November 7, 2000

Dear Construction Circle Business/Property Owner:

YOU'RE INVITED! ...

The City of Irvine invites you to attend a meeting of Construction Circle business and property owners and City, County, and State representatives. The purpose of the meeting is to discuss common issues relating to unauthorized non-stormwater runoff to City stormdrains, street cleanliness, and overweight trucks and related spills.

As you are aware, runoff from Construction Circle stormdrains directly enters Peters Canyon Wash adjacent to Construction Circle which flows to Upper Newport Bay and the ocean. Construction Circle business and property owners, the City of Irvine, and the County of Orange each have responsibilities by law to ensure that polluted water does not enter Construction Circle stormdrains and reach waterways and the ocean. Violations can result in significant fines of up to $10,000 per day.

Representatives from the following agencies will be in attendance to make brief presentations of the issues and discuss best management practices:

- Santa Ana Region of the State Regional Water Quality Control Board
- County of Orange Public Facilities and Resources Department
- City of Irvine Public Works and Community Development Departments
- City of Irvine Public Safety Department
- Irvine Ranch Water District

After the presentations there will be an opportunity to ask questions and discuss proactive solutions.

WHEN:	Wednesday, November 29, 2000 9:00 to 11:45 a.m.
WHERE:	Irvine City Hall, Conference and Training Center One Civic Center Plaza Irvine, CA 92623
RSVP TO:	Sue Olson at the City of Irvine at (949) 724-6452. Reservations are not necessary, but appreciated.

PRINTED ON RECYCLED PAPER

We invite you to attend, and look forward to your contribution in identifying positive best management practices that can be successfully employed to address these issues.

Thank you in advance for your cooperation and commitment to improving the Construction Circle and our environment.

Sincerely,

Eric M. Tolles

ERIC M. TOLLES
Chief Building Official

AQUA CHINON WASH

Location:	At Irvine Center Dr. and Pacifica Lat. 33-39-09 Long: 117-44-56
Channel:	F18
Storet Code:	ACWF 18
Watershed Area:	approx. 7.2 sq.mi. (18.7 sq.km.)
Cities in Watershed:	Irvine, Lake Forest
Raingage:	Lambert Reservoir Alert #217

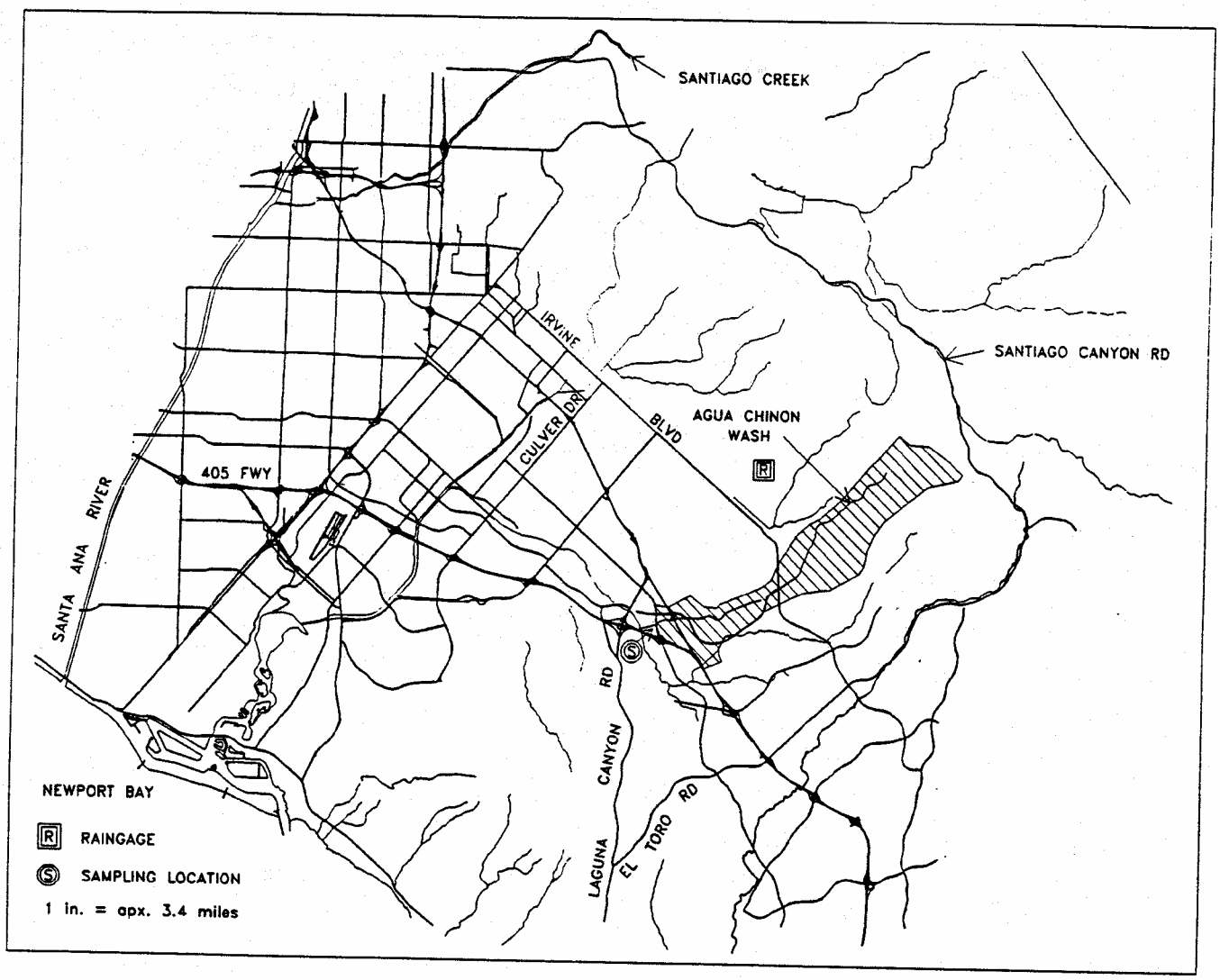

ALISO CREEK

Location:	At Pacific Coast Highway Lat. 33-30-38 Long: 117-45-05
Channel:	J01
Storet Code:	ABJ01
Watershed Area:	29.7 sp.mi.(76.9 sq.km.)
Cities in Watershed:	El Toro, Laguna Beach, Laguna Hills, Laguna Niguel, Lake Forest, Mission Viejo.
Raingage:	El Toro Alert #207, El Toro #176

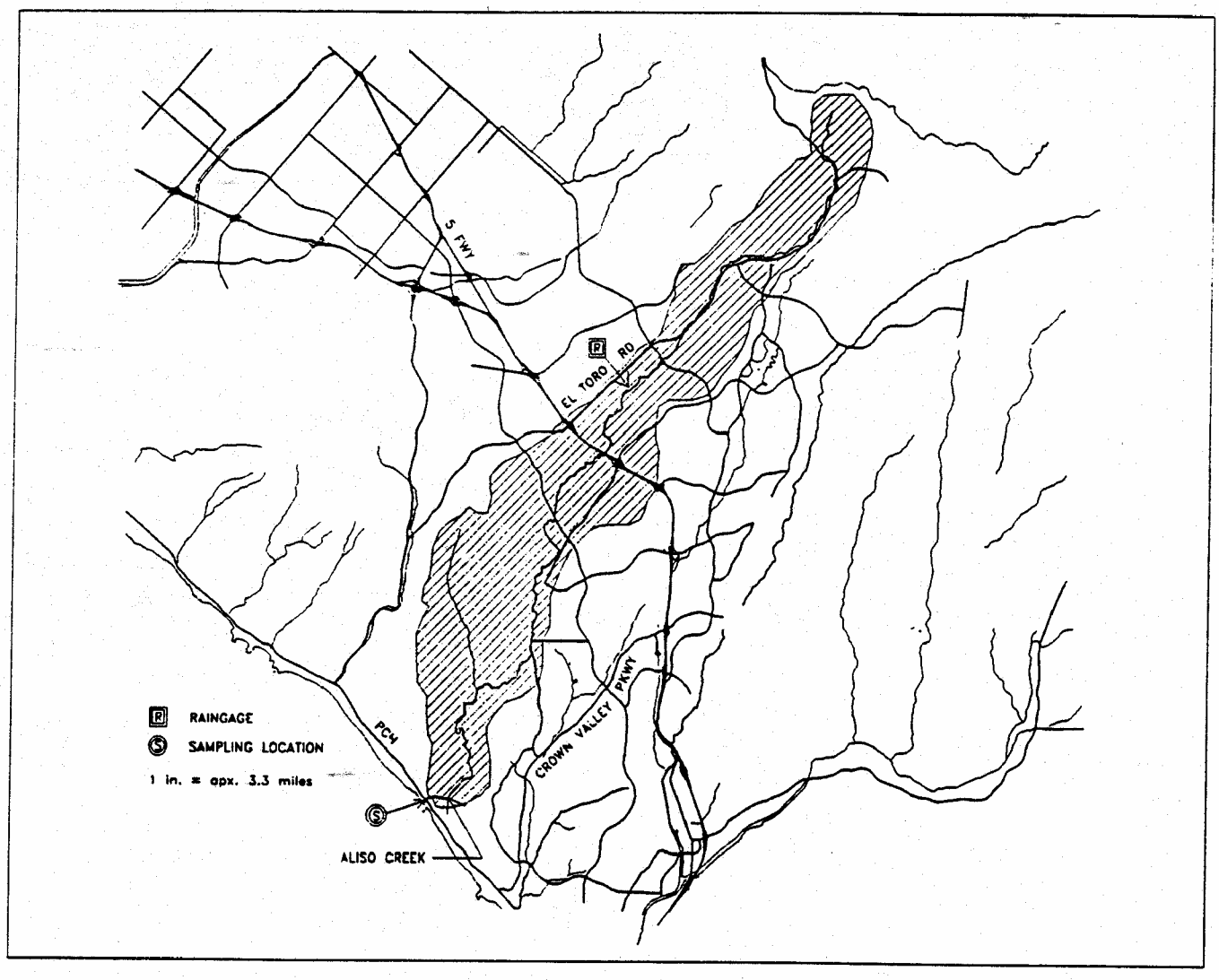

ANAHEIM BARBER CITY CHANNEL

Location:	Downstream U.S. Gov. Railroad Bridge at Rancho Road Lat. 33-45-5 Long: 117-02-10
Channel:	C03
Storet Code:	ABCC03
Watershed Area:	14.9 sq. mi. (38.6 sq. km)
Cities in Watershed:	Anaheim, Garden Grove, Huntington Beach, Stanton, Westminster
Raingage:	Garden Grove Alert #1175, Garden Grove Fire Station #229
Gaging Station:	#232
Equipment:	Stevens A-71 Water-Stage Record with Nitrogen Bubbler and Mercury Manometer Alert Water Level Sensor and Rain Gage.

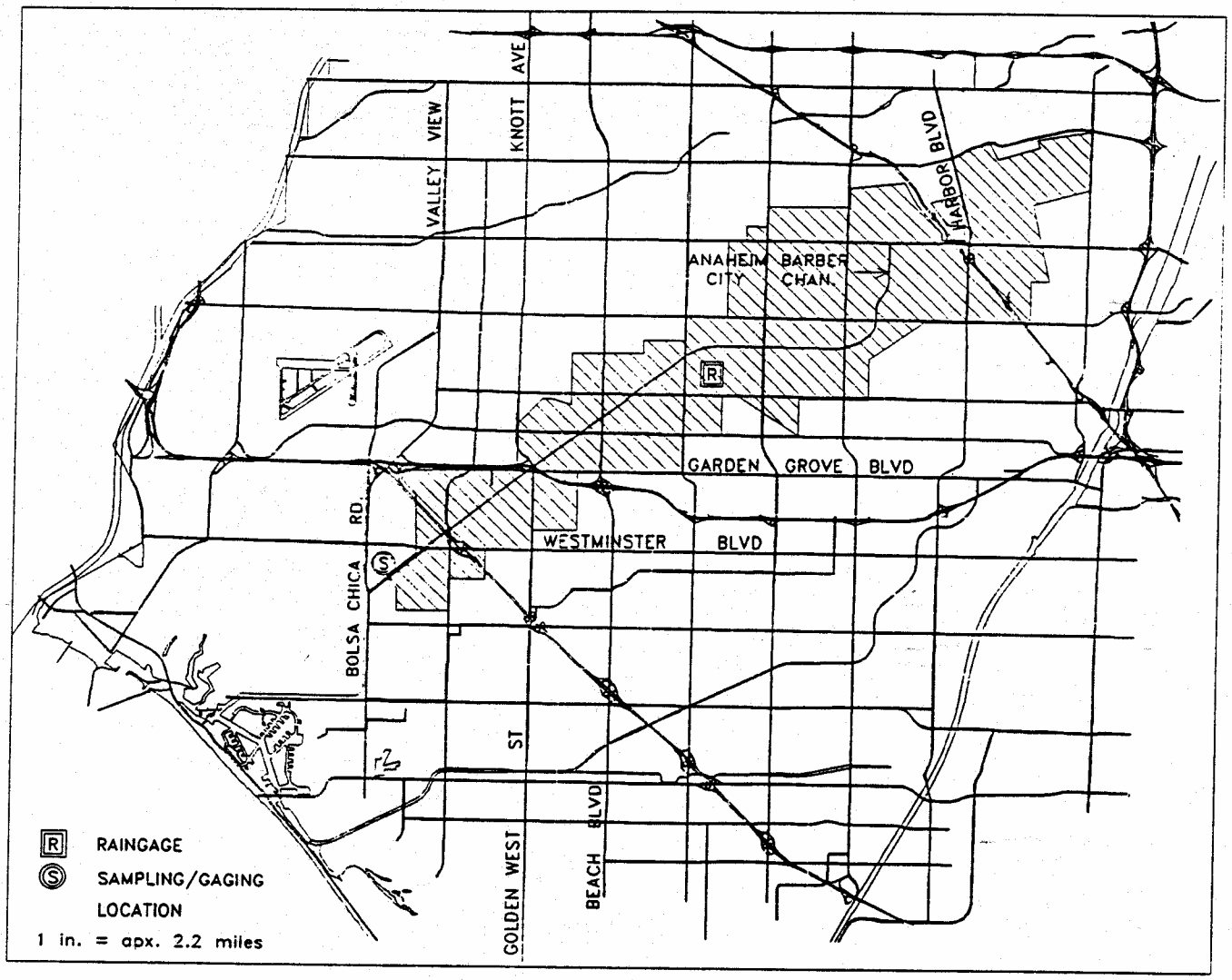

BARRANCA CHANNEL

Location:	At Main St. Lat. 33-30-38 Long. 117-50-07
Channel:	F09
Storet Code:	BC2F09
Watershed Area:	approx. 2.7 sq.mi. (7.0 sq.km)
Cities in Watershed:	Irvine, Santa Ana, Tustin
Raingage:	Santa Ana Engineering Alert #219, Santa Ana #121

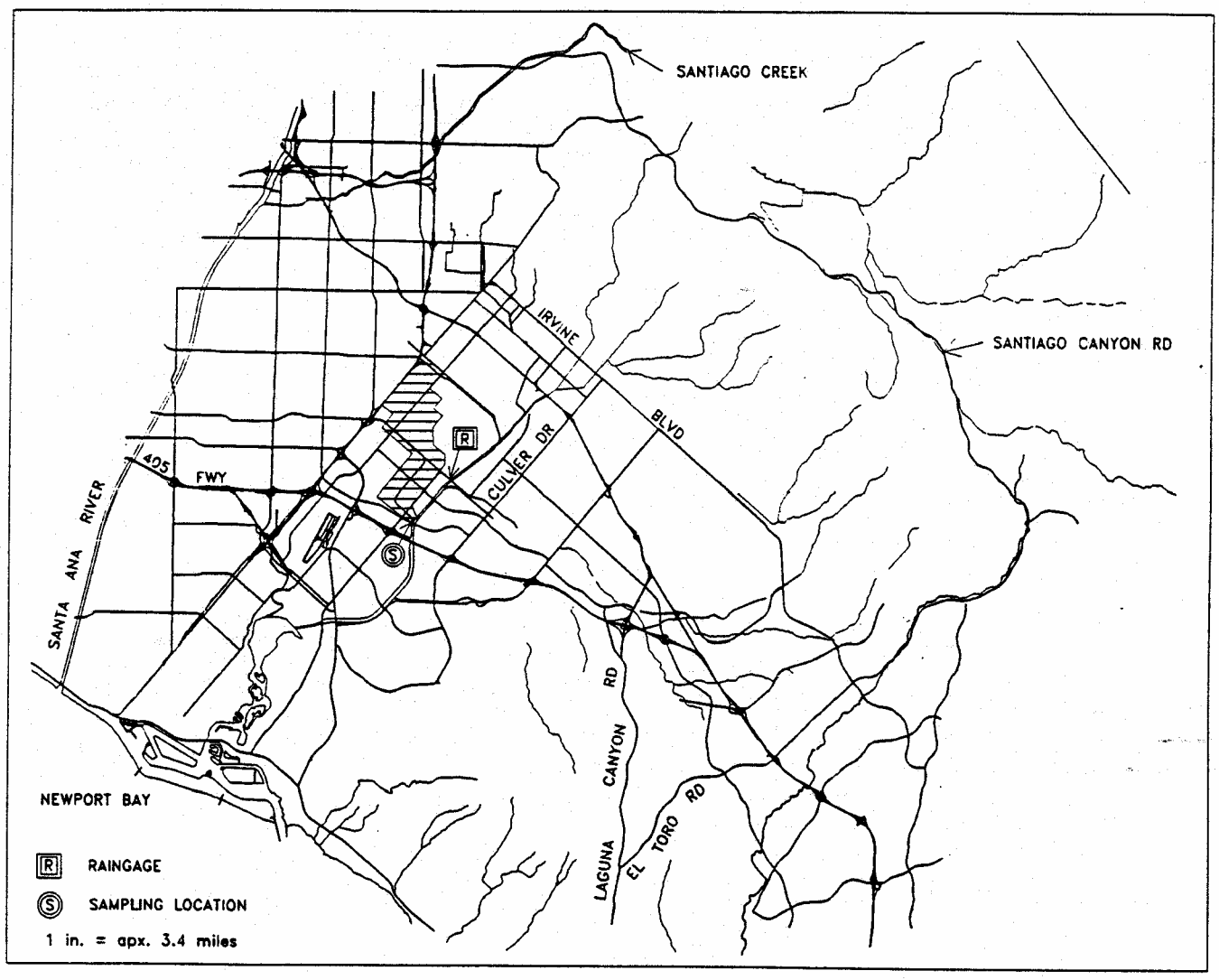

BEE CANYON CHANNEL

Location:	At Alton and Pacifica Lat. 33-39-22 Long: 117-45-22
Channel:	F17
Storet Code:	BEEF17
Watershed Area:	11.2 sq mi. (29.1 sq.km)
Cities in Watershed:	Irvine
Raingage:	Lambert Reservoir Alert #217

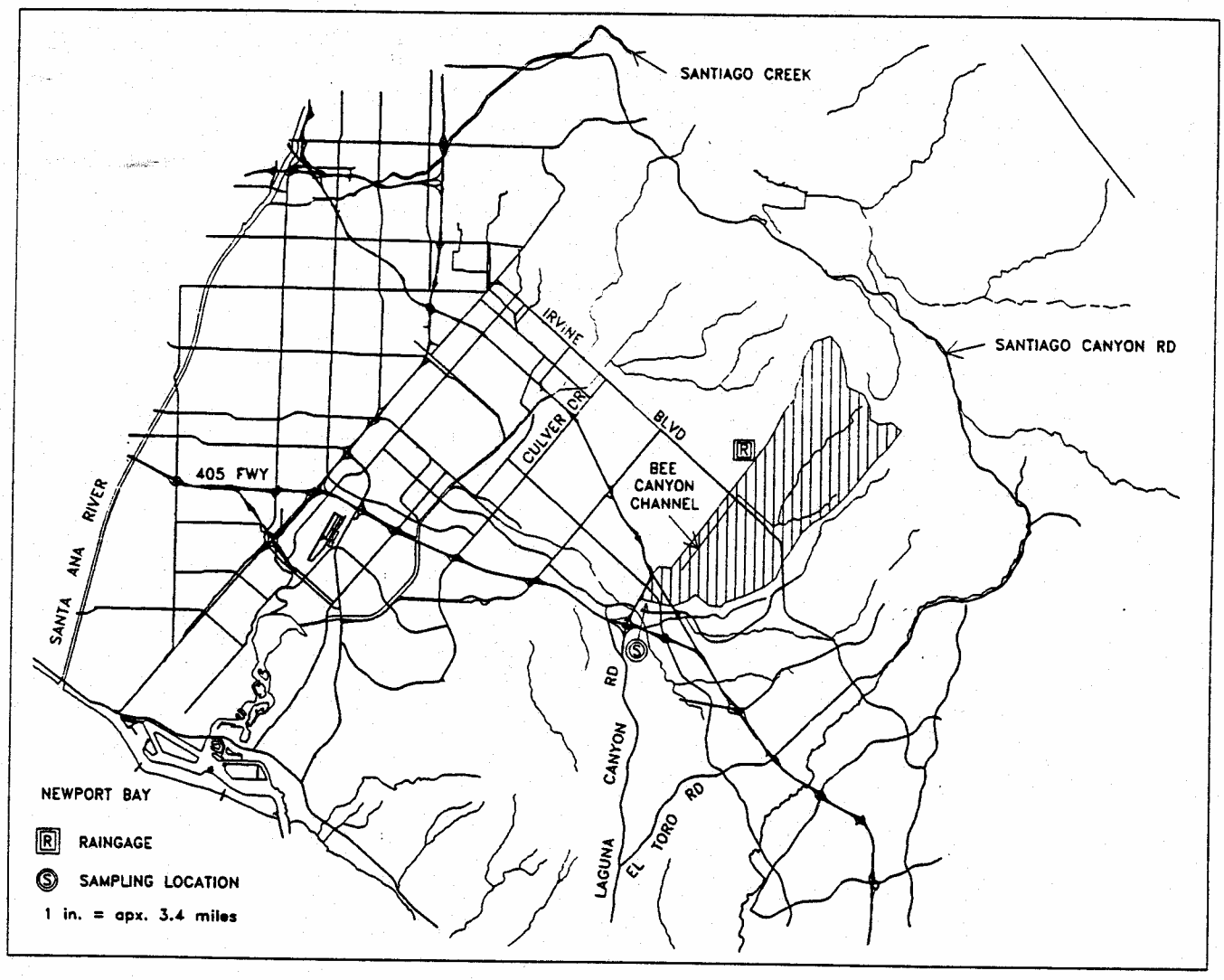

BOLSA CHICA CHANNEL

Location:	At Bolsa Chica Road and Westminster Ave. Lat. 33-45-32 Long: 117-02-34
Channel:	C02
Storet Code:	BCC02
Watershed Area:	10.0 sq.mi. (26.0 sq.km)
Cities in Watershed:	Anaheim, Buena Park, Cypress, Garden Grove, Los Alamitos, Seal Beach, Stanton, Westminster
Raingage:	Garden Grove Alert #1175, Garden Grove Fire Station #229
Gaging Station:	#225
Equipment:	Stevens A-71 Water-Stage Recorder with Float Alert Rain Gage and Water Level Sensor

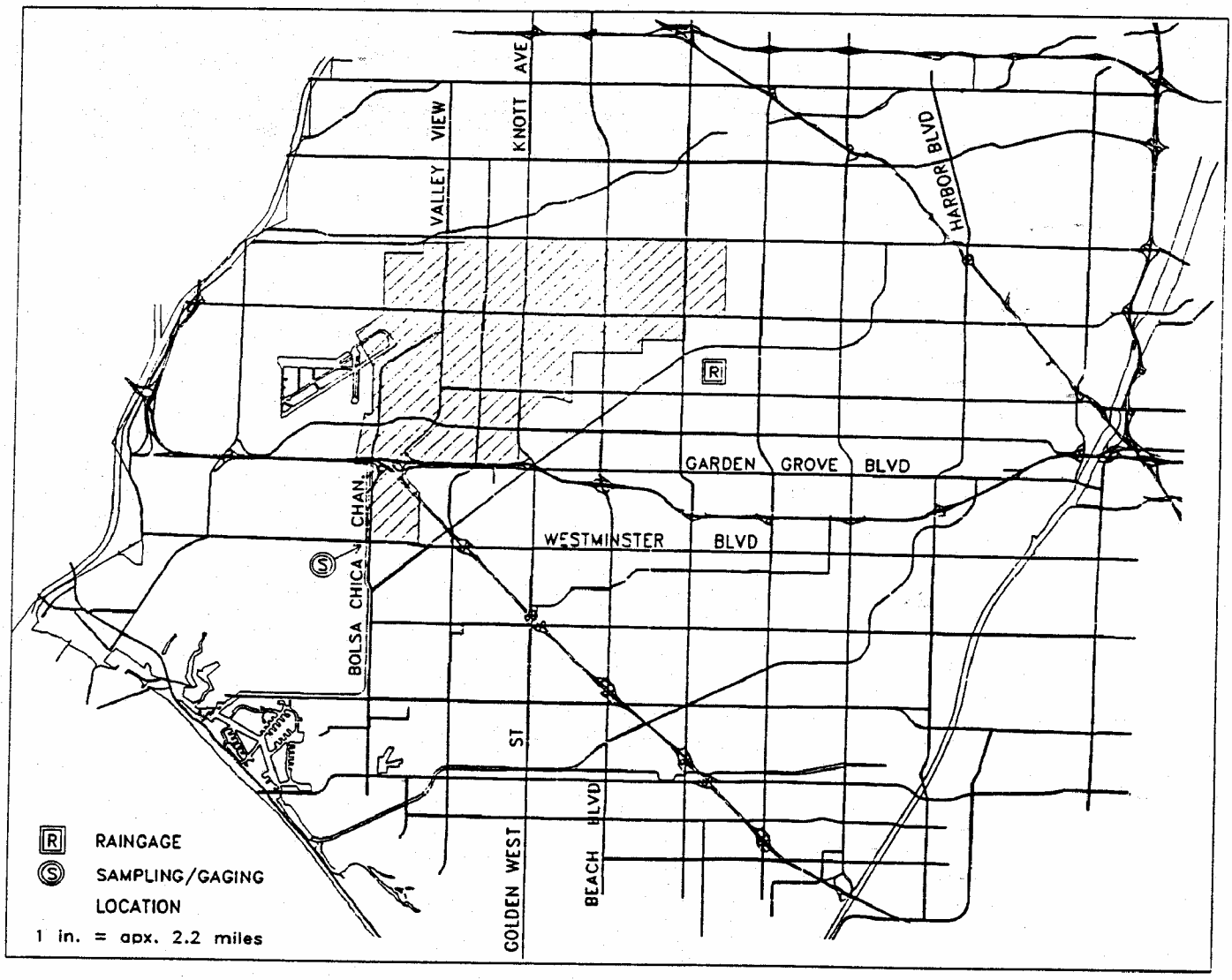

BONITA CANYON CHANNEL

Location:	At San Diego Creek Confluence Lat. 33-39-05 Long: 117-51-38
Channel:	F04
Storet Code:	BCF04
Watershed Area:	approx. 5.0 sq.mi. (13.0 sq.km.)
Cities in Watershed:	Irvine, Newport Beach
Raingage:	San Diego Creek Alert #1125
Equipment:	Stevens A-71 Water Stage Recorder and Nitrogen Bubbler with Non-Submersible Pressure Transducer. Alert Water Level Sensor.

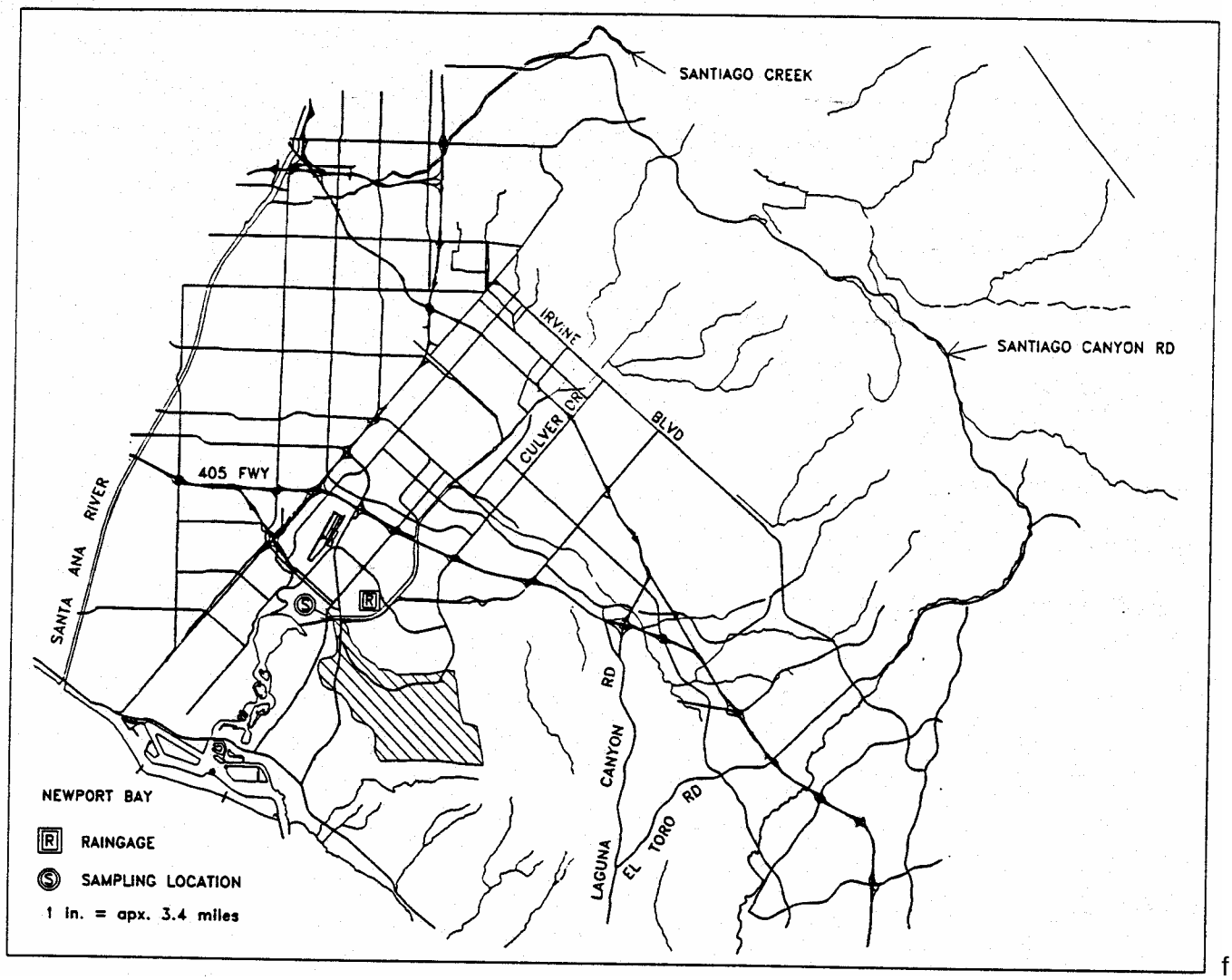

f

COSTA MESA CHANNEL

Location:	At Westcliff Drive Lat. 33-37-23 Long: 117-53-59
Channel:	G02
Storet Code:	CMCG02
Watershed Area:	approx. 1.0 sq.mi. (2.6 sq.km.)
Cities in Watershed:	Costa Mesa, Newport Beach
Raingage:	Santa Ana Delhi Alert #1111, Newport Harbor Master #88

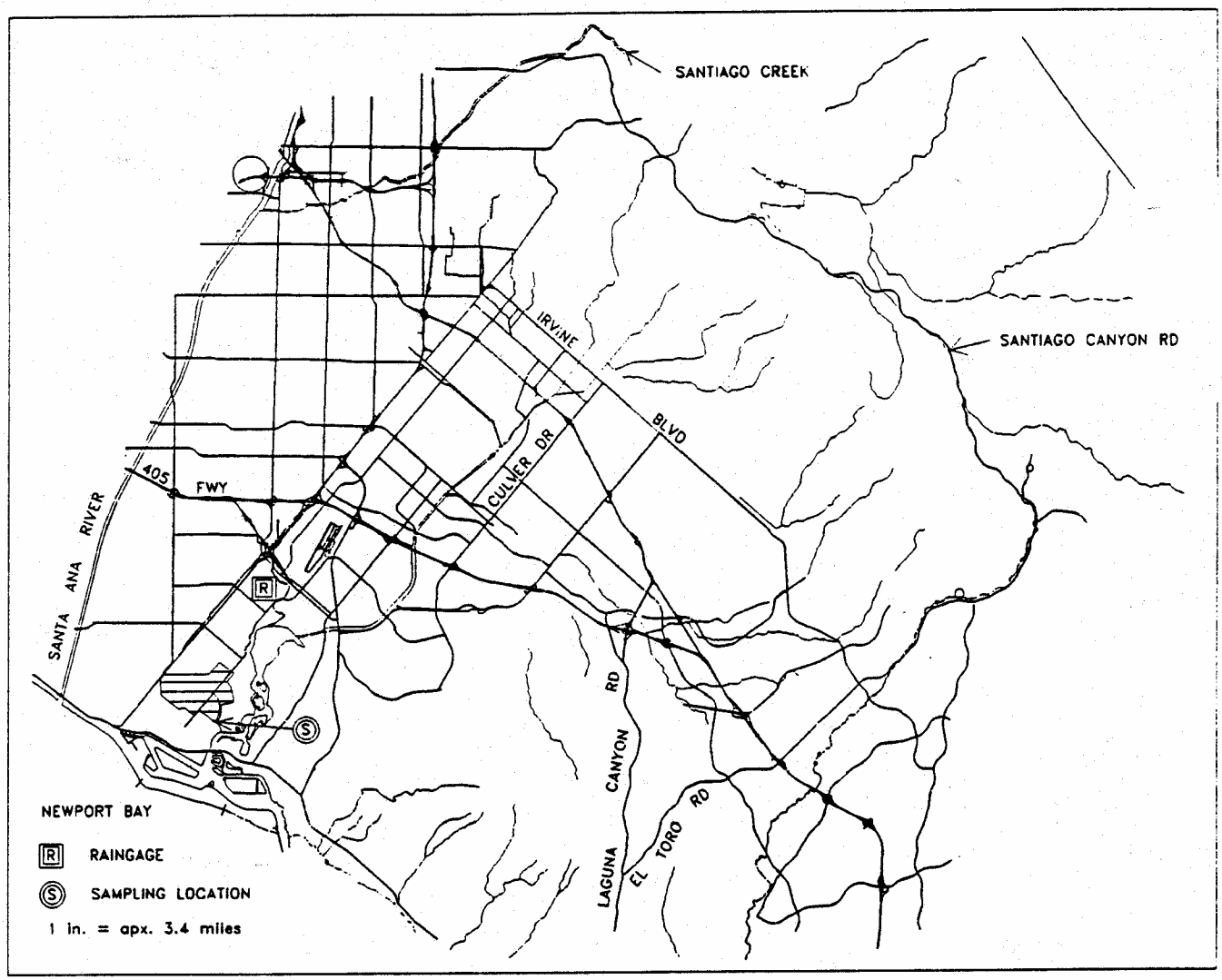

EAST GARDEN GROVE WINTERSBURG

Location:	At Gothard St. Lat. 33-43-03 Long: 117-59-57
Channel:	C05
Storet Code:	EGWC05
Watershed Area:	20.8 sq.mi. (53.8 sq.km)
Cities in Watershed:	Anaheim, Fountain Valley, Garden Grove, Huntington Beach, Orange, Santa Ana, Westminster
Raingage:	Katella Yard Alert #223
Gaging Station:	#217
Equipment:	Stevens A-71 Water-Stage Recorder with Nitrogen Bubbler and Balanced Beam Manometer Alert Water Level Sensor and Rain Gage.

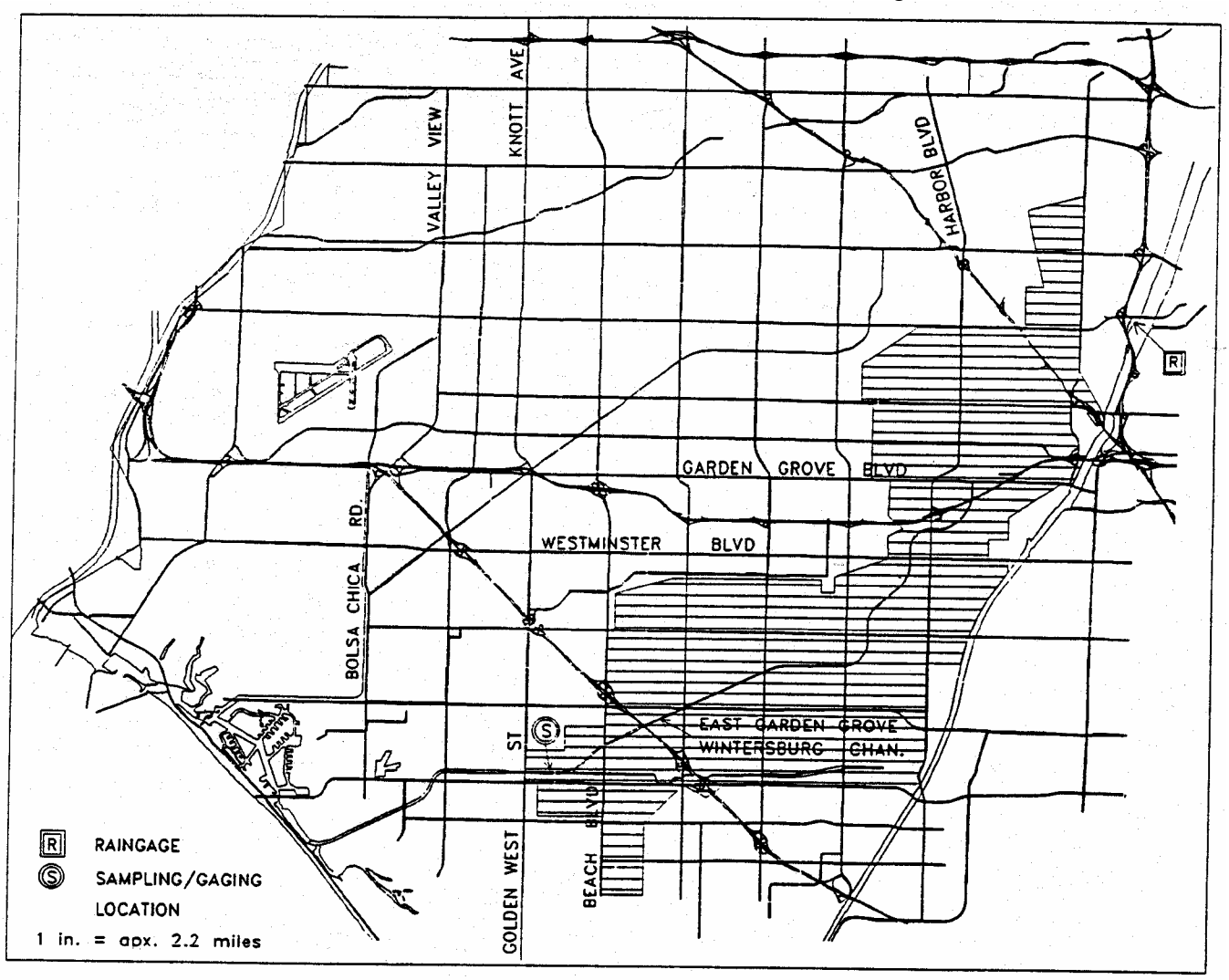

HICKS CANYON WASH

Location:	At Culver Blvd. Lat. 33-43-25 Long: 117-46-02
Channel:	F27
Storet Code:	HCWF27
Watershed Area:	approx. 7.5 sq mi. (19.4 sq. km)
Cities in Watershed:	Irvine
Raingage:	Lambert Reservoir Alert #217

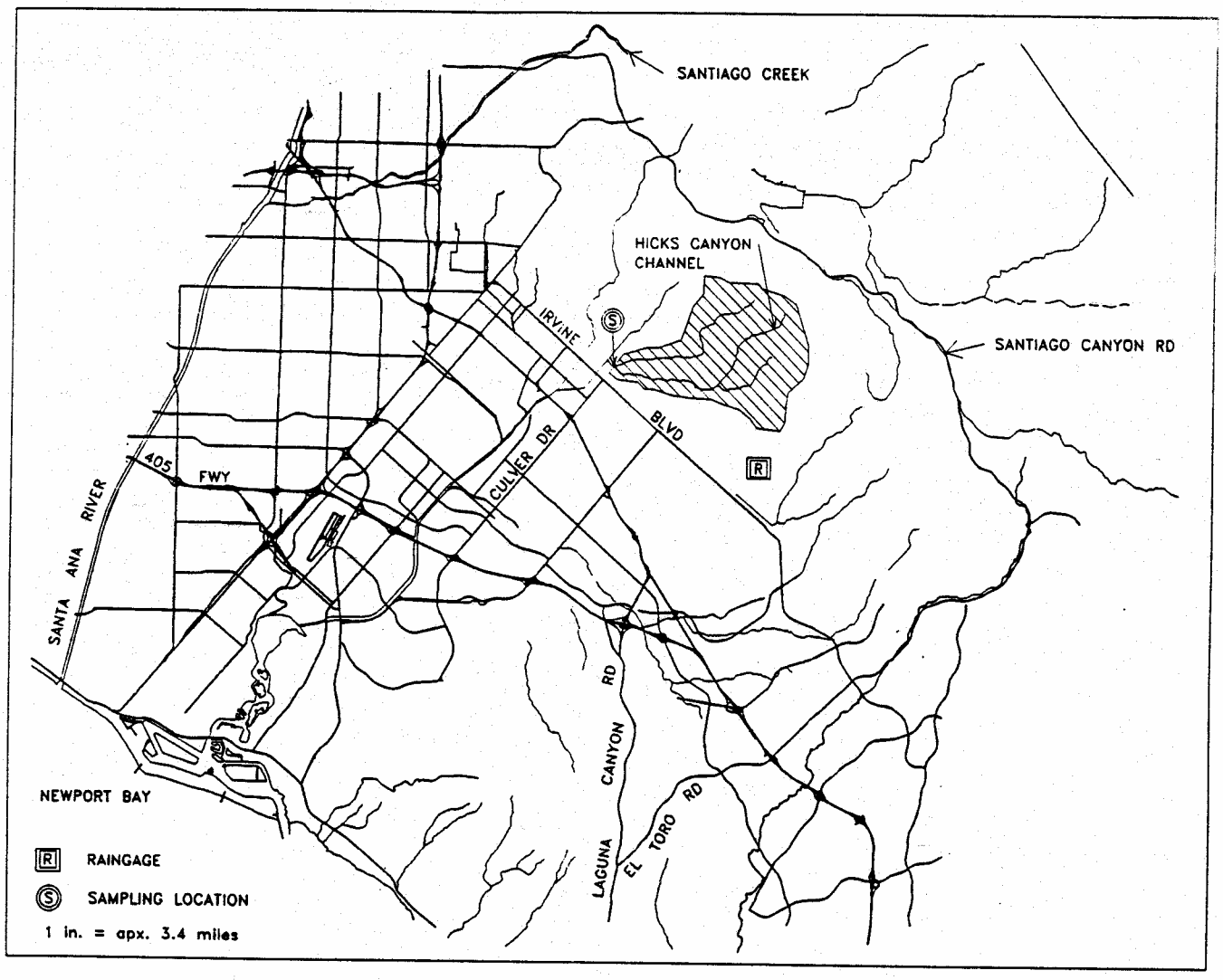

LAGUNA CANYON CHANNEL

Location:	At Woodland Ave. Lat. 33-33-15 Long: 117-46-29
Channel:	I02
Storet Code:	LCWI02
Watershed Area:	8.3 sq. mi. (21.4 sq. km)
Cities in Watershed:	Laguna Beach
Raingage:	Laguna Canyon Alert #1120
Gaging Station:	#222
Equipment:	Stevens A-71 Water-Stage Recorder with Nitrogen Bubbler and Balanced Beam Manometer. Alert Rain Gage and Water Level Sensor

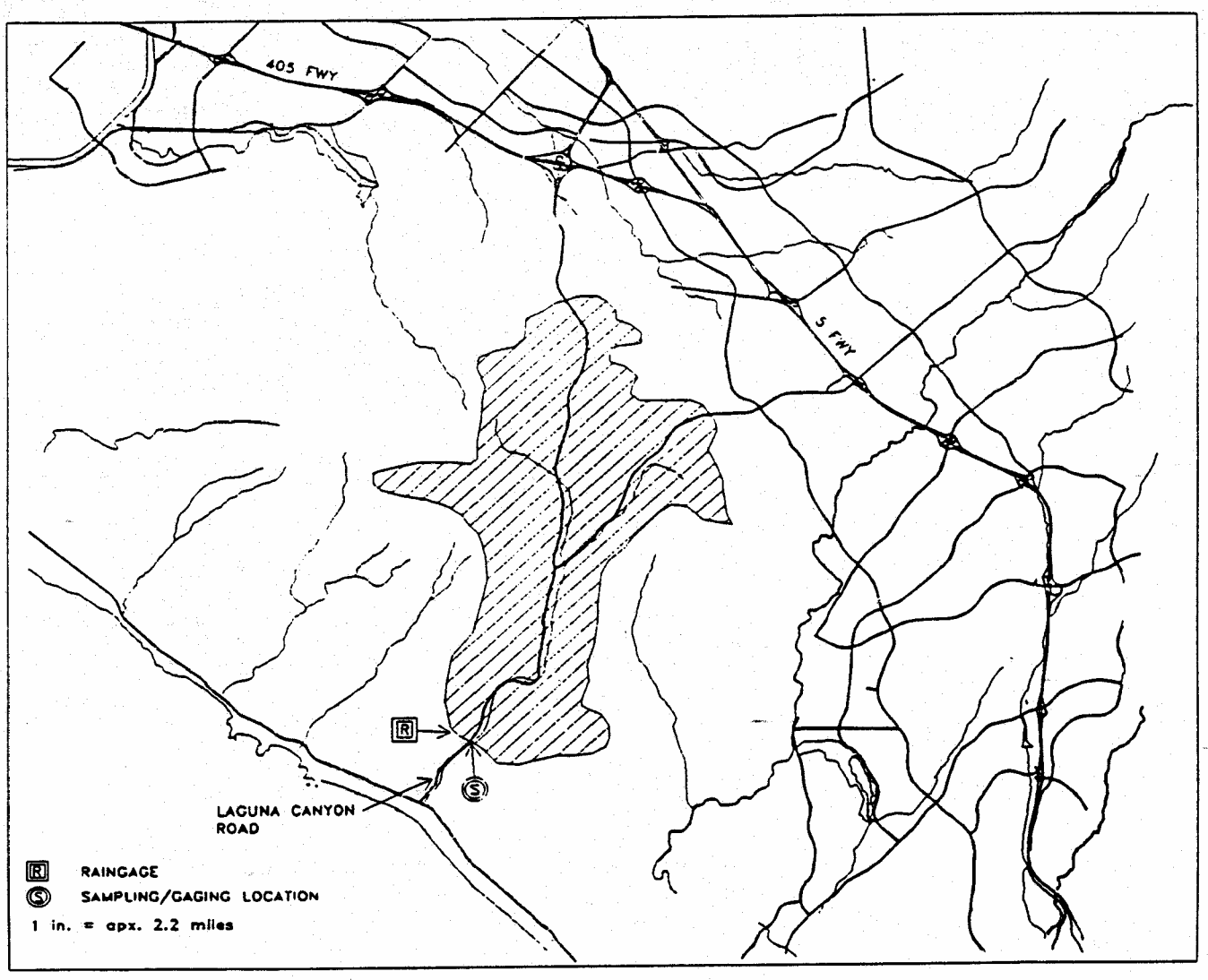

LANE CHANNEL

Location:	At McCabe Way, upstream F08/F05 confluence Lat. 33-40-40 Long: 117-50-39
Channel:	F08
Storet Code:	LANF08
Watershed Area:	approx. 4.6 sq. mi. (11.9 sq. km.)
Cities in Watershed:	Irvine, Santa Ana
Raingage:	Santa Ana Engineering Alert #219, Santa Ana #121

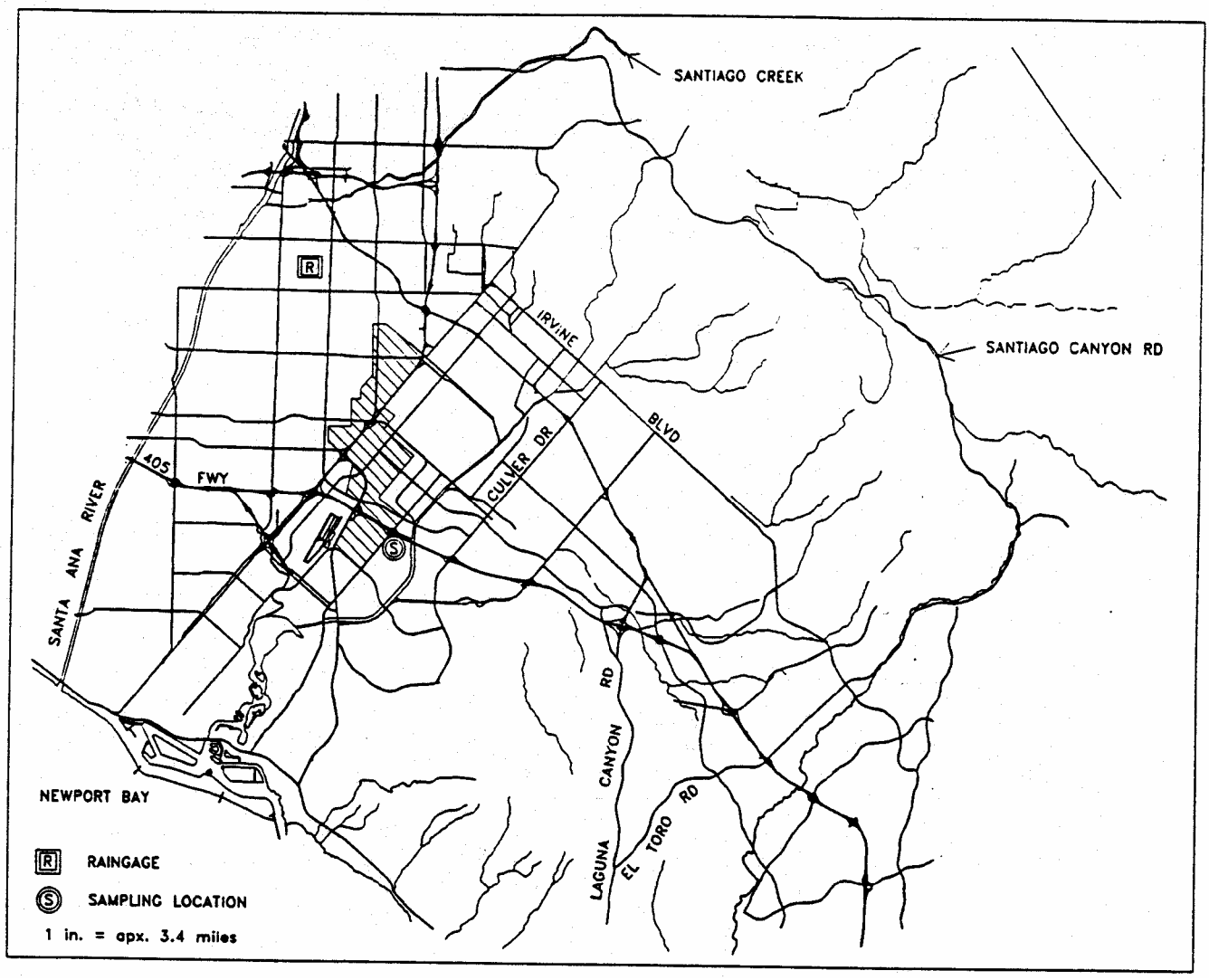

OSO CREEK

Location:	At Crown Valley Parkway Lat. 33-45-28 Long: 117-40-35
Channel:	L03
Storet Code:	OSOL03
Watershed Area:	14.0 sq.mi. (36.2 sq.km)
Cities in Watershed:	Laguna Hills, Laguna Niguel, Mission Viejo
Raingage:	Upper Oso Creek Alert #297, Trabuco Canyon #133
Gaging Station:	#218
Equipment:	Stevens A-71 Water-Stage Recorder with Float Alert Rain Gage and Water Level Sensor

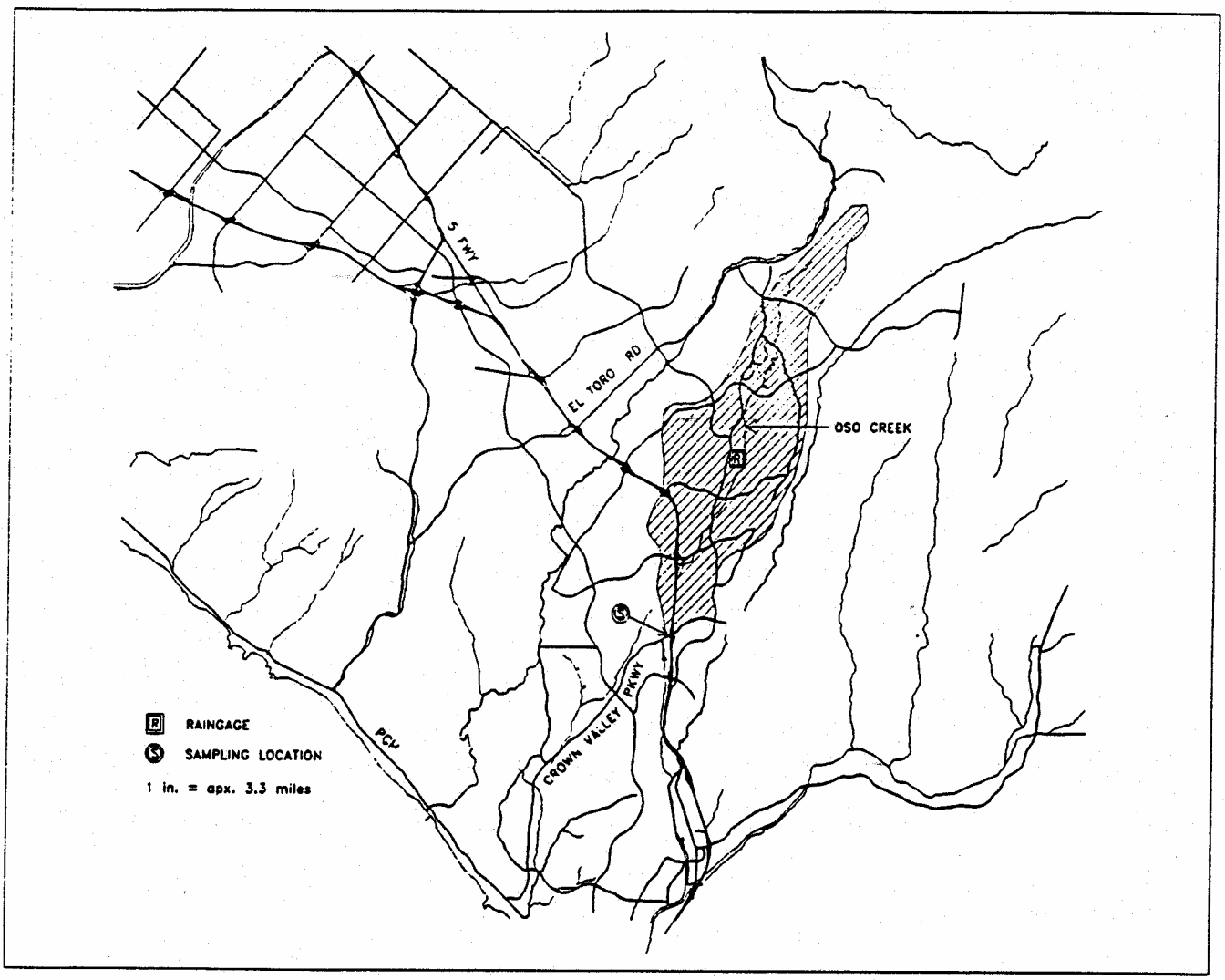

PRIMA DESHECHA CHANNEL

Location:	At Calla Grande Vista Lat. 33-26-44 Long: 117-38-38
Channel:	M01
Storet Code:	PDCM01
Watershed Area:	7.0 sq mi. (18.1 sq.km)
Cities in Watershed:	San Clemente, San Juan Capistrano
Raingage:	San Juan Capistrano Alert #215

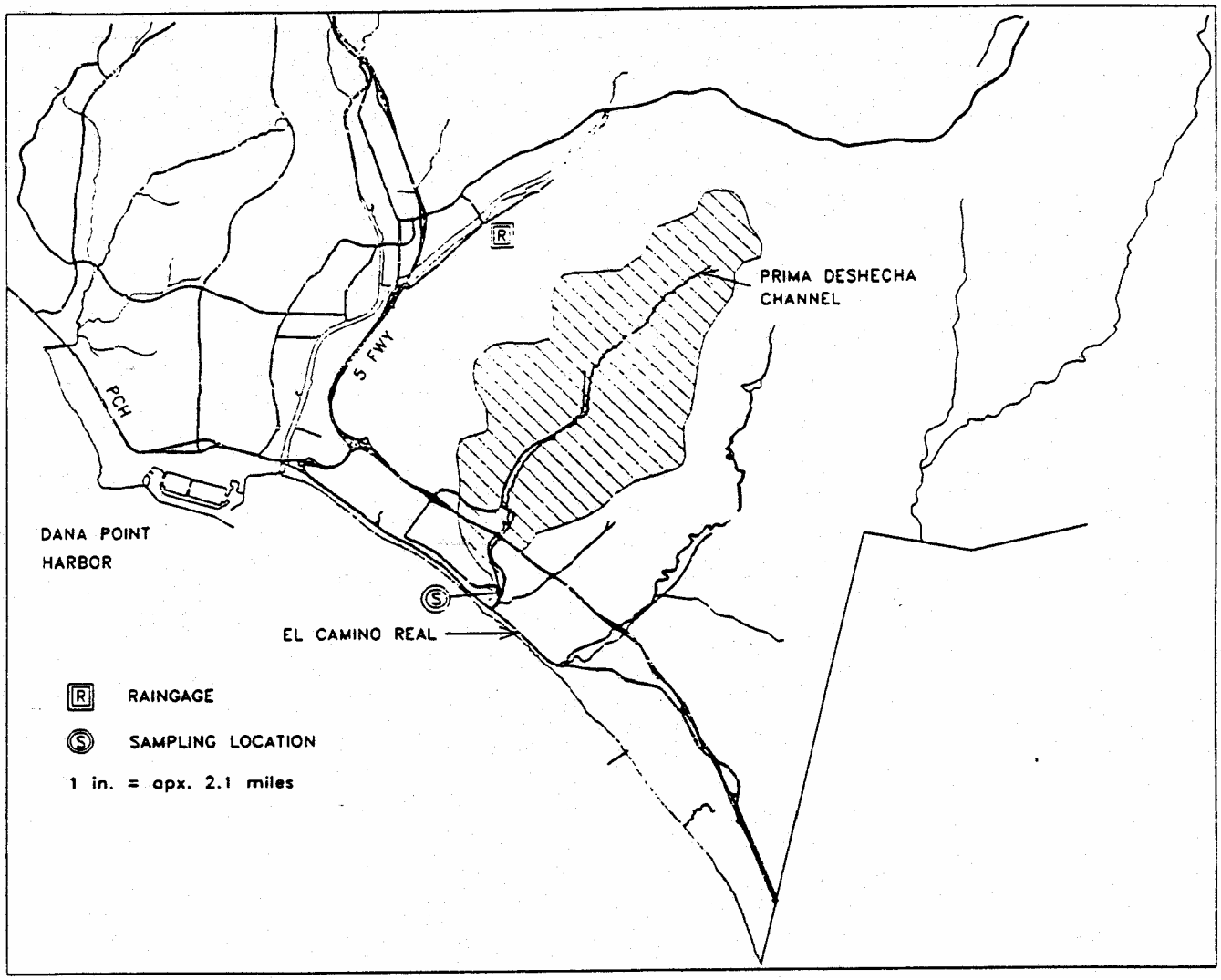

RATTLESNAKE CANYON WASH

Location:	At Irvine Blvd. Lat. 33-43-38 Long: 117-46-46
Channel:	F26
Storet Code:	RCWF26
Watershed Area:	
Cities in Watershed:	Irvine, Tustin
Raingage:	Lambert Reservoir Alert #217

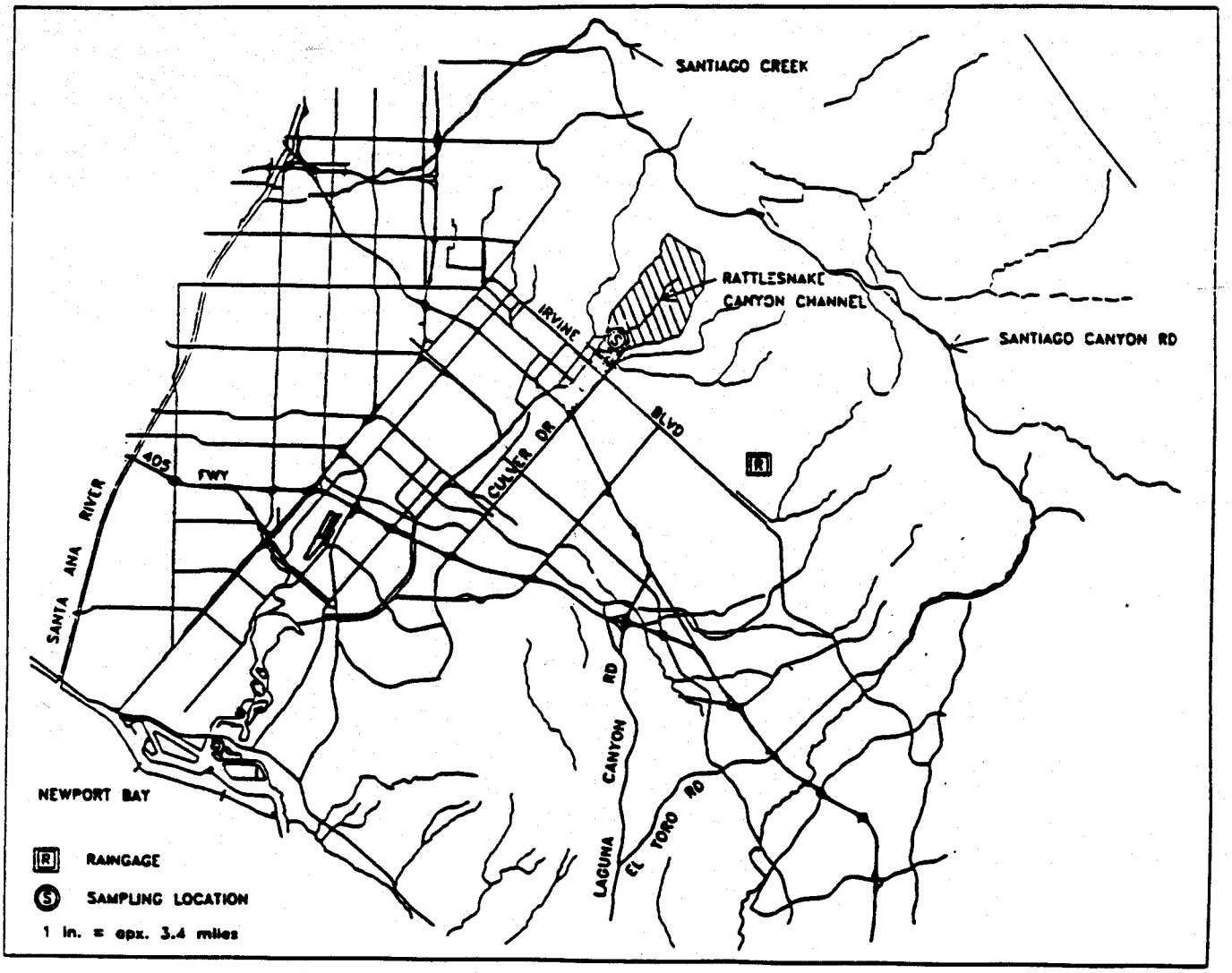

PETERS CANYON CHANNEL

Location:	At Barranca Road Lat. 33-41-30 Long: 117-49-23
Channel:	F06
Storet Code:	BARSED
Watershed Area:	45.2 sq.mi. (117.1 sq.km)
Cities in Watershed:	Irvine, Santa Ana
Raingage:	San Ana Engineering Alert #219, Santa Ana #121
Gaging Station:	#230
Equipment:	Stevens A-71 Water-Stage Recorder with Nitrogen Bubbler and Balanced Beam Manometer. Alert Rain Gage and Water Level Float.

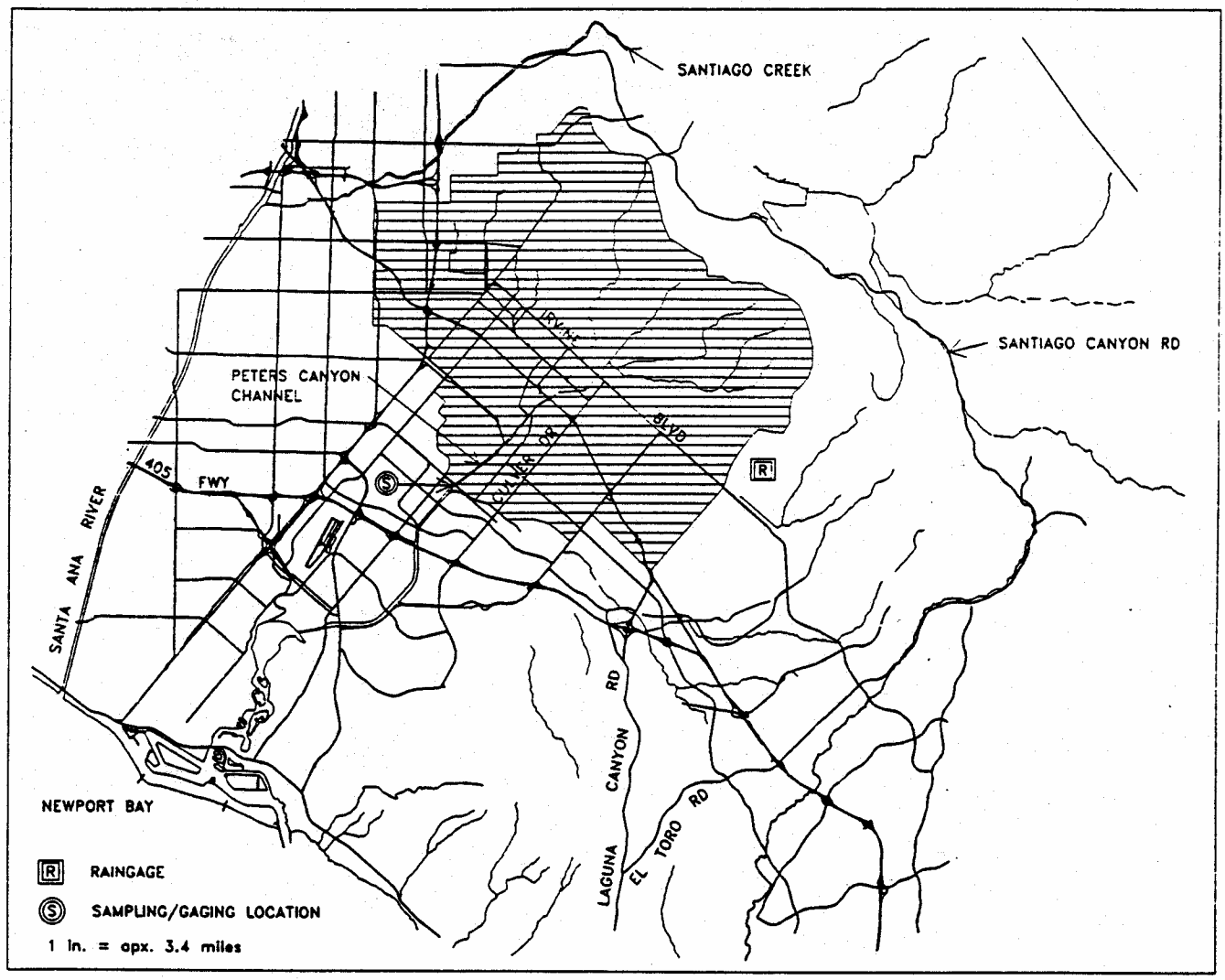

SAN DIEGO CREEK AT CAMPUS

Location:	At Campus Drive Lat. 33-39-19 Long: 117-50-43
Channel:	F05
Storet Code:	SDMF05
Watershed Area:	111.0 sq.mi. (287.5 sq.km.)
Cities in Watershed:	Irvine, Lake Forest, Orange, Santa Ana, Tustin
Raingage:	Lambert Reservoir Alert #217
Equipment:	Stevens A-71 Water Stage Recorder and Nitrogen Bubbler and Balanced Beam Manometer Alert Rain Gage and Water Level Sensor.

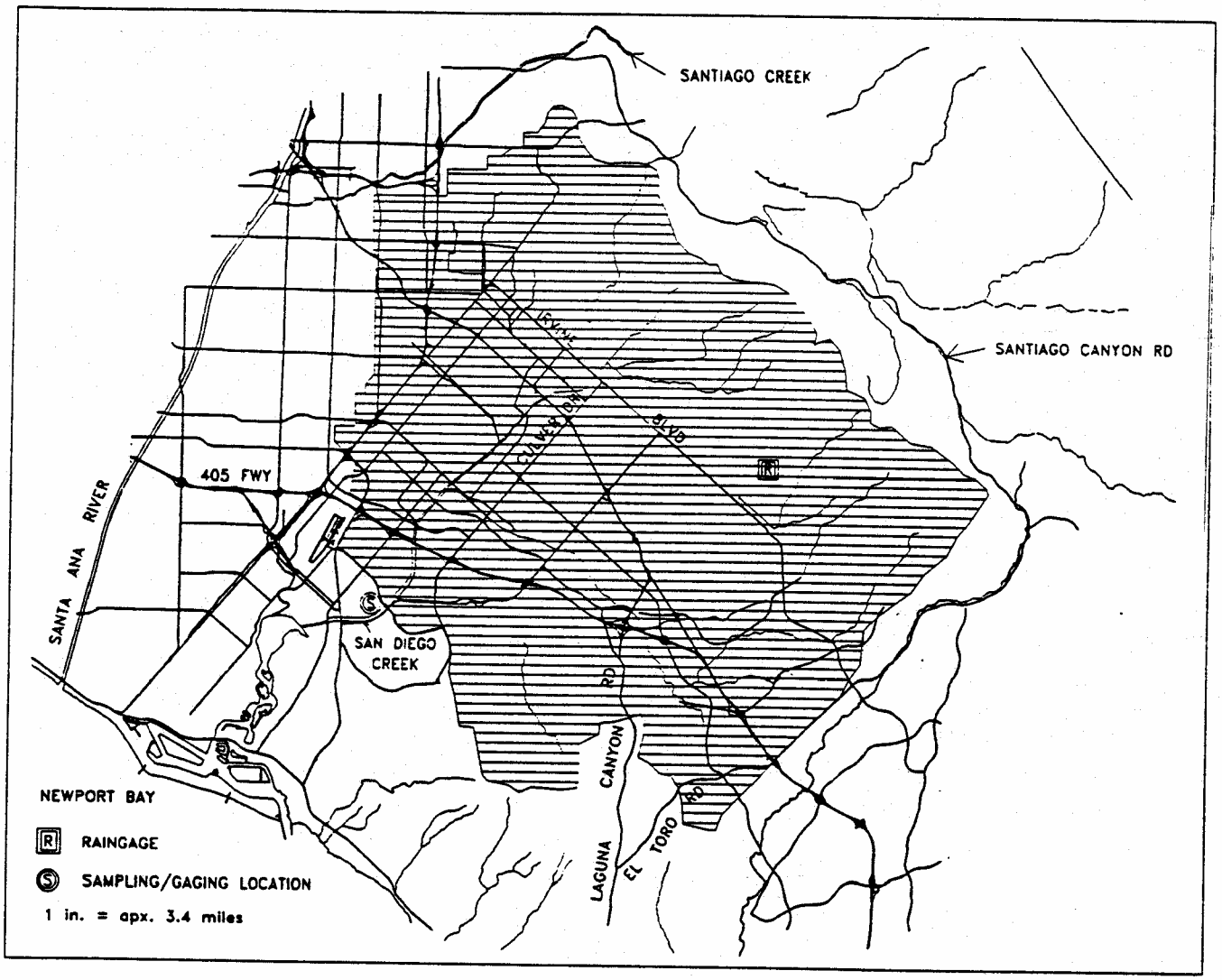

SAN DIEGO CREEK AT CULVER

Location:	At Culver Lat. 33-40-53 Long: 117-48-34
Channel:	F05
Storet Code:	WYLSED
Watershed Area:	41.8 sq mi. (108.3 sq. km)
Cities in Watershed:	Irvine, Lake Forest
Raingage:	Lambert Reservoir Alert #217
Gaging Station:	#231
Equipment:	Stevens A-71 Water-Stage Recorder with Nitrogen Bubbler and Balanced Beam Manometer

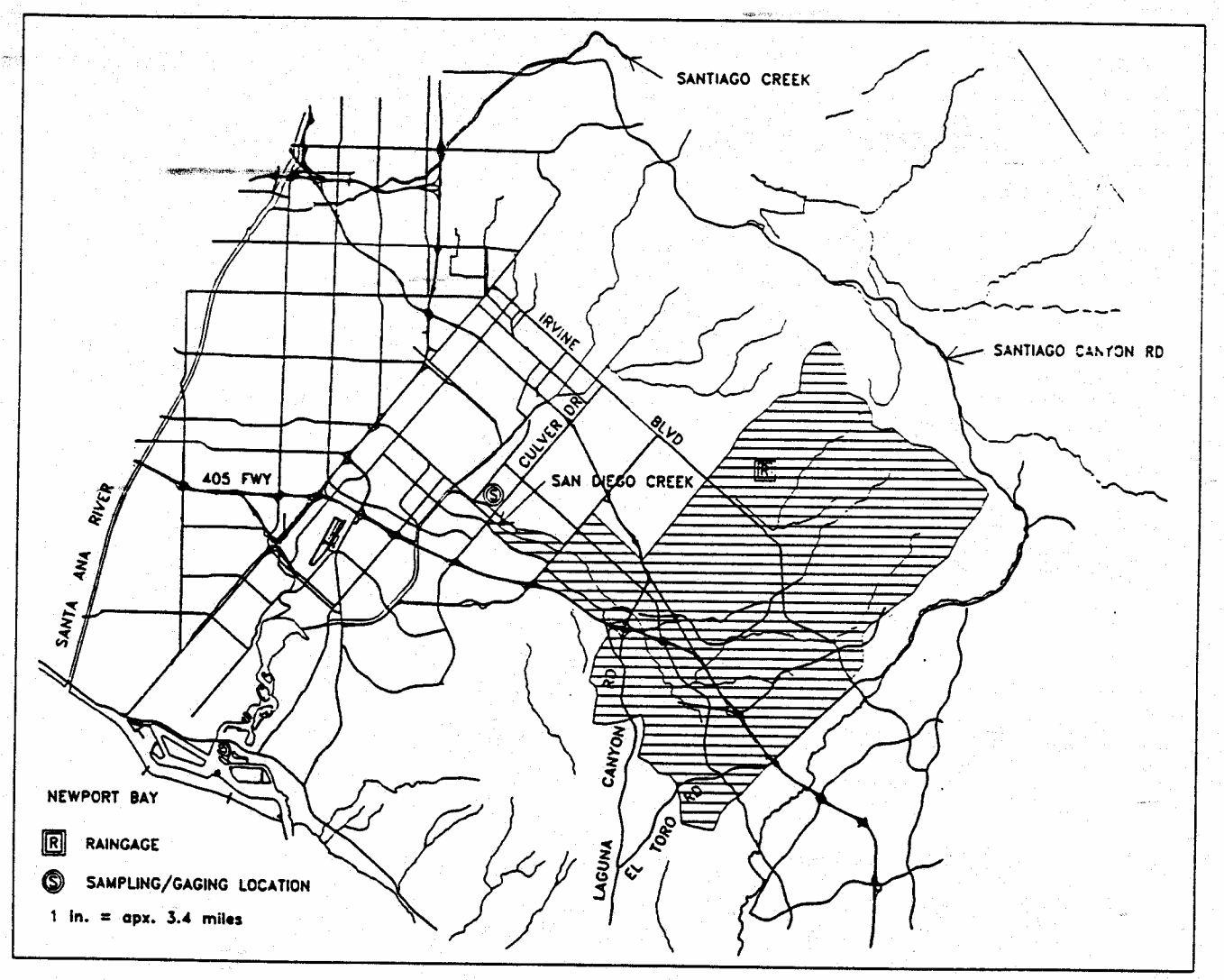

SAND CANYON CHANNEL

Location:	At Culver and University Lat. 33-39-25 Long: 117-49-39
Channel:	F15
Storet Code:	SCCF1 5
Watershed Area:	approx. 9.6 sq.mi. (24.8 sq.km.)
Cities in Watershed:	Irvine
Raingage:	San Diego Creek Alert #1125

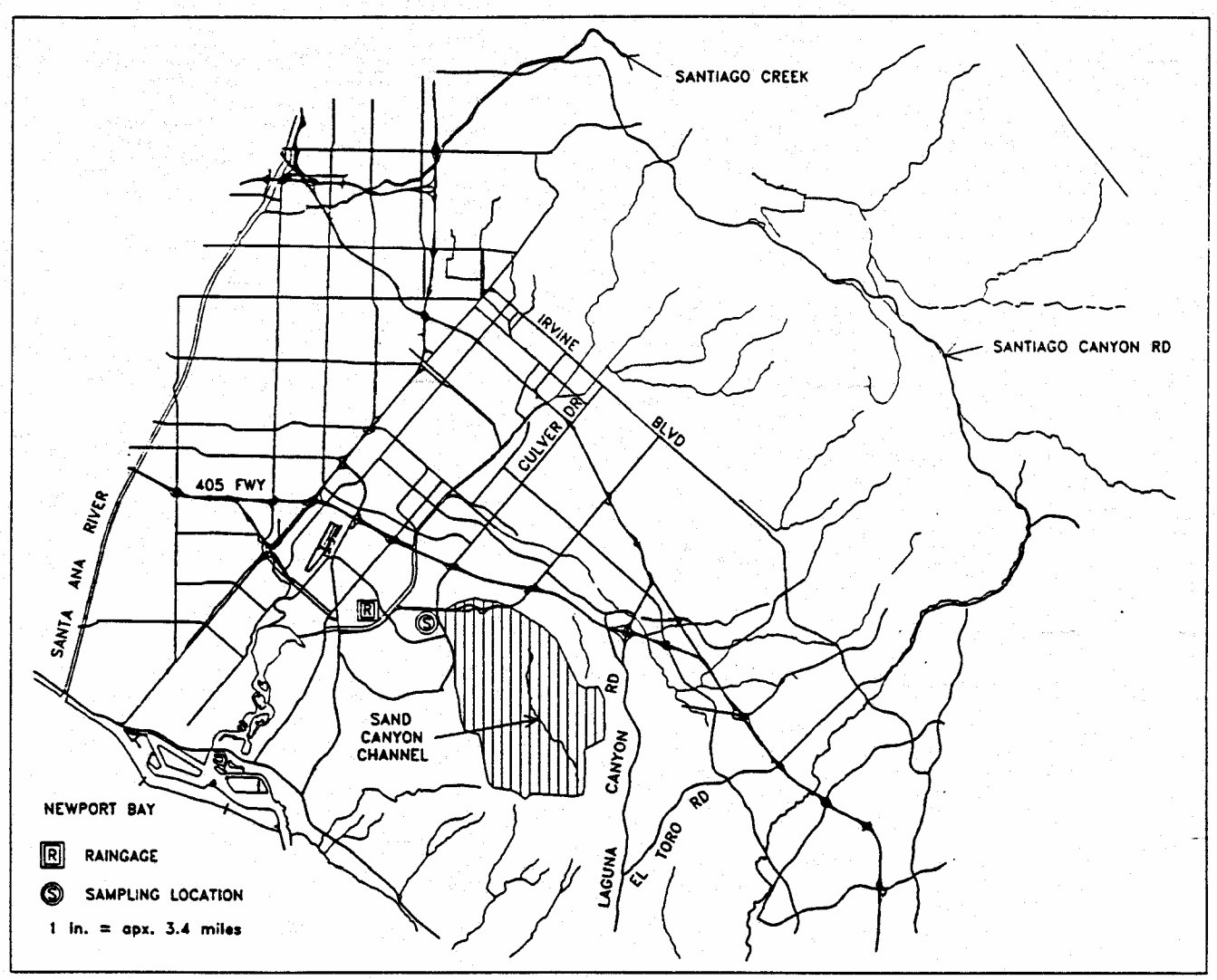

SANTA ANA DELHI CHANNEL

Location:	Upstream Irvine Ave. Lat. 33-39-35 Long: 117-52-51
Channel:	F01
Storet Code:	SADF01
Watershed Area:	17.6 sq mi. (45.6 sq.km)
Cities in Watershed:	Costa Mesa, Irvine, Newport Beach, Santa Ana
Raingage:	Costa Mesa Alert #1150, Costa Mesa #165
Gaging Station:	#220
Equipment:	Stevens A-71 Water-Stage Recorder with Nitrogen Bubbler and Balanced Beam Manometer. Alert Rain Gage and Water Level Sensor.

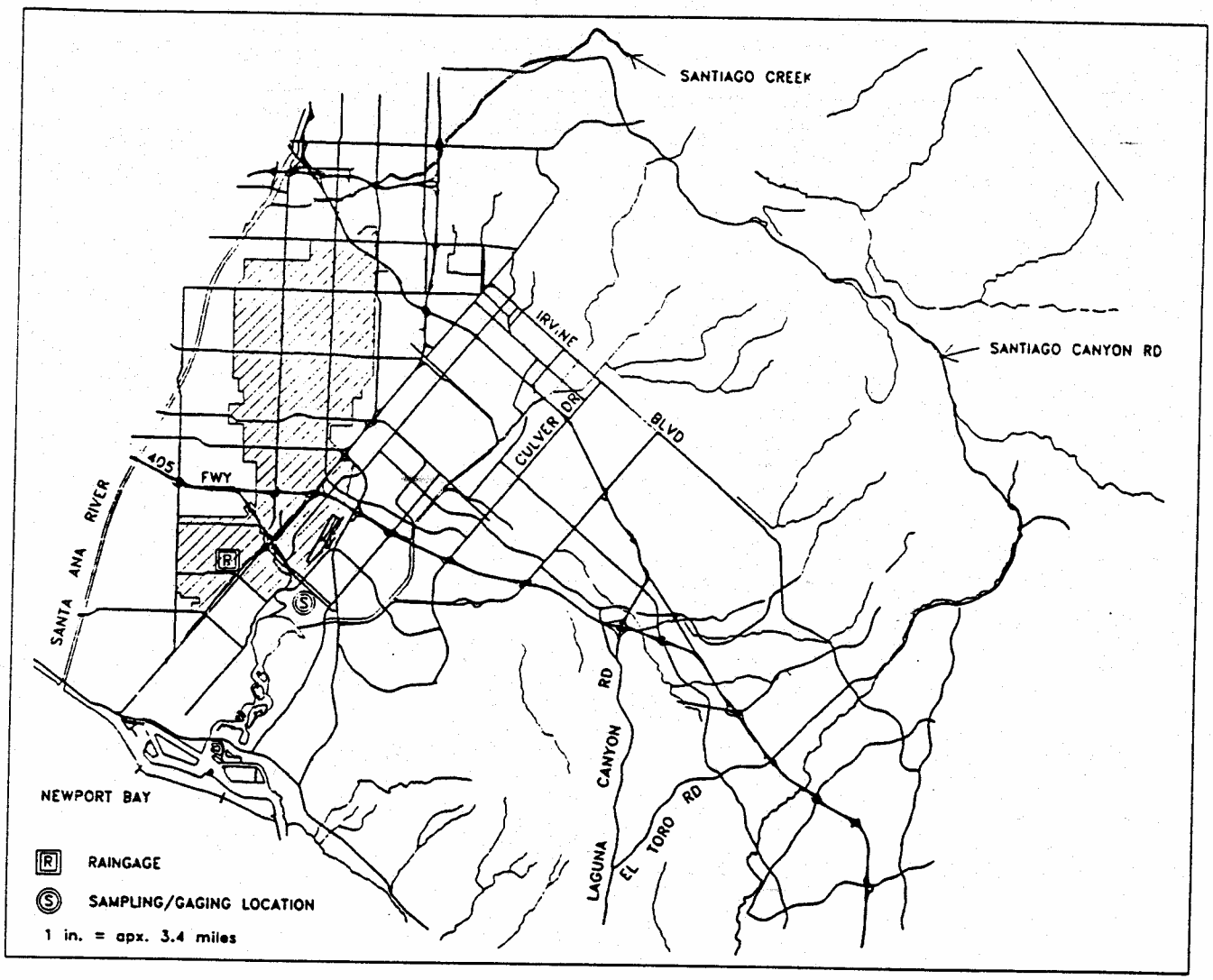

SEGUNDA DESHECHA CHANNEL

Location:	At El Camino Real Lat. 33-25-58 Long: 117-37-57
Channel:	M02
Storet Code:	SDCM02
Watershed Area:	8.9 sq mi. (23.1 sq.km)
Cities in Watershed:	San Clemente
Raingage:	San Juan Capistrano Alert #215

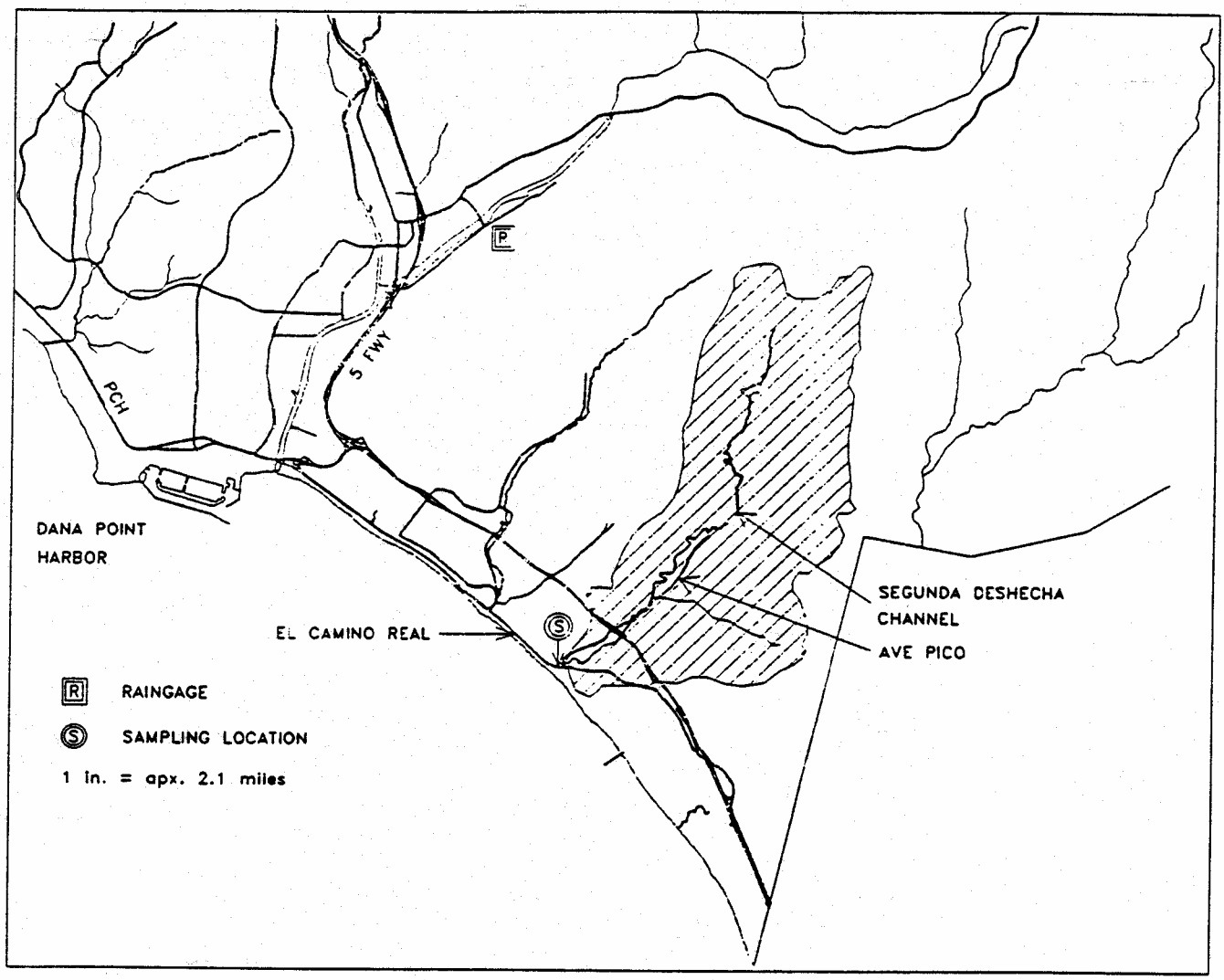

SERRANO CREEK

Location:	At Alton and Muirlands Lat. 33-38-34 Long: 117-41-32
Channel:	F19
Storet Code:	SERF19
Watershed Area:	approx. 6.9 sq.mi. (17.9 sq.km.)
Cities in Watershed:	Irvine, Lake Forest
Raingage:	Lambert Reservoir Alert #217

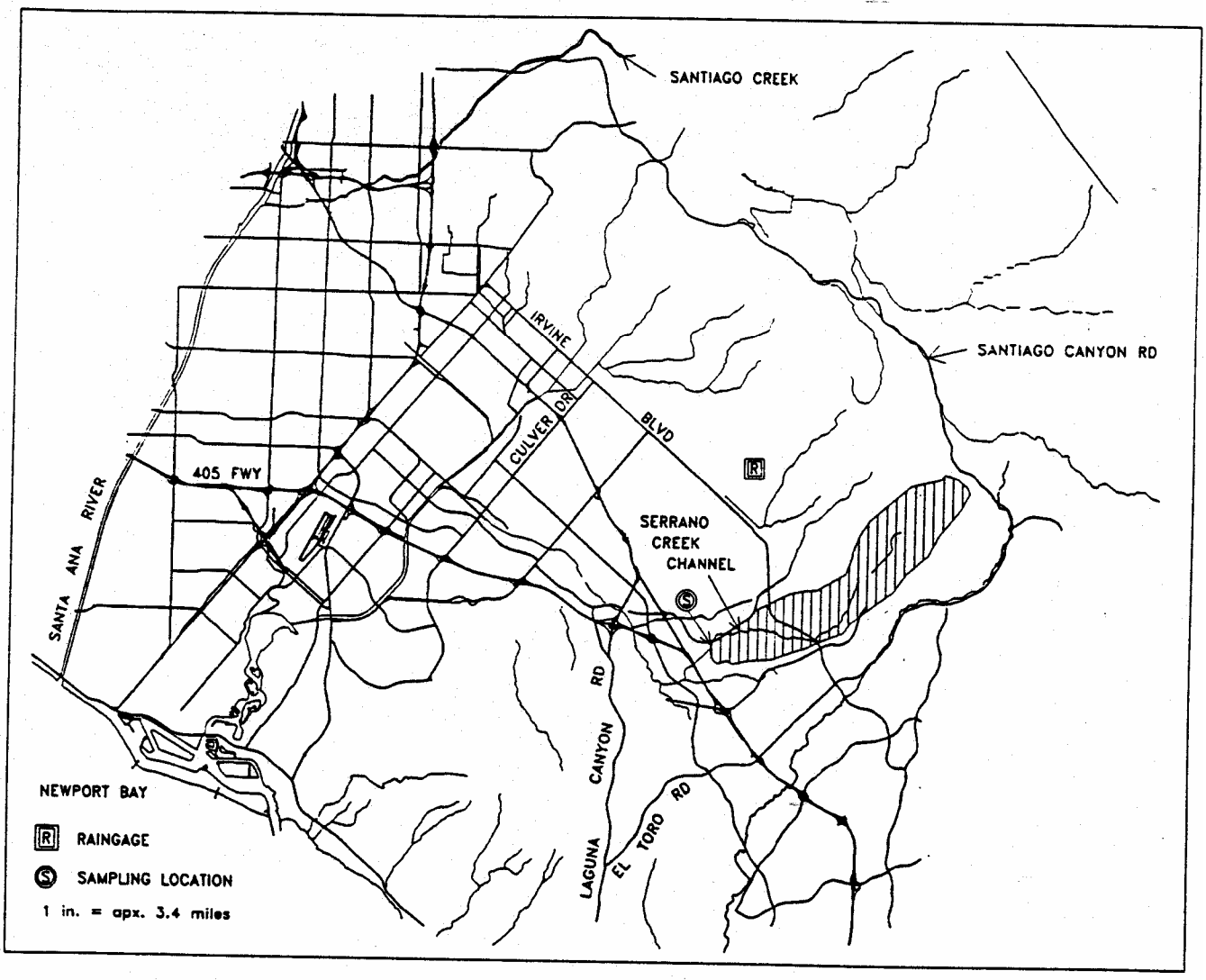

WESTMINSTER CHANNEL

Location:	At Hazard Downstream Beach Blvd. Lat. 33-45-07 Long: 117-59-26
Channel:	C04
Storet Code:	WMCC04
Watershed Area:	6.7 sq mi. (17.3 sq. km)
Cities in Watershed:	Garden Grove, Westminster
Raingage:	Garden Grove Alert #1175, Garden Grove Fire Station #229
Gaging Station:	#207
Equipment:	Stevens A-71 Water-Stage Recorder with Float Alert Water Level Sensor and Rain Gage.

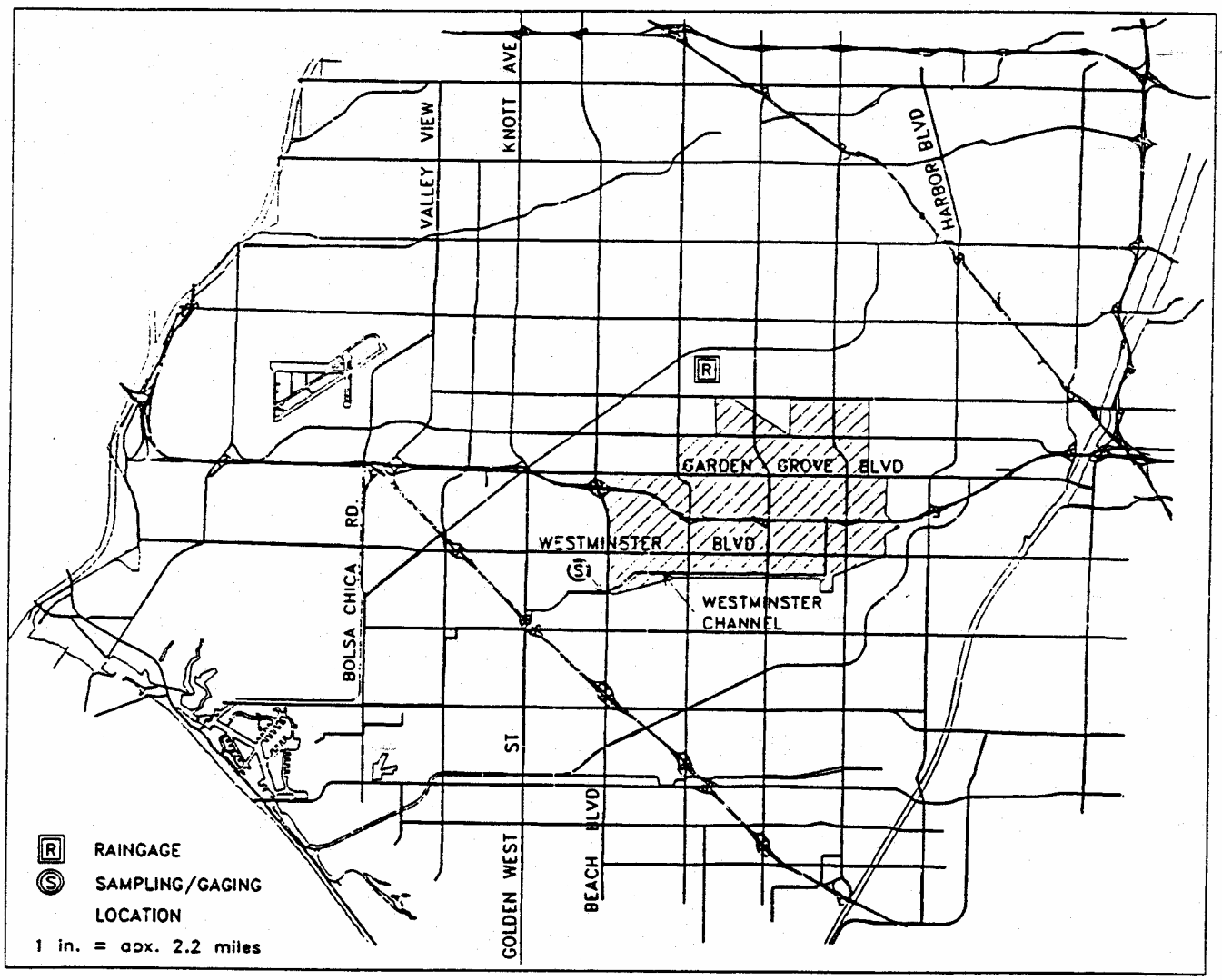

APPENDIX K

HARBOR/BAY MONITORING DATA

Huntington Harbour Watershed

STATION		SAMPLES Type	#	Turb NTU	EC umhos	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	oP mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
Anaheim Border City Channel																					
ABCC03	10/11/00 7:11	ST	5	27	440	7.4	12	0.427	10	3.98	0.069	530	135	1.9	18	90	48	18	<2	640	128
ABCC03	10/11/00 8:11	SF												<1	<8	13	<2	9.6	<2	80	
ABCC03	10/11/00 10:11	ST	12											<1	11	48	14	10	<2	250	
ABCC03	10/12/00 8:11	SF												<1	<8	17	<2	7.9	<2	91	
ABCC03	10/12/00 10:11	ST	6	7.6	795	8.8	8.6	<0.05	1.9	0.459	0.112	20	40	<1	<8	26	4.7	5	<2	97	
ABCC03	10/12/00 20:11	SF												<1	<8	19	<2	4	<2	46	
ABCC03	10/12/00 22:11	ST	22	1.5	1230	8.5	9	<0.05	1.1	0.704	0.029	<10	<10	<1	<8	13	<2	<4	<2	30	315
ABCC03	10/14/00 16:11	SF												<1	<8	11	<2	<4	<2	24	

Newport Bay Watershed

STATION	DATE/TIME	SAMPLES Type	#	Turb NTU	EC umhos	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	oP mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
									Agua Chinon Wash												
ACWF18	7/25/00 12:20	DT	1	2.5	1340	8	16	<0.05	1	2.59	0.737	<10	<1								
ACWF18	8/30/00 10:05	DT	1	2.6	1130	7.9	17	0.065	0.69	1.93	0.57	<10	<10								
ACWF18	9/8/00 12:15	DT	1	1.7	1760	8.8	22	<0.05	0.76	1.87	0.402	<10	<10								
ACWF18	11/8/00 10:00	DT	1	145	1830	7.7	53	0.166	2.2	2.88	0.426	180	23								
ACWF18	11/30/00 15:30	DT	1	6.3	1740	7.7	39	<0.05	0.39	1.84	0.489	<10	<10								
ACWF18	12/8/00 10:30	DT	1	6.7	1650	7.8	31	0.242	0.78	4.28	0.977	<10	<10								
ACWF18	1/3/01 9:00	DT	1	4.8	1580	8	28	<0.05	0.71	3.06	0.697	12	<10								
ACWF18	1/18/01 7:10	DT	1	5.9	1840	7.7	40	<0.05	0.75	2.3	0.435	<10	<10								
ACWF18	2/13/01 0:00	ST	1	2210	412	8.8	13	0.175	5	7.04		4620	420	1.8	20	24	13	18	<2	110	142
ACWF18	2/13/01 0:00	SF												<1	<8	4.9	<2	<4	<2	<10	
ACWF18	3/27/01 10:00	DT	1	29	1760	7.9	40	0.066	1.3	2.57	0.738	40	<10								592
ACWF18	4/18/01 0:00	DT	24	40	1640	8.1	38	<0.05	1.1	1.96	0.511	110	14								548
ACWF18	4/19/01 0:00																				
ACWF18	6/20/01 8:50	DT	24	75	895	8.3	5.5	<0.05	1.6	4.9	1.78	110	15								290
ACWF18	6/21/01 7:50																				

Newport Bay Watershed

STATION	DATE/TIME	SAMPLES Type	#	Turb NTU	EC umhos	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	oP mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
									Peters Canyon Wash												
BARSED	7/19/00 9:30	DT	1	10	2530	8.6	40	<0.05	1.2	0.615	0.06	20	10								
BARSED	8/4/00 12:25	DT	1	10	2400	8.9	35	<0.05	0.99	0.581	0.102	23	8								
BARSED	8/16/00 14:34	DT	24	19	2560	8.2	33	<0.05	1.5	0.673	0.084	30	<10								
BARSED	8/17/00 13:34																				
BARSED	8/29/00 14:25	DT	24	5.8	1940	8.4	37	0.166	1.5	1.04	0.227	<10	<10								
BARSED	8/30/00 13:25																				
BARSED	9/12/00 11:32	DT	24	7.4	2410	8.4	33	<0.05	1.3	0.337	0.026	13	<10								
BARSED	9/13/00 10:32																				
BARSED	9/26/00 12:36	DT	24	3.4	2420	8.6	44	<0.05	0.78	1.1	0.196	10	<10								
BARSED	9/27/00 11:36																				
BARSED	10/5/00 11:15	DT	24	6	2280	8.5	40	<0.05	0.94	0.918	0.149	25	<10								
BARSED	10/6/00 10:15																				
BARSED	10/10/00 9:28	ST	5	34	1120	7.5	38	0.908	12	3.67	0.15	290	80	1.1	11	60	13	12	<2	170	328
BARSED	10/10/00 10:28																				
BARSED	10/10/00 11:28	ST	12	17	1620	7.8	44	0.345	4.1	1.56	0.205	74	18	<1	8.3	31	3.8	5.1	<2	62	520
BARSED	10/11/00 11:28	SF												<1	<8	16	<2	<4	<2	34	
BARSED	10/11/00 13:28	ST	38	10	2120	8.3	40	0.228	2.4	1.19	0.184	16	40	<1	<8	14	<2	<4	<2	25	615
BARSED	10/14/00 6:28	SF												<1	<8	13	<2	<4	<2	18	
BARSED	10/27/00 3:43	ST	5	300	1530	8.2	53	0.742	5.7	4.59	0.54	620	100								
BARSED	10/27/00 4:43																				
BARSED	10/27/00 6:43	ST	8	700	1120	7.5	32	0.409	3.2	3.98	0.546	430	60	1.1	20	84	11	13	<2	140	300
BARSED	10/27/00 20:43	SF												<1	11	13	<2	5	<2	18	
BARSED	10/27/00 22:43	ST	18	18	2390	8.2	57	0.233	1.7	1.77	0.44	25	<10	<1	8.1	14	<2	<4	<2	29	734
BARSED	10/29/00 7:43	SF												<1	8.6	11	<2	<4	<2	16	
BARSED	10/29/00 9:43	ST	5	12	2710	8.5	53	0.075	0.75	0.949	0.19	12	<10								
BARSED	10/29/00 17:43	SF																			
BARSED	10/29/00 19:43	ST	10	137	1070	7.8	25	0.209	2.1	2.51	0.489	190	29	<1	13	19	7.2	6.8	<2	79	320
BARSED	10/30/00 13:43	SF												<1	9	9.4	<2	<4	<2	20	
BARSED	10/30/00 15:43	ST	7	20	2290	8.3	44	0.138	1.1	0.979	0.352	19	<10	<1	8.7	17	<2	<4	<2	23	640
BARSED	10/31/00 3:43	SF												<1	8.3	7.5	<2	<4	<2	18	
BARSED	11/8/00 10:30	DT	1	5.3	2330	8.9	43	<0.05	1.5	0.306	0.22	18	<10								
BARSED	11/30/00 10:32	DT	24	5	2630	8.3	53	0.133	0.96	0.765	0.114	13	<10								
BARSED	12/1/00 9:32																				
BARSED	12/14/00 8:50	DT	24	9.9	2510	8.8	70	<0.05	1.6	1.1	0.215	37	11								
BARSED	12/15/00 7:50																				
BARSED	12/26/00 8:56	DT	24	22	2070	8.5	66	0.116	1.4	1.71	0.302	41	10								
BARSED	12/27/00 7:56																				
BARSED	1/8/01 14:35	ST	5	2.6	1260	7.6	44	1.42	5.1	3.67	0.449	<10	<10	1.9	13	31	9.9	15	<2	130	222
BARSED	1/8/01 15:35																				
BARSED	1/8/01 17:35	ST	8	170	810	7.7	20	1.13	6.5	4.28	0.311	600	110	2.4	21	86	38	27	<2	400	148
BARSED	1/9/01 0:00													<1	<8	12	<2	<4	<2	11	
BARSED	1/9/01 7:35																				

Newport Bay Watershed

STATION	DATE/TIME	SAMPLES Type	#	Turb NTU	EC umhos	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	oP mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
									Peters Canyon Wash												
BARSED	1/10/01 14:26	ST		160	2190	8.2	48	<0.05	3.3	2.36	0.5	<10	48								
BARSED	1/10/01 16:26																				
BARSED	1/10/01 18:26	ST	21	270	455	7.8	16	0.266	2	3.06	0.44	300	40	1.5	16	32	12	15	<2	110	248
BARSED	1/12/01 12:26	SF												<1	<8	6.4	<2	<4	<2	<10	
BARSED	1/17/01 7:10	DT	2	6	3280	8.1	84	<0.05	0.75	0.581	0.167	<10	<10								
BARSED	1/18/01 6:10																				
BARSED	1/24/01 8:57	ST	5	283	930	7.9	25	0.792	5.5	2.75	0.242	430	76	1.4	10	35	15	13	<2	180	300
BARSED	1/24/01 9:57	SF												<1	<8	10	<2	4.3	<2	16	
BARSED	1/24/01 11:57	ST	10	104	1430	8	44	0.508	2.3	1.93	0.372	110	16	<1	<8	17	4.6	7.4	<2	59	414
BARSED	1/25/01 5:57	SF												<1	<8	9.4	<2	5.3	<2	17	
BARSED	1/25/01 7:57	ST	12	9	2950	7.8	84	0.111	0.47	0.887	0.269	<10	<10	<1	<8	4.6	<2	4.7	<2	13	966
BARSED	1/26/01 5:57	SF												<1	<8	4.2	<2	4.5	<2	13	
BARSED	1/26/01 7:57	ST	26	128	1860	8.2	57	0.33	0.94	1.59	0.281	170	22	<1	<8	15	7.3	8.6	<2	71	592
BARSED	1/28/01 9:57	SF												<1	<8	5.7	<2	5	<2	14	
BARSED	2/1/01 9:22	DT	24	3.5	3510	8.2	84	<0.05	0.4	0.643	0.153	<10	<10								1128
BARSED	2/2/01 8:22																				
BARSED	2/14/01 0:00	ST	24	73	1070	7.8	21	0.155	1.5	1.65	0.356	67	<10								305
BARSED	2/15/01 0:00																				
BARSED	2/22/01 8:30	DT	24	4	5630	8.2	210	<0.05	0.71	0.612	0.026	<10	<10								2400
BARSED	2/23/01 7:30																				
BARSED	3/6/01 2:56	ST	5	170	1130	7.4	30	0.136	2.2	1.93		240	37	1.2	12	40	14	10	<2	170	340
BARSED	3/6/01 3:56	SF												<1	<8	8.1	<2	<4	<2	16	
BARSED	3/6/01 5:56	ST	5	260	1180	7.4	33	0.11	1.8	2.17	0.214	330	40	1.5	12	21	10	11	<2	98	395
BARSED	3/6/01 13:56	SF												<1	<8	2.3	<2	<4	<2	14	
BARSED	3/7/01 14:56	ST	13	31	2940	8	97	0.168	1.3	0.857	0.219	22	<10	<1	<8	12	<2	<4	<2	28	1090
BARSED	3/7/01 15:56	SF												<1	<8	7.4	<2	<4	<2	17	
BARSED	3/7/01 17:56	ST	30	30	3380	8.3	100	<0.05	1.1	0.979	0.23	45	<10	<1	<8	6.8	3	<4	<2	44	1215
BARSED	3/10/01 3:56	SF												<1	<8	<2	<2	<4	<2	16	
BARSED	3/20/01 8:49	DT	24	2.2	3220	8.3	88	<0.05	0.75	0.153	0.041	<10	<10								1025
BARSED	3/21/01 7:49																				
BARSED	4/3/01 0:00	DT	24	12	2670	8.2	97	0.757	2.6	1.41	0.409	48	15								890
BARSED	4/4/01 0:00																				
BARSED	4/25/01 8:45	DT	24	2.6	2670	8.3	57	<0.05	1.1	0.459	0.088	<10	<10								828
BARSED	4/26/01 7:45																				
BARSED	5/15/01 10:00	DT	24	3.9	2320	8.6	75	<0.05	2.2	1.71	0.479	<10	<10								
BARSED	5/16/01 9:00																				
BARSED	5/16/01 10:00	DT	24	3.9	2590	8.6	88	0.65	2.9	1.9	0.549	<10	<10								
BARSED	5/17/01 9:00																				
BARSED	5/17/01 10:00	DT	24	2.9	2520	8.6	75	<0.05	1.7	1.1	0.34	<10	<10								
BARSED	5/18/01 9:00																				
BARSED	5/18/01 10:00	DT	24	2.9	2380	8.5	70	<0.05	4.3	1.35	0.337	<10	<10								
BARSED	5/19/01 9:00																				

Newport Bay Watershed

STATION	DATE/TIME	SAMPLES Type	#	Turb NTU	EC umhos	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	oP mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
									Peters Canyon Wash												
BARSED	5/19/01 10:00	DT	24	4.5	2450	8.5	62	<0.05	2	1.19	0.288	<10	<10								
BARSED	5/20/01 9:00																				
BARSED	5/20/01 10:00	DT	24	3.6	2440	8.6	66	0.068	1.6	0.918	0.265	<10	<10								
BARSED	5/21/01 9:00																				
BARSED	5/21/01 10:00	DT	24	0.7	3120	8.2	66	<0.05	0.37	0.581		<10	<10								
BARSED	5/22/01 9:00																				
BARSED	5/22/01 10:00	DT	24	4.9	2370	8.5	57	<0.05	1.5	0.887	0.224	10	<10								
BARSED	5/23/01 9:00																				
BARSED	5/30/01 9:05	DT	24	3.2	2190	8.4	53	<0.05	1.5	1.35	0.417	<10	<10								810
BARSED	5/31/01 8:05																				
BARSED	6/7/01 8:55	DT	24	2.5	2510	8.4	53	<0.05	0.66	0.765	0.024	<10	<10								1080
BARSED	6/8/01 7:55																				
BARSED	6/14/01 9:03	DT	24	2.8	2240	8.5	44	<0.05	0.74	0.734	0.201	<10	<10								762
BARSED	6/15/01 8:03																				

Newport Bay Watershed

STATION	DATE/TIME	SAMPLES Type	#	Turb NTU	EC umhos	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	oP mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
									Bonita Canyon Wash												
BCF04	8/29/00 12:13	DT	24	6.9	2470	8.3	1.5	<0.05	0.34	0.398	0.065	10	<10								
BCF04	8/30/00 11:13																				
BCF04	9/7/00 12:43	DT	24	20	3360	8.3	2.4	<0.05	0.67	0.612	0.026	50	<10								
BCF04	9/8/00 11:43																				
BCF04	10/3/00 11:42	DT	24	10	3010	7.8	2.3	<0.05	0.42	0.153	0.036	34	<10								
BCF04	10/4/00 10:42																				
BCF04	10/27/00 3:22	ST	2	2.5	2160	7.7	6.1	0.213	2.3	1.59	0.219	<10	<10								
BCF04	10/27/00 5:22																				
BCF04	11/7/00 10:43	DT	24	5.9	2940	8.3	11	<0.05	0.52	0.337	0.074	<10	<10								
BCF04	11/8/00 9:43																				
BCF04	12/21/00 14:00	DT	24	1.4	3040	8.3	2.6	<0.05	0.31	0.153	0.02	<10	<10								
BCF04	12/22/00 13:00																				
BCF04	1/2/01 11:42	DT	24	1.3	2960	8.3	2.5	<0.05	0.52	0.122	0.053	<10	<10								
BCF04	1/3/01 10:42																				
BCF04	2/5/01 11:01	DT	24	4.6	2740	8.5	2.1	<0.05	1.8	0.0918	0.047	<10	<10								706
BCF04	2/6/01 9:01																				
BCF04	2/12/01 14:13	ST	10	648	346	7.6	3.2	0.084	1.4	1.35	0.212	540	40	1.1	60	42	8.2	49	<2	110	100
BCF04	2/13/01 10:13	SF												<1	<8	7	<2	<4	<2	<10	
BCF04	2/13/01 10:13	ST	14	300	723	7.9	4.1	<0.05	1.2	0.979	0.19	230	24	<1	26	28	4.3	28	<2	60	210
BCF04	2/14/01 12:13	SF												<1	<8	8.2	<2	4.3	<2	<10	
BCF04	2/14/01 14:13	ST	17	51	1640	8.2	3.7	<0.05	0.43	0.612	0.112	35	<10	<1	<8	11	<2	8	<2	15	435
BCF04	2/16/01 1:00	SF												<1	<8	8.2	<2	5.1	<2	<10	
BCF04	2/20/01 12:20	ST	10	9.7	1540	8.2	1.1	<0.05	0.33	0.214		<10	<10	<1	<8	6.2	<2	4.2	<2	<10	432
BCF04	2/21/01 7:22	SF												<1	<8	5.7	<2	<4	<2	<10	
BCF04	2/25/01 15:45	ST	5	273	472	7.8	2.5	<0.05	1.2	1.01		270	26	<1	29	21	3.9	23	<2	46	100
BCF04	2/25/01 16:33	SF												<1	<8	7.8	<2	<4	<2	<10	
BCF04	2/25/01 18:14	ST	14	462	418	7.6	2	<0.05	1.3	1.13		430	42	<1	33	25	5	25	<2	61	115
BCF04	2/26/01 20:14	SF												<1	<8	6.3	<2	<4	<2	<10	
BCF04	2/27/01 22:14	ST	29	109	916	8.1	3.4	<0.05	0.71	0.734		72	<10	<1	10	12	<2	10	<2	19	240
BCF04	3/1/01 7:17	SF												<1	<8	7.1	<2	5	<2	<10	
BCF04	3/6/01 3:40	ST	5	120	1330	7.5	2.7	<0.05	0.94	0.643	0.071	170	20	<1	17	16	3.7	15	<2	44	335
BCF04	3/6/01 4:40	SF												<1	<8	4.8	<2	4.4	<2	<10	
BCF04	3/6/01 6:40	ST	7	140	676	7.7	1.7	<0.05	0.91	0.612	0.081	120	<10	1	19	17	3	15	<2	37	
BCF04	3/6/01 18:40	SF												<1	<8	5.6	<2	<4	<2	<10	
BCF04	3/6/01 20:40	ST	14	13	1700	8.2	0.73	<0.05	0.61	0.214	0.067	21	<10	<1	<8	8	<2	5.6	<2	10	478
BCF04	3/7/01 22:40	SF												<1	<8	5.7	<2	4	<2	<10	
BCF04	3/8/01 0:40	ST	27	14	2230	8.3	1.2	<0.05	0.56	0.153	0.046	18	<10	<1	<8	6.3	<2	4.8	<2	11	575
BCF04	3/10/01 4:40	SF												<1	8.7	3.6	<2	<4	<2	<10	
BCF04	4/12/01 0:00	DT	24	21	1720	8.1	1.5	<0.05	0.62	0.398	0.067	30	<10								466
BCF04	4/13/01 0:00																				
BCF04	6/28/01 0:00	DT	1	69	2900	7.9	2.6	<0.05	0.67	0.826	0.143	160	18								

Newport Bay Watershed

STATION	DATE/TIME	SAMPLES Type	#	Turb NTU	EC umhos	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	oP mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
									Barranca Channel												
BRCF09	5/15/01 0:00	DT	1	3.7	6910	7.8	<0.44	<0.05	0.74	<0.061		<10	<10								
BRCF09	5/16/01 8:47	DT	1	1.5	8450	8.1	<0.44	<0.05	0.76	<0.061		<10	<10								
BRCF09	5/17/01 9:01	DT	1	1.9	8020	8.2	<0.44	<0.05	1.1	0.214		<10	<10								
BRCF09	5/18/01 0:00	DT	1	2.7	5960	8.5	<0.44	<0.05	1.1	0.122		10	<10								
BRCF09	5/19/01 9:50	DT	1	2.9	5730	8.3	<0.44	<0.05	2.9	0.52		17	10								
BRCF09	5/19/01 10:00	DT	1	3.4	5450	8.4	<0.44	<0.05	1.3	0.337		16	12								
BRCF09	5/21/01 9:14	DT	1	2.9	5240	8.2	<0.44	<0.05	1.4	0.184		17	<10								
BRCF09	5/22/01 0:00	DT	1	3.4	4410	8.1	<0.44	<0.05	1.1	<0.061		10	<10								

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STATION	DATE/TIME	SAMPLES Type	#	Turb NTU	EC umhos	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	oP mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
									Central Irvine Channel												
CICF25	7/7/00 10:35	DT	1	30	1520	9.1	32	0.234	3.3	1.96	0.383	32	12								
CICF25	7/7/00 10:35	DF																			
CICF25	7/20/00 10:45	DT	1	23	1940	8.7	88	0.094	2.6	3.18	0.916	24	9								
CICF25	8/9/00 8:15	DT	24	58	1970	8	170	10.5	9	7.65	2.61	160	30								
CICF25	8/10/00 7:15																				
CICF25	8/24/00 10:00	DT	24	17	1960	8.3	84	0.238	2.9	7.96	1.92	<10	<10								
CICF25	8/25/00 9:00																				
CICF25	9/5/00 14:02	DT	24	20	1930	8.1	57	0.148	5.6	4.28	0.732	220	22								
CICF25	9/6/00 13:02																				
CICF25	9/19/00 8:04	DT	24	78	2040	8.4	35	<0.05	3.49	3.98	0.749	140	28								
CICF25	9/20/00 7:04																				
CICF25	10/3/00 9:14	DT	24	35	1460	8.4	57	0.179	1.8	2.88	0.892	120	11								
CICF25	10/4/00 8:14																				
CICF25	10/17/00 11:22	DT	24	132	1830	8.2	66	0.282	3.9	3.06	0.57	170	26								
CICF25	10/18/00 10:22																				
CICF25	11/2/00 10:30	DT	24	24	1940	8.2	150	3.35	4.5	6.12	0.934	<10	<10								
CICF25	11/3/00 9:30																				
CICF25	11/30/00 9:48	DT	24	26	1930	8.1	120	1.73	2.3	5.81	1.82	12	<10								
CICF25	12/1/00 8:48																				
CICF25	12/14/00 8:16	DT	24	13	1860	8.6	150	0.825	2.1	5.2	1.04	17	<10								
CICF25	12/15/00 7:16																				
CICF25	12/21/00 10:22	DT	24	167	1960	8	180	8.34	10	1.25	3.21	210	34								
CICF25	12/22/00 9:22																				
CICF25	1/2/01 8:15	DT	24	24	1880	8.1	120	<0.05	1.7	4.59	1.49	25	<10								
CICF25	1/3/01 7:15																				
CICF25	2/1/01 9:45	DT	24	2	2210	8.1	100	<0.05	0.24	0.918	0.256	<10	<10								320
CICF25	2/2/01 8:45																				
CICF25	2/14/01 0:00	ST	24	126	1140	7.8	88	0.685	3.9	7.34	1.86	93	14								355
CICF25	2/15/01 0:00																				
CICF25	3/13/01 8:45	DT	24	19	1810	8	150	3.21	4.7	2.72	0.74	15	<10								528
CICF25	3/14/01 7:45																				
CICF25	3/27/01 8:24	DT	24	12	1860	7.9	220	0.425	2.8	8.26	2.37	21	<10								576
CICF25	3/28/01 7:24																				
CICF25	4/12/01 9:15	DT	24	12	1810	7.9	190	6.26	8.6	6.12	2.04	13	<10								520
CICF25	4/13/01 8:15																				
CICF25	4/18/01 8:35	DT	24	3.4	1900	9.2	190	<0.05	3.2	2.05	0.562	<10	<10								584
CICF25	4/19/01 7:35																				
CICF25	4/25/01 7:45	DT	24	55	2070	8.3	290	17.2	23	10.7	5.59	61	12								594
CICF25	4/26/01 6:45																				
CICF25	5/1/01 15:25	DT	1	13	2100	7.4	220	21.2	30	10.1		10	<10								
CICF25	5/15/01 10:00	DT	6	94	1540	8.6	180	1.63	6.9	7.04		86	13								
CICF25	5/15/01 15:00										1.76										
CICF25	5/15/01 16:00	DT	6	151	1600	8.7	180	<0.05	3.6	5.81		134	15								

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STATION	DATE/TIME	SAMPLES Type	#	Turb NTU	EC umhos	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	oP mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
									Central Irvine Channel												
CICF25	5/15/01 21:00										1.77										
CICF25	5/16/01 22:00	DT	6	67	1630	8.1	160	0.924	3.9	7.96		44	<10								
CICF25	5/16/01 3:00										3.57										
CICF25	5/16/01 4:00	DT	6	121	1870	7.9	240	16.3	21	14.4		150	21								
CICF25	5/16/01 9:00										3.73										
CICF25	5/16/01 10:00	DT	6	54	1660	8.6	230	9.29	17	7.04	1.85	51	11								
CICF25	5/16/01 15:00																				
CICF25	5/16/01 22:00	DT	6	23	1900	7.9	300	10.5	20	11.6	3.05	18	<10								
CICF25	5/17/01 3:00																				
CICF25	5/16/01 16:00	DT	6	49	1890	8.6	250	7.28	14	6.12	1.34	45	12								
CICF25	5/16/01 21:00																				
CICF25	5/17/01 4:00	DT	6	23	1980	7.9	260	14.6	24	13.2	3.89	21	<10								
CICF25	5/17/01 9:00																				
CICF25	5/17/01 10:00	DT	6	105	1660	9.1	140	1.06	5.4	4.9	0.799	140	32								
CICF25	5/17/01 15:00																				
CICF25	5/17/01 16:00	DT	6	21	1470	9.3	160	0.243	4.2	2.66	0.575	37	<10								
CICF25	5/17/01 21:00																				
CICF25	5/17/01 22:00	DT	2				200	2.49	4.6	6.43	1.6										
CICF25	5/17/01 23:00																				
CICF25	5/18/01 0:00	DT	8	16	1880	8.2	180	3.21	6.1	7.65	2.2	25	<10								
CICF25	5/18/01 7:00																				
CICF25	5/18/01 8:00	DT	2				250	8.14	20	15.9	3.67										
CICF25	5/18/01 9:00																				
CICF25	5/18/01 10:00	DT	24	15	1690	8.4	160	0.435	5.3	5.81	1.38	22	<10								
CICF25	5/19/01 9:00																				
CICF25	5/19/01 10:00	DT	6	92	1800	8.9	110	0.059	3.5	5.81	0.686	150	29								
CICF25	5/19/01 15:00																				
CICF25	5/19/01 16:00	DT	6	103	1860	8.2	220	0.149	5.8	7.96	0.921	150	31								
CICF25	5/19/01 21:00																				
CICF25	5/19/01 22:00	DT	6	23	1690	7.7	180	<0.05	2.8	9.18	2.06	27	<10								
CICF25	5/20/01 3:00																				
CICF25	5/20/01 4:00	DT	6	18	1870	8	160	<0.05	2.5	8.57	2.37	25	<10								
CICF25	5/20/01 9:00																				
CICF25	5/20/01 10:00	DT	6	15	1670	8.5	180	<0.05	4	4.28	0.913	20	<10								
CICF25	5/20/01 15:00																				
CICF25	5/20/01 16:00	DT	6	14	1820	8.7	220	0.054	3.4	2.08	0.375	21	<10								
CICF25	5/20/01 21:00																				
CICF25	5/20/01 22:00	DT	6	6.3	1810	9	170	<0.05	3	6.43	1.96	11	<10								

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STATION	DATE/TIME	SAMPLES Type	#	Turb NTU	EC umhos	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	oP mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
									Central Irvine Channel												
CICF25	5/21/01 3:00																				
CICF25	5/21/01 4:00	DT	6	7.3	1790	8.2	130	<0.05	3.3	7.65	2.43	14	<10								
CICF25	5/21/01 9:00																				
CICF25	5/21/01 10:00	DT	6	14	1700	8.9	110	<0.05	2.4	3.37	0.796	24	<10								
CICF25	5/21/01 15:00																				
CICF25	5/21/01 16:00	DT	6	8.4	1710	9.2	140	<0.05	<0.2	1.62	0.305	12	<10								
CICF25	5/21/01 21:00																				
CICF25	5/21/01 22:00	DT	6	8.5	1610	8.2	110	<0.05	0.48	5.51	1.53	11	<10								
CICF25	5/22/01 3:00																				
CICF25	5/22/01 4:00	DT	6	12	1540	8.1	70	<0.05	<0.2	6.12	0.03	18	<10								
CICF25	5/22/01 9:00																				
CICF25	5/22/01 10:00	DT	6	73	1560	8.9	70	0.12	<0.2	3.98	0.59	110	26								
CICF25	5/22/01 15:00																				
CICF25	5/22/01 15:00																				
CICF25	5/22/01 16:00	DT	6	21	1690	8.8	180	0.982	4	2.63	0.582	33	10								
CICF25	5/22/01 21:00																				
CICF25	5/22/01 22:00	DT	6	10	1610	7.8	150	1.3	<0.2	6.12	1.68	14	<10								
CICF25	5/23/01 3:00																				
CICF25	5/23/01 4:00	DT	6	12	1630	7.9	140	0.671	3	7.04	2.32	13	<10								
CICF25	5/23/01 9:00																				
CICF25	5/30/01 8:35	DT	24	110	1650	7.7	120	5.55	12	13.5	1.81	600	130								708
CICF25	5/31/01 7:35																				
CICF25	6/20/01 9:55	DT	24	23	2070	8.3	280	0.095	3.2	10.4	3.37	26	<10								720
CICF25	6/21/01 8:55																				
CICF25	6/28/01 0:00	DT	1	31	1780	8.8	110	0.168	3.4	4.9	1.6	30	<10								

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STATION	DATE/TIME	SAMPLES Type	#	Turb NTU	EC umhos	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	oP mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
									Costa Mesa Channel												
CMCG02	7/7/00 11:30	DT	1	27	830	9.5	<0.44	0.133	2.8	1.44	0.293	22	16	<1	<8	11	2.3	4.5	<2	24	440
CMCG02	7/7/00 11:30	DF												<1	<8	2.2	4.8	<2	24	0	
CMCG02	7/13/00 9:00	DT	1	7.2	845	8.7	<0.44	0.086	1.6	7.04	0.426	13	10	<1	<8	28	5	6.2	<2	79	338
CMCG02	7/13/00 9:00	DF												<1	<8	6	2.1	5	<2	46	
CMCG02	7/19/00 12:30	DT	1	7.6	765	9.4	0.58	<0.05	1.6	1.78	0.688	<10	<1	<1	<8	16	3.4	4.6	<2	40	414
CMCG02	7/19/00 12:30	DF												<1	<8	13	2.9	4.7	<2	31	
CMCG02	7/26/00 12:45	DT	1	4	1120	8.4	1.1	0.356	14	309	0.691	<10	<1	<1	<8	13	<2	<4	<2	41	
CMCG02	7/26/00 12:45	DF												<1	<8	10	<2	5.3	<2	20	
CMCG02	8/4/00 13:30	DT	1	4.9	770	9.6	0.44	0.103	2.1	1.29	0.295	22	18	<1	<8	24	2.8	5	<2	41	
CMCG02	8/4/00 13:30	DF	1											<1	<8	14	<2	4.3	<2	19	
CMCG02	8/9/00 11:43	DT	24	4.7	845	8.4	66	<0.05	1.5	0.581	0.93	10	8	<1	<8	33	<2	5.1	<2	29	
CMCG02	8/10/00 10:43	DF												<1	<8	16	<2	4.3	<2	22	
CMCG02	8/17/00 8:31	DT	1	11	1060	7.7	1.2	0.137	1.4	1.25	0.277	20	12	<1	<8	11	2.5	<4	<2	42	412
CMCG02	8/17/00 8:31	DF												<1	<8	5.7	<2	<4	<2	18	
CMCG02	8/24/00 12:32	DT	24	4.4	1040	7.6	1.2	0.134	1.1	1.9	0.6	<10	<10	<1	<8	15	<2	4.6	<2	32	
CMCG02	8/25/00 11:32	DF												<1	<8	12	3.5	4.4	<2	33	
CMCG02	8/29/00 10:20	DT	24	14	870	8.2	0.51	0.263	4.3	2.26	0.521	31	18	<1	<8	30	4.2	7.3	<2	77	340
CMCG02	8/30/00 9:20	DF												<1	<8	17	<2	7.2	<2	36	
CMCG02	9/5/00 13:37	DT	24	21	1100	8.2	0.75	0.094	1.6	3.67	0.874	72	19	<1	<8	22	3.6	4.5	<2	58	
CMCG02	9/6/00 12:37	DF												<1	<8	13	<2	4.4	<2	30	
CMCG02	9/12/00 8:57	DT	24	4.4	990	7.8	0.58	0.301	2.3	2.6	0.59	<10	<10	<1	<8	17	<2	6.4	<2	46	
CMCG02	9/13/00 7:57	DF												<1	<8	13	<2	6.2	<2	38	
CMCG02	9/19/00 9:53	DT	24	6.4	940	8.3	1.5	0.134	4.07	2.97	0.536	18	10	<1	<8	19	6.5	<4	<2	81	
CMCG02	9/20/00 8:53	DF												<1	<8	13	<2	<4	<2	32	
CMCG02	9/26/00 10:57	DT	24	3	810	9.4	<0.44	<0.05	1.4	1.29	0.269	<10	<10	<1	<8	18	2.6	<4	<2	63	
CMCG02	9/27/00 9:57	DF												<1	<8	17	<2	4	<2	43	
CMCG02	10/5/00 9:30	DT	24	4	790	8.8	3.7	0.112	1.5	1.59	0.261	12	<10	<1	<8	31	<2	<4	<2	41	312
CMCG02	10/6/00 8:30	DF												<1	<8	23	<2	<4	<2	29	
CMCG02	10/11/00 6:07	ST	5	15	845	6.9	16	2.45	64	5.51	0.709	170	115	1.9	14	120	25	39	<2	940	248
CMCG02	10/11/00 11:07	SF												<1	10	23	3.1	33	<2	560	
CMCG02	10/11/00 9:07	ST	12	10	490	6.9	15	0.461	6.6	4.59	0.993	42	30	<1	<8	82	11	22	<2	310	136
CMCG02	10/11/00 21:07	SF												<1	<8	55	2.4	20	<2	210	
CMCG02	10/11/00 23:07	ST	44	6	825	7.8	0.65	<0.05	1.6	0.581	0.405	<10	<10	<1	<8	24	2.2	5.1	<2	79	195
CMCG02	10/15/00 7:07	SF												<1	<8	18	<2	4.6	<2	50	
CMCG02	10/17/00 8:40	DT	24	5.9	815	8.6	0.68	<0.05	1.6	1.16	0.169	<10	<10	<1	<8	24	<2	<4	<2	27	
CMCG02	10/18/00 7:40	DF												<1	12	22	<2	<4	2.6	21	
CMCG02	10/26/00 3:25	ST	4	85	380	7.1	9.3	0.568	5	2.23	0.128	280	140								
CMCG02	10/26/00 4:10																				
CMCG02	10/27/00 6:10	ST	11	24	210	7	5.9	0.205	2.2	1.62	0.361	43	20	<1	9.8	33	11	6.9	2.8	200	52
CMCG02	10/28/00 10:10	SF												<1	<8	21	<2	5.8	2.5	120	
CMCG02	10/28/00 12:10	ST	2											<1	14	49	31	11	<2	320	64
CMCG02	10/28/00 12:10	SF												<1	11	25	3.3	6.9	<2	130	

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STATION	DATE/TIME	SAMPLES Type	#	Turb NTU	EC umhos	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	oP mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
									Costa Mesa Channel												
CMCG02	10/29/00 10:10	ST	5	5.1	655	8.5	1.1	<0.05	0.97	1.38	0.212	<10	<10								
CMCG02	10/29/00 18:10	SF																			
CMCG02	10/29/00 20:10	ST	4	17	255	7.4	2.8	0.057	0.87	1.38	0.349	16	10	<1	8.9	24	5.4	<4	<2	81	56
CMCG02	10/30/00 4:10	SF												<1	9.4	17	<2	<4	<2	51	
CMCG02	11/8/00 11:00	DT	1	78	785	8.2	<0.44	<0.05	3.3	3.37	0.288	270	78	<1	<8	75	18	5.5	<2	230	
CMCG02	11/8/00 11:00	DF												<1	<8	12	<2	<4	<2	31	
CMCG02	11/16/00 11:00	DT	1	20	865	8.4	4.1	0.088	2.1	2.48	0.452	58	23	<1	<8	18	<2	<4	<2	38	
CMCG02	11/16/00 11:00	DF												<1	<8	7.6	<2	<4	<2	26	
CMCG02	11/30/00 9:11	DT	24	4.1	865	8.7	2.2	0.171	1	0.857	0.16	<10	<10	<1	<8	31	<2	7	<2	39	382
CMCG02	12/1/00 8:11	DF												<1	<8	14	<2	<4	<2	20	
CMCG02	12/8/00 12:00	DT	1	14	705	8.8	53	0.225	1	1.56	0.128	15	13	<1	<8	26	5.3	14	<2	63	
CMCG02	12/8/00 12:00	DF												<1	<8	12	<2	5.8	<2	26	
CMCG02	12/14/00 10:00	DT	24	4.5	825	8.6	4.6	0.167	1.4	1.41	0.368	<10	<10	<1	<8	17	<2	<4	<2	46	396
CMCG02	12/15/00 9:00	DF												<1	<8	15	<2	<4	<2	32	
CMCG02	12/22/00 12:20	DT	1	7.6	815	8.8	4.4	0.12	3.8	1.96	0.257	14	<10	<1	<8	26	8.5	<4	<2	100	
CMCG02	12/22/00 12:20	DF												<1	<8	9.2	<2	<4	<2	25	
CMCG02	12/26/00 10:30	DT	24	8.1	610	8.1	2.2	<0.05	0.84	0.643	0.093	16	<10	<1	<8	12	2	<4	<2	52	
CMCG02	12/27/00 9:30	DF												<1	<8	7.1	<2	<4	<2	26	
CMCG02	1/2/01 9:15	DT	24	3.3	925	7.6	2.2	0.244	2.1	0.949	0.23	<10	<10	<1	<8	13	<2	<4	<2	36	
CMCG02	1/3/01 8:15	DF												<1	<8	11	<2	<4	<2	30	
CMCG02	1/8/01 11:10	ST	4	230	690	6.7	26	4.24	21	9.18	0.906	500	230	6.4	39	370	140	66	12	2700	120
CMCG02	1/8/01 11:55																				
CMCG02	1/9/01 7:54	ST	17	50	690	7.7	7.7	0.133	3	1.04	0.41	29	<10	<1	<8	2.1	3.4	<4	<2	65	140
CMCG02	1/10/01 15:54	SF												<1	<8	17	<2	<4	<2	42	
CMCG02	1/10/01 17:54	ST	22	32	160	7	3.3	0.289	1.3	1.96	0.4	33	14	<1	<8	20	6.7	<4	<2	84	168
CMCG02	1/12/01 11:54	SF												<1	<8	13	<2	<4	<2	40	
CMCG02	1/17/01 9:09	DT	24	17	3120	8.2	53	<0.05	1.2	0.704	0.16	25	<10	<1	<8	9.8	<2	<4	<2	16	
CMCG02	1/18/01 8:09	DF												<1	<8	7.7	<2	<4	<2	11	180
CMCG02	1/24/01 7:32	ST	5	72	175	6.9	7	1.12	3.4	1.84	0.361	150	58	<1	<8	55	25	8.2	<2	280	50
CMCG02	1/24/01 8:32	SF												<1	<8	20	<2	4	<2	78	
CMCG02	1/24/01 10:32	ST	1				280	0.546	3.2	1.5											
CMCG02	1/25/01 9:12	ST	11	7	865	7.4	5.3	2.08	3.1	3.67	0.881	<10	<10	<1	<8	20	<2	4.3	<2	38	244
CMCG02	1/26/01 5:12	SF												<1	<8	15	<2	<4	<2	27	
CMCG02	1/26/01 7:12	ST	9	27	185	7.5	4.2	0.34	1.3	1.32	0.324	25	<10	<1	<8	20	8.6	5.4	<2	93	60
CMCG02	1/26/01 23:12	SF												<1	<8	12	<2	<4	<2	48	
CMCG02	1/27/01 1:12	ST	16	7.8	810	8.4	6.6	0.135	1.1	1.1	0.304	<10	<10	<1	<8	15	<2	4.2	<2	57	240
CMCG02	1/28/01 7:12	SF												<1	<8	12	<2	5.6	<2	41	
CMCG02	2/1/01 10:20	DT	24	4.7	1060	8.6	14	2.11	3.2	1.59	0.427	<10	<10	<1	<8	20	2	<4	<2	29	262
CMCG02	2/2/01 9:20	DF												<1	<8	17	<2	<4	<2	21	
CMCG02	2/5/01 7:09	DT	24	2.2	976	8.9	2.2	0.054	6	0.826	0.174	<10	<10	<1	<8	15	<2	<4	<2	26	370
CMCG02	2/5/01 9:09																				
CMCG02	2/6/01 7:09	DF	24											<1	<8	15	<2	<4	<2	23	

Newport Bay Watershed

STATION	DATE/TIME	SAMPLES Type	#	Turb NTU	EC umhos	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	oP mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
									Costa Mesa Channel												
CMCG02	2/6/01 9:09																				
CMCG02	2/14/01 0:00	ST	24	16	1260	8.4	7.6	<0.05	2.6	0.796	0.161	<10	<10	<1	<8	15	<2	<4	<2	37	290
CMCG02	2/15/01 0:00	SF												<1	<8	13	<2	4	<2	28	
CMCG02	2/22/01 10:35	DT	24	9.4	1350	8.3	2.4	<0.05	1	0.857	0.141	<10	<10	<1	<8	24	2.4	<4	<2	130	374
CMCG02	2/23/01 9:35	DF												<1	<8	28	<2	<4	<2	55	
CMCG02	3/7/01 0:00	ST	5	30	93	5.6	2.1	0.19	1.2	1.07	0.181	58	21	<1	<8	21	12	<4	<2	110	25
CMCG02	3/7/01 0:00	SF												<1	<8	9.1	<2	<4	<2	28	
CMCG02	3/9/01 0:00	ST		2.4	1580	8.1	6.6	<0.05	2.1	0.275	0.055	<10	<10	1.4	<8	10	4.5	<4	<2	29	404
CMCG02	3/9/01 0:00	SF												1.2	<8	7.7	3.7	<4	<2	23	
CMCG02	3/13/01 0:00	DT	24	2.4	1360	9.1	1.9	<0.05	1	0.184	0.011	15	<10	<1	<8	11	<2	<4	<2	22	312
CMCG02	3/14/01 0:00	DF												<1	<8	9.8	<2	<4	<2	<10	
CMCG02	3/20/01 9:55	DT	24	15	1060	8.9	1.5	0.069	3.3	0.643	0.062	45	14	<1	<8	13	2.1	<4	<2	30	335
CMCG02	3/21/01 8:55													<1	<8	9.6	<2	<4	<2	12	
CMCG02	3/27/01 10:25	DT	24	2.5	1270	8.5	1.5	<0.05	1.1	0.306	0.069	<10	<10	<1	<8	11	<2	4.9	<2	23	358
CMCG02	3/28/01 9:25	DF												<1	<8	9	<2	4.1	<2	19	
CMCG02	4/3/01 0:00	DT	24	5.1	1370	8.4	1.3	0.095	1.5	0.367	0.051	15	<10	<1	<8	11	<2	<4	<2	24	348
CMCG02	4/4/01 0:00	DF												<1	<8	9.5	<2	<4	<2	13	
CMCG02	4/12/01 11:00	DT	24	1.9	2730	8.3	12	<0.05	13	0.275	0.035	<10	<10	<1	<8	17	<2	<4	<2	18	614
CMCG02	4/13/01 10:00	DF												<1	<8	15	<2	<4	<2	19	
CMCG02	4/18/01 10:05	DT	24	6.3	1240	8.9	<0.44	0.083	1.4	0.398	0.06	23	11	<1	<8	16	2.1	<4	<2	31	340
CMCG02	4/19/01 9:05	DF												<1	<8	13	<2	<4	<2	18	
CMCG02	4/25/01 9:45	DT	24	3.3	1420	8.6	2.8	<0.05	4.7	0.765	0.142	<10	<10	<1	<8	16	2.6	<4	<2	44	386
CMCG02	4/26/01 8:45	DF												<1	<8	14	2.1	<4	<2	33	
CMCG02	5/2/01 10:45	DT	24	3.1	1400	8.7	0.66	<0.05	1.4	0.796	0.258	<10	<10	<1	<8	9.5	<2	<4	<2	21	
CMCG02	5/2/01 10:45	DT	24	3.1	1400	8.7	0.66	<0.05	1.4	0.796	0.258	<10	<10	<1	<8	9.5	<2	<4	<2	21	356
CMCG02	5/2/01 9:45	DF												<1	<8	12	<2	<4	<2	32	
CMCG02	5/3/01 9:45																				
CMCG02	5/24/01 9:06	DT	24	3	2080	8.1	13	0.137	3	1.07	0.273	<10	<10	<1	<8	18	<2	<4	<2	33	500
CMCG02	5/25/01 8:06	DF												<1	<8	14	<2	<4	<2	21	
CMCG02	5/30/01 10:35	DT	24	11	1330	8.5	2.3	0.167	22	0.826	0.097	39	17	<1	28	4.5	<2	36	<2	44	672
CMCG02	5/31/01 9:35	DF												<1	<8	22	<2	<4	<2	35	
CMCG02	6/7/01 0:00	DT	24	4.2	1170	8.8	<0.44	<0.05	1.6	0.49	0.088	<10	<10	<1	<8	79	3.2	<4	<2	58	494
CMCG02	6/8/01 0:00	DF												<1	<8	23	<2	<4	<2	18	
CMCG02	6/14/01 10:13	DT	24	6.1	1160	8.5	0.94	<0.05	1.5	1.41	0.262	12	<10	<1	<8	38	2.1	5	<2	36	384
CMCG02	6/15/01 9:13													<1	<8	34	<2	4.9	<2	21	
CMCG02	6/20/01 10:35	DT	24	4.3	1080	8.4	<0.44	<0.05	1.9	1.32	0.368	<10	<10	<1	<8	42	3	4.7	<2	49	390
CMCG02	6/21/01 9:35	DF												<1	<8	23	<2	5.3	<2	25	
CMCG02	6/28/01 0:00	DT	1	37	914	8.7	<0.44	0.066	3	2.54	0.435	110	58								
CMCG02	6/28/01 0:00	DF												<1	<8	10	<2	5.5	<2	29	

Newport Bay Watershed

STATION	DATE/TIME	SAMPLES Type	#	Turb NTU	EC umhos	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	oP mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
									Como Storm Channel												
CSCS03	7/20/00 12:30	DT	1	1.5	2690	8	48	<0.05	0.62	<0.061	0.01	<10	<1								
CSCS03	8/9/00 9:02	DT	24	26	2420	8.5	30	0.233	2	0.673		84	16								
CSCS03	8/10/00 8:02																				
CSCS03	8/24/00 10:43	DT	24	13	2730	8.3	62	<0.05	0.72	0.367	0.57	43	10								
CSCS03	8/25/00 9:43																				
CSCS03	5/1/01 15:45	DT	1	1.4	2560	8.6	79	<0.05	0.65	0.141		<10	<10								
CSCS03	5/15/01 10:00	DT	24	1.7	2540	8.3	79	<0.05	0.89	0.275		<10	<10								
CSCS03	5/16/01 9:00																				
CSCS03	5/16/01 10:00	DT	24	2.2	2590	8.3	79	<0.05	0.98	0.306		<10	<10								
CSCS03	5/17/01 9:00																				
CSCS03	5/17/01 10:00	DT	24	2.3	2650	8.4	75	<0.05	1.1	0.214		<10	<10								
CSCS03	5/18/01 9:00																				
CSCS03	5/18/01 10:00	DT	24	2.8	2540	8.4	48	<0.05	0.62	0.367		<10	<10								
CSCS03	5/19/01 9:00																				
CSCS03	5/20/01 10:00	DT	11	2.4	2570	8.5	79	<0.05	0.81	0.0918		<10	<10								
CSCS03	5/20/01 20:00																				
CSCS03	5/21/01 10:00	DT	24	3.3	2610	8.3	79	<0.05	0.67	0.306		<10	<10								
CSCS03	5/22/01 9:00																				
CSCS03	5/22/01 10:00	DT	1	2.4	2510	8.4	75	<0.05	0.74	0.398		<10	<10								

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STATION	DATE/TIME	SAMPLES Type	#	Turb NTU	EC umhos	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	oP mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
65" RCP d/s Bryan Avenue																					
DSBRCP	7/7/00 11:00	DT	1	5	825	8.4	2.1	<0.05	0.25	0.398	0.06	<10	<1								
DSBRCP	7/7/00 11:00	DF																			
DSBRCP	7/21/00 8:30	DT	1	0.72	905	8.3	2.6	<0.05	0.25	0.177		<10	<1								
DSBRCP	8/2/00 12:30	DT	1	0.5	985	8.3	5.4	<0.05	<0.2	0.367		<10	<5								
DSBRCP	5/1/01 15:20	DT	1	1.6	804	8.5	<0.44	<0.05	0.25	0.0949		<10	<10								
DSBRCP	5/15/01 10:00	DT	24	1.3	796	8.5	3.2	<0.05	0.32	0.184		<10	<10								
DSBRCP	5/16/01 9:00																				
DSBRCP	5/16/01 10:00	DT	24	1	785	8.5	2.9	<0.05	0.32	0.153		<10	<10								
DSBRCP	5/17/01 9:00																				
DSBRCP	5/17/01 9:00																				
DSBRCP	5/17/01 10:00	DT	24	2.4	782	8.6	2.7	<0.05	0.23	0.122		<10	<10								
DSBRCP	5/18/01 9:00																				
DSBRCP	5/18/01 10:00	DT	24	5.3	884	8.3	3.9	<0.05	7.4	0.52		17	10								
DSBRCP	5/19/01 9:00																				
DSBRCP	5/19/01 10:00	DT	24	2.9	814	8.4	2.9	<0.05	0.28	0.184		<10	<10								
DSBRCP	5/20/01 9:00																				
DSBRCP	5/20/01 10:00	DT	24	1.5	790	8.3	2.8	<0.05	0.65	0.184		<10	<10								
DSBRCP	5/21/01 9:00																				
DSBRCP	5/21/01 10:00	DT	24	1.4	786	8.4	2.8	<0.05	<0.2	0.153		<10	<10								
DSBRCP	5/22/01 9:00																				
DSBRCP	5/22/01 10:00	DT	24	0.7	774	8.5	2.5	<0.05	0.36	0.214		<10	<10								
DSBRCP	5/23/01 9:00																				

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STATION	DATE/TIME	SAMPLES Type	#	Turb NTU	EC umhos	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	oP mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
									Construction Circle Drain												
F06P06	7/25/00 13:45	DT	1	22	4880	8.2	120	<0.05	1.2	2.23	0.516	19	11								
F06P06	8/2/00 13:30	DT	1	20	6120	8.3	130	<0.05	0.86	0.337		34	14								
F06P06	5/1/01 16:35	DT	1	6.5	6450	7.8	75	<0.05	0.6	0.367		<10	<10								
F06P06	5/15/01 10:00	DT	24	16	5500	8.3	88	<0.05	1.2	0.275		19	<10								
F06P06	5/16/01 9:00																				
F06P06	5/16/01 10:00	DT	24	34	5130	8.4	88	<0.05	1.4	0.245		54	<10								
F06P06	5/17/01 9:00																				
F06P06	5/17/01 10:00	DT	24	17	5620	8.3	88	<0.05	0.92	0.275		20	<10								
F06P06	5/18/01 9:00																				
F06P06	5/18/01 10:00	DT	24	122	5370	8	84	<0.05	1.3	0.275		120	10								
F06P06	5/19/01 9:00																				
F06P06	5/19/01 10:00	DT	24	16	5320	8.1	84	<0.05	1.3	0.428		23	<10								
F06P06	5/20/01 9:00																				
F06P06	5/20/01 10:00	DT	24	12	5380	8.3	84	<0.05	1.3	0.49		21	<10								
F06P06	5/21/01 9:00																				
F06P06	5/21/01 10:00	DT	24	15	4880	8.2	75	<0.05	0.89	0.459		18	<10								
F06P06	5/22/01 9:00																				
F06P06	5/22/01 10:00	DT	24	17	5120	8.2	75	<0.05	4	0.398		22	<10								
F06P06	5/23/01 9:00																				

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STATION	DATE/TIME	SAMPLES Type	#	Turb NTU	EC umhos	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	oP mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
									Lyon Storm Drain												
F06P07	5/1/01 15:35	DT	1	2.2	2370	7.9	97	<0.05	1.5	1.38		<10	<10								
F06P07	5/15/01 0:00	DT	1	3.8	1520	7.9	62	<0.05	1.9	1.38		<10	<10								
F06P07	5/16/01 9:18	DT	1	8.8	1320	8	39	<0.05	2.7	1.96		<10	<10								
F06P07	5/17/01 9:40	DT	1	5.6	1840	7.9	70	<0.05	2.3	1.68		<10	<10								
F06P07	5/18/01 10:15	DT	1	36	1110	8.3	79	2.67	6.7	3.67		35	<10								
F06P07	5/19/01 0:00	DT	1	3.1	1740	7.8	70	<0.05	1.7	1.07		<10	<10								
F06P07	5/20/01 9:48	DT	1	3.4	2050	7.8	79	0.128	2.5	1.84		<10	<10								
F06P07	5/21/01 9:45	DT	1	3.9	1690	8.1	53	<0.05	2.1	1.41		<10	<10								
F06P07	5/22/01 0:00	DT	1	6.2	5450	8.3	40	<0.05	0.69	1.25		10	<10								

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STATION	DATE/TIME	SAMPLES Type	#	Turb NTU	EC umhos	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	oP mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
F06P08 at Moulton Parkway																					
F06P08	7/21/00 9:30	DT	1	0.5	3120	7.7	48	<0.05	0.55	0.523		<10	<1								
F06P08	8/2/00 13:00	DT	1	0.8	3540	7.7	66	0.132	0.33	0.612		<10	5								
F06P08	2/20/01 10:00	DT	23	0.6	3060	8.3	62	<0.05	0.48	0.49		<10	<10								
F06P08	5/1/01 16:05	DT	1	0.3	3480	8	57	<0.05	0.63	0.337		<10	<10								
F06P08	5/15/01 10:00	DT	24	1.3	3270	8.3	66	<0.05	0.52	0.581		<10	<10								
F06P08	5/16/01 9:00																				
F06P08	5/16/01 10:00	DT	24	0.6	3240	8.1	66	<0.05	0.48	0.612		<10	<10								
F06P08	5/17/01 9:00																				
F06P08	5/17/01 10:00	DT	24	0.75	3290	8	62	<0.05	0.47	0.306		<10	<10								
F06P08	5/18/01 9:00																				
F06P08	5/18/01 10:00	DT	6	1.4	3340	8.2	57	0.37	1.9	0.704		<10	<10								
F06P08	5/18/01 15:00																				
F06P08	5/21/01 9:00																				
F06P08	5/22/01 10:00	DT	24	0.75	3100	8.2	66	<0.05	0.58	0.643		<10	<10								
F06P08	5/23/01 9:00																				

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STATION	DATE/TIME	SAMPLES Type	#	Turb NTU	EC umhos	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	oP mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
									Hines Nursery Channel												
HINF28	7/20/00 11:05	DT	1	55	1600	8.5	43	0.107	3	3.34	0.925	63	16								
HINF28	8/9/00 7:30	DT	24	28	1630	7.8	140	9.17	8.5	7.65	2.48	10	5								
HINF28	8/10/00 6:30																				
HINF28	8/24/00 10:10	DT	24	19	1830	7.7	26	0.132	3.1	4.9	1.03	<10	<10								
HINF28	8/25/00 9:10																				
HINF28	9/6/00 14:30	DT	1	76	1450	8.2	24	0.199	2	3.98	0.846	110	<10								
HINF28	9/19/00 7:57	DT	24	314	2560	7.6	70	0.061	5.37	8.26	1.35	460	64								
HINF28	9/20/00 6:57																				
HINF28	10/3/00 9:33	DT	24	180	1730	7.7	97	2.57	6	9.79	1.75	650	90								
HINF28	10/4/00 8:33																				
HINF28	10/17/00 9:43	DT	24	357	1570	7.7	48	0.366	4.1	11.6	1.46	790	100								
HINF28	10/18/00 8:43																				
HINF28	12/1/00 8:00	DT	1	35	1780	7.8	140	4.71	7.3	6.73	2.2	30	<10								
HINF28	12/14/00 8:00	DT	24	54	1920	7.1	200	8.44	11	11.9	3.15	18	<10								
HINF28	12/15/00 7:00																				
HINF28	12/27/00 7:45	DT	1	40	1680	7.8	260	9.92	13	13.5	4.1	47	<10								
HINF28	1/18/01 6:45	DT	1	968	1130	8.1	15	0.18	4	7.04	0.404	1480	140								
HINF28	2/14/01 0:00	ST	24	21	2450	8.1	75	1.2	3.9	5.2	1.75	<10	<10								955
HINF28	2/15/01 0:00																				
HINF28	3/27/01 8:06	DT	24	39	1630	6.7	290	2.87	6.2	17.7	5.52	48	<10								568
HINF28	3/28/01 7:06																				
HINF28	4/12/01 9:35	DT	24	133	1890	7.5	400	30.3	39	20.5	5.9	120	16								672
HINF28	4/13/01 9:15																				
HINF28	4/18/01 8:50	DT	24	24	1840	8.9	370	1.11	5.3	9.12	2.84	21	<10								680
HINF28	4/19/01 7:50																				
HINF28	4/25/01 8:15	DT	24	34	2280	7.3	530	34.8	49	19.3	5.7	23	<10								676
HINF28	4/26/01 7:15																				
HINF28	5/30/01 8:46	DT	24	18	2120	7.5	480	15.7	24	22	6.82	29	<10								924
HINF28	5/31/01 7:46																				
HINF28	6/20/01 10:20	DT	24	96	1900	7.9	260	1.34	5.8	9.18	2.5	110	17								706
HINF28	6/21/01 9:20																				
HINF28	6/28/01 0:00	DT	1	4.3	1350	8.8	40	<0.05	2.2	3.98	1.2	<10	<10								

Newport Bay Watershed

STATION	DATE/TIME	SAMPLES Type	#	Turb NTU	EC umhos	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	oP mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
Lane Channel at Jamboree Blvd																					
LANF08	7/25/00 13:20	DT	1	6.5	4770	8.5	21	<0.05	1.3	0.734	0.136	<10	<1								
LANF08	8/29/00 13:29	DT	24	15	7560	8.1	24	0.181	1.2	1.16	0.227	20	<10								
LANF08	8/30/00 12:29																				
LANF08	9/7/00 10:19	DT	24	10	5880	8	21	0.241	1.1	1.22	0.174	17	<10								
LANF08	9/8/00 9:19																				
LANF08	10/5/00 10:43	DT	24	18	5360	8.4	27	0.187	1.2	1.53	0.276	60	11								
LANF08	10/6/00 9:43																				
LANF08	10/27/00 2:55	ST	5	65	3180	8	35	0.386	3.6	1.5	0.211	100	22	<1	11	43	8	8.1	<2	190	900
LANF08	10/27/00 3:55																				
LANF08	10/27/00 5:55	ST	8	120	935	7.5	7.4	0.218	2.2	1.65	0.157	190	34	3.1	14	52	23	14	<2	270	184
LANF08	10/27/00 19:55	SF												<1	<8	14	3	6.1	<2	63	
LANF08	10/27/00 21:55	ST	19	18	4730	7.9	23	0.226	1.7	0.887	0.157	25	<10	2.1	<8	12	2.2	<4	<2	55	
LANF08	10/29/00 8:55	SF												1.2	8.1	9.2	<2	<4	<2	36	
LANF08	10/29/00 11:55	ST	5	22	8120	8.3	33	0.184	2.6	0.765	0.157	25	<10	2.7	<8	14	2.7	<4	<2	58	1400
LANF08	10/29/00 19:55	SF												1.7	<8	12	<2	<4	<2	34	
LANF08	10/29/00 21:55	ST	10	39	2910	7.8	7.9	0.189	0.99	0.887	0.146	61	11	<1	10	24	6	6.8	<2	94	384
LANF08	10/30/00 15:55	SF												<1	8.4	11	<2	4.7	<2	39	
LANF08	10/30/00 17:55	ST	6	20	5460	8.1	15	0.218	1.5	0.734	0.111	26	<10								740
LANF08	10/31/00 3:55	SF																			
LANF08	11/7/00 11:03	DT	24	11	6120	8.3	30	<0.05	0.84	0.643	0.103	11	<10								
LANF08	11/8/00 10:03																				
LANF08	12/21/00 13:42	DT	24	28	6320	8.3	39	0.151	1.1	1.35	0.262	44	11								
LANF08	12/22/00 12:42																				
LANF08	1/2/01 10:59	DT	24	0.5	5720	8	31	0.109	1.1	1.19	0.23	22	<10								
LANF08	1/3/01 9:59																				
LANF08	1/8/01 12:57	ST	5	340	1790	7.1	26	2	9.1	4.9	0.159	700	120	3.7	26	150	42	22	<2	730	470
LANF08	1/8/01 13:57	SF												<1	<8	16	<2	7.7	<2	110	
LANF08	1/8/01 15:57	ST	5	120	745	7	8.4	1.43	3	1.5	0.132	210	48	2	15	73	23	20	<2	280	160
LANF08	1/8/01 23:57	SF												<1	<8	17	<2	10	<2	68	
LANF08	1/9/01 3:57	ST	19	15	4710	8	29	0.566	2.4	0.887	0.27	18	<10	<1	<8	20	<2	<4	<2	54	788
LANF08	1/10/01 15:57	SF												<1	<8	14	<2	<4	<2	38	
LANF08	1/10/01 17:57	ST	23	19	425	7.7	4.7	0.265	1.2	1.13	0.19	140	23	<1	<8	33	12	8.3	<2	120	440
LANF08	1/12/01 13:57	SF												<1	<8	11	<2	<4	<2	28	
LANF08	1/17/01 7:30	DT	24	5.7	6890	8.1	44	0.106	0.95	0.398	0.117	12	<10								
LANF08	1/18/01 8:30																				
LANF08	1/24/01 3:06	SF												<1	<8	21	<2	8.6	<2	59	
LANF08	1/24/01 8:06	ST	5	137	2160	7.6	21	0.778	5.4	1.93	0.128	290	52	1.8	9.4	58	17	12	<2	260	482
LANF08	1/24/01 9:06	SF												<1	<8	14	<2	6.2	<2	64	
LANF08	1/24/01 11:06	ST	9	26	2200	7.7	8.3	0.583	1.7	0.765	0.147	24	<10	<1	<8	32	4.9	9.7	<2	92	276
LANF08	1/25/01 5:06	ST	14	8	5020	8.1	33	0.216	4.6	1.04	0.26	<10	<10	<1	<8	12	<2	10	<2	48	1220
LANF08	1/26/01 7:06	SF												<1	<8	8.5	<2	9.9	<2	36	
LANF08	1/26/01 9:06	ST	9	66	590	7.8	5.6	0.425	1.4	0.765	0.1	82	16	<1	<8	27	12	7.5	<2	120	136

Newport Bay Watershed

STATION	DATE/TIME	SAMPLES Type	#	Turb NTU	EC umhos	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	oP mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
									Lane Channel at Jamboree Blvd												
LANF08	1/27/01 1:06	SF												<1	<8	8.5	<2	5.3	<2	33	
LANF08	2/5/01 0:00	DT	24	2.8	6120	9.2	42	0.114	1.2	1.07	0.235	<10	<10								1990
LANF08	2/6/01 0:00																				
LANF08	3/13/01 9:25	DT	24	4.7	6170	8.3	44	<0.05	0.69	0.214	0.068	11	<10								1658
LANF08	3/14/01 8:25																				
LANF08	4/18/01 9:36	DT	24	4.6	5930	8.8	35	<0.05	0.79	0.536	0.114	20	<10								1564
LANF08	4/19/01 8:36																				
LANF08	5/2/01 9:00	DT	24	4.9	5400	8.3	41	<0.05	0.9	1.07	0.226	<10	<10								1480
LANF08	5/3/01 8:00																				
LANF08	5/15/01 10:00	DT	24	7.4	4140	8.4	32	<0.05	1.2	3.98		<10	<10								
LANF08	5/15/01 16:00	SUB	18	8.3	3780	8.4	29	<0.05	1.3	5.2		<10	<10								
LANF08	5/16/01 9:00																				
LANF08	5/16/01 9:00																				
LANF08	5/16/01 10:00	DT	24	5.1	5190	8.5	37	<0.05	1	1.74		<10	<10								
LANF08	5/17/01 9:00																				
LANF08	5/17/01 10:00	DT	24	5.2	5370	8.6	35	0.07	0.92	1.35	0.294	<10	<10								
LANF08	5/18/01 9:00																				
LANF08	5/18/01 10:00	DT	24	5	5430	8.4	37	<0.05	1.5	1.35		10	<10								
LANF08	5/19/01 9:00																				
LANF08	5/19/01 10:00	DT	24	6.3	5610	8.4	35	<0.05	1.3	1.32		11	<10								
LANF08	5/20/01 9:00																				
LANF08	5/20/01 10:00	DT	24	6.4	5240	7.9	34	<0.05	1.1	1.07		15	<10								
LANF08	5/21/01 9:00																				
LANF08	5/21/01 10:00	DT	24	3.4	1740	7.9	70	0.907	3.3	2.69		<10	<10								
LANF08	5/22/01 9:00																				
LANF08	5/22/01 10:00	DT	24	3.7	5070	8.4	38	<0.05	0.86	1.16		<10	<10								
LANF08	5/23/01 9:00																				
LANF08	6/14/01 9:27	DT	24	12	4650	8.4	32	<0.05	0.91	2.42	0.544	17	<10								1456
LANF08	6/15/01 8:27																				

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STATION	DATE/TIME	SAMPLES Type	#	Turb NTU	EC umhos	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	oP mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
									El Modena Irvine Channel												
MIRF07	7/25/00 12:50	DT	1	9.1	1120	9.6	5.3	0.32	5.6	2.14	0.277	<10	<1								
MIRF07	8/29/00 15:23	DT	24	16	1160	8.6	11	0.343	2.3	1.38	0.293	19	<10								
MIRF07	8/30/00 14:23																				
MIRF07	9/7/00 11:00	DT	24	6.3	1360	8.3	7.9	0.2	1.9	1.16	0.118	24	11								
MIRF07	9/8/00 10:00																				
MIRF07	10/17/00 10:52	DT	24	12	1290	8.4	9.6	<0.05	1.2	1.38	0.262	19	10								
MIRF07	10/18/00 9:52																				
MIRF07	11/7/00 11:48	DT	24	4.1	1330	8.3	17	<0.05	2.3	0.643	0.096	<10	<10								
MIRF07	11/8/00 10:48																				
MIRF07	12/21/00 11:49	DT	24	6	1250	8.6	15	0.102	1.4	1.16	0.217	20	<10								
MIRF07	12/22/00 10:49																				
MIRF07	1/2/01 8:40	DT	24	1.7	1190	8.6	8	<0.05	1.5	0.367	0.077	<10	<10								
MIRF08	1/3/01 7:40																				
MIRF07	2/5/01 0:00	DT	24	4.1	1070	8.6	23	<0.05	0.68	0.49	0.12	<10	<10								418
MIRF07	2/6/01 0:00																				
MIRF07	2/13/01 7:31	ST	16	25	751	8	11	0.064	2.3	1.22	0.286	21	<10	<1	<8	15	2.3	<4	<2	32	245
MIRF07	2/14/01 13:31	SF												1.1	<8	11	<2	10	<2	23	
MIRF07	2/14/01 15:31	ST	12	20	1590	8.4	18	<0.05	3.4	0.643	0.143	17	<10	<1	<8	11	<2	4.3	<2	20	505
MIRF07	2/15/01 17:31	SF												<1	<8	7.7	<2	<4	<2	13	
MIRF07	2/20/01 13:47	ST	23	3.1	1400	8.6	9.1	<0.05	1.7	0.612	0.152	<10	<10								430
MIRF07	2/22/01 7:47	SF																			
MIRF07	2/23/01 7:47	ST	5	78	292	7.2	4.5	0.626	2.9	1.19	0.121	140	41	<1	<8	31	9.7	6.8	<2	180	45
MIRF07	2/23/01 8:47	SF												<1	<8	17	<2	4.2	<2	35	
MIRF07	2/23/01 10:47	ST	3	44	164	7.3	3.1	0.15	1.1	0.918	0.128	56	15	<1	<8	15	5.5	<4	<2	55	60
MIRF07	2/23/01 14:47	SF												<1	<8	6.9	<2	<4	<2	11	
MIRF07	2/24/01 12:47	ST	12	15	316	7.4	5.6	0.11	0.78	0.673		14	<10	<1	<8	11	2	<4	<2	40	90
MIRF07	2/25/01 10:47	SF												<1	<8	9	<2	<4	<2	23	
MIRF07	2/25/01 12:47	ST	9	44	157	7.3	2.4	0.082	0.81	1.13		60	<10	<1	<8	13	4.1	<4	<2	45	30
MIRF07	2/26/01 4:47	SF												1.8	<8	7.1	<2	<4	<2	14	
MIRF07	2/26/01 6:47	ST	7	24	598	7.9	9.3	0.054	1.1	1.25		15	<10	<1	<8	21	3.3	<4	<2	33	170
MIRF07	2/26/01 21:47	SF												<1	<8	16	<2	<4	<2	18	
MIRF07	3/27/01 8:50	DT	24	3.2	1490	8.9	11	<0.05	3	0.428	0.095	14	<10								482
MIRF07	3/28/01 7:50																				
MIRF07	4/18/01 9:10	DT	24	2.2	1480	9.1	7.6	<0.05	2.4	0.465	0.09	<10	<10								480
MIRF07	4/19/01 8:10																				
MIRF07	5/15/01 10:00	DT	24	3.1	1320	9.3	9.3	0.358	3.7	1.01		<10	<10								
MIRF07	5/16/01 9:00																				
MIRF07	5/16/01 10:00	DT	24	4.1	1250	9	12	<0.05	5.4	1.19		12	<10								
MIRF07	5/17/01 9:00																				
MIRF07	5/17/01 10:00	DT	24	2.5	1170	9	13	<0.05	3	0.673		10	<10								
MIRF07	5/18/01 9:00																				
MIRF07	5/18/01 10:00	DT	24	3.9	1120	8.8	8.1	<0.05	5.2	0.826		<10	<10								

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STATION	DATE/TIME	SAMPLES Type	#	Turb NTU	EC umhos	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	oP mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
									El Modena Irvine Channel												
MIRF07	5/19/01 9:00																				
MIRF07	5/19/01 10:00	DT	24	3	1300	8.9	4.7	<0.05	2.8	0.796		10	<10								
MIRF07	5/20/01 9:00																				
MIRF07	5/20/01 10:00	DT	24	3.6	1220	9	2.5	<0.05	2.3	0.704		10	<10								
MIRF07	5/21/01 9:00																				
MIRF07	5/21/01 10:00	DT	24	2.8	1220	9	3.4	<0.05	1.9	0.826		<10	<10								
MIRF07	5/22/01 9:00																				
MIRF07	6/14/01 8:47	DT	24	26	1430	8.7	5.1	0.213	3.4	1.13	0.111	40	14								468
MIRF07	6/15/01 7:47																				

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STATION	DATE/TIME	SAMPLES Type	#	Turb NTU	EC umhos	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	oP mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
Rattlesnake Canyon Wash																					
RCWF26	2/13/01 0:00	ST	1	1568	572	7.7	20	0.351	4.3	7.65		3380	260	5.6	43	47	39	31	<2	290	206
RCWF26	2/13/01 0:00	SF												<1	<8	8.4	<2	4.4	<2	13	
RCWF26	5/1/01 15:15	DT	1	30	1210	8.7	11	<0.05	1.8	1.68		51	<10								
RCWF26	5/15/01 10:00	DT	24	154	1540	7.9	210	1.17	23	10.4		161	24								
RCWF26	5/16/01 9:00																				
RCWF26	5/16/01 10:00	DT	24	131	1610	7.8	210	16.1	23	9.79		140	22								
RCWF26	5/17/01 9:00																				
RCWF26	5/17/01 10:00	DT	24	322	1690	7.9	220	10.4	22	12.5		390	28								
RCWF26	5/18/01 9:00																				
RCWF26	5/18/01 10:00	DT	24	147	1580	7.4	190	4.35	12	8.26		200	34								
RCWF26	5/19/01 9:00																				
RCWF26	5/19/01 9:00																				
RCWF26	5/19/01 10:00	DT	24	156	1470	7.6	140	0.128	4.7	7.34		200	30								
RCWF26	5/20/01 9:00																				
RCWF26	5/20/01 10:00	DT	24	110	1380	8.5	100	0.085	4.4	6.73		160	32								
RCWF26	5/21/01 9:00																				
RCWF26	5/21/01 10:00	DT	24	234	1650	7.4	240	15.8	18	12.5		270	42								
RCWF26	5/22/01 9:00																				
RCWF26	5/22/01 10:00	DT	16	372	1970	7.1	410	29.4	36	19		460	72								
RCWF26	5/23/01 12:00																				

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STATION	DATE/TIME	SAMPLES Type	#	Turb NTU	EC umhos	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	oP mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
									Santa Ana Delhi Channel												
SADF01	7/19/00 12:00	DT	1	9.9	785	8.8	2.3	<0.05	0.31	0.269	0.044	18	8								
SADF01	8/4/00 13:05	DT	1	8.4	1830	8.8	8.7	<0.05	0.77	0.459	0.015	19	8								
SADF01	8/16/00 15:14	DT	24	10	2150	8	8.8	0.182	1.1	0.459	0.019	27	<10								
SADF01	8/17/00 14:14																				
SADF01	8/29/00 11:09	DT	24	6.5	1780	8.2	10	0.059	0.64	0.428	0.028	<10	<10								
SADF01	8/30/00 10:09																				
SADF01	9/12/00 9:22	DT	24	18	2140	8.1	10	<0.05	0.98	0.275	<0.01	31	<10								
SADF01	9/13/00 8:22																				
SADF01	9/26/00 13:57	DT	24	2.9	2010	8.4	8.8	<0.05	1.1	0.49	0.046	<10	<10								
SADF01	9/27/00 12:57																				
SADF01	10/5/00 10:06	DT	24	6.1	2340	8.3	14	<0.05	0.96	0.337	0.026	23	<10								
SADF01	10/6/00 9:06																				
SADF01	10/27/00 2:57	ST	5	190	575	7.4	8.9	0.66	6.4	2.97	0.185	470	110	1.6	20	130	52	19	<2	600	160
SADF01	10/27/00 3:57	SF												<1	8.4	15	2.1	10	<2	100	
SADF01	10/27/00 5:57	ST	20	33	1050	7.9	13	0.161	1.6	1.19	0.181	54	13	<1	9.5	25	11	<4	<2	98	344
SADF01	10/28/00 19:57	SF												<1	<8	10	<2	<4	<2	41	
SADF01	10/28/00 21:57	ST	5	2.4	2040	8.1	17	<0.05	1	0.337	0.08	<10	<10	<1	<8	11	<2	<4	<2	37	740
SADF01	10/29/00 5:57	SF												<1	<8	8.1	<2	<4	<2	31	
SADF01	10/29/00 9:57	ST	5	3.6	2250	8.3	16	<0.05	0.7	0.266		<10	<10	<1	8.3	13	<2	<4	<2	28	800
SADF01	10/29/00 17:57	SF																			
SADF01	10/29/00 19:57	ST	7	60	520	7.5	6.2	0.15	1.3	1.22	0.12	72	24	<1	12	33	14	5.5	<2	110	160
SADF01	10/30/00 7:57	SF												<1	9.7	14	<2	4	<2	39	
SADF01	10/30/00 9:57	ST	12	5.6	1480	8	14	<0.05	0.54	0.367	0.123	<10	<10	<1	9.2	14	2.4	<4	<2	83	500
SADF01	10/31/00 7:57	SF												<1	9.3	11	<2	<4	<2	38	
SADF01	11/30/00 10:13	DT	24	2.7	2360	8.1	18	<0.05	0.5	0.184	0.026	<10	<10								
SADF01	12/1/00 9:13																				
SADF01	12/14/00 11:00	DT	24	4	2290	8.5	24	<0.05	1	0.367	<0.01	32	10								
SADF01	12/15/00 10:00																				
SADF01	12/26/00 9:15	DT	24	8	1810	8.3	21	<0.05	0.85	0.428	0.061	20	<10								
SADF01	12/27/00 8:15																				
SADF01	1/8/01 13:25	ST	5	160	940	7	25	3.67	8.8	2.11	0.21	210	68								260
SADF01	1/8/01 14:25	SF												<1	<8	36	5.8	17	<2	230	
SADF01	1/8/01 16:25	ST	5	170	400	7	9.7	1.29	4.4	2.82	0.198	280	72	1.5	17	110	49	17	<2	380	122
SADF01	1/9/01 0:25																				
SADF01	1/9/01 2:25	ST	18	18	1650	7.9	23	0.363	1.3	0.765	0.14	15	<10	<1	<8	18	3.1	<4	<2	52	92
SADF01	1/10/01 14:25	SF												<1	<8	18	2.9	<4	<2	48	
SADF01	1/10/01 16:25	ST	23	75	325	7.5	5.9	0.254	1.6	1.1	0.24	110	25	<1	<8	24	17	4.7	<2	110	128
SADF01	1/12/01 12:25	SF												<1	<8	8.4	<2	<4	<2	26	
SADF01	1/17/01 9:50	DT	24	2.3	2820	8.1	30	0.109	0.92	0.214	0.069	<10	<10								
SADF01	1/18/01 8:50																				
SADF01	1/24/01 8:42	ST	5				16	1.19	3.8	1.16											
SADF01	1/24/01 9:42																				

Newport Bay Watershed

STATION	DATE/TIME	SAMPLES Type	#	Turb NTU	EC umhos	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	oP mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
									Santa Ana Delhi Channel												
SADF01	1/24/01 11:42	ST	9	38	580	7.5	7.3	0.54	2.4	0.887	0.126	70	16	<1	<8	29	16	6.8	<2	120	166
SADF01	1/25/01 3:42	SF												<1	<8	14	<2	4.9	<2	40	
SADF01	1/25/01 5:42	ST	14	7.9	1830	8.1	17	0.13	0.61	0.245	0.059	<10	<10	<1	<8	11	6.3	5.9	<2	39	712
SADF01	1/26/01 7:42	SF												<1	<8	9	<2	6	<2	30	
SADF01	1/26/01 9:42	ST	25	61	925	8.1	13	0.35	1.6	0.673	0.103	81	20	<1	<8	20	15	6	<2	94	312
SADF01	1/28/01 9:42	SF												<1	<8	5.8	<2	<4	<2	24	
SADF01	2/1/01 10:10	DT	24	1.6	3010	8.2	25	<0.05	0.85	0.184	0.037	<10	<10								1088
SADF01	2/2/01 9:10																				
SADF01	2/14/01 0:00	ST	24	24	2180	8.1	23	<0.05	0.98	0.428	0.076	10	<10								730
SADF01	2/15/01 0:00																				
SADF01	2/22/01 10:10	DT	24	1.7	2530	8.2	21	<0.05	0.56	<0.061	0.032	<10	<10								1040
SADF01	2/23/01 9:10																				
SADF01	3/6/01 1:54	ST	5	29	999	7.4	11	0.263	1.2	0.398		31	10	<1	<8	30	5.6	5.3	<2	110	330
SADF01	3/6/01 2:54	SF												<1	<8	20	<2	4.2	<2	69	
SADF01	3/6/01 4:54	ST	8	25	749	7.3	8.1	<0.05	1.3	0.49	0.057	29	<10	<1	<8	10	3.3	<4	<2	34	225
SADF01	3/6/01 18:54	SF												<1	<8	12	<2	5.2	<2	28	
SADF01	3/6/01 20:54	ST	12	4	1980	8.2	17	<0.05	0.94	0.0918	0.025	<10	<10	<1	<8	26	<2	<4	<2	40	735
SADF01	3/7/01 3:00	ST	28	3.6	2540	8.2	21	<0.05	0.94	0.214	0.019	<10	<10	<1	<8	6.7	<2	<4	<2	30	1040
SADF01	3/7/01 19:54	SF												<1	<8	7.9	<2	<4	<2	24	
SADF01	3/10/01 3:00	SF												<1	<8	5	<2	<4	<2	24	
SADF01	3/20/01 9:20	DT	24	2.1	1880	8.1	12	<0.05	<0.2	0.0612	0.01	<10	<10								700
SADF01	3/21/01 8:20																				
SADF01	4/3/01 0:00	DT	24	5.3	2740	8.1	18	<0.05	1.5	0.0704	<0.01	41	11								1146
SADF01	4/4/01 0:00																				
SADF01	4/12/01 10:45	DT	24	1.6	2760	8.1	18	<0.05	0.83	0.214	0.038	<10	<10								1134
SADF01	4/13/01 9:45																				
SADF01	5/2/01 9:45	DT	24	6	2210	8.3	13	<0.05	0.83	0.165	0.017	14	<10								812
SADF01	5/3/01 8:45																				
SADF01	5/30/01 10:12	DT	24	6.4	2370	8.2	11	0.06	1.9	0.367	0.032	17	<10								1040
SADF01	5/31/01 9:12																				
SADF01	6/7/01 10:00	DT		3.2	2460	8.2	11	<0.05	0.51	0.214	<0.01	<10	<10								1006
SADF01	6/8/01 9:00																				
SADF01	6/14/01 9:58	DT	24	2.1	2640	8.2	12	<0.05	0.64	0.245	0.03	<10	<10								1006
SADF01	6/15/01 8:58																				

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STATION	DATE/TIME	SAMPLES Type	#	Turb NTU	EC umhos	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	oP mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
Santa Ana - Santa Fe Channel																					
SAFF10	7/20/00 11:30	DT	1	3.8	2040	7.7	57	<0.05	0.62	0.321	0.087	<10	<1								
SAFF10	8/9/00 9:22	DT	24	5.3	1800	8.1	<0.44	0.149	1.8	2.54		17	8								
SAFF10	8/10/00 8:22																				
SAFF10	8/24/00 11:00	DT	24	9.2	2020	7.8	53	<0.05	1.7	0.826	0.3	76	31								
SAFF10	8/25/00 10:00																				
SAFF10	5/1/01 15:55	DT	1	0.8	1890	8.3	57	<0.05	0.69	0.15		<10	<10								
SAFF10	5/15/01 10:00	DT	24	1.4	1820	8	62	<0.05	1.3	0.122		<10	<10								
SAFF10	5/16/01 9:00																				
SAFF10	5/16/01 10:00	DT	24	2.2	1940	8	62	<0.05	2.5	0.122		<10	<10								
SAFF10	5/17/01 9:00																				
SAFF10	5/17/01 10:00	DT	24	2.3	1990	8	66	<0.05	1.1	0.153		<10	<10								
SAFF10	5/18/01 9:00																				
SAFF10	5/18/01 10:00	DT	24	1.6	1950	7.9	62	<0.05	1.3	0.245		<10	<10								
SAFF10	5/19/01 9:00																				
SAFF10	5/19/01 10:00	DT	24	1.3	1980	8.1	66	<0.05	0.79	0.214		<10	<10								
SAFF10	5/20/01 9:00																				
SAFF10	5/20/01 10:00	DT	24	1.9	1930	8.2	62	<0.05	1	0.0918		<10	<10								
SAFF10	5/21/01 9:00																				
SAFF10	5/21/01 10:00	DT	24	2.7	1880	7.9	62	<0.05	0.68	0.275		<10	<10								
SAFF10	5/22/01 9:00																				
SAFF10	5/22/01 10:00	DT	24	2.7	1870	8.1	62	<0.05	0.74	0.153		12	<10								
SAFF10	5/23/01 9:00																				

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STATION	DATE/TIME	SAMPLES Type	#	Turb NTU	EC umhos	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	oP mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
									Sand Canyon Channel												
SCCF15	5/15/01 0:00	DT	1	1.3	2130	8	1.4	<0.05	0.88	1.19		<10	<10								
SCCF15	5/16/01 7:57	DT	1	2.4	2190	8.1	31	<0.05	0.82	0.673		<10	<10								
SCCF15	5/17/01 8:17	DT	1	1.2	2090	8.1	1.6	<0.05	0.95	1.01		<10	<10								
SCCF15	5/20/01 8:34	DT	1	2.8	2310	8.1	1	<0.05	0.66	1.41		<10	<10								
SCCF15	5/21/01 8:18	DT	1	1.5	2140	8.3	1.7	<0.05	0.47	0.979		<10	<10								
SCCF15	5/22/01 0:00	DT	1	1.9	2100	8.1	1.7	<0.05	1.5	0.887		<10	<10								

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STATION	DATE/TIME	SAMPLES Type	#	Turb NTU	EC umhos	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	oP mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
San Diego Creek at Campus Dr																					
SDMF05	7/7/00 12:00	DT	1	60	3190	8.6	12	0.086	2.7	0.612	<0.01	79	27								
SDMF05	7/7/00 12:00	DF																			
SDMF05	7/13/00 9:30	DT	1	55	2900	8.5	15	<0.05	1.7	0.468	0.018	110	48								
SDMF05	7/13/00 9:30	DF																			
SDMF05	7/19/00 12:15	DT	1	45	4250	8.6	13	<0.05	1.8	0.389	<0.01	81	30								
SDMF05	7/19/00 12:15	DF																			
SDMF05	7/25/00 14:10	DT	1	50	2490	8.7	10	<0.05	2.7	0.487	<0.01	73	26								
SDMF05	8/4/00 12:50	DT	1	20	2880	8.7	62	<0.05	0.36	0.153	<0.01	42	14								
SDMF05	8/9/00 11:15	DT	24	50	2500	8.4	62	<0.05	1.4	1.1	0.017	120	19								
SDMF05	8/10/00 10:15																				
SDMF05	8/17/00 14:00	DT	1	28	3020	8.2	29	0.056	1	6.12	0.086	50	<10								
SDMF05	8/24/00 12:04	DT	24	140	2940	8.3	19	<0.05	3.1	1.5	0.27	<10	<10								
SDMF05	8/25/00 11:04																				
SDMF05	8/29/00 11:37	DT	24	89	2300	8.3	21	0.191	1.5	0.857	0.033	133	17								
SDMF05	8/30/00 10:37																				
SDMF05	9/5/00 13:13	DT	24	78	2860	8.4	29	0.095	1.3	0.887	0.091	280	19								
SDMF05	9/6/00 12:13																				
SDMF05	9/12/00 10:00	DT	24	120	3060	8.4	27	0.355	0.97	0.887	0.022	210	21								
SDMF05	9/13/00 9:00																				
SDMF05	9/19/00 7:19	DT	24	121	2840	8.4	27	0.086	1.36	1.1	0.024	190	22								
SDMF05	9/20/00 6:19																				
SDMF05	9/26/00 10:06	DT	24	34	3060	8.4	23	0.107	1.4	<0.061	0.072	129	19								
SDMF05	9/27/00 9:06																				
SDMF05	10/5/00 10:00	DT	24	24	2680	8.7	38	0.628	1.5	0.734	0.096	93	15								
SDMF05	10/6/00 9:00																				
SDMF05	10/10/00 13:50	ST	5	26	2350	8.2	44	0.213	2	1.1	0.128	140	18	<1	<8	18	3.6	<4	<2	47	680
SDMF05	10/10/00 14:50	SF												<1	<8	8.1	<2	<4	<2	19	
SDMF05	10/10/00 16:50	ST	22	70	2270	8	36	0.395	3.1	1.68	0.125	140	20	<1	<8	18	2.7	<4	<2	33	
SDMF05	10/12/00 12:43	SF												<1	<8	12	<2	<4	<2	24	
SDMF05	10/12/00 14:43	ST	29	57	2470	8.2	33	0.188	2.1	0.826	0.085	90	13	<1	<8	19	2.6	6.2	<2	150	645
SDMF05	10/14/00 16:43	SF												<1	<8	9.3	<2	<4	<2	19	
SDMF05	10/17/00 9:02	DT	24	66	2970	8.3	39	0.195	1.5	0.551	0.06	110	19								
SDMF05	10/18/00 8:02																				
SDMF05	10/26/00 18:31	ST	5	32	2760	8.5	40	0.075	1.3	0.459	0.039	37	<10	<1	8.4	14	<2	<4	<2	25	740
SDMF05	10/26/00 19:31	SF												<1	9.3	11	<2	<4	<2	18	
SDMF05	10/26/00 21:31	ST	21	240	1250	7.9	29	0.236	3	2.69	0.325	370	54	<1	14	24	8.9	11	<2	89	324
SDMF05	10/28/00 13:31	SF												<1	<8	9.1	<2	<4	<2	16	
SDMF05	10/29/00 11:31	ST	6	58	1560	7.9	33	0.377	2	1.59	0.384	57	<10	<1	9.2	9.6	2.4	5	<2	27	432
SDMF05	10/29/00 21:31	SF												<1	<8	6.5	<2	<4	<2	14	
SDMF05	10/29/00 23:31	ST	9	604	500	7.7	11	0.152	2.1	3.06	0.276	650	64	2.1	26	30	15	17	<2	140	144
SDMF05	10/30/00 15:31	SF												<1	8.6	6.2	<2	<4	<2	<10	
SDMF05	10/30/00 17:31	ST	3	169	725	7.7	18	0.202	1.5	2.02	0.36	120	20	<1	10	11	4.5	6	<2	42	180

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STATION	DATE/TIME	SAMPLES Type	#	Turb NTU	EC umhos	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	oP mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
San Diego Creek at Campus Dr																					
SDMF05	10/30/00 21:31	SF												<1	<8	25	<2	7.8	<2	12	
SDMF05	11/7/00 9:52	DT	24	57	3010	8.3	48	<0.05	1.2	0.673	0.061	64	12								
SDMF05	11/8/00 8:52																				
SDMF05	11/16/00 10:30	DT	1	28	2770	8.2	53	<0.05	0.74	0.52	0.192	33	<10								
SDMF05	11/30/00 8:50	DT	24	29	3040	8.4	53	<0.05	1.3	<0.061	0.043	38	10								
SDMF05	12/1/00 7:50																				
SDMF05	12/8/00 11:30	DT	1	18	2810	8.2	4.2	<0.05	1.7	0.581	0.334	24	<10								
SDMF05	12/14/00 10:19	DT	24	21	2810	8.6	53	<0.05	0.9	0.643	0.093	36	12								
SDMF05	12/15/00 9:19																				
SDMF05	12/21/00 11:48	DT	24	25	3180	8.6	48	<0.05	1.2	0.49	0.039	42	13								
SDMF05	12/22/00 10:48																				
SDMF05	12/26/00 10:01	DT	24	21	2030	8.5	48	<0.05	1.6	0.887	0.304	37	11								
SDMF05	12/27/00 9:01																				
SDMF05	1/2/01 9:32	DT	24	33	2950	8.7	44	<0.05	1.7	0.796	0.087	57	16								
SDMF05	1/3/01 8:32																				
SDMF05	1/8/01 14:44	ST	5				39	0.053	1.8	1.07											
SDMF05	1/8/01 15:44																				
SDMF05	1/8/01 17:44	ST		196	790	7.4	22	1.12	3.6	3	0.254	250	40								
SDMF05	1/9/01 5:44																				
SDMF05	1/10/01 13:44	ST	2	80	1240	7.7	37	0.661	2.7	1.74	0.41	61	12								
SDMF05	1/10/01 15:44																				
SDMF05	1/10/01 17:44	ST	22	140	465	7.7	14	0.293	3.2	3.98	0.4	900	88	2.7	23	44	19	21	<2	170	124
SDMF05	1/12/01 11:44	SF												<1	<8	5.8	<2	<4	<2	<10	
SDMF05	1/17/01 9:38	DT	24	26	1250	8.4	3.4	0.083	2.4	0.826	0.214	10	<10								144
SDMF05	1/18/01 8:38																				
SDMF05	1/24/01 9:12	ST	5	21	2980	8.4	53	<0.05	1.4	0.52	0.025	29	<10	<1	<8	10	<2	7.3	<2	21	826
SDMF05	1/24/01 10:12	SF												<1	<8	7.2	<2	6.5	<2	12	
SDMF05	1/24/01 12:12	ST	11	153	700	7.7	22	0.57	2.6	1.5	0.282	160	19	<1	<8	18	4.9	9.1	<2	58	190
SDMF05	1/25/01 8:12	SF												<1	<8	8.3	<2	5	<2	14	
SDMF05	1/25/01 10:12	ST	13	58	1080	7.9	25	0.386	1.3	1.32	0.242	36	<10	<1	<8	10	2.6	6.6	<2	40	324
SDMF05	1/26/01 10:12	SF												<1	<8	6.7	<2	5.5	<2	15	
SDMF05	1/26/01 12:12	ST	14	122	790	7.8	23	0.466	2.7	1.74	0.32	140	19	<1	<8	14	5	7.9	<2	49	176
SDMF05	1/28/01 8:30	SF												<1	<8	5.6	<2	<4	<2	11	
SDMF05	2/1/01 9:55	DT	24	26	2880	8	48	<0.05	0.27	0.887	0.115	32	<10								620
SDMF05	2/2/01 8:55																				
SDMF05	2/5/01 9:36	DT	24	22	2920	8.4	48	0.053	0.86	0.184	<0.01	45	13								908
SDMF05	2/6/01 7:36																				
SDMF05	2/14/01 0:00	ST	24	8.4	4710	7.6	210	0.051	0.64	0.337	0.077	11	<10								1980
SDMF05	2/15/01 0:00																				
SDMF05	2/22/01 9:52	DT	24	24	1520	8.2	31	<0.05	0.71	0.796	0.161	22	<10								434
SDMF05	2/23/01 8:52																				
SDMF05	3/6/01 3:23	ST	1											<1	<8	15	2.7	<4	<2	19	

Newport Bay Watershed

STATION	DATE/TIME	SAMPLES Type	#	Turb NTU	EC umhos	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	oP mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
									San Diego Creek at Campus Dr												
SDMF05	3/6/01 3:23	SF												<1	<8	12	<2	<4	<2	17	
SDMF05	3/7/01 0:23	ST	2	140	827	7.7	18	0.129	0.78	1.65	0.064	120	17								
SDMF05	3/7/01 2:23																				
SDMF05	3/7/01 9:50	ST	14	25	1760	8.3	33	0.064	1.4	0.918	0.172	36	<10	<1	<8	10	3.1	<4	<2	19	480
SDMF05	3/8/01 11:50	SF												<1	<8	7.3	<2	<4	<2	<10	
SDMF05	3/8/01 13:50	ST	20	29	2290	8.4	37	<0.05	1.6	<0.061	0.027	44	<10	<1	<8	5.8	<2	<4	<2	22	700
SDMF05	3/10/01 3:50	SF												<1	<8	<2	<2	<4	<2	<10	
SDMF05	3/15/01 9:00	DT	1	23	2850	8.4	44	<0.05	1.1	0.367	0.013	38	<10								
SDMF05	3/20/01 9:15	DT	24	17	2560	8.4	44	<0.05	1.9	0.337	<0.01	62	13								770
SDMF05	3/21/01 8:16																				
SDMF05	3/27/01 10:03	DT	24	21	2890	8.4	53	<0.05	2.1	0.153	<0.01	65	12								844
SDMF05	3/28/01 9:03																				
SDMF05	4/3/01 0:00	DT	24	38	2790	8.4	38	0.121	2.3	0.398	<0.01	100	19								852
SDMF05	4/4/01 0:00																				
SDMF05	4/12/01 10:00	DT	24	24	2360	8.1	28	<0.05	1.7	0.643	0.012	34	12								700
SDMF05	4/13/01 9:00																				
SDMF05	4/18/01 10:36	DT	24	34	2620	8.8	28	0.088	2.3	0.361	<0.01	66	19								722
SDMF05	4/19/01 9:36																				
SDMF05	4/25/01 9:20	DT	24	52	2480	8.3	21	<0.05	2.9	0.459	<0.01	110	25								668
SDMF05	4/26/01 8:20																				
SDMF05	5/2/01 9:20	DT	24	62	2610	8.7	31	<0.05	2.2	0.581	<0.01	94	21								654
SDMF05	5/3/01 8:20																				
SDMF05	5/15/01 10:00	DT	8	63	2770	8.3	37	0.243	2.1	0.796	0.099	75	11								
SDMF05	5/15/01 17:00																				
SDMF05	5/16/01 10:00	DT	24	76	2740	8.5	31	<0.05	3.4	0.673	0.016	150	33								
SDMF05	5/17/01 9:00																				
SDMF05	5/17/01 10:00	DT	24	78	2750	8.7	30	<0.05	2.8	0.643	0.011	120	26								
SDMF05	5/18/01 9:00																				
SDMF05	5/18/01 10:00	DT	24	112	2780	8.5	27	<0.05	3.6	0.673	0.01	150	28								
SDMF05	5/19/01 9:00																				
SDMF05	5/19/01 10:00	DT	24	112	2870	8.4	36	<0.05	3.3	0.826	0.012	140	30								
SDMF05	5/20/01 9:00																				
SDMF05	5/20/01 10:00	DT	24	95	2610	8.4	37	<0.05	3.3	1.04	0.014	130	28								
SDMF05	5/21/01 9:00																				
SDMF05	5/21/01 9:00																				
SDMF05	5/21/01 10:00	DT	24	94	2740	8.2	35	<0.05	2	0.765	0.024	115	19								
SDMF05	5/22/01 9:00																				
SDMF05	5/22/01 9:00																				
SDMF05	5/22/01 10:00	DT	24	73	2740	8.3	38	<0.05	1.8	0.704	0.041	92	20								
SDMF05	5/23/01 9:00																				
SDMF05	5/30/01 10:00	DT	24	70	2600	8.6	37	<0.05	3.2	1.1	0.098	110	22								796
SDMF05	5/31/01 9:00																				

Newport Bay Watershed

STATION	DATE/TIME	SAMPLES Type	#	Turb NTU	EC umhos	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	oP mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
San Diego Creek at Campus Dr																					
SDMF05	6/7/01 9:30	DT		66	2620	8.5	33	<0.05	2.6	0.428	0.223	100	17								936
SDMF05	6/8/01 8:30																				
SDMF05	6/14/01 9:43	DT	24	93	2520	8.5	24	<0.05	2	0.673	<0.01	120	25								790
SDMF05	6/15/01 8:43																				
SDMF05	6/20/01 9:35	DT	24	48	2630	8.5	32	<0.05	1.1	0.612	0.01	61	10								938
SDMF05	6/21/01 8:35																				
SDMF05	6/28/01 0:00	DT	1	122	2580	8.4	24	<0.05	1.7	0.826	0.138	140	20								

Newport Bay Watershed

STATION	DATE/TIME	SAMPLES Type	#	Turb NTU	EC umhos	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	oP mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
									San Joaquin Channel												
SJQF14	5/1/01 16:50	DT	1	1.5	1970	8.7	42	<0.05	1.4	0.49		<10	<10								
SJQF14	5/1/01 16:50	DUP	1	1.2	1880	8.7	42	<0.05	1.3	0.428		<10	<10								
SJQF14	5/15/01 0:00	DT	1	0.9	1760	7.6	28	<0.05	2.3	0.857		<10	<10								
SJQF14	5/16/01 8:19	DT	1	0.85	1540	7.8	1.6	<0.05	0.61	1.16		<10	<10								
SJQF14	5/17/01 8:26	DT	1	0.7	1550	8.1	29	<0.05	1.2	1.04		<10	<10								
SJQF14	5/18/01 0:00	DT	1	1.3	1590	7.9	28	<0.05	0.83	0.765		<10	<10								
SJQF14	5/19/01 8:45	DT	1	1.1	1640	7.5	31	<0.05	1.4	0.796		<10	<10								
SJQF14	5/20/01 8:53	DT	1	1.4	1620	7.8	28	<0.05	1.1	1.13		<10	<10								
SJQF14	5/21/01 8:40	DT	1	0.75	1540	8	30	<0.05	1.1	0.765		<10	<10								
SJQF14	5/22/01 0:00	DT	1	0.9	1560	7.7	31	<0.05	0.79	0.551		<10	<10								

Newport Bay Watershed

STATION	DATE/TIME	SAMPLES Type	#	Turb NTU	EC umhos	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	oP mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
Peters Canyon Wash u/s Rattlesnake Canyon Wash																					
USRF06	5/15/01 10:00	DT	24	5	1710	8.7	9.5	0.379	2.6	1.16		<10	<10								
USRF06	5/16/01 9:00																				
USRF06	5/17/01 8:40	DT	1	2.8	1640	8.9	7.3	0.094	1.6	0.918		<10	<10								
USRF06	5/17/01 10:00	DT	20	4.2	1690	8.9	5.1	<0.05	0.33	0.796		<10	<10								
USRF06	5/18/01 5:00																				
USRF06	5/18/01 10:00	DT	24	3	1710	8.7	6.2	0.094	2	0.979		<10	<10								
USRF06	5/19/01 9:00																				
USRF06	5/19/01 10:00	DT	24	2.7	1770	8.7	4.3	<0.05	2.1	0.765		<10	<10								
USRF06	5/20/01 9:00																				
USRF06	5/20/01 10:00	DT	24	2.2	1710	8.4	3.3	<0.05	2	0.581		<10	<10								
USRF06	5/21/01 9:00																				
USRF06	5/21/01 10:00	DT	24	7.2	1600	8.7	3.5	<0.05	1.1	0.765		<10	<10								
USRF06	5/22/01 9:00																				
USRF06	5/22/01 10:00	DT	24	4.4	1610	8.7	3.1	<0.05	1.2	0.581		<10	<10								
USRF06	5/23/01 9:00																				

Newport Bay Watershed

STATION	DATE/TIME	SAMPLES Type	#	Turb NTU	EC umhos	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	oP mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
USRPCW	7/21/00 9:00	DT	1	10	1450	8.6	5.4	0.168	1.4	1.25		15	7								
USRPCW	8/2/00 12:00	DT	1	9.9	1490	8.8	7.4	0.149	1.8	1.1		31	<5								
USRPCW	5/1/01 15:10	DT	1	6.4	1570	9.4	2.2	<0.05	0.9	0.581		26	<10								

Newport Bay Watershed

STATION	DATE/TIME	SAMPLES Type	#	Turb NTU	EC umhos	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	oP mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
									Valencia Storm Drain												
VALS02	7/20/00 12:00	DT	1	5.1	2510	8.1	53	<0.05	0.64	0.511	0.141	10	6								
VALS02	8/9/00 10:31	DT	24	190	2460	8.4	210	19.3	12	10.7		270	160								
VALS02	8/10/00 9:31																				
VALS02	8/24/00 11:09	DT	24	190	2810	8.1	62	0.159	5.6	4.59	0.79	1040	400								
VALS02	8/25/00 10:09																				
VALS02	5/1/01 16:15	DT	1	1.3	2860	8.2	66	<0.05	0.48	0.581		<10	<10								
VALS02	5/16/01 10:00	DT	24	1.9	2850	8.3	88	0.053	1.2	0.918		<10	<10								
VALS02	5/17/01 9:00																				
VALS02	5/17/01 10:00	DT	24	3.5	2940	8.3	84	<0.05	1.9	0.949		<10	<10								
VALS02	5/18/01 9:00																				
VALS02	5/18/01 10:00	DT	24	7.2	2860	8.2	84	<0.05	1.3	0.918		22	<10								
VALS02	5/19/01 9:00																				
VALS02	5/19/01 10:00	DT	24	3.3	2810	8.2	84	<0.05	0.96	0.857		18	<10								
VALS02	5/20/01 9:00																				
VALS02	5/20/01 10:00	DT	24	4.8	2840	7.9	79	<0.05	1.1	1.32		13	<10								
VALS02	5/21/01 9:00																				
VALS02	5/21/01 10:00	DT	24	5.2	2880	8.2	84	<0.05	0.82	1.38		14	<10								
VALS02	5/22/01 9:00																				
VALS02	5/22/01 10:00	DT	24	4.7	2710	8.2	79	<0.05	0.86	0.949		15	<10								
VALS02	5/23/01 9:00																				

Newport Bay Watershed

STATION	DATE/TIME	SAMPLES Type	#	Turb NTU	EC umhos	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	oP mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
									Warner Drain												
WARF06	7/20/00 11:40	DT	1	3.7	2700	7.8	57	<0.05	0.77	0.728	0.226	<10	<1								
WARF06	8/9/00 8:42	DT	24	38	2360	8.2	57	0.268	5.6	2.48		150	35								
WARF06	8/10/00 7:42																				
WARF06	8/24/00 11:22	DT	24	3.2	2680	8.1	57	<0.05	0.61	0.857	0.81	11	<10								
WARF06	8/25/00 10:22																				
WARF06	5/1/01 16:25	DT	1	2.2	2670	7.9	57	<0.05	0.59	0.765		<10	<10								
WARF06	5/15/01 10:00	DT	24	1.9	2600	8.1	66	<0.05	0.73	0.673		<10	<10								
WARF06	5/16/01 9:00																				
WARF06	5/17/01 10:00	DT	24	1.9	2650	8.1	66	<0.05	0.35	0.765		<10	<10								
WARF06	5/18/01 9:00																				
WARF06	5/18/01 10:00	DT	24	2.4	2570	8	66	<0.05	0.7	0.857		<10	<10								
WARF06	5/19/01 9:00																				
WARF06	5/19/01 10:00	DT	24	2.3	2580	8.2	62	<0.05	0.52	0.826		<10	<10								
WARF06	5/20/01 9:00																				
WARF06	5/20/01 10:00	DT	24	2.6	2610	7.9	66	<0.05	0.61	0.673		<10	<10								
WARF06	5/21/01 9:00																				
WARF06	5/21/01 19:00	DT	16	2.4	2540	8.1	62	<0.05	<0.2	0.796		<10	<10								
WARF06	5/22/01 9:00																				
WARF06	5/22/01 10:00	DT	24	2.7	2570	8.1	66	<0.05	0.6	0.734		<10	<10								
WARF06	5/23/01 9:00																				

Newport Bay Watershed

STATION	DATE/TIME	SAMPLES Type	#	Turb NTU	EC umhos	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	oP mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
San Diego Creek at Harvard Ave																					
WYLSED	7/19/00 10:15	DT	1	2.6	2250	8.3	62	<0.05	0.84	0.0765	0.097	<10	<1								
WYLSED	8/4/00 12:35	DT	1	3.7	2200	8.5	25	<0.05	1.1	0.367	0.028	10	<5								
WYLSED	8/16/00 14:58	DT	24	9.1	2140	8	53	<0.05	1.1	0.11	<0.01	24	<10								
WYLSED	8/17/00 15:58																				
WYLSED	8/29/00 14:50	DT	24	2	1730	8.2	70	<0.05	0.53	0.223	0.03	<10	<10								
WYLSED	8/30/00 13:50																				
WYLSED	9/12/00 10:49	DT	24	2.3	2180	8.1	10	<0.05	0.93	<0.061	<0.01	<10	<10								
WYLSED	9/13/00 9:49																				
WYLSED	9/26/00 13:42	DT	24	0.3	2310	8.3	66	<0.05	0.88	0.337	0.077	<10	<10								
WYLSED	9/27/00 12:42																				
WYLSED	10/5/00 11:32	DT	24	3.5	2000	8.3	57	<0.05	0.83	0.49	0.043	21	<10								
WYLSED	10/6/00 10:32																				
WYLSED	10/26/00 15:17	ST	10	140	870	7.7	21	0.253	3.3	1.59	0.158	230	42	1.4	12	33	4.9	7.4	<2	72	256
WYLSED	10/27/00 7:17	SF												<1	8.2	20	<2	4.4	<2	22	
WYLSED	10/27/00 12:17	ST	5	140	1680	8.3	48	0.321	4.6	1.96	0.18	520	90								
WYLSED	10/27/00 13:17																				
WYLSED	10/27/00 23:17	ST	17	45	1470	8	33	<0.05	1.6	1.13	0.203	51	12	<1	11	19	<2	<4	<2	27	424
WYLSED	10/29/00 8:17	SF												<1	9	15	<2	<4	<2	15	
WYLSED	10/29/00 10:17	ST	3	6.2	3110	8.2	43	<0.05	1.4	0.551		<10	<10								496
WYLSED	10/29/00 14:17	SF																			
WYLSED	10/29/00 16:17	ST	11	376	1500	7.8	23	<0.05	2.1	2.72	0.267	600	64	2.1	24	36	13	16	<2	120	264
WYLSED	10/30/00 12:17	SF												<1	<8	11	<2	<4	<2	11	
WYLSED	10/30/00 14:17	ST	10	53	1970	7.8	31	0.101	1.4	1.04	0.243	52	<10	<1	9.2	17	2.5	<4	<2	28	340
WYLSED	10/31/00 8:17	SF												<1	<8	14	2.2	<4	<2	12	
WYLSED	11/7/00 10:06	DT	24	1.5	2150	8.2	79	<0.05	0.64	0.306	0.041	<10	<10								
WYLSED	11/8/00 9:06																				
WYLSED	12/1/00 8:30	DT	1	2	2190	8	79	0.052	0.56	<0.061	0.025	<10	<10								
WYLSED	12/14/00 9:42	DT	24	4	2070	8.5	84	<0.05	0.66	0.275	0.208	27	<10								
WYLSED	12/15/00 8:42																				
WYLSED	12/26/00 9:49	DT	24	34	1570	8.6	75	<0.05	4	1.71		150	28								
WYLSED	12/27/00 8:49																				
WYLSED	1/8/01 14:27	ST	5	160	935	7.2	30	1.33	7.9	3.67	0.19	360	68								500
WYLSED	1/8/01 15:27	SF												<1	<8	8.2	<2	4.6	<2	34	
WYLSED	1/8/01 17:27	ST		766	645	7.3	30	0.257	4.2	5.51	0.263	1150	150								202
WYLSED	1/9/01 1:27	SF												<1	<8	6.7	<2	<4	<2	18	
WYLSED	1/9/01 9:27	ST	17	40	1610	8	53	0.46	1.5	1.25	0.53	42	<10	<1	<8	10	<2	<4	<2	22	360
WYLSED	1/10/01 17:27	SF												<1	<8	8.2	<2	<4	<2	14	
WYLSED	1/10/01 19:27	ST	23	390	455	7.8	17	0.317	2	3.37	0.4	750	80	2.8	22	36	14	21	<2	140	304
WYLSED	1/12/01 13:27	SF												1.6	12	23	7.1	13	<2	89	
WYLSED	1/17/01 8:42	DT	24	6.4	2030	8.1	62	<0.05	1.1	0.734	0.208	<10	<10								
WYLSED	1/18/01 7:42																				
WYLSED	1/24/01 8:18	ST	5	17	1420	8	48	0.419	2.2	0.52	0.111	24	<10	<1	<8	15	<2	7	<2	42	386

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STATION	DATE/TIME	SAMPLES Type	#	Turb NTU	EC umhos	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	oP mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
									San Diego Creek at Harvard Ave												
WYLSED	1/24/01 9:18	SF												<1	<8	10	<2	6.4	<2	24	
WYLSED	1/24/01 11:18	ST	11	300	760	7.7	33	0.73	3.4	2.2	0.217	320	40	1.6	9.9	21	6.8	12	<2	85	226
WYLSED	1/25/01 7:18	SF												<1	<8	7.3	<2	4.7	<2	11	
WYLSED	1/25/01 21:18	ST	13	20	1400	7.7	48	0.157	0.72	0.857	0.232	18	<10	<1	<8	6.5	<2	4.8	<2	15	404
WYLSED	1/26/01 9:18	SF												<1	<8	5.3	<2	4.8	<2	11	
WYLSED	1/26/01 11:18	ST	24	196	805	8	34	0.499	2.1	2.2	0.341	290	38	1	8.8	19	7.2	11	<2	74	256
WYLSED	1/28/01 9:18	SF												1	<8	6.1	<2	4.6	<2	<10	
WYLSED	2/1/01 9:39	DT	24	3.4	2070	8.2	75	<0.05	<0.2	0.612	0.171	<10	<10								592
WYLSED	2/2/01 8:39																				
WYLSED	2/14/01 0:00	ST	24	61	1070	7.9	26	0.13	2.4	2.23	0.519	58	<10								290
WYLSED	2/15/01 0:00																				
WYLSED	2/22/01 8:50	DT	24	3	1490	8.2	48	<0.05	0.63	0.673	0.195	<10	<10								448
WYLSED	2/23/01 7:50																				
WYLSED	3/6/01 3:02	ST	5	55	924	7.6	29	<0.05	1	0.704	0.132	87	16	<1	<8	14	2.8	6	<2	53	270
WYLSED	3/6/01 4:02	SF												<1	<8	6.6	<2	<4	<2	15	
WYLSED	3/6/01 6:02	ST	13	190	656	7.4	18	0.076	1.5	2.2	0.304	290	40	1.2	9.9	21	6	13	<2	70	190
WYLSED	3/7/01 6:02	SF												<1	<8	7.3	<2	<4	<2	<10	
WYLSED	3/20/01 9:02	DT	1	6.3	1670	8.2	48	<0.05	0.93	0.0918	<0.01	69	13								450
WYLSED	4/3/01 0:00	DT	24	1.2	2020	8.2	75	<0.05	1.1	0.337	0.078	<10	<10								654
WYLSED	4/4/01 0:00																				
WYLSED	4/25/01 8:50	DT	24	1.3	1830	8	62	<0.05	0.64	0.0918	0.019	<10	<10								450
WYLSED	4/26/01 7:50																				
WYLSED	5/16/01 10:00	DT	24	3.4	1920	8.3	70	<0.05	1.2	0.245	0.055	10	<10								
WYLSED	5/17/01 9:00																				
WYLSED	5/17/01 10:00	DT	5				70	<0.05	1.3	0.153											
WYLSED	5/17/01 14:00																				
WYLSED	5/18/01 10:00	DT	24	1.9	2010	8.2	79	<0.05	1.2	0.337	0.05	10	<10								
WYLSED	5/19/01 9:00																				
WYLSED	5/19/01 10:00	DT	24	1.9	1920	8.2	79	<0.05	1.1	0.337	0.056	<10	<10								
WYLSED	5/20/01 9:00																				
WYLSED	5/20/01 9:00																				
WYLSED	5/21/01 9:45	DT	1				79	<0.05	1.7	0.306											
WYLSED	5/21/01 10:00	DT	24	8.3	1950	7.9	79	<0.05	1.6	0.337		67	23								
WYLSED	5/22/01 9:00																				
WYLSED	5/22/01 10:00	DT	24	1.7	1980	8	79	<0.05	0.6	0.306	0.058	<10	<10								
WYLSED	5/23/01 9:00																				
WYLSED	5/30/01 9:35	DT	24	3	1960	8.4	70	0.13	1.6	0.428	0.129	<10	<10								740
WYLSED	5/31/01 8:35																				
WYLSED	6/7/01 9:05	DT		1.8	1960	8.2	79	<0.05	0.71	0.184	0.032	<10	<10								620
WYLSED	6/8/01 8:05																				
WYLSED	6/14/01 9:11	DT	24	1.5	1950	8.2	66	<0.05	0.62	0.0949	<0.01	<10	<10								620
WYLSED	6/15/01 8:11																				

South County Watershed

STATION	DATE/TIME	SAMPLES Type	#	Turb NTU	EC umhos	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	oP mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
									Aliso Creek												
ACJ01	7/26/00 13:58	DT	24	2	3310	8.3	2.5	<0.05	<0.2	0.551		16	7								
ACJ01	7/27/00 12:58																				
ACJ01	8/31/00 13:35	DT	24	1.8	3040	8.2	4.9	<0.05	0.48	1.07		<10	<10								
ACJ01	9/1/00 12:35																				
ACJ01	9/21/00 14:04	DT	24	2	3100	8.2	5.5	<0.05	0.78	0.857		10	<10								
ACJ01	9/22/00 13:04																				
ACJ01	10/26/00 6:58	ST	5	45	2950	8.2	7.5	0.096	1.3	1.47	0.216	80	16	3.4	9.8	12	<2	26	2.4	34	1000
ACJ01	10/26/00 7:58	SF												<1	8.2	6.7	<2	19	2.1	14	
ACJ01	10/26/00 9:58	ST	15	120	1340	7.7	6.8	0.258	2.5	2.45	0.275	280	44	3.4	19	25	6.5	31	2.2	100	780
ACJ01	10/27/00 13:58	SF												<1	<8	8.2	<2	15	<2	19	
ACJ01	10/27/00 15:58	ST	21	23	2180	8	4.7	<0.05	0.95	1.25	0.331	34	<10	<1	8.1	8.6	<2	18	<2	25	748
ACJ01	10/28/00 6:58	SF												<1	<8	8.1	<2	17	<2	18	
ACJ01	10/29/00 8:58	ST	6	2.6	2860	8.2	3.6	<0.05	0.7	0.918	0.255	<10	<10	1.6	<8	9.3	<2	25	<2	18	940
ACJ01	10/29/00 18:58	SF												1.3	<8	9.4	<2	25	<2	15	
ACJ01	10/29/00 20:58	ST	10	174	1420	7.8	2.7	<0.05	1.8	2.23	0.22	300	38	2.7	15	21	6.8	19	<2	84	420
ACJ01	10/30/00 14:58	SF												<1	<8	5.3	<2	9.6	<2	<10	
ACJ01	10/30/00 16:58	ST	8	13	2150	8	3.6	0.085	1	1.16	0.299	18	<10	1.7	<8	8.4	<2	19	<2	21	680
ACJ01	10/31/00 6:58	SF												<1	<8	6.4	<2	18	<2	14	
ACJ01	11/15/00 14:32	DT	24	1.4	2960	8.1	6.5	<0.05	0.81	0.612		<10	<10								
ACJ01	11/16/00 13:32																				
ACJ01	12/5/00 14:39	DT	24	2.1	2500	8	6.2	0.115	0.57	0.581		<10	<10								
ACJ01	12/6/00 13:39																				
ACJ01	1/16/01 14:12	DT	24	5.5	2860	8.1	7.2	0.169	0.97	0.581		<10	<10								
ACJ01	1/17/01 13:12																				
ACJ01	1/24/01 9:47	ST	5	53	2910	8.2	6.7	0.187	1.4	0.918		110	<10	9.3	<8	21	<2	61	<2	51	1036
ACJ01	1/24/01 10:47	SF												8.2	<8	9.5	<2	54	<2	21	
ACJ01	1/24/01 12:47	ST	11	61	1320	7.9	5.7	0.345	1.6	0.949		84	<10	2.3	<8	18	2.8	49	<2	43	408
ACJ01	1/25/01 8:47	SF												1.5	<8	11	<2	21	<2	16	
ACJ01	1/25/01 10:47	ST	13	21	2100	7.8	6.1	0.137	0.67	0.581	0.18	10	<10	2.6	<8	5.8	<2	32	<2	17	740
ACJ01	1/26/01 10:47	SF												1.8	<8	3.6	<2	29	<2	13	
ACJ01	1/26/01 12:47	ST	11	88	915	7.6	5.4	0.251	1.4	1.22	0.161	120	18	1.8	<8	16	4.9	18	<2	61	340
ACJ01	1/27/01 8:47	SF												<1	<8	7.4	<2	12	<2	13	
ACJ01	1/27/01 10:47	ST	13	14	1910	8	6.4	0.1	0.21	0.643		13	<10	2.3	<8	3.8	<2	29	<2	19	664
ACJ01	1/28/01 10:47	SF												1.3	<8	2.3	<2	27	<2	16	
ACJ01	2/12/01 10:29	ST	2				2.9	0.189	1.4	2.33				2.8	18	36	7.5	21	<2	84	160
ACJ01	2/12/01 10:44	SF												<1	<8	13	<2	4.8	<2	<10	
ACJ01	2/12/01 12:44	ST	11	271	447	7.5	3.8	0.196	1.5	2.69		530	40	2.9	18	25	7.1	21	<2	79	170
ACJ01	2/13/01 8:44	SF												<1	<8	6.1	<2	6.4	<2	<10	
ACJ01	2/13/01 10:44	ST	12	120	891	7.8	5.3	0.159	3.9	1.62		180	18	2.7	<8	14	2.6	20	<2	40	565
ACJ01	2/14/01 8:44	SF												1.3	<8	7.8	<2	15	<2	10	
ACJ01	2/15/01 10:44	ST	13	23	1990	8	6.6	0.119	0.94	0.887		21	<10	5.7	<8	7.2	<2	42	<2	28	292
ACJ01	2/16/01 10:44	SF												3.9	<8	3.8	<2	41	<2	15	

South County Watershed

STATION	DATE/TIME	SAMPLES Type	#	Turb NTU	EC umhos	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	oP mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
										Aliso Creek											
ACJ01	2/19/01 18:24	ST	5	20	2730	8.1	7.1	0.106	0.65	0.673		39	<10	9	<8	9.8	<2	62	<2	34	1030
ACJ01	2/19/01 19:24	SF												7.2	<8	4.3	<2	58	<2	17	
ACJ01	2/19/01 21:24	ST	8	68	904	7.5	3.7	0.156	0.62	1.04		120	16	2.7	<8	14	2.9	18	<2	39	288
ACJ01	2/20/01 11:24	SF												1.4	<8	6.4	<2	13	<2	<10	
ACJ01	2/20/01 13:24	ST	15	26	1780	8	5.1	0.107	0.77	0.826		24	<10	3.7	<8	7.5	<2	29	<2	19	604
ACJ01	2/21/01 17:24	SF												2.3	<8	5.2	<2	27	<2	11	
ACJ01	2/21/01 19:24	ST	19	3.6	2440	8.1	5.9	<0.05	0.48	0.551		<10	<10	5.2	<8	5.1	<2	42	<2	20	955
ACJ01	2/23/01 7:24	SF												3.4	<8	4.1	<2	40	<2	44	
ACJ01	2/23/01 9:24	ST	6	76	1270	7.8	3.7	0.109	1	1.04		120	15	3.5	<8	10	2.6	21	<2	49	370
ACJ01	2/23/01 19:24	SF												1.4	<8	4.1	<2	16	<2	12	
ACJ01	2/24/01 21:13	ST	5	21	1880	8.1	6.1	0.055	0.75	0.581		32	<10	4.8	<8	6	<2	33	<2	32	610
ACJ01	2/24/01 22:13	SF												2.9	<8	3.6	<2	30	<2	12	
ACJ01	2/25/01 0:13	ST	7	45	1160	7.8	4.5	0.079	0.83	0.857		75	<10	4.5	<8	8.3	<2	25	<2	33	360
ACJ01	2/25/01 12:13	SF												2.1	<8	4	<2	21	<2	12	
ACJ01	2/25/01 14:13	ST	10	150	495	7	2.3	0.064	1	1.77		270	25	2.8	13	17	5.9	20	<2	72	165
ACJ01	2/26/01 8:13	SF												<1	<8	5.3	<2	8.8	<2	<10	
ACJ01	2/26/01 10:13	ST	19	75	911	7.7	3.8	0.082	0.83	1.29		120	14	3	<8	11	3	21	<2	42	120
ACJ01	2/27/01 22:15	SF												1.7	<8	5.9	<2	18	<2	14	
ACJ01	2/28/01 0:15	ST	12	59	1360	8	5.1	0.075	0.68	1.04		84	11	5.6	<8	14	2.7	32	<2	44	855
ACJ01	2/28/01 22:15	SF												2.9	<8	6.3	<2	30	<2	15	
ACJ01	6/26/01 15:39	DT	5	7.6	3050	8.3	5	<0.05	0.83	0.765		13	<10								
ACJ01	6/26/01 19:39																				

South County Watershed

STATION	DATE/TIME	SAMPLES Type	#	Turb NTU	EC umhos	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	oP mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
									Prima Deschecha Channel												
PDCM01	7/26/00 12:38	DT	24	250	8360	8.1	13	<0.05	0.99	3.37		1200	136								
PDCM01	7/27/00 11:38																				
PDCM01	8/31/00 12:00	DT	24	40	6010	7.9	11	0.157	1.8	2.14		500	27								
PDCM01	9/1/00 11:00																				
PDCM01	9/21/00 12:58	DT	24	90	8160	8.1	16	0.061	2.2	2.02		90	29								
PDCM01	9/22/00 11:58																				
PDCM01	11/15/00 12:36	DT	24	106	9330	8.1	22	<0.05	1.7	1.19		150	18								
PDCM01	11/16/00 11:36																				
PDCM01	12/5/00 13:32	DT	24	64	7020	8.1	17	0.125	1.5	1.41		150	18								
PDCM01	12/6/00 12:32																				
PDCM01	1/16/01 12:23	DT	24	262	9560	8	21	0.15	2.2	1.44		430	36								
PDCM01	1/17/01 11:23																				
PDCM01	1/24/01 8:50	ST	5	608	1380	7.7	11	1.06	4.3	3.06		1890	140	15	34	87	15	85	<2	370	392
PDCM01	1/24/01 9:50	SF												1.8	<8	22	<2	28	<2	14	
PDCM01	1/24/01 11:50	ST	6	352	3180	7.9	10	0.43	3.2	1.19		390	38	9.8	17	33	4.5	78	<2	130	918
PDCM01	1/24/01 21:50	SF												5.8	<8	15	<2	61	<2	34	
PDCM01	1/24/01 23:50	ST	17	75	9670	7.3	22	0.908	3.1	0.887	0.144	110	<10	34	<8	12	<2	220	<2	150	330
PDCM01	1/26/01 7:50	SF												32	<8	6	<2	220	<2	92	
PDCM01	1/26/01 9:50	ST	9	800	2230	7.4	8.8	1.13	3	2.23	0.167	1110	88	9.9	40	43	10	85	<2	220	760
PDCM01	1/27/01 1:50	SF												2.8	<8	4.4	<2	48	<2	16	
PDCM01	1/27/01 3:50	ST	7	60	4620	8	16	0.754	0.8	1.04		130	13	14	<8	5.9	<2	110	<2	79	2140
PDCM01	1/27/01 15:50	SF												12	<8	2.7	<2	110	<2	41	
PDCM01	2/10/01 11:43	ST	5	326	1680	7.1	6.3	0.627	2.8	1.93	0.166	470	50	5.3	22	34	6.7	42	<2	150	524
PDCM01	2/10/01 12:43	SF												1.1	<8	11	<2	24	<2	<10	
PDCM01	2/11/01 9:39	ST	9	17	9570	8.1	23	0.084	1.6	0.581		34	10	41	<8	40	2.3	250	<2	190	2902
PDCM01	2/12/01 1:39	SF												38	<8	13	<2	240	<2	130	
PDCM01	2/12/01 3:39	ST	15	1260	1570	7.4	8.7	0.533	4.8	4.28		2610	150	12	72	64	16	94	<2	360	562
PDCM01	2/13/01 7:39	SF												10	<8	7.7	<2	36	<2	<10	
PDCM01	2/13/01 9:39	ST	10	456	3030	7.6	12	0.427	4.9	2.48		740	50	18	30	110	6.9	210	<2	210	2110
PDCM01	2/14/01 3:39	SF												10	<8	17	<2	110	<2	28	
PDCM01	2/14/01 5:39	ST	14	195	6060	7.9	16	0.265	2.1	1.38		460	36	35	14	20	2.3	240	<2	190	1430
PDCM01	2/15/01 7:39	SF												29	<8	11	<2	230	<2	65	
PDCM01	2/15/01 9:39	ST	13	57	7290	8	16	0.182	1.2	0.459		90	12	42	<8	18	<2	290	<2	180	2540
PDCM01	2/16/01 9:39	SF												37	<8	12	<2	280	<2	80	
PDCM01	2/18/01 11:30	ST	5	286	4390	7.5	13	0.328	3.6	2.33		610	60	23	14	41	7.1	150	<2	210	1430
PDCM01	2/18/01 12:30	SF												15	<8	12	<2	130	<2	34	
PDCM01	2/18/01 14:30	ST	14	16	9999	8	22	0.141	1.5	0.459		22	<10	59	<8	14	<2	360	<2	220	4000

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STATION	DATE/TIME	SAMPLES Type	#	Turb NTU	EC umhos	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	oP mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
										Prima Deschecha Channel											
PDCM01	2/19/01 16:30	SF												59	<8	13	<2	370	<2	140	
PDCM01	2/19/01 18:30	ST	5	67	2880	7.6	6.8	0.407	1.3	0.796		120	13	13	<8	14	<2	92	<2	84	964
PDCM01	2/20/01 2:30	SF												10	<8	8	<2	82	<2	39	
PDCM01	2/20/01 10:30	ST	5	303	8360	8	23	1.01	2.3	1.47		440	41	40	25	16	4.9	240	<2	220	2998
PDCM01	2/20/01 18:30	SF												30	<8	<2	<2	240	<2	66	
PDCM01	2/20/01 20:30	ST	21	72	9999	8	23	0.147	1.5	0.673		120	12	52	<8	9.9	<2	340	<2	220	
PDCM01	2/22/01 12:30	SF												49	<8	<2	<2	340	<2	130	
PDCM01	2/24/01 13:26	ST	5	35	1370	7.6	4.5	0.135	0.78	0.643		33	<10	4.9	<8	11	<2	39	<2	52	375
PDCM01	2/24/01 14:45	SF												3.2	<8	6.7	<2	31	<2	24	
PDCM01	2/25/01 0:54	ST	5	128	2400	7.8	6.9	0.354	1.3	1.13		210	21	10	12	11	2.4	85	<2	99	810
PDCM01	2/25/01 8:54	SF												6.7	<8	<2	<2	62	<2	32	
PDCM01	2/25/01 10:54	ST	13	786	1240	7.4	4.7	0.212	2.5	3.37		1790	120	9.8	55	44	10	79	<2	230	405
PDCM01	2/26/01 0:54	ST	17	326	3580	7.4	9	0.121	2.5	2.11		570	44	23	25	19	5.3	170	<2	190	1330
PDCM01	2/26/01 10:54	SF												1.8	<8	6.2	<2	33	<2	<10	
PDCM01	2/27/01 22:08	SF												17	<8	<2	<2	160	<2	54	
PDCM01	2/28/01 0:08	ST	13	256	3610	7.6	9.1	0.09	2	1.35		490	40	24	23	16	3.8	190	<2	180	
PDCM01	3/1/01 0:08	SF												17	<8	<2	<2	160	<2	52	
PDCM01	6/14/01 11:30	DT	1	104	9030	8.1	23	<0.05	1.5	1.38		200	21								
PDCM01	6/21/01 14:15	DT	1	45	6390	8.2	14	0.157	0.78	0.949		190	10								
PDCM01	6/26/01 14:22	DT	24	198	6340	8	15	<0.05	2.8	1.62		410	36								
PDCM01	6/27/01 13:22																				

South County Watershed

STATION	DATE/TIME	SAMPLES Type	#	Turb NTU	EC umhos	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	oP mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
								Segunda Deschecha Channel													
SDCM02	7/26/00 11:40	DT	24	10	5540	8.6	<0.44	<0.05	0.47	1.41		40	24								
SDCM02	7/27/00 10:40																				
SDCM02	8/31/00 11:05	DT	24	6.4	5240	8.4	0.61	<0.05	1.2	1.29		27	20								
SDCM02	9/1/00 10:05																				
SDCM02	9/21/00 12:15	DT	24	10	5750	8.5	2.5	<0.05	<0.2	1.32		34	11								
SDCM02	9/22/00 11:15																				
SDCM02	11/15/00 11:49	DT	24	1.6	5320	8.4	5.6	<0.05	0.61	0.551		<10	<10								
SDCM02	11/16/00 10:49																				
SDCM02	12/5/00 12:52	DT	24	13	4720	8.3	5.7	0.07	1.4	1.19		56	20								
SDCM02	12/6/00 11:52																				
SDCM02	1/16/01 11:24	DT	24	69	3940	8	6.8	0.107	1.1	0.826		94	11								
SDCM02	1/17/01 10:24																				
SDCM02	6/14/01 11:00	DT	1	37	5710	8.8	0.89	<0.05	2.4	1.47		120	26								
SDCM02	6/21/01 13:45	DT	1	7.1	6020	8.9	<0.44	<0.05	1.3	0.52		42	<10								
SDCM02	6/26/01 13:29	DT	24	2.7	3840	8.5	2.9	<0.05	1.7	0.551		<10	<10								
SDCM02	6/27/01 12:29																				

South County Watershed

STATION	DATE/TIME	SAMPLES Type	#	Turb NTU	EC umhos	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	oP mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
San Juan Creek at Ortega Hwy																					
SJOL01	2/25/01 19:06	ST	5	19	490	7.3	1.8	0.061	0.61	0.245		13	<10	<1	<8	5.8	<2	<4	<2	12	140
SJOL01	2/25/01 20:06	SF												<1	<8	4.9	<2	<4	<2	<10	
SJOL01	2/25/01 22:06	ST	19	7.4	430	7.8	0.55	<0.05	0.22	0.184		<10	<10	<1	<8	4.8	<2	<4	<2	<10	125
SJOL01	2/27/01 10:06	SF												<1	<8	3.1	<2	<4	<2	<10	
SJOL01	2/27/01 10:41	ST	19	2.3	406	7.9	0.92	<0.05	0.22	<0.061		<10	<10	3.4	<8	4.3	<2	<4	<2	<10	115
SJOL01	2/28/01 22:41	SF												2.7	<8	4.1	<2	<4	<2	<10	
SJOL01	6/26/01 11:14	DT	24	1.1	486	8.1	<0.44	<0.05	<0.2	<0.061		<10	<10								
SJOL01	6/27/01 10:14																				

South County Watershed

STATION	DATE/TIME	SAMPLES Type	#	Turb NTU	EC umhos	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	oP mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
San Juan Creek at La Novia																					
SJNL01	11/15/00 10:21	DT	24	0.9	2250	8.1	1.2	<0.05	0.34	0.245		<10	<10								
SJNL01	11/16/00 9:21																				
SJNL01	12/5/00 11:52	DT	24	2.3	2910	8.2	1	<0.05	1.4	0.153		25	16								
SJNL01	12/6/00 10:52																				
SJNL01	1/16/01 10:18	DT	24	1.3	1450	8.1	3.4	<0.05	0.33	0.275		<10	<10								
SJNL01	1/17/01 9:18																				
SJNL01	2/12/01 4:04	ST	5	58	753	7.5	2.3	0.095	2	0.887		130	22	<1	<8	12	3.4	6.6	<2	61	226
SJNL01	2/12/01 5:04	SF												<1	<8	4.8	<2	4.1	<2	14	
SJNL01	2/12/01 7:04	ST	14	612	665	7.6	7.3	0.188	3.6	3.37		1000	100	2.2	30	30	12	29	<2	140	208
SJNL01	2/13/01 9:04	SF												<1	<8	5.2	<2	6.9	<2	<10	
SJNL01	2/13/01 11:04	ST	13	138	752	7.8	9.7	<0.05	3.9	2.42		180	20	<1	<8	11	4	5.9	<2	34	315
SJNL01	2/14/01 11:04	SF												<1	<8	6.3	<2	<4	<2	<10	
SJNL01	2/14/01 13:04	ST	11	8	999	7.9	7.1	<0.05	0.96	1.16		<10	<10	<1	<8	5.5	<2	<4	<2	<10	355
SJNL01	2/15/01 9:04	SF												<1	<8	5.3	<2	<4	<2	<10	
SJNL01	2/15/01 11:04	ST	10	6.2	1180	8	4.9	<0.05	0.3	0.643		10	<10	<1	<8	5.2	<2	<4	<2	<10	365
SJNL01	2/16/01 5:04	SF												<1	<8	3.7	<2	<4	<2	<10	
SJNL01	2/19/01 21:01	ST	5	30	882	7.5	3	0.085	0.28	0.826		45	<10	1.1	<8	10	<2	8.7	<2	27	
SJNL01	2/19/01 22:01	SF												<1	<8	5.5	<2	6.8	<2	<10	
SJNL01	2/20/01 0:01	ST	6	5.6	1200	7.7	4.1	<0.05	0.78	0.428		10	<10	<1	<8	4.5	<2	<4	<2	<10	
SJNL01	2/20/01 10:01	SF												<1	<8	4.1	<2	<4	<2	<10	
SJNL01	2/20/01 12:01	ST	22	3.7	1190	8	2.8	<0.05	0.28	0.291		<10	<10	<1	<8	6.2	<2	<4	<2	<10	338
SJNL01	2/22/01 6:01	SF												<1	<8	5.6	<2	<4	<2	<10	
SJNL01	2/22/01 8:01	ST	12	1.8	1310	8.2	2.3	<0.05	0.22	0.184		<10	<10	<1	<8	3.6	<2	<4	<2	<10	405
SJNL01	2/23/01 6:01	SF												<1	<8	3.3	<2	<4	<2	<10	
SJNL01	2/23/01 8:01	ST	8	146	999	8	4.2	0.051	1.1	0.918		220	24	1.4	<8	12	2.1	10	<2	47	208
SJNL01	2/23/01 22:01	SF												<1	<8	4.6	<2	4.1	<2	<10	
SJNL01	2/25/01 9:58	ST	5	196	818	7.9	2.7	0.101	1.3	1.19		240	27	1.8	12	17	4.2	16	<2	69	225
SJNL01	2/25/01 12:58	ST	16	394	660	7.6	5.3	0.112	1.6	2.39		490	52	1.8	17	20	7.2	21	<2	88	160
SJNL01	2/26/01 17:44	SF												<1	<8	6.9	<2	9.8	<2	<10	
SJNL01	2/26/01 19:44	ST	19	120	780	7.8	4.8	<0.05	1	1.47		130	16	<1	<8	8.7	2.9	6.6	<2	31	255
SJNL01	2/27/01 10:58	SF												<1	<8	5	<2	5.9	<2	<10	
SJNL01	2/28/01 7:44	SF												<1	<8	4.3	<2	4.2	<2	<10	
SJNL01	2/28/01 10:11	ST	13	60	1470	8.1	4.6	0.067	0.98	1.13		64	<10	1.9	<8	9.2	2.6	24	<2	32	455
SJNL01	3/1/01 10:11	SF												<1	<8	5	<2	20	<2	<10	
SJNL01	6/26/01 12:31	DT	24	2.5	1540	8.2	<0.44	<0.05	0.34	<0.061		<10	<10								
SJNL01	6/27/01 11:31																				

APPENDIX L

WATERSHED MONITORING DATA

Huntington Harbour/Sunset, Anaheim, Bolsa Bays

STATION	DATE/TIME	SAMPLES Type	#	Turb NTU	EC umhos	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	oP mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
Huntington Harbour																					
HUNBCC	11/28/00 0:00			1.4	52600	7.9	<0.44	<0.05	0.61	<0.061		24	<10	<1	<8	21	<2	<4	<2	<10	
HUNBCC	11/28/00 0:00													<1	<8	19	<2	<4	<2	13	
HUNBCC	6/29/01 0:00			3.2	43560	7.9	<0.44	<0.05	0.51	0.0612		16	<10	<1	<8	<2	<2	11	<2	12	
HUNBCC	6/29/01 0:00													<1	<8	<2	<2	11	<2	13	
HUNWAR	11/28/00 0:00			0.85	52700	8	<0.44	<0.05	0.85	0.0918		24	<10	<1	<8	20	<2	<4	<2	25	
HUNWAR	11/28/00 0:00													<1	<8	19	<2	<4	<2	25	
HUNWAR	6/29/01 0:00			3	44100	7.9	<0.44	<0.05	0.49	0.153		17	<10	<1	<8	<2	<2	11	<2	19	
HUNWAR	6/29/01 0:00													1.1	<8	<2	<2	12	<2	19	
Christiana Bay																					
HUNCRB	11/28/00 0:00			0.75	51800	8	<0.44	<0.05	0.66	0.0612		21	<10	<1	<8	19	<2	<4	<2	25	
HUNCRB	11/28/00 0:00													<1	<8	20	<2	<4	<2	28	
HUNCRB	6/29/01 0:00			2.1	44200	8	<0.44	<0.05	0.42	0.0612		<10	<10	<1	<8	<2	<2	12	<2	16	
HUNCRB	6/29/01 0:00													<1	<8	<2	<2	12	<2	16	
Anaheim Bay																					
HUNHAR	11/28/00 0:00			1	52800	8	<0.44	<0.05	0.76	0.0612		15	<10	<1	<8	17	<2	<4	<2	<10	
HUNHAR	11/28/00 0:00													<1	<8	18	<2	<4	<2	<10	
Sunset Aquatic Park																					
HUNSUN	11/28/00 0:00			2.1	53200	7.9	<0.44	<0.05	0.65	<0.061		21	<10	<1	<8	19	<2	<4	<2	<10	
HUNSUN	11/28/00 0:00													<1	<8	19	<2	<4	<2	<10	
HUNSUN	6/29/01 0:00			3.5	44320	7.9	<0.44	0.075	0.52	<0.061		<10	<10	<1	<8	<2	<2	9.7	<2	<10	
HUNSUN	6/29/01 0:00													<1	<8	<2	<2	9	<2	<10	
Bolsa Bay																					
BBOLR	11/28/00 0:00			1.4	53100	8.1	<0.44	<0.05	0.81	0.184		23	<10	<1	<8	18	<2	<4	<2	10	
BBOLR	11/28/00 0:00													<1	<8	17	<2	<4	<2	<10	
d/s Bolsa Bay																					
TGUC05	11/28/00 0:00			2.6	52900	8	<0.44	<0.05	0.76	0.0918		27	<10	<1	<8	20	<2	<4	<2	17	
TGUC05	11/28/00 0:00													<1	<8	20	<2	<4	<2	17	

Dana Point Harbor

STATION	DATE/TIME	SAMPLES Type	#	Turb NTU	EC umhos	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	oP mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
										East Basin											
DAPTEB	11/21/00 0:00	D		2.7	54100	7.9	<0.44	0.059	1.1	<0.061		20	<10								
DAPTEB	1/24/01 0:00	ST		4.6	48400	7.9	0.65	0.054	0.68	<0.061		25	<10	<1	<8	3.5	<2	14	<2	31	
DAPTEB	1/24/01 0:00	SF												<1	<8	<2	<2	15	<2	27	
DAPTEB	1/26/01 0:00	ST		5.6	44200	8	0.49	<0.05	0.47	<0.061		34	<10	<1	<8	<2	<2	20	<2	12	
DAPTEB	1/26/01 0:00	SF												<1	<8	<2	<2	28	<2	<10	
DAPTEB	1/28/01 0:00	ST		2.3	54500	8.1	<0.44	<0.05	0.43	<0.061		36	<10	<1	<8	8.7	<2	25	<2	33	
DAPTEB	1/28/01 0:00	SF												<1	<8	3.2	<2	24	<2	24	
DAPTEB	2/26/01 0:00	ST		23	33420	7.7	1.2	0.064	0.47	0.459		14	<10	<1	<8	8.1	<2	16	<2	29	
DAPTEB	2/26/01 0:00	SF												<1	<8	<2	<2	16	<2	15	
DAPTEB	2/28/01 0:00	ST		6	41900	8	0.88	<0.05	0.52	0.184		26	<10	<1	<8	<2	<2	35	<2	17	
DAPTEB	2/28/01 0:00	SF												<1	<8	<2	<2	48	<2	83	
DAPTEB	3/2/01 0:00	ST		2.1	45900	8	<0.44	<0.05	0.39	<0.061		12	<10	<1	<8	<2	<2	49	<2	20	
DAPTEB	3/2/01 0:00	SF												<1	9.4	<2	<2	42	<2	39	
DAPTEB	6/28/01 0:00	D		3.5	44190	8	<0.44	<0.05	0.84	0.122		11	<10								

Dana Point Harbor

STATION	DATE/TIME	SAMPLES Type	#	Turb NTU	EC umhos	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	oP mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
									Harbor Entrance												
DAPTHE	1/24/01 0:00	ST		2.9	53200	8	<0.44	<0.05	0.637	<0.061		12	<10	<1	<8	<2	<2	17	<2	19	
DAPTHE	1/24/01 0:00	SF												<1	<8	<2	<2	19	<2	17	
DAPTHE	1/26/01 0:00	ST		2.8	49800	8	<0.44	<0.05	0.38	<0.061		25	<10	<1	<8	7.3	<2	23	<2	36	
DAPTHE	1/26/01 0:00	SF												<1	<8	2	<2	24	<2	23	
DAPTHE	1/28/01 0:00	ST		76	55700	8.1	<0.44	<0.05	<0.2	<0.061		250	13	<1	<8	<2	<2	32	<2	<10	
DAPTHE	1/28/01 0:00	SF												<1	<8	<2	<2	56	<2	<10	
DAPTHE	2/26/01 0:00	ST		50	28060	8.1	1.9	0.077	0.46	0.643		66	<10	<1	<8	<2	<2	16	<2	13	
DAPTHE	2/26/01 0:00	SF												<1	<8	<2	<2	16	<2	<10	
DAPTHE	2/28/01 0:00	ST		21	42270	8	0.88	<0.05	0.55	0.214		47	<10	<1	<8	<2	<2	35	<2	12	
DAPTHE	2/28/01 0:00	SF												<1	<8	<2	<2	36	<2	<10	
DAPTHE	3/2/01 0:00	ST		4.1	46300	8.1	<0.44	<0.05	0.4	<0.061		10	<10	<1	9.4	<2	<2	36	<2	<10	
DAPTHE	3/2/01 0:00	SF												<1	9.4	<2	<2	35	<2	<10	

Dana Point Harbor

STATION	DATE/TIME	SAMPLES Type	#	Turb NTU	EC umhos	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	oP mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
									Launch Ramp												
DAPTLB	11/21/00 0:00	D		1	54900	8.1	<0.44	0.07	0.9	<0.061		20	<10								
DAPTLB	1/24/01 0:00	ST		3.5	50500	8	<0.44	<0.05	0.57	<0.061		33	<10	<1	<8	<2	<2	16	<2	18	
DAPTLB	1/24/01 0:00	SF												<1	<8	<2	<2	16	<2	15	
DAPTLB	1/26/01 0:00	ST		5.3	47300	8	0.44	<0.05	0.42	<0.061		18	<10	<1	<8	2.4	<2	20	<2	65	
DAPTLB	1/26/01 0:00	SF												<1	<8	<2	<2	21	<2	17	
DAPTLB	1/28/01 0:00	ST		2.7	54300	8	<0.44	<0.05	<0.2	<0.061		18	<10	<1	<8	8.8	<2	23	<2	26	
DAPTLB	1/28/01 0:00	SF												<1	<8	<2	<2	26	<2	14	
DAPTLB	2/26/01 0:00	ST		8.9	36600	8.1	0.65	<0.05	0.3	0.184		29	<10	<1	<8	<2	<2	16	<2	24	
DAPTLB	2/26/01 0:00	SF												<1	<8	<2	<2	16	<2	15	
DAPTLB	2/28/01 0:00	ST		5.4	44520	8	0.44	<0.05	0.52	0.0918		29	<10	<1	8.4	<2	<2	40	<2	11	
DAPTLB	2/28/01 0:00	SF												<1	9.4	<2	<2	42	<2	12	
DAPTLB	3/2/01 0:00	ST		2.5	46300	8.1	<0.44	<0.05	0.45	<0.061		33	<10	<1	<8	<2	<2	27	<2	<10	
DAPTLB	3/2/01 0:00	SF												<1	<8	<2	<2	34	<2	<10	
DAPTLB	6/28/01 0:00	D		1.7	45100	8	<0.44	<0.05	0.37	0.0612		25	<10								

Dana Point Harbor

STATION	DATE/TIME	SAMPLES Type	#	Turb NTU	EC umhos	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	oP mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
										West Basin											
DAPTWB	11/21/00 0:00	D		1.6	56300	8.1	<0.44	<0.05	0.94	<0.061		<10	<10								
DAPTWB	1/24/01 0:00	ST		3.9	47800	7.9	0.65	<0.05	0.62	<0.061		14	<10	<1	<8	<2	<2	16	<2	23	
DAPTWB	1/24/01 0:00	SF												<1	<8	<2	<2	16	<2	18	
DAPTWB	1/26/01 0:00	ST		4.7	44600	8	0.47	<0.05	0.45	<0.061		27	<10	<1	<8	3.1	<2	20	<2	24	
DAPTWB	1/26/01 0:00	SF												<1	<8	<2	<2	19	<2	17	
DAPTWB	1/28/01 0:00	ST		1.9	55100	8.1	<0.44	<0.05	22	<0.061		36	<10	<1	<8	11	<2	23	<2	31	
DAPTWB	1/28/01 0:00	SF												<1	<8	<2	<2	23	<2	18	
DAPTWB	2/26/01 0:00	ST		11	32110	8.1	1.4	0.056	0.44	0.428		24	<10	<1	9.9	22	4.3	17	<2	43	
DAPTWB	2/26/01 0:00	SF												<1	<8	<2	<2	16	<2	12	
DAPTWB	2/28/01 0:00	ST		4.8	38710	8	0.83	<0.05	0.5	0.184		<10	<10	<1	8.7	<2	<2	38	<2	32	
DAPTWB	2/28/01 0:00	SF												<1	8.5	<2	<2	38	<2	17	
DAPTWB	3/2/01 0:00	ST		1.7	46610	8.1	<0.44	<0.05	0.4	<0.061		13	<10	<1	8.5	<2	<2	33	<2	15	
DAPTWB	3/2/01 0:00	SF												<1	9.3	<2	<2	33	<2	14	
DAPTWB	6/28/01 0:00	D		3.8	44320	8	<0.44	<0.05	0.38	0.0612		27	<10								

Dana Point Harbor

STATION	DATE/TIME	SAMPLES Type	#	Turb NTU	EC umhos	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	oP mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
Launch Ramp near boatyard																					
DAPTLR	1/24/01 0:00	ST		2.3	50800	8	<0.44	<0.05	0.73	<0.061		<10	<10	<1	<8	<2	<2	17	<2	15	
DAPTLR	1/24/01 0:00	SF												<1	<8	<2	<2	17	<2	12	
DAPTLR	1/26/01 0:00	ST		3.7	46100	8	0.48	0.08	0.38	<0.061		30	<10	<1	<8	<2	<2	20	<2	19	
DAPTLR	1/26/01 0:00	SF												<1	<8	<2	<2	22	<2	16	
DAPTLR	1/28/01 0:00	ST		2.2	54600	8.1	<0.44	<0.05	0.8	<0.061		<10	<10	<1	8.8	17	2.7	24	<2	36	
DAPTLR	1/28/01 0:00	SF												<1	<8	<2	<2	24	<2	13	
DAPTLR	2/26/01 0:00	ST		7.8	36560	8.1	0.84	0.053	0.36	0.153		12	<10	<1	<8	<2	<2	16	<2	15	
DAPTLR	2/26/01 0:00	SF												<1	<8	<2	<2	16	<2	<10	
DAPTLR	2/28/01 0:00	ST		3.2	45500	8	0.47	<0.05	0.47	0.0612		31	<10	<1	8	<2	<2	35	<2	15	
DAPTLR	2/28/01 0:00	SF												<1	<8	<2	<2	34	<2	13	
DAPTLR	3/2/01 0:00	ST		3.9	46410	8	<0.44	<0.05	0.45	<0.061		30	<10	<1	9.1	<2	<2	36	<2	11	
DAPTLR	3/2/01 0:00	SF												<1	9.4	<2	<2	36	<2	12	

Lower Newport Bay

STATION	DATE/TIME	SAMPLES Type	#	Turb NTU	EC umhos	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	oP mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
Lower Newport Bay - Harbor Island Reach																					
LNBHIR	7/28/00 9:45	D		2	51200	8.2	<0.44	<0.05	0.2	0.184		17	13								
LNBHIR	7/28/00 9:45	D		6	53500	8.2	<0.44	<0.05	<0.2	0.153		29	12								
LNBHIR	7/28/00 9:45	D		3	53200	8.2	<0.44	<0.05	0.65	0.153		33	10								
LNBHIR	9/15/00 11:00	D		2.2	51300	8.1	<0.44	<0.05	<0.2	0.0918		<10	<10								
LNBHIR	9/15/00 11:00	D		4.2	52400	8.1	<0.44	<0.05	0.64	<0.061		11	<10								
LNBHIR	9/15/00 11:00	D		6.5	53100	8.1	<0.44	<0.05	0.64	<0.061		19	<10								
LNBHIR	9/29/00 10:20	D		0.8	51100	8	<0.44	<0.05	0.68	0.214		<10	<10								
LNBHIR	9/29/00 10:20	D		0.85	51400	8	<0.44	<0.05	0.73	0.184		<10	<10								
LNBHIR	9/29/00 10:20	D		0.55	52600	8.1	<0.44	<0.05	0.57	0.122		<10	<10								
LNBHIR	10/27/00 0:00	ST		2.2	44100	8.1	0.58	0.106	0.7	0.0949		<10	<10	<1	<8	19	<2	11	<2	35	
LNBHIR	10/27/00 0:00	SF												<1	<8	20	<2	11	<2	35	
LNBHIR	10/29/00 0:00	ST		1.9	44100	7.9	2.5	0.156	0.66	0.171		14	<10	<1	8.6	21	<2	12	<2	93	
LNBHIR	10/29/00 0:00	SF												<1	8.1	19	<2	11	<2	26	
LNBHIR	10/31/00 0:00	ST		1.8	45200	8	2.9	0.187	0.8	0.214		<10	<10	<1	9.6	27	<2	13	<2	20	
LNBHIR	10/31/00 0:00	SF												<1	8.6	27	<2	13	<2	22	
LNBHIR	11/17/00 0:00	D		2.4	51200	8.1	0.6	<0.05	0.67	<0.061		32	<10								
LNBHIR	11/17/00 0:00	D		2.6	52500	8.1	<0.44	<0.05	0.79	<0.061		32	<10								
LNBHIR	11/17/00 0:00	D		2	50900	8.1	<0.44	<0.05	0.73	<0.061		29	<10								
LNBHIR	1/11/01 0:00	ST		34	19100	7.8	7.9	0.39	0.6	0.734	0.138	19	<10	<1	9.3	23	4.3	4.3	<2	46	
LNBHIR	1/11/01 0:00	SF												<1	<8	13	<2	<4	<2	17	
LNBHIR	1/13/01 0:00	ST		8.1	16100	7.8	6.9	0.278	0.62	0.765	0.32	<10	<10	<1	<8	12	<2	<4	<2	11	
LNBHIR	1/13/01 0:00	SF												<1	<8	11	<2	<4	<2	<10	
LNBHIR	1/15/01 0:00	ST		1.3	39900	2.8	2.7	0.212	1.1	0.275	0.12	20	<10	<1	11	16	<2	<4	<2	18	
LNBHIR	1/15/01 0:00	SF												<1	<8	45	2.6	5.9	<2	60	
LNBHIR	3/6/01 0:00	ST		8	35570	7.9	6.5	0.206	0.66	0.337		14	<10	<1	<8	<2	<2	13	<2	14	
LNBHIR	3/6/01 0:00	SF												<1	<8	<2	<2	12	<2	<10	
LNBHIR	3/8/01 0:00	ST		2.1	39540	8	2.3	0.12	0.45	0.153		<10	<10	<1	<8	<2	<2	15	<2	14	
LNBHIR	3/8/01 0:00	SF												<1	<8	<2	<2	16	<2	12	
LNBHIR	3/10/01 0:00	ST		3.5	40730	8	1.8	0.087	0.73	0.153		29	<10	<1	<8	<2	<2	16	<2	20	
LNBHIR	3/10/01 0:00	SF												<1	<8	<2	<2	15	<2	10	
LNBHIR	3/29/01 0:00	D		3.5	45080	8.2	<0.44	<0.05	0.59	<0.061		<10	<10	<1	<8	<2	<2	19	<2	16	
LNBHIR	3/29/01 0:00	D		5.6	44840	8.2	<0.44	<0.05	0.69	<0.061		15	<10	<1	<8	<2	<2	20	<2	12	
LNBHIR	3/29/01 0:00	D		6.6	46600	8.2	<0.44	<0.05	0.64	<0.061		32	<10								
LNBHIR	4/30/01 0:00	D		1.8	42300	8	0.56	0.093	0.85	0.132		<10	<10								
LNBHIR	4/30/01 0:00	D		12	43920	8.1	<0.44	<0.05	0.78	0.125		23	<10								
LNBHIR	4/30/01 0:00	D		13	39700	8.1	<0.44	0.053	1.2	0.459		22	<10								
LNBHIR	6/6/01 0:00	D		3.5	45090	8	<0.44	<0.05	0.64	0.0612		<10	<10	<1	10	<2	<2	31	<2	18	
LNBHIR	6/6/01 0:00	D		4.5	45200	8	<0.44	<0.05	0.62	0.0612		<10	<10	<1	12	<2	<2	38	<2	13	
LNBHIR	6/6/01 0:00	D		0.15	42360	5.6	4	0.178	0.93	1.62		14	<10	19	51	20	19	52	19	99	
LNBHIR	6/27/01 0:00	D		6.4	44120	8.1	<0.44	<0.05	0.64	0.122	0.028	11	<10								
LNBHIR	6/27/01 0:00	D		5.2	44400	8.1	<0.44	<0.05	0.55	0.122	0.016	27	<10								
LNBHIR	6/27/01 0:00	D		5.6	45380	8.1	<0.44	<0.05	0.66	0.0612	0.013	21	<10								

Lower Newport Bay

STATION	DATE/TIME	SAMPLES Type	#	Turb NTU	EC umhos	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	oP mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
Lower Newport - Rhine Channel																					
LNBRIN	10/27/00 0:00	ST		4	36600	8.1	0.93	0.146	0.66	0.147		<10	<10	<1	<8	28	<2	12	<2	80	
LNBRIN	10/27/00 0:00	SF												<1	<8	23	<2	11	<2	63	
LNBRIN	10/29/00 0:00	ST		1.5	42600	7.9	2.7	0.157	0.84	0.23		13	<10	<1	8.3	32	<2	13	<2	32	
LNBRIN	10/29/00 0:00	SF												<1	8.4	24	<2	14	<2	37	
LNBRIN	10/31/00 0:00	ST		1.7	40600	7.9	4.2	0.243	0.93	0.26		<10	<10	<1	8.9	28	<2	15	<2	28	
LNBRIN	10/31/00 0:00	SF												<1	8.6	27	<2	13	<2	30	
LNBRIN	1/11/01 0:00	ST		14	27200	7.8	6.9	0.348	<0.2	0.551	0.113	<10	<10	<1	<8	19	<2	<4	<2	44	
LNBRIN	1/11/01 0:00	SF												<1	<8	13	<2	<4	<2	33	
LNBRIN	1/13/01 0:00	ST		8.3	16400	7.3	7	0.281	0.58	0.826	0.33	<10	<10	<1	<8	14	<2	<4	<2	23	
LNBRIN	1/13/01 0:00	SF												<1	<8	12	<2	<4	<2	20	
LNBRIN	1/15/01 0:00	ST		0.5	40500	3.1	3.2	0.229	0.88	0.275	0.125	<10	<10	<1	<8	18	<2	4.5	<2	25	
LNBRIN	1/15/01 0:00	SF												<1	<8	17	<2	5	<2	25	
LNBRIN	3/6/01 0:00	ST		0.9	33780	8	2.9	0.109	0.52	0.245		15	<10	<1	<8	<2	<2	13	<2	34	
LNBRIN	3/6/01 0:00	SF												<1	<8	<2	<2	13	<2	30	
LNBRIN	3/8/01 0:00	ST		0.6	39100	8	2	0.082	0.41	0.122		19	<10	<1	<8	<2	<2	18	<2	27	
LNBRIN	3/8/01 0:00	SF												<1	<8	<2	<2	16	<2	24	
LNBRIN	3/10/01 0:00	ST		1.7	44870	8	0.53	0.055	0.78	<0.061		23	<10	<1	<8	<2	<2	16	<2	18	
LNBRIN	3/10/01 0:00	SF												<1	<8	<2	<2	17	<2	17	

Lower Newport Bay

STATION	DATE/TIME	SAMPLES Type	#	Turb NTU	EC umhos	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	oP mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
Lower Newport Bay - Turning Basin																					
LNBTUB	10/27/00 0:00	ST		4.8	31600	8.1	1.3	0.137	0.69	0.257		<10	<10	<1	<8	20	<2	11	<2	48	
LNBTUB	10/27/00 0:00	SF												<1	<8	21	<2	12	<2	60	
LNBTUB	10/29/00 0:00	ST		1.4	42800	7.9	2.5	0.175	0.84	0.208		12	<10	<1	8.6	22	<2	12	<2	36	
LNBTUB	10/29/00 0:00	SF												<1	<8	21	<2	10	<2	29	
LNBTUB	10/31/00 0:00	ST		1.2	44500	8	2.9	0.192	0.8	0.184		19	<10	<1	8.8	27	<2	12	<2	21	
LNBTUB	10/31/00 0:00	SF												<1	8.5	24	<2	12	<2	21	
LNBTUB	1/11/01 0:00	ST		16	27400	7.8	5	0.297	<0.2	0.49	0.146	21	<10	<1	<8	20	2.4	<4	<2	43	
LNBTUB	1/11/01 0:00	SF												<1	<8	13	<2	<4	<2	48	
LNBTUB	1/13/01 0:00	ST		8.3	16500	7.7	6.6	0.278	0.7	0.796	0.3	<10	<10	<1	<8	14	<2	<4	<2	14	
LNBTUB	1/13/01 0:00	SF												<1	<8	13	<2	<4	<2	11	
LNBTUB	1/15/01 0:00	ST		1.7	40600	3.4	2.7	0.218	0.99	0.275	0.116	30	<10	<1	<8	15	<2	4.9	<2	16	
LNBTUB	1/15/01 0:00	SF												<1	<8	12	<2	4.8	<2	14	
LNBTUB	3/6/01 0:00	ST		4.4	30290	7.9	3	0.162	0.48	0.306		<10	<10	<1	<8	<2	<2	19	<2	25	
LNBTUB	3/6/01 0:00	SF												<1	<8	<2	<2	14	<2	15	
LNBTUB	3/7/01 0:00	ST		1.3	39740	8	2.1	0.093	0.51	0.122		<10	<10	<1	<8	<2	<2	15	<2	11	
LNBTUB	3/7/01 0:00	SF												<1	<8	<2	<2	15	<2	10	
LNBTUB	3/10/01 0:00	ST		2.1	44800	8.1	0.63	<0.05	0.74	0.184		24	<10	<1	<8	<2	<2	17	<2	12	
LNBTUB	3/10/01 0:00	SF												<1	<8	<2	<2	17	<2	13	

Upper Newport Bay

STATION	DATE/TIME	SAMPLES Type	#	Turb NTU	EC umhos	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	oP mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
Upper Newport Bay at PCH bridge																					
UNBCHB	7/28/00 10:15	D		1.7	51800	8.1	<0.44	<0.05	0.59	0.245		32	9								
UNBCHB	7/28/00 10:15	D		1.8	53400	8.1	<0.44	<0.05	0.67	0.153		36	16								
UNBCHB	7/28/00 10:15	D		2	52600	8.1	<0.44	<0.05	<0.2	0.153		35	11								
UNBCHB	9/15/00 10:30	D		6.8	51200	8	<0.44	<0.05	0.75	0.0918		31	10								
UNBCHB	9/15/00 10:30	D		6.8	50100	8.1	<0.44	<0.05	0.7	<0.061		10	<10								
UNBCHB	9/15/00 10:30	D		6.8	52000	8.1	<0.44	<0.05	<0.2	0.0918		<10	<10								
UNBCHB	9/29/00 9:50	D		3	51500	8	<0.44	0.051	0.64	0.214		<10	<10								
UNBCHB	9/29/00 9:50	D		10	52200	8	<0.44	<0.05	0.54	0.184		35	<10								
UNBCHB	9/29/00 9:50	D		4.9	50500	8	<0.44	<0.05	0.61	0.184		12	<10								
UNBCHB	10/27/00 0:00	ST		7.7	42100	8	1.1	0.161	0.74	0.208		26	<10	<1	<8	19	<2	12	<2	36	
UNBCHB	10/27/00 0:00	SF												<1	<8	18	<2	12	<2	35	
UNBCHB	10/29/00 0:00	ST		2.8	42600	7.9	2	0.142	0.86	0.181		57	<10	<1	8.5	20	<2	12	<2	18	
UNBCHB	10/29/00 0:00	SF												<1	<8	13	<2	9	<2	25	
UNBCHB	10/31/00 0:00	ST		2.4	37100	7.9	4.8	0.266	0.83	0.337		21	<10	<1	8.8	26	<2	12	<2	20	
UNBCHB	10/31/00 0:00	SF												<1	8.4	27	<2	12	<2	23	
UNBCHB	11/17/00 0:00	D		2.8	51400	8.1	0.46	<0.05	0.7	0.0918		24	<10								
UNBCHB	11/17/00 0:00	D		2.6	51800	8.1	0.48	<0.05	0.64	0.0918		16	<10								
UNBCHB	11/17/00 0:00	D		3.4	50400	8.1	0.45	<0.05	0.62	0.0918		33	<10								
UNBCHB	12/28/00 0:00	D		1.8	53800	8	<0.44	0.063	0.52	<0.061	0.025	25	<10								
UNBCHB	12/28/00 0:00	D		1.9	54100	8	<0.44	0.058	<0.2	<0.061	0.029	25	<10								
UNBCHB	12/28/00 0:00	D		1.5	54400	8	<0.44	0.062	0.5	0.0857	0.025	32	<10								
UNBCHB	1/11/01 0:00	ST		71	8910	7.7	9.3	0.446	0.77	1.13	0.154	50	14	<1	<8	13	2.4	<4	<2	41	
UNBCHB	1/11/01 0:00	SF												<1	<8	9.2	<2	<4	<2	20	
UNBCHB	1/13/01 0:00	ST		8.2	22900	7.9	5.7	0.235	0.39	0.673	0.33	14	<10	<1	<8	8.4	<2	<4	<2	18	
UNBCHB	1/13/01 0:00	SF												<1	<8	8.2	<2	<4	<2	15	
UNBCHB	1/15/01 0:00	ST		1.5	41300	6.6	2.5	0.185	0.98	0.214	0.109	30	<10	<1	<8	13	<2	4.5	<2	12	
UNBCHB	1/15/01 0:00	SF												<1	<8	13	<2	7.1	<2	13	
UNBCHB	3/6/01 0:00	ST		16	33500	7.9	7.8	0.223	0.61	0.428		25	<10	<1	<8	<2	<2	11	<2	16	
UNBCHB	3/6/01 0:00	SF												<1	<8	<2	<2	12	<2	11	
UNBCHB	3/8/01 0:00	ST		9.9	40530	8	1.6	0.102	5.2	0.153		16	<10	<1	<8	<2	<2	17	<2	21	
UNBCHB	3/8/01 0:00	SF												<1	<8	<2	<2	19	<2	16	
UNBCHB	3/10/01 0:00	ST		9	44100	8.3	0.76	0.073	0.89	0.153		29	<10	<1	<8	<2	<2	17	<2	19	
UNBCHB	3/10/01 0:00	SF												<1	<8	<2	<2	16	<2	12	
UNBCHB	3/29/01 0:00	D		5	43700	8.2	<0.44	<0.05	0.73	<0.061		<10	<10	<1	<8	<2	<2	18	<2	15	
UNBCHB	3/29/01 0:00	D		6.3	45600	8.2	<0.44	<0.05	0.66	<0.061		<10	<10	<1	<8	<2	<2	19	<2	13	
UNBCHB	3/29/01 0:00	D		5.9	45640	8.2	<0.44	<0.05	0.61	<0.061		<10	<10								
UNBCHB	4/30/01 0:00	D		3.8	43240	8	0.45	0.063	1.1	0.116		13	<10								
UNBCHB	4/30/01 0:00	D		4.8	44320	8	<0.44	0.051	0.99	0.122		<10	<10								
UNBCHB	4/30/01 0:00	D		7	42250	8.1	<0.44	<0.05	0.92	0.11		11	<10								
UNBCHB	6/6/01 0:00	D		2.7	44900	8	0.59	0.053	1	<0.061		<10	<10	<1	13	2.7	<2	39	<2	21	
UNBCHB	6/6/01 0:00	D		3.5	45300	8	0.49	<0.05	0.76	0.0612		<10	<10	<1	16	<2	<2	36	<2	20	
UNBCHB	6/6/01 0:00	D		3	46410	8	0.5	<0.05	0.6	0.0918		<10	<10								
UNBCHB	6/27/01 0:00	D		7.7	43860	8	<0.44	<0.05	0.55	0.122	0.03	28	<10								
UNBCHB	6/27/01 0:00	D		6.5	46030	8.1	<0.44	<0.05	0.59	0.0918	0.028	18	<10								
UNBCHB	6/27/01 0:00	D		7.9	44580	8	<0.44	<0.05	0.62	0.0918	0.03	33	<10								

Upper Newport Bay

STATION	DATE/TIME	SAMPLES Type	#	Turb NTU	EC umhos	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	oP mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
Upper Newport Bay - Unit I in-bay basin																					
UNBJAM	7/28/00 11:30	D		4.5	39800	8.3	<0.44	<0.05	0.92	0.459		15	7								
UNBJAM	7/28/00 11:30	D		12	50800	8	<0.44	0.157	0.88	0.551		40	8								
UNBJAM	7/28/00 11:30	D		14	49000	8	<0.44	0.2	0.85	0.428		38	7								
UNBJAM	9/15/00 9:14	D		17	37400	8.1	6.6	0.288	1	0.673		32	<10								
UNBJAM	9/15/00 9:14	D		2.9	47100	7.8	1.5	0.149	0.96	0.306		<10	<10								
UNBJAM	9/15/00 9:14	D		3.6	48100	8	1.9	0.152	0.97	0.275		<10	<10								
UNBJAM	9/29/00 8:23	D		2.5	37300	7.9	5.7	0.319	1	0.52		<10	<10								
UNBJAM	9/29/00 8:23	D		0.55	49600	7.8	1.1	0.273	1.1	0.428		11	<10								
UNBJAM	9/29/00 8:23	D		0.6	49800	7.8	1	0.263	0.99	0.428		<10	<10								
UNBJAM	10/27/00 0:00	ST		90	6790	7.7	9.5	0.686	1.3	1.25		96	18	<1	15	17	3.9	13	<2	69	
UNBJAM	10/27/00 0:00	SF												<1	<8	8.3	<2	11	2.2	26	
UNBJAM	10/29/00 0:00	ST		7.5	20700	7.5	10	0.631	1.3	0.918		<10	<10	<1	9.3	16	<2	9.4	<2	22	
UNBJAM	10/29/00 0:00	SF												<1	<8	17	<2	10	<2	30	
UNBJAM	10/31/00 0:00	ST		13	13000	6.8	11	0.495	1.2	0.887		<10	<10	<1	<8	20	<2	12	<2	21	
UNBJAM	10/31/00 0:00	SF												<1	<8	21	<2	13	<2	23	
UNBJAM	11/17/00 0:00	D		3.8	42100	8	8	0.218	0.74	0.306		22	<10								
UNBJAM	11/17/00 0:00	D		2.4	47100	8.1	2	0.155	0.78	0.245		28	<10								
UNBJAM	11/17/00 0:00	D		3.1	48200	8.1	1.5	0.131	0.51	0.184		21	<10								
UNBJAM	12/28/00 0:00	D		6	40500	7.9	6.6	0.24	0.68	0.254	0.065	48	<10								
UNBJAM	12/28/00 0:00	D		2.3	49400	7.9	1.4	0.192	0.59	0.144	0.056	28	<10								
UNBJAM	12/28/00 0:00	D		3.6	50200	7.9	1.1	0.179	0.73	0.19	0.052	32	<10								
UNBJAM	1/11/01 0:00	ST		754	500	7.8	10	0.371	1.7	3.98	0.38	1090	110	3.7	40	48	26	36	<2	250	
UNBJAM	1/11/01 0:00	SF												<1	<8	28	<2	<4	<2	<10	
UNBJAM	1/13/01 0:00	ST		45	3660	7.8	11	0.259	1.1	2.02	0.42	15	<10	<1	<8	7.5	<2	<4	<2	17	
UNBJAM	1/13/01 0:00	SF												<1	<8	6.3	<2	<4	<2	12	
UNBJAM	1/15/01 0:00	ST		2.2	16400	7	14	0.347	1.2	1.04	0.308	10	<10	<1	9.1	14	2.2	6.1	<2	27	
UNBJAM	1/15/01 0:00	SF												<1	<8	11	<2	6.1	<2	17	
UNBJAM	3/6/01 0:00	ST		60	14500	7.8	13	0.297	0.77	0.673		64	<10	<1	<8	<2	<2	7.5	<2	31	
UNBJAM	3/6/01 0:00	SF												<1	<8	<2	<2	7.2	<2	17	
UNBJAM	3/7/01 0:00	ST		11	17470	7.6	10	0.26	0.8	0.734		<10	<10	<1	<8	<2	<2	11	<2	19	
UNBJAM	3/7/01 0:00	SF												<1	<8	<2	<2	11	<2	14	
UNBJAM	3/10/01 0:00	ST		25	6010	8.6	35	0.117	1.3	0.551		16	<10	<1	<8	2.1	<2	12	<2	24	
UNBJAM	3/10/01 0:00	SF												<1	<8	<2	<2	11	<2	14	
UNBJAM	3/29/01 0:00	D		5.8	37100	7.9	6	0.432	1.3	0.275		17	<10	<1	<8	<2	<2	20	<2	19	
UNBJAM	3/29/01 0:00	D		6.8	40040	7.8	3	0.484	1.2	0.337		<10	<10	<1	<8	<2	<2	21	<2	16	
UNBJAM	3/29/01 0:00	D		7.5	43500	7.8	1.7	0.509	1.1	0.428		21	<10								
UNBJAM	4/30/01 0:00	D		8.2	31100	7.6	4.2	0.293	1.1	0.3		13	<10								
UNBJAM	4/30/01 0:00	D		7.3	41670	7.7	0.76	0.316	1.3	0.398		24	<10								
UNBJAM	4/30/01 0:00	D		7.7	42400	7.7	0.67	0.358	1.4	0.428		13	<10								
UNBJAM	6/6/01 0:00	D		4.5	35210	7.9	5.9	0.167	0.95	0.306		<10	<10	<1	11	<2	<2	41	<2	39	
UNBJAM	6/6/01 0:00	D		5.3	40640	7.8	3.4	0.221	0.89	0.275		<10	<10	<1	15	2.8	<2	39	<2	32	
UNBJAM	6/6/01 0:00	D		8.2	41300	7.9	2.2	0.188	0.94	0.275		15	<10								
UNBJAM	6/27/01 0:00	D		5.6	38100	8.1	1.6	<0.05	0.76	0.184	0.089	13	<10								
UNBJAM	6/27/01 0:00	D		11	41870	8	0.75	0.057	0.83	0.245	0.1	20	<10								
UNBJAM	6/27/01 0:00	D		18	41400	8	<0.44	0.136	0.95	0.367	0.111	33	<10								

Upper Newport Bay

STATION	DATE/TIME	SAMPLES Type	#	Turb NTU	EC umhos	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	oP mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
Upper Newport Bay - North Star Beach																					
UNBNSB	7/28/00 12:20	D		1.5	49700	8.1	<0.44	<0.05	0.29	0.337		27	15								
UNBNSB	7/28/00 12:20	D		1.8	50600	8.1	<0.44	<0.05	0.28	0.337		27	7								
UNBNSB	7/28/00 12:20	D		1.5	49600	8.1	<0.44	<0.05	<0.2	0.245		25	15								
UNBNSB	9/15/00 9:50	D		3.1	49100	8.1	<0.44	<0.05	<0.2	0.122		<10	<10								
UNBNSB	9/15/00 9:50	D		4.1	52100	8.1	<0.44	<0.05	<0.2	0.0918		<10	<10								
UNBNSB	9/15/00 9:50	D		9.9	51800	8.1	<0.44	<0.05	0.31	0.245		22	<10								
UNBNSB	9/29/00 9:20	D		0.9	53600	8	<0.44	0.088	0.74	0.214		<10	<10								
UNBNSB	9/29/00 9:20	D		3.5	52800	8	<0.44	<0.05	<0.2	0.214		<10	<10								
UNBNSB	9/29/00 9:20	D		3.6	52400	8	<0.44	0.083	<0.2	0.245		<10	<10								
UNBNSB	10/27/00 0:00	ST		3.4	42300	8.1	0.69	0.128	0.49	0.153		<10	<10	<1	<8	23	<2	13	<2	89	
UNBNSB	10/27/00 0:00	SF												<1	<8	20	<2	12	<2	85	
UNBNSB	10/29/00 0:00	ST		2.1	39500	7.9	2.6	0.17	0.72	0.22		18	<10	<1	8.2	22	<2	12	<2	28	
UNBNSB	10/29/00 0:00	SF												<1	8.1	21	<2	11	<2	25	
UNBNSB	10/31/00 0:00	ST		2.6	33300	7.8	5.7	0.303	1.2	0.398		<10	<10	<1	8.1	25	<2	12	<2	22	
UNBNSB	10/31/00 0:00	SF												<1	8.1	26	<2	13	<2	23	
UNBNSB	11/17/00 0:00	D		2.3	51200	8.1	0.75	0.062	0.62	0.122		14	<10								
UNBNSB	11/17/00 0:00	D		2.7	52100	8.1	0.72	0.07	0.7	0.0918		24	<10								
UNBNSB	11/17/00 0:00	D		3.7	50100	8.1	0.72	0.065	0.86	0.0918		23	<10								
UNBNSB	12/28/00 0:00	D		2.5	51800	8	0.57	0.102	0.49	0.147	0.036	32	<10								
UNBNSB	12/28/00 0:00	D		2.7	53800	8	0.53	0.096	0.63	0.141	0.033	25	<10								
UNBNSB	12/28/00 0:00	D		2.7	54500	7.9	0.53	0.097	0.91	0.122	0.033	27	<10								
UNBNSB	1/11/01 0:00	ST		191	2660	7.8	9.5	0.437	1.3	1.87	0.3	120	40	<1	<8	11	<2	<4	<2	32	
UNBNSB	1/11/01 0:00	SF												<1	<8	6.5	<2	<4	<2	16	
UNBNSB	1/13/01 0:00	ST		14	14600	7.9	7.3	0.253	0.67	0.979	0.37	10	<10	<1	<8	12	<2	4.1	<2	15	
UNBNSB	1/13/01 0:00	SF												<1	<8	9.5	<2	4.1	<2	<10	
UNBNSB	1/15/01 0:00	ST		1.9	29600	3.1	6.3	0.351	1.4	0.796	0.205	18	<10	<1	<8	12	<2	5.1	<2	19	
UNBNSB	1/15/01 0:00	SF												<1	<8	9.8	<2	4.4	<2	11	
UNBNSB	3/6/01 0:00	ST		17	26720	7.8	10	0.26	0.76	0.49		19	<10	<1	<8	<2	<2	10	<2	27	
UNBNSB	3/6/01 0:00	SF												<1	<8	<2	<2	8.7	<2	13	
UNBNSB	3/7/01 0:00	ST		8.5	37700	8	2.4	0.134	0.54	0.275		21	<10	<1	<8	<2	<2	14	<2	35	
UNBNSB	3/7/01 0:00	SF												<1	<8	<2	<2	14	<2	16	
UNBNSB	3/10/01 0:00	ST		5.1	42060	8	1.5	0.097	0.78	0.184		31	<10	<1	<8	<2	<2	17	<2	22	
UNBNSB	3/10/01 0:00	SF												<1	<8	<2	<2	15	<2	16	
UNBNSB	3/29/01 0:00	D		3.4	42900	8.1	1.8	0.185	0.87	<0.061		12	<10	<1	<8	<2	<2	23	<2	18	
UNBNSB	3/29/01 0:00	D		3.9	45200	8.2	2.2	0.222	1	0.122		15	<10	<1	<8	<2	<2	18	<2	14	
UNBNSB	3/29/01 0:00	D		2.3	45140	8.2	<0.44	<0.05	0.64	<0.061		<10	<10								
UNBNSB	4/30/01 0:00	D		2.9	40200	7.9	1.6	0.212	1	0.202		<10	<10								
UNBNSB	4/30/01 0:00	D		3.7	42100	7.9	0.69	0.153	1.1	0.162		13	<10								
UNBNSB	4/30/01 0:00	D		3.3	43030	8	0.48	0.128	0.93	0.147		<10	<10								
UNBNSB	6/6/01 0:00	D		4.3	43450	8	0.7	0.055	0.61	0.0918		18	<10	<1	18	3.5	<2	37	<2	24	
UNBNSB	6/6/01 0:00	D		3.4	43600	8	0.57	<0.05	0.73	0.0918		28	<10	<1	9.2	<2	<2	31	<2	23	
UNBNSB	6/6/01 0:00	D		3.3	45130	8	0.59	0.054	0.76	0.0918		11	<10								
UNBNSB	6/27/01 0:00	D		4.7	41000	8.1	0.48	<0.05	0.63	0.184	0.056	29	<10								
UNBNSB	6/27/01 0:00	D		3.7	42740	8.1	<0.44	<0.05	0.61	0.122	0.051	<10	<10								
UNBNSB	6/27/01 0:00	D		4.4	43100	8	<0.44	<0.05	0.54	0.153	0.04	29	<10								

Upper Newport Bay

STATION	DATE/TIME	SAMPLES Type	#	Turb NTU	EC umhos	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	oP mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
Upper Newport Bay - North Star Beach																					
UNBSDC	7/28/00 11:00	D		3.2	43800	8.2	<0.44	<0.05	0.79	0.428		24	10								
UNBSDC	7/28/00 11:00	D		3.4	47400	8.1	<0.44	<0.05	0.32	0.428		21	10								
UNBSDC	7/28/00 11:00	D		2.4	49100	8.1	<0.44	<0.05	0.39	0.367		15	8								
UNBSDC	9/15/00 9:39	D		1.9	51500	8	<0.44	0.097	0.71	0.184		<10	<10								
UNBSDC	9/15/00 9:39	D		2.6	51800	8	<0.44	0.097	0.88	0.184		<10	<10								
UNBSDC	9/15/00 9:39	D		4.1	51400	8	0.44	0.101	0.75	0.184		<10	<10								
UNBSDC	9/29/00 8:49	D		0.7	52200	7.9	<0.44	0.132	0.73	0.245		<10	<10								
UNBSDC	9/29/00 8:49	D		0.8	52700	7.9	0.44	0.127	0.81	0.275		<10	<10								
UNBSDC	9/29/00 8:49	D		0.8	51600	7.9	<0.44	0.132	0.54	0.275		<10	<10								
UNBSDC	10/27/00 0:00	ST		60	15200	8	9.5	0.617	1.2	1.01		62	12	<1	10	17	3.6	12	<2	65	
UNBSDC	10/27/00 0:00	SF												<1	<8	12	<2	11	<2	32	
UNBSDC	10/29/00 0:00	ST		2.7	33800	7.7	4.4	0.34	0.98	0.428		<10	<10	<1	<8	18	<2	11	<2	33	
UNBSDC	10/29/00 0:00	SF												<1	<8	17	<2	12	<2	36	
UNBSDC	10/31/00 0:00	ST		7.4	19800	7.7	7.9	0.412	1	0.734		<10	<10	<1	<8	21	<2	12	<2	19	
UNBSDC	10/31/00 0:00	SF												<1	<8	22	<2	12	<2	32	
UNBSDC	11/17/00 0:00	D		2.6	44600	8.1	4.8	0.172	0.67	0.245		29	<10								
UNBSDC	11/17/00 0:00	D		2.2	49300	8.1	1.6	0.116	0.73	0.153		31	<10								
UNBSDC	11/17/00 0:00	D		2.1	51100	8.1	1.2	0.096	0.74	0.122		29	<10								
UNBSDC	12/28/00 0:00	D		1.7	49800	7.9	0.84	0.148	0.64	0.153	0.046	31	<10								
UNBSDC	12/28/00 0:00	D		1.9	52100	8	0.66	0.125	0.5	0.15	0.039	27	<10								
UNBSDC	12/28/00 0:00	D		2.7	53600	7.9	0.66	0.126	0.54	0.122	0.038	20	<10								
UNBSDC	1/11/01 0:00	ST		440	700	7.8	8.2	0.387	0.99	2.42	0.303	360	40	<1	9.1	20	8.1	11	<2	88	
UNBSDC	1/11/01 0:00	SF												<1	<8	2.7	<2	<4	<2	<10	
UNBSDC	1/13/01 0:00	ST		24	6510	7.8	8.7	0.266	0.87	1.22	0.39	10	<10	<1	<8	8.4	<2	<4	<2	18	
UNBSDC	1/13/01 0:00	SF												<1	<8	7.7	<2	<4	<2	13	
UNBSDC	1/15/01 0:00	ST		2.5	17400	7.9	11	0.37	1.2	0.918	0.265	<10	<10	<1	<8	10	<2	5.2	<2	17	
UNBSDC	1/15/01 0:00	SF												<1	<8	8	<2	6.7	<2	13	
UNBSDC	3/6/01 0:00	ST		38	17900	7.8	13	0.322	0.67	0.673		43	<10	<1	<8	<2	2.8	8.9	<2	35	
UNBSDC	3/6/01 0:00	SF												<1	<8	<2	<2	7.7	<2	14	
UNBSDC	3/7/01 0:00	ST		3.4	29650	7.8	4.9	0.138	0.52	0.367		12	<10	<1	<8	<2	<2	16	<2	18	
UNBSDC	3/7/01 0:00	SF												<1	<8	<2	<2	13	<2	17	
UNBSDC	3/10/01 0:00	ST		5.1	38500	8	3.9	0.117	0.83	0.214		23	<10	<1	8.4	<2	<2	20	<2	16	
UNBSDC	3/10/01 0:00	SF												<1	<8	<2	<2	14	<2	13	
UNBSDC	3/29/01 0:00	D		4.8	41400	8	3	0.3	1	0.153		26	<10	<1	<8	<2	<2	20	<2	21	
UNBSDC	3/29/01 0:00	D		12	42100	8	2.7	0.312	1	0.214		32	<10	<1	<8	<2	<2	21	<2	14	
UNBSDC	3/29/01 0:00	D		13	42210	8	2.8	0.293	0.95	0.153		32	<10								
UNBSDC	4/30/01 0:00	D		13	31500	7.9	4	0.267	1.4	0.398		19	<10								
UNBSDC	4/30/01 0:00	D		11	34830	7.9	3.3	0.272	1.3	0.367		20	<10								
UNBSDC	4/30/01 0:00	D		7.5	37230	7.9	2.7	0.269	1.5	0.337		27	<10								
UNBSDC	6/6/01 0:00	D		5	40800	7.8	2.4	0.141	0.65	0.214		<10	<10	<1	14	<2	<2	37	<2	35	
UNBSDC	6/6/01 0:00	D		4.9	43290	7.9	1.3	0.116	1	0.184		16	<10								
UNBSDC	6/6/01 0:00	D		11	43500	7.9	1.1	0.096	0.77	0.153		36	<10								
UNBSDC	6/27/01 0:00	D		5.1	38100	8.1	1.4	<0.05	0.67	0.153	0.063	23	<10								
UNBSDC	6/27/01 0:00	D		6.9	42200	8.1	<0.44	0.075	1.2	0.275	0.07	12	<10								
UNBSDC	6/27/01 0:00	D		8.6	42600	8.1	<0.44	0.091	0.84	0.245	0.073	16	<10								

APPENDIX M

SEMIANNUAL SEDIMENT DATA

Semiannual Sediment Sampling Data

Site	Date	Time	Cd mg/Kg	Cr mg/Kg	Cu mg/Kg	Pb mg/Kg	Ni mg/Kg	Ag mg/Kg	Zn mg/Kg	Fe mg/Kg	Clay %	Silt+ Clay %	Chlordane µg/Kg	DDD µg/Kg	DDE µg/Kg	DDT µg/Kg	γ BHC µg/Kg	Malathion µg/Kg	2,4-D µg/Kg	2,4,5-TP µg/Kg	Benzo(b) mg/Kg	Benzo(k) mg/Kg	Chrysene mg/Kg	Flranth mg/Kg	Pyrene mg/Kg	Mthxy µg/Kg	Dznon µg/Kg	Endo 1 µg/Kg	Aroclor 1254 µg/Kg	Aroclor 1260 µg/Kg
Huntington Harbour / Bolsa Bay																														
HUNBCC	6/28/00	9:39	0.331	16.8	30.5	27.2	11.5	<0.50	130	13,500	14.37	76.25	<8	<4	31	11	<3	<400	<800	<110						<25	<8000	<4	<10	<25
HUNBCC	1/4/01		<0.30	12.6	21.4	16.2	7.35	<0.50	106	13,500	20.47	76.82	<8	5	12	4	<3	<20	<800	<110						<25	<400	<4	<10	<25
HUNCRB	5/25/00	13:35	<0.30	17.3	34.1	49.1	11.0	<0.50	109	13,700	28.44	89.70																		
HUNCRB	6/28/00	11:10	<0.30	18.0	35.6	51.6	11.7	<0.50	107	14,800	32.80	90.60	<8	<4	36	6	<3	<400	<800	<110						<25	<8000	<4	<10	<25
HUNCRB	1/4/01		<0.30	18.1	27.5	45.6	10.9	<0.50	95.7	18,600	28.83	82.02	9	5	26	6	<3	<20	<800	<110						<25	<400	<4	<10	<25
HUNWAR	6/28/00	10:50	<0.30	12.0	33.9	27.3	8.40	<0.50	146	9,620	9.21	50.72	<8	<4	<3	<3	<3	<400	<800	<110						<25	<8000	<4	<10	<25
HUNWAR	1/4/01		0.55	11.6	10.6	22.8	6.70	<0.50	83.8	12,200	3.20	14.33	9	5	24	6	<3	<20	<800	<110						<25	<400	<4	<10	<25
BBOLR	6/28/00	12:45	<0.30	8.20	10.6	18.3	5.51	<0.50	57.4	7,140	11.80	28.53	<8	<4	<3	<3	<3	<400	<800	<110						<25	<8000	<4	<10	<25
BBOLR	1/4/01		<0.30	6.46	6.07	12.8	4.38	<0.50	47.4	7,180			<8	<4	<3	<3	<3	<20	<800	<110						<25	<400	<4	<10	<25
Newport Bay Watershed																														
ACWF18	11/8/00	10:00											<8	<4	<3	<3	<3	<20	<800	<110						<25	<400	<4	<10	<25
ACWF18	6/28/01		<10.0	<20.0	<20.0	1.08	<30.0	<10.0	<100.0	1,280	0.00	0.22	<8	<4	<3	<3	<3	<20	<800	<110						<25	<400	<4	<10	<25
BCF04	6/28/01		<10.0	24.7	<20.0	6.89	<30.0	<10.0	40.6	15,900	15.09	42.62	<8	<4	<3	<3	<3	<20	<800	<110						<25	<400	<4	<10	<25
HCWF27	11/8/00	10:30									10.46	55.06	<8	7	25	20	<3	<20	<800	<110						<25	<400	<4	<10	<25
HCWF27	6/28/01		<10.0	85.8	<20.0	6.64	<30.0	<10.0	<100.0	13,700	21.81	66.20	<8	5	6	13	<3	<20	<800	<110						<25	<400	<4	<10	<25
SDMF05	11/8/00	9:30											<8	<4	<3	5	<3	<20	<800	<110						<25	<400	<4	<10	<25
SDMF05	6/28/01		<10.0	18.0	<20.0	7.72	<30.0	<10.0	<100.0	13,100	6.73	38.21	10	<4	4	<3	<3	<20	<800	<110						<25	<400	<4	<10	<25
WYLSED	11/8/00	9:00											<8	<4	<3	5	<3	<20	<800	<110						<25	<400	<4	<10	<25
WYLSED	6/28/01		<10.0	<20.0	<20.0	1.01	<30.0	<10.0	<100.0	1,650	0.13	0.63	<8	<4	<3	<3	<3	<20	<800	<110						<25	<400	<4	<10	<25
Upper Newport Bay																														
UNBJAM	11/17/00	9:43	0.83	16.8	16.6	11.1	10.8	<0.50	75.6	13,900			<8	4	22	4	<3	<20	<800	<110						<25	<400	<4	<10	<25
UNBJAM	6/5/01	11:50	<10.0	14.8	<20.0	6.40	<30.0	<10.0	48.5	10,300			8	6	8	8	<3	<20	<800	<110						<25	<400	<4	<10	<25
UNBJAM	6/27/01	13:00	<10.0	22.6	10.0	8.60	<30.0	<10.0	65.3	13,400			40	7	37	8	<3	<20	<800	<110						<25	<400	<4	<10	<25
UNBJAM	6/27/01	13:00	<10.0	16.9	<20.0	7.81	14.6	<10.0	58.5	13,800	13.08	56.61	31	7	31	9	<3	<20	<800	<110						<25	<400	<4	<10	<25
UNBSDC	11/17/00	10:15	0.58	11.8	16.9	13.9	8.43	<0.50	80.9	10,200			<8	<4	15	<3	<3	<20	<800	<110						<25	<400	<4	<10	<25
UNBSDC	6/5/01	12:20	<10.0	17.0	11.3	12.1	<30.0	<10.0	82.0	13,100			9	7	13	7	<3	<20	<800	<110						<25	<400	<4	<10	<25
UNBSDC	6/27/01	12:30	<2.5	12.6	18.4	10.5	8.31	<2.5	98.8	14200			24	7	32	7	<3	<20	<800	<110						<25	<400	<4	<10	<25
UNBSDC	6/27/01	12:30	<2.5	11.9	19.1	11.1	9.3	<2.5	95.4	14700			28	6	32	6	<3	<20	<800	<110						<25	<400	<4	<10	<25
UNBNSB	6/5/01	13:10	<10.0	25.7	25.8	14.0	<30.0	<10.0	112	18,700			9	7	22	7	<3	<20	<800	<110						<25	<400	<4	<10	<25
UNBNSB	6/27/01	13:00	<10.0	10.8	12.5	9.10	<30.0	<10.0	72.6	11,600			13	4	19	6	<3	<20	<800	<110						<25	<400	<4	<10	<25
UNBCHB	6/5/01	13:35	<10.0	34.0	27.9	12.4	38.2	<10.0	92.1	15,300			11	7	19	<3	<3	<20	<800	<110						<25	<400	<4	<10	<25
UNBCHB	6/27/01	13:40	<10.0	17.6	21.1	9.74	<30.0	<10.0	58.6	9,980			10	4	15	6	<3	<20	<800	<110						<25	<400	<4	<10	<25
Lower Newport Bay																														
LNBHIR	11/17/00	11:45	0.50	14.3	15.2	9.56	8.56	<0.50	55.4	12,300			<8	<4	28	<3	<3	<20	<800	<110						<25	<400	<4	<10	<25
LNBHIR	6/27/01	15:00	<10.0	21.4	10.1	11.7	<30.0	<10.0	63.0	14,300	23.36	54.72	14	5	20	8	<3	<20	<800	<110						<25	<400	<4	<10	<25
LNBRIN	11/17/00	12:40	0.41	16.6	205	36.6	7.73	<0.50	113	13,300			<8	<4	20	9	<3	<20	<800	<110						<25	<400	<4	<10	63
LNBRIN	6/27/01	14:30	<10.0	24.3	204	38.5	<30.0	<10.0	157	15,900	55.04	75.56	37	6	21	15	<3	<20	<800	<110						<25	<400	<4	<10	61
LNBTUB	11/17/00	12:15	0.39	19.1	36.2	26.4	13.0	<0.50	80.8	15,200			<8	5	32	5	<3	<20	<800	<110						<25	<400	<4	<10	46
LNBTUB	6/27/01	14:00	<10.0	20.5	21.8	14.2	<30.0	<10.0	61.3	14,100	57.39	97.69	13	4	18	6	<3	<20	<800	<110						<25	<400	<4	<10	<25

Semiannual Sediment Sampling Data

Site	Date	Time	Cd mg/Kg	Cr mg/Kg	Cu mg/Kg	Pb mg/Kg	Ni mg/Kg	Ag mg/Kg	Zn mg/Kg	Fe mg/Kg	Clay %	Silt+ Clay %	Chlordane µg/Kg	DDD µg/Kg	DDE µg/Kg	DDT µg/Kg	γ BHC µg/Kg	Malathion µg/Kg	2,4-D µg/Kg	2,4,5-TP µg/Kg	Benzo(b) mg/Kg	Benzo(k) mg/Kg	Chrysene mg/Kg	Flranth mg/Kg	Pyrene mg/Kg	Mthxy µg/Kg	Dznon µg/Kg	Endo 1 µg/Kg	Aroclor 1254 µg/Kg	Aroclor 1260 µg/Kg
South County Watershed																														
ACJ01	12/6/00	14:10	0.64	7.00	7.19	3.01	11.8	<0.50	32.0	5,460	0.06	0.19	<8	<4	<3	<3	<3	<20	<800	<110						<25	<400	<4	<10	<25
ACJ01	6/27/01	16:00	<10.0	12.7	<20.0	2.46	30.3	<10.0	53.7	6,040	15.19	38.74	<8	<4	<3	<3	<3	<20	<800	<110						<25	<400	<4	<10	<25
SCDAM	12/6/00	9:45	<0.30	20.4	9.25	2.73	15.5	<0.50	30.3	13,800	28.01	63.38																		
SCDAM	6/27/01	15:10	<10.0	<20.0	<20.0	1.27	25.2	<10.0	34.4	3,850	1.62	4.27																		
SJNL01	12/6/00	10:43	<0.30	2.89	6.54	2.14	1.87	<0.50	12.6	3,570	0.59	1.49	<8	<4	<3	7	<3	<20	<800	<110						<25	<400	<4	<10	<25
SJNL01	6/27/01	12:55	<10.0	<20.0	<20.0	1.79	<30.0	<10.0	17.5	3,470	0.00	0.82	<8	<4	<3	<3	<3	<20	<800	<110						<25	<400	<4	<10	<25
SJOL01	6/27/01	11:55	<10.0	<20.0	<20.0	2.6	<30.0	<10.0	27.7	5,380	0.00	0.08	<8	<4	<3	<3	<3	<20	<800	<110						<25	<400	<4	<10	<25
Dana Point Harbor																														
DAPTEB	11/21/00	11:25	2.14	15.0	81.7	14.0	10.1	<0.5	118	10,700	16.53	47.17	50	<4	<3	<3	<3	<20	<800	<110	<0.05	<0.05	<0.05	<0.05	<0.05	<25	<400	<4	<10	<25
DAPTEB	6/28/01	11:30	<10.0	24.6	69.7	18.0	14.1	<10.0	116	10,500	12.11	25.57	<40	<20	<15	<15	<15	<20	<800	<110	<0.25	<0.25	<0.25	<0.25	<0.25	<25	<400	<20	<10	<25
DAPTWB	11/21/00	11:45	<0.30	16.8	56.7	22.8	22.7	<0.50	78.4	12,400	20.51	61.11	24	<4	<3	5	<3	<20	<800	<110						<25	<400	<4	<10	<25
DAPTWB	6/28/01	11:50	<10.0	27.6	76.9	23.6	18.6	<10.0	111	14,400	27.57	67.74	<40	<20	<15	<15	<15	<20	<800	<110						<25	<400	<20	<10	<25
DAPTLB	11/21/00	12:10	<0.30	16.7	70.2	13.1	7.72	<0.50	79.4	13,600	19.70	69.37	<8	<4	<3	<3	<3	<20	<800	<110						<25	<400	<4	<10	<25
DAPTLB	6/28/01	12:15	<10.0	28.7	94.9	11.6	12.9	<10.0	97.4	14,600	23.11	75.51	<8	<4	<3	<3	<3	<20	<800	<110						<25	<400	<4	<10	<25
DAPTLR	11/21/00	12:22	<0.30	10.3	39.9	6.84	5.17	<0.50	48.6	8,880	26.41	86.60	<8	<4	<3	<3	<3	<20	<800	<110						<25	<400	<4	<10	<25
DAPTLR	6/28/01	12:30	<10.0	25.8	72.7	9.01	16.7	<10.0	85.2	14,500	30.59	89.06	<8	<4	<3	<3	<3	<20	<800	<110						<25	<400	<4	<10	<25

Above NOAA Effects Range Median (ERM) concentration

Anthropogenically Enriched - 99% Confidence using SCCWRP Iron Normalization Database

All organic compounds unless otherwise noted were below the detection limits of the laboratory.

Benzo (b) - Benzo(b) flouranthene
Benzo(k) - Benzo(k)flouranthene
Flranth - Flouranthene
Mthxy - Methoxychlor
Dznon - Diazinon
Endo I - Endosulfan I

ND - Not Detected (below detection limit of laboratory).

APPENDIX N

HYDROGRAPHS FROM SAMPLED STORMS

Stormwater Sampling in Anaheim Barber City Channel

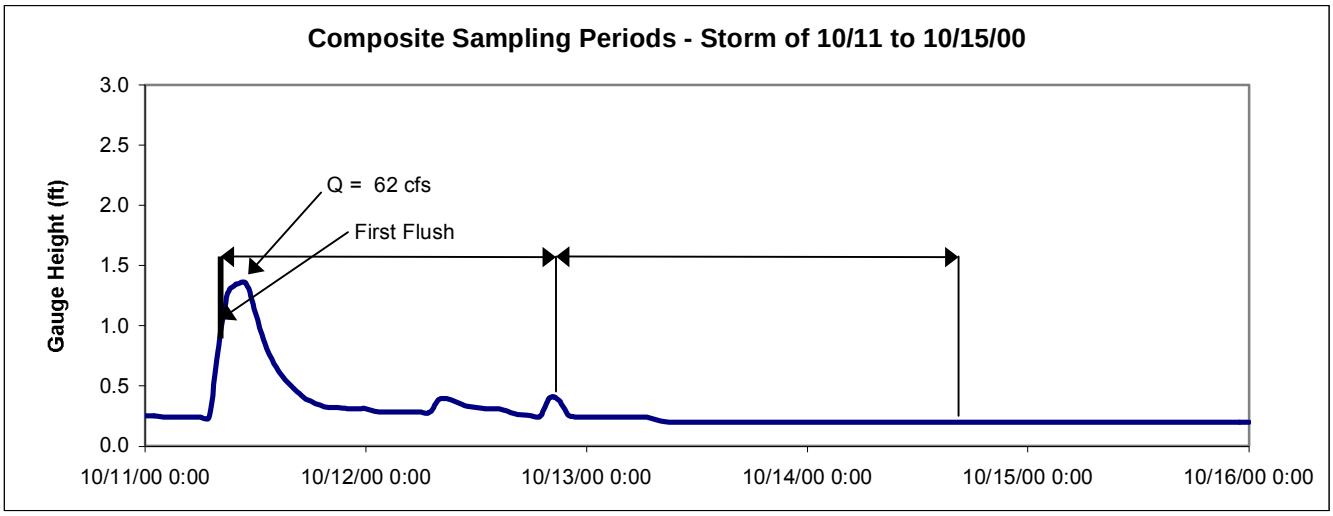

Stormwater Sampling in El Modena-Irvine @ Michelle

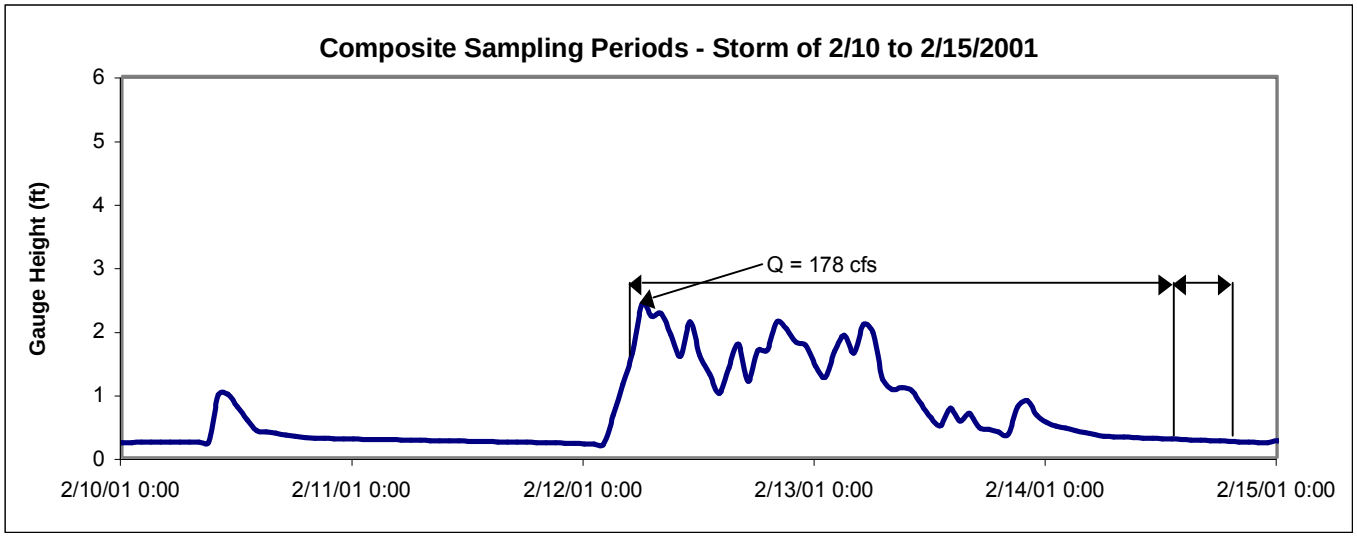

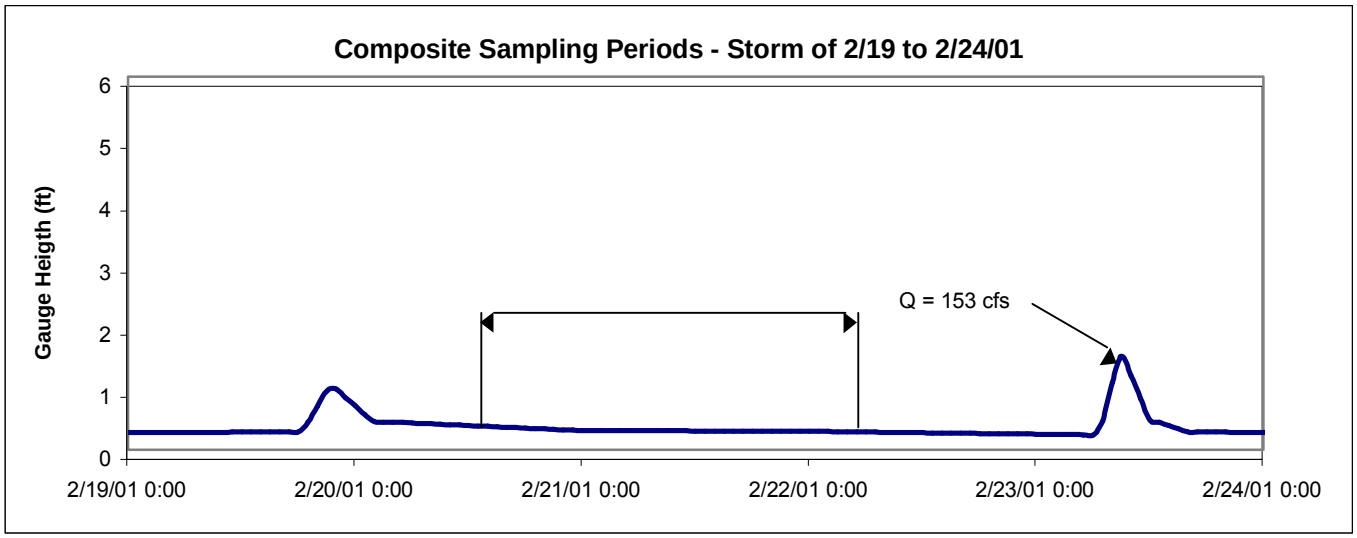

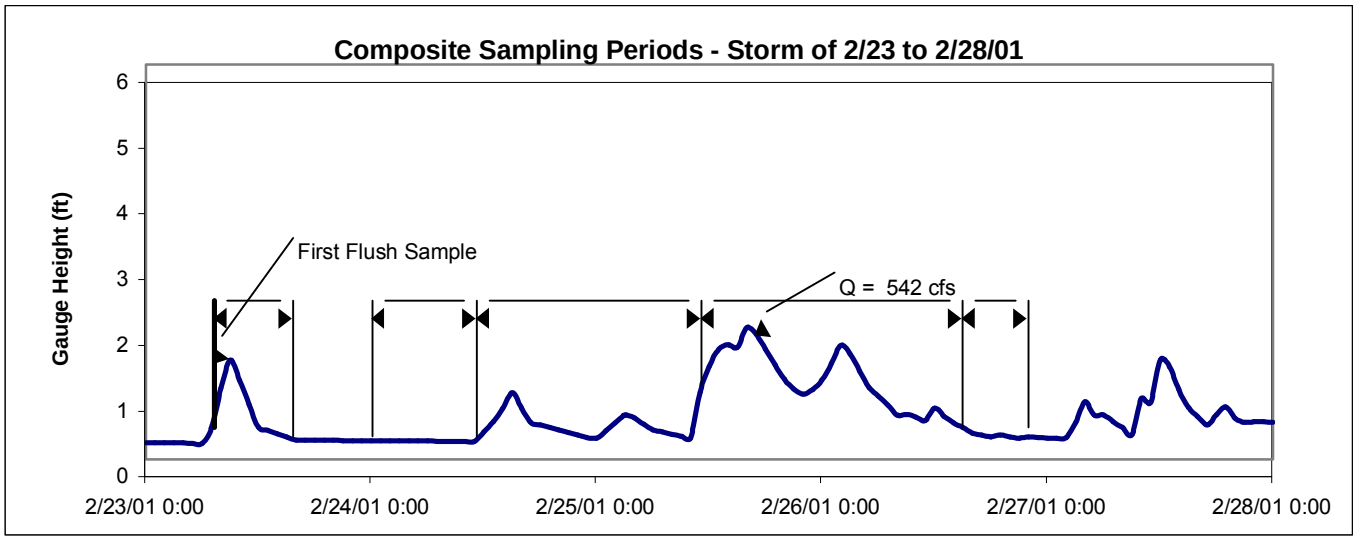

Stormwater Sampling in Santa Ana Delhi Channel

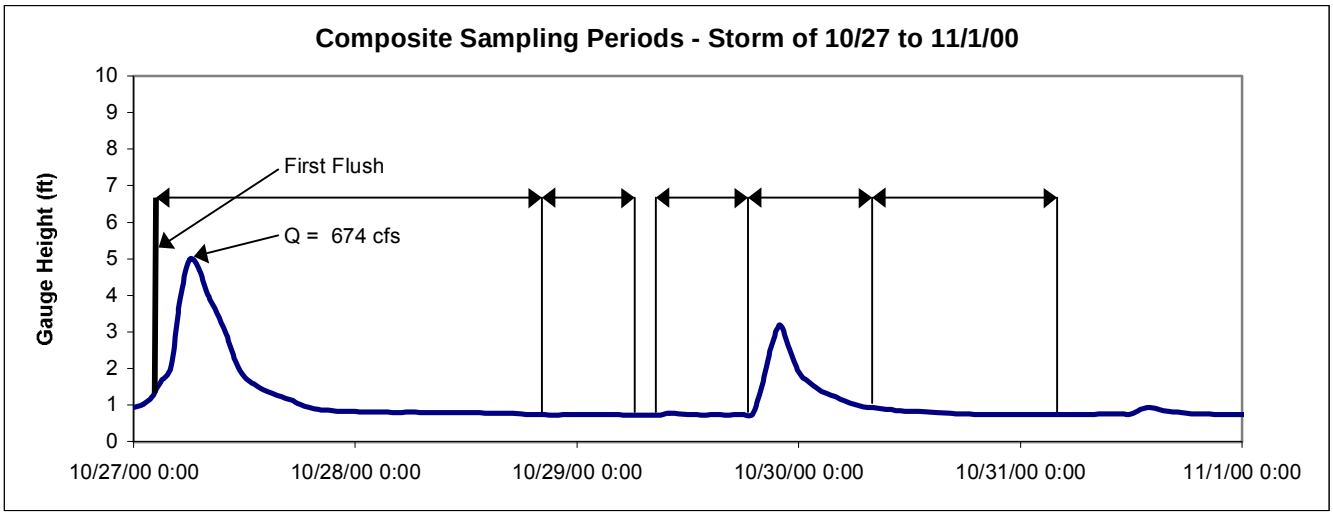

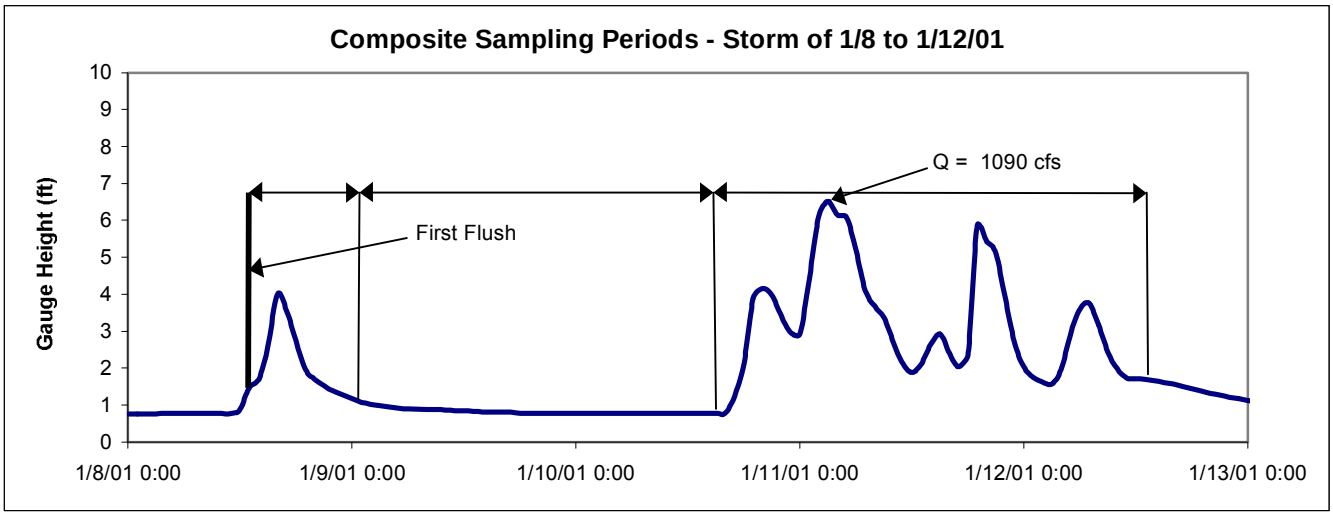

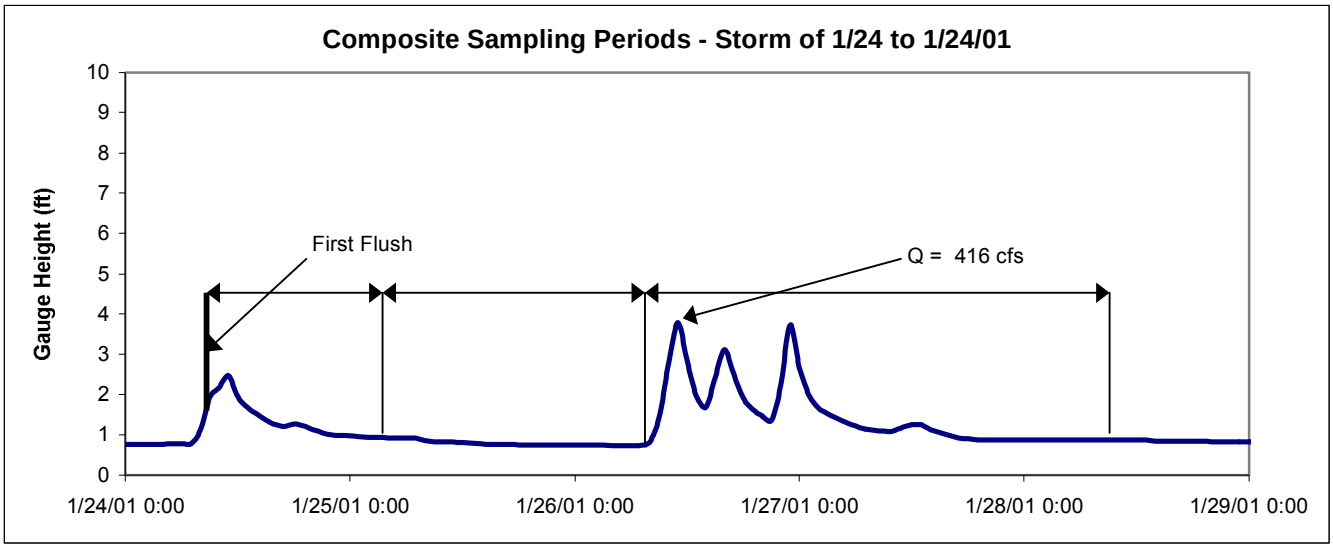

Stormwater Sampling in Santa Ana Delhi Channel

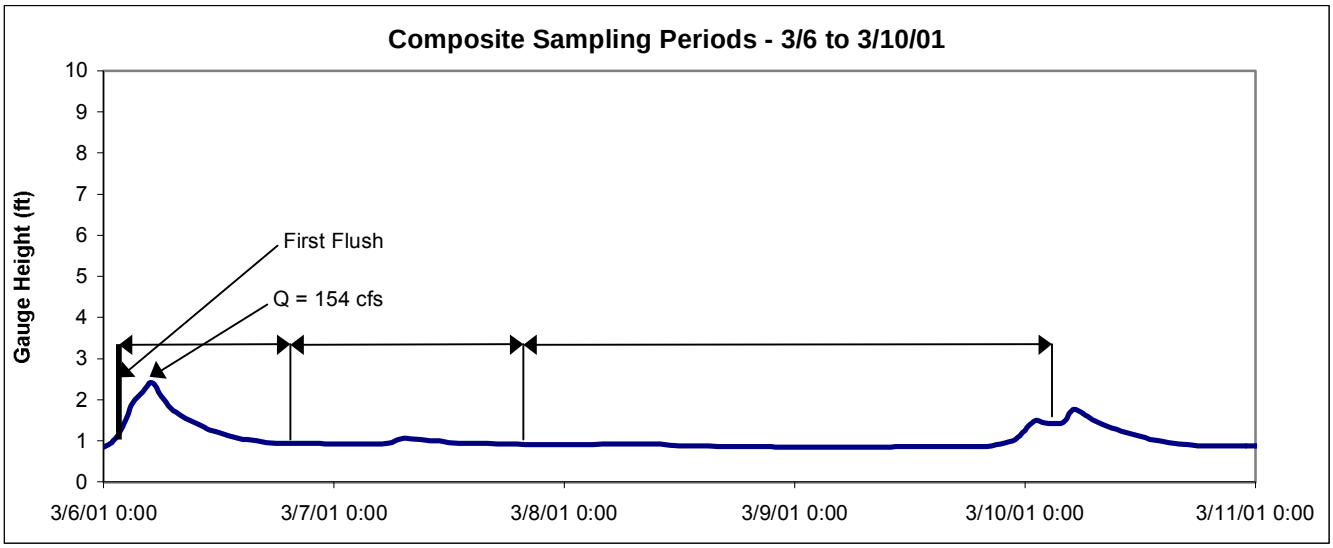

Stormwater Sampling in San Diego Creek @ Campus Drive

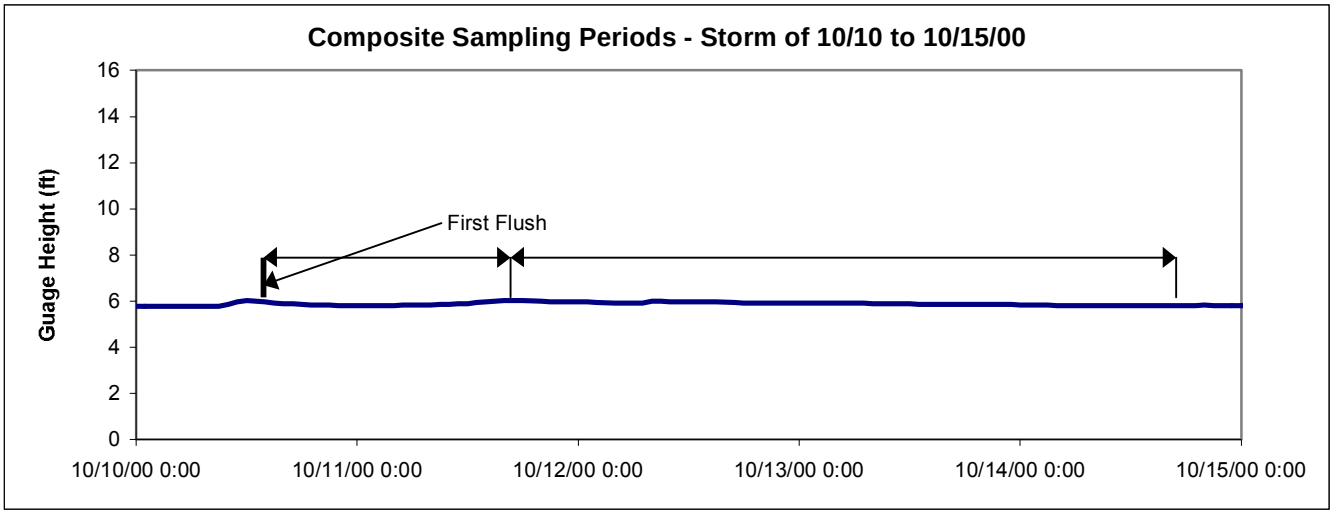

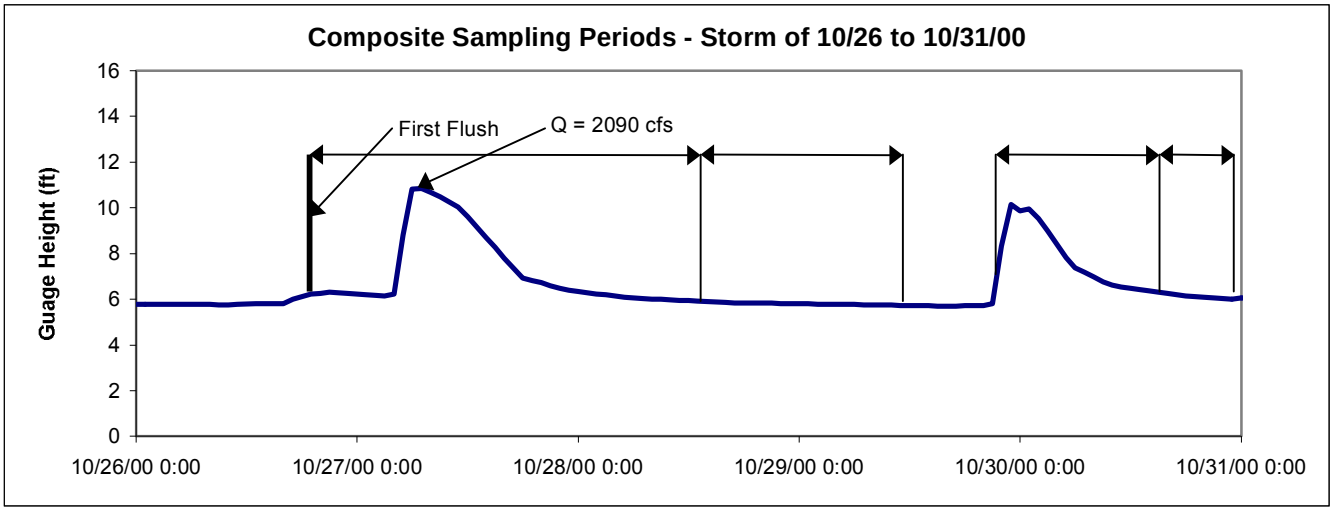

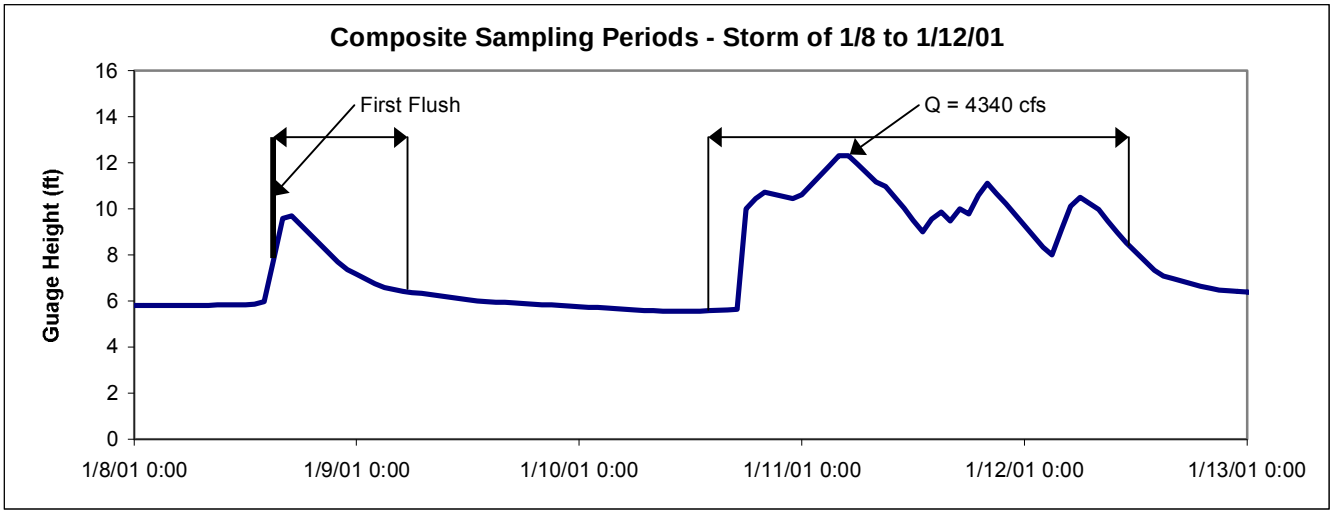

Stormwater Sampling in San Diego Creek @ Campus Drive

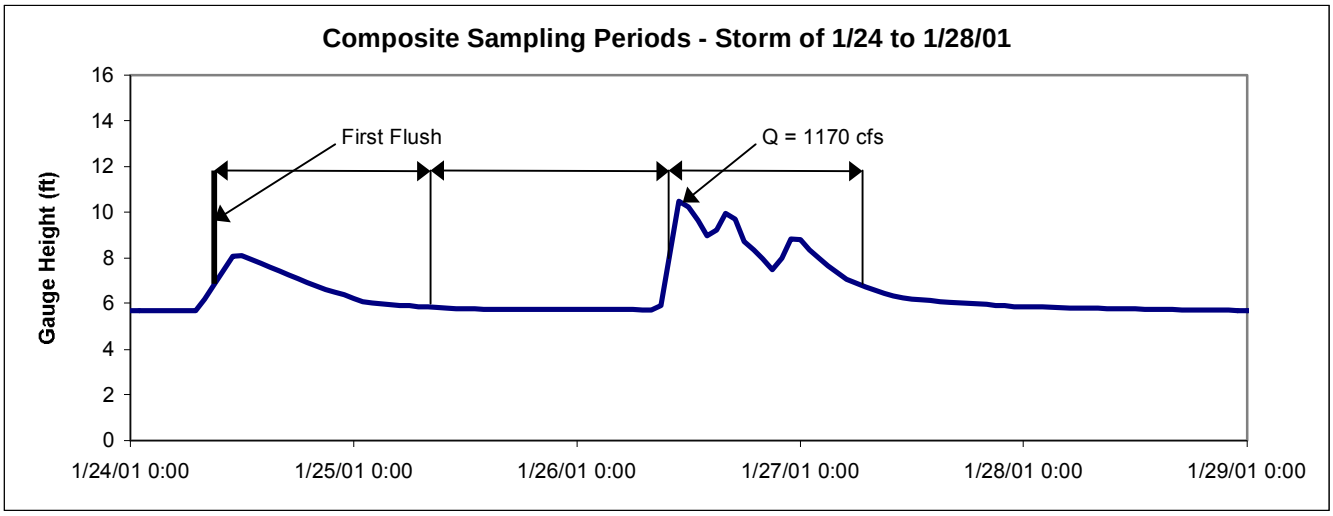

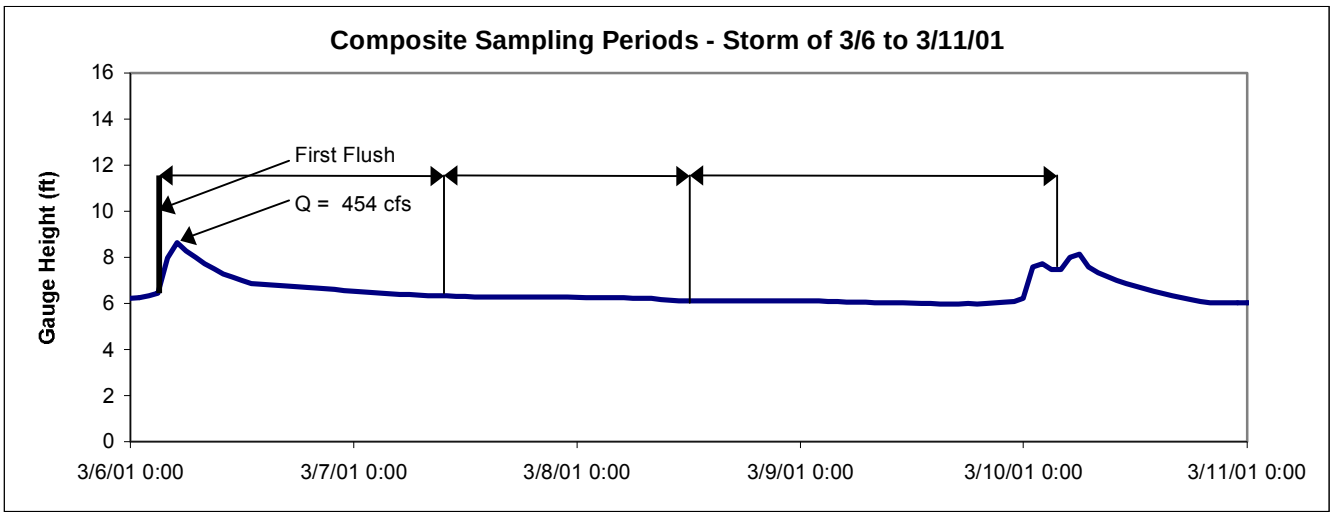

Stormwater Sampling in Peters Canyon Wash @ Barranca Parkway

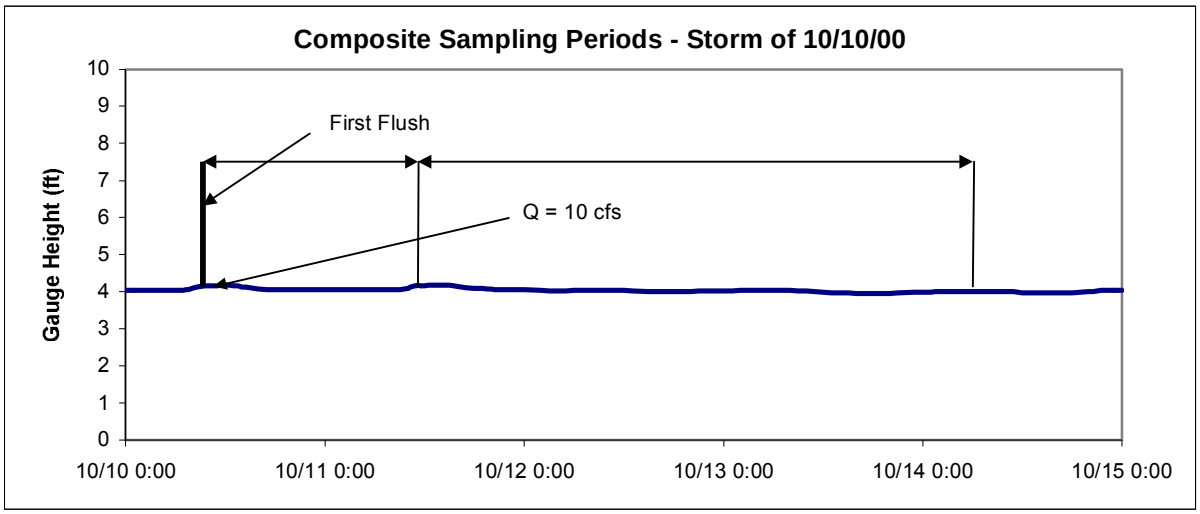

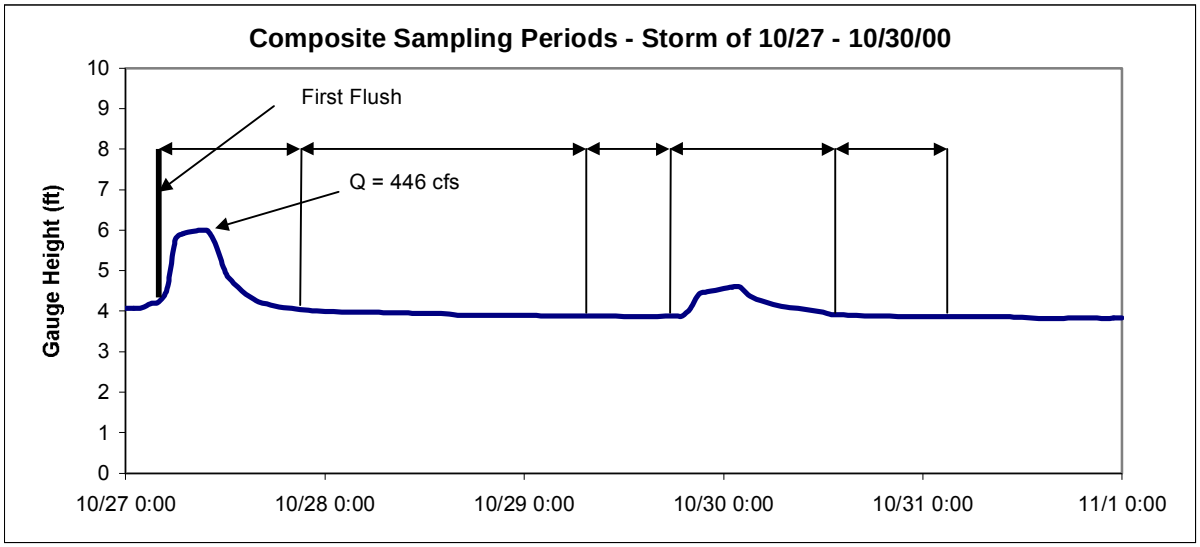

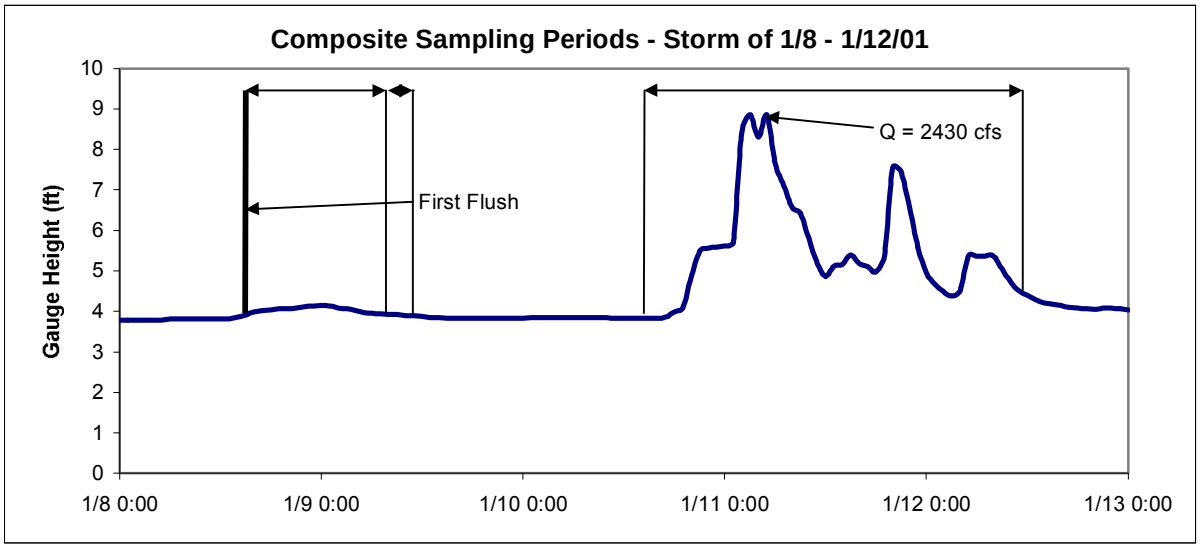

Stormwater Sampling in Peters Canyon Wash @ Barranca Parkway

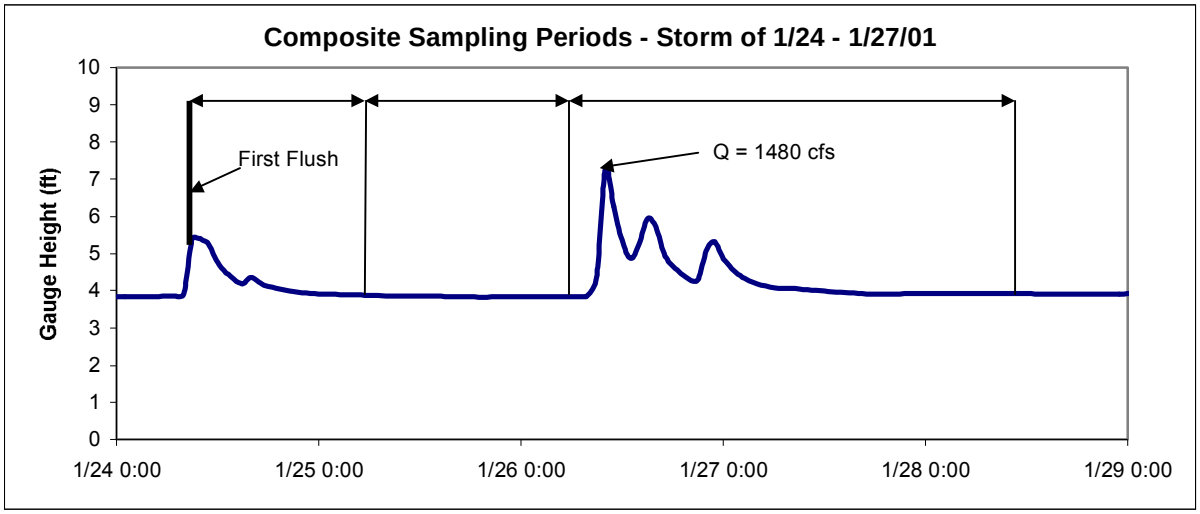

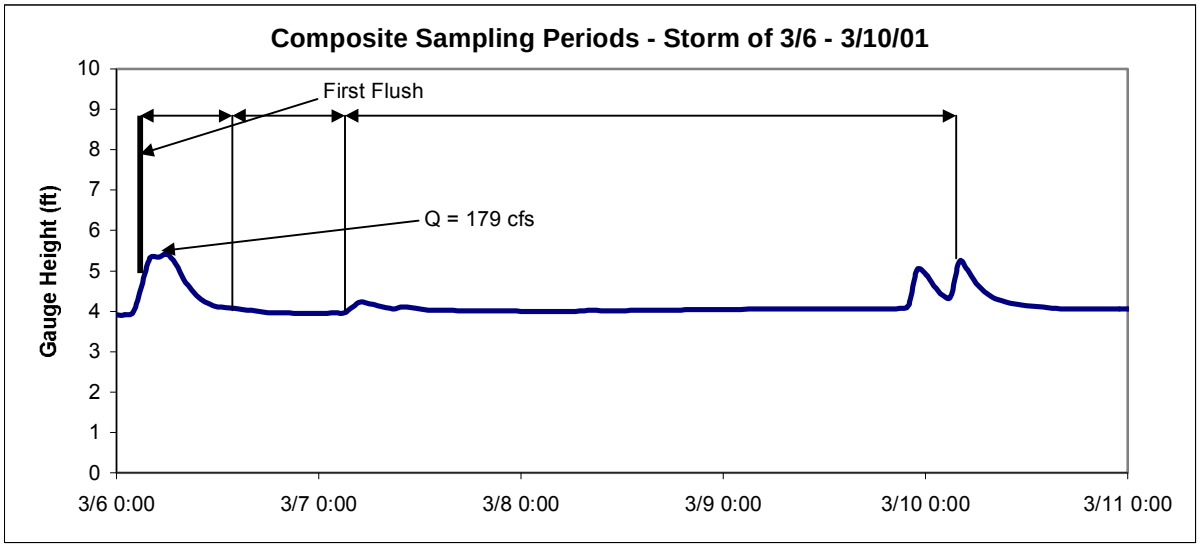

Stormwater Sampling in San Diego Creek @ Harvard Avenue

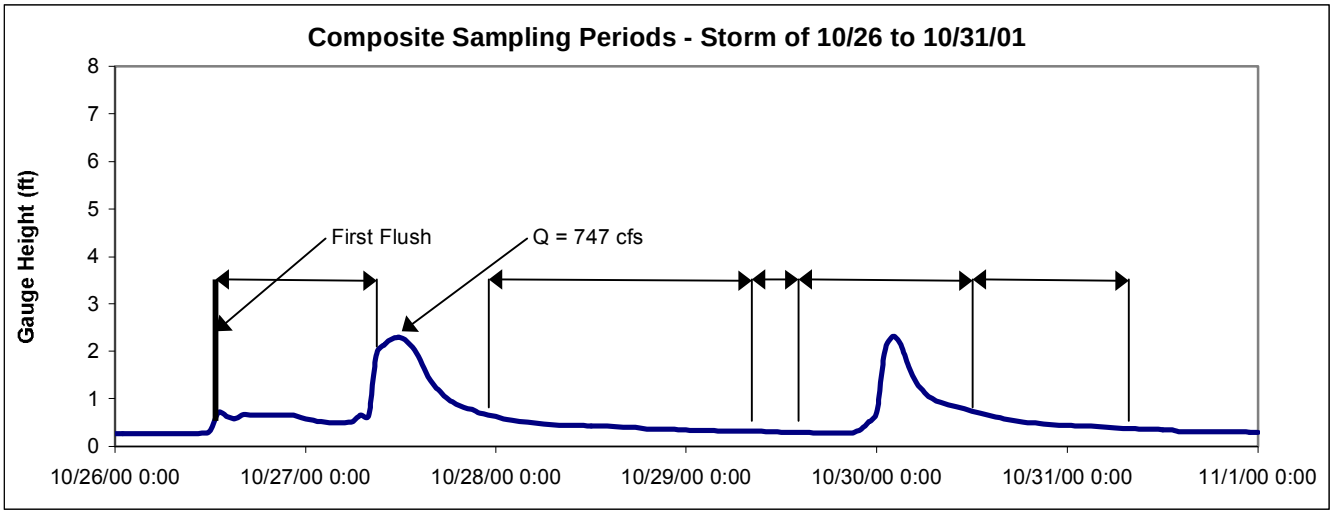

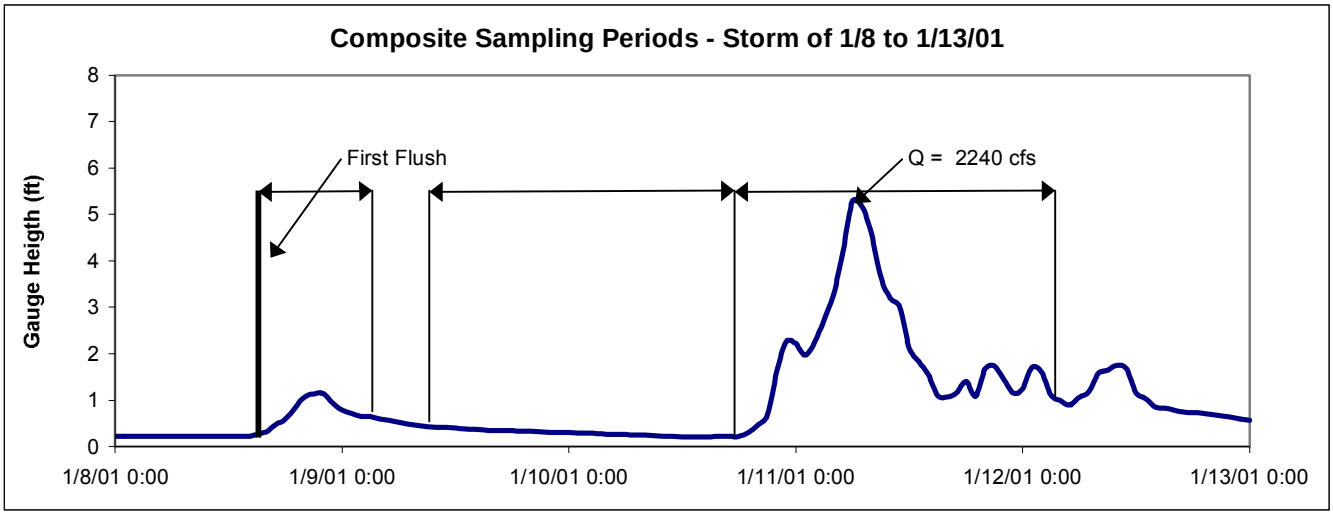

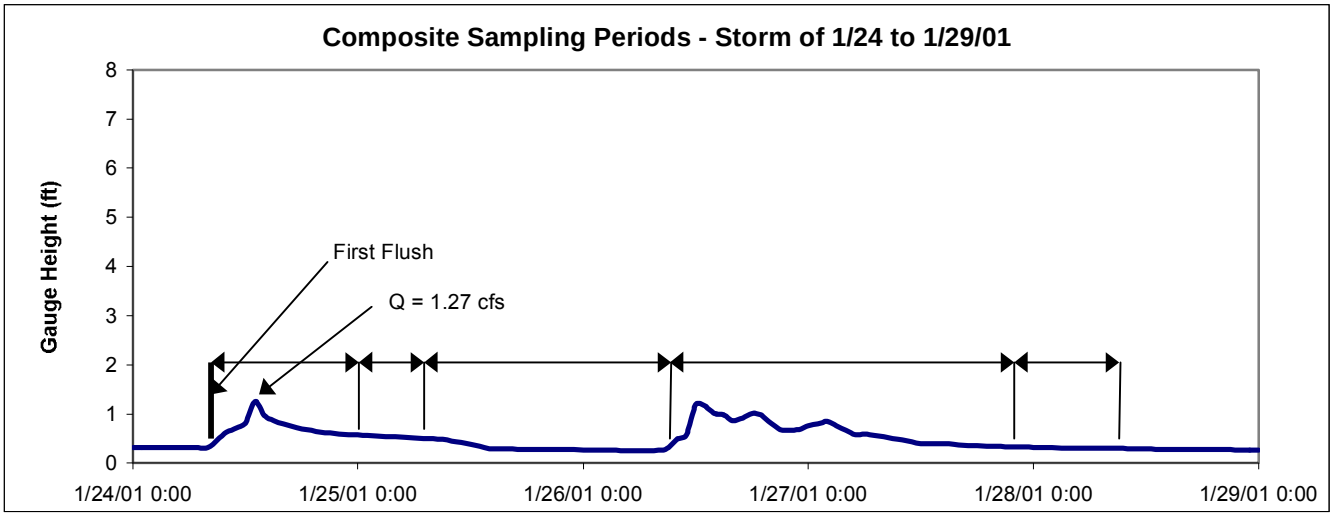

Stormwater Sampling in San Diego Creek @ Harvard Avenue

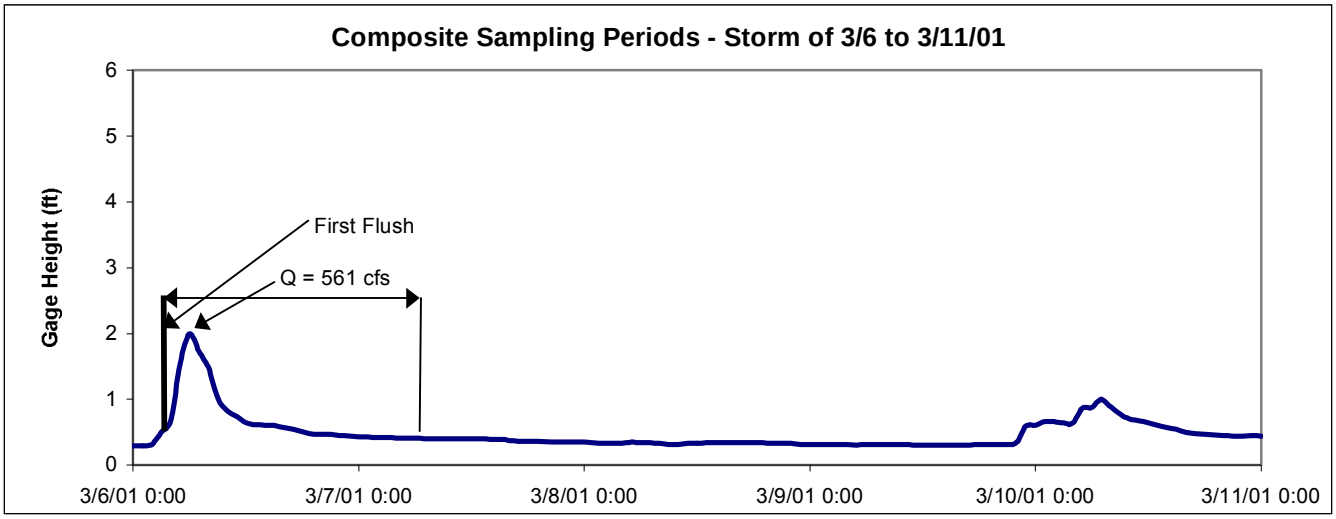

Stormwater Sampling in Lane Channel

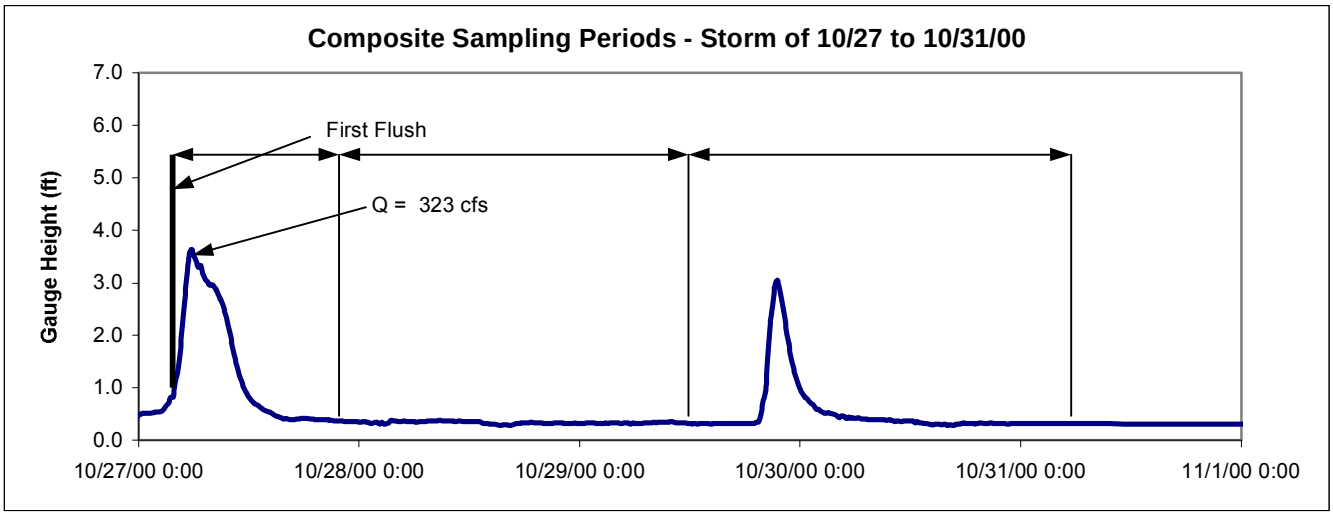

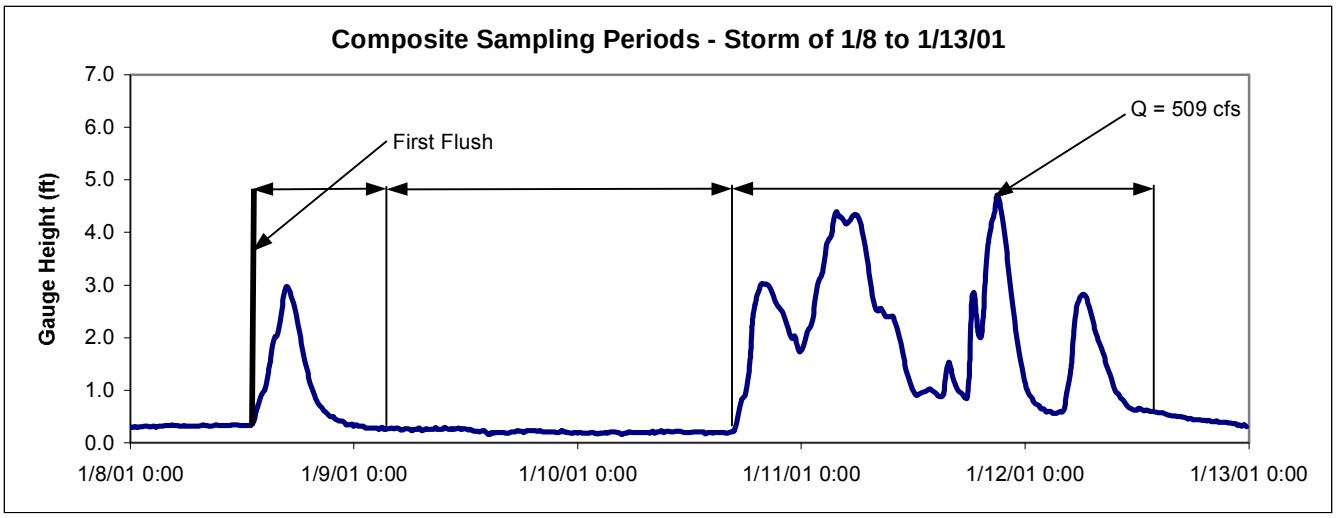

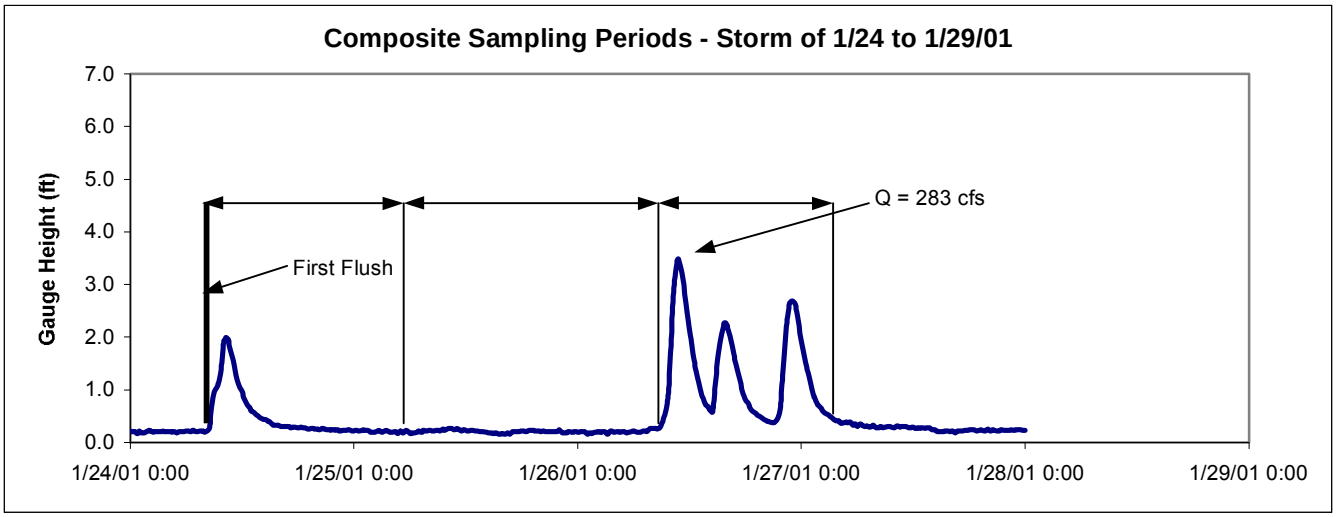

Stormwater Sampling in Costa Mesa Channel

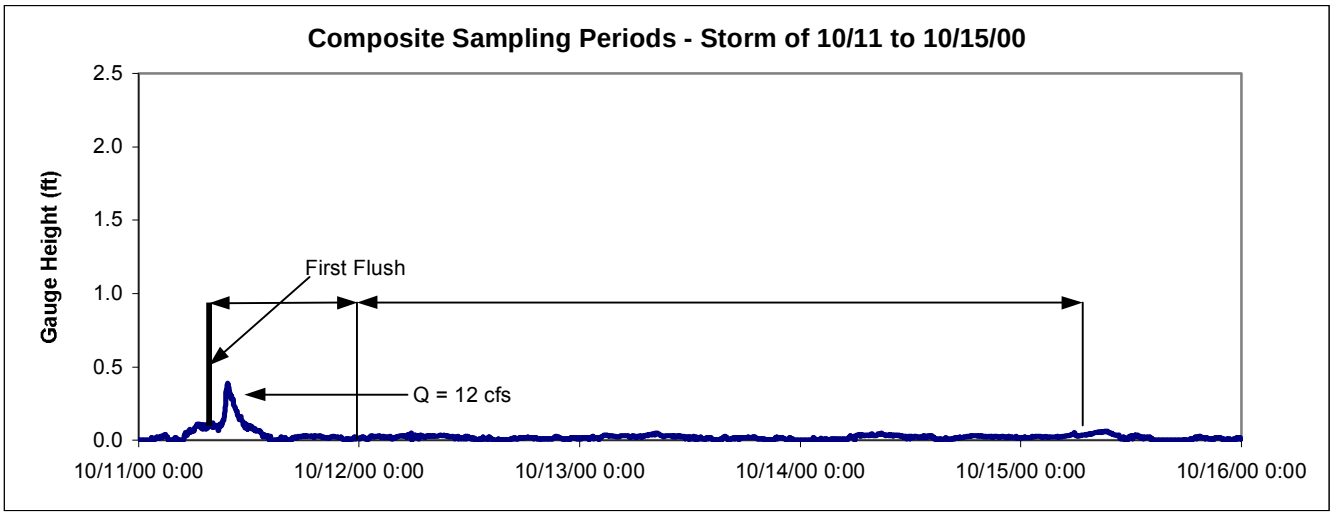

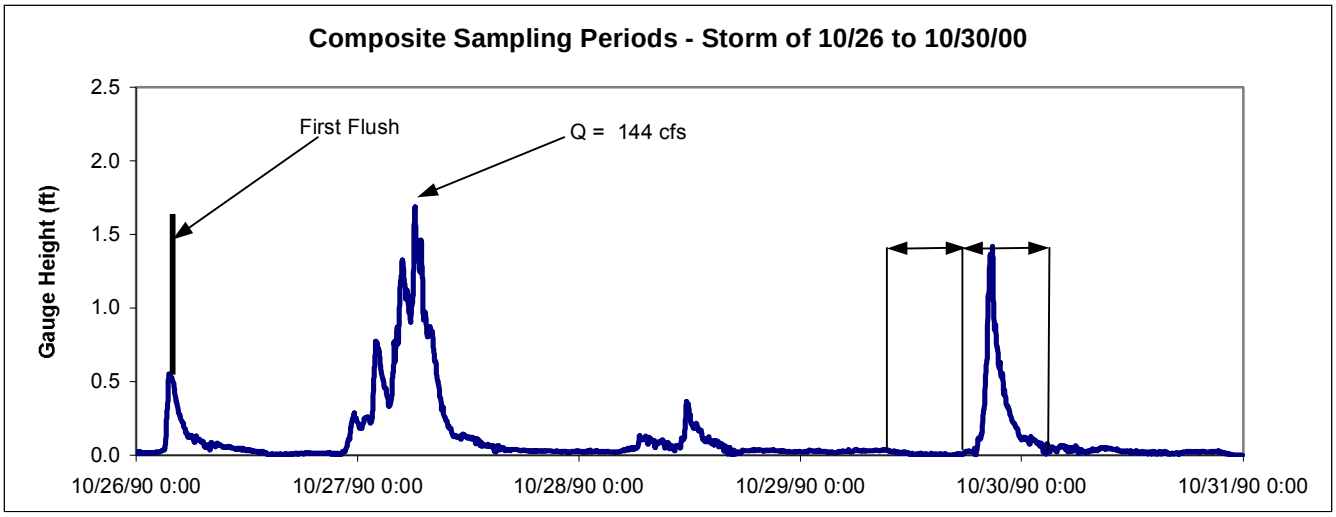

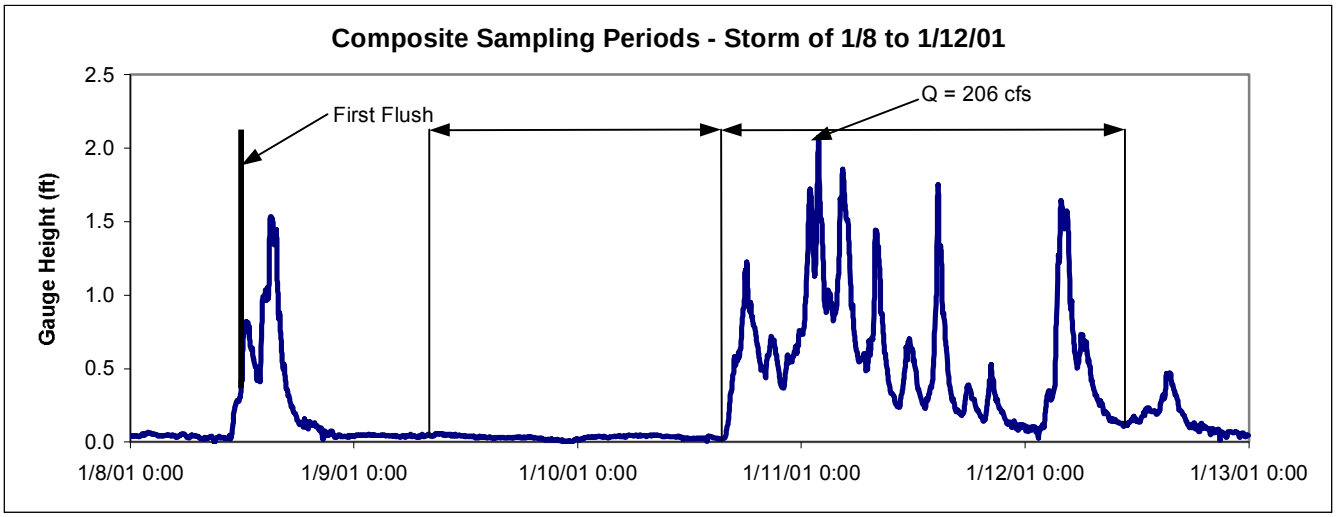

Stormwater Sampling in Costa Mesa Channel

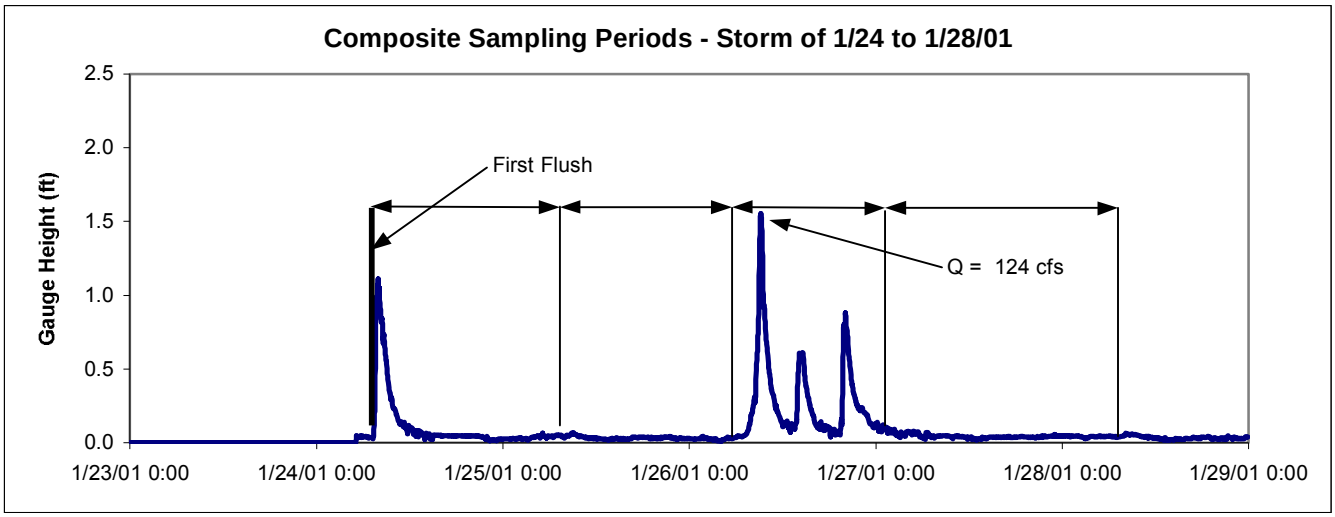

APPENDIX O

MASSLOADS FROM SAMPLED STORMS

Massloads from Sampled Storms : 2000-2001 Season

STATION		SAMPLES Type	#	Volume ac-ft	Storm Volume	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	oP mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
ABCC03	10/11/00 7:11	ST	5	0.74	30.01	12	0.427	10	3.98	0.069	530	135	1.9	18	90	48	18	1	640	128
ABCC03	10/11/00 8:11	SF											0.5	4	13	1	9.6	1	80	
						24.2	**0.9**	**20.1**	**8.0**	**0.1**	**1,067**	**272**	**0.00**	**0.04**	**0.18**	**0.10**	**0.04**	**0.00**	**1.29**	**257.7**
ABCC03	10/11/00 10:11	ST	12	25.30									0.5	11	48	14	10	1	250	
ABCC03	10/12/00 8:11	SF											0.5	4	17	1	7.9	1	91	
													0.03	**0.76**	**3.30**	**0.96**	**0.69**	**0.07**	**17.19**	
ABCC03	10/12/00 10:11	ST	6	3.36		8.6	0.025	1.9	0.459	0.112	20	40	0.5	4	26	4.7	5	1	97	
ABCC03	10/12/00 20:11	SF											0.5	4	19	1	4	1	46	
						78.5	**0.2**	**17.3**	**4.2**	**1.0**	**183**	**365**	**0.00**	**0.04**	**0.24**	**0.04**	**0.05**	**0.01**	**0.89**	
ABCC03	10/12/00 22:11	ST	22	6.66		9	0.025	1.1	0.704	0.029	5	5	0.5	4	13	1	2	1	30	315
ABCC03	10/14/00 16:11	SF											0.5	4	11	1	2	1	24	
						163.0	**0.5**	**19.9**	**12.7**	**0.5**	**91**	**91**	**0.01**	**0.07**	**0.24**	**0.02**	**0.04**	**0.02**	**0.54**	**5,703.9**
Period Totals (lbs)			**45**	**36.1**	**30.0**	**266**	**2**	**57**	**25**	**2**	**1,340**	**727**	**0.1**	**0.9**	**4.0**	**1.1**	**0.8**	**0.1**	**19.9**	**5,962**
BARSED	10/10/00 9:28	ST	5	0.79	25.0	38	0.908	12	3.67	0.15	290	80	1.1	11	60	13	12	1	170	328
BARSED	10/10/00 10:28																			
						81.3	**1.9**	**25.7**	**7.9**	**0.3**	**620**	**171**	**0.00**	**0.02**	**0.13**	**0.03**	**0.03**	**0.00**	**0.36**	**701.6**
BARSED	10/10/00 11:28	ST	12	14.41		44	0.345	4.1	1.56	0.205	74	18	0.5	8.3	31	3.8	5.1	1	62	520
BARSED	10/11/00 11:28	SF											0.5	4	16	1	2	1	34	
						1,722.4	**13.5**	**160.5**	**61.1**	**8.0**	**2,897**	**705**	**0.02**	**0.32**	**1.21**	**0.15**	**0.20**	**0.04**	**2.43**	**20,355.9**
BARSED	10/11/00 13:28	ST	38	30.85		40	0.228	2.4	1.19	0.184	16	40	0.5	4	14	1	2	1	25	615
BARSED	10/14/00 6:28	SF											0.5	4	13	1	2	1	18	
						3,352.9	**19.1**	**201.2**	**99.7**	**15.4**	**1,341**	**3,353**	**0.04**	**0.34**	**1.17**	**0.08**	**0.17**	**0.08**	**2.10**	**51,550.5**
Period Totals (lbs)			**55**	**46.0**	**25.0**	**5,157**	**35**	**387**	**169**	**24**	**4,858**	**4,229**	**0.1**	**0.7**	**2.5**	**0.3**	**0.4**	**0.1**	**4.9**	**72,608**

Massloads from Sampled Storms : 2000-2001 Season

STATION		SAMPLES Type	#	Volume ac-ft	Storm Volume	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	oP mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
BARSED	10/27/00 3:43	ST	5	1.31	266	53	0.742	5.7	4.59	0.54	620	100								
BARSED	10/27/00 4:43																			
						188.4	**2.6**	**20.3**	**16.3**	**1.9**	**2,205**	**356**								
BARSED	10/27/00 6:43	ST	8	208.13		32	0.409	3.2	3.98	0.546	430	60	1.1	20	84	11	13	1	140	300
BARSED	10/27/00 20:43	SF											0.5	11	13	1	5	1	18	
						18,097	**231.3**	**1,810**	**2,251**	**308.8**	**243,181**	**33,932**	**0.62**	**11.31**	**47.51**	**6.22**	**7.35**	**0.57**	**79.18**	**169,661.1**
BARSED	10/27/00 22:43	ST	18	20.21		57	0.233	1.7	1.77	0.44	25	5	0.5	8.1	14	1	2	1	29	734
BARSED	10/29/00 7:43	SF											0.5	8.6	11	1	2	1	16	
						3,130.7	**12.8**	**93.4**	**97.2**	**24.2**	**1,373**	**275**	**0.03**	**0.44**	**0.77**	**0.05**	**0.11**	**0.05**	**1.59**	**40,314.0**
BARSED	10/29/00 9:43	ST	5	4.77		53	0.075	0.75	0.949	0.19	12	5								
BARSED	10/29/00 17:43	SF																		
						687.3	**1.0**	**9.7**	**12.3**	**2.5**	**156**	**65**								
BARSED	10/29/00 19:43	ST	10	30.69		25	0.209	2.1	2.51	0.489	190	29	0.5	13	19	7.2	6.8	1	79	320
BARSED	10/30/00 13:43	SF											0.5	9	9.4	1	2	1	20	
						2,084.5	**17.4**	**175.1**	**209.3**	**40.8**	**15,842**	**2,418**	**0.04**	**1.08**	**1.58**	**0.60**	**0.57**	**0.08**	**6.59**	**26,681.7**
BARSED	10/30/00 15:43	ST	7	6.83		44	0.138	1.1	0.979	0.352	19	5	0.5	8.7	17	1	2	1	23	640
BARSED	10/31/00 3:43	SF											0.5	8.3	7.5	1	2	1	18	
						816.4	**2.6**	**20.4**	**18.2**	**6.5**	**353**	**93**	**0.01**	**0.16**	**0.32**	**0.02**	**0.04**	**0.02**	**0.43**	**11,875.2**
Period Totals (lbs)			**53**	**271.9**	**266.1**	**25,005**	**268**	**2,129**	**2,604**	**385**	**263,109**	**37,138**	**0.7**	**13.0**	**50.2**	**6.9**	**8.1**	**0.7**	**87.8**	**248,532**
BARSED	1/8/01 14:35	ST	5	0.50	16.9	44	1.42	5.1	3.67	0.449	5	5	1.9	13	31	9.9	15	1	130	222
BARSED	1/8/01 15:35																			
						59.7	**1.9**	**6.9**	**5.0**	**0.6**	**7**	**7**	**0.003**	**0.02**	**0.04**	**0.01**	**0.02**	**0.00**	**0.18**	**301.2**
BARSED	1/8/01 17:35	ST	8	13.31		20	1.13	6.5	4.28	0.311	600	110	2.4	21	86	38	27	1	400	148
BARSED	1/9/01 7:35												0.5	4	12	1	2	1	11	
						723.6	**40.9**	**235.2**	**154.8**	**11.3**	**21,707**	**3,980**	**0.09**	**0.76**	**3.11**	**1.37**	**0.98**	**0.04**	**14.47**	**5,354.3**
Period Totals (lbs)			**13**	**13.8**	**16.9**	**783**	**43**	**242**	**160**	**12**	**21,714**	**3,986**	**0.1**	**0.8**	**3.2**	**1.4**	**1.0**	**0.0**	**14.6**	**5,656**
BARSED	1/10/01 14:26	ST	2	0.63	1768	48	0.025	3.3	2.36	0.5	5	48								
BARSED	1/10/01 16:26																			
						82.6	**0.0**	**5.7**	**4.1**	**0.9**	**9**	**83**								
BARSED	1/10/01 18:26	ST	21	1756.23		16	0.266	2	3.06	0.44	300	40	1.5	16	32	12	15	1	110	248
BARSED	1/12/01 12:26	SF											0.5	4	6.4	1	2	1	5	
						76,355	**1,269**	**9,544**	**14,603**	**2,100**	**1,431,649**	**190,887**	**7.16**	**76.4**	**152.7**	**57.3**	**71.6**	**4.77**	**525**	**1,183,497**
Period Totals (lbs)			**23**	**1757**	**1768**	**76,437**	**1,269**	**9,550**	**14,607**	**2,101**	**1,431,658**	**190,969**	**7.2**	**76.4**	**152.7**	**57.3**	**71.6**	**4.8**	**524.9**	**1,183,497**

Massloads from Sampled Storms : 2000-2001 Season

STATION		SAMPLES Type	#	Volume ac-ft	Storm Volume	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	oP mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
BARSED	1/24/01 8:57	ST	5	13.60	367	25	0.792	5.5	2.75	0.242	430	76	1.4	10	35	15	13	1	180	300
BARSED	1/24/01 9:57	SF											0.5	4	10	1	4.3	1	16	
						923.5	**29.3**	**203.2**	**101.6**	**8.9**	**15,885**	**2,808**	**0.05**	**0.37**	**1.29**	**0.55**	**0.48**	**0.04**	**6.65**	**11,082.4**
BARSED	1/24/01 11:57	ST	10	37.18		44	0.508	2.3	1.93	0.372	110	16	0.5	4	17	4.6	7.4	1	59	414
BARSED	1/25/01 5:57	SF											0.5	4	9.4	1	5.3	1	17	
						4,445.6	**51.3**	**232.4**	**195.0**	**37.6**	**11,114**	**1,617**	**0.05**	**0.40**	**1.72**	**0.46**	**0.75**	**0.10**	**5.96**	**41,829.3**
BARSED	1/25/01 7:57	ST	12	8.21		84	0.111	0.47	0.887	0.269	5	5	0.5	4	4.6	1	4.7	1	13	966
BARSED	1/26/01 5:57	SF											0.5	4	4.2	1	4.5	1	13	
						1,874.1	**2.5**	**10.5**	**19.8**	**6.0**	**112**	**112**	**0.01**	**0.09**	**0.10**	**0.02**	**0.10**	**0.02**	**0.29**	**21,552.3**
BARSED	1/26/01 7:57	ST	26	313.71		57	0.33	0.94	1.59	0.281	170	22	0.5	4	15	7.3	8.6	1	71	592
BARSED	1/28/01 9:57	SF											0.5	4	5.7	1	5	1	14	
						48,589	**281**	**801**	**1,355**	**240**	**144,914**	**18,754**	**0.43**	**3.41**	**12.79**	**6.22**	**7.33**	**0.85**	**60.52**	**504,640.9**
Period Totals (lbs)			**53**	**372.7**	**366.9**	**55,832**	**364**	**1,247**	**1,672**	**292**	**172,024**	**23,289**	**0.5**	**4.3**	**15.9**	**7.3**	**8.7**	**1.0**	**73.4**	**579,105**
BARSED	3/6/01 2:56	ST	5	7.79	164	30	0.136	2.2	1.93		240	37	1.2	12	40	14	10	1	170	340
BARSED	3/6/01 3:56	SF											0.5	4	8.1	1	2	1	16	
						635.0	**2.9**	**46.6**	**40.8**		**5,080**	**783**	**0.03**	**0.25**	**0.85**	**0.30**	**0.21**	**0.02**	**3.60**	**7,196.3**
BARSED	3/6/01 5:56	ST	5	54.39		33	0.11	1.8	2.17	0.214	330	40	1.5	12	21	10	11	1	98	395
BARSED	3/6/01 13:56	ST											0.5	4	2.3	1	2	1	14	
						4,876.8	**16.3**	**266.0**	**320.7**	**31.6**	**48,768**	**5,911**	**0.22**	**1.77**	**3.10**	**1.48**	**1.63**	**0.15**	**14.48**	**58,373.4**
BARSED	3/6/01 15:56	SF	13	18.23		97	0.168	1.3	0.857	0.219	22	5	0.5	4	12	1	2	1	28	1090
BARSED	3/7/01 15:56	SF											0.5	4	7.4	1	2	1	17	
						4,805.9	**8.3**	**64.4**	**42.5**	**10.9**	**1,090**	**248**	**0.02**	**0.20**	**0.59**	**0.05**	**0.10**	**0.05**	**1.39**	
BARSED	3/7/01 17:56	ST	30	59.16		100	0.025	1.1	0.979	0.23	45	5	0.5	4	6.8	3	2	1	44	1215
BARSED	3/10/01 3:56	SF											0.5	4	1	1	2	1	16	
						16,076	**4.0**	**177**	**157**	**37**	**7,234**	**804**	**0.08**	**0.64**	**1.09**	**0.48**	**0.32**	**0.16**	**7.07**	**195,322.0**
Period Totals (lbs)			**53**	**139.6**	**164.3**	**26,394**	**31**	**554**	**561**	**79**	**62,172**	**7,746**	**0.4**	**2.9**	**5.6**	**2.3**	**2.3**	**0.4**	**26.5**	**260,892**
CMCG02	10/11/00 6:07	ST	5	0.01	0.10	16	2.45	64	5.51	0.709	170	115	1.9	14	120	25	39	1	940	248
CMCG02	10/11/00 7:07	SF											0.5	10	23	3.1	33	1	560	
						0.3	**0.0**	**1.1**	**0.1**	**0.0**	**3**	**2**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.02**	**4.2**
CMCG02	10/11/00 9:07	ST	12	0.09		15	0.461	6.6	4.59	0.993	42	30	0.5	4	82	11	22	1	310	136
CMCG02	10/11/00 21:07	SF											0.5	4	55	2.4	20	1	210	
						3.8	**0.1**	**1.7**	**1.2**	**0.2**	**11**	**8**	**0.00**	**0.00**	**0.02**	**0.00**	**0.01**	**0.00**	**0.08**	**34.2**
CMCG02	10/11/00 23:07	ST	44	0.07		0.65	0.025	1.6	0.581	0.405	5	5	0.5	4	24	2.2	5.1	1	79	195
CMCG02	10/15/00 7:07	SF											0.5	4	18	1	4.6	1	50	
						0.1	**0.0**	**0.3**	**0.1**	**0.1**	**1**	**1**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.01**	**35.9**
Period Totals (lbs)			**61**	**0.17**	**0.10**	**4**	**0**	**3**	**1**	**0**	**14**	**10**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.1**	**74**

Massloads from Sampled Storms : 2000-2001 Season

STATION		SAMPLES Type	#	Volume ac-ft	Storm Volume	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	oP mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
CMCG02	10/26/00 3:25	ST	4	11.24	414.37	9.3	0.568	5	2.23	0.128	280	140								
CMCG02	10/26/00 4:10																			
						284.0	**17.3**	**152.7**	**68.1**	**3.9**	**8,552**	**4,276**								
CMCG02	10/27/00 6:10	ST	11	302.56		5.9	0.205	2.2	1.62	0.361	43	20	0.5	9.8	33	11	6.9	2.8	200	52
CMCG02	10/28/00 10:10	SF											0.5	4	21	1	5.8	2.5	120	
						4,851	**169**	**1,809**	**1,332**	**297**	**35,353**	**16,443**	**0.41**	**8.06**	**27.13**	**9.04**	**5.67**	**2.30**	**164.43**	**42,751.9**
CMCG02	10/28/00 12:10	ST	2	4.77									0.5	14	49	31	11	1	320	64
CMCG02	10/28/00 12:10	SF											0.5	11	25	3.3	6.9	1	130	
													0.01	**0.18**	**0.64**	**0.40**	**0.14**	**0.01**	**4.15**	**829.9**
CMCG02	10/29/00 10:10	ST	5	0.59		1.1	0.025	0.97	1.38	0.212	5	5								
CMCG02	10/29/00 18:10	SF																		
						1.7	**0.0**	**1.5**	**2.2**	**0.3**	**8**	**8**								
CMCG02	10/29/00 20:10	ST	4	86.92		2.8	0.057	0.87	1.38	0.349	16	10	0.5	8.9	24	5.4	2	1	81	56
CMCG02	10/30/00 4:10	SF											0.5	9.4	17	1	2	1	51	
						661.3	**13.5**	**205.5**	**325.9**	**82.4**	**3,779**	**2,362**	**0.12**	**2.10**	**5.67**	**1.28**	**0.47**	**0.24**	**19.13**	**13,226.9**
Period Totals (lbs)			**26**	**406.1**	**414.4**	**5,798**	**199**	**2,168**	**1,728**	**383**	**47,691**	**23,089**	**0.5**	**10.3**	**33.4**	**10.7**	**6.3**	**2.6**	**187.7**	**56,809**
CMCG02	1/8/01 11:10	ST	4	4.55	1195	26	4.24	21	9.18	0.906	500	230	6.4	39	370	140	66	12	2700	120
CMCG02	1/8/01 11:55																			
						321.2	**52.4**	**259.4**	**113.4**	**11.2**	**6,177**	**2,841**	**0.08**	**0.48**	**4.57**	**1.73**	**0.82**	**0.15**	**33.35**	**1,482.4**
CMCG02	1/9/01 7:54	ST	17	6.25		7.7	0.133	3	1.04	0.41	29	5	0.5	4	2.1	3.4	2	1	65	140
CMCG02	1/10/01 15:54	SF											0.5	4	17	1	2	1	42	
						130.8	**2.3**	**51.0**	**17.7**	**7.0**	**493**	**85**	**0.01**	**0.07**	**0.04**	**0.06**	**0.03**	**0.02**	**1.10**	**2,378.0**
CMCG02	1/10/01 17:54	ST	22	942.99		3.3	0.289	1.3	1.96	0.4	33	14	0.5	4	20	6.7	2	1	84	168
CMCG02	1/12/01 11:54	SF											0.5	4	13	1	2	1	40	
						8,456	**741**	**3,331**	**5,022**	**1,025**	**84,558**	**35,873**	**1.3**	**10.2**	**51.2**	**17.2**	**5.12**	**2.56**	**215.24**	**430,476.5**
Period Totals (lbs)			**43**	**954**	**1195**	**8,908**	**795**	**3,641**	**5,153**	**1,043**	**91,227**	**38,799**	**1.4**	**10.8**	**55.9**	**19.0**	**6.0**	**2.7**	**249.7**	**434,337**

Massloads from Sampled Storms : 2000-2001 Season

STATION		SAMPLES Type	#	Volume ac-ft	Storm Volume	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	oP mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
CMCG02	1/24/01 7:32	ST	5	34.50	214.9	7	1.12	3.4	1.84	0.361	150	58	0.5	4	55	25	8.2	1	280	50
CMCG02	1/24/01 8:32	SF											0.5	4	20	1	4	1	78	
						656.2	**105.0**	**318.7**	**172.5**	**33.8**	**14,061**	**5,437**	**0.05**	**0.37**	**5.16**	**2.34**	**0.77**	**0.09**	**26.25**	**4,686.9**
CMCG02	1/24/01 10:32	ST	1	20.96		280	0.546	3.2	1.5											
	1/24/01 10:32																			
						15,948	**31**	**182**	**85**											
CMCG02	1/25/01 9:12	ST	11	3.52		5.3	2.08	3.1	3.67	0.881	5	5	0.5	4	20	1	4.3	1	38	244
CMCG02	1/26/01 5:12	SF											0.5	4	15	1	2	1	27	
						50.7	**19.9**	**29.7**	**35.1**	**8.4**	**48**	**48**	**0.00**	**0.04**	**0.19**	**0.01**	**0.04**	**0.01**	**0.36**	**2,335.3**
CMCG02	1/26/01 7:12	ST	9	144.69		4.2	0.34	1.3	1.32	0.324	25	5	0.5	4	20	8.6	5.4	1	93	60
CMCG02	1/26/01 23:12	SF											0.5	4	12	1	2	1	48	
						1,651.2	**133.7**	**511.1**	**519.0**	**127.4**	**9,829**	**1,966**	**0.20**	**1.57**	**7.86**	**3.38**	**2.12**	**0.39**	**36.56**	**23,589.1**
CMCG02	1/27/01 1:12	ST	16	10.71		6.6	0.135	1.1	1.1	0.304	5	5	0.5	4	15	1	4.2	1	57	240
CMCG02	1/28/01 7:12	SF											0.5	4	12	1	5.6	1	41	
						192.1	**3.9**	**32.0**	**32.0**	**8.8**	**146**	**146**	**0.01**	**0.12**	**0.44**	**0.03**	**0.12**	**0.03**	**1.66**	**6,984.9**
Period Totals (lbs)			**42**	**214**	**215**	**18,498**	**294**	**1,074**	**844**	**179**	**24,083**	**7,596**	**0.3**	**2.1**	**13.6**	**5.8**	**3.1**	**0.5**	**64.8**	**37,596**
LANF08	10/27/00 2:55	ST	5	0.09	4.81	35	0.386	3.6	1.5	0.211	100	22	0.5	11	43	8	8.1	1	190	900
LANF08	10/27/00 3:55																			
						8.1	**0.1**	**0.8**	**0.3**	**0.0**	**23**	**5**	**0.00**	**0.00**	**0.01**	**0.00**	**0.00**	**0.00**	**0.04**	**208.4**
LANF08	10/27/00 5:55	ST	8	1.90		7.4	0.218	2.2	1.65	0.157	190	34	3.1	14	52	23	14	1	270	184
LANF08	10/27/00 19:55	SF											0.5	4	14	3	6.1	1	63	
						38.2	**1.1**	**11.4**	**8.5**	**0.8**	**981**	**176**	**0.02**	**0.07**	**0.27**	**0.12**	**0.07**	**0.01**	**1.39**	**950.3**
LANF08	10/27/00 21:55	ST	19	1.04		23	0.226	1.7	0.887	0.157	25	5	2.1	4	12	2.2	2	1	55	
LANF08	10/29/00 8:55	SF											1.2	8.1	9.2	1	2	1	36	
						65.0	**0.6**	**4.8**	**2.5**	**0.4**	**71**	**14**	**0.01**	**0.01**	**0.03**	**0.01**	**0.01**	**0.00**	**0.16**	
LANF08	10/29/00 11:55	ST	5	0.31		33	0.184	2.6	0.765	0.157	25	5	2.7	4	14	2.7	2	1	58	1400
LANF08	10/29/00 19:55	SF											1.7	4	12	1	2	1	34	
						27.8	**0.2**	**2.2**	**0.6**	**0.1**	**21**	**4**	**0.00**	**0.00**	**0.01**	**0.00**	**0.00**	**0.00**	**0.05**	**1,179.3**
LANF08	10/29/00 21:55	ST	10	1.22		7.9	0.189	0.99	0.887	0.146	61	11	0.5	10	24	6	6.8	1	94	384
LANF08	10/30/00 15:55	SF											0.5	8.4	11	1	4.7	1	39	
						26.3	**0.6**	**3.3**	**2.9**	**0.5**	**203**	**37**	**0.00**	**0.03**	**0.08**	**0.02**	**0.02**	**0.00**	**0.31**	**1,276.6**
LANF08	10/30/00 17:55	ST	6	0.31		15	0.218	1.5	0.734	0.111	26	5								740
LANF08	10/31/00 3:55	SF																		
						12.8	**0.2**	**1.3**	**0.6**	**0.1**	**22**	**4**								**629.2**
Period Totals (lbs)			**53**	**4.9**	**4.8**	**178**	**3**	**24**	**16**	**2**	**1,321**	**240**	**0.0**	**0.1**	**0.4**	**0.1**	**0.1**	**0.0**	**2.0**	**4,244**

Massloads from Sampled Storms : 2000-2001 Season

STATION		SAMPLES Type	#	Volume ac-ft	Storm Volume	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	oP mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
LANF08	1/8/01 12:57	ST	5	0.04	**9.82**	26	2	9.1	4.9	0.159	700	120	3.7	26	150	42	22	1	730	470
LANF08	1/8/01 13:57	SF											0.5	4	16	1	7.7	1	110	
						3.1	**0.2**	**1.1**	**0.6**		**83**	**14**	**0.00**	**0.00**	**0.02**	**0.00**	**0.00**	**0.00**	**0.09**	**55.6**
LANF08	1/8/01 15:57	ST	5	1.10		8.4	1.43	3	1.5	0.132	210	48	2	15	73	23	20	1	280	160
LANF08	1/8/01 23:57	SF											0.5	4	17	1	10	1	68	
						25.0	**4.3**	**8.9**	**4.5**		**625**	**143**	**0.01**	**0.04**	**0.22**	**0.07**	**0.06**	**0.00**	**0.83**	**476.2**
LANF08	1/9/01 3:57	ST	19	0.74		29	0.566	2.4	0.887	0.27	18	5	0.5	4	20	1	2	1	54	788
LANF08	1/10/01 15:57	SF											0.5	4	14	1	2	1	38	
						58.5	**1.1**	**4.8**	**1.8**		**36**	**10**	**0.00**	**0.01**	**0.04**	**0.00**	**0.00**	**0.00**	**0.11**	**1,589.0**
LANF08	1/10/01 17:57	ST	23	7.59		4.7	0.265	1.2	1.13	0.19	140	23	0.5	4	33	12	8.3	1	120	440
LANF08	1/12/01 13:57	SF											0.5	4	11	1	2	1	28	
						96.9	**5.5**	**24.7**	**23.3**		**2,887**	**474**	**0.01**	**0.08**	**0.68**	**0.25**	**0.17**	**0.02**	**2.47**	**9,074.8**
Period Totals (lbs)			**52**	**9.5**	**9.8**	**183**	**11**	**40**	**30**	**0**	**3,632**	**641**	**0.0**	**0.1**	**1.0**	**0.3**	**0.2**	**0.0**	**3.5**	**11,196**
LANF08	1/24/01 8:06	ST	5	0.048	3.6	21	0.778	5.4	1.93	0.128	290	52	1.8	9.4	58	17	12	1	260	482
LANF08	1/24/01 9:06	SF											0.5	4	14	1	6.2	1	64	
						2.8	**0.1**	**0.7**	**0.3**		**38**	**7**	**0.00**	**0.00**	**0.01**	**0.00**	**0.00**	**0.00**	**0.03**	**63.2**
LANF08	1/24/01 11:06	ST	9	0.737		8.3	0.583	1.7	0.765	0.147	24	5	0.5	4	32	4.9	9.7	1	92	276
LANF08	1/25/01 3:06	SF											0.5	4	21	1	8.6	1	59	
						16.6	**1.2**	**3.4**	**1.5**	**0.3**	**48**	**10**	**0.00**	**0.01**	**0.06**	**0.01**	**0.02**	**0.00**	**0.18**	**552.7**
LANF08	1/25/01 5:06	ST	14	0.469		33	0.216	4.6	1.04	0.26	5	5	0.5	4	12	1	10	1	48	1220
LANF08	1/26/01 7:06	SF											0.5	4	8.5	1	9.9	1	36	
						42.1	**0.3**	**5.9**	**1.3**	**0.3**	**6**	**6**	**0.00**	**0.01**	**0.02**	**0.00**	**0.01**	**0.00**	**0.06**	**1,555.8**
LANF08	1/26/01 9:06	ST	9	1.945		5.6	0.425	1.4	0.765	0.1	82	16	0.5	4	27	12	7.5	1	120	136
LANF08	1/27/01 1:06	SF											0.5	4	8.5	1	5.3	1	33	
						29.6	**2.2**	**7.4**	**4.0**	**0.5**	**433**	**85**	**0.00**	**0.02**	**0.14**	**0.06**	**0.04**	**0.01**	**0.63**	**718.6**
Period Totals (lbs)			**37**	**3.2**	**3.6**	**91**	**4**	**17**	**7**	**1**	**526**	**108**	**0.0**	**0.0**	**0.2**	**0.1**	**0.1**	**0.0**	**0.9**	**2,890**
MIRF07	2/13/01 7:31	ST	16	22.1371	748.9	11	0.064	2.3	1.22	0.286	21	5	0.5	4	15	2.3	2	1	32	245
MIRF07	2/14/01 13:31	SF											1.1	4	11	1	10	1	23	
						661.7	**3.8**	**138.4**	**73.4**	**17.2**	**1,263**	**301**	**0.03**	**0.24**	**0.90**	**0.14**	**0.12**	**0.06**	**1.92**	**14,737.3**
MIRF07	2/14/01 15:31	ST	12	4.05579		18	0.025	3.4	0.643	0.143	17	5	0.5	4	11	1	4.3	1	20	505
MIRF07	2/15/01 17:31	SF											0.5	4	7.7	1	2	1	13	
						198.4	**0.3**	**37.5**	**7.1**	**1.6**	**187**	**55**	**0.01**	**0.04**	**0.12**	**0.01**	**0.05**	**0.01**	**0.22**	**5,565.4**
Period Totals (lbs)			**28**	**26.2**	**748.9**	**860**	**4**	**176**	**80**	**19**	**1,451**	**356**	**0.0**	**0.3**	**1.0**	**0.1**	**0.2**	**0.1**	**2.1**	**20,303**

Massloads from Sampled Storms : 2000-2001 Season

STATION		SAMPLES Type	#	Volume ac-ft	Storm Volume	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	oP mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
MIRF07	2/20/01 13:47	ST	23	9.23	14.17	9.1	0.025	1.7	0.612	0.152	5	5								430
MIRF07	2/22/01 7:47	SF																		
						228.3	**0.6**	**42.7**	**15.4**	**3.8**	**125**	**125**								**10,788.6**
MIRF07	2/23/01 7:47	ST	5	2.31	297.8	4.5	0.626	2.9	1.19	0.121	140	41	0.5	4	31	9.7	6.8	1	180	45
MIRF07	2/23/01 8:47	SF											0.5	4	17	1	4.2	1	35	
						28.3	**3.9**	**18.2**	**7.5**	**0.8**	**880**	**258**	**0.00**	**0.03**	**0.19**	**0.06**	**0.04**	**0.01**	**1.13**	**283.0**
MIRF07	2/23/01 10:47	ST	3	14.58		3.1	0.15	1.1	0.918	0.128	56	15	0.5	4	15	5.5	2	1	55	60
MIRF07	2/23/01 14:47	SF											0.5	4	6.9	1	2	1	11	
						122.8	**5.9**	**43.6**	**36.4**	**5.1**	**2,218**	**594**	**0.02**	**0.16**	**0.59**	**0.22**	**0.08**	**0.04**	**2.18**	**2,376.5**
MIRF07	2/24/01 12:47	ST	12	13.04		5.6	0.11	0.78	0.673		14	5	0.5	4	11	2	2	1	40	90
MIRF07	2/25/01 10:47	SF											0.5	4	9	1	2	1	23	
						198.4	**3.9**	**27.6**	**23.8**		**496**	**177**	**0.02**	**0.14**	**0.39**	**0.07**	**0.07**	**0.04**	**1.42**	**3,187.8**
MIRF07	2/25/01 12:47	ST	9	249.36		2.4	0.082	0.81	1.13		60	5	0.5	4	13	4.1	2	1	45	30
MIRF07	2/26/01 4:47	SF											1.8	4	7.1	1	2	1	14	
						1,626.2	**55.6**	**548.8**	**765.7**		**40,655**	**3,388**	**0.34**	**2.71**	**8.81**	**2.78**	**1.36**	**0.68**	**30.49**	**20,327.3**
MIRF07	2/26/01 6:47	ST	7	13.06		9.3	0.054	1.1	1.25		15	5	0.5	4	21	3.3	2	1	33	170
MIRF07	2/26/01 21:47	SF											0.5	4	16	1	2	1	18	
						330.0	**1.9**	**39.0**	**44.4**		**532**	**177**	**0.02**	**0.14**	**0.75**	**0.12**	**0.07**	**0.04**	**1.17**	**6,032.9**
Period Totals (lbs)			**36**	**292.3**	**297.8**	**2,306**	**71**	**677**	**878**	**6**	**44,781**	**4,594**	**0.4**	**3.2**	**10.7**	**3.2**	**1.6**	**0.8**	**36.4**	**32,207**
SADF01	10/27/00 2:57	ST	5	2.3	356.17	8.9	0.66	6.4	2.97	0.185	470	110	1.6	20	130	52	19	1	600	160
SADF01	10/27/00 3:57	SF											0.5	8.4	15	2.1	10	1	100	
						55.5	**4.1**	**39.9**	**18.5**	**1.2**	**2,929**	**685**	**0.01**	**0.12**	**0.81**	**0.32**	**0.12**	**0.01**	**3.74**	**997.1**
SADF01	10/27/00 5:57	ST	20	265		13	0.161	1.6	1.19	0.181	54	13	0.5	9.5	25	11	2	1	98	344
SADF01	10/28/00 19:57	SF											0.5	4	10	1	2	1	41	
						9,370	**116**	**1,153**	**858**	**130**	**38,924**	**9,370**	**0.36**	**6.85**	**18.02**	**7.93**	**1.44**	**0.72**	**70.64**	**247,957.7**
SADF01	10/28/00 21:57	ST	5	6.3		17	0.025	1	0.337	0.08	5	5	0.5	4	11	1	2	1	37	740
SADF01	10/29/00 5:57	SF											0.5	4	8.1	1	2	1	31	
						291.2	**0.4**	**17.1**	**5.8**	**1.4**	**86**	**86**	**0.01**	**0.07**	**0.19**	**0.02**	**0.03**	**0.02**	**0.63**	**12,674.0**
SADF01	10/29/00 9:57	ST	5	1.7		16	0.025	0.7	0.266		5	5	0.5	8.3	13	1	2	1	28	800
SADF01	10/29/00 17:57	SF																		
						73.2	**0.1**	**3.2**	**1.2**		**23**	**23**	**0.00**	**0.04**	**0.06**	**0.00**	**0.01**	**0.00**	**0.13**	**3,662.0**
SADF01	10/29/00 19:57	ST	7	74.8		6.2	0.15	1.3	1.22	0.12	72	24	0.5	12	33	14	5.5	1	110	160
SADF01	10/30/00 7:57	SF											0.5	9.7	14	1	4	1	39	
						1,260	**30**	**264**	**248**	**24**	**14,637**	**4,879**	**0.10**	**2.44**	**6.71**	**2.85**	**1.12**	**0.20**	**22.36**	**32,527.3**
SADF01	10/30/00 9:57	ST	12	4.3		14	0.025	0.54	0.367	0.123	5	5	0.5	9.2	14	2.4	2	1	83	500
SADF01	10/31/00 7:57	SF											0.5	9.3	11	1	2	1	38	
						164.6	**0.3**	**6.3**	**4.3**	**1.4**	**59**	**59**	**0.01**	**0.11**	**0.16**	**0.03**	**0.02**	**0.01**	**0.98**	**5,879.0**
Period Totals (lbs)			**54**	**354.7**	**356.2**	**11,215**	**151**	**1,484**	**1,136**	**159**	**56,657**	**15,102**	**0.5**	**9.6**	**26.0**	**11.1**	**2.7**	**1.0**	**98.5**	**303,697**

Massloads from Sampled Storms : 2000-2001 Season

STATION		SAMPLES Type	#	Volume ac-ft	Storm Volume	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	oP mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
SADF01	1/8/01 13:25	ST	5	4.35	1421	25	3.67	8.8	2.11	0.21	210	68								260
SADF01	1/8/01 14:25	SF											0.5	4	36	5.8	17	1	230	
						295.7	**43.4**	**104.1**	**25.0**	**2.5**	**2,484**	**804**								**3,075.1**
SADF01	1/8/01 16:25	ST	5	123.05		9.7	1.29	4.4	2.82	0.198	280	72	1.5	17	110	49	17	1	380	122
SADF01	1/9/01 0:25																			
						3,243.3	**431.3**	**1,471.2**	**942.9**	**66.2**	**93,622**	**24,074**	**0.50**	**5.68**	**36.78**	**16.38**	**5.68**	**0.33**	**127.06**	**40,792.3**
SADF01	1/9/01 2:25	ST	18	11.95		23	0.363	1.3	0.765	0.14	15	5	0.5	4	18	3.1	2	1	52	92
SADF01	1/10/01 14:25	SF											0.5	4	18	2.9	2	1	48	
						747.0	**11.8**	**42.2**	**24.8**	**4.5**	**487**	**162**	**0.02**	**0.13**	**0.58**	**0.10**	**0.06**	**0.03**	**1.69**	**2,988.0**
SADF01	1/10/01 16:25	ST	23	1250.18		5.9	0.254	1.6	1.1	0.24	110	25	0.5	4	24	17	4.7	1	110	128
SADF01	1/12/01 12:25	SF											0.5	4	8.4	1	2	1	26	
						20,043	**863**	**5,435**	**3,737**	**815**	**373,678**	**84,927**	**1.70**	**13.59**	**81.53**	**57.75**	**15.97**	**3.40**	**373.68**	**434,825.0**
Period Totals (lbs)			**51**	**1390**	**1421**	**24,329**	**1,349**	**7,053**	**4,729**	**889**	**470,270**	**109,968**	**2.2**	**19.4**	**118.9**	**74.2**	**21.7**	**3.8**	**502.4**	**481,680**
SADF01	1/24/01 8:42	ST	5	6.32	301.77	16	1.19	3.8	1.16											
SADF01	1/24/01 9:42																			
						274.6	**20.4**	**65.2**	**19.9**											
SADF01	1/24/01 11:42	ST	9	48.27		7.3	0.54	2.4	0.887	0.126	70	16	0.5	4	29	16	6.8	1	120	166
SADF01	1/25/01 3:42	SF											0.5	4	14	1	4.9	1	40	
						957.6	**70.8**	**314.8**	**116.4**	**16.5**	**9,182**	**2,099**	**0.07**	**0.52**	**3.80**	**2.10**	**0.89**	**0.13**	**15.74**	**21,775.2**
SADF01	1/25/01 5:42	ST	14	7.20		17	0.13	0.61	0.245	0.059	5	5	0.5	4	11	6.3	5.9	1	39	712
SADF01	1/26/01 7:42	SF											0.5	4	9	1	6	1	30	
						332.4	**2.5**	**11.9**	**4.8**	**1.2**	**98**	**98**	**0.01**	**0.08**	**0.22**	**0.12**	**0.12**	**0.02**	**0.76**	**13,921.3**
SADF01	1/26/01 9:42	ST	25	243.86		13	0.35	1.6	0.673	0.103	81	20	0.5	4	20	15	6	1	94	312
SADF01	1/28/01 9:42	SF											0.5	4	5.8	1	2	1	24	
						8,614.3	**231.9**	**1,060.2**	**446.0**	**68.3**	**53,673**	**13,253**	**0.33**	**2.65**	**13.25**	**9.94**	**3.98**	**0.66**	**62.29**	**206,742.0**
Period Totals (lbs)			**53**	**306**	**302**	**10,179**	**326**	**1,452**	**587**	**86**	**62,953**	**15,449**	**0.4**	**3.3**	**17.3**	**12.2**	**5.0**	**0.8**	**78.8**	**242,438**
SADF01	3/6/01 1:54	ST	5	4.33	124.96	11	0.263	1.2	0.398		31	10	0.5	4	30	5.6	5.3	1	110	330
SADF01	3/6/01 2:54	SF											0.5	4	20	1	4.2	1	69	
						129.5	**3.1**	**14.1**	**4.7**		**365**	**118**	**0.01**	**0.05**	**0.35**	**0.07**	**0.06**	**0.01**	**1.29**	**3,884.5**
SADF01	3/6/01 4:54	ST	8	59.15		8.1	0.025	1.3	0.49	0.057	29	5	0.5	4	10	3.3	2	1	34	225
SADF01	3/6/01 18:54	SF											0.5	4	12	1	5.2	1	28	
						1,301.8	**4.0**	**208.9**	**78.8**	**9.2**	**4,661**	**804**	**0.08**	**0.64**	**1.61**	**0.53**	**0.32**	**0.16**	**5.46**	**36,161.1**
SADF01	3/6/01 20:54	ST	12	12.35		17	0.025	0.94	0.0918	0.025	5	5	0.5	4	26	1	2	1	40	735
SADF01	3/7/01 18:54	SF											0.5	4	7.9	1	2	1	24	
						570.4	**0.8**	**31.5**	**3.1**	**0.8**	**168**	**168**	**0.02**	**0.13**	**0.87**	**0.03**	**0.07**	**0.03**	**1.34**	**24,662.3**
SADF01	3/7/01 20:00	ST	28	28.87		21	0.025	0.94	0.214	0.019	5	5	0.5	4	6.7	1	2	1	30	1040
SADF01	3/10/01 3:00	SF											0.5	4	5	1	2	1	24	
						1,647.3	**2.0**	**73.7**	**16.8**	**1.5**	**392**	**392**	**0.04**	**0.31**	**0.53**	**0.08**	**0.16**	**0.08**	**2.35**	**81,579.3**
Period Totals (lbs)			**53**	**104.7**	**125.0**	**3,649**	**10**	**328**	**103**	**11**	**5,586**	**1,481**	**0.1**	**1.1**	**3.4**	**0.7**	**0.6**	**0.3**	**10.5**	**146,287**

Massloads from Sampled Storms : 2000-2001 Season

STATION		SAMPLES Type	#	Volume ac-ft	Storm Volume	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	oP mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
SDMF05	10/10/00 13:50	ST	5	1.36	113.79	44	0.213	2	1.1	0.128	140	18	0.5	4	18	3.6	2	1	47	680
SDMF05	10/10/00 14:50	SF											0.5	4	8.1	1	2	1	19	
						163.0	**0.8**	**7.4**	**4.1**	**0.5**	**519**	**67**	**0.00**	**0.01**	**0.07**	**0.01**	**0.01**	**0.00**	**0.17**	**2,519.7**
SDMF05	10/10/00 16:50	ST	22	57.26		36	0.395	3.1	1.68	0.125	140	20	0.5	4	18	2.7	2	1	33	
SDMF05	10/12/00 12:43	SF											0.5	4	12	1	2	1	24	
						5,601.2	**61.5**	**482.3**	**261.4**	**19.4**	**21,782**	**3,112**	**0.08**	**0.62**	**2.80**	**0.42**	**0.31**	**0.16**	**5.13**	
SDMF05	10/12/00 14:43	ST	29	59.56		33	0.188	2.1	0.826	0.085	90	13	0.5	4	19	2.6	6.2	1	150	645
SDMF05	10/14/00 16:43	SF											0.5	4	9.3	1	2	1	19	
						5,340.7	**30.4**	**339.9**	**133.7**	**13.8**	**14,565**	**2,104**	**0.08**	**0.65**	**3.07**	**0.42**	**1.00**	**0.16**	**24.28**	**104,385.9**
Period Totals (lbs)			**56**	**118.2**	**113.8**	**11,105**	**93**	**830**	**399**	**34**	**36,867**	**5,282**	**0.2**	**1.3**	**5.9**	**0.9**	**1.3**	**0.3**	**29.6**	**106,906**
SDMF05	10/26/00 18:31	ST	5	2.58	1648	40	0.075	1.3	0.459	0.039	37	5	0.5	8.4	14	1	2	1	25	740
SDMF05	10/26/00 19:31	SF											0.5	9.3	11	1	2	1	18	
						280.7	**0.5**	**9.1**	**3.2**	**0.3**	**260**	**35**	**0.00**	**0.06**	**0.10**	**0.01**	**0.01**	**0.01**	**0.18**	**5,193.1**
SDMF05	10/26/00 21:31	ST	21	1073.69		29	0.236	3	2.69	0.325	370	54	0.5	14	24	8.9	11	1	89	324
SDMF05	10/28/00 13:31	SF											0.5	4	9.1	1	2	1	16	
						84,607.9	**688.5**	**8,752.5**	**7,848.1**	**948.2**	**1,079,480**	**157,546**	**1.46**	**40.85**	**70.02**	**25.97**	**32.09**	**2.92**	**259.66**	**945,274.1**
SDMF05	10/29/00 11:31	ST	6	33.31		33	0.377	2	1.59	0.384	57	5	0.5	9.2	9.6	2.4	5	1	27	432
SDMF05	10/29/00 21:31	SF											0.5	4	6.5	1	2	1	14	
						2,987.1	**34.1**	**181.0**	**143.9**	**34.8**	**5,160**	**453**	**0.05**	**0.83**	**0.87**	**0.22**	**0.45**	**0.09**	**2.44**	**39,104.5**
SDMF05	10/29/00 23:31	ST	9	500.19		11	0.152	2.1	3.06	0.276	650	64	2.1	26	30	15	17	1	140	144
SDMF05	10/30/00 15:31	SF											0.5	8.6	6.2	1	2	1	5	
						14,951	**207**	**2,854**	**4,159**	**375**	**883,442**	**86,985**	**2.85**	**35.34**	**40.77**	**20.39**	**23.11**	**1.36**	**190.28**	**195,716.4**
SDMF05	10/30/00 17:31	ST	3	14.19		18	0.202	1.5	2.02	0.36	120	20	0.5	10	11	4.5	6	1	42	180
SDMF05	10/30/00 21:31	SF											0.5	4	25	1	7.8	1	12	
						694.3	**7.8**	**57.9**	**77.9**	**13.9**	**4,628**	**771**	**0.02**	**0.39**	**0.42**	**0.17**	**0.23**	**0.04**	**1.62**	**6,942.5**
Period Totals (lbs)			**44**	**1624**	**1648**	**103,521**	**938**	**11,855**	**12,232**	**1,372**	**1,972,969**	**245,790**	**4.4**	**77.5**	**112.2**	**46.8**	**55.9**	**4.4**	**454.2**	**1,192,231**
SDMF05	1/8/01 14:44	ST	5	33.56	5663	39	0.053	1.8	1.07											
SDMF05	1/8/01 15:44																			
						3,556.5	**4.8**	**164.1**	**97.6**											
SDMF05	1/8/01 17:44	ST		342.14		22	1.12	3.6	3	0.254	250	40								
SDMF05	1/9/01 5:44																			
						20,453.2	**1,041.3**	**3,346.9**	**2,789.1**	**236.1**	**232,423**	**37,188**								
SDMF05	1/10/01 13:44	ST	2	3.33		37	0.661	2.7	1.74	0.41	61	12								
SDMF05	1/10/01 15:44																			
						334.4	**6.0**	**24.4**	**15.7**	**3.7**	**551**	**108**								
SDMF05	1/10/01 17:44	ST	22	5111		14	0.293	3.2	3.98	0.4	900	88	2.7	23	44	19	21	1	170	124
SDMF05	1/12/01 11:44	SF											0.5	4	5.8	1	2	1	5	
						194,416	**4,069**	**44,438**	**55,270**	**5,555**	**12,498,156**	**1,222,042**	**37.49**	**319.40**	**611.02**	**263.85**	**291.62**	**13.89**	**2,361**	**1,721,968.1**
Period Totals (lbs)			**29**	**5490**	**5663**	**218,760**	**5,121**	**47,973**	**58,172**	**5,795**	**12,731,130**	**1,259,338**	**37.5**	**319.4**	**611.0**	**263.8**	**291.6**	**13.9**	**2,360.8**	**1,721,968**

Massloads from Sampled Storms : 2000-2001 Season

STATION		SAMPLES Type	#	Volume ac-ft	Storm Volume	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	oP mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
SDMF05	1/24/01 9:12	ST	5	10.41	1107.5	53	0.025	1.4	0.52	0.025	29	5	0.5	4	10	1	7.3	1	21	826
SDMF05	1/24/01 10:12	SF											0.5	4	7.2	1	6.5	1	12	
						1,499.7	**0.7**	**39.6**	**14.7**	**0.7**	**821**	**141**	**0.01**	**0.11**	**0.28**	**0.03**	**0.21**	**0.03**	**0.59**	**23,372.1**
SDMF05	1/24/01 12:12	ST	11	173.38		22	0.57	2.6	1.5	0.282	160	19	0.5	4	18	4.9	9.1	1	58	190
SDMF05	1/25/01 8:12	SF											0.5	4	8.3	1	5	1	14	
						10,364.7	**268.5**	**1,224.9**	**706.7**	**132.9**	**75,380**	**8,951**	**0.24**	**1.88**	**8.48**	**2.31**	**4.29**	**0.47**	**27.33**	**89,513.7**
SDMF05	1/25/01 10:12	ST	13	36.94		25	0.386	1.3	1.32	0.242	36	5	0.5	4	10	2.6	6.6	1	40	324
SDMF05	1/26/01 10:12	SF											0.5	4	6.7	1	5.5	1	15	
						2,509.5	**38.7**	**130.5**	**132.5**	**24.3**	**3,614**	**502**	**0.05**	**0.40**	**1.00**	**0.26**	**0.66**	**0.10**	**4.02**	**32,523.7**
SDMF05	1/26/01 12:12	ST	14	884.38		23	0.466	2.7	1.74	0.32	140	19	0.5	4	14	5	7.9	1	49	176
SDMF05	1/28/01 8:30	SF											0.5	4	5.6	1	2	1	11	
						55,271.3	**1,119.8**	**6,488.4**	**4,181.4**	**769.0**	**336,434**	**45,659**	**1.20**	**9.61**	**33.64**	**12.02**	**18.98**	**2.40**	**117.75**	**422,946.0**
Period Totals (lbs)			**43**	**1105**	**1107**	**69,645**	**1,428**	**7,883**	**5,035**	**927**	**416,249**	**55,254**	**1.5**	**12.0**	**43.4**	**14.6**	**24.1**	**3.0**	**149.7**	**568,356**
SDMF05	3/6/01 3:23	ST	1	13.40	581.6								0.5	4	15	2.7	2	1	19	
SDMF05	3/6/01 3:23	SF											0.5	4	12	1	2	1	17	
													0.02	**0.15**	**0.55**	**0.10**	**0.07**	**0.04**	**0.69**	
SDMF05	3/7/01 0:23	ST	2	8.42		18	0.129	0.78	1.65	0.064	120	17								
SDMF05	3/7/01 2:23																			
						412.0	**3.0**	**17.9**	**37.8**	**1.5**	**2,746**	**389**								
SDMF05	3/7/01 9:50	ST	14	6.22		33	0.064	1.4	0.918	0.172	36	5	0.5	4	10	3.1	2	1	19	480
SDMF05	3/8/01 11:50	SF											0.5	4	7.3	1	2	1	5	
						557.7	**1.1**	**23.7**	**15.5**	**2.9**	**608**	**84**	**0.01**	**0.07**	**0.17**	**0.05**	**0.03**	**0.02**	**0.32**	**8,111.4**
SDMF05	3/8/01 13:50	ST	20	179.50		37	0.025	1.6	0.0305	0.027	44	5	0.5	4	5.8	1	2	1	22	700
SDMF05	3/10/01 3:50	SF											0.5	4	1	1	2	1	5	
						18,047.2	**12.2**	**780.4**	**14.9**	**13.2**	**21,462**	**2,439**	**0.24**	**1.95**	**2.83**	**0.49**	**0.98**	**0.49**	**10.73**	**341,433.2**
Period Totals (lbs)			**37**	**207.5**	**581.6**	**19,017**	**16**	**822**	**68**	**18**	**24,816**	**2,912**	**0.3**	**2.2**	**3.5**	**0.6**	**1.1**	**0.5**	**11.7**	**349,545**

Massloads from Sampled Storms : 2000-2001 Season

STATION		SAMPLES Type	#	Volume ac-ft	Storm Volume	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	oP mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
WYLSED	10/26/00 15:17	ST	10	38.36	826.4	21	0.253	3.3	1.59	0.158	230	42	1.4	12	33	4.9	7.4	1	72	256
WYLSED	10/27/00 7:17	SF											0.5	8.2	20	1	4.4	1	22	
						2,189.0	**26.4**	**344.0**	**165.7**		**23,975**	**4,378**	**0.15**	**1.25**	**3.44**	**0.51**	**0.77**	**0.10**	**7.51**	**26,684.7**
WYLSED	10/27/00 12:17	ST	5	55.69		48	0.321	4.6	1.96	0.18	520	90								
WYLSED	10/27/00 13:17																			
						7,263.4	**48.6**	**696.1**	**296.6**	**27.2**	**78,687**	**13,619**								
WYLSED	10/27/00 23:17	ST	17	27.80		33	0.025	1.6	1.13	0.203	51	12	0.5	11	19	1	2	1	27	424
WYLSED	10/29/00 8:17	SF											0.5	9	15	1	2	1	15	
						2,492.9	**1.9**	**120.9**	**85.4**	**15.3**	**3,853**	**907**	**0.04**	**0.83**	**1.44**	**0.08**	**0.15**	**0.08**	**2.04**	**32,030.1**
WYLSED	10/29/00 10:17	ST	3	1.88		43	0.025	1.4	0.551		5	5								496
WYLSED	10/29/00 14:17	SF																		
						220.2	**0.1**	**7.2**	**2.8**		**26**	**26**								**2,539.6**
WYLSED	10/29/00 16:17	ST	11	295.80		23	0.025	2.1	2.72	0.267	600	64	2.1	24	36	13	16	1	120	264
WYLSED	10/30/00 12:17	SF											0.5	4	11	1	2	1	11	
						18,486.9	**20.1**	**1,687.9**	**2,186.3**	**214.6**	**482,267**	**51,442**	**1.69**	**19.29**	**28.94**	**10.45**	**12.86**	**0.80**	**96.45**	**212,197.3**
WYLSED	10/30/00 14:17	ST	10	30.58		31	0.101	1.4	1.04	0.243	52	5	0.5	9.2	17	2.5	2	1	28	340
WYLSED	10/31/00 8:17	SF											0.5	4	14	2.2	2	1	12	
						2,575.5	**8.4**	**116.3**	**86.4**	**20.2**	**4,320**	**415**	**0.04**	**0.76**	**1.41**	**0.21**	**0.17**	**0.08**	**2.33**	**28,247.5**
Period Totals (lbs)			**56**	**450.1**	**826.4**	**33,228**	**105**	**2,972**	**2,823**	**277**	**593,127**	**70,786**	**1.9**	**22.1**	**35.2**	**11.2**	**13.9**	**1.1**	**108.3**	**301,699**
WYLSED	1/8/01 14:27	ST	5	0.24	2192	30	1.33	7.9	3.67	0.19	360	68								500
WYLSED	1/8/01 15:27	SF											0.5	4	8.2	1	4.6	1	34	
						19.2	**0.9**	**5.1**	**2.3**	**0.1**	**230**	**44**								**320.0**
WYLSED	1/8/01 17:27	ST		80.2		30	0.257	4.2	5.51	0.263	1150	150								202
WYLSED	1/9/01 1:27	SF											0.5	4	6.7	1	2	1	18	
						6,540.5	**56.0**	**915.7**	**1,201.3**	**57.3**	**250,721**	**32,703**								**44,039.7**
WYLSED	1/9/01 9:27	ST	17	11.5		53	0.46	1.5	1.25	0.53	42	5	0.5	4	10	1	2	1	22	360
WYLSED	1/10/01 17:27	SF											0.5	4	8.2	1	2	1	14	
						1,662.4	**14.4**	**47.0**	**39.2**	**16.6**	**1,317**	**157**	**0.02**	**0.13**	**0.31**	**0.03**	**0.06**	**0.03**	**0.69**	**11,292.0**
WYLSED	1/10/01 19:27	ST	23	2005.7		17	0.317	2	3.37	0.4	750	80	2.8	22	36	14	21	1	140	304
WYLSED	1/12/01 13:27	SF											1.6	12	23	7.1	13	1	89	
						92,650.0	**1,727.6**	**10,900.0**	**18,366.5**	**2,180.0**	**4,087,500**	**436,000**	**15.26**	**119.9**	**196.2**	**76.3**	**114.4**	**5.4**	**763.0**	**1,656,799.9**
Period Totals (lbs)			**45**	**2098**	**2192**	**100,872**	**1,799**	**11,868**	**19,609**	**2,254**	**4,339,768**	**468,903**	**15.3**	**120.0**	**196.5**	**76.3**	**114.5**	**5.5**	**763.7**	**1,712,452**

Massloads from Sampled Storms : 2000-2001 Season

STATION		SAMPLES Type	#	Volume ac-ft	Storm Volume	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	oP mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
WYLSED	1/24/01 8:18	ST	5	1.04	295.1	48	0.419	2.2	0.52	0.111	24	5	0.5	4	15	1	7	1	42	386
WYLSED	1/24/01 9:18	SF											0.5	4	10	1	6.4	1	24	
						135.6	**1.2**	**6.2**	**1.5**		**68**	**14**	**0.00**	**0.01**	**0.04**	**0.00**	**0.02**	**0.00**	**0.12**	**1,090.8**
WYLSED	1/24/01 11:18	ST	11	103.51		33	0.73	3.4	2.2	0.217	320	40	1.6	9.9	21	6.8	12	1	85	226
WYLSED	1/25/01 7:18	SF											0.5	4	7.3	1	4.7	1	11	
						9,282.0	**205.3**	**956.3**	**618.8**		**90,007**	**11,251**	**0.45**	**2.78**	**5.91**	**1.91**	**3.38**	**0.28**	**23.91**	**63,567.3**
WYLSED	1/25/01 21:18	ST	13	3.19		48	0.157	0.72	0.857	0.232	18	5	0.5	4	6.5	1	4.8	1	15	404
WYLSED	1/26/01 9:18	SF											0.5	4	5.3	1	4.8	1	11	
						415.9	**1.4**	**6.2**	**7.4**		**156**	**43**	**0.00**	**0.03**	**0.06**	**0.01**	**0.04**	**0.01**	**0.13**	**3,500.5**
WYLSED	1/26/01 11:18	ST	24	178.26		34	0.499	2.1	2.2	0.341	290	38	1	8.8	19	7.2	11	1	74	256
WYLSED	1/28/01 9:18	SF											1	4	6.1	1	4.6	1	5	
						16,468.8	**241.7**	**1,017.2**	**1,065.6**		**140,469**	**18,406**	**0.48**	**4.26**	**9.20**	**3.49**	**5.33**	**0.48**	**35.84**	**124,000.3**
Period Totals (lbs)			**53**	**286.0**	**295.1**	**26,302**	**450**	**1,986**	**1,693**	**0**	**230,700**	**29,715**	**0.9**	**7.1**	**15.2**	**5.4**	**8.8**	**0.8**	**60.0**	**192,159**
WYLSED	3/6/01 3:02	ST	5	1.95	193.8	29	0.025	1	0.704	0.132	87	16	0.5	4	14	2.8	6	1	53	270
WYLSED	3/6/01 4:02	SF											0.5	4	6.6	1	2	1	15	
						153.6	**0.1**	**5.3**	**3.7**	**0.7**	**461**	**85**	**0.00**	**0.02**	**0.07**	**0.01**	**0.03**	**0.01**	**0.28**	**1,429.9**
WYLSED	3/6/01 6:02	ST	13	185.39		18	0.076	1.5	2.2	0.304	290	40	1.2	9.9	21	6	13	1	70	190
WYLSED	3/7/01 6:02	SF											0.5	4	7.3	1	2	1	5	
						9,067.4	**38.3**	**755.6**	**1,108.2**	**153.1**	**146,087**	**20,150**	**0.60**	**4.99**	**10.58**	**3.02**	**6.55**	**0.50**	**35.26**	**95,712.0**
Period Totals (lbs)			**18**	**187.3**	**193.8**	**9,221**	**38**	**761**	**1,112**	**154**	**146,547**	**20,235**	**0.6**	**5.0**	**10.7**	**3.0**	**6.6**	**0.5**	**35.5**	**97,142**

APPENDIX P

SITE MEAN EMC'S: 1992-2001

Site Mean EMCs : 1992 - 2001

Date	Vol. Storm ac-ft	Sampled ac-ft	Percent Characterized	NO3 mg/l	PO4 mg/l	TSS mg/l	Cu ug/l	Pb ug/l	Zn ug/l
	Anaheim Barber City Channel								
Feb 7-11, 1993	590	555	94	3.7	1.2	50	33	11	88
Feb 18-21, 1993	599	594	99	2.5	0.9	89	16	19	104
Nov 11-15, 1993	185	172	93	5.9	1.0	51	48	45	361
Nov 22-26, 1993	23	22	93	12.6	1.7	28	42	7	52
Feb 17-21, 1994	1,404	1,401	100	5.4	1.3	65	17	19	117
Mar 10-14,1995	528	510	97	5.9	0.8	68	22	13	87
Dec 12-14, 1995	275	294	107	11.9	2.9	144	114	40	403
Jan 16-17,1996	73	67	91	7.7	2.0	123	57	22	234
Jan 19,1996	37	31	84	12.4	0.8	32	49	9	139
Jan 31-Feb 4, 1996	332	330	99	7.1	1.2	49	43	3	184
Mar 4-8,1996	412	470	114	6.0	0.7	36	26	12	112
Oct 30-31, 1996	431	430	100	6.4	1.8	84	47	47	326
Nov 21-25, 1996	652	658	101	3.5	0.9	34	40	16	139
Dec 9-13, 1996	621	621	100	2.2	0.6	20	20	9	90
Jan 1-5, 1997	136	140	103	6.5	0.4	12	29	5	79
Sep 25-29, 1997	169	161	95	6.8	2.0	175	100	50	465
Nov 10-14, 1997	170	177	104	7.9	2.3	143	45	22	323
Dec 18-19, 1997	383	383	100	4.2	0.8	65	30	14	130
Jan 29-Feb 2, 1998	191	196	103	10.2	0.6	105	27	12	77
May 12-16, 1998	265	223	84	5.0	2.2	122	27	15	112
Nov 8-12, 1998	467	553	118	10.7	3.1	83	39	11	152
Oct 11-14, 2000	30	36	120				40	11	203
			Distribution	normal	lognormal	normal	lognormal	lognormal	lognormal
			sample median	6.4	1.2	65.3	39.5	13.7	134.4
			true median		1.2		36.4	14.7	149.0
			mean or μ	**6.7**	**1.3**	**74.7**	**41.0**	**18.9**	**179.1**
			S_x or S_{lnx}	3.07	0.70	46.54	0.49	0.71	0.61
			COV	0.46	0.79	0.62	0.52	0.81	0.67
			+ or -	1.4	0.3	21.8			
			lower limit	5.3	1.0	53.0	34.6	14.8	145.3
			upper limit	8.1	1.6	96.5	50.9	26.9	238.7
	Bolsa Chica Channel								
Jan 15-18, 1993	595	529	89	3.1	2.0	344	15	22	123
Feb 7-11, 1993	365	322	88	5.4	2.2	380	10	22	71
Feb 18-22, 1993	334	320	96	3.3	2.7	724	15	28	109
Nov 11-15, 1993	204	203	99	9.4	1.9	191	40	36	334
Nov 23-27, 1993	9	8	85	21.4	1.3	136	27	13	92
Nov 30-Dec 4, 1993	83	80	97	13.6	4.2	657	34	39	201
Feb 17-20, 1994	1,098	1,102	100	9.8	2.8	480	37	28	151
Nov 10, 1994	143	135	94	9.4	6.7	~~1,616~~	137	91	565
Mar 2-6,1995	431	425	99	4.3	1.3	135	22	13	69
Mar 10-14,1995	491	492	100	8.4	2.2	229	32	25	132
Dec 12-16, 1996	162	169	104	13.1	2.0	154	20	17	156
Jan 19-23,1997	48	54	113	10.2	1.3	115	35	15	123
Jan 31-Feb 4, 1997	141	144	102	7.4	1.5	136	32	22	139
Mar 4-8, 1997	179	183	102	4.4	1.0	116	19	15	108
Oct 30-Nov 3, 1996	227	229	101	11.5	2.1	171	47	30	280
Nov 21-25, 1996	395	383	97	5.3	1.8	199	59	31	196
Dec 9-13, 1996	562	561	100	4.6	1.3	125	23	18	91
Dec 27-31, 1996	150	153	102	6.6	0.9	113	25	14	151
Sep 25-29, 1997	473	473	100	10.1	2.5	263	35	25	216
Nov 10-13, 1997	669	601	90	11.2	2.2	355	35	27	327
Jan 29-Feb 2, 1998	310	280	90	8.4	1.6	180	31	18	135
May 13 - May 16, 1998	271	273	101	8.6	0.7	103	23	9	67
Nov 8 - Nov 12, 1998	308	325	105	12.8	2.7	121	43	12	120
Jan 25 - Jan 29, 1999	182	181	99	7.2	1.5	60	30	11	85
Mar 15 - Mar 19, 1999	124	109	88	7.4	2.1	199	46	18	135
Mar 25 - Mar 29, 1999	95	103	108	6.7	1.3	49	22	7	94
			Distribution	lognormal	lognormal	lognormal	lognormal	lognormal	lognormal
			sample median	8.4	1.9	171.3	31.6	20.0	133.3
			true median	7.8	1.8	207.9	29.1	22.3	147.9
			mean or μ	**8.6**	**2.1**	**247.7**	**33.4**	**25.0**	**171.7**
			S_x or S_{lnx}	0.46	0.50	0.59	0.53	0.48	0.55
			COV	0.49	0.53	0.65	0.57	0.51	0.59
			+ or -						
			lower limit	7.4	1.7	201.1	27.9	21.2	142.3
			upper limit	10.3	2.6	329.6	42.5	30.9	220.4

Site Mean EMCs : 1992 - 2001

Date	Vol. Storm ac-ft	Sampled ac-ft	Percent Characterized	NO3 mg/l	PO4 mg/l	TSS mg/l	Cu ug/l	Pb ug/l	Zn ug/l
Westminster									
Feb 9-13, 1992	826	*725*	*88*	*4.0*	~~*15.1*~~	*235*	*27*	*45*	*141*
Mar 20-21, 1992	234	*216*	*92*	*2.4*	*2.0*	*160*	*26*	*104*	*300*
Mar 26-27, 1992	79	*71*	*90*	*3.7*	*0.8*	*68*	*18*	*23*	*71*
Jan 15-19, 1993	683	*614*	*90*	*2.1*	*1.3*	*174*	*25*	*18*	*99*
Feb 18-22, 1993	198	*182*	*92*	*5.2*	*2.1*	*443*	*20*	*27*	*91*
Nov 22-26, 1993	8	*6*	*85*	*16.4*	*0.6*	*5*	*31*	*2*	*54*
Nov 30-Dec 3, 1993	18	*17*	*95*	*11.2*	*1.7*	*69*	*25*	*12*	*104*
Nov 10, 1994	71	*71*	*100*	*6.1*	*4.1*	*313*	*194*	*51*	*327*
Mar 10-14,1995	330	*330*	*100*	*8.6*	*1.0*	*129*	*25*	*24*	*88*
Dec 12-16, 1995	*94*	*108*	*114*	*11.9*	*2.3*	*178*	*97*	*29*	*266*
Jan 16-17, 1996	*31*	*30*	*96*	*2.8*	*0.8*	*62*	*16*	*7*	*56*
Jan 19-23, 1996	*70*	*78*	*110*	*6.4*	*0.2*	*10*	*93*	*8*	*167*
Jan 31-Feb 4, 1996	*165*	*162*	*99*	*12.0*	*1.9*	*157*	*62*	*42*	*305*
Mar 4-8, 1996	*111*	*115*	*104*	*4.2*	*1.4*	*159*	*34*	*19*	*123*
Oct 30-Nov 3, 1996	*102*	*108*	*106*	*12.5*	*3.2*	*388*	*68*	*39*	*414*
Nov 21-25, 1996	*260*	*253*	*97*	*4.1*	*1.7*	*178*	*47*	*32*	*170*
Dec 9-13, 1996	*345*	*341*	*99*	*4.1*	*0.9*	*68*	*22*	*15*	*86*
Dec 27-31, 1996	*113*	*134*	*118*	*6.0*	*2.3*	*534*	*35*	*31*	*206*
Sep 25-27, 1997	*73*	*74*	*102*	*7.5*	*2.1*	*164*	*83*	*25*	*208*
Nov 10-14, 1997	*18*	*23*	*132*	*8.7*	*2.0*	*147*	*62*	*16*	*303*
Dec 18-22, 1997	*133*	*166*	*125*	*10.0*	*0.8*	*190*	*20*	*17*	*80*
May 12-16, 1998	*251*	*277*	*110*	*7.1*	*0.9*	*57*	*52*	*15*	*81*
Mar 25 - Mar 29, 1999	*94*	*102*	*108*	*9.3*	*1.4*	*110*	*31*	*13*	*121*
			Distribution	normal	normal	normal	lognormal	lognormal	lognormal
			sample median	6.4	1.6	159.4	31.2	22.5	123.1
			true median	5.7			38.7	20.7	140.2
			mean or μ	**7.1**	**1.6**	**176.7**	**47.9**	**28.3**	**170.0**
			S_x or S_{lnx}	3.87	0.93	136.16	0.66	0.80	0.62
			COV	0.54	0.57	0.77	0.73	0.94	0.69
			+ or -	1.7	0.4	60.4			
			lower limit	5.4	1.2	116.3	38.3	21.4	137.3
			upper limit	8.8	2.1	237.1	65.9	43.6	228.4
E. Garden Grove Wintersburg									
Dec 10-11, 1991	56	*56*	*100*	*6.4*	~~*62.9*~~	*2*	*60*	*50*	*469*
Mar 26-27, 1992	239	*229*	*96*	*3.3*	*0.9*	*37*	*10*	*7*	*37*
Jan 15-19, 1993	2,981	*2,346*	*79*	*1.8*	*1.4*	*103*	*25*	*15*	*87*
Feb 7-11, 1993	635	*594*	*94*	*2.6*	*1.7*	*176*	*14*	*24*	*88*
Nov 30-Dec 4, 1993	83	*78*	*94*	*5.5*	*1.6*	*65*	*25*	*16*	*25*
Oct 4-8, 1994	51	*50*	*99*	*4.9*	*2.4*	*192*	*42*	*25*	*183*
Mar 2-6, 1995	959	*932*	*97*	*3.6*	*0.9*	*61*	*36*	*13*	*62*
Mar 10-14, 1995	*1,176*	*1,171*	*100*	*4.1*	*1.2*	*111*	*30*	*16*	*84*
Dec 12-16, 1995	*375*	*418*	*111*	*11.9*	*2.5*	*162*	*41*	*22*	*193*
Jan 16-22, 1996	*404*	*357*	*88*	*5.0*	*2.1*	*40*	*35*	*47*	*54*
Mar 4-8, 1996	*428*	*423*	*99*	*2.9*	*0.8*	*59*	*29*	*8*	*86*
Oct 30-Nov 3, 1996	*113*	*103*	*91*	*7.2*	*1.5*	*121*	*34*	*15*	*148*
Nov 21-25, 1996	*953*	*957*	*100*	*4.3*	*2.1*	*272*	*49*	*26*	*181*
Dec 9-13, 1996	*1,253*	*1,231*	*98*	*2.2*	*1.1*	*75*	*23*	*16*	*73*
Dec 27-31, 1996	*365*	*392*	*107*	*4.9*	*0.7*	*54*	*22*	*10*	*112*
Sep 25, 1997	*222*	*193*	*87*	*0.2*	*0.2*	*27*	*3*	*3*	*29*
Nov 10-14, 1997	*285*	*315*	*111*	*7.0*	*1.7*	*197*	*37*	*22*	*226*
Nov 26-30, 1997	*331*	*362*	*109*	*5.3*	*1.5*	*69*	*29*	*26*	*133*
Dec 18-22, 1997	*661*	*663*	*100*	*6.4*	*1.2*	*120*	*27*	*16*	*114*
Jan 29 - Feb 2, 1998	*331*	*391*	*118*	*5.0*	*0.8*	*98*	*32*	*17*	*78*
Feb 14 - Feb 18, 1998	*1489*	*1375*	*92*	*7.0*	*2.8*	*103*	*22*	*15*	*53*
May 12 - May 13, 1998	*586*	*506*	*86*	*2.4*	*1.3*	*238*	*41*	*46*	*166*
Nov 8 - Nov 12, 1998	*688*	*723*	*105*	*6.0*	~~*13.6*~~	~~*423*~~	*70*	*71*	*357*
			Distribution	normal	normal	normal	normal	lognormal	lognormal
			sample median	4.9	1.4	100.5	30.0	16.4	87.8
			true median	4.2				17.3	95.1
			mean or μ	**4.7**	**1.4**	**108.2**	**30.3**	**21.0**	**113.2**
			S_x or S_{lnx}	2.46	0.66	70.93	12.62	0.62	0.56
			COV	0.52	0.46	0.66	0.42	0.68	0.60
			+ or -	1.1	0.3	31.5	5.6		
			lower limit	3.6	1.1	76.8	24.7	17.0	90.5
			upper limit	5.8	1.7	139.7	35.9	28.1	155.3

Site Mean EMCs : 1992 - 2001

Date	Vol. Storm ac-ft	Sampled ac-ft	Percent Characterized	NO3 mg/l	PO4 mg/l	TSS mg/l	Cu ug/l	Pb ug/l	Zn ug/l
Santa Ana Delhi									
Jan 5-6, 1992	704	*704*	*100*	*5.6*	*1.6*	*172*	*30*	*45*	*130*
Jan 15-19, 1993	3,142	*2,463*	*78*	*3.0*	*1.2*	*217*	*15*	*30*	*147*
Feb 7-9, 1993	754	*747*	*99*	*3.2*	*1.3*	*182*	*22*	*38*	*103*
Feb 18-21, 1993	847	*843*	*100*	*2.8*	*1.3*	*312*	*19*	*35*	*114*
Oct 16-19, 1993	18	*16*	*88*	*11.6*	*3.1*	*250*	*63*	*123*	*291*
Nov 23-27, 1993	23	*20*	*84*	*7.3*	*1.0*	*35*	*24*	*12*	*64*
Oct 4-8, 1994	27	*23*	*87*	*7.3*	*1.0*	*89*	*32*	*12*	*166*
Nov 8-12, 1994	211	*204*	*96*	*8.5*	*4.1*	*754*	*111*	*78*	*348*
Mar 21-25, 1995	419	*399*	*95*	*6.8*	*1.3*	*147*	*26*	*11*	*60*
Dec 12-13, 1995	*150*	*130*	*87*	*11.4*	*4.6*	*630*	*130*	*132*	*539*
Feb 19-23, 1996	*882*	*879*	*100*	*7.1*	*4.6*	*376*	*87*	*1*	*502*
Mar 4-8, 1996	*246*	*258*	*105*	*4.3*	*1.2*	*174*	*30*	*30*	*172*
Oct 30-Nov 3, 1996	*239*	*241*	*101*	*9.0*	*3.1*	*554*	*47*	*55*	*416*
Nov 21-25, 1996	*918*	*933*	*102*	*7.4*	*2.0*	*318*	*54*	*41*	*254*
Dec 9-13, 1996	*963*	*859*	*89*	*11.1*	*0.9*	*46*	*24*	*11*	*80*
Sep 25-29, 1997	*174*	*180*	*103*	*7.2*	*3.3*	*604*	*109*	*89*	*493*
Nov 10-14, 1997	*274*	*283*	*103*	*9.9*	*1.3*	*137*	*52*	*30*	*273*
Nov 26-30, 1997	*280*	*294*	*105*	*8.1*	*1.3*	*116*	*42*	*32*	*172*
Dec 6-10, 1997	*2804*	*2465*	*88*	*3.7*	*1.5*	*237*	*41*	*32*	*182*
Jan 3-7, 1998	*84*	*90*	*108*	*12.5*	*0.5*	*23*	*29*	*5*	*50*
Jan 9-13, 1998	*225*	*245*	*109*	*5.5*	*0.7*	*150*	*50*	*27*	
Feb 14, 1997	*1328*	*1176*	*89*	*4.5*	*9.5*	*141*	*33*	*19*	*228*
Feb 19-24, 1998	*2329*	*2248*	*97*	*6.4*	*11.5*		*25*	*16*	*64*
Mar 25-29, 1998	*711*	*725*	*102*	*8.8*	*0.2*	*436*	*50*	*23*	*110*
Nov 8 - Nov 12, 1998	*299*	*331*	*110*	*11.1*	*2.6*	*154*	*31*	*14*	*150*
Feb 4 - Feb 8, 1999	*32*	*37*	*117*	*8.5*	*1.3*	*44*	*22*	*10*	*163*
Apr 6 - Apr 10, 1999	*181*	*183*	*101*	*6.1*	*2.4*	*115*	*40*	*20*	*158*
Feb 10 - 14, 2000	*327*	*319*	*97.6*	*6.4*	*1.3*	*184*	*49*	*28*	183
Oct 27-31, 2000	*356*	*355*	*99.6*	*11.6*	*1.2*	*59*	*27*	*12*	102
Jan 8-12, 2001	*1421*	*1390*	*97.8*	*6.4*	*1.3*	*125*	*31*	*20*	133
Jan 24-28, 2001	*302*	*306*	*101.3*	*12.3*	*0.7*	*76*	*21*	*15*	95
Mar 6-10, 2001	*125*	*105*	*83.8*	*12.8*	*0.4*	*20*	*12*	*2*	37
			Distribution	normal	lognormal	lognormal	lognormal	lognormal	lognormal
			sample median	7.3	1.3	154.0	32.0	25.1	157.6
			true median		1.5	150.2	36.2	21.3	152.8
			mean or μ	**7.8**	**2.3**	**232.4**	**42.5**	**35.2**	**193.3**
			S_x or S_{lnx}	2.95	0.87	0.94	0.57	1.01	0.69
			COV	0.38	1.07	1.19	0.62	1.33	0.78
			+ or -	1.1					
			lower limit	6.7	1.7	175.2	36.2	26.1	157.9
			upper limit	8.8	3.3	355.4	52.4	56.0	253.7
San Diego Creek at Campus Drive									
Nov 26-30, 1997	*1191*	*1127*	*95*	15.1	4.4	690.6	54.0	30.9	268.0
Dec 6-10, 1997	*20430*	*20298*	*99*	7.0	15.7	2,361.1	99.3	79.8	~~596.9~~
Dec 18-22, 1997	*971*	*948*	*98*	20.7	3.4	797.3	31.4	14.2	112.5
Jan 3-6, 1998	*352*	*320*	*91*	17.3	1.0	95.6	22.8	2.9	19.9
Jan 9-13, 1998	*2333*	*2338*	*100*	19.4	5.0	1,287.1	~~193.8~~	110.0	25.8
Feb 3-6, 1998	*3954*	*3915*	*99*	12.2	4.8	1,322.5	44.1	17.9	118.5
Feb 6-10, 1998	*11742*	*11581*	*99*	12.0	7.5	1,492.0	55.4	33.3	205.0
Feb 14-15, 1998	*6445*	*6409*	*99*	9.6	8.1	2,642.0	50.3	34.8	207.5
Feb 19-24, 1998	*13881*	*13265*	*96*	9.1	9.6		57.7	34.0	181.2
Mar 25-29, 1998	*3194*	*3191*	*100*	16.9	1.0	149.2	38.8	36.9	175.0
May 12-16, 1998	*2317*	*2380*	*103*	18.8	2.5	1,475.2	45.3	29.5	212.4
Nov 8 - Nov 12, 1998	*895*	*940*	*105*	28.3	4.6	1,389.0	42.7	28.4	406.6
Nov 28 - Dec 2, 1998	*1221*	*1237*	*101*	9.2	2.1	463.6	35.6	19.8	186.7
Jan 25 - Jan 29, 1999	*1730*	*1915*	*111*	17.8	2.8	812.7	37.9	16.9	127.1
Mar 25 - Mar 29, 1999	*847*	*897*	*106*	24.6	3.1	707.1	44.8	17.1	169.6
Feb 10 - 14, 2000	*1193*	*1237*	104	19.2	2.9	541.8	29.3	14.4	127.6
Mar 3 - 6, 2000	*1987*	*1886*	95	15.1	3.3	637.6	23.7	12.4	102.9
Oct 10-14, 2000	*114*	*118*	104	34.6	1.2	114.8	18.5	2.7	92.1
Oct 26-30, 2000	*1648*	*1624*	99	23.5	2.8	447.1	25.4	10.6	102.9
Jan 8-12, 2001	*5663*	*5490*	97	14.7	3.9	853.5	41.0	17.7	158.3
Jan 24-28, 2001	*1107*	*1105*	100	23.2	1.7	138.6	14.5	4.9	49.8
			Distribution	normal	lognormal	lognormal	lognormal	lognormal	normal
			sample median	17.3	3.3	752.2	39.9	17.9	142.9
			true median		3.7	627.0	36.9	18.5	123.2
			mean or μ	**17.5**	**4.3**	**1,003.6**	**40.7**	**28.2**	**160.7**
			S_x or S_{lnx}	6.84	0.72	0.98	0.44	0.93	0.73
			COV	0.39	0.82	1.27	0.47	1.17	0.84
			+ or -	3.1					
			lower limit	14.4	3.4	703.3	34.7	20.3	123.4
			upper limit	20.6	6.3	1,846.6	49.9	48.3	238.4

Site Mean EMCs : 1992 - 2001

Date	Vol. Storm ac-ft	Sampled ac-ft	Percent Characterized	NO3 mg/l	PO4 mg/l	TSS mg/l	Cu ug/l	Pb ug/l	Zn ug/l
San Diego Creek @ Harvard									
Mar 24-28, 1994	385	356	92	11.3	9.5	709	52	30	230
Apr 24-28, 1994	345	341	99	21.0	4.4	731	43	18	141
Jan 19-23, 1996	361	335	93	26.6	5.1	1,585	14	24	270
Jan 31-Feb 4, 1996	783	777	99	17.9	7.4	1,024	58	21	185
Feb 20-22, 1996	2,411	1,983	82	8.1	8.8	3,396	69	1	320
Mar 4-8, 1996	487	484	99	13.2	5.6	2,220	53	25	279
Oct 30-Nov 5, 1996	449	449	100	26.7	5.5	1,358	29	27	315
Nov 21-24, 1996	1,902	1,903	100	10.4	6.7	1,995	66	30	261
Dec 9-13, 1996	2272	2272	100	11.0	3.2	973	30	14	139
Nov 10 - Nov 14, 1997	367	365	100	27.9	3.8	659	40	11	210
Nov 26 - Nov 30, 1997	581	613	106	14.4	5.8	935	57	29	264
Jan 9 - Jan 10, 1998	655	610	93	6.8	9.5	3,709	72	36	84
Feb 14 - Feb 18, 1998	3021	3024	100	8.1	8.7	2,218	51	32	114
Feb 4 - Feb 8, 1999	87	88	101	33.8	2.7	901	42	14	127
Mar 4 - 6, 2000	1189	1018	86	14.5	3.0	487	33	12	113
Jan 8-12, 2001	2192	2098	96	17.7	3.4	761	34	13	134
Jan 24-28, 2001	295	286	97	33.8	2.2	297	20	7	77
Mar 6-7, 2001	194	187	97	18.1	2.2	288	21	6	70
			Distribution	normal	normal	lognormal	normal	normal	normal
			sample median	16.1	5.3	954.0	42.6	19.5	163.0
			true median			1034.7			
			mean or μ	**17.9**	**5.4**	**1353.5**	**43.6**	**19.4**	**185.2**
			S_x or S_{lnx}	8.67	2.53	0.74	17.39	10.17	84.44
			COV	0.49	0.47	0.85	0.40	0.52	0.46
			+ or -	4.3	1.3		8.6	5.1	42.0
			lower limit	13.5	4.1	1,025.0	34.9	14.3	143.3
			upper limit	22.2	6.7	2,078.8	52.2	24.5	227.2
Peters Canyon									
Jan 24-28, 1994	269	238	88	20.4	1.7	281	19	10	91
Feb 7-11, 1994	988	788	80	13.1	2.1	360	18	14	70
Dec 5, 1994	4	4	100	18.0	1.4	68	30	5	62
Mar 21-23, 1995	500	483	97	39.7	1.8	205	20	7	26
Dec 12-16, 1995	125	144	115	39.4	2.0	170	43	5	123
Jan 31-Feb 4, 1996	369	386	105	23.5	4.6	1,041	82	32	269
Feb 19-23, 1996	1,112	1,131	102	33.9	3.3	758	48	1	189
Oct 30-Nov 3, 1996	712	747	105	23.4	3.7	685	45	22	231
Nov 21-25, 1996	1,815	1,834	101	16.4	5.5	1,539	74	34	263
Dec 9-13, 1996	1,268	1,256	99	15.9	2.0	415	25	12	101
Nov 10-14, 1997	924	935	101	25.2	2.8	473	34	12	201
Nov 26-30, 1997	222	251	113	34.8	5.2	631	59	26	218
Dec 6-8, 1997	6,040	6,007	99	8.4	~~16.8~~	3,682	128	85	~~720~~
Jan 9-13, 1998	526	574	109	24.2	4.3	971	45	23	29
Feb 14-15, 1998	2,135	2,111	99	10.7	6.2	2,594	70	46	126
Mar 25-29, 1998	1,141	1,207	106	25.1	1.3	78	45	26	120
Jan 25 - Jan 29, 1999	653	671	103	80.5	1.4	276			
Feb 27 - 28, 2000	48	45	93	32.1	1.1	178	31	8	82
Oct 27-31, 2000	266	272	102	33.8	3.5	356	68	9	119
Jan 8-9, 2001	17	14	82	20.9	4.3	578	84	37	390
Jan 10-12, 2001	1,768	1757	99	16.0	3.1	300	32	12	110
Jan 24-28, 2001	367	373	102	55.1	1.7	170	16	7	73
Mar 6-10, 2001	164	140	85	69.6	1.5	164	15	6	70
			Distribution	lognormal	lognormal	lognormal	lognormal	lognormal	lognormal
			sample median	24.2	2.4	360.4	44.1	12.1	121.2
			true median	25.2	2.5	404.3	39.3	13.2	122.3
			mean or μ	**29.4**	**2.9**	**668.6**	**47.0**	**20.9**	**166.1**
			S_x or S_{lnx}	0.56	0.53	1.01	0.60	0.97	0.79
			COV	0.61	0.57	1.34	0.66	1.24	0.93
			+ or -						
			lower limit	24.4	2.4	472.3	38.2	14.9	126.6
			upper limit	37.8	3.7	1,197.8	62.4	36.4	250.1

Site Mean EMCs : 1992 - 2001

Date	Vol. Storm ac-ft	Sampled ac-ft	Percent Characterized	NO3 mg/l	PO4 mg/l	TSS mg/l	Cu ug/l	Pb ug/l	Zn ug/l
Lane Channel									
Jan 21-25, 1996	130	142	109	13.0	2.3	432	91	31	302
Feb 19-23, 1996	497	498	100	8.2	2.7	417	96	1	663
Nov 21 - Nov 22, 1996	450	407	91	2.8	1.4	269	42	31	230
Dec 9 - Dec 13, 1996	490	490	100	8.9	0.4	130	29	14	131
Jan 1 - Jan 2, 1996	29	27	93	6.9	0.4	30	26	5	75
Nov 26-30, 1997	150	171	114	11.0	0.9	80	35	14	147
Feb 14-18, 1998	552	595	108	8.3	3.3	132	27	12	52
Feb 19-23, 1998	315	381	121	13.8	~~11.9~~		36	11	49
Mar 25-29, 1998	312	343	110	9.6	0.1	41	49	21	114
Nov 28 - Dec 2, 1998	160	163	102	8.0	1.5	125	49	19	165
Jan 25 - Jan 29, 1999	186	208	112	7.3	1.1	98	48	15	128
Mar 25 - Mar 26, 1999	83	86	104	5.9	1.0	62	45	9	351
Feb 10 - 14, 2000	103	101	98	14.8	2	263	72	26	264
Feb 16. 2000	8.4	7.5	89	14.7	2	160	74	22	261
Oct 27-31, 2000	4.8	4.9	89	13.5	1.2	100	31	11	148
Jan 8-12, 2001	9.8	9.5	89	7.1	1.2	141	37	13	136
Jan 24-27, 2001	3.6	3.2	89	10.5	0.8	60	26	9	105
			Distribution	normal	normal	lognormal	lognormal	normal	lognormal
			sample median	8.9	1.2	127.4	42.2	13.6	146.6
			true median			119.3	43.4		154.6
			mean or μ	**9.7**	**1.4**	**159.2**	**47.5**	**15.5**	**193.8**
			S_x or S_{lnx}	3.4	0.86	0.77	0.42	8.5	0.68
			COV	0.35	0.62	0.89	0.44	0.55	0.76
			+ or -	1.8	0.5			4.4	
			lower limit	7.9	0.9	117.4	40.2	11.1	149.2
			upper limit	11.4	1.8	260.2	58.8	19.9	287.6
Costa Mesa Channel									
Mar 10-14, 1995	75	76	101	3.0	1.3	41	33	15	158
Jan 31-Feb 4, 1996	16	16	101	2.3	1.3	28	39	12	119
Feb 19-23, 1996	137	142	104	1.9	1.4	55	34	1.0	140
Nov 21-22, 1996	81	80	100	3.7	1.6	36	46	16	180
Jan 21-25, 1997	51	42	81	1.8	0.7	68	32	16	157
Nov 10-14, 1997	27	29	107	3.7	2.0	47	21	11	190
Feb 6-9, 1998	214	206	97	3.7	1.4	19	21	8	45
Feb 14-18, 1998	102	106	104	4.8	4.1	13	~~188~~	21	273
Sep 4 - Sep 8, 1998	3	3	82	2.8	4.3	32	34	4	119
Nov 7 - Nov 11, 1998	23	25	109	5.7	2.8	38	32	11	117
Nov 28 - Dec 2, 1998	25	26	104	3.8	2.7	75	46	17	144
Feb 9 - Feb 10, 1999	4	5	103	3.2	2.0	31	43	8	128
Mar 25 - Mar 26, 1999	21	22	101	2.3	1.7	60	33	9	159
Oct 26-30, 2000	414	406	98	5.3	1.6	43	30	10	170
Jan 8-12, 2001	1,195	954	80	3.4	2.0	35	22	7	96
Jan 24-28, 2001	215	214	100	~~31.8~~	1.4	41	23	10	111
			Distribution	normal	lognormal	normal	normal	normal	normal
			sample median	3.4	1.6	39.4	32.7	10.2	142.3
			true median		1.8				
			mean or μ	**3.4**	**2.0**	**41.4**	**32.7**	**11.0**	**144.2**
			S_x or S_{lnx}	1.17	0.46	16.66	8.50	5.10	49.39
			COV	0.34	0.48	0.40	0.26	0.46	0.34
			+ or -	0.6		8.9	4.7	2.7	26.3
			lower limit	2.8	1.7	32.5	28.0	8.3	117.9
			upper limit	4.1	2.6	50.3	37.4	13.7	170.5
Laguna Canyon Channel									
Jan 6-10, 1993	347	321	93	4.5	2.9	776	10	5	44
Feb 7-10, 1993	319	283	89	3.2	4.4	1,309	17	12	43
Feb 17-20, 1994	304	304	100	3.4	7.4	1,324	40	82	173
Mar 24-28, 1994	84	82	97	2.1	4.4	1,903	37	114	181
Dec 12-16, 1995	14	15	108	5.5	1.9	134	33	19	62
Jan 19-23, 1996	25	26	104	3.0	2.8	949	59	21	128
Feb 20-24, 1996	191	180	94	4.5	6.2	2,517	62	1	233
Oct 30-Nov 1, 1996	50	57	113	7.7	3.6	740	25	33	166
Nov 21-25, 1996	226	236	104	3.7	4.7	1,398	57	27	192
Dec 9-13, 1996	262	272	104	3.6	2.1	794	26	10	83
			Distribution	normal	normal	normal	normal	lognormal	normal
			sample median	3.7	4.0	1,128.7	35.0	20.1	147.1
			true median					16.1	
			mean or μ	**4.1**	**4.0**	**1,184.5**	**36.6**	**36.6**	**130.6**
			S_x or S_{lnx}	1.59	1.76	670.71	17.99	1.32	68.16
			COV	0.39	0.44	0.57	0.49	2.17	0.52
			+ or -	1.1	1.3	479.8	12.9		48.8
			lower limit	3.0	2.8	704.7	23.7	19.4	81.8
			upper limit	5.2	5.3	1,664.2	49.4	223.2	179.3

Site Mean EMCs : 1992 - 2001

Date	Vol. Storm ac-ft	Sampled ac-ft	Percent Characterized	NO3 mg/l	PO4 mg/l	TSS mg/l	Cu ug/l	Pb ug/l	Zn ug/l
	Oso Creek								
Mar 5-9, 1992	48	*37*	*78*	*5.6*	*1.1*	*54*	*13*	*1.7*	*22*
Mar 20-24, 1992	902	*898*	*100*	*2.9*	*2.1*	*386*	*12*	*3.4*	*78*
Mar 26-29, 1992	27	*27*	*100*	*5.3*	*0.4*	*14*	*9*	*4.5*	*16*
Dec 17-20, 1992	49	*49*	*100*	*3.0*	*1.7*	*104*	*10*	*1.2*	*39*
Dec 29, 1992 - Jan 2, 1993	493	*400*	*81*	*1.8*	*9.0*	*983*	*10*	*5.6*	*68*
Jan 6-10, 1993	2,582	*2,514*	*97*	*3.5*	*4.7*	*1,113*	*10*	*4.1*	*76*
Dec 19-23,1993	21	*21*	*101*	*5.9*	*1.1*	*60*	*17*	*2.6*	*34*
Feb 7-11, 1994	620	*611*	*99*	*4.2*	*2.6*	*503*	*22*	*6.6*	*84*
Feb 17-21, 1994	926	*922*	*100*	*5.3*	*2.9*	*645*	*36*	*12.1*	*131*
Mar 2-6, 1995	2,107	*2,081*	*99*	*2.0*	*4.1*	*857*	*31*	*10.9*	*108*
Mar 10-13, 1995	2,285	*2,271*	*99*	*3.3*	*3.3*	*674*	*41*	*10.9*	*119*
Jan 19-23, 1996	*154*	*134*	*87*	*6.8*	*1.4*	*190*	*38*	*5.4*	*80*
Jan 31-Feb 2, 1996	*342*	*310*	*91*	*5.9*	*2.9*	*427*	*44*	*14.6*	*139*
Feb 20-24, 1996	*1,250*	*1,247*	*100*	*7.7*	*1.6*	*171*	*24*	*1.9*	*60*
Oct 30-Nov 3, 1996	*344*	*381*	*111*	*6.7*	*4.5*	*803*	*40*	*19.1*	*253*
Dec 9-13, 1996	*1,067*	*1,073*	*101*	*4.7*	*1.5*	*213*	*21*	*4.6*	*68*
Jan 25 - Jan 29, 1999	*327*	*330*	*101*	*4.3*	*1.5*	*212*	*25*	*6.3*	*62*
			Distribution	normal	lognormal	normal	lognormal	lognormal	lognormal
			sample median	4.7	2.1	386.4	22.0	5.4	76.0
			true median		2.2		20.0	5.0	68.5
			mean or μ	**4.7**	**2.8**	**450.0**	**23.7**	**6.9**	**87.6**
			S_x or S_{lnx}	1.77	0.73	358.66	0.59	0.80	0.71
			COV	0.38	0.85	0.80	0.64	0.95	0.81
			+ or -	0.9		191.1			
			lower limit	3.7	2.1	258.9	18.7	5.1	66.1
			upper limit	5.6	4.5	641.0	33.2	11.1	135.8

COV = Coefficient of Variation
= s/μ for normal distributions
= (EXP(s)^2 - 1)^0.5 for lognormal distributions

APPENDIX Q

SUMMARY OF INVESTIGATIONS FOR HIGH TDS IN LANE CHANNEL

Lane Channel (LANF08)
Identifying Sources of "Warm Spots"

Introduction

In an attempt to identify sources contributing to elevated total dissolved solids (TDS) concentrations in Lane Channel (F08), a reconnaissance study was initiated using electrical conductivity (EC) as the measurement parameter. Beginning at the LANF08 NPDES sampling station, electrical conductivity measurements were made moving upstream at several distinct input (channels and pipes) locations. Locations included Armstrong Storm Channel (F08S01), inputs to Armstrong Storm Channel, F08P17 at Gillette and pre-determined (from drainage maps) 24", 36", and 60" underground pipes upstream (u/s) of LANF08. Conductivity measurements were made at these sites during the initial phase of investigation on 12/22/98, 12/23/98, 3/10/99, 3/17/99, and 6/16/99. All measurements were made using a Hanna instrument HI 9033 Multi-range conductivity meter.

Monitoring Summary

Electrical conductivity of the discharges from the tributaries to Lane Channel ranged from 1500 to 16,100 µmhos/cm in the five days of initial measurements. The mean and median of the 34 measurements was 4248 and 3535 µmhos/cm, respectively. A summary of the sampling is provided below:

Location	12/22/98	3/10/99	3/17/99	6/16/99
Lane Channel (LANF08) at NPDES Sampling Station	4420	5130	3800	5660
36" pipe approx. 20 yards u/s LANF08	3100	1300	2700	4650
24" pipe approx. 1/8 mile u/s LANF08	1710	3100	1500	dry
F08P07 approx. 1/4 mile u/s LANF08	1770		1800	2100
F08P01 at Von Karmen	4150			2300
36" pipe approx. 3/8 mile u/s LANF08		16000		16100
60" pipe at Sky Park East	2600			3300
Armstrong Storm Channel (F08S01)	3900	4300	2200	7270
F08P12	4240			
F08P13 at McGaw	2500			
F08P14 at Alton	dry			
F08P17 at Gillette	6530		5500	5000
F08P02 at Redhill	3510		3100	
60" pipe at Daimler (from west side of MacArthur)	1190			3560
F08P20 at Daimler (from east side of MacArthur)	4440			

The greatest readings were found in a 36" pipe approximately 3/8 mile upstream of LANF08. On 3/10/99 and 6/16/99 the EC of the discharge from this pipe was 16,000 and 16,100 µmhos/cm, respectively. Follow-up measurements were made on 6/21, 7/2, and 7/6/99. The following is a summary of the preliminary measurements at this site:

Date	EC (µmhos/cm)
3/10/99 11:00	16,000
6/16/99 13:00	16,100
6/21/99 12:35	16,100
7/2/99 11:35	12,100
7/6/99 13:00	12,700

Using an automatic sampler, samples were collected every three hours from July 2–5, 1999, and hourly from July 6-7, 1999. EC measurements ranged from 4,140 umhos to 14,680 µmhos during the six days. The following are graphical summaries of the results.

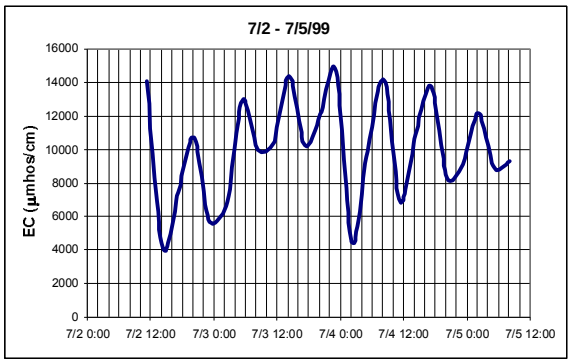

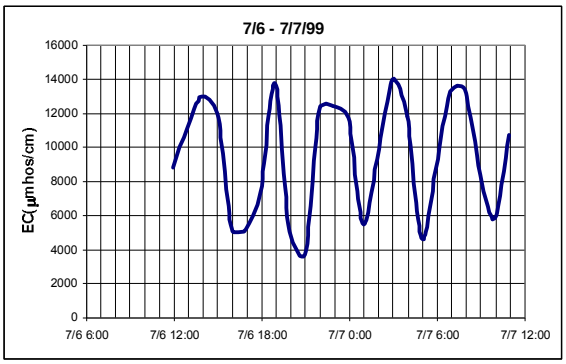

The hourly sampling gives a more detailed description of the TDS concentration in the discharge from the pipe. It appears that the peaks in conductivity are periodic occurring approximately every 4-5 hours and may be the result of a manufacturing process. The discharge rate from this pipe was estimated at the times that the automatic sampler was serviced. Each estimate was ~0.2 cubic feet/second (cfs).

This 36” pipe drains a very small portion of the Lane Channel watershed. The drainage area is less than 1/10 of a square mile. Medium sized commercial buildings and parking structures account for a majority of the drainage area. A reconnaissance of the surface drainage area noted no unusual discharges. The suspect discharge may be through an underground pipe. Since the minimum pipe diameter for underground inspections was set at 39", no records of lateral connections to this pipe are available.

In addition to conductivity measurements, a 4-day composite sample was collected between July 2-5, 1999 from the 36" pipe for general mineral analysis. The EC of this sample was 9,200 µmhos/cm and TDS concentration was 8,340 mg/L. The concentrations of ionic substances contributing to this high TDS level are listed below.

Ion	mg/L	me/L
Cl	1380	38.93
SO_4	3940	82.03
Ca	219	10.93
Mg	319	26.25
Na	2120	92.22

Sediment samples were collected at several points around the sampling location for LANF08 and from the levee of Peters Canyon Wash at Barranca Parkway for comparison. The intent of these sampling was to verify that the soils comprising this earthen channel was not the source of the high TDS. At LANF08, sediment samples were collected from the top of the levee, the channel wall above the low-flow waterline, and the soil and white precipitate (~50:50 ratio) lining the sides of the channel just above the waterline. All of the samples were analyzed for major cations and aluminum. The sample of the soil from the levee at Peters Canyon Wash had higher concentrations of the major cations and a slightly lower concentration of aluminum compared to the sample from the levee at LANF08. The soil/white precipitate mixture was approximately 13% sodium.

Conclusions

From the information collected to date it was concluded that:

- High TDS concentrations (determined by electrical conductivity measurements) were found in the discharges from several tributaries to Lane Channel. The greatest conductivity was measured in the discharge from a 36" pipe approximately 3/8 mile upstream of LANF08 (Lane Channel at Jamboree).
- The flowrate and the average conductivity of the discharge from the 36" pipe however do not totally account for the high conductivity readings at LANF08. The flowrate from the pipe is approximately 1/10 of the usual dry weather flowrate at LANF08.
- A 24-hr sampling of this 36" pipe showed that the high electrical conductivity in the discharge is periodic, occurring approximately every 4-5 hours.
- The soils comprising the earthen walls of Lane Channel are not contributing significantly to the high TSS levels.
- The discharge from the 36" pipe contained large amounts of sulfate, chloride, sodium, and magnesium.
- Additional investigation is required to isolate the sources of TDS in Lane Channel.

APPENDIX R

2001 PETERS CANYON WASH/SAN DIEGO NUTRIENT STUDY

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Executive Summary

In May 2001 an intensive study was conducted of the nutrient loads contributed by the tributaries of Peters Canyon Wash and San Diego Creek. This study was a follow-up to similar studies conducted in September 1999 and June 2000. In the September 1999 and June 2000 studies it was found that the biggest contributor of nutrients to San Diego Creek was Peters Canyon Wash and its tributaries. The intent of the May 2001 study was to quantify the loads of nutrients from the tributaries of Peters Canyon Wash during the period where the greatest dry-weather loads would be expected.

The findings of the study were as follows:

- The average daily water discharge rate in San Diego Creek at Campus Drive was 8.94 cfs compared to 11.16 cfs in June 2000 and 7.81 cfs in September 1999. The sum of the average discharges from all measured upstream inputs in 2001 was 12.18 cfs, approximately 36% higher than measured at Campus Drive. During the May 2001 study, it appeared that water was by-passing the low-flow channel at Campus Drive. The area on the west side of the low-flow channel beneath Campus Drive was completely submerged. The amount of water bypassing the low-flow channel during this period however was not quantified.

- The average discharge rate at Peters Canyon Wash at Barranca Parkway was 6.73 cfs compared to 6.59 cfs in June 2000 and 5.61 cfs in September 1999. The sum of the average discharges from all upstream measured inputs to Peters Canyon Wash was 6.24 cfs, approximately 7% less than measured at Barranca Parkway.

- Of the Peters Canyon Wash tributaries, the Santa Ana – Santa Fe Channel showed the greatest change in average discharge rate from study to study. The rate increased from 0.89 cfs in September 1999 to 1.78 cfs in June 2000, and then decreased to 0.97 cfs in May 2001. The flowrate in San Diego Creek at Culver Drive increased from 0.73 cfs in June 2000 to 2.23 cfs in May 2001.

- Hicks Canyon Wash and Central Irvine Channel showed the greatest increase in the average nitrate nitrogen concentration from June 2000 study to the May 2001 study. The concentration of Hicks Canyon Wash increased from 2.2 to 48.5 mg/L while the average concentration in the Central Irvine Channel increased from 17.9 to 45.3 mg/L. In San Diego Creek at Campus Drive the average concentration in the June 2000 study was 2.8 mg/L and the average concentration in the May 2001 study was 7.6 mg/L. In the discharge from the Irvine Ranch Water District's treatment wetlands the average concentration increased from 0.62 in the June 2000 study to 5.7 mg/L in the May 2001 study.

- In the May 2001 study, the average nitrate nitrogen load transported by Peters Canyon Wash, measured at Barranca Parkway, was 571 lbs/day compared to the June 2000 study value of 328 lbs/day. The sum of the average loads from the monitoring points upstream of Barranca Parkway in the May 2001 study was 552 lbs/day. These

findings are inconsistent with what was observed in the previous two studies where the sum of the loads upstream were approximately 20% higher than measured at Barranca Parkway. In the previous reports it was hypothesized that the reduction in load was probably due to assimilation by the higher order plants and attached algae in Peters Canyon Wash. Generally, the amount of algae observed in the channels during the May 2001 study was much less than in the previous two studies. Little or no rooted vegetation was observed in the reaches of Peters Canyon Wash where rooted plants were observed in the September 1999 and June 2000 study.

- The greatest contributors to the nitrate nitrogen load in Peters Canyon Wash were the Central Irvine Channel (139 lbs/day), Hicks Canyon Wash (99.8 lbs/day), Valencia Channel (74.3 lbs/day), Santa Ana – Santa Fe Channel (74.1 lbs/day), Como Storm Channel (62.3 lbs/day) and the Warner Drain (53.2 lbs/day). The load measured in Hicks Canyon Wash was approximately 92 lbs/day greater than measured in June 2000.

- The average daily nitrate nitrogen load measured in San Diego Creek at Campus Drive was 370 lbs/day compared to 169 lbs/day in June 2000 and 382 lbs/day in September 1999. The sum of the average daily nitrate loads measured at Peters Canyon Wash at Barranca Parkway, San Diego Creek at Harvard Avenue, the net load from the Irvine Ranch Water District's wetlands and the estimated loads for Lane, Barranca, San Joaquin, and Sand Canyon Channels was 794 lbs/day. Assuming that the flow rate of the water by-passing the low-flow channel at Campus Drive is equal to the difference between the sum of the upstream flowrates and the flowrate measured at Campus Drive the corrected nitrate nitrogen load for Campus Drive would be 504 lbs/day.

- As in the previous two studies, the Irvine Ranch Water District (IRWD) was diverting water from San Diego Creek through its constructed wetlands to reduce the nitrate load in the creek. The quality and volume of the water diverted from and returned to the Creek was monitored by IRWD. The average pumping rate from the Creek (May 15-22, 2001) was 6.70 cfs. The average return rate to the creek was 6.47 cfs yielding a net removal of 0.23 cfs.

  The mean nitrate nitrogen load pumped from the Creek was 393 lbs/day as NO_3. The mean nitrate nitrogen load returned to the Creek was 194 lbs/day. The IRWD Wetland Treatment Project removed on average, 199 lbs/day of nitrate nitrogen or about 51% of nitrate nitrogen pumped into the wetlands. The total nitrogen removal efficiency of the wetlands was about 41%. With respect to concentrations, the efficiencies for nitrate and total nitrogen reduction were 45% and 34% respectively. The efficiencies observed in the May 2001 study were lower than in the September 1999 and June 2000 studies. The efficiency of the wetlands is proportional to temperature. The first two studies were conducted during the summer when temperatures were higher and the removal efficiency of the wetlands was greater.

- The average daily Total Nitrogen (TN) loads from San Diego Creek at Campus Drive, Peters Canyon Wash at Barranca Pkwy and San Diego Creek at Harvard Avenue were 503, 647, and 224 lbs/day, respectively.

- The average daily total phosphate (as P) loads from San Diego Creek at Campus Drive, Peters Canyon Wash at Barranca Parkway and San Diego Creek at Harvard Avenue were 12.1, 14.3, and 1.16 lbs/day, respectively. The tributaries that contributed the greatest phosphate load to Peters Canyon Channel during the May 2001 study were Hicks Canyon Wash (7.28), El Modena Irvine (1.78) and the Central Irvine Channel (7.86). San Joaquin Channel (1.33 lbs/day) contributed the greatest phosphate load to reach 1 of San Diego Creek.

- Data from the UC Cooperative Extension indicate that no commercial agricultural fields were present in the watersheds of Como, Santa Ana–Santa Fe, Valencia, and Warner Storm Channels. These channels however continue to discharge high levels of nitrates, which are assumed to from groundwater.

- Using data from this study the projected total nitrogen load at Campus Drive between April 1st and September 30th would be 92,200 pounds. Using the adjusted flowrate for Campus Drive the load would be 125,000 pounds. Both of these estimates are well below the December 31, 2002 target of 200,000 pounds.

2001 Peters Canyon Wash / San Diego Creek Nutrient Study

1.0 Introduction

In September of 1999 the County of Orange conducted a comprehensive seven-day study of the total mass (loads) of nutrients transported by Peters Canyon Wash, San Diego Creek and their respective major tributaries *1999 Peters Canyon Wash / San Diego Creek Nutrient Study – June 2000*. Peters Canyon Wash was found to be the greatest contributor of nitrate nitrogen to San Diego Creek. Several tributaries to Peters Canyon Wash including Valencia, Santa Ana – Santa Fe, Como, and Central Irvine Channels each contributed on average more than 60 pounds of nitrate nitrogen per day. The study was repeated in June 2000 (*2000 Peters Canyon Wash / San Diego Creek Nutrient Study – November 2000)* and found that the loads of nitrate nitrogen from the tributaries of Peters Canyon Wash, with the notable exception of the Santa Fe Channel, were slightly lower than measured in September 1999. The average load at Santa Fe Channel was more than 50% higher (123 vs. 78 lbs/day) in the June 2000 study.

The two studies were conducted to quantify the loads of total nitrogen from each of the major tributaries of Peters Canyon Wash and the lower reach of San Diego Creek during two different months of the summer season. Another objective of the two studies was to evaluate the total nitrogen load from San Diego Creek relative to nutrient TMDL targets established by the Santa Ana Regional Water Quality Control Board. Using the average daily total nitrogen loads measured in San Diego Creek at Campus Drive during the two studies, the projected total nitrogen loads from San Diego Creek for the period between April 1st and September 30th were estimated. These two estimates were well below the summertime TMDL target that was set by the Regional Water Quality Control Board for attainment by December 31, 2002. Weekly sampling data (July 1999 – June 2000) from San Diego Creek at Campus Drive however, showed that the period of greatest total nitrogen load occurred during April and May.

In May 2001 a third study was conducted to evaluate the loads during the period of the TMDL summer season that was assumed to generate the greatest total nitrogen load.

In the May 2001 study, the monitoring locations in the Peters Canyon Wash watershed included the same channels and stormdrains as in the previous two studies and the Lyons Storm Drain. The tributaries of the lower reach of San Diego Creek downstream of Peters Canyon Wash were grab-sampled as in the previous studies. Monitoring protocols and analytical methods were the same in both studies. This report is a summary of the results.

2.0 Study Area

San Diego Creek, the primary tributary to the Upper Newport Bay, has a watershed area upstream of Campus Drive, Irvine of approximately 111 mi^2. Its headwaters are in the City of Lake Forest and it receives drainage from many tributaries before discharging to the Upper Newport Bay at Jamboree Road in Newport Beach.

In its Water Quality Control Plan for the Santa Ana River Basin, the Regional Water Quality Control Board has divided San Diego Creek into two reaches. The lower reach designated as Reach 1 is the segment from the Upper Newport Bay to Jeffrey Road in Irvine. The segment above Jeffrey Road to the headwaters is designated as Reach 2.

Reach 2 drains the eastern portion of the watershed and receives runoff from several tributaries including Marshburn, Agua Chinon, Bee Canyon, Serrano Creek, and Canada Channels.

Reach 1 has many manmade and natural tributaries including Sand Canyon Channel, Bonita Canyon Channel, San Joaquin Channel, Lane Channel, Barranca Channel, and Peters Canyon Wash. With its 45 mi^2 watershed area, Peters Canyon Wash contributes the greatest water volume of any tributary to San Diego Creek.

Peters Canyon Wash has several tributaries including Hicks Canyon Wash, El Modena-Irvine Channel, Como Storm Channel, Santa Ana-Santa Fe Channel, Valencia Channel, and Warner Storm Drain.

3.0 Background

Studies to quantify the nutrient loads from tributaries to San Diego Creek have been conducted four times during the 1990's. In 1990, the County of Orange and the Santa Ana Regional Water Quality Control Board (RWQCB) initiated a cooperative project to monitor these loads and evaluate the compliance of three major nurseries with recently-issued NPDES permits. Seven sites were monitored with automatic sampling equipment and eight others were grab-sampled during a two to three day period in August. The load calculations suggested that the nurseries were in compliance with the waste discharge requirements (WDRs) of their respective permits. Both the Peters Canyon Channel and Reach 2 of San Diego Creek showed significant amounts of nitrate in their discharges.

Hines Channel and Rattlesnake Canyon Channel were the greatest contributors to the nitrate load in Peters Canyon Wash. Unexplainably the El Modena-Irvine Channel, which had a predominately urbanized watershed, with limited agriculture, also discharged a high load of nitrate to Peters Canyon Channel.

In May of 1991 the County of Orange and the RWQCB repeated a portion of the August 1990 study to assess the difference between seasons. Although the average nitrate-nitrogen concentration at Campus Drive increased from 13.8 to 17.0 mg/l (23%) the average water discharge rate decreased from 15.6 to 10 cfs (42%). The average nitrate-nitrogen load consequently decreased from 1150 to 894 lbs/day (22%).

In May of 1993, another watershed assessment was conducted. The average daily nitrate-nitrogen load at Campus Drive was measured at 1570 lbs/day.

In May of 1999, the County completed development of a revised stormwater quality monitoring program to comply with the requirements of its new NPDES Stormwater and Urban Runoff Permits. The data collected under the previous NPDES permits were statistically evaluated to identify areas where levels of pollutants were higher than the system-wide mean values. Central Irvine Channel and its tributary Hines Channel had the highest mean values for nitrate concentrations in dry weather discharges of any channel monitored in the County. These data however were the result of grab and not composite samplings and represented only fixed moments in time.

In September 1999 a comprehensive watershed study was conducted to meet the commitments in the revised NPDES monitoring program to further study the Central Irvine Channel in addition to other broader watershed objectives. From the September 1999 study the following was found.

- The average nitrate nitrogen load transported by Peters Canyon Wash, measured at Barranca Parkway, was 318.8 lbs/day. The total nitrogen load was 351.7 lbs/day.
- The average nitrate nitrogen load from reach 2 of San Diego Creek, measured at Harvard Avenue, was 126.3 lbs/day. The total nitrogen load was 130.5 lbs/day
- The average nitrate nitrogen load transported by San Diego Creek, measured at Campus Drive, was 351.5 lbs/day. The total nitrogen load was 435.1 lbs/day. The average nitrate nitrogen load was well below those found in 1990, 1991, and 1993.
- The tributaries to Peters Canyon Wash that contributed the greatest nitrate load were Valencia, Santa Ana-Santa Fe, Central Irvine, Como, and Warner Channels.
- The projected summertime (April 1 – September 30) total nitrogen load from San Diego Creek at Campus Drive would be approximately 80,000 pounds compared to the TMDL target of 200,097 pounds for 2003.

In June of 2000, a follow-up to the September 1999 study was conducted to evaluate the difference in loads between the beginning and the end of the summer. The findings of this second study were:

- The flowrates in Peters Canyon Wash at Barranca Parkway and San Diego Creek at Campus Drive were greater in the June 2000 study. The 43% increase (7.81 to 11.16 cfs) at Campus Drive was primarily due to the increase in the outflow from the Irvine Ranch Water District's (IRWD) wetland treatment project for nitrate removal. In 1999 the average inflow into the wetlands exceeded the outflow by more than 3 cfs. During the June 2000 study the average inflow and outflow were more in equilibrium with outflow exceeding inflow by only 0.4 cfs.

- The average nitrate nitrogen concentration in San Diego Creek at Campus Drive was 2.84 mg/l in June 2000 compared to 9.04 in September 1999. The total nitrogen concentrations were 6.45 and 10.31 mg/l for June 2000 and September 1999 respectively.

- The average daily nitrate nitrogen loads from Peters Canyon Wash at Barranca Parkway were 319 and 328 lbs/day for September 1999 and June 2000 respectively. The average daily total nitrogen load was 352 and 367 lbs/day for September 1999 and June 2000 respectively.

- The average reduction in nitrate concentration of water treated from San Diego Creek by IRWD's wetlands was 92% (from 33.2 to 2.7 mg/l) compared to 77% observed in the previous study. The average reduction in total nitrogen was about the same between studies (62% in June 2000 and 59% in September 1999).

- The average daily nitrate nitrogen loads from San Diego Creek at Campus Drive were 382 and 169 lbs/day for September 1999 and June 2000. The average daily total nitrogen loads were 435 and 376 lbs/day for September 1999 and June 2000 respectively. The latter study showed a decrease in nitrate concentration and load from the previous study but an increase in organic nitrogen concentration and load. The increase in organic nitrogen was primarily due to the increase in outflow from the IRWD wetlands (see above). The decrease in nitrate nitrogen load is most likely the result of a substantial increase in efficiency of nitrate removal by the wetlands and a reduction in the loads contributed by Reach 2 of San Diego Creek, San Joaquin and Sand Canyon Channels.

- Using the June 2000 data to estimate the summertime (April 1 – September 30) total nitrogen load from San Diego Creek yields a value lower than that calculated from the September 1999 data. Both are less than one-half of the December 31, 2002 target of 200,097 pounds developed by the Regional Board. The estimates were compared to the average monthly load calculated from NPDES data collected from San Diego Creek by Orange County between July 1, 1999 and June 30, 2000. Using the study values for June and September and the NPDES values for the remaining four months yields a total of 116,000 pounds. Without IRWD's removal of approximately 125 lbs/day the total nitrate nitrogen load would be approximately 139,000 pounds, still well below the December 2002 target.

The weekly monitoring data from San Diego Creek during the period from July 1999 to June 2000 showed that the period of greatest dry-weather total nitrogen load occurred during April and May. Consequently a study was planned for this period in 2001.

4.0 May 2001 Study

The intent of the 2001 study was to quantify the maximum total nitrogen loads that would be expected from each of the major tributaries to Peters Canyon Wash.

Automatic samplers and continuously monitoring flow measurement devices were used at all sites that were found to be significant contributors to the nutrient load in September 1999 and June 2000. The monitoring protocols and analytical methods described in the September 1999 study report and cited in the June 2000 study report were also used in this study.

4.1 Monitoring Locations

As in the previous studies the primary monitoring locations were Peters Canyon Wash at Barranca Parkway, San Diego Creek at Harvard Avenue, and San Diego Creek at Campus Drive. The Peters Canyon Wash tributaries monitored in the previous studies were again monitored in May 2001 as was Peters Canyon Wash upstream of the furthest-upstream, monitored tributary (Hicks Canyon Wash). Dr. Barry Hibbs of California State University Los Angeles assisted with the study by collecting grab samples and making instantaneous water discharge measurements daily at Lyon Storm Drain, San Joaquin, Barranca, and Sand Canyon Channels.

Table 1 is a list of the sites that were monitored during this study. Alphanumeric station identification codes are listed in the first column. These codes are used throughout this report. **Figure 1** is a map of the monitoring sites.

4.2 Results

- The average daily water discharge rate in San Diego Creek at Campus Drive was 8.94 cfs compared to 11.16 cfs in June 2000 and 7.81 cfs in September 1999. The sum of the average discharges from all measured upstream inputs was 12.18 cfs, approximately 36% higher than measured at Campus Drive.

- The average discharge rate at Peters Canyon Wash at Barranca Parkway was 6.73 cfs compared to 6.59 cfs in June 2000 and 5.61 cfs in September 1999. The sum of the average discharges from all upstream measured inputs to Peters Canyon Wash was 6.24 cfs, approximately 7% less than measured at Barranca Parkway.

- Of the Peters Canyon Wash tributaries, the Santa Ana – Santa Fe Channel showed the greatest change in average discharge rate from study to study. The rate increased from 0.89 cfs in September 1999 to 1.78 cfs in June 2000, and then decreased to 0.97 cfs in 2001. The flowrate in San Diego Creek at Culver Drive increased from 0.73 cfs in 2000 to 2.23 cfs in May 2001. **Figure 2** shows the average discharge rate of each monitored tributary of Peters Canyon Wash as well as tributaries to Reach 1 of San Diego Creek. The lengths of the arrows representing flow into and out of the system are proportional to the discharge rates.

- Hicks Canyon Wash and Central Irvine Channel showed the greatest increase in the average nitrate nitrogen concentration from June 2000 study to the May 2001 study. The concentration in Hicks Canyon Wash increased from 2.2 to 48.5 mg/L while the average concentration in the Central Irvine Channel increased from 17.9 to 45.3 mg/L. In San Diego Creek at Campus Drive the average concentration in the June 2000 study was 2.8 mg/L and the average concentration in the May 2001 study was 7.6 mg/L. In the discharge from the Irvine Ranch Water District's treatment wetlands the average concentration

increased from 0.62 in the June 2000 study to 5.7 mg/L in the May 2001 study. **Figure 3** shows the nitrate nitrogen concentrations measured at all sites during the 2000 study. **Appendix A** contains the laboratory results for all samples collected during this study. **Table 2** is a summary of the average concentrations found at each location during this study.

- In the May 2001 study, the average nitrate nitrogen load transported by Peters Canyon Wash, measured at Barranca Parkway, was 571 lbs/day compared to the June 2000 study value of 328 lbs/day. The sum of the average loads from the monitoring points upstream of Barranca Parkway in the May 2001 study was 552 lbs/day. **Table 3** is a summary of the average daily loads measured at each site during the study. **Tables 4 and 5** show the differences in flowrates, concentrations, and loads among the three studies.

- The greatest contributors to the nitrate nitrogen load in Peters Canyon Wash were the Central Irvine Channel (139 lbs/day), Hicks Canyon Wash (99.8 lbs/day), Valencia Channel (74.3 lbs/day), Santa Ana – Santa Fe Channel (74.1 lbs/day), Como Storm Channel (62.3 lbs/day) and the Warner Drain (53.2 lbs/day). The load measured in Hicks Canyon Wash was approximately 92 lbs/day greater than measured in June 2000. **Figure 4** shows the average daily nitrate nitrogen loads measured at each site.

- The average daily nitrate nitrogen load measured in San Diego Creek at Campus Drive was 370 lbs/day. The sum of the average daily nitrate loads measured at Peters Canyon Wash at Barranca Parkway, San Diego Creek at Harvard Avenue, the net load from the Irvine Ranch Water District's wetlands and the estimated loads for Lane, Barranca, San Joaquin, and Sand Canyon Channels was 794 lbs/day. **Appendix B** shows graphical summaries of results from each site monitored with an automatic sampler.

- As in the previous two studies, the Irvine Ranch Water District (IRWD) was diverting water from San Diego Creek through its constructed wetlands to reduce the nitrate load in the creek. The quality and volume of the water diverted from and returned to the Creek was monitored by IRWD.

  The water that was pumped from and returned to the creek was done so in the reach between Michaelson Avenue and Campus Drive. The average pumping rate from the Creek (May 15-22, 2001) was 6.70 cfs. The average return rate to the creek was 6.47 cfs yielding a net removal of 0.23 cfs. The mean nitrate nitrogen load pumped from the Creek was 393 lbs/day as NO_3. The mean nitrate nitrogen load returned to the Creek was 194 lbs/day. The net load removed from the Creek during the study was 199 lbs/day.

- The average daily Total Nitrogen (TN) loads from San Diego Creek at Campus Drive, Peters Canyon Wash at Barranca Pkwy and San Diego Creek at Harvard

Avenue were 503, 647, and 224 lbs/day, respectively. **Figure 5** shows the average TN load from each of the monitored tributaries.

- The average daily total phosphate (as P) loads from San Diego Creek at Campus Drive, Peters Canyon Wash at Barranca Parkway and San Diego Creek at Harvard Avenue were 12.1, 14.3, and 1.16 lbs/day, respectively. The tributaries that contributed the greatest phosphate load to Peters Canyon Channel during the 2000 study were Hicks Canyon Wash (7.28), El Modena Irvine (1.78) and the Central Irvine Channel (7.86). San Joaquin Channel (1.33 lbs/day) contributed the greatest phosphate load to reach 1 of San Diego Creek. **Figure 6** shows the average total phosphate load as P from each tributary.

- **Figures 7-18** show the differences in flowrates concentrations and loads among the three studies.

- Data from the UC Cooperative Extension (**Appendix C**) indicate that no commercial agricultural fields were present in the watersheds of Como, Santa Ana–Santa Fe, Valencia, and Warner Storm Channels. These channels however continue to discharge high levels of nitrates. The total agricultural acreage in the San Diego Creek and Peters Canyon Wash watersheds during the May 2001 study was 4305 compared to 6029 in June 2000 and 6880 in September 1999.

4.3 Conclusions

- The average water discharge measured in San Diego Creek at Campus Drive was 2.36 cfs lower than was measured in the June 2000 study. There was a disparity in the sum of the average daily flowrates measured from all sources (tributary channels and IRWDs wetlands treatment system) upstream of Campus Drive and the flowrate measured at Campus Drive. The sum of the upstream sources was 3.24 cfs greater than measured at the Campus Drive streamgage. During the May 2001 study, it appeared that water was by-passing the low-flow channel at Campus Drive. The area on the west side of the low-flow channel beneath Campus Drive was completely submerged. The amount of water bypassing the low-flow channel during this period however was not quantified.

- The average discharge rate from Peters Canyon Wash at Barranca Parkway (6.73 cfs) was comparable to that measured in the June 2000 study (6.60 cfs). The sum of the measured upstream discharges (6.24 cfs) was about 7% lower than measured at Barranca Parkway (6.73 cfs).

- The average daily nitrate nitrogen load at Barranca Parkway (571 lbs/day) was over 240 lbs/day greater than in the June 2000 study (328 lbs/day) and more than 250 lbs/day greater than in the September 1999 study (319 lbs/day). The sum of the measured nitrate nitrogen loads upstream of Barranca Parkway in the May 2001 study was approximately 3% lower than was measured at the Barranca Parkway site. These findings are inconsistent with what was observed in the

previous two studies where the sum of the loads upstream were approximately 20% higher than measured at Barranca Parkway. In the previous reports it was hypothesized that the reduction in load was probably due to assimilation by the higher order plants and attached algae in Peters Canyon Wash. Generally, the amount of algae observed in the channels during the May 2001 study was much less than in the previous two studies. Little or no rooted vegetation was observed in the reaches of Peters Canyon Wash where rooted plants were observed in the September 1999 and June 2000 studies (see photos in **Appendix D**).

- The IRWD Wetland Treatment Project removed on average, 199 lbs/day of nitrate nitrogen or about 51% of nitrate nitrogen pumped into the wetlands. The total nitrogen removal efficiency of the wetlands was about 41%. With respect to concentrations, the efficiencies for nitrate and total nitrogen reduction were 45% and 34% respectively. The efficiencies observed in the May 2001 study were lower than in the September 1999 and June 2000 studies. The efficiency of the wetlands is proportional to temperature. The first two studies were conducted during the summer when temperatures were higher and the removal efficiency of the wetlands was greater.

- The average nitrate nitrogen load measured in San Diego Creek at Campus Drive was 370 lbs/day compared to 169 lbs/day in June 2000 and 382 lbs/day in September 1999. The total load from the measured upstream tributaries (794 lbs/day) was more than 400 lbs/day greater. Assuming that the flow rate of the water by-passing the low-flow channel at Campus Drive is equal to the difference between the sum of the upstream flowrates and the flowrate measured at Campus Drive the corrected nitrate nitrogen load for Campus Drive would be 504 lbs/day.

- Using data from this study the projected total nitrogen load at Campus Drive between April 1st and September 30th would be 92,200 pounds. Using the adjusted flowrate for Campus Drive the load would be 125,000 pounds. Both of these estimates are well below the December 31, 2002 target of 200,000 pounds. **Figure 19** is a graph of the TMDL targets and the estimated loads based on results from this study. Also shown is the effect of the IRWD wetland treatment system. It appears that the IRWD treatment wetlands are an important component to meet the TMDL targets.

- The NPDES data collected from San Diego Creek during the 2000 – 2001 were plotted in **Figures 20 - 21** to show the variation in total nitrogen concentration and load in dry-weather samples. Note that all calculated daily loads in the TMDL summer season (April 1 - September 30) were below the December 31, 2002 target.

Tables

Table 1
Monitoring Locations

Station Code	Location	Period	Sample Type	Discrete Samples per day	Composite Samples per day	Flowrate Measurement
SDMF05	San Diego Creek @ Campus Drive	Tues-Tues	Composite (10AM-9AM)	24	1	Manometer Gage
WYLSED	San Diego Creek @ Harvard Avenue	Wed-Tues	Composite (10AM-9AM)	24	1	Manometer Gage
BARSED	Peters Canyon Channel @ Barranca Parkway	Tues-Tues	Composite (10AM-9AM)	24	1	Manometer Gage
CICF25	Central Irvine Channel	Tues-Tues	Composite (10AM-9AM)	24	4	12" 45° Trapezoidal SRCRC Flume with bubbler flowmeter
MIRF07	El Modena-Irvine Channel	Tues-Mon	Composite (10AM-9AM)	24	1	Manometer Gage
CSCS03	Como Storm Channel	Tues-Tues	Composite (10AM-9AM)	24	1	1.5' H Flume + bubbler flowmeter
SASF10	Santa Ana-Santa Fe Channel	Tues-Tues	Composite (10AM-9AM)	24	1	12" 45° Trapezoidal SRCRC Flume with bubbler flowmeter
F06P08	F06P08 at Moulton Parkway	Tues-Tues	Composite (10AM-9AM)	24	1	8" Palmer-Bowlus Flume + ultrasonic flowmeter
VALS02	Valencia Channel	Wed-Tues	Composite (10AM-9AM)	24	1	6" Parshall Flume + ultrasonic flowmeter
WARF06	Warner Avenue Drain	Tues-Tues	Composite (10AM-9AM)	24	1	2" 45° Trapezoidal WSC Flume + ultrasonic flowmeter
F06P06	Construction Circle Drain (F06P06)	Tues-Tues	Composite (10AM-9AM)	24	1	XL 60° V Trapezoidal Flume + ultrasonic flowmeter
USHF06	Peters Canyon Channel u/s Hicks Canyon Wash	Tues-Tues	Composite (10AM-9AM)	24	1	XL 60° V Trapezoidal Flume with bubbler flowmeter
HCWF27	Hicks Canyon Wash	Tues-Tues	Composite (10AM-9AM)	24	1	XL 60° V Trapezoidal Flume with ultrasonic flowmeter
DSBRCP	65" RCP d/s Bryan	Tues-Tues	Composite (10AM-9AM)	24	1	12" Palmer Bowlus Flume with ultrasonic flowmeter
F06P07	Lyon's Storm Channel		Grab (7AM-10 AM)	1		XL 60° V Trapezoidal Flume
LANF08	Lane Channel	Tues-Tues	Composite (10AM-9AM)	1		Ultrasonic flowmeter + instantaneous discharge measurement
BC2F09	Barranca Channel	Tues-Tues	Grab (7AM-10 AM)	1		Instantaneous discharge measurements
SJCF14	San Joaquin Channel	Tues-Tues	Grab (7AM-10 AM)	1		2" 45° Trapezoidal WSC Flume
SCCF15	Sand Canyon Channel	Tues-Tues	Grab (7AM-10 AM)	1		Instantaneous discharge measurements
IRWD 001	San Diego Creek flow into wetlands	Tues-Tues		1		In-line flowmeter
IRWD 002	Discharge from wetlands to San Diego Creek	Tues-Tues		1		In-line flowmeter

Table 2
Average Flowrate and Concentrations
May 15 - 22, 2001

	Flowrate cfs	NO3 mg/L	NO3 as N mg/L	PO4 mg/L	PO4 as P mg/L	TN mg/L	oP as P mg/L
USHF06	0.38	5.3	1.2	0.82	0.27	2.8	
HCWF27	0.38	215	48.5	10.82	3.53	66.4	
DSBRCP	0.17	3.0	0.7	0.21	0.07	1.9	
CICF25	0.65	173	39.0	6.71	2.19	45.3	1.66
F06P07	0.06	61.5	13.9	1.78	0.58	16.5	
MIRF07	1.17	7.6	1.7	0.86	0.28	5.2	
CSCS03	0.70	73.4	16.6	0.28	0.09	17.4	
F06P08	0.26	63.2	14.3	0.56	0.18	15.0	
SAFF10	0.97	63.0	14.2	0.17	0.06	15.4	
VALS02	0.73	83.1	18.8	1.04	0.34	19.9	
WARF06	0.67	64.9	14.6	0.76	0.25	15.2	
F06P06	0.11	83.3	18.8	0.36	0.12	20.3	
BARSED	6.73	69.9	15.8	1.20	0.39	17.8	0.35
WYLSED	2.23	76.4	17.3	0.29	0.09	18.5	0.05
LANF08	2.03	39.8	9.0	1.83	0.60	10.4	
BRCF09	0.26	<0.44	<0.09	0.28	0.09	1.3	
SJQF14	0.86	25.8	5.8	0.88	0.29	7.0	
SCCF15	0.29	6.4	1.4	1.02	0.33	2.3	
SDMF05	8.94	33.9	7.6	0.77	0.25	10.4	0.03
IRWD 001	6.70	46.1	10.4	<0.20	<0.07	11.9	0.79
IRWD 002	6.47	25.3	5.7	<0.13	<0.04	7.8	0.27

Table 3
Average Nitrogen and Phosphorus Loads
May 15 - 22, 2001

	Q_{ave} cfs	NO3 lbs/day	NO3 as N lbs/day	PO4 lbs/day	PO4 as P lbs/day	TN lbs/day	oP as P lbs/day
USHF06	0.38	10.6	2.4	1.66	0.54	5.7	
HCWF27	0.38	442	99.8	22.3	7.28	137	
DSBRCP	0.17	2.8	0.6	0.21	0.07	1.9	
CICF25	0.65	616	139	24.1	7.86	163	6.07
F06P07	0.06	19.1	4.3	0.57	0.18	5.1	
MIRF07	1.17	50.3	11.3	5.46	1.78	33.7	
CSCS03	0.70	276	62.3	1.05	0.34	65.4	
F06P08	0.26	88.1	19.9	0.77	0.25	20.9	
SAFF10	0.97	328	74.1	0.91	0.30	80.1	
VALS02	0.73	329	74.3	4.12	1.35	78.9	
WARF06	0.67	236	53.2	2.75	0.90	55.1	
F06P06	0.11	48.3	10.9	0.20	0.06	11.8	
BARSED	6.73	2527	571	43.7	14.3	647	12.8
WYLSED	2.23	924	209	3.54	1.16	224	
LANF08	2.03	820	185	1.83	0.60	214	
BRCF09	0.26	0.63	0.14	0.26	0.08	1.9	
SJQF14	0.86	120	27.1	4.06	1.33	32.5	
SCCF15	0.29	9.4	2.1	1.61	0.5	3.5	
SDMF05	8.94	1639	370	36.9	12.1	503	1.19
IRWD 001	6.70	1741	393	22.7	7.4	452	15.0
IRWD 002	6.47	859	194	14.4	4.7	267	8.5

Table 4
Average Daily Discharge, Nitrate and Phosphate Concentrations
Sep 99, June 00, May 01

Date of Study	Location	Avg. Q (cfs)	Avg. [Nitrate] as NO_3 (mg/L)	Avg. [Nitrate] as N (mg/L)	Avg. TN (mg/L)	Avg. [Phosphate] as PO_4 (mg/L)	Avg. [Phosphate] as P (mg/L)	Avg. [ortho-PO_4] as P (mg/L)
Sep-99	USHF06	0.29	13.9	3.14	4.61	1.37	0.45	
Jun-00	USHF06	0.74	2.54	0.57	1.83	0.62	0.20	
May-01	USHF06	**0.38**	**5.3**	**1.2**	**2.8**	**0.82**	**0.27**	
Sep-99	HCWF27		7.46	1.69	4.60	3.04	0.99	
Jun-00	HCWF27	0.57	9.79	2.21	6.02	3.13	1.02	
May-01	HCWF27	**0.38**	**215**	**48.5**	**66.4**	**10.8**	**3.53**	
Sep-99	DSBRCP	0.10	4.09	0.92	1.13	0.16	0.05	
Jun-00	DSBRCP	0.07	4.09	0.92	3.38	2.11	0.69	
May-01	DSBRCP	**0.17**	**3.0**	**0.7**	**1.9**	**0.21**	**0.07**	
Sep-99	CICF25	0.55	99.1	22.4	27.4	3.06	0.90	0.86
Jun-00	CICF25	0.58	66.3	15.0	17.9	2.96	0.96	0.63
May-01	CICF25	**0.65**	**173**	**39.0**	**45.3**	**6.71**	**2.19**	**1.66**
May-01	F06P07	**0.06**	**61.5**	**13.9**	**16.5**	**1.78**	**0.58**	
Sep-99	MIRF07	1.04	11.9	2.70	4.25	0.73	0.24	
Jun-00	MIRF07	1.20	7.81	1.76	4.95	1.20	0.39	
May-01	MIRF07	**1.17**	**7.6**	**1.7**	**5.2**	**0.86**	**0.28**	
Sep-99	CSCS03	0.56	89.6	20.2	20.8	0.19	0.06	
Jun-00	CSCS03	0.66	72.8	16.4	16.9	0.09	0.03	
May-01	CSCS03	**0.70**	**73.4**	**16.6**	**17.4**	**0.28**	**0.09**	
Sep-99	F06P08	0.23	81.0	18.3	18.8	0.56	0.18	
Jun-00	F06P08	0.22	65.4	14.8	15.1	0.54	0.18	
May-01	F06P08	**0.26**	**63.2**	**14.3**	**15.0**	**0.56**	**0.18**	
Sep-99	SAFF10	0.89	75.8	17.1	17.7	0.28	0.09	
Jun-00	SAFF10	1.78	57.1	12.9	13.4	0.15	0.05	
May-01	SAFF10	**0.97**	**63.0**	**14.2**	**15.4**	**0.17**	**0.06**	
Sep-99	VALS02	1.01	71.9	16.2	19.5	0.75	0.25	
Jun-00	VALS02	0.78	68.4	15.5	16.1	0.73	0.24	
May-01	VALS02	**0.73**	**83.1**	**18.8**	**19.9**	**1.04**	**0.34**	
Sep-99	WARF06	0.52	78.8	17.8	18.5	0.67	0.22	
Jun-00	WARF06	0.64	61.7	13.9	14.5	0.68	0.22	
May-01	WARF06	**0.67**	**64.9**	**14.6**	**15.2**	**0.76**	**0.25**	
Sep-99	F06P06	0.06	63.1	14.2	18.6	1.16	0.38	
Jun-00	F06P06	0.14	107	24.1	25.4	0.85	0.28	
May-01	F06P06	**0.11**	**83.3**	**18.8**	**20.3**	**0.36**	**0.12**	
Sep-99	BARSED	5.61	47.5	10.7	11.8	0.54	0.19	0.12
Jun-00	BARSED	6.60	41.0	9.26	10.3	0.68	0.22	0.12
May-01	BARSED	**6.73**	**69.9**	**15.8**	**17.8**	**1.20**	**0.39**	**0.35**
Sep-99	Agua Chinon Wash	0.25(i)	24.9(g)	5.63	6.31	1.85	0.60	
Sep-99	Bee Canyon Wash	0.06(i)	20.9(g)	4.72	6.48	3.01	0.98	
Sep-99	Marshburn Channel	0.05(i)	25.5(g)	5.77	6.29	0.60	0.19	
Sep-99	WYLSED	1.15	89.0	20.1	20.8	0.20	0.06	0.06
Jun-00	WYLSED	0.73	53.0	12.0	12.8	0.13	0.04	0.01
May-01	WYLSED	**2.23**	**76.4**	**17.3**	**18.5**	**0.29**	**0.09**	**0.05**
Sep-99	LANF08	1.20(i)	40.1(g)	9.05	9.80	0.46	0.15	
Jun-00	LANF08		24.1(g)	5.44	6.85	0.97	0.32	
May-01	LANF08	**2.03**	**39.8**	**9.0**	**10.4**	**1.83**	**0.60**	
Sep-99	BRCF09	0.53(i)	2.53(g)	0.57	1.53	0.27	0.09	
Jun-00	BRCF09	0.37(i)	2.53(g)	0.57	1.41	0.37	0.12	
May-01	BRCF09	**0.26(i)**	**<0.44**	**<0.09**	**1.3**	**0.28**	**0.09**	
Sep-99	SJQF14	0.70(i)	39.8(g)	8.99	9.74	0.83	0.27	
Jun-00	SJQF14	0.68(i)	15.8(g)	3.56	4.56	1.34	0.44	
May-01	SJQF14	**0.86**	**25.8(g)**	**5.83**	**7.00**	**0.88**	**0.29**	
Sep-99	SCCF15	0.58(i)	8.54(g)	1.93	3.53	1.04	0.34	
Jun-00	SCCF15	0.10(i)	0.56(g)	0.13	0.93	0.91	0.30	
May-01	SCCF15	**0.29(i)**	**6.40(g)**	**1.45**	**2.33**	**1.02**	**0.33**	
Sep-99	SDMF05	7.81	40.0	9.04	10.3	0.36	0.16	0.12
Jun-00	SDMF05	11.30	12.6	2.84	6.45	0.73	0.24	0.03
May-01	SDMF05	**8.94**	**33.9**	**7.6**	**10.4**	**0.77**	**0.25**	**0.03**
Sep-99	IRWD 001	5.10	32.5	7.35	9.34	0.45	0.15	
Jun-00	IRWD 001	4.97	33.1	7.49	9.36	<0.61	<0.20	<0.20
May-01	IRWD 001	**6.70**	**46.1**	**10.4**	**11.9**	**<0.20**	**<0.07**	**0.79**
Sep-99	IRWD 002	1.82	7.42	1.68	3.79	0.41	0.13	
Jun-00	IRWD 002	5.37	2.74	0.62	3.54	1.03	0.34	<0.20
May-01	IRWD 002	**6.47**	**25.3**	**5.7**	**7.8**	**<0.13**	**<0.04**	**0.27**

Analyses performed by IRWD
stantaneous discharge measurement or estimate
(g) = daily grab samples

Table 5
Average Daily Discharge Nitrate and Phosphate Loads
Sep 99, Jun 00, May 01

Date of Study	Location	Avg. Q (cfs)	Avg. Nitrate Load as NO_3 (lbs/day)	Avg. Nitrate Load as N (lbs/day)	TN lbs/day	Avg. Phosphate Load as PO_4 (lbs/day)	Avg. Phosphate Load as P (lbs/day)	oP lbs/day
Sep-99	USHF06	0.29	16.1	3.63	5.97	2.24	0.73	
Jun-00	USHF06	0.74	10.3	2.32	7.31	2.45	0.80	
May-01	USHF06	**0.38**	**10.6**	**2.4**	**5.7**	**1.66**	**0.54**	
Sep-99	HCWF27							
Jun-00	HCWF27	0.57	29.8	6.73	18.6	9.63	3.14	
May-01	HCWF27	**0.38**	**442**	**99.8**	**137**	**22.3**	**7.28**	
Sep-99	DSBRCP	0.10	2.25	0.51	0.62	0.09	0.03	
Jun-00	DSBRCP	0.07	1.14	0.26	0.51	0.25	0.08	
May-01	DSBRCP	**0.17**	**2.8**	**0.6**	**1.9**	**0.21**	**0.07**	
Sep-99	CICF25	0.55	299	67.4	83.5	9.06	2.96	
Jun-00	CICF25	0.58	210	47.4	56.8	9.21	3.00	
May-01	CICF25	**0.65**	**616**	**139**	**163**	**24.1**	**7.86**	**6.07**
May-01	F06P07	**0.06**	**19.1**	**4.3**	**5.1**	**0.57**	**0.18**	
Sep-99	MIRF07	1.04	68.6	15.5	24.3	4.10	1.34	
Jun-00	MIRF07	1.20	51.6	11.7	32.0	0.39	2.53	
May-01	MIRF07	**1.17**	**50.3**	**11.3**	**33.7**	**5.46**	**1.78**	
Sep-99	CSCS03	0.56	281	63.3	65.1	0.57	0.19	
Jun-00	CSCS03	0.66	259	58.4	60.2	0.31	0.10	
May-01	CSCS03	**0.70**	**276**	**62.3**	**65.4**	**1.05**	**0.34**	
Sep-99	F06P08	0.23	99.7	22.5	23.1	0.69	0.22	
Jun-00	F06P08	0.22	77.3	17.5	17.9	0.64	0.21	
May-01	F06P08	**0.26**	**88.1**	**19.9**	**20.9**	**0.77**	**0.25**	
Sep-99	SAFF10	0.89	346	78.1	81.0	1.36	0.44	
Jun-00	SAFF10	1.78	545	123	127	1.46	0.48	
May-01	SAFF10	**0.97**	**328**	**74.1**	**80.1**	**0.91**	**0.30**	
Sep-99	VALS02	1.01	390	88.2	106	4.14	1.35	
Jun-00	VALS02	0.78	288	64.9	67.7	3.09	1.01	
May-01	VALS02	**0.73**	**329**	**74.3**	**78.9**	**4.12**	**1.35**	
Sep-99	WARF06	0.52	219	49.5	51.4	1.88	0.61	
Jun-00	WARF06	0.64	212	47.8	49.7	2.35	0.77	
May-01	WARF06	**0.67**	**236**	**53.2**	**55.1**	**2.75**	**0.90**	
Sep-99	F06P06	0.06	18.9	4.27	5.51	0.36	0.12	
Jun-00	F06P06	0.14	79.1	17.9	18.8	0.62	0.20	
May-01	F06P06	**0.11**	**48.3**	**10.9**	**11.8**	**0.20**	**0.06**	
Sep-99	BARSED	5.61	1412	319	352	16.1	5.24	
Jun-00	BARSED	6.59	1453	328	367	24.1	7.87	4.31
May-01	BARSED	**6.73**	**2527**	**571**	**647**	**43.7**	**14.3**	**12.8**
Sep-99	Agua Chinon Wash	0.25(i)	31.7(g)	7.15	8.08	2.50	0.82	
Sep-99	Bee Canyon Wash	0.06(i)	7.05(g)	1.59	2.21	1.02	0.33	
Sep-99	Marshburn Channel	0.05(i)	2.83(g)	0.64	0.75	0.14	0.04	
Sep-99	WYLSED	1.15	559	126	131	1.20	0.39	
Jun-00	WYLSED	0.73	211	47.6	50.8	0.50	0.16	0.04
May-01	WYLSED	**2.23**	**924**	**209**	**224**	**3.54**	**1.16**	
Sep-99	LANF08	1.30(i)	281(g)	63.4	68.6	2.97	0.97	
Jun-00	LANF08	1.70(i)	220(g)	49.6	62.6	8.89	2.90	
May-01	LANF08	**2.03**	**820**	**185**	**214**	**1.83**	**0.60**	
Sep-99	BRCF09	0.53(i)	7.33(g)	1.66	4.36	0.76	0.25	
Jun-00	BRCF09	0.37(i)	5.42(g)	1.22	3.08	0.58	0.19	
May-01	BRCF09	**0.26(i)**	**0.63(g)**	**0.14**	**1.9**	**0.26**	**0.08**	
Sep-99	SJQF14	0.70(i)	150(g)	33.8	36.6	3.09	1.01	
Jun-00	SJQF14	0.68(i)	57.9(g)	13.1	16.7	4.95	1.62	
May-01	SJQF14	**0.86(i)**	**120(g)**	**27.1**	**32.5**	**4.06**	**1.33**	
Sep-99	SCCF15	0.58(i)	28.0(g)	6.32	11.4	3.36	1.10	
Jun-00	SCCF15	0.10(i)	0.34(g)	0.08	0.70	0.49	0.16	
May-01	SCCF15	**0.29(i)**	**9.40(g)**	**2.1**	**3.5**	**1.61**	**0.5**	
Sep-99	SDMF05	7.81	1690	382	435	15.4	5.03	
Jun-00	SDMF05	11.2	748	169	376	43.4	14.2	1.86
May-01	SDMF05	**8.94**	**1639**	**370**	**503**	**36.9**	**12.1**	**1.19**
Sep-99	IRWD 001	5.10	891	201	256	12.5	4.08	
Jun-00	IRWD 001	4.96	893	202	252	<16.5	<5.38	<5.38
May-01	IRWD 001	**6.70**	**1741**	**393**	**452**	**<22.7**	**<7.4**	**15.0**
Sep-99	IRWD 002	1.82	67.6	15.3	27.8	3.41	1.11	
Jun-00	IRWD 002	5.37	114	25.7	127	35.6	11.6	<5.35
May-01	IRWD 002	**6.47**	**859**	**194**	**267**	**<14.4**	**<4.7**	**8.5**

Figures

Figure 1
2001 Peters Canyon Wash / San Diego Creek Nutrient Study
Monitoring Site Location Map

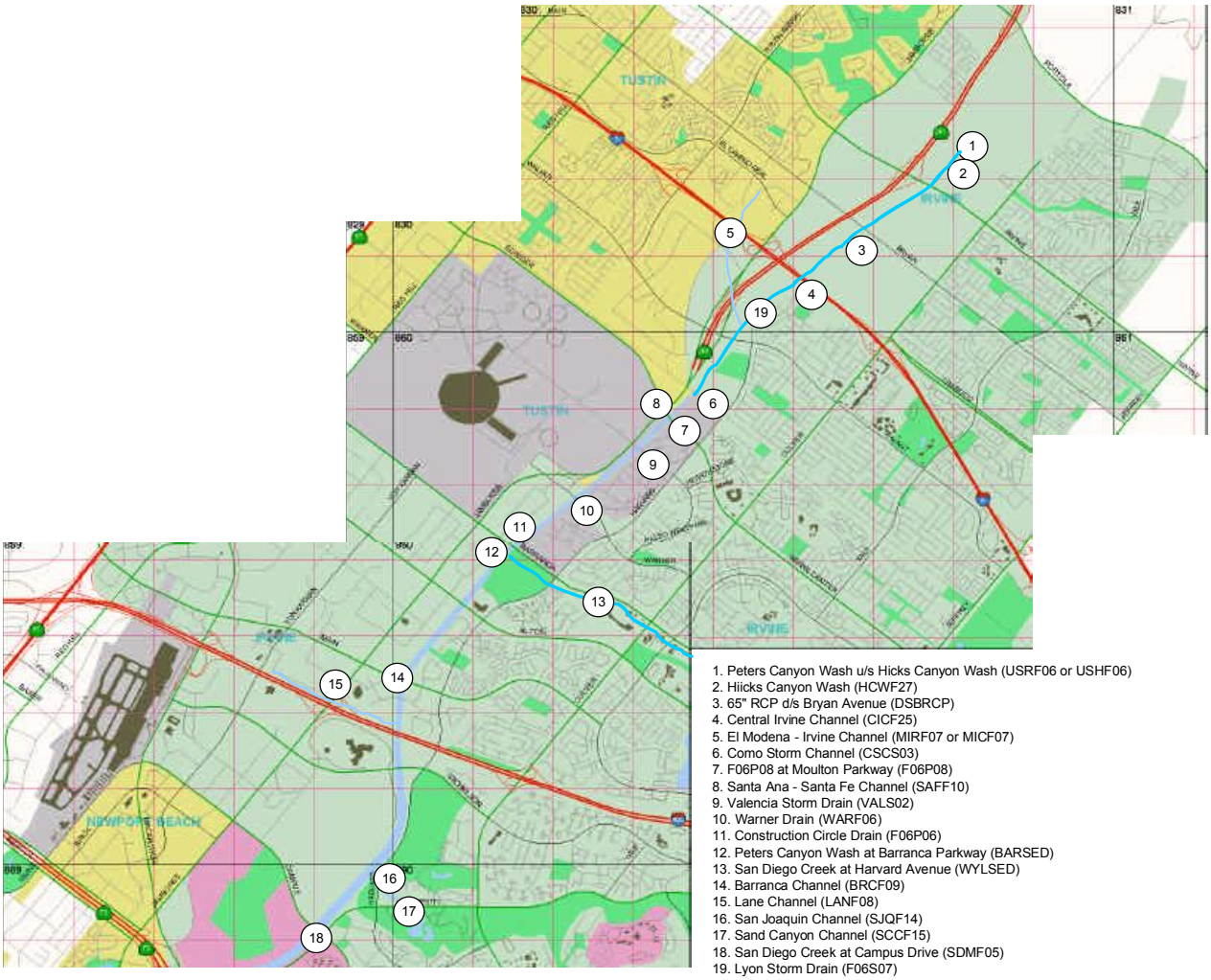

1. Peters Canyon Wash u/s Hicks Canyon Wash (USRF06 or USHF06)
2. Hiicks Canyon Wash (HCWF27)
3. 65" RCP d/s Bryan Avenue (DSBRCP)
4. Central Irvine Channel (CICF25)
5. El Modena - Irvine Channel (MIRF07 or MICF07)
6. Como Storm Channel (CSCS03)
7. F06P08 at Moulton Parkway (F06P08)
8. Santa Ana - Santa Fe Channel (SAFF10)
9. Valencia Storm Drain (VALS02)
10. Warner Drain (WARF06)
11. Construction Circle Drain (F06P06)
12. Peters Canyon Wash at Barranca Parkway (BARSED)
13. San Diego Creek at Harvard Avenue (WYLSED)
14. Barranca Channel (BRCF09)
15. Lane Channel (LANF08)
16. San Joaquin Channel (SJQF14)
17. Sand Canyon Channel (SCCF15)
18. San Diego Creek at Campus Drive (SDMF05)
19. Lyon Storm Drain (F06S07)

Figure 2
Average Daily Flow Rates
cubic feet / second
May 15 -22, 2001

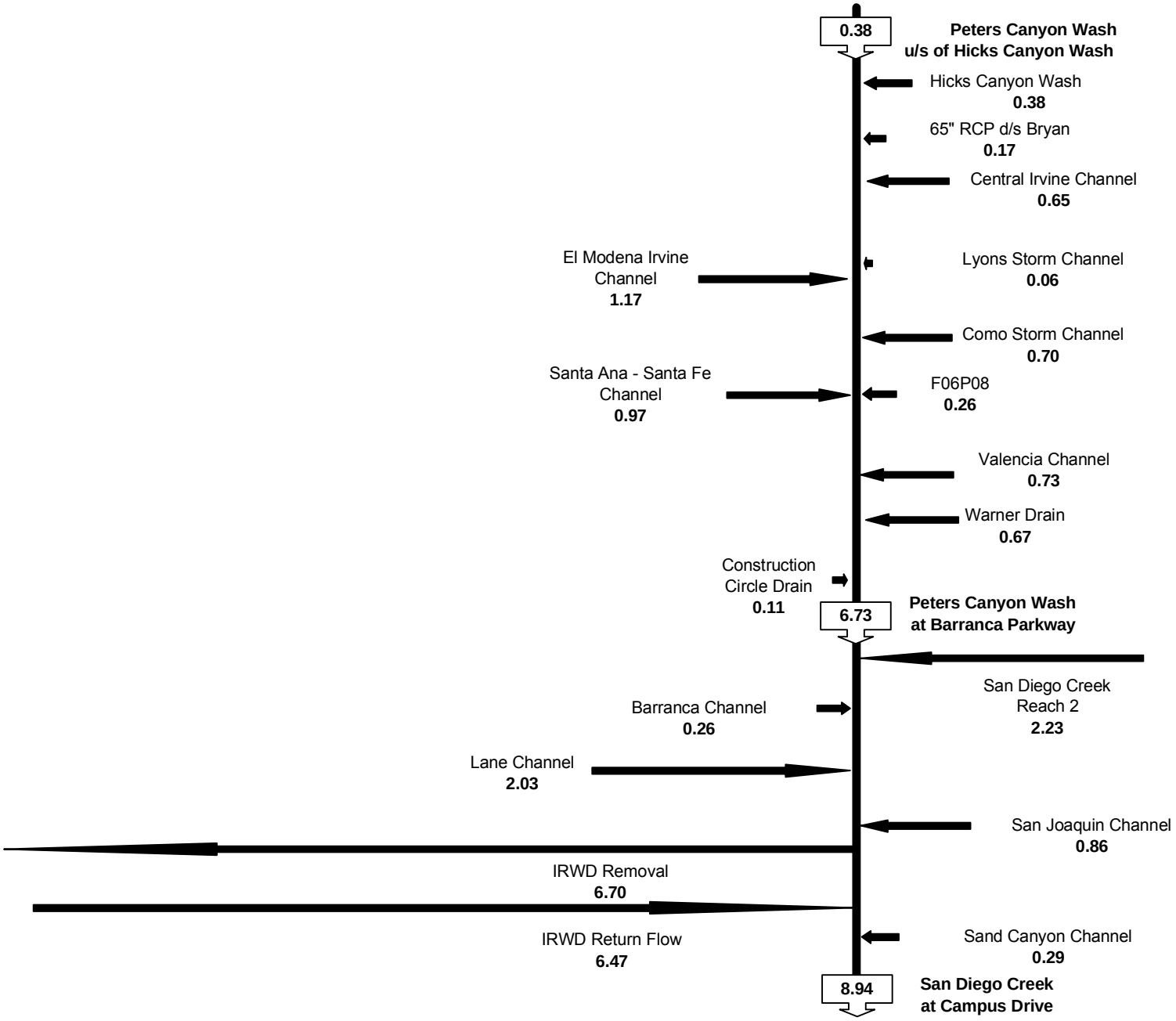

Figure 3
Average Daily Nitrate Nitrogen Concentration
mg/L NO_3 as N
May 15 -22, 2001

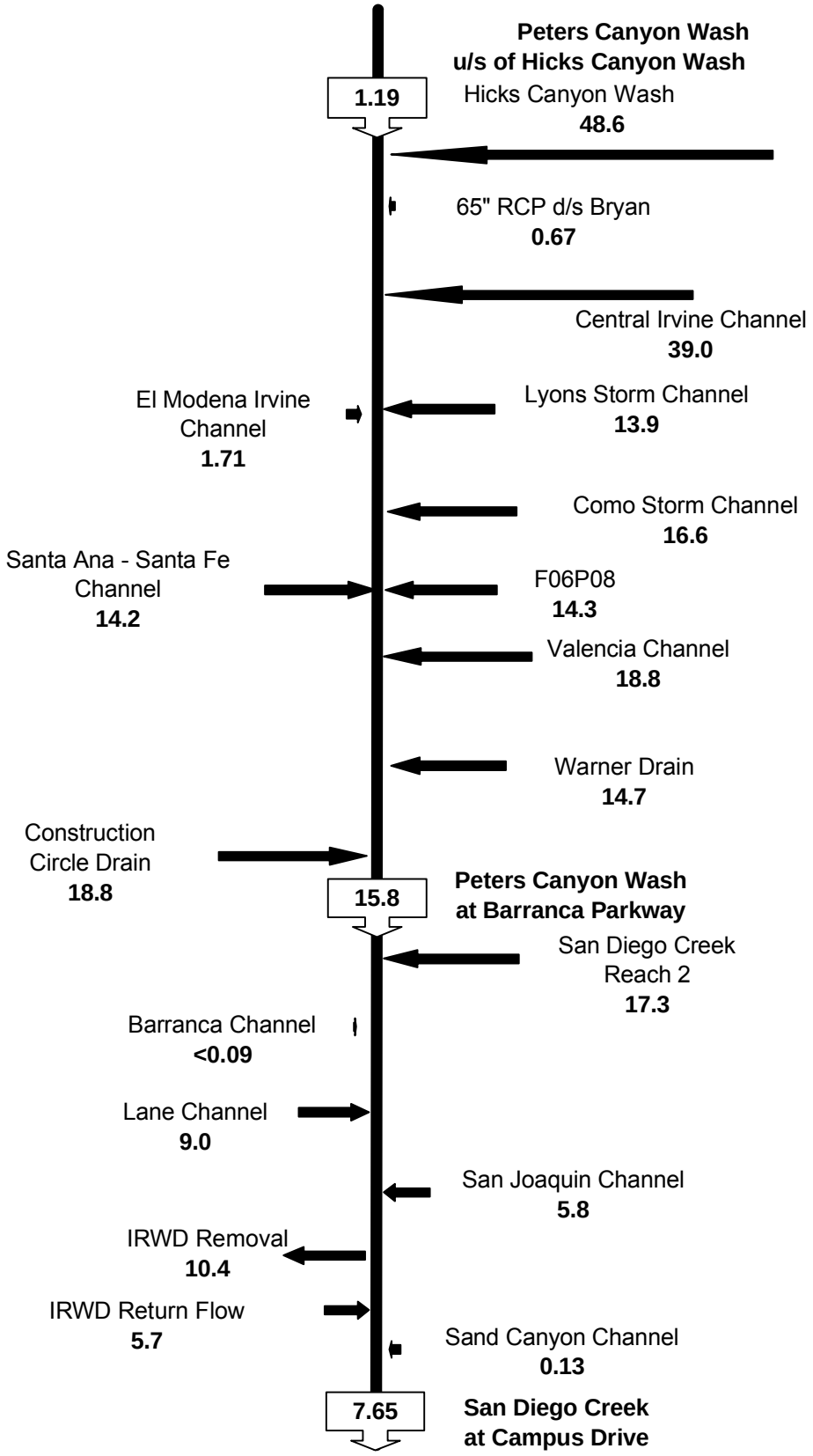

Figure 4
Average Daily Nitrate Nitrogen Load
NO_3 as N (lbs/day)
May 15 -22, 2001

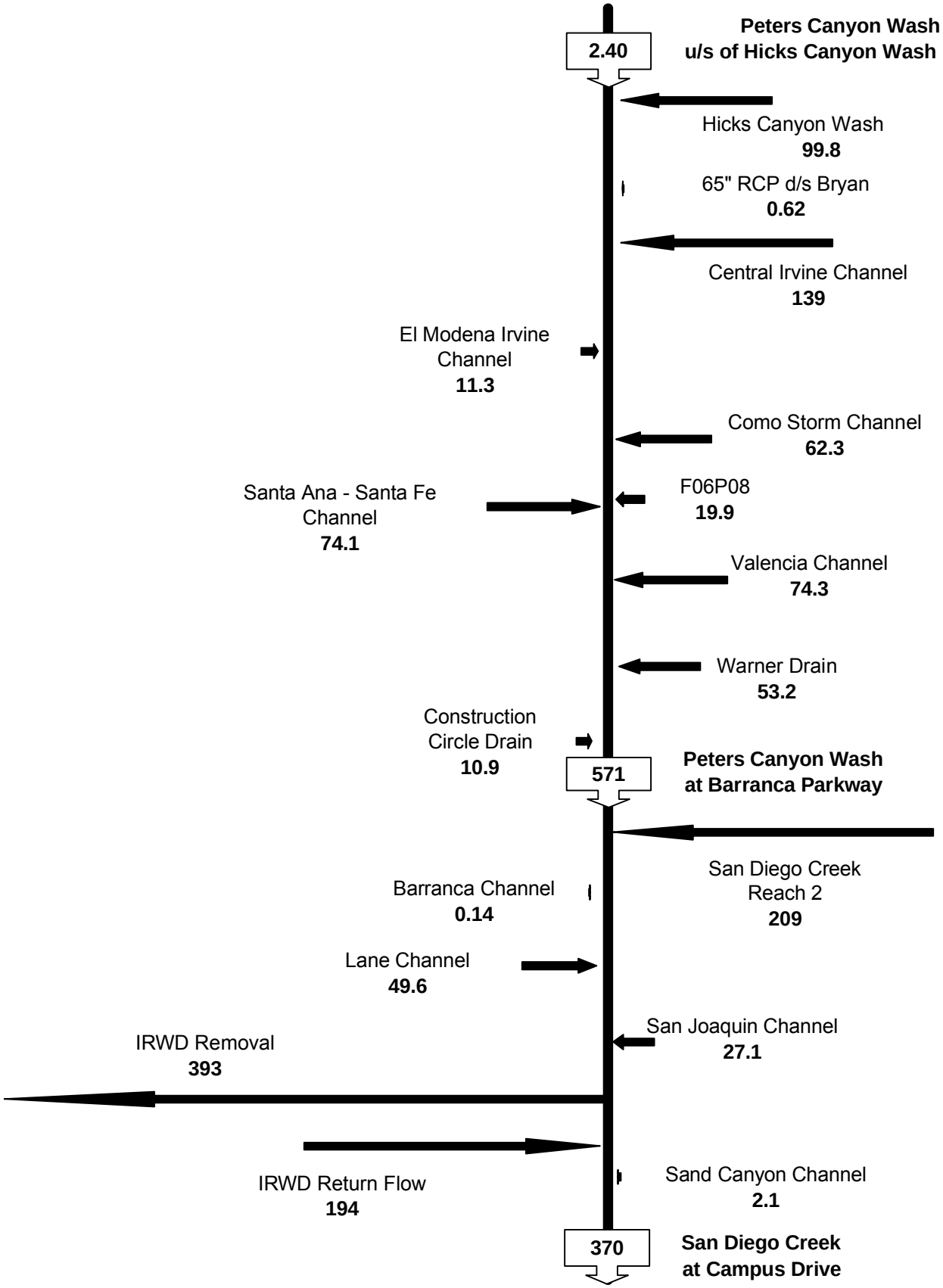

Figure 5
Average Daily Total Nitrogen Load
TN (lbs/day)
May 15 - 22, 2001

005514

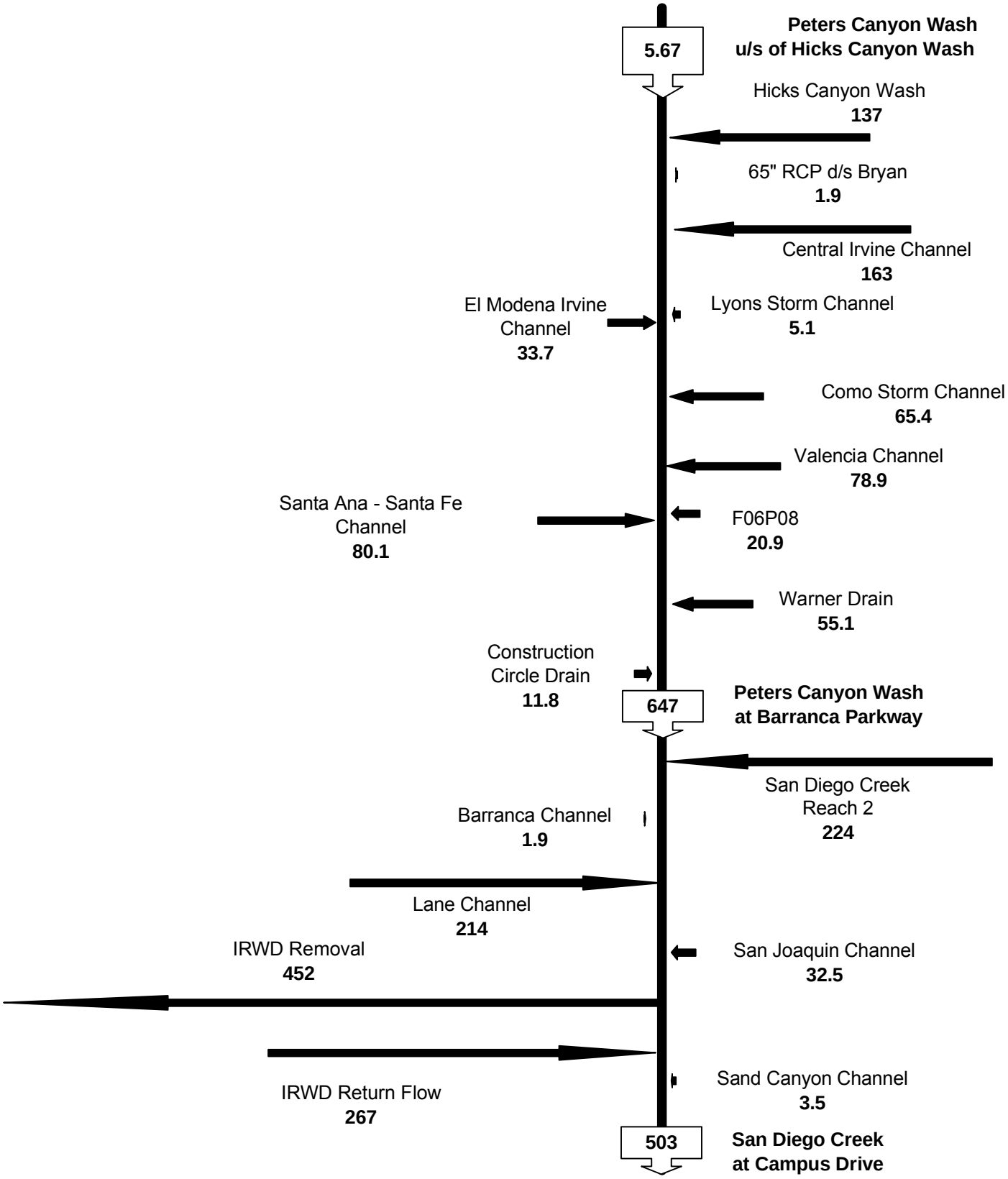

Figure 6
Average Daily Phosphorus Load
PO_4 as P (lbs/day)
May 15 - 22, 2001

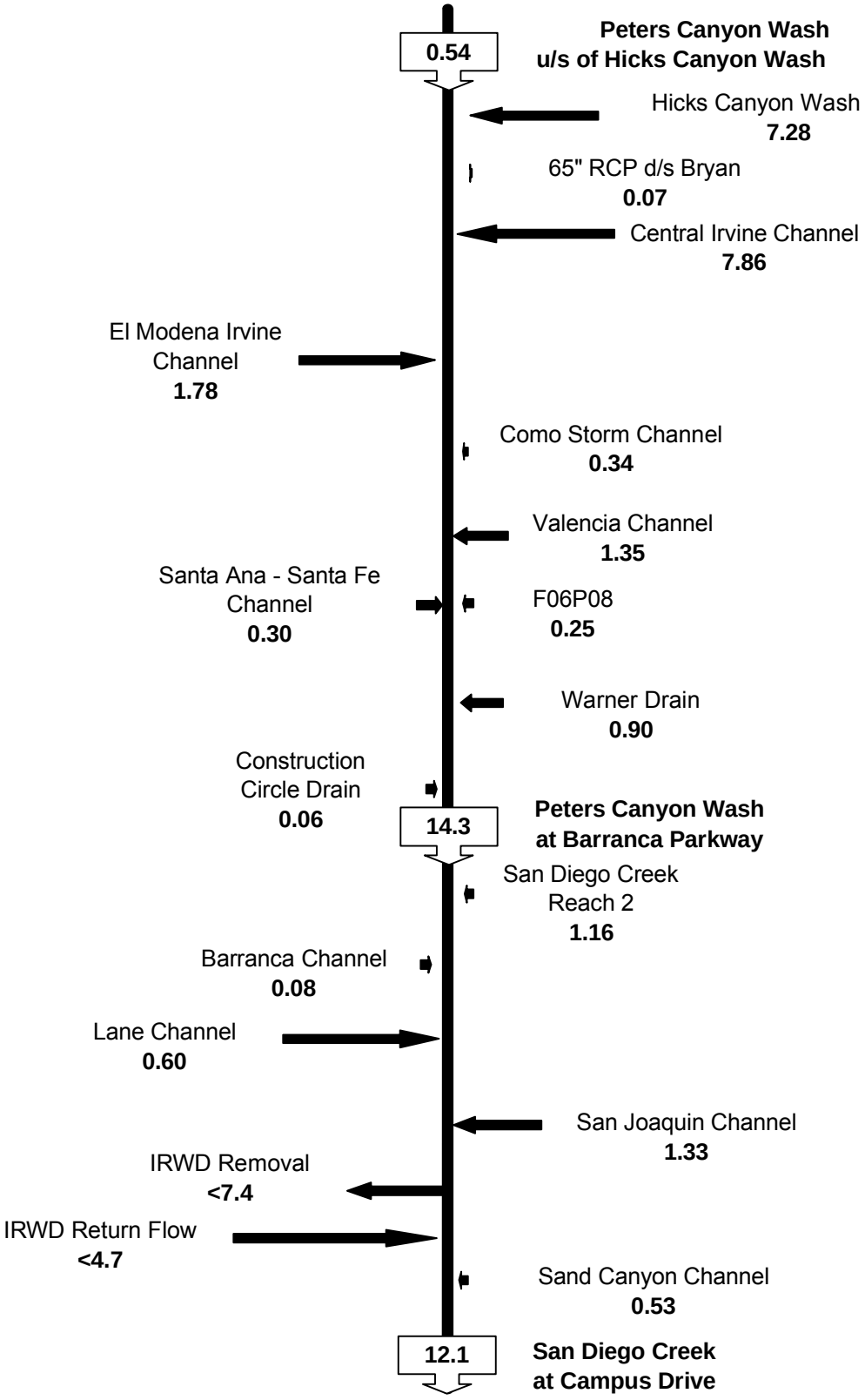

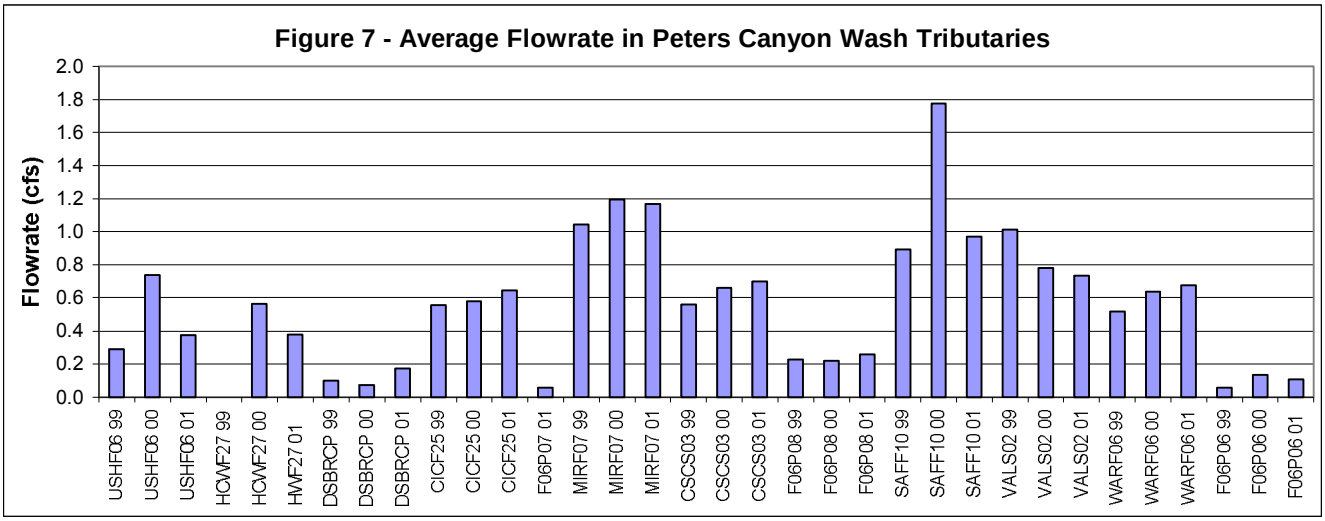
Figure 7 - Average Flowrate in Peters Canyon Wash Tributaries
Flowrate (cfs)
2.0
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
USHF06 99
USHF06 00
USHF06 01
HCWF27 99
HCWF27 00
HWF27 01
DSBRCP 99
DSBRCP 00
DSBRCP 01
CICF25 99
CICF25 00
CICF25 01
F06P07 01
MIRF07 99
MIRF07 00
MIRF07 01
CSCS03 99
CSCS03 00
CSCS03 01
F06P08 99
F06P08 00
F06P08 01
SAFF10 99
SAFF10 00
SAFF10 01
VALS02 99
VALS02 00
VALS02 01
WARF06 99
WARF06 00
WARF06 01
F06P06 99
F06P06 00
F06P06 01

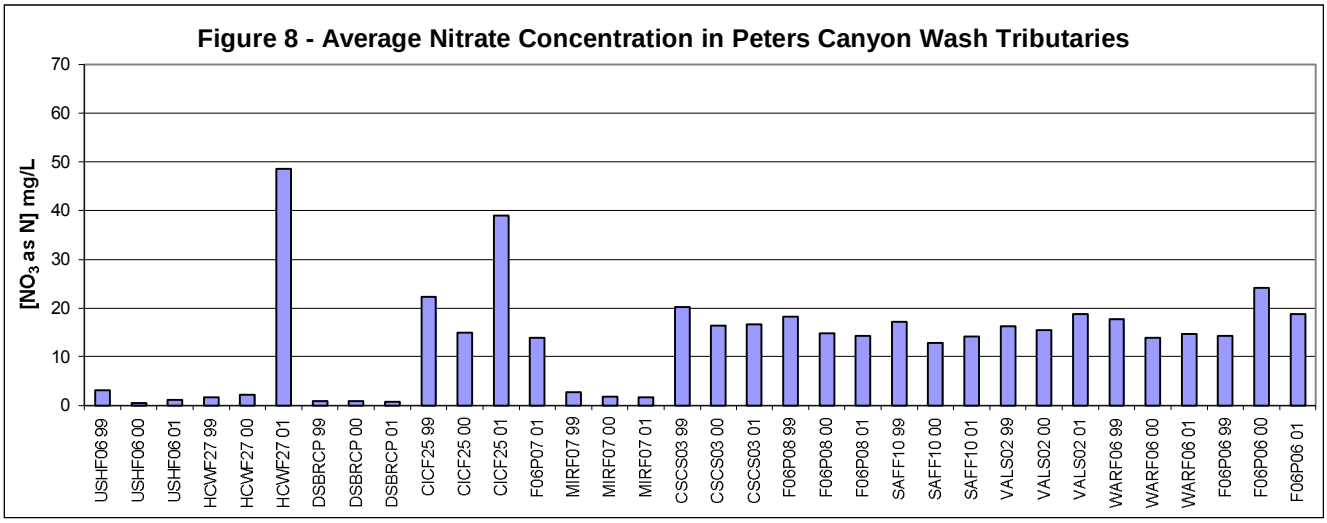
Figure 8 - Average Nitrate Concentration in Peters Canyon Wash Tributaries
[NO3 as N] mg/L
70
60
50
40
30
20
10
0
USHF06 99
USHF06 00
USHF06 01
HCWF27 99
HCWF27 00
HCWF27 01
DSBRCP 99
DSBRCP 00
DSBRCP 01
CICF25 99
CICF25 00
CICF25 01
F06P07 01
MIRF07 99
MIRF07 00
MIRF07 01
CSCS03 99
CSCS03 00
CSCS03 01
F06P08 99
F06P08 00
F06P08 01
SAFF10 99
SAFF10 00
SAFF10 01
VALS02 99
VALS02 00
VALS02 01
WARF06 99
WARF06 00
WARF06 01
F06P06 99
F06P06 00
F06P06 01

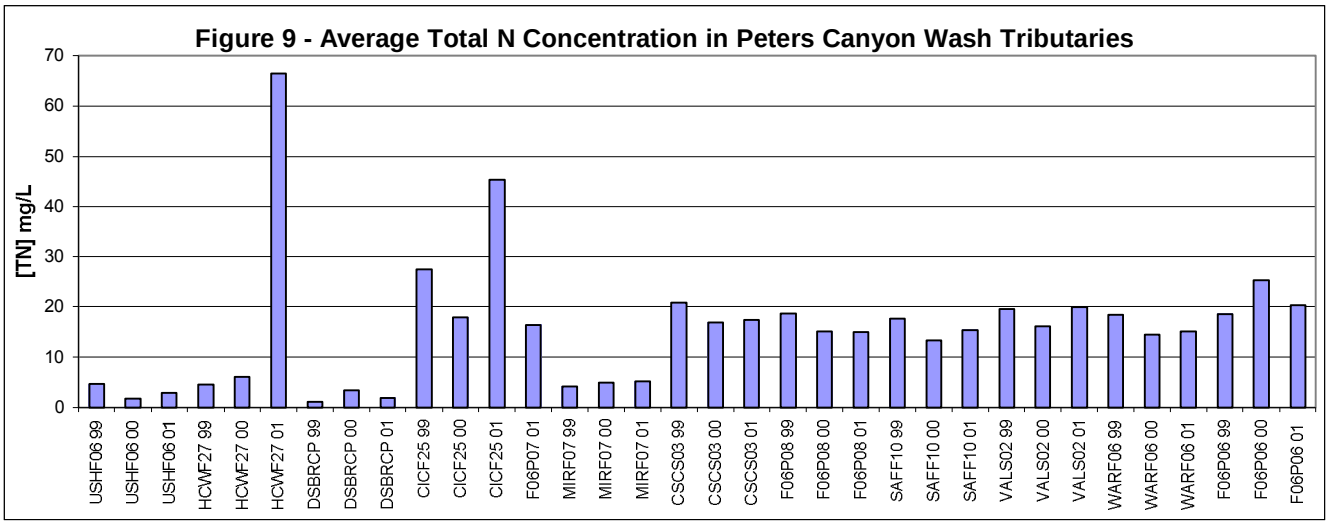
Figure 9 - Average Total N Concentration in Peters Canyon Wash Tributaries
[TN] mg/L
70
60
50
40
30
20
10
0
USHF06 99
USHF06 00
USHF06 01
HCWF27 99
HCWF27 00
HCWF27 01
DSBRCP 99
DSBRCP 00
DSBRCP 01
CICF25 99
CICF25 00
CICF25 01
F06P07 01
MIRF07 99
MIRF07 00
MIRF07 01
CSCS03 99
CSCS03 00
CSCS03 01
F06P08 99
F06P08 00
F06P08 01
SAFF10 99
SAFF10 00
SAFF10 01
VALS02 99
VALS02 00
VALS02 01
WARF06 99
WARF06 00
WARF06 01
F06P06 99
F06P06 00
F06P06 01

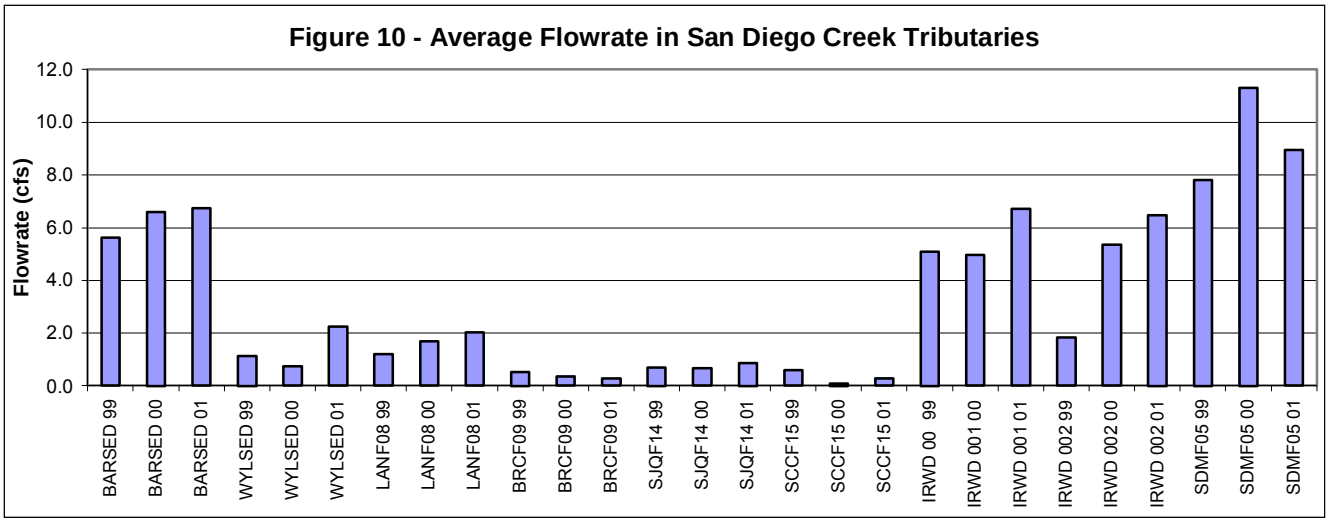
Figure 10 - Average Flowrate in San Diego Creek Tributaries
Flowrate (cfs)
12.0
10.0
8.0
6.0
4.0
2.0
0.0
BARSED 99
BARSED 00
BARSED 01
WYLSED 99
WYLSED 00
WYLSED 01
LANF08 99
LANF08 00
LANF08 01
BRCF09 99
BRCF09 00
BRCF09 01
SJQF14 99
SJQF14 00
SJQF14 01
SCCF15 99
SCCF15 00
SCCF15 01
IRWD 00 99
IRWD 001 00
IRWD 001 01
IRWD 002 99
IRWD 002 00
IRWD 002 01
SDMF05 99
SDMF05 00
SDMF05 01

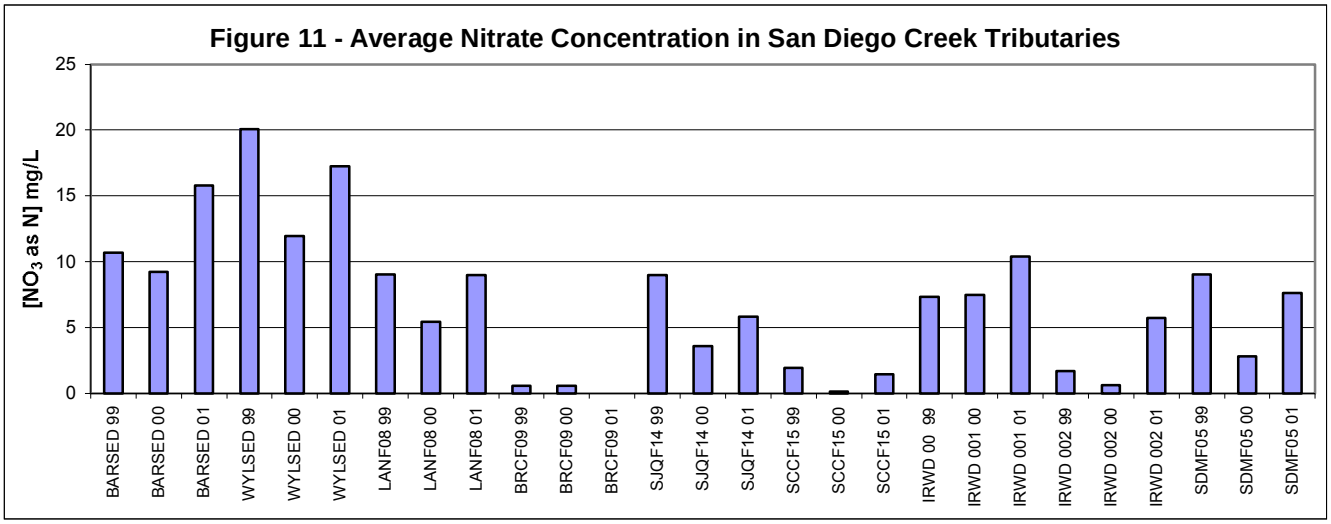
Figure 11 - Average Nitrate Concentration in San Diego Creek Tributaries
[NO3 as N] mg/L
25
20
15
10
5
0
BARSED 99
BARSED 00
BARSED 01
WYLSED 99
WYLSED 00
WYLSED 01
LANF08 99
LANF08 00
LANF08 01
BRCF09 99
BRCF09 00
BRCF09 01
SJQF14 99
SJQF14 00
SJQF14 01
SCCF15 99
SCCF15 00
SCCF15 01
IRWD 00 99
IRWD 001 00
IRWD 001 01
IRWD 002 99
IRWD 002 00
IRWD 002 01
SDMF05 99
SDMF05 00
SDMF05 01

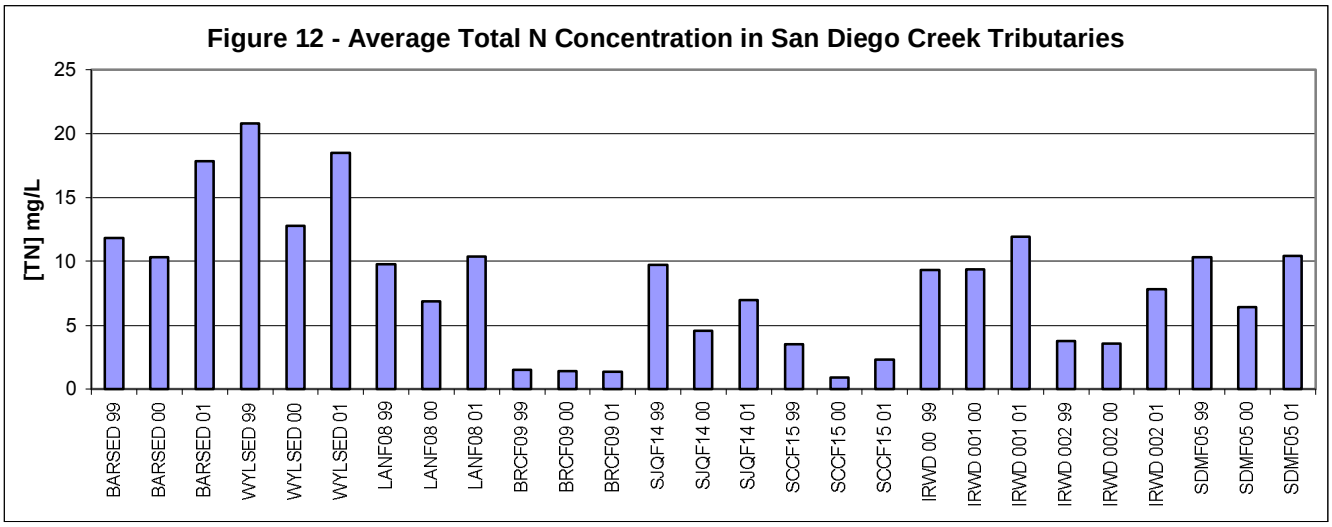
Figure 12 - Average Total N Concentration in San Diego Creek Tributaries
[TN] mg/L
25
20
15
10
5
0
BARSED 99
BARSED 00
BARSED 01
WYLSED 99
WYLSED 00
WYLSED 01
LANF08 99
LANF08 00
LANF08 01
BRCF09 99
BRCF09 00
BRCF09 01
SJQF14 99
SJQF14 00
SJQF14 01
SCCF15 99
SCCF15 00
SCCF15 01
IRWD 00 99
IRWD 001 00
IRWD 001 01
IRWD 002 99
IRWD 002 00
IRWD 002 01
SDMF05 99
SDMF05 00
SDMF05 01

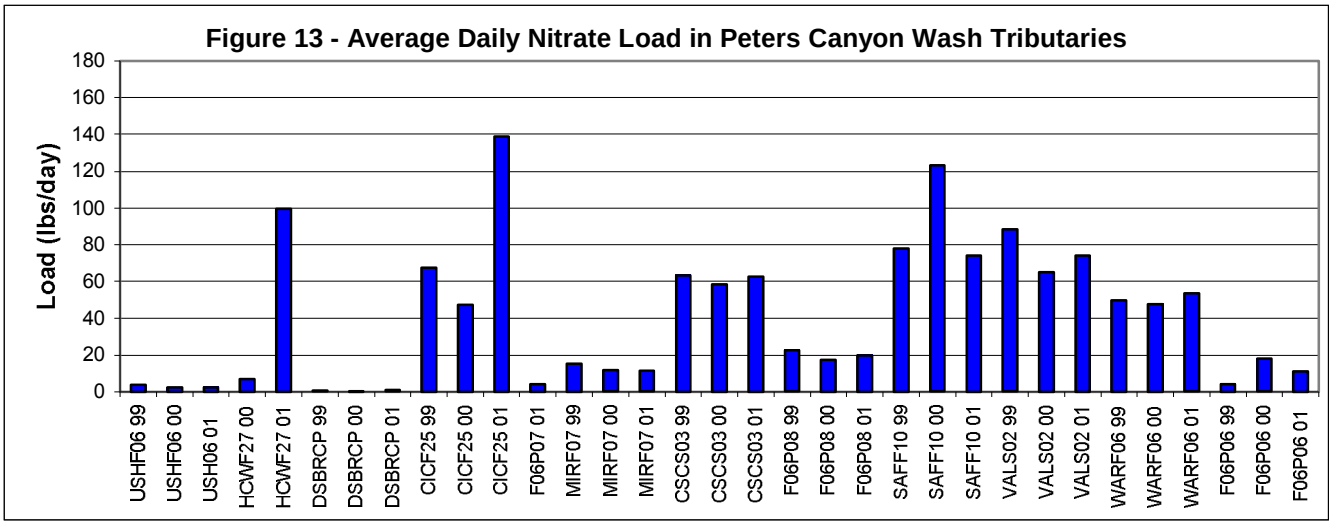
Figure 13 - Average Daily Nitrate Load in Peters Canyon Wash Tributaries
Load (lbs/day)
0
20
40
60
80
100
120
140
160
180
USHF06 99
USHF06 00
USH06 01
HCWF27 00
HCWF27 01
DSBRCP 99
DSBRCP 00
DSBRCP 01
CICF25 99
CICF25 00
CICF25 01
F06P07 01
MIRF07 99
MIRF07 00
MIRF07 01
CSCS03 99
CSCS03 00
CSCS03 01
F06P08 99
F06P08 00
F06P08 01
SAFF10 99
SAFF10 00
SAFF10 01
VALS02 99
VALS02 00
VALS02 01
WARF06 99
WARF06 00
WARF06 01
F06P06 99
F06P06 00
F06P06 01

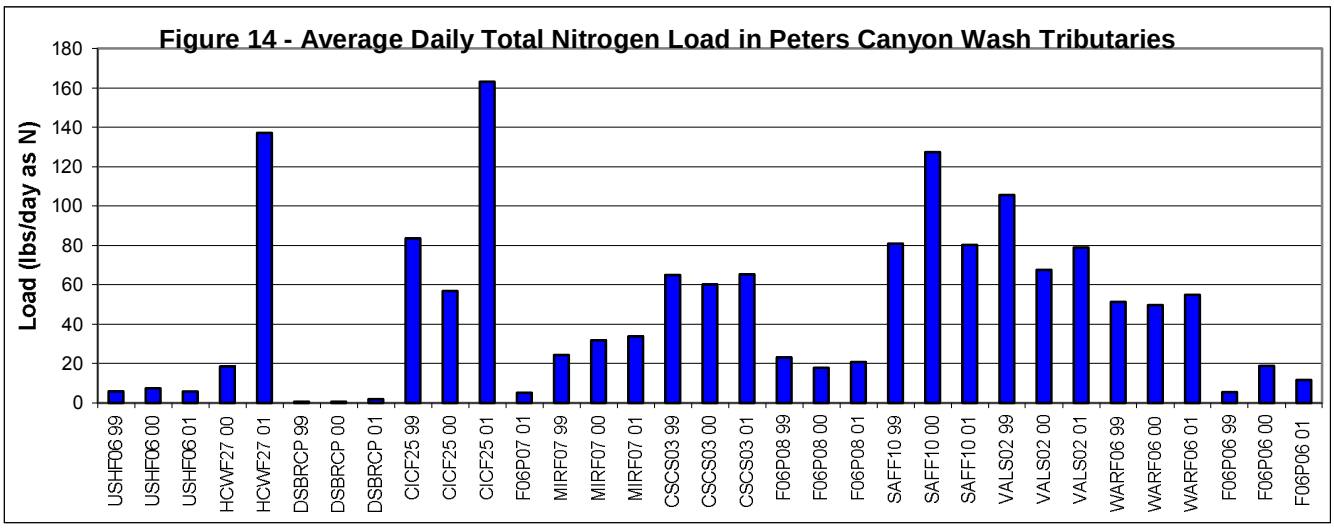
Figure 14 - Average Daily Total Nitrogen Load in Peters Canyon Wash Tributaries
Load (lbs/day as N)
0
20
40
60
80
100
120
140
160
180
USHF06 99
USHF06 00
USHF06 01
HCWF27 00
HCWF27 01
DSBRCP 99
DSBRCP 00
DSBRCP 01
CICF25 99
CICF25 00
CICF25 01
F06P07 01
MIRF07 99
MIRF07 00
MIRF07 01
CSCS03 99
CSCS03 00
CSCS03 01
F06P08 99
F06P08 00
F06P08 01
SAFF10 99
SAFF10 00
SAFF10 01
VALS02 99
VALS02 00
VALS02 01
WARF06 99
WARF06 00
WARF06 01
F06P06 99
F06P06 00
F06P06 01

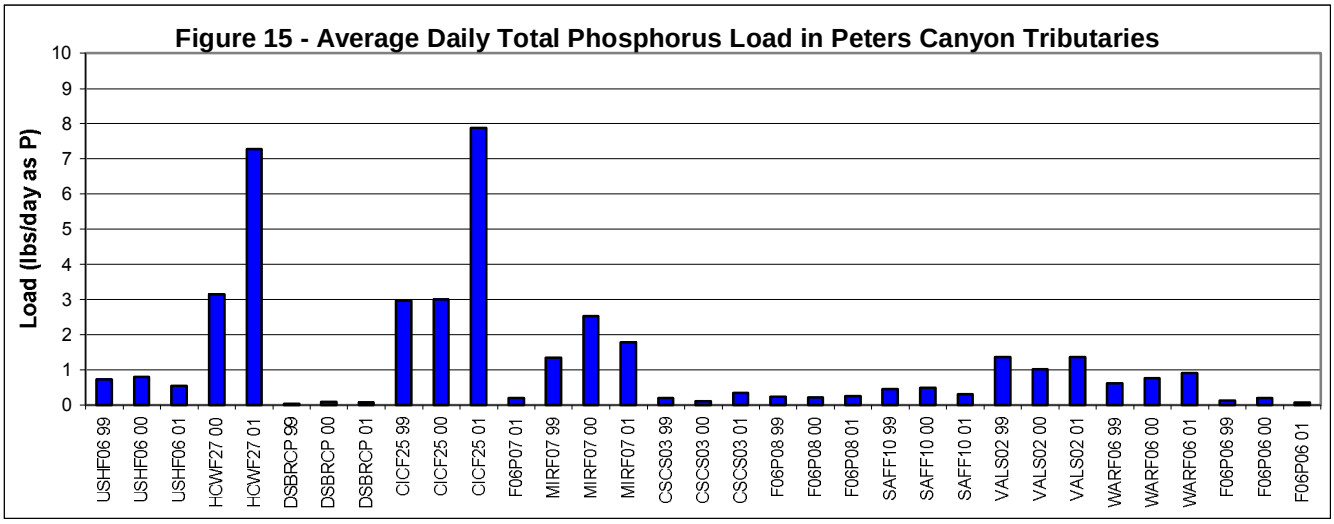
Figure 15 - Average Daily Total Phosphorus Load in Peters Canyon Tributaries
Load (lbs/day as P)
0
1
2
3
4
5
6
7
8
9
10
USHF06 99
USHF06 00
USHF06 01
HCWF27 00
HCWF27 01
DSBRCP 99
DSBRCP 00
DSBRCP 01
CICF25 99
CICF25 00
CICF25 01
F06P07 01
MIRF07 99
MIRF07 00
MIRF07 01
CSCS03 99
CSCS03 00
CSCS03 01
F06P08 99
F06P08 00
F06P08 01
SAFF10 99
SAFF10 00
SAFF10 01
VALS02 99
VALS02 00
VALS02 01
WARF06 99
WARF06 00
WARF06 01
F06P06 99
F06P06 00
F06P06 01

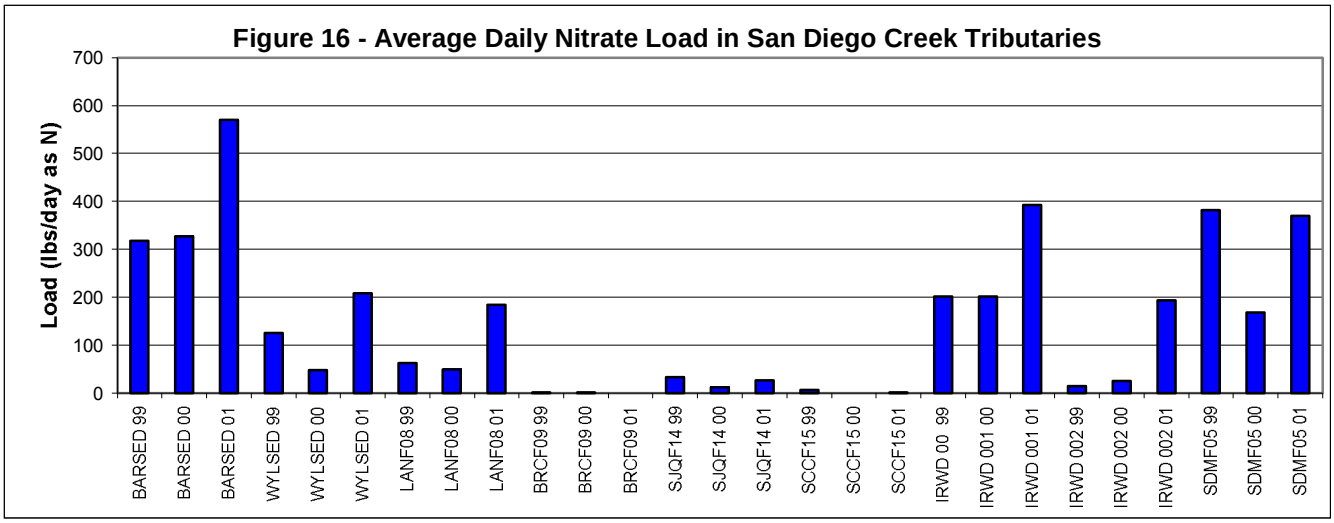
Figure 16 - Average Daily Nitrate Load in San Diego Creek Tributaries
Load (lbs/day as N)
700
600
500
400
300
200
100
0
BARSED 99
BARSED 00
BARSED 01
WYLSED 99
WYLSED 00
WYLSED 01
LANF08 99
LANF08 00
LANF08 01
BRCF09 99
BRCF09 00
BRCF09 01
SJQF14 99
SJQF14 00
SJQF14 01
SCCF15 99
SCCF15 00
SCCF15 01
IRWD 00 99
IRWD 001 00
IRWD 001 01
IRWD 002 99
IRWD 002 00
IRWD 002 01
SDMF05 99
SDMF05 00
SDMF05 01

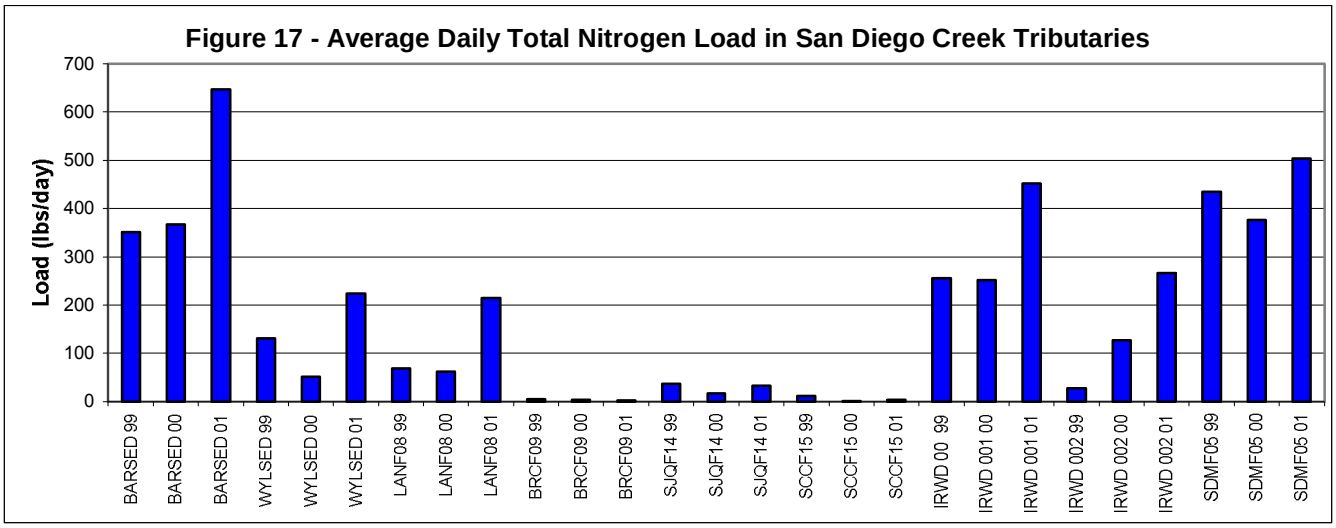
Figure 17 - Average Daily Total Nitrogen Load in San Diego Creek Tributaries
Load (lbs/day)
700
600
500
400
300
200
100
0
BARSED 99
BARSED 00
BARSED 01
WYLSED 99
WYLSED 00
WYLSED 01
LANF08 99
LANF08 00
LANF08 01
BRCF09 99
BRCF09 00
BRCF09 01
SJQF14 99
SJQF14 00
SJQF14 01
SCCF15 99
SCCF15 00
SCCF15 01
IRWD 00 99
IRWD 001 00
IRWD 001 01
IRWD 002 99
IRWD 002 00
IRWD 002 01
SDMF05 99
SDMF05 00
SDMF05 01

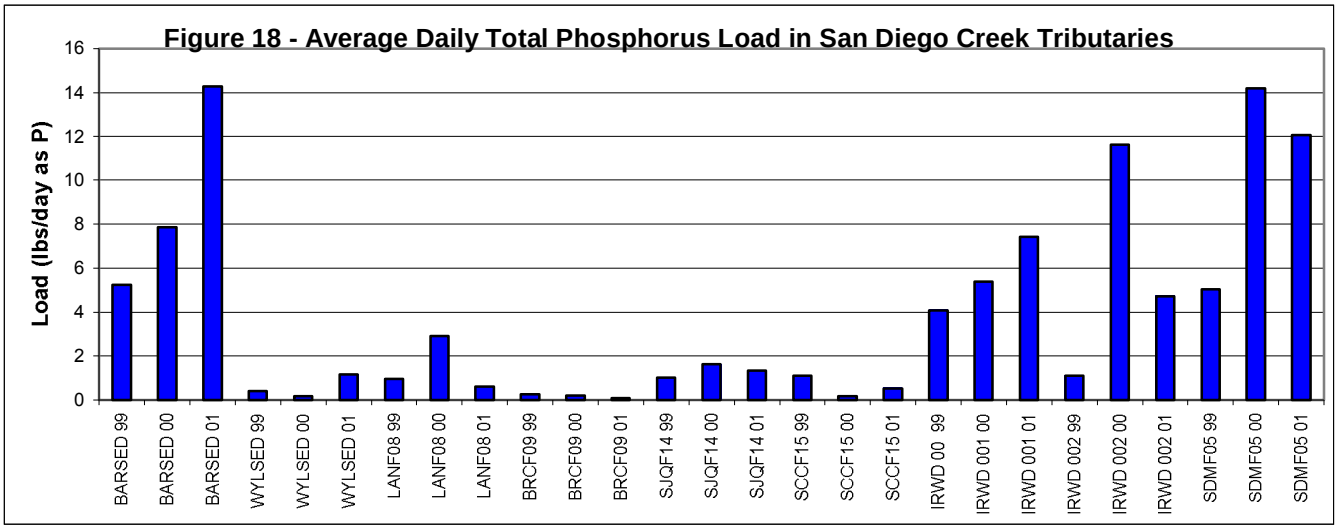
Figure 18 - Average Daily Total Phosphorus Load in San Diego Creek Tributaries
Load (lbs/day as P)
16
14
12
10
8
6
4
2
0
BARSED 99
BARSED 00
BARSED 01
WYLSED 99
WYLSED 00
WYLSED 01
LANF08 99
LANF08 00
LANF08 01
BRCF09 99
BRCF09 00
BRCF09 01
SJQF14 99
SJQF14 00
SJQF14 01
SCCF15 99
SCCF15 00
SCCF15 01
IRWD 00 99
IRWD 001 00
IRWD 001 01
IRWD 002 99
IRWD 002 00
IRWD 002 01
SDMF05 99
SDMF05 00
SDMF05 01

Figure 19

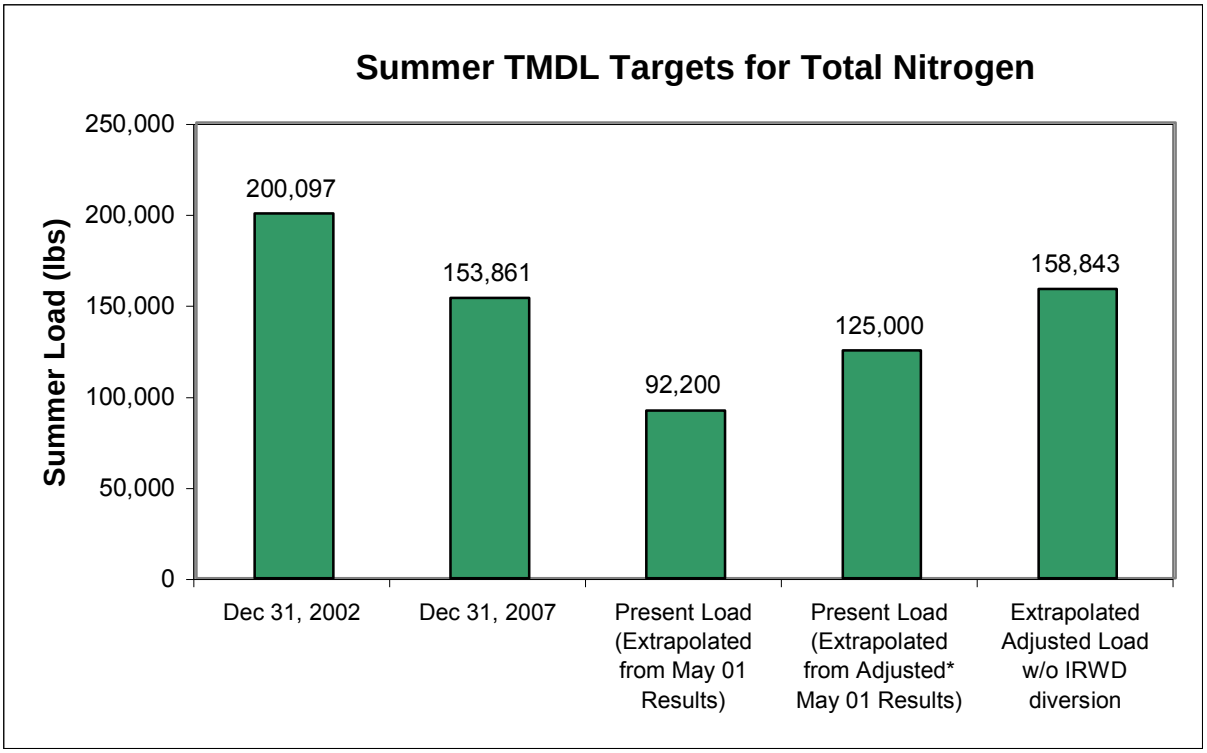

* Adjustment of flowrate at Campus Drive to sum of upstream discharges
Summer = April 1 - September 30
Total Nitrogen includes nitrate nitrogen, ammonia nitrogen, and organic nitrogen.

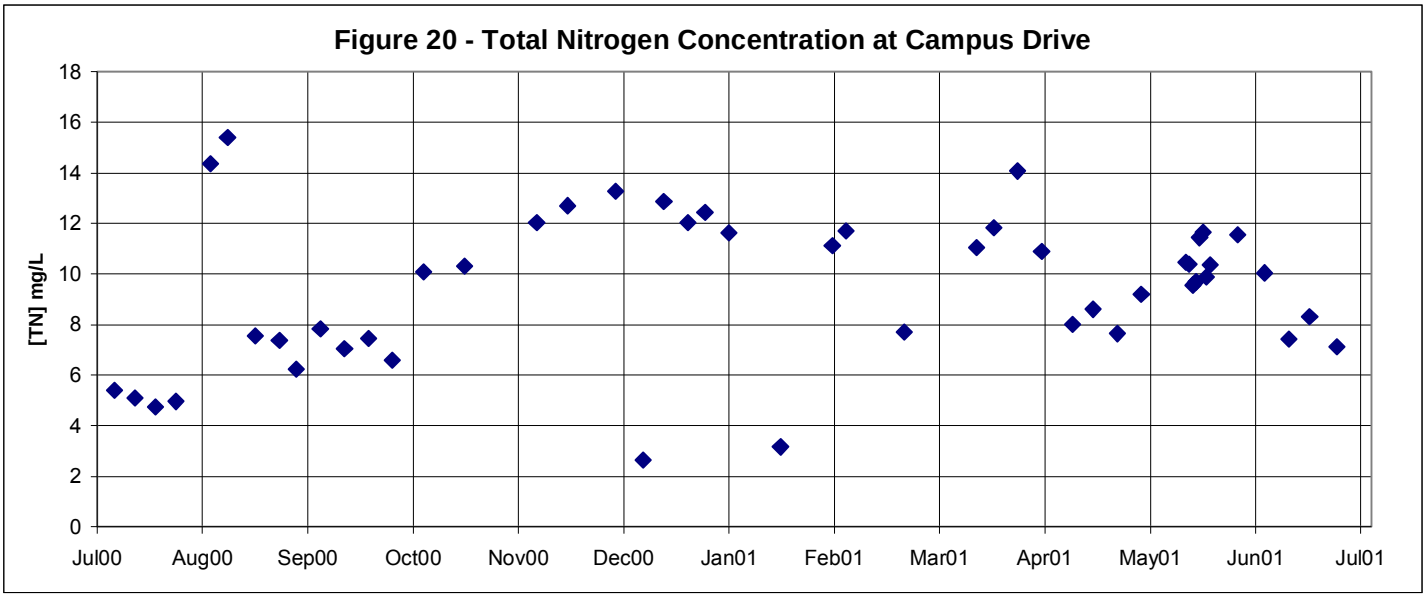
Figure 20 - Total Nitrogen Concentration at Campus Drive
[TN] mg/L
0
2
4
6
8
10
12
14
16
18
Jul00
Aug00
Sep00
Oct00
Nov00
Dec00
Jan01
Feb01
Mar01
Apr01
May01
Jun01
Jul01

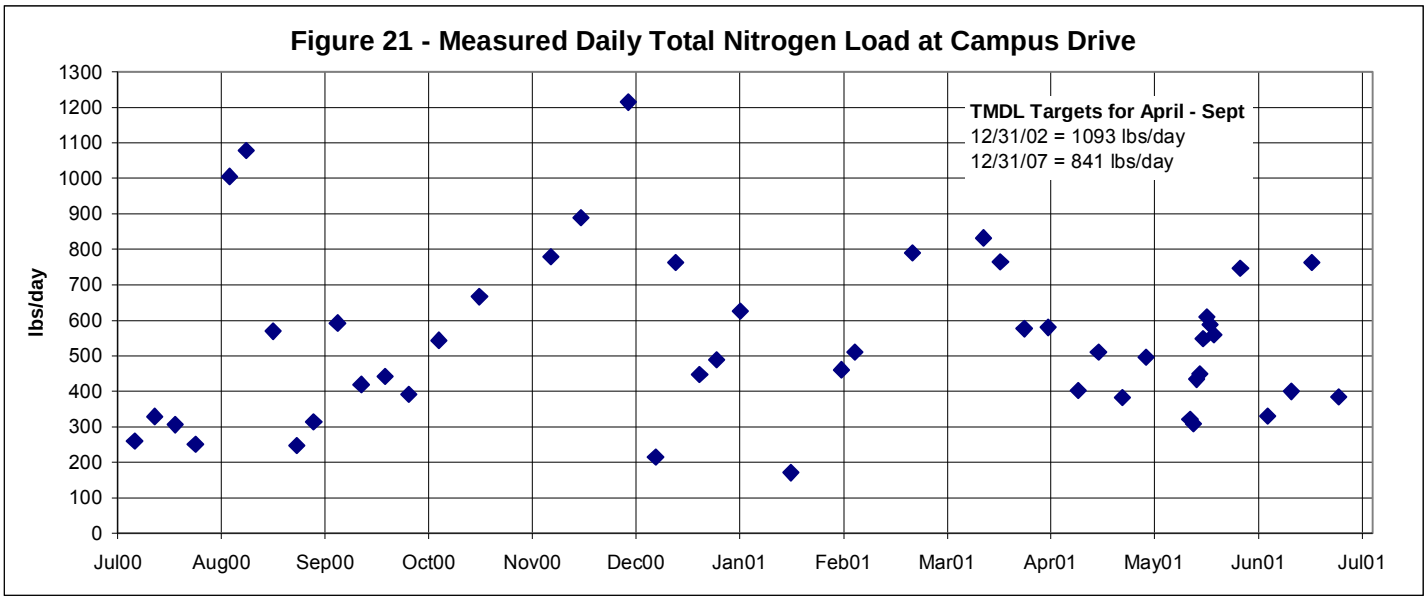
Figure 21 - Measured Daily Total Nitrogen Load at Campus Drive
lbs/day
0
100
200
300
400
500
600
700
800
900
1000
1100
1200
1300
TMDL Targets for April - Sept
12/31/02 = 1093 lbs/day
12/31/07 = 841 lbs/day
Jul00
Aug00
Sep00
Oct00
Nov00
Dec00
Jan01
Feb01
Mar01
Apr01
May01
Jun01
Jul01

Appendix A
Water Quality Data

Analytical Results for Samples collected from Peters Canyon Wash and Tributaries

STATION	DATE	SAMPLES Type	#	Turb NTU	EC µmhos	pH	NO_3 mg/L	NO_3 as N mg/L	NH_3 as N mg/L	TKN mg/L	TN mg/L	PO_4 mg/L	oP as P mg/L	TSS mg/L	VSS mg/L
Peters Canyon Wash upstream of Hicks Canyon Wash															
USRF06	5/15/01 10:00	DT	24	5	1710	8.7	9.5	2.1	0.379	2.6	4.7	1.16		<10	<10
USRF06	5/16/01 9:00														
USRF06	5/17/01 8:40	DT	1	2.8	1640	8.9	7.3	1.6	0.094	1.6	3.2	0.918		<10	<10
USRF06	5/17/01 10:00	DT	20	4.2	1690	8.9	5.1	1.2	<0.05	0.33	1.5	0.796		<10	<10
USRF06	5/18/01 5:00														
USRF06	5/18/01 10:00	DT	24	3	1710	8.7	6.2	1.4	0.094	2	3.4	0.979		<10	<10
USRF06	5/19/01 9:00														
USRF06	5/19/01 10:00	DT	24	2.7	1770	8.7	4.3	1.0	<0.05	2.1	3.1	0.765		<10	<10
USRF06	5/20/01 9:00														
USRF06	5/20/01 10:00	DT	24	2.2	1710	8.4	3.3	0.7	<0.05	2	2.7	0.581		<10	<10
USRF06	5/21/01 9:00														
USRF06	5/21/01 10:00	DT	24	7.2	1600	8.7	3.5	0.8	<0.05	1.1	1.9	0.765		<10	<10
USRF06	5/22/01 9:00														
USRF06	5/22/01 10:00	DT	24	4.4	1610	8.7	3.1	0.7	<0.05	1.2	1.9	0.581		<10	<10
USRF06	5/23/01 9:00														
Hicks Canyon Wash															
HCWF27	5/15/01 10:00	DT	24	154	1540	7.9	210	47.4	1.17	23	70.4	10.4		161	24
HCWF27	5/16/01 9:00														
HCWF27	5/16/01 10:00	DT	24	131	1610	7.8	210	47.4	16.1	23	70.4	9.79		140	22
HCWF27	5/17/01 9:00														
HCWF27	5/17/01 10:00	DT	24	322	1690	7.9	220	49.7	10.4	22	71.7	12.5		390	28
HCWF27	5/18/01 9:00														
HCWF27	5/18/01 10:00	DT	24	147	1580	7.4	190	42.9	4.35	12	54.9	8.26		200	34
HCWF27	5/19/01 9:00														
HCWF27	5/18/01 10:00	DUP	24	144	1580	7.4	200	45.2	4.3	10	55.2	8.57		200	32
HCWF27	5/19/01 9:00														
HCWF27	5/19/01 10:00	DT	24	156	1470	7.6	140	31.6	0.128	4.7	36.3	7.34		200	30
HCWF27	5/20/01 9:00														
HCWF27	5/20/01 10:00	DT	24	110	1380	8.5	100	22.6	0.085	4.4	27.0	6.73		160	32
HCWF27	5/21/01 9:00														
HCWF27	5/21/01 10:00	DT	24	234	1650	7.4	240	54.2	15.8	18	72.2	12.5		270	42
HCWF27	5/22/01 9:00														
HCWF27	5/22/01 10:00	DT	16	372	1970	7.1	410	92.6	29.4	36	128.6	19		460	72
HCWF27	5/23/01 12:00														

Analytical Results for Samples collected from Peters Canyon Wash and Tributaries

STATION	DATE	SAMPLES Type	#	Turb NTU	EC µmhos	pH	NO_3 mg/L	NO_3 as N mg/L	NH_3 as N mg/L	TKN mg/L	TN mg/L	PO_4 mg/L	oP as P mg/L	TSS mg/L	VSS mg/L
						65" RCP d/s Bryan									
DSBRCP	5/15/01 10:00	DT	24	1.3	796	8.5	3.2	0.7	<0.05	0.32	1.0	0.184		<10	<10
DSBRCP	5/16/01 9:00														
DSBRCP	5/16/01 10:00	DT	24	1	785	8.5	2.9	0.7	<0.05	0.32	1.0	0.153		<10	<10
DSBRCP	5/17/01 9:00														
DSBRCP	5/16/01 10:00	DUP	24	0.8	790	8.5	2.9	0.7	<0.05	0.64	1.3	0.153		<10	<10
DSBRCP	5/17/01 9:00														
DSBRCP	5/17/01 10:00	DT	24	2.4	782	8.6	2.7	0.6	<0.05	0.23	0.8	0.122		<10	<10
DSBRCP	5/18/01 9:00														
DSBRCP	5/18/01 10:00	DT	24	5.3	884	8.3	3.9	0.9	<0.05	7.4	8.3	0.52		17	10
DSBRCP	5/19/01 9:00														
DSBRCP	5/19/01 10:00	DT	24	2.9	814	8.4	2.9	0.7	<0.05	0.28	0.9	0.184		<10	<10
DSBRCP	5/20/01 9:00														
DSBRCP	5/20/01 10:00	DT	24	1.5	790	8.3	2.8	0.6	<0.05	0.65	1.3	0.184		<10	<10
DSBRCP	5/21/01 9:00														
DSBRCP	5/21/01 10:00	DT	24	1.4	786	8.4	2.8	0.6	<0.05	<0.2	0.7	0.153		<10	<10
DSBRCP	5/22/01 9:00														
DSBRCP	5/22/01 10:00	DT	24	0.7	774	8.5	2.5	0.6	<0.05	0.36	0.9	0.214		<10	<10
DSBRCP	5/23/01 9:00														
						Central Irvine Channel									
CICF25	5/15/01 10:00	DT	6	94	1540	8.6	180	40.6	1.63	6.9	47.5	7.04	1.76	86	13
CICF25	5/15/01 15:00														
CICF25	5/15/01 16:00	DT	6	151	1600	8.7	180	40.6	<0.05	3.6	44.2	5.81	1.77	134	15
CICF25	5/15/01 21:00														
CICF25	5/16/01 22:00	DT	6	67	1630	8.1	160	36.1	0.924	3.9	40.0	7.96	3.57	44	<10
CICF25	5/16/01 3:00														
CICF25	5/16/01 4:00	DT	6	121	1870	7.9	240	54.2	16.3	21	75.2	14.4	3.73	150	21
CICF25	5/16/01 9:00														
CICF25	5/16/01 10:00	DT	6	54	1660	8.6	230	51.9	9.29	17	68.9	7.04	1.85	51	11
CICF25	5/16/01 15:00														
CICF25	5/16/01 16:00	DT	6	49	1890	8.6	250	56.5	7.28	14	70.5	6.12	1.34	45	12
CICF25	5/16/01 21:00														
CICF25	5/16/01 22:00	DT	6	23	1900	7.9	300	67.7	10.5	20	87.7	11.6	3.05	18	<10
CICF25	5/17/01 3:00														

Analytical Results for Samples collected from Peters Canyon Wash and Tributaries

STATION	DATE	SAMPLES Type	#	Turb NTU	EC µmhos	pH	NO_3 mg/L	NO_3 as N mg/L	NH_3 as N mg/L	TKN mg/L	TN mg/L	PO_4 mg/L	oP as P mg/L	TSS mg/L	VSS mg/L
						Central Irvine Channel									
CICF25	5/17/01 4:00	DT	6	23	1980	7.9	260	58.7	14.6	24	82.7	13.2	3.89	21	<10
CICF25	5/17/01 9:00														
CICF25	5/17/01 10:00	DT	6	105	1660	9.1	140	31.6	1.06	5.4	37.0	4.9	0.799	140	32
CICF25	5/17/01 15:00														
CICF25	5/17/01 16:00	DT	6	21	1470	9.3	160	36.1	0.243	4.2	40.3	2.66	0.575	37	<10
CICF25	5/17/01 21:00														
CICF25	5/17/01 22:00	DT	2				200	45.2	2.49	4.6	49.8	6.43	1.6		
CICF25	5/17/01 23:00														
CICF25	5/18/01 0:00	DT	8	16	1880	8.2	180	40.6	3.21	6.1	46.7	7.65	2.2	25	<10
CICF25	5/18/01 7:00														
CICF25	5/18/01 8:00	DT	2				250	56.5	8.14	20	76.5	15.9	3.67		
CICF25	5/18/01 9:00														
CICF25	5/18/01 10:00	DT	24	15	1690	8.4	160	36.1	0.435	5.3	41.4	5.81	1.38	22	<10
CICF25	5/19/01 9:00														
CICF25	5/19/01 10:00	DT	6	92	1800	8.9	110	24.8	0.059	3.5	28.3	5.81	0.686	150	29
CICF25	5/19/01 15:00														
CICF25	5/19/01 16:00	DT	6	103	1860	8.2	220	49.7	0.149	5.8	55.5	7.96	0.921	150	31
CICF25	5/19/01 21:00														
CICF25	5/19/01 22:00	DT	6	23	1690	7.7	180	40.6	<0.05	2.8	43.4	9.18	2.06	27	<10
CICF25	5/20/01 3:00														
CICF25	5/20/01 4:00	DT	6	18	1870	8	160	36.1	<0.05	2.5	38.6	8.57	2.37	25	<10
CICF25	5/20/01 9:00														
CICF25	5/20/01 10:00	DT	6	15	1670	8.5	180	40.6	<0.05	4	44.6	4.28	0.913	20	<10
CICF25	5/20/01 15:00														
CICF25	5/20/01 16:00	DT	6	14	1820	8.7	220	49.7	0.054	3.4	53.1	2.08	0.375	21	<10
CICF25	5/20/01 21:00														
CICF25	5/20/01 22:00	DT	6	6.3	1810	9	170	38.4	<0.05	3	41.4	6.43	1.96	11	<10
CICF25	5/21/01 3:00														
CICF25	5/21/01 4:00	DT	6	7.3	1790	8.2	130	29.4	<0.05	3.3	32.7	7.65	2.43	14	<10
CICF25	5/21/01 9:00														
CICF25	5/21/01 10:00	DT	6	14	1700	8.9	110	24.8	<0.05	2.4	27.2	3.37	0.796	24	<10
CICF25	5/21/01 15:00														
CICF25	5/21/01 16:00	DT	6	8.4	1710	9.2	140	31.6	<0.05	<0.2	31.7	1.62	0.305	12	<10
CICF25	5/21/01 21:00														

Analytical Results for Samples collected from Peters Canyon Wash and Tributaries

STATION	DATE	SAMPLES Type	#	Turb NTU	EC µmhos	pH	NO_3 mg/L	NO_3 as N mg/L	NH_3 as N mg/L	TKN mg/L	TN mg/L	PO_4 mg/L	oP as P mg/L	TSS mg/L	VSS mg/L
						Central Irvine Channel									
CICF25	5/21/01 22:00	DT	6	8.5	1610	8.2	110	24.8	<0.05	0.48	25.3	5.51	1.53	11	<10
CICF25	5/22/01 3:00														
CICF25	5/22/01 4:00	DT	6	12	1540	8.1	70	15.8	<0.05	<0.2	15.9	6.12	0.03	18	<10
CICF25	5/22/01 9:00														
CICF25	5/22/01 10:00	DT	6	73	1560	8.9	70	15.8	0.12	<0.2	15.9	3.98	0.59	110	26
CICF25	5/22/01 15:00														
CICF25	5/22/01 10:00	DUP	6	61	1520	8.9	66	14.9	0.105	<0.2	15.0	3.67	0.594	110	26
CICF25	5/22/01 15:00														
CICF25	5/22/01 16:00	DT	6	21	1690	8.8	180	40.6	0.982	4	44.6	2.63	0.582	33	10
CICF25	5/22/01 21:00														
CICF25	5/22/01 22:00	DT	6	10	1610	7.8	150	33.9	1.3	<0.2	34.0	6.12	1.68	14	<10
CICF25	5/23/01 3:00														
CICF25	5/23/01 4:00	DT	6	12	1630	7.9	140	31.6	0.671	3	34.6	7.04	2.32	13	<10
CICF25	5/23/01 9:00														
						Lyons Storm Channel									
F06P07	5/15/01 0:00	DT	1	3.8	1520	7.9	62	14.0	<0.05	1.9	15.9	1.38		<10	<10
F06P07	5/16/01 9:18	DT	1	8.8	1320	8	39	8.8	<0.05	2.7	11.5	1.96		<10	<10
F06P07	5/17/01 9:40	DT	1	5.6	1840	7.9	70	15.8	<0.05	2.3	18.1	1.68		<10	<10
F06P07	5/18/01 10:15	DT	1	36	1110	8.3	79	17.8	2.67	6.7	24.5	3.67		35	<10
F06P07	5/19/01 0:00	DT	1	3.1	1740	7.8	70	15.8	<0.05	1.7	17.5	1.07		<10	<10
F06P07	5/20/01 9:48	DT	1	3.4	2050	7.8	79	17.8	0.128	2.5	20.3	1.84		<10	<10
F06P07	5/21/01 9:45	DT	1	3.9	1690	8.1	53	12.0	<0.05	2.1	14.1	1.41		<10	<10
F06P07	5/22/01 0:00	DT	1	6.2	5450	8.3	40	9.0	<0.05	0.69	9.7	1.25		10	<10

Analytical Results for Samples collected from Peters Canyon Wash and Tributaries

STATION	DATE	SAMPLES Type	#	Turb NTU	EC µmhos	pH	NO_3 mg/L	NO_3 as N mg/L	NH_3 as N mg/L	TKN mg/L	TN mg/L	PO_4 mg/L	oP as P mg/L	TSS mg/L	VSS mg/L
					El Modena Irvine Channel										
MIRF07	5/15/01 10:00	DT	24	3.1	1320	9.3	9.3	2.1	0.358	3.7	5.8	1.01		<10	<10
MIRF07	5/16/01 9:00														
MIRF07	5/16/01 10:00	DT	24	4.1	1250	9	12	2.7	<0.05	5.4	8.1	1.19		12	<10
MIRF07	5/17/01 9:00														
MIRF07	5/17/01 10:00	DT	24	2.5	1170	9	13	2.9	<0.05	3	5.9	0.673		10	<10
MIRF07	5/18/01 9:00														
MIRF07	5/18/01 10:00	DT	24	3.9	1120	8.8	8.1	1.8	<0.05	5.2	7.0	0.826		<10	<10
MIRF07	5/19/01 9:00														
MIRF07	5/19/01 10:00	DT	24	3	1300	8.9	4.7	1.1	<0.05	2.8	3.9	0.796		10	<10
MIRF07	5/20/01 9:00														
MIRF07	5/20/01 10:00	DT	24	3.6	1220	9	2.5	0.6	<0.05	2.3	2.9	0.704		10	<10
MIRF07	5/21/01 9:00														
MIRF07	5/21/01 10:00	DT	24	2.8	1220	9	3.4	0.8	<0.05	1.9	2.7	0.826		<10	<10
MIRF07	5/22/01 9:00														
					Como Storm Channel										
CSCS03	5/15/01 10:00	DT	24	1.7	2540	8.3	79	17.8	<0.05	0.89	18.7	0.275		<10	<10
CSCS03	5/16/01 9:00														
CSCS03	5/16/01 10:00	DT	24	2.2	2590	8.3	79	17.8	<0.05	0.98	18.8	0.306		<10	<10
CSCS03	5/17/01 9:00														
CSCS03	5/17/01 10:00	DT	24	2.3	2650	8.4	75	16.9	<0.05	1.1	18.0	0.214		<10	<10
CSCS03	5/18/01 9:00														
CSCS03	5/18/01 10:00	DT	24	2.8	2540	8.4	48	10.8	<0.05	0.62	11.5	0.367		<10	<10
CSCS03	5/19/01 9:00														
CSCS03	5/20/01 10:00	DT	11	2.4	2570	8.5	79	17.8	<0.05	0.81	18.6	0.0918		<10	<10
CSCS03	5/20/01 20:00														
CSCS03	5/21/01 10:00	DT	24	3.3	2610	8.3	79	17.8	<0.05	0.67	18.5	0.306		<10	<10
CSCS03	5/22/01 9:00														
CSCS03	5/22/01 10:00	DT	1	2.4	2510	8.4	75	16.9	<0.05	0.74	17.7	0.398		<10	<10

Analytical Results for Samples collected from Peters Canyon Wash and Tributaries

STATION	DATE	SAMPLES Type	#	Turb NTU	EC µmhos	pH	NO_3 mg/L	NO_3 as N mg/L	NH_3 as N mg/L	TKN mg/L	TN mg/L	PO_4 mg/L	oP as P mg/L	TSS mg/L	VSS mg/L
						Santa Ana - Santa Fe Channel									
SAFF10	5/15/01 10:00	DT	24	1.4	1820	8	62	14.0	<0.05	1.3	15.3	0.122		<10	<10
SAFF10	5/16/01 9:00														
SAFF10	5/16/01 10:00	DT	24	2.2	1940	8	62	14.0	<0.05	2.5	16.5	0.122		<10	<10
SAFF10	5/17/01 9:00														
SAFF10	5/17/01 10:00	DT	24	2.3	1990	8	66	14.9	<0.05	1.1	16.0	0.153		<10	<10
SAFF10	5/18/01 9:00														
SAFF10	5/18/01 10:00	DT	24	1.6	1950	7.9	62	14.0	<0.05	1.3	15.3	0.245		<10	<10
SAFF10	5/19/01 9:00														
SAFF10	5/19/01 10:00	DT	24	1.3	1980	8.1	66	14.9	<0.05	0.79	15.7	0.214		<10	<10
SAFF10	5/20/01 9:00														
SAFF10	5/20/01 10:00	DT	24	1.9	1930	8.2	62	14.0	<0.05	1	15.0	0.0918		<10	<10
SAFF10	5/21/01 9:00														
SAFF10	5/21/01 10:00	DT	24	2.7	1880	7.9	62	14.0	<0.05	0.68	14.7	0.275		<10	<10
SAFF10	5/22/01 9:00														
SAFF10	5/22/01 10:00	DT	24	2.7	1870	8.1	62	14.0	<0.05	0.74	14.7	0.153		12	<10
SAFF10	5/23/01 9:00														
						F06P08									
F06P08	5/15/01 10:00	DT	24	1.3	3270	8.3	66	14.9	<0.05	0.52	15.4	0.581		<10	<10
F06P08	5/16/01 9:00														
F06P08	5/16/01 10:00	DT	24	0.6	3240	8.1	66	14.9	<0.05	0.48	15.4	0.612		<10	<10
F06P08	5/17/01 9:00														
F06P08	5/17/01 10:00	DT	24	0.75	3290	8	62	14.0	<0.05	0.47	14.5	0.306		<10	<10
F06P08	5/18/01 9:00														
F06P08	5/18/01 10:00	DT	6	1.4	3340	8.2	57	12.9	0.37	1.9	14.8	0.704		<10	<10
F06P08	5/18/01 15:00														
F06P08	5/20/01 10:00	DT	23	0.6	3060	8.3	62	14.0	<0.05	0.48	14.5	0.49		<10	<10
F06P08	5/21/01 9:00														
F06P08	5/22/01 10:00	DT	24	0.75	3100	8.2	66	14.9	<0.05	0.58	15.5	0.643		<10	<10
F06P08	5/23/01 9:00														

Analytical Results for Samples collected from Peters Canyon Wash and Tributaries

STATION	DATE	SAMPLES Type	#	Turb NTU	EC µmhos	pH	NO_3 mg/L	NO_3 as N mg/L	NH_3 as N mg/L	TKN mg/L	TN mg/L	PO_4 mg/L	oP as P mg/L	TSS mg/L	VSS mg/L
						Valencia Channel									
VALS02	5/16/01 10:00	DT	24	1.9	2850	8.3	88	19.9	0.053	1.2	21.1	0.918		<10	<10
VALS02	5/17/01 9:00														
VALS02	5/17/01 10:00	DT	24	3.5	2940	8.3	84	19.0	<0.05	1.9	20.9	0.949		<10	<10
VALS02	5/18/01 9:00														
VALS02	5/18/01 10:00	DT	24	7.2	2860	8.2	84	19.0	<0.05	1.3	20.3	0.918		22	<10
VALS02	5/19/01 9:00														
VALS02	5/19/01 10:00	DT	24	3.3	2810	8.2	84	19.0	<0.05	0.96	19.9	0.857		18	<10
VALS02	5/20/01 9:00														
VALS02	5/20/01 10:00	DT	24	4.8	2840	7.9	79	17.8	<0.05	1.1	18.9	1.32		13	<10
VALS02	5/21/01 9:00														
VALS02	5/21/01 10:00	DT	24	5.2	2880	8.2	84	19.0	<0.05	0.82	19.8	1.38		14	<10
VALS02	5/22/01 9:00														
VALS02	5/22/01 10:00	DT	24	4.7	2710	8.2	79	17.8	<0.05	0.86	18.7	0.949		15	<10
VALS02	5/23/01 9:00														
						Warner Storm Drain									
WARF06	5/15/01 10:00	DT	24	1.9	2600	8.1	66	14.9	<0.05	0.73	15.6	0.673		<10	<10
WARF06	5/16/01 9:00														
WARF06	5/17/01 10:00	DT	24	1.9	2650	8.1	66	14.9	<0.05	0.35	15.3	0.765		<10	<10
WARF06	5/18/01 9:00														
WARF06	5/18/01 10:00	DT	24	2.4	2570	8	66	14.9	<0.05	0.7	15.6	0.857		<10	<10
WARF06	5/19/01 9:00														
WARF06	5/19/01 10:00	DT	24	2.3	2580	8.2	62	14.0	<0.05	0.52	14.5	0.826		<10	<10
WARF06	5/20/01 9:00														
WARF06	5/20/01 10:00	DT	24	2.6	2610	7.9	66	14.9	<0.05	0.61	15.5	0.673		<10	<10
WARF06	5/21/01 9:00														
WARF06	5/21/01 19:00	DT	16	2.4	2540	8.1	62	14.0	<0.05	<0.2	14.1	0.796		<10	<10
WARF06	5/22/01 9:00														
WARF06	5/22/01 10:00	DT	24	2.7	2570	8.1	66	14.9	<0.05	0.6	15.5	0.734		<10	<10
WARF06	5/23/01 9:00														

Analytical Results for Samples collected from Peters Canyon Wash and Tributaries

STATION	DATE	SAMPLES Type	#	Turb NTU	EC µmhos	pH	NO_3 mg/L	NO_3 as N mg/L	NH_3 as N mg/L	TKN mg/L	TN mg/L	PO_4 mg/L	oP as P mg/L	TSS mg/L	VSS mg/L
					Construction Circle Drain										
F06P06	5/15/01 10:00	DT	24	16	5500	8.3	88	19.9	<0.05	1.2	21.1	0.275		19	<10
F06P06	5/16/01 9:00														
F06P06	5/16/01 10:00	DT	24	34	5130	8.4	88	19.9	<0.05	1.4	21.3	0.245		54	<10
F06P06	5/17/01 9:00														
F06P06	5/17/01 10:00	DT	24	17	5620	8.3	88	19.9	<0.05	0.92	20.8	0.275		20	<10
F06P06	5/18/01 9:00														
F06P06	5/18/01 10:00	DT	24	122	5370	8	84	19.0	<0.05	1.3	20.3	0.275		120	10
F06P06	5/19/01 9:00														
F06P06	5/19/01 10:00	DT	24	16	5320	8.1	84	19.0	<0.05	1.3	20.3	0.428		23	<10
F06P06	5/20/01 9:00														
F06P06	5/20/01 10:00	DT	24	12	5380	8.3	84	19.0	<0.05	1.3	20.3	0.49		21	<10
F06P06	5/21/01 9:00														
F06P06	5/21/01 10:00	DT	24	15	4880	8.2	75	16.9	<0.05	0.89	17.8	0.459		18	<10
F06P06	5/22/01 9:00														
F06P06	5/22/01 10:00	DT	24	17	5120	8.2	75	16.9	<0.05	4	20.9	0.398		22	<10
F06P06	5/23/01 9:00														
					Peters Canyon Wash at Barranca										
BARSED	5/15/01 10:00	DT	24	3.9	2320	8.6	75	16.9	<0.05	2.2	19.1	1.71	0.479	<10	<10
BARSED	5/16/01 9:00														
BARSED	5/16/01 10:00	DT	24	3.9	2590	8.6	88	19.9	0.65	2.9	22.8	1.9	0.549	<10	<10
BARSED	5/17/01 9:00														
BARSED	5/17/01 10:00	DT	24	2.9	2520	8.6	75	16.9	<0.05	1.7	18.6	1.1	0.34	<10	<10
BARSED	5/18/01 9:00														
BARSED	5/18/01 10:00	DT	24	2.9	2380	8.5	70	15.8	<0.05	4.3	20.1	1.35	0.337	<10	<10
BARSED	5/19/01 9:00														
BARSED	5/19/01 10:00	DT	24	4.5	2450	8.5	62	14.0	<0.05	2	16.0	1.19	0.288	<10	<10
BARSED	5/20/01 9:00														
BARSED	5/20/01 10:00	DT	24	3.6	2440	8.6	66	14.9	0.068	1.6	16.5	0.918	0.265	<10	<10
BARSED	5/21/01 9:00														
BARSED	5/21/01 10:00	DT	24	0.7	3120	8.2	66	14.9	<0.05	0.37	15.3	0.581		<10	<10
BARSED	5/22/01 9:00														
BARSED	5/22/01 10:00	DT	24	4.9	2370	8.5	57	12.9	<0.05	1.5	14.4	0.887	0.224	10	<10
BARSED	5/23/01 9:00														

Analytical Results for Samples Collected from San Diego Creek and Tributaries

STATION	DATE	SAMPLES Type	#	Turb NTU	EC µmhos	pH	NO_3 mg/L	NO_3 as N mg/L	NH_3 as N mg/L	TKN mg/L	TN mg/L	PO_4 mg/L	oP as P mg/L	TSS mg/L	VSS mg/L
						San Diego Creek at Harvard									
WYLSED	5/16/01 10:00	DT	24	3.4	1920	8.3	70	15.8	<0.05	1.2	17.0	0.245	0.055	10	<10
WYLSED	5/17/01 9:00														
WYLSED	5/17/01 10:00	DT	5				70	15.8	<0.05	1.3	17.1	0.153			
WYLSED	5/18/01 14:00														
WYLSED	5/18/01 10:00	DT	24	1.9	2010	8.2	79	17.8	<0.05	1.2	19.0	0.337	0.05	10	<10
WYLSED	5/19/01 9:00														
WYLSED	5/19/01 10:00	DT	24	1.9	1920	8.2	79	17.8	<0.05	1.1	18.9	0.337	0.056	<10	<10
WYLSED	5/20/01 9:00														
WYLSED	5/19/01 10:00	DUP	24	3.4	1970	8.2	79	17.8	<0.05	0.96	18.8	0.275	0.061	13	<10
WYLSED	5/20/01 9:00														
WYLSED	5/21/01 9:45	DT	1				79	17.8	<0.05	1.7	19.5	0.306			
WYLSED	5/21/01 10:00	DT	24	8.3	1950	7.9	79	17.8	<0.05	1.6	19.4	0.337		67	23
WYLSED	5/22/01 9:00														
WYLSED	5/22/01 10:00	DT	24	1.7	1980	8	79	17.8	<0.05	0.6	18.4	0.306	0.058	<10	<10
WYLSED	5/23/01 9:00														
						Lane Channel									
LANF08	5/15/01 10:00	DT	24	7.4	4140	8.4	32	7.2	<0.05	1.2	8.4	3.98		<10	<10
LANF08	5/16/01 9:00														
LANF08	5/15/01 16:00	SUB	18	8.3	3780	8.4	29	6.5	<0.05	1.3	7.8	5.2		<10	<10
LANF08	5/16/01 9:00														
LANF08	5/16/01 10:00	DT	24	5.1	5190	8.5	37	8.4	<0.05	1	9.4	1.74		<10	<10
LANF08	5/17/01 9:00														
LANF08	5/17/01 10:00	DT	24	5.2	5370	8.6	35	7.9	0.07	0.92	8.8	1.35	0.294	<10	<10
LANF08	5/18/01 9:00														
LANF08	5/18/01 10:00	DT	24	5	5430	8.4	37	8.4	<0.05	1.5	9.9	1.35		10	<10
LANF08	5/19/01 9:00														
LANF08	5/19/01 10:00	DT	24	6.3	5610	8.4	35	7.9	<0.05	1.3	9.2	1.32		11	<10
LANF08	5/20/01 9:00														
LANF08	5/20/01 10:00	DT	24	6.4	5240	7.9	34	7.7	<0.05	1.1	8.8	1.07		15	<10
LANF08	5/21/01 9:00														
LANF08	5/21/01 10:00	DT	24	3.4	1740	7.9	70	15.8	0.907	3.3	19.1	2.69		<10	<10
LANF08	5/22/01 9:00														
LANF08	5/22/01 10:00	DT	24	3.7	5070	8.4	38	8.6	<0.05	0.86	9.4	1.16		<10	<10
LANF08	5/23/01 9:00														

Analytical Results for Samples Collected from San Diego Creek and Tributaries

STATION	DATE	SAMPLES Type	#	Turb NTU	EC µmhos	pH	NO_3 mg/L	NO_3 as N mg/L	NH_3 as N mg/L	TKN mg/L	TN mg/L	PO_4 mg/L	oP as P mg/L	TSS mg/L	VSS mg/L
						Barranca Channel at Main									
BRCF09	5/15/01 0:00	DT	1	3.7	6910	7.8	<0.44	<0.09	<0.05	0.74	0.8	<0.061		<10	<10
BRCF09	5/16/01 8:47	DT	1	1.5	8450	8.1	<0.44	<0.09	<0.05	0.76	0.8	<0.061		<10	<10
BRCF09	5/17/01 9:01	DT	1	1.9	8020	8.2	<0.44	<0.09	<0.05	1.1	1.1	0.214		<10	<10
BRCF09	5/18/01 0:00	DT	1	2.7	5960	8.5	<0.44	<0.09	<0.05	1.1	1.1	0.122		10	<10
BRCF09	5/19/01 9:50	DT	1	2.9	5730	8.3	<0.44	<0.09	<0.05	2.9	2.9	0.52		17	10
BRCF09	5/19/01 10:00	DT	1	3.4	5450	8.4	<0.44	<0.09	<0.05	1.3	1.3	0.337		16	12
BRCF09	5/21/01 9:14	DT	1	2.9	5240	8.2	<0.44	<0.09	<0.05	1.4	1.4	0.184		17	<10
BRCF09	5/22/01 0:00	DT	1	3.4	4410	8.1	<0.44	<0.09	<0.05	1.1	1.1	<0.061		10	<10
BRCF10	5/20/01 9:00														
						San Joaquin Channel at Michaelson									
SJQF14	5/15/01 0:00	DT	1	0.9	1760	7.6	28	6.3	<0.05	2.3	8.6	0.857		<10	<10
SJQF14	5/16/01 8:19	DT	1	0.85	1540	7.8	1.6	0.4	<0.05	0.61	1.0	1.16		<10	<10
SJQF14	5/17/01 8:26	DT	1	0.7	1550	8.1	29	6.5	<0.05	1.2	7.7	1.04		<10	<10
SJQF14	5/18/01 0:00	DT	1	1.3	1590	7.9	28	6.3	<0.05	0.83	7.2	0.765		<10	<10
SJQF14	5/19/01 8:45	DT	1	1.1	1640	7.5	31	7.0	<0.05	1.4	8.4	0.796		<10	<10
SJQF14	5/20/01 8:53	DT	1	1.4	1620	7.8	28	6.3	<0.05	1.1	7.4	1.13		<10	<10
SJQF14	5/21/01 8:40	DT	1	0.75	1540	8	30	6.8	<0.05	1.1	7.9	0.765		<10	<10
SJQF14	5/22/01 0:00	DT	1	0.9	1560	7.7	31	7.0	<0.05	0.79	7.8	0.551		<10	<10
						Sand Canyon Channel at Culver									
SCCF15	5/15/01 0:00	DT	1	1.3	2130	8	1.4	0.3	<0.05	0.88	1.2	1.19		<10	<10
SCCF15	5/16/01 7:57	DT	1	2.4	2190	8.1	31	7.0	<0.05	0.82	7.8	0.673		<10	<10
SCCF15	5/17/01 8:17	DT	1	1.2	2090	8.1	1.6	0.4	<0.05	0.95	1.3	1.01		<10	<10
SCCF15	5/20/01 8:34	DT	1	2.8	2310	8.1	1	0.2	<0.05	0.66	0.9	1.41		<10	<10
SCCF15	5/21/01 8:18	DT	1	1.5	2140	8.3	1.7	0.4	<0.05	0.47	0.9	0.979		<10	<10
SCCF15	5/22/01 0:00	DT	1	1.9	2100	8.1	1.7	0.4	<0.05	1.5	1.9	0.887		<10	<10

Analytical Results for Samples Collected from San Diego Creek and Tributaries

STATION	DATE	SAMPLES Type	#	Turb NTU	EC µmhos	pH	NO_3 mg/L	NO_3 as N mg/L	NH_3 as N mg/L	TKN mg/L	TN mg/L	PO_4 mg/L	oP as P mg/L	TSS mg/L	VSS mg/L
						San Diego Creek at Campus									
SDMF05	5/15/01 10:00	DT	8	63	2770	8.3	37	8.4	0.243	2.1	10.5	0.796	0.099	75	11
SDMF05	5/15/01 17:00														
SDMF05	5/16/01 10:00	DT	24	76	2740	8.5	31	7.0	<0.05	3.4	10.4	0.673	0.016	150	33
SDMF05	5/17/01 9:00														
SDMF05	5/17/01 10:00	DT	24	78	2750	8.7	30	6.8	<0.05	2.8	9.6	0.643	0.011	120	26
SDMF05	5/18/01 9:00														
SDMF05	5/18/01 10:00	DT	24	112	2780	8.5	27	6.1	<0.05	3.6	9.7	0.673	0.01	150	28
SDMF05	5/19/01 9:00														
SDMF05	5/19/01 10:00	DT	24	112	2870	8.4	36	8.1	<0.05	3.3	11.4	0.826	0.012	140	30
SDMF05	5/20/01 9:00														
SDMF05	5/20/01 10:00	DT	24	95	2610	8.4	37	8.4	<0.05	3.3	11.7	1.04	0.014	130	28
SDMF05	5/21/01 9:00														
SDMF05	5/20/01 10:00	DUP	24	97	2760	8.4	35	7.9	<0.05	3	10.9	0.734	0.015	130	28
SDMF05	5/21/01 9:00														
SDMF05	5/21/01 10:00	DT	24	94	2740	8.2	35	7.9	<0.05	2	9.9	0.765	0.024	115	19
SDMF05	5/22/01 9:00														
SDMF05	5/21/01 10:00	DUP	24	88	2490	8.2	34	7.7	<0.05	2.6	10.3	0.765	0.024	120	22
SDMF05	5/22/01 9:00														
SDMF05	5/22/01 10:00	DT	24	73	2740	8.3	38	8.6	<0.05	1.8	10.4	0.704	0.041	92	20
SDMF05	5/23/01 9:00														

Appendix B
Graphical Summary of Flowrates, Concentrations, and Loads for each Monitoring Location

Nitrate Levels in Peters Canyon Wash and its Tributaries
May 15 - 22, 2001

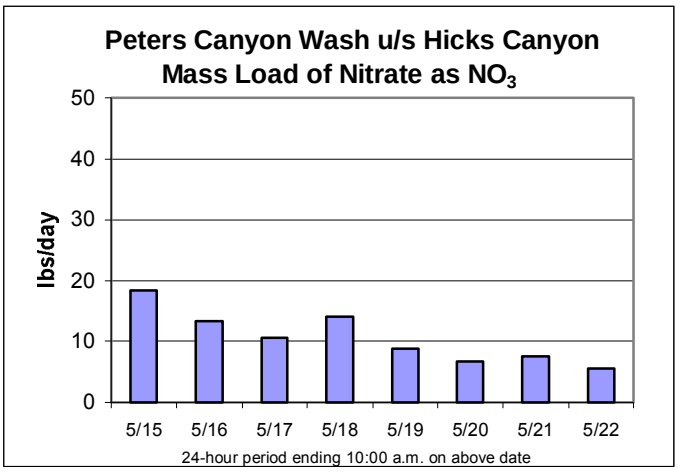

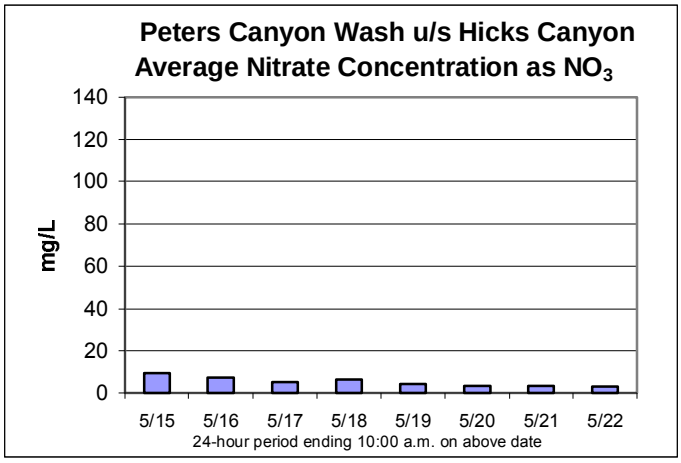

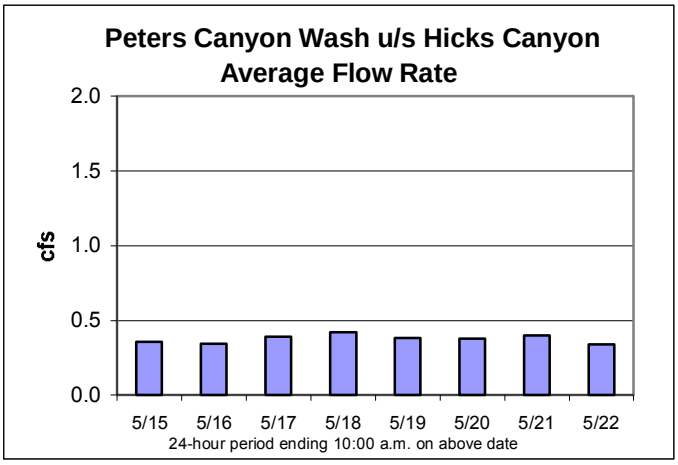

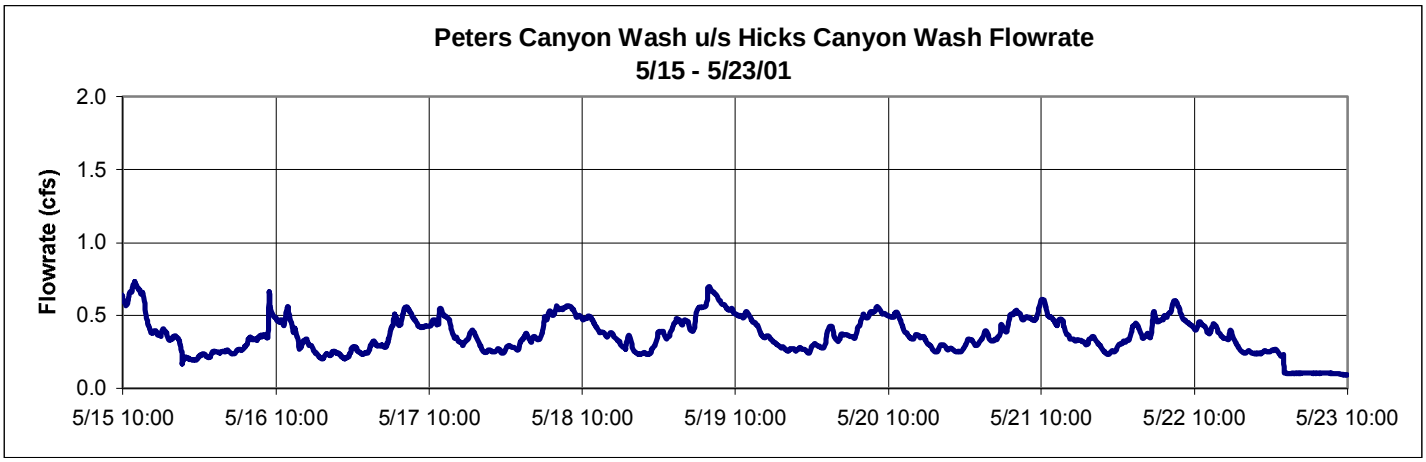

Nitrate Levels in Peters Canyon Wash and its Tributaries
May 15 - 22, 2001

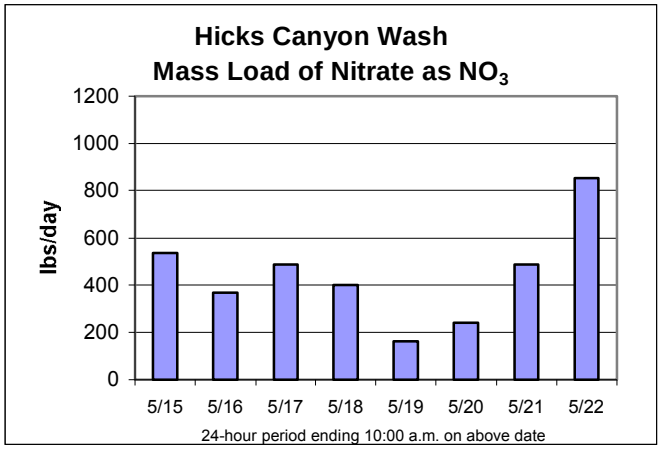

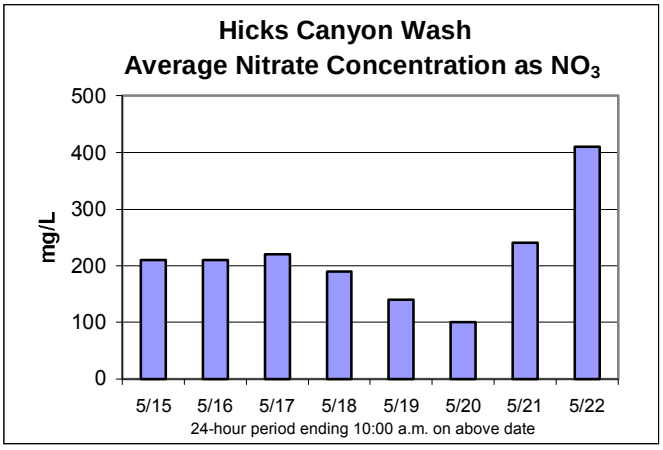

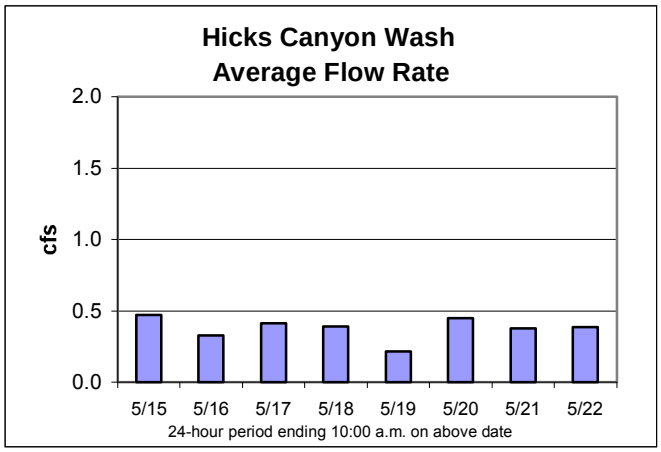

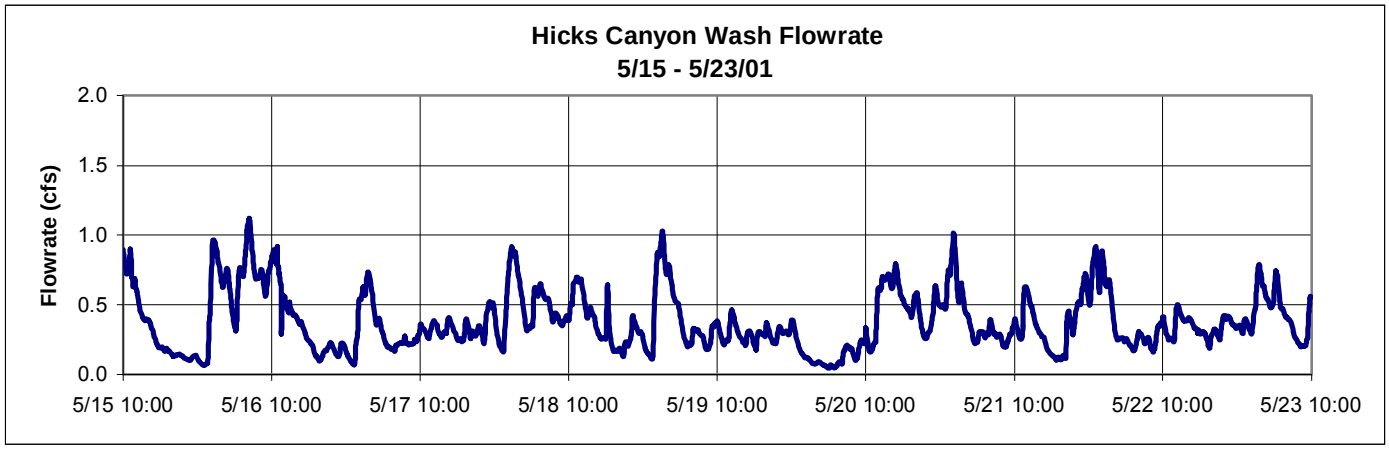

Nitrate Levels in Peters Canyon Wash and its Tributaries
May 15 - 22, 2001

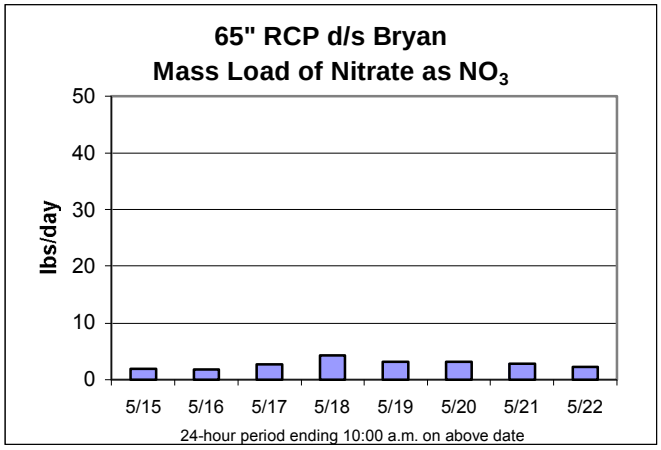

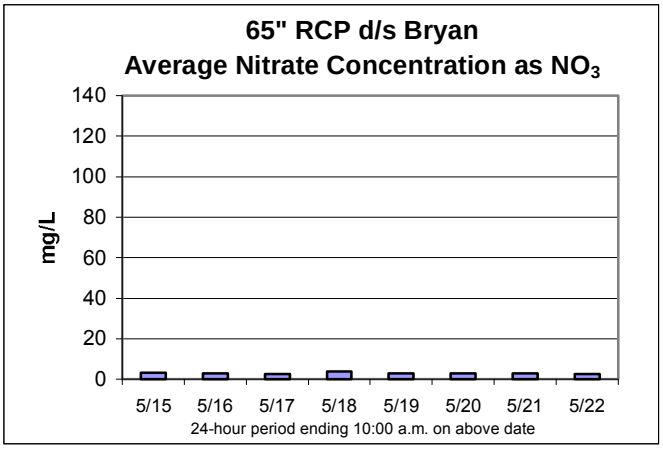

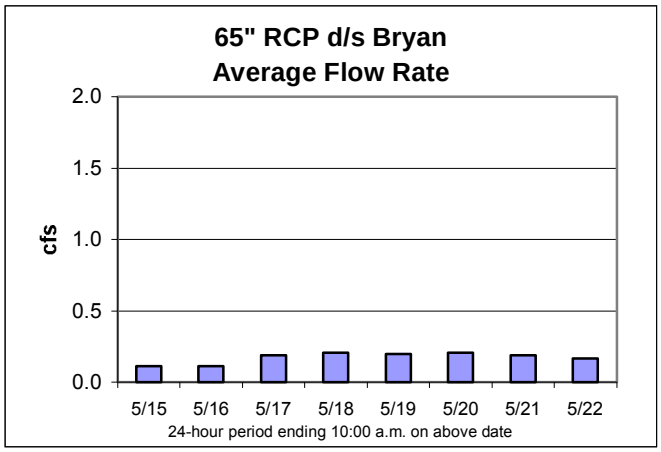

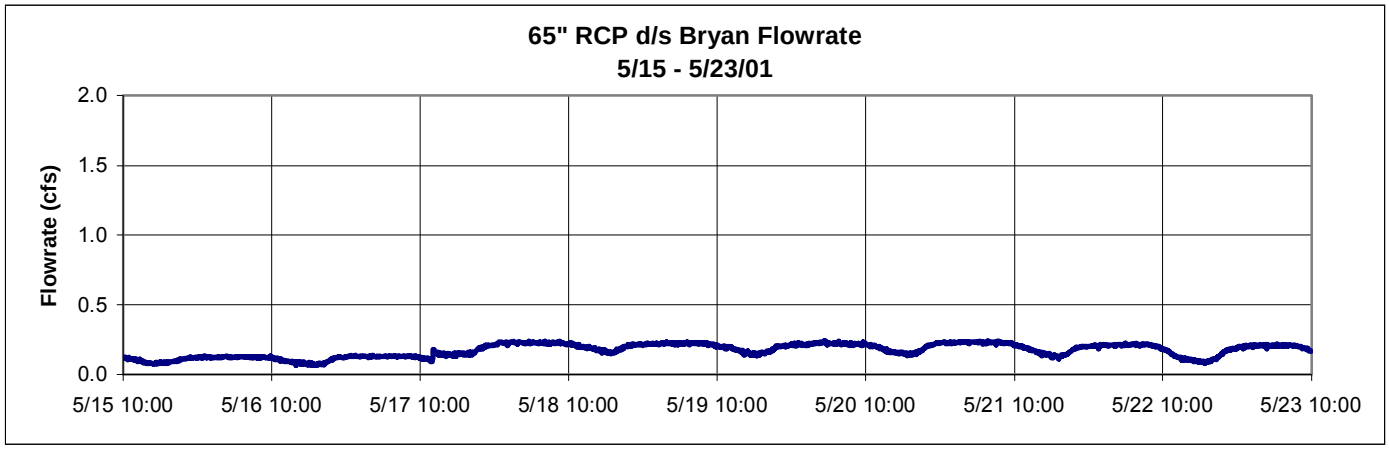

Nitrate Levels in Peters Canyon Wash and its Tributaries
May 15 - 22, 2001

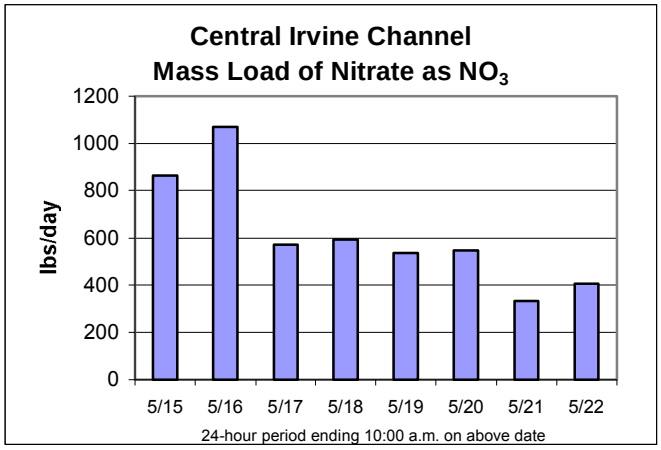

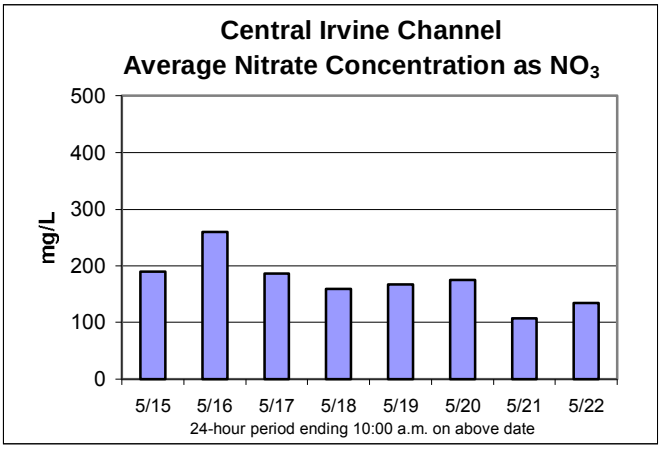

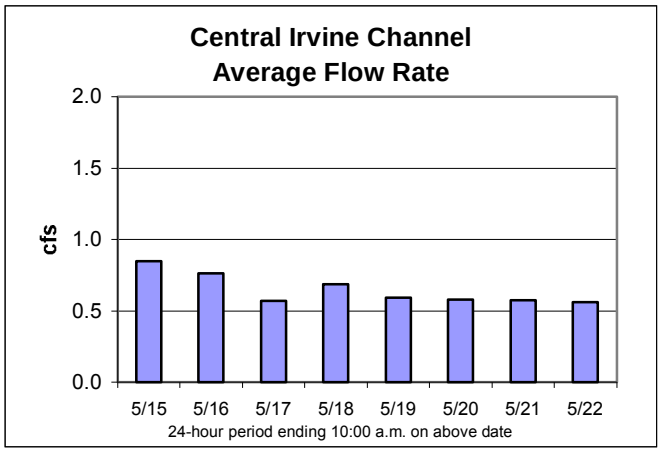

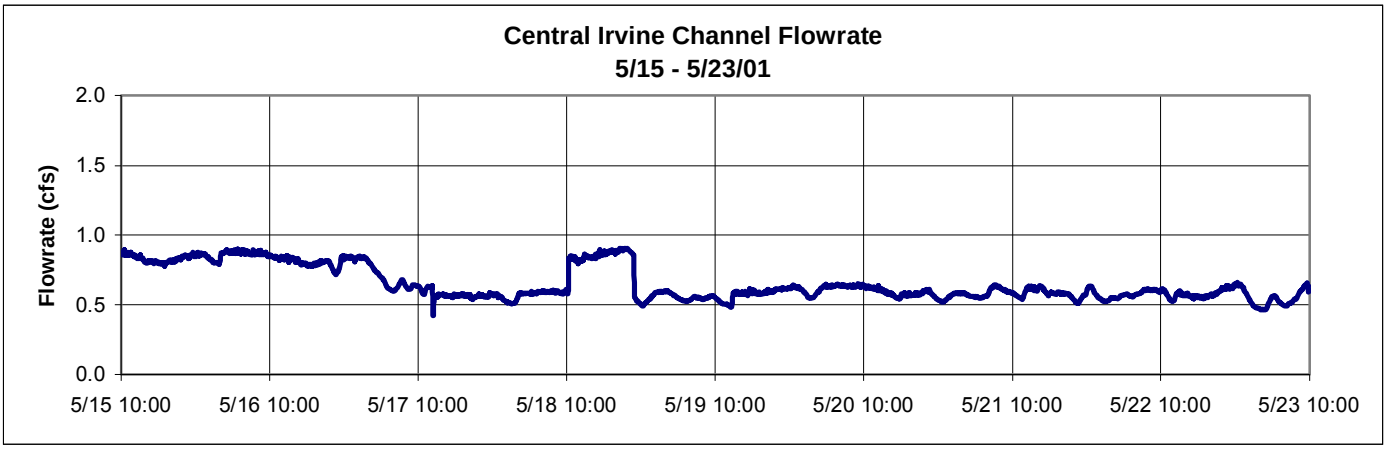

Nitrate Levels in Peters Canyon Wash and its Tributaries
May 15 - 22, 2001

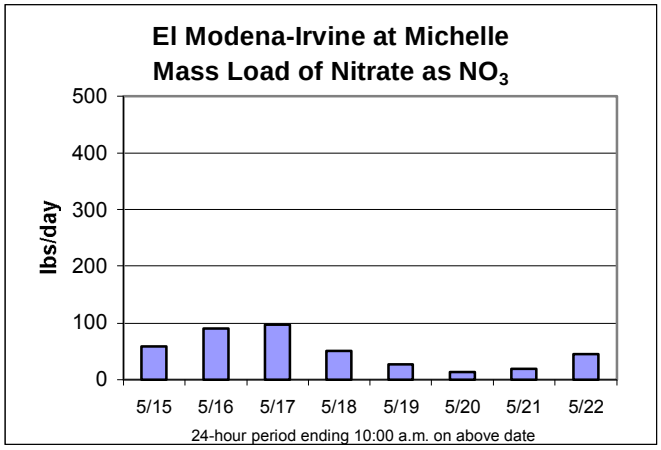

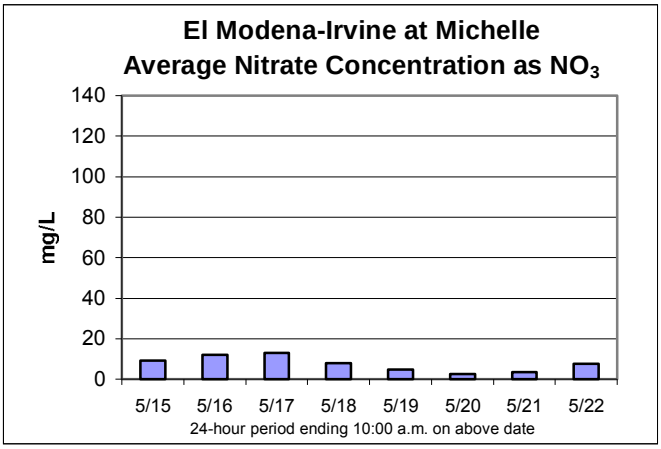

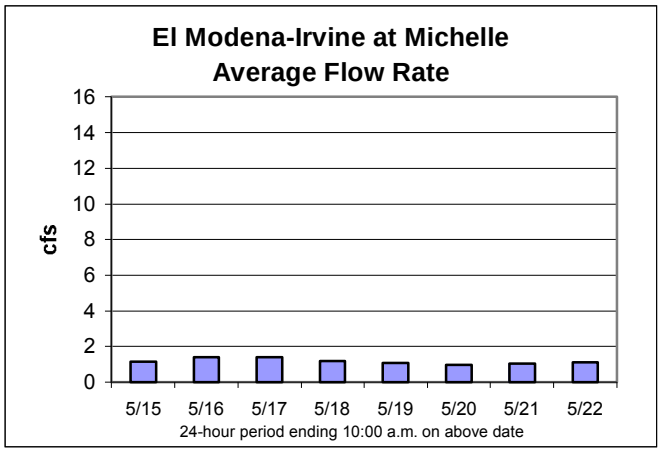

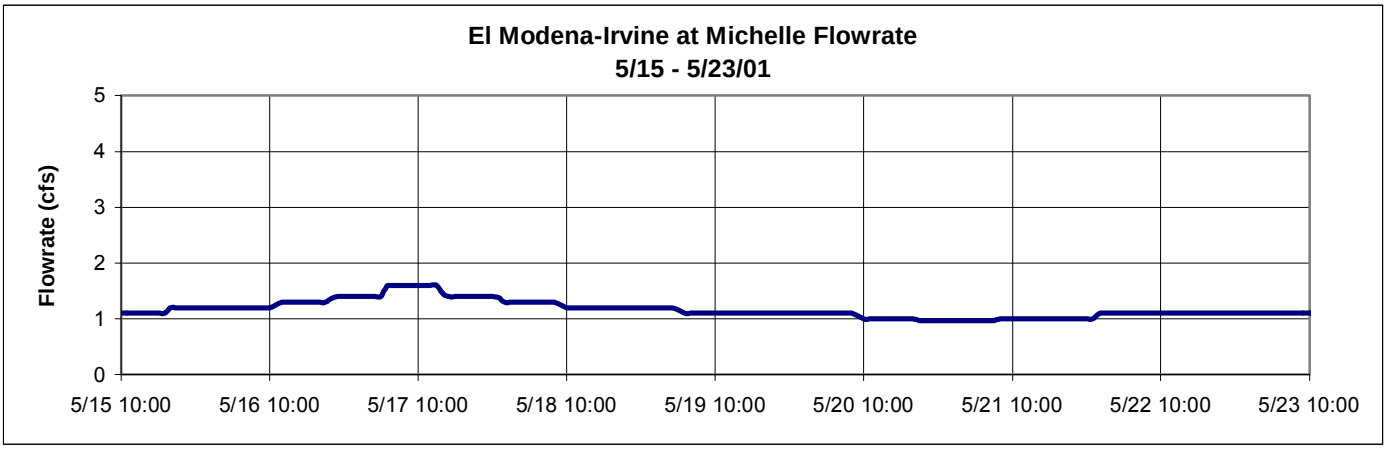

Nitrate Levels in Peters Canyon Wash and its Tributaries
May 15 - 22, 2001

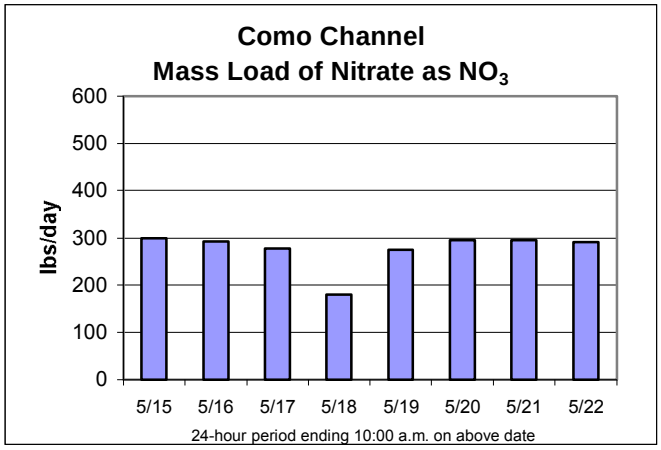

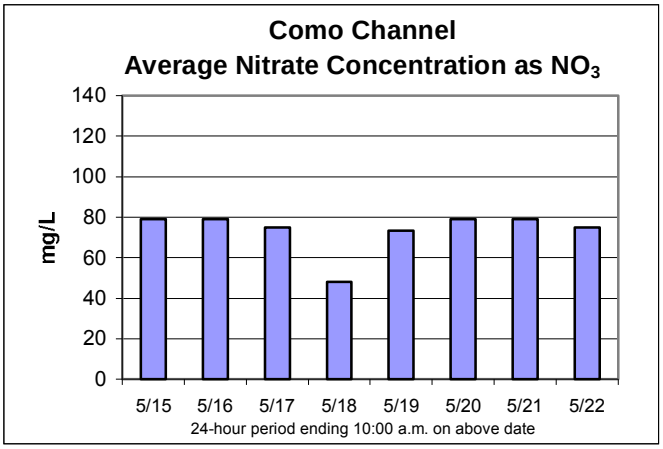

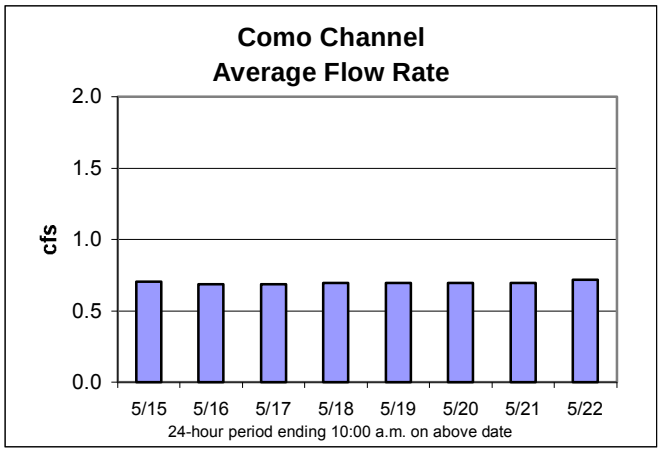

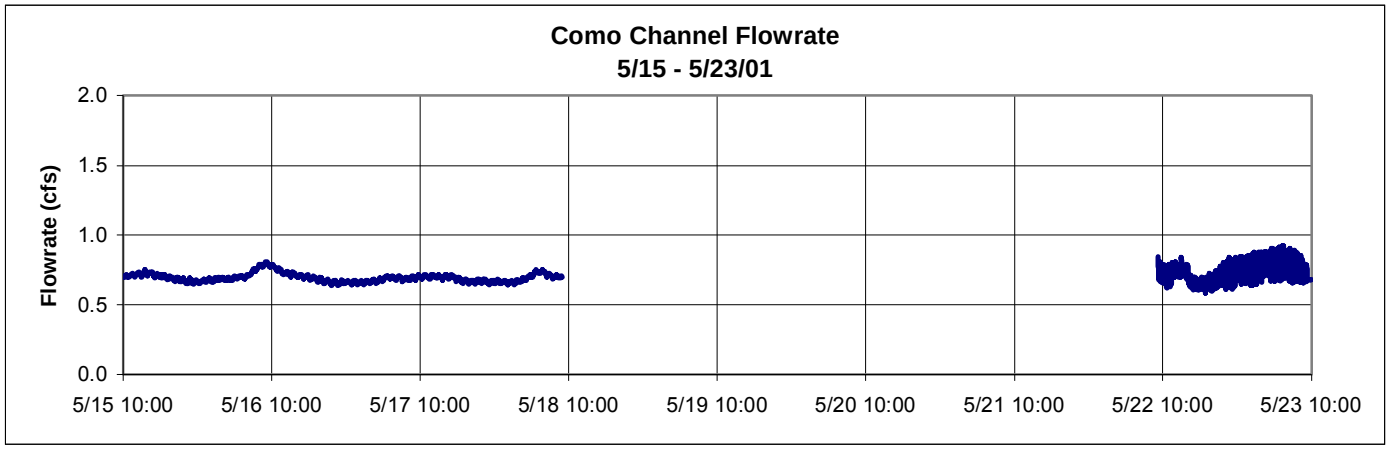

Nitrate Levels in Peters Canyon Wash and its Tributaries
May 15 - 22, 2001

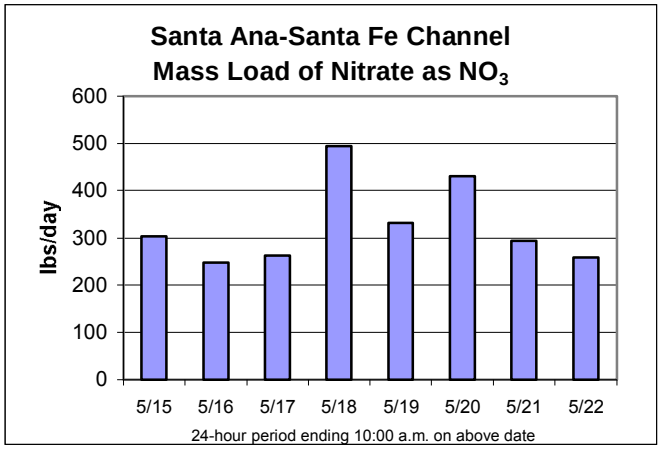

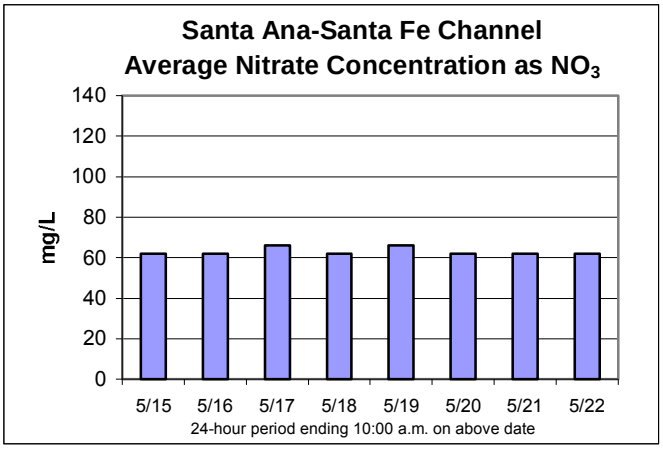

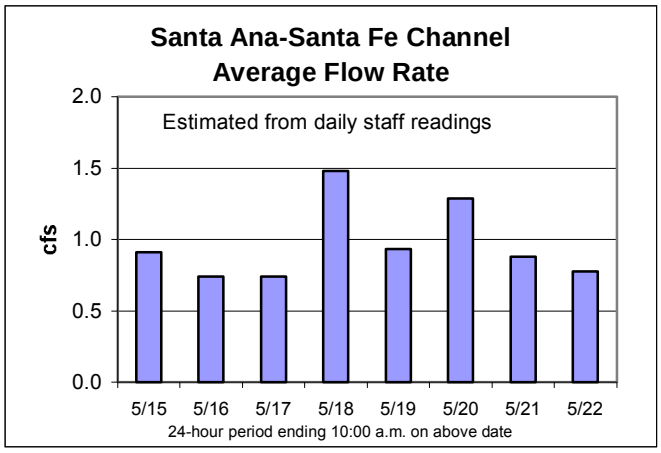

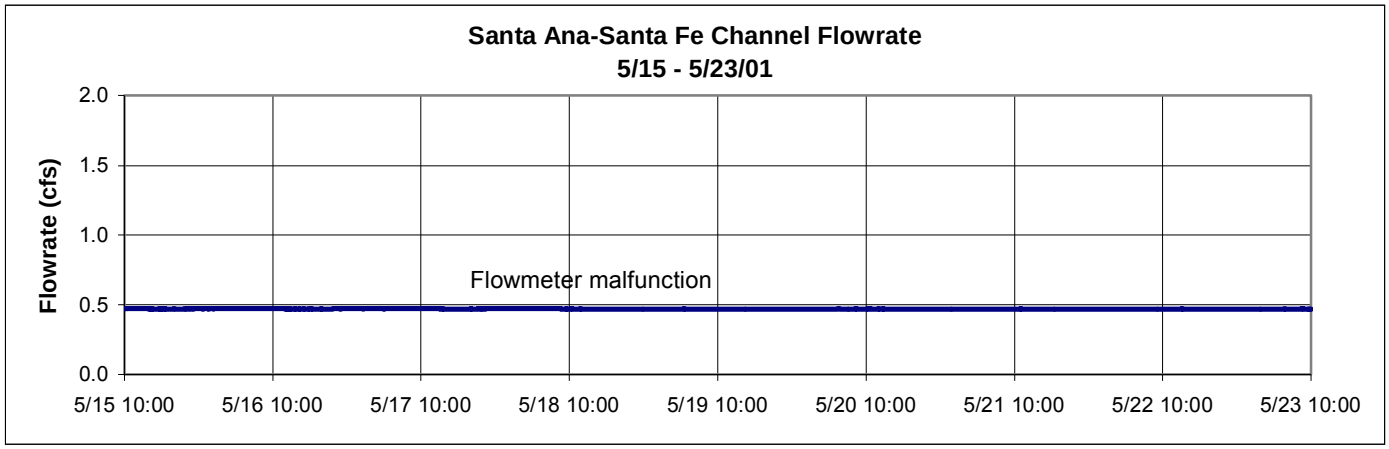

Nitrate Levels in Peters Canyon Wash and its Tributaries
May 15 - 22, 2001

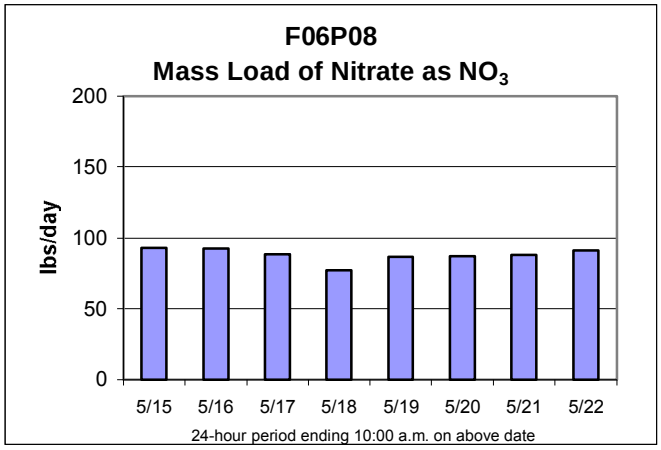

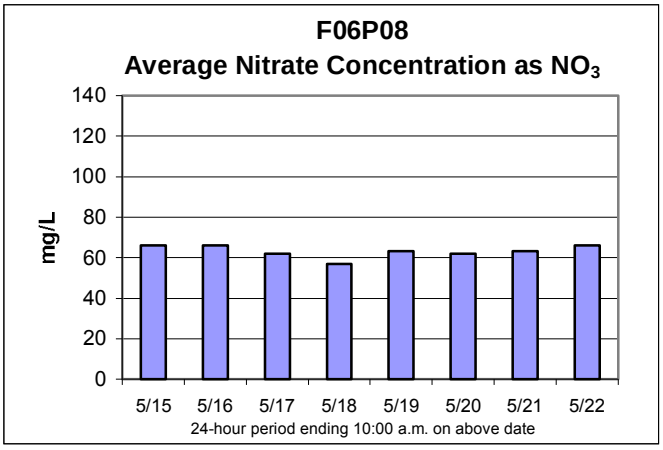

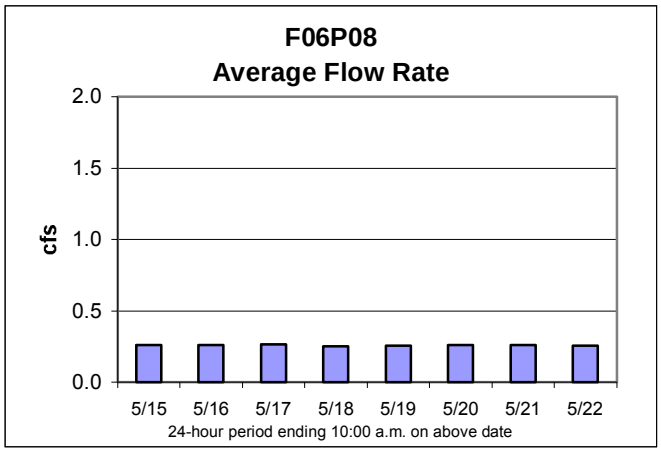

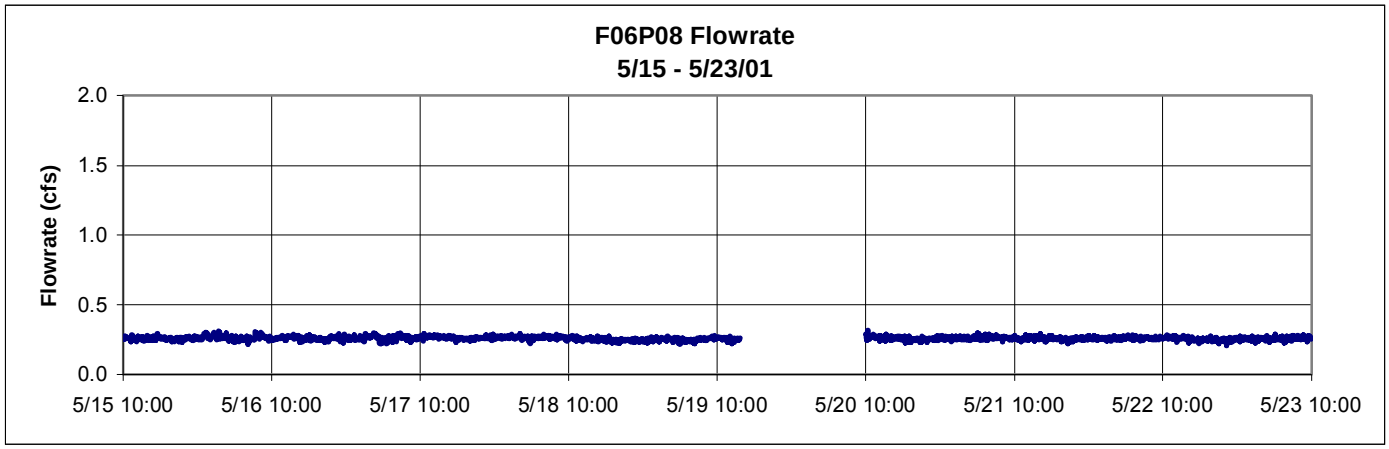

Nitrate Levels in Peters Canyon Wash and its Tributaries
May 15 - 22, 2001

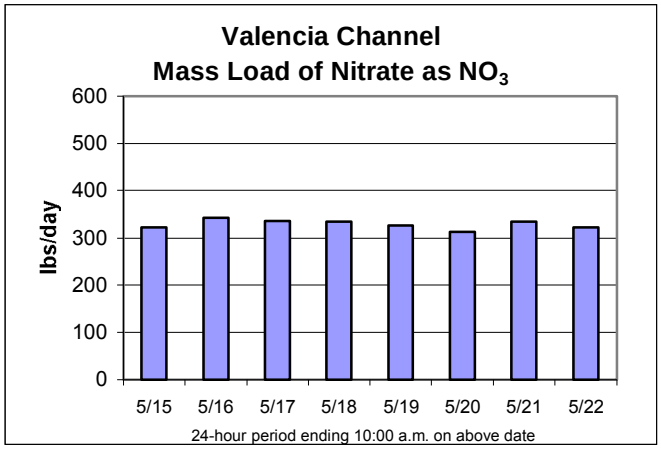

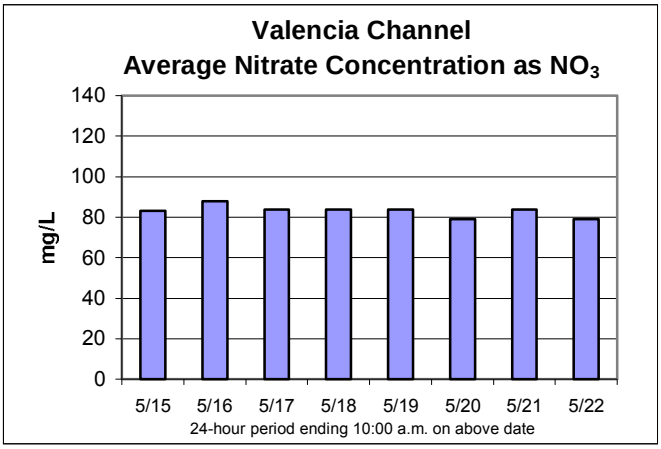

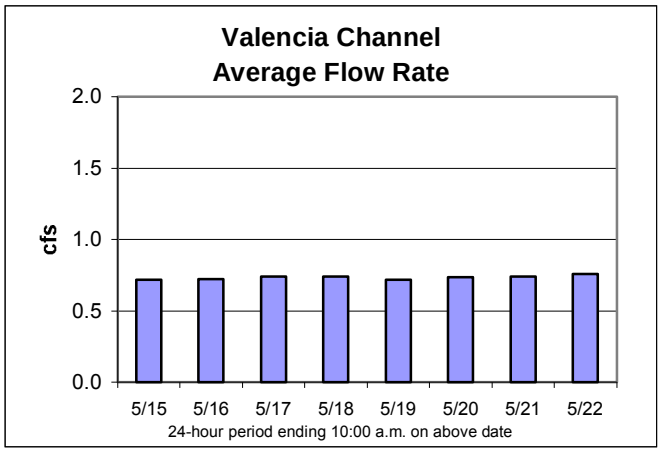

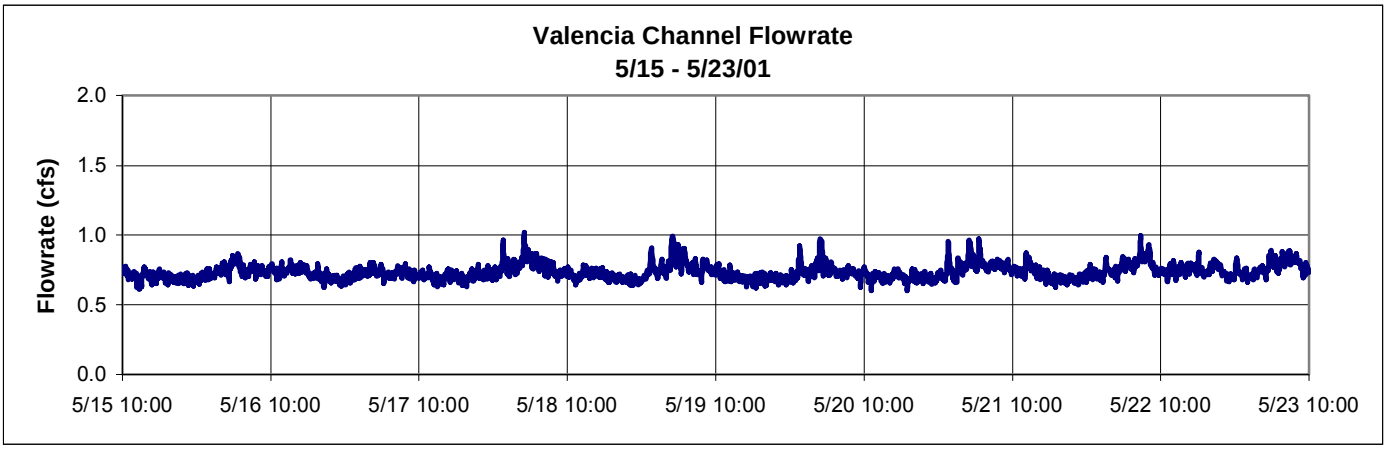

Nitrate Levels in Peters Canyon Wash and its Tributaries
May 15 - 22, 2001

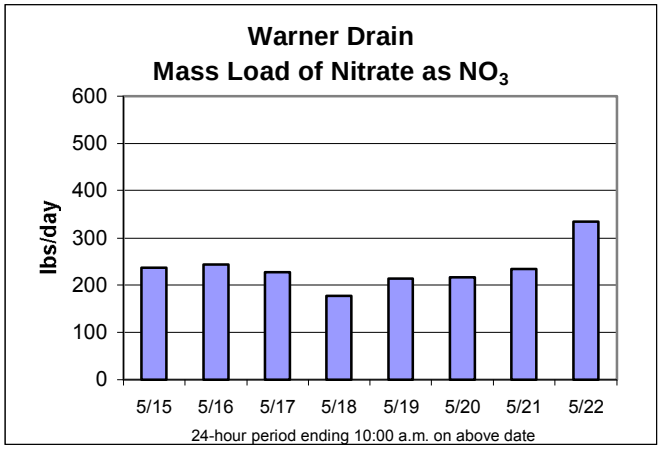

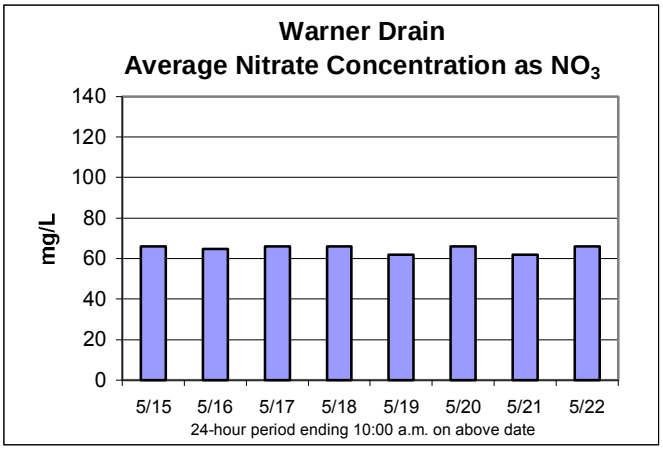

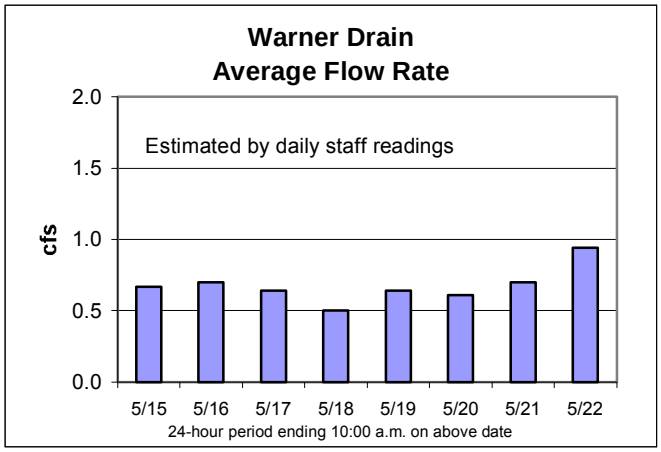

Nitrate Levels in Peters Canyon Wash and its Tributaries
May 15 - 22, 2001

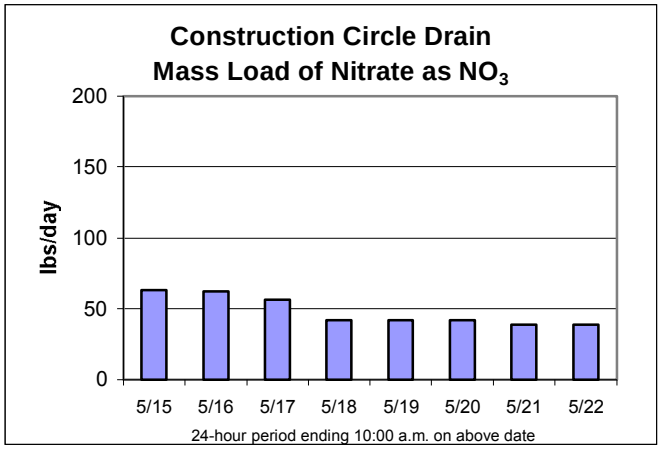

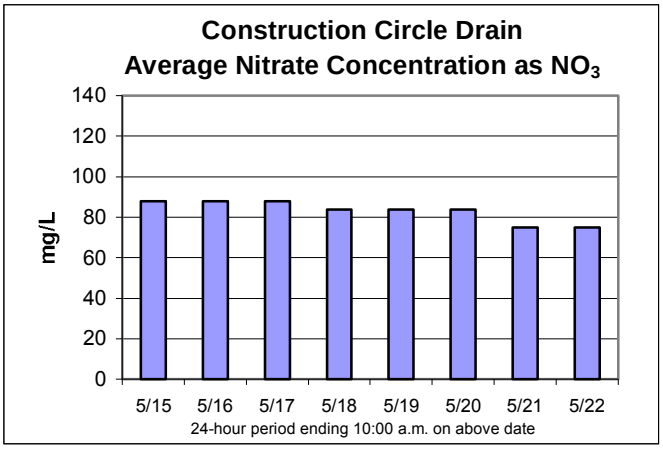

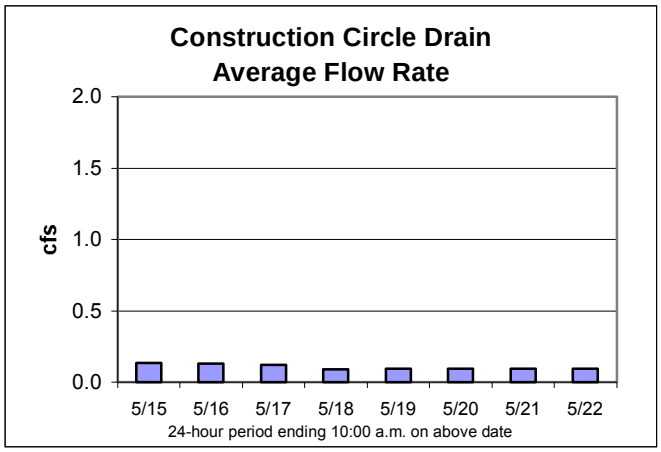

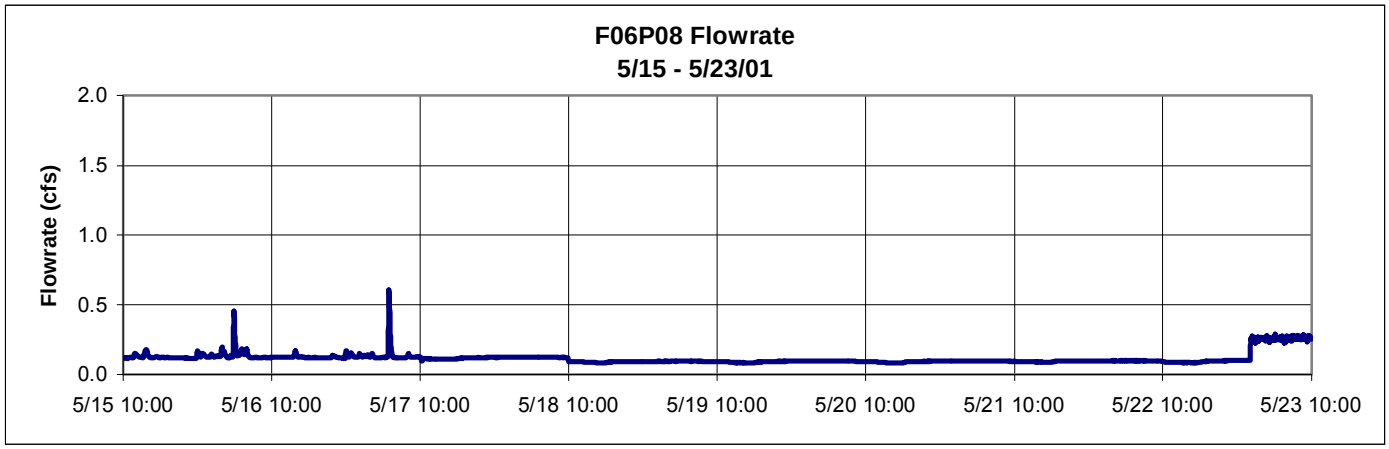

Nitrate Levels in Peters Canyon Wash and its Tributaries
May 15 - 22, 2001

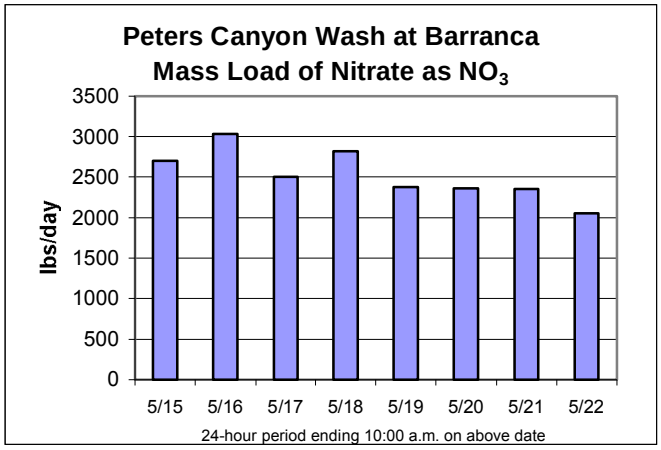

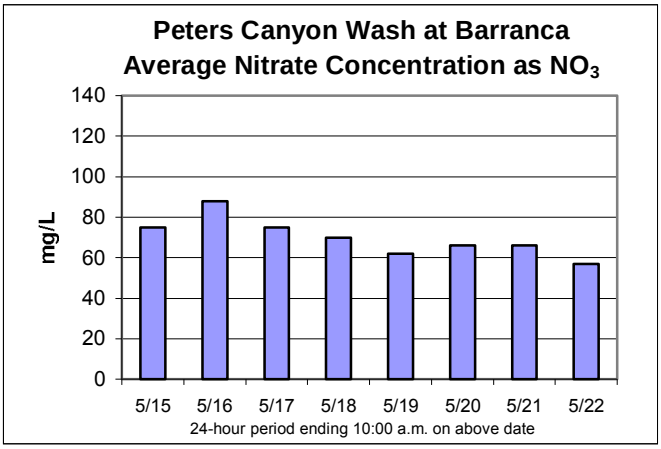

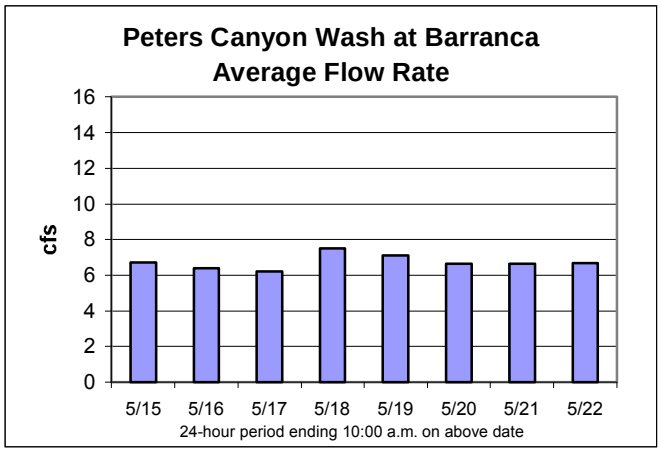

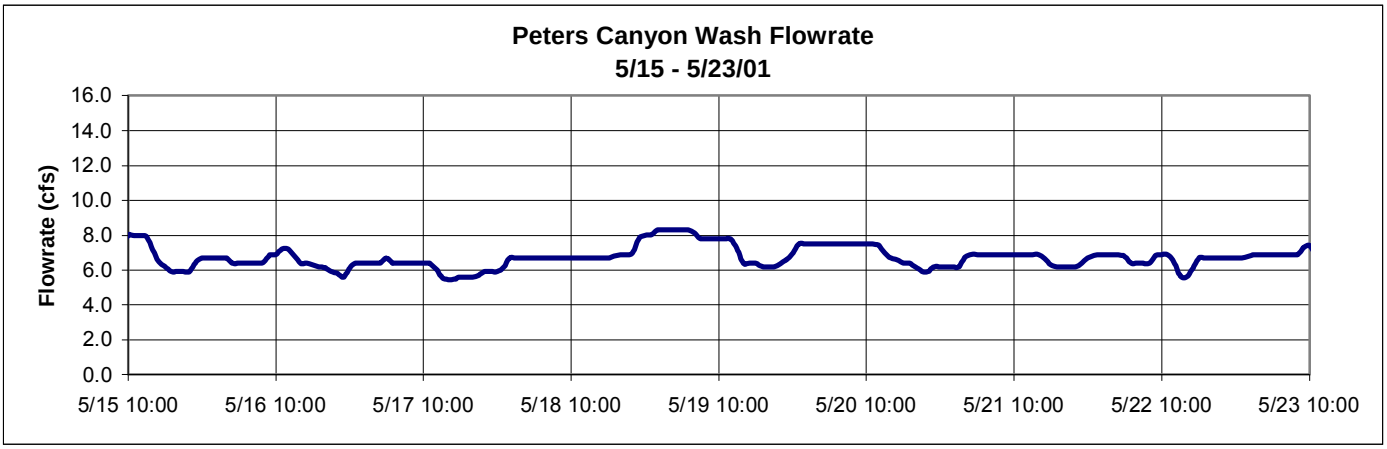

Nitrate Levels in Peters Canyon Wash and its Tributaries
May 15 - 22, 2001

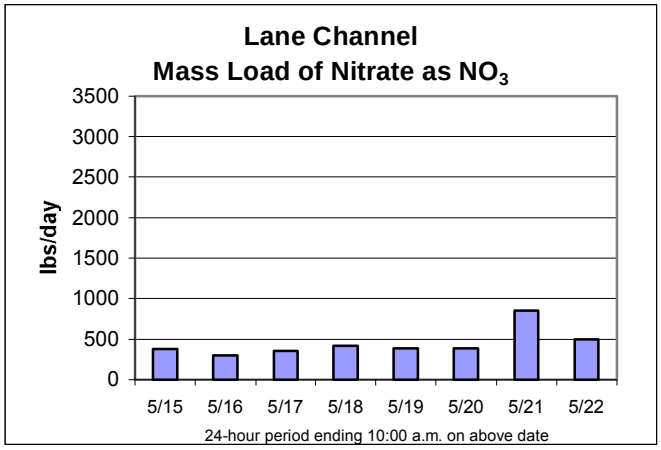

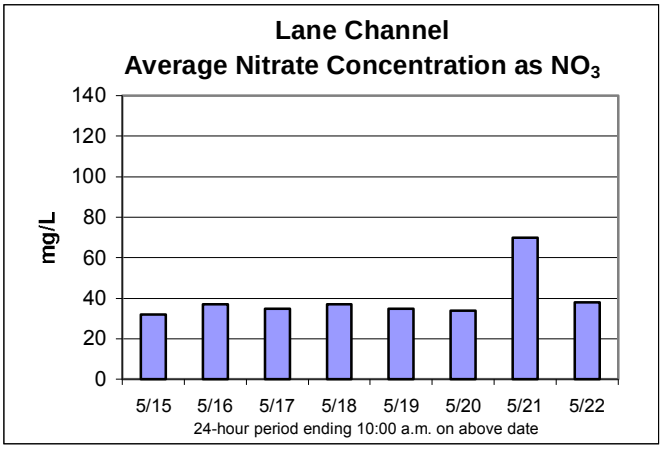

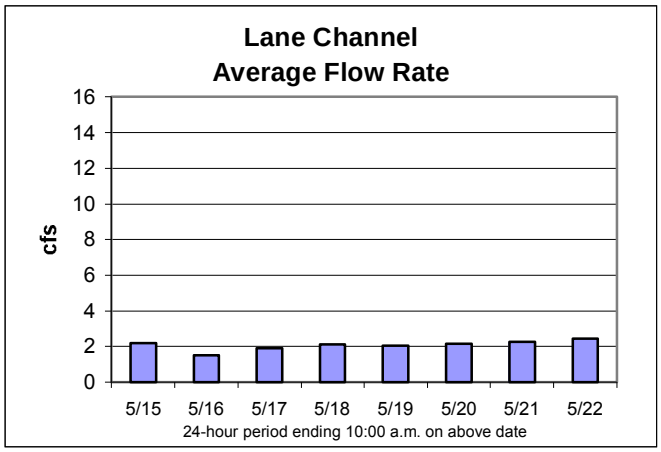

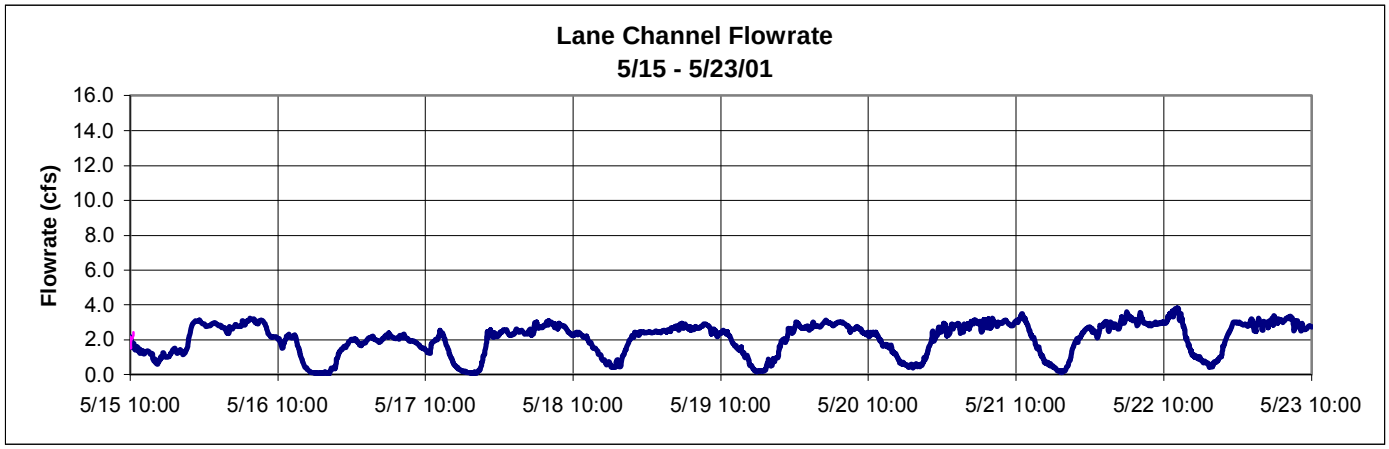

Nitrate Levels in Peters Canyon Wash and its Tributaries
May 15 - 22, 2001

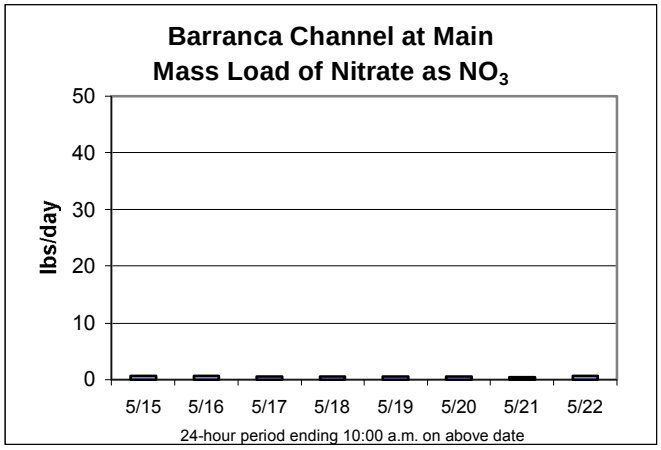

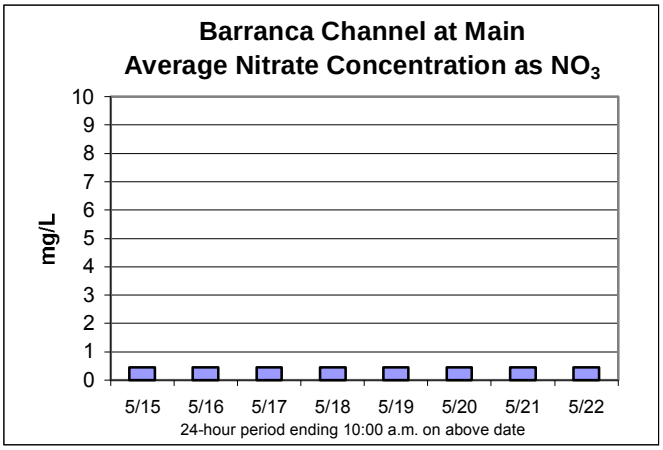

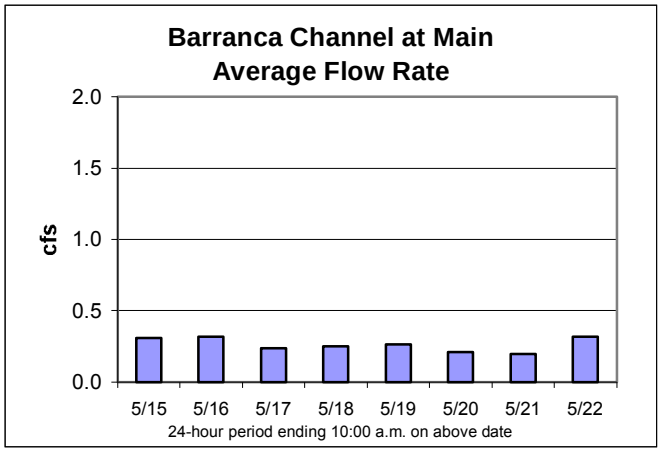

Nitrate Levels in Peters Canyon Wash and its Tributaries
May 15 - 22, 2001

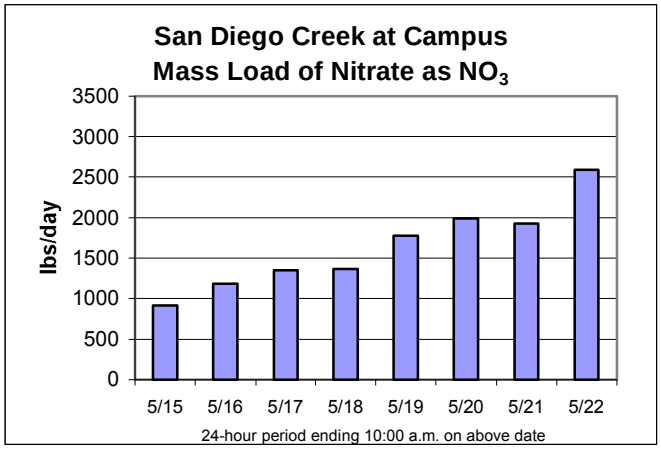

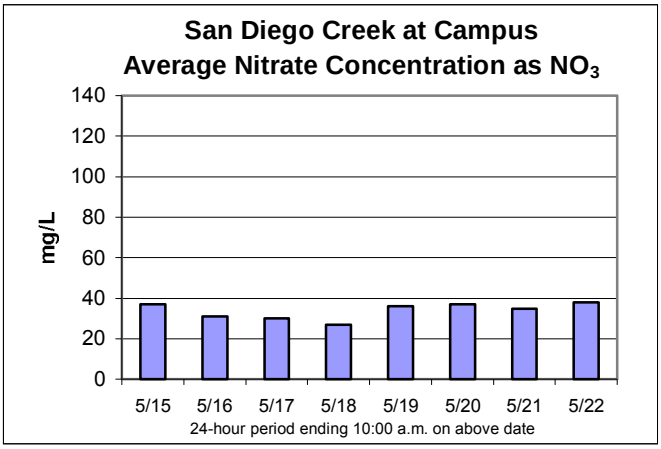

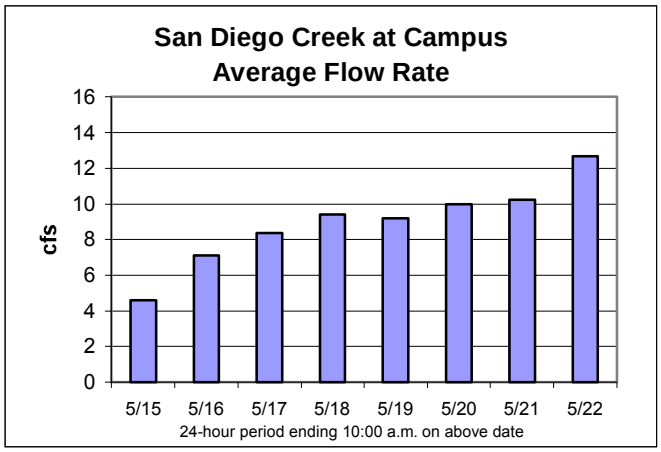

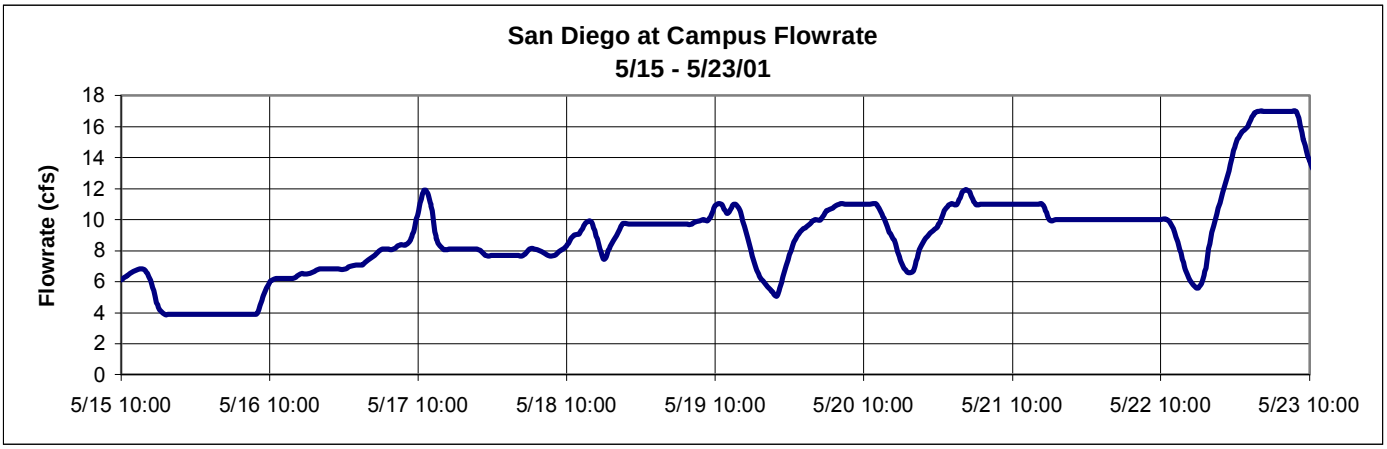

Appendix C
Crop Summary from UC Cooperative Extension

Agricultural Acreage Estimates for the County of Orange Nutrient Study 005551
May 2001
Source: UC Cooperative Extension (UCCE) – November 6, 2001

The acreage estimates below represent various agricultural activities that were most likely in place during the County of Orange Nutrient Study that was conducted from May 15-22, 2001. Since the study period occurred five months prior, every effort was made by UCCE to reconstruct the crop composition upstream of the sampling stations. The agricultural acreage numbers reported are compiled from a combination of the 2000 County of Orange Agricultural Commissioners records and actual site visits to verify and update acreage in place in May 2001. Crops listed here as "miscellaneous crops" were recorded by the County Agricultural Commissioner as "misc. truck", "vegetable", and "misc. vegetable". In addition, if the actual crop that was in the ground at the time was unknown, UCCE designated these sites as "misc. crop".

The acreage estimates listed below each County sampling station reflect the maximum agricultural acreage that may have contributed to the presence of surface runoff. Under dry conditions, such as during the May sampling period, agricultural runoff would have been minimal or non-existent from many sources. Crops that should have had no runoff during the sampling period include: box tree nurseries, avocados, strawberries, citrus, tomatoes, and peppers. This is based upon the maturity of the crop at the time of sampling and the method of irrigation applied (drip or micro).

The strawberry production season in the Newport Bay Watershed is finished in late June to early July depending on grower preference. Surface runoff during the May sampling period, however, should be absent due to the continued use of drip irrigation as well as the decreased frequency of irrigation as the end of the growing season approaches.

The most significant agricultural activities upstream of the Central Irvine Channel sampling station (4) include 520 acres of nursery operations that have current Waste Discharge Requirements (WDRs) from RWQCB and 565 acres of strawberry and 230 acres of tomato production.

Acreage in the San Diego Creek/Newport Bay Watershed under agricultural production during the May 2001 sampling dates was approximately 4,000 acres.

1. Peters Canyon Wash u/s Hicks Canyon Wash (USRF06 or USHF06)
   Estimated agricultural acreage: 991
   Composition:

Avocado	680 acres
Strawberry	131
Tomatoes	180

2. Rattlesnake Canyon Wash (RCWF26)
   Estimated agricultural acreage: 102 acres
   Composition:

Avocados	102 acres

3. 65" RCP d/s Bryan Avenue (DSBRCP)
   Estimated agricultural acreage: 7
   Composition:

Bean	7 acres

4. Central Irvine Channel at PCW (CICF25)
   Estimated agricultural acreage: 1315
   Composition:

Nursery	520 acres (WDRs issued for this acreage)
Strawberries	565
Tomatoes	230

5. El Modena Irvine Channel-PCW (MIRF07)
   Estimated agricultural acreage: 24
   Composition:

Lemons	17 acres
Avocados	2
Mixed orchard (Citrus/avocado)	5

6. Como Storm Channel-PCW (CSCS03)
   Estimated agricultural acreage: None

7. F06P08 at Moulton Parkway (runs parallel to Irvine Ctr Dr.; enters PCW from opposite side that F10 does)
   Estimated agricultural acreage: None

8. Santa Ana-Santa Fe Channel (SAFF10)
   Estimated agricultural acreage: None

9. Valencia Storm Drain (VALS02)
   None

10. Warner Drain-PCW (WARF06)
    None

11. Construction Circle Drain-PCW (F06P06)
    None

12. Peters Canyon Wash at Barranca Pkwy (BARSED)
    Estimated agricultural acreage: None
    Composition:

13. San Diego Creek at Harvard Avenue (WYLSED)
    Estimated agricultural acreage: 573
    Composition:

Box tree	62
Nursery	170
Misc. Crops	161
Strawberries	180

14. Barranca Channel-SD Creek (BRCF09)
    Estimated agricultural acreage: None

15. Lane Channel -SD Creek (LANF08)
    Estimated agricultural acreage: 1
    Composition:

Nursery	1

16. San Joaquin Channel-SD Creek (SJQF14)
    Estimated agricultural acreage: 34
    Composition:

Nursery	4
Strawberry	10
Misc. Crops	20

17. Sand Canyon Channel -SD Creek (SCCF15)
    Estimated agricultural acreage: None

18. San Diego Creek at Campus Drive (SDMF05)
    Estimated agricultural acreage: 20
    Composition:

Nursery	20

19. Lyon Storm Drain (F06S07)
    Estimated agricultural acreage: None

Reach 2 of San Diego Creek

Agua Chinon Channel-SD Creek
Estimated agricultural acreage: 305
Composition:

Misc. crops	180 acres (includes Musick Facility)
Strawberry	125

Bee Canyon Channel-SD Creek
Estimated agricultural acreage: 640
Composition:

Avocados	384
Box Tree	40
Nursery	142
Misc. crops	19
Strawberries	55

Marshburn Channel-SD Creek
Estimated agricultural acreage: 293
Composition:

Avocados	101
Box tree	22
Nursery	170

Appendix D
Photographs

San Diego Creek u/s of Campus Drive - 5/23/01

San Diego Creek d/s Campus Drive - 5/23/01

Peters Canyon Wash u/s Barranca Parkway looking downstream - 7/2/00

Peters Canyon Wash u/s Barranca Parkway - 5/23/01

Peters Canyon Wash d/s Central Irvine Channel - 6/23/00

Peters Canyon Wash d/s Central Irvine Channel - 5/23/01

Peters Canyon Wash d/s Irvine Blvd looking upstream - 7/2/00

Peters Canyon Wash d/s Irvine Blvd looking downstream - 5/20/01

APPENDIX S

NEWPORT BAY-TIME SERIES PLOT

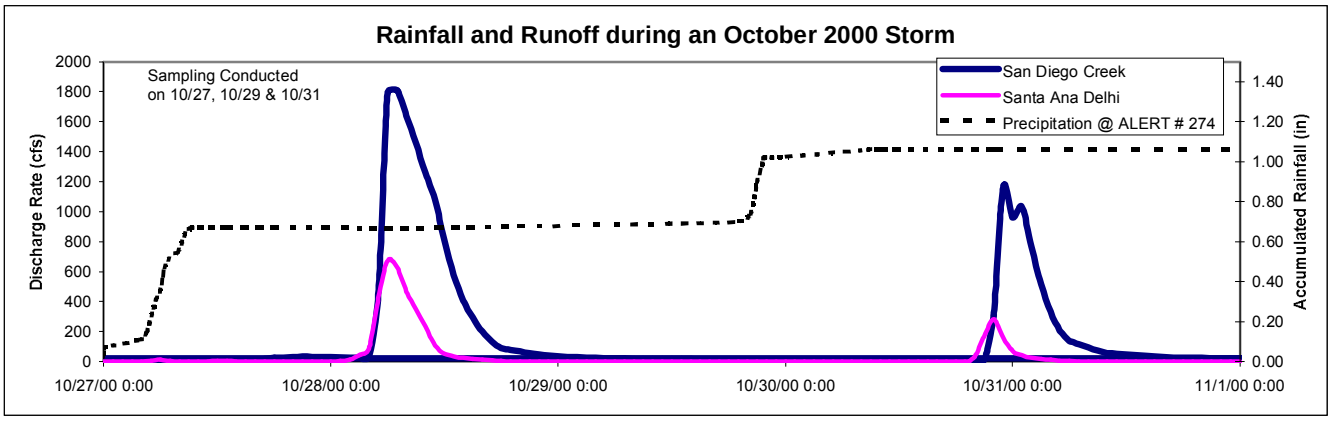
Rainfall and Runoff during an October 2000 Storm
Sampling Conducted
on 10/27, 10/29 & 10/31
San Diego Creek
Santa Ana Delhi
Precipitation @ ALERT # 274
Discharge Rate (cfs)
Accumulated Rainfall (in)
2000
1800
1600
1400
1200
1000
800
600
400
200
0
1.40
1.20
1.00
0.80
0.60
0.40
0.20
0.00
10/27/00 0:00
10/28/00 0:00
10/29/00 0:00
10/30/00 0:00
10/31/00 0:00
11/1/00 0:00

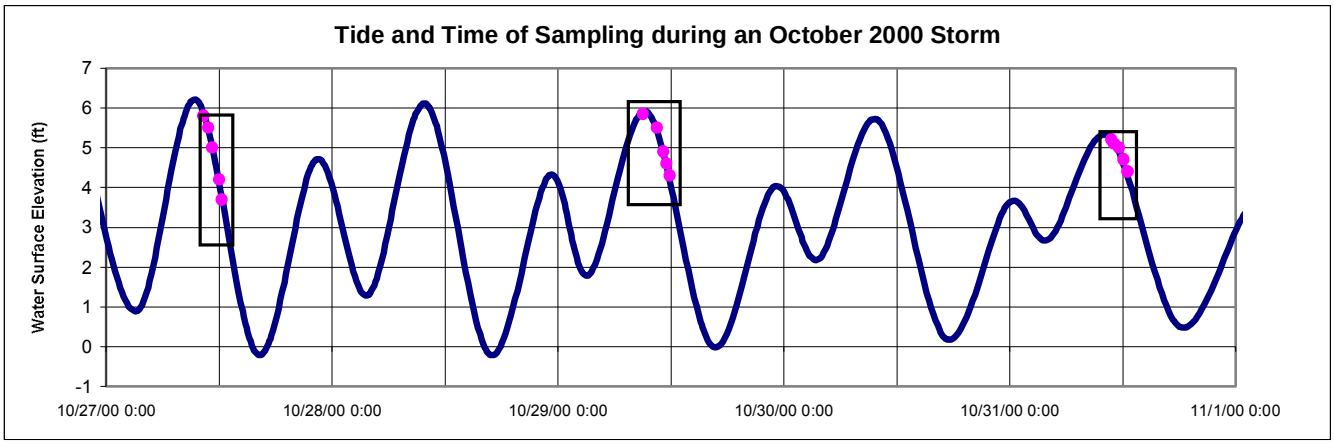
Tide and Time of Sampling during an October 2000 Storm
Water Surface Elevation (ft)
7
6
5
4
3
2
1
0
-1
10/27/00 0:00
10/28/00 0:00
10/29/00 0:00
10/30/00 0:00
10/31/00 0:00
11/1/00 0:00

Appendix S-1

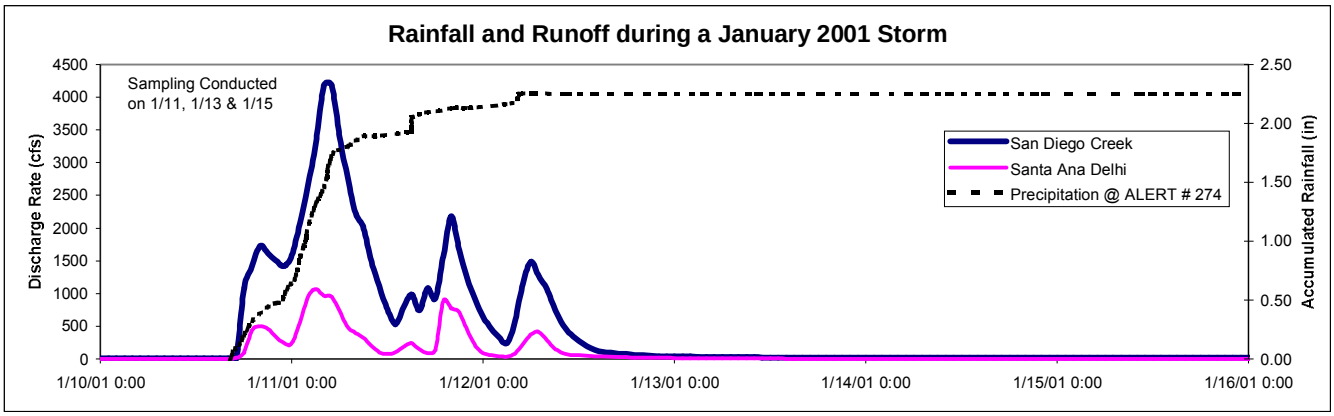
Rainfall and Runoff during a January 2001 Storm
Sampling Conducted on 1/11, 1/13 & 1/15
Discharge Rate (cfs)
Accumulated Rainfall (in)
San Diego Creek
Santa Ana Delhi
Precipitation @ ALERT # 274
4500
4000
3500
3000
2500
2000
1500
1000
500
0
2.50
2.00
1.50
1.00
0.50
0.00
1/10/01 0:00
1/11/01 0:00
1/12/01 0:00
1/13/01 0:00
1/14/01 0:00
1/15/01 0:00
1/16/01 0:00

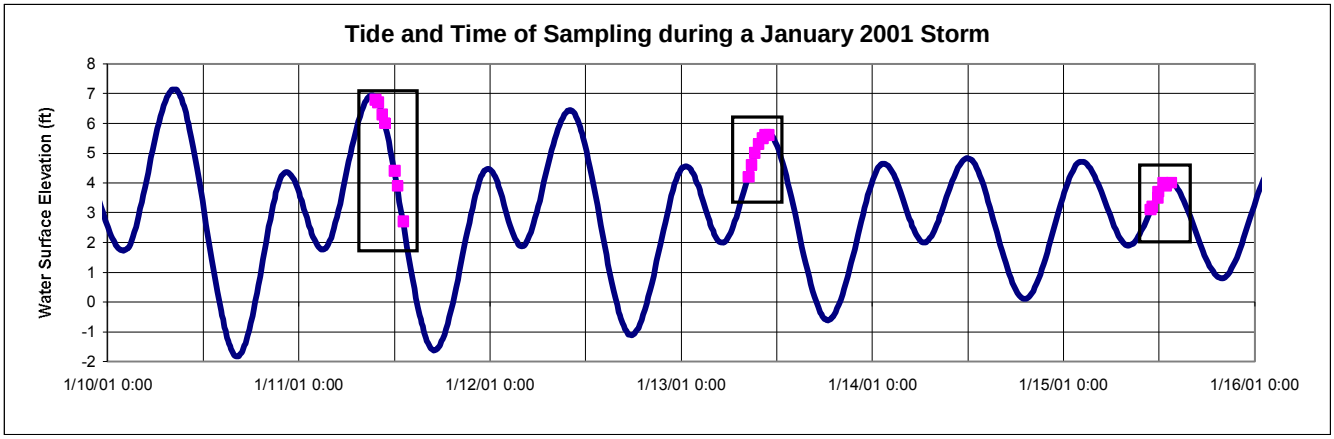
Tide and Time of Sampling during a January 2001 Storm
Water Surface Elevation (ft)
8
7
6
5
4
3
2
1
0
-1
-2
1/10/01 0:00
1/11/01 0:00
1/12/01 0:00
1/13/01 0:00
1/14/01 0:00
1/15/01 0:00
1/16/01 0:00

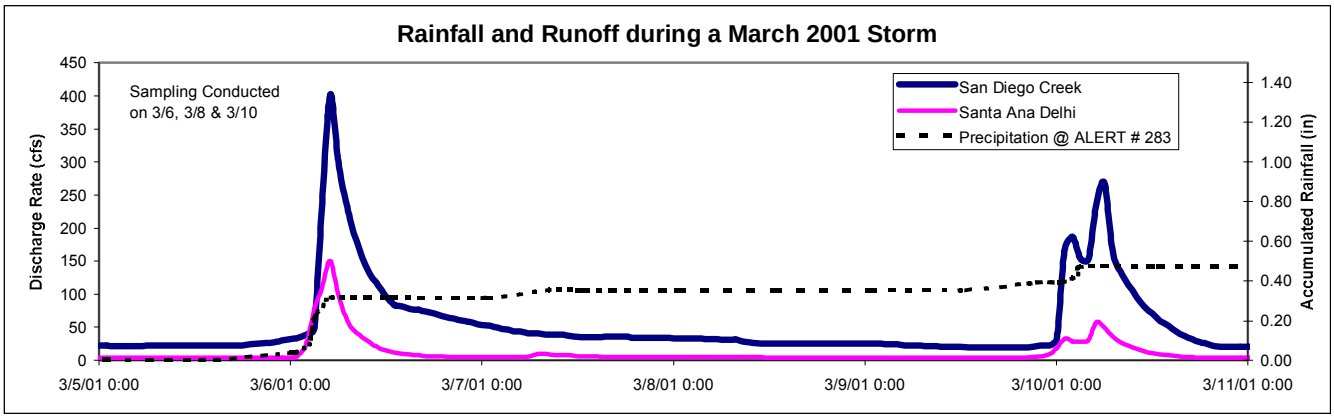
Rainfall and Runoff during a March 2001 Storm
Sampling Conducted on 3/6, 3/8 & 3/10
San Diego Creek
Santa Ana Delhi
Precipitation @ ALERT # 283
Discharge Rate (cfs)
Accumulated Rainfall (in)
450
400
350
300
250
200
150
100
50
0
1.40
1.20
1.00
0.80
0.60
0.40
0.20
0.00
3/5/01 0:00
3/6/01 0:00
3/7/01 0:00
3/8/01 0:00
3/9/01 0:00
3/10/01 0:00
3/11/01 0:00

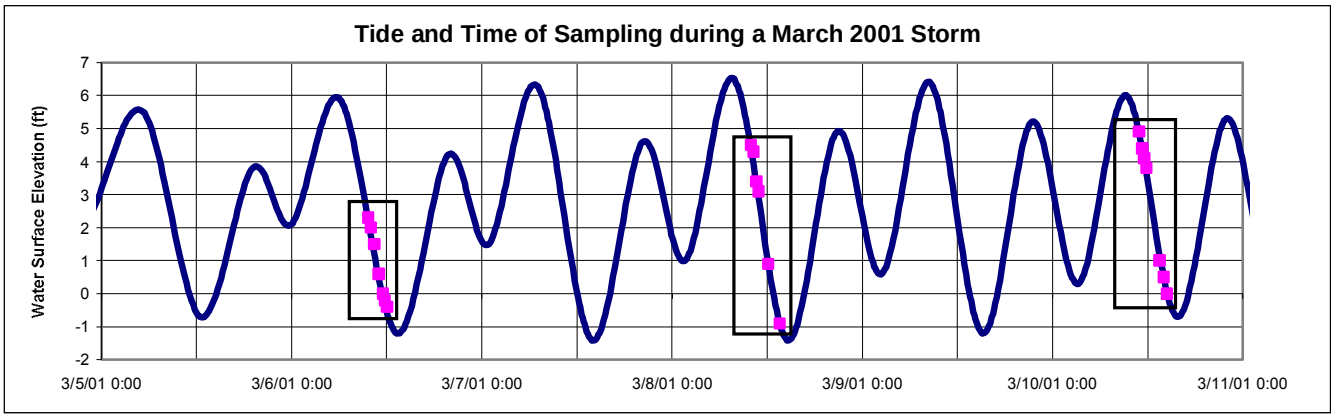
Tide and Time of Sampling during a March 2001 Storm
Water Surface Elevation (ft)
7
6
5
4
3
2
1
0
-1
-2
3/5/01 0:00
3/6/01 0:00
3/7/01 0:00
3/8/01 0:00
3/9/01 0:00
3/10/01 0:00
3/11/01 0:00

APPENDIX T

2000/01 NUTRIENT TMDL REGIONAL MONITORING REPORT

REPORT OF THE REGIONAL MONITORING PROGRAM FOR THE NEWPORT/SAN DIEGO CREEK WATERSHED NUTRIENT TMDL

(Resolution No. 98-9, as amended by Resolution No. 98-100)

November 2001

Prepared and submitted on behalf of:

The County of Orange
and
The Cities of Irvine, Tustin, Newport Beach,
Lake Forest, Santa Ana, Orange and Costa Mesa

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1.0 INTRODUCTION

The Nutrient TMDL for the Newport Bay/San Diego Creek Watershed (Resolution No. 98-9, as amended by Resolution No. 98-100) requires that the Santa Ana Regional Water Quality Control Board (Regional Board) establish and oversee a regional monitoring program (RMP) for the Newport Bay watershed. The RMP is a coordinated program among the stakeholders to assess the attainment of the goals of the nutrient TMDL. The stated objectives of the monitoring program are to quantify the three endpoints of the nutrient TMDL: 1) the seasonal nutrient loading from the watershed; 2) the nutrient concentration in San Diego Creek, Reaches 1 and 2; and 3) the extent, magnitude, and duration of algal blooms in San Diego Creek and Newport Bay.

The RMP is composed of two components: a routine monitoring component and a special monitoring component. The routine monitoring includes most of the traditional monitoring that has occurred in the watershed. The special monitoring includes investigations into unanswered questions about nutrient sources and dynamics in the watershed.

This report is a summary of the results of the routine monitoring component. The County of Orange initiated this element of the RMP in February 2000 as a cooperative program with the cities of Costa Mesa, Irvine, Laguna Hills, Laguna Woods, Lake Forest, Newport Beach, Orange, Santa Ana, and Tustin. The reporting period covered by this report is July 1, 2000 – June 30, 2001. The monitoring was conducted according to the outline based on Regional Board guidance (**Appendix A**).

As part of the RMP, monitoring is conducted at nine sites in the Upper Newport Bay watershed and five sites in the Newport Bay. **Figure 1** is a map of these locations. **Table 1** is a list of the sites and the monitoring frequencies.

2.0 SAMPLING METHODS

Automatic samplers were used to collect composite samples at eight of the nine watershed sites. The site at Agua Chinon was grab sampled because shifting bed material and low channel discharge rates hampered automatic sampling.

The five locations in the Newport Bay were grab-sampled. Dry weather monitoring at these sites included sampling at the surface mid-depth and bottom of the water column. Subsurface samples were collected using an ISCO peristaltic pump, tygon tubing and a weighted sample strainer.

3.0 WATERSHED SAMPLING RESULTS

All data from the monitoring in Upper Newport Bay watershed are contained in **Appendix B** including the results of a special one-week intensive sampling in May 2001 of San Diego Creek, Peters Canyon Wash, and its tributaries. These data were evaluated by computing simple statistics on the dry weather and storm runoff component from each site. Data from the May 2001 nutrient study were not included in the statistics because for most sites, the large amount of data collected during this one-week study would skew the annual mean. **Table 2** is a summary of the statistics. The Central Irvine Channel, a tributary to Peters Canyon Wash, is monitored as part of the NPDES urban runoff program. Because this channel is a major contributor of nutrients to the San Diego Creek watershed its data are also included in this report.

3.1 Nutrient Concentrations

Figure 2 is a graphical summary of the mean dry and wet-weather nitrate nitrogen concentrations measured at the RMP watershed sites and the Central Irvine Channel (station code CICF25). **Figure 3** is a summary of the total nitrogen concentrations. **Figure 4** shows the number of samples collected from each site. The results show that the greatest mean concentration of nitrate nitrogen was measured in the Central Irvine Channel during dry weather conditions.

3.2 Flow Measurements

Continuous water level recording gages are maintained at El Modena Irvine Channel, Peters Canyon Wash, San Diego Creek at Culver, San Diego Creek at Campus, and Santa Ana Delhi Channel, Lane Channel, and Costa Mesa Channel. Storm hydrographs (water level vs. time) from each monitored storm are presented in **Appendix C**.

With the exception of Costa Mesa and Lane Channels, rating curves based on numerous field measurements, have been developed. Until reliable ratings can be developed for Lane and Costa Mesa, discharge rates will be estimated by the Manning Equation. Preliminary streamgaging measurements at Costa Mesa and Lane Channels, however show that the Manning Equation overestimates the discharge rate at the lower end of the rating curve. The mean daily discharge rates for the streamgages with established channel ratings are presented in **Table 3**.

3.3 Nutrient Loads

The dry weather and stormwater nutrient loads from this monitoring period were calculated for each of the channels with established ratings. The loads from each sampled storm are presented in **Table 4**. The mean dry-weather nitrate nitrogen and total nitrogen loads from each site are plotted in **Figure 5**. The daily load from each dry-weather sampling San Diego Creek at Campus Drive is presented in **Figure 6**. The plot of mean nitrate nitrogen and total nitrogen load shows that the average load from Peters Canyon Wash exceeds those measured in San Diego Creek at Campus Drive. The

reduction in the loads downstream is due primarily to the operation of the Irvine Ranch Water District's (IRWD) Wetland Treatment system. The 2001 San Diego Creek / Peters Canyon Wash Nutrient study (Appendix R of the 2000/01 NPDES Annual Status Report) discusses this treatment system in more detail.

4.0 BAY SAMPLING RESULTS

Dry weather sampling of the Newport Bay was conducted nine times during the reporting period. The data from storm sampling of the bay although not a requirement of the RMP is included in **Appendix D**.

For the most part, the nitrate concentrations in the lower reaches of the Upper Bay (UNBNSB, UNBCHB) and at Harbor Island Reach (LNBHIR) were below the detection limits of the laboratory (0.44 mg/L as NO_3, 0.10 mg/L as N). **Figure 7** shows the average dry weather concentrations of nitrate in the Bay. As expected the concentrations are greater near the mouth of San Diego Creek and at the surface.

Figure 8 shows the dry weather nitrate concentrations at the uppermost station UNBJAM. With the exception of the June 2001 sampling all concentrations at the surface were greater than 4.0 mg/L as NO_3.

5.0 ALGAL SURVEYS

Alex Horne and Associates provided an analysis of the data collected in the algal biomass surveys. A draft report of this analysis is contained **Appendix E**. A series of infrared aerial photographs were taken of the Bay during the monitoring period. These photographs have been digitized and a composite photo in 11"X 17" format will be provided at a later date.

6.0 DISSOLVED OXYGEN STUDIES

The Irvine Ranch Water District (IRWD) reestablished a remote sensing station in the Upper Bay to monitor temperature, electrical conductivity, pH, and dissolved oxygen during August 2000. Measurements of these parameters were made every 30 minutes and stored in the datalogger of a multi-parameter probe. The monitoring data for August 2000 are presented in **Figures 9** and **10**.

Salinity values varied as a function of tide, with the high tide of the day corresponding to the daily salinity peak. Dissolved oxygen concentrations varied as a function of both time and tide. The highest daily dissolved oxygen concentrations occurred in late afternoon or early evening, regardless of tide stage. These peaks probably corresponded to the end of the period of direct sunlight. If a high tide occurred after the daily dissolved oxygen maximum and before the next sunrise a second smaller dissolved oxygen peak was observed. The dissolved oxygen data near the end of the month (**Figure 10**) appears to be in error due to probe fouling.

Tables

Table 1
RMP Monitoring Frequencies

				Annual Frequency of Measurement									
Station Code	**Location**	**Weather**	**Special Requirements**	**Temperature**	**Dissolved O_2**	**pH**	**Conductivity**	**Nutrients**	**ortho - PO_4**	**flowrate**	**hardness**	**algae biomass**	**Species Composition**
SADF01	Santa Ana Delhi Ch u/s Irvine	Dry		24	24	24	24	24	24	365	24		
		Storm		3	3	3	3	3	3	TS	3		
SDMF05	San Diego Creek @ Campus	Dry		52	52	52	52	52	52	365	52		
		Storm		3	3	3	3	3	3	TS	3		
BCF04	Bonita Canyon Ch u/s University	Dry		12	12	12	12	12	12	12	12		
		Storm		3	3	3	3	3	3	3	3		
CMCG02	Costa Mesa Ch @ Highland*	Dry		12	12	12	12	12	12	12	12		
		Storm		3	3	3	3	3	3	3	3		
MIRF07	El Modena Irvine Ch @ Michelle	Dry		12	12	12	12	12	12	12	12		
		Storm		3	3	3	3	3	3	3	3		
LANF08	Lane Ch u/s Jamboree	Dry		12	12	12	12	12	12	12	12		
		Storm		3	3	3	3	3	3	3	3		
ACWF18	Agua Chinon Wash @ SDC confluence	Dry		12	12	12	12	12	12	12	12		
		Storm		3	3	3	3	3	3	3	3		
BARSED	Peters Canyon Wash @ Barranca	Dry		24	24	24	24	24	24	365	24		
		Storm		3	3	3	3	3	3	TS	3		
WYLSED	San Diego Creek @ Harvard	Dry		24	24	24	24	24	24	365	24		
		Storm		3	3	3	3	3	3	TS	3		
UNBJAM	Upper Newport Bay in Unit I Basin	Dry	S, M, B	12	12	12	12	12	12				
UNBSDC	Upper Newport Bay in Unit II Basin	Dry	S, M, B	12	12	12	12	12	12				
UNBNSB	Upper Newport Bay at North Star Beach	Dry	S, M, B	12	12	12	12	12	12				
UNBCHB	Upper Newport Bay at Coast Highway Bridge	Dry	S, M, B	12	12	12	12	12	12				
LNBHIR	Lower Newport Bay at Harbor Island Reach	Dry	S, M, B	12	12	12	12	12	12				
Horne # 2	South end of Shellmaker Island	Dry		9	9		9	9	9			9	9
Horne # 4	South tip of Middle Island	Dry		9	9		9	9	9			9	9
Horne # 8	North end of Middle Island	Dry		9	9		9	9	9			9	9
Horne # 10	West side of the Narrows	Dry		9	9		9	9	9			9	9
Horne # 12	Southwest side of Unit II Basin	Dry		9	9		9	9	9			9	9
Horne # 15	North end of Unit II Basin, West side of dike	Dry		9	9		9	9	9			9	9
Horne # 18	South side of Unit I Basin	Dry		9	9		9	9	9			9	9
Horne # 19	North side of Unit I Basin	Dry		9	9		9	9	9			9	9
Horne # 24	Northeast side of Unit I Basin	Dry		9	9		9	9	9			9	9

Nutrients = Nitrate + Nitrite, Ammonia, TKN, total Phosphate, TSS, VSS, turbidity

* Sampled weekly as model urban runoff station

S, M, B - surface mid depth, bottom

TS - Total volume of storm runoff and amount sampled

Table 2
Summary of Data from RMP Channels
Excluding May 2001 Nutrient Study Data

Station		NO_3 as N			NH_3			TKN			TN			PO_4			O-PO_4			TSS			VSS		
		all	Dry	Storm	all	Dry	Storm	all	Dry	Storm	all	Dry	Storm	all	Dry	Storm	all	Dry	Storm	all	Dry	Storm	all	Dry	Storm
ACWF18	n	12	11	1	12	11	1	12	11	1	12	11	1	12	11	1	11	11		12	11	1	12	11	1
	mean	6.44	6.76	3	0.089	0.081	0.175	1.36	1.03	5.00	7.80	7.79	7.94	3.10	2.74	7.04	0.71	0.71		428	47	4620	45.25	11.18	420
	geomean	5.53	5.86	3	0.073	0.068	0.175	1.07	0.93	5.00	7.18	7.12	7.94	2.83	2.60	7.04	0.64	0.64		36.06	23.19	4620	12.85	9.36	420
	max	12.0	12.0	3	0.242	0.242	0.175	5.00	2.20	5.00	14.17	14.17	7.94	7.04	4.90	7.04	1.78	1.78		4620	180	4620	420	23	420
	min	1.2	1.2	3	0.050	0.050	0.175	0.39	0.39	5.00	2.84	2.84	7.94	1.84	1.84	7.04	0.40	0.40		10	10	4620	1.00	1.00	420
	std dev	3.17	3.12		0.066	0.064		1.25	0.51		3.11	3.27		1.57	1.01		0.40	0.40		1321	59		118.12	5.25	
SADF01	n	39	20	19	39	20	19	39	20	19	39	20	19	39	20	19	39	20	19	39	20	19	39	20	19
	mean	3.24	3.24	3.23	0.27	0.07	0.49	1.50	0.86	2.10	4.79	4.14	5.41	0.61	0.29	0.93	0.07	0.03	0.12	47.89	16.40	82.89	16.95	9.80	24.89
	geomean	2.91	2.86	2.96	0.11	0.06	0.20	1.08	0.77	1.49	4.35	3.77	4.98	0.40	0.26	0.64	0.05	0.02	0.10	22.51	14.85	35.74	12.69	9.78	16.96
	max	6.77	6.77	5.65	3.67	0.182	3.67	8.8	1.9	8.8	14.45	7.69	14.45	2.97	0.49	2.97	0.24	0.069	0.24	470	32	470	110	10	110
	min	0.52	0.52	1.33	0.05	0.05	0.05	0.2	0.2	0.54	0.83	0.83	2.70	0.061	0.061	0.0918	0.01	0.01	0.019	10	10	10	8	8	10
	std dev	1.44	1.56	1.33	0.63	0.04	0.85	1.68	0.39	2.17	2.3	1.7	2.6	0.67	0.13	0.85	0.07	0.02	0.07	89.62	7.82	122.26	20.76	0.62	28.47
BARSED	n	42	19	23	42	19	23	42	19	23	42	19	23	42	19	23	42	19	23	42	19	23	42	19	23
	mean	11.90	11.87	10.32	0.25	0.10	0.39	2.16	1.21	3.05	14.34	13.69	14.87	1.56	0.83	2.24	0.25	0.17	0.33	104.95	19.89	182.73	23.81	10.21	36.18
	geomean	10.47	11.21	9.21	0.13	0.07	0.25	1.60	1.11	2.27	13.14	13.02	13.24	1.24	0.75	1.95	0.20	0.13	0.31	37.76	16.96	80.08	16.42	10.15	25.45
	max	47.42	21.90	22.58	1.42	0.757	1.42	12	2.6	12	48.13	24.50	48.13	4.59	1.71	4.59	0.546	0.417	0.546	620	48	620	110	15	110
	min	3.61	7.45	3.61	0.05	0.05	0.05	0.4	0.4	0.47	5.61	8.75	5.61	0.306	0.306	0.857	0.024	0.024	0.15	10	10	10	8	8	10
	std dev	7.37	4.36	5.20	0.33	0.16	0.38	2.14	0.49	2.65	7.13	4.66	8.74	1.14	0.37	1.18	0.15	0.11	0.13	163.33	12.13	196.58	25.83	1.27	31.06
WYLSED	n	37	19	18	37	19	18	37	19	18	37	19	18	37	19	18	37	19	18	37	19	18	37	19	18
	mean	11.08	14.29	7.69	0.17	0.05	0.29	1.71	1.01	2.44	12.75	15.21	10.15	1.11	0.35	1.91	0.16	0.07	0.26	141.84	20.32	270.11	24.43	10.21	39.44
	geomean	9.87	13.17	7.27	0.10	0.05	0.18	1.28	0.85	2.00	11.84	14.22	9.75	0.58	0.23	1.54	0.10	0.04	0.24	38.96	13.85	116.04	14.99	9.02	25.65
	max	18.97	18.97	11.97	1.33	0.13	1.33	7.9	4	7.9	20.94	20.94	15.44	5.51	1.71	5.51	0.53	0.21	0.53	1150	150	1150	150	28	150
	min	2.26	2.26	3.84	0.05	0.05	0.05	0.2	0.2	0.63	3.19	3.19	5.56	0.061	0.061	0.52	0.01	0.01	0.111	10	10	10	1	1	10
	std dev	4.81	4.21	2.56	0.25	0.02	0.32	1.52	0.79	1.76	4.47	4.35	2.88	1.23	0.38	1.31	0.14	0.07	0.12	251.08	31.95	313.83	30.53	4.88	38.52
BCF04	n	22	11	11	22	11	11	22	11	11	22	11	11	22	11	11	22	11	11	22	11	11	22	11	11
	mean	0.66	0.67	0.64	0.06	0.05	0.07	0.85	0.65	1.05	1.48	1.26	1.69	0.59	0.36	0.82	0.08	0.05	0.12	117.73	61.27	174.18	16.36	13.45	19.27
	geomean	0.56	0.56	0.56	0.05	0.05	0.06	0.74	0.58	0.95	1.32	1.12	1.55	0.44	0.29	0.68	0.06	0.04	0.11	50.83	29.01	89.08	13.95	11.97	16.26
	max	2.48	2.48	1.38	0.213	0.05	0.213	2.3	1.8	2.3	3.68	3.00	3.68	1.59	0.826	1.59	0.219	0.143	0.219	540	300	540	42	40	42
	min	0.16	0.34	0.16	0.05	0.05	0.05	0.31	0.31	0.43	0.58	0.58	0.77	0.092	0.092	0.153	0.02	0.02	0.046	10	10	10	10	10	10
	std dev	0.48	0.61	0.34	0.04	0.00	0.05	0.50	0.40	0.53	0.78	0.73	0.79	0.42	0.24	0.44	0.06	0.04	0.07	149.8	90.5	178.6	11.02	9.13	12.37
LANF08	n	27	14	13	27	14	13	27	14	13	27	14	13	27	14	13	27	14	13	27	14	13	27	14	13
	mean	5.87	7.49	4.37	0.34	0.11	0.55	1.98	1.02	2.88	7.78	8.18	7.36	1.20	1.04	1.35	0.19	0.21	0.17	73.78	20.31	123.43	17.96	9.46	25.86
	geomean	5.03	7.25	3.58	0.20	0.09	0.40	1.55	1.00	2.31	7.00	7.88	6.17	1.01	0.89	1.15	0.17	0.18	0.16	31.73	16.98	56.72	12.39	8.50	17.57
	max	9.94	9.94	7.90	2	0.241	2	9.1	1.3	9.1	14.97	10.89	14.97	4.9	2.42	4.9	0.544	0.544	0.27	700	60	700	120	11	120
	min	1.06	4.74	1.06	0.05	0.05	0.18	0.69	0.69	0.99	2.26	3.87	2.26	0.21	0.21	0.73	0.068	0.068	0.1	10	10	10	1	1	10
	std dev	2.69	1.90	2.48	0.44	0.07	0.54	1.85	0.19	2.24	3.25	2.13	4.19	0.87	0.57	1.08	0.09	0.12	0.05	141.77	15.06	185.67	23.23	2.57	30.56

Table 2
Summary of Data from RMP Channels
Excluding May 2001 Nutrient Study Data

Station		NO_3 as N			NH_3			TKN			TN			PO_4			O-PO_4			TSS			VSS		
		all	Dry	Storm	all	Dry	Storm	all	Dry	Storm	all	Dry	Storm	all	Dry	Storm	all	Dry	Storm	all	Dry	Storm	all	Dry	Storm
CICF25	**n**	24	23	1	24	23	1	24	23	1	24	23	1	24	23	1	24	23	1	24	23	1	24	23	1
	mean	30.93	31.41	19.9	3.68	3.81	0.69	6.36	6.46	3.9	36.91	37.49	23.77	5.83	5.76	7.34	1.71	1.70	1.86	91.00	90.91	93.0	19.92	20.17	14.0
	geomean	26.56	26.90	19.9	0.67	0.67	0.69	4.15	4.16	3.9	31.79	32.19	23.77	4.81	4.73	7.34	1.33	1.31	1.86	42.10	40.67	93.0	14.83	14.86	14.0
	max	65.48	65.48	19.87	21.2	21.2	0.69	30	30	3.9	88.48	88.48	23.77	13.5	13.5	7.34	5.59	5.59	1.86	600	600	93.0	130	130	14.0
	min	7.23	7.23	19.87	0.05	0.05	0.69	0.24	0.24	3.9	10.53	10.53	23.77	0.918	0.918	7.34	0.26	0.26	1.86	10	10	93.0	9	9	14.0
	std dev	16.14	16.32		5.89	5.98		6.96	7.10		20.56	20.83		3.28	3.34		1.23	1.25		129.48	132.38		24.82	25.34	
MIRF07	**n**	19	12	7	19	12	7	19	12	7	19	12	7	19	12	7	19	12	7	19	12	7	19	12	7
	mean	2.22	2.47	1.89	0.12	0.13	0.08	2.04	2.33	1.60	4.27	4.73	3.49	0.97	0.98	0.92	0.16	0.16	0.18	21.21	16.91	27.57	10.11	9.64	10.71
	geomean	1.93	2.23	1.54	0.09	0.10	0.07	1.76	2.03	1.39	3.93	4.61	2.99	0.87	0.84	0.88	0.15	0.14	0.17	17.82	15.16	22.03	9.30	8.44	10.60
	max	5.19	5.19	4.06	0.343	0.343	0.15	5.6	5.6	3.4	7.46	6.80	7.46	2.14	2.14	1.25	0.293	0.293	0.286	60	40	60	15	14	15
	min	0.54	1.15	0.54	0.05	0.05	0.05	0.68	0.68	0.78	1.35	3.31	1.35	0.367	0.367	0.612	0.077	0.077	0.128	10	10	10	1	1	10
	std dev	1.19	1.23	1.21	0.09	0.11	0.04	1.20	1.34	0.96	1.64	1.14	2.13	0.45	0.55	0.28	0.08	0.08	0.07	14.92	9.21	21.08	2.62	3.11	1.89
CMCG02	**n**	60	41	19	60	41	19	60	41	19	60	41	19	60	41	19	60	41	19	60	41	19	60	41	19
	mean	2.53	1.44	4.87	0.33	0.16	0.69	4.27	3.19	6.61	6.80	4.63	11.47	6.85	9.00	2.21	0.35	0.32	0.40	42.08	26.02	78.67	21.80	13.61	40.44
	geomean	0.58	0.39	1.41	0.13	0.10	0.25	2.36	2.21	2.70	3.55	3.14	4.64	1.39	1.31	1.57	0.25	0.23	0.32	20.30	16.56	32.26	12.69	10.30	20.41
	max	63.23	14.90	63.23	4.24	2.11	4.24	64	22	64	67.61	22.52	67.61	309	309	9.18	0.99	0.93	0.99	500	270	500	230	78	230
	min	0.10	0.10	0.15	0.05	0.05	0.05	0.84	0.84	0.87	1.22	1.34	1.22	0.184	0.184	0.275	0.01	0.01	0.06	10	10	10	1	1	10
	std dev	8.47	3.37	14.20	0.71	0.32	1.10	8.88	4.07	14.61	12.44	5.06	20.40	39.70	48.04	2.17	0.25	0.23	0.28	82.03	43.79	128.08	36.84	13.35	60.67
SDMF05	**n**	60	39	21	60	39	21	60	39	21	60	39	21	60	39	21	60	39	21	60	39	21	60	39	21
	mean	7.89	7.46	8.77	0.15	0.08	0.29	1.78	1.68	2.04	9.76	9.19	10.82	1.02	0.75	1.56	0.12	0.07	0.21	112.07	82.03	178.47	19.37	17.41	23.89
	geomean	6.53	6.32	6.93	0.09	0.07	0.19	1.60	1.51	1.86	8.84	8.57	9.35	0.70	0.54	1.17	0.06	0.03	0.15	73.24	65.45	98.29	16.55	16.03	18.16
	max	47.42	14.00	47.42	1.12	0.628	1.12	3.6	3.2	3.6	48.06	15.40	48.06	6.12	6.12	3.98	0.41	0.334	0.41	900	280	900	88	48	88
	min	0.77	0.77	2.48	0.05	0.05	0.05	0.27	0.27	0.64	2.65	2.65	4.58	0.061	0.061	0.061	0.01	0.01	0.025	10	10	11	10	10	10
	std dev	6.10	3.58	9.41	0.20	0.10	0.27	0.77	0.71	0.83	5.80	3.19	8.85	1.02	0.94	1.01	0.12	0.09	0.14	144.29	55.85	231.16	14.16	7.87	21.93

Table 3
Mean Daily Discharge Rates (cfs) at RMP Streamgages

San Diego Creek at Campus Drive

	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN
1	10.5	11.1	17.4	9.4	7.2	16.0	9.5	7.6	41.2	11.9	9.0	11.8
2	10.0	10.2	13.1	9.2	6.2	16.0	10.2	7.5	24.9	12.1	10.0	14.9
3	9.8	7.9	13.0	8.9	6.2	15.4	11.1	7.4	24.0	9.9	7.2	17.0
4	9.5	12.7	13.8	9.8	5.7	15.0	11.5	7.8	22.8	9.5	8.1	13.5
5	9.2	12.5	14.0	10.0	6.8	15.0	10.2	8.2	23.0	36.7	11.2	7.0
6	9.2	20.2	12.9	9.2	14.6	15.0	11.7	8.8	116.7	15.6	14.1	6.6
7	8.9	13.0	10.9	10.0	12.2	14.6	12.4	8.0	38.9	260.9	15.5	6.1
8	8.9	13.0	12.0	9.9	11.7	15.0	182.3	7.9	27.7	23.5	13.1	7.8
9	8.7	13.0	11.4	9.6	12.0	14.0	34.6	8.4	21.3	21.1	12.2	6.7
10	8.7	13.0	11.8	12.6	13.0	14.0	381.7	32.5	92.0	17.3	11.1	5.4
11	8.7	13.0	11.4	15.1	18.4	14.0	1828.9	15.3	18.9	10.2	11.9	5.7
12	9.4	13.4	11.0	16.2	15.2	14.7	411.2	1667.7	17.1	9.4	12.2	8.9
13	12.1	14.0	11.0	14.5	13.8	14.5	28.7	1024.1	17.0	9.3	12.7	9.7
14	10.5	14.0	11.0	11.6	13.8	10.6	18.8	56.2	16.7	9.1	8.2	10.1
15	10.0	14.0	11.0	12.0	13.0	8.5	16.4	19.0	14.5	9.6	5.7	10.4
16	9.9	14.0	11.0	12.0	13.0	8.8	13.0	17.4	12.7	10.4	5.5	10.7
17	9.9	14.0	11.0	12.0	13.0	8.3	10.3	15.9	12.0	9.1	8.4	9.7
18	12.3	9.7	11.0	12.0	13.0	7.9	11.0	16.1	11.9	11.3	8.6	9.4
19	12.5	11.1	11.1	12.0	13.1	7.5	11.2	20.8	12.1	11.3	8.9	12.6
20	11.4	13.0	11.5	12.0	13.9	7.1	8.4	54.5	12.1	9.5	9.7	17.3
21	10.2	12.3	9.8	12.0	14.0	6.9	8.7	19.5	12.0	70.7	10.7	17.7
22	9.4	8.9	13.2	12.0	14.0	6.9	10.1	18.9	12.5	6.6	9.9	17.0
23	9.8	7.1	60.5	12.0	14.0	6.6	9.6	114.2	11.1	16.4	14.0	13.9
24	9.5	6.2	10.6	12.0	14.2	8.1	91.9	41.1	10.1	11.2	9.3	12.9
25	9.4	8.8	11.0	12.0	15.0	8.6	14.8	1015.1	11.4	9.3	10.7	10.9
26	9.4	8.4	11.0	17.6	15.0	7.3	373.9	741.8	10.4	6.0	11.0	11.5
27	9.5	9.0	10.6	521.0	15.0	7.4	78.1	139.2	7.6	13.7	13.6	11.3
28	9.7	8.9	10.0	20.1	15.3	8.6	12.1	66.5	5.6	14.5	21.8	10.2
29	9.7	9.3	10.0	90.4	16.5	8.6	9.1		8.9	14.5	12.4	10.8
30	10.0	9.0	9.7	181.7	16.6	9.3	8.1		8.4	9.6	12.1	10.1
31	9.9	10.3		13.4		9.2	8.1		8.3		11.5	
TOTAL	306.60	354.94	397.99	1132.26	385.19	339.40	3657.46	5167.53	683.71	690.18	340.41	327.51
MEAN	9.89	11.45	13.27	36.52	12.84	10.95	117.98	184.55	22.06	23.01	10.98	10.92
MAX	12.48	20.21	60.55	521.02	18.44	16.00	1828.89	1667.72	116.68	260.93	21.82	17.68
MIN	8.70	6.24	9.74	8.91	5.66	6.65	8.14	7.40	5.57	5.96	5.49	5.41
AC-FT	608.13	704.02	789.40	2245.81	764.02	673.19	7254.48	10249.66	1356.11	1368.95	675.20	649.61

Table 3
Mean Daily Discharge Rates (cfs) at RMP Streamgages

Peters Canyon Wash

	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN
1	5.66	4.36	2.60	4.63	5.51	4.73	3.94	6.85	8.72	8.44	5.92	7.03
2	5.45	4.57	2.60	4.76	5.86	4.97	4.04	6.82	6.17	8.10	5.60	6.52
3	5.38	4.42	2.67	4.97	5.67	4.78	3.44	6.63	5.75	6.87	6.41	6.83
4	4.77	4.43	2.63	5.28	5.63	4.90	3.50	6.55	5.60	7.17	8.12	6.51
5	4.43	4.49	2.67	5.06	5.41	4.27	3.74	6.75	5.43	17.48	8.77	6.64
6	4.80	4.37	2.91	4.75	5.07	4.59	3.29	6.88	35	6.95	9.93	6.55
7	5.14	4.41	4.04	5.44	5.70	4.72	2.91	6.22	8.88	35	9.41	6.89
8	5.22	4.66	4.44	5.77	6.19	5.31	6.04	6.02	8.01	6.08	6.71	7.20
9	5.25	4.39	4.77	5.24	5.63	5.34	6.11	5.14	13	6.31	6.89	7.31
10	5.48	4.17	4.91	6.81	5.64	5.23	41	12	23	6.84	7.14	7.09
11	6.04	4.14	4.78	7.36	5.18	5.32	808	6.21	8.41	6.61	6.98	6.70
12	6.01	4.17	4.36	5.28	4.93	4.55	46	1004	7.92	5.93	7.12	7.59
13	6.31	4.22	4.92	4.84	4.71	4.46	6.76	501	7.33	5.76	6.61	6.73
14	6.24	3.67	5.04	4.77	5.05	4.31	5.00	13.90	7.62	6.38	6.75	6.75
15	6.60	3.00	4.54	5.09	5.47	4.37	4.54	8.61	7.60	6.04	6.70	6.47
16	6.27	3.00	4.73	4.33	5.71	4.26	3.77	7.20	7.39	5.08	6.45	6.95
17	6.78	3.00	5.58	5.24	4.44	3.77	3.34	6.47	7.61	5.00	6.09	7.38
18	5.61	2.91	5.81	5.16	4.23	3.28	3.67	6.63	8.61	5.00	6.89	7.14
19	4.34	2.90	6.56	5.70	4.51	3.58	3.93	9.58	7.82	4.51	7.38	7.42
20	4.40	2.90	7.82	6.62	4.50	4.36	3.90	12	8.32	4.36	6.96	7.54
21	4.46	2.90	7.07	6.58	4.28	4.39	4.35	7.38	8.03	26	6.65	7.89
22	4.44	2.78	7.20	6.43	4.20	4.38	4.33	6.62	8.27	5.52	6.58	7.78
23	4.47	2.70	11.37	6.52	4.11	4.63	4.34	32.10	8.59	4.94	6.46	8.01
24	4.77	2.70	3.82	7.80	4.49	4.24	27	15.65	8.30	5.16	6.77	7.76
25	5.50	2.70	3.90	8.40	4.79	3.40	4.43	490	8.67	5.87	7.41	8.40
26	5.49	2.67	3.91	10	4.22	3.07	146	166	8.57	6.46	7.64	8.25
27	5.42	2.60	3.86	109	4.50	3.56	11	57	8.57	6.54	11.66	7.99
28	4.62	2.60	5.15	7.01	4.92	3.89	5.68	31	8.37	6.48	8.73	8.21
29	4.71	2.67	4.80	9.48	5.30	3.89	6.20		8.26	6.13	7.63	7.65
30	5.07	2.70	4.82	13	5.24	4.59	7.03		8.19	5.92	6.65	7.63
31	4.76	2.60		5.82		4.43	7.07		8.16		6.96	
TOTAL	163.88	107.81	144.31	296.61	151.09	135.56	1193.00	2449.77	290.34	242.28	225.98	218.83
MEAN	5.29	3.48	4.81	9.57	5.04	4.37	38.48	87.49	9.37	8.08	7.29	7.29
MAX	6.8	4.7	11.4	108.7	6.2	5.3	807.5	1003.8	35.2	34.7	11.7	8.4
MIN	4.3	2.6	2.6	4.3	4.1	3.1	2.9	5.1	5.4	4.4	5.6	6.5
AC-FT	325.04	213.83	286.23	588.32	299.68	268.88	2366.29	4859.05	575.89	480.55	448.23	434.04

Table 3
Mean Daily Discharge Rates (cfs) at RMP Streamgages

San Diego Creek at Culver

	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN
1	0.56	1.18	1.15	1.08	3.29	1.39	1.52	2.01	13	2.80	2.51	0.87
2	0.62	1.38	1.14	1.21	2.56	1.54	1.93	2.09	3.86	2.81	2.68	0.91
3	0.70	1.57	0.91	1.19	2.41	1.60	2.13	2.07	2.98	3.11	2.51	0.85
4	0.76	1.73	0.82	1.28	2.10	1.53	2.14	1.92	2.24	3.30	2.61	0.82
5	0.90	1.51	0.92	2.28	1.93	1.41	1.91	1.94	2.45	3.30	2.56	0.84
6	0.78	1.33	1.06	1.60	2.28	1.18	1.77	2.13	93	3.42	2.01	0.76
7	0.84	1.25	1.13	1.59	1.91	1.06	1.99	2.20	5.40	148.18	2.11	0.98
8	0.90	1.20	1.26	1.54	1.69	1.10	38	2.28	3.46	13.45	2.53	1.42
9	0.91	1.26	1.45	1.29	3.34	1.20	16	2.34	4.43	25.11	2.42	1.28
10	1.04	1.30	1.53	1.49	3.08	1.09	65	5.24	35	7.36	2.55	1.52
11	1.06	1.30	1.54	5.31	2.65	1.09	790	3.47	4.40	2.16	2.58	1.56
12	1.22	1.30	1.60	3.71	2.18	1.00	185	859	2.98	1.63	2.84	1.11
13	1.55	1.42	1.83	1.15	1.98	1.22	12	493	2.67	1.38	2.84	0.86
14	1.79	1.50	2.13	0.94	1.86	1.27	5.33	26	2.55	1.46	2.14	0.93
15	1.96	2.14	2.30	1.09	1.87	1.28	3.11	22	2.75	1.65	2.08	0.83
16	2.30	2.25	2.47	1.15	1.63	1.38	2.52	5.57	2.85	1.90	2.31	0.76
17	2.58	3.88	2.63	1.28	1.53	1.40	2.21	3.72	2.84	3.32	1.75	0.74
18	2.48	2.01	2.80	1.54	1.61	1.46	1.74	3.22	2.54	3.70	1.41	0.92
19	2.40	2.26	2.97	1.90	1.63	1.50	1.60	6.70	2.29	5.07	1.55	1.11
20	2.25	3.46	2.85	2.04	1.47	1.50	1.52	25	2.28	4.27	2.05	1.30
21	2.20	1.85	3.65	1.96	1.88	1.50	1.42	4.60	2.43	46.68	2.90	1.23
22	1.90	1.06	3.66	1.83	2.08	1.50	1.30	3.13	2.60	3.30	3.31	1.22
23	1.80	1.12	13.21	1.93	2.10	1.39	2.66	85	2.77	2.07	3.31	1.50
24	1.60	0.84	2.86	2.00	1.75	1.47	47	9.00	2.97	1.74	3.09	1.29
25	1.58	1.02	1.62	2.45	2.40	1.50	12	412	3.15	2.10	2.96	1.38
26	1.50	1.53	0.90	18.86	2.17	1.50	65	301	3.15	2.40	3.06	1.14
27	1.44	1.07	0.76	219	2.04	1.50	25	146	3.10	2.54	5.69	1.03
28	1.30	1.22	0.91	11.39	1.84	1.50	4.10	83	3.10	2.51	3.23	0.94
29	1.26	1.24	0.94	5.30	1.50	1.53	2.84		3.08	2.60	1.59	1.29
30	1.20	1.37	0.94	158	1.30	1.60	2.40		2.80	2.60	1.51	1.04
31	1.14	1.40		6.53		1.58	2.40		2.80		0.95	
TOTAL	44.50	48.95	63.95	464.61	62.05	42.77	1303.42	2517.07	226.44	307.91	77.63	32.42
MEAN	1.44	1.58	2.13	14.99	2.07	1.38	42.05	89.90	7.30	10.26	2.50	1.08
MAX	2.6	3.9	13.2	219.2	3.3	1.6	789.7	859.0	93.2	148.2	5.7	1.6
MIN	0.6	0.8	0.8	0.9	1.3	1.0	1.3	1.9	2.2	1.4	0.9	0.7
AC-FT	88.27	97.09	126.84	921.54	123.07	84.84	2585.29	4992.54	449.14	610.74	153.97	64.30

Table 3
Mean Daily Discharge Rates (cfs) at RMP Streamgages

El Modena - Irvine Channel

	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN
1	1.1	1.0	0.9	0.9	1.1	1.8	2.1	1.7	1.9	1.3	1.1	1.3
2	1.1	1.1	0.9	0.8	1.3	1.8	2.4	1.8	1.4	1.3	1.2	1.3
3	1.1	0.9	1.1	0.9	1.0	1.7	2.1	1.9	1.3	1.3	1.2	1.2
4	1.2	1.0	1.2	0.9	1.1	1.8	1.7	1.8	1.3	1.7	1.1	1.2
5	1.3	0.9	1.1	0.9	1.1	1.8	2.0	1.7	1.3	4.3	1.1	1.2
6	1.2	0.9	1.1	0.8	1.2	1.9	2.3	1.7	19.2	1.5	1.1	1.2
7	1.2	1.0	0.8	0.9	1.6	1.8	1.4	1.6	3.7	13.6	1.0	1.2
8	1.2	0.9	0.8	1.0	1.6	1.8	13.3	1.5	1.2	1.3	1.0	1.2
9	1.1	0.8	0.8	0.9	1.7	1.9	2.6	1.5	4.9	1.2	1.1	1.2
10	1.1	0.9	0.8	2.3	1.7	1.8	55	4.8	4.7	1.1	1.1	1.2
11	1.6	0.9	0.7	1.3	1.6	1.8	182	1.9	1.7	1.1	1.2	1.2
12	1.6	0.8	0.8	1.0	2.2	2.0	19	280	1.1	1.0	1.2	1.2
13	1.4	0.7	0.9	0.8	2.3	1.9	2.2	95	1.2	1.0	1.2	1.3
14	1.5	0.8	0.9	0.8	2.1	1.7	1.8	2.8	1.2	1.1	1.2	1.3
15	1.7	0.7	0.8	0.8	2.1	1.5	1.6	1.9	1.2	1.0	1.1	1.4
16	1.1	0.8	0.8	0.9	2.2	1.8	1.4	1.8	1.2	1.0	1.3	1.4
17	1.0	1.0	0.7	1.0	2.3	1.6	1.3	1.9	1.3	1.0	1.5	1.4
18	1.1	1.0	0.7	1.1	2.2	1.6	1.6	2.1	1.2	1.0	1.2	1.3
19	1.1	0.9	0.7	1.0	2.0	1.7	1.3	5.1	1.1	1.1	1.1	1.3
20	1.2	1.1	0.8	1.0	2.3	1.8	1.6	4.2	1.1	1.1	1.0	1.3
21	1.2	1.0	0.9	1.3	1.8	1.8	1.5	2.5	1.1	8.1	1.0	1.3
22	1.2	1.0	2.2	1.5	2.0	1.8	1.6	2.1	1.2	1.1	1.1	1.2
23	1.1	1.0	1.3	1.2	1.9	2.0	1.4	10.7	1.3	1.1	1.1	1.2
24	1.1	1.1	0.8	1.4	1.9	2.2	20	5.1	1.3	1.1	1.1	1.3
25	1.1	0.8	0.9	1.7	1.9	1.7	2.1	98	1.2	1.0	1.1	1.4
26	1.1	0.9	0.9	1.6	1.6	1.2	61	37.2	1.2	1.1	1.1	1.6
27	1.1	0.9	1.0	41	2.0	1.2	2.8	21.5	1.2	1.1	1.3	1.3
28	1.1	0.9	1.0	1.8	2.0	2.0	1.7	12.6	1.2	1.1	1.4	1.3
29	1.1	0.9	0.9	18	1.7	1.4	1.5		1.1	1.1	1.2	1.2
30	1.0	0.9	0.9	2.3	1.7	1.6	1.9		1.1	1.1	1.2	1.2
31	1.1	0.8		1.3		1.6	1.8		1.2		1.3	
TOTAL	37.25	28.36	27.98	93.78	53.44	54.24	395.39	607.02	66.47	56.82	35.84	38.21
MEAN	1.20	0.91	0.93	3.03	1.78	1.75	12.75	21.68	2.14	1.89	1.16	1.27
MAX	1.7	1.1	2.2	41.1	2.3	2.2	181.6	280.0	19.2	13.6	1.5	1.6
MIN	1.0	0.7	0.7	0.8	1.0	1.2	1.3	1.5	1.1	1.0	1.0	1.2
AC-FT	73.88	56.24	55.50	186.01	106.00	107.58	784.24	1204.00	131.83	112.70	71.09	75.79

Table 3
Mean Daily Discharge Rates (cfs) at RMP Streamgages

Santa Ana Delhi

	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN
1	1.72	1.72	2.00	2.02	1.91	2.03	1.78	2.67	8.21	2.57	2.57	2.98
2	1.55	2.09	2.24	2.08	1.84	2.18	2.08	2.64	5.87	2.60	3.59	2.75
3	2.47	2.18	1.83	2.09	1.88	2.17	2.33	2.52	4.97	2.88	2.62	2.68
4	1.42	2.05	2.30	1.99	1.99	2.38	2.44	2.31	4.30	2.67	2.44	2.76
5	1.39	1.96	2.26	2.51	2.10	2.38	2.87	2.25	4.03	13.71	2.39	2.59
6	1.20	1.68	2.40	2.23	2.20	2.19	2.71	2.49	31.65	2.67	3.11	2.99
7	1.11	2.00	2.46	1.95	1.74	2.10	2.61	2.64	5.89	38.85	2.50	3.17
8	0.99	2.05	2.73	1.89	1.57	2.09	66.62	2.63	4.48	4.16	2.44	2.93
9	0.88	2.23	2.22	1.89	1.85	1.99	4.58	2.61	4.37	3.38	2.34	3.04
10	2.46	2.13	1.81	3.82	2.09	1.89	93.43	12.33	17.88	3.35	2.39	3.16
11	3.58	2.32	2.41	5.28	2.25	1.80	457	3.86	3.88	2.98	2.76	3.41
12	3.18	2.66	2.81	5.59	1.72	1.59	96	473	3.61	3.26	2.68	3.55
13	2.98	1.96	2.94	1.70	1.53	1.39	6.56	228	3.48	3.37	2.76	4.06
14	2.76	2.51	2.87	1.70	1.55	1.69	4.62	17.61	3.23	3.18	2.76	4.28
15	2.88	2.05	2.83	1.77	1.57	2.01	4.04	6.76	3.20	3.27	2.73	4.47
16	2.74	1.52	2.98	1.70	1.56	2.29	3.74	5.71	3.19	3.29	2.51	5.99
17	2.55	1.46	2.78	1.70	1.66	1.98	3.70	5.45	3.42	3.44	2.39	3.54
18	2.73	1.79	2.95	1.70	1.75	2.38	3.84	6.64	4.00	3.50	2.10	3.88
19	2.92	1.39	3.36	1.76	1.71	2.26	3.41	12.27	6.40	3.78	2.33	4.29
20	2.94	1.35	2.94	1.95	1.76	2.84	3.02	10.99	3.24	3.77	2.64	3.42
21	0.85	1.28	2.78	2.37	1.81	2.46	2.53	4.26	3.69	17.05	3.14	2.70
22	1.14	1.78	4.14	2.23	2.08	2.28	2.51	6.22	3.42	2.88	2.98	2.73
23	1.16	1.79	7.34	2.07	2.05	2.13	2.78	36	3.45	3.28	2.97	2.64
24	1.59	1.68	2.27	1.85	2.47	2.26	28.46	17.15	4.31	2.99	2.80	2.66
25	1.59	1.80	2.48	1.99	2.25	1.71	3.62	264	3.51	2.88	2.82	2.54
26	1.59	1.87	2.50	4.26	2.05	1.72	102	130	3.72	2.72	3.35	2.64
27	1.69	1.70	2.41	136	2.45	1.85	20	68.89	3.23	2.38	3.62	2.80
28	1.67	1.85	2.39	2.09	2.31	1.92	4.01	33.16	3.40	2.31	2.70	2.78
29	1.50	2.45	2.45	32	3.08	2.11	3.36		3.86	2.05	3.05	2.36
30	1.24	1.95	2.36	8.49	1.96	2.13	3.14		2.79	2.02	3.02	2.82
31	1.69	2.23		2.13		1.86	2.78		2.55		2.91	
TOTAL	60.15	59.46	82.25	243.06	58.73	64.06	943.00	1364.36	167.22	151.25	85.38	96.60
MEAN	1.94	1.92	2.74	7.84	1.96	2.07	30.42	48.73	5.39	5.04	2.75	3.22
MAX	3.6	2.7	7.3	136.2	3.1	2.8	457.4	472.9	31.6	38.9	3.6	6.0
MIN	0.8	1.3	1.8	1.7	1.5	1.4	1.8	2.3	2.5	2.0	2.1	2.4
AC-FT	119.31	117.93	163.13	482.11	116.48	127.06	1870.42	2706.18	331.68	300.00	169.34	191.61

Table 4
Total Stormwater Loads from the Newport Bay Watershed

Santa Ana Delhi Channel								
Oct 27-31, 2000	356.2	354.7	5.61	0.568	28.33	26.0	11.15	98.5
Jan 8-12, 2001	1420.9	1389.5	12.16	2.365	235.14	118.9	74.23	502.4
Jan 24-28, 2001	301.8	305.6	5.09	0.294	31.48	17.3	12.16	78.8
Mar 6-10, 2001	125.0	104.7	1.82	0.052	2.79	3.4	0.71	10.5
Total Sampled Load		2154.6	24.69	3.28	297.7	165.5	98.25	690.1
Annual Stormwater Volume	4,980	**Site Mean EMC**	**7.8**	**2.3**	**232.4**	**42.5**	**35.2**	**193.3**
Calc. Unsampled Load	2,826		29.8	8.6	892.6	327	271	1485
Sampled+Unsampled Load			54.5	11.9	1,190.4	492	369	2,175
Peters Canyon Wash								
Oct 11-14, 2000	25.0	46.0	2.58	0.084	2.43	2.5	0.26	4.9
Oct 27-31, 2000	266.1	271.9	12.50	1.302	131.55	50.2	6.89	87.8
Jan 8-9, 2001	16.9	13.8	0.39	0.080	10.86	3.2	1.39	14.6
Jan 10-12, 2001	1768.0	1756.9	38.22	7.303	715.83	152.7	57.27	524.9
Jan 24-28, 2001	366.9	372.7	27.92	0.836	86.01	15.9	7.26	73.4
Mar 6-10, 2001	164.3	139.6	13.20	0.281	31.09	5.6	2.31	26.5
Total Sampled Load		2600.9	94.8	9.9	977.8	230.1	75.4	732.2
Annual Stormwater Volume	7,546	**Site Mean EMC**	**29.4**	**2.9**	**668.6**	**47.0**	**20.9**	**166.1**
Calc. Unsampled Load	4,945		197.9	19.7	4,494	632	281	2232
Sampled+Unsampled Load			292.7	29.5	5,472	862	356	2,964
San Diego Creek at Campus Drive								
Oct 10-14, 2000	113.8	118.2	5.55	0.20	18.43	5.9	0.85	29.6
Oct 26-30, 2000	1647.7	1624.0	51.76	6.12	986.48	112.2	46.75	454.2
Jan 8-12, 2001	5663.2	5489.6	109.38	29.09	6,366	611.0	263.85	2,360.8
Jan 24-28, 2001	1107.5	1105.1	34.82	2.52	208	43.4	14.61	149.7
Mar 6-10, 2001	581.6	207.5	9.51	0.03	12.41	3.5	0.64	11.7
Total Sampled Load		8544.4	211.02	37.95	7,591	776.1	326.7	3,006.0
Annual Stormwater Volume	19,797	**Site Mean EMC**	**17.5**	**4.3**	**1,003.6**	**40.7**	**28.2**	**160.7**
Calc. Unsampled Load	11,253		268.2	66.1	15,349	1244	861	4914
Sampled+Unsampled Load			479.2	104.1	22,940	2,020	1,188.0	7,920
San Diego Creek at Harvard Avenue								
Oct 26-31, 2000	826.4	450.1	16.61	1.41	296.56	35.2	11.24	108.3
Jan 8-12, 2001	2192.2	2097.7	50.44	9.80	2,170	196.5	76.33	763.7
Jan 24-28, 2001	295.1	286.0	13.15	0.85	115.35	15.2	5.41	60.0
Mar 6-7, 2001	193.8	187.3	4.61	0.56	73.27	10.7	3.04	35.5
Total Sampled Load		3021.1	84.8	12.6	2655.1	257.6	96.0	967.6
Annual Stormwater Volume	8,918	**Site Mean EMC**	**17.9**	**5.4**	**1353.5**	**43.6**	**19.4**	**185.2**
Calc. Unsampled Load	5,897		143.1	43.3	10,846	698	311	2,969
Sampled+Unsampled Load			227.9	55.9	13,502	956	407	3,937

Figures

Figure 1
Nutrient TMDL RMP Routine Monitoring Stations

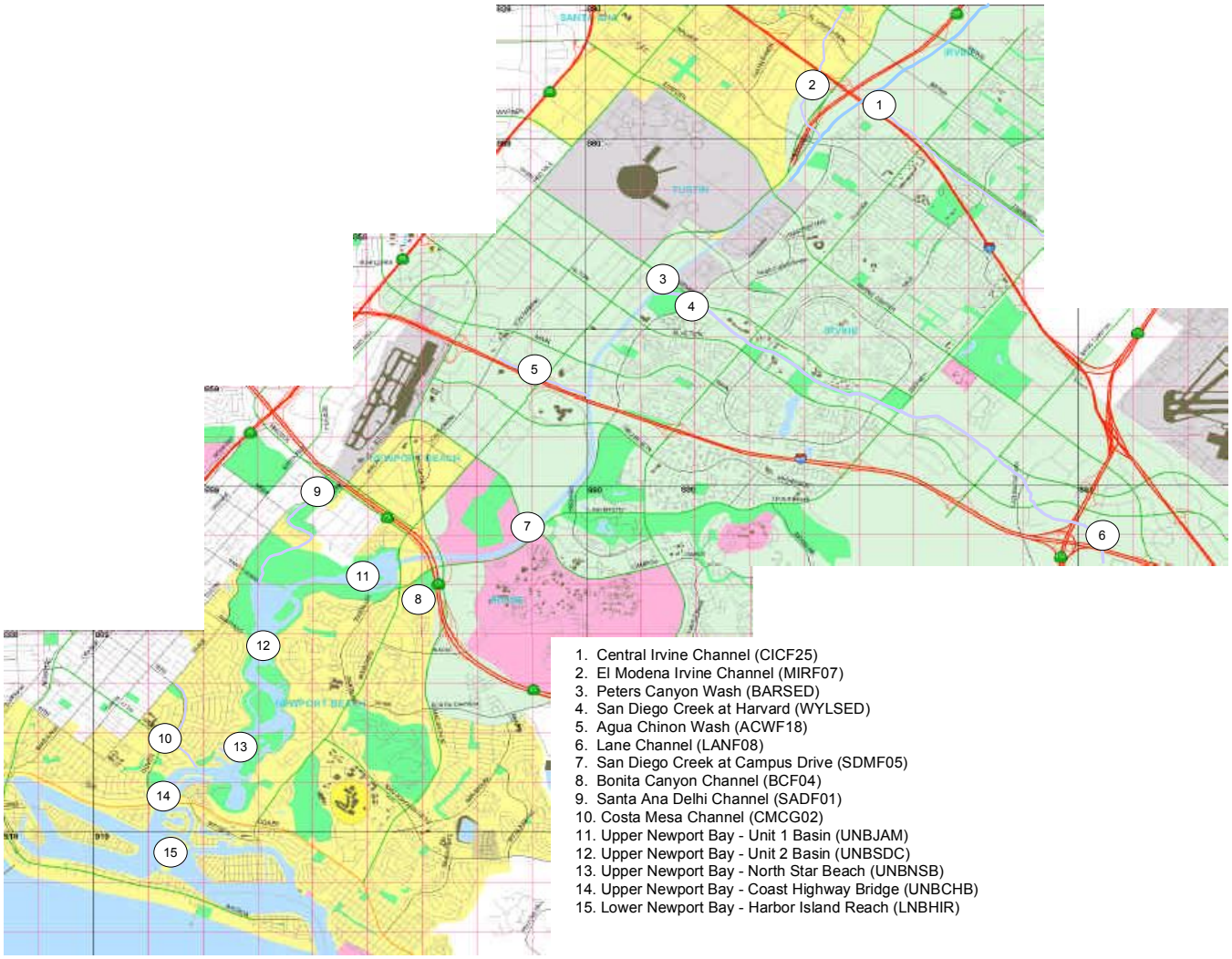

1. Central Irvine Channel (CICF25)
2. El Modena Irvine Channel (MIRF07)
3. Peters Canyon Wash (BARSED)
4. San Diego Creek at Harvard (WYLSED)
5. Agua Chinon Wash (ACWF18)
6. Lane Channel (LANF08)
7. San Diego Creek at Campus Drive (SDMF05)
8. Bonita Canyon Channel (BCF04)
9. Santa Ana Delhi Channel (SADF01)
10. Costa Mesa Channel (CMCG02)
11. Upper Newport Bay - Unit 1 Basin (UNBJAM)
12. Upper Newport Bay - Unit 2 Basin (UNBSDC)
13. Upper Newport Bay - North Star Beach (UNBNSB)
14. Upper Newport Bay - Coast Highway Bridge (UNBCHB)
15. Lower Newport Bay - Harbor Island Reach (LNBHIR)

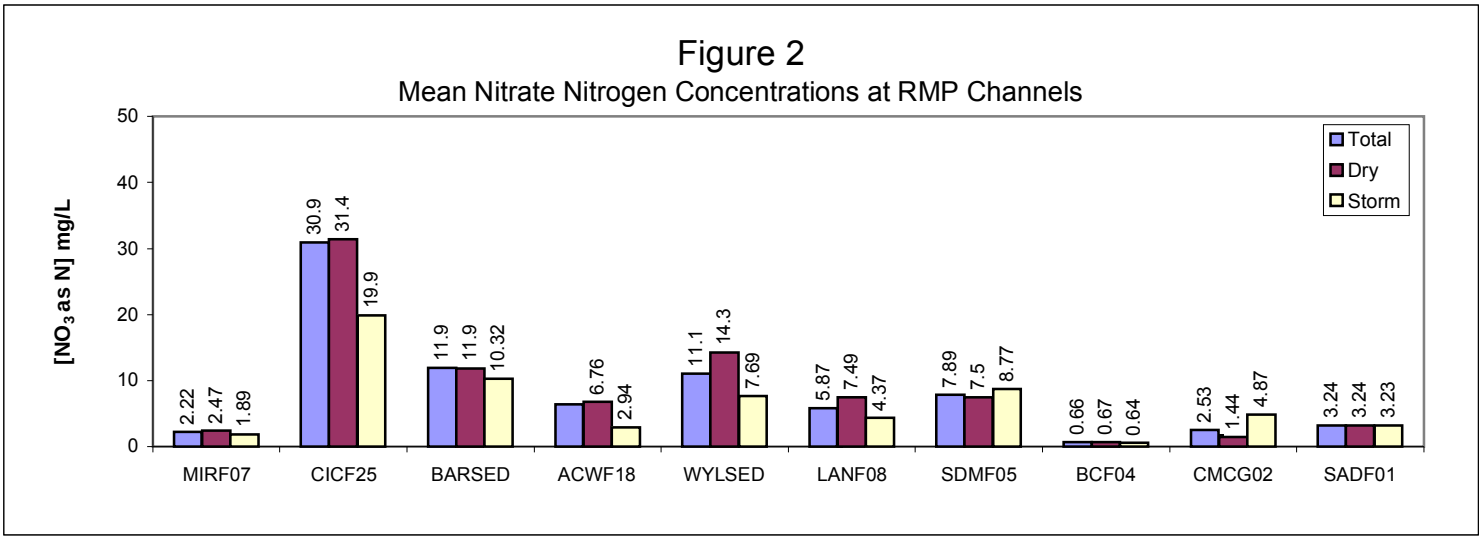

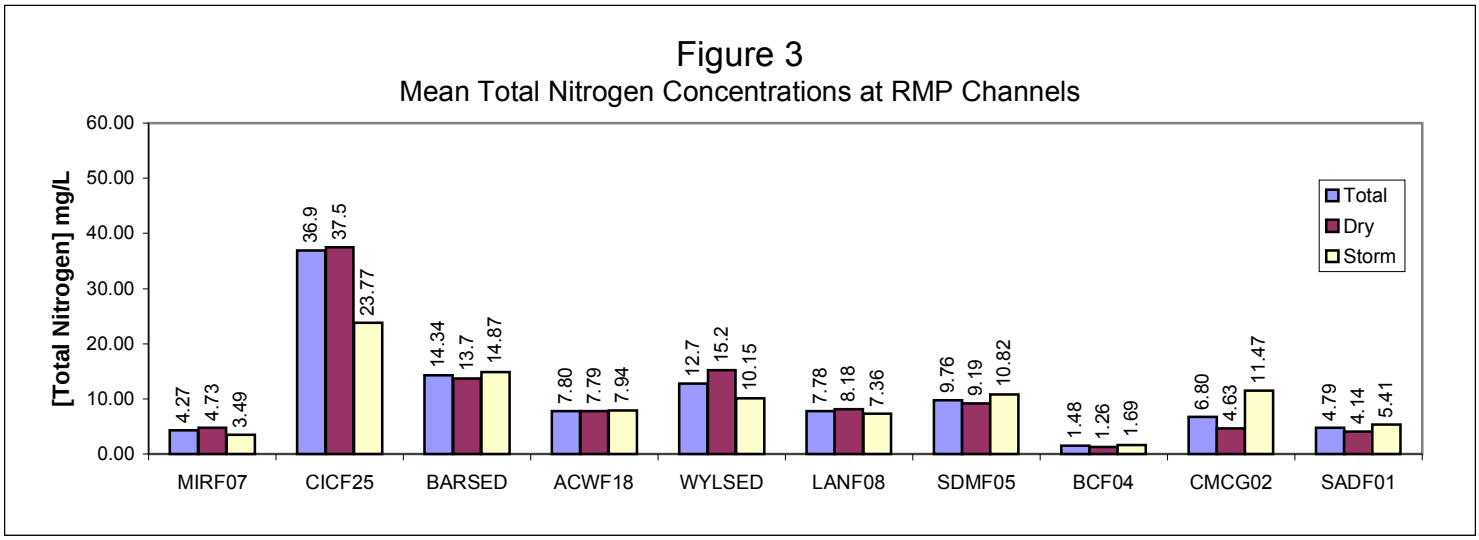

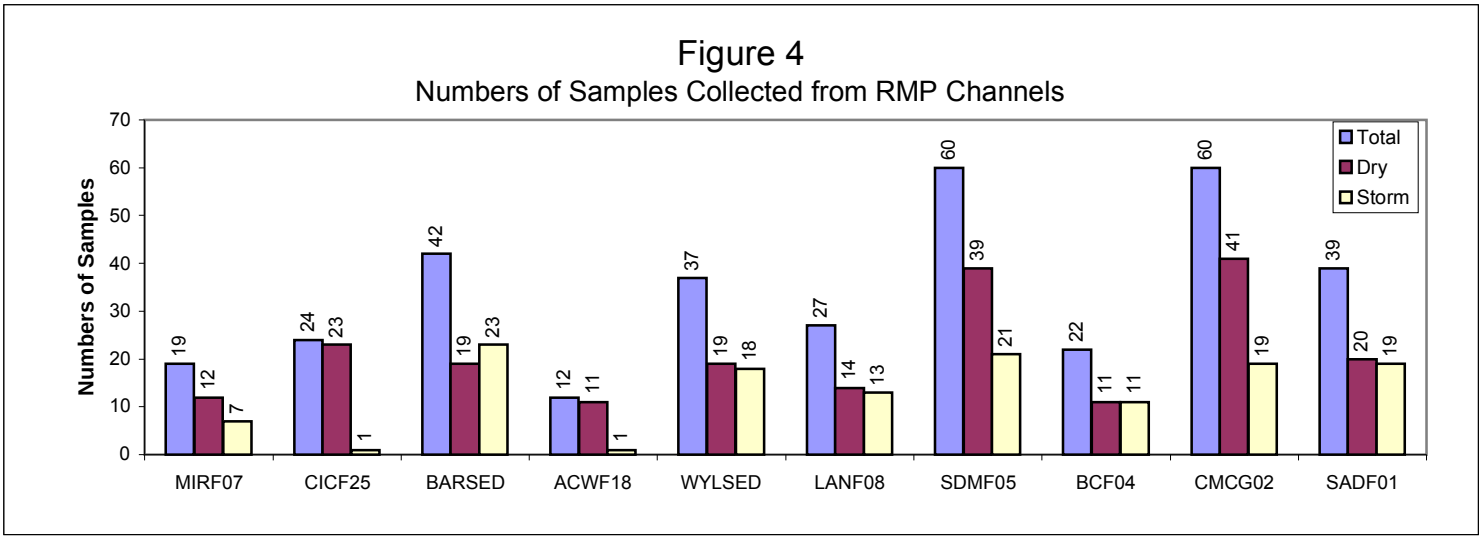

Excluding May 2001 Nitrate Study Data

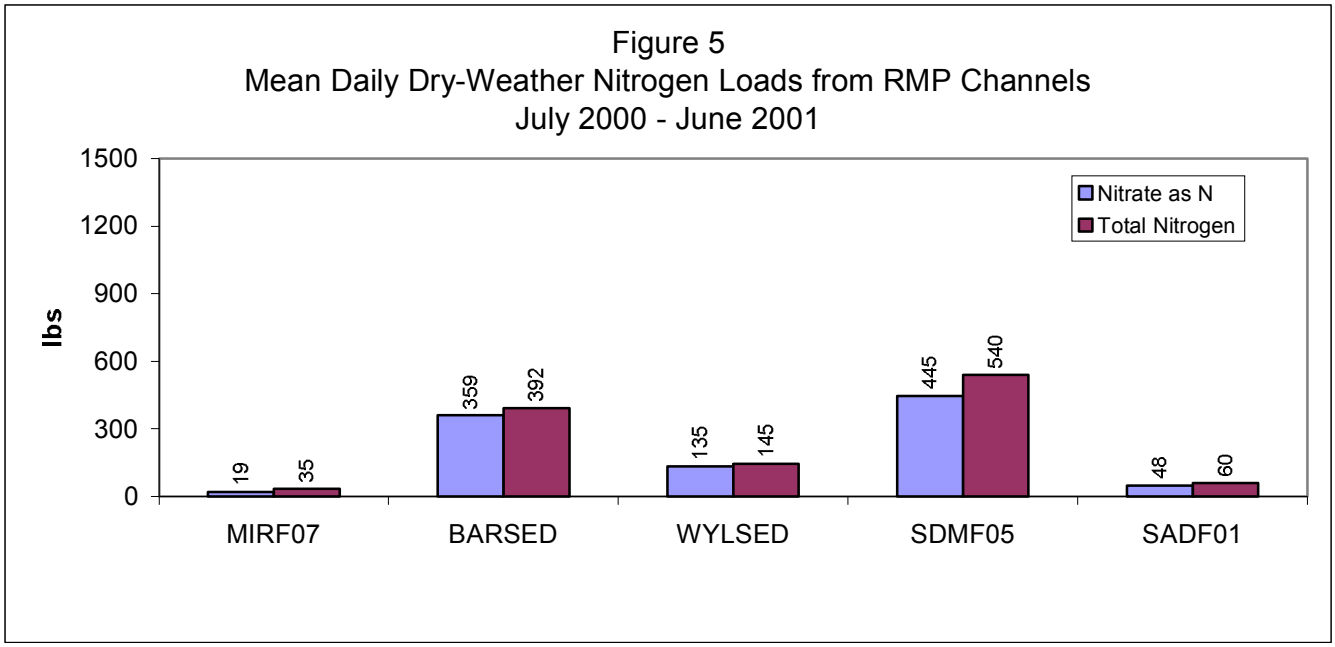
Figure 5
Mean Daily Dry-Weather Nitrogen Loads from RMP Channels
July 2000 - June 2001
lbs
1500
1200
900
600
300
0
Nitrate as N
Total Nitrogen
19
35
359
392
135
145
445
540
48
60
MIRF07
BARSED
WYLSED
SDMF05
SADF01

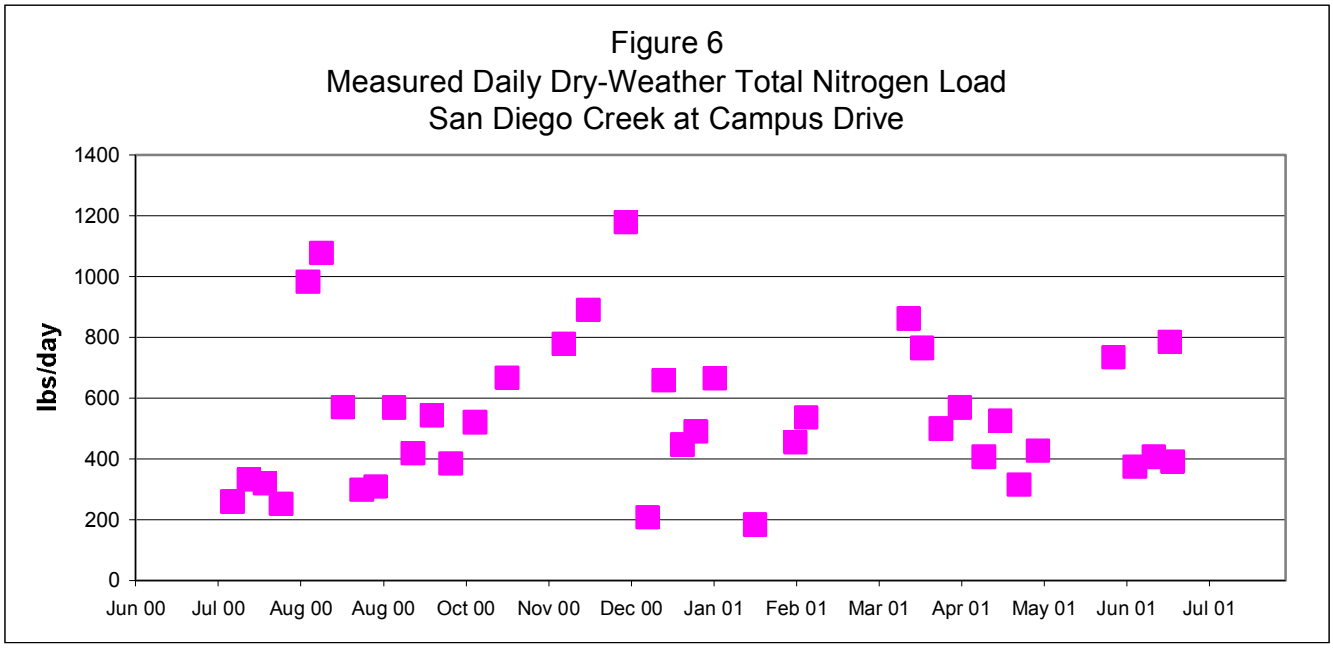
Figure 6
Measured Daily Dry-Weather Total Nitrogen Load
San Diego Creek at Campus Drive
lbs/day
1400
1200
1000
800
600
400
200
0
Jun 00
Jul 00
Aug 00
Aug 00
Oct 00
Nov 00
Dec 00
Jan 01
Feb 01
Mar 01
Apr 01
May 01
Jun 01
Jul 01

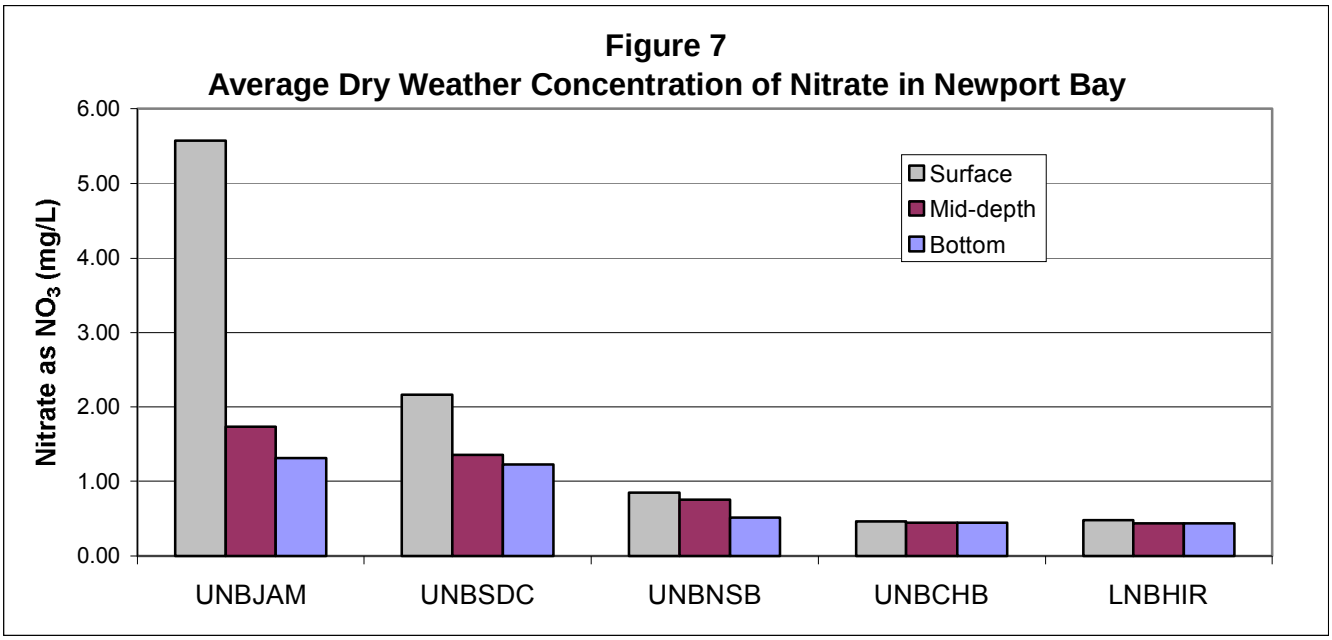
Figure 7
Average Dry Weather Concentration of Nitrate in Newport Bay
Nitrate as NO_3 (mg/L)
6.00
5.00
4.00
3.00
2.00
1.00
0.00
Surface
Mid-depth
Bottom
UNBJAM
UNBSDC
UNBNSB
UNBCHB
LNBHIR

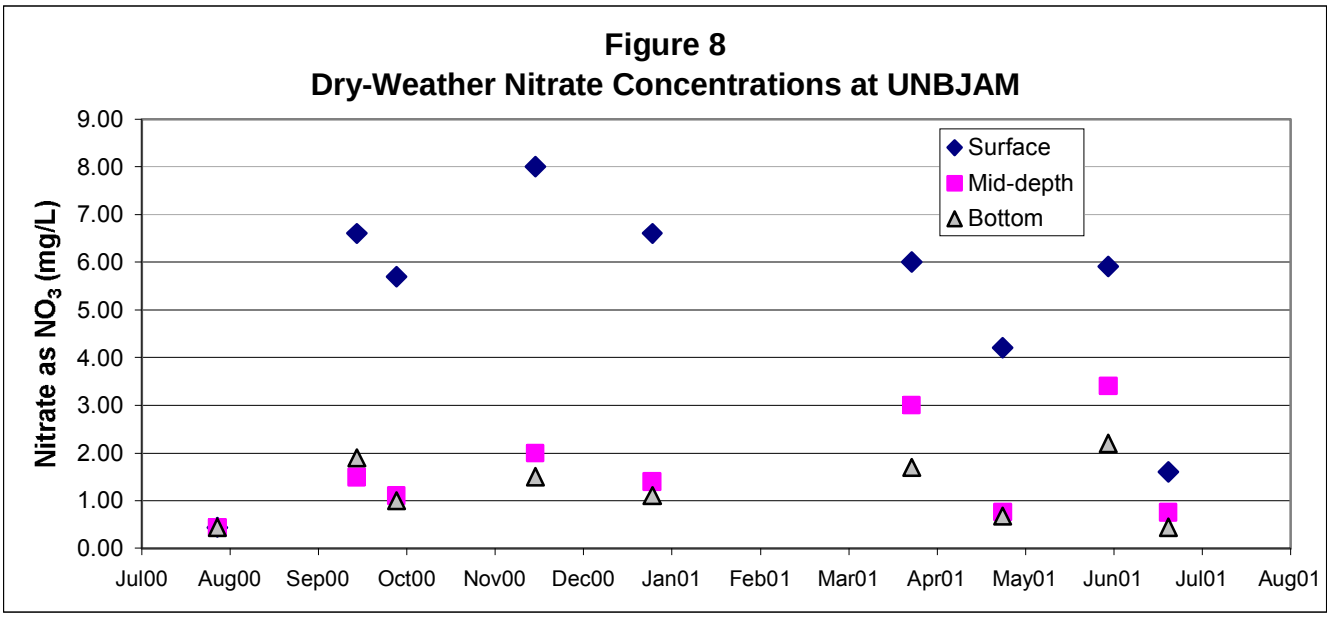
Figure 8
Dry-Weather Nitrate Concentrations at UNBJAM
Nitrate as NO_3 (mg/L)
9.00
8.00
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
Surface
Mid-depth
Bottom
Jul00
Aug00
Sep00
Oct00
Nov00
Dec00
Jan01
Feb01
Mar01
Apr01
May01
Jun01
Jul01
Aug01

Figure 9
IRWD Hydrolab Data
Upper Newport Bay - August 1-16, 2000

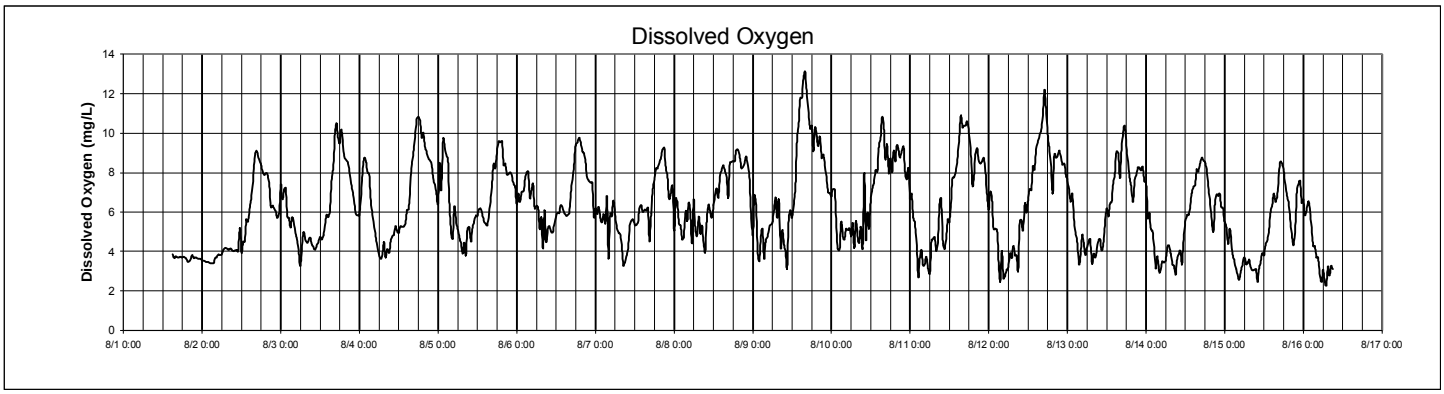

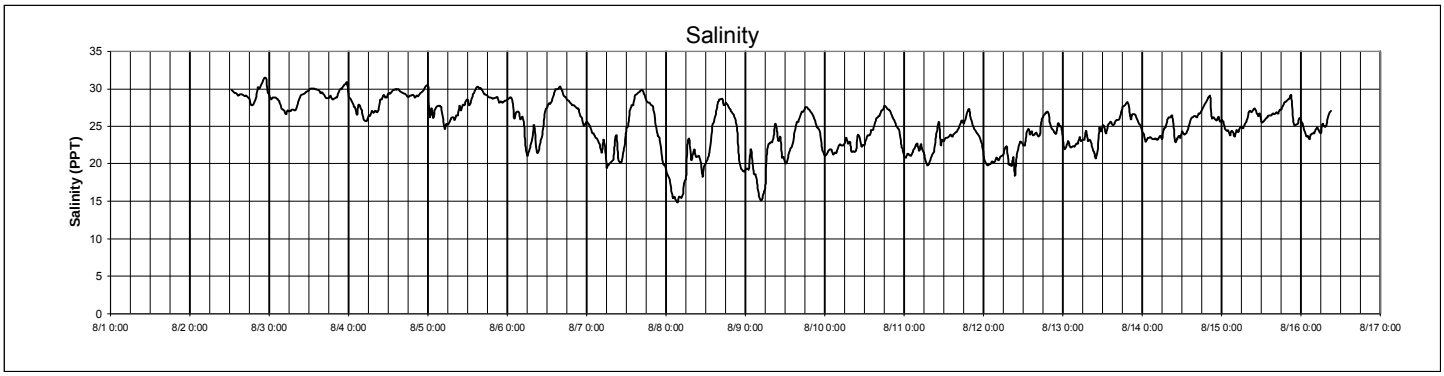

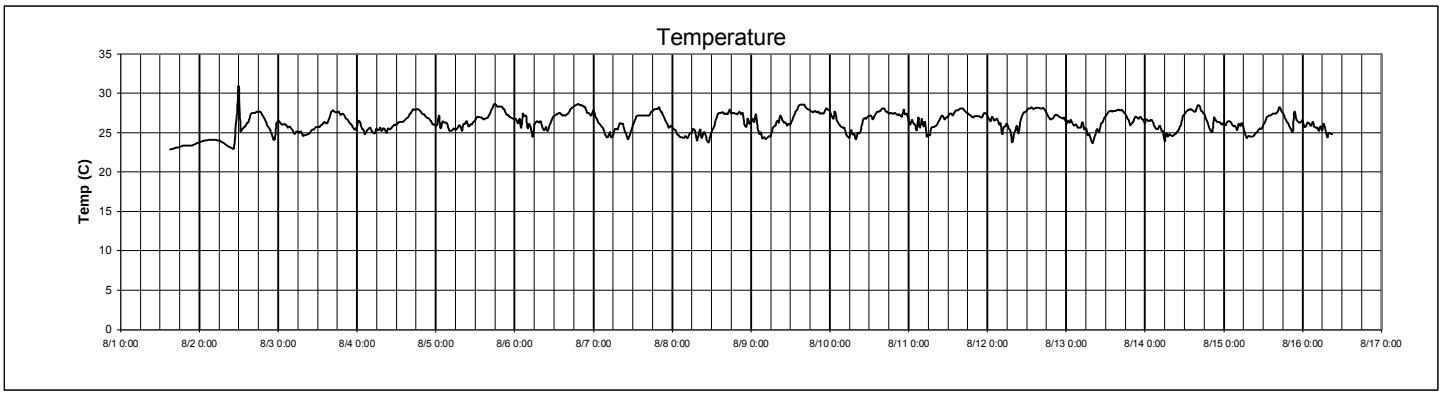

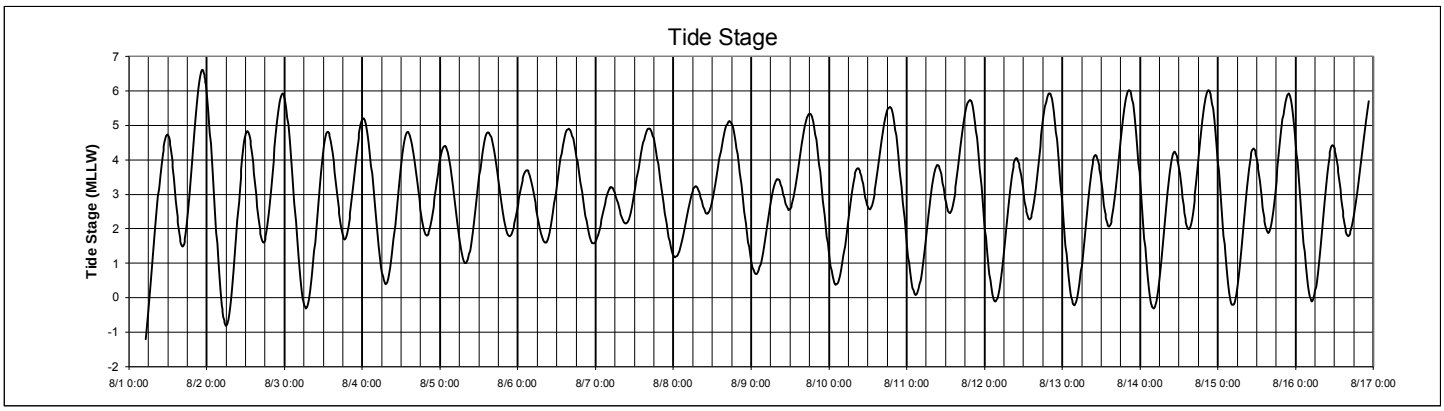

Figure 10
IRWD Hydrolab Data
Upper Newport Bay - August 16 -31, 2000

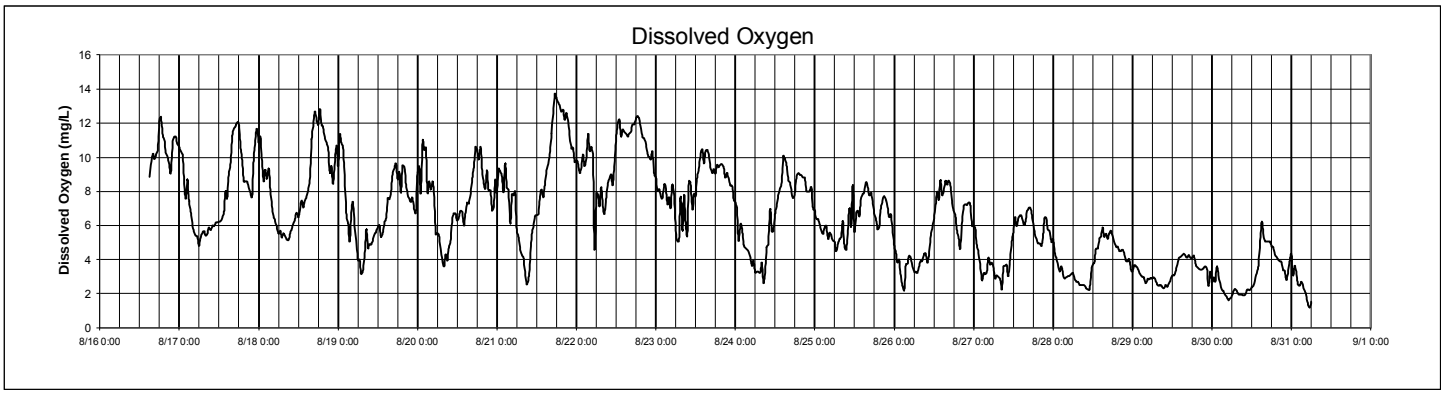

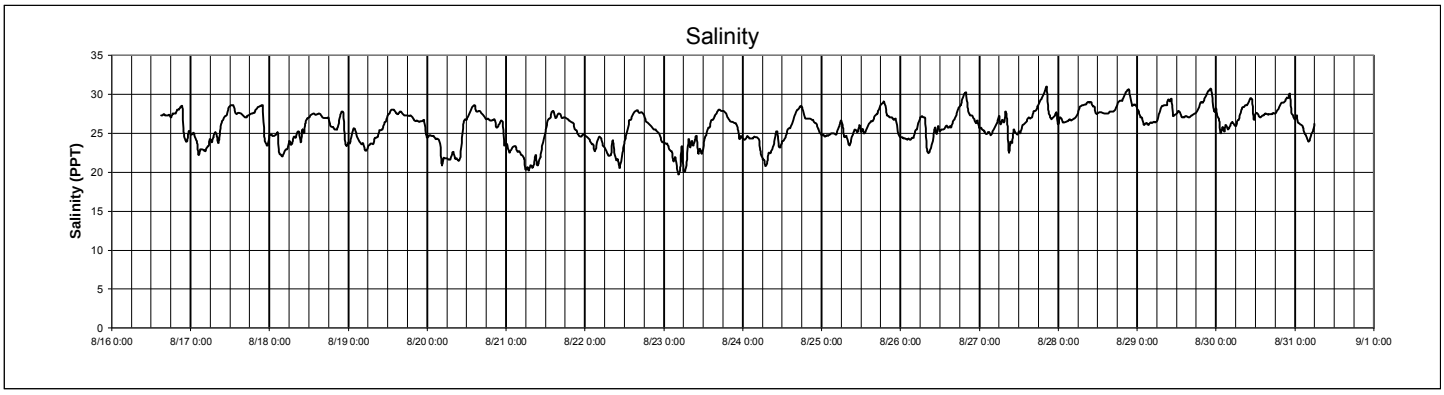

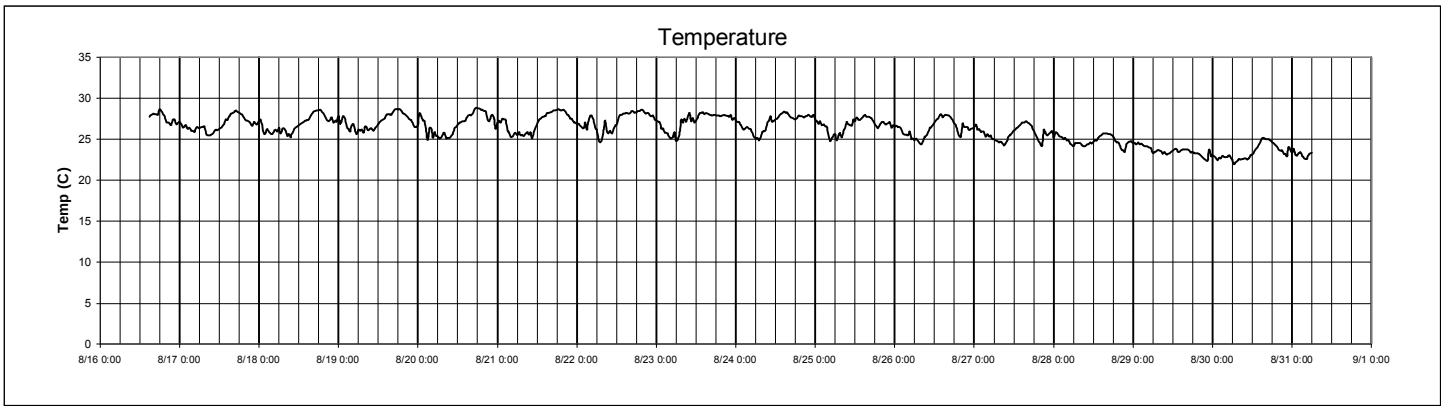

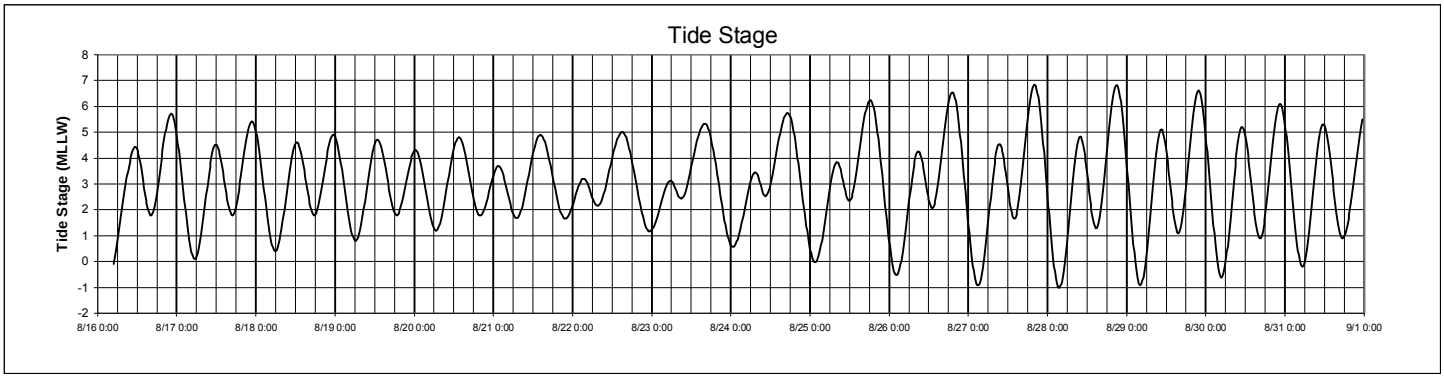

Appendix A
A Regional Nutrient Monitoring Program for the Newport Bay Watershed - RWQCB Staff Report

A REGIONAL NUTRIENT MONITORING PROGRAM FOR THE NEWPORT BAY WATERSHED

INTRODUCTION

The Nutrient TMDL for the Newport Bay/San Diego Creek Watershed (Resolution No. 98-9, as amended by Resolution No. 98-100) requires that the Santa Ana Regional Water Quality Control Board establish and oversee a regional monitoring program (RMP) for the Newport Bay watershed. The RMP is a coordinated program to assess the attainment of the goals of the nutrient TMDL. The objectives of the monitoring program are to quantify the three endpoints of the nutrient TMDL: 1) the seasonal nutrient loading from the watershed; 2) the nutrient concentration in San Diego Creek, Reaches 1 and 2; and 3) the extent, magnitude, and duration of algal blooms in San Diego Creek and Newport Bay.

BACKGROUND

The RMP is intended to eliminate the redundancies in monitoring occurring in the Newport Bay watershed. The RMP is intended to allow all dischargers in the watershed to participate. Participation in the RMP could result in the reduction of self-monitoring requirements contained in individual Waste Discharge Requirements (WDRs) or National Pollution Discharge Elimination System (NPDES) permits.

The RMP is composed of two components: a routine monitoring component and a special monitoring component. The routine monitoring includes most of the traditional monitoring that has occurred in the watershed. The special monitoring includes special investigations into unanswered questions about nutrient sources and dynamics in the watershed.

While the RMP was originally conceived as focusing only on nutrients, the Newport Bay Watershed Water Quality Technical Workgroup has also recognized the utility of using the RMP as a framework for additional monitoring in the watershed. This is an appropriate extension of the program considering the current development of a toxic substances TMDL for the Newport Watershed by the Regional Board for adoption in 2002. Specifically, monitoring for toxic substances and toxicity would be conducted at the same sites in the Bay and watershed. A proposed toxic substances monitoring plan is included in Appendix A.

PROCEDURES AND QUALITY ASSURANCE/QUALITY CONTROL

Sampling procedures and quality assurance/quality control will follow those outlined in County of Orange, 1998b. If more than one entity or laboratory is collecting or analyzing samples, a standard sampling procedure, quality assurance/quality control, and analysis procedure will need to be developed. Additional sampling procedures and quality assurance/quality control protocols will need to be developed for algae sampling.

RATIONALE FOR STATION SELECTION

TMDL Compliance Monitoring

Compliance monitoring will quantify the three endpoints of the nutrient TMDL. The seasonal nutrient loading from the watershed will be determined from samples collected at the San Diego Creek at Campus, Santa Ana-Delhi at Irvine Ave., Bonita Canyon at San Diego Creek, and Costa Mesa Channel at Highland stations. These station locations will capture 99% of the total annual nitrogen load in the watershed based on analyses conducted during the development of the TMDL. The remaining 1% of the total annual nitrogen load, coming from the Lower Newport Bay watershed, will be determined by modeling land use and loading rates.

The nutrient concentration in San Diego Creek, Reaches 1 and 2, will be determined from samples collected at the San Diego Creek at Campus and San Diego Creek at Culver stations. These are the historical stations used to determine the concentrations in the Creek.

The extent, magnitude, and duration of algal blooms in San Diego Creek and Newport Bay will be determined by the in-bay algae and water quality monitoring program and an algae survey of the creek system.

TMDL Allocation Monitoring

Allocation monitoring will quantify the allocations of the nutrient TMDL. The currently permitted and unpermitted nurseries will sample discharges from their facilities. The agricultural discharges will be characterized by sampling stations located in three general soil zones and for different crop types. These sites are yet to be determined.

The urban allocation will be determined from samples collected at the Santa Ana-Delhi at Irvine Ave., Costa Mesa Channel at Highland, Lane Channel at Jamboree, El Modena-Irvine Channel at Michelle, and Agua Chinon Wash at Irvine Center Dr. stations.

ROUTINE MONITORING

Physicals/Nutrients

The selection of monitoring locations relied upon the historical location of monitoring stations maintained by the County of Orange, analysis of the current NPDES monitoring program (County of Orange, 1998a) and proposed revisions to that program (County of Orange, 1998b), the data used to develop the nutrient TMDL, and areas of information that were missing in the development of the TMDL.

Watershed

The watershed monitoring plan serves two of the three goals of the nutrient TMDL as well as providing compliance monitoring with TMDL load and wasteload allocations. The stations were selected based on the three main land uses associated with allocations: urban, nurseries, and agriculture. The station locations include nine stations previously monitored by the County of Orange, the three permitted nursery stations, and additional stations to be added for currently unpermitted nurseries and agricultural sites. The sites and constituents to be sampled are listed in Table 1.

In-Bay

The in-bay monitoring plan serves to address a component of the third endpoint of the TMDL, algal blooms in the Bay. The five stations are a reduction from the ten that are currently monitored by the County of Orange. The five stations are representative of the Bay based on the analysis conducted by the County of Orange (County of Orange, 1998a). The stations and constituents to be sampled are listed in Table 2.

Algae

The third endpoint of the TMDL is to determine the extent, magnitude, and duration of algal blooms in San Diego Creek and Newport Bay. The monitoring stations selected are representative sites from the stations established by Dr. Horne for the IRWD WWSP. (Alex Horne Associates, 1998). The 9 sites are distributed throughout the Upper Bay. Algae distribution in the creek system is a special monitoring priority (see next section). The stations and parameters are listed in Table 3.

SPECIAL MONITORING

Several areas and problems within the watershed need further intensive study in order to provide information to update and revise the nutrient TMDL, if necessary. The studies range from short duration, focused investigations into the nutrient loading from open space in the watershed to longer, more complex investigations, such as nutrients concentrations in Bay and Creek sediments and shallow groundwater loading to the creek system. A few of these studies would be performed each year. The monitoring priorities (not in order of priority) are:

Aerial mapping of algae distribution
Open space nutrient loading
Shallow groundwater contribution to the creek system
Algae survey of the creek system
Nutrient concentrations in bay and creek sediments
Quantification of beneficial use impairment of the bay
Nutrient fluxes from bay sediments and algae
Quantification of precipitation loading

REFERENCES

Alex Horne Associates, 1998. Macroalgae (Seaweed) in Newport Bay-Estuary: Spring-Summer-Fall 1998 and a comparison with 1996-97. Report to the Irvine Ranch Water District. 27p.

County of Orange, Public Facilities and Resources Dept., 1998a. Monitoring Program Design. Report prepared for the San Diego and Santa Ana Regional Water Quality Control Boards. 36p.

County of Orange, Public Facilities and Resources Dept., 1998b. Water Quality Sampling Plan. Report prepared for the San Diego and Santa Ana Regional Water Quality Control Boards. 10p + appendices.

Table #1 Newport Bay Watershed Monitoring

STATION	ANALYSIS	CONSTITUENTS	FREQUENCY	ANNUAL FREQUENCY	SAMPLES PER STATION	ANNUAL SAMPLES PER STATION
SADF01 Santa Ana-Delhi @ Irvine Ave	Physicals	temp, conductivity, turbidity, Ph, DO, hardness	Bi-monthly	24	1	24
	Nutrients	TN (nitrate, nitrite, ammonia, kjeldahl), TP(ortho)	Bi-monthly	24	1	24
	Physicals	flow	Daily	NA	NA	NA
	Physicals	temp, conductivity, turbidity, Ph, DO, hardness	Storm	3 minimum	1	3 minimum
	Nutrients	TN (nitrate, nitrite, ammonia, kjeldahl), TP(ortho)	Storm	3 minimum	1	3 minimum
SDMF05 San Diego Creek @ Campus	Physicals	temp, conductivity, turbidity, Ph, DO, hardness	Weekly	52	1	52
	Nutrients	TN (nitrate, nitrite, ammonia, kjeldahl), TP(ortho)	Weekly	52	1	52
	Physicals	flow	Daily	NA	NA	NA
	Physicals	temp, conductivity, turbidity, Ph, DO, hardness	Storm	3 minimum	1	3 minimum
	Nutrients	TN (nitrate, nitrite, ammonia, kjeldahl), TP(ortho)	Storm	3 minimum	1	3 minimum
BCF04 Bonita Canyon @ SDC	Physicals	temp, conductivity, turbidity, Ph, DO, hardness, flow	Monthly	12	1	12
	Nutrients	TN (nitrate, nitrite, ammonia, kjeldahl), TP(ortho)	Monthly	12	1	12
	Physicals	temp, conductivity, turbidity, Ph, DO, hardness, flow	Storm	3 minimum	1	3 minimum
	Nutrients	TN (nitrate, nitrite, ammonia, kjeldahl), TP(ortho)	Storm	3 minimum	1	3 minimum
CMCG02 Costa Mesa Channel @ Highland	Physicals	temp, conductivity, turbidity, Ph, DO, hardness, flow	Monthly	12	1	12
	Nutrients	TN (nitrate, nitrite, ammonia, kjeldahl), TP(ortho)	Monthly	12	1	12
	Physicals	temp, conductivity, turbidity, Ph, DO, hardness, flow	Storm	3 minimum	1	3 minimum
	Nutrients	TN (nitrate, nitrite, ammonia, kjeldahl), TP(ortho)	Storm	3 minimum	1	3 minimum

Table #1 Newport Bay Watershed Monitoring

STATION	ANALYSIS	CONSTITUENTS	FREQUENCY	ANNUAL FREQUENCY	SAMPLES PER STATION	ANNUAL SAMPLES PER STATION
MIRF07	Physicals	temp, conductivity, turbidity, Ph, DO, hardness, flow	Monthly	12	1	12
El Modena-Irvine Channel						
@ Michelle	Nutrients	TN (nitrate, nitrite, ammonia, kjeldahl), TP(ortho)	Monthly	12	1	12
	Physicals	temp, conductivity, turbidity, Ph, DO, hardness, flow	Storm	3 minimum	1	3 minimum
	Nutrients	TN (nitrate, nitrite, ammonia, kjeldahl), TP(ortho)	Storm	3 minimum	1	3 minimum
LANF08	Physicals	temp, conductivity, turbidity, Ph, DO, hardness, flow	Monthly	12	1	12
Lane Channel						
@ Jamboree	Nutrients	TN (nitrate, nitrite, ammonia, kjeldahl), TP(ortho)	Monthly	12	1	12
	Physicals	temp, conductivity, turbidity, Ph, DO, hardness, flow	Storm	3 minimum	1	3 minimum
	Nutrients	TN (nitrate, nitrite, ammonia, kjeldahl), TP(ortho)	Storm	3 minimum	1	3 minimum
ACWF18	Physicals	temp, conductivity, turbidity, Ph, DO, hardness, flow	Monthly	12	1	12
Agua Chinon Wash						
@ Irvine Center Dr.	Nutrients	TN (nitrate, nitrite, ammonia, kjeldahl), TP(ortho)	Monthly	12	1	12
	Physicals	temp, conductivity, turbidity, Ph, DO, hardness, flow	Storm	3 minimum	1	3 minimum
	Nutrients	TN (nitrate, nitrite, ammonia, kjeldahl), TP(ortho)	Storm	3 minimum	1	3 minimum
BARSED	Physicals	temp, conductivity, turbidity, Ph, DO, hardness	Bi-monthly	24	1	24
Peters Canyon Wash						
@ Barranca	Nutrients	TN (nitrate, nitrite, ammonia, kjeldahl), TP(ortho)	Bi-monthly	24	1	24
	Physicals	flow	Daily	NA	NA	NA
	Physicals	temp, conductivity, turbidity, Ph, DO, hardness	Storm	3 minimum	1	3 minimum
	Nutrients	TN (nitrate, nitrite, ammonia, kjeldahl), TP(ortho)	Storm	3 minimum	1	3 minimum

Table #1 Newport Bay Watershed Monitoring

STATION	ANALYSIS	CONSTITUENTS	FREQUENCY	ANNUAL FREQUENCY	SAMPLES PER STATION	ANNUAL SAMPLES PER STATION
WYLSED San Diego Creek @ Culver	Physicals	temp, conductivity, turbidity, Ph, DO, hardness	Bi-monthly	24	1	24
	Nutrients	TN (nitrate, nitrite, ammonia, kjeldahl), TP(ortho)	Bi-monthly	24	1	24
	Physicals	flow	Daily	NA	NA	NA
	Physicals	temp, conductivity, turbidity, Ph, DO, hardness	Storm	3 minimum	1	3 minimum
	Nutrients	TN (nitrate, nitrite, ammonia, kjeldahl), TP(ortho)	Storm	3 minimum	1	3 minimum
Currently permitted nurseries Hines, El Modeno, Bordiers	Physicals	temp, conductivity, turbidity, Ph, DO, hardness	Weekly	52	1	52
	Physicals	Flow	Daily	NA	NA	NA
	Nutrients	TN (nitrate, nitrite, ammonia, kjeldahl), TP(ortho)	Weekly	52	1	52
Currently unpermitted nurseries (Possibly 1 to 10)	Physicals	temp, conductivity, turbidity, Ph, DO, hardness	Weekly	52	1	52
	Flow	Flow	Daily	NA	NA	NA
	Nutrients	TN (nitrate, nitrite, ammonia, kjeldahl), TP(ortho)	Weekly	52	1	52
Agricultural discharges (Sites to be determined)	Physicals	temp, conductivity, turbidity, Ph, DO, hardness	Irrigation/Storm	NA	NA	NA
	Flow	Flow	Daily	NA	NA	NA
	Nutrients	TN (nitrate, nitrite, ammonia, kjeldahl), TP(ortho)	Irrigation/Storm	NA	NA	NA

Table # 2 Newport Bay Monitoring

STATION	ANALYSIS	CONSTITUENTS	FREQUENCY	ANNUAL FREQUENCY	SAMPLES PER STATION	ANNUAL SAMPLES PER STATION
UNBJAM	Physicals	temp, conductivity, turbidity, Ph, DO	Monthly	12	3 (1 @ 3 depths)	36
	Nutrients	TN (nitrate, nitrite, ammonia, kjeldahl), TP(ortho)	Monthly	12	3 (1 @ 3 depths)	36
UNBSDC	Physicals	temp, conductivity, turbidity, Ph, DO	Monthly	12	3 (1 @ 3 depths)	36
	Nutrients	TN (nitrate, nitrite, ammonia, kjeldahl), TP(ortho)	Monthly	12	3 (1 @ 3 depths)	36
UNBNSB	Physicals	temp, conductivity, turbidity, Ph, DO	Monthly	12	3 (1 @ 3 depths)	36
	Nutrients	TN (nitrate, nitrite, ammonia, kjeldahl), TP(ortho)	Monthly	12	3 (1 @ 3 depths)	36
UNBCHB	Physicals	temp, conductivity, turbidity, Ph, DO	Monthly	12	3 (1 @ 3 depths)	36
	Nutrients	TN (nitrate, nitrite, ammonia, kjeldahl), TP(ortho)	Monthly	12	3 (1 @ 3 depths)	36
LNBHIR	Physicals	temp, conductivity, turbidity, Ph, DO	Monthly	12	3 (1 @ 3 depths)	36
	Nutrients	TN (nitrate, nitrite, ammonia, kjeldahl), TP(ortho)	Monthly	12	3 (1 @ 3 depths)	36

Table # 3 Newport Bay Algae Monitoring

STATION	ANALYSIS	CONSTITUENTS	FREQUENCY	ANNUAL FREQUENCY	SAMPLES PER STATION	ANNUAL SAMPLES PER STATION
Horne # 2 (South end of Shellmaker Is)	Physicals	temp, DO, conductivity	Monthly during season/Bi-monthly off season	9	1	9
	Nutrients	TN (nitrate, nitrite, ammonia, kjeldahl), TP(ortho)	Monthly during season/Bi-monthly off season	9	1	9
	Algae	biomass, species composition	Monthly during season/Bi-monthly off season	9	transect	9
Horne # 4 (South tip of Middle Is)	Physicals	temp, DO, conductivity	Monthly during season/Bi-monthly off season	9	1	9
	Nutrients	TN (nitrate, nitrite, ammonia, kjeldahl), TP(ortho)	Monthly during season/Bi-monthly off season	9	1	9
	Algae	biomass, species composition	Monthly during season/Bi-monthly off season	9	transect	9
Horne # 8 (N end of Middle Is)	Physicals	temp, DO, conductivity	Monthly during season/Bi-monthly off season	9	1	9
	Nutrients	TN (nitrate, nitrite, ammonia, kjeldahl), TP(ortho)	Monthly during season/Bi-monthly off season	9	1	9
	Algae	biomass, species composition	Monthly during season/Bi-monthly off season	9	transect	9
Horne # 10 (W side of the Narrows)	Physicals	temp, DO, conductivity	Monthly during season/Bi-monthly off season	9	1	9
	Nutrients	TN (nitrate, nitrite, ammonia, kjeldahl), TP(ortho)	Monthly during season/Bi-monthly off season	9	1	9
	Algae	biomass, species composition	Monthly during season/Bi-monthly off season	9	transect	9

Table # 3 Newport Bay Algae Monitoring

STATION	ANALYSIS	CONSTITUENTS	FREQUENCY	ANNUAL FREQUENCY	SAMPLES PER STATION	ANNUAL SAMPLES PER STATION
Horne # 12 (SW side of Unit II Basin)	Physicals	temp, DO, conductivity	Monthly during season/Bi-monthly off season	9	1	9
	Nutrients	TN (nitrate, nitrite, ammonia, kjeldahl), TP(ortho)	Monthly during season/Bi-monthly off season	9	1	9
	Algae	biomass, species composition	Monthly during season/Bi-monthly off season	9	transect	9
Horne # 15 (N end of Unit II Basin, W side of Dike)	Physicals	temp, DO, conductivity	Monthly during season/Bi-monthly off season	9	1	9
	Nutrients	TN (nitrate, nitrite, ammonia, kjeldahl), TP(ortho)	Monthly during season/Bi-monthly off season	9	1	9
	Algae	biomass, species composition	Monthly during season/Bi-monthly off season	9	transect	9
Horne # 18 (S side of Unit I Basin)	Physicals	temp, DO, conductivity	Monthly during season/Bi-monthly off season	9	1	9
	Nutrients	TN (nitrate, nitrite, ammonia, kjeldahl), TP(ortho)	Monthly during season/Bi-monthly off season	9	1	9
	Algae	biomass, species composition	Monthly during season/Bi-monthly off season	9	transect	9
Horne # 19 (N side of Unit I Basin)	Physicals	temp, DO, conductivity	Monthly during season/Bi-monthly off season	9	1	9
	Nutrients	TN (nitrate, nitrite, ammonia, kjeldahl), TP(ortho)	Monthly during season/Bi-monthly off season	9	1	9
	Algae	biomass, species composition	Monthly during season/Bi-monthly off season	9	transect	9
Horne #24 (NE side of Unit I Basin)	Physicals	temp, DO, conductivity	Monthly during season/Bi-monthly off season	9	1	9
	Nutrients	TN (nitrate, nitrite, ammonia, kjeldahl), TP(ortho)	Monthly during season/Bi-monthly off season	9	1	9
	Algae	biomass, species composition	Monthly during season/Bi-monthly off season	9	transect	9

APPENDIX A - Newport Bay Watershed Toxic Substances Monitoring

STATION	ANALYSIS	CONSTITUENTS	FREQUENCY	ANNUAL FREQUENCY	SAMPLES PER STATION	ANNUAL SAMPLES PER STATION
SDMF01	Metals	Cadmium, Chromium, Copper, Lead, Mercury, Selenium, Silver, Zinc	Seasonally (Wet/dry)	12	1	12
Santa Ana-Delhi @ Irvine Ave	Organophosphate Pesticides	Diazinon, Chlorpyrifos	Seasonally (Wet/dry)	12	1	12
	Sediment	Trace Metals, DDT, Chlordane, Toxaphene	Semi-Annually	2	1	2
	Acute Toxicity - water column		Seasonally (Wet/dry)	4	1	4
	Chronic Toxicity - (Ceriodaphnia/Pimephales) water column		Seasonally (Wet/dry)	8	1	8
SDMF05	Metals	Cadmium, Chromium, Copper, Lead, Mercury, Selenium, Silver, Zinc	Seasonally (Wet/dry)	12	1	12
San Diego Creek @ Campus	Organophosphate Pesticides	Diazinon, Chlorpyrifos	Seasonally (Wet/dry)	12	1	12
	Sediment	Trace Metals, DDT, Chlordane, Toxaphene	Semi-Annually	2	1	2
	Acute Toxicity - water column		Seasonally (Wet/dry)	4	1	4
	Chronic Toxicity - (Ceriodaphnia/Pimephales) water column		Seasonally (Wet/dry)	8	1	8
BCF04	Metals	Cadmium, Chromium, Copper, Lead, Mercury, Selenium, Silver, Zinc	Seasonally (Wet/dry)	6	1	6
Bonita Canyon @ SDC	Organophosphate Pesticides	Diazinon, Chlorpyrifos	Seasonally (Wet/dry)	6	1	6
	Sediment	Trace Metals, DDT, Chlordane, Toxaphene	Semi-Annually	2	1	2
	Acute Toxicity - water column		Seasonally (Wet/dry)	4	1	4
	Chronic Toxicity - (Ceriodaphnia/Pimephales) water column		Seasonally (Wet/dry)	8	1	8

APPENDIX A - Newport Bay Watershed Toxic Substances Monitoring

STATION	ANALYSIS	CONSTITUENTS	FREQUENCY	ANNUAL FREQUENCY	SAMPLES PER STATION	ANNUAL SAMPLES PER STATION
CMCG02	Metals	Cadmium, Chromium, Copper, Lead, Mercury, Selenium, Silver, Zinc	Seasonally (Wet/dry)	6	1	6
Costa Mesa Channel						
@ Highland	Organophosphate Pesticides	Diazinon, Chlorpyrifos	Seasonally (Wet/dry)	6	1	6
	Acute Toxicity - water column		Seasonally (Wet/dry)	4	1	4
	Chronic Toxicity - (Ceriodaphnia/Pimephales) water column		Seasonally (Wet/dry)	8	1	8
MICF07	Metals	Cadmium, Chromium, Copper, Lead, Mercury, Selenium, Silver, Zinc	Seasonally (Wet/dry)	6	1	6
El Modena-Irvine Channel						
@ Michelle	Organophosphate Pesticides	Diazinon, Chlorpyrifos	Seasonally (Wet/dry)	6	1	6
	Acute Toxicity - water column		Seasonally (Wet/dry)	4	1	4
	Chronic Toxicity - (Ceriodaphnia/Pimephales) water column		Seasonally (Wet/dry)	8	1	8
LANF08	Metals	Cadmium, Chromium, Copper, Lead, Mercury, Selenium, Silver, Zinc	Seasonally (Wet/dry)	6	1	6
Lane Channel						
@ Jamboree	Organophosphate Pesticides	Diazinon, Chlorpyrifos	Seasonally (Wet/dry)	6	1	6
	Sediment	Trace Metals, DDT, Chlordane, Toxaphene	Semi-Annually	2	1	2
	Acute Toxicity - water column		Seasonally (Wet/dry)	4	1	4
	Chronic Toxicity - (Ceriodaphnia/Pimephales) water column		Seasonally (Wet/dry)	8	1	8

APPENDIX A - Newport Bay Watershed Toxic Substances Monitoring

STATION	ANALYSIS	CONSTITUENTS	FREQUENCY	ANNUAL FREQUENCY	SAMPLES PER STATION	ANNUAL SAMPLES PER STATION
ACWF18	Metals	Cadmium, Chromium, Copper, Lead, Mercury, Selenium, Silver, Zinc	Seasonally (Wet/dry)	6	1	6
Agua Chinon Wash @ Irvine Center Dr.	Organophosphate Pesticides	Diazinon, Chlorpyrifos	Seasonally (Wet/dry)	6	1	6
	Sediment	Trace Metals, DDT, Chlordane, Toxaphene	Semi-Annually	2	1	2
	Acute Toxicity - water column		Seasonally (Wet/dry)	4	1	4
	Chronic Toxicity - (Ceriodaphnia/Pimephales) water column		Seasonally (Wet/dry)	8	1	8
BARSED	Metals	Cadmium, Chromium, Copper, Lead, Mercury, Selenium, Silver, Zinc	Seasonally (Wet/dry)	12	1	12
Peters Canyon Wash @ Barranca	Organophosphate Pesticides	Diazinon, Chlorpyrifos	Seasonally (Wet/dry)	12	1	12
	Sediment	Trace Metals, DDT, Chlordane, Toxaphene	Semi-Annually	2	1	2
	Acute Toxicity - water column		Seasonally (Wet/dry)	4	1	4
	Chronic Toxicity - (Ceriodaphnia/Pimephales) water column		Seasonally (Wet/dry)	8	1	8
WYLSED	Metals	Cadmium, Chromium, Copper, Lead, Mercury, Selenium, Silver, Zinc	Seasonally (Wet/dry)	12	1	12
San Diego Creek @ Culver	Organophosphate Pesticides	Diazinon, Chlorpyrifos	Seasonally (Wet/dry)	12	1	12
	Sediment	Trace Metals, DDT, Chlordane, Toxaphene	Semi-Annually	2	1	2
	Acute Toxicity - water column		Seasonally (Wet/dry)	4	1	4
	Chronic Toxicity - (Ceriodaphnia/Pimephales) water column		Seasonally (Wet/dry)	8	1	8

APPENDIX A - Newport Bay Watershed Toxic Substances Monitoring

STATION	ANALYSIS	CONSTITUENTS	FREQUENCY	ANNUAL FREQUENCY	SAMPLES PER STATION	ANNUAL SAMPLES PER STATION
Currently permitted nurseries	Priority Pesticides	Chlordane, DDT, Endosulfan, Toxaphene, PCB, etc.	Bi-annually	2	1	2
Hines, El Modeno, Bordiers						
	Organophosphate Pesticides	Diazinon, Chlorpyrifos	Seasonally (Wet/dry)	4	1	4
	Chronic Toxicity		Bi-annually	2	1	2
Currently unpermitted nurseries	Priority Pesticides	Chlordane, DDT, Endosulfan, Toxaphene, PCB, etc.	Bi-annually	2	1	2
(Possibly 1 to 10)						
	Organophosphate Pesticides	Diazinon, Chlorpyrifos	Seasonally (Wet/dry)	4	1	4
	Chronic Toxicity		Bi-annually	2	1	2
Agricultural discharges	Priority Pesticides	Chlordane, DDT, Endosulfan, Toxaphene, PCB, etc.	Bi-annually	2	1	2
(Sites to be determined)						
	Organophosphate Pesticides	Diazinon, Chlorpyrifos	Seasonally (Wet/dry)	4	1	4
	Chronic Toxicity		Bi-annually	2	1	2

APPENDIX A - Newport Bay Toxic Substances Monitoring

STATION	ANALYSIS	CONSTITUENTS	FREQUENCY	ANNUAL FREQUENCY	SAMPLES PER STATION	ANNUAL SAMPLES PER STATION
UNBJAM	Metals	Cadmium, Chromium, Copper, Lead, Mercury, Selenium, Silver, Zinc	Seasonally (Wet/dry)	4	3 (1 @ 3 depths)	12
	Organophosphate Pesticides	Diazinon, Chlorpyrifos	Seasonally (Wet/dry)	4	3 (1 @ 3 depths)	12
	Sediment	Trace Metals, DDT, Chlordane	Semi-Annually	2	1	2
	Acute Toxicity - (Mysids) water column		Seasonally (Wet/dry)	4	1	4
	Chronic Toxicity - (Mysids) water column		Seasonally (Wet/dry)	4	1	4
UNBSDC	Metals	Cadmium, Chromium, Copper, Lead, Mercury, Selenium, Silver, Zinc	Seasonally (Wet/dry)	4	3 (1 @ 3 depths)	12
	Organophosphate Pesticides	Diazinon, Chlorpyrifos	Seasonally (Wet/dry)	4	3 (1 @ 3 depths)	12
	Sediment	Trace Metals, DDT, Chlordane	Semi-Annually	2	1	2
	Acute Toxicity - (Mysids) water column		Seasonally (Wet/dry)	4	1	4
	Chronic Toxicity - (Mysids) water column		Seasonally (Wet/dry)	4	1	4
UNBNSB	Metals	Cadmium, Chromium, Copper, Lead, Mercury, Selenium, Silver, Zinc	Seasonally (Wet/dry)	4	3 (1 @ 3 depths)	12
	Organophosphate Pesticides	Diazinon, Chlorpyrifos	Seasonally (Wet/dry)	4	3 (1 @ 3 depths)	12
	Sediment	Trace Metals, DDT, Chlordane	Semi-Annually	2	1	2
	Acute Toxicity - (Mysids) water column		Seasonally (Wet/dry)	4	1	4
	Chronic Toxicity - (Mysids) water column		Seasonally (Wet/dry)	4	1	4

APPENDIX A - Newport Bay Toxic Substances Monitoring

STATION	ANALYSIS	CONSTITUENTS	FREQUENCY	ANNUAL FREQUENCY	SAMPLES PER STATION	ANNUAL SAMPLES PER STATION
UNBCHB	Metals	Cadmium, Chromium, Copper, Lead, Mercury, Selenium, Silver, Zinc	Seasonally (Wet/dry)	4	3 (1 @ 3 depths)	12
	Organophosphate Pesticides	Diazinon, Chlorpyrifos	Seasonally (Wet/dry)	4	3 (1 @ 3 depths)	12
	Sediment	Trace Metals, DDT, Chlordane	Semi-Annually	2	1	2
	Acute Toxicity - (Mysids) water column		Seasonally (Wet/dry)	4	1	4
	Chronic Toxicity - (Mysids) water column		Seasonally (Wet/dry)	4	1	4
LNBHIR	Metals	Cadmium, Chromium, Copper, Lead, Mercury, Selenium, Silver, Zinc	Seasonally (Wet/dry)	4	3 (1 @ 3 depths)	12
	Organophosphate Pesticides	Diazinon, Chlorpyrifos	Seasonally (Wet/dry)	4	3 (1 @ 3 depths)	12
	Sediment	Trace Metals, DDT, Chlordane	Semi-Annually	2	1	2
	Acute Toxicity - (Mysids) water column		Seasonally (Wet/dry)	4	1	4
	Chronic Toxicity - (Mysids) water column		Seasonally (Wet/dry)	4	1	4
LNBRIN	Metals	Trace Metals, TBT	Semi-annually	2	3 (1 @ 3 depths)	6
	Synthetic Organics	DDT, PCB	Semi-annually	2	3 (1 @ 3 depths)	6
	Sediment	Trace Metals, DDT, PCB, TBT	Annually	1	1	1
	Acute Toxicity - (Mysids) water column		Semi-annually	2	1	2
	Chronic Toxicity - (Mysids) water column		Semi-annually	2	1	2
	Chronic Toxicity - (Rhepoxynius) sediment		Semi-annually	2	1	2

APPENDIX B - Budget

County NPDES Monitoring

	turbidity, NO3, NH3, TKN, TP, TSS, VSS	flow	Temp, EC, pH, DO		
SADF01		1	9		
SDMF05	61	1	61		
BCF04			12		
CMCG02	61	1	61		
MICF07		1			
LANF08		1	10		
ACWF18			2		
CICF25	20	1	20		
RCWF26	20		20		
HCWF27			2		
HINF28	20		20		
BARSED		1			
WYLSED	21	1	21		
UNBJAM	18		18		
UNBSDC	18		18		
UNBNSB	18		18		
UNBCHB	18		18		
LNBRIN	5		5		
LNBTUB			6		
LNBHIR			8		
Total Analyses	**280**	**8**	**329**		
Cost/Analysis	$121	$3,440	$86		
Totals	$33,880	$27,520	$28,294	**$89,694**	

RMP

	TN(nitrate, nitrite, ammonia, TKN), TP	flow	Temp, EC, turbidity, pH, DO, hardness	Temp, DO, EC	Algae (biomass, species composition)	
SADF01	33	1	33			
SDMF05	61	1	61			
BCF04	21	1	21			
CMCG02	21	1	21			
MICF07	21	1	21			
LANF08	21	1	21			
ACWF18	15	1	15			
BARSED	33	1	33			
WYLSED	33	1	33			
UNBJAM	36		12			
UNBSDC	36		12			
UNBNSB	36		12			
UNBCHB	36		12			
LNBRIN	36		12			
HORNE #2	9*			9*	9	
HORNE #4	9*			9*	9	
HORNE #8	9*			9*	9	
HORNE #10	9*			9*	9	
HORNE #12	9*			9*	9	
HORNE #15	9*			9*	9	
HORNE #18	9*			9*	9	
HORNE #19	9*			9*	9	
HORNE #24	9*			9*	9	
Total Analyses	**439**	**9**	**319**	**0**	**81**	
Cost/Analysis	$121	$3,440	$86		$284	
Totals	$53,119	$30,960	$27,434	$0	$23,004	**$134,517**

* Price included in Algal Survey
2 ERS II labor hours including burden factor and overhead

2 weeks of ERS II labor

Recommended Toxic Substances Monitoring											
	Cr, Cu, Pb, Hg, Se, Zn	Seawater Cr, Cu, Pb, Hg, Se, Zn	OP Pesticides	Trace metals in Sediment	Organochlorine Pesticides in Sediment	TBT	Acute Toxicity (Ceriod aphnia, fathead minnow)	Chronic Toxicity (Ceriodaphnia, fathead minnow)	Acute Toxicity (Mysids)	Chronic Toxicity (Mysids)	
SADF01	12		12	2	2		4	8			
SDMF05	12		12	2	2		4	8			
BCF04	6		6	2	2		4	8			
CMCG02	6		6				4	8			
MICF07	6		6				4	8			
LANF08	6		6	2	2		4	8			
ACWF18	6		6	2	2		4	8			
BARSED	12		12	2	2		4	8			
WYLSED	12		12	2	2		4	8			
UNBJAM		12	12	2	2				4	4	
UNBSDC		12	12	2	2				4	4	
UNBNSB		12	12	2	2				4	4	
UNBCHB		12	12	2	2				4	4	
LNBRIN		6	6	1	1	1			2	2	
Total Analyses	**78**	**54**	**132**	**23**	**23**	**1**	**36**	**72**	**18**	**18**	
Cost/Analysis	$88	$103	$300	$50	$180		$250	$250	$250	$250	
Totals	$6,864	$5,562	$39,600	$1,150	$4,140	$0	$9,000	$18,000	$4,500	$4,500	$93,316
								2 ERS II labor hours including burden factor and overhead			
								2 weeks of ERS II labor			

County NPDES Monitoring											
	Diss & Total Ag, Cd, Cr, Cu, Ni, Pb, Zn, hardness	Diss & Total Seawater Ag, Cd, Cr, Cu, Ni, Pb, Zn	Trace metals in Sediment	PCBs, Organochlorine Pesticides in Sediment							
SADF01	9										
SDMF05	9		2	2							
BCF04	12		2	2							
CMCG02	61										
MICF07											
LANF08											
ACWF18				2							
CICF25											
RCWF26											
HCWF27				2							
HINF28											
BARSED											
WYLSED			2	2							
UNBJAM		6	2	2							
UNBSDC		6	2	2							
UNBNSB		6									
UNBCHB		6									
LNBRIN		6	5	2							
LNBTUB		6	2	2							
LNBHIR		8	2	2							
Total Analyses	**182**	**88**	**19**	**20**							
Cost/Analysis	$60	$75	$50	$180							
Totals	$10,920	$6,600	$950	$3,600	$22,070						

Appendix B
Newport Bay Watershed Monitoring Data

RMP WATERSHED SITES
Agua Chinon Wash

STATION	DATE	TIME	SAMPLES Type	#	EC µmhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Field Measurements Date	Time	EC µmhos	pH	TEMP C	DO mg/L
ACWF18	7/25/00	12:20	DT	1	1340	2.5	8	16	<0.05	1	2.59	0.737	<10	<1	7/25/00	12:20	1500	7.1	24.9	7.4
	8/30/00	10:05	DT	1	1130	2.6	7.9	17	0.065	0.69	1.93	0.57	<10	<10	8/30/00	10:05	1430	7	23.2	6.3
	9/8/00	12:15	DT	1	1760	1.7	8.8	22	<0.05	0.76	1.87	0.402	<10	<10	9/8/00	12:15	1400	6.9	24.3	6.5
	11/8/00	10:00	DT	1	1830	145	7.7	53	0.166	2.2	2.88	0.426	180	23						
	11/30/00	15:30	DT	1	1740	6.3	7.7	39	<0.05	0.39	1.84	0.489	<10	<10	11/30/00	15:30	1090	8	14.9	8.9
	12/8/00	10:30	DT	1	1650	6.7	7.8	31	0.242	0.78	4.28	0.977	<10	<10	36868	0.4375	1110	8.1	16	9
	1/3/01	9:00	DT	1	1580	4.8	8	28	<0.05	0.71	3.06	0.697	12	<10	1/3/01	9:00	1212	7	15.1	8
	1/18/01	7:10	DT	1	1840	5.9	7.7	40	<0.05	0.75	2.3	0.435	<10	<10	36909	0.29861111	813	7	6	15.6
	2/13/01		ST	1	412	2210	8.8	13	0.175	5	7.04		4620	420						
	2/13/01		SF																	
	3/27/01	10:00	DT	1	1760	29	7.9	40	0.066	1.3	2.57	0.738	40	<10	3/27/01	10:00	1757	7.8	20.8	9.13
	4/18/01		DT	24	1640	40	8.1	38	<0.05	1.1	1.96	0.511	110	14						
	4/19/01																			
	6/20/01	8:50	DT	24	895	75	8.3	5.5	<0.05	1.6	4.9	1.78	110	15						
	6/21/01	7:50																		

RMP WATERSHED SITES
Peters Canyon Wash at Barranca Parkway

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC µmhos	Turb NTU	pH	NO_3 mg/L	NH_3 mg/L	TKN mg/L	PO_4 mg/L	o-PO_4 mg/L	TSS mg/L	VSS mg/L	Field Measurements Date	Field Measurements Time	EC µmhos	pH	TEMP C	DO mg/L
BARSED	7/19/00	9:30	DT	1	2530	10	8.6	40	<0.05	1.2	0.615	0.06	20	10	7/19/00	9:30	2610	8	29	11.3
	8/4/00	12:25	DT	1	2400	10	8.9	35	<0.05	0.99	0.581	0.102	23	8	8/4/00	12:25	2550	8.7	32.1	
	8/16/00	14:34	DT	24	2560	19	8.2	33	<0.05	1.5	0.673	0.084	30	<10	8/17/00	13:40	2670	8.4	33.3	
	8/17/00	13:34																		
	8/29/00	14:25	DT	24	1940	5.8	8.4	37	0.166	1.5	1.04	0.227	<10	<10	8/29/00	13:30	2240	8.1	28.3	22.4
	8/30/00	13:25																		
	9/12/00	11:32	DT	24	2410	7.4	8.4	33	<0.05	1.3	0.337	0.026	13	<10	9/13/00	8:55	2350	8.5	22.3	16.1
	9/13/00	10:32																		
	9/26/00	12:36	DT	24	2420	3.4	8.6	44	<0.05	0.78	1.1	0.196	10	<10	9/27/00	12:10	2320	8	33.6	
	9/27/00	11:36																		
	10/5/00	11:15	DT	24	2280	6	8.5	40	<0.05	0.94	0.918	0.149	25	<10	10/6/00	10:40	1790	7.9	20.2	6.7
	10/6/00	10:15																		
	10/10/00	9:28	ST	5	1120	34	7.5	38	0.908	12	3.67	0.15	290	80						
	10/10/00	10:28																		
	10/10/00	11:28	ST	12	1620	17	7.8	44	0.345	4.1	1.56	0.205	74	18						
	10/11/00	11:28	SF																	
	10/11/00	13:28	ST	38	2120	10	8.3	40	0.228	2.4	1.19	0.184	16	40						
	10/14/00	6:28	SF																	
	10/27/00	3:43	ST	5	1530	300	8.2	53	0.742	5.7	4.59	0.54	620	100						
	10/27/00	4:43																		
	10/27/00	6:43	ST	8	1120	700	7.5	32	0.409	3.2	3.98	0.546	430	60						
	10/27/00	20:43	SF																	
	10/27/00	22:43	ST	18	2390	18	8.2	57	0.233	1.7	1.77	0.44	25	<10	10/29/00	9:55	2200	7.96	19.4	8.9
	10/29/00	7:43	SF																	
	10/29/00	9:43	ST	5	2710	12	8.5	53	0.075	0.75	0.949	0.19	12	<10						
	10/29/00	17:43	SF																	
	10/29/00	19:43	ST	10	1070	137	7.8	25	0.209	2.1	2.51	0.489	190	29						
	10/30/00	13:43	SF																	
	10/30/00	15:43	ST	7	2290	20	8.3	44	0.138	1.1	0.979	0.352	19	<10						
	10/31/00	3:43	SF																	
	11/8/00	10:30	DT	1	2330	5.3	8.9	43	<0.05	1.5	0.306	0.22	18	<10						
	11/30/00	10:32	DT	24	2630	5	8.3	53	0.133	0.96	0.765	0.114	13	<10	12/1/00	8:35	1481	7.4	14.7	10.5
	12/1/00	9:32																		
	12/14/00	8:50	DT	24	2510	9.9	8.8	70	<0.05	1.6	1.1	0.215	37	11	12/15/00	9:30	1300	7.3	14.9	8.8
	12/15/00	7:50																		
	12/26/00	8:56	DT	24	2070	22	8.5	66	0.116	1.4	1.71	0.302	41	10						
	12/27/00	7:56																		
	1/8/01	14:35	ST	5	1260	2.6	7.6	44	1.42	5.1	3.67	0.449	<10	<10						
	1/8/01	15:35																		
	1/8/01	17:35	ST	8	810	170	7.7	20	1.13	6.5	4.28	0.311	600	110						
	1/9/01	7:35																		
	1/9/01																			
	1/10/01	14:26	ST		2190	160	8.2	48	<0.05	3.3	2.36	0.5	<10	48						
	1/10/01	16:26																		
	1/10/01	18:26	ST	21	455	270	7.8	16	0.266	2	3.06	0.44	300	40						
	1/12/01	12:26	SF																	
	1/17/01	7:10	DT	2	3280	6	8.1	84	<0.05	0.75	0.581	0.167	<10	<10	1/18/01	9:15	1100	7.2	7.9	10.3
	1/18/01	6:10																		

RMP WATERSHED SITES
Peters Canyon Wash at Barranca Parkway

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC µmhos	Turb NTU	pH	NO_3 mg/L	NH_3 mg/L	TKN mg/L	PO_4 mg/L	o-PO_4 mg/L	TSS mg/L	VSS mg/L	Field Measurements Date	Field Measurements Time	EC µmhos	pH	TEMP C	DO mg/L
BARSED	1/24/01	8:57	ST	5	930	283	7.9	25	0.792	5.5	2.75	0.242	430	76						
	1/24/01	9:57	SF																	
	1/24/01	11:57	ST	10	1430	104	8	44	0.508	2.3	1.93	0.372	110	16						
	1/25/01	5:57	SF																	
	1/25/01	7:57	ST	12	2950	9	7.8	84	0.111	0.47	0.887	0.269	<10	<10						
	1/26/01	5:57	SF																	
	1/26/01	7:57	ST	26	1860	128	8.2	57	0.33	0.94	1.59	0.281	170	22						
	1/28/01	9:57	SF																	
	2/1/01	9:22	DT	24	3510	3.5	8.2	84	<0.05	0.4	0.643	0.153	<10	<10						
	2/2/01	8:22																		
	2/14/01		ST	24	1070	73	7.8	21	0.155	1.5	1.65	0.356	67	<10	2/15/01		5576	7.8	12.4	10.1
	2/15/01																			
	2/22/01	8:30	DT	24	5630	4	8.2	210	<0.05	0.71	0.612	0.026	<10	<10	2/22/01	8:30	2494	8.1	15	18.6
	2/23/01	7:30																		
	3/6/01	2:56	ST	5	1130	170	7.4	30	0.136	2.2	1.93		240	37						
	3/6/01	3:56	SF																	
	3/6/01	5:56	ST	5	1180	260	7.4	33	0.11	1.8	2.17	0.214	330	40						
	3/6/01	13:56	SF																	
	3/6/01	15:56	ST	13	2940	31	8	97	0.168	1.3	0.857	0.219	22	<10						
	3/7/01	15:56	SF																	
	3/7/01	17:56	ST	30	3380	30	8.3	100	<0.05	1.1	0.979	0.23	45	<10						
	3/10/01	3:56	SF																	
	3/20/01	8:49	DT	24	3220	2.2	8.3	88	<0.05	0.75	0.153	0.041	<10	<10	3/20/01	10:30	2950	8.2	19	19.9
	3/21/01	7:49																		
	4/3/01		DT	24	2670	12	8.2	97	0.757	2.6	1.41	0.409	48	15						
	4/4/01																			
	4/25/01	8:45	DT	24	2670	2.6	8.3	57	<0.05	1.1	0.459	0.088	<10	<10	4/26/01		2745	8.3	19.5	16.1
	4/26/01	7:45																		
	5/15/01	10:00	DT	24	2320	3.9	8.6	75	<0.05	2.2	1.71	0.479	<10	<10						
	5/16/01	9:00																		
	5/16/01	10:00	DT	24	2590	3.9	8.6	88	0.65	2.9	1.9	0.549	<10	<10						
	5/17/01	9:00																		
	5/17/01	10:00	DT	24	2520	2.9	8.6	75	<0.05	1.7	1.1	0.34	<10	<10						
	5/18/01	9:00																		
	5/18/01	10:00	DT	24	2380	2.9	8.5	70	<0.05	4.3	1.35	0.337	<10	<10						
	5/19/01	9:00																		
	5/19/01	10:00	DT	24	2450	4.5	8.5	62	<0.05	2	1.19	0.288	<10	<10						
	5/20/01	9:00																		
	5/20/01	10:00	DT	24	2440	3.6	8.6	66	0.068	1.6	0.918	0.265	<10	<10						
	5/21/01	9:00																		
	5/21/01	10:00	DT	24	3120	0.7	8.2	66	<0.05	0.37	0.581		<10	<10						
	5/22/01	9:00																		
	5/22/01	10:00	DT	24	2370	4.9	8.5	57	<0.05	1.5	0.887	0.224	10	<10						
	5/23/01	9:00																		
	5/30/01	9:05	DT	24	2190	3.2	8.4	53	<0.05	1.5	1.35	0.417	<10	<10	5/31/01		2979	8.2	22.9	13.7
	5/31/01	8:05																		
	6/7/01	8:55	DT		2510	2.5	8.4	53	<0.05	0.66	0.765	0.024	<10	<10						
	6/8/01	7:55																		
	6/14/01	9:03	DT	24	2240	2.8	8.5	44	<0.05	0.74	0.734	0.201	<10	<10						
	6/15/01	8:03																		

RMP WATERSHED SITES
Bonita Canyon Wash

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC µmhos	Turb NTU	pH	NO_3 mg/L	NH_3 mg/L	TKN mg/L	PO_4 mg/L	o-PO_4 mg/L	TSS mg/L	VSS mg/L	Field Measurements Date	Field Measurements Time	EC µmhos	pH	TEMP C	DO mg/L
BCF04	7/25/00	13:14	DT	1	2780	75	8.1	1.8	<0.05	0.6	0.285	0.021	300	40			2.84	7.9	21	7.8
	8/29/00	12:13	DT	24	2470	6.9	8.3	1.5	<0.05	0.34	0.398	0.065	10	<10	8/29/00	12:15	3040	7.8	20.8	8
	8/30/00	11:13																		
	9/7/00	12:43	DT	24	3360	20	8.3	2.4	<0.05	0.67	0.612	0.026	50	<10	9/8/00		3160	7.8	21.3	9.9
	9/8/00	11:43																		
	10/3/00	11:42	DT	24	3010	10	7.8	2.3	<0.05	0.42	0.153	0.036	34	<10	10/4/00	11:40	2580	8.2	24	6.7
	10/4/00	10:42																		
	10/27/00	3:22	ST	2	2160	2.5	7.7	6.1	0.213	2.3	1.59	0.219	<10	<10						
	10/27/00	5:22																		
	11/7/00	10:43	DT	24	2940	5.9	8.3	11	<0.05	0.52	0.337	0.074	<10	<10						
	11/8/00	9:43																		
	12/21/00	14:00	DT	24	3040	1.4	8.3	2.6	<0.05	0.31	0.153	0.02	<10	<10	12/22/00		1290	7.1	15.9	8.1
	12/22/00	13:00																		
	1/2/01	11:42	DT	24	2960	1.3	8.3	2.5	<0.05	0.52	0.122	0.053	<10	<10	1/2/01	11:00	1130	7.3	15.2	10.2
	1/3/01	10:42																		
	2/5/01	11:01	DT	24	2740	4.6	8.5	2.1	<0.05	1.8	0.0918	0.047	<10	<10	2/6/01	11:01	2500		14.8	10.5
	2/6/01	9:01																		
	2/12/01	14:13	ST	10	346	648	7.6	3.2	0.084	1.4	1.35	0.212	540	40						
	2/13/01	10:13	SF																	
	2/13/01	10:13	ST	14	723	300	7.9	4.1	<0.05	1.2	0.979	0.19	230	24						
	2/14/01	12:13	SF																	
	2/14/01	14:13	ST	17	1640	51	8.2	3.7	<0.05	0.43	0.612	0.112	35	<10	2/16/01	13:45	1940	7.6	12.5	10.1
	2/16/01	1:00	SF																	
	2/20/01	12:20	ST	10	1540	9.7	8.2	1.1	<0.05	0.33	0.214		<10	<10	2/22/01	9:15	2212	8.2	12.1	8.8
	2/21/01	7:22	SF																	
	2/25/01	15:45	ST	5	472	273	7.8	2.5	<0.05	1.2	1.01		270	26						
	2/25/01	16:33	SF																	
	2/25/01	18:14	ST	14	418	462	7.6	2	<0.05	1.3	1.13		430	42	2/26/01	9:25	524	8.5	12.2	5.7
	2/26/01	20:14	SF																	
	2/27/01	22:14	ST	29	916	109	8.1	3.4	<0.05	0.71	0.734		72	<10						
	3/1/01	7:17	SF																	
	3/6/01	3:40	ST	5	1330	120	7.5	2.7	<0.05	0.94	0.643	0.071	170	20						
	3/6/01	4:40	SF																	
	3/6/01	6:40	ST	7	676	140	7.7	1.7	<0.05	0.91	0.612	0.081	120	<10						
	3/6/01	18:40	SF																	
	3/6/01	20:40	ST	14	1700	13	8.2	0.73	<0.05	0.61	0.214	0.067	21	<10						
	3/7/01	22:40	SF																	
	3/8/01	0:40	ST	27	2230	14	8.3	1.2	<0.05	0.56	0.153	0.046	18	<10						
	3/10/01	4:40	SF																	
	4/12/01		DT	24	1720	21	8.1	1.5	<0.05	0.62	0.398	0.067	30	<10						
	4/13/01																			
	6/28/01		DT	1	2900	69	7.9	2.6	<0.05	0.67	0.826	0.143	160	18						

RMP WATERSHED SITES
Central Irvine Channel - NPDES Station

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC µmhos	Turb NTU	pH	NO_3 mg/L	NH_3 mg/L	TKN mg/L	PO_4 mg/L	o-PO_4 mg/L	TSS mg/L	VSS mg/L	Field Measurements Date	Field Measurements Time	EC µmhos	pH	TEMP C	DO mg/L
CICF25	7/7/00	10:35	DT	1	1520	30	9.1	32	0.234	3.3	1.96	0.383	32	12						
	7/7/00	10:35	DF																	
	7/20/00	10:45	DT	1	1940	23	8.7	88	0.094	2.6	3.18	0.916	24	9						
	8/9/00	8:15	DT	24	1970	58	8	170	10.5	9	7.65	2.61	160	30						
	8/10/00	7:15																		
	8/24/00	10:00	DT	24	1960	17	8.3	84	0.238	2.9	7.96	1.92	<10	<10	8/24/00	10:00	1530	7.4	24.5	13.6
	8/25/00	9:00																		
	9/5/00	14:02	DT	24	1930	20	8.1	57	0.148	5.6	4.28	0.732	220	22	9/6/00	14:04	1070	9.1	31.1	13.3
	9/6/00	13:02																		
	9/19/00	8:04	DT	24	2040	78	8.4	35	<0.05	3.49	3.98	0.749	140	28	9/20/00	7:50	2090	7.9	21.1	8.1
	9/20/00	7:04																		
	10/3/00	9:14	DT	24	1460	35	8.4	57	0.179	1.8	2.88	0.892	120	11						
	10/4/00	8:14																		
	10/17/00	11:22	DT	24	1830	132	8.2	66	0.282	3.9	3.06	0.57	170	26						
	10/18/00	10:22																		
	11/2/00	10:30	DT	24	1940	24	8.2	150	3.35	4.5	6.12	0.934	<10	<10						
	11/3/00	9:30																		
	11/30/00	9:48	DT	24	1930	26	8.1	120	1.73	2.3	5.81	1.82	12	<10	12/1/00	7:30	1094	7.8	13.9	7
	12/1/00	8:48																		
	12/14/00	8:16	DT	24	1860	13	8.6	150	0.825	2.1	5.2	1.04	17	<10	12/15/00	7:45	1390	7	15.1	7.8
	12/15/00	7:16																		
	12/21/00	10:22	DT	24	1960	167	8	180	8.34	10	1.25	3.21	210	34	12/22/00		1100	7.9	14.1	10.1
	12/22/00	9:22																		
	1/2/01	8:15	DT	24	1880	24	8.1	120	<0.05	1.7	4.59	1.49	25	<10	1/2/01	9:00	962	6.3	11.3	10
	1/3/01	7:15																		
	2/1/01	9:45	DT	24	2210	2	8.1	100	<0.05	0.24	0.918	0.256	<10	<10	2/1/01		1483		15.1	10.9
	2/2/01	8:45																		
	2/14/01		ST	24	1140	126	7.8	88	0.685	3.9	7.34	1.86	93	14	2/15/01		1917	7.6	18.6	10.1
	2/15/01																			
	3/13/01	8:45	DT	24	1810	19	8	150	3.21	4.7	2.72	0.74	15	<10	3/13/01	9:00	1965	7.9	16.1	15
	3/14/01	7:45																		
	3/27/01	8:24	DT	24	1860	12	7.9	220	0.425	2.8	8.26	2.37	21	<10	3/27/01	9:00	330	8.5	16.3	16.5
	3/28/01	7:24																		
	4/12/01	9:15	DT	24	1810	12	7.9	190	6.26	8.6	6.12	2.04	13	<10	4/12/01	9:00	1941	8.4	15.1	12.7
	4/13/01	8:15																		
	4/18/01	8:35	DT	24	1900	3.4	9.2	190	<0.05	3.2	2.05	0.562	<10	<10	4/19/01		1798	8.4	16.2	14.9
	4/19/01	7:35																		
	4/25/01	7:45	DT	24	2070	55	8.3	290	17.2	23	10.7	5.59	61	12	4/26/01		2104	8.1	16.9	11.2
	4/26/01	6:45																		
	5/1/01	15:25	DT	1	2100	13	7.4	220	21.2	30	10.1		10	<10						
	5/15/01	10:00	DT	6	1540	94	8.6	180	1.63	6.9	7.04		86	13						
	5/15/01	15:00										1.76								
	5/15/01	16:00	DT	6	1600	151	8.7	180	<0.05	3.6	5.81		134	15						
	5/15/01	21:00										1.77								
	5/16/01	22:00	DT	6	1630	67	8.1	160	0.924	3.9	7.96		44	<10						
	5/16/01	3:00										3.57								
	5/16/01	4:00	DT	6	1870	121	7.9	240	16.3	21	14.4		150	21						
	5/16/01	9:00										3.73								
	5/16/01	10:00	DT	6	1660	54	8.6	230	9.29	17	7.04	1.85	51	11						
	5/16/01	15:00																		
	5/16/01	22:00	DT	6	1900	23	7.9	300	10.5	20	11.6	3.05	18	<10						
	5/17/01	3:00																		
	5/16/01	16:00	DT	6	1890	49	8.6	250	7.28	14	6.12	1.34	45	12						

RMP WATERSHED SITES
Central Irvine Channel - NPDES Station

STATION	DATE	TIME	SAMPLES Type	#	EC µmhos	Turb NTU	pH	NO_3 mg/L	NH_3 mg/L	TKN mg/L	PO_4 mg/L	o-PO_4 mg/L	TSS mg/L	VSS mg/L	Field Measurements Date	Time	EC µmhos	pH	TEMP C	DO mg/L
CICF25	5/16/01	21:00																		
	5/17/01	4:00	DT	6	1980	23	7.9	260	14.6	24	13.2	3.89	21	<10						
	5/17/01	9:00																		
	5/17/01	10:00	DT	6	1660	105	9.1	140	1.06	5.4	4.9	0.799	140	32						
	5/17/01	15:00																		
	5/17/01	16:00	DT	6	1470	21	9.3	160	0.243	4.2	2.66	0.575	37	<10						
	5/17/01	21:00																		
	5/17/01	22:00	DT	2				200	2.49	4.6	6.43	1.6								
	5/17/01	23:00																		
	5/18/01	0:00	DT	8	1880	16	8.2	180	3.21	6.1	7.65	2.2	25	<10						
	5/18/01	7:00																		
	5/18/01	8:00	DT	2				250	8.14	20	15.9	3.67								
	5/18/01	9:00																		
	5/18/01	10:00	DT	24	1690	15	8.4	160	0.435	5.3	5.81	1.38	22	<10						
	5/19/01	9:00																		
	5/19/01	10:00	DT	6	1800	92	8.9	110	0.059	3.5	5.81	0.686	150	29						
	5/19/01	15:00																		
	5/19/01	16:00	DT	6	1860	103	8.2	220	0.149	5.8	7.96	0.921	150	31						
	5/19/01	21:00																		
	5/19/01	22:00	DT	6	1690	23	7.7	180	<0.05	2.8	9.18	2.06	27	<10						
	5/20/01	3:00																		
	5/20/01	4:00	DT	6	1870	18	8	160	<0.05	2.5	8.57	2.37	25	<10						
	5/20/01	9:00																		
	5/20/01	10:00	DT	6	1670	15	8.5	180	<0.05	4	4.28	0.913	20	<10						
	5/20/01	15:00																		
	5/20/01	16:00	DT	6	1820	14	8.7	220	0.054	3.4	2.08	0.375	21	<10						
	5/20/01	21:00																		
	5/20/01	22:00	DT	6	1810	6.3	9	170	<0.05	3	6.43	1.96	11	<10						
	5/21/01	3:00																		
	5/21/01	4:00	DT	6	1790	7.3	8.2	130	<0.05	3.3	7.65	2.43	14	<10						
	5/21/01	9:00																		
	5/21/01	10:00	DT	6	1700	14	8.9	110	<0.05	2.4	3.37	0.796	24	<10						
	5/21/01	15:00																		
	5/21/01	16:00	DT	6	1710	8.4	9.2	140	<0.05	<0.2	1.62	0.305	12	<10						
	5/21/01	21:00																		
	5/21/01	22:00	DT	6	1610	8.5	8.2	110	<0.05	0.48	5.51	1.53	11	<10						
	5/22/01	3:00																		
	5/22/01	4:00	DT	6	1540	12	8.1	70	<0.05	<0.2	6.12	0.03	18	<10						
	5/22/01	9:00																		
	5/22/01	10:00	DT	6	1560	73	8.9	70	0.12	<0.2	3.98	0.59	110	26						
	5/22/01	15:00																		
	5/22/01	10:00	DUP	6	1520	61	8.9	66	0.105	<0.2	3.67	0.594	110	26						
	5/22/01	15:00																		
	5/22/01	16:00	DT	6	1690	21	8.8	180	0.982	4	2.63	0.582	33	10						
	5/22/01	21:00																		
	5/22/01	22:00	DT	6	1610	10	7.8	150	1.3	<0.2	6.12	1.68	14	<10						
	5/23/01	3:00																		
	5/23/01	4:00	DT	6	1630	12	7.9	140	0.671	3	7.04	2.32	13	<10						
	5/23/01	9:00																		
	5/30/01	8:35	DT	24	1650	110	7.7	120	5.55	12	13.5	1.81	600	130	5/31/01		1811	8.5	19.7	12
	5/31/01	7:35																		
	6/20/01	9:55	DT	24	2070	23	8.3	280	0.095	3.2	10.4	3.37	26	<10						
	6/21/01	8:55																		
	6/28/01		DT	1	1780	31	8.8	110	0.168	3.4	4.9	1.6	30	<10						

RMP WATERSHED SITES
Costa Mesa Channel

STATION	DATE	TIME	SAMPLES Type	#	EC µmhos	Turb NTU	pH	NO_3 mg/L	NH_3 mg/L	TKN mg/L	PO_4 mg/L	o-PO_4 mg/L	TSS mg/L	VSS mg/L	Field Measurements Date	Time	EC µmhos	pH	TEMP C	DO mg/L
CMCG02	7/7/00	11:30	DT	1	830	27	9.5	<0.44	0.133	2.8	1.44	0.293	22	16						
	7/7/00	11:30	DF																	
	7/13/00	9:00	DT	1	845	7.2	8.7	<0.44	0.086	1.6	7.04	0.426	13	10						
	7/13/00	9:00	DF																	
	7/19/00	12:30	DT	1	765	7.6	9.4	0.58	<0.05	1.6	1.78	0.688	<10	<1						
	7/19/00	12:30	DF																	
	7/26/00	12:45	DT	1	1120	4	8.4	1.1	0.356	14	309	0.691	<10	<1						
	7/26/00	12:45	DF																	
	8/4/00	13:30	DT	1	770	4.9	9.6	0.44	0.103	2.1	1.29	0.295	22	18	8/4/00	13:30	843	9.4	31.9	7.8
	8/4/00	13:30	DF	1																
	8/9/00	11:43	DT	24	845	4.7	8.4	66	<0.05	1.5	0.581	0.93	10	8	8/10/00	14:30	718	9.2	33.1	8.8
	8/10/00	10:43	DF																	
	8/17/00	8:31	DT	1	1060	11	7.7	1.2	0.137	1.4	1.25	0.277	20	12						
	8/17/00	8:31	DF																	
	8/24/00	12:32	DT	24	1040	4.4	7.6	1.2	0.134	1.1	1.9	0.6	<10	<10	8/24/00	12:05	455	9.4	26.2	11.3
	8/25/00	11:32	DF																	
	8/29/00	10:20	DT	24	870	14	8.2	0.51	0.263	4.3	2.26	0.521	31	18	8/29/00	11:10	395	8.2	236	11.2
	8/30/00	9:20	DF																	
	9/5/00	13:37	DT	24	1100	21	8.2	0.75	0.094	1.6	3.67	0.874	72	19	9/6/00	13:30	850	8.9	26.2	10
	9/6/00	12:37	DF																	
	9/12/00	8:57	DT	24	990	4.4	7.8	0.58	0.301	2.3	2.6	0.59	<10	<10	9/13/00	7:45	872	8.3	20.2	6.7
	9/13/00	7:57	DF																	
	9/19/00	9:53	DT	24	940	6.4	8.3	1.5	0.134	4.07	2.97	0.536	18	10	9/20/00	9:10	780	8.1	21.1	7.6
	9/20/00	8:53	DF																	
	9/26/00	10:57	DT	24	810	3	9.4	<0.44	<0.05	1.4	1.29	0.269	<10	<10						
	9/27/00	9:57	DF																	
	10/5/00	9:30	DT	24	790	4	8.8	3.7	0.112	1.5	1.59	0.261	12	<10	10/6/00		656	8.2	20.4	9.7
	10/6/00	8:30	DF																	
	10/11/00	6:07	ST	5	845	15	6.9	16	2.45	64	5.51	0.709	170	115						
	10/11/00	7:07	SF																	
	10/11/00	9:07	ST	12	490	10	6.9	15	0.461	6.6	4.59	0.993	42	30						
	10/11/00	21:07	SF																	
	10/11/00	23:07	ST	44	825	6	7.8	0.65	<0.05	1.6	0.581	0.405	<10	<10						
	10/15/00	7:07	SF																	
	10/17/00	8:40	DT	24	815	5.9	8.6	0.68	<0.05	1.6	1.16	0.169	<10	<10						
	10/18/00	7:40	DF																	
	10/26/00	3:25	ST	4	380	85	7.1	9.3	0.568	5	2.23	0.128	280	140						
	10/26/00	4:10																		
	10/27/00	6:10	ST	11	210	24	7	5.9	0.205	2.2	1.62	0.361	43	20						
	10/28/00	10:10	SF																	
	10/28/00	12:10	ST	2																
	10/28/00	12:10	SF																	
	10/29/00	10:10	ST	5	655	5.1	8.5	1.1	<0.05	0.97	1.38	0.212	<10	<10						
	10/29/00	18:10	SF																	
	10/29/00	20:10	ST	4	255	17	7.4	2.8	0.057	0.87	1.38	0.349	16	10						
	10/30/00	4:10	SF																	
	11/8/00	11:00	DT	1	785	78	8.2	<0.44	<0.05	3.3	3.37	0.288	270	78						
	11/8/00	11:00	DF																	
	11/16/00	11:00	DT	1	865	20	8.4	4.1	0.088	2.1	2.48	0.452	58	23						
	11/16/00	11:00	DF																	

RMP WATERSHED SITES
Costa Mesa Channel

STATION	DATE	TIME	SAMPLES Type	#	EC µmhos	Turb NTU	pH	NO_3 mg/L	NH_3 mg/L	TKN mg/L	PO_4 mg/L	o-PO_4 mg/L	TSS mg/L	VSS mg/L	Field Measurements Date	Time	EC µmhos	pH	TEMP C	DO mg/L
CMCG02	11/30/00	9:11	DT	24	865	4.1	8.7	2.2	0.171	1	0.857	0.16	<10	<10	12/1/00	9:45	590	8.1	15.1	9.9
	12/1/00	8:11	DF																	
	12/8/00	12:00	DT	1	705	14	8.8	53	0.225	1	1.56	0.128	15	13	12/8/00	12:00	610	8	16.2	11.2
	12/8/00	12:00	DF																	
	12/14/00	10:00	DT	24	825	4.5	8.6	4.6	0.167	1.4	1.41	0.368	<10	<10			670	8	14.3	8.7
	12/15/00	9:00	DF																	
	12/22/00	12:20	DT	1	815	7.6	8.8	4.4	0.12	3.8	1.96	0.257	14	<10						
	12/22/00	12:20	DF																	
	12/26/00	10:30	DT	24	610	8.1	8.1	2.2	<0.05	0.84	0.643	0.093	16	<10						
	12/27/00	9:30	DF																	
	1/2/01	9:15	DT	24	925	3.3	7.6	2.2	0.244	2.1	0.949	0.23	<10	<10	1/2/01	10:30	900	7.2	13.1	9
	1/3/01	8:15	DF																	
	1/8/01	11:10	ST	4	690	230	6.7	26	4.24	21	9.18	0.906	500	230						
	1/8/01	11:55																		
	1/9/01	7:54	ST	17	690	50	7.7	7.7	0.133	3	1.04	0.41	29	<10						
	1/10/01	15:54	SF																	
	1/10/01	17:54	ST	22	160	32	7	3.3	0.289	1.3	1.96	0.4	33	14						
	1/12/01	11:54	SF																	
	1/17/01	9:09	DT	24	3120	17	8.2	53	<0.05	1.2	0.704	0.16	25	<10						
	1/18/01	8:09	DF																	
	1/24/01	7:32	ST	5	175	72	6.9	7	1.12	3.4	1.84	0.361	150	58						
	1/24/01	8:32	SF																	
	1/24/01	10:32	ST	1				280	0.546	3.2	1.5									
	1/25/01	9:12	ST	11	865	7	7.4	5.3	2.08	3.1	3.67	0.881	<10	<10						
	1/26/01	5:12	SF																	
	1/26/01	7:12	ST	9	185	27	7.5	4.2	0.34	1.3	1.32	0.324	25	<10						
	1/26/01	23:12	SF																	
	1/27/01	1:12	ST	16	810	7.8	8.4	6.6	0.135	1.1	1.1	0.304	<10	<10						
	1/28/01	7:12	SF																	
	2/1/01	10:20	DT	24	1060	4.7	8.6	14	2.11	3.2	1.59	0.427	<10	<10	2/1/01		640		13	8.1
	2/2/01	9:20	DF																	
	2/5/01	9:09	DT	24	976	2.2	8.9	2.2	0.054	6	0.826	0.174	<10	<10	2/6/01	9:09	915		16.3	14.3
	2/6/01	7:09																		
	2/5/01	9:09	DF	24																
	2/6/01	7:09																		
	2/14/01		ST	24	1260	16	8.4	7.6	<0.05	2.6	0.796	0.161	<10	<10						
	2/15/01		SF																	
	2/22/01	10:35	DT	24	1350	9.4	8.3	2.4	<0.05	1	0.857	0.141	<10	<10						
	2/23/01	9:35	DF												2/22/01	10:35	1200	9.4	16	19.7
	3/7/01		ST	5	93	30	5.6	2.1	0.19	1.2	1.07	0.181	58	21						
	3/7/01		SF																	
	3/9/01		ST		1580	2.4	8.1	6.6	<0.05	2.1	0.275	0.055	<10	<10						
	3/9/01		SF																	
	3/13/01		DT	24	1360	2.4	9.1	1.9	<0.05	1	0.184	0.011	15	<10						
	3/14/01		DF																	
	3/20/01	9:55	DT	24	1060	15	8.9	1.5	0.069	3.3	0.643	0.062	45	14	3/20/01	10:30	1208	8.96	20.7	19
	3/21/01	8:55	DF																	
	3/27/01	10:25	DT	24	1270	2.5	8.5	1.5	<0.05	1.1	0.306	0.069	<10	<10	3/27/01	9:00	604	9.4	21.2	19.3
	3/28/01	9:25	DF																	

RMP WATERSHED SITES
Costa Mesa Channel

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC µmhos	Turb NTU	pH	NO_3 mg/L	NH_3 mg/L	TKN mg/L	PO_4 mg/L	o-PO_4 mg/L	TSS mg/L	VSS mg/L	Field Measurements Date	Field Measurements Time	EC µmhos	pH	TEMP C	DO mg/L
CMCG02	4/3/01		DT	24	1370	5.1	8.4	1.3	0.095	1.5	0.367	0.051	15	<10						
	4/4/01		DF																	
	4/12/01	11:00	DT	24	2730	1.9	8.3	12	<0.05	13	0.275	0.035	<10	<10	4/12/01	9:00	1241	9.6	21.2	24.7
	4/13/01	10:00	DF																	
	4/18/01	10:05	DT	24	1240	6.3	8.9	<0.44	0.083	1.4	0.398	0.06	23	11	4/19/01		1100	9	18.3	17.8
	4/19/01	9:05	DF																	
	4/25/01	9:45	DT	24	1420	3.3	8.6	2.8	<0.05	4.7	0.765	0.142	<10	<10	4/26/01		2104	8.5		
	4/26/01	8:45	DF																	
	5/3/01	9:45	DF																	
	5/2/01	10:45	DT	24	1400	3.1	8.7	0.66	<0.05	1.4	0.796	0.258	<10	<10	5/3/01		1055	8.8	18.7	12.5
	5/3/01	9:45																		
	5/24/01	9:06	DT	24	2080	3	8.1	13	0.137	3	1.07	0.273	<10	<10						
	5/25/01	8:06	DF																	
	5/30/01	10:35	DT	24	1330	11	8.5	2.3	0.167	22	0.826	0.097	39	17	5/31/01		1192	9.2	24.3	17.6
	5/31/01	9:35	DF																	
	6/7/01		DT	24	1170	4.2	8.8	<0.44	<0.05	1.6	0.49	0.088	<10	<10						
	6/8/01		DF																	
	6/14/01	10:13	DT	24	1160	6.1	8.5	0.94	<0.05	1.5	1.41	0.262	12	<10						
	6/15/01	9:13																		
	6/20/01	10:35	DT	24	1080	4.3	8.4	<0.44	<0.05	1.9	1.32	0.368	<10	<10						
	6/21/01	9:35	DF																	
	6/28/01		DT	1	914	37	8.7	<0.44	0.066	3	2.54	0.435	110	58						
	6/28/01		DF																	

RMP WATERSHED SITES
Lane Channel

STATION	DATE	TIME	SAMPLES Type	#	EC µmhos	Turb NTU	pH	NO_3 mg/L	NH_3 mg/L	TKN mg/L	PO_4 mg/L	o-PO_4 mg/L	TSS mg/L	VSS mg/L	Field Measurements Date	Time	EC µmhos	pH	TEMP C	DO mg/L
LANF08	7/25/00	13:20	DT	1	4770	6.5	8.5	21	<0.05	1.3	0.734	0.136	<10	<1	7/25/00	13:20	5680	7.3	22.9	10.8
	8/29/00	13:29	DT	24	7560	15	8.1	24	0.181	1.2	1.16	0.227	20	<10	8/29/00	12:45	10680	7.2	23.3	10.5
	8/30/00	12:29																		
	9/7/00	10:19	DT	24	5880	10	8	21	0.241	1.1	1.22	0.174	17	<10	9/8/00	13:00	5300	7.4	24.6	8
	9/8/00	9:19																		
	10/5/00	10:43	DT	24	5360	18	8.4	27	0.187	1.2	1.53	0.276	60	11	10/6/00	10:15	3900	7.4	20.6	3.3
	10/6/00	9:43																		
	10/27/00	2:55	ST	5	3180	65	8	35	0.386	3.6	1.5	0.211	100	22						
	10/27/00	3:55																		
	10/27/00	5:55	ST	8	935	120	7.5	7.4	0.218	2.2	1.65	0.157	190	34						
	10/27/00	19:55	SF																	
	10/27/00	21:55	ST	19	4730	18	7.9	23	0.226	1.7	0.887	0.157	25	<10	10/29/00	9:25	5400	7.81	19.18	7.64
	10/29/00	8:55	SF																	
	10/29/00	11:55	ST	5	8120	22	8.3	33	0.184	2.6	0.765	0.157	25	<10						
	10/29/00	19:55	SF																	
	10/29/00	21:55	ST	10	2910	39	7.8	7.9	0.189	0.99	0.887	0.146	61	11						
	10/30/00	15:55	SF																	
	10/30/00	17:55	ST	6	5460	20	8.1	15	0.218	1.5	0.734	0.111	26	<10						
	10/31/00	3:55	SF																	
	11/7/00	11:03	DT	24	6120	11	8.3	30	<0.05	0.84	0.643	0.103	11	<10						
	11/8/00	10:03																		
	12/21/00	13:42	DT	24	6320	28	8.3	39	0.151	1.1	1.35	0.262	44	11	12/22/00		4890	8	14.9	9
	12/22/00	12:42																		
	1/2/01	10:59	DT	24	5720	0.5	8	31	0.109	1.1	1.19	0.23	22	<10	1/2/01	9:30	3112	6.9	13.1	6.7
	1/3/01	9:59																		
	1/8/01	12:57	ST	5	1790	340	7.1	26	2	9.1	4.9	0.159	700	120						
	1/8/01	13:57	SF																	
	1/8/01	15:57	ST	5	745	120	7	8.4	1.43	3	1.5	0.132	210	48						
	1/8/01	23:57	SF																	
	1/9/01	3:57	ST	19	4710	15	8	29	0.566	2.4	0.887	0.27	18	<10						
	1/10/01	15:57	SF																	
	1/10/01	17:57	ST	23	425	19	7.7	4.7	0.265	1.2	1.13	0.19	140	23						
	1/12/01	13:57	SF																	
	1/17/01	7:30	DT	24	6890	5.7	8.1	44	0.106	0.95	0.398	0.117	12	<10	1/18/01	8:20	2690	7.5	9.3	13.9
	1/18/01	8:30																		
	1/24/01	8:06	ST	5	2160	137	7.6	21	0.778	5.4	1.93	0.128	290	52						
	1/24/01	9:06	SF																	
	1/24/01	11:06	ST	9	2200	26	7.7	8.3	0.583	1.7	0.765	0.147	24	<10						
	1/25/01	3:06	SF																	
	1/25/01	5:06	ST	14	5020	8	8.1	33	0.216	4.6	1.04	0.26	<10	<10						
	1/26/01	7:06	SF																	
	1/26/01	9:06	ST	9	590	66	7.8	5.6	0.425	1.4	0.765	0.1	82	16						
	1/27/01	1:06	SF																	
	2/5/01		DT	24	6120	2.8	9.2	42	0.114	1.2	1.07	0.235	<10	<10	2/6/01	10:16	5720		18.8	26.5
	2/6/01																			
	3/13/01	9:25	DT	24	6170	4.7	8.3	44	<0.05	0.69	0.214	0.068	11	<10	3/13/01		6030	8.2	18.1	215
	3/14/01	8:25																		
	4/18/01	9:36	DT	24	5930	4.6	8.8	35	<0.05	0.79	0.536	0.114	20	<10	4/19/01		5783	9	18.5	16.8
	4/19/01	8:36																		
	5/2/01	9:00	DT	24	5400	4.9	8.3	41	<0.05	0.9	1.07	0.226	<10	<10	5/3/01		5517	8	18.5	3.6
	5/3/01	8:00																		

RMP WATERSHED SITES
Lane Channel

STATION	DATE	TIME	SAMPLES Type	#	EC µmhos	Turb NTU	pH	NO_3 mg/L	NH_3 mg/L	TKN mg/L	PO_4 mg/L	o-PO_4 mg/L	TSS mg/L	VSS mg/L	Field Measurements Date	Time	EC µmhos	pH	TEMP C	DO mg/L
LANF08	5/15/01	10:00	DT	24	4140	7.4	8.4	32	<0.05	1.2	3.98		<10	<10						
	5/16/01	9:00																		
	5/15/01	16:00	SUB	18	3780	8.3	8.4	29	<0.05	1.3	5.2		<10	<10						
	5/16/01	9:00																		
	5/16/01	10:00	DT	24	5190	5.1	8.5	37	<0.05	1	1.74		<10	<10						
	5/17/01	9:00																		
	5/17/01	10:00	DT	24	5370	5.2	8.6	35	0.07	0.92	1.35	0.294	<10	<10						
	5/18/01	9:00																		
	5/18/01	10:00	DT	24	5430	5	8.4	37	<0.05	1.5	1.35		10	<10						
	5/19/01	9:00																		
	5/19/01	10:00	DT	24	5610	6.3	8.4	35	<0.05	1.3	1.32		11	<10						
	5/20/01	9:00																		
	5/20/01	10:00	DT	24	5240	6.4	7.9	34	<0.05	1.1	1.07		15	<10						
	5/21/01	9:00																		
	5/21/01	10:00	DT	24	1740	3.4	7.9	70	0.907	3.3	2.69		<10	<10						
	5/22/01	9:00																		
	5/22/01	10:00	DT	24	5070	3.7	8.4	38	<0.05	0.86	1.16		<10	<10						
	5/23/01	9:00																		
	6/14/01	9:27	DT	24	4650	12	8.4	32	<0.05	0.91	2.42	0.544	17	<10						
	6/15/01	8:27																		

RMP WATERSHED SITES
El Modena Irvine Channel

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC µmhos	Turb NTU	pH	NO_3 mg/L	NH_3 mg/L	TKN mg/L	PO_4 mg/L	o-PO_4 mg/L	TSS mg/L	VSS mg/L	Field Measurements Date	Field Measurements Time	EC µmhos	pH	TEMP C	DO mg/L
MIRF07	7/25/00	12:50	DT	1	1120	9.1	9.6	5.3	0.32	5.6	2.14	0.277	<10	<1			1120	8.8	27.9	22
	8/29/00	15:23	DT	24	1160	16	8.6	11	0.343	2.3	1.38	0.293	19	<10	8/29/00	14:15	1075	8.9	28.4	21.6
	8/30/00	14:23																		
	9/7/00	11:00	DT	24	1360	6.3	8.3	7.9	0.2	1.9	1.16	0.118	24	11	9/8/00	13:00	960	8	28.4	22
	9/8/00	10:00																		
	10/17/00	10:52	DT	24	1290	12	8.4	9.6	<0.05	1.2	1.38	0.262	19	10						
	10/18/00	9:52																		
	11/7/00	11:48	DT	24	1330	4.1	8.3	17	<0.05	2.3	0.643	0.096	<10	<10						
	11/8/00	10:48																		
	12/21/00	11:49	DT	24	1250	6	8.6	15	0.102	1.4	1.16	0.217	20	<10						
	12/22/00	10:49																		
	1/2/01	8:40	DT	24	1190	1.7	8.6	8	<0.05	1.5	0.367	0.077	<10	<10	1/2/01	8:00	646	6.6	9.3	8.2
	1/3/01	7:40																		
	2/5/01		DT	24	1070	4.1	8.6	23	<0.05	0.68	0.49	0.12	<10	<10						
	2/6/01																			
	2/13/01	7:31	ST	16	751	25	8	11	0.064	2.3	1.22	0.286	21	<10						
	2/14/01	13:31	SF																	
	2/14/01	15:31	ST	12	1590	20	8.4	18	<0.05	3.4	0.643	0.143	17	<10	2/13/01		1770	8.5	21	9.7
	2/15/01	17:31	SF																	
	2/20/01	13:47	ST	23	1400	3.1	8.6	9.1	<0.05	1.7	0.612	0.152	<10	<10						
	2/22/01	7:47	SF																	
	2/23/01	7:47	ST	5	292	78	7.2	4.5	0.626	2.9	1.19	0.121	140	41						
	2/23/01	8:47	SF																	
	2/23/01	10:47	ST	3	164	44	7.3	3.1	0.15	1.1	0.918	0.128	56	15						
	2/23/01	14:47	SF																	
	2/24/01	12:47	ST	12	316	15	7.4	5.6	0.11	0.78	0.673		14	<10						
	2/25/01	10:47	SF												2/26/01	13:05	352	8.6	16.3	4.7
	2/25/01	12:47	ST	9	157	44	7.3	2.4	0.082	0.81	1.13		60	<10						
	2/26/01	4:47	SF																	
	2/26/01	6:47	ST	7	598	24	7.9	9.3	0.054	1.1	1.25		15	<10						
	2/26/01	21:47	SF																	
	3/27/01	8:50	DT	24	1490	3.2	8.9	11	<0.05	3	0.428	0.095	14	<10	3/27/01	9:00	1373	9	18.3	24.5
	3/28/01	7:50																		
	4/18/01	9:10	DT	24	1480	2.2	9.1	7.6	<0.05	2.4	0.465	0.09	<10	<10	4/19/01		1741	8.8	16.8	19.2
	4/19/01	8:10																		
	5/15/01	10:00	DT	24	1320	3.1	9.3	9.3	0.358	3.7	1.01		<10	<10						
	5/16/01	9:00																		
	5/16/01	10:00	DT	24	1250	4.1	9	12	<0.05	5.4	1.19		12	<10						
	5/17/01	9:00																		
	5/17/01	10:00	DT	24	1170	2.5	9	13	<0.05	3	0.673		10	<10						
	5/18/01	9:00																		
	5/18/01	10:00	DT	24	1120	3.9	8.8	8.1	<0.05	5.2	0.826		<10	<10						
	5/19/01	9:00																		
	5/19/01	10:00	DT	24	1300	3	8.9	4.7	<0.05	2.8	0.796		10	<10						
	5/20/01	9:00																		
	5/20/01	10:00	DT	24	1220	3.6	9	2.5	<0.05	2.3	0.704		10	<10						
	5/21/01	9:00																		
	5/21/01	10:00	DT	24	1220	2.8	9	3.4	<0.05	1.9	0.826		<10	<10						
	5/22/01	9:00																		
	6/14/01	8:47	DT	24	1430	26	8.7	5.1	0.213	3.4	1.13	0.111	40	14						
	6/15/01	7:47																		

RMP WATERSHED SITES
Santa Ana Delhi Channel

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC µmhos	Turb NTU	pH	NO_3 mg/L	NH_3 mg/L	TKN mg/L	PO_4 mg/L	o-PO_4 mg/L	TSS mg/L	VSS mg/L	Field Measurements Date	Field Measurements Time	EC µmhos	pH	TEMP C	DO mg/L
SADF01	7/19/00	12:00	DT	1	785	9.9	8.8	2.3	<0.05	0.31	0.269	0.044	18	8	7/19/00	12:00	1110	7.9	26.9	12.4
	8/4/00	13:05	DT	1	1830	8.4	8.8	8.7	<0.05	0.77	0.459	0.015	19	8	8/4/00	13:05	1170	8.6	30.1	
	8/16/00	15:14	DT	24	2150	10	8	8.8	0.182	1.1	0.459	0.019	27	<10	8/17/00	14:20	1210	8.6	32	
	8/17/00	14:14																		
	8/29/00	11:09	DT	24	1780	6.5	8.2	10	0.059	0.64	0.428	0.028	<10	<10	8/29/00	11:30	1780	7.8	24.3	19.5
	8/30/00	10:09																		
	9/12/00	9:22	DT	24	2140	18	8.1	10	<0.05	0.98	0.275	<0.01	31	<10	9/13/00	8:07	2000	7.9	21.1	6.1
	9/13/00	8:22																		
	9/26/00	13:57	DT	24	2010	2.9	8.4	8.8	<0.05	1.1	0.49	0.046	<10	<10	9/27/00	11:00	1340	8.1	29.9	
	9/27/00	12:57																		
	10/5/00	10:06	DT	24	2340	6.1	8.3	14	<0.05	0.96	0.337	0.026	23	<10	10/6/00	9:15	1700	8	20.4	5.2
	10/6/00	9:06																		
	10/27/00	2:57	ST	5	575	190	7.4	8.9	0.66	6.4	2.97	0.185	470	110						
	10/27/00	3:57	SF																	
	10/27/00	5:57	ST	20	1050	33	7.9	13	0.161	1.6	1.19	0.181	54	13						
	10/28/00	19:57	SF																	
	10/28/00	21:57	ST	5	2040	2.4	8.1	17	<0.05	1	0.337	0.08	<10	<10	10/29/00	9:00	2180	9	18.7	9.1
	10/29/00	5:57	SF																	
	10/29/00	9:57	ST	5	2250	3.6	8.3	16	<0.05	0.7	0.266		<10	<10						
	10/29/00	17:57	SF																	
	10/29/00	19:57	ST	7	520	60	7.5	6.2	0.15	1.3	1.22	0.12	72	24						
	10/30/00	7:57	SF																	
	10/30/00	9:57	ST	12	1480	5.6	8	14	<0.05	0.54	0.367	0.123	<10	<10						
	10/31/00	7:57	SF																	
	11/30/00	10:13	DT	24	2360	2.7	8.1	18	<0.05	0.5	0.184	0.026	<10	<10	12/1/00	9:30	1446	7.8	15.2	9.4
	12/1/00	9:13																		
	12/14/00	11:00	DT	24	2290	4	8.5	24	<0.05	1	0.367	<0.01	32	10	12/15/00	10:00	1540	7.9	14.7	9
	12/15/00	10:00																		
	12/26/00	9:15	DT	24	1810	8	8.3	21	<0.05	0.85	0.428	0.061	20	<10						
	12/27/00	8:15																		
	1/8/01	13:25	ST	5	940	160	7	25	3.67	8.8	2.11	0.21	210	68						
	1/8/01	14:25	SF																	
	1/8/01	16:25	ST	5	400	170	7	9.7	1.29	4.4	2.82	0.198	280	72						
	1/9/01	0:25																		
	1/9/01	2:25	ST	18	1650	18	7.9	23	0.363	1.3	0.765	0.14	15	<10						
	1/10/01	14:25	SF																	
	1/10/01	16:25	ST	23	325	75	7.5	5.9	0.254	1.6	1.1	0.24	110	25						
	1/12/01	12:25	SF																	
	1/17/01	9:50	DT	24	2820	2.3	8.1	30	0.109	0.92	0.214	0.069	<10	<10	1/18/01	8:45	1000	7.7	9.8	10.2
	1/18/01	8:50																		
	1/24/01	8:42	ST	5				16	1.19	3.8	1.16									
	1/24/01	9:42																		
	1/24/01	11:42	ST	9	580	38	7.5	7.3	0.54	2.4	0.887	0.126	70	16						
	1/25/01	3:42	SF																	
	1/25/01	5:42	ST	14	1830	7.9	8.1	17	0.13	0.61	0.245	0.059	<10	<10						
	1/26/01	7:42	SF																	
	1/26/01	9:42	ST	25	925	61	8.1	13	0.35	1.6	0.673	0.103	81	20						
	1/28/01	9:42	SF																	
	2/1/01	10:10	DT	24	3010	1.6	8.2	25	<0.05	0.85	0.184	0.037	<10	<10	2/1/01		1851		11.7	8.9
	2/2/01	9:10																		

RMP WATERSHED SITES
Santa Ana Delhi Channel

STATION	DATE	TIME	SAMPLES Type	#	EC µmhos	Turb NTU	pH	NO_3 mg/L	NH_3 mg/L	TKN mg/L	PO_4 mg/L	o-PO_4 mg/L	TSS mg/L	VSS mg/L	Field Measurements Date	Time	EC µmhos	pH	TEMP C	DO mg/L
SADF01	2/14/01		ST	24	2180	24	8.1	23	<0.05	0.98	0.428	0.076	10	<10						
	2/15/01																			
	2/22/01	10:10	DT	24	2530	1.7	8.2	21	<0.05	0.56	<0.061	0.032	<10	<10	2/22/01	10:10	2348	7.7	14.8	11.5
	2/23/01	9:10																		
	3/6/01	1:54	ST	5	999	29	7.4	11	0.263	1.2	0.398		31	10						
	3/6/01	2:54	SF																	
	3/6/01	4:54	ST	8	749	25	7.3	8.1	<0.05	1.3	0.49	0.057	29	<10						
	3/6/01	18:54	SF																	
	3/6/01	20:54	ST	12	1980	4	8.2	17	<0.05	0.94	0.0918	0.025	<10	<10						
	3/7/01	19:54	SF																	
	3/7/01	21:00	ST	28	2540	3.6	8.2	21	<0.05	0.94	0.214	0.019	<10	<10						
	3/10/01	3:00	SF																	
	3/20/01	9:20	DT	24	1880	2.1	8.1	12	<0.05	<0.2	0.0612	0.01	<10	<10	3/20/01		2629	7.9	19.3	14.9
	3/21/01	8:20																		
	4/3/01		DT	24	2740	5.3	8.1	18	<0.05	1.5	0.0704	<0.01	41	11						
	4/4/01																			
	4/12/01	10:45	DT	24	2760	1.6	8.1	18	<0.05	0.83	0.214	0.038	<10	<10	4/12/01	9:00	2566	8.1	17.4	18.5
	4/13/01	9:45																		
	5/2/01	9:45	DT	24	2210	6	8.3	13	<0.05	0.83	0.165	0.017	14	<10	5/3/01		2393	7.9	18	10.4
	5/3/01	8:45																		
	5/30/01	10:12	DT	24	2370	6.4	8.2	11	0.06	1.9	0.367	0.032	17	<10	5/31/01		2970	8.1	22.9	12.2
	5/31/01	9:12																		
	6/7/01	10:00	DT		2460	3.2	8.2	11	<0.05	0.51	0.214	<0.01	<10	<10						
	6/8/01	9:00																		
	6/14/01	9:58	DT	24	2640	2.1	8.2	12	<0.05	0.64	0.245	0.03	<10	<10						
	6/15/01	8:58																		

RMP WATERSHED SITES
San Diego Creek at Campus Drive

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC µmhos	Turb NTU	pH	NO_3 mg/L	NH_3 mg/L	TKN mg/L	PO_4 mg/L	o-PO_4 mg/L	TSS mg/L	VSS mg/L	Field Measurements Date	Field Measurements Time	EC µmhos	pH	TEMP C	DO mg/L
SDMF05	7/7/00	12:00	DT	1	3190	60	8.6	12	0.086	2.7	0.612	<0.01	79	27						
	7/7/00	12:00	DF																	
	7/13/00	9:30	DT	1	2900	55	8.5	15	<0.05	1.7	0.468	0.018	110	48						
	7/13/00	9:30	DF																	
	7/19/00	12:15	DT	1	4250	45	8.6	13	<0.05	1.8	0.389	<0.01	81	30						
	7/19/00	12:15	DF																	
	7/25/00	14:10	DT	1	2490	50	8.7	10	<0.05	2.7	0.487	<0.01	73	26						
	8/4/00	12:50	DT	1	2880	20	8.7	62	<0.05	0.36	0.153	<0.01	42	14			2010	8.4	27.7	
	8/9/00	11:15	DT	24	2500	50	8.4	62	<0.05	1.4	1.1	0.017	120	19	8/10/00	14:00	2800	8.1	29.1	9.2
	8/10/00	10:15																		
	8/17/00	14:00	DT	1	3020	28	8.2	29	0.056	1	6.12	0.086	50	<10	8/17/00	14:00	2100	8.3	28.9	
	8/24/00	12:04	DT	24	2940	140	8.3	19	<0.05	3.1	1.5	0.27	<10	<10	8/24/00	11:30	2870	8.9	28.6	
	8/25/00	11:04																		
	8/29/00	11:37	DT	24	2300	89	8.3	21	0.191	1.5	0.857	0.033	133	17	8/29/00	11:55	2810	7.8	24.3	10.7
	8/30/00	10:37																		
	9/5/00	13:13	DT	24	2860	78	8.4	29	0.095	1.3	0.887	0.091	280	19						
	9/6/00	12:13																		
	9/12/00	10:00	DT	24	3060	120	8.4	27	0.355	0.97	0.887	0.022	210	21	9/13/00	8:20	2920	8	21.7	6.5
	9/13/00	9:00																		
	9/19/00	7:19	DT	24	2840	121	8.4	27	0.086	1.36	1.1	0.024	190	22	9/20/00	8:45	2680	7.9	22.3	5.1
	9/20/00	6:19																		
	9/26/00	10:06	DT	24	3060	34	8.4	23	0.107	1.4	<0.061	0.072	129	19						
	9/27/00	9:06																		
	10/5/00	10:00	DT	24	2680	24	8.7	38	0.628	1.5	0.734	0.096	93	15	10/6/00	10:00	2100	7.9	21.5	3.5
	10/6/00	9:00																		
	10/10/00	13:50	ST	5	2350	26	8.2	44	0.213	2	1.1	0.128	140	18						
	10/10/00	14:50	SF																	
	10/10/00	16:50	ST	22	2270	70	8	36	0.395	3.1	1.68	0.125	140	20						
	10/12/00	12:43	SF																	
	10/12/00	14:43	ST	29	2470	57	8.2	33	0.188	2.1	0.826	0.085	90	13						
	10/14/00	16:43	SF																	
	10/17/00	9:02	DT	24	2970	66	8.3	39	0.195	1.5	0.551	0.06	110	19						
	10/18/00	8:02																		
	10/26/00	18:31	ST	5	2760	32	8.5	40	0.075	1.3	0.459	0.039	37	<10						
	10/26/00	19:31	SF																	
	10/26/00	21:31	ST	21	1250	240	7.9	29	0.236	3	2.69	0.325	370	54	10/29/00	9:30	1490	7.5	17.4	7.6
	10/28/00	13:31	SF																	
	10/29/00	11:31	ST	6	1560	58	7.9	33	0.377	2	1.59	0.384	57	<10						
	10/29/00	21:31	SF																	
	10/29/00	23:31	ST	9	500	604	7.7	11	0.152	2.1	3.06	0.276	650	64						
	10/30/00	15:31	SF																	
	10/30/00	17:31	ST	3	725	169	7.7	18	0.202	1.5	2.02	0.36	120	20						
	10/30/00	21:31	SF																	
	11/7/00	9:52	DT	24	3010	57	8.3	48	<0.05	1.2	0.673	0.061	64	12						
	11/8/00	8:52																		
	11/16/00	10:30	DT	1	2770	28	8.2	53	<0.05	0.74	0.52	0.192	33	<10						
	11/30/00	8:50	DT	24	3040	29	8.4	53	<0.05	1.3	<0.061	0.043	38	10	12/1/00	9:00	1660	7.6	15.5	11.4
	12/1/00	7:50																		
	12/8/00	11:30	DT	1	2810	18	8.2	4.2	<0.05	1.7	0.581	0.334	24	<10	12/8/00	11:30	1500	7.5	16.9	12.9
	12/14/00	10:19	DT	24	2810	21	8.6	53	<0.05	0.9	0.643	0.093	36	12	12/15/00	10:40	1730	7.5	13.9	9.6
	12/15/00	9:19																		

RMP WATERSHED SITES
San Diego Creek at Campus Drive

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC µmhos	Turb NTU	pH	NO_3 mg/L	NH_3 mg/L	TKN mg/L	PO_4 mg/L	o-PO_4 mg/L	TSS mg/L	VSS mg/L	Field Measurements Date	Field Measurements Time	EC µmhos	pH	TEMP C	DO mg/L
SDMF05	12/21/00	11:48	DT	24	3180	25	8.6	48	<0.05	1.2	0.49	0.039	42	13	12/22/00		1510	7.8	15.9	10.9
	12/22/00	10:48																		
	12/26/00	10:01	DT	24	2030	21	8.5	48	<0.05	1.6	0.887	0.304	37	11						
	12/27/00	9:01																		
	1/2/01	9:32	DT	24	2950	33	8.7	44	<0.05	1.7	0.796	0.087	57	16	1/2/01	10:00	1490	7.1	12.1	8.9
	1/3/01	8:32																		
	1/8/01	14:44	ST	5	0	0		39	0.053	1.8	1.07									
	1/8/01	15:44																		
	1/8/01	17:44	ST		790	196	7.4	22	1.12	3.6	3	0.254	250	40						
	1/9/01	5:44																		
	1/10/01	13:44	ST	2	1240	80	7.7	37	0.661	2.7	1.74	0.41	61	12						
	1/10/01	15:44																		
	1/10/01	17:44	ST	22	465	140	7.7	14	0.293	3.2	3.98	0.4	900	88						
	1/12/01	11:44	SF																	
	1/17/01	9:38	DT	24	1250	26	8.4	3.4	0.083	2.4	0.826	0.214	10	<10	1/18/01	9:30	1370	7.7	9.9	10.1
	1/18/01	8:38																		
	1/24/01	9:12	ST	5	2980	21	8.4	53	<0.05	1.4	0.52	0.025	29	<10						
	1/24/01	10:12	SF																	
	1/24/01	12:12	ST	11	700	153	7.7	22	0.57	2.6	1.5	0.282	160	19						
	1/25/01	8:12	SF																	
	1/25/01	10:12	ST	13	1080	58	7.9	25	0.386	1.3	1.32	0.242	36	<10						
	1/26/01	10:12	SF																	
	1/26/01	12:12	ST	14	790	122	7.8	23	0.466	2.7	1.74	0.32	140	19						
	1/28/01	8:30	SF																	
	2/1/01	9:55	DT	24	2880	26	8	48	<0.05	0.27	0.887	0.115	32	<10	2/1/01	9:55	1632		11.1	6.5
	2/2/01	8:55																		
	2/5/01	9:36	DT	24	2920	22	8.4	48	0.053	0.86	0.184	<0.01	45	13	2/6/01	9:36	2840		15.9	13.2
	2/6/01	7:36																		
	2/14/01		ST	24	4710	8.4	7.6	210	0.051	0.64	0.337	0.077	11	<10	2/15/01		1787	7.8	12.9	10.6
	2/15/01																			
	2/22/01	9:52	DT	24	1520	24	8.2	31	<0.05	0.71	0.796	0.161	22	<10	2/22/01	9:52	1921	8.4	15.8	13.5
	2/23/01	8:52																		
	3/6/01	4:23	ST	1																
	3/6/01	4:23	SF																	
	3/7/01	0:23	ST	2	827	140	7.7	18	0.129	0.78	1.65	0.064	120	17						
	3/7/01	2:23																		
	3/7/01	9:50	ST	14	1760	25	8.3	33	0.064	1.4	0.918	0.172	36	<10						
	3/8/01	11:50	SF																	
	3/8/01	13:50	ST	20	2290	29	8.4	37	<0.05	1.6	<0.061	0.027	44	<10						
	3/10/01	3:50	SF																	
	3/15/01	9:00	DT	1	2850	23	8.4	44	<0.05	1.1	0.367	0.013	38	<10	3/15/01	9:00	2272	8.2	17.8	12.7
	3/20/01	9:15	DT	24	2560	17	8.4	44	<0.05	1.9	0.337	<0.01	62	13	3/20/01	10:30	160	8.3	20.1	12.8
	3/21/01	8:16																		
	3/27/01	10:03	DT	24	2890	21	8.4	53	<0.05	2.1	0.153	<0.01	65	12	3/27/01	9:00	2941	8.6	19.4	15.7
	3/28/01	9:03																		
	4/3/01		DT	24	2790	38	8.4	38	0.121	2.3	0.398	<0.01	100	19						
	4/4/01																			
	4/12/01	10:00	DT	24	2360	24	8.1	28	<0.05	1.7	0.643	0.012	34	12	4/12/01	9:00	2757	8.2	17.2	10.4
	4/13/01	9:00																		
	4/18/01	10:36	DT	24	2620	34	8.8	28	0.088	2.3	0.361	<0.01	66	19	4/19/01		2546	8.4	20	11.3
	4/19/01	9:36																		

RMP WATERSHED SITES
San Diego Creek at Campus Drive

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC µmhos	Turb NTU	pH	NO_3 mg/L	NH_3 mg/L	TKN mg/L	PO_4 mg/L	o-PO_4 mg/L	TSS mg/L	VSS mg/L	Field Measurements Date	Field Measurements Time	EC µmhos	pH	TEMP C	DO mg/L
SDMF05	4/25/01	9:20	DT	24	2480	52	8.3	21	<0.05	2.9	0.459	<0.01	110	25	4/26/01		2834	8.4	21.9	13.5
	4/26/01	8:20																		
	5/2/01	9:20	DT	24	2610	62	8.7	31	<0.05	2.2	0.581	<0.01	94	21	5/3/01		2431	8.3	21.1	10.8
	5/3/01	8:20																		
	5/15/01	10:00	DT	8	2770	63	8.3	37	0.243	2.1	0.796	0.099	75	11						
	5/15/01	17:00																		
	5/16/01	10:00	DT	24	2740	76	8.5	31	<0.05	3.4	0.673	0.016	150	33						
	5/17/01	9:00																		
	5/17/01	10:00	DT	24	2750	78	8.7	30	<0.05	2.8	0.643	0.011	120	26						
	5/18/01	9:00																		
	5/18/01	10:00	DT	24	2780	112	8.5	27	<0.05	3.6	0.673	0.01	150	28						
	5/19/01	9:00																		
	5/19/01	10:00	DT	24	2870	112	8.4	36	<0.05	3.3	0.826	0.012	140	30						
	5/20/01	9:00																		
	5/20/01	10:00	DT	24	2610	95	8.4	37	<0.05	3.3	1.04	0.014	130	28						
	5/21/01	9:00																		
	5/20/01	10:00	DUP	24	2760	97	8.4	35	<0.05	3	0.734	0.015	130	28						
	5/21/01	9:00																		
	5/21/01	10:00	DT	24	2740	94	8.2	35	<0.05	2	0.765	0.024	115	19						
	5/22/01	9:00																		
	5/21/01	10:00	DUP	24	2490	88	8.2	34	<0.05	2.6	0.765	0.024	120	22						
	5/22/01	9:00																		
	5/22/01	10:00	DT	24	2740	73	8.3	38	<0.05	1.8	0.704	0.041	92	20						
	5/23/01	9:00																		
	5/30/01	10:00	DT	24	2600	70	8.6	37	<0.05	3.2	1.1	0.098	110	22	5/31/01		3116	8.2	22.7	9.2
	5/31/01	9:00																		
	6/7/01	9:30	DT		2620	66	8.5	33	<0.05	2.6	0.428	0.223	100	17						
	6/8/01	8:30																		
	6/14/01	9:43	DT	24	2520	93	8.5	24	<0.05	2	0.673	<0.01	120	25						
	6/15/01	8:43																		
	6/20/01	9:35	DT	24	2630	48	8.5	32	<0.05	1.1	0.612	0.01	61	10						
	6/21/01	8:35																		
	6/28/01		DT	1	2580	122	8.4	24	<0.05	1.7	0.826	0.138	140	20						

RMP WATERSHED SITES
San Diego Creek at Harvard

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC µmhos	Turb NTU	pH	NO_3 mg/L	NH_3 mg/L	TKN mg/L	PO_4 mg/L	o-PO_4 mg/L	TSS mg/L	VSS mg/L	Field Measurements Date	Field Measurements Time	EC µmhos	pH	TEMP C	DO mg/L
WYLSED	7/19/00	10:15	DT	1	2250	2.6	8.3	62	<0.05	0.84	0.0765	0.097	<10	<1	7/19/00	10:15	2100	8.2	26.2	9
	8/4/00	12:35	DT	1	2200	3.7	8.5	25	<0.05	1.1	0.367	0.028	10	<5	8/4/00	12:35	2010	8.4	29.4	
	8/16/00	14:58	DT	24	2140	9.1	8	53	<0.05	1.1	0.11	<0.01	24	<10	8/17/00	13:15	2200	8.5	31.6	
	8/17/00	15:58																		
	8/29/00	14:50	DT	24	1730	2	8.2	70	<0.05	0.53	0.223	0.03	<10	<10	8/29/00	13:50	2030	7.8	26.3	18.8
	8/30/00	13:50																		
	9/12/00	10:49	DT	24	2180	2.3	8.1	10	<0.05	0.93	<0.061	<0.01	<10	<10	9/13/00	9:05	2130	7.9	21.6	9.7
	9/13/00	9:49																		
	9/26/00	13:42	DT	24	2310	0.3	8.3	66	<0.05	0.88	0.337	0.077	<10	<10	9/27/00	11:55	1990	8.9	26.7	
	9/27/00	12:42																		
	10/5/00	11:32	DT	24	2000	3.5	8.3	57	<0.05	0.83	0.49	0.043	21	<10	10/6/00	11:00	1540	7.4	20.3	5.9
	10/6/00	10:32																		
	10/27/00	12:17	ST	5	1680	140	8.3	48	0.321	4.6	1.96	0.18	520	90						
	10/27/00	13:17																		
	10/26/00	15:17	ST	10	870	140	7.7	21	0.253	3.3	1.59	0.158	230	42						
	10/27/00	7:17	SF																	
	10/27/00	23:17	ST	17	1470	45	8	33	<0.05	1.6	1.13	0.203	51	12	10/29/00	9:10	1550	7.9	18.4	11.9
	10/29/00	8:17	SF																	
	10/29/00	10:17	ST	3	3110	6.2	8.2	43	<0.05	1.4	0.551		<10	<10						
	10/29/00	14:17	SF																	
	10/29/00	16:17	ST	11	1500	376	7.8	23	<0.05	2.1	2.72	0.267	600	64						
	10/30/00	12:17	SF																	
	10/30/00	14:17	ST	10	1970	53	7.8	31	0.101	1.4	1.04	0.243	52	<10						
	10/31/00	8:17	SF																	
	11/7/00	10:06	DT	24	2150	1.5	8.2	79	<0.05	0.64	0.306	0.041	<10	<10						
	11/8/00	9:06																		
	12/1/00	8:30	DT	1	2190	2	8	79	0.052	0.56	<0.061	0.025	<10	<10	12/1/00	8:30	1241	7.5	14.2	11.3
	12/14/00	9:42	DT	24	2070	4	8.5	84	<0.05	0.66	0.275	0.208	27	<10	12/15/00	9:45	1300	7.5	13.9	11
	12/15/00	8:42																		
	12/26/00	9:49	DT	24	1570	34	8.6	75	<0.05	4	1.71		150	28						
	12/27/00	8:49																		
	1/8/01	14:27	ST	5	935	160	7.2	30	1.33	7.9	3.67	0.19	360	68						
	1/8/01	15:27	SF																	
	1/8/01	17:27	ST		645	766	7.3	30	0.257	4.2	5.51	0.263	1150	150						
	1/9/01	1:27	SF																	
	1/9/01	9:27	ST	17	1610	40	8	53	0.46	1.5	1.25	0.53	42	<10						
	1/10/01	17:27	SF																	
	1/10/01	19:27	ST	23	455	390	7.8	17	0.317	2	3.37	0.4	750	80						
	1/12/01	13:27	SF																	
	1/17/01	8:42	DT	24	2030	6.4	8.1	62	<0.05	1.1	0.734	0.208	<10	<10	1/18/01	9:00	837	7.7	7.8	13.5
	1/18/01	7:42																		
	1/24/01	8:18	ST	5	1420	17	8	48	0.419	2.2	0.52	0.111	24	<10						
	1/24/01	9:18	SF																	
	1/24/01	11:18	ST	11	760	300	7.7	33	0.73	3.4	2.2	0.217	320	40						
	1/25/01	7:18	SF																	
	1/25/01	21:18	ST	13	1400	20	7.7	48	0.157	0.72	0.857	0.232	18	<10						
	1/26/01	9:18	SF																	
	1/26/01	11:18	ST	24	805	196	8	34	0.499	2.1	2.2	0.341	290	38						
	1/28/01	9:18	SF																	
	2/1/01	9:39	DT	24	2070	3.4	8.2	75	<0.05	<0.2	0.612	0.171	<10	<10	2/1/01		1329		10	5
	2/2/01	8:39																		

RMP WATERSHED SITES
San Diego Creek at Harvard

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC µmhos	Turb NTU	pH	NO_3 mg/L	NH_3 mg/L	TKN mg/L	PO_4 mg/L	o-PO_4 mg/L	TSS mg/L	VSS mg/L	Field Measurements Date	Field Measurements Time	EC µmhos	pH	TEMP C	DO mg/L
WYLSED	2/14/01		ST	24	1070	61	7.9	26	0.13	2.4	2.23	0.519	58	<10	2/15/01		1320	7.8	11.9	13.1
	2/15/01																			
	2/22/01	8:50	DT	24	1490	3	8.2	48	<0.05	0.63	0.673	0.195	<10	<10	2/22/01	8:50	1702	8.3	13.9	13.3
	2/23/01	7:50																		
	3/6/01	3:02	ST	5	924	55	7.6	29	<0.05	1	0.704	0.132	87	16						
	3/6/01	4:02	SF																	
	3/6/01	6:02	ST	13	656	190	7.4	18	0.076	1.5	2.2	0.304	290	40						
	3/7/01	6:02	SF																	
	3/20/01	9:02	DT	1	1670	6.3	8.2	48	<0.05	0.93	0.0918	<0.01	69	13	3/20/01	9:02	1839	8.1	19.4	16.3
	4/3/01		DT	24	2020	1.2	8.2	75	<0.05	1.1	0.337	0.078	<10	<10						
	4/4/01																			
	4/25/01	8:50	DT	24	1830	1.3	8	62	<0.05	0.64	0.0918	0.019	<10	<10	4/26/01		2141	8.1	19	14.8
	4/26/01	7:50																		
	5/16/01	10:00	DT	24	1920	3.4	8.3	70	<0.05	1.2	0.245	0.055	10	<10						
	5/17/01	9:00																		
	5/17/01	10:00	DT	5				70	<0.05	1.3	0.153									
	5/18/01	14:00																		
	5/18/01	10:00	DT	24	2010	1.9	8.2	79	<0.05	1.2	0.337	0.05	10	<10						
	5/19/01	9:00																		
	5/19/01	10:00	DT	24	1920	1.9	8.2	79	<0.05	1.1	0.337	0.056	<10	<10						
	5/20/01	9:00																		
	5/19/01	10:00	DUP	24	1970	3.4	8.2	79	<0.05	0.96	0.275	0.061	13	<10						
	5/20/01	9:00																		
	5/21/01	9:45	DT	1				79	<0.05	1.7	0.306									
	5/21/01	10:00	DT	24	1950	8.3	7.9	79	<0.05	1.6	0.337		67	23						
	5/22/01	9:00																		
	5/22/01	10:00	DT	24	1980	1.7	8	79	<0.05	0.6	0.306	0.058	<10	<10						
	5/23/01	9:00																		
	5/30/01	9:35	DT	24	1960	3	8.4	70	0.13	1.6	0.428	0.129	<10	<10	5/31/01		2391	8.1	22.4	12.3
	5/31/01	8:35																		
	6/7/01	9:05	DT		1960	1.8	8.2	79	<0.05	0.71	0.184	0.032	<10	<10						
	6/8/01	8:05																		
	6/14/01	9:11	DT	24	1950	1.5	8.2	66	<0.05	0.62	0.0949	<0.01	<10	<10						
	6/15/01	8:11																		

Appendix C
Storm Hydrographs

Stormwater Sampling in El Modena-Irvine Channel

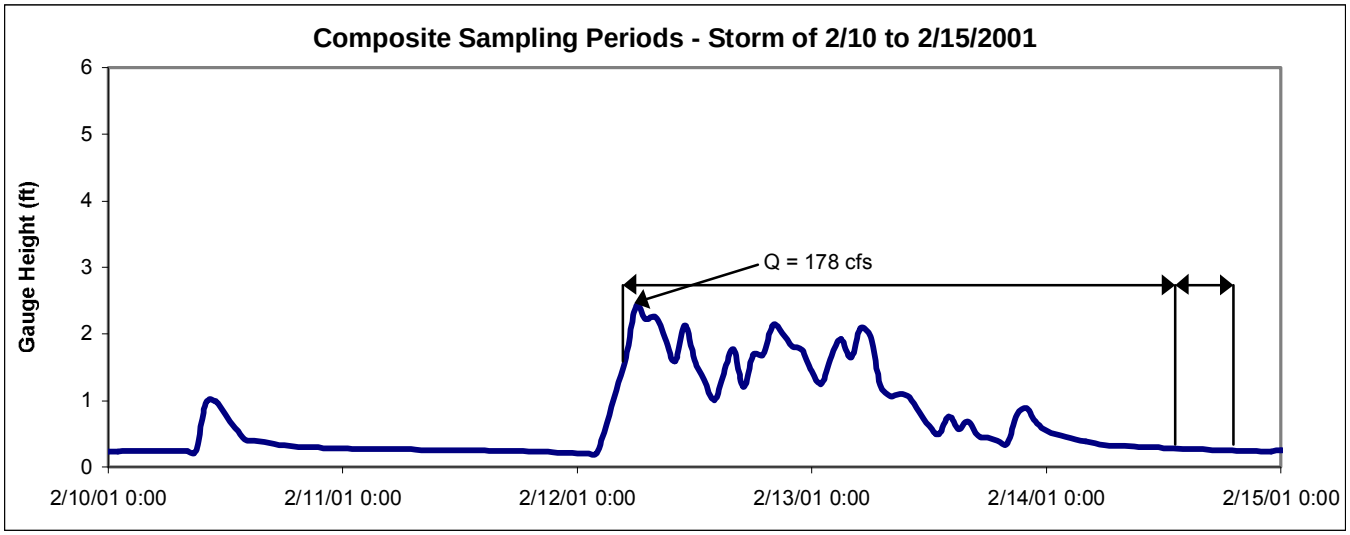

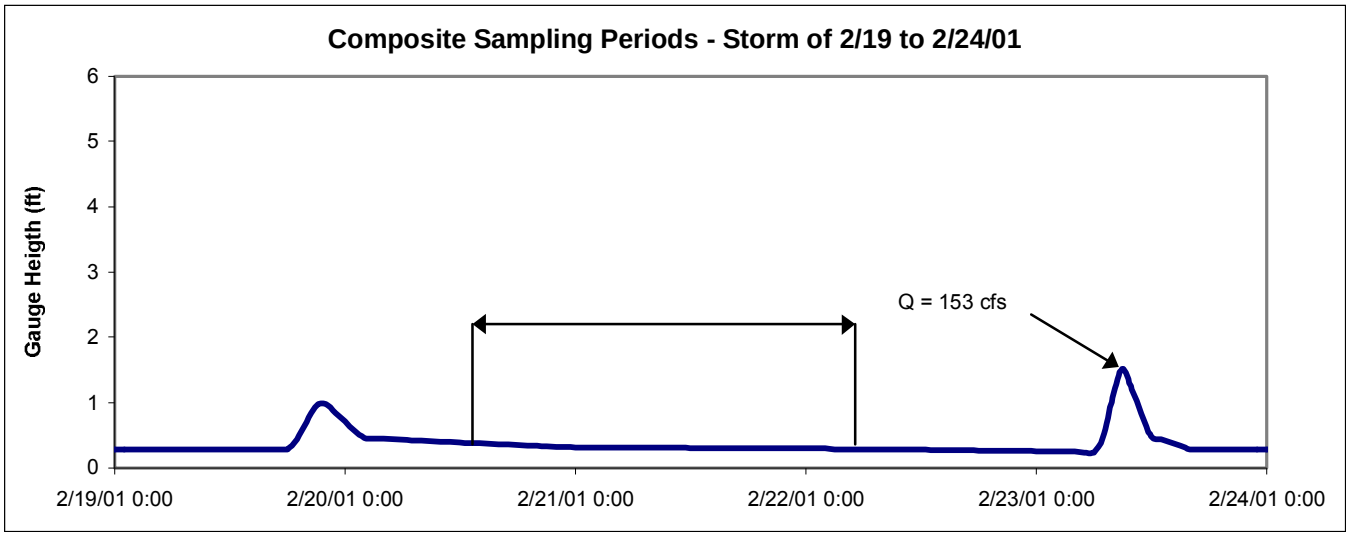

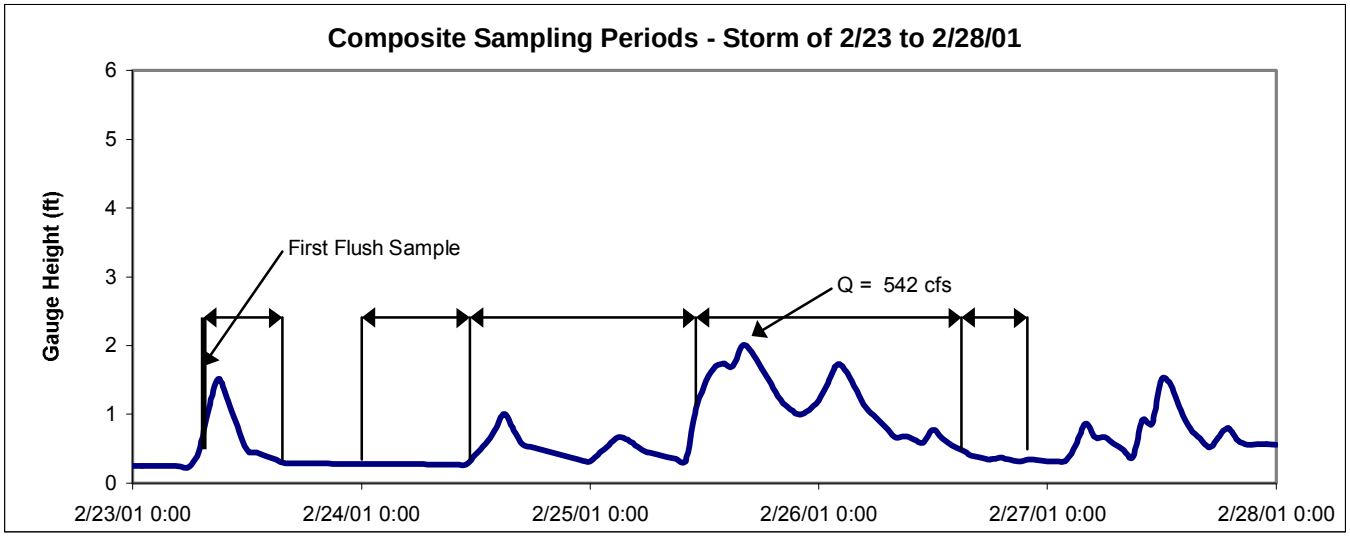

Stormwater Sampling in Santa Ana Delhi Channel

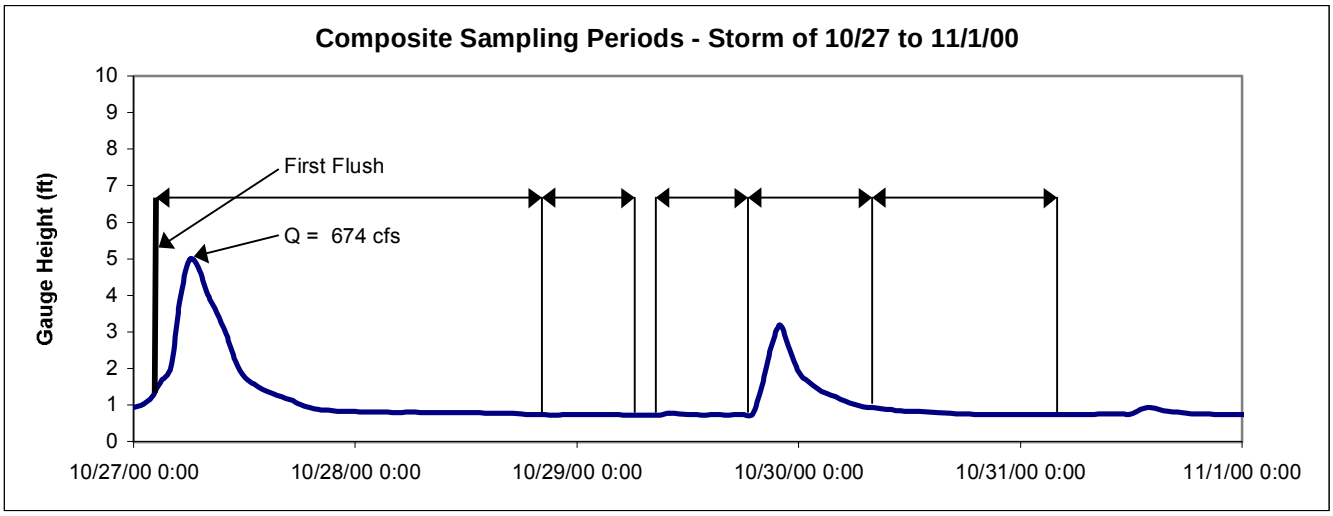

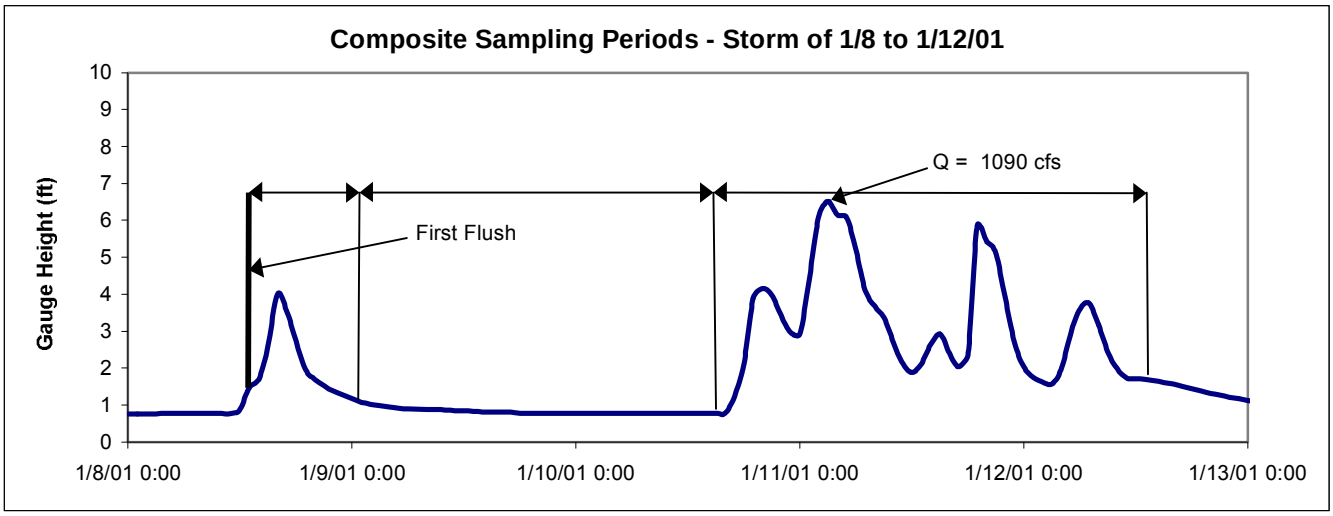

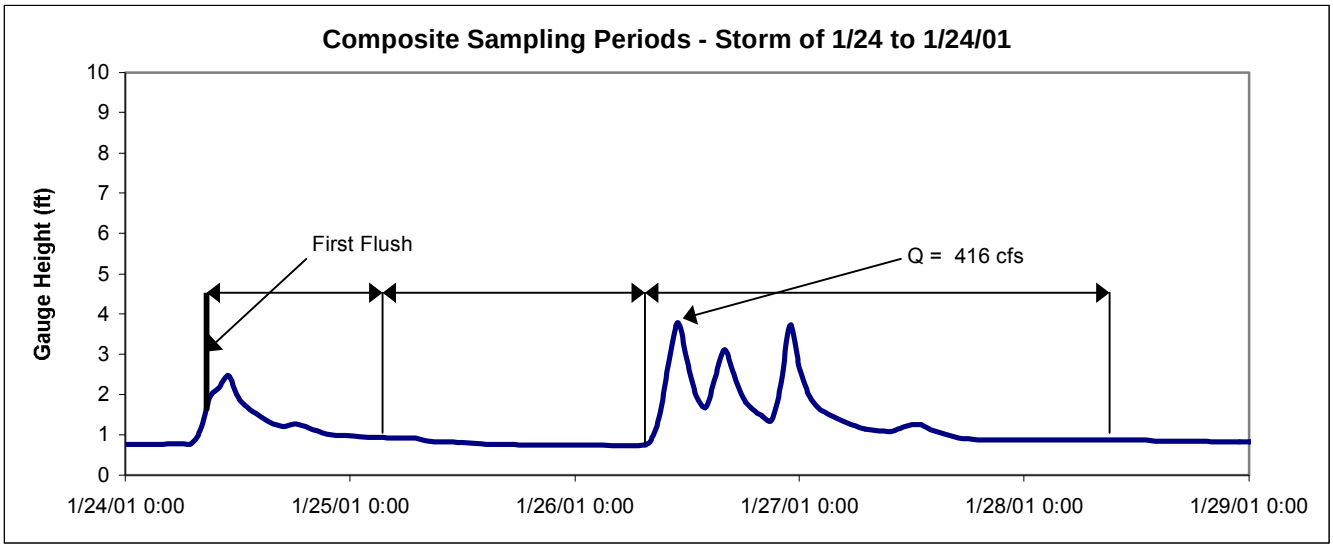

Stormwater Sampling in Santa Ana Delhi Channel

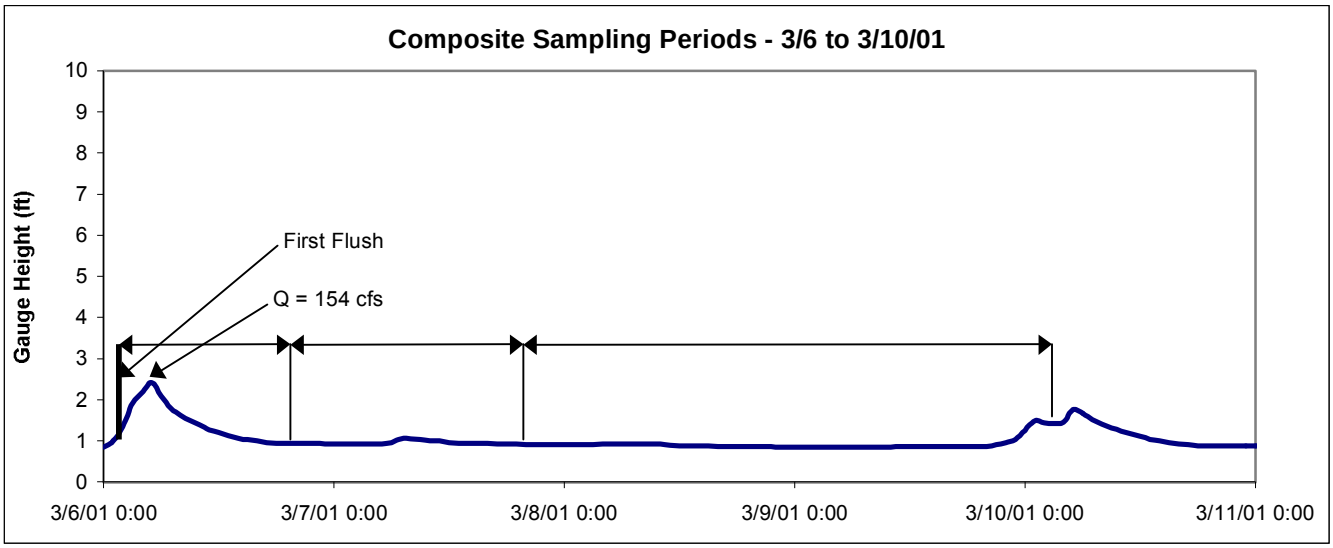

Stormwater Sampling in San Diego Creek @ Campus Drive

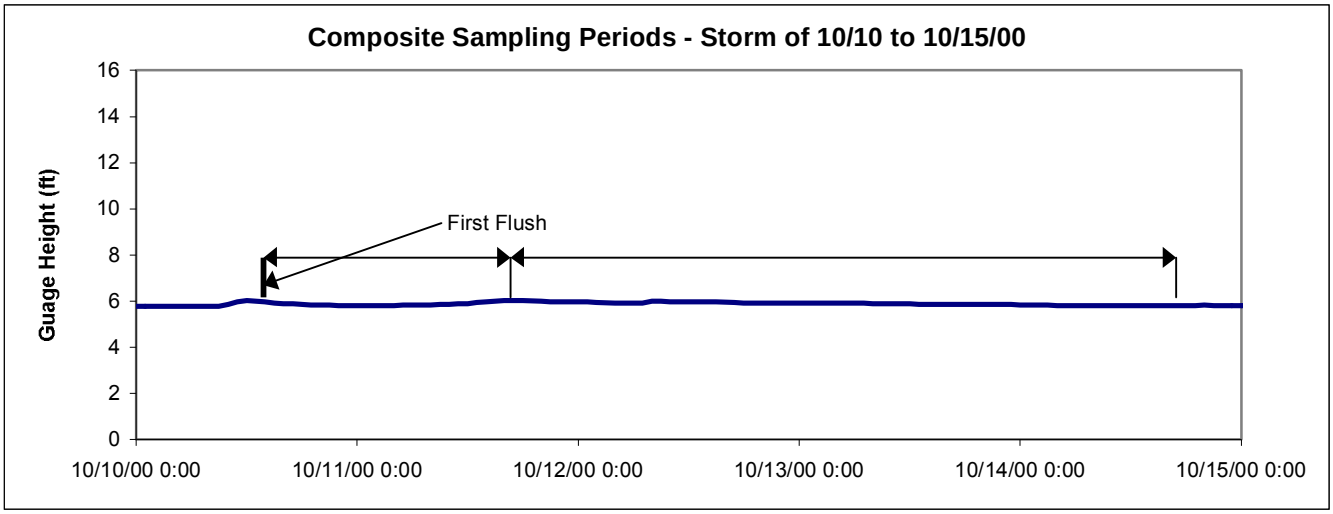

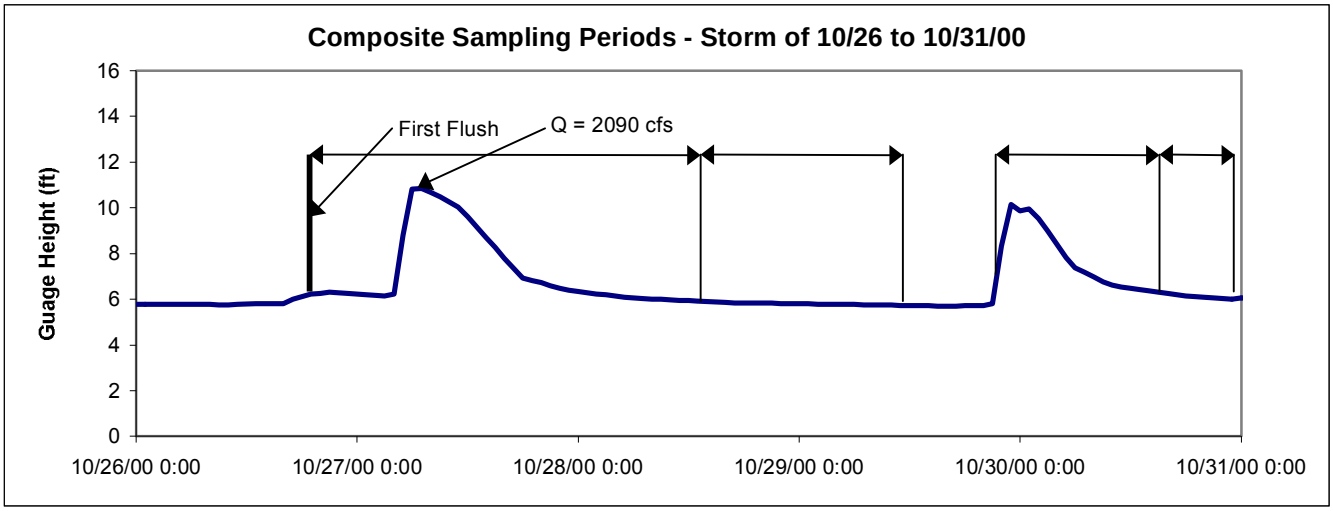

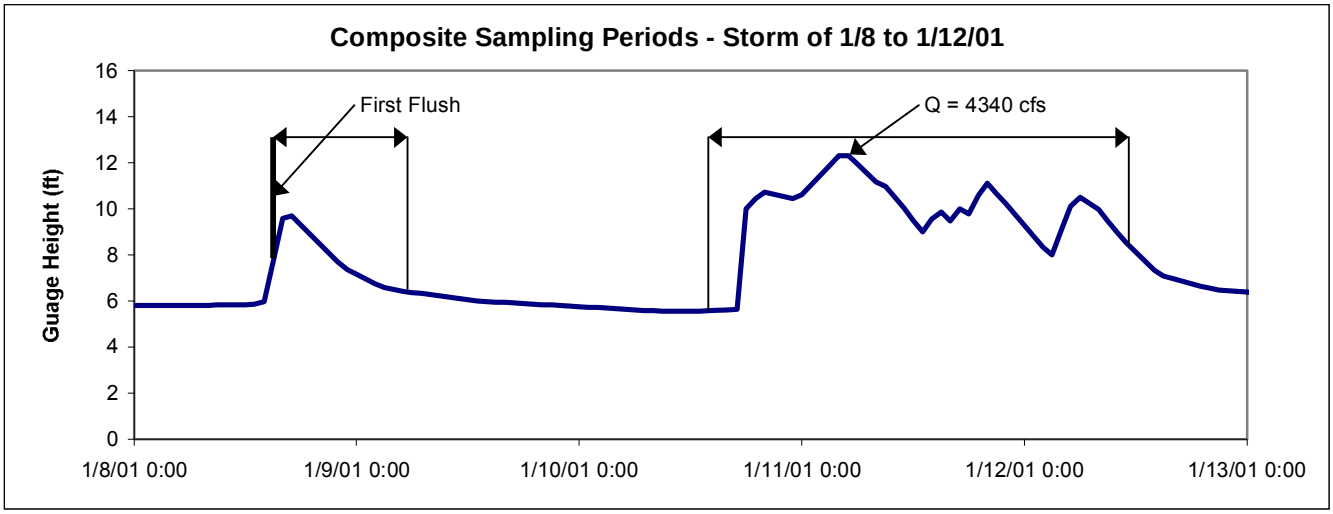

Stormwater Sampling in San Diego Creek @ Campus Drive

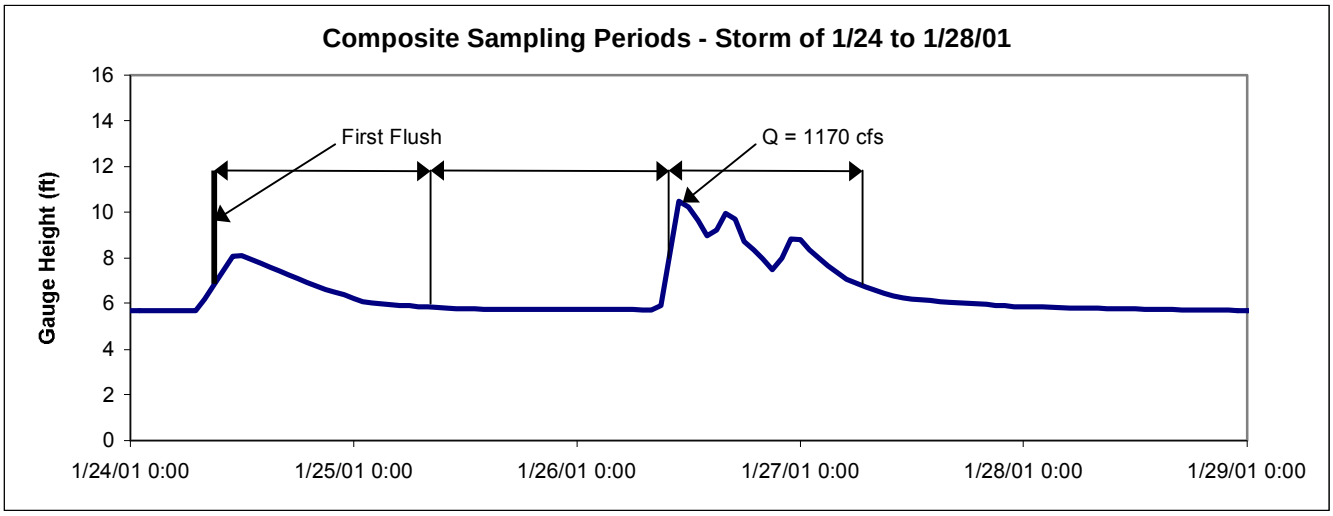

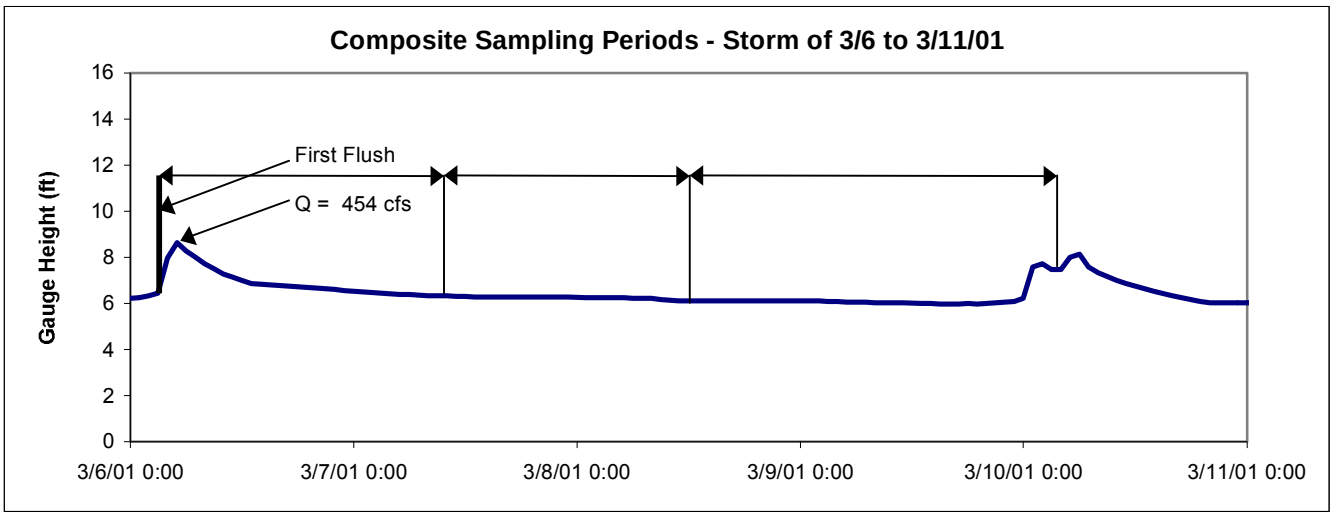

Stormwater Sampling in Peters Canyon Wash @ Barranca Parkway

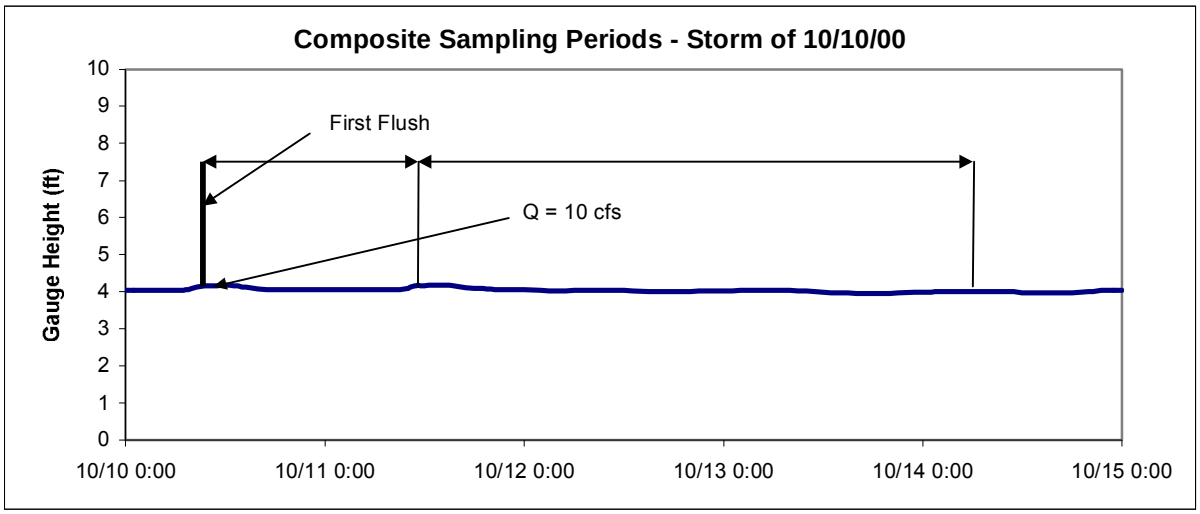

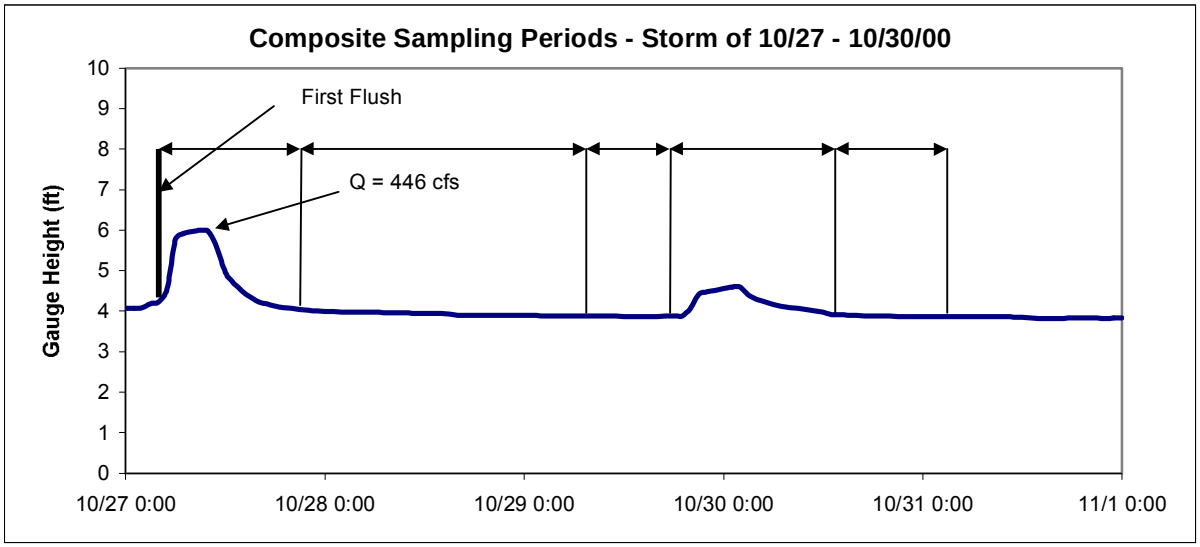

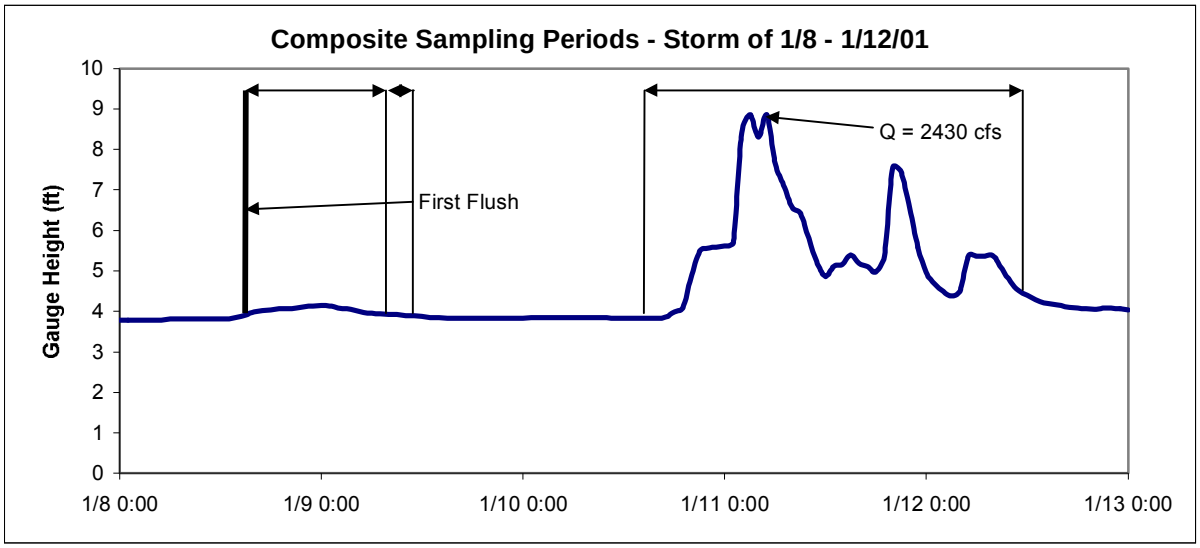

Stormwater Sampling in Peters Canyon Wash @ Barranca Parkway

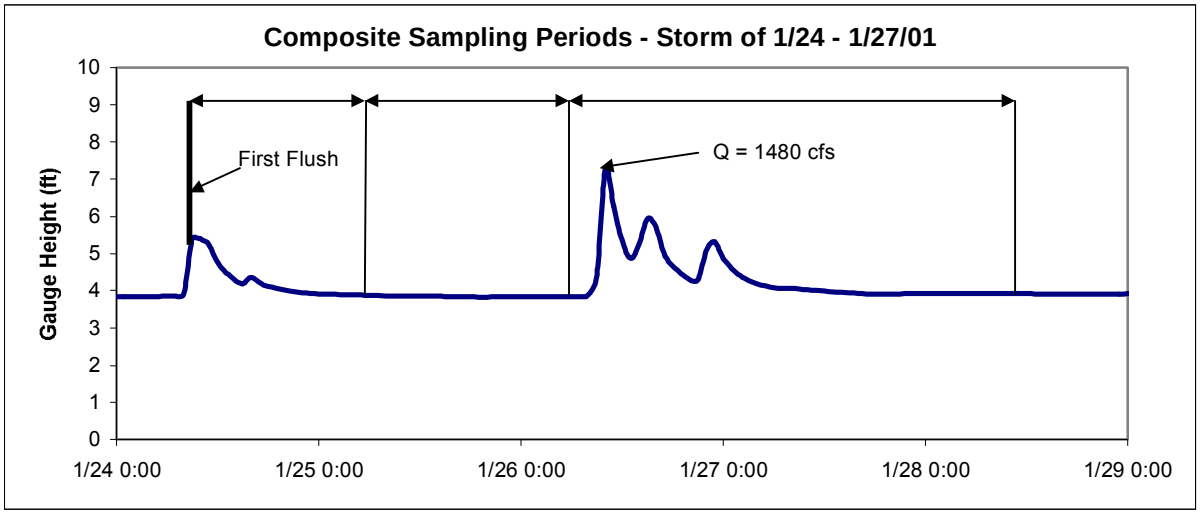

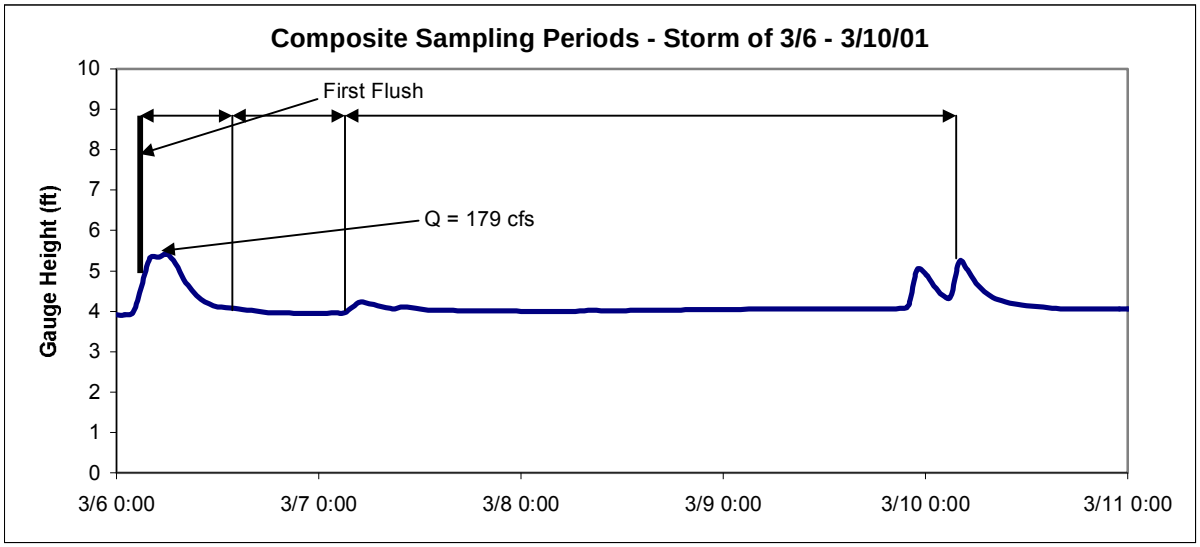

Stormwater Sampling in San Diego Creek @ Harvard Avenue

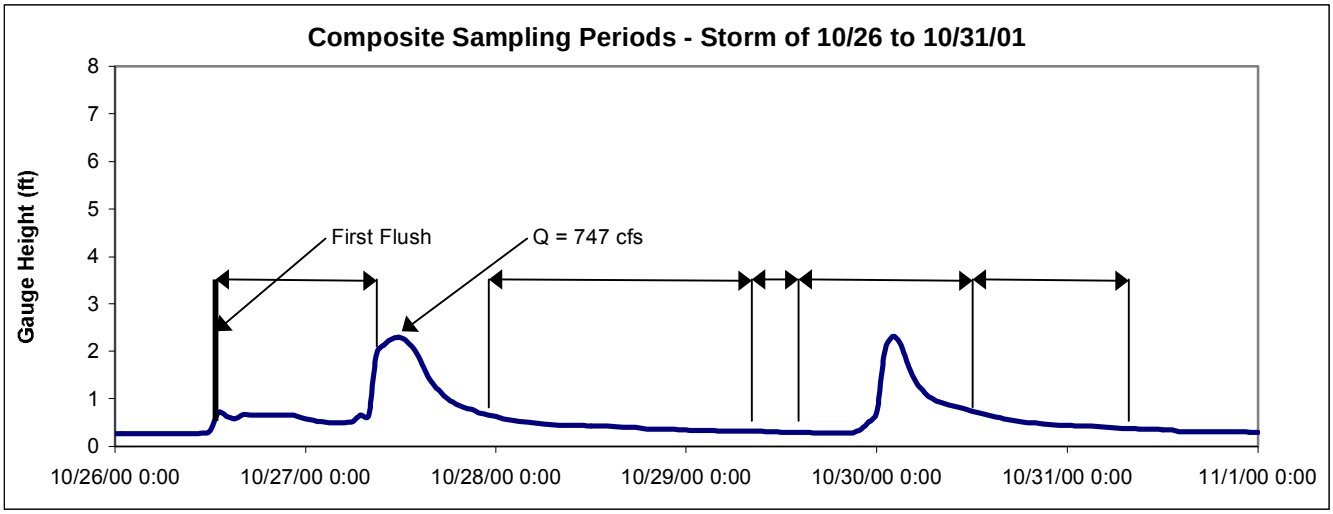

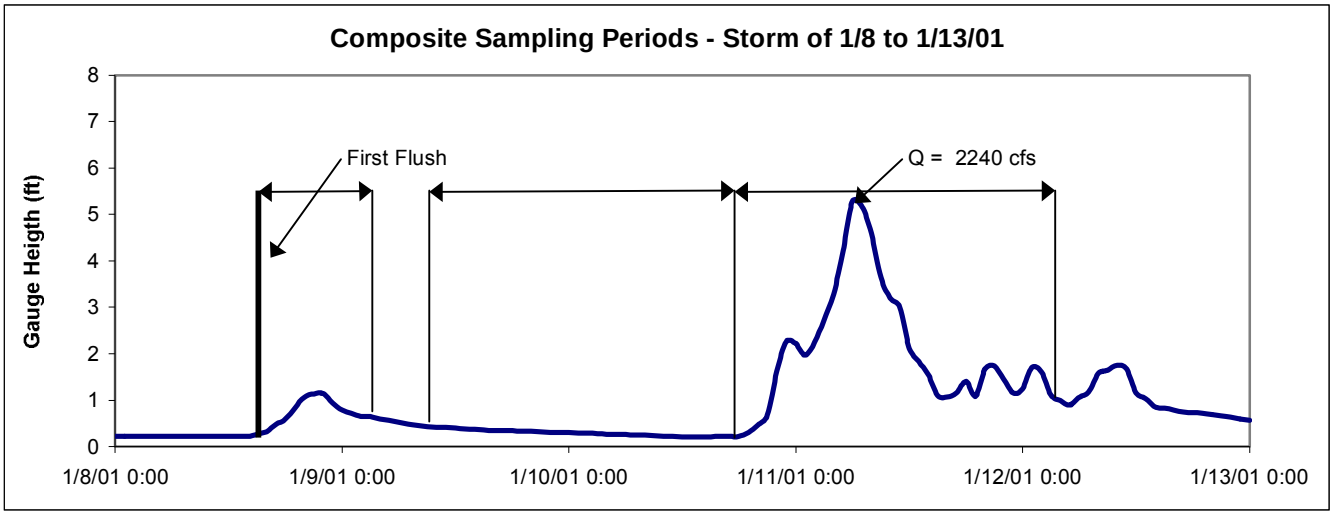

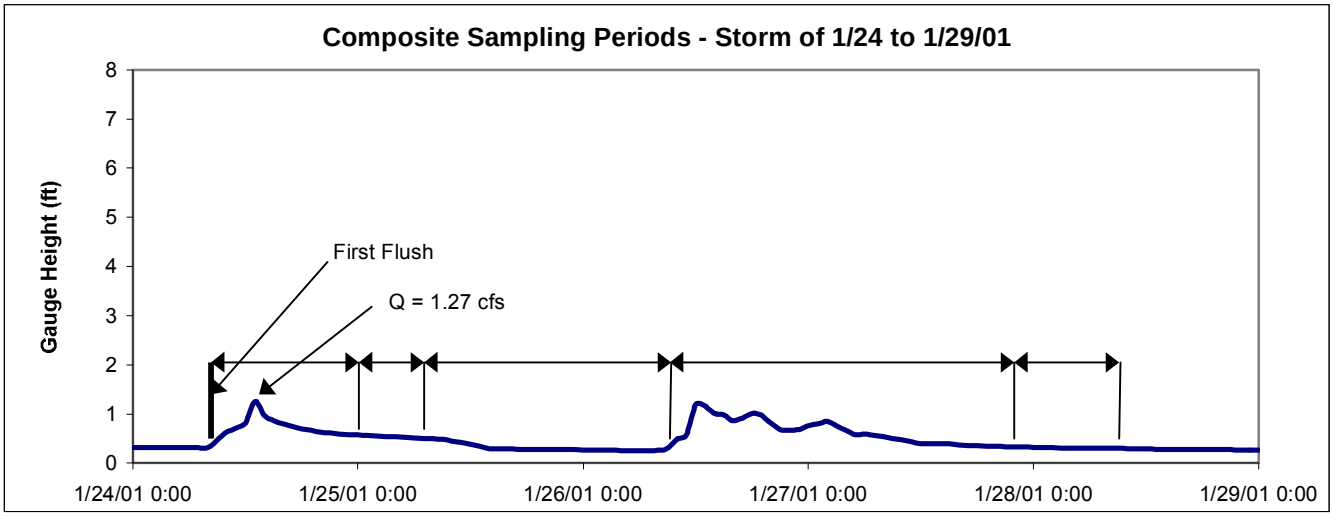

Stormwater Sampling in San Diego Creek @ Harvard Avenue

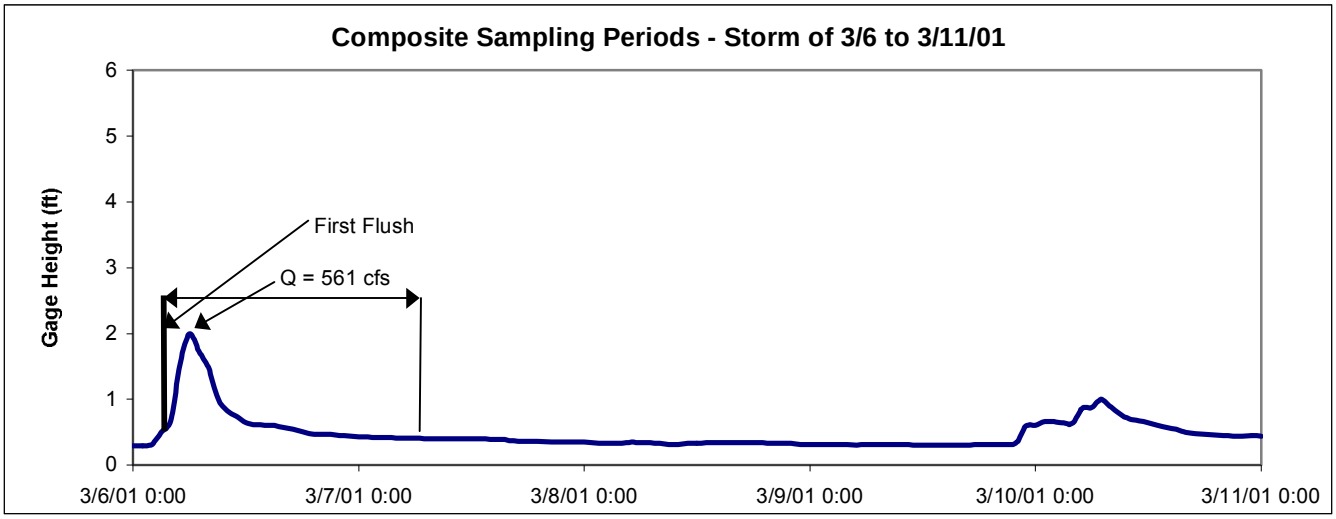

Stormwater Sampling in Lane Channel

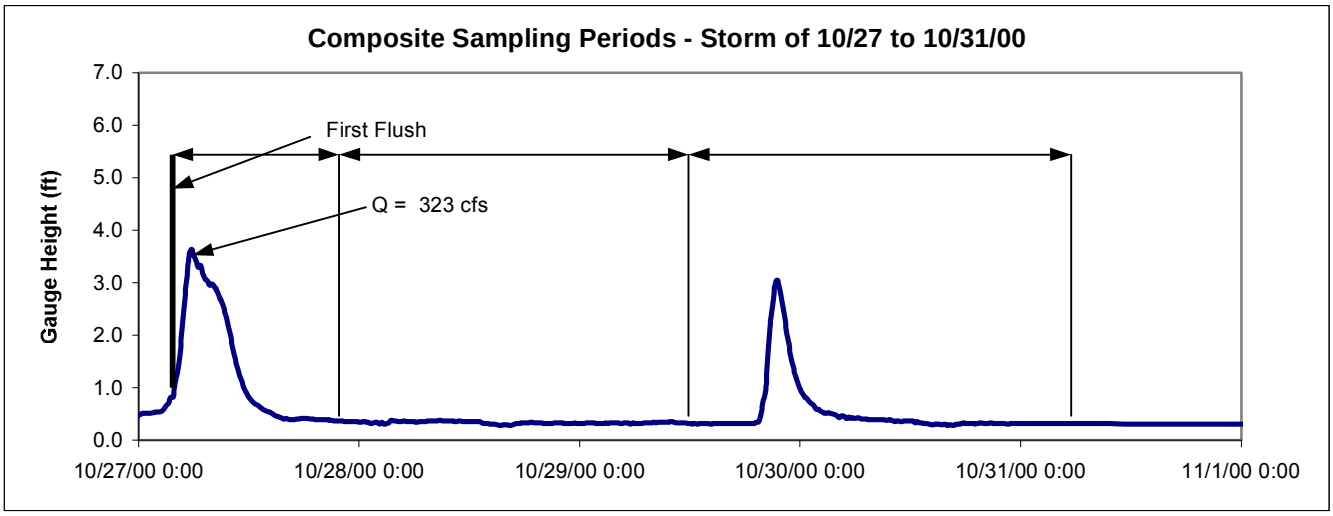

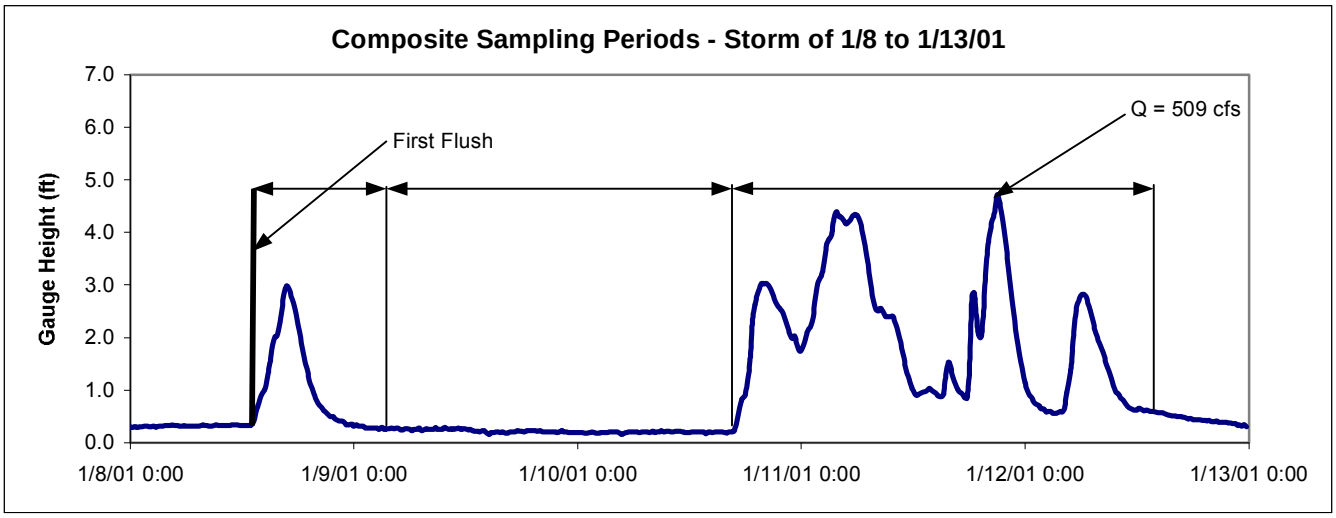

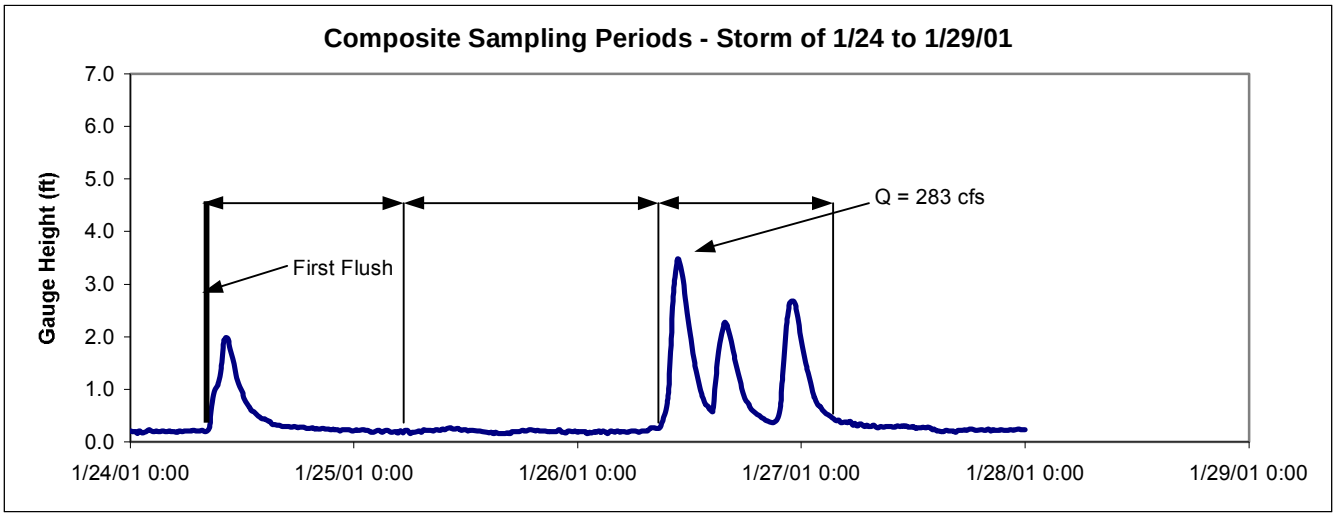

Stormwater Sampling in Costa Mesa Channel

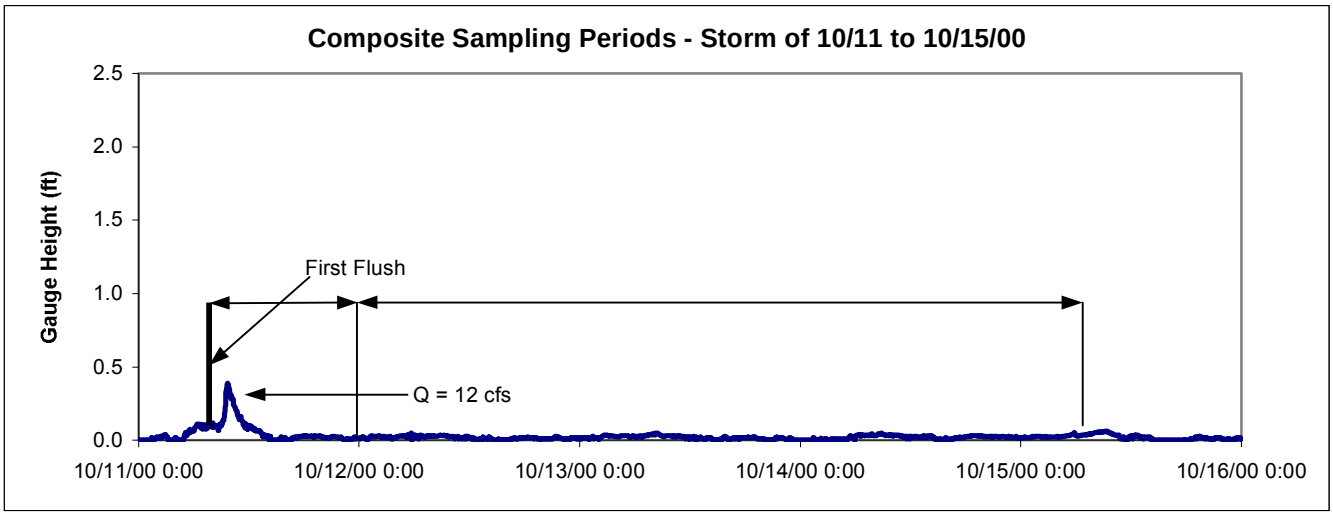

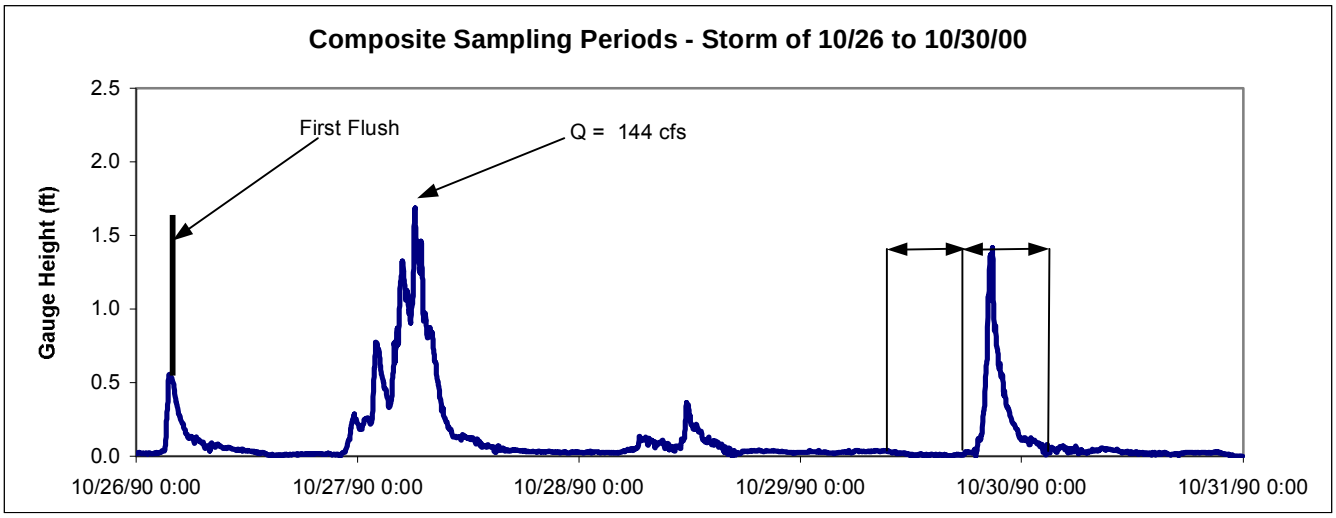

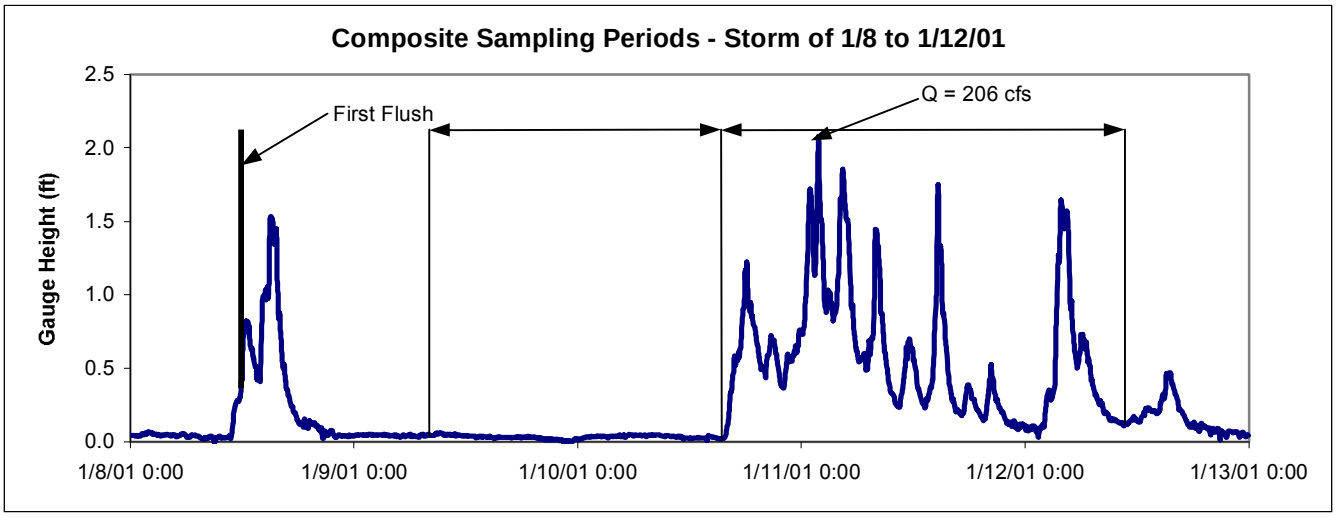

Stormwater Sampling in Costa Mesa Channel

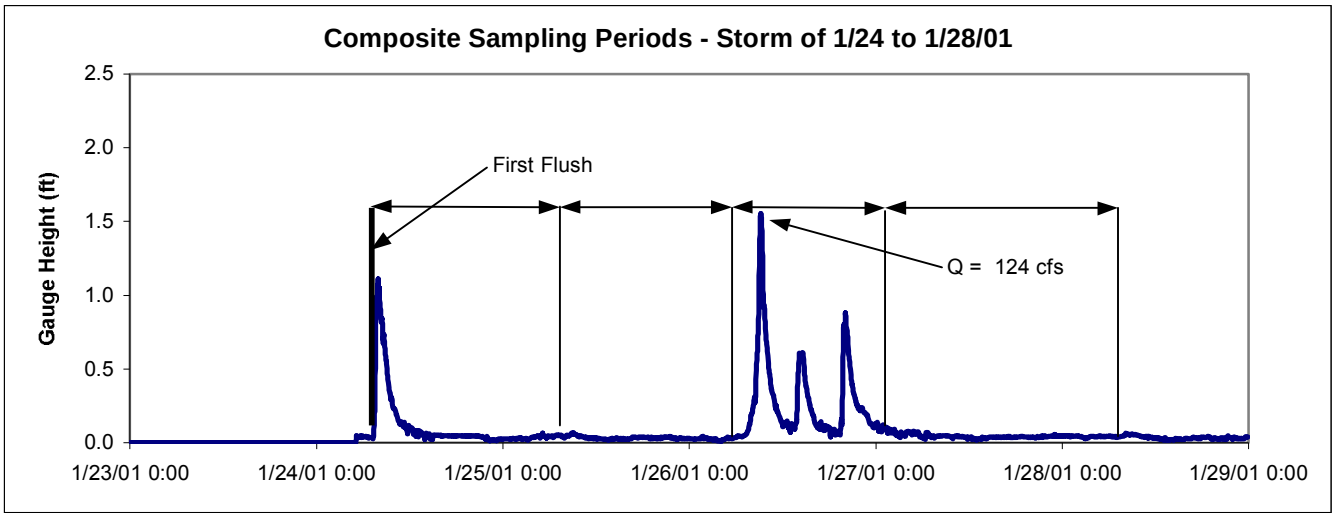

Appendix D
Newport Bay Monitoring Data

RMP Bay Sites
Upper Newport Bay - Unit I Basin

STATION	DATE	TIME	SAMPLE Depth	Maximum Depth (ft)	EC µmhos	Turb NTU	pH	NO_3 mg/L	NH_3 mg/L	TKN mg/L	PO_4 mg/L	o-PO_4 mg/L	TSS mg/L	VSS mg/L
UNBJAM	7/28/00	11:30	S		39800	4.5	8.3	<0.44	<0.05	0.92	0.459		15	7
	7/28/00		M		50800	12	8	<0.44	0.157	0.88	0.551		40	8
	7/28/00		B	9.8	49000	14	8	<0.44	0.2	0.85	0.428		38	7
	9/15/00	9:14	S		37400	17	8.1	6.6	0.288	1	0.673		32	<10
	9/15/00		M		47100	2.9	7.8	1.5	0.149	0.96	0.306		<10	<10
	9/15/00		B	3.28	48100	3.6	8	1.9	0.152	0.97	0.275		<10	<10
	9/29/00	8:23	S		37300	2.5	7.9	5.7	0.319	1	0.52		<10	<10
	9/29/00		M		49600	0.55	7.8	1.1	0.273	1.1	0.428		11	<10
	9/29/00		B	6.56	49800	0.6	7.8	1	0.263	0.99	0.428		<10	<10
	10/27/00	11:15	ST		6790	90	7.7	9.5	0.686	1.3	1.25		96	18
	10/27/00			3.28										
	10/29/00	11:50	ST		20700	7.5	7.5	10	0.631	1.3	0.918		<10	<10
	10/29/00			6.56										
	10/31/00	12:05	ST		13000	13	6.8	11	0.495	1.2	0.887		<10	<10
	10/31/00			13.1										
	11/17/00	9:43	S		42100	3.8	8	8	0.218	0.74	0.306		22	<10
	11/17/00		M		47100	2.4	8.1	2	0.155	0.78	0.245		28	<10
	11/17/00		B	13.1	48200	3.1	8.1	1.5	0.131	0.51	0.184		21	<10
	12/28/00	8:30	S		40500	6	7.9	6.6	0.24	0.68	0.254	0.065	48	<10
	12/28/00		M		49400	2.3	7.9	1.4	0.192	0.59	0.144	0.056	28	<10
	12/28/00		B	13.1	50200	3.6	7.9	1.1	0.179	0.73	0.19	0.052	32	<10
	1/11/01	9:40	ST		500	754	7.8	10	0.371	1.7	3.98	0.38	1090	110
	1/11/01			6.56										
	1/13/01	8:30	ST		3660	45	7.8	11	0.259	1.1	2.02	0.42	15	<10
	1/13/01			16.4										
	1/15/01	10:56	ST		16400	2.2	7	14	0.347	1.2	1.04	0.308	10	<10
	1/15/01			16.4										
	3/6/01	9:40	ST		14500	60	7.8	13	0.297	0.77	0.673		64	<10
	3/6/01			13.1										
	3/8/01	9:57	ST		17470	11	7.6	10	0.26	0.8	0.734		<10	<10
	3/8/01			6.56										
	3/10/01	10:55	ST		6010	25	8.6	35	0.117	1.3	0.551		16	<10
	3/10/01			6.56										
	3/29/01	11:30	S		37100	5.8	7.9	6	0.432	1.3	0.275		17	<10
	3/29/01		M		40040	6.8	7.8	3	0.484	1.2	0.337		<10	<10
	3/29/01		B	6.56	43500	7.5	7.8	1.7	0.509	1.1	0.428		21	<10

RMP Bay Sites
Upper Newport Bay - Unit I Basin

STATION	DATE	TIME	SAMPLE Depth	Maximum Depth (ft)	EC µmhos	Turb NTU	pH	NO_3 mg/L	NH_3 mg/L	TKN mg/L	PO_4 mg/L	o-PO_4 mg/L	TSS mg/L	VSS mg/L
UNBJAM	4/30/01	12:00	S		31100	8.2	7.6	4.2	0.293	1.1	0.3		13	<10
	4/30/01		M		41670	7.3	7.7	0.76	0.316	1.3	0.398		24	<10
	4/30/01		B	9.84	42400	7.7	7.7	0.67	0.358	1.4	0.428		13	<10
	6/6/01	11:50	S		35210	4.5	7.9	5.9	0.167	0.95	0.306		<10	<10
	6/6/01		M		40640	5.3	7.8	3.4	0.221	0.89	0.275		<10	<10
	6/6/01		B	6.56	41300	8.2	7.9	2.2	0.188	0.94	0.275		15	<10
	6/27/01	13:00	S		38100	5.6	8.1	1.6	<0.05	0.76	0.184	0.089	13	<10
	6/27/01		M		41870	11	8	0.75	0.057	0.83	0.245	0.1	20	<10
	6/27/01		B	13.1	41400	18	8	<0.44	0.136	0.95	0.367	0.111	33	<10

RMP Bay Sites

Upper Newport Bay - Unit I Basin

Date	Time	Depth(m)	EC(μmhos)	Temp(C)	pH	DO(ppm)
7/28/00	11:30	0.0	41300	27.6	7.4	10.8
		1.0	48400	25.5	7.0	4.2
		2.0	49400	25.4	6.9	3.2
		3.0	50300	25.2	6.9	3.0
9/15/00	9:14	0.0	43820	23.6	8.1	6.1
		1.0	45910	23.6	8.1	6.1
9/29/00	8:23	0.0	46070	21.9	7.4	5.0
		1.0	48200	22.0	7.4	4.7
		2.0	49440	22.3	7.5	4.6
10/27/00	11:15	0.0	6570	7.1	8.5	7.6
		1.0	13320	17.4	8.2	5.7
		2.0	18790	17.7	8.1	5.8
10/29/00	11:50	0.0	25300	19.6	7.7	2.9
		1.0	39600	19.1	7.6	2.7
		2.0	41900	18.9	7.5	2.4
10/31/00	12:05	0.0	12412	20.0	8.6	6.1
		1.0	39880	19.3	7.9	4.7
		2.0	42210	19.1	7.9	3.9
		3.0	44290	19.0	7.9	4.9
		4.0	46310	18.9	7.9	4.4
11/17/00	9:43	0.0	41800	15.1	7.6	4.9
		1.0	45600	15.1	7.6	4.9
		2.0	47300	15.2	7.5	4.3
		3.0	48100	15.2	7.5	4.4
		4.0	48300	15.2	7.5	4.6
12/28/00	8:30	0.0	44900	10.8	6.3	5.1
		1.0	51800	12.8	7	4.6
		2.0	51810	13.0	6.1	3.2
		3.0	51600	13.1	6.7	2.9
		4.0	51170	13.4	6.5	2.3
1/11/01	9:40	0.0	650	11.1	6.6	10.2
		1.0	630	11.2	6.5	11.8
		2.0	650	11.2	6.2	13.8
1/13/01	8:30	0.0	4010	12.1	6.1	-
		1.0	5610	12.3	6.1	-
		2.0	27320	12.5	6.1	-
		3.0	31960	12.9	6.1	-
		4.0	33730	13.1	6.1	-
		5.0	34210	13.1	6.1	-

RMP Bay Sites

Upper Newport Bay - Unit I Basin

Date	Time	Depth(m)	EC(μmhos)	Temp(C)	pH	DO(ppm)
1/15/01	10:56	0.0	15600	12.6	6.2	UNK
		1.0	37850	13.5	5.6	UNK
		2.0	40250	13.7	5.9	UNK
		3.0	41750	13.8	5.8	UNK
		4.0	43790	14.0	5.9	UNK
		5.0	44410	14.0	6	UNK
3/6/01	9:40	0.0	17060	14.7	8.2	8.6
		1.0	22210	14.2	8	7.9
		2.0	22870	14.2	7.8	5.6
		3.0	26510	14.3	7.8	5.4
		4.0	46640	14.0	7.6	2.7
3/8/01	9:57	0.0	66570	16.0	7.1	2.2
		1.0	67600	15.3	7.1	2.2
		2.0	61620	15.3	7.1	1.5
3/10/01	10:55	0.0		16.7	7.2	
		1.0		15.8	7.04	
		2.0		15.1	7.1	
3/29/01	11:30	0.0	40230	19.7	7.8	6.12
		1.0	3700	19.5	7.7	4.9
		2.0	46200	19.3	7.7	4.9
4/30/01	12:00	0.0	28910	21.3	7.7	7.6
		1.0	30510	20.8	7.6	6.6
		2.0	39000	19.1	7.6	6.7
		3.0	39330	18.6	7.5	3.5
6/6/01	11:50	0.0	44300	23.1	7.8	6.8
		1.0	50910	22.2	7.6	5.5
		2.0	53640	21.8	7.6	4.1
6/27/01	13:00	0.0	95300	26.2	7.8	7.7
		1.0	100100	26.2	7.7	6
		2.0	99200	26.0	7.8	6.5
		3.0	106300	25.5	7.7	6
		4.0	108100	24.1	7.7	7.7

RMP Bay Sites
Upper Newport Bay - Unit II Basin

STATION	DATE	TIME	SAMPLE Depth	Maximum Depth (ft)	EC µmhos	Turb NTU	pH	NO_3 mg/L	NH_3 mg/L	TKN mg/L	PO_4 mg/L	o-PO_4 mg/L	TSS mg/L	VSS mg/L
UNBSDC	7/28/00	11:00	S		43800	3.2	8.2	<0.44	<0.05	0.79	0.428		24	10
	7/28/00		M		47400	3.4	8.1	<0.44	<0.05	0.32	0.428		21	10
	7/28/00		B	3.28	49100	2.4	8.1	<0.44	<0.05	0.39	0.367		15	8
	9/15/00	9:39	S		51500	1.9	8	<0.44	0.097	0.71	0.184		<10	<10
	9/15/00		M		51800	2.6	8	<0.44	0.097	0.88	0.184		<10	<10
	9/15/00		B	9.84	51400	4.1	8	0.44	0.101	0.75	0.184		<10	<10
	9/29/00	8:49	S		52200	0.7	7.9	<0.44	0.132	0.73	0.245		<10	<10
	9/29/00		M		52700	0.8	7.9	0.44	0.127	0.81	0.275		<10	<10
	9/29/00		B	6.56	51600	0.8	7.9	<0.44	0.132	0.54	0.275		<10	<10
	10/27/00	10:50	ST		15200	60	8	9.5	0.617	1.2	1.01		62	12
	10/27/00			6.56										
	10/29/00	11:30	ST		33800	2.7	7.7	4.4	0.34	0.98	0.428		<10	<10
	10/29/00			16.4										
	10/31/00	12:30	ST		19800	7.4	7.7	7.9	0.412	1	0.734		<10	<10
	10/31/00			13.1										
	11/17/00	10:15	S		44600	2.6	8.1	4.8	0.172	0.67	0.245		29	<10
	11/17/00		M		49300	2.2	8.1	1.6	0.116	0.73	0.153		31	<10
	11/17/00		B	13.1	51100	2.1	8.1	1.2	0.096	0.74	0.122		29	<10
	12/28/00	8:00	S		49800	1.7	7.9	0.84	0.148	0.64	0.153	0.046	31	<10
	12/28/00		M		52100	1.9	8	0.66	0.125	0.5	0.15	0.039	27	<10
	12/28/00		B	13.1	53600	2.7	7.9	0.66	0.126	0.54	0.122	0.038	20	<10
	1/11/01	10:00	ST		700	440	7.8	8.2	0.387	0.99	2.42	0.303	360	40
	1/11/01			13.1										
	1/13/01	8:50	ST		6510	24	7.8	8.7	0.266	0.87	1.22	0.39	10	<10
	1/13/01			16.4										
	1/15/01	11:09	ST		17400	2.5	7.9	11	0.37	1.2	0.918	0.265	<10	<10
	1/15/01			6.56										
	3/6/01	10:00	ST		17900	38	7.8	13	0.322	0.67	0.673		43	<10
	3/6/01			6.56										
	3/8/01	10:18	ST		29650	3.4	7.8	4.9	0.138	0.52	0.367		12	<10
	3/8/01			3.28										
	3/10/01	11:20	ST		38500	5.1	8	3.9	0.117	0.83	0.214		23	<10
	3/10/01			9.84										
	3/29/01	12:00	S		41400	4.8	8	3	0.3	1	0.153		26	<10
	3/29/01		M		42100	12	8	2.7	0.312	1	0.214		32	<10
	3/29/01		B	6.56	42210	13	8	2.8	0.293	0.95	0.153		32	<10

RMP Bay Sites
Upper Newport Bay - Unit II Basin

STATION	DATE	TIME	SAMPLE Depth	Maximum Depth (ft)	EC µmhos	Turb NTU	pH	NO_3 mg/L	NH_3 mg/L	TKN mg/L	PO_4 mg/L	o-PO_4 mg/L	TSS mg/L	VSS mg/L
UNBSDC	4/30/01	12:30	S		31500	13	7.9	4	0.267	1.4	0.398		19	<10
	4/30/01		M		34830	11	7.9	3.3	0.272	1.3	0.367		20	<10
	4/30/01		B	6.56	37230	7.5	7.9	2.7	0.269	1.5	0.337		27	<10
	6/6/01	12:20	S		40800	5	7.8	2.4	0.141	0.65	0.214		<10	<10
	6/6/01		M		43290	4.9	7.9	1.3	0.116	1	0.184		16	<10
	6/6/01		B	9.84	43500	11	7.9	1.1	0.096	0.77	0.153		36	<10
	6/27/01	12:30	S		38100	5.1	8.1	1.4	<0.05	0.67	0.153	0.063	23	<10
	6/27/01		M		42200	6.9	8.1	<0.44	0.075	1.2	0.275	0.07	12	<10
	6/27/01		B	13.1	42600	8.6	8.1	<0.44	0.091	0.84	0.245	0.073	16	<10

RMP Bay sites

Upper Newport Bay - Unit II Basin

Date	Time	Depth(m)	EC(μmhos)	Temp(C)	pH	DO(ppm)
7/28/00	11:00	0.0	44100	26.2	7.1	5.4
		1.0	47200	25.3	7.0	4.9
9/15/00	9:39	0.0	42820	22.5	8.1	7.0
		1.0	49960	22.4	8.0	6.6
		2.0	50000	22.3	7.9	6.3
		3.0	50100	22.3	8.0	6.1
9/29/00	8:49	0.0	51520	21.7	7.7	8.3
		1.0	51520	21.6	7.7	7.3
		2.0	51530	21.6	7.7	7.2
10/27/00	10:50	0.0	12850	17.4	8.1	5.8
		1.0	15720	17.7	8.1	4.2
		2.0	23100	18.3	8.1	4.2
10/29/00	11:30	0.0	38700	19.3	7.6	3.0
		1.0	44600	19.0	7.6	3.3
		2.0	45200	19.1	7.6	3.0
		3.0	47300	18.9	7.6	3.1
		4.0	47000	18.6	7.6	2.9
		5.0	46700	18.7	7.6	2.9
10/31/00	12:30	0.0	23690	19.3	7.9	6.5
		1.0	41180	19.1	7.8	9.1
		2.0	48730	19.1	7.8	4.2
		3.0	49670	18.9	7.7	4
		4.0	49230	18.6	7.7	5.1
11/17/00	10:15	0.0	44200	14.7	7.6	5.2
		1.0	48600	15.0	7.4	5.3
		2.0	49700	15.3	7.5	5.1
		3.0	49700	15.0	7.6	5
		4.0	49000	15.2	7.5	5.1
12/28/00	8:00	0.0	51770	13.1	7.2	4.2
		1.0	52000	13.1	7.2	4.2
		2.0	52100	13.6	7.1	4.2
		3.0	52120	13.1	7.1	4
		4.0	52150	13.2	7	4.1
1/11/01	10:00	0.0	810	11.5	6.6	7.4
		1.0	940	11.9	6.7	8
		2.0	810	12.9	6.8	9.6
		3.0	7330	13.0	6.3	9.7
		4.0	33340	13.5	5.3	7.4

RMP Bay sites

Upper Newport Bay - Unit II Basin

Date	Time	Depth(m)	EC(μmhos)	Temp(C)	pH	DO(ppm)
1/13/01	8:50	0.0	7030	10.1	7.2	-
		1.0	10690	10.9	7.2	-
		2.0	26710	11.9	7.2	-
		3.0	36490	12.6	7.2	-
		4.0	41270	13.3	7.2	-
		5.0	41500	13.7	7.2	-
1/15/01	11:09	0.0	15990	12.2	6.5	UNK
		1.0	35550	13.3	6	UNK
3/6/01	10:00	0.0	20180	14.9	8.2	6
		1.0	23150	14.6	8.2	5.9
		2.0	33970	14.4	8.1	5.3
3/8/01	10:18	0.0	66440	16.0	7.1	1.5
		1.0	67350	15.4	7.1	1.4
3/10/01	11:20	0.0		15.9	7.2	
		1.0		15.8	7.1	
		2.0		15.3	7.1	
		3.0		14.9	7.1	
3/29/01	12:00	0.0	45600	19.6	7.9	7.3
		1.0	48800	19.3	7.9	6.9
		2.0	45200	19.2	7.9	6.6
4/30/01	12:30	0.0	31200	21.0	7.7	7
		1.0	31289	22.0	7.8	6.7
		2.0	35240	20.6	7.7	6.4
6/6/01	12:20	0.0	51980	22.4	7.7	6.3
		1.0	53400	22.1	7.7	5.54
		2.0	54800	21.6	7.7	5.9
		3.0	55900	21.1	7.8	6
6/27/01	12:30	0.0	106100	24.7	7.8	8.2
		1.0	107100	23.9	7.8	5.3
		2.0	108200	23.8	7.8	5.3
		3.0	108000	23.7	7.7	4
		4.0	108200	23.1	7.6	3

RMP Bay Sites
Upper Newport Bay - North Star Beach

STATION	DATE	TIME	SAMPLE Depth	Maximum Depth (ft)	EC µmhos	Turb NTU	pH	NO_3 mg/L	NH_3 mg/L	TKN mg/L	PO_4 mg/L	o-PO_4 mg/L	TSS mg/L	VSS mg/L
UNBNSB	7/28/00	12:20	S		49700	1.5	8.1	<0.44	<0.05	0.29	0.337		27	15
	7/28/00		M		50600	1.8	8.1	<0.44	<0.05	0.28	0.337		27	7
	7/28/00		B	9.8	49600	1.5	8.1	<0.44	<0.05	<0.2	0.245		25	15
	9/15/00	9:50	S		49100	3.1	8.1	<0.44	<0.05	<0.2	0.122		<10	<10
	9/15/00		M		52100	4.1	8.1	<0.44	<0.05	<0.2	0.0918		<10	<10
	9/15/00		B	13.1	51800	9.9	8.1	<0.44	<0.05	0.31	0.245		22	<10
	9/29/00	9:20	S		53600	0.9	8	<0.44	0.088	0.74	0.214		<10	<10
	9/29/00		M		52800	3.5	8	<0.44	<0.05	<0.2	0.214		<10	<10
	9/29/00		B	16.4	52400	3.6	8	<0.44	0.083	<0.2	0.245		<10	<10
	10/27/00	10:19	ST		42300	3.4	8.1	0.69	0.128	0.49	0.153		<10	<10
	10/27/00			19.68										
	10/29/00	11:10	ST		39500	2.1	7.9	2.6	0.17	0.72	0.22		18	<10
	10/29/00			13.1										
	10/31/00	11:35	ST		33300	2.6	7.8	5.7	0.303	1.2	0.398		<10	<10
	10/31/00			16.4										
	11/17/00	10:44	S		51200	2.3	8.1	0.75	0.062	0.62	0.122		14	<10
	11/17/00		M		52100	2.7	8.1	0.72	0.07	0.7	0.0918		24	<10
	11/17/00		B	9.84	50100	3.7	8.1	0.72	0.065	0.86	0.0918		23	<10
	12/28/00	7:32	S		51800	2.5	8	0.57	0.102	0.49	0.147	0.036	32	<10
	12/28/00		M		53800	2.7	8	0.53	0.096	0.63	0.141	0.033	25	<10
	12/28/00		B	16.4	54500	2.7	7.9	0.53	0.097	0.91	0.122	0.033	27	<10
	1/11/01	10:30	ST		2660	191	7.8	9.5	0.437	1.3	1.87	0.3	120	40
	1/11/01			16.4										
	1/13/01	9:15	ST		14600	14	7.9	7.3	0.253	0.67	0.979	0.37	10	<10
	1/13/01			16.4										
	1/15/01	11:50	ST		29600	1.9	3.1	6.3	0.351	1.4	0.796	0.205	18	<10
	1/15/01			6.56										
	3/6/01	10:27	ST		26720	17	7.8	10	0.26	0.76	0.49		19	<10
	3/6/01			13.1										
	3/8/01	10:38	ST		37700	8.5	8	2.4	0.134	0.54	0.275		21	<10
	3/8/01			6.56										
	3/10/01	11:35	ST		42060	5.1	8	1.5	0.097	0.78	0.184		31	<10
	3/10/01			13.1										
	3/29/01	12:45	S		42900	3.4	8.1	1.8	0.185	0.87	<0.061		12	<10
	3/29/01		M		45200	3.9	8.2	2.2	0.222	1	0.122		15	<10
	3/29/01		B	13.1	45140	2.3	8.2	<0.44	<0.05	0.64	<0.061		<10	<10

RMP Bay Sites
Upper Newport Bay - North Star Beach

STATION	DATE	TIME	SAMPLE Depth	Maximum Depth (ft)	EC µmhos	Turb NTU	pH	NO_3 mg/L	NH_3 mg/L	TKN mg/L	PO_4 mg/L	o-PO_4 mg/L	TSS mg/L	VSS mg/L
UNBNSB	4/30/01	13:15	S		40200	2.9	7.9	1.6	0.212	1	0.202		<10	<10
	4/30/01		M		42100	3.7	7.9	0.69	0.153	1.1	0.162		13	<10
	4/30/01		B	6.56	43030	3.3	8	0.48	0.128	0.93	0.147		<10	<10
	6/6/01	13:10	S		43450	4.3	8	0.7	0.055	0.61	0.0918		18	<10
	6/6/01		M		43600	3.4	8	0.57	<0.05	0.73	0.0918		28	<10
	6/6/01		B	*UNK	45130	3.3	8	0.59	0.054	0.76	0.0918		11	<10
	6/27/01	12:00	S		41000	4.7	8.1	0.48	<0.05	0.63	0.184	0.056	29	<10
	6/27/01		M		42740	3.7	8.1	<0.44	<0.05	0.61	0.122	0.051	<10	<10
	6/27/01		B	6.56	43100	4.4	8	<0.44	<0.05	0.54	0.153	0.04	29	<10

*UNK - Unknown (YSI Probe failure)

RMP Bay sites

Upper Newport Bay - North Star Beach

Date	Time	Depth(m)	EC(μmhos)	Temp(C)	pH	DO(ppm)
7/28/00	12:20	0.0	49500	25.4	7.2	5.7
		1.0	50800	24.4	7.1	5.8
		2.0	51600	24.0	7.1	6.0
		3.0	51900	23.8	7.1	6.0
9/15/00	9:50	0.0	50600	21.3	8.0	8.3
		1.0	51000	21.2	8.0	8.0
		2.0	51200	21.1	8.1	8.0
		3.0	53700	21.0	8.0	7.8
		4.0	5400	21.0	8.0	7.9
9/29/00	9:20	0.0	52140	21.4	7.9	8.5
		1.0	52170	21.4	7.9	8.6
		2.0	52180	21.3	7.9	8.7
		3.0	52170	21.3	7.9	8.7
		4.0	52180	21.3	7.9	9.0
		5.0	52180	21.3	7.9	9.3
10/27/00	10:19	0.0	39500	18.7	7.9	3.0
		1.0	40200	18.8	7.9	3.9
		2.0	40910	18.9	7.9	3.9
		3.0	41210	19.0	7.8	4.1
		4.0	41680	19.0	7.8	4.4
		5.0	41800	18.9	7.8	4.1
		6.0	41790	18.8	7.8	4.0
10/29/00	11:10	0.0	44300	19.1	7.6	3.9
		1.0	45700	18.9	7.6	3.7
		2.0	46200	18.7	7.6	3.9
		3.0	47900	18.6	7.6	3.6
		4.0	48700	18.6	7.5	3.7
10/31/00	11:35	0.0	34480	18.6	8.1	6.9
		1.0	45010	18.6	8.1	6.4
		2.0	47370	18.7	8	6.4
		3.0	49370	18.7	7.9	6.6
		4.0	50000	18.7	7.9	6.5
		5.0	50030	18.7	7.9	6.5
11/17/00	10:44	0.0	50200	14.9	7.6	4.8
		1.0	50200	14.9	7.6	4.8
		2.0	50300	15.0	7.7	4.8
		3.0	50200	15.0	7.5	4.7
12/28/00	7:32	0.0	52460	13.6	6.7	4
		1.0	52500	13.6	6.8	4
		2.0	52510	13.6	7	4.1
		3.0	52500	13.7	6.6	4.1
		4.0	52530	13.6	7	4.1
		5.0	52600	13.6	6.5	3.9

RMP Bay sites

Upper Newport Bay - North Star Beach

Date	Time	Depth(m)	EC(µmhos)	Temp(C)	pH	DO(ppm)
1/11/01	10:30	0.0	2950	11.7	7	4.6
		1.0	3110	11.8	6.6	5.9
		2.0	4500	12.2	6.1	26.1
		3.0	22620	13.1	6	28.2
		4.0	42680	14.3	5.8	21.3
		5.0	43710	14.3	5.8	7.0
1/13/01	9:15	0.0	13600	10.8	7.2	
		1.0	29230	11.8	7.2	
		2.0	33470	12.5	7.2	
		3.0	41290	13.0	7.1	
		4.0	47650	13.8	7.1	
		5.0	48400	14.2	7.1	
1/15/01	11:50	0.0	28220	13.3	6.3	
		1.0	41050	13.8	6.2	
		2.0	44520	14.1	6.3	
3/6/01	10:27	0.0	30970	14.8	8.2	6.6
		1.0	31960	14.7	8.2	6.4
		2.0	32420	14.7	8.1	6.2
		3.0	33730	14.7	8.1	6.0
		4.0	33890	14.6	8.1	5.9
3/8/01	10:38	0.0	67690	15.3	7.2	1.6
		1.0	67760	15.2	7.2	1.7
		2.0	67790	15.2	7.2	1.8
3/10/01	11:35	0.0		15.2	7.2	
		1.0		15.2	7.0	
		2.0		15.2	7.2	
		3.0		15.2	7.2	
		4.0		15.2	7.2	
3/29/01	12:45	0.0	46410	19.2	8.0	8.6
		1.0	46930	18.8	8.2	8.2
		2.0	48800	17.7	8.1	9.3
		3.0	49100	17.7	8.1	9.3
		4.0	49200	17.7	8.1	9.3
4/30/01	13:15	0.0	37790	20.1	7.8	5.9
		1.0	38420	19.5	7.8	5.6
		2.0	39890	18.5	9.8	5.5
6/27/01	12:00	0.0	106100	24.7	7.8	5.1
		1.0	107100	24.0	7.8	5.0
		2.0	108200	23.2	7.8	4.9

RMP Bay Sites
Upper Newport Bay - Coast Highway Bridge

STATION	DATE	TIME	SAMPLE Depth	Maximum Depth (ft)	EC µmhos	Turb NTU	pH	NO_3 mg/L	NH_3 mg/L	TKN mg/L	PO_4 mg/L	o-PO_4 mg/L	TSS mg/L	VSS mg/L
UNBCHB	7/28/00	10:15	S		51800	1.7	8.1	<0.44	<0.05	0.59	0.245		32	9
	7/28/00		M		53400	1.8	8.1	<0.44	<0.05	0.67	0.153		36	16
	7/28/00		B	9.8	52600	2	8.1	<0.44	<0.05	<0.2	0.153		35	11
	9/15/00	10:30	S		51200	6.8	8	<0.44	<0.05	0.75	0.0918		31	10
	9/15/00		M		50100	6.8	8.1	<0.44	<0.05	0.7	<0.061		10	<10
	9/15/00		B	9.8	52000	6.8	8.1	<0.44	<0.05	<0.2	0.0918		<10	<10
	9/29/00	9:50	S		51500	3	8	<0.44	0.051	0.64	0.214		<10	<10
	9/29/00		M		52200	10	8	<0.44	<0.05	0.54	0.184		35	<10
	9/29/00		B	9.8	50500	4.9	8	<0.44	<0.05	0.61	0.184		12	<10
	10/27/00	12:00	ST		42100	7.7	8	1.1	0.161	0.74	0.208		26	<10
	10/27/00			16.4										
	10/29/00	10:30	ST		42600	2.8	7.9	2	0.142	0.86	0.181		57	<10
	10/29/00			19.6										
	10/31/00	11:05	ST		37100	2.4	7.9	4.8	0.266	0.83	0.337		21	<10
	10/31/00			16.4										
	11/17/00	11:30	S		51400	2.8	8.1	0.46	<0.05	0.7	0.0918		24	<10
	11/17/00		M		51800	2.6	8.1	0.48	<0.05	0.64	0.0918		16	<10
	11/17/00		B	13.1	50400	3.4	8.1	0.45	<0.05	0.62	0.0918		33	<10
	12/28/00	9:30	S		53800	1.8	8	<0.44	0.063	0.52	<0.061	0.025	25	<10
	12/28/00		M		54100	1.9	8	<0.44	0.058	<0.2	<0.061	0.029	25	<10
	12/28/00		B	9.8	54400	1.5	8	<0.44	0.062	0.5	0.0857	0.025	32	<10
	1/11/01	10:50	ST		8910	71	7.7	9.3	0.446	0.77	1.13	0.154	50	14
	1/11/01			19.6										
	1/13/01	9:45	ST		22900	8.2	7.9	5.7	0.235	0.39	0.673	0.33	14	<10
	1/13/01			13.1										
	1/15/01	11:55	ST		41300	1.5	6.6	2.5	0.185	0.98	0.214	0.109	30	<10
	1/15/01			9.8										
	3/6/01	11:00	ST		33500	16	7.9	7.8	0.223	0.61	0.428		25	<10
	3/6/01			9.8										
	3/8/01	10:56	ST		40530	9.9	8	1.6	0.102	5.2	0.153		16	<10
	3/8/01			9.8										
	3/10/01	11:50	ST		44100	9	8.3	0.76	0.073	0.89	0.153		29	<10
	3/10/01			13.1										
	3/29/01	13:10	S		43700	5	8.2	<0.44	<0.05	0.73	<0.061		<10	<10
	3/29/01		M		45600	6.3	8.2	<0.44	<0.05	0.66	<0.061		<10	<10
	3/29/01		B	9.8	45640	5.9	8.2	<0.44	<0.05	0.61	<0.061		<10	<10

RMP Bay Sites
Upper Newport Bay - Coast Highway Bridge

STATION	DATE	TIME	SAMPLE Depth	Maximum Depth (ft)	EC µmhos	Turb NTU	pH	NO_3 mg/L	NH_3 mg/L	TKN mg/L	PO_4 mg/L	o-PO_4 mg/L	TSS mg/L	VSS mg/L
UNBCHB	4/30/01	14:00	S		43240	3.8	8	0.45	0.063	1.1	0.116		13	<10
	4/30/01		M		44320	4.8	8	<0.44	0.051	0.99	0.122		<10	<10
	4/30/01		B	13.1	42250	7	8.1	<0.44	<0.05	0.92	0.11		11	<10
	6/6/01	13:35	S		44900	2.7	8	0.59	0.053	1	<0.061		<10	<10
	6/6/01		M		45300	3.5	8	0.49	<0.05	0.76	0.0612		<10	<10
	6/6/01		B	*UNK	46410	3	8	0.5	<0.05	0.6	0.0918		<10	<10
	6/27/01	13:40	S		43860	7.7	8	<0.44	<0.05	0.55	0.122	0.03	28	<10
	6/27/01		M		46030	6.5	8.1	<0.44	<0.05	0.59	0.0918	0.028	18	<10
	6/27/01		B	9.8	44580	7.9	8	<0.44	<0.05	0.62	0.0918	0.03	33	<10

*UNK - Unknown (YSI Probe failure)

RMP Bay sites

Upper Newport Bay - Coast Highway Bridge

Date	Time	Depth(m)	EC(μmhos)	Temp(C)	pH	DO(ppm)
7/28/00	10:15	0.0	52300	23.4	7.2	6.2
		1.0	52600	23.2	7.1	6.2
		2.0	52700	23.1	7.1	6.2
		3.0	52900	23.0	7.1	6.2
9/15/00	10:30	0.0	51350	20.6	8.0	8.3
		1.0	51400	20.5	8.0	7.9
		2.0	51500	20.8	8.0	8.0
		3.0	51900	20.5	8.0	7.9
9/29/00	9:50	0.0	52100	20.1	8	7.9
		1.0	52700	20.1	7.9	7.9
		2.0	52800	20.0	7.9	7.9
		3.0	52900	19.9	7.9	8.0
10/27/00	12:00	0.0	39000	18.8	7.8	4.0
		1.0	39210	18.8	7.8	4.7
		2.0	39090	18.8	7.8	3.9
		3.0	39650	18.7	7.7	3.9
			39210	18.7	7.7	3.9
		5.0	39700	18.8	7.7	3.8
10/29/00	10:30	0.0	46000	18.7	7.5	3.9
		1.0	47100	18.7	7.6	3.5
		2.0	48700	18.7	7.6	3.9
		3.0	49200	19.0	7.6	4.1
		4.0	50700	18.7	7.6	4.0
		5.0	50600	19.0	7.5	4.5
		6.0	50000	18.7	7.5	3.9
10/31/00	11:05	0.0	40700	18.2	8	6.5
		1.0	43720	18.3	7.9	7
		2.0	47110	18.6	7.9	6.9
		3.0	49230	18.6	7.9	6
		4.0	50640	18.4	7.9	5.7
		5.0	51220	18.3	7.9	6.2
11/17/00	11:30	0.0	50700	15.3	7.6	5.1
		1.0	50700	15.4	7.6	8.7
		2.0	50700	15.4	7.6	4.6
		3.0	50810	15.4	7.6	3.9
		4.0	50900	17.4	7.5	3.5
12/28/00	9:30	0.0	52100	13.8	6.5	7
		1.0	52220	13.8	6.6	4.9
		2.0	52730	13.8	7	3.2
		3.0	53000	13.8	6.5	2.2

RMP Bay sites

Upper Newport Bay - Coast Highway Bridge

Date	Time	Depth(m)	EC(μmhos)	Temp(C)	pH	DO(ppm)
1/11/01	10:50	0.0	8730	12.2	7	
		1.0	9580	12.7	6.9	
		2.0	29960	13.3	6.3	
		3.0	30730	13.4	6.3	
		4.0	30670	13.8	6.1	
		5.0	38210	14.0	6.1	
		6.0	48710	14.3	6.1	3.6
1/13/01	9:45	0.0	21030	11.3	7.2	
		1.0	25930	11.7	7.2	
		2.0	47310	12.9	7.1	
		3.0	49760	13.8	7.2	
		4.0	50000	14.4	7.1	
1/15/01	11:55	0.0	40390	14.2	6.5	
		1.0	43890	14.2	6.4	
		2.0	47700	14.5	6.4	
		3.0	49470	14.6	6.5	
3/6/01	11:00	0.0	36900	14.7	8.2	7.5
		1.0	37070	14.7	8.2	7.3
		2.0	38090	14.7	8.2	7.2
		3.0	39700	14.6	8.1	7.4
3/8/01	10:56	0.0	67920	15.1	7.3	1.4
		1.0	67920	15.1	7.2	1.9
		2.0	67920	15.1	7.2	2
		3.0	67930	15.1	7.3	8.7
3/10/01	11:50	0.0		15.0	7.2	
		1.0		15.0	7.1	
		2.0		15.0	7.1	
		3.0		15.0	7.1	
		4.0		15.0	7.1	
3/29/01	13:10	0.0	49900	17.9	8.09	9.8
		1.0	49900	17.6	8.1	9.3
		2.0	50100	17.5	8.1	9.2
		3.0	50000	17.4	8.1	9
4/30/01	14:00	0.0	40790	18.6	7.95	7.49
		1.0	40950	18.5	7.47	7.96
		2.0	41300	17.8	7.98	7.6
		3.0	41940	16.7	8.01	7.55
		4.0	41600	16.7	7.98	8.54
6/27/01	13:40	0.0	112200	23.1	7.7	5.5
		1.0	117300	23.0	7.7	5.9
		2.0	111300	23.2	7.7	6
		3.0	113200	23.0	7.7	8.3

RMP Bay Sites
Lower Newport Bay - Harbor Island Reach

STATION	DATE	TIME	SAMPLE Depth	Maximum Depth (ft)	EC µmhos	Turb NTU	pH	NO_3 mg/L	NH_3 mg/L	TKN mg/L	PO_4 mg/L	o-PO_4 mg/L	TSS mg/L	VSS mg/L
LNBHIR	7/28/00	9:45	S		51200	2	8.2	<0.44	<0.05	0.2	0.184		17	13
	7/28/00		M		53500	6	8.2	<0.44	<0.05	<0.2	0.153		29	12
	7/28/00		B	19.6	53200	3	8.2	<0.44	<0.05	0.65	0.153		33	10
	9/15/00	11:00	S		51300	2.2	8.1	<0.44	<0.05	<0.2	0.0918		<10	<10
	9/15/00		M		52400	4.2	8.1	<0.44	<0.05	0.64	<0.061		11	<10
	9/15/00		B	19.6	53100	6.5	8.1	<0.44	<0.05	0.64	<0.061		19	<10
	9/29/00	10:20	S		51100	0.8	8	<0.44	<0.05	0.68	0.214		<10	<10
	9/29/00		M		51400	0.85	8	<0.44	<0.05	0.73	0.184		<10	<10
	9/29/00		B	22.9	52600	0.55	8.1	<0.44	<0.05	0.57	0.122		<10	<10
	10/27/00	12:15	ST		44100	2.2	8.1	0.58	0.106	0.7	0.0949		<10	<10
	10/27/00			22.9										
	10/29/00	9:00	ST		44100	1.9	7.9	2.5	0.156	0.66	0.171		14	<10
	10/29/00			22.9										
	10/31/00	10:48	ST		45200	1.8	8	2.9	0.187	0.8	0.214		<10	<10
	10/31/00			22.9										
	11/17/00	11:45	S		51200	2.4	8.1	0.6	<0.05	0.67	<0.061		32	<10
	11/17/00		M		52500	2.6	8.1	<0.44	<0.05	0.79	<0.061		32	<10
	11/17/00		B	22.9	50900	2	8.1	<0.44	<0.05	0.73	<0.061		29	<10
	1/11/01	11:10	ST		19100	34	7.8	7.9	0.39	0.6	0.734	0.138	19	<10
	1/11/01			22.9										
	1/13/01	11:00	ST		16100	8.1	7.8	6.9	0.278	0.62	0.765	0.32	<10	<10
	1/13/01			22.9										
	1/15/01	13:32	ST		39900	1.3	2.8	2.7	0.212	1.1	0.275	0.12	20	<10
	1/15/01			22.9										
	3/6/01	12:04	ST		35570	8	7.9	6.5	0.206	0.66	0.337		14	<10
	3/6/01			19.6										
	3/8/01	13:36	ST		39540	2.1	8	2.3	0.12	0.45	0.153		<10	<10
	3/8/01			16.4										
	3/10/01		ST		40730	3.5	8	1.8	0.087	0.73	0.153		29	<10
	3/10/01			16.4										
	3/29/01	13:45	S		45080	3.5	8.2	<0.44	<0.05	0.59	<0.061		<10	<10
	3/29/01		M		44840	5.6	8.2	<0.44	<0.05	0.69	<0.061		15	<10
	3/29/01		B	19.6	46600	6.6	8.2	<0.44	<0.05	0.64	<0.061		32	<10
	4/30/01	14:20	S		42300	1.8	8	0.56	0.093	0.85	0.132		<10	<10
	4/30/01		M		43920	12	8.1	<0.44	<0.05	0.78	0.125		23	<10
	4/30/01		B	19.6	39700	13	8.1	<0.44	0.053	1.2	0.459		22	<10

RMP Bay Sites
Lower Newport Bay - Harbor Island Reach

STATION	DATE	TIME	SAMPLE Depth	Maximum Depth (ft)	EC µmhos	Turb NTU	pH	NO_3 mg/L	NH_3 mg/L	TKN mg/L	PO_4 mg/L	o-PO_4 mg/L	TSS mg/L	VSS mg/L
LNBHIR	6/6/01		S		45090	3.5	8	<0.44	<0.05	0.64	0.0612		<10	<10
	6/6/01		M		45200	4.5	8	<0.44	<0.05	0.62	0.0612		<10	<10
	6/6/01		B	*UNK	42360	0.15	5.6	4	0.178	0.93	1.62		14	<10
	6/27/01	15:00	S		44120	6.4	8.1	<0.44	<0.05	0.64	0.122	0.028	11	<10
	6/27/01		M		44400	5.2	8.1	<0.44	<0.05	0.55	0.122	0.016	27	<10
	6/27/01		B	16.4	45380	5.6	8.1	<0.44	<0.05	0.66	0.0612	0.013	21	<10

*UNK - Unknown (YSI Probe failure)

RMP Bay sites

Lower Newport Bay - Harbor Island Reach

Date	Time	Depth(m)	EC(μmhos)	Temp(C)	pH	DO(ppm)
7/28/00	9:45	0.0	52500	23.2	7.1	6.5
		1.0	52600	23.0	7.0	6.5
		2.0	52900	22.8	7.0	6.5
		3.0	53000	22.7	6.9	6.4
		4.0	53200	21.8	6.7	6.5
		5.0	53600	21.3	7.0	7.1
		6.0	53600	21.2	7.1	7.1
9/15/00	11:00	0.0	51200	21.8	8.0	8.8
		1.0	51410	21.2	8.0	8.7
		2.0	51900	20.7	8.0	8.5
		3.0	52000	20.3	8.0	8.5
		4.0	52200	20.2	8.0	8.5
		5.0	52300	20.2	8.1	8.6
		6.0	52400	20.1	8.1	8.7
9/29/00	10:20	0.0	52260	21.9	8.1	7.7
		1.0	52290	21.2	8.1	7.9
		2.0	52400	20.7	8.1	8.0
		3.0	52500	20.6	8.1	8.1
		4.0	52600	20.8	8.1	8.3
		5.0	52700	20.0	8.1	8.5
		6.0	52800	20.0	8.1	7.0
		7.0	52900	19.8	8.1	9.8
10/29/00	9:00	0.0	43000	18.6	7.5	3.6
		1.0	44900	18.6	7.4	4.0
		2.0	51200	18.6	7.4	4.0
		3.0	51200	18.6	7.3	4.1
		4.0	51200	18.6	7.2	5.0
		5.0	51100	18.6	7.1	5.2
		6.0	51100	18.6	7.1	5.2
		7.0	51000	18.6	7.1	5.4
10/27/00	12:15	0.0	39740	18.8	7.9	4.2
		1.0	42970	18.8	7.9	4.2
		2.0	42500	18.9	7.9	4.3
		3.0	42600	18.7	7.9	4.2
		4.0	41910	18.7	7.9	4.2
		5.0	42170	18.7	7.9	4.2
		6.0	41200	18.8	7.8	4.1
		7.0	43000	17.8	7.8	4.2
10/31/00	10:48	0.0	44850	18.6	7.9	6.6
		1.0	47450	18.7	7.9	6.7
		2.0	49570	18.8	7.9	7.1
		3.0	50670	18.6	7.9	6.4
		4.0	51100	18.5	7.9	7.7
		5.0	51800	18.3	7.9	7.7
		6.0	51900	18.1	7.9	7.4
		7.0	52000	18.0	7.9	7.5

RMP Bay sites

Lower Newport Bay - Harbor Island Reach

Date	Time	Depth(m)	EC(μmhos)	Temp(C)	pH	DO(ppm)
11/17/00	11:45	0.0	50100	15.3	7.6	5.6
		1.0	50200	15.4	7.6	6
		2.0	50900	15.4	7.6	5.4
		3.0	51060	15.3	7.6	4.6
		4.0	51110	15.2	7.6	4.5
		5.0	51000	15.4	7.6	4.8
		6.0	51000	15.4	7.6	4.8
		7.0	51000	15.3	7.6	4.1
1/11/01	13:10	0.0	18380	12.9	7.1	6.5
		1.0	29270	13.1	7.6	6
		2.0	35630	13.9	7	5.5
		3.0	47220	14.3	6.9	5
		4.0	48710	14.2	7	5.4
		5.0	49810	14.3	7	9.9
		6.0	49800	14.4	6.9	5.4
		7.0	50130	14.5	6.7	4.6
1/13/01	11:00	0.0	15730	11.2	7.2	-
		1.0	22710	11.3	7.2	-
		2.0	44920	12.9	7.2	-
		3.0	48710	14.3	7.1	-
		4.0	49670	14.8	7.1	-
		5.0	50000	14.8	7.1	-
		6.0	50000	14.6	7.1	-
		7.0	49900	14.0	7.1	-
1/15/01	13:32	0.0	38710	13.8	6.8	UNK
		1.0	41000	13.9	6.7	UNK
		2.0	45500	14.3	6.6	UNK
		3.0	50070	14.6	6.6	UNK
		4.0	50620	14.7	6.6	UNK
		5.0	50900	14.7	6.6	UNK
		6.0	51000	14.7	6.6	UNK
		7.0	51000	14.7	6.7	UNK
3/6/01	12:04	0.0	38230	14.9	8.1	6
		1.0	38630	14.8	8	5.9
		2.0	39970	14.7	7.9	6.4
		3.0	45630	14.5	7.9	6.4
		4.0	48830	14.3	7.9	6.1
		5.0	49540	14.2	7.9	7
		6.0	49790	14.1	8	6.5
3/8/01	13:36	0.0	65290	16.7	7.8	3.3
		1.0	65230	16.3	7.2	2.3
		2.0	66330	16.0	7.2	2.5
		3.0	66990	15.5	7.2	2.2
		4.0	67830	14.8	7.3	1.9
		5.0	68360	14.7	7.2	2

RMP Bay sites

Lower Newport Bay - Harbor Island Reach

Date	Time	Depth(m)	EC(μmhos)	Temp(C)	pH	DO(ppm)
3/10/01		0.0		15.6	7.3	
		1.0		15.6	7.2	
		2.0		15.6	7.2	
		3.0		15.6	7.2	
3/29/01	13:45	0.0	49900	18.6	8.1	9.8
		1.0	49900	18.1	8.1	9.7
		2.0	50100	17.7	8.1	9.8
		3.0	50300	17.4	8.1	9.6
		4.0	50400	17.1	8.1	9.1
		5.0	50600	16.7	8	8.7
		6.0	50600	16.6	8	8.2
4/30/01	14:20	0.0	40620	19.0	7.93	7.33
		1.0	41070	18.4	7.95	7.24
		2.0	41390	17.9	7.96	7.13
		3.0	41890	17.1	7.99	7.27
		4.0	41910	16.9	7.99	7.14
		5.0	42260	16.2	7.99	7.06
		6.0	42440	15.6	8	7.05
6/27/01	15:00	0.0	109700	24.9	7.8	7
		1.0	110800	24.3	7.8	6.1
		2.0	110900	23.7	7.8	6.5
		3.0	113000	23.6	7.7	6
		4.0	113100	23.5	7.7	5.9
		5.0	113000	22.9	7.7	5.9

RMP Bay sites

Lower Newport Bay - Harbor Island Reach

Date	Time	Depth(m)	EC(μmhos)	Temp(C)	pH	DO(ppm)
3/10/01		0.0		15.6	7.3	
		1.0		15.6	7.2	
		2.0		15.6	7.2	
		3.0		15.6	7.2	
3/29/01	13:45	0.0	49900	18.6	8.1	9.8
		1.0	49900	18.1	8.1	9.7
		2.0	50100	17.7	8.1	9.8
		3.0	50300	17.4	8.1	9.6
		4.0	50400	17.1	8.1	9.1
		5.0	50600	16.7	8	8.7
		6.0	50600	16.6	8	8.2
4/30/01	14:20	0.0	40620	19.0	7.93	7.33
		1.0	41070	18.4	7.95	7.24
		2.0	41390	17.9	7.96	7.13
		3.0	41890	17.1	7.99	7.27
		4.0	41910	16.9	7.99	7.14
		5.0	42260	16.2	7.99	7.06
		6.0	42440	15.6	8	7.05
6/27/01	15:00	0.0	109700	24.9	7.8	7
		1.0	110800	24.3	7.8	6.1
		2.0	110900	23.7	7.8	6.5
		3.0	113000	23.6	7.7	6
		4.0	113100	23.5	7.7	5.9
		5.0	113000	22.9	7.7	5.9

Appendix E
An Analysis of the Decline of Nuisance Macroalgae (Seaweed) in Newport Bay - Estuary : 1996-2001

DRAFT

AN ANALYSIS OF THE DECLINE OF NUISANCE MACROALGAE (SEAWEED) in NEWPORT BAY-ESTUARY, 1996-2001

Report to: Orange County Public Facilities & Resources Department

Alex Horne Associates

November 2001

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1. SUMMARY

Biomass and species of large attached macroalgae (seaweed) were measured in the intertidal zone of Upper Newport Bay during the estimated period of maximum biomass in mid-summer 1996-2001. Biomass, species composition and spatial patterns were assessed.

1.1. Biomass of seaweeds. The annual average macroalgae midsummer biomass index in Upper Newport Bay fell dramatically over the last six years. From an initial value of 1.8 kg/m^2 in 1966 seaweed biomass had fallen 58 % to 0.76 kg/m^2 by 2001. Nuisance seaweed in Upper Newport Bay gradually declined by 12-18 % in the first two years and fell by 47% after four years. The 1999 increase was attributed to ammonia released during dredging. If the dredging year is omitted, the regression (R^2 = 0.993) indicates that the entire decline in seaweeds was explained by the passage of time. The observed declines can best be explained by a gradual decline in nitrate flowing into the estuary from the San Diego Creek. Possible contributing factors are (i) the gradually increase in nitrate removal from the creek by the Irvine Ranch Water District's San Joaquin Marsh, (ii) lower than normal rainfall in 1999-200l and (iii) the on-going efforts of the Santa Ana Regional Water Quality Board and environmental groups to reduce nitrate in the watershed. These factors will be examined in other reports.

1.2. Species distribution and distribution. Over an all six years, three genera of attached macroalgae; *Ulva* (sea lettuce), *Enteromorpha* (sea confetti) and *Centroceras* were common in Newport Bay. In general, *Ulva* was more dominant in the upper and middle sections of the estuary while *Enteromorpha* dominated in the most seaward section. Although abundant locally in the 1970s-1980s, growths of these three seaweeds are now uncommon in Lower Newport Bay between the PCH Bridge and the Ocean. The spatial pattern of biomass distribution in Upper Newport Bay over the five years showed that dense seaweed (> 1.3 kg/m^2) was at first found at almost all stations (84%) above the Sculling Boat Club (Sta. #4-24). Perhaps not coincidentally, most of these stations were characterized by a soft muddy substrate relative to the firmer sand of stations 1-3. In 2000 dense biomass occurred in only 44% of stations 4-24 and was restricted to the two apparently most favorable sub-regions within the bay. Both of these areas were characterized by very soft mud: stations 10-13 in the extensive mud flats on the east side of the central Bay and 16-18, a narrow strip in the channel just upstream of the Salt Works Dike. For the lesser number of stations assayed in 2001, the earlier general patterns persisted but now only one site exceeded 1.3 kg/m^2. In terms of beneficial use impairment the extensive central section would exert the most effect on the bay due to its large size. Thus if further nutrient reduction in infeasible, dredging of some of this large mudflat would probably suffice to restore any still unmet beneficial uses to the upper estuary.

1.3. Increase in seaweed in 1999. The six-year decline in nuisance seaweed was interrupted by the 1999 season where the highest ever mean biomass, 2.4 kg/m2 was recorded. Dredging of rich organic sediments was carried out over the entire seaweed growth season in 1999. Dredging is known to release large amounts of ammonia that would stimulate seaweed growth and is most likely the reason for the aberrant 1999 seaweed increase.

2.0. METHODS

2.1. OBSERVATIONS AND COLLECTIONS

Macroalgae were collected on 28 July 1999, 31 July- 1 August 2000 in the same manner as in previous years (AHA, 1996, 1997, 1998). Seaweed samples in 1999 were collected at 22 of the 24 (1999) and 21 (2000) intertidal sites used previously. In 2001 a different system was instituted collecting in mid-summer only at 8 stations but collecting at 3 time (2001) and 4 times (2001). At these sites triplicate randomly located samples were harvested. Seaweed was collected by hand from quadrats of approximately 0.1 m^2 area, picked clean on any debris, washed in clean local seawater, spun damp dry in a field centrifuge, and immediately weighed on site using a field balance. Samples of seaweed needed for nitrogen and phosphorus content and dry weight analysis were treated similarly, enclosed in plastic bags, kept cool, and were delivered to the laboratory within a few hours of collection. Analysis of dry weight, nitrogen and phosphorus in samples was in accordance with Standard Methods (APHA, 1997).

3.0. RESULTS

3.1. UPPER NEWPORT BAY BIOMASS DISTRIBUTION AND SPECIES COMPOSITION

3.1.1. Biomass Distribution: 1999. The amount of fresh weight of macroalgae in each station is shown in Table 1 and Figure 1. The average biomass of all species of macroalgae in Upper Newport Bay in summer 1999 was 2.4 kg/m^2 as fresh weight if all 22 stations collected are used (Table 1). If only the stations in the main Upper Bay (4-24) are considered the 1999 mean biomass (Sta. 4-24) is 2.6 kg/m^2. The range of sample biomass estimates from all 66 collections was 0.008 – 8.5 kg/m^2 and for the 22 station means the range was 0.008 – 7.4 kg/m^2. Peak biomass occurred in station 16 (Fig. 2). This sites faces downwind (downstream) of large open water and the high biomass may have been enhanced with drift weed. However, little drift weed was observed in the open water and the seaweed found in station 15 appeared healthy, indicating it had not drifted in several days previously.

3.1.2. Species composition: 1999. The percentage of the major algal species was also estimated from each quadrat and is shown in Table 1. In Upper Newport Bay, as in past years, three genera of attached macroalgae, the two green genera Ulva (sea lettuce), *Enteromorpha* (confetti) and the small brown form *Centroceras* were common in Newport Bay. In July 1999, *Ulva* and *Enteromorpha* were both common, with *Ulva* present in 51 samples (82%) and *Enteromorpha* present in 47 or 48 samples (76% or 77%). At station 24, *Enteromorpha* was possibly present although another filamentous alga was present making identification uncertain. *Ulva* dominated seaweed biomass in 35% of samples, and *Enteromorpha* dominated in 53% of samples. *Ulva* and Enteromorpha were co-dominant in 5% of the samples. *Centroceras* dominated two samples (3%) and was co-dominant with *Ulva* in 1 sample (2%). Two samples were dominated by an unknown filamentous alga, likely *Cladophora*. *Enteromorpha* tended to dominate at both ends of the estuary (stations 1 – 8 and 21-22) while *Ulva* tended to dominate in the middle stations (9-20).

3.2.1. Biomass Distribution: 2000. The amount of fresh weight of macroalgae in each station is shown in Table 2. The average biomass of all species of macroalgae in Upper Newport Bay in summer 2000 was 0.96 kg/m^2 as fresh weight if all 21 stations collected were used (Table 2). If only the stations in the main Upper Bay (4-24) are considered the 2000 mean biomass (Sta. 4-24) was kg/m^2. The range of individual sample biomass estimates from all collections was 0.02 – 3.7 kg/m^2 and for the 21 station means the range was 0.02 – 2.1 kg/m^2. Peak biomass occurred at stations 13 and 18. These sites have always provided good habitat for intertidal seaweeds, although they were not always more productive in previous years. Unlike previous years, algae at the stations with most biomass did not appear to be healthy, and had a yellow-green rather than a brighter green hue. This yellow color often indicates a lack of nitrogen in the plant.

3.2.2. Species composition: 2000. In 2000 species composition changed in the estuary, especially at the lower end furthest away from the San Diego Creek inflow. There was only a trace of intertidal algae growing in this region from the PCH Bridge to the Black Sail Beach Club. Some dying ocean kelp was found that had drifted in from the open sea. Of the small amount of living attached algae present, *Enteromorpha* was absent from the lowest regions of the estuary and was replaced by the filamentous green algae *Cladophora*. In the lower section of the estuary *Enteromorpha*, *Centrocerus* and *Cladophora* occupied almost entire sites in a patchy fashion with no clear order to dominance. *Ulva* did not appear in 2000 until station 9.

3.3.1. Biomass Distribution: 2001. The amount of fresh weight of macroalgae in each station is shown in Table 3. The average biomass of all species of macroalgae in Upper Newport Bay in summer 2001 was 0.76 kg/m^2 as fresh weight for the reduced number of stations (8) used (Table 3). The range of individual sample biomass estimates from all collections was 0.003 – 2.63 kg/m^2 and for the 8 station means the range was 0.019-2.01 kg/m^2. Peak biomass occurred at station 7 and the next two highest values were at stations 16 and 19. These sites have always provided good habitat for intertidal seaweeds, although station 16 can be influenced by drift accumulation of *Enteromorpha*.

3.3.2. Species composition: 2001. The percentage of the major algal species was also estimated from each quadrat and is shown in Table 3. As in all six years of quantitative record, three genera of attached macroalgae, the two green genera *Ulva* (sea lettuce), *Enteromorpha* (confetti) and the small brown form *Centroceras* were common in Newport Bay. The Cladophora that had been common in a few sites in 2000 was not found in any quantity in mid summer 2001. At the index time, in July 2001, *Ulva* and *Enteromorpha* were both common, with *Ulva* present in 20 samples (83%) and *Enteromorpha* present in 23 samples (96%). *Ulva* each dominated seaweed biomass in half of the sample and *Enteromorpha* dominated in the other half. *Ulva* and *Enteromorpha* were co-dominant in only 1 (4%) of the samples. *Centroceras* was usually present in small amounts (~ 5%) and reached 30% of the biomass in only one sample at station 24 at the uppermost end of the estuary. *Enteromorpha* tended to dominate at both ends of the estuary (stations 2 – 7 and 24) while *Ulva* tended to dominate in the middle stations (9-19).

3.4. RELATIVE CHANGES IN NUISANCE SEAWEEDS 1996-2001

The percentages changes from year to year and across years are shown in Table 4. The overall decline in the simple mean (all data from all stations averaged) was 58% between 1996 and 2001 (Table 1). The mean seaweed biomass for all stations declined about 10% per year between 1996 and 1998, but increased by about 60% percent between 1998 and 1999 following the sediment dredging (Complete mean at top of Table 4). A similar approximately 60% drop in seaweed biomass occurred between 1999 and 2000, presumably because the ammonia produced by dredging had been rapidly washed out to sea. In the final year of record so far a further drop of 21% occurred between 2000 and 2001.

Omitting the lower stations 1-3 that focuses most attention to areas of the main Upper Newport Bay where seaweed is high. In this region the decline was about 11 %/y between 1996 and 1998, increased 60 percent between 1998 and 1999

3.5. TOTAL NITROGEN AND PHOSPHORUS IN SEAWEED FROM UPPER NEWPORT BAY COLLECTED ON 1 AUGUST 2000

Nitrogen in the seaweed in Upper Newport Bay ranged from 1,800 to 4,000 mg/kg wet wt (0.18 – 0.4% wet wt or about 1.8-4 % dry wt. Table 5). Phosphorus in the samples ranged from 300 – 436 mg/kg wet wt (0.03-0.04% wet wt. or about 0.3-0.4% dry wt.). The mean ratio of N:P is thus 7.4:1 . This indicates an overall tendency for nitrogen limitation in the seaweeds. Values below 10:1 indicate N limitation; values above 10:1 show phosphorus limitation. Since the emphasis for seaweed control in the past has been on nitrate control in the watershed, the low N:P ratio shows that this strategy could be continued with the aim of further reducing nuisance seaweeds if required.

In terms of individual sites in Upper Newport Bay, the range of N:P ratios from a high of 10.5 to a low of 5.9 (Table 5). The lowest values were found furthest away from the inflow of San Diego Creek, which is logical if the main source of nitrogen is from the creek. In turn, the N:P ratio indicates that sediments are not an important source of nitrogen for the seaweeds in summer. Since sediment-N is regulated under the total nitrogen winter flow TMDL, this target may need to be reconsidered.

AUTHORS, TEAM MEMBERS AND ANALYTICAL SERVICES

This report was prepared by Alex J. Horne, Ph.D. (Alex Horne Associates) with assistance from Marcie Commins, Ph.D. (Commins Consulting). Field sampling was conducted by in 1999 by Alex Horne and James C. Roth, Ph.D. and with the assistance of Matt Tucker and Mary Brill (Orange County Public Facilities & Resources Department. In 2000 Orange County PF& RD took over the collection and treatment of the seaweeds. Marcie L. Commins, Ph.D. assisted with data analysis and figure preparation. Associated Laboratories, Orange, CA, carried out analyses of and nitrogen and phosphorus content of the seaweeds.

Table 1. Fresh biomass and species composition for macrophytes in Upper Newport Bay on 28 July 1999. The distance (dist) is distance in km from the estuary mouth; values for three replicates (a-c) and the mean are given in kg/m^2 fresh weight. The percentage composition of the dominant macroalgae in each replicate is shown as a percentage of the total (U = *Ulva*, E = *Enteromorpha*, C = *Centrocerus*, Cl = *Cladophora*)

Stn #	Dist.	Rep A	rep B	rep C	Mean	rep A	rep B	rep C
1	5.0	0.008	0.008	0.008	0.008	100% E	100% E	100% E
2	5.8	0.40	2.1	2.9	1.8	100% E	100% E	100% E
3	6.1	3.78	1.6	0.71	2.0	98% E, 2% U	100% E	100% E
4	6.6	0.9	2.3	2.7	2.0	100% E	100% E	100% E
5	6.8	0.0	2.9	5.6	2.9	99% E, 1% U	100% E	100% E
6	7.1	2.0	1.9	4.5	2.8	95% E, 5% U	95% E, 5% U	100% E
7	7.4	5.62	0.3	0.1	2.0	99% E, 1% U	85% E, 15% U	80% E, 20% U
8	7.6	0.1	0.11	0.38	0.21	75% E, 25% U	85% E, 15% U	85% E, 15% U
9	8.2	2.6	0.04	0.86	1.2	95% U, 5% C	50% U, 50% C	30% U, 70% C
10	8.2	0.90	1.2	1.0	1.0	95% U, 5% E	96% U, 2% E, 2% C	93% U, 2% E, 5% C
11	8.7	1.60	0.92	1.94	1.5	99% U, 1% C	95% U, 5% C	75% U, 25% C
12	8.9	2.1	1.70	1.9	1.9	100% U	80% U, 20% E	100% U
13	9.1	2.6	6.3	2.5	3.8	100% U	100% U	100% U
14	9.2	2.9	1.8	1.8	2.2	100% U	50% U, 50% E	80% U, 20% E
15	9.2	6.2	8.5	7.5	7.4	40% E, 60% U	97% E, 2% U, 1% C	86% E, 13% U, 1% C
16	9.2	2.1	1.3	0.51	1.3	100% U	100% U	100% U
17	10.0	4.57	1.4	1.8	2.6	72% U, 28% E	98% U, 2% E	100% U
18	10.1	2.96	3.8	1.31	2.7	100% E	100% E	80% U, 20% E
19	10.2	2.90	1.7	2.1	2.2	50% U, 50% E	100% U	90% U, 10% E
21	10.5	3.60	1.9	3.9	3.1	50% U, 50% E	90% E, 10% U	75% E, 25% U
23	10.8	6.7	3.4	5.5	5.2	95% E, 5% U	90% E, 10% U	80% E, 20% U
24	10.8	3.9	2.6	4.1	3.6	25% E, 2% U, 73% Cl?	2% U, 98% E&Cl?	100% Cl?
Mean		**2.7**	**2.1**	**2.4**	**2.4**			

Table 2. Fresh biomass and species composition for macrophytes in Upper Newport Bay on July 31-1 August 2000. The distance (dist) is distance in km from the estuary mouth, values for three replicates (a-c) and the mean are given in kg/m^2 fresh weight. The percentage composition of the dominant macroalgae in each replicate is shown as a percentage of the total (U = *Ulva*, E = *Enteromorpha*, C = *Centrocerus*, Clado = *Cladophora*)

Stn #	Dist.	Rep A	rep B	Rep C	Mean	rep A	rep B	rep C
1	5.0	0.020	0.020	0.020	0.020	Clado*	Clado	Clado
2	5.8	0.020	0.020	0.020	0.020	5% Clado	5% Clado	5% Clado
3	6.1	0.30	0.063	0.047	0.137	90%E, 10%U	90% C, 10%E	70% C, 15% U, 15% E
4	6.6	0.269	0.221	0.427	0.305	100% E	100% E	100% E
5	6.8	0.198	0.198	0.198	0.198	Trace E	Trace E + U	Trace E
6	7.1	ND	ND	ND	ND			
7	7.4	0.758	0.411	1.280	0.816	100% Clado	90% Clado	100% Clado
8	7.6	1.596	1.611	0.995	1.40	100% E	100% E	100% E
9	8.2	0.427	0.269	0.30	0.332	98% E, 2% C	90%U, 10% C	40%U, 30%E, 30% C
10	8.2	0.237	2.718	2.75	1.90	90% E, 10%U	60%E, 40% C	ND
11	8.7	1.64	1.69	1.31	1.55	95% C, 5% U	ND	90%C, 5%U, 5% E
12	8.9	1.63	0.30	0.57	0.83	50%U, 50% C	50%U, 50% C	50%U, 50% C
13	9.1	1.47	0.98	3.68	2.04	90%E, 9%U, 1%C	98%U, 2% C	95%C, 5% U
14	9.2	0.03	0.32	0.19	0.18	100% C	95%C, 5%U	100%C
15	9.2	1.07	1.14	0.13	0.77	50%U, 50% E	50%U, 50% E	100%U
16	9.2	0.98	3.44	1.15	1.86	95%U, 5%C	95%U, 5%C	95%U, 5%C
17	10.0	1.49	1.42	0.99	1.30	100% U	100% U	100% U
18	10.1	2.29	1.56	2.53	2.13	100% U	100% U	100% U
19	10.2	1.42	0.85	1.42	1.23	100% U	100% U	100% U
20		nd	nd	nd	Nd			
21	10.5	1.20	0.88	1.42	1.17	50%U, 50% E	50%U, 50% E	90%U, 10% E
22		nd	nd	nd	Nd			
23	10.8	0.50	2. 05	0.36	0.97	50%U, 50% E	50%U, 50% E	nd
24	10.8	1.17	1.66	1.01	1.28	98%U, 2% E	95%U, 5% E	98%U, 2% E
Mean					**0.96**			

*Claco = No normal algae, some drift kelp (not in quadrats) and small amounts of the common filamentous green algae Cladophora (blanket weed). Nd = no data.

Table 3. Fresh biomass and species composition for macrophytes in Upper Newport Bay on July 26 2001. Only 8 sites were sampled in 2001 rather than the 20-24 in 1996-2000. The distance (dist) is distance in km from the estuary mouth, values for three replicates (a-c) and the mean are given in kg/m^2 fresh weight. The percentage composition of the dominant macroalgae in each replicate is shown as a percentage of the total (U = *Ulva*, E = *Enteromorpha*, C = *Centrocerus*, Cl = *Cladophora*). Less stations were sampled in 2001 a this date

Stn #	Dist.	Rep A	rep B	Rep C	Mean	rep A	rep B	rep C
2	5.8	0.043	0.003	0.012	0.019	95% E, 5% U	90%E, 10%E	99%E, 1%U
4	6.6	0.335	0.667	0.001	0.334	95%E, 5%C	95%E, 5%C	100%E
7	7.4	1.35	2.63	2.04	2.01	95% E, 5% U	95% E, 5% U	95% E, 5% U
9	8.2	0.065	0.635	1.33	0.678	100%U	10%U, 40%E, 50%C	80%U, 15%E, 5%C
13	9.1	0.130	0.917	0.805	0.617	95%U, 5%E	75%U, 20%E, 5%C	90%U, 9%E, 1%C
16	9.2	0.149	2.84	0.229	1.07	90%U, 19%E	95%U, 5%E	95%U, 5%E
19	10.2	1.14	1.48	0.479	1.03	95%U, 5%E	85%U, 10%, 5%C	80%U, 15%10, 5%C
24	10.8	0.863	0.057	0.07	0.330	30%U, 40%E, 30%C	5%U, 90%E, 5%C	5%U, 90%E, 5%C
Mean					**0.76**			

Table 4. Various ways of determining the mean declines in seaweed biomass for Upper Newport Bay 1996-2001						
	Percent change between Years					
Type of average	96-97	97-98	98-99	99-00	00-01	96-01
1. mean	-13	-8	+65	-60	-21	-58
2. 20 Stations	-15	-4	+58	-58	-	-
3. Omit 1-3	-11	-11	+60	-57	-	-
Average	**-13**	**-8**	**+61**	**-58**	**-**	**-**

*Biomass over the three years has been averaged in three ways: (1) All data for each year (different # n), (2) Only similar stations (i.e. always same station numbers compared), and (3) Omit sta # 1-3 which are outside the main Upper Newport Bay. w = site washed away by El Nino floods, b = site too near skimmer colony, in = inaccessible for regular sampling (water too shallow for too long).

Table 5. Nitrogen and phosphorus concentrations in seaweeds from the main part of Upper Newport Bay collected on 1 August 2000. Values were converted from wet to dry wt by multiplying by 10. Species present were Cladophora (Clado), Ulva, and Enteromorpha (Ent). Site locations are shown on the map, Figure 1.

Station/species	**Nitrogen %**	**Phosphorus %**	**Tissue N:P ratio**
Station 7A Clado	1.78	0.301	5.9:1
Station 13B Ulva	2.33	0.382	6.1:1
Station 21 Ulva/Ent	3.98	0.377	10.5:1
Station 24A Ulva	2.89	0.436	6.6:1
Mean	**2.75**	**0.374**	**7.4:1**

Trend analysis of nuisance seaweeds in Upper Newport Bay 1996-2001. The 1999 data, shown as a cross, has been omitted from the statistical regression since the system was perturbed by dredging.

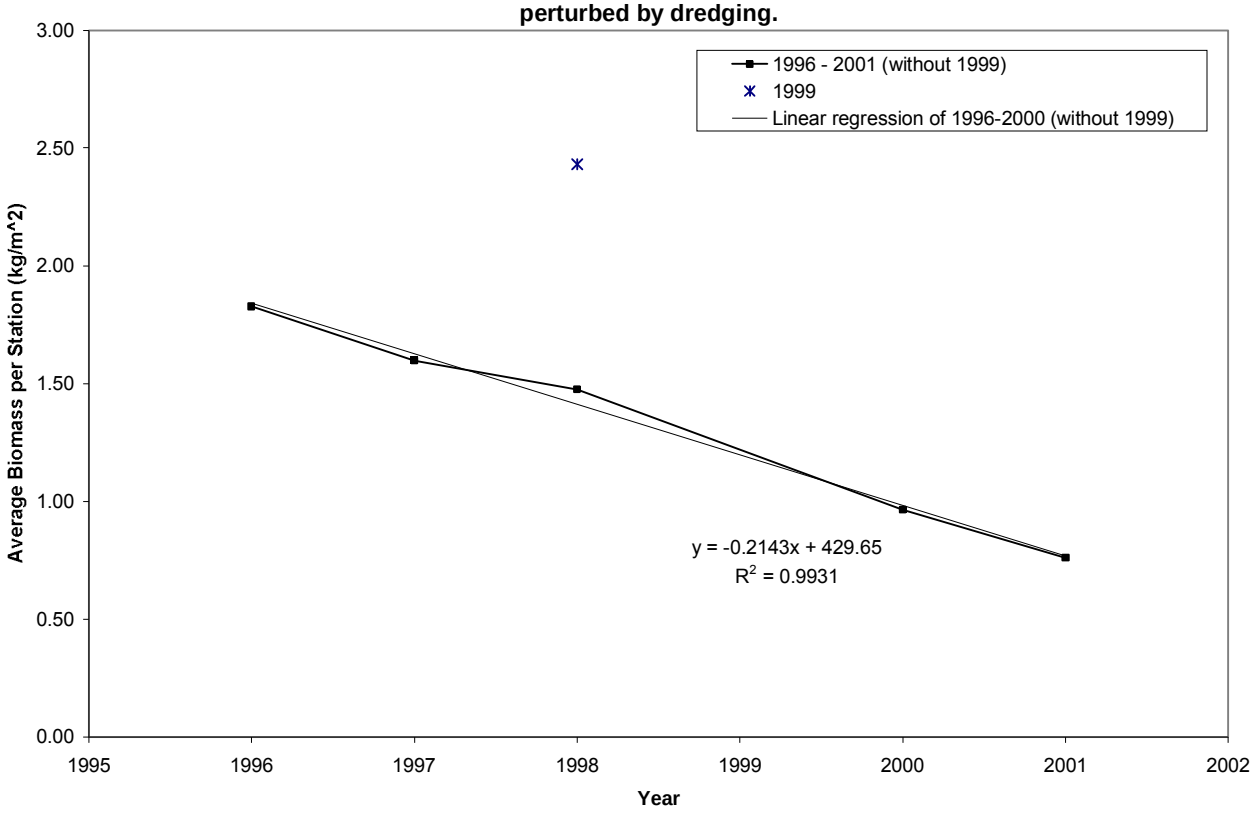

Average Biomass per Station
Dec 2000 through Oct 2001

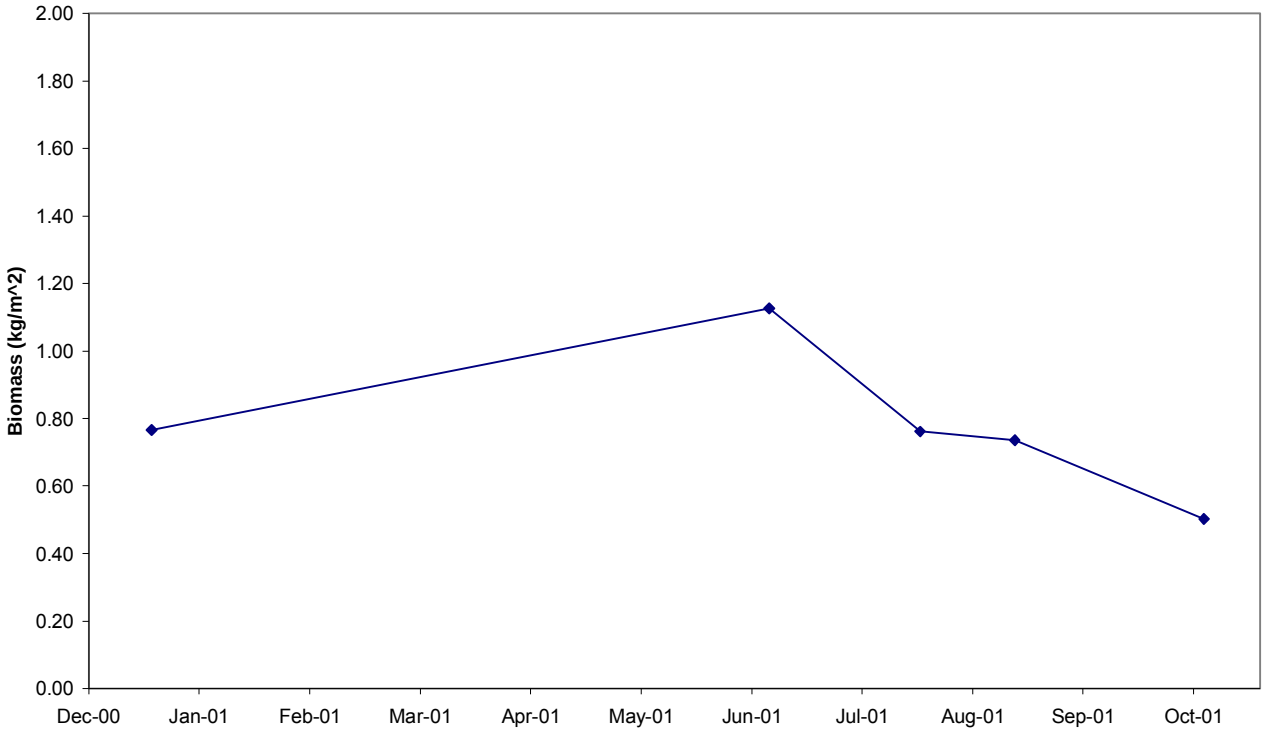

APPENDIX U

QUALITY ASSURANCE/QUALITY CONTROL SUMMARY

Analyses of Synthetically Prepared Samples: 00/01

			Nutrient Analyses							Trace Metal Analyses						
										5	40	10	10	20	10	50
Date	Sample #	Laboratory	NO3 mg/L	NH3-N mg/L	TKN mg/L	PO4 mg/L	Date	Sample #	Laboratory	Cd ug/L	Cr ug/L	Cu ug/L	Pb ug/L	Ni ug/L	Ag ug/L	Zn ug/L
								Synthetic Samples								
Jul 27	WR 36663	Mont.-Wat.	1.80	0.25	0.48	0.40	Jul 19	WR 36609	Weck	49	93	47	47	44	39	77
	laboratory		1.82	0.26	2.60	0.35		Laboratory		50	100	50	50	50	50	100
	difference		0.02	0.01	2.12	-0.05		difference		1.00	7.00	3.00	3.00	6.00	11.00	23.00
	% difference		1.11	2.77	441.67	-12.06		% difference		2.04	7.53	6.38	6.38	13.64	28.21	29.87
Jul 28	WR36689	Mont.-Wat.	0.66	0.105	0.61	0.367	Sep 27	WR 36966	Weck	16	49	15	15	110	15	50
	laboratory		0.73	0.13	0.60	0.35		Laboratory		15	50	15	15	120	15	50
	difference		0.07	0.03	-0.01	-0.02		difference		-1.00	1.00	0.00	0.00	10.00	0.00	0.00
	% difference		10.61	23.81	-1.64	-4.63		% difference		-6.25	2.04	0.00	0.00	9.09	0.00	0.00
Aug 4	WR36719	Mont.-Wat.	<0.44	<0.05	<0.20	0.122	Oct 4	WR 36997	Weck	16	50	15	14	120	15	50
	laboratory		<0.44	<0.05	<0.20	<0.06		Laboratory		16	50	15	15	120	15	50
	difference		0.00	0.00	0.00	-0.06		difference		0.00	0.00	0.00	1.00	0.00	0.00	0.00
	% difference		0.00	0.00	0.00	-50.00		% difference		0.00	0.00	0.00	7.14	0.00	0.00	0.00
Aug 30	WR36839	Mont.-Wat.	0.7	0.26	0.49	0.459	Oct 27	WR 37140	Weck	10	46	11	10	25	8.1	17
	laboratory		0.73	0.26	0.73	0.35		Laboratory		12	40	12	12	25	12	20
	difference		0.03	0.00	0.24	-0.11		difference		2.00	-6.00	1.00	2.00	0.00	3.90	3.00
	% difference		4.29	0.00	48.98	-23.75		% difference		20.00	-13.04	9.09	20.00	0.00	48.15	17.65
Sep 1	WR36851	Mont.-Wat.	1.7	0.262	2.2	0.459	Oct 27	WR 37110	Weck	31	90	30	29	98	34	74
	laboratory		1.82	0.26	2.60	0.35		Laboratory		40	100	40	40	100	40	100
	difference		0.12	0.00	0.40	-0.11		difference		9.00	10.00	10.00	11.00	2.00	6.00	26.00
	% difference		7.06	-0.76	18.18	-23.75		% difference		29.03	11.11	33.33	37.93	2.04	17.65	35.14
Sep 15	WR36879	Mont.-Wat.	11	1.3	1.2	1.65	Oct 29	WR 37155	Weck	48	100	46	46	54	47	90
	laboratory		9.12	1.31	2.24	1.74		laboratory		50	100	50	50	50	50	100
	difference		-1.88	0.01	1.04	0.09		difference		2.00	0.00	4.00	4.00	-4.00	3.00	10.00
	% difference		-17.09	0.77	86.67	5.45		% difference		4.17	0.00	8.70	8.70	-7.41	6.38	11.11
Sep 22	WR36944	Mont.-Wat.	<0.44	<0.05	<0.20	<0.06	Oct 31	WR 37250	Weck	9.9	45	11	11	24	9	17
	laboratory		<0.44	<0.05	<0.20	<0.06		Laboratory		12	40	12	12	25	12	20
	difference		0.00	0.00	0.00	0.00		difference		2.10	-5.00	1.00	1.00	1.00	3.00	3.00
	% difference		0.00	0.00	0.00	0.00		% difference		21.21	-11.11	9.09	9.09	4.17	33.33	17.65
Sep 27	WR36966	Mont.-Wat.	40	1.31	1.3	1.74	Oct 31	WR 37200	Weck	46	97	42	45	73	45	83
	laboratory		36.47	1.31	1.31	1.74		Laboratory		50	100	50	50	50	50	100
	difference		-3.53	0.00	0.01	0.00		difference		4.00	3.00	8.00	5.00	-23.00	5.00	17.00
	% difference		-8.83	0.00	0.77	0.00		% difference		8.70	3.09	19.05	11.11	-31.51	11.11	20.48
Oct 6	WR37015	Mont.-Wat.	9.9	1.26	1.3	3.67	Nov 16	WR 37409	Weck	<1	<8	<2	<2	<4	<2	<10
	laboratory		9.12	1.31	1.78	3.49		Laboratory		<1	<8	<2	<2	<4	<2	<10
	difference		-0.78	0.05	0.48	-0.18		difference		0.00	0.00	0.00	0.00	0.00	0.00	0.00
	% difference		-7.88	3.97	36.92	-4.90		% difference		0.00	0.00	0.00	0.00	0.00	0.00	0.00
Oct 12	WR37028	Mont.-Wat.	10	0.638	1.3	1.74	Nov 27	WR 37472	Weck	4.9	25	4.8	5	23	4	30
	laboratory		9.12	0.65	1.12	1.74		Laboratory		5	25	5	5	25	5	30
	difference		-0.88	0.01	-0.18	0.00		difference		0.10	0.00	0.20	0.00	2.00	1.00	0.00
	% difference		-8.80	1.88	-13.85	0.00		% difference		2.04	0.00	4.17	0.00	8.70	25.00	0.00

Analyses of Synthetically Prepared Samples: 00/01

			Nutrient Analyses							Trace Metal Analyses						
										5	40	10	10	20	10	50
Date	Sample #	Laboratory	NO3 mg/L	NH3-N mg/L	TKN mg/L	PO4 mg/L	Date	Sample #	Laboratory	Cd ug/L	Cr ug/L	Cu ug/L	Pb ug/L	Ni ug/L	Ag ug/L	Zn ug/L
Oct 26	WR37095	Mont.-Wat.	18	1.26	1.1	1.71	Nov 27	WR 37473	Weck	<1	<8	<2	<2	<4	<2	<10
	laboratory		18.23	1.31	1.31	1.74		Laboratory		<1	<8	<2	<2	<4	<2	<10
	difference		0.23	0.05	0.21	0.03		difference		0.00	0.00	0.00	0.00	0.00	0.00	0.00
	% difference		1.28	3.97	19.09	1.75		% difference		0.00	0.00	0.00	0.00	0.00	0.00	0.00
Oct 27	WR37140	Mont.-Wat.	19	1.26	1.3	1.77	Nov 27	WR 37474	Weck	<1	<8	<6	<2	<4	<2	15
	laboratory		18.23	1.31	1.31	1.74		laboratory		<1	<8	<2	<2	<4	<2	<10
	difference		-0.77	0.05	0.01	-0.03		difference		0.00	0.00	-3.90	0.00	0.00	0.00	-5.00
	% difference		-4.05	3.97	0.77	-1.69		% difference		0.00	0.00	-66.10	0.00	0.00	0.00	-33.33
Oct 27	WR37110	Mont.-Wat.	4	0.277	1.1	1.56	Nov 27	WR 37475	Weck	<1	<8	<2	<2	<4	<2	<10
	laboratory		3.65	0.26	1.19	1.74		laboratory		<1	<8	<2	<2	<4	<2	<10
	difference		-0.35	-0.02	0.09	0.18		difference		0.00	0.00	0.00	0.00	0.00	0.00	0.00
	% difference		-8.75	-6.14	8.18	11.54		% difference		0.00	0.00	0.00	0.00	0.00	0.00	0.00
Oct 29	WR37155	Mont.-Wat.	4.4	0.236	1	1.65	Nov 27	WR 37476	Weck	<1	<8	<2	<2	<4	<2	<10
	laboratory		3.65	0.26	1.19	1.74		laboratory		<1	<8	<2	<2	<4	<2	<10
	difference		-0.75	0.02	0.19	0.09		difference		0.00	0.00	0.00	0.00	0.00	0.00	0.00
	% difference		-17.05	10.17	19.00	5.45		% difference		0.00	0.00	0.00	0.00	0.00	0.00	0.00
Oct 31	WR37200	Mont.-Wat.	4.1	0.253	1	1.65	Nov 27	WR 37477	Weck	<1	<8	<2	<2	<4	<2	<10
	laboratory		3.65	0.26	1.19	1.74		Laboratory		<1	<8	<2	<2	<4	<2	<10
	difference		-0.45	0.01	0.19	0.09		difference		0.00	0.00	0.00	0.00	0.00	0.00	0.00
	% difference		-10.98	2.77	19.00	5.45		% difference		0.00	0.00	0.00	0.00	0.00	0.00	0.00
Nov 3	WR37368	Mont.-Wat.	3.6	0.229	1.5	0.367	Nov 27	WR 37479	Weck	<1	<8	<2	<2	<4	<2	<10
	laboratory		3.65	0.26	1.19	0.35		Laboratory		<1	<8	<2	<2	<4	<2	<10
	difference		0.05	0.03	-0.31	-0.02		difference		0.00	0.00	0.00	0.00	0.00	0.00	0.00
	% difference		1.39	13.54	-20.67	-4.63		% difference		0.00	0.00	0.00	0.00	0.00	0.00	0.00
Nov 16	WR37403	Mont.-Wat.	41	1.25	1	1.74	Nov 27	WR 37481	Weck	<1	<8	<2	<2	<4	<2	<10
	laboratory		36.47	1.31	1.31	1.74		Laboratory		<1	<8	<2	<2	<4	<2	<10
	difference		-4.53	0.06	0.31	0.00		difference		0.00	0.00	0.00	0.00	0.00	0.00	0.00
	% difference		-11.05	4.80	31.00	0.00		% difference		0.00	0.00	0.00	0.00	0.00	0.00	0.00
Nov 17	WR37436	Mont.-Wat.	4.4	0.626	0.68	0.612	Nov 27	WR 37482	Weck	<1	<8	<2	<2	<4	<2	<10
	laboratory		3.65	0.65	0.65	0.70		laboratory		<1	<8	<2	<2	<4	<2	<10
	difference		-0.75	0.02	-0.03	0.09		difference		0.00	0.00	0.00	0.00	0.00	0.00	0.00
	% difference		-17.05	3.83	-4.41	14.38		% difference		0.00	0.00	0.00	0.00	0.00	0.00	0.00
Nov 21	WR37457	Mont.-Wat.	2.2	0.273	0.8	0.581	Nov 27	WR 37483	Weck	4.5	25	4.4	5.2	24	4	30
	laboratory		1.82	0.26	0.73	0.70		Laboratory		5	25	5	5	25	5	30
	difference		-0.38	-0.01	-0.07	0.12		difference		0.50	0.00	0.60	-0.20	1.00	1.00	0.00
	% difference		-17.27	-4.76	-8.75	20.48		% difference		11.11	0.00	13.64	-3.85	4.17	25.00	0.00
Nov 28	WR37484	Mont.-Wat.	1.9	0.684	1.3	1.68	Nov 28	WR 37484	Weck	34	94	40	41	94	37	80
	laboratory		1.82	0.65	1.12	1.74		Laboratory		40	100	40	40	100	40	100
	difference		-0.08	-0.03	-0.18	0.06		difference		6.00	6.00	0.00	-1.00	6.00	3.00	20.00
	% difference		-4.21	-4.97	-13.85	3.57		% difference		17.65	6.38	0.00	-2.44	6.38	8.11	25.00

Analyses of Synthetically Prepared Samples: 00/01

Nutrient Analyses

Date	Sample #	Laboratory	NO3 mg/L	NH3-N mg/L	TKN mg/L	PO4 mg/L
Dec 1	WR37495	Mont.-Wat.	2.2	0.341	2.6	<0.06
	laboratory		1.82	0.26	2.60	0.35
	difference		-0.38	-0.08	0.00	0.29
	% difference		-17.27	-23.75	0.00	473.77
Dec 6	WR37512	Mont.-Wat.	37	0.746	3.2	3.67
	laboratory		36.47	0.65	2.99	3.49
	difference		-0.53	-0.10	-0.21	-0.18
	% difference		-1.43	-12.87	-6.56	-4.90
Dec 15	WR37545	Mont.-Wat.	<0.44	<0.05	<0.20	<0.06
	laboratory		<0.44	<0.05	<0.20	<0.06
	difference		0.00	0.00	0.00	0.00
	% difference		0.00	0.00	0.00	0.00
Dec 22	WR37598	Mont.-Wat.	4.1	0.319	1.4	0.337
	laboratory		3.65	0.26	1.19	0.35
	difference		-0.45	-0.06	-0.21	0.01
	% difference		-10.98	-18.50	-15.00	3.86
Dec 27	WR37623	Mont.-Wat.	2	0.301	3	0.367
	laboratory		1.82	0.26	2.60	0.35
	difference		-0.18	-0.04	-0.40	-0.02
	% difference		-9.00	-13.62	-13.33	-4.63
Dec 28	WR37653	Mont.-Wat.	9.1	1.41	2.6	1.71
	laboratory		9.12	1.31	2.24	1.74
	difference		0.02	-0.10	-0.36	0.03
	% difference		0.22	-7.09	-13.85	1.75
Jan 3	WR37665	Mont.-Wat.	3.5	0.285	1.1	0.245
	laboratory		3.65	0.26	1.19	0.35
	difference		0.15	-0.03	0.09	0.11
	% difference		4.29	-8.77	8.18	42.86
Jan 9	WR37703	Mont.-Wat.	9.2	0.721	0.92	1.68
	laboratory		9.12	0.65	1.12	1.74
	difference		-0.08	-0.07	0.20	0.06
	% difference		-0.87	-9.85	21.74	3.57
Jan 11	WR37752	Mont.-Wat.	0.72	0.102	0.27	0.214
	laboratory		0.73	0.13	0.60	0.35
	difference		0.01	0.03	0.33	0.14
	% difference		1.39	27.45	122.22	63.55
Jan 12	WR37775	Mont.-Wat.	0.84	0.266	0.83	0.245
	laboratory		0.73	0.26	0.73	0.35
	difference		-0.11	-0.01	-0.10	0.11
	% difference		-13.10	-2.26	-12.05	42.86

Trace Metal Analyses

Date	Sample #	Laboratory	5 Cd ug/L	40 Cr ug/L	10 Cu ug/L	10 Pb ug/L	20 Ni ug/L	10 Ag ug/L	50 Zn ug/L
Dec 27	WR 37623	Weck	5.1	27	5.1	5	25	5.1	30
	Laboratory		5	25	5	5	25	5	30
	difference		-0.10	-2.00	-0.10	0.00	0.00	-0.10	0.00
	% difference		-1.96	-7.41	-1.96	0.00	0.00	-1.96	0.00
Jan 3	WR 37665	Weck	5.2	26	5.2	4.7	25	4.8	30
	Laboratory		5	25	5	5	25	5	30
	difference		-0.20	-1.00	-0.20	0.30	0.00	0.20	0.00
	% difference		-3.85	-3.85	-3.85	6.38	0.00	4.17	0.00
Jan 9	WR 37703	Weck	15	49	15	15	110	14	26
	Laboratory		15	50	15	15	120	15	25
	difference		0.00	1.00	0.00	0.00	10.00	1.00	-1.00
	% difference		0.00	2.04	0.00	0.00	9.09	7.14	-3.85
Jan 11	WR 37777	Weck	14	46	16	16	96	15	47
	Laboratory		15	50	15	15	120	15	50
	difference		1.00	4.00	-1.00	-1.00	24.00	0.00	3.00
	% difference		7.14	8.70	-6.25	-6.25	25.00	0.00	6.38
Jan 12	WR 37775	Weck	10	43	8.8	9.9	100	9.6	50
	Laboratory		10	40	10	10	100	10	50
	difference		0.00	-3.00	1.20	0.10	0.00	0.40	0.00
	% difference		0.00	-6.98	13.64	1.01	0.00	4.17	0.00
Jan 13	WR 37776	Weck	15	43	14	14	96	15	43
	Laboratory		15	50	15	15	120	15	50
	difference		0.00	7.00	1.00	1.00	24.00	0.00	7.00
	% difference		0.00	16.28	7.14	7.14	25.00	0.00	16.28
Jan 16	WR 37794	Weck	90	100	89	96	99	88	180
	Laboratory		100	100	100	100	100	100	120
	difference		10.00	0.00	11.00	4.00	1.00	12.00	-60.00
	% difference		11.11	0.00	12.36	4.17	1.01	13.64	-33.33
Jan 18	WR 37823	Weck	10	45	9.2	9.8	100	9.6	53
	Laboratory		10	40	10	10	100	10	50
	difference		0.00	-5.00	0.80	0.20	0.00	0.40	-3.00
	% difference		0.00	-11.11	8.70	2.04	0.00	4.17	-5.66
Jan 24	WR 37845	Weck	20	49	19	19	25	19	94
	Laboratory		20	50	20	20	25	20	100
	difference		0.00	1.00	1.00	1.00	0.00	1.00	6.00
	% difference		0.00	2.04	5.26	5.26	0.00	5.26	6.38
Jan 25	WR 37873	Weck	24	100	20	23	90	15	87
	Laboratory		25	100	25	25	100	25	100
	difference		1.00	0.00	5.00	2.00	10.00	10.00	13.00
	% difference		4.17	0.00	25.00	8.70	11.11	66.67	14.94

Analyses of Synthetically Prepared Samples: 00/01

Nutrient Analyses

Date	Sample #	Laboratory	NO3 mg/L	NH3-N mg/L	TKN mg/L	PO4 mg/L
Jan 13	WR37776	Mont.-Wat.	2	0.278	<0.20	0.612
	laboratory		1.82	0.26	0.73	0.70
	difference		-0.18	-0.02	0.53	0.09
	% difference		-9.00	-6.47	265.00	14.38
Jan 15	WR37794	Mont.-Wat.	1.9	0.281	0.95	0.612
	laboratory		1.82	0.26	0.73	0.7
	difference		-0.08	-0.02	-0.22	0.09
	% difference		-4.21	-7.47	-23.16	14.38
Jan 17	WR37811	Mont.-Wat.	18	1.41	5.5	1.71
	laboratory		18.23	1.31	1.31	1.74
	difference		0.23	-0.10	-4.19	0.03
	% difference		1.28	-7.09	-76.18	1.75
Jan 24	WR37845	Mont.-Wat.	4	0.282	0.76	1.74
	Laboratory		3.65	0.26	1.19	1.74
	difference		-0.35	-0.02	0.43	0.00
	% difference		-8.75	-7.80	56.58	0.00
Jan 25	WR37873	Mont.-Wat.	4.3	0.292	1.2	1.71
	laboratory		3.65	0.26	1.19	1.74
	difference		-0.65	-0.03	-0.01	0.03
	% difference		-15.12	-10.96	-0.83	1.75
Jan 26	WR37893	Mont.-Wat.	4	0.297	1.2	1.68
	laboratory		3.65	0.26	1.19	1.74
	difference		-0.35	-0.04	-0.01	0.06
	% difference		-8.75	-12.46	-0.83	3.57
Jan 27	WR37911	Mont.-Wat.	10	1.37	1.6	3.67
	laboratory		9.12	1.31	1.78	3.49
	difference		-0.88	-0.06	0.18	-0.18
	% difference		-8.80	-4.38	11.25	-4.90
Jan 29	WR37947	Mont.-Wat.	10	1.49	2.1	3.67
	laboratory		9.12	1.31	1.78	3.49
	difference		-0.88	-0.18	-0.32	-0.18
	% difference		-8.80	-12.08	-15.24	-4.90
Feb 1	WR37960	Mont.-Wat.	9.8	1.47	2	3.67
	laboratory		9.12	1.31	1.78	3.49
	difference		-0.68	-0.16	-0.22	-0.18
	% difference		-6.94	-10.88	-11.00	-4.90
Feb 13	WR38009	Mont.-Wat.	37	1.54	1.2	1.9
	laboratory		36.47	1.31	1.31	1.74
	difference		-0.53	-0.23	0.11	-0.16
	% difference		-1.43	-14.94	9.17	-8.42

Trace Metal Analyses

Date	Sample #	Laboratory	Cd ug/L	Cr ug/L	Cu ug/L	Pb ug/L	Ni ug/L	Ag ug/L	Zn ug/L
			5	40	10	10	20	10	50
Jan 26	WR 37893	Weck	39	100	42	38	100	34	96
	laboratory		40	100	40	40	100	40	100
	difference		1.00	0.00	-2.00	2.00	0.00	6.00	4.00
	% difference		2.56	0.00	-4.76	5.26	0.00	17.65	4.17
Jan 27	WR 37911	Weck	16	52	15	16	120	15	26
	Laboratory		15	50	15	15	120	15	25
	difference		-1.00	-2.00	0.00	-1.00	0.00	0.00	-1.00
	% difference		-6.25	-3.85	0.00	-6.25	0.00	0.00	-3.85
Jan 28	WR 37904	Weck	40	98	41	39	100	35	96
	laboratory		40	100	40	40	100	40	100
	difference		0.00	2.00	-1.00	1.00	0.00	5.00	4.00
	% difference		0.00	2.04	-2.44	2.56	0.00	14.29	4.17
Jan 29	WR 37947	Weck	24	98	19	24	86	15	93
	Laboratory		25	100	25	25	100	25	100
	difference		1.00	2.00	6.00	1.00	14.00	10.00	7.00
	% difference		4.17	2.04	31.58	4.17	16.28	66.67	7.53
Feb 1	WR 37960	Weck	92	96	89	92	110	100	190
	Laboratory		100	100	100	100	100	100	200
	difference		8.00	4.00	11.00	8.00	-10.00	0.00	10.00
	% difference		8.70	4.17	12.36	8.70	-9.09	0.00	5.26
Feb 13	WR 38009	Weck	4.6	24	5.4	5.4	27	5.5	22
	laboratory		5	25	5	5	25	5	30
	difference		0.40	1.00	-0.40	-0.40	-2.00	-0.50	8.00
	% difference		8.70	4.17	-7.41	-7.41	-7.41	-9.09	36.36
Feb 15	WR 38043	Weck	4.3	23	4.8	5	25	5.2	21
	Laboratory		5	25	5	5	25	5	30
	difference		0.70	2.00	0.20	0.00	0.00	-0.20	9.00
	% difference		16.28	8.70	4.17	0.00	0.00	-3.85	42.86
Feb 20	WR 38076	Weck	50	100	50	51	49	51	100
	laboratory		50	100	50	50	50	50	100
	difference		0.00	0.00	0.00	-1.00	1.00	-1.00	0.00
	% difference		0.00	0.00	0.00	-1.96	2.04	-1.96	0.00
Feb 24	WR 38129	Weck	<1	<8	<2	<2	<4	<2	<10
	Laboratory		<1	<8	<2	<2	<4	<2	<10
	difference		0.00	0.00	0.00	0.00	0.00	0.00	0.00
	% difference		0.00	0.00	0.00	0.00	0.00	0.00	0.00
Feb 26	WR 38140	Weck	9.8	42	9.9	9.3	44	8.8	26
	laboratory		10	40	10	10	25	10	25
	difference		0.20	-2.00	0.10	0.70	-19.00	1.20	-1.00
	% difference		2.04	-4.76	1.01	7.53	-43.18	13.64	-3.85

Analyses of Synthetically Prepared Samples: 00/01

			Nutrient Analyses							Trace Metal Analyses						
										5	40	10	10	20	10	50
Date	Sample #	Laboratory	NO3 mg/L	NH3-N mg/L	TKN mg/L	PO4 mg/L	Date	Sample #	Laboratory	Cd ug/L	Cr ug/L	Cu ug/L	Pb ug/L	Ni ug/L	Ag ug/L	Zn ug/L
Feb 15	WR38043	Mont.-Wat.	36	1.45	1.5	1.96	Feb 28	WR 38198	Weck	9.2	42	9.7	8.5	44	8.8	24
	laboratory		36.47	1.31	1.31	1.74		laboratory		10	40	10	10	25	10	25
	difference		0.47	-0.14	-0.19	-0.22		difference		0.80	-2.00	0.30	1.50	-19.00	1.20	1.00
	% difference		1.31	-9.66	-12.67	-11.22		% difference		8.70	-4.76	3.09	17.65	-43.18	13.64	4.17
Feb 16	WR38059	Mont.-Wat.	36	1.48	1.8	1.84	Mar 2	WR 38227	Weck	12	30	11	10	27	11	43
	laboratory		36.47	1.31	1.31	1.74		laboratory		12	40	12	12	25	12	40
	difference		0.47	-0.17	-0.49	-0.10		difference		0.00	10.00	1.00	2.00	-2.00	1.00	-3.00
	% difference		1.31	-11.49	-27.22	-5.43		% difference		0.00	33.33	9.09	20.00	-7.41	9.09	-6.98
Feb 20	WR38076	Mont.-Wat.	1.8	0.319	2.5	0.398	Mar 2	WR 38210	Weck	48	100	50	45	88	45	96
	laboratory		1.82	0.26	2.60	0.35		laboratory		50	100	50	50	50	50	100
	difference		0.02	-0.06	0.10	-0.05		difference		2.00	0.00	0.00	5.00	-38.00	5.00	4.00
	% difference		1.11	-18.50	4.00	-12.06		% difference		4.17	0.00	0.00	11.11	-43.18	11.11	4.17
Feb 22	WR38108	Mont.-Wat.	1.8	0.325	2.7	0.367	Mar 6	WR 38247	Weck	45	97	49	44	53	45	99
	laboratory		1.82	0.26	2.60	0.35		Laboratory		50	100	50	50	50	50	100
	difference		0.02	-0.07	-0.10	-0.02		difference		5.00	3.00	1.00	6.00	-3.00	5.00	1.00
	% difference		1.11	-20.00	-3.70	-4.63		% difference		11.11	3.09	2.04	13.64	-5.66	11.11	1.01
Feb 24	WR38129	Mont.-Wat.	1.7	0.278	2.7	0.337	Mar 7	WR 38266	Weck	10	22	9.7	9.2	99	10	51
	laboratory		1.82	0.26	2.60	0.35		Laboratory		10	20	10	10	100	10	50
	difference		0.12	-0.02	-0.10	0.01		difference		0.00	-2.00	0.30	0.80	1.00	0.00	-1.00
	% difference		7.06	-6.47	-3.70	3.86		% difference		0.00	-9.09	3.09	8.70	1.01	0.00	-1.96
Feb 26	WR38140	Mont.-Wat.	9.6	1.32	1.2	1.71	Mar 7	WR 38301	Weck	14	52	15	14	110	14	51
	laboratory		9.12	1.31	2.24	1.74		Laboratory		15	50	15	15	120	15	50
	difference		-0.48	-0.01	1.04	0.03		difference		1.00	-2.00	0.00	1.00	10.00	1.00	-1.00
	% difference		-5.00	-0.76	86.67	1.75		% difference		7.14	-3.85	0.00	7.14	9.09	7.14	-1.96
Feb 27	WR38163	Mont.-Wat.	3.8	0.27	0.89	0.398	Mar 9	WR 38318	Weck	12	34	12	12	27	11	43
	laboratory		3.65	0.26	1.19	0.35		laboratory		12	40	12	12	25	12	40
	difference		-0.15	-0.01	0.30	-0.05		difference		0.00	6.00	0.00	0.00	-2.00	1.00	-3.00
	% difference		-3.95	-3.70	33.71	-12.06		% difference		0.00	17.65	0.00	0.00	-7.41	9.09	-6.98
Feb 28	WR38198	Mont.-Wat.	1.9	0.269	0.53	0.643	Mar 10	WR 38361	Weck	9.5	21	11	9.6	100	9.1	52
	laboratory		1.82	0.26	0.73	0.70		laboratory		10	20	10	10	100	10	50
	difference		-0.08	-0.01	0.20	0.06		difference		0.50	-1.00	-1.00	0.40	0.00	0.90	-2.00
	% difference		-4.21	-3.35	37.74	8.86		% difference		5.26	-4.76	-9.09	4.17	0.00	9.89	-3.85
Mar 2	WR38227	Mont.-Wat.	0.77	0.258	0.58	0.275	Mar 10	WR 38343	Weck	13	59	19	14	150	13	51
	laboratory		0.73	0.26	0.73	0.35		Laboratory		15	50	15	15	120	15	50
	difference		-0.04	0.00	0.15	0.08		difference		2.00	-9.00	-4.00	1.00	-30.00	2.00	-1.00
	% difference		-5.19	0.78	25.86	27.27		% difference		15.38	-15.25	-21.05	7.14	-20.00	15.38	-1.96

Analyses of Synthetically Prepared Samples: 00/01

Nutrient Analyses

Date	Sample #	Laboratory	NO3 mg/L	NH3-N mg/L	TKN mg/L	PO4 mg/L
Mar 2	WR38210	Mont.-Wat.	1.9	0.262	0.33	0.581
	laboratory		1.82	0.26	0.73	0.70
	difference		-0.08	0.00	0.40	0.12
	% difference		-4.21	-0.76	121.21	20.48
Mar 6	WR38247	Mont.-Wat.	1.9	0.657	0.93	1.77
	laboratory		1.82	0.65	1.12	1.74
	difference		-0.08	-0.01	0.19	-0.03
	% difference		-4.21	-1.07	20.43	-1.69
Mar 7	WR38266	Mont.-Wat.	0.72	0.256	0.72	0.306
	laboratory		0.73	0.26	0.73	0.35
	difference		0.01	0.00	0.01	0.04
	% difference		1.39	1.56	1.39	14.38
Mar 7	WR38301	Mont.-Wat.	4.1	0.619	0.47	0.612
	laboratory		3.65	0.65	0.65	0.70
	difference		-0.45	0.03	0.18	0.09
	% difference		-10.98	5.01	38.30	14.38
Mar 9	WR38318	Mont.-Wat.	4.1	0.244	1.1	0.275
	laboratory		3.65	0.26	1.19	0.35
	difference		-0.45	0.02	0.09	0.08
	% difference		-10.98	6.56	8.18	27.27
Mar 10	WR38343	Mont.-Wat.	4.1	0.617	0.79	0.612
	laboratory		3.65	0.65	0.65	0.70
	difference		-0.45	0.03	-0.14	0.09
	% difference		-10.98	5.35	-17.72	14.38
Mar 29	WR38446	Mont.-Wat.	4.3	0.295	1.3	1.68
	laboratory		3.65	0.26	1.19	1.74
	difference		-0.65	-0.04	-0.11	0.06
	% difference		-15.12	-11.86	-8.46	3.57
May 11	WR39152	Mont.-Wat.	4.1	0.227	1.5	0.306
	laboratory		3.65	0.26	1.19	0.35
	difference		-0.45	0.03	-0.31	0.04
	% difference		-10.98	14.54	-20.67	14.38
May 15	WR39222	Mont.-Wat.	10	0.544	1.2	1.81
	laboratory		9.12	0.65	1.12	1.74
	difference		-0.88	0.11	-0.08	-0.07
	% difference		-8.80	19.49	-6.67	-3.87
May 16	WR39282	Mont.-Wat.	10	0.529	1.6	1.74
	laboratory		9.12	0.65	1.12	1.74
	difference		-0.88	0.12	-0.48	0.00
	% difference		-8.80	22.87	-30.00	0.00

Trace Metal Analyses

Date	Sample #	Laboratory	Cd ug/L	Cr ug/L	Cu ug/L	Pb ug/L	Ni ug/L	Ag ug/L	Zn ug/L
			5	40	10	10	20	10	50
Mar 29	WR 38446	Weck	92	100	97	82	110	89	190
	laboratory		100	100	100	100	100	100	120
	difference		8.00	0.00	3.00	18.00	-10.00	11.00	-70.00
	% difference		8.70	0.00	3.09	21.95	-9.09	12.36	-36.84
Jun 6	WR39777	Weck	19	51	20	19	52	19	99
	laboratory		20	50	20	20	25	20	100
	difference		1.00	-1.00	0.00	1.00	-27.00	1.00	1.00
	% difference		5.26	-1.96	0.00	5.26	-51.92	5.26	1.01

Analyses of Synthetically Prepared Samples: 00/01

Nutrient Analyses

Date	Sample #	Laboratory	NO3 mg/L	NH3-N mg/L	TKN mg/L	PO4 mg/L
May 17	WR39329	Mont.-Wat.	10	0.537	1.1	1.74
	laboratory		9.12	0.65	1.12	1.74
	difference		-0.88	0.11	0.02	0.00
	% difference		-8.80	21.04	1.82	0.00
May 18	WR39352	Mont.-Wat.	38	1.38	18	3.37
	laboratory		36.47	1.31	10.64	3.49
	difference		-1.53	-0.07	-7.36	0.12
	% difference		-4.03	-5.07	-40.89	3.56
May 18	WR39366	Mont.-Wat.	37	1.37	15	3.37
	laboratory		36.47	1.31	10.64	3.49
	difference		-0.53	-0.06	-4.36	0.12
	% difference		-1.43	-4.38	-29.07	3.56
May 20	WR39392	Mont.-Wat.	2.1	0.204	3.4	0.459
	laboratory		1.82	0.26	2.60	0.35
	difference		-0.28	0.06	-0.80	-0.11
	% difference		-13.33	27.45	-23.53	-23.75
May 21	WR39460	Mont.-Wat.	2	0.235	3.4	0.306
	laboratory		1.82	0.26	2.60	0.35
	difference		-0.18	0.03	-0.80	0.04
	% difference		-9.00	10.64	-23.53	14.38
May 22	WR39501	Mont.-Wat.	19	1.16	1.3	1.81
	laboratory		18.23	1.31	1.31	1.74
	difference		-0.77	0.15	0.01	-0.07
	% difference		-4.05	12.93	0.77	-3.87
May 23	WR39574	Mont.-Wat.	19	1.15	1.7	1.74
	laboratory		18.23	1.31	1.31	1.74
	difference		-0.77	0.16	-0.39	0.00
	% difference		-4.05	13.91	-22.94	0.00
Jun 6	WR39778	Mont.-Wat.	4	0.178	0.93	1.62
	laboratory		3.65	0.26	1.19	1.74
	difference		-0.35	0.08	0.26	0.12
	% difference		-8.75	46.07	27.96	7.41
Jun 27	WR40193	Mont.-Wat.	9.7	1.05	2	3.37
	laboratory		9.12	1.31	1.78	3.49
	difference		-0.58	0.26	-0.22	0.12
	% difference		-5.98	24.76	-11.00	3.56

Trace Metal Analyses

Date	Sample #	Laboratory	Cd ug/L	Cr ug/L	Cu ug/L	Pb ug/L	Ni ug/L	Ag ug/L	Zn ug/L
			5	40	10	10	20	10	50

Analyses of Synthetically Prepared Samples: 00/01

Nutrient Analyses

Date	Sample #	Laboratory	NO3 mg/L	NH3-N mg/L	TKN mg/L	PO4 mg/L
Jun 28	WR40227	Mont.-Wat.	2	0.212	0.63	0.643
	laboratory		1.82	0.26	0.73	0.70
	difference		-0.18	0.05	0.10	0.06
	% difference		-9.00	22.64	15.87	8.86
Jun 29	WR40266	Mont.-Wat.	1.9	0.198	0.21	0.612
	laboratory		1.82	0.26	0.73	0.70
	difference		-0.08	0.06	0.52	0.09
	% difference		-4.21	31.31	247.62	14.38

Trace Metal Analyses

Date	Sample #	Laboratory	Cd ug/L	Cr ug/L	Cu ug/L	Pb ug/L	Ni ug/L	Ag ug/L	Zn ug/L
			5	40	10	10	20	10	50

Recovery outside 70 - 130% range
Nutrient and trace QCs spiked at levels ≤5 times laboratory detection limit not flagged unless laboratory result is >50% lower or >100% higher than spike level
N/A - not analyzed

70.00

Replicate Samples: 00/01

			Nutrient Analyses					Trace Metal Analyses						
Date	Sample #	Laboratory	NO3 mg/L	NH3-N mg/L	TKN mg/L	PO4 mg/L	Laboratory	Cd ug/L	Cr ug/L	Cu ug/L	Pb ug/L	Ni ug/L	Ag ug/L	Zn ug/L
Oct 15	WR 37052	Mont.-Wat.	8.7	<0.05	1.4	0.306	Weck	<1	<8	13	<2	<4	<2	30
	WR 37048		9	<0.05	1.1	0.704		<1	<8	13	<2	<4	<2	30
	difference		0.30	0.00	-0.30	0.40		0.00	0.00	0.00	0.00	0.00	0.00	0.00
	% difference		3.45	0.00	-21.43	130.07		0.00	0.00	0.00	0.00	0.00	0.00	0.00
May 1	WR 38943	Mont.-Wat.	42	<0.05	1.4	0.49		N/A	N/A	N/A	N/A	N/A	N/A	N/A
	WR 38945		42	<0.05	1.3	0.428		N/A	N/A	N/A	N/A	N/A	N/A	N/A
	difference		0.00	0.00	-0.10	-0.06								
	% difference		0.00	0.00	-7.14	-12.65								
May 16	WR 39283	Mont.-Wat.	32	<0.05	1.2	3.98		N/A	N/A	N/A	N/A	N/A	N/A	N/A
	WR 39284		29	<0.05	1.3	5.2		N/A	N/A	N/A	N/A	N/A	N/A	N/A
	difference		-3.00	0.00	0.10	1.22								
	% difference		-9.38	0.00	8.33	30.65								
May 17	WR 39319	Mont.-Wat.	2.9	<0.05	0.32	0.153		N/A	N/A	N/A	N/A	N/A	N/A	N/A
	WR 39320		2.9	<0.05	0.64	0.153		N/A	N/A	N/A	N/A	N/A	N/A	N/A
	difference		0.00	0.00	0.32	0.00								
	% difference		0.00	0.00	100.00	0.00								
May 19	WR 39367	Mont.-Wat.	190	4.35	12	8.26		N/A	N/A	N/A	N/A	N/A	N/A	N/A
	WR 39368		200	4.3	10	8.57		N/A	N/A	N/A	N/A	N/A	N/A	N/A
	difference		10.00	-0.05	-2.00	0.31								
	% difference		5.26	-1.15	-16.67	3.75								
May 20	WR 39394	Mont.-Wat.	79	<0.05	1.1	0.337		N/A	N/A	N/A	N/A	N/A	N/A	N/A
	WR 39395		79	<0.05	0.96	0.275		N/A	N/A	N/A	N/A	N/A	N/A	N/A
	difference		0.00	0.00	-0.14	-0.06								
	% difference		0.00	0.00	-12.73	-18.40								
May 21	WR 39444	Mont.-Wat.	37	<0.05	3.3	1.04		N/A	N/A	N/A	N/A	N/A	N/A	N/A
	WR 39445		35	<0.05	3	0.734		N/A	N/A	N/A	N/A	N/A	N/A	N/A
	difference		-2.00	0.00	-0.30	-0.31								
	% difference		-5.41	0.00	-9.09	-29.42								
May 22	WR 39499	Mont.-Wat.	35	<0.05	2	0.765		N/A	N/A	N/A	N/A	N/A	N/A	N/A
	WR 39500		34	<0.05	2.6	0.765		N/A	N/A	N/A	N/A	N/A	N/A	N/A
	difference		-1.00	0.00	0.60	0.00								
	% difference		-2.86	0.00	30.00	0.00								

Replicate Samples: 00/01

			Nutrient Analyses					Trace Metal Analyses						
Date	Sample #	Laboratory	NO3 mg/L	NH3-N mg/L	TKN mg/L	PO4 mg/L	Laboratory	Cd ug/L	Cr ug/L	Cu ug/L	Pb ug/L	Ni ug/L	Ag ug/L	Zn ug/L
May 23	WR 39566	Mont.-Wat.	70	0.12	<0.20	3.98		N/A	N/A	N/A	N/A	N/A	N/A	N/A
	WR 39567		66	0.105	<0.20	3.67		N/A	N/A	N/A	N/A	N/A	N/A	N/A
	difference		-4.00	-0.02	0.00	-0.31								
	% difference		-5.71	-12.50	0.00	-7.79								

Recovery outside 70 - 130% range
Nutrient and trace QCs spiked at levels ≤ 5 times laboratory detection limit not flagged unless laboratory result is >50% lower or >100% higher than spike level
N/A - not analyzed

Analyses of Blank Equipment Test Samples: 00/01

Nutrient Analyses							Trace Metal Analyses									
Date	Sample #	Laboratory	NO3 mg/L	NH4-N mg/L	TKN mg/L	PO4 mg/L	Date	Sample #	Laboratory	Cd ug/L	Cr ug/L	Cu ug/L	Pb ug/L	Ni ug/L	Ag ug/L	Zn ug/L
							Equipment Test Samples									
ISCO Pump Tubing																
Nov 27	WR 37471	Mont. - Wat.	11	1.32	1.8	3.37	Nov 27	WR 37472	Weck	4.9	25	4.8	5	23	4	30
	laboratory		9.12	1.31	1.78	3.49		Laboratory		5	25	5	5	25	5	30
	difference		-1.88	-0.01	-0.02	0.12		difference		0.10	0.00	0.20	0.00	2.00	1.00	0.00
	% difference		-17.09	-0.76	-1.11	3.56		% difference		2.04	0.00	4.17	0.00	8.70	25.00	0.00
ISCO Bottles																
Nov 27	WR 37473	Mont. - Wat.	<0.44	<0.05	<0.20	0.0918	Nov 27	WR 37473	Weck	<1	<8	<2	<2	<4	<2	<10
	laboratory		<0.44	<0.05	<0.20	<0.06		Laboratory		<1	<8	<2	<2	<4	<2	<10
	difference		0.00	0.00	0.00	-0.03		difference		0.00	0.00	0.00	0.00	0.00	0.00	0.00
	% difference		0.00	0.00	0.00	-33.55		% difference		0.00	0.00	0.00	0.00	0.00	0.00	0.00
Dishwasher Sink D.I. Water																
Nov 27	WR 37474	Mont. - Wat.	<0.44	0.053	<0.20	<0.06	Nov 27	WR 37474	Weck	<1	<8	5.9	<2	<4	<2	15
	laboratory		<0.44	<0.05	<0.20	<0.06		Laboratory		<1	<8	<2	<2	<4	<2	<10
	difference		0.00	0.00	0.00	0.00		difference		0.00	0.00	-3.90	0.00	0.00	0.00	-5.00
	% difference		0.00	-5.66	0.00	-1.64		% difference		0.00	0.00	-66.10	0.00	0.00	0.00	-33.33
50 Liter Lab Carboy																
Nov 27	WR 37475	Mont. - Wat.	<0.44	<0.05	<0.20	<0.06	Nov 27	WR 37475	Weck	<1	<8	<2	<2	<4	<2	<10
	laboratory		<0.44	<0.05	<0.20	<0.06		Laboratory		<1	<8	<2	<2	<4	<2	<10
	difference		0.00	0.00	0.00	0.00		difference		0.00	0.00	0.00	0.00	0.00	0.00	0.00
	% difference		0.00	0.00	0.00	0.00		% difference		0.00	0.00	0.00	0.00	0.00	0.00	0.00
1 Liter and 2 Liter Volumetric Flasks																
Nov 27	WR 37476	Mont. - Wat.	<0.44	<0.05	<0.20	0.0612	Nov 27	WR 37476	Weck	<1	<8	<2	<2	<4	<2	<10
	laboratory		<0.44	<0.05	<0.20	<0.06		Laboratory		<1	<8	<2	<2	<4	<2	<10
	difference		0.00	0.00	0.00	0.00		difference		0.00	0.00	0.00	0.00	0.00	0.00	0.00
	% difference		0.00	0.00	0.00	-1.96		% difference		0.00	0.00	0.00	0.00	0.00	0.00	0.00
Compositing Basin																
Nov 27	WR 37477	Mont. - Wat.	<0.44	<0.05	0.28	0.0612	Nov 27	WR 37477	Weck	<1	<8	<2	<2	<4	<2	<10
	laboratory		<0.44	<0.05	<0.20	<0.06		Laboratory		<1	<8	<2	<2	<4	<2	<10
	difference		0.00	0.00	-0.08	0.00		difference		0.00	0.00	0.00	0.00	0.00	0.00	0.00
	% difference		0.00	0.00	-28.57	-1.96		% difference		0.00	0.00	0.00	0.00	0.00	0.00	0.00
Internal Pump Tubing																
Nov 27	WR 37479	Mont. - Wat.	<0.44	<0.05	0.3	0.0612	Nov 27	WR 37479	Weck	<1	<8	<2	<2	<4	<2	<10
	laboratory		<0.44	<0.05	<0.20	<0.06		Laboratory		<1	<8	<2	<2	<4	<2	<10
	difference		0.00	0.00	-0.10	0.00		difference		0.00	0.00	0.00	0.00	0.00	0.00	0.00
	% difference		0.00	0.00	-33.33	-1.96		% difference		0.00	0.00	0.00	0.00	0.00	0.00	0.00
1680 Pump and Filtering Method																
Nov 27	WR 37481	Mont. - Wat.	<0.44	<0.05	0.75	0.0612	Nov 27	WR 37481	Weck	<1	<8	<2	<2	<4	<2	<10
	laboratory		<0.44	<0.05	<0.20	<0.06		Laboratory		<1	<8	<2	<2	<4	<2	<10
	difference		0.00	0.00	-0.55	0.00		difference		0.00	0.00	0.00	0.00	0.00	0.00	0.00
	% difference		0.00	0.00	-73.33	-1.96		% difference		0.00	0.00	0.00	0.00	0.00	0.00	0.00

Analyses of Blank Equipment Test Samples: 00/01

Nutrient Analyses							Trace Metal Analyses									
Date	Sample #	Laboratory	NO3 mg/L	NH4-N mg/L	TKN mg/L	PO4 mg/L	Date	Sample #	Laboratory	Cd ug/L	Cr ug/L	Cu ug/L	Pb ug/L	Ni ug/L	Ag ug/L	Zn ug/L
Strainer, Tygon Tubing and ISCO Bottles																
Nov 27	WR 37482	Mont. - Wat.	<0.44	<0.05	<0.20	0.0918	Nov 27	WR 37482	Weck	<1	<8	<2	<2	<4	<2	<10
	laboratory		<0.44	<0.05	<0.20	<0.06		Laboratory		<1	<8	<2	<2	<4	<2	<10
	difference		0.00	0.00	0.00	-0.03		difference		0.00	0.00	0.00	0.00	0.00	0.00	0.00
	% difference		0.00	0.00	0.00	-34.64		% difference		0.00	0.00	0.00	0.00	0.00	0.00	0.00
ISCO Pump Tubing																
		N/A	N/A	N/A	N/A	N/A	Nov 27	WR 37483	Weck	4.5	25	4.4	5.2	24	4	30
		N/A	N/A	N/A	N/A	N/A		Laboratory		5	25	5	5	25	5	30
								difference		0.50	0.00	0.60	-0.20	1.00	1.00	0.00
								% difference		11.11	0.00	13.64	-3.85	4.17	25.00	0.00
ISCO Pump Tubing																
		N/A	N/A	N/A	N/A	N/A	Feb 23	WR 38114	Weck	<1	<8	<2	<2	5.9	<2	<10
		N/A	N/A	N/A	N/A	N/A		Laboratory		<1	<8	<2	<2	<4	<2	<10
								difference		0.00	0.00	0.00	0.00	-1.90	0.00	0.00
								% difference		0.00	0.00	0.00	0.00	-32.20	0.00	0.00
ISCO Bottles																
May 11	WR 39148	Mont. - Wat.	<0.44	<0.05	<0.20	<0.06			N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	laboratory		<0.44	<0.05	<0.20	<0.06			N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	difference		0.00	0.00	0.00	0.00										
	% difference		0.00	0.00	0.00	0.00										
Compositing Basin																
May 11	WR 39149	Mont. - Wat.	<0.44	<0.05	<0.20	<0.06			N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	laboratory		<0.44	<0.05	<0.20	<0.06			N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	difference		0.00	0.00	0.00	0.00										
	% difference		0.00	0.00	0.00	0.00										
ISCO Pump Tubing																
May 11	WR 39150	Mont. - Wat.	<0.44	<0.05	<0.20	<0.06			N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	laboratory		<0.44	<0.05	<0.20	<0.06			N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	difference		0.00	0.00	0.00	0.00										
	% difference		0.00	0.00	0.00	0.00										
Strainer, Tygon Tubing and ISCO Bottles																
May 11	WR 39151	Mont. - Wat.	<0.44	<0.05	<0.20	<0.06			N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	laboratory		<0.44	<0.05	<0.20	<0.06			N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	difference		0.00	0.00	0.00	0.00										
	% difference		0.00	0.00	0.00	0.00										
ISCO Bottles																
May 11	WR 39153	Mont. - Wat.	3.3	0.226	1.3	0.306			N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	laboratory		3.65	0.26	1.19	0.35			N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	difference		0.35	0.03	-0.11	0.04										
	% difference		10.61	15.04	-8.46	14.38										

Recovery outside 70 - 130% range
Nutrient and trace QCs spiked at levels ≤ 5 times laboratory detection limit not flagged unless laboratory result is >50% lower or >100% higher than spike level
N/A - not analyzed

Analysis of Synthetically Prepared Samples for the Nutrient Study
5/15 - 5/23/01

Date	Sample #	Laboratory	NO3 mg/L	NH4-N mg/L	TKN mg/L	PO4 mg/L	O-PO4 mg/L
May 15	WR 39222	Mont. - Wat.	10.00	0.54	1.20	1.81	N/A
	laboratory		9.12	0.65	1.12	1.74	N/A
	difference		-0.88	0.11	-0.08	-0.07	N/A
	% difference		-8.80	19.49	-6.67	-3.87	N/A
May 16	WR 39282	Mont. - Wat.	10.00	0.53	1.60	1.74	N/A
	laboratory		9.12	0.65	1.12	1.74	N/A
	difference		-0.88	0.12	-0.48	0.00	N/A
	% difference		-8.80	22.87	-30.00	0.00	N/A
May 17	WR 39329	Mont. - Wat.	10.00	0.54	1.10	1.74	N/A
	laboratory		9.12	0.65	1.12	1.74	N/A
	difference		-0.88	0.11	0.02	0.00	N/A
	% difference		-8.80	21.04	1.82	0.00	N/A
May 18	WR 39352	Mont. - Wat.	38.00	1.38	18.00	3.37	0.995
	laboratory		36.47	1.31	10.64	3.49	1.138
	difference		-1.53	-0.07	-7.36	0.12	0.14
	% difference		-4.03	-5.07	-40.89	3.56	14.37
May 19	WR 39366	Mont. - Wat.	37.00	1.37	15.00	3.37	0.996
	laboratory		36.47	1.31	10.64	3.49	1.138
	difference		-0.53	-0.06	-4.36	0.12	0.14
	% difference		-1.43	-4.38	-29.07	3.56	14.26
May 20	WR 39392	Mont. - Wat.	2.10	0.20	3.40	0.46	0.117
	laboratory		1.82	0.26	2.60	0.35	0.114
	difference		-0.28	0.06	-0.80	-0.11	0.00
	% difference		-13.33	27.45	-23.53	-23.75	-2.56
May 21	WR 39460	Mont. - Wat.	2.00	0.24	3.40	0.31	0.118
	laboratory		1.82	0.26	2.60	0.35	0.114
	difference		-0.18	0.03	-0.80	0.04	0.00
	% difference		-9.00	10.64	-23.53	14.38	-3.39
May 22	WR 39501	Mont. - Wat.	19.00	1.16	1.30	1.81	0.586
	laboratory		18.23	1.31	1.31	1.74	0.567
	difference		-0.77	0.15	0.01	-0.07	-0.02
	% difference		-4.05	12.93	0.77	-3.87	-3.24
May 23	WR 39574	Mont. - Wat.	19.00	1.15	1.70	1.74	0.586
	laboratory		18.23	1.31	1.31	1.74	0.567
	difference		-0.77	0.16	-0.39	0.00	-0.02
	% difference		-4.05	13.91	-22.94	0.00	-3.24

Recovery outside 70 - 130% range
Nutrient and trace QCs spiked at levels ≤ 5 times laboratory detection limit not flagged unless laboratory result is >50% lower **or >100% higher than spike level. N/A - not analyzed**

APPENDIX V

DEBRIS CHARACTERIZATION STUDY

COUNTY OF ORANGE

PUBLIC FACILITIES & RESOURCES DEPARTMENT

DEBRIS CHARACTERIZATION STUDY

Agreement No. 8-023-258-0

July 2000

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This project has been funded wholly or in part by the United States Environmental Protection Agency Assistance Agreement. The contents of this document do not necessarily reflect the views and policies of the Environmental Protection Agency or the State Water Resources Control Board, nor does mention of trade names or commercial products constitute endorsement or recommendation for use.

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1.0 INTRODUCTION

This report presents the results of the debris characterization study completed by the County of Orange as a part of the San Diego Creek 319 (h) grant project (Agreement No. 8-023-258-0).

The San Diego Creek 319(h) grant project, which focuses on the control of watershed and land management activities that impair beneficial-uses, is funded by the Federal Clean Water Act Section 319(h) Non-point Source Implementation Program and administered by the State Water Resources Control Board. The San Diego Creek 319(h) grant project, in addition to providing for measures to be implemented to limit pollutant effects to San Diego Creek and Upper Newport Bay, is also a component of a larger watershed effort designed to assess water quality within San Diego Creek, its tributaries, and within Newport Bay. One of the objectives of these studies is to determine the causes of receiving water beneficial-use impairments.

Debris containment systems installed in various flood control channel locations are designed to reduce the amount of trash and debris transported into the receiving waters of Orange County. During storm events, rain runoff washes trash and debris from the streets, parking lots and open land areas into stormdrains and eventually into flood control channels and into receiving waters such as a bay or harbor. A debris containment system can be used to capture the trash and debris from the runoff before the creek or channel flows into the bay.

The debris containment systems installed within the flood control channels in the San Diego Creek watershed consist of an 18” wide net suspended below a floating boom that extends the span of the flood control channel. **Figure 1** shows the debris containment system in the Santa Ana-Delhi Channel. Although this type of debris containment system captures a considerable amount of trash and debris, its' efficiency is limited by the fact that it can only remove floating materials within a vertical span of 18”. In addition, heavier trash and debris can pass underneath the net and the turbulence within the channel can cause the trash and debris to be pushed under or over the net. While the removal of trash and debris can be improved by utilizing other costlier methods, it is more desirable to reduce the amount of trash and debris by implementing source control measures.

To implement a source control measure for trash and debris, it is necessary to determine its source by characterizing the material collected by the containment systems. The 319(h) grant required that the quantity, type and source of the debris removed from the containment systems be specifically characterized from a selected storm using appropriate sampling techniques and the results compared with similar data obtained from the existing debris boom located on the Santa Ana-Delhi channel. Initially, data for this debris study was to be collected from the Santa Ana-Delhi Channel and then, with the installation of the new debris containment systems in the El Modena-Irvine and Peters Canyon channels, additional data would be collected from these two new locations and compared to the data collected within the Santa Ana-Delhi Channel.

Although an attempt was made to collect trash and debris from the two newly installed containment systems, due to the infrequency of storms in the recent storm season and upstream

construction activities in the Peters Canyon channel, no data could be obtained from these channels. All data obtained for this study was therefore from the Santa Ana-Delhi Channel debris containment system.

Even though data was not collected from Peters Canyon and El Modena-Irvine channels, the results of the debris characterization from the Santa Ana Delhi channel during the 1998-1999 and 1999-2000 storm seasons provide valuable information to move forward with implementing source control measures to reduce the pollutant effects from trash and debris. Additional data obtained from the El Modena-Irvine and Peters Canyon channels during the 2000-2001 storm season will be used to further refine the source control measures that are implemented within the watershed. Furthermore, it is anticipated that as new information is gathered over the years regarding the types and quantities of trash and debris that are removed from the containment systems the source control measures may also change to reflect this.

2.0 DEBRIS CHARACTERIZATION

This debris characterization study examines the collection, segregation and quantification of trash and debris from a debris containment system located on the Santa Ana Delhi channel after several rain events during 1998-1999 and 1999-2000.

2.1 Objective

The results of this debris characterization study will begin to provide the information necessary for implementing effective source control measures. The results provide the data needed for completing other related 319 (h) grant tasks such as the prioritization of applicable source control measures for trash and debris and the implementation of source control measures.

2.2 Study Area

Characteristics of these watersheds are described below. **Figure 2** illustrates the locations of the containment systems within the San Diego Creek watershed.

2.2.1 Santa Ana-Dehi Channel

The debris containment system in the Santa Ana-Delhi Channel is located within the city of Newport Beach, just south of the Mesa Drive bridge, near Irvine Avenue and upstream of the channel's confluence with Upper Newport Bay. The Santa Ana-Delhi Channel, which is one of the major tributaries to the Upper Newport Bay, contains about 17 square miles of watershed area. This watershed is 95 % developed with land uses that include commercial, industrial, recreational and residential. Roads and residential make up a large portion of the land uses.

2.2.2 El Modena-Irvine Channel

The debris containment system in the El Modena-Irvine Channel is located in the city of Irvine, just downstream of Walnut. This debris containment system was installed as part of the San Diego Creek 319 (h) grant. The placement of the containment system at this location allows the

collection of trash and debris in runoff just before they can reach San Diego Creek, which is the largest tributary to the Upper Newport Bay. The El Modena-Irvine Channel watershed is nearly 100 % urbanized with mixed land uses.

2.2.3 Peters Canyon Channel

The debris containment system located in the Peters Canyon Channel, also located in the city of Irvine, is just upstream of the El Modena-Irvine Channel confluence. This debris containment system was installed as part of Task 2.2 of the San Diego Creek 319 (h) grant. Peters Canyon Channel drains an area of about 44.7 square miles; this watershed is comprised of about 50 % agricultural use and 50 % urban areas. It is estimated that over half of the remaining agricultural area in the watershed is tributary to Peters Canyon Channel.

2.3 Methodology

The components of the debris characterization study include the collection, segregation and obtaining subset samples of trash and debris from the debris containment system. A brief description of these tasks is as follows.

2.3.1 Collection

After each rain event, the County of Orange Public Facilities and Resources Department (PFRD), Operations and Maintenance Division deployed a work crew to the debris containment system location to collect the trash and debris manually and deposit it into large plastic bags. The bags were then transported to a staging area for storage and additional processing. At the staging area, the bottoms of the bags were punctured to allow water to drain and after 24 hours, the collected materials were segregated.

2.3.2 Segregation

The segregation step involves the separation of the trash and debris into seven defined categories based on previous trash and debris studies[1]. These categories are: organic, plastic, glass, rubber, metal, paper and cloth. Items that do not fit into these seven categories are put in the "other" category. Items in the "other" category are items that are large, unusual or are made of materials in several categories. **Figure 3** is the field data sheet used during this process. After the trash and debris were segregated they were bagged separately by category and then weighed. The sums of all the categorized bag's weights were added to determine the total weight of trash and debris removed from the debris containment system. For selected category samples, subset samples were obtained in order to determine other characteristics of the collected trash and debris.

[1] Nielsen & Carleton, M.G., 1989, A study of Trash and Trash Interception Devices on the Cooks River Catchment, Sidney, in the Proc. of the 13th Australian Water and Wastewater Association Federal Convention, pp.126-129

2.3.3 Subset Samples

Since the collected trash and debris items were wet and some items have a significant amount of sediment attached to the surface, water content and sediment weight subset samples were collected from selected category samples.

Water content subset samples, collected from selected categorized samples, were used to estimate the amount of water absorbed within the trash and debris items. A small subset sample was obtained from each category and placed in a small aluminum tray. The trays of subset samples were weighed to obtain the wet weights. The subset samples in the trays were then dried in an oven at 60 degrees Celsius to remove water and moisture. After drying for 24 hours, the subset samples in the trays were re-weighed to determine the dry weights. The difference in the wet and dry weights of a specific category is the amount of water associated with that category.

Sediment weight subset samples, used for the estimation of sediment attached to organic and plastic trash and debris items, were obtained from the segregated plastic and organic categories only. These categories were selected based on previous study[2] findings that these two categories make up the majority of the trash and debris collected and therefore most affected by the amount of attached sediment.

For the sediment subset sampling, one subset sample bag of organic and one subset sample bag of plastic were selected and weighed. The contents of these subset sample bags were then separately placed into large crates that have quarter inch diameter holes at the bottom. The crates serve as strainers to allow the sediment to be washed from the pieces of organic and plastic items. In some instances, scrubbing and flushing is necessary to remove the sediment. After the washing and straining, the items were shaken vigorously in the crate to remove excess wash water. The items were then placed into two separate clean bags and small holes were punctured in the bottom of the bags to allow excess water to drain. After draining, the subset samples were re-weighed. The difference in the weights before and after washing the subset samples is the weight of the sediment attached to the plastic and organic materials.

3.0 RESULTS

Trash and debris data were collected after six storms during the 1998-1999 storm season, and one storm during the 1999-2000 storm season from the Santa Ana-Delhi containment system.

Data collected from each storm was obtained by processing the entire sample collected with exception of the February 21, 2000 storm. While the average number of trash and debris bags collected from other storms was 40 to 60 bags, the February 21, 2000 storm which had the highest rainfall, produced 184 bags. With this large amount of trash and debris it was not feasible to process the entire sample. Therefore, only 15 of the 184 bags were selected at random, segregated and then weighed. The resulting data presented in the tables has been extrapolated to reflect the 184 bags collected.

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[2] Gamtron P/L, 1992, Performance Assessment of Four Rubbish Interception Booms, prepared for Water Board, Southern Region Stormwater Management, Rockdale NSW, pp. 68

During the segregation process, many of the items were found to be common. **Table 1** is a list of the common items found. After the samples were segregated and drained of excess water, the wet weights of each category were measured and recorded. The wet weight data along with the total rainfall for each storm is presented in **Table 2.**

For the estimation of the amount of water absorbed within the trash and debris items, the water content within each subset was determined. These results are presented in **Table 3** and **Table 4**. In evaluating the water content percent averages, it was observed that some numbers did not appear to be consistent with the overall data set. The Dixon test[3] was used to determine if the suspected points were outliers to a normal distribution. The outlying data was excluded prior to calculating the averages by using the following procedure:

The data set was ordered from smallest to largest that is X1 < X2 < X3 < … Xn. The Dixon ratio r, which is a function of n was calculated.

Number of Points	**Ratio Calculated**
n = 3 to 7	r_{10}
n = 8 to 10	r_{11}
n = 11 to 13	r_{21}
n = 14 to 25	r_{22}

Depending on which point was suspected of being the outlier, the ratio was calculated in the following manner:

r	**If X_n is Suspect**	**If X_1 is Suspect**
r_{10}	$(X_n-X_{n-1})/(X_n-X_1)$	$(X_2-X_1)/(X_n-X_1)$
r_{11}	$(X_n-X_{n-1})/(X_n-X_2)$	$(X_2-X_1)/(X_{n-1}-X_1)$
r_{21}	$(X_n-X_{n-2})/(X_n-X_2)$	$(X_3-X_1)/(X_{n-1}-X_1)$
r_{22}	$(X_n-X_{n-2})/X_n-X_3)$	$(X3-X_1)/X_{n-2}-X_1)$

Using Table A.7[4] for calculated confidence values, the calculated ratio was compared to the critical value at a confidence level of 95%. If the calculated value was greater than the tabled value the suspected point was rejected and the distribution was re-tested to confirm normality.

For normal distributions the mean is calculated as the arithmetic mean, that is

$$\bar{x} = \frac{1}{n}\sum_{i=1}^{n} x_i$$

[3] John Keenan Taylor, 1990, Statistical Techniques for Data Analysis , pg. 89-91
[4]Taylor, John Keenan. Statistical Techniques for Data Analysis, 1990. Lewis Publishers, Inc., p168.

the confidence limits for the mean of a normal distribution with unknown variance is given by

$$\bar{x} - t_{(1-\alpha/2,n-1)} \frac{s}{\sqrt{n}} \le \mu \le \bar{x} + t_{(1-\alpha/2,n-1)} \frac{s}{\sqrt{n}}$$

where *s* is the standard deviation of the data set and $t_{(1-\alpha/2,n-1)}$ is from table A2[5]. Using $\alpha = 0.05$ the upper and lower limits are calculated. The true mean μ will occur outside of this range 5% of the time.

After excluding outlying data, the averages are calculated. The resulting calculated averages showed that organic and paper categories had the highest water content averages of 65% and 40%, respectively.

The sediment subset data and the estimation of the percent sediment associated with organic and plastic categories are presented in **Table 5**. The average percent composition of sediment attached to the organic and plastic items in the trash and debris samples was also calculated after excluding anomalous data with the Dixon test. The resulting calculated average indicates organic materials averaged 34% weight sediment and plastic materials contained 31% weight sediment.

The estimation of the water content and sediment weight averages were then used to estimate the adjusted or actual weight of trash and debris. To arrive at the estimated adjusted values, the wet weight values are reduced by the average water content percent for each category and also reduced by the average sediment weight percent for organic and plastic categories. The adjusted trash and debris weights correlated with the amount of rainfall for each storm presented in **Table 6**.

Figure 4 illustrates this correlation in a graph, which demonstrates that (except for the March 25, 1999 storm), the amount of trash and debris collected is generally proportional to the amount of rainfall.

The adjusted weight values were used to estimate the percent composition of the trash and debris. The resulting adjusted composition of the trash and debris is presented in **Table 7** and **Figure 5** is a graph of these values.

As a result of the calculations, the average adjusted composition percent of organic and plastic categories at Santa Ana Delhi channel were approximately 47% and 34%, respectively. The sum of averages for the remaining categories is less than 20%.

[5]Gilbert, Richard O. Statistical Methods of Environmental Pollution Monitoring, 1987. Van Nostrand Reinhold, p255.

4.0 CONCLUSION

The data collected from all the storms provided consistent and useful trash and debris characterization information. The results of this study indicate that the percent composition of the trash and debris followed a similar pattern for each of the storms. In general, the organic (47%) and plastic (34%) were found to be the predominant materials collected from the debris containment system. This information is important for implementing a source control program to reduce the amount of trash and debris from impacting the Upper Newport Bay and also provides the baseline for measuring future trash and debris reductions.

These results support data obtained from the 15th Annual California Coastal Commission's Cleanup Day that plastic items constitute a significant portion of trash and debris. During the event in September 1998, the top five items picked up were cigarette butts, foamed plastic pieces, plastic pieces, paper pieces, and plastic food bags/wrappers.

ADDENDUM

This addendum includes additional data obtained from the El Modena-Irvine Channel after the completion of the original Santa Ana-Delhi debris characterization study. Due to the infrequency of storms during the September – December 2000 period, only one storm sample could be collected from the El Modena-Irvine channel debris containment system. Trash and debris could not be collected from Peters Canyon Channel because of few storms and an upstream portion of the channel supports vegetation which prevents trash and debris from flowing downstream to the debris containment system.

The results of the characterization of the trash and debris collected from the El Modena-Irvine channel for the storm occurring on October 27, 2000 are presented in the revised **Table 2**. The recent data was adjusted using the same correction factors for water content and sediment as previously obtained from the Santa Ana-Delhi data and are presented in the revised **Table 7**.

The majority of trash and debris from the El Modena-Irvine channel were characterized to be 18% organic and 48% plastic and 16% rubber. The composition of remaining categories (glass, metal, paper and cloth) total less than 20%. The high percentage composition of rubber was attributed to the large number of balls (tennis, soccer, basketball, etc.) A graph of the summary data for both Santa Ana-Delhi and El Modena-Irvine channels are presented in the revised **Figure 5**.

In comparing the data from the two containment systems, it is apparent that the composition of trash and debris are different. The amount of organic materials found at El Modena-Irvine (18%) was significantly less than the average (47%) at Santa Ana-Delhi. The amount of plastic materials found at El Modena-Irvine (48%) was significantly higher than the average (34%) at Santa Ana-Delhi. In addition, the composition of rubber materials for El Modena-Irvine (16%) is much higher than the average for Santa Ana-Delhi (4.9%). The significance of this difference, however, is difficult to evaluate since the data for El Modena-Irvine was only for one storm

event. Therefore, additional data from the El Modena-Irvine and Peters Canyon channels will be collected to complete the evaluation of this data.

TABLES & FIGURES

TABLE 1

SANTA ANA-DELHI CHANNEL

COMMON TRASH & DEBRIS ITEMS

CATEGORY	ITEMS
Organic	Leaves, twigs, branches, grass clippings, flowers, fruit, seeds, pine cones, pods, lumber materials, pencils, chair legs, bark
Plastic	**Plastic:** bags, pens, wrappers, caps, straws, balls, sports bottles, plastic water and beverage bottles, unidentified plastic ends, six pack beverage container holders, fruit juice containers, toys, oil containers, misc. hard plastic items, chords, tubes and tubing, rings, packaging material, **Foamed plastics:** plates, cups and lids, peanuts for packaging, surfboard foam, foam plastic sheets for grocery store packaged meats, foam packaging materials
Glass	Beverage bottles, light bulbs, misc. glass pieces,
Rubber	Tennis balls, racket balls, balloons, gloves, inner tubes, rubber shoes and sandals, misc. rubber pieces, condoms, sun glass holder, rubber tubes
Metal	Aerosol containers, aluminum beverage cans, foil gum wrappers, tin cans
Paper	Newspaper, cardboard, cigarette butts, fast food cups, white paper
Cloth	Fabrics, clothing remnants, cotton/nylon strings

TABLE 2

SANTA ANA-DELHI CHANNEL

TRASH & DEBRIS WET WEIGHT PERCENT COMPOSITION

	STORM DATE							
	2/9/99	3/11/99	3/15/99	3/25/99	4/7/99	4/12/99	2/21/00*	
RAINFALL	0.16	0.12	0.20	0.56	0.16	0.08	0.82	AVERAGE
ORGANIC	67.9%	60.3%	77.2%	77.8%	74.7%	76.5%	59.8%	70.6%
PLASTIC	22.8%	32.0%	18.0%	15.9%	14.2%	18.6%	30.6%	21.7%
GLASS	0.9%	0.0%	1.2%	0.8%	0.7%	0.4%	3.9%	1.1%
RUBBER	1.1%	1.1%	1.0%	1.6%	1.3%	1.2%	2.8%	1.4%
METAL	1.2%	5.7%	1.2%	2.8%	0.9%	2.3%	2.0%	2.3%
PAPER	1.2%	0.9%	0.8%	0.7%	0.4%	0.9%	0.4%	0.8%
CLOTH	0.2%	0.0%	0.7%	0.4%	0.2%	0.0%	0.4%	0.3%
OTHER	4.9%	0.0%	0.0%	0.0%	7.5%	0.0%	0.0%	1.8%

* data extrapolated from 15 bags sampled of 184 total

TABLE 3

SANTA ANA-DELHI CHANNEL

WATER CONTENT SUBSET SAMPLES

	2/8/99				4/7/99			
	wet weight (g)	dry weight (g)	difference	%	wet weight (g)	dry weight (g)	difference	%
ORGANIC	6.22	3.68	2.54	40.8%	126.44	46.37	80.07	63.3%
PLASTIC	1.13	0.97	0.16	14.2%	48.75	38.51	10.24	21.0%
GLASS	14.66	14.66	0.00	0.0%	265.13	262.84	2.29	0.9%
RUBBER	6.53	5.16	1.37	21.0%	135.10	115.33	19.77	14.6%
METAL	11.32	10.25	1.07	9.5%	27.88	27.21	0.67	2.4%
PAPER	6.43	3.50	2.93	45.6%	22.70	16.79	5.91	26.0%
CLOTH	6.86	5.31	1.55	22.6%	68.80	42.42	26.38	38.3%

	4/12/99				2/21/00			
	wet weight (g)	dry weight (g)	difference	%	wet weight (g)	dry weight (g)	difference	%
ORGANIC	82.88	33.57	49.31	59.5%	180.00	52.00	128.00	71.1%
PLASTIC	37.94	35.07	2.87	7.6%	71.00	58.00	13.00	18.3%
GLASS	268.29	268.08	0.21	0.1%	209.00	208.00	1.00	0.5%
RUBBER	192.31	157.75	34.56	18.0%	155.00	138.00	17.00	11.0%
METAL	33.05	29.64	3.41	10.3%	183.00	165.00	18.00	9.8%
PAPER	31.86	21.39	10.47	32.9%	52.00	30.00	22.00	42.3%
CLOTH	0.00	0.00	0.00	0.0%	183.00	139.00	44.00	24.0%

TABLE 4

SANTA ANA-DELHI CHANNEL

PERCENT WATER CONTENT IN TRASH & DEBRIS

CATEGORY	02/08/99	04/07/99	04/12/99	02/21/00	AVG*
ORGANIC	40.8%	63.3%	59.5%	71.1%	64.6%
PLASTIC	14.2%	21.0%	7.6%	18.3%	17.8%
GLASS	0.0%	0.9%	0.1%	0.5%	0.2%
RUBBER	21.0%	14.6%	18.0%	11.0%	17.9%
METAL	9.5%	2.4%	10.3%	9.8%	9.9%
PAPER	45.6%	26.0%	32.9%	42.3%	40.2%
CLOTH	22.6%	38.3%	0.0%	24.0%	28.3%

* Average calculated by excluding anomalous data with the Dixon test

TABLE 5

SANTA ANA-DELHI CHANNEL

PERCENT OF SEDIMENT IN ORGANIC AND PLASTIC

	02/09/99				03/25/99			
	w/ sediment (lbs)	w/o sediment (lbs)	difference	%	w/ sediment (lbs)	w/o sediment (lbs)	difference	%
ORGANIC	62	33	29	47%	11	8	3	27%
PLASTIC	15	13	2	13%	4	3	1	25%

	04/07/99				04/12/99			
	w/ sediment (lbs)	w/o sediment (lbs)	difference	%	w/ sediment (lbs)	w/o sediment (lbs)	difference	%
ORGANIC	10	5	5	50%	8	6	2	25%
PLASTIC	3	2	1	33%	3	2	1	33%

TABLE 6

SANTA ANA-DELHI CHANNEL

ADJUSTED PERCENT COMPOSITION

	STORM DATE							
	2/8/99	3/11/99	3/15/99	3/26/99	4/7/99	4/12/99	2/21/00*	AVERAGE
RAINFALL (in.)	0.16	0.12	0.24	0.56	0.43	0.12	1.06	
ORGANIC**	42.83%	36.47%	56.08%	56.14%	48.71%	55.27%	35.23%	47.25%
PLASTIC**	34.58%	46.65%	31.45%	27.61%	22.30%	32.40%	43.38%	34.05%
GLASS	2.35%	0.00%	3.56%	2.43%	1.92%	1.34%	9.76%	3.05%
RUBBER	2.32%	2.33%	2.54%	4.00%	3.01%	2.94%	5.80%	3.28%
METAL	2.76%	13.19%	3.43%	7.68%	2.20%	6.45%	4.40%	5.73%
PAPER	1.83%	1.36%	1.42%	1.27%	0.73%	1.60%	0.65%	1.27%
CLOTH	0.34%	0.00%	1.53%	0.87%	0.38%	0.00%	0.78%	0.56%
OTHER	12.97%	0.00%	0.00%	0.00%	20.76%	0.00%	0.00%	4.82%

* data extrapolated from 15 bags sampled of 184 total
** data adjusted for sediment weight

TABLE 7

SANTA ANA-DELHI CHANNEL

ADJUSTED PERCENT COMPOSITION

	STORM DATE							
	2/8/99	3/11/99	3/15/99	3/26/99	4/7/99	4/12/99	2/21/00*	AVERAGE
RAINFALL (in.)	0.16	0.12	0.24	0.56	0.43	0.12	1.06	
ORGANIC**	42.83%	36.47%	56.08%	56.14%	48.71%	55.27%	35.23%	47.25%
PLASTIC**	34.58%	46.65%	31.45%	27.61%	22.30%	32.40%	43.38%	34.05%
GLASS	2.35%	0.00%	3.56%	2.43%	1.92%	1.34%	9.76%	3.05%
RUBBER	2.32%	2.33%	2.54%	4.00%	3.01%	2.94%	5.80%	3.28%
METAL	2.76%	13.19%	3.43%	7.68%	2.20%	6.45%	4.40%	5.73%
PAPER	1.83%	1.36%	1.42%	1.27%	0.73%	1.60%	0.65%	1.27%
CLOTH	0.34%	0.00%	1.53%	0.87%	0.38%	0.00%	0.78%	0.56%
OTHER	12.97%	0.00%	0.00%	0.00%	20.76%	0.00%	0.00%	4.82%

* data extrapolated from 15 bags sampled of 184 total
** data adjusted for sediment weight

TABLE 2 (Revised)

WET WEIGHT OF TRASH & DEBRIS COLLECTED (lbs)

	STORM DATE								
	2/9/99	3/11/99	3/15/99	3/25/99	4/7/99	4/12/99	2/21/00*	10/27/00	Total Wt.
LOCATION	S.A-D	S.A-D	S.A-D	S.A-D	S.A-D	S.A-D	S.A-D	E M-I	
RAINFALL (in.)	0.16	0.12	0.24	0.56	0.43	0.12	1.06	1.1	
ORGANIC	767	81	997	779	1179	522	2180	212	6505
PLASTIC	257	43	232	159	224	127	1114	237	2156
GLASS	10	0	15	8	11	3	143	14	190
RUBBER	12	1	13	16	21	8	103	56	175
METAL	13	8	16	28	14	16	72	19	166
PAPER	13	1	10	7	7	6	16	7	60
CLOTH	2	0	9	4	3	0	16	21	34
OTHER	55	0	0	0	119	0	0	0	174
TOTAL	1129	134	1292	1001	1578	682	3643	565	9460

* data extrapolated from 15 bags sampled of 184 total
S.A-D -- Santa Ana-Delhi
E M-I -- El Modena-Irvine

TABLE 7 (Revised)

ADJUSTED PERCENT COMPOSITION

	STORM DATE								
	2/8/99	3/11/99	3/15/99	3/26/99	4/7/99	4/12/99	2/21/00*	10/27/00	AVERAGE
LOCATION	S.A-D	S.A-D	S.A-D	S.A-D	S.A-D	S.A-D	S.A-D	E M-I	
RAINFALL (in.)	0.16	0.12	0.24	0.56	0.43	0.12	1.06	1.01	
ORGANIC**	42.83%	36.47%	56.08%	56.14%	48.71%	55.27%	35.23%	17.81%	43.57%
PLASTIC**	34.58%	46.65%	31.45%	27.61%	22.30%	32.40%	43.38%	48.06%	35.80%
GLASS	2.35%	0.00%	3.56%	2.43%	1.92%	1.34%	9.76%	4.97%	3.29%
RUBBER	2.32%	2.33%	2.54%	4.00%	3.01%	2.94%	5.80%	16.35%	4.91%
METAL	2.76%	13.19%	3.43%	7.68%	2.20%	6.45%	4.40%	6.09%	5.78%
PAPER	1.83%	1.36%	1.42%	1.27%	0.73%	1.60%	0.65%	1.38%	1.28%
CLOTH	0.34%	0.00%	1.53%	0.87%	0.38%	0.00%	0.78%	5.35%	1.16%
OTHER	12.97%	0.00%	0.00%	0.00%	20.76%	0.00%	0.00%	0.00%	4.22%

* data extrapolated from 15 bags sampled of 184 total
** data adjusted for sediment weight
S.A-D -- Santa Ana-Delhi
E M-I -- El Modena-Irvine

FIGURE 1

SANTA ANA-DELHI CONTAINMENT SYSTEM

FIGURE 2

CONTAINMENT SYSTEM LOCATIONS

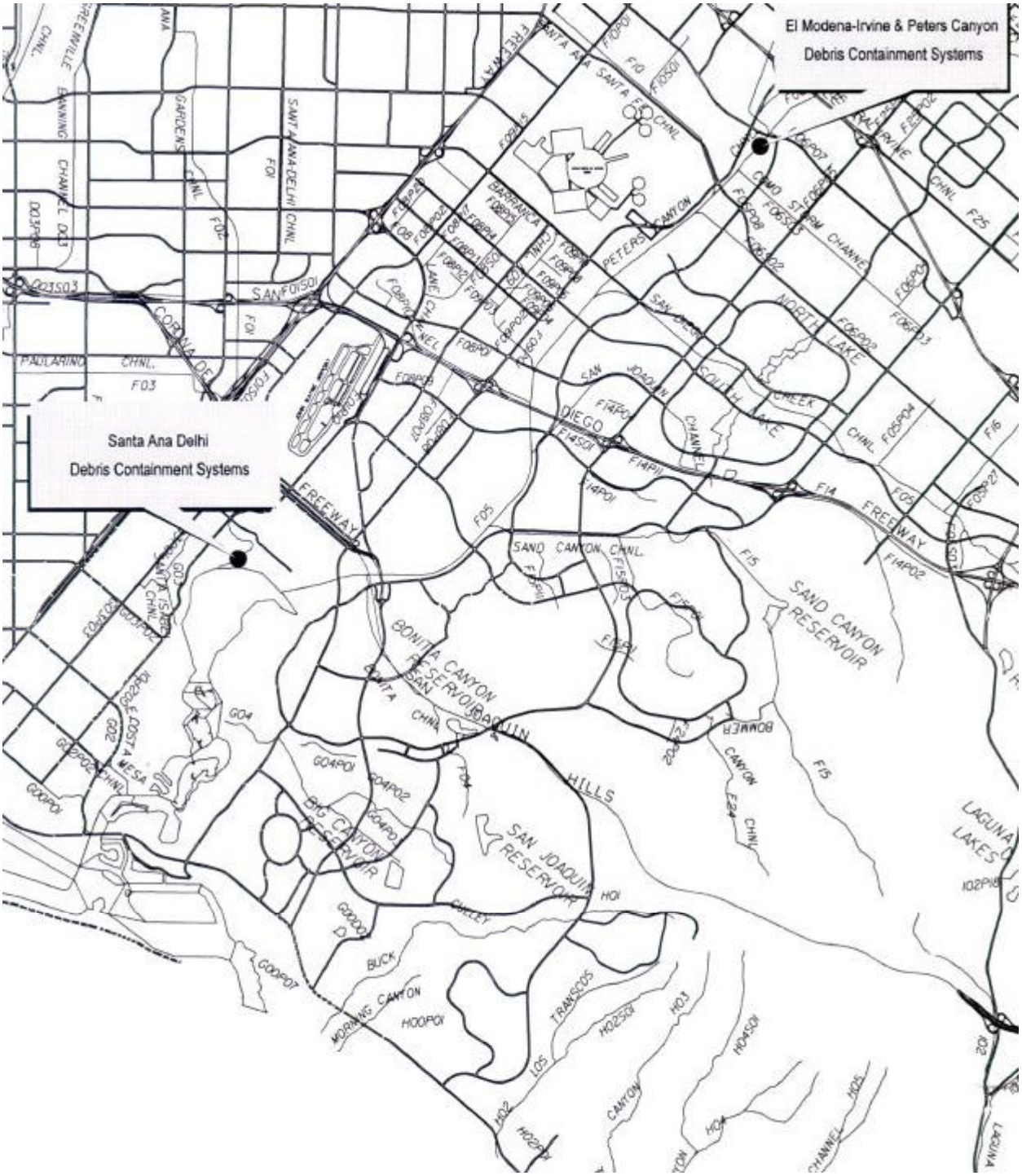

FIGURE 3

Trash & Debris Characterization Study

Debris Characterization Data Form

(Keep track of items by making tick marks in the space provided. Enter total in the bo:

Location:
Santa Ana-Delhi (F01) ___
Peters Canyon (F06) ___
El Modena-Irvine (F07) ___

Collect Date: _____ Storm date: _____

PLASTIC

		TOTAL			TOTAL
Bags:				plastic pieces	
	grocery bags			rope	
	wrappers		sheeting		
	trash			> 2 feet	
	other			< 2 feet	
Bottles:				6-pack holders	
	beverage		strapping bands		
	cleaner			straws	
	milk,water			syringes	
	oil,lube			tampon appl.	
	other			toys	
	caps, lids		vegetable sacks		
	cups,utensils			other (specify)	
	diapers				

FOAMED PLASTIC

cups		plates		
egg cartons		foam pieces		
fast food contain.		other foam plas.		
packaging mater.				

GLASS

Bottles/jars:			
beverage bottles		light bulbs	
food jars		glass pieces	
other bottles/jars		other (specify)	

RUBBER

balloons		tires	
condoms		other (specify)	
gloves			

METAL

bottle caps		shopping carts	
Cans:		55 gallon drums	
aerosol		pull tabs	
beverage		wire	
food		metal pieces	
other cans		other (specify)	

PAPER

bags		newspaper/mag.	
cardboard		plates	
cartons		paper pieces	
cups		other (specify)	

WOOD

branches/twigs		pallets	
lumber pieces		other (specify)	

CLOTH

clothing/pieces		other (specify)

FIGURE 4

SANTA ANA-DELHI CHANNEL

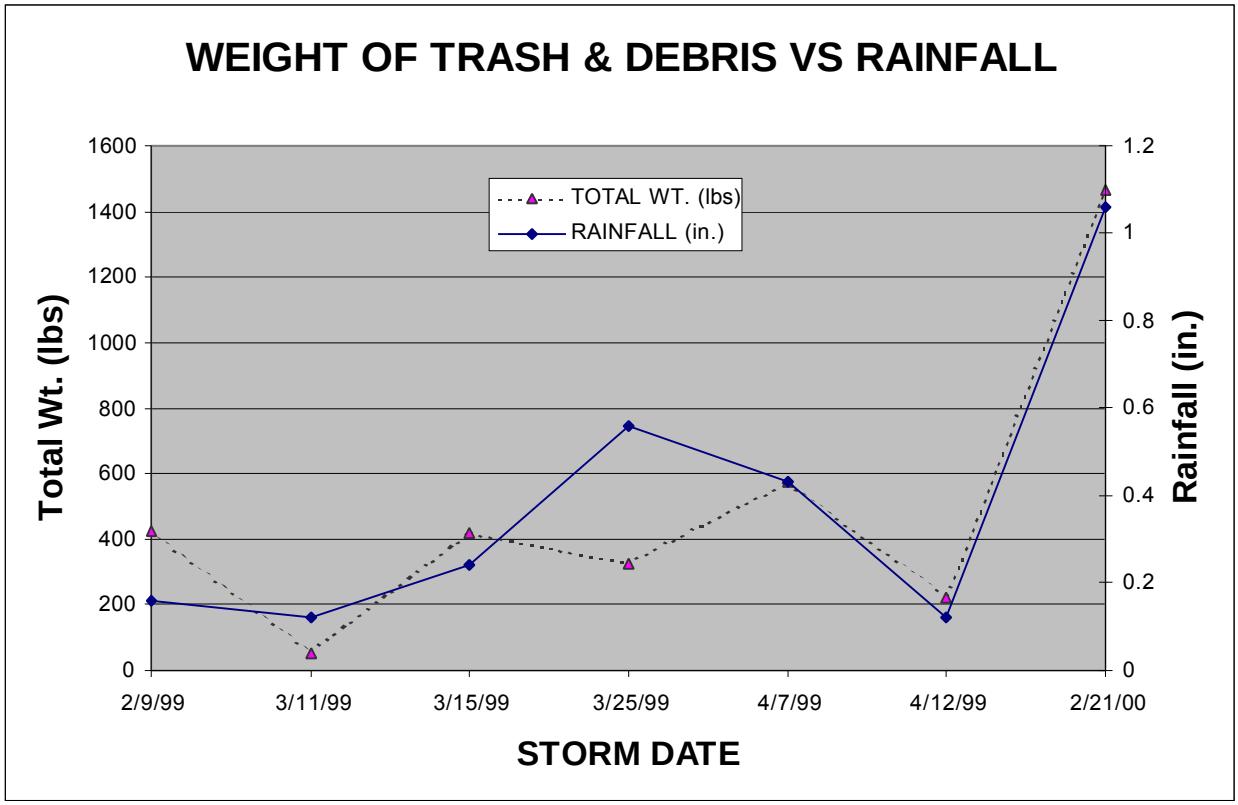

FIGURE 5

SANTA ANA-DELHI CHANNEL

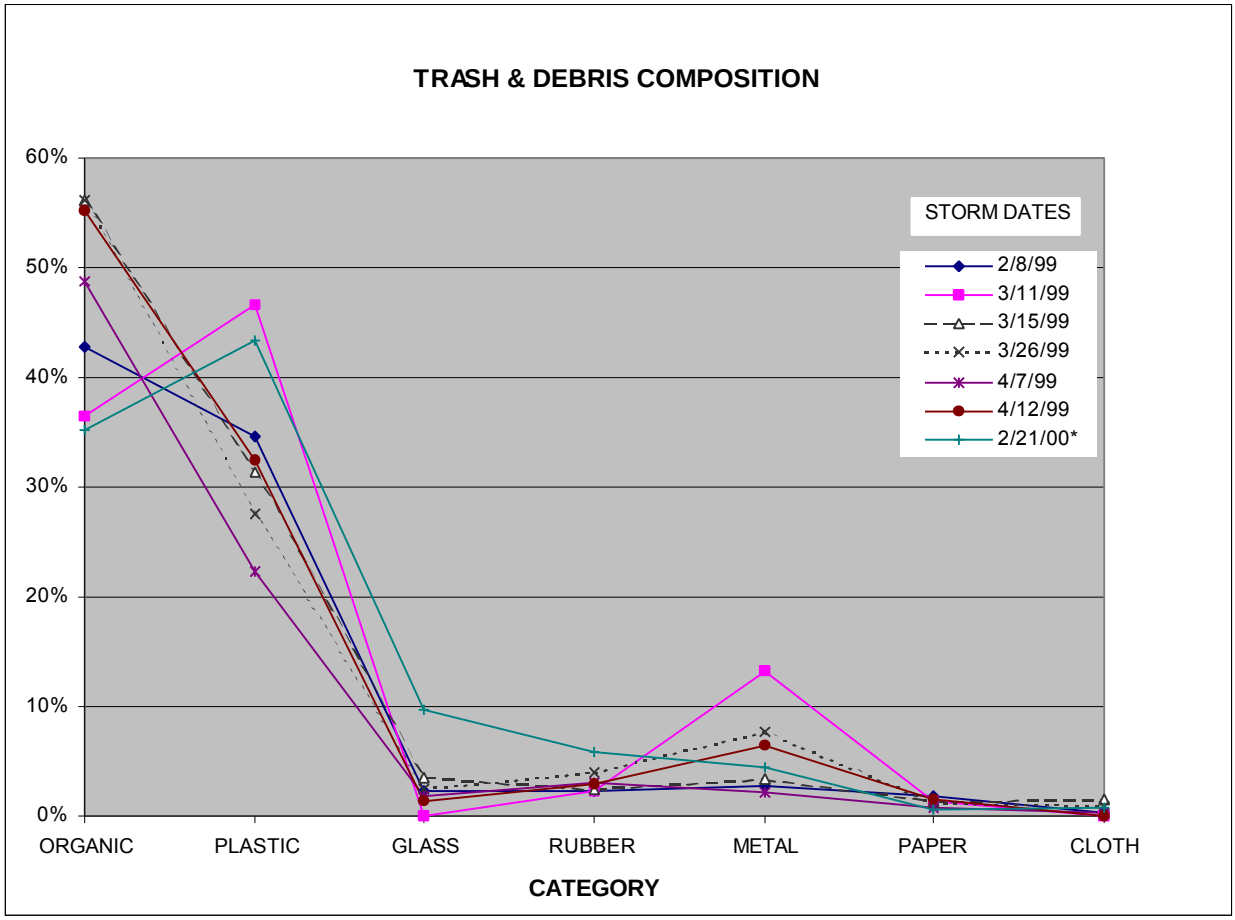

FIGURE 5 (Revised)

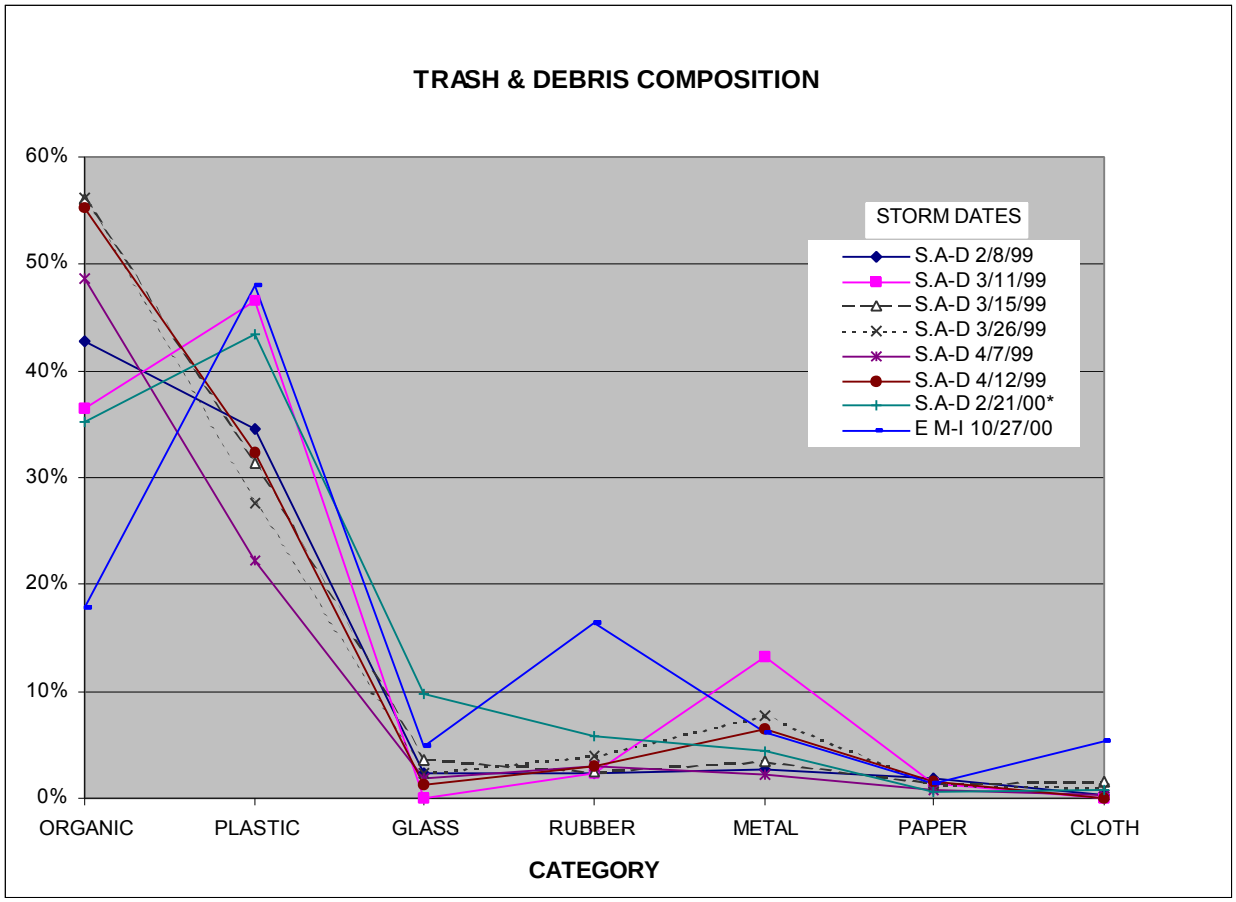

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COUNTY OF ORANGE

PUBLIC FACILITIES & RESOURCES DEPARTMENT

NPDES ANNUAL PROGRESS REPORT

November 15, 2000

VICKI L. WILSON
Director

2001 JAN 30 P 4:15
SAN DIEGO REGIONAL WATER QUALITY CONTROL BOARD

ORANGE COUNTY BOARD OF SUPERVISORS

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STORM WATER CONVEYANCE SYSTEM
NPDES ORDER: 96-03
REPORT FILE: 28 11/2000-11/2000
10-6000.03 STATUS: C

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EXECUTIVE SUMMARY

The purpose of this document is to comply with Regional Water Quality Control Board Orders 96-31 (Santa Ana Region) and 96-03 (San Diego Region), which require the submittal of an Annual Progress Report. This report consolidates into one submittal the series of reports that were previously required under Orange County's initial areawide permits.

Section 1.0 provides a background on the Orange County NPDES Stormwater Program as well as the permit and annual status reporting requirements.

Section 2.0 includes a discussion of the specific requirements for legal authority to control pollutant contributions to the storm drain system, the use of this authority to eliminate illegal discharges and efforts to identify and eliminate illicit connections to the storm drain system through routine facility inspections.

The Permittees collectively provided a summary of the types and total numbers of water pollution incidents that were reported within their jurisdiction. This information included the following:

- The Permittees reported a total of 854 water pollution incidents.
- The Principal Permittee handled approximately half (407) of the total and served a primary role in incident reporting coordination

The Permittees formerly designated the staff responsible for carrying out the enforcement services according to the Enforcement Consistency Guide and update these designations every year. The Permittees will continue to have responsibility for water pollution enforcement within their jurisdiction unless that authority has been designated to the Orange County Flood Control District.

The Permittees provided a summary of the enforcement actions that have been taken against offenders within their jurisdiction. This information included the following:

- The Permittees reported a total of 397 enforcement actions. This total constituted 231 educational letters, 72 administrative actions and 67 criminal enforcement actions. The criminal enforcement includes citations/fines as well as charges being filed.

An illicit connection to the storm drain system is an undocumented and/or unpermitted physical connection from a facility to the storm drain system. The Permittees developed a facility inspection and documentation program to identify such connections. This information included the following:

- The Permittees reported finding 53 illicit connections. Residential pool drains constituted the majority of these connections. These connections were either permitted, removed, plugged or are still pending while the Permittees are working with the property owners to resolve the issue.

Section 3.0 details the Permittees' programs to implement Best Management Practices (BMPs) as part of routine public agency activities, in the construction and post construction phases of new development and the participation in several water quality planning initiatives.

All of the Permittees routinely conduct preventive maintenance activities that are widely recognized as effective BMPs for pollutant control. These activities include litter control, solid waste collection/recycling, drainage facility maintenance, catch basin stenciling, street sweeping, hazardous materials management/environmental performance reporting, household hazardous waste collection, emergency spill response and fertilizer and pesticide management. This information included the following:

- Within the drainage facility maintenance section twenty nine Permittees reported the removal of 15,381 cubic yards and 24,324 tons of material from approximately 220 miles of storm drains and 22,022 drain inlets;
- The Permittees also reported on a limited number of drainage system diversions to the sanitary sewer system at several coastal locations;
- It was reported that of an estimated inventory of 34,000 catchbasins, approximately 33,300 (98%) catchbasins had been stenciled with "No Dumping Drains To Ocean" or similar phrase. Additionally, several Permittees noted a positive public response and cleaner catchbasins as a consequence of this activity;
- Within in the Environmental Performance Reporting section, 24 Permittee facilities completed 29 (39%) of the 74 remaining significant issues action plans identified in the 1998/99 report. Two new significant issues were identified during this reporting period bringing the total number of outstanding issues to 47 from 17 facilities. At the end of 1999/2000, seventeen Permittees were able to report the completion of all outstanding significant issues;
- Seven Permittees reported additional household hazardous waste collection efforts, which brought in an additional 190,905 pounds of hazardous waste;
- Twenty four Permittees reported implementing Integrated Pest Management (IPM) techniques as recommended in the Management Guidelines for Fertilizer and Pesticides. As a result, nine Permittees reported a reduction in the quantity of pesticides used within their jurisdiction that ranged from 5% - 50%;
- In addition to all of the public education efforts undertaken as listed above, in late 1999, the Permittees developed a comprehensive long-term NPDES public and business education strategy in order to effectively educate the public and targeted business groups about the effects of stormwater pollution and encourage their participation in the protection of surface waters. The Public Education Program includes a comprehensive planning approach and "tool box" of implementable educational elements based upon the desired direction of the program;
- The Permittees reported that, since the implementation of the program in 1997, a total of 1100 WQMPs had been approved, covering 10,661 acres which represents approximately 2.5% of the area within Orange County subject to the NDPES Stormwater Permit. This is consistent with the incremental implementation of BMPs over the life of development envisaged by the Clean Water Act.

To date, the evaluation of BMP implementation countywide and its effect on the county's receiving waters has been limited. Section 4.0 discusses the conventional and non-conventional monitoring that has been utilized in order to assess the performance of the BMPs being implemented.

The conventional monitoring that has been utilized includes overall water quality monitoring, monitoring specific projects where BMPs have been implemented such as the Las Flores Storm Water Quality Basins and the Newport Bay Nitrate reduction efforts. The non-conventional monitoring includes the 1994 and upcoming 2000 public opinion surveys as well as evaluating the various public agency activities discussed in Section 3.0.

The Water Quality Monitoring Program is described in Section 5.0. During 1999/2000 the monitoring program as proposed in a May 1999 submittal to the Boards was implemented. Under the First Term Permit, water quality monitoring could be characterized as areawide rather than focused to any specific area or areas. Under the new program, monitoring has been conducted in waterbodies or watersheds which have been assessed as important aquatic resources or which have shown some elevated constituent levels which may be attributable to stormwater.

Data from the First Term Permit program were used to identify those areas with elevated constituents in either the water or the sediment. These areas are designated as "Warm Spots". Power analyses were used to determine the annual sampling frequency that would be required to detect a statistically significant changes in the constituent of concern.

The areas of ecological and recreational importance were prioritized for study during the permit term. The Critical Aquatic Resources (CARSs) San Diego Creek and the Newport Bay were assigned the highest priorities and special investigations were initiated this year.

Monitoring from this season produced the following findings:

- The dissolved metals concentrations from several storm and non-storm events were compared to the California Toxic Rule (CTR) guidance criteria for the protection of freshwater aquatic life. In all, 109 samples from the Upper Newport Bay watershed (including 39 dry weather samples) were compared to the CTR criteria. The majority (34 of 39) of the dry weather sampling was conducted at the Costa Mesa Channel. The acute toxicity criteria for dissolved copper were exceeded in 23 of the samples including 15 (5 dry weather) samples from the Costa Mesa Channel. The acute toxicity criteria for dissolved zinc were exceeded in 8 of the samples. Ten composite samplings, including two dry-weather samplings from Costa Mesa Channel, were compared to the chronic toxicity guidance criteria from the CTR. One exceedance of the dissolved lead criteria was observed and 2 exceedances of the dissolved copper criteria were observed.

- For channels discharging directly to the Newport Bay, dissolved metals concentrations were compared to the CTR guidance criteria for the protection of saltwater aquatic life. Out of 77 samples, 75 exceeded the acute toxicity guidance criterion for dissolved copper and 14 exceeded the acute toxicity guidance criterion for dissolved zinc. Of the 6 composite periods that were evaluated against the chronic toxicity guidance criteria for the protection of saltwater aquatic life, all exceeded the guidance criterion for dissolved copper and 1 exceeded the criterion for dissolved zinc.

- Two intensive studies (September 1999 and June 2000) of nutrient concentrations and loads were conducted in the Peters Canyon Wash and San Diego Creek watersheds. From these studies the projected summertime (April 1 – September 30) total nitrogen load was estimated. From these two studies it was determined that using the June 2000 data to estimate the summertime total nitrogen load from San Diego Creek yields a value lower than that calculated from the September 1999 data. Both are less than one-half of the December 31, 2002 target of 200,097 pounds developed by the Regional Board. The estimates were compared to the average monthly load calculated from NPDES data collected from San Diego Creek by Orange County between July 1, 1999 and June 30, 2000. Using the nutrient study values for June and September and the NPDES values for the remaining four months yields a total of 116,000 pounds. Without the removal of nitrogen from the creek by the Irvine Ranch Water District's wetlands the total nitrate nitrogen load would be approximately 139,000 pounds, still well below the December 2002 target.

- The Costa Mesa Channel was selected as a model urban runoff site for the Upper Newport Bay watershed. Its watershed is approximately one square mile in area and has predominately urban land uses within it. Monitoring during this year included weekly sampling of nutrients, dissolved metals and bacteria, monthly sampling for the organophosphorus pesticides Diazinon and Chlorpyrifos, and continuous water level measurements.

  Fecal coliform concentrations were extremely variable throughout the year with a range of <2 to 240,000 MPN / 100 ml and a logmean of approximately 4,100 MPN / 100 ml.

  Diazinon was found above the detection limit (0.05 µg/l) of the laboratory in nearly every sample. Over one third of the samples had concentrations greater than the LC_{50} for the freshwater toxicity testing organism *Ceriodaphnia dubia.* Chlorpyrifos was not detected in any sample from this monitoring year. However, for over 40% of the samples, the detection limit of the laboratory was greater than the LC_{50} for *Ceriodaphnia* and all reported detection limits were greater than the LC_{50} for the saltwater toxicity testing organism *Mysidopsis bahia.*

- During the 1999 nutrient study the discharge from the Construction Circle Storm Drain was intermittently contaminated with what was believed to be highly alkaline, concrete slurry. In June of 2000 an automatic sampler was used to characterize the discharge from this drain. Each hourly sample was analyzed for electrical conductivity and pH. Spikes of high pH occurred between 6:00 and 7:00 A.M. and 3:00 to 4:00 P.M. These spikes may have been the result of washing of concrete delivery trucks at the beginning and end of the workday. A more extensive investigation has been planned for November of 2000.

Section 6.0 is a fiscal summary and analysis of the Permittees compliance activities. This information included the following:

- The total cost of the activities undertaken by the County as Principle Permittee and the activities undertaken by the Permittees, implementing those programs required specifically by the DAMP was $7,938,633; and
- The total cost of the municipal activities that contribute to non-point source pollutant control was $50,724,379.

Section 7.0 discusses the management program modifications that have been undertaken to comply with the Clean Water Act requirements to reduce the discharge of pollutants to the maximum extent practicable.

Section 8.0 describes the proposed implementation of the DAMP for 1999/00 and is consistent with the program changes proposed in the 1994 Report of Waste Discharge and the Report of Waste Discharge and draft DAMP submitted in September 2000.

1.0 INTRODUCTION

1.1 Background

This Annual Status Report was prepared in response to the requirements of municipal NPDES Stormwater Permit Nos. CAS618030 and CAS0108740 (subsequently referred to as the Second Term Permits), issued to the County of Orange (subsequently referred to as the Principal Permittee), the Orange County Flood Control District and the 31 incorporated cities of Orange County (subsequently collectively referred to as the Permittees) by the Santa Ana and San Diego Regional Water Quality Control Boards (subsequently collectively referred to as the Regional Boards and individually as the Santa Ana Board and the San Diego Board), respectively.

The Orange County NPDES Stormwater Program is a cooperative effort between the 33 current Permittees (35 once the recently incorporated cities of Laguna Woods and Rancho Santa Margarita are added to the permits). A formal agreement (the Implementation Agreement) underpins Permittee cooperation and recognizes the additional role of the County of Orange as the Principal Permittee. The Implementation Agreement, originally entered into in December of 1990, was amended in October of 1993 to include two additional Permittees (Laguna Hills and Lake Forest). The Implementation Agreement establishes the responsibilities of each party, a funding mechanism for the shared costs of the NPDES Stormwater Program and establishes a Technical Advisory Committee (TAC).

The County of Orange, as Principal Permittee, is responsible for coordinating compliance with permit terms and conditions and overall program management. The Permittee Committee provides the overall program guidance with designated representatives from each Permittee. The TAC, comprised of a City Engineer, or selected representative, from each of five County Supervisorial Districts and a representative from the Principal Permittee serves in a program advisory role to the Permittee Committee.

The specific water pollutant control program elements of the NPDES Stormwater Program are documented in the 1993 DAMP, which has served as the Permittees' primary policy and implementation document regarding compliance with the NPDES Stormwater. The 1993 DAMP was originally completed through a process that involved public and private sector representation and was formally approved in June of 1994 by the Santa Ana Regional Board and in 1996 by the San Diego Board.

1.2 NPDES Permit Requirements

The Second Term Permits, issued by the Santa Ana Regional Board in March 1996 and by the San Diego Regional Board in August 1996, require the Permittees to:

1. Prohibit illicit/illegal discharges from entering into the municipal stormwater conveyance systems and require controls to reduce the discharge of pollutants to the maximum extent practicable;

2. Develop and implement Best Management Practices (BMPs) to control/reduce the discharge of pollutants to waters of the United States to the maximum extent practicable (MEP), and

The Permits also require the Permittees to prepare an Annual Progress Report for submittal to the Regional Boards and United States Environmental Protection Agency (USEPA) Region IX no later than November 15 of each year. This Annual Progress Report presents an analysis and assessment of permit compliance activities for the period July 1, 1999 to June 30, 2000, as required by the permits.

The permits collectively require the report to, at a minimum, include the following:

* A review of the status of program implementation and compliance with the schedules contained in the Order;

* An assessment of the control measures established under the illicit discharge elimination program and the Drainage Area Management Plan (DAMP);

* An assessment of any stormwater management program modifications made to comply with the Clean Water Act requirements to reduce the discharge of pollutants to the maximum extent practicable (MEP);

* A summary and analysis of monitoring results from the previous year and any changes to the monitoring program for the following year;

* A fiscal analysis report;

* A description of the proposed implementation of the DAMP for the next year running from July 1, 2000 through June 30, 2001; and

* Major changes in any previously submitted plan/policies.

2.0 DETECTION/ELIMINATION OF ILLEGAL DISCHARGES AND ILLICIT CONNECTIONS

2.1 Introduction

This section includes a discussion of the specific requirements for legal authority to control pollutant contributions to the storm drain system, the use of this authority to eliminate illegal discharges and efforts to identify and eliminate illicit connections to the storm drain system through routine facility inspections.

2.2 Legal Authority (DAMP Section 4.0)

The Second Term Permits required that the Permittees establish "adequate legal authority" to implement the necessary DAMP programs by July 31, 1997. This included adequate authority to regulate the discharge of pollutants to municipal separate storm drain systems in Orange County and to implement pollution control programs.

Although adequate legal authority existed for most potential pollutant discharges at the inception of the stormwater program, in 1993 the permittees determined that a Model Water Quality Ordinance should be prepared to provide a more uniform countywide approach and to provide a legal underpinning to the entire NPDES Stormwater Program.

A consultant law firm was retained for this purpose, and the Ordinance and accompanying Enforcement Consistency Guide were prepared under the aegis of the TAC and with input from representative city attorneys, County counsel, Orange County Sanitation District, the Orange County Building Industry Association (BIA), the Food Sanitation Advisory Council, Western States Petroleum Association (WSPA) and the Permittees.

All of the Permittees adopted the Water Quality Ordinance and corresponding Enforcement Consistency Guide and provided certifications regarding this to the Regional Boards the 1997-98 Annual Status Report. In addition, each Permittee has designated the Authorized Inspector(s) responsible for enforcing the Ordinance and provides updates to this list annually. The Authorized Inspectors are the individuals designated to investigate compliance with, detect violations of and/or take actions pursuant to the Ordinance.

The detection, elimination and enforcement activities undertaken by the Permittees are described below in Sections 2.3 and 2.4. In addition to prohibiting illicit connections and illegal discharges, the Water Quality Ordinance also provides for requiring BMPs in new development and significant redevelopment.

2.3 Detection of Illegal Discharges (DAMP Section 10.0)

An illegal discharge is any discharge to a municipal separate storm sewer that is not composed entirely of stormwater and that is not covered by an NPDES permit or identified in the NPDES Stormwater permit as an allowed discharge. The elimination of these discharges to the storm drain system requires the sequential detection, investigation, and enforcement using supporting statutory authority

The Permittees have a number of programs that have facilitated the detection of sources of non-stormwater discharges. These programs include industrial facility inspection (Section 2.3.1), drainage facility inspection (Section 2.3.2), water quality monitoring (see Section 5.0), and the wide distribution of public education materials that provide phone numbers and encourage the reporting of spills (Section 3.3).

2.3.1 Industrial Facility Inspection

A number of public agencies routinely conduct inspections of industrial facilities in Orange County. These agencies and their areas of responsibility include the following:

- The Orange County Health Care Agency regulates the storage and disposal of hazardous wastes. Approximately 6,339 businesses are inspected annually to ensure proper waste management.

- The Fire Departments in Orange County regulate the storage of hazardous materials through disclosure ordinances such as OCC Sec 4-3-200-300 and Article 80 of the Fire Code. This regulation involves inspection at approximately 7,000 business.

- Agricultural chemicals, notably pesticides, are regulated by the Agriculture Commissioner through the State Agriculture Code (CCR Title 3, Sec. 6000 et seq.). The Commissioner's office performs facility inspections at about 200 facilities/year out of a total of approximately 700 facilities that use/store pesticides. The Commissioners office also initiates enforcement action for non-compliance.

- Discharges to the sanitary sewers are regulated by the Orange County Sanitation District and the Aliso Water Management Agency/South East Regional Reclamation Authority who routinely conduct pre-treatment facility inspections.

Routine coordination with staff of these inspection programs occurs through Permittee participation with the Orange County Hazardous Materials Strike Force and the Stormwater Awareness training developed and presented by the Principal Permittee. These coordination efforts ensure that the staff of these inspection programs are cognizant of stormwater issues and regularly notify the Principal Permittee of situations that may present a source of water pollution.

2.3.2 Drainage Facility Inspection

Through routine maintenance activities within the municipal storm drain system, Permittee field personnel continue to report suspected problems and/or discharges to the system (Section 3.2.3).

2.3.3 Countywide Reconnaissance

During the First Term Permit and during part of the Second Term Permit the Permittees conducted field screening/reconnaissance every year which included conducting a site investigation and chemical analyses twice during dry weather and once during storm events. While the primary objective of this component of the water quality monitoring program was to detect gross contamination from illegal discharges through field analyses minimal incidences were detected.

New monitoring program objectives set in the Second Term Permit prompted a re-evaluation of the monitoring program starting in 1997. In May 1999, a final report outlining a new monitoring program that addressed the requirements of this permit was submitted to the Regional Boards and the program was implemented.

The reconnaissance and source identification section of the final water quality monitoring program (May 1999) addresses the core objective of identifying problems and sources through a series of focused reconnaissance studies and special investigations. These focused studies will include investigations to determine the sources of pollutants impacting warm spots and critical aquatic resources, monitor intermittent illegal discharges recorded in the Principal Permittee's Pollution, Notification, Incident and Reporting (PNIR) database and determine the effectiveness of BMPs used to protect the quality of stormwater runoff from various land uses.

2.3.4 Incident Reporting

The public reporting of spills is facilitated by a listing of:

- Permittee business telephone numbers in materials produced and distributed by the NPDES Stormwater Program's public education activities (brochures and magnets).
- The 24 hour water pollution problem reporting hotline and corresponding e-mail address in materials produced and distributed by the NPDES Stormwater Program's public education activities
- The Principal Permittee's water pollution telephone number in the Orange County "white page" telephone directories

2.4 Elimination Of Illegal Discharges (DAMP Section 10.0)

2.4.1 Investigations

Investigations of water pollution incidents are routinely undertaken by Permittee Authorized Inspector staff and various fire and police departments (Section 3.2.8). Although investigations may be unilateral efforts, more serious incidents are typically coordinated with federal, state, and local agencies through the Orange County Hazardous Materials Strike Force. The Strike Force is headed by the Orange County District Attorney's Office and includes representatives of a wide variety of local, regional, and state agencies.

In addition, the Permittees also coordinate with Regional Board staff on an ongoing basis with a particular focus on facilities regulated by an NPDES permit.

Commencing with the 1999/00 reporting period, the Permittees began to collectively provide a summary of the types and total numbers of water pollution incidents that have been reported within their jurisdiction. A summary of these investigations can be found in **Table 2.1.**

During the 1999/00 reporting period, the Permittees reported a total of 854 water pollution incidents. This total consisted of 297 Notifications, 285 Complaints and 170 Response Requests and 102 referrals to other agencies. It should be noted that the referrals to other agencies may result in the double reporting due to the process by which the numbers were tallied.

Figure 2.1 illustrates the sources of water pollution incident reports received by the Principal Permittee with the cities and the public/businesses constituting over 60% of the sources and **Figure 2.2** illustrates the types of materials involved **(Table 2.2).**

The Principal Permittee incidents constituted approximately half (407) of the total. The number of incidents addressed by the Principal Permittee illustrates its effective countywide role as the local agency with primary responsibility for surface water pollution investigations.

2.4.2 Enforcement

Enforcement activities are undertaken according to the Water Quality Ordinance and accompanying Enforcement Consistency Guide. Water pollution cases may be handled administratively or in more serious instances, have been prepared for prosecution by the Orange County District Attorney who may prosecute under the applicable sections of the Water Quality Ordinance, State Fish and Game Code, State Water Code, Uniform Fire Code, and Penal Code that address pollutant discharges.

The Permittees have formerly designated the staff responsible for carrying out the enforcement services according to the Enforcement Consistency Guide and update these designations every year in the Annual Status Report (Section 3.2.8). The Permittees will continue to have responsibility for water pollution enforcement within their jurisdiction unless that authority has been designated to the Orange County Flood Control District.

During the 1997/98 and 1998/99 reporting periods, the Principal Permittee provided Water Quality Ordinance Enforcement Consistency Guide training to approximately 40 Permittees and support staff. This training was designed to assist with the establishment or implementation of the Water Quality Ordinance enforcement program.

Commencing with the 1999/00 reporting period, the Permittees began to provide a summary of the enforcement actions that have been taken against offenders within their jurisdiction. This information includes the types and total numbers of the various enforcement actions that have been taken against the violators, the number of repeat violators and the incremental enforcement actions taken against them, and additional information regarding any prosecutions that are either currently underway of that have been settled.

As provided for in the Enforcement Consistency Guide, when selecting enforcement options, it is important that the Permittees ensure that violations of a similar nature are subjected to similar types of enforcement remedies. The Permittees have five types of remedies including educational letters, Notices of Noncompliance, Administrative Compliance Orders, Cease and Desist Orders and commencement of other civil or criminal enforcement action.

The Enforcement Consistency Guide provides a framework to the Permittees for selecting the type of enforcement that should be pursued. Some of the factors that influence this decision include the duration and significance of the violation of threat, the cooperativeness and willingness of the responsible party to remedy the conditions, whether the incident is isolated or re-occurring and whether the violation or threat will affect or harm human health or the environment.

The Permittees reported a total of 397 enforcement actions during the 1999/00 reporting period (**Table 2.3**). This total constituted 231 educational letters, 72 administrative enforcement actions and 67 criminal enforcement actions. The criminal enforcement actions includes citations/fines as well as criminal charges being filed.

Table 2.4 provides a summarization of the incremental enforcement actions taken by thirteen Permittees with respect to repeat violators as well as any ongoing prosecutions. A total of thirteen prosecutions were reported. Of these, four resulted in guilty pleas and subsequent fines, while the others are still pending.

2.5 Detection/Elimination of Illicit Connections

An illicit connection to the storm drain system is an undocumented and/or unpermitted physical connection from a facility to the storm drain system. The First Term Permit required the Permittees to undertake programs to identify and eliminate illicit connections to the storm drain system. In response, the Permittees developed a facility inspection and documentation program to identify such connections (**DAMP Appendix J**).

The Second Term Permit required the Permittees to certify the completion of the reconnaissance of the storm drain system by February 28, 1997, and, in instances where illicit connections are detected, a schedule be provided for their elimination. The Reconnaissance Survey Report of February, 1997, reported finding two illicit connections countywide and inspection of drainage facilities is now conducted as part of routine maintenance.

Any illicit connection identified during routine inspections is investigated by the affected Permittee. Appropriate actions are then taken to approve undocumented connections by permit procedure and/or pursue removal of those connections that are determined to be illicit connections and not permissible.

During the reporting period 1999/00, the Permittees reported finding 53 illicit connections to the storm drain system. Residential pool drains constituted the majority of these connections. The illicit connections were either permitted, removed, plugged or are still pending while the Permittees are working with the property owners to resolve the issue. **(Table 2.5).**

Table 2.1 1999/00 Incident Investigation Summary

Permittee	Investigative/Enforcement Status			Type of Incident				Total Reported
	County Provides All	City Provides Some	City Provides All	Notification	Complaint	Response Request	Referral to Other Agency	
Anaheim		X		8	5	0	0	13
Brea		X		0	0	0	0	0
Buena Park	X			3	0	0	2	5
Costa Mesa			X	3	3	14	3	23
Cypress		X		0	9	0	0	9
Dana Point		X		10	38	0	0	48
Fountain Valley		X		16	16	3	0	35
Fullerton		X		0	14	0	0	14
Garden Grove		X		6	9	3	0	18
Huntington Beach		X		0	1	1	0	2
Irvine			X	0	0	9	0	9
La Habra		X		2	11	0	0	13
La Palma	X			0	0	0	0	0
Laguna Beach			X	2	4	3	0	9
Laguna Hills	X			0	0	0	0	0
Laguna Niguel		X		3	10	2	4	19
Lake Forest	X			0	0	0	0	0
Los Alamitos		X		0	0	0	2	2
Mission Viejo	X			1	19	0	0	20
Newport Beach			X	16	6	20	2	44
Orange			X	1	6	6	0	13
Placentia	X			0	0	6	0	6
San Clemente			X	0	0	9	0	9
San Juan Capistrano		X		0	9	0	0	9
Santa Ana	X			0	16	45	22	83
Seal Beach		X		10	0	0	0	10
Stanton		X		0	0	0	0	0
Tustin		X		0	3	2	1	6
Villa Park		X		No Report				
Westminster			X	16	3	6	0	25
Yorba Linda		X		0	3	0	0	3
County of Orange/OCFCD	X			200	100	41	66	407
Total				297	285	170	102	854

Notification - An incident that is reported to the municipality that does not require any follow up such as an investigation or an enforcement letter. This would include any incidents where the material did not enter the storm drain system and was in the process of being cleaned up.

Complaint - A minor incident that is reported to the municipality that requires an investigation within a few days. This would include complaints where the discharge is alleged to have already occurred but is not posing an immediate threat to the storm drain system. Examples of this may include: oil leaking from vehicles parked on the street, past pool water discharge, past discharge from a residence/facility.

Response Request - An incident that is reported to the municipality that requires an immediate investigation/response due to the threatened release/impact to the storm drain system.

Referral to other agency - The incident was referred to and handled by a city or County authorized inspector.

Table 2.2 Materials Involved in Water Pollution Incidents

Materials Involved in Water Pollution Incidents					
Inorganic	Paint	Petroleum Products	Sewage	Miscellaneous	Unidentified
Acids	Dry Scrapings/Residuals	Automotive Fluids	Greywater/Sewage	Animal Waste/Remains	Liquid
Bases	Latex	Crude Oil	Odor	Carpet Cleaning Washwater	Material
Chemicals	Mixtures	Degreasers		Chemicals	Residue
Metals	Oil Based	Diesel		Construction Runoff	Solid
Process Solutions/Wastewater	Wastewater	Gasoline		Dye	Did Not Observe
		Hydraulic Fluid		Ethylene Glycol	
		Jet Fuel		Fire Supression Runoff	
		Miscellaneous		Food Process Wastewater	
		Odor		Grease	
		Sheen		Green Waste/Material	
		Waste Oil/Mixture		Miscellaneous	
				Odor	
				Pool Wastewater	
				Process Wastewater	
				Detergents/Washwater	
				Trash/Debris	
				Silt/Mud	
				Surface/Groundwater	

Table 2.3 FY 1999/00 E[illegible]ement Summary

Permittee	Investigative/Enforcement Status			Type of Enforcement								
	County Provides All	City Provides Some	City Provides All	Education Letter (EL)	Administrative Enforcement			Criminal Enforcement			Other	Total
					NON	ACO	CDO	Mis	Inf	IOC		
Anaheim		X		0	5	0	0	0	0	0	0	5
Brea		X		0	0	0	0	0	0	0	0	0
Buena Park	X			0	0	0	0	0	0	0	0	0
Costa Mesa			X	3	0	0	0	2	0	0	0	5
Cypress		X		6	0	0	0	0	0	0	3	9
Dana Point		X		38	0	0	0	0	0	0	0	38
Fountain Valley		X		15	15	0	0	0	0	0	0	30
Fullerton		X		14	0	0	0	0	0	0	0	14
Garden Grove		X		18	1	0	0	0	0	0	9	28
Huntington Beach		X		0	2	0	0	0	0	0	0	2
Irvine			X	0	6	2	1	1	0	0	0	10
La Habra		X		10	0*	0	13	0	0	0*	0	23
La Palma	X			1	0	0	0	0	0	0	0	0
Laguna Beach			X	2	1	0	0	0	0	0	6	9
Laguna Hills	X			0	0	0	0	0	0	0	0	0
Laguna Niguel		X		11	1	0	0	0	0	0	0	12
Lake Forest	X			0	0	0	0	0	0	0	0	0
Los Alamitos		X		1	1	0	0	0	0	0	0	2
Mission Viejo	X			19	0	0	0	0	0	0	0	19
Newport Beach			X	4	3	0	0	0	0	62	0	69
Orange			X	13	0	0	0	0	0	0	0	13
Placentia	X			5	0	0	0	0	0	0	0	5
San Clemente			X	0	0	0	0	0	0	0	0	0
San Juan Capistrano		X		2	0	0	0	0	0	0	0	2
Santa Ana	X			4	0	0	0	0	0	0	0	4
Seal Beach		X		0	0	0	0	0	0	0	10	10
Stanton		X		0	0	0	0	0	0	0	0	0
Tustin		X		2	3	0	0	1	0	0	0	6
Villa Park		X		No Report								
Westminster			X	14	2	0	16	0	1	0	0	33
Yorba Linda		X		0	0	0	0	0	0	0	0	0
County of Orange/OCFCD	X			49	0	0	0	0	0	0	0	49
Total				**231**	**40**	**2**	**30**	**4**	**1**	**62**	**28**	**397**

NON = Notice of Noncompliance
ACO = Administrative Compliance Order
CDO = Cease and Desist Order

Mis = Misdemeanor
Inf = Infraction
IOC = Issuance of Citation

Table 2.4 1999/00 Repeat Violators/Prosecutions Summary

Violator Type	Type of Enforcement Action								Information on Violators Prosecuted				
	EL	NON	ACO	CDO	Mis	Inf	IOC	Other	Description	Pollutant of Concern	Nature of Violation	Status of Judgment/Settlement	Nature of Judgment/Settlement
City of Costa Mesa													
Business					1				Automotive Business	Fuel injection chemicals	Fuel injection testing outdoors	Found guilty	Fined $700
Residence					1				Personal Residence	Oil into stormdrain	Vehicle repair in street illegal	Pending	Pending
City of Cypress													
Business	1												
City of Fountain Valley													
Residence									Personal Residence	Animal Feces	Accumulated feces clogging backyard drain	$369.32	City reimbursed for cleanup cost.
Business									Restaurant	Grease	Grease overflow	$1,751.54	City reimbursed for cleanup cost
City of Garden Grove													
Business	1	1											
City of Huntington Beach													
Business		2							Automotive Business	Automotive Fluids	Draining into storm system		Monitor
									Restaurant	Kitchen Grease	Draining into storm system		Monitor
City of Irvine													
Business									Cement Manufacturer	Diesel Fuel	Spill into Stormdrain	Pending	
City of Laguna Beach													
Business		1						1					
City of Laguna Niguel													
Residence	1	1											
Business	1												
City of Los Alamitos													
Business	2												
City of Orange													
Business	3	3											
City of Tustin													
Business		3			1								
Residence	2								Personal Residence	Concrete	Improper disposal	Guilty plea	$1360 fine
City of Westminster													
Business	2	2		2									
County of Orange													
Business	3								Construction Business	Concrete Slurry	Discharge of contaminants to state waters	Pending	Pending
									Shipyard	Wastewater	Discharge of contaminants to state waters	Pending	Pending
									Grain Business	Sewage	Discharge of sewage to storm drain	Pending	Pending
Residence	2								Personal Residence	Diesel Fuel	Discharge of contaminants to state waters	Pending	Pending
									Personal Residence	Diesel Fuel	Discharge of contaminants to state waters	Pending	Pending

EL = Education Letter
NON = Notice of Noncompliance
ACO = Administrative Compliance Order
CDO = Cease and Desist Order

Mis = Misdemeanor
Inf = Infraction
IOC = Issuance of Citation

Table 2.5 1999-2000 Detection and Elimination of Illicit Connections to Storm Drain Systems

	1999-2000		
Permittee	# Illicit Connections Found	Type of Connection	Resulting Action
Anaheim	10	Residential connections to surface drains, clogged sewers	All pipes removed
Brea	0		
Buena Park	0		
Costa Mesa	0		
Cypress	0		
Dana Point	0		
Fountain Valley	0		
Fullerton	0		
Garden Grove	0		
Huntington Beach	0		
Irvine	0		
La Habra	1	Pool Drain	1 permit
La Palma	Not Reported		
Laguna Beach	1	Restaurant Floor Drain to OCFCD Channel	City working with property owner to resolve issue
Laguna Hills	0		
Laguna Niguel	0		
Lake Forest	0		
Los Alamitos	0		
Mission Viejo	0		
Newport Beach	0		
Orange	7	Pool Drains, Misc. business connections	All pipes plugged/removed
Placentia	0		
San Clemente	0		
San Juan Capistrano	0		
Santa Ana	0		
Seal Beach	0		
Stanton	0		
Tustin	0		
Villa Park	Not Reported		
Westminster	0		
Yorba Linda	0		
County of Orange/OCFCD*	34		1 permit, 2 plugged/removed, 31 pending
Total	53		

* 1999 (25) and 2000 (9) figures for the County of Orange represent calender year totals.

Figure 2.1

Water Pollution Incidents
Notification Sources (1999-2000)

Total of 407 Incidents

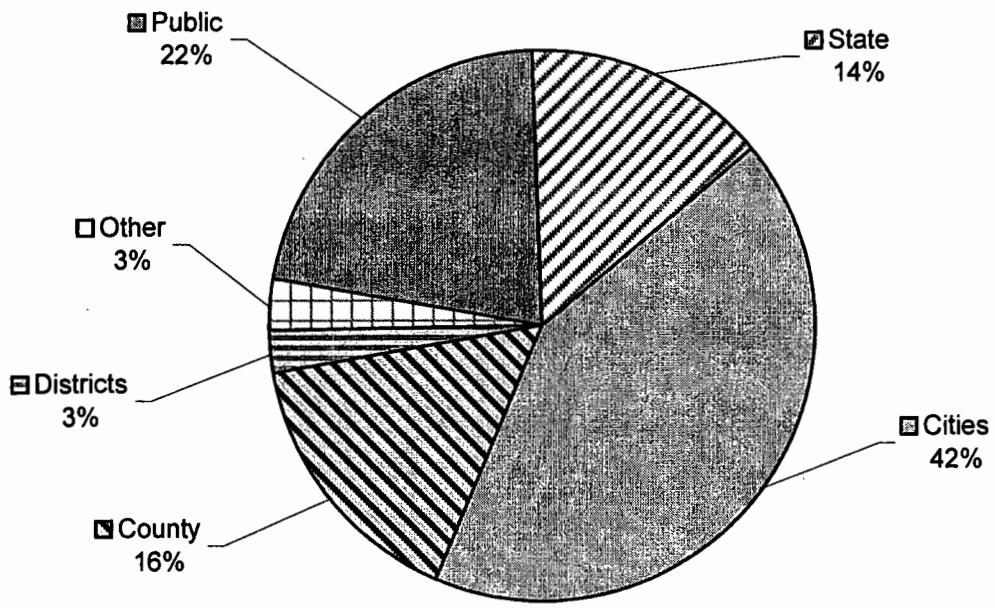

Figure 2.2

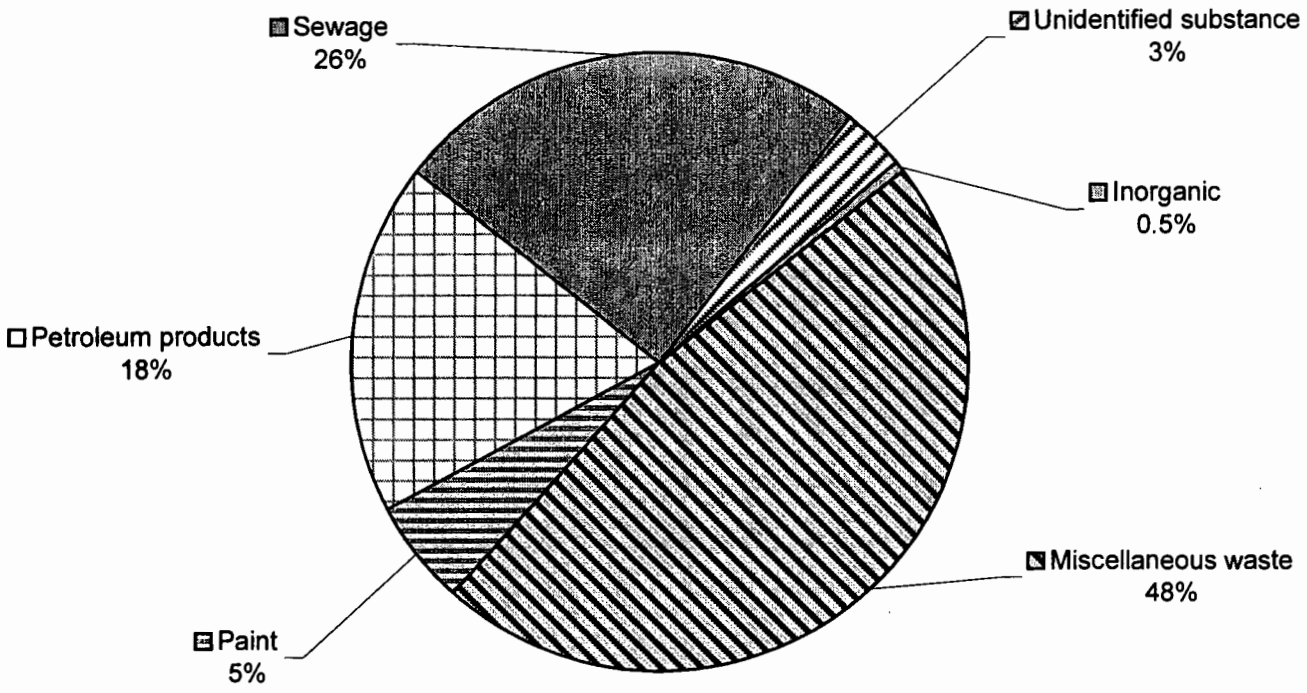
Water Pollution Incidents
Types of Materials (1999-2000)
Total of 407 Incidents
Sewage
26%
Unidentified substance
3%
Inorganic
0.5%
Petroleum products
18%
Miscellaneous waste
48%
Paint
5%

3.0 STATUS OF BMP IMPLEMENTATION

3.1 Introduction

This Section details the Permittees' programs to implement Best Management Practices (BMPs) as part of routine public agency activities (DAMP Section 5.0), in the construction and post construction phases of new development (DAMP Section 7.0 and 8.0) and the participation in several water quality planning initiatives.

The Second Term Permits added a requirement for BMP implementation related to the operation of municipal facilities through an environmental performance evaluation and reporting program. This program is now in its third year of implementation and is discussed in Section 3.2.6.

3.2 Public Agency Activities (DAMP Section 5.0)

All of the Permittees routinely conduct preventive maintenance activities that are widely recognized as effective BMPs for pollutant control. These activities include litter control, solid waste collection/recycling, drainage facility maintenance, catch basin stenciling, street sweeping, hazardous materials management/environmental performance reporting, household hazardous waste collection, emergency spill response and fertilizer and pesticide management.

The Second Term Permit requires an annual evaluation of these activities and, where appropriate, improvements or new practices implemented to further reduce the amount of pollutants discharged into the storm drain system. An important component of this evaluation process is the documentation and collection of data related to these selected activities.

3.2.1 Litter Control

Litter control is an important element in the diversion of trash and other materials from the storm drain system. Although most Permittees historically viewed litter control as a public service program (i.e., preventing visual blight, etc.), rather than as a pollution control problem, they now consider it equally important as a visual indicator of water quality. All Permittees now have the legal authority to control littering in public areas either through the Water Quality Ordinance or existing municipal code sections.

Other DAMP-recognized elements of litter control include provision of trash receptacles and special clean-up events **(Table 3.1)**. During the 1999/00 reporting period, twenty-eight Permittees reported that trash receptacles are maintained in public areas. Other initiatives included the allocation of staff to litter and debris control, arrangements to facilitate the disposal of large waste items by residents, and organized community/neighborhood clean-ups.

Garden Grove, for example, coordinated volunteer groups to clean litter twice monthly. Another example was the organization of Neighborhood Enhancement Programs by the City of Orange, wherein each year specifically targeted community areas clean-up litter. Several other cities reported organizing, or participating in, initiatives related to litter control such as "Beach Clean-Up Day", "Volunteer Connection Day", "Earth Day Clean-Up," "Coastal Clean-Up Day," and "Pride Days."

Every year the California Coastal Commission sponsors a Coastal Cleanup Day to help cleanup the trash and debris that accumulates along the coastline, fouling the beaches and tidal zone **(Table 3.2)**. During the first cleanup day in Orange County in 1996, 4,649 volunteers collected 38,906 pounds of trash and 3,914 pounds of recyclables (9.2 pounds/person). In 1999, 4,382 volunteers joined in and collected 65,900 pounds of trash and 8,841 pounds of recyclables (17 pounds/person).

The top five items collected during the 1999 event were 14,587 cigarette butts; 9,650 foamed plastic pieces; 5,621 plastic food bags/wrappers; 5,288 paper pieces and 4,630 plastic pieces; which corresponded closely with the results from the debris characterization study conducted within the Newport Watershed (Section 3.9.1).

3.2.2 Solid Waste Collection/Recycling

The Permittees have solid waste collection programs for public, residential, commercial and industrial areas. The Permittees recognize that the public must be encouraged to properly dispose of their trash and educated that the storm drain is not a waste receptacle. The Permittees conduct public education outreach through a variety of methods including community newsletters, radio and television public service announcements, brochures and utility bill inserts.

In 1994, the Permittees reported recycling information that they were separately required to collate under the requirements of AB 939 Since the AB 939 reporting requirements have changed, the Permittees no longer provide this information.

In the 1999/00 reporting period, thirty of the Permittees reported the collection of approximately 3.4 million tons of solid waste **(Table 3.3)**. In addition, the Permittees reported on the types of solid waste and recycling education materials made available to the public and the frequency with which they were distributed or broadcast **(Table 3.4)**.

Twenty four Permittees indicated that they distributed community newsletters, while seventeen Permittees reported the distribution of utility bill inserts containing information regarding recycling and/or proper waste disposal at least annually. In 1999/2000 eleven Permittees reported that they broadcast public service announcements via radio and/or television. Moreover, Cypress, Mission Viejo, Placentia, and San Clemente all reported the inclusion of information about recycling and waste disposal on their city web sites.

Another example is Tustin which reported the continuance of an ad hoc committee, "Tustin Pride", that organizes events such as their Christmas Tree recycling program. Anaheim reported contracting with a private communications firm for public relations services to promote "Recycle Anaheim."

Examples of recycling public education materials are included in **Appendix 3.1.** Reflected in the program materials is that fact that many jurisdictions have combined the recycling, litter control and hazardous materials disposal messages.

3.2.3 Drainage Facility Maintenance

Maintenance

During the First and Second Term Permit periods, the Permittees developed and implemented drainage facility inspection and maintenance procedures and created inspection logsheets in order to document the total volume of material removed from their facilities and the percentages of each type of material. Through their routine inspections, the Permittees also notify the appropriate Authorized Inspectors of any evidence of chemical contamination or suspected illegal discharges.

The Permittees inspect the drainage system within their jurisdictions on a regular basis and clean out accumulated debris on an as-needed basis. Removal of accumulated debris and sediment is carried out either manually or by mechanical methods using flushing in emergency situations only.

In the 1999/00 reporting period, twenty nine Permittees reported the removal of 15,381 cubic yards and 24,324 tons of material from approximately 220 miles of storm drains and 22,022 drain inlets (**Table 3.5**).

Debris characterization varied significantly between jurisdictions but averaged 43% soil, 38% vegetation, 9% paper, 4% plastic, and 5%.

Drainage Facility Changes

The NPDES permit requires that the Permittees provide information regarding any significant changes to the storm drain systems, outfalls, detention or retention basins, dams or other controls, including map updates of the storm drain system. During 1999/2000 the Permittees reported approximately seventy changes to their municipal storm drain systems (**Table 3.6**).
The Permittees also reported that they provide the Principal Permittee with drainage facility map updates on a continual basis. Updated hard and electronic copies of the countywide drainage maps will be provided to the Regional Boards in early 2001.

Low Flow Diversions

The Permittees have implemented a limited number of drainage system diversions to the sanitary sewer system at several coastal locations. Diversion projects take low flow flood control channel water and divert them to sanitary sewer or ocean outfall to avoid direct discharge to recreational and other use areas.

Talbert/Lower Santa Ana River Watershed

Elevated bacteria indicator levels in the surfzone off Huntington State Beach in 1999 were attributed, in part, to the storm drain system of the Talbert/Lower Santa Ana River Watershed (see Section 3.8.2). As part of an early action plan, all storm drain and pump station discharges in this watershed have been temporarily diverted during the summer months.

As an added measure to prevent bacteria in the Santa Ana River from impacting Huntington State Beach, low flow runoff from the lower Santa Ana River Watershed was diverted to the sanitary sewer at four locations. These locations are: the Santa Ana River just upstream of Talbert; the Greenville Banning Channel upstream of Hamilton; and two Huntington Beach pump stations at Hamilton and Meredith.

Newport Bay Watershed

Elevated bacteria indicator levels in the Back Bay/Newport Dunes resort area also lead to the diversion of the Back Bay drain during the summer months when the resort area has a high number of people who utilize the area.

Aliso Creek Watershed

The lower mile of Aliso Creek has been listed as impaired for the presence of elevated levels of fecal coliform (see also Section 3.8.3). Pursuant to a 205(j) grant the Principal Permittee initiated a water quality planning study. One of the results of the study was the identification of elevated fecal coliform levels at a number of points along Aliso Creek and in its tributaries. One storm drain (identified as J03P02) exhibiting elevated fecal coliform levels was issued a Clean Up Abatement Order in December 1999 by the San Diego Board. As an early action, the flows from J03P02 have been temporarily diverted during the summer months to the sanitary sewer by the City of Laguna Niguel.

As a further watershed step, the Principal Permittee and the Aliso Water Management Agency installed, operated and maintained a diversion project to remove summer flows in Aliso Creek from an area immediately upstream of Aliso Beach. This diversion project utilizes a summer-season-only sand berm to allow pumping of creek water to an adjacent ocean outfall line.

No mention of source ID or control / elimination specific to J03P02 or watershed wide failure to implement DAMP?

Diversion is not the only action req'd to meet MEP. w/out further efforts (source ID/BMPs) MEP not attained

Laguna Beach Coastal Storm Drains

The city of Laguna Beach installed their first diversion in 1987. Since that time they have installed five additional diversions and plan to install fourteen more by the year 2007. Currently the diversions cover 960 urban acres, 38% of the 2,500 total urban acres in Laguna Beach. By the year 2007 the diversions will cover 2,130 (85%) of the 2,500 total urban acres in Laguna Beach.

Dana Point Coastal Storm Drains

The City of Dana Point, working with the South Coast Water District, designed and constructed their first Urban Low Flow Diversion Project in the spring of 2000. This project constructed low flow interceptor basins upstream of the new peak flow catch basins constructed by the city. Observation of the diversion system over the summer season indicated that the grates are effectively intercepting irrigation water and other low flow constituents. Catch basin filters in the new peak flow basins immediately downstream are intercepting large floating trash and other macro pollutants.

3.2.4 Catch Basin Stenciling

The goal of the stenciling program is to label and subsequently maintain labels on stormdrain catch basins throughout Orange County. Initially the label was comprised of "No Dumping - Drains To Ocean" written in 3" black letters on either the top of the curb or the curb face adjacent to the inlet.

This format was later revised to 3" blue letters on a white background. Each Permittee, however, may implement its own version of the catchbasin stenciling program including variations on the phrase or the method of labeling such as the use of hot/tape decals or thermoplastic plaques.

In the 1999/00 reporting period the Permittees reported that over 33, 300 catch basins (98%) of the total inventory of over 34,000 drain inlets have been stenciled at least once. The number of Permittees who have stenciled 100% of their catch basins at least once has increased from twenty to twenty eight. Nineteen Permittees reported re-stenciling over 12,000 catch basins (over one third) during 1999/2000 **(Table 3.7)**.

Most Permittees use the recommended stencil: "No Dumping - Drains To Ocean". There are, however, a few variations. Newport Beach uses "Drains to Ocean" or "Drains to Bay" depending on the storm drain's receiving water, Irvine uses "No Dumping Waste – Drains To Ocean", and Laguna Beach designed its own logo to accompany the phrase: "Keep It Clean – Drains To Ocean". Seal Beach and Placentia both use "No Dumping", with Placentia including the corresponding municipal code (P.M.C. Section 16.08.040).

All but four of the Permittees used spray paint to stencil their inlets, with nine using either blue or black paint on a white background instead of only black with no background color. Alternative application methods included hot tape/decals (Irvine, Orange), thermo-plastic (Brea), and adhesive plaques (Laguna Beach and Orange).

Several Permittees, including Brea, Buena Park, La Habra, and Orange reported positive public reaction to the stenciling programs. Still others noted an apparent decrease in the amount of litter in the catch basins since the initiation of stenciling programs.

The use of volunteer resources was reported by a number of Permittees; in 1999/00 over 4,700 catch basins were stenciled by volunteer groups. Fullerton, San Clemente, and Lake Forest all utilized Boy/Eagle Scouts, while Costa Mesa, Irvine, La Habra, and San Clemente reported stenciling assistance from the Orange County Conservation Corps.

3.2.5 Street Sweeping

All Permittees maintain street sweeping programs in residential, commercial and/or industrial areas. In 1993 the Permittees compiled information regarding their existing street sweeping schedules and practices and subsequently changed elements of their programs such as the types of sweepers purchased, the frequency of sweeping, and the use of parking restrictions in order for the street sweeping program to aid in water quality improvements.

During the Second Term Permit period, the Principal Permittee recommended that the Permittees apply a standard of pollutant control removal effectiveness in the purchase of new street sweeper equipment. This recommendation was based upon a preponderance of research literature suggesting that regenerative air sweepers are superior in performance to vacuum and mechanical brush. The research is not, however, unequivocal.

In the 1999/00 reporting period, thirty Permittees reported using a fleet of street sweepers consisting of at least 37 mechanical broom, 71 vacuum and 7 regenerative air sweepers. It is expected that, over the next permit period, these numbers will continue to change as Permittees replace older equipment. The Permittees also reported removing over 411,000 tons and 111,400 cubic yards of material with the sweepers.

Monthly sweeping of residential, commercial, and industrial public street areas was the minimum reported sweeping frequency with the Principal Permittee commencing monthly residential street sweeping in the 2000/01 reporting period. Approximately half of the Permittees reported conducting weekly sweeping in industrial and commercial areas, with seventeen conducting weekly sweeping in residential areas. Six Permittees reported a sweeping frequency of twice weekly or greater for at least one of the three designated areas. Laguna Beach, Newport Beach, and Santa Ana all reported daily sweeping in some commercial areas **(Table 3.8)**.

Twenty three Permittees reported the use of parking restrictions to improve street sweeping effectiveness. All reporting Permittees noted visual inspection of streets to verify street sweeper effectiveness, with twenty Permittees indicating that their street sweeping equipment is monitored at least weekly for adherence to manufacturer's specifications for optimal performance. In addition, several Permittees noted that they actively encourage citizen comment on their street sweeping programs and will repeat the sweeping of an area when a complaint is received.

3.2.6 Hazardous Materials Management/Environmental Performance Reporting

Prior to 1997, the Permittees annually reviewed their hazardous materials management practices. Specific information was submitted in the annual reports regarding product substitution, structural modifications to storage areas, elimination of hazardous waste streams, installation of a clarifier for site drainage, the use of off-site facilities for vehicle cleaning, employee training, and site audits. The improvements included major structural changes in the waste storage facilities and the replacement of hazardous materials with non-hazardous substitutes.

The Second Term Permit required the Permittees to prepare an Environmental Performance Reporting Program and include in subsequent Annual Reports a discussion of the actions taken by the Permittees to eliminate pollutant discharges at public agency facilities. This program was implemented in 1997 and was applied to municipal facilities whose operations include hazardous materials storage, waste storage, and/or vehicle and equipment maintenance.

Permittee facility operators were required to:

1. Determine which operations are the most significant contributors to stormwater pollution; and then to
2. Identify significant issues at each facility and develop and implement action plans to control the discharge of pollutants.

The program is iterative, involving an annual evaluation of municipal facility environmental performance and the implementation of corrective actions until all identified significant issues are addressed. The action plans that have been developed by the Permittees to address the significant issues have demonstrated a commitment by the Permittees to implement both structural and non-structural controls. **Table 3.9** summarizes the number of significant issues and action plans that have been identified and corrected over the past four years in addition to those made in the old program.

Since the inception of the program the Permittees have been committed to reducing the pollutants from their fixed facilities. This is evidenced by the 94 municipal facilities and 244 significant issues identified during the first year of the program decreasing to 17 facilities and 47 significant issues by the end of the 1999/00 reporting period.

The initial compilation of the significant issues and action plans identified at each facility were provided in the 1996/97 report. In that initial report Dana Point, Laguna Hills, Laguna Niguel, Lake Forest, Mission Viejo, San Clemente and San Juan Capistrano reported no significant issues for any of their facilities, primarily due to the fact that they are either smaller jurisdictions or they contract out the majority of their municipal activities.

In 1997/98 the Permittees completed 158 (65%) of the 244 significant issues action plans identified in the 1996/97 report. Ten new significant issues were identified during this reporting period bringing the total number of outstanding issues to 96. At the end of 1997/98 the number of facilities with significant issues had decreased to 58, and thirteen Permittees (compared to seven at the end of the previous year) were able to report no significant issues at any of their facilities.

In 1998/99 the Permittees completed 25 (26%) of the 96 remaining significant issues action plans identified in the 1997/98 report. Three new significant issues were identified during this reporting period bringing the total number of outstanding issues to 74 from 51 facilities.

In 1999/2000 24 Permittee facilities completed 29 (39%) of the 74 remaining significant issues action plans identified in the 1998/99 report. Two new significant issues were identified during this reporting period bringing the total number of outstanding issues to 47 from 17 facilities. At the end of 1999/2000, seventeen Permittees were able to report the completion of all outstanding significant issues.

Some examples of action plans completed during the last reporting period include the City of Anaheim which relocated vehicle washing areas at ten of its Fire Stations, and the City of Garden Grove which reported hazardous material storage training for employees at eight of its facilities. Of the 50 action plans completed during 1999/00, twenty four (48%) involved the implementation of structural controls such as the construction of berms to contain runoff, while 26 action plans (52%) required the implementation of non-structural controls, for example, employee training or the relocation of wash areas **(Table 3.10).**

Of the 41 action plans that still need to be completed, the majority (83%) require the implementation of structural controls. For example, the city of Cypress is in the process of constructing berms and installing a storage area roof at its Corporation Yard facility, while La Habra is re-budgeting for the installation of a clarifier at its Public Works Yard. New end dates have been provided for instances in which the implementation of the control will extend beyond the previous end date provided.

The completed Significant Issues Action Plans forms are included in **Appendix 3.2.**

3.2.7 Household Hazardous Waste Collection

Collection Centers

Orange County has an effective household hazardous waste collection program administered by the Integrated Waste Management Department (IWMD). The program comprises four sites (Anaheim, Huntington Beach, San Juan Capistrano, and Irvine) that operate 5 days per week for a total of 259 days per center (excluding partial or full day closures due to rainy weather).

During the 1999/00 reporting period the Permittees reported that through their trash collection services and various public education initiatives residents are directed to use these IWMD facilities for disposal of their household hazardous waste.

Table 3.11 includes the quantities of the various types of household hazardous waste dropped off by County residents at the four IWMD collection centers. A total of 2,896,967 pounds of household hazardous waste was collected in 1999/2000.

Household Hazardous Waste Events

In 1999/00, seven Permittees reported separate household hazardous waste collection efforts which brought in an additional 190,905 pounds of waste. This figure excludes materials collected by Laguna Beach since totals for its new door-to-door collection program are unavailable. These efforts included three waste oil collection initiatives (Costa Mesa, Garden Grove, and Orange) and four programs involving household hazardous waste collection days (Laguna Beach, Lake Forest, Mission Viejo, and Placentia) **(Table 3.12 & 3.13).**

Oil Recycling

All Permittees and the County's Health Care Agency currently implement used oil recycling programs. These programs involve comprehensive public outreach including television and newspaper advertising, displays at community events, and the distribution, at no cost to residents, of used oil containers. In addition, some Permittees also conduct household hazardous round-ups or drop off events for their residents.

The public outreach efforts associated with the used oil recycling programs are comprehensive as is reflected in the public education materials that have been developed and distributed **(Appendix 3.1).** Several Permittees also reported advertising the locations of used oil collection centers as well as participating in various used oil recycling programs and/or grants.

In 1999/00, the Permittees updated and distributed the used oil collection brochures for North, Central and South Orange County. The brochure provides information regarding locations within each city that will accept water motor oil and information regarding the proper disposal of oil filters. In 1999/00 20 Permittees reported that they received a Used Oil Recycling grant (compared to 17 in 1998/99).

3.2.8 Emergency Spill Response

The Orange County Hazardous Materials Area Plan or a city equivalent has been adopted by most of the Permittees. This Plan is a set of planned responses to hazardous materials emergencies, addressing chain-of-command, public agency participation and allocation of authority.

The Permittees have all enacted the authority to control releases to the storm drain system through a common Water Quality Ordinance. The Permittees have formerly designated the Authorized Inspectors according to the Enforcement Consistency Guide **(Table 3.14 – 3.16).** The Permittees will continue to have responsibility for water pollution enforcement within their jurisdiction unless that authority has been designated to the Orange County Flood Control District (see also Section 2.3 and 2.4).

3.2.9 Fertilizer and Pesticide Management

Careful fertilizer application and management is the most effective means of controlling nutrient loss from landscaped areas. Similarly, careful pesticide management addresses both acute toxicity and chronic exposure concerns associated with all insecticides, rodenticides and herbicides.

During the First Term Permit period, the "Management Guidelines for Use of Fertilizers and Pesticides," **(DAMP Appendix F)** were developed to provide guidelines for application methods for fertilizers and pesticides, surface runoff minimization, accident mitigation and Integrated Pest Management. These guidelines were subsequently implemented by the Permittees following training.

Fertilizer Management

In 1999/00, at least 1,884,000 pounds of fertilizers were applied to a reported total of 5,837 acres of public land in Orange County **(Table 3.17)**. **Table 3.18** provides information on the number and types of fertilizers used by the Permittees in 1999/00.

Nineteen Permittees reported consulting a qualified fertilizer specialist within the past year regarding application rates, application timing, storage and/or handling of fertilizers, while fourteen Permittees reported that, during 1999/00, soil testing was conducted to determine compatibility with the fertilizers being used. It should be noted that some of the Permittees may have consulted a specialist in prior years.

Seventeen Permittees reported using organic or slow release fertilizers to a greater extent than the year before. No spills of fertilizers were reported.

Pesticide Management

The Permittees reported individually applying 318 pesticides, 45 of which were Category I or restricted, to 12,310 acres of public land in 1999/00. Similar figures were reported in 1998/99 when Permittees reported applying 325 pesticides, 48 of which were Category I or restricted, to a reported 12,310 acres of public land **(Tables 3.19 & 3.20).** At least 33,000 pounds and 11,000 gallons of pesticides were applied by Permittees in the last year. These figures, however, represent low-range estimates since not all Permittees reported their figures in total pounds or gallons while some did not provide quantities.

In 1999/00 six permittees reported that soil testing was conducted at some point during the past two years for compatibility with the pesticides being used **(Table 3.21)**. It should be noted that some Permittees may have conducted soil testing in prior years.

Twenty Permittees reported requiring that all pest control personnel (applicators) obtain a Qualified Applicators License (QAL) from the State. It should be noted that at the minimum, all Permittees require either a QAL or equivalent County training for pesticide applicator personnel.

Twenty eight Permittees reported conducting inspections of the pesticide application equipment and contractor or in-house pest control crews during the last year. These inspections were typically conducted on a routine basis.

Twenty eight Permittees reported having the appropriate measures implemented for the application, storage, disposal and/or transportation of pesticides. Although no spills of pesticides were reported, 27 Permittees reported implementing an accident mitigation plan in case of a spill.

Integrated Pest Management (IPM)

Twenty four Permittees reported implementing IPM techniques as recommended in the Management Guidelines for Fertilizer and Pesticides **(Table 3.22 & 3.23).**

Specific alternatives to the use of chemical pesticides included mechanical or manual weeding (17 Permittees), mulching (9 Permittees), water management/drip irrigation (1 Permittee), the use of disease resistant plants (two Permittees), the use of biological controls (9 Permittees) and basic agronomic practices. Overall, nine Permittees reported a 5-50% decrease in the use of pesticides after implementing IPM techniques.

Costa Mesa, Seal Beach, Laguna Hills, and Anaheim reported the largest decreases in pesticide usage (50%, 20%, 12%, and 12%, respectively). Examples of IPM techniques included the utilization of predatory wasps for controlling giant whiteflies (Costa Mesa and Santa Ana), water pressure for controlling aphids and whiteflies (Santa Ana), and the use of parraffinitic oil to control whiteflies (Tustin). Seal Beach, Anaheim, and Laguna Hills achieved their reductions through mechanical controls and mulching.

Table 3.23 summarizes the total acreage and quantity of fertilizers and pesticides applied by the Permittees within their jurisdiction. It also summarizes the number of Permittees applying integrated pest management techniques and the corresponding reduction in the amount of pesticides applied.

3.3 Public Information (DAMP Section 6.0)

The primary goal of the public education program is to inform the community about the origins and causes of stormwater pollution and to constructively involve the public, municipalities, businesses, industries and the development community in the NPDES Stormwater Program's objective of controlling pollutants at their source (ie: pollution prevention). Achievement of this goal involves the development of materials to explain the nature of urban stormwater pollution and its effect on water quality and to identify and promote behavioral changes that will contribute to controlling pollutants at the source. The educational materials developed and distributed by the Permittees are included in **Appendix 3.2**.

3.3.1 Countywide Efforts

During the First and Second Term Permit periods the Principal Permittee, took the lead in developing a regional awareness program and provided the Permittees with copies of educational materials for distribution to the public. The public education program consisted of public, business and household hazardous waste elements. The Permittees were encouraged, but not required, to enhance the information provided with educational efforts more specific to local issues of importance related to water quality.

During the Second Term Permit period, specific public educational efforts included the creation and distribution of additional public educational materials and BMP guidelines for those potentially polluting activities not otherwise regulated, establishing and advertising a 24 hour water pollution problem reporting hotline, participating in community outreach events, participating in joint outreach programs, workshops and seminars. The specific efforts are listed below:

- Distributing copies of the color brochure "The Ocean Begins at Your Front Door": Commencing in July 1999 the County began track the distributed public education materials. From July 1999 through June 2000 10,968 copies of this brochure had been distributed;

- Creating and distributing a new brochure in 1998-99, "Do You Know Where the Water In Your Storm Drain Goes?" From July 1999 through June 2000, 10,299 of these brochures had been distributed;

- Updating and distributing North, Central and South Orange County Waste Oil Collection Center brochures in 1998-99 (Section 3.2.7);

- Procedures began to be developed for certain potentially polluting activities not otherwise regulated **(Appendix 3.3)**. Efforts included:
  - Creating and distributing Auto Service Center Pressure Washing guidelines to approximately 200 large automotive service centers in 1997-98;
  - Creating and distributing Pool Maintenance Discharges guidelines in 1998-99;
  - Updating and distributing the Mobile Detailing Brochure in 1999-00;
  - Distributing Auto Service Center Pressure Washing Guidelines to approximately 2,000 small to medium automotive service centers in 1999-00; and
  - Creating and distributing Restaurant Cleaning Operations guidelines in 1999-00.

- Providing a Principal Permittee 24-hr telephone line for inquiries about stormwater and public education material;

- In an effort to encourage the public to report illegal dumping, creating and distributing magnets and bookmarks that utilize graphics from the "Do You Know Where the Water In Your Storm Drain Goes?" brochure to the general public, interested groups, the County's libraries and the Permittees. From July 1999 through June 2000, 2,792 of these magnets, as well as 1,128 bookmarks were distributed;

- Distributing appropriate educational materials with enforcement letters sent out as a result of a water pollution complaint.

- Providing the video, "The Ocean Begins At Your Front Door" for broadcast by Huntington Beach Television;

- Participating in public information activities including community outreach events such as the Orange County Fair, the Children's Drinking Water Festival, National Pollution Prevention Week, Beach and Watershed Cleanup Days;

- In 2000-01 the Principal Permittee, County of Orange/HCA, County of Orange/IWMD and Orange County Sanitation participated in a coordinated "Environmental Partners" public education effort aimed at educating the public about the proper disposal of wastes. This effort merged several similar messages about proper waste disposal;

- Principal Permittee staff participated as presenters at workshops and seminars addressing stormwater management issues;

- The initiation of a volunteer monitoring program (Section 3.3.2);

- Principal Permittee staff participated in the State Stormwater Quality Task Force: Public Information and Participation Committee (PIPP). The exchange of material has served to augment current information currently provided to new development and industries including participation in the 1-800-CLEANUP phone line and web site;

- Participation in the LA Times in Education Program in 1999-00. This environmental study unit, which was distributed to approximately 180 schools, included newspaper-based lessons, classroom explorations and the opportunity for students and their families to participate in a survey to help Orange County understand how pesticides move through our watersheds;

- Participation in the Upper Newport Bay Cleanup Day;

- Participation in the American Oceans Campaign stormwater resources web page at www.americanoceans.org/runoff/epa.htm; and

- Participation in two water quality/urban runoff issues workshops for both North and South Orange County and Watershed 202 presentations which were implemented as a first-contact offering on how the County is responding to problems in our watersheds. The presentation covers such topics as water quality, habitat protection and stream stability issues with examples of short, medium and long-term solutions.

In addition to all of the public education efforts undertaken as listed above, in late 1999, the Permittees developed a comprehensive long-term NPDES public and business education strategy (subsequently referred to as the Public Education Program) in order to effectively educate the public and targeted business groups about the effects of stormwater pollution and encourage their participation in the protection of surface waters (DAMP Section 6.0). The Public Education Program includes a comprehensive planning approach and "tool box" of implementable educational elements based upon the desired direction of the program (**Appendix 3.4**).

Other County agencies also provide information to the public that aids in controlling stormwater pollution. The County of Orange/HCA manages the county's used oil program that encourages the recycling of used motor oil and filters. The program assists the NPDES Stormwater Program by eliminating the number of incidents of people dumping used oil down the storm drain system. The County of Orange/IWMD manages the household hazardous waste program. The agency utilizes a variety of educational materials to recommend alternatives to hazardous products as well as proper disposal of household hazardous waste.

3.3.2 Local Efforts

In 1999/00 all Permittees made the countywide educational materials available to their residents at public facilities such as city halls, libraries, fire stations, etc.

In addition many Permittees developed and distributed their own materials to the general public. In 1999/00, twenty six Permittees reported enhancing local materials and/or conducting their own initiatives. For example, Laguna Hills reported the development and distribution of public education literature expanding upon the County's "The Ocean Begins at Your Front Door" brochure, while Santa Ana produced waste disposal and recycling information in English, Spanish, and Vietnamese.

Fountain Valley also reported the incorporation of waste reduction and litter control slides before movies at the local theaters. Five Permittees reported that they display information regarding storm drains, water quality, and/or recycling on their city websites.

The education materials separately prepared by the Permittees are summarized in **Table 3.24**. Examples of these materials are included in **Appendix 3.2**.

3.3.3 Volunteer Monitoring

During the Second Term Permit period, the Principal Permittee continued its previously initiated volunteer monitoring program. Several students/interns, one under the direction of Dr. Prem Saint of the California State University at Fullerton, were instrumental in:

- Gathering and analyzing trash/debris and sedimentation data;
- Quantifying and characterizing the types of trash/debris that were collected a debris boom during storm flows;
- Maintenance of the field equipment and scientific instruments they used; and
- Preparation of statistical reporting spreadsheets.

3.4 New Development (DAMP Section 7.0)

3.4.1 Requirements

In 1993, the New Development/Construction Task Force comprising representatives from the Principal Permittee, Building Industry Association (BIA), Association of General Contractors (AGC) and Civil Engineers & Land Surveyors of California (CELSOC), completed a report that provides the basis for requiring the incorporation of structural and non-structural Best Management Practices (BMPs) into new development and significant redevelopment. The report, entitled "Best Management Practices For New Development Including Nonresidential Construction Projects (1-5 acres)" (**DAMP Section 7.0 and Appendix G**), involved additional contributions on specific BMPs from the Western States Petroleum Association (WSPA), Food Sanitation Advisory Council (FSAC), and Orange County's sanitary districts.

In 1997 the Permittees certified that they were implementing **Appendix G**. Since that time, the Permittees and development industry have gained considerable experience in implementing over a thousand Water Quality Management Plans (WQMPs) countywide. Tables 1 and 2 of **Appendix G** provide an outline of standard practice site specific structural and non-structural BMPs for special developments such as residential, industrial, retail/office centers, restaurants, warehouses/grocery, fuel dispensing areas and vehicle repair/maintenance facilities.

3.4.2 Educational Outreach On New Development Requirements

The Principal Permittee provided training to other Permittee planning staffs to facilitate uniform countywide implementation of the requirements of **Appendix G**. In December 1993, the report was the subject of a workshop for Permittee planning staff held at Santiago Oaks Regional Park. This training has since been complimented by individual presentations, conducted by Principal Permittee staff, to Permittee development processing staff.

The Permittees continue to provide educational brochures and **Appendix G** with its attachments to assist developers and contractors with the NPDES program. During 1999/00 approximately 1200 of the public education brochures were directly requested and distributed by developers within Orange County.

In addition, several Permittees reported working closely with developers and contractors in an effort to educate them about stormwater BMPs and various other water quality/runoff issues (**Table 3.24**). For instance, San Juan Capistrano provided samples of BMPs for new developments to all developers and their engineers upon the initial submission of applications, while the city of Tustin sent training opportunity notices to developers and provided them a model set of plans to illustrate the BMPs required.

Additionally, the city of Irvine hosted a number of workshops addressing the topic of watershed BMPs. Topics included: "Water Quality Ordinance and Enforcement Consistency," "Construction Site Planning and Management," and "New Developments."

In limited instances, Principal Permittee staff also provided third party review of Water Quality Management Plans.

3.4.3 Implementation

At the end of 1999/00 the Permittees reported that, since the implementation of the program in 1997, a total of 1100 WQMPs had been approved, covering 10,661 acres which represents approximately 2.5% of the area within Orange County subject to the NDPES Stormwater Permit. This is consistent with the incremental implementation of BMPs over the life of development envisaged by the Clean Water Act. Catch basin stenciling was the most frequent structural control implemented (5423) followed by common area efficient irrigation (965) and common area landscape design (934) (**Table 3.25**).

BMP maintenance (903), common area landscape management and education for new property occupiers (853), and common area litter control (833) were the four most frequently implemented non-structural controls (**Table 3.26**).

The report also recognizes that "Special" structural BMPs, specifically, engineered facilities designed to address specific pollutant problems, may be required through a new development runoff management plan, CEQA process, or similar water quality planning process. Examples of "special" structural BMPs that have been implemented include low flow diversions, catch basin filtering and screening and water quality detention/infiltration basins **(Table 3.27)** The targeted constituents include bacteria, nutrients, sediment, litter, oil and grease.

In addition, since the implementation of **Appendix G**, Principal Permittee staff have reviewed Non-County and County lead CEQA documents for water quality issues.

3.5 Construction (DAMP Section 8.0)

Permittee initiatives relating to the control of sediment and related pollutants are based upon established programs that involve implementation of both source control and treatment control measures at construction sites and within certain portions of the San Diego Creek watershed (DAMP Section 8.0).

The problem of construction site erosion and sediment loss has long been recognized by the Permittees. Consequently Permittee grading ordinances and codes, the Green Book, and Public Works construction specifications already contain requirements for construction practices for erosion control.

In 1999/00 the Permittees were surveyed regarding the need to revise the grading and erosion control ordinances. As a result of the survey, it was determined that a model grading and erosion control ordinance may need to be developed in order to reflect and incorporate the current requirements contained in the State General Construction permit, the adopted Water Quality Ordinances and the Green Book. This will be a focus in the next permit term.

The First Term Permits required changes in grading practices to recognize sediment balance concepts, control of regulated materials used on the job site, and control of sediments polluted by contaminants. The control of stormwater pollution associated with construction is handled through the existing grading, building permit, and public works contracting process.

During the First Term Permit period the Best Management Practices For Public Works Construction report was developed and incorporated as part of the DAMP **(Appendix H)**. This Appendix applies to Permittee public works construction projects and requires that such activities will implement non-structural and structural BMPs to control contaminated stormwater run-off.

At a minimum BMP selection for public works projects shall be consistent with the Construction Permit and Green Book standards for site maintenance and environmental protection. In 1997 the Permittees certified to the Regional Boards that the **Appendix H** guidelines or their equivalent were being implemented.

In 1999/00 the Permittees were requested to report the following information: the number of grading and construction permits issued, the number of sites greater than five acres, the number of site inspections conducted and the number of citations issued. The Permittees were not able to provide all of the information because of variations in the way the data is collected and stored, but were able to report the number of grading permits issued and the number of sites over 5 acres **(Table 3.28)**. It is expected that additional information will be provided in the next annual status report.

In 1999/00 the Permittees reported that 9,635 grading permits were issued and there were 325 sites greater than five acres. The Permittees were also actively involved with and/or attended two Construction Site Planning workshops sponsored by both Regional Boards. The focus of the workshop was planning and implementation of appropriate erosion and sediment controls.

Beyond Orange County the Principal Permittee participated in the working groups that developed the Statewide General Construction and Industrial Discharge Permits under the Statewide NPDES program.

3.6 Industrial Discharger Identification (DAMP Section 9.0)

In 1992 a central database was developed which consolidated the 40 CFR 122.26 (a) (4) notifications, current NPDES permit holders and industries whose Standard Industrial Classification (SIC) codes were identified by the State Water Resources Control Board as requiring coverage under the Industrial Permit. The database provided the basis for a single notification to all the identified industrial facilities informing the facilities' staff of the existence of the NPDES stormwater program and possible industrial permit application requirements.

This early program commitment was completed in 1992 by the Principal Permittee with the distribution of educational flyers to more than 10,000 potentially affected industrial businesses in Orange County. More than 7,000 flyers were also sent to construction-related businesses in Orange County to notify them of the obligations under the General Construction Permit **(DAMP Appendix I)**.

Subsequently, in 1997-98 and in 1999-00 the Principal Permittee distributed additional guidance for the cleaning of automotive service centers to over 2,100 businesses, which included some industrial facilities subject to the Industrial Permit (Section 3.3).

In 1999/00 the Permittees were surveyed regarding their ability to identify new businesses by Standard Industrial Classification (SIC) codes in order to be able to identify those businesses that are subject to the Industrial Activities Storm Water General Permit.

As a result of the survey, fifteen Permittees indicated that they currently had a business licensing or similar mechanism in place that would facilitate this type of notification. The remaining Permittees do not have such a mechanism and are continuing to determine the ways in which they will be able to notify businesses within jurisdiction. This will be a focus in the next permit term.

3.6.1 Management of Significant Industrial Discharges

The Permittees already identify large industrial facilities where hazardous/toxic substances are stored, used, manufactured or disposed of, as well as local landfills, hazardous waste disposal, treatment, and recovery facilities, and any known spills, leaks or other problems in their municipal area. A number of municipalities that perform annual fire code inspections coincidentally examine site pollution issues.

Management of the significant industrial discharges is accomplished through a training program provided by Principal Permittee staff and by coordination with various public agency organizations to encourage participation in implementing the stormwater program (Section 2.3.1).

3.7 Coordination With Other Agencies

Successful implementation of the NPDES Stormwater Program requires cooperation and coordination with other public agencies or organizations within and adjacent to Orange County that have programs or activities that have an impact on stormwater quality.

During the Second Term Permit period, a significant example of such an approach was the joint participation with Riverside, Orange and San Bernardino Counties in the Bight 98' regional monitoring program, which was coordinated by SCCWRP. This represented a collective opportunity for the three Counties to cooperatively participate in an integrated watershed monitoring program and meet a common permit objective (Section 7.0).

This coordination on monitoring has further developed into a region-wide monitoring and research cooperative program with the neighboring counties, SCCWRP and the three Regional Boards and will be implemented during the Third Term Permit period.

The Principal Permittee has also actively coordinated with Cal Trans through respective attendance at NPDES meetings. This joint participation has allowed for the sharing of information and resources and has provided for a greater understanding of the respective programs and challenges.

The Permittees also anticipate that there may be additional opportunities for cooperative efforts with other stormwater dischargers that may be permitted separately under Phase II of the federal stormwater regulations. These dischargers include federal and state lands, including, but not limited to, military bases, national forest, hospitals, colleges and universities, and highways; utilities and special districts; Native American tribal lands; non-urbanized areas; and agricultural lands.

3.8 Water Quality Planning Initiatives

During the Second Term Permit period, the Permittees initiated several water quality planning efforts. These priority water quality planning initiatives are intended to identify and better understand site-specific urban water quality problems in Newport Bay (nutrients), Aliso Creek (bacteria) and Talbert/Lower Santa Ana River (bacteria).

3.8.1 Newport Bay/San Diego Creek Watershed

Newport Bay and certain sections of San Diego Creek have been listed as impaired for the presence of excess levels of fecal coliform, sediment and nutrients as well as toxicity to organisms.

The development of Total Maximum Daily Load (TMDL) allocations pursuant to Section 303(d) of the Clean Water Act has imposed additional requirements on the Newport Permittees (the County, Orange County Flood Control District and the cities of Costa Mesa, Irvine, Lake Forest, Laguna Hills, Laguna Woods, Newport Beach, Orange, Santa Ana and Tustin) which include significant additional requirements on these Permittees for monitoring and program development (Section 7.0).

3.8.2 Talbert/Lower Santa Ana River Watershed

Elevated bacteria indicator levels in the surfzone off Huntington State Beach in 1999 were attributed, in part, to the storm drain system of the Talbert/Lower Santa Ana River Watershed. In response to a Section 13267 letter from the Regional Board, the Talbert/Lower Santa Ana River Watershed Permittees (the County, Orange County Flood Control District, and the cities of Costa Mesa, Fountain Valley, Huntington Beach, Newport Beach and Santa Ana) committed to conducting monitoring investigations and research studies in conjunction with the University of California Irvine and the National Water Research Institute. These studies have been initiated by these Permittees and subsequently expanded to include watershed-scale monitoring and investigations, including extensive dispersion monitoring in the surfzone.

The studies are anticipated to be completed during the renewal process for the Third Term Permit and surfzone fecal coliform impacts attributable to urban sources will be addressed through a revision of current BMPs pursuant to the water quality planning process. As part of an early action plan, all storm drain and pump station discharges in this watershed were diverted to the sanitary sewer during the summer months of 2000.

3.8.3 Aliso Creek Watershed

The lower mile of Aliso Creek has been listed as impaired for the presence of elevated levels of fecal coliform. Pursuant to a Clean Water Act Section 205(j) grant the County initiated a water quality planning study to compliment ongoing watershed restoration efforts being conducted by the Corps of Engineers in conjunction with watershed cities and special districts.

One of the results of the study was the identification of elevated fecal coliform levels at many points along Aliso Creek and in its tributaries. One storm drain (identified as J03P02) exhibited higher fecal coliform levels than the rest and was issued a Clean Up Abatement Order by the Regional Board pursuant to violations of the NPDES Stormwater Permit. The Order, as one action, assigns additional monitoring requirements to the J03P02 Permittees (the County, Orange County Flood Control District, and City of Laguna Niguel).

The 205(j) water quality planning study is now complete and the Corps of Engineers Feasibility studies and are anticipated to be completed during the renewal process for the Third Term Permit and will provide the first comprehensive restoration plan for an entire watershed in Orange County with subsequent project implementation over a multi-year period. As an early action, the flows from Lower Aliso Creek and J03P02 have been temporarily diverted during the summer months to the sanitary sewer.

3.9 Methodology For Examining BMP Retrofit Opportunities (DAMP Section 3.0)

The NPDES Stormwater program elements fall into two general categories: prevention of pollutant introduction into the drainage system and removal of pollutants from the drainage system.

The removal-oriented programs identified in the DAMP include:

- Structural BMPs identified through the water quality planning process; and
- Site specific special BMPs for new developments necessary pursuant to DAMP Section 7.0 and Appendix G.

Water quality problems are identified through the monitoring program and other water quality assessments. Watersheds determined to require additional BMPs are surveyed for potential retrofitting and considered using the principles of Maximum Extent Practicable (MEP). Existing flood control, retarding, sediment control, water conservation, recreation, habitat, and greenbelt facilities are evaluated in terms of their potential for modification to provide water quality benefits. Where retrofitting opportunities are found, new structural BMPs will be considered, using the principles of MEP.

In the 1994 Report of Waste Discharge, the Permittees committed to develop a methodology to evaluate opportunities to incorporate stormwater quality features into existing flood control structures.

In 1997-98, the feasibility of incorporating these types of retrofits to optimize beneficial use attainment began to be addressed in the context of the long-term water quality planning initiatives being conducted within Orange County a number of which are in cooperation with the Army Corps of Engineers (Section 3.8).

The feasibility for establishing various types of improvements such as separate high and low flow channels, re-establishing pool/riffle sequences or enhancing the shading within the watersheds continue to be examined.

3.9.1 Trash and Debris Booms

In an effort to reduce the amount of debris entering the County's coastal waters, trash and debris booms have been installed in several flood control channels to remove floatable material. To date, the booms have proven effective in reducing the amount of floatable material especially during the first rains of the storm season when accumulated debris finds its way into the ocean's waters.

Huntington Watershed

Three debris booms have been deployed in the Huntington watershed. The booms are located at: 1) tide gates of East Garden Grove-Wintersburg Channel, 2) upstream of Edinger in the Bolsa Chica Channel and 3) at the confluence of Westminster and Bolsa Chica Channel.

Talbert/Lower Santa Ana River Watershed

To reduce floatable debris, a debris boom was installed upstream of Hamilton in the Greenville Banning Channel/Lower Santa Ana River.

Newport Watershed

In 1999, the Principal Permittee received a Clean Water Act 319(h) grant to implement additional trash and vegetative debris booms in the watershed and focus on enhanced source control measures. The additional debris booms were installed in El Modena-Irvine and Peters Canyon Channel. One of the grant tasks required the characterization of debris collected by the trash and debris booms and the comparison of the results with similar data obtained from the existing debris boom located on the Santa Ana-Delhi channel.

During the 1998-1999 and 1999-2000 storm seasons, a debris characterization study was initiated to collect trash and debris samples from the containment boom in the Santa Ana Delhi Channel. Samples were collected from a total of seven storm events. Although an attempt was made to collect data from the newly installed containment systems in Peters Canyon Wash and El Modena-Irvine channels, due to the infrequency of storms during the recent storm season and upstream construction activities in the Peters Canyon channel, no data could be obtained from these channels. Data from these containment systems will be collected in the 2000-2001 storm season.

The results of the debris characterization study at the Santa Ana Delhi Channel indicated that the percent composition of the trash and debris are similar for each of the storms. The study showed that the adjusted (excluding the weight of water and sediment) composition percentage of organic and plastic categories averaged 47% and 34%, respectively. The remaining five categories (glass, rubber, metal, paper, cloth, misc.) averaged less than 20% **(Table 3.29 and Figure 3.1)**. These results provide the basis for targeting source control measures for trash and debris reduction in the Santa Ana-Delhi watershed on organics and plastics.

3.9.2 Additional Retrofit Projects

Additional operational retrofits include the installation of separate high and low flow channels on portions of Bonita Creek in the Newport Watershed by the San Joaquin Hills Transportation Corridor Agency.

The addition of pump stations to the standard detention basin outlet structures leading to the San Gabriel River are in the design stage. Adding the pump stations will allow for easier retrieval of floatables and will aid in decreasing the amount of trash and debris entering the San Gabriel River.

In addition, some of the low flow diversions discussed in Section 3.2.3 may become permanent engineered facilities during the third term permit period.

Table 3.1 1999/00 Elements of Litter Control

Permittee	Litter Ordinance	Clean-Up Programs	Special or Bulky Item Pickup	Trash Receptacles	Other
Anaheim	X	X	X	X	Roll off boxes for trash collection in target neighborhoods
Brea	X			X	City of Brea Beautification Day
Buena Park	X	X	X	X	City holds "Spring Clean-Up" and "Fall Clean-Up"
Costa Mesa	X	X	X	X	Court referrals and community service programs used for debris cleanup; City hosted a clean-up event for the Fillmore/Coolidge neighborhood.
Cypress	X		X	X	None
Dana Point		X	X	X	Twice weekly litter pick up; City sponsored weekend litter cleanup in conjunction with Lantern Village Association and Solag Inc.
Fountain Valley	X	X	X	X	Annual "Neighborhood Cleanup" where free waste dumpsters are provided to problem areas; City sponsors volunteer clean-ups among community groups; Extensive Code Enforcement Program.
Fullerton			X		Maintenance crews remove litter and debris in high accumulation public areas; Each residential customer allowed an unlimited number of trash receptacles.
Garden Grove	X	X	X	X	City hosts Volunteer Connection/Earth Day event; Used Tire Round-Up Event; City coordinates volunteer groups to clean City parks & other public right-of-ways twice monthly.
Huntington Beach	X		X	X	None
Irvine	X	X	X	X	Trash receptacles at bus stops and pedestrian walkways and expansion of residential recycling program.
La Habra	X	X	X	X	City-wide cleanup day events held three times. Also provided dumpsters at no cost for "Pride Day" cleanups.
La Palma	X			X	City targets one area a year to clean and beautify during Volunteer Connection Day
Laguna Beach	X	X	X	X	Beach Cleanup Day; Vacuuming of sidewalks with "Clean Machine" in business districts; Weekly sand sifting and litter control on beaches, Urban Runoff Diversion Program to divert nuisance flow to City sewer system.
Laguna Hills	X		X	X	Daily litter pickup in parks.
Laguna Niguel	X	X		X	"Doggie Clean-up Bags", Volunteer Connection Day beautifies the Community Park in the Botanical Preserve
Lake Forest		X	X		Sponsored 2 Neighborhood Pride Clean-up Days
Los Alamitos		X	X	X	None
Mission Viejo	X	X	X	X	City sponsored "Tierra Nativa", an annual event celebrating Earth Day, National Trails Day, Arbor Day & Volunteer Connection Day.
Newport Beach	X	X	X	X	Community Cleanup events, Clean Harbor Day, Clean Estuary Day. City operates a Harbor Debris Boat to clean up the harbor area. Periodic events at request of homeowners associations.
Orange	X	X	X	X	Special recycling days and Neighborhood Enhancement Programs wherein specifically targeted areas clean up litter
Placentia	X	X	X	X	X
San Clemente	X	X	X	X	Neighborhood Pride Clean Up Day, Public recycling bin for cardboard & other recyclables
San Juan Capistrano	X		X	X	None
Santa Ana	X	X	X	X	Housing Department conducts neighborhood clean-ups throughout the year
Seal Beach	X		X	X	Bi-annual City Clean Up Week
Stanton			X		None
Tustin	X		X	X	Lanscaping contractors required to include litter pick-up in their activities
Villa Park	No Report				
Westminster	X		X	X	Christmas Tree Recycling Program
Yorba Linda	X	X	X	X	Holiday Collection Days
County of Orange	X	X	X	X	Collection bins for special events, America Recycles Day, Earth Day

Table 3.2 California Coastal Commission Clean Up Day - Orange County Totals, 1996-1999

		1996	1997	1998	1999
	Volunteers	4,649	4,052	3,310	4,382
	Trash (lbs)	38,906	41,114	67,112	65,900
	Recyclables (lbs)	3,914	4,211	1,243	8,841
	Total (lbs)	42,820	45,325	68,355	74,741
Top Five Items Collected	Cigarette Butts	N/A	N/A	5,720	14,587
	Foamed Plastic Pieces	N/A	N/A	4,361	9,650
	Plastic Pieces	N/A	N/A	1,360	4,630
	Paper Pieces	N/A	N/A	1,188	5,288
	Plastic Food Bags/Wrappers	N/A	N/A	1,360	5,621

Data obtained from http://www.coastal.ca.gov/publiced/ccd/ccd.html

Table 3.3 1999/00 Solid Waste Collection

Permittee	Total Quantity of Solid Waste Collected (Tons)	Comments
Anaheim	324,492	
Brea	68,106	
Buena Park	115,000	
Costa Mesa	166,339	Includes residential and commercial waste
Cypress	47,927	
Dana Point	41,637	Includes 11,479 tons of recyclables
Fountain Valley	65,967	
Fullerton	159,424	
Garden Grove	158,724	
Huntington Beach	246,923	
Irvine	366,565	Per California Integrated Waste Management Board for calender year 1999
La Habra	67,000	
La Palma	14,700	
Laguna Beach	42,794	Significant increase in recycled waste since implementation of cart program in April.
Laguna Hills	40,412	
Laguna Niguel	33,966	
Lake Forest	57,796	
Los Alamitos	No Report	
Mission Viejo	160,506	Includes 64,188 diversion tonnage
Newport Beach	112,000	
Orange	196,909	Includes 25% diversion of 49,228 tons
Placentia	53,232	
San Clemente	60,832	
San Juan Capistrano	66,077	Does not include data for Second Quarter '00
Santa Ana	347,634	
Seal Beach	26,802	
Stanton	28,601	
Tustin	78,146	
Villa Park	No Report	
Westminster	40,456	9,913 tons diverted from landfill as recycled waste; 55 tons of recycled X-Mas trees
Yorba Linda	74,994	
County of Orange	157,700	

Total tons of solid waste collected 3,421,660

Table 3.4 1999/00 Solid Waste Public Education Materials

Permittee	Types of Litter Public Education Materials					
	Community Newsletters	Public Service Announcements: Radio	Public Service Announcements: Television	Recycling Brochures	Utility Bill Inserts	Other
Anaheim	Continuously	Numerous		Continuously		Promotion of "Recycle Anaheim"
Brea	Quarterly			Annually	Monthly	
Buena Park	Quarterly				Bi-annually	Promotion of Spring and Fall Clean-up
Costa Mesa	Quarterly		Quarterly	Continuously		Orange County Fair Recycling Booth
Cypress	Quarterly		Monthly	Continuously		Local newspaper & City website advertise Used Oil Collection Centers. Free used oil containers distributed at City Hall.
Dana Point	Quarterly			Annually		Recycling Video: Quarterly
Fountain Valley	Quarterly			Continuously	Quarterly	Movie Screen Announcements at local theaters; MRF Tours
Fullerton	Quarterly			Annually and As Needed	Quarterly	
Garden Grove	Annually		35/year	Continuously	Bi-annually	Cable News: 76/Year
Huntington Beach	Quarterly		Weekly	Monthly		Daily
Irvine				Annually and As Needed		Various State, County and City materials & newspaper ads
La Habra	Bi-annually		Bi-annually	Annually		
La Palma	X			X		
Laguna Beach	Quarterly			Annually	As Needed	
Laguna Hills	Semi-annually			Quarterly		
Laguna Niguel				Unknown*	Unknown*	*Materials are provided by Solag Inc. in their bills
Lake Forest	Annually			Continuously	Annually	
Los Alamitos	Annually			Annually		
Mission Viejo	Quarterly		Daily	Continuously	Quarterly	Web site: Continuously
Newport Beach				Annually	Annually	
Orange	Randomly	Event Based	Event Based	Randomly	Randomly	Special events as requested
Placentia	Quarterly			Annually		Waste disposal information posted on City website
San Clemente	Quarterly			Continuously	Bi-annually	Web site: Continuously
San Juan Capistrano				Quarterly	Quarterly	
Santa Ana				Annually	Bi-annually	
Seal Beach						
Stanton						Door Hangers: Annually
Tustin	Annually			Annually		Committee: Tustin Pride
Villa Park	No Report					
Westminster	Annually		X	Upon Request	Annually	Trash Bin Stickers: Bi-annually
Yorba Linda	Semi-annually		Continuously	Continuously	Quarterly	
County of Orange	Annually			Continuously	Quarterly	Solag Annual Award Program

Table 3.5 1999/00 Drainage Facilities Maintenance - Debris Removal

Permittee	Total Volume From Facilities		Length of Channel/Pipe	Number of Catchbasins	Debris Characterization (as a percentage of total removed)					Method of Removal		
	Cu Yards	Tons	Cleaned (miles)	Drains Cleaned	Soil	Vegetation	Paper	Plastic	Other	Vacuum Truck	Hand Crews	Other
Anaheim	8	1572	47.4	3095	20	70	5	5		X	X	Skip Loader
Brea		2	Not available	800	0	75	20	5	5		X	
Buena Park	2		0.0	25	50	10	20	10	10		X	
Costa Mesa		80	1.3	1065	60	30	5	5		99%	1%	
Cypress	Not available		0.4	487		50	50			X	X	
Dana Point	218		0.4	395	60	30	4	4	2	X	X	Confined Space Teams
Fountain Valley		417	1.5	738	12	63	18	4	3	X	X	
Fullerton	2142		47.0	1267	25	60	5	5	5	X	X	
Garden Grove		92	29.8	775	40	25	25	5	5		X	
Huntington Beach		44	7.2	1680	40	10	25	15	10	30%	70%	
Irvine	8876		1.9	3,220	90	5	3	2	0	6%	4%	90%
La Habra		0.3	2.7	300	15	55	25	5		X	X	
La Palma	12		5.2	157	40	30	5	5	20		X	
Laguna Beach	65		0.6	445	49	41	0	0	10	X	X	
Laguna Hills	4		Not available	136	50	40	5	5		X		
Laguna Niguel	196.3		0.8	400	46	42	6	5	1	1%	99%	
Lake Forest	8		Not available	328	85	10	2	2.5	0.5	X		
Los Alamitos	5		1.3	40	20	20	20	20	20	X	X	
Mission Viejo	600		3.6	268	40	50	3	2	5	X	X	
Newport Beach	415		3.6	561	70	10	10	10	0	X	X	
Orange	1688		18.9	766		50	0.5	0.5	49		X	Equipment used for unusual debris
Placentia		20	0.4	360	70	20	5	5		X	X	
San Clemente	869		14.8	1974	70	20	7	2	1	X	X	
San Juan Capistrano		0.5	0.6	42	40	55	3	2		X	X	
Santa Ana	158		802.9 SF	515	2	87	3	2	6		X	
Seal Beach	55			197	20	80	0	0	0	20%	80%	
Stanton	No Report											
Tustin		1.5	0.0	500	80	15	2	2	1		X	
Villa Park	No Report											
Westminster		15	0.2	744	3	95	1	1		X	X	Bobcat & Backhoe
Yorba Linda	60		0.13	290	90	10	0	0		X	X	
County of Orange		22080	30.7	452	80	15	5	0	0	X		
Totals	15381	24,324	220.3	22,022	42	39	9	4	5			

Table 3.6: 1999-2000 Storm Drain System Changes

Facility	Reach Changed	Type of Change	Date
City of Costa Mesa			
	262 & 263 & 265 21st St.	Lateral/CB	2000
City of Cypress			
A01	Gay St. & on Crescent	SD	1999
City of Dana Point			
M00-P01	Calle Naranja/Calle Monterey	SD/CB	Under Construction
M00-P01	Calle Loma - Camino Capistrano & Avenue Las Palmas	SD/CB	Under Construction
M00-P05	Camino Capistrano & Camino de Estrella	SD/CB	Under Construction
M00-P01	Camino Capistrano - Mira Costa & Via Bella	SD/CB	Under Construction
	PCH & Crown Valley	SD/CB	1999
City of Fullerton			
	Highland Grade Separation	SD/CB	1999
City of Garden Grove			
D-6	Garden Grove Blvd. - Village to Galway	SD	1999
B-4	Lampson - Beach to Haga	SD	Ongoing
G-1	Ninth - Chapman to Reva	SD	1999
City of Huntington Beach			
Not Available	Not Available	42" RCP	1999
Not Available	Not Available	CB	1999
Not Available	Not Available	42" RCP	1999
Not Available	Not Available	CB	1999
Not Available	Not Available	48" RCP	1999
Not Available	Not Available	48", 60" RCP	1996-1999
Not Available	Not Available	42"	1999
Not Available	Not Available	54" RCP	1999
Not Available	Not Available	51" RCP	1999
City of Laguna Beach			
Pacific Ocean	Mystic Way	SD	1999
Pacific Ocean	Virginia Park Dr.	SD/CB	1999
Pacific Ocean	Blumont/Hilledge	SD/CB	1999
Pacific Ocean	Terry Rd.	SD/CB	1999
Pacific Ocean	Nyes Pl.	CB	1999
Pacific Ocean	Lower Nyes Pl.	CB	1999
Pacific Ocean	Cliff Dr.	CB	1999
I02	1900 Laguna Canyon Rd.	SD/CB	2000
City of Laguna Hills			
J05P01	Community Center (Via Lomas - Alicia)	SD	1999
City of Laguna Niguel			
J03P09	Via Portola - Vista Plaza	SD	1998-99
City of Mission Viejo			
L03P14 - 713.3	Sileros to 1000' NLY	RR	2000
Not Available	I-5 to Via Grande	42", 48", 72" RCP	2000
Not Available	Upstream El Toro Rd. to Rte. 241	SD	2000
Not Available	Olympiad/Alicia	SD	1999
City of Newport Beach			
Newport Bay	Hospital Rd. to W. Service Rd.	SD/CB	1999
Newport Bay	Bayside Dr. adj. County Road	SD	1999
Newport Bay	Newport Blvd/PCH	SD/CB/JS	1999
Newport Bay	Castaway Lane/Dover Dr.	SD/CB/JS	2000
Newport Bay	MacArthur Blvd - PCH to Bonita Canyon	SD/CB/JS	1999

Table 3.6: 1999-2000 Storm Drain System Changes

Facility	Reach Changed	Type of Change	Date
City of Orange			
	Milford	SD	1999
	Walnut	SD	1998/1999
City of Placentia			
E03	Alta Vista - Chapman	BC	1999
City of San Clemente			
MOO-P02	Trafalgar Ln.	SD	1999
MOO-S07	Palizada/El Camino Real	SD/CB/JS	1999
MOO-P10	San Fernando/El Camino Real	SD/CB	1999
MOO-P10	Dominguez/El Camino Real	SD/CB	1999
MO2-P02	Calle Valle	SD/CB/JS	1999
MO1-P05	Laing	RR/IS/JS/CB/SD	1999/2000
MO2-P02	Talega	RR/IS/JS/CB/SD	1999/2000
MO3-P01	Talega	RR/IS/JS/CB/SD	1999/2000
MOO-P01	Los Alamos	SD/CB/JS	2000
City of Santa Ana			
Euclid St. Stormdrain	First St. - Sixth St.	SD	1999
Penn Way Stormdrain	Santa Ana Blvd. - 15th St.	SD	2000
City of Stanton			
	Western Ave. - Knott Ave.	60" RCP	1999/2000
	UPRR R/W to Katella Ave.	2 - 30" RCP	1999/2000
City of Westminster			
	Tract 15539	SD/CB	1999
	Pacific/Bucknell	SD/CB/JS	1999
City of Yorba Linda			
E05-P01	Mariposa - E. of Richfield	SD	1999
E08-P08	Jamestown Dr.	SD	1999
E05-P03	Arroyo St.	SD	1999
E05-P03	Lakeview - Lemon	SD	1999
County of Orange			
D02	Atlanta - Indianapolis		1996-1999
A02	200' upstream Beach - 400' downstream Dale		1997-1999
A03	Knott - Beach		1997-1999
C05	411 M downstream Goldenwest - 349 M upstream		1997-1999
C02	I-405 Fwy - Belgrave		1998-2000
D02	Indianapolis - Adams		1998-2000
D01	1750' upstream Newland - Atlanta		2000
F06	Walnut - I-5 Fwy		1999
F05	Bake - Irvine Center Dr		1999

SD = Storm Drain Extension, Addition or Replacement
CB = New Catch Basin
JS = Junction Structure
IS = Inlet Structure
RR = Rip Rap

OC = Open Channel Construction
BC = Box Culvert
SB = Stilling Basin
MC = Miscellaneous Construction
RCP = Reinforced Concrete Pipe

Table 3.7 1999/00 Drain Inlet Stenciling

Permittee	Total Number of Catch Basins	% of Basins Stenciled at Least Once	# Of Basins Re-Stenciled 1999-2000	Phrase Used	Type of Application Used			Volunteer/Other Organizations	# of Basins Re-Stenciled During 1999-2000	Comments
					Spray Paint	Heat	Adhesives			
Anaheim	3500	100	1110	No Dumping - Drains To Ocean	X (blue,black,red)					
Brea	800	100	5	No Dumping - Drains To Ocean		X				Positive public reaction to stenciling
Buena Park	791	100	0	No Dumping - Drains To Ocean	X (blue on white)					Positive public reaction to stenciling; City has budgeted funds to purchase acrylic catch basin markers for the next fiscal year.
Costa Mesa	1300	100	1300	No Dumping - Drains to Ocean	X (blue on white)			Orange County Conservation Corps	1300	Stenciling information article in the Winter, 2000 Community Newsletter
Cypress	487	100	0	No Dumping - Drains To Ocean	X					Promotion of stenciling program in the City newsletter; Majority of re-stenciling performed by Boy Scouts.
Dana Point	395	100	0	No Dumping - Drains To Ocean	X (black)					15 new catch basins currently under construction. City provided stencils for use in private communities.
Fountain Valley	738	100	100	No Dumping - Drains To Ocean	X (blue)					Low level of trash and illegal dumping.
Fullerton	1684	100	600	No Dumping - Drains To Ocean	X			Boy Scouts of America Eagle Scout Project	600	
Garden Grove	775	100	775	No Dumping - Drains To Ocean	X (blue)			City Maintenance Personnel	24	
Huntington Beach	1680	100	1680	No Dumping - Drains To Ocean	X					
Irvine	4600	100	500	No Dumping Waste - Drains To Ocean	X	X		Orange County Conservation Corps	500	
La Habra	552	100	552	No Dumping - Drains To Ocean	X (blue on white)			Orange County Conservation Corps	552	Positive public reaction to stenciling
La Palma	180	87	0	No Dumping - Drains To Ocean	X					
Laguna Beach	445	56	195	Keep It Clean - Drains To Ocean			X (Blue)			No illegally dumped material discovered since installation of new vinyl medallion "stencils"
Laguna Hills	340	100	0	No Dumping - Drains To Ocean	X (black on white)					
Laguna Niguel	1035	90	50	No Dumping - Drains To Ocean	X (blue)					
Lake Forest	438	100	50	No Dumping - Drains To Ocean	X			Eagle Scout Candidate	50	
Los Alamitos	80	100	0	No Dumping - Drains To Ocean	X (blue on white)					
Mission Viejo	1850	100	0	No Dumping - Drains To Ocean	X (blue)					
Newport Beach	2298	100	892	No Dumping - Drains To Ocean No Dumping Drains To Bay	X (black)					
Orange	3100	100	0	No Dumping - Drains To Ocean		X	X			Positive public reaction to stenciling, vandalism almost nil
Placentia	240	100	0	No Dumping - P.M.C. Section 16.08.040	X					
San Clemente	1705	100	1974	No Dumping - Drains To Ocean	X (black)			Orange County Conservation Corps & Boy Scouts	OCCC - 1380; Boy Scouts - 316	269 catch basins stenciled twice during this reporting period
San Juan Capistrano	762	80	0	No Dumping - Drains To Ocean	X					
Santa Ana	1230	100	100	No Dumping - Drains To Ocean	X (blue on white)					
Seal Beach	197	100	0	No Dumping	X (black)					
Stanton	No Report	100	100	No Dumping - Drains To Ocean	X (black on white)					
Tustin	660	94	450	No Dumping - Drains To Ocean	X (blue on white)					Road median catch basins are not required to be stenciled
Villa Park	No Report									
Westminster	744	100	744	No Dumping - Drains To Ocean	X (blue)					
Yorba Linda	1080	65	700	No Dumping - Drains To Ocean	X (black)					
County of Orange	1237	100	0	No Dumping - Drains To Ocean	X (blue on white)					
Totals	34,923	99	11,877							

Table 3.8 1999/00 Street Sweeping Practices By City

Permittee	Type of Sweeper			Frequency			Volume of Material Collected			Parking Restrictions	Performance Standards	Sweeping Monitored	Monitoring Method
	Brush	Vacuum	Other	Commercial	Industrial	Residential	Commercial	Industrial	Residential				
Anaheim	7	21		W	W	W	322,690 tons			Yes	D	D	Visual
Brea		3		W	W	W	3840 CY	3840 CY	3840 CY	No	M	M	Visual
Buena Park		3		2/W	W	W	3.5 tons	1.5 tons	30 tons	Yes	D	D	Visual
Costa Mesa	1		Regenerative Air - 4	W	W	W	2.5 tons/W	2.5 tons/W	26.75 tons/W	Yes	M	O	Visual
Cypress	1	2		W	W	W	No Report			Yes	BW	D	Visual
Dana Point		X	Regenerative Air	BW	N/A	BW	86 tons	N/A	344 tons	Yes	BW	BW	Visual
Fountain Valley		3		W	W	2/W	211 tons	106 tons	1776 tons	Yes	D	D	Visual
Fullerton		5		W	W	W	2678 CY	8093 CY	874 CY	Yes	D	D	Visual
Garden Grove		3		W	BW	BW	60 tons/Month	30 tons/Month	105 tons/Month	Yes	O	O	Visual
Huntington Beach		5		BW	BW	BW	20 yards	40 yards	890 yards	Yes	2/W	2/M	Visual
Irvine	2	1		BW	BW	BW	1500 tons	1500 tons	1248 tons	No	W	W	Visual
La Habra		3		W	W	W	3.5 tons (data from 1 sweeper only)			No	D	W	Visual
La Palma	1	1		W	W	W	4-5 CY/day	4-5 CY/day	4-5 CY/day	Yes	W	W	Visual
Laguna Beach	2			D	N/A	BW	680 CY	N/A	1356 CY	Yes	D	D	Visual
Laguna Hills		1		W	N/A	BW	312 tons		260 tons	No	W	W	Visual
Laguna Niguel		X		M	M	M	No Report			No	No	M	Visual
Lake Forest	X	X		W	W	W	809.7 tons			No	O	O	Visual
Los Alamitos	1			2/W	2/W	W	.25 tons	.25 tons	1 ton	Yes	Q	Q	Visual
Mission Viejo		3		W	W	BW	10 tons	10 tons	80 tons	No	D	D	Visual
Newport Beach	5	1		D	N/A	W	5384 CY			Yes	D	D	Visual
Orange	4	3		BW	BW	W	15,250 CY			Yes	D	D	Visual
Placentia		2		M	M	M	346 tons	346 tons	346 tons	Yes	D	D	Visual
San Clemente			Regenerative Air (2)	3.5/W	3.5/W	M	364 CY	273 CY	1080 CY	Yes	D	D	Visual
San Juan Capistrano	No Report			BW	BW	BW	No Report			Yes	M	M	Visual
Santa Ana	10			D	W	W	2184 CY	16,380 CY	36,400 CY	Yes	W	W	Visual
Seal Beach	1	1		W	W	W				Yes	W	Variable	Visual
Stanton		1		W	W	W	2 tons	2 tons	8 tons	Yes	No Report	W	Visual
Tustin	1	2		W	W	W	750 tons			Yes	D	D	Visual
Villa Park	No Report												
Westminster		2		BW	BW	BW	778.8 CY	401.2 CY	1180 CY	Yes	BM	W	Visual
Yorba Linda		X		W	W	BW	76,552 tons			No	A	W	Visual
County of Orange		3				M	No Report			Yes	M	M	Visual

D: Daily Frequency
W: Weekly Frequency
BW: Every Other Week
M: Monthly Frequency
BM: Every Other Month
BA: Every Other Year
O: On-Going
Q: Quarterly

Table 3.9 1996-2000 Environmental Performance Reporting Overview

005773

Permittee	1996/1997		1997/1998				1998/1999				1999/2000					
	New Significant Issues	Facilities With Significant Issues	Existing Significant Issues	Facilities With Significant Issues	New Significant Issues	Significant Issues Resolved	Existing Significant Issues	Facilities With Significant Issues	New Significant Issues	Significant Issues Resolved	Existing Significant Issues	Facilities With Significant Issues	New Significant Issues	Significant Issues Resolved	Remaining Significant Issues	Facilities With Significant Issues
Anaheim	83	24	83	24	0	68	15	13	0	1	14	13	0	12	2	1
Brea	3	1	3	1	0	0	3	1	0	3	0	0	0	0	0	0
Buena Park	5	1	5	1	0	4	1	1	1	1	1	0	0	0	1	0
Costa Mesa	14	10	14	10	0	12	2	2	0	0	2	2	0	0	2	2
Cypress	5	1	5	1	0	0	5	1	0	0	5	1	2	2	5	1
Dana Point	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fountain Valley	10	3	10	3	0	2	8	2	0	0	8	2	0	0	8	2
Fullerton	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0
Garden Grove	12	10	12	10	0	1	11	10	0	0	11	10	0	10	1	1
Hunt. Beach	27	9	27	9	2	12	17	8	0	6	11	7	0	3	8	4
Irvine	1	1	1	1	0	1	0				0				0	
La Habra	5	1	5	1	0	2	3	1	0	0	3	1	0	1	2	1
La Palma	2	2	2	2	0	0	2	2	0	2	0	0	0	0	0	0
Laguna Beach	0	0	0	4	4	0	4	4	0	1	3	3	0	0	3	0
Laguna Hills	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Laguna Niguel	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lake Forest	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Los Alamitos	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0
Mission Viejo	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Newport Beach	5	3	5	3	0	5	0	0	0	0	0	0	0	0	0	0
Orange	6	4	6	4	0	6	0	0	0	0	0	0	0	0	0	0
Placentia	4	1	4	1	0	4	0	0	0	0	0	0	0	0	0	0
San Clemente	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
S.J. Capistrano	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Santa Ana	5	1	5	1	0	4	1	1	2	1	2	1	0	0	2	0
Seal Beach	5	4	5	4	1	1	5	0	0	0	5	0	0	0	5	0
Stanton	5	1	5	1	0	4	1	1	0	0	1	1	0	0	1	1
Tustin	3	1	3	1	0	0	3	1	0	2	1	1	0	0	1	1
Villa Park	7	2	7	2	0	3	4	2	0	0	4	2	0	0	4	2
Westminster	5	1	5	1	0	4	1	1	0	1	0	0	0	0	0	0
Yorba Linda	2	1	2	1	0	0	2	1	0	0	2	1	0	0	2	1
County of Orange	28	10	28	10	3	23	8	6	0	7	1	6	0	1	0	0
Total	244	94	244	98	10	158	96	58	3	25	74	51	2	29	47	17

= All Significant Issues Addressed

Table 3.10 1999/00 Environmental Performance Report Significant Issues Action Plan Updates

Location	Significant Issue	Type Of Control	ACTION 1	ACTION 2	START DATE	END DATE	Action Plan Complete & Revised End Date	Any Additional Significant Issues
City of Anaheim								
Streets & Sanitation #28	Material Storage - Asphalt/Dirt	Structural	Construct metal roofing to cover bunkers (Action plan changed from: Install clarifier)	Install drain inlet filters (Action plan changed from: Construct berm)	11/24/97	12/31/99	No - 6/30/01	No
	General Stormwater Runoff	Structural	Install and service 4 stormwater inlet filters (Action plan changed from: Install clarifier)		11/24/97	6/30/99	No - 6/30/01	
Dad Miller Golf Course	Material Storage	Non-structural	Purchase tarps		11/15/97	On going	Yes	No
Anaheim Hills Yard	Material Storage	Non-structural	Purchase tarps		11/15/97	On going	Yes	No
Fire Station One	Vehicle Washing	Non-structural	Relocate wash area		3/1/98	3/1/99	Yes	No
Fire Station Two	Vehicle Washing	Non-structural	Relocate wash area		3/1/98	3/1/99	Yes	No
Fire Station Four	Vehicle Washing	Non-structural	Relocate wash area		3/1/98	3/1/99	Yes	No
Fire Station Five	Vehicle Washing	Non-structural	Relocate wash area		3/1/98	3/1/99	Yes	No
Fire Station Six	Vehicle Washing	Non-structural	Relocate wash area		3/1/98	3/1/99	Yes	No
Fire Station Seven	Vehicle Washing	Non-structural	Relocate wash area		3/1/98	3/1/99	Yes	No
Fire Station Eight	Vehicle Washing	Non-structural	Relocate wash area		3/1/98	3/1/99	Yes	No
Fire Station Nine	Vehicle Washing	Non-structural	Relocate wash area		3/1/98	3/1/99	Yes	No
Fire Station Ten	Vehicle Washing	Non-structural	Relocate wash area		3/1/98	3/1/99	Yes	No
Convention Center	Material Storage - Chemical Coolant	Structural	Install containment system		2/1/98	7/31/98	Yes	No
City of Brea								
Service Center	Vehicle/Equipment Wash Water	Structural	Construct new wash facility with water recycling		5/1/97	3/1/99	Yes - Completed prior to last reporting period	No
	Steam Cleaning	Structural	Provide new location (move to newly constructed facility)		5/1/97	3/1/99	Yes - Completed prior to last reporting period	
	Sweeper Transfer Area	Structural	Capture and treat runoff from dump pile		5/1/97	3/1/99	Yes - Completed prior to last reporting period	
City of Buena Park								
Vehicle Maintenance Yard	Fuel Spills - Small and Large	Structural	Construct Berm		11/1/97	Ongoing	No - Specs under review	No
City of Costa Mesa								
New Corporation Yard	Sweeper Transfer Area	Structural	Develop industrial waste system		12/1/00	2/1/00	No - Budget 12/15/00	No
Old Corporation Yard	Large & Small Spills	Structural	Construct roof for paint cleaning area & fence		9/1/00	10/1/00	No - Budget 10/00	No
City of Cypress								
Corporation Yard	Waste Storage - Paint	Structural	Provide covered storage area		11/1/00	1/1/01	No - 1/1/01	Yes
	Fluid Transfer Area	Structural	Construct berm around perimeter		11/1/00	1/1/01	No - 1/1/01	
	Fluid Transfer Area	Non-structural	Utilize effective housekeeping techniques		2/1/98	2/1/99	Yes	
	Spills - Small	Non-structural	Relocate landscape equipment to cover		2/1/98	8/1/99	No - 8/1/00	
	Material Storage	Structural	Install roof over storage area	Temporarily cover bins	9/1/98	10/1/98	No - 1/1/01	
	Vehicle/Equipment Wash Water	Non-structural	Inspect wash rack drainage system regularly		1/1/98	2/1/99	Yes	
	Fluid Storage	Structural	Install berm around fluid drums in garage		9/1/00	9/30/00	New	
	Vehicle Maintenance	Non-structural	Increase frequency of vehicle maintenance		9/1/00	Ongoing	New	
City of Dana Point - No Significant Issues								

Table 3.10 1999/00 Environmental Performance Report Significant Issues Action Plan Updates

Location	Significant Issue	Type Of Control	ACTION 1	ACTION 2	START DATE	END DATE	Action Plan Complete & Revised End Date	Any Additional Significant Issues
City of Fountain Valley								
Fire Station #2	Material Storage - Fuel Tanks	Structural	Install clarifier and roof cover		10/1/98	10/1/99	No - Facility Moving 12/99	No
City Yard	Material Storage - Lube Oil Drums	Structural	Install clarifier and roof cover		4/1/98	10/1/98	No - Facility Moving 12/99	No
	Vehicle/Equipment Wash Water	Structural	Install clarifier and roof cover		4/1/97	10/1/98	No - Facility Moving 12/99	
	Sweeper Transfer Area	Structural	Install clarifier and roof cover		4/1/98	10/1/98	No - Facility Moving 12/99	
	Fuel Spills	Structural	Install clarifier and roof cover		4/1/97	10/1/98	No - Facility Moving 12/99	
	Vehicle Storage	Structural	Install clarifier and roof cover		6/1/98	6/1/99	No - Facility Moving 12/99	
	Material Storage - Waste Oil	Structural	Install clarifier/separator and roof cover		6/1/98	10/1/98	No - Facility Moving 12/99	
	Vehicle/Equipment Wash Water	Structural	Install roof		6/1/98	6/1/99	No - Facility Moving 12/99	
City of Fullerton - No Significant Issues								
City of Garden Grove								
Municipal Service Center	Hazardous Materials Storage	Non-structural	Training of personnel		12/1/98	4/1/00	Yes	No
Fire Station #2	Hazardous Materials Storage	Non-structural	Training of personnel		12/1/98	4/1/00	Yes	No
Fire Station #3	Hazardous Materials Storage	Non-structural	Training of personnel		12/1/98	4/1/00	Yes	No
Fire Station #4	Hazardous Materials Storage	Non-structural	Training of personnel		12/1/98	4/1/00	Yes	No
Fire Station #5	Hazardous Materials Storage	Non-structural	Training of personnel		12/1/98	4/1/00	Yes	No
Fire Station #6	Hazardous Materials Storage	Non-structural	Training of personnel		12/1/98	4/1/00	Yes	No
Fire Station #7	Hazardous Materials Storage	Non-structural	Training of personnel		12/1/98	4/1/00	Yes	No
City Hall	Materials Storage	Structural	Replace generator		TBD	12/22/99	No - 2005	No
Police & Fire Station	Hazardous Materials Storage	Non-structural	Training of personnel		12/1/98	4/1/00	Yes	No
Willowick Golf Course	Waste Storage	Structural	Build berm	Train personnel	11/1/98	12/1/98	Yes - Incorrectly identified as a municipal facility	No
	Vehicle & Equipment Washing	Structural	Install a clarifier		12/1/98	6/1/99		
City of Huntington Beach								
Park Maintenance Facility	Material Storage/Trash Bin	Structural	Construct berm		11/15/97	On going	No - In Design	No
	Fuel Spills - Large	Structural	Construct roof		11/15/97	On going	No - Under Construction	
Joint Powers Train Center	Trash Bin	Structural	Construct roof		12/1/98	Ongoing	No	No
	Trash Bin	Non-structural	Provide spill clean up materials		11/15/97	On going	No	
Civic Center	Fuel Spills	Structural	Replace fuel system		11/15/97	12/1/98	Yes - Completed prior to last reporting period	No
	Trash Bin - Police Parking Lot	Structural	Construct roof and berm		N/A	Pending Funding	No - In progress	
	Trash Bin - City Hall	Structural	Construct roof and berm		N/A		Yes - Completed prior to last reporting period	
	Vehicle/Equipment Wash Water	Structural	Construct vehicle washing bay		N/A	Pending Funding	No - In Progress	
19001 Huntington Street	Fluoride Bulk Storage	Structural	Construct Roof For Area		1/1/98	12/1/1998 (Pending funding)	No - In Design	No
	Fuel Spill - Small	Structural	Replace fuel system		11/15/97	4/1/99	Yes - Completed prior to last reporting period	
	Material Storage	Structural	Relocate and construct covered storage area		1/1/00	12/1/01 (Funding needed)	No - 12/1/01	
Beach Maintenance Yard	Material Storage - Oil	Structural	Construct berm		10/1/98	10/1/99	Yes	No

Table 3.10 1999/00 Environmental Performanc[illegible]ort Significant Issues Action Plan Updates

Location	Significant Issue	Type Of Control	ACTION 1	ACTION 2	START DATE	END DATE	Action Plan Complete & Revised End Date	Any Additional Significant Issues
City of Huntington Beach (continued)								
Beach Maintenance Yard	Fuel Spills	Structural	Construct berm		10/1/98	10/1/99	Yes	No
	Underground Storage Tank	Structural	Remove underground storage tanks		12/1/98	12/1/99	Yes	
Gothard Fire Station	Underground Storage Tank	Structural	Remove & replace underground storage tank		N/A	4/4/99	Yes - Completed prior to last reporting period	No
Warner Fire Station	Underground Storage Tank	Structural	Remove & replace underground storage tank		N/A	4/1/99	Yes - Completed prior to last reporting period	No
Corporate Yard	Fuel Spills	Structural	Construct berm		12/1/98	1/1/99	Yes - Completed prior to last reporting period	No
City of Irvine - No Significant Issues								
City of La Habra								
Public Works Yard	Vehicle/Equipment Wash Water	Structural	Install clarifier		7/1/01	6/30/02 (Pending funding)	No - Rebudget for clarifier 7/1/01	No
	Trash Bin	Structural	Construct a containment berm		7/1/01	6/30/02 (Pending funding)	No - Design containment cover 7/1/00	
	Material Storage - Chemicals	Structural	Construct new chemical shed		7/1/98	1999	Yes	
City of La Palma								
Walker Well & Pump Stn	Material Storage - Chlorine/Aquamag	Structural	Construct a containment berm		11/15/97	7/1/98	Yes - no sig issues chemicals housed in a pump station	No
City Yard & Pump Stn	Material Storage - Building Materials	Structural	Construct a containment area	Construct a berm - water division	11/15/97	7/1/98	Yes - no sig issues chemicals housed in a pump station	No
City of Laguna Beach								
Nursery	Material Storage - Chemicals		Identify improvements needed		1/1/99	8/30/99	No - 10/00	No
Fire Station	Vehicle/Equipment Wash Water		Identify improvements needed		1/1/99	1/1/00	No - 10/00	
Corporate Yard	Vehicle/Equipment Wash Water		Identify improvements needed		1/1/99	1/1/00	No - 10/00	
Dumpster Facility	Waste Storage	Non-structural	Cover during wet weather		12/1/98	On going	Yes - Completed prior to last reporting period	
City of Laguna Hills - No Significant Issues								
City of Laguna Niguel - No Significant Issues								
City of Lake Forest - No Significant Issues								
City of Los Alamitos - No Significant Issues								
City of Mission Viejo - No Significant Issues								
City of Newport Beach - No Significant Issues								
City of Orange - No Significant Issues								
City of Placentia - No Significant Issues								
City of San Clemente - No Significant Issues								
City of San Juan Capistrano - No Significant Issues								
City of Santa Ana								
Corporation Yard	Material Storage - (Out Door) Chemicals	Structural	Construct a roof & containment berm	Train employees	1/5/98	7/1/98	Yes - Training/ No - Berm Completion Date = 10/00	No
	Leakage from fluid transfer area	Structural	Move drums to covered area & add containment berms	Train employees	1/1/00	7/1/00	Yes - Training/ No - Berm Completion Date = 10/00	
City of Seal Beach								
Beverly Manor	Liquefied Petroleum Gas	Structural	Construct a containment berm		11/15/97	7/1/98	No - 7/1/00 Budget Item	No

Table 3.10 1999/00 Environmental Performance Report Significant Issues Action Plan Updates

Location	Significant Issue	Type Of Control	ACTION 1	ACTION 2	START DATE	END DATE	Action Plan Complete & Revised End Date	Any Additional Significant Issues
City of Seal Beach (continued)								
Beverly Manor	Material Storage - Oil	Structural	Construct a containment berm & roof	Install an oil/water separator			No - 7/1/00 Budget Item	No
Bolsa Chica	Material Storage	Structural	Construct a containment berm & roof	Install an oil/water separator	11/15/97	7/1/00	No	No
Public Works Yard	Fuel Island	Structural	Remove underground storage tank and relocate		11/15/97	7/1/98	No - UST to be removed 1/99	No
City of Stanton								
10852 Bell Street	Material Storage	Non-structural	Increase inspections of storage area	Train employees	11/15/97	On going	No - In Progress	No
City of Tustin								
Corporate Yard	Sweeper Transfer Area	Structural	Temporarily use sandbags as berms	Design/install canopy; Obtain wastewater discharge permit for wash rack discharge to sanitary sewer	N/A	N/A	Yes (Action 1)/ No (Action 2)	No
City of Villa Park								
17855 Santiago Boulevard	Vehicle/Equipment Maintenance	Structural	Construct a containment berm, remove pump	Reduce size of on-site storage containers	1/1/98	1/1/05	No - Still need berm	
	Fluid Transfer Areas	Structural	Remove gasoline pump, install clarifier	Construct a containment berm, effluent to sewer	1/1/99	1/1/02	No - Pump and Tank Removed	No
	Waste Storage	Structural	Construct a containment berm & roof		1/1/99	1/1/02	No 1/1/02	
18021 Lincoln Street	Waste Storage	Structural	Cover waste bins		1/1/00	12/1/00	No - 12/1/00	No
City of Westminster								
Corporation Yard	Paint Drying Area	Structural	Construct a canopy	Remove drying area	1/1/98	5/1/98	Yes - Completed prior to last reporting period	No
City of Yorba Linda								
City Yard	Fuel Spills - Small & Large	Structural	Construct a containment berm		11/15/97	On going	No	
	Fuel Spills - Small & Large	Non-structural	Purchase spill clean up materials	Train employees, inspect daily, sweep	10/3/97	On going	No	
County of Orange								
Laguna Niguel Park	Materials Storage - Paint	Structural	Reconstruct a portion of the containment berm	Construct berm	1/1/98	6/30/98	Yes - Completed prior to last reporting period	No
Irvine Regional Park	Materials Storage - 55 gal. drums	Non-structural	Remove and dispose of		1/1/98	12/30/98	Yes - Completed prior to last reporting period	No
Central Utility Facility	Materials Storage - Chemicals	Structural	Construct new berm		2/15/98	10/30/98	Yes - Completed prior to last reporting period	No
Health Care Complex	Waste Storage - Biohazards	Non-structural	Train employees	Put up signs	2/1/98	6/30/98	Yes - Completed prior to last reporting period	No
Katella Yard	Fuel Spills - Small	Non-structural	Place pan underneath vehicles	Conduct degreasing on wash pad	12/1/98	On going	Yes - Completed prior to last reporting period	
	Vehicle & Equipment Washing	Non-structural	Train employees		12/1/98	On going	Yes - Completed prior to last reporting period	No
	Waste Storage	Non-structural	Train employees	Conduct inspections	12/1/98	On going	Yes - Completed prior to last reporting period	
Sheriff-Coroner Civic Center	Vehicle Washing	Structural	Discontinue runoff		7/1/98	12/30/99	Yes	No

Table 3.11 1999/00 Integrated Waste Management Household Hazardous Waste Program Collection Totals

Category	Type Of Waste	Collection Center Waste Volumes Collected (pounds)			
		Anaheim	Huntington Beach	Irvine	San Juan Capistrano
1. Flammable & Poison	Flammable Solid/Liquid	165,443	158,110	82,010	72,200
	Bulked Flammable Liquids	—	—	—	—
	Oil-Base Paint	119,095	152,309	104,615	97,726
	Poison (Excl aerosols)	38,385	36,524	17,516	15,620
	Reactive & Explosive	10	—	—	10
2. Acid	Inorganic Acid	5,728	6,046	3,573	2,610
	Organic Acid	4,600	6,600	2,200	1,200
3. Base	Inorganic Base	1,328	846	773	1,000
	Organic Base	5,600	11,600	2,800	2,600
4. Oxidizer	Neutral Oxidizer	400	1,000	400	200
	Organic Peroxides	20	6	10	10
	Oxidizing Acid	—	200	200	200
	Oxidizing Base	1,328	846	373	—
5. PCB -containing	PCB Containing Paint	—	—	—	—
	Other PCB Waste	10	—	200	300
6. Aerosol	Corrosive Aerosols	600	1,200	800	200
	Flammable Aerosols	25,864	36,060	14,148	12,000
	Poison Aerosols	3,000	3,600	1,200	1,200
7. Reclaimable	Antifreeze	24,379	29,410	15,114	8,585
	Car Batteries	95,840	111,840	35,360	44,720
	Fluorescent Bulbs	—	—	—	—
	Latex Paint	201,444	214,832	158,117	71,825
	Motor Oil/Oil Products	208,962	177,221	85,973	63,750
	Oil Filters	4,200	2,800	1,800	1,000
	Mercury (Metallic)	30	40	40	1
8. Other	Medical Waste	—	—	—	—
	Household Batteries	400	100	700	500
	Other	42,722	32,987	24,748	13,275
9. Asbestos					—
	Collection Center Totals	949,388	984,177	552,670	410,732
	Grand Total Collected	2,896,967			

Table 3.12 1999/00 Household Hazardous Waste Management

Permittee	Does The City Collect Household Hazardous Waste?	City Household Hazardous Waste Examples	Does the City Have or Participate in a Used Oil Grant?	Types of Materials Collected	Does The City Refer Residents to the County Collection Centers?
Anaheim	No	—	No Report	—	Yes
Brea	No	—	No	—	Yes
Buena Park	No	—	July 2000 - June 2003	—	Yes
Costa Mesa	Yes	Roundups	July 2000 - June 2003	Used Oil	Yes
Cypress	No	—	July 2000 - June 2001	—	Yes
Dana Point	No	—	July 2000 - June 2003	—	Yes
Fountain Valley	No	—	July 1997 - June 2002	Used Oil	Yes
Fullerton	No	—	July 1997 - July 2000	—	Yes
Garden Grove	Yes	Door to Door	July 2000 - June 2003	Used Oil	Yes
Huntington Beach	No	—	July 2000 - June 2001	—	Yes
Irvine	No	—	July 2000 - July 2001	—	Yes
La Habra	No	—	July 2000 - June 2003	—	Yes
La Palma	No	—	No	—	Yes
Laguna Beach	Bi-annually	Door to Door, 5/00	July 1999 - June 2000	Not Available	Yes
Laguna Hills	No	—	July 1997 - July 2000	—	Yes
Laguna Niguel	No	—	Through the County	—	Yes
Lake Forest	Yes	—	June 1997 - June 2002	Household Hazardous Waste	Yes
Los Alamitos	No	—	No	—	No
Mission Viejo	Yes	Drop Off Location	July 2000 - June 2003	Household Hazardous Waste	Yes
Newport Beach	No	—	No	—	Yes
Orange	Yes	Used Oil Pick-Up	July to June	Household Hazardous Waste	Yes
Placentia	Yes	—	June 1997 - June 2000	—	Yes
San Clemente	No	—	No	—	Yes
San Juan Capistrano	No	—	No	—	Yes
Santa Ana	No	—	January 2000 - April 2002	—	Yes
Seal Beach	No	—	Yes	—	Yes
Stanton	No	—	No	—	Yes
Tustin	No	—	July 1997 - July 2002	—	Yes
Villa Park	No Report				
Westminster	No	—	June 1997 - June 2000	—	Yes
Yorba Linda	No	—	No	—	Yes
County of Orange	Operate Collection Centers	Drop Off Location	June 2000 - June 2003	Household Hazardous Waste	Yes

Table 3.13 1999/00 Permittee Household Hazardous Waste Program Collection Efforts

Category	Type Of Waste	Costa Mesa	Garden Grove	Orange	Lake Forest	Mission Viejo	Placentia
		Oil Collection			HHW Roundup/Event		
1. Flammable & Poison	Flammable Solid/Liquid	0	0	0	305	9,415	137
	Bulked Flammable Liquids	0	0	0	0	0	0
	Oil-Base Paint	0	0	0	5,404	26,090	128
	Poison (Excl aerosols)	0	0	0	12,510	2,499	19
	Reactive & Explosive	0	0	0	0	0	0
	Subtotal	0	0	0	18,219	38,004	284
2. Acid	Inorganic Acid	0	0	0	300	645	1
	Organic Acid	0	0	0	0	70	8
	Subtotal	0	0	0	300	715	9
3. Base	Inorganic Base	0	0	0	300	980	0
	Organic Base	0	0	0	0	0	1
	Subtotal	0	0	0	300	980	1
4. Oxidizer	Neutral Oxidizer	0	0	0	35	0	0
	Organic Peroxides	0	0	0	0	5	0
	Oxidizing Acid	0	0	0	0	10	0
	Oxidizing Base	0	0	0	0	972	0
	Subtotal	0	0	0	35	987	0
5. PCB -containing	PCB Containing Paint	0	0	0	0	0	0
	Other PCB Waste	0	0	0	0	11	0
	Subtotal	0	0	0	0	11	0
6. Aerosol	Corrosive Aerosols	0	0	0	0	168	0
	Flammable Aerosols	0	0	0	600	1,176	23
	Poison Aerosols	0	0	0	0	336	0
	Subtotal	0	0	0	600	1,680	23
7. Reclaimable	Antifreeze	74	80	0	167	1,275	0
	Car Batteries (Avg 30 Lbs)	6,335	1,465	0	870	6,840	280
	Fluorescent Bulbs	0	0	0	0	0	0
	Latex Paint	13,680	0	0	1,835	16,150	272
	Motor Oil/Oil Products (1 gal = 8.34 Lbs)	5,425	31,973	29,600	917	6,800	298
	Oil Filters (Avg 1 Lbs)	9	1,154	997	0	0	5
	Mercury (Metallic)	0	0	0	0	20	0
	Subtotal	25,523	34,672	30,597	3,789	31,085	855
8. Other	Medical Waste	949	0	0	0	0	0
	Household Batteries	0	0	0	0	300	0
	Other	0	0	0	950	0	12
	Subtotal	949	0	0	950	300	12
9. Asbestos		0	0	0	0	25	0
	Collection Center Totals	26,472	34,672	30,597	24,193	73,787	1,184
	Grand Total Collected	190,905					

Table 3.14

City To Provide Partial Water Pollution Incident Services
1999/2000 Designated Authorized Inspector(s)

City	24 Hour Number	City Designated Authorized Inspectors Name	Department	Phone
Anaheim		Code Enforcement Division During Normal Work Hours 714-765-5158		
		Al Brady	Dan Dominguez	David Gensler
		Mark Ilagan	Lee Kull	Matt Letteriello
		Ken Marsh	Chris Martel	Chet Panique
		Arlene Ruelaz-Hernandez	Bill Small	Richard Steenbergen
		Denny Tucker	Max Wilson	
		Code Enforcement After Normal Work Hours		
	Pager 714-346-9939	Richard LaRochelle	Code Enforcement Supervisor	714-765-5158 x4413
	Pager 714-346-9935	John Polle	Code Enforcement Manager	714-765-5158 x5190
	Pager 714-346-9930	Roger Bennion	Code Enforcement Supervisor	714-765-5158 x4470
	Pager 714-346-9924	Fred Fix	Senior Code Enforcement Officer	714-765-5158 x4471
	Pager 714-346-4617	Don Yourstone	Senior Code Enforcement Officer	714-765-5158 x4451
	Pager 714-346-9929	Linda Eaves	Senior Code Enforcement Officer	714-765-5158 x4472
Brea		Sam Hanna	Assoc. City Engineer	714-990-7760
		Phil Wray	City Engineer	714-990-7763
		Roger Gary	Code Enforcement Officer	714-990-7139
Cypress		Gonzalo Vasquez	Public Works	714-229-6752
Dana Point		Bob Warren	Director of Public Works	949-248-3554
Fountain Valley		Bill Ault	Director of Public Works	714-593-4434
Fullerton	Fullerton Police Department 714-738-6715	Jinny Barton	Code Enforcement Supervisor	714-738-5799
		Steve Long	Hazardous Materials Specialist	714-738-3160
		Gene Viramontes	Street Superintendent	714-738-6897
		Hadi Tabatabaee-Pour	Building Official	714-738-6558
		Ron Wallin	Sr. Civil Engineer	714-738-6853
Garden Grove		Les M. Jones, II	Public Works/Director	714-741-5378
Huntington Beach		George Munsey	Fire Dept/Captain	714-536-5411
		Tom Shaw	Fire Dept/Captain	714-536-5411
		Frank Mead	Fire Dept/Captain	714-536-5411
		*Mike Strange	Community Dev/Sr. Planner	714-536-5253
		*Code Enforcement		
		Eric Charlonne	Public Works	714-536-5430
		Chuck Burney	Fire Dept	714-536-5979
La Habra		Vaughn Herrick	Police/Code Enforcement	562-905-9750 x228
		Gary Sins	Fire	562-905-9618
		Paul Hamilton	Public Services/Streets	562-905-9792
		Alan Leung	Public Works	562-905-9720
Laguna Niguel		Jean Jambon	Public Works Inspector	949-362-4345
Los Alamitos		Michael M. Kim	Public Services/City Engineer	562-431-3538x100
		David Cox	Public Services/Superintendent	562-431-3538x105
San Juan Capistrano		Jack Galaviz	Public Works/Manager	949-443-6364
		William Huber	Engineering/Building	949-443-6336
Seal Beach		Steve Stockett	Public Works Supervisor	562-493-8660x432
		George Bernard	Public Works Assistant	562-431-2527x343
Stanton		Mike Kim	Engineering/Public Works	714-379-9222 x204
		Craig Stubbe	Public Works	714-379-9222 x202
Tustin		Tim D. Serlet	Dir. Of PW/City Engineer	714-573-3150
		Nick Anderson	Community Development	714-573-3130
Villa Park		Gary Johnson	City Engineer	714-998-1500
		Ron Hagley	Street Superintendent	714-998-1500
Westminster	Westminster P.D. 898-3311 x421 898-3315 898-3315	Vicki Morgan	Sr. Code Enforcement Officer	714-898-3311x276
		Jeff Jones	Code Enforcement Officer	714-898-3311x206
Yorba Linda		Tom Wheeler	Engineering	714-961-7170
		Bill Krelle	PW Inspector	714-961-7170
		Pat Guzik	PW Inspector	714-961-7170

As of 11/10/00

Table 3.15
City To Provide ALL Water Pollution Incident Services
1999/2000 Designated Authorized Inspector(s)

005782

City	24 Hour Response Number	City Designated Authorized Inspectors		
		Name	Department	Phone
Costa Mesa	Communications Division 714-754-5250	Tom Banks	Public Serv. Construction Mgr	714-754-5222
		Sandra Benson	Dev Services - Code Enforcement	714-754-5059
		Victor Cliff	Private Right of Way	714-754-5293
		Edward Petros	Dev Services - Building	714-754-5295
Irvine	Irvine Police Department 949-724-7200	Jan Helf	Community Development	949-724-6326
		Terry Trytten	Community Development	949-724-6329
		Manuel Garcia	Community Development	949-724-6333
		Mel Harwell	Community Development	949-724-6333
		Gary Sager	Community Development	949-724-6324
		Julie Clift	Community Development	949-724-6400
Laguna Beach	949-497-0701	Louis Kirk	Senior Code Enforcement Officer	949-497-0301
		Kyle Butterwise	Community Development	949-497-0332
Newport Beach	Newport Beach P.D. 949-644-3711	Jim Sinasek	Planning	949-644-3215
		Lloyd Whisenant	Police	949-644-3652
		Wes Armand	Harbor Resources	949-644-3043
Orange	Orange Police Department 714-538-1961	John Loertscher	Public Works - Mtce Supt	714-532-6455
		George Pedroza	Public Works - Mtce Inspector	714-532-6461
		Jim Woods	Public Works - Mtce Inspector	714-532-6474
San Clemente	City Dispatch 949-366-1553	John Bressan	Public Works	949-361-8200
		Mike Parness	City Manager	949-361-6150

As of 11/10/00

Table 3.16
County/OCFCD to Provide ALL Water Pollution Incident Services
1999/2000 Designated Authorized Inspectors

		County Designated Authorized Inspectors		
Buena Park	Mission Viejo	Name	Department	Phone
La Palma	Placentia	Duc Nguyen	Environmental Resources	714-567-6339
Laguna Hills	Santa Ana	Karen Ashby	Environmental Resources	714-567-6297
Laguna Woods	Lake Forest	Lane Waldner	Environmental Resources	714-567-6370
Unincorporated County		Bruce Moore	Environmental Resources	714-567-6373
		Eric Klein	Environmental Resources	714-567-6371
24 Hour Response Number: 714-628-7208				

Table 3.17 1999/00 Permittee F[illegible] Management Practices

Permittee	Fertilizers In Your Jurisdiction Are Managed By:		Acres on Which Fertilizers In use	Soils Tested for Compatibility	Qualified Fertilizer Specialist Consulted Regarding				Have Fertilizer Storage Facilities Been Upgraded	Organic/Slow Release Fertilizers Used?	Organic/Slow Release Fertilizers Used To Greater Extent?	Did Any Fertilizer Spills Occur In The Last Year
	City Personnel	Contractor			Application Rates/Timing	Application Methods	Storage	Handling				
Anaheim	X	X	449	No	Yes				Yes	Yes	Yes	No
Brea	X		75	No	No				No	No	No	No
Buena Park		X	66	No	1998		No		N/A	No	No	No
Costa Mesa	X	X	200	Ongoing	Yes				Yes	Yes	No	No
Cypress	X		3	No	No				1997/1998	Yes	Yes	No
Dana Point		X	50	Mar-99	Jun-99				Jun-99	Yes	No	No
Fountain Valley	X		200	Dec-99	Ongoing				No	Yes	No	No
Fullerton	X		20	Jul-99	No				1997	Yes	No	No
Garden Grove	X	X	160	1998	1999				Not needed	Yes	Yes	No
Huntington Beach	X		429	Yes	Yes				Yes	Yes	Yes	No
Irvine	X	X	568	Ongoing	Ongoing				No	Yes	Yes	No
La Habra	X	X	44	No	No				No	Yes	Yes	No
La Palma	X		30	No	Yes				No	No	No	No
Laguna Beach	X		30	No	No				No	Yes	No	No
Laguna Hills		X	102	Apr-00	Jun-00				Yes	Yes	Yes	No
Laguna Niguel	X	X	151	1999	1999	No	No	No	No	Yes	Yes	No
Lake Forest		X	175	Yes	Yes	Yes	No	No	No	Yes	No	No
Los Alamitos	X		22	1997	1997				1997	Yes	Yes	No
Mission Viejo		X	796	Yes	Ongoing				No	Yes	Yes	No
Newport Beach	X	X	260	Dec-99	Jun-00		No	No	1995	Yes	Yes	No
Orange	X		125	No	Ongoing				1998	Yes	Yes	No
Placentia	X		130	Yes	Ongoing				No	Yes	Yes	No
San Clemente	X		100	No	No				1996	Yes	Yes	No
San Juan Capistrano		X	75	No	No				Yes	Yes	Yes	No
Santa Ana	X	X	480	Feb-00	Yes				Yes	Yes	Yes	No
Seal Beach	X		15	Ongoing	Yes				Yes	Yes	No	No
Stanton		X	27	No	No				No	Yes	No	No
Tustin	X	X	77	Yes	Yes	No			No	Yes	Yes	No
Villa Park	No Report											
Westminster	X		18	No	No				Yes	No	No	No
Yorba Linda		X	400	Ongoing	Yes		No		No	No	No	No
County of Orange	X	X	560	No	No				Varies by park	Yes	No	No

Table 3.18 1999/00 Fertilizer Application by Permittee

Permittee	Fertilizer	Amount Applied
Anaheim	Best 16-6-8	20,550 lbs
	Calcium Nitrate 25-0-0	6250 lbs
	Ammcrium	6000 lbs
	Cro-power	6000 lbs
	46-0-0	Not Reported
	35-3-11	Not Reported
	Turf Supreme 15-5-7	86,665 lbs
	Scottss High K 13-2-26	2,000 lbs
	Nutriculture 10-20-30	497 lbs
	Scotts Minors 26-4-12	2313 lbs
	Scotts Super Fairway 36-3-7	450 lbs
	Scotts Nit/Pot 21-3-20	709 lbs
	Scotts Supergreen 19-0-17	150 lbs
	Scotts Turf 32-3-16	550 lbs
	Scotts Fug II 14-3-3	14,577 lbs
	Persell Pyon 0-0-46	2700 lbs
	Plant Marvel 28-8-18	4550 lbs
	Scotts Starter 19-25-5	500 lbs
	Scotts Weed II 21-3-20	360 lbs
	Scottss Complete 31-3-10	1210 lbs
	Scottss 30-3-9	3800 lbs
	Calcium Nitrate 15-0-0	3990 lbs
	Ammonium Nitrate 34-0-0	1160 lbs
	Scottss Weed Plus 22-0-6	17,850 lbs
	Sulfate of Ammonium 21-0-0	100 lbs
	Grow Power 5-3-1	1230 lbs
	Best Nitra King 22-3-9	31,698 lbs
	Ammonium Nitrate 35-0-0	120 lbs
Brea	Turf Royale 21-7-14	50 lbs/ 10,000 sq. ft.
	Best w/ Trimec 16-6-8	50 lbs/ 10,000 sq. ft.
	Best Ammonium Phosphate 16-20-20	50 lbs/ 6,000 sq. ft.
	Best Super Iron 9-9-9	50 lbs/ 4,500 sq. ft.
Buena Park	Turf Supreme	6 lbs/ 1000 sq. ft.
Costa Mesa	Turf Royale 21-7-14	5 lbs/ 1000 sq. ft.
	Best XB 6-20-20	15 lbs/ 1000 sq. ft.
	Best Turf Supreme 16-6-8	6.2 lbs/ 1000 sq. ft.
	Ammonium Nitrate 34-0-0	3 lbs/ 1000 sq. ft.
Cypress	Turf Royale 21-7-14	10,500 lbs
Dana Point	Best 16-6-8	20,000 lbs
	Calcium Nitrate	6000 lbs
	Ammonium	6000 lbs
	Gro-Power	6000 lbs
Fountain Valley	Scott's ProGrow	12,000 lbs
	Parex	4500 lbs
Fullerton	16-6-8	6000 lbs
	15-15-15	200 lbs
Garden Grove	Best 16-20-20 Preplant	20 bags
	Best Turf Supreme 16-6-8	6000 lbs

Table 3.18 1999/00 Fertilizer Application by Permittee

Permittee	Fertilizer	Amount Applied
Huntington Beach	Super Iron 9-9-9	1000 lbs
	Turf Supreme/Trimec	300 lbs
	Nitra King 22-3-9	10,400 lbs
	Scotts Pro Turf 36-3-7	113,000 lbs
Irvine	16-6-8	38,750 lbs
	9-9-9 w/ iron	3500 lbs
	21-0-0	2200 lbs
	46-0-0	500 lbs
	25-5-5	500 lbs
	16-20-0	1900 lbs
	37-0-0	8000 lbs
	29-3-8	2000 lbs
	39-0-0 SCU	26,000 lbs
	20-20-20	12 lbs
	Security Iron & Zinc Chelate	5 quarts
	Gypsum	4,000 lbs
La Habra	Nitra King 22-3-9	3250 lbs
	Turf Supreme 16-6-8	3750 lbs
	Slow Release 28-3-7	8500 lbs
	Organic Mulch	100 yards
La Palma	Turf Supreme (Beat Cote)	4 tons
Laguna Beach	Best Turf Supreme 16-6-8	28 Acres @ 4lbsper 1000sq ft. X 6.25 Actual Nitrogen
	Peters Professional 20-20-20	200 lbs
Laguna Hills	Best 16-66-8	16,000 lbs
	Nitraking 21-7-7	8000 lbs
	Ammonium Sulfate 21-0-0	32,000 lbs
Laguna Niguel	Best 16-6-8	1 lb./ 1000 sq. ft.
	Best Super Turf 25-5-5	1 lb./ 1000 sq. ft.
	Best Soil Buster	20 lbs/ 1000 sq. ft.
Lake Forest	Turf Supreme 16-6-8	180,000 lbs
Los Alamitos	Best Super Turf	350 lbs
	Best Turf Supreme PLVS Trimec	2300 lbs
Mission Viejo	Sulfate of Ammonium	6 lbs/ 1000 sq. ft. per year
	Sulphur Coated Urea	12 lbs/ 1000 sq. ft. per year
	Humate (Humic Acid)	100 lbs/ 1000 sq. ft per year
	IBDU	8 lbs/ 1000 sq. ft. per year
	NitraKing	6 lbs/1000 sq. ft. per year
	9-9-9	2 lbs/ 1000 sq. ft. per year
	16-6-8	2 lbs/ 1000 sq. ft. per year
Newport Beach	Best 16-6-8	22,500 lbs
	Best 21-0-0	6,000 lbs
	Best 30 -39	33,5000 lbs
	Best 9-9-9	800 lbs
	Best 15-15-15	55,000 lbs
Orange	Best 16-68	24,000 lbs
	Best 16-6-8	300 gallons
	Best 15-15-15	24,000 lbs

Table 3.18 1999/00 Fertilizer Application by Permittee

Permittee	Fertilizer	Amount Applied
	Best 2239	24,000 lbs
	Agri-Form	129 lbs
	Ammonium Sulfate	20,000 lbs
Placentia	Turf Supreme 16-6-8	2000 lbs
	Best Super Turf 25-5-5	9000 lbs
	Best 6-20-20xb	2000 lbs
San Clemente	KN03 13-0-6	2000 lbs
	CaNO3 15-0-0	6000 lbs
	PolyCoated Urua 34-0-0	20,000 lbs
	5-16-22 Ammoniacal N	2000 lbs
San Juan Capistrano	16-6-8	3600 lbs
	21-0-0	6000 lbs
Santa Ana	Turf Supreme 16-6-8	28045 lbs
	Nirta King Fertilizer	4020 lbs
	Potassium Sulphate 0-0-50	216 lbs
	Gypsum	1080 lbs
	Calcium Nitrate 15-5-0-0	5 lbs
	Ground Calcium Carbonate	360 lbs
	Ammonium Sulphate	1050 lbs
Seal Beach	Super Turf 25-5-5	2050 lbs
Stanton	No Report	
Tustin	23-4-7	1000 lbs
	Best Turf Supreme 16-6-8	1400 lbs
	16-6-8	1400 lbs
	Planer/Soil Mix	25 yards
Villa Park	No Report	
Westminster	Super Turf 16-8-4	1900 lbs
	Custom Fertilizer 7-7-7	650 lbs
	Rose Food	1200 lbs
	Weed Control/Lawn Food 12-4-4	500 lbs
Yorba Linda	16-6-8	36,250 lbs
	15-0-0	1100 lbs
	22-0-6	1200 lbs
	9-9-9	18,642 lbs
	21-0-0	14280 lbs
	22-3-9	16,800 lbs
County of Orange	Turf Supreme 16-6-8	19,150 lbs
	Turf Royale 21-7-14	43,000 lbs
	8-8-16	25 lbs
	Best Super Turf 25-5-5	174 lbs
	Ammonium Nitrate 33-0-0	500 lbs
	Classic Royale 15-15-15	100 lbs
	Scotts Starter Fertilizer 16-25-2	272 lbs
	Urea 46% Nitrogen	Not Available
	Vigaro 28-3-3	16 lbs

Table 3.19 1999/00 Permittee Pesticide Use

Permittee	Number of Acres On Which Pesticides are in Use	Tested Soils for Compatibility	Number Of Pesticides Used	Number of Restricted/Category I Pesticides
Anaheim	809	No	40	4
Buena Park	No Report	No	1	1
Brea	75	No	4	0
Costa Mesa	250	No	14	3
Cypress	16	No	2	0
Dana Point	3	Sep-98	3	2
Fountain Valley	200	No	12	0
Fullerton	130	No	11	1
Garden Grove	130	Yes	11	0
Huntington Beach	No Report	No	12	2
Irvine	1,400	No	42	6
La Habra	126	No	5	1
La Palma	5	No	8	0
Laguna Beach	20	No	6	0
Laguna Hills	102	Apr-00	4	0
Laguna Niguel	25	No	7	Not Available
Lake Forest	175	No	6	6
Los Alamitos	10	1997	7	0
Mission Viejo	796	No .	7	7
Newport Beach	250	Dec-99	8	2
Orange	25	1999	5	0
Placentia	130	No	4	0
San Clemente	2	No	11	0
San Juan Capistrano	7	No	5	2
Santa Ana	456	No	16	1
Seal Beach	3	No	3	0
Stanton	No Report	No	4	No Report
Tustin	166	No	12	0
Villa Park	No Report			
Westminster	No Report	No	8	1
Yorba Linda	60	No	12	Not Available
County of Orange	6,939	No	28	6

Table 3.20 1999/00 Permittee Pesticide Use

Permittee	Pesticide	Amount Applied	Restricted/Category I	
			Restricted	Category I
Anaheim	Empire 20	83 lbs		
	Garlon	29.75 lbs		
	Triplet	15 lbs		X
	Roundup Pro	447 lbs		
	Fumigiation	301 lbs	X	
	Maki	151 lbs		
	Trimec	10 gal	X	
	Telstar	No Report		
	TruPower	No Report	X	
	Turflon Ester	No Report		
	Mamase	No Report		
	Eagle WSP	No Report		
	Snapshot 2-5	No Report		
	Amdro	10 lbs		
	Cutrine Plus	208 lbs		
	Award	68 lbs		
	Aquashade	35.75 lbs		
	Daconil	509 lbs		
	Subdue	22 lbs		
	Primo	10 lbs		
	Heritage	16.5 lbs		
	Merit	21 lbs		
	Dursban Pro	38 lbs		
	Chipco	190 lbs		
	Bayleton	37.5 lbs		
	Fur/Fug II	18.5		
	3336 Up	156 lbs		
	Crabgrass Control	39 lbs		
	Dicot Weed II	22.5 lbs		
	Banner Max	145 lbs		
	Pro-Starr	17 lbs		
	Golden Eagle	15 lbs		
	Spotrete	394 lbs		
	Dylox	20 lbs		
	Chloropyrifos	2.25 lbs		
	Fungo Flo	9.5 lbs		
	Eagle	67.5 lbs		
	Fore-Flo	80 lbs		
	Pendimethanin	14,280 lbs		
	Plus Pre	490 lbs		
Buena Park	Roundup Pro	7.6 HR		
Brea	Fusilade	.75 oz / gallon		
	Ronstar	100 lbs / acre		
	Roundup Pro	2 oz / gallon		
	Surflan	3 oz / gallon		
Costa Mesa	Aluminum Phosphate	None	X	
	Cutrine	6 gal		
	Florel	.5 gal		
	Fusilade	2 gal		
	Lontrel	No Report		
	MSMA	None	X	
	Nalcotrol	None		
	No Foam	.5 gal		
	Ronstar	None		
	Roundup Pro	78 gal		
	Safer Soap	None		
	Trimec	8 gal		
	Wasp Free	1.5 lbs		
	Zinc Phosphate	None	X	

Table 3.20 1999/00 Permittee Pesticide Use

Permittee	Pesticide	Amount Applied	Restricted/Category I	
			Restricted	Category I
Cypress	Monsanto Roundup Pro	149 lbs		
	Valent Distance	1.5 lbs		
Dana Point	Fumitoxin	2.5 lbs	X	
	Maki	9 lbs		
	Trimec/Triple	17 gal	X	
Fountain Valley	Roundup Pro	89.5 gal		
	Pendulum	51 lbs		
	Factor	16.1 lbs		
	Reward	4 gal		
	Ronstar-G	132 lbs		
	Ronstar 50 WSP	60 lbs		
	Envoy	2.5 qts		
	Gallery	6.5 lbs		
	Max Force Ant Bait	4.5 lbs		
	PT515 Wasp Freeze	5.25 lbs		
	Trimec	59 gal		
	Award	1.3 lbs		
Fullerton	Award	1.2 lbs		
	Cutrine Plus	45 lbs		
	Fusilade II	.5 lbs		
	Orthene	1 lbs		
	Ramik Green	312 lbs		
	Ronstar G	225 lbs		
	Roundup Pro	324 gal		
	Surflan AS	130.5 gal		
	Turflon Ester	.25 gal		
	Wilco Gopher Getter	386 lbs		
	Wilco Squirrel Bait	212 lbs		
Garden Grove	Agrimycin	1 lb		
	Aquazine	4.25 lbs		
	Copper Bordeaux	15 lbs		
	Dursban 2E	.25 lbs		
	Fusilade 2000	.1 lb		
	Manage	64 gal		
	Oust	1 lb		
	Roundup Pro	120.25 gal		
	Simazine 90DF	261 lbs		
	Surflan	8 gal		
	Turflon	51.5 lbs		
Huntington Beach	Deadline	100 lbs		
	Fumitoxin	39 lbs	X	
	Fusilade	1.75 gal		
	Gallery	19.5 lbs		
	M-Pede	3.5 gal		
	No Foam B	11 gal		
	Orthene	7 lbs		
	Rodeo	5 gal		
	Roundup Pro	267.5 gal		
	Rozol	120 lbs		
	Surflan	92.5 gal		
	Trimec Plus	1 gal	X	
Irvine	Anti-stress 550	2.5 gal		
	Aquashade	8 gal		
	Atrimec	67 gal		
	Blazon	2.5 gal		
	Chipco 26019	4 lbs		
	Cleary's 3336	1 lb		
	Cutrine Plus	60 gal		
	Daconil 2787	.25 gal		

Table 3.20 1999/00 Permittee Pesticide Use

Permittee	Pesticide	Amount Applied	Restricted/Category I	
			Restricted	Category I
	Dimension	19.63 gal		
	Diphacinone	3 lbs		
	Diquat	2 quarts		
	Dissolve	10 lbs	X	
	Ditrac	25.62 lbs		
	Dursban Pro	.75 lbs		
	Fumitoxin	91 lbs	X	
	Fusilade II	12.1 lbs		
	Garlon	.75 gal		
	Greenzit	1 gal		
	Honcho	1 gal		
	Hyvar	3 gal		
	Kinetic	1.5 gal		
	Mavrick	2 lbs		
	Merit 75 WP	3.4 lbs		
	M-Pede	1 gal		
	Oust	.75 lbs		
	Pentac	.5 lbs		
	Reward	1 gal		
	Rodeo	.75 gal		
	Ropel	8 gal		
	Roundup	135 gal		
	Royal Slow Grow	16 gal		
	Scythe	4.25 gal		
	Subdue	.5 lbs		
	Telar	.75 lbs		
	Tempo	.2 lbs		
	Three Way	.02 lbs	X	
	Tracker	.75 gal		
	Trimec	26.75 gal	X	
	Triplet	124 lbs	X	
	Triplet	7.5 gal	X	
	Turflon	.5 gal		
	Veteran	2.25 gal		
	Zinc Phosphide	44 lbs	X	
La Habra	Fumitoxin	Not Available	X	
	Gro Tarll	5 gal		
	Roundup Pro	50.03 gal		
	Surflan	11 gal		
La Palma	Roundup	No Report		
	Roundup Pro	17 lbs		
	Turf Supreme	No Report		
	Malathion 50	No Report		
	Spectracide	No Report		
	Tectron	No Report		
	E1 Inspecticide	No Report		
	Deadline	75 lbs		
Laguna Beach	Chipco Ronstar	45 lbs		
	Fusilade II	6.8 lbs		
	Garlon 4	384 lbs		
	Metaldyhyde 3.5	290 lbs		
	Ramik Green	4 lbs		
	Roundup Pro	16.3 gal		
Laguna Hills	Fusilade	1.75 gal		
	Orthene	1 gal		
	Roundup	35 gal		
	Turflon	6 gal		

Table 3.20 1999/00 Permittee Pesticide Use

Permittee	Pesticide	Amount Applied	Restricted/Category I	
			Restricted	Category I
Laguna Niguel	Dicamba 4S	No Report		
	Gophergetter	No Report		
	MCPA 4 Amine	No Report		
	Pendimethalin 60 WDG	No Report		
	Roundup	No Report		
	Triplet	No Report		
	Turflon 4E	No Report		
Lake Forest	Diazinon	20 gal		X
	Fumitoxin	1500 lbs	X	
	Fusilade	18 gal		X
	Ronstar	1000 lbs	X	
	Roundup Pro	70 gal		X
	Surflar	80 gal		X
Los Alamitos	Rodeo	No Report		
	Surflan	No Report		
	Roundup Pro	No Report		
	Pendulum 2G	No Report		
	Turflan	No Report		
	Fusilade	No Report		
	Scotts 26-4-4 w/24D fertilizer	No Report		
Mission Viejo	2, 4-D	No Report	X	
	Aluminum Phospate	No Report	X	
	Dicamba	No Report	X	
	MCPA	No Report	X	
	Oxydemetonmethyl	No Report	X	
	Strychnine	No Report	X	
	Zinc Phosphide	No Report	X	
Newport Beach	Barricade	5 lbs		
	Diazinon	50 lbs		
	Fumitoxin	5 lbs	X	
	Fusilade II	2 gal		
	Ronstar G	100 lbs		
	Roundup Pro	150 gal		
	Sluggo	150 lbs		
	Trimec for Turf	32 gal	X	
Orange	Fusilade II	77.22 gal		
	Pendulum	32 gal		
	Rodeo	38.38 gal		
	Roundup	410.68 gal		
	Surflan	11.62 gal		
Placentia	Fusilade 2000	.5 lbs		
	Manage	.02 lbs		
	Pennant 56	46 lbs		
	Roundup	68 lbs		
San Clemente	Alliette	32 lbs		
	Banner	12 gal		
	Bayleton 25	11 lbs		
	Chipco 266 T	5 gal		
	Fore	112 lbs		
	Fusilade 2000	1.5 lbs		
	Primo Maxx	4 gal		
	Primo NSB	12 lbs		
	Roundup Pro	6 gal		
	Subdue Granular	25 lbs		
	Surflan	3 gal		

Table 3.20 1999/00 Permittee Pesticide Use

Permittee	Pesticide	Amount Applied	Restricted/Category I	
			Restricted	Category I
San Juan Capistrano	Amine 2-4-D	160 gal		X
	Fumitoxin	50 lbs		X
	Merit	2.5 lbs		
	Roundup	4.5 gal		
	Surflan	1.5 gal		
Santa Ana	Aquashade	104 gal		
	Blazom	2.25 lbs		
	Cutrine Plus G	120 lbs		
	Cutrine Plus Liquid	94 gal		
	Fusilade	20.6 lbs		
	Glyfos	12 lbs		
	Merit 75 WSP	1 gal		
	Metaldehyde	167 lbs		
	Non-ionic Surfactant	.25 lbs		
	Reward	21 gal		
	Roundup Pro	111 lbs		
	Surflan	2 lbs		
	Target Pro Spreader	16 gal		
	Trimec	14.75 lbs		
	Turflon Ester	5 lbs		
	Weedhoe 108	1.5 gal		
Seal Beach	Fusilade	2 gal		
	Oust	4 lbs		
	Roundup Pro	25 gal		
Stanton	Aluminum Phosphide	No Report		
	Diphacinone	No Report		
	Strychnine	No Report		
	Zinc Phosphide	No Report		
Tustin	Biobarrier	15 ft		
	Eatons Bait Block	5 blocks		
	Fusilade	2 lbs		
	Manage	.02 lbs		
	Metaldehyde	243 lbs		
	M-Pede	10.75 gal		
	Pendulum WDG	117.2 lbs		
	Ronstar G	256 lbs		
	Roundup Pro	98.67 gal		
	Turflon Ester	4.7 lbs		
	Ultrafine	2.5 gal		
	ZP Rodent Bait	.25 lbs		
Villa Park	No Report			
Westminster	Banner Maxx	2.6 lbs		
	Fumitoxin	14.59 gal	X	
	Fusilade	2.28 gal		
	Manage	.2 lbs		
	Pro Spreader Activator	1.2 gal		
	Rodeo	3 gal		
	Ronstar	30 lbs		
	Roundup Pro	71.38 gal		
Yorba Linda	Roundup	101.5 gal		
	Ronstar	1510 lbs		
	Deadline Bullets	280 lbs		
	Turflow	11 lbs		
	Embark	15 gal		
	Surflow	18.5 gal		

Table 3.20 1999/00 Permittee Pesticide Use

Permittee	Pesticide	Amount Applied	Restricted/Category I	
			Restricted	Category I
Yorba Linda	Trimel	5 gal	X	
	Atrimel	41 gal		
	Fusilade	4 gal		
	No Foam	8 gal		
	Rodeo Herdilide	2.5 gal		
	Diazinon	10 gal		
County of Orange	41A	179 gal		
	Altosid Pellets	2.5-10 lbs/application		
	Andro	74 lbs		
	Award	297 lbs		
	Bactimos Pellets	10-16 lbs/application		
	Cutrine Plus	50 gal		X
	Cutrine Plus Granular	30 lbs		
	Diazinon	12.3 lbs / 7 gals		
	Diphacinone	601 lbs		
	Endurance	2 lbs		
	Fumitoxin	300 lbs	X	X
	Garlon 3A	.75 gal		X
	Garlon 4	78.75 gal		
	Lesco Cavalier 2G	37.5 lbs		
	Lesco Pre-M	300 lbs		
	Lorsban 4E	2.5 gal	X	
	Manage	.025 lbs		
	Mosquito Larvicide GB-111	3 gal/application		
	M-Pede	.25 gal		
	Oust	.246 gal		
	Pendulum 3.3 EC	653 gal		
	Pendulum WDG	1592 lbs		
	Pointer	.25 lbs		
	Pro Spreader	1635 gal		
	Reward	171 gal		
	Rodent Gas Cartridge	9.94 lbs		
	Rodeo	1353 gal		
	Roundup	2657 gal		
	Sevin	.25 gal		
	Spike 8OW	Not Available		
	Stalker	1.25 gal		
	Strychnine	331 lbs	X	
	Surflan	1.25 gal		
	Telar	113 lbs		
	Triplet	10 lbs		
	Turflon	4 lbs		
	Weedone LV4	78 gal	X	
	Zinc Phosphide	1274 lbs	X	
	Zoecon	2.5-10 lbs/application		

Table 3.21 1999/00 Permittee Pesticide Management Practices

Permittee	Pesticides Are Managed By:		Have All Applicators Obtained State Licenses?	Or Completed Equivalent County Applicator Training?	Has A Qualified Pest Control Advisor Been Consulted?	Inspection Conducted For		Appropriate Measures Implemented				Has An Accident Mitigation Plan Been Implemented In Case Of A Spill?	Pesticide Spills In The Last Year?
	City Personnel	Contractor				Application Equipment	Application Crews	Application	Storage	Disposal	Transport		
Anaheim	X	X	No	Yes	Apr-00	Ongoing		Ongoing				Yes	No
Buena Park		X	Yes	---------	No	No		No				No	No
Brea	X		No	Yes	No	Jun-99		Annually				Yes	No
Costa Mesa	X	X	Yes	---------	Yes	1999		Yes				Yes	No
Cypress	X		Yes	---------	Ongoing	Dec-98		Yes				Yes	No
Dana Point		X	Yes	---------	Jan-98	Oct-98		Oct-99				Yes	No
Fountain Valley	X		Yes	---------	Ongoing	Jan-00		Dec-99				Yes	No
Fullerton	X	X	Yes	Yes	Ongoing	Jul-00		Jan-00				Yes	No
Garden Grove	X	X	No	Yes	Ongoing	Daily		Annually				Yes	No
Huntington Beach	X	X	Yes	---------	Ongoing	Daily		Ongoing				Yes	No
Irvine	X	X	No	Yes	Jan-99	Apr-99		Apr-99				Yes	No
La Habra	X	X	No	Yes	Yes	Jul-00		Mar-00				Yes	No
La Palma	X		Yes	---------	1997	1999		Yes				Yes	No
Laguna Beach	X		Yes	---------	Annually	Spring 1999		Fall 1997				Yes	No
Laguna Hills		X	Yes	---------	Apr-00	Jun-00		Nov-99				Yes	No
Laguna Niguel		X	Yes	---------	Yes	Yes	No	Ongoing				Yes	No
Lake Forest		X	No Report										
Los Alamitos	X		Yes	---------	Annually	Feb-00		1999				Yes	No Report
Mission Viejo		X	Yes	---------	Annually	No	Yes	No				No	No
Newport Beach	X	X	No	Yes	Ongoing	Jun-00		1994				Yes	No
Orange		X	Yes	---------	No	Monthly		1999				Yes	No
Placentia	X		No	Yes	Ongoing	Jul-00		Jul-00				Yes	No
San Clemente	X		Yes	---------	Yes	Ongoing		1997				Yes	No
San Juan Capistrano		X	Yes	---------	Yes	Mar-00		Ongoing				Yes	No
Santa Ana	X	X	No	Yes	Ongoing	Jun-00		Apr-00				Yes	No
Seal Beach	X	X	No	Yes	Jan-00	Jan-00		Ongoing				Yes	No
Stanton		X	Yes	---------	No	No		1996				No Report	No
Tustin	X	X	No	Yes	Annually	Ongoing		Yes				Yes	No
Villa Park		X	No Report										
Westminster	X		Yes	---------	No	Oct-98		Ongoing				Yes	No
Yorba Linda		X	Yes	---------	Aug-98	Aug-00		1997				Yes	No
County of Orange	X	X	Yes	---------	Varies by park	Varies by park		Ongoing				Yes	No

Table 3.22 1999/00 Permittee Integrated Pest Management Techniques

		Integrated Pest Management Alternatives						
Permittee	Implement Techniques	Manual or Mechanical Weeding/Pruning	Mulch	Water Mgmt/Drip Irrigation	Use of Disease Resistant Plants	Use of Biological Controls	Other	Reduction in Pesticide Usage
Anaheim	Yes	X	X			X		12%
Buena Park	N/A							N/A
Brea	Yes						Horticulture practices to reduce plant stress and thus the need for pesticides	10%
Costa Mesa	Yes	X	X		X	X		50%
Cypress	Yes		X			X	Timing of growth and volume of plant material reduces need for pesticides	No
Dana Point	Yes	X				X	Botanical Insecticieds	No
Fountain Valley	Yes	X	X		X			No
Fullerton	Yes	X				X		5%
Garden Grove	Yes	X	X	X				No
Huntington Beach	Yes	X	X			X	Foliar Applications, Trapping, Exclusion	5%
Irvine	Yes	X					Flail moving	No
La Habra	Yes	X	X				Flaying, Disking, Mowing	No
La Palma	No							No
Laguna Beach	Yes	X					Weed abatement conducted by hang crews	No
Laguna Hills	Yes	X	X					12%
Laguna Niguel	Yes							No
Lake Forest	Yes							Yes
Los Alamitos	Yes	X						No
Mission Viejo	No Report							
Newport Beach	Yes	X				X		5%
Orange	Yes	X						No
Placentia	Yes							No
San Clemente	Yes						Conservative cultural practices	No
San Juan Capistrano	No Report							
Santa Ana	Yes	X				Wasps for whitefly	Water pressure - aphids & whitefly	No
Seal Beach	Yes	X	X			X		20%
Stanton	No	No Report						
Tustin	Yes						Parraffinitic oil/M-Pede Safer Soap used on whitefly	No
Villa Park	No Report							
Westminster	No							No
Yorba Linda	No							No
County of Orange	Yes	X					Beehive removal	No

Table 3.23 Fertilizer and Pesticide Management Annual Comparison

	Fertilizer Management		Pesticide Management					Integrated Pest Management	
Reporting Year	Total Acres	Quantity Applied (lbs)*	Total Acres	# of Pesticides	# Restricted	Quantity Applied (lbs)*	Quantity Applied (gals)*	# Implementing	# Reduced Pesticide Use
1994 - 1995	5,900	N/A	11,800	N/A	N/A	N/A	N/A	20	N/A
1995 - 1996	6,011	N/A	11,361	340	N/A	N/A	N/A	17	N/A
1996 - 1997	4,054	N/A	12,159	303	N/A	N/A	N/A	22	11
1997 - 1998	4,813	N/A	12,439	307	24	N/A	N/A	26	9
1998 - 1999	4,616	N/A	12,408	254	34	N/A	N/A	23	10
1999 - 2000	5,637	1,883,905	12,310	306	45	32,223	10,600	23	9

*Since not all Permittees reported quantities in pounds and/or gallons, while others reported application rates instead of totals, these figures should be interpreted as low-range estimates.

N/A indicates data not previously requested in Annual Status Reports

Table 3.24 1999/00 Permittee Stormwater Quality Public and Business Education Efforts

Permittee	Describe Steps Taken By The City To Further Stormwater Quality Public Education	Describe Steps Taken By The City To Conduct Special Education Initiatives For Developers and Contractors
Anaheim	Attended NPDES erosion control seminar in Irvine; Developed and distributed numerous water pollution brochures and newsletters. Sewer/stormdrain information on City website.	---------
Brea	County water pollution brochures are distributed at the public counter and at the Community Center.	---------
Buena Park	City refers residents to used oil collection sites.	City informs developers of NPDES requirements as part of the conditions of development
Costa Mesa	---------	---------
Cypress	Staffed a Public Works Department and Oil Recycling Booth at the Cypress Community Festival; Developed brochures pertaining to good housekeeping techniques; Distributed County brochures and attended an erosion control BMP workshop in Irvine. Aired water quality and used oil public service announcements.	---------
Dana Point	Earth Day Festival sponsored by Solag, Inc. & associated cities; Display booth at Festival of Whales; Distributed urban runoff brochures; Staff attended Erosion and Sediment Control Training and participated in Trails 4 All Annual Watershed Clean-up and Exposition	Erosion control notes on all grading plans; Pre-grading meeting where urban runoff was discussed
Fountain Valley	Runoff and pollution information distributed at community health fair; Waste management and hazardous waste information distributed through information kiosks and City newsletter; City staff attend environmental meetings hosted/attended by other cities and community members; Waste reduction/litter control slides before movies at local theaters.	---------
Fullerton	Website and weekly advertisements in the newspaper about used oil collection. Participated in Used Oil Public Education Booth at the Orange County Fair.	---------
Garden Grove	America Recycles Day; Earth Day; Fire Services Day; Garden Grove Pride; Public Works Educational Display; Staff attended Erosion & Sediment Control Workshops; Distributed pamphlets describing stormdrain protection measures at City Hall and the Municipal Service Center; Public Service Announcements focusing on stormwater quality aired on local Cable TV.	Co-hosted a Trash Reduction & Stormwater Workshop; City promoted the New General Construction Stormwater Permit: Permit Overview & Compliance Strategies Workshop offered by the APWA
Huntington Beach	Public Works "Open House" included a stormwater program; Distributed County water pollution brochures	Distributed "blueprint" for a clean ocean with every encroachment/grading permit. City produced several half hour programs on Cable TV discussing urban runoff issues.
Irvine	City distributed brochures at the City's Public Works Open House, Irvine Harvest Festival, Children's Water Festival and through the City Hall lobby public information rack. Public service announcements on cable TV promoting proper solid waste and used oil disposal.	Hosted workshops on watershed BMPs, "Water Quality Ordinance & Enforcement Consistency", "Construction Site Planning & Mgmt.", and "New Development"
La Habra	Stormwater brochures handed out concurrent with sandbag distribution & at "I Love La Habra" Fair; Composting workshop at Fullerton Arboretum	---------
La Palma	---------	---------
Laguna Beach	Posted Ocean Water Quality Advisory Committee meeting agendas on City's web page; Distributed water quality literature at City's Vision Fair; City Engineer gave presentation to Grand Jury; Developed a brochure expanding on County's "Ocean Begins at Your Front Door" brochure	---------
Laguna Hills	Distributed public education brochures and attended NPDES, Aliso Creek, and San Juan Creek meetings; City website with link to O.C. Integrated Waste Management Department	---------
Laguna Niguel	Letters regarding the J03P02 watershed and associated problems were sent to 1400 residents - "Report Cards" will update residents on progress in the future; Distributed County water pollution brochures; City held workshop for South County City Managers regarding the Clean Water Act and its effect on cities.	City informs developers of requirements during pre-grading meetings prior the start of construction activities. City requires developers to prepare Water Quality Management Plans as a condition of project approval.
Lake Forest	---------	City sponsored a barbeque luncheon to which developers and contractors were invited to learn more about the permitting process and the need to comply with all stormwater quality requirements.
Los Alamitos	---------	---------
Mission Viejo	City distrubuted several recyclying and pollution prevention brochures; Ran an article regarding stormwater pollution in a local newsletter; Promoted and advertised a Household Hazardous Waste Round-up on Cable TV and on the City website	City routinely meets one-on-one with developers to educate them on the importance of stormwater pollution prevention. City provides assistance to developers in preparing erosion control plans, preparing WQMPs, and incorporating public education documents.
Newport Beach	Distributed several brochures to the public	---------

Table 3.24 1999/00 Permittee Stormwater Quality Public and Business Education Efforts

Permittee	Describe Steps Taken By The City To Further Stormwater Quality Public Education	Describe Steps Taken By The City To Conduct Special Education Initiatives For Developers and Contractors
Orange	Worked with local groups (e.g. Girl Scouts) to promote recycling and water quality, including providing teaching materials; Staff attended County PFRD training classes; Earth Day; Neighborhood Enhancement Program; and Street Fair with booth on reclycling and water quality; Coordinated with local courts to use juvenile offenders to perform community cleanups	Major projects included special plan review meetings with developers to ensure that they meet all NPDES regulations; Similar activities are being undertaken with CalTrans for the I-5 Modernization and the proposed Centerline Rail Project; City BMP materials are also made available to developers as appropriate.
Placentia	Earth Week Run: promotes oil recycling and household hazardous waste programs; Maintenance personnel view new videos on stormwater BMPs; City newsletter and website provide information to the public.	Send training opportunity notices to developers and provide developers a model set of plans to illustrate required BMPs
San Clemente	---------	---------
San Juan Capistrano	---------	Samples of BMPs for new developments are distributed to all developers and/or their engineers when the application is initially submitted.
Santa Ana	Produced waste disposal and recycling information in English, Spanish and Vietnamese; Recycling presentations at 5 area elementary schools centered around CYCLER - Waste Management's Environmental Robot.	---------
Seal Beach	At the issuance of permits, staff informs applicant of proper construction practices.	---------
Stanton	---------	---------
Tustin	Stormwater brochures and "The Tustin Recycle News" available to residents; Catch basin stenciling program educates the public on the relationship between stormdrain flows and the ocean	Provided literature to contractors and developers; Notes on construction plans include stormwater pollution prevention requirements; Building Division conducted an onsite workshop.
Villa Park	No Report	No Report
Westminster	Staff attended RWQCB, APWA, and City of Irvine (erosion control) seminars.	---------
Yorba Linda	Flyers distributed at Fiesta Days City Booth and available to residents; Public announcements on Cable TV; Recycling Program information with City trash bills.	---------
County of Orange	Stormwater brochures available to residents	---------

Table 3.25 1996-2000 WQMP Structural Controls Summary

Permittee	# WQMPs approved	Acreage covered by WQMPs	Structural Controls Implemented															
			S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	S13	S14	S15	S16
Anaheim	51	U	51	51	51	U	1	54	1	U	7	7	7	U	U	16	U	U
Brea	10	U	10	0	0	0	0	2	0	0	0	0	0	0	10	1	0	0
Buena Park	4	6	1	2	2	0	0	4	0	1	0	0	0	0	1	0	2	0
Costa Mesa	44	215	37	38	37	3	6	28	4	3	4	3	3	3	21	1	7	10
Cypress	4	25	3	3	3	0	0	2	0	1	0	0	0	0	3	0	1	0
Dana Point	5	32	23	23	24	0	0	4	0	0	0	1	0	0	30	0	0	32
Fountain Valley	6	34	39	39	0	0	23	7	2	0	24	24	12	0	680	0	0	0
Fullerton	7	465	5	4	4	0	1	7	0	3	2	2	2	4	0	3	0	2
Garden Grove	40	88	33	34	28	0	12	30	0	4	9	7	8	4	19	8	5	13
Hunt. Beach	55	391	54	55	55	0	12	61	7	0	3	3	3	2	268	23	284	188
Irvine	161	2526	101	113	156	8	18	63	17	16	12	11	11	21	114	18	53	28
La Habra	33	U	24	17	17	4	9	20	11	2	2	2	2	15	15	9	15	20
La Palma	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Laguna Beach	1	20	1	1	1	0	0	1	0	0	0	0	0	3	22	1	2	4
Laguna Hills	1	1	1	0	0	0	0	1	0	0	0	1	0	0	0	0	0	1
Laguna Niguel	5	112	3	5	5	1	0	2	1	1	0	0	0	1	5	1	1	3
Lake Forest	39	263	36	40	40	6	8	39	5	2	4	4	4	7	38	17	30	32
Los Alamitos	3	5	3	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0
Mission Viejo	90	390	4	90	90	2	0	90	0	0	11	11	11	5	90	6	4	4
Newport Beach	8	U	3	8	8	0	4	8	4	0	0	0	1	6	0	0	0	0
Orange	6	580	0	0	0	0	0	0	1	0	1	1	0	0	3100	0	0	0
Placentia	5	50	5	0	0	0	0	0	0	0	0	0	0	2	25	0	0	0
San Clemente	22	944	Unavailable at this time															
S.J. Capistrano	12	113	0	12	12	0	0	7	0	0	0	0	0	0	610	0	0	0
Santa Ana	66	340	10	50	20	3	11	60	7	2	10	10	4	2	20	5	0	5
Seal Beach	1	157	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0
Stanton	No Report		2	2	2			1	1	1				1	1			1
Tustin	10	173	8	9	9	5	0	4	2	1	2	1	2	7	9	0	8	3
Villa Park	No Report		No Report															
Westminster	23	68	7	10	10	3	2	5	2	3	2	2	2	4	6	2	3	2
Yorba Linda	4	1	2	1	2	0	2	4	1	1	3	3	2	1	1	0	1	1
County of Orange	384	3662	269	358	356	46	31	150	24	15	15	12	14	27	335	42	165	24
Total	1100	10661	737	965	934	81	140	655	91	56	111	105	88	115	5423	153	581	373

S1 = Filtration
S2 = Common Area Efficient Irrigation
S3 = Common Area Landscape Design
S4 = Community Car Wash Racks
S5 = Wash Water Controls Food Prep Areas
S6 = Trash Container Areas
S7 = Self-Contained Areas Washing/Steam Cleaning
S8 = Outdoor Storage
S9 = Motor Fuel Concrete Dispensing Areas
S10 = Motor Fuel Dispensing Area Canopy
S11 = Motor Fuel Interruptable Drainage
S12 = Energy Dissipator
S13 = Catch Basin Stenciling
S14 = Diversion of Loading Dock Drainage
S15 = Inlet Trash Racks
S16 = Water Quality Inlets

U = Unknown

Table 3.26 1996-2000 WQMP Non-Structural Control Summary

Permittee	# WQMPs approved	Acreage covered by WQMPs	Non-Structural Controls Implemented															
			N1	N2	N3	N4	N5	N6	N7	N8	N9	N10	N11	N12	N13	N14	N15	N16
Anaheim	51	U	U	51	0	U	U	U	U	7	U	U	51	51	U	U	51	U
Brea	10	U	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Buena Park	4	6	2	2	2	2	0	0	2	0	0	1	1	4	1	0	2	0
Costa Mesa	44	215	36	30	33	40	16	2	15	4	14	13	29	27	8	18	23	2
Cypress	4	25	3	3	4	2	0	0	3	0	0	0	3	3	1	3	4	0
Dana Point	5	32	6	6	7	6	0	0	0	0	0	0	8	6	1	1	6	0
Fountain Valley	6	34	48	1	0	0	12	12	12	12	0	39	1	0	0	0	1	0
Fullerton	7	465	7	7	7	7	7	3	6	2	5	7	7	7	7	7	7	3
Garden Grove	40	88	28	33	34	37	15	10	17	10	16	18	39	31	15	22	24	5
Hunt. Beach	55	391	55	55	55	55	14	11	14	3	14	14	55	55	23	51	55	0
Irvine	161	2526	115	117	123	124	32	34	47	12	36	39	113	84	24	105	112	9
La Habra	33	U	15	33	15	33	11	4	11	4	11	11	33	29	11	33	15	9
La Palma	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Laguna Beach	1	20	1	1	1	1	0	0	0	0	0	0	1	1	1	1	1	1
Laguna Hills	1	1	1	1	0	1	0	0	1	1	1	0	0	1	0	0	0	0
Laguna Niguel	5	112	4	4	5	5	1	1	2	0	1	1	4	2	1	5	4	1
Lake Forest	39	263	40	39	40	40	27	24	33	5	28	27	39	40	25	38	38	6
Los Alamitos	3	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Mission Viejo	90	390	90	10	90	90	10	10	10	10	10	10	90	90	6	90	90	10
Newport Beach	8	U	Not available at this time															
Orange	6	580	0	0	2	0	0	0	2	1	0	0	0	6	0	0	1	1
Placentia	5	50	0	0	3	5	0	0	5	1	0	5	5	1	0	25	5	0
San Clemente	22	944	Not available at this time															
S.J. Capistrano	12	113	0	0	10	9	9	0	0	0	0	9	0	4	0	0	9	0
Santa Ana	66	340	10	10	50	66	10	6	16	10	10	10	10	66	5	20	66	4
Seal Beach	1	157	0	0	1	1	1	0	0	0	1	1	0	0	0	0	1	0
Stanton	No Report		2	2	2	2	1	1	1	0	1	1	1	2	0	2	2	1
Tustin	10	173	9	9	8	8	1	1	2	1	1	2	9	3	0	7	8	2
Villa Park	No Report		No Report															
Westminster	23	68	10	8	10	10	3	2	3	2	3	4	9	5	3	6	9	1
Yorba Linda	4	1	3	3	1	4	3	2	4	2	3	3	4	4	3	3	1	0
County of Orange	384	3662	368	345	350	355	34	14	36	18	30	47	321	241	56	313	271	10
Total	1100	10661	853	770	853	903	207	137	242	105	185	262	833	763	191	750	806	65

N1 = Education POA
N2 = Activity Restrictions
N3 = Common Area Landscape Mgmt.
N4 = BMP Maintenance
N5 = Title 22 CCR Compliance
N6 = Local Industrial Permit Compliance
N7 = Spill Contingency Plan
N8 = Underground Storage Tank Compliance
N9 = Hazardous Materials Disclosure Compliance
N10 = Uniform Fire Code Implementation
N11 = Common Area Litter Control
N12 = Employee Training
N13 = Housekeeping of Loading Docks
N14 = Common Area Catch Basin Inspection
N15 = Street Sweeping
N16 = Commercial Vehicle Washing

U = Unknown

Table 3.27 1999/00 "Special" BMP Summary

Name of project where BMP was required	Watershed where project is located	Type of "special" BMP	Targeted pollutant of concern
Laguna Beach			
Treasure Island - Private Development	Laguna Beach	Summer Flow Diversion	Bacteria, Viruses
San Clemente			
Talega	MO2 & Christianitos	Catch basin screening & filtering	Litter, Oil, Grease
Laing Forster Ranch	MO1	Catch basin screening & filtering	Litter, Oil, Grease
County of Orange			
Ladera Planned Community (Planning Areas 1, 2, & 7: 850 acres)	Trabuco Crk / Horno Crk	Water Quality Basin (for filtration, infiltration, and detention purposes)	Sediment, nutrients, & other pollutants
Ladera Planned Community (Planning Areas 3, 4, 5, 6, & 8: 1,550 acres)	San Juan Crk / Horno Crk	Water Quality Basin	Sediment, nutrients, & other pollutants
Ladera Planned Community (Planning Areas 3, 4, 5, 6, & 8: 1,550 acres)	San Juan Crk / Horno Crk	Water Quality Basin	Sediment and nutrients
Ladera Planned Community (Planning Areas 3, 4, 5, 6, & 8: 1,550 acres)	San Juan Crk / Horno Crk	Riverine / Riparian System	Sediment and nutrients
Newport Coast Planned Community (PC) (CCC Appeal Portion of the 9.432 acre PC)	Los Trancos / Muddy Crk	6 Detention Basins	Sediment, nutrients, & other pollutants
Newport Coast Planned Community (PC) (CCC Appeal Portion of the 9.432 acre PC)	Los Trancos / Muddy Crk	Grass swales	Sediment and nutrients
Newport Coast Planned Community (PC) (CCC Appeal Portion of the 9.432 acre PC)	Los Trancos / Muddy Crk	Storm Drain Filter (DrainPac) Inserts	Sediment, nutrients, & other pollutants
Newport Coast Planned Community (PC) (CCC Appeal Portion of the 9.432 acre PC)	Los Trancos / Muddy Crk	Constructed Wetlands / Riparian Enhancement	Sediment and nutrients

Table 3.28 1999/00 Construction Activities Summary

Permittee	Type of Activity	
	Grading Permits Issued	Sites >5 acres
Anaheim	153	N/A
Brea	50	22
Buena Park	21	N/A
Costa Mesa	121	10
Cypress	6	N/A
Dana Point	54	1
Fountain Valley	N/A	6
Fullerton	30	8
Garden Grove	44	4
Huntington Beach	105	46
Irvine	36	26
La Habra	N/A	5
La Palma	2	0
Laguna Beach	0	1
Laguna Hills	10	N/A
Laguna Niguel	206	2
Lake Forest	18	5
Los Alamitos	0	0
Mission Viejo	116	10
Newport Beach	2,200	0
Orange	15	2
Placentia	12	3
San Clemente	5,283	143
San Juan Capistrano	46	8
Santa Ana	43	5
Seal Beach	10	1
Stanton	5	0
Tustin	6	2
Villa Park	No Report	No Report
Westminster	27	6
Yorba Linda	34	9
County of Orange	982	No Report
Total	9,635	325

Table 3.29

Santa Ana Delhi Channel
Adjusted Trash & Debris Percent Composition

	STORM DATE							
	2/8/99	3/11/99	3/15/99	3/26/99	4/7/99	4/12/99	2/21/00*	AVERAGE
RAINFALL (in.)	0.16	0.12	0.24	0.56	0.43	0.12	1.06	
ORGANIC**	42.83%	36.47%	56.08%	56.14%	48.71%	55.27%	35.23%	47.25%
PLASTIC**	34.58%	46.65%	31.45%	27.61%	22.30%	32.40%	43.38%	34.05%
GLASS	2.35%	0.00%	3.56%	2.43%	1.92%	1.34%	9.76%	3.05%
RUBBER	2.32%	2.33%	2.54%	4.00%	3.01%	2.94%	5.80%	3.28%
METAL	2.76%	13.19%	3.43%	7.68%	2.20%	6.45%	4.40%	5.73%
PAPER	1.83%	1.36%	1.42%	1.27%	0.73%	1.60%	0.65%	1.27%
CLOTH	0.34%	0.00%	1.53%	0.87%	0.38%	0.00%	0.78%	0.56%
OTHER	12.97%	0.00%	0.00%	0.00%	20.76%	0.00%	0.00%	4.82%
								100.00%

* data extrapolated from 15 bags sampled of 184 total

** data adjusted for sediment weight

Figure 3.1- Santa Ana Delhi Channel Trash and Debris Composition

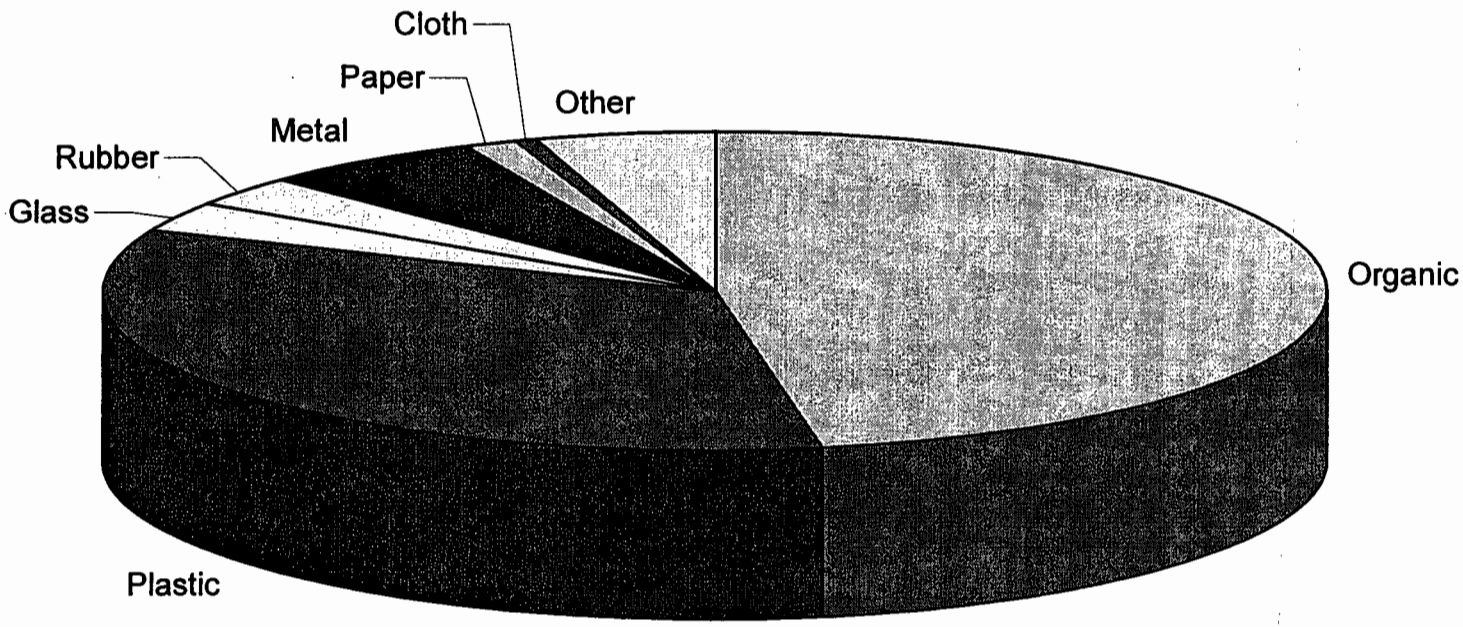

4.0 MEASURING PROGRAM EFFECTIVENESS

4.1 Introduction

There are generally two accepted methodologies for assessing the performance of the BMP effectiveness: conventional monitoring (such as water quality monitoring) and non-conventional monitoring.

An accurate, quantifiable assessment of the cumulative effectiveness of current BMPs is difficult for a variety of reasons that include:

1. Non-structural BMPs began to be implemented prior to the stormwater mandate, meaning no "baseline" monitoring data representative of "pre-BMP" conditions can be identified;

This belies the "watershed" approach touted throughout the DAMP

2. The BMPs identified in the DAMP are being implemented incrementally on a countywide basis. Since, to date, no watershed has been uniquely subject to a single BMP, the influence of an individual BMP upon the overall surface water quality cannot be readily determined yet;

3. There is considerable variability in water quality data that complicates any statistical correlation of the data with storm frequency, storm length and intensity, land use, or land management practices. This is even more compounded by storm seasons in recent years that have varied much in their intensity, duration and volume;

4. Many of the BMPs identified in the DAMP are implemented to address the issues associated with a specific land use. However, since the land uses are so blended within the watersheds, it has not proven possible to characterize the effects of those specific BMPs; and

5. Factors other than chemical water quality may be more directly responsible for impairment of beneficial uses, yet all these factors combine in their effects and are difficult to separate one from another.

Assessing the cumulative effect of BMPs employed countywide on the water quality of receiving waterbodies may take a number of years. There are however, a number of programs that are currently contributing to the assessment of individual project BMP performance. For example?

The Permittees will continue to assess and evaluate the data from these and other studies in order to try and determine the overall effectiveness of the implementation of the BMPs on the water quality within Orange County. The following sections discuss these methodologies and detail Permittee efforts in each.

4.2 Conventional Monitoring

4.2.1 Water Quality Monitoring

Orange County has been implementing a water quality monitoring program since the Regional Boards approved its program in January 1991. In accordance with the requirements of the initial permit, one specific objective of this program is to evaluate the effectiveness of pollution prevention and correction methods. The channel monitoring element of the monitoring program discussed in Section 5.0 directly addresses this objective. Additional information on specific monitoring programs dealing with BMP implementation and effectiveness on individual development projects is also discussed in Section 5.0.

Data from the channel monitoring program discussed in Section 5.0 highlights the broad spatial differences with regard to suspended/settleable solids, nutrient loading and potential for aquatic toxicity due to dissolved metals in channels draining predominantly urban watersheds. Aquatic toxicity guidance criteria were provided by the California Toxics Rule (CTR). The spatial variations in water quality may be interpreted as reflecting differences in watershed land uses, imperviousness and the very low hardness of rainwater draining off into flood control facilities.

In the context of stormwater quality management, the use of CTR criteria exceedances as an indicator of adverse impact will need to be validated since it is now recognized that water quality is only one of many determinants that include water temperature, habitat, bank stability, etc., of beneficial use attainment. This does not excuse failure to assess compliance w/ MEP Std.

TRUEISM

4.2.2 Effectiveness of Pollution Prevention and Correction Measures

The paragraphs above have discussed the difficulty in assessing the cumulative effect of BMPs employed countywide on the water quality of receiving waterbodies. That assessment cannot be made for many years. There are however, a number of programs that are contributing to the assessment of individual project BMP performance. There are also monitoring programs in place that are intended to measure the quality of runoff from individual project sites. The following discussion provides information on some of these programs.

Las Flores Storm Water Quality Basins

The Las Flores community, located easterly of Mission Viejo, has two water quality basins that were constructed in the early 90's by the Santa Margarita Company to treat the first flush (1/2" of rain) effects of urban runoff from the 592 acre planned development. The conditions of approval for the development called for the developer to begin monitoring wet and dry weather runoff from the community once the tributary area to each basin was 50% complete.

The northwest water quality basin (8 ac-ft volume) has been treating wet and dry weather runoff from 189 acres of the development for the past three storm seasons. Analysis of grab samples taken from the inlet and outlet of the basin has thus far provided inconclusive results on the basin's effectiveness. In an effort to improve on the sampling techniques and obtain samples more representative of the water flowing in and out of the basin, automatic storm sampling equipment was used during the 1998-1999 storm season. Although this sampling is complete the results have not been made available. 1-2 yr gap in data application?? why?

The southerly portion of the development serviced by the southwest detention basin, the larger of the two basins (16 ac-ft volume, 403 acres tributary), has reached 50% development and was scheduled to start monitoring during the 1997-1998 storm season. However, due to vandalism of the sampling equipment the sampling schedule was delayed and only one dry monitoring sequence was completed. Additional sampling was scheduled for 1998-1999. Up to now the basin has served primarily to intercept sediment from construction within the development which would naturally drain directly to Trabuco Creek, a natural creek.

Past tense? as in failed to happen?

data? was it actually sampled?

Newport Coast Golf Course and Muddy Canyon Studies

In 1992, The Irvine Company initiated a water quality monitoring program to assess the runoff from Pelican Hills Golf Course as part of the condition of approval for the project. For the monitoring program, stations were located on land, in the surf zone and in the offshore subtidal areas. Additional stations were also located southerly of the golf course as reference control monitoring sites for comparison with the runoff stations. The monitoring program included chemical monitoring for nutrients (nitrate and phosphate) and a marine ecological component conducted in the ocean's waters in the 1995-1996 storm season to assess the runoff's impact on three indicator plants (Eisenia, Egregia and Phyllospadix) that are known to react quickly to increased nutrient levels by increasing their growth rates. The ecological study also evaluated animal epibionts living on these plants.

The general conclusions of the study found that the nutrient levels measured at the fresh water monitoring stations were reduced to such low concentrations by the time they reached the surf and subtidal stations that there were no significant differences between the runoff monitoring stations and the reference control stations. The low levels of nutrients from the golf course may be partially attributed to computer controlled fertilizer rates and efficient irrigation.

Additional studies of the Newport Coast development have been proposed for the winter-spring period of 1999-2000 in Muddy Canyon. This initial data collection will provide baseline information on the storm runoff from Muddy Canyon and will likely be repeated as project build out occurs providing information on the impact of the development and the effectiveness of the BMPs implemented.

Newport Bay Watershed Nitrate Reduction

Newport Bay currently faces an eutrophication problem due primarily to the excessive use of nutrients in the watershed. The nutrient loads (nitrate) reaching Newport Bay reached a peak of approximately 1.6 million pounds in 1985-1986. At that point the nitrate loads reaching the bay began to decrease reaching an annual average of just over 0.8 million (50% reduction) from 1990 to 1997.

This reduction can be partially attributed to the use of drip irrigation on agricultural areas owned by The Irvine Company and increased runoff controls at the watershed's major nurseries. As additional measures to reduce the nitrate loading in the watershed are implemented by the watershed's stakeholders in the coming years, the total nitrate load and the eutrophication problem in the bay will also be reduced.

One project potentially contributing to a further reduction of nitrate is the San Joaquin Marsh Pond Demonstration Project. Installed and monitored by the Irvine Ranch Water District, these ponds have been supplied with water from San Diego Creek from June 1998 to the present. Total nitrogen reduction (difference between the influent total nitrogen and the pond effluent total nitrogen returned to the creek) has ranged from 7-10 mg as N/l during the spring, summer and fall months to a reduction of 5mg as N/l or less during January. The variability of nitrogen reduction was dependent upon temperature. Total nitrogen removal (difference in mass of total nitrogen entering the ponds and leaving the ponds) over the 405 day monitoring period was 51 tons. This equates to 46 tons annually, or 252 pounds of nitrogen removed per day.

In addition to the watershed actions pursued to date, the Co-permittees have initiated a program to study in greater detail the urban nutrient loading in this watershed and to identify additional BMPs for more intensive study (Newport Bay Watershed Urban Nutrient TMDL Technical Report, September 1999 and Newport Bay Watershed Urban Nutrient TMDL Compliance Evaluation, July 2000). Future, detailed analyses of nutrient loading during two one-week periods in 1999 and 2000 are described in Section 5.0 and Appendix 5.9.

Newport Bay/San Diego Creek Sediment Reduction

The Newport Bay watershed, like the County of Orange, has transitioned from predominantly agricultural land uses to a more urban setting over the years. As a result of development, agriculture and land erosion, the amount of sediment discharged from the watershed created sediment deposition problems in Newport Bay.

To address the bay's sediment problems, a 208 Areawide Study Plan was completed in 1982. That plan recommended that foothill, in-channel and in-bay basins in Upper Newport Bay be constructed within the watershed to intercept sediment reaching Newport Bay. To date, as recommended by the report, foothill, in-channel and in-bay basins have been constructed and are achieving their intended function.

There are three In-channel Basins in San Diego Creek. In-channel Basin 1, the largest of the basins in located downstream of Campus Drive while In-channel Basins 2 and 3 are located upstream of Campus Drive. The sediment TMDL for the Newport Bay Watershed requires that the In-channel Basins have at least 50 % sediment holding capacity at the beginning of each storm season. The Irvine Ranch Water District is presently committed to cleaning In-channel Basins 1 and 2. The funds for cleaning In-channel Basin 1 are secured through a cooperative agreement with The Irvine Company, County of Orange, Orange County flood Control District, and the cities of Tustin, Irvine, Newport Beach and Lake Forest The available capacities of In-channel Basin 1, 2 and 3 as of July 2000 was 89%, 86%, and 60%, respectively.

A new sediment monitoring program adopted by the Santa Ana Regional Water Quality Control Board on November 19, 1999 is designed to determine compliance with sediment TMDL land use allocations. The program will result in additional data collection in the Santa Ana-Delhi Channel in 1999-2000 and additional load monitoring stations being added in the subsequent two years.

Additional sediment analyses have recently been completed (Preliminary Sediment Load Allocation Analysis for San Diego Creek and Newport Bay, Tetra Tech 1999 and Hydraulic/Sediment Analysis for San Diego Creek Watershed, Tetra Tech, July 2000) that will form the basis for implementing further erosion and sediment controls during the next permit term.

In addition to the basins in the watershed, a special effort worth noting is the experimental program conducted at Round Canyon Detention Basin. The basin had the lower part of its outlet tower wrapped by filter fabric in an attempt to capture the finer sediment particles leaving the basin. It was felt that decreasing the openings at the lower part of the tower would prevent the finer sediment particles such as silt and clay from flowing out the basin. It was also felt that the filter fabric would increase the storm water detention time in the basin resulting in increased sediment deposition.

Capturing the finer particles is important because nutrients from the watershed may attach themselves to these particles as they leave the basin and find their way to Newport Bay. If the Bay's tidal exchange is unable to carry these particles into the ocean, the particles will end up as sediment deposition in the Bay. The preliminary results indicated an increase in the percentage of silt and clay captured. Based upon these results, the outlet tower at Bee Canyon was also wrapped with filter fabric. Both towers will remain wrapped in the future.

San Joaquin Hills Transportation Corridor Water Quality Basins

The Transportation Corridor Agencies have installed a number of water quality basins along the San Joaquin Hills Transportation Corridor to treat storm water runoff from the toll road. The water quality basins are open-aired, rectangular in shape, made of concrete and are divided into a number of different cells. Treatment of the storm water is through layers of compost material that acts as a filter. The treated water is removed from the basins by underdrain pipes surrounded by rock and filter fabric below the compost material.

To assess the treatment efficiency of these basins, Caltrans initiated a study of two basins during 1998-99. One basin was located in North Hollywood at a maintenance yard and the second basin was the Bonita Canyon basin located off the San Joaquin Hills Corridor in Orange County. The recently concluded study (Caltrans Compost Stormwater Filters: Bonita Canyon & North Hollywood Maintenance Yard, Storm Water Monitoring 1997/1998 Wet Season, June 10, 1998) provides only one season's worth of monitoring but generally seems consistent with a similar type basin tested by Stormwater Management (manufacturer) in the early 1990's.

The results of the study for the five 5 storms monitored in 1997-98 show event mean concentration reductions for motor oil, diesel, and oil and grease ranging from 14 % to 64 %; fecal coliform (80%), Chemical Oxygen Demand (32%), metal removal (chromium, copper, lead, nickel and zinc) ranging from 33 to 72% and removal efficiencies of 72% for total suspended solids. The results also show that there was an increase in the effluent concentrations for total dissolved solids (24%) and nutrients (nitrate, nitrite, total phosphorous, total Kjeldahl nitrogen (TKN), dissolved phosphorous) ranging from 133% (TKN) to 1633% (dissolved phosphorous). The adverse reactions indicate that there were ongoing reactions in the basin that added to the effluent concentration of these water quality parameters. The original tests conducted by Stormwater Management also showed increases for nitrate nitrogen (145%) and dissolved phosphorous (197%) but not TKN and total phosphorous. However, the event mean effluent concentrations are still fairly small, 0.52mg/l for dissolved phosphorous and 3.46 mg/l for nitrate.

Additional information regarding these water quality basins has not been received.

Eastern Transportation Corridor Evaluation Monitoring Program

In contrast to the normal chemical monitoring program usually undertaken to assess storm water impacts, the monitoring program for the Eastern Transportation Corridor utilizes direct measurements of the receiving water quality in Newport Bay. While the project still utilizes conventional BMPs such as detention basins, erosion control measures, litter control and public education, it focuses on measuring the toxicity of the receiving waters to assess storm water impacts.

Preliminary studies conducted by Dr. Fred Lee, a consultant to the Transportation Corridor Agencies, showed a significant toxicity on the test organism, *Ceriodaphnia dubia*, in the runoff waters of San Diego Creek. A Toxicity Identification Evaluation (TIE) test found that a portion of the toxicity was attributed to the organophosphate pesticides Diazinon and Chlorpyriphos. These pesticides were found at levels below 1 ppb, but are very toxic to *Ceriodaphnia*. Since the initial study the project was expanded to include seven stormwater runoff events, four dry weather flow samples, the Santa Ana Delhi Channel and another test organism, *Americamysis bahia*.

The first phase of the study concluded that San Diego Creek stormwater runoff is toxic to *Ceriodaphnia* and mysids, primarily due to the organophosphate pesticides diaznon and chlorpyrifos and additional unknown constituents. The source of this toxicity is speculated to be urban residential use for lawn and garden pest control and commercial nurseries. The study suggests that the water quality significance of this toxicity primarily lies in the exposure to marine zooplankton that migrate into the mixed water lens formed at the interface of San Diego Creek and Upper Newport Bay. The report also concludes that further study is necessary to identify the water quality significance of the toxicity on marine zooplankton based upon exposure and migration patterns. In addition, it will be necessary to perform specific monitoring of a small residential subdivision defining organophosphate usage to determine if pesticides are a significant source of runoff toxicity. The workplan for this study is currently being developed in conjunction with the Department of Pesticide Regulation.

City of Irvine Oil/Water Separators

The City of Irvine has installed two oil/water separators to treat water at their City Hall and Operations Support Fueling Facility. The results of two tests indicated that the oil/water separator is removing diesel fuel, gasoline and oil and grease to limits below detection where the initial amount was measurable. In addition, a new fueling system installed concurrently with the separators has reduced operator drive off with the pump engaged. The combination of the oil/water separators and the new fueling system has reduced contaminant levels to non-measurable amounts.

4.3 Non-Conventional Monitoring

The California Best Management Practices (BMP) Handbook defines "non-conventional monitoring" as the enumeration of some quantity other than water quality data to infer pollution reduction or water quality improvement. Examples cited include surveys of public opinion to demonstrate increasing environmental awareness, monitoring of the amount of used oil being delivered to household hazardous waste collection centers, etc.

Section 3.0 presents data on the extent of BMP implementation and the volume of potential pollutants that are being diverted from the storm drain system: pollutants that would otherwise contribute to water quality problems.

4.3.1 Public Opinion Survey

1994 Stormwater Pollution Prevention and Flood Awareness Survey

In 1994 the University of California at Irvine (UCI) conducted a public education survey on behalf of the NPDES Stormwater Program as a part of the Orange County Annual Survey. This survey was co-directed by Mark Baldassare and Cheryl Katz of the University of California, Irvine. The Stormwater Pollution Prevention and Flood Awareness Survey comprised 10 questions on topics such as awareness and knowledge. The intent of the survey was to gather information on the public's perception regarding storm water.

For this telephone survey, random samples of 1,000 Orange County adults were interviewed over the period August 19-29, 1994. The sampling error was three percent for the total sample. The key results of this survey were:

- Eighty-six percent say it is illegal to throw materials into the storm drain. However, nearly half of Orange county adults believe that the storm drain system and the sewer system are the same (44%) and that the water in storm drains is filtered and tested before it leaves the system (48%). Older Anglo, South County and higher socioeconomic status residents tend to know more about stormwater pollution.

- Thirty-three percent have seen public service announcements on television about dumping in storm drains, while 8 percent have seen brochures and 60 percent have noticed the "No Dumping" messages stenciled on curbs or storm drains. The study notes that, in general, exposure to announcements and warning signs on curbs lead to greater awareness of stormwater pollution prevention.

The main finding of the survey was that the public assumed that storm water was being treated. As a result of that finding, an effort was made to stencil storm water inlets with a uniform message throughout the county that informs the public that storm water drains directly to the ocean.

2000-2001 Public Opinion Survey

During 1998/99 the Permittees developed a long term NPDES public and business education strategy (Section 3.3 and Appendix 3.4). The strategy was finalized in September 1999 and began to be implemented in 1999/2000. The Permittees will complete a public awareness survey by December 2001 to determine the effectiveness of the public and business education strategy to date and to provide direction to the overall program for the Third Term Permit period. The results of this survey should be available for inclusion in the 2001 Annual Status Report.

4.3.2 Illegal Discharges

Section 2.4.1 presents information relating to the incidents involving hazardous materials to which the Principal Permittee and/or other Permittees responded. For 1999/00, **Figure 2.1** illustrates the sources of water pollution incident reports received by the Principal Permittee with the cities and the public constituting over 60% of the sources and **Figure 2.2** illustrates the types of materials involved **(Table 2.2).**

There was a marked increase in the number of water pollution incidents that were reported from 1990-1994 (808) and 1995-2000 (1872). This increase is likely due to the increased public and agency awareness regarding the problem of disposing or washing materials into the storm drains and that the storm drains flows directly to the ocean.

4.3.3 Public Agency Activities

It is recognized in the DAMP that there are many existing public agency activities that contribute to the control of urban stormwater pollution. Consequently, a major part of DAMP implementation involves instituting regular documentation of such activities for the purpose of non-conventional monitoring (see section 3.0). This report marks the seventh year of "full" DAMP implementation.

Over the second permit term, this data has yielded information on the extent of BMP implementation and the volume of specific pollutants that are being diverted from the storm drain system.

Drainage Facility Maintenance

From 1993 to 1999 the efforts to clean out the drainage facilities and the quantity of material removed have doubled. During 1999/00 twenty-eight Permittees reported the removal of 15,381 cubic yards and 23,907 tons of material from 218.8 miles of storm drains and 21,284 drain inlets. By removing this amount of material from the catch basin inlets and stormdrain system, the Permittees made a significant contribution in preventing problems downstream.

Household Hazardous Waste Collection

Orange County has an effective household hazardous waste collection program administered by the Integrated Waste Management Department (IWMD). The amount of material collected by these four sites has increased by over 400,000 pounds since 1994 (2,896,967 pounds of household hazardous waste in 1999/00 and 2,449,902 pounds of waste in 1994).

In addition, some Permittees also conduct special events such as waste oil or household hazardous waste roundups. In 1994 four Permittees reported conducting such events and in 1999/00 seven Permittees reported conducting similar events. These events resulted in the collection and proper disposal of an additional 190,905 pounds of household hazardous waste.

The increase in the amount of household hazardous waste collected and properly disposed of is encouraging since these materials can pose a serious threat to human health and the environment if disposed of incorrectly.

5.0 WATER QUALITY MONITORING SUMMARY AND ANALYSES

5.1 Introduction

The data presented in this section are the result of the water quality monitoring conducted from July 1, 1999 to June 30, 2000. More detailed information specific to data from prior years can be found in the 91/92, 92/93, 93/94, 94/95, 95/96, 96/97, 97/98, and 98/99 Analysis of Data Reports and the two prior Reports of Waste Discharge.

From February 20, 1991 to May 1999, a water quality monitoring program was implemented to address the objectives of NPDES permits CA 8000180 (RWQCB-SAR) and CA 0108740 (RWQCB-SDR). This program consisted of four elements: field screening, channel monitoring, harbor/bay monitoring, and sediment quality monitoring. Sampled waterbodies included natural creeks, streams, and rivers; constructed flood control facilities (channels and basins); and harbors and bays. The objectives of that monitoring program included identifying illegal discharges, quantifying the mass of pollutants that were discharged from the stormwater system and comparing the quality of water in the stormwater system and its receiving waters to established standards for the protection of aquatic life.

On July 15, 1997, a revised monitoring plan was submitted to the Regional Water Quality Control Boards. The final version of the plan was submitted to the Boards in May 1999. The report entitled Orange County Water Quality Monitoring Program – Final Monitoring Plan is hereinafter referred to as the 99-04 Plan. The revisions were made to more adequately address the objectives of the new permits CAS618030 (Santa Ana Region) and CAS0108740 (San Diego Region). Some elements of this revised program were implemented during the 98/99 monitoring year while most of the others were implemented during 99/00 season.

5.2 Monitoring Approach

Under the 1991 permit, water quality monitoring could be characterized as areawide rather than focused to any specific area or areas. Under the 99-04 Plan monitoring has been conducted in waterbodies or watersheds which have been assessed as important aquatic resources or which have shown some elevated constituent levels which may be attributable to stormwater. Three processes were used in selecting the monitoring sites. They are summarized below:

- A list of the County's "Critical Aquatic Resources" (CARs), including inland streams, bays, harbors, estuaries, and coastal waters, was compiled and ranked according to several criteria including 303(d) listing, community interest, and beneficial uses. The CARs receiving the highest ranking were prioritized for study during the term of the permit. The CARs selected for intensive study during this reporting year were the San Diego Creek Watershed, the Upper Newport Bay and the Lower Newport Bay. A baseline monitoring program is being maintained for the other CARs until they are monitored in future years.

- The previously collected NPDES water and sediment quality data was statistically evaluated to identify areas which had mean concentrations of constituents of concern that were above countywide averages. These areas designated as "Warm Spots" were selected if their site mean concentration of a specific pollutant of concern was either (1) greater than two standard deviations above the systemwide mean (including all similar monitoring sites such as channels or harbor locations), or (2) three interquartile ranges above the third quartile. The database of each "Warm Spot" was further evaluated using power analyses to determine the frequency of annual monitoring that would be needed to detect statistically significant trends in the constituent of concern that led to the "Warm Spot" designation.

  The "Warm Spots" include Bonita Creek, Lane Channel, Agua Chinon Wash, Central Irvine Channel, Hicks Canyon Wash, Hines Channel, Sulphur Creek, Prima Deschecha Channel, Segunda Deschecha Channel, the Rhine Channel in the Lower Newport Bay, and Christiana Bay in Huntington Harbour.

- The countywide Pollution, Notification, Investigation, and Response (PNIR) database maintained by Principal Permittee water pollution staff was interrogated to identify channels or drainage areas that had high incidences of water pollution activity during the period from 1991 through 1998. From these database evaluations was created a priority list for reconnaissance and source evaluation studies. Areas targeted for study during this and the next reporting year include Construction Circle Drain which flows to Peters Canyon Wash and J01P32 (El Toro Auto Center drain) which flows to Aliso Creek.

5.2.1 Incorporation of the Nutrient TMDL Regional Monitoring Program

A Regional Monitoring Program (RMP) for the San Diego Creek Nutrient TMDL was initiated in February of 2000 at the direction of the Santa Ana Board. The chemical monitoring for this program includes many of the same sites in the Newport Bay and watershed as the NPDES Program. Monitoring frequencies for some of the sites were increased above NPDES program levels and orthophosphate was been added to the suite of nutrient analyses. The NPDES monitoring program and the RMP are intended to complement each other. Therefore the chemical data from both programs will be included in this report.

Table 5.1 is compilation of the "Warm Spots" and CARs from the 99-04 Plan and the RMP sites that were monitored during this reporting year. **Table 5.2** shows the monitoring frequencies of the 99-04 Plan with the Nutrient TMDL additions in bold letters. If a monitoring location is within a designated "Water of the State" the beneficial uses for waterbody can be found **Table 5.3**. **Appendix 5.1** contains the location maps of channels that were monitored with automatic samplers and continuously monitoring streamgages.

5.3 Description of Monitoring Procedures

The following are brief descriptions of the procedures used during this reporting period. More detailed information is contained in the Principal Permittee NPDES sampling manual.

5.3.1 Time-Composite Sampling

Time-composite sampling is the primary method of monitoring the concentration and load of constituents in streams, creeks, and drainage channels. This type of sampling is conducted with automatic samplers that consist of programmable pumps (peristaltic) which transport water from the channel to a collection reservoir in the autosampler base. The collection reservoir can be a single large composite bottle or a series of up to 24 bottles. The autosampler program can be modified to vary sample volumes and frequency of collection. In the 99-04 Plan, 24 discrete sample bottles are used in each autosampler base.

For dry weather discharge evaluations, the automatic samplers are programmed to collect a discrete sample once an hour for a 24-hour period. During storms, sampling is initiated when the water level in the channel rises above a triggering device hardwired to the autosampler. The frequency of collection during the first hour of the storm is set at 1 sample/15 minutes. After the fifth sample is collected at the one-hour mark, the collection frequency is decreased to once every 2 hours. A storm event sampling spans approximately 96 hours to allow comparison of the data to 96-hour guidance criteria for chronic aquatic toxicity from the California Toxics Rule (CTR). Autosampler maintenance is performed periodically to change bottles, icepacks, and power supplies.

The first five samples collected during a storm are composited and represent the first flush. The concentrations of dissolved heavy metals in this sample can be compared to acute toxicity criteria. The remaining bi-hourly storm samples are composited using the stage hydrograph or by evaluating the electrical conductivities of the discrete samples. Using the hydrograph from the ALERT system, samples collected beyond the first flush and representing the storm peak and recession are composited into a single sample. In the absence of a streamgage hydrograph, the conductivity of each sample (in order of collection) is measured. Changes in conductivity usually denote the beginning or end of storm runoff. After the "first flush" of a storm, conductivities tend to immediately decrease during the rise of the storm hydrograph and slowly rise after the recession.

Sample appearance (turbidity or fluvial sediment) can also be used in the compositing process. Storm samples tend to be more turbid and contain more fluvial sediment. Composite samples are analyzed for pH, electrical conductivity, turbidity, nitrate, ammonia, total Kjehldahl Nitrogen (TKN), phosphate, total suspended and settleable solids, volatile suspended solids, and total recoverable and dissolved copper, chromium, lead, cadmium, zinc, silver and nickel (see **Appendix 5.2**). The frequency of time composite monitoring is dependent on "Waters of the State" designation. "Waters of the State" are monitored monthly and during storms. Other channels in the network are monitored during storms only.

Time composite monitoring is supported by the Principal Permittee's precipitation and streamgaging network which consists of recording and/or transmitting ALERT gages. Mechanical recording raingages are weighing bucket type. Accumulated rainfall is recorded in analog format on drum charts. The ALERT precipitation gages are tipping bucket type with dataloggers. Data are recorded and transmitted in digital format; sensitivity is 1 mm (0.04 inches) of accumulated rainfall.

The Principal Permittee uses several types of streamgages to monitor changes in water level. The oldest design is the stilling well with water level float; the newer types are manometer gages or pressure transducers. Data (water level versus time) are recorded on stripcharts. The ALERT interface to these gages consists of a connection from the recorder chart drive to an ALERT shaft encoder. ALERT information is recorded on a datalogger and transmitted to the Principal Permittee Katella yard base station in digital format. Sensitivity of the transmitted and recorded ALERT record is user-variable with the greatest sensitivity being a change in water level of 0.01 feet.

5.3.2 Harbor/Bay Monitoring

Harbor/bay monitoring is conducted semiannually and during storms (see **Appendix 5.3**). Monthly sampling in the Upper Newport Bay is also conducted to evaluate nutrient loading from the San Diego Creek. Monthly monitoring of nitrogen and phosphorus in the sediments of the Upper Newport Bay was added in 99/00 to assist with the critical aquatic resource evaluation. The semiannual monitoring includes sampling for nutrients in the water column, and trace metals and organic contaminants in the sediments. Storm monitoring consists of surface water sampling for nutrient concentrations and depth-integrated sampling to evaluate the magnitude of heavy metal contamination in the water column.

5.3.3 Semiannual Sediment Sampling

On a semiannual schedule, sediment samples are collected from the channels and several locations in the harbors and bays (see **Table 5.2**) to evaluate concentrations of copper, chromium, cadmium, lead, zinc, silver, nickel, chlorinated hydrocarbon and organophosphate pesticides, herbicides, PCBs, and Polynuclear Aromatic Hydrocarbons (PAHs). The data from these samplings is contained in **Appendix 5.4**.

5.4 Methods of Data Analysis

Acute and chronic aquatic toxicity criteria from the California Toxics Rule (CTR) were used as guidance to evaluate dissolved metals data collected from storm channels and harbors. Water quality criteria from the CTR and other sources are presented in **Table 5.4.**

Sediment quality criteria from the National Oceanographic and Atmospheric Administration's (NOAA) Effects Range database were used as guidance to evaluate the toxicity of sediments in the harbors and bays. The Southern California Coastal Water Research Project's (SCCWRP) iron normalization procedure was also used evaluate harbor sediment quality relative to statistically predicted anthropogenic amounts of trace metals. A summary of the sediment guidance criteria is found in **Table 5.5**.

5.4.1 Comparison to Water Quality Guidance

California Water Code Section 13170 authorizes the State Water Resources Control Board (SWRCB) to adopt water quality control plans for waters where standards are required by the Federal Clean Water Act (CWA) and its 1987 amendments, the Water Quality Act (WQA). According to Section 303(c)(2)(B) of the CWA, these plans must contain water quality objectives for priority pollutants that could be reasonably expected to affect the beneficial uses of the waters of the State.

On March 2, 2000, the State adopted the United States Environmental Protection Agency's (USEPA) Proposed Rules establishing numeric water quality criteria for priority toxic pollutants (commonly referred to as the California Toxics Rule (CTR)) for the State of California. The CTR sets criteria for dissolved heavy metals in freshwater that are based on water hardness. Criteria for saltwater are also established. Although the CTR has not been formally implemented during the entire reporting period, the dissolved metals data were compared to the acute and chronic criteria for guidance purposes. **Table 5.6** presents these guidance criteria for freshwater relative to water hardness. The saltwater guidance criteria are found in **Table 5.4**.

In applying the CTR criteria to freshwater, if the time period to which the guidance applies is less than the length of the sampled period, a measured concentration greater than that guidance value will constitute an exceedance. For example, if the 1-hour guidance for lead (at a hardness of 100 mg/L as $CaCO_3$) is 65 µg/L, a concentration of 68 µg/L during a 24-hour period will be considered an exceedance of the guidance criterion.

In computing the mean concentration during a sampled period with multiple composite samples, values below the detection limit were assumed to be zero. This assumption allows for a more consistent evaluation from year to year as detection limits are lowered with alternative methods of analyses or new technology. The assumption also gives greater confidence to a designation of an exceedance of a guidance criterion as it reduces the likelihood that the exceedance was caused by an erroneous estimation of a non-detected value. During this monitoring year the low detection limits achieved by the contract laboratory did not make this approach an issue.

With respect to the saltwater guidance from the CTR, the average concentrations of dissolved metals in depth-integrated samplings from each 4-day storm monitoring of the Harbors and Bays were compared to the 4-day guidance criteria. The dissolved metals concentrations in each grab sample were compared to the 1-hr acute toxicity guidance criteria. There is no chronic guidance criterion for silver so only the acute criterion was used. Since total chromium was analyzed only the Chromium III criteria were used.

5.4.2 Mass Load Calculations

Mass loads were calculated using chemical and hydrographic data. **Appendix 5.1** contains watershed maps for all of the channels monitored to date, with automatic samplers. On each map, the watershed boundary upstream of the monitoring site, hydrographic (water level station) and representative precipitation station are shown. Water level records from streamgaging stations at or near the sampling site were processed using Western Hydrologic Software. Water levels from the station's continuous stripchart recorder were digitized and converted to discharge rates using stage-discharge relationships (channel ratings). The digitized streamflow record was converted to ASCII format and imported to a Microsoft Excel file. Graphs of time vs. water level stage are contained in **Appendix 5.5**. The total discharge in acre-feet during each sampled period was computed. By multiplying the total water discharge per sampled period by the pollutant concentration of the composite sample from the period and applying the proper conversion factors (acre-feet to lbs. of water), a mass load in pounds or tons of contaminant was calculated. For data reported as ND (non-detected), one-half of reported laboratory detection limits were used in the calculations. **Appendix 5.6** contains the mass load data from each monitored storm. **Table 5.7** is an annual summary.

5.4.3 Event Mean Concentrations (EMCs)

Event mean pollutant concentrations were calculated to produce a site mean EMC that could be used in the estimation of the mass loads from unsampled storms. To calculate the EMC of a monitored storm the sum of the mass load from each composite sampling during a storm was divided by the total sampled volume of water during the same period. After applying the appropriate conversion factors, an event mean concentration in mg/L or µg/L was calculated. The site mean EMCs were updated each year (**Appendix 5.7**) with the EMC data from that year. **Table 5.8** contains the calculated EMCs of each monitored storm during the 99-00 season.

5.4.4 Statistical Methods

Site mean EMCs were used to estimate mass loads from unsampled storms. To estimate these mass loads, the site mean EMC for a stormwater contaminant from a particular station was multiplied by the total annual volume of water discharged during unsampled storms, and the appropriate conversion factors. The site mean EMC was calculated from the set of calculated EMCs from each sampled storm from the beginning of the NPDES program. Only EMCs in which the 75-120% of the total storm runoff volume was sampled were used in the calculation. Each year the site means were updated with the data from that year.

The distribution of each EMC dataset was first evaluated for normality using the W Test developed by Shapiro and Wilk (1965). The W statistic was compared to a tabled value for a given value of α. To calculate W, the data from each station was first ordered from smallest to largest to obtain the sample order statistics $x_1 \leq x_2 \ldots \leq x_n$. k was then calculated from n where:

$$k = \frac{n}{2} \text{ if n is even or}$$

$$k = \frac{n-1}{2} \text{ if n is odd}$$

$$W = \frac{1}{d}\left[\sum_{i=1}^{k} a_i \left(x_{(n-i+1)} - x_i\right)\right]^2$$

where $$d = \sum_{i=1}^{n}(x_i - \bar{x})^2 = \sum_{i=1}^{n} x_i^2 - \frac{1}{n}\left(\sum_{i=1}^{n} x_i\right)^2$$

Values of a_i were found in Table A6[1]. If the calculated W was less than the tabled value at the a (0.05) significance level, the null hypothesis was rejected and the distribution was considered normal. If the distribution was not normal at the α significance level the data was log-transformed and the W test was repeated to test for log-normality. If the distribution was not lognormal, the dataset was inspected for possible outliers. The Dixon test (for n < 25) was used to determine if the suspected points were outliers to a normal distribution. The procedure was performed as follows:

[1]Gilbert, Richard O. Statistical Methods of Environmental Pollution Monitoring, 1987. Van Nostrand Reinhold, p259.

The dataset was ordered from smallest to largest that is $X_1 < X_2 < X_3 < \ldots X_n$. The Dixon ratio r, which is a function of n was calculated.

Number of Points	Ratio Calculated
n = 3 to 7	r_{10}
n = 8 to 10	r_{11}
n = 11 to 13	r_{21}
n = 14 to 25	r_{22}

Depending on which point was suspected of being the outlier, the ratio was calculated in the following manner:

r	If X_n is Suspect	If X_1 is Suspect
r_{10}	$(X_n-X_{n-1})/(X_n-X_1)$	$(X_2-X_1)/(X_n-X_1)$
r_{11}	$(X_n-X_{n-1})/(X_n-X_2)$	$(X_2-X_1)/(X_{n-1}-X_1)$
r_{21}	$(X_n-X_{n-2})/(X_n-X_2)$	$(X_3-X_1)/(X_{n-1}-X_1)$
r_{22}	$(X_n-X_{n-2})/X_n-X_3)$	$(X3-X_1)/X_{n-2}-X_1)$

Using Table A.7[2], the calculated ratio was compared to the critical value at a confidence level of 95%. If the calculated value was greater than the tabled value the suspected point was rejected and the distribution was retested to confirm normality.

For normal distributions the mean is calculated as the arithmetic mean, that is

$$\bar{x} = \frac{1}{n}\sum_{i=1}^{n} x_i$$

the confidence limits for the mean of a normal distribution with unknown variance is given by

$$\bar{x} - t_{(1-\alpha/2,n-1)}\frac{s}{\sqrt{n}} \le \mu \le \bar{x} + t_{(1-\alpha/2,n-1)}\frac{s}{\sqrt{n}}$$

where s is the standard deviation of the dataset and $t_{(1-\alpha/2,n-1)}$ is from table A2[3]. Using $\alpha = 0.05$ the upper and lower limits are calculated. The true mean μ will occur outside of this range 5% of the time.

[2]Taylor, John Keenan. Statistical Techniques for Data Analysis, 1990. Lewis Publishers, Inc., p168.
[3]Gilbert, Richard O. Statistical Methods of Environmental Pollution Monitoring, 1987. Van Nostrand Reinhold, p255.

For lognormal distributions the arithmetic mean and standard deviation of the log-transformed data were first computed. The estimate of the mean is given by the minimum variance unbiased estimate μ_l which is defined as

$$\mu_1 = [\exp(\bar{x})]\Psi_n\left(\frac{s^2}{2}\right)$$

where $\Psi_n(t)$ is the infinite series defined by

$$\Psi_n(t) = 1 + \frac{(n+1)t}{n} + \frac{(n+1)^3 t^2}{2!n^2(n+1)} + \frac{(n-1)^5 t^3}{3!n^3(n+1)(n+3)} + \frac{(n-1)^7 t^4}{4!n^4(n+1)(n+3)(n+5)} + \bullet\bullet\bullet$$

$\frac{s^2}{2}$ is substituted for t and values for Ψ_n are calculated using formulas in a Microsoft EXCEL 7.0 spreadsheet.

The lower confidence limit of the mean is given by

$$LL_\alpha = \exp\left(\bar{x} + 0.5s^2 + \frac{sH_\alpha}{\sqrt{n-1}}\right)$$

and the upper limit is given by

$$UL_{1-\alpha} = \exp\left(\bar{x} + 0.5s^2 + \frac{sH_{1-\alpha}}{\sqrt{n-1}}\right)$$

The values of H_α and $H_{1-\alpha}$ were found in Table A10 - A13[4]

The sample median of each normal distribution was calculated by first ordering the sample population from smallest to largest.

$$\text{sample median} = x_{(n-1)/2} \quad \text{if n is odd}$$

$$= \frac{1}{2}\left(x_{(n/2)} + x_{(n+2)/2}\right) \quad \text{if n is even}$$

[4]Gilbert, Richard O. Statistical Methods of Environmental Pollution Monitoring, 1987. Van Nostrand Reinhold, pp264-265.

The true median of a lognormal distribution can be estimated by

$$M_2 = \exp(\bar{x})\Psi_n(t)$$

where $\Psi_n(t)$ is the infinite series described above. In this case the value of $t = -s^2/[2(n-1)]$.

5.4.5 Assessing Anthropogenic Influence in Harbor Sediments

The Southern California Coastal Water Research Project (SCCWRP) database for iron normalization[5] was used to determine the presence of anthropogenic enrichment in sediments collected from Orange County harbors. SCCWRP developed regression equations for the each relationship between a heavy metal and the percentage of iron in sediments collected from non-impacted sites in the Southern California Bight. 99% confidence limits (2 standard deviations) were calculated for each regression equation. Concentrations of heavy metals greater than the upper confidence limits are considered to be the result of anthropogenic enrichment.

5.5 Analysis of Data

5.5.1 Program Implementation

As in the previous season the below average rainfall in Orange County limited the stormwater runoff monitoring during this season. **Figure 5.1** shows the total annual rainfall at three sites in Orange County during the last six seasons. **Figure 5.2** shows the accumulated rainfall per season measured at the Principle Permittee gauge in Santa Ana. As can be seen by the 99/00 season graph, precipitation fell primarily during the period from mid-January to mid-April of 2000. The shortness of this period compounded with the problem of limited rainfall and runoff made completion of all intended stormwater runoff monitoring difficult. Only 9 of the intended 20 stormwater samples from the Prima Deschecha Channel were collected. In the Nutrient TMDL RMP the annual frequency for sampling of storms at 11 channels in the Upper Newport Bay watershed is 3 storms per year. Since the program was implemented in February of 2000, the goal was to sample at least 2 storms per site during the remainder of the monitoring year. This was accomplished at 9 of the 11 sites. The annual frequency of storm sampling in the harbors is two storms per year per harbor. Newport Bay was sampled during two storms this season. Dana Point Harbor and Huntington Harbour were each sampled during only one storm.

[5] Southern California Coastal Water Research Project. Annual Report, 1996. Southern California Coastal Water Research Project Authority, pp68-76.

5.5.1 "Warm Spot" Monitoring

With some exceptions related to limited rainfall, samples from each designated "Warm Spot" were collected at the annual frequencies defined by the power analysis used in developing the 99-04 Plan. According to the power analysis significant trends will not be observed for several years. As stated in the 98/99 Annual Status report, Rattlesnake Canyon Wash was rerouted to Hicks Canyon Wash. The site on Bryan Avenue to which the "Warm Spot" designation was assigned does not receive runoff from this channel in its present configuration. In the 98/99 Annual Report it was stated that Rattlesnake Canyon Wash would not be monitored as a "Warm Spot". The high concentrations of total suspended solids observed in stormwater at the previous location may however also be present at the new point of discharge to Peters Canyon Wash. During the Peters Canyon Wash / San Diego Creek Nutrient Study in June 2000, significant concentrations of sediment were observed intermittently in the discharge from Rattlesnake Canyon Wash into Peters Canyon Wash. Samples will be collected in the upcoming year to determine if this is a chronic occurrence or just the product of the construction instability in the immediate watershed.

5.5.2 Critical Aquatic Resources (CARs) Monitoring

The Upper and Lower Newport Bay and the San Diego Creek were assigned the top monitoring priority in the 99-04 Plan. The monitoring of these areas included routine NPDES and TMDL sampling as described in **Table 5.2** and special studies including the 1999 and 2000 Peters Canyon Wash / San Diego Creek Nutrient Studies and the model urban watershed study of Costa Mesa Channel.

Upper Newport Bay Watershed

The mass loads of nutrients and total recoverable metals were calculated for each storm monitored with an automatic sampler and streamgage. In the Upper Newport Bay Watershed loads were calculated for sampled stormwater runoff in Santa Ana Delhi Channel, El Modena Irvine Channel, Lane Channel, Peters Canyon Wash, San Diego Creek at Harvard Avenue, and San Diego Creek at Campus Drive. Data from the first storm of the season impacting Huntington Harbour / Bolsa Bay were also collected. The mass load information for each sample from every storm is contained in **Appendix 5.6**. The total annual stormwater discharge volumes from Santa Ana Delhi Channel, Peters Canyon Wash, San Diego Creek at Harvard, and San Diego Creek at Campus Drive were calculated from Principle Permittee's streamgaging records. Using these volumes and the updated site mean EMCs from **Appendix 5.7** the unsampled stormwater loads from each of these channels was calculated. **Table 5.9** is a summary of the sampled and unsampled loads from the Newport Watershed.

The dissolved metals concentrations from several storm and non-storm events were compared to the guidance criteria from the CTR for the protection of freshwater aquatic life. In all, 109 samples including 39 dry weather samples from the Upper Newport Bay Watershed were compared to the CTR criteria. The majority (34 of 39) of the dry weather sampling was conducted at the Costa Mesa Channel. The acute criteria for dissolved copper were exceeded in 23 of the samples including 15 (5 dry weather) samples from the Costa Mesa Channel. The acute criteria for zinc were exceeded in 8 of the samples. Ten composite samplings, including two dry-weather samplings from Costa Mesa Channel, were compared to the chronic toxicity guidance criteria from the CTR. One exceedance of the dissolved lead criteria was observed and 2 exceedances of the dissolved copper criteria were observed.

For channels discharging directly to the Newport Bay, dissolved metals concentrations were compared to the guidance criteria for saltwater from the CTR. Out of 77 samples, 75 exceeded the acute toxicity guidance criterion for copper and 14 exceeded the acute toxicity guidance criterion for zinc. Of the 6 composite periods that were evaluated against the chronic toxicity guidance criteria for the protection of saltwater aquatic life, all exceeded the guidance criterion for copper and 1 exceeded the criterion for zinc. **Table 5.10** is a summary of exceedances to the CTR that were found in the storm channels during this monitoring year.

Two intensive studies of nutrient concentrations and loads were conducted in the watersheds of Peters Canyon Wash and San Diego Creek. One was conducted at the end of the summer season in 1999 (September 1999) and the other was conducted at the beginning (June 2000) of the 2000 summer season. Each study spanned seven days and utilized automatic sampling and continuous flow monitoring equipment to quantify the nitrogen and phosphate loads contributed by tributaries of Peters Canyon Wash. Automatic samplers were also used to quantify the load from San Diego Creek at Harvard Avenue and Campus Drive. The results from Campus Drive were used to extrapolate the summertime total nitrogen load for comparison to the December 31, 2002 TMDL target set by the Santa Ana Regional Water Quality Control Board. From these two studies it was concluded that:

- The flowrates in Peters Canyon Wash at Barranca Parkway and San Diego Creek at Campus Drive were greater in the June 2000 study. The 43% increase (7.81 to 11.16 cfs) at Campus Drive was primarily due to the increase in the outflow from the Irvine Ranch Water District's (IRWD) wetland treatment project for nitrate removal. In 1999 the average inflow into the wetlands exceeded the outflow by more than 3 cfs. During the June 2000 study the average inflow and outflow were more in equilibrium with outflow exceeding inflow by only 0.4 cfs.

- The average nitrate nitrogen concentration in San Diego Creek at Campus Drive was 2.84 mg/l in June 2000 compared to 9.04 in September 1999. The total nitrogen concentrations were 6.45 and 10.31 mg/l for June 2000 and September 1999 respectively.

- The average daily nitrate nitrogen loads from Peters Canyon Wash at Barranca Parkway were 319 and 328 lbs/day for September 1999 and June 2000 respectively. The average daily total nitrogen load was 352 and 367 lbs/day for September 1999 and June 2000 respectively.

- The average reduction in nitrate concentration of water treated from San Diego Creek by IRWD's wetlands was 92% (from 33.2 to 2.7 mg/l) compared to 77% observed in the previous study. The average reduction in total nitrogen was about the same between studies (62% in June 2000 and 59% in September 1999).

- The average daily nitrate nitrogen loads from San Diego Creek at Campus Drive were 382 and 169 lbs/day for September 1999 and June 2000. The average daily total nitrogen loads were 435 and 376 lbs/day for September 1999 and June 2000 respectively. The latter study showed a decrease in nitrate concentration and load from the previous study but an increase in organic nitrogen concentration and load. The increase in organic nitrogen was primarily due to the increase in outflow from the IRWD wetlands (see above). The decrease in nitrate nitrogen load is most likely the result of a substantial increase in efficiency of nitrate removal by the wetlands and a reduction in the loads contributed by Reach 2 of San Diego Creek, San Joaquin and Sand Canyon Channels.

- Using the June 2000 data to estimate the summertime (April 1 – September 30) total nitrogen load from San Diego Creek yields a value lower than that calculated from the September 1999 data. Both are less than one-half of the December 31, 2002 target of 200,097 pounds developed by the Regional Board. The estimates were compared to the average monthly load calculated from NPDES data collected from San Diego Creek by Orange County between July 1, 1999 and June 30, 2000. Using the study values for June and September and the NPDES values for the remaining four months yields a total of 116,000 pounds. Without IRWD's removal of approximately 125 lbs/day the total nitrate nitrogen load would be approximately 139,000 pounds, still well below the December 2002 target.

The complete reports for the two nutrient studies can be found in **Appendix 5.8**.

Newport Bay

The Newport Bay was sampled during two storms. Beginning in monitoring year 97/98 dissolved metals analyses were conducted on depth integrated stormwater samples from the bays. The dissolved metals data from each storm were compared to water quality guidance criteria (acute and chronic toxicity) from the CTR. Values below detection limits were considered zero when calculating means. Means calculated from detection limit values are preceded by a ">" in **Appendix 5.3**. Nearly every sample contained copper above the acute toxicity guidance criterion of 3.1 µg/L. The four-day average concentrations at each site exceeded the chronic toxicity guidance criterion of 4.8 µg/L. The dissolved metals data from these storms, as in previous years show exceedance of the CTR saltwater guidance criterion for copper.

These results suggest that toxicity testing be initiated in the future to determine if the Bay's beneficial uses are being impaired by dissolved copper.

In addition to nutrient and heavy metal monitoring, bacteriological sampling was also conducted during these storms. **Figures 5.3** and **5.4** show the concentrations of total and fecal coliform bacteria at the water surface of each the monitoring locations. Rainfall occurred during each of the three days of the first storm runoff event sampling in February (**Figure 5.3**). In the March sampling rainfall was measured only on the first day of sampling and on the day between the first and second samplings. As in previous years the concentration of bacteria diminishes from the first to the third day of sampling. This diminution can be seen very clearly in **Figure 5.4**.

Dry weather monitoring of bacteriological quality was also conducted in the Upper Newport Bay. Figure 5.5 shows the total and fecal coliform concentrations at four Upper Bay station on June 2, 2000. Also shown is the concentration of total and fecal coliform during 5 dry weather sampling days at the uppermost station UNBJAM. These data show that the concentrations of bacteria are greatest near the mouth of San Diego Creek.

Time series plots of the tributary discharge, precipitation and tide stage during each monitored storm can be found in **Appendix 5.9**.

Costa Mesa Channel

The Costa Mesa Channel was selected as a model urban runoff site for the Upper Newport Bay watershed. Its watershed is approximately one square mile in area and has predominately urban land uses within it. Monitoring during this year included weekly sampling of nutrients, dissolved metals and bacteria, monthly sampling for the organophosphorus pesticides Diazinon and Chlorpyrifos, and continuous water level measurements.

As stated in Section 5.6.2.1, all of the dissolved copper and over 70% of the dissolved zinc concentrations in Costa Mesa Channel would exceed the CTR acute toxicity criteria for saltwater at the interface of the channel and the Upper Newport Bay.

Figure 5.6 is plot of the fecal coliform concentration throughout the year. As can be seen from the graph the fecal coliform concentration were extremely variable with a range of <2 to 240,000 MPN / 100 ml and a logmean of approximately 4,100 MPN / 100 ml.

Diazinon was found above the detection limit (0.05 μg/l) of the laboratory in nearly every sample. Over one third of the samples had concentrations greater than the LC_{50} for the freshwater toxicity testing organism *Ceriodaphnia dubia*[6]. **Figure 5.7** is a summary of the diazinon sampling. Chlorpyrifos was not detected in any sample from this monitoring year. However, for over 40% of the samples, the detection limit of the laboratory was greater than the LC_{50} for *Ceriodaphnia* and all reported detection limit were greater than the LC_{50} for the saltwater toxicity testing organism *Mysidopsis bahia*.

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[6] **Lee, G. Fred, Evaluation Monitoring Report for San Diego Creek, 1998, Table 6-3.**

Construction Circle Drain

During the 1999 nutrient study (see above) the discharge from the Construction Circle Storm Drain was intermittently contaminated with what was believed to be concrete slurry. In June of 2000 an automatic sampler was used to characterize the discharge from this drain. Each hourly sample was analyzed for electrical conductivity and pH. Concrete slurry tends to be highly alkaline. Figure 5.8 shows the results of the sampling that spanned a two-week period from June 19 to July 2, 2000. As can be seen from the graph of pH vs. time, spikes of high pH occurred between 6:00 and 7:00 A.M. and 3:00 to 4:00 P.M. These spikes may have been the result of washing of concrete delivery trucks at the beginning and end of the workday. A more extensive investigation has been planned for November of 2000.

Nutrient TMDL Sampling

In February of 2000, the Regional Monitoring Program (RMP) for the Nutrient TMDL was initiated. Chemical sampling for nutrients during storms and dry weather was conducted according to the frequencies outlined in RMP report. The data from this sampling is contained in **Appendix 5.10.** A contract for training to conduct algal biomass surveys was established and the first survey was conducted in July of 2000.

5.5.3 Semiannual Sediment Sampling

Beginning in 97/98 analyses for iron concentration and particle size distribution were conducted on sediment samples collected from the bays and harbors. These additional analyses were added to provide information that could be used to explain differences between stations or between samplings at the same station.

Particle size distribution data from the basin downstream of Campus Drive show that the sediment after the El Nino season was predominately sand. Prior to the El Niño year the sediment was approximately 70% sand; three subsequent samples collected in the Summer of 1998, Fall of 1998, Spring of 1999, and Fall of 1999 show 97%, 96%, 99%, and 99% sand respectively. After in-channel basin maintenance by IRWD, the Spring 2000 sample was 77% sand.

SCCWRP's iron normalization procedure was again used to determine the presence of trace metal enrichment in the sediments from the bays and harbors. Using the regression equations and 99% prediction intervals (**Table 5.5**) it was determined that almost every site in Huntington Harbour and Dana Point Harbor was anthropogenically (caused by the actions of man) enriched with lead, copper, and zinc. The Rhine Channel showed similar results. Interestingly the Fall 1999 samples from the Upper Newport Bay showed less influence than the Spring 1999 and Spring 2000 samples. This observation may have been a product of the recent dredging project. The furthest upstream sampling point in the Upper Bay (UNBJAM) showed almost no anthropogenic influence. This observation may be due to limited sedimentation of finer stormwater particulates contaminated with metals or less influence by powered recreational boats in the area.

The database for harbor and bay sediments was evaluated using NOAA's guidance criteria for sediment toxicity. These criteria are used by SCCWRP in assessing the toxicity of sediments collected from the Southern California Bight. Concentrations of metals and organic compounds from Newport Bay, Bolsa Bay, Huntington Harbour and Dana Point Harbor were compared to NOAA's ER-Ms (Effects Range Median). An ER-M is a predicted concentration at which half of the test organisms in a toxicity test would show a toxic effect.

No exceedances of the ER-Ms for metals were found in the samples collected during this monitoring year. Exceedances of the ER-M for the DDT metabolite p,p' DDE were found in the samples collected Huntington Harbour (see **Appendix 5.4).**

5.6 Quality Assurance/Quality Control

The quality of data produced by each of the three contractor laboratories was evaluated by submitting quality control samples with environmental samples. Most of the samples submitted were synthetic, comprised of aliquots of prepared standard solutions in nanopure water matrices. QC sample conductivities were adjusted to levels similar to environmental samples with Ultrex grade sodium chloride. These synthetic samples were used to assess the accuracy of each laboratory. Replicate samples were also submitted to evaluate the precision of the laboratories.

The contractor laboratories conduct internal quality control programs utilizing certified reference materials (CRMs), spiked and replicate samples.

The results of the quality assurance program with the contract laboratory are summarized in **Appendix 5.11.** The allowable range of percent recovery for synthetic and samples is set at 70 - 130 for concentrations above 5 times the detection limit. For replicate samples in which the highest reported value exceeded 5 times the detection limit, the allowable range was set at 75-125 percent. For blank sample analyses the allowable range was dl to 3(dl). Those results outside these ranges are boxed in the appendix.

For the most part the analytical performance of each laboratory was acceptable. A consistent problem with low recoveries of TKN was observed in the analysis of synthetic saltwater samples. In approximately 36% of the saltwater QA samples TKN was reported below the acceptable lower limit of recovery. For freshwater QA samples, TKN was reported lower than the acceptable lower limit of recovery only 13% of the time.

The results of the submittal of the quality assurance samples were used to improve the quality of the database. If an analysis showed a substantial (greater than 100%) deviation from the true value, the contract laboratory was asked to rerun the batch of samples containing that QA/QC sample. In almost all cases, the re-analyses resulted in an amended report. If the differences could not satisfactorily resolved the data were not stored in the database.

Most of the errors (except TKN) appear to be of a random nature (deviations from the true value were both positive and negative). In performing mass load and EMC calculations it was assumed that the data exhibiting these random errors are uniformly distributed about the mean. In calculating site means (see Section 5.4.4) values in the database that appeared to be outliers were screened using the Dixon Test. If these points did not pass this statistical test they were not used in the calculation.

Table 5.1
NPDES and TMDL Monitoring Locations

	Warm Spot	CAR	TMDL	Waterbody	Location of Site	Station Code
Upper Newport Bay Watershed			X	El Modena Irvine Channel	at Michelle Dr.	MIRF07
			X	Lane Channel	at Jamboree Blvd.	LANF08
	X		X	Agua Chinon Wash	at Pacifica	ACWF18
	X			Central Irvine Channel	at I-5 Fwy.	CICF25
	X			Hines Nursery Channel	at Trabuco / Jefferey	HINF28
				Hicks Canyon Wash	at Culver Dr.	HCWF27
			X	Bonita Canyon Wash	u/s University Ave.	BCF04
		X	X	San Diego Creek	at Campus Dr.	SDMF05
		X	X	San Diego Creek	at Harvard Ave.	WYLSED
			X	Peters Canyon Wash	at Barranca Pkwy.	BARSED
			X	Costa Mesa Channel	at Westcliff Dr.	CMCG02
			X	Santa Ana Delhi Channel	u/s Irvine Ave.	SADF01
		X		San Juan Creek	at Ortega Hwy. In Caspers Park	SJOL01
		X			at La Novia	SJNL01
		X		Aliso Creek	in Laguna / Wood Canyon Wilderness Park	ACJ01
	X			Prima Deschecha Channel	at Calle Vista Grande	PDCM01
	X			Segunda Deschecha Channel	at El Camino Real	SDCM02
	X			Sulphur Creek	d/s Sulphur Creek dam	SCDAM
Upper Newport Bay		X	X		Unit I in-bay basin	UNBJAM
		X	X	Narrows	d/s Unit II In-bay basin	UNBSDC
		X	X	North Star Beach		UNBNSB
		X	X		at PCH bridge	UNBCHB
Lower Newport Bay		X	X	Turning Basin		LNBTUB
	X	X	X	Rhine Channel		LNBRIN
		X	X	Harbor Island Reach		LNBHIR
Sunset Aquatic Park / Anaheim Bay / Huntington Harbour		X		Sunset Aquatic Park	Near U.S. Navy bouys	HUNSUN
		X		Huntington Harbour	approx. 1/4 mi. d/s Bolsa Chica Ch. Mouth	HUNBCC
		X		Huntington Harbour	d/s Warner Ave. near HH Yacht Club dock	HUNWAR
	X	X		Christiana Bay	near outlet of Sunset Channel	HUNCRB
		X		Anaheim Bay	between two breakwaters	HUNHAR
		X		Bolsa Bay	off pier	BBOLR
Dana Point Harbor		X		East Basin	near outlet of 60" RCP	DAPTEB
		X		West Basin	near outlet of 51" RCP	DAPTWB
		X		Launch Ramp	near outlet of 18" RCP	DAPTLB
		X			near boatyard	DAPTLR
		X		Harbor Entrance	between two breakwaters	DAPTHE

Table 5.2
NPDES and TMDL Monitoring Frequencies

Station Code	Nutrients (aq)	Nutrients (sed)	Trace (aq)	Trace (sed)	PHP (s)	PAH (s)	Other Interest
MIRF07	**m/st**						
LANF08	**m/st**						EC(m)
ACWF18	**m/st**				semi		
CICF25	biweekly						
HINF28	biweekly						
HCWF27					semi		
BCF04	**m/st**		st(12)	semi			
SDMF05	w/st		st	semi	semi		op pest (m)
WYLSED	**biweekly**/st		st	semi	semi		
BARSED	**biweekly/st**						
CMCG02	w/st		w/st				bacteria (w/st), op pest (m)
SADF01	**biweekly/st**		st				
SJOL01	m/st		st	semi	semi		
SJNL01	m/st		st	semi	semi		
ACJ01	m/st		st	semi	semi		
PDCM01			st(20)				EC(m)
SDCM02							EC(m)
SCDAM				semi			
UNBJAM	m(s,**m,b**)/st	m	st	semi	semi		bacteria (m/st), debris (st)
UNBSDC	m(s,**m,b**)/st	m	st	semi	semi		bacteria (m/st), debris (st)
UNBNSB	m(s,**m,b**)/st	m	st				bacteria (m/st), debris (st)
UNBCHB	m(s,**m,b**)	m	st				bacteria (m/st), debris (st)
LNBTUB	st		st	semi	semi		
LNBRIN	st		st	5	semi		
LNBHIR	**m(s,m,b)**/st		st	semi	semi		
HUNSUN	semi/st		st				
HUNBCC	semi/st		st	semi	semi		
HUNWAR	semi/st		st	semi	semi		
HUNCRB	semi/st		st	5	semi		
HUNHAR	st		st				
BBOLR	semi/st		st	semi	semi		
DAPTEB	semi/st		st	semi	semi	semi	
DAPTWB	semi/st		st	semi	semi		
DAPTLB	semi/st		st	semi	semi		
DAPTLR	st		st	semi	semi		
DAPTHE	st		st				

(s,m,b) surface, middepth, bottom
s(12) storm sampling - 12 total composite samples per year
bold - nutrient TMDL additions

Table 5.3
Beneficial Uses of Monitored Waterbodies

Bay/Harbor	Station Codes		MUN	AGR	IND	PROC	GWR	NAV	POW	REC1	REC2	COMM	WARM	LWARM	COLD	BIOL	WILD	RARE	SPWN	MAR	SHEL	EST
Anaheim Bay - Outer	HUNHAR		+					X		X	X					X	X	X	X	X		
Anaheim Bay - Seal Beach Nat'l Wildlife Refuge	HUNSUN		+							X[1]	X					X	X	X	X	X		X
Sunset Bay - Huntington Harbor	HUNBCC, HUNCRB HUNWAR		+					X		X	X	X					X	X	X	X		
Bolsa Chica Ecological Reserve	BBOLR		+							X	X					X	X	X	X	X		X
Upper Newport Bay	UNBJAM, UNBSDC UNBBCW, UNBNSB UNBNDB, UNBCHB		+							X	X	X				X	X	X	X	X	X	X
Lower Newport Bay	LNBTUB, LNBTRI, LNBRIN, LNBHIR LNBHAR		+					X		X	X	X					X	X	X	X	X	
Dana Point Harbor	DAPTLB, DAPTLR DAPTEB, DAPTWB DAPTHE				X			X		X	X	X					X	X	X	X	X	

Channel	Station Code	Watershed	MUN	AGR	IND	PROC	GWR	NAV	POW	REC1	REC2	COMM	WARM	LWARM	COLD	BIOL	WILD	RARE	SPWN	MAR	SHEL	EST
Santa Ana Delhi	SADF01	Upper Newport Bay																				
Bonita Canyon Channel	BCF04	Upper Newport Bay	+				I			I	I		I									
San Diego Creek - Harvard	WYLSED	Upper Newport Bay	+				I			I	I		I				I					
San Diego Creek - Campus	SDMF05	Upper Newport Bay	+							X[2]	X		X				X					
Peters Canyon Wash	BARSED	Upper Newport Bay	+				I			I	I		I									
[illegible]nd Canyon Wash	SCCF15	Upper Newport Bay	+				I			I	I		I									
[illegible]e Canyon Channel	BEEF17	Upper Newport Bay	+				I			I	I		I									
Agua Chinon Wash	ACWF18	Upper Newport Bay	+				I			I	I		I									
Serrano Creek	SERF19	Upper Newport Bay	+				I			I	I		I									
Rattlesnake Canyon Wash	RCWF26	Upper Newport Bay	+				I			I	I		I									
Hicks Canyon Wash	HCWF27	Upper Newport Bay	+				I			I	I		I									
E. Costa Mesa Channel	CMCG02	Upper Newport Bay																				
Santa Isabella Channel	SICG03	Upper Newport Bay																				
Big Canyon Wash	BCWG04	Upper Newport Bay																				
Laguna Canyon	LCW102	South County	+	X						O	X		X				X					
Aliso Creek Channel	ACJ01	South County	+	X						O	X		X				X					
Sulphur Creek Channel	SCDAM	South County	+	X						O	X		X				X					
San Juan Creek - La Novia Ave	SJNL01	South County	+	X	X					X	X		X		X		X					
San Juan Creek - Ortega	SJOL01	South County	+	X	X					X	X		X		X		X					
Trabuco Creek	TCOL02	South County	+	X	X					X	X		X		X		X					
Oso Creek	OSOL03	South County	+	X	X					X	X		X		X		X					
Prima Deschecha	PDCM01	South County	+	X						O	X		X				X					
Segunda Deschecha	SDCM02	South County	+	X						O	X		X				X					
Santa Ana River - Imperial	SARIMP	Santa Ana River	+				X			X	X		X				X	X				
Santa Ana River - 5th Street	SARE01	Santa Ana River	+							X[2]	X		I				I					
Santiago Creek	SANE08	Santa Ana River	X				X			X[3]	X		X				X					
Silverado Creek	SILE17	Santa Ana River	X				X			I	I		I				I	I				

X - Present or Potential Beneficial Use
1 - No access per agency with jurisdiction (U.S. Navy)
2 - Access Prohibited in all or part by PFRD
I - Intermittent Beneficial Use
* - Excepted from MUN
o - Potential Beneficial Use
This information was taken from the 1994 update of the beneficial uses & water quality objectives for the San Diego Region and the 1995 Santa Ana River Basin Plan update.

Table 5.4
Applicable Water Quality Guidance for the Protection of Aquatic Life

Water Quality Measurement	California Toxics Rule (CTR) Freshwater dissolved metals (Guidance only) H=ln(water hardness in mg/L as $CaCO_3$)	CTR Saltwater Dissolved metals	Ocean Plan Toxic Mat. Limits Total metals	Region 8/9 Basin Plans
Lead ug/L H=ln Hardness	4 day =[1.462-0.146H][exp(1.273H-4.705)] 1 hour =[1.462-0.146H][exp(1.273H-1.460)]	4day = 8.1 1hr = 210	Daily max = 8 Inst. max = 20	
Cadmium ug/L	4 day = [1.107-0.042H][exp(0.7852H-2.715)] 1 hour = [1.137-0.042H][exp(1.128H-3.6867)]	4day = 9.3 1hr =42	Daily max = 4 Inst. max = 10	
Hexavalent Chromium ug/L		4day = 50 1hr = 1100	Daily max = 8 Inst. max = 20	
Nickel ug/L	4 day = 0.997[exp(0.846H+0.0584)] 1 hour = 0.998[exp(0.846H + 2.255)]	4day = 8.2 1hr = 74	Daily max = 60 Inst. max = 150	
Copper ug/L	4 day = 0.96[exp(0.8545H-1.702)] 1 hour = 0.96[exp(0.9422H-1.70)]	4day = 3.1 1hr = 4.8	Daily max = 12 Inst. max = 30	
Silver ug/L	1 hour = 0.85[exp(1.72H-6.52)]	1hr = 1.9	Daily max = 2.8 Inst. max = 7	
Zinc ug/L	4 day = 0.986[exp(0.8473H+0.884)] 1 hour = 0.978[exp(0.8473H+0.884)]	4 day = 81 1 hr = 90	Daily max = 80 Inst. max = 200	
Turbidity				Natural / Max. increase 0-50 NTU / 20% over natural 50-100 NTU / 10 NTU >100 NTU / 10% over natural
pH				6.5 - 8.5 freshwater 7.0 - 8.5 saltwater
Dissolved Oxygen				>5.0 mg/L MAR & WARM >6.0 mg/L COLD
Unionized Ammonia*				0.025 in receiving waters

$$* \text{ [Unionized Ammonia]} = \frac{[NH3\text{-}N]}{10^{(pka-pH)} + 1}$$

$$\text{where pka} = 0.09018 + \frac{2729.92}{T}$$

NH3-N = Total Ammonia as N
T = water temperature in Kelvin (C + 273.16)
pH = water pH

For example : at 20 C and pH 8.0 divide the ammonia nitrogen value by 26.25 to obtain unionized ammonia.
at 25 C and pH 9.0 divide by 2.76.

Table 5.5
Guidance Criteria for Harbor Sediment Evaluation

NOAA's Screening Concentrations

Metals (ppm)	ER-L	ER-M
Cadmium	1.2	9.6
Chromium	81	370
Copper	34	270
Lead	46.7	218
Nickel	20.9	51.6
Silver	1.0	3.7
Zinc	150	410
Organics (ppb)		
Acenaphthene	16	500
Acenaphthylene	44	640
Anthracene	85.3	1100
Fluorene	19	540
2-Methyl naphthalene	70	670
Naphthalene	160	2100
Phenanthrene	240	1500
Low molecular weight PAH	552	3160
Benzo(a)anthracene	261	1600
Benzo(a)pyrene	430	1600
Chrysene	384	2800
Dibenzo(a,h)anthracene	63.4	260
Fluoranthene	600	5100
Pyrene	665	2600
High molecular weight PAH	1700	9600
Total PAH	4022	44792
p,p' -DDE	2.2	27
Total DDT	1.58	46.1
Total PCBs	22.7	180

ER-L - Effects Range Low

The ERL represents the concentration corresponding to the 10th percentile in toxicity testing. No effects are likely below the ER-L.

ER-M - Effects Range Median

The ERM represents the concentration corresponding to the 50th percentile or median value. Effects are likely above the ER-M.

SCCWRP Iron Normalization Regression Coefficients

Iron (% dry) versus	Sample Size	r^2	Slope (m)	Intercept (b)	± 99% Prediction Interval
Cadmium (µg/dry g)	83	0.734	0.0978	0.0055	0.1274
Chromium (µg/dry g)	88	0.882	16.50	-0.021	11.56
Copper (µg/dry g)	96	0.833	7.40	-2.01	6.50
Lead (µg/dry g)	103	0.738	4.350	0.0836	5.199
Nickel (µg/dry g)	110	0.533	9.850	-0.407	19.596
Silver (µg/dry g)	99	0.581	0.0795	-0.0183	0.1426
Zinc (µg/dry g)	88	0.967	31.50	-1.95	15.45

Table 5.6
California Toxics Rule for Dissolved Metals in Freshwater

HARDNESS mg/L as CaCO3	ln Hardness	Lead 1 hr µg/L	Lead 4 day µg/L	Cadmium 1 hr µg/L	Cadmium 4 day µg/L	Chromium III 1 hr µg/L	Chromium III 4 day µg/L	Nickel 1 hr µg/L	Nickel 4 day µg/L	Copper 1 hr µg/L	Copper 4 day µg/L	Silver Inst µg/L	Zinc 1 hr µg/L	Zinc 4 day µg/L
10	2.30	4.91	0.19	0.35	0.41	83.25	27.00	67	7	1.54	1.25	0.07	17	17
20	3.00	10.79	0.42	0.74	0.68	146.86	47.64	120	13	2.95	2.26	0.22	30	30
30	3.40	17.04	0.66	1.16	0.92	204.70	66.40	169	19	4.32	3.20	0.43	42	43
40	3.69	23.51	0.92	1.58	1.14	259.09	84.05	216	24	5.67	4.09	0.71	54	54
50	3.91	30.14	1.17	2.01	1.34	311.04	100.90	260	29	6.99	4.95	1.05	65	66
60	4.09	36.88	1.44	2.45	1.53	361.14	117.15	304	34	8.31	5.79	1.43	76	77
70	4.25	43.71	1.70	2.90	1.72	409.73	132.91	346	38	9.60	6.60	1.87	87	87
80	4.38	50.61	1.97	3.35	1.90	457.08	148.27	388	43	10.89	7.40	2.35	97	98
90	4.50	57.57	2.24	3.80	2.07	503.37	163.29	428	48	12.17	8.18	2.88	107	108
100	4.61	64.58	2.52	4.26	2.24	548.74	178.00	468	52	13.44	8.96	3.45	117	118
110	4.70	71.63	2.79	4.73	2.40	593.29	192.46	508	56	14.70	9.72	4.06	127	128
120	4.79	78.72	3.07	5.20	2.56	637.11	206.67	546	61	15.96	10.47	4.72	137	138
130	4.87	85.83	3.34	5.67	2.72	680.28	220.67	585	65	17.21	11.21	5.42	146	148
140	4.94	92.97	3.62	6.14	2.87	722.84	234.48	622	69	18.45	11.94	6.15	156	157
150	5.01	100.13	3.90	6.62	3.02	764.86	248.11	660	73	19.69	12.66	6.93	165	167
160	5.08	107.31	4.18	7.10	3.17	806.38	261.58	697	77	20.93	13.38	7.74	175	176
170	5.14	114.50	4.46	7.58	3.31	847.43	274.90	734	81	22.16	14.09	8.59	184	185
180	5.19	121.70	4.74	8.06	3.45	888.04	288.07	770	86	23.38	14.80	9.48	193	194
190	5.25	128.92	5.02	8.55	3.60	928.25	301.11	806	90	24.60	15.50	10.41	202	204
200	5.30	136.14	5.31	9.03	3.73	968.07	314.03	842	93	25.82	16.19	11.37	211	213
210	5.35	143.37	5.59	9.52	3.87	1007.54	326.84	877	97	27.04	16.88	12.36	220	222
220	5.39	150.61	5.87	10.02	4.01	1046.67	339.53	912	101	28.25	17.57	13.39	229	230
230	5.44	157.85	6.15	10.51	4.14	1085.48	352.12	947	105	29.46	18.25	14.45	237	239
240	5.48	165.10	6.43	11.00	4.27	1123.98	364.61	982	109	30.66	18.92	15.55	246	248
250	5.52	172.34	6.72	11.50	4.40	1162.19	377.00	1017	113	31.86	19.59	16.68	255	257
260	5.56	179.59	7.00	12.00	4.53	1200.13	389.31	1051	117	33.06	20.26	17.85	263	265
270	5.60	186.84	7.28	12.50	4.66	1237.80	401.53	1085	121	34.26	20.93	19.04	272	274
280	5.63	194.09	7.56	13.00	4.78	1275.23	413.67	1119	124	35.46	21.59	20.27	280	283
290	5.67	201.34	7.85	13.50	4.91	1312.41	425.73	1153	128	36.65	22.24	21.53	289	291
300	5.70	208.58	8.13	14.01	5.03	1349.36	437.72	1186	132	37.84	22.90	22.83	297	300
310	5.74	215.83	8.41	14.51	5.16	1386.09	449.63	1219	135	39.02	23.55	24.15	306	308
320	5.77	223.07	8.69	15.02	5.28	1422.60	461.48	1253	139	40.21	24.20	25.51	314	317
330	5.80	230.31	8.97	15.53	5.40	1458.91	473.25	1286	143	41.39	24.84	26.89	322	325
340	5.83	237.54	9.26	16.04	5.52	1495.02	484.97	1319	146	42.57	25.48	28.31	331	333
350	5.86	244.77	9.54	16.55	5.64	1530.94	496.62	1351	150	43.75	26.12	29.76	339	341

Table 5.6
California Toxics Rule for Dissolved Metals in Freshwater

HARDNESS mg/L as CaCO3	ln Hardness	Lead 1 hr µg/L	Lead 4 day µg/L	Cadmium 1 hr µg/L	Cadmium 4 day µg/L	Chromium III 1 hr µg/L	Chromium III 4 day µg/L	Nickel 1 hr µg/L	Nickel 4 day µg/L	Copper 1 hr µg/L	Copper 4 day µg/L	Silver inst µg/L	Zinc 1 hr µg/L	Zinc 4 day µg/L
360	5.89	252.00	9.82	17.06	5.76	1566.67	508.21	1384	154	44.93	26.76	31.24	347	350
370	5.91	259.22	10.10	17.57	5.88	1602.22	519.74	1416	157	46.10	27.39	32.74	355	358
380	5.94	266.43	10.38	18.09	5.99	1637.60	531.22	1449	161	47.28	28.02	34.28	363	366
390	5.97	273.64	10.66	18.60	6.11	1672.81	542.64	1481	164	48.45	28.65	35.85	371	374
400	5.99	280.85	10.94	19.12	6.22	1707.86	554.01	1513	168	49.62	29.28	37.44	379	382
410	6.02	288.04	11.22	19.64	6.34	1742.75	565.33	1545	172	50.79	29.90	39.07	387	390
420	6.04	295.24	11.50	20.15	6.45	1777.49	576.60	1577	175	51.95	30.53	40.72	395	399
430	6.06	302.42	11.78	20.67	6.56	1812.07	587.82	1608	179	53.12	31.15	42.40	403	407
440	6.09	309.60	12.06	21.19	6.67	1846.52	598.99	1640	182	54.28	31.76	44.11	411	415
450	6.11	316.77	12.34	21.71	6.79	1880.82	610.12	1671	186	55.44	32.38	45.85	419	423
460	6.13	323.93	12.62	22.23	6.90	1914.98	621.20	1703	189	56.60	32.99	47.62	427	430
470	6.15	331.09	12.90	22.76	7.01	1949.01	632.24	1734	193	57.76	33.61	49.41	435	438
480	6.17	338.24	13.18	23.28	7.12	1982.90	643.23	1765	196	58.92	34.22	51.23	443	446
490	6.19	345.38	13.46	23.81	7.22	2016.67	654.19	1796	200	60.07	34.82	53.08	450	454
500	6.21	352.51	13.74	24.33	7.33	2050.32	665.10	1827	203	61.23	35.43	54.96	458	462
510	6.23	359.64	14.01	24.86	7.44	2083.84	675.98	1858	206	62.38	36.03	56.86	466	470
520	6.25	366.75	14.29	25.38	7.55	2117.25	686.81	1889	210	63.53	36.64	58.80	474	478
530	6.27	373.86	14.57	25.91	7.65	2150.54	697.61	1920	213	64.68	37.24	60.75	481	485
540	6.29	380.96	14.85	26.44	7.76	2183.71	708.37	1950	217	65.83	37.84	62.74	489	493
550	6.31	388.05	15.12	26.97	7.87	2216.78	719.10	1981	220	66.98	38.44	64.75	497	501
560	6.33	395.14	15.40	27.50	7.97	2249.73	729.79	2011	223	68.13	39.03	66.79	504	509
570	6.35	402.21	15.67	28.03	8.07	2282.58	740.45	2041	227	69.27	39.63	68.85	512	516
580	6.36	409.27	15.95	28.56	8.18	2315.33	751.07	2072	230	70.42	40.22	70.94	520	524
590	6.38	416.33	16.22	29.09	8.28	2347.97	761.66	2102	233	71.56	40.81	73.06	527	532
600	6.40	423.38	16.50	29.63	8.38	2380.52	772.21	2132	237	72.70	41.40	75.20	535	539
610	6.41	430.41	16.77	30.16	8.49	2412.96	782.74	2162	240	73.84	41.99	77.37	542	547
620	6.43	437.44	17.05	30.69	8.59	2445.31	793.23	2192	243	74.98	42.58	79.57	550	554
630	6.45	444.46	17.32	31.23	8.69	2477.56	803.70	2222	247	76.12	43.17	81.79	557	562
640	6.46	451.47	17.59	31.76	8.79	2509.73	814.13	2252	250	77.26	43.75	84.03	565	569
650	6.48	458.47	17.87	32.30	8.89	2541.80	824.53	2281	253	78.40	44.33	86.30	572	577
660	6.49	465.46	18.14	32.84	8.99	2573.78	834.91	2311	257	79.53	44.92	88.60	580	585
670	6.51	472.45	18.41	33.38	9.09	2605.68	845.25	2341	260	80.67	45.50	90.92	587	592
680	6.52	479.42	18.68	33.91	9.19	2637.40	855.57	2370	263	81.80	46.08	93.27	595	599
690	6.54	486.38	18.95	34.45	9.29	2669.21	865.86	2400	267	82.93	46.66	95.64	602	607
700	6.55	493.33	19.22	34.99	9.39	2700.85	876.13	2429	270	84.07	47.23	98.04	609	614
710	6.57	500.28	19.50	35.53	9.49	2732.41	886.37	2458	273	85.20	47.81	100.46	617	622
720	6.58	507.21	19.77	36.07	9.59	2763.89	896.58	2488	276	86.33	48.38	102.90	624	629

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Table 5.6
California Toxics Rule for Dissolved Metals in Freshwater

HARDNESS mg/L as CaCO3	ln Hardness	Lead 1 hr µg/L	Lead 4 day µg/L	Cadmium 1 hr µg/L	Cadmium 4 day µg/L	Chromium III 1 hr µg/L	Chromium III 4 day µg/L	Nickel 1 hr µg/L	Nickel 4 day µg/L	Copper 1 hr µg/L	Copper 4 day µg/L	Silver inst µg/L	Zinc 1 hr µg/L	Zinc 4 day µg/L
730	6.59	514.13	20.04	36.61	9.68	2795.29	906.76	2517	280	87.46	48.96	105.37	631	637
740	6.61	521.05	20.30	37.15	9.78	2826.61	916.92	2546	283	88.59	49.53	107.87	639	644
750	6.62	527.95	20.57	37.70	9.88	2857.86	927.06	2575	286	89.71	50.10	110.39	646	651
760	6.63	534.85	20.84	38.24	9.97	2889.03	937.17	2604	289	90.84	50.67	112.93	653	659
770	6.65	541.73	21.11	38.78	10.07	2920.12	947.26	2633	292	91.96	51.24	115.50	661	666
780	6.66	548.60	21.38	39.33	10.17	2951.15	957.32	2662	296	93.09	51.81	118.09	668	673
790	6.67	555.47	21.65	39.87	10.26	2982.10	967.36	2691	299	94.21	52.38	120.71	675	681
800	6.68	562.32	21.91	40.42	10.36	3012.98	977.38	2719	302	95.34	52.94	123.35	682	688
810	6.70	569.17	22.18	40.96	10.45	3043.79	987.37	2748	305	96.46	53.51	126.01	690	695
820	6.71	576.00	22.45	41.51	10.55	3074.53	997.35	2777	308	97.58	54.07	128.70	697	703
830	6.72	582.82	22.71	42.05	10.64	3105.20	1007.30	2805	312	98.70	54.63	131.41	704	710
840	6.73	589.64	22.98	42.60	10.74	3135.81	1017.22	2834	315	99.82	55.19	134.15	711	717
850	6.75	596.44	23.24	43.15	10.83	3166.35	1027.13	2863	318	100.94	55.76	136.91	718	724
860	6.76	603.24	23.51	43.70	10.92	3196.83	1037.02	2891	321	102.06	56.32	139.69	726	731
870	6.77	610.02	23.77	44.24	11.02	3227.24	1046.88	2919	324	103.18	56.87	142.49	733	739
880	6.78	616.79	24.04	44.79	11.11	3257.59	1056.73	2948	327	104.29	57.43	145.32	740	746
890	6.79	623.56	24.30	45.34	11.20	3287.88	1066.55	2976	331	105.41	57.99	148.17	747	753
900	6.80	630.31	24.56	45.89	11.29	3318.10	1076.36	3004	334	106.53	58.55	151.05	754	760
910	6.81	637.05	24.83	46.44	11.39	3348.27	1086.14	3033	337	107.64	59.10	153.95	761	767
920	6.82	643.78	25.09	46.99	11.48	3378.37	1095.91	3061	340	108.76	59.66	156.87	768	774
930	6.84	650.51	25.35	47.55	11.57	3408.42	1105.66	3089	343	109.87	60.21	159.81	775	782
940	6.85	657.22	25.61	48.10	11.66	3438.40	1115.38	3117	346	110.98	60.76	162.78	782	789
950	6.86	663.92	25.87	48.65	11.75	3468.33	1125.09	3145	349	112.09	61.32	165.77	789	796
960	6.87	670.61	26.13	49.20	11.84	3498.21	1134.78	3173	352	113.21	61.87	168.78	796	803
970	6.88	677.30	26.39	49.76	11.93	3528.02	1144.45	3201	356	114.32	62.42	171.82	803	810
980	6.89	683.97	26.65	50.31	12.02	3557.78	1154.11	3229	359	115.43	62.97	174.88	810	817
990	6.90	690.63	26.91	50.86	12.11	3587.49	1163.74	3257	362	116.54	63.51	177.96	817	824
1000	6.91	697.28	27.17	51.42	12.20	3617.14	1173.36	3284	365	117.64	64.06	181.06	824	831

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Table 5.7
Mass Loads from Sampled Storms - 1999/00 Season

PERIOD	SAMPLES #	Volume ac-ft	Storm Volume	NO_3 tons	NH_3 tons	TKN tons	PO_4 tons	o-PO_4 tons	TSS tons	VSS tons	Cd lbs	Cr lbs	Cu lbs	Pb lbs	Ni lbs	Ag lbs	Zn lbs	Hardness tons
Anaheim Barber City Channel																		
Nov 8, 1999	11	9.4	16.2	0.44	0.020	0.149	0.025		4.25	2.38	0.02	0.14	2.47	0.35	0.74	0.03	11.2	4.34
Bolsa Chica Channel																		
Nov 8, 1999	11	22.3	28.9	1.16	0.086	0.292	0.040		10.11	3.31	0.03	0.31	4.12	0.60	2.78	0.06	13.2	7.21
East Garden Grove Wintersburg Channel																		
Nov 8 , 1999	11	31.7	43.7	1.12	0.080	0.549	0.063		8.83	4.28	0.04	0.40	4.52	0.85	2.65	0.09	22.3	12.12
Westminster Channel																		
Nov 8, 1999	5	1.2	12.3	0.06	0.007	0.002	0.005		0.64	0.38	0.00	0.04	0.51	0.08	0.15	0.00	1.8	0.48
Lane Channel																		
Feb 10 - 14, 2000	54	100.9	102.7	2.03	0.045	0.382	0.276	0.024	36.06	11.32	0.62	4.32	19.81	7.17	4.23	0.50	72.4	116.16
Feb 16. 2000	8	7.5	8.4	0.15	0.004	0.041	0.018	0.003	1.64	0.87	0.05	0.41	1.50	0.45	0.39	0.04	5.3	0.13
Feb 28 - Mar 2, 2000	53	18.7	52.8	1.78	0.002	0.041	0.045	0.008	2.55	1.42	0.10	0.41	1.98	0.19	0.69	0.10	5.9	22.76
El Modena Irvine Channel																		
Feb 16, 2000	9	15.2	18.2	0.17	0.003	0.027	0.016	0.004	1.13	0.51	0.02	0.17	1.51	0.22	0.08	0.04	2.1	2.30
Santa Ana Delhi Channel																		
Nov 8, 1999	9	7.5	10.7	0.40	0.023	0.117	0.022	0.000	3.44	1.77	0.04	0.13	2.00	0.37	0.69	0.02	10.0	4.67
Jan 25 - 26, 2000	19	58.3	88.0	1.12	0.077	0.310	0.250	0.011	24.62	15.26	0.26	1.89	13.07	6.94	2.52	0.16	48.9	21.86
Feb 10 - 14, 2000	60	318.8	326.7	2.76	0.097	0.782	0.569	0.045	79.68	29.95	0.43	3.47	42.15	24.57	5.96	0.87	158.6	75.60
Feb 3 - 5, 2000	24	337.1	457.0	3.27	0.136	0.563	0.361	0.051	33.47	15.21	0.46	3.66	39.68	11.85	1.90	0.92	86.6	69.44
Peters Canyon Wash																		
Feb 10 - 11, 2000	17	38.0	52.8	2.04	0.018	0.129	0.158	0.020	18.81	10.24	0.17	1.30	4.52	1.78	1.00	0.10	18.0	17.43
Feb 16, 2000	6	21.2	48.3	0.65	0.007	0.070	0.075	0.007	23.50	9.71	0.10	0.82	2.08	0.88	0.63	0.06	8.5	7.91
Feb 27 - 28, 2000	13	44.6	48.0	1.95	0.004	0.085	0.068	0.008	10.78	5.34	0.06	0.48	3.76	0.98	0.63	0.12	9.9	28.57
San Diego Creek at Campus Drive																		
Jan 25 - 28,	29	103.5	453.0	4.89	0.09	0.33	0.32	0.01	22.43	16.12	0.14	1.29	6.68	1.69	3.06	0.28	14.8	35.40
Feb 10 - 14, 2000	52	1236.7	1192.7	32.21	0.52	3.20	4.86	0.52	910.45	678.41	5.94	57.67	98.33	48.38	50.20	3.36	428.9	882.30
Feb 27 - Mar 2, 2000	53	183.8	114.6	7.07	0.01	0.28	0.24	0.02	26.36	12.42	0.25	2.00	6.31	1.31	1.35	0.50	14.9	0.00
Mar 3 - 6, 2000	30	1885.6	1987.0	38.81	0.65	5.14	8.36	1.29	1,634	1,044	7.66	80.37	121.36	63.51	81.61	5.12	527.4	309.27
Apr 18 - 21, 2000	42	507.5	1562.3	17.23	0.06	1.26	3.70	0.17	931.52	339.94	5.29	40.25	63.25	66.71	37.95	1.15	345.0	184.01
San Diego Creek at Harvard Avenue																		
Mar 4 - 6, 2000	23	1017.9	1189.1	20.00	0.16	2.66	4.09	0.51	673.37	371.79	4.01	42.63	91.67	32.48	45.51	2.77	313.2	297.66

Table 5.8
EMCs of Sampled Storms - 1999/00 Season

PERIOD	SAMPLES #	Volume ac-ft	Storm Volume	NO_3 mg/L	NH_3 mg/L	TKN mg/L	PO_4 mg/L	o-PO_4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
Anaheim Barber City Channel																		
Nov 8, 1999	11	9.4	16.2	34.1	1.6	11.6	1.9		332	186	0.7	5.3	96.3	13.5	28.8	1.0	438	339
Bolsa Chica Channel																		
Nov 8, 1999	11	22.3	28.9	38.5	2.8	9.6	1.3		334	109	0.5	5.1	68.1	9.9	46.0	1.0	218	238
East Garden Grove Wintersburg Channel																		
Nov 8 , 1999	11	31.7	43.7	26.0	1.9	12.7	1.5		205	99	0.5	4.7	52.4	9.8	30.7	1.0	259	281
Westminster Channel																		
Nov 8, 1999	5	1.2	12.3	40.0	4.7	1.5	3.4		400	240	1.4	12.9	160.0	26.5	48.2	1.0	555	300
Lane Channel																		
Feb 10 - 14, 2000	54	100.9	102.7	14.8	0.3	2.8	2.0	0.18	263	83	2.2	15.7	72.3	26.1	15.4	1.8	264	848
Feb 16. 2000	8	7.5	8.4	14.7	0.4	4.0	1.7	0.31	160	85	2.5	19.9	73.8	22.0	19.2	1.9	261	13
Feb 28 - Mar 2, 2000	53	18.7	52.8	70.1	0.1	1.6	1.8	0.30	100	56	2.1	8.0	39.0	3.7	13.6	2.0	115	895
El Modena Irvine Channel																		
Feb 16, 2000	9	15.2	18.2	8.3	0.1	1.3	0.8	0.19	55	25	0.5	4.0	36.5	5.4	2.0	1.0	51	111
Santa Ana Delhi Channel																		
Nov 8, 1999	9	7.5	10.7	39.7	2.3	11.5	2.2		338	174	1.9	6.6	98.6	18.3	34.0	1.0	494	460
Jan 25 - 26, 2000	19	58.3	88.0	14.2	1.0	3.9	3.2	0.14	311	193	1.6	12.0	82.5	43.8	15.9	1.0	309	276
Feb 10 - 14, 2000	60	318.8	326.7	6.4	0.2	1.8	1.3	0.10	184	69	0.5	4.0	48.7	28.4	6.9	1.0	183	175
Feb 3 - 5, 2000	24	337.1	457.0	7.1	0.3	1.2	0.8	0.11	73	33	0.5	4.0	43.3	12.9	2.1	1.0	95	152
Peters Canyon Wash																		
Feb 10 - 11, 2000	17	38.0	52.8	39.6	0.4	2.5	3.1	0.38	365	198	1.6	12.6	43.8	17.2	9.7	1.0	174	338
Feb 16, 2000	6	21.2	48.3	22.4	0.3	2.4	2.6	0.26	815	337	1.7	14.2	36.0	15.2	10.8	1.0	147	274
Feb 27 - 28, 2000	13	44.6	48.0	32.1	0.1	1.4	1.1	0.14	178	88	0.5	4.0	31.1	8.1	5.2	1.0	82	472
San Diego Creek at Campus Drive																		
Jan 25 - 28,	29	103.5	453.0	34.7	0.6	2.3	2.3	0.06	159	115	0.5	4.6	23.7	6.0	10.9	1.0	52	252
Feb 10 - 14, 2000	52	1236.7	1192.7	19.2	0.3	1.9	2.9	0.31	542	404	1.8	17.2	29.3	14.4	14.9	1.0	128	525
Feb 27 - Mar 2, 2000	53	183.8	114.6	28.3	0.0	1.1	0.9	0.08	106	50	0.5	4.0	12.6	2.6	2.7	1.0	30	0
Mar 3 - 6, 2000	30	1885.6	1987.0	15.1	0.3	2.0	3.3	0.51	638	408	1.5	15.7	23.7	12.4	15.9	1.0	103	121
Apr 18 - 21, 2000	42	507.5	1562.3	25.0	0.1	1.8	5.4	0.24	1,351	493	3.8	29.2	45.9	48.4	27.5	0.8	250	267
San Diego Creek at Harvard Avenue																		
Mar 4 - 6, 2000	23	1017.9	1189.1	14.5	0.1	1.9	3.0	0.37	487	269	1.4	15.4	33.1	11.7	16.5	1.0	113	215

Table 5.9
Total Stormwater Loads from the Newport Bay Watershed

PERIOD	Vol. Storm ac-ft	Vol. Sampled ac-ft	NO3 tons	PO4 tons	TSS tons	Cu lbs	Pb lbs	Zn lbs
Santa Ana Delhi Channel								
Nov 8, 1999	10.7	7.5	0.40	0.022	3.44	2.0	0.37	10.0
Jan 25 - 26, 2000	88.0	58.3	1.12	0.250	24.62	13.1	6.94	48.9
Feb 10 - 14, 2000	326.7	318.8	2.76	0.569	79.68	42.2	24.57	158.6
Feb 3 - 5, 2000	457.0	337.1	3.27	0.361	33.47	39.7	11.85	86.6
Total Sampled Load		721.7	7.56	1.20	141.2	96.9	43.73	304.1
Annual Stormwater Volume	1,916	**Site Mean EMC**	**7.3**	**2.5**	**255.3**	**45.4**	**38.4**	**208.5**
Calc. Unsampled Load	1,194		11.9	4.0	414.4	147	125	677
Sampled+Unsampled Load			19.4	5.2	555.6	244	169	981
Peters Canyon Wash								
Feb 10 - 11, 2000	52.8	38.0	2.04	0.158	18.81	4.5	1.78	18.0
Feb 16, 2000	48.3	21.2	0.65	0.075	23.50	2.1	0.88	8.5
Feb 27 - 28, 2000	48.0	44.6	1.95	0.068	10.78	3.8	0.98	9.9
Total Sampled Load		103.8	4.64	0.30	53.09	10.4	3.63	36.4
Annual Stormwater Volume	2,932	**Site Mean EMC**	**26.8**	**3.0**	**800.4**	**47.9**	**23.4**	**137.4**
Calc. Unsampled Load	2,828		102.9	11.4	3,076	368	180	1056
Sampled+Unsampled Load			107.6	11.7	3,129	378	183	1,093
San Diego Creek at Campus Drive								
Jan 25 - 28,	453.0	103.5	4.89	0.32	22.43	6.7	1.69	14.8
Feb 10 - 14, 2000	1192.7	1236.7	32.21	4.86	910.45	98.3	48.38	428.9
Feb 27 - Mar 2, 2000	114.6	183.8	7.07	0.24	26.36	6.3	1.31	14.9
Mar 3 - 6, 2000	1987.0	1885.6	38.81	8.36	1,634	121.4	63.51	527.4
Apr 18 - 21, 2000	1562.3	507.5	17.23	3.70	931.52	63.3	66.71	345.0
Total Sampled Load		3917.2	100.20	17.47	3,524	295.9	181.6	1,331.0
Annual Stormwater Volume	9,997	**Site Mean EMC**	**16.0**	**4.8**	**1,054.0**	**44.4**	**32.0**	**177.7**
Calc. Unsampled Load	6,080		132.4	39.9	8,709	734	529	2937
Sampled+Unsampled Load			232.6	57.3	12,233	1,030	710.2	4,268
San Diego Creek at Harvard Avenue								
Mar 4 - 6, 2000	1189.1	1017.9	20.00	4.09	673.37	91.7	32.48	313.2
Total Sampled Load		1017.9	20.00	4.09	673.37	91.7	32.48	313.2
Annual Stormwater Volume	5,260	**Site Mean EMC**	**16.8**	**6.0**	**1516.7**	**47.3**	**21.5**	**203.6**
Calc. Unsampled Load	4,242		96.8	34.4	8,744	545	248	2,347
Sampled+Unsampled Load			116.8	38.5	9,418	637	281	2,660

Table 5.10
Evaluation of Dissolved Metals in Channels to CTR

										At point of discharge to receiving water							
			Freshwater							Saltwater							San Diego Creek
			n		> Criteria					> Criteria							> Criteria*
			Acute	Chronic	Acute		Chronic			Acute			Chronic				Acute
Station Code	Channel				Cu	Zn	Cd	Pb	Cu	Cu	Ni	Zn	Cd	Cu	Ni	Zn	Cu
ABCC03	Anaheim Barber City	S	3	0	2	1				3		2					
ACJ01	Aliso Creek	S	8	1						8				1	1		
BARSED	Peters Canyon Wash	S	7	1													
BCC02	Bolsa Chica	S	2	0	1					2		1					
BCF04	Bonita Canyon	S	6	1	1												
CICF25	Central Irvine	S	1	0	1												
CMCG02	Costa Mesa	S	11	1	10	6		1	1	10		8		1			
	Costa Mesa	D	34	2	5	1			1	33		2		2		1	
EGWC05	East Garden Grove Wintersburg	S	3	0	1					3		2					
HINF28	Hines	S	1	0	1												1
LANF08	Lane	S	9	2													
	Lane	D	4	0													
LCWI02	Laguna Canyon Wash	D	3	0													
MIRF07	El Modena Irvine	S	1	0													
PDCM01	Prima Deschecha	S	9	1			1			8	4		1	1	1		
SADF01	Santa Ana Delhi	S	14	1	5	1				14		3		1			
SDMF05	San Diego Creek @ Campus	S	18	2						17		1		2			
	San Diego Creek @ Campus	D	1	0						1							
WMCC04	Westminster	S	2	0	2	1				2		1					
WYLSED	San Diego Creek @ Harvard	S	2	0													
	Totals		**139**	**12**	**29**	**10**	**1**	**1**	**2**	**101**	**4**	**20**	**1**	**8**	**2**	**1**	**1**

Not Applicable
n = Number of observations
S = Stormwater sampling
D = Dry weather sampling
Freshwater evaluation included comparison to CTR criteria for Cd, Cu, Cr III, Pb, Ni, Ag, Zn
Evaluation of discharges to saltwater included comparison to CTR criteria for Cd, Cu, Pb, Ni, Ag, Zn
*Using freshwater criteria and average hardness of 421 mg/L for San Diego Creek

Figure 5.1

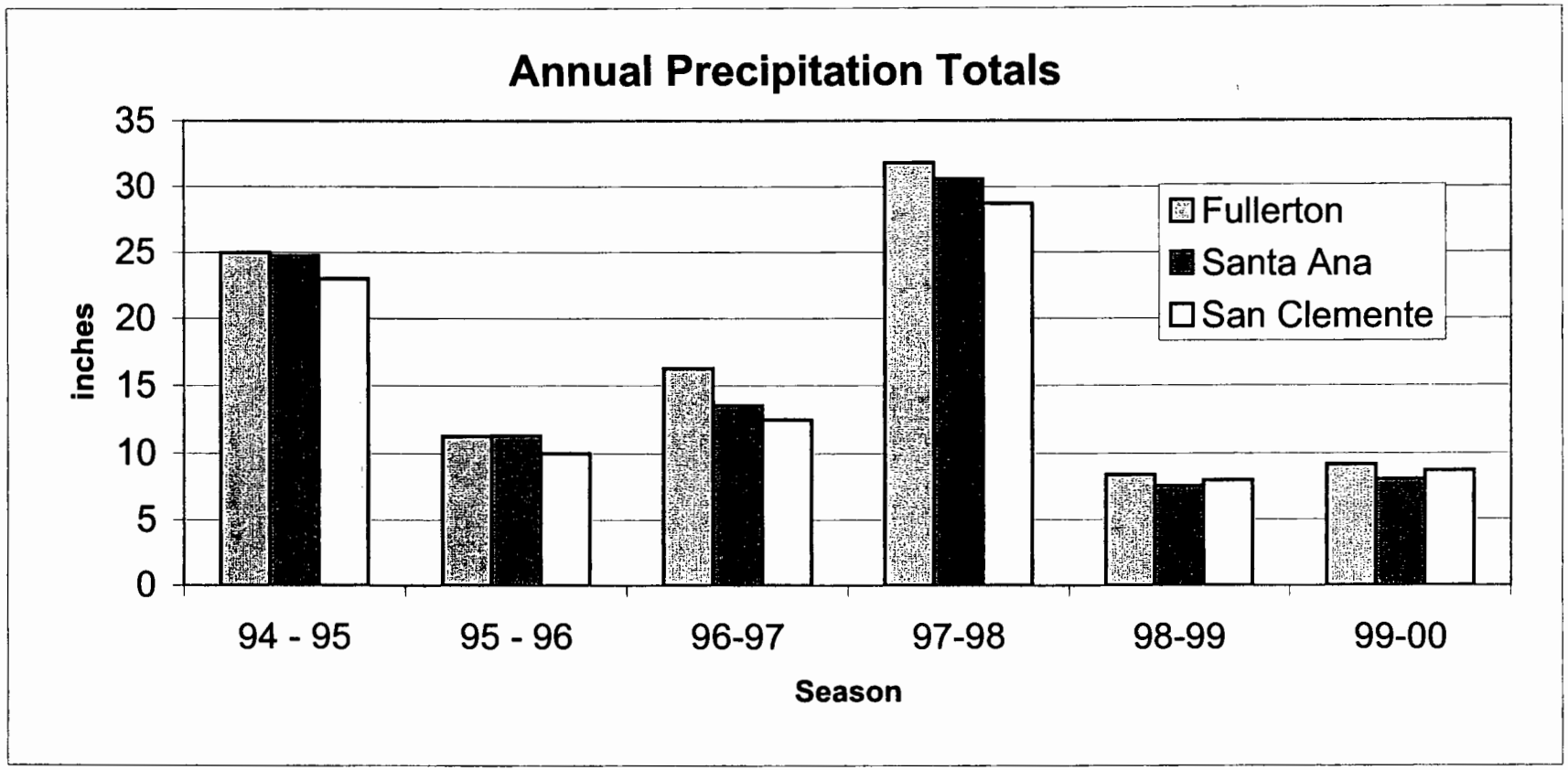

Season = July 1 - June 30

Figure 5.2
Annual Accumulated Rainfall at Santa Ana

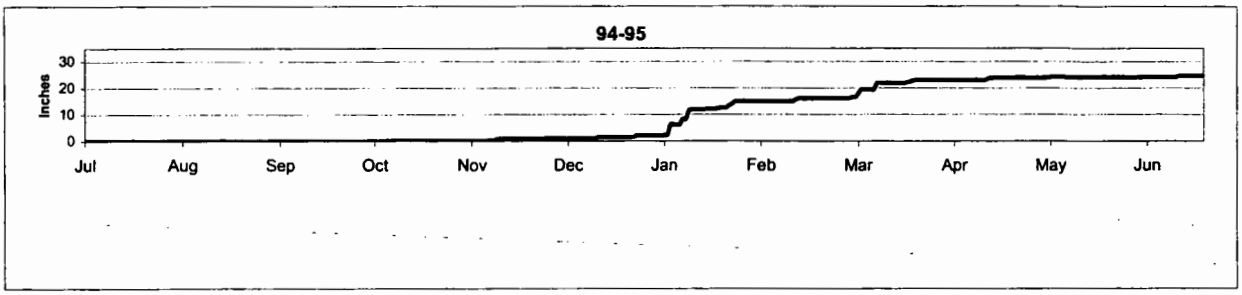

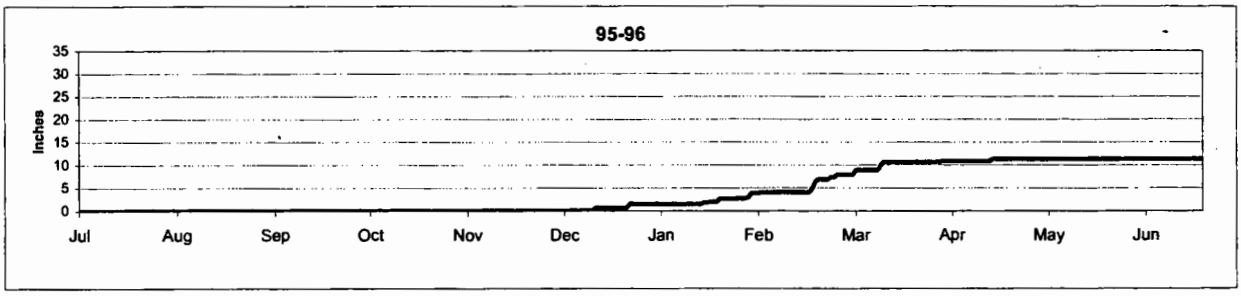

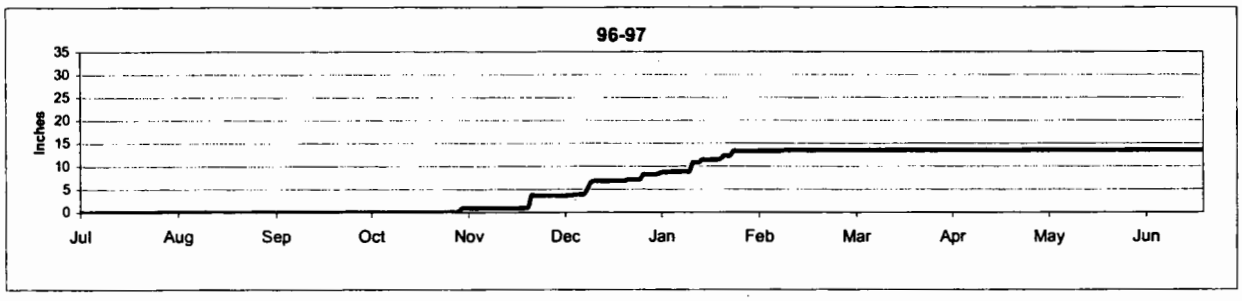

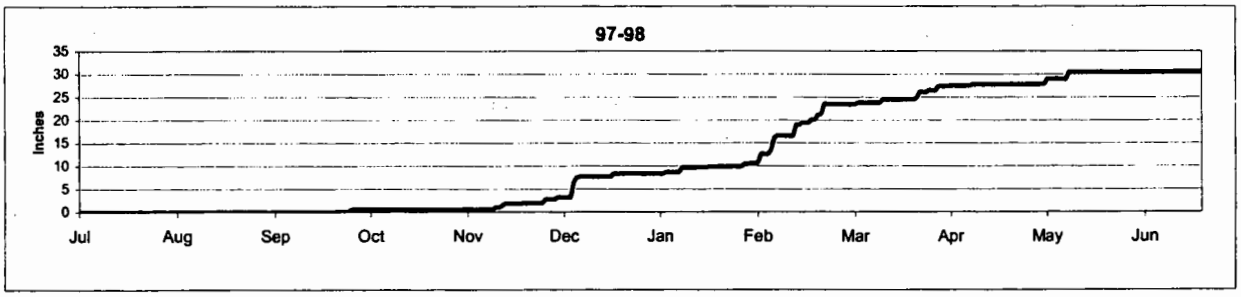

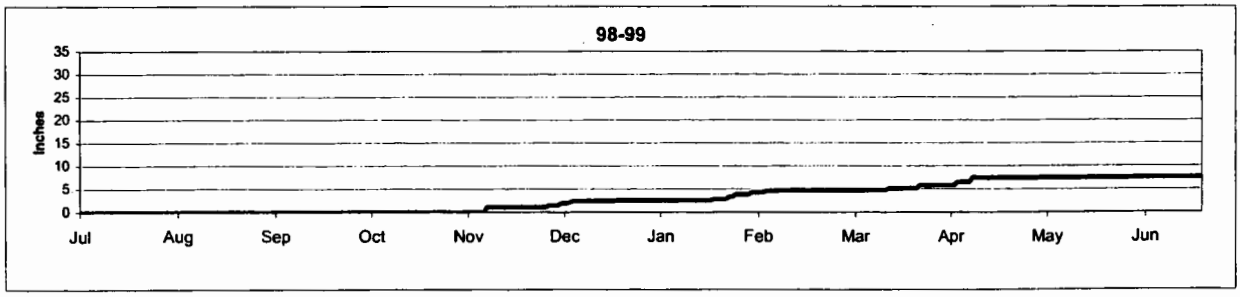

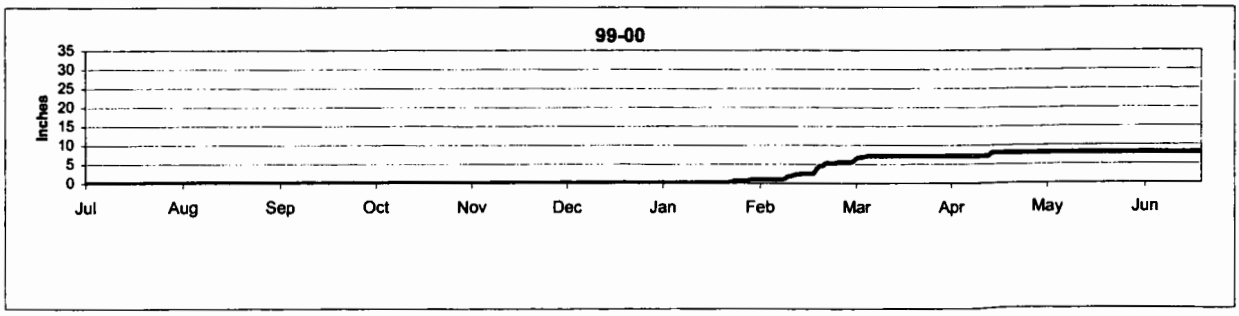

Figure 5.3
Bacteriological Sampling in Newport Bay
Rainfall Total for 2/12 - 2/16/00 = 0.67 inches

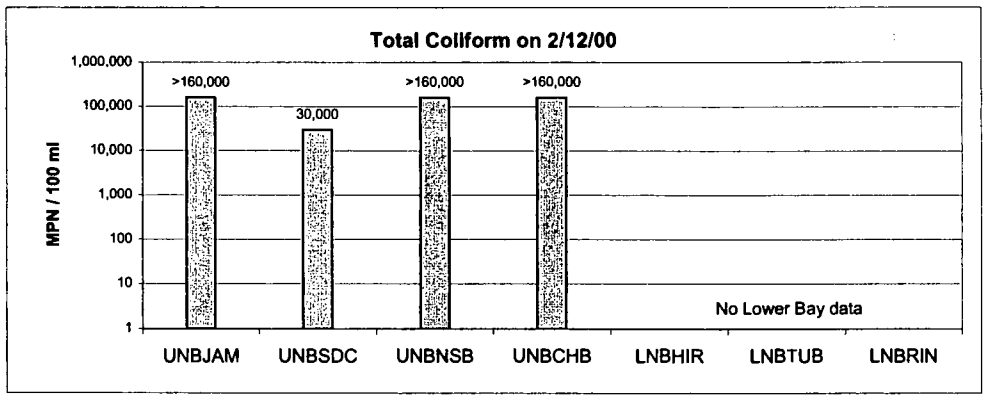

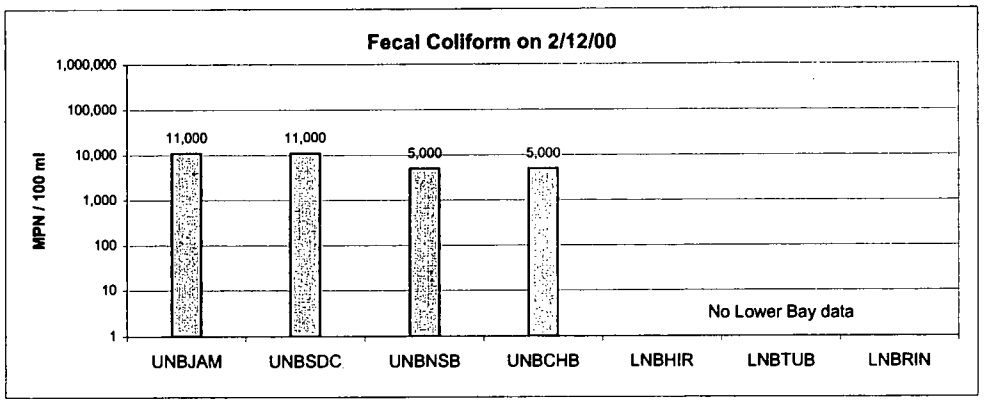

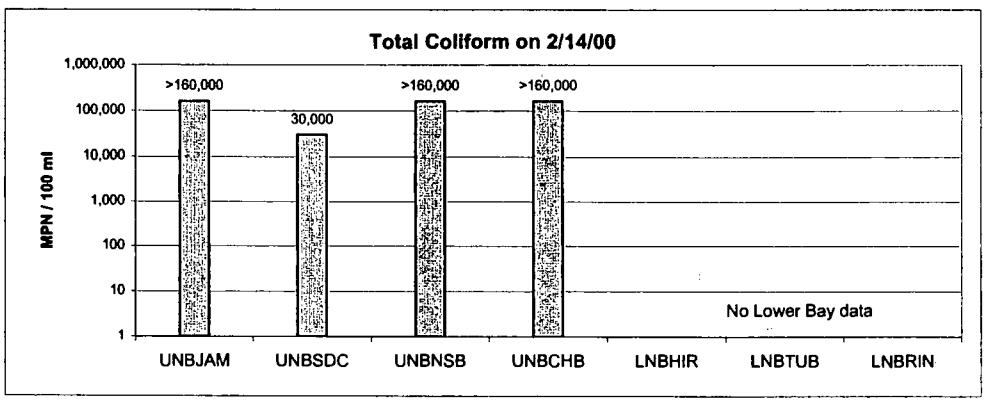

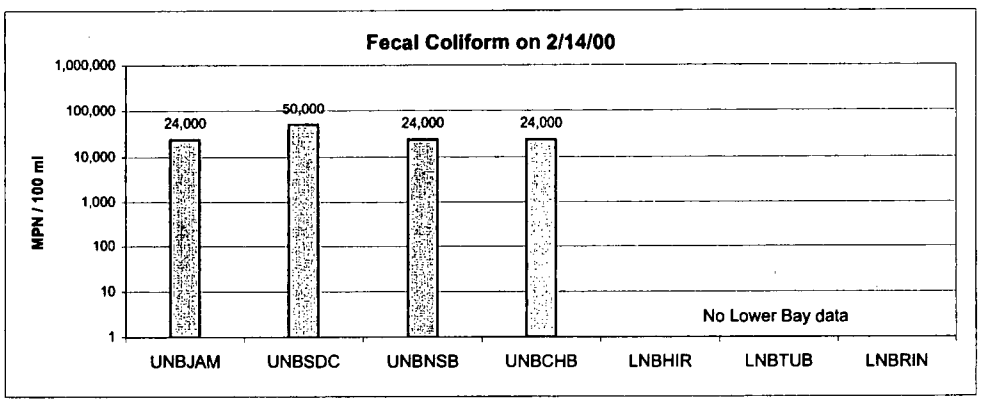

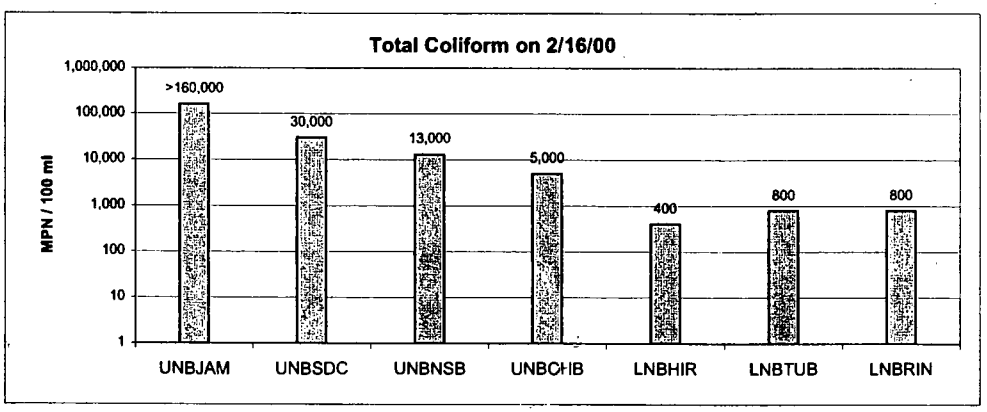

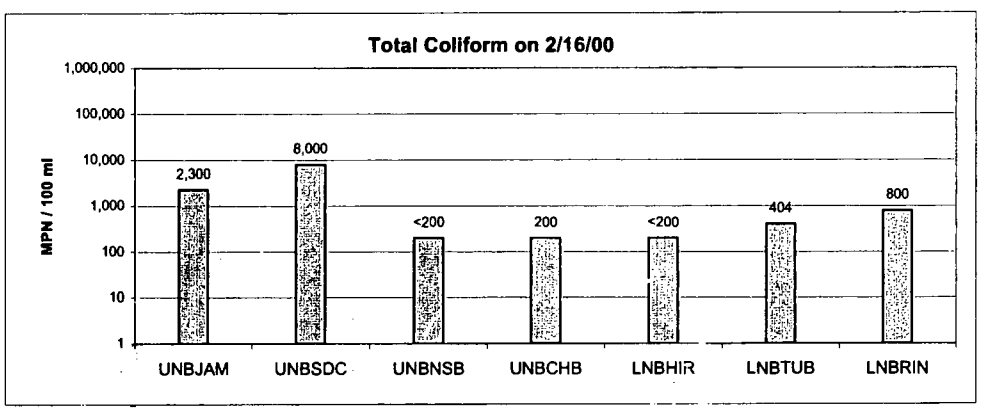

Rainfall recorded on all three sampling days
Sampled at surface

Figure 5.4
Bacteriological Sampling in Newport Bay
Rainfall Occurred on 3/8 and 3/9/00

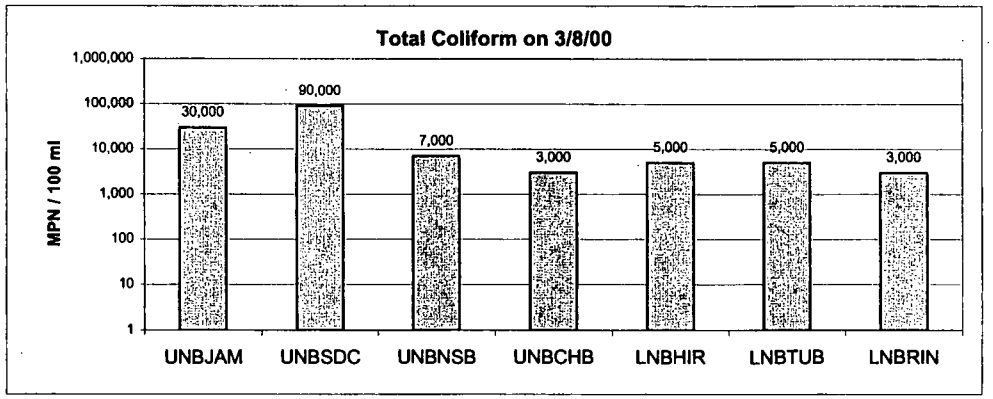

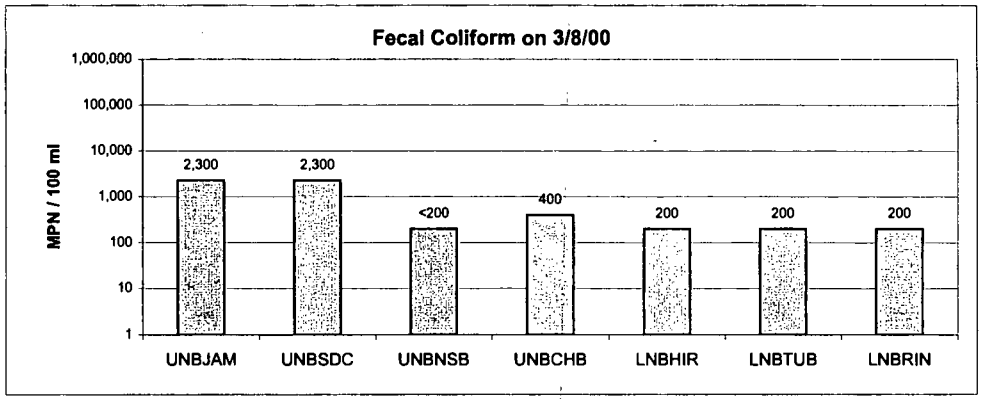

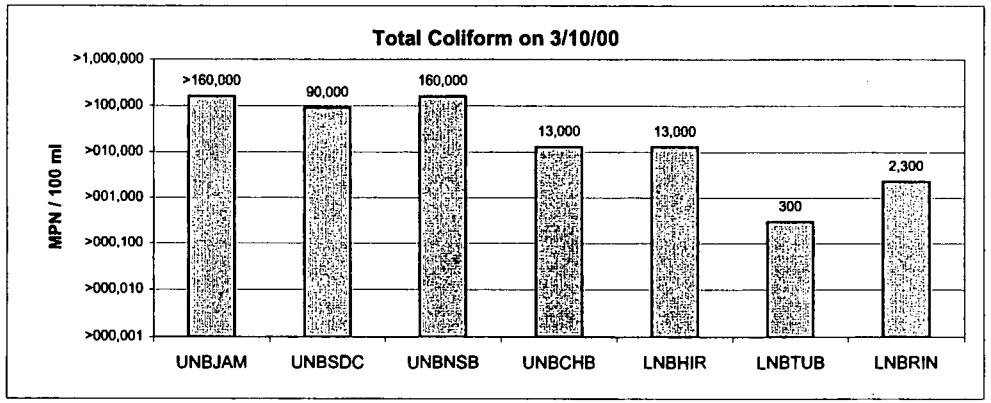

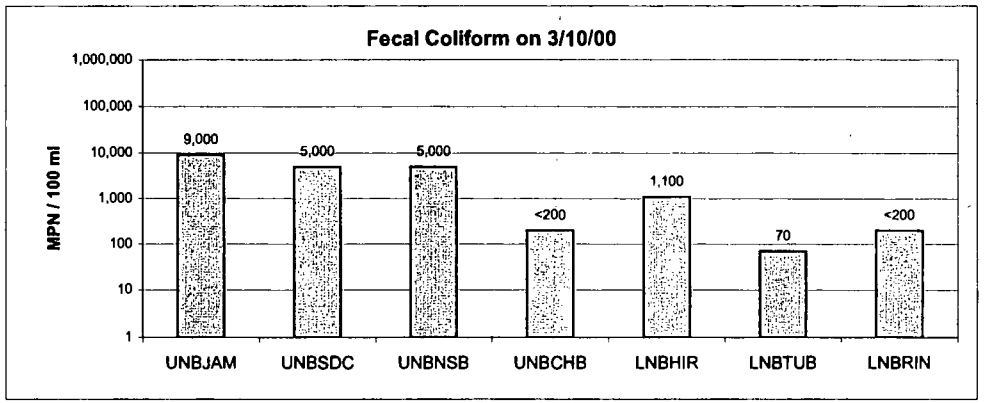

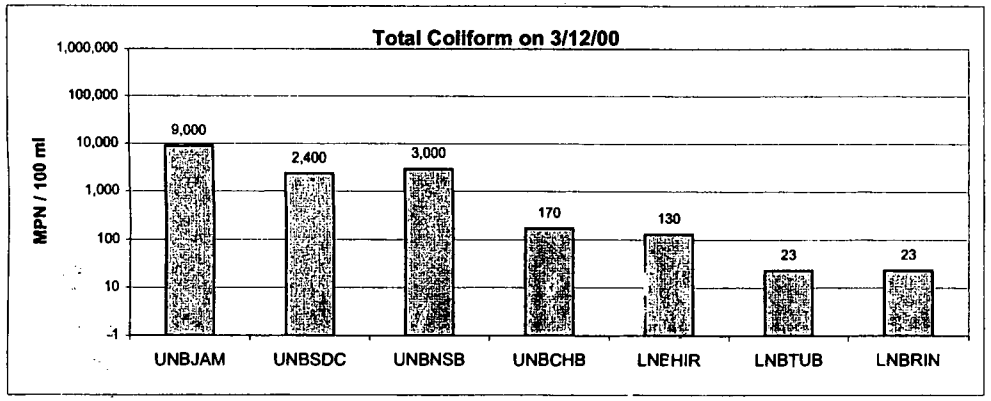

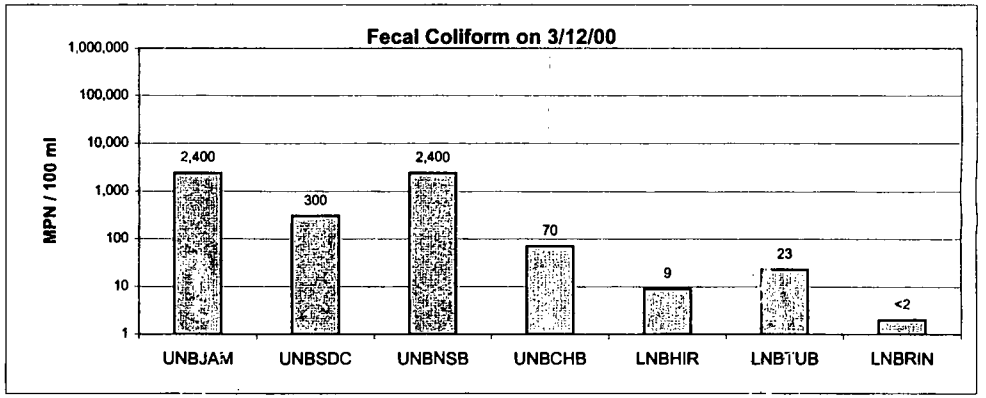

Figure 5.5
Dry Weather Bacteriological Concentrations in Upper Newport Bay

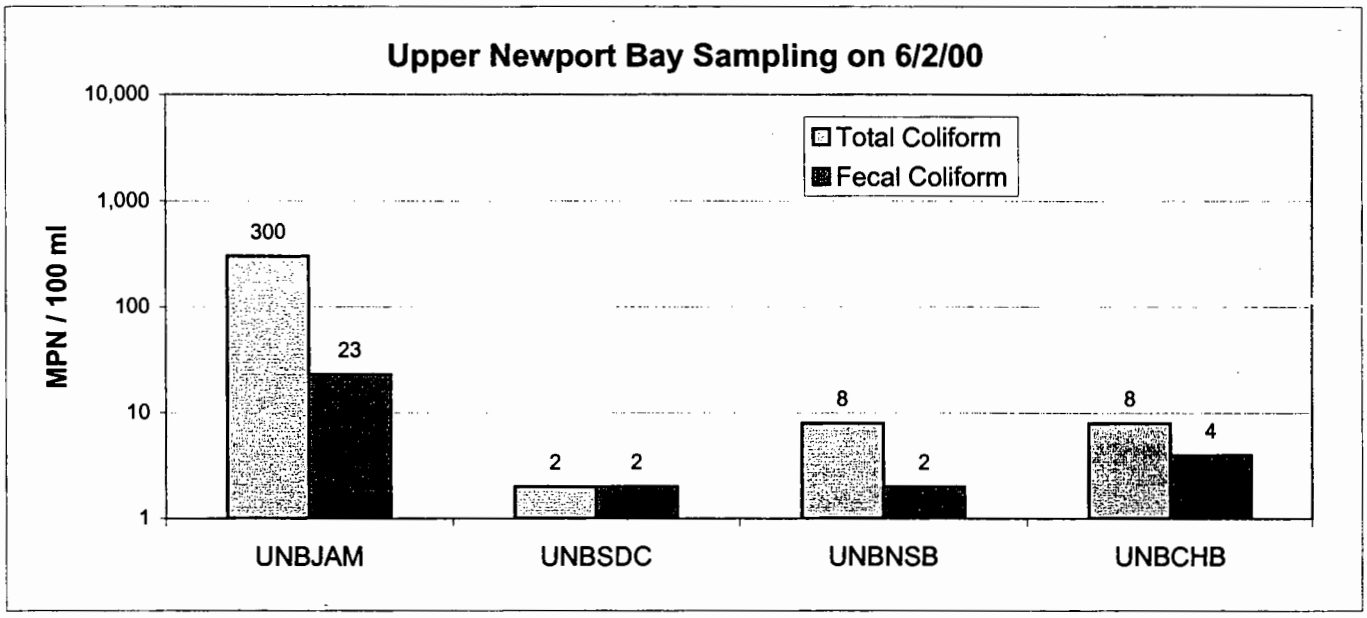

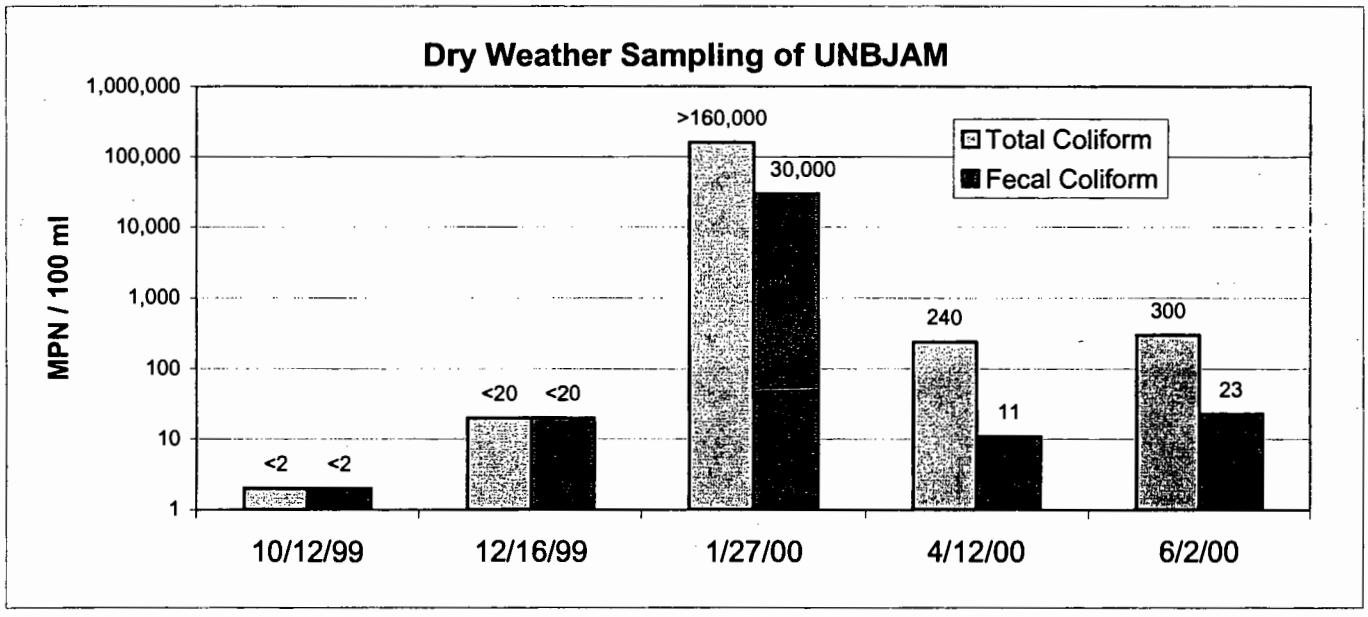

Sampled at surface

Figure 5.6
Fecal Coliform Concentration in Costa Mesa Channel

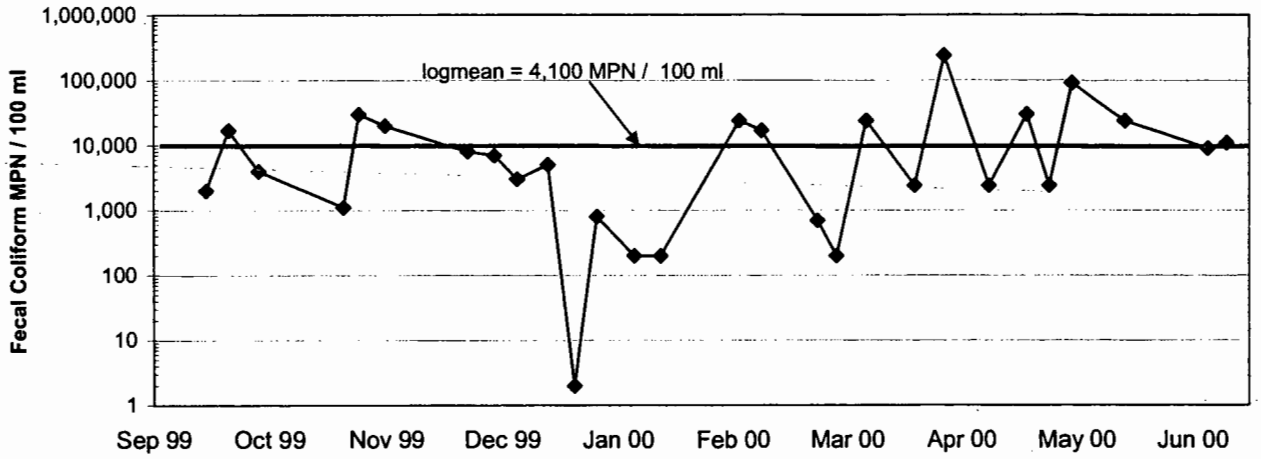

Figure 5.7
Diazinon Concentration in Costa Mesa Channel

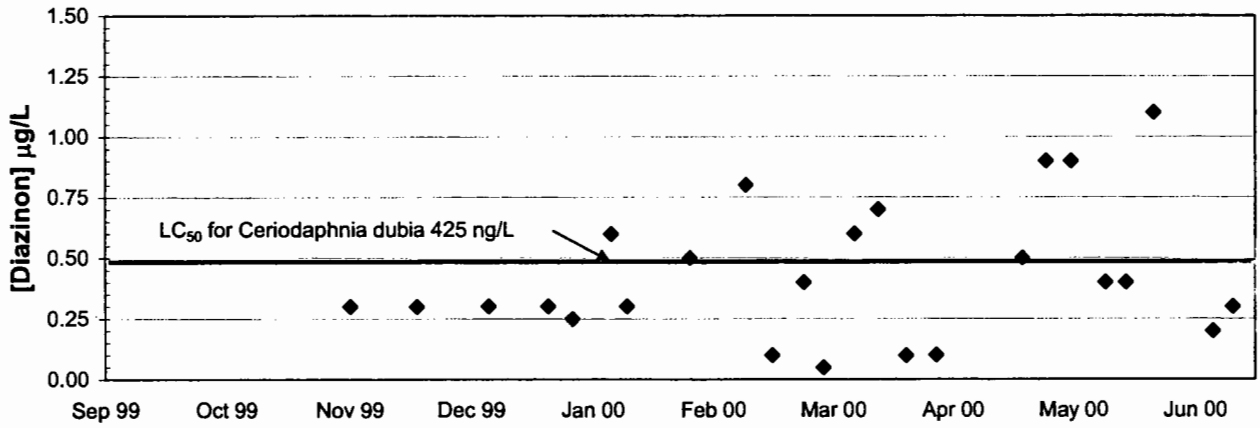

Figure 5.8

Special Investigation of Construction Circle Storm Drain : 6/19 - 7/2/00

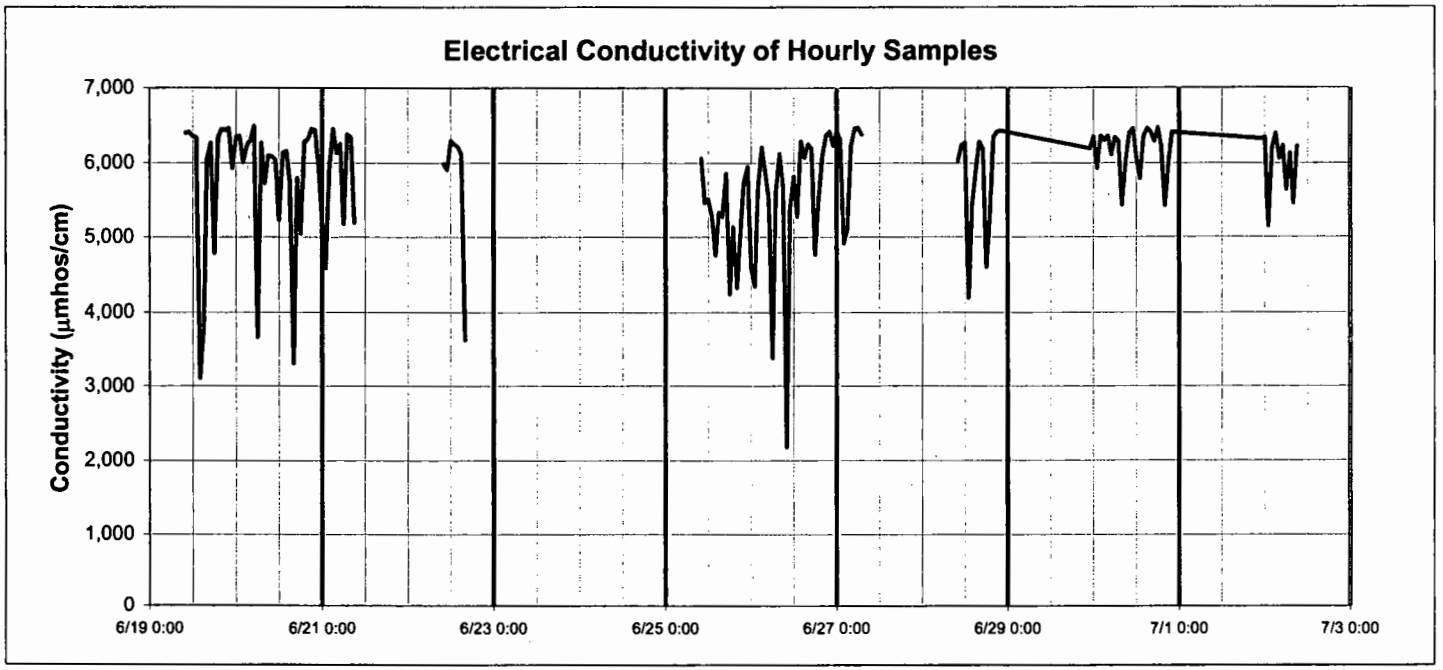

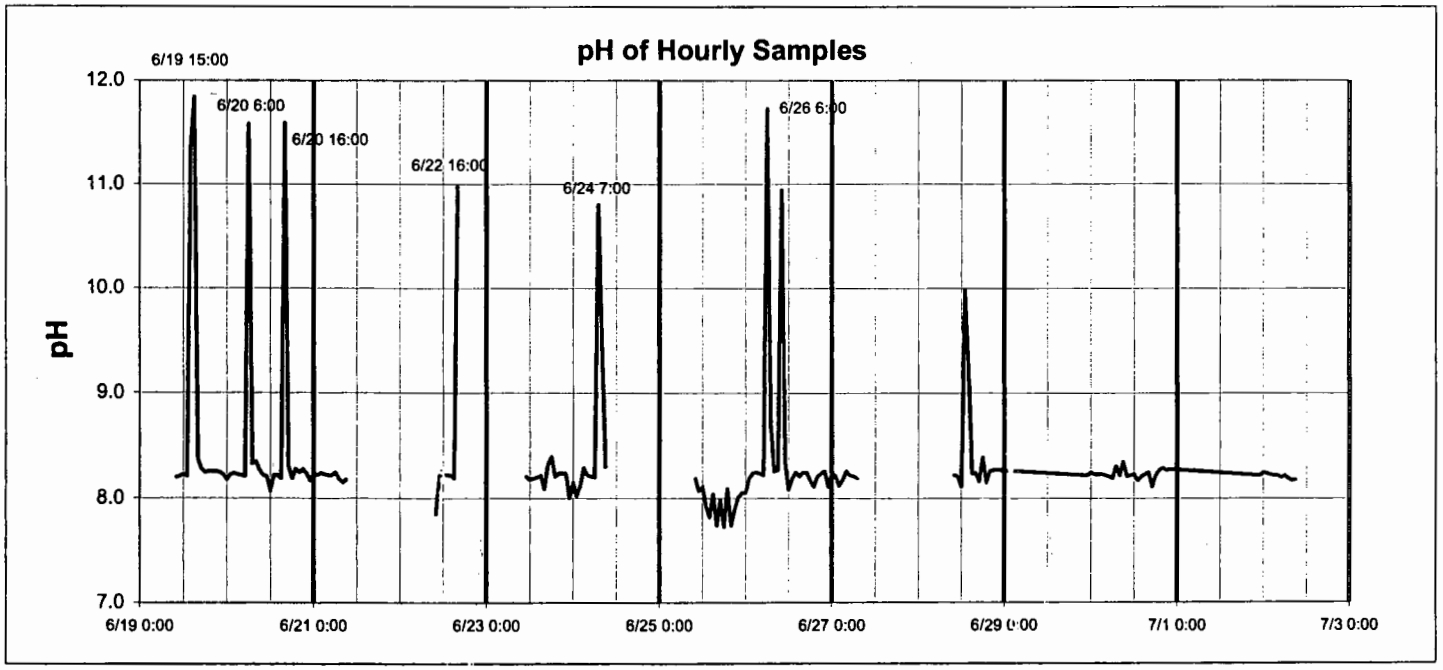

6.0 FISCAL ANALYSIS

6.1 Introduction

This Section presents a fiscal summary and analysis of the Permittee activities undertaken in order to comply with the Second Term Permits.

Information on the funding sources used by each Permittee are discussed in Section 6.4 of this report. The costs and funding sources for each Permittee are summarized in **Tables 6.1 through 6.96**. "Capital costs" refers to expenditures for land, large equipment, and structures. "Operations and Maintenance costs" refers to normal costs of operation including the cost of keeping equipment and facilities in working order.

The sum of the capital and operations and maintenance costs is the total cost that each Permittee has incurred to meet the requirements of the Second Term Permits. The total cost comprises shared costs and individual costs. The distinction between these costs is described in subsequent sections.

6.2 Shared Costs

Shared costs are those that fund activities performed by the County of Orange on behalf of the Permittees as Principle Permittee for the NPDES permits, under the stormwater program's Implementation Agreement. Each municipality's contribution to the shared costs is determined by a formula established in the Implementation Agreement, based on the population and land area of each jurisdiction. These activities include compliance program management, the water quality monitoring program and public education.

Program management activities handled by the County include development and execution of intergovernmental agreements, representation on the California Storm Water Quality Task Force, preparation of compliance reports, budgets and other program documentation, representation of the program before appropriate agencies such as the Regional Water Quality Control Boards and the State Water Resources Control Board, procurement and subsequent coordination of consultant studies and coordination with city NPDES representatives.

6.2.1 FY 1999/00

The actual shared program expenditures for the 1999/00 fiscal year were $943,067.

6.2.2 FY 2000/01

The projected shared cost expenditures for the 2000/01 fiscal year, as approved by the Permittees, are $1,089,397.

6.3 Individual Costs

Individual costs are those incurred by each municipality through implementation of the various Best Management Practices (BMPs) discussed in the DAMP. These BMPs, as discussed in Sections 2.0 and 3.0, include a wide range of existing activities, such as street sweeping, litter control and emergency spill response, facility inspection, drain inlet/catchbasin stenciling and dissemination of public education materials.

6.3.1 FY 1999/00

The individual costs incurred by each Permittee vary widely for each municipal activity identified as a BMP. This variation reflects a number of factors, including area, population and land use. These costs are detailed for each Permittee in **Table 6.1 through 6.96** and are presented separately as costs incurred specifically to implement DAMP programs and as costs incurred for previously existing programs that meet DAMP objectives.

6.3.2 FY 2000/01

Estimates of costs to be incurred in fiscal year 2000/01 are also included in **Tables 6.1 through 6.96.**

6.4 Funding Sources

Funding sources to implement DAMP programs, including previously existing programs that meet DAMP objectives, includes both general and specific funds, taxes, maintenance and user fees, and grants.

General funds were the most utilized funding source followed by Gas Taxes, Sewer and Storm Drain Maintenance Fees, Sanitation Fees, a Special District Fund and Benefit Assessments. In number of cases, certain DAMP elements were implemented by such groups as the Boy Scouts of America and Surfrider. No fiscal value is attributed to these volunteer contributions.

6.5 Conclusion

Tables 6.97 - 6.99 summarize all of the individual costs and fund sources for the Permittees. In 1999/00, the total cost of the activities undertaken by the County as Principle Permittee (Shared Costs) and the activities undertaken by the Permittees implementing those programs required specifically by the DAMP (Individual Costs attributable to the DAMP), was $7,938,633 (compared to $4,415,513 in FY1998/99, $3,580,088 in FY 1997/98).

In 1999/00, the total reported cost of the municipal activities that contribute to nonpoint source pollutant control, identified as pre-existing programs, was $50,724,379 (compared to $42,126,146 in FY 1998/99, $42,356,036 in FY 1997/98 and $47,619,624 in FY1996/97).

For FY1999/00 the areas of greatest overall cost (both shared and individual) in order of significance were:

1. Recycling/Solid Waste Collection
2. Street Sweeping
3. Drainage Facility Maintenance
4. Public Property & Street Chemical Spill Response
5. Litter Control

In comparison, FY1999/98 and FY1997/98 the areas of greatest cost, based upon the information provided, in order of significance were:

1. Recycling/Solid Waste Collection
2. Street Sweeping
3. Drainage Facility Maintenance
4. Litter Control
5. Pesticide & Fertilizer Management

Table 6.1

County of Orange/OCFCD
Fiscal Analysis Summary

CAPITAL COSTS
(land, large equipment, and structures)

DAMP Cost Elements		1999/2000 FY Costs		Projected 2000/01 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$0	$0	$0	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$0	$0	$0
	Recycling	$0	$0	$0	$0
	Drainage Facility Maintenance	$0	$0	$0	$0
	Catch Basin Stenciling	$0	$0	$0	$0
	Street Sweeping	$0	$0	$0	$0
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$0	$0	$0	$0
	Pesticide & Fertilizer Management	$0	$0	$0	$0
PUBLIC INFORMATION DAMP (Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	$0	$0	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$0	$0	$0	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$0	$0	$0	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$0	$0	$0	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$0	$0	$0
TOTALS		$0	$0	$0	$0

Table 6.2

County of Orange/OCFCD
Fiscal Analysis Summary

OPERATIONS AND MAINTENANCE

DAMP Cost Elements		1999/2000 FY Costs		Projected 2000/01 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$42,322	$280,678	$51,597	$273,973
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$660,615	$0	$1,078,774
	Recycling	$0	$0	$0	$0
	Drainage Facility Maintenance	$144,247	$1,632,599	$255,568	$1,101,260
	Catch Basin Stenciling	$17,245	$0	$13,563	$0
	Street Sweeping	$63,000	$52,853	$190,000	$52,853
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$0	$0	$0	$0
	Pesticide & Fertilizer Management	$0	$1,347,368	$0	$2,427,196
PUBLIC INFORMATION DAMP (Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	$0	$0	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$0	$0	$0	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$0	$0	$0	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$259,450	$0	$279,415	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$0	$0	$0
TOTALS		$526,264	$3,974,113	$790,143	$4,934,056

Table 6.3

County of Orange/OCFCD

Fiscal Analysis Summary

FUNDING SOURCES

DAMP FUNDING SOURCES	FUNDING PERCENTAGES	
	FISCAL YEAR 1999-2000	FISCAL YEAR 2000-01 (Projected)
GENERAL FUND		
UTILITY TAX / CHARGES		
SEPARATE UTILITY BILLING ITEM		
GAS TAX	14	17
SPECIAL DISTRICT FUND	86	83
OTHERS (Specify) User Fees for Recycling and Hazardous Waste Collection. Integrated Waste Management Interest Earnings Sanitation Fee Benefit Assessment Fleet Maintenance Fund Community Services District Used Oil Grant Water Fund Sewer & Storm Drain Maintenance Fee		
TOTALS (must add up to 100%)	100	100

Table 6.4

City of Anaheim
Fiscal Analysis Summary

CAPITAL COSTS
(land, large equipment, and structures)

DAMP Cost Elements		1999/2000 FY Costs		Projected 2000/01 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$0	$0	$0	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$0	$0	$0
	Recycling	$0	$1,710,171	$0	* $83,000
	Drainage Facility Maintenance	$17,047	$0	$0	$0
	Catch Basin Stenciling	$0	$0	$0	$0
	Street Sweeping	$0	$0	$0	$0
	Environmental Performance	$0	$0	$35,000	$0
	Public Property & Street Chemical Spill Response	$0	$0	$0	$0
	Pesticide & Fertilizer Management	$0	$0	$0	$0
PUBLIC INFORMATION DAMP (Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	$0	$0	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$0	$0	$0	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$0	$0	$0	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$0	$0	$0	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$0	$0	$0
TOTALS		$17,047	$1,710,171	$35,000	$83,000

*Reduced projection is because the COP's have been paid off for past recycling truck purchases, and no new recycling truck purchases are planned until 2005. The projected $83,000 is for Automatic Recycling Barrels.

Table 6.5

City of Anaheim
Fiscal Analysis Summary

OPERATIONS AND MAINTENANCE

DAMP Cost Elements		1999/2000 FY Costs		Projected 2000/01 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$31,084	$224,345	$32,226	$232,470
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$1,000,761	$0	$1,055,508
	Recycling	$0	$8,807,437	$0	$8,982,851
	Drainage Facility Maintenance	$0	$216,438	$0	$220,767
	Catch Basin Stenciling	$0	$400	$9,500	$400
	Street Sweeping	$0	$3,123,854	$0	$3,186,231
	Environmental Performance	$1,339	$0	$4,500	$0
	Public Property & Street Chemical Spill Response	$0	$0	$0	$0
	Pesticide & Fertilizer Management	$19,330	$61,008	$25,000	$66,339
PUBLIC INFORMATION DAMP (Section 6.0)	Nonpoint Source Pollution Awareness	$9,906	$0	$10,000	$0
	Household Hazardous Waste Collection	$0	$446,871	$0	$455,808
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$0	$3,302	$0	$3,401
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$0	$0	$0	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$0	$0	$0	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$44,890	$0	$45,788	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$0	$0	$0
From Public Works Department		$0	$0	$0	$0
TOTALS		$106,549	$13,884,416	$127,014	$14,203,775

Table 6.6

City of Anaheim
Fiscal Analysis Summary

FUNDING SOURCES
Design Services

DAMP FUNDING SOURCES	FUNDING PERCENTAGES	
	FISCAL YEAR 1999-2000	FISCAL YEAR 2000-01 (Projected)
GENERAL FUND	0	0
UTILITY TAX / CHARGES		
SEPARATE UTILITY BILLING ITEM		
GAS TAX		
SPECIAL DISTRICT FUND	0	0
OTHERS (Specify) User Fees for Recycling and Hazardous Waste Collection. Integrated Waste Management Interest Earnings Sanitation Fee Benefit Assessment Fleet Maintenance Fund Community Services District Used Oil Grant Water Fund Sewer & Storm Drain Maintenance Fee	100	100
TOTALS (must add up to 100%)	100	100

Table 6.7

City of Brea
Fiscal Analysis Summary

CAPITAL COSTS
(land, large equipment, and structures)

DAMP Cost Elements		1999/2000 FY Costs		Projected 2000/01 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$0	$0	$0	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$0	$0	$0
	Recycling	$0	$0	$0	$0
	Drainage Facility Maintenance	$0	$0	$0	$0
	Catch Basin Stenciling	$0	$0	$0	$0
	Street Sweeping	$0	$0	$0	$0
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$0	$0	$0	$0
	Pesticide & Fertilizer Management	$0	$0	$0	$0
PUBLIC INFORMATION DAMP (Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	$0	$0	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$0	$0	$0	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$0	$0	$0	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$0	$0	$0	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$0	$0	$0
TOTALS		$0	$0	$0	$0

Table 6.8

City of Brea
Fiscal Analysis Summary

OPERATIONS AND MAINTENANCE

DAMP Cost Elements		1999/2000 FY Costs		Projected 2000/01 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$0	$0	$0	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$0	$0	$0
	Recycling	$0	$0	$0	$0
	Drainage Facility Maintenance	$0	$0	$0	$0
	Catch Basin Stenciling	$0	$0	$0	$0
	Street Sweeping	$0	$1,689,751	$0	$1,694,712
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$0	$0	$0	$0
	Pesticide & Fertilizer Management	$0	$0	$0	$0
PUBLIC INFORMATION DAMP (Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	$0	$0	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$0	$0	$0	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$0	$0	$0	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$0	$0	$0	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$0	$0	$0
TOTALS		$0	$1,689,751	$0	$1,694,712

Table 6.9

City of Brea

Fiscal Analysis Summary

FUNDING SOURCES

DAMP FUNDING SOURCES	FUNDING PERCENTAGES	
	FISCAL YEAR 1999-2000	FISCAL YEAR 2000-01 (Projected)
GENERAL FUND	5	5
UTILITY TAX / CHARGES	20	20
SEPARATE UTILITY BILLING ITEM	25	25
GAS TAX		
SPECIAL DISTRICT FUND	50	50
OTHERS (Specify) User Fees for Recycling and Hazardous Waste Collection. Integrated Waste Management Interest Earnings Sanitation Fee Benefit Assessment Fleet Maintenance Fund Community Services District Used Oil Grant Water Fund Sewer & Storm Drain Maintenance Fee		
TOTALS (must add up to 100%)	100	100

Table 6.10

City of Buena Park
Fiscal Analysis Summary

CAPITAL COSTS
(land, large equipment, and structures)

DAMP Cost Elements		1999/2000 FY Costs		Projected 2000/01 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$0	$0	$0	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$0	$0	$0
	Recycling	$0	$0	$0	$0
	Drainage Facility Maintenance	$0	$0	$0	$0
	Catch Basin Stenciling	$0	$0	$0	$0
	Street Sweeping	$0	$0	$0	$0
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$0	$0	$0	$0
	Pesticide & Fertilizer Management	$0	$0	$0	$0
PUBLIC INFORMATION DAMP (Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	$0	$0	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$0	$0	$0	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$0	$0	$0	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$0	$0	$0	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$0	$0	$0
TOTALS		$0	$0	$0	$0

Table 6.11

City of Buena Park

Fiscal Analysis Summary

OPERATIONS AND MAINTENANCE

DAMP Cost Elements		1999/2000 FY Costs		Projected 2000/01 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$0	$8,150	$0	$8,150
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$0	$0	$0
	Recycling	$0	$0	$0	$0
	Drainage Facility Maintenance	$0	$10,500	$0	$10,500
	Catch Basin Stenciling	$0	$0	$0	$15,000
	Street Sweeping	$0	$211,260	$0	$211,260
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$0	$4,200	$0	$4,200
	Pesticide & Fertilizer Management	$0	$17,850	$0	$17,850
PUBLIC INFORMATION DAMP (Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	$0	$0	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$0	$0	$0	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$0	$0	$0	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$0	$0	$0	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$0	$0	$0
TOTALS		$0	$251,960	$0	$266,960

Table 6.12

City of Buena Park
Fiscal Analysis Summary

FUNDING SOURCES

DAMP FUNDING SOURCES	FUNDING PERCENTAGES	
	FISCAL YEAR 1999-2000	FISCAL YEAR 2000-01 (Projected)
GENERAL FUND	100	100
UTILITY TAX / CHARGES		
SEPARATE UTILITY BILLING ITEM		
GAS TAX		
SPECIAL DISTRICT FUND		
OTHERS (Specify) User Fees for Recycling and Hazardous Waste Collection. Integrated Waste Management Interest Earnings Sanitation Fee Benefit Assessment Fleet Maintenance Fund Community Services District Used Oil Grant Water Fund Sewer & Storm Drain Maintenance Fee		
TOTALS (must add up to 100%)	100	100

Table 6.13

City of Costa Mesa
Fiscal Analysis Summary

CAPITAL COSTS
(land, large equipment, and structures)

DAMP Cost Elements		1999/2000 FY Costs		Projected 2000/01 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$0	$0	$0	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$0	$0	$0
	Recycling	$0	$0	$0	$0
	Drainage Facility Maintenance	$0	$485,000	$0	$0
	Catch Basin Stenciling	$0	$0	$0	$0
	Street Sweeping	$0	$0	$0	$0
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$0	$0	$0	$0
	Pesticide & Fertilizer Management	$0	$0	$0	$0
PUBLIC INFORMATION DAMP (Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	$0	$0	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$0	$0	$0	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$0	$0	$0	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$0	$0	$0	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$0	$0	$0
TOTALS		$0	$485,000	$0	$0

Table 6.14

City of Costa Mesa

Fiscal Analysis Summary

OPERATIONS AND MAINTENANCE

DAMP Cost Elements		1999/2000 FY Costs		Projected 2000/01 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$25,000	$0	$25,000	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$0	$0	$0
	Recycling	$0	$0	$0	$0
	Drainage Facility Maintenance	$0	$126,000	$0	$485,000
	Catch Basin Stenciling	$0	$0	$0	$0
	Street Sweeping	$0	$0	$0	$0
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$0	$0	$0	$0
	Pesticide & Fertilizer Management	$0	$0	$0	$0
PUBLIC INFORMATION DAMP (Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	$0	$0	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$0	$0	$0	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$0	$0	$0	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$0	$0	$0	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$0	$0	$0
TOTALS		$25,000	$126,000	$25,000	$485,000

Table 6.15

City of Costa Mesa

Fiscal Analysis Summary

FUNDING SOURCES

DAMP FUNDING SOURCES	FUNDING PERCENTAGES	
	FISCAL YEAR 1999-2000	FISCAL YEAR 2000-01 (Projected)
GENERAL FUND	100	100
UTILITY TAX / CHARGES		
SEPARATE UTILITY BILLING ITEM		
GAS TAX		
SPECIAL DISTRICT FUND		
OTHERS (Specify) User Fees for Recycling and Hazardous Waste Collection. Integrated Waste Management Interest Earnings Sanitation Fee Benefit Assessment Fleet Maintenance Fund Community Services District Used Oil Grant Water Fund Sewer & Storm Drain Maintenance Fee		
TOTALS (must add up to 100%)	100	100

Table 6.16

City of Cypress
Fiscal Analysis Summary

CAPITAL COSTS
(land, large equipment, and structures)

DAMP Cost Elements		1999/2000 FY Costs		Projected 2000/01 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$0	$0	$0	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$0	$0	$0
	Recycling	$0	$0	$0	$0
	Drainage Facility Maintenance	$0	$0	$0	$0
	Catch Basin Stenciling	$0	$0	$0	$0
	Street Sweeping	$301,700	$0	$0	$0
	Environmental Performance	$0	$0	$12,000	$0
	Public Property & Street Chemical Spill Response	$0	$0	$0	$0
	Pesticide & Fertilizer Management	$0	$0	$0	$0
PUBLIC INFORMATION DAMP (Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	$0	$0	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$0	$0	$0	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$0	$0	$0	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$0	$0	$0	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$0	$0	$0
TOTALS		$301,700	$0	$12,000	$0

Table 6.17

City of Cypress
Fiscal Analysis Summary

OPERATIONS AND MAINTENANCE

DAMP Cost Elements		1999/2000 FY Costs		Projected 2000/01 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$0	$2,500	$0	$2,500
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$0	$0	$0
	Recycling	$0	$5,462	$0	$13,963
	Drainage Facility Maintenance	$0	$163,815	$0	$151,670
	Catch Basin Stenciling	$0	$0	$800	$0
	Street Sweeping	$0	$181,764	$0	$169,409
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$0	$1,000	$0	$1,000
	Pesticide & Fertilizer Management	$0	$191,000	$0	$191,000
PUBLIC INFORMATION DAMP (Section 6.0)	Nonpoint Source Pollution Awareness	$2,000	$0	$2,000	$0
	Household Hazardous Waste Collection	$10,000	$0	$10,000	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$0	$19,346	$0	$14,404
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$0	$19,346	$0	$14,404
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$0	$0	$0	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$0	$0	$0
TOTALS		$12,000	$584,233	$12,800	$558,350

Table 6.18

City of Cypress
Fiscal Analysis Summary

FUNDING SOURCES

DAMP FUNDING SOURCES	FUNDING PERCENTAGES	
	FISCAL YEAR 1999-2000	FISCAL YEAR 2000-01 (Projected)
GENERAL FUND	100	100
UTILITY TAX / CHARGES		
SEPARATE UTILITY BILLING ITEM		
GAS TAX		
SPECIAL DISTRICT FUND		
OTHERS (Specify) User Fees for Recycling and Hazardous Waste Collection. Integrated Waste Management Interest Earnings Sanitation Fee Benefit Assessment Fleet Maintenance Fund Community Services District Used Oil Grant Water Fund Sewer & Storm Drain Maintenance Fee		
TOTALS (must add up to 100%)	100	100

Table 6.19

City of Dana Point
Fiscal Analysis Summary

CAPITAL COSTS
(land, large equipment, and structures)

DAMP Cost Elements		1999/2000 FY Costs		Projected 2000/01 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$0	$0	$0	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$0	$0	$0
	Recycling	$0	$0	$0	$0
	Drainage Facility Maintenance	$0	* $1,535,715	$0	* $2,700,000
	Catch Basin Stenciling	$0	$0	$0	$0
	Street Sweeping	$0	$0	$0	$0
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$0	$0	$0	$0
	Pesticide & Fertilizer Management	$0	$0	$0	$0
PUBLIC INFORMATION DAMP (Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	$0	$0	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$0	$0	$0	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$0	$0	$0	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$0	$0	$0	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$0	$475,000	$0
TOTALS		$0	$1,535,715	$475,000	$2,700,000

*Installed 3 new storm drain lines with thirteen new catch basin inlets in 1999-2000
Will install 2 new storm drain lines 2000/01

Table 6.20

City of Dana Point
Fiscal Analysis Summary

OPERATIONS AND MAINTENANCE

DAMP Cost Elements		1999/2000 FY Costs		Projected 2000/01 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$4,000	$13,564	$4,000	$12,763
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$5,207	$20,829	$3,963	$15,853
	Recycling	$0	$0	$0	$0
	Drainage Facility Maintenance	$0	$97,522	$0	$47,437
	Catch Basin Stenciling	$0	$2,071	$0	$4,000
	Street Sweeping	$0	$45,953	$0	$100,859
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$0	$0	$0	$0
	Pesticide & Fertilizer Management	$0	$12,850	$0	$12,000
PUBLIC INFORMATION DAMP (Section 6.0)	Nonpoint Source Pollution Awareness	$500	$0	$2,000	$0
	Household Hazardous Waste Collection	$0	$0	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$2,262	$0	$4,000	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$3,003	$10,010	$3,600	$12,000
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$13,865	$0	$6,000	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$0	$84,000	$0
TOTALS		$28,837	$202,799	$107,563	$204,912

Table 6.21

City of Dana Point

Fiscal Analysis Summary

FUNDING SOURCES

DAMP FUNDING SOURCES	FUNDING PERCENTAGES	
	FISCAL YEAR 1999-2000	FISCAL YEAR 2000-01 (Projected)
GENERAL FUND	100	90
UTILITY TAX / CHARGES		
SEPARATE UTILITY BILLING ITEM		
GAS TAX		
SPECIAL DISTRICT FUND		
OTHERS (Specify) User Fees for Recycling and Hazardous Waste Collection. Integrated Waste Management Interest Earnings Sanitation Fee Benefit Assessment Fleet Maintenance Fund Community Services District Used Oil Grant Water Fund Sewer & Storm Drain Maintenance Fee		10 (Measure M)
TOTALS (must add up to 100%)	100	100

Table 6.22

City of Fountain Valley
Fiscal Analysis Summary

CAPITAL COSTS
(land, large equipment, and structures)

DAMP Cost Elements		1999/2000 FY Costs		Projected 2000/01 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		2,330	0	2,330	0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	0	0	0	0
	Recycling	0	0	0	0
	Drainage Facility Maintenance	0	1,018,000	0	30,000
	Catch Basin Stenciling	0	0	0	0
	Street Sweeping	0	0	0	0
	Environmental Performance	10,000	0	10,000	0
	Public Property & Street Chemical Spill Response	0	0	0	0
	Pesticide & Fertilizer Management	0	0	0	0
PUBLIC INFORMATION DAMP (Section 6.0)	Nonpoint Source Pollution Awareness	0	0	0	0
	Household Hazardous Waste Collection	0	0	0	0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		0	0	0	0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		0	0	0	0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	0	0	0	0
	Other Efforts to Identify & Eliminate Illicit Connections	0	0	135,000	0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		0	0	0	0
TOTALS		$12,330	$1,018,000	$147,330	$30,000

Table 6.23

City of Fountain Valley
Fiscal Analysis Summary

OPERATIONS AND MAINTENANCE

DAMP Cost Elements		1999/2000 FY Costs		Projected 2000/01 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$2,908	$0	$2,908	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$58,812	$0	$61,929
	Recycling	$0	$52,716	$0	$52,716
	Drainage Facility Maintenance	$0	$159,436	$0	$177,173
	Catch Basin Stenciling	$0	$8,859	$0	$9,399
	Street Sweeping	$0	$282,057	$0	$288,811
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$0	$91,815	$0	$94,661
	Pesticide & Fertilizer Management	$0	$195,030	$0	$205,366
PUBLIC INFORMATION DAMP (Section 6.0)	Nonpoint Source Pollution Awareness	$600	$0	$600	$0
	Household Hazardous Waste Collection	$0	$26,000	$0	$26,000
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$6,160	$0	$6,160	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$4,724	$0	$4,724	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$8,859	$0	$9,487	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$35,000	$0	$10,000	$0
TOTALS		$58,251	$874,725	$33,879	$916,055

Table 6.24

City of Fountain Valley
Fiscal Analysis Summary

FUNDING SOURCES

DAMP FUNDING SOURCES	FUNDING PERCENTAGES	
	FISCAL YEAR 1999-2000	FISCAL YEAR 2000-01 (Projected)
GENERAL FUND	95	95
UTILITY TAX / CHARGES		
SEPARATE UTILITY BILLING ITEM		
GAS TAX	1	1
SPECIAL DISTRICT FUND		
OTHERS (Specify) User Fees for Recycling and Hazardous Waste Collection. Integrated Waste Management Interest Earnings Sanitation Fee Benefit Assessment Fleet Maintenance Fund Community Services District Used Oil Grant Water Fund Sewer & Storm Drain Maintenance Fee	4	4
TOTALS (must add up to 100%)	100	100

Table 6.25

City of Fullerton
Fiscal Analysis Summary

CAPITAL COSTS
(land, large equipment, and structures)

DAMP Cost Elements		1999/2000 FY Costs		Projected 2000/01 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$0	$0	$0	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$0	$0	$0
	Recycling	$0	$0	$0	$0
	Drainage Facility Maintenance	$0	$0	$0	$0
	Catch Basin Stenciling	$0	$0	$0	$0
	Street Sweeping	$0	$0	$0	$0
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$0	$0	$0	$0
	Pesticide & Fertilizer Management	$0	$0	$0	$0
PUBLIC INFORMATION DAMP (Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	$0	$0	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$0	$0	$0	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$0	$0	$0	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$0	$0	$0	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$0	$0	$0
TOTALS		$0	$0	$0	$0

Table 6.26

City of Fullerton

Fiscal Analysis Summary

OPERATIONS AND MAINTENANCE

DAMP Cost Elements		1999/2000 FY Costs		Projected 2000/01 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$0	$0	$0	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$15,816	$0	$16,300
	Recycling	$0	$0	$0	$0
	Drainage Facility Maintenance	$0	$473,280	$0	$487,500
	Catch Basin Stenciling	$0	Included Above	$0	Included Above
	Street Sweeping	$0	$453,910	$0	$467,500
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$0	$95,070	$0	$97,900
	Pesticide & Fertilizer Management	$124,470	$0	$126,740	$0
PUBLIC INFORMATION DAMP (Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	$0	$0	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$0	$0	$0	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$0	$0	$0	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$0	$0	$0	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$0	$0	$0
TOTALS		$124,470	$1,038,076	$126,740	$1,069,200

Table 6.27

Fullerton

Fiscal Analysis Summary

FUNDING SOURCES

DAMP FUNDING SOURCES	FUNDING PERCENTAGES	
	FISCAL YEAR 1999-2000	FISCAL YEAR 2000-01 (Projected)
GENERAL FUND	1	1
UTILITY TAX / CHARGES		
SEPARATE UTILITY BILLING ITEM		
GAS TAX		
SPECIAL DISTRICT FUND	11	11
OTHERS (Specify) User Fees for Recycling and Hazardous Waste Collection. Integrated Waste Management Interest Earnings Sanitation Fee Benefit Assessment Fleet Maintenance Fund Community Services District Used Oil Grant Water Fund Sewer & Storm Drain Maintenance Fee	80 8	80 8
TOTALS (must add up to 100%)	100	100

Table 6.28

City of Garden Grove
Fiscal Analysis Summary

CAPITAL COSTS
(land, large equipment, and structures)

DAMP Cost Elements		1999/2000 FY Costs		Projected 2000/01 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$0	$0	$0	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$0	$0	$0
	Recycling	$0	$0	$0	$0
	Drainage Facility Maintenance	$0	$0	$0	$0
	Catch Basin Stenciling	$0	$0	$0	$0
	Street Sweeping	$0	$0	$0	$0
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$0	$0	$0	$0
	Pesticide & Fertilizer Management	$0	$0	$0	$0
PUBLIC INFORMATION DAMP (Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	$0	$0	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$0	$0	$0	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$0	$0	$0	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$0	$0	$0	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$0	$0	$0
TOTALS		$0	$0	$0	$0

Table 6.29

City of Garden Grove
Fiscal Analysis Summary

OPERATIONS AND MAINTENANCE

DAMP Cost Elements		1999/2000 FY Costs		Projected 2000/01 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$5,250	$0	$5,648	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$0	$0	$0
	Recycling	$0	$11,848	$0	$13,310
	Drainage Facility Maintenance	$0	$148,967	$0	$210,741
	Catch Basin Stenciling	$550	$0	$550	$0
	Street Sweeping	$0	$426,759	$0	$439,871
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$0	$64,318	$0	$78,371
	Pesticide & Fertilizer Management	$5,000	$0	$5,000	$0
PUBLIC INFORMATION DAMP (Section 6.0)	Nonpoint Source Pollution Awareness	$500	$0	$500	$0
	Household Hazardous Waste Collection	$0	$46,170	$0	$54,398
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		* $7,955	$0	* $5,740	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		* $4,546	$0	* $3,279	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$1,048	$0	$1,573	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$524	$0	$787	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$35,000	$0	$30,000	$0
TOTALS		$60,373	$698,062	$53,077	$796,691

*Figures are costs estimates

Table 6.30

City of Garden Grove
Fiscal Analysis Summary

FUNDING SOURCES

DAMP FUNDING SOURCES	FUNDING PERCENTAGES	
	FISCAL YEAR 1999-2000	FISCAL YEAR 2000-2001 (Projected)
GENERAL FUND	53	51
UTILITY TAX / CHARGES		
SEPARATE UTILITY BILLING ITEM		
GAS TAX	29	26
SPECIAL DISTRICT FUND		
OTHERS (Specify)		
User Fees for Recycling and Hazardous Waste Collection.		
Integrated Waste Management		
Interest Earnings		
Sanitation Fee		
Benefit Assessment		
Fleet Maintenance Fund		
Community Services District		
Used Oil Grant	6	6
Water Fund	12	17
Sewer & Storm Drain Maintenance Fee		
TOTALS (must add up to 100%)	100	100

Table 6.31

City of Huntington Beach
Fiscal Analysis Summary

CAPITAL COSTS
(land, large equipment, and structures)

DAMP Cost Elements		1999/2000 FY Costs		Projected 2000/01 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$0	$0	$0	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$0	$0	$0
	Recycling	$0	$0	$0	$0
	Drainage Facility Maintenance	* $200,000	$83,500	$50,000	$284,000
	Catch Basin Stenciling	$0	$0	$0	$0
	Street Sweeping	$0	$0	$0	$0
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$0	$0	$0	$0
	Pesticide & Fertilizer Management	$0	$0	$0	$0
PUBLIC INFORMATION DAMP (Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	$0	$0	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$0	$0	$0	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$0	$0	$0	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$0	$0	$0	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$0	$0	$0
TOTALS		$200,000	$83,500	$50,000	$284,000

* Diversion of Pump Stations to Sewer Facilities

Table 6.32

City of Huntington Beach
Fiscal Analysis Summary

OPERATION AND MAINTENANCE COSTS

DAMP Cost Elements		1999/2000 FY Costs		Projected 2000/01 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$250,000	$900,000	$200,000	$900,000
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$15,000	$0	$15,000
	Recycling	$0	$2,200,000	$0	$2,200,000
	Drainage Facility Maintenance	$630,000	$1,200,000	$500,000	$1,200,000
	Catch Basin Stenciling	$1,000	$0	$1,000	$0
	Street Sweeping	$375,000	$560,000	$385,000	$600,000
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$10,000	$1,100,000	$10,000	$1,200,000
	Pesticide & Fertilizer Management	$3,000	$0	$3,000	$0
PUBLIC INFORMATION DAMP (Section 6.0)	Nonpoint Source Pollution Awareness	* $1,500,000	$0	* $500,000	$0
	Household Hazardous Waste Collection	$0	**	$0	**
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$2,000	$0	$5,000	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$5,000	$0	$15,000	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$0	$0	$0	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$7,500	$0	$10,000	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		***	$0	***	$0
TOTALS		$2,783,500	$5,975,000	$1,629,000	$6,115,000

* Includes urban runoff studies
** Included in recycling program
*** Not tracked as separate costs

Table 6.33

City of Huntington Beach
Fiscal Analysis Summary

FUNDING SOURCES

DAMP FUNDING SOURCES	FUNDING PERCENTAGES	
	FISCAL YEAR 1999-2000	FISCAL YEAR 2000-01 (Projected)
GENERAL FUND	100	100
UTILITY TAX / CHARGES		
SEPARATE UTILITY BILLING ITEM		
GAS TAX		
SPECIAL DISTRICT FUND		
OTHERS (Specify) User Fees for Recycling and Hazardous Waste Collection. Integrated Waste Management Interest Earnings Sanitation Fee Benefit Assessment Fleet Maintenance Fund Community Services District Used Oil Grant Water Fund Sewer & Storm Drain Maintenance Fee		
TOTALS (must add up to 100%)	100	100

Table 6.34

City of Irvine
Fiscal Analysis Summary

CAPITAL COSTS
(land, large equipment, and structures)

DAMP Cost Elements		1999/2000 FY Costs		Projected 2000/01 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$0	$0	$0	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$0	$0	$0
	Recycling	$0	$0	$0	$0
	Drainage Facility Maintenance	$0	$0	$0	$0
	Catch Basin Stenciling	$0	$0	$0	$0
	Street Sweeping	$0	$0	$0	$0
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$0	$0	$0	$0
	Pesticide & Fertilizer Management	$0	$0	$0	$0
PUBLIC INFORMATION DAMP (Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	$0	$0	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$0	$0	$0	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$0	$0	$0	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$0	$0	$0	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$243,650	$0	$114,700	$0
TOTALS		$243,650	$0	$114,700	$0

Table 6.35

City of Irvine
Fiscal Analysis Summary

OPERATIONS AND MAINTENANCE

DAMP Cost Elements		1999/2000 FY Costs		Projected 2000/01 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$0	$0	$0	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$0	$0	$0
	Recycling	$0	$505,984	$0	$505,984
	Drainage Facility Maintenance	$0	$0	$0	$0
	Catch Basin Stenciling	$0	$5,000	$0	$5,000
	Street Sweeping	$0	$661,792	$0	$661,792
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$3,000	$0	$3,600	$0
	Pesticide & Fertilizer Management	$0	$0	$0	$0
PUBLIC INFORMATION DAMP (Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	$0	$0	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		* $6,000	$0	* $6,000	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		** $8,000	$0	** $9,600	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$0	$0	$0	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$0	$0	$0
TOTALS		$17,000	$1,172,776	$19,200	$1,172,776

*Assumes 1 hour of Engineering @ $75.92/hour, 2 hours of Planning @ $85.70/hour, and 2 hours of Inspection @ $68.35/hour - for each of 36 projects
**Assumes static Planning 20% increase to spill response plus Inspection and Plan Check

Table 6.36

City of Irvine
Fiscal Analysis Summary

FUNDING SOURCES

DAMP FUNDING SOURCES	FUNDING PERCENTAGES	
	FISCAL YEAR 1999-2000	FISCAL YEAR 2000-01 (Projected)
GENERAL FUND		
UTILITY TAX / CHARGES		
SEPARATE UTILITY BILLING ITEM		
GAS TAX		
SPECIAL DISTRICT FUND		
OTHERS (Specify) User Fees for Recycling and Hazardous Waste Collection. Integrated Waste Management Interest Earnings Sanitation Fee Benefit Assessment Fleet Maintenance Fund Community Services District Used Oil Grant Water Fund Sewer & Storm Drain Maintenance Fee		
TOTALS (must add up to 100%)	0	0

Table 6.37

City of La Habra
Fiscal Analysis Summary

CAPITAL COSTS
(land, large equipment, and structures)

DAMP Cost Elements		1999/2000 FY Costs		Projected 2000/01 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$0	$0	$0	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$0	$0	$0
	Recycling	$0	$0	$0	$0
	Drainage Facility Maintenance	$0	$0	$0	$0
	Catch Basin Stenciling	$0	$0	$0	$0
	Street Sweeping	$0	$0	$0	$0
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$0	$0	$0	$0
	Pesticide & Fertilizer Management	$0	$0	$0	$0
PUBLIC INFORMATION DAMP (Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	$0	$0	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$40,000	$6,000	$40,000	$6,000
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$0	$20,000	$0	$20,000
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$0	$0	$0	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$200,000	$0	$200,000
TOTALS		$40,000	$226,000	$40,000	$226,000

Table 6.38

City of La Habra

Fiscal Analysis Summary

OPERATIONS AND MAINTENANCE

DAMP Cost Elements		1999/2000 FY Costs		Projected 2000/01 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$0	$0	$0	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$0	$0	$120,100
	Recycling	$0	$275,500	$0	$500,000
	Drainage Facility Maintenance	$0	$0	$0	$10,000
	Catch Basin Stenciling	$600	$0	$600	$0
	Street Sweeping	$0	$200,000	$0	$210,000
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$0	$0	$0	$0
	Pesticide & Fertilizer Management	$0	$3,300	$0	$4,000
PUBLIC INFORMATION DAMP (Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	$0	$0	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$0	$0	$0	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$0	$0	$0	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$0	$0	$0	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$2,200	$0	$2,300	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$0	$0	$0
TOTALS		$2,800	$478,800	$2,900	$844,100

Table 6.39

City of La Habra

Fiscal Analysis Summary

FUNDING SOURCES

DAMP FUNDING SOURCES	FUNDING PERCENTAGES	
	FISCAL YEAR 1999-2000	FISCAL YEAR 2000-01 (Projected)
GENERAL FUND	100	100
UTILITY TAX / CHARGES		
SEPARATE UTILITY BILLING ITEM	Recycling is part of customer billing	Recycling is part of customer billing
GAS TAX		
SPECIAL DISTRICT FUND		
OTHERS (Specify) User Fees for Recycling and Hazardous Waste Collection. Integrated Waste Management Interest Earnings Sanitation Fee Benefit Assessment Fleet Maintenance Fund Community Services District Used Oil Grant Water Fund Sewer & Storm Drain Maintenance Fee		
TOTALS (must add up to 100%)	100	100

Table 6.40

City of La Palma
Fiscal Analysis Summary

CAPITAL COSTS
(land, large equipment, and structures)

DAMP Cost Elements		1999/2000 FY Costs		Projected 2000/01 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$0	$0	$0	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$0	$0	$0
	Recycling	$0	$0	$0	$0
	Drainage Facility Maintenance	$0	$0	$0	$0
	Catch Basin Stenciling	$0	$500	$0	$0
	Street Sweeping	$0	$2,000	$0	$2,000
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$0	$0	$0	$0
	Pesticide & Fertilizer Management	$0	$500	$0	$1,500
PUBLIC INFORMATION DAMP (Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	$0	$0	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$0	$0	$0	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$0	$0	$0	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$0	$0	$0	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$0	$0	$0
TOTALS		$0	$3,000	$0	$3,500

Table 6.41

City of La Palma
Fiscal Analysis Summary

OPERATIONS AND MAINTENANCE

DAMP Cost Elements		1999/2000 FY Costs		Projected 2000/01 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$0	$0	$0	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$0	$0	$0
	Recycling	$0	$0	$0	$0
	Drainage Facility Maintenance	$0	$55,600	$0	$55,100
	Catch Basin Stenciling	$0	$0	$0	$0
	Street Sweeping	$0	$74,000	$0	$74,000
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$0	$0	$0	$0
	Pesticide & Fertilizer Management	$0	$8,500	$0	$1,200
PUBLIC INFORMATION DAMP (Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	$0	$0	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$0	$0	$0	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$0	$0	$0	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$0	$0	$0	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$0	$0	$0
TOTALS		$0	$138,100	$0	$130,300

Table 6.42

City of La Palma
Fiscal Analysis Summary

FUNDING SOURCES

DAMP FUNDING SOURCES	FUNDING PERCENTAGES	
	FISCAL YEAR 1999-2000	FISCAL YEAR 2000-01 (Projected)
GENERAL FUND	85	85
UTILITY TAX / CHARGES		
SEPARATE UTILITY BILLING ITEM		
GAS TAX	15	15
SPECIAL DISTRICT FUND		
OTHERS (Specify) User Fees for Recycling and Hazardous Waste Collection. Integrated Waste Management Interest Earnings Sanitation Fee Benefit Assessment Fleet Maintenance Fund Community Services District Used Oil Grant Water Fund Sewer & Storm Drain Maintenance Fee		
TOTALS (must add up to 100%)	100	100

Table 6.43

City of Laguna Beach
Fiscal Analysis Summary

CAPITAL COSTS
(land, large equipment, and structures)

DAMP Cost Elements		1999/2000 FY Costs		Projected 2000/01 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$0	$0	$0	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$0	$0	$0
	Recycling	$0	$0	$0	$0
	Drainage Facility Maintenance	$0	$0	$0	$6,500
	Catch Basin Stenciling	$0	$2,680	$0	$0
	Street Sweeping	$0	$0	$0	$0
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$0	$4,000	$0	$0
	Pesticide & Fertilizer Management	$0	$3,000	$0	$0
PUBLIC INFORMATION DAMP (Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	$0	$0	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$0	$0	$0	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$0	$0	$0	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$0	$0	$0	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$75,000	$0	$200,000
TOTALS		$0	$84,680	$0	$206,500

Table 6.44

City of Laguna Beach
Fiscal Analysis Summary

OPERATIONS AND MAINTENANCE

DAMP Cost Elements		1999/2000 FY Costs		Projected 2000/01 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$0	$0	$0	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$0	$0	$0
	Recycling	$0	$445,370	$0	$454,410
	Drainage Facility Maintenance	$0	$95,000	$0	$100,000
	Catch Basin Stenciling	$0	$0	$0	$0
	Street Sweeping	$0	$68,300	$0	$71,000
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$0	$6,900	$0	$10,000
	Pesticide & Fertilizer Management	$0	$55,500	$0	$57,000
PUBLIC INFORMATION DAMP (Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	$0	* $62,000	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$0	$0	$0	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$0	$0	$0	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$0	$0	$0	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$0	$0	$0
TOTALS		$0	$733,070	$0	$692,410

*The City's HHW Collection Program is a bi-annual program, and was significantly augmented in June, 2000.

Table 6.45

City of Laguna Beach
Fiscal Analysis Summary

FUNDING SOURCES

DAMP FUNDING SOURCES	FUNDING PERCENTAGES	
	FISCAL YEAR 1999-2000	FISCAL YEAR 2000-01 (Projected)
GENERAL FUND	90	90
UTILITY TAX / CHARGES		
SEPARATE UTILITY BILLING ITEM		
GAS TAX		
SPECIAL DISTRICT FUND		
OTHERS (Specify) User Fees for Recycling and Hazardous Waste Collection. Integrated Waste Management Interest Earnings Sanitation Fee Benefit Assessment Fleet Maintenance Fund Community Services District Used Oil Grant Water Fund Sewer & Storm Drain Maintenance Fee	10	10
TOTALS (must add up to 100%)	100	100

Table 6.46

City of Laguna Hills
Fiscal Analysis Summary

CAPITAL COSTS
(land, large equipment, and structures)

DAMP Cost Elements		1999/2000 FY Costs		Projected 2000/01 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$0	$0	$0	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$0	$0	$0
	Recycling	$0	$0	$0	$0
	Drainage Facility Maintenance	$0	$0	$0	$0
	Catch Basin Stenciling	$0	$0	$0	$0
	Street Sweeping	$0	$0	$0	$0
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$0	$0	$0	$0
	Pesticide & Fertilizer Management	$0	$0	$0	$0
PUBLIC INFORMATION DAMP (Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	$0	$0	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$0	$0	$0	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$0	$0	$0	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$0	$0	$0	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$0	$0	$0
TOTALS		$0	$0	$0	$0

Table 6.47

City of Laguna Hills
Fiscal Analysis Summary

OPERATIONS AND MAINTENANCE

DAMP Cost Elements		1999/2000 FY Costs		Projected 2000/01 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$0	$0	$0	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$3,000	$0	$3,000
	Recycling	$0	$0	$0	$0
	Drainage Facility Maintenance	$7,509	$0	$10,000	$0
	Catch Basin Stenciling	$5,000	$0	$0	$0
	Street Sweeping	$0	$98,000	$0	$100,000
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$0	$0	$0	$0
	Pesticide & Fertilizer Management	$0	$0	$0	$0
PUBLIC INFORMATION DAMP (Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	$0	$0	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$0	$0	$0	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$0	$0	$0	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$0	$0	$0	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$0	$0	$0
TOTALS		$12,509	$101,000	$10,000	$103,000

Table 6.48

City of Laguna Hills

Fiscal Analysis Summary

FUNDING SOURCES

DAMP FUNDING SOURCES	FUNDING PERCENTAGES	
	FISCAL YEAR 1999-2000	FISCAL YEAR 2000-01 (Projected)
GENERAL FUND	100	100
UTILITY TAX / CHARGES		
SEPARATE UTILITY BILLING ITEM		
GAS TAX		
SPECIAL DISTRICT FUND		
OTHERS (Specify) User Fees for Recycling and Hazardous Waste Collection. Integrated Waste Management Interest Earnings Sanitation Fee Benefit Assessment Fleet Maintenance Fund Community Services District Used Oil Grant Water Fund Sewer & Storm Drain Maintenance Fee		
TOTALS (must add up to 100%)	100	100

Table 6.49

City of Laguna Niguel
Fiscal Analysis Summary

CAPITAL COSTS
(land, large equipment, and structures)

DAMP Cost Elements		1999/2000 FY Costs		Projected 2000/01 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$0	$0	$0	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$0	$0	$0
	Recycling	$0	$0	$0	$0
	Drainage Facility Maintenance	$10,000	$100,000	$38,000	$100,000
	Catch Basin Stenciling	$0	$0	$0	$0
	Street Sweeping	$0	$0	$0	$0
	Environmental Performance	$0	$0	$200,000	$0
	Public Property & Street Chemical Spill Response	$0	$0	$0	$0
	Pesticide & Fertilizer Management	$0	$0	$0	$0
PUBLIC INFORMATION DAMP (Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	$0	$0	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$0	$0	$0	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$0	$0	$0	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$1,000	$0	$2,000	$3,000
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$0	$0	$0
TOTALS		$11,000	$100,000	$240,000	$103,000

Table 6.50

City of Laguna Niguel
Fiscal Analysis Summary

OPERATIONS AND MAINTENANCE

DAMP Cost Elements		1999/2000 FY Costs		Projected 2000/01 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$40,000	$2,000	$20,000	$2,000
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$7,800	$0	$7,800
	Recycling	$0	$0	$0	$0
	Drainage Facility Maintenance	$113,386	$0	$4,000	$0
	Catch Basin Stenciling	$400	$0	$500	$0
	Street Sweeping	$0	$62,755	$18,000	$62,755
	Environmental Performance	$0	$0	$110,000	$0
	Public Property & Street Chemical Spill Response	$0	$1,000	$0	$600
	Pesticide & Fertilizer Management	$0	$1,000	$0	$1,000
PUBLIC INFORMATION DAMP (Section 6.0)	Nonpoint Source Pollution Awareness	$2,000	$0	$1,000	$0
	Household Hazardous Waste Collection	$0	$0	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$0	Yes (no cost)	$0	Yes (no cost)
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$3,000	Yes (no cost)	$4,000	Yes (no cost)
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$0	$0	$0	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$0	$0	$0
TOTALS		$158,786	$74,555	$157,500	$74,155

Table 6.51

City of Laguna Niguel
Fiscal Analysis Summary

FUNDING SOURCES

DAMP FUNDING SOURCES	FUNDING PERCENTAGES	
	FISCAL YEAR 1999-2000	FISCAL YEAR 2000-01 (Projected)
GENERAL FUND	20	20
UTILITY TAX / CHARGES		
SEPARATE UTILITY BILLING ITEM		
GAS TAX	65	65
SPECIAL DISTRICT FUND		
OTHERS (Specify) User Fees for Recycling and Hazardous Waste Collection. Integrated Waste Management Interest Earnings Sanitation Fee Benefit Assessment Fleet Maintenance Fund Community Services District Used Oil Grant Water Fund Sewer & Storm Drain Maintenance Fee	15	15
TOTALS (must add up to 100%)	100	100

Table 6.52

City of Lake Forest
Fiscal Analysis Summary

CAPITAL COSTS
(land, large equipment, and structures)

DAMP Cost Elements		1999/2000		Projected 2000/01 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$0	$0	$0	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$0	$0	$0
	Recycling	$0	$0	$0	$0
	Drainage Facility Maintenance	$0	$0	$0	$0
	Catch Basin Stenciling	$0	$0	$0	$0
	Street Sweeping	$0	$0	$0	$0
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$0	$0	$0	$0
	Pesticide & Fertilizer Management	$0	$0	$0	$0
PUBLIC INFORMATION DAMP (Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	$0	$0	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$0	$0	$0	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$0	$0	$0	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$0	$0	$0	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$0	$0	$0
TOTALS		$0	$0	$0	$0

Table 6.53

City of Lake Forest
Fiscal Analysis Summary

OPERATIONS AND MAINTENANCE

DAMP Cost Elements		1999/2000 FY Costs		Projected 2000/01 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$2,950	$10,327	$3,251	$13,960
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$56,206	$0	$112,312
	Recycling	$57,310	$0	$60,000	$0
	Drainage Facility Maintenance	$29,563	$56,206	$45,354	$74,108
	Catch Basin Stenciling	$0	$0	$0	$0
	Street Sweeping	$0	$0	$0	$0
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$0	$0	$0	$0
	Pesticide & Fertilizer Management	$0	$33,354	$0	$53,696
PUBLIC INFORMATION DAMP (Section 6.0)	Nonpoint Source Pollution Awareness	$16,500	$0	$18,000	$0
	Household Hazardous Waste Collection	$14,793	$0	$19,500	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$0	$0	$0	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$0	$0	$0	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$402	$0	$1,000	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$704	$0	$500	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$0	$0	$0
TOTALS		$122,222	$156,093	$147,605	$254,076

Table 6.54

City of Lake Forest
Fiscal Analysis Summary

FUNDING SOURCES

DAMP FUNDING SOURCES	FUNDING PERCENTAGES	
	FISCAL YEAR 1999-2000	FISCAL YEAR 2000-01 (Projected)
GENERAL FUND	10	10
UTILITY TAX / CHARGES		
SEPARATE UTILITY BILLING ITEM		
GAS TAX	90	90
SPECIAL DISTRICT FUND		
OTHERS (Specify) User Fees for Recycling and Hazardous Waste Collection. Integrated Waste Management Interest Earnings Sanitation Fee Benefit Assessment Fleet Maintenance Fund Community Services District Used Oil Grant Water Fund Sewer & Storm Drain Maintenance Fee		
TOTALS (must add up to 100%)	100	100

Table 6.55

City of Los Alamitos
Fiscal Analysis Summary

CAPITAL COSTS
(land, large equipment, and structures)

DAMP Cost Elements		1999/2000 FY Costs		Projected 2000/01 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$0	$0	$0	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$0	$0	$0
	Recycling	$0	$0	$0	$0
	Drainage Facility Maintenance	$0	$0	$0	$0
	Catch Basin Stenciling	$0	$0	$0	$0
	Street Sweeping	$0	$0	$0	$0
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$0	$0	$0	$0
	Pesticide & Fertilizer Management	$0	$0	$0	$0
PUBLIC INFORMATION DAMP (Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	$0	$0	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$0	$0	$0	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$0	$0	$0	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$0	$0	$0	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$0	$0	$0
TOTALS		$0	$0	$0	$0

Table 6.56

City of Los Alamitos
Fiscal Analysis Summary

OPERATIONS AND MAINTENANCE

DAMP Cost Elements		1999/2000 FY Costs		Projected 2000/01 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$0	$0	$0	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$0	$0	$0
	Recycling	$0	$0	$0	$0
	Drainage Facility Maintenance	$0	$5,000	$0	$5,000
	Catch Basin Stenciling	$0	$0	$0	$0
	Street Sweeping	$0	$51,000	$0	$51,800
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$0	$1,500	$0	$1,500
	Pesticide & Fertilizer Management	$0	$5,000	$0	$5,000
PUBLIC INFORMATION DAMP (Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	$0	$0	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$0	$0	$0	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$0	$0	$0	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$0	$0	$0	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$0	$0	$0
TOTALS		$0	$62,500	$0	$63,300

Table 6.57

City of Los Alamitos
Fiscal Analysis Summary

FUNDING SOURCES

DAMP FUNDING SOURCES	FUNDING PERCENTAGES	
	FISCAL YEAR 1999-2000	FISCAL YEAR 2000-01 (Projected)
GENERAL FUND	100	100
UTILITY TAX / CHARGES		
SEPARATE UTILITY BILLING ITEM		
GAS TAX		
SPECIAL DISTRICT FUND		
OTHERS (Specify) User Fees for Recycling and Hazardous Waste Collection. Integrated Waste Management Interest Earnings Sanitation Fee Benefit Assessment Fleet Maintenance Fund Community Services District Used Oil Grant Water Fund Sewer & Storm Drain Maintenance Fee		
TOTALS (must add up to 100%)	100	100

Table 6.58

City of Mission Viejo
Fiscal Analysis Summary

CAPITAL COSTS
(land, large equipment, and structures)

DAMP Cost Elements		1999/2000 FY Costs		Projected 2000/01 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$0	$0	$0	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$0	$0	$0
	Recycling	$0	$0	$0	$0
	Drainage Facility Maintenance	$0	$0	$0	$0
	Catch Basin Stenciling	$0	$0	$0	$0
	Street Sweeping	$0	$0	$0	$0
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$0	$0	$0	$0
	Pesticide & Fertilizer Management	$0	$0	$0	$0
PUBLIC INFORMATION DAMP (Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	$0	$0	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$2,500	$0	$10,000	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$5,000	$0	$20,000	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$0	$0	$0	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$5,000	$0	$5,000	$0
TOTALS		$12,500	$0	$35,000	$0

Table 6.59

City of Mission Viejo
Fiscal Analysis Summary

OPERATIONS AND MAINTENANCE

DAMP Cost Elements		1999/2000 FY Costs		Projected 2000/01 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$65,013	$0	$61,463	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$11,735	$0	$20,000
	Recycling	$0	$0	$0	$0
	Drainage Facility Maintenance	$215,270	$645,800	$152,500	$457,500
	Catch Basin Stenciling	$0	$0	$0	$0
	Street Sweeping	$0	$240,278	$0	$320,000
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$0	$2,152	$0	$5,000
	Pesticide & Fertilizer Management	$0	$425	$0	$1,835
PUBLIC INFORMATION DAMP (Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	$0	$0	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$9,500	$0	$10,000	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$5,000	$0	$5,000	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$0	$0	$0	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$5,000	$0	$10,000	$0
TOTALS		$299,783	$900,390	$238,963	$804,335

Table 6.60

City of Mission Viejo
Fiscal Analysis Summary

FUNDING SOURCES

DAMP FUNDING SOURCES	FUNDING PERCENTAGES	
	FISCAL YEAR 1999-2000	FISCAL YEAR 2000-01 (Projected)
GENERAL FUND	85	85
UTILITY TAX / CHARGES		
SEPARATE UTILITY BILLING ITEM		
GAS TAX		
SPECIAL DISTRICT FUND		
OTHERS (Specify) User Fees for Recycling and Hazardous Waste Collection. Integrated Waste Management Interest Earnings Sanitation Fee Benefit Assessment Fleet Maintenance Fund Community Services District Used Oil Grant Water Fund Sewer & Storm Drain Maintenance Fee	15	15
TOTALS (must add up to 100%)	100	100

Table 6.61

City of Newport Beach
Fiscal Analysis Summary

CAPITAL COSTS
(land, large equipment, and structures)

DAMP Cost Elements		1999/2000 FY Costs		Projected 2000/01 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$0	$0	$0	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$0	$0	$0
	Recycling	$0	$0	$0	$0
	Drainage Facility Maintenance	$0	$235,000	$0	$0
	Catch Basin Stenciling	$0	$0	$0	$0
	Street Sweeping	$0	$105,000	$0	$110,000
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$0	$8,000	$0	$8,500
	Pesticide & Fertilizer Management	$0	$0	$0	$0
PUBLIC INFORMATION DAMP (Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	$0	$0	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$0	$0	$0	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$0	$0	$0	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$0	$0	$0	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$0	$0	$0
TOTALS		$0	$348,000	$0	$118,500

Table 6.62

City of Newport Beach
Fiscal Analysis Summary

OPERATIONS AND MAINTENANCE

DAMP Cost Elements		1999/2000 FY Costs		Projected 2000/01 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$40,000	$0	$40,000	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$349,000	$0	$352,000
	Recycling	$0	$630,000	$0	$742,860
	Drainage Facility Maintenance	$0	$185,000	$0	$190,000
	Catch Basin Stenciling	$0	$1,200	$0	$1,200
	Street Sweeping	$0	$345,000	$0	$355,000
	Environmental Performance	$0	$42,000	$0	$42,000
	Public Property & Street Chemical Spill Response	$0	$15,000	$0	$1,500
	Pesticide & Fertilizer Management	$0	$3,000	$0	$3,000
PUBLIC INFORMATION DAMP (Section 6.0)	Nonpoint Source Pollution Awareness	$3,500	$3,500	$3,500	$0
	Household Hazardous Waste Collection	$0	$4,000	$0	$4,000
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$0	$2,500	$0	$2,500
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$0	$2,500	$0	$2,500
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$18,000	$0	$18,000	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$7,000	$0	$8,000	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$0	$0	$0
TOTALS		$68,500	$1,582,700	$69,500	$1,696,560

Table 6.63

City of Newport Beach
Fiscal Analysis Summary

FUNDING SOURCES

DAMP FUNDING SOURCES	FUNDING PERCENTAGES	
	FISCAL YEAR 1999-2000	FISCAL YEAR 2000-01 (Projected)
GENERAL FUND	100	100
UTILITY TAX / CHARGES		
SEPARATE UTILITY BILLING ITEM		
GAS TAX		
SPECIAL DISTRICT FUND		
OTHERS (Specify) User Fees for Recycling and Hazardous Waste Collection. Integrated Waste Management Interest Earnings Sanitation Fee Benefit Assessment Fleet Maintenance Fund Community Services District Used Oil Grant Water Fund Sewer & Storm Drain Maintenance Fee		
TOTALS (must add up to 100%)	100	100

Table 6.64

City of Orange
Fiscal Analysis Summary

CAPITAL COSTS
(land, large equipment, and structures)

DAMP Cost Elements		1999/00 FY Costs		Projected 2000/01 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$0	$0	$0	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$0	$0	$0
	Recycling	$0	$0	$0	$0
	Drainage Facility Maintenance	$0	$0	$0	$0
	Catch Basin Stenciling	* $375	$0	* $200	$0
	Street Sweeping	$0	** $417,500	$0	** $150,000
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$0	$25,000	$0	$25,000
	Pesticide & Fertilizer Management	$10,000	$22,000	$10,000	$22,000
PUBLIC INFORMATION DAMP (Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	# $1,500	$0	# $1,500	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$0	$0	$0	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$0	$0	$0	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	^ $16,750	$0	^ $16,750	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$0	$0	$0
TOTALS		$28,625	$464,500	$28,450	$197,000

* Program complete. Very few reapplications and new catch basins required
** Replaced entire fleet (7: 4 brush/3 vacuum)
# Non-grant reimbursed costs for used oil recycling
^ Increase from 1998-99 due to increased inspections

Table 6.65

City of Orange

Fiscal Analysis Summary

OPERATIONS AND MAINTENANCE

DAMP Cost Elements		1999/00 FY Costs		Projected 2000/01 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$33,000	$6,000	$35,000	$6,000
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$75,000	$0	$75,000
	Recycling	$0	$2,200,000	$0	$2,200,000
	Drainage Facility Maintenance	$0	$215,000	$0	$215,000
	Catch Basin Stenciling	$0	$1,250	$0	$250
	Street Sweeping	$0	$649,000	$0	$650,000
	Environmental Performance	$21,000	$113,500	$0	$115,000
	Public Property & Street Chemical Spill Response	$0	$64,500	$0	$65,000
	Pesticide & Fertilizer Management	$0	$13,500	$0	$15,000
PUBLIC INFORMATION DAMP (Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	$109,500	$2,500	$110,000	$3,000
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$0	$0	$0	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$20,000	$0	$0	$22,000
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$0	$0	$0	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$10,500	$0	$12,000
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$0	$0	$0
TOTALS		$183,500	$3,350,750	$145,000	$3,378,250

1: State Grant Money

Table 6.66

City of Orange
Fiscal Analysis Summary

FUNDING SOURCES

DAMP FUNDING SOURCES	FUNDING PERCENTAGES	
	FISCAL YEAR 1999-2000	FISCAL YEAR 2000-01 (Projected)
GENERAL FUND		
UTILITY TAX / CHARGES		
SEPARATE UTILITY BILLING ITEM		
GAS TAX		
SPECIAL DISTRICT FUND		
OTHERS (Specify)		
User Fees for Recycling and Hazardous Waste Collection.		
Integrated Waste Management	15	15
Interest Earnings		
Sanitation Fee	75	75
Benefit Assessment		
Fleet Maintenance Fund	10	10
Community Services District		
Used Oil Grant		
Water Fund		
Sewer & Storm Drain Maintenance Fee		
TOTALS (must add up to 100%)	100	100

Table 6.67

City of Placentia
Fiscal Analysis Summary

CAPITAL COSTS
(land, large equipment, and structures)

DAMP Cost Elements		1999/2000 FY Costs		Projected 2000/01 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$2,266	$0	$2,575	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$1,236	$0	$1,339
	Recycling	$0	$0	$0	$0
	Drainage Facility Maintenance	$0	$5,150	$0	$6,695
	Catch Basin Stenciling	$0	$0	$0	$0
	Street Sweeping	$30,900	$30,900	$30,900	$103,000
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$0	$0	$0	$0
	Pesticide & Fertilizer Management	$0	$4,120	$0	$4,635
PUBLIC INFORMATION DAMP (Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	$0	$0	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$0	$0	$0	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$1,030	$0	$1,030	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$721	$0	$1,030	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$515	$0	$1,030	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$0	$0	$0
TOTALS		$35,432	$41,406	$36,565	$115,669

Table 6.68

City of Placentia
Fiscal Analysis Summary

OPERATIONS AND MAINTENANCE

DAMP Cost Elements		1999/2000 FY Costs		Projected 2000/01 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$22,660	$0	$25,750	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$15,450	$0	$20,600
	Recycling	$0	$0	$0	$0
	Drainage Facility Maintenance	$0	$4,558	$0	$6,180
	Catch Basin Stenciling	$8,755	$0	$8,755	$0
	Street Sweeping	$103,000	$0	$103,000	$0
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$0	$20,600	$0	$20,600
	Pesticide & Fertilizer Management	$0	$3,090	$0	$3,090
PUBLIC INFORMATION DAMP (Section 6.0)	Nonpoint Source Pollution Awareness	$1,545	$0	$1,545	$0
	Household Hazardous Waste Collection	$0	$6,695	$0	$72,100
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$1,339	$0	$1,545	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$5,150	$0	$6,180	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$7,210	$0	$8,240	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$10,300	$5,150	$10,300	$5,150
TOTALS		$159,959	$55,543	$165,315	$127,720

Table 6.69

City of Placentia
Fiscal Analysis Summary

FUNDING SOURCES

DAMP FUNDING SOURCES	FUNDING PERCENTAGES	
	FISCAL YEAR 1999-2000	FISCAL YEAR 2000-01 (Projected)
GENERAL FUND	33	33
UTILITY TAX / CHARGES	34	34
SEPARATE UTILITY BILLING ITEM		
GAS TAX	33	33
SPECIAL DISTRICT FUND		
OTHERS (Specify) User Fees for Recycling and Hazardous Waste Collection. Integrated Waste Management Interest Earnings Sanitation Fee Benefit Assessment Fleet Maintenance Fund Community Services District Used Oil Grant Water Fund Sewer & Storm Drain Maintenance Fee		
TOTALS (must add up to 100%)	100	100

Table 6.70

City of San Clemente
Fiscal Analysis Summary

CAPITAL COSTS
(land, large equipment, and structures)

DAMP Cost Elements		1999/2000 FY Costs		Projected 2000/01 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		0	0	0	0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	0	0	0	0
	Recycling	0	0	0	0
	Drainage Facility Maintenance	247,566	0	0	0
	Catch Basin Stenciling	0	0	0	0
	Street Sweeping	0	0	0	0
	Environmental Performance	0	0	0	0
	Public Property & Street Chemical Spill Response	0	0	0	0
	Pesticide & Fertilizer Management	0	0	0	0
PUBLIC INFORMATION DAMP (Section 6.0)	Nonpoint Source Pollution Awareness	0	0	0	0
	Household Hazardous Waste Collection	0	0	0	0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		0	0	0	0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		0	0	0	0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	0	0	0	0
	Other Efforts to Identify & Eliminate Illicit Connections	0	0	0	0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		0	0	0	0
TOTALS		247,566	0	0	0

Table 6.71

City of San Clemente
Fiscal Analysis Summary

OPERATIONS AND MAINTENANCE

DAMP Cost Elements		1999/2000 FY Costs		Projected 2000/01 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		161,130	0	162,780	0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	0	0	0	0
	Recycling	114,200	0	124,490	0
	Drainage Facility Maintenance	108,762	0	103,506	0
	Catch Basin Stenciling	18,127	0	17,251	0
	Street Sweeping	118,400	0	122,220	0
	Environmental Performance	0	0	0	0
	Public Property & Street Chemical Spill Response	0	0	0	0
	Pesticide & Fertilizer Management	0	0	0	0
PUBLIC INFORMATION DAMP (Section 6.0)	Nonpoint Source Pollution Awareness	0	0	0	0
	Household Hazardous Waste Collection	0	0	0	0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		0	0	0	0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		0	0	0	0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	54,381	0	51,753	0
	Other Efforts to Identify & Eliminate Illicit Connections	0	0	0	0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		0	0	0	0
TOTALS		575,000	0	582,000	0

Table 6.72

City of San Clemente
Fiscal Analysis Summary

FUNDING SOURCES

DAMP FUNDING SOURCES	FUNDING PERCENTAGES	
	FISCAL YEAR 1999-2000	FISCAL YEAR 2000-01 (Projected)
GENERAL FUND	20 street sweeping	21 street sweeping
UTILITY TAX / CHARGES		
SEPARATE UTILITY BILLING ITEM		
GAS TAX		
SPECIAL DISTRICT FUND		
OTHERS (Specify) User Fees for Recycling and Hazardous Waste Collection. Integrated Waste Management Interest Earnings Sanitation Fee Benefit Assessment Fleet Maintenance Fund Community Services District Used Oil Grant Water Fund Sewer & Storm Drain Maintenance Fee	16 solid waste fee 64	21 solid waste fee 58
TOTALS (must add up to 100%)	100	100

Table 6.73

City of San Juan Capistrano
Fiscal Analysis Summary

CAPITAL COSTS
(land, large equipment, and structures)

DAMP Cost Elements		1999/2000 FY Costs		Projected 2000/01 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$0	$0	$0	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$0	$0	$0
	Recycling	$0	$0	$0	$0
	Drainage Facility Maintenance	$0	$0	$0	$0
	Catch Basin Stenciling	$0	$0	$0	$0
	Street Sweeping	$0	$0	$0	$0
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$0	$0	$0	$0
	Pesticide & Fertilizer Management	$0	$0	$0	$0
PUBLIC INFORMATION DAMP (Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	$0	$0	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$0	$0	$0	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$0	$0	$0	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$0	$0	$0	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$10,000	$0	$10,000	$10,000
TOTALS		$10,000	$0	$10,000	$10,000

Table 6.74

City of San Juan Capistrano
Fiscal Analysis Summary

OPERATIONS AND MAINTENANCE

DAMP Cost Elements		1999/2000 FY Costs		Projected 2000/01 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$0	$0	$0	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$2,000	$16,000	$2,000	$16,000
	Recycling	Contracted	$0	$0	$0
	Drainage Facility Maintenance	$6,000	$18,500	$8,000	$18,500
	Catch Basin Stenciling	$600	$0	$2,000	$0
	Street Sweeping	$6,000	$62,000	$7,000	$69,000
	Environmental Performance	$5,000	$0	$25,000	$0
	Public Property & Street Chemical Spill Response	$500	$1,500	$500	$1,500
	Pesticide & Fertilizer Management	$0	$11,000	$0	$11,000
PUBLIC INFORMATION DAMP (Section 6.0)	Nonpoint Source Pollution Awareness	$100	$0	$100	$0
	Household Hazardous Waste Collection	$0	$0	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$1,700	$0	$2,000	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$1,400	$0	$2,000	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$300	$0	$15,000	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$500	$0	$700	$0
TOTALS		$24,100	$109,000	$64,300	$116,000

Table 6.75

City of San Juan Capistrano
Fiscal Analysis Summary

FUNDING SOURCES

DAMP FUNDING SOURCES	FUNDING PERCENTAGES	
	FISCAL YEAR 1999-2000	FISCAL YEAR 2000-01 (Projected)
GENERAL FUND	70	86
UTILITY TAX / CHARGES	15	7
SEPARATE UTILITY BILLING ITEM		
GAS TAX	15	7
SPECIAL DISTRICT FUND		
OTHERS (Specify) User Fees for Recycling and Hazardous Waste Collection. Integrated Waste Management Interest Earnings Sanitation Fee Benefit Assessment Fleet Maintenance Fund Community Services District Used Oil Grant Water Fund Sewer & Storm Drain Maintenance Fee		
TOTALS (must add up to 100%)	100	100

Table 6.76

City of Santa Ana
Fiscal Analysis Summary

CAPITAL COSTS
(land, large equipment, and structures)

DAMP Cost Elements		1999/2000 FY Costs		Projected 2000/01 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$0	$0	$0	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$0	$0	$0
	Recycling	$0	$0	$0	$0
	Drainage Facility Maintenance	$0	$0	$0	$0
	Catch Basin Stenciling	$0	$0	$0	$0
	Street Sweeping	$0	$0	$0	$0
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$0	$0	$0	$0
	Pesticide & Fertilizer Management	$0	$0	$0	$0
PUBLIC INFORMATION DAMP (Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	$0	$0	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$0	$0	$0	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$0	$0	$0	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$0	$0	$0	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$0	$0	$0
TOTALS		$0	$0	$0	$0

Table 6.77

City of Santa Ana
Fiscal Analysis Summary

OPERATIONS AND MAINTENANCE

DAMP Cost Elements		1999/00 FY Costs		Projected 2000/01 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$15,000	$0	$19,000	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$0	$0	$0
	Recycling	$0	$0	$0	$0
	Drainage Facility Maintenance	$0	$53,300	$0	$75,000
	Catch Basin Stenciling	$5,000	$0	$5,000	$0
	Street Sweeping	$0	$3,555,395	$0	$3,555,000
	Environmental Performance	$13,313	$35,930	$13,312	$35,930
	Public Property & Street Chemical Spill Response	$0	$1,068,000	$0	$1,125,150
	Pesticide & Fertilizer Management	$0	$162,426	$0	$163,000
PUBLIC INFORMATION DAMP (Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	$0	$0	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$6,600	$0	$6,800	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$0	$0	$0	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$0	$0	$0	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$0	$0	$0
TOTALS		$39,913	$4,875,051	$44,112	$4,954,080

Table 6.78

City of Santa Ana
Fiscal Analysis Summary

FUNDING SOURCES

DAMP FUNDING SOURCES	FUNDING PERCENTAGES	
	FISCAL YEAR 1999-2000	FISCAL YEAR 2000-01 (Projected)
GENERAL FUND	26	24
UTILITY TAX / CHARGES		
SEPARATE UTILITY BILLING ITEM		
GAS TAX		
SPECIAL DISTRICT FUND		
OTHERS (Specify) User Fees for Recycling and Hazardous Waste Collection. Integrated Waste Management Interest Earnings Sanitation Fee Benefit Assessment Fleet Maintenance Fund Community Services District Used Oil Grant Water Fund Sewer & Storm Drain Maintenance Fee	74	76
TOTALS (must add up to 100%)	100	100

Table 6.79

City of Seal Beach
Fiscal Analysis Summary

CAPITAL COSTS
(land, large equipment, and structures)

DAMP Cost Elements		1999/2000 FY Costs		Projected 2000/01 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$0	$0	$0	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$7,000	$0	$7,000
	Recycling	$0	$166,000	$0	$166,000
	Drainage Facility Maintenance	$0	$45,500	$0	$50,000
	Catch Basin Stenciling	$0	$164	$0	$164
	Street Sweeping	$0	$98,000	$0	$99,000
	Environmental Performance	$3,000	$12,000	$3,000	$12,000
	Public Property & Street Chemical Spill Response	$500	$0	$500	$0
	Pesticide & Fertilizer Management	$0	$2,000	$0	$2,000
PUBLIC INFORMATION DAMP (Section 6.0)	Nonpoint Source Pollution Awareness	$500	$0	$500	$0
	Household Hazardous Waste Collection	$1,400	$0	$1,400	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$500	$0	$500	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$1,000	$0	$1,000	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$10,000	$0	$10,000	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$1,000	$0	$1,000	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$500	$0	$500	$0
TOTALS		$18,400	$330,664	$18,400	$336,164

Table 6.80

City of Seal Beach
Fiscal Analysis Summary

OPERATIONS AND MAINTENANCE

DAMP Cost Elements		1999/2000 FY Costs		Projected 2000/01 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$0	$0	$0	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$0	$0	$0
	Recycling	$0	$0	$0	$0
	Drainage Facility Maintenance	$0	$0	$0	$0
	Catch Basin Stenciling	$0	$1,200	$0	$1,200
	Street Sweeping	$0	$0	$0	$0
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$0	$0	$0	$0
	Pesticide & Fertilizer Management	$0	$0	$0	$0
PUBLIC INFORMATION DAMP (Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	$0	$0	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$0	$0	$0	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$0	$0	$0	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$0	$0	$0	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$0	$0	$0
TOTALS		$0	$1,200	$0	$1,200

Table 6.81

City of Seal Beach
Fiscal Analysis Summary

FUNDING SOURCES

DAMP FUNDING SOURCES	FUNDING PERCENTAGES	
	FISCAL YEAR 1999-2000	FISCAL YEAR 2000-01 (Projected)
GENERAL FUND	100	100
UTILITY TAX / CHARGES		
SEPARATE UTILITY BILLING ITEM		
GAS TAX		
SPECIAL DISTRICT FUND		
OTHERS (Specify) User Fees for Recycling and Hazardous Waste Collection. Integrated Waste Management Interest Earnings Sanitation Fee Benefit Assessment Fleet Maintenance Fund Community Services District Used Oil Grant Water Fund Sewer & Storm Drain Maintenance Fee		
TOTALS (must add up to 100%)	100	100

Table 6.82

City of Stanton
Fiscal Analysis Summary

CAPITAL COSTS
(land, large equipment, and structures)

DAMP Cost Elements		1999/2000 FY Costs		Projected 2000/01 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$0	$0	$0	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$0	$0	$0
	Recycling	$0	$0	$0	$0
	Drainage Facility Maintenance	$0	$0	$0	$0
	Catch Basin Stenciling	$0	$0	$0	$0
	Street Sweeping	$0	$0	$0	$0
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$0	$0	$0	$0
	Pesticide & Fertilizer Management	$0	$0	$0	$0
PUBLIC INFORMATION DAMP (Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	$0	$0	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$0	$0	$0	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$0	$0	$0	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$0	$0	$0	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$0	$0	$0
TOTALS		$0	$0	$0	$0

Table 6.83

City of Stanton
Fiscal Analysis Summary

OPERATIONS AND MAINTENANCE

DAMP Cost Elements		1999/2000 FY Costs		Projected 2000/01 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$0	$0	$0	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$0	$0	$0
	Recycling	$0	$0	$0	$0
	Drainage Facility Maintenance	$2,500	$2,500	$2,500	$2,500
	Catch Basin Stenciling	$1,000	$0	$1,000	$0
	Street Sweeping	$88,000	$88,000	$88,000	$88,000
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$500	$0	$500	$0
	Pesticide & Fertilizer Management	$0	$0	$0	$0
PUBLIC INFORMATION DAMP (Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	$0	$0	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$0	$0	$0	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$500	$0	$500	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$0	$0	$0	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$500	$0	$500	$0
TOTALS		$93,000	$90,500	$93,000	$90,500

Table 6.84

City of Stanton
Fiscal Analysis Summary

FUNDING SOURCES

DAMP FUNDING SOURCES	FUNDING PERCENTAGES	
	FISCAL YEAR 1999-2000	FISCAL YEAR 2000-01 (Projected)
GENERAL FUND	100	100
UTILITY TAX / CHARGES		
SEPARATE UTILITY BILLING ITEM		
GAS TAX		
SPECIAL DISTRICT FUND		
OTHERS (Specify) User Fees for Recycling and Hazardous Waste Collection. Integrated Waste Management Interest Earnings Sanitation Fee Benefit Assessment Fleet Maintenance Fund Community Services District Used Oil Grant Water Fund Sewer & Storm Drain Maintenance Fee		
TOTALS (must add up to 100%)	100	100

Table 6.85

City of Tustin
Fiscal Analysis Summary

CAPITAL COSTS
(land, large equipment, and structures)

DAMP Cost Elements		1999/2000 FY Costs		Projected 2000/01 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$0	$0	$0	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$0	$0	$0
	Recycling	$0	$0	$0	$0
	Drainage Facility Maintenance	$0	$0	$0	$0
	Catch Basin Stenciling	$0	$0	$0	$0
	Street Sweeping	$0	$0	$0	$0
	Environmental Performance	$0	$20,000	$0	$140,000
	Public Property & Street Chemical Spill Response	$0	$0	$0	$0
	Pesticide & Fertilizer Management	$0	$0	$0	$0
PUBLIC INFORMATION DAMP (Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	$0	$0	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$0	$0	$0	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$0	$0	$0	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$0	$0	$0	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$0	$0	$0
TOTALS		$0	$20,000	$0	$140,000

Table 6.86

City of Tustin

Fiscal Analysis Summary

OPERATIONS AND MAINTENANCE

DAMP Cost Elements		1999/2000 FY Costs		Projected 2000/01 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		* $34,000	$0	* $34,000	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$70,000	$0	$70,000
	Recycling	$0	see above	$0	see above
	Drainage Facility Maintenance	$0	$56,000	$0	** $56,000
	Catch Basin Stenciling	$6,000	$0	$6,000	$0
	Street Sweeping	$0	*** $235,000	$0	*** $235,000
	Environmental Performance	$0	see below	$0	see below
	Public Property & Street Chemical Spill Response	$0	+ $15,000	$0	+ $15,000
	Pesticide & Fertilizer Management	$0	$78,000	$0	** $78,000
PUBLIC INFORMATION DAMP (Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	$0	^ $34,000	$0	^ $34,000
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$0	$0	$0	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$0	$0	$0	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$0	$0	$0	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$0	$0	$0
TOTALS		$40,000	$488,000	$40,000	$488,000

*Includes costs for staff training and consultant services

**Values based on 1999-2000 estimates

***Estimate includes driver labor costs and equipment supplies; does not include equipment maintenance or fuel costs

+ Includes Hazardous Materials Management

^ Estimate includes $21,000 in funding from a State of California used oil recycling block grant.

Table 6.87

City of Tustin
Fiscal Analysis Summary

FUNDING SOURCES

DAMP FUNDING SOURCES	FUNDING PERCENTAGES	
	FISCAL YEAR 1999-2000	FISCAL YEAR 2000-01 (Projected)
GENERAL FUND	96	96
UTILITY TAX / CHARGES		
SEPARATE UTILITY BILLING ITEM		
GAS TAX		
SPECIAL DISTRICT FUND		
OTHERS (Specify) User Fees for Recycling and Hazardous Waste Collection. Integrated Waste Management Interest Earnings Sanitation Fee Benefit Assessment Fleet Maintenance Fund Community Services District Used Oil Grant Water Fund Sewer & Storm Drain Maintenance Fee	4	4
TOTALS (must add up to 100%)	100	100

Table 6.88

City of Villa Park
Fiscal Analysis Summary

CAPITAL COSTS
(land, large equipment, and structures)

DAMP Cost Elements		1999/2000 FY Costs		Projected 2000/01 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$0	$0	$0	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$0	$0	$0
	Recycling	$0	$0	$0	$0
	Drainage Facility Maintenance	$0	$0	$0	$0
	Catch Basin Stenciling	$0	$0	$0	$0
	Street Sweeping	$0	$0	$0	$0
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$0	$0	$0	$0
	Pesticide & Fertilizer Management	$0	$0	$0	$0
PUBLIC INFORMATION DAMP (Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	$0	$0	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$0	$0	$0	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$0	$0	$0	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$0	$0	$0	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$0	$0	$0
TOTALS		$0	$0	$0	$0

Table 6.89

City of Villa Park
Fiscal Analysis Summary

OPERATIONS AND MAINTENANCE

DAMP Cost Elements		1999/2000 FY Costs		Projected 2000/01 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$0	$0	$0	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$0	$0	$0
	Recycling	$0	$0	$0	$0
	Drainage Facility Maintenance	$0	$0	$0	$0
	Catch Basin Stenciling	$0	$0	$0	$0
	Street Sweeping	$0	$0	$0	$0
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$0	$0	$0	$0
	Pesticide & Fertilizer Management	$0	$0	$0	$0
PUBLIC INFORMATION DAMP (Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	$0	$0	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$0	$0	$0	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$0	$0	$0	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$0	$0	$0	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$0	$0	$0
TOTALS		$0	$0	$0	$0

Table 6.90

City of Villa Park
Fiscal Analysis Summary

FUNDING SOURCES

DAMP FUNDING SOURCES	FUNDING PERCENTAGES	
	FISCAL YEAR 1998-99	FISCAL YEAR 1999-00 (Projected)
GENERAL FUND	100	100
UTILITY TAX / CHARGES		
SEPARATE UTILITY BILLING ITEM		
GAS TAX		
SPECIAL DISTRICT FUND		
OTHERS (Specify) User Fees for Recycling and Hazardous Waste Collection. Integrated Waste Management Interest Earnings Sanitation Fee Benefit Assessment Fleet Maintenance Fund Community Services District Used Oil Grant Water Fund Sewer & Storm Drain Maintenance Fee		
TOTALS (must add up to 100%)	100	100

Table 6.91

City of Westminster
Fiscal Analysis Summary

CAPITAL COSTS
(land, large equipment, and structures)

DAMP Cost Elements		1999/2000 FY Costs		Projected 2000/01 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$0	$0	$0	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$0	$0	$0
	Recycling	$0	$0	$0	$0
	Drainage Facility Maintenance	$0	$0	$0	$0
	Catch Basin Stenciling	$0	$0	$0	$0
	Street Sweeping	$0	$0	$0	$0
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$0	$0	$0	$0
	Pesticide & Fertilizer Management	$0	$0	$0	$0
PUBLIC INFORMATION DAMP (Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	$0	$0	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$0	$0	$0	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$0	$0	$0	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$0	$0	$0	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$0	$0	$0
TOTALS		$0	$0	$0	$0

Table 6.92

City of Westminster
Fiscal Analysis Summary

OPERATIONS AND MAINTENANCE

DAMP Cost Elements		1999/2000 FY Costs		Projected 2000/01 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$25,000	$0	$25,000	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$208,180	$0	$208,180
	Recycling	$0	$0	$0	$0
	Drainage Facility Maintenance	$30,000	$5,400	$35,000	$5,400
	Catch Basin Stenciling	$7,000	$0	$7,000	$0
	Street Sweeping	$0	$243,000	$0	$245,000
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$0	$12,000	$0	$12,000
	Pesticide & Fertilizer Management	$0	$75,000	$0	$82,000
PUBLIC INFORMATION DAMP (Section 6.0)	Nonpoint Source Pollution Awareness	$3,000	$0	$3,000	$0
	Household Hazardous Waste Collection	$23,500	$0	$30,000	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$3,000	$0	$3,000	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$2,500	$0	$3,500	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$0	$0	$0	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$10,000	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$28,000	$0	$40,000	$0
TOTALS		$122,000	$543,580	$156,500	$552,580

Table 6.93

City of Westminster
Fiscal Analysis Summary

FUNDING SOURCES

DAMP FUNDING SOURCES	FUNDING PERCENTAGES	
	FISCAL YEAR 1999-2000	FISCAL YEAR 2000-01 (Projected)
GENERAL FUND	100	100
UTILITY TAX / CHARGES		
SEPARATE UTILITY BILLING ITEM		
GAS TAX		
SPECIAL DISTRICT FUND		
OTHERS (Specify) User Fees for Recycling and Hazardous Waste Collection. Integrated Waste Management Interest Earnings Sanitation Fee Benefit Assessment Fleet Maintenance Fund Community Services District Used Oil Grant Water Fund Sewer & Storm Drain Maintenance Fee		
TOTALS (must add up to 100%)	100	100

Table 6.94

City of Yorba Linda
Fiscal Analysis Summary

CAPITAL COSTS
(land, large equipment, and structures)

DAMP Cost Elements		1999/2000 FY Costs		Projected 2000/01 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$0	$0	$0	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$0	$0	$0
	Recycling	$0	$0	$0	$0
	Drainage Facility Maintenance	$0	$0	$0	$0
	Catch Basin Stenciling	$3,000	$0	$3,200	$0
	Street Sweeping	$5,000	$0	$5,300	$0
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$0	$0	$0	$0
	Pesticide & Fertilizer Management	$0	$0	$0	$0
PUBLIC INFORMATION DAMP (Section 6.0)	Nonpoint Source Pollution Awareness	$3,000	$0	$3,000	$0
	Household Hazardous Waste Collection	$0	$0	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$0	$0	$0	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$0	$0	$0	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$5,000	$0	$5,300	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$0	$0	$0
TOTALS		$16,000	$0	$16,800	$0

Table 6.95

City of Yorba Linda

Fiscal Analysis Summary

OPERATIONS AND MAINTENANCE

DAMP Cost Elements		1999/2000 FY Costs		Projected 2000/01 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$0	$0	$0	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$12,000	$0	$12,500	$0
	Recycling	$10,000	$0	$10,000	$0
	Drainage Facility Maintenance	$25,000	$0	$25,000	$0
	Catch Basin Stenciling	$2,000	$0	$2,000	$0
	Street Sweeping	$95,000	$55,000	$95,000	$55,000
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$0	$0	$0	$0
	Pesticide & Fertilizer Management	$5,000	$5,000	$5,000	$5,000
PUBLIC INFORMATION DAMP (Section 6.0)	Nonpoint Source Pollution Awareness	$2,000	$0	$2,000	$0
	Household Hazardous Waste Collection	$2,000	$0	$2,000	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$3,000	$1,000	$3,000	$1,000
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$2,000	$0	$2,000	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$3,000	$0	$3,000	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$2,000	$0	$2,000	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$6,000	$0	$6,000	$0
TOTALS		$169,000	$61,000	$169,500	$61,000

Table 6.96

City of Yorba Linda
Fiscal Analysis Summary

FUNDING SOURCES

DAMP FUNDING SOURCES	FUNDING PERCENTAGES	
	FISCAL YEAR 1999-2000	FISCAL YEAR 2000-01 (Projected)
GENERAL FUND	75	75
UTILITY TAX / CHARGES		
SEPARATE UTILITY BILLING ITEM		
GAS TAX		
SPECIAL DISTRICT FUND		
OTHERS (Specify) User Fees for Recycling and Hazardous Waste Collection. Integrated Waste Management Interest Earnings Sanitation Fee Benefit Assessment Fleet Maintenance Fund Community Services District Used Oil Grant Water Fund Sewer & Storm Drain Maintenance Fee	2 23	2 23
TOTALS (must add up to 100%)	100	100

Table 6.97

Grand Totals
Fiscal Analysis Summary

CAPITAL COSTS
(land, large equipment, and structures)

DAMP Cost Elements		1999/2000 FY Costs		Projected 2000/01 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		4,596	0	4,905	0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	0	8,236	0	8,339
	Recycling	0	1,876,171	0	249,000
	Drainage Facility Maintenance	474,613	3,507,865	88,000	3,177,195
	Catch Basin Stenciling	3,375	3,344	3,400	164
	Street Sweeping	337,600	653,400	36,200	464,000
	Environmental Performance	13,000	32,000	260,000	152,000
	Public Property & Street Chemical Spill Response	500	37,000	500	33,500
	Pesticide & Fertilizer Management	10,000	31,620	10,000	30,135
PUBLIC INFORMATION DAMP (Section 6.0)	Nonpoint Source Pollution Awareness	3,500	0	3,500	0
	Household Hazardous Waste Collection	2,900	0	2,900	0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		43,000	6,000	50,500	6,000
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		7,030	20,000	22,030	20,000
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	33,471	0	35,080	3,000
	Other Efforts to Identify & Eliminate Illicit Connections	1,515	0	137,030	0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		259,150	275,000	605,200	410,000
	Totals	1,194,250	6,450,636	1,259,245	4,553,333

Table 6.98

Grand Totals

Fiscal Analysis Summary

OPERATIONS AND MAINTENANCE

DAMP Cost Elements		1999/2000 FY Costs		Projected 2000/01 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		799,317	1,447,564	747,623	1,451,816
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	19,207	2,584,204	18,463	3,248,356
	Recycling	181,510	15,134,317	194,490	15,666,094
	Drainage Facility Maintenance	1,312,237	5,626,421	1,141,428	5,362,336
	Catch Basin Stenciling	73,277	19,980	75,519	36,449
	Street Sweeping	848,400	13,716,681	1,008,220	14,014,853
	Environmental Performance	40,652	191,430	152,812	192,930
	Public Property & Street Chemical Spill Response	14,000	2,564,555	14,600	2,733,982
	Pesticide & Fertilizer Management	156,800	2,283,201	164,740	3,403,572
PUBLIC INFORMATION DAMP (Section 6.0)	Nonpoint Source Pollution Awareness	1,542,151	3,500	544,245	0
	Household Hazardous Waste Collection	147,793	628,236	171,500	649,306
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		49,516	26,148	53,245	21,305
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		64,823	31,856	59,383	50,904
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	366,515	0	393,468	0
	Other Efforts to Identify & Eliminate Illicit Connections	64,818	10,500	79,375	12,000
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		120,300	5,150	191,500	5,150
Totals		5,801,316	44,273,743	5,010,611	46,849,053

Table 6.99

Grand Totals
Fiscal Analysis Summary

AVERAGE FUNDING SOURCES

DAMP FUNDING SOURCES	FUNDING PERCENTAGES	
	FISCAL YEAR 1999-2000	FISCAL YEAR 2000-01 (Projected)
GENERAL FUND	67%	67%
UTILITY TAX / CHARGES	2%	2%
SEPARATE UTILITY BILLING ITEM		
GAS TAX	8%	8%
SPECIAL DISTRICT FUND	5%	5%
OTHERS (Specify)	1%	1%
User Fees for Recycling and Hazardous Waste Collection	0%	0%
Integrated Waste Management	0%	0%
Interest Earnings	0%	0%
Sanitation Fee	5%	5%
Benefit Assessment	3%	3%
Fleet Maintenance Fund	0%	0%
Community Services District	0%	0%
Used Oil Grant	0%	0%
Water Fund	0%	1%
Sewer & Storm Drain Maintenance Fee	7%	7%
TOTALS (must add up to 100%)	100%	100%

7.0 ASSESSMENT OF MANAGEMENT PROGRAM MODIFICATIONS

The permits require assessment of any stormwater management program modifications made to comply with Clean Water Act requirements to reduce the discharge of pollutants to the maximum extent practicable.

In 1999/00, the following program modifications were initiated, continued or completed:

- Participation with neighboring counties in the regional Southern California Coastal Research Water Project (SCCWRP) 1998 Southern California Bight Study;
- Participation in the Regional Research/Monitoring program that is being coordinated with the neighboring counties, SCCWRP and the three Southern California Regional Boards; and
- The urban nutrient, sediment, and fecal coliform TMDL allocations in the Newport Bay Watershed and pending adoption of a TMDL for toxicity.

7.1 1998 Southern California Bight Regional Monitoring Project (Bight '98)

The NPDES Stormwater Permits issued to Riverside, Orange and San Bernardino Counties by the Santa Ana Regional Water Quality Control Board encouraged the implementation of "an integrated watershed monitoring program" which could be developed cooperatively by the three counties. The Bight 98' regional monitoring program which was coordinated by SCCWRP represented a unique opportunity for the three Counties to cooperatively participate in an integrated watershed monitoring program, obtain meaningful information on the ecological effects of stormwater discharges, and meet a common permit objective.

The Southern California Bight 1998 Regional Monitoring Project (Bight'98) is a continuation of the successful cooperative regional-scale monitoring begun in southern California in 1994. Bight'98 built upon the previous successes and expanded on the 1994 survey by including more participants, sampling more habitats, and measuring more parameters. More than fifty organizations, including international and volunteer organizations participated in this project.

The inclusion of new participants (e.g. Orange, Riverside and San Bernardino County Stormwater Programs) provided several benefits. Cooperative interactions among many organizations with different perspectives and interests, including a combination of regulators and dischargers, ensures that an appropriate set of regional-scale questions were addressed by the study. The additional resources brought by new participants also expand the number of habitats and indicators that were sampled. Sampling for Bight'98 included all of the areas sampled in 1994, plus a new focus on nearshore habitats (bays, harbors and beaches) and offshore islands. Bight'98 also coordinated with a Mexican program to characterize the condition of Southern California Bight (SCB) coastal waters south of the US border. The new indicators that were measured included shoreline microbiology, biomarkers and new chemical measures.

The Bight'98 Survey was organized into three technical components:

1) Coastal ecology

The overall goal of the coastal ecology component of Bight'98 was to assess the condition of the bottom environment and the health of the biological resources in the SCB. To accomplish this goal, Bight'98 focused on four objectives:

1. Estimate the extent and magnitude of ecological change in the SCB,

2. Compare conditions among selected geographic regions of the SCB,

3. Assess the relationship between biological responses and contaminant exposure, and

4. Describe historical trends at selected sites.

Monitoring for the coastal ecology component included fish trawls, benthic invertebrate taxonomy, and assessments of sediment chemistry and toxicity.

2) Shoreline microbiology

More than 80,000 bacteriological samples are collected annually in southern California, representing roughly half of the total bacteriological monitoring conducted in the United States. Despite this impressive amount of monitoring, these data are difficult to integrate towards a regional assessment of water quality because they are collected by 22 different organizations, many of which have different sampling strategies and different data management systems. Additionally, the monitoring programs focus sampling in known "problem areas", which does not allow assessment of typical shoreline water quality. To address these limitations, all of the organizations that conduct routine monitoring in the SCB pooled their efforts to conduct an integrated survey to assess the overall water quality of the Southern California shoreline during the summer of 1998.

3) Water quality

The Water Quality component of Bight'98 included four objectives:

1. Determine the spatial extent and distribution of surface runoff from shoreline sources in the coastal ocean,

2. Evaluate the contribution of surface runoff to the physical, chemical and biological characteristics of the coastal ecosystem,

3. Evaluate and compare the contributions of surface runoff and POTW inputs into the coastal ocean, and

4. Develop tools for integrated assessment of water quality using *in situ* and remotely sensed data sets.

Monitoring in Orange County included a coastal microbiological assessment, monitoring in the Lower Newport Bay, Dana Point Harbor and Huntington Harbour; and monitoring of the impacts of the Santa Ana River and Aliso Creek.

To date, only the results of the shoreline microbiology component are available to the public. Reports on the 1998 summertime sampling and the 1999 dry weather winter sampling are available from SCCWRP's website at www.sccwrp.org. The results of the sediment toxicity evaluation and the 2000 winter storm, shoreline microbiology sampling are in the final stages of approval before public release. The water quality, invertebrate taxonomy and fish assemblage data will be released in the near future. The sediment and fish tissue chemistry results are the farthest from a public release date.

7.2 Regional Research Monitoring Program

During 1997/98 the Co-permittees began evaluating the applicability of the monitoring and information synthesis approaches being developed for the U.S. EPA's Rouge River National Demonstration Project. As a result of that evaluation, discussions commenced with the neighboring counties, SCCWRP and the three Regional Boards in establishing a Southern California Stormwater Monitoring/Research Cooperative Program.

The intent is an initial five-year period of study with commitments established through subsequent implementation agreements and/or federal, state, or organizational grants. The key focus of the research/monitoring program is to develop improved methodologies and assessment tools to more effectively understand urban municipal stormwater and non-stormwater (anthropogenic) impacts to receiving waters from a management perspective. These issues cross local political boundaries and agency jurisdictions thereby representing a need for the multiple agencies to interact cooperatively to resolve important stormwater-related problems at regional scales.

An agreement, which is undergoing ratification, was developed with Los Angeles and San Diego Counties, the Ventura Flood Control District, the Riverside County Flood Control and Water Conservation District, the Santa Barbara Flood Control District, the City of Long Beach, the Los Angeles, Santa Ana and San Diego Regional Water Quality Control Boards and the Southern California Coastal Water Research Project (SCCWRP) to develop the five year program.

The initial project entails the development and prioritization of a research agenda with the assistance of water quality/resource management/regulatory experts. This initial project will be completed in 2000/01 and will be coordinated by SCCWRP. The research agenda will provide a list of proposed projects, designed by the water quality/resource management/regulatory experts, which shall form the focus of research/monitoring program for the collaborating stormwater discharge and regulating agencies in Southern California.

The scope of work will involve four main tasks. The first task is to assemble the panel of experts to design the research agenda. The panel of experts will be a diverse group of technical specialists in a variety of stormwater disciplines. The second task will be to convene the experts though a workshop format. The workshop will be preceded with a white paper that defines the research/monitoring needs of stormwater managers in Southern California. The third task will be detailing the research agenda produced by the expert panel. The research agenda will be documented in a draft report and will include a technical prioritization of scientific projects, the technical tasks necessary to address each research project, a proposed schedule for implementing these research tasks, and estimated costs for each research project. The draft report shall also be submitted to an oversight Steering Committee in an oral format. The fourth task incorporates comments from the draft and oral reports, and uses the Steering Committee to rank the research projects for management needs. It is this ranked research agenda by the Steering Committee that is intended to become the research/monitoring focus over the next five years.

The following list of research/monitoring topics are examples of the types of projects that will be considered by the expert panel. If feasible, the expert panel will create a research/monitoring study design that will attempt to answer these management questions:

- What are the most appropriate monitoring designs to assess stormwater discharges, potential water quality impacts, and the effectiveness of stormwater management programs?

- What standardized field and laboratory protocols are appropriate for urban stormwater monitoring in Southern California?

- Which toxicity tests should be used to evaluate the toxicity of urban pollutants of concern in the stormwater runoff of Southern California?

- Do dissolved heavy metals in stormwater runoff cause toxicity in receiving waters and how do we measure these forms of dissolved heavy metals?

- What improvements can be made to current methodologies for identifying unknown toxicants in urban runoff, or are there alternative methodologies that can be developed?

- Can biological indicators be used to assess the health of inland surface and coastal waters in Southern California? Can biocriteria be developed?

- How do the physical characteristics of urban stormwater discharges (e.g., flow rate, volume, temperature, etc.) affect the beneficial uses of receiving water bodies?

- How can pollutant fate, transport and dispersion studies be used to evaluate transitory/intermittent stormwater impacts? Are there models that can be used or developed to help management efforts?

- How can advances in information technology be used in monitoring, modeling and information exchange?

- How effective are various BMPs for improving stormwater quality for particular parameters at local scales? Can sensitivity analysis be used to evaluate which BMPs are most efficient for improving stormwater quality at the watershed scale?

- What are the appropriate pathogens and/or pathogen indicators that should be measured in stormwater discharges? How do these measures relate to human health risk?

- What issues are not covered by this list? Are there additional questions of management concern in the Southern California Region?

7.3 Newport Bay/San Diego Creek Watershed TMDLs

The Newport Bay watershed has been the focus of local efforts to improve water quality and restore Bay habitat since the late 1970's. Early efforts were initiated under the planning authority of CWA Section 208 to reduce the impacts of excessive sediment on the Bay through the development and implementation of areawide plans.

Other water quality problems were subsequently identified including an over-abundance of algae attributable to excess nutrients from San Diego Creek, sanitary quality associated with contact recreation and shellfish harvesting, aquatic life toxicity to organisms and excessive bioaccumulation of toxic substances in fish tissues. Based on these identified problems, the Santa Ana Board listed Newport Bay and portions of San Diego Creek as impaired on the CWA 303(d) list.

The Santa Ana Board has adopted TMDLs for sediment, nutrients and fecal coliform as amendments to its Water Quality Control Plan attributing in each case part of the load allocation to urban areas. Following state ratification of the amendments, the Santa Ana Board issued requests for monitoring and technical reports to the Newport Watershed Permittees pursuant to its authority under Section 13267 of the State Water Code. In the case of the nutrient TMDL the Santa Ana Board cited the terms of the NPDES Stormwater Permit as the basis of enforcement of the request.

7.3.1 Urban Nutrient TMDL

During 1998/99 the Regional Water Quality Control Board, Santa Ana Region amended the Basin Plan to establish a TMDL for nutrient discharges in the Newport Bay/San Diego Creek Watershed. The TMDL is the maximum load of nutrients that can be discharged to San Diego Creek and Newport Bay while assuring that water quality objectives for these waters are met for the designated beneficial uses.

The nutrient TMDL establishes targets for reducing the annual loading of nitrogen and phosphorus to Newport Bay by 50% and meeting the numeric and narrative water quality objectives by 2012. To achieve these targets, the TMDL establishes a number of interim targets requiring a 30% and 50% reduction in nutrients in summer flows by 2002 and 2007, respectively, and a 50% reduction in non-storm winter flows by 2012.

The nutrient TMDL identifies five principal sources of nutrients that are assigned waste load and load allocations:

- Nurseries
- Silverado Constructors ETC
- Urban runoff
- Agricultural discharges
- Undefined sources

Upon request from the Regional Board, an urban nutrient technical report was submitted in 1998/99 in order to provide:

- An analysis of whether the DAMP should be revised to prevent continuing or recurring beneficial use impairments and exceedances of water quality objectives related to urban nutrients, and if a revision is recommended, a workplan and schedule to revise the DAMP;

- A plan and schedule for achieving the short and long term nutrient load reduction targets; and

- A plan and schedule for evaluating the effectiveness of urban runoff nutrient control actions implemented in the Newport Bay Watershed.

The report included an analysis of the DAMP and a workplan for addressing the remaining elements of the request. Although the watershed permittees believe that the programs within the DAMP are achieving their intended goal of reducing pollutants in the Newport Watershed, it was recognized that further investigations needed to be completed in some BMP areas that could potentially result in further enhancement of nutrient reductions.

In addition, in order to evaluate compliance with the nutrient load allocation and evaluate the potential and actual effectiveness of control actions, it was proposed that several model watersheds be established and monitored. One such area, the Costa Mesa watershed, was established with monitoring commencing in 1998/99.

The Newport Watershed Permittees have evaluated compliance with the TMDL targets (Newport Bay Watershed Urban TMDL Compliance Evaluation, Tetra Tech, July 2000). The report indicated significant compliance with the 2002 targets and slight nutrient loads in excess of the future targets. It concluded that current programs are working and that further minor program revisions will achieve all TMDL targets.

These findings are further supported by nutrient loading studies conducted in September 1999 and June 2000 (Appendix 5.9) which demonstrate compliance with the December 2000 target based on extrapolation of the data collected for 1999/2000. A further nutrient loading study will be evaluated for May 2001 which was identified as being the period of highest nutrient concentrations.

7.3.2 Urban Sediment TMDL

The sediment TMDL establishes 10 year load allocation targets for urban areas of 2,500 tons per year to Newport Bay and 2,500 tons per year to San Diego Creek. Sediment load allocation studies conducted (Preliminary Sediment Load Allocation Analysis for San Diego Creek and Newport Bay, Tetra Tech October 1999 and Hydraulic/Sediment Analysis for San Diego Creek Watershed, Tetra Tech, July 2000) indicate a need to focus on construction sites and identify the difficulty of controlling sediment by land type given the presence of channel erosion as a significant contributor to sediment loads.

Continued progress towards TMDL targets will therefore most effectively be achieved on a watershed basis and the comprehensive study approach underway with the Corps of Engineers will form the basis of identifying future implementation projects. The adjustment of the current in-channel basin weirs is one element of this evaluation which has the potential to improve sediment trapping during major storm events.

7.3.3 Urban Fecal Coliform TMDL

The fecal coliform TMDL establishes a long-term objective of meeting recreational contact and shellfish harvesting standards in Newport Bay. The Newport Watershed Permittees are currently supporting studies, modeling and monitoring in the Bay with other stakeholders that are expected to result in the development of an implementation plan. No urban area control programs are anticipated until the completion of the current study period although increased public and business education may be implemented.

7.3.4 Urban Toxicity TMDL

The toxicity TMDL for the watershed is currently being developed, which will address a variety of toxicity and bioaccumulation problems resulting from current and past practices. The Newport Watershed Permittees are currently supporting studies and monitoring in the watershed with other stakeholders that are expected to result in the development of an appropriate TMDL. No urban area control programs are anticipated until the completion of the current period of TMDL development although early public and business education may be implemented.

The Permittees are currently working with the California Department of Pesticide Regulation to develop a pesticide study element of an intensive residential water use and runoff investigation in selected neighborhoods within the City of Irvine. This program is anticipated to be initiated in early 2001.

8.0 WORKPLAN

8.1 Introduction

This section describes the objectives of the DAMP, the BMPs that have been developed, implemented or proposed during the First, Second and upcoming Third Term Permits and the workplan for the 2000/01 reporting period.

8.2 Objectives of the Drainage Area Management Plan

The main objectives of the DAMP are to fulfill the commitment of the Permittees to present a plan that satisfies NPDES permit requirements and to evaluate the impacts of urban stormwater quality on the beneficial uses.

The April 1993 version of the DAMP (subsequently referred to as 1993 DAMP) was prepared in compliance with the specific requirements of the First Term Permit. The September 2000 draft update of the DAMP (subsequently referred to as 2000 DAMP) was prepared to incorporate the programs developed since 1993 and was submitted concurrently as Volume II of the Report of Waste Discharge on September 1, 2000. The plan proposes a wide range of continuing and enhanced Best Management Practices (BMPs) and control techniques, which will be implemented during the upcoming Third Term Permit period.

The 2000 DAMP, once finalized, is intended to serve as the principal policy and guidance document for the countywide NPDES Stormwater Program. The 2000 DAMP describes the programs that will serve to:

1. Provide the framework for the program management activities and plan development;

2. Provide the legal authority for prohibiting unpermitted discharges to the storm drain system and for requiring BMPs in new development and significant redevelopment;

3. Improve existing pollution prevention and removal BMPs to further reduce the amount of pollutants entering the storm drain system;

4. Educate the public about the issue of urban stormwater and non-stormwater pollution and obtain their support in implementing pollution prevention BMPs;

5. Ensure that all new development and significant redevelopment incorporates appropriate post construction nonstructural and structural BMPs and evaluate "special" structural BMPs to address specific water quality problems as identified through the water quality planning process;

6. Ensure that construction sites implement pollutant control practices that address control of construction related pollutants including erosion and sediment control and on-site hazardous materials and waste management;

7. Identify industrial stormwater dischargers in Orange County and notify them of State Industrial stormwater permit requirements;

8. Detect and eliminate unpermitted discharges and illegal connections to the municipal storm drain system;

9. Conduct a stormwater monitoring program to identify areas with water quality problems, to assist in the prioritization of watersheds for analysis and planning, and to assist in the prioritization of pollutants to facilitate the development of specific controls to address these problems; and

10. Address the special focus within the Newport Bay/San Diego Creek watershed due to its impaired status and the resulting development of TMDLs for sediment, nutrients, bacteria and toxicity.

8.3 First Term Permit: 1993 DAMP Emphasis and Accomplishments

The 1993 DAMP defined a management structure for the Permittees' compliance effort, a formal agreement to underpin cooperation, and detailed municipal efforts to develop, implement, and evaluate various BMPs.

The 1993 DAMP was formulated using the accepted framework for water quality planning, specifically, a systematic and iterative process of defining goals, assessing existing conditions, setting priorities, selecting near-term BMPs, implementing near-term program, and assessing program effectiveness. The First Term Permit schedule for completing this process reflected the congressional expectation of expeditious program implementation and was completed in two years resulting in the 1993 DAMP.

The overriding objective of 1993 DAMP development was compliance with the federal requirements and the schedule of the NPDES permits. The 1993 DAMP was thus the product of an abbreviated water quality planning effort, and control program elements were selected based upon the review of literature and other non-point source control initiatives, rather than an understanding of identified water quality problems.

The specific 1993 DAMP accomplishments achieved during the First Term Permit include the following programs which were developed and subsequently implemented.

1. Establishment of program management structure and adoption and revision of the Implementation Agreement;
2. Development of Model Water Quality Ordinance and Enforcement Consistency Guide;
3. Development of a Water Pollution Enforcement Implementation Plan;
4. Development of public agency activity BMP program;
5. Evaluation of existing litter regulations;
6. Evaluation of existing street sweeping schedules;
7. Development of common public pesticide and fertilizer use guidelines;
8. Development of recommended and extended conditions of approval for BMPs for new development and significant redevelopment and industrial/commercial construction sites of 1-5 acres and initial training of County and city staff in same. The measures consist of:
    a) Non-structural and structural BMPs on specified new development and significant redevelopment;
    b) Special notes on grading and building plans for industrial/commercial construction operations (1-5 acres); and
    c) Proof of coverage by State General Construction Permit(s) for private grading and building permit applicants (>5 acres);
9. Development and conductance of a workshop for development industry on 1993 DAMP Appendix G implementation;
10. Development of recommended BMPs for public works construction and initial training of County and city staff in same. The measures consist of:
    a) Use of "Standard Specifications for Public Works Construction" (the "Green Book") provisions as base-line standards for public new construction less than 5 acres; and
    b) SWPPPs on public new construction and ground surface alteration (>5 acres);
11. Completion of industrial discharger notification;
12. Development of criteria and conductance of inspections of the separate municipal storm drain systems to identify and eliminate all illegal or illicit storm drain connections; and
13. Development of a water quality monitoring program.

8.4 Second Term Permit: 1993 DAMP Emphasis and Accomplishments

The program management structure and the BMPs developed during the First Term Permit and subsequently incorporated into the 1993 DAMP were the basis of the compliance effort during the Second Term Permit period. In addition, the Permittees also initiated several water quality planning efforts in the Talbert/Lower Santa Ana River, Newport Bay and Aliso Creek watersheds. These priority water quality planning initiatives have helped identify and better understand site-specific urban water quality problems in Newport Bay (nutrients) and Aliso Creek (bacteria) and Talbert/Lower Santa Ana River (bacteria). The Permittees intend to bring the experience that is gained from these initiatives to other watersheds based on a rolling priority list.

Through the ongoing implementation of the 1993 DAMP and the initiation of water quality planning efforts, the Permittees continued to improve existing stormwater quality management practices, identify current water quality problems, implement remedial measures and implement new practices preventing future receiving water quality problems. The specific 1993 DAMP accomplishments achieved during the Second Term Permit period are as follows:

1. Coordination of activities with other public agencies within and adjacent to Orange County having programs or activities that have an impact on stormwater quality (state and regional transportation agencies, cities, counties, flood control districts, water districts, sanitation districts, etc.);
2. Modification of existing flood control facilities in order to provide additional water quality benefits. Implemented retrofits include channel stabilization, sediment basins and debris booms;
3. Certification that the Permittees have adopted and are implementing the Water Quality Ordinance and accompanying Enforcement Consistency Guide;
4. Conductance of investigator training on Model Water Quality Ordinance and Enforcement Consistency Guide.
5. Conductance of a review of street sweeper effectiveness studies and provided a recommendation that all Permittees apply a standard of pollutant removal effectiveness to the purchase of any new equipment;
6. Development, implementation and provision of training for an environmental performance reporting program for fixed public facilities (initially those facilities whose operations include hazardous materials storage, waste storage and vehicle and equipment maintenance);
7. Development of a long term public and business education strategy;
8. Development of BMP guidance for the control of those potentially polluting activities not otherwise regulated by any agency (mobile detailing, automotive service centers, restaurants, pool maintenance activities);
9. Establishment and promotion of a single phone line for all county public water pollution phone calls;
10. Conductance of a joint outreach program with Orange County Sanitation District, Orange County Health Care Agency and Orange County Integrated Waste Management, to ensure that a consistent message on stormwater pollution prevention is brought to the public;
11. Certification that the 1993 DAMP Appendix G was implemented;
12. Development and conductance of training for city planners on 1993 DAMP Appendix G implementation;
13. Certification that the 1993 DAMP Appendix H was implemented;
14. Development and conductance of training for grading, building and public works construction inspectors;
15. Submittal of a report of the findings and schedule for elimination for the detection/elimination of illicit connections;
16. Development of a training program for staff of existing industrial inspection programs;
17. Submittal of an evaluation report to the Regional Water Quality Control Board, Santa Ana Region addressing the urban nutrients in the Newport Bay Watershed;

18. Participation with neighboring counties in the regional Southern California Coastal Water Research Project (SCCWRP) 1998 Southern California Bight Study; and
19. Completion of a revised water quality monitoring program to meet new monitoring objectives.

8.5 Upcoming Third Term Permit: 2000 DAMP Emphasis

During the upcoming Third Term Permit period the emphasis of the program will continue to provide for equitable consideration of all DAMP objectives. This consideration involves the use of a strategic framework of water quality planning and BMP investigation and is a systematic and iterative process of:

1. Implementing additional BMPs and revising current BMPs based upon site specific urban water quality problems, technical, institutional and economic feasibility and the protection of beneficial uses of the receiving waters;
2. Monitoring to ensure that the BMPs are correctly applied and to determine BMP effectiveness in achieving water quality standards; and
3. Adjustment of BMPs if water quality standards are not being achieved or possible adjustment of water quality standards if they are not appropriate.

This approach is consistent with the intent of the Permittees to reduce the discharge of pollutants to the MEP and that the 2000 DAMP will represent a further step in a comprehensive planning process rather than the culmination.

By applying this systematic and iterative process, the Permittees intend to further improve existing urban stormwater quality management practices, better understand water quality problems and implement remedial measures in order to protect the existing water quality as well as address problem areas. The comprehensive planning approach for the Third Term Permit period therefore consists of:

- Continuing the effective stormwater control programs already established and implemented during the First and Second Term Permits (Sections 8.3 and 8.4);
- Making revisions to specific BMPs that were developed or implemented during the First and Second Term Permits; and
- Developing additional BMPs and/or expanding the emphasis of current BMPs during the Third Term Permit.

Continuation of First and Second Term BMPs

The BMPs that were developed during the First and Second Term Permits that will be carried forth into the Third Term Permit period are as listed below:

1. Coordination of activities with other public agencies within Orange County having programs or activities that have an impact on urban stormwater quality (state and regional transportation agencies, cities, counties, flood control districts, water districts, sanitation districts, etc.);
2. Evaluation of existing flood control facilities for modification to provide water quality benefits identified through the water quality planning process (Talbert/Lower Santa Ana River, Newport Bay/San Diego Creek, Aliso Creek watersheds);
3. Implementation of the long term public and business education strategy elements;
4. Development of BMP guidance for the control of those potentially polluting activities from non-fixed facility businesses not otherwise regulated by any agency. These businesses include, but are not limited to, mobile detailers, carpet cleaners, commercial landscapers and general contractors;
5. Evaluation of cost-effective "special" structural BMPs that may help further reduce levels of nutrients and bacteriological indicators as identified by the water quality planning initiatives in the Talbert/Lower Santa Ana River, Newport Bay and Aliso Creek watersheds; and
6. Continuing participation in the Regional Research/Monitoring program that is being conducted with the neighboring counties, SCCWRP and three Southern California Regional Boards.

Program Modifications and BMP Emphasis

Within each section of the 2000 DAMP, there is a discussion regarding the development of the program and the foundation of each NPDES Stormwater Program element. In order to develop effective program modifications for the Third Term Permit period, careful consideration was given to the objectives of the program and the relative importance of each element.

Performance Commitments for each program element were developed and are included within each section of the 2000 DAMP to help provide consistency among the programs, define requirements for permit compliance and measure performance. The new or emphasized BMPs and the performance commitments are included at the end of each section. These modifications and commitments are summarized in **Table 8.1**. The dates provided within the performance commitments are based upon some elements that may be out of the Permittees' control such as the date of the adoption of the Third Term Permit and the completion of the state BMP manuals. As a result, any necessary modifications to the dates provided will be reported in the Annual Status Reports.

The key performance commitments in the 2000 DAMP are:

- An evaluation and revision of the program management structure and Implementation Agreement;
- Systematic watershed assessments to evaluate opportunities to configure or reconfigure channel segments to address the impacts of urban water quality on beneficial uses;
- An evaluation of extending the Environmental Performance Reporting Program into contracts, leases and municipal field operations;
- Formalized training elements;
- The establishment of a public education committee;
- Implementation of the comprehensive public and business education strategy;
- Re-establishment of the New Development Task Force to evaluate the need to revise the 1993 DAMP Appendix G based on the updated California Stormwater BMP Manuals;
- The establishment of a new development/significant redevelopment water quality management plan verification program;
- An evaluation of the need for a Model Erosion Control Ordinance;
- An evaluation of opportunities to outreach to those industrial facilities that need to obtain coverage under the State General Industrial Permit;
- The establishment of authorized inspector quarterly meetings;
- An evaluation of the need to revise the procedures and practices for sewage spill response;
- Future participation in additional regional monitoring and research cooperative programs;
- A re-evaluation and revision of the water quality monitoring program; and
- A modification to the implementation of the Newport Bay/San Diego Creek watershed nutrient program requirements.

Progress and refinement of these modifications and commitments will be reported on in future NPDES Annual Status Reports.

8.6 2000/01 Workplan

Although during 2000/01 the principle focus will be on working cooperatively with the Regional Boards so that a mutually agreeable Third Term Permit can be adopted by March (Santa Ana Region) and August (San Diego Region) of 2001, there are additional areas where the Permittees' efforts will be focused.

1. Implementation Agreement Revision

The agreement underpinning County and city cooperation is the Implementation Agreement, which establishes the responsibilities of each Permittee with respect to compliance with the NPDES Stormwater Permits. The Implementation Agreement also establishes a funding mechanism for the shared costs of the NPDES Stormwater Program based on each municipality's area and resident population and includes a provision that allows newly incorporated cities to become additional parties to the Agreement. This agreement, originally entered into in December of 1990, was amended in October of 1993 to include two additional Permittees and formally establish the TAC.

By December 2001 the implementation agreement will be amended to include the newly incorporated cities of Laguna Woods and Rancho Santa Margarita. The Implementation Agreement may be further evaluated at that time to determine whether any changes are appropriate to the decision making committee structure or if the countywide cost shared formula should form the basis for watershed specific planning and improvement programs.

2. Coordination with Other Agencies

Successful implementation of the NPDES Stormwater Program requires the cooperation and coordination with other public agencies or organizations within and adjacent to Orange County that have programs or activities that have an impact on stormwater quality.

During 1999/2000 the Permittees will continue this effort by participating in the following:

- The region-wide monitoring and research cooperative program with the neighboring counties, SCCWRP and the three Regional Boards;
- Reciprocal participation with Cal Trans and attendance at NPDES meetings;
- Coordination with multiple agencies in educating the public about the proper disposal of wastes at the Orange County Fair;
- Coordination with Orange County Sanitation District in initiating a sewage spill prevention and response demonstration project; and
- Coordination with multiple agencies to address illicit dischargers identified within the final water quality monitoring plan. The first two efforts will focus on an identified areas within the cities of Irvine and El Toro.

3. Public Agency Activities

All of the Permittees routinely conduct preventive maintenance activities that are widely recognized as effective BMPs for pollutant control. These activities include litter control, solid waste collection/recycling, drainage facility maintenance, catch basin, stenciling, street sweeping, hazardous materials management/environmental performance reporting, household hazardous waste collection, emergency spill response and fertilizer and pesticide management.

The Permittees will conduct the following activities during 1999/2000:

- The Principal Permittee will offer pollution prevention training to public agency and contract field operations staff;
- Provide any significant changes to the above ground and below ground storm drain systems, outfalls, detention or retention basins or dams and other controls for inclusion in the countywide drainage maps on an annual basis;
- Consider pollutant removal effectiveness (including macro and particulate pollutant removal information, which may be obtained from manufacturer specifications, technical documents, etc.) when purchasing street sweeping equipment or contracting for these services;

- Begin to evaluate the Management Guidelines for Use of Fertilizers and Pesticides to determine the need for revision. This review shall take into account the nutrient and toxicity findings from the Newport Bay watershed;
- Conduct a street sweeper water quality evaluation to qualify and quantify the pollutants that are removed; and
- Evaluate the need for sewer diversions in Talbert/Santa Ana River Watershed.

4. Public and Business Education Program

In late 1999, the Permittees developed a comprehensive long-term NPDES public and business education strategy (subsequently referred to as the Public Education Program) in order to effectively educate the public and targeted business groups about the effects of stormwater pollution and encourage their participation in the protection of surface waters (Appendix 3.4). The Public Education Program includes a comprehensive planning approach and "tool box" of implementable educational elements based upon the desired direction of the program.

The Permittees will undertake the following activities during 1999/2000:

- A Public Education Committee shall be established to provide oversight and guidance for the implementation of the public education program.
- The Permittees shall initiate a public awareness survey to determine the effectiveness of the public and business education strategy to date and to provide direction to the overall program education strategy for the upcoming Third Term Permit period;
- The Permittees shall utilize the survey results, when available, to develop the campaign goals, determine the key messages and community outreach activities and strategies, prepare a master timeline, create a "brand" name for the Stormwater and develop website materials; and
- The Permittees shall develop and distribute BMP guidance for restaurants, automotive service centers and gasoline stations and provide it to existing industrial facility inspectors for distribution to the businesses they inspect

5. BMP Guidelines

Guidelines were developed for mobile detailing, which was identified in the First and Second Term Permits as being a potentially polluting activity not otherwise regulated. These efforts will continue to address additional unregulated activities such as pressure washing of pavements, mobile vehicle maintenance, carpet cleaners, commercial landscape maintenance, pavement cutting for utilities and restaurant floor mat cleaning.

During 2000/01, the Permittees will focus on business practices or activities causing water quality problems countywide, specifically those businesses of concern such as mobile businesses, gas stations, automotive service centers, restaurants, etc. and will begin to develop and distribute BMP guidelines for their related business activities.

6. New Development BMP Requirements

The Permittees have developed and implemented an effective and flexible program for new development and significant redevelopment that allows focus to be placed on constituents of concern identified through the monitoring program and water quality planning process. Commencing in 2000-2001, the Permittees intend to further refine the program through the following actions:

- The Permittees are contributing financially to the revision of the California BMP Handbooks and will participate in the technical review of their development; and
- Once the BMP Handbooks are updated, the New Development/Construction Task Force will be re-established to evaluate the need to revise the 1993 DAMP Appendix G based on the revision to the California Handbooks.

7. Existing Industrial Facility Inspection

A number of public agencies routinely conduct inspections of industrial facilities in Orange County. The agencies include Orange County Health Care Agency, the Fire Departments, the Orange County Agricultural Commissioner's Office and sanitation districts. The Permittees will conduct the following activities during 1999/2000:

- Stormwater quality awareness training will be provided to the staff of existing industrial inspection programs. The training will include the dissemination of the new BMP guidelines developed for restaurants, automotive service centers and gasoline stations.
- The Permittees will establish an Authorized Inspector Committee in order to provide for better consistency among the enforcement programs.

8. Water Quality Monitoring

In response to the Second Term Permits, the Permittees conducted a two year re-evaluation and revision of the water quality monitoring program in order to re-focus the efforts to determine the role, if any, of urban stormwater discharges to the impairment of beneficial uses and to provide technical information to support an effective urban stormwater management program to reduce the beneficial use impairments determined to be associated with urban stormwater. This effort resulted in the Final Water Quality Monitoring Plan (99-04 Plan) which was submitted to the Regional Boards in May 1999.

The reconnaissance and source identification section of the 99-04 plan addresses the core objective of identifying problems and sources through a series of focused reconnaissance studies and special investigations. These focused studies are to include investigations to determine the sources of pollutants impacting warm spots and critical aquatic resources, monitor intermittent illegal discharges recorded in the Principal Permittee's Pollution, Notification, Incident and Reporting (PNIR) database and determine the effectiveness of BMPs used to protect the quality of stormwater runoff from various land uses.

The Permittees also initiated several water quality planning efforts, conducted additional water quality evaluations in response to technical requests from the Regional Boards and participated in various regional research and/or monitoring programs. The combination of these efforts will aid the Permittees in determining the extent and degree of the relationship between urban stormwater runoff and impairment of beneficial uses within the aquatic resources of Orange County.

During 1999/2000 the Permittees will conduct the following:

- Revise the water quality monitoring program and associated timelines annually. These changes may be due to necessary timeline adjustments, newly identified water quality problems or information gained through experience or the research/monitoring programs;
- Participate in the Southern California Stormwater Monitoring/Research Cooperative Program. The key focus of the program is to develop the methodologies and assessment tools to more effectively understand urban municipal stormwater and non-stormwater impacts to receiving waters;
- Evaluate conducting a third focused nitrate study in May 2000 similar to the efforts conducted in September 1999 and June 2000; and
- Initiate planning for a dissolved metals study to be conducted in 2001/02 in several receiving water mixing zones.
- Address illicit dischargers identified within the final water quality monitoring plan. The first two efforts will focus on identified areas within the cities of Irvine and El Toro.

Table 8.1 Third Term Permit Program Modifications/Performance Commitments

	DAMP Section/Performance Commitments	Principal Permittee	Permittees	Pub Ed Committee	Reporting Year																						
					2000 -2001				2001-2002				2002-2003				2003-2004				2004-2005				2005-2006		
							Mar	Apr-Jun	Jul-Sep	Oct-Dec	Jan-Mar	Apr-Jun	Jul-Sep	Oct-Dec	Jan-Mar	Apr-Jun	Jul-Sep	Oct-Dec	Jan-Mar	Apr-Jun	Jul-Sep	Oct-Dec	Jan-Mar	Apr-Jun	Jul-Sep	Oct-Dec	Jan-Mar
Program Management (Section 2.0)																											
1	Permittee Committee shall meet a minimum of three times per year	x	x																								
2	Permittees shall maintain a representative and alternate as designated in writing, convey any changes in 60 days		x							xx				xx				xx				xx				xx	
3	Permittee shall be represented at a minimum of two Permittee meetings		x							xx				xx				xx				xx				xx	
4	Implementation Agreement shall be revised to include new cities. Additional changes in program management and funding shall be reviewed concurrently	x	x							Dec				xx													
5	Coordination and common training shall be investigated with other public agencies that have an impact on stormwater quality	x	x							xx				xx				xx				xx				xx	
Plan Development (Section 3.0)																											
1	The DAMP shall be revised and submitted as the proposed plan for each ROWD	x																									
2	Permittees shall assess the watersheds on a rolling priority basis to evaluate the urban impacts on water quality and opportunities to configure or reconfigure channel segments	x	x							xx				xx				xx				xx				xx	
3	Permittees shall contribute to the revision of the CA BMP Manuals and, upon completion, assess BMPs for inclusion into the NPDES program pursuant to Section 3.2.2	x	x							xx				xx				xx				xx				xx	
4	The Permittees shall assess and evaluate the data from site specific BMPs	x	x							xx				xx				xx				xx				xx	

x Responsible for complying with the peformance commitment
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xx Performance commitment reported on in Annual Status Report
Month that performance commitment is to be completed

Table 8.1 Third Term Permit Program Modifications/Performance Commitments

	DAMP Section/Performance Commitments	Principal Permittee	Permittees	Pub Ed Committee	Reporting Year																						
					2000 -2001				2001-2002				2002-2003				2003-2004				2004-2005				2005-2006		
							Mar	Apr-Jun	Jul-Sep	Oct-Dec	Jan-Mar	Apr-Jun	Jul-Sep	Oct-Dec	Jan-Mar	Apr-Jun	Jul-Sep	Oct-Dec	Jan-Mar	Apr-Jun	Jul-Sep	Oct-Dec	Jan-Mar	Apr-Jun	Jul-Sep	Oct-Dec	Jan-Mar
	Public Agency Activities (Section 5.0)																										
1	Principal Permittee shall develop and distribute model maintenance procedures for public agency activities	x											Jul	xx													
2	Principal Permittee shall develop and distribute BMP guidance for public agency and contract field O&M staff.	x											Jul	xx													
3	Principal Permittee shall provide training to the public agency staff implementing the model maintenance procedures three times during the permit period.	x																xx				xx				xx	
4	Each Permittee adopting the model maintenance procedures shall be represented at a min of two of the training sessions		x															xx				xx				xx	
5	Principal Permittee shall provide pollution prevention training to the public agency and contract field operations staff three times during the permit period.	x																xx				xx				xx	
6	Each Permittee shall be represented at a minimum of two of the pollution prevention training sessions		x															xx				xx				xx	
7	Each Permittee shall document any non-Permittee sponsored workshops, training or educational activities undertaken		x							xx				xx				xx				xx				xx	
8	Principal Permittee shall evaluate the efficiency and cost effectiveness of the available BMPs for litter control and provide a recommendation	x															Jul	xx									
9	Each Permittee shall inspect 80% of the storm drain inlets and catch basins within their jurisdiction at least once per year with subsequent cleaning based upon critera developed.		x							xx				xx				xx				xx				xx	
10	Each Permittee shall evaluate the need for additional diversions based on water quality monitoring and water quality planning data		x							xx				xx				xx				xx				xx	
11	Each Permittee shall provide any significant changes to their storm drain systems in electronic format to the Principal Permittee for inclusion into the countywide drainage maps		x							xx				xx				xx				xx				xx	
12	Each Permittee shall consider pollutant removal effectivess when purchasing street sweeper equipment		x							xx				xx				xx				xx				xx	
13	Permittees shall evaluate applying the Environmental Performance Reporting (EPR) Program to municipal maintenance contracts and leases	x	x										Jul	xx													
14	Permittees shall evaluate applying the EPR Program to municipal or contract field maintenance operations	x	x										Jul	xx													
15	Principal Permittee shall provide EPR training a minimum of three times during the permit period	x								xx				xx				xx				xx				xx	
16	The Permittees shall be represented at a minimum of two of the EPR trainings		x							xx				xx				xx				xx				xx	
17	Principal Permittee shall evaluate the Fertilizer and Pesticide Guidelines to determine the need for revision	x											Jul	xx													
18	Principal Permittee shall provide training on the Management Guidelines for the Use of Fertilizers and Pesticides as the same may be revised.	x															Jul	xx									
19	Each Permittee shall be represented at the Fertilizer and Pesticide training.		x														Jul	xx									

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Public Education (Section 6.0)																											
1	The Permittees shall establish a public edcuation committee	x	x						Jul																		
2	The Pub Ed Comm shall meet a minimum of three times per year			x																							
3	The Pub Ed Comm members shall attend a minimum of two of the three meetings per year			x						xx				xx				xx				xx				xx	
4	The Permittees shall complete a public awareness survey	x	x	x						Dec				xx													
5	The Permittees and Pub Ed Comm shall implement elements of the long term strategy based upon the survey results.	x	x	x										xx				xx				xx				xx	
6	Each Permittee shall conduct a mass distribution of pub ed information to approximately 20% of their residents each year		x							xx				xx				xx				xx				xx	
7	The Permittees shall sponsor or staff a stormwater table or booth for at least one community outreach event per year		x							xx				xx				xx				xx				xx	
8	The Principal Permittee shall continue to coordinate and participate with similar joint outreach programs	x		x						xx				xx				xx				xx				xx	
9	The Permittees shall provide stormwater program outreach to all municipal staff at least once per year		x							xx				xx				xx				xx				xx	
10	The Principal Permittee shall develop BMP guidance for restaurants, automotive service centers and gasoline stations and provide them to existing industrial facility inspectors	x		x									Jul	xx													
11	The Principal Permittee shall develop BMP guidance for at least three non-fixed facility businesses during the permit	x		x						xx				xx				xx				xx				xx	
12	The Principal Permittee shall identify any trade associations, etc common to the non-fixed facility and conduct additional outreach	x		x						xx				xx				xx				xx				xx	

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New Development/Significant Redevelopment (Section 7.0)																											
1	Re-establish the New Development and Construction Task Force (NDCTF) to evaluate the need to revise Appendix G	x											Jul	xx													
2	The Principal Permittee shall develop a training program based on the revisions to Appendix G	x												xx				xx				xx				xx	
3	The Permittees shall verify 90% of the approved WQMPs each year through inspections, self certifications, surveys, etc.		x							xx				xx				xx				xx				xx	
4	The Principal Permittee shall provide training a minimum of three times during the permit period to the Permittees on any revisions made to Appendix G	x												xx				xx				xx				xx	
5	Each Permittee shall be represented at a minimum of two of the Appendix G trainings		x											xx				xx				xx				xx	
6	Each Permittee shall document any non-Permittee sponsored workshops, training or educational activities undertaken		x							xx				xx				xx				xx				xx	
Construction (Section 8.0)																											
1	The Permittees shall review current grading/erosion control ordinances for consistency with related regulatory documents	x	x										Jul	xx													
2	Re-establish the New Development and Construction Task Force (NDCTF) to evaluate the need to revise Appendix H	x											Jul	xx													
3	The Principal Permittee shall develop a training program based on the revisions to Appendix H	x												xx				xx				xx				xx	
4	Each Permittee shall be represented at a minimum of two of the three Appendix H trainings		x											xx				xx				xx				xx	
5	Each Permittee shall document any non-Permittee sponsored workshops, training or educational activities undertaken		x							xx				xx				xx				xx				xx	

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Industrial Discharger Identification (Section 9.0)																											
1	The Permittees shall evaluate the feasibility of establishing a mechanism for the local identification of businesses that need to obtain coverage under the Construction Permit	x	x													Jul	xx										
Detection/Elimination of Illegal Discharges and Illicit Connections (Section 10.0)																											
1	The Principal Permittee shall provide stormwater quality awareness training to staff of existing industrial inspection programs a minimum of three times during the permit period	x								xx				xx				xx				xx				xx	
2	Authorized Inspectors shall meet three times per year		x																								
3	Each Permittee shall be represented at a minimum of two of the three Authorized Inspector meetings		x							xx				xx				xx				xx				xx	
4	The Principal Permittee shall develop and distribute an electronic water pollution database	x											Jul	xx													
5	The Permittees shall review and revise sewage spill response procedures as necessary	x	x							xx				xx				xx				xx				xx	
6	Each Permittee shall document any non-Permittee sponsored workshops, training or educational activities undertaken		x							xx				xx				xx				xx				xx	

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Water Quality Monitoring (Section 11.0)																											
1	The Permittees shall adjust the water quality monitoring program annually	x	x							xx				xx				xx				xx				xx	
2	The Permittees shall participate in future Southern California Bight Regional Monitoring Programs	x	x							xx				xx				xx				xx				xx	
3	The Permittees shall participate in the Southern California Stormwater Monitoring/Research Cooperative Program	x	x							xx				xx				xx				xx				xx	
4	The Permittees shall re-evaluate and revise the water quality monitoring program	x	x															xx									
Newport Bay (Section 12.0)																											
1	The Newport Watershed Permittees shall evaluate and implement the suggested BMPs contained in Appendix N	x	x							xx				xx				xx				xx				xx	

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APPENDIX 3.1

REPRESENTATIVE PUBLIC EDUCATION MATERIALS

REPRESENTATIVE PUBLIC EDUCATION MATERIALS

COUNTY OF ORANGE

TRANSPORTATION AND HANDLING

- A maximum of 15 gallons or 125 pounds may be transported per vehicle, per trip (Department of Transportation regulation).
- Materials should be in original containers (except motor oil, fuels and antifreeze).
- All containers must have lids, be sturdy, non-leaking, and protected from breakage.
- Do not combine types of waste.
- Do not mix oil-base paint with latex paint.
- Dry out empty paint cans and discard in regular trash.
- If you wish to have a container returned (i.e. oil containers and boxes/crates used to transport materials), please notify the attendant in advance. Some containers may not be returnable.

WHY SHOP WHEN YOU DROP?

VISIT THE STOP & SWAP!

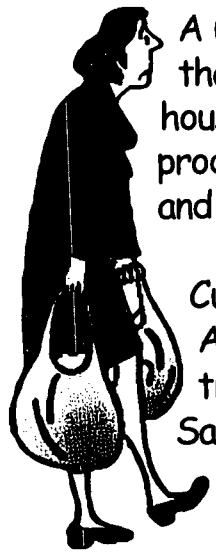

A unique and FREE program that allows you to drop off household, yard, and car care products you no longer need and pick up others you can use.

Currently available at the Anaheim and Irvine locations only. (Tuesday through Saturday, 9 a.m. to 1 p.m.)

FOR MORE INFORMATION ABOUT THE HOUSEHOLD HAZARDOUS WASTE COLLECTION PROGRAM AND THE STOP & SWAP CALL:

(714) 834-6752

Or see our webiste: www.oc.ca.gov/iwmd

Orange County Recycles!

Printed on recycled paper.

COUNTY OF ORANGE CALIFORNIA

Integrated Waste Management Department

DISPOSAL OF HOUSEHOLD HAZARDOUS WASTE

Household Hazardous Waste Collection Program

005981

DID YOU KNOW?

- Most home, car, and yard care products can't be thrown in the trash?
- Paint, used motor oil, and most cleaning products are considered to be "hazardous waste"?
- If these products are put in the landfill they can contaminate our groundwater?

SO WHAT CAN YOU DO?

EASY AS 1-2-3!

1. Pack unwanted home, yard, and car care products in your car.
2. Drive to the Household Hazardous Waste Center closest to you.
3. Sit in your car and fill out a simple form while an attendant removes the unwanted products.

AND AWAY YOU GO!

LOCATIONS

Tuesday through Saturday
9 a.m. to 1 p.m.
except for rainy days and major holidays: Independence, Thanksgiving, Christmas and New Years Days)

STOP & SWAP*

ANAHEIM
1071 N. Blue Gum Street
(Located between the 91 and 57 Freeways on the corner of La Palma and Blue Gum)

STOP & SWAP*

HUNTINGTON BEACH
17121 Nichols Street
(Between Beach Blvd. and Gothard St. off Warner Ave. at Rainbow Recycling and Disposal. Use Gate 6.)

IRVINE
6411 Oak Canyon
(Off Sand Canyon between the 5 and 405 Freeways. Next to the City Corporate Yard and Animal Shelter.)

MATERIALS ACCEPTED

- Automotive products (antifreeze, motor oil, fluids)
- Batteries (home and car)
- Cosmetics
- Herbicides
- Hobby supplies
- Household cleaners
- Fuels
- Medicines
- Paints (latex and oil)
- Paint products
- Personal care products
- Pesticides
- Polishes and waxes
- Pool and spa chemicals
- Propane tanks from barbecues
- Unused road flares
- Wood preservatives

WASTE NOT ACCEPTED

Ammunition
Asbestos
Biological
Business-generated
Explosives
Radioactive
Compressed gas cylinders

* See reverse for Stop & Swap info!

GREEN WASTE ONLY

DO'S	DON'TS
Grass	Plastic Bags
Leaves	Pet Waste
Green Plants	Palm Branches
Weeds	Soil
Garden Trimmings	Dirt
Tree Limbs	Tree Stumps
Wood Chips	Painted Wood
Sawdust	Treated Wood
Small Wood Scraps	

WM WASTE MANAGEMENT
(949) 642-1191
(714) 558-7761

TAKE ME

WM WASTE MANAGEMENT

Waste Management will discard your old trash can(s). Place this sticker on your trash can to be discarded and place at the curb on your trash collection day.

TAKE ME

WM WASTE MANAGEMENT

Waste Management will discard your old trash can(s). Place this sticker on your trash can to be discarded and place at the curb on your trash collection day.

LARGE BIN SERVICE

For large household and yard projects, special bin rental service is available. Please call the Waste Management Customer Service Center at (949) 642-1191 or (714) 558-7761 for rates and information.

BULKY ITEM PICKUP

Each household is entitled to two free bulky item pickups each year. We will collect up to four large items or 20 plastic bags of refuse per pickup (bags not to exceed 50 pounds). Bulky items include large, hard-to-handle items such as furniture, major appliances, and other household items that require two individuals to move. To schedule your free bulky item pickup, please call the Waste Management Customer Service Center at (949) 642-1191 or (714) 558-7761.

HOUSEHOLD HAZARDOUS WASTE

The County of Orange operates regional household hazardous waste collection centers for homeowners to take and dispose of their paint, oil, pesticides, cleaners, solvents, etc. The two centers for South County residents are San Juan Capistrano and Irvine. For more information, call the County's Information Hotline at (714) 834-6752.

CHRISTMAS TREE RECYCLING

We will collect and recycle Christmas trees for the first two weeks following Christmas. Trees must be placed at the curb no later than Friday, January 7, 2000. Trees longer than six feet must be cut in half. Please remove all tinsel, metal ornaments and metal stands from trees. Flocked trees will be collected but not recycled.

HOLIDAY SCHEDULE

Waste Collection does not occur on the following holidays:

New Year's Day	Memorial Day
4th of July	Labor Day
Thanksgiving Day	Christmas Day

When any of these holidays is observed on a weekday, collections for the remainder of the week are delayed one day.

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WASTE MANAGEMENT

005983

Your New Expanded Recycling Program

Presented by The County of Orange and Waste Management of Orange County

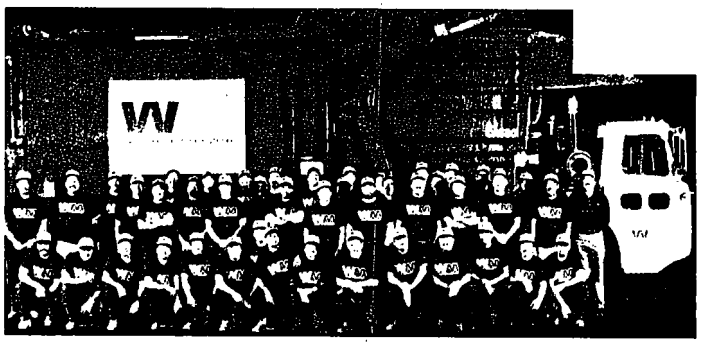

Dear Resid

Welcome to the County of Orange's new expanded recycling program. The County of Orange, like all cities and counties in California, is required by state law to reduce the waste it sends to landfills by 50 percent by the year 2000. We need your help to accomplish this goal.

Today Waste Management is beginning its new program by making it more convenient for you to recycle. We are doing this in three ways:

- *Providing you with a new cart that you will use for your trash*
- *Increasing recycling service from every other week to every week*
- *Beginning a new green waste (yard trimmings) recycling program for those customers who generate significant quantities of green waste*

Best of all there is no increase in rates.

We are excited about the expanded recycling program and are confident that you will find the program easy to use and convenient for your household. Please take a few minutes to review the information about the new program we have included in your Starter Kit. If you have any questions, please call the Waste Management Customer Service Center at (949) 642-1191 or (714) 558-7761.

Thank you for your help in assisting the County of Orange in reaching its recycling goals.

Sincerely,

Robert J. Coyle
Division President

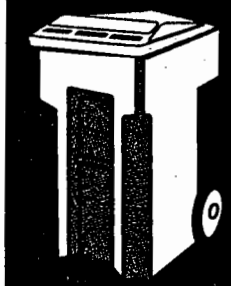

YOUR NEW TRASH CART (UE LID)

Each resident with curbside trash service will receive a new trash cart that has a distinctive blue lid with "Trash" stamped on the lid to identify it. Based on the neighborhood you live in you will receive either a 64-gallon cart (equivalent to TWO regular 32-gallon trash cans) or a 96-gallon cart (equivalent to THREE regular trash cans.) If you need either a larger or smaller size after you have used the cart for a few weeks, please call our Customer Service Center at (949) 642-1191 or (714) 558-7761 and we will exchange your cart at no charge. The trash cart is for household waste that cannot be recycled.

Sorted recyclable materials whic will be made into new products

RECYCLABLES (GREEN OR GRAY LID)

Beginning next week you can put your recycling cart out every week. One of the biggest requests from County residents was that they wanted to recycle more items and they wanted more frequent service. The expanded recycling program provides a solution for both requests.

We are also expanding the list of material that you can recycle. You can now put the following materials in the recycling cart with the green or gray lid:

- Newspapers
- Cardboard
- Mixed Paper
- Junk Mail
  Cereal Boxes
- Plastic Bottles
- Magazines, Catalogs & Phone Books
- Aluminum Cans
- Steel/Tin Cans
- Glass Food & Beverage Containers

You no longer need to separate your newspapers within your recyclin cart. All recycling materials can now be mixed together. And remembe if it tears, recycle it.

To avoid contamination, please do not place liquid or food waste, pla bags or styrofoam in the recycling cart. <u>If you are not sure if a produ can be recycled please put it in the trash cart with the blue lid.</u>

GREEN WASTE. IT'S NEW!

The expanded recycling program also includes a new "Green Waste" service. Green waste is commonly referred to as yard trimmings, and includes the following:

- Grass/Leaves
- Tree Branches
- Wood Chips
- Garden Trimmings
- Green Plants/Weeds
- Sawdust/Small Pieces of Wood

How does it work? If you generate green waste, place the enclosed "Green Waste" stickers on your old trash can(s).* Please remember that green waste cans cannot exceed 35-gallons or weigh more than 50 pounds.

Green waste can be put out for collection every week. Plastic is a major contaminant of green waste. Do not place green waste in plastic bags. All of your green waste should be loose in the cans. Tree branches may be tied in 4-foot long bundles and placed next to your green waste cans.

*Note: The County of Orange and Waste Management of Orange County have identified some areas outside the designated green waste collection areas. If you did not receive "Green Waste" stickers, you are located outside the "Green Waste" service areas and you may place green waste in your trash cart.

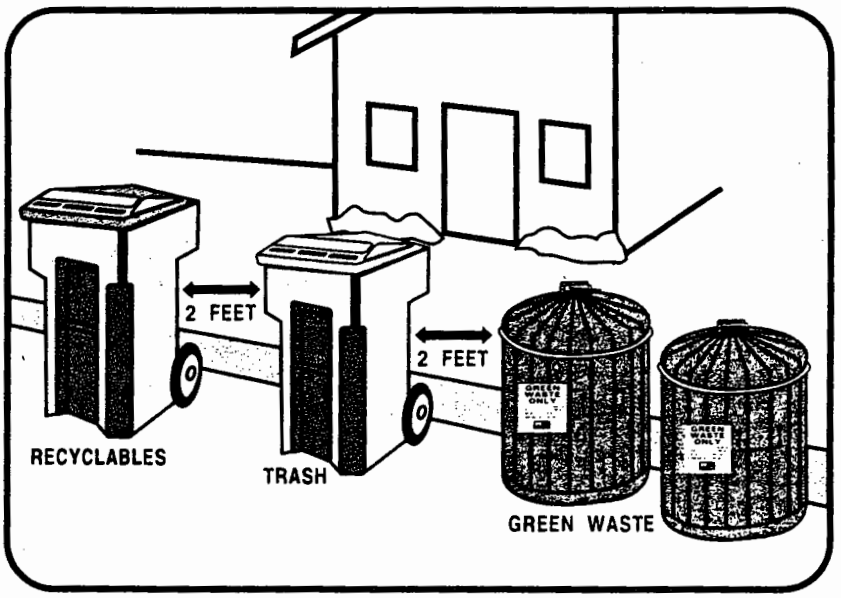

REMINDER: Please place all items in the carts or cans. Cart lids must close to prevent spillage.

CR&R would like to advise the residence of Rossmoor that we acknowledge the following Holidays:

New Years Day
Memorial Day
4th of July
Labor Day
Thanksgiving
Christmas

If one of these Holidays falls during the week (Monday-Friday), your pick-up will be **delayed** one day. If these Holidays fall on the week end (Saturday or Sunday) your pick up day will **not** be changed.

Rossmoor Clean-up

CR&R will have our annual bulky item **clean-up** on October 23, 1999 at Rossmoor Park on Pemberton St. The clean-up program will give you the opportunity to dispose of unwanted bulky items. Please put all items inside the dumpsters. **Do not place items on the ground outside the trash boxes.**

Saturday October 23RD 8:00 AM to 2:00 PM

Proof of residence in the Community of Rossmoor must be provided

No hazardous waste: batteries, paint, paint thinners, tires or oil

MRF RESOURCE CENTER

MRF RESOURCE CENTER was a two year dream of the Environmental Education Team (made up of community members from Huntington Beach, Fountain Valley, and Rainbow Disposal).

MRF RESOURCE CENTER is made from about 500 pounds of recycled materials, items that were at one time, someone else's trash!

MRF RESOURCE CENTER is constructed from:

- Recycled aluminum
- Rumber (a recycled tire and recycled plastic composite)
- Recycled melamine
- Particle board (made from recycled wood product)
- Recycled Polyethylene Terephthalate (a plastic from which soda bottles are made)
- Recycled tin, and
- Recycled, expanded polyvinyl chloride.
- The featured garbage can holds more than 100 cubic feet of trash.

MRF RESOURCE CENTER artist/designer is **Rob Hardin**, owner/operator of **Innovative Design,** 17401 Nichols Street, Suite K, Huntington Beach, CA 92647.

The recycled promotional items inside the "garbage can" were generously donated by **Adapt Consulting – The Environmental Resource Experts,** 13618 Lemay Street, Van Nuys, CA 91401

MRF RESOURCE CENTER was made possible by a grant from the California Department of Conservation, Division of Recycling

RAINBOW
DISPOSAL CO., INC.
. BOX 1026 • HUNTINGTON BEACH, CA 92647-1026 • PH: (714) 847-3581 FAX: (714) 841-4660

RAINBOW DISPOSAL TOUR APPLICATION

NAME /ORGANIZATION: _____

ADDRESS: _____

CONTACT PERSON: _____

PHONE: ( )_____ FAX: ( )_____

ACTIVITIES OR OBJECTIVES OF ORGANIZATION:

_____

_____NON PROFIT: YES____ NO____

DATES & TIME REQUESTED

Date:_____Day_____Time:_____A.M._____P.M.
Date:_____Day_____Time:_____A.M._____P.M.
Date:_____Day_____Time:_____A.M._____P.M.
Date:_____Day_____Time:_____A.M._____P.M.

APPROXIMATE NUMBER OF PEOPLE TO TOUR THE FACILITY:_____

"MRF"
RAINBOW'S MATERIALS RECOVERY FACILITY
INTERACTIVE EDUCATIONAL DISPLAY

TOURS ARE CONDUCTED TUESDAY THROUGH THURSDAY
10:00 A.M. TO 3:00 P.M.
Tours are approximately one hour
(Please arrive 10 minutes before your tour begins)

Rainbow is located at:
17121 Nichols St.
Huntington Beach, CA 92647

Your request will be answered within ten (10) days from receipt of this application
If you have any questions please call:
(714) 847-3581
Sandra Jacobs Ext. 245
or
Ron Shenkman Ext. 230

Thank you for your interest in Rainbow Disposal and the Environment ! !

PRINTED ON RECYCLED PAPER

RAINBOW DISPOSAL
SCHOOL TOUR APPLICATION

DATE: _____ TEACHER/S: _____
SCHOOL: _____ _____
DISTRICT: _____ PHONE: _____
FAX NO: _____

DATE/S REQUESTED

Date:_____Day:_____Time:_____a.m._____p.m.
Grade/s:_____No. of Students:_____Adults:_____
Date:_____Day:_____Time:_____a.m._____p.m.
Grade/s:_____No. of Students:_____Adults:_____

"PLANET MRF"
RAINBOW'S MATERIALS RECOVERY FACILITY
INTERACTIVE EDUCATIONAL DISPLAY

TOURS ARE CONDUTED TUESDAY, WEDNESDAY & THURSDAY
FROM 9:30 A.M. TO 3:00 P.M. AND ARE APPROXIMATELY ONE (1) HOUR

- ***Schools are limited to one (1) Back to Back tour per month*** *(two classes of 30 to 34 Students).*
- ***Two adults*** *must accompany each class. Each class will be divided into two groups*
- ***Bus will transport 30 to 34 students per trip (one class)****, drop off one group - return to school, pick up and transport second group - (Turn around time approximately one (1) hour). When second group arrives for tour - the first group will be picked up and transported back to school. The bus will then return for the remaining students.*
- ***Before Completing Form*** *(if busing) contact your School Transportation Department for available dates and times.*
- ***Tour Requests*** *will be confirmed promptly by FAX or mail.*
- ***Keep copy as a reminder.*** *We will make every attempt to fulfill your requests .*

LOOKING FORWARD TO YOUR VISIT!!!!
RAINBOW IS LOCATED AT:
17121 Nichols St.
Huntington Beach, Ca 92647

Sandra Jacobs - Rainbow Disposal
(714) 847-3581, Ext. 245
Fax: (714) 841-4660

AFRAID OF YOUR HAZARDOUS WASTE?

HURRY to a HOUSEHOLD HAZARDOUS WASTE COLLECTION CENTER... IT'S FREE!

CITY OF FOUNTAIN VALLEY ♻ RAINBOW DISPOSAL ♻ CITY OF HUNTINGTON BEACH

WHERE ARE WE GOING TO THROW IT... WHEN THERE IS NO MORE "AWAY"?...

Follow these Waste Prevention tips today!

- Buy products with less packaging
- Use both sides of the paper
- Buy in bulk

CITY OF FOUNTAIN VALLEY ♻ RAINBOW DISPOSAL ♻ CITY OF HUNTINGTON BEACH

Out of Sorts?

We Sort For You!!

Recycling Made Easy

City of Huntington Beach
Rainbow Disposal
City of Fountain Valley

Extra packaging is garbage

City of Fountain Valley City of Huntington Beach Rainbow Disposal

WHAT YOU PUT HERE

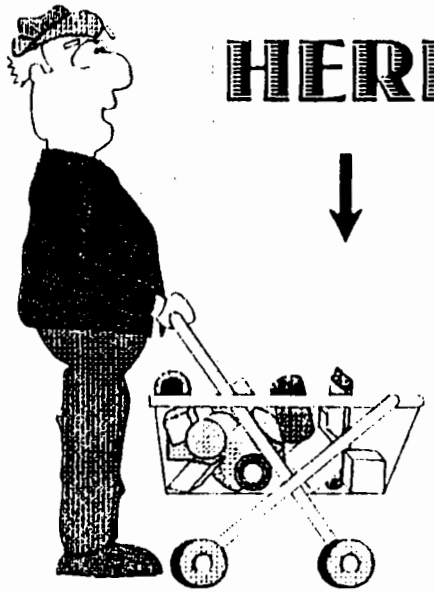

MAY WIND UP HERE

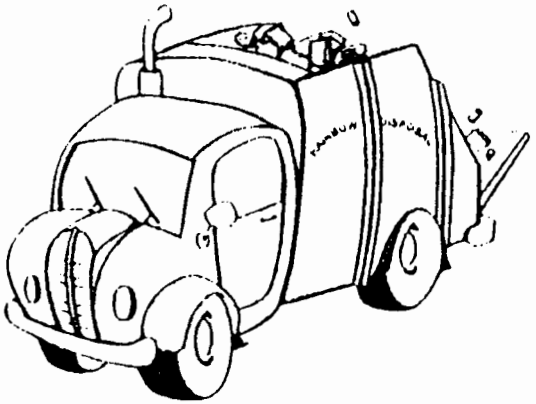

SHOP WISELY, REDUCE WASTE !

CITY OF FOUNTAIN VALLEY *RAINBOW DISPOSAL* *CITY OF HUNTINGTON BEACH*

OUT OF SORTS?
We Sort For You!!
Recycling made easy
TAKE ONE

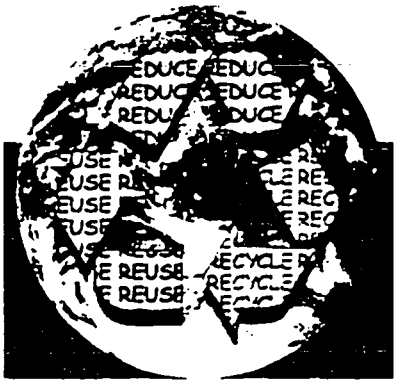
REDUCE
REUSE
RECYCLE

Out of Sorts?
We Sort For You!!
Recycling Made Easy

TAKE ONE

HOW MUCH TRASH

HOUSEHOLD HAZARDOUS WASTE

Don't be a Household Hazardous Waste Generator...

You can make a Difference!

DO YOU HAVE

- Used Motor Oil
- Old Paint
- Solvents
- Pesticides
- Used Automotive Batteries
- Household Cleaning Products
- Pool Chemicals

IN YOUR HOME?

The County of Orange provides a *FREE...*

HOUSEHOLD HAZARDOUS WASTE COLLECTION CENTER

Located at: Rainbow Disposal
17121 Nichols St., Huntington Beach
Hours: 9:00 A.M. to 1:00 P.M.
Tuesday thru Saturday
For Hazardous Waste Information
Call - (714) 834-6752

ENVIRONMENTAL EDUCATION TEAM

Earth-friendly ideas for a brighter future...

City of Fountain Valley-Rainbow Disposal-City of Huntington Beach
P.O. Box 1026 – Huntington Beach, CA 92647

WHERE ARE WE GOING TO THROW IT...

005997

WHEN THERE IS NO MORE AWAY?

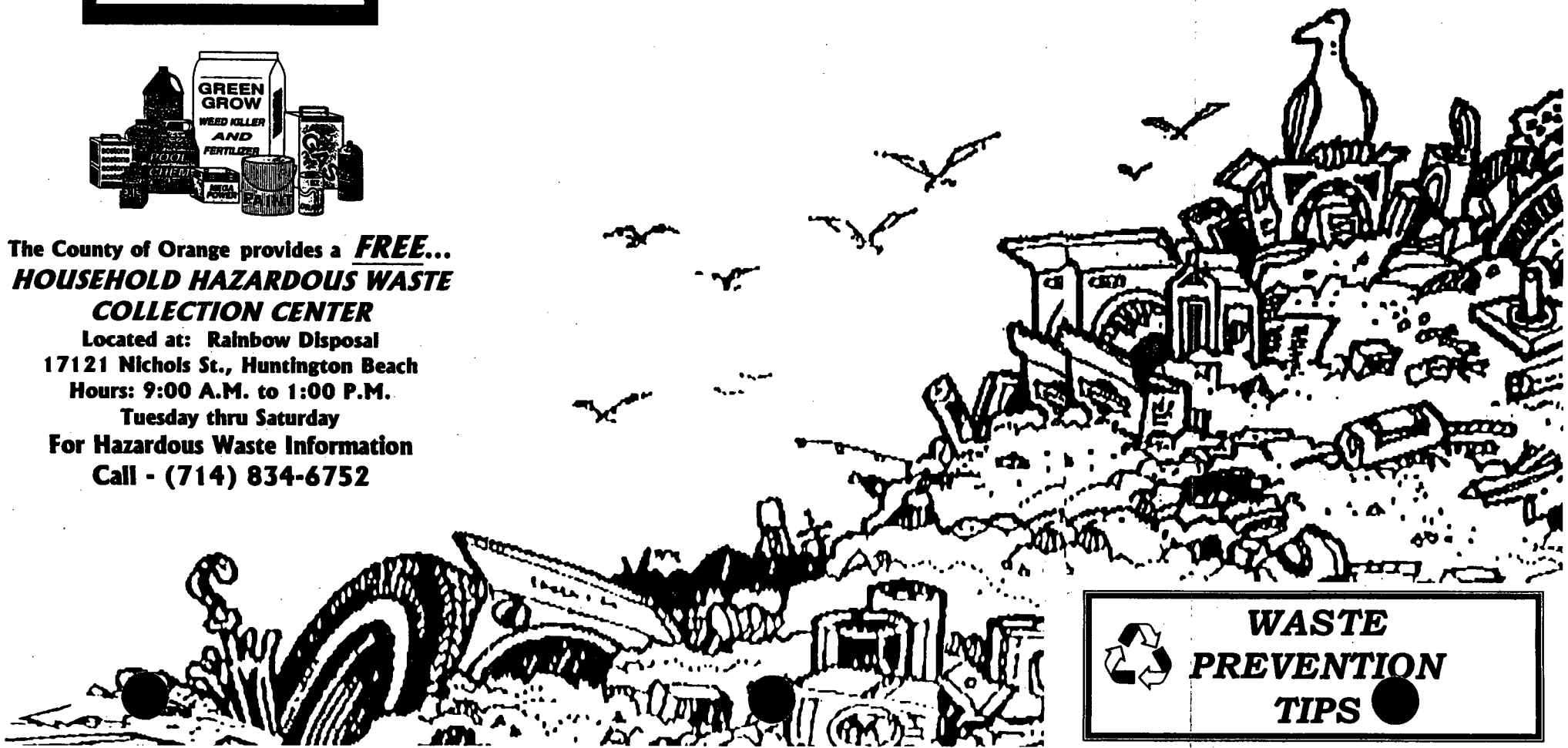

WASTE PREVENTION TIPS

WASTE PREVENTION TIPS

STOP TRASH BEFORE IT STARTS!

Many people believe that recycling is the only solution to the trash problem. While recycling can divert valuable materials from the landfill, it is only one part of an efficient Waste Management Program. Controlling waste, conserving landfill space and improving the environment requires the "3R's.

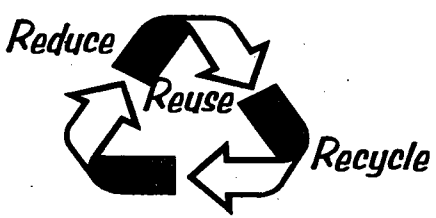

Lets start with *"Reduce"*

Californians generate 4.4 million tons of garbage each year. This equals 8 lbs. per person per day. Let's go one step further and think about how to reduce waste in the first place by going to the source.

THINK BEFORE YOU TOSS!!
IF YOU'RE NOT PREVENTING WASTE
YOU'RE WASTING RESOURCES!!
LOOK AT WHAT YOU BUY
AND WHAT YOU THROW AWAY!

FOLLOW THE "STOP BUYING TRASH" CHECK LIST!!

Did you know that packaging represents 30% of all waste?

- BUY RECYCLED PRODUCTS WHENEVER POSSIBLE
- SELECT PRODUCTS WITH MINIMAL PACKAGING
- BUY IN BULK, ECONOMY SIZES & CONCENTRATES
- AVOID DISPOSABLE DIAPERS, AND PAPER PRODUCTS SUCH AS ... PLATES, NAPKINS & TOWELS
- BUY REFILLABLE ITEMS SUCH AS PENS & RAZORS

Make something new from something old *"Reuse"*

- REPAIR DURABLE PRODUCTS
- BORROW, RENT OR SHARE ITEMS USED INFREQUENTLY
- USE REUSABLE PRODUCTS SUCH AS SPONGES, CLOTH TOWELS, DISHES, UTENSILS, CLOTH NAPKINS, CUPS & RAZORS

BE A PAPER SAVER

- USE BOTH SIDES OF THE PAPER
- USE GROCERY BAGS TO LINE HOUSEHOLD TRASH CANS
- MAKE NOTE PADS FROM USED PAPER

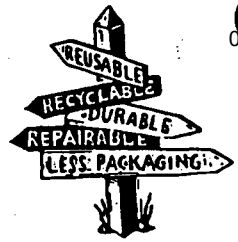

Give it away, don't throw it away *"Recycle"*

Many schools and community groups could benefit from receiving your used:

- *CLOTHING*
- *TOYS*
- *BOOKS*
- *FURNITURE*
- *APPLIANCES & MORE*

- DONATE BOOKS TO LIBRARIES, MAGAZINES TO NURSING HOMES, SCHOOLS, & FRIENDS
- REUSE PACKAGING MATERIAL AGAIN – STYROFOAM PEANUTS, BUBBLE WRAP, WRAPPING PAPER ETC. FOR

ZERO WASTE LUNCH

- NO DISPOSABLES, USE LUNCH BOXES OR FABRIC BAGS & CLOTH NAPKINS

- NO PREPACKAGED SINGLE SERVING CONTAINERS FOR CHIPS, DRINKS FRUIT, ETC.
- USE TUPPERWARE OR RUBBERMAID TYPE DURABLE CONTAINERS.
- USE REFILLABLE THERMOS CONTAINERS

ENVIRONMENTAL EDUCATION TEAM

Earth friendly ideas for a brighter future

MRF
GALACTIC FUN BOOK
HI! WE'RE THE MRFLINGS! REDUCE, REUSE AND RECYCLE!

ENVIRONMENTAL EDUCATION TEAM

Earth-friendly ideas for a brighter future ...

City of Fountain Valley–Rainbow Disposal–City of Huntington Beach

006001

Recycle Now There's A Future In It!

Recycling News

July 1, 1999 Volume VII. No 3

IMPORTANT NOTICE

NO DELAY IN TRASH COLLECTION THIS JULY 4TH

This year the Fourth of July falls on a Sunday. Currently the County landfills operate Monday through Saturday so you will not experience delay in trash service. On your normal collection day, please place your trash/recyclables out at the curb for collection.

PROPER DISPOSAL OF THE AMERICAN FLAG

As we celebrate America's Independence this Fourth of July we may notice that the flags we display have become torn or tattered beyond repair. This past year the editors of Recycling News received a letter from a World War II Veteran regarding proper disposal of an American Flag.

The Orange County Veterans will forward the flags to the American Legion Post where they will be Disposed of in conformance with tradition and local laws. Please mail your old American Flags to:

ORANGE COUNTY VETERANS
SERVICE CENTER OFFICE
1300 South Grand Avenue, building B
Santa Ana, CA 92705

TIPS TO REMEMBER WHEN YOU'RE AT THE BEACH OR PARK

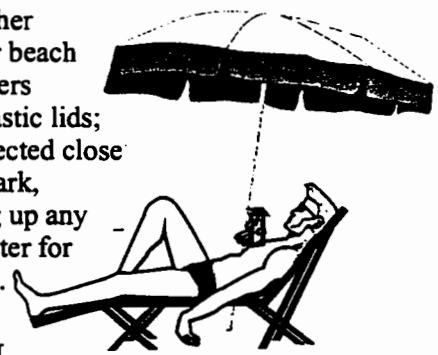

Did you know that our oceans provide most of the planet's oxygen, moisture and weather patterns? Every year, the Center of Marine Conservation sponsors a nationwide 3-hour beach clean-up, which has proven to be extremely effective. In 1987, in Texas alone, volunteers collected: 31,773 plastic bags; 30,295 plastic bottles; 15,631 six pack rings; 28,450 plastic lids; and 1,914 disposable diapers. And around the nation, the volunteer clean-up crew collected close to 2 million pounds of debris in just 3 hours. So next time you go to the beach or the park, remember to bring a trash bag and before you leave try to spend a few minutes picking up any litter you find. If you are interested in beach clean-up activities, please contact the Center for Marine Conservation at (202) 429-5609 or the Surfrider Foundation at (800) 743-7873.

IMPORTANT Y2K INFORMATION

By December 31, 2000 your city will need to be in compliance with the regulations set forth by state law AB 939. As you are already aware, AB 939 is the state-mandated requirement for each City throughout California to divert 50% of their waste stream away from the landfill by the Year 2000. Over the past several years the Editors of *Recycling News* have been discussing the 50% goal and the importance of reducing your waste, recycling and buying recycled products. Over the next year, your city will evaluating the programs currently in place and will review new ideas to promote the goals or the state law. Keep up the good work!!!!

Holiday Collection Schedule	**We will not pick-up on these holidays:** **- New Years Day - Memorial Day - Independence Day - Labor Day - Thanksgiving Day - Christmas Day** **However, trash collection will resume one day later.**

TRASH FRIENDLY WEBSITES

Each quarter the editor of ***Recycling News*** will be reviewing website and e-mail addresses on the Internet that may be of interest to our readers. The sites examine ways to **reduce** waste, avenues to **reuse** unwanted materials (such as donations to non-profit organizations), lists of **recyclable** material and directions to **backyard composting**.

http://www.1800cleanup.com -
For information on clean-up projects throughout the state.

http://www.envirofind.com -
To find information on all types of environmental businesses and other information.

Solag Disposal, Inc. - www.solag.com
Laguna Niguel - www.ci.laguna-niguel.ca.us
San Clemente - www.cty.org/san-clemente/
County of Orange - www.oc.ca.gov/iwmd/
Dana Point - www.ci.dana-point.ca.us
San Juan Capistrano - www.sanjuancapistrano.org

For a "buy-back" or "drop-off" recycling center near you contact the Department of Conservation at 1-800-RECYCLE (1-800-732-9253) or the California Integrated Waste Management Board at 1-800-253-2687.

FIND A NEW USE FOR AN OLD ITEM

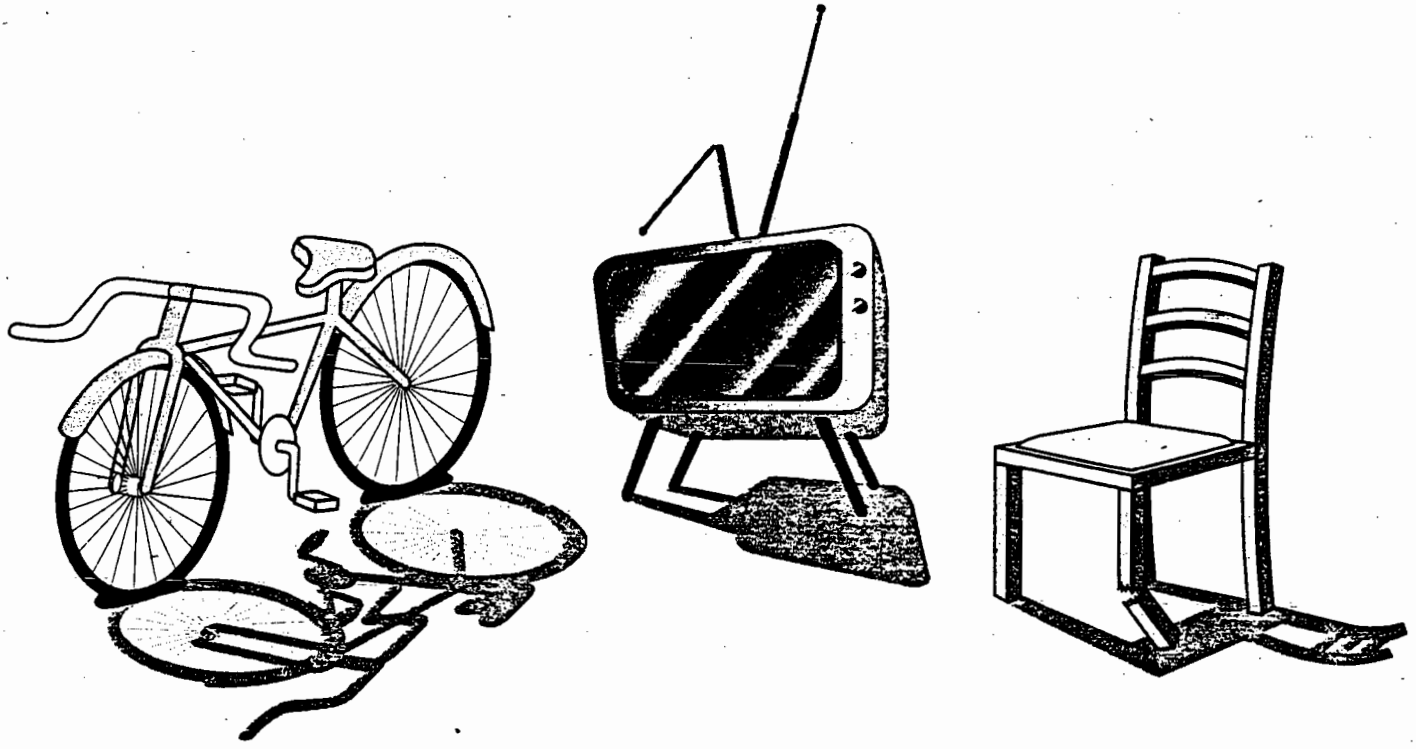

Have an old bike that needs fixing or a chair that is missing a leg? Or how about some other large item that needs some minor repairs? Before you throw that item away, why not give it to someone who could put it to good use? There are many organizations such as Goodwill Industries, Children's Hospital of Orange County (CHOC) and the Salvation Army that make it their business to bring new life to older, reusable items. In the spirit of goodwill and less waste, SOLAG Disposal, Inc. together with your City encourage you to contact these organizations before you throw a reusable item in the trash. For telephone numbers to these organizations, please look in the yellow pages under "Thrift Shops." Also remember that your contribution may also be tax deductible.

Recycle Now
There's A Future In It!

Recycling News

6003

October 1, 1999 | Volume VII, No. 4

KEEP RECYCLING WORKING - AMERICA RECYCLES

On November 13, California cities will have the opportunity to participate in the second annual America Recycles Day - a national campaign designed specifically to reinforce public support of recycling. Your City, the County of Orange and SOLAG Disposal would like to "Keep Recycling Working." You can help by remembering to reduce, reuse, recycle and compost your waste, but most importantly... purchase products that contain recycled materials. By working together we can preserve our planet, promote a healthier environment and secure the future of recycling.

AMERICA RECYCLES DAY
NOVEMBER 13, 1999

SPECIAL GIVEAWAY

To celebrate America Recycles Day, on Saturday, November 13 from 8:00 a.m. to 12:00 p.m. Tierra Verde Industries, a green waste recycling facility located in San Juan Capistrano, has offered to donate compost for use in your yard. Bring a shovel and a large container/bag to Federal Doc Loading, located on Alicia Parkway between Avila and Aliso Creek Road in the City of Laguna Niguel to collect the free compost material.

FIND A NEW USE FOR AN OLD ITEM

Have an old bike that needs fixing or a chair that is missing a leg? Or how about some other large item that needs some minor repairs? Before you throw that item away, why not give it to someone who could put it to good use? There are many organization such as Goodwill Industries, Children's Hospital of Orange County (CHOC) and the Salvation Army that make it their business to bring new life to older, reusable items. In the spirit of goodwill and less waste, SOLAG Disposal, Inc. together with your City encourage you to contact these organizations before you throw a reusable item in the trash. For telephone numbers to these or other non-profit organizations, please look in the yellow pages under "Thrift Shops," or you may contact Solag Disposal for more information. Also remember that your contribution may be tax deductible.

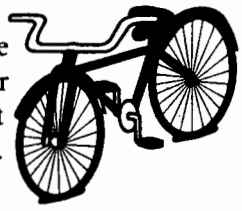

ENVIRONMENTAL AWARDS

The Cities of Dana Point, Laguna Niguel, San Clemente, San Juan Capistrano and the County of Orange would like to recognize the following businesses for their outstanding efforts to reduce waste and recycle in their community:

Doubletree Guest Suites, Dana Point • Flex Foot, Inc. • Trade Winds Motel
Unichem Industries, Inc. • Tall Mouse Arts & Crafts, Inc. • Auto Care
Launderland • Mission Yamaha, Inc. • Saturn of San Juan Capistrano

Each of these businesses are being recognized by their respective cities for their dedication to help keep our environment clean and their commitment to recycling and source reduction.

TRASH FRIENDLY WEBSITES

Solag Disposal - www.solag.com
www.choose2reuse.org - This website will give you valuable information and on-line resources to help in your efforts to re-use everyday items.

Dana Point - www.ci.dana-point.ca.us
Laguna Niguel - www.ci.laguna-niguel.ca.us
San Juan Capistrano - www.sanjuancapistrano.org
San Clemente - www.cty.org/san-clemente/
County of Orange - www.oc.ca.gov/iwmd/

Sally Swallow
San Juan Capistrano

Corky Coyote
Laguna Niguel

Dana Dolphin
Dana Point

Selena Seal
San Clemente

SOLAG DISPOSAL
Quad Cities Recycling Program

IS YOUR TRASH WEIGHING YOU DOWN?

Items that are too large to fit in your container are considered bulky-items. As a customer of SOLAG Disposal you are entitled to two bulky-item pick-ups per calendar year, at no extra charge. Almost anything that can be managed by a two-person crew will be picked up as a bulky-item. This includes old furniture, appliances, carpet, mattresses, water heaters, etc. Loose items need to be bagged or bundled, and no liquids or drums of any kind will be accepted. Before you put out large items to be landfilled, consider donating these items to a non-profit organization. If you would like more information about bulky-item pick-ups or non-profit organizations willing to pick-up your reusable items, please contact one of the customer service representatives at (949) 240-0446, Ext. 1.

Recycle Now There's A Future In It!

Recycling News

January 1, 2000 Volume VIII, No 1

SEASONAL RECYCLING TIPS (Some thoughts)

During this Holiday season remember that one of the biggest gifts you can give your children is a clean environment. Here are some of the ways you can recycle and reuse holiday leftovers.

Types of things that can be recycled include:

Tin Jars	Wrapping Paper	Glass Containers	Cardboard Boxes/Packaging

Cannot be recycled:

Tinsel	Bows/Ribbons	Holiday Lights	Styrofoam Peanuts*

* = Clean Styrofoam packaging peanuts can be reused or are accepted at several packaging/delivering companies (such as Mail Boxes, Etc.), please check your local listings.

Some products may not be recyclable in our program, but that doesn't mean they should go in the trash!!! Many nonprofit organizations around the area can reuse your seasoned clothing, toys, exercise equipment, bicycles and other items. If you have any questions, please contact one of our customer service representatives at (949) 240-0446.

RECYCLING YOUR CHRISTMAS TREE IS AS EASY AS 1-2-3....

Can you believe that the Holiday Season is already behind us? Well it's time again to recycle your Christmas Trees. Depending on where you live, collection of your trees will take place on your normal collection day during a two week period shortly after Christmas or after the New Year. Just follow these three simple steps:

FIRST, please review the front of your bill for the dates of the curbside collection of your Christmas trees.

SECOND, Remove all decorations, tinsel and stands (wood or metal) from the tree before collection. If your tree is over 8feet in height, please cut the tree in half.

THIRD, Place your tree at the curb next to your container on collection day. **On trash day a separate collection vehicle will pick up your Christmas tree.**

NOTE: Flocked trees or trees with nails, stands or ornaments cannot be recycled, but will be picked up and disposed of at the landfill. Please do your part to help recycle your trees.

ITS NEVER TOO LATE TO RECYCLE OLD CHRISTMAS CARDS

For the past 20 years St. Jude's Ranch for Children has recycled holiday, birthday, get well and all other occasion cards. St. Jude's Ranch is a non-profit home for abused and homeless children located in Boulder City, Nevada. People from across the United States and around the world send used cards to the Ranch. In 1992 nearly one and a half million cards were collected. If you would like to recycle your Christmas cards, please send them to:

St. Jude's Ranch for Children
P.O. Box 60100
Boulder City, NV 89006

If sending by United Parcel Service, send to:
St. Jude's Ranch for Children
100 St. Jude Street
Boulder City, NV 89005

The Ranch requests that you send the front of cards only and please do not include cards that have writing or other markings.

SOLAG DISPOSAL
Quad Cities Recycling Program

Unwanted Computer Parts - Help Your Community Recycle

Recently there has been a lot of talk about the year 2000 (Y2K) and the potential of imbedded computer chips disabling thousands of appliances, electronic products, etc. While the editors of ***Recycling News*** can neither confirm nor deny these reports, we would like to request our customers' help to try and locate alternatives to disposing of these items in the landfill. If you or someone you know can direct us to a non-profit organization willing to accept these items or a remanufacturer that would be interested in securing this material, please contact our office in writing.

Some locations that may take old computers (via the internet)
CALMAX - http://www.ciwmb.ca.gov/calmax
Detwiler Foundation - http:/www.detwiler.org
Goodwill Industries of Orange County - http:/ocgoodwill.org/computer_donations.html

More Trash Friendly Websites

Solag Disposal, Inc. - www.solag.com
County of Orange - www.oc.ca.gov./iwmd/
Laguna Hills - www.ci.laguna-hills.ca.us

006007

Recycling News

April 1, 2000 Volume VIII, No. 2

EARTH DAY CELEBRATION

Come celebrate Earth Day with students and residents from the surrounding communities. On Saturday, April 22, 2000 from 8:00 a.m. to 12:00 p.m. your city together with SOLAG Disposal, Inc. will be hosting an Earth Day celebration and Children's Invention & Art Fair in the City of Laguna Niguel.

INVENTION & ART FAIR:

Bring the entire Family for a fun-filled morning including an Easter Egg Hunt (for children ages 1-12), members of the local fire department, Environmental Booths, Invention and Art Displays by local elementary students.

Hey Kids: before you throw that object in the trash, think about other things you can do with it?

Every day hundreds of items are thrown into the trash that could have served a better or more useful purpose. Your City is sponsoring an Invention and Art Fair to determine the best way to reuse old items. Can you invent something that is used around the house, in the garage or at school? How about designing an art project that can be shared with your friends and family? We want you to be creative, serious or silly. Your idea could be anything from a floor mat, a napkin holder or thousands of other inventive ideas. Most important, we want you to have fun! Each entry in the Invention and Art Fair will be judged based on innovation, creativity and usefulness. The top three winners from each category (Kindergarten - Second, Third - Fourth and Fifth - Sixth) will receive an award. All children participating in the Inventions & Art Show will receive recognition in the June 2000 Issue of *Recycling News*. Once your project is complete, call Dan Batty at (949) 240-0446 to reserve a spot at Earth Day 2000. To receive a free T-shirt, you must RSVP no later than April 10, 2000.

SPECIAL GIVE-A-WAY

To celebrate Earth Day, on Saturday, April 22 from 8:00 a.m. to 12:00 p.m. Tierra Verde Industries, a green waste recycling facility located in San Juan Capistrano has offered to donate compost for use in your yard. Bring a shovel and large container or bag to the site of the Earth Day Celebration in the City of Laguna Niguel located on Golden Lantern and Camino Los Padres to collect the free compost material.

TRASH FRIENDLY WEBSITES

Each quarter the editor of ***Recycling News*** will be reviewing website and e-mail addresses on the internet that may be of interest to our readers. The sites examine: ways to reduce waste, avenues to reuse unwanted materials (such as donations to non-profit organizations), types of recyclable material and instructions for backyard composting.

SOLAG Disposal - www.solag.com
www.choose2reuse.org - This website will give you valuable information and on-line resources to help in your efforts to re-use everyday items.
ecoboard.cc - Alternative material for decks, playground equipment, outdoor furniture.

Dana Point - www.ci.dana-point.ca.us
Laguna Niguel - www.ci.laguna-niguel.ca.us
San Juan Capistrano - www.sanjuancapistrano.org
San Clemente - www.cty.org/san-clemente/
County of Orange - www.oc.ca.gov/iwmd/
www.inkbank.com - Ink cartridges

Holiday Collection Schedule

We will not pick-up on these holidays:
New Years • Memorial Day • Independence Day • Labor Day • Thanksgiving Day • Christmas Day
However, trash collection will resume one day later.

EARTHY SAYS,

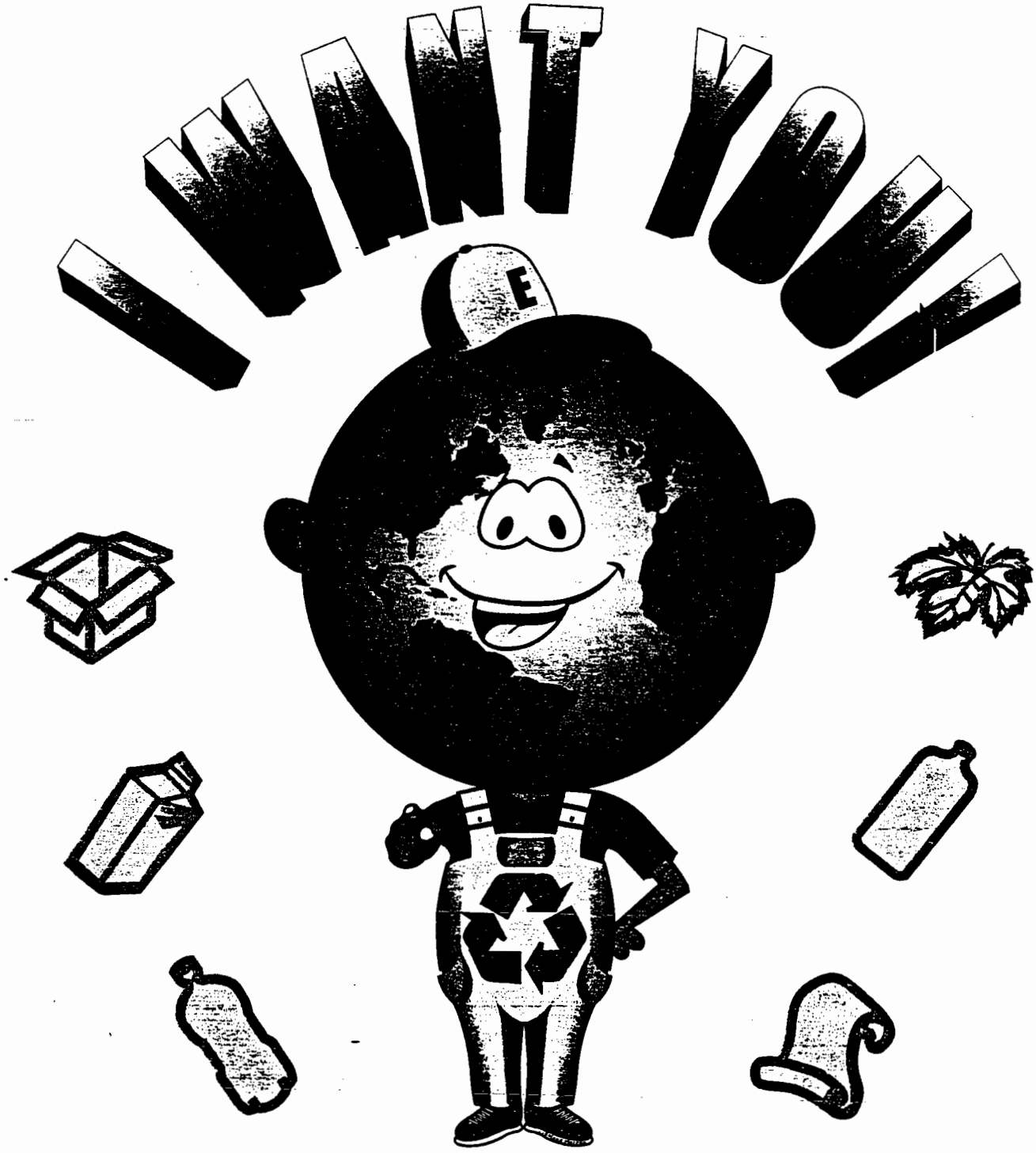

The beginning of the millennium is upon us and we need your help. In 1989 (eleven short years ago) all cities in the state of California were mandated to divert 50% of their waste stream away from the landfill by the end of the year 2000 (Public Resources Code 40000 et. seq,, ter known as AB939). Your city has one of the most progressive programs available in the state of California, however it is more important now than ever before to stop and look at what items are being placed in your trash or recycling containers.

Over the past several years the Editors of *Recycling News* have been discussing the 50% goal and the importance of reducing your waste, recycling and buying recycled products. Over the next year, your city will be re-evaluating the programs currently in place throughout your City and will review new ideas to help us achieve the state-mandated goals. If you have questions about recycling or waste reduction, there is a detailed brochure that we would be happy to send to you (in English or Spanish) that will help explain the types of material that can be recycled. Earthy says, "Keep up the good work!"

WHAT DOES SOLAG DO WITH THE GREEN WASTE?

Once green waste is collected by SOLAG Disposal, it is taken to a composting facility. At the facility the yard waste is shredded, mixed with a balance of other organic material and placed in rows for composting.

HOW DOES GREEN WASTE BECOME COMPOST?

Compost requires four basic elements:

1. Green waste such as grass clippings.
2. Brown waste such as leaves and wood chips,
3. Air.
4. Water.

In an effective compost pile, micro-organisms and earthworms help to decompose the organic materials, thus heating the compost and accelerating the process. If the compost pile is turned regularly, the organic materials can become compost in 4 to 6 weeks. If left untouched, the material will decompose in 6 to 8 months.

WHAT IF I WOULD LIKE COMPOST MATERIAL FOR HOME USE?

Compost is a vital addition to all soils. It adds nutrients to the soil for planting and makes good top soil for most plants. At this time, the smallest quantity sold at most compost facilities is one cubic yard.

SOLAG DISPOSAL, INC.
P.O. Box 1109
San Juan Capistrano, CA 92693

GREEN WASTE RECYCLING PROGRAM

arting: July

New, Voluntary Service
Added To Curbside Collection

GREEN WASTE RECYCLING PROGRAM

GREEN WASTE COLLECTION PROGRAM

In cooperation with the County of Orange, SOLAG Disposal, Inc. is offering a FREE, VOLUNTARY curbside green waste collection program.

For more information about the program, please contact SOLAG Disposal, Inc. at (949) 240-0446, Ext. 1.

WHY SHOULD WE PARTICIPATE?

Approximately 20% of Aliso Viejo's residential waste is green waste. By collecting this material separately to be composted and not landfilled, the residents are helping to meet the state-mandated waste reduction goal.

WHAT IS GREEN WASTE?

Green waste is almost all organic landscape waste materials. The most common types of green waste include:

- grass clippings
- wood scraps
- weeds
- branches (not to exceed 4' in length and 2" in diameter)
- plant materials
- garden trimmings
- leaves

WHAT IS NOT GREEN WASTE

The following items must be disposed of in the black container unless otherwise noted:

- animal waste
- diseased plants
- palm branches
- meat/fish or bones
- dairy products
- dirt/sod*
- construction materials

* Dirt, sod and construction materials cannot be disposed of in the automated program. Please call our office for details on disposal alternatives.

IS THERE A COST FOR THIS PROGRAM?

No. The County and SOLAG Disposal reached an agreement that would allow for this program at no additional charge to the resident.

HOW DOES THE PROGRAM WORK?

Residents are asked to put their green waste at the curb on their regular trash collection day. The green waste may be bagged, bundled, or placed in a container. Residential subscribers may place no more than 6 bags, bundles or containers of green waste generated from their homes at the curb for collection.

BAGS - The weight of any green waste item should not surpass the physical strength of the bag and not exceed 40 lbs.

BUNDLES - Trimmings and branches may be tied together in bundles with string only, not exceeding 2' x 4' and not to exceed 40 lbs.

CONTAINERS - Any standard trash container, up to 32-gallons and weighing less than 40 lbs. Only six (6) may be placed at the curb for weekly green waste collection.

WHAT ABOUT MY CHRISTMAS TREE?

Trees may be placed curbside, once the ornaments, garland, stakes and stands are removed. Collection of trees will take place on each of your normal collection days for the two weeks following New Years.

IS THIS PROGRAM AVAILABLE TO ALL RESIDENTS?

SOLAG Disposal has surveyed the Aliso Viejo residentia community and is initiating this program in th neighborhoods that generate large amounts of gree waste. The program will be monitored frequently t determine how the service area will be expanded o changed.

DO I HAVE TO PARTICIPATE IN THIS PROGRAM?

No. This is a voluntary program. Some residents like t recycle as much as possible and will place a containe curbside each week. For those residents whose yard require less maintenance, they may find that this progran is beneficial only when they do their major trimming.

WHEN DO I PUT MY GREEN WASTE OUT FOR COLLECTION?

The collection of your green waste is the same day as your regular trash day. The green waste will be collected manually using a separate truck in addition to the recycling and refuse collection vehicles.

WHERE SHOULD I PLACE THE GREEN WASTE?

The bundled/bagged/containerized green waste should b placed curbside before 7:00 a.m. to ensure collection Remember to place the material at least 1' away from th recycling and trash containers.

Find out more about SOLAG DISPOSAL, INC. by visiting our website at www.solag.com

REPRESENTATIVE PUBLIC EDUCATION MATERIALS

CITY OF ANAHEIM

ANAHEIM

VOLUME 10 AN ANNUAL RECYCLING NEWSLETTER FOR CITY OF ANAHEIM RESIDENTS WINTER 1999

Residents Approach 2000 with Recycling Success

Residents of Anaheim approach the new Millennium with recycling success. In 1999, your efforts helped the City of Anaheim recycle over 46,743,888 pounds of recyclable material.

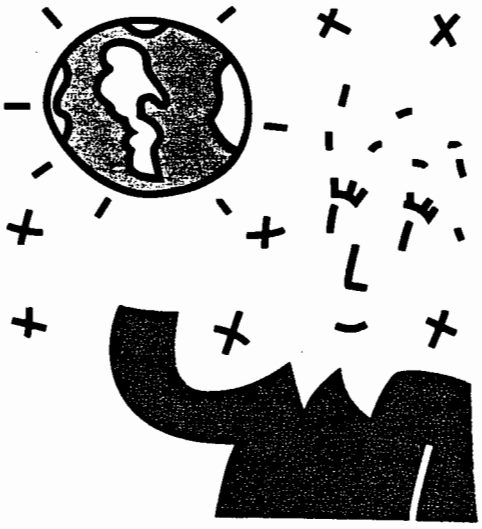

As we draw near the turn of the century, we meet recycling challenges set by the state of California with great success. In 1989, Assembly Bill 939 mandated each city to reduce their amount of waste by 50 percent by the year 2000. By participating in ***Recycle Anaheim***, the city is poised to smoothly meet the state's challenge. But we should not stop there. With or without state mandated laws, the Earth's resources are still precious and landfill space is still limited. What can we do in addition to recycling to make our community healthier? We can take the next step in preserving our environment: we can focus on reuse.

Reuse vs. Recycle

There are subtle but important differences between reuse and recycle. Recycling means taking a product, such as a aluminum can, deconstructing it, and using the materials to remanufacture something new. Although this is greatly preferred over starting from scratch, it is clear that if you don't have to spend the time, energy, or resources deconstructing and remanufacturing a product, you are saving resources.

Reuse is the process of taking idle goods and materials and reemploying them in a manner that does not require altering their original form. Reuse can also mean just reusing something over and over again. Popular examples of reusable goods include cloth shopping bags; plastic insulated coffee mugs and eraser boards.

The Benefits of Reuse

The benefits of reuse are as plentiful as the diversity of reuse options. By reusing items instead of disposing of them, we are saving landfill space. But equally important, there is no need to spend energy or raw materials to manufacture new items. Reuse not only saves resources, but also puts materials into the hands of those in need like schools, community organizations, and businesses. Reuse allows us to save money and contribute to our community. ✹

Recycling ... it works because of you!

combat the increasing amount of green waste, the County of Orange is sponsoring a new *Landscape Performance Certification Program.* The program is available to all businesses, public agencies, parks, schools and homeowner associations. "We will help every landscaper and property manager develop more efficient landscape practices and in turn, help reduce green waste for site owners," says Tom Ash, project coordinator and horticultural consultant. Getting started in the program is easy. Call Tom Ash at CTSI Corporation, (714) 669-4303 or send an e-mail to toma@ctsicorp.com.

Q & A

Q. What should I do if one of my containers gets damaged?

A. If your container is damaged, contact our Customer Service Department at 238-2444. Damaged containers will be repaired or replaced at no charge, unless the damage is due to negligence or abuse.

Q. If I have service questions, whom do I call?

A. For questions regarding your service, call our Customer Service Department at 238-2444. We are open Monday - Friday from 7:00 a.m. - 5:30 p.m., and Saturday, for phone calls only, from 7:00 a.m. to 3:00 p.m.

Q. How do I dispose of household hazardous waste?

A. The County of Orange operates a FREE household hazardous waste collection center at 1071 N. Blue Gum Street in Anaheim. Call the H.H.W. hotline for days and hours - (714) 834-6752.

Q. I have a hard time maneuvering my trash containers, can I get a smaller one(s)?

A. If it is difficult for you to maneuver your containers as a result of a physical disability or if you are a senior citizen, you may call our Customer Service Department at 238-2444 to arrange for assistance.

Used Oil Recycling Making a Difference One Drop at a Time

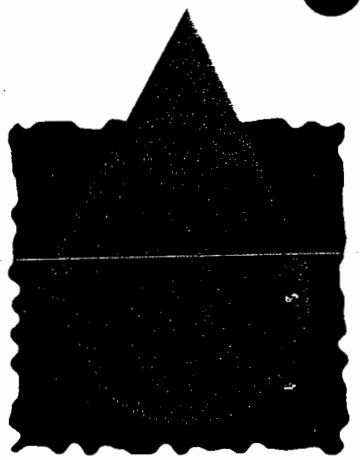

The improper disposal of used oil poses a threat to both the public and the environment. That's why it's illegal to throw used oil in the trash. Used oil can hurt our environment, family members, trash handlers and landfill workers. If used oil is poured into household drains or dumped into storm drains, it can upset operations at wastewater treatment plants and cause damage to local waterways and beaches. Recycling is the only safe and legal way to handle used motor oil.

Through funding from the California Integrated Waste Management Board, the Anaheim Fire Department has made recycling used motor oil and oil filters easy and convenient. Residents can have their used oil picked up from their doorsteps or take it to a local collection center FREE of charge! For a collection center near you call 1-800-CLEAN-UP, or for information on Anaheim's FREE residential services, call (714) 765-4154. ✹

Experience the Environment at the Oak Canyon Nature Center

Don't throw away that egg carton or that paper cup...it can be art! Learn many different ways to use recyclable trash to create beautiful art projects at the Oak Canyon Nature Center.

The Oak Canyon Nature Center is a 58-acre natural park nestled in Anaheim Hills. It consists of three adjoining canyons, a year-round stream and four miles of hiking trails. Individuals and families are invited to see, hear and touch the natural environment. The center offers a wide variety of programs for all age groups throughout the year. The center is also home to a variety of seasonal events such as the annual Environmental Faire hosted by the City of Anaheim.

Bring the family to visit the Oak Canyon Nature Center! And while you're there, take a look at the three picnic benches located at the entrance. They are made out of recycled plastic and were donated by ***Recycle Anaheim.***

For location, park hours and program or event schedules, call (714) 998-8380. ✹

Anti-litter Campaign Puts Kids to Draw

Recycle Anaheim co-sponsored an anti-litter campaign in the Jeffrey-Lynne neighborhood with the Anaheim Police Department's D.A.R.E. program. Elementary school children were asked to illustrate through drawings how they were helping to keep their neighborhood litter free.

The D.A.R.E. program was started in 1982 to help children learn ways to resist drugs. It has since expanded to teach gang and violence resistance, how to handle stress and peer pressure how to find alternatives to drugs and violence and conflict resolution as well as build self esteem.

The program is taught in 43 elementary schools citywide and includes visits to junior and senior high schools. More than 5,000 students are reached each year. Teachers and students can send D.A.R.E. questions to DARE@anaheim.net. ✹

Jeffrey-Lynne Neighborhood Center's Ida Duran, Officer Jim Farley, Sgt. Kirt Robertson and Recycle Anaheim's Marcia Myers with anti-litter contest winners. The prizes - boom boxes, sports radios and a T.V. set were all made possible by generous donations from the following sponsors: Nobest, Inc., R.J. Noble Co., Shield Security, Inc., Anaheim Disposal and Zumar Industries.

Incidents of Scavenging on the Decrease

The city's Anti-Scavenging Enforcement Program continues to address complaints from citizens regarding individuals removing recyclables from the green recycle container. As a result, scavenging incidents have decreased.

The city asks for your continued assistance in reporting scavengers by calling the Code Enforcement Division at (714) 765-5158. You can also discourage scavenging by placing your green container out by 7:00 a.m. instead of the night before. ✹

CHOOSE TO REUSE

AT HOME:

- Compost or grasscycle
- Rent or borrow machines, tools and sports equipment
- Repair broken appliances instead of replacing
- Use your local library

AT WORK:

- Use both sides of paper
- Reuse envelopes and folders
- Donate used magazines, journals and publications
- Sell or donate old furniture
- Bring your lunch in a reusable container

IN THE COMMUNITY:

- Shop at thrift stores
- Support local yard sales
- Coordinate a community rummage sale

Service Costs

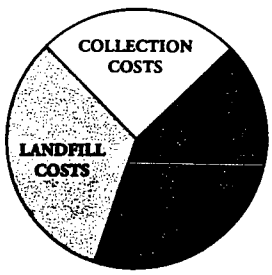

HOLIDAY COLLECTION

Your regular pickup day for trash and recycling during the holidays will not change unless your collection day falls on one of only six holidays.

CHRISTMAS DAY: Saturday, December 25, 1999. Trash collection services will not be affected.

NEW YEAR'S DAY: Saturday, January 1, 2000. Trash collection services will not be affected.

MEMORIAL DAY: If your collection day falls on Monday, May 29, your trash will be collected on Tuesday, May 30. If your collection day falls on any other day than Monday, your service will not be affected.

INDEPENDENCE DAY: If your collection day falls on Tuesday, July 4, your trash will be collected on Wednesday, July 5. If your collection day falls on any other day than Tuesday, your service will not be affected.

LABOR DAY: If your collection day falls on Monday, September 4, your trash will be collected on Tuesday, September 5. If your collection day falls on any other day than Monday, your service will not be affected.

THANKSGIVING DAY: If your collection day falls on Thursday, November 23, your trash will be collected on Friday, November 24. If your collection day falls on Friday, November 24, your trash will be collected on Saturday. If your collection day falls on any other day than Thursday or Friday your service will not be affected.

Recycle Your Christmas Tree

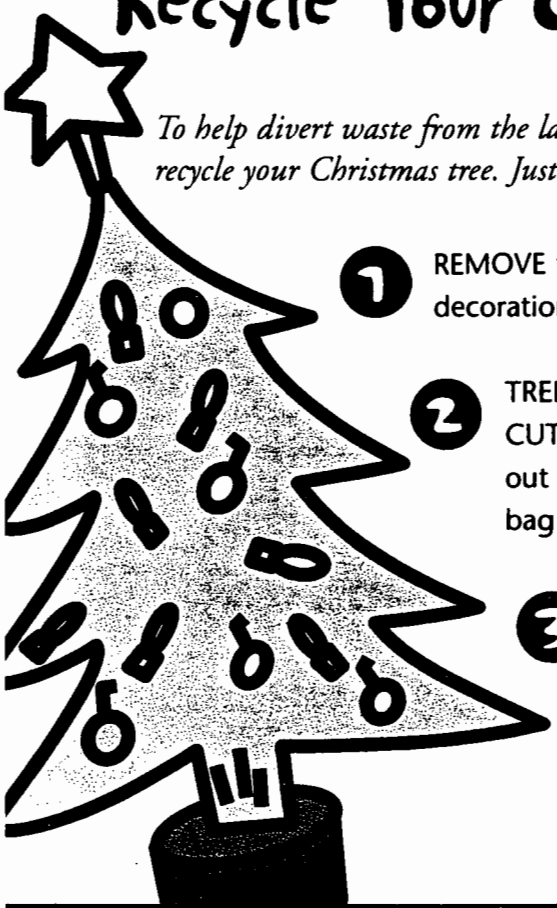

To help divert waste from the landfill, the city asks you to recycle your Christmas tree. Just follow these three simple steps:

1. REMOVE the TREE STAND (wood or metal), decorations and tinsel from your tree.
2. TREES OVER SIX FEET TALL must be CUT IN HALF before they are placed out for collection. Also, please do not bag your tree.
3. ON YOUR COLLECTION DAY only, starting DECEMBER 27 until JANUARY 7, place your tree at curbside with your containers. Trees will be picked up separately by a special collection truck.

006015

Waste Wise Holiday Greetings

Did you know that 2.65 billion Christmas cards sold each year in the U.S. could fill a football field 10 stories high? If we each sent one card less, we'd save 50,000 cubic yards of paper. Here are some good ideas to reduce the amount of waste from holiday cards.

- Send electronic greetings to family and friends who are on-line.
- Save yourself some time, money and hard feelings between friends – and reduce mail volume by updating and paring down your holiday mailing list.
- Be creative. Instead of buying placemats or table decorations, make your own. Cut old cards into shapes and press between two pieces of clear contact paper.
- Make gift tags from last years holiday cards, or use them as name tags for arranged seating at formal dinners.

WHAT WHERE?

Save this list of accepted recyclables (green can) and non-recyclables (black can) as a guide for separating your trash.

Non-recyclable...

- Animal waste
- Bathroom waste
- Carbon paper
- Carpet
- Car parts
- Cat litter
- Cigarette butts
- Dirt/cement/rock (do not fill more than 1/3 of container)
- Disposable diapers
- Drinking glasses
- Electronics
- Flooring
- Food waste
- Freezer/refrigerator food boxes
- Furniture
- Glass and ceramic plates/cups
- Liquid waste
- Light bulbs
- Mirrors
- Needles (sealed in thick plastic container)
- Old clothes/shoes
- Plastic toys
- Rags/sponges
- Tires
- Toothpaste tubes/pumps
- Soiled paper plates
- Waxed paper
- Window glass
- Yard waste (can be composted)

Recyclable...

- Aerosol cans (completely empty)
- Aluminum cans (do not crush)
- Aluminum foil
- Beverage cans
- Bottle caps
- Brochures
- Cardboard
- Cereal boxes (remove inner lining)
- Computer paper
- Drink boxes
- Egg cartons (cardboard and foam)
- Foam cups/plates (unsoiled)
- Food cans
- Frozen food boxes (no wax coating)
- Glass bottles/jars
- Juice cartons
- Junk mail/coupons
- Laundry bottles
- Ledger paper
- Magazines
- Metal coat hangers
- Milk type cartons
- Newspapers
- Paint cans (only empty, dry cans with lids off)
- Paper/paper tubes
- Phone books
- Pizza boxes
- Plastics (#1- 6)
- Plastic bottles (small mouthed)
- Plastic containers
- Plastic cups/plates
- Plastic utensils
- Plastic milk jugs
- Tin cans
- Used envelopes (includes plastic windows)
- Wrapping paper

Questions or comments? Call the Customer Service Department at (714) 238-2444

CVT Public Recycling Center

Located at the corner of Blue Gum & La Palma

TOP PRICES PAID.

Open Mon. - Fri., 7 a.m. to 5 p.m.,
Sat. 8 a.m. to 5 p.m. and
Sun. 11 a.m. to 4 p.m.
No hazardous materials accepted.

(714) 238-3301

1071 N. Blue Gum St., Anaheim, CA 92[illegible]

Household Hazardous Waste

(Dispose of properly at an Orange County Collection Center)

HOTLINE
(714) 834-6752

- Oil / latex paint and paint products
- Automotive products (batteries, motor oil, antifreeze, etc.)
- Auto / furniture polish
- Household cleaners
- Wood preservatives
- Pesticides and herbicides
- Hobby and pool supplies
- Empty compressed gas cylinders
- Unused road flares
- Smoke detectors
- Household batteries
- Fluorescent light ballasts

THE TOP 10 REASONS TO SAVE THE EARTH

It's the only one there is.

Clean water is good for life.

We are not alone here.

It stinks to live with garbage.

Earth Care means the world to us.

© 1999 Great Events Publishing
1-888-43-EVENT

THE TOP 10 REASONS TO SAVE THE EARTH

Pollution will take your breath away.

Your children will need a place to live.

Plants don't grow well in acid rain.

Global warming would put much of the world under water.

Mother Nature smells much sweeter than toxic waste.

RECYCLE ANAHEIM

TRAILS4ALL
& Trail Users Bringing it Together

Finally!... an organization that brings together all trail user groups – hikers, runners, equestrians and mountain cyclists to establish and maintain trails in Orange County and improve the environment.

All it takes is people who care!

For information on membership, upcoming events, or to answer any questions, please call us at (714) 834-3136.

❑ *Yes!*

I want to make a commitment to help TRAILS4ALL keep our parks open, maintain our trials and clean up the environment. Enclosed is my tax-deductible donation...

Individual Memberships

- ❑ Active ..... $ 16
- ❑ Family ..... $ 26
- ❑ Supporter ..... $ 50
- ❑ Trail Builder ..... $ 100
- ❑ Benefactor ..... $ 250
- ❑ Other ..... $____

Club / Organization:

- ❑ Basic ..... $ 50
- ❑ Supporting ..... $ 100

Merchant/Retailer:

- ❑ Basic ..... $ 100
- ❑ Supporting ..... $ 250

❑ ***I am interested in volunteering to help Trails4All!***

- ❑ Trail Projects
- ❑ Clean-Ups
- ❑ Other
- ❑ Fundraising
- ❑ In Kind Services

Name: _____

Address: _____

City/Zip: _____

Organization: _____

Phone: _____

Work: _____

Fax: _____

E-Mail: _____

Please mail with check to:

Trails4All
P.O. Box 4048 • Santa Ana, CA 92702-4048

All Donations are Tax Deductible!

Trails4All is a qualified charitable organization under IRC 501(c)(3). All donations are deductible as provided by law.

Fed ID# 33-0719807

TRAILS4ALL

"Sharing the Responsibility"

300 North Flower
Box 4048
Santa Ana, CA 92702-4048

(714) 834-3136
fax (714) 834-7657
E-Mail: info@trails4all.org
Web Site: www.trails4all.org

TRAILS4ALL
An Organization for Everyone

Trails4All has helped organize hundreds of trail projects, helped clean up our creeks and watersheds, provided vital funds for new trail construction, and sponsored trail construction seminars. From urban trails to remote locations in the Cleveland National Forest, Trails4All has coordinated thousands of volunteers who have donated tens of thousands of hours of time to keep our trails open.

TRAILS4ALL
At the Forefront

Trails4All is at the forefront in helping repair trails, improving the environment and encouraging a spirit of cooperation among all trail users throughout Orange County.

Trails4All has undertaken ambitious projects to improve our environment and keep trails open.

- Cleaned Up Trabuco Canyon, removing more than 118,OOO pounds of trash, recyclables and debris with the help of over 400 volunteers.
- Organizes and Hosts the Annual "(Non)-Coastal and Watershed Cleanup Day" held at 6 Regional and Wilderness Park locations resulting in the removal of tons of trash and recyclables from our creeks and streams.
- Helped reopen County Parks closed as a result of winter storm damage (including recent "El Nino" storms). Trails4All was instrumental in getting the volunteers out to repair the damage and get you back onto the trails.

TRAILS4ALL
Filling the Gap

Each year, our parks see more visitors and our trails get more use. Yet since 1992, the budget for the Orange County Park System has been reduced by over $50 Million, and is diminishing at $10 Million annually. In response, Trails4All is expanding its efforts to reach more locations, more parks and more trails. If you are using trails in Orange County, chances are, you are directly benefiting from Trails4All's efforts. Your help is vital to these efforts. Think about what it would be like if you couldn't use your favorite trail because no one maintained it. Whether you hike, trail run, mountain bike or ride horseback, Trails4All's efforts directly benefit you by keeping our trails open and our parks clean.

TRAILS4ALL
A Chance for You to Give Something Back

Your support of Trails4All has a direct benefit for our trails and parks. In 1998, over 87% of Trails4All's resources go directly to providing services to improve our trails and parks. Less than 13% was used for fundraising and administrative expenses. Yet, Trails4All can only survive if you support its mission. Your membership is the most effective way to keep Trails4All working for you. In addition to knowing that you are helping our parks, as a member you will be kept informed about upcoming trail projects and events. Please return your tax-deductible contribution with the attached application. Thank you in advance for *"sharing the responsibility!"*

Printing Compliments of

LADERA RANCH

Anaheim, CA 92806

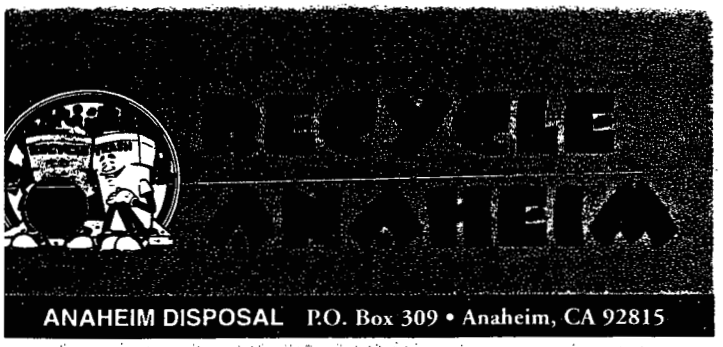

ANAHEIM DISPOSAL P.O. Box 309 • Anaheim, CA 92815

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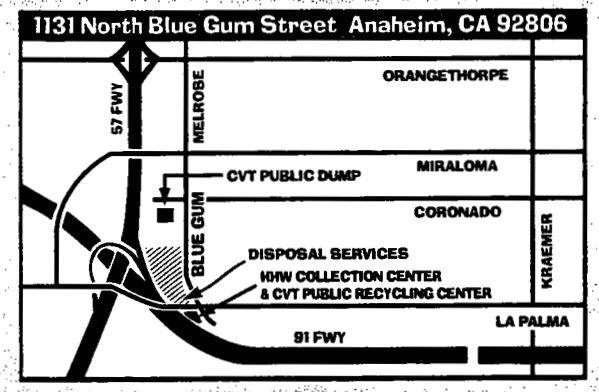

Para recibir informacion sobre el reciclamiento en español favor de llamar al numero (714) 238-3300.

Printed on recycled paper with soy-based inks.

HERE'S YOUR ANNUAL UPDATE & 2000 RECYCLE CALENDAR

Anti-litter Campaign Puts Kids to Draw

CHOOSE TO REUSE

WHAT WHERE?

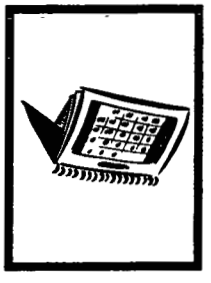

HOLIDAY COLLECTION

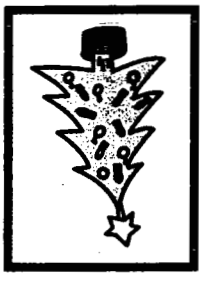

Recycle Your Christmas Tree

006021

ANAHEIM WEB PAGE

Department of Public Works
Street and Sanitation Division

400 E. Vermont Avenue
Anaheim, CA 92805
(714) 765-6860

Storm Drain and Sewer Maintenance
Swimming Pool and Spa Area

Water containing chlorine is harmful to aquatic life. Whenever possible, drain pool and spa water into the sewer system. There are established guidelines on the amount of residual chlorine, acceptable ph range, coloration, filter media and acid cleaning wastes when draining into the storm drain system, and some areas may require a permit. Check with your city or call the county at (714) 567-6363 for a copy of the guidelines.

*O.C. Household Hazardous Waste Information (714) 834-6752 or www.oc.ca.gov/IWMD

Main	Street and Sidewalk Maintenance	Storm Drain and Sewer	Street Sweeping and Parking Control/Citations	Solid Waste and Disposal	Useful Links

ANAHEIM WEB PAGE

Department of Public Works
Street and Sanitation Division

400 E. Vermont Avenue
Anaheim, CA 92805
(714) 765-6860

Storm Drain and Sewer Maintenance

Sandbag Information

Storm Water & Urban Runoff Pollution

Swimming Pool and Spa Area

It is our goal to maintain the City's network of 503 miles of sanitary sewer lines and 67 miles of storm drain lines in a clean and safe condition. To achieve this, the City's storm and sewer lines, pump stations, drain easements and other related facilities are cleaned and inspected for good operating and environmental condition. For more information, call (714) 765-6935 or e-mail us at CALLAN@anaheim.net.<>

Transfer interrupted!

Main	Street and Sidewalk Maintenance	Storm Drain and Sewer	Street Sweeping and Parking Control/Citations	Solid Waste and Disposal	Useful Links

ANAHEIM WEB PAGE

Department of Public Works
Street and Sanitation Division

400 E. Vermont Avenue
Anaheim, CA 92805
(714) 765-6860

Storm Drain and Sewer Maintenance

Sandbag Information

During inclement weather, the Streets & Sanitation Division will provide sandbags to residents for their use. The City provides a maximum of 10 bags for each single-family dwelling and 25 for multi-family or commercial complexes. They are available at two locations:

Streets and Sanitation Yard
400 E. Vermont Avenue
Monday - Thursday and every other Friday, 7 AM - 5 PM
Hours may be extended during severe weather conditions.
Call (714) 765-6860 for more information.

Anaheim City Hall
Engineering Public Counter, Second Floor
200 S. Anaheim Blvd.
Monday - Friday, 8 AM - 5 PM
(714) 765-5176

Proof of Anaheim residency or business ownership must be provided when picking up sandbags. Please note that only the bags are provided; fill materials are the responsibility of the recipient. If sand is not available, substitute dirt from your planters. Sandbags can also be purchased from major hardware stores and home centers.

Sandbags may be available at the Orange County Public Facilities and Resources yard at 10852 Douglass Road (714) 567-6300.

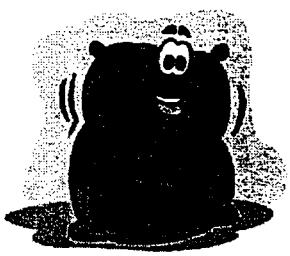

Sandbagging Information:

Fill the bag about ½ full. Use soil from your planter areas. Then after the storms, the soil can be returned to the planter and you will not have excess soil to discard.

Sandbags will rot in the sun. Placing them out too early in the storm season may cause more problems if the bags are rotting. Check the bags for rips or weak spots/seams.

Keep plastic sheeting available in case of an emergency.

Clean out your drains, roof gutters, down spouts, and any other water path that may be impeded. Check these frequently as debris will collect after each rain.

Main	Street and Sidewalk Maintenance	Storm Drain and Sewer	Street Sweeping and Parking Control/Citations	Solid Waste and Disposal	Useful Links

Home

ANAHEIM WEB PAGE

Department of Public Works
Street and Sanitation Division

400 E. Vermont Avenue
Anaheim, CA 92805
(714) 765-6860

SOLID WASTE COLLECTION & DISPOSAL

Orange County Storm Water & Urban Runoff Prevention Program

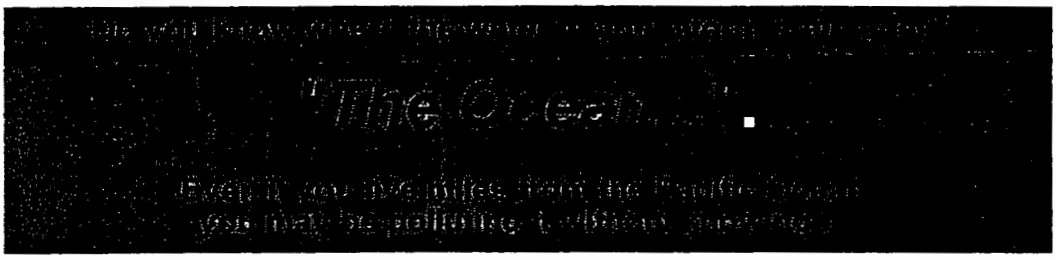

STORM WATER & URBAN RUNOFF POLLUTION (SWURP) AND WHAT YOU CAN DO TO STOP IT

- Before you pour anything into the gutter or down the drain, stop and think! Storm Drains go directly into channels and creeks...and through wetlands and bays to the ocean.

- **DID YOU KNOW...**Anything we use in our home, car and business like motor oil, paint, pesticides, fertilizers and cleaners can wind up in the street.

- A little water from rain or a garden hose can carry automotive and household materials through the storm drain causing the pollution of bays, wetlands and the ocean. Storm drains are there to drain water off the street-not for disposal of hazardous materials.

- **WHERE DOES IT GO?**These pollutants flow together on a journey from the storm drain to the flood control channel where it can eventually empty into the ocean. This type of pollution is called Storm Water & Urban Runoff (SWURP) and is a serious threat to the beaches and ocean of Southern California.

- **WHAT IS STORM WATER & URBAN RUNOFF POLLUTION (SWURP)?** Storm water runoff refers to seasonal rainfall flows. It is very noticeable during a heavy rain storm when large volumes of water drain off paved areas. Urban runoff can happen anytime of the year when excessive water use from irrigation, car washing and other sources carries litter, lawn clippings and other urban pollutants into storm drains. Even an automobile leaking motor oil 20 miles inland can still pollute the ocean.

HOW IS IT DIFFERENT FROM OTHER FORMS OF WATER POLLUTION? SWURP can include anything that washes into the storm drain from the community. Unlike water pollution linked to factories or sewage treatment plants, SWURP can come from city streets, neighborhoods, farms, construction sites and parking lots.

STORM WATER & URBAN RUNOFF POLLUTION COMES FROM: Automotive leaks and spills. Disposal of used oil and other engine fluids down the storm drain. Metals in vehicle exhaust, paint, rust, metal plating and tires. Pesticides, herbicides and fertilizers from lawns, gardens and farms. Improper disposal of cleaners, paint and paint removers. Soil erosion and dust debris from landscape and construction activities. Litter, lawn clippings, animal waste and other organic matter. Oil stains on parking lots and paved surfaces.

STORM WATER & URBAN RUNOFF POLLUTION AND THE OCEAN SWURP may have a serious impact on water quality in Orange County. Pollutants from the storm drain system can harm marine life as well as coastal and wetland habitats. It can also

ANAHEIM WEB PAGE

degrade recreation areas such as beaches, harbors and bays.

THE OCEAN IS CLOSER THAN YOU THINK. THERE ARE WAYS TO REDUCE STORM WATER & URBAN RUNOFF POLLUTION (SWURP)

HOME MAINTENANCE

- Buy household products such as cleaners and furniture polish labeled "non toxic". Use small quantities and purchase only the amount you need.
- Properly use and store all toxic products, including cleaners, solvents and paints. Use up paint cleaners and other products or share leftovers with a neighbor.
- Take household hazardous materials and containers to a hazardous material collection center.
- Use kitty litter or other absorbent materials to clean spills. Depending on the substance, dispose absorbents in the trash can or at a hazardous materials collection center.
- Rinse water based paint brushes in the sink. Filter and reuse paint thinner or brush cleaners. Dispose of used thinner, oil and latex paint at a hazardous materials collection center.
- Recycle reusable materials. Throw litter into trash cans and keep cans tightly covered to prevent foraging by animals.
- Control erosion at construction and landscape sites to prevent dirt and debris from entering storm drains.

LAWN AND GARDEN

- Use pesticides, herbicides and fertilizers in accordance with label instructions. Do not apply before rain and dispose leftovers at a hazardous materials collection center.
- Use a broom rather than a hose to clean up garden clippings. Put leaves and clippings in a trash can or a compost pile.
- Divert rain spouts and garden hoses from paved surfaces onto grass to allow water to filter through the soil. Water only your lawn and garden. Caution! Do not use this suggested action in areas with steep slopes or landslide potential.
- Pick up animal waste and dispose in the trash can.

AUTOMOTIVE

- Take used motor oil and antifreeze to gas stations that accept recyclable automotive fluids, or to a hazardous materials collection center.
- Have your car maintained regularly to prevent oil, antifreeze and other fluid leaks.
- Reduce automotive emissions through routine auto maintenance, ride sharing and public transportation.
- Conserve water when washing your car and use biodegradable soap. Clean engines at a "Do It Yourself Car Wash" where the drainage is not connected to the storm drain.
- You can control SWURP by supporting city and county activities to keep your streets clean. You can help by participating in recycling, beach clean-ups, and the proper disposal of hazardous materials.
- Since many businesses and residents are unaware of the storm water & urban runoff problem, encourage neighbors and co-workers to be careful in not polluting the storm drain system.
- Together, you, your neighbors and city can make a difference in keeping the ocean and beaches clean for ourselves and wildlife. Contact the Storm Water Participant in your area to share ideas or ask questions on keeping storm drains clean.

DID YOU KNOW THAT DUMPING ONE QUART OF MOTOR OIL DOWN A STORM DRAIN CONTAMINATES 250,000 GALLONS OF WATER?

Storm Water Quality Management Programs have been developed by the Orange County Environmental Management Agency, local cities, and other agencies which participate in the National Pollutant Discharge Elimination System (NPDES). Their

ANAHEIM WEB PAGE

responsibilities involve encouraging the public to help protect water quality, monitoring runoff in the storm drain system, managing the NPDES permit process for municipalities, investigating illegal disposal and maintaining storm drains.

IMPORTANT PHONE NUMBERS AND LINKS
Orange County Hazardous Materials Hotline (714) 834-6752

Severe Emergencies Only 911

For information on service stations that accept used motor oil.
California Integrated Waste Management Board (800) 253-2687

For information on agricultural chemicals, pesticides and possible alternatives
O.C. Agriculture Commissioner (714) 447-7100

Information for industries regarding Hazardous Waste And Underground Storage Tank Requirements:
O.C. Health Care Agency / Environmental Health Division / Hazardous Materials Management Section (714) 667-3700 or www.oc.ca.gov/IWMD

For a list of other participants in the Orange County Storm Water Program, click here.

Main	Street and Sidewalk Maintenance	Storm Drain and Sewer	Street Sweeping and Parking Control/Citations	Solid Waste and Disposal	Useful Links

Do You Know Where The Water In Your Storm Drain Goes?

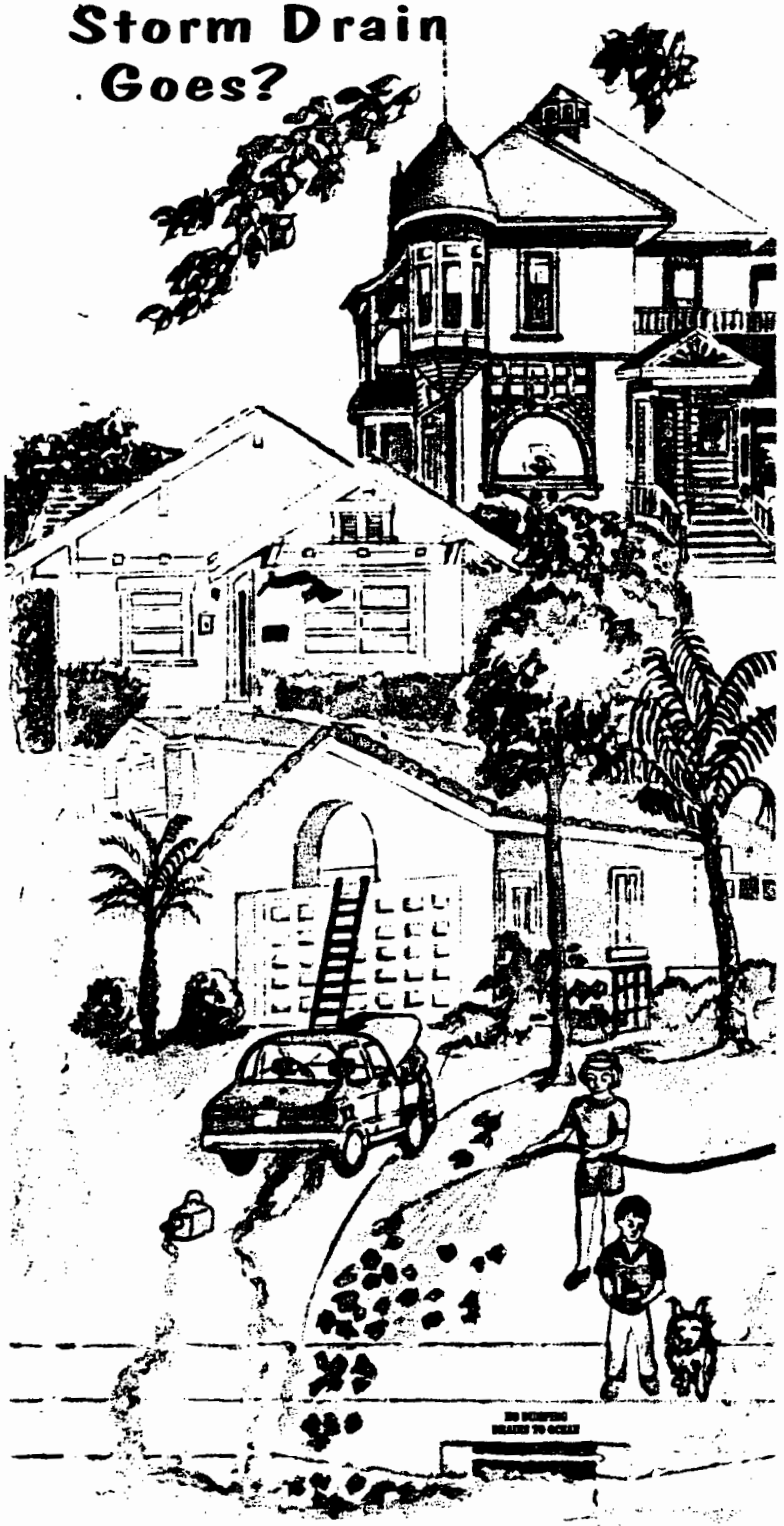

To The Ocean...

REPRESENTATIVE PUBLIC EDUCATION MATERIALS

CITY OF COSTA MESA

Costa Mesa
SUMMER 2000
Community Report

The Costa Mesa Community Report is the official newsletter of the City of Costa Mesa. It is intended to aid in informing residents of programs, services and activities available to them. Editorial guidelines have been adopted regulating contents to ensure that the newsletter remains accurate and unbiased.

Annual FREE Large Item Collection Program

Single and small multi-family dwellings using curbside trash collection (not dumpsters) may participate in the Annual Large Item Collection Program. The program runs for ten weeks, beginning the week of June 19 and ending August 25. Residents have the opportunity to dispose of items too large or bulky for their trash containers. Water heaters, washers, dryers, refrigerators, carpeting and furniture will be collected, recycled and/or disposed of, at no additional cost to the resident.

Watch for your **bright yellow door hanger!** A notice will be hung at the door of your residence two weeks in advance of the collection date for your neighborhood.

In addition, residents are entitled to a one-time call in during the year for a large item pick up. To schedule your one-time pick up, call (949) 646-4617.

Factlet: Last year approximately 918,000 pounds of large items were collected. Appliances accounted for 172,800 pounds or 19% of the total.

FREE
Large Item Collection Program "Multi-Family Residences"

Residents living in apartment, condominium, duplex, and other multi-family complexes that utilize dumpster trash service will be able to participate in a large-item pick-up program offered in June. The City is offering this program for a limited time free of charge to residents. Your waste hauler will collect large items such as water heaters, washers, dryers, refrigerators, and furniture.

Additional information is available on the City of Costa Mesa's cable channel 74, the City's web page, from your waste hauler, or by calling the City at (714) 754-5024.

Update: Downtown Recreation Facility

Construction is in progress on the new Downtown Recreation Facility located in Lions Park. The facility will house a new gymnasium, meeting rooms and a 25-meter swimming pool. Pictures of the finished facility are posted at the construction site and can be viewed on the City's web page. (www.cityofcostamesa.com)

Construction is expected to be complete by March 2001. The existing Downtown Community Center will remain open during the construction.

Attention First Time Homebuyers!

You may qualify for down payment assistance of up to $35,000 or 15% of the purchase price, whichever is less, for the purchase of a home in the City of Costa Mesa. You must meet the following program requirements:

1. You have not had ownership interest in residential real estate within the last three (3) years, unless you are a 'displaced home maker.' (Please contact Agency for additional information on displaced home maker.)
2. Your total gross household income is less than 120% of the Area Median Income for the County of Orange:

Household Size	*Maximum Income
1	$58,450
2	$66,800
3	$75,150
4	$83,500
5	$90,200
6	$96,900

3. You have enough funds in savings to contribute 5% of the purchase price as your portion of the down payment plus cover closing costs for the purchase of a home.
4. You plan on purchasing a home in the City of Costa Mesa not to exceed *$252,700 in price.

To request an application, please call the City's Housing hotline at (714) 754-4892 and leave your name, address and telephone number. Applications will be processed on a first-come/first-served basis and are subject to funding availability.

*Housing purchase price and income limit guidelines are subject to change.

Residential Pick-up of Used Oil

The City of Costa Mesa and the Costa Mesa Sanitary District offer a "free" service for the pick up of used motor oil and oil filters from city residents. The used motor oil will be recycled into replacement fuel and/or re-refined motor oil. The used oil filters will be recycled into new metal products. This program is funded by a grant from the California Integrated Waste Management Board.

Residents can call 1-800-576-0041 to schedule the home pick-up. If you prefer to take your used motor oil and filters to a certified collection center in Costa Mesa, call the Used Oil Recycling Hotline at (714) 754-4861 for locations.

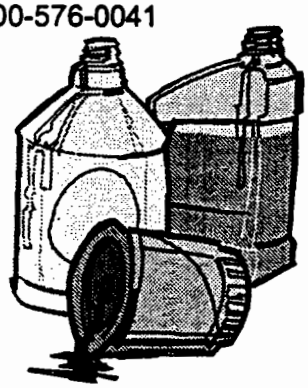

Telephone Book Recycling

New Pacific Bell yellow page directories are arriving between May 30 and June 7. Recycle your outdated books by dropping them off at one of our collection bins located in front of City Hall or at the Orange Coast College Recycling Center located on Adams between Harbor and Fairview. For more information, please call the Recycling Hotline (714) 754-5600

Factlet: In 1999, Costa Mesa residents recycled 23,500 telephone directories.

Recycling Hotline

Recorded information about current recycling programs in Costa Mesa is available 24 hours a day by calling (714) 754-5600. Recycling information is also available on the City's website: www.cityofcostamesa.com

Christmas Tree Recycling

Once again the City of Costa Mesa and the Costa Mesa Sanitary District will be providing the annual Christmas Tree Recycling Program. Residents are asked to remove the stands and all decorations from their trees and place them at the curb on their regular trash collection day.

Costa Mesa Disposal will be sending a special truck to pick up the trees from December 28 through January 8, 1999. The recycled trees are used for weed abatement and erosion control.

Residents and businesses who use a dumpster are advised to contact their own hauler (phone number is on you bin) and inquire about tree recycling at their location.

Factlet: *10,002 trees weighing 130 tons were collected and recycled in 1997.*

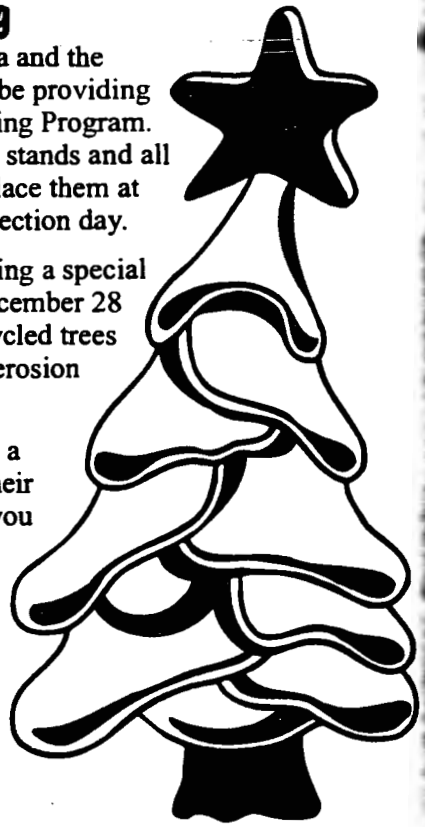

Recycling Made Easy!

Did you know that the trash collected each week from your household is sorted and separated for the recyclables? All of the recyclables and trash are delivered to a large plant in Stanton that uses mechanical and manual sorting techniques. The recyclables are separated, baled, and shipped to manufacturers throughout the world. About 35% of the trash arriving at the plant is able to be be recycled. The leftover debris is landfilled within Orange County. For more information, call (714) 754-5307.

Holiday Schedule For Trash Collection

The collection for Friday, December 25 and January 1, will be picked up on *Saturday!*

ABOP Collection Program for Household Hazardous Waste

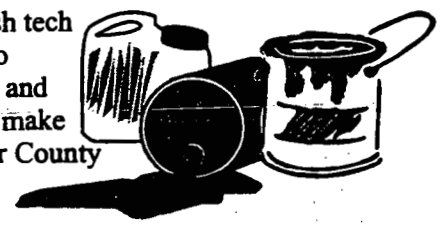

ABOP? That's trash tech For antifreeze, auto Batteries, used oil, and Latex paint! Can't make it to one of the four County hazardous waste collection centers (714) 834-6752, then let us pick it up at your house for you! The Costa Mesa Sanitary District is funding a one year program to collect recyclable household hazardous waste. To schedule a FREE pickup at your home, call 800-HHW-PKUP. *Residents who use dumpsters are not eligible for this program.*

Annual Large Item Collection Program

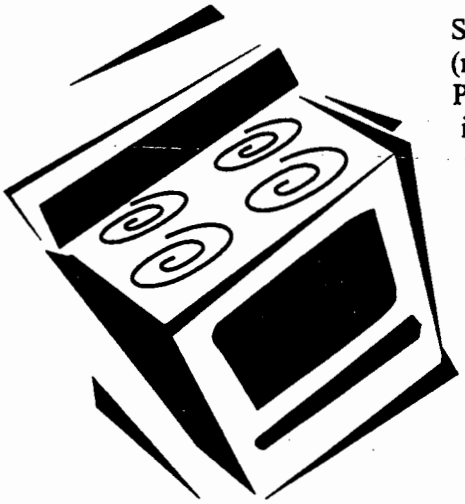

Single and small multi-family dwellings that use curbside trash collection (not dumpsters) may participate in the Annual Large Item Collection Program. The program runs for ten weeks, beginning late June and ending in August. Residents have the opportunity to dispose of items that are too large or bulky for their trash containers. Water heaters, washers, dryers, refrigerators, carpeting, and furniture will be collected, recycled and/or disposed, at no additional cost to the resident.

A notice will be hung on each resident's door two weeks in advance of the collection date for their neighborhood. Watch for your **bright yellow door hanger**! In addition, residents are entitled to a one-time call-in during the year for a large item pick up.

For additional information, call (949) 646-4617 or (714) 754-5307.

Factlet: Last year approximately 1.1 million pounds of large items were collected. Appliances accounted for 170,200 pounds or 16% of the total.

Telephone Book Recycling

New Pacific Bell yellow page directories are arriving! Recycle your outdated books by dropping them off at one of our collection bins located in front of City Hall or at the Orange Coast College Recycling Center located on Adams between Harbor and Fairview. For more information, please call the Recycling Hotline, (714) 754-5600.

Factlet: In 1998, Costa Mesa residents recycled 21,000 telephone directories.

Recycling Hotline

Recorded information about current recycling programs in Costa Mesa is available 24 hours a day by calling (714) 754-5600. Recycling information is also available on the City's website: www.cityofcostamesa.com.

Residential Pick-up of Used Oil

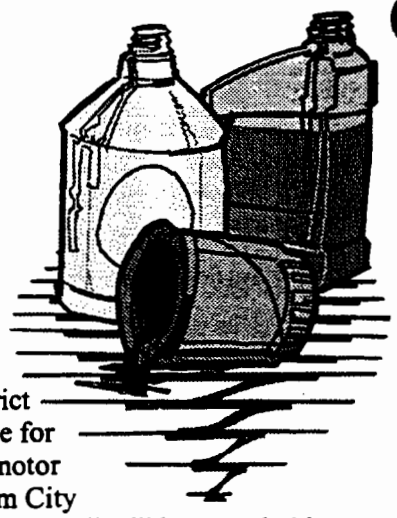

The City of Costa Mesa and the Costa Mesa Sanitary District offer a "free" service for the pick up of used motor oil and oil filters from City residents. The used motor oil will be recycled into replacement fuel and/or re-refined motor oil. The used oil filters will be recycled into new metal products. This program is being funded by a grant from the California Integrated Waste Management Board. Residents can call 1-800-576-0041 to schedule the home pick-up. If you prefer to take your used motor oil and filters to a certified collection center in Costa Mesa, call the City's Used Oil Recycling Hotline, (714) 754-4861 for locations.

Westside Specific Plan Update

The Westside Specific Plan is a long-range strategic plan to improve and enhance the southwest portion of the community. The study area is bounded on the north by Fairview Park, on the east by Harbor and Newport Boulevards, and on the west by the Santa Ana River. Major issues to be addressed by the plan include revitalization of the West 19th Street commercial district and resolution of land use conflicts within the southwest industrial area.

The plan has been developed over the past year with input from members of the community through a series of public workshops and neighborhood meetings. The draft plan will be completed in December 1999 and ready for public hearings in early 2000. Please call the Planning Division at (714) 754-5245 if you would like additional information or if you would like to be placed on the mailing list for the upcoming public hearings.

Holiday Tree Recycling

The City of Costa Mesa and the Costa Mesa Sanitary District will be providing the annual Holiday Tree Recycling Program. Residents are asked to remove the stands and all decorations from their trees and place them at the curb on their regular trash collection day. Costa Mesa Disposal will be sending a special truck to pick up the trees from December 27, 1999, through January 9, 2000. The recycled trees are used for weed abatement and erosion control.

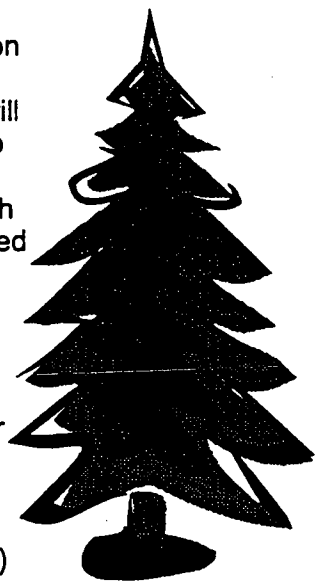

Residents and businesses who use a dumpster for their normal trash collection service are advised to contact their own hauler (phone number is on the bin) and inquire about tree recycling at their location.

Catch Basin Stenciling

In August, 1999, a two-man volunteer team from the Orange County Conservation Corp applied curb markers at each of the City's storm drain inlets. In an effort to preserve and protect the quality of our oceans and waterways, the inlets are being marked to discourage people from dumping and washing used motor oil and other contaminants down the storm drain inlet.

The curb markers are a 3-3/4 x 8 inch rectangle plastic tile with a clear protective urethane coating. The curb markers are permanently affixed to the concrete surface near the storm drain inlet. The curb markers are impact and theft resistant and will remain legible for up to ten years. The message on the curb marker reads "No Dumping, Drains to Ocean" in blue and green letters with a picture of a dolphin.

Used oil recycling grant funds from the California Integrated Waste Management Board were used to purchase and install the curb markers.

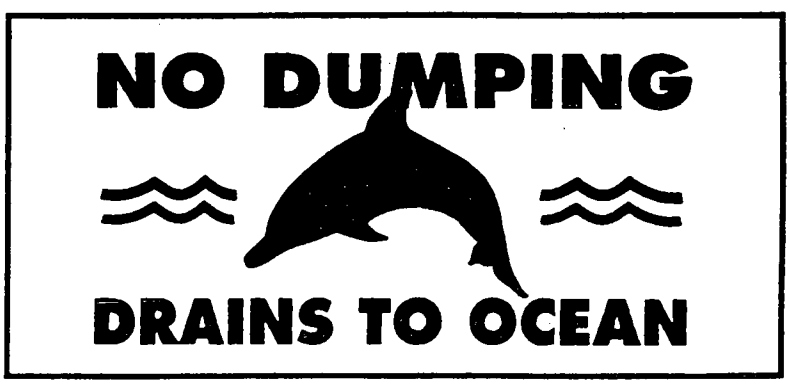

These curb markers have been installed throughout the City in an effort to discourage people from dumping and washing contaminants down the storm drain inlets, which drain to the ocean.

Scavenging is Illegal

Anyone going through your trash is a scavenger and is illegally stealing your recyclables. Scavenging is also a front for other crimes such as obtaining blank checks or discarded credit card receipts. Please report scavenging activity to the District at 714/754-5307.

Holiday Schedule For Trash Collection

Memorial Day, Monday, May 29

All week, trash collection will be one day late

Large Item Call-In

Our summertime Large Item Collection Program helps residents dispose of unwanted furniture and appliances. Watch for your bright yellow door hanger about two weeks before your neighborhood collection date between June and August.

In addition to the summer program, residents may call 949/646-4617 and arrange a FREE special large item pickup, one time during the calendar year.

Sharps Program

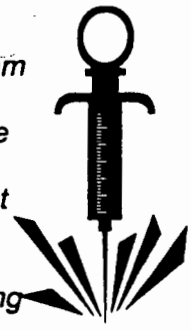

A FREE home generated sharps (syringes/needles) recycling program is available to Costa Mesa and Santa Ana Heights residents. Three local pharmacies, RiteAid at 3029 Harbor Blvd., Steven's Pharmacy at 1525 Mesa Verde Dr. East, and Ramsey Rexall at 2246 Newport Blvd. in Costa Mesa are participating in this unique program.

Residents who use needles at home are invited to visit the pharmacies and pick up a FREE quart-sized container. The containers hold approximately 100 used syringes. Residents may return filled containers to the pharmacies for collection, and will receive a new one in exchange. For more information, please call (714) 754-5307.

Watch Your Weight

Containers weighing more than 50 pounds can easily injure the waste collection workers. The District requires that the combined weight of the container and contents may not exceed 50 pounds. If in doubt, please separate the items into two containers or heavy-duty trash bags. Plastic and paper grocery bags are not acceptable containers. A maximum of 200 pounds per household can be collected each week.

Do You Have Any Of These Items At Your House?

Used oil, Batteries, Cleaning Products
Pesticides, Paint, Pool Chemicals
Propane Tanks, Road Flares
Fuels, Antifreeze, Paint Thinner
Polishes & Waxes

Most home, car and yard care products cannot be thrown into the trash. The Orange County Household Hazardous Waste Collection centers will accept your materials for FREE. Your nearest center is in Huntington Beach at 17121 Nichols Street, near Warner & Beach Blvd. For hours of operation and directions, call 714/394-6752.

Can't make it to the one of the four County hazardous waste collection centers, then let us pick it up at your house for you! To schedule a FREE pickup at your home, call 800-HHW-PKUP. This program is partially funded by the State of California, Integrated Waste Management Department.

Recycling Hotline

Recorded information about current recycling programs in Costa Mesa is available 24 hours a day by call (714) 754-5600. Recycling information is also available on the City's website www.cityofcostamesa.com

Honey, before you go shopping, please check the Stop & Swap for:

- ✔ Latex Paint
- ✔ Bug Spray
- ✔ Chlorine
- ✔ Cleaning products

Thanks!

COUNTY OF ORANGE

HOUSEHOLD HAZARDOUS WASTE PROGRAM

For free disposal of old paints, pesticides, and other household toxic products, call:

(714) 834-6752

County of Orange Stop and Swaps are funded by a Grant from the California Integrated Waste Management Board.

Printed on recycled paper.

Integrated Waste Management Department

Before you shop...

Stop!

Drop!

and

Swap!

Household Hazardous Waste Collection Program

TRANSPORTATION AND HANDLING

- A maximum of 15 gallons or 125 pounds may be transported per vehicle, per trip (Department of Transportation regulation).
- Materials should be in original containers (except motor oil, fuels and antifreeze).
- Containers larger than 5 gallons in size will not be accepted.
- All containers must have lids, be sturdy, non-leaking, and protected from breakage.
- Do not combine types of waste.
- Do not mix oil-base paint with latex paint.
- Dry out empty paint cans and discard in regular trash.
- If you wish to have a container returned (i.e. oil containers and boxes/crates used to transport materials), please notify the attendant in advance. Some containers may not be returnable.

WHY SHOP 'TIL YOU DROP?

VISIT THE STOP & SWAP!

A unique and FREE program that allows you to drop off household, yard, and car care products you no longer need and pick up others you can use.

Currently available at the Anaheim, Huntington Beach and Irvine locations only. (Tuesday through Saturday, 9 a.m. to 1 p.m.)

FOR MORE INFORMATION ABOUT THE HOUSEHOLD HAZARDOUS WASTE COLLECTION PROGRAM AND THE STOP & SWAP CALL:

(714) 834-6752

Or see our website: www.oc.ca.gov/iwmd

Orange County Recycles!

Printed on recycled paper.

Integrated Waste Management Department

006036

safe! easy! free!

DISPOSAL OF HOUSEHOLD HAZARDOUS WASTE

Household Hazardous Waste Collection Program

HOUSEHOLD HAZARDOUS WASTE

The County of Orange has four Household Hazardous Waste Collection Centers available FREE to Orange County citizens. (Proof of residency may be required.)

COLLECTION CENTER LOCATIONS

ANAHEIM REGIONAL COLLECTION CENTER

1071 N. BLUE GUM STREET
Located between the 91 & 57 Fwys
at the corner of La Palma Avenue
and Blue Gum Street in Anaheim
**Visit the Stop & Swap to obtain partially used household products at no charge.*

IRVINE REGIONAL COLLECTION CENTER

6411 OAK CANYON
Next to City of Irvine Corporate Yard.
From the (5) freeway take the Sand Canyon exit, go Southwest to Oak Canyon and turn right.
**Visit the Stop & Swap to obtain partially used household products at no charge.*

HUNTINGTON BEACH REGIONAL COLLECTION CENTER

17121 NICHOLS STREET
Next to Rainbow Recycling and Disposal.
Major cross streets are Beach Blvd.
and Warner Ave. in Huntington Beach.

SAN JUAN CAPISTRANO REGIONAL COLLECTION CENTER

PRIMA DESHECHA LANDFILL
From the (5) freeway take Ortega Hwy. (74),
east to La Pata Avenue, turn right and
follow road to Landfill entrance.

COLLECTION CENTER HOURS OF OPERATION:

Tuesday through Saturday
9:00 a.m. to 1:00 p.m.

Collection Centers are Closed:

Rainy Days; Christmas, Independence, New Years and Thanksgiving Days.

Hazardous waste is not accepted from businesses, schools, government agencies, churches, non-profit organizations.

Printed on recycled paper

Attention All Residents of Costa Mesa and Sanitary District Customers!

FREE Home Pick-Up Program For Used Oil and Other Household Hazardous Waste!

How Does It Work?

1.) Resident Calls the HHW Hotline (800)-HHW-PKUP to Request a Collection: When a Resident calls our Household Hazardous Waste (HHW) Hotline at 1-800-449-7587 we ask for the caller's address, age and the type and amount of material available for collection.

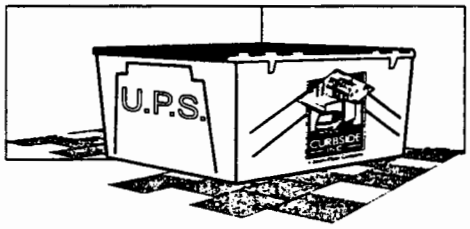

2.) A Collection Date is Scheduled by Phone, and an HHW Kit is Shipped via UPS to the Home: A pickup date is scheduled over the phone based on the next available collection day. The program is fully explained and safety procedures reviewed. An HHW Kit is sent via UPS to the resident's home prior to the collection date. The kit can hold up to 75 pounds of the most hazardous chemicals.

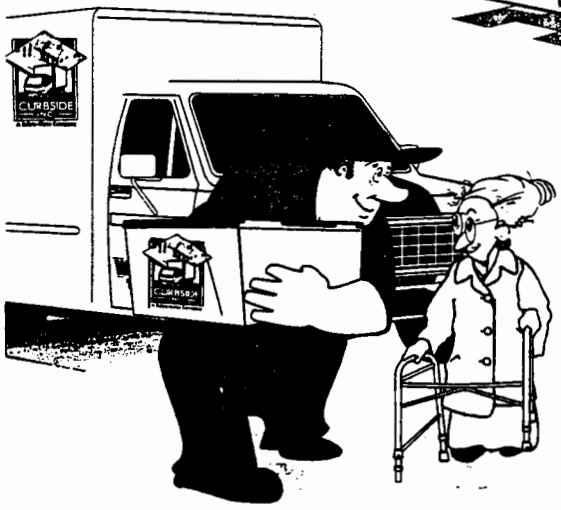

3.) The HHW Material is Collected: On the scheduled date, our team will collect the eligible HHW directly from the resident's home. The program satisfaction survey card (included in the kit) should now be completed by the participant and mailed directly to the City to help track the program.

4.) HHW is Transported to the Appropriate Facility for Recycling or Disposal: Used oil will be transported by Safety-Kleen to its refinery in East Chicago, Indiana. There the oil will be refined into new lubricants. Other materials will be sorted and lab packed for recycling or proper disposal. Paint will be recycled into more usable paint. More than 90% of all materials collected Safety-Kleen/Curbside are recycled.

Don't Forget to Recycle Your Used Oil and Filters! Help to ensure clean land and water for the future. One gallon of oil pollutes one-million gallons of water. Also, a drained oil filter still retains up to 44% of its original capacity. That's 9 oz. of oil!

This program is made possible, in part, by a grant from the California Integrated Waste Management Board.

Don't dump used motor oil in the trash, down the storm drain, or on the ground . . .

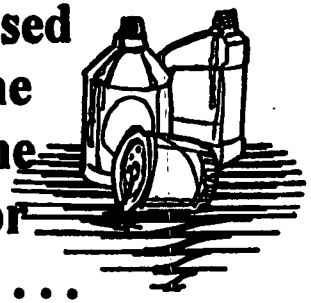

Recycle your used motor oil at any of the Certified Collection Centers listed on the back of this brochure.

If you need more information regarding the City of Costa Mesa Used Oil Recycling Program, call the City's Used Oil Hotline:

714-754-4861

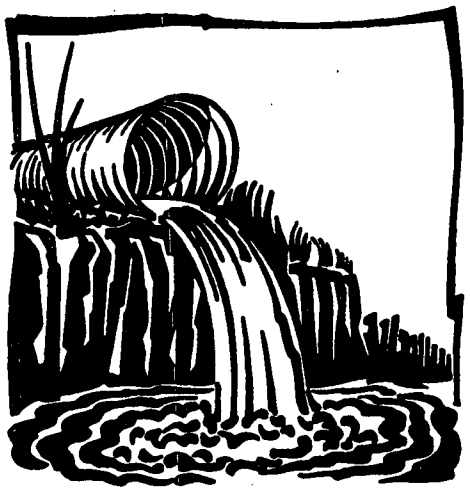

Certified Collection Centers in the City of Costa Mesa:

Big O Tires
3181 Harbor Blvd.
(714) 549-4022
Hrs: M-F, 8 a.m.to 6 p.m.
Sat., 8 a.m. to 5 p.m
Sun., 9 a.m. to 4 p.m

Econo Lube N' Tune
1550 Newport Blvd.
(714) 631-9146
Hrs: M-Sat., 7:30 a.m. to 5 p.m.

Haus of Performance
3017 Enterprise St.
(714) 545-2755
Hrs: M-F, 8a.m. to 6 p.m.

Jiffy Lube
2255 Fairview Rd.
(714) 557-5823
Hrs: M-Sat., 8 a.m. to 6 p.m.
Sun., 9 a.m. to 5 p.m.

Parnelli Jones
1739 Superior Ave.
(714) 631-7712
Hrs: M-F,
7:30 a.m. to 6:30 p.m.
Sat., 7:30 a.m. to 5 p.m.

Purrfect Auto Service
2049 Harbor Blvd.
(714) 722-2424
Hrs: M-Sat., 8 a.m. to 6 p.m.

Texaco Xpress Lube
300 E. 17th Street
(714) 548-2505
Hrs: M-Sat., 8 a.m. to 6 p.m.
Sun., 9 a.m. to 5 p.m.

Kragen Auto Parts
1739 Superior Avenue
(714) 642-3384
Hrs: M-F, 8 a.m. to 9 p.m.
Sat., 8 a.m. to 8 p.m
Sun., 9 a.m. to 7 p.m.

Coast General Tire
2855 Harbor Blvd.
(714) 540-5710
Hrs: M-F, 8 a.m. to 5:30 p.m.
Sat., 8a.m. to 4 p.m

Fedco Tire Center
1450 Baker
(714) 438-6783
Hrs: M-F, 7 a.m. to 9 p.m
Sat., 8 a.m to 6 p.m.
Sun., 9 a.m. to 6 p.m.

Jiffy Lube
375 Bristol St.
(714) 650-5823
Hrs: M-Sat., 8 a.m. to 6 p.m.
Sun., 9 a.m. to 5 p.m.

Kymco Motorsport
2121 Harbor Blvd.
(714) 642-1835
Hrs: M-Sat., 8 a.m. to 6 p.m.
Sun., 9 a.m. to 5 p.m.

Plaza Chevron
3048 Bristol St.
(714) 545-4257
Hrs: M-F, 7 a.m. to 5:30 p.m.
Sat., 7 a.m. to 4 p.m.

Superior Texaco
1695 Superior Ave.
(714) 645-3793
Hrs: M-F, 8 a.m. to 5 p.m.

Tire Station
475 E. 17th Street
(714) 646-2444
Hrs: M-F, 8 a.m. to 6 p.m.
Sat., 8 a.m. to 5 p.m.

Kragen Auto Parts
1175 Baker Blvd. Unit E
(714) 662-2005
Hrs: M-F, 8 a.m. to 9 p.m.
Sat., 8 a.m. to 8 p.m.
Sun., 9 a.m. to 7 p.m.

Recycle Used Motor Oil at NO CHARGE & Receive a $0.16 per Gallon REBATE!

City of Costa Mesa Used Oil Recycling Guide

Oil

Presented by
City of Costa Mesa Public Services Department

Paid for by a grant from the California Integrated Waste Management Board

Biggest Water Polluter? Used Motor Oil

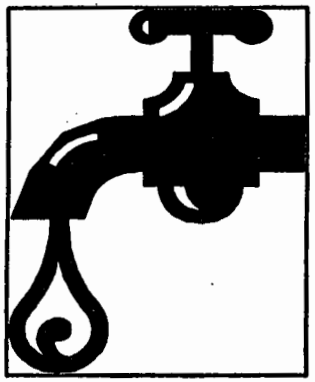

Thousands of Costa Mesa's residents are changing their own used motor oil; but according to the Environmental Protection Agency, only 10% of all "Do-It-Yourselfers" (DIYers) properly dispose of this hazardous waste. Every year, more than 200 million gallons of used motor oil are being dumped into our environment by DIYers. That's more than 20 Exxon Valdez oil spills!

Illegally disposed DIY oil is the largest pollutant to our oceans and underground drinking water resources. One gallon of motor oil can contaminate one million gallons of water! Fortunately, this problem has a solution.

The State of California passed a Used Oil Recycling Enhancement Act to promote convenient recycling. The City of Costa Mesa is participating in this program and is pleased to announce the opening of sixteen (16) Certified Collection Centers (CCC's) where City residents can take their used motor oil for recycling AT NO COST. In fact, CCC's will pay you a $0.16 per gallon rebate for your used motor oil!

How to Recycle Used Motor Oil

1. Drain your car's motor oil before working on other parts of the engine. This will help prevent contamination of the oil.
2. Place used oil in clean, empty plastic containers with tight lids.
3. Do not place oil in metal containers or containers that once held paint, bleach, antifreeze or gasoline. The residues can contaminate the oil. **Do not mix any other substances with the oil.**
4. During regular business hours, take uncontaminated used oil to one of the Certified Collection Centers listed on the back of this brochure. Contaminated oil will not be accepted.
5. You may bring oil in containers no larger than 5 gallons. Call the Certified Collection Cent[illegible] confirm hours and amounts accepted.

Recycle Used Motor Oil

Because the Earth ca[illegible]'t!

June 2000 Volume 6.1

Fire Prevention News

How to Reach Us

327.7400	Rebekah Tapie
327.7401	Bill Halley
327.7402	Michelle Rudaitis
327.7403	Dave Hollister
327.7404	Tom Macduff
327.7405	Teri Durnall
327.7406	Lisa Yarnell
327.7407	Planning Desk
327.7408	FAX

SPARKY THE FIRE DOG'S CYBERSURFARI

NFPA's Sparky the Fire Dog web site (www.sparky.org) will be among the featured destinations on this year's CyberSurfari, a free Internet treasure hunt sponsored by Lycos. CyberSurfari lets kids safely explore more than 100 educational web sites, solve clues, and win prizes. By exploring the exciting and safe destinations featured on this year's CyberSurfari, players will improve their deductive reasoning, Web savvy, and reading skills. Whatever your child's age, or surfing skill level, there is a division of play suitable for them. To prepare for an expedition, visit www.cybersurfari.org.

DID YOU KNOW...

THE HOUSEHOLD BATH IS THE MOST COMMON SITE FOR DROWNING IN THE FIRST YEAR OF LIFE?

POOL SAFETY

Each year hundreds of children needlessly succumb to drowning in swimming pools. Drowning is the leading cause of death and permanent brain damage among children ages one to five years old. The following considerations should be followed to help prevent an accidental drowning.

- Remove toys from around pool decking and on water surface. Brightly colored pool accessories add to the attraction children already have for pools.
- Surround pool with a fence at least five feet high with a self-closing, self-latching gate. Do not consider the house as part of the fence.
- Pool covers provide a false sense of security. Children can still drown, even with a pool cover. Follow the manufacturer's directions. Make sure the cover fits well and read any consumer product surveys before purchasing.
- Never leave a child unattended. Remember, it only takes seconds to drown.
- Know CPR if something does occur and activate 911 immediately.
- Teach children the danger of pools and how to swim as early as possible.

Remember, children can drown in as little as a gallon of water. Wading pools, buckets, and toilets are all potential dangers.

Follow these simple rules to prevent accidents at home, when vacationing, or leaving your child in someone else's care.

CELEBRATE Safety!

SUMMER SAFETY ISSUE

1. POOL SAFETY
2. Spotlight on Safety -- Who's EDITH?
3. DANGEROUS ASSUMPTIONS
4. SWURP - The ocean is closer than you think
5. SPARKLERS – What Parents Should Know

spotlight on safety

HOME ESCAPE PLANNING ON THE RISE

In 1997, the NFPA commissioned a national survey, which showed that only 16% of Americans had developed a "practiced" home fire escape plan. Earlier this year, another survey was conducted that showed a significant increase in the number of people who have participated in this life-saving activity. Use the following safety information to educate your family members and PRACTICE IT!

FIRE SAFETY For Your Family

Who's EDITH?

EDITH stands for EXIT DRILLS IN THE HOME, a standard approach to formulating escape plans recommended by NFPA, the National Fire Protection Association.

Every family should DRAW A FLOOR PLAN of their home, marking two ways out (including windows) of every room.

DISCUSS THE ESCAPE ROUTES with every member of the household.

PICK A MEETING PLACE outside the home where everyone can meet, so you can count heads and tell the Fire Department if anyone is trapped inside.

The most important element of any escape plan is to PRACTICE IT.

DANGEROUS ASSUMPTIONS

When the NFPA asked Americans, "How long do you have to escape from a fire in your home?", 58% said two minutes or more—and that includes 24% who estimated they have more than ten minutes to escape a home fire.

The truth is, you may have much less time to escape. A typical living-room fire can threaten the entire house in just a few minutes—producing life-threatening conditions in upstairs bedrooms less than two minutes after the smoke alarm sounds.

Storm Water & Urban Runoff Pollution (SWURP)

Even though you might live miles from the Pacific Ocean, you may be polluting it without knowing it.

Anything we use in our home, car and business like motor oil, paint, pesticides, fertilizers and cleaners can wind up in the street.

A little water from rain or a garden hose can carry automotive and household materials through the storm drain polluting bays, wetlands and the ocean. Storm drains are there to drain water off the street, not for disposal of hazardous materials.

Before you pour anything into the gutter or down the drain, stop and think! These pollutants flow together on a journey from the storm drain to the flood control channel where it can eventually empty into the ocean. This type of pollution is called Storm Water & Urban Runoff Pollution (SWURP). It is a serious threat to the beaches and ocean of Southern California. The July issue of *Fire Prevention News* will include ways to reduce SWURP.

Sparklers

what every parent should know...

- Wood or metal core sparklers are illegal in California.
- Sparklers are the most frequent cause of injuries to children under age 10.
- Sparklers burn at temperatures as high as 1,800 degrees and can cause severe burns to children.
- Sparklers can also easily and quickly ignite children's clothing.
- Fireworks purchased in Mexico are illegal and can be even more deadly because manufacturing codes are non-existent.

SUMMER CERT CLASSES

Call Teri Dumall in the Fire Prevention Bureau at 714.327.7405 to schedule an upcoming class.

- June 17
- July 15
- August 19

THINK

THE SAFE WAY IS THE BEST WAY

Newsletter designed by Rebekah C. Tapie

July 2000 Volume 7.1

Fire Prevention News

Fire Prevention Numbers

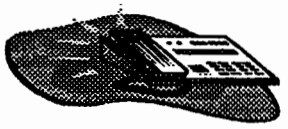

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COSTA MESA EMERGENCY SERVICES EXPO

A GREAT SUCCESS

IT'S GOOD FOR THE CITY! AN ESTIMATED 5,000 PEOPLE ATTENDED THE MAY 21, 2000, EMERGENCY SERVICES EXPO AT FIRE STATION #4 THIS YEAR.

A BIG THANK YOU TO EMCEE BATTALION CHIEF JAMES ELLIS, CAPTAINS SCOTT BROUSSARD AND KIRK DOMINIC, AS WELL AS NUMEROUS OTHER INDIVIDUALS WHO PLANNED AND PREPARED FOR THIS EVENT. EVERYONE INVOLVED IN THIS YEAR'S EXPO DONATED COUNTLESS HOURS TO ENSURE THOSE WHO ATTENDED LEFT WITH A BETTER UNDERSTANDING OF EMERGENCY SERVICES PROVIDED BY THE CITY.

BESIDES INFORMATION AND EDUCATIONAL BOOTHS, THE FOLLOWING DEMONSTRATIONS WERE PROVIDED:

- AUTO EXTRICATION
- CSFA VINTAGE FIRE ENGINE, FOR PHOTOS AND NOSTALGIA BENEFITS
- FIRE DEPARTMENT HIGH-RISE RAPPELLING
- ISIS, SEARCH CANINE, PERFORMING "STOP, DROP, & ROLL"
- MAKESHIFT BUILDING USED FOR A "LIVE FIRE"
- POLICE CANINE APPREHENDING A PERPETRATOR
- MCDONNELL DOUGLAS FOAM DISPENSING UNIT
- MINIATURE TRAIN RIDES AND FIRE APPARATUS RIDES
- O. C. FIRE AUTHORITY EXTINGUISHMENT OF JET FUEL BY FOAM BLANKET

ORANGE COUNTY FAIR JULY 19-30, 2000

"Hot...Hot...Hot" We're spicing it up! is the theme for the millennium Orange County fair! Costa Mesa Fire Prevention Officers will be staffing the Fire Prevention Spanish Village booth on July 19th.

Make sure you stop by to say hello, play a Water Watchers game, find out "What's Hot, What's Not", and pick up a free safety electrical plug. We hope to see you all there!

Saluting Peppers

Features This Month

1 EMERGENCY SERVICES EXPO SUCCESS
2 ORANGE COUNTY FAIR – FIRE PREVENTION BOOTH
3 Halogen Floor Lamps
4 SWURP – Ways to Reduce SWURP
5 Costa Mesa Retail and Construction

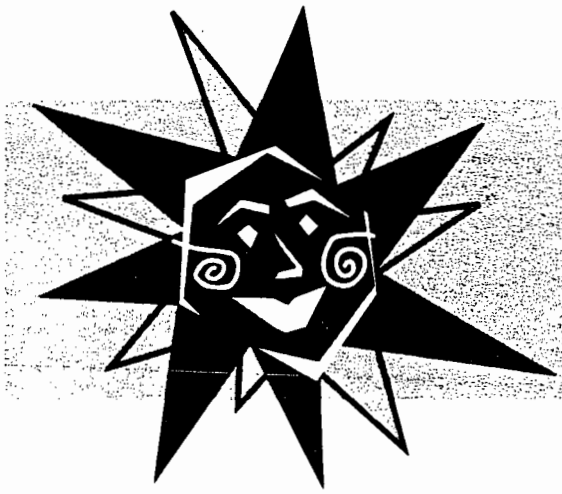

CONVIERTA SU BASURA EN ABONO

ASI RECICLA LA NATURALEZA

CALIFORNIA INTEGRATED WASTE MANAGEMENT BOARD

¿QUE ES CONVERTIR BASURA EN ABONO (COMPOSTAJE) Y POR QUE HAY QUE HACERLO?

La manera como recicla la naturaleza, es decir, el compostaje, es la desintegración controlada de materias orgánicas tales como hojas, ramas, recortes de pasto y residuos de alimentos vegetales. El producto que resulta de esta descomposición se llama "compost" o abono orgánico.

El compostaje reduce la acumulación de grandes cantidades de materias orgánicas en nuestros basureros municipales y las convierte en un producto útil. Las materias orgánicas representan más de la mitad de la bosura municipal de California. Por lo tanto, el compostaje en casa reduce los costos tanto del transporte de la basura como de la operación de los basureros municipales.

El abono o "compost" es excelente para los jardines y los prados. Además, usted ahorra dinero al no tener que comprar acondicionadores de suelo, paja y fertilizante.

EL COMPOSTAJE ES FACIL

El compostaje puede efectuarse en el patio de la casa en un recipiente fabricado para este propósito, o simplemente amontonando los desechos orgánicos (algunas ciudades requieren recipientes cerrados). Los negocios, las escuelas y otras instituciones también pueden transformar fácilmente los desechos en abono. Comuníquese con el gobierno del condado o de la ciudad para obtener información acerca de clases gratuitas sobre compostaje y de cómo adquirir recipientes gratis o a precio de descuento.

Los recipientes caseros se pueden construir con pedazos de madera, malla para gallineros, e incluso en recipientes viejos para basura (con agujeros perforados en los lados y en el fondo).

Los recipientes fabricados incluyen unidades de rotación, conos y unidades verticales formadas por varios recipientes; estos recipientes se pueden comprar en tiendas o a través del correo. Dedique suficiente tiempo a considerar sus opciones y luego seleccione el recipiente que mejor se ajuste a sus necesidades.

Para obtener una descripción sobre cómo construir su propio recipiente, o una lista de vendedores de recipientes pre-fabricados para compostaje casero, llame a California Integrated Waste Management Board al 1-800-553-2962.

METODO DE COMPOSTAJE

Se requieren cuatro ingredientes básicos en la elaboración de abono; nitrógeno, carbono, agua y aire. El método más sencillo consiste en:

- mezclar en capas, partes aproximadamente iguales de materiales verdes (ricos en nitrógeno) y materiales de color café o secos (ricos en carbono), formando una pila al aire libre o colocando los materiales en una estructura cerrada;
- agregar agua;
- revolver para que entre el aire; y
- permitir que los microorganismos e insectos desintegren los materiales con el transcurso del tiempo.

NITROGENO

Los materiales verdes tales como recortes de césped y desechos del jardín son fuentes ideales de nitrógeno (una vez que se secan se convierten en fuentes de carbono). Las cáscaras y trozos de fruta o verduras también pueden proporcionar nitrógeno. Para reducir la posibilidad de plagas o malos olores, es mejor evitar los residuos de carnes o productos lácteos y enterrar hasta el fondo de la pila otros residuos de alimentas.

CARBONO

El césped seco y los recortes de jardinería tales como hojas secas, ramas o heno pueden proporcionar el balance necesario de carbono a una pila de abono. Corte o desmenuce las piezas grandes a un tamaño de 12" o más pequeñas (las ramas gruesas con bastante madera, deben cortarse en pedazos pequeños, molerse o no usarse).

Las astillas de madera sin tratar y el aserrín son una fuente útil de carbono; pueden ser usados si la pila contiene demasiado nitrógeno.

AGUA

Su pila de abono debe tener la misma humedad que una "esponja exprimida". El contenido de humedad debe ser de 40 a 60 por ciento. Para verificar que existe la humedad adecuada, introduzca la mano en la pila de abono, tome un puñado de material y oprímalo; si escurren unas cuantas gotas de agua, probablemente contiene suficiente humedad, si no, agregue agua.

Al agregar agua es mejor introducir la manguera de manera que no se humedezca únicamente la parte de arribo de la pila. También puede humedecer la pila cuando la esté revolviendo. En clima seco, tal vez tenga que añadir agua con regularidad, además, quizás también sea necesario cubrir la pila. Una pila de abono debidamente construida elimina el exceso de agua.

INTEGRATED WASTE MANAGEMENT BOARD

ANTIFREEZE

What is Antifreeze?

Antifreeze, made up of mainly water and ethylene glycol, is added to radiator water in motor vehicles. Ethylene glycol lowers the freezing point and raises the boiling point of radiator fluid. In other words, it keeps the water from freezing on very cold days and boiling over on hot days.

Auto maintenance experts recommend that radiators should be flushed every 1-2 years. This presents a question of what to do with the radiator fluid. Care must be taken to store new antifreeze safely and also to dispose of used antifreeze properly.

What are the Hazards?

Antifreeze contains ethylene glycol, a hazardous chemical. Because ethylene glycol is a clear, colorless, and sweet-tasting liquid, it is very attractive to pets and small children. If swallowed, ethylene glycol may cause depression, followed by respiratory and cardiac failure, renal and brain damage.

According to the U.S. Consumer Product Safety Commission, between 1986 and 1988 more than 3,000 injuries related to antifreeze occurred.

Other hazardous chemicals found in used antifreeze could include a variety of elements such as gasoline, copper, zinc, and lead. These materials become trapped in and contaminate antifreeze over time in an operating vehicle.

Antifreeze, carelessly disposed of, such as poured into a storm drain or ditch, into a river or stream, onto the ground, or into the regular trash, presents a health threat to humans, animals and the environment. The hazardous chemicals may seep into the ground and contaminate the groundwater.

In addition, antifreeze should be stored properly to avoid accidents to children and pets attracted by its sweet smell and taste.

Can Antifreeze Be Recycled?

Used antifreeze can be recycled for use by the mining industry, which sprays it on coal to keep it from sticking together and the glycol industry, which uses it as an airplane de-icing solution. It is also used in cement grinding and brake fluid.

Call nearby radiator shops to find out if they collect used antifreeze for recycling or accept it for proper disposal.

Antifreeze should be stored properly to reduce accidents to children and pets

How do I Dispose of Antifreeze?

Follow these proper disposal and storage methods:

Store antifreeze in its original container away from children and pets. Children may mistake the antifreeze for beverages.

If the antifreeze is new, give it away to a friend or neighbor who could use it.

Take your used antifreeze to a household hazardous waste collection facility or save it for a collection event.

Call your local health department or the California Integrated Waste Management Board's Recycling Hotline at 1-800-553-2962 to find the location of a household hazardous waste collection program in your community.

8800 Cal Center Drive
Sacramento, CA 95826

For more information contact
The California Integrated Waste Management Board
At 916.255.2296

INTEGRATED WASTE MANAGEMENT BOARD

AEROSOLS

What are Aerosols?

Aerosol cans contain propellants and active ingredients such as pesticides or paint. Propellants are gases under normal conditions, but when they are placed under pressure (as in aerosol containers), they liquify and occupy far less space. When the nozzle is pressed, pressure is released and the propellant quickly returns to its gaseous state, spraying into the air and carrying the product with it.

What are the Hazards?

Aerosol products include: Oven cleaners, tile cleaners, pesticides, disinfectants, hair sprays, room deodorizers, paints, and furniture polishes.

Hazards associated with aerosols vary greatly. For example, pesticides include toxic materials, while some oven cleaners contain corrosive chemicals. Since aerosol-propelled particles are very small, they are easily absorbed into the lungs and bloodstream. Many of the propellants used with these products, such as butane or propane, are flammable and may be explosive.

A variety of aerosol products still contain chlorofluorocarbons, which are harmful to the ozone layer (present approximately 70,000 feet above the earth's surface). The ozone layer provides a protective shield against harmful radiation.

How Do I Avoid Accidents?

The following safety rules should be observed when using aerosol products:

Never puncture or subject an aerosol can to sharp impact; a sudden puncture may cause an explosion.

Never leave or place an aerosol can near a high heat source such as a heater, direct sunlight, or fire. Heat causes the propellants to expand which may cause an explosion. Also, many propellants are flammable.

Never place an aerosol can in a trash compactor; the increased pressure may cause an explosion.

Never throw a full or partially-full aerosol can into the regular trash. Refuse collectors may be injured by exploding cans and/or be sprayed with hazardous chemicals.

Buy non-aerosol, pump-type sprays or powders

How Do I Dispose of Aerosols?

The following procedures should be observed when disposing of aerosols:

Use the product completely or give it away to a friend or neighbor who may be able to use it.

If the product cannot be given away for reuse or if the nozzle is broken, take it to a household hazardous waste collection facility or store it safely, away from heat, until a community collection day is held.

Empty aerosol cans (no product emits when nozzle is depressed) may be thrown away with the regular trash.

Buy non-aerosol, pump-type sprays or powders.

Call your local health department or the California Integrated Waste Management Board's Recycling Hotline at 1-800-553-2962 to find the location of a household hazardous waste collection program in your area.

8800 CAL CENTER DRIVE
SACRAMENTO, CA 95826

FOR MORE INFORMATION CONTACT
THE CALIFORNIA INTEGRATED WASTE MANAGEMENT BOARD
AT 916.255.2296

How Big Is the Problem?

What are the Hazards?

Severe lead poisoning include coma, convulsions

Costa Mesa Sanitary District

NEWS

Winter 1999

P.O. Box 1200 • Costa Mesa • CA • 92628-1200

Congratulations!

50% of Your Trash is Being Recycled!

Our recycling program has accomplished its goal! Recycle 50% of your trash by the year 2000. How did it happen? In two easy steps!! Step one, take your containers to the curb. Step two, you're done. That's it! We sort and separate the recyclables from your trash, so you don't have to! Since we recycle for you, there is no need to sort your waste before placing it at the curb for collection.

All of the recyclables and trash are delivered to a large recycling plant that uses mechanical and hand sorting techniques. We recycle efficiently and can also easily adapt to changes in the science of recycling. Our recycler is currently diverting 50% of the total waste stream, all with no effort from residents.

COLOR ME

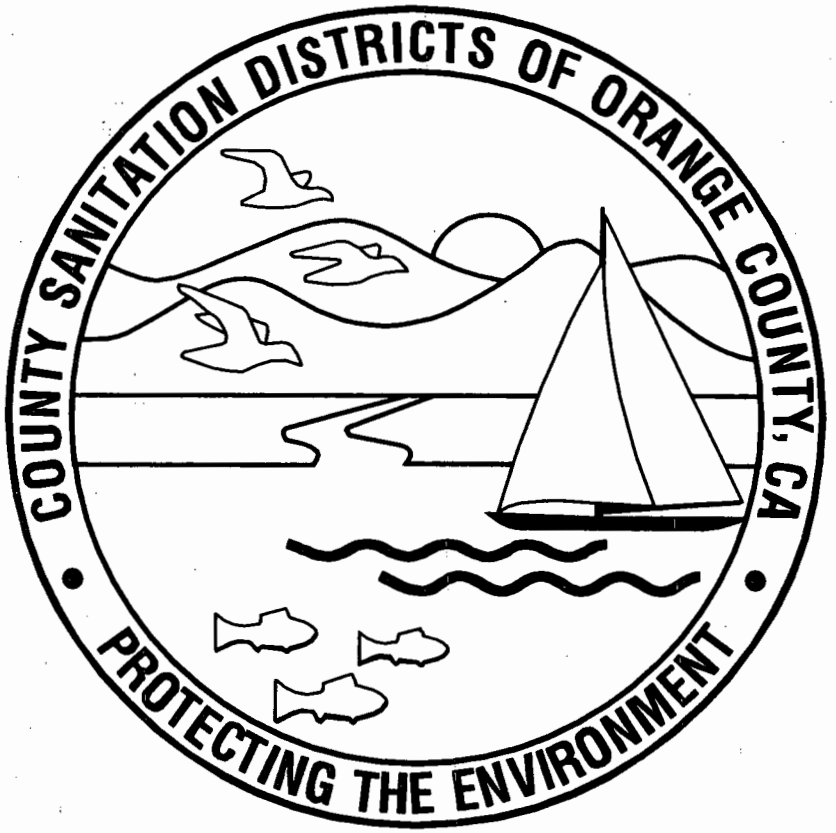

County Sanitation Districts of Orange County, California
P.O. Box 8127
Fountain Valley, CA 92728-8127
(714) 962-2411

Made with post-consumer content

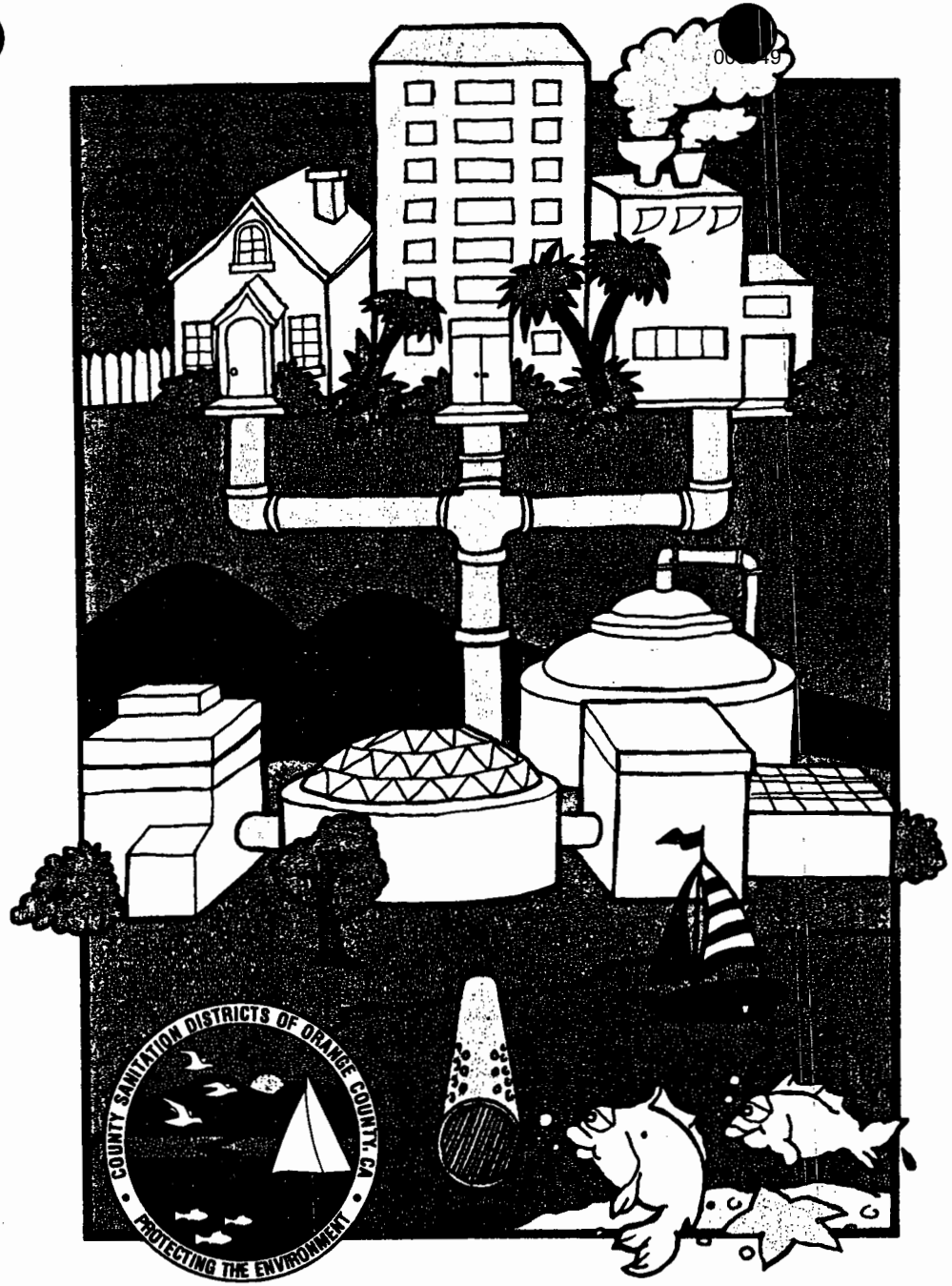

County Sanitation Districts of Orange County, California

WASTEWATER TREATMENT PROCESS

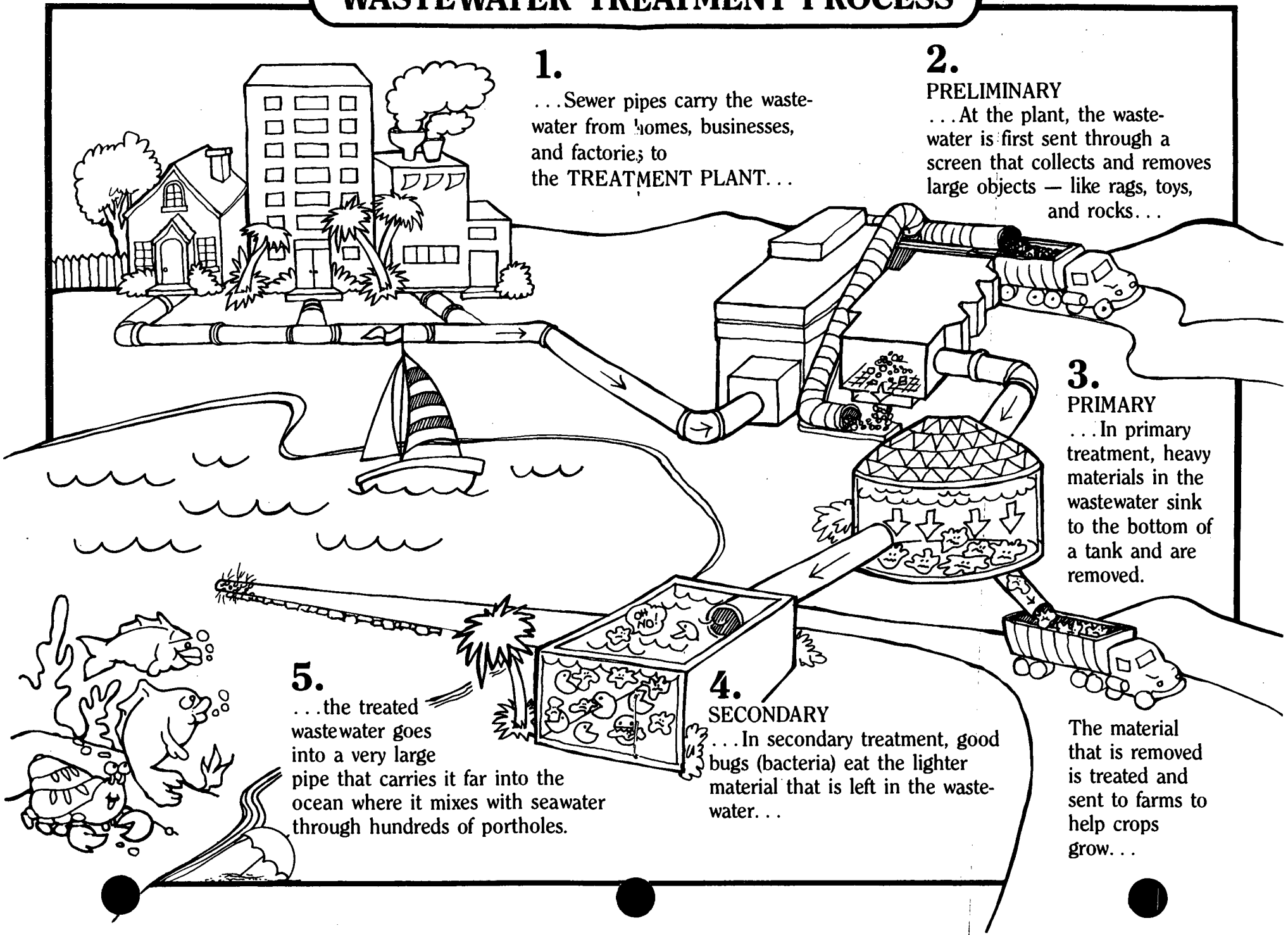

1.
. . . Sewer pipes carry the wastewater from homes, businesses, and factories to the TREATMENT PLANT. . .

2.
PRELIMINARY
. . . At the plant, the wastewater is first sent through a screen that collects and removes large objects — like rags, toys, and rocks. . .

3.
PRIMARY
. . . In primary treatment, heavy materials in the wastewater sink to the bottom of a tank and are removed.

4.
SECONDARY
. . . In secondary treatment, good bugs (bacteria) eat the lighter material that is left in the wastewater. . .

The material that is removed is treated and sent to farms to help crops grow. . .

5.
. . . the treated wastewater goes into a very large pipe that carries it far into the ocean where it mixes with seawater through hundreds of portholes.

Do You Know Where The Water In Your Storm Drain Goes?

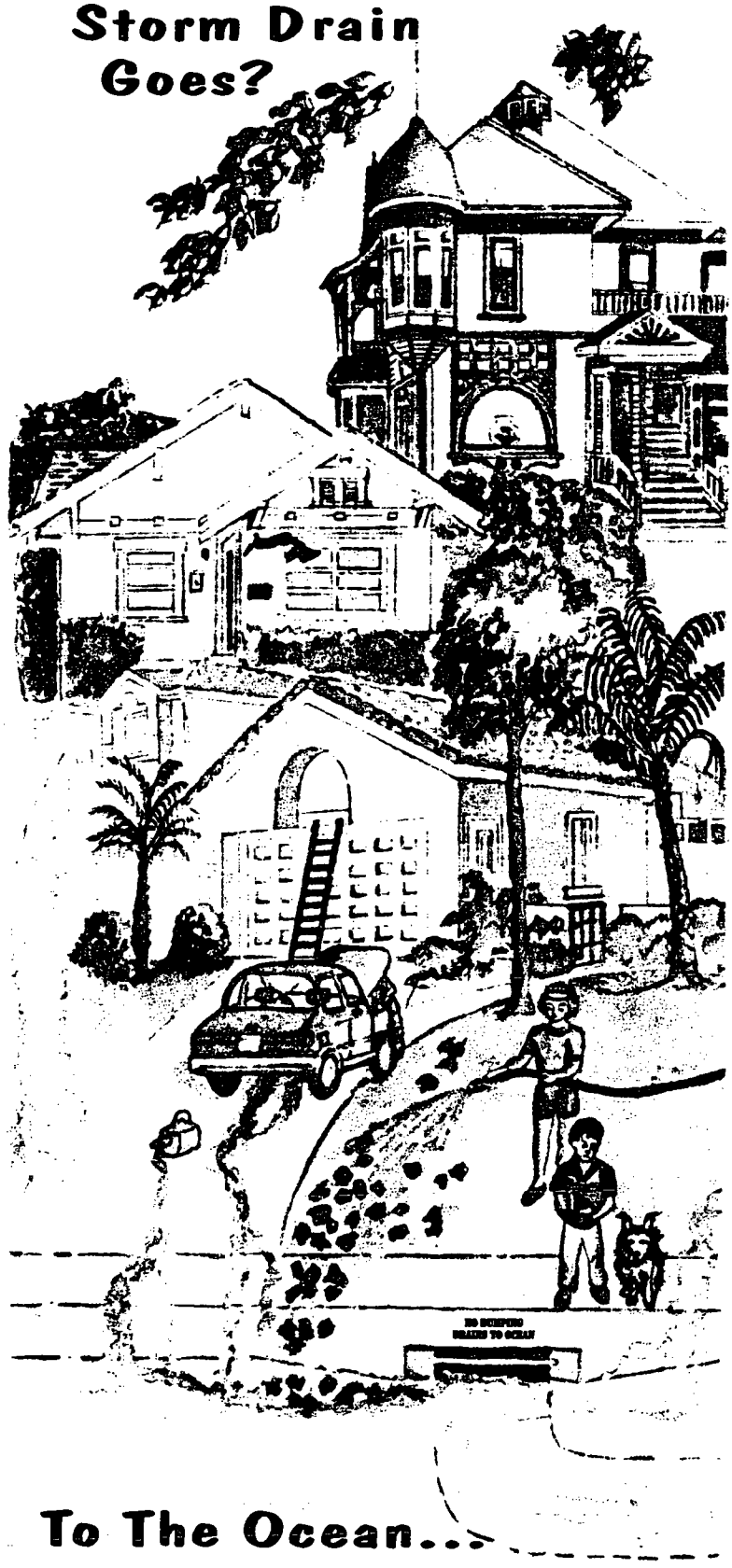

To The Ocean...

Source Reduction

SDA

The Soap and Detergent Association
475 Park Avenue South
New York, NY 10016
(212) 725-1262

©1995
The Soap and Detergent Association

This paper is made from 50% recycled content that includes 10% post-consumer waste

Reciclaje de llantas

Es La Ley

El California Integrated Waste Management Act requiere que las ciudades reduscan las cantidades de basura, que se depositan en los basureros, por 50% para el año 2000. En California se genera mas de 29 millones de llantas usadas cada año. Pocos basureros aceptan llantas usadas por lo que tienden a flotar arriba de los basureros una vez que la basura es cubierta con tierra.

Millones de toneladas de llantas usadas son almacenadas en el estado de California, causando problemas de salud y seguridad. Llantas que son tiradas en las calles y callejones pueden causar incendios y depositar sustancias venenosas al ambiente.

Cerrando El Circulo

Llantas usadas se pueden procesar para sacarles el hule que se puede usar para construir carreteras y otros productos. Reciclando sus llantas usadas puede usted ayudar a la ciudad llegar alcanzar la meta de reducir la basura que se tiene que llevar a los basureros, y al mismo tiempo ayudar a que Costa Mesa sea un lugar mas limpio y saludable adonde vivir. Usted puede cerrar el circulo de reciclage al comprar productos que sean fabricados de materiales reciclados, como algunas mangueras de regar y alfombras para la puerta de su hogar. Para mayor informacion llame al 714/754-5043 o al 714/754-5024Para basura peligrosa que se genera en los hogares, llame al 714/834-6752

Reciclaje de llantas)

Simples Medidas Que Puede Tomar

Compre las llantas mas eficientes, que duren mas tiempo en gastarse y le ahorren gasolina a su vehiculo. Si todos los carros en Los Estados Unidos estuvieran equipados con llantas eficientes, se ahorrarian 400,000 barriles de aceite al dia.

Para incrementar la vida de sus llantas y reducir el consumo de gasolina de su carro asegurese que sus llantas esten infladas correctamente, balancee e intercambie sus llantas de posisión en el vehiculo, para que se desgasten igualmente, cada 6-8000 millas.

Se calcula que 50% a 80% de las llantas en los vehicules son usadas sin suficiente aire, lo cual reduce las eficiencia de se vehiculo por 5%. Mantenga sus llantas infladas correctamente y ayude a ahorrar al pais 2 billones de galones de gasolina al año.

Traiga sus llantas usadas a los eventos de coleccion de llantas o llevelas a los lugares donde venden llantas para que sean recicladas. En Costa Mesa hay dos lugares que acceptan llantas usadas sin cobrar or por una pequeña cantidad de dinero:

Just Tires	**Big O Tires**
3005 Harbor Blvd.	322 E. 17th St.

006052

TIRE RECYCLING

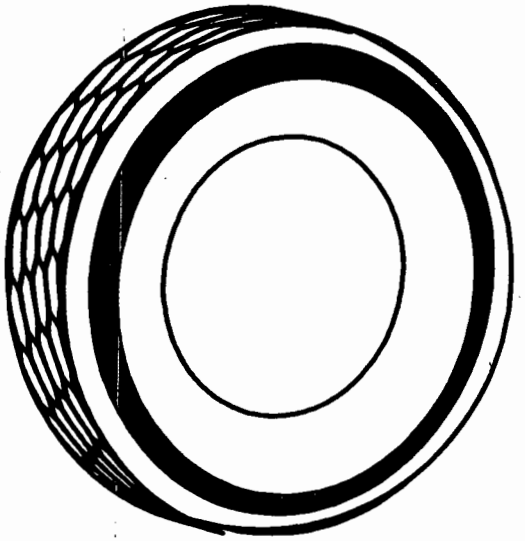

Costa Mesa Sanitary District

City of Costa Mesa

IT'S THE LAW!

The California Integrated Waste Management Act requires cities to reduce the amount of waste disposed in landfills by 50% by the year 2000. Californian's generate over 29 million scrap tires per year. Fewer landfills are accepting tires for disposal because they tend to "float" to the landfill surface after being covered. Millions of tons of tires are stockpiled around the state, creating health and safety concerns. Tires illegally dumped in streets and alleys may catch fire and release toxins into the air

COMPLETING THE LOOP

Old tires are processed into crumb rubber, which can be used to make things like roadways and carpet padding. By recycling your used tires, you will be helping the City to meet reduction goals, and helping to make Costa Mesa a healthier place to live. You can complete the recycling loop by buying products made from recycled material, like soaker hoses and doormats.

Call For Further Information

714/754-5043 714/754-5024

Household Hazardous Waste Hotline 714/834-6752

Tire Recycling

SIMPLE THINGS YOU CAN DO

Purchase the longest lasting, most fuel efficient tires available. If all cars in the U.S. were equipped with the most efficient tires possible, the fuel savings would equal 400,000 barrels of oil a day.

To increase the life of your tires and improve your car's fuel efficiency make sure they are properly inflated, balanced and rotated every 6-8,000 miles.

It is estimated that 50-80% of tires are underinflated which decreases the car's fuel efficiency by 5%. Maintaining properly inflated tires could save Americans up to 2 billion gallons of gasoline per year.

Bring old tires to collection events or to businesses that sell tires to ensure they are recycled or properly disposed. Costa Mesa sites that accept tires for free or for a nominal fee are:

Just Tires	**Big O Tires**
3005 Harbor Blvd.	322 E. 17th St.

Support local and state efforts to recycle tires, to use more recycled rubber in tires, to purchase materials manufactured from recycled tires, and to convert discarded tires into energy.

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RECICLAJE DE LLANTAS

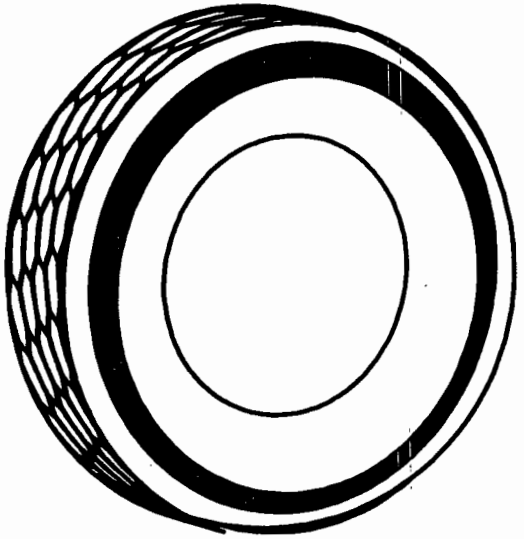

Costa Mesa Sanitary District

City of Costa Mesa

WHAT IS CONSTRUCTION AND DEMOLITION DEBRIS?

C&D debris is material generated in the construction and demolition of buildings and roads. According to the California Integrated Waste Management Board, C&D debris makes up approximately 28% of the state's waste stream. Orange County businesses generate large quantities of C&D debris and could save money by diverting this material through reuse and recycling. Reducing the amount of C&D debris that is landfilled will also help Orange County cities meet the 50% diversion rate required by the California Integrated Waste Management Act of 1989.

Disposal rates are determined by the quality of material. Some processors will give estimates of disposal rates over the phone. Ultimately, the condition of the material will be determined upon delivery of the material.

Tips for managing your C&D debris for recycling:

- Develop a C&D waste management plan
- Assess the amounts and composition of your waste
- Assess the space available for separation of materials on site
- Assess the location of nearby recycling facilities

Educating employees, contractors, and sub-contractors about the benefits of recycling C&D debris will improve your bottom line and help your community conserve natural resources.

Printed on recycled content paper.

County of Orange
Integrated Waste Management Department
320 N. Flower Street, Suite 400
Santa Ana, CA 92703

Construction and Demolition Debris Facilities

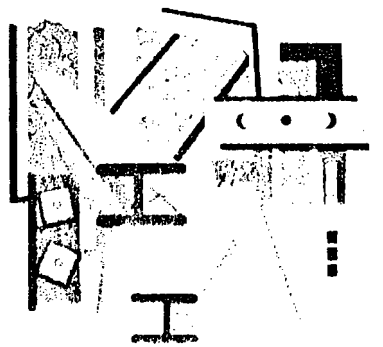

This brochure provides alternatives to landfilling specific types of Construction and Demolition (C&D) Debris.

Integrated Waste Management Department

Construction and Demolition Debris Facilities

COMPANY KEY: b = buyback n/c = no charge f=fee	Appliances	Asphalt	Brick	Carpet	Concrete	Dirt	Drywall	Flooring	Glass	Greenwaste	Metal	Paint	Plastic	Rebar	Wood	Other	Description of Materials Accepted
Adams Steel, Inc. **3200 E. Frontera Street, Anaheim** **(714) 630-6523**	b										b			b		b	I- beams, any scrap metal, car bodies, pick up service available.
Aguinaga Fertilizer Company **7992 Irvine Boulevard, Irvine** **(949) 786-9558**										f					f		Clean lumber, clean pallets, trees sized to 5'x3', wood chips. Entrance from N Street
All Variety Metals, Inc. **1016 Santiago, Santa Ana** **(714) 835-9235**											b			b	b		Ferrous and non-ferrous metals, usable wood, occasional rebar
Amazon Environmental **7048 Elmer Avenue, Whittier** **(562) 789-9191**												f					Latex paint only. Call ahead.
Brea Green Recycling **1952 Valencia Avenue, Brea** **(714) 529-0100**										f					f		Woody trees and shrubs and clean lumber
Consolidated Volume Transporter **1131 Blue Gum, Anaheim** **(714) 238-3300**	f	f	f	f	f	f	f	f	f	f	f		f	f	f		No liquid, or hazardous waste
CR Transfer **11232 Knott Avenue, Stanton** **(714) 891-2776**	f	f	f	f	f	f	f	f	f	f	f		f	f	f		No liquid, or hazardous waste
Dan Copp Crushing Corp **1120 N. Richfield Road, Irvine** **(949) 777-6400**		f			f									f		f	Clean concrete, asphalt, rebar, and mesh. Mesh and rebar have to be sized.
Du Pont Carpet Reclamation/Recycle Center **1355 S. Acacia Avenue, Fullerton** **(714) 518-1088**				f													DuPont Antron Carpet, Winner of CIWMB 1999 WRAP award.
El Toro Materials Company **Rocky Road at Portola Pkwy, Lake Forest** **(949) 458-7993**		f	f		f			f								f	Broken concrete w/rebar ok; roofing tiles, floor tiles, concrete and asphalt
Ewles Materials **16081 Construction Circle, Irvine** **(714) 552-6008**		f			f												Clean concrete and asphalt
Ewles Materials **32501 Ortega Hwy, San Juan Capistrano** **(949) 728-0436**		f			f												Clean concrete and asphalt
Ewles Materials **8182 Katella Avenue, Stanton** **(714) 894-0032**		f			f												Clean concrete and asphalt
Hanson Aggregates **California South of Spring, Long Beach** **(800) 300-6120**		f			f												Clean concrete and asphalt
Hanson Aggregates **6956 Cherry, Long Beach** **(800) 300-6120**		f			f												Clean concrete and asphalt
Hanson Aggregates **Gothard & Talbert, Huntington Beach** **(800) 300-6120**		f			f												Clean concrete and asphalt
Hanson Aggregates **6145 Santiago Canyon, Orange** **(800) 300-6120**		n/c			n/c												Clean concrete and asphalt
J&P Rebon Wholesaler **1301 Hancock Street, Suite C, Anaheim** **(714) 779-1565**				f												f	Carpet and sofa cushions
Waste Management of Orange **2050 N. Glassell, Orange** **(714) 282-0200**	f	f	f	f			f	f	f	f	f		f	f	f		No dirt, concrete, liquid, or hazardous waste
Ortiz Enterprises, Inc. **Locations vary throughout Orange County** **(949) 753-1414 ext. 114**		f			f												Concrete and asphalt need to be sized to 2'x2'x1', any wires need to be cut flush
Rainbow Disposal **17121 Nichols, Huntington Beach** **(714) 847-3581**	f	f	f	f	f	f	f	f	f	f	f		f	f	f		No liquid or hazardous waste
RJ Noble **15505 E. Lincoln Avenue @ Batavia, Orange** **(714) 637-1550**		f	f		f	f	f	f									Concrete, asphalt, dirt, tile, sand, brick, rock, plaster
Sunset Environmental **16122 Construction Circle W., Irvine** **(949) 552-8784**	f	f	f	f	f	f	f	f	f	f	f		f	f	f		No liquid or hazardous waste
Sun West Metals **1150 N. Lemon Street, Anaheim** **(714) 635-0470**	f				f												Scrap metals, stoves, washers, dryers. No refrigerators.
Tierra Verde Industries **7982 Irvine Boulevard, Irvine** **(949) 551-0363**	f	f	f	f	f	f	f	f	f	f	f		f	f	f		No liquid or hazardous waste
Tierra Verde Industries **31748 La Pata Road, San Juan Capistrano** **(949) 728-0401**										f					f		Greenwaste - no Palms or succulents Wood - painted or nails ok

NOTE: The Integrated Waste Management Department is not liable for any errors or changes on this list, nor does it guarantee the accuracy of any information regarding materials, services or products. To make corrections, please call (714) 834-4000.

FREE HOUSEHOLD HAZARDOUS WASTE DISPOSAL

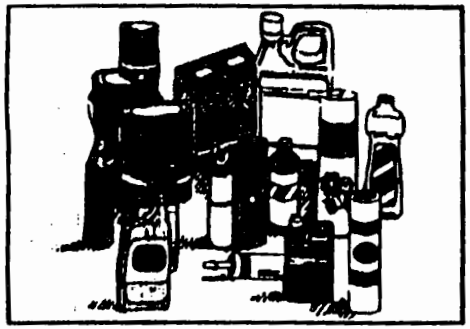

- Paint • Used Motor Oil • Batteries •
- Pesticides • Fertilizers •
- Household Cleaners • Antifreeze •
- Pool Chemicals •
- And Other Household Waste Containing Hazardous Chemicals •

EASY AS 1-2-3!

1. Pack those unwanted household and car-care products in the back seat or trunk of your car.
2. Drive to the convenient location listed on back.
3. Sit in the comfort of your car, fill out an easy form and attendant will remove products.

SEE BACK SIDE FOR LOCATION AND MAP

We'll Make It Worth Your Drive!

FREE

Your Choice

(While supplies last)

- Southern California Edison Night Light
- 15 qt. Reusable Oil Drain Container*
- 1 Gallon Of 100% Recycled Paint (on white, beige or green)

When you bring in your haz[illegible] San Juan Capistrano [illegible]

Printed on Recyclable Paper/Advertise with Val-Pak, America's Favorite Mailer (949) 757-7500 ©Val-Pak, 1/1999. Val-Pak of Coastal Orange County, 624303.0181

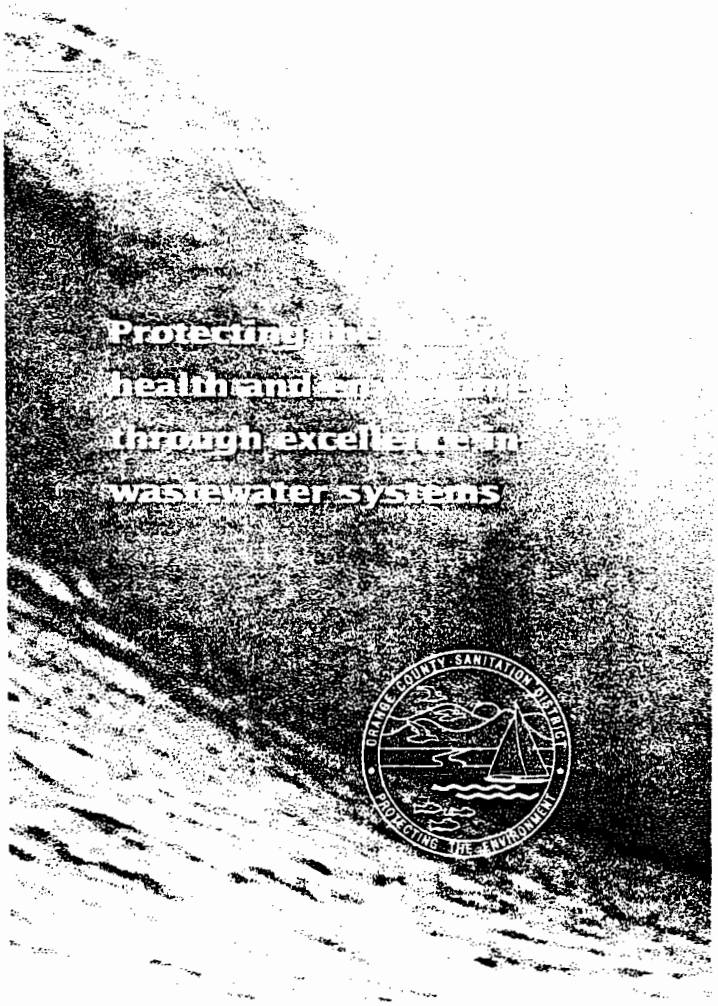
Protecting the
health and en
through excellen
wastewater systems
ORANGE COUNTY SANITATION DISTRICT
PROTECTING THE ENVIRONMENT

REPRESENTATIVE PUBLIC EDUCATION MATERIALS

CITY OF CYPRESS

• Use and Disposal

- Compost soiled bedding and manure for your own use, or give it away to local greenhouses, nurseries and botanical parks.
- Transport manure to topsoil companies or composting centers.
- Fertilize pastures, cropland and lawns with manure and soil bedding. Do not apply fertilizer just before or during rainstorms.

• Pesticide Alternatives

The "chemicals-only approach" to pest control is only a temporary fix. Intergrated pest management is a more common-sense approach for a long-term solution. Plan to use:

Physical controls, such as pheromone traps, tarps, bug zappers, fly-tight storage sheds.

Biological controls, such as swallows, bats and other insect-eating animals.

Chemical controls, such as pyrethrin-based insecticides, dehydrating dusts, insecticidal soaps and horticultural oils. If pesticides must be used:

- Rinse empty pesticide containers and use rinse water as you would the product. Dispose of empty rinsed containers in the trash.
- Dispose of unused pesticide at the Household Hazardous Waste Roundups, instead of dumping it into the sink, street, gutter or storm drain. Call (714) 834-6752.

Spill Response Agencies

Orange County Fire Authority
Health/Hazardous Matererials Program
(714) 288-2541

Recycling & Hazardous Waste Disposal

City of Cypress
Department of Public Works
(714) 229-6740

Orange County
Recycling & Household Hazardous Waste Hotline
(714) 834-6752
Orange County

To Report Illegal Dumping

Deparment of Public Works
(800) 69-TOXIC
City of Cypress

To Report a Clogged Catch Basin

Department of Public Works, Division
(714) 229-6760

For more information about storm drain protection or additional brochures, please call the City of Cypress Public Works Department at (714) 229-6741.

This brochure is one of a series of pamphlets describing storm drain protection measures.
Pamphlets include: Painting • Food Service Industry • Fresh Concrete and Mortar Application • General Construction and Site Supervision • Heavy Equipment and Earth-Moving Activities • Landscaping, Gardening and Pest Control • Home Repair and Remodeling • Automotive Maintenance and Car Care • Roadwork and Paving • Horse Owners and Equine Industry.

Preventing Storm Water Pollution During

Horse Owners and the Equine Industry

A Guide For

- **Urban Horse Owners**
- **Small Farms**
- **Equestrian Centers**
- **Boarding Stables**

Published by:
City of Cypress
Public Works Department
Engineering Division

Ocean Pollution Prevention: It's Up To Us

Cypess has two drainage systems: sewers and storm drains. The storm drain system was designed to prevent flooding by carrying excess rainwater away from city streets out to the ocean. Because the system contains no filters, it now serves the *unintended* function of carrying urban pollution straight to the ocean.

This pamphlet tells you how to prevent ocean pollution from "stormwater" or "urban runoff."

Rain, industrial and household water mixed with urban pollutants creates stormwater pollution. The pollutants include: oil and other automotive fluids, paint and construction debris, yard and pet wastes, pesticides and litter.

Urban runoff pollution flows to the ocean through the storm drain system which takes water and debris straight from the streets to the ocean. Each day 100 million gallons of polluted urban runoff enter the ocean untreated, leaving toxic chemical in our surf and tons of trash on our beaches.

Urban runoff pollution contaminates the ocean, closes beaches, harms aquatic life and increases the risk of inland flooding by clogging gutters and catch basins.

These Best Management Practices (BMPs) will ensure a cleaner city and ocean.

Animal Waste Problems

Animal waste contributes to ocean pollution when it is improperly stored or left uncovered near small streams and storm drains. During rainfall, it is washed into storm drains and flows untreated, directly into the ocean.

Animal waste contains some nutrients — phosphorus and nitrogen — as well as bacteria. The nutrients fertilize the aquatic plants causing their proliferation, which depletes oxygen in the water killing sea life. The high bacteria levels in the water can cause gastro-intestinal problems for swimmers.

Sediment is also a common pollutant washed from pastures and livestock facilities. It creates multiple problems once it enters the ocean. It harms sea life by clogging the gills of fish, blocking light transmission and increasing ocean water temperature.

Solutions

• Facilities Design

- Situate barns, corrals and other high-use areas on the portion of property that drains away from the nearest creek or stream.
- Install gutters that will divert runoff away from livestock areas.
- Design diversion terraces which drain into area with sufficient vegetation to filter the flow.
- Protect manure storage facilities from rainfall and surface runoff.

• Pasture Management

006060

- Confine animals in properly fenced areas except for exercise and gazing time.
- Corrals, stables and barns should be located on higher ground when possible and surrounded by pasture to act as a natural filtration sysytem.
- Use fencing to keep horses away from environmentally sensitive areas and protect stream banks from contamination.
- Use manure and soiled bedding sparingly to fertilize pastures and croplands.

• Grazing Management

- Establish healthy and vigorous pastures with at least 3 inches of leafy material present.
- Subdivide grazing areas into three or more units of equal size. Clip tall weeds and old grass.
- Rotate animals to clean pasture when grass is grazed down to 3-4 inches. Let pasture regrow to 8-10 inches before allowing regrazing.
- Keep animals away from wet fields if possible.
- During heavy rainfall, consider indoor feeding, a practice which keeps more manure under roof and away from runoff.

• Collection and Storage

Collect soiled bedding and manure on a daily basis from stalls and paddocks and place in temporary or long-term storage pits. Store in sturdy, insect-resistant and seepage-free units.

• During Construction

- Cover catch basins and maintenance holes when applying seal coat, slurry seal, fog seal, etc.
- Use check dems, ditches or berms to divert runoff around excavations.
- Never wash excess materials from exposed aggregate concrete or similar treatments into a street, gutter or storm drain.
- Collect and recycle excess abrasive gravel or sand.
- Avoid over-application by water trucks during dust control.

• Spills

• Never hose down "dirty" pavement or surfaces. Clean up all spills and leaks using "dry" methods (with absorbent materials and/or rags), or dig up and remove contaminated soil. For disposal information contact the Orange County Hazardous Waste Hotline at (714) 288-2541.

Spill Resp Agencies

Orange County Fire Authority
Health/Hazardous Matererials Program
(714) 288-2541

Recycling & Hazardous Waste Disposal

City of Cypress
Department of Public Works
(714) 229-6741

Orange County
Recycling & Household Hazardous Waste Hotline
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Orange County

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(800) 69-TOXIC

To Report a Clogged Catch Basin

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Preventing Storm Water Pollution During

Roadwork and Paving

A Guide For

- **Driveway, Sidewalk & Parking Lot Construction Crews**
- **Seal Coat Contractors**
- **Construction Inspectors**
- **General Contractors**
- **Operators of grading equipment, paving machines, dump trucks and cement mixers**

Published by:
City of Cypress
Public Works Department
Engineering Division

Ocean Pollution Prevention: It's Up To Us

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These Best Management Practices (BMPs) will ensure a cleaner city and ocean.

Roadwork and Paving Problems

Road paving, surfacing and pavement removal activities contribute to urban runoff pollution because they take place right in the street, where urban runoff contaminatoin can result from asphalt saw-cut slurry or excavated material.

Rain or runoff can carry these toxic substances to the ocean through the storm drain system, posing a hazard to human and sea life.

Extra planning is required to store and dispose of materials properly and guard against stormwater and ocean pollution. This brochure tells you how.

Solutions

Handling, storing, and disposing of materials properly can prevent pollutants from entering the storm drains.

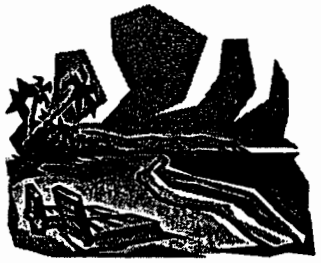

• General Business Practices

- Keep materials out of the rain. Store them under cover, with temporary roofs or plastic sheets, protected from rainfall, runoff and wind.
- Plan excavation and grading for dry weather.
- Develop and implement erosion and sediment control plans for embankments.
- Recycle used oil, concrete, asphalt, etc.

• Paint Removal

006062

- Maintain all vehicles and heavy equipment. Inspect frequency for leaks.
- Conduct all vehicle/equipment maintenance and refueling at one location—away from storm drains.

- Perform equipment/ vehicle repairs and washing off-site.
- Do not use diesel oil to lubricate equipment or parts.

• Asphalt & Concrete Removal

- After breaking up paving, be sure to remove all chunks and pieces. Recycle them at a crushing company.
- Dispose of small amounts of dry concrete in the trash. Make sure broken pavement does not come in contact with rainfall or runoff.

- Shovel or vacuum saw-cut slurry and remove from the site.
- Cover or barricade storm drain openings during saw-cutting.

• Disposal Options

Use a crushing company to recycle cement, asphalt and porcelain rather than taking them to a landfill.

- When breaking up paving (cement or asphalt), be sure to pick up all the pieces. Recycle them at a crushing company.
- Dispose of small amounts of excess dry concrete, grout and mortar in the trash.
- Never bury waste material. Recycle or dispose of it as hazardous waste material.

Handling Materials & Wastes

- Practice source reduction—minimize waste when ordering materials. Ordering materials. Order only the amounts needed to complete the job.
- Use recycled and recyclable materials whenever possible.
- Recycle broken asphalt, concrete, wood, and cleared vegetation. Unrecycled materials must be taken to an appropriate landfill or disposed of as hazardous waste. Call the numbers on the back of this pamphlet for disposal information.

Disposal Options

Use a crushing company like to recycle cement, asphalt and porcelain rather than taking them to a landfill. To locate a crushing company near you contact the Integrated Waste Management Department by calling (714) 834-4000.

Spill Response Agencies

Orange County Fire Authority
Health/Hazardous Matererials Program
(714) 288-2541

Recycling & Hazardous Waste Disposal

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Preventing Storm Water Pollution During

Concrete & Mortar Application

A Guide For

- **Masons and Bricklayers**
- **Sidewalk Construction Crews**
- **Patio Construction Workers**
- **Construction Inspectors**
- **Home Builders**
- **Developers**
- **Do-It-Yourselfers**

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Concrete & Mortar Application Problems

Fresh concrete and mortar activities are frequent sources of urban runoff pollution. Materials and waster blown or washed into a street, gutter or storm drain have a direct impact on the ocean.

Sediment is the most common pollutant washed from worksites. Sediment clogs the gills of fish, blocks light transmission and increases ocean water temperature, all of which harm sea life, disrupting the food chain upon which both fish and people depend.

Sediment carries with it other worksite pollutants such as cement wash, gravel, asphalt, pesticides, cleaning solvents, motor oil, grease and fuel. Poorly maintained equipment and vehicles leaking fuel and oil also contribute to ocean pollution.

Solutions

Handling, storing, and disposing of materials properly can prevent pollutants from entering the storm drains.

• General Business Practices

- Schedule projects for dry weather periods.
- Keep materials out of the rain. Store both dry and wet materials under cover, protected from rainfall and runoff. Also, protect dry materials from the wind.
- Secure open bags of cement to keep wind-blown cement powder away from streets, gutter, storm drains, rainfall and runoff.

• Cleaning Up

- When cleaning up after driveway or sidewalk construction, wash concrete dust onto dirt areas, not down the driveway or into the street or storm drain.
- Wash out concrete mixers and equipment only in designated wash-out areas, where the water flows into containment ponds or onto dirt.
- Recycle cement wash water by pumping it back into cement mixers for reuse.

- Never dispose of cement washout into driveways, streets, gutters, storm drains or ditches.

• During Construction

- Place erosion controls (berms or temporary vegetation) down-slope to capture runoff carrying mortar or cement before it reaches the gutter.
- Do not order or mix up more fresh concrete or cement than you will use.
- Set up and operate small mixers on tarps or heavy drop cloths.

Recycle oil and grease wastes. Never dump them down storm drains or on the ground. Look in the yellow for "renders" or call one of the disposal numbers listed in this brochure.

• Employee & Client Education

Include urban runoff training in employee orientations and reviews. Promote these Best Management Practices (BMPs):

Storage containers should be regularly inspected and kept in good condition.

• Place materials inside rigid, durable, watertight and rodent-proof containers with tight fitting covers.

• Store materials inside a building or build a covered area that is paved and designed to prevent runoff from entering storm drains.

• Place temporary plastic sheeting over materials or containers and secure the cover with ties and weighted objects. (Not appropriate for storing liquids.)

Post BMPs where employees and customers can see them. Showing customers you protect the ocean is good public relations.

Explain BMPs to other food businesses through you business associations or chamber of commerce.

Stencil catch basins near the workplace with a stencil that says "No Dumping: This drains to the ocean."

Spill Response Agencies

Orange County Fire Authority
Health/Hazardous Matererials Program
(714) 288-2541

Recycling & Hazardous Waste Disposal

City of Cypress
Department of Public Works
(714) 229-6740

Orange County
Recycling & Household Hazardous Waste Hotline
(714) 834-6752
Orange County

To Report Illegal Dumping

Deparment of Public Works
(800) 69-TOXIC
City of Cypress

To Report a Clogged Catch Basin

Department of Public Works, Division
(714) 229-6760

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Preventing Storm Water Pollution During

Food Service Industry

A Guide For

- **Restraunts**
- **Grocery Stores**
- **Bakeries**
- **Food Producers**
- **Food Distributors**

Published by:
City of Cypress
Public Works Department
Engineering Division

Ocean Pollution Prevention: It's Up To Us

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This pamphlet tells you how to prevent ocean pollution from "stormwater" or "urban runoff."

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Urban runoff pollution contaminates the ocean, closes beaches, harms aquatic life and increases the risk of inland flooding by clogging gutters and catch basins.

These Best Management Practices (BMPs) will ensure a cleaner city and ocean.

Food Service Problems

The by-products of food-related businesses can harm the ocean and sea life if they enter the storm drain system. Food businesses can cause harm by putting food waste in leaky dumpsters, not cleaning up outdoor food or chemical spills, or by washing outdoor spills into the storm drain system.

Other routine activities such as cleaning oily vents and operating and maintaining delivery trucks are sourcs of pollution, unless proper precautions are taken. When it rains, motor oil that has dripped onto parking lot from business and customer vehicles is washed into the ocean via the storm drain system.

Oil and grease can clog fish gills and block oxygen from entering the water. Also, toxics found in oven and floor cleaners can, in high concentrations, harm aquatic life.

Solutions

• Keep Work Sites Clean

Handling, storing, and disposing of materials properly can prevent pollutants from entering the storm drains.

• Minimize Wastes

Use non-disposable products. Serve food on ceramic dishware rather than paper, plastic or styrofoam and use cloth napkins rather than paper ones. If you must use cloth napkins rather than paper ones. If you must use disposable products, use paper instead of styrofoam and look for recycled and recyclable containers.

Buy the least toxic products available.

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- Look for "non-toxic," "non-petroleum based," "free of ammonia, phosphates, dye or perfume," or "biodegradable" on the label.
- Avoid chlorinated compounds, petroleum distillates, phenols and formaldehyde.
- Use water-based products.

• Parking Lot Drainage

Cover, repair or replace leaky dumpsters and compactors, and/or drain the pavement beneath them to the sewer. Rain can wash oil, grease, and substances into the storm drain system.

Wash greasy equipment such as vents and vehicles before storing outside and only in designated wash areas properly connected to the sewer system with an appropriate oil/water separator.

• Recycle Wastes

Purchase recycled products. By doing so, you help ensure a use for the recyclable materials that people collect and recycle.

Recycle the following: food waste (non-greasy, non-animal food waste can be composted); paper and cardboard, container glass, aluminum, and tin, pallets and drums; and oil and grease.

Separate wastes. Keep your recyclable wastes in separate containers according to the type of material. They are easier to recycle if separated

- Control surface runoff to reduce erosion, especially during excavation. Use drainage ditches to divert water flow.
- Use gravel approaches to reduce soil com paction and limit the tracking of sediments into streets,, where truck traffic is frequent.
- Prevent erosion by planting fast-growing annual and perennial grasses. These will shield and bind the soil.
- Do not remove trees or shrubs unnecessary. They help decrease erosion.

Handling Materials & Waste

- Practice source reduction—minimize waste when ordering materials. Order only the amounts needed to complete the job.
- Use recycled and recycled materials.
- Never bury waste or leave it in the street.
- Dispose of all waste properly. Many construction materials, including solvents, water-based paints, vehicle fluids, broken asphalt and concrete, wood, and cleared vegetation can be recycled. Unrecycled materials must be taken to an appropriate landfill or diposed of as hazardous waste.

Disposal Options

- Use a crushing company to recycle concrete, asphalt and porcelain rather than taking them to a landfill.

Spill Response Agencies

Orange County Fire Authority
Health/Hazardous Matererials Program
(714) 288-2541

Recycling & Hazardous Waste Disposal

City of Cypress
Department of Public Works
(714) 229-6740

Orange County
Recycling & Household Hazardous Waste Hotline
(714) 834-6752

To Report Illegal Dumping

Orange County
Deparment of Public Works
(800) 69-TOXIC

To Report a Clogged Catch Basin

City of Cypress
Department of Public Works, Division
(714) 229-6760

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Preventing Storm Water Pollution During

General Construction and Site Supervision

A Guide For

- General Contractors
- Construction Inspectors
- Home Builders
- Developers
- Masons and Bricklayers
- Patio Construction Workers
- Sidewalk Construction Crews

Published by:
City of Cypress
Public Works Department
Engineering Division

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General Construction Problems

Construction sites are common sources of urban runoff pollution. Materials and wastes blown or washed into a street, gutter or storm drain flow directly to the ocean.

Sediment is the most common pollutant washed from worksites, creating multiple problems once it enters the ocean. Sediment clogs the gills of fish, blocks light transmission and increases ocean water temperture, all of which harm sea life, disturbing the food chain upon which both fish and people depend.

Sediment also carries with it other worksite pollutants such as pesticides, cleaning solvents, cement wash, asphalt and car fluids like motor oil, grease and fuel. Thus, poorly maintained vehicles and heavy equipment leaking fuel and oil at the construction site also contribute to ocean pollution.

As a contractor, site supervisor, owner of operator of a site, you may be responsible for the environmental demage cused by subcon-tractors or employees.

Solutions

Handling, storing, and disposing of materials properly can prevent pollutants from entering the storm drains.

• General Business Practices

- Cover and maintain dumpsters. Check frequently for leaks. Place dumpsters under a roof or cover with tarps or plastic sheeting. Never clean a dumpster by hosing it down on site.
- Keep pollutants off exposed surfaces. Put trash cans and recycling receptacles around the site.
- Keep materials out of the rain. Cover exposed piles of soil or construction materials with plastic sheeting or temporary roofs.
- Designate one area for auto parking, vehicle refueling and routine equipment maintenance. The area should be well away from gutters or storm drains. Make major repairs off site.
- Use as little reclaimed water as possible for dust control.

• Clean Up Spills

- Clean up leaks, drips and other spills immediately. This will prevent contaminated soil or residue on paved surfaces.
- Never hose down "dirty" pavement or impermeable surfaces wherefluids have spilled. Usedry cleanup methods (saw dust, cat litter, and/or rags).

• Planning to Prevent Pollution

An erosion control program, worked out be-fore construction begins, prevents or minimizes problems.

- Train your employees and subcontractors. Make these brochures available to everyone working on site. Inform subcontractors about stormwater requirements and responsibilities.
- Schedule excavation and g ng activities for dry weather periods.

- Don't use diesel fuel to lubricate equipment or part.
- Use drip pans or drop cloths to catch drips and spill, if you drain and replace motor oil, radiator coolant or other fluids on site. Collect all used fluids, store in separate containers and recycle.

Erosion Prevention

- After cleaning, grading or excavating, exposed soil poses a clear and immediate danger of stormwater pollution. Revegetation (permanent or temporary) is an excellent form of erosion control for any site.
- Avoid excavation or grading in wet weather.
- Construct diversion dikes to channel runoff around the site. Line channels with grass or roughened pavement to reduce runoff velocity.
- Cover stockpiles and excavated soil with secured tarps or plastic sheeting.
- Remove existing vegetation only when absolutely necessary. Large projects should be done in phases.
- Consider planting temporary vegetation for erosion control on slopes or where construction is not immediately planned.
- Plant permanent vegeation as soon as possible, once excavation and grading activities are complete.

Spill Response Agencies

Orange County Fire Authority
Health/Hazardous Matererials Program
(714) 288-2541

Recycling & Hazardous Waste Disposal

City of Cypress
Department of Public Works
(714) 229-6741

Orange County
Recycling & Household Hazardous Waste Hotline
(714) 834-6752
Orange County

To Report Illegal Dumping

Deparment of Public Works
(800) 69-TOXIC

To Report a Clogged Catch Basin

City of Cypress
Department of Public Works, Maintenance
(714) 229-6760

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Preventing Storm Water Pollution During

Heavy Equipment Use & Earth Moving

A Guide For

- Site Supervisors
- Bulldozer and Backhoe Operators
- Gardening Machine Operators
- Dump Truck Drivers
- General Contractors
- Home Builders

Published by:
City of Cypress
Public Works Department
Engineering Division

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Heavy Equipment Operations Problems

Soil excavation and grading operations often contribute to urban runoff pollution. By loosening large amounts of soil and sediment, earthmoving activities can cause sediment to flow into gutters, storm drains and the ocean.

Sediment is the most common pollutant washed from worksites, creating multiple problems once it enters the ocean. Sediment clogs the gills of fish, blocks light transmission and increases ocean water temperture, all of which harm sea life, disturbing the food chain upon which both fish and people depend.

Sediment also carries with it other worksite pollutants such as pesticides, cleaning solvents, cement wash, asphalt and car fluids like motor oil, grease and fuel. Thus, poorly maintained vehicles and heavy equipment leaking fuel and oil at the construction site also contribute to ocean pollution.

Solutions

Handling, storing, and disposing of materials properly can prevent pollutants from entering the storm drains.

• General Business Practices

- Plan excavation and grading for dry weather.
- Use as little water as possible for dust control.

• Clean Up Spills

- Never hose down "dirty" pavement or imper meable surfaces where fluids have spilled. Use dry cleanup methods (saw dust, cat litter, and/ or rags).

- Sweep up dry spilled materials immediately. Never attempt to bury them or "wash them away with water.
- Clean up spills on dirt areas by digging up and properly disposing of contaminated soil.
- Report significant spills to the appropriate spill response agencies immediately, listed on the back of this pamphlet.

• Vehicles & Equipment

- Maintain all vehicles and heavy equipment. Inspect frequently for leaks.
- Conduct all vehicle/equipment maintenance and refueling at one location away from storm drains.
- Perform major maintenance, repair jobs and vehicle/equipment washing off site.
- Use gravel approaches where truck traffic is frequent to reduce soil compaction and limit the tracking of sediment into streets.

Design [illegible]ng areas so that spills are contained and runoff cannot carry spills into storm drains. Slope the containment area toward drain connected to the sewer system. Equip the drain with a shutoff valve in the event of a large spill.

Keep absorbent materials on-site to allow prompt cleanup of all spills.

Post signs instructing people not to overfill gas tanks, which causes spills and gas fumes.

Recycle

Recycle what you must:

- Division 20 of the Health and Safety Code requires motor oil to be recycled.
- Section 66822 of the California Code requires lead acid batteries to be recycled.

Recycle what you can, including metal scraps, water-based paints, used tires, paper and cardboard, container glass, aluminum, and tin.

Call the referral numbers to the right for information.

Employee & Customer Education

Educate your employees. Include water quality training in new-employee orientations and conduct annual review sessions.

Educate your customers. Raise both employee and customer awareness by stenciling storm drains near the word place with the stencil: "No Dumping — This Drains to the Ocean."

Spill Res[illegible]se Agencies

Orange County Fire Authority
Health/Hazardous Matererials Program
(714) 288-2541

Recycling & Hazardous Waste Disposal

City of Cypress
Department of Public Works
(714) 229-6740

Orange County
Recycling & Household Hazardous Waste Hotline
(714) 834-6752

To Report Illegal Dumping

Orange County
Deparment of Public Works
(800) 69-TOXIC

To Report a Clogged Catch Basin

City of Cypress
Department of Public Works, Division
(714) 229-6760

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Preventing Storm Water Pollution During

Automotive Maintenance & Car Care

A Guide For

- Gas Stations
- Auto Repair Shops
- Auto Body Shops
- Car Dealerships
- Mobile Fleet Manager
- Mobile Fleet Washing Businesses

Published by:
City of Cypress
Public Works Department
Engineering Division

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Car Maintenance Problems

Many car maintenance routines, such as washing a car or pouring used motor oil into a gutter or storm drain, contribute to ocean pollution.

Water runoff from streets, parking lots and driveways picks up oil and grease dripped from cars, asbestos worn from brake linings, zinc from tires and organic compounds and metals from spilled fuels.

Chemicals drain into the ocean, harming sea life. Oil and grease, for example, clog fish gills and block oxygen from entering the water. If oxygen levels in the water are too low, aquatic animals die.

Solutions

Handling, storing, and disposing of materials properly can prevent pollutants from entering the storm drains.

• Cleaning Work Sites

Don't hose down your shop floor. It is best to sweep. Use non-toxic cleaners. For instance, baking soda mixed with a mild, biodegradable dishwashing soap works well on battery heads, cable clamps and chrome. For window, mix white vinegar or lemon juice with water.

• Spills

Prepare and use easy-to-fill spill containment and cleanup kits. Include safety equipment and cleanup materials appropriate to the type and quantity of materials that could spill. Pour kitty litter, sawdust or cornmeal on spills.

• Fluids

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Your customers regular car maintenance prevents fluids from leaking onto streets and washing into storm drains. It is also good for business.

Change fluids carefully — use a drip pan.

Prevent fluid leaks by draining gas, transmission and hydraulic oil, brake and radiator fluid from vehicles or parts kept in storage.

Implement simple work practices to reduce spills. Use a funnel when pouring liquids (like lubricants or motor oil) and place a tray underneath to catch spills. Place drip pans under the spouts of liquid storage containers.

Clean up spills immediately.

• Washing Vehicles

Prevent oil and grease, suspended solids and toxics from washing into storm drains.

Wash vehicles with biodegradable, phosphatefree detergent. Use a bucket (not a running hose) to wash and rinse the car to conserve water.

Designate a washing site where water drains to the sewer system. The area must be paved and well marked as a wash area. Post signs prohibiting oil changes and washing with solvents. Train all employees to use the designated area.

• Fueling Vehicles

Cover the fueling area to keep rain from washing away spilled materials. Extend the cover several feet beyond the containment

- When stripping or cleaning building exteriors with high-pressure water, block storm drains. Wash water onto a dirt area, or into the sewer system.

• Paint Cleanup

- Never clean brushes or rinse paint containers into a street, gutter, or sewer system.
- For water-based paints, paint out brushes to the extent possible, and rinse in the sink.
- For oil-based paints, paint out brushes to the extent possible. Clean with thinner, then filter and reuse thinner or solvent.

• Disposal Options

- Reuse leftover paint for touch-ups.
- Recycle or use up excess paint. Call the Orange County House hold Hazardous Waste Hotline for disposal or recycling information at (714)834-6752.

Spill Response Agencies

Orange County Fire Authority
Health/Hazardous Matererials Program
(714) 288-2541

Recycling & Hazardous Waste Disposal

City of Cypress
Department of Public Works
(714) 229-6741

Orange County
Recycling & Household Hazardous Waste Hotline
(714) 834-6752
Orange County

To Report Illegal Dumping

Deparment of Public Works
(800) 69-TOXIC

To Report a Clogged Catch Basin

City of Cypress
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Preventing Storm Water Pollution During

Painting

A Guide For

- **Professional Painters**
- **Dry Wall Crews and Plasterers**
- **Paper Hangers**
- **Floor Covering Installers**
- **General Contractors**
- **Home Builders and Developers**
- **Do-It-Yourselfers**

Published by:
City of Cypress
Public Works Department
Engineering Division

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Painting

All paints, solvents, and adhesives contain chemicals that are harmful to wildlife and humans. That is why proper handling and disposal of these products is so important.

Toxic chemicals from liquid or solid products or from cleaning residues or rags may enter the ocean via storm drains.

It is especially important not to clean brushes in an area where paint residue can flow to a street, gutter or storm drain. Once residue enters the storm drain system, it flows directly to the ocean.

Solutions

Handling, storing, and disposing of materials properly can prevent pollutants from entering the storm drains.

• General Business Practices

- Keep all liquid paint products and wastes away from the street, gutter, and storm drains. Liquid residues from paints, thinners, solvents, glues and cleaning fluids are hazardous wastes. When thor oughly dry, used brushes, rags, drop cloths and empty paint cans (lids off), may be disposed of as trash.
- Use water-based paints instead of oil based paints. Look for the words "Latex" or "Clean up with water" on the label.

- Don't use paints over 15 years old. They may contain toxic levels of lead.
- Reuse paint thinner. Set used thinner aside in a closed jar to out paint particles. Then pour off clear liquid for future use. Wrap the residue in newspaper and dis pose of it in the trash.

• Paint Removal

- Chemical paint stripping residue is a hazardous waste. For disposal information call the Orange County Household Hazardous Waste Hotline at (714) 834-6752.
- Chips and dust from marine paints or paints containing lead or tributyl tin are hazardous wastes. Dry sweep and call the Orange County Household Hazardous waste Hotline at (714) 834-6752.

- Paint chips and dust from non-hazardous dry stripping and stripping and sand blasting may be swept up.

- Use organic or non-toxic fertilizers and pesticides. Do not fertilize or use pesticides near ditches, gutters or storm drains.
- Store pesticides, fertilizers, and other chemicals in a covered area to prevent runoff.
- Do not blow, sweep or rake leaves into the street, gutter or strom drain.
- Conserve water by using drip irrigation, soaker hoses, or micro-spray systems.

• Costruction

Sediment, from excavation and other construction projects, ist he most common pollutant washed from worksites. Sediment entering the ocean harms sea life and disrupts the food chain upon which both fish and people depend.

- Keep all construction debris away from street, gutter and storm drain. Look for and clean up material that may have traveled away from your property.
- Keep materials out of the rain by storing them indoors or outdoors with a secure cover.
- Plan grading and excavation for dry weather.
- Cover excavated material and stockpiles of asphalt, sand, etc., with plastic tarps.
- Prevent erosion by planting fast-growing annual and perennial grasses.
- Use a crushing company to recycle cement, asphalt and porcelain.

Spill Response Agencies

Orange County Fire Authority
Health/Hazardous Matererials Program
(714) 288-2541

Recycling & Hazardous Waste Disposal

City of Cypress
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Orange County

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City of Cypress

To Report a Clogged Catch Basin

Department of Public Works, Division
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Preventing Storm Water Pollution During

Home Repair and Remodeling

A Guide For

- **Homeowners**
- **Do-It-Yourself Remodelers**
- **Do-It-Yourself Painters**
- **Do-It-Yourself Landscapers**

Published by:
City of Cypress
Public Works Department
Engineering Division

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These Best Management Practices (BMPs) will ensure a cleaner city and ocean.

• Household Hazardous Waste

Household toxics, such as common household cleaners, paint products and motor oil, can pollute the ocean and poison the groundwater if not disposed of as hazardous waste.

- Take your household chemicals and toxics to a local Household Hazardous Waste Roundup instead of dumping them on the ground, down the sink or into a gutter, street or storm drain.
- Call the Los Angeles County Household Hazardous Waste Department (714) 834-6752 to find out when a neighborhood roundup event will take place in your community.

• Concrete & Masonry

Fresh concrete and mortar application materials can wash down or blow into the street, gutter or storm drain, posing a hazard to sea life humans.

- Don't mix more cement than you will use.
- Store bags of cement and plaster under cover, protected from rainfall, runoff and wind, and away from gutters and storm drains.
- Never dispose of cement washout or concrete dust on driveways, streets, gutters or stormdrains.

• Painting

All paints and solvents contain chemicals that are harmful to sea life. Toxic chemicals can come from liquid or solid products or from cleaning residues on rags. It is especially important to prevent these chemicals from entering drains.

- Never clean brushes or rinse paint containers into a street, gutter or storm drain.
- For oil-based paints, paint out brushes to the maixmum extent possible. Clean with thinner and then filter and reuse thinner.
- For water-based paints, paint out brushes to the extent possible, then rinse in the sink.
- When thoroughly dry, used brushes, empty paint cans (lids off), rags and drop cloths may be disposed of as trash.
- Chemical paint stripping residue, including saturated rags, is a hazardous waste and should be taken to a household hazardous waste collection event.
- Chips and dust from marine paints or paints containing lead or tributyl tin are also hazardous wastes. Sweep them up and save them for a household hazardous waste collection event.
- Reuse leftover paint for touch-ups or recycle it at a local household hazardous waste collection event, where it will be recycled or donated to a local graffiti paint-out program.

• Landscaping & Gardening

Intensive gardening and landscaping increase the likelihood that garden chemicals and soil will wash into storm drains. Pesticides and herbicides not only kill garden invaders, they also harm insects, poison fish and contaminate ground and ocean water.

• Safe Substitutes

Garden aphids and mites: mix one tablespoon of liquid soap and one cup of vegetable oil. Add one teaspoon of this mixture to a cup of water and spray.

Catepillars: apply products containing Bacillus thuringiensis to leaves

Ants: place boric acid dust or hydramethylnon baits in problem areas. Be sure it is inaccessible to children and pets (it is a mild poison.)

Roaches: apply boric acid dust to cracks and entry points (see ants above.) Place bay leaves on pantry shelves.

• If You Must Use Pesticides

- Use a pesticide that is specifically designed to control your pest. The insect should be listed on the label. Use only as directed.

• Pesticide Disposal

- Rinse empty pesticide containers and use rinse water as you would the product. Dispose of empty rinsed containers in the trash.
- Orange County residents can dispose of unused household toxics at the House hold Hazardous Waste Roundups, instead of dumping them into the sink, street, gutter or storm drain. Call (714) 834-6752 for more information.

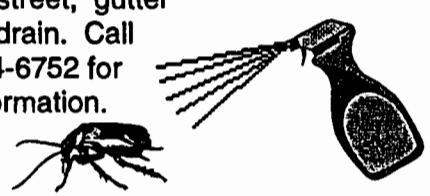

Spill Response Agencies

Orange County Fire Authority
Health/Hazardous Matererials Program
(714) 288-2541

Recycling & Hazardous Waste Disposal

City of Cypress
Department of Public Works
(714) 229-6740

Orange County
Recycling & Household Hazardous Waste Hotline
(714) 834-6752

To Report Illegal Dumping

Orange County
Deparment of Public Works
(800) 69-TOXIC

To Report a Clogged Catch Basin

City of Cypress
Department of Public Works, Division
(714) 229-6760

For more information about storm drain protection or additional brochures, please call the City of Cypress Public Works Department at (714) 229-6740.

This brochure is one of a series of pamphlets describing storm drain protection measures.
Pamphlets include: Painting • Food Service Industry • Fresh Concrete and Mortar Application • General Construction and Site Supervision • Heavy Equipment and Earth-Moving Activities • Landscaping, Gardening and Pest Control • Home Repair and Remodeling • Automotive Maintenance and Car Care • Roadwork and Paving • Horse Owners and Equine Industry.

Preventing Storm Water Pollution During

Landscaping Gardening & Pest Control

A Guide For

- **Home Owners**
- **Gardeners**
- **Landscapers**

Published by:
City of Cypress
Public Works Department
Engineering Division

Ocean Pollution Prevention: It's Up To Us

Cypess has two drainage systems: sewers and storm drains. The storm drain system was designed to prevent flooding by carrying excess rainwater away from city streets out to the ocean. Because the system contains no filters, it now serves the *unintended* function of carrying urban pollution straight to the ocean.

This pamphlet tells you how to prevent ocean pollution from "stormwater" or "urban unoff."

Rain, industrial and household water mixed with urban pollutants creates stormwater pollution. The pollutants include: oil and other automotive fluids, paint and construction debris, yard and pet wastes, pesticides and litter.

Urban runoff pollution flows to the ocean through the storm drain system which takes water and debris straight from the streets to the ocean. Each day 100 million gallons of polluted urban runoff enter the ocean untreated, leaving toxic chemical in our surf and tons of trash on our beaches.

Urban runoff pollution contaminates the ocean, closes beaches, harms aquatic life and increases the risk of inland flooding by clogging gutters and catch basins.

These Best Management Practices (BMPs) will ensure a cleaner city and ocean.

Landscaping Problems

Landscaping and garden maintenance activites can be major contribitors to ocean pollution. Soils, yard wastes, overwatering and garden chemicals become part of the urban runoff mix that winds its way through the streets, gutters and storm drains before entering the ocean. Poorly functioning sprinklers and overwatering, for example, waste water and increase the number of pollutants flowing into storm drains.

Fertilizers, pesticides and herbicides are washed off lawns and landscaped areas. These chemicals not only kill garden invaders, they also harm useful insects, poison fish and contaminate ground and ocean water.

Leaves, grass clippings and tree trimmings that are swept or blown into the street and gutter are also ocean polluters. These wastes clog catch basins, increasing the risk of flooding on your street, and carry garden chemicals into the ocean. As they decompose, they also absorb oxygen fish need to survive.

Solutions

• General Landscaping Practices

- Protect stockpiles and materials from wind and rain by storing them under tarps or plastic sheets.
- Plan grading adn excavation for dry weather.
- Use temporary check dams or ditches to divert runoff away from storm drains.

006078

- Prevent erosion by planting fast-growing annuals and perennial grasses. These will shield and bind the soil.

• Garden & Lawn Maintenance

- Conserve water by using drip irrigation, soaker, hoses or micro-spray systems.
- Do not blow or rake leaves into the street, gutter or storm drains.
- Use organic or non-toxic fertilizers.
- Do not overfertilize and do not fertiliize near ditches, streams or other water bodies.
- Store pesticides, fertilizers and other chemicals in a covered area to prevent runoff.

• Pesticide Alternatives

The "chemicals-only" approach to pest control is ony a temporary fix. A more common-sense approach is needed for a long-term solution, called "Intergrated Pest Management."

Physical pest control includes caulking holes, building barriers, hand picking pests and setting traps. Biological pest control includes purchasing and spreading predatory insects and bacterial insects. Chemical pest control, a last resort includes dehydrating dust, insecticidal soaps, boric acid, horticultural oils and pyrethrin based insecticides.

Problem

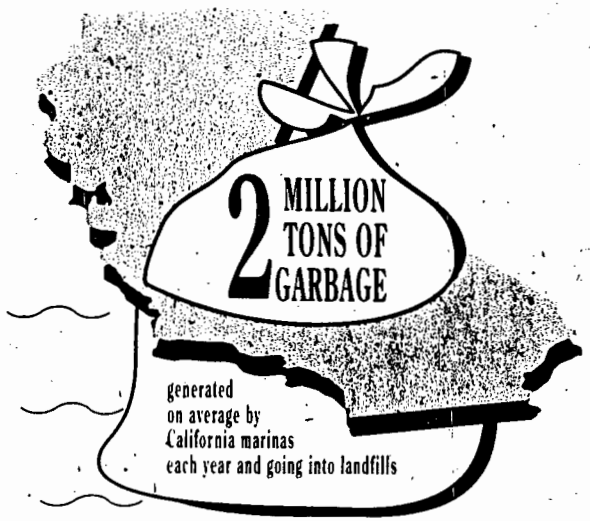

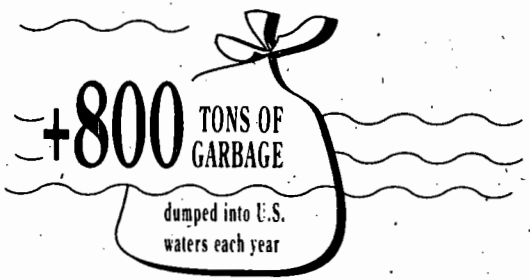

Over 60% of marine debris could be recycled now!

Get Involved Now!

In addition to recycling your marine debris you can participate on a larger scale by:

- starting a recycling program at your marina if one does not currently exist
- joining a beach or bay clean-up campaign
- supporting organizations actively working to protect the marine environment

For more information on recycling programs, contact:
Coastal Resources Center
P.O. Box 3084
San Rafael, CA 94912
(415) 527-3346

Department of Conservation
Division of Recycling
Program Development Branch
1025 P Street, Room 325
Sacramento, CA 95814
(916) 323-3508

RECYCLE MARINE DEBRIS
WIND AND WATER WON'T WASH IT AWAY

Design by Mark Hall Graphic Design, Copywriting by SDR Consulting, Illustration by Diane Varner Illustration. Printed on recycled paper.

Preven
Sea Sicknes

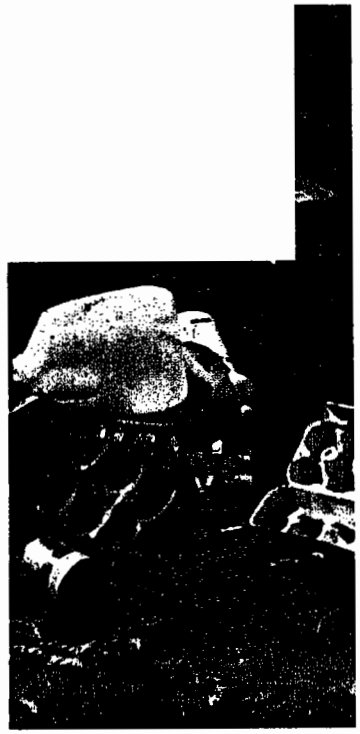

The Solution Is To Recycle

Marine Debris — A Preventable Sickness

The next time you are out on your boat or casually stroll down a dock, take a look around. Is the water clean, is the shoreline free of debris, is animal life abundant? The answer is probably no. The ocean is threatened. Threatened by a sickness that you can prevent—the dumping of your debris into the water.

The U.S. Coast Guard estimates that over 800 tons of garbage are dumped annually into U.S. waters. California marinas alone, generate 5 to 3,000 tons of garbage per marina each year.

Every time you toss your trash into the ocean you become part of the problem. Your trash could be responsible for the death of an animal, a boating accident, or a polluted beach.

There is a solution — something you can do — stow your trash and recycle it.

Four Easy Steps to Recycling

Successful marine debris recycling requires that you...

1. Stop dumping trash into the ocean. Whether you are on a boat or enjoying the ocean from shore, don't carelessly toss your debris. Every can, cigarette butt, and plastic bag hurts!

2. On shore or at sea, stow your trash and separate recyclable items. You can recycle newspaper, glass jars and bottles, some plastics, paper, aluminum and steel cans, cardboard, scrap metal, wood, oil, batteries, and more. Recent studies indicate that over 60% of a marina's garbage can be recycled. Dispose of your non-recyclable trash in an appropriate receptacle.

3. Take your recyclable items to a recycling center. Centers are available in most communities and many marinas have their own recycling program.

4. Purchase wisely. When you buy new products look for items packaged in recyclable materials, or better yet, purchase reusable items. The less you need to throw away or recycle, the better for the ocean, the environment, and your pocket book.

There are obvious reasons to recycle:

- *saves natural resources*
- *eliminates trash in the ocean*
- *provides an alternative to the use of landfills*

There are also some not so obvious reasons to recycle:

- *provides a cost-effective way to eliminate trash*
- *helps maintain a marina's waste management costs (which eventually come back to you, the consumer)*
- *provides positive PR for you, your vessel, and your marina*

CITIES OF CYPRESS, LA PALMA, LOS ALAMITOS & SEAL BEACH
PROTECT THE ENVIRONMENT WHEN WE RECYCLE
FUNDED BY A USED OIL RECYCLING GRANT FROM THE CALIFORNIA INTEGRATED WASTE MANAGEMENT BOARD
State Oil Recycling Hotline 1-800-CLEAN UP

USED MOTOR OIL

PROPER MANAGEMENT

Bring to service station, "quick lube" shop, drop-off location, or household hazardous waste collection for recyclin Inquire about curbside collection. D not mix with other automotive fluid

BENEFITS OF PROPER MANAGEMENT

Prevents:
- soil and water contamination
- damage to septic systems an wastewater treatment facilitie

Can be rerefined and reused as fuel.

HAZARD PROPERTIES

Toxic

OIL FILTERS

GASOLINE

ANTIF

AUTO RECYCLER®

The Automobile Care for the Environment Guide

AUTO BATTERIES

ABOUT TIRES:

Nearly 200 million worn passenger tires are generated each year. Some are recycled into products like rubber mats or footwear, while others are burned as fuel or retreaded and sold again. Recycling and retreading keep millions of scrap tires out of landfills each year.

PROPER TIRE MANAGEMENT

- **Purchase retreaded tires!** Currently, approximately 400 million gallons of oil are saved each year due to the use of retreaded tires. Doing so, also reduces municipal tire procurement and disposal costs, and saves you money! For more information on retreaded tires, call the Tire Retread Information Bureau at (408) 372-1917.
- **Properly maintain tires!** This extends wear and increases the chance that they can be retreaded.
  1) Keep tires inflated at recommended inflation level. Underinflation can waste up to 5% of a car's fuel! Check every two weeks.
  2) Repair punctures; maintain alignment; rotate tires every 6,000 - 8,000 miles.
  3) Check tread wear indicators (on tires) periodically. When tire tread is worn to same height as tread wear indicator, retread or replace tire.

For more information on tire safety and maintenance, contact the Tire Industry Safety Council at (202) 783-1022.

HAZARD PROPERTIES:

Toxic: May cause injury or death upon ingestion, inhalation, or skin absorption (depends on dose, length of exposure).
Flammable: Can be ignited by a flame, spark, ignition source or hot surface, under almost all temperature conditions.
Corrosive: A chemical (or its vapors) that can burn or destroy living tissues at the site of contact, and deteriorate or wear away the surface of a material.

Prepared by EHMI,
Environmental Hazards Management Institute,
10 Newmarket Road,
P.O. Box 932,
Durham, NH 03824

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WIPER FLUID

TRANSMISSION FLUID

POWER STEERING FLUID

BRAKE FLUID

HOUSEHOLD HAZARDOUS WASTE

The County of Orange has four Household Hazardous Waste Collection Centers available FREE to Orange County citizens. (Proof of residency may be required.)

COLLECTION CENTER LOCATIONS

ANAHEIM REGIONAL COLLECTION CENTER

1071 N. BLUE GUM STREET
Located between the 91 & 57 Fwys
at the corner of La Palma Avenue
and Blue Gum Street in Anaheim
**Visit the Stop & Swap to obtain partially used household products at no charge.*

IRVINE REGIONAL COLLECTION CENTER

6411 OAK CANYON
Next to City of Irvine Corporate Yard.
From the (5) freeway take the Sand Canyon exit, go Southwest to Oak Canyon and turn right.
**Visit the Stop & Swap to obtain partially used household products at no charge.*

HUNTINGTON BEACH REGIONAL COLLECTION CENTER

17121 NICHOLS STREET
Next to Rainbow Recycling and Disposal.
Major cross streets are Beach Blvd.
and Warner Ave. in Huntington Beach.

SAN JUAN CAPISTRANO REGIONAL COLLECTION CENTER

PRIMA DESHECHA LANDFILL
From the (5) freeway take Ortega Hwy. (74),
east to La Pata Avenue, turn right and
follow road to Landfill entrance.

COLLECTION CENTER HOURS OF OPERATION:

Tuesday through Saturday
9:00 a.m. to 1:00 p.m.

Collection Centers are Closed:

Rainy Days; Christmas, Independence, New Years and Thanksgiving Days.

Hazardous waste is not accepted from businesses, schools, government agencies, churches, non-profit organizations.

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City of Cypress
Department of Public Works

Best Management Practices for Construction Activities

The following represents the minimum standards of good housekeeping which must be implemented on all construction sites regardless of size.

- Eroded sediments and other pollutants must be retained on site and may not be transported from the site via sheetflow swales, area drains, natural drainage courses or wind.

- Stockpiles of earth and other construction related materials must be protected from being transported from the site by the forces of wind or water.

- Fuels, oils, solvents and other toxic materials must be stored in accordance with their listing and are not to contaminate the soil and surface waters. All approved storage containers are to be protected from the weather. Spills must be cleaned up immediately and disposed of in a proper manner. Spills may not be washed into the drainage system.

- Excess or waste concrete may not be washed into the public way or any drainage system. Provisions shall be made to retain concrete waste on sites until they can be disposed of as solid waste.

- Trash and construction related solid wastes must be deposited into a covered receptacle to prevent contamination of rainwater and dispersal by wind.

- Sediments and other materials may not be tracked from the site by vehicular traffic. The construction entrance roadways must be stabilized so as to inhibit sediments from being deposited into the public way. Accidental depositions must be swept up immediately and may not be washed down by rain or other means.

- Any slopes with disturbed soils or denuded of vegetation must be stabilized so as to inhibit erosion by wind and water.

- Other

---

* The above Best Management Practices are detailed in the California Storm Water Best Management Practices Handbook March 1993.
* Questions regarding these practices should be directed to the Cypress Dept. of Public Works (714) 229-6752.

City of Cypress

Department of Public Works

GUIDELINES FOR CLEANING AUTOMOTIVE SERVICE FACILITIES

Steam/Pressure Washing of Vehicle Maintenance Areas & Fuel Dispensing Areas

* Block the storm drain and collect water/waste for disposal to the sanitary sewer (with the prior approval of the local sanitation district).

Pressure Washing Sidewalks, Parking Lots, Common Areas

* If soap or any other cleaning agent is used, block the storm drain and collect water/waste and discharge to the sanitary sewer (with the approval of the local sanitation district).

* If only tap water with no cleaning agent is used, then the following Best Management Practices (BMPs) must be implemented before pressure washing:

  ⇒ Prior to washing, clean and/or sweep all large debris from the area, and

  ⇒ Clean any oil/auto fluid spills with an appropriate dry method, such as kitty litter or other absorbent, and dispose of appropriately.

  ⇒ To the extent practicable, the wash water must be directed to vegetative or unpaved areas where it would percolate,

  ⇒ If visual observance of the wash water indicates contamination (cloudy, colored, presence of suspended solids), additional Best Management Practices such as temporary retention of wash water (sandbags around storm drain inlets) or filtration methods must be implemented prior to discharge.

◊ Questions regarding these practices should be directed to the Cypress Dept. of Public Works (714) 229-6752.

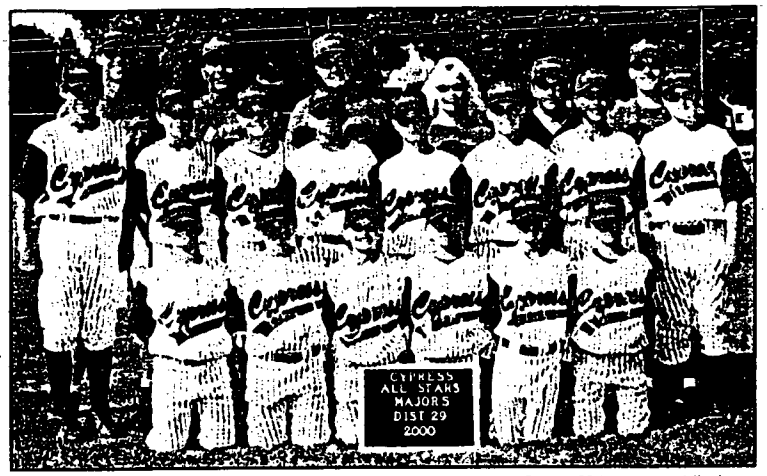

The Cypress Federal Little League Major All-Stars won the California District 29 tournament that took place July 1-19, and featured 15 different area league all-star teams. Cypress won the tournament with a come-from-behind victory in the 6th inning of the final game. The team now moves on to the California Sectional Tournament in Huntington Beach. Team members include (from left, front row) John Short, Mott Gras, Brett Tanos, Chad Colvin, Michael Raines, Jacob Novy, (middle) Jeff Fenoglio, Adam Wilk, Trey Meeker, Jordan Lara, Matt Sherren, Michael Morrison, Billy Swanson, Bradford Belote, (back) Coach Tom Gras, Coach Rabin Rice, Coach Alan Meeker, Player Agent Lisa Morrison, Coach Frank Sherren and Manager Randy Tanos.

Cypress Stars Head to National Championships

A team of local baseball players from the Cypress area will be competing in the AAU National Championship Tournament in Peoria, Ariz., from July 28 to Aug. 5.

Participating players include, from Cypress High School, Steve Clark, Robert Hook, Andrew Lara, J.J. Lovejoy, Justin Masigila, Rusty Murray, Brian Parkhill, Rosel Samala and Richard Zarate; from Kennedy High School, Shawn Benevante, Kevin and Matthew Monahan.

Other players inclde Steve Fabela, Doug Ford, Nick Henry, Kyle Stanley and A.J. Sappi.

They will be competing with teams from all over the nation for this title for 17-year-old players.

Many of the players have been playing tournament ball together for five years.

Team Needs Uniforms

The Cypress High School Girls Basketball Program is trying to purchase new uniforms and warm-up outfits for the upcoming 2000-2001 basketball season.

Donations of $100 are rewarded with recognition in the annual program; $500 donators will receive a complimentary team photo, a half-page recognition in the program and two complimentary admissions to all Cypress High School girls' basketball home games. For information, call (714) 746-1358 or 746-8336.

RECYCLE MOTOR OIL

Did you know that one gallon of used oil can pollute 1 million gallons of drinking water! So don't be a quack SEND IT BACK!

THE RIGHT WAY!
- Change your oil
- Put used oil in sealable containers
- Bring to used oil collection center

THE QUACKED WAY! (THE WRONG WAY)
- Pour used oil down the storm drain
- Put used oil in the trash
- Dump oil into the ground
- Mix used oil with other products

THIS IS A FREE SERVICE TO THE PUBLIC

Locations...

CYPRESS

Auto Zone
5471 Lincoln Ave.
Mon.-Sat. 8am-10pm
Sun 8am-8pm

Discount Auto Services
Ball Rd. at Holder
Mon.-Fri. 8:30am-10pm
Sun 8am-8pm

Metric Motors of Cypress
6042 Cerritos Ave.
Mon.-Fri. 7:30am-6pm
Some Sat. 8am-2pm

Masterlube
5971 Ball Rd.
Mon.-Fri. 8:00am-6pm
Sat. 8am-5pm

Econo Lube N Tune
Cerritos Ave at Walker
Mon.-Sat. 8am-6pm

Jiffy Lube Center
4042 Lincoln Ave.
Mon.-Sat. 7am-7pm
Sun 8am-6pm

M&N Coastline Auto & Tire Service
4005 Ball Rd.
Mon.-Fri. 7:30am-6pm
Sat. 7:30am-6pm
Sun. 8am-4pm

Big O Tires
4052 Cerritos Ave.
Mon.-Fri. 8am-6pm
Sat. 8am-5pm
Sun. 8am-4pm

Masterlube
5904 Lincoln Blvd.
Mon.-Fri. 8:00am-5pm
Sat 8am-5pm

Call Center For Hours of Operation & Quantities Accepted

HOTLINE FOR: Cypress, La Palma, Los Alamitos & Seal Beach (714)229-6708
STATE HOTLINE: 1-800-CLEAN UP (253-2687)

LA PALMA

Firestone Store
Orangethorpe & Valley View
Mon.-Fri. 7:30am-6pm
Sat. 8am-5pm

LOS ALAMITOS

Jiffy Lube Center
3311 Katella Ave.
Mon.-Sat. 7:00am-7pm
Sun. 8am-6pm

SEAL BEACH

Leisure World Union 76
Seal Beach Blvd. at Westminster
Mon.-Sat. 7am-8pm
Sat 7am-1pm

M&N Coastline Auto & Tire Service
12239 Seal Beach Blvd.
Mon.-Fri. 7:30am-6pm
Sat. 7:30am-6pm
Sun. 8am-4pm

RECYCLE USED OIL

Funded by a Used Oil Recycling Grant from the California Integrated Waste Management Board

Photo by Amy Myers

Alex Kostich, 30, of Burbank won the 10-mile event at the 32nd Annual Seal Beach Rough Water Swim on July 15, with a time of 3:08:25.

Photo by Amy Myers

Mission Viejo's Jennifer McLeod, 25, was the top female finisher in the Seal Beach 10-mile swim on July 15, and finished second overall among all finishers, with a time of 3:21:49.

Photo by Amy Myers

Sarah Alvy, 11, writes "Eat My Bubbles" on the back of Kelsey Myers, 10, at the Seal Beach Rough Water Swim held on July 15.

Self Storage, Low Prices

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One Coupon Per Rental • No Other Offers Apply
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32ND ANNUAL SEAL BEACH ROUGH WATER SWIM RESULTS

July 15, 2000

200 Yard - Ages 7-8

Male

Place	Name	Age	Time
1	Scott Goodall	8	4:34
2	Brock Redondo	8	4:53
3	Kurt Buchholzer	8	5:16
4	Lee Myers	8	5:20

Female

Place	Name	Age	Time
1	Maddie Gobson	7	4:53
2	Blair Elliot	8	4:59
3	Dan Watkins	7	5:10
4	Rachel Fattal	6	5:31

400 Yard - Ages 9-10

Male

Place	Name	Age	Time
1	Jonathan Howard	10	8:00
2	Ryan Fattal	9	8:24
3	Daniel Levy	9	8:36
4	Curtis Barber	10	8:58

Female

Place	Name	Age	Time
1	Alexis Schauer	10	8:03
2	Margaret Spach	9	8:13
3	Kinsey Buchholzer	10	8:23
4	Meghan Dwyer	9	8:24

800 Yard - Ages 11-12

Male

Place	Name	Age	Time
1	Nick Dwan	12	10:29
2	Tootsie Freund	12	11:05
3	Larry Kukimoto	12	11:06
4	Greg Goodall	12	11:19

Female

Place	Name	Age	Time
1	Brett Pedley	11	11:31
2	Anna Redondo	11	11:41
3	Sasha Patterson	12	11:57
4	Elizabeth Arzeno	12	12:52

1200 Yard - Ages 13-14

Male

Place	Name	Age	Time
1	Chris Howard	14	13:19
2	Paul Dwan	14	13:57
3	Kevin Bruton	14	14:57
4	Kahan Kim	14	15:04

Female

Place	Name	Age	Time
1	Kelsie Quan	14	15:07
2	Samantha Rodriguez	13	15:10
3	Karin Wassenthal	13	15:12
4	Jacqueline Welch	13	15:16

1 Mile

Male

Place	Name	Age	Time
1	Lee Moss	15	18:27
2	Grant Levy	37	19:03
3	Marc Wolic	32	19:08

Age Division Winners

Group	Name	Age	Time	Overall
1-18	Lee Moss	15	18:27	1
25-29	Jaime Ramirez	26	19:37	9
30-34	Marc Wolic	32	19:08	3
35-39	Grant Levy	37	19:03	2
40-44	Tracy Edwards	43	19:25	5
45-49	Rich Phelps	46	19:30	6
50-54	Patrick Dwan	51	20:53	14
55-59	C.H. Meier	57	21:04	15
60-64	Ted Porter	63	29:36	45
65-69	Frank Reynolds	68	29:36	45

Female

Place	Name	Age	Time
1	Ashley Szachowski	19	
2	Seeffany Pearce	23	
3	Jane Boys	31	

Age Division Winners

Group	Name	Age	Time	Overall
1-18	Kelly Boudreau	13	21:20	5
19-24	Ashley Szachowski	19	20:41	6
25-29	Wendy Alcock	29	20:57	4
30-34	Jane Boys	31	20:49	3
35-39	Kathy Moss	39	22:15	7
40-44	Karen Kaufut	43	23:14	10
45-49	Pat Magdaleno	48	27:31	21
50-54	Linda Gaytan	52	28:35	28
55-59	Linda Bird	57	26:41	18
60-64	Joanne Little	63	28:29	27
65-69	Audrey Hughey	65	1:32:45	43

3 Mile

Male

Place	Name	Age	Time
1	Peter Hay	32	49:40
2	Marc Wolic	32	50:00
3	Chris Guest	40	50:16

Age Division Winners

Group	Name	Age	Time	Overall
19-24	Loren Dotson	23	1:00:45	21
25-29	Mike Rainwater	26	54:29	11
30-34	Peter Hay	32	49:40	1
35-39	Grant Levy	37	50:01	4
40-44	Chris Guest	40	50:16	3
45-49	Jack Angstadt	45	57:01	16
50-54	Patrick Dwan	51	55:37	12
55-59	Tagra Tav Hamaiku	59	58:11	13
60-64	Peter Reidle	62	1:19:49	47
65-69	Buddy Belcher	66	1:06:15	33
70-74	Bud Schumacher	70	1:18:21	45

Female

Place	Name	Age	Time
1	Heidi Christensen	41	51:01
2	Meghan Quan	15	51:03
3	Jenny Cash	42	51:42

Age Division Winners

Group	Name	Age	Time	Overall
1-18	Meghan Quan	15	51:03	2
19-24	Elizabeth Schapla	22	57:15	4
25-29	Elizabeth Nagy	25	1:00:14	8
35-39	Cynthia Wyels	35	57:45	5
40-44	Heidi Christensen	41	51:01	1
45-49	Edna Moore	45	1:10:41	15
50-54	Kristin Hemold	51	1:15:37	17
55-59	Ellen Shochra	57	1:18:17	19
60-64	Betsy Jordan	63	1:11:43	16

10 Mile

Male

Place	Name	Age	Time
1	Alex Kostich	30	3:08:25
2	Peter Egan	36	3:25:06
3	Scott Zarag	40	3:30:32

Age Division Winners

Group	Name	Age	Time	Overall
25-29	Trevor Gabriel	26	4:13:14	10
30-34	Alex Kostich	30	3:06:25	1
35-39	Peter Egan	36	4:25:06	2
40-44	Scott Zarag	40	3:30:32	3
45-49	Michael Suttle	47	4:16:01	12
50-54	Don Van Cleve	50	5:48:36	18

Female

Place	Name	Age	Time
1	Jennifer McLeod	25	3:21:49
2	Laurel Hoopes	26	3:34:46
3	Sherry Eatrell	48	4:22:27

Olympic Teams to Compete in Los Al

By KENDRA KRAUSE
For the News-Enterprise

From June 29 to July 9, all of the world's Olympic water polo teams will be in Los Alamitos at the Water Polo National Aquatic Center on the Joint Forces Training Base, competing in two tournaments.

The men's Olympic team will engage in a fierce competition for the UPS Cup, from June 27 to July 2.

The women's teams will face each other from July 4 to 9 for the Holiday Cup.

The opportunity to witness these competitions is one that, simply put, should not be passed up; it means watching Olympic athletes who are representing America.

"This is a great opportunity to test us, to see where we are as far as world water polo," said John Vargas, head coach of the men's team.

He recounted the medals that the team has won in recent Olympic years, also mentioning that the last gold medal came home in 1904.

He sees a great opportunity to bring one home this year.

According to the women's team captain, Julie Swail, "This is the last chance for the Olympic teams to get a look at one another."

It's a definite precursor to the Olympic games, especially since the six teams playing in this event are the same teams playing in Australia.

It's also just an amazing way to spend an evening.

The teams see a golden opportunity to educate the community about water polo, as well as garner some "home town support," which they may lack in Australia.

"The more people we can get, the better, to show what water polo is; it's good to have fans, especially when you're at home, but mostly we would like to teach people about water polo," said player Heather Petri.

Maureen O'Toole, who has seen six World Championships and who will retire after Sydney, sees the importance of fan support.

"When you play in Italy, the fans just go off, and the place is packed. We're proud to be at home and representing our country, and having a crowd would be helpful. We don't get to play at home very often," O'Toole said.

Fanna Fugua, not a member of the team but spending the summer practicing with them, has a unique view of the teams.

"Everyone knows what they want, and they pull themselves together for a common goal. They're all role models," she said.

And maybe that in itself is a valid reason to attend; good role models are sometimes hard to find.

So grab the youngsters and watch a game. For information, call (562) 430-1071.

Team USA Tournament Schedule

All games at 11700 Lexington Drive, off Farquhar in Los Alamitos.

Date	Opponent	Time
Men's UPS Cup		
Tuesday, June 27	vs. Australia	8:30 p.m.
Wednesday, June 28	vs. Canada	8:30 p.m.
Thursday, June 29	vs. USA	8:30 p.m.
Friday, June 30	vs. Yugoslavia	8:30 p.m.
Saturday, July 1	vs. Italy	1:30 p.m.
Sunday, July 2	*FINALS*	12 to 3 p.m.
Women's Holiday Cup		
Tuesday, July 4	vs. Canada	7:00 p.m.
Wednesday, July 5	vs. Australia	8:30 p.m.
Thursday, July 6	vs. France	8:30 p.m.
Friday, July 7	vs. Kazakhstan	8:30 p.m.
Saturday, July 8	vs. Netherlands	5:30 p.m.
Sunday, July 9	*FINALS*	4 to 7 p.m.

Tickets:
$10 adults; $6 students with ID
Finals:
$12 adults; $8 students

Photo by Kendra Krause

U.S. Women's Olympic Water Polo team members, (from left) Brenda Villa, Courtney Johnson and Julie Swail, discuss the upcoming pre-Olympic tournaments to be held at the Joint Forces Training Base in Los Alamitos.

Australia Trip Proves Costly

The U.S Women's water polo national team returned home on June 18 from a productive two weeks of training in Australia, but two-meter defender Robin Beauregard injured her knee prior to the team's final match with the Aussies on Thursday, June 15.

Having played three test matches with the Aussies in Sydney, drawing two losses and a tie in the process, the U.S. was eager to cap off its trip in winning fashion. That opportunity came on Thursday night, June 15, in Kawana on Australia's Sunshine Coast.

The U.S. joined their hosts in an Olympic torch relay that night, with team members perched atop Harley Davidson motorcycles. The fanfare in the streets, however, would give way to the fourth contest in a week's time between the U.S. and Australia.

Unfortunately, it was a game marred by rain, shot clock problems and freak injuries. When the storm had calmed, the sunshine saw Australia coming out on top, 5-4.

The team's arrival at the pool was less than pleasant. As the team was walking across the rain-soaked pool deck, Beauregard slipped awkwardly, injuring her knee.

The U.S. misfortune snowballed after the game's first sprint, with the Aussies drawing first blood.

"Individually, we had some great performances," said USA coach Guy Baker. "Notably, Nicolle Payne in goal, Brenda Villa from the outside, and Ellen Estes and Gubba Sheehy out of set."

It is uncertain when Beauregard will be able to return.

The team will make its Holiday Cup debut at 7 p.m. on July 4 against Canada, which will be followed by a fireworks spectacular.

For information, visit www.holidaycup.com.

2000 USA WATER POLO ROSTERS

(As of 6/19/2000)

Men's Roster

Name	Position	Height	Weight	Hometown	College
Chris Aguilera	GK	6-3	195	Saratoga	Stanford
Gavin Arroyo	2M Def	6-3	190	Orange	UC Berkeley
Tony Azevedo	Driver	6-0	188	Long Beach	Stanford
Ryan Bailey	2M	6-5	245	Long Beach	UC Irvine
Layne Beaubien	2M Def	6-5	205	Coronado	Stanford
Ryan Flynn	2M	6-8	245	Los Angeles	UC Berkeley
Dan Hackett	GK	6-6	195	Irvine	UCLA
Chris Humbert	2M	6-7	230	Lodi	UC Berkeley
Sean Kern	2M	6-6	230	Honolulu, HI	UCLA
Kyle Kopp	2M Def	6-8	235	Long Beach	Cal State Long Beach
Chi Kridell	2M Def	6-2	210	Seal Beach	Cal State Long Beach
Robert Lynn	2M Def	6-2	200	Long Beach	USC
Merrill Moses	GK	6-2	205	Palos Verdes	Pepperdine
Sean Nolan	GK	6-6	215	Palo Alto	UC Berkeley
Chris Oeding*	Driver	6-1	185	Newport Beach	UC Berkeley
Jeremy Pope	Utility	6-5	240	Clovis	Pepperdine
Brad Schumacher	Utility	6-4	200	Bowie, MD	Pacific
Wolf Wigo	Driver	6-2	190	New York, NY	Stanford

Head Coach: John Vargas
Assistant Coaches: Monte Nitzkowski, John Tanner

Women's Roster

Name	Position	Height	Weight	Hometown	College
Robin Beauregard	2M Def	5-9	175	Huntington Beach	UCLA
Ellen Estes	2M	6-1	165	Newton	Stanford
Courtney Johnson	Driver	5-4	130	Salt Lake City, UT	UC Berkeley
Ericka Lorenz	Attacker	5-11	155	San Diego	UC Berkeley
Heather Moody	2M	6-1	170	Green River, WY	San Diego State
Bernice Orwig	GK	6-0	175	Anaheim	USC
Maureen O'Toole	Playmaker	5-11	145	Piedmont	Hawaii
Nicolle Payne	GK	5-9	150	Cerritos	UCLA
Heather Petri	2M Def	5-11	155	Orinda	UC Berkeley
Rachel Servi	2M Def	5-11	150	Bainbridge Island, WA	San Diego State
Kathy "Gubba" Sheehy	2M	5-10	155	San Diego, CA	San Diego State
Coralie Simmons	Playmaker	5-8	140	Hemet	UCLA
Julie Swail *	Def	5-8	145	Placentia	UCSD
Brenda Villa	Playmaker	5-4	150	Commerce, CA	Stanford
Catherine von Schwarz	2M	5-8	170	Annapolis, MD	UCLA

Head Coach: Guy Baker
Assistant Coaches: Ken Lindgren, Chris Duplessy

* Team Captain

Do It Right!

Bring your household hazardous waste to a collection center. Items accepted include: automotive products, oil & latex paint, pesticides & herbicides, household cleaners, hobby & pool supplies, and household batteries. This is a FREE public service.

COLLECTION CENTERS ARE OPEN: Tuesday thru Saturday, 8:00 am to 4:00 pm. Our collection centers are closed on holidays: Christmas, Independence, Labor, Memorial, New Year's, and Thanksgiving Days.

The County of Orange has several Household Hazardous Waste Collection Centers available to residents upon proof of residency.

COLLECTION CENTER LOCATIONS

Anaheim Regional Collection Center

Huntington Beach Regional Collection Center

Hazardous waste is not accepted from businesses, schools, government agencies, churches, and non-profit organizations.

Call the Household Hazardous Waste HOTLINE at: (714) 834-6752 for quantity instructions and additional information.

RECYCLE USED OIL

Advertising funded by a grant from the California Integrated Waste Management Board.

Do You Know Where The Water In Your Storm Drain Goes?

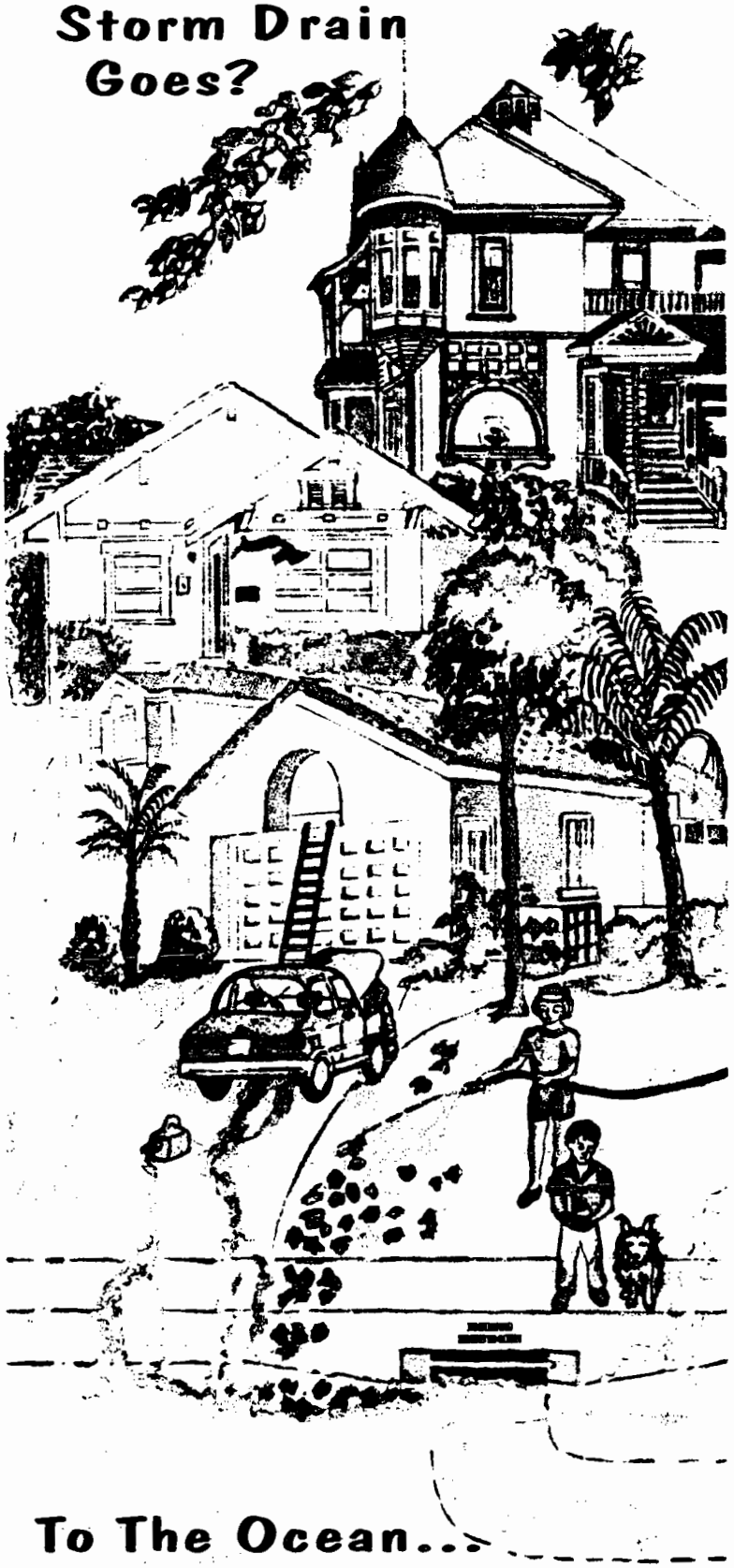

To The Ocean...

For More Information...

Questions regarding this notice may be directed to:

The Orange County Public Facilities and Resources Department's Stormwater Section at (714)567-6363

Or

Pavlova Vitale of the Santa Ana Regional Water Quality Control Board at (909) 782-4130

ORANGE COUNTY • STORMWATER • PROGRAM

Orange County Stormwater Program
10852 Douglass Rd.
Anaheim, CA 92806

006088

MOBILE DETAILING AND THE WATER QUALITY ACT

This flyer has been prepared at the request of the mobile detailing industry to provide direction with regard to compliance with the federal Water Quality Act of 1987.

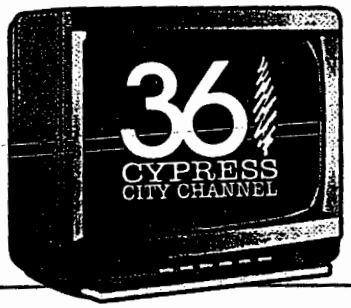

Cypress City Channel 36 Programming

2nd and 4th Mondays

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Lost Pet Bulletin, 6:30 p.m. & 6:45 p.m.

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10:00 a.m. & 6:00 p.m.

Discover Cypress
10:30 a.m. & 6:30 p.m.

Crime File
11:00 a.m. & 7:00 p.m.

Your City Your Police
11:30 a.m. & 7:30 p.m.

Cypress Cares
12:00 p.m. & 8:00 p.m.

Modern Video
12:30 p.m. & 8:30 p.m.

Annenberg CPB
1:00 p.m. & 9:00 p.m.

Navy & Marine Corp News
2:00 p.m. & 10:00 p.m.

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Youth Commission
1st & 3rd Tuesday, 6:30 p.m., Community Center

Friends of Cypress Cultural Arts
1st Wednesday, 7:00 p.m., Senior Center

Friends of Cypress Recreation and Parks, Inc.
2nd Wednesday, 7:00 p.m., Senior Center

Cable TV and Technology Commission
1st Thursday, 4:00 p.m. , City Hall

Senior Citizens Commission
2nd Wednesday, 3:00 p.m., Senior Center

Recreation & Community Services Commission
3rd Tuesday, 7:30 p.m., Community Center

Traffic Commission
3rd Tuesday, 3:00 p.m., City Hall

Cultural Arts Commission
1st Thursday, 7:00 p.m., Community Center

Tips to Keep Our Oceans Clea

Recent incidents of beaches being closed due to polluted waters should b concern to all of us. Not only do our beaches provide a recreational are southern California residents, they also serve as the home for marine Protecting our coastal waters begins with you.

To help protect our ocean waters, we need to eliminate the source pollution which enter the ocean via catch basins and storm drains. The phr **"NO DUMPING - DRAINS TO OCEAN"**, which is stenciled on city cc basins, means just that - whatever enters goes directly to the ocean. paper cup or grass clippings you thought about tossing in the catch basin end up at the beach and will not be removed at a treatment facility as m people believe.

You can help keep our oceans clean by practicing the following:

- Place all litter in a trash receptacle. Do not throw trash on the grou because it could eventually end up in a catch basin and, subsequently, ocean.
- Follow manufacturer's instructions while applying fertilizers, herbicides, pesticides at your home. Excessive use may cause the material to run your lawn and into the gutter.
- If your automobile is leaking oil, have it repaired. Oil on the driveway street will enter the storm drain system with irrigation water or during rai weather.
- Be sure to pick up after your pets while taking them for walks around th neighborhood.
- Prevent construction materials, such as concrete, plaster, or paint, fro entering the storm drain system by using appropriate containment barrier when working with these materials.

For additional water quality information, please call the Department of Publi Works at (714) 229-6740. Remember, it is up to you to make sure that ou ocean waters remain safe for future generations.

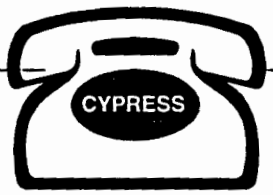

City Telephone Numbers

Business License	229-6712
City Clerk	229-6680
Mayor/Council	229-6699
City Manager	229-6688
Community Development	229-6720
Building Division	229-6730
Redevelopment Agency	229-6729
Finance Department	229-6713
Orange County Fire Department (Business)	744-0400
Orange County Library, Cypress	826-0350
Personnel Office (Job Line)	229-6681
Police Department	
Administration	229-6620
Crime Prevention	229-6626
Public Works	229-6740
Engineering Division	229-6741
Maintenance Division (7:30 a.m. - 4:30 p.m.)	229-6760
24 Hour Graffiti Removal	229-6760
Recreation and Park District	
Community Center Facilities & Programs	229-6780
Senior Citizens Center	229-2005
Senior Citizens Nutrition	229-2007
Cypress City Hall Information	229-6700

City of Cypress Website address is: **www.ci.cypress.ca.us**

Recycling In Cypress

When it comes to recycling, Cypress is right on track. Recycling has been alive and well in the City for years. In 1989, the California State Legislature passed recycling legislation that required every city and county in California to divert 25% of its trash from landfills by 1995 and 50% by the year 2000. Cypress can proudly say that by 1995 the City had surpassed the State's year 2000 goal by diverting 63% of its trash from nearby landfills. To continue on this great endeavor of protecting the environment, here are some recycling tips:

- Shop carefully and buy only what you need. All too often we purchase products that we don't really need and end up never using.
- Don't use a bag if you're buying only one item or if you will be consuming or using the item as soon as you leave the store.
- Buy non perishable products in large quantities or in bulk. One large container creates less garbage than several smaller ones.
- Reduce the amount of junk mail you receive.
- Use reusable containers with lids instead of aluminum foil, plastic bags, or plastic wrap.
- Say "NO" to items you're not going to use. If you don't need napkins, straws, plastic utensils or condiments, leave them behind at the restaurant or store.
- Buy appropriately packaged products. Packaging represents about 30% of all our waste, and much of the packaging isn't even needed to protect the product.

Recycling and reducing the amount of waste your household generates helps the environment and saves a variety of resources, including energy, water, minerals and trees. It also helps reduce pollution. Finally, by recycling you are helping the City continue to meet a state mandate to reduce waste.

36 CYPRESS CITY CHANNEL

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Recreation and Park District	
Community Center Facilities & Programs	229-6[illegible]
Senior Citizens Center	229-2[illegible]
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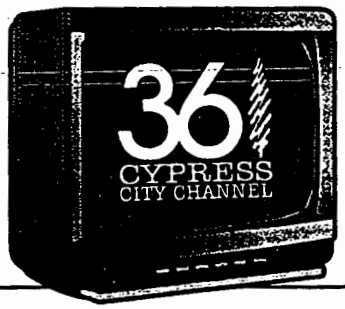

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Recycling in 2000

A special "Thank You" goes out to all Cypress residents for their participation in the City's curbside recycling program. Your outstanding participation resulted in less trash generated which means less trash hauled to the landfills. This is significant because it means that our local landfills will not reach capacity as early as originally predicted in the late 1980's and the City met the State requirement of diverting 25% of the waste stream away from the landfill. Recycling really does work!

The year 2000 is important for the City of Cypress as this is the year when the State required diversion of 50% must be met by all California cities and counties. Cypress residents are encouraged to continue practicing the three "R"s - Reduce, Reuse and Recycle - so that we can meet this goal. Only with your support can we meet these requirements.

To further demonstrate the benefits of recycling, here are some recycling facts:

- Recycling aluminum results in 95% less air pollution and 97% less water pollution than producing aluminum from natural resources.
- We save over a ton of resources for every ton of glass recycled - 1,330 lbs. of sand, 433 lbs. of soda ash, 433 lbs. of limestone and 151 lbs. of feldspar.
- If the Pilgrims had six-packs, we'd still have the plastic rings from them today. The long decomposition period of material such as plastic makes it even more important to recycle.

Recycling - it not only benefits you - it benefits all of us.

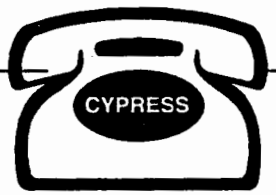

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Prevent Water Pollution While Making Home Improvements

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Friends of Cypress Recreation and Parks, Inc.
2nd Wednesday, 7:00 p.m., Senior Center

Cable TV and Technology Commission
1st Thursday, 4:00 p.m. , City Hall

Senior Citizens Commission
2nd Wednesday, 3:00 p.m., Senior Center

Recreation & Community Services Commission
3rd Tuesday, 7:30 p.m., Community Center

Traffic Commission
3rd Tuesday, 3:00 p.m., City Hall

Cultural Arts Commission
1st Thursday, 7:00 p.m., Community Center

With summer right around the corner, many Cypress residents are thinking about making improvements to their homes to improve their appearance and property value. While making these improvements, keep in mind that construction activity which takes place on your property can have a significant impact on water quality.

If your home improvements include things such as installation of a concrete driveway or walkway, brick wall or planter, re-stuccoing or painting the outside of your home, or even re-plastering your swimming pool, please be sure that you, or the contractor hired to do the work, take all the necessary steps to make sure that debris does not go into the gutter. Often times the City receives reports of discharges, such as concrete or plaster, which originated from a home improvement project, flowing down the gutter and into the storm drain. This debris can build up in a catch basin and damage the storm drain system. More importantly, it eventually flows into the ocean and poses a threat to water quality and sea life.

If you or your contractor are identified as the contributor to this illegal discharge, you will be required to clean up the impacted area and could be subject to a fine. This is why it is so important to prevent any debris resulting from home improvement projects from going into the gutter. Make sure that all debris gets properly disposed of in a trash container so we can protect the storm drain system and our coastal waters. We all like to make our homes look nice. Let's also do our part to make our oceans look nice too.

To obtain a brochure about the best management practices for home improvement projects, call the Department of Public Works at (714) 229-6740.

NO DUMPING! DRAINS TO OCEAN

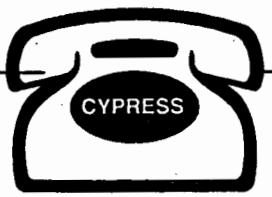

City Telephone Numbers

Business License	229-6712
City Clerk	229-6680
Mayor/Council	229-6699
City Manager	229-6688
Community Development	229-6720
Building Division	229-6730
Redevelopment Agency	229-6729
Finance Department	229-6713
Orange County Fire Department (Business)	744-0400
Orange County Library, Cypress	826-0350
Personnel Office (Job Line)	229-6681
Police Department	
Administration	229-6620
Crime Prevention	229-6626
Public Works	229-6740
Engineering Division	229-6741
Maintenance Division (7:30 a.m. - 4:30 p.m.)	229-6760
24 Hour Graffiti Removal	229-6760
Recreation and Park District	
Community Center Facilities & Programs	229-6780
Senior Citizens Center	229-2005
Senior Citizens Nutrition	229-2007
Cypress City Hall Information	229-6700

City of Cypress Website address is: **www.ci.cypress.ca.us**

Lincoln Avenue Scheduled For Facelift

On September 28, 1998, the Cypress City Council approved the $4.3 million Lincoln Avenue Streetscape Project which includes construction of aesthetic improvements to the Lincoln Avenue Bridge across the Coyote Creek. Construction on this project began in October 1998 and is estimated to be completed in July 1999.

The construction of entrance monuments at the Lincoln Avenue bridge is only part of the major improvements scheduled for this street. Other improvements will include new roadway surface treatments, bridge and ornamental street lighting, landscape treatments at both ends of the bridge and parkway planter extensions located at major intersections. Also included is planting of severol new street trees in conjunction with the reconstruction and relandscaping of medians. Finally, new storm drains and asphalt are planned for this major thoroughfare. All scheduled construction will occur between Valley View Street and Bloomfield Avenue.

The streetscape improvements to Lincoln Avenue are a major component of the Rediscover Lincoln Project. This is a multifaceted effort to revitalize the Lincoln Avenue corridor. Recognizing that a facelift is not enough, the City Council is working in partnership with the community to consider implementing land use and design standards for private development on Lincoln Avenue, including strategies for stimulating economic development.

1998 Business Appreciation Breakfast

On October 6, 1998, the Cypress City Council held its annual Business Appreciation Breakfast. This event was hosted in the Cypress Ballroom at the Courtyard Marriott. Approximately 50 business leaders attended representing many of the City's major corporations. The purpose of the breakfast is to recognize the efforts of the business community in preserving and promoting a stable tax base and healthy local economy for the City of Cypress.

The Mayor highlighted some of the major economic development activities which took place in the past year. During this time Home Depot, OfficeMax, Sizzlers and IHOP all opened their doors for business. Joining the roster of business park tenants were companies such as TDK, Johnson Controls, G-Tech and the Exhibit Group/Giltspur. Homestead Village arrived to service the growing demand for additional hotel rooms. In summary, a total of over one million square feet of new commercial, office and warehouse industrial space was approved during the past year, valued at over 30 million dollars.

The Mayor concluded by saying that the City is an active partner for economic development. By working in partnership with the business community, the City can continue to provide the high quality of life which has become the calling card for the City of Cypress.

Protecting Our Beaches and Environment

Guess where pollutants go when they are poured into the gutter or find their way into the storm drain? You guessed it, straight to the ocean. Although our community has no ocean-front property, the City of Cypress is only seven miles from the nearest beach.

The City of Cypress has a great record of recycling and properly disposing of hazardous materials. Protecting the environment for current and future generations is of utmost concern to the city. But, like most cities, Cypress has two drainage systems: sewers and storm drains. The storm drain system was designed to prevent flooding by carrying excess rainwater from our city streets to the ocean. Unlike the sewer system, the storm drain system contains no filters. So where the storm drains keep us safe from flooding, they can also serve the unintended and unfortunate function of carrying urban pollution straight to the ocean.

The most hazardous conditions arise when rain is mixed with industrial or household water containing pollutants, creating dangerous runoff pollution. These pallutants can include oil and other automotive fluids, paint and construction debris, yard fertilizers, pesticides and pet wastes.

Each day polluted urban runoff enters the ocean untreated, leaving toxic chemicals in our surf and trash on our beaches. Urban runoff pollution contaminates the ocean, closes beaches, harms aquatic life and increases the risk of inland flooding by clogging gutters and catch basins.

This can be a serious problem, but there are manageable solutions. If hazardous materials from the workplace, garage, or home are handled, stored and disposed of properly, pollution can be reduced dramatically. To do your part in protecting the environmental well-being of our city and nearby oceans, please follow these easy guidelines:

- Take cleaners, paints, thinners, automotive fluids and pesticides to a Hazardous Materials Collection Center. For locations and operating hours call the Household Hazardous Waste Hotline at (714)834-6752.
- Never clean brushes or rinse paint containers into a street, gutter or storm drain.
- Use organic or non-toxic fertilizers and pesticides and avoid dispensing them near ditches, gutters and storm drains.

Working together we can insure a beautiful clean future. For more information or a brochure on urban runoff pollution, please call the **Cypress Public Works Department at (714)229-6740.**

West-Comm Celebrates A Successful First Year

On October 1, 1998, West-Comm, the consolidated police communications center formed by the cities of Cypress, Los Alamitos and Seal Beach celebrated its first year of operation. The center was established as a three city joint venture to provide state of the art public safety communications and cost savings.

In the first year of operation, West-Comm received 19,000 9-1-1 calls, 81,000 requests for service and handled an average of 163 incidents per day. West-Comm's first year of operation is considered a success and will go on its way saving the three cities an estimated $500,000 during its five years of operations.

REPRESENTATIVE PUBLIC EDUCATION MATERIALS

CITY OF DANA POINT

Recycle Now - There's A Future In It

Recycling News

October 1, 1999 Volume VII, No. 4

KEEP RECYCLING WORKING - AMERICA RECYCLES

On November 13, California cities will have the opportunity to participate in the second annual America Recycles Day - a national campaign designed specifically to reinforce public support of recycling. Your City, the County of Orange and SOLAG Disposal would like to "Keep Recycling Working." You can help by remembering to reduce, reuse, recycle and compost your waste, but most importantly... purchase products that contain recycled materials. By working together we can preserve our planet, promote a healthier environment and secure the future of recycling.

SPECIAL GIVEAWAY

To celebrate America Recycles Day, on Saturday, November 13 from 8:00 a.m. to 12:00 p.m. Tierra Verde Industries, a green waste recycling facility located in San Juan Capistrano, has offered to donate compost for use in your yard. Bring a shovel and a large container/bag to Federal Doc Loading, located on Alicia Parkway between Avila and Aliso Creek Road in the City of Laguna Niguel to collect the free compost material.

FIND A NEW USE FOR AN OLD ITEM

Have an old bike that needs fixing or a chair that is missing a leg? Or how about some other large item that needs some minor repairs? Before you throw that item away, why not give it to someone who could put it to good use? There are many organization such as Goodwill Industries, Children's Hospital of Orange County (CHOC) and the Salvation Army that make it their business to bring new life to older reusable items. In the spirit of goodwill and less waste, SOLAG Disposal, Inc. together with your City encourage you to contact these organizations before you throw a reusable item in the trash. For telephone numbers to these or other non-profit organizations, please look in the yellow pages under "Thrift Shops," or you may contact Solag Disposal for more information. Also remember that your contribution may be tax deductible.

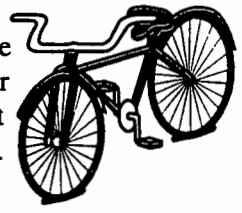

ENVIRONMENTAL AWARDS

The Cities of Dana Point, Laguna Niguel, San Clemente, San Juan Capistrano and the County of Orange would like to recognize the following businesses for their outstanding efforts to reduce waste and recycle in their community:

Doubletree Guest Suites, Dana Point • Flex Foot, Inc. • Trade Winds Motel
Unichem Industries, Inc. • Tall Mouse Arts & Crafts, Inc. • Auto Care
Launderland • Mission Yamaha, Inc. • Saturn of San Juan Capistrano

Each of these businesses are being recognized by their respective cities for their dedication to help keep our environment clean and their commitment to recycling and source reduction.

TRASH FRIENDLY WEBSITES

www.choose2reuse.org - This website will give you valuable information and on-line resources to help in your efforts to re-use everyday items.

Solag Disposal - www.solag.com
County of Orange - www.oc.ca.gov/iwmd/
City of Laguna Hills - www.ci.laguna-hills.ca.us/

Holiday Collection Schedule

We will not pick-up on these holidays:
New Years • Memorial Day • Independence Day • Labor Day • Thanksgiving Day • Christmas Day
However, trash collection will resume one day later.

IS YOUR TRASH WEIGHING YOU DOWN?

Items that are too large to fit in your container are considered bulky-items. As a customer of SOLAG Disposal you are entitled to two bulky-item pick-ups per calendar year, at no extra charge. Almost anything that can be managed by a two-person crew will be picked up as a bulky-item. This includes old furniture, appliances, carpet, mattresses, water heaters, etc. Loose items need to be bagged or bundled, and no liquids or drums of any kind will be accepted. Before you put out large items to be landfilled, consider donating these items to a non-profit organization. If you would like more information about bulky-item pick-ups or non-profit organizations willing to pick-up your reusable items, please contact one of the customer service representatives at (949) 240-0446, Ext. 1.

Dana Point tackles runoff in storm drains

■ The city is testing different filters to catch pollution. It hopes to set an example for other municipalities.

Eric C Sanitate
OUR TIMES

DANA POINT—The city is testing two types of storm drain filters as part of an urban runoff prevention program that water quality officials hope will spawn imitators in other Orange County coastal cities.

The filtration systems have been installed in 21 of the city's 300 catch basins and storm drain inlets. The city will monitor their effectiveness for several months before deciding whether to expand the program or purchase more of the filters.

"One of the things that we as an agency set out to do is clean up [pollution] into the creeks and streams and ocean," Robert Warren, public works director, said.

"If we take a proactive stance and help shame our upstream neighboring cities to do something similar ... then it's going to do a whole lot of good."

The city installed large, metal mesh baskets called DrainPacs in six storm drains near San Juan Creek, Salt Creek and Dana Point Harbor late last year. The baskets run the length of the drain to catch trash and debris that would otherwise wash into the ocean.

The DrainPacs were chosen because they were relatively inexpensive and easy to maintain, Warren said. The filters cost about $1,600 to install and will cost about $700 a year in upkeep.

Warren said the city will analyze the pollutants collected from the DrainPacs during routine maintenance and determine what sort of particles are being filtered out of the water.

"If they work well, we may buy a few more this next summer," Warren said. "How many more of those depends on how well they work."

South Coast Water District General Manager Michael Dunbar said the program could prove useful to other coastal cities that may look at Dana Point's field tests before implementing urban runoff prevention programs.

"I think it's an excellent way to look at two different techniques and kind of do a comparison test," Dunbar said. "That data can be used by other cities and agencies when looking at installing similar systems."

The city is also testing a more elaborate filter, similar to those found in swimming pools, to remove petroleum and other fluid pollutants from the runoff in 15 catch basins.

Those devices, called Fossil Filters, use highly absorbent material to soak up oil and grease while allowing water to pass through. The filters are housed in a structure that captures solid particles as well.

Because these filters are relatively new, the city has not determined the maintenance costs, Warren said.

Proper maintenance will be the key to the program's success, said Monica Mazur, spokeswoman for the Orange County Health Care Agency.

Although she applauded the city's efforts, Mazur warned that the filters could actually create problems around storm drains if they aren't cleaned regularly.

"They need to be maintained properly so they don't cause other problems, such as odors," she said.

Warren said every inlet in the city could feature some type of filtration device within the next five years if the filters being tested get city approval.

"We're in the process of trying to discover what products there are and which work best," he said. "Anything we can do is to our own benefit, particularly since we're at the end of the stream. We're the recipients of everyone else's waste."

Victor Armenta, assistant project manager at United Storm Water, inspects a filter in a storm drain in Dana Point. The city is testing filters in 21 catch basins. MEDIHA FEIZAGIC/DIMARTINO/OUR TIMES

JOIN us on TRASH AWARENESS DAY to make OUR neighborhood a cleaner place to live!

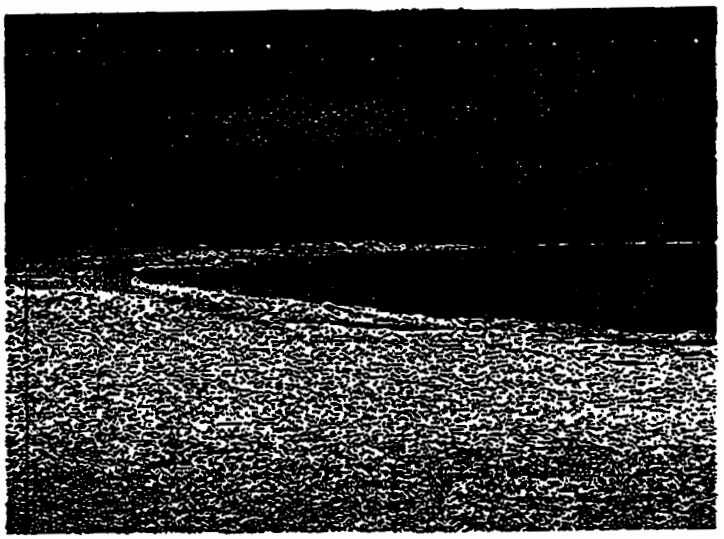

July 10, 1999

On Saturday, July 10th, we will be coming together as a neighborhood to clean up our streets and yards. A dumpster will be available for you to dump at the following site:

The red house on the corner of Violet Lantern and La Cresta.

Come join us on Saturday. The trash dumpster will be manned from 8am to 2pm. Trash bags will be provided at the dumpster site. If you can help for an hour or all day, please call 460-8108. This event is being sponsored by Lantern Village Association, Dana Point City, and Solag.

City News

GREEN WASTE COLLECTION PROGRAM

On November 4, 1996, Solag Disposal in cooperation with the City of Dana Point implemented Phase I of the Curbside Green Waste Collection Program. Residential subscribers may place green waste generated from their residence at the curb using any of the following methods: standard trash containers (up to 35 gallon), plastic bags or bundled trimmings/branches (not to exceed 2 ft., by 4 ft.). The maximum weight of the containers should not exceed the physical strength of the plastic bag or be over 50 pounds. This program is voluntary and there is not an additional fee for this service. Recycling green waste will assist Dana Point towards the 50% State mandated recycling goal by the year 2000.

Phase II of the program which encompasses all the private/gated communities was implemented May 1997. Solag must have the homeowner association's permission to bring a third truck on private streets. If you live in a private/gated community and would like to participate in the green waste collection program, request that your homeowners association call Solag.

Here is a list of green waste material, which will be collected:

- **Grass Clippings**
- **Wood Scraps**
- **Branches (not to exceed 4" in diameter and 4' in length)**
- **Leaves**
- **Weeds**
- **Plant Materials**
- **Garden Trimmings**

If you have any questions regarding the Green Waste Collection Program or would like to know if your area is included in the program, call Solag at **(949) 240-0446.**

STREET LIGHT REPAIRS

San Diego Gas & Electric (SDG&E) own and maintains the City's streetlights located within the public right-of-way. SDG&E has been providing this service since the City incorporated in 1989.

If you find a street light that is out, flickering or continuously on (day and night) you should either call SDG&E directly at 1-800-411-7343, or call Francisco Sanchez, City of Dana Point Public Works Department at (949) 248-3509. If you call the City we will log your call and notify SDG&E of the problem. When you call either number please leave the following information.

1. Approximate address of street light
2. Your name
3. Your phone number
4. Nature of the problem

This information will help to properly locate the troubled light and will help us to follow up to be sure the light has been repaired. Repairs are usually completed within a week, barring unforeseen circumstances such as inclement weather and local emergencies.

In case of an emergency, such as a light being damaged by a traffic accident, you should call 1-800-411-7343. This number can also be called for damaged electrical wires and utility poles.

NEIGHBORHOOD WATCHERS FALL OFF

Crime is down and so is the number of block captains for Dana Point's Neighborhood Watch program.

"Everyone is becoming complacent," said Scotty Smith, who as a member of Volunteers In Police Services spearheaded the program's growth over the past five years.

According to Smith and VIPS Program Director Peggy Nunes, the total Neighborhood Watch block captains fell in the last quarter of 1998 from a one-time high of 175 to 100.

"People get burned out and they want someone else to take over the job," Smith said. "But so far, we haven't found replacements."

Smith said in addition to block captains tiring of the commitment, media reports of falling crime rates have made some people believe that the program has done its job.

"People think they can just leave their doors open now and their home unattended," Smith said. "The criminals just love that."

Lt. Paul Ratchford, Chief of Dana Point Police Services agrees that despite the fact that crime is down, the Neighborhood Watch program is a vital weapon in the war against crime.

Ratchford said much of the successful police work done over the past few years was directly related to residents acting as extra eyes and ears for the police.

In fact, the Neighborhood Watch program was created to teach people how to protect themselves from crime and how to work with the Sheriff's Department. The goal of the program is crime prevention through community involvement.

Key elements of the program are the Neighborhood Watch meetings. During these meetings, neighbors gather at a home and become acquainted with the proper procedures in reporting possible crimes.

"Neighborhood Watch is based on the theory that if you know your neighbors, and they know you, you can keep the sheriff's (deputies) alert to suspicious activity," said Smith. "Hosting a Neighborhood Watch meeting in your home is simple."

According to Smith, to arrange for a meeting, call 248-3517/3585.

The program will then supply the resident with flyers to notify neighbors of the meeting, the time and address.

A Neighborhood Watch representative and a sheriff's deputy will speak at the meeting, addressing specific concerns in the area.

"Once the neighbors have met, talking about crime prevention is easier," said Smith. "Then people feel more comfortable reporting suspicious activity to the police. And your street will feel more like a community than just a place where you live."

Smith said the program is constantly looking for volunteers and block captains. For more information call the number above.

Registration on page 35

For registration see page 35

WHAT TO DO WITH BULKY ITEMS?

A bulky item is an item that cannot fit into the blue recycling or black trash containers, such as a chair or a couch. Other bulky items include any item that can be easily handled by a two- (2) man crew and may include the following: a refrigerator, washer, dryer, table and lawn furniture.

Each residential unit is entitled to two (2) free-of-charge bulky item pick-ups per year from Solag Disposal, a maximum of four (4) items per pick up; however, additional pick-ups can be arranged at a nominal fee per pick-up. Refrigerators and freezers can also be picked up. If you are interested in a bulky item pick-up, please call one of the Solag Disposal customer service representatives at (949) 240-0446. All items must be placed at curbside on the scheduled collection day by 6:30 a.m.

HOW DO I GET TO THE HOUSEHOLD HAZARDOUS COLLECTION CENTER?

Remember it is illegal to dispose of Household Hazardous Waste (HHW) through the automated residential program. There are four HHW Collection Centers in operation throughout Orange County. To ensure proper disposal of the HHW it must be disposed of at a certified collection center. The nearest collection centers are located at the Prima Deshecha landfill in San Juan Capistrano and in the City of Irvine (see maps above).

Prima Deshecha Landfill

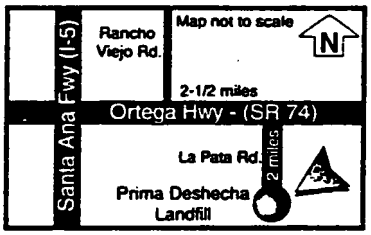

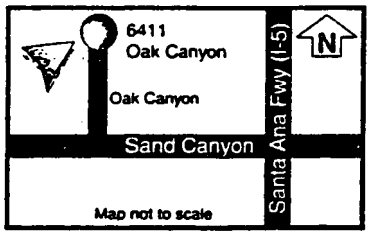

6411 Oak Canyon

HOUSEHOLD HAZARDOUS WASTE INCLUDES, BUT IS NOT LIMITED TO:

- Motor Oil
- Batteries
- Cleaning Products
- Wood Preservative
- Road Flares
- Pool Chemicals
- Pesticides
- Paint
- Solvents

The hours of operation are Tuesday through Saturday, 9:00 a.m. - 1:00 p.m. and closed Sundays, Mondays, holidays and rainy days. A maximum of 15 gallons or 125 lbs. of hazardous materials may be brought to the collection center per vehicle, per visit. If you need directions to the additional HHW facilities located throughout the county, please call the Orange County Integrated Waste Management information line at (714) 834-6752.

POOL WATER DISCHARGES

This notice is to explain the regulatory issues regarding the discharge of pool water and the two methods by which it may be discharged.

1. Many pools are plumbed to allow the discharge to go directly to the sanitary sewer. This is an acceptable and preferred method of disposal.
2. Where the discharge of pool water to the sanitary sewer is not feasible, federal law allows the release of dechlorinated swimming pool water. In Orange County the guidance for such releases requires pool owners to ensure that the following criteria are met:

a The residual chlorine does not exceed 0.1 mg/L (parts per million)
b The pH is between 6.5 and 8.5
c The water is free of any unusual coloration
d There is no discharge of filter media
e There is no discharge of acid cleaning wastes; and
f Any pipe connection to the storm drain system has permits from the city or county having jurisdiction

Compliance with this guidance can be verified using a pool testing kit. Excess chlorine can be removed by removing the chlorine tablets for a couple of days prior to discharge or by purchasing dechlorinating chemicals from local pool supply companies.

By ensuring compliance with these criteria, you will make a significant contribution toward keeping pollutants out of Orange County's creeks, streams, and receiving waters and help protect organisms that are sensitive to pool chemicals.

DANA POINT SUMMER CONCERT SERIES

August 15	UPSTREAM - Calypso Music
August 22	PAM LOE & HIP SHOT - Western Music
August 29	COVINA CONCERT BAND - Marches, Show Tunes and Dixieland,
Time:	4:30 p.m.
Location:	Heritage Park (Dana Point) - Old Golden Lantern Road
Cost:	Free
Sponsored by:	Lawn Chair & Picnic Society & City of Dana Point

COMMUNITY GROUPS

DANA POINT/CAPISTRANO BEACH HISTORICAL SOCIETY

Meetings - 4th Wednesday of every month (no meeting in July or August) Fax # (949) 248-5166

HERITAGE MUSEUM

Hours: 11:00 a.m. - 4:00 p.m.
Days: Tuesday through Saturday

 For registration see page 34

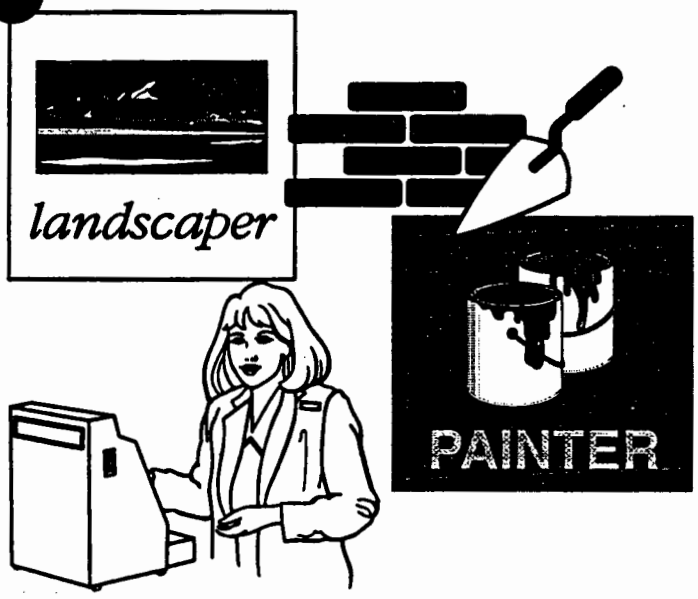

DAY WORKER PHONE EXCHANGE

"A Community Service by the City of Dana Point"

The City of Dana Point offers a convenient way to fill your temporary or permanent

r needs:

Phone: 949- 248-3558

Skills Offered Included:

- Painters
- Masonry
- Landscaping
- Cashiers
- Domestic Help
- Construction Helpers
- Companion to the Elderly

SPRING CLEANING
WHAT TO DO WITH BULKY ITEMS?

Spring is almost upon us and that means it will soon be time for "spring cleaning." For those items that are too large for the automated containers, call Solvang Disposal to arrange for a "bulky-item" pick up. Almost anything that can be managed by a two-man crew will be picked up as a bulky-item. This includes old furniture, appliances, carpet, mattresses, water heaters, etc. Items such as refrigerators, washers, dryers and water heaters (or white goods for short) are sent to a metal recycler, where the hazardous material is extracted and the remaining metal is melted down and reused. All other items are delivered to the landfill for disposal. Remember, before you put out large items to be landfilled, consider donating working appliances and reusable supplies to a profit organization. If you would like more information about y-item pickups or non-profit organizations willing to pick-up your reusable items, please contact Solag Disposal at (949) 240-0446, Ext. 1.

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1. Many pools are plumbed to allow the discharge to go directly to the sanitary sewer. This is an acceptable and preferred method of disposal.
2. Where the discharge of pool water to the sanitary sewer is not feasible, federal law allows the release of dechlorinated swimming pool water. In Orange County the guidance for such releases required pool owners to ensure that the following criteria are met.
   - **(a) The residual chlorine does not exceed 0.1 mg/L (parts per million);**
   - **(b) The pH is between 6.5 and 8.5;**
   - **(c) The water is free of any unusual coloration;**
   - **(d) There is no discharge of filter media;**
   - **(e) There is no discharge of acid cleaning wastes; and**
   - **(f) Any pipe connection to the stormdrain system has permits from the city or county having jurisdiction.**

Compliance with this guidance can be verified using a pool testing kit. Excess chlorine can be removed by removing the chlorine tablets for a couple of days prior to discharge or by purchasing dechlorinating chemicals from local pool supply companies.

By ensuring compliance with these criteria, you will make a significant contribution toward keeping pollutants out of Orange County's creeks, streams, and receiving waters and help to protect organisms that are sensitive to pool chemicals.

 For registration see page 26

006102

Recycle Now
There's A Future In It!

Recycling News

July 1, 1999 Volume VII, No 3

IMPORTANT NOTICE

NO DELAY IN TRASH COLLECTION THIS JULY 4TH

This year the Fourth of July falls on a Sunday. Currently the County landfills operate Monday through Saturday so you will not experience delay in trash service. On your normal collection day, please place your trash/recyclables out at the curb for collection.

PROPER DISPOSAL OF THE AMERICAN FLAG

As we celebrate America's Independence this Fourth of July we may notice that the flags we display have become torn or tattered beyond repair. This past year the editors of Recycling News received a letter from a World War II Veteran regarding proper disposal of an American Flag.

The Orange County Veterans will forward the flags to the American Legion Post where they will be Disposed of in conformance with tradition and local laws. Please mail your old American Flags to:

ORANGE COUNTY VETERANS
SERVICE CENTER OFFICE
1300 South Grand Avenue, building B
Santa Ana, CA 92705

TIPS TO REMEMBER WHEN YOU'RE AT THE BEACH OR PARK

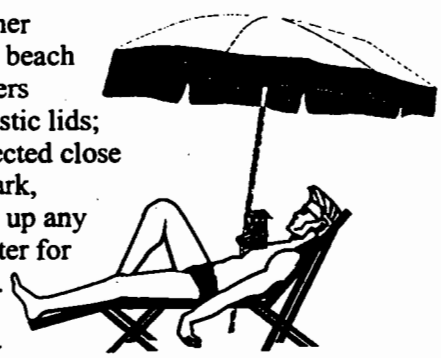

Did you know that our oceans provide most of the planet's oxygen, moisture and weather patterns? Every year, the Center of Marine Conservation sponsors a nationwide 3-hour beach clean-up, which has proven to be extremely effective. In 1987, in Texas alone, volunteers collected: 31,773 plastic bags; 30,295 plastic bottles; 15,631 six pack rings; 28,450 plastic lids; and 1,914 disposable diapers. And around the nation, the volunteer clean-up crew collected close to 2 million pounds of debris in just 3 hours. So next time you go to the beach or the park, remember to bring a trash bag and before you leave try to spend a few minutes picking up any litter you find. If you are interested in beach clean-up activities, please contact the Center for Marine Conservation at (202) 429-5609 or the Surfrider Foundation at (800) 743-7873.

IMPORTANT Y2K INFORMATION

By December 31, 2000 your city will need to be in compliance with the regulations set forth by state law AB 939. As you are already aware, AB 939 is the state-mandated requirement for each City throughout California to divert 50% of their waste stream away from the landfill by the Year 2000. Over the past several years the Editors of *Recycling News* have been discussing the 50% goal and the importance of reducing your waste, recycling and buying recycled products. Over the next year, your city will evaluating the programs currently in place and will review new ideas to promote the goals or the state law. Keep up the good work!!!!

Holiday Collection Schedule	**We will not pick-up on these holidays:** **- New Years Day - Memorial Day - Independence Day - Labor Day - Thanksgiving Day - Christmas Day** **However, trash collection will resume one day later.**

Unwanted Computer Parts - Help Your Community Recycle

Recently there has been a lot of talk about the year 2000 (Y2K) and the potential of imbedded computer chips disabling thousands of appliances, electronic products, etc. While the editors of ***Recycling News*** can neither confirm nor deny these reports, we would like to request our customers' help to try and locate alternatives to disposing of these items in the landfill. If you or someone you know can direct us to a non-profit organization willing to accept these items or a remanufacturer that would be interested in securing this material, please contact our office in writing.

Some locations that may take old computers (via the internet)
CALMAX - http://www.ciwmb.ca.gov/calmax
Detwiler Foundation - http:/www.detwiler.org
Goodwill Industries of Orange County -
http:/ocgoodwill.org/computer_donations.html

More Trash Friendly Websites

Solag Disposal, Inc. - www.solag.com
County of Orange - www.oc.ca.gov./iwmd/
Laguna Hills - www.ci.laguna-hills.ca.us

006104

Recycle Now There's A Future In It!

Recycling News

January 1, 2000 Volume VIII, No 1

SEASONAL RECYCLING TIPS (Some thoughts)

During this Holiday season remember that one of the biggest gifts you can give your children is a clean environment. Here are some of the ways you can recycle and reuse holiday leftovers.

Types of things that can be recycled include:

Tin Jars	Wrapping Paper	Glass Containers	Cardboard Boxes/Packaging

Cannot be recycled:

Tinsel	Bows/Ribbons	Holiday Lights	Styrofoam Peanuts*

* = Clean Styrofoam packaging peanuts can be reused or are accepted at several packaging/delivering companies (such as Mail Boxes, Etc.), please check your local listings.

Some products may not be recyclable in our program, but that doesn't mean they should go in the trash!!! Many nonprofit organizations around the area can reuse your seasoned clothing, toys, exercise equipment, bicycles and other items. If you have any questions, please contact one of our customer service representatives at (949) 240-0446.

RECYCLING YOUR CHRISTMAS TREE IS AS EASY AS 1-2-3....

Can you believe that the Holiday Season is already behind us? Well it's time again to recycle your Christmas Trees. Depending on where you live, collection of your trees will take place on your normal collection day during a two week period shortly after Christmas or after the New Year. Just follow these three simple steps:

FIRST, please review the front of your bill for the dates of the curbside collection of your Christmas trees.

SECOND, Remove all decorations, tinsel and stands (wood or metal) from the tree before collection. If your tree is over 8feet in height, please cut the tree in half.

THIRD, Place your tree at the curb next to your container on collection day. **On trash day a separate collection vehicle will pick up your Christmas tree.**

NOTE: Flocked trees or trees with nails, stands or ornaments cannot be recycled, but will be picked up and disposed of at the landfill. Please do your part to help recycle your trees.

ITS NEVER TOO LATE TO RECYCLE OLD CHRISTMAS CARDS

For the past 20 years St. Jude's Ranch for Children has recycled holiday, birthday, get well and all other occasion cards. St. Jude's Ranch is a non-profit home for abused and homeless children located in Boulder City, Nevada. People from across the United States and around the world send used cards to the Ranch. In 1992 nearly one and a half million cards were collected. If you would like to recycle your Christmas cards, please send them to:

St. Jude's Ranch for Children
P.O. Box 60100
Boulder City, NV 89006

If sending by United Parcel Service, send to:
St. Jude's Ranch for Children
100 St. Jude Street
Boulder City, NV 89005

The Ranch requests that you send the front of cards only and please do not include cards that have writing or other markings.

TRASH FRIENDLY WEBSITES

Each quarter the editor of ***Recycling News*** will be reviewing website and e-mail addresses on the Internet that may be of interest to our readers. The sites examine ways to **reduce** waste, avenues to **reuse** unwanted materials (such as donations to non-profit organizations), lists of **recyclable** material and directions to **backyard composting**.

http://www.1800cleanup.com -
For information on clean-up projects throughout the state.

http://www.envirofind.com -
To find information on all types of environmental businesses and other information.

Solag Disposal, Inc. - www.solag.com
Laguna Niguel - www.ci.laguna-niguel.ca.us
San Clemente - www.cty.org/san-clemente/
County of Orange - www.oc.ca.gov/iwmd/
Dana Point - www.ci.dana-point.ca.us
San Juan Capistrano - www.sanjuancapistrano.org

For a "buy-back" or "drop-off" recycling center near you contact the Department of Conservation at 1-800-RECYCLE (1-800-732-9253) or the California Integrated Waste Management Board at 1-800-253-2687.

FIND A NEW USE FOR AN OLD ITEM

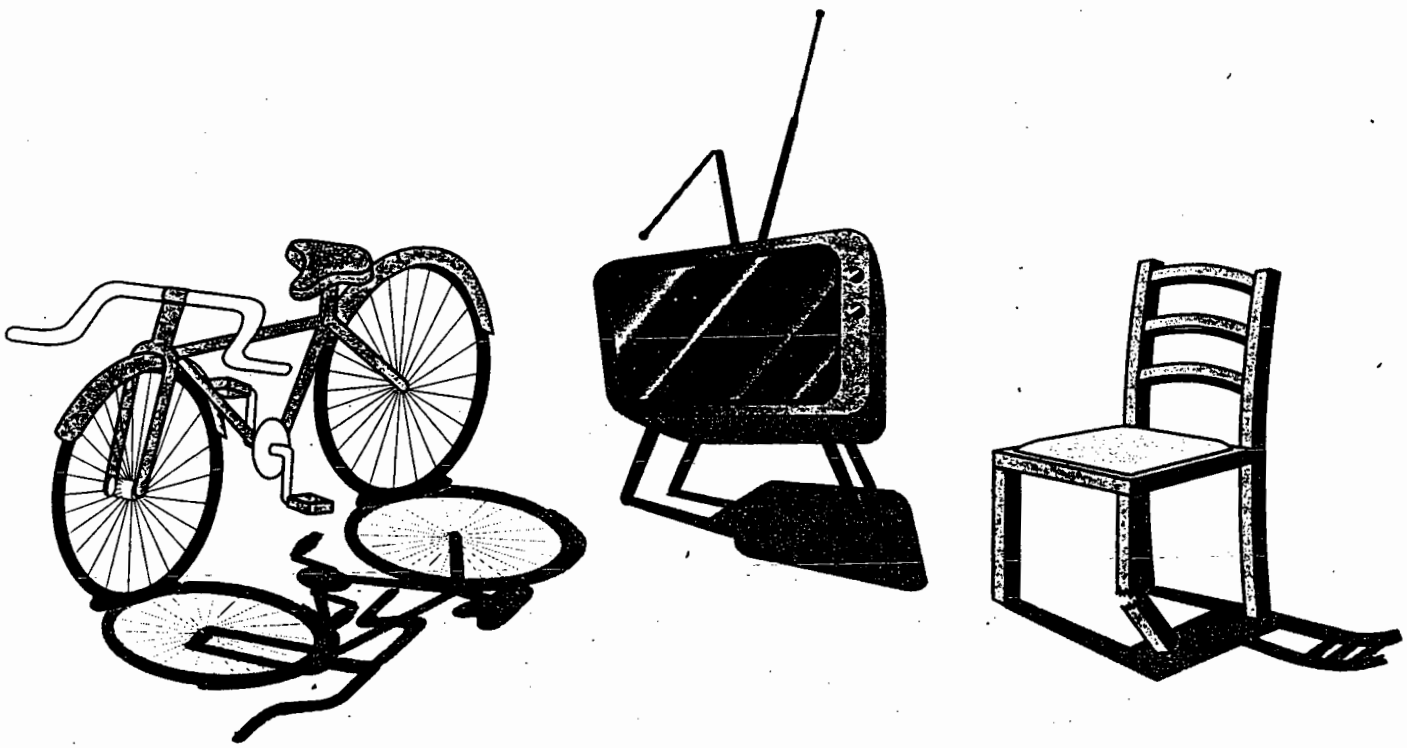

Have an old bike that needs fixing or a chair that is missing a leg? Or how about some other large item that needs some minor repairs? Before you throw that item away, why not give it to someone who could put it to good use? There are many organizations such as Goodwill Industries, Children's Hospital of Orange County (CHOC) and the Salvation Army that make it their business to bring new life to older, reusable items. In the spirit of goodwill and less waste, SOLAG Disposal, Inc. together with your City encourage you to contact these organizations before you throw a reusable item in the trash. For telephone numbers to these organizations, please look in the yellow pages under "Thrift Shops." Also remember that your contribution may also be tax deductible.

Recycle Now There's A Future In It!

Recycling News

April 1, 2000 Volume VIII, No. 2

EARTH DAY CELEBRATION

Come celebrate Earth Day with students and residents from the surrounding communities. On Saturday, April 22, 2000 from 8:00 a.m. to 12:00 p.m. your city together with SOLAG Disposal, Inc. will be hosting an Earth Day celebration and Children's Invention & Art Fair in the City of Laguna Niguel.

INVENTION & ART FAIR:

Bring the entire Family for a fun-filled morning including an Easter Egg Hunt (for children ages 1-12), members of the local fire department, Environmental Booths, Invention and Art Displays by local elementary students.

Hey Kids: before you throw that object in the trash, think about other things you can do with it?

Every day hundreds of items are thrown into the trash that could have served a better or more useful purpose. Your City is sponsoring an Invention and Art Fair to determine the best way to reuse old items. Can you invent something that is used around the house, in the garage or at school? How about designing an art project that can be shared with your friends and family? We want you to be creative, serious or silly. Your idea could be anything from a floor mat, a napkin holder or thousands of other inventive ideas. Most important, we want you to have fun! Each entry in the Invention & Art Fair will be judged based on innovation, creativity and usefulness. The top three winners from each category (Kindergarten - Second, Third - Fourth and Fifth - Sixth) will receive an award. All children participating in the Inventions & Art Show will receive recognition in the June 2000 Issue of *Recycling News*. Once your project is complete, call Dan Batty at (949) 240-0446 to reserve a spot at Earth Day 2000. To receive a free T-shirt, you must RSVP no later than April 10, 2000.

SPECIAL GIVE-A-WAY

To celebrate Earth Day, on Saturday, April 22 from 8:00 a.m. to 12:00 p.m. Tierra Verde Industries, a green waste recycling facility located in San Juan Capistrano has offered to donate compost for use in your yard. Bring a shovel and large container or bag to the site of the Earth Day Celebration in the City of Laguna Niguel located on Golden Lantern and Camino Los Padres to collect the free compost material.

TRASH FRIENDLY WEBSITES

Each quarter the editor of ***Recycling News*** will be reviewing website and e-mail addresses on the internet that may be of interest to our readers. The sites examine: ways to reduce waste, avenues to reuse unwanted materials (such as donations to non-profit organizations), types of recyclable material and instructions for backyard composting.

SOLAG Disposal - www.solag.com
www.choose2reuse.org - This website will give you valuable information and on-line resources to help in your efforts to re-use everyday items.
ecoboard.cc - Alternative material for decks, playground equipment, outdoor furniture.

Dana Point - www.ci.dana-point.ca.us
Laguna Niguel - www.ci.laguna-niguel.ca.us
San Juan Capistrano - www.sanjuancapistrano.org
San Clemente - www.cty.org/san-clemente/
County of Orange - www.oc.ca.gov/iwmd/
www.inkbank.com - Ink cartridges

Holiday Collection Schedule

We will not pick-up on these holidays:
New Years • Memorial Day • Independence Day • Labor Day • Thanksgiving Day • Christmas Day
However, trash collection will resume one day later.

EARTHY SAYS,

The beginning of the millennium is upon us and we need your help. In 1989 (eleven short years ago) all cities in the state of California were mandated to divert 50% of their waste stream away from the landfill by the end of the year 2000 (Public Resources Code 40000 et. seq,, better known as AB939). Your city has one of the most progressive programs available in the state of California, however it is more important now than ever before to stop and look at what items are being placed in your trash or recycling containers.

Over the past several years the Editors of *Recycling News* have been discussing the 50% goal and the importance of reducing your waste, recycling and buying recycled products. Over the next year, your city will be re-evaluating the programs currently in place throughout your City and will review new ideas to help us achieve the state-mandated goals. If you have questions about recycling or waste reduction, there is a detailed brochure that we would be happy to send to you (in English or Spanish) that will help explain the types of material that can be recycled. Earthy says, "Keep up the good work!"

NO DUMPING

Dana Point

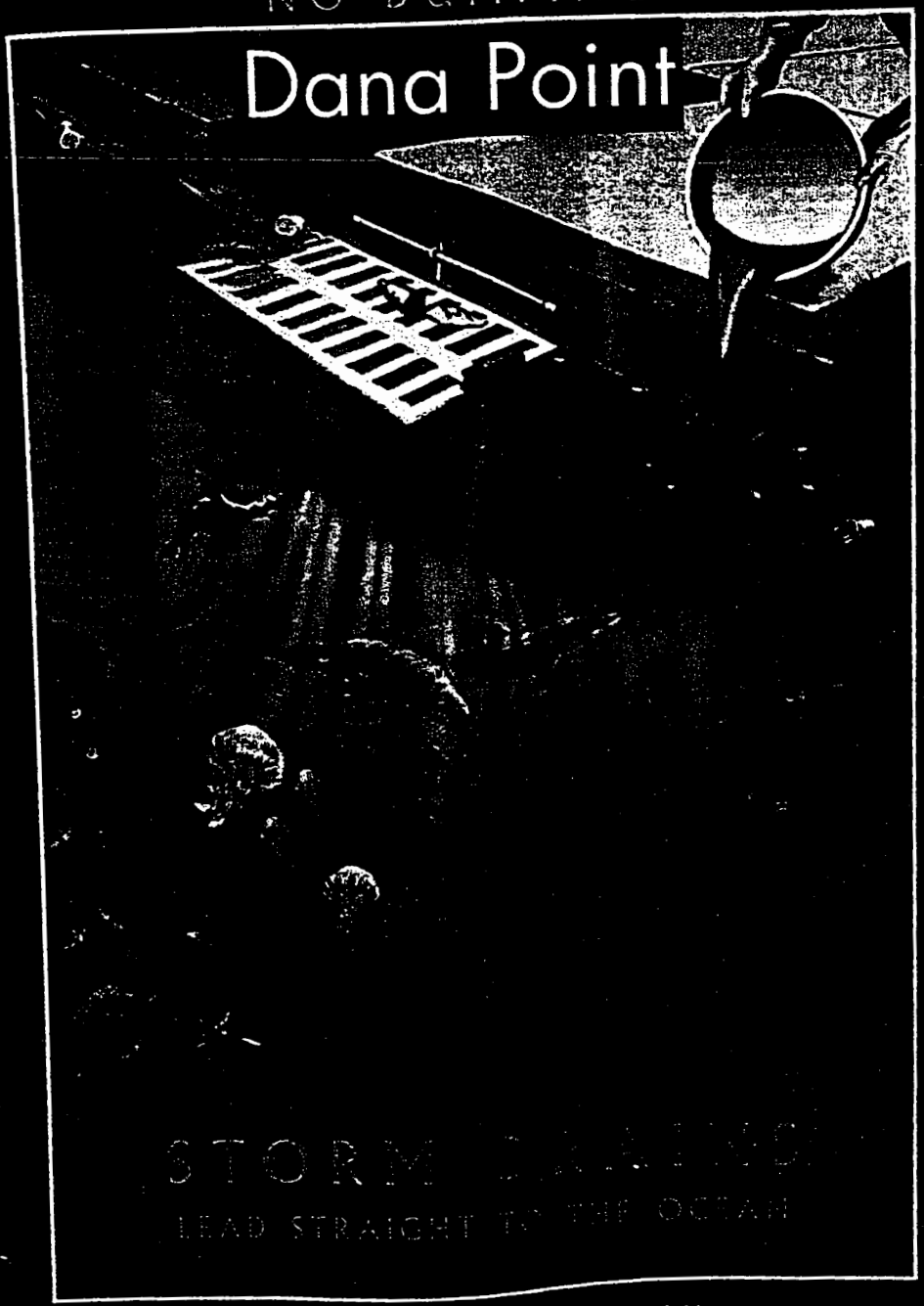

STORM DRAINS
LEAD STRAIGHT TO THE OCEAN

RECYCLE USED MOTOR OIL

REPRESENTATIVE PUBLIC EDUCATION MATERIALS

CITY OF FULLERTON

Green Waste Collection Program

A Green Waste Collection Program is in effect for single and multi-family homes with curbside collection service. Regular weekly trash collection days are not altered in each neighborhood, however, a separate truck which collects only green waste comes before the regular trash truck.

The program uses "yellow stickers" which are to be placed on regular trash barrels, or other designated containers, to identify them as containing green waste. Plastic trash bags are not acceptable for this program, as plastic is not an acceptable material that can be introduced into the composting process and workers are not able to determine if disposed green waste is on the list of 'acceptable' items.

"Yard Waste Only" stickers and Recycle Fullerton brochures are available through MG Disposal or City Hall. Contact MG Disposal's Customer Service line at 238-3300 or the Planning/Environmental Programs office at 738-6884 for information. Items are also available at the Cashier's Desk at City Hall, where water and trash bills are paid in person.

Used Oil Collection Program

The City of Fullerton, in its commitment to protecting the environment, sponsors a Used Oil Collection Program aimed at encouraging residents to recycle their used motor oil. Under the program, residents may bring used motor oil to any of the following state-certified collection centers, where it is disposed of safely and properly. In addition, center operators offer residents 16 cents per gallon of used oil collected.

EZ Lube Inc. 4002 N. Harbor Blvd. 477-1223	North County Automotive 146-B W. Wilshire Ave. 870-9936
Fox Service Center 1018 W. Orangethorpe Ave. 879-1430	Fullerton College Auto. Tech. 321 E. Chapman Ave. 992-7275
University Chevron 2950 E. Nutwood Ave. 528-0302	Kragen Auto Parts #731 2978 Yorba Linda Blvd. 966-4780
Pep Boys # 642 - Region 3 1530 S. Harbor Blvd. 870-0700	Auto Zone #2898 146 N. Raymond Ave. 870-9772
Sunnyside Unocal 2701 N. Brea Blvd. 256-0773	Tire Station 1933 N. Placentia Ave. 993-7100

Household Hazardous Waste

(pesticides, paints, cleaners, etc.)

can be taken to:

County of Orange Household Hazardous Waste Collection Center

1071 N. Blue Gum Avenue, Anaheim
Phone # 834-6752
Open Tuesday - Saturday, 9am - 1pm
(closed Holidays and rainy days)

006110

CITY OF FULLERTON CALIFORNIA

Recycle Fullerton

Development Services Department
Planning/Environmental Programs
303 W. Commonwealth Avenue
Fullerton, CA 92832

Phone: (714) 738-6884
Fax: (714) 738-3110

Website: www.ci.fullerton.ca.us

Reduce

Even with the good job Californians are doing of recycling, the landfills are filling up fast. Fortunately, there is something positive that every resident can do. If you, and your neighbors, help reduce the amount of garbage you generate, we can help keep our disposal bills, and our number of landfills, low at the same time.

State law requires that all cities cut their amount of garbage going to landfills in half by the year 2000. And that law is why we encourage you to reduce and reuse, then recycle and buy recycled. The fact is, over 75% of what we throw away can be reduced, reused or recycled. And it's easier than you think.

You can significantly reduce your garbage by selecting products with the least amount of packaging, buying items in bulk, and buying products that can be used over and over again.

Reuse

Learning to reuse is easy and after a little practice, it will become second nature. Here are some great ways to reuse our precious resources.

Reuse shopping bags or buy canvas bags and use them when you shop. Buy durable high quality goods for a longer life outside the landfill. Although durable goods may cost a little more at first, they will save you money and help save the environment in the long run.

Before throwing anything away, think about how each item can be reused. Donate clothing, furniture, and appliances to charity. Hospitals and nursing homes often accept old magazines and schools reuse many items in their art and theater classes. Almost all glass, plastic, and metal containers can be reused for storage in the kitchen or garage. Think before you toss.

Recycle

Recycling means collecting, processing, marketing, and ultimately using materials that were once discarded. For example, this morning's newspaper can be recycled into insulation, packing material, wrapping paper, and more newspaper. Plastic soda and milk jugs are recycled into lumber that is used for making durable playground equipment and park benches.

Many different materials can be recycled. Among these are aluminum cans, glass bottles and jars, plastics, tin cans, steel cans, brass, copper, car batteries, computer paper, office paper, corrugated cardboard, motor oil, scrap iron and steel, and tires.

Recycle Fullerton

The City does not have a "curbside" recycling program - where separate bins for recyclables are used. However, the City has chosen to implement a program known as ***"murfing"***, which involves processing of the waste stream at a Materials Recovery Facility (MRF) ***AFTER*** being picked up by our refuse company, MG Disposal.

At the MRF, items which are placed in the trash and which can be recycled are placed on a conveyer belt and processed by CVT Recycling. The City feels that sorting the trash this way makes sure that recyclable materials are retrieved and not taken to the landfills along with the regular trash.

There are some guidelines that residents and businesses should follow in order to assist the MRF in retrieving recyclable items from the waste stream. First of all, make sure all *non-recyclable* items are bagged tightly before being placed in your waste containers. All ***recyclable*** items should then be placed loosely in your containers and prepare as follows: wipe or lightly rinse all cans and make sure they are dry, fold newspapers into brown paper bags or bundle with string into one foot stacks, break down corrugated cardboard boxes, rinse plastic and glass containers and remove metal or plastic rims and lids. (If plastic is recyclable, it will have a number on the bottom of the container.)

Do You Know Where The Water In Your Storm Drain Goes?

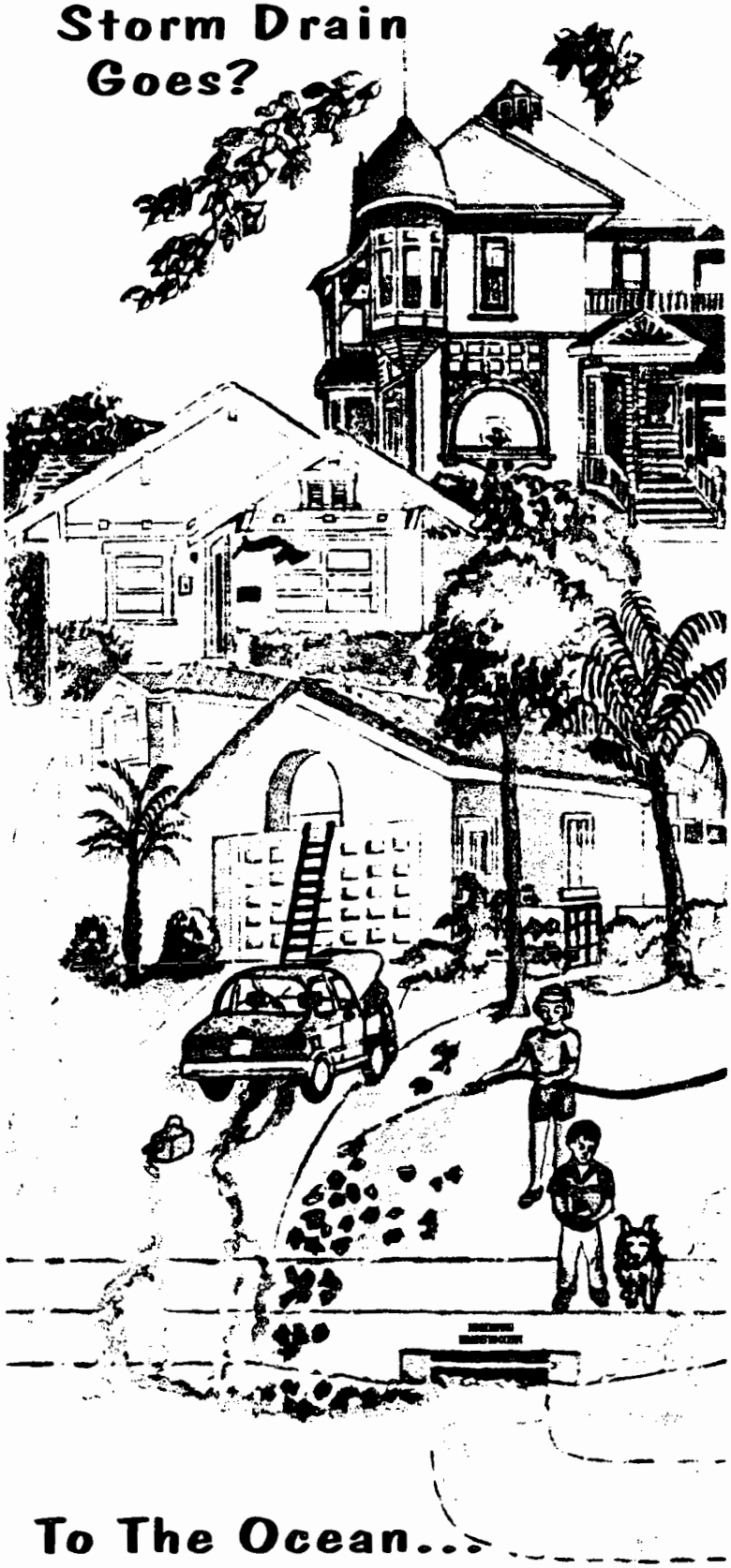

To The Ocean...

The Ocean begins at your front door!

Storm Water & Urban Runoff Pollution (SWURP)
And What You Can Do To Stop It!

For More Information...

Questions regarding this notice may be directed to:

The Orange County Public Facilities and Resources Department's Stormwater Section at (714)567-6363

Or

Pavlova Vitale of the Santa Ana Regional Water Quality Control Board at (909) 782-4130

ORANGE COUNTY • STORMWATER • PROGRAM

Orange County Stormwater Program
10852 Douglass Rd.
Anaheim, CA 92806

MOBILE DETAILING AND THE WATER QUALITY ACT

This flyer has been prepared at the request of the mobile detailing industry to provide direction with regard to compliance with the federal Water Quality Act of 1987.

WHAT IS CONSTRUCTION AND DEMOLITION DEBRIS?

C&D debris is material generated in the construction and demolition of buildings and roads. According to the California Integrated Waste Management Board, C&D debris makes up approximately 28% of the state's waste stream. Orange County businesses generate large quantities of C&D debris and could save money by diverting this material through reuse and recycling. Reducing the amount of C&D debris that is landfilled will also help Orange County cities meet the 50% diversion rate required by the California Integrated Waste Management Act of 1989.

Disposal rates are determined by the quality of material. Some processors will give estimates of disposal rates over the phone. Ultimately, the condition of the material will be determined upon delivery of the material.

Tips for managing your C&D debris for recycling:

- Develop a C&D waste management plan
- Assess the amounts and composition of your waste
- Assess the space available for separation of materials on site
- Assess the location of nearby recycling facilities

Educating employees, contractors, and sub-contractors about the benefits of recycling C&D debris will improve your bottom line and help your community conserve natural resources.

Printed on recycled content paper.

County of Orange
Integrated Waste Management Department
320 N. Flower Street, Suite 400
Santa Ana, CA 92703

Construction and Demolition Debris Facilities

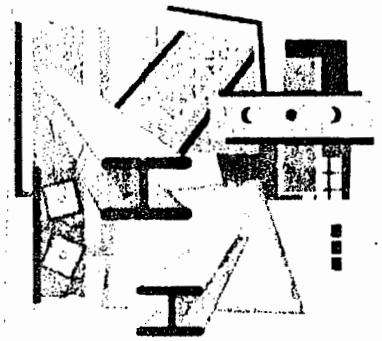

This brochure provides alternatives to landfilling specific types of Construction and Demolition (C&D) Debris

Integrated Waste Management Department

006116

¡El Reciclar...
Funciona gracias a usted!

UN PROGRAMA DE RECICLAJE PARA SU COMUNIDAD

(Turn over for English version.)

Reciclar Fullerton

Recycle Fullerton

Recycling...
It works because of you!

A RECYCLING PROGRAM FOR YOUR COMMUNITY

(A la vuelta versión en español.)

Introduction	3
How It Works	3
Preparing Trash for Recycling, Yard Waste	4-5
Special Services	6
Household Hazardous Waste	6
Questions and Answers	7-8

Customer Service

Call MG Disposal at (714) 238-3300

1131 N. Blue Gum St. • Anaheim, California 92806

MG Disposal Customer Service hours are
Monday - Friday, 7:00 AM to 5:30 PM
Saturday (for phone calls only) 7:00 AM to 3:00 PM

• Residential Containers • Roll Off Services
• Construction Containers • Portable Storage Containers
• Public Dump & Recycling Center • Bulky Item Collection

Fullerton City Hall (714) 738-6300

RECYCLING... as easy as 1-2-3

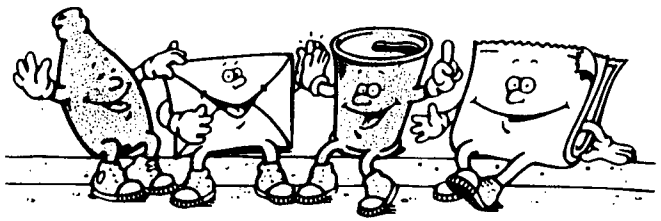

Printed on Recycled Paper

Introduction...

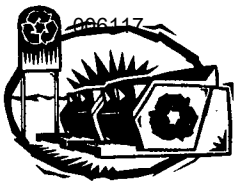

The City of Fullerton takes a unique approach to waste disposal with ***Recycle Fullerton***, an innovative program that recovers recyclables from the waste stream and includes a separate yard waste program. In a joint effort by the City and MG Disposal, ***Recycle Fullerton*** is designed to reduce the volume of waste dumped in our local landfills and to conserve our natural resources.

By participating in ***Recycle Fullerton***, residents have the chance to significantly help decrease the amount of trash buried in local landfills and to help the City comply with the state's strict recycling laws. According to Assembly Bill 939, each city must reduce their waste by 50 percent by the year 2000. The ***Recycle Fullerton*** program allows the City to recycle many types and greater quantities of recyclable items and yard waste, instead of dumping it in the landfill. Recycling allows us to conserve our country's natural resources by providing alternative sources for aluminum, paper, glass, plastics and other recyclable items.

How It Works...

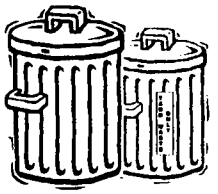

The ***Recycle Fullerton*** program was designed with you in mind and requires very little extra effort. The waste generated from residents and businesses is taken to the CVT Material Recovery Facility in Anaheim. There the waste travels through a system of conveyor belts, magnets and sifting devices and the recovered recyclable material is then manually sorted and bundled into bales for shipping.

The separated yard waste is collected from containers marked by the resident with "yard waste only" stickers. MG Disposal sends separate trucks to collect only yard waste. The yard waste is taken to the CVT Material Recovery Facility and prepared for compost, mulch or a variety of other uses. For your added convenience, regular household trash and yard waste will be collected on the same day each week.

To make ***Recycle Fullerton*** a success, please follow the guidelines outlined within this booklet and adopt the new disposal practices. Your participation and support of ***Recycle Fullerton*** is a big step towards solving our waste problems now and into the future. *Recycling... it works because of you!*

Bulky Item Collection

To aid in the disposal of large, bulky items such as furniture, stoves, and water heaters, MG Disposal provides a FREE bulky item pick up service. These special collections are provided on the same day of regular collection service. To inform MG Disposal of a bulky item pick up, call our Customer Service Department at (714) 238-3300. Please be prepared to list the items you need picked up. (A $31.00 charge is added for pick up of air conditioners and refrigerators due to special handling requirements of freon.)

Temporary Rental Bins

MG Disposal offers clean up solutions for the house, garage, or yard. Residents can rent bins in a variety of sizes on a daily, weekly, or monthly basis for a fee. Prompt delivery and pick up are available on a scheduled basis. For more information call MG Disposal's Customer Service Department at (714) 238-3300.

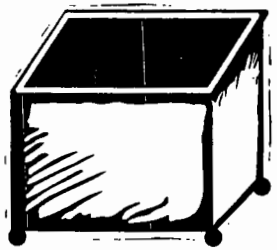

Household Hazardous Waste

Do your part to protect the environment. Dispose of old paint, pesticides, used motor oil, and household chemicals properly at a designated facility. Orange County residents can take "household hazardous waste" to a County Household Hazardous Waste Collection Center at 1071 N. Blue Gum St. in Anaheim. To locate additional FREE Collection Centers closest to you or for information call **(714) 834-6752.** To dispose only of used motor oil call the City's Used Oil Collection Program Hotline at **(714) 871-4OIL.**

1. What type of containers must be used?

Residents will use their own selected containers for trash and yard waste collection. Containers must not exceed a 40 gallon capacity. Residents should designate yard waste containers with the special "yard waste only" stickers provided by MG Disposal. Yard waste stickers should face the street where they are visible to the collection crew.

2. What should I do if I don't have enough trash containers for my trash?

MG Disposal will pick up an unlimited amount of trash left in household trash containers or tied plastic trash bags. If at times you have less yard waste and more trash, simply place the extra trash in your yard waste container with the sticker facing away from the street, so that it is not visible to the collection crew.

3. What should I do if I don't have enough yard waste stickers for my containers?

If you fill your yard waste containers and still have more yard waste, you should use additional containers. Group the containers with yard waste away from your regular trash. Place containers with yard waste stickers facing the street so that the stickers are visible to the collection crew. Yard waste cannot be collected if it is placed in plastic bags.

4. What should I do on collection day?

Place your containers in the street at curbside, near the corner of your driveway. All containers must be at curbside or alley by 7 AM or earlier on your collection day. Also, please check your containers before removing them from the curb, as the yard waste containers will be emptied by a separate truck.

Basura recicable

Estos pasos sensillos asistarán el recogimiento y el proceso de reciclables. Por favor úse estos pasos cuando tira su basura:

- **Periódico** — Coloquelos en una bolsa abierta en su recipiente de basura.

- **Papél mezclado/ cartón** — Coloquelos en una bolsa abierta o sueltos en su recipiente de basura.
- **Jarros de vídrio** — Tienen que estar vacío. No tiene que quitar los sellos.

- **Botes de aluminio** — Tiene que estar vacío. No tiene que estar aplastado.
- **Plástico** — Recipientes transparentes o de color de plástico tienen que estar vacíos.

- **Metál** — Recipientes y botes de metál tienen que estar vacíos. No tiene que quitar los sellos.

Basura que no puede ser reciclada

Estos artículos deberían de ser puestos en bolsas cellados ántes de colocarlos en los recipientes de basura.

- Desechos de baño

- Desechos de camas de gatos
- Desechos de alimentos

- Pañales desechables
- Ropa

- Papél de cera
- Jugetes de plástico

Desechos de Yarda

006119

Coloque las etiquetas engomadas que dicen "Yard Waste Only" en los recipientes que va usar para los desechos de yarda. Los desechos de yarda deberían estar sueltos en los recipientes designados para desechos de yarda. No se ponen en bolsas de plástico.

Desechos de yarda aceptable

- Zacate y hojas (suelto, no en bolsas)
- Ramas podadas y maleza
- Retoños y ramas pequeñas (Pueden ponerse en bulto, no mas de 4 pies o menos de largo y no exceder 16 pulgadas de diámetro.)

Desechos de yarda no aceptable

- Desechos de animales y de alimentos
- Residuos de construcción
- Tierra y piedras
- Hojas de palma
- Bolsas plásticas

Importante Puntos Claves - Desechos de Patios y Jardines

- **Se consideran desechos de Patios y Jardines solamente la vegetación que crece en ellos (desecho "verde").**
- **Recorte las ramas podadas para ampliar la capacidad del recipiente.**
- **NO empaque el desecho de patios y jardines en bolsas plásticas de basura. Coloque una hoja de papel periódico en el fondo del recipiente, evitando así que el zacate se adhiera a éste.**

¿Porqué Reciclar?...

El residente americano desecha un promedio de 4 1/2 libras de basura al día. Anteriormente, la mayor parte de esta basura era enterrada en terrenos de relleno. Hoy en día, esos terrenos se están llenando demasiado rápido. El reciclar es uno de los métodos más fáciles para reducir la cantidad de desechos destinados a los terrenos de relleno. A su vez, el reciclar ayuda a estabilizar las tarifas de colección de basura, pues controla el volúmen de desechos depositados en terrenos de desechos.

REPRESENTATIVE PUBLIC EDUCATION MATERIALS

CITY OF GARDEN GROVE

One person's trash could be another person's treasure! The next time you have clothes, furniture, or other household items to get rid of, give them to a thrift store rather than sending them to the landfill. By fostering the reuse of products, you help save resources and valuable landfill space, while providing inexpensive goods to people who want them. Some thrift stores even offer free collection service. In addition, circulars such as the Pennysaver, (800) 995-3333 and the Recycler, (714) 449-2900, offer free listings of services for private parties with merchandise under a certain value to sell (usually about $100).

This **Thrift Store Directory** is a public service, and is not an endorsement of stores by the City of Garden Grove or its departments.

This list of thrift stores will be up dated periodically. Please keep us informed of thrift stores that are not listed and would like to be included.

Provided as a public service by:

City of Garden Grove

☎ (714) 741-5554

Printed on recycled paper

Garden Gr
And Area

Thrift Store Directory

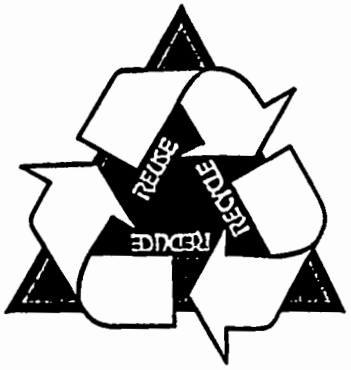

- Pipe
  - Used
- Plastics
  - Scrap

RRR

- Rackets
  - Restringing & Repairing
- Ranges & Ovens
  - Dealers - Used
- Re-Sale Clothes
- Recycling Centers
- Rendering Companies
- Rubbish Containers & Hauling

SSS

- Safes & Vaults
  - Used
- Salvage Merchandise
- Salvage Merchandise Buyers
- Sawdust & Shavings
- Scrap Metals
- Second Hand Stores
- Sewing Machines
  - Service & Repair
- Sharpening Service
- Shoe Repairing
- Shoes
  - Used
- Slag
- Sporting Goods
  - Repairing
- Surplus Merchandise
- Swap Meets & Shops

TT

- Thrift Shops
- Tire Recapping, Retreading & Repair
- Tire Shredding
- Tools
  - Repairing & Parts
- Trash Removal Services
- Truck Equipment & Parts
  - Used & Rebuilt

UUUU

- Upholsterers

WWWW

- Washing Machines & Dryers
  - Dealers - Used
- Waste Paper
- Waste Reduction, Disposal & Recycling

ZZZ

- Zippers
  - Repairing & Replacing

Provided as a public service by:

City of Garden Grove
Integrated Waste Management
13802 Newhope St.
Garden Grove, CA 92843
(714) 741-5554

Printed on recycled paper

0061

DON'T TRASH IT!

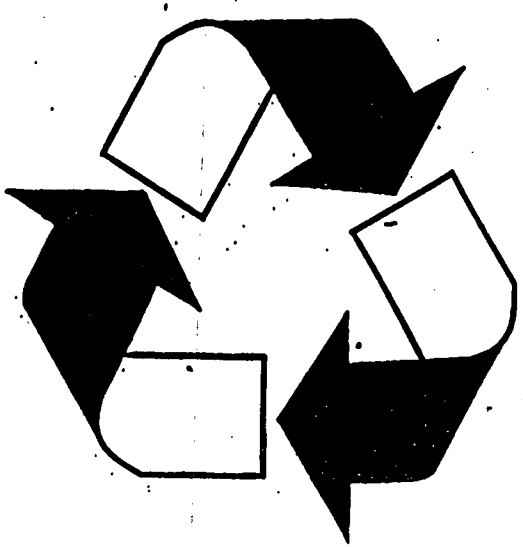

REUSE IT!

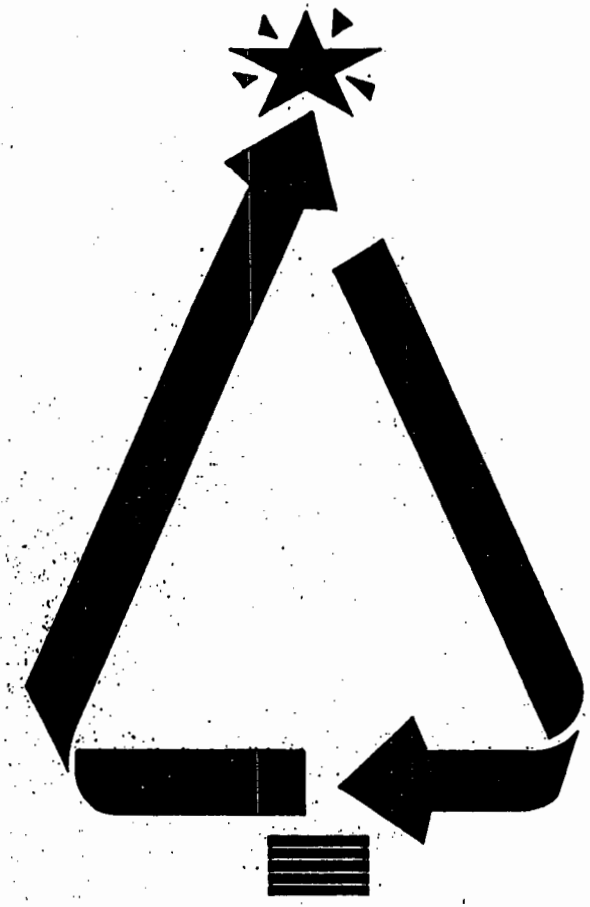

PEACE ON EARTH

Christmas Holiday Ways to Recycle

Printed on Recycled Paper

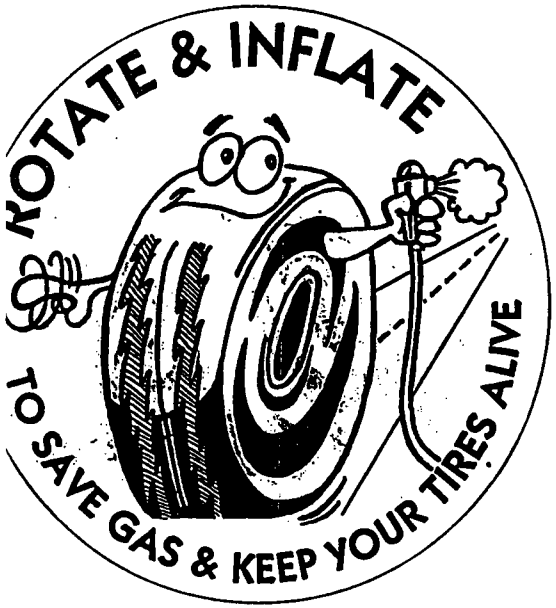

Sponsored by

Ventura County Solid Waste Management Department

California Integrated Waste Management Board

Local Government Commission

AND

GARDEN GROVE

006124

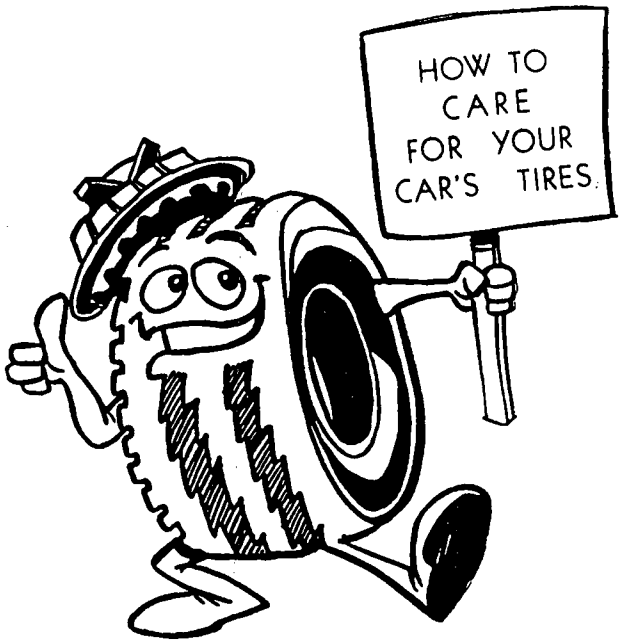

Don't Let Your Tires Get Tired

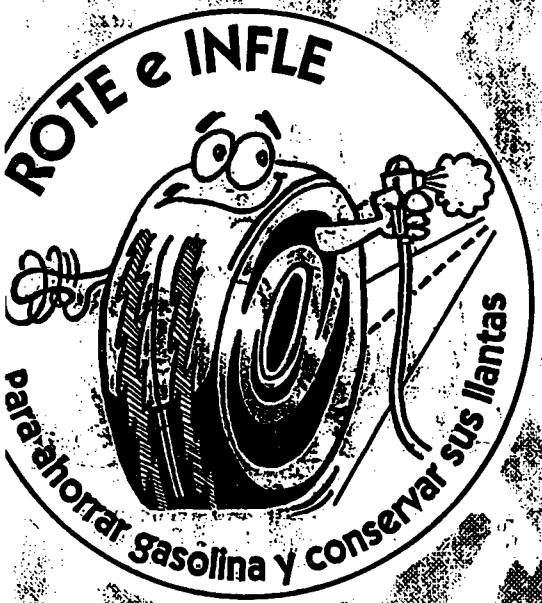

Patrocinado por

Ventura County Solid Waste Management Department

California Integrated Waste Management Board

Local Government Commission

y

GARDEN GROVE

376-1/17/95 (2)

No Permita Que Sus Llantas Se Desgasten

Provided as a public service by:
The City of Garden Grove
Waste Management Division
13802 Newhope Street
Garden Grove, CA 92843
(714) 741-5389

Printed On

006126

Leave
Less Behin
For The
Future

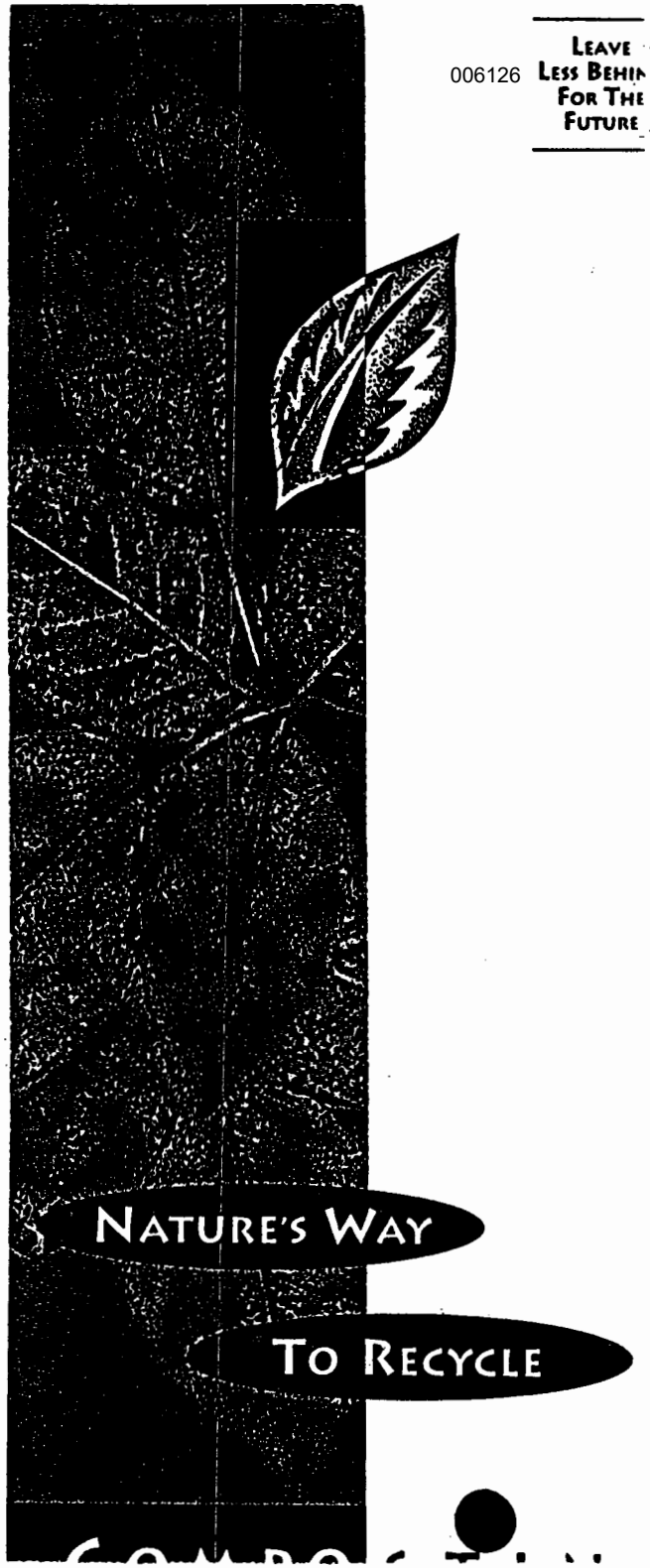

Nature's Way To Recycle

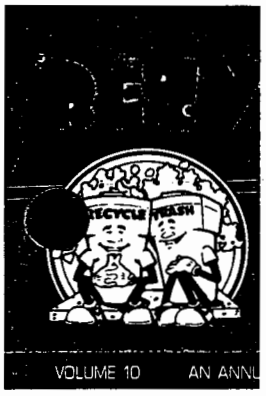

Residents Approach 2000 with Recycling Success

Residents of Garden Grove Sanitary District approach the new Millennium with recycling success. In 1999, your efforts helped the City of Garden Grove Sanitary District recycle over 31,972,272 pounds of recyclable material.

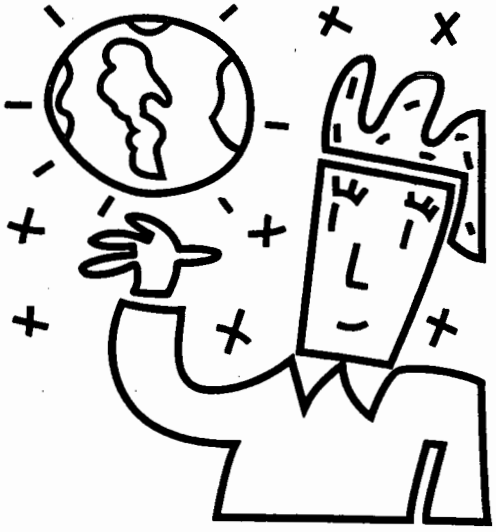

As we draw near the turn of the century, we meet recycling challenges set by the state of California with great success. In 1989, Assembly Bill 939 mandated each city to reduce their amount of waste by 50 percent by the year 2000. By participating in ***Recycle Garden Grove Sanitary District***, the city is poised to smoothly meet the state's challenge. But we should not stop there. With or without state mandated laws, the Earth's resources are still precious and landfill space is still limited. What can we do in addition to recycling to make our community healthier? We can take the next step in preserving our environment: we can focus on reuse.

Reuse vs. Recycle

There are subtle but important differences between reuse and recycle. Recycling means taking a product, such as a aluminum can, deconstructing it, and using the materials to remanufacture something new. Although this is greatly preferred over starting from scratch, it is clear that if you don't have to spend the time, energy, or resources deconstructing and remanufacturing a product, you are saving resources.

Reuse is the process of taking idle goods and materials and reemploying them in a manner that does not require altering their original form. Reuse can also mean just reusing something over and over again. Popular examples of reusable goods include cloth shopping bags; plastic insulated coffee mugs and eraser boards.

The Benefits of Reuse

The benefits of reuse are as plentiful as the diversity of reuse options. By reusing items instead of disposing of them, we are saving landfill space. But equally important, there is no need to spend energy or raw materials to manufacture new items. Reuse not only saves resources, but also puts materials into the hands of those in need like schools, community organizations, and businesses. Reuse allows us to save money and contribute to our community. ✹

Recycling ... it works because of you!

IN THE COMMUNITY:

- Shop at thrift stores
- Support local yard sales
- Coordinate a community rummage sale

Q & A

Q. What should I do if one of my containers gets damaged?

A. If your container is damaged, contact our Customer Service Department at 238-2444. Damaged containers will be repaired or replaced at no charge, unless the damage is due to negligence or abuse.

Q. If I have service questions, whom do I call?

A. For questions regarding your service, call our Customer Service Department at 238-2444. We are open Monday - Friday from 7:00 a.m. - 5:30 p.m., and Saturday, for phone calls only, from 7:00 a.m. to 3:00 p.m.

Q. How do I dispose of household hazardous waste?

A. The County of Orange operates a FREE household hazardous waste collection center at 1071 N. Blue Gum Street in Anaheim. Call the H.H.W. hotline for days and hours: (714) 834-6752.

Q. I have a hard time maneuvering my trash containers, can I get a smaller one(s)?

A. If it is difficult for you to maneuver your containers as a result of a physical disability or if you are a senior citizen, you may call our Customer Service Department at 238-2444 to arrange for assistance.

GRASSCYCLING
Simply a Terrific Idea

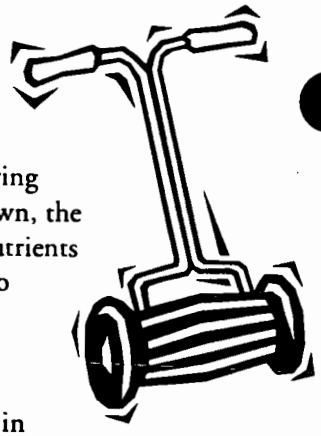

It seemed like a good idea at the time: attaching a grass catcher to your mower. But, as it turns out, leaving those clippings over the lawn is actually better for the lawn, the environment and you. For starters, it returns valuable nutrients back to the soil. Grass consists of 80-85 percent water, so essentially you get an irrigating effect too. Grasscycling conserves water and limited landfill space as well.

More good news. Grasscycling hands you a nifty refund in the form of time and money. It will take you less time to mow the lawn if you leave the clippings on the grass. Plus, with the nutrient benefits of the grass clippings, you'll spend less money on fertilizer and water.

So now that you are more familiar with the benefits of grasscycling, give it a try. For more information on how you can help the environment, call 1-800-CLEANUP. ✹

Help Shopping Carts Find Their Homes

Help a stray shopping cart find its way back home. You can help reduce clutter in our neighborhood by reporting stray shopping carts that have been abandoned.

- If the cart has a label, call the telephone number provided.
- If the cart does not have a label or is not picked up within 24 hours from the time it was reported, call the City of Garden Grove's Shopping Cart Hotline at 741-5053.

STORM DRAINS & HOUSEHOLD HAZARDOUS WASTE
What's the Problem?

Did you know that water flowing down driveways and streets and into gutters goes into a storm drain which flows directly to a lake, river or the ocean? This water may pick up pollutants which are never treated. Most of the pollutants consist of Household Hazardous Waste, or H.H.W. Some common contaminants include motor oil, pesticides, pet wastes and paint. When these items are improperly disposed of into our storm drains, they can be harmful to our drinking water, recreational use and wildlife. But there are ways you can prevent storm water pollution. You can take your H.H.W. to a local FREE collection center. Call the County operated H.H.W. hotline for times and locations: (714) 834-6752. ✹

FREE PICK UP SERVICE FOR USED OIL

Just one gallon of oil will pollute one million gallons of water

Recycling is the only environmentally safe and legal method to dispose of used oil. In Garden Grove, there are two ways to recycle used oil **FREE**! One of the easiest ways to recycle your used oil is through the **Residential Used Oil Collection Program**. This program allows you to have your used oil collected directly from your home. After you change your motor oil, simply pour the used oil into a plastic container with a secure cap. On the pre-scheduled day, place the container by your front or garage door. The used motor oil, container(s), used oil filters, and oily rags will be collected. There is a limit of five (5) gallons per home on each pick up, and pick ups will be available every two weeks. To schedule a convenient pick up day, call the **Used Oil Hotline:** (714) 289-7661.

Another easy and convenient way to recycle used oil is to take it to a State Certified Used Oil Collection Center right here in Garden Grove. These centers will accept used oil from the public during normal business hours. Call the center to confirm hours of operation and the amounts accepted. The service is **FREE**! In fact, a $.16 per gallon incentive will be offered. To locate the certified center nearest you, call (714) 289-7661. ✹

Residents of Garden Grove Qualify for FREE Toilet Upgrades

The Metropolitan Water District of Orange County is currently offering an Ultra Low Flush Toilet (ULF) Retrofit Program. Under this program Garden Grove Sanitary District customers can recycle their old water-wasting toilet and get a brand new water efficient model at not cost (limit 3 per household).

Program Requirements:

- Participants must provide the dimensions from the wall to the toilet bolts and a current water bill.
- New toilets must be installed at the address designated on application - no exceptions (applications provided when toilets are delivered).
- Participants are responsible for installation (seniors, 65 and older, are eligible for two free installs).
- To avoid a $100 program cost charge, participants must return one old toilet for each new toilet received.
- Program sponsor reserves the right to verify installation through visual on-site inspections.

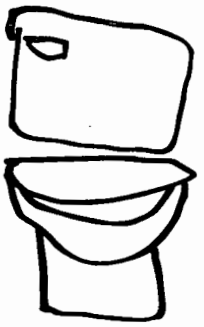

For more information on the Ultra Low Flush Toilet Retrofit Program, call 1-800-424-8538. ✹

[illegible] clear for [illegible] improve the [illegible] and appearance of valuable land [illegible] the increasing amount of green waste the County of Orange is sponsoring a new program called Landscape Certification Program. The program is available to all businesses, public agencies, parks, schools and home owner associations. We will help every landscape and property manager develop more efficient landscape practices and hopefully help reduce green waste for the owners. Say Tom Ash, project coordinator and horticultural consultant. Getting started in the program is easy. Call Tom Ash at CTSI Corporation, (714) 669-4303 or send an e-mail to toma@ctsicorp.com. ✹

Remember to Remove 'Em

By being a good neighbor and remembering to remove your trash and recycle containers on collection day, you will be helping to keep your neighborhood looking neat and clean.

Sanitary District Ordinance 3592 requires that after trash containers have been emptied, they are to be removed from the curb on the same day, and placed in an area not visible from the public street. ✹

HOLIDAY COLLECTION

Your regular pickup day for trash and recycling during the holidays will not change unless your collection day falls on one of only six holidays.

CHRISTMAS DAY: Saturday, December 25, 1999.
Trash collection services will not be affected.

NEW YEAR'S DAY: Saturday, January 1, 2000.
Trash collection services will not be affected.

MEMORIAL DAY: If your collection day falls on Monday, May 29, your trash will be collected on Tuesday, May 30. If your collection day falls on any other day than Monday, your service will not be affected.

INDEPENDENCE DAY: If your collection day falls on Tuesday, July 4, your trash will be collected on Wednesday, July 5. If your collection day falls on any other day than Tuesday, your service will not be affected.

LABOR DAY: If your collection day falls on Monday, September 4, your trash will be collected on Tuesday, September 5. If your collection day falls on any other day than Monday, your service will not be affected.

THANKSGIVING DAY: If your collection day falls on Thursday, November 23, your trash will be collected on Friday, November 24. If your collection day falls on Friday, November 24, your trash will be collected on Saturday. If your collection day falls on any other day than Thursday or Friday your service will not be affected.

Recycle Your Christmas Tree

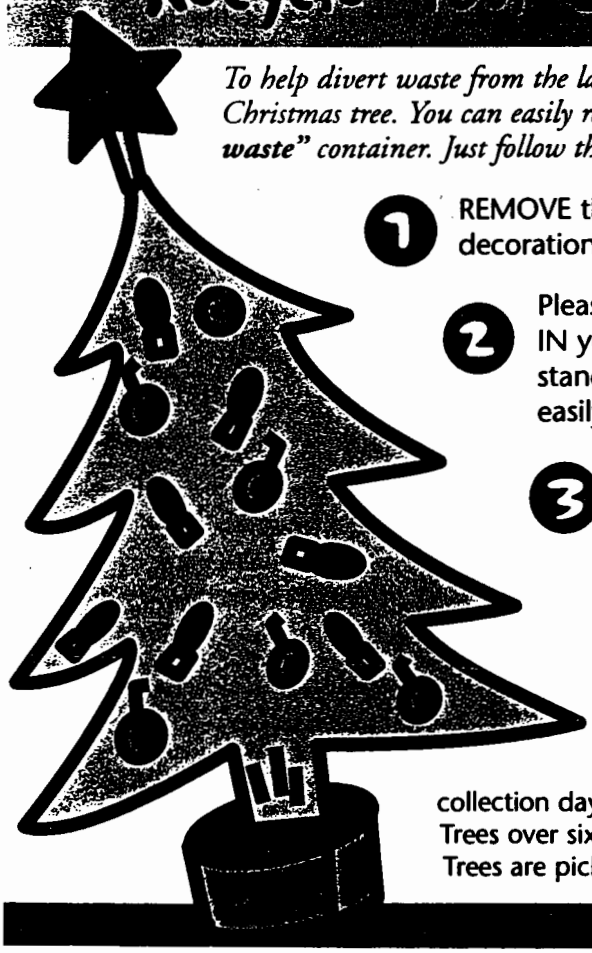

To help divert waste from the landfill, the city asks you to recycle your Christmas tree. You can easily recycle your tree ***in your brown "yard waste"*** *container. Just follow these three simple steps:*

1. REMOVE the TREE STAND (wood or metal), decorations and tinsel from your tree.
2. Please CUT UP your TREE* and PLACE IN your BROWN CONTAINER (no tree stands please). The pieces should fit easily in your container.
3. PLACE your BROWN CONTAINER AT THE CURB along with your other containers on your regular collection day.

*If you're unable to cut up your tree and put it in a brown container, place the tree at the curb for pick up on your regular collection day from December 27 until January 7. Trees over six (6) feet tall must be cut in half. Trees are picked up by a special collection truck.

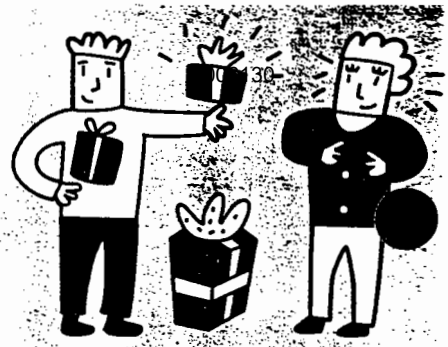

Waste Wise Holiday Greetings

Did you know that 2.65 billion Christmas cards sold each year in the U.S. could fill a football field 10 stories high? If we each sent one card less, we'd save 50,000 cubic yards of paper. Here are some good ideas to reduce the amount of waste from holiday cards.

- ★ Send electronic greetings to family and friends who are on-line.
- ★ Save yourself some time, money and hard feelings between friends – and reduce mail volume by updating and paring down your holiday mailing list.
- ★ Be creative. Instead of buying place mats or table decorations, make your own. Cut old cards into shapes and press between two pieces of clear contact paper.
- ★ Make gift tags from last years holiday cards, or use them as name tags for arranged seating at formal dinners.

WHAT WHERE?

Save this list of accepted recyclables (green can) and non-recyclables (black can) as a guide for separating your trash.

Non-recyclable...

- Animal waste
- Bathroom waste
- Carbon paper
- Carpet
- Car parts
- Cat litter
- Cigarette butts
- Dirt/cement/rock (do not fill more than 1/3 of container)
- Disposable diapers
- Drinking glasses
- Electronics
- Flooring
- Food waste
- Freezer/refrigerator food boxes
- Furniture
- Glass and ceramic plates/cups
- Liquid waste
- Light bulbs
- Mirrors
- Needles (sealed in thick plastic container)
- Old clothes/shoes
- Plastic toys
- Rags/sponges
- Tires
- Toothpaste tubes/pumps
- Soiled paper plates
- Waxed paper
- Window glass
- Yard waste (can be composted)

Recyclable...

- Aerosol cans (completely empty)
- Aluminum cans (do not crush)
- Aluminum foil
- Beverage cans
- Bottle caps
- Brochures
- Cardboard
- Cereal boxes (remove inner lining)
- Computer paper
- Drink boxes
- Egg cartons (cardboard and foam)
- Foam cups/plates (unsoiled)
- Food cans
- Frozen food boxes (no wax coating)
- Glass bottles/jars
- Juice cartons
- Junk mail/coupons
- Laundry bottles
- Ledger paper
- Magazines
- Metal coat hangers
- Milk type cartons
- Newspapers
- Paint cans (only empty, dry cans with lids off)
- Paper/paper tubes
- Phone books
- Pizza boxes
- Plastics (#1- 6)
- Plastic bottles (small mouthed)
- Plastic containers
- Plastic cups/plates
- Plastic utensils
- Plastic milk jugs
- Tin cans
- Used envelopes (includes plastic windows)
- Wrapping paper

Questions or comments? Call the Customer Service Department at (714) 238-2444

006131

Household Hazardous Waste

(Dispose of properly at a free Collection Center)

HAZARDOUS HOTLINE
(714) 884-6752

Oil / latex paint
Automotive products (batteries, oil, anti-freeze)
Household cleaners
Pesticides / herbicides
Hobby and pool supplies

Yard Waste Collection

(For residents with brown containers)

- **Grass** (loose, not bagged)
- **Leaves** (loose, not bagged)
- **Prunings** (NO palm fronds)
- **Twigs & small branches** (4 inches or less in diameter and 3 feet or less in length)
- **Weeds** (loose, not bagged)
- **Vegetation** (from the yard)

HELPFUL TIPS

- Place a sheet of newspaper in the bottom of the brown container to prevent sticking.
- Do not place any yard waste in plastic bags. Plastic bags are not composable and they will contaminate the yard waste.
- Cut up trimmings to increase the amount of yard waste that fits in the brown container.

GARDEN GROVE DISPOSAL P.O. Box 309 • Anaheim, CA 92815

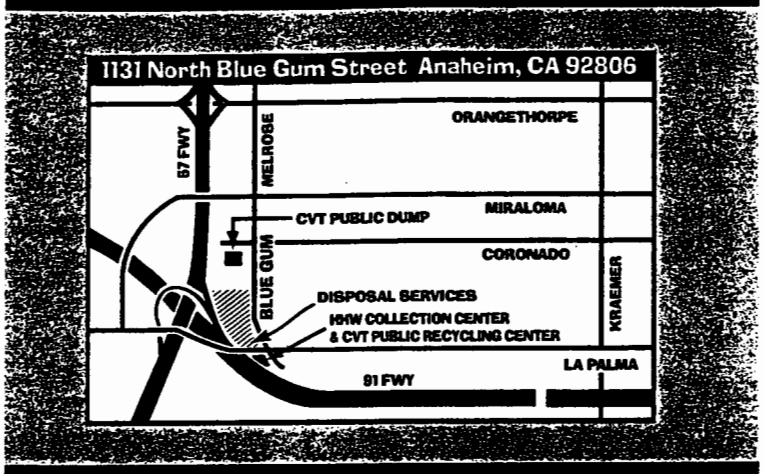

Para recibir informacion sobre el reciclamiento en español favor de llamar al numero (714) 238-3300.

Printed on recycled paper, with soy based inks

006132 Bulk Rate
U.S. Postage
PAID
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HERE'S YOUR ANNUAL UPDATE

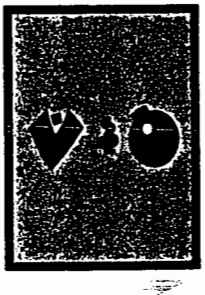

Questions & Answers

CHOOSE TO REUSE

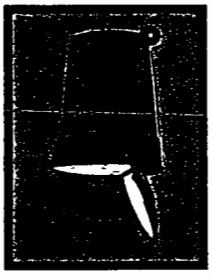

WHAT GOES WHERE?

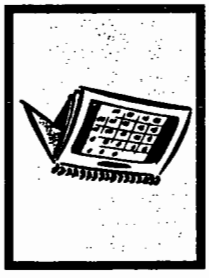

HOLIDAY COLLECTION

Recycle Your Christmas Tree

006133

You Can Make A Difference

Coloring Book

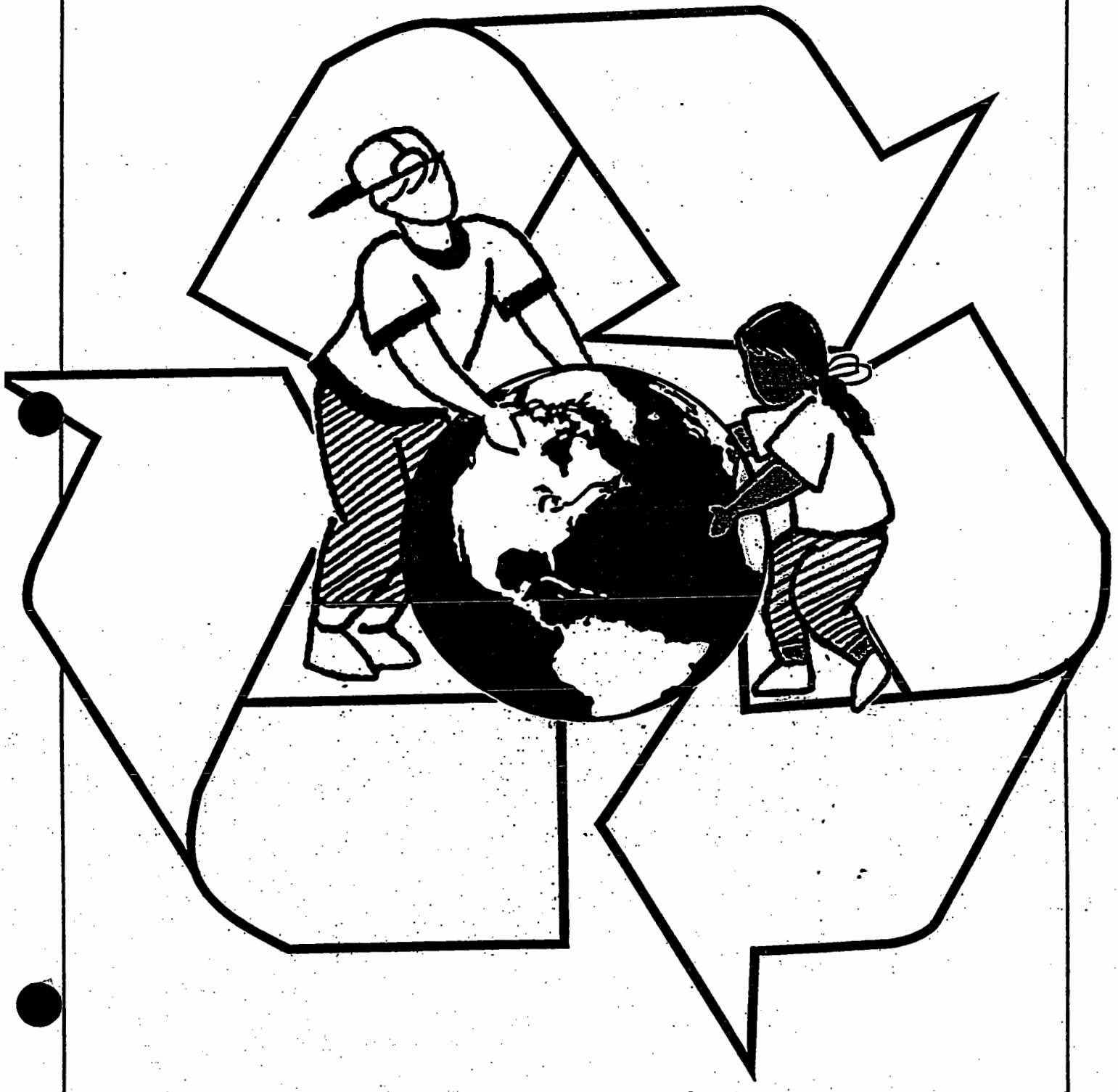

City of Garden Grove
Recycling Education Program

Recycling Resource Center at
The Garden Grove Regional Library

006134

Conserving Earth's Resources

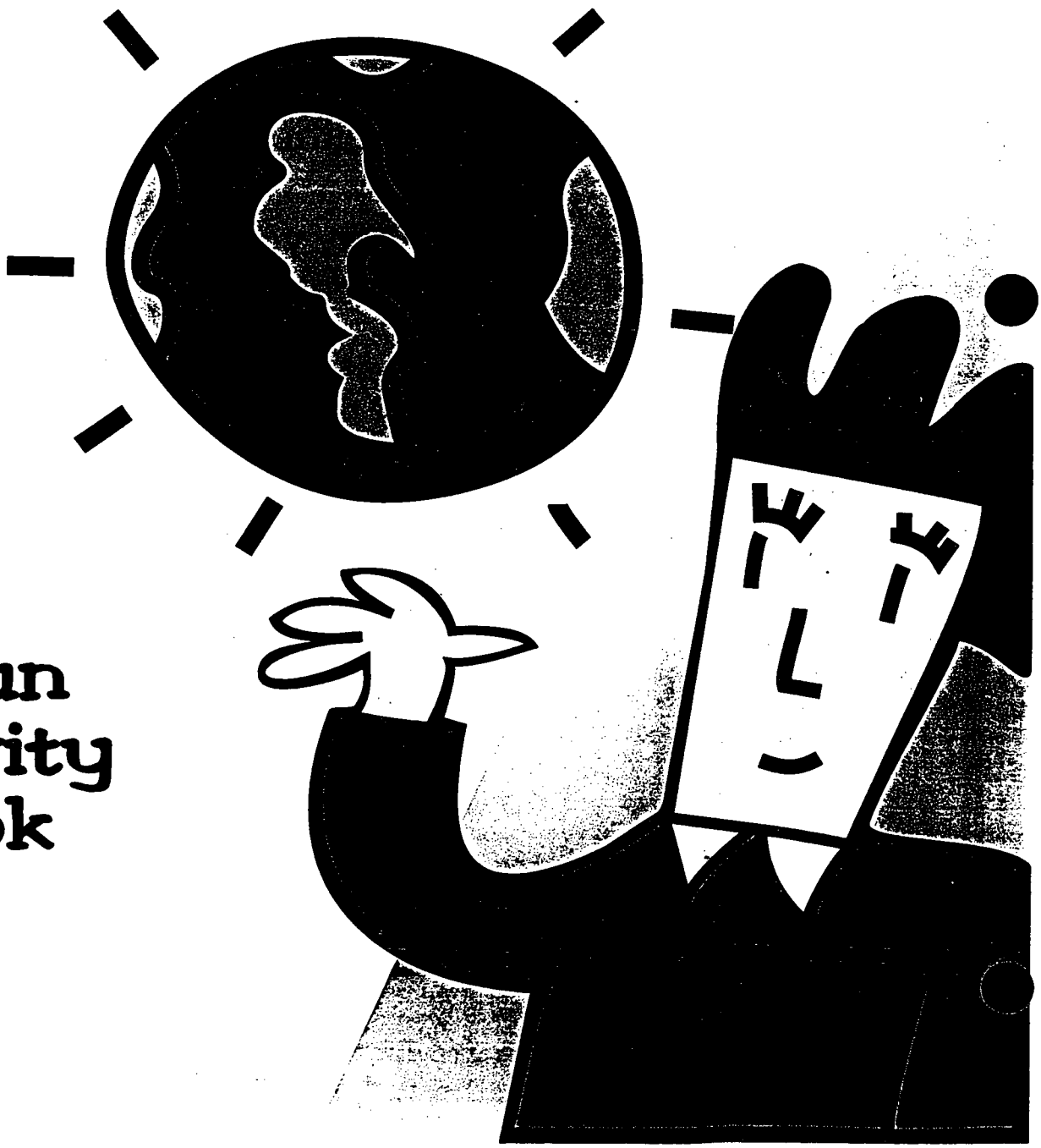

A Fun Activity Book

006135

CARE FOR THE EARTH

A Kid's Guide To Recycling

An Educational Activity Book

CONSERVING EARTH'S RESOURCES™

CVT RECYCLING
A DIVISION OF TAORMINA INDUSTRIES

1131 NORTH BLUE GUM STREET
ANAHEIM, CALIFORNIA 92806
(714)238-3300

Recycle Garden Grove

What Goes Where?

Save this list of accepted recyclables (green can) and non-recyclables (black can) as a reference.

Recyclable...

- Aerosol cans (completely empty)
- Aluminum cans (do not crush)
- Aluminum foil
- Beverage cans
- Bottle caps
- Brochures
- Cardboard
- Cereal boxes (remove inner lining)
- Computer paper
- Drink boxes
- Egg cartons (cardboard and foam)
- Foam cups/plates (unsoiled)
- Food cans
- Frozen food boxes (no wax coating)
- Glass bottles/jars
- Juice cartons
- Junk mail/coupons
- Laundry bottles
- Ledger paper
- Magazines
- Metal coat hangers
- Milk type cartons
- Newspapers
- Paint cans (only empty, dry cans with lids off)
- Paper/paper tubes
- Phone books
- Pizza boxes
- Plastics (#1- 6)
- Plastic bottles (small mouthed)
- Plastic containers
- Plastic cups/plates
- Plastic utensils
- Plastic milk jugs
- Tin cans
- Used envelopes (includes plastic windows)
- Wrapping paper

Non-recyclable...

- Animal waste
- Bathroom waste
- Carbon paper
- Carpet
- Car parts
- Cat litter
- Cigarette butts
- Dirt/cement/rock
- Disposable diapers
- Drinking glasses
- Electronics
- Flooring
- Food waste
- Freezer/refrigerator food boxes
- Furniture
- Glass and ceramic plates/cups
- Liquid waste
- Light bulbs
- Mirrors
- Needles (sealed in thick plastic container)
- Old clothes/shoes
- Plastic toys
- Rags/sponges
- Tires
- Toothpaste tubes/pumps
- Soiled paper plates
- Waxed paper
- Window glass
- Yard waste (can be composted)

Household Hazardous Waste

(Dispose at an Orange County Collection Center)

Oil / latex paint
Automotive products (batteries, oil, anti-freeze)
Household cleaners
Pesticides / herbicides
Hobby and pool supplies

County's Hazardous Hotline # (714) 834-6752

Yard Waste

(For residents with brown containers)

- **Grass** (loose, not bagged)
- **Leaves** (loose, not bagged)
- **Prunings** (NO palm fronds)
- **Twigs & small branches** *(4 inches or less in diameter and 3 feet or less in length)*
- **Weeds** (loose, not bagged)
- **Vegetation** (from the yard)
- **Christmas tree** (cut up)

HELPFUL TIPS

- Place a sheet of newspaper in the bottom of the brown container to prevent sticking.
- Do not place any yard waste in plastic bags. Plastic bags are not compostable, and they will contaminate the yard waste.
- Cut up trimmings to increase the amount of yard waste that fits in the brown container.

Questions or comments? Call the Customer Service Department at (714) 238-2444

Where Can I Take My Old Tires?

Old tires cannot simply be thrown into the trash, or left in illegal stockpiles.

The following businesses and public landfill accept old tires for disposal. Remember, only four tires can be legally hauled without permits. Anyone hauling five or more tires must have the appropriate permits as issued by the State of California.

In Garden Grove and Area.....

Gordon Tire Company
7031 Garden Grove Blvd., Garden Grove
714/898-2696
$1.00 /Tire Disposal Fee
(maximum four tires)
$1.75/Tire Fee for pick-up

Ecology Tire CO
1881 Crystal St., Huntington Beach
714/848-8260
$2.00/Tire Disposal Fee

Brea Olinda Landfill
57 Freeway North
Exit Imperial - East
North on Valencia until it ends.
714/834-6752
$10.00 for 1-4 tires
$55.50 per ton (5 or more tires)

Where Can I Take Household Hazardous Waste?

For Orange County residents....

Anaheim Regional Collection Center
1131 Blue Gum Street
Located between the 91 & 57 Fwys at the corner of La Palma Avenue and Blue Gum Street in Anaheim

Huntington Beach Regional Collection Center
17121 Nichols Street
Located next to Rainbow Disposal at the cross streets Beach Blvd. and Warner in Huntington Beach

San Juan Capistrano Regional Collection Center
Prima Deshecha Landfill
Take the Ortega (74) Hwy exit from the 5 Fwy in San Juan Capistrano to La Pata Avenue.

Collection Centers will accept old paint, solvents, pesticides, pool chemicals, used motor oil and used automotive batteries at no cost. The Centers are open Tuesday - Saturday, from 9 a.m. to 1 p.m., and are closed on rainy days.

For more information, please call the County Hazardous Hotline at 714/834-6752.

Provided as a public service by the California Integrated Waste Management Board and the City of Garden Grove and is not an endorsement of stores by either party.

Winter Wonderland

See Some Snow, See Some Snow, See Some Snow

Atlantis Park will be transformed into a frosty funhouse when the Winterfest Carnival takes over on Saturday, December 4, from 10 a.m. to 3 p.m. Kids will delight in a snow play area, a snow hill for sledding, craft booths to make presents and ornaments, and games and contests. And, of course, Santa will be on hand taking requests.

This once-a-year event is $4 per person. Atlantis Park is located at 9301 Westminster Avenue. For more information, call Community Services at 741-5200.

Don't Trash That Tannenbaum

Pine Pick-Up As Easy As 1-2-3

To help divert waste from the landfills, recycle the holiday tree. Here's how:

1. Remove the stand, decorations and tinsel.
2. Cut up the tree and put it in your brown trash container. Trees over six feet need to be cut in half.
3. Put the brown container at the curb on your regular collection day.

If you're unable to cut up the tree, place it at the curb for pick-up on your regular collection day between December 27 and January 7.

Green Is Good

Keep That Tree The Tops

They're common sense safety tips, but they bear repeating, because, sadly, every year fires are caused by unattended tannenbaums. So, remember these:

- Keep water in it.
- Get the tree in the house late - get it out early.
- Keep candles away from it.
- Don't put it near heating vents.

Stick It!

In this issue, look for your complimentary Garden Grove bumper sticker. It comes courtesy of the Garden Grove Community Foundation - the non-profit fundraising arm for the Renaissance Garden Grove program - developed to promote the progress and spirit of the community.

If you'd like to contribute to the Foundation, look for the insert card inside this newsletter or call 741-5280.

Renaissance

City Calendar

- **City Hall Closures**
  November 12, 25, 26
  December 10, 24
  January 3, 2000
  January 7, 21
- **Volunteer Paint-Outs**
  November 6, 12, 20
  December 4, 10, 18
- **Speaker Series**
  Jim Rohn
  November 18 - Noon
  Community Center
  11300 Stanford Avenue
  Tickets: $20
  544-5679
- **Speaker Series**
  Dr. Leonard Olguin
  December 1 - Noon
  Community Center
  11300 Stanford Avenue
  Tickets: $20
  544-5679
- **Winterfest Carnival**
  December 4
  Atlantis Park
  9301 Westminster Avenue
  10 a.m. - 3 p.m.
  $4 per person
- **Spark of Love Toy Drive**
  Month of December
  All seven Fire Stations
  741-5600

GARDEN GROVE

Citywork's

006

GARDEN GROVE CITY HALL November 14, 1995

The Garden Grove Newsletter • November 1999

'Tis The Last Season of The Century

The Holidays Are Here & Here Comes The Millennium!

December 31, 1999 ... 11:59 p.m... a memorable moment in history - a new century will be upon us. How will you commemorate this once-in-a-thousand-year's event and are you prepared for any technical glitches which may occur? Here's an answer to both of those questions.

Leave A Legacy

This holiday season, why not give a truly unique gift with real staying power. Want a clue? It's red, made of clay, weighs about five pounds and has a personal message on it which you wrote. Need another hint? Okay, you won't have to wrap it, and lots of people will walk on it, including generations of your family.

It's a brick, and for $125, you and your loved ones can become a permanent part of the community through the Brick Walkway Project. Clusters of personally-inscribed bricks will be placed at 32 areas along Main Street beginning in January, running the length of the historic shopping plaza.

To purchase one, call 741-5280.

Going to Great Heights

Buy a brick this holiday season, and during the next one, see the result of your contribution. In December, 2000, a Millennium Clock Tower (pictured left) will be dedicated in the Village Green Park at the point where Euclid and Main Streets meet. This Mission-era, steel-crafted, 45-foot landmark will forever mark the Year 2000 for residents and visitors of Garden Grove.

A seven-foot marble obelisk inscribed with the names of Garden Grove Community Foundation sponsors will sit at the base of the Clock Tower, which will be encircled with glazed, colorful, inscribed tiles, also available for sale for $500 each.

Y2K - You Ready?

Free Seminar

If you'd like some helpful hints to prepare you for the Year 2000, attend a free seminar hosted by the City of Garden Grove on November 17, at the Community Meeting Center, from 5:30 to 7:30 p.m.

Representatives from companies like Pacific Bell, Southern California Edison, Emergency Management Systems, and Garden Grove Hospital will be on hand to answer questions and detail their preparations.

For more information, call 741-5280.

Inside . . .

Warm A Heart 2
Giving Back 2
State Of The City 3
Winter Wonderland 4

SAFETY NET

New Program Has Parents Talking

Do you know the names and phone numbers of your children's friends? Or their parents? These are two questions that developers of a new citywide program say some day soon every parent in the community will be able to answer "yes" to.

"Parent Networks - Keeping Our Kids Safe" is a self-help parenting tool designed to open communication among moms, dads and guardians, so that all become more aware of their kids' activities outside of the home and classroom.

The program was initiated in an effort to stem the rising tide of youth-related crime and injuries. Sponsors include the City's Community Services and Police Departments, the Garden Grove Unified School District, the Girls and Boys Clubs of Garden Grove and the Garden Grove Unified Council of Parent/Teacher Students' Association.

For more information about Parent Networks, call Community Services at 741-5200.

DEVELOPMENT DETAILS

A Lowdown On What's Going Up

Higher Learning

The City's downtown is looking a lot more upscale with the near completion of the second Higher Education building. Nicknamed "Ed 2," this sequel is sure to be a top-seller with students seeking to extend their education this fall.

Tenants include the University of LaVerne and Concord Career College, both of which will offer Bachelor's and Master's degrees in business and medical-related fields. Enrollment is sure to get cooking when the building's third tenant, the California Culinary Academy, opens its doors. This Garden Grove site becomes just the second such culinary academy in the state.

Big Screen Debut

Movie-lovers get ready to celebrate this fall when the Regal Cinema's 16-screen theater complex makes its Garden Grove debut at the Garden Promenade Center at Brookhurst and Chapman. Stadium-style seating and a state-of-the-art sound system are sure to make this development a blockbuster hit.

Fund-Raisers

By the end of the millennium, Harbor Boulevard in Garden Grove should be home to six more hotels. That's 2,400 hotel rooms and suites catering to Disneyland tourists and business travelers. More guests to Garden Grove means more revenue, in the form of bed tax, for the City's General Fund, which pays for public safety, clean streets and parks, and much more.

The Crowne Plaza - Just broke ground

The Renaissance Suites - Ground breaking set for late summer

Hampton Inn - Opening doors late summer

Hilton Garden Inn - Also set to start business late summer

Homewood Suites - Construction underway

Embassy Suites - Construction starting in September

STICK IT!

In this issue, look for your complimentary Garden Grove bumper sticker. For more stickers, stop by City Hall - they're for sale for $2 each.

FIRE FACTS

Be Water Wiser

Just days after City Fire Departments and the County Fire Authority launched their annual Drowning Prevention Education campaign at the beginning of the summer, tragedy struck - two children drowned - one in just inches of a bucket of water, the other in a spa.

The Garden Grove Fire Department urges you to remember the simple, life-saving tips listed below, and not just during the summer months, but year-round. Look for more prevention pointers in the next issue of *Cityworks* or call the Injury Prevention Program at (714) 834-2228 for a free brochure.

Safeguard Pool/Spa

- Remove toys and chairs from area
- Gates and doors should be self-closing and self-latching
- Add safety covers on doors and windows leading to water
- Use a non-climbable 5-foot fence children can't squeeze through

Be Emergency Prepared

- Learn CPR
- Install a backyard phone
- Keep rescue equipment nearby and teach everyone to use it
- Ensure all household members know how to swim and dial 911

POLICE DETAIL

Another Set of Eyes

Going on a trip this summer? The Police Department has someone to watch over your house while you're away, thanks to their Vacation Home Check program. A daily inspection of your property will be provided by members of the Department's Volunteers-In-Policing.

To take advantage of this free service, call the Police Department at 741-5704 on the day of your departure, no earlier.

"JUST BEAUTIFUL" "SIMPLY DELICIOUS" "CAN'T WAIT TO SEE NEXT YEAR'S"

- Overheard at Tour & Tea Event

The rave reviews are still coming in from the over 250 attendees of the 1999 Garden Tour & Tea held in June. The seven distinctly unique and enchanting Garden Grove backyards showcased for the event definitely impressed the guests, as did the authentic Victorian Tea held at the Courtyard Center.

Mark your calendars for the next Tour & Tea, set for Saturday, June 10, 2000. If you'd like to volunteer your backyard for consideration or if you'd like to serve on a panel of volunteer judges selecting next year's gardens, call Administrative Services at 741-5280.

DON'T DUMP 'EM -

It's Illegal!

Did you know that pouring anything but clean water into a gutter or storm drain is against the law? The City adopted a water quality ordinance two years ago prohibiting the placement of a laundry list of items into these kinds of receptacles. They include:

- Clippings, soil, fertilizer
- Trash, animal waste, paint
- Oil, antifreeze, radiator fluid
- Pool chemicals, detergents, cleaners

REMEMBER, THE OCEAN IS JUST A STORM DRAIN AWAY.

The Garden Grove Newsletter • August 1999

REPRESENTATIVE PUBLIC EDUCATION MATERIALS

CITY OF HUNTINGTON BEACH

The Ocean begins at your front door!

Storm Water & Urban Runoff Pollution (SWURP)
And What You Can Do To Stop It!

TRANSPORTATION AND HANDLING

- A maximum of 15 gallons or 125 pounds may be transported per vehicle, per trip (Department of Transportation regulation).
- Materials should be in original containers (except motor oil, fuels and antifreeze).
- All containers must have lids, be sturdy, non-leaking, and protected from breakage.
- Do not combine types of waste.
- Do not mix oil-base paint with latex paint.
- Dry out empty paint cans and discard in regular trash.
- If you wish to have a container returned (i.e. oil containers and boxes/crates used to transport materials), please notify the attendant in advance. Some containers may not be returnable.

WHY SHOP 'TIL YOU DROP?

VISIT THE STOP & SWAP!

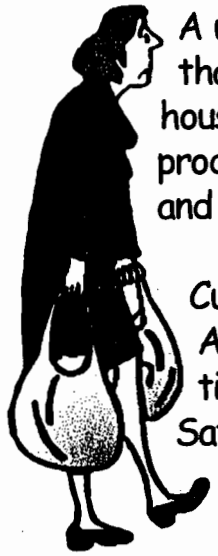

A unique and FREE program that allows you to drop off household, yard, and car care products you no longer need and pick up others you can use.

Currently available at the Anaheim and Irvine locations only. (Tuesday through Saturday, 9 a.m. to 1 p.m.)

FOR MORE INFORMATION ABOUT THE HOUSEHOLD HAZARDOUS WASTE COLLECTION PROGRAM AND THE STOP & SWAP CALL:

(714) 834-6752

Or see our webiste: www.oc.ca.gov/iwmd

Orange County Recycles!

Printed on recycled paper.

Integrated Waste Management Department

safe! easy! free!

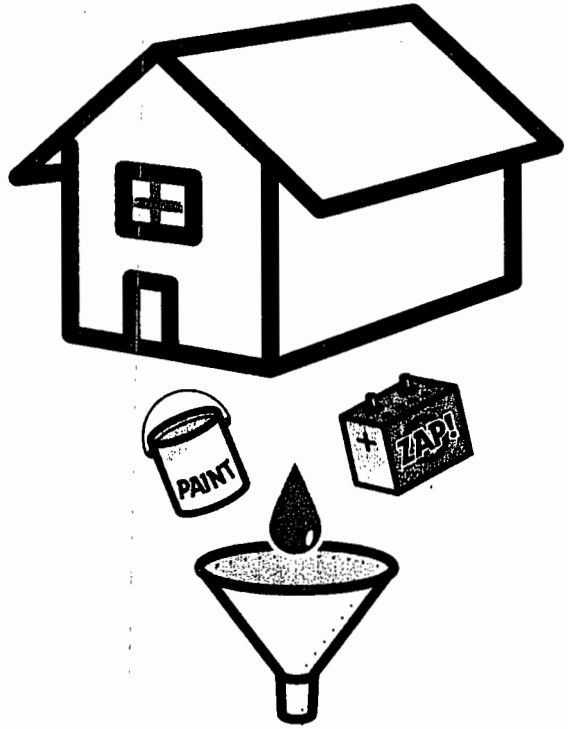

DISPOSAL OF HOUSEHOLD HAZARDOUS WASTE

Household Hazardous Waste Collection Program

006143

Blueprint for a Clean Ocean

Best Management Practices to Prevent Stormwater Pollution from Construction-Related Activities

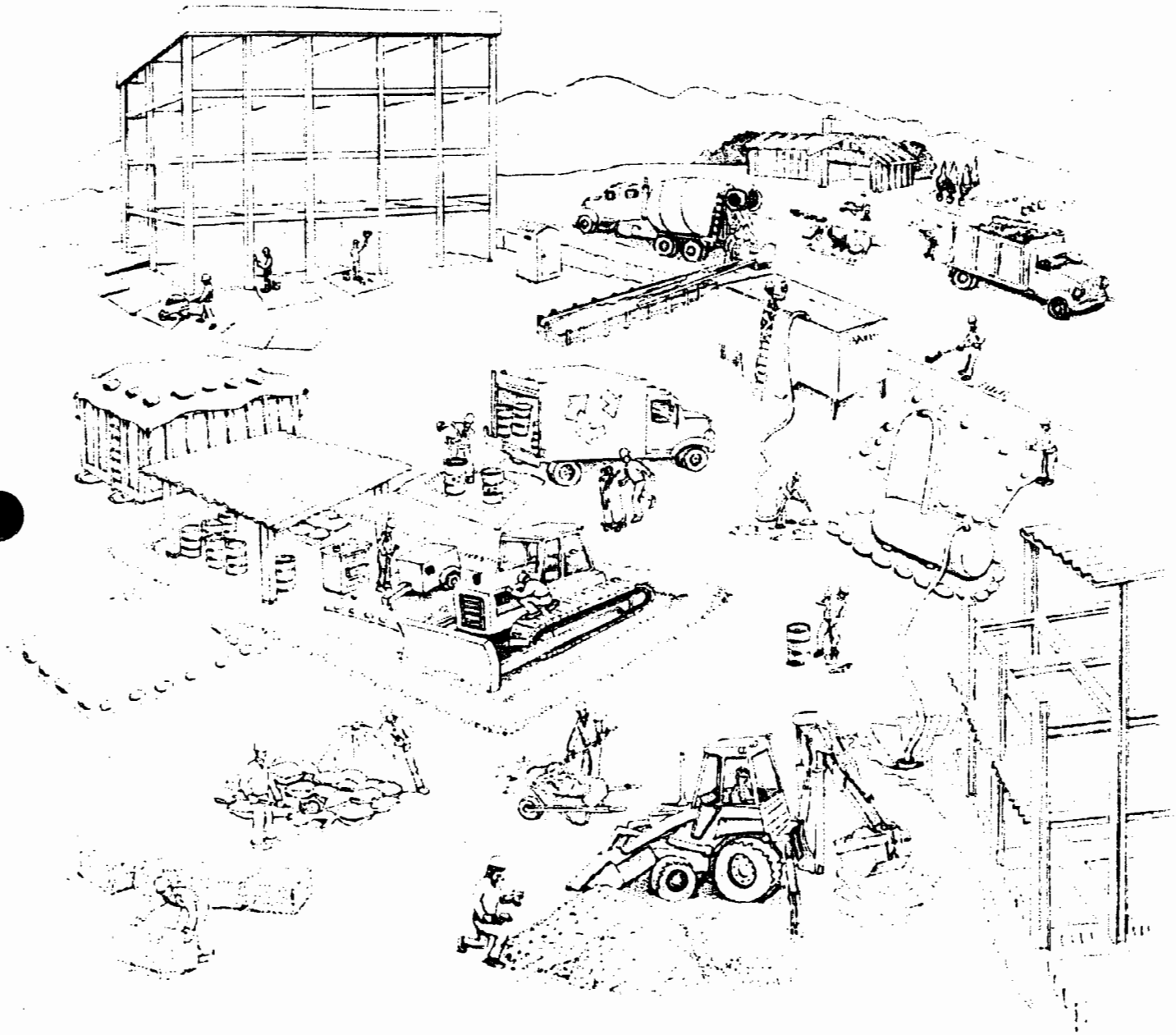

CITY OF HUNTINGTON BEACH

NO DUMPING • THIS DRAINS TO OCEAN •

This booklet has been developed as a resource for all general contractors, home builders, and subcontractors working on construction sites.

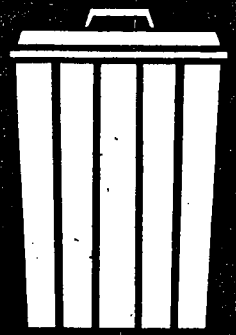

GOOD NEWS ABOUT RECYCLING

It works!
Every newspaper, aluminum can, glass bottle or plastic product recycled saves pollution, landfill space and valuable natural resources. Recycling in our community is easy to understand, effective, and involves you.

SCAVENGING

Scavenging is illegal and poses many problems, such as invasion of personal privacy, neighborhood theft, speeding vehicles and strewn trash. Please help your City uphold the law! When you observe scavengers at work, please record:

- ✔ vehicle description and license plate number
- ✔ description of scavenger and goods taken
- ✔ area/address of incident
- ✔ date/time of incident
- ✔ your name, address & phone #

Then, call:

- **536-5271 (HB incidents)** or
- **965-4483 (FV incidents)**

The Huntington Beach and Fountain Valley environmental education partnership is dedicated to providing the latest information about recycling and related programs. To learn more, call the City environmental affairs representative.

Huntington Beach — 536-5431
Fountain Valley — 965-4400

REMEMBER . . .

Individual and group tours of the Rainbow Recycling facility are available by calling (714) 847-3581.

Printed on recycled paper

006144

OUR COMMUNITY RECYCLING PLAN

CITY OF HUNTINGTON BEACH

CITY OF FOUNTAIN VALLEY

HOUSEHOLD HAZARDOUS WASTE

Don't be a Household Hazardous Waste Generator...

You can make a Difference!

DO YOU HAVE

- Used Motor Oil
- Old Paint
- Solvents
- Pesticides
- Used Automotive Batteries
- Household Cleaning Products
- Pool Chemicals

IN YOUR HOME?

The County of Orange provides a *FREE...*

HOUSEHOLD HAZARDOUS WASTE COLLECTION CENTER

Located at: Rainbow Disposal
17121 Nichols St., Huntington Beach
Hours: 9:00 A.M. to 1:00 P.M.
Tuesday thru Saturday
For Hazardous Waste Information
Call - (714) 834-6752

ENVIRONMENTAL EDUCATION TEAM
Earth-friendly ideas for a brighter future...
City of Fountain Valley–Rainbow Disposal–City of Huntington Beach
P.O. Box 1026 – Huntington Beach, CA 92647

WHERE ARE WE GOING TO THROW IT...

WHEN THERE IS NO MORE AWAY?

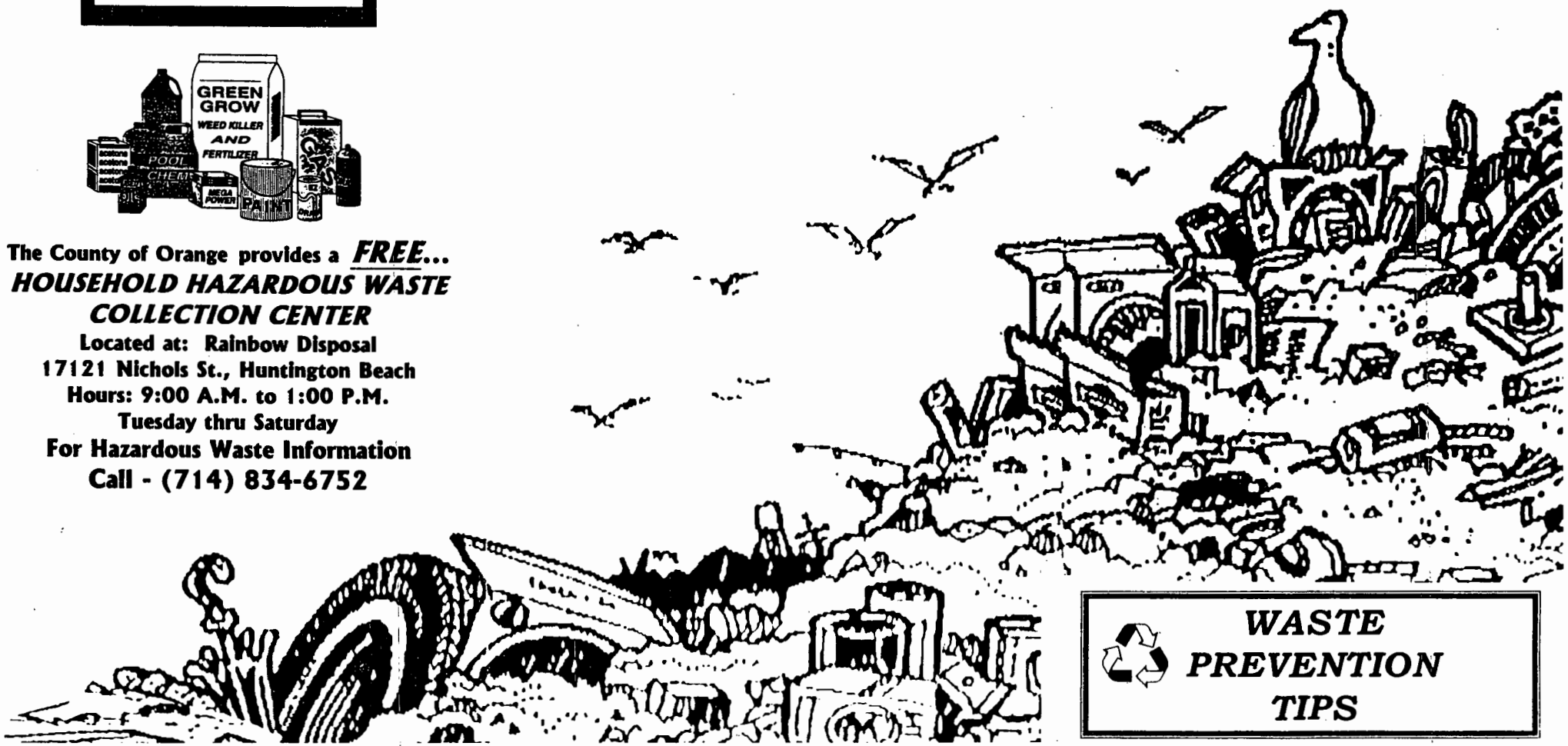

WASTE PREVENTION TIPS

WHAT IS CONSTRUCTION AND DEMOLITION DEBRIS?

C&D debris is material generated in the construction and demolition of buildings and roads. According to the California Integrated Waste Management Board, C&D debris makes up approximately 28% of the state's waste stream. Orange County businesses generate large quantities of C&D debris and could save money by diverting this material through reuse and recycling. Reducing the amount of C&D debris that is landfilled will also help Orange County cities meet the 50% diversion rate required by the California Integrated Waste Management Act of 1989.

Disposal rates are determined by the quality of material. Some processors will give estimates of disposal rates over the phone. Ultimately, the condition of the material will be determined upon delivery of the material.

Tips for managing your C&D debris for recycling:

- Develop a C&D waste management plan
- Assess the amounts and composition of your waste
- Assess the space available for separation of materials on site
- Assess the location of nearby recycling facilities

Educating employees, contractors, and sub-contractors about the benefits of recycling C&D debris will improve your bottom line and help your community conserve natural resources.

Printed on recycled content paper.

County of Orange
Integrated Waste Management Department
320 N. Flower Street, Suite 400
Santa Ana, CA 92703

Construction and Demolition Debris Facilities

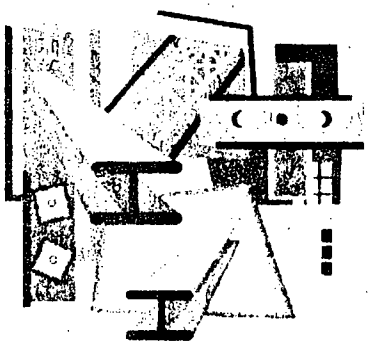

This brochure provides alternatives to landfilling specific types of Construction and Demolition (C&D) Debris

Integrated Waste Management Department

REPRESENTATIVE PUBLIC EDUCATION MATERIALS

CITY OF IRVINE

PREVENT POLLUTION!

USED RAGS, CAT LITTER, AND OTHER ABSORBENTS

PREVENT SPILLS CHECK FOR LEAKS

STORE SAFELY

RECYCLE OIL FILTER

CLOSE THE LOOP!

RECYCLE USED OIL

Used Oil Recycling Wheel

HT THING...
CLE USED OIL!

K
RM DRAIN!
K or TOILET!
USED OIL and
TER sections for
directions.
iners/cans:
onmental
cepted recy-
al method.

• Oil soaked rags an
can be combustible
disposed of immed
• Contact your lo
coordinator or e
agency to dete
accepted disp
in your area.

RECYCLING USED OIL BENEFITS YOU, YOUR FAMILY, AND THE ENVIRONMENT!

Recycling used oil:

- Protects the water supply, including your drinking water, by keeping oil from seeping into the ground;
- Prevents oil pollution in recreational waterways—storm drains commonly lead to streams, bays, rivers, and oceans;
- Prevents plant, soil, surface water, and ground water contamination; and
- Helps you keep your communities' environment safe and clean.

More reasons to recycle used oil:

- Used oil can be re-refined for reuse. Purchasing re-refined motor oil saves natural resources and lessens US dependence on imported oil.
- **IT IS AGAINST THE LAW** to dump used oil—from vehicles, lawn mowers, etc.—on the ground, in the trash, down storm drains, or down the sink or toilet.
- Receive $0.16 for every gallon of used oil returned to a certified used oil collection center.

TIPS FOR AN ENVIRONMENT FRIENDLY OIL CHANGE

...it is easy being green!

BE PREPARED! Have ground cloth, rags, funnel, tools, oil pan, and a CLEAN plastic container with secure lid ready (If you use a plastic milk jug with snap-on cap, tape down securely). Clearly label container as "Used Oil." Avoid working on grass or dirt.

DRAIN used oil filter for at least 12 hours. Both the used oil and the metal from the filter must be recycled.

PREVENT SPILLS. Use a funnel when pouring. Make sure the new oil filter is secure. Do not overfill. Check your vehicle owner's manual for oil specifications and amount.

CLEAN ALL SPILLS. On concrete/asphalt: soak up spilled oil with rags or cat litter; wash area with mild cleaner. On dirt/gravel: dig up visibly contaminated area. Call your local used oil coordinator or environmental agency for specific disposal information.

NEVER MIX USED OIL with any other liquids! Mixed automotive fluids *cannot* be recycled.

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SIDE 1 (Round 1)

CITY OF IRVINE

RECYCLES USED OIL

TIPS FOR RECYCLING USED OIL:

- Please call FREE drop-off sites to verify hours of acceptance.
- CONTAMINATED OIL IS NOT ACCEPTED!
- Carry oil in clean, non-breakable containers—not metal.
- Do not mix with bleach, paint, solvents, or automotive fluids.
- Maximum container size: 5 gallons.
- Maximum drop-off: 20 gallons per day.

Funded by California Integrated Waste Management Board.

Become The Center of Attention

It's Good For You and Your Community

Hydraulic
Hydrolyte
Fluid
Oil
Pineapple
Body and
Bone Fluid
OIL

Recycle used motor oil

Recycle used oil filters

Did you know that all the water that has ever been, or will be, available to our planet is on or in the earth right now?
If the earth were a globe the size of a basketball, all the usable water on the surface of the planet would fill less than half a cup! That is why it is important to protect our water supply.

Rain can wash used motor oil that was disposed of improperly into city drains and eventually into lakes, rivers, groundwater, and the ocean! One gallon of used motor oil can contaminate one million gallons of drinking water!

Here are ways that you can help prevent this from happening and help protect the earth: reduce, reuse, and recycle the materials that you use to keep them from reaching our water supply.

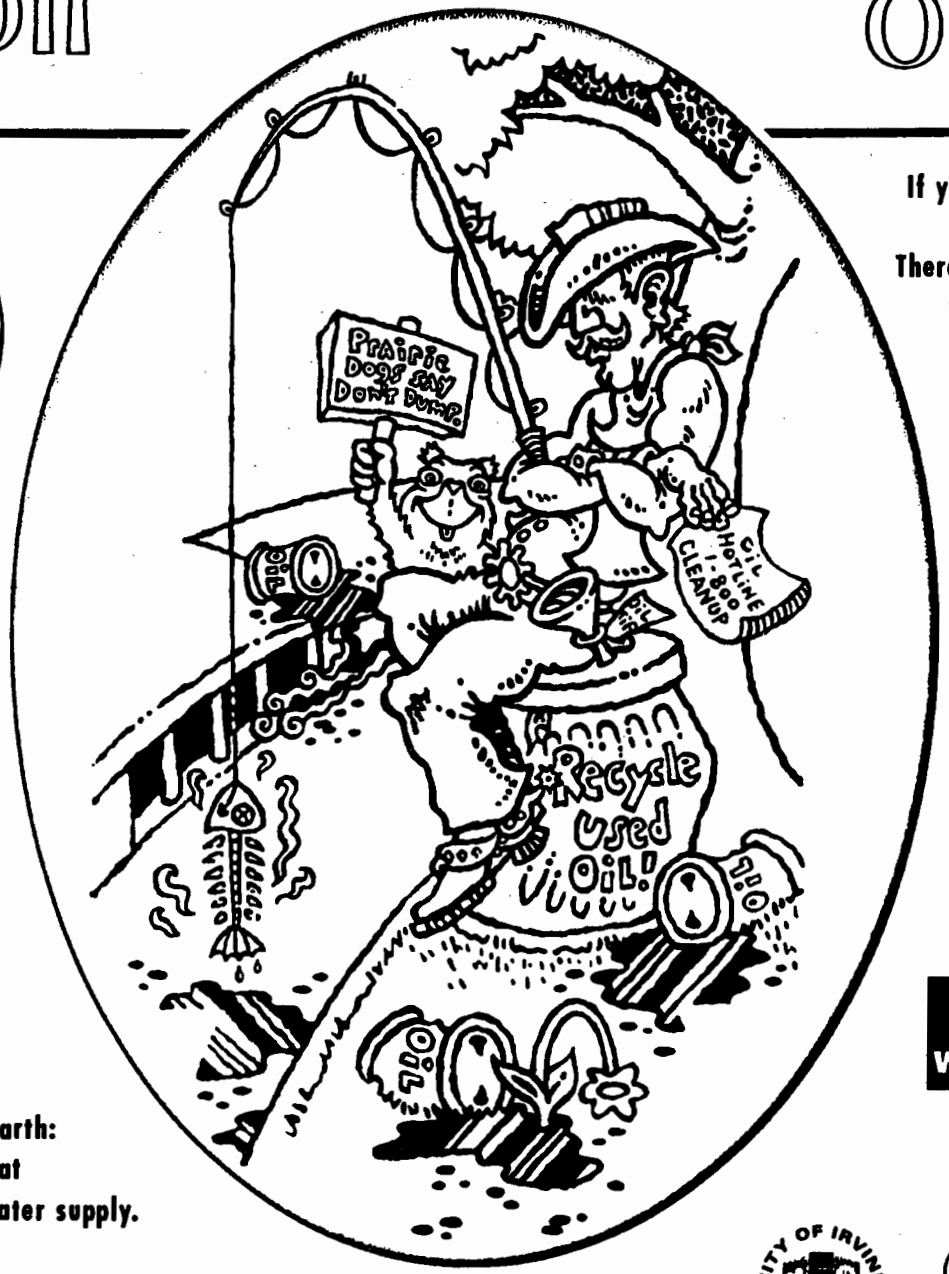

If you see your parents changing the oil in their cars, remind them to dispose of it properly. There are 2,700 state certified collection centers which accept used oil and used oil filters for FREE!

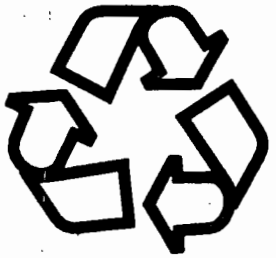

When recycling used motor oil, remember to use a clean plastic container with a tight lid. This container can be reused again, but your parents should store it safely away from children and pets.

If you have additional questions about used motor oil recycling, please contact the California Environmental Hotline

at 1-800-CLEANUP or www.1800CLEANUP.org.

This program is brou[illegible]ou by the City of Irvine and made possible by a grant from the Cali[illegible] Integrated Waste Management Board.

City of Irvine

Irvine Recycles

WM Waste Management

RECYCLE USED OIL

IRVINE RECYCLES

USED MOTOR OIL!

Did you know that you can recycle your used motor oil safely and easily right here in the City of Irvine? That's right. All you need to do is bring your used motor oil in a sealed container to one of the conveniently located State Certified Used Oil Collection Centers in Irvine.

And... Irvine has five State Certified Used Oil Collection Centers standing by to help you. When you do an oil change, just drain your vehicle's old oil into a clean container, seal the container well with a lid and bring it to one of the five conveniently located State Certified Used Oil Collection Centers in Irvine. So don't throw good oil down the drain. Recycle now!

Do You Need A Container?

THIS COUPON IS GOOD FOR
1 FREE 15-QUART USED OIL RECYCLING CONTAINER!

(one per household and must be an Irvine resident)

Just mail us this coupon and the Orange County Conservation Corps will deliver the container to you within two weeks!

Name: _____

Address: _____ **Zip:** _____

Day Phone: _____

Mail Coupon to Ms. Jan Noce, Program Specialist, City of Irvine, Post Office Box 19575, Irvine, CA 92713

*IRVINE STATE CERTIFIED USED MOTOR OIL COLLECTION CENTERS**

Caylin Environmental
1350 Reynolds Ave, Suite 121
Irvine, CA 92614
(949) 852-1616

Firestone Store
51 Auto Center Drive
Irvine, CA 92618
(949) 829-8710

Irvine City Auto Parts
14427 Culver Drive
Irvine, CA 92604
(949) 551-5588

Jiffy Lube
3080 Main Street
Irvine, CA 92614
(949) 863-0625

Jiffy Lube
8777 Irvine Center Drive
Irvine, CA 92618
(949) 753-0485

***Note: It is advisable to call before taking oil to any of the State Certified Used Oil Collection Centers listed. Centers will pay you $.04 for each quart you recycle. Should you have additional questions about used motor oil recycling, please contact the California Environmental Hotline at 1-800-CLEANUP or www.1800CLEANUP.org.**

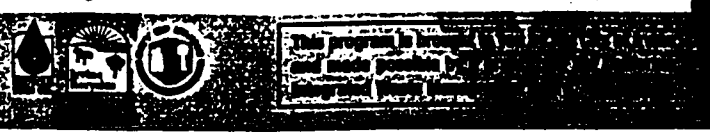

IRVINE RECYCLES USED MOTOR OIL!

Did you know that you can recycle your used motor oil safely and easily right here in the City of Irvine? That's right... All you need to do is bring your used motor oil in a sealed container to one of the conveniently located State Certified Used Oil Collection Centers in Irvine. **And, State Certified Used Oil Collection Centers will pay you $.04 for each quart you recycle!**

IF YOU HAVE ADDITIONAL QUESTIONS ABOUT USED MOTOR OIL RECYCLING, PLEASE CALL THE IRVINE RECYCLES HOTLINE (714) 724-7669.

This program is brought to you by the City of Irvine and made possible by a grant from the California Integrated Waste Management Board.

Irvine City Auto Parts
14427 Culver Dr
Irvine, CA 92604
(714) 551-5588

Firestone
51 Auto Center Dr
Irvine, CA 92618
(714) 829-8710

Jiffy Lube
8777 Irvine Ctr. Dr
Irvine, CA 92618
(714) 753-0485

Auto Service 2000*
1350 Reynolds Ave.
Irvine, CA 92614
(714) 852-1616
*Please call Auto Service 2000 before taking in your oil.

Irvine Recycles

Do You Need a Container?

THIS COUPON IS GOOD FOR

1 FREE 15-QUART USED OIL RECYCLING CONTAINER!

(one per household and must be an Irvine resident)

Just mail us this coupon and the Orange County Conservation Co will deliver the container to you within two weeks!

NAME

ADDRESS ZIP

DAY PHONE

MAIL COUPON TO MS. JAY NOCE, PROGRAM SPECIALIST, CITY OF IRVINE, POST OFFICE BOX 19575, IRVINE, CA 92713

IRVINE RECYCLES USED MOTOR OIL!

Did you know that you can recycle your used motor oil safely and easily right here in the City of Irvine? That's right... All you need to do is bring your used motor oil in a clean, sealed container to one of the conveniently located State Certified Used Oil Collection Centers in Irvine. **And, State Certified Used Oil Collection Centers will pay you $.04 for each quart you recycle!**

FOR ADDITIONAL INFORMATION ABOUT THIS PROGRAM, OR TO OBTAIN A FR USED OIL CONTAINER, PLEASE CALL THE IRVINE RECYCLES HOTLINE AT 949/7

1. Caylin Environmental
1350 Reynolds Avenue
Suite 120
Irvine, CA 92614
(949) 852-1616

2. Firestone Store
51 Auto Center Drive
Irvine, CA 92618
(949) 829-8710

3. Irvine City Auto Parts
14427 Culver Drive
Irvine, CA 92604
(949) 551-5588

4. Jiffy Lube
8777 Irvine Center Drive
Irvine, CA 92618
(949) 753-0485

5. Jiffy Lube
3080 Main Street
Irvine, CA 92614
(714) 961-5491

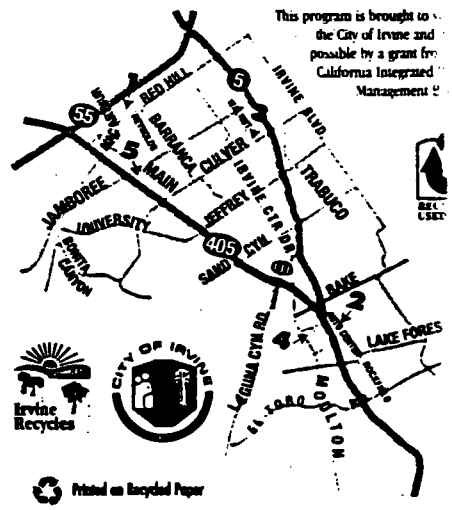

This program is brought to the City of Irvine and possible by a grant fr California Integrated Management

Irvine Recycles

Printed on Recycled Paper

RECYCLE
USED OIL

A Slick Solution to Water Pollution

...RECYCLE

- **If dumped in the trash, on the ground, into household drains, or down storm drains, used motor oil can work its way into our groundwater and oceans.**
- **One gallon of oil pollutes 1,000,000 gallons of water - equivalent to:**
  - **1 year supply of water for 50 people**
  - **28 home swimming pools**
  - **6 footballs fields covered by 1 foot of water**
- **A single pint of oil can cause an oil slick one acre in size.**

DROP-OFF USED OIL....FREE

Irvine City Auto Parts
(Culver Dr. & Walnut Ave.)
(714) 551-5588

Auto Service 2000
(Red Hill Ave. & Reynolds Ave.)
(714) 852-1616- CALL FIRST

Household Hazardous Waste Collection Center (Oak Canyon Rd.)
(Proof of County residence required here - drivers license)

For the FREE drop-off site nearest you
Call (800) 553-2962

Funded by the California
Integrated Waste Management Board

Jan Noce' (714) 724-6356
Business & Environmental Assistance

CITY OF IRVINE

City of Irvine

CHANGING YOUR OIL?

RECYCLE IT!

REMEMBER .....IF USED OIL IS DUMPED IN THE TRASH, ON THE GROUND, INTO HOUSEHOLD DRAINS, OR DOWN STORM DRAINS, USED MOTOR OIL CAN WORK ITS WAY INTO OUR GROUNDWATER AND OCEANS. . . . .

GOOD FOR 1 FREE 15 - QUART USED OIL RECYCLING CONTAINER

(ONE PER HOUSEHOLD + MUST BE AN IRVINE RESIDENT)

Name _____

Address _____
Street City State Zip

Phone # _____

MAIL COUPON TO: Jan Noce', P.O. Box 19575, Irvine, California 92713
(714) 724-6356

~Clip and send~

Funded by the California Integrated Waste Management Board

Moving In?

Moving Out?

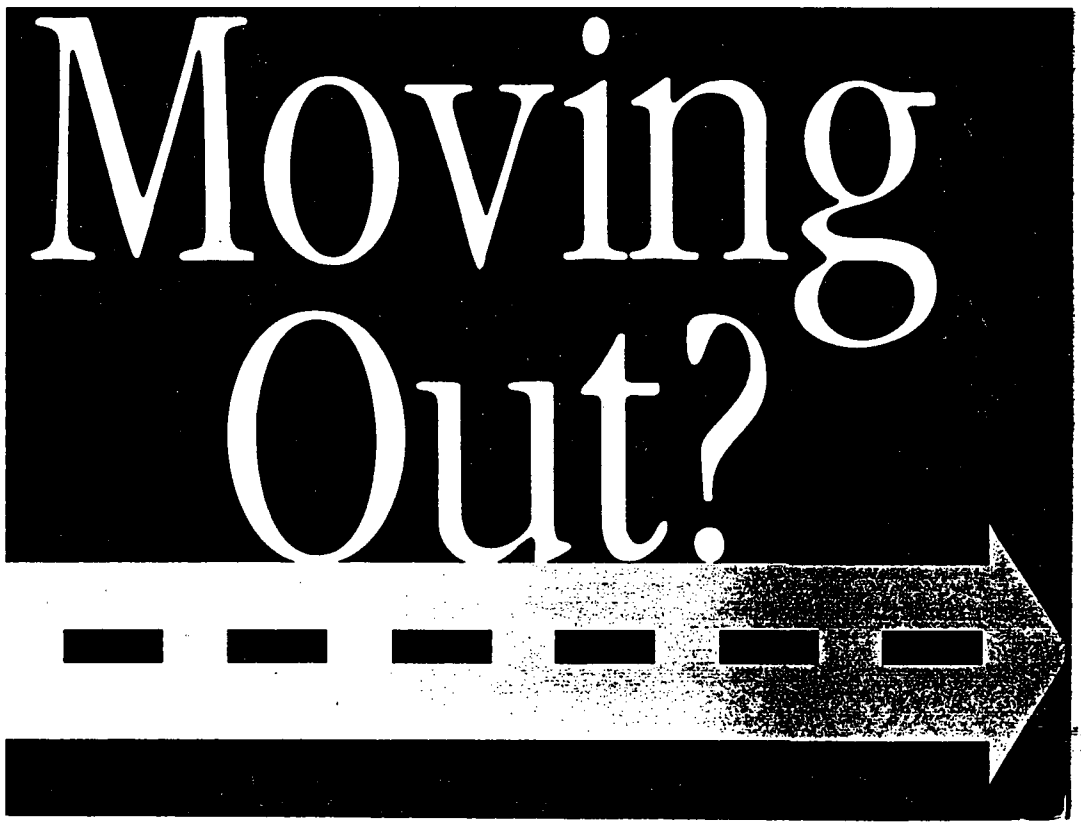

Recycles USED OIL

IRVINE RECYCLES USED MOTOR OIL!

You can recycle your used motor oil for FREE!

Call 1-800-CLEANUP

for a State Certified Used Motor Oil Collection Center Near You.

RECYCLE USED OIL

Irvine Recycles

WM
WASTE MANAGEMENT

Waste Truck Banner

IRVINE RECYCLES USED MOTOR OIL!

Irvine Recycles

RECYCLING USED MOTOR OIL PRESERVES A VALUABLE NATURAL RESOURCE AND PROTECTS THE ENVIRONMENT!

WM
WASTE MANAGEMENT

IRVINE RECYCLES USED MOTOR OIL!

Oil poured down drains or onto the ground can work its way into our ground and surface waters and cause serious pollution. One gallon of used oil can foul one million gallons of drinking water!

Irvine has five State Certified Used Oil Collection Centers standing by to help you recycle your used motor oil. Recycling oil is easy! When you do an oil change, just drain your vehicle's old oil into a clean container, seal the container well with a lid and bring it to one of the five conveniently located State Certified Used Oil Collection Centers in Irvine. So don't throw good oil down the drain. Recycle now!

1. Caylin Environmental
(Accepts oil filters too!)
1350 Reynolds Ave, Suite 121
Irvine, CA 92614
(949) 852-1616

2. Firestone
(Accepts oil filters too!)
51 Auto Center Drive
Irvine, CA 92618
(949) 829-8710

3. Irvine City Auto Parts
(Accepts oil filters too!)
14427 Culver Drive
Irvine, CA 92604
(949) 551-5588

4. Jiffy Lube
8777 Irvine Center Drive
Irvine, CA 92618
(949) 753-0485

5. Jiffy Lube
3080 Main Street
Irvine, CA 92614
(949) 863-0625

***Note: It is advisable to call before taking oil to any of the State Certified Used Oil Collection Centers listed. Centers will pay you $.04 for each quart you recycle. If you have additional questions about used motor oil recycling, please contact the California Environmental Hotline at 1-800-CLEANUP or www.1800CLEANUP.org. You can take other hazardous household wastes, such as paint, pesticides, cleaners, solvents, etc., to a nearby County of Orange Collection Center: 32250 La Pata Ave., San Juan Capistrano or 6411 Oak Canyon, Irvine. Please call (714) 834-6752 for more information.**

RECYCLE USED OIL

WASTE MANAGEMENT

CITY OF IRVINE

Irvine Recycles

This program is brought to you by the City of Irvine and made possible by a grant from the California Integrated Waste Management Board.

Printed on Recycled Paper

IRVINE RECYCLES USED MOTOR OIL!

Did you know that you can recycle your used motor oil safely and easily right here in the City of Irvine? That's right...

All you need to do is bring your used motor oil in a clean, sealed container to one of the conveniently located State Certified Used Oil Collection Centers in Irvine.

And, State Certified Used Oil Collection Centers will pay you $.04 for each quart you recycle!

FOR ADDITIONAL INFORMATION ABOUT THIS PROGRAM, OR TO OBTAIN A FREE 15-QUART USED OIL CONTAINER, PLEASE CALL THE IRVINE RECYCLES HOTLINE AT 949/724-7669.

1. Caylin Environmental
1350 Reynolds Avenue
Suite 120
Irvine, CA 92614
(949) 852-1616

2. Firestone Store
51 Auto Center Drive
Irvine, CA 92618
(949) 829-8710

3. Irvine City Auto Parts
14427 Culver Drive
Irvine, CA 92604
(949) 551-5588

4. Jiffy Lube
8777 Irvine Center Drive
Irvine, CA 92618
(949) 753-0485

5. Jiffy Lube
3080 Main Street
Irvine, CA 92614
(714) 961-5491

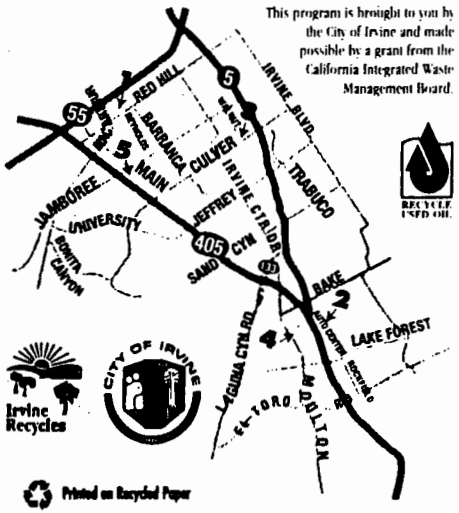

This program is brought to you by the City of Irvine and made possible by a grant from the California Integrated Waste Management Board.

Printed on Recycled Paper

006163

[illegible] RECYCLES USED MOTOR OIL!

[illegible]n recycle your used motor oil for FREE!

Call 1-800-CLEANUP

for a State Certified Used Motor Oil Collection Center Near You.

RECYCLE USED OIL

CITY OF IRVINE

WASTE MANAGEMENT

*Note: It is advisable to call before taking oil to any of the listed State Certified Used Oil Collection Centers listed. Centers will pay you $.04 for each quart you recycle.

This program is brought to you by the City of Irvine and made possible by a grant from the California Integrated Waste Management Board.

Bus Stop Poster

Do You Know Where The Water In Your Storm Drain Goes?

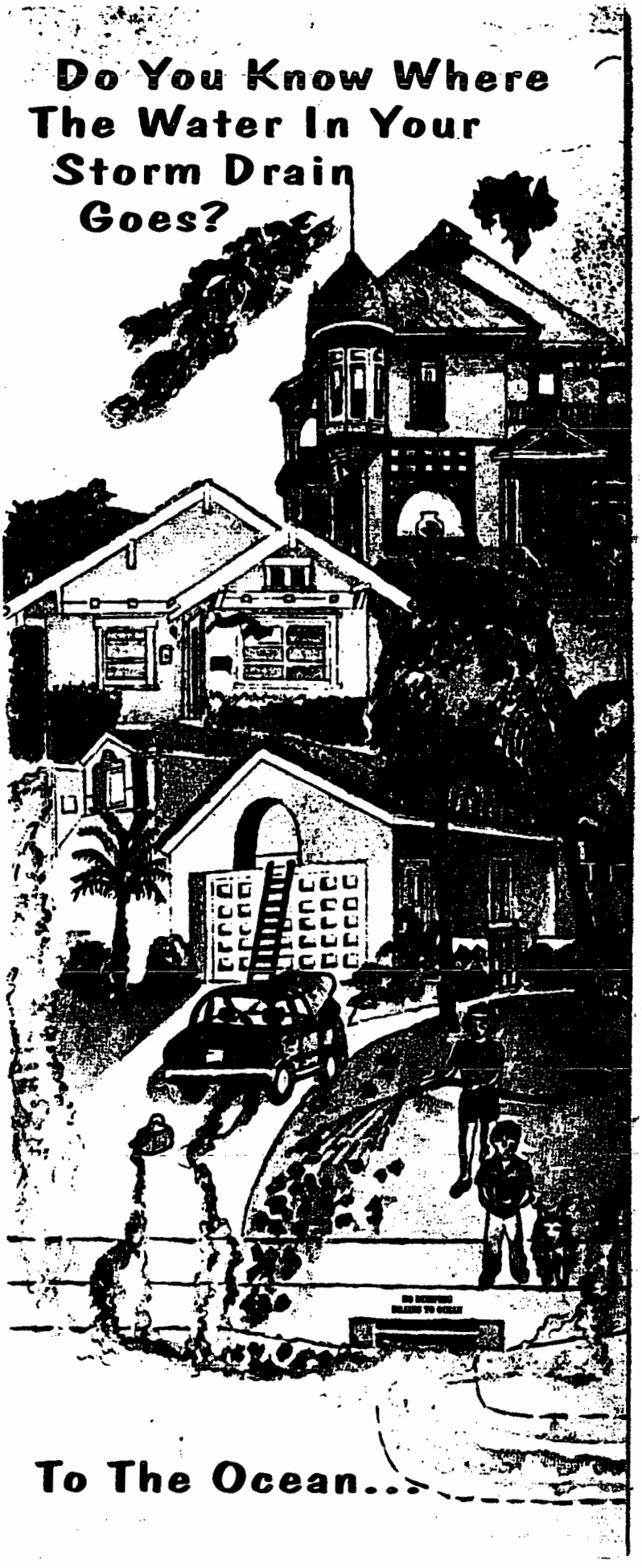

To The Ocean...

When you're at the park...

RECYCLE!

When you bring drinks to the park in glass, aluminum or pl
containers, be sure to look for the specially-marked recy
bins. Separate your trash and put recyclables in their p
place. It's easy, it's responsible, and it's great for Irv

IT'S GOOD FOR OUR PARKS

The special-lidded containers for glass and aluminu
products discourage littering and help keep our park
clean and family friendly.

Waste Management has joined forces with the Orange
County Conservation Corps to help collect our parks'
recyclables. At the current rate, we expect to collect
over 15,000 pounds of glass and aluminum every year
And that means that a lot of valuable resources will b
used again and again, and kept out of the landfill

OUR SUCCESS DEPENDS ON YO

Please remember to use the new recycling contain
next time you visit the park.

For more information, please call the Irv
Recycles Hotline at (949) 724-7669

Irvine Recycles

Recycles
When you're at the park...
RECYCLE!
Irvine Recycles

WASTE MANAGEMENT
OF ORANGE COUNTY

MAKING IRVINE ...AN EVEN BETTER PLACE TO LIVE

WASTE & RECYCLING SERVICE GUIDE

IRVINE RECYCLES USED MOTOR OIL!

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And, State Certified Used Oil Collection Centers will pay you $.04 for each quart you recycle!

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1350 Reynolds Avenue
Suite 120
Irvine, CA 92614
(949) 852-1616

2. Firestone Store
51 Auto Center Drive
Irvine, CA 92618
(949) 829-8710

3. Irvine City Auto Parts
14427 Culver Drive
Irvine, CA 92604
(949) 551-5588

4. Jiffy Lube
8777 Irvine Center Drive
Irvine, CA 92618
(949) 753-0485

5. Jiffy Lube
3080 Main Street
Irvine, CA 92614
(714) 961-5491

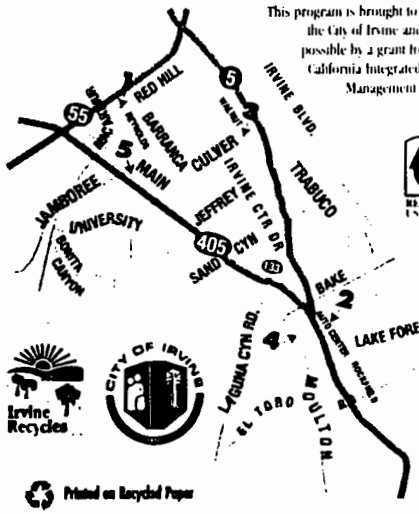

This program is brought to you by the City of Irvine and made possible by a grant from the California Integrated Waste Management Board

Printed on Recycled Paper

Integrated Waste
Management Department

Before you shop...

Stop!

Drop!

and

Swap!

Household Hazardous Waste Collection Program

CITY OF IRVINE

(800) 553-2962

REPRESENTATIVE PUBLIC EDUCATION MATERIALS

CITY OF LA HABRA

City Communicator

"A Caring Community"

CDBG Committee Vacancies

The La Habra City Council is currently accepting applications from residents who are interested in appointment to the Community Development Citizen Participation Committee. The primary purpose of the Committee is to identify needs, prioritize activities, and recommend to the City Council proposed use of Community Development Block Grant (CDBG) funds as allocated by the U. S. Department of Housing and Urban Development. Applicants must be residents of the incorporated area of the City of La Habra, and appointment shall be made on the basis of the interests of applicants. Members of the CDBG Committee serve a three-year term.

Applications and additional information is available in the City Clerk's Office, located in the Administration Building, 201 E. La Habra Boulevard, Monday through Thursday, 8:00 a.m. to 5:00 p.m., 562.905.9701. Applications must be filed with the City Clerk no later than November 22, 1999. The City Council will hold interviews during the month of December, 1999, and make appointments shortly thereafter.

"I Love La Habra"

Community Fair Seeks Vendors

Interested in selling your wares and crafts at the annual I Love La Habra Community Fair? Please call the Community Services Department now for an application!

Safely Dispose Hazardous Waste From Homes

Did you know that old paint cans, used motor oil, car batteries, and yard care products are considered "hazardous waste?" If dumped in our landfills or storm drains, these products can contaminate our groundwater and pollute our beaches.

The City of La Habra participates in a County-wide program to address this issue. Household Hazardous Waste Collection Centers are available to provide a safe, easy and free means to dispose of hazardous products stored in your home. Unwanted products can be easily disposed of at the Collection Center located at 1071 N. Blue Gum Street, Anaheim (located between the 91 and 57 Freeways on the corner of La Palma and Blue Gum). The Collection Center is open Tuesday through Sunday, 9:00 a.m to 1:00 p.m.; closed on rainy days and major holidays.

The City of La Habra has also implemented a Used Oil Recycling Program and has established the following four certified collection centers near you. Bring in all used motor oil to any one of these La Habra retailers during normal business hours:

- √ Firestone, 1071 S. Beach Boulevard
- √ Speedee Oil Change, 1580 W. Imperial Highway
- √ Pep Boys, 125 W. Imperial Highway
- √ Burch Ford, 201 N. Harbor Boulevard

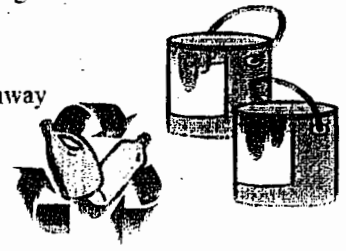

Recycling used oil, paints and other hazardous products is a way to help preserve our environment. Plus it's safe, easy, and free! **Let's all do our part and recycle today.**

La Habra

FOR YOUR INFORMATION

New Number for Waste Management

Effective October 18, 1999, the trucks servicing the City of La Habra residences and commercial businesses will be operated from Orange County facilities. If you have service issues or questions, please call Waste Management's Customer Service at either 714-558-7761 or 562-694-3730. Customer Service hours are 7 a.m. to 7 p.m. Monday through Friday and 8 a.m. – Noon on Saturday.

Storm Water Pollutants

Even living miles away, you may be polluting the Pacific Ocean without even knowing it. Unlike the sewer system which carries water to a wastewater treatment plant, the storm drain system empties untreated water directly into channels, rivers and ultimately the ocean. If this water is polluted, it ultimately affects our ocean as was the case recently with the Orange County beach closures. Common storm drain pollutants are detergents and cleansers, paints, oil and other automotive fluids, swimming pool chemicals, yard waste, and outdoor trash and litter. Before you let anything go into the gutter or storm drain, stop and think! It's up to all of us working together and doing our part to make a difference by keeping gutters, storm drains and waterways free of pollutants. Yard waste and trash/ litter can be disposed of in your regular trash pick-up, while the other pollutants are considered hazardous and must be taken to a special collection center.

Where to dispose of old paints, batteries, detergents and chemicals, and used oil... The City of La Habra participates in a county-wide program to address hazardous waste disposal. Just pack your car with unwanted home, yard and car care products, drive up to the Household Hazardous Collection Center, and sit in your car and fill out a simple form while an attendant removes your unwanted products. The nearest collection center to La Habra is located at 1071 N. Blue Gum Street, Anaheim (located between the 91 and 57 freeways on the corner of La Palma and Blue Gum). the Center is open Tuesday - Saturday, from 9 a.m. to 1 p.m. and closed on rainy days and major holidays.

For more information, call (714) 834-6752 or access via the Internet at www.oc.ca.gov/IWMD

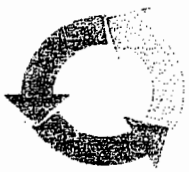

Pick up Free Recycled Material

The Household Hazardous Collection Center also recycles a large portion of the dropped off material. There's a "Stop and Swap"area at the Collection Center where you have the opportunity to obtain recycled products such as paint and cleaning products at no cost.

Used Oil Recycling Program

Used Oil can also be dropped off here in the City of La Habra. The City has implemented a Used Oil Recycling program and has established the following four certified collection centers near you. Bring used motor oil to any one of these La Habra retailers during normal business hours.

Firestone, 1071 S. Beach Blvd. - (562) 691-1731
Speedee Oil Change, 1580 W. Imperial Highway - (562) 697-3513
Pep Boys, 125 W. Imperial Highway - (714) 447-0601
Burch Ford, 201 N. Harbor Boulevard - (562) 691-3225

Tree Trimming

City Tree Trimming services are contracted through West Coast Arborists, Inc. This past year, the contractor was able to trim over 2500 city trees. At this rate, the city anticipates each city tree will be trimmed on a cycle of every four years. The program also includes the replacement of trees. If you are interested in a parkway tree, please contact the Public Works - Parks and Landscape Division at (562) 905-9792 and your request will be placed on a waiting list. Once the tree is planted in the parkway area, we ask that the resident water the tree for at least two years until the tree roots are established at the site. The City already has a plot plan describing which tree species will be planted at your location.

Composting Classes

The Friends of the Fullerton Arboretum offer Saturday Home Composting Workshop classes held at 10 a.m. at the Fullerton Arboretum located at 1900 Associated Road, Fullerton. These 90-minute composting workshops demonstrate how to naturally recycle yard waste and food scraps and are sponsored by several cities including La Habra and MG Disposal. The following is a schedule of future workshops:

February 19, 2000 – Home Composting II Workshop (for those who have attended Home Composting I, this workshop builds on previous information)
April 8 – Home Composting Workshop
June 17 – Home Composting Workshop

The workshops are presented by Dr. Bill Roley, Applied Ecological Systems and Pat McNelly, Orange County Sanitation District. For more information, please contact (714) 278-3404.

BROUGHT TO YOU BY . . .

PUBLIC WORKS DEPARTMENT
562-905-9792

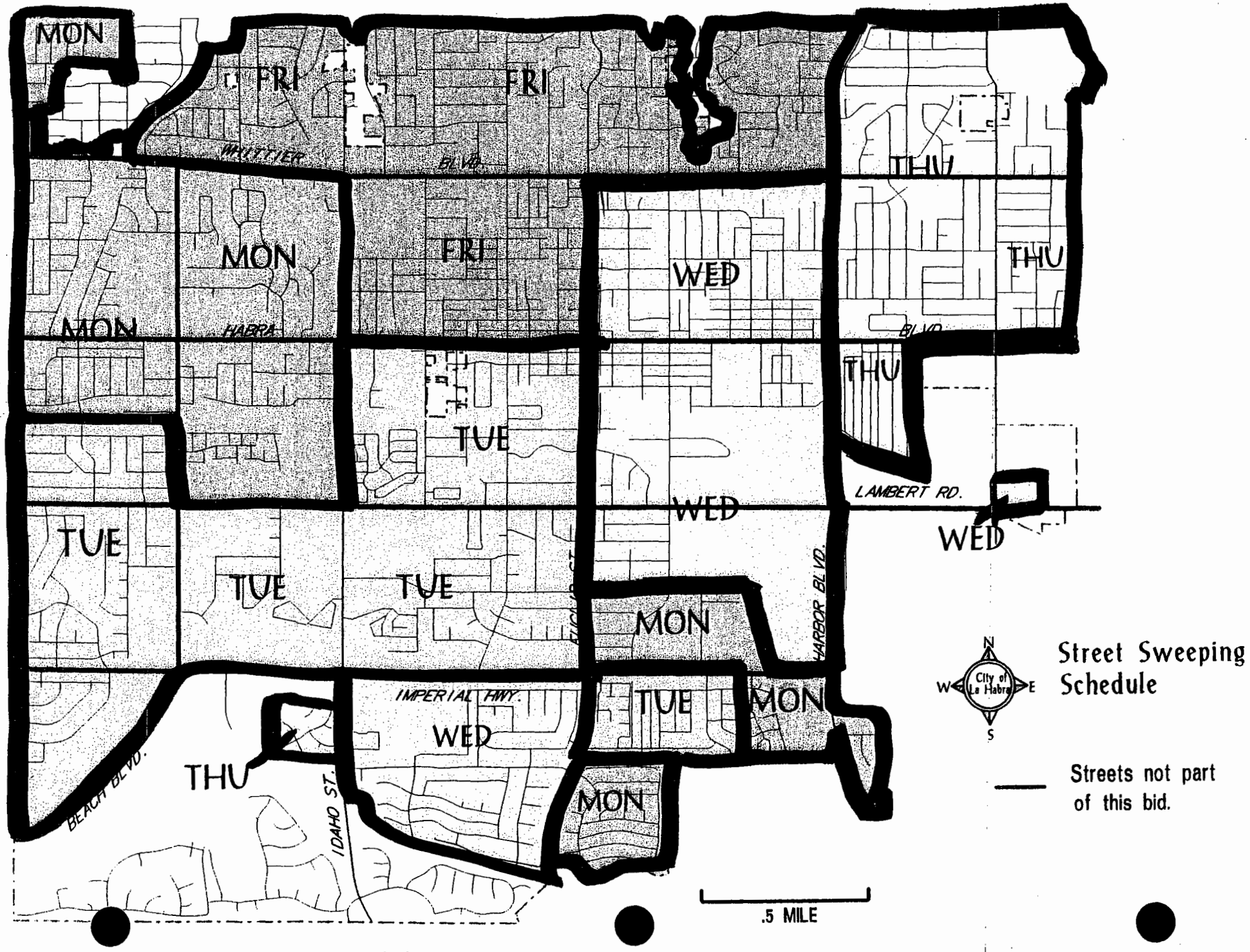

Map produced by La Habra Planning Dept. GIS 12/8/99 Rev. 2/15/00 sweepb.tl

006176

"Go with the Flow"

Currently two options are available for La Habra residents to receive water-saving toilets

- La Habra residents can pick up a standard 12" or 10", white round ultra-flush toilet bowl with a $15 co-payment. Toilets can be picked up at the Toilet Program Warehouse located at CTSI Corporation, 2722 Walnut Ave., Tustin. Please bring current water bill and a photo identification.
- La Habra residents may receive a $65 rebate toward the purchase of a toilet of your choice.

Both programs are provided courtesy of the City of La Habra Public Works, Municipal Water District of Orange County, Orange County Sanitation District and Metropolitan Water District of Southern California. For more information, please call (800) 424-8538.

Cleaner Streets in La Habra

Street sweeping frequency increases throughout the city beginning March 2000. To better enhance and provide for a cleaner community, street sweeping will be performed weekly in your residential area the day following your refuse collection. Residential street sweeping will be cleaned by contractor Nationwide Environmental Services while the major arterial city streets will be swept three times per week by city staff. (see map next page)

FREE Household Hazardous Waste Disposal

Wet paint, used motor oil, and most cleaning products are considered to be hazardous waste and can't be thrown in the trash. If these products are placed in the landfill, they can contaminate our groundwater. For this public safety concern and to conserve our environment, drop these products off at the Household Hazardous Waste Center, located at 1071 N. Blue Gum Street, Anaheim. It's absolutely free.

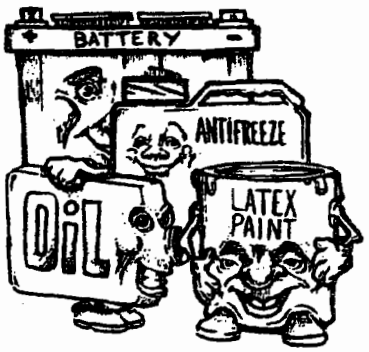

New Greenwaste Container

The City of La Habra and Waste Management are pleased to announce an enhancement to the city's existing recycling program. Over 85% of the requests received by the city for a second trash container since the automated collection/recycling system began in 1998 are requests for space to contain and dispose of yard waste. Because of this need and the need to divert waste away from landfills, the residents of La Habra will be receiving a third 96-gallon container solely for yard waste. Instead of placing grass clippings, leaves and weeds in your gray trash container, this yard waste will be placed in these new green containers. Material in the green containers will be collected separately and recycled. We hope this new program set be begin **Summer 2000** will fulfill the need expressed by many residents to get rid of yard waste while simultaneously reduce the waste tonnage at the landfills and help our environment. For more information about this upcoming program, please call the Public Works Department at (562) 905-9792.

Composting Classes

Learn the tips and technique on how to turn your yard waste into productive material for your garden. Fullerton Arboretum will be hosting composting workshops **free** to La Habra residents. Attendees will receive a voucher good for $25 off an "Earth Machine" composting bin redeemable at James Hardware. The workshops will be held on Saturday at 10 a.m., April 8 and June 17 at the Fullerton Arboretum, 1900 Associated Road, Fullerton. No need to pre-register. Call (714) 278-4790 for more details.

"Go with the Flow"

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(se

Recycle Used Oil and Oil Filters

Recycle used motor oil and oil filters in La Habra by taking them to a State Certified Used Oil Collection Center. These businesses will accept your motor oil and filters during normal business hours. Call the center to confirm hours of operations and amounts accepted. The service is FREE. In fact, $0.16 per gallon incentive will be offered.

State Certified Used Oil Collection Centers in La Habra

Auto Zone 1200 W. Imperial Hwy. (562) 694-5337	**Kragen Auto Parts** 1621 W. Whittier Blvd. (562) 905-2538	**Speedee Oil*** 1580 W. Imperial Hwy. (562) 697-3513
Burch Ford 201 N. Harbor Blvd. (562) 691-3225	**Pep Boys** 125 W. Imperial Hwy. (714) 447-0601	**USA Express*** 421 E. Imperial Hwy. (714) 680-4890
Firestone 1071 S. Beach Blvd. (562) 691-1731	*Does not accept oil filters This program is brought to you by the City of La Habra and funded by the California Integrated Waste Management Board.	

RECYCLE
USED OIL

Placed

GTE RECYCLING ALL PHONE BOOKS

Telephone Book Recycling Drive

Single family residents & businesses in Azusa, Baldwin Park, Bradbury, Covina, Duarte, La Habra, La Mirada, La Puente, Monrovia, Pico Rivera, Whittier:

Place your outdated telephone books in your curbside recycling container for pick-up

Multi family residents in La Mirada, Residents & businesses in West Covina, Multi family residents & businesses in La Habra:

Place your outdated telephone books in your regular trash container and they will be sorted out and recycled later

Drop-Off Locations:

Azusa Public Works Yard
809 N. Angeleno Ave.
in Azusa

Allan Company
14618 Arrow Hwy.
in Baldwin Park

Glendora Chamber of Commerce
131 E. Foothill Blvd., at Glendora Ave.
recycling bin behind building
in parking lot

Guirado Park
at Pioneer & Orange
in Whittier

Parnell Park
at Lambert & Scott
in Whittier

Call GTE Recycling at 1-800-610-4992 for further information

GTE thanks the cities for their participation and support.

WM · BURRTEC · Athens Services · METROPOLITAN WASTE DISPOSAL · CONSOLIDATED DISPOSAL SERVICE, INC.

GTE RECYCLING

568 E. Foothill Blvd., Suite 107 - Azusa, California 91702 - (626) 969-7816 - Fax: (626) 969-7854

FAX

TO:	Louie Pedroza, City of Azusa	**FAX:** 626-334-5464
	Wendy Harris, City of Baldwin Park	**FAX:** 626-337-1753
	Cary Kalscheuer, City of Covina	**FAX:** 626-858-5556
	Dianne Herring, City of Glendora	**FAX:** 626-914-9053
	Steve Hauerwass, City of La Puente	**FAX:** 626-961-4626
	Diann Paul, City of West Covina	**FAX:** 626-813-8663
	Greg Grammer, City of Bradbury	**FAX:** 626-303-5154
	Mike Yelton, City of Duarte	**FAX:** 626-358-0018
	Kandee Forbes, City of Monrovia	**FAX:** 626-359-8507
	Gina Nila, City of Whittier	**FAX:** 562-464-3572
	Marlin Munoz, City of La Mirada	**FAX:** 562-943-3666
	Karen Sulekian, City of La Habra	**FAX:** 562-691-1626
FROM:	Sandy Costandi, GTE Recycling	
DATE:	December 2, 1999	
PAGES:	2, including this one	
RE:	1999 Telephone Book Recycling Drive	

Attached is the ad that will be placed in the Tribune, the Pasadena Star, and the Whittier Daily News advertising GTE's telephone book recycling drive. Please verify that all information is correct and let me know of any revisions.

Sent a news release to La Habra Star + La Habra Journal

Thank You,

Sandy

City of La Habra Community Services 562/905-9708

INFORMATION FOR CHANNEL 3

Today's Date: December 1, 1999

Name of Non-Profit Organization: Public Works Department

Contact Person: Tina Truebe Telephone: 562-905-9792 ext. 633

Message Start Date: December 10, 1999 Message Stop Date: January 14, 2000

Information for Message*

Organization Name: City of La Habra

Event: Xmas Tree Recycling

Date of Event: December 26,1999 - January 15, 2000

Time of Event: N/A

Location of Event:

Contact Name and Number (If you want it broadcast)

Public Works Department at 562-905-9792

Additional Information:

Waste Management of Orange County will collect and recycle Christmas trees for three weeks immediately following Christmas (December 26, 1999 – January 15, 2000) on your regular pick-up day. Please remember not to obstruct refuse and recycling containers as it will interfere with the regular collection.

***MATERIAL MAY BE EDITED BY THE COMMUNITY SERVICES DEPARTMENT**

DIRECTOR'S APPROVAL

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City of La Habra Community Services 562/905-9708

INFORMATION FOR CHANNEL 3

Today's Date: March 9, 2000

Name of Non-Profit Organization: Public Works Department

Contact Person: Tina Truebe Telephone: 562-905-9792 ext. 633

Message Start Date: Now Message Stop Date: May 7, 2000

Information for Message*

Organization Name: City of La Habra

Event: Clean-Up Day Event

Date of Event: May 6, 2000

Time of Event: 8 a.m. – 3 p.m.

Location of Event: Various drop-off sites throughout city

Contact Name and Number (If you want it broadcast)

Public Works Department at 562-905-9792

Additional Information:

La Habra residents will have an opportunity to get rid of unwanted items normally not picked up on regular trash pick-up day at no charge. Items such as appliances, furniture as well as loose items such as lumber and yard waste will be accepted. Loose items are not to exceed 20 bags/bundles securely fastened no more than 8 inches in diameter and 4 feet in length. Drop-off sites are La Bonita, Montwood, Vista Grande, Oeste and El Centro Parks and Sierra Vista Elementary School. No Hazardous or Toxic Material accepted. Questions about hazardous and toxic waste, please call (714) 834-6752. **LA HABRA RESIDENTS ONLY—NO BUSINESS WASTE ACCEPTED. PROOF OF RESIDENCY WILL BE REQUIRED.**

***MATERIAL MAY BE EDITED BY THE COMMUNITY SERVICES DEPARTMENT**

DIRECTOR'S APPROVAL

Christmas Tree Recycling Program

The City of La Habra and Waste Management invite you to participate in the Christmas Tree Recycling Program. Waste Management of Orange County will collect and recycle Christmas Trees for three weeks immediately following Christmas, from December 27, 1999 through January 14, 2000. Trees must be free of metal ornaments and stands. Flocked trees will be collected but not recycled. Place your tree at the curbside on your regular collection day. Please remember to keep clear the refuse and recycling collection containers as any obstructions will interfere with regular collection.

For more information, please contact Waste Management of Orange County Customer Service Center at (562) 694-3730 or (714) 558-7761 Monday through Friday, from 7 a.m. – 7 p.m. and Saturday from 8 a.m. until 12 noon.

REPRESENTATIVE PUBLIC EDUCATION MATERIALS

CITY OF LAGUNA BEACH

- **Have your car inspected** and maintained regularly to avoid leaks. Don't spill oil when changing it.
- **Use kitty litter** or other absorbent materials to clean spills and dispose of it properly.
- **Eliminate septic tanks** where possible and tie into the City's sewer system.
- **Take unwanted household hazardous wastes,** such as motor oil, auto batteries, chemicals and paint, to County centers for safe disposal.
- **Report illegal dumping** into storm drains and any catch basins to the Police Department at (949) 497-0701 or call 1-(800)-69-TOXIC.
- **Purchase less toxic, biodegradable gardening and household products.** Use vinegar and baking soda as substitutes.
- **Dispose of pet waste** in the trash. Pet wastes, containing harmful bacteria, can be washed into the ocean whenever you water or when it rains.
- Start your own compost program or place yard waste in your trash. **Do not sweep debris into the streets or catch basins.** Keep streets cleared on street sweeping days.
- **Recycle and reuse** everything you can.
- **Control erosion** at construction and landscape sites to prevent dirt and debris from entering storm drains.
- **Conserve water** and keep it out of the gutter. Take your car to a car wash that recycles its water. **Do not overwater your lawn or garden.** Use a broom, not water, to sweep driveways and sidewalks.
- **Never pour anything down a storm drain** that you wouldn't want to swim in.

Hazardous Materials Emergencies -- **911**

Spills of Contaminants/ Police Department
(949) 497-0701

For information on City streets, sewer system, storm drains: Municipal Services Department
(949) 497-0706

Recycling Information
(949) 497-0323 **www.lagunabeachcity.org**

County of Orange

Household Hazardous Waste Hotline and information on collection center locations and requirements
(714) 834-6752 **www.oc.ca.gov/iwmd**

For information on agricultural chemicals, pesticides and possible alternatives
(714) 447-7100

Information on beach closures, industrial hazardous waste and underground storage tanks and to report illegal disposal of hazardous, medical or solid waste
(714) 667-3700

Additional Information

Used oil collection centers and recycling referral
1-(800)-CLEAN-UP **www.1800cleanup.org**
www.ciwmb.ca.gov

Waste Alert to report illegal, industrial dumping or for referral information on toxic substances
1-(800)-69-TOXIC

City of Laguna Beach
505 Forest Avenue Laguna Beach, CA 92651
(949) 497-3311

Special thanks to the City of Los Angeles Department of Public Works and artist Oscar J. Amaro for use of their artwork.

Printed on recycled paper 11/99

The Ocean Begins at Your Front Door

Runoff from Aliso Creek and Laguna Canyon is a key source of pollution at our beaches.

Things you can do to reduce storm water pollution

Trash and household toxins dumped on the street go straight to the beaches. Unlike household sewer drains which lead to a sewage treatment plant, public storm drains and flood channels carry water, litter and toxic substances directly to the ocean.

Urban pollutants, such as **oil** and other **automotive fluids, paint, yard** and **pet wastes, construction debris, pesticides, fertilizers and cleaners** can wind up in the street.

A little water from rain or a garden hose can carry automotive and household toxic materials through the storm drains to the flood control channel and ocean.

Polluted urban runoff contaminates the ocean and beaches, harms aquatic life and increases the risk of flooding by clogging gutters and catch basins.

You can help control water contamination by being aware of the sources and the activities that contribute to storm water pollution.

This pamphlet provides information on the Laguna Canyon Flood Control Channel, Aliso Creek and tips on reducing pollution of storm water.

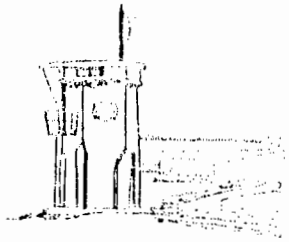

The Laguna Canyon Flood Control Channel and Aliso Creek collect water from **28,122** acres of watershed area and transport this runoff directly to the Pacific Ocean at Main Beach and at Aliso Beach.

These natural waterways and the connecting storm drain system are designed to prevent flooding by carrying excess rainwater from city streets to the ocean.

Unfortunately, **whatever enters these channels and storm drains ends up in the ocean.**

For this reason, storm water and urban runoff have become a focus of environmental and legislative action. Your assistance will ensure we protect our resources.

We must work together to keep Laguna Beach **clean** and **pollution free!**

006186

HANDLING HOUSEHOLD HAZARDOUS WASTE

Residents can dispose of household hazardous wastes at County Collection Centers located at 6411 Oak Canyon Road in Irvine or at the Prima Deshecha Landfill off Ortega Highway and La Pata in San Juan Capistrano.

The centers are open from 9 a.m. to 1 p.m., Tuesday through Saturday, and are closed on rainy days and major holidays. There is no charge for residents to deposit household waste up to a maximum of 15 gallons or 125 pounds per visit. The County centers do not accept hazardous waste from businesses, schools, government agencies, churches and non-profit organizations.

To reach the **Irvine** center from Laguna, take 133 to I-5 north, exit Sand Canyon and go west to Oak Canyon and turn right. To reach the center located in **San Juan Capistrano,** take I-5 south, exit Ortega Highway (SR74) and go east 2½ miles to La Pata and turn right. The center is two miles down La Pata next to the landfill.

Also, Laguna Pete's Automotive, located at 890 South Coast Highway, accepts used motor oil free of charge! The Chevron station at South Coast Highway and Legion accepts used motor oil for a nominal charge.

TRANSPORTATION AND HANDLING

- A maximum of 15 gallons or 125 pounds may be transported per vehicle, per trip (Department of Transportation regulation).
- Materials should be in original containers (except motor oil, fuels and antifreeze).
- All containers must have lids, be sturdy, non-leaking, and protected from breakage.
- Do not combine types of waste.
- Do not mix oil-base paint with latex paint.
- Dry out empty paint cans and discard in regular trash.
- If you wish to have a container returned (i.e. oil containers and boxes/crates used to transport materials), please notify the attendant in advance. Some containers may not be returnable.

WHY SHOP TO YOU DROP?

VISIT THE STOP & SWAP!

A unique and FREE program that allows you to drop off household, yard, and car care products you no longer need and pick up others you can use.

Currently available at the Anaheim and Irvine locations only. (Tuesday through Saturday, 9 a.m. to 1 p.m.)

FOR MORE INFORMATION ABOUT THE HOUSEHOLD HAZARDOUS WASTE COLLECTION PROGRAM AND THE STOP & SWAP CALL:

(714) 834-6752

Or see our webiste: www.oc.ca.gov/iwmd

Orange County Recycles!

Printed on recycled paper.

Integrated Waste Management Department

DISPOSAL OF HOUSEHOLD HAZARDOUS WASTE

Household Hazardous Waste Collection Program

5. On the new filter, wet the rubber seal with oil, then spin it on. **Do not** use a filter wrench to tighten the new filter. Tighten it snugly with your fingers. Replace the oil pan plug and make sure it's tight. Add the new oil. Don't overfill! (Most cars take 4 or 5 quarts. Check the owner's manual.)

7. Start the engine. Be sure the area is well ventilated. The oil pressure warning light may be on; it should go out after a few seconds. Let the engine run a few seconds.

8. Turn the engine off and check the oil level. Also check around the filter and drain plug for leaks.

9. Pour the used oil into an empty **clean**, plastic screw-top container. Use a funnel if necessary.

WARNING! WARNING!

DO NOT MIX ANYTHING WITH THE USED OIL! WHEN MIXED WITH SOLVENTS, WATER, GASOLINE, THINNER, ANTIFREEZE, ETC., THE USED MOTOR OIL CANNOT BE RECYCLED.

10. Take the oil container to a used oil collection center for RECYCLING.

For your convenience, the following Used Oil Collection Centers will accept your used motor oil. Call to confirm hours of operation and amount accepted.

BREA
Firestone Tires and Service
891 East Imperial Highway
(714) 529-8404

Imperial Unocal
525 S. Valencia
(714) 993-7770

LAGUNA BEACH
Laguna Pete's Automotive
890 S. Coast Highway
(714) 494-7408

VILLA PARK
Phil's Unocal
17771 Santiago Blvd.
(714) 637-0854

YORBA LINDA
Firestone Tires and Service
18500 Yorba Linda Blvd.
(714) 779-1966

Jiffy Lube
16751 Yorba Linda Blvd.
(714) 528-2800

* Chief Auto Parts
18528 Yorba Linda Blvd.
(714) 970-8933

For additional centers call 800-253-2687
*does not offer 4¢ per quart incentive

RECYCLE USED OIL

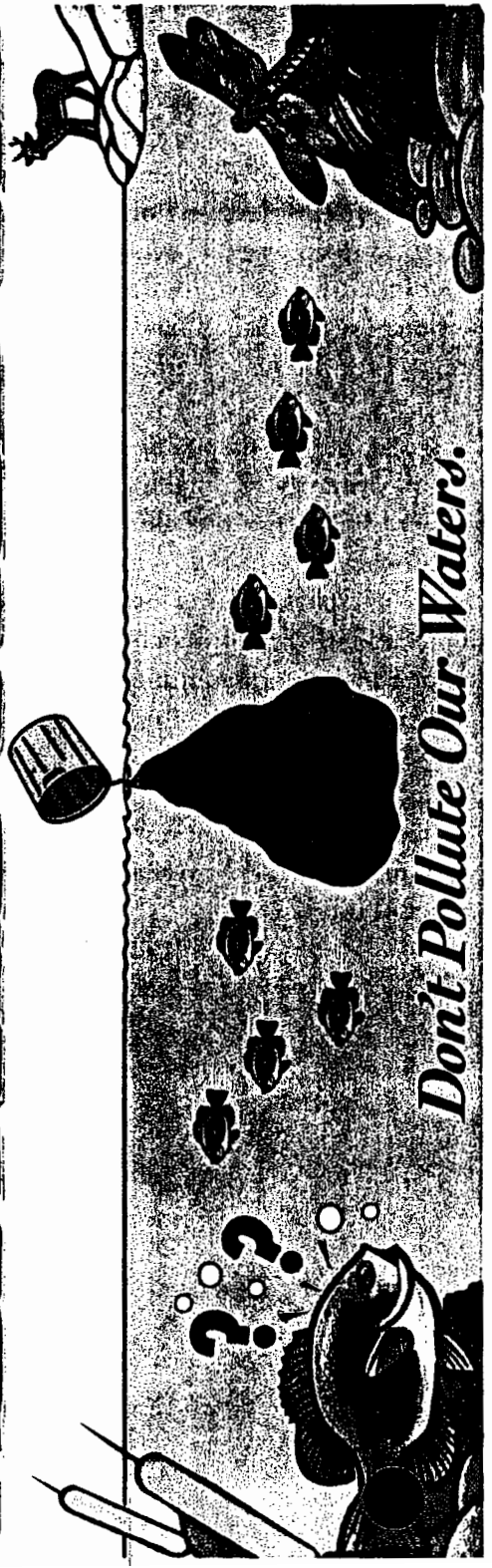

Each year millions of gallons of oil are dumped into our environment. The oil that pollutes our oceans, harms our wildlife and aquatic species and contaminates our groundwater comes from seemingly harmless drips that leak onto the street, and from do-it-yourselfers who dump oil in vacant lots, trash cans, or storm drains. These actions are not only harmful to the environment, they are also illegal.

You can help by disposing of your used motor oil properly. To make it easier and convenient for you to recycle your used oil, the California Integrated Waste Management Board and participating local businesses have joined together to establish collection centers throughout the community that will accept your used oil.

By taking your used oil to a State Certified Collection Center you not only help the environment, you are also rewarded 4¢ for each quart of oil recycled.

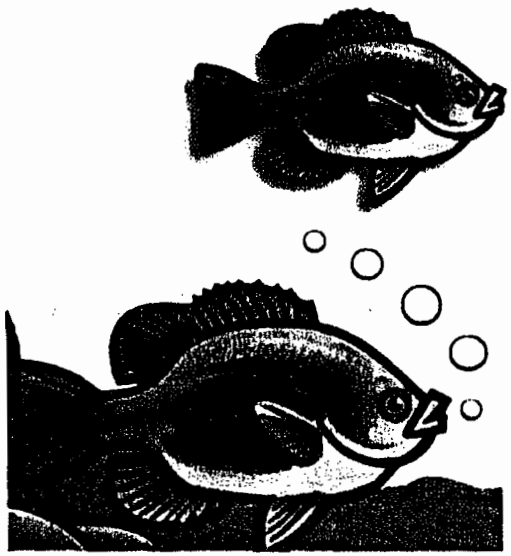

Knowing some facts about used oil helps us understand why recycling used motor oil is important but it is up to you to do your part and make sure the oil reaches a collection center.

1. Oil does not wear out, it simply gets dirty and can be re-refined and turned into a usable fuel for your vehicle or used as fuel for ships.

2. Over 1.3 billion gallons of used oils, lubricating and industrial, are generated each year in the U.S.

3. Less than 60% of the oil is recycled

4. Over 41 million gallons of oil are disposed of in an unknown manner in California.

5. One gallon of oil can ruin the taste of one million gallons of water.

6. A film of oil on the water surface prevents replenishment of dissolved oxygen, impairs the photosynthetic process and blocks sunlight needed by some organisms.

7. One in four households in California have a do-it-yourself oil changer.

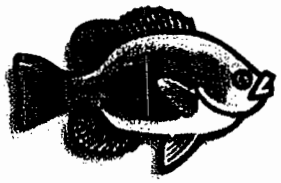

RE-REFINED OIL

When adding or changing your motor oil, consider re-refined oil. Re-refined oil is the oil that is produced from the manufacturing process in which the water, metal contaminants and other impurities are taken out of the used oil. It is as good or better than virgin oil produced from a barrel of crude oil and helps conserve energy and natural resources. When you consider that it take 42 gallons of high quality crude oil to produce the same 2.5 quarts of base stock for lubricants that is produced from 1 gallon of recycled used oil, it makes sense to use re-refined oil.

OIL FILTERS

Oil filters can also be recycled to conserve our resources. Oil filters, which are made of 80% steel can be recycled to make rebar, utility covers and other products. The amount of oil contained in a used oil filter can be as much as 1 quart and can be recycled with ordinary used motor oil. Be sure to take used oil filters to a recycling facility so that they do not pollute our environment.

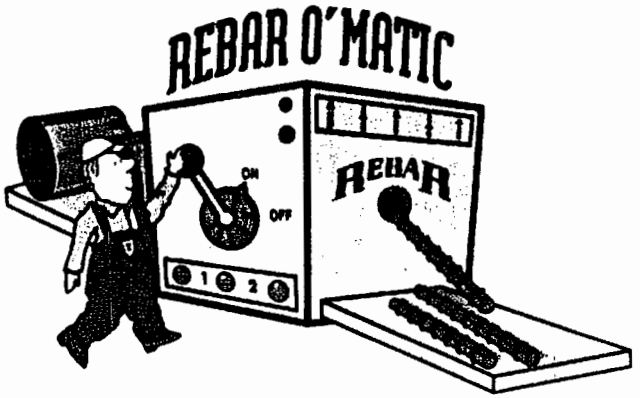

LAGUNA BEACH Recycling News

WM

MAY 2000

A publication of the City of Laguna Beach in cooperation with Waste Management of Orange County with funding provided by the California Integrated Waste Management Board

Printed on recycled paper.

Introducing FREE Pick-up of Household Hazardous Waste at Your Home!

Getting rid of your unwanted motor oil, oil filters, paint, batteries and other pesticides and chemicals is as easy as picking up the phone. From **May 15th** through **June 2nd** (excluding weekends) you can have your household hazardous waste picked up right at your doorstep. Just call **1-800-HHW-PKUP (1-800-449-7587)** and ask for the next available pick-up date in Laguna Beach.

The City's contractor, Curbside Inc., will send you a kit and instructions prior to your collection date. Eligible materials will be picked up between 8 a.m. and 5 p.m. Residents do not have to be home when materials are collected. Also, senior and disabled residents can request in-home assistance in gathering and packing their materials.

Explosives, ammunition, solid waste for landfill or recycling, tires, and biological and radioactive wastes cannot be accepted. Curbside Inc. recycles more than 90 percent of all materials it collects. Call by **May 26th** to schedule your free appointment.

Be a Good Neighbor! Place Your Carts Out of Public View

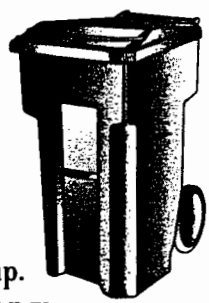

Please be kind to your neighbors - and your neighborhood. Make sure that your trash collection carts are put away following pick-up. Residential collection is from 7:00 a.m. to 6:00 p.m. You may set your carts out as early as the evening prior to your scheduled collection. Residents should remove empty carts on the same day trash is collected to an area not visible from the street. All of Laguna Beach thanks you for your cooperation.

Recycle Motor Oil Here

RECYCLE USED OIL

Located at 890 South Coast Highway at Thalia Street, Laguna Pete's Automotive will accept your used motor oil free of charge. Laguna Pete's is certified by the State of California and is a good neighbor providing this important service. For details, call 494-7408. For the locations of additional certified collection centers and other recycling information, call **1-800-CLEANUP** or visit **www.1800cleanup** on the web.

Commercial Recycling... It's Good Business!

About 30 percent of Laguna Beach's solid wastes come from the commercial sector, yet less than four percent of it is collected as recycling. To help boost this number, the Laguna Beach Commercial Recycling Program allows "commingled" collection, that is, all acceptable materials can be placed in the same container. This means businesses do not need to invest time or space separating recyclables to help cut down on the amount of waste we send to our overburdened landfills.

Recycling services are offered to any Laguna Beach business with a commercial trash account. Recycling containers can be emptied up to 3 times each week and it's free! To begin commercial recycling, call Waste Management of Orange County at **(949) 642-1191**. Your customers will appreciate it. Recycling sends a positive message that your company cares about the future and the environment.

Stop, Drop & Swap at County Collection Centers!

Popcorn, Peanuts... Crackerjacks

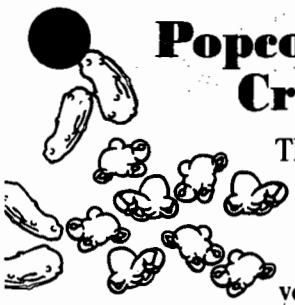

The dictionary defines crackerjack as "someone or something of marked excellence." Be a "crackerjack" yourself and take proper care of your popcorn and peanuts – packing materials, that is. Loose-fill, polystyrene packaging chips, often referred to as "peanuts" or "popcorn" because of their shape, are commonly used in mailing and shipping fragile items. Due to their small size and near weightlessness, such materials are difficult to recycle and can cause litter problems when placed loosely in dumpsters and trash carts.

If you need packing material, look for opportunities to take unwanted materials from local businesses. If you have extra packing material, consider donating your peanuts so others can reuse them. Canyon Box & Packaging (494-3523) and Mail Boxes Etc. (494-4420) will gladly accept and reuse your clean packing materials. If you must dispose of small packing materials, please place them in secured boxes or bags so they do not fly about when dumped into trash collection trucks.

Managing Your Waste Stream Keeps Our Waters Clean

City departments are working hard to improve our ocean water quality by reconstructing old sewer lines, by building additional facilities to capture runoff before it reaches beaches and the ocean, and by addressing pollution problems at its various sources. Many times, sewer line breaks and spills are caused by grease buildup and tree root invasion. You can help prevent system failures by keeping grease products out of the sink and by alerting the City when you clean or rod your laterals. Be aware of sources of contamination and choose to do something about it. To make a report, call Municipal Services at **497-0706**.

got vision?

Think about what you really love about Laguna Beach. Now imagine what would make Laguna Beach even better. Vision Laguna is a community based project designed to capture your dreams about the future of Laguna Beach and to cultivate an action plan to make these dreams come true. Kick-off events begin **May 12th** and **13th**. To learn more about public environmental programs in Laguna Beach, visit the Municipal Services Department booth at the Vision Fair on Saturday, **May 13th**, at Laguna Beach High School from 8:30 a.m. to 4:30 p.m. For more information about Vision

5 Easy Ways To Cut Your Trash In Half

For over a decade, you have been doing a great job recycling bottles, cans and newspapers. In the first year of the expanded recycling program, you've been equally enthusiastic about recycling green waste. Is there anything more you can do? Absolutely!

1 Recycle Beverage Containers at Home and On the Go

The increasing popularity of 20-oz. plastic bottles is contributing to a noticeable drop in the plastic beverage container recycling rate. These containers are recyclable, so whether you are on the road for business, vacation, or a weekend outing, deposit your empty beverage containers in a recycling bin. Look for new recycling containers at Main Beach this summer!

2 Grasscycle and Compost in Your Backyard

Mow without a bag and leave your grass clippings on the lawn to provide mulch and nutrients, save water, and save time. Composting yard waste and some food scraps make outstanding free topsoil. Check out the State's website **www.ciwmb.ca.gov** for great tips.

3 Xeriscape

In arid climates such as ours, xeriscaping, landscaping with plants that don't need much water, may help reduce your costs. In addition, drought-tolerant plants tend to be slower growing and require less maintenance. Mowing, watering, and fertilizing chores take less time and money, and yard waste and water runoff are minimized. With xeriscaping, you save water, you save landfill space, and you save the ocean from contamination – now that's integrated management!

4 Reduce Household Waste

Find a home for unneeded items. Give them to charity or have a yard sale. Buy in bulk and, like your mom said, eat your leftovers. Use cloth bags at the grocery store instead of paper or plastic. At home, use reusable containers to store leftovers and other items. Avoid overpackaged products.

5 Buy Recycled

Earth's resources are too precious to waste. For recycling to succeed we all need to check the labels and to buy products made with recycled content. Everything from clothes to carpeting, cans to comic books are made from recycled materials.

Take your Used Oil to the following Used Oil Collection Center.
Call to confirm hours of operation and amount accepted.

LAGUNA BEACH

Laguna Pete's Automotive, 890 S. Coast Highway • (714) 494-7408

Call (800) 553-2962 for additional centers in the county.

Sponsored by the City of Laguna Beach.
Funded by a grant from the California Integrated Waste Management Board.

♻ Printed on recycled paper.

RECYCLE USED OIL

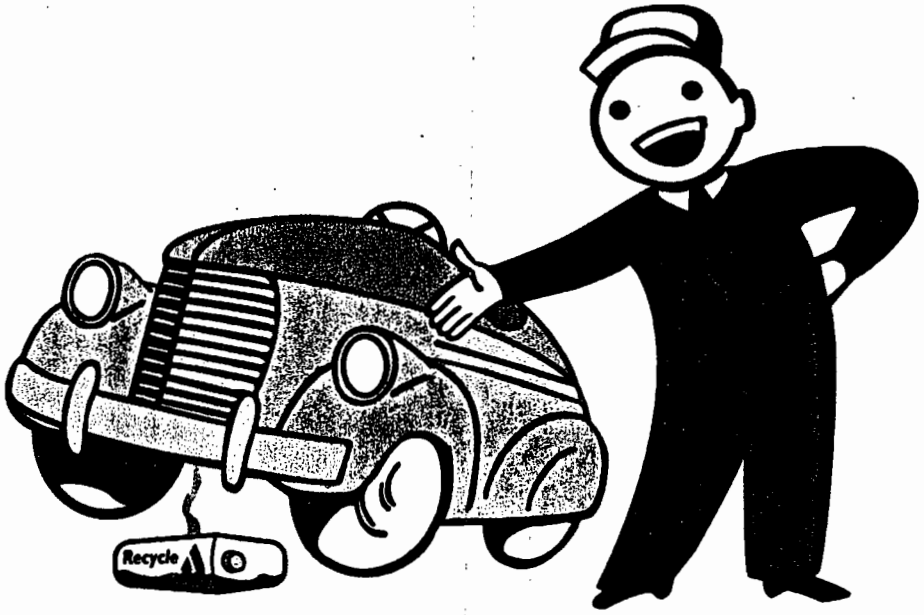

A HANDBOOK FOR DO-IT-YOURSELFERS!

WHY SHOULD WE RECYCLE USED MOTOR OIL?

Each year millions of gallons of used oil are dumped down storm drains, buried in backyards or emptied in trash dumpsters.

HOW YOU CAN HELP

If you change your car's oil be sure to recycle it and take it to one of the many certified collection centers located in the county. By doing so you not only protect the environment but you will also receive 4¢ per quart.

The following ten tips will help to eliminate hazardous used oil waste and protect our environment.

10 TIPS FOR THE DO-IT-YOURSELF OIL CHANGER

BEFORE YOU START, PROTECT YOURSELF BY WEARING APPROPRIATE GLOVES AND SAFETY GLASSES.

1. If possible, change the oil after the car has warmed up. The old oil will drain out more quickly.

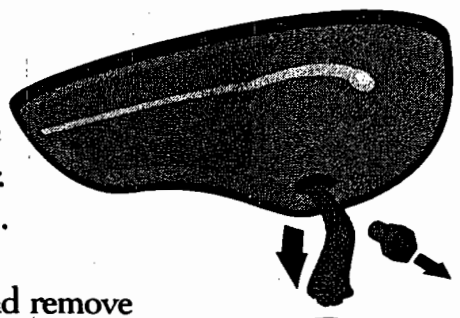

2. Make sure the engine is off. Block the wheels and apply the parking brake before getting under the car. (Be careful the engine is not hot).

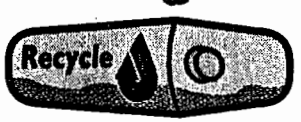

3. Use a clean container or pan and remove the drain plug on the bottom of the oil pan allowing the oil to drain into your drain pan.

4. Use a filter wrench to loosen the old filter, then spin it off. Invert the oil filter and drain all the used oil into the pan. If you're changing your oil filter, be sure it is completely drained, seal it in a leak-proof plastic zip-lock bag, and bring it to a collection center with your used oil. Not all centers accept oil filters. **Check first.** Call 1-800-553-2962.

5. Wet the rubber seal on the new filter with oil, then spin it on. **Do not** use a filter wrench to tighten the new filter. Tighten it snugly with your fingers. Replace the oil pan plug and make sure it's tight.

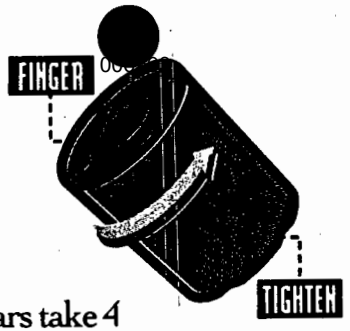

6. Add the new oil. Don't overfill! (Most cars take 4 or 5 quarts. Check the owner's manual.)

7. Start the engine. Be sure the area is well ventilated. The oil pressure warning light may be on; it should go out in a few seconds. Let the engine run a few seconds.

8. Turn the engine off and check the oil level. Also check around the filter and drain plug for leaks.

9. Pour the used oil from the pan into an empty clean, plastic screw-top container. Use a funnel if necessary.

10. Take the oil container to a used oil collection center for RECYCLING.

WARNING! WARNING! WARNING!

DO NOT MIX ANYTHING WITH THE USED OIL! WHEN MIXED WITH SOLVENTS, WATER, GASOLINE, THINNERS, ETC., THE USED MOTOR OIL CANNOT BE RECYCLED!

WHY SHOULD I RECYCLE USED MOTOR OIL?

- Certified collection centers will pay you 4¢ a quart to recycle oil.
- Used motor oil is a hazardous waste. It must be recycled properly.
- California state law prohibits the disposal of oil by dumping it in sewers or storm drains, putting it in the garbage, or pouring it on the ground.
- One quart can pollute 250,000 gallons of drinking water!
- Both conventional motor oil and synthetic motor oil can be recycled.

MAINTENANCE RECORD

MAKE:	YEAR:
MODEL:	LICENSE #:
DATE PURCHASED:	
ENGINE TYPE:	
SPARK PLUG GAP:	AIR FILTER:
OIL FILTER:	
OIL WEIGHT:	
OIL CAPACITY:	
FRONT TIRE PRESSURE:	
REAR TIRE PRESSURE:	

006194

DATE	MILEAGE	CHANGED MOTOR OIL (Y/N)	OTHER TYPE OF SERVICE PERFORMED										

Place
Stamp
Here

006195

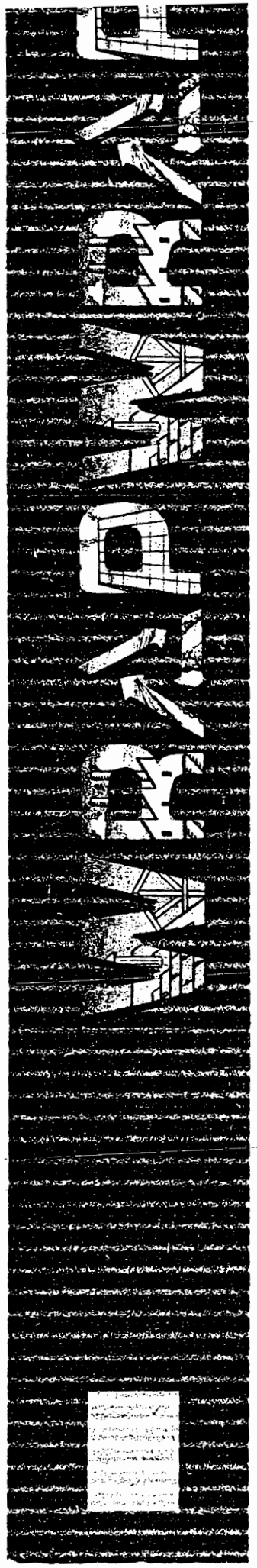

California Integrated Waste Management Board
#23 - Waste Reduction Awards Program
8800 Cal Center Drive
Sacramento, CA 95826

WRAP
WASTE REDUCTION
AWARDS PROGRAM

WRAP recognizes businesses that are reducing waste.

Does your business...

...reduce, reuse, recycle waste?

...buy recycled products?

...educate employees about waste reduction?

YOU DESERVE TO BE RECOGNIZED!
You may be eligible for a ***WRAP*** award.

Learn more, Look inside!

CIWMB
#23-WRAP
8800 Cal Center Drive
Sacramento, CA 95826

YES! I would like to apply for WRAP
WASTE REDUCTION AWARDS PROGRAM

Please send me an application.

06196

business name

contact name

address

city state zip code

phone fax email

☐ **I am not eligible but will forward the application to another business.**

cut here

What is WRAP?

WRAP, the **Waste Reduction Awards Program,** is sponsored by the California Integrated Waste Management Board. CIWMB annually recognizes California businesses that make outstanding efforts to reduce waste and send less garbage to landfills.

Who can apply?

California businesses and nonprofit organizations that have taken effective measures to reduce the amount of nonhazardous waste they send to landfills can apply for a WRAP award. We encourage multi-year winners! Government agencies and public schools are not eligible.

How do you qualify for a WRAP award?

WRAP awards are given to businesses that reduce, reuse, recycle waste, purchase recycled products, and educate employees on waste reduction opportunities. Each business is evaluated on its efforts to reduce its OWN nonhazardous waste. For example, a recycling business is eligible based on activities that reduce its OWN waste, rather than recycling the waste of others.

How do you apply?

To request an application, simply do one of the following:

- ✉ Complete, stamp, and return the attached postcard.
- ☎ Leave a phone message at (916) 255-2497.
- ☎ Send a fax to CIWMB - (916) 255-4580.
- Send e-mail to lhenness@ciwmb.ca.gov.

You may also obtain a copy of the application through the Internet at: http://www.ciwmb.ca.gov/wrap. Once you receive the application, fill it out according to the directions and return it to CIWMB.

When is the deadline?

Your completed application must be received or postmarked by June 30.

What is the WRAP award?

Winners will receive an award from the State of California along with a WRAP WINNER logo. Previous WRAP winners have used the logo on their Web sites, in advertising, and on products such as telephone directories, beverage containers, and packaging.

CIWMB does not discriminate on the basis of disability in access to its programs. CIWMB publications are available in accessible formats upon request by calling the Public Affairs Office at (916) 255-2296. Persons with hearing impairments can reach CIWMB through the California Relay Service, 1-800-735-2929.

A successful business is measured by the bottom line.

Remember, **REDUCING WASTE INCREASES PROFIT!**

REPRESENTATIVE PUBLIC EDUCATION MATERIALS

CITY OF LAGUNA HILLS

Recycling is the only environmentally safe and legal method to dispose of used oil. When used oil is dumped on the ground or sent to landfills, it works its way into streams, rivers and lakes. When dumped into storm drains, used oil flows to the ocean where it poisons marine life. Poured down sewers, used oil can damage sewage treatment plants and cause costly delays.

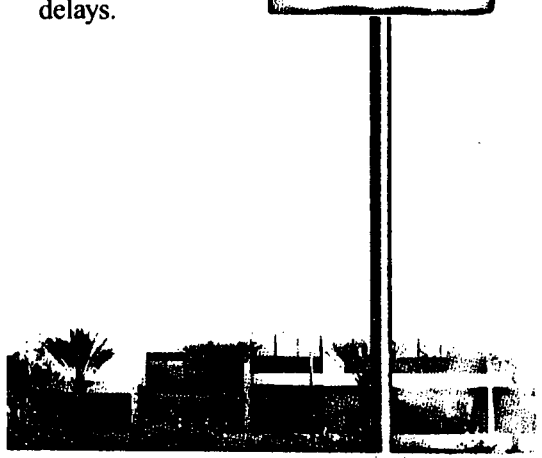

- When you change your motor oil, drain the used oil into a clean plastic drain pan or container with a tight lid.
- Do not mix oil with other substances.
- Use a reusable container which holds five (5) gallons or less.
- Take your used oil to a Certified Used Oil Collection Center and give the container to an attendant during business hours.

Used motor oil is 100% recyclable and reusable. There is no practical limit to the number of times that used oil can be reused. The oil does not wear out; it just becomes dirty.

Once the oil is changed and is collected for recycling, the oil can be used in one of two ways. It can either be re-refined into neutral oil, a base with which to make other automotive lubricants, or it can be consumed as bunker fuel by ships.

The City of Laguna Hills has established State Certified Used Oil Collection Centers in the City. These public minded businesses will accept used oil from the public during normal business hours. The service is free. In fact, a $0.16 per gallon incentive will be offered. You can call the State Used Oil Hotline at 1-800 CLEAN UP to locate the Certified Used Oil Collection Center nearest you.

To locate a convenient Certified Used Oil Collection Center

1-800-CLEAN UP

RECYCLE USED OIL

This program is brought to you by the City of Laguna Hills and made possible through funding from the California Integrated Waste Management Board.

Laguna Hills Certified Used Oil Collection Centers

Alicia Mobil Services
25491 Alicia Parkway
Laguna Hills, CA 92653
(714)472-9692

David J. Phillip's Buick
24888 Alicia Parkway
Laguna Hills, CA 92653
(714)837-2400

EZ Lube, Inc
24281 Moulton Parkway
Laguna Hills, CA 92653
(714)830-9840

Kragen Auto Parts #715
26562 Moulton Ave. Ste. C
Laguna Hills, CA 92653
(714)831-0434

La Paz & I-5 Chevron
25172 Cabot Rd.
Laguna Hills, CA 92653
(714)830-5814

Tire Station
24196 Laguna Hills Mall
Laguna Hills, CA 92653
(714)581-4700

CALL CENTERS TO CONFIRM HOURS OF OPERATION AND AMOUNTS ACCEPTED.

Do You Know Where The Water In Your Storm Drain Goes?

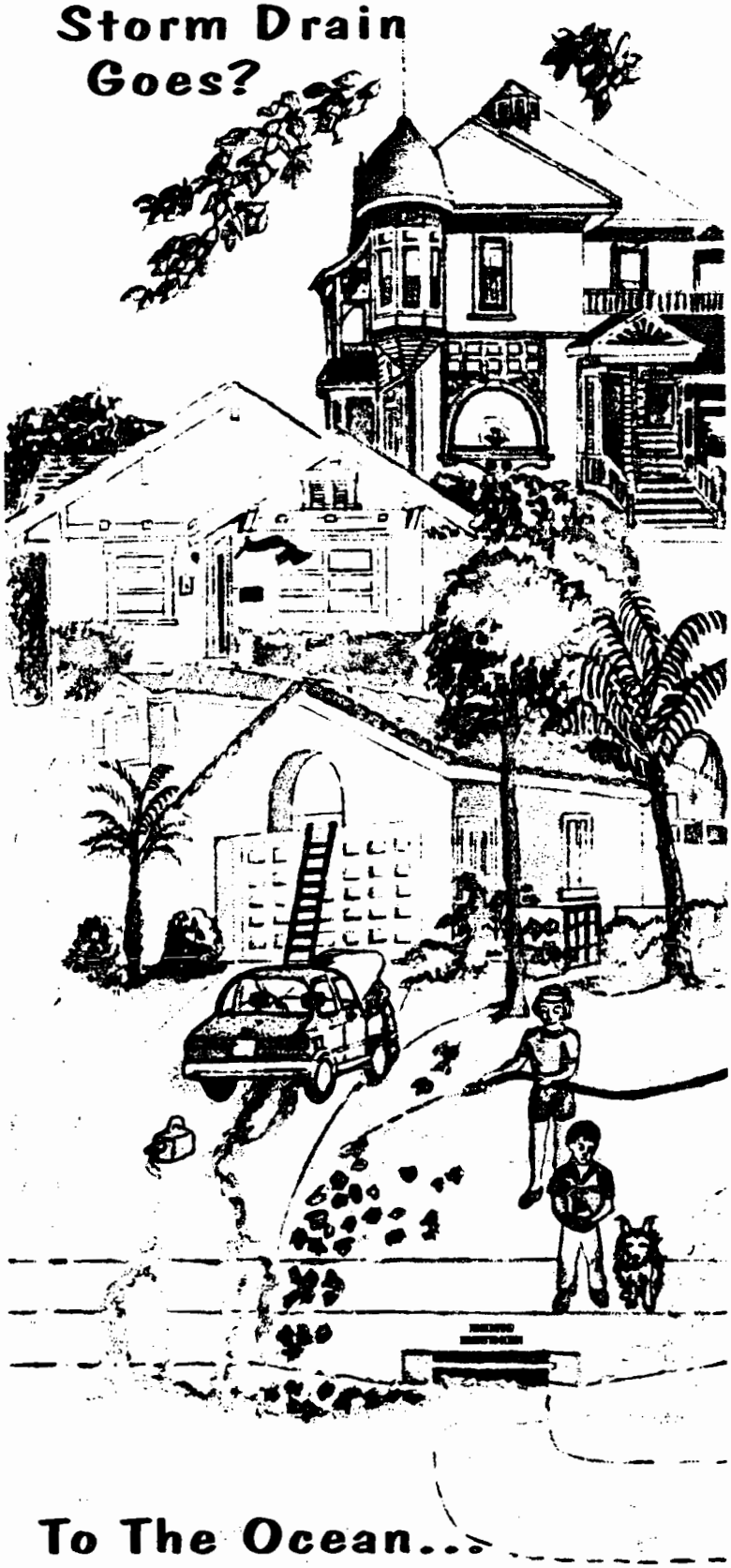

To The Ocean...

REPRESENTATIVE PUBLIC EDUCATION MATERIALS

CITY OF LAGUNA NIGUEL

ORANGE COUNTY STORM WATER PROGRAM PARTICIPANTS:

SOUTH COUNTY:

Irvine Public Works	949-724-6315
Laguna Beach Municipal Services	949-497-0711
Laguna Hills Engineering	949-707-2600
Laguna Niguel Public Works	949-362-4337
Lake Forest Public Works	949-461-3480
Mission Viejo Public Works	949-470-3095
San Clemente Engineering	949-361-6100
San Juan Capistrano Engineering	949-493-1171
O.C. Storm Water Program	714-567-6363
O. C. Urban Runoff Plan Review	714-834-3526
24 Hour Water Pollution Problem Reporting Hotline	714-567-6363

or rubiol@pfrd.co.orange.ca.us

OTHER IMPORTANT PHONE NUMBERS:

O.C. Household Hazardous Waste Information 714-834-6752
or www.oc.ca.gov/IWMD

Chemical and Hazardous Material Spill Emergencies **911**

Information on locations that accept used motor oil, California Integrated Waste Management Board ... (800) 553-2962
or www.CIWMB.ca.gov

Information on agriculture chemicals, pesticides and possible alternatives. O. C. Agriculture Commissioner 714-447-7100

Information for industries regarding Hazardous Waste and Underground Storage Tank Requirements: O.C. Healthcare Agency /Environmental Health Division/Hazardous Materials Management Section ... 714-667-3700

NO DUMPING! DRAINS TO OCEAN

PLEASE

HELP KEEP OUR GUTTERS AND STORM DRAINS CLEAN.
THEY EMPTY OUT TO STREAMS THAT FLOW TO THE OCEAN.

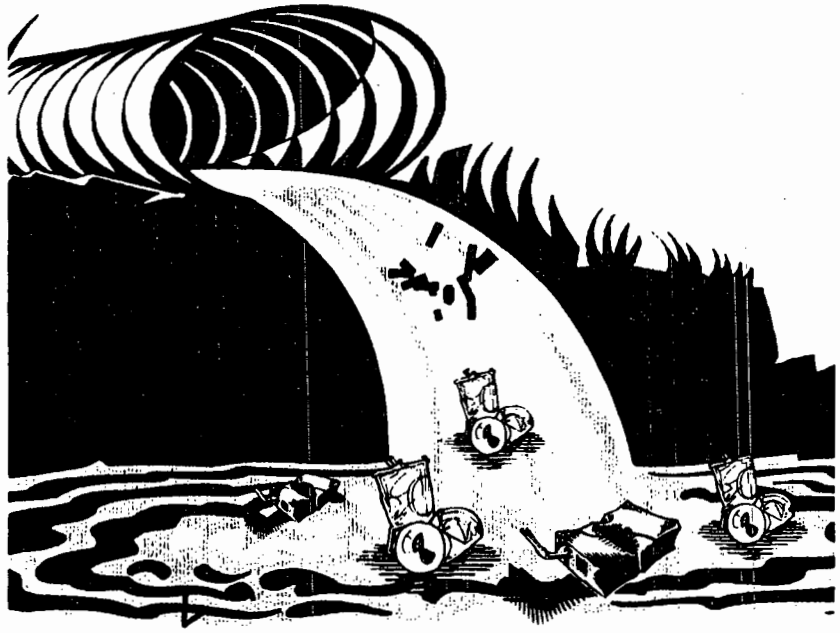

BY PUTTING ANIMAL WASTE, TRASH, AND GARBAGE IN THE PROPER CONTAINER, YOU HELP PROTECT THE ENVIRONMENT AND YOU SAVE THE CITY TAXPAYERS MONEY TOO!

CITY OF LAGUNA NIGUEL

DUMPING ON CITY STREETS AND SIDEWALKS IS NOT ALLOWED!!

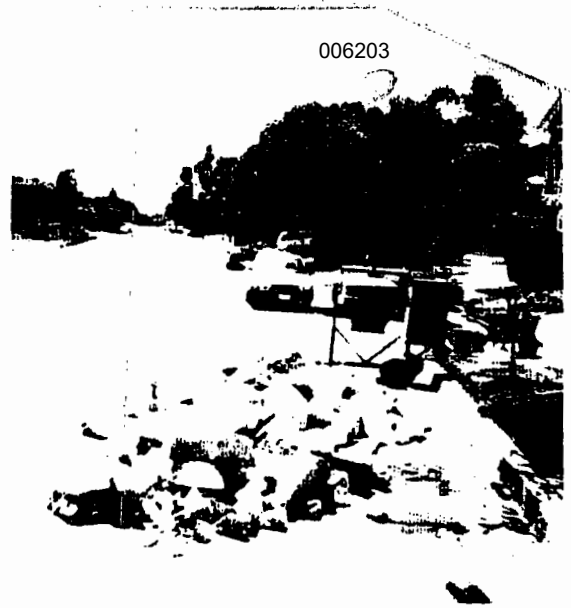

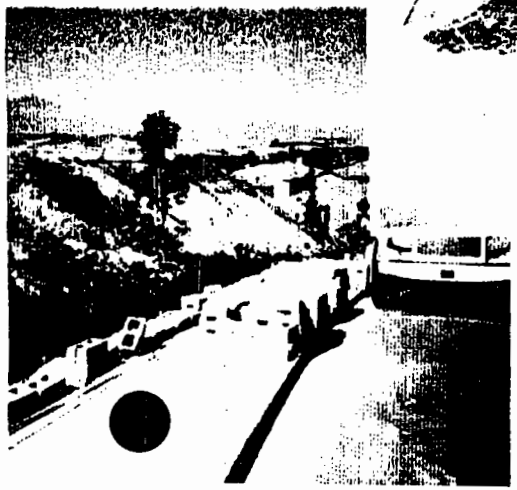

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WATER YOUR LAWN

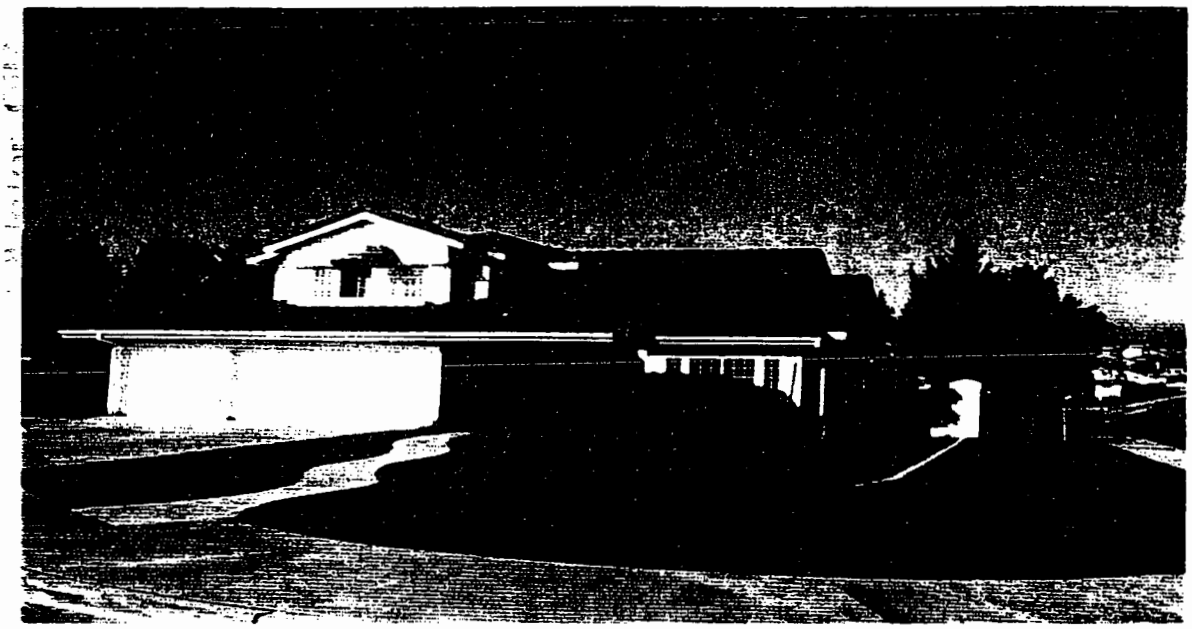

NOT THE STREET !!

SAVES WATER • SAVES TIME • SAVES ENERGY • SAVES MONEY

PLEASE DONT OVER WATER

CITY of LAGUNA NIGUEL

Public Works/Engineering
27791 La Paz Road • Laguna Niguel, California 92677
Phone/949•362•4300 Fax/949•362•4385

CITY COUNCIL

Joe Brown
Cathryn DeYo
Mark J.Goodman
Linda Lindholm
Mimi Walters

February 24, 1997

Contractors Working in the City of Laguna Niguel

Subject: Compliance Requirements for the Clean Water Act

The Clean Water Act, which the Regional Water Quality Board enforces through the County and the city members, prohibits certain discharges to the storm water drainage system. Any discharge, which is not composed entirely of storm water or which contains any pollutant, shall not be discharged to: the storm water drainage system; any upstream flow which is tributary to the storm water drainage system; river; stream; creek; wash; dry arroyo; wetlands; marsh; coastal slough/bay/harbor; or Pacific Ocean.

Only clean potable water can be dumped onto the street or into the gutter.

Any work that creates a slurry of asphalt or cement, such as saw cutting, must be picked up by vacuum and disposed of other than in the street or gutter.

Please inform your sub-contractors that it is an illegal discharge that can result in, large fines (and even prison) if they choose to ignore the law.

Thank you for your cooperation.

Sincerely,

Ken Montgomery

Ken Montgomery
Director of Public Works/City Engineer

KM:rm

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RM

Do You Know Where The Water In Your Storm Drain Goes?

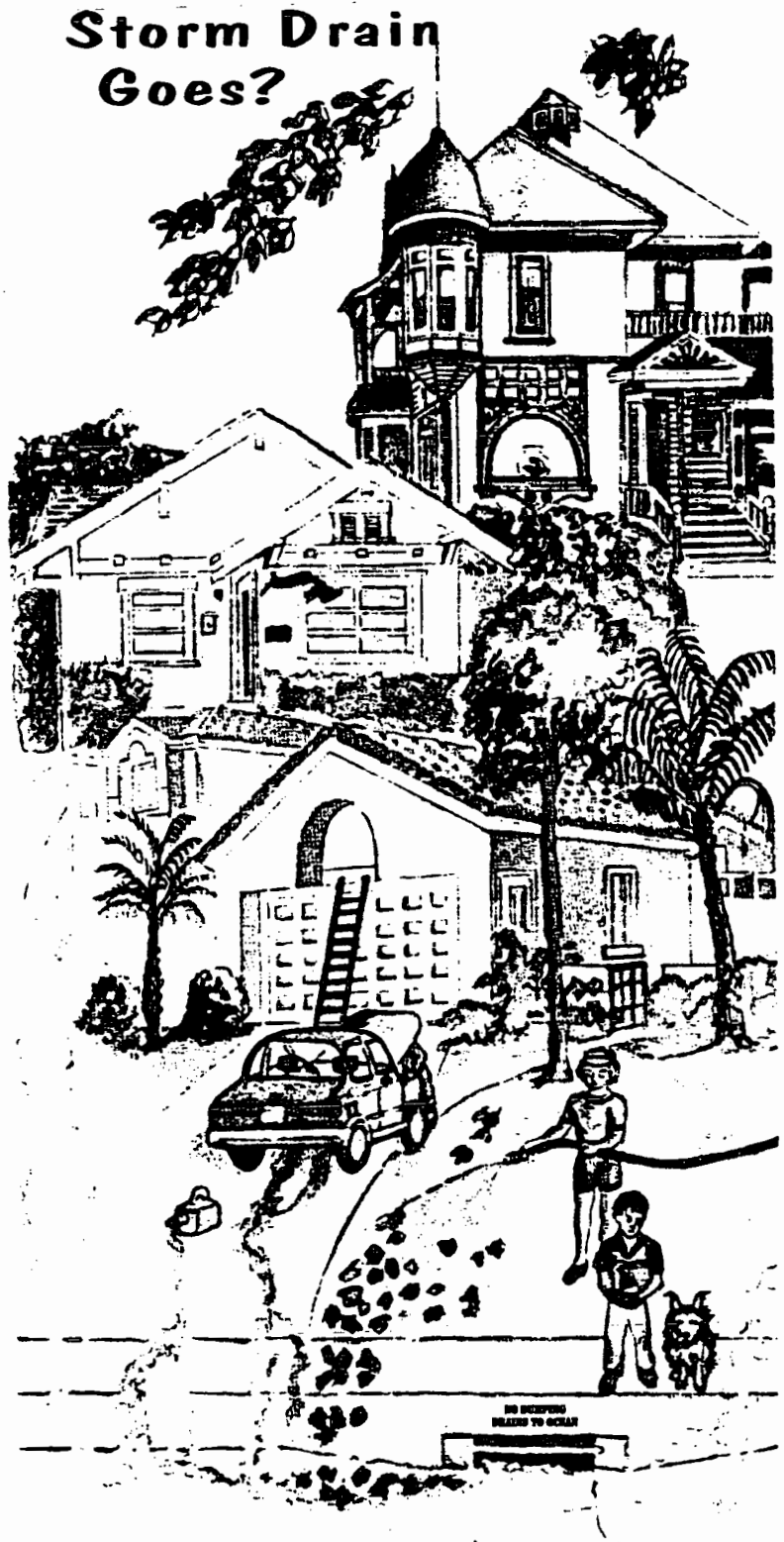

To The Ocean...

REPRESENTATIVE PUBLIC EDUCATION MATERIALS

CITY OF LAKE FOREST

CITY OF LAKE FOREST

ATTACHMENT "A"
PAGE 1 OF 9

February 11, 2000

Mayor
Richard T. Dixon

Mayor Pro Tem
Helen Wilson

Council Members
Peter Herzog
Kathryn McCullough
Marcia Rudolph

City Manager
Robert C. Dunek

City Clerk
Jeri L. Stately

RE: Neighborhood Pride Clean Up Day
Saturday, March 11, 2000

Dear Lake Forest Resident:

The City of Lake Forest is coordinating efforts in your neighborhood for Neighborhood Pride Clean-up Day on Saturday, March 11, 2000, from 8:30 a.m. to 2:00 p.m. All residents are encouraged to join in and help one another with clearing out garages and moving or discarding old items.

Large items such as old furniture, mattresses, and appliances will be picked up if placed on your front curb by 8:00 a.m. on Saturday, March 11th.

Hazardous waste, such as used oil and paint, cannot be left at the curb for pick up. The City's Household Hazardous Waste Collection event will be held in the rear parking lot of El Toro High School on Saturday, May 6, 2000 from 9:00 a.m. to 1:00 p.m. While this service is provided free of charge, space is limited. Please call (949) 642-1191 to make an appointment.

Please note that each household is allocated two bulky item pick-ups per calendar year and a pick-up on Saturday, March 11, 2000, will count as one of the two allowable pick-ups for the year.

The City looks forward to a successful Neighborhood Pride Clean Up Day and we appreciate your cooperation and assistance.

Sincerely,
CITY OF LAKE FOREST

Kathy Lancaster

Kathy Lancaster
Community Preservation Technician

DRUG USE IS LIFE ABUSE

El 1 de febrero 2000

RE: Dia de Orgullo del Vecindario y Día de Limpeza
Sábado, el 11 de marzo 2000

Estimado Residente de Lake Forest:

La Ciudad de Lake Forest esta haciendo esfuerzos en su vecindario para el Dia de Orgullo del Vecindario y Dia de Limpeza, el sábado, 11 de marzo 2000, de 8: 30 de la mañana a 2: 00 de la tarde. Se pide a todo los residentes a unirse y ayudar el uno al otro en limpiar sus garajes mover y o votar artículos viejos.

Artículos grandes tal como mueble viejo, colchones, y aparatos electronicos se recojerán si lo ponen enfrente de su casa antes de las 8: 00 de la mañana el sábado, marzo 11.

Las cosas peligrosas, tal como aceite usado y pintura, no se recojerán este dia. El evento para recolectar estos materiales se sostendra en el parque de estacionamiento trasero de la escuela secundaria El Toro el sábado, 6 de mayo 2000 de 9: 00 de la mañana a 1: 00 de la tarde. Este servicio es gratis, y hay espacio limitado. Favor de llamar (949) 642-1191 para hacer su citar.

Favor de notar que cada casa pueda pedir que recogan artículo voluminoso dos veces al año. Articulos que se recojen el sábado, 11 de marzo 2000, contará como uno de estas veces.

La Ciudad espera un gran exito en el Dia de Orgullo del Vecindario y Dia de Limpieza y apreciamos su cooperación y ayuda.

Sinceramente,
CIUDAD DE LAKE FOREST

Kathy Lancaster
Community Development Technician

City of Lake Forest

NEIGHBORHOOD PRIDE CLEAN-UP DAY!

The City of Lake Forest is sponsoring a Neighborhood Pride Clean-Up Day in your neighborhood on Saturday, March 11, 2000. We encourage you to participate and support this effort by placing your unused bulky household items, such as refrigerators, water heaters, washer/dryer machines, and furniture, at your curb for pick up service prior to 8:00 a.m. on Saturday, March 11th. By taking advantage of this opportunity to dispose of your unused bulky items, you will be helping to improve the quality and appearance of your neighborhood.

Note: Paint, motor oil, chemicals or other hazardous household wastes <u>may not be discarded</u> at the curb. These items can be disposed of on May 6, 2000 at El Toro High School. Please see the enclosed flier for additional information.

Again, we encourage you to support this effort by doing some Spring-cleaning and remove all unused bulky items from your property.

If you have any questions concerning Neighborhood Pride Clean-Up Day, please contact Kathy Lancaster at 461-3474.

Neighborhood Pride Clean-Up Day

The residential neighborhoods bounded by Rockfield, Ridge Route, Muirlands and El Toro Road as well as the residential neighborhoods northeast of the railroad tracks bounded by Farthing, Ridge Route and Jeronimo will be the site of spring-cleaning activity on Saturday, March 11, 2000. Residents will join forces to clear out homes and garages of large unused furniture and appliances for bulky-item curbside pick-up.

Well-maintained neighborhoods are vital to a community's health, attractiveness and desirability as a place to live. Neighborhood Pride Clean-Up Day is intended to promote a sense of pride in our community and to encourage visual improvements. The older residential neighborhoods of Lake Forest have been targeted for this on-going program and annual clean-up days will be held in designated neighborhoods to help improve the appearance of our community.

For more information about this event, call the Community Preservation Technician at 461-3474. This event is coordinated and sponsored by the City and funded through Community Development Block Grants.

Volunteers

Here is your chance to work for your community. There is currently one vacancy on the Parks and Recreation Commission. As a Parks and Recreation Commissioner, the volunteer will advise the City on matters pertaining to the acquisition, development, and maintenance of public parks and recreational facilities. The Commission also advises the City Council on matters relating to recreational programs and provides advice to the Community Services Department.

Please call 461-3400 for an application or download the form from www.city-lakeforest.com.

Orange County Public Library

The Orange County Public Library has installed seventeen new computers and seven new printers in the El Toro Library at 24672 Raymond Way. The new computers will provide full access to the internet for library users, increasing access from the one internet terminal previously available. They will also provide access to Orange County Library databases, which include the catalog of the 2.5 million books and other items owned by the library, indexed full text articles from over 800 magazines and periodicals, and the text of selected encyclopedias, reference books, and other sources, and interactive patron services.

Children's access to the internet will be limited to "filtered" terminals which eliminate sites and materials which could be deemed inappropriate for minors; written permission must be provided by a parent or guardian for a child to access the unfiltered internet. The Library provides pathfinders to specially selected sites for children and also information for parents in guiding their children's web surfing.

Clean Sweep

The public residential and arterial streets in the City of Lake Forest, and the communities of Foothill Ranch and Portola Hills, are swept weekly by Sunset Property Services of Irvine, California. Sweeping day in your neighborhood occurs on the day after trash collection. If your trash is collected on Friday, sweeping will be done on Monday. As you know, when your trash collection day occurs on a holiday, collection is postponed by one day, with Friday collection sometimes moving to Saturday. Street sweeping day still remains the day after trash collection, which may mean that sweeping occasionally is done on Saturday. If your trash collection day is moved to Saturday due to a holiday, sweeping will be done on the following Monday.

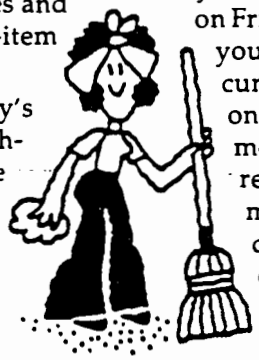

The residential streets are swept between the hours of 7:00 a.m. and 5:00 p.m. The arterial routes through the City, such as Lake Forest Drive, El Toro Road and Trabuco Road, are swept between 10:00 p.m. and 7:00 a.m. Under normal circumstances, no residential sweeping is done on weekends, before 7:00 a.m. or after 10:00 p.m. Additional street sweeping may occur, occasionally, because of a special event, severe windstorm, or other unplanned occurrence.

Please help the street sweeping program by parking your vehicles off the street (in your garage or your driveway) on the designated sweeping day. Keeping debris out of the gutters helps the storm drains to accommodate rainfall and water from irrigation runoff. Your neighborhood's appearance will reflect your cooperation with this request! If you have questions or concerns, please feel free to contact Sunset Property Services directly at 551-5151, or the Public Works Department Street Sweeping Hotline at 461-3497.

Fair Housing Opportunity is the Law

The City of Lake Forest is committed to furthering fair housing practices in the community. If you or someone you know has a fair housing question or issue that needs to be addressed, please call the Community Development Block Grant Manager at 461-3471. The City cooperates with the Fair Housing Council of Orange County to eliminate discriminatory practices Countywide.

An impediment to fair housing opportunity is any policy or practice that denies or adversely affects the provision of housing to persons in any protected class.

NEIGHBORHOOD PRIDE
CLEAN-UP DAY

Saturday, March 11, 2000

Saturday, March 11, 2000, is Neighborhood Pride Clean-Up Day. The City will arrange for pick-up of large items such as furniture, mattresses, and large appliances that you may wish to discard.

If you wish to participate with curbside collection, you **MUST** complete the postcard questionnaire below. Detach and return the self-addressed, stamped postcard to the City no later than March 6, 2000. Only items placed in front of your home on the curb ***on Saturday, March 11, before 9:00 a.m. will be collected.***

IMPORTANT: ONLY LARGE ITEMS MAY BE LEFT ON THE CURB. EVERYDAY HOUSEHOLD TRASH, YARD CLIPPINGS, TIRES, OR POISONOUS MATERIALS (USED AUTOMOTIVE OIL AND PAINT) *WILL NOT* BE COLLECTED.

For more information call:
Elaine Nagano or Kathy Lancaster at
(949) 461-3474

I am interested in

Having curbside pick-up of large items.

Name: _____

Address: _____
Lake Forest, CA 92630

Telephone: (949) _____

Number of Items to be Picked Up: _____

NEIGHBORHOOD PRIDE CLEAN-UP DAY

Saturday, November 20, 1999

Saturday, November 20, 1999, is Neighborhood Pride Clean-Up Day. The City will arrange for pick-up of large items such as furniture, mattresses, and large appliances that you may wish to discard.

If you wish to participate with curbside collection, you **MUST** complete the postcard questionnaire below. Detach and return the self-addressed, stamped postcard to the City no later than November 12, 1999. Only items placed in front of your home on the curb ***on Saturday, November 20th before 9:00 a.m. will be collected.***

IMPORTANT: ONLY LARGE ITEMS MAY BE LEFT ON THE CURB. EVERYDAY HOUSEHOLD TRASH, YARD CLIPPINGS, TIRES, OR POISONOUS MATERIALS (USED AUTOMOTIVE OIL AND PAINT) *WILL NOT* BE COLLECTED.

For more information call:
Elaine Nagano or Kathy Lancaster at
(949) 461-3474

I am interested in

☐ **Having curbside pick-up of large items.**

Name: _____

Address: _____
Lake Forest, CA 92630

Telephone: (949) _____

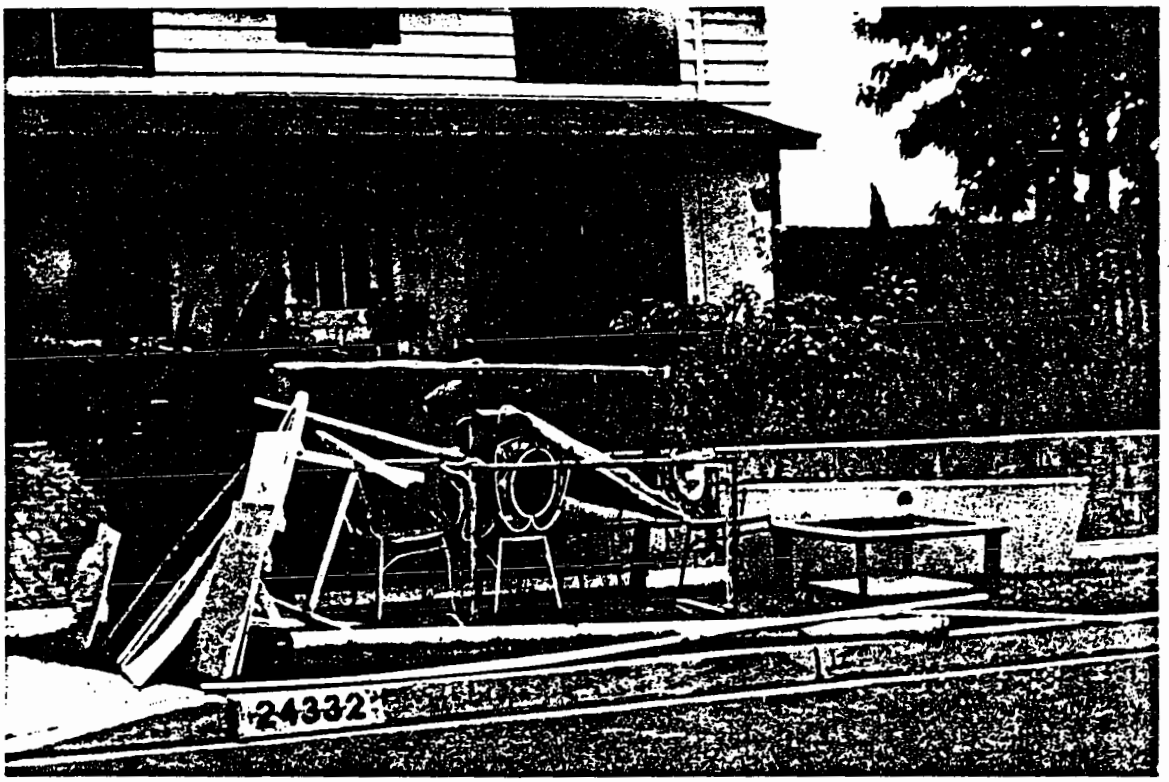
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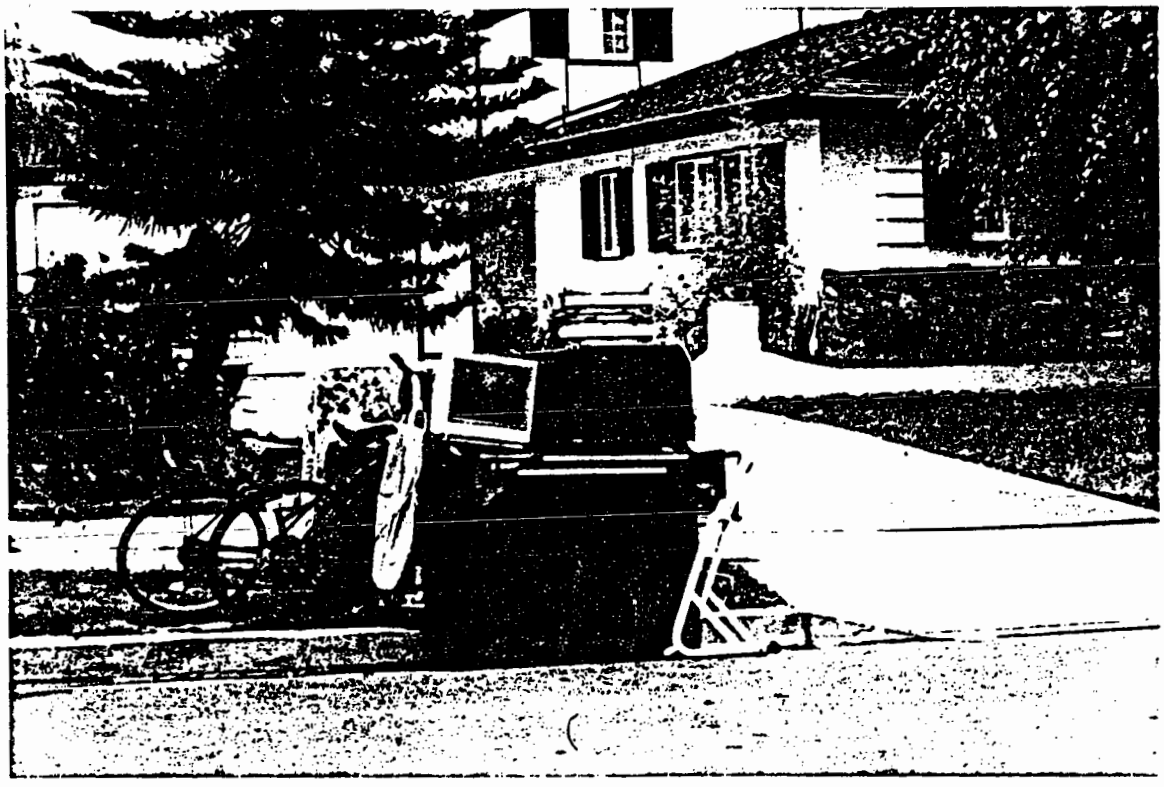

Household Hazardous Waste (HHW) Collection Event!

On **Saturday, May 6, 2000,** Waste Management of Orange County will hold a free **HHW Collection Event** for Lake Forest residents at El Toro High School, 25255 Toledo Way (enter from Serrano Road through the student parking lot behind the school).

Residents must schedule an appointment by calling (949) 642-1191 before 5:00 p.m. on Thursday May 4th, and bring an I.D. and proof of Lake Forest residence to the appointment. This service is FREE to Lake Forest residents but HHW is limited to 5 gallons or 50 lbs. per vehicle.

What is HHW? HHW is materials and substances which cannot be safely sent to the landfill, such as paint, household cleaners, pesticides, pool supplies, and automotive products such as batteries, motor oil, antifreeze, etc.

If you are unable to attend the HHW Collection Event, you can dispose of HHW at County of Orange permanent Household Hazardous Waste Collection Centers. Please call (714) 834-6752 for more information.

Bulky Item Collection

Did you know that the residents of Lake Forest have free curbside bulky item collection service? Each single family residence is entitled to two free bulky item pickups each year (up to four items per pickup). Bulky items include large, hard-to-handle items such as sofas, furniture and appliances that can be lifted by two persons. Just contact our Customer Service Center at (949) 642-1191 to schedule a pickup.

Printed on recycled paper

Fiesta Days and Rodeo at Foothill Ranch!

CASA (Community Activities and Service Association) and the Lake Forest Chamber of Commerce have joined forces to present the Fiesta Days and Rodeo at Foothill Ranch in Lake Forest. The event will be held Thursday May 18th through Sunday May 21st at the corner of Portola Parkway and Glenn Ranch Road in Foothill Ranch.

And you are invited to participate!

Weekend activities include: Professional Rodeo Cowboys Association Competition, Business Expo, full carnival, live entertainment, food vendors and more. KIKFM will be airing their program live from the rodeo.

Admission is $3.00 for adults and $2.00 for children. Tickets for the rodeo are $13.00 for adults and $11.00 for children. You may save $3.00 on the rodeo by purchasing advance tickets from any Boot Barn, AIM Mail Center or De Nault's True Value Hardware.

Waste Management of Orange County will have a booth with Cycler the Robot. Come on down and join in the fun!

If you have any questions, please contact Marion Algier at the Lake Forest Chamber of Commerce at (949) 460-7942, or Janet Coe, Economic Development Manager, at the City of Lake Forest, (949) 461-3477.

Did you know that Lake Forest Recycles Used Motor Oil?

006217

RECYCLE USED OIL

Did you know that you can dispose of your used motor oil safely and easily at 12 convenient locations right here in Lake Forest?

If you have questions about used motor oil recycling or to find the center nearest you, please call the California Integrated Waste Management Board Recycling Hotline at (800) CLEAN-UP.

Park Recycling in Lake Forest

The City of Lake Forest is continuing recycling at various public parks for a simple reason: It's the right thing to do! When you go to throw out your trash, you will now find a container near the trash receptacle at most city parks for recycling glass, aluminum and plastic.

So, the next time you visit the park, please look for these recycling containers.

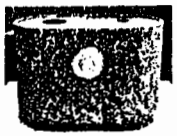

This program is funded by

CA Department Of Conservation

Source Reduction

Source Reduction means reducing waste at its source and preventing garbage from being created in the first place. This includes reducing unnecessary packaging of items, purchasing reusable and repairable items instead of disposable goods, purchasing in bulk, and making a conscious choice to create less garbage. Please join us in our efforts to reduce, reuse and recycle!

PAGE 1 of 5

ATTACHMENT 1

ATTACHMENT "B"
PAGE 2 OF 5

KEEP THE FOREST in Lake Forest

Saturday, May 6th, 2000 - City of Lake Forest Household Hazardous Waste Collection Event

What is Household Hazardous Waste?

Household hazardous waste, or "HHW", is generated by everyone. HHW is materials and substances which cannot be safely collected with your refuse and sent to the landfill such as paint, automotive products (batteries, motor oil, antifreeze), pesticides, gasoline, pool chemicals, poisons, etc. When improperly discarded, HHW can pollute our landfills, contaminate the city's water supply or drain into the ocean.

Upcoming Lake Forest HHW Collection Event!

On Saturday, May 6th, Waste Management of Orange County will hold the 3rd Annual Lake Forest HHW Collection Day Event at El Toro High School, 25255 Toledo Way (enter from Serrano Road through the student parking lot behind the school).

This service is FREE to City of Lake Forest residents, but HHW is limited to 5 gallons or 50 lbs. per vehicle.

Call to Schedule an Appointment...

Residents must schedule an appointment by calling (949) 642-1191 before 5:00 p.m. on May 4th. You must bring an I.D. and proof of Lake Forest residence to the appointment!

If you are unable to attend the Waste Management HHW Collection Event, the County of Orange operates permanent HHW Collection Centers. The nearest center is located at 6411 Oak Canyon in Irvine (take the Sand Canyon exit off the 5 Freeway and go west). For more information, please call the Orange County HHW Hotline at (714) 834-6752.

For additional information and customer service, please call (949) 642-1191.

In the best interest of the health and well-being of students, employees and the general public, the Governing Board of the Saddleback Valley Unified School District is proud to provide a healthy, tobacco free environment. In accordance with California State Assembly Bill 816, board policy prohibits the use of tobacco products at any time on school district property. We therefore request that all people refrain from using any tobacco products while on or in school or district grounds, buildings or vehicles. We thank you for your cooperation.

WM WASTE MANAGEMENT

"JUST SAY NO" TO HOUSEHOLD HAZARDOUS WASTE!

Have you been meaning to check under your sink, in the garage, out in the storage shed and in secret hiding places throughout your home for "treasures" that no longer have any value? Did you ever wonder if there was a place that you could take these items? There is, it's called the Household Hazardous Waste Collection Center. Household Hazardous Waste (HHW) consists of materials and substances which cannot be safely sent to the landfill, such as paint, household cleaners, pesticides, antifreeze, batteries and motor oil.

Just call the HHW Hotline at (714) 834-6752 (press 2) for information about no-fee collection centers in Orange County. This Hotline also provides a complete list of what products are classified as HHW and may be helpful to you in gathering items for disposal.

VINTAGE PARK IMPROVEMENT UPDATE

The City of Lake Forest would like to thank you for your patience during the construction of the park improvements at Vintage Park. Because of ongoing concerns, the City felt that it was in the best interest of the community to terminate the contract with the original contractor. The process of selecting a replacement contractor must be adhered to in a strictly-defined legal manner, thus resulting in an unfortunate delay to the project and inconvenience to our residents. We are now anticipating that the project will be completed during July 2000. We hope that residents will use and enjoy Vintage and other City parks and their new additions.

HOME IMPROVEMENT AND REPAIR LOANS AVAILABLE THIS SUMMER

The City's CDBG (Community Development Block Grant) Rehabilitation Program continues to offer assistance to those who are in need of repairs to their home. Homeowners who are eligible can receive deferred 0% interest loans or 3% amortized loans for home improvements. Homeowners can receive up to $10,000 and mobile home owners can receive up to $5,000 for repairs. Eligible residents in Foothill Ranch and Portola Hills can now participate in the Lake Forest Program. Annual income cannot exceed 80% of the HUD median income (See chart below). Eligible items include painting, flooring, roofing, plumbing, heating, garage doors, driveways, and other common home improvement items. The City will be accepting applications for this Program during the months of July and August 2000. All applications will be reviewed after the application period has ended. For more information or to be put on the mailing list to receive an application when available, please call (949) 461-3473.

2000 HUD INCOME RESTRICTIONS

Combined gross household income may not exceed 80% of HUD median income. Income is adjusted annually.

Household Size	Income Limits for 0% Deferred Loan	Income Limits for 3% Loan
1	$24,350	$35,150
2	27,850	40,150
3	31,300	45,200
4	34,800	50,200
5	37,600	54,200
6	40,350	58,250
7	43,150	62,250
8	45,950	66,250

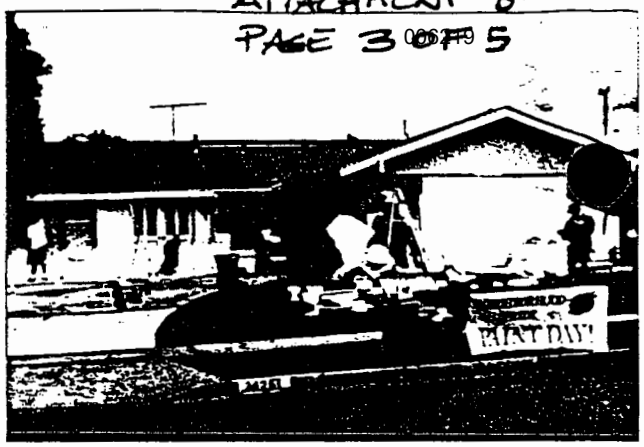

COMMUNITY SPIRIT SOARS

Neighborhood Pride Volunteer Paint Day

The efforts of 146 wonderful volunteers made a very successful second annual Neighborhood Pride Volunteer Paint Day. This year's event took place on April 8th and April 15th and volunteers assisted seven families with the exterior painting of their homes.

Sponsored by the City's Community Development Block Grant (CDBG) and coordinated through efforts of Code Enforcement and Parks and Recreation, the volunteer groups that participated in painting included: Saddleback Valley Foursquare Church, the Trabuco and Lake Forest Wards of the Church of Jesus Christ of Latter Day Saints, Wells Fargo Bank Foothill Corridor Area, the Kiwanis Club of Lake Forest, and the Promise Keepers Men's Group from Saddleback Church.

To qualify for painting at no cost, homes must be owner occupied, homeowners must income-qualify, and the home must be located in one of the City's CDBG Target Areas. A professional paint crew reviewed each home and all prep work was completed prior to the arrival of the volunteers. Volunteers masked all the required areas, painted the exterior walls and trim, and assisted with the necessary clean up.

This program also provides an opportunity for volunteer organizations to "adopt" the home that they painted and to provide further clean-up and rehab/repair/maintenance assistance throughout the year. One volunteer organization has already indicated they will "adopt" the home that they painted in April.

Many thanks to all whom participated in this year's event who will be honored at an upcoming City Council meeting. Paint Day helps to foster community pride and is instrumental in maintaining and improving the character of our neighborhoods. If you or your organization would like to volunteer for next year's Neighborhood Pride Volunteer Paint Day, or if your home could benefit from this program, please contact the City of Lake Forest Community Preservation Technician at 461-3474.

ATTACHMENT "C"
PAGE 1 OF 1

006220

INVITATION

Calling All Architects, Builders, Contractors And Developers!

Get To Know The People Who Make Things So Much Easier In The City Of Lake Forest

The City's Development Services Team – Planning, Building and Engineering – is hosting a lunchtime "meet and greet" for architects, builders, contractors, developers and others involved in projects in Lake Forest. We'll serve a barbecue lunch and drinks.

Learn how our team can make your projects easier. We will explain our permitting processes and introduce you to the staff members who can answer your questions and help you move your projects ahead. Come and put faces with the names.

DATE:	**Wednesday, June 14, 2000**
TIME:	**11:30 a.m. to 1:00 p.m.**
PLACE:	**Lake Forest City Hall – Council Chambers** **23161 Lake Center Drive, Lake Forest**
RSVP:	**To Peggy Samantha at (949) 461-3460** **Or** **FAX to (949) 461-3512** **Or** **Email: psamantha@city-lakeforest.com**

006221

AGENDA
DEVELOPMENT & BUILDING ROUNDTABLE
JUNE 14, 2000

WELCOME	Kathy Graham Community Development Director
PLANNING PROCEDURES	Gayle Ackerman Development Services Manager
ENGINEERING PROCEDURES	Bob Woodings Public Works Director/City Engineer
BUILDING PERMITS	Jim Brogan Building Official

INTRODUCTION OF OTHER AGENCIES

- Orange County Fire Authority
- Cal EPA – Permit Assistance Center
- Irvine Water District
- Southern California Edison

LAKE FOREST RECYCLES USED MOTOR OIL!

Used oil can contain such contaminants as lead, magnesium, copper, zinc, chromium, arsenic, chlorides, cadmium and chlorinated compounds. Oil poured down storm drains or onto the ground can work its way into our ground and surface waters and cause serious pollution. One gallon of used oil can foul one million gallons of drinking water!

Lake Forest has 10 State Certified Used Oil Collection Centers standing by to help you recycle your used motor oil. Recycling oil is easy. When you do an oil change, just drain your vehicle's old oil into a clean container, seal the container well with a lid and bring it to one of the 10 conveniently located State Certified Used Oil Collection Centers in Lake Forest. So don't throw good oil down the drain. Recycle now!

ATTACHMENT "A"
PAGE 5 OF 5

It's Easy! It's Free!

Did you know that you can dispose of your used motor oil safely and easily right here in Lake Forest? When you change your oil, drain your used motor oil into a container, seal the container well with a lid, and bring it to one of the conveniently located State Certified Used Oil Collection Centers in Lake Forest. Be sure that your motor oil is not mixed with other substances, such as antifreeze, solvents, gasoline or water.

Why Recycle Used Motor Oil?

Because it never wears out! Your used motor oil can be recycled, cleaned and used again. And that means you can conserve a natural resource. Motor oil which is poured into the ground, or your trash, can pollute the soil, groundwater, streams and rivers... your environment. When you take your used motor oil to a State Certified Used Oil Collection Center for recycling, you are protecting the environment and conserving a valuable resource. And, State Certified Used Oil Collection Centers will pay you $.04 for each quart you recycle.

Used Oil Recycling Tips

- When draining used oil, use a clean plastic oil pan or container with a tight lid.
- Reuse your used oil container, and store it safely, away from children and pets.
- Don't mix used oil with chemicals, gasoline, water or other substances.
- Use a reusable 5-gallon or smaller sized container.
- State Certified Used Oil Collection Centers will take between 5 and 20 gallons per day, per person.

PAGE 4 OF 5

State Certified Used Oil Collection Centers*

Firestone Store
24421 Rockfield
Lake Forest (714) 581-2660

El Toro Texaco
23751 El Toro Road
Lake Forest (714) 457-9892

Jiffy Lube # 1301
20781 Lake Forest Drive
Lake Forest (714) 583-0470

Lake Forest Texaco
23652 Rockfield Blvd.
Lake Forest (714) 581-5770

Midas
22757 Centre Drive
Lake Forest (714) 855-1218

Pep Boys
22671 Lake Forest Drive
Lake Forest (714) 855-9593

Purrfect Auto Service
20732 Lake Forest Drive
Lake Forest (714) 457-1150

Purrfect Auto Service
20751 Bake Parkway
Lake Forest (714) 830-7624

Ryan's Foothill Ranch Transmission
20622 Pascal Way
Lake Forest (714) 770-6888

* Please telephone these centers before taking in your used oil.

Printed on Recycled Paper

If you have additional questions about used motor oil recycling, please call the California Integrated Waste management Board Recycling Hotline at **800-553-2962.**

REPRESENTATIVE PUBLIC EDUCATION MATERIALS

CITY OF MISSION VIEJO

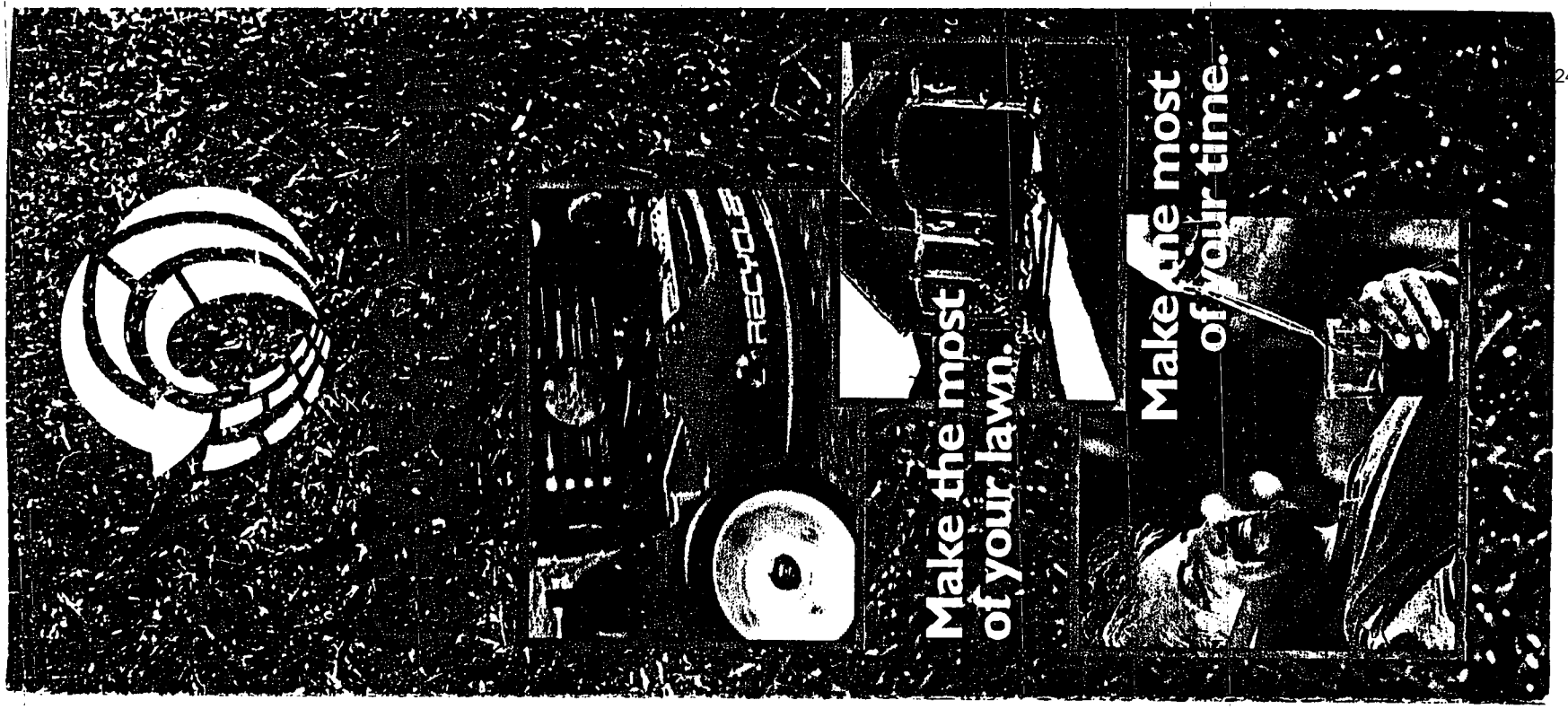

California Environmental Protection Agency
Integrated Waste Management Board

8800 Cal Center Drive MS 23
Sacramento CA 95826

50% BY 2000

Visit our Web site at: www.ciwmb.ca.gov/Organics/

Save time!

The average person spends less time on lawn care when they grasscycle. You save time and the hassle of raking, sweeping, bagging, and throwing out grass clippings.

Help the environment!

Grasscycling cuts the amount of green materials going to landfills. Grasscycling slows evaporation from the soil surface, enhancing your lawn's drought tolerance and conserving water. Grassycling helps reduce fertilizer and water usage, which means less runoff from your lawn that can lead to surface and groundwater pollution. Grasscycling with electric mulching mowers also is better for the air.

Will grasscycling make my lawn look bad?

No! The key to maintaining a neat appearance is to cut the lawn often enough to produce short grass clippings. If you follow the 1/3 rule—mow often enough so that no more than 1/3 of the length of the grass is cut—the short clippings decompose quickly and will not cover the grass surface. Also remember to mow when the grass is dry to prevent grass clippings from clumping in piles on the lawn.

Does grasscycling cause thatch buildup?

No! Short grass clippings left on a lawn do not smother the grass underneath or cause thatch buildup. Research has shown that grass roots and stems are the primary cause of thatch, not grass clippings. Roots and stems contain large amounts of lignin (wood), a substance that decomposes very slowly. In contrast, grass clippings are approximately 80-85 percent water with only small amounts of lignin, and they decompose rapidly.

Is grasscycling always appropriate?

Grasscycling does not work in every situation. Prolonged wet weather, mower breakdowns, or infrequent mowing are situations where grass clippings should probably be bagged since a large number of clippings may be generated. But do not throw the clippings away! Add clippings to your compost pile, or use them as mulch around trees, flowerbeds, and shrubs.

Does grasscycling spread lawn disease?

No! Improper watering and fertilizing are the primary cause of turfgrass disease. If an environment for disease is present, it will occur whether clippings are left on the lawn or not. Most grasses in California need about 1 inch of water every 5 to 7 days in the growing season and much less during slow-growth months. Lawns watered too frequently tend to develop shallow root systems that may make them more susceptible to stress and disease. Overfertilization can also weaken a lawn by causing excessive top growth. It is better for the lawn to apply smaller quantities of fertilizer more frequently rather than larger amounts occasionally.

Does grasscycling require special equipment?

You may be able to use your existing mower to grasscycle. Refer to your owner's manual or contact a local lawnmower dealer to learn if you can grasscycle. You may need to purchase a retrofit kit, and your mower dealer can assist you with selecting the correct one.

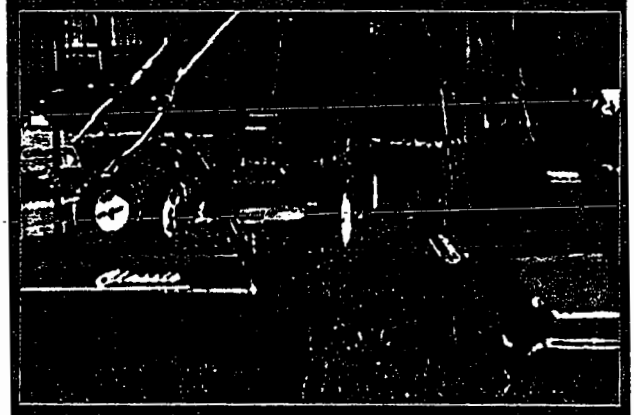

Remember:

Grasscycling is faster, cheaper, and easier!

Saves time

(no more bagging)

Saves money

(less fertilizer is needed, no disposal fees)

Encourages a healthier lawn

(clippings contain valuable nutrients)

Benefits the environment

(conserves landfill space and water resources)

For more information about grasscycling, contact your local recycling coordinator or call the Waste Board at (916) 255-2708.

www.ciwmb.ca.gov/Organics/

The Integrated Waste Management Board (IWMB) does not discriminate on the basis of disability in access to its programs. IWMB publications are available in accessible formats upon request by calling the Public Affairs Office at (916) 255-2296. Persons with hearing impairments can reach the IWMB through the California Relay Service, 1-800-735-2929.

Pub# 443-99-011
Printed On Recycled Paper

Grass clippings make up a surprisingly large portion of California's waste stream. Increasingly, as California communities work to meet the State mandate to cut the amount of trash sent to landfills, they are looking at grasscycling to reduce the amount of green materials generated.

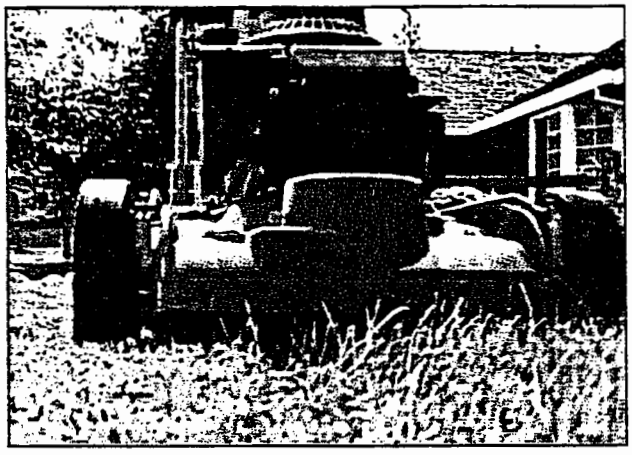

What is grasscycling?

Grasscycling is the natural recycling of grass by leaving clippings on the lawn when mowing. When you grasscycle with a mulching mower, the clippings stay in the chamber longer and are cut and recut before falling back to the soil. Once on the ground, the clippings decompose quickly, returning valuable nutrients back to the soil. Grasscycling is simple, easy, and it works!

Enjoy a healthier Lawn!

The valuable nutrients released through grasscycling make lawns greener and encourage a healthier stand of grass. Grass clipping decomposition enhances soil microbial activity and adds beneficial organic matter to the soil.

Save money!

Since grasscycling returns valuable nutrients to the soil, you can reduce the amount of fertilizer you purchase by 15 to 20 percent. In addition, even if your community has a green waste collection program, it is costly to collect this material and grasscycling can help keep garbage collection rates down.

s best to be prepared!

Living in California means living with the reality that a major **earthquake** can hit at any minute. Preparing for such an event will help you get safely through a disaster.

We depend so much on household utilities for both comfort and security that it's hard to imagine living without them. But, putting all comfort aside, there's one household utility that offers more than simple comfort; it also protects your health and the environment around you. That household utility is your sewer system.

Knowing what to do if your sewer system becomes damaged or inoperable will not only help you get through a disaster such as an earthquake, it will also help protect your health and the environment.

NO ILLEGAL DUMPING TO SEWERS OR STORM DRAINS
PROTECT OUR ENVIRONMENT

Checkli for an EMERGENCY provisional toilet

- ☐ 5-gallon plastic bucket with a tight-fitting lid
- ☐ 2 boxes heavy-duty trash can liners (8-10 gallon size) with ties
- ☐ 1 gallon liquid chlorine bleach or other toilet disinfectant
- ☐ 2 boxes baking soda
- ☐ 2 large boxes heavy-duty trash can liners (30-gallon size) with ties
- ☐ 6-8 rolls toilet paper
- ☐ Hand sanitizer to clean and disinfect hands without water
- ☐ Feminine products
- ☐ Paper towels
- ☐ Moist towelettes or baby wipes

It's easy, so be prepared!

OCS
Rev. 2/

ORANGE COUNTY SANITATION DISTRICT
PROTECTING THE ENVIRONMENT

For additional information, contact
the Orange County Sanitation District
Communications Department (714) 962-2411
or visit our website at www.ocsd.com

Orange County Sanitati District

EARTHQUAKE PREPAREDNESS

What to do if your sewer system becomes damaged or inoperable

HOUSEHOLD HAZARDOUS WASTE DISPOSAL

FREE

Tuesday - Saturday 9AM - 1PM

6411 OAK CANYON, IRVINE
(between the 5 & 405 off Sand Canyon)
For Info Call
714-834-6752

BFI Waste Systems

BROWNING-FERRIS INDUSTRIES

PACIFIC BELL

B.F.I. CURBSIDE

PHONE BOOK RECYCLING

APRIL 6TH TO MAY 15TH

FOR MORE INFO CALL

1-800-953-4400

FREE COMPOST GIVEAWAY

SPONSORED BY BFI

SATURDAY, APRIL 24TH

9AM UNTIL ITS GONE

AT THE

NORMAN P. MURRAY COMMUNITY CENTER

BRING YOUR SHOVEL

FREE FREE FREE

HOUSEHOLD HAZARDOUS WASTE ROUND-UP 1999

BFI

MISSION VIEJO CALIFORNIA

Saturday, November 6th 1999

9am - 2pm

Unisys Parking Lot

25725 Jeronimo Road

pacific clippings
p m b 1 7 8 9
santa ana, calif. 92711

The Register NOV 6 - 1999
Daily

MISSION VIEJO 386

Hazardous waste: The Annual Waste Collection Day is today. Residents are encouraged to collect old paints, aerosols, flammable liquids, pesticides and corrosive materials and properly discard them from 9 a.m. to 2 p.m. at Unisys Corp., 24725 Jeronimo Road, between Los Alisos and Alicia Parkway. Last year, 1,500 people hauled 73,000 pounds of hazardous materials to the site.

— Joan Hansen
(949) 454-7377
Saddleback@link.freedom.com

Where Does the Water in Your Storm Drain Go?

Sewer drains and pipes lead to a sewage treatment plant, but storm drains are designed to prevent flooding by carrying excess rainwater from city streets to the ocean. If this urban runoff is polluted, it can contaminate the ocean and beaches, harm aquatic life, and increase the risk of flooding by clogging gutters and catch basins.

Common household pollutants poured into gutters flow to the ocean. Similarly, waste material washed from driveways, lawns, and grasslands flows to the sea. Recently, this drainage has increased levels of bacteria and other toxins along beaches where streams and storm drains empty, causing frequent closure of these southland recreational areas to surfers and swimmers.

Although some of this pollution may be the result of sewage leaks or industrial dumping, most of it appears to be caused by natural processes and individual carelessness or indifference. Together, you and your neighbors can make a difference to keep gutters, storm drains, and waterways clean.

You can help prevent polluted urban runoff from contaminating southland streams, oceans, and beaches by taking the following steps:

- Never pour anything down a storm drain that you would not want to swim in.
- Use absorbent material or kitty litter to clean up spills of oil or other similar toxic liquids and dispose of them in the trash.
- Dispose of unwanted paint and other toxic liquids at Mission Viejo's annual Household Hazardous Waste Roundup.
- Avoid overwatering your lawn. Runoff from lawn irrigation may contain fertilizer, pesticides, and/or animal waste.
- Clean patios, driveways, porches, and sidewalks with a broom, not a hose.
- Take your vehicle to a car wash that recycles water rather than washing it in your driveway.
- Flush pet waste down the toilet or place it in a plastic bag in the trash so that the harmful bacteria this waste contains will not be washed into streams and onto beaches.
- Control erosion at construction and landscape sites with sandbags or other devices to prevent dirt and debris from entering storm drains.

Even if you live miles from the Pacific Ocean you may be polluting it without knowing it. Before you let anything go into the gutter or the storm drain, stop and think!

Prepare for Medical Emergencies

The Orange County Fire Authority (OCFA) responds to a variety of situations, including fires, earthquakes, floods, and medical emergencies. In a medical emergency, it is essential that firefighter paramedics quickly assess the patient to determine his condition and decide upon proper stabilizing treatment.

Yet in situations of this kind, the patient may be unconscious or in shock and so not able to describe his general health, name the medications he is taking, or alert emergency responders regarding physical conditions like diabetes that may be cause for extra concern or require special care.

At times like these, a Medical Information Sheet may be a lifesaver. This sheet should be prepared before an emergency arises and should include the following information:

- A brief medical history that mentions all physical conditions, ailments, or diseases that may be cause for additional concern or require special care
- Prescription medications that are being taken regularly
- Allergies, especially those to medications
- Insurance carrier or health care provider along with group and/or policy numbers
- Name and telephone number for primary care physician
- Hospital preference
- Name of attorney in fact
- Name and telephone number for family member or friend who should be contacted in an emergency

For additional information call the OCFA Community Relations and Education Section at (714) 744-0496.

006234

Critter Corner

During the past two years, the California legislature has passed several laws that will dramatically change the philosophies and daily operations of animal shelters throughout the state.

For example, Senate Bill 1785 (referred to as the Hayden Bill) requires all animal shelters, humane societies, and animal welfare groups to adhere to improved care, custody, animal adoption, and euthanasia standards for stray and homeless animals.

California animal shelters are now required to lengthen their animal holding periods and extend operating hours to allow working pet owners time to redeem their lost animals.

Shelters must spay and neuter all animals before they are released for adoption and collect fines (required by Food and Agricultural Code Section 30804.7) for all impounded dogs that have not been spayed or neutered.

Last year 1,958 animals were impounded by the Mission Viejo Animal Services center. Over 950 of these animals were adopted. Another 658 were reunited with their owners.

The Mission Viejo Animal Services Center is proud of its commitment to caring for stray and homeless animals and encouraged by this new legislation, which improves the standards for shelter operations statewide.

If you lose your pet or are interested in adopting a dog or cat, please contact the Mission Viejo Animal Services Center at 470-3045.

Insert to be included in the October Billing.....

Unlimited Recycling

Printed on Recycled Paper

Do you have extra recycling material?

BFI will take all of your extra recycling material! Just put the extra material in any 32 gallon trash can and place it next to your BFI blue recycling can. Our drivers will collect it at NO extra cost. Please no plastic bags.

Help the City of Mission Viejo reach the 50% reduction of trash goal by 2000.

Unlimited Green Waste Recycling

Printed on Recycled Paper

Do you have extra green waste?

BFI will take all of your extra green waste! Just put the extra material in any 32 gallon trash can and place it next to your BFI can. Our drivers will collect it at NO extra cost. Bundles are also accepted. Please no plastic bags.

Help the City of Mission Viejo reach the 50% reduction of trash goal by 2000.

The Only Weekly Newspaper Exclusively For The Mission Viejo Area

Mission Viejo News

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KATHERINE LARA: Art Director

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E-MAIL: cotonews @ deltanet.com

"Good News For A Change in Mission Viejo"

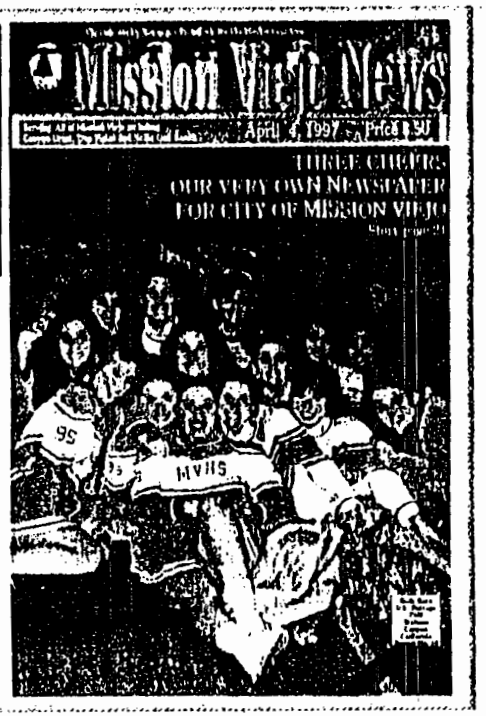

LOCAL NEWS

MISSION VIEJO OFFERS HOUSEHOLD HAZARDOUS WASTE COLLECTION DAY

The City of Mission Viejo is pleased to announce its annual Household Hazardous Waste Collection Event. This year's event is scheduled for Saturday, November ' om 9:00 AM to 2:00 PM at the Unisys Corporation, between Alicia Parkway and Los Alisos in Mission Viejo.

There is no charge for this service, and all Mission Viejo residents are invited to bring up to 15 gallons or 125 pounds of household hazardous waste, such as used motor oil, antifreeze, batteries, paint, paint thinner, pesticides, herbicides, pool acids, cleaning supplies and photo chemicals.

To minimize the potential for a delay, residents are invited to arrive between designated times according to first initial of last name, as follows:

A-I 9:00 AM to 10:30 AM; J-Q 10:30 AM to noon; R-Z noon to 2:00 PM.

For more information, please refer to the notice on BFI trash collection bill, the fall edition of City Outlook, or call (888)PICK-BFI.

GREAT NEW CHRISTMAS BOUTIQUE IN RANCHO

Santa Margarita Catholic High School will be holding its Tenth ual Christmas Boutique to benefit Boys' Volleyball and Grad Night 2000. It will be held on Friday, November 5th from 6:00 p.m. to 10:00 p.m. and Saturday, November 6th from 9:00 a.m. to 4:00 p.m. in the Santa Margarita Catholic High School Moiso Pavilion at 22062 Antonio Parkway in Rancho Santa Margarita.

More than 160 vendors from throughout Southern California will offer hand-crafted and manufactured gifts, clothing, ceramics and holiday items. The boutique will also ature

25 Ways You Can Help Save Our Planet

1. Buy products that feature the recycling mark.
2. Bring a lunch box to school instead of throwing out those paper lunch bags every day.
3. Use cloth instead of paper napkins and a sponge instead of paper towels.
4. Give outgrown toys and clothes to someone who can use them.
5. Bring a container filled with your favorite drink to lunch every day instead of individual cartons.
6. Avoid buying items that have excessive packaging.
7. Decorate a shoe box with old wrapping paper and use it to store small toys and other things.
8. Save used paper and use the clean side whenever you need scrap paper.
9. Refuse a paper bag when you buy something small.
10. Find out if there are any other uses before throwing things out.
11. Take shorter showers.
12. Be careful not to disturb plants and animals when outdoors.
13. Volunteer to work at the recycling center.
14. Save and reuse bubble and foam packing.
15. Turn off appliances when not in use.
16. Ride your bike instead of in the car.
17. Buy toys that are well made and last.
18. Get some friends and visit a local stream to collect trash.
19. Cut six-pack plastic rings.
20. Don't let the water run unnecessarily when brushing your teeth.
21. Build a bird house for the backyard.
22. Save empty cardboard containers for craft projects.
23. Pick up at least one piece of litter every day.
24. Leave grass clippings on the lawn.
25. Let grass water naturally in dry weather.

©1996 GREAT [illegible]

Reduce Reuse Recycle

For Today, Tomorrow, Forever!

Do You Know Where The Water In Your Storm Drain Goes?

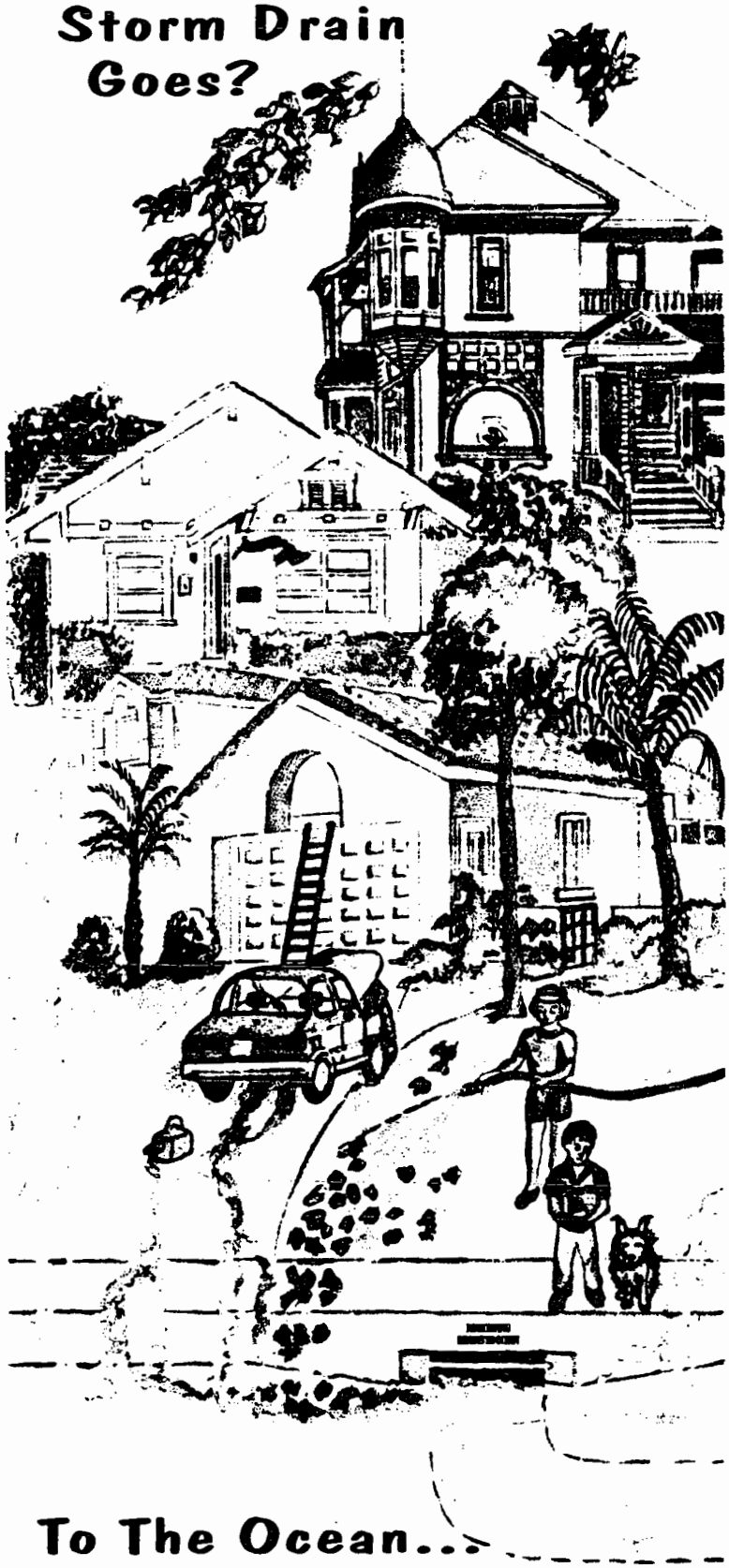

To The Ocean...

RECEIVED
NOV 22 1999
CITY OF
MISSION VIEJO

006239

MSE ENVIRONMENTAL, INC.
a division of environmental systems corp.

880 West Verdulera Street
Camarillo, CA 93010

Telephone (805) 987-0217
Fax (805) 987-8718

November 19, 1999

Ms. Karen Wiley
CITY OF MISSION VIEJO
25909 Pala, Suite 200
Mission Viejo, California 92691

Dear Ms. Wiley:

MSE Environmental, Inc. (MSE) wishes to thank you for the opportunity to assist in the management of your recent household hazardous waste program held November 6, 1999, in the City of Mission Viejo.

Enclosed please find a summary of all pertinent documentation organized in a booklet format. This year's event was a success servicing 1,120 residents. Almost 75,000 pounds of waste was collected with 78% of this material being recycled.

The MSE team looks forward to working with the City of Mission Viejo again on future programs. Should you have any questions or need additional information, please contact me at (805) 987-0217.

Sincerely,

MSE ENVIRONMENTAL, INC.

Scott Bauwens
HHW Program Coordinator, Southern California

Enclosures

MISSION VIEJO
WASTE MANAGEMENT SUMMARY

RECYCLABLE	**78.0%**		
	Oil Base Paint		26,090 lbs.
	Motor Oil		6,800 lbs.
	Latex Paint		16,150 lbs.
	Antifreeze		1,275 lbs.
	Lead Acid Batteries		6,840 lbs.
	Propane Cylinders		525 lbs.
	Household Batteries		300 lbs.
	Ni-Cad Batteries		30 lbs.
	Mercury Thermometers		20 lbs.
		Total	**58,030 lbs.**
INCINERATION	**22.0%**		
	Flammable Liquids		6,800
	Flammable Solids		2,580
	Pesticide Liquids		2,094
	Pesticide Solids		405
	Alkaline Liquids		980
	Corrosive Liquids		645
	Aerosols		1,680
	Oxidizing Liquids, Corrosive		982
	Compressed Gases		80
	Organic Peroxide		5
	PCB's		11
	Fusses		25
	Corrosive Liquids, Organic		70
	Gopher Gases		10
	Isocyanates		10
		Total	**16,377 lbs.**
LANDFILL	**<1%**		
	Asbestos		25 lbs.
		Total	**25 lbs.**
TOTAL WASTE MANAGED			**74,432 lbs.**

Printed on Recycled Paper

006241

City OUTLOOK

Fall - 1999 A Quarterly Newsletter for Mission Viejo Residents and Businesses

Shops at Mission Viejo Open in September

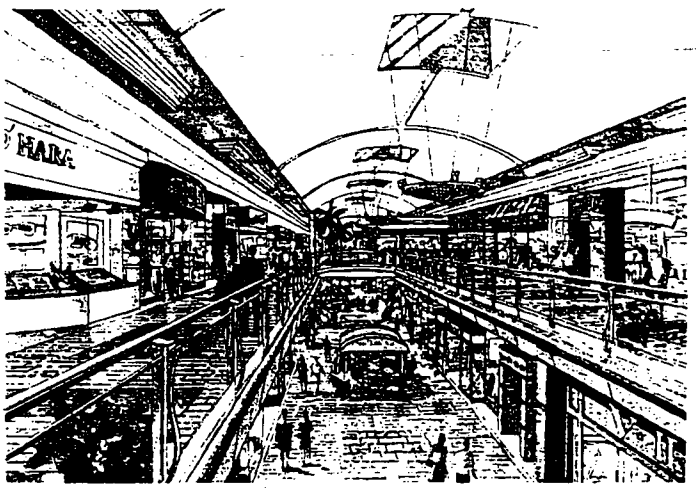

The Shops at Mission Viejo - Gallery View

Attention, shoppers! Friday, September 10, marks the grand reopening of the Shops at Mission Viejo.

Festivities begin with a ribbon cutting at 9:30 a.m. in the new West Court. At 9:50 a.m., Orange County's newest Nordstrom store opens its doors.

Throughout the weekend, shoppers will be treated to music and will have hourly opportunities to win prizes worth at l[illegible] $1,000 or to walk o[illegible] ith the grand prize, an Infiniti I30.

New Mall Hours

Monday - Friday
10:00 a.m. to 9:00 p.m.
Saturday
10:00 a.m. to 7:00 p.m.
Sunday
11:00 a.m. to 6:00 p.m.

Built in the late 1970s, during the energy crisis, the Mission Viejo Mall had reached its twentieth year and was showing its age. Its sharp edges, dark woods, and enclosed feel reflected the pessimism of that period. And since 1999, its retail sales tax revenues had declined 20 percent.

The mall owner, Simon Property Group, invested $150 million in a major makeover that increased the mall's size by 400,000 square feet, attracted more than 60 new stores and restaurants, and transformed it into a regional shopping destination whose graceful curves, stately palm trees, and teal accents bespeak a casual elegance.

To fund construction of two parking structures with space for 2,500 cars, Mission Viejo's Community Development Agency issued bonds valued at $35 million.

According to projections, the cumulative effect of the Simon and Mission Viejo [illegible] investments will be to generate retail [illegible] equal to that of the top 10 percent of super regional malls in the western United States and to increase Mission Viejo's retail sales tax revenues by more than $3 million annually over the next ten years.

The mall revitalization is important to Mission Viejo because the city derives one-third of its operating revenues from retail sales taxes.

Mission Viejo Considers City Hall Options

Mission Viejo does not have its own city hall. Instead, the city leases office space in a building located at 25909 Pala in the High Park business complex. Effective October 1, 1999, rent payments for this space will increase from $389,985 to $514,780 annually. The present lease expires on September 30, 2001.

The Mission Viejo City Council is responsible for ensuring that the city's [illegible] mployees have a safe and adequate space in which to do their jobs. The Council must decide whether to (1) renew the lease in the present building at a much higher rate, (2) begin the search for space to lease in another building in a very tight office space market, (3) purchase an existing building and remodel it to meet current access requirements and seismic codes, or (4) recommend construction of a new building on land the city already owns.

To evaluate these four options, the Council sought advice from Keyser Marston Associates, a firm specializing in the economic analysis of real estate transactions. **A summary of the report prepared by Keyser Marston appears as an insert in this issue of the Mission Viejo *City Outlook*.**

Also in this Issue . . .

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DAWG Walk Raises Money 2
Walk Against Drugs 2
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Comings and Goings 3
Critter Corner 3
City Contacts 4
City Meetings 4
Calendar of Events 4

Mission Viejo City Council

Sherri M. Butterfield Mayor
Thomas R. Potocki Mayor Pro Tempore
William S. Craycraft Council Member
John Paul Ledesma Council Member
Susan Withrow Council Member

Under Construction

As a part of Mission Viejo's ongoing capital improvement program, changes will soon be made to the intersections of Alicia Parkway with Jeronimo Road and with Via Fabricante.

At Jeronimo, the roadway will be widened to accommodate dual left-turn lanes for all four legs of the intersection and designated right-turn lanes for three legs of the intersection. At Via Fabricante, dual left-turn lanes will be added for traffic eastbound on Alicia.

As a part of this project, the medians on Alicia Parkway will be reconstructed and relandscaped to feature more plant material in place of the current hardscape.

Construction will begin in September and be completed by the end of the year. To minimize the inconvenience to users of this busy arterial, much of the work will be performed at night.

Most of the funding for this $800,000 project will be provided by contributions from the Ladera Ranch development, now under construction east of the city.

For more information regarding Mission Viejo's capital improvement projects, visit the city's web site at ci.mission-viejo.ca.us.

City Outlook is a quarterly publication of the City of Mission Viejo. To submit comments or suggestions, please call 470-3051.

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Fifth Annual DAWG Walk Raises Money for Animal Shelter

006242

The Dedicated Animal Welfare Group (DAWG) will hold its fifth annual DAWG Walk from 7:30 a.m. until 9:30 a.m. on Saturday, September 25, at the Market on the Lake, 27762 Vista del Lago in Mission Viejo.

This annual amble around Lake Mission Viejo benefits the Mission Viejo Animal Shelter and features a dog-owner look-alike contest and prize drawings with a chance to win theme park tickets, dinners for two, and a wide assortment of pet-related merchandise and services.

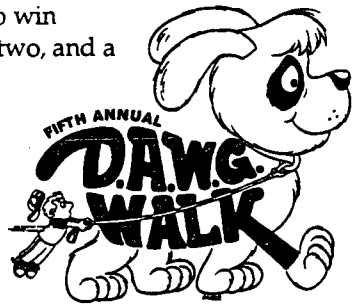

Grand marshal for this year's stroll is a blue merle Queensland heeler named Blue, who is an alumna of the shelter. When found abandoned, Blue had been hit by a car. Previous surgery apparently intended to help her had been unsuccessful, leaving her in pain and unable to walk. DAWG paid for the orthopedic surgery needed to correct the problem.

DAWG Walk registration forms are available at the Mission Viejo Animal Shelter, located at 28095 Hillcrest, one block south of the Crown Valley-Marguerite Parkway intersection. A $5 discount on the $20 entry fee is available to those who register in advance at the Pet and Wildlife Faire on Saturday, September 18, at the Animal Shelter.

The DAWG Walk is sponsored by Big Dog Sportswear, the Coach House, El Torito Grill, IAMS Company, Medix Ambulance Service, Mimi's Café, Morning Dove Farms, Six Flags, and Waste Management of Orange County.

The Mission Viejo Animal Services Center serves the communities of Mission Viejo and Laguna Niguel. Its purpose is to provide humane shelter for lost and homeless animals, to offer life-saving treatment for animals that are injured or ill, and to find homes for "orphaned" animals.

Since the center opened in October 1993, it has welcomed and cared for more than 10,000 lost pets, reuniting some with their grateful owners and finding families for others who needed new homes.

For more information about DAWG or the upcoming DAWG Walk, call 582-9331.

Walk Against Drugs Opens Red Ribbon Week

Mission Viejo's eleventh annual Walk Against Drugs is set for Saturday, October 23. Walkers will meet at 8:00 a.m. in the Mission Viejo High School football stadium, 25025 Chrisanta Drive, for a pep rally and then move east on La Paz Road to Oso Viejo Park for a fair.

Slated to last until noon, the fair will feature food, music, game booths, and informational displays provided by the Orange County Fire Authority and the Orange County Sheriff's Department.

First held in 1989, the Mission Viejo Walk Against Drugs coincides with Red Ribbon Week, a time set aside for communities nationwide to recall the death of federal drug agent Enrique Camarena in the line of duty and renew their no-tolerance pledges.

Household Hazardous Waste Round-up

Mission Viejo's annual Household Hazardous Waste Round-up will take place between 9:00 a.m. and 2:00 p.m. on Saturday, November 6, 1999, in the Unisys Corporation parking lot located at 25725 Jeronimo Road.

Sponsored jointly by the city and its residential waste-hauler, BFI, this convenient drive-through event offers Mission Viejo residents an opportunity to dispose safely and legally of toxic items with a limit of 5 gallons or 125 pounds per vehicle.

Participants must show proof that they are Mission Viejo residents, should place materials to be disposed of in the trunk of their vehicle, and are asked to arrive between the times indicated below based on the first letter of their last name.

A-I	9:00 a.m. to 10:30 a.m.
J-Q	10:30 a.m. to noon
R-Z	Noon to 2:00 p.m.

City of Mission Viejo

Office of the City Manager

Sherri M. Butterfield
Mayor
Thomas R. Potocki
Mayor Pro Tempore
William S. Craycraft
Council Member
John Paul "J.P." Ledesma
Council Member
Susan Withrow
Council Member
Daniel P. Joseph
City Manager

October 18, 1999

FOR IMMEDIATE RELEASE
Press Release Number: 99-68

Contact: Karen Wylie, Assistant to the City Manager
(949) 470-8409 Phone
(714) 859-1386 Fax Number

MISSION VIEJO TO OFFER HOUSEHOLD HAZARDOUS WASTE COLLECTION DAY

The City of Mission Viejo is pleased to announce its annual Household Hazardous Waste Collection Event. This year's event is scheduled for Saturday, November 6, 1999 from 9:00 a.m. to 2:00 p.m. at the Unisys Corporation, located at 24725 Jeronimo Road between Alicia Parkway and Los Alisos in Mission Viejo.

There is no charge for this service and all Mission Viejo residents are invited to bring up to 15 gallons or 125 pounds household hazardous waste such as used motor oil, antifreeze, batteries, paint, paint thinner, pesticides, herbicides, pool acids, cleaning supplies and photo chemicals.

To minimize the potential for a delay, residents are invited to arrive between designated times.

A-I 9:00 a.m. to 10:30 a.m.

J-Q 10:30 a.m. to Noon

R-Z Noon to 2:00 p.m.

For more information, please refer to the notice on BFI trash collection bill, the fall edition of City Outlook or call 1-888-PICK-BFI.

# # #

pacific clippings
post office box 11789
santa ana, calif. 92711

Mission Viejo News Weekly OCT 2 1 199

LOCAL NEWS

MISSION VIEJO OFFERS HOUSEHOLD HAZARDOUS WASTE COLLECTION DAY

386 The City of Mission Viejo is pleased to announce its annual Household Hazardous Waste Collection Event. This year's event is scheduled for Saturday, November 6 from 9:00 AM to 2:00 PM at the Unisys Corporation, located at 24725 Jeronimo Road between Alicia Parkway and Los Alisos in Mission Viejo.

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City of Mission Viejo - Volunteer Connection Day Project

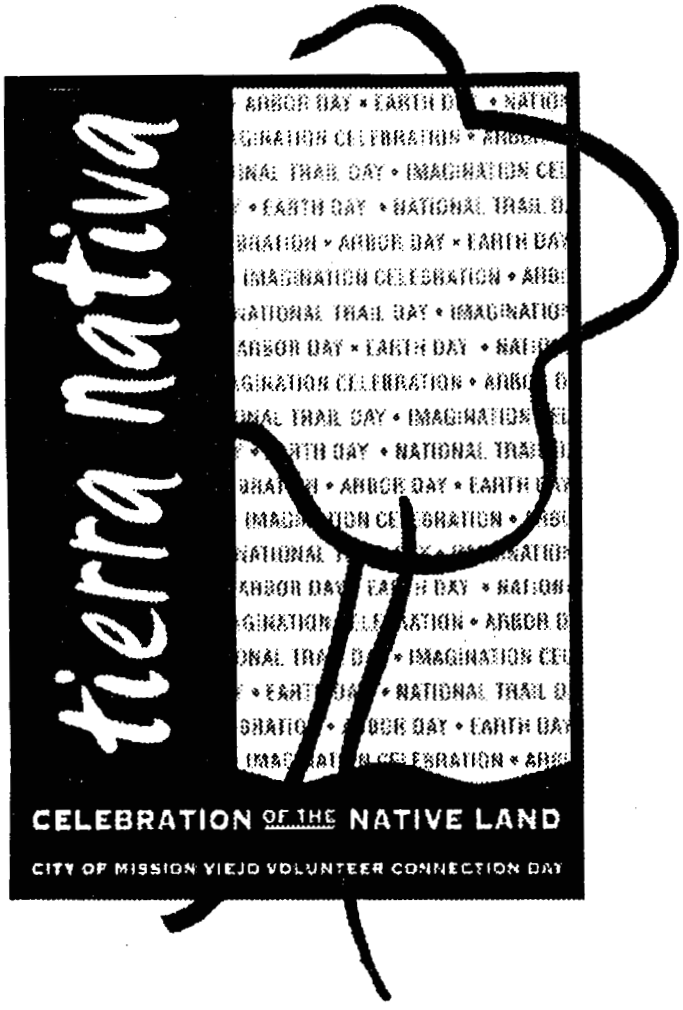

To commemorate Arbor Day, Earth Day, National Trail Day and Imagination Celebration as one event entitled

Tierra Nativa'99

Celebration of the Native Land

8:00 am - 12:00 Planting
10:00 am - 1:00 pm Festival Activities

To Volunteer or Sponsorship

Call (949) 470-3064

Tierra Nativa'99

Saturday, April 24, 1999

City of Mission Viejo
Volunteer Connection Day Project

006246

tierra nativa'99

Saturday, April 24, 1999 • 8AM-1PM

Weather Permitting

• Volunteer Planting • 8:00AM - 12NOON •

• Festival • 10AM - 1PM •

On! Saturday, April 24 the City has planned a day full of activities. This event is for the whole family, no minimum age limit!

8:00AM - 12NOON

PLANTING & RENOVATION OF OSO CREEK TRAIL Starting on the west side of Oso Creek, volunteers will be planting small tree, native plants, flowers, shrubs, painting and scattering seeds.

10:00AM - 1:00 PM • FESTIVAL & CHILDREN'S ACTIVITIES

FREE CRAFTS - MISSION VIEJO ACTIVITIES COMMITTEE

- **BOUQUET OF FLOWERS** Take home an arrangement of tulips, sunflowers, and daffodils.
- **TIERRA NATIVA NOTECARDS** Make personalized stationary for that special person, yourself.
- **POTATO HEAD** Cherish your own pet potato, designed and painted with love and care.
- **WINDSOCK** - Design a colorful windsock to flutter in the air.
- **NATURE MOBILES** Use your imagination, to create a dangling mobile which moves with the wind.
- **BUTTERFLY PENCILS** Make your own special butterfly with bright ribbon and your delightful imagination.

10:30 - 1:00 P.M. ENTERTAINMENT

- **STEELY PAN** - Listen to the calypso beat of this steel drum band.
- Storytelling
- Clowns
- Raffle
- Balloon Making

11:30AM BUTTERFLY RELEASE

See the sky filled with brilliant colored butterfly to help the environment.

SMOKEY THE BEAR

Take a picture with the most famous Oso of all.

FAMILY & GROUP PHOTO

A special thank you for all volunteer participants.

EXHIBITORS

- **CANYON CREST GARDEN CLUB** - Information on programs & services.
- **CITY OF MV** - Keeping you informed on the latest services & programs. Make your own flower garden.
- **CITY OF MV ANIMAL SERVICES** - Come learn about the best animal shelter in South County.
- **CITY OF MV CULTURAL ARTS COMM.** - Help paint a butterfly banner or a tile for Oympiad Park.
- **CITY OF MV HERITAGE COMM.** - A peek of the past with information on local history & heritage projects.
- **CITY OF MV RECREATION, FITNESS & TENNIS CENTERS** - Be informed on what's happening at these local facilities.
- **N.P.M COMMUNITY & SENIOR CENTER** - Highlights of services & programs.
- **O.C. VESTOR CONTROL DIST.** - Killer bees, fire ants, mosquitoes, and other information on pesty critters.
- **RMV LAND CONSERVANCY** - Learn how to track and make your own "track cards."
- **SADDLEBACK VALLEY YMCA** - Hear about a place for the whole family.
- **WEST COAST ARBORISTS** - Lessons on how to take care of your trees & participate in a special raffle.

B.F.I. PLANTING MULCH

Take a bag of planting mulch home to your garden.

FREE MULCH

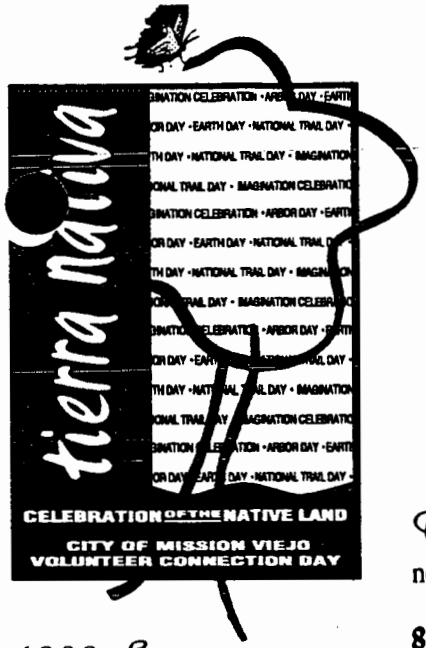

1999 Sponsors

MIGHTY OAKS • $1,000+

BFI
Granich Construction
RJM Design Group
Waste Management OC
West Coast Arborist
Wm. Vandergeest Landscape

• $100 - $999

an Controller Reparir
Big Apple Bagels
Bongo Construction Inc.
California Pizza Kitchen
Easterday Janitorial Supply
Hardy & Harpers Inc.
Hydro-Scape Products
Mervyn's - Mission Viejo
Miracle Park, Inc.
Santa Margarita Ford
Sunset Properties
Target Stores - Mission Viejo

SEEDLINGS • $50-$99

Claim Jumper • In & Out Burgers • Wild Rivers • Waxie

1999 Participants

City of Mission Viejo
- Rec. & Community Services Dept.
- Public Works Department
- Animal Services
- Cultural Arts Committee
- Heritage Committee
- Senior Citizens Activities Committee

Mission Viejo Activities Committee
Volunteer Center of Greater Orange County

DRAFT March 16, 1999

For More Information Call (949) 470-3064

City of Mission Viejo

January 5, 1999

FOR IMMEDIATE RELEASE
98-12
Contact Person: Karen Wylie, Assistant to the City Manager
Phone Number: (949) 470-3051

HOLIDAY TREE COLLECTION SERVICE EXTENDED BY BFI

Browning-Ferris Industries (BFI) has extended holiday tree collection services in Mission Viejo through Friday, January 15, 1999. Holiday trees should be placed out at the curb for pick up on your regular trash collection day. Trees over 6 feet need to be cut in half and should be free of ornaments and the tree stand. Flocked and fake holiday trees will be collected when a bulky item pick up is scheduled with BFI. Flocked trees are not recyclable but they may be cut and placed in the large blue trash container.

To dispose of a holiday tree after January 15, 1999, place the cut up tree in either the large blue trash container or the green waste recycling container.

For more information or to schedule a bulky item pickup, contact BFI at 1-888-742-5234.

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006248

City of Mission Viejo

Office of the City Manager

Sherri M. Butterfield
Mayor
Thomas R. Potocki
Mayor Pro Tempore
William S. Craycraft
Council Member
John Paul "J.P." Ledesma
Council Member
Susan Withrow
Council Member
Daniel P. Joseph
City Manager

January 22, 1999

FOR IMMEDIATE RELEASE
#99-5

Contact: Keith Rattay, Manager of Maintenance Services, (949) 470-3056
Karen Wylie, Assistant to the City Manager, (949) 470-3051

CITY OF MISSION VIEJO'S TIERRA NATIVA WINS STATE SPECIAL EVENT AWARD

The City of Mission Viejo's Tierra Nativa will soon be honored with the 1998 State Merit Award for Special Events by the California Park and Recreation Society. This event is held annually in April to plant along the Oso Creek Trail and is the city's celebration of Volunteer Connection Day, Earth Day, Arbor Day, Imagination Celebration, and Trails Day.

Keith Rattay, Manager of Maintenance Services will accept the award on behalf of the City at the California Parks and Recreation Society's Annual Conference in February 1999.

###

25909 Pala • Suite 200 • Mission Viejo, California 92691
http://www.ci.mission-viejo.ca.us

949/470-3051
FAX 949/859-1386

City of Mission Viejo

Recreation and Community Services Department

Sherri M. Butterfield
Mayor
Thomas R. Potocki
Mayor Pro Tempore
William S. Craycraft
Council Member
John Paul "J.P." Ledesma
Council Member
Susan Withrow
Council Member

PRESS RELEASE

April 22, 1999

FOR IMMEDIATE RELEASE #99-27

Contact: Virginia Nonaca Chavez, Community Services Coordinator
(949) 470-3072 Office (949) 581-0795 Fax
E-mail: vchavez@mission-viejo.com

Tierra Nativa '99 Celebration

Over 450 volunteers have pre-registered to participate in this year's Tierra Nativa'99 Celebration on Saturday, April 24, 1999 from 8:00 AM-1:00 PM. The following is a schedule of events and special highlights for the day:

8:00 AM - Noon	Shovel Aerobics and the planting of Oso Creek Trail
10:00 AM – 1:00 PM	Festival Booths with crafts, environmental groups, and entertainment
10:30 AM – 1:00 PM	Steely Pan Steel Drum Band
11:00 AM - 11:30 AM	Storytellers – Debra Weller and Bathgate Elementary School Storytellers
11:30AM	Butterfly Release – Butterfly Poem

-MORE-

Mission Viejo Television Channel 31 October 1999

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
26	27	28	29	30	1 4:00p American Cinema #4 5:00p High Performance Home 5:30p Earth Cafe #6 6:00p Navy/Marine Corp. News 6:30p Heart Break Cafe #19 7:00p MVTV News 7:30p Animal House 8:00p Everybody is an Artist 28 8:30p HOLA O.C. 10 9:00p Project Wipe Out 9:30p Growing Old In America #2	2 4:00p American Cinema #4 5:00p High Performance Home 5:30p Earth Cafe #6 6:00p Navy/Marine Corp. News 6:30p Heart Break Cafe #19 7:00p MVTV News 7:30p Animal House 8:00p Everybody is an Artist 28 8:30p HOLA O.C. 10 9:00p Project Wipe Out 9:30p Growing Old In America #2
3 4:00p MVTV News 4:30p Animal House 5:00p Cross & Flame 5:30p Human Geography 6:00p Living Life 6:30p The Missing Link 7:00p Strength for Today 7:30p Cross & Flame 8:00p Human Geography 8:30p Living Life 9:00p The Missing Link	4 4:00p MVTV News 4:30p Animal House 5:00p Mission Viejo City Council Meeting	5 4:00p Mustangs in Motion 4:30p Earth Revealed 24/25 5:30p Action @ Aliso October 6:00p City Talk OCFA 6:30p IW MD Hazardous Waste 7:00p MVTV News 7:30p Animal House 8:00p Grass Recycle 8:30p Diablo Heat 9:00p Ethics in America #2 10:00p Food Rules	6 4:00p Mustangs in Motion 4:30p Earth Revealed 24/25 5:30p Action @ Aliso October 6:00p City Talk OCFA 6:30p IW MD Hazardous Waste 7:00p MVTV News 7:30p Animal House 8:00p Grass Recycle 8:30p Diablo Heat 9:00p Ethics in America #2 10:00p Food Rules	7 4:00p Mustangs in Motion 4:30p Earth Revealed 24/25 5:30p Action @ Aliso October 6:00p City Talk OCFA 6:30p IW MD Hazardous Waste 7:00p MVTV News 7:30p Animal House 8:00p Grass Recycle 8:30p Diablo Heat 9:00p Ethics in America #2 10:00p Food Rules	8 4:00p American Cinema #4 5:00p High Performance Home 5:30p Earth Cafe #6 6:00p Navy/Marine Corp. News 6:30p Heart Break Cafe #19 7:00p MVTV News 7:30p Animal House 8:00p Everybody is an Artist 28 8:30p HOLA O.C. 10 9:00p Project Wipe Out 9:30p Growing Old In America #2	9 4:00p American Cinema #4 5:00p High Performance Home 5:30p Earth Cafe #6 6:00p Navy/Marine Corp. News 6:30p Heart Break Cafe #19 7:00p MVTV News 7:30p Animal House 8:00p Everybody is an Artist 28 8:30p HOLA O.C. 10 9:00p Project Wipe Out 9:30p Growing Old In America #2
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MVTV Community Notices

Week Ending 1/16/99

Order	#	Name of Notice	Start Date	End Date
1	1A	MVTV Station ID	12/4/98	None
2	1B	Come Visit the M.V. Library	12/4/98	None
3	1C	Report Fire Ants	12/27/98	None
4	1D	Hospice family care	11/24/97	None
5	1E	Modjeska House	6/11/98	None
6	1F	MVTV News " Got a story?"	4/1/97	None
7	1G	Graffiti Hotline	1/1/99	None
8	1H	Activity Clubs	3/17/98	None
9	1J	MVTV Community Notice Charges		None
10	1K	MVTV Phone Number For Info	4/5/98	None
11	1M	MVTV Greeting Promo		None
12	1N	NARFE		None
13	1O	MV Animal Shelter		None
14	1P	Saddleback Community Outreach	7/1/98	None
15	1Q	Dayle Macintosh center for the disabled	7/1/98	None
16	1R	Disabled Vets	1/1/99	None
15	1S	Lions Club	7/21/98	None
16	1T	Daughter's of the American Revolution	9/27/98	None
17	1U1	MVTV Public Access station ID (Animation)	1/5/97	None
18	1V	MV Fine Arts		None
19	1W	Grandparenting Today		None
20	1X	AFS		None
21	1Y	Council Meeting Notice	7/27/97	None
22	1Z	Council Meeting Replay	8/1/97	None
23	2E	Food Rules	7/24/98	None
24	1U	MVTV station ID Global	1/5/97	None
25	2A	MVTV Programming Sched Sun/Mon 4-7	1/4/99	None
26	2B	MVTV Programming Sched Sun/Mon 7-10	1/4/99	None
27	2C	MVTV Programming Sched Tues-Sat 4-7	1/4/99	None
28	2D	MVTV Programming Sched Tues-Sat 7-10	1/4/99	None
29	2F	Library Volunteers	1/4/99	None
30	2G	YMCA Pancake Breakfast	1/9/99	1/16/99
31	3A	Elks Members	4/19/98	4/19/99
32	3B	The Byte Brothers	12/19/97	3/19/99
33	3C	Elks Bingo	5/20/98	5/20/99
34	3D	Bower Automotive 1	7/31/98	1/31/99
35	3E	Bower Automotive 2	7/31/98	1/31/99
36	3F	Elks Police & Fire Appreciation	1/4/99	1/16/99
37	3G	Alicia Village	1/4/99	4/4/99
38	3H	Elks Old Timers Night	1/9/99	1/19/99
39	3I	Christmas Tree Pick up*	1/9/99	1/15/99
40	3J	Library Auction	1/9/99	1/30/99
41	3K	Underwater Archaeology	1/9/99	1/29/99
42	2H	Mission Viejo Community Calender January	1/9/99	2/1/99

Items in Blue are new or updated ads

Graphics YTD: 103 Month: 18 Current: 42 New: 8

Item in green has been Fixed

MVTV Community Notices

Week Ending 1/23/99

Order	#	Name of Notice	Start Date	End Date
1	1A	MVTV Station ID	12/4/98	None
2	1B	Come Visit the M.V. Library	12/4/98	None
3	1C	Report Fire Ants	12/27/98	None
4	1D	Hospice family care	11/24/97	None
5	1E	Modjeska House	6/11/98	None
6	1F	MVTV News " Got a story?" (Animation)	1/16/99	None
7	1G	Graffiti Hotline	1/1/99	None
8	1H	Activity Clubs	3/17/98	None
9	1J	MVTV Community Notice Charges		None
10	1K	MVTV Phone Number For Info	4/5/98	None
11	1L	Household Waste	1/16/99	None
12	1M	MVTV Greeting Promo		None
13	1N	NARFE		None
14	1O	MV Animal Shelter		None
15	1P	Saddleback Community Outreach	7/1/98	None
16	1Q	Dayle Macintosh center for the disabled	7/1/98	None
17	1R	Disabled Vets	1/1/99	None
18	1S	Lions Club	7/21/98	None
19	1T	Daughter's of the American Revolution	9/27/98	None
20	1U1	MVTV Public Access station ID (Animation)	1/5/97	None
21	1V	MV Fine Arts		None
22	1W	Grandparenting Today		None
23	1X	AFS		None
24	1Y	Council Meeting Notice	7/27/97	None
25	1Z	Council Meeting Replay	8/1/97	None
26	2E	Food Rules (Animation)	1/16/99	None
27	1U	MVTV station ID Global	1/5/97	None
28	2A	MVTV Programming Sched Sun/Mon 4-7	1/4/99	None
29	2B	MVTV Programming Sched Sun/Mon 7-10	1/4/99	None
30	2C	MVTV Programming Sched Tues-Sat 4-7	1/4/99	None
31	2D	MVTV Programming Sched Tues-Sat 7-10	1/4/99	None
32	2F	Library Volunteers	1/4/99	None
33	2G	YMCA Pancake Breakfast	1/9/99	1/16/99
34	2H	Community Calender January	1/16/99	2/1/99
35	3A	Elks Members	4/19/98	4/19/99
36	3B	The Byte Brothers	12/19/97	3/19/99
37	3C	Elks Bingo	5/20/98	5/20/99
38	3D	Bower Automotive 1	7/31/98	1/31/99
39	3E	Bower Automotive 2	7/31/98	1/31/99
40	3G	Alicia Village	1/4/99	4/4/99
41	3H	Elks Old Timers Night	1/9/99	1/19/99
42	3J	Library Auction	1/9/99	1/30/99
43	3K	Underwater Archaeology	1/9/99	1/29/99

Items in Blue are new or updated ads

Graphics YTD: 107 Month: 22 Current: 43 New: 4

MVTV Community Notices

Week Ending 3/28/99

Order	#	Name of Notice	Start Date	End Date
1	1A	MVTV Station ID	12/4/98	None
2	1B	Come Visit the M.V. Library	12/4/98	None
3	1C	Report Fire Ants	12/27/98	None
4	1D	Hospice family care	11/24/97	None
5	1E	Modjeska House	6/11/98	None
6	1F	MVTV News " Got a story?" (Animation)	1/16/99	None
7	1G	Graffiti Hotline	1/1/99	None
8	1H	Activity Clubs	3/17/98	None
9	1J	MVTV Community Notice Charges		None
10	1K	MVTV Phone Number For Info	4/5/98	None
11	1L	Household Waste	1/16/99	None
12	1M	MVTV Greeting Promo		None
13	1N	NARFE		None
14	1O	MV Animal Shelter		None
15	1P	Saddleback Community Outreach	7/1/98	None
16	1Q	Dayle Macintosh center for the disabled	7/1/98	None
17	1R	Disabled Vets	1/1/99	None
18	1S	Lions Club	7/21/98	None
19	1T	Daughter's of the American Revolution	9/27/98	None
20	1U1	MVTV Public Access station ID (Animation)	1/5/97	None
21	1V	MV Fine Arts		None
22	1W	Grandparenting Today		None
23	1X	AFS		None
24	1Y	Council Meeting Notice	7/27/97	None
25	1Z	Council Meeting Replay	8/1/97	None
26	2E	Food Rules (Animation)	1/16/99	None
27	1U	MVTV station ID Global	1/5/97	None
28	3A	Elks Members	4/19/98	4/19/99
29	3C	Elks Bingo	5/20/98	5/20/99
30	2A	MVTV Programming Sched Sun/Mon 4-7	2/28/99	4/1/99
31	2B	MVTV Programming Sched Sun/Mon 7-10	2/28/99	4/1/99
32	2C	MVTV Programming Sched Tues-Sat 4-7	2/28/99	4/1/99
33	2D	MVTV Programming Sched Tues-Sat 7-10	2/28/99	4/1/99
34	2F	Library Volunteers	1/4/99	None
35	2H	Community Calendar February PG 1	2/28/99	4/1/99
36	2H	Community Calendar February PG 2	2/28/99	4/1/99
37	3G	Alicia Village	1/4/99	4/4/99
38	3F	Elks Officers	3/7/99	4/3/99
39	3J	SVUSD	2/4/99	3/21/99
40	3K	Youth Fair	2/4/99	4/24/99
41	3L	Lifeguard	2/8/99	3/31/99
42	3M	CMV JOB1 (Life Guard)	2/8/99	3/19/99
43	3N	CMV JOB2 (Dept Asst.)	2/9/99	3/25/99
44	3O	CMV JOB3 (Lib Page)	3/10/99	3/31/99
45	3P	CMV JOB4 (Animal Officer)	3/10/99	4/5/99
46	3Q	CMV JOB5 (Library Clerk)	3/10/99	3/31/99
46	3R	CMV JOB6 (Com. Service Aide)	3/10/99	3/31/99
48	4A	SVUSD Bingo	1/24/99	None
49	4B	YMCA Spring Break	3/7/99	4/9/99
50	4C	Bahai Art Contest #1	3/19/99	3/31/99
51	4D	Bahai Art Contest #2	3/19/99	3/31/99
52	4E	Bahai Art Contest #3	3/19/99	3/31/99
53	4F	Tour d'Olympiad	3/19/99	4/12/99
54	4G	SVUSD Recreation	3/19/99	3/26/99
55	4H	Tierra Nativa	3/19/99	4/24/99

Items in Blue are new or updated ads

Graphics YTD: 147 Month: 21 Current: 55 New: 10

MVTV Community Notices

Week Ending 4/4/99

Order	#	Name of Notice	Start Date	End Date
1	1A	MVTV Station ID	12/4/98	None
2	1B	Come Visit the M.V. Library	12/4/98	None
3	1C	Report Fire Ants	12/27/98	None
4	1D	Hospice family care	11/24/97	None
5	1E	Modjeska House	6/11/98	None
6	1F	MVTV News " Got a story?" (Animation)	1/16/99	None
7	1G	Graffiti Hotline	1/1/99	None
8	1H	Activity Clubs	3/17/98	None
9	1J	MVTV Community Notice Charges		None
10	1K	MVTV Phone Number For Info	4/5/98	None
11	1L	Household Waste	1/16/99	None
12	1M	MVTV Greeting Promo		None
13	1N	NARFE		None
14	1O	MV Animal Shelter		None
15	1P	Saddleback Community Outreach	7/1/98	None
16	1Q	Dayle Macintosh center for the disabled	7/1/98	None
17	1R	Disabled Vets	1/1/99	None
18	1S	Lions Club	7/21/98	None
19	1T	Daughter's of the American Revolution	9/27/98	None
20	1U1	MVTV Public Access station ID (Animation)	1/5/97	None
21	1V	MV Fine Arts		None
22	1W	Grandparenting Today		None
23	1X	AFS		None
24	1Y	Council Meeting Notice	7/27/97	None
25	1Z	Council Meeting Replay	8/1/97	None
26	2E	Food Rules (Animation)	1/16/99	None
27	1U	MVTV station ID Global	1/5/97	None
28	1B	Elks Members	4/19/98	4/19/99
29	1C	Elks Bingo	5/20/98	5/20/99
30	1D	Norman P. Murray "Speak your language"	3/27/99	None
31	2A	MVTV Programming Sched Sun/Mon 4-7	2/28/99	4/1/99
32	2B	MVTV Programming Sched Sun/Mon 7-10	2/28/99	4/1/99
33	2C	MVTV Programming Sched Tues-Sat 4-7	2/28/99	4/1/99
34	2D	MVTV Programming Sched Tues-Sat 7-10	2/28/99	4/1/99
35	2F	Library Volunteers	1/4/99	None
36	2H	Community Calendar April PG 1	3/27/99	5/1/99
37	2H	Community Calendar April PG 2	3/27/99	5/1/99
38	3G	Alicia Village	1/4/99	4/4/99
39	3F	Elks Officers	3/7/99	4/3/99
40	3K	Youth Fair	2/4/99	4/24/99
41	3L	Lifeguard	2/8/99	3/31/99
42	3M	CMV JOB1 (Life Guard)	2/8/99	3/19/99
43	3O	CMV JOB3 (Lib Page)	3/10/99	3/31/99
44	3P	CMV JOB4 (Animal Officer)	3/10/99	4/5/99
45	3Q	CMV JOB5 (Library Clerk)	3/10/99	3/31/99
46	3R	CMV JOB6 (Com. Service Aide)	3/10/99	3/31/99
47	3S	Pac Bell/BFI Phone Book Recycle	3/27/99	5/5/99
48	4A	SVUSD Bingo	1/24/99	None
49	4B	YMCA Spring Break	3/7/99	4/9/99
50	4F	Tour d'Olympiad	3/19/99	4/12/99
51	4G	SVUSD Recreation	3/19/99	4/9/99
52	4H	Tierra Nativa	3/19/99	4/24/99
53	4I	Library Book Sale	3/27/99	4/10/99
54	4J	Killian Church Casino Night	3/27/99	4/24/99
55	4K	Christian Fellowship	3/27/99	4/4/99
56	4L	Norman P. Murray "Stroke info"	3/27/99	4/20/99
57	4M	Norman P. Murray "Long Term Care"	3/27/99	4/21/99
58	4N	Norman P. Murray "International Day"	3/27/99	4/21/99

Items in Blue are new or updated ads

Graphics YTD: 161 Month: 14 Current: 58 New: 14

006255

THE RECYCLE CYCLE

MOBIUS Fun Book

REPRESENTATIVE PUBLIC EDUCATION MATERIALS

CITY OF NEWPORT BEACH

Your Wastes Become.

Since 1990, the City of Newport Beach has partnered with CR&R to process the City's residential waste stream at CR&R's Material Recovery Facility, or MRF, located in the City of Stanton. Designed to handle the recycling needs of cities with narrow streets and small lots like those in Newport Beach, the MRF has provided the City with effective recycling services by recycling a monthly average of 30% of the residential waste stream collected in Newport Beach. An added benefit is that waste diversion is achieved without the congestion, noise and pollution associated with the additional trucks needed to implement a conventional curbside recycling program. In addition, by utilizing the MRF, the City eliminates the need to continually educate a changing residential population of which approximately 42% are renters.

Newport Beach collection vehicles pick up commingled wastes from your residence. The contents of fully-loaded trucks are then transferred into specialized semi-trailers for shipment to CR&R's MRF. At the MRF, the waste is unloaded onto conveyor belts and transported into a recycling building which has a full acre under roof. In this building, materials that can be recovered for reuse are separated from non-recyclable wastes.

A giant rotating machine known as a trommel separates large materials, such as bundles of newspapers, from small materials such as dirt and grit. Once separated, the material is distributed to three sorting lines where additional machines and laborers pick out recyclable materials such as cardboard, steel and aluminum.

Useable Products

Recyclable materials then fall into huge storage containers. When the containers are full, the recyclables are hydraulically pushed onto another conveyor that sends them into a baler. Once baled, the materials become commodities that are shipped into the world marketplace where they are used to make new products.

Old cardboard becomes new boxboard; old newspapers are returned for reuse at the LA Times and Orange County Register; aluminum becomes new beverage containers; plastics are processed into carpet and made into fiberglass; and steel is used for new cars, refrigerators and steel cans.

Organic materials such as grass clippings and garden shrubs are also separated from the waste, through an additional mechanical process. This material is used as a daily cover for landfills and can be processed for use as a soil amendment known as compost.

Any material that cannot be recovered through this process is shipped to Orange County landfills for disposal.

R E C Y C L I N G

006259

- **Know what's recyclable**
  Newspaper, mixed paper (scrap paper, junk mail, cartons, etc.), cardboard, glass, plastic, metals and yard wastes are all recyclable.

- **Keep recyclable materials dry**. Recyclable materials become unmarketable when contaminated with food wastes, animal wastes, yard wastes and other wet wastes.

- **Use your in sink garbage disposal** for disposal of food wastes.

- **Use a plastic bag for any wet wastes**, diapers and animal wastes that you put in your trash. Bagging wet wastes helps keep recyclable materials dry and marketable.

- **Tie your newspapers in bundles.**

- **Put your yard wastes in a plastic bag.**

- **Scrape/rinse** glass, plastics, aluminum cans and other metals that you put in your trash. Clean recyclable materials increase their marketability.

- **Don't mix wet wastes with recyclable materials.** Contaminated recyclable materials usually end up in a landfill.

- **Don't put hazardous wastes in your trash.** Paints, oils, pesticides, home cleaning products, car batteries, etc. are all considered to be hazardous wastes and require special disposal.

  Call the County of Orange at (714) 834-6752 for the location of the nearest household hazardous waste collection center.

  Call the City of Newport Beach at (949) 644-3066 for all other refuse related questions.

PLEASE TEAR OFF AND SAVE

REGIONAL HAZARDOUS MATERIALS COLLECTION CENTERS

e County residents (proof of residency required) ispose of household hazardous materials (limit llons or 50 pounds per visit) at these locations:

ntington Beach Regional Collection Center 17121 Nichols

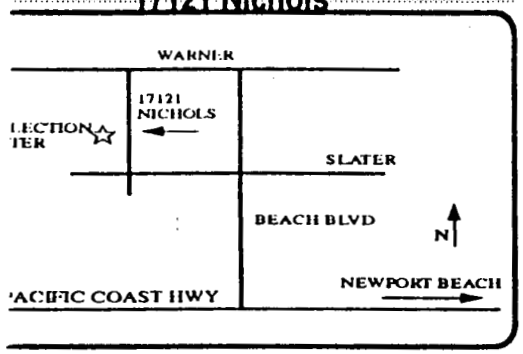

Irvine Regional Collection Center 6411 Oak Canyon

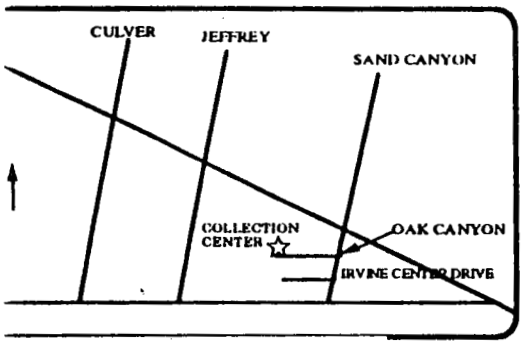

HOURS OF OPERATION:
9AM to 1PM
TUESDAY - SATURDAY
Closed on rainy days and holidays

t • Wood Preservatives • Batteries • Auto luids • Motor Oil • Antifreeze • Hobby and Supplies • Household Chemicals • Drain aners • Pesticides • Herbicides • Fertilizer

COMPOSTING & GRASSCYCLING

Compost consists of decomposed organic wastes that are ecologically recycled as a soil conditioner. In addition to air and water, carbon derived from newspaper, leaves, and twigs and nitrogen originating from manure, grass clippings, and kitchen wastes are key ingredients for nutrient-rich compost. Compost is beneficial because not only does it improve the soil fertility and air and water movement in soil but also saves landfill space and costs by recycling yard and kitchen wastes.

Grasscycling is the natural recycling of grass by leaving clippings on the lawn when mowing. Nutrients such as nitrogen released from the decomposition of grass clippings increase the biological activity near the soil surface, resulting in a healthier-looking lawn. Through grasscycling, the need for fertilizers decreases and yard waste is recycled and diverted from landfills.

Visit the Oasis Senior Citizen Center located at 5th and Marguerite Avenues in Corona del Mar to view active compost displays and to obtain helpful tips on creating your own backyard compost. Informative brochures on composting and grasscycling are available at the center.

INFO PHONE NUMBERS

General Services Department
644-3066
Oasis Senior Citizen Center
644-3244
Household Hazardous Materials Hotline
834-6752
Hazardous Materials Program Office
834-6892
Orange County Integrated Waste
834-4000
CA Integrated Waste Recycling Hotline
1-800-553-2962

PRINTED ON RECYCLED PAPER

CITY OF NEWPORT BEACH REFUSE RECYCLING HAZARDOUS WASTE & YARD WASTE

INFORMATION

General Services Department

644-3066

7 am to 4 pm Monday-Friday

REFUSE COLLECTION

The following regulations should be observed in order to help us continue to provide you with high quality, efficient municipal refuse service.

Refuse is collected once each week.

Property owners must provide a sufficient number of containers to accommodate all refuse accumulated on the premises. Containers should be constructed of metal or plastic and equipped with handles and a tight fitting lid. Any one refuse container must not exceed 45 gallons and 50 pounds in weight, including contents. The use of sturdy, nonreturnable garbage plastic bags is highly recommended.

Containers should be placed for collection on the street side of the sidewalks, in the parkway, or in driveways next to the street. Containers should not be placed in the gutter or in the street. When the premises border an alley, containers should be placed at or next to the property line in the alley, but in no case shall the containers obstruct any vehicular travel through the alley. Refuse containers must be set out by 7 AM on collection days, but not earlier than 7 PM the night before. Emptied containers should be removed as soon as possible after collection, but no later than 7 AM of the day following collection.

Your cooperation in keeping alleys clear of parked cars will be greatly appreciated.

HOLIDAY SERVICE

Refuse collection services will not be provided on NEW YEAR'S DAY, MEMORIAL DAY, JULY 4th, LABOR DAY, THANKSGIVING, or CHRISTMAS. When a specified holiday falls on a week day, collections will be delayed one day for the remainder of the week.

Materials Accepted for Collection

- Food refuse such as meats and vegetables.
- Meat, game, or fish cleanings that are thoroughly drained and securely wrapped to prevent leakage, odor, and access to flies and animals.
- Paper, rags, cardboard, fiber, metals, glass, cartons, containers, boxes, bottles, jars, and other materials of similar nature normally discarded as household or business refuse.
- Newspapers and magazines that are tied into bundles which do not exceed 50 pounds in weight.
- Animal waste that is securely wrapped to prevent leakage, odor, and access to flies and insects.
- Vacuum cleaner sweepings, ashes, sawdust, or similar powdery materials that are securely wrapped so they will not spill or be inhaled when collected.
- Tree or shrub trimmings, limbs and branches, plants, and grass cuttings that are placed in bags and/or tied into bundles less than four feet long, 18 inches in diameter, and not to exceed 50 pounds in weight.

Materials Prohibited from Collection

Household hazardous materials; ammunition; explosives; industrial wastes; chemicals; pathological, toxic, and radioactive waste; acids; drugs; unwrapped human and animal waste; large pieces of metal; machine parts; logs; tree stumps; and building scraps such as lumber, shingles, plaster, bricks, stones, concrete, asphalt, and drywall.

Do NOT place these materials in the trash. Use a Hazardous Materials Collection Center or rent a disposal bin.

FREQUENTLY ASKED QUESTIONS

How do I sign up for refuse collection?
It is not necessary to sign up for collection since no disposal fees are collected; however, a recycling surcharge is included in your water billing.

Why are "Red Tags" placed on containers?
Red tags indicate non-compliance with refuse regulations.

May I rent a disposal bin from the City?
The City does NOT rent bins. Private refuse collection contractors who have such bins may be found in the Yellow Pages listed under *Rubbish Hauling*.

Does the City collect bulky items such as sofas, water heaters, etc., during normal weekly pickups?
The City does NOT provide this service except on those special pickup days which have been arranged by homeowners associations.

Where can I take my recyclables?
Charities and citizens are encouraged to redeem their recyclables at their local recycling center. To find a recycling center near you, call the Recycling Hotline at (800) 553-2962 or our General Services Dept. at 644-3066.

Recycle Today!

SOURCE REDUCTION

Source reduction is the design, manufacture, purchase, or use of materials to reduce the amount or toxicity of waste generated. Source reduction strategies include:

- Choose products that are recycled, reusable, refillable, repairable, reliable, and recyclable.
- Invest in reusable rather than disposable products. Use mugs, cloth towels, and reusable shopping bags.
- Buy products in bulk and with minimal packaging.
- Repair or donate appliances and clothing rather than discarding them.
- Adopt practices that reduce waste toxicity.
- Compost and grasscycle yard wastes.
- Avoid impulse shopping - buy only what you need.

Do You Know Where The Water In Your Storm Drain Goes?

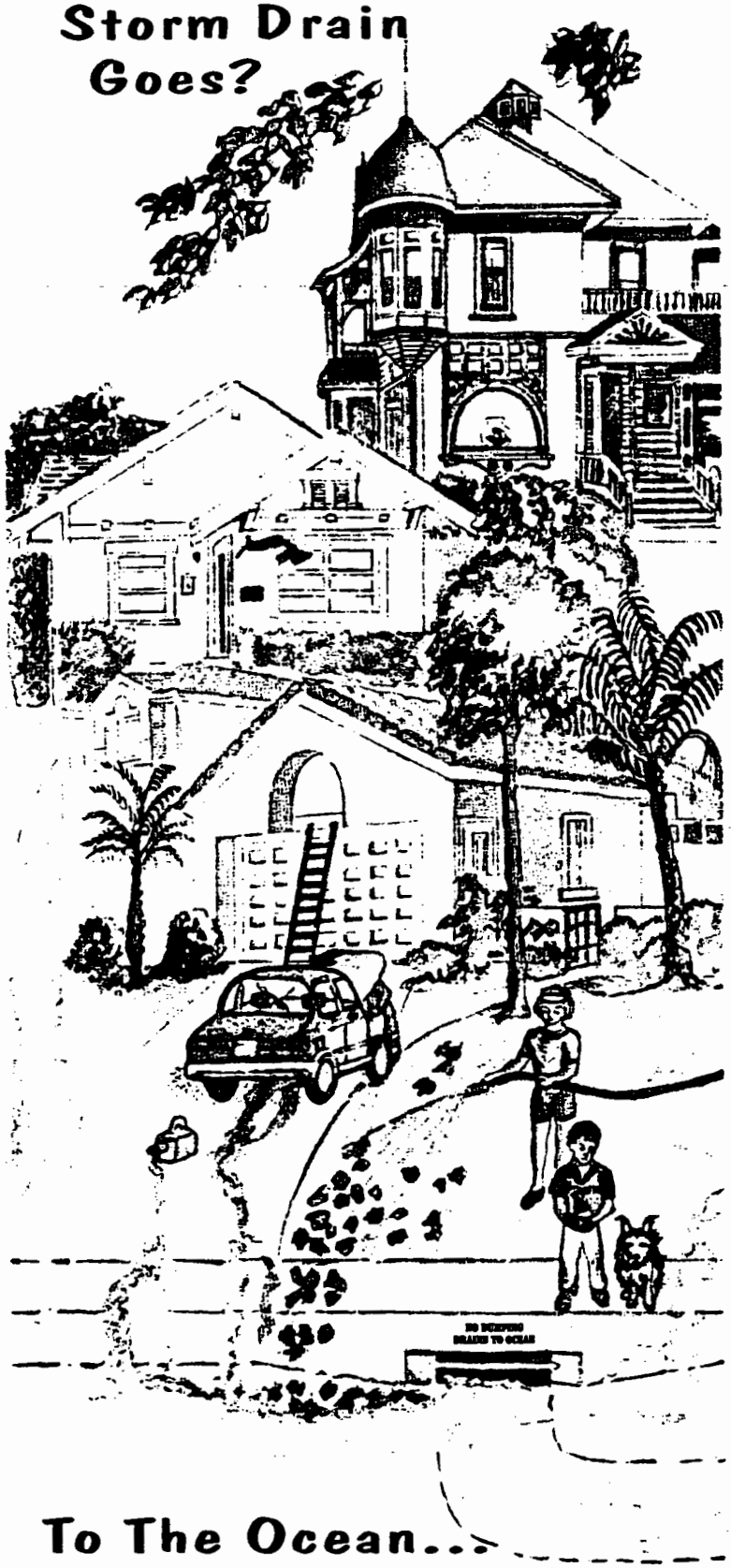

To The Ocean...

ALTERNATIVE CLEANERS

ALL PURPOSE HOUSEHOLD CLEANER

1 Quart Warm Water
1 Teaspoon Liquid Soap
1 Teaspoon Borax, or squeeze of lemon

GOOD FOR A MULTITUDE OF JOBS, INCLUDING COUNTER TOPS, FLOORS, WALLS, RUGS, AND UPHOLSTERY

DISINFECTANT

½ cup of Borax in one gallon of hot water. To inhibit mold and mildew, do not rinse off Borax Solution.

AIR FRESHENER

Leave open box of baking soda in places where odors are present. Open doors and windows for ventilation. Use flowers, herbs and spices. (Example: cinnamon in boiling water.)

GLASS CLEANER

¼ cup of vinegar in one quart of warm water. (Do not use as windshield wiper solution as it may damage pump.)

DRAINS

Never pour liquid grease down a drain. Mix one cup baking soda, one cup salt, ¼ cup of Cream of Tartar. Pour ¼ cup of mixture down the drain once a week.

ALTERNATIVE PESTICIDES

ANTS

Locate the place of entry, squeeze a lemon in path and leave the peel. Ants will also retreat from lines of talcum powder, chalk, damp coffee grounds, bone meal, charcoal, dust and cayenne pepper.

SILVERFISH

Traps can be made with a mixture of one part molasses to two parts vinegar. Place near cracks and holes where pests live.

COCKROACHES

Plug all small cracks along baseboards, wall shelves, cupboards, around pipes, sinks and bathtub fixtures. A light dusting of Borax around the refrigerator, stove and ductwork is effective in controlling cockroaches. For a trap, lightly grease the inner neck of a glass bottle and put a little stale beer or a raw potato inside.

HOUSE PLANT PESTS

Hot pepper spray will help to control pests on the leaves. Don't forget soap and water, be sure to rinse the plants with fresh water after treating.

NEWPORT BEACH FIRE DEPARTMENT

000263

HOW TO HANDLE COMMON HOUSEHOLD HAZARDOUS WASTE

REDUCE • REUSE • RECYCLE

HOUSEHOLD HAZARDOUS WASTE DISPOSAL INFORMATION

HOURS - MATERIALS & AMOUNTS ACCEPTED - DIRECTIONS

COUNTY OF ORANGE
INTEGRATED WASTE MANAGEMENT
HOTLINE
(714) 834-6752

- COLLECTION CENTERS -

Huntington Beach
17121 Nichols Street

Anaheim
1131 Blue Gum Avenue

San Juan Capistrano
Prima Deshecha Landfill
La Pata off Ortega Highway

NEWPORT BEACH FIRE DEPARTMENT
HAZARDOUS MATERIALS DIVISION
644-3113

TOXIC TIPS

DO'S

DO Remember that *most* storm drains in Newport Beach empty into the bay.

DO Remind those working on your property such as painters, masons, carpet cleaners and others that it is *illegal* to discharge any material other than clean water into the storm drain system.

DO Remember that you as property owner are ultimately responsible for spills caused by those who are employed to work on your property.

DO Reduce the amount of Hazardous Products you purchase by reading the labels and purchasing the least hazardous, also store all products in original containers.

DO Recycle leftover materials by offering unused paints to your church, school, theater group or neighbors.

DO Rinse water base paint brushes and rollers in the sink. Filter and reuse paint thinner and brush cleaners. Dispose of carpet cleaning solutions in sinks or toilet.

DO Dispose of old oil base paint by painting cardboard, plastic or waste wood and placing in trash container for pick-up when dry.

DO Dispose of used motor oil and antifreeze at a service station that is an approved collection site or take to a Hazardous Materials Collection Center.

DO Call the Household Hazardous Waste Disposal Hotline (714) 834-6752 for information on site locations, hours and materials accepted.

THIS SERVICE IS FREE TO ALL COUNTY RESIDENTS

TOXIC TIPS

DON'TS

DON'T Throw products such as motor oil or paints into the trash. Dispose of properly.

DON'T Rinse paint brushes or rollers in the street *regardless* of whether latex or oil base paint was used.

DON'T Pour poisons or toxic chemicals down the drain.

DON'T Dump waste oil, flammable liquids or paint on the ground. Dispose of properly at a service station collection site or Hazardous Materials Collection Center.

DON'T Smoke while handling hazardous materials or store these products near any heat source.

DON'T Store or mix different hazardous product types together. Also, keep materials in original, labeled containers.

DON'T Allow commercial contractors, painters or carpet cleaners working on your property to dispose of waste water and cleaning solutions in the storm drain system.

DON'T Rinse garage floor cleaners and auto or motorcycle engine cleaning products into the storm drain system.

DON'T Dispose of swimming pool products such as acids and neutralizers in your household trash. It is *illegal* and the main cause of respiratory injuries to City of Newport Beach refuse personnel. Pool chemicals are accepted at your local Household Hazardous Waste Collection site, call (714) 834-6752 for information.

POLLUTER BEWARE

006264

Laws were developed to protect the life and safety of the public, and to prevent subsequent damage to the environment. By following the tips in this handout, you will be able to avoid hidden costs associated with accidental and illegal discharges of hazardous waste. Listed below are fines, penalties, and responsible party costs.

An incident involving a misdemeanor, for example, cleaning of latex paint brushes or rollers in the street, is punishable by up to a $1,000 fine and/or possibly up to one year in jail.

An incident involving a felony, for example, the willful discharge of crank case oil that enters the storm drain is punishable by up to a $25,000 fine and/or up to three years in state prison.

A violator will be responsible for costs associated with the clean-up of the spill or discharge. Violators shall be responsible for costs incurred by a responding agency, such as the fire department, public works, police, and/or any other required agency, and/or the combination of all agencies.

These costs will be based on the quantity of material spilled and hours spent cleaning up the spill. These costs may be paid to either the private firm or governmental agency that cleaned up the spill.

HOUSEHOLD HAZARDOUS WASTE

The County of Orange has four
Household Hazardous Waste Collection Centers available FREE
to Orange County citizens. (Proof of residency may be required.)

COLLECTION CENTER LOCATIONS

ANAHEIM REGIONAL COLLECTION CENTER

1071 N. BLUE GUM STREET
Located between the 91 & 57 Fwys
at the corner of La Palma Avenue
and Blue Gum Street in Anaheim
**Visit the Stop & Swap to obtain partially used household products at no charge.*

IRVINE REGIONAL COLLECTION CENTER

6411 OAK CANYON
Next to City of Irvine Corporate Yard.
From the (5) freeway take the Sand Canyon
exit, go Southwest to Oak Canyon and turn right.
**Visit the Stop & Swap to obtain partially used household products at no charge.*

HUNTINGTON BEACH REGIONAL COLLECTION CENTER

17121 NICHOLS STREET
Next to Rainbow Recycling and Disposal.
Major cross streets are Beach Blvd.
and Warner Ave. in Huntington Beach.

SAN JUAN CAPISTRANO REGIONAL COLLECTION CENTER

PRIMA DESHECHA LANDFILL
From the (5) freeway take Ortega Hwy. (74),
east to La Pata Avenue, turn right and
follow road to Landfill entrance.

COLLECTION CENTER HOURS OF OPERATION:

Tuesday through Saturday
9:00 a.m. to 1:00 p.m.

Collection Centers are Closed:

Rainy Days; Christmas, Independence,
New Years and Thanksgiving Days.

Hazardous waste is not accepted from businesses, schools, government agencies, churches, non-profit organizations.

Printed on recycled paper

In order to reach the State mandated recycling goal of 50% by 2000, the City transports all City collected solid waste to a Materials Recovery Facility (MRF) where the waste is sorted for recyclable materials. The MRF is equipped with conveyors and other mechanized systems which separate and process recyclables. This innovative recycling program seeks to maximize recycling while minimizing costs and inconvenience to residents.

A monthly recycling surcharge is included in your bimonthly utility billing. This fee covers direct costs associated with the City's recycling program only and does not pay for refuse collection nor disposal costs.

Newport Beach surpassed the 1995 State goal of 25% by recycling over 30% of the residential waste stream between 1995-97.
Newport Beach Recycles!

What Can I Do To Help?

Although separation of refuse is not mandatory, please remember that all of your trash will be mechanically or manually sorted. In order to minimize contamination of recyclables materials, please *separate* the following items in bags, bundles, or a different container:

Newspapers
Yard and Food Waste
Animal Waste and Diapers

Residents are not asked to sort their refuse, but are reminded to seal wet refuse in bags to prevent contamination of newsprint.

With your continued support and conscious effort to recycle, Newport Beach will successfully meet its recycling challenge!

REDUCE, REUSE, RECYCLE

- CDM (North of Coast Hwy. to 5th Avenue – MacArthur –to Hazel)
- 5th Avenue-Hazel to MacArthur
- Broadmoors
- Jasmine Creek
- Jasmine Park
- Lusk Tract
- CDM Terrace
- Point Del Mar
- Spyglass Hill
- Canyon Crest
- Seaview Broadmoor
- Harbor Ridge
- Harbor View Knoll
- Harbor View Homes
- Harbor Hill
- Seawind

HOUSEHOLD HAZARDOUS MATERIALS

A material is hazardous when it exhibits corrosive, poisonous, flammable, and/or reactive properties and has the potential to harm human health and the environment. In fact, thousands are injured each year due to improper use or disposal of household hazardous materials, particularly refuse collectors who fall victims to fumes, spills, and explosions. Hazardous materials may also contaminate air and water sources through landfill seepage and introduction into storm and sewer drains.

TIPS ON TOXICS

Be an **INFORMED** consumer. Follow these guidelines for the **SAFE** storage, and disposal of household chemicals.

SAFE STORAGE:

- Separate and store like products together.
- Check label for storing instructions.
- Check expiration dates.
- Store out of reach of children and animals.

SAFE DISPOSAL:

- Do NOT pour products down drain, in storm drains, on ground , in trash, or in the street.
- Share unused products with others.
- Use Hazardous Materials Collection Centers.

CITY OF NEWPORT BEACH CALIFORNIA

90 266

RESIDENTIAL REFUSE, RECYCLING, & HAZARDOUS WASTE

INFORMATION

CITY OF NEWPORT BEACH

GENERAL SERVICES DEPARTMENT
REFUSE DIVISION
(949) 644-3066
7 am to 4 pm Monday-Friday

REFUSE COLLECTION

The following regulations should be observed in order to help us continue to provide you with high quality, efficient municipal refuse service:

1. Refuse is collected once each week.

2. Property owners must provide a sufficient number of containers to accommodate all refuse accumulated on the premises. Containers should be constructed of metal or plastic and equipped with handles and tight fitting lids. Any one refuse container must not exceed 45 gallons and 50 pounds in weight, including can weight. **The use of sturdy, nonreturnable garbage plastic bags is highly recommended.**

3. Containers should be placed for collection on the street side of the sidewalks, in the parkway, or in driveways next to the street. Containers should not be placed in the gutter or in the street. When the premises border an alley, containers should be placed at or next to the property line in the alley, but in no case shall the containers obstruct any vehicular travel through the alley. Refuse containers must be set out by 7 A.M. on collection days, but not earlier than 7 P.M. the night before. Emptied containers should be removed as soon as possible after collection, but no later than 7 A.M. of the day following collection.

4. Your cooperation in keeping alleys clear of parked cars will be greatly appreciated.

HOLIDAY SERVICE

Refuse collection services will not be provided on NEW YEAR'S DAY, MEMORIAL DAY, JULY 4th, LABOR DAY, THANKSGIVING, NOR CHRISTMAS. When a specified holiday falls on a weekday, collections will be delayed one day for the remainder of the week.

Materials Accepted for Collection

- Food waste such as meats and vegetables.
- Meat, game, or fish cleanings that are thoroughly drained and securely wrapped to prevent leakage, odor, and access to flies and animals.
- Paper, rags, cardboard, fiber, metals, glass, cartons, containers, boxes, bottles, jars, and other materials of similar nature normally discarded as household refuse.
- Newspapers and magazines that are tied into bundles which do not exceed 50 pounds in weight.
- Animal waste that is securely wrapped to prevent leakage, odor, and access to flies and insects.
- Vacuum cleaner sweepings, ashes, sawdust, or similar powdery materials that are securely wrapped so they will not spill or be inhaled when collected.
- Tree or shrub trimmings, limbs and branches, plants, and grass cuttings that are placed in bags and/or tied into bundles less than four feet long, 18 inches in diameter, and do not exceed 50 pounds in weight.

Non-Collectible Materials

Household hazardous materials; ammunition; explosives; industrial wastes; chemicals; pathological, toxic, and radioactive waste; acids; drugs; unwrapped human and animal waste; large pieces of metal; machine parts; logs; tree stumps; building scraps such as lumber, shingles, plaster, bricks, stones, concrete, asphalt and drywall. Bulky items such as water heaters, mattress and sofas. Unusually large amounts of refuse such as tree trimmings, house cleaning debris, packing boxes, etc. Sod, containers over 50 lbs.

Do NOT place these materials at the curb. Use a Hazardous Materials Collection Center or rent a disposal bin.

FREQUENTLY ASKED QUESTIONS

How do I sign up for refuse collection?
It is not necessary to sign up for collection since no disposal fees are collected; however, a recycling surcharge is included in your utility billing.

Why are "Red Tags" placed on containers?
Red tags indicate non-compliance with refuse regulations and are a warning only.

May I rent a disposal bin from the City?
The City does NOT rent bins. The General Services Department has a list of licensed franchised haulers from whom you may contract bin services.

Where can I take my recyclables?
Charities and citizens are encouraged to redeem their recyclables at their local recycling center. To find a recycling center near you, call the Recycling Hotline at (800) 553-2962.

Recycle Today!

Information Phone Numbers

General Service Department, Refuse Division
(949) 644-3066
Household Hazardous Materials
Orange County Hotline
(714) 834-6752
County of Orange Hazardous Materials Program Office
(714) 834-8892
Orange County Integrated Waste Management Department
(714) 834-4000
California Integrated Waste Management Board Recycling Hotline
(800) 553-2962
Orange County Vector Control
(800) 734-2421

Printed on Recycled Paper

TRANSPORTATION AND HANDLING

- A maximum of 15 gallons or 125 pounds may be transported per vehicle, per trip (Department of Transportation regulation).
- Materials should be in original containers (except motor oil, fuels and antifreeze).
- All containers must have lids, be sturdy, non-leaking, and protected from breakage.
- Do not combine types of waste.
- Do not mix oil-base paint with latex paint.
- Dry out empty paint cans and discard in regular trash.
- If you wish to have a container returned (i.e. oil containers and boxes/crates used to transport materials), please notify the attendant in advance. Some containers may not be returnable.

WHY SHOP TIL YOU DROP?

VISIT THE STOP & SWAP!

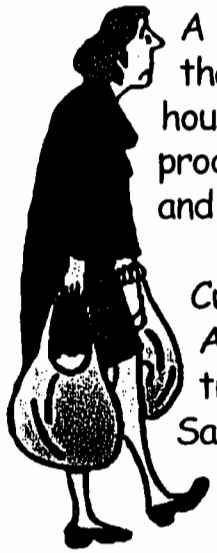

A unique and FREE program that allows you to drop off household, yard, and car care products you no longer need and pick up others you can use.

Currently available at the Anaheim and Irvine locations only. (Tuesday through Saturday, 9 a.m. to 1 p.m.)

FOR MORE INFORMATION ABOUT THE HOUSEHOLD HAZARDOUS WASTE COLLECTION PROGRAM AND THE STOP & SWAP CALL:

(714) 834-6752

Or see our webiste: www.oc.ca.gov/iwmd

Orange County Recycles!

Printed on recycled paper.

Integrated Waste Management Department

DISPOSAL OF HOUSEHOLD HAZARDOUS WASTE

Household Hazardous Waste Collection Program

DID YOU KNOW?

- Most home, car, and yard care products can't be thrown in the trash?
- Paint, used motor oil, and most cleaning products are considered to be "hazardous waste"?
- If these products are put in the landfill they can contaminate our groundwater?

SO WHAT CAN YOU DO?

EASY AS 1-2-3!

1. Pack unwanted home, yard, and car care products in your car.
2. Drive to the Household Hazardous Waste Center closest to you.
3. Sit in your car and fill out a simple form while an attendant removes the unwanted products.

AND AWAY YOU GO!

LOCATIONS

Tuesday through Saturday
9 a.m. to 1 p.m.
except for rainy days and major holidays: Independence, Thanksgiving, Christmas and New Years Days)

STOP & SWAP

ANAHEIM
1071 N. Blue Gum Street
(Located between the 91 and 57 Freeways on the corner of La Palma and Blue Gum)

HUNTINGTON BEACH
17121 Nichols Street
(Between Beach Blvd. and Gothard St. off Warner Ave. at Rainbow Recycling and Disposal. Use Gate 6.)

STOP & SWAP

IRVINE
6411 Oak Canyon
(Off Sand Canyon between the 5 and 405 Freeways. Next to the City Corporate Yard and Animal Shelter.)

SAN JUAN CAPISTRANO
Prima Desecha Landfill
(From the 5 Freeway, exit Ortega Highway, go east to La Pata, and turn right.)

MATERIALS ACCEPTED

- Automotive products (antifreeze, motor oil, fluids)
- Batteries (home and car)
- Cosmetics
- Herbicides
- Hobby supplies
- Household cleaners
- Fuels
- Medicines
- Paints (latex and oil)
- Paint products
- Personal care products
- Pesticides
- Polishes and waxes
- Pool and spa chemicals
- Propane tanks from barbecues
- Unused road flares
- Wood preservatives

WASTE NOT ACCEPTED

Ammunition
Asbestos
Biological
Business-generated
Explosives
Radioactive
Compressed gas cylinders

* See reverse for Stop & Swap info!

CITY OF NEWPORT BEACH

RESTAURANT CLEANING AND MAINTENANCE GUIDE

August 7, 1998

TO ALL RESTAURANT OWNERS, MANAGERS AND STAFF

The City of Newport Beach has recently experienced several beach closures due to high bacteria counts in the Bay. Orange County Environmental Health Division's stormdrain bacteriological monitoring has indicated that this high bacterium count may be associated with Newport Beach Restaurants. During the course of cleaning equipment and facilities some materials, cleaning agents and/or rinse waters may migrate into the storm drain system and finally into the bay. In addition dumpsters provide a perfect incubator for bacteria and fluids may leak from the dumpster into the storm drain system. The storm drain system consists of the curb and gutter, catch basins and pipes, which carry rainwater from our streets into the bay.

The City seeks the support and assistance of all restaurant owners, managers and staff in eliminating the possibility of this type of occurrence. It is in our mutual best interest to maintain the recreational waters in Newport Beach to high standards in order to promote and facilitate the tourism that contributes to our local economy.

In order to eliminate potential undesirable material, dumpster effluent and cleaning agents from migrating into the storm drain system and bay, it is necessary that all cleaning and dumpster storage be confined to a dedicated area with a hard surface where any discharge is connected to the sewer system. This area must also have a cover to keep rain from entering the sewer connection. Any new connections to the sewer system will require a permit from the Building Department. Absolutely no material, dumpster effluent, cleaning agents and/or rinse waters should be allowed to migrate into the storm drain system. Allowing any material, dumpster effluent, cleaning agents and/or rinse waters to enter the storm drain system is a violation of numerous municipal, state and federal laws.

In addition it is important to periodically sweep your parking lot area in order to remove any potential contaminants. Sweeping of the parking lot should be conducted on a weekly basis, at a minimum.

You should also be aware the City will be increasing it's efforts to enforce these requirements and the fines can be severe, starting at $100.00 for the first occurrence.

Thank you for your support in making our community a better place to visit and dine in. If you have any questions please call the City's Code Enforcement Supervisor, Jim Sinasek, at (949) 644-3215 or the City's National Pollutant Discharge Elimination System Coordinator Stephen Luy, at (949) 644-3330.

Sincerely,

Don Webb
Public Works Director

COLLECTION CENTER LOCATIONS

006271

HAZARDOUS WASTE ACCEPTED

Oil & latex paint and paint products
Automotive products
(batteries, motor oil, antifreeze, etc.)
Auto & furniture polish
Household cleaners
Wood preservatives
Pesticides & herbicides
Hobby & pool supplies
Propane barbecue cylinders
Unused road flare
Household batteries
(alkaline, nickel-cadmium and mercury [button])
Fluorescent light ballasts

HAZARDOUS WASTE NOT ACCEPTED

Business generated waste
Biological waste
Radioactive waste
Ammunition
Compressed gas cylinders
Explosives
Asbestos

For more information, call our HOTLINE at (714) 834-6752 or visit our web site at *www.oc.ca.gov/iwmd*

TRANSPORTATION

CAUTION should be used when transporting hazardous waste to a Collection Center due to the potential for spillage and/or exposure.

- A maximum of 15 gallons or 125 pounds may be brought in per vehicle, per visit.
- Hazardous Waste must be in its original container (**except motor oil and antifreeze**).
- **Containers will NOT be returned**, except for oil containers in good condition (upon request).
- All containers must be sturdy, non-leaking and protected from breakage.
- Containers must have lids.
- Do NOT mix or combine Hazardous Waste (Exception: consolidate like paints — combine partial cans of oil-base paint with oil base paint, and combine partial cans of latex paint with latex or water-based paint).
- Dry out empty paint cans and discard in regular trash.
- **DO NOT MIX OIL-BASE PAINT WITH LATEX PAINT!!**

FOR ADDITIONAL INFORMATION CALL:

911 . . . . . Household Hazardous Materials Emergencies
834-4000 . . . . . Integrated Waste Management Department
667-3700 . . . . . Health Care Agency (HCA) Environmental Health
800 553-2962 . . . . . CIWMB* Recycling Hotline – Motor Oil
800 777-6476. . . . . Orange County Poison Center
800 69-TOXIC . . . . . Waste Alert to report illegal dumping

* California Integrated Waste Management Board

REPRESENTATIVE PUBLIC EDUCATION MATERIALS

CITY OF ORANGE

HAPPY S.O.R.T. SINGS...

WE'VE GOT A PROBLEM, BOYS AND GIRLS, THAT SPEAKS OF DOOM AND GLOOM!
WE'RE THROWIN' SO MUCH STUFF AWAY, WE'RE RUNNING OUT OF ROOM.
NOW, JUST BECAUSE YOU THREW IT OUT, IT HASN'T DISAPPEARED—
IT'S SITTING IN THE LANDFILL FOR A COUPLE HUNDRED YEARS!

SO HAVE A CLUE AND HELP THE EARTH! NOW DON'T YOU BE A CHUMP!
IF YOU KNOW IT CAN BE USED AGAIN, DON'T SEND IT TO THE DUMP!

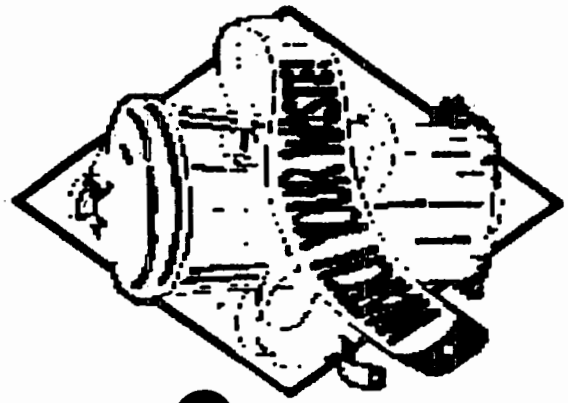

LEAVE LESS BEHIND FOR THE FUTURE

Compliments of the City of Orange;
Orange Disposal Service;
CIWMB; and the
Ca. League of Cities

NO!
YES!

LEAVE
LESS
BEHIND
FOR
THE
FUTURE

It's best to be prepared!

Living in California means living with the reality that a major **earthquake** can hit at any minute. Preparing for such an event will help you get safely through a disaster.

We depend so much on household utilities for both comfort and security that it's hard to imagine living without them. But, putting all comfort aside, there's one household utility that offers more than simple comfort; it also protects your health and the environment around you. That household utility is your sewer system.

Knowing what to do if your sewer system becomes damaged or inoperable will not only help you get through a disaster such as an earthquake, it will also help protect your health and the environment.

NO ILLEGAL DUMPING TO SEWERS OR STORM DRAINS PROTECT OUR ENVIRONMENT

Checklist for an EMERGENCY provisional toilet

- ☐ 5-gallon plastic bucket with a tight-fitting lid
- ☐ 2 boxes heavy-duty trash can liners (8-10 gallon size) with ties
- ☐ 1 gallon liquid chlorine bleach or other toilet disinfectant
- ☐ 2 boxes baking soda
- ☐ 2 large boxes heavy-duty trash can liners (30-gallon size) with ties
- ☐ 6-8 rolls toilet paper
- ☐ Hand sanitizer to clean and disinfect hands without water
- ☐ Feminine products
- ☐ Paper towels
- ☐ Moist towelettes or baby wipes

It's easy, so be prepared!

OCSD
Rev. 2/99

ORANGE COUNTY SANITATION DISTRICT PROTECTING THE ENVIRONMENT

For additional information, contact the Orange County Sanitation District Communications Department at (714) 962-2411 or visit our website at www.ocsd.com

Orange County Sanitation District

EARTHQUAKE PREPAREDNESS

What to do if your sewer system becomes damaged or inoperable

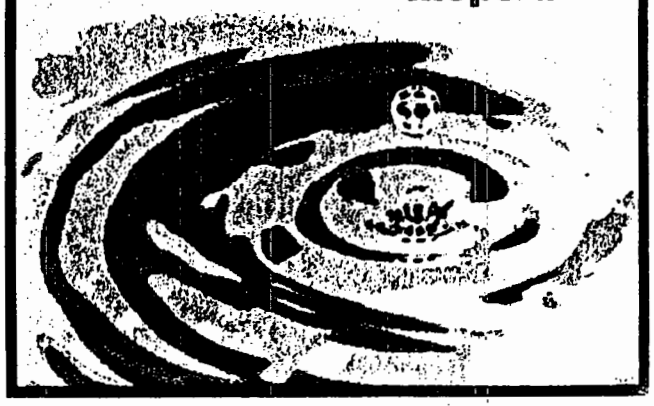

Importance of your household sewer system

In the event of a major disaster such as an earthquake, the sewer system in your area may become damaged or inoperable. Damaged sewer systems are health hazards. It is important to get damaged septic tanks, cesspools, pits and leaching systems into service as soon as possible. Trained personnel from local environmental regulatory agencies can help with these problems.

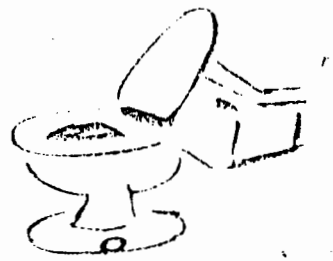

If your local sewer system becomes inoperable, there are proper procedures you can use to temporarily replace your toilet and safely dispose of sewage while service is being restored. In our continuing effort to protect public health and the environment, the Orange County Sanitation District has prepared the following step-by-step plan to assist you if an earthquake or any other disaster causes your local sewer system to fail. We recommend that you keep these guidelines close at hand because you never know when you might need them.

How to create a provisional toilet

1 If sewage lines are broken but the toilet bowl is usable, place a trash can liner inside the bowl and follow the disinfectant procedures below.

If the toilet is completely backed up, use a bucket with a trash can liner and make a toilet seat out of two boards placed parallel to each other across the bucket. For greater comfort, you can remove the seat from your household toilet and place it on the bucket.

2 Every time you use the provisional toilet, pour or sprinkle a small amount of regular household disinfectant, such as chlorine bleach (**DO NOT** mix chlorine with other disinfectants as it can produce a dangerous chemical reaction), baking soda or laundry detergent to keep down odors and germs.

3 Cover the container tightly when not in use and replace the trash can liner when waste has accumulated. **NEVER use a provisional toilet that is not lined with a plastic bag!**

. . .and safely dispose of sewage

4 After using the provisional toilet, you will need another container to empty the contents for later disposal.

The second container should be lined with a 30-gallon size trash can liner. As bags from the provisional toilet fill up, they should be placed in the second container for safe disposal.

NEVER deposit human waste or garbage on the open ground. This will not only pollute the environment but it can also create a serious health hazard.

If you have **no other** alternative for disposal, it is safe to bury waste in trenches 24-30 inches deep.

HEALTH – SAFETY – ENVIRONMENT

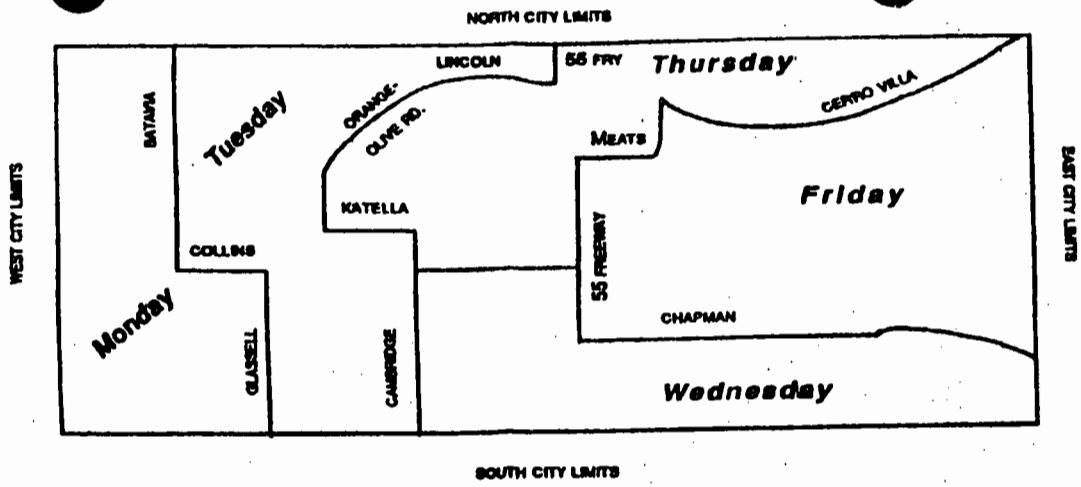

TRASH AND RECYCLING COLLECTION SCHEDULE

HOLIDAY SCHEDULE

Our curbside recycling and regular trash pickup service observes six holidays a year:

NEW YEAR'S DAY
OBSERVED MEMORIAL DAY
FOURTH OF JULY
LABOR DAY
THANKSGIVING DAY
CHRISTMAS DAY

If your collection day falls on one of these holidays, your service will be one day late. If your collection day does not fall on one of these six holidays, but is within a holiday week, place your containers at curbside on your regular trash collection day. Any other holidays other than those listed will have regularly scheduled service with no delays.

The map above shows the general boundaries of each day's trash collection area for Monday through Friday. Please put your trash and recyclables at the curbside or other designated collection point by 6:00 a.m. on your scheduled day. Please remove your containers after pick up a soon as possible. If you have bulky items to discard, call Orange Disposal Service at 637-3010 to schedule. There is no charge for this service, but an appointment must be made. For replacement of recycling bins, or other pick up related questions, please call Orange Disposal Service at 637-3010.

For other questions relating to City business or programs, please call 532-6480. Thank you!

STREET SWEEPING INFORMATION

NOTICE

Street sweeping services are provided the day following your regular trash day. **Exception:** If your trash day is Thursday, your street sweeping day will be on Monday or Tuesday, as posted. (Friday's trash day is swept on Monday.)

NOTE: On inclement weather days, such as rain or high winds, there will be no street sweeping, and no makeups.

000277

CITY OF ORANGE
SOLID WASTE DIVISION

General Information About Your Curbside Trash and Recycling Collection Services

DEPARTMENT OF PUBLIC WORKS
637 West Struck Avenue
Orange, CA 92867
(714) 532-6480

Rev. 4/98

Trash Collection Information:

* Refuse shall be in approved containers only and placed on the curb in the parkway (or alley) no earlier than noon of the day before, nor later than 6:00 a.m. the day of collection.
* Containers shall be removed by noon of the day after collection. Failure to comply will result in a violation notice, and /or a citation being issued.
* Approved containers include:
  - Sheet metal or plastic 20 - 45 gallon container with tight fitting lid.
  - Large plastic bags designed for exterior use, tied or secured in a closed position.
* Containers not approved for regular use:
  - Small plastic bags designed for interior use
  - 50 or 55 gallon drums
  - Cardboard boxes as regular containers
    Note: If used, boxes will be taken and not returned. (Corrugated cardboard boxes may be set out with recycling program if broken down and flattened.)
* Food wastes should be drained, and wrapped before placing in regular trash container.
* Wooden boxes and packing crates must be broken up or flattened before setting out.
* Brush, tree, and shrub trimmings shall not exceed 4 feet in length. Tie in bundles not over 2 feet in diameter. Limit 50 lbs per bundle.
* Refuse exceeding 60 lbs., including container, will not be removed by the City's contractor. Please keep containers within this limit for maximum service.
* **NO building or construction materials** sand, rock, gravel, broken concrete, dirt, sod, tree stumps, auto bodies, tires, animal droppings, used motor oil or other hazardous waste. *(for used oil pick up call 289-7661)* *For the Household Hazardous Waste hotline: 834-6752 (County of Orange)*
* It is unlawful to dump debris of any kind loosely in the streets, parkway or alley. Failure to comply will result in a violation notice and/ or a citation being issued.

Special Programs:

⇒ **Bulky Items** such as refrigerators stoves, washers, dryers, freezers, water heaters, and other general household furniture or appliances may be picked up at no charge by calling the City's contractor, Orange Disposal Service at 637-3010. *Please call at least 5 days in advance of your trash day to schedule.*

⇒ **No lumber or construction** material will be picked up as bulky items. To dispose of these items, call 637-3010 to rent a commercial bin, or take mat-material to the Material Recovery Facility, 2050 N. Glassell or to a County Landfill. *(see information at right).*

⇒ **RECYCLING:**
The City's recycling program is with a three small basket container system. To obtain containers, call 282-0200
Recyclable material includes:

* **Orange Bin:**
  Newspapers, mixed waste paper, magazines, catalogs, phone books.
* **Green Bin:**
  Aluminum cans, and all steel or bi-metal cans. Plastics/ #1 or #2 only.
* **Yellow Bin:**
  Glass bottles and jars. No mirror, panes or ceramics.

For more information on the recycling program, please consult the Orange Recycles brochure, or call 282-0200

*Scavenging of recyclable materials is illegal! If observed, call **532-6461***

WHO TO CALL

006278

Trash & Recycling Information

Street/Sanitation Office (City)	532-6480
Orange Disposal Service (contractor)	637-3010
Trash Collection	637-3010
Sanitation Inspections	532-6480
Scavenging Reports	532-6461
Street Sweeping	532-6480
Bulky Item Pick Up	637-3010
Rental Bin/Drop Off Box	637-3010
Recycling Information	282-0200
Recycling Container Replacement	282-0200
Used Motor Oil Pick Up *(Residential Only)*	289-7661
Household Hazardous Waste Hotline	834-6752
Public Dump/Buy Back Center *(contractor)*	282-0200
Olinda Landfill *(County dump)*	834-6752

(call for hours open, location and materials accepted)

Other Important Numbers

Drainage Problems	744-5544
Pothole Repair	532-6480
Street/Parkway Trees	532-6480
Waste Water	532-6480
Missing Street Signs	744-5536
Street Light/Traffic Signal Malfunctions	532-6426
Evening & Weekend Emergency...	**538-1961**
Street Sweeping Parking Control	744-7444
Utility Billing	744-2233
Water Plant	288-2475
Community Services/Parks	744-7272
Building Code Enforcement	744-7220
Police Department	744-7444
Fire Department	288-2500

Emergency Safety (Fire/Police) 911

OLINDA LANDFILL
(Valencia Ave., N. of Imperial Hwy.)
Closed on 4th of July, Memorial Day, Labor Day, Columbus Day, Thanksgiving, Christmas and New Year's. Gate fees, hours, and materials accepted are included on hotline information line: (714) 834-6752
Public dumping also available at Orange Resource Recovery Systems, 2050 Glassell, Orange: (714) 282-0200

Printed on Recycled Paper, of Course!

Do You Know Where The Water In Your Storm Drain Goes?

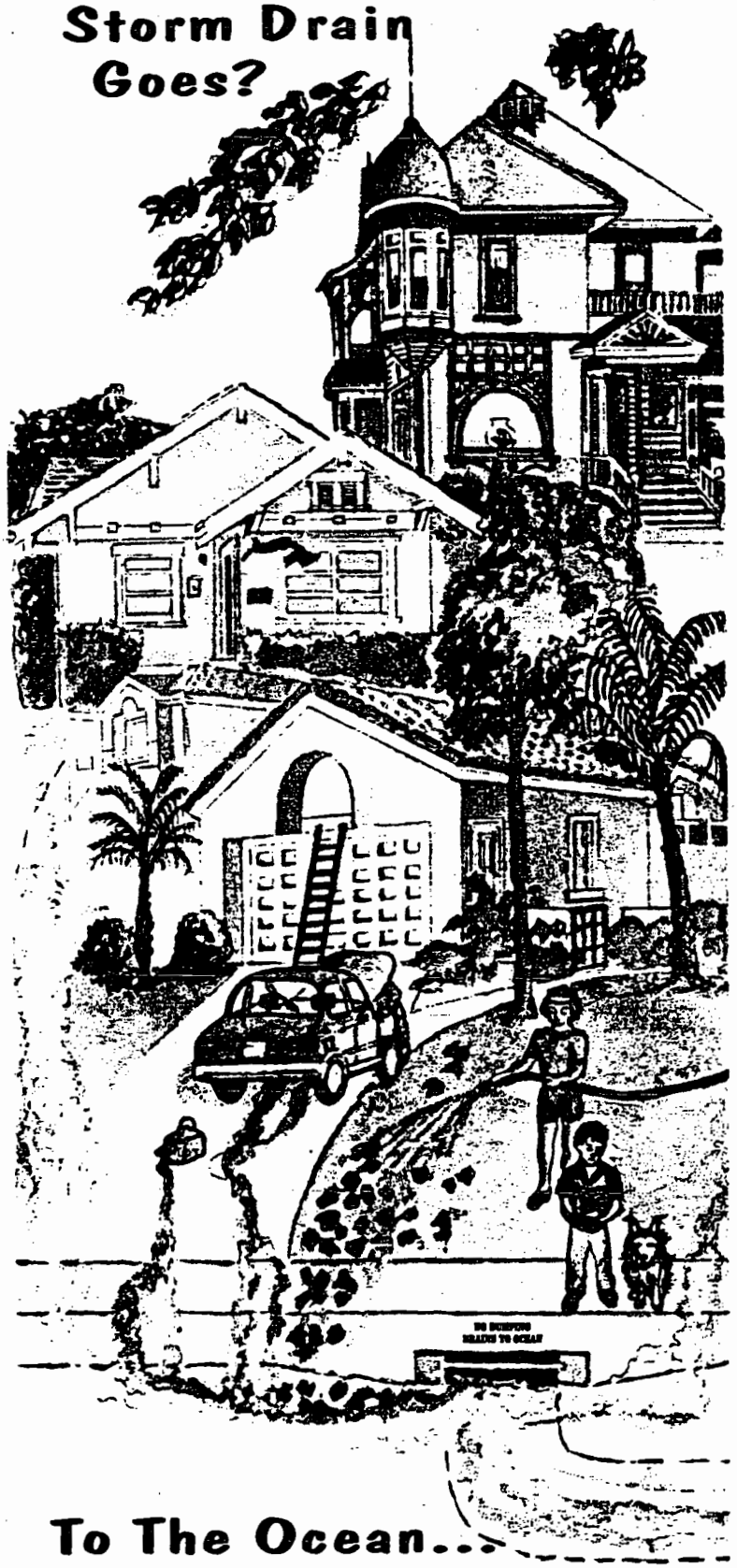

To The Ocean...

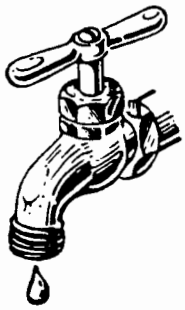

4 ways to save water in the Bathroom

- **Check your toilet for leaks.**
  Put a few drops of food coloring in your toilet tank. If the coloring begins to appear in the toilet bowl with out flushing, you have a wasteful leak that should be repaired at once.
- **Put a plastic bottle in your toilet tank.**
  Put an inch or two of sand or pebbles in the bottom of a quart bottle and fill the rest of the bottle with water. Then place the bottle in your toilet tank, safely away from the operating mechanism. The bottle will save water on each flush without impairing the efficiency of the toilet.
- **Take shorter showers.**
- **Check faucets and pipes for leaks.**

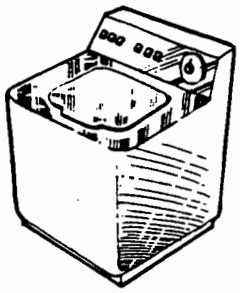

3 ways to save water in the kitchen and laundry.

- **Use your automatic dishwasher only for full loads.**
- **Use your automatic washing machine only for full loads.**
- **Keep a bottle of drinking water in the refrigerator.**
  This beats the wasteful habit of running tap water to cool it for drinking.

The Orange City Council and the Water Department Staff ask that you adopt a program of water conservation at home and at work.

100 cubic feet = 750 gallons

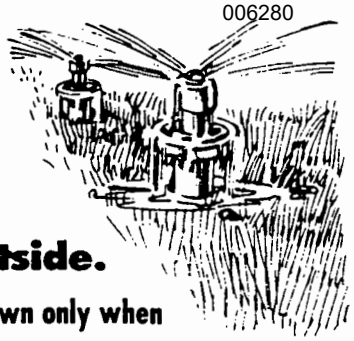

7 ways to save water outside.

- **Water your lawn only when it needs it.**
  Step on the grass. If it springs back when you take your foot off, it doesn't need water.
- **Deep-soak your lawn.**
  When you do water your lawn, water it just long enough to seep down to the roots where it is needed. A light sprinkling, which sits on the surface, will evaporate and be wasted.
- **Water during the cool parts of the day.**
  Early morning is better than dusk since it helps prevent the growth of fungus.
- **Don't water the gutter.**
  Position your sprinklers so that water lands on your lawn or garden, not on concrete or other paved areas. Also, avoid watering on windy days.
- **Use a broom instead of a hose to clean driveways and sidewalks.**
- **Don't run the hose while washing your car.**
- **Check for leaks in pipes, hoses faucets and couplings.**
  Leaks outside the house can be extremely wasteful, especially when they occur in your main water line. To check for hidden leaks in your pipes, shut off all faucets and taps around the house for 15 minutes. If the water meter shows some movement during that time, you have a leak.

Billing 714/744-2233
Engineering 714/288-2475

SOURCE OF SUPPLY

Approximately 75% of the City's supply is groundwater pumped from City-owned wells. About 22% is treated water purchased from the Metropolitan Water District which imports its water from the Colorado Ri[illegible]d the State Water Project. The remaining 3% is treated water fro[illegible]ine Lake purchased from the Serrano Water District.

FIRE PROTECTION RATING

The Insurance Services Office, a national organization representing the insurance industry, performed a comprehensive study and analysis of the reliability of the water system to supply water for emergency fire fighting purposes. The City of Orange water system received a near perfect score and a Class 1 Water Utility Rating.

▶ GENERAL WATER SYSTEM STATISTICS ◀

Active Wells	15
Total Well Capacity	31,275 GPM
Imported Water Connections	7
Total Imported Capacity	26,400 GPM
Miles of Pipe	430
Active Service Connections	32,800
Pressure Zones	5
Elevations Served	110-930 feet
Pumping Stations	16
Storage Tanks	18
Total Storage Capacity	43.2 MG
Hydrants	4,079
Average Day Demand	30 MG
Maximum Day Demand	50 MG

GPM = Gallons Per Minute
[illegible] Million Gallons
[illegible]llons = 100 Cubic Feet = 1 Billing Unit

NEED TO CONTACT US?

Address: City of Orange Water Department
189 South Water Street
P.O. Box 449
Orange, California 92866

Water Quality (714) 288-2475
Willie Kralich .....*Sr. Water Quality Inspector*
Roger Westergard....*Water Quality Inspector*
Water Engineering (714) 288-2475
24 Hour Emergency (714) 538-1961
Water Billing (714) 744-2233

CLASS 1
WATER UTILITY

Annual Water Quality Report 1998

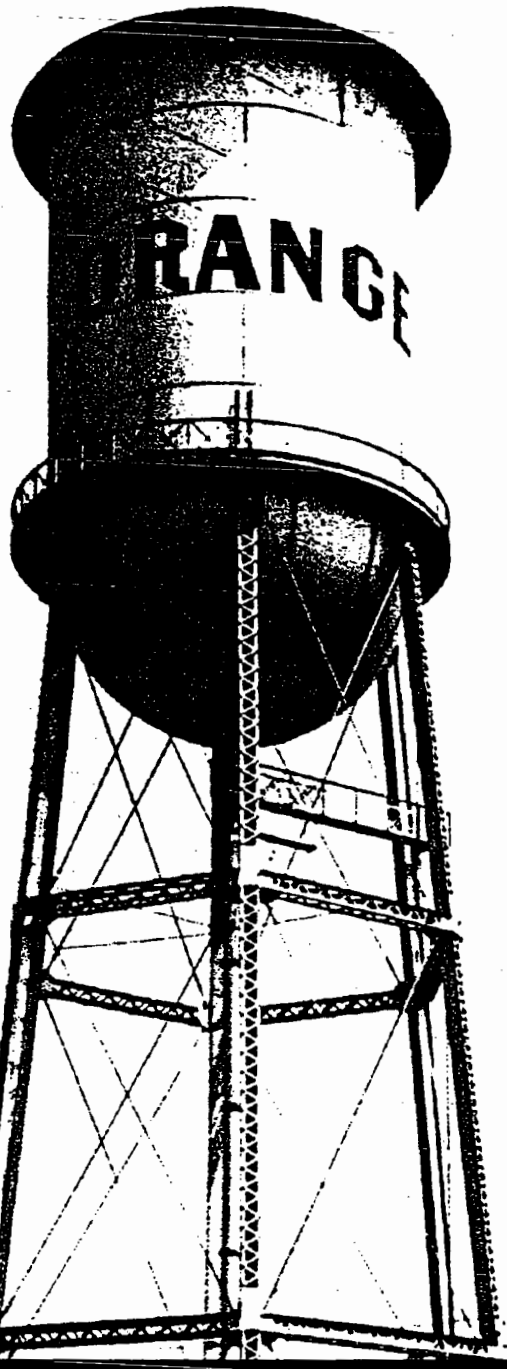

OWD Tower
1929-1969

CITY OF ORANGE WATER DEPARTMENT
CLASS I WATER UTILITY

CITY OF ORANGE ANNUAL WAT

"Primary Standards - Mandatory Health-Related Standards Established by the State of California, Department of Health Services"

PARAMETER (units)	MCLG OR (PHG)	MAXIMUM CONTAMINANT LEVEL	SURFACE WATER RANGE	SURFACE WATER AVERAGE	GROUNDWATER RANGE	GROUNDWATER AVERAGE
ORGANIC CHEMICALS (mg/L) Pesticides/PCBs						
Alachlor	(0.004)	0.002	ND	ND	ND	[illegible]
Atrazine	0.003	0.003	ND	ND	ND	ND
Bentazon	NS	0.018	ND	ND	NR	NR
Carbofuran	0.04	0.018	ND	ND	ND	ND
Chlordane	(0.00003)	0.0001	ND	ND	ND	ND
"2,4-D"	(0.07)	0.07	ND	ND	NR	NR
Dalapon	(0.79)	0.2	ND	ND	NR	NR
Dibromochloropropane (DBCP)	0	0.0002	ND	ND	ND	ND
Dinoseb	(0.014)	0.007	ND	ND	NR	NR
Diquat	0.02	0.02	ND	ND	ND	ND
Endothall	(0.58)	0.1	ND	ND	ND	ND
Endrin	0.002	0.002	ND	ND	ND	ND
Ethylene Dibromide (EDB)	0	0.00005	ND	ND	ND	ND
Glyphosate	(1)	0.7	ND	ND	ND	ND
Heptachlor	0	0.00001	ND	ND	ND	ND
Heptachlor Epoxide	0	0.00001	ND	ND	ND	ND
Lindane	0.0002	0.0002	ND	ND	ND	ND
Methoxychlor	0.04	0.04	ND	ND	ND	ND
Molinate	NS	0.02	ND	ND	ND	ND
Oxamyl	(0.05)	0.2	ND	ND	ND	ND
Pentachlorophenol	(0.0004)	0.001	ND	ND	NR	NR
Picloram	(0.5)	0.5	ND	ND	NR	NR
Polychlorinated Biphenyls (PCBs)	0	0.0005	ND	ND	ND	ND
Simazine	0.004	0.004	ND	ND	ND-0.0002	ND
"2,4,5-TP (Silvex)"	0.05	0.05	ND	ND	NR	NR
Thiobencarb	NS	0.07 (#0.001)	ND	ND	ND	ND
Toxaphene	0	0.003	ND	ND	ND	ND
SEMI-VOLATILE ORGANIC COMPOUNDS						
Benzo(a)pyrene	(0.00000-4)	0.0002	ND	ND	ND	ND
Di (2-ethylhexyl) adipate	0.4	0.4	ND	ND	ND	ND
Di (2-ethylhexyl) phthalate	(0.012)	0.004	ND	ND	ND	ND
Hexachlorobenzene	0	0.001	ND	ND	ND	ND
Hexachlorocyclopentadiene	0.05	0.05	ND	ND	ND	ND
"2,3,7,8-TCDD (Dioxin)"	0	0.00000003	ND	ND	ND	ND
VOLATILE ORGANIC COMPOUNDS						
Benzene	0	0.001	ND	ND	ND	ND
Carbon Tetrachloride	0	0.0005	ND	ND	ND	ND
"1,2-Dichlorobenzene"	(0.6)	0.6	ND	ND	ND	ND
"1,4-Dichlorobenzene"	(0.006)	0.005	ND	ND	ND	[illegible]
"1,1-Dichloroethane"	NS	0.005	ND	ND	ND	[illegible]
"1,2-Dichloroethane"	0	0.0005	ND	ND	ND	ND
"1,1-Dichloroethylene"	0.007	0.006	ND	ND	ND	ND
"cis-1,2-Dichloroethylene"	0.07	0.006	ND	ND	ND	ND
"trans-1,2-Dichloroethylene"	0.1	0.01	ND	ND	ND	ND
Dichloromethane (methylene chloride)	0	0.005	ND	ND	ND	ND
"1,2-Dichloropropane"	0	0.005	ND	ND	ND	ND
"1,3-Dichloropropene"	NS	0.0005	ND	ND	ND	ND
Ethylbenzene	(0.3)	0.7	ND	ND	ND	ND
Monochlorobenzene	0.1	0.07	ND	ND	ND	ND
Styrene	0.1	0.1	ND	ND	ND	ND
"1,1,2,2-Tetrachloroethane"	NS	0.001	ND	ND	ND	ND
Tetrachloroethylene (PCE)	0	0.005	ND	ND	ND	ND
Toluene	NS	0.15	ND	ND	ND	ND
"1,2,4-Trichlorobenzene"	(0.005)	0.07	ND	ND	ND	ND
"1,1,1-Trichloroethane"	0.2	0.2	ND	ND	ND	ND
"1,1,2-Trichloroethane"	0.003	0.005	ND	ND	ND	ND
Trichloroethylene (TCE)	0	0.005	ND	ND	ND	ND
Trichlorofluoromethane	(0.7)	0.15	ND	ND	ND-0.0013	ND
"1,1,2-Trichloro-1,2,2-trifluoroethane"	(4)	1.2	ND	ND	ND	ND
Vinyl Chloride	0	0.0005	ND	ND	ND	ND
Xylenes	(1.8)	1.75	ND	ND	ND	ND
TURBIDITY (NTU)	NS	0.5 (b)	0.05-0.08	0.07	0.04-0.09	0.05

Total Trihalomethanes	NS	0.1	Distribution System: Range ND-0.058	Average 0.013
MICROBIOLOGICAL (Presence/Absence) (c)	0%	5%	Distribution System: Range ND-0.81%	Average 0.06%

About your new waste services provider...

Waste Management of Orange.

We believe you'll be extremely happy with Waste Management of Orange's new automated service, expanded recycling collection program and flat rate structure.

If you have any further questions, please call the City of Orange at (714) 532-6480 or Waste Management of Orange's Customer Service Center at (714) 637-3010.

WASTE MANAGEMENT of ORANGE

Printed on recycled paper

ABOUT YOUR NEW WASTE COLLECTION SERVICE

On April 27, 1999, the City of Orange terminated its contract with Orange Disposal Service and hired Waste Management of Orange to be its new trash collection service provider. Since that time, the City has received numerous questions from residents who are concerned about how this changeover will affect them. You may have had some questions yourself.

To help ease any worries you may have about how trash service will be conducted under Waste Management of Orange, here are the answers to the questions we receive most often:

REMEMBER TO RECYCLE

Aluminum Cans
Glass Food and Beverage Containers
Steel/ Tin Cans
Plastic Food and Beverage Containers
Detergent Containers (#1 & #2 Plastics)
Newspaper
Mixed Papers
Junk Mail
Magazines, Catalogs and Phone Books
Corrugated Cardboard Boxes

QUESTIONS?

Waste Management Customer Service Center
(714) 637-3010

Scavenging
(714) 532-6480

Bulky Item Pickup
(714) 637-3010

WASTE MANAGEMENT of ORANGE

WASTE MANAGEMENT of ORANGE

CITY OF ORANGE INCORPORATED APRIL 6, 1888 ORANGE COUNTY CALIFORNIA

ORANGE RECYCLES!

Your Starter Kit Enclosed

ADDITIONAL SERVICES

BULKY ITEM COLLECTION

Each Orange Resident with curbside refuse collection is entitled to two free bulky item pick-ups each year, with up to four large items or 20 plastic bags of refuse permitted per pick-up. Bulky items include large, hard-to-handle items such as furniture, major appliances, and other household items that require two individuals to move. Call the Waste Management Customer Service Center at (714) 637-3010 to schedule your free bulky item pick-up.

HOUSEHOLD HAZARDOUS WASTE

The County of Orange operates free regional household hazardous waste collection centers for homeowners to take and dispose of their paint, automotive products, pesticides, cleaners, solvents, etc. The two closest centers for Orange residents are conveniently located in Anaheim at 1071 N. Blue Gum St. and in Irvine at 6411 Oak Canyon. For more information, call the County's Information Hotline at (714) 834-6752.

DISPOSAL OF USED MOTOR OIL

Orange residents can safely & easily dispose of used motor oil right here in Orange. Please refer to the Used Motor Oil Reference Card inclosed in the Starter Kit or contact the California Environmental Hotline at 1-800-CLEANUP to locate a State Certified Used Oil Collection Center near you.

CHRISTMAS TREE RECYCLING

We will collect and recycle Christmas trees for the first two weeks following Christmas on your regular trash day. Trees longer than six feet must be cut in half. Please remove all tinsel, metal ornaments and metal stands from trees. Flocked trees will be collected but not recycled.

HOLIDAY SCHEDULE

Waste collection does not occur on the following holidays:

New Year's Day	Labor Day
Memorial Day	Thanksgiving Day
4th of July	Christmas Day

When any of these holidays are observed on a weekday, refuse and recycling collections for the remainder of the week will be delayed one day. PLEASE NOTE: During holiday weeks when your refuse collection falls on a street sweeping day, place your carts on the curb or in your driveway, NOT IN THE STREET.

LARGE BIN SERVICE

For large household and yard projects, special bin rental service is available. Please call the Waste Management Customer Service Center at (714) 637-3010 for rates and information.

HOME COMPOSTING WORKSHOPS

available FREE to all residents of the City of Orange

SATURDAYS at 10:00 am

Under the Ash Tree

February 19 () April 8 () June 17

reservations not required

Plan to attend one of these 90 minute workshops. Learn how to naturally recycling your yard waste. Hands-on demonstrations about composting, mulching, "grasscycling", and more. Workshop participants will receive a voucher to purchase a compost bin for only $15.

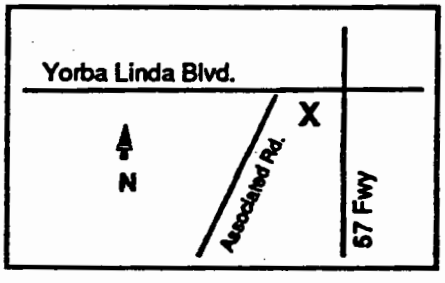

All workshops are held at the

Fullerton Arboretum

Located at 1900 Associated Road, west of the 57 Freeway, off Yorba Linda Blvd.

The Community Compost Education Program is sponsored by the Fullerton Arboretum and various cities including Orange. All entry fees, donations, and balance due for backyard composting unit are paid for by the City of Orange. Any donation made individually by Orange residents to the Arboretum will help to further Arboretum programs.

For more information on other recycling programs for the City of Orange, call (714) 744-5563.

Groundwater Replenishment System

Providing High-quality Water for 200,000 Orange County Families

The Need for a Stable, Independent Water Supply

Orange County and much of the southwestern portion of the United States are short of water and dependent on increasingly less-reliable imported water supplies. Finding new sources of imported water holds little promise, in fact, federal watershed policy and court actions will probably lead to decreases in future imports. As Orange County experiences increased population growth, the supply of existing water will out distance the demand. One innovative approach to providing future high-quality water is the Groundwater Replenishment System.

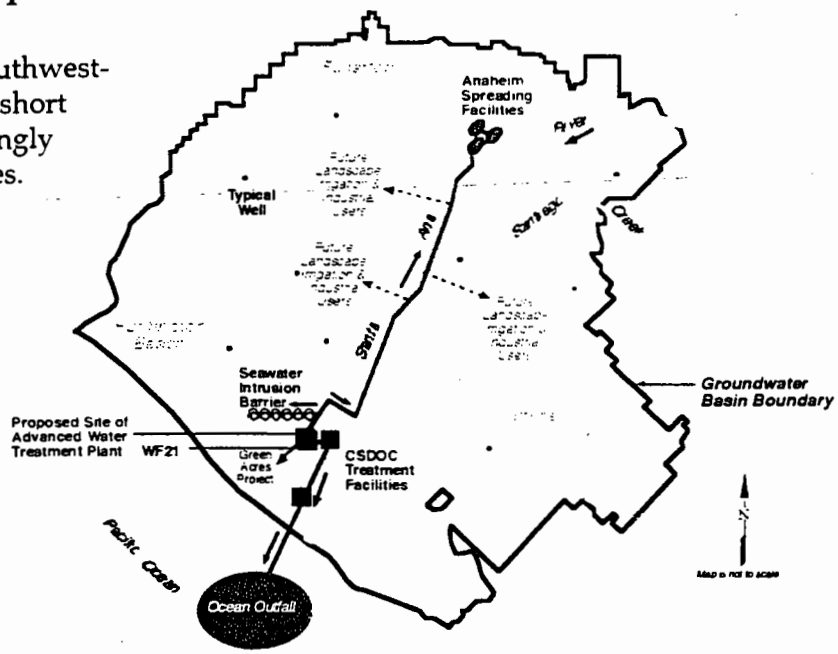

The Groundwater Replenishment System

The Groundwater Replenishment System will take highly treated wastewater now sent to the ocean and treat it through highly advanced microfiltration and reverse osmosis processes to standards that will surpass all drinking water requirements. Reverse Osmosis is the same process used by many bottled water companies. Some of the purified water will then be naturally percolated into Orange County's large underground water basin where it will actually improve the overall quality of our groundwater. The remainder of the water will be used for irrigation, industrial use, and for protecting the groundwater basin from seawater intrusion.

Reverse Osmosis (RO) is the process in which water is forced through a membrane to filter out contaminants. The RO membrane is like a microscopic strainer that allows only the water molecules (H_2O) to pass through. Visualize the water molecules as the size of tennis balls, then relatively speaking, metal and inorganic compounds screened out would be the size of softballs; organic compounds soccer balls; viruses the size of a tractor-trailer truck; bacteria the size of a large office building; and a protozoa would be the relative size of a mountain.

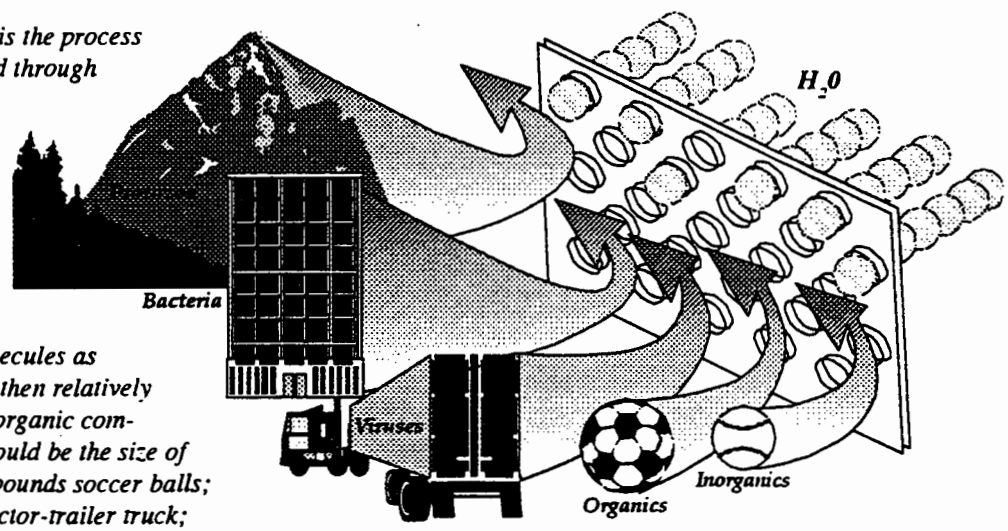

Additional information on the Groundwater Replenishment System

Besides providing 100,000 acre-feet of new water, enough for 200,000 families, here is what the Groundwater Replenishment System will do: provide water for multiple uses including household, landscaping, industrial and prevention of seawater intrusion; make the County less dependent on more expensive, less-reliable imported water; free up water which can be used by agriculture and the environment; produce "drought-proof" water, easing the hardships of the next drought; improve the overall quality of our groundwater by adding this purified water; provide increased wastewater storm treatment capability; decrease the amount of discharge into the ocean; provide water that is more energy efficient and environmentally friendly than current sources; and provide water at a cost lower than or comparable to imported water. This proposed solution to the growing need for more local water comes from over 8 years of study by the joint project sponsors - The Orange County Water District (OCWD) and the County Sanitation Districts of Orange County (CSDOC). The people who will be operating the Replenishment System, recently won the California Water and Environment Association's Santa Ana River Basin "1997 Plant of the Year Award" recognizing their ability to run a safe, well-operated water production facility. Because the new System will be built on the property of the two agencies and use the Santa Ana River right-of-way for moving the water from Fountain Valley to the Anaheim percolation basins, there will be minimal impact on the community. Health and safety will be primary concerns with the new System – the water, treated beyond drinking water standards, will constantly be monitored by the producers as well as outside health and regulatory agencies. The water will actually be purified twice, the last time by natural groundwater absorption, the same process that purifies rainwater. This System actually improves on existing, similar water Systems already operating successfully in cities in Virginia, Texas and California.

Water Quality - Total Dissolved Solids (Salts)

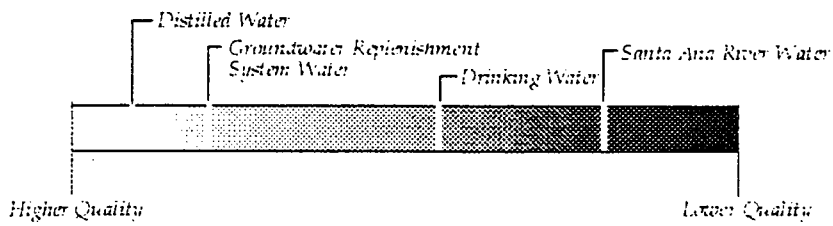

Feedback on the Groundwater Replenishment System

We would like to hear from you concerning the Groundwater Replenishment System. If you have any ideas, thoughts or opinions on this new proposed System, please write the Orange County Water District (Attn: Tom Dawes) 10500 Ellis Ave., P.O. Box 8300, Fountain Valley, CA 92728 or contact us through our Internet homepage: www.ocwd.com, or call 714- 378-3351.

REPRESENTATIVE PUBLIC EDUCATION MATERIALS

CITY OF SAN CLEMENTE

TRANSPORTATION AND HANDLING

- A maximum of 15 gallons or 125 pounds may be transported per vehicle, per trip (Department of Transportation regulation).
- Materials should be in original containers (except motor oil, fuels and antifreeze).
- All containers must have lids, be sturdy, non-leaking, and protected from breakage.
- Do not combine types of waste.
- Do not mix oil-base paint with latex paint.
- Dry out empty paint cans and discard in regular trash.
- If you wish to have a container returned (i.e. oil containers and boxes/crates used to transport materials), please notify the attendant in advance. Some containers may not be returnable.

WHY SHOP TIL YOU DROP?

VISIT THE STOP & SWAP!

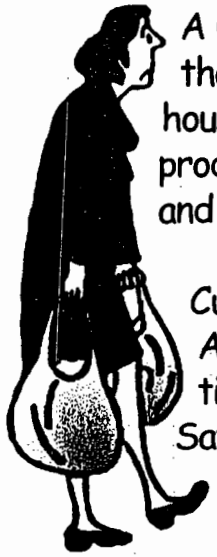

A unique and FREE program that allows you to drop off household, yard, and car care products you no longer need and pick up others you can use.

Currently available at the Anaheim and Irvine locations only. (Tuesday through Saturday, 9 a.m. to 1 p.m.)

FOR MORE INFORMATION ABOUT THE HOUSEHOLD HAZARDOUS WASTE COLLECTION PROGRAM AND THE STOP & SWAP CALL:

(714) 834-6752

Or see our webiste: www.oc.ca.gov/iwmd

Orange County Recycles!

Printed on recycled paper.

Integrated Waste Management Department

DISPOSAL OF HOUSEHOLD HAZARDOUS WASTE

Household Hazardous Waste Collection Program

DID YOU KNOW?

- Most home, car, and yard care products can't be thrown in the trash?
- Paint, used motor oil, and most cleaning products are considered to be "hazardous waste"?
- If these products are put in the landfill they can contaminate our groundwater?

SO WHAT CAN YOU DO?

EASY AS 1-2-3!

1. Pack unwanted home, yard, and car care products in your car.
2. Drive to the Household Hazardous Waste Center closest to you.
3. Sit in your car and fill out a simple form while an attendant removes the unwanted products.

AND AWAY YOU GO!

LOCATIONS

Tuesday through Saturday
9 a.m. to 1 p.m.
except for rainy days and major holidays: Independence, Thanksgiving, Christmas and New Years Days)

STOP & SWAP*

ANAHEIM
1071 N. Blue Gum Street
(Located between the 91 and 57 Freeways on the corner of La Palma and Blue Gum)

HUNTINGTON BEACH
17121 Nichols Street
(Between Beach Blvd. and Gothard St. off Warner Ave. at Rainbow Recycling and Disposal. Use Gate 6.)

STOP & SWAP*

IRVINE
6411 Oak Canyon
(Off Sand Canyon between the 5 and 405 Freeways. Next to the City Corporate Yard and Animal Shelter.)

SAN JUAN CAPISTRANO
Prima Deshecha Landfill
(From the 5 Freeway, exit Ortega Highway, go east to La Pata, and turn right.)

MATERIALS ACCEPTED

006292

- Automotive products (antifreeze, motor oil, fluids)
- Batteries (home and car)
- Cosmetics
- Herbicides
- Hobby supplies
- Household cleaners
- Fuels
- Medicines
- Paints (latex and oil)
- Paint products
- Personal care products
- Pesticides
- Polishes and waxes
- Pool and spa chemicals
- Propane tanks from barbecues
- Unused road flares
- Wood preservatives

WASTE NOT ACCEPTED

Ammunition
Asbestos
Biological
Business-generated
Explosives
Radioactive
Compressed gas cylinders

* See reverse for Stop & Swap info!

Honey, before you go shopping, please check the Stop & Swap for:

- ✔ Latex Paint
- ✔ Bug Spray
- ✔ Chlorine
- ✔ Cleaning products

Thanks!

COUNTY OF ORANGE

HOUSEHOLD HAZARDOUS WASTE PROGRAM

For free disposal of old paints, pesticides, and other household toxic products, call:

(714) 834-6752

County of Orange Stop and Swaps are funded by a Grant from the California Integrated Waste Management Board.

Printed on recycled paper.

Integrated Waste Management Department

Before you shop...

Stop! Drop! and Swap!

Household Hazardous Waste Collection Program

The County of Orange Integrated Waste Management Department introduces a **FREE** program that will **SAVE** you time and money...

Stop & Swap

What is Stop & Swap?
A unique program that allows you to drop off household and car maintenance products you no longer need and pick up other products you can use in your home and yard.

How does it work?
It's simple, just

Stop

Drop &

Swap!

Stop

It's convenient!
Just stop at one of three Regional Household Hazardous Waste Collection Centers, Tuesday through Saturday, 9 a.m. to 1 p.m. (except rainy days and major holidays).

Drop

It's quick!
Drive through and drop off the household and car maintenance products you no longer need but can't throw in the trash.* While you wait in your car, an attendant removes the unwanted materials. These products will either be added to the Stop & Swap for someone else to use or be treated and disposed of in an environmentally friendly way.

* This includes cleaning products, old paint, used motor oil, pesticides, pool and hobby chemicals, and much more! Call our hotline: 714-834-6752 for more details.

Swap

It's easy!
Park your car and visit the Stop & Swap area. Select products you can use at home, complete a simple form telling us what you are taking, and away you go!

How much does it cost?
It's FREE! Not only is it free, you actually **SAVE** money when you take these products home instead of buying new ones!

Orange County

Printed on recycled

Where is the nearest Stop & Swap?
Stop & Swaps are found at the following Household Hazardous Waste Collection Centers:

IRVINE
6411 Oak Canyon
(Next to the City of Irvine Corporate Yard. Off Sand Canyon between the 5 and 405 Freeways.)

ANAHEIM
COMING IN 1999!

HUNTINGTON BEACH
COMING IN 1999!

Although the San Juan Capistrano Center accepts household hazardous waste, it does not currently have a Stop & Swap.

Orange County Recycles!

REPRESENTATIVE PUBLIC EDUCATION MATERIALS

CITY OF SAN JUAN CAPISTRANO

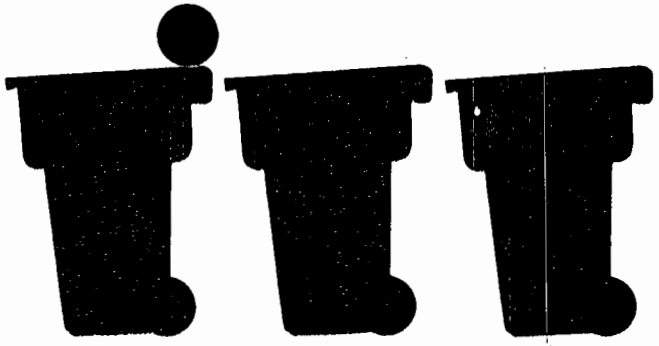

TRASH RECYCLABLE YARD WASTE

RECYCLABLE PAPER

DO'S

- Corrugated Cardboard
- Junk Mail
- Magazines
- Phonebooks
- Chipboard (Cereal/cracker boxes)
- Newspaper
- Computer Paper
- Any White Paper
- Mixed Paper

DON'TS

- No Mixed Products (i.e. metal/paper combination)
- Waxed Milk Cartons
- Waxed Paper
- No Coated Materials

RECYCLABLE METAL

DO'S

- Empty Aerosol Cans
- Metal Coat Hangers
- Aluminum Cans
- Tin Cans
- Food and Juice Cans
- Empty Paint Cans (dry paint is O.K.)
- Metal Foil
- Lawn Furniture

DON'TS

- No Mixed Products (i.e. metal/paper combination)
- Automotive/Plumbing Parts

RECYCLABLE GLASS

DO'S

- Food/Beverage Bottles
- Glass Jars and Bottles
- House Windows
- Liquor, Soda Juice Bottles

DON'TS

- No Ceramic/Pyrex
- No Mirrors
- Fluorescent Tubes
- No Light Bulbs
- No Safety Glass

RECYCLABLE PLASTICS

DO'S

- **PET:** (soft drink bottles, photo film)
- **HDPE:** (detergent containers, plastic water and milk containers, pails, T-shirt bags)
- **PVC:** (sprinkler pipe)
- **LDPE:** (trash can liners, shrink wrap, grocery bags)
- **PP:** (yogurt containers, luggage, drinking straws)
- **PS:** (plastic plates, cups, egg cartons, food trays)
- **Other:** (Tupperware and mixed plastic containers)

DON'TS

- No Plastic Container Lids
- No Mixed products (i.e. plastic/metal combination)
- Plastic Toys
- Flower/Plant Containers

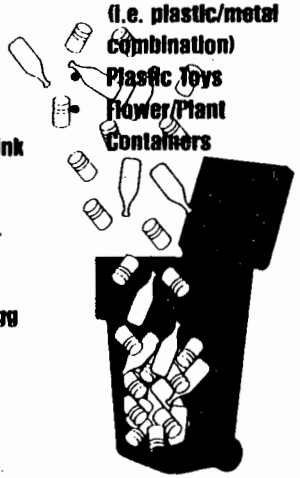

Note: Please remove liquids, lids and food residue from all recyclables before placing them in the "brown / blue" container.

YARD WASTE

DO'S

- Grass Clippings
- Green Plants
- Dry Leaves
- Wood Chips
- Garden Trimmings
- Weeds
- Wood Scraps

DON'TS

- Animal Waste
- Palm Branches
- Diseased Plants
- Meat/Fish/Bones
- Dairy Products
- Sod/Dirt

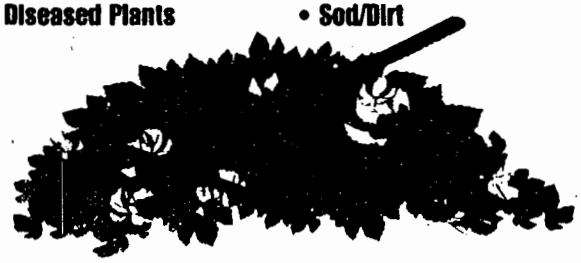

Household HAZARDOUS WASTE?

It is illegal to dispose of Household Hazardous Waste (HHW) through the automated residential program. HHW must be disposed of at a certified collection center. The nearest collection center is located at the Prima Deshecha Landfill (see map below). Household Hazardous Waste includes but is not limited to:

- Used Motor Oil
- Solvents
- Batteries
- Cleaning Products
- Wood Preservative
- Old Paint
- Pesticides
- Pool Chemicals
- Printer Cartridges
- Unused Road Flares

Call the office of the Orange County Integrated Waste Management Department or SOLAG Disposal for the collection centers' hours of operation. A maximum of 15 gallons or 125 lbs. of hazardous materials may be brought to the collection center per vehicle, per visit. You must have a valid Drivers License Number.

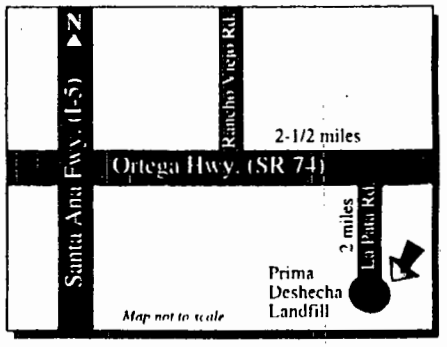

CHRISTMAS TREE RECYCLING

Free curbside collection of your Christmas trees will take place on your normal collection day, the two weeks following New Years. Your trees need to be unflocked, free of any ornaments, nails or stands to be recycled. The trees should then be placed at the curb where they will be recycled.

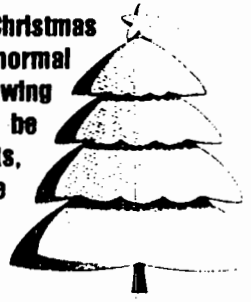

BLACK CONTAINER #_____ BROWN / BLUE CONTAINER

GREEN CONTAINER #: _____

ABOUT THE AUTOMATED SYSTEM

The reason for this new automated collection program is to meet the requirements of the California Integrated Waste Management Act of 1989, better known as AB 939. One of the main objectives of AB 939 is to get Californians to manage their solid waste stream and reduce production of solid waste on an individual basis (i.e. source reduction). This law requires that each city divert 50% of their waste stream away from the landfill by the year 2000.

Subscribers may select a set of three specially designed automated containers with an attached lid and wheels. A black container will be for regular trash, a brown or blue container for recyclable material and a green container for yard waste. You may choose a set of 35 or 67-gallon containers.

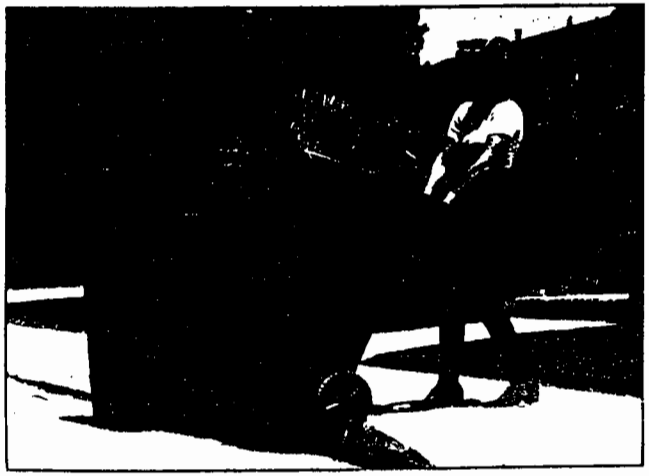

Approximately 70 percent of the residential waste stream is recyclable material. A list of the materials that can be recycled are provided on the back of this flyer. From time to time as markets are developed new recyclable may be added. If you are unsure as to whether or not an item is recyclable, please call a customer service representative to assist you.

TIPS FOR COLLECTION DAY

The automated solid waste and recycling collection program is an efficient means of collecting refuse, yard waste and recyclables, and offers long-term price stability to the consumer. The program requires the use of automated collection vehicles equipped with a robotic arm. The driver will use the robotic arm to pick-up and dump the contents of the container into the truck. Because of this, it is important that all materials are placed inside of, not around or on top of the automated containers.

HOW THE AUTOMATED SYSTEM WORKS

In order to improve efficiency, stabilize prices and ensure regular collection of the automated containers, SOLAG Disposal recommends that you remember the following on collection day:

1. The containers should be placed at curbside no later than 6:30 am on collection day.
2. The containers must be placed side-by-side approximately 1' foot apart and at least 3' from any obstruction. (i.e. fire hydrants, trees)
3. The containers should be placed with the handles & wheels facing towards your home.
4. Containers should be removed from curbside within 12 hours after service.
5. Items placed outside of the containers will not be collected.

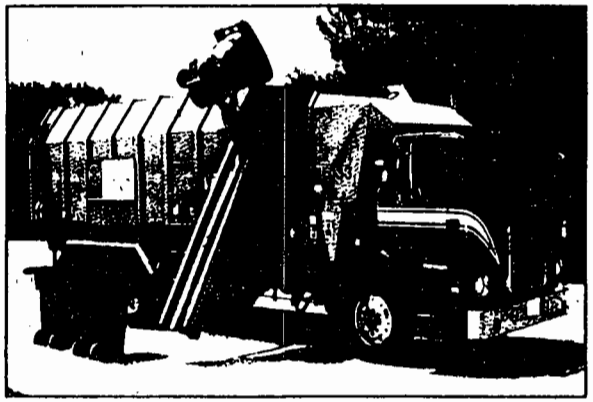

BULKY ITEMS

SCHEDULE A BULKY-ITEM PICK-UP

Each residential customer is entitled to two (2) bulky-item pick-ups free-of-charge per calendar year from SOLAG Disposal. Please call a customer service representative to arrange for a pick-up of the bulky-items on your regular trash collection day. Additional bulky-item pick-up may be arranged for a nominal charge per collection.

WHAT ARE BULKY-ITEMS?

Items that cannot fit in your "black," "brown / blue," or "green" automated containers, such as a chair or a couch, are considered "bulky-items." The bulky-item is an object that can be handled by a two-person crew, and may include washers, dryers, refrigerators or other large materials.

NON-PROFIT ORGANIZATIONS

Before you put out large items to be landfilled, consider donating these items to a non-profit organization. If you would like more information about bulky-item pickups or the phone number of a non-profit organization willing to pick-up your reusable items, please contact a customer service representative at (714) 240-0446.

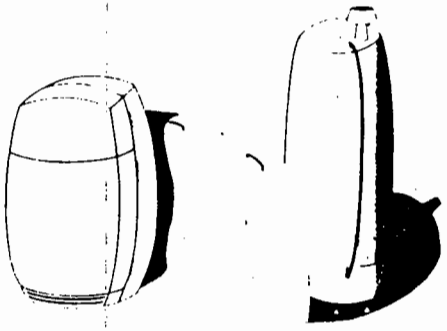

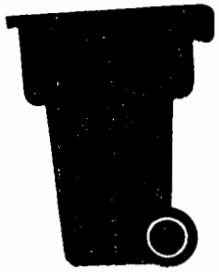

BASURA

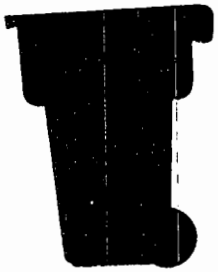

RECICLABLE

PAPEL RECICLABLE

SI:

- Cartón corrugado
- Publicidad
- Revistas
- Directorios telefónicos
- Cartón para envases (cajas de galletas/cereales)
- Papel periódico
- Papel de computadora
- Papel blanco
- Papel mezclado

NO:

- Productos mixtos (metal y papel combinados)
- Envases encerados de leche
- Papel encerado
- Materiales de recubrimiento

METAL RECICLABLE

SI:

- Aerososoles vacíos
- Ganchos de alambre para ropa
- Latas de aluminio
- Hoja lata
- Latas de alimentos/jugos
- Latas vacías de pintura (se aceptan con pintura seca)
- Papel de estaño

NO:

- Productos mixtos (metal y papel combinados)
- Refacciones automotrices/ de plomería

VIDRIO RECICLABLE

SI:

- Botellas de alimentos/bebidas
- Jarros y frascos de vidrio
- Ventanas de la casa
- Botellas de licor, soda y jugo

NO:

- Cerámica/Pyrex
- Espejos
- Tubos fluorescentes
- Focos
- Vidrio de seguridad

PLASTICOS RECICLABLES

SI:

- **PET:** (botellas de sodas, película fotográfica)
- **HDPE:** (contenedores para detergente, contenedores de plástico para agua y leche, charolas, bolsas para camisetas)
- **PVC:** (tubería para aspersores)
- **LDPE:** (bolsas para botes de basura, celofán, bolsas de abarrotes)
- **PP:** (recipientes para yogurt, maletas, popotes)
- **PS:** (platos, tazas, contenedores para huevos y bandejas para comida de plástico)
- **OTROS:** (contenedores de plástico mixtos y Tupperware®)

NO:

- Tapaderas de recipientes de plástico
- Productos mixtos (metal y plástico)
- Juguetes de plástico
- Macetas para flores/plantas

Nota: Por favor remueva líquidos, tapaderas y residuos alimenticios de todos los productos para reciclar antes de depositarlos en el contenedor "café/azul".

DESECHOS DE PATIO:

SI:

- Pasto cortado
- Plantas verdes
- Hojas secas
- Hojuelas de madera
- Recortes del jardín
- Yerbas
- Sobrantes de madera

NO:

- Desechos animales
- Ramas de palmas
- Plantas enfermas
- Carne/pescado/huesos
- Productos lácteos
- Zacate/tierra

DESECHOS DEL PATIO

Los residentes de San Juan Capistrano deben usar el contenedor automatizado verde.

Los residentes de la Ciudad de Dana Point pueden usar sus propios contenedores (hasta 35 galones), bolsas o pueden atar los desechos de jardín.

¿Desechos PELIGROSOS EN EL HOGAR?

Es ilegal deshacerse de Desechos Peligrosos en el Hogar (DPH) por medio del programa residencial automatizado. Los DPH deben depositarse en un centro de recolección certificado. El centro de recolección se encuentra en Prima Desecha Landfill (veáse mapa más adelante). Los Desechos Peligrosos en el Hogar incluyen, aunque sin limitarse:

- Aceite usado de automóvil
- Solventes
- Baterías
- Productos de limpieza
- Preservantes para madera
- Pintura vieja
- Pesticidas
- Productos químicos para alberca
- Cartuchos de impresoras
- Luces de bengala sin usar

Llame a la oficina del Departamento de Desechos Integrados del Condado de Orange o SOLAG para los horarios de operación de los centros de recolección. Se pueden depositar en el centro de recolección un máximo de 15 galones o 125 libras de materiales peligrosos por vehículo y por visita. Usted debe ser residente del Condado de Orange y tener licencia de manejo o tarjeta de identificación válidas para usar las instalaciones.

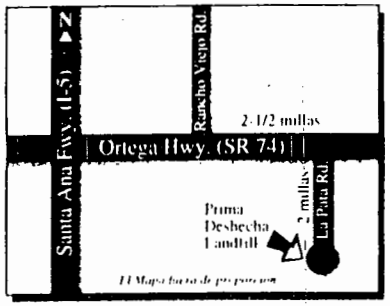

RECICLAJE DE ARBOLES DE NAVIDAD

La recolección en la banqueta de árboles de navidad se llevará a cabo en el día usual de recolección, durante las dos semanas después del año nuevo. Para poder ser reciclados los árboles no deben tener nieve artificial, esferas, clavos o bases. Se deben colocar en la banqueta de donde serán recogidos para ser reciclados.

ACERCA DEL SISTEMA AUTOMATIZADO

La razón de este nuevo programa de recolección automatizada es el cumplimiento del Acta de Manejo Integrado de los Desechos de 1989, más conocida como AB 939. Uno de los principales objetivos del AB 939 es lograr que los californianos manejen los desechos sólidos y reduzcan la generación de desechos sólidos individual (por ejemplo, reducción del origen). Esta ley requiere que las ciudades canalizen 50% de sus desechos a otros lugares que no sean los basureros para el año 2000.

Los subscriptores en las Ciudades de Dana Point, San Clemente y San Juan Capistrano pueden seleccionar un juego de tres contenedores especialmente diseñados con tapas y ruedas. El contenedor negro será para los desechos comunes y el café o azul será para materiales reciclables. Los residentes de San Juan Capistrano pueden obtener un verde adicional para desechos del jardín. Usted puede escojer el juego de 35 o 67 galones.

Aproximadamente 70% del flujo de desechos residenciales consiste de materiales reciclables. Una lista de los materiales que pueden ser reciclados aparece al reverso de este volante. De vez en cuando , nuevos materiales reciclables se pueden añadir. Si no está seguro si un artículo es o no es reciclable, llame a un representante para ser auxiliado.

IDEAS PARA EL DIA DE RECOLECCION

El sistema de desechos sólidos y de reciclados es el modo mejor de recolectar basura y materiales reciclables y ofrece, estabilidad en el precio, a largo plazo para el consumidor.

Es importante para los residentes de la Ciudad de Dana Point que reciben servicio del vehículo de recolección de desechos del jardín que opera manualmente asegurarse que los desechos de jardín estén en bolsas o estén atados apropiadamente.

El programa requiere el uso de vehículos automatizados de recolección equipados con un brazo robotizado. El conductor usará el brazo robotizado para recoger y vaciar el contenido del contenedor en el camión. Debido a esto, es importante que todos los materiales se depositen dentro del contenedor automatizado y no fuera o encima del mismo.

COMO FUNCIONA EL SISTEMA AUTOMATIZADO

Para mejorar la eficiencia, estabilizar los precios y asegurar la recolección habitual de los contenedores automatizados, SOLAG Disposal recomienda que recuerde lo siguiente el día de recolección:

1. Los contenedores deben de colocarse en la orilla de la banqueta antes de las 6:30 a.m. el día de recolección.
2. Los contenedores deben de colocarse un lado a otro, con un pie de separación y 3 pies de obstrucción, (por ejemplo: hidrantes, árboles).
3. Los contenedores deben de colocarse con las asas y ruedas apuntando a su casa.
4. Los contenedores deben de removerse de la banqueta entre 12 horas después del servicio.
5. Los artículos colocados a fuera de los contenedores no serán recogidos.

ARTICULOS VOLUMINOSOS

PROGRAME LA RECOLECCION DE ARTICULOS VOLUMINOSOS

Cada cliente residencial tiene derecho a dos (2) recolecciones de artículos voluminosos sin costo al año por parte de SOLAG Disposal. Por favor llame a un representante para hacer arreglos de artículos voluminosos en el día usual de recolección de basura. Se pueden hacer arreglos para recoger artículos voluminosos con un pago nominal por cada recolección.

¿QUE SON ARTICULOS VOLUMINOSOS?

Los artículos que no caben en sus contenedores automatizados negro (basura), café/azul (reciclables) o verde (jardín) tal como una silla o un couch, se consideran "artículos voluminosos". El artículo voluminoso es un objeto que no puede ser manejado con un equipo de dos personas, pudiendo ser lavadoras, secadoras, refrigeradores o cualquier otro objeto grande.

ORGANIZACIONES NO LUCRATIVAS

Antes de que usted saque los artículos voluminoso para ser desechados, considere donarlos a una organización no lucrativa. Si desea más información sobre la recolección de artículos voluminosos o el número telefónico de alguna organización no lucrativa que esté dispuesta a recoger artículos usados, comuníquese con un representante (714) 240-0446.

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Recycling News

July 1, 1999 Volume VII, No 3

IMPORTANT NOTICE

NO DELAY IN TRASH COLLECTION THIS JULY 4TH

This year the Fourth of July falls on a Sunday. Currently the County landfills operate Monday through Saturday so you will not experience delay in trash service. On your normal collection day, please place your trash/recyclables out at the curb for collection.

PROPER DISPOSAL OF THE AMERICAN FLAG

As we celebrate America's Independence this Fourth of July we may notice that the flags we display have become torn or tattered beyond repair. This past year the editors of Recycling News received a letter from a World War II Veteran regarding proper disposal of an American Flag.

The Orange County Veterans will forward the flags to the American Legion Post where they will be Disposed of in conformance with tradition and local laws. Please mail your old American Flags to:

ORANGE COUNTY VETERANS
SERVICE CENTER OFFICE
1300 South Grand Avenue, building B
Santa Ana, CA 92705

TIPS TO REMEMBER WHEN YOU'RE AT THE BEACH OR PARK

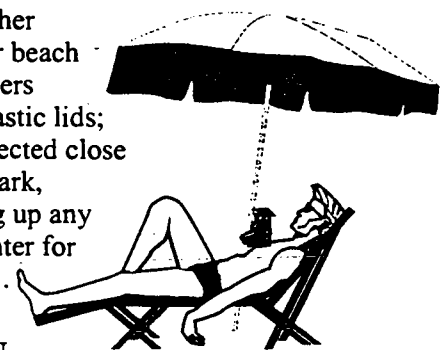

Did you know that our oceans provide most of the planet's oxygen, moisture and weather patterns? Every year, the Center of Marine Conservation sponsors a nationwide 3-hour beach clean-up, which has proven to be extremely effective. In 1987, in Texas alone, volunteers collected: 31,773 plastic bags; 30,295 plastic bottles; 15,631 six pack rings; 28,450 plastic lids; and 1,914 disposable diapers. And around the nation, the volunteer clean-up crew collected close to 2 million pounds of debris in just 3 hours. So next time you go to the beach or the park, remember to bring a trash bag and before you leave try to spend a few minutes picking up any litter you find. If you are interested in beach clean-up activities, please contact the Center for Marine Conservation at (202) 429-5609 or the Surfrider Foundation at (800) 743-7873.

IMPORTANT Y2K INFORMATION

By December 31, 2000 your city will need to be in compliance with the regulations set forth by state law AB 939. As you are already aware, AB 939 is the state-mandated requirement for each City throughout California to divert 50% of their waste stream away from the landfill by the Year 2000. Over the past several years the Editors of *Recycling News* have been discussing the 50% goal and the importance of reducing your waste, recycling and buying recycled products. Over the next year, your city will evaluating the programs currently in place and will review new ideas to promote the goals or the state law. Keep up the good work!!!!

Holiday Collection Schedule

We will not pick-up on these holidays:
- New Years Day - Memorial Day - Independence Day - Labor Day - Thanksgiving Day - Christmas Day
However, trash collection will resume one day later.

Unwanted Computer Parts - Help Your Community Recycle

Recently there has been a lot of talk about the year 2000 (Y2K) and the potential of imbedded computer chips disabling thousands of appliances, electronic products, etc. While the editors of ***Recycling News*** can neither confirm nor deny these reports, we would like to request our customers' help to try and locate alternatives to disposing of these items in the landfill. If you or someone you know can direct us to a non-profit organization willing to accept these items or a remanufacturer that would be interested in securing this material, please contact our office in writing.

Some locations that may take old computers (via the internet)
CALMAX - http://www.ciwmb.ca.gov/calmax
Detwiler Foundation - http:/www.detwiler.org
Goodwill Industries of Orange County - http:/ocgoodwill.org/computer_donations.html

More Trash Friendly Websites

Solag Disposal, Inc. - www.solag.com
County of Orange - www.oc.ca.gov./iwmd/
Laguna Hills - www.ci.laguna-hills.ca.us

006302

Recycling News

October 1, 1999 Volume VII, No. 4

KEEP RECYCLING WORKING - AMERICA RECYCLES

On November 13, California cities will have the opportunity to participate in the second annual America Recycles Day - a national campaign designed specifically to reinforce public support of recycling. Your City, the County of Orange and SOLAG Disposal would like to "Keep Recycling Working." You can help by remembering to reduce, reuse, recycle and compost your waste, but most importantly... purchase products that contain recycled materials. By working together we can preserve our planet, promote a healthier environment and secure the future of recycling.

SPECIAL GIVEAWAY

To celebrate America Recycles Day, on Saturday, November 13 from 8:00 a.m. to 12:00 p.m. Tierra Verde Industries, a green waste recycling facility located in San Juan Capistrano, has offered to donate compost for use in your yard. Bring a shovel and a large container/bag to Federal Doc Loading, located on Alicia Parkway between Avila and Aliso Creek Road in the City of Laguna Niguel to collect the free compost material.

FIND A NEW USE FOR AN OLD ITEM

Have an old bike that needs fixing or a chair that is missing a leg? Or how about some other large item that needs some minor repairs? Before you throw that item away, why not give it to someone who could put it to good use? There are many organization such as Goodwill Industries, Children's Hospital of Orange County (CHOC) and the Salvation Army that make it their business to bring new life to older, reusable items. In the spirit of goodwill and less waste, SOLAG Disposal, Inc. together with your City encourage you to contact these organizations before you throw a reusable item in the trash. For telephone numbers to these or other non-profit organizations, please look in the yellow pages under "Thrift Shops," or you may contact Solag Disposal for more information. Also remember that your contribution may be tax deductible.

ENVIRONMENTAL AWARDS

The Cities of Dana Point, Laguna Niguel, San Clemente, San Juan Capistrano and the County of Orange would like to recognize the following businesses for their outstanding efforts to reduce waste and recycle in their community:

Doubletree Guest Suites, Dana Point • Flex Foot, Inc. • Trade Winds Motel
Unichem Industries, Inc. • Tall Mouse Arts & Crafts, Inc. • Auto Care
Launderland • Mission Yamaha, Inc. • Saturn of San Juan Capistrano

Each of these businesses are being recognized by their respective cities for their dedication to help keep our environment clean and their commitment to recycling and source reduction.

TRASH FRIENDLY WEBSITES

Solag Disposal - www.solag.com
www.choose2reuse.org - This website will give you valuable information and on-line resources to help in your efforts to re-use everyday items.

Dana Point - www.ci.dana-point.ca.us
Laguna Niguel - www.ci.laguna-niguel.ca.us
San Juan Capistrano - www.sanjuancapistrano.org
San Clemente - www.cty.org/san-clemente/
County of Orange - www.oc.ca.gov/iwmd/

Sally Swallow
San Juan Capistrano

Corky Coyote
Laguna Niguel

Dana Dolphin
Dana Point

Selena Seal
San Clemente

SOLAG DISPOSAL
Quad Cities Recycling Program

IS YOUR TRASH WEIGHING YOU DOWN?

Items that are too large to fit in your container are considered bulky-items. As a customer of SOLAG Disposal you are entitled to two bulky-item pick-ups per calendar year, at no extra charge. Almost anything that can be managed by a two-person crew will be picked up as a bulky-item. This includes old furniture, appliances, carpet, mattresses, water heaters, etc. Loose items need to be bagged or bundled, and no liquids or drums of any kind will be accepted. Before you put out large items to be landfilled, consider donating these items to a non-profit organization. If you would like more information about bulky-item pick-ups or non-profit organizations willing to pick-up your reusable items, please contact one of the customer service representatives at (949) 240-0446, Ext. 1.

006304

Recycling News

January 1, 1999 Volume VII, No 1

RECYCLING YOUR CHRISTMAS TREE IS AS EASY AS 1-2-3....

Can you believe that the Holiday Season is already behind us? Well it's time again to recycle your Christmas Trees. Depending on where you live, collection of your trees will take place on your normal collection day during a two week period shortly after Christmas or after the New Year. Just follow these three simple steps:

FIRST, please review the front of your bill for the dates of the curbside collection of your Christmas trees.

SECOND, Remove all decorations, tinsel and stands (wood or metal) from the tree before collection. If your tree is over 8-feet in height, please cut the tree in half.

THIRD, Place your tree at the curb next to your container on collection day. On trash day a separate collection vehicle will pick up your Christmas tree.

NOTE: Flocked trees or trees with nails, stands or ornaments cannot be recycled, but will be picked up and disposed of at the landfill. Please do your part to help recycle your trees.

ITS NEVER TOO LATE TO RECYCLE OLD CHRISTMAS CARDS

For the past 20 years St. Jude's Ranch for Children has recycled holiday, birthday, get well and all other occasion cards. St. Jude's Ranch is a non-profit home for abused and homeless children located in Boulder City, Nevada. People from across the United States and around the world send used cards to the Ranch. In 1992 nearly one and a half million cards were collected. If you would like to recycle your Christmas cards, please send them to:

St. Jude's Ranch for Children
P.O. Box 60100
Boulder City, NV 89006

If sending by United Parcel Service, send to:
St. Jude's Ranch for Children
100 St. Jude Street
Boulder City, NV 89005

TRASH FRIENDLY WEBSITES

Each quarter the editor of *Recycling News* will be reviewing website and e-mail addresses on the Internet that may be of interest to our readers. The sites examine: ways to reduce waste, avenues to reuse unwanted materials (such as donations to non-profit organizations), types of recyclable material and directions to backyard composting.

http://www.epa.gov This website is an excellent source for businesses and individuals that have questions about waste prevention, water & air quality information & regulations.

http://www.mastercomposter.com Want to know the secret to a successful home composting system? Check out this site for complete & easy do-it-yourself instructions.

http://www.recycle.net This location is a worldwide trading site for information related to secondary or recyclable commodities, by-products, used materials and surplus items.

There will be no collection on the following holidays:

New Years Day	Independence Day	Memorial Day
Thanksgiving Day	Christmas Day	Labor Day

Trash collection will be delayed one day after the holiday.

SOLAG DISPOSAL

CLOSE THE RECYCLING LOOP

comic books

plastic bottles

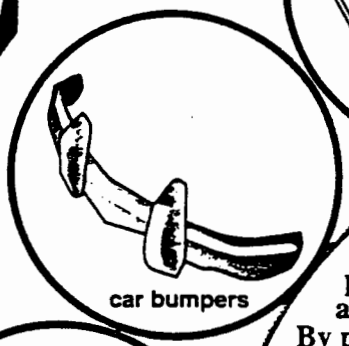
car bumpers

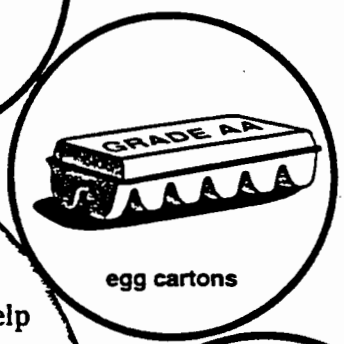

egg cartons

Many products are collected through community recycling programs. These materials are cleaned and processed to produce new products. By purchasing recycled products you can help "Close The Loop"

Why buy recycled products:

1. Buying Recycled reduces waste and pollution.
2. Buying Recycled conserves resources.
3. Buying Recycled conserves energy.

Some myths about recycled products:

1. Recycled products are hard to find.
2. Recycled products cost more.
3. Recycled products are inferior in quality.

"Look for these symbols when purchasing everyday products."

CA Redemption Value

Recyclable

Contains Recycled Material

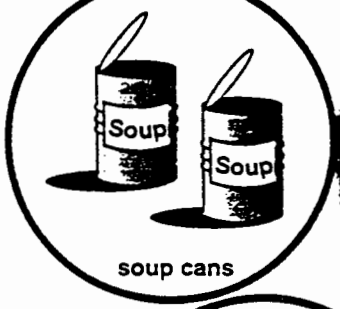

soup cans

aluminum cans

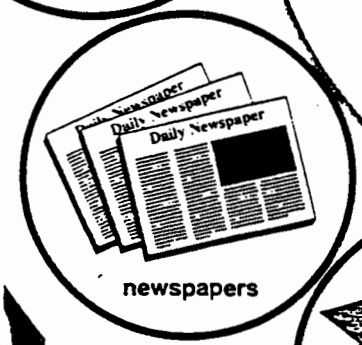

newspapers

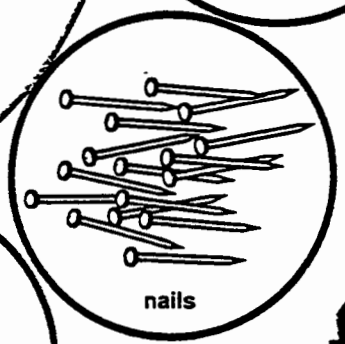
nails

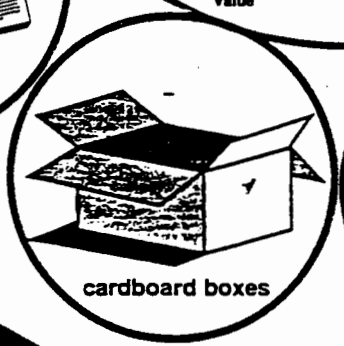
cardboard boxes

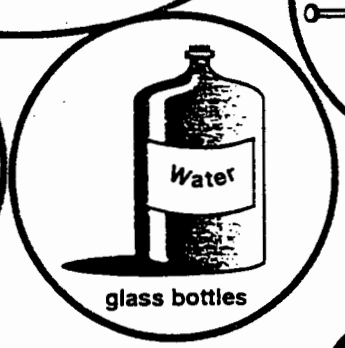

glass bottles

BUY RECYCLED PRODUCTS

006306

Recycling News

April 1, 1999 Volume VII, No 2

IS YOUR TRASH WEIGHING YOU DOWN?

Items that are too large to fit in your container are considered bulky-items. As a customer of SOLAG Disposal you are entitled to two bulky-item pick-ups per calendar year, at no extra charge. Almost anything that can be managed by a two-person crew will be picked up as a bulky-item. This includes old furniture, appliances, carpet, mattresses, water heaters, etc. Loose items need to be bagged or bundled, and no liquids or drums of any kind will be accepted. Before you put out large items to be landfilled, consider donating these items to a non-profit organization. If you would like more information about bulky-item pickups or non-profit organizations willing to pick-up your reusable items, please contact one of the customer service representatives at (949) 240-0446, Ext. 1.

HOUSEHOLD HAZARDOUS WASTE (Roundup Available Year-round)

To make proper disposal of "household hazardous material" convenient, the County of Orange operates four household hazardous waste (HHW) collection centers throughout the County. The closest facilities are located in San Juan Capistrano and in the City of Irvine. Each facility will accept your hazardous waste at no charge, upon proof of Orange County residency. Some common household hazardous materials are:

- Road Flares
- Toilet Bowl Cleaners
- Wood Preservatives
- Batteries
- Weed Killers
- Fertilizers
- Antifreeze
- Medicines
- Pool Chemicals
- Oil
- Bleach
- Paint

For proper disposal of these materials, we recommend that all items are in their original containers, are clearly marked as to their content, or are marked as "unknown material". A maximum of 15 gallons or 125 lbs. of hazardous materials may be brought to the collection center per vehicle, per visit.

The **Household Hazardous Waste Collection Facility** in San Juan Capistrano is located at the Prima Deshecha landfill off of Ortega Highway at the [illegible] of La Pata Avenue. Or the Irvine facility is located at 6411 Oak Canyon between the 5 and 405 off the Sand Canyon exit. Hours of operation are [illegible]sday through Saturday, 9:00 a.m. - 1:00 p.m. They are closed Sundays, Mondays, major holidays and rainy days. ***For more information on the Stop, Drop & Swap Program at the Irvine Facility (which allows residents to select free products that can be used at home) call (714) 834-6752 or visit their website at:*** **www.oc.ca.gov/iwmd/**

MORE DISPOSAL TIPS: Save a trip to the HHW Facility by using the hazardous materials completely. And remember products such as paint, stain or weed killers may be useful to friends or neighbors. For additional information please call the County of Orange trash and recycling hotline @ (714) 834-6752.

Prima Deshecha Landfill

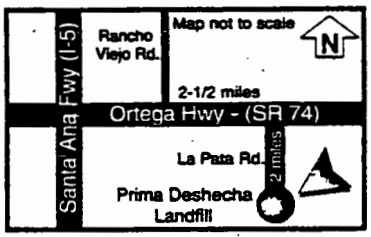

6411 Oak Canyon

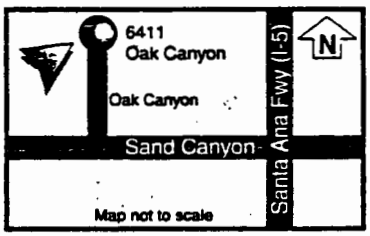

TRASH FRIENDLY WEBSITES

http://www.obviously.com/recycle/
The Internet Consumer Recycling Guide shows ways to stop unwanted mail and other reuse and recycling tips.

http://www.ergroup.com
The Environmental Recycling Group helps to promote the use of environmentally friendly products and the use of recycled building materials. They have an extensive data base of recycled building materials for homeowners and contractors.

Along with the many website offerings we bring you each quarter, your local cities also have sites that are both informative and interesting. And this quarter, SOLAG Disposal is excited to introduce their new website at **solag.com**. If you have any suggestions to help make our webpage more informative, please contact our office with your ideas.

Laguna Niguel www.ci.laguna-niguel.ca.us
[illegible] Clemente www.cty.org/san-clemente/
Dana Point www.ci.dana-point.ca.us
San Juan Capistrano www.sanjuancapistrano.org

SOLAG DISPOSAL
Quad Cities Recycling Program

REPRESENTATIVE PUBLIC EDUCATION MATERIALS

CITY OF SANTA ANA

Santa Ana State Certified Used Motor Oil Collection Centers*

All Phase Environmental
1367 Santiago
(714) 731-5995

Archie's Tire & Towing
(Accepts oil filters too!)
(¡Aceptam Filtros!)
(Chúng tôi cũng thu hồi đồ lọc dầu cũ)
4518 Westminster Ave.
(714) 636-4518

AutoZone
430 W. 17th Street
(714) 547-7003

AutoZone
1101 S. Bristol
[illegible]) 241-0335

Big O Tires
1211 W. Warner Ave.
(714) 540-8646

Firestone
(Accepts oil filters too!)
(¡Aceptam Filtros!)
(Chúng tôi cũng thu hồi đồ lọc dầu cũ)
3733 S. Bristol
(714) 549-4015

Firestone
2005 N. Tustin Ave.
Suite A
(714) 541-7977

Jiffy Lube
(Accepts oil filters too!)
(¡Aceptam Filtros!)
(Chúng tôi cũng thu hồi đồ lọc dầu cũ)
2025 N. Tustin Ave.
(714) 834-0470

John's Mobil
1465 S. Main St.
(714) 835-3266

Kragen Auto Parts
1302 E. 17th St.
(714) 953-6061

Kragen Auto Parts
1400 W Edinger Ave.
(714) 754-1432

Kragen Auto Parts
521 W. 17th St.
(714) 543-4492

Kragen Auto Parts
2337 S. Bristol Ave.
(714) 557-0787

Pep Boys
(Accepts oil filters too!)
(¡Aceptam Filtros!)
(Chúng tôi cũng thu hồi đồ lọc dầu cũ)
120 E. 1st St.
(714) 547-7477

Pep Boys
1107 S. Harbor Blvd.
(714) 775-0828

Purrfect Auto Service
2519 S. Main St.
(714) 549-7900

Saturn of Santa Ana
(Accepts oil filters too!)
(¡Aceptam Filtros!)
(Chúng tôi cũng thu hồi đồ lọc dầu cũ)
1350 Auto Mall Dr.
(714) 648-2444

Scher Tire
(Accepts oil filters too!)
(¡Aceptam Filtros!)
(Chúng tôi cũng thu hồi đồ lọc dầu cũ)
1805 N. Grand Ave.
(714) 558-8644

Tire Station
101 S. Main St.
(714) 542-8857

*Note: It is advisable to call before taking oil to any of the State Certified Used Oil Collection Centers listed. Centers will pay you $.04 for each quart you recycle. If you have additional questions about used motor oil recycling, please contact the California Environmental Hotline at **1-800-CLEANUP** or **www.1800CLEANUP.org**. You can take other hazardous household wastes, such as paint, pesticides, cleaners, solvents, etc., to a nearby County of Orange Collection Center: 1071 N. Blue Gum Street, Anaheim or 6411 Oak Canyon, Irvine. Please call (714) 834-6752 for more information.

*Por favor llame por teléfono al centro antes de visitarlo. Los centros le pagarán $.04 por cada cuarto de aceite que Ud recicle. Si tiene otras preguntas acerca del reciclaje de aceite usado de motor, por favor llame al California Environmental Hotline al teléfono **1-800-CLEANUP** o **www.1800CLEANUP.org**. Ud. puede llevar materiales domésticos peligrosos como ser pintura, pesticidas, limpiadores solventes, etc., a uno de los centros de Recolección del Condado de Orange: 1071 N. Blue Gum Street, Anaheim or 6411 Oak Canyon, Irvine. Por favor llame al teléfono (714) 834-6752 para obtener más información.

* Ghi chú: Quý vị nên gọi trước khi đem dầu đến bất cứ trung tâm Thu Hồi Dầu Cũ nào được tiểu bang chấp thuận trong danh sách. Trung tâm sẽ trả $.04 cho mỗi quart dầu thu hồi. Nếu có thêm thắc mắc nào về việc thu hồi dầu cũ, xin liên lạc Đường Dây Nóng Môi Trường California tại số **1-800-CLEANUP** hay đến mạng lưới **www.1800CLEANUP.org**. Quý vị có thể đem đồ phế thải gia dụng nguy hại như sơn, thuốc trừ sâu bọ, chất liệu lau chùi, dung môi, vân vân. đến Trung Tâm Thu Hồi gần nhà trong Quận Cam: 1071 N. Blue Gum Street, Anaheim hay 6411 Oak Canyon, Irvine. Xin gọi số (714) 834-6752 để biết thêm chi tiết.

006308

Santa Ana RECYCLES USED OIL!

IT'S EASY! IT'S FREE!

Did you know that you can dispose of your used motor oil safely and easily right here in Santa Ana? When you change your vehicle's oil, drain the used motor oil into a clean container, seal the container well with a lid, and bring it to one of the conveniently located State Certified Used Oil Collection Centers in Santa Ana. And...State Certified Used Oil Collection Centers will pay you $.04 for each quart you recycle.

Santa Ana recycles

You make the difference!

RECYCLE USED OIL

This program is brought to you by the City of Santa Ana and made possible by a grant from the California Integrated Waste Management Board.

Santa Ana RECICLA ACEITE USADO DE MOTOR

¡Es Fácil! ¡Es Gratis!

¿Sabe que Ud. puede deshacerse del aceite usado de motor aquí en Santa Ana? Cuando Ud. cambia el aceite de su motor, vacíelo en un recipiente, selle el recipiente con una tapa bien segura, y tráigalo a uno de los Centros Certificados de Recolección de Aceite Usado de Motor en Santa Ana. Estos Centros Certificados le pagarán $.04 por cada cuarto de aceite usado que usted recicle si así lo desea.

RECICLE ACEITE USADO

Este programa es traído a usted por la Ciudad de Santa Ana y es hecho posible con fondos del California Integrated Waste Management Board.

THU HỒI DẦU CŨ TẠI SANTA ANA!

RẤT DỄ DÀNG! MIỄN PHÍ!

Quý vị có biết là quý vị có thể bỏ dầu xe cũ của mình một cách an toàn và dễ dàng tại Santa Ana không? Khi thay dầu xe, đổ dầu xe cũ vào một thùng sạch, đóng kín nắp thùng lại, và đem dầu đến một trong các trung tâm Thu Hồi Dầu Cũ được tiểu bang chấp thuận tiện lợi trong Santa Ana. Và... các trung tâm Thu Hồi Dầu Cũ được tiểu bang chấp thuận sẽ trả $.04 cho mỗi quart dầu thu hồi.

TÁI CHẾ DẦU CŨ

Đây là một chương trình do Thành Phố Santa Ana cống hiến và được Hội Đồng Quản Lý Rác California tài trợ.

RECYCLE USED OIL

It's Easy! It's Free!

Santa Ana residents with curbside refuse service are eligible to have their used motor oil collected free of charge. Call (714) 558-7761 to have a used motor oil container delivered to your home. When you fill the container with used motor oil, call Great Western Reclamation and schedule a pickup for your next regularly scheduled refuse collection day. An empty container will be left for your next oil change.

RECICLE ACEITE USADO DE MOTOR

¡Es Fácil! ¡Es Gratis!

Los residentes de la Ciudad de Santa Ana que reciben servicio de recolección de basura al borde de la vereda/banqueta pueden reciclar el aceite de motor usado sin cargo! Llamen al telefono (714) 558-7761 para pedir que le envíen un recipiente para recojer el aceite a su domicilio. Una vez que el recipiente este lleno, llamen a Great Western Reclamation y pidan que lo recojan la próxima vez que le recojen la basura. Al recojer el recipiente lleno le dejarán uno vacío para usar la próxima vez.

TÁI CHẾ BIẾN DẦU MÁY ĐÃ DÙNG RỒI

Vừa dễ dàng! Vừa miễn phí!

Cư dân của thành phố Santa Ana đang sử dụng dịch vụ để rác trước cửa nhà cho xe lấy đổ hàng tuần còn được hưởng dịch vụ miễn phí thu hồi dầu, nhớt máy đã dùng rồi. Xin gọi số (714) 558-7761 để có được thùng chứa dầu giao đến tận nhà. Sau khi thùng chứa dầu cũ đã đầy, xin gọi cơ quan Great Western Reclamation ở số điện thoại trên để sắp xếp giờ cho xe đến thâu hồi thùng dầu. Quý vị sẽ được cung cấp một thùng chứa dầu mới để tiếp tục sử dụng.

Great Western Reclamation Customer Service Center (714) 558-7761
Mon - Fri 8:00 am - 5:00 pm Sat 8:00 am - 12:00 pm

Great Western Reclamation Trung Tâm Phục Vụ Khách Hàng (Customer Service Center)
714-558-7761 Thứ Hai - Thứ Sáu: 8 giờ sáng - 5 giờ chiều Thứ Bảy: 8 giờ sáng - 12 giờ trưa

The Recycle Used Oil program is brought to you by the City of Santa Ana and made possible by a grant from the California Integrated Waste Management Board.
Este programa es traido a usted por la ciudad de Santa Ana y es hecho posible con fondos del California Integrated Waste Management Board.
Chương trình tái chế biến dầu máy được bảo trợ bởi thành phố Santa Ana và tài trợ bởi cơ quan California Integrated Waste Management Board.

RECYCLE USED OIL

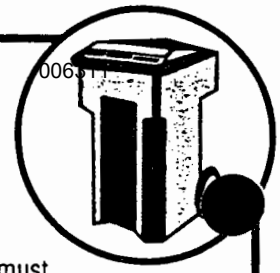

SPECIAL NOTICE!

As a reminder, the Santa Ana Municipal Code requires that all carts be placed at the curb no earlier than 4:00 p.m. the day prior to collection and must be removed and placed in a location out of public view before 12:00 a.m. (midnight) the day of collection. (Please note that a fine of $50 to $150 may be assessed if carts are not placed out of public view.) Your assistance in making Santa Ana a better place to live is greatly appreciated. (If you would like to report carts left in public view, please call Community Preservation at (714) 667-2780.)

¡NOTICIA ESPECIAL!

Por favor recuerden que el Código Municipal de la Ciudad de Santa Ana requiere que todos los recipientes sean ubicados en el cordón de la vereda despues de las 4:00 de la tarde del día anterior a la recolección, y se los debe guardar antes de las 12:00 de la medianoche del día de recolección. (Por favor tenga en cuenta que se les puede dar una multa de $50.00 a $150.00 si los recipientes no están fuera de la vista del público). Se les agradece con anticipación su esfuerzos para ayudar a mantener a Santa Ana a ser un lugar mejor para vivir. (Si Ud. quiere informar acerca de recipientes que no han sido guardados, por favor llame a Community Preservation al telefono (714) 667-2780.)

LƯU Ý ĐẶC BIỆT!

Xin lưu ý quý vị rằng luật thành phố chỉ cho phép để thùng rác ra lề đường sớm nhất là sau 4 giờ chiều ngày hôm trước, và thùng phải được cất kỹ khỏi tầm nhìn của công chúng trước nửa đêm ngày hôm sau (tức ngày đổ rác). Nếu vi phạm, quý vị có thể bị phạt từ $50 đô-la đến $150 đô-la. Xin cám ơn sự hợp tác của quý vị trong lãnh vực này. Trong trường hợp có những thùng rác không ai cất và bỏ ngoài lề đường quá hạn, xin quý vị thông báo về cơ quan Community Preservation ở số (714) 667-2780.

Santa Ana recycles

You make the difference!

RECYCLE USED OIL! IT'S EASY! IT'S FREE!

Did you know that you can dispose of your used motor oil safely and easily right here in Santa Ana? When you change your oil, drain your used motor oil into a container, seal the container well with a lid, and bring it to one of the conveniently located State Certified Used Oil Collection Centers in Santa Ana. And, State Certified Used Oil Collection Centers will pay you $.04 for each quart you recycle.

WHY RECYCLE USED MOTOR OIL?

Because it never wears out! Your used motor oil can be recycled and used again. And that means you can be conserving a natural resource. Motor oil which is poured into the ground can pollute the soil, groundwater, streams, and rivers... your environment. When you take your used motor oil to a certified center for recycling, you are protecting the environment and conserving a valuable resource. And, State Certified Used Oil Collection Centers will pay you $.04 for each quart you recycle.

USED OIL RECYCLING TIPS

- When draining used oil, use a clean plastic oil pan and a container with a tight lid.
- Never pour or drain oil in the gutter or storm drains. City storm drains empty to the ocean.
- Reuse your used oil container, and store it safely, away from children and pets.
- Don't mix used oil with chemicals, gasoline, water or other substances.
- Use a reusable 5-gallon or smaller size container.
- Call your nearest State Certified Used Oil Collection Center for hours of operation and amounts accepted.

¡ES FACIL! ¡ES GRATIS!

006312

¿Sabe que Ud. puede deshacerse del aceite usado de motor aquí en Santa Ana? Cuando Ud. cambia el aceite de su motor, vacíelo en un recipiente, selle el recipiente con una tapa bien segura, y tráigalo a uno de los Centros Certificados de Recolección de Aceite Usado de Motor en Santa Ana. Estos Centros Certificados le pagarán $.04 por cada cuarto de aceite usado que Ud. recicle si usted así lo desea.

¿PORQUE RECILAR ACEITE USADO DE MOTOR?

¡Porque nunca se gasta! El aceite usado de motor puede ser usado nuevamente si se le limpian las impurezas. Haciendo ésto, conservamos nuestros recursos naturales. Si uno se deshace del aceite usado de motor tirándolo en un agujero en el jardín, se puede contaminar las tablas de agua bebible, los lagos y los ríos. Cuando Ud. lleva su aceite de motor usado a un Centro Certificado de reciclaje, Ud. está protegiendo al medio ambiente y conservando recursos naturales. Y los Centros Certificados de Recolección de Aceite Usado de Motor le pagarán $.04 por cada cuarto de aceite usado si Ud. así lo desea.

SUGERENCIAS ACERCA DEL ACEITE USADO DE MOTOR

- Cuando cambie el aceite de su motor use un recipiente que tenga una tapa segura y que esté limpio.
- Nunca tire el aceite usado de motor en la alcantarilla. Los desagües de la Ciudad de Santa Ana se desagotan en el océano.
- Vuelva a usar el recipiente original y guárdelo en un lugar fuera del alcance de los niños y animales.
- Nunca mezcle el aceite de motor con productos químicos, gasolina, agua, u otras sustancias.
- Use un recipiente con una capacidad de 5 galones y que se pueda volver a usar.
- Llame al Centro Certificado de Reciclaje de Aceite Usado de Motor más cerca a su domicilio para averiguar horas de operación y cantidad aceptada.

RECYCLE USED OIL

State Certified Used Oil Collection Centers*

For additional recycling locations, please call the Integrated Waste Management Board Recycling Hotline at **1-800-CLEANUP.**

Para otras localidades por favor llame al Integrated Waste Management Board al teléfono **1-800-CLEANUP.**

Please telephone these centers before taking in your used oil. **Por favor llame por teléfono al centro antes de visitarlo.*

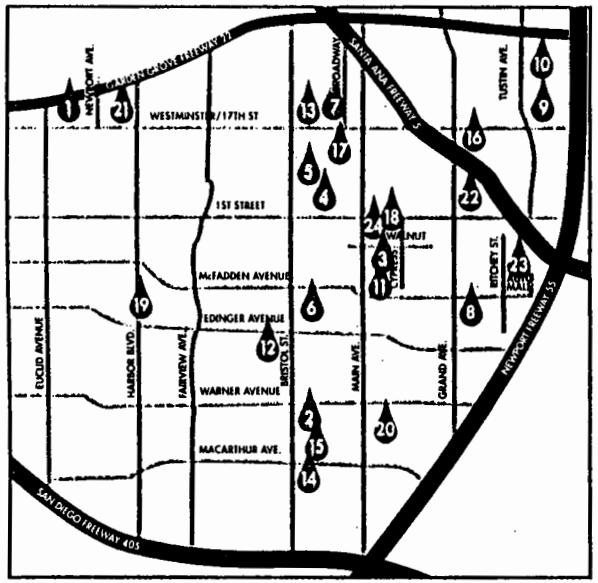

1. **Archie's Tire and Towing Inc.**
   4518 Westminster Ave
   Santa Ana, CA 92703
   (714) 636-4518
2. **Big O Tires**
   1211 West Warner Ave
   Santa Ana, CA 92707
   (714) 540-8646
3. **Car-Tune Complete Auto Services**
   112A East Walnut St
   Santa Ana, CA 92701
   (714) 835-4455
4. **Car-Tune Complete Auto Services**
   1135 West 1st St
   Santa Ana, CA 92703
   (714) 542-1497
5. **Car-Tune Complete Auto Services**
   509 N. Bristol
   Santa Ana, CA 92703
   (714) 835-4433
6. **Chief Auto Parts Inc.**
   1101 So. Bristol
   Santa Ana, CA 92704
   (714) 241-0335
7. **Ed Dickens Unocal**
   1702 N. Broadway
   Santa Ana, CA 92706
   (714) 541-6688
8. **Edinger Unocal**
   1502 E. Edinger Ave
   Santa Ana, CA 92705
   (714) 667-0207
9. **Firestone Store**
   3733 S. Bristol
   Santa Ana, CA 92704
   (714) 549-4015
10. **Firestone Store**
    2005 N. Tustin Ave
    Santa Ana, CA 92705
    (714) 541-7977
11. **Jiffy Lube**
    2025 N. Tustin Ave
    Santa Ana, CA 92705
    (714) 834-0470
12. **John's Mobil**
    1465 S. Main St
    Santa Ana, CA 92707
    (714) 835-3266
13. **Kragen Auto Parts**
    1400 W. Edinger Ave
    Santa Ana, CA 92704
    (714) 754-1432
14. **Kragen Auto Parts**
    521 W. 17th St
    Santa Ana, CA 92706
    (714) 543-4492
15. **Kragen Auto Parts**
    2337 S. Bristol Ave
    Santa Ana, CA 92704
    (714) 557-0787
16. **Kragen Auto Parts**
    1302 E. 17th St
    Santa Ana, CA 92705
    (714) 953-6061
17. **Parts USA**
    430 W 17th St
    Santa Ana, CA 92706
    (714) 835-9555
18. **Pep Boys**
    120 East 1st St
    Santa Ana, CA 92701
    (714) 547-7477
19. **Pep Boys**
    1107 S. Harbor Blvd.
    Santa Ana, CA 92704
    (714) 775-0828
20. **Purrfect Auto Service**
    2519 S. Main St
    Santa Ana, CA 92707
    (714) 549-7900
21. **Quaker State Minit-Lube Inc.**
    3822 W. Westminster
    Santa Ana, CA 92703
    (714) 554-0610
22. **Saturn of Santa Ana**
    1350 Auto Mall Dr
    Santa Ana, CA 92705
    (714) 648-2444
23. **Scher Tire**
    1805 N. Grand Ave
    Santa Ana, CA 92705
    (714) 558-8644
24. **Tire Station**
    101 S. Main St
    Santa Ana, CA 92701
    (714) 542-8857

This program is brought to you by the City of Santa Ana and made possible by a grant from the California Integrated Waste Management Board.

Este programa es traido a usted por la Ciudad de Santa Ana y es hecho posible con fondos del California Integrated Waste Management Board.

Printed on Recycled Paper

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RECYCLE USED OIL

It's Easy! It's Free!

RECICLE ACEITE USADO DE MOTOR

¡Es Fácil! ¡Es Gratis!

Santa Ana recycles

You make the difference!

LA RECOLECCION DE ACEITE Y FILTROS USADOS DE MOTOR GRATIS YA ESTA AQUI

006314

¡Es Fácil! ¡Es Gratis!

¡AHORA SI RECICLA EL ACEITE USADO DE MOTOR SE AHORRAN RECURSOS NATURALES MUY VALIOSOS

¡Great Western Reclamation vendrá a su casa a recoger el aceite y los filtros usados de motor sin cargo alguno!

¡Así es! Los residentes de la Ciudad de Santa Ana que tienen servicio de recolección de basura al cordón de la vereda pueden gozar de este servicio totalmente gratis.

Llame al teléfono (714) 558-7761 y pida que le envíen a su casa un recipiente para el aceite y una bolsa para el filtro. Cuando tenga el recipiente lleno de aceite usado de motor y el filtro dentro de la bolsa de plástico, llame a Great Western Reclamation para hacer una cita para que se lo recojan.

Recicle El Aceite y Los Filtros Usados

El aceite y el filtro usado de motor serán recagidos el próximo dia que le recojan la basura, y al mismo tiempo le dejarán un recipiente y una bolsa de plástico limpios para que Ud. use la próxima vez que tenga que cambiar el aceite del motor a su vehículo. ¡Llame hoy mismo al teléfono (714) 558-7761 y haga una cita para que le envien un recipiente para el aceite y una bolsa de plástico para el filtro!

TIENE UD. MATERIALES TÓXICOS

El Condado de Orange opera centras de recolección para materiales tóxicos donde residentes pueden llevar pinturas, pesticidas, solventes, etc. Los residentes de la Cuidad de Santa Ana pueden utilizar das centros: 6411 Oak Canyon Road en la Ciudad de Irvine, y/o 1071 Blue Gum Street en la Ciudad de Anaheim. Para más informacion, por favor llame al teléfono (714) 834-6752.

RECYCLE USED OIL

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Santa Ana recycles
You make the difference!

Tại Đây Có Thu Hồi Dầu và Đồ Lọc Dầu Cũ Miễn Phí

Rất Dễ Dàng! Miễn Phí!

Thu hồi dầu xe hơi đã dùng bảo vệ một tài nguyên đáng giá.

Great Western Reclamation sẽ đến tận nhà và thu hồi dầu xe hơi và đồ lọc dầu cũ... miễn phí!

Đúng vậy, cư dân tại Santa Clara có dịch vụ hốt rác bên lề nhà hội đủ điều kiện để được thu hồi dầu xe hơi và đồ lọc dầu cũ... miễn phí!

Chỉ cần gọi số (714) 558-7761 để được gởi đến tận nhà một thùng đựng dầu và bịt đựng đồ lọc dầu. Khi đã đổ dầu xe hơi cũ vào thùng, và bỏ đồ lọc dầu vào bịt, hãy gọi Great Western Reclamation để sắp xếp thời biểu thu hồi.

Santa Ana recycles
You make the difference!

Thu hồi dầu và đồ lọc dầu

Dầu xe hơi và đồ lọc dầu cũ sẽ được thu hồi vào ngày hốt rác thông thường sắp đến, và họ sẽ để lại một thùng không và một bịt khác đựng đồ lọc dầu cho lần thay dầu kỳ tới! Hãy gọi số (714) 558-7761 để sắp xếp thời biểu nhận thùng đựng dầu và bịt đựng đồ lọc dầu miễn phí ngay hôm nay!

Quý vị có muốn phế thải gia vật nguy hại không?

Quận Orange điều hành các trung tâm thu hồi phế thải gia vật nguy hại trong vùng cho gia chủ đem bỏ sơn, thuốc trừ sâu bọ, vật liệu lau chùi, dung môi, vân vân. Hai trung tâm tiện lợi cho cư dân tại Santa Clara nằm tại 6411 Oak Canyon Road, Irvine và 1071 Blue Gum Street, Anaheim. Để biết thêm chi tiết, xin gọi số (714) 558-6752.

RECYCLE USED OIL

Chương trình này do Thành Phố SanTa Ana cống hiến và được Hội Đồng Tổng Hợp Quản Lý Rác California tài trợ.

FREE USED OIL AND OIL FILTER COLLECTION IS HERE

It's Easy! It's Free!

RECYCLING USED MOTOR OIL PRESERVES A VALUABLE RESOURCE.

Great Western Reclamation will come to your home and collect your used motor oil and oil filters...for free!

That's right. Santa Ana residents with curbside refuse collection are eligible to have their used motor oil and oil filters collected for free.

Simply call (714) 558-7761 to have an oil container and an oil filter bag delivered to your home. When you fill the container with used motor oil, and place your used oil filter into the plastic bag, call Great Western Reclamation to schedule a pickup.

Recycle Your Oil and Oil Filters

Your used motor oil and oil filter will be picked up on your next regularly scheduled refuse collection day and an empty container and oil filter bag will be left for your next oil change! Call (714) 558-7761 to schedule a FREE oil container and oil filter bag drop-off today!

DO YOU HAVE HOUSEHOLD HAZARDOUS WASTE?

The County of Orange operates regional household hazardous waste collection centers for homeowners to take and dispose of their paint, pesticides, cleaners, solvents, etc. Two centers convenient for Santa Ana residents are 6411 Oak Canyon Road, Irvine and 1071 Blue Gum Street, Anaheim. For more information, please call (714) 834-6752.

RECYCLE USED OIL

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Santa Ana recycle
You make the difference!

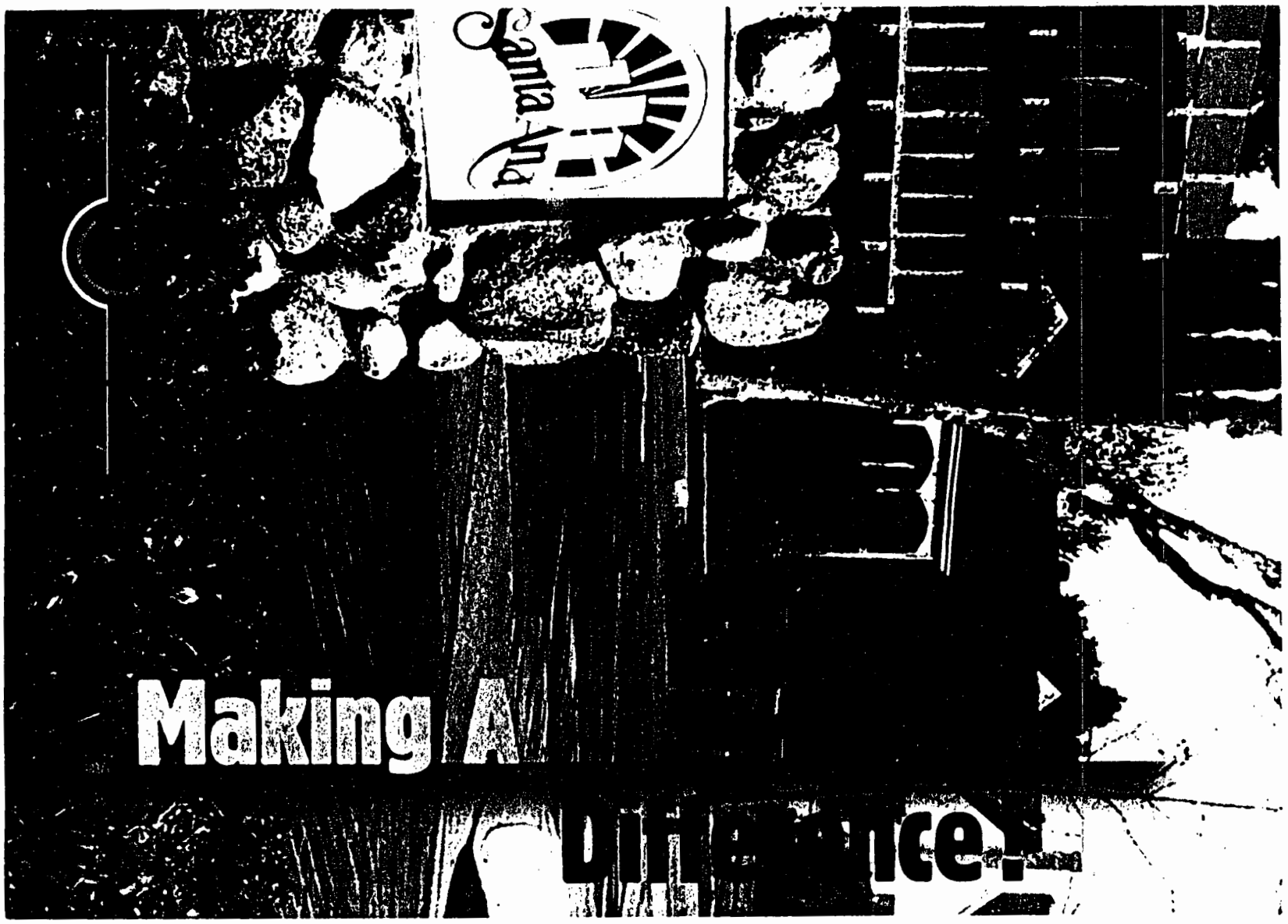
Santa Ana
Making A
Difference.

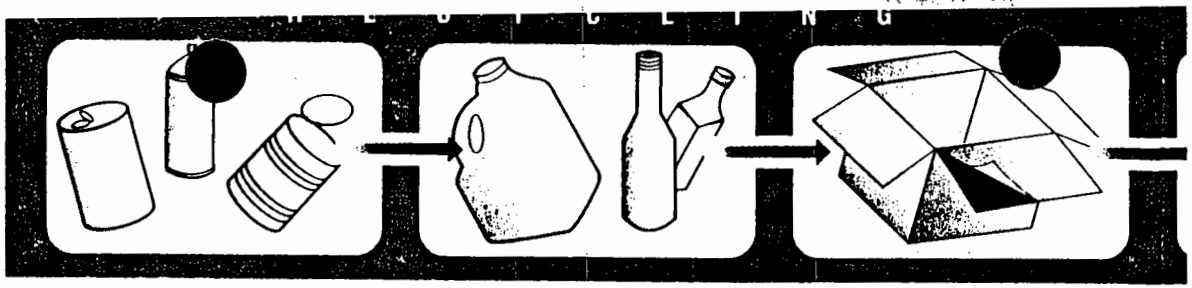

WE ARE ALMOST THERE!

The City of Santa Ana is moving toward the 50% recycling goal set by the State of California for the year 2000. Approximately 40% of the waste generated at each home is now being recycled. Even with this success, the City continues to need your support and participation. So please review the points outlined below so that we may continue to increase the amount of clean recyclables collected and reach our 50% goal by the year 2000.

RECYCLING REMINDERS

1. Place only recyclable materials in the recycling (gray) cart.
2. Please refer to the decal on the cart lid for acceptable materials.
3. When in doubt, please place materials in the refuse (burgundy) cart.
4. Do not place any liquid or food waste in the recycling (gray) cart.
5. Do not place recyclable materials in plastic bags.

GREEN WASTE REMINDERS

1. Place all yard trimmings in the green waste (green) cart.
2. Refer to the decal on the cart lid for acceptable materials.
3. Do not place green waste in plastics bags.
4. Only green waste can be placed in the green waste (green) cart. When in doubt, please place materials in the refuse (burgundy) cart.
5. Animal waste cannot be placed in the green waste (green) cart. Place it in a plastic bag and in the refuse (burgundy) cart.

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Bulky Item Pickup Service

Each resident with curbside refuse service is entitled to 2 free bulky item pickups eac year (not to exceed 4 items per pickup). Bulky items include large, hard-to-handl items such as sofas, furniture and appliances which can be lifted by two men.
Call Great Western Reclamation at (714) 558-7761 to schedule a pickup.

Holiday Schedule

When New Year's Day, Labor Day, Independence Day (July 5th), Memorial Day, Th Christmas Day is observed on a weekday, collections for the remainder of the week will

VERY IMPORTANT! To maximize street sweeping services, when your refuse colle a street sweeping day, your carts should be placed on the curb or on your driveway with the handles facing your home!

Servicio para los Artículos Grandes y Pesados

Cada residente con servicio de recolección de basura en el cordón de la vereda tien se le recojan artículos grandes y pesados dos veces por año, gratis (no más de 4 a Los artículos grandes y pesados incluyen sofás, muebles, y artículos del hogar que tados por dos personas. **Llame a Great Western Reclamation al telefono (714) 558 una cita y usar el servicio.**

Horarios de Días Feriados

Cuando Año Nuevo, Día del Trabajo, Día de la Independencia (5 de julio), Día de Acción de es observado en un día de semana, la recolección por el resto de la semana va a ser un

MUY IMPORTANTE! Para utilizar al máximo el servicio de la barredora de la calle, día de recolección de basura coincide con el de la barrida de las calles, Ud. pong en la vereda o en su entrada al garage, no en la calle, con las manijas mirando hac

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Dịch vụ thu lượm vật dụng lớn và nặng

Những quý vị hiện đang dùng dịch vụ để rác trước cửa nhà cho xe đến lấy đồ được hưởng thêm dịch vụ thu lượm vật dụng lớn và nặng. Đây là một dịch miễn phí, mỗi năm 2 lần, nhằm thâu nhặt vật dụng lớn và nặng thí dụ như bàn cũ, tủ lạnh cũ v.v. Xin lưu ý mỗi lần không được quá 4 món đồ khác nhau. X **Great Western Reclamation ở số (714) 558-7761 để hẹn giữ xe đến nhà quý**

Thời khoá biểu ngày lễ

Sau đây là danh sách các ngày lễ chính: Tết Dương Lịch, Lễ Lao Động, Lễ Độc Lễ Chiến Sĩ Trận Vong, Lễ Tạ Ơn và Lễ Giáng Sinh. Nếu những ngày lễ này rơi tuần thì thời khóa biểu đổ rác cho những ngày còn lại của tuần sẽ bị chậm đi

Xin lưu ý! Để tránh gây cản trở cho dịch vụ quét đường, nếu ngày đổ rác củ với ngày quét đường, xin để thùng rác trên vỉa hè thay vì trên mặt đường, và cầm của thùng rác phải quay vào hướng nhà quý vị.

REPRESENTATIVE PUBLIC EDUCATION MATERIALS

CITY OF TUSTIN

Green Waste Recycling

Green waste is one of the largest components of Tustin's waste. The City of Tustin encourages all homeowners, homeowner associations, businesses and property management firms who contract for landscape maintenance services to ask your contractor to recycle all green waste. Green waste should not be disposed of in a landfill, if possible. The Sunset Environmental Material Recovery Facility in Irvine is one location that accepts green waste for a fee. These efforts will save landfill space and put a valuable resource to better use.

Backyard composting is another way to recycle your green waste and its also great for your garden. Local retailers such as Tustin Home Depot sell home inexpensive home composting units. Backyard composting is easy and an effective way to keep green waste out of the landfill.

For more information on how you or your landscape contractor can recycle green waste, please contact Sunset Environmental at (949) 451-2600.

Holiday Schedule 1999 - 2000

New Year's Day	Independence Day *
Labor Day	Thanksgiving Day
Memorial Day	Christmas Day

When one of these holidays is observed on a weekday, collections for the remainder of the week will be delayed one day. *Independence Day (4th of July) will be observed on Monday July 5, 1999.

Important Telephone Numbers

City of Tustin	
General Information	(714) 573-3000
Public Works	(714) 573-3150
Police Dept. Waste Scavenging	(714) 573-3225
Graffiti Hotline	(714) 573-1111
Sunset Environmental	(949) 451-2600
Used Oil Recycling Centers	(800) CLEANUP
County of Orange	
Landfills	(714) 834-6752
Household Hazardous Waste Disposal	(714) 834-6752
Waste Alert - Illegal Dumping	(800) 698-6942
California Shopping Cart Retrieval Corp.	(800) 252-4613

WASTE MANAGEMENT
Customer Service Center
1800 South Grand Avenue
Santa Ana, CA 92705
(714) 558-7761

000318

City of Tustin Refuse and Recycling Program Information

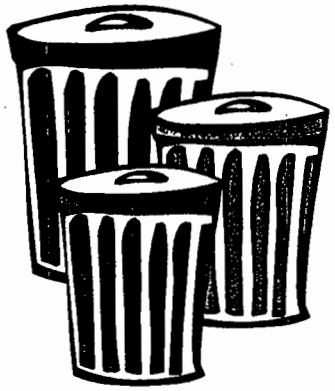

What services does Great Western Reclamation provide to Tustin residents?

The following basic services are provided to all residents at no additional charge:

- ✓ Curbside refuse collection
- ✓ Bulky item collection
- ✓ Christmas tree recycling
- ✓ Customer Service Center Assistance

What do I do with my recyclables?

It is not necessary to separate your recyclables at home to participate in Tustin's residential recycling program. All refuse and recycling is collected together at the curb and then taken to Sunset Environmental, where the refuse is sorted and recyclables are removed.

What size containers can I use?

- ✓ No larger than 35 gallons in capacity
- ✓ No heavier than 50 pounds

Containers should be constructed of solid weather resistant materials. Great Western Reclamation will collect up to five containers on a weekly basis.

When do I place my trash out for collection?

- ✓ Prior to 6 [illegible] .m. on your collection day or the night befor[illegible]

Bulky Item Collection

Great Western Reclamation provides for free bulky item pickups to each household. If you need to dispose of large, hard-to-handle furniture or appliances, contact our Customer Service Center at (714) 558-7761 to schedule a pickup.

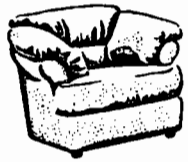

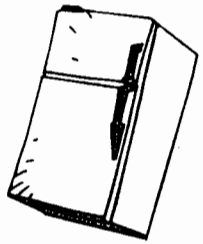

Source Reduction

Source Reduction means reducing waste at its source and preventing garbage from being created in the first place. This includes reducing unnecessary packaging of items, purchasing reusable and repairable items instead of disposable goods, purchasing in bulk, and making a conscious choice to create less garbage. Please join us in our efforts to reduce, reuse and recycle!

Waste Disposal Center

Sunset Environmental, located at 16122 Construction Circle West in Irvine, is a transfer facility.

Rather than going to the landfill, come to Sunset Environmental! For hours of operation, please call (949) 451-2600.

Household Hazardous Waste

006319

What is HHW? HHW consists of materials which cannot be safely sent to the landfill. Some hazardous materials are paint, household cleaners, pesticide pool chemicals, and automotiv products such as batteries, mot oil and antifreeze.

The County of Orange has permanent Househol Hazardous Waste Collection Centers. The neare center is located at 6411 Oak Canyon in Irvin (take the Sand Canyon exit off the 5 freeway an go west). For more information call th Household Hazardous Waste Hotline at (714) 834 6752.

Used motor oil is accepted by many servic stations. If you need to locate a state-certified use oil collection center in the Tustin area, call (800 CLEANUP.

RECYCLE
USED OIL

Printed [illegible] Recycled Paper

Do You Know Where The Water In Your Storm Drain Goes?

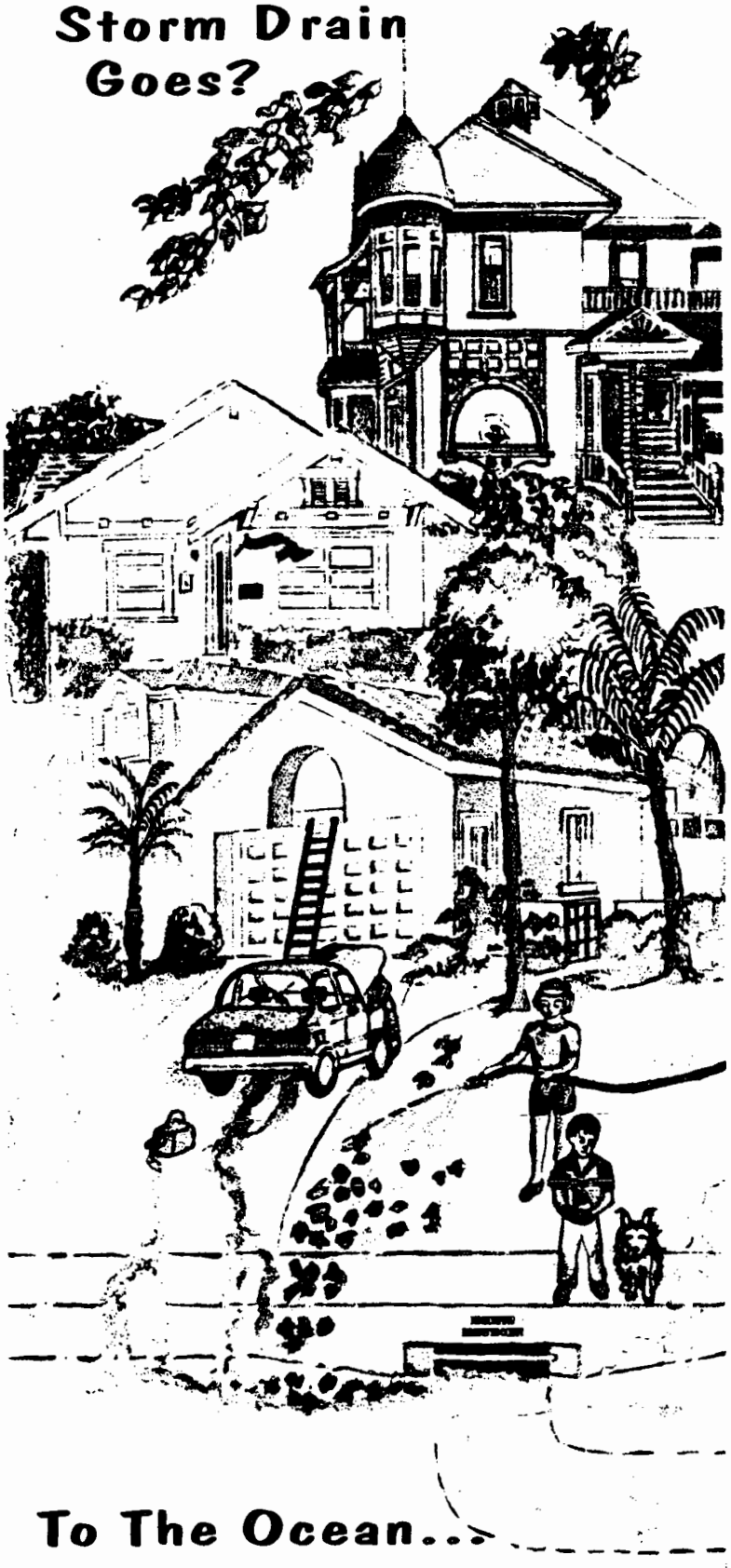

To The Ocean...

The Ocean begins at your front door!

Storm Water & Urban Runoff Pollution (SWURP)
And What You Can Do To Stop It!

To locate the nearest

Certified Used Oil Collection

Center, please call

1-800-CLEANUP

or you may visit the website at

www.1800CLEANUP.org.

RECYCLE
USED OIL

This program is brought to you by the City of Tustin and made possible by a grant from the California Integrated Waste Management Board.

TUSTIN RECYCLES USED MOTOR OIL!

IT'S EASY! IT'S FREE!

RECYCLING USED MOTOR OIL PRESERVES A VALUABLE NATURAL RESOURCE AND PROTECTS THE ENVIRONMENT!

Recycling Used Oil is Easy!

It's easy to recycle your used motor oil safely right here in Tustin. When you change your vehicle's oil, drain the used motor oil into a clean container, seal the container well with a lid, and bring it to one of the conveniently located State Certified Collection Centers. Be sure that your motor oil is not mixed with other substances, such as antifreeze, solvents, gasoline or water.

Why Recycle Used Motor Oil?

Because it never wears out! Your used motor oil can be recycled, cleaned and used again. That means you can help conserve a valuable natural resource, and help protect the environment. Used oil can contain such contaminants as lead, magnesium, copper, zinc, chromium, arsenic, chlorides, cadmium and chlorinated compounds. Oil poured down storm drains or on the ground can work its way into our ground and surface waters and cause serious pollution. One gallon of used oil can pollute one million gallons of drinking water!

When you take your used motor oil to a State Certified Used Oil Collection Center for recycling, you are protecting our planet and our future. So don't pour good oil down the drain!

How To Recycle Used Oil?

Tustin has 6 State Certified Used Oil Collection Centers standing by to help you recycle your used motor oil. Recycling oil is easy! When you do an oil change, just drain your vehicle's old oil into a clean container, seal the container well with a lid, and bring it to one of the 6 conveniently located State Certified Used Oil Collection Centers in Tustin. So don't throw good oil down the drain. Recycle now!

Used Oil Recycling Tips

006323

- When draining used oil, use a clean plastic oil pan or container with a tight lid.
- Use a reusable 5-gallon or smaller size container.
- Reuse your used oil container, and store it safely away from children and pets.
- Don't mix used oil with chemicals, gasoline, water or other substances.
- State Certified Used Oil Collection Centers will take up to 5 gallons per day, per person.
- You can take other hazardous household wastes, such as paint, pesticides, cleaners, solvents, etc., to a nearby County of Orange Collection Center: 32250 La Pata Ave., San Juan Capistrano or 6411 Oak Canyon, Irvine. Please call (714) 834-6752 for more information.

TUSTIN STATE CERTIFIED USED MOTOR OIL COLLECTION CENTERS*

AUTO ZONE
14460 Newport Ave.
(714) 544-1820

BIG O TIRES
131 E. 1st Street
(714) 544-9431

BOB NEIL'S UNOCAL
17280 E. 17th Street
(714) 544-3704

JIFFY LUBE
(*Accepts oil filters too!*)
3087 Edinger Ave.
(949) 651-8814

KRAGEN AUTO PARTS
502 B E. 1st Street
(714) 544-9249

SCHER TIRE, INC.
14511 Red Hill Ave.
(714) 832-6011

*Note: It is advisable to call before taking oil to any of the State Certified Used Oil Collection Centers listed. Centers will pay you $.04 for each quart you recycle.

Printed on Recycled Paper

REPRESENTATIVE PUBLIC EDUCATION MATERIALS

CITY OF WESTMINSTER

14451 CEDARWOOD AVENUE
WESTMINSTER, CALIFORNIA 92683
893-3553

MIDWAY CITY SANITARY DISTRICT AND THE ENVIRONMENT
(KEEP FOR FUTURE REFERENCE)

This information is provided to assist you, our valued customer, in protecting the Environment and by doing so, help us keep your service fees the lowest in Orange County. We have accomplished this through cost efficient service and an aggressive trash recycling program. Here's how you can help.

RECYCLABLES: Plastics, styrofoam, glass bottles and jars, phone books, newspapers, magazines, junk mail, cardboard and most other paper products (dry only), tin and aluminum cans.

NON-RECYCLABLES: Wet paper, diapers, animal waste and kitty litter, food waste, grease, coffee grounds, old clothes. shoes, window glass, mirrors, yard waste (grass and tree trimmings).

BULKY ITEMS: (Call District office 893-3553 to arrange pick up on trash day). Two items per month including washers, dryers, hot water heaters, refrigerators and other appliances, furniture, and mattresses.

HOUSEHOLD HAZARDOUS WASTES: (DO NOT put in trash, take to Orange County Collection Centers at 17121 Nichols, in Huntington Beach or 1131 Blue Gum Ave. in Anaheim). Antifreeze batteries. pesticides, herbicides, clear solvents, motor oil and filters, paints, paint thinner are accepted at the center. Biological and radioactive waste, ammunition, explosives and asbestos are not accepted. Call County at 834-6752 for information.

SEWERS: Do not pour cooking oil, grease or coffee grounds down the sink. They plug up sewer lines, and increase service costs. They should be disposed of in closed containers and placed in the trash.

MOTOR OIL DISPOSAL: In addition to the County disposal sites, Westminster residents may telephone the City of Westminster for free pick service at the home (telephone 1 800 576-0041). Small quantities of used motor oil in covered containers may be taken to the District at 14451 Cedarwood Avenue in Westminster.

CHRISTMAS TREES: Strip off ornamentation and set out with trash on collection day. Do not place in barrels. They will be picked up by special trucks for two or three weeks after Christmas and recycled.

WHAT GOES WHERE?

Periodically, we update the list of what is and is not recyclable. We are pleased to say that the list of recyclable items keeps growing! Here is a complete list of items that are and are not recyclable. The list can be clipped out of the newsletter for posting in your home. ■

Your Blue Container

RECYCLABLE

Aerosol cans (must be completely empty)
Aluminum cans (please do not crush)
Aluminum foil
Beverage cans
Bottle caps
Brochures
Cardboard
Cardboard 12-pack soda container boxes
Cereal boxes (remove the inner paper lining)
Computer paper
Coupons
Drink boxes
Egg cartons (cardboard and foam)
Foam cups and plates
Food cans
Glass bottles and jars
Glass cosmetic bottles (remove caps and lids)
Juice cartons
Junk mail
Laundry bottles
Ledger paper
Lids and container closures
Magazines
Metal coat hangers
Milk/half & half/cream cartons
Newspapers
Paper
Paper tubes
Phone books
Pizza boxes
All recyclable plastics
Plastic bags
Plastic bottles (small mouthed)
Plastic containers
Plastic cups/plates/utensils
Plastic milk jugs
Styrofoam
Tin cans
Tissue boxes
Used envelopes (including those with plastic windows)
Wrapping paper
Yogurt containers

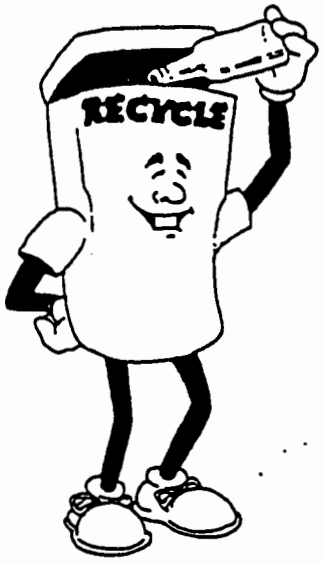

Your Black Container

NON-RECYCLABLE

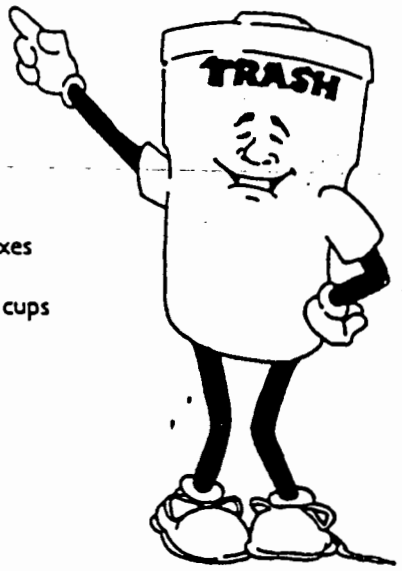

Bathroom wastes
Carbon paper
Cigarette butts
Drinking glasses
Electronic equipment
Flooring
Food waste
Freezer/refrigerator food boxes
Furniture
Glass and ceramic plates and cups
Liquid waste
Mirrors
Needles
Old clothes/shoes
Plastic toys
Rags
Sponges
Toothpaste tubes/pumps
Soiled paper plates
Waxed paper
Window glass
Yard waste (can be composted)
Animal Waste*
Cat litter*
Disposable diapers*
***Bagged, tied, and placed in black container**

HOUSEHOLD HAZARDOUS WASTE

FOR DISPOSAL AT THE ORANGE COUNTY HOUSEHOLD HAZARDOUS WASTE COLLECTION CENTER

Antifreeze
Aerosol can (full or partially full)
Household cleaners
Motor oil
Paints (latex or oil-based)
Paint thinner

HAZARDOUS MATERIALS HOTLINE
714 834-6752

District Holiday Schedule - New Year's Day, Memorial Day, Fourth of July, Labor Day, Thanksgiving and Christmas Day.

Need Additional Information? Please telephone the District Office at (714) 893-3553 for details on the Recycle Midway City Sanitary District Program. Please note that all provided containers are property of the Midway City Sanitary District. Your cooperation in protecting containers from abuse or negligence will be appreciated. Remember, containers must be left behind if you move away.

As a reminder, if your street sweeping is scheduled the same day as refuse collection, please do not place your container in the street. Place the container on the sidewalk or parkway area with the wheels facing your home. If you do not have street sweeping on the same day, place the container at the curb. The new automated truck can service your container from those areas.

MIDWAY CITY SANITARY DISTRICT

NEWSLETTER - WINTER 1999

14451 CEDARWOOD AVE. • WESTMINSTER, CA 92683
(714) 893-3553

"GIVING EXCELLENT SERVICE AT THE LOWEST RATE IN ORANGE COUNTY"

Board of Directors

Grace P. Epperson
James V. Evans
Joy L. Neugebauer
Russell C. Paris
Margie L. Rice

General Manager

Del Boyer

MIDWAY CITY SANITARY DISTRICT EXCEEDS STATE RECYCLING REQUIREMENT!

The residents and businesses within the Midway City Sanitary District now recycle more than 50% percent of their waste. By recycling 53.9% percent of their waste, pending State approval, the District will exceed the Year 2000 State-mandated 50 percent recycling requirement. Congratulations and keep up the good work!

WE'RE IN THE MOVIES

We are shooting moving pictures (television pictures that is) of the inside of our sewer to determine their condition. Up to now we have televised approximately 25 miles of our 168-mile system and found broken sewers that will cost $775,000 to fix.

Fortunately for us, the Orange County Sanitation District established their Cooperative Services Program. Through this program, the Sanitation District gives matching funds for the repair of sewers. Our District applied for and received $347,500 in matching funds, which means we have to pay the remaining $427,500. The Midway City Sanitary District is paying their matching fund amount out of reserve funds that have been saved for this purpose. We project our televising and repair program for the whole District will take eight years.

YOUR SEWER NEEDS CARE

House grease should never be dumped into your drains. The grease builds up on the side of your sewer and can plug it. Save a plumber's service fee, put excess grease in a container and dispose of it in your black container.

YOUR RATES - LOWEST IN THE COUNTY

As a result of your efforts, the Midway City Sanitary District is proud to currently have the lowest rate for customer service in the County of Orange. The District is an independent special district providing refuse and sewer service in Westminster and Midway City.

GRASSCYCLING?

Grasscycling is the natural recycling of grass. Grass clippings left on the lawns after you mow decompose quickly and release valuable nutrients back into the soil. Grasscycling saves time (no more bagging), valuable landfill space, and money.

Grasscycling can be practiced with almost any mower. Just remove the collection bag and allow clippings to drop on the lawn. Retrofit kits can be purchased to convert lawnmowers that do not have a safety flap covering the opening where the bag fits into the chute.

You can also buy a special mower to recycle grass. Several lawnmower manufacturers have developed mulching or recycling mowers that cut grass into small pieces and force them into the soil. In fact, some are rechargeable, electric mowers that improve air quality while cutting your lawn. If you choose to grasscycle, always follow the "1/3 rule"; a lawn should be mowed so that no more than 1/3 of the length of the grass blade is cut in any one mowing. If a lawn is not cut frequently, the clippings will be too large to fall back to the soil and it will produce a "hay-like" look that can be unsightly.

052432918919 Americlean Environmental SRVS 740 LOCC 5-12-99 Log# 351 Miki (2) show

Announcing

City of Westminster

RESIDENTIAL

Used Oil Collection

The City of Westminster provides FREE used motor oil collection at your home or apartment. To schedule an appointment call:

1-800-576-0041

Westminster residents only

Funded by a grant from the California Integrated Waste Management Board

AMERICLEAN
ENVIRONMENTAL 2-25 sharoon1
Ad Control p/o

WANTED

USED MOTOR OIL

CITY OF WESTMINSTER

FREE PICKUP AND COLLECTION!

¡COLLECTION GRATIS!

The City of Westminster Now Provides Collection of Used Motor Oil at the Resident's Home or Apartment. To Schedule This Free Service, Please Call the Number Below:

La Cuidad de Westminster le ayuda a reciclar aceite usado de motor. Este servicio es para los residentes de Westminster solamente. Por favor, llame numero abajo y un representativo le puede hacer una cita, para recojer su aceite usado.

RECYCLE USED OIL

CITY OF WESTMINSTER RESIDENTS ONLY!

CALL 1-800-576-0041

FUNDED BY A GRANT FROM THE CALIFORNIA INTEGRATED WASTE MANAGEMENT BOARD

APPENDIX 3.2

ENVIRONMENTAL PERFORMANCE REPORT - SIGNIFICANT ISSUES ACTION PLANS & UPDATES

ENVIRONMENTAL PERFORMANCE REPORT - SIGNIFICANT ISSUES ACTION PLANS & UPDATES
COUNTY OF ORANGE

FORM 2

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: County of Orange

Facility: Laguna Niguel Park

Prepared By: John Robinson

Date: 6-12-00

Significant Issue	ACTION 1	ACTION 2	START DATE	END DATE	Action Plan Completed?
Materials Storage - Paint	Reconstruct a portion of the containment berm	Construct berm	1/1/98	6/30/98	Yes / No
If action plan is not completed, note progress made: Revised end date 12/15/98					

FORM 2

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: County of Orange

Facility: Laguna Niguel Park

☑ No More Significant Issues

Significant Issue (From Form 1):

Objective and Target Date:

Action Items

Actions To Be Taken	Responsible Party	Projected Start Date	Projected Completion Date	Comments

ORM 2

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: County of Orange

Facility: Health Care Complex

Prepared By: Patti Herschel

Date: 8-15-00

Significant Issue	ACTION 1	ACTION 2	START DATE	END DATE	Action Plan Completed?
Waste Storage - Biohazards	Train employees	Put up signs	2/1/98	6/30/98	Yes / No
If action plan is not completed, note progress made: Revised end date 12/98					

FORM 2

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: County of Orange

Facility: Health Care Complex

☑ No More Significant Issues

Significant Issue (From Form 1):

Objective and Target Date:

Action Items

Actions To Be Taken	Responsible Party	Projected Start Date	Projected Completion Date	Comments
Put up signs			Completed	Signs were up when I began my assignment as Building Mgr in March 1999.

Rcvd: 8/15/00 11:01AM; 7148348741 -> OC PFRD ENV RESOURCES ; Page 3
8-15-00 11:01am From-HCA BLDG 50 7148348741 T-881 P.03/03 F-378

FORM 2

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: County of Orange

Facility: Katella Yard

Prepared By: TAMARA KILLINGSWORTH

Date: 8/11/00

Significant Issue	ACTION 1	ACTION 2	START DATE	END DATE	Action Plan Completed?
Fuel Spills - Small **If action plan is not completed, note progress made:**	Place pan underneath vehicles	Conduct degreasing on wash pad	12/1/98	On going	Yes / No
Vehicle & Equipment Washing **If action plan is not completed, note progress made:**	Train employees		12/1/98	On going	Yes / No
Waste Storage **If action plan is not completed, note progress made:**	Train employees	Conduct inspections	12/1/98	On going	Yes / No

FORM 2

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: County of Orange

Facility: Katella Yard

☐ No More Significant Issues

Significant Issue (From Form 1):

Objective and Target Date: NONE

Action Items

Actions To Be Taken	Responsible Party	Projected Start Date	Projected Completion Date	Comments

FORM 2

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: County of Orange

Facility: Sheriff - Coroner Civic Center

Prepared By: Lucille Freer

Date: 7/17/00

Significant Issue	ACTION 1	ACTION 2	START DATE	END DATE	Action Plan Completed?
Vehicle Washing	Discontinue Runoff		7/1/98	12/30/99	(Yes) / No
If action plan is not completed, note progress made: Revised end date 12/99					

FORM 2

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: County of Orange

Facility: Sheriff - Coroner Civic Center

☒ No More Significant Issues

Significant Issue (From Form 1):

Objective and Target Date:

Action Items

Actions To Be Taken	Responsible Party	Projected Start Date	Projected Completion Date	Comments

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: County of Orange

Facility: Central Utility Facility

Prepared By: [illegible]

Date: 5/31/00

Significant Issue	ACTION 1	ACTION 2	START DATE	END DATE	Action Plan Completed?
Materials Storage - Chemicals	Construct a new berm		2/15/98	~~4/30/98~~ 10/30/98	Yes / No
If action plan is not completed, note progress made: Revised end date 12/98					

FORM 2

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: County of Orange

Facility: Central Utility Facility

☒ No More Significant Issues

Significant Issue (From Form 1):

Objective and Target Date:

Action Items

Actions To Be Taken	Responsible Party	Projected Start Date	Projected Completion Date	Comments

ENVIRONMENTAL PERFORMANCE REPORT - SIGNIFICANT ISSUES ACTION PLANS & UPDATES

CITY OF ANAHEIM

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Anaheim

Facility: Streets & Sanitation #28

Prepared By: ROD HALLOCK

Date: 7/20/00

Significant Issue	ACTION 1	ACTION 2	START DATE	END DATE	Action Plan Completed?
Material Storage - Asphalt/Dirt	Install a clarifier/Construct asphalt berm		11/24/97	12/31/97	Yes / (No)
If action plan is not completed, note progress made:				Revised 12/99	
General Stormwater Runoff	Install a clarifier		11/24/97	6/30/99	Yes / (No)
If action plan is not completed, note progress made: None noted					

FORM 2

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Anaheim

Facility: Streets & Sanitation #28

☐ No More Significant Issues

Significant Issue (From Form 1): GENERAL STORMWATER RUNOFF - INSTALL CLARIFIER

Objective and Target Date:
INSTALL DRAIN INLET FILTERS 6/30/01

Action Items

Actions To Be Taken	Responsible Party	Projected Start Date	Projected Completion Date	Comments
ISSUE A BLANKET PURCHASE ORDER TO A	ROD HALLOCK	11/24/97	6/30/01	*
CONTRACTOR TO INSTALL AND SERVICE				
FOUR STORMWATER INLET FILTERS				

* THE PREVIOUS PLAN WAS TO INSTALL ONE LARGE CLARIFIER AND INSTALL NEW DRAIN LINES TO DIRECT RUN OFF TO THE CLARIFIER. WE DECIDED WE COULD CAPTURE AND FILTER A GREATER AMOUNT OF RUNOFF BY INSTALLING FILTERS IN ALL EXISTING STORM DRAIN INLETS. WE WERE IN CONTRACT NEGOTIATIONS WITH ONE DRAIN FILTER CONTRACTOR BUT THE CONTRACTOR COULD NOT DELIVER THE DEBRIS DISPOSAL SERVICE WE REQUESTED. WE ARE CURRENTLY PREPARING A SERVICE CONTRACT WITH A NEW DRAIN FILTER SERVICE CONTRACTOR.

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Anaheim

Facility: Streets & Sanitation #28

☐ No More Significant Issues

Significant Issue (From Form 1): MATERIAL STORAGE - ASPHALT/DIRT - INSTALL CLARIFIER AND ASPHALT BERM

Objective and Target Date:
CONSTRUCT METAL ROOFING TO COVER BUNKERS 6/30/01

Action Items

Actions To Be Taken	Responsible Party	Projected Start Date	Projected Completion Date	Comments
CONSTRUCT METAL ROOFING TO COVER BUNKERS	HECTOR CRUZ	11/24/97	6/30/01	*

* WE HAVE DECIDED TO CONSTRUCT METAL ROOFING OVER THE MATERIALS BUNKERS TO PREVENT RUNOFF DURING STORMS. THIS PROJECT WAS DELAYED DURING 99/00 BECAUSE OTHER MODIFICATIONS TO OUR METAL BUILDINGS WERE IDENTIFIED AND WE WANT TO AWARD ALL THE NEW METAL STRUCTURE WORK ON ONE CONTRACT. WE STILL COVER OUR MATERIALS BUNKERS WITH TARPS DURING RAIN STORMS TO PREVENT RUN OFF UNTIL THE METAL ROOFING IS CONSTRUCTED. WE WILL STILL INSTALL STORM DRAIN INLET FILTERS (INSTEAD OF A CLARIFIER) IN addition TO THE METAL ROOFING (WE WILL DO BOTH).

C: LANG VECCHIONE

FORM 2

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Anaheim

Facility: Dad Miller Golf Course

Prepared By:

Date:

Significant Issue	ACTION 1	ACTION 2	START DATE	END DATE	Action Plan Completed?
Material Storage	Purchase tarps		11/15/97	On going	(Yes) / No
If action plan is not completed, note progress made: Need to purchase tarps					

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Anaheim

Facility: Dad Miller Golf Course

☐ No More Significant Issues

Significant Issue (From Form 1):

Objective and Target Date:

Action Items

Actions To Be Taken	Responsible Party	Projected Start Date	Projected Completion Date	Comments

FORM 2

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Anaheim

Facility: Anaheim Hills Yard

Prepared By:

Date:

Significant Issue	ACTION 1	ACTION 2	START DATE	END DATE	Action Plan Completed?
Material Storage	Purchase tarps		11/15/97	On going	Yes / No
If action plan is not completed, note progress made: Need to purchase tarps					

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Anaheim

Facility: Anaheim Hills Yard

☒ No More Significant Issues

Significant Issue (From Form 1):

Objective and Target Date:

Action Items

Actions To Be Taken	Responsible Party	Projected Start Date	Projected Completion Date	Comments

FORM 2

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Anaheim

Facility: Fire Station One

Prepared By: Roger Smith

Date: 7/5/00

Significant Issue	ACTION 1	ACTION 2	START DATE	END DATE	Action Plan Completed?
Vehicle Washing	Relocate wash area		3/1/98	3/1/99	Yes / No
If action plan is not completed, note progress made: None noted					

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Anaheim

Facility: Fire Station One

☒ No More Significant Issues

Significant Issue (From Form 1):

Objective and Target Date:

Action Items

Actions To Be Taken	Responsible Party	Projected Start Date	Projected Completion Date	Comments

FORM 2

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Anaheim

Facility: Fire Station Two

Prepared By: Roger Smith

Date: 7/5/00

Significant Issue	ACTION 1	ACTION 2	START DATE	END DATE	Action Plan Completed?
Vehicle Washing	Relocate wash area		3/1/98	3/1/99	Yes / No
If action plan is not completed, note progress made: None noted					

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Anaheim

Facility: Fire Station Two

☒ No More Significant Issues

Significant Issue (From Form 1):

Objective and Target Date:

Action Items

Actions To Be Taken	Responsible Party	Projected Start Date	Projected Completion Date	Comments

FORM 2

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Anaheim

Facility: Fire Station Four

Prepared By: Roger Smith

Date: 7/5/00

Significant Issue	ACTION 1	ACTION 2	START DATE	END DATE	Action Plan Completed?
Vehicle Washing	Relocate wash area		3/1/98	3/1/99	Yes / No
If action plan is not completed, note progress made: None noted					

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Anaheim

Facility: Fire Station Four

☒ No More Significant Issues

Significant Issue (From Form 1):

Objective and Target Date:

Action Items

Actions To Be Taken	Responsible Party	Projected Start Date	Projected Completion Date	Comments

FORM 2

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Anaheim

Facility: Fire Station Five

Prepared By: Roger Smith

Date: 7/5/00

Significant Issue	ACTION 1	ACTION 2	START DATE	END DATE	Action Plan Completed?
Vehicle Washing	Relocate wash area		3/1/98	3/1/99	Yes / No
If action plan is not completed, note progress made: None noted					

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Anaheim

Facility: Fire Station Five

☒ No More Significant Issues

Significant Issue (From Form 1):

Objective and Target Date:

Action Items

Actions To Be Taken	Responsible Party	Projected Start Date	Projected Completion Date	Comments

FORM 2

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Anaheim

Facility: Fire Station Six

Prepared By: Roger Smith

Date: 7/5/00

Significant Issue	ACTION 1	ACTION 2	START DATE	END DATE	Action Plan Completed?
Vehicle Washing	Relocate wash area		3/1/98	3/1/99	Yes / No
If action plan is not completed, note progress made: None noted					

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Anaheim

Facility: Fire Station Six

☒ No More Significant Issues

Significant Issue (From Form 1):

Objective and Target Date:

Action Items

Actions To Be Taken	Responsible Party	Projected Start Date	Projected Completion Date	Comments

FORM 2

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Anaheim

Facility: Fire Station Seven

Prepared By: Roger Smith

Date: 7/5/00

Significant Issue	ACTION 1	ACTION 2	START DATE	END DATE	Action Plan Completed?
Vehicle Washing	Relocate wash area		3/1/98	3/1/99	Yes / No
If action plan is not completed, note progress made: None noted					

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Anaheim

Facility: Fire Station Seven

☒ No More Significant Issues

Significant Issue (From Form 1):

Objective and Target Date:

Action Items

Actions To Be Taken	Responsible Party	Projected Start Date	Projected Completion Date	Comments

FORM 2

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Anaheim

Facility: Fire Station Eight

Prepared By: Roger Smith

Date: 7/5/00

Significant Issue	ACTION 1	ACTION 2	START DATE	END DATE	Action Plan Completed?
Vehicle Washing	Relocate wash area		3/1/98	3/1/99	Yes No
If action plan is not completed, note progress made: None noted					

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Anaheim

Facility: Fire Station Eight

☒ No More Significant Issues

Significant Issue (From Form 1):

Objective and Target Date:

Action Items

Actions To Be Taken	Responsible Party	Projected Start Date	Projected Completion Date	Comments

FORM 2

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Anaheim

Facility: Fire Station Nine

Prepared By: Roger Smith

Date: 7/5/00

Significant Issue	ACTION 1	ACTION 2	START DATE	END DATE	Action Plan Completed?
Vehicle Washing	Relocate wash area		3/1/98	3/1/99	Yes / No
If action plan is not completed, note progress made: None noted					

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Anaheim

Facility: Fire Station Nine

☒ No More Significant Issues

Significant Issue (From Form 1):

Objective and Target Date:

Action Items

Actions To Be Taken	Responsible Party	Projected Start Date	Projected Completion Date	Comments

FORM 2

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Anaheim

Facility: Fire Station Ten

Prepared By: Roger Smith

Date: 7/5/00

Significant Issue	ACTION 1	ACTION 2	START DATE	END DATE	Action Plan Completed?
Vehicle Washing	Relocate wash area		3/1/98	3/1/99	Yes / No
If action plan is not completed, note progress made: None noted					

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Anaheim

Facility: Fire Station Ten

☒ No More Significant Issues

Significant Issue (From Form 1):

Objective and Target Date:

Action Items

Actions To Be Taken	Responsible Party	Projected Start Date	Projected Completion Date	Comments

FORM 2

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Anaheim

Facility: Convention Center

Prepared By:

Date:

Significant Issue	ACTION 1	ACTION 2	START DATE	END DATE	Action Plan Completed?
Material Storage - Chemical Coolant	Install containment system		2/1/98	7/31/98	Yes / No
If action plan is not completed, note progress made: None stated					
Transfer Area	Install curbs, drains and clarifier		6/1/98	10/31/98	Yes / No
If action plan is not completed, note progress made: None stated					

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Anaheim

Facility: Convention Center

☒ No More Significant Issues

Significant Issue (From Form 1):

Objective and Target Date:

Action Items

Actions To Be Taken	Responsible Party	Projected Start Date	Projected Completion Date	Comments

ENVIRONMENTAL PERFORMANCE REPORT - SIGNIFICANT ISSUES ACTION PLANS & UPDATES

CITY OF BREA

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Brea

Facility: Service Center

Prepared By: Beatrice Ramirez/Jerry Mesa

Date: 7/20/00

Significant Issue	ACTION 1	ACTION 2	START DATE	END DATE	Action Plan Completed?
Vehicle/Equipment Wash Water If action plan is not completed, note progress made:	Construct new wash facility with water recycling		05/01/1997	03/01/1999	Yes / No
Steam Cleaning If action plan is not completed, note progress made:	Provide new location (move to newly contstructed facility)		05/01/1997	03/01/1999	Yes / No
Sweeper Transfer Area If action plan is not completed, note progress made:	Capture and treat runoff from dump pile		05/01/1997	03/01/1999	Yes / No

ENVIRONMENTAL PERFORMANCE REPORT - SIGNIFICANT ISSUES ACTION PLANS & UPDATES

CITY OF BUENA PARK

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Buena Park

Facility: Vehicle Maintenance Yard

Prepared By: Paul DePietro

Date: July 17, 2000

Significant Issue	ACTION 1	ACTION 2	START DATE	END DATE	Action Plan Completed?
Fuel Spills - Small and Large	Placed spill cleanup materials.	Inspect daily and sweep	11/1/97	On going	Yes / No
Hazardous Materials Storage	Purchased secondary containment pallets.	Conduct daily inspections	11/1/97	On going	Yes / No
Material Storage - Oil Drums	Purchased secondary containment pallets.	Conduct daily inspections	11/1/97	On going	Yes / No
Material Storage - Paint	Purchased secondary containment pallets.	Conduct daily inspections	11/1/97	On going	Yes / No
Material Storage - Garage	Purchased secondary containment pallets.	Conduct daily inspections	11/1/97	On going	Yes / No

If action plan is not completed, note progress made:

FORM 2

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Buena Park

Facility: Vehicle Maintenance Yard

☐ No More Significant Issues

Significant Issue (From Form 1):

Objective and Target Date:	Removed, replaced and retrofitted underground storage tanks to meet secondary containment standards. This project was completed in November 1999.

Action Items

Actions To Be Taken	Responsible Party	Projected Start Date	Projected Completion Date	Comments
Removed, replaced and retrofitted	Paul DePietro	December-98	November-99	
underground storage tanks at City				
Yard, Fire Stations and Police Dept.				

ENVIRONMENTAL PERFORMANCE REPORT - SIGNIFICANT ISSUES ACTION PLANS & UPDATES

CITY OF COSTA MESA

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Costa Mesa

Facility: New Corporation Yard

Prepared By: Bruce Covey

Date: 7-27-00

Significant Issue	ACTION 1	ACTION 2	START DATE	END DATE	Action Plan Completed?
Sweeper Transfer Area	New sweeper dump area to be constructed		December 2000	February 2000	Yes / No X
If action plan is not completed, note progress made: Budget 12/15/00					

FORM 2

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Costa Mesa

Facility: New Corporation Yard

☐ No More Significant Issues

Significant Issue (From Form 1): Prevent sweeper debris liquid from entering storm drain system.

Objective and Target Date: Relocate debris site and use approved sewer clarifier and drain.

Action Items

Actions To Be Taken	Responsible Party	Projected Start Date	Projected Completion Date	Comments
Budget in FY 1999-2000	Bruce Covey	December 2000	February 2000	on schedule

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Costa Mesa

Facility: Old Corporation Yard

Prepared By: Bruce Covey

Date: 7-27-00

Significant Issue	ACTION 1	ACTION 2	START DATE	END DATE	Action Plan Completed?
Large & Small Spills	Install waterproof cover on existing frame work		September 2000	October 2000	Yes / No X
If action plan is not completed, note progress made: Budget 6/30/99					

FORM 2

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Costa Mesa

Facility: Old Corporation Yard

☐ No More Significant Issues

Significant Issue (From Form 1): Large and small spills

Objective and Target Date: Construct a roof for paint cleaning area

Action Items

Actions To Be Taken	Responsible Party	Projected Start Date	Projected Completion Date	Comments
Budget or use end-of-year funds to construct a roof	Bruce Covey	September 2000	October 2000	on schedule

ENVIRONMENTAL PERFORMANCE REPORT - SIGNIFICANT ISSUES ACTION PLANS & UPDATES

CITY OF CYPRESS

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Cypress

Facility: Corporation Yard

Prepared By: Gonzalo Vazquez/Bill Raymond

Date: July 28,2000

Significant Issue	ACTION 1	ACTION 2	START DATE	END DATE	Action Plan Completed?
Waste Storage - Paint	Provide covered storage area		11/1/00	1/1/01	Yes / No
If action plan is not completed, note progress made: Revised end date 1/1/01 - Funded as capital project in fiscal year 2000-2001					
Fluid Transfer Area	Construct berm around perimeter		11/1/00	1/1/01	Yes / No
If action plan is not completed, note progress made: Revised end date 1/1/01 - Funded as capital project in fiscal year 2000-2001					
Fluid Transfer Area	Utilize effective housekeeping techniques		2/1/98	2/1/99	Yes / No
If action plan is not completed, note progress made: 2/1/99					
Spills - Small	Tarp landscape equipment to cover		2/1/98	8/1/00	Yes / No
If action plan is not completed, note progress made: 8/1/00					
Material Storage	Install roof over storage area	Temporarily cover bins	9/1/98	1/1/01	Yes / No
If action plan is not completed, note progress made: Revised end date 1/1/01 - Funded as capital project in fi					
Vehicle/Equipment Wash Water	Inspect wash rack drainage system regularily		1/1/98	2/1/99	Yes / No
If action plan is not completed, note progress made: 2/1/99					

FORM 2

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Cypress

Facility: Corporation Yard

☐ No More Significant Issues

Significant Issue (From Form 1):

Fluid storage inside of building and ongoing equipment and vehicle maintenance

Objective and Target Date:

To install a berm around automotive fluids stored inside of garage to prevent any potential spill flows outside of building and performance of regularly scheduled maintenance of equipment so to remove any exposed grease and prevent any potential runoff

Action Items

Actions To Be Taken	Responsible Party	Projected Start Date	Projected Completion Date	Comments
Install berm around fluid drums inside of garage	Maintenance Division	9/1/00	9/30/00	
Increase frequency of vehicle maintenance	Maintenance Division	9/1/00	Ongoing	Will be ongoing program

ENVIRONMENTAL PERFORMANCE REPORT - SIGNIFICANT ISSUES ACTION PLANS & UPDATES

CITY OF DANA POINT

FORM 2

006384

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Dana Point

Facility: Del Obispo Community Center

Prepared By: Cindy Asher

Date: July 27, 2000

[X] No Significant Issues *

* This municipal facility **does not** have any of the following operations that could contribute to storm-water pollution.

- Hazardous materials stored on-site.
- Waste stored or handled on-site.
-Vehicle and equipment maintenance activiites.

Significant Issue (From Form 1):

Objective and Target Date:

Action Items

Actions To Be Taken	Responsible Party	Projected Start Date	Projected Completion Date	Comments

FORM 2

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Dana Point

Facility: City Plaza - Dana Point City Hall

Prepared By: Cindy Asher

Date: July 27, 2000

[X] No* Significant Issues

* This municipal facility does not have any of the follow operations that could contribute to stormwater pollutio

- Hazardous materials stored or handled on-site.
- Waste stored or handled on-site.
- Vehicle and equipment maintenance activities.

Significant Issue (From Form 1):

Objective and Target Date:

Action Items

Actions To Be Taken	Responsible Party	Projected Start Date	Projected Completion Date	Comments

ENVIRONMENTAL PERFORMANCE REPORT - SIGNIFICANT ISSUES ACTION PLANS & UPDATES

CITY OF FOUNTAIN VALLEY

ENVIRONMENTAL PERFORMANCE REPORT - SIGNIFICANT ISSUES ACTION PLANS & UPDATES

CITY OF FULLERTON

ENVIRONMENTAL PERFORMANCE REPORT - SIGNIFICANT ISSUES ACTION PLANS & UPDATES

CITY OF GARDEN GROVE

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Garden Grove

Facility: Municipal Service Center

Prepared By: Maria Stipe

Date: 7/28/00

Significant Issue	ACTION 1	ACTION 2	START DATE	END DATE	Action Plan Completed?
Hazardous Materials Storage	Training of personnel		12/1/98	Ongoing	(Yes) / No
If action plan is not completed, note progress made: Annual training completed 4/00					

FORM 2

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Garden Grove

Facility: Municipal Service Center

[X] No More Significant Issues

Significant Issue (From Form 1):

Objective and Target Date:

Action Items

Actions To Be Taken	Responsible Party	Projected Start Date	Projected Completion Date	Comments

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Garden Grove

Facility: Fire Station #2

Prepared By: Maria Stipe

Date: 7/28/00

Significant Issue	ACTION 1	ACTION 2	START DATE	END DATE	Action Plan Completed?
Hazardous Materials Storage	Training of personnel		12/1/98	Ongoing	Yes / No
If action plan is not completed, note progress made: Annual training completed 4/00					

FORM 2

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Garden Grove

Facility: Fire Station #2

[X] No More Significant Issues

Significant Issue (From Form 1):

Objective and Target Date:

Action Items

Actions To Be Taken	Responsible Party	Projected Start Date	Projected Completion Date	Comments

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Garden Grove

Facility: Fire Station #3

Prepared By: Maria Stipe

Date: 7/28/00

Significant Issue	ACTION 1	ACTION 2	START DATE	END DATE	Action Plan Completed?
Hazardous Materials Storage	Training of personnel		12/1/98	Ongoing	(Yes) / No
If action plan is not completed, note progress made: Annual training completed 4/00					

FORM 2

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Garden Grove

Facility: Fire Station #3

[X] No More Significant Issues

Significant Issue (From Form 1):

Objective and Target Date:

Action Items

Actions To Be Taken	Responsible Party	Projected Start Date	Projected Completion Date	Comments

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Garden Grove

Facility: Fire Station #4

Prepared By: Maria Stipe

Date: 7/28/2000

Significant Issue	ACTION 1	ACTION 2	START DATE	END DATE	Action Plan Completed?
Hazardous Materials Storage	Training of personnel		12/1/98	Ongoing	Yes / No
If action plan is not completed, note progress made: Annual training completed 4/00					

FORM 2

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Garden Grove

Facility: Fire Station #4

[X] No More Significant Issues

Significant Issue (From Form 1):

Objective and Target Date:

Action Items

Actions To Be Taken	Responsible Party	Projected Start Date	Projected Completion Date	Comments

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Garden Grove

Facility: Fire Station #5

Prepared By: Maria Stipe

Date: 7/28/2000

Significant Issue	ACTION 1	ACTION 2	START DATE	END DATE	Action Plan Completed?
Hazardous Materials Storage	Training of personnel		12/1/98	Ongoing	(Yes) / No
If action plan is not completed, note progress made: Annual training completed 4/00					

FORM 2

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Garden Grove

Facility: Fire Station #5

[X] No More Significant Issues

Significant Issue (From Form 1):

Objective and Target Date:

Action Items

Actions To Be Taken	Responsible Party	Projected Start Date	Projected Completion Date	Comments

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Garden Grove

Facility: Fire Station #6

Prepared By: Maria Stipe

Date: 7/28/00

Significant Issue	ACTION 1	ACTION 2	START DATE	END DATE	Action Plan Completed?
Hazardous Materials Storage	Training of personnel		12/1/98	Ongoing	Yes / No
If action plan is not completed, note progress made: Annual training completed 4/00					

FORM 2

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Garden Grove

Facility: Fire Station #6

[X] No More Significant Issues

Significant Issue (From Form 1):

Objective and Target Date:

Action Items

Actions To Be Taken	Responsible Party	Projected Start Date	Projected Completion Date	Comments

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Garden Grove

Facility: Fire Station #7

Prepared By: Maria Stipe

Date:7/28/00

Significant Issue	ACTION 1	ACTION 2	START DATE	END DATE	Action Plan Completed?
Hazardous Materials Storage	Training of personnel		12/1/98	Ongoing	Yes / No
If action plan is not completed, note progress made: Annual training completed 4/00					

FORM 2

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Garden Grove

Facility: Fire Station #7

[X] No More Significant Issues

Significant Issue (From Form 1):

Objective and Target Date:

Action Items

Actions To Be Taken	Responsible Party	Projected Start Date	Projected Completion Date	Comments

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Garden Grove

Facility: City Hall

Prepared By: Maria Stipe

Date: 7/28/00

Significant Issue	ACTION 1	ACTION 2	START DATE	END DATE	Action Plan Completed?
Materials Storage	Replace generator		TBD	12/29/99	Yes / No
If action plan is not completed, note progress made:		Revised end date: 2005. The action plan was not completed due to funding contraints. However, the integrety of the existing emergency generator remains good and is inspected on a regular basis. **Should funding become available sooner than 2005, the end date will be accelerated.*			

FORM 2

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Garden Grove

Facility: City Hall

☐ No More Significant Issues

Significant Issue (From Form 1):

Objective and Target Date:

Action Items

Actions To Be Taken	Responsible Party	Projected Start Date	Projected Completion Date	Comments

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Garden Grove

Facility: Police & Fire Station

Prepared By: Maria Stipe

Date: 7/28/00

Significant Issue	ACTION 1	ACTION 2	START DATE	END DATE	Action Plan Completed?
Hazardous Materials Storage	Training of personnel		12/1/98	On going	Yes / No
If action plan is not completed, note progress made: Annual training completed 4/00					

FORM 2

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Garden Grove

Facility: Police & Fire Station

[X] No More Significant Issues

Significant Issue (From Form 1):

Objective and Target Date:

Action Items

Actions To Be Taken	Responsible Party	Projected Start Date	Projected Completion Date	Comments

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Garden Grove

Facility: Willowick Golf Course

Prepared By: Maria Stipe

Date: 7/28/00

Significant Issue	ACTION 1	ACTION 2	START DATE	END DATE	Action Plan Completed?
Waste Storage	Build berm	Train personnel	11/1/98	12/1/98	Yes / No
If action plan is not completed, note progress made:		*Willowick Golf Course was incorrectly identified as a municipal facility and should not be included in this report. Donovan Golf Courses Management, Inc. leases this property from the City and operates the business. There are no municipal employees.*			
Vehicle & Equipment Washing	Install a clarifier		12/1/98	6/1/99	Yes / No
If action plan is not completed, note progress made:		*See a note above.*			

FORM 2

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Garden Grove

Facility: Willowick Golf Course

[X] No More Significant Issues

Significant Issue (From Form 1):

Objective and Target Date:

Action Items

Actions To Be Taken	Responsible Party	Projected Start Date	Projected Completion Date	Comments

ENVIRONMENTAL PERFORMANCE REPORT - SIGNIFICANT ISSUES ACTION PLANS & UPDATES

CITY OF HUNTINGTON BEACH

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Huntington Beach

Facility: Beach Maintenance Yard

Prepared By: Edward Magyar

Date: 14-Jul-00

Significant Issue	ACTION 1	ACTION 2	START DATE	END DATE	Action Plan Completed?
Material Storage - Oil	Construct berm		10/1/98	10/1/99	Yes
If action plan is not completed, note progress made: In Design 07/14/00					
Fuel Spills	Construct berm		10/1/98	10/1/99	Yes
If action plan is not completed, note progress made: In Design 07/14/00					
Underground Storage Tank	Remove underground storage tanks		12/1/98 (no longer used)	12/1/99 (removed)	Yes
If action plan is not completed, note progress made: In Pogress 12/1/98				Removed	

FORM 2

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Huntington Beach

Facility: Beach Maintenance Yard

☒ No More Significant Issues

Significant Issue (From Form 1):

Objective and Target Date:

Action Items

Actions To Be Taken	Responsible Party	Projected Start Date	Projected Completion Date	Comments

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Huntington Beach

Facility: Park Maintenance Facility

Prepared By: Edward Magyar

Date: 14-Jul-00

Significant Issue	ACTION 1	ACTION 2	START DATE	END DATE	Action Plan Completed?
Material Storage/Trash Bin	Construct berm		11/15/97	On going	No
If action plan is not completed, note progress made: In Design					
Fuel Spills - Large	Construct roof		11/15/97	On going	No
If action plan is not completed, note progress made: Under Construction					

FORM 2

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Huntington Beach

Facility: Park Maintenance Facility

☒ No More Significant Issues

Significant Issue (From Form 1):

Objective and Target Date:

Action Items

Actions To Be Taken	Responsible Party	Projected Start Date	Projected Completion Date	Comments

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Huntington Beach

Facility: Gothard Fire Station

Prepared By: **Edward Magyar**

Date: **14-Jul-00**

Significant Issue	ACTION 1	ACTION 2	START DATE	END DATE	Action Plan Completed?
Underground Storage Tank	Remove tanks			~~12/31/00~~	Yes
If action plan is not completed, note progress made: Complete 04-04-99					

FORM 2

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Huntington Beach

Facility: Gothard Fire Station

☒ No More Significant Issues

Significant Issue (From Form 1):

Objective and Target Date:

Action Items

Actions To Be Taken	Responsible Party	Projected Start Date	Projected Completion Date	Comments

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Huntington Beach

Facility: Joint Powers Training Center

Prepared By: Edward Magyar

Date: 14-Jul-00

Significant Issue	ACTION 1	ACTION 2	START DATE	END DATE	Action Plan Completed?
Trash Bin	Construct roof		12/1/98	On-going	No
If action plan is not completed, note progress made: Revised end date 12/1/99					
Trash Bin	Provide spill clean up materials		11/15/97	On going	No
If action plan is not completed, note progress made: Not Stated					

FORM 2

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Huntington Beach

Facility: Joint Powers Training Center

☒ No More Significant Issues

Significant Issue (From Form 1):

Objective and Target Date:

Action Items

Actions To Be Taken	Responsible Party	Projected Start Date	Projected Completion Date	Comments

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Huntington Beach

Facility: Warner Fire Station

Prepared By: Edward Magyar

Date: 14-Jul-00

Significant Issue	ACTION 1	ACTION 2	START DATE	END DATE	Action Plan Completed?
Underground Storage Tank	Remove tanks			4/1/99	Yes
If action plan is not completed, note progress made: In Progress 12/28/98					

FORM 2

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Huntington Beach

Facility: Warner Fire Station

☒ No More Significant Issues

Significant Issue (From Form 1):

Objective and Target Date:

Action Items

Actions To Be Taken	Responsible Party	Projected Start Date	Projected Completion Date	Comments

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Huntington Beach

Facility: Civic Center

Prepared By: Edward Magyar

Date: 14-Jul-00

Significant Issue	ACTION 1	ACTION 2	START DATE	END DATE	Action Plan Completed?
Fuel Spills	Replace fuel system		11/15/97	12/1/98	Yes
If action plan is not completed, note progress made: Under Construction					
Trash Bin - Police Parking Lot	Construct roof and berm		N/A	Pending Funding	No
If action plan is not completed, note progress made: In Progress					
Trash Bin - City Hall	Construct roof and berm		N/A	Complete	Yes
If action plan is not completed, note progress made: In Progress					
Vehicle/Equipment Wash Water	Construct vehicle washing bay		N/A	Pending Funding	No
If action plan is not completed, note progress made: In Progress					

FORM 2

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Huntington Beach

Facility: Civic Center

☒ No More Significant Issues

Significant Issue (From Form 1):

Objective and Target Date:

Action Items

Actions To Be Taken	Responsible Party	Projected Start Date	Projected Completion Date	Comments

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Huntington Beach

Facility: 19001 Huntington Street

Prepared By: Edward Magyar

Date: 14-Jul-00

Significant Issue	ACTION 1	ACTION 2	START DATE	END DATE	Action Plan Completed?
Fluoride Bulk Storage	Construct Roof For Area		1/1/98	12/1/1998 (Pending funding)	No
If action plan is not completed, note progress made: In Design 12/1/98					
Fuel Spill - Small	Replace fuel system		11/15/97	Complete 4-1-99	Yes
If action plan is not completed, note progress made: In Design 1/30/99					
Material Storage	Relocate and construct covered storage area		1/1/00	12/1/2001 (Funding needed)	Yes
If action plan is not completed, note progress made: In design					

FORM 2

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Huntington Beach

Facility: 19001 Huntington Street

☒ No More Significant Issues

Significant Issue (From Form 1):

Objective and Target Date:

Action Items

Actions To Be Taken	Responsible Party	Projected Start Date	Projected Completion Date	Comments

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Huntington Beach

Facility: Corporate Yard

Prepared By: Edward Magyar

Date: 14-Jul-00

Significant Issue	ACTION 1	ACTION 2	START DATE	END DATE	Action Plan Completed?
Fuel Spills	Construct berm		12/1/98	1/1/99	Yes
If action plan is not completed, note progress made: In Progrss 1/1/99					

FORM 2

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Huntington Beach

Facility: Corporate Yard

☒ No More Significant Issues

Significant Issue (From Form 1):

Objective and Target Date:

Action Items

Actions To Be Taken	Responsible Party	Projected Start Date	Projected Completion Date	Comments

ENVIRONMENTAL PERFORMANCE REPORT - SIGNIFICANT ISSUES ACTION PLANS & UPDATES

CITY OF IRVINE

ENVIRONMENTAL PERFORMANCE REPORT - SIGNIFICANT ISSUES ACTION PLANS & UPDATES

CITY OF LA HABRA

Received: 8/14/00 1:04PM; 5629059643 -> OC PFRD ENV RESOURCES ; Page 2
08/14/2000 12:04 FAX 5629059643 COMMUNITY DEV 02

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: La Habra

Facility: Public Works Yard

Prepared By: Alan Leung

Date: 8/10/2000

Significant Issue	ACTION 1	ACTION 2	START DATE	END DATE	Action Plan Completed?
Vehicle/Equipment Wash Water	Install clarifier		7/1/2001	6/30/02 (Pending funding)	Yes / (No)
If action plan is not completed, note progress made: Rebudget for clarifier 7/1/01					
Trash Bin	Construct a containment berm		7/1/2001	6/30/02 (Pending funding)	Yes / (No)
If action plan is not completed, note progress made: Design containment cover 7/1/01					
Material Storage - Chemicals	Cosntruct new chemical shed		7/1/1998	1999	(Yes) / No
If action plan is not completed, note progress made: Completed					

006429

FORM 2

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: La Habra

Facility: Public Works Yard

☒ No More Significant Issues

Significant Issue (From Form 1):

Objective and Target Date:

Action Items

Actions To Be Taken	Responsible Party	Projected Start Date	Projected Completion Date	Comments
SAME AS ABOVE				

ENVIRONMENTAL PERFORMANCE REPORT - SIGNIFICANT ISSUES ACTION PLANS & UPDATES

CITY OF LA PALMA

FOR

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ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: LA PALMA

[X] No Significant Issues

Facility: PUBLIC WORKS DEPARTMENT

Prepared By: ISMILE H. NOORBAKSH

Date: 8-8-00

Significant Issue (From Form 1): NONE

Objective and Target Date: N/ A

Action Items

Actions To Be Taken	Responsible Party	Projected Start Date	Projected Completion Date	Comments
N/ A				

ENVIRONMENTAL PERFORMANCE REPORT - SIGNIFICANT ISSUES ACTION PLANS & UPDATES

CITY OF LAGUNA BEACH

ENVIRONMENTAL PERFORMANCE REPORT - SIGNIFICANT ISSUES ACTION PLANS & UPDATES

CITY OF LAGUNA HILLS

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Laguna Hills

[X] No Significant Issues

Facility:

Prepared By: Kenneth H. Rosenfield, City Engineer

Date: July 27, 2000

Significant Issue (From Form 1): None

Objective and Target Date:

Action Items

Actions To Be Taken	Responsible Party	Projected Start Date	Projected Completion Date	Comments

ENVIRONMENTAL PERFORMANCE REPORT - SIGNIFICANT ISSUES ACTION PLANS & UPDATES

CITY OF LAGUNA NIGUEL

ENVIRONMENTAL PERFORMANCE REPORT - SIGNIFICANT ISSUES ACTION PLANS & UPDATES

CITY OF LAKE FOREST

FO[illegible]2

00[illegible]

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of:Lake Forest

[X] No Significant Issues

Facility:

Prepared By:

Date:

Significant Issue (From Form 1):

Objective and Target Date:

Action Items

Actions To Be Taken	Responsible Party	Projected Start Date	Projected Completion Date	Comments

ENVIRONMENTAL PERFORMANCE REPORT - SIGNIFICANT ISSUES ACTION PLANS & UPDATES

CITY OF LOS ALAMITOS

ENVIRONMENTAL PERFORMANCE REPORT - SIGNIFICANT ISSUES ACTION PLANS & UPDATES

CITY OF MISSION VIEJO

ENVIRONMENTAL PERFORMANCE REPORT - SIGNIFICANT ISSUES ACTION PLANS & UPDATES

CITY OF NEWPORT BEACH

ENVIRONMENTAL PERFORMANCE REPORT - SIGNIFICANT ISSUES ACTION PLANS & UPDATES

CITY OF ORANGE

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Orange

☒ No Significant Issues

Facility: ALL (includes City Hall, CoRP[1] and Water Yards)

Prepared By: James Bisetti - Administrative Analyst II

Date: June 15, 2000

Significant Issue (From Form 1): NONE

Objective and Target Date: ALL issues previously identified in last year's report and now COMPLETED. No new issues.

Action Items

Actions To Be Taken	Responsible Party	Projected Start Date	Projected Completion Date	Comments

1-City's maintenance facility at 637 W. Stuck

ENVIRONMENTAL PERFORMANCE REPORT - SIGNIFICANT ISSUES ACTION PLANS & UPDATES

CITY OF PLACENTIA

ENVIRONMENTAL PERFORMANCE REPORT - SIGNIFICANT ISSUES ACTION PLANS & UPDATES

CITY OF SAN CLEMENTE

ENVIRONMENTAL PERFORMANCE REPORT - SIGNIFICANT ISSUES ACTION PLANS & UPDATES

CITY OF SAN JUAN CAPISTRANO

ENVIRONMENTAL PERFORMANCE REPORT - SIGNIFICANT ISSUES ACTION PLANS & UPDATES

CITY OF SANTA ANA

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

10-1-99

City of: Santa Ana

Facility: Corporation Yard

☐ No More Significant Issues

Significant Issue (From Form 1): Leakage from Fluid Transfer Area: Material transfer Area S/E Yard.
* Same as spillage of waste

Objective and Target Date:
Move Drums to Covered Area, add containment Berms. 7-2000

Action Items

Actions To Be Taken	Responsible Party	Projected Start Date	Projected Completion Date	Comments
SC 5 - Berm Area	Corp/Yard Mgr.	1/2000	7/2000	*
SC 14 - Employee training	Supervisors	1/2000	7/2000	* *

		Action 1	Action 2	Action Plan completed
7-17-00	*	SC5 Berm Area		No
	**		SC 14 Training	Yes

* Berm Completion date 10-2000.

006448

FORM 2

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Santa Ana

Facility: Corporation Yard

☐ No More Significant Issues

Significant Issue (From Form 1): Small / Large Spills ; Street Sweeping Run-Off

Objective and Target Date:
Eliminate Street Sweeping Run-Off From reaching Storm Drain

Action Items

Actions To Be Taken	Responsible Party	Projected Start Date	Projected Completion Date	Comments
SC 5 Berm Area or	Corp/Yard Mgr	7-2000	12-2000	*
Contain Liquid.				
SC 14 Employee Training	Supervisors	7-2000	12-2000	* *

	Action 1	Action 2	Action Plan Completed
	* Berm Area or Contain Liquid		No
7-17-00	* *	SC14 Emp. Training	Yes

* Install Storm Drain Filtration System 1-2001

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Santa Ana

Facility: Corporation Yard

Prepared By:

Date:

Significant Issue	ACTION 1	ACTION 2	START DATE	END DATE	Action Plan Completed?
Material Storage - (Out Door) Chemicals	Construct a roof & containment berm	Train employees	1/5/98	7/1/98	Yes / No
If action plan is not completed, note progress made: In Progress					

See attached!

FORM 2

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Santa Ana

Facility: Corporation Yard

Prepared By: Terrill Price

Date: 7-1-99

Significant Issue	ACTION 1	ACTION 2	START DATE	END DATE	Action Plan Completed?
Material Storage - (Out Door) Chemicals	Construct a roof & containment berm	Train employees	1/5/98	7/1/98	Yes / No
If action plan is not completed, note progress made: In Progress					

Note: Chemical storage tank no longer in use!

ENVIRONMENTAL PERFORMANCE REPORT - SIGNIFICANT ISSUES ACTION PLANS & UPDATES

CITY OF SEAL BEACH

ENVIRONMENTAL PERFORMANCE REPORT - SIGNIFICANT ISSUES ACTION PLANS & UPDATES

CITY OF STANTON

FORM 2

00

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Stanton

Facility: 10652 Bell Street

Prepared By: Craig Stubbe and Pin Chan

Date: July 20, 2000

Enclosed storage pad with block on three sides, placed concrete on 1/2 of storage floor.

Significant Issue	ACTION 1	ACTION 2	START DATE	END DATE	Action Plan Completed?
Materials Storage **If action plan is not completed, note progress made: In progress**	Increase inspections of storage area	Train employees	11/15/97	On Going	Yes / No X

FORM 2

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Stanton

Facility: 10652 Bell Street

[X] No More Significant Issues

Significant Issue (From Form 1):

Objective and Target Date:

Action Items

Actions To Be Taken	Responsible Party	Projected Start Date	Projected Completion Date	Comments

ENVIRONMENTAL PERFORMANCE REPORT - SIGNIFICANT ISSUES ACTION PLANS & UPDATES

CITY OF TUSTIN

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Tustin

Facility: Corporate Yard

Prepared By: Thomas Lo (URS)

Date: 8/1/2000

Significant Issue	ACTION 1	ACTION 2	START DATE	END DATE	Action Plan Completed?
Sweeper Transfer Area	Temporary sand bag containment berms are in place preventing runoff from entering the storm drain system. Sump water is removed by the waste hauler and the sump pump is disabled to avoid accidental discharge into the storm drain system. **(Completed prior to 1999)**	**(2A)** Design and installation of canopy over sweeper transfer area.	N/A	N/A	**Yes (Action 1) / No (Action 2A)**
		(2B) Obtain wastewater discharge permit from the Orange County Sanitation District for wash rack discharge to the sanitary sewer.			**No (Action 2B)**
If action plan is not completed, note progress made:		Design of Canopy complete. Construction anticipated in October 2000. Wastewater discharge permit application complete. Being submitted to OCSD for issuance.			
If action plan is not completed, note progress made:			N/A	N/A	Yes
If action plan is not completed, note progress made:			N/A	N/A	Yes

FORM 2

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Tustin

Facility Corporate Yard

☐ No More Significant Issues

Significant Issue (From Form 1):

Objective and Target Date:

Action Items

Actions To Be Taken	Responsible Party	Projected Start Date	Projected Completion Date	Comments

ENVIRONMENTAL PERFORMANCE REPORT - SIGNIFICANT ISSUES ACTION PLANS & UPDATES

CITY OF VILLA PARK

ENVIRONMENTAL PERFORMANCE REPORT - SIGNIFICANT ISSUES ACTION PLANS & UPDATES

CITY OF WESTMINSTER

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Westminster

Facility: Corporation Yard

Prepared By:

Date:

Significant Issue	ACTION 1	ACTION 2	START DATE	END DATE	Action Plan Completed?
Paint Drying Area	Construct a canopy	removed drying area	1/1/98	5/1/98	Yes
If action plan is not completed, note progress made: we store drying paint in drums that aew pumped out when full.					

FORM 2

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Westminster

Facility: Corporation Yard

[X] No More Significant Issues

Significant Issue (From Form 1):

Objective and Target Date:

Action Items

Actions To Be Taken	Responsible Party	Projected Start Date	Projected Completion Date	Comments

ENVIRONMENTAL PERFORMANCE REPORT - SIGNIFICANT ISSUES ACTION PLANS & UPDATES

CITY OF YORBA LINDA

APPENDIX 3.3

BMP GUIDELINES

006464
Vicki L. Wilson, Director

COUNTY OF ORANGE

PUBLIC FACILITIES & RESOURCES DEPARTMENT

Environmental Resources
10852 Douglass Road
Anaheim, CA 92806

Telephone: (714) 567-6363
Fax: (714) 567-6220

April 03, 2000

To: Automotive Service Managers

Subject: Automotive Service Center Maintenance - Control of Wash Water Runoff

Dear Sir or Madam:

This letter is being sent to automotive service businesses to draw the attention of service managers to the need to eliminate the discharge of pollutants in wash water runoff to the street and storm drain and to explain why these discharges are of concern to municipalities in Orange County.

In 1990, pursuant to the federal Water Quality Act, Orange County's municipalities received National Pollutant Discharge Elimination System (NPDES) permits. These NPDES permits require the municipalities to eliminate non-stormwater discharges to their storm drain systems and reduce the discharge of pollutants in stormwater runoff to the maximum extent practicable. As a consequence of these requirements, Orange County's municipalities must address the routine disposal of automotive service center wash water runoff to the street and storm drain.

Pressure washing or steam cleaning of areas used for automotive servicing results in runoff containing detergents, caustic cleaning agents, oils and grease, and heavy metals. Consequently, eliminating the discharge of these pollutants to the street or storm drain will make a significant contribution towards protecting the creeks, rives, streams and sensitive receiving waters that ultimately receive all runoff from the municipal storm drain system.

The proper management of this waste stream can also help ensure that regulatory intervention to protect sensitive receiving waters and the municipal storm drain system is avoided. The State Fish and Game Code, State Water Code and local Water Quality Ordinances enforced by this Department and the cities of Orange County all include provision that prohibit unpermitted disposal of wastes to the municipal storm drain system and surface waters.

A number of automotive service centers already use "zero discharge" cleaning services or have arranged with sewering agencies for the direct disposal of waste to the sanitary sewer. If you have not previously considered arranging for the safe disposal of facility wash water, the

attached guidelines prepared by this Department in collaboration with the Regional Water Quality Control Board (Santa Ana Region), should be helpful to you.

Please direct any questions regarding this letter to Karen Ashby at (714) 567-6297.

Very truly yours,

Chris Crompton, Manager
Environmental Resources

Distribution

Attachment: Guidelines for Automotive Service Center Maintenance - Control of Wash Water Runoff

cc: Mark Smythe, Regional Water Quality Control Board - Region 8
Deborah Jayne, Regional Water Quality Control Board, Region 9
Dan Meer, USEPA Region IX
Co-Permittee Cities

GUIDELINES FOR CLEANING AUTOMOTIVE SERVICE FACILITIES

Steam/Pressure Washing of Vehicle Maintenance Areas & Fuel Dispensing Areas

- Block the storm drain and collect water/waste for disposal to the sanitary sewer (with the prior approval of the local sanitation district).

Pressure Washing Sidewalks, Parking Lots, Common Areas

- If soap or any other cleaning agent is used, block the storm drain and collect water/waste and discharge to the sanitary sewer (with the approval of the local sanitation district).

- If only tap water with no cleaning agent is used, then the following Best Management Practices (BMPs) must be implemented before pressure washing:

  - Prior to washing, clean and/or sweep all large debris from the area, and

  - Clean any oil/auto fluid spills with an appropriate dry method, such as kitty litter or other absorbent, and dispose of appropriately,

  - To the extent practicable, the wash water must be directed to vegetative or unpaved areas where it would percolate,

  - If visual observation of the wash water indicates contamination (cloudy, colored, presence of suspended solids), additional Best Management Practices such as temporary retention of wash water (sandbags around storm drain inlets) or filtration methods must be implemented prior to discharge.

For further information, please contact:

Karen Ashby, County of Orange, PFRD/Stormwater Section. Tel. (714) 567-6297
Mark Smythe, Regional Water Quality Control Board - Santa Ana Region. Tel. (909) 782-4998

GUIDELINES FOR CLEANING AUTOMOTIVE SERVICE FACILITIES

Steam/Pressure Washing of Vehicle Maintenance Areas & Fuel Dispensing Areas

- Block the storm drain and collect water/waste for disposal to the sanitary sewer (with the prior approval of the local sanitation district).

Pressure Washing Sidewalks, Parking Lots, Common Areas

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- If only tap water with no cleaning agents is used, then the following Best Management Practices (BMPs) must be implemented before pressure washing:

  - Prior to washing, clean and/ or sweep all large debris from the area, and

  - Clean any oil/auto fluid spills with an appropriate dry method, such as kitty litter or other absorbent, and dispose of appropriately,

  - To the extent practicable, the wash water must be directed to vegetative or unpaved areas where it would percolate,

  - If visual observation of the wash water indicates contamination (cloudy, colored, presence of suspended solids), additional best management practices such as temporary retention of wash water (sand bags around storm drain inlets) or filtration methods must be implemented prior to discharge.

For further information, please contact:

Richard Boon, County of Orange, PFRD/Stormwater Section. Tel. (714)567-6371
Laurie Taul, Regional Water Quality Control Board - Santa Ana Region Tel. (909)782-4906

County of Orange

Public Facilities & Resources Department

John W. Sibley, Director

June 10, 1998

To: Automotive Service Managers

Subject: Automotive Service Center Maintenance - Control of Wash Water Runoff

Dear Sir or Madam:

This letter is being sent to automotive service businesses to draw the attention of service managers to the need to eliminate the discharge of pollutants in wash water runoff to the street and storm drain and to explain why these discharges are of concern to municipalities in Orange County.

In 1990, pursuant to the federal Water Quality Act, Orange County's municipalities received National Pollutant Discharge Elimination System (NPDES) permits. These NPDES permits require the municipalities to eliminate non-stormwater discharges to their storm drain systems and reduce the discharge of pollutants in stormwater runoff to the maximum extent practicable. As a consequence of these requirements, the routine use of the street and storm drain for the disposal of automotive service center wash water runoff must be addressed by Orange County's municipalities.

The pressure washing or steam cleaning of areas that are used for automotive servicing generally means that any runoff will contain detergents, caustic cleaning agents, oils and grease, and heavy metals. Consequently, eliminating the discharge of these pollutants to the street or storm drain will make a significant contribution towards protecting the creeks, rivers, streams and sensitive receiving waters that ultimately receive all runoff from the municipal storm drain system.

The proper management of this waste stream can also help ensure that regulatory intervention to protect sensitive receiving waters and the municipal storm drain system is avoided. The State Fish and Game Code, State Water Code and local Water Quality Ordinances enforced by this Department and the cities of Orange County all include provisions that prohibit the unpermitted disposal of wastes to the municipal storm drain system and surface waters.

A number of automotive service centers already use "zero discharge" cleaning services or have arranged with sewering agencies for the direct disposal of waste to the sanitary sewer. If you have not previously considered arranging for the safe disposal of facility wash water, the attached guidelines, which have been prepared by this Department in collaboration with the Regional Water Quality Control Board (Santa Ana Region), should be helpful to you.

LOCATION:
300 N. FLOWER ST
SANTA ANA, CALIFORNIA

MAILING ADDRESS:
P.O. BOX 4048
SANTA ANA, CA 92702-4048

TELEPHONE:
(714) 834-2300
FAX # 834-5188

Please direct any questions regarding this letter to Richard Boon at (714)567-6371.

Very truly yours,

Chris Crompton
Manager
Environmental Resources

Attachment: Guidelines

CC: Laurie Taul, Regional Water Quality Control Board - Region 8
Deborah Jayne, Regional Water Quality Control Board - Region 9
Dan Meer, USEPA Region IX
City Representatives

For More Information...

Questions regarding this notice may be directed to:

The Orange County Public Facilities and Resources Department's Stormwater Section at (714)567-6363

Or

Pavlova Vitale of the Santa Ana Regional Water Quality Control Board at (909) 782-4130

ORANGE COUNTY • STORMWATER • PROGRAM

Orange County Stormwater Program
10852 Douglass Rd.
Anaheim, CA 92806

MOBILE DETAILING AND THE WATER QUALITY ACT

This flyer has been prepared at the request of the mobile detailing industry to provide direction with regard to compliance with the federal Water Quality Act of 1987.

THE WATER QUALITY ACT: Controlling Storm Drain Pollution

Under the federal Water Quality Act of 1987, the County and cities of Orange County are obligated to control the discharge of pollutants into storm drain systems. Specifically, National Pollutant Discharge Elimination System (NPDES) Permits issued by the state in 1990 pursuant to the Act prohibit the public agencies of Orange County from accepting, with few exceptions, non-stormwater discharges into these systems.

According to EPA, exceptions to local regulation include water line flushing, landscape irrigation water, water from potable water sources, foundation drains, air conditioning condensation, irrigation water, water from crawl space pumps, footing drains, lawn watering, individual residential car washing, dechlorinated swimming pool discharges, street wash runoff and fire fighting runoff.

The County's NPDES Permits prohibit, with few exceptions, non-stormwater discharges into the storm drain system.

Mobile Detailing Procedures

Since commercial vehicle washing, including mobile detailing, is not exempted, the following procedures should be adopted by individuals performing this service:

1. When cleaning engines and/or vehicles using chemical additives such as soaps, solvents or degreasers.

   a. Service must be performed at a facility that has the equipment to properly process the contaminated wastewater runoff, or

   b. Service must be performed using a leak-proof ground cover device that will catch and contain all contaminated wastewater runoff for later disposal in a manner that complies with all city, county, state and federal codes.

2. When engine cleaning is not involved, the service may be performed using only deionized water, purified water, and/or tap water with no additives for wash and rinse purposes. This water may then be discharged to the storm drain systems provided there is no visible evidence of chemical contamination such as foams, odors, discoloration, etc.

   When chemical products must be used to perform this type of service, they must be used on a spot basis, and wiped off prior to rinsing.

3. Equipment, such as ground cover devices, shall be regularly inspected and maintained to ensure proper and effective functioning.

Before you allow anything to go into the gutter or storm drain, stop to think!

Storm drains run directly into channels and creeks, through wetlands and to the ocean.

For More Information...

Questions regarding this brochure may be directed to:

The Orange County Public Facilities and Resources Department's Stormwater Section at (714) 567-6363

ORANGE COUNTY • STORMWATER • PROGRAM

Orange County Stormwater Program
10852 Douglass Road
Anaheim, CA 92806

000472

Pool Maintenance and the Water Quality Act

July 2000

This brochure has been prepared to inform the public of the guidelines that have been established regarding the discharge of pool water in Orange County in order to protect storm drains, channels, creeks and bays.

Pool Maintenance and the Water Quality Act

This brochure is presented to you to explain the regulatory issues regarding the discharge of pool water and the two methods by which it may be discharged.

Many pools are plumbed to allow the discharge to go directly to the sanitary sewer. This is an acceptable and preferred method of disposal.

Where the discharge of pool water to the sanitary sewer is not feasible, federal law allows the release of dechlorinated swimming pool water. In Orange County the guidlines for such releases requires pool owners to ensure that all the following criteria are met:

- The residential chlorine does not exceed 0.1 mg/l (parts per million);
- The pH is between 6.5 and 8.5;
- The water is free of any unusual coloration;
- There is no discharge of filter media;
- There is no discharge of acid cleaning wastes; and
- Any pipe connection to the stormdrain system has permits from the city or county having jurisdiction.

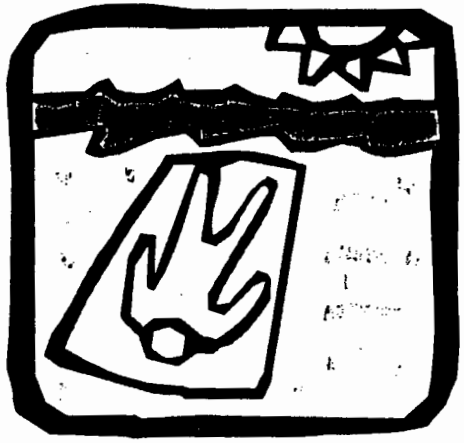

Compliance with this guidance can be verified using a pool testing kit. Excess chlorine can be removed by removing the chlorine tablets for a couple of days prior to discharge or by purchasing dechlorinating chemicals from local pool supply companies.

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By ensuring compliance with these criteria, you will make a significant contribution toward keeping pollutants out of Orange County's creeks, streams and receiving waters and help to protect organisms that are sensitive to pool chemicals.

Before you allow anything to go into the gutter or storm drain, stop to think.

Storm drains run directly into channels and creeks, through wetlands and to the ocean.

Remember the ocean begins at your front door.

GUIDELINES FOR RESTAURANT CLEANING OPERATIONS

General Cleaning Operations

- Clean floormats, filters and garbage cans in a mop sink, floor drain or contained area outside.
- Pour all washwater into a janitorial or mop sink.
- Keep dumpster area clean and closed, clean area following the guidelines listed below.

Steam/Pressure Washing of Dumpster Areas, Sidewalks and Common Areas

- Block the storm drain and collect all water/waste for disposal to the sanitary sewer (with the prior approval of the local sanitation district).

Hose Washing of Dumpster Areas, Sidewalks, Common Areas

- If hot water, soap or any other cleaning agent is used, block the storm drain and collect water/waste and discharge to the sanitary sewer (with the approval of the local sanitation district).
- If only cold tap water with no cleaning agent is used, then the following Best Management Practices (BMPs) must be implemented before washing:
  - Prior to washing, clean and/or sweep all large debris from the area, and
  - Clean any fluid spills with an appropriate dry method, such as kitty litter or other absorbent, and dispose of appropriately,
  - To the extent practicable, the wash water must be directed to vegetative or unpaved areas where it would percolate,
  - If visual observation of the wash water indicates contamination (cloudy, colored, presence of suspended solids), additional Best Management Practices such as temporary retention of wash water (sandbags around storm drain inlets) or filtration methods must be implemented prior to discharge.

For further information, please contact:

Karen Ashby, County of Orange, PFRD/Stormwater Section (714) 567-6297
Angela Duzich, City of Dana Point/Code Enforcement (949) 248-3565

APPENDIX 3.4

ORANGE COUNTY STORMWATER PROGRAM PUBLIC AND BUSINESS EDUCATION STRATEGY

FINAL REPORT

Recommendations for Expanding the Orange County Stormwater Program's Public and Business Education Outreach Program

Prepared for:

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September 15, 1999

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I. Executive Summary

The keys to a successful long-term, complex, issue-oriented public outreach campaign are: know your audiences; develop messages and outreach activities based on what motivates them; monitor and evaluate success as you go; and redefine messages and target audiences as needed.

The Orange County Stormwater Program (Stormwater Program) is seeking to expand its public outreach campaign to reach a wider audience, and effectively educate and motivate residents and business owners to adopt a variety of simple behavior changes that can help to prevent stormwater pollution.

To succeed, this campaign must be well-planned yet flexible, so that it can stay responsive to—and reflective of—the increasing levels of resident and business owner awareness over the course of the campaign. All campaign outreach components must be implemented in accordance with a "master timeline," so that they synergistically build upon each other, reaching their targets from a variety of angles. Finally, the County can amplify campaign volume and coverage by creating a long-term campaign "brand name" that sets the tone and creates the impetus for comprehensive, unified countywide delivery of educational messages.

Recommendation #1: Conduct Periodic Surveys to Assess Changes in Public Perceptions

In order to develop a campaign that really "speaks to" and *moves* its audience to adopt behavior changes, the Stormwater Program will need to determine the current levels of knowledge and understanding possessed by Orange County residents. According to the 1994 Orange County Stormwater Pollution Prevention and Flood Awareness Survey, only 31 percent of the residents in Orange County were aware that the sewer system and the storm drain system are distinct from each other.

This means that 69 percent of the Orange County population has not yet learned that the river of waste that flows off of streets—and other impermeable surfaces—into the storm drain system is carried directly to the ocean without benefit of "sewage" treatment. While the recent beach closures (and associated news media coverage) have heightened awareness of pollution in our waterways, the relationship to untreated stormwater runoff has not been made clearly enough. Until this reality sinks in—and each person takes responsibility for stormwater pollution causes and consequences—it is unlikely that a widespread shift in public attitudes and behaviors will occur.

Thus, before the Stormwater Program can launch an expanded campaign, it needs to determine what changes in public perception have occurred since the 1994 survey. PS Enterprises (PSE) therefore strongly recommends that the Stormwater Program prepare for its long-term campaign by conducting a survey to identify and more fully understand the current level of general knowledge held by people in Orange County. Based on this

research, the Stormwater Program will be able to formulate appropriate messages, set realistic goals that will keep the campaign on track, implement cost-effective outreach activities, and evaluate the success of the campaign over time. Furthermore, the Stormwater Program will be able to make appropriate and timely revisions in the messages or the methods of outreach, responding to shifts in public perception.

If the survey results indicate that a large percentage of the population still does not know that urban runoff is discharged to the ocean without treatment—and that the resultant water pollution affects the health of swimmers, sea life, and the local economy—then the immediate goal of the campaign must be to reach more people with this crucial information. On the other hand, if the vast majority of the population in Orange County now recognizes the severity of this problem, then outreach materials can stress how each person can be part of the solution by taking specific yet simple everyday precautions.

This document also suggests survey questions that will enable the Stormwater Program to identify the characteristics of specific population sub-groups that are most likely to need—and heed—the pollution-prevention message. However, because of the expense entailed in conducting such an in-depth survey, PSE has indicated which questions are most essential for obtaining a general gauge of knowledge, attitudes and behaviors of residents about stormwater pollution prevention.

PSE further recommends that the Stormwater Program conduct a second survey—midway in the long-term campaign—to determine whether the goals of the program are being met. This survey data will enable the Stormwater Program to fine-tune its outreach—or alter its direction—in accordance with shifts in public awareness and interest. A final survey at campaign's end will reveal how effectively the campaign achieved the Stormwater Program's goals and will provide insight as to what the next steps should be to achieve an even broader adoption of best management practices (BMPs).

In addition to periodic countywide public opinion surveys, PSE encourages the Stormwater Program to use a variety of measurement tools to evaluate the effectiveness of outreach materials – in the design phase – and outreach activities as they are being conducted. We discuss various assessment tools, including focus groups, intercept interviews, and questionnaires and we provide recommendations for obtaining immediate responses from a particular outreach effort.

Recommendation #2: Segment the Audience to Tailor the Message and Outreach

Given that industrial inputs to the storm drain system are highly regulated, the general audiences that the County will want to reach—and that this document describes—are residents and businesses.

General Population

The residential population of Orange County includes people with young children, homeowners, pet owners, consumers of hazardous materials (such as fertilizers, pesticides, paints, etc.) and school kids. By developing outreach materials specifically related to activities or products favored by these subgroups, the behavior changes that the Stormwater Program is requesting will appear relatively easy to adopt and integrate into their daily lives.

Residents can be reached through a variety of means, such as radio, print, and billboard advertisements; presentations at community meetings; the placement of materials at public counters; the news media; radio public service announcements; and school education programs that turn children into their parents' "teachers." Colorful, non-traditional formats for presenting educational materials will make them more visible amid the clutter of literature every resident receives and discards on a regular basis.

Many residents have grown very familiar with a variety of environmental messages and have made BMPs such as recycling, and the proper disposal of household hazardous waste, a regular part of their cleaning routines. The Stormwater Program can build upon this ingrained impulse to "do the right thing" by incorporating messages from these educational programs into its outreach materials. Most often, environmental messages regarding disposal of materials directly translate to the best management practices for stormwater pollution prevention.

Business Audiences

Orange County's business audience includes owners, managers, employees, and customers of industries and businesses of all sizes. It is imperative that all of these people understand the penalties of polluting behaviors. However, the Stormwater Program's campaign will be more effective—and compliance more readily achieved—if the Stormwater Program focuses on the "carrot" rather than the "stick," and if the County is perceived as a partner/facilitator rather than as an enforcer/punisher.

The best incentives/rewards that the Stormwater Program can offer to compliant businesses is publicity. Through the Stormwater Program's newsletters, media releases, and certifications—as well as through formal recognition from the County Board of Supervisors and/or city councils—the Program can "promote" to the public those companies that employ environmentally sound practices in all of their business activities. And by educating the public to favor such companies, the Stormwater Program can create a popular force that uses monetary incentives to convince companies to follow the recommended BMPs.

A second essential strategy that will enhance compliance is to include representatives from each of the audience categories in the development stage of the campaign to help refine the message and outreach strategies. Not only will this create early "buy-in" from business audiences, but the Stormwater Program will also gain a far better understanding

of specific issues involved and will thus be able to create a more workable set of BMPs. With the help of these groups, the Stormwater Program will also discover the most effective ways to communicate the BMPs to different business operators.

The Stormwater Program can reach large and/or established industry and business audiences through their respective associations' newsletters and meetings—as well as through their customers. But mobile industries—like auto detailers, construction companies, surface cleaners, and carpet cleaners—can be a challenge to reach with educational messages. This is because of the diversity of the industries, their transient operators, cultural and educational differences, language barriers, and the additional effort and expense that may be required for some of these industries to implement the BMPs.

The people most able to persuade mobile service providers to utilize environmentally friendly procedures in their operations are their customers; for service users have direct contact with members of the mobile industries and will be held liable for pollution that occurs on their property. Thus, educating the public, publicizing compliant businesses, and working with mobile business owners—along with their customers and suppliers—to develop specific, realistic BMPs as well as effective outreach materials, are the three primary strategies for creating compliance in this group of business owners.

Recommendation #3: Create a Guidebook to Communicate Purpose and Structure for Outreach Campaign

As the lead entity for public education under the Stormwater Program, the County of Orange has a number of responsibilities. It must develop, implement, and measure an effective outreach campaign, and provide the cities with opportunities to implement this campaign at a local level, so that the widest possible audience can be reached in the shortest possible time through the most efficient and economic means.

To achieve this ambitious objective, PSE recommends that the Stormwater Program create a comprehensive guidebook that describes the rationale behind—and the details of—every element of the campaign, from its unified look to its ultimate goals. The Stormwater Program's responsibilities, and the opportunities for cities to participate, should also be specified along with target audiences, timelines for implementation, and the means to measure the effectiveness of each activity detailed in the guidebook. The guidebook allows all cities to follow the long-term campaign and to anticipate the development of outreach elements by the County of Orange. This document provides a prototype for such a guidebook, and details a number of specific outreach activities directed toward the general public and business audiences.

Recommendation #4: Use Existing Avenues to Reach Residents and Businesses Most Cost Effectively

One of the most cost-effective ways for the Stormwater Program to deliver educational messages to Orange County residents and businesses is through existing distribution

avenues. A vast number of networks currently feed information to the public and within communities. These outlets—including neighborhood block clubs, libraries, community events, health inspection visits to businesses, animal registration mailings, and business associations—are identified in this document.

In most cases, these outlets respond positively to requests for dissemination of educational information, through inclusion in mailings or newsletters, by placement at public desks, and/or by handing out materials or hosting speakers at meetings. This broad-based approach will reach a wide audience and use minimal Stormwater Program resources.

Conclusion

The health and well being of the Orange County population is critical to the economic success of the region. Effective stormwater public education—that motivates the population to change its behavior and reduce pollution of local waterways—is an essential step in maintaining the environmental quality of life for all residents.

PS Enterprises commends the Orange County Stormwater Program for seeking to create a strategic and cost-effective long-term public and business education campaign that stays ahead of the regulatory process. It is our sincere belief that the document we have prepared will serve as an integral planning tool for the Stormwater Program to design and implement a model program that will dramatically influence the behavior of Orange County residents and businesses, resulting in a significant reduction in stormwater pollution.

II. What We Know

Requirements

The Orange County Stormwater Program (Stormwater Program) finds itself in a fortuitous position, compared with most other entities required to create and implement stormwater public education campaigns. The Stormwater Program is not "under the gun" of a court order; thus, it has much more latitude to create a campaign that meets the specific needs of the region and the Stormwater Program's internal goals.

The Stormwater Program is the combined force of the County of Orange and all cities within Orange County—united to meet the requirements of three documents: the *Drainage Area Management Plan*; *National Pollutant Discharge Elimination System Permits*; and the *Report of Waste Discharge*. These documents govern what stormwater public outreach efforts the Stormwater Program will implement.

As the lead entity for public education under the Stormwater Program, the County of Orange will prepare and submit public outreach goals for inclusion in these reports, on behalf of the Stormwater Program. An integrated long-term (at least five year) public outreach strategy is critical to ensure synergy among all outreach efforts.

The Stormwater Program must fulfill requirements both broad and specific. PS Enterprises (PSE) has analyzed the public education sections of the documents listed above and has determined that, as the lead entity for public education under the Stormwater Program, the County of Orange is committed to:

- Coordinating a countywide public awareness campaign;
- Informing the community about the origins and causes of non-point source pollution and its significant contribution to water quality impairment;
- Preparing and distributing a stormwater pollution brochure and poster;
- Identifying and promoting behavioral changes that will contribute to controlling pollutants at the source;
- Participating in joint outreach with other programs including, but not limited to, other municipal stormwater programs to ensure that the public is presented a consistent stormwater pollution prevention message;
- Coordinating activities with other public information programs, such as water districts, sanitation districts, fire departments and community and environmental groups;
- Creating a message that includes more recognizable environmental issues, such as recycling, proper disposal of chemicals, reducing the waste of water, littering, pollution of coastal areas, etc.;
- Developing and disseminating Best Management Practices (BMPs) guidelines for specified activities not otherwise regulated by any agency (mobile pavement pressure

washing, mobile vehicle maintenance, carpet cleaners, restaurant floor mat cleaning, commercial landscape maintenance, pavement cutting for utilities, etc.);

- Developing public education materials to encourage the public to report illegal dumping from residential, industrial, construction and commercial sites into public streets, storm drains and other water bodies;
- Incorporating stormwater pollution features into Orange County Fair booths, community fair booths, and speaking engagements; and,
- Continuing the household hazardous waste outreach program.

This PS Enterprises report reviews the processes necessary to prepare for and meet these requirements and, in many cases, includes recommendations for outreach activities.

Outreach to Date

The County of Orange has a significant household hazardous waste collection program and a used oil recycling outreach program, both of which deliver messages that directly affect the volume of pollutants that end up in the storm drain system.

The educational component of the Orange County Stormwater Program is in its infancy. The Stormwater Program has developed a brochure and implemented many outreach activities and, in some cases, individual cities have developed their own stormwater outreach materials. Past Stormwater Program outreach efforts include:

- Distribution of Public Service Announcements (PSAs) to local cable and public television stations and movie theaters;
- Distribution of three brochures: *The Ocean Begins at Your Front Door*, *Preventing Sea Sickness* and *Do You Know Where the Water in Your Storm Drain Goes?* to the general public through interest groups and libraries;
- Production of a 30-minute educational video, "The Ocean Begins at Our Front Door";
- Staffing booths at community outreach events, including the Orange County Fair, the Earth Day Fair, and the Beach Clean-Up Days;
- Coordination of clean-up events in partnership with the Harbors, Beaches and Parks Function;
- Placement of stormwater related articles in the County's *Floodline* newsletter;
- Presentations to interest groups;
- Presentations on the stormwater mandate and the Stormwater Program at business workshops and seminars;
- Participation in the Statewide "Pollution Prevention Week";
- Development and distribution of BMP guidelines to automotive service centers;
- A Hotline for receiving questions and requests for materials; and,
- Conducting a Stormwater Pollution Prevention and Flood Awareness Public Survey as part of the 1994 Orange County Annual Survey.

(A review of these outreach efforts will be included in Section V, along with recommendations for future activities.)

While the Stormwater Program's outreach efforts to date have most likely increased public awareness of stormwater pollution, they are only discrete elements. The Stormwater Program must plan a comprehensive outreach campaign to ensure its message is appropriate, consistent, and delivered in the most cost-effective manner. We will suggest, among other strategies, that the Stormwater Program develop its own "brand name" that will help deliver an integrated message to its residents.

This document builds upon the Stormwater Program's public outreach efforts to date, providing an approach to a long-term cost-effective strategy for a targeted stormwater public education campaign, with easy-to-implement elements.

III. Measuring Effectiveness

This section will review research to date and recommend effective methods, frequencies, survey questions, etc. that could be used to evaluate the success of the Stormwater Program's public and business education strategy.

We will:

1) Review the results and methodology of the 1994 Orange County Stormwater Pollution Prevention and Flood Awareness Survey conducted by Mark Baldassare and Cheryl Katz of the University of California, Irvine. (Note: the information gathered in the survey regarding flood awareness, while somewhat relevant, will not be considered or evaluated here.)

2) Offer an overview of the options/tools for measuring effectiveness for a countywide campaign, as well as specific activities.

3) Deliver recommendations for future measurements, including methods, frequencies, and questions.

Review of the Results and Methodology of the 1994 Survey

Results

The Stormwater Pollution Prevention and Flood Awareness Survey conducted as part of the 1994 Orange County Annual Survey offers a good general baseline of Orange County residents' awareness of general stormwater and flood issues. However, due to its brevity and general nature, the survey does not give as clear a picture as might be wished of residents' awareness of the problem of stormwater pollution or the effectiveness of outreach efforts in Orange County.

For example, some of the information gathered about whether or not Orange County residents have seen various stormwater outreach vehicles (i.e. PSAs, brochures, curb stenciling) may not necessarily be a fair judgement of the effectiveness or ineffectiveness of those message vehicles, or the overall outreach effort's success or failure.

The finding that knowledge about stormwater pollution tends to increase with exposure to public service announcements and storm drain stenciling points to the positive effect that certain educational vehicles can have on public awareness, although exposure to the brochure did not necessarily accomplish the same result.

The demographic patterns revealed by the survey—older, better-educated, higher-income Anglo and South County residents are more knowledgeable about stormwater pollution prevention than young, non-Anglo, lower-educated and lower-income earning residents—are not as revealing as they may seem. It would be helpful to further

distinguish the awareness levels among demographics in order to better define target audiences and develop more suitable messages and/or educational vehicles. This approach will be discussed later in this section.

Although it is expected that the next public survey will indicate that public knowledge has increased, the 1994 survey is no longer relevant enough to use as a base for evaluating the effectiveness of the Stormwater Program's outreach to date, nor for planning the next steps for an outreach campaign. The survey's conclusion that nearly half of Orange County residents (44 percent) believe that the storm drain system and the sewer system are the same indicates a need for an increase in public knowledge of the difference before the Stormwater Program can expect widespread behavior change. PSE's experience in stormwater education has taught us that people must first make the distinction. Then they can be taught how to change their behaviors.

The next public survey will have one of two outcomes:

1. A minimal increase in public knowledge, which will require additional intensive focus on storm drain system-related messages; or
2. A significant increase in public awareness, which will facilitate a shift into messages that stimulate a change of behavior toward storm drains.

If the former occurs, we expect that a follow-up survey 2 ½ years later, after residents have received the basic "there's a difference" message, will indicate a shift into the latter. We provide a more detailed analysis of appropriate message shifts in Section IV.

Methodology

The methods used by Baldassare and Katz to conduct and analyze the 1994 Orange County Annual Survey were certainly in line with public opinion survey methodologies. Because the stormwater and flood awareness survey was only a portion of a much larger survey, the number of questions regarding stormwater awareness was minimal. Therefore, the information gathered regarding stormwater awareness, etc. is basic background information, which indicated general trends versus more quantifiable results.

In addition, the specific questions used in the survey focused solely on the level of knowledge about the stormwater system and experience with outreach materials. A new survey can be expanded to both gauge residents' level of knowledge, and to review polluting behaviors and cross-reference those with demographics to define target audiences. While this technique means more work and is more expensive, it will position the Stormwater Program for a much more effective outreach campaign by allowing funds to be directed to areas that can have the most effect. (Samples of questions used in this technique are included in the Recommendations section below.)

Options/Tools for Measuring Effectiveness

The California Best Management Practices (BMP) Handbook defines "non-conventional monitoring" as the enumeration of some quantity other than water quality data to infer pollution reduction or water quality improvement. Examples cited include surveys of

public opinion to demonstrate increasing environmental awareness, monitoring of the amount of used oil being delivered to household hazardous waste collection centers, etc.[1] This section reviews many options for "non-conventional monitoring" tools to ensure and measure the success of a public education campaign.

The following tools can be adapted to measure the effectiveness of an entire campaign or specific outreach activities, based on the frequency of delivery and the emphasis. It is important to note that most tools can be used both before and after outreach. By using many of these techniques before, the specific outreach strategy and target audiences can be defined, and messages can be tailored to most effectively reach the target audiences. Using these techniques after an outreach campaign/activity can provide data that determines how effectively the campaign or activity increased knowledge and/or changed behavior.

The keys to a successful long-term, complex issue-oriented public outreach campaign are:

1. Knowing your audience;
2. Developing your messages and outreach activities based on motivators;
3. Monitoring and evaluating success as you go; and,
4. Refining messages and/or the target audience(s) as needed.

Surveys

Public opinion surveys are a widely recognized tool for measuring the quantitative effectiveness of a public outreach campaign, such as a countywide stormwater education campaign. Their effectiveness as a measurement tool, however, varies greatly depending on the frequency of their use, the questions asked, how those questions are framed, and how they compare to "benchmark" data.

Surveys before, during and after a five-year campaign will be critical for developing and maintaining an effective public outreach campaign. However, if the survey tool for each is not almost identical, data collected cannot be evaluated effectively, and must be considered "untrustworthy." To this end, the specific questions used in the survey must be designed based on the goals for all five years of the campaign.

Obviously, public opinion surveys can be conducted in a variety of ways, but the most efficient, cost-effective, statistically reliable data collection method is a telephone survey.

Other Measurement Tools

A variety of other tools are available to measure the effectiveness of the overall campaign and/or specific campaign activities.

[1] Drainage Area Management Plan, Section 5.2

Focus Groups
While focus groups are not a great tool for measuring effectiveness, they are an excellent tool for effective campaign or activity planning. As mentioned previously, gathering data before developing outreach efforts can make the outreach exponentially more effective. Because information regarding the stormwater system and behavior changes is relatively complex, how such information is delivered becomes very important. The right data will help shape the message/materials/activity/campaign to ensure the information delivered makes sense and makes the public care about the message. The data required for this development process includes: the demographics of an identified target audience (including language preferences), what motivates the audience, and the issue-related vocabulary that most effectively delivers the message.

Focus groups provide an excellent forum for collecting this information. Focus groups are generally 1-4 hour group "interviews" (participants are paid for their time). The group setting allows the interview to turn into a discussion, which provides more honest and candid information regarding public perception of the issue at hand. These sessions are usually planned by a research specialist and run by a professional moderator, to guide discussion and ensure the most effective use of the participants' time. These sessions are often videotaped or conducted in a facility with a one-way mirror so the client can watch the participants interact. To ensure the information collected is valid on a regional level, it is often necessary to conduct two to four focus groups. Conducting multiple focus groups also allows for language-specific sessions.

Focus groups can help the Stormwater Program develop an overall campaign or outreach activities tied to pollutant-related behaviors, i.e. illegal dumping, or pesticide application. This research technique includes a general discussion of the issue and a review of proposed materials/messages/themes with responses from participants.

Intercept Interviews
This alternative survey tool is usually conducted in a public area, such as a shopping mall. Survey participants are selected based on specific demographics, and are simply approached in a public place and asked for a few moments of their time. Most intercept interviews are actually conducted in a separate room adjacent to the public space and interviewees are given $5-10 for participating.

While these face-to-face interviews are often more expensive than a telephone public opinion survey, they provide a great opportunity to test sample outreach materials. For example, if the Stormwater Program is creating a print advertisement and wants to make sure the public is getting the ad's key message, it can be presented in an intercept interview along with several other print advertisements (for other items/campaigns). The interviewer then asks questions to determine how memorable the advertisement is—how well it cut through the clutter of competing ads—and how well it is received.

While focus groups are appropriate for researching approaches to a campaign strategy, intercept interviews are most effective for soliciting comment on a selected outreach

strategy. However, one-on-one intercepts do not provide the benefit of a group discussion.

Water Quality Measurement
Stormwater quality testing can help indicate a change in behavior (such as a reduction in the improper disposal of a pollutant) resulting from a public education outreach program. However, because of the inherent variability of stormwater quality—based on the diversity of activities/conditions that affect water quality, including sewage leakage and weather conditions—any data collection must be extensive, to provide statistic validity.

If the Stormwater Program implements a small, area-specific targeted outreach campaign responding to the detected presence of a select pollutant, water quality measurement could be used to evaluate the effectiveness of these outreach efforts. However, to obtain statistically significant water data, a large number of samples would need to be collected many times a day over a period before, during and after the outreach campaign.

When using water quality as a measurement tool for evaluating a regional multi-year campaign, a large number of samples must be collected over a number of years before, during, and after the campaign—to obtain statistically significant water quality data.

Activity-specific Goals/Measurement
Because of the length of time between public surveys, it is important to build measurement tools into every outreach effort. This method not only provides specific feedback for each activity rather than a general set of results on a three-year basis, it also provides almost immediate justification for continuation of an activity. Please note, however, that while this type of measurement usually has no additional cost, it does not provide statistically valid data regarding a shift in public perception/knowledge. Examples of this type of measurement process include:

- *Measuring shifts in quantity of calls to the hotline or Website hits*. This is an excellent measurement tool for an outreach activity designed to ask the public to report information to the hotline/Website or to encourage the public to use the hotline/Website for obtaining additional information. Tracking the number of calls/hits provides quantitative data about the effectiveness of the related activity.

- *Measuring a direct change in behavior by visual indicators*. This is often not an option, due to the "invisible" nature of many pollutants, such as automotive fluids and pesticides. However, for a targeted outreach activity such as illegal dumping or trash abatement, it may be possible to team up with catch basin cleaning crews to track a reduction in the amount of waste/trash ending up in catch basins and gauge the outreach activity's effectiveness.

- *Telephone surveys*. Full-scale public opinion telephone surveys are costly. However, smaller targeted telephone surveys can provide valuable information regarding a particular target audience. These are helpful in developing outreach activities for specific industries, community issues, or other targeted sub-groups.

- *Distribution and collection of questionnaires*. Questionnaires given out after presentations can measure participants' retention of the information provided during the presentation as well as comment on the campaign in general. A questionnaire could also be used on a Website. The agency distributing this questionnaire may offer some incentive (i.e. participants will be sent campaign magnets) to ensure that participants complete the survey.

- *News clippings*. Measuring of the amount of media coverage (column inches, minutes of air time) in an area provides anecdotal information about the effectiveness of outreach efforts if media relations is one of the active components of the activity.

In conclusion, the most important aspect of designing an effective and useful system of evaluation and measurement is the creation of measurable goals before the onset of any campaign/activity. (The approach for setting goals will be addressed in Section IV.) This preparation is the only means through which one can prove the ultimate success of outreach efforts and, in turn, the return on investment of public funds.

Recommendations for Future Measurements

A more extensive series of public opinion surveys, designed solely for use in conjunction with the Stormwater Program's five-year public outreach campaign, will provide data to define baseline awareness (setting benchmarks) and target audiences. It will also enable the Stormwater Program to measure the campaign's effectiveness in mid-stream (at the 2½ year mark), and better quantify and evaluate results at the end of the five-year campaign.

Each of the three surveys (before, during and after) should have a consistent set of questions to measure overall awareness. The surveys conducted at the halfway point and at the end of the campaign should also contain sufficient questions to help determine whether the campaign (or a particular outreach activity) is effective, but also how and why it is effective. These findings will help the Stormwater Program validate any necessary changes during the campaign and/or to make changes for a subsequent campaign.

The following are recommendations for questions to be included in the next series of public surveys to help identify audiences, messages, and even the vehicles for message delivery. While these are recommendations, please be aware that research specialists usually write questions using specific language to avoid confusion or leading questions. To this end, most of the questions below should include answer options such as "strongly agree, agree, no comment, disagree, strongly disagree" or a set of possible answers related to the specific question.

PS Enterprises recognizes that public opinion surveys increase in cost based on the number of questions asked. The following list covers the ideal information to be collected in a stormwater public education survey. This list should be modified to reflect the available budget and the Stormwater Program's goals for a public education

campaign. Specific recommendations for ranking these questions for use in a shorter survey are included below.

To gain a better understanding of the general public's current level of awareness, PSE recommends including (not necessarily in this order):

The first three questions in the 1994 survey (because a baseline exists):

✓ 1) Agree or disagree: The storm drain system and the sewer system are part of the same underground system.

✓ 2) Agree or disagree: The water and other substances that flow through the storm drain system are tested and filtered to remove wastes before they are discharged from the system.

3) Agree or disagree: It is illegal for anyone to throw, dispose of or allow anything other than rainwater into the storm drains.

4) A question that asks if they know the purpose of the storm drain system.

✓ 5) A question that asks if they know where water from storm drains ends up.

6) A question that determines their level of concern about generic problems facing Orange County, such as air pollution, traffic congestion, crime, the quality of education, racial tensions, water supply and quality, unemployment, etc.

7) A question that asks if they have ever heard of the problem of stormwater pollution and, if yes, what they heard (in a few words).

8) A subsequent question that asks where they heard of stormwater pollution. (The possible answers for this question should include brochure, a friend, radio announcements, television announcements, curb stenciling, news articles, radio/television news stories (local and national), community events, etc.)

9) A question that asks if they think the waters of Newport Bay and along the beaches of Orange County are polluted.

To gain a better picture of the general public's current level of understanding, PSE recommends including (not necessarily in this order):

✓ 10) A subsequent question that asks, assuming there is a pollution problem in Newport Bay and along Orange County's coast, what the major contributors are, such as: industry, littering on streets, construction, boaters, etc.

11) A question that asks what they think are the possible pollutants.

12) A question that asks their level of concern for the following consequences of stormwater pollution: harmful to fish and marine wildlife; a health problem for humans who swim or bathe in the water; a health problem for surfers only; a health problem because fish is unsafe to eat; clogged catch basins cause neighborhood flooding; clogged catch basins cause foul odors; clogged catch basins attract vermin; and clogged catch basins are unsightly.

13) A question that asks their level of concern about the following items that may end up in the storm drain system, such as paint, leaves, litter, car wash runoff, motor oil, swimming pool water, pet waste, etc.

To gain information that can be cross-referenced with demographics to determine target audiences and motivators for behavior change, PSE recommends including:

14) Standard and non-standard demographic questioning including:
- Age range
- Ethnic group
- Level of education
- Preferred language for written information
- Household income range
- Gender
- Marital status
- Years as an Orange County resident
- What type of residence they live in (single-family house/condo/apartment/etc.)
- Number of people in household
- Number of children and age ranges
- Zip code

15) A question that asks how frequently they go to the beach or the ocean and in what activities they participate at the beach.

16) A question addressing several general lifestyle attitudes: health, exercise, environmental consciousness, community participation, financial pressure, etc.

17) A question that asks where the respondent gets their information about current events and issues affecting Orange County: local TV news (list of stations); local newspapers (list of papers); radio programs (list of local radio stations); local magazines or periodicals (list of magazines/periodicals); the Internet (prompt for sites).

18) A question that asks if the household has: an automobile (how many), a dog/cat/horse (how many), a garden, a lawn, or an abundance of wild animals in its vicinity (what kind).

19) As applicable, a question that asks if they perform the following tasks at home: auto repair (oil change), auto washing, gardening, application of fertilizers and pesticides, lawn mowing.

20) A subsequent series of questions regarding the interviewees' water quality related behaviors for these activities.

21) A question regarding their willingness to change polluting behaviors if they knew they were polluting.

22) A question that asks them what would motivate them to correct their polluting behavior.

23) A question regarding their willingness to stop someone else from polluting.

While this list covers all areas that would support the development of an effective campaign, we understand that a 23-question survey will be costly. To that end, we have narrowed this list for use in smaller surveys (5 or 10 core questions). A five-question survey should include questions 1, 2, 5, 10, and 12. A ten-question survey should include questions 1, 2, 3, 5, 6, 7, 8, 10, 12, and 13. These core questions will provide a good understanding (baseline) of current public awareness levels, which will allow for appropriate message development and for measurement of shifts in knowledge base.

Most of the questions we have dropped seek audience and behavior specific information (questions 14 through 23). Those questions are particularly helpful for defining the specific segment of the general public audience that is most likely to change its behavior and for measuring changes in behavior over time. Given the Stormwater Program's current goal of delivering a broad-based public outreach campaign at a reasonable cost, we feel the latter questions are not as crucial.

Finally, a public survey is a limited tool, if used alone, for gauging the success of discrete tactics, because the length of time between surveys means it only measures the success of a campaign as a whole. Therefore, in addition to a public survey, PSE strongly recommends the incorporation of at least one activity-specific goal/measurement for each activity within the campaign. As noted above, this strategy will provide timely feedback specific to each outreach effort.

IV. Building a Campaign

As mentioned above, base research is fundamental to building an effective public education campaign. We recommend the following approach to building a campaign, but note that this is a flexible tool, adaptable to accommodate the results of the Stormwater Program's next public survey.

The graphic below presents a universal formula for developing and implementing outreach campaigns. This formula can be applied for a multi-year comprehensive outreach program or a short targeted outreach activity. Not only does this formula illustrate the step-by-step planning process, it also serves as a tool for quickly identifying the current stage of development for any program/activity. The following sections describe the stages represented here.

Universal Formula for an Outreach Campaign

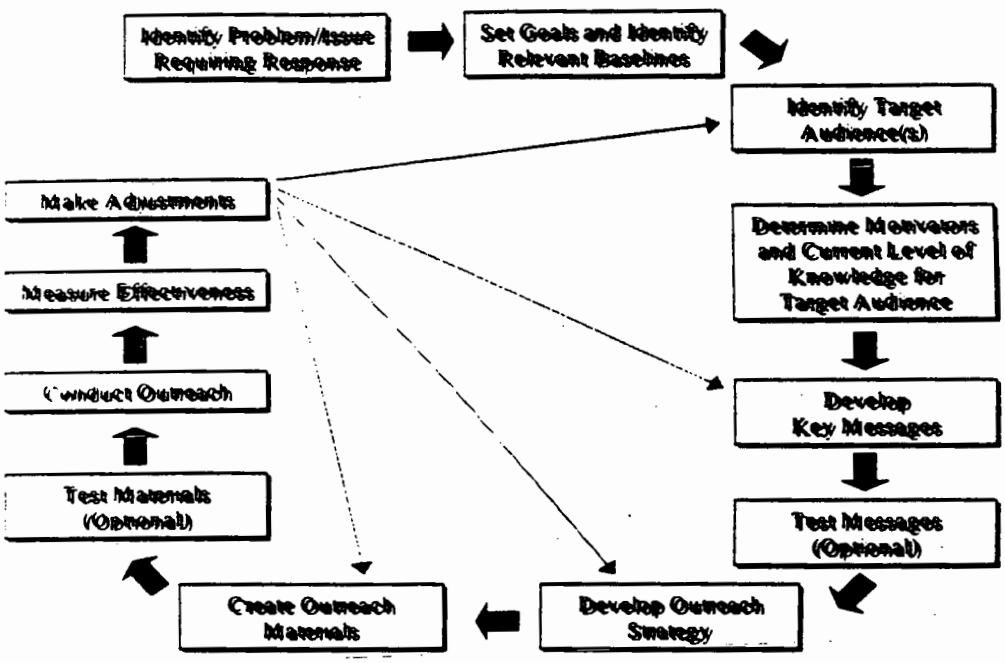

Develop Goals

While research provides quantitative baselines from which to launch campaigns, campaign goals based on the research data will keep a campaign on track. For Orange County, where requirements are based on goals set by the Stormwater Program, rather than by court order, well-planned goals are as valuable as research results in evaluating success.

All goals must be realistic and they must be based on information that can actually be collected. The more current data available for inclusion in goals the better, as this will provide an almost quantifiable measurement of effectiveness.

PSE recommends that the Stormwater Program's campaign goals address both expected achievements and more general regional improvements. In addition, as mentioned in the Activity-specific Goals/ Measurement segment above, it is important to develop goals for each outreach activity before implementing the activity, as these goals become a tool to measure the success of each outreach activity.

We suggest these approaches for determining goals:

Sample general goals for the campaign:

- Increase awareness of the storm drain system and stormwater pollution among the general public.
- Increase awareness of polluting behaviors and motivate the public to shift to pollution preventing behaviors.
- Implement a cost-effective outreach campaign by leveraging funds with other public information outreach programs in the region.

Sample general goal for a targeted activity:

- Develop BMP materials and conduct a targeted outreach activity for mobile auto detailers.
- Develop BMP materials and conduct a targeted outreach activity to reduce nitrogen and phosphorous compounds reaching a targeted water body (e.g. Newport Bay) from identified sources. (Obviously, this type of activity would need to be based on specific scientific data that identifies pollutants and their possible sources.)

Sample specific goal for an increase in public knowledge:

- Decrease the percentage of the population that agrees with the statement "The storm drain system and the sewer system are part of the same underground system" from XX percent to XX percent.

Sample specific goal for a targeted activity:

- Increase the number of illegal dumping reports to the Hotline by XX percent.

Identify Target Audiences

To effectively build and implement a long-term outreach campaign, the Stormwater Program must identify target audiences based on regional stormwater quality issues and public opinion survey results. Clarifying target audiences will allow the Stormwater Program to develop messages and outreach activities that incorporate the behaviors and motivators specific to each audience.

As discussed in Section III and based on available funds for strategy development, the Stormwater Program may elect to conduct an extensive initial public survey that not only determines the level of public knowledge regarding stormwater pollution, but also begins to delineate different demographic sub-populations based on their polluting behaviors. This research technique would identify those most likely to pollute, the type of pollution caused by different sub-populations, and those most likely to change their behavior. While this approach would be most effective in clearly identifying the most beneficial populations to target with outreach, it is significantly more expensive.

If the Stormwater Program chooses not to pursue that research approach, an alternative option is to select audiences based on obvious sub-group characteristics. The two main audience categories are the general public and businesses. This section offers a brief description of all sub-groups (identified based on their specific influence on stormwater pollution prevention) and possible avenues for reaching each sub-group. PSE recommends selecting target audiences at the sub-group level before developing outreach activities. It will be important to review the languages in which to best reach these audiences before preparing outreach materials.

Furthermore, if the Stormwater Program chooses this less-costly approach, it will be beneficial to incorporate some of the other research tools described earlier to learn more about the target audiences and prepare the most effective outreach activities.

While the following information is a comprehensive set of possible sub-groups, it should be used as a series of suggestions rather than a checklist.

General Public/Residents

Outreach to this broad audience will be effective if used as a support mechanism for targeted outreach efforts. Such a general approach would also be applicable if the Stormwater Program seeks to increase the general public's knowledge of the storm drain system. (If the Stormwater Program seeks specific behavior changes, outreach to an audience this broadly defined is not the most cost-effective.) Also, as a support mechanism, this broad approach will reach the neighbors of the pet owners, homeowners, personal auto maintainers, etc. Community "watchdogs" exist in every neighborhood, and they will help reinforce messages delivered to specific audiences.

Residents can be reached through advertisements (radio, print, and billboards), presentations at community/neighborhood meetings, canvassing to talk to residents, placement of materials at public counters (libraries, city/county agency desks, community

centers), and radio and television PSAs. These options are discussed in more detail in Section V.

Residents with Children
This audience provides a bit more focus than the General Public group, in that these residents are more likely to respond to messages regarding the possible effects of stormwater pollution on children. In addition, they are more accessible because they have children who can bring the message home. The school system is an excellent avenue for reaching these residents, either by creating educational activities for children who, in turn, bring messages home to their parents, or for direct distribution of materials to students to take home to their parents.

Homeowners
This audience provides a bit more focus than the General Public group, in that homeowners are responsible for maintaining their homes and yards. This group is the most logical audience for messages regarding home repair (painting, etc.) and yard care (fertilizer, pesticide, and green waste).

Pet Owners
All pets in the county should be registered with the Orange County Health Care Agency. This provides a great opportunity to strategically target pet owners through the mail. The Stormwater Program can collaborate with pet supply stores to provide space for point-of-purchase displays, or to distribute flyers to customers. In addition, the Stormwater Program should add pet-related events to the list of events in which it participates.

Product-related Audiences
A significant amount of stormwater pollution is caused by specific products such as fertilizers, pesticides, paint, motor oil, other automotive fluids, and automotive cleansers. Two cost-effective options exist for targeting the users of these products: partnerships with product suppliers for specific product labeling (neck-hangers, tear sheets) regarding the safe use/disposal of the product; or partnerships with the automotive and home-repair stores that sell these products to place point-of-purchase displays.

School Children
As mentioned earlier, school children are an effective mechanism for reaching the residential community. Not only do they "police their parents" when they learn about pollution prevention, these young people are the future of Orange County. Their purchasing decisions will have a huge effect in only a few years. Their future decisions as homeowners will have fewer harmful effects if they are given a solid foundation of environmental stewardship.

Obviously, this sub-group can be reached through the schools. How they are reached, however, requires more planning. Simply distributing curricula to schools is not very effective, because teachers are already overwhelmed by the amount of information they need to teach students. A more effective approach might include developing a school activity that the Stormwater Program brings to each school, or partnering with an existing

school activity such as the Municipal Water District's "Ricky the Raindrop." The Stormwater Program could also offer workshops for teachers, teaching them how to most effectively incorporate stormwater-related environmental messages into their lesson plans.

Businesses

As with the general public, outreach efforts to the business community will be most cost-effective if they are specific to sub-groups/industries. Delivery of general messages (such as promotion of the county and city water quality ordinances) will be effective only as a support mechanism for industry-specific outreach activities.

The business sub-groups have sub-categories of their own. Not only must different industries be treated as different target audiences, but most businesses also have different levels of employees who need to understand stormwater pollution prevention. In addition, all businesses have customers who can influence the implementation of BMPs. The sub-groups are described below.

Industries

There are two main avenues for identifying target industries for stormwater education outreach. The identification should be based on the Stormwater Program's internal goals for business outreach. The first approach includes reviewing the major industry categories within Orange County, and cross-referencing this with the industries most often visited through the County and cities fire and health inspection programs. This cross-referencing for target industry selection is important because the most cost-effective general outreach campaign to businesses is probably the distribution of materials and BMP instructions through existing inspection programs.

The second approach involves focusing business outreach on the industries that have been significant and consistent contributors to the degradation of water quality in Orange County. One such problem industry, already identified by the Stormwater Program, is the collective mobile businesses. Identifying target audiences based on the impact on water quality is usually more complicated, but can be made through interviews with stormwater staff who spend time responding to stormwater pollution incidents throughout Orange County. This focused approach often results in area-specific outreach, as many polluting industries are clustered in the same neighborhood.

If the Stormwater Program cannot collaborate with inspection programs for business outreach, or wishes to supplement this outreach effort, many options exist. Many industries have business associations that provide an excellent avenue for reaching industry members, either through placing articles in newsletters, or presentations at association meetings. These outreach avenues are discussed in further detail in Section V.

Mobile industries are a distinct sub-group, addressed in Section VI.

Finally, PSE recommends conducting focus groups or telephone surveys with members of a target industry to discover how to reach that industry most effectively, and to discover appropriate motivators for BMP implementation.

Business Owners/Managers/Employees
Business owners are ultimately responsible for pollution leaving their properties and/or facilities. However, managers are responsible for the behavior of employees, and employees must understand BMP requirements so they can incorporate them into their daily activities. This information transfer is not always made in an employee training program and must be supplemented by outreach to all levels. For all outreach to the industries discussed above, PSE recommends supplementing any materials sent to business owners and managers with a simpler translation of the BMPs that can be easily understood by employees at most education levels.

Customers
Customers can often be an important target audience for business outreach. Given the sheer number of businesses that provide the same service in any region, environmentally responsible businesses may draw additional customers from among residents with an environmental consciousness. Customers of these businesses should be targeted for outreach.

Create a Unified Campaign
As with any campaign, creating an easily identifiable "brand" for the Stormwater Program's outreach campaign is essential. This brand does not need to be educational, merely memorable and flexible. It should include a program name that serves as a graphic logo and sets the tone for all campaign outreach.

A single brand "sponsoring" all outreach activities and on all campaign materials will help the public understand that all the information it is receiving is interrelated. The Stormwater Program can increase the number of audience "impressions" if it is able to encourage the use of this brand in city-sponsored outreach activities/materials and by other internal environmental education programs (such as household hazardous waste and used oil). Unfortunately, the vast number of public education programs—delivered at the local, regional, state and federal levels, and by non-profit and for-profit corporations—each provide a slightly different message, often confusing the public. Linking regional and local efforts through a brand identity will help to build regional momentum for environmental stewardship.

The County of Los Angeles has created such a brand, Project Pollution Prevention, recommended for use in all County and city environmental outreach programs. The Orange County Stormwater Program may explore the possibility of partnering with Los Angeles to use this brand for regional unity. Radio advertisements placed by the County of Los Angeles reach some Orange County residents. These radio ads use Project Pollution Prevention as the program reference, rather than identifying the County of Los Angeles, as there is concern

PROJECT Pollution PREVENTION
A County and City of Los Angeles PARTNERSHIP

that the public responds less favorably to information coming directly from a government agency.

However, the Stormwater Program may wish to develop its own brand. as the messages delivered by the two agencies and the target audiences may vary.

Recommendations for incorporating messages from other outreach campaigns are included below.

Prepare a Master Timeline

We recommend creating a Master Timeline to ensure that educational messages are strategically delivered throughout this long-term campaign. This timeline will need to be created as specific outreach activities are outlined.

The Master Timeline should be sketched out to ensure that activities overlap and the public is continuously being exposed to stormwater pollution prevention messages. In addition, some activities will reach the public more effectively if they are conducted concurrently with other outreach. For example, a point-of-purchase campaign in automotive stores will be much more effective when integrated with radio public service announcements delivering automotive care messages.

Determine Messages

Effective environmental education follows a very simple formula:

Awareness ⇨ Understanding ⇨ Action

The components of this formula are straightforward:

- Awareness—The knowledge that a problem exists.
- Understanding—The development of a personal/human connection to the problem, both as part of the problem and part of the solution.
- Action—The motivation to change personal behavior to minimize personal impact on the problem.

While this formula seems rather elementary, it is a fundamental strategy for delivering a public education campaign. Because stormwater pollution is a complex issue, the transition through these phases is a bit slower than, say, a recycling campaign. The recycling message is simple, it requires one behavior change, and provides immediate personal reward.

Stormwater pollution, however, is intangible. While residents may be aware of and even understand the problem, motivating them to change a behavior is more complicated. The lack of immediate "feel-good" connection to any behavior change (BMP implementation) requires strategic analysis of motivators specific to the target audience, as discussed in Section III.

The data collected in the 1994 Orange County public survey does not illuminate the public's current perception of the problem. Without this information it is difficult to determine whether (and what percentage of) the Orange County population is in the "awareness" or "understanding" phase. Based on outreach efforts to date, and regional trends, PSE predicts that a follow-up survey will show that the Orange County's population is shifting from awareness to understanding.

The next public survey will determine how the Stormwater Program should direct its public education campaign—awareness, or understanding. A survey conducted 2½ years into the campaign will provide critical information on the public's progress from awareness to understanding, and will allow for message revision as necessary.

The following are examples of message content for each phase of education:

- *Awareness*. Our rivers, bays, and coastal waters are polluted.
- *Understanding*. Our daily human activities directly contribute pollutants to those waters. (What happens in Orange County's communities directly affects the waterways.) Human contact with these pollutants in the rivers, bays, and waterways can have adverse health effects. (PSE also recommends referring to the health/aesthetic affects upon humans in inland communities too, rather than just near waterways.)
- *Action*. Simple changes in daily routines can have a great effect on pollution prevention. Residents will have the power to take action after receiving the Stormwater Program's information on how to make a difference.

When an outreach program has shifted into the action stage, it is important to carefully gauge public support of the issue to sustain the momentum for pollution prevention. Research has shown that if the public has made behavior changes for a cause, they are interested in learning about the progress made toward solving the problem. PSE suggests periodic reinforcement messages "thanking" the public for helping to improve the quality of local waterways. This is a supplemental, yet direct, "feel-good" reward.

Integrating Other Environmental Program Messages

Stormwater pollution prevention offers an excellent avenue for effectively building upon other environmental issues and messages the public receives through other programs.

As mentioned, stormwater pollution is a complex issue and the public will be asked to adopt a plethora of BMPs. The most effective way to incorporate other environmental messages is to use these messages to define the BMPs for stormwater pollution prevention. For example, residents should be encouraged to:

- Recycle used motor oil;
- Dispose of household hazardous waste (paint, pesticides, household cleansers, etc.) at a designated collection site; and
- Recycle cans, bottles, paper, etc.

The language/vocabulary used in these BMPs should mirror that used in the specific outreach programs with which they are associated.

General Message Development Guidelines

All messages, whether used at the campaign or activity level, should be based on the motivators and current knowledge base of the target audiences, as determined through the research methods discussed in Section III.

When it is necessary to translate a campaign or activity message into another language, the message may need to shift focus to make it culturally applicable. Direct translations of messages created in English are often ineffective without incorporating cultural nuances.

Business Outreach Messages

Business education does not need to follow the formula above, as the motivation to change behavior usually is not based on a "feel-good" incentive. While the information included in the awareness and understanding phases, discussed above, is effective as background support, the message focus is different for businesses. While the most effective stormwater pollution prevention measures (BMPs) vary from industry to industry, the prime motivator for businesses to implement BMPs is the possibility of economic benefits. To this end, any communication with businesses should highlight the following points:

- Implementation of BMPs incurs little or no additional cost;
- Businesses are accountable under county and city water quality ordinances and these include penalties/fines; and
- Customers will be more supportive of an environmentally responsible business. Businesses can promote their concern for the environment by posting BMP information in their workplace, when applicable, and by making sure that all employees use the BMPs.

V. Delivering a Campaign

The preceding sections have reviewed, in detail, the planning elements necessary to create a comprehensive, effective outreach campaign. This section will build upon the Section IV discussion to prepare suggestions for delivering a long term, cohesive public education program.

The County of Orange's Role as Lead Permittee

The 1993 Drainage Area Management Plan (Section 6.3.1) states:

> "The County of Orange will coordinate a County-wide public awareness program for the benefit of all co-permittees. This will be a regional public outreach program, addressing storm water quality problems and solutions applicable to all co-permitees. Individual co-permittees, at their option and expense, may choose to enhance the regional information to address specific storm water quality problems."

As the lead entity for public education under the Stormwater Program, the County of Orange will be responsible for delivering all elements of the countywide campaign, including:

- Defining the elements of the education campaign and determining outreach activities;
- Developing and producing outreach materials for the campaign and related activities;
- Implementing activities to reach the public and businesses through a variety of avenues;
- Guiding cities through opportunities to participate locally in the countywide campaign;
- Periodically measuring public knowledge and effectiveness of the countywide education campaign by conducting public opinion surveys; and,
- Communication with cities at every stage of the campaign;

The Cities' Roles as Co-Permittees

Each city within Orange County will be encouraged to participate in the Stormwater Program's public outreach efforts. The resulting level of participation will vary from city to city and activity to activity. Possible areas for participation include:

- Review of the Stormwater Program's proposed countywide outreach campaign and activities;
- Implementation of the Stormwater Program's pollutant specific outreach activities on a local level; and,
- Distribution of materials produced by the Stormwater Program.

We will discuss participation opportunities in detail below (see Suggested Activities).

In addition, some cities have demonstrated a commitment to stormwater public education by producing their own materials and conducting outreach programs. These cities will be encouraged to incorporate the "brand" and key messages from the countywide campaign to ensure the delivery of a unified campaign.

The Public and Business Education and Outreach Guidebook

Approach to Creating the Guidebook

The Stormwater Program must structure the long-term public education campaign so that it can be easily implemented and so that cities can participate in campaign outreach efforts. To effectively communicate all plans for the outreach campaign, we recommend production of a *Public and Business Education and Outreach Guidebook*. This will outline all intended outreach activities, opportunities for cities to participate, and elements to be made available by the County—as the lead entity for public education under the Stormwater Program.

This tool will become the "bible" for this outreach campaign, and a unifying document that helps the Stormwater Program deliver a cohesive and comprehensive public and business education campaign. The *Guidebook* should include the elements enumerated below.

Elements of the Guidebook

The *Guidebook* will need to provide enough information so that anyone who is unfamiliar with the Stormwater Program's outreach campaign will be easily able to understand its purpose, timing, goals and planned outreach. To that end, the following sections should be included in the guidebook.

Introduction—Review of Unified Approach and "Look"

Because this public education campaign will be the Stormwater Program's first formal delivery of a long-term guided outreach strategy, it will be important to review the development process. This introduction should provide an overview of the sections in the *Guidebook*, and a discussion of the need for a countywide integrated approach (message and timeline) to ensure the most effective delivery and receipt of public education messages.

If applicable, this section should also introduce the Stormwater Program's campaign "brand" (Section IV), and should encourage cities to include this brand on any outreach materials they produce.

Review of Goals

This section represents the Stormwater Program's opportunity to formally outline the goals for a long-term campaign and its commitment to achieving them. The goals should be determined based on the criteria discussed in Section IV.

Review of Target Audiences
This section should review target audiences identified by the Stormwater Program for this campaign, reasons for targeting those audiences, and any related demographic information (and language requirements) for those audiences. Where available, this section should include specific data (from the public survey) regarding the current level of knowledge and concern regarding stormwater pollution among these audiences. In addition, this section should mention that specific outreach activities have been developed for each audience and are included in the Activities section of the *Guidebook*.

At this time, the Stormwater Program is interested in pursuing an outreach campaign targeting the following main audiences, so they should be included in this section:

- The general public/residents;
- The general business community; and,
- Mobile industries (discussed in Section VI).

In addition, the Stormwater Program will target specific pollutant-related or regionally based audiences, as needed. To this end, the activities recommended in this section will include recommendations for adapting outreach to a narrower audience.

Review of Key Messages
As discussed in Section IV, the Stormwater Program will need to develop a key message/theme for each main target audience and for incorporation into all outreach activities. These messages should be based on survey responses regarding the current level of awareness and understanding, and identified motivators for behavior change.

This section of the *Guidebook* should identify the key messages the Stormwater Program has selected, justification for the message selections, and a description of how they should be applied within this campaign. In addition, this section should provide examples for adapting the key messages to pollutant-specific or region-specific outreach efforts.

- A generic example of a key message: *All stormwater in Orange County drains to the ocean, without treatment.*
- A regional adaptation of this message: *All stormwater in [community] drains to [local creek or water body], without treatment.*
- A pollutant-specific adaptation of this message: *All stormwater in Orange County drains to the ocean, without treatment. So pick up your pet's waste, or you could end up swimming with it.*

This is a critical section of the *Guidebook*, as it will ensure that cities understand the key messages of the Stormwater Program's campaign so they can apply them locally. This countywide application will ensure that the public receives a unified message, and that all outreach efforts seek to shift public awareness in the same direction.

Review of Strategy for Measuring Effectiveness
We assume that the Stormwater Program will conduct a public survey to obtain a current gauge of public understanding of this issue before creating the *Guidebook*. Because this information will influence the key messages selected and the goals for public education, it will be important to include a summary of the research results in the *Guidebook*. This section should also identify the Stormwater Program's plans/timing for follow-up public surveys and any areas in which the Stormwater Program intends to use focus groups or informational interviews to test messages and materials.

In addition, this section should review the use of activity-specific measurement tools because these tools will be included under each activity described in the *Guidebook*.

Review of Master Timeline
As discussed in Section IV, the Stormwater Program will need to prepare a Master Timeline to ensure that the timelines for implementing the activities described in the *Guidebook* will overlap. This section of the Guidebook should review the Master Timeline strategy and explain that each Activity-specific timeline integrates that Activity into a unified outreach program.

Identify Activities
While it may seem that this is the most important element of the *Guidebook*, the Stormwater Program can not ensure the most effective campaign without the preceding elements. It is extremely important that the preceding elements set the stage for the activities introduced in this section. The activities in this section should be grouped under the two major audiences—the general public and businesses.

In presenting the activities to be implemented under this campaign, it is important to define the following areas for each activity:

- Purpose: Why this activity has been included and what it seeks to accomplish.
- Target audience: Who this activity will reach. This area should include an overview of how to shift this activity to a more specific audience (i.e. homeowners, auto owners, pet owners, or a region with a specific pollutant problem.)
- Responsibilities of County: The specific steps/tasks the County of Orange will implement and the specific educational materials the County will use or produce (if applicable). These responsibilities will be carried out on behalf of the Stormwater Program.
- Opportunities for cities to participate: Suggestions for local-level implementation of this outreach activity. This section should identify opportunities for coordinating with other environmental education or public outreach programs at the city level.
- Timeline for implementation: The anticipated milestones for implementation of this activity. These milestones can be identified by calendar quarters rather than specific dates.
- Tracking/measuring effectiveness (at the Activity level): Specific strategies for determining the success of outreach conducted under this activity.

Suggested Activities

The following sample activities have been created under the format outlined above. Most activities have been outlined generally, with recommendations for application to more specific audiences/purposes. This section details the following activities:

General Public/Residents:

- Activity 1—Educational Materials
- Activity 2—Hotline
- Activity 3—Website
- Activity 4—Media Relations Campaign
- Activity 5—Community Outreach Campaign
- Activity 6—Advertising Campaign
- Activity 7—Speakers Bureau
- Activity 8—School Outreach
- Activity 9—Partnerships with Internal County/City Agencies and Contractors
- Activity 10—Participation in Events
- Activity 11—Radio Public Service Announcement Campaign

Businesses:

- Activity 1—Educational Materials
- Activity 2—Business Association Outreach
- Activity 3—Partnerships with Internal County/City Agencies
- Activity 4—Hotline
- Activity 5—Website

The information provided below includes discussion of recommendations and instructions for including activities in the long-term outreach campaign. When including these activities in the *Guidebook*, the language will need to be revised to provide more informational descriptions of outreach plans and to include a specific timeline for each activity.

Outreach Activities for General Public/Residents

Activity 1—Educational Materials

Purpose:

Educational materials are most influential if delivered to support public outreach efforts, rather than as stand-alone educational tools. They can communicate educational messages effectively if they are well-designed and the content is clear. To this end, we strongly recommend production of educational materials to support the Stormwater Program's long-term public education program.

As discussed in Section IV, the key messages delivered in these materials will be most effective if they result from information gleaned in a public survey. While all materials should include a combination of stormwater pollution information and best management

practices, the theme should reflect the public's current level of knowledge and motivators, to be identified in the public survey. All materials should also include the Stormwater Program's campaign brand and refer to the hotline and Website (as available) for more information.

When referring to behavior changes, we recommend stressing that these are simple things residents can do, with great benefits. Rather than using the term "best management practices," we recommend using "safe/good housekeeping practices" for any communication with residents. The language used to describe the safe practices should be straightforward—"just tell me what you want me to do and I will do it" is a common attitude among the public.

In addition, because the behavior changes necessary for stormwater pollution prevention are numerous and encompass a variety of activities, we recommend that the Stormwater Program produce activity-specific materials (i.e. one for pet owners, one for auto maintenance, one for home owners) whenever possible. This will narrow down the list of activities a resident is asked to implement, which will make the shift to being "environmentally responsible" seem like less of a lifestyle change.

The Stormwater Program currently uses three brochures, *The Ocean Begins at Your Front Door*, *Preventing Sea Sickness* and *Do You Know Where the Water in Your Storm Drain Goes?* These brochures each provide a good overview of the issue and recommended behavior changes, but the format and the volume of information included in each is a bit overwhelming.

The traditional brochure format has been overused. Residents constantly receive brochures regarding a variety of topics, through the mail, at events, etc. We recommend producing educational materials in various sizes (pocket-size) and shapes (square) and of high graphic quality to make them stand out among the sea of brochures that residents typically receive.

Posters can also be effective to reinforce key messages. We strongly recommend that the poster deliver the campaign's key message, with minimal other text.

Videos can be effective if they are of high production quality and the style is comparable to a television program. In this era of "channel surfing," the public is quite comfortable with shifting attention quickly from topic to topic. The Stormwater Program's current video, "The Ocean Begins at Our Front Door," may be effective if used on a loop at an event or public counter. It may also be appropriate for distribution to teachers who request stormwater materials. Due to high costs, we do not recommend production of an additional video at this time. Public service announcements will be discussed under Activity 11 below.

Target audience:
The general public and pollutant specific segments of this audience.

Responsibilities of County:

- Work with graphic designer to create format for activity-specific handouts, posters, etc.
- Prepare text for these materials.
- Translate text, as necessary.
- Share the mock-ups for the materials with cities and determine quantities to produce. (These quantities must be within a range approved by the Technical Advisory Committee.)
- Print materials.

Opportunities for cities to participate:

- Review materials produced by the County and submit request for a specific number of copies.

Timeline for implementation:

The public survey will provide valuable information for use in the development of these materials, so this activity must follow the survey. In addition, because these materials will introduce the Stormwater Program's campaign message and "brand," we recommend production of these materials before the campaign launch.

Tracking/measuring effectiveness:

The public survey will provide a good understanding of the public's current level of understanding and the most effective motivators for behavior change. While use of focus groups to test mock-ups for materials will enhance their effectiveness, it will not be critical if the materials are based on public survey data and produced by a high quality graphic designer. In addition, because the public's level of understanding of this issue is expected to increase over the course of this campaign, it will be important to update educational materials based on results of follow-up public surveys. Please refer to Section IV for a more detailed discussion of message development and progression.

Activity 2—Hotline

Purpose:

Like educational handouts, a stormwater hotline will support most campaign outreach efforts by providing the public with a resource from which it can request more information or report a polluting activity. The Stormwater Program will need to determine if it will use one unified hotline or continue to reference the appropriate contact number for each city. We strongly recommend establishing and promoting a countywide hotline. As with the Stormwater Program brand, countywide promotion of a single stormwater hotline will lessen confusion among the public of who to contact to make a report or to request more information regarding stormwater pollution.

At this time, the County of Orange and many cities operate hotlines with live operators. If, in the future, the County and cities decide to use automated answering services (not recommended), we strongly recommend that the tree of options is organized logically and is easy to navigate. In addition, the County and cities must be sure to respond promptly

to caller requests (and follow up on reports made) to build confidence among users that the hotlines are effective.

Target audience:
Any resident exposed to any other educational activity in this campaign.

Responsibilities of County:
- Establish and maintain a hotline for public requests and reports.
- Respond to requests and reports promptly.

Opportunities for cities to participate:
- Include the Stormwater Program's hotline number on all outreach materials.

Timeline for implementation:
This is a continuing activity because this mechanism will support all outreach activities.

Tracking/measuring effectiveness:
We assume that all calls to the hotline are currently being logged. Because promotion of the hotline will occur in most outreach activities/materials, it will be important for the Stormwater Program to periodically review/chart the number of incoming calls to measure increased public use over the course of the campaign.

In addition, if the Stormwater Program plans a specific outreach activity to increase the number of incident reports to the hotline, the number of incoming calls during that period should be measured against the number of calls received during the same period in previous years.

Activity 3—Website
Purpose:
A Website will also support outreach activities by serving as a resource through which residents can obtain additional information and report polluting behavior (via e-mail). In addition, with the dramatically increasing use of the Internet as an information resource, a Website can function as a stand-alone outreach "activity." It will be important to promote the Stormwater Program Website in the following ways to ensure that residents can easily find it:

- Register the site and all associated keywords with all search engines.
- Conduct outreach to related groups/organizations to place links on all associated Website (i.e. the Long Beach Aquarium, local environmental groups, and Stormwater Program agencies).

The site should be designed with up-to-date graphics and include the Stormwater Program "brand" to separate it from other government agency sites. The Stormwater Program should have a professional design the site as a stormwater public education tool

rather than a prosaic description of the education program. Specifically, the site should be written for the general public and businesses who are interested in stormwater pollution—not Stormwater Program logistics. This will ensure that the site increases public understanding and motivates behavior change.

Target audience:
Residents exposed to the Stormwater Program's public education campaign through an outreach activity, and Web surfers seeking more information on stormwater pollution prevention.

Responsibilities of County:
- Select a host for the Stormwater Program's Website.
- Prepare text for the site.
- Work with a designer to create the site and include the text.
- Register the site and all associated keywords with all search engines.
- Conduct outreach to related groups/organizations to place links to all associated Websites.
- Update messages and time-sensitive information as necessary.

Opportunities for cities to participate:
- Provide a link to the Stormwater Program's Website on your city's Website.

Timeline for implementation:
Because of the increasing dependence on the Internet for information, we recommend creating this site as soon as possible.

Tracking/measuring effectiveness:
Hits are easy to track. We recommend that the Stormwater Program track/chart the number of hits over time and attempt to link any spike in the chart with the outreach activity responsible.

Activity 4—Media Relations Campaign
Purpose:
The public relies on the news media for new information. A strategic media relations campaign will support the Stormwater Program's public education efforts by delivering issue-specific information through the sources the public trusts. It will also be important to develop strong media relations to promote any corporate partnerships established in this program and to gain recognition for corporate support.

Target audience:
Outreach efforts directed to the general news media will reach the general public. Media relations efforts can be directed to community papers, specific ethnic press, special sections of publications (such as the gardening columns), or issue-specific radio shows (such as auto care/maintenance).

Responsibilities of County:

- Prepare an annual media relations strategy identifying all seasonal events that can be tied to stormwater pollution and any launches of notable outreach efforts, such as a point-of-purchase campaign. This strategy should be flexible enough to allow for immediate media relations outreach, when necessary, to piggy-back on stormwater-related items in the news.
- Prepare a media contact list for all regional, ethnic and community-specific publications and television and radio outlets.
- Prepare and distribute news releases as outlined in the media relations strategy.
- If possible, promote the availability of a storm drain channel tour (or an equivalent visual experience) for news reporters.
- When applicable, invite the relevant city's media relations representatives to participate in interviews.

Opportunities for cities to participate:

- Provide the County with contact information for community publications.
- Provide the County with information about city representatives available for interviews.
- Refer inquiries from the local media to the Stormwater Program's media relations contact.

Timeline for implementation:

Media relations should be conducted throughout the five-year campaign, but the strategy should be revisited annually to incorporate new ideas, new activities, and shifts in program direction. Timing for specific media relations efforts should be tied to launches of outreach efforts, seasonal events affecting stormwater quality, and immediate responses to related items in the news.

Tracking/measuring effectiveness:

We recommend collecting copies of all articles placed, audio clips of radio reports and video clips of television news reports. While the radio and television clips must be purchased from clipping services, this collection provides a great portfolio highlighting the success of this outreach effort.

Activity 5—Community Outreach Campaign

Purpose:

A community-specific outreach campaign is an excellent way to saturate a specific community with a message. Possible reasons for this type of campaign include:

- Scientific data determines a specific stormwater pollutant (i.e. pesticides) is coming from the community.
- A particular type of behavior (i.e. illegal dumping) occurs more frequently in this community.

Target audience:
The residents in an identified geographic region. This group may be refined to the users of a specific pollutant in the identified area.

Responsibilities of County:

- Define the key message for this campaign. (Because these campaigns are usually focused, we recommend conducting a focus group to test this message. The group will also provide valuable information on public perception of the pollutant-specific issue.)
- Identify and obtain contact information for all community groups, neighborhood associations, schools, senior centers, houses of worship, community centers, publications, and news media in the specific area.
- If necessary, prepare educational materials specific to the issue, focusing on the behavior change you are seeking (i.e. using a hotline to report something or request information, recycling used motor oil, or proper disposal of horse waste).
- Work with all groups in the community to schedule speaking engagements and distribute materials at their regular meetings or place articles in their membership newsletters.
- Staff booths at events in the community and focus on the message from this campaign (rather than general stormwater messages or other behavior changes).
- Work with the local news media to highlight both the specific problem in the area and the campaign the Stormwater Program is undertaking to rectify that problem. Make sure you are promoting what you want the residents to do.
- Work with the community newspapers to place advertisements. The artwork can be similar to that in the educational handouts.
- If the target pollutant issue is product-related, identify all businesses in the community that sell the product. Ask these businesses to place proper disposal/handling information on the product (sticker or neck-hanger), as a stand-alone display in the aisle near the product, or at the checkout counter.
- Follow up with any group or business that participated, recognizing their contribution to this outreach effort.

Opportunities for cities to participate:
For the city(s) in which the target community falls, the following are areas for support of County efforts:

- Help identify and obtain contact information for all community groups, neighborhood associations, schools, senior centers, houses of worship, community centers, and news media in the target area.
- Offer your city's letterhead (and mayor's signature?) for letters soliciting support/partnership from local groups and businesses.
- Provide recognition of participating groups and businesses by awarding them certificates of commendation from your city.

Timeline for implementation:
We recommend implementing this type of outreach campaign on a short timeline—three to six months. This intensive delivery will ensure that residents are exposed to the message over and over in a short amount of time, which ensures higher absorption. In addition, this short timeline will allow for more immediate measurable results directly attributable to this campaign.

In addition, if the campaign is product-related, we recommend implementing the campaign just before or during the period in which residents are most likely to use the product (i.e. pesticides and paint in spring and summer).

Tracking/measuring effectiveness:
The ability to measure the effectiveness of this type of campaign will be based on the data available for the behavior before the outreach. (This would include the number of reports or requests coming into the hotline from the target area during the timeframe in previous years, or the original scientific water quality data that indicated a need for public outreach).

Outreach effectiveness can be measured by comparing data collected during and after the campaign with that collected previously. For water quality measurements, it may be necessary to wait for rain in order to collect accurate comparable data.

Activity 6—Advertising Campaign
Purpose:
A well-designed mass media advertising campaign can be an extremely effective way to reach a huge number of residents. Although this type of campaign is costly, if it is focused, it provides a broad-stroke delivery of your key messages, supporting all other outreach efforts. Based on the target audience, and specific ad placement costs in Orange County, such a campaign would most likely include a combination of radio and print.

Target audience:
A campaign of this magnitude must be focused. We recommend such a campaign only if the Stormwater Program conducts an extensive public survey to determine the segment of the general public that contributes significantly to pollution and whose members are most likely to change their behavior. If this information is available, all ad space/time should be bought based on the stations and publications that best match the demographics of the target audience segment.

Responsibilities of County:
- Work with advertising agency to create advertisements. (Unless your primary goal for the campaign is to get the public to call your hotline, we recommend staying away from using a hotline as a key message of the campaign. Because the advertisements will have very short time to deliver your message, if your primary goal for the

campaign is to motivate the public to implement a behavior change, focus on that message.)

- Work with advertising agency or media buyer to develop ad placement strategy.
- Work with advertising agency or media buyer to purchase ad space.

Opportunities for cities to participate:

- Purchase ad space in community publications and place ads produced by the County.
- Encourage community publications to donate space for placement of ads produced by the County.

Timeline for implementation:
Because the budget for this type of campaign will vary, we strongly recommend working with a professional media planner to determine the most effective placement schedule. This schedule will most likely range from two to six months, and will be designed to maximize the number of times a resident is exposed to the message.

This ad campaign could be repeated annually during the five-year span of the public outreach campaign, but the message will need to be updated as the level of public understanding increases.

Tracking/measuring effectiveness:
While the media outlet will provide information on how much of the population was reached and how many times they were exposed to the message, this does not provide real data on whether the campaign influenced behavior change or improved public understanding of the issue. The most effective way to measure a shift in knowledge or behavior is a through the next countywide public survey.

Activity 7—Speakers Bureau
Purpose:
As in Activity 5, this activity takes advantage of existing community groups as an excellent avenue for educating residents. Many of these groups meet regularly and are open to guest speakers to discuss local issues. Educational materials should be distributed at these meetings to reinforce messages delivered. Residents who participate in these meetings are usually interested in the well being of their communities and want to do the right thing.

Target audience:
Any group in Orange County interested in hosting a speaker at a meeting. These groups include community organizations, neighborhood associations, schools, senior centers, houses of worship, community centers, and garden clubs.

Responsibilities of County:

- Train a few staff members to make presentations to community groups. The presentation should focus on the key messages of the overall campaign, for maximum benefit.
- Prepare a flyer promoting availability of speakers and distribute it when staffing booths at events.
- Develop a list of community groups in Orange County and periodically contact them to schedule speakers. If a group does not have regular meetings or does not want a speaker, ask them to distribute your educational materials to their members or place an article in their newsletter.
- Prepare drop-in newsletter articles and distribute upon request.
- Make presentations as requested.

Opportunities for cities to participate:

- Provide the County with contact information for local community groups.
- Notify the County of speakers available to represent your city.
- Promote availability of County speakers when interacting with local community groups.
- Refer requests for speakers to the County.

Timeline for implementation:

This is a continuing activity; presentations are made on an as-needed basis. Community groups should be contacted at least once a year to offer a speaker and distribute materials. The list of groups should be updated as needed. If an intensive outreach effort to promote speakers is planned, it should be built into the Master Timeline.

Tracking/measuring effectiveness:

Obviously, tracking the number of meetings attended and attendees at each meeting will provide a report of how many people have been directly reached. Tracking the quantity of outreach materials distributed is more difficult. Unless the materials are actually handed out by the speaker, they may not reach their intended recipients. Copies of newsletter articles are great proof that your message has reached a membership, as the majority of a group's members will read the newsletter.

Activity 8—School Outreach

Purpose:

We understand that the Stormwater Program is not currently interested in creating a school outreach program. However, it is inevitable that teachers will contact the Stormwater Program to request more information about stormwater education for their classes. To this end, we recommend that the Stormwater Program research existing educational programs (i.e. Project Wild, MWD, and other agencies) and materials available and make a list of contacts for these programs. This list can be distributed upon request, to make sure that any interest in teaching youth about the environment is supported.

Target audience:
Teachers in the Orange County seeking more information on environmental education opportunities.

Responsibilities of County:
- Research existing environmental education programs for primary and secondary school students.
- Prepare a list of these programs (including program summaries).
- Distribute this list to all cities and as requested.

Opportunities for cities to participate:
- Distribute the list of existing school education opportunities to local teachers.

Timeline for implementation:
This list will need to be updated annually and should be distributed upon request.

Tracking/measuring effectiveness:
Because this outreach is merely providing resources to ensure students have the opportunity to become environmentally responsible, there is no short-term measurable outcome associated with this activity.

Activity 9—Partnerships with Internal County/city Agencies and Contractors
Purpose:
Many agencies within—and contractors to—the County and cities have regular contact with the general public. These avenues provide an excellent opportunity to cost-effectively reach the public with stormwater pollution prevention messages.

Target audience:
The agencies within the County and cities that have contact with the general public. These agencies will provide a direct connection with the public, the indirect target. Also, contractors who provide a communications service to the County and cities (i.e. information technology specialists, utilities and cable providers).

Responsibilities of County:
- Identify County divisions that have regular contact with the public such as:
  - animal services (license renewal and shelters);
  - police (neighborhood watch groups);
  - permitting offices (public counters);
  - transportation (buses and bus shelters have advertising space); and ,
  - any environmental outreach program (recycling and composting).
- Identify County contractors that provide communications services.

- Determine what the County could bring to a relationship with each of these agencies, if applicable, (i.e. producing a display for each animal shelter that holds stormwater materials as well as animal services materials).
- Contact each group, establish a relationship, and encourage them to place materials at public desks, to place an article in a public newsletter, to insert materials in mailings, or to invite speakers to make presentations at meetings, when applicable. When working with a group that currently makes presentations to the public, encourage them to distribute stormwater education materials at the meetings.
- Work with County contractors to negotiate opportunities to place stormwater pollution prevention messages. These opportunities may include PSA placement through cable providers, materials distribution through utilities' bill mailings, and Website design/support from information technology contractors.

Opportunities for cities to participate:

- Identify appropriate divisions in your city, establish relationships, and encourage them to distribute Stormwater Program materials or invite speakers from the Stormwater Program.
- Incorporate communications benefits when negotiating with contractors such as communications providers.

Timeline for implementation:

This can be a continuing activity. If an intensive outreach effort is planned with any one division, it should be built into the Master Timeline.

Tracking/measuring effectiveness:

Because the partnerships will vary, it will be most effective to identify and document the benefits gained from each partnership as outreach that would not have been possible without a partnership.

Activity 10—Participation in Events

Purpose:

Personal interaction with the public is a great way to communicate educational messages effectively, superior to mere distribution of materials at events.

Events occur throughout Orange County and draw a significant percentage of the population. We recommend, whenever possible, focusing Stormwater Program participation in events that are "pollutant-specific" (i.e. dog walks, horse shows, auto shows, and garden shows).

Because these types of events include many booths, all striving for the public's attention, it is important to have eye-catching professional displays to draw residents to the booth. The City of Los Angeles has a quite effective nine-foot tall plywood cutout—the Storm Drain Pollution Monster—that a City employee created. The Monster towers over the booth, and attracts children to it. While children are having their picture taken with the

monster, City staff has a great opportunity to discuss pollution prevention tips with parents. The City has also created a cardstock "frame" for the photo, which includes pollution prevention tips and the City's stormwater hotline number.

Target audience:
The general public. In addition, this activity may be focused to target residents most likely to engage in polluting behaviors (i.e. pet owners and home gardeners).

Responsibilities of County:
- Ensure that the Stormwater Program has an eye-catching display for a booth.
- Identify appropriate events throughout Orange County in which to participate.
- Secure booth space at these events.
- Staff booths at these events.

Opportunities for cities to participate:
- Inform the County of events in your city.
- Provide staff to work with County representatives at events in your city.
- Borrow the Stormwater Program's display (if available) for use at local events.

Timeline for implementation:
Public events occur throughout the year. We recommend selecting events in which to participate annually. This recurring planning will allow for adjustments based on successful participation in previous years.

Tracking/measuring effectiveness:
The number of people who visit the booth determines if the display (and staff) is drawing people to the booth—and if the event itself was worth Stormwater Program participation.

Discussions with the public will reveal anecdotal information including what the public knows about the issue and comments on the Stormwater Program's program efforts to date. While this information is not necessarily specific to this outreach effort, event participation serves as an effective vehicle through which the Stormwater Program can also measure the effectiveness of the overall program.

Activity 11—Radio Public Service Announcements
Purpose:
Radio public service announcements (PSAs) are a low-cost avenue to reach large populations with an educational message. Radio PSAs are also a great opportunity for promoting public events. Most often, radio PSAs are submitted as text and either recorded by the station or read live.

Target audience:
The general public. This outreach effort can be tailored by only distributing the PSA to stations with the listeners you are seeking.

Responsibilities of County:

- Determine applicable radio stations in the Orange County.
- Contact target radio stations to determine if they accept PSA text and what lengths they prefer (10, 20, 30 and/or 60 seconds).
- Prepare PSA text. (We recommend preparing at least one PSA for each length.)
- Distribute PSA text to radio stations with an introduction to issue and Stormwater Program contact information.
- Track PSA airtime, if available.
- Present radio stations that aired the PSAs with Certificates of Commendation from the County's Board of Supervisors or an alternate County office.

Opportunities for cities to participate:

- Encourage local radio stations to air radio PSAs.

Timeline for implementation:

Radio PSAs can be submitted (and resubmitted) often during this long-term campaign, but the text should be rewritten annually (or bi-annually) to reflect shifts in key messages. For distribution of general campaign messages, we recommend annual development of text for PSAs, and distribution to all stations that will accept them. We also encourage distribution of event-specific or seasonal stormwater messages, as applicable.

Tracking/measuring effectiveness:

Unlike purchasing radio time, submitting text for radio PSAs does not guarantee placement. If PSA text is read on the air, it is difficult to track on what stations and how often. These limits make measuring effectiveness very difficult. We recommend following up with public affairs directors at each station to ask if the PSA is being used and how often. The Stormwater Program may receive some informed answers, but most often the stations cannot provide that information because they are overwhelmed with PSAs.

For this reason, we do not recommend using television PSAs. If the Stormwater Program currently has a 30- or 60-second television PSA produced, it is worthwhile to redistribute it annually to regional television stations. However, we do not feel it is cost-effective to invest in production of a television PSA because of the difficulty in tracking placement.

Outreach Activities for Businesses

Because most industries (other than mobile businesses) are similarly organized, it is possible to create a general approach for business outreach and apply it to most industries. Specific outreach activity recommendations for mobile businesses are included in Section VI.

Activity 1—Educational Materials

Purpose:

At this time, the Stormwater Program has not produced business-specific educational materials. Because the nature of the message and the behavior changes sought differ significantly from those for the general public, we strongly recommend production of business-specific materials.

Although it is possible to use a general business brochure, it will not be very effective, as BMPs vary significantly from industry to industry. We recommend producing a series of outreach materials, similar in appearance, yet industry-specific.

The audiences within a business (owners, managers, and employees) require different levels of information to implement best management practices. To this end, it will be important for the Stormwater Program to address each audience in the outreach materials.

We recommend creating a two-part educational handout, either two-sided or two separate pieces. One part, directed towards owners and managers, should include a description of the issue, the ordinance, and address motivators for complying (i.e. fines and customer appeal). This part could be similar, if not identical, for all industries if written in general language. The other part, for employees, should present the industry-specific best management practices graphically with a small amount of text (elementary language), in applicable languages.

When identifying BMPs to be included for each industry, the Stormwater Program must consider the cost of any required equipment, and the time required to implement that extra step. Both of these factors will influence the supervisors' and employees' willingness to add the pollution prevention measures to their operations.

In addition, all materials should reference both the hotline and Website (as available) for more information regarding stormwater pollution, ordinance compliance, and BMP implementation.

Target audience:

Industries that may adversely affect stormwater quality.

Responsibilities of County:

- Determine and rank industries whose practice may affect stormwater quality. The ranking should be influenced by the information collected in Activities 2 and 3 regarding industries that will be reached through inspections, and existing business associations. (Additional discussion of target business selection is in Section IV.)
- Work with a graphic designer to brainstorm a format for the two-part educational handout.
- Prepare text for the overview/introductory section of the handout.
- Work with a graphic designer to prepare a template for the industry specific BMP section of the handout.

- Work with a graphic designer to create a formal mock-up of the two-part piece.
- Conduct focus groups with employees to test the format and content of the BMP-specific piece.
- Conduct focus groups with owners and managers to test the format and content of both pieces.
- Determine applicable BMPs for the top priority industries.
- Work with a graphic designer to create illustrations for BMPs and to finish the two-part educational handout for the top priority industries.
- Share final mock-up with cities and collect information regarding how many copies they would like.
- Print the two-part handout for the top priority industries. (This is based on the assumption that the cities will not require city-specific versions.)

Opportunities for cities to participate:

- Determine number of copies, for each industry, that your city will be able to use and submit this number to the County.

Timeline for implementation:

This production should occur before outreach under Activities 2, 3, and 4. However, it will be important to include research from these activities in determining priority industries. As the Stormwater Program moves through the long-term strategy, it will most likely need to produce materials specific to additional industries. All materials should be reproduced as necessary.

Tracking/measuring effectiveness:

To ensure that these materials not only attract the attention of the intended audiences but also motivate them to implement BMPs, we strongly recommend using focus groups to test the intended format and content with applicable audiences. The focus groups should include a mix of representatives from the target industries.

Tracking of distribution of these materials will occur under actual outreach activities.

Activity 2—Business Association Outreach

Purpose:

Many of the larger industries have business/professional organizations and associations that serve their members. These associations usually have regular meetings for their members and most often distribute a regular newsletter with updates on changes in the industry. Partnering with regional chapters of these organizations to reach their members with stormwater pollution prevention messages is a cost-effective way to make contact with a large number of businesses in Orange County.

Target audience:

The membership of the business associations within Orange County that represent industries that may adversely affect stormwater quality.

Responsibilities of County:

- Identify the industries within Orange County that may affect stormwater quality;
- Identify the business associations that represent those industries;
- Prepare a drop-in newsletter article (with a version tailored for each industry) reviewing the issue, the ordinance, and applicable BMPs;
- If necessary, train the general public speakers bureau to make technical presentations delivering BMP information;
- Contact each applicable business association, determine what outreach avenues they have available (i.e. newsletter, regular meetings and annual workshops); and,
- Subsequently pitch speakers and article placement to increase understanding of compliance requirements.

Opportunities for cities to participate:

- Provide the County with information on business association local chapters; and,
- Refer requests from business associations for information or speakers to the County

Timeline for implementation:

If internal partnerships under Activity 3 are successful, the Stormwater Program should coordinate business association outreach with the inspection timelines. For example, if health inspectors will be visiting restaurants (and distributing materials) in May and June, focus attention on information dissemination through restaurant associations in May and June as well.

Tracking/measuring effectiveness:

Because this is a cost-effective outreach strategy, it will be beneficial to track the success of this activity by the number of partnerships established and the resulting educational outreach conducted. In addition, request and keep on file copies of all newsletter articles placed.

Activity 3—Partnerships with Internal County/city Agencies

Purpose:

Many agencies within the County and the cities have regular contact with businesses in Orange County. These avenues provide an excellent opportunity to reach these businesses with stormwater pollution prevention messages cost-effectively.

Target audience:

The agencies within the County and the cities that have contact with the business community. These agencies will provide a direct connection with the businesses in Orange County, the indirect target.

Responsibilities of County:

- Identify County divisions that have regular contact with businesses in the county, such as:
  - fire department (inspections);
  - health department (inspections); and,
  - permitting offices (public counters).
- Determine what the County could bring to a relationship with each of these agencies, if applicable (i.e. promoting the health department's hotline on stormwater educational materials for businesses).
- Contact each office, establish a relationship with them, and encourage them to place materials at public counters and distribute materials during site inspections. If applicable, ask them to include a couple of stormwater pollution prevention tips as they conduct each site inspection (i.e. including proper procedures for cleaning floor mats when visiting restaurants).

Opportunities for cities to participate:

- Identify appropriate divisions at the city level, establish relationships, and encourage them to distribute County materials or place them at public counters.

Timeline for implementation:

This can be a continuing activity. If an intensive outreach effort is planned with any one division, it should be built into the Master Timeline.

Tracking/measuring effectiveness:

Because the partnerships will vary, it will be most effective to identify and track the benefits gained from each partnership as outreach that would not have been possible without a partnership.

Activity 4—Hotline

Purpose:

Like educational handouts, a Stormwater Program hotline will support most outreach efforts under this campaign by providing businesses with a resource for requesting more information or reporting a polluting activity.

Target audience:

Any business owner, manager, or employee exposed to any other educational activity in this campaign.

Responsibilities of County:

- Establish and maintain a hotline for requests and reports from businesses.
- Respond to requests and reports promptly.

Opportunities for cities to participate:

- Include the Stormwater Program's hotline number on all outreach materials, unless your city has an efficient hotline in place.

Timeline for implementation:
This is a continuing activity because this mechanism will support all outreach activities.

Tracking/measuring effectiveness:
We assume that all calls to the hotline are currently being logged. Because promotion of the hotline will occur in most outreach activities/materials, it will be important for the Stormwater Program to periodically review/chart the number of calls coming in to the hotline to measure the increased public use over the course of the campaign.

In addition, if the Stormwater Program plans an outreach activity to specifically increase the number of incident reports to the hotline, the number of calls coming in to the hotline during that period should be evaluated against the number of calls received during the same time period in previous years.

Activity 5—Website
Purpose:
A Website will also support outreach activities by serving as a resource through which business representatives can obtain additional information and report polluting behavior (via e-mail). In addition, with the dramatically increasing use of the Internet as an informational resource, a Website can function as a stand-alone outreach "activity."

Target audience:
Business owners, managers, and employees exposed to the Stormwater Program's public education campaign through an outreach activity or who seek more information on stormwater pollution prevention.

Responsibilities of County:

- Select a host for the Stormwater Program's Website.
- Prepare text for the site.
- Work with a site designer to create the site and include the text.
- Register the site and all associated keywords with all search engines.
- Conduct outreach to related groups/organizations to place links to all associated Websites.
- Update messages and time-sensitive information as necessary.

Opportunities for cities to participate:

- Provide a link to the Stormwater Program's Website on your city's Website.

Timeline for implementation:
Because of the increasing dependence on the Internet for information, we recommend creating this site as soon as possible.

Tracking/measuring effectiveness:
Hits should be easy to track. We recommend that the Stormwater Program track/chart the number of hits over time and attempt to link any spike in the chart with the outreach activity responsible.

Selecting Outreach Activities to Implement First

The activities described above each include the types of applications that are appropriate. Although PSE recommends that the Stormwater Program create a master timeline for implementation of all outreach activities, we understand that the Stormwater Program is eager to begin outreach. PSE also recognizes that some of the activities described above incur higher costs and/or require specific audience profile research to be cost effective (i.e. Mass Media Advertising).

To that end, PSE has identified the activities that will be most cost-effective to implement first. For reaching the General Public, we strongly recommend development of simple outreach materials (Activity 1) and distribution through existing avenues (Activities 5, 7, and 9). For reaching Businesses we recommend development of business-specific materials (Activity 1) and distribution through internal County/city agencies (Activity 3). As mentioned many times in this document, any outreach materials and messages will be most effective if the Stormwater Program first conducts a survey to gauge the current level of knowledge and motivators for behavior change.

Using Consultants to Develop and Implement the Outreach Campaign

Much of this document has stressed the importance of creating and delivering a unified outreach campaign that uses a set of messages, timelines, activities, and materials that work together synergistically to achieve a profound shift in public awareness and behavior—in the most cost-effective manner. Since it will take meticulous planning and oversight to ensure that each element of the campaign moves forward as part of the whole "package," PSE recommends that the Stormwater Program carefully consider the strategy it will employ to achieve the objectives of such expanded public outreach efforts.

As the lead entity in charge of public education under the Stormwater Program, the County of Orange will be responsible for providing the staff to administer and manage this campaign. To help the Stormwater Program better understand how consultants may be utilized to support the County in its efforts, PSE has prepared two scenarios. PSE is not in a position to recommend which scenario is best for the Stormwater Program's outreach campaign. However, we have provided a review of some advantages and disadvantages associated with the two possible scenarios.

Scenario A

Scenario A involves hiring **one** consultant firm, with subcontractors, to manage the Stormwater Program's outreach campaign elements. This scenario will require creation of a fairly specific scope of work—which can be derived from the information in this document—for ease of tracking the consultant's progress. Scenario A will also require the County of Orange to dedicate ½ a staff person to monitor the efforts of the consultant, administer the contract, and track the participation of the cities in this outreach campaign.

Advantages

- The Stormwater Program will only need to manage one contractor.
- In the RFP process, the consultants that submit proposals (and proposed budgets) will help determine the budgetary needs of the campaign—which may also provide clarification of funding necessary from the Stormwater Program.
- With one contractor and a fixed budget amount, costs are much easier to control.
- The County of Orange will not have to overcome a contract/project management learning curve for a dedicated staff person.

Disadvantages

- The administration of this scenario is more expensive because the Stormwater Program will be paying the consultant to coordinate work among sub-consultants rather than a County staff person to manage a number of contracts.
- The Stormwater Program will be responsible for preparing and issuing an RFP for this work—and evaluating the responses it receives—and this process can be time consuming.
- The Stormwater Program will be under pressure to select the "right" consultant team, as only one team will be selected.

Scenario B

Scenario B involves hiring **a number of** consultants—through a number of contracts—to implement individual elements of the Stormwater Program's outreach campaign. Scenario B would require Orange County to dedicate one full-time staff person in addition to the ½ time staff person, as this scenario requires supervision of several contracts and coordination of the program as a whole.

Advantages

- Stormwater Program can solicit the lowest cost alternative per element.
- Close supervision of many contractors allows the Stormwater Program to have maximum control over consultants and the work product (assuming each scope of work is very specifically defined).

Disadvantages

- Because of the number of separate contracts to develop and implement elements of the program, it may be difficult to achieve an overall unified campaign without

extraordinary staff management. This may also result in overlap of contact with the public and Orange County residential and business representatives.

- The dedicated County of Orange staff person would need to have previous consultant management experience in public relations (or absorb the learning curve).
- Multiple contracts do not provide great cost controls for the entire stormwater program, so this scenario may result in a higher overall campaign cost.
- The County of Orange will need to dedicate one additional staff person.

V. Mobile Industry Outreach

Overview

While serving their customers, mobile businesses generate a variety of pollutants that enter our waterways via the storm drain system. These pollutants include waste water that carries automobile fluids, cleaning fluids, pesticides, herbicides, street litter, and other harmful substances; green waste from landscaping; paint chips, bits of concrete and dirt from repairs; food grease and waste from restaurant clean-up, etc.

Many businesses are aware of these problems but need to be educated on viable, time- and cost-effective solutions to reduce and control runoff. The Stormwater Program is currently evaluating how to prepare an outreach effort to inform mobile businesses of the Best Management Practices (BMPs) that will enable them to deliver their services with minimal additional effort and in a way that meets legal requirements for environmental protection.

However, the Stormwater Program faces significant challenges to the goal of reaching mobile businesses and gaining their compliance with the BMPs. These challenges include the diversity of mobile businesses; the variety of sizes and resources of companies doing the same work (which can range from large, licensed organizations to unregistered, seasonal, one-person operations); the transient nature of these operations; diverse educational backgrounds; and cultural differences of business owners and their staffs (many of whom do not speak English).

Because customers of these businesses share in the liability for stormwater pollution that originates on their property—and because many business owners will be difficult to reach—the Stormwater Program needs to focus its outreach efforts on customers as well as mobile business operators. The Stormwater Program can also call upon manufacturers and distributors of supplies to help inform business owners about the BMPs and legal requirements.

While the possibility of enforcement and the mandatory fines for polluting must be made clear, PSE recommends that the Stormwater Program develop a campaign strategy that emphasizes incentives rather than the threat of penalties for non-compliance.

The following are PSE's specific recommendations for developing an educational outreach program for mobile businesses.

Target Audience(s)

Mobile businesses provide the following services:

- Surface cleaning—including steam cleaners and pressure washers who clean sidewalks, plazas, parking areas, driveways, drive-throughs and building surfaces;
- Janitorial clean-up;

- Auto detailing/washing—which ranges from nationwide companies with fleet contracts to one-person operations operating out of a truck with a hose and bucket;
- Auto repair and oil changing;
- Carpet cleaning;
- Window washing;
- Pool cleaning and maintenance—which involves draining pool water into sewage systems or storm drains;
- Food catering;
- Sand blasting;
- Pet grooming;
- Commercial landscape maintenance and residential gardening;
- Restaurant floor mat cleaning; and
- Pavement cutting for utilities.

Based on the types of water pollution complaints received, at this time the Stormwater Program is interested in concentrating its outreach efforts on businesses that provide surface cleaning, pool cleaning and maintenance, and construction services. Over time, the Stormwater Program may target each mobile industry with educational outreach.

For most of the mobile industries listed above, the Stormwater Program can develop a database of established businesses by using trade association membership lists, local chambers of commerce, business listings in the local Yellow Pages, and customer surveys. For example, in addition to local listings, businesses in the construction industry can be reached by obtaining a list from the Southern California Contractors Association of the contractors conducting business in Orange County.

The Stormwater Program may also seek partnerships with vendors/retailers that supply equipment and products to these businesses. The terms of this partnership may include positive publicity from the Stormwater Program for those organizations that provide environmentally friendly products and that distribute the Stormwater Program's BMP materials to their customers.

But many businesses—such as mobile auto detailers and pool cleaners—are not well established, are not members of a business organization, and can obtain supplies at a wide variety of outlets. In fact, many of them can be considered "fly-by-night" operations because they are small and transient and may not survive long in a competitive market. Since such businesses do not use normal channels of advertising, it will take a more creative strategy to reach them with the BMP information. These smaller start-up businesses are most easily held accountable by educating the *customers* so that they do not permit polluting practices to occur on their property.

When targeting the mobile auto detailers that service downtown Los Angeles, the City of Los Angeles contacted all property and parking lot owners and managers with ordinance compliance information and materials for them to distribute to the detailers that operate on their property. For targeting the mobile pool cleaners, we recommend that the

Stormwater Program undertake an intensive outreach in those neighborhoods where residents are most likely to have pools.

This outreach should include handout materials that residents can give to the service provider outlining the BMPs that the residents expect the provider to implement. In addition, the Stormwater Program can furnish a guide that informs residents of the practices they should look for as the business representative conducts the service. The Stormwater Program may also wish to provide residents with a BMP checklist that they can return to the Stormwater Program after the service has been performed to indicate that compliance was achieved. Suggestions for these materials are discussed in detail in the incentive-based outreach program section below.

Involving Business Owners in the Development of the Program

As discussed in Section III, PSE recommends that the Stormwater Program conduct one-on-one telephone interviews—or focus groups—to develop the most accessible outreach materials and the most effective incentives for implementing the BMPs. The Stormwater Program can solicit comment on program elements from representative business owners, as well as from the manufacturers and suppliers of environmentally friendly equipment and supplies. By so doing, the Stormwater Program will gain a better understanding of industry-specific activities, potential pollutants, and the best ways to communicate the BMPs.

Armed with this knowledge, the Stormwater Program will then be able to:

- Develop a workable set of BMPs for each industry;
- Tailor the program to achieve optimal participation;
- Gain greater industry buy-in, since it will be an industry-developed program; and,
- Achieve the greatest possible reduction in stormwater pollution from the mobile business industry.

An Incentive-Based Outreach Program

The growing public awareness of pollution-related problems means that many customers now choose to patronize businesses that are perceived as operating in ways that do not harm the environment. The Stormwater Program can capitalize on this trend by creating a program that offers free publicity, thus greater visibility, to companies that employ the BMPs in all of their operations. The Stormwater Program can provide these businesses with publicity by including compliant businesses on a list provided through the Stormwater Program hotline, promoting outstanding businesses through the news media, and distributing marketing materials to businesses that adopt the BMPs. These incentives are described in more detail below.

This publicity will then enable customers to select businesses that protect them from liability at the same time that they protect the environment. Compliant businesses may thereby gain a wider customer base, while those that do not adopt the BMPs could fall out of favor—even if they offer their services at a cheaper rate—since they put their customers at risk of expensive fines.

Through the use of rewards for compliance, the Stormwater Program can indicate to mobile business owners that it is seeking to work in partnership with them rather than to impose additional, burdensome regulations that tax their resources. And since compliance with the BMPs may require that business owners adopt new, less convenient measures, purchase additional materials, and train their employees in new practices—these businesses deserve to be recognized and rewarded in ways that will help them prosper and will reinforce their allegiance to the program.

Incentive-based stormwater education programs for businesses are being implemented throughout California. The Bay Area Stormwater Management Agencies Association in Northern California has implemented such a program for surface cleaners. The City of Sacramento has implemented a similar program to reach carpet cleaners. The City of Los Angeles is in the midst of distributing BMP materials to mobile auto detailers and their customers.

Possible incentives for businesses to participate in the Stormwater Program's mobile business outreach program include:

- Stormwater Program certification—acquired through participation in a Stormwater Program-sponsored workshop (in person, via the World Wide Web or through direct mail). This type of program requires consistent follow-up/maintenance;
- Bumper stickers, truck stickers, and promotional materials that advertise compliance;
- Inclusion on printed and electronic lists of businesses that employ the BMPs;
- Mention in news releases, media advisories, and Stormwater Program newsletters;
- A camera-ready program logo that can be used on business letterhead and promotional material to indicate that the business operates in an environmentally friendly manner;
- Stormwater Program-prepared materials indicating compliance (with space for individual business identification) for distribution to customers after a service is rendered; and,
- Formal recognition by the County of Orange Board of Supervisors and/or city councils.

The Stormwater Program may seek to collaborate with other agencies in the County and cities that share similar goals in order to pool resources and reach the largest possible audiences. For instance, carpet cleaners that use the BMPs can be listed in a mailer that accompanies utility bills. In addition, the County and cities can include a requirement for use of designated BMPs when contracting with mobile businesses for these services.

Creating Attractive, Accessible and Memorable Outreach Material

By surveying the outreach materials developed for mobile business owners by other municipalities, the Stormwater Program can get a head start on creating its own materials. As stated, the use of focus groups can also help in the development of a memorable theme and attractive identity for the Stormwater Program's program.

By using a uniform look and recognizable identity, the Stormwater Program will be able to build public awareness of the program and will demonstrate its commitment to this program. The name/theme can be used on all program materials, including fact sheets, brochures, decals, news releases and certificates.

The outreach material should employ colorful graphics and very simple grammar (in appropriate languages) to explain, in general:

- The problem of storm drain pollution;
- The benefits and requirements of the urban runoff pollution control ordinance;
- Reference to the potential economic benefits of participation; and,
- How-to information for implementing recommended industry BMPs.

For industry-specific BMP delivery, a separate fact sheet/brochure should be prepared for each industry to avoid confusion. Rewards for business compliance with the BMPs, and for customer participation in the monitoring process, should be explained in the materials directed toward these two groups.

PS Enterprises suggests that the Stormwater Program begin with an introductory mailing to owners of each of the mobile businesses consisting of a short sales-pitch with a "Yes, I want to learn more..." call, fax, e-mail or mail-in response card. This mailing will help verify the data in the mailing list.

In the second direct-mail packet, sent to businesses that return the response card (or the Stormwater Program can elect to do this as the initial mailing), the Stormwater Program should include a personalized cover (form) letter that thanks the respondent for their interest in protecting the environment.

The packet can contain the following material for the businesses and their customers:

- Fact Sheets on the legal requirements for the protection of the environment;
- A sheet outlining the recommended BMPs;
- A sample Pollution Prevention Voucher for the businesses to use;
- A sample Postcard for customers to complete and return to the Stormwater Program; and,
- The description of incentives for compliance.

Supporting and Monitoring BMP Compliance

Just as the outreach program needs to educate and inspire both business owners and their customers, the Stormwater Program's follow-up activities to monitor and ensure compliance with the BMPs can also be focused on both groups.

Businesses will need help understanding how to implement the BMPs in a cost-effective manner. The Stormwater Program can address this need by providing (through its hotline) knowledgeable staff members to answer questions and address the concerns of

business owners. This will also provide the opportunity for the Stormwater Program to learn from these business owners how their customers are responding to the program.

In addition, the Stormwater Program can provide businesses with a Pollution Prevention Voucher as part of its outreach materials. These vouchers can be completed by business employees to indicate the type of surface cleaned, the cleaning method used, and the way in which waste water was disposed. Customers should be asked to sign the voucher to verify its accuracy. A copy of the voucher can then be given to the customer and a second retained by the business to show inspectors.

As previously mentioned, customers can also help provide verification of a company's adherence to the BMPs through a simple, prepaid response card that asks them to "check the box" to indicate which practices the business employed in the course of performing its service. The Stormwater Program can supply business owners with this form—to be mailed in by customers—along with the other printed material that it produces. To encourage use of this form, the Stormwater Program can:

- Award those businesses that generate the greatest number of favorable responses with more favorable placement on the promotional material that the Stormwater Program produces.
- Encourage customers to send in the form by letting them know they will receive stormwater magnets, stickers, and other "goodies" in return for their postcard.

These strategies will enable the Stormwater Program to motivate business owners to provide this educational survey to their clients. The customer response cards will then make it possible for the Stormwater Program to track the effectiveness of this activity and monitor business practices by calling customers at random to verify the validity of their response.

The Stormwater Program can also measure the program's effectiveness by tracking the number of reports of violations to the Stormwater Program hotline, as well as the number and nature of calls that ask questions or express concerns.

Conclusion

PS Enterprises recommends that the Stormwater Program create a positive, pollution prevention program that focuses on the carrot rather than the stick. The Stormwater Program can do this by offering incentives that make program participation beneficial to mobile businesses by publicly recognizing them for their active implementation of the BMPs. The Stormwater Program can coordinate its business recognition program with local chapters of business associations. It can also inform the public about compliant businesses by making lists available through the Stormwater Program hotline and promoting the availability of the lists.

PSE further recommends that the Stormwater Program invites representatives of each of the mobile businesses—plus their suppliers and customers—to participate in the process of developing and publicizing outreach materials. This will assure the creation of the

most accessible and persuasive program materials and will gain early "buy-in" for the program from these groups.

In addition, business participants can inform the Stormwater Program of appropriate newsletters, associations, and other outlets through which to promote the program and can also supply the Stormwater Program with feedback as the program progresses. Residents who participate in the design of the program—and who fully understand the importance of the BMPs to the preservation of the local environment—may help the Stormwater Program spread the word through schools, churches, and neighborhood associations. Happy customers will also provide invaluable word-of-mouth advertising for those mobile businesses that perform their services in environmentally responsible ways.

Appendix 5.1
Watershed Maps for Automatic Sampling Sites

AGUA CHINON WASH

Location :	At Irvine Center Dr. and Pacifica Lat. 33-39-09 Long. 117-44-56
Channel :	F18
Storet Code :	ACWF18
Watershed Area :	approx. 7.2 sq.mi. (18.7 sq.km.)
Cities in Watershed :	Irvine, Lake Forest
Raingage :	Lambert Reservoir Alert #217

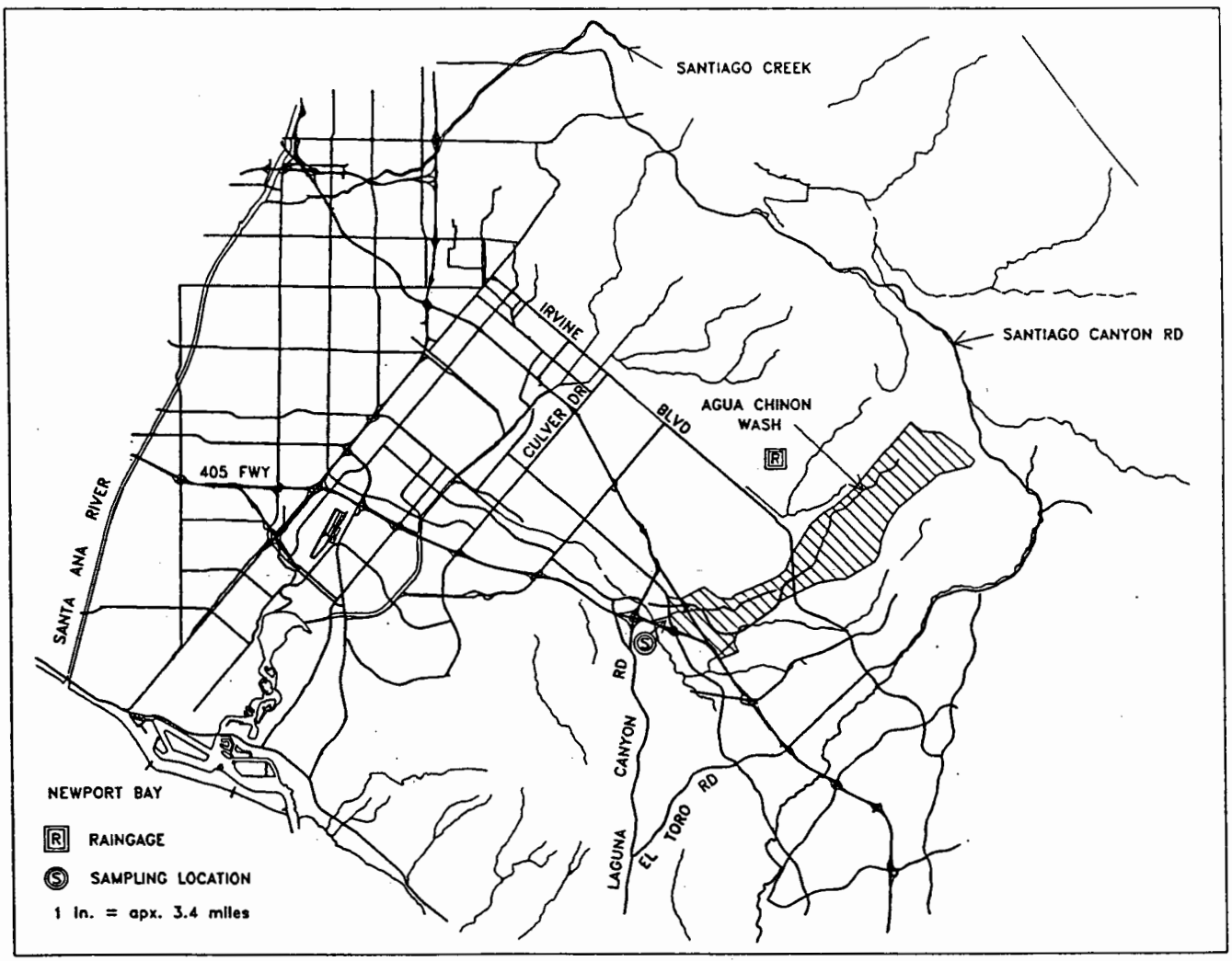

ALISO CREEK

Location :	At Pacific Coast Highway Lat. 33-31-10 Long 117-45-07
Channel :	JO1
Storet Code :	ABJ01
Watershed Area :	29.7 sq.mi. (76.9 sq.km.)
Cities in Watershed :	El Toro, Laguna Beach,Laguna Hills, Laguna Niguel, Lake Forest Mission Viejo
Raingage :	El Toro Alert #207, El Toro #176

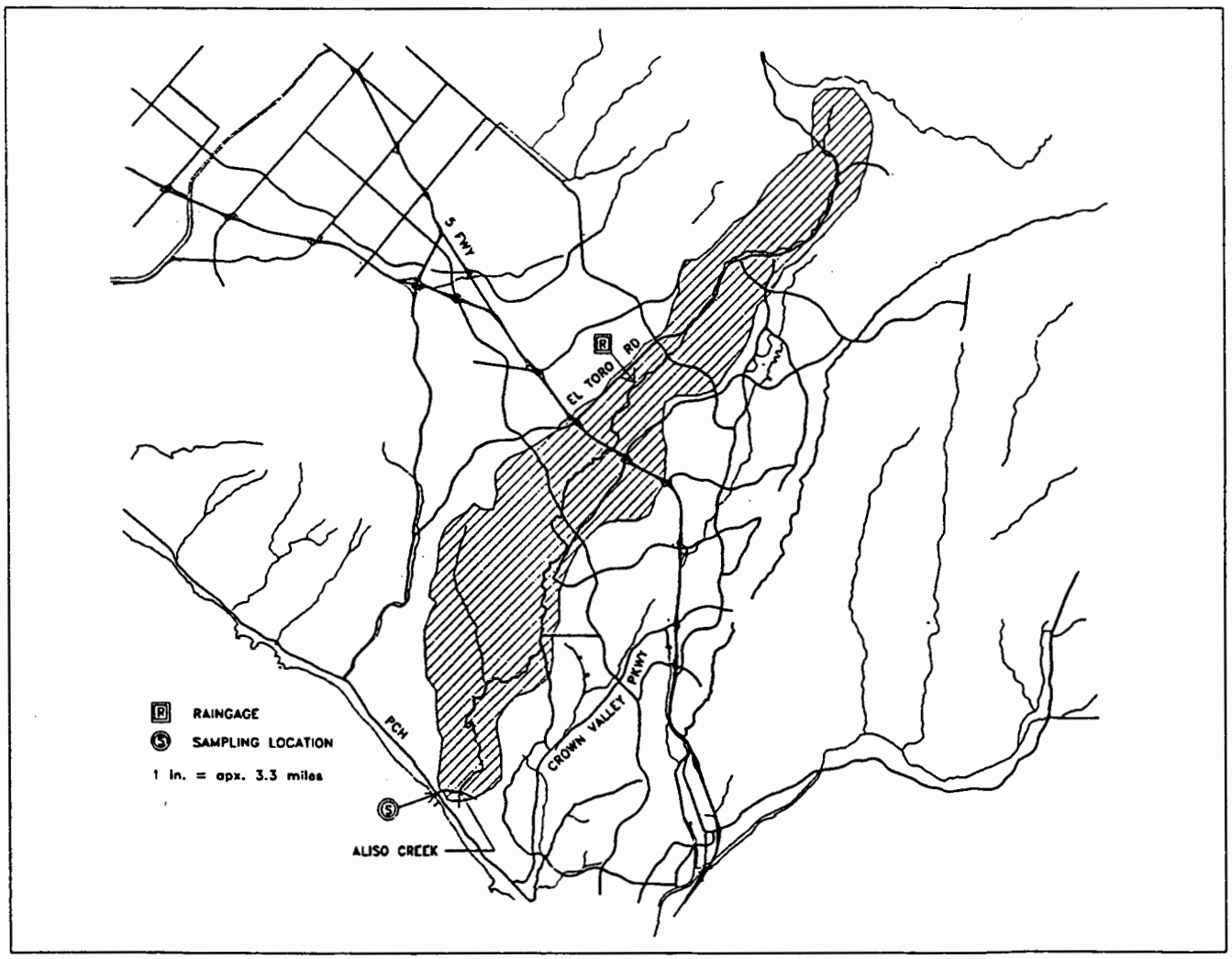

ANAHEIM BARBER CITY CHANNEL

Location :	Downstream U.S. Gov. Railroad Bridge at Rancho Road Lat. 33-45-16 Long. 118-02-04
Channel :	CO3
Storet Code :	ABCC03
Watershed Area :	14.9 sq. mi. (38.6 sq. km.)
Cities in Watershed :	Anaheim, Garden Grove, Huntington Beach, Stanton, Westminster
Raingage :	Garden Grove Alert #1175, Garden Grove Fire Station #229
Gaging Station :	#232
Equipment :	Stevens A-71 Water-Stage Recorder with Nitrogen Bubbler and Mercury Manometer Alert Water Level Sensor and Rain Gage

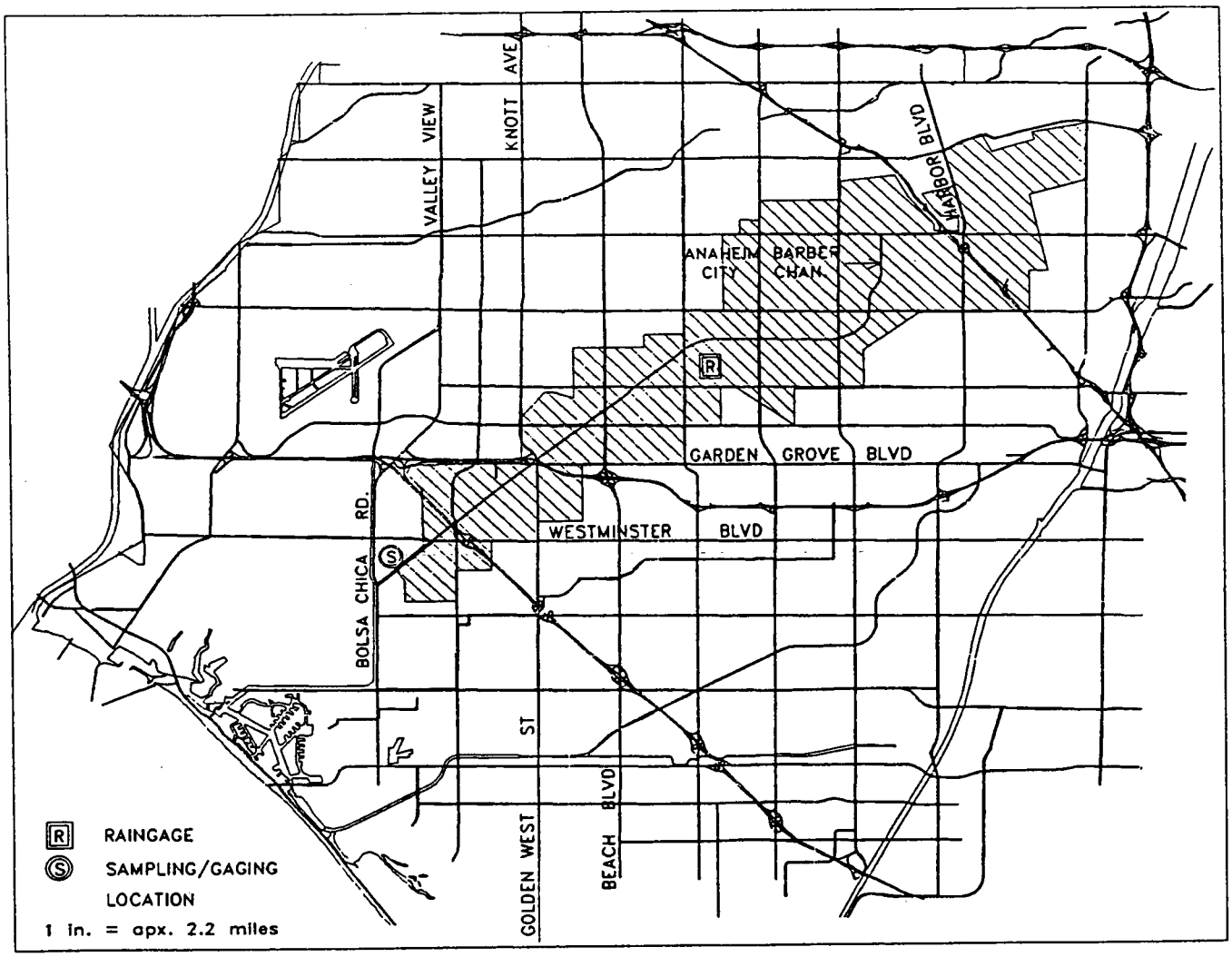

BARRANCA CHANNEL

Location :	At Main St. Lat. 33-40-45 Long. 117-50-07
Channel :	FO9
Storet Code :	BC2FO9
Watershed Area :	approx. 2.7 sq.mi. (7.0 sq.km.)
Cities in Watershed :	Irvine, Santa Ana, Tustin
Raingage :	Santa Ana Engineering Alert #219, Santa Ana #121

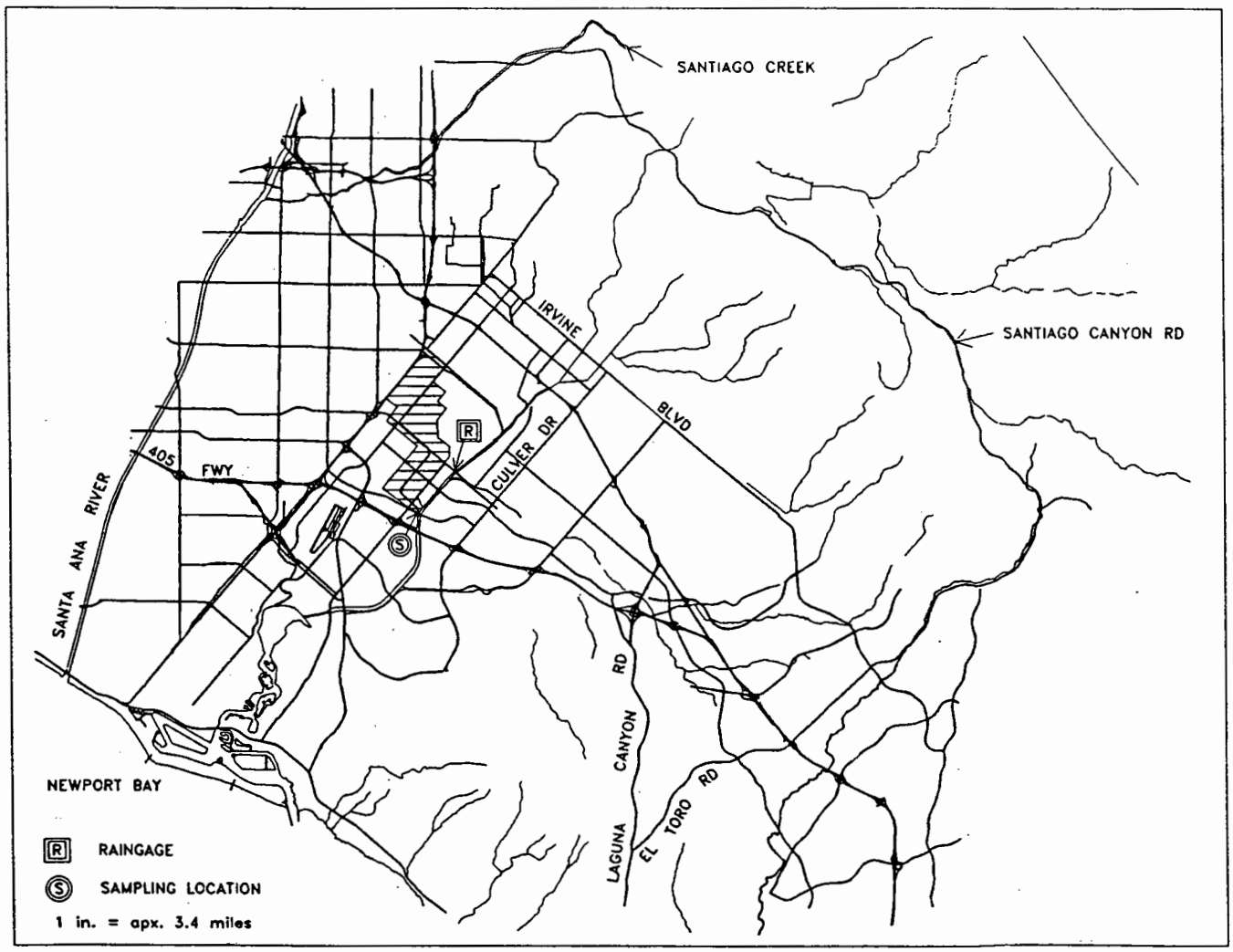

BEE CANYON CHANNEL

Location :	At Alton and Pacifica Lat. 33-39-22 Long. 117-45-22
Channel :	F17
Storet Code :	BEEF17
Watershed Area :	11.2 sq.mi. (29.1 sq.km.)
Cities in Watershed :	Irvine
Raingage :	Lambert Reservoir Alert #217

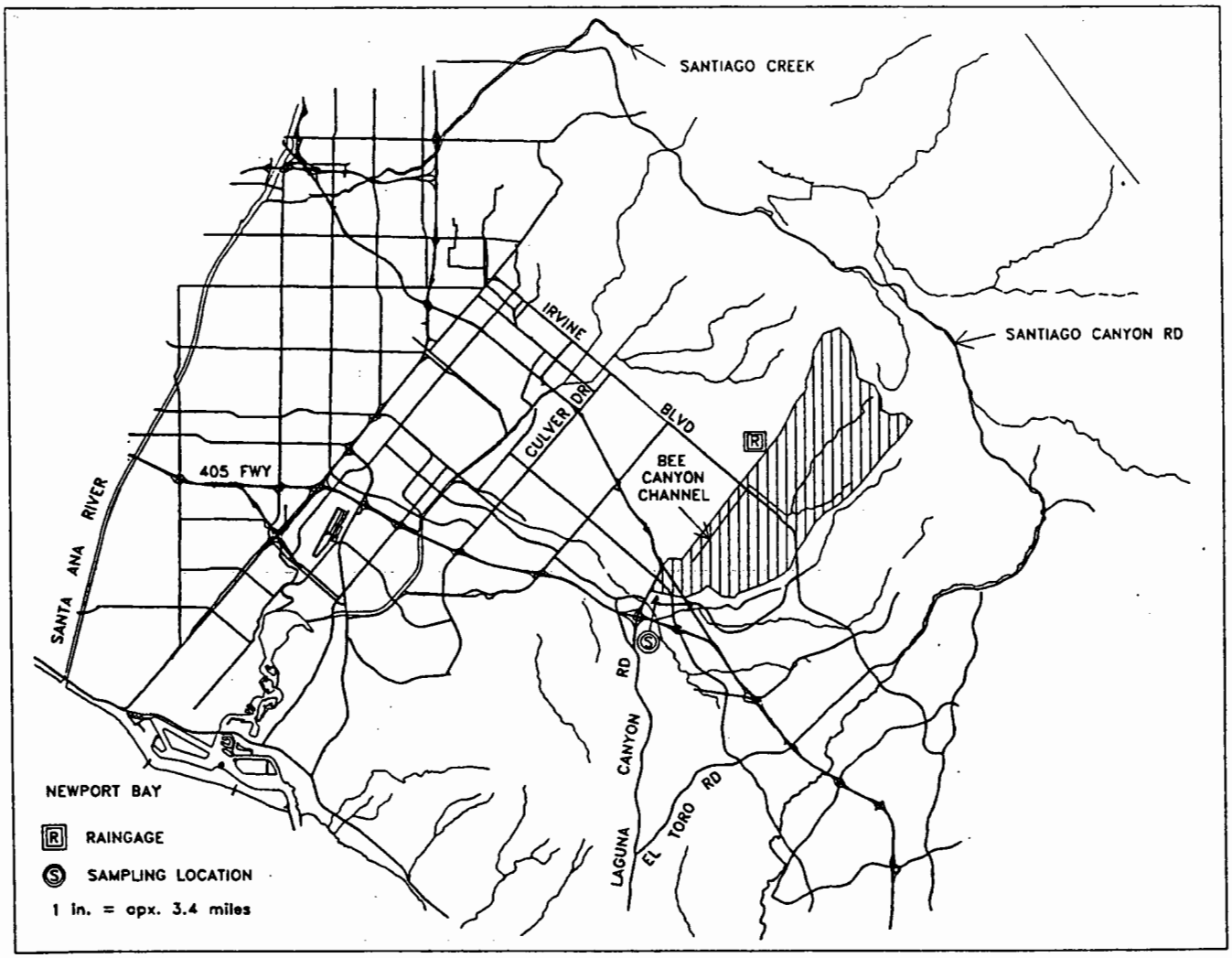

BOLSA CHICA CHANNEL

Location :	At Bolsa Chica Road and Westminster Ave. Lat. 33-45-33 Long. 118-02-30
Channel :	CO2
Storet Code :	BCC02
Watershed Area :	10.0 sq. mi. (26.0 sq. km.)
Cities in Watershed :	Anaheim, Buena Park, Cypress, Garden Grove, Los Alamitos, Seal Beach, Stanton, Westminster
Raingage :	Garden Grove Alert #1175, Garden Grove Fire Station #229
Gaging Station :	#225
Equipment :	Stevens A-71 Water-Stage Recorder with Float Alert Water Level Sensor

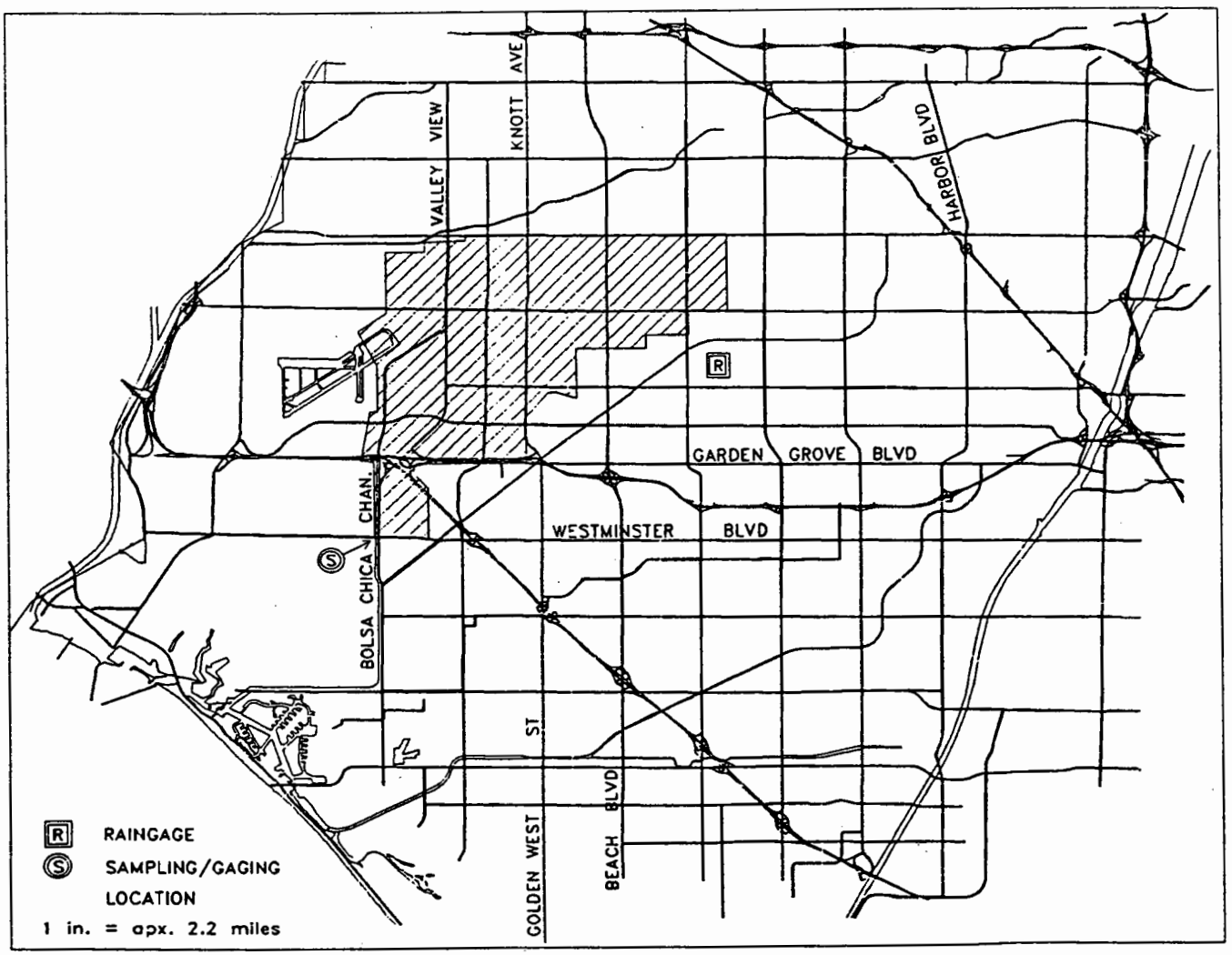

BONITA CANYON CHANNEL

Location :	At San Diego Creek Confluence Lat. 33-39-05 Long. 117-51-38
Channel :	FO4
Storet Code :	BCFO4
Watershed Area :	approx. 5.0 sq.mi. (13.0 sq.km.)
Cities in Watershed :	Irvine, Newport Beach
Raingage :	San Diego Creek Alert #1125

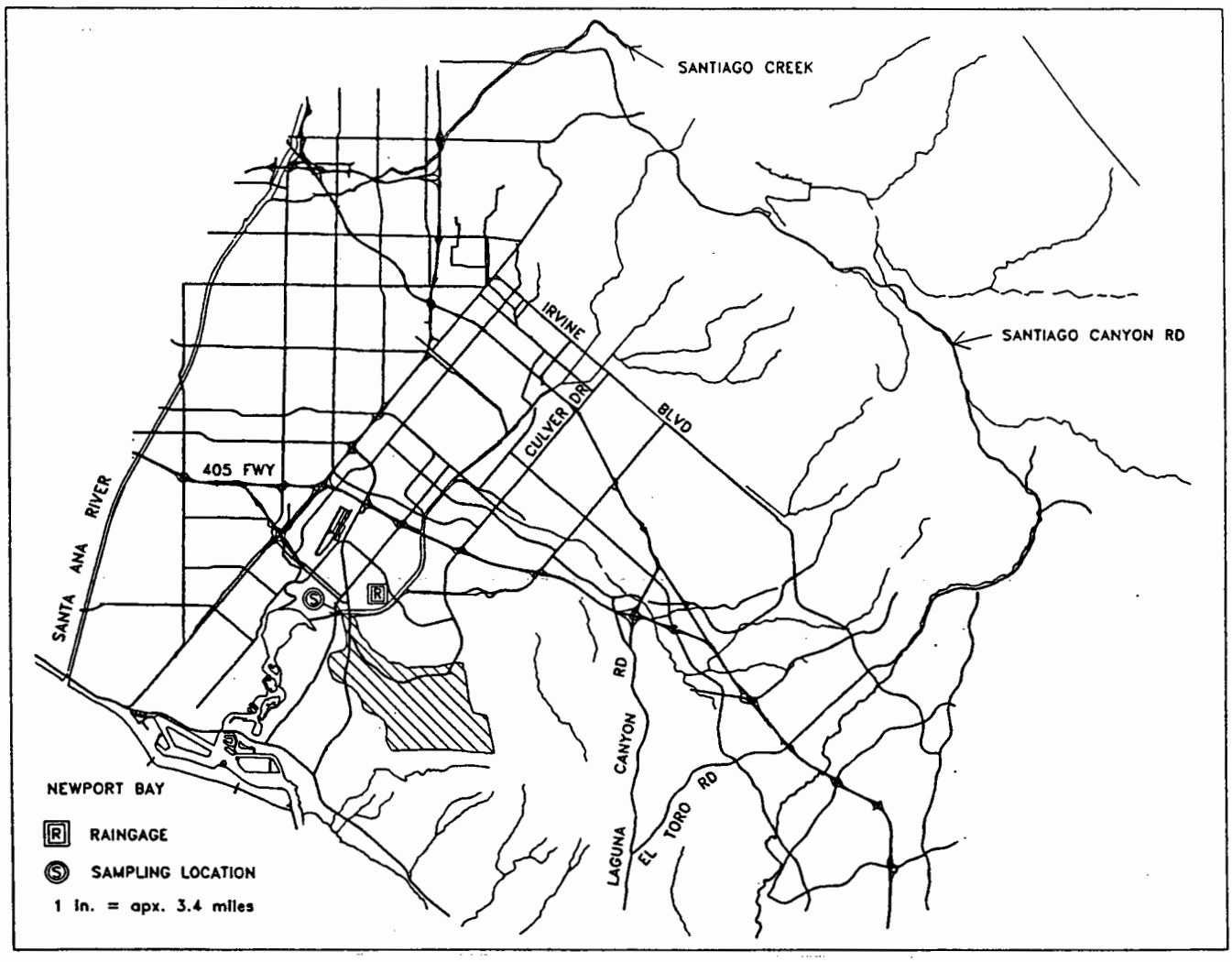

COSTA MESA CHANNEL

Location :	At Westcliff Drive Lat. 33-37-23 Long. 117-53-57
Channel :	GO2
Storet Code :	CMCGO2
Watershed Area :	approx. 1.0 sq.mi. (2.6 sq.km.)
Cities in Watershed :	Costa Mesa, Newport Beach
Raingage :	Santa Ana Delhi Alert #1111, Newport Harbor Master #88

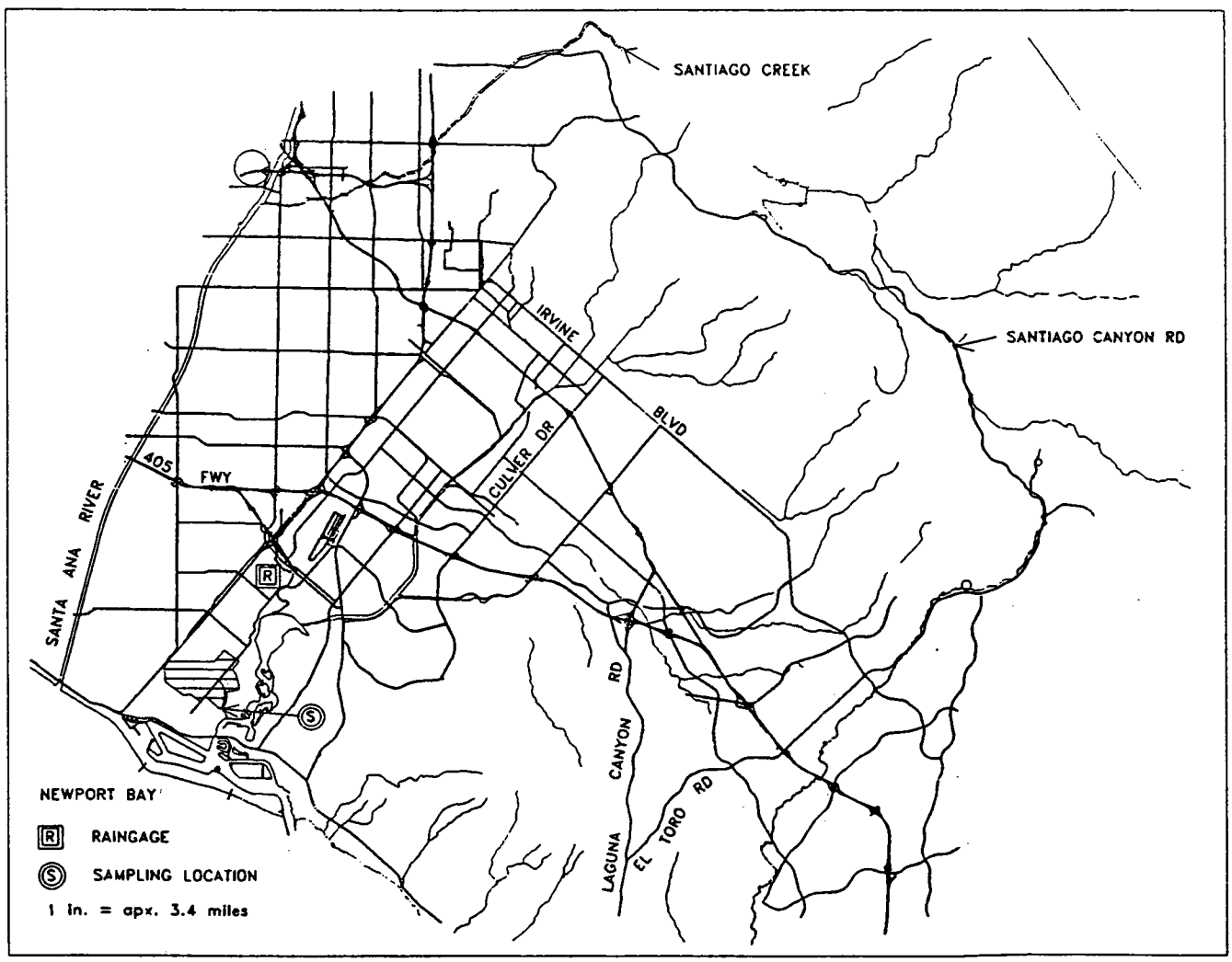

EAST GARDEN GROVE WINTERSBURG

Location :	At Gothard St. Lat. 33-42-58 Long. 117-59-57
Channel :	CO5
Storet Code :	EGWC05
Watershed Area :	20.8 sq. mi. (53.8 sq. km.)
Cities in Watershed :	Anaheim, Fountain Valley, Garden Grove, Huntington Beach, Orange Santa Ana, Westminster
Raingage :	Katella Yard Alert #223
Gaging Station :	#217
Equipment :	Stevens A-71 Water-Stage Recorder with Float Alert Water Level Sensor and Rain Gage

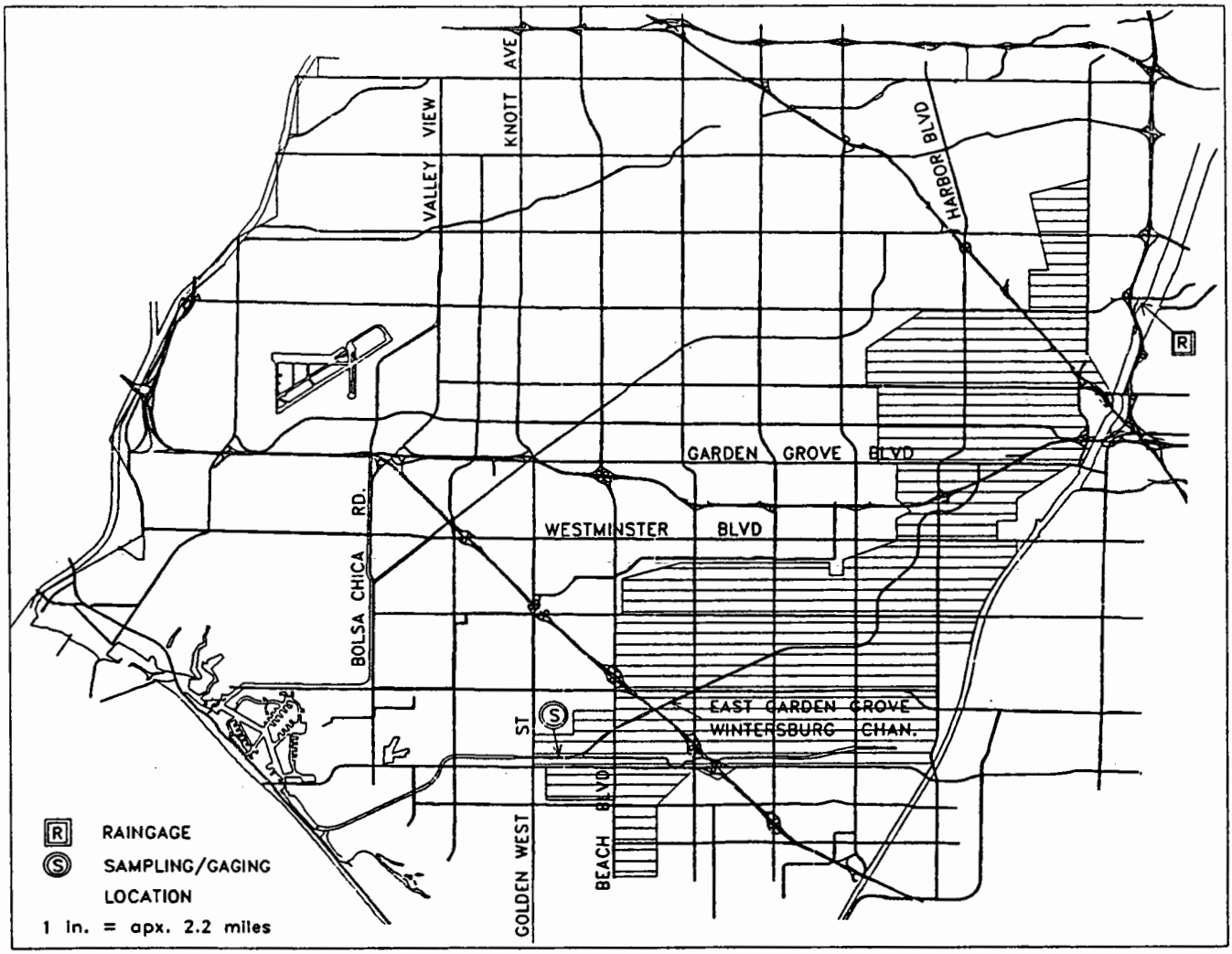

HICKS CANYON WASH

Location :	At Culver Blvd. Lat. 33-43-27 Long. 117-46-01
Channel :	F27
Storet Code :	HCWF27
Watershed Area :	approx. 7.5 sq.mi. (19.4 sq.km.)
Cities in Watershed :	Irvine
Raingage :	Lambert Reservoir Alert #217

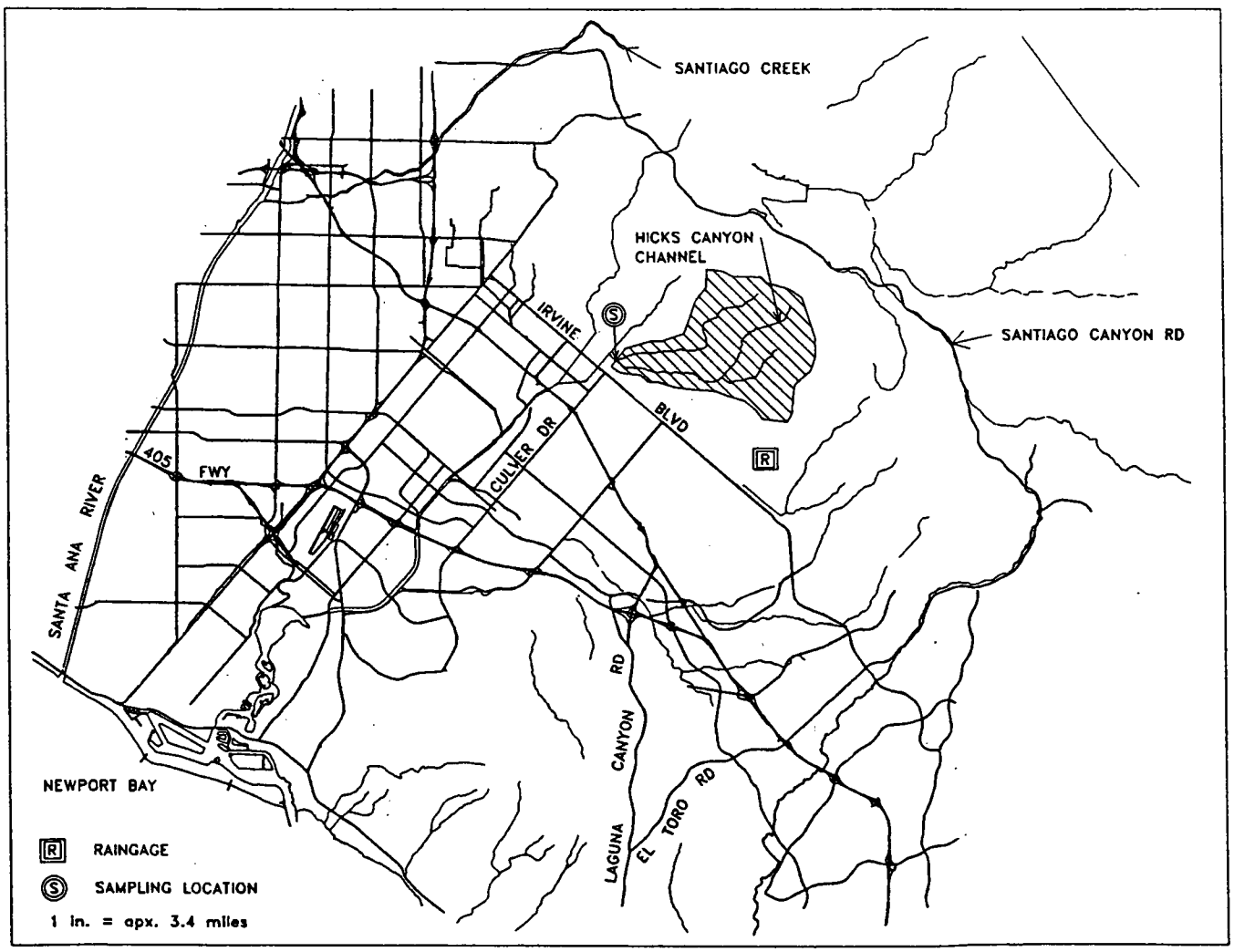

LAGUNA CANYON CHANNEL

Location :	At Woodland Ave. Lat. 33-33-18 Long 117-46-33
Channel :	IO2
Storet Code :	LCWI02
Watershed Area :	8.3 sq.mi. (21.4 sq.km.)
Cities in Watershed :	Laguna Beach
Raingage :	Laguna Canyon Alert #1120
Gaging Staion :	#222
Equipment :	Stevens A-71 Water-Stage Recorder with Float Alert Rain Gage and Water Level Sensor

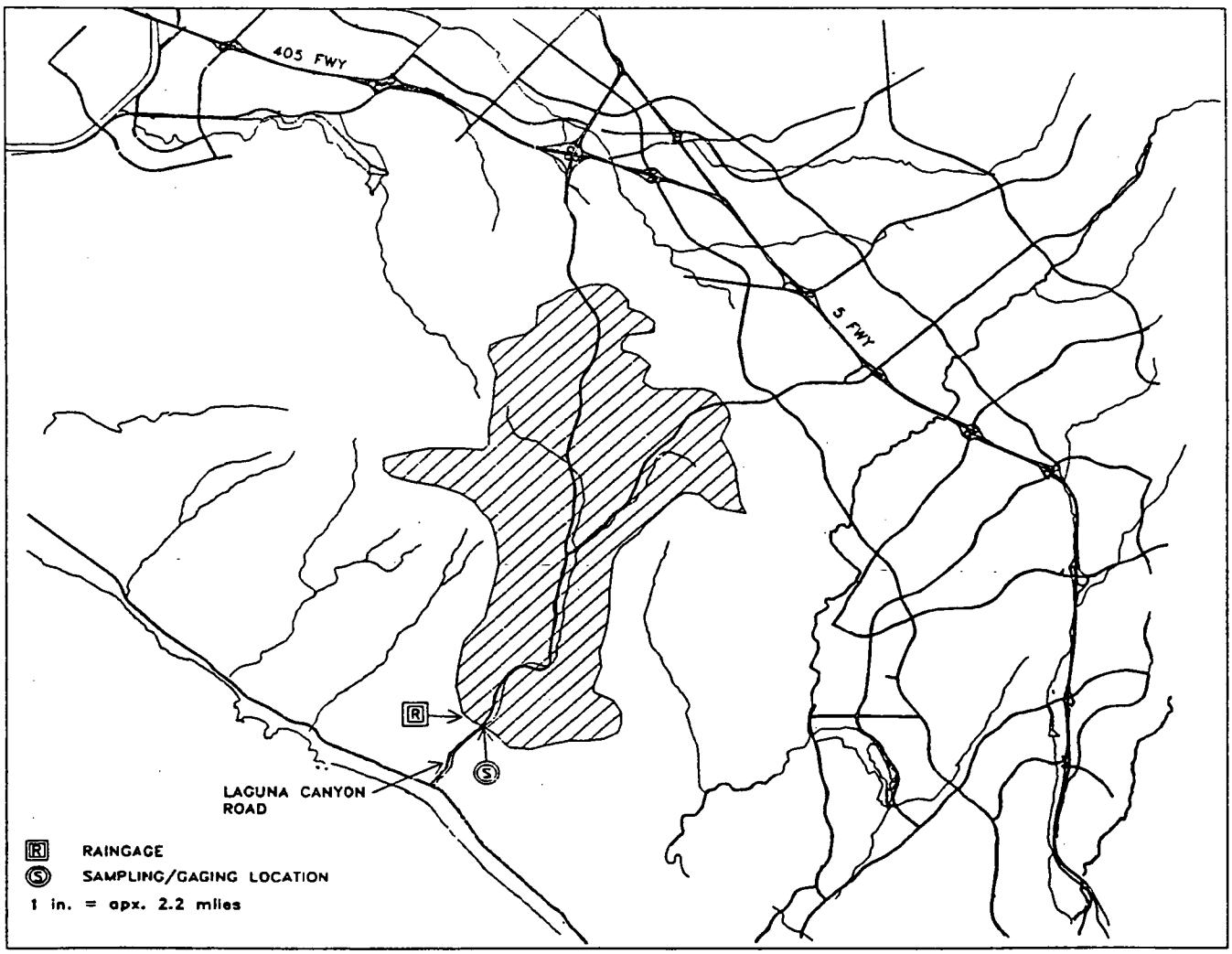

LANE CHANNEL

Location :	At McCabe Way, upstream FO8/FO5 confluence Lat. 33-40-41 Long. 117-50-34
Channel :	FO8
Storet Code :	LANFO8
Watershed Area :	approx. 4.6 sq.mi. (11.9 sq.km.)
Cities in Watershed :	Irvine, Santa Ana
Raingage :	Santa Ana Engineering Alert #219, Santa Ana #121

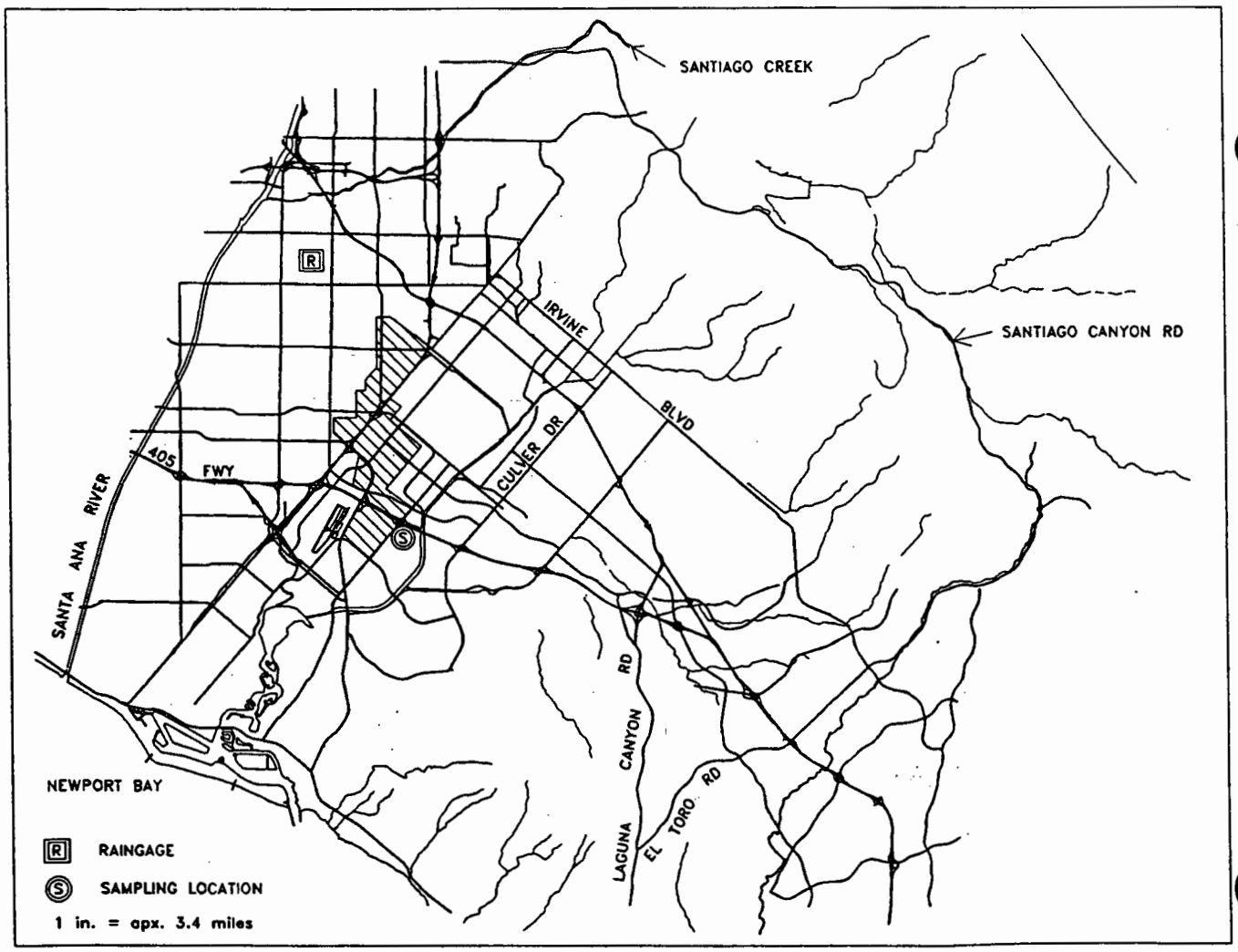

OSO CREEK

Location :	At Crown Valley Parkway Lat. 33-33-29 Long 117-40-33
Storet Code :	OSOL03
Watershed Area :	14.0 sq.mi. (36.2 sq.km.)
Cities in Watershed :	Laguna Hills, Laguna Niguel, Mission Viejo
Raingage :	Upper Oso Creek Alert #297, Trabuco Canyon #133
Gaging Station :	#218
Equipment :	Stevens A-71 Water-Stage Recorder with Float Alert Raingage and Water Level Sensor

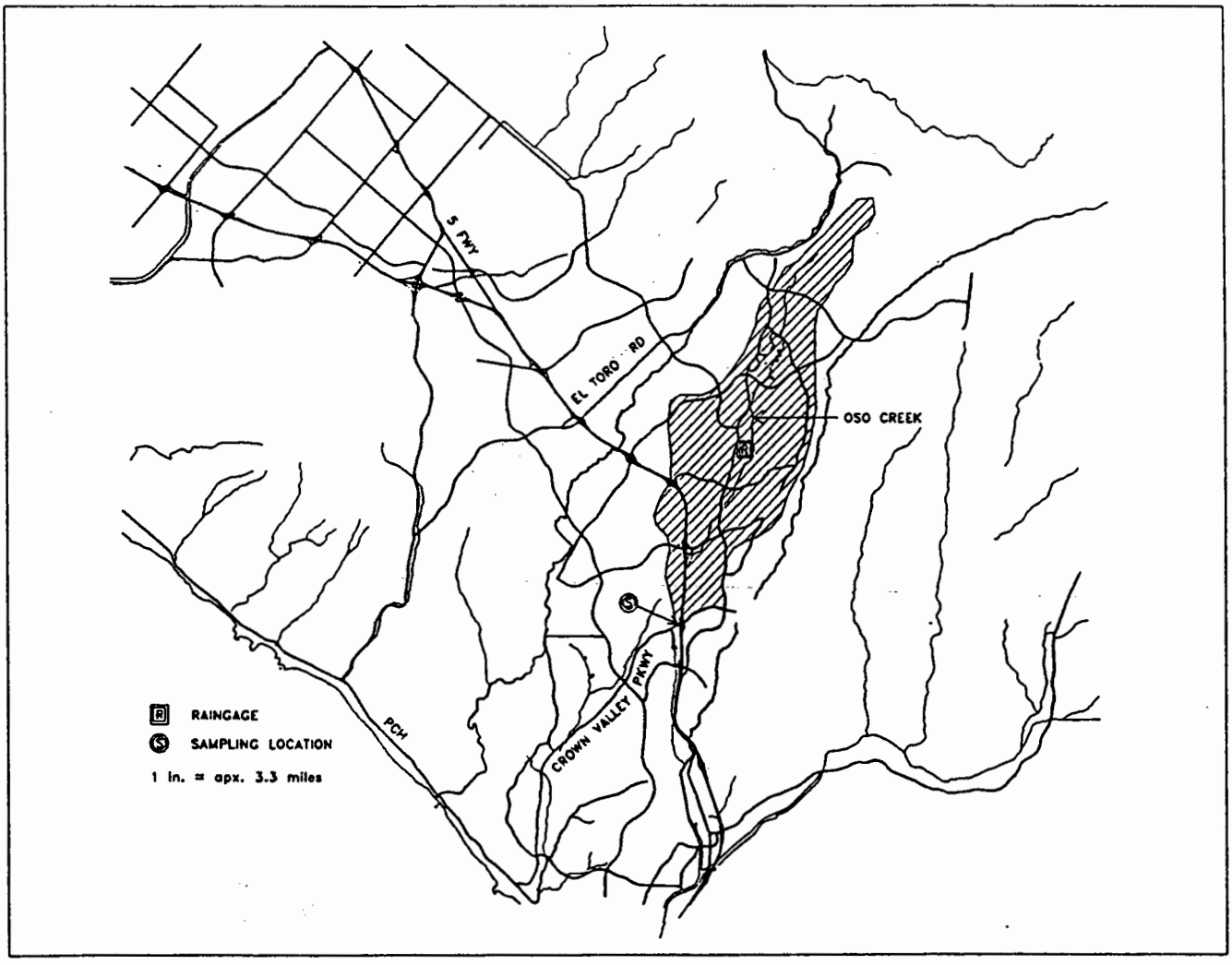

PETERS CANYON CHANNEL

Location :	At Barranca Road Lat. 33-41-30 Long. 117-49-23
Channel :	FO6
Storet Code :	BARSED
Watershed Area :	45.2 sq.mi. (117.1 sq.km.)
Cities in Watershed :	Irvine, Santa Ana
Raingage :	Santa Ana Engineering Alert #219, Santa Ana #121
Gaging Station :	#230
Equipment :	Stevens A-71 Water-Stage Recorder with Float Alert Rain Gage and Water Level Float

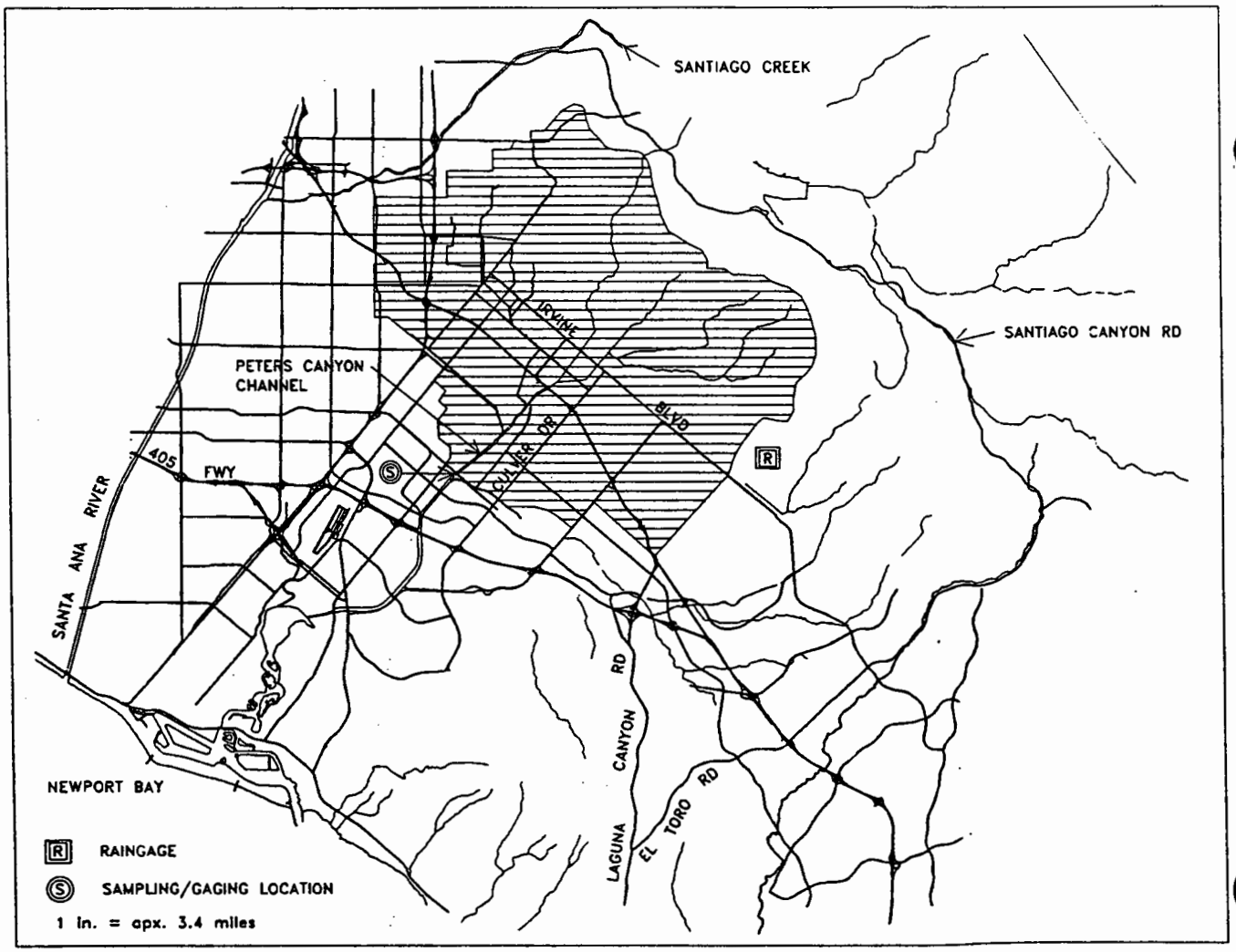

PRIMA DESHECHA CHANNEL

Location :	At Calle Grande Vista Lat. 33-25-57 Long. 117-37-53
Channel :	MO1
Storet Code :	PDCMO1
Watershed Area :	7.0 sq.mi. (18.1 sq.km.)
Cities in Watershed :	San Clemente, San Juan Capistrano
Raingage :	San Juan Capistrano Alert #215

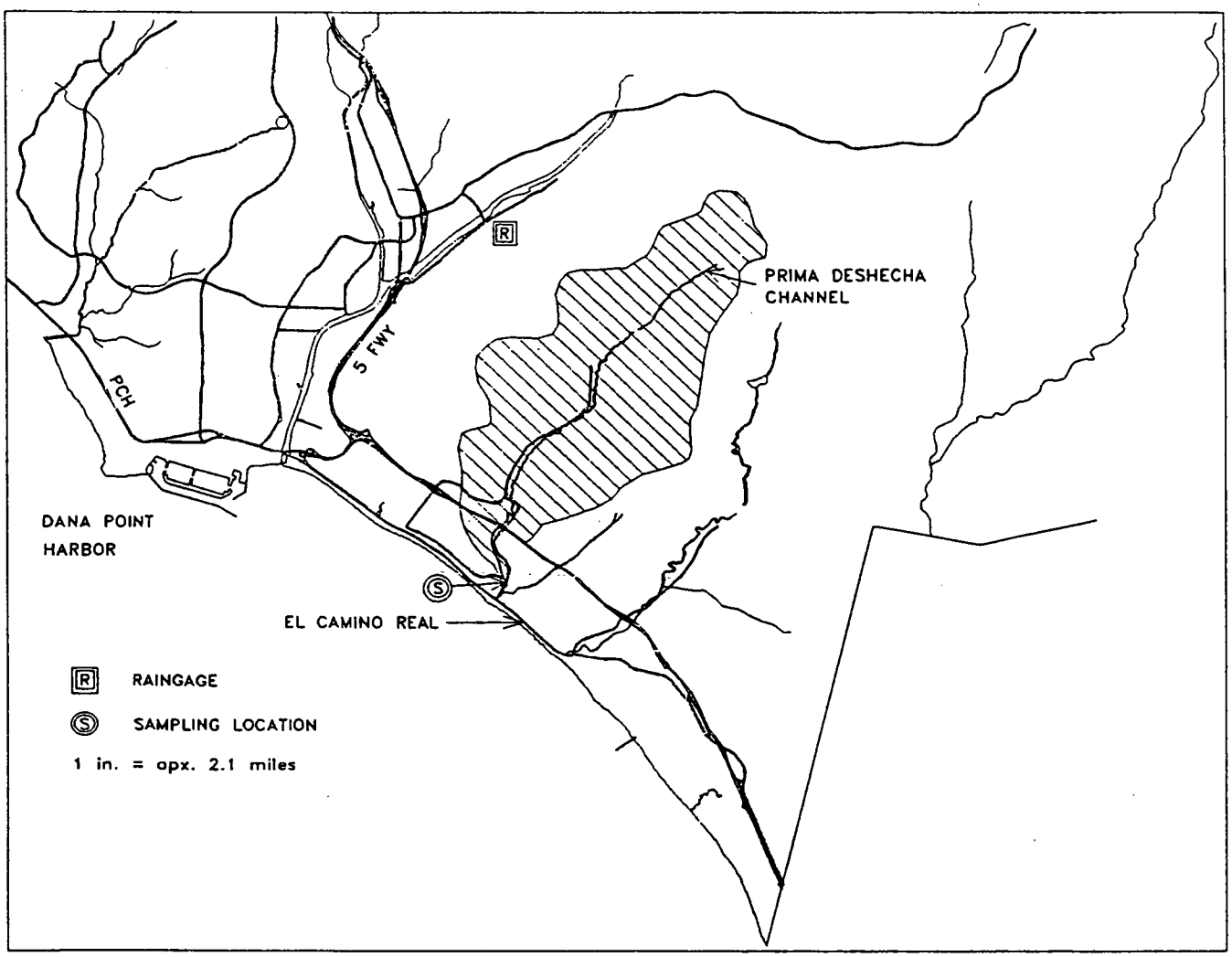

RATTLESNAKE CANYON WASH

Location :	At Bryan Ave. Lat. 33-42-30 Long. 117-45-00
Channel :	F26
Storet Code :	RCWF26
Watershed Area :	approx. 3.5 sq.mi. (9.1 sq.km.)
Cities in Watershed :	Irvine, Tustin
Raingage :	Lambert Reservoir Alert #217

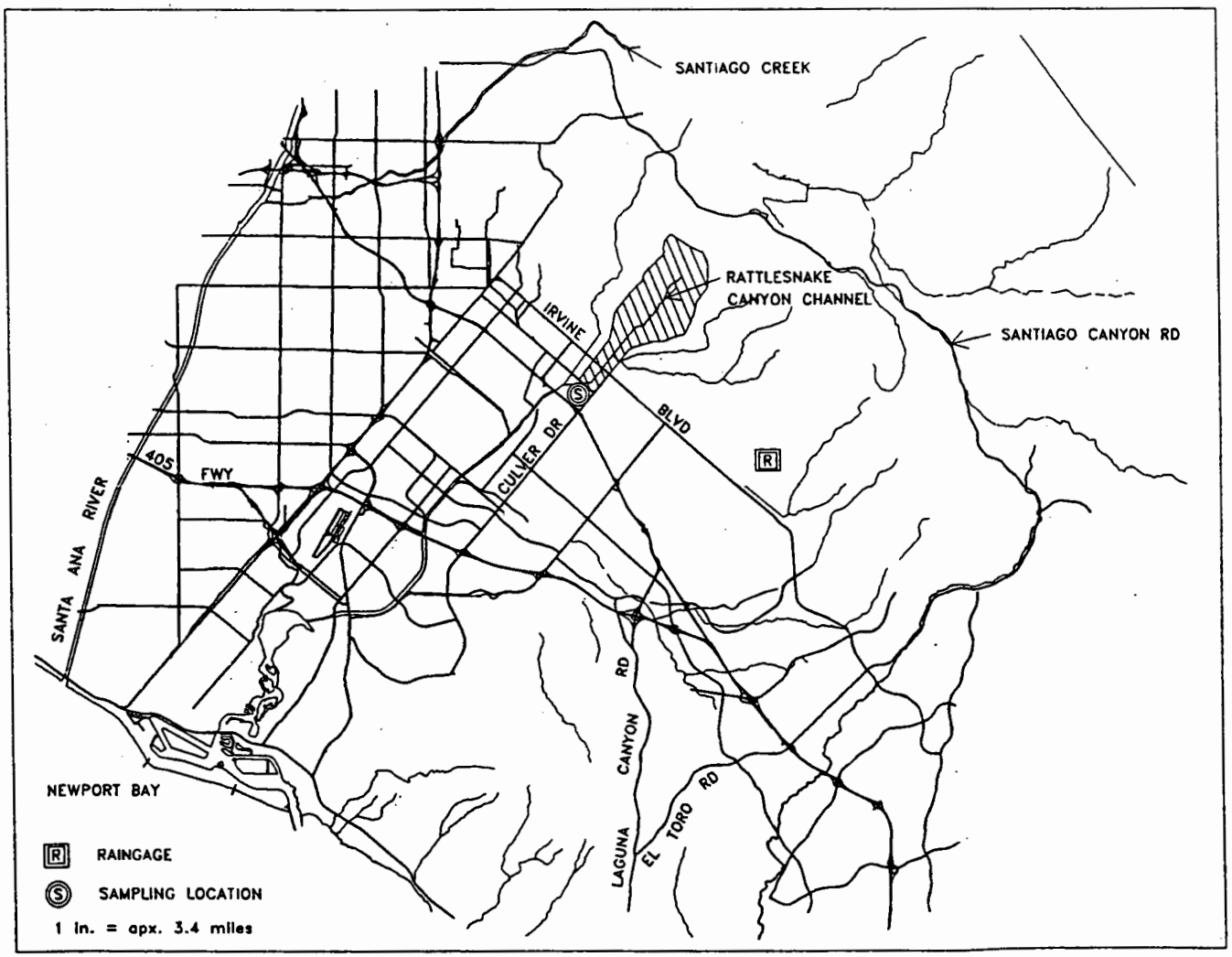

SAN DIEGO CREEK AT CAMPUS

Location :	At Campus Dr. Lat. 33-39-20 Long. 117-50-41
Channel :	FO5
Storet Code :	SDMFO5
Watershed Area :	111.0 sq.mi. (287.5 sq.km.)
Cities in Watershed :	Irvine, Lake Forest, Orange, Santa Ana, Tustin
Raingage :	Lambert Reservoir Alert #217
Gaging Station :	#226
Equipment :	Stevens A-71 Water-Stage Recorder with Nitrogen Bubbler and Mercury Manometer Alert Rain Gage and Water Level Sensor

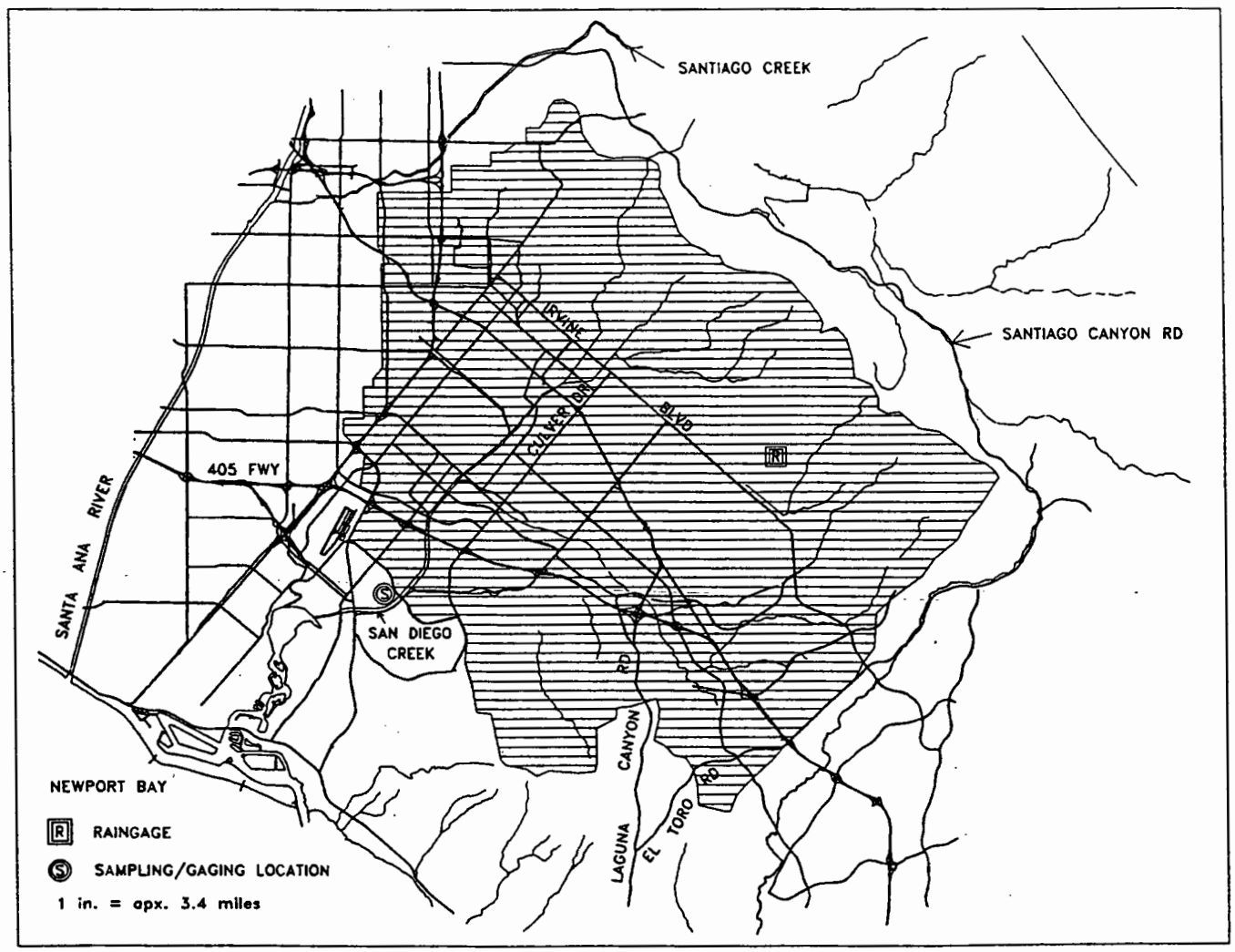

SAN DIEGO CREEK AT CULVER

Location :	At Culver Lat. 33-40-54 Long. 117-48-31
Channel :	FO5
Storet Code :	WYLSED
Watershed Area :	41.8 sq.mi. (108.3 sq.km.)
Cities in Watershed :	Irvine, Lake Forest
Raingage :	Lambert Reservoir Alert #217
Gaging Station :	#231
Equipment :	Stevens A-71 Water-Stage Recorder with Nitrogen Bubbler and Mercury Manometer

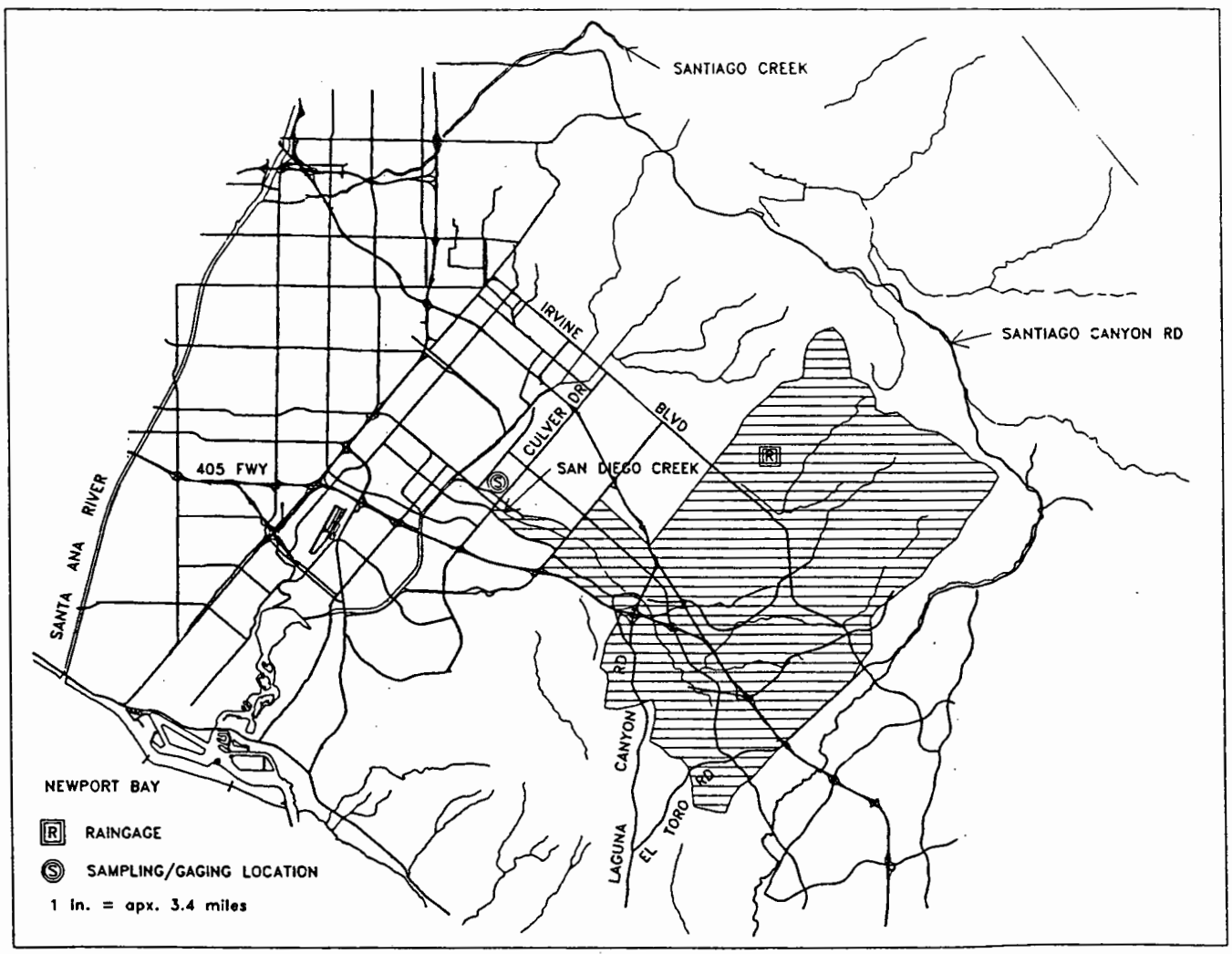

SAND CANYON CHANNEL

Location :	At Culver and University Lat. 33-39-30 Long. 117-49-40
Channel :	F15
Storet Code :	SCCF15
Watershed Area :	approx. 9.6 sq.mi. (24.8 sq.km.)
Cities in Watershed :	Irvine
Raingage :	San Diego Creek Alert #1125

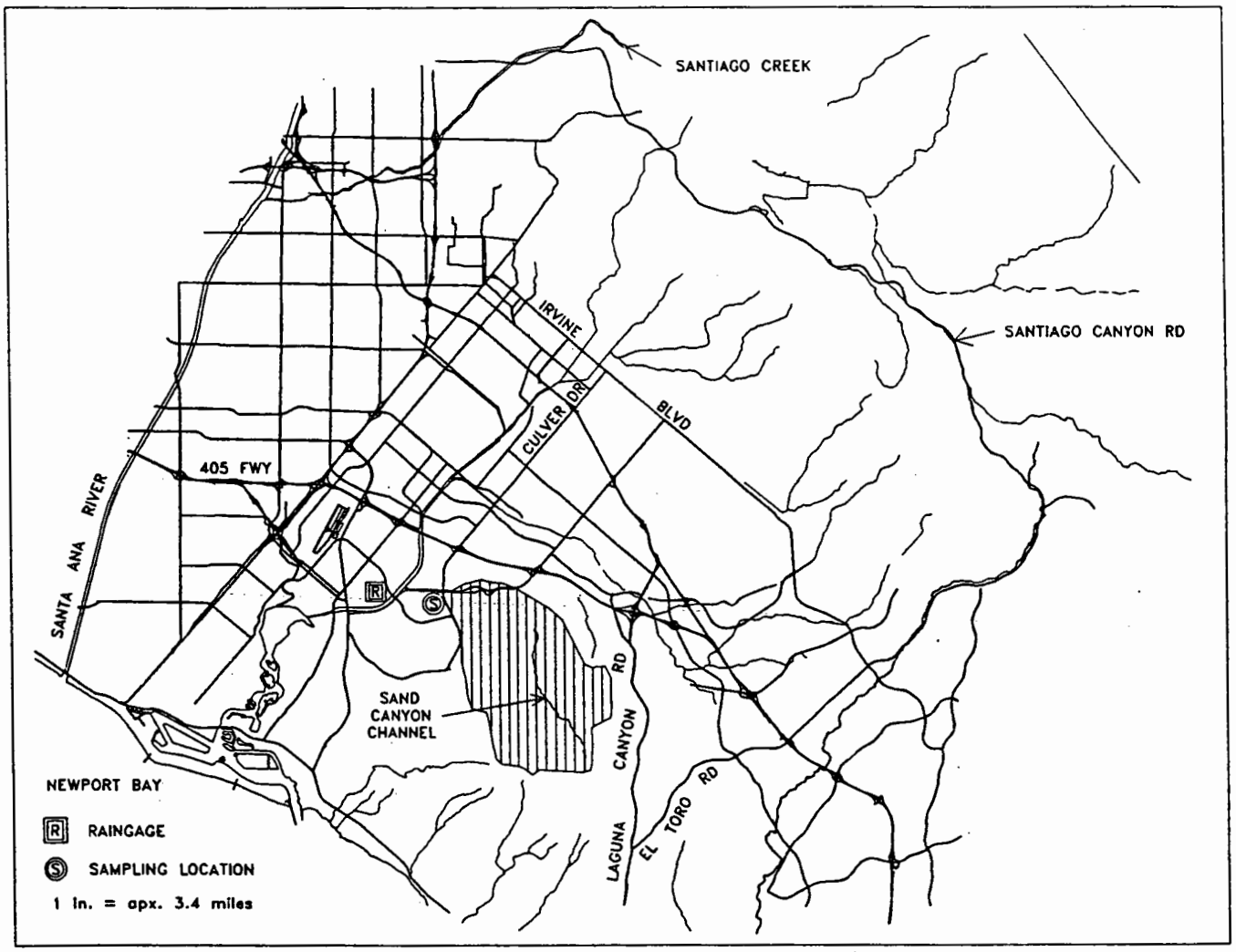

SANTA ANA DELHI CHANNEL

Location :	Upstream Irvine Ave. Lat. 33-39-36 Long. 117-52-50
Channel :	FO1
Storet Code :	SADFO1
Watershed Area :	17.6 sq.mi. (45.6 sq.km.)
Cities in Watershed :	Costa Mesa, Irvine, Newport Beach, Santa Ana
Raingage :	Costa Mesa Alert #1150, Costa Mesa #165
Gaging Station :	#220
Equipment :	Stevens A-71 Water-Stage Recorder with Float Alert Rain Gage and Water Level Sensor

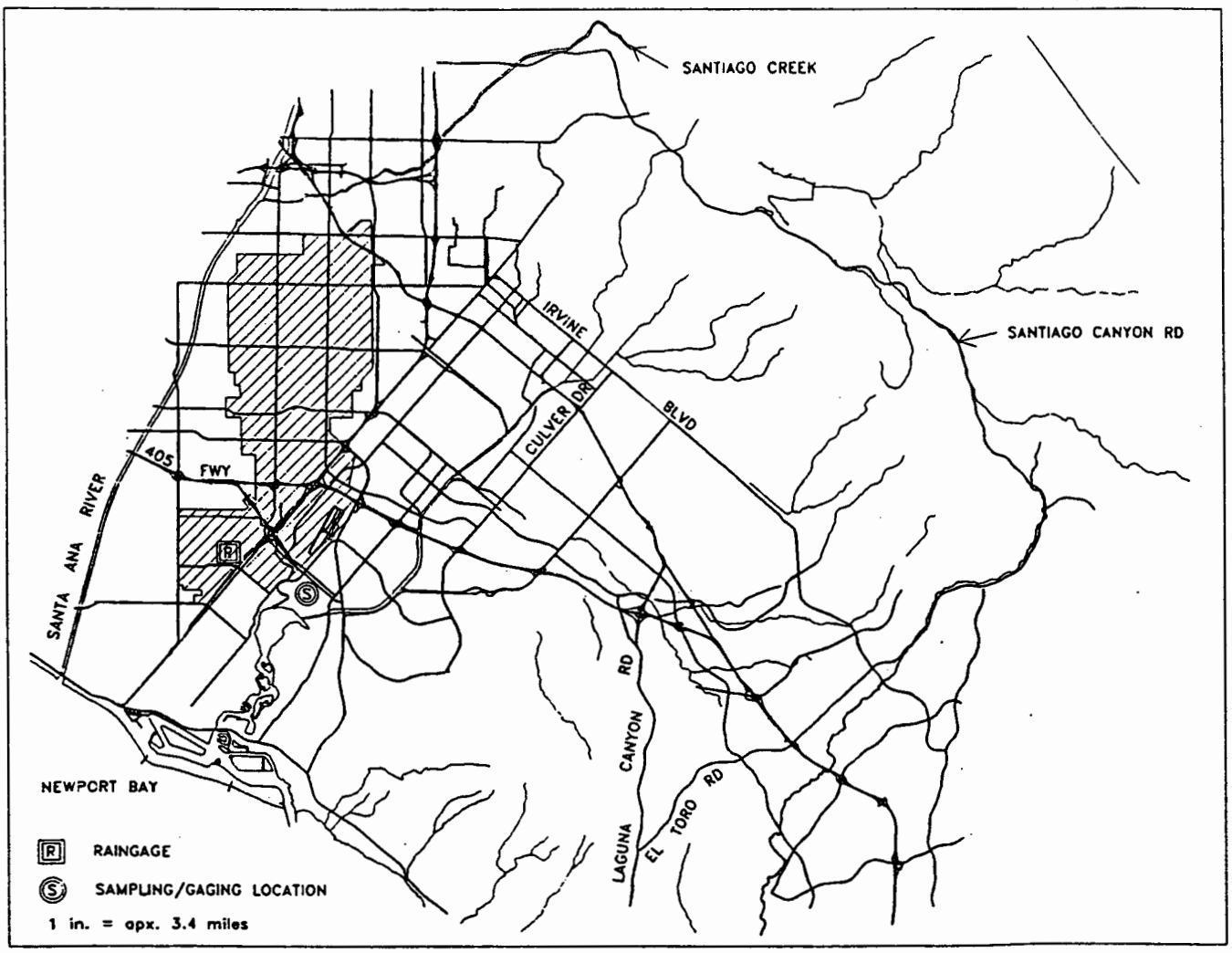

SEGUNDA DESHECHA CANNEL

Location :	At El Camino Real Lat. 33-25-58 Long. 117-37-51
Channel :	MO2
Storet Code :	SDCMO2
Watershed Area :	8.9 sq.mi. (23.1 sq.km.)
Cities in Watershed :	San Clemente
Raingage :	San Juan Capistrano Alert #215

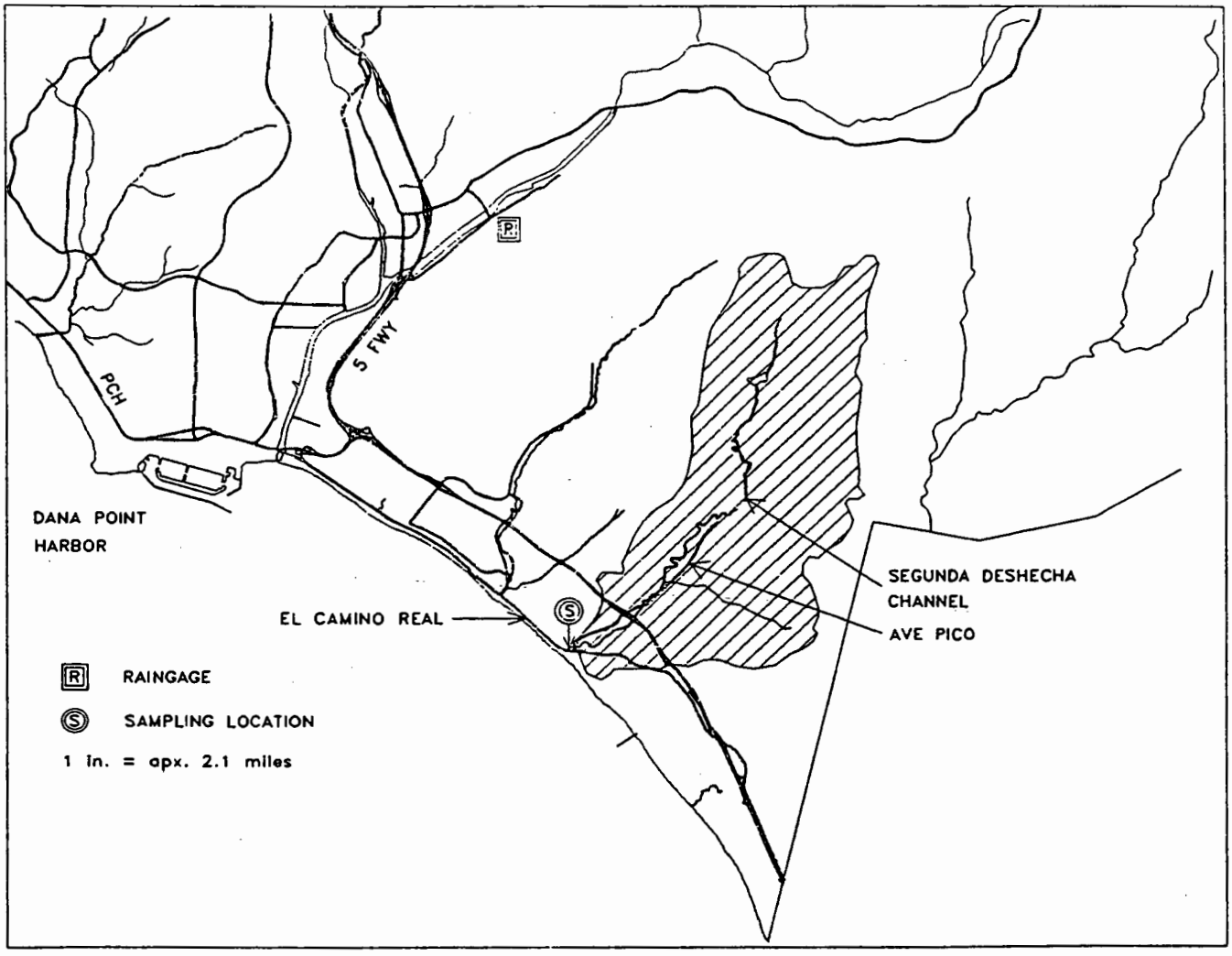

SERRANO CREEK

Location :	At Alton and Muirlands Lat. 33-39-00 Long. 117-42-21
Channel :	F19
Storet Code :	SERF19
Watershed Area :	approx. 6.9 sq.mi. (17.9 sq.km.)
Cities in Watershed :	Irvine, Lake Forest
Raingage :	Lambert Reservoir Alert #217

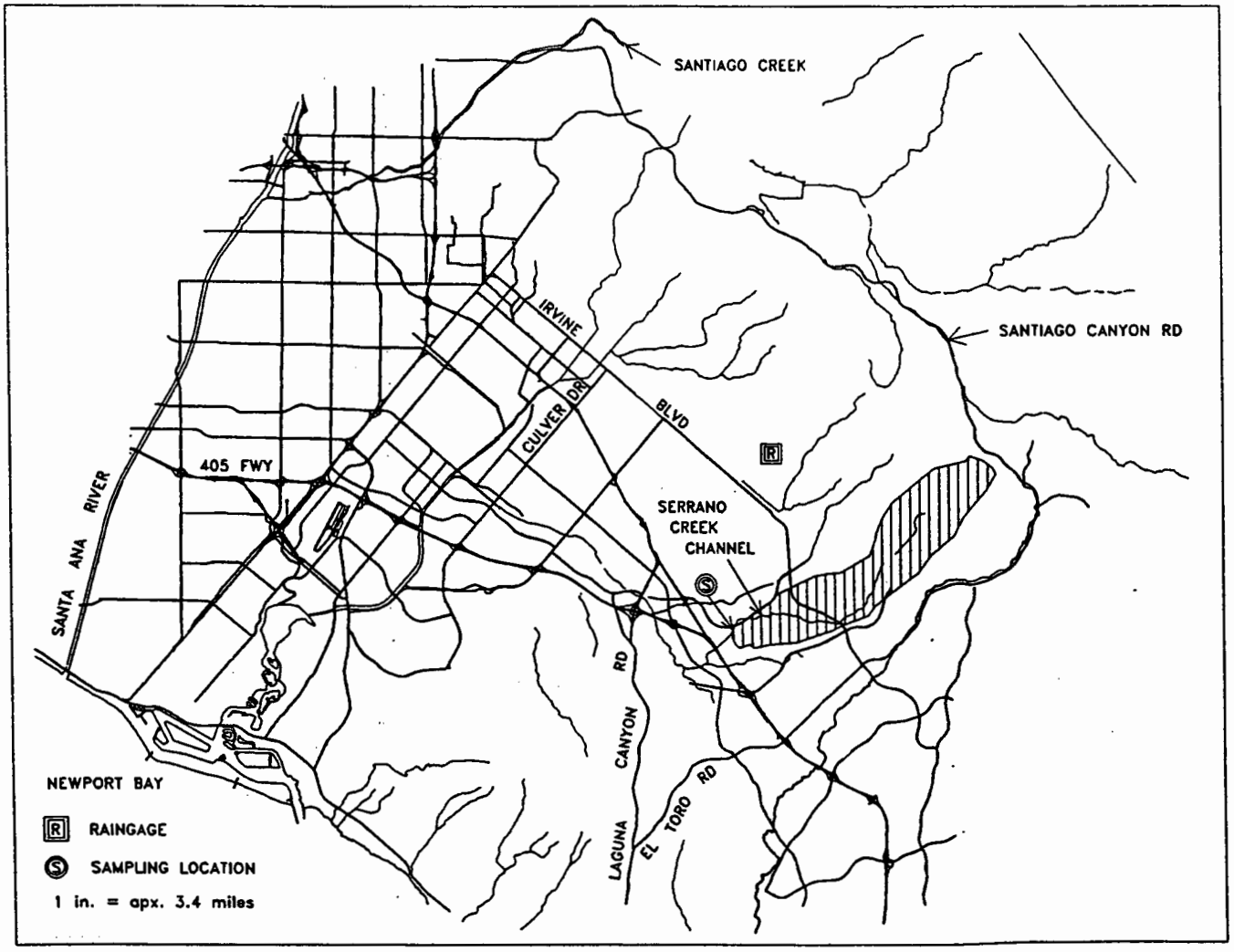

WESTMINSTER CHANNEL

Location :	At Hazard Downstream Beach Blvd. Lat. 33-45-07 Long. 117-59-26
Channel :	CO4
Storet Code :	WMCC04
Watershed Area :	6.7 sq. mi. (17.3 sq. km.)
Cities in Watershed :	Garden Grove, Westminster
Raingage :	Garden Grove Alert #1175, Garden Grove Fire Station #229
Gaging Station :	#207
Equipment :	Stevens A-71 Water-Stage Recorder with Float Alert Water Level Sensor and Rain Gage

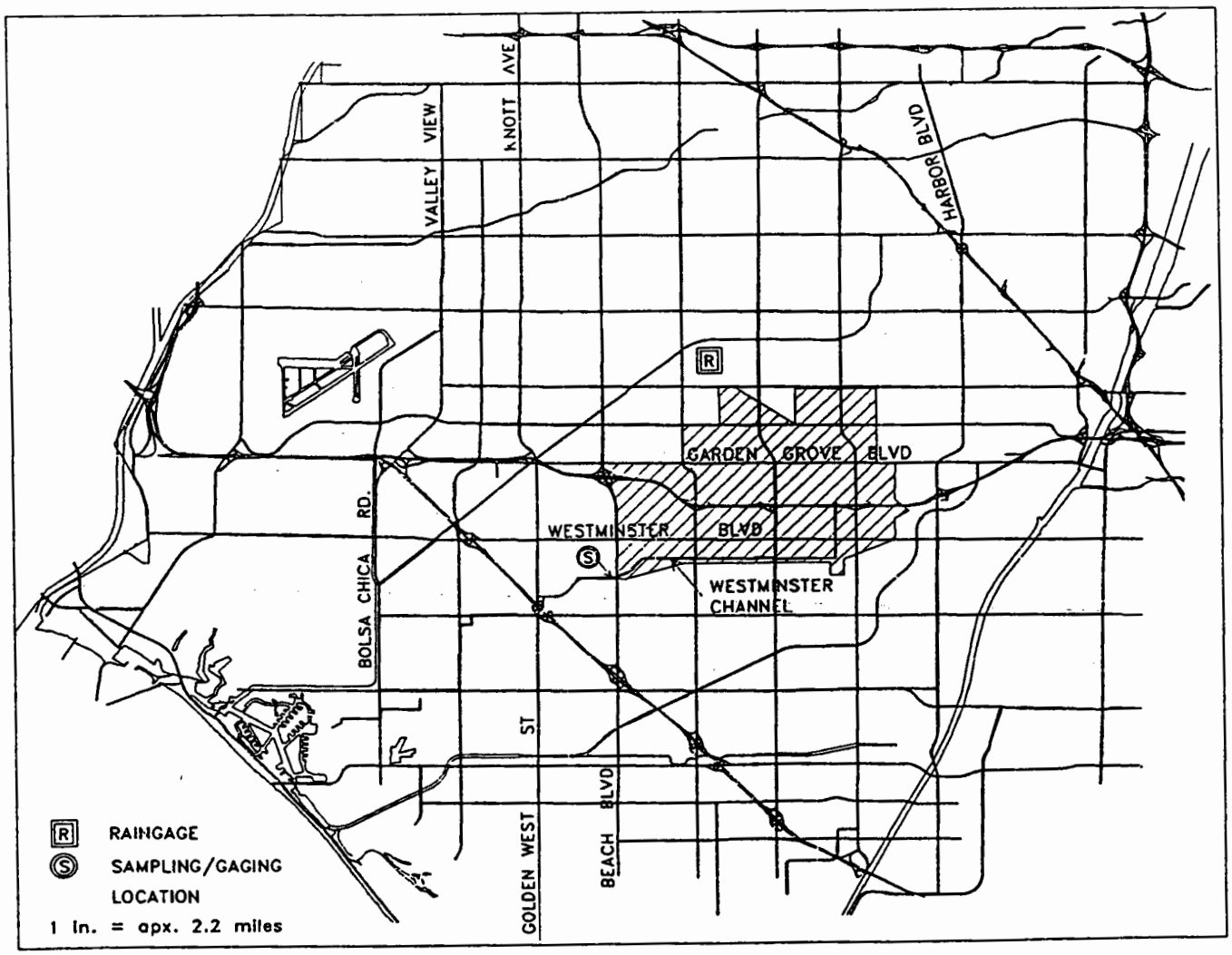

Appendix 5.2
Water Quality Data from Channels

STATION	DATE	TIME	SAMPLES Type	#	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
TGDC05	2/25/00	9:20	ST	1	33100	4	8.2	<0.44	0.13	0.64	0.19		52	36	<1	10	18	<2	10	<2	14	
	2/25/00	9:20	SF	1											<1	10	17	<2	11	<2	16	
	2/27/00	7:24	ST	1	28400	5	7.9	0.98	0.22	0.62	0.27		48	38	<1	9	17	<2	8	<2	19	
	2/27/00	0:00	SF	1											<1	9	16	<2	8	<2	18	

STATION	DATE	TIME	SAMPLES Type	#	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
TGUC05	8/28/97		DT	1	43000	3	8.2	<0.2	<0.1	1.1	1		98	36	<1	<10	<4	<2	<4	<1	40	
	9/25/97	10:48	ST	5	23000	7.7	8.1	1	<0.1	1.7	1	<0.5	46	21	100	<5	23	<2	6	<1	320	2380
	9/25/97	11:48	SF												<1	<5	13	<2	<4	<1	19	
	9/25/97	13:48	ST	7	3700	52	7.2	4	1	5.3	1	<0.5	57	27	3	<10	28	14	15	<1	200	450
	9/26/97	7:48	SF												2	<10	25	16	14	<1	180	
	9/26/97	9:48	ST	9	41000	5.2	7.7	1	1	2.0	0.93	<0.5	91	41	<1	<5	12	<2	<4	<1	43	3620
	9/27/97	7:48	SF												<1	<5	11	<2	<4	<1	54	
	10/3/97		DT	1	41000	7.1	8.2	<0.2	0	2.3	1	<5	120	45	<1	<10	6	<2	<4	<1	18	
	10/3/97		DT												<1	<10	5	<2	<4	<1	13	
	11/5/97	9:05	DT	1	31000	5.0	8.3	<0.2	<0.1	1.4	0	<50	53	16	1	<1	10	2	8	<1	14	
			SF												<1	1	11	2	9	<1	16	
	11/10/97	16:07	SF	5				0.80				<50			<10	<40	22	<20	10	<100	29	>2000
	11/10/97	17:07																				
	11/10/97	19:07	ST	7	29000	50	7.7	6	1	4.1	1	<30	150	41	1	7	34	13	14	<1	85	2320
	11/11/97	11:07	SF												3	6	26	7	14	2	47	
	11/11/97	21:07	ST	9	12000	40	7.7	7	1	6.0	2	<0.5	90	30	2	8	39	10	16	<1	77	2110
	11/12/97	13:07	SF												2	5	27	3	15	<1	46	
	11/13/97	7:07	ST	14	9700	100	7.3	3	1	5.9	3	<0.5	240	61	2.0	12	39	23	12	<1	120	1440
	11/14/97	9:07	SF												2	<1	6	64	19	4	8	
	11/26/97	10:09	ST	5	41000	180	8.0	2	0	3.2	2	<50	640	450	2	<4	21	<2	11	<1	64	
	11/26/97	11:09	SF												1	13	54	62	18	<1	140	
	11/26/97	13:09	ST	12	6200	180	7.6	5.0	1	4.9	3	<0.5	300	260	3	16	56	56	13	<1	230	626
	11/27/97	11:09	SF												2	4	10	2	4	<1	26	
	11/27/97	21:09	ST	22	34000	19	7.4	1	0.49	1.4	0.90	<50	300	250	1	<4	24	6.0	9	<1	48	3620
	11/30/97	7:09	SF												<1	<4	19	3	11	<1	60	
	12/18/97	14:05	ST	5	18000	300	7.8	5	1	3.4	3	<20	1300	200	<10	<40	58	54	17	<10	196	2082
	12/18/97	15:05	SF												<10	<40	31	<20	<10	<10	<100	
	12/18/97	17:05	ST	9	16000	280	7.6	2	1	3.8	3	<20	1100	150	<10	<40	69	67	17	<10	268	1270
	12/19/97	9:05	SF												<10	<40	18	<20	<10	<10	<100	
	12/19/97	11:05	ST	37	30000	63	7.6	12	<0.5	<0.5	1		310	48	<10	<40	41	<20	<10	<10	<100	2740
	12/22/97	13:05	SF												<10	<40	<10	<20	<10	<10	<100	
	1/3/98	10:01	ST	5	39000	59	7.8	2	<0.5	1.5	1	<0.5	210	36	<10	<40	37	<20	11	<10	<100	>2000
	1/3/98	11:01	SF												<10	<40	25	<20	<10	<10	<100	
	1/3/98	13:01	ST	10	40000	24	7.7	3	2	2.9	3	<20	180	37	<10	<40	32	<20	17	<10	<100	>2000
	1/4/98	7:01	SF												<10	<40	24	<20	15	<10	<100	
	1/4/98	9:01	ST	36	35000	35	7.7	1.0	1	2.0	2.0	<0.5	170	22	<1	<4	18	6	8	<1	18	>2000
	1/7/98	7:01	SF												<1	<4	9	<2	5	<1	<10	
	1/9/98	12:30	ST	5	32000	22	7.7	1	3	5.9	6	<0.5	230	50	<10	<40	21	<20	13	<10	<100	
	1/9/98	13:30	SF												<10	<10	12	<2	18	<1	68	
	1/9/98	15:30	ST	11	11000	180	7.5	1	1	4.3	3	<20	390	58	<1	12	39	82	19	<1	12	1182
	1/10/98	11:30	SF												<1	<10	21	22	20	<1	<10	
	6/28/00	13:00	S	1	53400	4.8	8.1	<0.44	0.07	1.40	0.34		36	14								

STATION	DATE	TIME	SAMPLES Type	#	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
SPDPMP	11/5/97	10:05	DT	1	95000	50	8.4	<0.2	0	6.8	2	<50	230	80	<1	2	40	2.0	26	<1	64	
			SF												<1	<1	34	<1	19	<1	48	
	11/26/97	10:20	ST	1											<1	<10	39	28	11	<1	200	110
	11/26/97		SF												<1	<10	11	<2	<4	<1	55	
	1/29/98	9:04	ST	5	270	21	7.4	3	<0.5	1.9	1.3	<0.5	72	27	<1	<10	29	11	8	<1	72	52
	1/29/98	10:04	SF												<1	<10	10	<2	10	<1	<10	
	1/29/98	12:04	ST	11	5800	25	7.5	7	<0.5	2.9	2		33	16	<1	<10	24	7	6	<1	31	690
	1/30/98	8:04	SF												11	<10	21	4	5	<1	33	
	2/19/98	20:03	ST	5	910	31	7.4	4.0	1	1	2				<1.00	6	15	10	5	1	46	108
	2/19/98	21:03	SF												<1.00	4	10	<1.00	2	<1.00	12	
	2/19/98	23:03	ST	5	2100	56	7.6	8.0	<0.5	2	2				<1.00	6	95	10	8	<1.00	55	336
	2/20/98	7:03	SF												<1.00	3	17	1	5	<1.00	25	
	2/21/98	22:59	ST	2											<1.00	4	11	3	3	<1.00	25	
	2/22/98	0:59	SF												<1.00	2	9.63	<1.00	4	<1.00	23	
	2/23/98	17:04	ST	10		31	7.7	5	<0.5	2	8				<1.00	6	51	5.30	5	<1.00	32	44
	2/24/98	11:04	SF												<1.00	3	21	2	3	<1.00	18	

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TPO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
SPDC05	9/25/97	9:16	ST	5	2000	22	7.4	1	0	2.8	1	1	25	16	2	<10	15	7	10	<1	220	190
	9/25/97	10:16	SF												<1	<10	17	3	7	<1	70	
	9/25/97	12:16	ST	9	400	200	7.0	6	1	8.0	4	<5	430	94	2	10	87	84	21	<1	440	230
	9/26/97	8:16	ST												<1	<10	25	21	14	<1	200	
	9/26/97	10:16	ST	9	420	16	7.1	5	0.50	3.0	1.4	<0.5	12	12	<1	30	20	6	7.0	<1	78	74
	9/27/97	6:16	SF												<1	<10	17	3	10	<1	59	
	11/5/97	10:25	DT	1	8700	6.9	8.1	<0.2	0.10	1.8	0	<0.5	18	<6	2	4	7	4	7	<1	17	
			SF												2	6	5.0	2	7	<1	12	
	11/10/97	8:38	SF	5				<0.8				<30			<10	<40	14	<20	<10	<100	23	1902
	11/10/97	9:38																				
	11/10/97	11:38	ST	9	3600	43	7.5	15	0.70	6.4	1	<0.5	30	20	<1	<10	<4	9	15	<1	120	452
	11/11/97	5:38	SF												<1	<10	29	7.0	15	<1	130	
	11/11/97	7:38	ST	23	3200	38	7.5	7	1	6.3	2	<0.5	52	24	<1	<10	37	14	13	<1	120	354
	11/13/97	5:38	SF														22	<2	14	<1	77	
	11/13/97	9:38	ST	12	340	420	7.6	5	1	18.0	9	<0.5	1600	330	4	54	250	220	44	<1	1400	88
	11/14/97	7:38	SF												<1	<10	5	3	5	<1	41	
	11/26/97	10:01	ST	5	5500	2600	7.7	2	1	59	34		4900	3700	15	100	810	890	180	3		640
	11/26/97	11:01	SF												<1	<10	4	<2	<4	<1	26	
	11/26/97	13:01	ST	13	270	210	7.4	5	1	6.6	4	1	210	140	2	22	76	100	21	2	510	60
	11/27/97	13:01	SF												<1	<10	8	<2	<4	<1	42	
	11/27/97	15:01	ST	30	18000	39	7.6	2	0.80	2.9	2	<50	130	110	2	6	22	15	8	<1	73	2006
	11/30/97	7:01	SF												1	<4	10	<2	6.0	<1	26	
	12/18/97	13:52	ST	5	400	240	7.9	6	<0.5	3.5	3	<0.5	860	96	<1	21	54	52	18	<1	270	96
	12/18/97	14:52	SF												<1	<10	10	<2	<4	<1	<10	
	12/18/97	16:52	ST	8	150	120	7.6	3	<0.5	1.7	1	0.70	380	85	<1	12	33	23	9	<1	120	32
	12/19/97	6:52	SF												<1	<10	12	<2	<4	<1	<10	
	12/19/97	8:52	ST	38	26000	25	7.6	5	1	1.6	1		120	38	<10	<40	26	<20	<10	<10	<100	2618
	12/22/97	12:52	SF												<10	<40	<10	<20	<10	<10	<100	
	1/3/98	9:41	ST	5	32000	18	8.1	4	<0.5	1.2	0	<20	85	24	<10	<40	28	<20	<10	<10	<100	>2000
	1/3/98	10:41	SF												<10	<40	24	<20	<10	<10	<100	
	1/3/98	12:41	ST	9	25000	11	7.9	5	<0.5	2.0	1	<20	50	22	<10	<40	30	<20	<10	<10	<100	>2000
	1/4/98	6:41	SF												<10	<40	26	<20	<10	<10	<100	
	1/4/98	8:41	ST	37	17000	200	7.5	2	0	3.3	2	<0.5	320	69	<1	5	37	36	10	<1	160	1440
	1/7/98	8:41	SF												<1	<4	9	<2	2	<1	<10	
	1/9/98	15:39	ST	5	4800	300	7.8	7.0	1	6.9	6	<0.5	1100	150	<10	<40	74	300	24	<10	450	650
	1/9/98	16:39	SF												<10	<10	9	6	5	<1	66	
	1/9/98	18:39	ST	10	2100	190	7.6	2	1	5.2	5	<0.5	880	120	<1	23	81	100	45	<1	23	396
	1/10/98	12:39	SF												<1	<10	8	<2	5	<1	<10	
	1/10/98	14:39	ST	32	11000	29	7.6	2	<0.5	2.6	1	<20	100	25	<10	<40	<10	<20	<10	<10	<10	1125
	1/13/98	14:39	SF												<10	<40	97	<20	<10	<10	<10	
	1/29/98	7:24	ST	5	17000	19	7.9	5	1	1.7	0	<20	65	21	<1	3	21	11	5	2	27	1900
	1/29/98	8:24	SF												<10	<10	11	<10	<10	<10	<50	

STATION	DATE	TIME	SAMPLES Type	#	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
SPDC05	2/14/98	10:57	ST	5	260	70	7.2	7	<0.5	1.8	2		380	42	<1.00	20	41	52	15	<1.00	107	70
	2/14/98	11:57	SF												<1.00	2	10	2	4	<1.00	20	
	2/14/98	13:57	ST	7	140	52	7.4	4.0	<0.5	0.97	2		450	41	<1.00	13	38	43	11	<1.00	92	60
	2/15/98	1:57	SF												<1.00	2	12	2	5	<1.00	38	
	2/15/98	3:57	ST	14	750	33	7.9	12.0	<0.5	2	9		44	12	<1.00	4	24	8	83	<1.00	26.0	196
	2/16/98	15:57	SF												<1.00	2	11	<1.00	2	<1.00	10	
	2/16/98	21:57	ST	9	170	35	7.5	4.0	<0.5	1	11		86	21	<1.00	16	28	19	5	<1.00	72	44
	2/17/98	13:57	SF												<1.00	3	10	2	2	<1.00	14	
	2/17/98	15:57	ST	10	540	43	7.7	8	<0.5	1	10		43	14	<1.00	49.0	24	12	19	<1.00	41.0	146
	2/18/98	9:57	SF												<1.00	2	18	1	3	<1.00	14	

STATION	DATE	TIME	SAMPLES Type	#	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
SLTGRM	9/25/97	9:47	SF												<1	<5	7	<2	<4	<1	<10	
	9/26/97	9:45	ST	1											<1	<10	30	12	11	<1	210	190
			SF												<1	<10	18	5	7	<1	110	
	11/5/97	9:35	DT	1	4800	26	8.2	<0.2	<0.1	2.4	1.0	<0.5	21	<6	2	5	17	4	7	<1	47	
			SF												2	6	12	2	6	<1	6	
	11/26/97	9:21	ST	5	1200	320	6.8	2	1	4.8	2		300	230	<1	17	54	48	16	<1		150
	11/26/97	10:21	SF												<1	<10	13	<2	<4	<1	35	
	11/26/97	12:21	ST	13	270	60	7.2	4	0	2.3	1	1	32	<20	<1	<10	27	17	4	<1	120	48
	11/27/97	12:21	SF												<1	<10	10	<2	<4	<1	55	
	11/27/97	14:21	ST	33	340	31	7.7	4	0	1.8	1	<0.5	28	<20	<1	<10	27	11	5	<1	95	58
	11/30/97	6:21	SF												<1	<10	17	<2	<4	<1	71	
	12/18/97	12:31	ST	5	2400	81	7.8	9	1	3.0	1	<0.5	150	32	<1	<10	45	10	8	<1	77	460
	12/18/97	13:31	SF												<1	<10	28	<2	7	<1	23	
	12/18/97	15:31	ST	9	160	54	7.4	3	<0.5	0.98	1	1	67	14	<1	<10	31	13	5	<1	69	38
	12/19/97	7:31	SF												<1	<10	19	<2	<4	<1	29	
	12/19/97	9:31	ST	38	560	40	7.7	5	<0.5	1.4	1		37	10	<10	<10	20	7	<4	<1	38	128
	12/22/97	11:31	SF												<10	<10	22	<2	<4	<1	47	
	1/3/98	0:40	ST	5	2500	12	7.7	6	1	2.1	1	<0.5	<6	<6	<1	<10	22	3	5	<1	44	456
	1/3/98	1:40	SF												<1	<10	16	<2	5	<1	23	
	1/3/98	3:40	ST	15	1200	15	7.5	6	1	2.5	1	<0.5	<6	<6	<1	<10	23	5	6	<1	39	250
	1/4/98	7:40	SF												<1	<10	14	<2	<4	<1	29	
	1/4/98	9:40	ST	32	1400	10	7.5	4.0	1	2.0	1	<0.5	10	8	<1	<10	21	3	6	<1	22	250
	1/6/98	23:40	SF												<1	<10	18	<2	6	<1	34	
	1/9/98	15:45	ST	5	1000	21	7.6	4	<0.5	2.4	1	<0.5	51	<6	<10	<10	23	13	8	<1	140	150
	1/9/98	16:45	SF												<10	<10	11	<2	6	<1	99	
	1/9/98	18:45	ST	10	200	39	7.2	2.0	<0.5	2.2	1	0.665	44	14	<1	<10	24	13	6	<1	<10	44
	1/10/98	12:45	SF												<1	<10	13	<2	<4	<1	<10	
	1/10/98	14:45	ST	37	450	21	7.6	3	<0.5	1.5	1	<0.5	13	8	<1	<10	18	5	<4	<1	110	94
	1/13/98	14:45	SF												<1	<10	15	<2	<4	<1	<10	

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
BCC02	8/5/91	10:50	D	25	2100	1.0	8.3	1.1	0.32	6.51	2.00		21	<5								
	8/6/91	10:50																				
	9/11/91	8:30	D	26	1800	4.0	8.5	0.9	0.20	2.30	1.40		140	23								
	9/12/91	9:30																				
	10/26/91	22:15	ST	4	1500	20.0	7.6	28.0	1.00	10.00	4.60		530	90	<7	<10	90	40	40	<2	420	370
	10/27/91	1:15																				
	11/6/91	9:55	D	24	1600	2.0	8.4	29.0	0.10	1.10	0.40		<5	<5								
	11/7/91	8:55																				
	12/4/91	10:30	D	24	2100	1.4	8.4	32.0	0.10	0.50	0.50		17	6								
	12/5/91	9:30																				
	12/10/91	14:10	ST	4	740	6.0	7.9	20.0	0.60	0.50	67.00		<5	<5	<20	<30	20	5	<40	<10	50	184
	12/10/91	17:10																				
	12/10/91	18:10	ST	4	940	17.0	7.9	18.0	0.80	3.00	85.00		<5	<5	<20	<30	20	11	<40	<10	50	278
	12/10/91	21:10																				
	1/5/92	8:00	ST	4	400	22.0	7.9	7.4	0.40	1.90	35.00		420	49	<20	<30	40	51	<40	<10	170	
	1/5/92	11:00																				
	1/5/92	11:30	ST	6	200	210.0	8.3	3.3	0.10	0.50	0.20		880	77	<20	<30	30	57	<40	<10	180	41
	1/6/92	16:30																				
	2/5/92	20:30	ST	4	820	390.0	7.5	21.0	1.90	2.10	52.00		770	100	<20	<30	60	110	<40	<10	330	
	2/5/92	22:30																				
	2/5/92	23:00	ST	20	380	240.0	7.6	10.0	1.40	1.90	46.00		610	58	<20	<30	40	92	<40	<10	250	86
	2/6/92	20:30																				
	5/21/92	11:22		24	2400	1.4	8.8	19.0	0.40	1.90	0.10		8	5	<2	<6	19	<2	<10	<2	20	365
	5/22/92	10:22																				
	8/12/92	13:20		1	2100	3.5	9.1	0.5	0.10	0.70	0.10		40	15	<20	<30	<20	6	<40	<10	<10	
	9/30/92	8:30			2300	2.1	8.3	0.2	0.30	1.10	0.10		<5	<5								
	11/25/92	11:00			2200	5.6	8.6	19.0	0.10	1.40	0.30		9	7								
	12/7/92	9:50	ST	1	260	340.0	8.6	3.1	0.38	1.60	3.20		640	47	<20	<30	20	32	<40	<10	150	
	1/15/93	14:30	ST	17	200	140.0	8.0	2.9	0.20	0.69	2.00		290	24	<7	15	<30	27	12	<4	110	58
	1/16/93	22:30																				
	1/17/93	4:30	ST	5	610	38.0	7.9	10.0	0.25	0.69	0.10		140	8	<7	<10	<30	10	<3	<4	37	134
	1/17/93	12:30																				
	1/17/93	11:58	ST	3	530	63.0	8.0	8.5	0.22	1.00	1.10		100	15	<7	<10	<30	11	4	<4	58	1150
	1/17/93	15:58																				
	1/17/93	17:58	ST	9	180	260.0	8.0	2.3	0.15	1.10	2.40		510	38	<7	19	<30	20	13	<4	140	45
	1/18/93	9:58																				
	1/18/93	11:58	ST	9	240	140.0	8.2	3.7	0.18	0.89	1.50		200	21	<7	11	<30	12	6	<4	130	52
	1/19/93	3:58																				
	2/7/93	22:00	ST	7	230	380.0	8.2	3.2	0.22	0.79	2.30		450	40	<20	<30	<20	24	<40	<10	74	58
	2/8/93	10:00																				
	2/8/93	12:00	ST	9	340	200.0	8.0	4.9	0.18	0.91	1.60		180	24	<20	<30	20	22	<40	<10	87	82
	2/9/93	4:00																				
	2/9/93	6:00	ST	4	830	24.0	8.1	9.9	0.18	1.20	1.40		22	9	<20	<30	<20	6	<40	<10	48	184
	2/9/93	11:45																				
	2/9/93	12:00	ST	13	1500	16.0	8.4	22.0	0.16	0.93	2.90		13	7	<7	<10	<30	5	<3	<4	<20	336
	2/10/93	15:00																				
	2/10/93	17:15	ST	11	2200	10.0	8.4	42.0	0.18	0.97	1.20		11	7	<7	<10	<30	4	<3	<4	<20	504
	2/11/93	15:45																				

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
BCC02	2/18/93	12:16	ST	1											<7	<10	<30	14	3	<4	50	500
	2/18/93	14:15	ST	9	220	95.0	7.9	3.7	0.20	0.72	1.00		200	22	<7	<10	<30	23	<3	<4	70	140
	2/19/93	6:15																				
	2/19/93	8:15	ST	14	200	580.0	8.5	2.6	0.13	0.74	3.40		960	34	<7	20	<30	31	12	<4	130	74
	2/20/93	10:15																				
	2/20/93	10:16	ST	6	360	60.0	8.1	4.0	0.11	0.84	0.77		69	21	<7	<10	<30	13	6	<4	32	140
	2/20/93	20:36																				
	2/20/93	22:40	ST	18	1500	11.0	8.3	21.0	0.12	1.40	0.94		10	<5	<7	<10	<30	3	<3	<4	<20	340
	2/22/93	8:26																				
	4/26/93	14:24	D	24	3000	5.7	8.3	47.0	0.10	1.30	0.10		16	6								
	4/27/93	13:30																				
	5/26/93	12:10	D	24	2900	27.0	8.6	43.0	0.10	2.30	0.40		110	7								
	5/27/93	12:55																				
	6/23/93	12:46	D	24	2900	7.9	8.5	1.5	0.10	2.30	0.50		19	7								
	6/24/93	11:46																				
	7/28/93	10:00	D	24	2700	60.0	8.2	28.0	0.18	1.90	0.38		22	11								
	7/29/93	9:00																				
	8/25/93	8:45	D	24	2800	22.0	8.6	14.0	0.27	2.20	0.47		40	13								
	8/26/93	7:45																				
	9/20/93	11:15	D	24	2500	1.9	8.2	13.0	0.45	1.80	0.82		150	20								
	9/21/93	12:15																				
	10/19/93	10:23	D	24	2200	56.0	8.4	12.0	0.45	3.40	1.20		160	<5								
	10/20/93	9:23																				
	11/11/93	3:00	ST	2											<5	<10	55	53	<40	<10	630	224
	11/11/93	5:00																				
	11/11/93	7:00	ST	9	500	190.0	7.4	13.0	0.75	4.10	2.70		280	48	<5	<10	35	30	<40	<10	220	112
	11/11/93	23:00																				
	11/12/93	1:00	ST	7	930	51.0	7.6	14.0	0.56	3.50	1.60		76	24	<5	<10	<20	9.9	<40	<10	100	204
	11/12/93	13:00																				
	11/12/93	15:00	ST	10	1300	17.0	6.8	12.0	0.83	3.00	1.30		39	<5	<5	<10	29	2.6	<40	<10	52	304
	11/13/93	11:00																				
	11/13/93	13:00	ST	12	1900	27.0	7.9	21.0	0.67	2.80	0.95		37	7	<5	<10	23	<2	<40	<10	44	413
	11/14/93	11:00																				
	11/14/93	13:00	ST	7	2400	16.0	8.3	36.0	0.50	2.30	0.36		42	15	<5	<10	<20	3.6	<40	<10	36	546
	11/15/93	1:00																				
	11/23/93	2:56	ST	4	2200	28.0	7.8	24.0	0.50	3.80	1.90		75	7	<5	<10	25	<2	<40	<10	44	430
	11/23/93	8:56																				
	11/23/93	10:56	ST	6	1400	22.0	7.6	29.0	0.58	4.40	1.40		50	<5	<5	<10	27	3.3	<40	<10	110	300
	11/23/93	20:56																				
	11/23/93	22:56	ST	5	1200	42.0	7.5	14.0	0.67	4.30	1.80		62	<5	<5	<10	44	5.8	<40	<10	120	290
	11/24/93	6:56																				
	11/24/93	10:56	ST	12	1500	130.0	7.9	11.0	0.53	4.00	0.20		220	<5	<5	<10	31	10	<40	<10	160	132
	11/25/93	8:56																				
	11/25/93	10:56	ST	12	2000	100.0	8.2	24.0	0.26	2.90	1.40		200	<5	<5	<10	27	7.8	<40	<10	71	412
	11/26/93	8:34																				
	11/26/93	10:56	ST	8	2400	100.0	8.3	23.0	0.23	3.00	1.40		230	<5	<5	<10	<20	85	<40	<10	57	448
	11/27/93	0:56																				

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
BCC02	11/30/93	2:52	ST	4	900	280.0	7.8	13.0	0.35	5.60	4.40		690	7	<5	<10	35	41	<40	<10	210	170
	11/30/93	13:00																				
	11/30/93	15:00	ST	9	800	80.0	7.8	12.0	0.41	2.70	1.90		10	13	<5	<10	<20	13	<40	<10	87	182
	12/1/93	7:07																				
	12/1/93	9:07	ST	13	1400	34.0	8.1	14.0	0.39	1.90	0.92		54	14	<5	<10	<20	3.9	<40	<10	38	300
	12/2/93	9:07																				
	12/2/93	11:07	ST	20	2100	32.0	8.3	34.0	0.28	1.90	1.10		160	19	<5	<10	24	14	<40	<10	52	319
	12/4/93	1:07																				
	12/30/93	9:45		1	2300	7.3	8.2	21.0	0.14	1.00	0.18		15	<5								
	1/31/94	10:00		1	2700	27.0	8.0	18.0	38.00	79.00	1.20		53	13								
	2/7/94	16:00	ST	1	130	150.0	7.9	3.7	0.51	2.40	2.40		300	40	<5	<10	<20	25	<40	<10	220	32
	2/17/94	5:00	ST	3	1100	400.0	8.1	21.0	0.40	3.70	4.80		930	46	<5	48	72	53	41	<10	300	220
	2/17/94	9:00																				
	2/17/94	11:00	ST	13	430	160.0	8.1	6.9	0.41	1.50	2.70		330	16	<5	25	29	18	<40	<10	100	100
	2/18/94	11:00																				
	2/18/94	13:00	ST	12	750	44.0	7.9	13.0	0.36	1.70	1.30		67	<5	<5	<10	<20	9.6	<40	<10	48	220
	2/19/94	11:00																				
	2/19/94	13:00	ST	9	850	62.0	8.0	15.0	0.14	1.50	1.10		100	<5	<5	<10	<20	8.5	<40	<10	57	170
	2/20/94	5:00																				
	2/20/94	7:00	ST	7	150	150.0	8.4	0.2	0.10	0.56	2.00		360	8	<5	21	23	22	<40	<10	99	38
	2/20/94	21:00																				
	4/11/94	14:00	D	24	2400	6.7	8.2	24.0	0.10	1.60	0.52		18	16								
	4/12/94	13:00																				
	5/18/94	10:50	D	24	840	0.1	7.2	1.0	1.80	2.50	1.60		<5	<5								
	5/19/94	9:50																				
	6/14/94	9:51	DDD	24	2900	46.0	8.2	17.0	0.35	2.40	2.90		110	8								
	6/15/94	8:51																				
	7/14/94	10:15			2700	15.0	8.3	10.0	0.51	2.30	0.52		37	<5								
	10/4/94	11:18	ST	4	2200	320.0	7.6	11.0	4.00	18.00	4.30		650	24	1.7	17	83	31	<40	2	260	308
	10/4/94	15:18																				
	10/5/94	13:18	ST	10	1400	270.0	7.5	7.2	6.50	18.00	5.80		870	28	2.1	30	<20	42	44	7.3	320	288
	10/6/94	7:18																				
	10/13/94	10:00		24	2400	8.5	8.3	11.0	0.38	2.20	0.55		88	8								
	10/14/94	9:00																				
	11/10/94	8:35	ST	2	460	740.0	6.5	8.8	0.79	6.30	7.30		1800	120	2.8	61	150	100	52	0.49	620	100
	11/10/94	10:35																				
	11/10/94	12:35	ST	4	610	130.0	6.5	14.0	0.59	3.10	2.10		230	31	<1	11	41	21	<40	<0.3	150	170
	11/10/94	18:35																				
	3/2/95	14:05	ST	3	2000	34.0	8.0	40.0	0.34	3.40	0.82		82	15	<1	<10	23	7.4	<40	1.6	57	342
	3/2/95	18:05																				
	3/2/95	20:05	ST	20	1300	19.0	7.9	19.0	0.42	2.80	0.75		21	8	<1	<10	23	5.9	<40	1.3	62	264
	3/4/95	10:05																				
	3/4/95	12:05	ST	7	1900	17.0	8.2	20.0	0.14	1.90	0.47		38	12	<1	<10	19	3.4	<40	1	26	436
	3/5/95	0:05																				
	3/5/95	2:05	ST	17	290	78.0	7.7	3.3	0.20	1.30	1.30		140	18	<1	<10	22	13	<40	<1	70	66
	3/6/95	10:05																				
	3/10/95	21:52	ST	3	710	200.0	7.8	9.5	0.16	2.20	2.70		340	43	<1	25	42	35	56	<1	180	114
	3/11/95	1:52																				
	3/11/95	3:52	ST	15	530	70.0	7.7	5.5	0.10	1.60	1.60		96	19	<1	10	20	14	<40	<1	75	110
	3/12/95	7:52																				

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
BCC02	3/12/95	9:52	ST	30	2100	11.0	8.0	19.0	0.17	1.70	1.20		19	8	<1	<10	14	3.7	<40	<1	28	396
	3/14/95	19:52																				
	5/8/95	10:34	D	24	3100	5.0	8.4	22.0	0.10	2.10	0.20		19	19								
	5/9/95	9:34																				
	6/7/95	9:53	D	24	2900	5.1	8.4	26.0	0.18	2.00	0.20		<6	<6								
	6/8/95	8:53																				
	7/10/95	13:12	D	24	3000	14.0	8.3	18.0	0.10	5.70	0.37		42	10								
	7/11/95	12:12																				
	8/9/95	10:30	D	24	2400	9.1	8.5	9.1	0.10	1.10	0.25		23	14								
	8/10/95	9:30																				
	9/5/95	10:50	D	24	2500	3.9	8.4	2.7	0.86	1.30	0.21		<6	<6								
	9/6/95	9:50																				
	10/10/95	13:51	D	24	2600	5.8	8.5	11.0	0.27	2.00	0.20		16	<6								
	10/11/95	12:51																				
	11/6/95	13:02	D	15	1200	2.4	8.5	6.7	0.10	0.79	0.20		<6	<6								
	11/7/95	3:02																				
	12/6/95	12:58	D	24	1800	3.3	8.7	18.0	0.21	1.00	0.38		7	7								
	12/7/95	11:58																				
	12/12/95	20:38	ST	5	1700	10.0	8.0	24.0	0.88	4.00	1.70		17	8	<1	<10	34	5	<40	<1	51	92
	12/12/95	21:38																				
	12/12/95	23:38	ST	18	500	100.0	7.6	13.0	0.70	3.90	2.10		160	29	<1	10	40	18	<40	<1	160	302
	12/14/95	9:38																				
	12/14/95	11:38	ST	29	1500	17.0	8.2	15.0	0.77	2.60	0.67		24	<6	<1	<10	20	2	<40	<1	64	396
	12/16/95	19:38																				
	1/10/96	9:16		24	2400	7.6	8.6	32.0	0.10	1.70	0.33		37	11								
	1/11/96	8:16																				
	1/19/96	6:37	ST	5	1300	140.0	8.1	24.0	0.82	3.90	1.60		410	65	<1	50	35	18	10	<1	140	276
	1/19/96	7:37																				
	1/19/96	9:37	ST	5	400	35.0	7.9	11.0	1.10	3.00	0.92		66	16	<1	<10	25	8	8	<1	92	88
	1/19/96	17:37																				
	1/19/96	17:37	ST	22	1200	11.0	8.0	10.0	0.10	2.50	0.58		32	8	<1	<10	23	3	10	<1	41	274
	1/21/96	13:37																				
	1/21/96	17:37	ST	9	330	80.0	7.6		0.12	0.50	1.40		120	24	<1	<10	39	18	11	<1	140	106
	1/22/96	7:37																				
	1/22/96	11:37	ST	10	1000	20.0	8.0	8.8	0.41	1.50	0.71		24	12	<1	<10	18	4	5	1	42	236
	1/23/96	5:37																				
	1/31/96	2:56	ST	5	1500	90.0	7.8	21.0	0.24	2.60	1.30		200	28	<1	<10	35	13	10	<1	92	278
	1/31/96	3:56																				
	1/31/96	5:56	ST	13	330	110.0	7.7	6.6	0.48	2.20	1.70		170	27	<1	17	34	27	12	<1	170	70
	2/1/96	7:56																				
	2/1/96	9:56	ST	24	1100	16.0	8.3	13.0	0.24	3.00	0.55		17	11	<1	<10	20	5	4	3	40	244
	2/3/96	7:56																				
	2/3/96	9:56	ST	9	520	29.0	7.6	6.7	0.41	2.10	0.97		53	14	<1	<10	29	13	7	2	60	102
	2/4/96	1:56																				
	3/4/96	13:22	ST	5	990	160.0	8.1	18.0	0.81	3.20	1.70		360	32	<1	10	33	30	12	<1	160	168
	3/4/96	14:22																				
	3/4/96	16:22	ST	10	190	78.0	7.9	2.7	0.38	1.30	0.99		110	15	<1	<10	19	15	8	<1	110	42
	3/5/96	10:22																				
	3/5/96	12:22	ST	35	1600	5.8	8.4	20.0	0.10	1.50	0.47		8	<6	<1	<5	14	<2	6	<1	32	382
	3/8/96	8:22																				

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
BCC02	3/27/96	9:30			2600	2.5	8.0	37.0	0.10	1.40	0.20		7	<6	<1	<10	4	<2	15	<1	35	620
	4/30/96	12:00			2400	2.8	8.4	16.0	0.14	2.00	0.20		11	9								
	5/28/96	10:00			2400	3.1	8.3	20.0	0.13	1.70	0.20		9	<6								
	6/17/96	10:00			2100	3.6	8.1	12.0	0.10	0.50	0.20		31	14								
	7/15/96	10:12		24	2100	1.6	8.4	3.5	<0.1	1.30	0.30		14	7								
	7/16/96	9:12																				
	8/7/96	10:14		24	2100	1.4	8.6	1.6	0.24	1.40	0.24		<6	<6								
	8/8/96	9:14																				
	9/4/96	10:10		24	2100	1.2	8.6	<0.2	0.38	1.50	0.39		9	7								
	9/5/96	9:10																				
	10/1/96	15:13		24	2200	2.5	8.3	3.9	0.24	1.50	0.49		<6	<6								
	10/2/96	14:13																				
	10/30/96	5:24	ST	5	1600	370.0	7.6	22.0	1.50	12.00	3.60		710	160	1	22	70	49	31	1	400	270
	10/30/96	6:24	SF												<1	<10	21	<2	14	<1	100	
	10/30/96	8:24	ST	6	300	140.0	7.2	11.0	0.94	4.10	2.10		170	38	<1	<10	48	31	17	<1	290	76
	10/30/96	18:24																				
	10/30/96	20:24	ST	42	1300	25.0	8.2	17.0	2.60	2.90	0.81		30	10	<1	<10	19	4	8	<1	80	348
	11/3/96	6:24																				
	11/14/96	10:35			2200	6.0	8.4	27.0	0.38	1.60	0.34		15	7								
	11/21/96	8:00	ST	5	340	130.0	7.5	9.9	1.10	6.50	3.30		220	26	1	<10	90	29	16	<1	280	60
	11/21/96	9:00																				
	11/21/96	11:00	ST	10	180	100.0	7.5	4.7	0.46	2.20	1.80		210	22	<1	<10	61	33	11	<1	200	32
	11/22/96	5:00																				
	11/22/96	7:00	ST	33	1100	1.3	8.3	15.0	0.36	1.90	0.87		20	8	2	<10	17	3	9	<1	110	258
	11/25/96	6:00																				
	12/9/96	13:10	ST	5	1300	150.0	8.0	18.0	0.31	3.10	1.40		320	37	<1	<10	34	26	10	<1	150	294
	12/9/96	14:10																				
	12/9/96	18:10	ST	4	160	96.0	7.9	3.6	0.13	0.95	1.50		150	18	<1	<10	25	21	7	<1	120	40
	12/10/96	0:10																				
	12/10/96	2:10	ST	11	620	24.0	7.9	10.0	0.19	1.20	0.95		24	<6	11	<10	14	5	<4	<1	37	134
	12/10/96	22:10																				
	12/11/96	0:10	ST	12	240	59.0	7.8	3.9	0.10	1.00	1.30		120	17	<1	<10	22	18	5	<1	75	54
	12/11/96	22:10																				
	12/11/96	0:10	ST	18	810	18.0	8.0	11.0	0.23	1.70	0.21		20	10	<1	<10	15	5	6	<1	110	196
	12/13/96	10:10																				
	12/27/96	11:51	ST	5	1900	180.0	8.1	40.0	0.54	3.40	1.80		250	40	<1	<10	24	31	9	<1	180	264
	12/27/96	12:51																				
	12/27/96	14:51	ST	9	240	78.0	7.6	4.4	0.47	1.20	0.98		120	16	<1	<10	26	15	<4	<1	160	72
	12/28/96	6:51																				
	12/28/96	8:51	ST	36	1600	5.1	8.3	21.0	0.16	1.70	0.48		25	10	<1	<10	13	3	<4	<1	62	382
	12/31/96	10:34																				
	1/23/97	7:45	ST		170	32.0	7.8	2.6	<0.1	0.76	0.65		30	7	<1	<10	8	3	<4	<1	83	50
	1/25/97	9:20	ST		2100	10.0	8.1	26.0	0.30	1.90	0.71		23	7	<1	<10	8	<2	<1	<1	160	490
	1/26/97	8:10	ST		160	76.0	8.0	2.4	0.33	0.75	0.85		98	14	<1	<10	14	12	7	<1	180	38
	2/24/97	12:20			2900	6.1	8.0	36.0	0.39	1.90	1.00		28	8								
	3/24/97	10:20			2700	3.7	8.1	29.0	0.54	2.00	0.46		10	<6								
	4/28/97	13:17		24	2600	6.7	8.6	19.0	<0.1	1.50	<0.2		24	10								
	4/29/97	12:17																				
	5/28/97	11:00		24	2500	9.1	8.3	14.0	0.26	2.20	0.31		26	13								
	5/29/97	10:00																				

STATION	DATE	TIME	SAMPLES Type	#	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
BCC02	7/2/97	14:30	D	23	2000	4	8.4	9	<0.1	1.6	<0.2		17	26								
	7/3/97	12:30																				
	8/7/97	13:30	DT	1	2100	2	8.6	2	<0.1	1.6	0		10	<6								
	9/17/97	14:10	DT	1	2100	5.9	8.3	1	2	6.6	1		9	8								
	9/25/97	8:22	ST	5	1500	81	7.1	15	2	9.9	2	<0.5	100	31	<1	<10	30	11	28	<1	210	210
	9/25/97	9:22	SF												1	<10	25	7	19	<1	320	
	9/25/97	11:22	ST	7	580	150	7.0	10	1	5.5	3	<0.5	270	51	<1	14	35	26	18	<1	220	130
	9/25/97	23:22	SF												<1	<10	17	4	10	<1	70	
	9/26/97	9:22	ST	24	1500	41	7.8	8	1	3.1	1.0	<0.5	80	24	<1	<10	20	6	<4	<1	55	370
	9/28/97	7:22	SF												<1	<10	12	<2	<4	<1	45	
	9/28/97	9:22	ST	12	2100	98	8.0	14	0	3.3	1	<0.5	210	29	<1	<10	35	14	11	<1	58	478
	9/29/97	7:22	SF												<1	<10	14	<2	4	<1	<10	
	11/5/97	8:30	DT	1	2300	7.2	7.9	18	0	1.8	<0.2	<0.5	<6	<6	2	6	13	4.0	6	0	77	
			SF												1	5	6	2.7	5	<1	59	
	11/10/97	17:42	SF	5				42				<0.5			<1	<10	32	5	16	<1	160	404
	11/10/97	18:42																				
	11/10/97	20:42	ST	7	780	82	7.2	9	2	8.9	2	<0.5	70	23	<1	<10	53	6	27	<1	320	212
	11/11/97	8:42	SF												<1	<10	44	4	25	<1	220	
	11/11/97	10:42	ST	23	1400	17	8.2	8	0.80	4.0	1	<0.5	26	10	<1	<10	30	4	14	<1	95	448
	11/13/97	6:42	SF												<1	<10	23	<2	6	<1	87	
	11/13/97	8:42	ST	8	490	150	7.3	11	1	4.5	2	<0.5	370	66	<1	13	35	28	9	<1	330	102
	11/13/97	22:42	SF												<1	<10	13	7	11	<1	88	
	12/16/97	12:15	DT	1	2700	4.9	8.1	27	<0.1	1.1	1		25	<6	<1	<10	4	0	<4	<1	16	560
	1/29/98	9:16	ST	5	390	61	7.6	11	1	4.2	2.2	<0.5	490	45	3	18	44	40	22	<1	250	88
	1/29/98	10:16	SF												<1	<10	30	15	13	<1	72	
	1/29/98	11:16	ST	8	310	100	6.6	3.8	<0.5	6.7	2		140	33	7	<10	31	18	7	<1	160	70
	1/30/98	1:16	SF												<1	<10	33	12	7	<1	110	
	1/30/98	1:16	ST	39	1200	13	7.5	13	<0.5	1.8	0		16	13	<1	<10	23	3	14	<1	22	275
	2/2/98	7:16	SF												<1	<10	16	<2	<4	<1	<10	
	5/13/98	2:36	ST	14	525	36	7.8	7.0	0	1.1	1		110	36	<0.5	7	24	10	5	<2	72	108
	5/13/98	18:36	SF												<0.5	9	15	<2	<4	<2	20	
	5/13/98	20:36	ST	32	2180	2.4	8.3	26	0	1.2	<0.05		32	16	<0.5	<4	15	<2	<4	<2	21	445
	5/16/98	12:36	SF												<0.5	<4	13	<2	<4	<2	16	
	6/22/98	10:43	DT	24	2680	18	8.3	20	<0.05	2.2	0		94	12								
	6/23/98	9:43																				
	7/15/98	9:00	D	6	1790	18	8	8	0	4	<0.061		120	38								
	7/15/98	15:00																				
	8/4/98	8:20	D	13	2650	6	8	4	<0.05	3	0		14	10								
	8/4/98	21:20																				
	9/8/98	10:30	D	24	1920	8	8	7	<0.05	2	<0.061		72	27								
	9/9/98	9:30																				
	10/20/98	9:49	D	24	2470	16	8	23	0	2	0		49	15								
	10/21/98	8:49																				
	11/2/98	9:18	D	24	2380	33	8	21	0	1	1		140	28								
	11/3/98	8:18																				
	11/8/98	3:27	ST	5	1520	145	8	21	1	12	4		660	200	<1	18	92	36	20	<2	313	275
	11/8/98	4:27	SF												<1	<8	38	8	12	<2	92	
	11/8/98	6:27	ST	9	470	27	8	12	0	3	2		120	80	<1	10	44	12	10	<2	121	70
	11/8/98	22:27	SF												<1	<8	27	<2	6	<2	39	
	11/9/98	0:27	ST	38	1780	10	8	24	0	1	1		34	18	<1	<8	20	13	5	<2	62	430
	11/12/98	2:27	SF												<1	<8	16	<2	5	<2	31	
	12/8/98	8:41	D	24	2330	5	8		0	<0.2	0		14	8								
	12/9/98	7:41																				
	1/4/99	8:46	D	24	2560	22	8	35	<0.05	1	0		120	66								
	1/5/99	7:46																				

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
BCC02	1/25/99	4:05	ST	5											<1	<8	32	11	7	<2	88	368
	1/25/99	5:05	SF												<1	<8	15	<2	5	<2	16	
	1/25/99	7:05	ST	13	510	19	8	7	0	1	1		44	18	<1	<8	26	6	5	<2	62	244
	1/26/99	7:05	SF												<1	<8	17	<2	4	<2	35	
	1/26/99	9:05	ST	15	360	32	8	5	0	2	1		78	22	<1	<8	34	14	6	<2	107	60
	1/27/99	13:05	SF												<1	<8	16	<2	<4	<2	23	
	1/27/99	15:05	ST	19	1480	6	8	19	0	2	0		14	6	<1	<8	22	<2	<4	<2	28	280
	1/29/99	3:05	SF												<1	<8	17	<2	<4	<2	18	
	2/2/99	12:50	D	24	2320	05	8	37	0	1	0		23	10								
	2/3/99	11:50																				
	3/1/99	9:55	D	24	2500	8	8	30	0	1	0		40	9								
	3/2/99	8:55																				
	3/11/99	10:45	ST	5	1670	13	8	19	0	2	0		34	12	<1	<8	35	4	5	<2	56	445
	3/11/99	11:45	SF												<1	<8	25	<2	6	<2	25	
	3/11/99	13:45	ST	6	735	14	8	13	0	2	0		28	18	<1	<8	38	5	7	<2	72	195
	3/11/99	23:45	SF												<1	<8	29	<2	6	<2	44	
	3/13/99	1:45	ST	37	1890	4	8	21	0	1	0		18	16	<1	<8	28	<2	5	<2	32	442
	3/15/99	5:30	SF												<1	<8	21	<2	6	<2	24	
	3/15/99	9:44	ST	5	220	78	8	5	0	4	1		590	130	1	17	59	39	12	<2	283	50
	3/15/99	10:44	SF												12	16	<2	7	<2	15		
	3/15/99	12:44	ST	3	160	25	8	4	0	1	1		50	16	<1	8	45	13	5	<2	88	40
	3/15/99	16:44	SF												<1	<8	27	<2	4	<2	26	
	3/15/99	18:44	ST	44	1640	6	8	23	0	1	0		16	5	<1	<8	27	2	4	<2	32	420
	3/19/99	9:44	SF												<1	<8	21	<2	4	<2	25	
	3/25/99	12:03	ST	5	1680	31	8	18	0	2	1		130	80	<1	<8	32	9	7	<2	81	318
	3/25/99	13:03	SF												<1	<8	23	4	5	<2	36	
	3/25/99	15:03	ST	9	295	21	8	5	0	1	1		50	14	<1	<8	22	8	5	<2	104	62
	3/26/99	7:03	SF												<1	<8	14	<2	<4	<2	56	
	3/26/99	9:03	ST	38	1880	3	8	20	0	1	0		15	8	<1	<8	15	<2	<4	<2	21	396
	3/29/99	11:03	SF												<1	<8	13	<2	<4	<2	15	
	4/27/99	9:17	D	24	2510	5	8	24	0	2	0		12	4								
	4/28/99	8:17																				
	5/4/99	8:20	D	24	2440	4	8	26	<0.05	1	<0.061		7	6								
	5/5/99	7:20																				
	6/1/99	10:10		24	1490	32	8	11	0	2	0		50	20								
	6/2/99	9:10																				
	7/14/99	8:19	DT	24	1840	2.4	8.6	<0.44	<0.05	1.33	0.15		8	6								
	7/15/99	7:19																				
	11/8/99	10:36	ST	5	1580	170.0	7.8	39.2	1.67	12.00	2.05		660	150	<1	10	47	18	17	<2	194	336
	11/8/99	11:36	SF																			
	11/8/99	12:36	ST	6	920	38.0	7.3	38.3	3.10	9.10	1.16		260	100	<1	<8	73	8	53	<2	223	216
	11/8/99	23:36	SF												<1	<8	31	3	36	<2	162	
	1/25/00	9:00	ST	1											2	29	90	66	28	2	391	180
	1/25/00	9:00	SF												<1	<8	14	3	8	<2	33	220

HUNTINGTON WATERSHED

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
ABCC03	3/20/92	6:46	ST	4	730	2.4	7.1	5.3	0.80	1.80	1.70		88	35	<20	<30	40	16	<40	<10	20	245
	3/20/92	10:46																				
	3/20/92	11:16	ST	9	460	2.3	7.3	5.4	0.30	1.00	2.20		18	13	<20	<30	<20	6	<40	<10	170	205
	3/21/92	18:00																				
	3/21/92	19:30	ST	10	990	1.5	7.9	12.0	0.10	0.80	1.50		16	<5	<20	<30	<20	<2	<40	<10	100	268
	3/22/92	9:00																				
	3/23/92	10:05	ST	5	240	5.6	7.7	3.5	0.10	1.40	1.10		<5	<5	<20	<30	<20	2	<40	<10	70	82
	3/23/92	14:00																				
	3/23/92	15:00	ST	3	510	5.7	8.5	5.3	0.10	1.20	1.70		<5	8	<20	<30	30	2	<40	<10	90	138
	3/23/92	17:00																				
	3/23/92	18:00	ST	8	1000	3.7	8.3	9.4	0.10	1.10	1.10		<5	<5	<20	<30	<20	<2	<40	<10	120	222
	3/24/92	1:00																				
	3/26/92	19:52	ST	4	110	46.0	7.1	4.2	0.30	0.70	0.50		83	21	<7	<10	19	29	<10	<2	100	38
	3/26/92	22:52																				
	3/26/92	23:52	ST	7	55	15.0	7.2	2.2	0.10	2.90	0.60		17	8	<7	<10	8	9	<10	39	40	32
	3/27/92	5:52																				
	12/7/92	10:10	ST	1	93	77.0	7.8	1.9	0.35	1.20	1.70		140	26	<20	<30	<20	33	<40	<10	140	
	1/15/93	14:45	ST	6	51	21.0	7.3	0.8	0.15	0.50	0.50		32	10	<7	<10	<30	12	<3	<4	58	13
	1/16/93	2:45																				
	1/16/93	14:45	ST	5	70	20.0	7.4	0.9	0.16	0.43	0.48		37	16	<7	<10	<30	13	<3	<4	66	14
	1/17/93	11:30																				
	1/17/93	11:40	ST	8	180	31.0	7.7	2.1	0.14	0.76	0.57		38	12	<7	<10	<30	8	5	<4	71	33
	1/18/93	1:40																				
	1/18/93	3:40	ST	11	100	30.0	7.8	1.5	0.16	0.66	0.75		33	10	<7	<10	<30	11	<3	<4	57	227
	1/18/93	23:40																				
	2/7/93	21:45	ST	4	62	20.0	7.4	1.1	0.23	0.63	1.10		48	14	<20	<30	30	12	<40	<10	97	14
	2/8/93	3:45																				
	2/8/93	5:45	ST	5	260	76.0	7.7	2.7	0.21	0.89	2.00		140	19	<20	<30	22	21	<40	<10	110	49
	2/8/93	13:45																				
	2/9/93	14:00	ST	6	1900	7.3	8.5	16.0	0.15	1.10	1.50		7	6	<7	20	54	3	4	10	35	252
	2/9/93	23:00																				
	2/10/93	1:15	ST	8	1400	16.0	8.6	12.0	0.16	0.91	0.57		21	10	<7	16	30	10	3	<4	81	180
	2/10/93	17:00																				
	2/10/93	19:15	ST	10	2500	2.3	8.6	22.0	0.14	1.00	1.70		<5	<5	<7	<10	<30	2	<3	<4	28	372
	2/11/93	15:30																				
	2/18/93	12:15	ST	10	160	50.0	7.1	2.3	0.19	0.77	0.85		88	22	<7	10	<30	19	8	<4	120	42
	2/19/93	6:15																				
	2/19/93	8:15	ST	14	190	60.0	7.2	2.2	0.15	0.56	0.89		94	21	<7	11	<30	20	6	<4	100	40
	2/20/93	10:15																				
	2/20/93	10:12	ST	5	420	32.0	8.1	4.1	0.16	0.76	0.39		33	16	<7	10	37	12	9	<4	47	76
	2/20/93	18:24																				
	2/20/93	20:27	ST	10	2000	9.3	8.5	16.0	0.18	1.30	0.20		8	11	<7	<10	<30	4	5	<4	26	330
	2/21/93	14:54																				
	11/11/93	3:00	ST	1											<5	<10	<50	70	<40	<10	500	
	11/11/93	5:00	ST	7	320	42.0	7.4	9.2	0.36	3.90	1.80		97	39	<5	<10	50	33	<40	<10	300	94
	11/11/93	19:00																				
	11/11/93	21:00	ST	9	1200	6.0	8.1	16.0	0.10	2.10	0.16		<5	<5	<5	<10	22	4.7	<40	<10	160	270
	11/12/93	13:00																				
	11/12/93	15:00	ST	11	1700	2.0	8.1	8.3	0.10	3.30	0.59		8	6	<5	<10	<20	<2	<40	<10	59	402
	11/13/93	11:00																				

STATION	DATE	TIME	SAMPLES Type	#	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
ABCC03	11/13/93	13:00	ST	12	2000	1.5	8.3	17.0	0.10	1.50	0.44		5	5	<5	<10	24	<2	<40	<10	51	452
	11/14/93	11:00																				
	11/14/93	13:00	ST	7	1900	2.5	8.4	15.0	0.10	1.20	0.10		<5	<5	<5	<10	24	<2	<40	<10	62	436
	11/15/93	1:00																				
	11/22/93	22:59	ST	1											<5	<10	37	4	<40	<10	80	330
	11/23/93	0:59	ST	8	860	22.0	7.2	13.0	0.60	7.10	3.20		65	<5	<5	<10	68	17	<40	<10	26	218
	11/23/93	14:59																				
	11/23/93	16:59	ST	9	1600	2.7	8.2	16.0	0.10	3.30	0.76		<5	<5	<5	<10	36	<2	<40	<10	95	
	11/24/93	8:59																				
	11/24/93	10:59	ST	12	1900	3.7	8.4	12.0	0.10	3.10	1.10		6	<5	<5	<10	27	<2	<40	<10	50	414
	11/25/93	8:59																				
	11/25/93	10:59	ST	12	1800	4.9	8.0	13.0	0.10	1.80	0.89		9	<5	<5	<10	<20	<2	<40	<10	56	382
	11/26/93	8:50																				
	11/30/93	2:12	ST	6	540	22.0	7.7	8.7	0.18	2.40	1.50		<5	<5	<5	<10	21	12	<40	<10	130	124
	11/30/93	12:12																				
	11/30/93	14:12	ST	10	1300	4.9	8.4	15.0	0.10	1.10	0.56		<5	<5	<5	<10	<20	<2	<40	<10	53	309
	12/1/93	8:12																				
	12/1/93	10:12	ST	12	1600	1.8	8.4	19.0	0.10	1.20	0.62		<5	<5	<5	<10	<20	<2	<40	<10	48	374
	12/2/93	8:12																				
	12/2/93	10:12	ST	20	1800	2.4	8.5	19.0	0.10	1.40	0.46		16	15	<5	<10	<20	<2	<40	<10	40	410
	12/4/93	0:12																				
	2/7/94	11:30	ST	1	38	17.0	7.8	1.5	0.57	1.90	2.30		26	12	<5	<10	<20	19		<10	130	14
	2/17/94	4:58	ST	3	470	12.0	7.5	7.0	0.45	2.60	1.00		55	19	<5	17	32	24	<40	<10	210	74
	2/17/94	8:58																				
	2/17/94	10:58	ST	13	530	40.0	7.8	7.6	0.46	1.50	2.00		40	7	<5	16	20	9.3	<40	<10	96	134
	2/18/94	10:58																				
	2/18/94	12:58	ST	3	960	180.0	7.8	13.0	0.10	1.60	1.40		140	5	<5	16	26	9.7	<40	<10	62	270
	2/18/94	16:58																				
	2/18/94	18:58	ST	9	320	24.0	7.9	5.7	0.41	1.80	1.10		30	<5	<5	10	20	16	<40	<10	110	76
	2/19/94	10:58																				
	2/19/94	12:58	ST	8	1200	6.9	8.5	16.0	0.10	0.94	0.52		11	5	<5	<10	<20	<2	<40	<10	35	212
	2/20/94	2:58																				
	2/20/94	4:58	ST	7	160	44.0	8.3	3.3	0.16	1.10	1.00		86	14	<5	10	<20	24	<40	<10	100	29
	2/20/94	16:58																				
	2/20/94	18:58	ST	8	990	33.0	7.9	15.0	0.10	3.50	2.20		30	7	<5	<10	<20	5.1	<40	<10	75	164
	2/21/94	8:58																				
	10/4/94	12:00	ST	4	560	330.0	7.1	0.7	2.20	16.00	8.80		1200	81	6.8	63	380	25	66	1.1	1600	188
	10/4/94	18:00																				
	10/5/94	12:00	ST	3	400	100.0	6.9	6.4	0.45	7.40	3.60		440	43	3.6	24	250	100	45	1.5	840	128
	10/5/94	16:00																				
	11/16/94	5:33	ST	5	1100	16.0	7.8	10.0	0.53	4.70	1.20		36	9	<1	<10	58	11	<40	<0.3	120	180
	11/16/94	19:53																				
	3/10/95	21:55	ST	2	650	36.0	7.8	5.9	0.15	1.40	0.84		110	26	<1	<10	31	17	<40	<1	100	84
	3/10/95	23:55																				
	3/11/95	1:55	ST	16	630	34.0	7.8	5.7	0.10	0.94	0.77		61	17	<1	<10	21	13	<40	<1	85	90
	3/12/95	7:55																				
	3/12/95	9:55	ST	30	2500	1.9	8.3	19.0	0.10	1.20	0.42		<6	6	<1	34	15	2.3	<40	<1	36	236
	3/14/95	19:55																				

STATION	DATE	TIME	SAMPLES Type	#	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
ABCC03	12/12/95	21:12	ST	5	750	780.0	7.3	19.0	2.80	47.00	27.00		2100	420	6	63	310	180	62	<1	1500	154
	12/12/95	22:12																				
	12/13/95	0:12	ST	15	400	54.0	7.2	10.0	0.63	4.70	2.20		74	35	<1	11	120	40	<40	<1	410	80
	12/14/95	4:12																				
	12/14/95	10:12	ST	30	1900	2.6	8.5	21.0	0.28	1.20	0.40		<6	<6	<1	<10	29	<2	<40	<1	67	364
	12/16/95	20:12																				
	1/16/96	17:04	ST	5	960	11.0	7.9	14.0	0.91	9.60	4.40		470	110	4	13	87	41	19	2	340	290
	1/16/96	18:04																				
	1/16/96	20:04	ST	5	230	34.0	7.3	7.5	1.60	5.10	1.90		110	33	10	<10	56	21	12	1	230	58
	1/17/96	4:04																				
	1/19/96	4:37	ST	5	2000	4.3	8.4	26.0	0.10	2.30	0.41		12	8	<1	91	46	3	3	<1	94	346
	1/19/96	5:37																				
	1/19/96	7:37	ST	3	210	15.0	7.9	12.0	0.92	3.20	0.82		33	19	<1	<10	49	9	7	<1	140	66
	1/19/96	11:37																				
	1/21/96	14:57	ST	5	330	170.0	7.6	3.5	0.16	4.00	2.80		360	84	3	16	81	53	16	<1	280	74
	1/21/96	15:57																				
	1/21/96	17:57	ST	9	610	19.0	7.6	6.5	0.10	1.60	0.86		46	22	<1	<10	36	14	<20	<1	140	140
	1/22/96	9:57																				
	1/25/96	13:45	ST		860	29.0	8.4	12.0	0.50	3.80	1.70		42	27	<1	<10	39	12	10	<1	190	260
	1/22/96	11:57	ST	38	1600	2.2	8.4	11.0	0.10	1.20	0.30		<6	<6	<1	<10	22	<2	4	<1	56	320
	1/25/96	13:45																				
	1/31/96	1:57	ST	5	630	140.0	7.9	8.1	0.27	3.30	1.60		180	19	<1	20	49	17	12	1	170	134
	1/31/96	2:57																				
	1/31/96	4:57	ST	10	210	58.0	7.7	3.9	0.33	2.70	1.40		65	21	<1	<10	46	<2	9	<1	240	60
	1/31/96	22:57																				
	2/1/96	14:57	ST	21	1700	5.4	8.5	19.0	0.10	1.00	0.42		13	9	<1	<10	26	3	4	2	70	326
	2/3/96	6:57																				
	2/3/96	8:57	ST	9	870	14.0	7.9	11.0	0.33	2.20	0.71		17	16	<1	<10	40	10	7	3	77	154
	2/4/96	0:57																				
	3/4/96	11:56	ST	5	980	78.0	8.5	11.0	0.54	3.50	1.00		70	23	<1	<10	41	19	9	1	170	132
	3/4/96	12:56																				
	3/4/96	14:56	ST	11	190	23.0	7.7	2.5	0.47	1.30	0.77		43	12	<1	<10	28	14	6	3	120	36
	3/5/96	10:56																				
	3/5/96	12:56	ST	35	2000	2.6	8.5	21.0	0.10	1.40	0.29		<6	<6	<1	<5	19	5	4	<1	78	348
	3/8/96	8:56																				
	10/30/96	4:43	ST	5	1700	1400.0	7.6	22.0	3.20	37.00	19.00		2900	530	6	50	310	130	52	2	1300	250
	10/30/96	5:43	F												<1	<10	29	4	22	<1	110	
	10/30/96	7:43	ST	7	220	62.0	7.0	5.9	0.87	2.90	1.80		83	24	<1	<10	47	49	12	<1	330	56
	10/30/96	19:43																				
	10/30/96	21:43	ST	10	1200	11.0	8.1	18.0	0.14	1.40	0.83		13	9	<1	<10	30	5	7	<1	180	225
	10/31/96	15:43																				
	11/21/96	7:34	ST	5	140	44.0	7.0	6.4	0.84	4.00	1.80		58	36	<1	<10	210	22	15	<1	300	38
	11/21/96	8:34																				
	11/21/96	10:34	ST	12	100	32.0	7.2	3.1	0.35	1.40	0.90		34	12	<1	<10	39	16	12	<1	140	32
	11/22/96	8:34																				
	11/22/96	10:34	ST	31	1000	20.0	8.6	13.0	0.12	1.50	0.63		23	8	<1	<10	24	4	5	<1	84	226
	11/25/96	6:34																				

STATION	DATE	TIME	SAMPLES Type	#	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
ABCC03	12/9/96	13:08	ST	3	250	200.0	7.3	5.9	0.45	2.90	2.00		250	50	<1	13	39	36	11	<1	270	58
	12/9/96	13:38																				
	12/9/96	16:08	ST	5	120	30.0	7.2	1.9	0.21	0.81	0.43		32	10	<1	<10	25	11	4	<1	95	30
	12/10/96	0:08																				
	12/10/96	2:08	ST	10	750	10.0	8.7	8.6	<0.1	0.88	0.69		<6	<6	<1	<10	25	3	<4	<1	47	198
	12/10/96	20:08																				
	12/10/96	22:08	ST	13	130	25.0	7.4	2.2	0.14	0.88	0.71		9	10	<1	<10	17	8	<4	<1	82	40
	12/11/96	22:08																				
	12/12/96	0:08	ST	18	550	58.0	8.1	7.7	0.15	1.40	<0.2		42	11	<1	<10	22	9	<4	<1	170	140
	12/13/96	14:08																				
	1/1/97	21:08	ST	5	1100	36.0	8.0	9.9	0.34	2.40	0.70		22	12	<1	<10	22	6	43	<1	82	190
	1/1/97	22:08																				
	1/2/97	0:08	ST	8	320	28.0	7.6	5.0	0.60	1.40	0.60		20	11	<1	<10	24	7	6	<1	100	78
	1/2/97	14:08																				
	1/2/97	16:08	ST	40	850	11.0	8.3	7.0	0.28	0.78	0.32		10	8	<1	<10	30	4	12	<1	72	862
	1/5/97	22:08																				
	1/21/97	19:02	ST	4	600	46.0	8.0	6.7	0.25	1.70	0.77		45	14	<1	<10	27	4	<4	<1	120	114
	1/22/97	1:02																				
	1/22/97	14:17	ST	6	800	24.0	8.0	9.5	0.27	1.70	0.61		35	6	<1	<10	34	10	5	<1	59	139
	1/22/97	23:02																				
	1/23/97	1:02	ST	9	260	38.0	7.7	2.5	<0.1	0.93	0.58		50	19	<1	<10	28	12	<4	<1	24	55
	1/23/97	17:02																				
	1/23/97	19:02	ST	22	1900	20.0	8.4	20.0	<0.1	1.60	0.43		23	10	<1	<10	25	<2	<4	<1	140	322
	1/25/97	13:02																				
	1/25/97	15:02	ST	2				12.0	0.27	2.40	0.73				<1	<10	46	13	4	<1	200	140
	1/25/97	17:02																				
	1/26/97	8:25	ST		58	21.0	7.5	1.2	0.29	0.79	0.50		27	15	<1	<10	11	10	<4	<1	200	14
	9/25/97	8:41	ST	1											9	69	480	180	23	<1	2500	>4000
	9/25/97	11:41	ST	8	390	120	6.8	7	0	4.7	2	<0.5	200	52	1	11	78	44	20	<1	350	
	9/26/97	1:41	SF												<1	<10	43	11	13	<1	300	
	9/26/97	9:41	ST	24	1300	11	8.1	11	0	1.7	0.44	<0.5	10	11	<1	<10	29	2	5	<1	52	298
	9/28/97	7:41	SF												<1	<10	26	<2	4	<1	64	
	9/28/97	9:41	ST	12	1600	2.4	8.2	9	<0.1	2.5	0	<0.5	17	<6	<1	<10	27	<2	7.0	<1	11	328
	9/29/97	7:41	SF												<1	<10	20	<2	<4	<1	16	
	11/10/97	12:15	SF	5				6				<0.5			<1	<10	33	9	13	<1	170	224
	11/10/97	13:15																				
	11/10/97	15:15	ST	8	460	150	6.9	10	2	9.2	4	<0.5	220	78	1.0	16	110	19	29	<1	680	132
	11/11/97	5:15	SF												<1	<10	47	6	20	<1	310	
	11/11/97	7:15	ST	25	1400	10	8.3	18	0	2.7	1	<0.5	<6	<6	<1	<10	<4	3	7	<1	110	282
	11/13/97	7:15	SF												<1	<10	25	<2	8	<1	93	
	11/13/97	9:15	ST	11	340	41	7.4	7	1	6.6	2	<0.5	140	39	<1	90	37	24	4	<1	280	68
	11/14/97	5:15	SF												<1	<10	25	7	6	<1	160	
	12/18/97	12:13	ST	5	650	440	7.5	10	1	4.1	3	<0.5	700	110	<1	18	48	42	18	<1	250	116
	12/18/97	13:13	SF												<1	<10	19	<2	7	<1	25	
	12/18/97	15:13	ST	7	200	63	7.5	4	1	1.7	1	<0.5	64	16	<1	20	30	14	6	<1	130	50
	12/19/97	3:13	SF												<1	<10	20	<2	5	<1	34	

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
ABCC03	1/29/98	5:21	ST	5	860	14	7.6	14	1	4.6	1.0	<0.5	98	30	2	<10	43	14	9	<1	140	158
	1/29/98	6:21	SF												<1	<10	34	6	7	<1	120	
	1/29/98	8:21	ST	18	820	140	7.8	10	<0.5	1.4	1		110	24	<1	<10	27	12	9	<1	79	186
	1/30/98	18:21	SF												9	<10	18	4	8	1	26	
	1/30/98	20:21	ST	29	1300	11	8.2	16	<0.5	1.7	0		13	9	<1	<10	22	4	8	<1	26	262
	2/2/98	4:21	SF												18	<10	19	<2	<4	<1	<10	
	5/12/98	14:40	ST	5	1050	136	7.9	10	<0.05	8.7	2		490	110	1	18	52	42	14	<2	370	210
	5/12/98	15:40	SF												<0.5	6	22	<2	6	<2	66	
	5/12/98	17:40	ST	13	195	44	7.5	3	0	<1.0	2		88	40	<0.5	9	25	13	5	<2	91	56
	5/13/98	17:40	SF												<0.5	5	13	<2	<4	<2	26	
	5/13/98	19:40	ST	33	1780	28	8.4	24	<0.05	1.1	<0.05		68	28	<0.5	6	19	4	<4	<2	37	350
	5/16/98	11:40	SF												<0.5	4	15	<2	<4	<2	17	
	11/8/98	3:03	ST	5	1010	190	7	22	2	40	11		600	333	4	29	132	87	36	<2	888	190
	11/8/98	4:03	SF												<1	<8	20	3	21	<2	100	
	11/8/98	6:03	ST	9	460	23	8	10	0	3	1		80	50	<1	9	40	11	8	<2	149	115
	11/8/98	22:03	SF												<1	<8	22	<2	6	<2	70	
	11/9/98	0:03	ST	38	1370	9	8	17	<0.05	1	0		16	8	<1	<8	20	2	<4	<2	50	295
	11/12/98	2:03	SF												<1	<8	18	<2	<4	<2	40	
	11/11/98	10:03	ST	6											<1	<8	41	14	9	<2	187	160
	11/11/98	20:03	SF												<1	<8	31	<2	9	<2	103	
	3/11/99	10:49	ST	5	670	88	8	10	1	9	1		210	110	2	15	71	39	16	<2	401	160
	3/11/99	11:49	SF												<1	<8	24	<2	9	<2	83	
	3/11/99	13:49	ST	2	375	64	8	7	1	6	2		220	98	1	13	70	33	15	<2	414	100
	3/11/99	15:49																				
	3/20/99	6:25	ST	5	755	18	8	10	0	4	2		210	62	<1	9	40	14	10	<2	210	184
	3/20/99	7:25	SF												<1	<8	22	<2	8	<2	109	
	3/20/99	9:25	ST	4	405	12	7	7	0	3	1		50	24	<1	<8	38	8	8	<2	135	112
	3/20/99	15:25	SF												<1	<8	33	13	8	<2	81	
	3/21/99	9:25	ST	35	1460	2	9	11	<0.05	1	0		7	3	<1	<8	32	<2	<4	<2	28	292
	3/24/99	7:25	SF												<1	<8	28	<2	4	<2	22	
	3/25/99	11:44	ST	5	565	26	8	5	0	4	2		220	166	<1	<8	33	22	8	<2	193	126
	3/25/99	12:44	SF												<1	<8	19	<2	4	<2	26	
	3/25/99	14:44	ST	9	380	18	8	6	0	1	0		42	14	<1	<8	24	8	5	<2	101	86
	3/26/99	6:44	SF												<1	<8	18	<2	<4	<2	55	
	3/26/99	8:44	ST	38	1270	2	9	10	0	1	0		9	6	<1	<8	23	<2	<4	<2	40	282
	3/29/99	10:44	SF												<1	<8	17	<2	<4	<2	25	
	11/8/99	10:52	ST	5	795	120.0	6.9	37.8	2.51	9.60	3.67		400	220	2	13	102	27	35	<2	684	220
	11/8/99	11:52	SF												<1	<8	42	4	30	<2	382	360
	11/8/99	13:52	ST	6	1560	55.0	7.1	33.4	1.38	12.00	1.62		320	180	<1	<8	95	11	28	<2	394	
	11/8/99	23:52	SF												<1	<8	42	3	25	<2	251	
	1/25/00	9:25	ST	1											2	18	113	50	23	<2	469	80
	1/25/00	9:25	SF												<1	<8	18	4	7	<2	53	56

STATION	DATE	TIME	SAMPLES Type	#	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
WMCC04	2/5/92	15:20	ST	4	460	120.0	6.9	8.6	2.90	9.40	42.00		300	94	<20	<30	70	84	<40	<10	480	110
	2/5/92	17:20																				
	2/5/92	17:50	ST	20	310	40.0	7.1	7.6	1.00	1.60	1.30		45	16	<20	<30	30	20	<40	<10	150	78
	2/6/92	15:20																				
	2/9/92	11:50	ST	4	180	6.3	7.3	2.1	0.32	0.50	1.20		210	40	<2	7	20	55	<10	<2	180	52
	2/9/92	13:50																				
	2/9/92	20:20	ST	16	320	6.1	7.6	4.8	0.21	0.50	0.70		51	12	<2	<6	11	10	<10	<2	60	90
	2/10/92	11:50																				
	2/11/92	9:10	ST	12	110	70.0	7.7	2.1	0.20	0.50	1.00		160	31	<2	<6	20	43	<10	47	130	34
	2/11/92	20:10																				
	2/11/92	21:10	ST	11	340	37.0	7.7	4.9	0.27	0.50	0.80		45	13	<2	<6	14	14	<10	<2	70	94
	2/12/92	8:10																				
	2/12/92	11:30	ST	12	140	16.0	7.1	3.9	0.19	0.50	24.00		330	44	<2	9	36	60	10	71	180	36
	2/12/92	22:30																				
	2/13/92	5:30	ST	5	130	12.0	7.2	2.8	0.15	0.50	1.10		130	26	<2	<6	18	38	<10	5	100	44
	2/13/92	9:30																				
	3/20/92	14:22	ST	4	140	8.3	7.7	2.2	0.20	0.70	2.60		220	47	<20	<30	40	170	<40	<10	480	72
	3/20/92	18:22																				
	3/20/92	19:22	ST	15	100	6.3	7.5	2.5	0.10	0.60	1.30		88	27	<20	<30	<20	23	<40	<10	80	42
	3/21/92	9:22																				
	3/21/92	12:22	ST	3	410	1.4	7.9	6.3	0.10	0.90	1.70		17	9	<20	<30	<20	<2	<40	<10	40	154
	3/21/92	14:22																				
	3/26/92	19:52	ST	4	130	42.0	7.5	3.4	0.10	0.90	1.40		110	28	<7	<10	25	37	<10	<2	110	22
	3/26/92	22:52																				
	3/26/92	23:52	ST	10	98	27.0	7.5	3.5	0.10	0.80	0.40		35	10	<7	<10	12	11	<10	<2	40	50
	3/27/92	8:52																				
	3/27/92	9:52	ST	10	580	4.9	8.2	17.0	0.10	0.50	0.30		<5	<5	<7	<10	7	5	<10	<2	10	180
	3/27/92	18:52																				
	12/7/92	10:30	ST	1	120	480.0	8.7	3.3	0.38	1.60	4.20		1100	71	<20	<30	<20	28	<40	<10	120	
	1/15/93	13:15	ST	8	85	80.0	7.9	0.9	0.18	0.57	1.40		140	17	11	22	52	17	18	<4	130	40
	1/16/93	3:15																				
	1/16/93	5:15	ST	4	210	34.0	7.7	2.7	0.19	0.57	0.96		56	14	<7	<10	<30	7	4	<4	46	80
	1/16/93	11:15																				
	1/16/93	13:15	ST	9	300	82.0	7.9	4.2	0.19	0.71	1.20		170	18	<7	<10	<30	15	9	<4	94	92
	1/17/93	5:15																				
	1/17/93	7:15	ST	3	140	53.0	7.9	2.2	0.19	0.60	0.75		110	21	<7	<10	<30	16	5	<4	68	54
	1/17/93	11:15																				
	1/17/93	11:17	ST	8	180	85.0	7.5	2.3	0.13	0.84	1.20		180	20	<7	<10	<30	16	5	<4	78	48
	1/18/93	1:17																				
	1/18/93	3:17	ST	8	96	120.0	7.7	1.3	0.13	0.91	1.30		220	30	<7	<10	<30	23	5	<4	95	292
	1/18/93	19:17																				
	1/18/93	21:17	ST	7	500	74.0	7.8	8.3	0.15	0.71	0.97		86	12	<7	<10	<30	9	<3	<4	69	146
	1/19/93	9:17																				

STATION	DATE	TIME	SAMPLES Type	#	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
WMCC04	2/7/93	21:30	ST	5	180	300.0	8.2	2.2	0.17	0.94	3.00		630	46	<20	<30	22	32	<40	<10	110	60
	2/8/93	5:30																				
	2/8/93	7:30	ST	8	300	120.0	7.8	4.1	0.17	0.89	2.40		380	28	<20	<30	20	28	<40	<10	90	79
	2/8/93	21:30																				
	2/8/93	23:30	ST	7	980	44.0	8.1	14.0	0.15	0.77	1.50		60	9	<20	<30	<20	11	<40	<10	55	120
	2/9/93	11:15																				
	2/9/93	11:30	ST	12	1400	17.0	8.4	21.0	0.15	0.69	1.30		13	5	<7	<10	<30	4	<3	<4	<20	460
	2/10/93	12:15																				
	2/10/93	14:30	ST	12	1600	7.8	8.3	23.0	0.16	0.63	0.47		8	5	<7	<10	<30	3	<3	<4	<20	530
	2/11/93	15:15																				
	2/18/93	13:50	ST	12	290	180.0	7.6	4.3	0.18	0.90	1.90		340	37	<7	<10	<30	23	5	<4	110	110
	2/19/93	11:50																				
	2/19/93	13:50	ST	11	310	200.0	7.9	3.8	0.13	0.82	2.60		600	41	<7	<10	<30	35	6	<4	91	90
	2/20/93	9:50																				
	2/20/93	9:51	ST	4	460	62.0	8.1	6.7	0.12	0.69	0.80		47	10	<7	<10	<30	13	<3	<4	38	134
	2/20/93	16:21																				
	2/20/93	18:31	ST	19	1600	4.6	8.3	19.0	0.12	0.78	0.18		<5	<5	<7	<10	90	<2	<3	<4	20	552
	2/22/93	9:04																				
	11/10/93	23:11	ST	1											<5	<10	90	100	<40	<10	700	258
	11/11/93	10:00	ST	7	510	38.0	7.6	11.0	0.36	3.20	1.40		49	22	<5	<10	33	19	<40	<10	170	136
	11/11/93	22:00																				
	11/12/93	16:00	ST	11	1800	1.2	8.4	21.0	0.10	0.56	0.16		<5	<5	<5	<10	<20	<2	<40	<10	24	538
	11/13/93	12:00																				
	11/13/93	14:00	ST	11	1800	2.5	8.3	21.0	0.10	0.68	0.37		<5	<5	<5	<10	<20	<2	<40	<10	39	542
	11/14/93	10:00																				
	11/14/93	12:00	ST	6	1800	0.8	8.4	20.0	0.10	0.65	1.90		<5	<5	<5	<10	27	<2	<40	<10	24	536
	11/14/93	22:00																				
	11/22/93	22:50	ST	1											<5	<10	32	4.5	<40	<10	96	434
	11/23/93	0:50	ST	8	1100	13.0	7.7	17.0	0.43	4.40	1.30		10	<5	<5	<10	65	3.7	<40	<10	96	338
	11/23/93	14:50																				
	11/23/93	16:50	ST	9	1700	2.3	8.2	21.0	0.10	1.10	0.56		<5	<5	<5	<10	29	<2	<40	<10	38	502
	11/24/93	8:50																				
	11/24/93	10:50	ST	12	1700	1.1	8.4	19.0	0.10	0.82	0.30		<5	<5	<5	<10	<20	<2	<40	<10	18	584
	11/25/93	8:50																				
	11/25/93	10:50	ST	12	1700	3.3	8.3	20.0	0.10	1.00	0.36		<5	<5	<5	<10	<20	<2	<40	13	19	514
	11/26/93	8:50																				
	11/26/93	10:50	ST	6	1600	1.2	8.4	19.0	0.10	1.20	0.26		10	9	<5	<10	<20	<2	<40	<10	27	430
	11/26/93	20:30																				
	11/30/93	1:41	ST	7	670	32.0	7.8	9.6	0.26	3.70	2.00		84	<5	<5	<10	29	14	<40	<10	120	185
	11/30/93	13:41																				
	11/30/93	15:31	ST	9	1400	5.1	8.2	17.0	0.10	1.10	0.62		<5	<5	<5	<10	<20	<2	<40	<10	43	425
	12/1/93	7:41																				
	12/1/93	9:41	ST	13	1700	2.2	8.4	18.0	0.10	0.84	0.50		6	<5	<5	<10	<20	<2	<40	<10	30	490
	12/2/93	9:41																				
	12/2/93	11:41	ST	19	1700	3.0	8.4	20.0	0.10	0.52	0.58		<5	<5	<5	<10	<20	<2	<40	<10	22	506
	12/3/93	23:41																				
	2/7/94	14:47	ST	1	120	56.0	7.7	5.4	0.51	1.70	2.20		67	7	<5	<10	<20	13	<40	<10	120	20
	11/10/94	6:50	ST	3	500	130.0	6.4	5.8	1.30	6.40	4.40		340	63	1.1	<10	210	55	<40	0.93	350	100
	11/10/94	10:50																				

STATION	DATE	TIME	SAMPLES Type	#	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
WMCC04	11/10/94	12:50	ST	5	490	29.0	6.7	9.6	0.52	2.50	1.50		37	23	<1	<10	35	9.5	<40	<0.3	97	105
	11/10/94	20:50																				
	11/16/94	5:41	ST	4	1100	20.0	7.8	13.0	0.43	4.60	1.50		28	20	<1	<10	80	8.4	<40	0.95	140	205
	11/16/94	11:41																				
	3/10/95	21:29	ST	3	700	70.0	8.0	8.9	0.10	1.40	1.10		180	29	<1	<10	28	33	<40	<1	110	164
	3/11/95	1:29																				
	3/11/95	3:29	ST	15	450	39.0	7.7	6.4	0.10	0.99	0.86		52	16	<1	<10	22	12	<40	<1	57	112
	3/12/95	7:29																				
	3/12/95	9:29	ST	30	1700	2.3	8.2	21.0	0.10	0.98	0.32		<6	<6	<1	<10	15	<2	<40	<1	19	440
	3/14/95	19:29																				
	9/27/95	9:00		6	1800	0.7	8.3	21.0	0.10	2.30	0.40		10	12	<1	<10	18	<2	<40	<1	14	
	9/27/95	14:00																				
	9/27/95	15:00		18	1900	0.9	8.3	17.0	0.10	1.30	0.20		7	<6	<1	<10	21	<2	<40	<1	17	
	9/28/95	8:00																				
	12/12/95	21:19	ST	4	740	590.0	7.3	25.0	2.90	26.00	13.00		2100	380	3	32	480	140	55	1	1100	185
	12/12/95	22:19																				
	12/13/95	0:19	ST	10	400	51.0	6.9	9.0	0.58	3.40	2.00		84	26	<1	<10	51	26	<40	<1	230	92
	12/13/95	18:19																				
	12/14/95	10:19	ST	30	1800	2.1	8.3	22.0	0.29	0.89	0.45		<6	<6	<1	<10	40	<2	<40	<1	33	540
	12/16/95	8:19																				
	1/16/96	16:36	ST	5	1100	45.0	7.7	27.0	1.30	10.00	2.40		160	59	10	<10	84	24	15	3	280	304
	1/16/96	17:36																				
	1/16/96	19:36	ST	7	440	180.0	7.5	9.1	0.88	5.20	2.90		230	53	<1	15	58	24	13	4	200	350
	1/17/96	7:36																				
	1/19/96	5:07	ST	5	910	25.0	8.0	25.0	0.82	4.30	0.90		56	29	<1	<10	39	9	6	<1	140	258
	1/19/96	6:07																				
	1/19/96	8:07	ST	5	480	55.0	8.1	14.0	0.38	3.30	1.00		76	22	<1	<10	32	10	8	<1	100	124
	1/19/96	16:07																				
	1/19/96	18:07	ST	23	1600	3.9	8.3	15.0	0.12	1.90	0.30		7	6	<1	<10	23	<2	11	<1	37	452
	1/21/96	16:07																				
	1/21/96	22:07	ST	6	540	120.0	7.9	6.2	0.16	2.90	2.50		260	45	1	14	84	48	16	<1	330	132
	1/22/96	6:07																				
	1/22/96	10:07	ST	10	1400	6.9	8.4	15.0	0.10	0.83	0.45		18	6	<1	<10	24	<2	4	2	42	404
	1/23/96	4:07																				
	1/31/96	1:46	ST	5	930	12.0	8.0	14.0	0.33	2.30	0.77		38	16	<1	13	41	10	7	<1	110	258
	1/31/96	2:46																				
	1/31/96	4:46	ST	8	210	140.0	7.4	3.8	0.47	3.00	1.90		180	36	1	16	59	50	25	<1	360	46
	1/31/96	18:46																				
	1/31/96	20:46	ST	30	1100	19.0	8.4	14.0	0.10	1.10	0.49		26	11	<1	<10	27	8	10	<1	79	318
	2/3/96	6:46																				
	2/3/96	8:46	ST	8	660	21.0	7.9	7.9	0.28	2.20	0.87		46	19	<1	<10	41	13	10	4	80	172
	2/4/96	0:46																				
	3/4/96	11:35	ST	5	1100	56.0	8.2	14.0	0.46	2.00	0.78		67	23	<1	<10	34	14	24	<1	130	258
	3/4/96	12:35																				
	3/4/96	16:35	ST	10	190	82.0	8.0	3.0	0.35	1.40	1.40		160	20	<1	<10	33	19	5	<1	120	56
	3/5/96	10:35																				
	3/5/96	12:35	ST	35	1400	2.2	8.4	15.0	0.10	0.71	0.29		12	<6	<1	<5	15	3	<4	<1	36	880
	3/8/96	10:35																				

STATION	DATE	TIME	SAMPLES Type	#	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
WMCC04	10/30/96	5:00	ST	5	550	270.0	7.1	13.0	1.50	8.20	4.00		520	110	2	21	83	50	31	<1	530	170
	10/30/96	13:00	SF												<1	<10	23	<2	14	<1	150	
	10/30/96	15:00	ST	7	620	62.0	7.9	10.0	0.42	1.60	1.30		60	13	<1	11	31	11	8	<1	130	180
	10/31/96	3:00																				
	10/31/96	5:00	ST	36	1400	1.8	8.4	17.0	0.15	0.50	0.31		<6	<6	<1	<10	19	<2	<4	<1	48	478
	11/3/96	3:00																				
	11/21/96	7:04	ST	5	250	160.0	7.4	6.2	0.59	4.80	2.40		260	42	1	18	83	41	14	<1	290	94
	11/21/96	8:04																				
	11/21/96	10:04	ST	12	140	98.0	7.5	3.8	0.33	1.90	1.70		180	26	<1	10	47	32	<20	<1	170	58
	11/22/96	8:04																				
	11/23/96	8:44	ST	24	1200	14.0	8.4	16.0	0.18	1.20	0.47		<6	<6	<1	<10	13	<2	6	<1	69	404
	11/25/96	6:04																				
	12/9/96	14:00	ST	5											2	35	85	88	30	1	420	66
	12/9/96	15:00																				
	12/9/96	17:00	ST	6	230	120.0	7.8	4.0	0.21	1.10	1.00		130	16	<1	<10	23	18	5	<1	85	68
	12/10/96	3:00																				
	12/10/96	5:00	ST	10	980	14.0	8.3	12.0	<0.1	0.83	0.61		37	8	<1	<10	17	4	<4	<1	20	306
	12/10/96	23:00																				
	12/11/96	1:00	ST	7	210	34.0	7.5	3.4	0.22	1.00	0.92		51	15	<1	<10	20	12	12	<1	76	52
	12/12/96	1:00																				
	12/12/96	3:00	ST	17	910	4.9	8.1	11.0	0.15	0.98	<0.2		<6	<6	<1	<10	15	2	<4	<1	74	295
	12/13/96	11:00																				
	12/27/96	10:00	ST	5	960	140.0	7.9	15.0	0.27	2.40	0.61		58	15	<1	<10	23	8	5	1	130	320
	12/27/96	11:00																				
	12/27/96	13:00	ST	10	230	330.0	7.8	3.4	0.43	2.20	2.80		670	50	<1	19	41	39	16	<1	240	82
	12/28/96	7:00																				
	12/28/96	9:05	ST	36	1400	5.4	8.3	16.0	<0.1	1.10	0.23		10	<6	<1	<10	11	<2	<4	<1	75	426
	12/31/96	9:05																				
	1/21/97	20:00	ST	3	230	130.0	7.5	3.6	0.27	1.80	0.91		210	31	<1	<10	31	12	6	<1	170	66
	1/22/97	0:00																				
	1/22/97	2:00	ST	11	990	11.0	7.9	13.0	<0.1	0.91	0.40		8	<6	<1	<10	19	3	5	<1	<10	305
	1/22/97	22:00																				
	1/23/97	0:00	ST	4	310	67.0	7.8	5.4	0.21	1.40	0.83		14	6	<1	<10	31	20	5	<1	22	95
	1/23/97	6:00																				
	1/23/97	8:00	ST	28	1300	15.0	8.1	19.0	<0.1	0.74	0.32		20	10	<1	<10	26	4	<4	<1	100	410
	1/25/97	14:00																				
	1/25/97	16:00	ST	3	340	64.0	8.0	6.0	0.38	1.40	1.90		130	26	2	<10	39	160	16	<1	530	102
	1/25/97	20:00																				
	1/26/97	8:55	ST		120	66.0	7.6	1.9	0.26	0.56	0.62		75	13	<1	<10	14	15	5	<1	190	36
	9/25/97	9:32	ST	5	930	240	7.0	10	3	21.0	5	<0.5	510	120	2	16	89	44	29	2	720	330
	9/25/97	10:32	SF												<1	<10	32	5	37	<1	340	
	9/25/97	12:32	ST	6	360	100	7.2	7	1	5.1	2	<0.5	170	52	<1	<10	89	27	18	<1	210	104
	9/26/97	0:32	ST	14	1400	3.9	8.5	14	0	1.8	0.58	<0.5	14	12	<1	<10	18	<2	<4	<1	56	364
	9/26/97	22:32	SF												<1	<10	49	17	14	<1	140	
	9/27/97	2:32	SF												<1	<10	17	<2	6	<1	45	

STATION	DATE	TIME	SAMPLES Type	#	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
WMCC04	11/10/97	11:24	SF	5				25				<0.5			<1	<10	56	17	20	<1	410	240
	11/10/97	12:24	SF																			
	11/10/97	14:24	ST	5	490	140	7.0	8	2	9.2	3	<0.5	170	61	<1	<10	80	16	18	<1	390	350
	11/10/97	22:24	SF												<1	<10	62	7	21	<1	310	
	11/11/97	8:24	ST	12	1200	5.3	8.2	14	0	1.7	1	<0.5	<6	7	<1	<10	30	2	<4	<1	63	446
	11/12/97	6:24	SF												<1	<10	23	<2	<4	<1	47	
	11/13/97	8:43	ST	11	470	45	7.9	7	1	3.3	2	<0.5	170	44	<1	<10	41	21	4	<1	220	136
	11/14/97	4:43	SF												<1	<10	17	4	6.0	<1	87	
	12/18/97	12:25	ST	5	510	130	7.7	9	1	3.1	2	<0.5	640	170	<1	20	39	59	10	<1	270	134
	12/18/97	13:25	SF												<1	<10	16	<2	<4	<1	22	
	12/18/97	15:25	ST	9	480	31	7.5	8	<0.5	1.2	1	<0.5	140	27	<1	<10	16	12	<4	<1	49	142
	12/19/97	7:25	SF												<1	<10	16	<2	<4	<1	<10	
	12/19/97	9:25	ST	38	1200	9.2	8.2	19	<0.5	1.2	0		16	12	<10	<10	20	3	<4	<1	37	376
	12/22/97	11:25	SF												<10	<10	19	<2	<4	<1	33	
	1/29/98	7:04	ST	5	390	10	7.4	12	1	5.0	1.3	<0.5	98	43	<1	<10	46	13	9	<1	150	114
	1/29/98	8:04	SF												<1	<10	28	<2	7	<1	22	
	5/12/98	12:25	ST	5	1660	3.1	8.3	20	<0.05	3.2	0		68	36	<1	<4	17	<2	<4	<2	35	440
	5/12/98	13:25	SF												1	5	15	<2	<4	<2	31	
	5/12/98	15:25	ST	13	290	22	7.8	5	0	1.1	1		60	36	<1	7	56	16	4	<2	88	86
	5/13/98	15:25	SF												<1	5	16	<2	<4	<2	23	
	5/13/98	17:25	ST	34	1670	1.4	8.2	28	<0.05	1.1	<0.05		32	24	<1	<4	17	<2	<4	<2	18	510
	5/16/98	11:25	SF												<1	<4	15	<2	<4	<2	15	
	3/11/99	10:28	ST	5	1130	23	8	20	1	4	0		80	40	<1	<8	76	17	8	<2	210	328
	3/11/99	11:28	SF												<1	<8	42	4	5	<2	98	
	3/20/99	6:14	ST	5	1010	5	8	15	0	2	1		22	15	<1	<8	36	4	5	<2	87	300
	3/20/99	7:14	SF												<1	<8	31	<2	7	<2	67	
	3/20/99	9:14	ST	8	645	6	8	10	0	2	0		14	12	<1	<8	31	3	6	<2	57	208
	3/20/99	23:14	SF												<1	<8	29	<2	5	<2	51	
	3/21/99	1:14	ST	40	1630	1	8	19	<0.05	1	0		<4	<1	<1	<8	23	<2	<4	<2	21	422
	3/24/99	7:14	SF												<1	<8	19	<2	4	<2	18	
	3/25/99	11:45	ST	5	525	23	8	7	0	4	1		170	62	<1	9	50	25	9	<2	227	140
	3/25/99	12:45	SF												<1	<8	19	<2	<4	<2	32	
	3/25/99	14:45	ST	9	510	21	8	7	0	1	1		130	24	<1	8	31	14	5	<2	132	140
	3/26/99	6:45	SF												<1	<8	19	<2	<4	<2	38	
	3/26/99	8:45	ST	38	1530	2	8	18	<0.05	1	0		<4	<1	<1	<8	18	<2	<4	<2	23	500
	3/29/99	10:45	SF												<1	<8	15	<2	<4	<2	19	
	11/8/99	11:18	ST	5	1060	110.0	7.0	40.0	4.66	1.50	3.37		400	240	1	13	160	27	48	<2	555	300
	11/8/99	12:18	SF												<1	14	55	4	42	<2	302	
	11/8/99	11:18	ST	5	1410	25.0	7.4	30.8	1.54	25.70	1.19		260	180	<1	<8	61	6	26	<2	240	416
	11/8/99	12:18	SF												<1	<8	39	3	28	<2	214	
	11/8/99	11:18	ST	5											<1	<8	55	4	41	<2	282	
	11/8/99	12:18	SF																			
	1/25/00	10:05	ST	1											2	15	166	42	18	<2	416	60
	1/25/00	10:05	SF												<1	<8	12	<2	6	<2	48	40

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
EGWC05	8/5/91	11:15		25	1200	1.4	8.5	0.4	0.16	5.20	1.10		49	<5								
	8/6/91	11:15																				
	9/12/91	10:45			1200	2.4	8.7	0.2	0.10	1.90	0.90		30	9								
	11/6/91	10:15		24	1600	6.6	8.6	2.6	0.10	2.70	2.20		77	17								
	11/7/91	9:15																				
	12/4/91	11:00		28	1400	5.9	8.4	3.2	0.10	1.70	0.60		66	18								
	12/5/91	14:00																				
	12/10/91	14:35		24	340	19.0	7.7	6.4	1.10	7.30	63.00		<5	<5	<20	<30	60	50	<40	<10	470	148
	12/11/91	13:35																				
	2/9/92	11:15	ST	4	140	7.6	7.2	1.8	0.14	0.50	1.40		250	48	<2	11	41	57	10	4	24	32
	2/9/92	13:15																				
	2/9/92	20:45	ST	15	130	6.4	7.3	2.4	0.27	0.50	0.80		40	10	<2	<6	10	10	<10	<2	70	36
	2/10/92	11:15																				
	2/11/92	9:45	ST	11	100	70.0	7.3	1.8	0.17	5.00	0.90		150	29	<2	<6	22	34	<10	<2	120	30
	2/11/92	20:45																				
	2/11/92	21:45	ST	12	140	32.0	7.4	2.3	0.20	5.00	0.90		37	10	<2	<6	12	14	<10	<2	60	48
	2/12/92	8:45																				
	3/21/92	12:08	ST	4	180	3.1	7.7	2.5	0.10	0.90	1.00		7	7	<20	<30	<20	<2	<40	<10	30	59
	3/21/92	15:08																				
	3/21/92	16:08	ST	10	170	3.6	7.3	2.3	0.10	0.90	1.30		<5	<5	<20	<30	<20	3	<40	<10	30	50
	3/23/92	16:30																				
	3/23/92	17:30	ST	10	220	3.7	7.3	2.6	0.10	1.20	1.80		<5	<5	<20	<30	<20	<2	<40	<10	30	69
	3/24/92	2:30																				
	3/26/92	19:30	ST	4	230	45.0	7.6	3.7	0.30	1.10	1.00		80	22	<7	<10	16	14	<10	<2	60	88
	3/26/92	22:30																				
	3/26/92	22:30	ST	8	78	6.6	7.6	2.9	0.10	0.60	0.80		<5	<5	<7	<10	8	4	<10	<2	20	32
	3/27/92	5:30																				
	3/27/92	6:30	ST	12	130	3.8	7.6	3.1	0.10	0.40	0.70		<5	<5	<7	<10	7	3	<10	<2	<10	60
	3/27/92	17:30																				
	5/22/92	14:35			1600	1.3	8.6	0.8	0.40	1.60	0.10		36	11	<2	<6	8	3	<10	3	30	
	8/12/92	13:20						0.5	0.10	0.70	2.10				<20	<30	<20	8	<40	<10	30	
	9/30/92	9:00			1200	5.1	8.0	0.2	0.10	0.70	0.30		<5	<5								
	10/29/92	10:45			1200	10.0	8.1	2.1	0.50	1.70	0.70		12	6								
	11/25/92	11:45			1700	6.6	8.6	0.2	0.10	1.00	0.53		6	<5								
	12/7/92	11:10	ST	1	100	130.0	7.9	3.6	0.40	1.60	2.40		240	34	<20	<30	23	21	<40	<10	150	
	1/15/93	13:50	ST	8	74	50.0	7.8	1.1	0.14	0.59	1.20		93	15	<7	<10	40	20	10	<4	67	20
	1/16/93	3:50																				
	1/16/93	5:50	ST	8	500	57.0	7.6	1.4	0.18	0.79	1.60		130	21	<7	<10	<30	20	8	<4	86	30
	1/16/93	19:50																				
	1/16/93	21:50	ST	8	210	50.0	7.6	3.4	0.16	0.87	1.70		69	17	<7	<10	<30	15	6	<4	70	60
	1/17/93	10:50																				
	1/17/93	10:50	ST	12	140	63.0	7.7	2.0	0.18	1.30	1.40		120	19	<7	<10	31	18	100	<4	110	37
	1/18/93	8:50																				
	1/18/93	10:50	ST	12	190	48.0	7.6	2.8	0.16	0.89	1.50		84	14	<7	<10	<30	14	7	<4	74	561
	1/19/93	8:50																				

STATION	DATE	TIME	SAMPLES Type	#	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
EGWC05	2/7/93	21:00	ST	5	120	65.0	7.6	1.8	0.22	1.00	1.90		220	33	<20	<30	<20	26	<40	<10	100	35
	2/8/93	5:00																				
	2/8/93	7:00	ST	15	220	55.0	7.7	3.0	0.17	0.92	1.40		130	20	<20	<30	23	24	<40	<10	80	61
	2/9/93	11:00																				
	2/9/93	11:00	ST	12	460	16.0	8.0	6.2	0.15	0.76	1.20		15	7	<7	<10	<30	7	4	<4	28	130
	2/10/93	11:45																				
	2/10/93	14:00	ST	12	540	15.0	8.0	7.5	0.13	0.82	1.20		15	7	<7	<10	<30	6	<3	<4	31	140
	2/11/93	14:45																				
	2/20/93	10:05	ST	12	350	30.0	8.1	4.5	0.11	0.80	1.20		29	16	<7	<10	<30	10	8	<4	45	100
	2/21/93	8:05																				
	2/21/93	10:05	ST	12	550	19.0	8.2	8.7	0.11	0.73	1.00		19	8	<7	<10	<30	6	5	<4	32	154
	2/22/93	8:05																				
	2/22/93	10:05	ST	12	570	15.0	8.2	7.3	0.13	0.67	1.20		25	100	<7	<10	<30	8	10	<4	120	172
	2/23/93	8:05																				
	2/23/93	10:05	ST	10	330	40.0	7.8	4.4	0.14	0.78	1.40		55	14	<7	<10	40	15	10	<4	150	92
	2/24/93	4:05																				
	4/26/93	15:09		23	1700	3.0	8.3	9.7	0.10	0.90	0.20		6	6								
	4/27/93	13:30																				
	5/26/93	13:55		24	1700	5.7	8.4	7.9	0.20	1.80	0.20		36	13								
	5/27/93	12:55																				
	6/23/93	12:23		24	54	0.1	6.6	40.0	0.10	2.20	0.40		<5	<5								
	6/24/93	11:23																				
	7/28/93	10:30		3	1800	0.1	8.2	2.6	0.18	1.40	0.36		38	11								
	7/28/93	13:30																				
	8/25/93	12:00		24	1700	5.6	8.5	0.4	0.10	1.30	0.26		5	6								
	8/26/93	11:00																				
	9/20/93	11:45		24	1500	1.5	8.3	1.5	0.11	0.89	1.20		14	14								
	9/21/93	10:45																				
	10/19/93	9:43		24	1600	42.0	8.3	2.3	0.39	4.10	1.20		72	<5								
	10/20/93	8:45																				
	11/11/93	7:00	ST	8	340	72.0	7.3	8.6	0.42	4.50	3.50		170	29	<5	<10	35	33	<40	<10	220	106
	11/11/93	21:00																				
	11/11/93	23:00	ST	8	470	19.0	7.4	7.3	0.39	2.70	0.92		20	13	<5	<10	<20	8.8	<40	<10	110	126
	11/12/93	13:00																				
	11/12/93	15:00	ST	11	640	8.0	7.9	6.3	0.31	2.30	1.00		8	<5	<5	<10	<20	<2	<40	<10	67	168
	11/13/93	11:00																				
	11/13/93	13:00	ST	12	1000	8.1	8.1	5.0	0.26	2.00	0.83		6	<5	<5	<10	<20	<2	<40	<10	54	270
	11/14/93	11:00																				
	11/14/93	13:00	ST	7	1300	4.8	8.2	5.9	0.11	2.20	0.89		8	8	<5	<10	<20	2	<40	<10	37	405
	11/15/93	1:00																				
	11/30/93	3:00	ST	7	420	60.0	7.5	6.1	0.22	3.50	2.10		100	8	<5	<10	33	23	<40	<10	14	122
	11/30/93	15:00																				
	11/30/93	17:00	ST	9	380	16.0	7.6	3.9	0.10	2.00	1.00		<5	<5	<5	<10	<20	4.2	<40	<10	52	106
	12/1/93	9:00																				
	12/1/93	11:00	ST	12	510	5.1	8.0	3.5	0.10	1.70	0.84		7	9	<5	<10	<20	2.2	<40	<10	45	132
	12/2/93	9:00																				
	12/2/93	11:00	ST	20	1100	5.9	8.3	6.3	0.22	1.50	0.52		9	<5	<5	<10	<20	3.7	<40	<10	25	315
	12/4/93	1:00																				
	12/30/93	10:15		1	1600	5.5	8.2	3.8	0.10	0.82	0.16		10	<5								
	1/31/94	7:30		1	1400	2.9	7.9	9.7	0.40	0.31	0.24		16	5								

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
EGWC05	2/7/94	15:24	ST	1	130	50.0	7.7	3.6	0.45	1.40	1.30		73	6	<5	<10	<20	11	<40	<10	180	32
	2/17/94	5:21	ST	3	280	39.0	8.1	4.4	0.31	2.10	1.30		130	12	<5	14	25	20	<40	<10	120	72
	2/17/94	9:21																				
	2/17/94	11:21	ST	12	230	74.0	8.1	4.2	0.26	1.30	1.80		110	13	<5	22	25	17	<40	<10	110	70
	2/18/94	9:21																				
	2/18/94	11:21	ST	12	330	40.0	7.4	5.5	0.19	1.90	1.10		54	6	<5	17	<20	15	<40	<10	72	96
	2/19/94	9:21																				
	2/19/94	11:21	ST	10	340	19.0	7.6	5.5	0.10	0.98	0.72		19	<5	<5	<10	<20	6.2	<40	<10	45	92
	2/20/94	5:21																				
	2/20/94	7:21	ST	11	180	34.0	7.7	3.3	0.10	0.94	1.20		73	<5	<5	11	<20	13	<40	<10	64	44
	2/21/94	9:21																				
	4/11/94	13:30		24	1200	4.0	8.3	3.7	0.82	1.50	0.66		<5	<5								
	4/12/94	12:30																				
	5/18/94	11:35		9	1200	4.7	8.6	2.7	0.50	1.20	0.43		<5	<5								
	5/18/94	19:35																				
	6/14/94	10:36		24	1500	28.0	8.3	0.3	0.13	1.60	0.27		80	8								
	6/14/94	9:36																				
	7/13/94	10:46		24	1600	34.0	8.6	0.3	0.20	1.60	0.59		58	22								
	7/14/94	9:46																				
	10/4/94	12:30	ST	4	1400	120.0	7.1	4.0	1.50	7.80	3.00		240	12	1.2	<10	39	24	140	1.8	170	344
	10/4/94	16:30																				
	10/4/94	18:30	ST	9	740	94.0	7.1	5.6	2.00	9.70	2.60		220	28	1.2	11	41	32	59	1.7	240	184
	10/5/94	10:30																				
	10/5/94	12:30	ST	11	840	76.0	7.4	5.9	0.94	5.60	1.70		120	15	<1	<10	31	17	76	1.9	160	228
	10/6/94	8:30																				
	10/6/94	12:30	ST	23	910	160.0	7.8	2.6	1.30	47.00	2.60		230	39	<1	<10	66	26	<40	1.1	130	200
	10/8/94	8:30																				
	10/13/94	10:30		24	1200	95.0	8.2	2.6	0.82	3.30	1.90		170	28								
	10/14/94	9:30																				
	11/8/94	4:00	ST	5	1800	60.0	7.9	7.1	0.34	2.10	0.50		84	16	<1	<10	42	11	<40	2.1	120	455
	11/8/94	12:00																				
	11/8/94	14:00	ST	19	1300	58.0	7.5	9.8	1.00	4.90	1.10		67	10	<1	<10	25	8	54	0.58	95	345
	11/10/94	2:00																				
	11/10/94	6:00	ST	1									200		<1	<10	78	66	<40	<0.3	300	165
	11/10/94	22:00	ST	13	580	160.0	6.7	5.4	0.44	5.10	2.90		380	36	1.3	10	100	49	<40	<0.3	260	155
	11/12/94	4:00																				
	3/2/95	20:00	ST	20	670	27.0	7.9	10.0	0.46	2.30	0.91		61	16	<1	<10	23	11	<40	1.2	63	174
	3/4/95	10:00																				
	3/2/95	12:00	ST	4	1900	12.0	8.3	19.0	0.24	2.30	0.41		23	10	<1	<10	20	3.3	<40	<1	44	460
	3/4/95	18:00																				
	3/4/95	12:00	ST	6	660	6.2	7.9	6.4	0.15	1.80	0.82		14	7	<1	<10	32	3.5	<40	1.1	32	170
	3/4/95	22:00																				
	3/5/95	0:00	ST	18	170	37.0	7.4	1.3	0.15	1.10	0.94		67	11	<1	<10	39	15	<40	<1	65	46
	3/6/95	10:00																				
	3/10/95	21:57	ST	3	250	92.0	7.5	3.3	0.10	1.20	1.20		180	31	<1	15	36	24	<40	<1	110	56
	3/11/95	1:57																				
	3/11/95	3:57	ST	15	250	40.0	7.4	3.3	0.11	1.10	1.20		62	16	<1	<10	27	11	<40	<1	70	64
	3/12/95	7:57																				
	3/12/95	9:57	ST	30	870	9.8	8.0	12.0	0.17	0.85	0.77		12	6	<1	<10	16	3.4	<40	<1	27	240
	3/14/95	19:57																				

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
EGWC05	5/8/95	11:10		24	1700	4.1	8.4	5.9	0.19	1.50	0.20		<6	<6								
	5/9/95	10:10																				
	6/7/95	10:27		24	1600	26.0	8.4	6.6	0.11	2.40	0.65		71	34								
	6/8/95	9:27																				
	7/10/95	13:35		24	1600	100.0	8.1	1.3	0.17	5.70	1.90		190	54								
	7/11/95	12:35																				
	8/9/95	10:49		24	1700	94.0	8.5	1.1	0.17	2.90	1.80		160	47								
	8/10/95	9:49																				
	9/5/95	9:29		24	1500	61.0	8.2	0.2	0.19	3.50	1.40		120	36								
	9/6/95	8:29																				
	10/10/95	13:20		24	1600	25.0	8.4	1.8	0.47	3.00	0.48		43	17								
	10/11/95	12:20																				
	11/6/95	13:45		24	1500	66.0	8.4	4.5	0.39	2.80	0.81		130	23								
	11/7/95	12:45																				
	12/6/95	13:19		17	1600	140.0	8.5	8.1	0.25	3.30	1.20		210	53								
	12/7/95	5:19																				
	12/12/95	20:35	ST	5	1200	180.0	7.9	14.0	0.61	8.40	2.40		300	61	<1	10	70	29	<40	<1	310	304
	12/12/95	21:35																				
	12/12/95	23:35	ST	11	460	110.0	7.5	12.0	0.71	5.50	2.60		170	28	<1	12	42	23	<40	<1	200	104
	12/14/95	3:00																				
	12/14/95	9:35	ST	30	780	8.6	8.1	11.0	0.69	2.40	0.77		15	<6	<1	22	25	3	<40	<1	71	296
	12/16/95	19:35																				
	1/10/96	8:47		24	1700	5.3	8.6	14.0	0.10	1.90	0.36		10	<6								
	1/11/96	7:47																				
	1/16/96	17:17	ST	5	1000	78.0	7.6	14.0	0.40	7.50	2.10		210	58	1	<10	59	24	19	3	200	262
	1/16/96	18:17																				
	1/16/96	20:17	ST	10	280	63.0	7.5	7.4	0.74	3.70	1.60		100	27	<1	<10	42	18	15	3	120	88
	1/17/96	14:17																				
	1/17/96	16:17	ST	19	640	61.0	8.1	9.1	0.34	3.60	1.00		110	30	<1	70	37	13	20	<1	98	198
	1/19/96	4:17																				
	1/19/96	6:17	ST	5	450	64.0	7.9	13.0	0.91	4.30	1.10		110	31	<1	<10	40	17	18	<1	130	130
	1/19/96	14:17																				
	1/19/96	16:17	ST	24	490	21.0	7.5	6.4	0.10	1.90	1.20		36	13	<1	<10	28	5	12	<1	60	146
	1/21/96	14:17																				
	1/21/96	16:17	ST	8				2.7	0.78	3.60	3.10				1	16	40	87	<20	<1	330	60
	1/22/96	18:17																				
	3/4/96	12:07	ST	5	1100	66.0	7.2	9.3	0.28	3.30	1.00		76	26	<1	<10	36	10	13	2	130	254
	3/4/96	13:07																				
	3/4/96	15:07	ST	11	120	52.0	8.4	2.0	0.34	1.20	0.87		77	19	<1	<10	34	10	5	<1	100	44
	3/5/96	11:07																				
	3/5/96	13:07	ST	35	400	6.0	8.0	4.9	0.21	1.30	0.64		16	6	<1	<5	17	4	8	<1	50	112
	3/8/96	9:07																				
	3/27/96	9:45			1700	3.2	8.1	12.0	0.13	2.00	0.20		8	<6	<1	<10	5	<2	8	<1	38	770
	4/29/96	13:34		24	1500	4.4	8.1	1.1	0.13	1.70	0.27		30	15								
	4/30/96	12:34																				
	5/28/96	10:30			1600	7.4	8.1	0.7	0.15	2.20	0.32		15	7								
	6/17/96	10:30			1500	6.9	8.1	0.7	0.14	0.50	0.20		20	6								
	7/15/96	10:57		24	1500	33.0	8.2	0.3	<0.1	2.90	0.54		47	20								
	7/16/96	9:57																				

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
EGWC05	8/7/96	10:51		24	1400	27.0	8.4	0.8	0.16	0.60	0.36		73	25								
	8/8/96	9:51																				
	9/4/96	10:44		24	1400	17.0	8.6	<0.2	0.35	2.00	0.48		62	20								
	9/5/96	9:44																				
	10/2/96	15:36		9	1500	6.5	8.4	0.6	0.23	3.00	0.51		56	32								
	10/2/96	23:36																				
	10/30/96	11:45	ST	6	220	130.0	7.1	6.5	0.82	3.00	1.90		150	28	<1	<10	41	22	13	<1	200	45
	10/30/96	21:45																				
	10/31/96	7:45	ST	32	690	92.0	8.0	7.9	2.20	2.60	1.20		94	17	<1	<10	27	8	11	<1	100	216
	11/3/96	9:45																				
	11/14/96	10:50			1500	44.0	8.4	3.9	0.29	1.40	0.38		73	19								
	11/21/96	7:25	ST	5	620	580.0	7.5	12.0	<0.1	5.70	1.80		93	22	<1	<10	52	3	20	<1	150	160
	11/21/96	8:25																				
	11/21/96	10:25	ST	14	200	350.0	7.7	4.0	<0.1	2.80	2.30		310	38	<1	18	53	30	17	<1	190	70
	11/22/96	2:25																				
	11/22/96	4:25	ST	34	670	12.0	8.2	5.9	0.19	1.30	0.82		23	7	<1	<10	21	4	9	<1	120	198
	11/25/96	6:25																				
	12/9/96	12:39	ST	5	900	180.0	7.9	6.9	0.12	2.50	1.10		110	26	<1	<10	32	13	9	<1	120	164
	12/9/96	13:39																				
	12/9/96	15:39	ST	7	150	110.0	7.5	2.3	0.24	1.50	1.30		130	23	<1	<10	30	36	9	<1	130	43
	12/10/96	3:39																				
	12/10/96	5:39	ST	10	300	32.0	7.6	3.5	<0.1	1.20	0.87		61	13	<1	<10	27	7	11	<1	50	88
	12/10/96	23:39																				
	12/11/96	1:39	ST	14	130	34.0	7.3	1.9	<0.1	0.85	1.00		57	13	<1	<10	21	10	<4	<1	51	42
	12/12/96	3:39																				
	12/12/96	5:39	ST	15	490	14.0	7.8	5.5	0.15	1.00	0.72		18	10	<1	<10	15	3	4	<1	120	145
	12/13/96	9:39																				
	12/27/96	10:05	ST	5	1500	32.0	8.2	14.0	0.19	1.70	0.50		31	7	<1	<10	27	5	23	<1	97	470
	12/27/96	11:05																				
	12/27/96	13:05	ST	10	370	37.0	7.7	4.1	0.31	1.50	0.76		65	17	<1	<10	23	12	<4	<1	120	106
	12/28/96	7:05																				
	12/28/96	9:05	ST	37	970	9.5	8.2	7.8	0.12	1.40	0.46		11	<6	<1	<10	16	<2	4	<1	79	384
	12/31/96	9:05																				
	1/21/97	20:03	ST	5	560	90.0	7.9	13.0	0.20	2.20	1.10		190	46	<1	<10	28	11	44	<1	190	144
	1/21/97	21:03																				
	1/21/97	23:03	ST	5	160	43.0	7.6	2.9	0.13	1.30	0.73		48	13	<1	<10	23	6	5	<1	100	52
	1/22/97	7:03																				
	1/22/97	9:03	ST	13	450	23.0	7.8	5.6	<0.1	0.88	0.54		25	7	<1	<10	18	4	11	<1	<10	114
	1/22/97	23:03																				
	1/23/97	1:03	ST	11	200	30.0	7.4	2.4	<0.1	0.76	0.67		39	13	<1	<10	28	7	7	<1	<10	59
	1/23/97	21:03																				
	1/23/97	23:03	ST	20	570	11.0	7.4	6.3	0.28	0.80	0.58		10	9	<1	<10	19	3	<4	<1	120	184
	1/25/97	13:03																				
	1/25/97	15:03	ST	4	280	50.0	7.9	3.2	0.29	0.93	0.73		72	26	<1	<10	33	12	<4	<1	180	94
	1/25/97	21:03																				
	1/26/97	8:40	ST		79	45.0	7.4	1.3	0.22	0.84	1.00		67	18	<1	<10	18	9	8	<1	180	30
	2/24/97	11:55			1800	3.0	8.0	14.0	0.31	1.70	0.79		23	10								
	3/24/97	10:50			1700	3.5	8.1	5.5	<0.5	1.60	0.48		12	8								

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
EGWC05	4/28/97	13:47		24	1700	4.8	8.2	1.8	<0.1	1.40	0.28		10	9								
	4/29/97	12:47																				
	5/29/97	10:30			1500	5.1	8.6	0.9	0.25	1.70	0.23		8	6								
	7/2/97	14:00	DT	24	6000	6.1	8.2	<0.2	<0.1	2.0	<0.2		11	10								
	7/3/97	13:00																				
	8/7/97	13:00	DT	1	1500	8	8.1	1	<0.1	1.7	1		17	<6								
	9/17/97	13:30	DT	1	1600	14	7.9	<0.4	1	7.3	1		27	16								
	9/25/97	9:08	ST	5	360	680	7.5	6.1	1	12.0	5	<0.5	860	180	8	24	110	110	30	1	930	320
	9/25/97	10:08	SF												1	<10	13	4	12	<1	340	
	11/5/97	10:50	DT	1	1600	7.3	7.9	1.1	1	2.1	0	<0.5	<6	<6	1	3.0	5	3.0	6.0	<1	49	
			SF												2	4	4	3	6	<1	49	
	11/10/97	11:45	SF	5				11.0				<0.5			<1	<10	43	7	12	<1	160	420
	11/10/97	12:45																				
	11/10/97	14:45	ST	9	550	100	7.2	11.0	2	7.9	2	<0.5	99	47	<1	<10	50	13	24	<1	380	174
	11/11/97	6:45	SF												<1	<10	28	7	18	<1	220	
	11/11/97	8:45	ST	22	850	40	7.9	5.2	0.90	4.5	1	<0.5	45	13	<1	<10	16	7	10	<1	86	244
	11/13/97	2:45	SF												<1	<10	25	2.0	11	<1	66	
	11/13/97	4:45	ST	15	340	46	7.7	6.4	1	4.0	2	<0.5	230	51	<1	<10	36	25	5.0	<1	210	98
	11/14/97	8:45	SF												<1	<10	19	10	6	<1	100	
	11/26/97	9:18	ST	5	570	390	8.6	5.2	1	7.3	5		880	720	2	<10	50	66	12	<1		140
	11/26/97	10:18	SF												<1	<10	8	<2	<4	<1	39	
	11/26/97	12:18	ST	16	240	68	7.0	5.2	0	2.58	1	1	20	<20	<1	11	29	25	6	<1	150	64
	11/27/97	18:18	SF												<1	<10	15	<2	<4	<1	98	
	11/27/97	20:18	ST	30	910	16	7.6	6.8	0	1.5	0.50	<0.5	17	11	<1	<10	20	4.0	5	<1	52	258
	11/30/97	6:18	SF												<1	<10	17	<2	6	<1	57	
	12/16/97	12:00	DT	1	1500	16	7.9	22.0	0	1.3	1.0		20	<6	<1	<10	7	3	5	<1	46	492
	12/18/97	12:55	ST	5	460	220	7.4	7.9	<0.5	3.6	2	<0.5	460	72	<1	15	48	45	17	<1	270	124
	12/18/97	13:55	SF												<1	<10	16	<2	4	<1	35	
	12/18/97	15:55	ST	9	220	75	7.4	4.3	<0.5	1.6	1	1	93	23	<1	<10	25	15	5	<1	110	60
	12/19/97	7:55	SF												<1	<10	13	<2	<4	<1	20	
	12/19/97	9:55	ST	38	470	38	7.4	8.9	1	1.8	0.90		29	13	<10	<10	23	8	<4	<1	61	148
	12/22/97	11:55	SF												<10	<10	17	<2	<4	<1	91	
	1/3/98	0:54	ST	5	1100	67	7.6	13.0	<0.5	2.9	1	<0.5	78	23	<1	<10	27	14	6	<1	93	280
	1/3/98	1:54	SF												<1	<10	14	<2	<4	<1	30	
	1/3/98	3:54	ST	14	500	50	7.4	9.1	<0.5	1.9	1	<0.5	48	16	<1	<10	27	8	7	<1	130	140
	1/4/98	5:54	SF												<1	<10	23	<2	5	<1	34	
	1/4/98	7:54	ST	33	660	40	7.7	5.7	0	1.5	1	<0.5	46	16	<1	<10	23	7	4	<1	41	200
	1/6/98	23:54	SF												<1	<10	18	<2	5	<1	<10	
	1/9/98	9:44	ST	5	1500	35	8.0	16.0	<0.5	3.0	1	<0.5	64	23	10	<10	34	11	22	<1	140	420
	1/9/98	10:44	SF												<10	<10	21	<2	7	<1	100	
	1/9/98	12:44	ST	13	180	68	7.3	2.6	<0.5	1.8	1.0	0.665	130	28	<1	<10	43	19	16	<1	<10	70
	1/10/98	12:44	SF												<1	<10	71	<10	<20	<1	<10	
	1/10/98	14:44	ST	34	440	26	7.7	1.3	<0.5	1.4	1	<0.5	31	14	<1	<10	20	6	<4	19	110	128
	1/13/98	8:44	SF												<1	<10	18	3.0	<4	<1	140	
	1/29/98	6:23	ST	5	1100	22	7.8	13.0	<0.5	3.0	0.73	<0.5	96	30	<1	<10	34	12	11	<1	64	300
	1/29/98	7:23	SF												<1	<10	24	2	7.0	<1	<10	
	1/29/98	9:23	ST	12	270	38	7.4	3.6	<0.5	1.3	1.0		130	27	<1	<10	36	22	8	<1	110	76
	1/30/98	7:23	SF												<1	<10	22	6	6	<1	19	
	1/30/98	9:23	ST	35	520	17	7.7	8.0	<0.5	1.3	0		24	12	<1	<10	23	6	9	<1	<10	152
	2/2/98	5:23	SF												<1	<10	16	<2	<4	<1	<10	

STATION	DATE	TIME	SAMPLES Type	#	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
EGWC05	2/14/98	8:53	ST	5	910	64	7.7	15.5	<0.5	2.6	1		180	39	<1	7.7	36	19	9	<1.00	87	240
	2/14/98	9:53	SF												<1	4	20	7	5	<1.00	42	
	2/14/98	11:53	ST	8	110	53	7.5	3.1	<0.5	0.88	1		120	19	<1	8	22	18	6	2	58	80
	2/15/98	1:53	SF												<1	2	22	1	7	<1.00	18	
	2/15/98	3:53	ST	21	1100	21	7.8	32.3	<0.5	1.60	11.0		24	9	<1	4	20	4	3	<1.00	30	288
	2/16/98	19:53	SF												<1	2	14	1	8	1	29	
	2/16/98	21:53	ST	14	630	38	7.6	10.6	<0.5	1.40	9		41	14	<1	4	20	9	4	1.10	35	170
	2/18/98	7:53	SF												<1	37	29	1.30	14	<1.00	13	
	5/12/98	14:29	ST	5	1310	12	8.2	22.0	<0.05	2.8	0		60	32	<0.5	6	32	6	<4	<2	57	376
	5/12/98	15:29	SF												<0.5	5	26	<2	<4	<2	32	
	5/12/98	17:29	ST	7	310	62	7.7	2.2	<0.05	1.6	1.35		240	48	1	12	41	46	9	<2	168	50
	5/13/98	11:29	SF												<0.5	5	11	<2	<4	<2	11	
	6/22/98	11:03	DT	24	1620	4.2	8.4	14.0	0.20	1.7	0.21		18	6								
	6/23/98	10:03																				
	7/15/98	9:30	D	6	1220	18	8.4	6.6	0.13		<0.061											
	7/15/98	15:30																				
	8/4/98	8:40	D	24	1640	6.7	7.9	4.1	<0.05	3.50	0.15		15	17								
	8/5/98	7:40																				
	9/8/98	11:30	D	24	1650	8.8	8.1	3.4	0.10	2.63	0.12		54	19								
	9/9/98	10:30																				
	10/20/98	10:20	D	24	1640	7.4	8.3	5.7	0.18	1.88	0.12		210	8								
	10/21/98	9:20																				
	11/2/98	9:50	D	24	1690	6.1	8.3	6.7	0.16	1.46	0.28		32	18								
	11/3/98	8:50																				
	11/8/98	3:00	ST	5	1400	22.0	7.9	11.0	0.39	4.38	0.89		120	80	<1	11	34	8	9	<2	176	385
	11/8/98	4:00	SF												<1	<8	19	<2	8	<2	105	
	11/8/98	6:00	ST	2	255	105	7.7	4.8	0.51	6.90	6.12		540	240	2	24	85	92	19	<2	436	65
	11/8/98	8:00	SF												<1	<8	7	<2	6	<2	29	
	11/9/98	8:36	ST	36	695	12	7.7	9.7	0.39	43	0.70		40	18	<1	9	21	8	6	<2	92	
	11/12/98	6:36	SF												<1	<8	13	4	5	<2	60	
	12/8/98	9:15	D	24	1080	22	8.0	10.5	0.09	0.76	0.52		40	10								
	12/9/98	8:15																				
	1/4/99	9:31	D	24	1670	9.4	8.2	14.0	<0.05	1.43	0.15		56	24								
	1/5/99	9:31																				
	2/2/99	13:12	D	24	650	6.4	8.0	7.5	0.06	0.61	0.31		24	7								
	2/3/99	12:12																				
	3/1/99	10:20	D	24	1610	3.8	8.3	7.4	<0.05	0.93	0.12		10	8								
	3/2/99	9:20																				
	3/11/99	10:41	ST	5	1180	11	8.1	9.6	0.08	1.80	1.53		26	24	<1	<8	28	6	6	<2	88	365
	3/11/99	11:41	SF												<1	<8	22	<2	5	<2	57	
	3/11/99	13:41	ST	10	685	10	7.8	12.8	0.49	1.93	0.12		22	12	<1	<8	32	4	9	<2	67	240
	3/12/99	7:41	SF												<1	<8	23	<2	9	<2	52	
	3/12/99	9:41	ST	33	1190	3	8.2	5.5	<0.05	1.51	0.09		10	4	<1	<8	22	<2	6	<2	38	340
	3/15/99	6:11	SF												<1	<8	20	<2	7	<2	30	
	3/15/99	10:09	ST	5	205	35	7.5	4.8	0.47	4.31	0.98		390	140	1	18	85	60	13	<2	368	112
	3/15/99	11:09	SF												<1	<8	7	<2	<4	<2	20	
	3/15/99	13:09	ST	4	155	18	7.5	4.3	0.45	1.84	0.58		56	26	<1	<8	24	11	5	<2	77	86
	3/15/99	19:09	SF												<1	<8	13	<2	4	<2	28	
	3/15/99	21:09	ST	43	785	4.4	8.2	7.2	0.13	1.30	0.31		17	7	<1	<8	21	3	8	<2	36	260
	3/19/99	9:47	SF												<1	<8	18	<2	5	<2	27	

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
EGWC05	3/20/99	7:06	ST	5	1250	4.6	7.9	8.0	<0.05	1.60	0.18		4	<1	<1	<8	32	4	5	<2	60	366
	3/20/99	8:06	SF												1	<8	29	3	7	<2	55	
	3/20/99	10:06	ST	10	735	5.9	7.7	8.2	0.24	2.23	0.40		20	10	<1	<8	28	3	6	<2	55	242
	3/21/99	4:06	SF												<1	<8	22	<2	8	<2	39	
	3/21/99	6:06	ST	38	1190	6.7	8.3	4.2	0.06	1.47	0.18		10	6	<1	<8	33	2	6	<2	38	340
	3/24/99	8:06	SF												<1	<8	22	<2	6	<2	24	
	3/25/99	11:33	ST	5	955	23.0	7.8	4.7	<0.05	2.40	0.52		78	30	<1	<8	27	10	8	<2	105	316
	3/25/99	12:33	SF												<1	<8	17	<2	5	<2	36	
	3/25/99	14:33	ST	9	215	19.0	7.5	3.3	0.20	1.60	0.80		76	28	<1	<8	27	12	5	<2	87	72
	3/26/99	6:33	SF												<1	<8	15	<2	<4	<2	28	
	3/26/99	8:33	ST	38	730	3.5	8.1	4.4	0.08	1.29	0.25		11	8	<1	<8	19	2	<4	<2	31	186
	3/29/99	10:33	SF												<1	<8	16	<2	<4	<2	21	
	4/27/99	8:31	D	24	1530	02	8.4	2.9	0.05	0.80	<0.061		4	2								
	4/28/99	7:31																				
	5/4/99	7:51	D	24	1160	5	8.3	9.4	<0.05	1.17	<0.061		14	10								
	5/5/99	6:51																				
	6/7/99	9:15	D	1																		
	7/14/99	8:40	DT	24	1370	4.5	8.4	<0.44	0.13	1.69	0.67		59	48								
	7/15/99	7:40																				
	11/8/99	11:10	ST	5	860	110.0	7.3	29.0	2.70	11.00	2.36		360	220	<1	9	64	20	31	<2	346	212
	11/8/99	12:10	SF												<1	<8	26	4	30	<2	203	
	11/8/99	14:10	ST	6	950	40.0	7.3	25.5	1.72	13.00	1.32		180	80	<1	<8	51	8	31	<2	245	292
	11/9/99	0:10	SF												<1	<8	31	3	28	<2	185	
	1/25/00	9:45	ST	1											2	25	107	69	32	<2	481	120
	1/25/00	9:45	SF												<1	<8	20	6	13	<2	60	84

HUNTINGTON WATERSHED

STATION	DATE	TIME	SAMPLING Type	#	SC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
SUNC07	2/7/94	15:45	ST	1	1200	150	7.5	6.3	0.6	2.1	1.3		220	41	<5	<10	<20	20	<40	<10	520	126

STATION	DATE	TIME	SAMPLES Type	#	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd ug/L	Cr ug/L	Cu ug/L	Pb ug/L	Ni ug/L	Ag ug/L	Zn ug/L	Hardness mg/L
ACJ01	8/27/91	12:00	D	27	3500	0.9	8.2	0.2	<0.1	0.5	0.5		<5	<5								
	8/28/91	14:00																				
	9/24/91	10:15	D	25	38000	0.9	8.1	0.4	<0.1	<0.1	0.9		34	16								
	9/25/91	10:15																				
	10/22/91	12:45	D	24	8600	5.6	8.2	9.9	0.2	2	1.3		63	20								
	10/23/91	11:45																				
	11/12/91	11:20	D	25	18000	0.9	8.1	2.1	<0.1	<0.5	0.22		8	5								
	11/13/91	11:20																				
	12/11/91	13:50	D	19	9100	4.0	8.1	5.4	0.1	<0.5	0.6		7	<5								
	12/12/91	7:50																				
	3/20/92	16:20	ST	3	1900	1700.0	7.7	2.1	0.2	0.9	10		3000	310	<20	<30	30	8	70	<10	160	618
	3/20/92	17:40																				
	3/21/92	16:53	ST	5	1000	1800.0	7.7	3.6	<0.1	0.9	6.2		2600	280	<20	<30	<20	<2	<40	<10	50	326
	3/21/92	20:34																				
	6/17/92	13:15	DT	13	3400	9.0	8.3	1.4	<0.1	0.9	0.2		23	7	<20	<30	<20	<2	<40	<10	<10	
	6/18/92	12:15																				
	8/31/92	10:45	D	1	3600	10.0	8.2	1.2	<0.1	0.4	0.7		57	10								
	9/30/92	10:45	D	1	3600	2.2	8.3	0.2	<0.1	0.6	0.9		9	7								
	10/29/92	15:10	D	1	2500	65.0	8.6	4.1	<0.1	1.1	1		110	<5								
	11/25/92	14:30	D	1	4300	3.6	8.5	2.4	<0.1	0.7	0.5		13	6								
	6/29/93	14:00	D	24	3500	2.9	8.4	1.7	<0.1	0.7	0.2		8	7								
	6/30/93	13:00																				
	7/21/93	15:45	D	1	3400	12.0	8.2	3.4	<0.1	0.88	0.51		27	11								
	8/9/93	15:41	D	24	3300	20.0	8.2	2.2	<0.1	0.58	<0.1		43	9								
	8/10/93	14:41																				
	9/7/93	13:10	D	24	3500	9.1	8.3	1.1	<0.1	0.69	0.43		16	11								
	9/8/93	12:10																				
	10/5/93	13:30	D	24	3400	4.9	8.6	1.4	<0.1	0.52	0.44		16	12								
	10/6/93	12:30																				
	11/4/93	11:20	D	1	3500	4.4	8.4	4.8	<0.1	0.69	1.4		<5	<5								
	12/29/94	14:55	D	1	3200	3.0	8.4	3.9	<0.1	0.55	0.21		17	<5								
	1/12/94	12:49	D	24	3300	2.4	8.3	7.8	0.14	0.98	0.23		14	5								
	1/13/94	11:49																				
	2/7/94	3:30	ST	3	1600	94.0	8.3	5.3	0.63	1.8	0.94		270	27	<5	<10	<20	3.7	<40	<10	25	476
	2/7/94	7:30																				
	2/8/94	13:30	ST	3	1600	180.0	8.1	4.4	0.16	2	2.4		380	7	<5	<10	<20	<2	<40	<10	38	456
	2/8/94	17:30																				
	4/24/94	4:00	ST	4	2100	80.0	7.9	8.0	0.29	3	1.7		150	15	8.2	13	26	<2	<40	<10	70	616
	4/24/94	10:00																				
	4/24/94	12:00	ST	11	2800	7.8	8.2	6.0	<0.1	1.5	1.2		11	5	<5	<10	<20	<2	<40	<10	30	836
	4/25/94	8:00																				
	4/25/94	10:00	ST	5	2500	70.0	8.4	530.0	<0.1	2	1.8		160	16	<5	<10	24	2.2	<40	<10	47	744
	4/25/94	18:00																				
	4/26/94	14:00	ST	10	1300	120.0	8.1	3.0	<0.1	1.7	2.2		250	18	<5	10	34	5.8	<40	<10	66	344
	4/27/94	8:00																				
	4/27/94	10:00	ST	9	2200	30.0	8.3	4.1	<0.1	0.99	2.8		50	19	<5	<10	<20	<2	<40	<10	24	618
	4/28/94	2:00																				
	5/3/94	13:27	DT	24	3400	2.9	8.2	6.2	<0.1	1.1	1.6		22	<5								
	5/4/94	12:27																				

STATION	DATE	TIME	SAMPLES Type	#	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd ug/L	Cr ug/L	Cu ug/L	Pb ug/L	Ni ug/L	Ag ug/L	Zn ug/L	Hardness mg/L
ACJ01	5/6/94	22:00	ST	8	2100	28.0	7.9	4.4	0.11	1.3	1.4		73	<5	3.2	<10	19	<2	<40	0.7	33	635
	5/7/94	12:00																				
	5/7/94	14:00	ST	10	2900	15.0	8.2	4.0	<0.1	0.92	1.9		6.5	9	3.5	<10	11	<2	<40	0.4	18	
	5/8/94	8:00																				
	5/8/94	10:00	ST	12	3400	2.0	8.2	3.6	<0.1	0.86	0.96		<5	<5	3.8	<10	9.6	<2	<40	0.8	<10	1036
	5/9/94	8:00																				
	5/9/94	10:00	ST	12	3600	2.3	8.2	3.9	<0.1	0.88	0.9		11	7	4	<10	10	<2	<40	0.8	12	1025
	5/10/94	8:00																				
	5/10/94	10:00	ST	6	3500	1.1	8.5	3.3	<0.1	1.2	0.86		<5	<5	2.6	<10	11	<2	<40	<0.3	<10	1016
	5/10/94	20:00																				
	5/25/94	1:15	DT	24	3600	2.2	8.4	4.8	<0.1	0.84	0.67		15	6								
	5/26/94	12:15																				
	6/23/94	11:45	DT	1	4300	1.9	8.7	2.0	0.11	0.61	0.64		14	<5								
	7/19/94	9:48	DT	24	3400	1.5	8.4	2.2	0.3	0.49	0.67		6	6	2.5	<6	23	<3	10	0.45	18	
	7/20/94	8:48																				
	10/26/94	9:22	DT	24	11000	2.1	8.4	2.0	0.36	1.5	0.22		39	25	<1	<10	23	<2	<40	<0.3	28	1005
	10/27/94	8:22																				
	11/7/94	8:37	DT	24	3800	1.8	8.3	3.2	<0.2	1.3	0.6		26	<5	2.1	<10	31	3.8	<40	<0.3	32	
	11/8/94	7:37																				
	5/25/95	10:15	DT	1	3000	2.5	8.4	4.6	0.22	0.59	0.28		10	7	4.2	<10	38	3	<40	2	50	1110
	5/25/95	10:20																				
	6/21/95	10:34	D	24	3100	3.0	8.1	2.3	<0.1	0.62	0.33		<6	<6								
	6/22/95	9:34																				
	7/25/95	10:30	D	8	3200	24.0	8.4	0.3	0.26	1.30	<0.20		51	18								
	7/26/95	9:30																				
	8/28/95	9:22	D	24	3300	2.7	8.4	1.5	0.26	0.79	0.52		9	<6								
	8/29/95	8:22																				
	9/11/95	11:45	D	24	3200	3.3	8.4	1.7	0.10	1.40	0.45		12	8								
	9/12/95	10:45																				
	10/18/95	9:48	D	24	3500	10.0	8.3	2.7	<0.10	0.98	0.84		7	6								
	10/19/95	8:48																				
	11/20/95	10:26	D	24	3400	22.0	8.3	5.2	0.27	1.50	0.90		<6	<6								
	11/21/95	9:26																				
	12/13/95	0:00	ST	3	2000	190.0	7.7	18.0	1.80	7.60	3.40		320	49	10	14	46	<10	59	<1	120	602
	12/13/95	4:00																				
	12/13/95	6:00	ST	11	1500	170.0	7.7	6.3	0.84	3.60	3.10		280	42	5	22	42	<10	42	<1	120	474
	12/14/95	2:00																				
	12/14/95	12:18	ST	29	3100	14.0	8.3	5.3	0.39	1.60	0.86		26	<6	2	<10	14	<2	<40	<1	25	1055
	12/16/95	22:00																				
	12/20/95	8:30	D	1	3700	5.8	8.0	7.0	0.29	1.30	0.57		7	10								
	1/31/96	4:00	ST	3	2400	86.0	8.0	6.9	0.30	4.60	1.30		130	25	8	12	27	4	47	<1	67	804
	1/31/96	6:00																				
	1/31/96	7:00	ST	7	940	190.0	7.9	6.8	<0.10	3.90	1.60		200	36	3	26	31	9	20	1	65	276
	1/31/96	15:00																				
	2/15/96	11:15	DT	1	3400	1.6	8.1	4.8	0.36	0.60	0.33		22	7	4	11	3	<2	48	2	27	1280
	3/27/96	13:45	DT	1	3300	2.2	8.4	5.7	<0.10	1.00	<0.20		10	<6	6	<10	3	<2	58	<1	24	1240
	4/16/96	10:11	ST	24	3000	15.0	8.2	0.2	0.12	1.40	0.28		18	10	3	<10	29	<2	25	<1	48	1018
	4/17/96	9:11																				
	4/18/96	1:30	ST	2	2000	52.0	7.8	0.5	0.40	3.00	1.20		120	24	7	<10	19	2	39	<1	60	708
	4/18/96	3:30																				
	4/18/96	9:30	ST	4	1300	100.0	7.9	0.2	0.24	2.10	3.30		230	40	6	14	42	6	28	<1	98	410
	4/18/96	13:30																				
	4/18/96	19:30	ST	37	2500	4.1	8.1	0.2	<0.10	1.20	0.62		15	7	2	<10	11	<2	27	<1	23	900
	4/21/96	21:30																				
	5/28/96	14:00	DT	1	2900	1.6	8.3	0.5	<0.10	1.00	0.49		19	6	2	<10	<2	<2	25	<1	<10	
	6/19/96	11:00	DT	1	2800	4.9	8.2	2.2	0.16	0.80	0.39		51	37	1	<10	3	<2	25	<1	<10	1120
	7/24/96	12:20	DT	24	2900	9.1	8.3	0.2	<0.1	1.10	0.54		17	11	2	<10	31	<2	27	<1	62	1018
	7/25/96	11:20																				
	8/27/96	12:00	DT	23	2900	5.7	8.1	3.6	0.22	1.30	0.85		16	10	2	<10	23	<2	30	<1	41	1142
	8/28/96	10:00																				

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd ug/L	Cr ug/L	Cu ug/L	Pb ug/L	Ni ug/L	Ag ug/L	Zn ug/L	Hardness mg/L
ACJ01	9/24/96	10:45	DT	23	3100	7.7	8.0	4.1	<0.1	0.93	<0.2		15	9	2	<10	14	<2	22	<1	32	1146
	9/25/96	8:45																				
	11/6/96	15:50	DT	1	3100	3.0	8.1	5.8	0.20	1.10	0.86		10	<6								
	11/21/96	12:58	ST	5	2000	60.0	7.5	15.0	0.82	4.10	1.70		130	20	3	11	27	2	51	<1	71	760
	11/21/96	13:58	SF												6	<10	14	<2	39	<1	17	
	12/4/96	15:35	DT	1	2900	6.5	8.2	5.8	0.33	0.85	0.63		14	<6	6	<10	<4	<2	53	<1	26	1222
	1/29/97	11:45	DT	1	2300	9.6	7.9	5.7	0.33	0.93	0.63		22	13	6	<10	4	<2	50	<1	52	980
	2/26/97	14:05	DT	1	3400	2.7	8.2	5.7	<0.1	1.10	0.32		11	<6	7	<10	7	<2	45	<1	17	1230
	3/18/97	14:45	DT	24	3200	5.9	8.2	5.3	<0.5	1.40	0.45		14	8	5	<10	6	<4	38	<1	150	1170
	3/19/97	13:45																				
	4/8/97	11:45	DT	24	3300	6.0	8.1	3.4	<0.5	1.30	0.43		12	<6	2	<10	16	<2	23	<1	<10	1086
	4/9/97	10:45																				
	5/6/97	14:00	DT	22	3300	7.2	8.3	2.8	<0.1	1.60	0.52		20	9	8	<10	59	2	28	1	190	1054
	5/7/97	11:00																				
	6/5/97	10:40	D	1	3300	1.2	7.7	2.7	0.56	0.85	0.55		6	6								
	7/2/97	10:50	D	1	3500	1.1	7.9	2	<0.1	1.1	0.42		10	7								
	8/7/97	10:10	D	1	3400	1.7	7.6	2	<0.1	1.1	0.73		7	8								
	9/17/97	11:00	D	1	3200	2.1	7.5	5	0	1.8	0.93		6	6								
	10/9/97	15:00	D	1	3400	2.0	8.2	7	<0.1	1.2	0.83		13	<6								
	6/19/98	13:40	D	1	3250	7.6	8.0	6.0	0	1.4	0.61		28	7.0								
	7/20/98	12:00	D	1																		
	8/11/98	11:23	D	1																		
	9/2/98	8:37	D	1	3220	0.3	7.8	4.2	0.17	1.30	0		13	05								
	10/1/98	8:35	D	1	3060	4.3	7.6	5.2	0.10	1.35	<0.061		19	6								
	11/8/98	4:59	ST	5											8	22	20	4	41	<2	153	880
	11/8/98	5:59	SF												<1	<8	7	<2	20	<2	36	
	11/8/98	7:59	ST	4											8	25	35	15	31	<2	209	285
	11/8/98	13:59	SF												3	12	16	5	18	<2	93	
	12/7/98	10:15	D	1	2250	9.4	7.9	5.3	0.06	1.11	0.67		26	9								
	1/13/99	10:45	D	1	3260	1.8	7.9	7.3	0.18	0.71	0.34		9	6								
	1/25/99	4:50	ST	10	2550	75.0	8.1	6.6	0.11	2.56	1.53		270	100	8	15	30	4	43	<2	86	940
	1/25/99	5:44	SF												2	<8	14	<2	24	<2	17	
	1/25/99	7:44	ST	13	1350	40.0	7.9	4.3	0.14	1.59	1.01		150	60	3	9	27	4	21	<2	71	480
	1/26/99	7:44	SF												1	<8	13	<2	13	<2	15	
	1/26/99	9:44	ST	15	1020	230.0	7.9	3.9	0.15	2.20	2.51		570	110	5	23	35	10	28	<2	116	280
	1/27/99	13:44	SF												<1	<8	9	<2	9	<2	<10	
	1/27/99	15:44	ST	13	2230	12.0	7.8	5.2	0.12	0.94	0.64		30	16	3	<8	17	<2	27	<2	32	720
	1/29/99	4:18	SF												2	<8	12	<2	25	<2	18	
	2/8/99	9:46	D	1	3200	2.6	8.0	6.6	0.10	1.18	0.46		22	10								
	2/9/99	18:18	ST	4	2520	36.0	8.3	7.0	0.10	1.66	1.07		110	18	5	11	24	3	42	<2	55	882
	2/9/99	19:18	SF												3	<8	14	<2	32	<2	16	
	2/9/99	21:18	ST	7	1040	72.0	8.1	4.4	0.13	1.92	1.01		170	36	2	9	31	5	17	<2	65	312
	2/10/99	9:18	SF												<1	<8	13	<2	12	<2	12	
	2/10/99	11:18	ST	18	2410	8.4	8.1	5.9	<0.05	0.68	0.46		40	12	3	<8	29	<2	33	<2	38	738
	2/12/99	21:18	SF												3	<8	23	<2	32	<2	49	
	3/1/99	10:24	D	1	3140	1.8	8.0	5.6	0.10	0.76	0.34		12	10								
	3/11/99		ST	1	2630	21.0	8.3	6.1	0.13	0.95	0.40		64	20	4	<8	27	<2	35	<2	40	970
	3/11/99		SF												3	<8	19	<2	28	<2	22	
	3/25/99	13:27	ST	5	1840	136.0	7.8	159.0	0.17	3.14	2.69		380	40	11	32	47	8	58	<2	166	786
	3/25/99	14:27	SF												1	<8	11	<2	23	<2	12	
	3/25/99	16:27	ST	8	1210	72.0	7.8	3.3	0.14	0.98	1.38		130	26	2	<8	27	5	15	<2	60	346
	3/26/99	6:27	SF												<1	<8	15	<2	9	<2	14	
	3/26/99	8:27	ST	39	2540	2.5	8.2	4.7	<0.05	0.55	0.43		11	6	2	<8	12	<2	22	<2	31	824
	3/29/99	12:27	SF												2	<8	11	<2	22	<2	14	
	4/29/99	8:30	D	1	3080	02	8.0	4.7	<0.05	1.02	0.36		11	7								
	5/20/99	10:25	DT	1	3150	2.2	8.0	5.8	0	0.74	0.49		56	20	4	<8	6	<2	24	<2	16	
	5/20/99	10:25	DF												4	8	6	<2	22	<2	14	
	6/9/99	9:52	D	1	2880	2.0	8.1	3.6	0	0.69	0.49		7	4								
	7/12/99	9:30	DT	1	2820	2.5	8.0	4.8	0	0.73	0.61		11	<1								
	8/17/99	12:15	DT	1	3150	3.1	8.2	5.2	0	0.67	0.67		12	9								

SOUTH COUNTY WATERSHED

006600

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd ug/L	Cr ug/L	Cu ug/L	Pb ug/L	Ni ug/L	Ag ug/L	Zn ug/L	Hardness mg/L
ACJ01	10/27/99	11:22	DT	24	3320	3.3	8.2	5.5	<0.05	0.35	0.55		19	5								
	10/27/99	10:22																				
	12/16/99	13:10	DT	24	3320	4.8	8.2	6.2	0.08	0.65	0.37		16	9								
	12/17/99	12:10																				
	1/7/00	12:19	DT	24	3210	6.9	8.2	9.3	1.34	1.90	1.22		15	10								
	1/8/00	11:19																				
	2/29/00	9:11	DT	24	2120	14.0	8.2	5.1	0.12	0.55	0.61		30	15								
	3/2/00	7:11																				
	3/3/00	20:08	ST	5	2540	110.0	8.3	6.2	0.16	1.30	1.93		200	110								
	3/3/00	21:08																				
	3/3/00	23:08	ST	6											2	9	18	7	16	<2	81	
	3/4/00	9:08	SF												<1	<8	6	<2	8	<2	27	
	3/4/00	11:08	ST	9	1220	45.0	7.9	6.1	0.15	1.20	0.95		110	70	2	<8	13	2	18	<2	37	280
	3/5/00	3:08	SF												1	<8	9	<2	16	<2	19	
	3/6/00	10:08	S	22	1510	34.0	8.1	5.2	0.15	1.10	0.89	0.21	53	37								
	3/8/00	4:08																				
	3/8/00	6:08	ST	21	1660	50.0	8.2	4.9	0.14	1.00	0.98	0.27	90	74	3	<8	13	<2	25	<2	29	540
	3/10/00	8:08	SF												2	<8	11	<2	23	<2	17	
	3/23/00	15:28	D	24	3070	4.4	8.3	4.2	<0.05	0.85	0.46		41	34								
	3/24/00	14:16																				
	4/6/00	15:01	D	24	2920	3.2	8.3	5.1	0.12	0.70	0.52		17	8								
	4/7/00	13:40																				
	4/17/00	15:12	ST	5											13	30	54	9	78	<2	170	428
	4/17/00	16:12	SF												<1	<8	25	<2	32	<2	25	
	4/17/00	18:12	ST	3																		
	4/17/00	22:12	SF												<1	<8	17	3	12	<2	38	368
	4/18/00	0:12	ST	3																		
	4/18/00	4:12	SF												<1	<8	12	<2	13	<2	19	252
	4/18/00	6:12	ST	11	1160	252.0	7.9	3.8	0.06	1.40	2.60		690	460	3	11	30	12	25	<2	96	
	4/19/00	2:12	SF									0.21			<1	<8	9	<2	9	<2	<1	688
	4/19/00	4:12	ST	30											2	<8	13	<2	23	<2	14	
	4/21/00	14:12	SF									0.19			2	<8	11	<2	21	<2	<10	464
	5/30/00	14:35	D	24	2820	1.8	8.3	3.5	<0.05	0.59	0.49		10	3								
	5/31/00	13:35																				
	6/29/00	13:45	D	24	2510	7.3	8.3	1.9	<0.05	0.65	0.52		62	22								
	6/30/00	12:45																				

SOUTH[illegible]NTY WATERSHED - STORM AND DRY WEATHER MONITORING

STATION	DATE	TIME	SAMPLES Type	#	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd ug/L	Cr ug/L	Cu ug/L	Pb ug/L	Ni ug/L	Ag ug/L	Zn ug/L	Hardness mg/L
LCWI02	3/2/92	11:00	ST	4	830		7.7		0.1		1.5		820		<2		29		40	<2		240
	3/2/92	14:00																				
	3/2/92	15:00	ST	10	480		7.7		0.2		65		1600		2		47		60	<2		144
	3/2/92	0:00																				
	3/2/92	1:00	ST	10	330		7.8		0.2		1.9		740		<2		20		30	<2		106
	3/3/92	10:00																				
	3/20/92	13:51	ST	6	420		7.6		0.3		3		510		<20		<20		<40	<10		148
	3/21/92	7:51																				
	3/21/92	10:51	ST	13	660		7.7		0.1		1.8		490		<20		<20		<40	<10		204
	3/24/92	10:51																				
	1/6/93	8:12	ST	10	310		7.8		<0.1		4.4		1400		<20		<20		<40	<10		86
	1/6/93	19:12																				
	1/6/93	22:12	ST	7	420		7.9		0.1		2.9		840		<20		<20		<40	<10		110
	1/7/93	22:12																				
	1/8/93	4:12	ST	3	790		8.1		<0.1		1.8		200		<20		<20		<40	<10		200
	1/8/93	13:30																				
	1/8/93	13:14	ST	12	940		8.4		0.1		1.4		110		<20		<20		<40	130		252
	1/9/93	11:41																				
	1/9/93	13:41	ST	12	1100		8.5		<0.1		1.3		50		<20		<20		<40	<10		300
	1/10/93	11:41																				
	1/15/93	11:05	ST	11	370		8		0.2		5.2		1800		<7		<30		63	<4		142
	1/16/93	13:05																				
	1/16/93	15:05	ST	10	350		8		0.2		5.4		1500		<7		<30		57	<4		142
	1/17/93	9:05																				
	1/17/93	12:07	ST	12	430		8		0.2		3.5		1100		<7		<30		50	<4		126
	1/18/93	10:07																				
	1/18/93	12:07	ST	10	430		8		0.2		3.7		710		<7		<30		48	<4		118
	1/19/93	10:07																				
	2/7/93	21:00	ST	9	430		7.8		0.2		8		3000		<20		<20		<40	<10		160
	2/8/93	15:00																				
	2/8/93	17:00	ST	10	370		8		0.2		3.8		960		<20		<20		<40	<10		115
	2/9/93	11:00																				
	2/9/93	13:00	ST	8	610		8		0.1		1.8		120		<7		33		8	<4		184
	2/10/93	3:00																				
	2/10/93	5:00	ST	7	840		8.2		0.2		1.3		42		<7		33		5	<4		250
	2/10/93	17:00																				
	11/11/93	3:13	ST	3	1300		7.7		0.56		12		2400		<5		<20		<40	<10		346
	11/11/93	16:08																				
	11/12/93	16:10	ST	1	1500		8.1								<5		60		<40	<10		440
	11/12/93	14:30	ST	10	1700		8.2		0.12		2.5		42		<5		<20		<40	<10		470
	11/13/93	10:30																				
	11/13/93	12:30	ST	9	1800		8.3		0.14		3.8		470		<5		<20		<40	<10		508
	11/14/93	6:30																				
	11/14/93	14:30	ST	1	1900		7.6								<5		<20		<40	<10		830
	11/14/93	14:30	ST	7	1900		8.3		0.15		6.4		820		<5		<20		<40	<10		632
	11/15/93	2:30																				
	11/15/93	0:00	ST	1	2000		8.2						200		<5		<20		<40	<10		660
	1/24/94	20:53	ST	1					1.4		7.2				<5		<20		<40	<10		380
	1/25/94	4:53	ST	3	800		8		0.47		6.6		840		<5		<20		<40	<10		202
	1/25/94	8:53																				
	1/25/94	10:53	ST	9	1300		8.2		0.13		1.5		59		<5		<20		<40	<10		560
	1/26/94	2:53	SF												<5		<20		<40	<10		
	1/26/94	13:00	ST	9	1600		8.3		<0.1		1.1		10		<5		<20		<40	<10		440
	1/27/94	5:00																				
	1/28/94	12:36	ST	5	1600		8.3		0.33		2.6		410		<5		<20		<40	<10		490
	1/28/94	20:36																				
	2/7/94	13:18	ST	3	480		7.9		0.13		8.4		1300		<5		<20		<40	<10		132
	2/7/94	17:18																				
	2/7/94	19:18	ST	8	640		7.9		0.21		9.8		1600		<5		<20		<40	<10		185
	2/8/94	11:18																				

SOUTH COUNTY WATERSHED - STORM AND DRY WEATHER MONITORING

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd ug/L	Cr ug/L	Cu ug/L	Pb ug/L	Ni ug/L	Ag ug/L	Zn ug/L	Hardness mg/L
LCWI02	2/9/94	13:01	ST	12	1400		8.4		<0.1		1.2		29		<5		<20		<40	<10		456
	2/10/94	11:01																				
	2/10/94	13:01	ST	12	1500		8.4		<0.1		1.1		13		<5		<20		<40	<10		452
	2/11/94	11:02																				
	2/17/94	5:49	ST	3	600		8		0.19		6.2		1100		<5		69		74	<10		172
	2/17/94	9:49	SF												<5		<20		<40	<10		
	2/17/94	11:49	ST	12	620		8		0.4		8.1		1300		<5		52		60	<10		182
	2/18/94	7:49	SF												<5		<20		<40	<10		
	2/18/94	9:49	ST	13	1000		8		0.18		2.1		140		<5		<20		<40	<10		340
	2/19/94	9:49	SF												<5		<20		<40	<10		
	2/19/94	11:49	ST	7	1400		8.4		<0.1		0.95		27		<5		<20		<40	<10		368
	2/20/94	5:49	SF												<5		<20		<40	<10		
	2/20/94	7:49	ST	7	440		8.2		0.34		8.6		1700		9		37		<40	<10		105
	2/20/94	23:49	SF												<5		<20		<40	<10		
	3/18/94	23:15	ST	1					0.59		4.8				<5		59		<40	18		560
	3/19/94	1:15	ST	5	440		7.9		0.52		8.2		2500		<5		62		67	<10		150
	3/19/94	9:15																				
	3/20/94	9:35	ST	4	830		8.4		<0.1		1.6		205		<5		<20		<40	<10		224
	3/20/94	11:35																				
	3/24/94	19:43	ST	10	660		8.1		0.42		4.4		2000		<5		39		46	<10		180
	3/25/94	13:43																				
	3/25/94	15:43	ST	10	700		8.1		0.14		5.6		250		<5		<20		<40	<10		175
	3/26/94	9:43																				
	3/26/94	11:43	ST	12	1100		8.6		<0.1		1.6		24		<5		<20		<40	<10		296
	3/27/94	9:43																				
	3/27/94	11:43	ST	12	1500		8.5		<0.1		2		<5		<5		<20		<40	<10		402
	3/28/94	9:43																				
	3/10/95	22:30	ST	2	530		7.7		0.12		21		10000		5.9		110		120	<1		180
	3/11/95	0:30																				
	3/11/95	8:30	ST	11	550		7.9		0.12		4.7		1000		<1		34		<40	<1		144
	3/12/95	9:30																				
	3/12/95	11:26	ST	11	960		8.2		0.15		2.2		320		<1		19		<40	<1		262
	3/13/95	13:26																				
	12/12/95	21:41	ST	5	970		7.4		2.00		21.00		2400		9		290		75	2		195
	12/12/95	22:41																				
	12/13/95	0:41	ST	14	1100		7.8		0.35		3.80		310		<1		43		<40	<1		312
	12/14/95	2:41																				
	12/14/95	10:41	ST	30	1700		8.6		0.31		0.64		10		<1		24		<40	<1		500
	12/16/95	20:41																				

STATION	DATE	TIME	SAMPLES Type	#	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd ug/L	Cr ug/L	Cu ug/L	Pb ug/L	Ni ug/L	Ag ug/L	Zn ug/L	Hardness mg/L
OSOL03	8/27/91	11:15		26	3400	3	8.1	<0.2	<0.1	0.7	1.2		11	<5								
	8/28/91	12:15																				
	12/12/91	13:45			9800	8	8.1	5.1	0.4	1.7	1.3		<5	<5								
	3/5/92	17:00	ST	5	2600	3.3	8.2	5.5	<0.1	0.9	0.9		<5	<5	<2	<10	37	<2	20	<2	<10	1004
	3/6/92	5:00																				
	3/6/92	8:00	ST	9	1400	75	7.8	4.9	<0.1	0.8	1.2		120	18	18	<10	10	3	20	<2	30	502
	3/6/92	11:00																				
	3/8/92	17:00	ST	5	1800	20	7.9	6.1	<0.1	1.1	1.2		26	8	2	<10	7	<2	10	<2	20	660
	3/9/92	17:00																				
	3/20/92	15:04	ST	4	1600	430	7.5	2.3	0.3	1.1	2.6		900	120	<20	<30	30	13	<40	<10	100	560
	3/20/92	17:04																				
	3/20/92	18:04	ST	9	630	340	7.5	3	<0.1	0.7	2.3		500	72	<20	<30	<20	3	<40	<10	110	240
	3/21/92	21:04																				
	3/22/92	3:04	ST	11	1100	48	7.6	2.9	<0.1	0.9	1.7		120	14	<20	<30	<20	2	<40	<10	30	414
	3/24/92	13:46																				
	3/26/92	18:04	ST	4	1800	8.3	7.9	5.3	0.1	0.7	0.6		15	7	<7	<10	14	5	10	<2	70	676
	3/26/92	20:04																				
	3/26/92	21:04	ST	8	1700	7.9	7.9	5.9	<0.1	0.5	0.4		9	6	<7	<10	11	4	<10	<2	<10	622
	3/27/92	18:04																				
	3/28/92	0:04	ST	12	2500	10	8	4.5	<0.1	0.5	0.4		20	7	<7	<10	5	5	10	<2	<10	945
	3/29/92	18:04																				
	12/17/92	11:15	ST	5	2000	200	8	4.5	0.2	2.8	6.6		480	60	<20	<30	24	11	45	<10	100	
	12/17/92	15:15																				
	12/17/92	16:15	ST	7	960	67	7.8	3.2	0.2	1.6	1.7		120	24	<20	<30	<20	<2	<40	<10	40	
	12/18/92	10:15																				
	12/18/92	16:15	ST	12	2100	10	8.1	2.4	<0.1	0.7	1		14	6	<20	<30	<20	<2	<40	<10	29	
	12/20/92	10:15																				
	12/29/92	7:50	ST	6	650	470	7.9	1.7	0.3	1.8	9.8		1100	120	<20	<30	<20	6	<40	<10	74	
	12/29/92	17:50																				
	12/29/92	19:50	ST	5	730	440	7.9	2.1	0.3	1.6	9.7		1000	110	<20	<30	<20	6	<40	<10	55	
	12/30/92	3:50																				
	12/30/92	5:50	ST	5	750	79	7.8	1.9	0.3	0.6	5.8		140	23	<20	<30	<20	2	<40	<10	27	
	12/30/92	13:50																				
	12/30/92	15:50	ST	8	1300	41	8.1	2	0.3	0.5	1.4		58	10	<20	<30	<20	4	<40	<10	23	
	12/31/92	5:50																				
	12/31/92	7:50	ST	12	2000	4	8.1	2.3	0.2	1	1		21	6	<20	<30	<20	<2	<40	<10	38	
	1/1/93	5:50																				
	1/1/93	7:50	ST	12	2400	2.2	8.2	2.5	0.2	1.8	1		24	6	<20	<30	<20	<2	<40	<10	40	
	1/2/93	5:50																				
	1/6/93	1:50	ST	5	1000	1100	7.8	3.7	0.1	1.3	2.8		950	75	<20	<30	<20	8	<40	<10	56	340
	1/6/93	5:50																				
	1/6/93	6:50	ST	8	510	470	7.9	3.3	0.1	1.4	5.4		1300	91	<20	<30	<20	3	46	<10	89	180
	1/7/93	6:50																				
	1/7/93	12:50	ST	11	970	1400	7.9	3.7	0.1	1.4	4		840	63	<20	<30	<20	7	<40	31	52	330
	1/8/93	12:50																				
	1/8/93	12:35	ST	9	1200	100	8.1	4.2	<0.1	1.2	1.5		200	26	<20	<30	<20	3	<40	<10	41	416
	1/9/93	4:35																				
	1/9/93	6:35	ST	15	2000	25	8.3	5.6	0.1	1.2	1		58	12	<20	<30	<20	<2	<40	<10	36	748
	1/10/93	20:35																				

STATION	DATE	TIME	SAMPLES Type	#	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd ug/L	Cr ug/L	Cu ug/L	Pb ug/L	Ni ug/L	Ag ug/L	Zn ug/L	Hardness mg/L
OSOL03	12/19/93	3:00	ST	6	2000	54	8.1	7.3	<0.1	0.92	1.3		89	6	<5	<10	23	4.3	<40	<10	41	684
	12/19/93	13:00																				
	12/19/93	15:00	ST	11	2100	50	8.1	8.3	<0.1	0.82	1		71	<5	<5	<10	<20	2.1	<40	<10	37	705
	12/20/93	11:00																				
	12/20/93	13:00	ST	12	2100	18	8.1	5.6	<0.1	1.1	1.2		30	30	<5	10	<20	<2	<40	<10	25	772
	12/21/93	11:00																				
	12/21/93	13:00	ST	12	2500	8.8	8.1	0.2	<0.1	1.1	0.55		21	21	5.1	<10	<20	<2	<40	10	30	780
	12/22/93	9:00																				
	12/22/93	11:00	ST	8	2800	5.5	8.2	4.5	<0.1	0.91	0.65		24	<5	<5	<10	20	<2	<40	<10	20	1032
	12/23/93	1:00																				
	2/3/94	18:30	ST	2	2400	110	8	6.8	0.45	3.1	1.9		290	41	<5	<10	<20	5.6	<40	<10	56	1010
	2/3/94	20:30																				
	2/3/94	22:30	ST	3	790	180	6.9	4.3	0.44	2.7	2.7		420	51	6.5	19	50	16	58	<10	140	250
	2/4/94	2:30																				
	2/7/94	2:00	ST	4	1400	36	8	6.1	0.56	1.4	0.91		190	22	<5	<10	24	3	<40	<10	38	464
	2/7/94	8:00																				
	2/7/94	10:00	ST	13	510	180	8.2	4	0.6	1.2	2.8		560	58	<5	<10	22	7.3	<40	<10	92	156
	2/8/94	10:00																				
	2/8/94	12:00	ST	12	980	52	8.1	4	0.14	0.69	2		150	15	<5	<10	25	<2	<40	<10	42	320
	2/9/94	10:00																				
	2/9/94	12:00	ST	12	1900	11	8.1	5.8	0.11	0.83	1.5		80	10	<5	<10	<20	<2	<40	<10	15	694
	2/10/94	10:00																				
	2/10/94	12:00	ST	7	2500	7.6	8.2	5.8	0.27	0.35	1		27	7	<5	<10	<20	<2	<40	<10	31	990
	2/11/94	0:00																				
	2/17/94	7:29	ST	3	1200	240	7.9	4.4	0.31	3.1	2.7		690	44	<5	48	50	16	<40	<10	150	410
	2/17/94	11:29																				
	2/17/94	13:29	ST	11	910	240	8	6.5	0.76	2.6	2.7		530	47	6.3	39	38	7.4	41	<10	170	296
	2/18/94	9:29																				
	2/18/94	11:29	ST	11	1000	170	7.6	6	0.45	1.8	2.6		360	20	<5	22	23	12	<40	<10	87	360
	2/19/94	7:29																				
	2/19/94	9:27	ST	11	1300	29	7.8	8.1	0.13	0.24	1.1		45	6	<5	14	<20	<2	<40	<10	22	472
	2/20/94	5:27																				
	2/20/94	7:27	ST	13	940	330	7.9	5.7	0.2	2.1	3.3		700	52	10	45	28	10	<40	<10	120	268
	2/21/94	7:27																				
	11/16/94	6:00	ST	3	2400	56	7.8	6.1	0.2	2.9	1.4		120	26	2.7	<10	28	7.3	<40	<0.3	72	975
	11/16/94	10:00																				
	3/2/95	19:30	ST	3	2900	54	8.0	8.5	<0.1	3.2	1.2		130	30	5	<10	6	6.5	<40	1.5	64	1008
	3/2/95	23:30																				
	3/3/95	1:30	ST	16	1300	130	7.8	4.2	0.24	2.1	1.7		210	32	4.8	<10	25	8.5	<40	3.6	69	378
	3/4/95	7:30																				
	3/4/95	9:30	ST	8	1300	42	7.6	2.6	<0.1	1.1	0.94		65	14	<1	<10	26	3.5	<40	1.2	28	346
	3/4/95	23:30																				
	3/5/95	1:30	ST	16	690	240	7.6	1.9	0.23	2.3	4.2		880	82	4.5	30	31	11	<40	<1	110	214
	3/6/95	7:30																				
	3/10/95	22:54	ST	18	1300	230	7.9	3.3	0.25	3.0	3.3		680	79	3.7	27	41	11	63	<1	120	402
	3/12/95	8:54																				
	3/12/95	10:54	ST	9	2500	16	8.0	5.6	<0.1	0.74	0.85		28	<5	7.4	<10	29	<2	59	<1	41	875
	3/13/95	2:54																				
	1/19/96	9:08	ST	5	1900	65.0	8.1	9.0	0.49	3.10	1.10		100	22	3	<10	22	4	19	<1	58	712
	1/19/96	10:08																				
	1/19/96	12:08	ST	4	2300	48.0	8.3	9.0	0.27	2.60	1.20		76	18	2	16	19	5	18	<1	51	872
	1/19/96	18:08																				
	1/19/96	20:08	ST	23	2500	30.0	8.1	7.7	<0.10	1.20	0.73		49	7	2	<10	29	2	24	<1	43	988
	1/21/96	20:08																				
	1/21/96	22:08	ST	3	680	630.0	7.7	3.0	0.67	4.80	6.20		1500	190	26	59	140	35	82	<1	400	210
	1/22/96	2:08																				
	1/22/96	10:08	ST	12	1200	46.0	7.7	3.8	0.43	1.50	1.40		57	15	4	<10	19	3	17	<1	59	364
	1/23/96	8:08																				
	1/31/96	2:58	ST	5	2100	64.0	8.1	3.3	<0.10	4.20	1.20		92	16	3	<10	30	8	23	1	120	736
	1/31/96	3:58																				

STATION	DATE	TIME	SAMPLES Type	#	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd ug/L	Cr ug/L	Cu ug/L	Pb ug/L	Ni ug/L	Ag ug/L	Zn ug/L	Hardness mg/L
OSOL03	1/31/96	5:58	ST	12	560	230.0	7.8	5.9	0.38	5.20	3.10		470	58	7	28	46	16	27	2	150	162
	2/1/96	3:58																				
	2/1/96	5:58	ST	18	1100	50.0	8.0	5.7	0.30	1.70	1.70		67	18	2	<10	26	3	13	6	46	458
	2/2/96	11:58																				
	2/20/96	2:12	ST	5	2400	29.0	7.7	3.1	<0.10	2.80	0.90		84	<20	2	<10	21	3	13	<1	57	846
	2/20/96	3:12																				
	2/20/96	5:12	ST	7	510	310.0	7.7	3.7	0.17	2.80	3.20		710	78	6	31	41	<2	<2	<1	160	160
	2/20/96	17:12																				
	2/20/96	19:12	ST	20	710	140.0	7.8	15.0	0.27	1.90	2.70		380	38	4	19	29	<2	<2	<1	98	208
	2/22/96	9:21																				
	2/22/96	11:21	ST	21	2300	21.0	8.1	6.3	0.23	1.60	1.40		27	9	<1	<10	21	<2	24	<1	<10	732
	2/24/96	3:21																				
	10/30/96	6:46	ST	5	1700	170.0	7.3	15.0	1.60	6.70	3.20		290	68	6	15	62	7	30	<1	510	604
	10/30/96	7:46	F												<1	<10	14	<2	18	<1	190	
	10/30/96	10:01	ST	5	760	380.0	7.4	6.8	1.00	6.60	5.00		910	140	15	36	43	21	37	1	280	244
	10/30/96	18:01																				
	10/30/96	20:01	ST	43	2100	29.0	8.2	6.4	0.54	1.10	1.20		48	11	2	<10	17	6	13	<1	56	814
	11/3/96	8:01																				
	12/9/96	13:21	ST	5	1800	51.0	8.0	5.8	0.18	1.80	0.94		72	19	2	<10	22	6	13	<1	110	700
	12/9/96	14:21																				
	12/9/96	16:21	ST	7	590	210.0	7.6	4.1	0.22	2.10	2.40		380	44	3	17	32	11	17	<1	110	158
	12/10/96	4:21																				
	12/10/96	6:21	ST	9	1000	120.0	7.9	5.4	0.21	1.60	0.93		105	18	1	<10	15	<2	11	<1	44	335
	12/10/96	22:21																				
	12/11/96	0:21	ST	13	670	150.0	7.8	3.7	0.19	1.70	1.60		240	28	2	<10	21	4	15	<1	61	230
	12/12/96	0:21																				
	12/12/96	2:21	ST	17	1800	23.0	8.1	5.8	0.23	1.90	<0.2		37	7	3	<10	15	<2	21	<1	98	700
	12/13/96	10:21																				
	3/25/98	6:00	ST	5	2760	20	7.65	8	0	1.8	<0.1		33	19								1080
	3/25/98	7:00	SF												2	3	14	2	26	<1.00	54	
	11/8/98	5:45	ST	5	2250	200	8	8	0	7	6		960	180	10	40	59	47	33	<2	288	755
	11/8/98	6:45	SF												<1	<8	9	<2	10	<2	21	
	11/8/98	8:45	ST	8	745	44	8	7	0	2	3		200	120	9	14	25	6	21	<2	96	240
	11/8/98	22:45	SF												4	9	16	3	14	<2	55	
	11/9/98	0:45	ST	39	1960	9	8	7	0	1	1		38	14	1	<8	13	<2	8	<2	24	685
	11/12/98	4:45	SF												1	<8	11	<2	8	<2	20	
	1/25/99	4:30	ST	5	1680	130	8	6	0	4	3		730	150	8	19	35	20	28	<2	136	620
	1/25/99	5:30	SF												<1	<8	8	<2	12	<2	11	
	1/25/99	7:30	ST	11	785	26	8	5	0	1	1		100	30	3	<8	17	3	10	<2	34	280
	1/26/99	3:30	SF												1	<8	10	<2	9	<2	13	
	1/26/99	5:30	ST	15	700	60	8	4	0	1	2		200	60	4	9	26	6	29	<2	66	210
	1/27/99	9:30	SF												<1	<8	12	<2	6	<2	14	
	1/27/99	11:30	ST	21	1300	26	8	5	0	1	1		58	34	2	<8	19	3	12	<2	32	404
	1/29/99	3:30	SF												1	<8	12	<2	6	<2	14	
	3/11/99	11:56	ST	5	2710	28	8	4	<0.05	1	0		98	20	3	<8	23	4	16	<2	49	1048
	3/11/99	12:56	SF												2	<8	17	<2	13	<2	17	
	3/11/99	14:56	ST	5	2430	68	8	5	<0.05	2	1		270	38	6	12	29	8	21	<2	81	974
	3/11/99	22:56	SF												1	<8	13	<2	12	<2	13	
	3/15/99	9:07	ST	5	2240	80	8	3	0	2	0		300	40	6	12	29	8	15	<2	110	1300
	3/15/99	10:07	SF												1	<8	14	<2	7	<2	18	
	3/15/99	12:07	ST	3	920	76	8	6	0	2	1		260	44	7	13	38	9	22	<2	118	436
	3/15/99	16:07	SF												1	<8	18	<2	12	<2	13	
	3/15/99	18:07	ST	44	2020	12	8	4	<0.05	1	0		40	11	3	<8	22	2	15	<2	39	750
	3/19/99	10:45	SF												2	<8	25	<2	15	<2	29	
	5/20/99	14:00	DT	1	3020	5	8	2	0	1	0		39	9	1	9	10	<2	9	<2	12	
	5/20/99	14:00	DF												<1	9	9	<2	8	<2	16	

STATION	DATE	TIME	SAMPLES Type	#	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd ug/L	Cr ug/L	Cu ug/L	Pb ug/L	Ni ug/L	Ag ug/L	Zn ug/L	Hardness mg/L
LCWI02	3/2/92	11:00	ST	4	830		7.7		0.1		1.5		820		<2		29		40	<2		240
	3/2/92	14:00																				
	3/2/92	15:00	ST	10	480		7.7		0.2		65		1600		2		47		60	<2		144
	3/2/92	0:00																				
	3/2/92	1:00	ST	10	330		7.8		0.2		1.9		740		<2		20		30	<2		106
	3/3/92	10:00																				
	3/20/92	13:51	ST	6	420		7.6		0.3		3		510		<20		<20		<40	<10		148
	3/21/92	7:51																				
	3/21/92	10:51	ST	13	660		7.7		0.1		1.8		490		<20		<20		<40	<10		204
	3/24/92	10:51																				
	1/6/93	8:12	ST	10	310		7.8		<0.1		4.4		1400		<20		<20		<40	<10		86
	1/6/93	19:12																				
	1/6/93	22:12	ST	7	420		7.9		0.1		2.9		840		<20		<20		<40	<10		110
	1/7/93	22:12																				
	1/8/93	4:12	ST	3	790		8.1		<0.1		1.8		200		<20		<20		<40	<10		200
	1/8/93	13:30																				
	1/8/93	13:14	ST	12	940		8.4		0.1		1.4		110		<20		<20		<40	130		252
	1/9/93	11:41																				
	1/9/93	13:41	ST	12	1100		8.5		<0.1		1.3		50		<20		<20		<40	<10		300
	1/10/93	11:41																				
	1/15/93	11:05	ST	11	370		8		0.2		5.2		1800		<7		<30		63	<4		142
	1/16/93	13:05																				
	1/16/93	15:05	ST	10	350		8		0.2		5.4		1500		<7		<30		57	<4		142
	1/17/93	9:05																				
	1/17/93	12:07	ST	12	430		8		0.2		3.5		1100		<7		<30		50	<4		126
	1/18/93	10:07																				
	1/18/93	12:07	ST	10	430		8		0.2		3.7		710		<7		<30		48	<4		118
	1/19/93	10:07																				
	2/7/93	21:00	ST	9	430		7.8		0.2		8		3000		<20		<20		<40	<10		160
	2/8/93	15:00																				
	2/8/93	17:00	ST	10	370		8		0.2		3.8		960		<20		<20		<40	<10		115
	2/9/93	11:00																				
	2/9/93	13:00	ST	8	610		8		0.1		1.8		120		<7		33		8	<4		184
	2/10/93	3:00																				
	2/10/93	5:00	ST	7	840		8.2		0.2		1.3		42		<7		33		5	<4		250
	2/10/93	17:00																				
	11/11/93	3:13	ST	3	1300		7.7		0.56		12		2400		<5		<20		<40	<10		346
	11/11/93	16:08																				
	11/12/93	16:10	ST	1	1500		8.1								<5		60		<40	<10		440
	11/12/93	14:30	ST	10	1700		8.2		0.12		2.5		42		<5		<20		<40	<10		470
	11/13/93	10:30																				
	11/13/93	12:30	ST	9	1800		8.3		0.14		3.8		470		<5		<20		<40	<10		508
	11/14/93	6:30																				
	11/14/93	14:30	ST	1	1900		7.6								<5		<20		<40	<10		830
	11/14/93	14:30	ST	7	1900		8.3		0.15		6.4		820		<5		<20		<40	<10		632
	11/15/93	2:30																				
	11/15/93	0:00	ST	1	2000		8.2						200		<5		<20		<40	<10		660
	1/24/94	20:53	ST	1					1.4		7.2				<5		<20		<40	<10		380
	1/25/94	4:53	ST	3	800		8		0.47		6.6		840		<5		<20		<40	<10		202
	1/25/94	8:53																				
	1/25/94	10:53	ST	9	1300		8.2		0.13		1.5		59		<5		<20		<40	<10		560
	1/26/94	2:53	SF												<5		<20		<40	<10		
	1/26/94	13:00	ST	9	1600		8.3		<0.1		1.1		10		<5		<20		<40	<10		440
	1/27/94	5:00																				
	1/28/94	12:36	ST	5	1600		8.3		0.33		2.6		410		<5		<20		<40	<10		490
	1/28/94	20:36																				
	2/7/94	13:18	ST	3	480		7.9		0.13		8.4		1300		<5		<20		<40	<10		132
	2/7/94	17:18																				
	2/7/94	19:18	ST	8	640		7.9		0.21		9.8		1600		<5		<20		<40	<10		185
	2/8/94	11:18																				

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd ug/L	Cr ug/L	Cu ug/L	Pb ug/L	Ni ug/L	Ag ug/L	Zn ug/L	Hardness mg/L
LCWI02	2/9/94	13:01	ST	12	1400		8.4		<0.1		1.2		29		<5		<20		<40	<10		456
	2/10/94	11:01																				
	2/10/94	13:01	ST	12	1500		8.4		<0.1		1.1		13		<5		<20		<40	<10		452
	2/11/94	11:02																				
	2/17/94	5:49	ST	3	600		8		0.19		6.2		1100		<5		89		74	<10		172
	2/17/94	9:49	SF												<5		<20		<40	<10		
	2/17/94	11:49	ST	12	620		8		0.4		8.1		1300		<5		52		60	<10		182
	2/18/94	7:49	SF												<5		<20		<40	<10		
	2/18/94	9:49	ST	13	1000		8		0.18		2.1		140		<5		<20		<40	<10		340
	2/19/94	9:49	SF												<5		<20		<40	<10		
	2/19/94	11:49	ST	7	1400		8.4		<0.1		0.95		27		<5		<20		<40	<10		368
	2/20/94	5:49	SF												<5		<20		<40	<10		
	2/20/94	7:49	ST	7	440		8.2		0.34		8.6		1700		9		37		<40	<10		105
	2/20/94	23:49	SF												<5		<20		<40	<10		
	3/18/94	23:15	ST	1					0.59		4.8				<5		59		<40	18		560
	3/19/94	1:15	ST	5	440		7.9		0.52		8.2		2500		<5		82		67	<10		150
	3/19/94	9:15																				
	3/20/94	9:35	ST	4	830		8.4		<0.1		1.6		205		<5		<20		<40	<10		224
	3/20/94	11:35																				
	3/24/94	19:43	ST	10	660		8.1		0.42		4.4		2000		<5		39		46	<10		180
	3/25/94	13:43																				
	3/25/94	15:43	ST	10	700		8.1		0.14		5.6		250		<5		<20		<40	<10		175
	3/26/94	9:43																				
	3/26/94	11:43	ST	12	1100		8.6		<0.1		1.6		24		<5		<20		<40	<10		296
	3/27/94	9:43																				
	3/27/94	11:43	ST	12	1500		8.5		<0.1		2		<5		<5		<20		<40	<10		402
	3/28/94	9:43																				
	3/10/95	22:30	ST	2	530		7.7		0.12		21		10000		5.9		110		120	<1		180
	3/11/95	0:30																				
	3/11/95	8:30	ST	11	550		7.9		0.12		4.7		1000		<1		34		<40	<1		144
	3/12/95	9:30																				
	3/12/95	11:26	ST	11	960		6.2		0.15		2.2		320		<1		19		<40	<1		262
	3/13/95	13:26																				
	12/12/95	21:41	ST	5	970		7.4		2.00		21.00		2400		9		290		75	2		195
	12/12/95	22:41																				
	12/13/95	0:41	ST	14	1100		7.8		0.35		3.80		310		<1		43		<40	<1		312
	12/14/95	2:41																				
	12/14/95	10:41	ST	30	1700		8.6		0.31		0.64		10		<1		24		<40	<1		500
	12/16/95	20:41																				

STATION	DATE	TIME	SAMPLES Type	#	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd ug/L	Cr ug/L	Cu ug/L	Pb ug/L	Ni ug/L	Ag ug/L	Zn ug/L	Hardness mg/L
PDCM01	8/27/91	14:00	D	26	11000	2.1	8.1	4.2	<0.1	1.3	1		34	6								
	8/28/91	15:00																				
	9/24/91	10:55	D	25	11000	1.1	8.4	5.1	0.4	1.5	1.7		14	14								
	9/25/91	10:55																				
	10/22/91	12:15	D	24	3300	1.6	8.3	1.9	<0.1	0.5	0.5		10	<5								
	10/23/91	11:15																				
	11/12/91	10:50	D	24	11000	0.9	8.2	12	<0.1	<0.5	0.47		13	6								
	11/13/91	9:50																				
	12/12/91	15:00	D	1	12000	2	8.1	15	0.1	1	0.7		<5	<5								
	3/3/92	13:05	ST	1	3400	96	7.8	8.6	0.5	2	0.9		160	24	9	<6	16	<2	100	<2	60	1096
	3/5/92	17:00	ST	8	11000	20	8	22	0.2	2.7	0.87		24	11	55	<10	15	<2	390	<2	200	>2000
	3/6/92	2:00																				
	3/6/92	8:00	ST	11	4800	260	7.6	9.7	0.1	2.5	1.7		460	48	17	30	19	<2	160	<2	130	1500
	3/8/92	11:00																				
	3/8/92	17:00	ST	5	9000	1.3	8	16	<0.1	1.5	0.5		42	10	33	<10	6	<2	290	<2	120	>2000
	3/9/92	17:00																				
	3/20/92	16:38	ST	4	1600	520	7.3	5.1	0.3	1.2	2		730	110	<20	<30	20	4	60	<10	140	426
	3/20/92	18:38																				
	3/20/92	19:38	ST	5	1300	6400	7.3	3.1	0.5	0.5	5.5		10000	1100	<20	<30	20	<2	80	<10	150	484
	3/21/92	7:38																				
	3/21/92	10:38	ST	14	3800	460	7.5	8	0.4	1.5	2.1		640	80	<20	<30	<20	2	90	<10	11	1200
	3/24/92	9:35																				
	3/30/92	22:46	ST	4	1600	840	7.4	4.5	0.1	0.5	1.5		1200	140	8	100	57	21	110	<2	250	500
	3/31/92	0:46																				
	6/17/92	14:40	ST	24	11000	3.3	8.1	7.4	0.5	0.7	0.3		30	13	<20	<30	20	4	90	10	50	
	6/18/92	13:40																				
	8/31/92	11:20	D	1	11000	9.9	8.3	1.9	<0.1	0.8	1		53	30								
	9/30/92	11:10	D	1	10000	3.1	8.3	2.4	<0.1	1	1.1		25	10								
	10/29/92	14:25	D	1	11000	2.4	8.2	10	<0.1	1.6	1.2		23	9								
	11/25/92	14:00	D	1	9600	4.7	8.5	13	<0.1	1.1	0.9		26	10								
	12/29/92	11:00	ST	5	2200	9700	7.6	3	0.8	2.5	15		20000	1600	<20	<30	<20	<2	87	<10	140	
	12/29/92	19:00																				
	12/29/92	21:00	ST	3	1800	1700	7.7	2.3	0.7	3.2	15		4700	310	<20	<30	<20	<2	60	<10	90	
	12/30/92	1:00																				
	12/30/92	3:00	ST	6	2700	520	7.9	3.6	0.7	1.8	7.9		980	94	<20	<30	<20	2	55	<10	49	
	12/30/92	15:00																				
	12/30/92	17:00	ST	12	7300	2.7	8.1	6.7	0.6	1	0.6		21	14	<20	<30	20	<2	150	11	120	
	12/31/92	15:00																				
	12/31/92	17:00	ST	12	9200	2.9	8.1	7.7	0.5	0.6	1		120	13	22	<30	<20	<2	190	12	120	
	1/1/93	15:00																				
	1/6/93	3:12	ST	6	1400	3800	7.7	11	0.3	5.2	5		11000	930	<20	<30	<20	3	73	<10	95	420
	1/7/93	9:04																				
	1/7/93	15:04	ST	5	3200	1000	7.7	18	0.5	2.8	6.6		1800	670	<20	<30	<20	<2	140	<10	96	1100
	1/8/93	10:30																				
	1/8/93	10:46	ST	12	7000	17	8	15	0.3	5	0.2		52	11	26	<30	<20	<2	220	47	110	2500
	1/9/93	8:46																				
	1/9/93	10:46	ST	12	5100	100	8	13	0.4	1.7	0.8		200	26	20	<30	20	<2	1800	120	1760	
	1/9/93	8:46																				
	10/5/93	12:44	D	4	11000	35	8.3	5.7	<0.1	7.2	6.7		2000	260								
	10/6/93	11:44																				
	1/15/93	9:30	ST	8	1400	1800	7.9	6.7	0.3	4.4	14		5000	370	20	300	150	19	260	<4	780	420
	1/15/93	23:30																				
	1/16/93	1:30	ST	8	1300	3200	7.7	6.6	0.3	8.8	19		7700	540	24	360	180	11	280	<4	900	554
	1/16/93	15:30																				
	1/17/93	10:41	ST	7	2500	2800	7.7	11	0.3	9.3	15		5100	410	27	290	150	<2	310	<4	760	952
	1/17/93	22:41																				
	1/17/93	0:40	ST	7	2000	1700	7.8	7.3	0.3	5.2	9.9		3400	260	21	240	110	<2	240	<4	580	760
	1/18/93	12:40																				
	6/29/93	11:12	D	24	9000	2	8.2	8.2	0.2	1.4	<0.1		19	16								
	6/29/93	10:12																				

STATION	DATE	TIME	SAMPLES Type	#	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd ug/L	Cr ug/L	Cu ug/L	Pb ug/L	Ni ug/L	Ag ug/L	Zn ug/L	Hardness mg/L
PDCM01	7/21/93	13:45	D	1	9300	2	8.1	7	0.25	1.6	0.44		29	16								
	8/9/93	13:41	D	24	10000	5.8	8.1	6.5	0.2	1.9	0.39		55	22								
	8/10/93	12:41																				
	9/7/93	11:19	D	24	9500	4.8	8.3	5.8	0.14	1.3	0.89		45	19								
	9/8/93	10:19																				
	10/5/93	12:44	D	4	11000	35	8.3	5.7	<0.1	7.2	6.7		2000	260								
	10/6/93	11:44																				
	11/3/93	9:28	D	24	9800	1.5	8.2	8.2	0.18	1.2	1.5		<5	<5								
	11/4/93	8:28																				
	11/11/93	3:55	ST	5	4800	1800	7.7	8.4	1.4	22	19		7300	730	71	<10	58	13	300	<10	580	1225
	11/11/93	11:55																				
	11/12/93	17:30	ST	11	6900	4	8.2	9.5	0.37	1.7	0.81		30	8	12	<10	<20	<2	130	<10	130	2064
	11/13/93	13:30																				
	11/13/93	15:30	ST	11	8100	4.3	8.2	10	0.26	1.7	0.88		39	14	14	<10	<20	<2	170	<10	81	2500
	11/14/93	11:30																				
	11/14/93	11:29	ST	7	11000	2.7	8.2	13	0.33	1.5	0.69		21	6	23	<10	<20	<2	220	19	100	3384
	11/14/93	23:30																				
	12/29/93	13:00	D	1	9700	2.4	8.8	7.7	<0.1	0.7	0.23		33	<5								
	1/12/94	10:46	D	24	8400	2.5	8.3	15	0.19	1	0.36		33	10								
	1/13/94	9:46																				
	2/4/94	0:52	ST	4	1100	360	7.4	4.5	0.56	1.9	2.5		740	71	5.1	51	46	15	79	<10	210	268
	2/4/94	6:00	SF												<5	<10	<20	<2	44	<10	23	
	2/4/94	8:00	ST	13	5000	66	7.5	14	0.35	1.5	0.78		130	15	11	<10	25	2	92	<10	100	1410
	2/5/94	8:00																				
	2/5/94	10:52	ST	19	8600	4.4	8.1	16	0.3	1	0.1		18	10	17	<10	<20	<2	110	16	66	2768
	2/6/94	22:52																				
	2/7/94	0:52	ST	5	1600	50	7.7	6.5	0.57	1.7	0.48		65	15	<5	<10	<20	2.3	<40	<10	62	410
	2/7/94	8:52																				
	2/8/94	10:52	ST	3	1100	640	8	5	1.1	6.7	16		2500	190	12	<10	32	6.6	83	<10	150	320
	2/8/94	14:52																				
	2/8/94	16:52	ST	4	1800	300	7.8	7.3	1.1	2.6	2.9		980	73	6	<10	21	4.3	49	<10	85	530
	2/8/94	22:52	SF												<5	<10	<20	<2	<40	<10	<10	

STATION	DATE	TIME	SAMPLES Type	#	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd ug/L	Cr ug/L	Cu ug/L	Pb ug/L	Ni ug/L	Ag ug/L	Zn ug/L	Hardness mg/L
PDCM01	3/24/94	19:00	ST	10	4100	2600	7.9	8.6	0.51	1.1	6.6		3700	320	33	180	120	25	230	<10	660	1225
	3/25/94	1:00																				
	3/25/94	13:00	ST	11	6600	32	7.9	13	0.42	0.36	1.3		78	17	18	<10	26	<2	130	13	88	1930
	3/26/94	8:00																				
	3/26/94	10:00	ST	12	10000	5.5	8.3	22	0.27	1.8	3.5		31	13	29	<10	24	<2	210	11	120	3180
	3/27/94	8:00																				
	3/27/94	10:00	ST	12	13000	3.4	8.3	36	0.19	<0.2	0.84		18	10	39	<10	26	<2	260	16	150	3994
	3/28/94	8:00																				
	3/28/94	10:00	ST	5	13000	3.4	8.5	24	0.13	0.98	0.46		27	10	35	<10	<20	<2	290	<10	92	4376
	3/28/94	18:00																				
	5/3/94	10:49	D	24	11000	1.9	8.3	17	0.16	1.3	2.1		18	<5								
	5/4/94	9:49																				
	5/25/94	12:15	D	10	12000	4.3	8.4	16	0.19	2.2	0.54		32	<5								
	5/26/94	11:15																				
	6/23/94	10:20	D	1	13000	1.1	8	17	0.23	0.91	0.5		16	<5								
	7/19/94	10:31	D	24	7400	0.5	8.3	15	0.12	0.69	0.81		28	20								
	7/20/94	9:31																				
	10/26/94	10:19	D	24	3900	1.7	8.2	4.1	0.27	1.1	0.37		10	<5								
	10/27/94	9:19																				
	11/7/94	9:34	D	24	10000	62	8.4	15	0.3	3.2	1.6		230	23								
	11/8/94	8:34																				
	11/10/94	7:23	ST	3	1000	440	6.4	8.3	1.3	9.4	12		1800	100	24	87	170	60	160	0.5	830	470
	11/10/94	11:23																				
	11/10/94	13:23	ST	14	8100	63	6.8	13	0.3	2.8	2		500	33	11	<10	33	2.4	93	<0.3	110	1695
	11/11/94	15:23																				
	5/25/95	14:45	D	1	10000	9.8	8.3	15	0.49	1.1	0.81		46	22								
	6/21/95	12:29	D	24	11000	60	8.2	15	<0.1	3.4	1.6		220	76								
	6/22/95	11:29																				
	7/25/95	13:10	D	24	8900	110.0	8.4	5.8	<0.10	4.20	0.21		260	58								
	7/26/95	12:10																				
	8/28/95	11:15	D	24	1000	160.0	8.3	12.0	0.30	5.40	5.00		450	75								
	8/29/95	10:15																				
	9/11/95	14:45	D	24	7900	150.0	8.4	14.0	0.11	3.60	1.80		280	60								
	9/12/95	13:45																				
	10/18/95	13:00	D	24	11000	100.0	8.4	18.0	0.40	6.70	3.80		490	120								
	10/19/95	12:00																				
	11/20/95	11:38	D	24	9900	390.0	8.3	17.0	0.15	6.20	3.90		640	69								
	11/21/95	10:38																				
	12/20/95	9:20	D	1	13000	14.0	8.2	24.0	0.24	2.60	0.87		51	18								
	2/15/96	10:20	ST	1	12000	9.4	8.1	21.0	0.25	1.20	0.76		57	23	34	<10	23	<2	280	3	150	4360
	2/20/96	3:24	ST	2	720	370.0	7.6	2.5	0.50	3.00	2.10		850	110	8	40	43	20	50	1	290	185
	2/20/96	3:33																				
	2/20/96	5:33	ST	28	2600	1000.0	7.7	9.1	0.53	5.40	8.50		2800	190	17	90	86	24	220	<1	280	864
	2/22/96	11:33																				
	2/22/96	13:33	ST	19	7600	46.0	8.2	19.0	0.38	1.40	0.86		110	20	38	<10	17	<2	190	<1	140	2850
	2/24/96	1:33																				
	3/12/96	15:42	ST	3	4800	160.0	8.1	8.2	0.33	1.70	1.10		320	34	18	22	31	6	120	<1	140	1450
	3/12/96	19:42																				
	3/12/96	21:42	ST	6	4600	150.0	7.7	9.0	0.98	2.80	1.80		310	41	20	18	81	6	140	1	240	1568
	3/13/96	11:42																				
	3/13/96	13:42	ST	38	6600	76.0	8.2	12.0	<0.10	0.88	0.76		160	28	26	<5	20	4	170	<1	130	3012
	3/16/96	13:42																				
	4/17/96	14:15	ST	1	10000	260.0	8.1	0.9	0.70	7.70	5.80		840	160	67	31	230	14	350	3	850	3215
	4/17/96	23:43	ST	5	800	93.0	7.5	0.6	0.80	2.80	2.10		420	52	8	18	38	10	34	2	200	224
	4/18/96	0:43																				
	4/18/96	2:43	ST	5	4000	420.0	8.0	0.4	0.27	3.90	2.80		670	86	12	47	76	6	97	<1	200	1276
	4/18/96	10:43																				
	4/18/96	12:43	ST	41	9900	57.0	8.3	1.7	0.25	3.10	1.40		140	46	41	<10	25	<2	390	1	230	3746
	4/21/96	22:43																				
	5/28/96	14:50	DT	1	8500	30.0	8.4	13.0	0.27	6.20	2.80		150	67	23	<10	14	<2	<4	<1	100	

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd ug/L	Cr ug/L	Cu ug/L	Pb ug/L	Ni ug/L	Ag ug/L	Zn ug/L	Hardness mg/L
PDCM01	6/19/96	13:30			8200	14.0	8.5	16.0	1.20	3.10	1.20		85	<6	17	<10	9	<2	130	<1	61	2870
	7/24/96	14:40	DT	24	7200	240.0	8.3	4.8	0.17	5.60	3.90		620	94	27	21	55	9	210	1	340	2400
	7/25/96	13:40																				
	8/27/96	12:30	DT	24	6700	73.0	8.2	15.0	0.94	11.00	3.70		190	34	21	<10	28	2	130	<1	160	2425
	8/28/96	11:30																				
	9/24/96	13:15	DT	23	7600	170.0	8.1	16.0	0.34	3.50	2.00		440	70	34	<10	29	5	160	1	250	2828
	9/25/96	11:15																				
	10/30/96	7:17	ST	5	1800	1400.0	7.1	30.0	4.90	21.00	19.00		5800	580	120	250	80	49	630	3	2100	550
	10/30/96	8:17	SF												2	<10	17	<2	93	<1	72	
	10/30/96	10:32	ST	4	1500	370.0	7.3	9.0	0.85	4.60	4.10		700	94	12	44	49	13	64	<1	320	470
	10/30/96	16:32																				
	10/30/96	18:32	ST	35	5500	45.0	8.3	13.0	0.45	1.60	1.30		100	20	15	7	25	2	114	<0.1	81	2094
	11/3/96	8:32																				
	11/6/96	13:05	DT	1	8900	13.0	8.2	17.0	<0.1	1.60	0.75		30	11								
	11/21/96	13:52	ST	5	350	200.0	7.2	3.2	0.44	2.80	2.70		570	56	3	32	43	16	32	<1	180	118
	11/21/96	14:52																				
	11/21/96	16:52	ST	9	1500	2000.0	7.5	7.3	0.44	5.90	14.00		5500	320	12	210	180	18	170	<1	570	620
	11/22/96	8:52																				
	11/22/96	10:52	ST	37	5400	62.0	8.2	7.3	0.19	2.10	1.40		120	21	8	17	30	3	81	<0.1	66	1920
	11/25/96	14:52																				
	12/4/96	14:00	DT	1	11000	9.4	8.5	25.0	0.23	1.20	0.87		52	14	49	<10	12	<2	300	<1	110	4380
	1/29/97	12:35	DT	1	4500	28.0	8.0	6.9	0.25	0.80	0.48		28	10	19	<10	6	<2	150	<1	130	1690
	2/26/97	13:50	DT	1	11000	38.0	8.3	21.0	<0.1	2.50	1.20		100	35	35	<2	12	1	240	0	120	4040
	3/18/97	13:27	DT	24	9600	79.0	8.1	22.0	<0.5	5.30	2.40		230	47	50	<10	29	5	290	<1	390	3560
	3/19/97	12:27																				
	4/8/97	9:25	DT	24	9600	46.0	8.1	18.0	<0.5	2.20	1.10		120	42	31	<10	19	<2	210	<1	85	2750
	4/9/97	8:25																				
	5/6/97	13:30	DT	22	7500	45.0	8.2	15.0	<0.1	2.50	1.30		130	30	26	<10	33	<2	150	<1	170	2120
	5/7/97	10:30																				
	6/5/97	8:50	D	1	6000	190.0	7.6	29.0	2.40	12.00	3.20		350	67								
	7/2/97	9:10	D	1	6300	4.1	8.0	11	0	2.6	1.4		56	23								
	8/7/97	8:45	D	1	5700	61	7.9	10	0	3.1	1.9		200	38								
	9/17/97	10:30	D	1	6900	7.9	8.0	12	<0.1	2.1	1.7		49	26								
	10/9/97	13:00	D	1	8500	72	8.3	17	<0.1	3.0	2.4		120	39								
	1/9/98	19:59	ST	1											50	<10	35	<2	240	<1	210	>2000
	1/9/98	22:59	ST	11	2500	680	7.7	8.4	<0.5	4.7	4.6	<0.5	1300	140	6	50	48	11	83	<1	50	390
	1/10/98	20:59	SF												3	<10	20	<2	28	<1	<10	

STATION	DATE	TIME	SAMPLES Type	#	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd ug/L	Cr ug/L	Cu ug/L	Pb ug/L	Ni ug/L	Ag ug/L	Zn ug/L	Hardness mg/L
PDCM01	1/29/98	13:24	ST	11	5300	130	7.8	13	<0.5	2.2	1.3		570	65	9	25	26	4	110	<1	110	1736
	1/30/98	9:24	SF												<1	14	31	3	97	<1	110	
	1/30/98	11:24	ST	35	7000	36	8.0	20	1	2.9	1.3		160	25	17	<10	21	<2	160	<1	93	2200
	2/2/98	7:24	SF												4	<10	16	<2	180	<1	34	
	2/14/98	9:36	ST	5	940	200	7.2	7	<0.5	2.2	2.4		730	69	5	30	40	15	43	<1.00	89	200
	2/14/98	10:36	SF												1	3	11	1	19	<1.00	15	
	2/14/98	12:36	ST	11	2700	1300	7.5	8	1	6	10		7000	750	22	256	110	20	254	<10	582	988
	2/15/98	6:36	SF												2	3	14	<1.00	60	<1.00	7	
	2/15/98	8:36	ST	11	7400	100	7.8	16	<0.5	2	10		360	57	39.0	18	7	<2	354	<5.00	176	>2000
	2/16/98	6:36	SF												27	3	17	<1.00	275	<1.00	44	
	2/16/98	8:36	ST	26	5800	850	7.7	14	<0.5	3	10		2400	290	38	85	102	21	336	<10	467	1910
	2/18/98	10:36	SF												17	3	23	<1.00	195	<1.00	32	
	3/25/98	6:14	ST	5	943	180	7.38	9	0	2.2	<0.1		7430	46	7	27	31	12.0	48	<1.00	110	290
	3/25/98	7:14	SF												2	3	15.0	2	26	<1.00	58.0	
	3/25/98	9:14	ST	6	1520	2900	7.43	<0.4	0	4.6	0.30		122	461	18	165	82	23	173	<10	535	590
	3/25/98	19:14	SF												<1.00	3	8	<1.00	23	<1.00	30	
	3/25/98	21:14	ST	27	5370	650	7.93	17	1	1.6	0.60		2230	172	26	85	45	17	241	<5.00	257	1608
	3/27/98	1:14	SF												13	3	22	4	173	<1.00	48.0	
	3/28/98	3:14	ST	15	3400	1660	7.75	4	1	6.7	0.30		4340	255	22	158	89	25	234	<5.00	485	1065
	3/29/98	7:14	SF												4	2	8.40	1	68.0	<1.00	17	
	6/22/98	10:00	D	1	9180	22	7.9	19	0	2.8	1.30		110	30								
	8/11/98	12:59	D	1	9920	280	7.7	22	2	30	6.12		860	190								
	9/2/98	10:19	D	1	6840	1000	7.9	13	<0.05	6	1.84		1280	260								
	10/1/98	10:40	D	1	7500	10	8.0	14	<0.05	1	<0.061		80	22								
	11/8/98	5:51	ST	5	435	95	7.3	4.20	0.41	2.25	3.37		470	90	5	28	32	10	32	<2	195	110
	11/8/98	6:51	SF												<1	<8	10	<2	11	<2	24	
	11/8/98	8:51	ST	10	4090	580	7.7	14.00	0.64	7.26	8.57		2580	320	16	98	66	20	90	<2	492	1235
	11/9/98	2:51	SF												5	37	31	5	52	<2	140	
	11/9/98	10:51	ST	37	8280	58	8.1	14.00	0.22	3.40	1.44		340	60	23	16	34	5	117	<2	182	2912
	11/12/98	4:51	SF												17	<8	22	<2	113	<2	54	
	11/28/98	5:08	ST	5											6	21	37	12	35	<2	209	160
	11/28/98	6:08	SF												<1	<8	10	<2	10	<2	19	
	11/28/98	8:08	ST	13	3390	900	7.8	10	0	1	9		1900	720	14	108	72	20	92	<2	481	1030
	11/28/98	8:08	SF												2	<8	13	<2	38	<2	14	
	11/29/98	10:08	ST	28	7970	152	8.2	12	<0.05	3	2		700	110	25	28	37	5	128	<2	184	2750
	12/1/98	16:08	SF												16	<8	20	<2	129	<2	34	
	12/1/98	18:08	ST	8	3490	3360	7.9	8	1	6	6		1910	750	12	66	48	11	82	<2	286	1155
	12/2/98	8:08	SF												4	<8	12	<2	56	<2	15	
	12/7/98	11:15	D	1	6570	120	8.1	13	0	3	1		580	100								
	1/13/99	10:10	D	1	9640	6	8.1	22	<0.05	1	1		41	13								
	2/9/99	17:32	ST	5	850	190	7.4	3	0	5	3		150	18	10	39	52	20	56	<2	329	264
	2/9/99	18:32	SF												<1	<8	6	<2	14	<2	20	
	2/9/99	20:32	ST	6	5110	72	8.0	14	0	3	1		260	28	11	14	22	4	90	<2	100	1610
	2/10/99	6:32	SF												8	<8	14	<2	84	<2	40	
	2/10/99	8:32	ST	41	10400	14	8.1	21	<0.05	1	0		200	18	26	<8	28	<2	204	<2	109	3228
	2/13/99	16:32	SF												24	<8	25	<2	207	<2	100	
	2/18/99	11:40	D	1	12000	14	8.2	22	<0.05	1	0		58	15								
	3/1/99	11:16	D	1	10300	13	8.4	19	<0.05	2	1		48	11								
	3/11/99	11:27	ST	5	1520	130	7.7	6	1	2	2		100	30	21	26	70	18	81	<2	433	464
	3/11/99	12:27	SF												1	<8	15	<2	28	<2	31	
	3/11/99	14:27	ST	5	7120	13	8.2	16	0	1	0		78	20	18	8	26	<2	129	<2	105	2460
	3/11/99	22:27	SF												17	<8	22	<2	128	<2	67	
	3/12/99	0:27	ST	8	8670	9	8.3	19	<0.05	1	0		48	11	21	<8	30	<2	148	<2	88	2618
	3/12/99	14:27	SF												18	<8	27	<2	140	<2	58	
	3/25/99	11:59	ST	5	1490	112	7.4	6	1	6	4		510	420	14	26	60	19	70	<2	444	394
	3/25/99	12:59	SF												3	<8	23	<2	30	<2	35	
	3/25/99	14:59	ST	9	4380	54	8.0	10	0	1	1		180	24	9	<8	30	2	70	<2	89	1268
	3/26/99	6:59	SF												8	<8	25	<2	64	<2	46	
	3/26/99	8:59	ST	38	9920	15	8.2	20	0	2	1		74	15	29	<8	30	<2	207	<2	117	3046
	3/29/99	10:59	SF												26	<8	25	<2	199	<2	67	

STATION	DATE	TIME	SAMPLES Type	#	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd ug/L	Cr ug/L	Cu ug/L	Pb ug/L	Ni ug/L	Ag ug/L	Zn ug/L	Hardness mg/L
PDCM01	4/7/99	2:16	ST	5	3350	194	7.9	6	0	2	1		500	110	9	21	30	6	67	<2	165	952
	4/7/99	3:16																				
	4/7/99	5:16	ST	6	3380	323	8.1	8	0	2	2		390	44	9	29	37	5	73	<2	162	1052
	4/7/99	15:16	SF												4	<8	13	<2	49	<2	23	
	4/7/99	17:16	ST	39	10400	15	8.2	22	<0.05	1	1		47	14	30	<8	31	<2	218	<2	132	3325
	4/11/99	1:59	SF												26	<8	27	<2	206	<2	84	
	4/29/99	10:30	D	1	8970	4	8.3	18	<0.05	2	1		18	5								
	5/20/99	12:00	D	1	9050	24	8.3	12	<0.05	1	1		130	18								
	6/9/99	12:00	D	1	9100	6	8.4	19	<0.05	<0.2	1		46	11								
	7/12/99	12:00	D	1	8680	18	8.6	15	<0.05	1	1		136	40								
	10/26/99	12:56	D	24	10200	26	8.1	17	<0.05	1	1		110	88								
	10/27/99	11:56																				
	12/16/99	11:47	D	24	10200	70	8.0	22	0.24	1.70	1.41		390	210								
	12/17/99	10:47																				
	1/7/00	10:41	D	24	8910	65	8.1	19.30	0.19	1.30	1.62		130	72								
	1/8/00	9:41																				
	2/29/00	8:30	D	8	6440	5400	7.9	12	0.38	5.40	11.30		10700	5300								
	2/29/00	18:30																				
	3/3/00	18:50	ST	5									980		14	28	62	10	93	<2	266	1280
	3/3/00	19:50	SF												6	<8	16	<2	57	<2	56	
	3/3/00	21:50	ST	9									190		19	9	25	3	144	<2	137	1950
	3/4/00	13:50	SF												16	<8	15	<2	138	<2	66	
	3/4/00	15:50	DT	9									940		13	43	42	9	100	<2	241	875
	3/5/00	9:50	DF												4	<8	10	<2	54	<2	24	
	3/5/00	9:50	DT	11	3390	1400	7.6	16	0.79	6.00	7.96		2360	2140	23	117	91	21	161	<2	601	1275
	3/6/00	5:50	DF									0.27			8	19	23	3	86	<2	89	
	3/8/00	7:50	DT	24									740									
	3/8/00	5:50																				
	3/8/00	7:50	ST	9									1390									
	3/9/00	23:50																				
	3/23/00	14:18	D	24	10800	110	8.0	17	0.07	2.60	1.47		380	218								
	3/24/00	12:26																				
	4/6/00	13:51	D	24	8980	117	8.1	18	0.18	2.20	2.75		630	260								
	4/7/00	12:00																				
	4/17/00	13:50	ST	5									1780		47	110	210	49	240	<2	1400	416
	4/17/00	14:50	SF												<1	<8	23	<2	60	<2	39	
	4/17/00	16:50	ST	4									1950		14	150	120	25	130	<2	610	724
	4/17/00	22:50	SF												1	<8	13	<2	33	<2	21	
	4/18/00	0:50	ST	3									1210		10	63	63	11	88	<2	270	620
	4/18/00	4:50	SF												3	<8	20	<2	47	<2	23	
	4/18/00	6:50	ST	6									280		14	15	31	3	110	<2	100	840
	4/18/00	16:50	SF												10	<8	24	<2	98	<2	34	
	4/18/00	18:50	ST	34									110		27	<8	41	<2	200	<2	110	1008
	4/21/00	12:50	SF												22	<8	34	<2	180	<2	53	
	5/30/00	13:47	D	24	7060	74	8.2	14	0.12	2.20	1.32		96	56								
	5/31/00	12:12																				
	6/29/00	12:28	D	24	6790	1400	8.0	11	0.11	4.50	8.87		3700	254								
	6/30/00	11:28																				

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd ug/L	Cr ug/L	Cu ug/L	Pb ug/L	Ni ug/L	Ag ug/L	Zn ug/L	Hardness mg/L
SDCM02	8/27/91	15:00	D	24	14000	2.4	8.2	<0.2	<0.1	0.9	1		9	<5								
	8/28/91	14:00																				
	9/24/91	11:30	D	25	19000	1.9	8.2	0.7	<0.1	0.6	0.9		25	14								
	9/25/91	11:30																				
	10/22/91	11:45	D	25	2300	3	8.7	7.9	0.2	1.6	1.6		44	10								
	10/23/91	11:45																				
	11/12/91	10:30	D	24	11000	3.8	8	4.5	0.2	<0.5	0.55		150	27								
	11/13/91	9:30																				
	12/12/91	15:20	D	1	35000	12	8.3	4.3	0.1	2.4	1.5		<5	<5								
	3/3/92	13:30	ST	5	3600	52	8	6.6	<0.1	1.7	5.2		66	13	4	<10	13	<2	60	<2	70	974
	3/4/92	5:30																				
	3/4/92	9:30	ST	11	10000	42	8	5.8	<0.1	1.8	1.2		62	14	8	<10	25	<2	90	<2	100	>2000
	3/6/92	1:30																				
	3/6/92	5:30	ST	8	3500	40	8.2	6.7	<0.1	1.3	1.2		50	8	5	<10	13	<2	60	<2	50	1014
	3/7/92	9:30																				
	3/20/92	16:04	ST	4	2500	330	7.5	2.3	0.3	1.5	5.5		610	110	<20	<30	50	28	50	<10	320	770
	3/20/92	18:04																				
	3/20/92	19:04	ST	8	560	440	7.3	2.4	<0.1	0.6	1.5		640	82	<20	<30	<20	<2	<40	<10	50	200
	3/21/92	16:04																				
	3/21/92	17:00	ST	10	3000	40	8.1	4.9	0.1	1.4	2		44	13	<20	<30	<20	<2	<40	<10	50	854
	3/22/92	9:01																				
	6/17/92	14:20	ST	4	9800	74	8	1	0.5	1.5	3.6		480	97	<20	<30	60	13	50	<10	160	
	6/17/92	16:20																				
	6/18/92	13:30	ST	1	5800	24	9.1	2.3	0.4	0.9	1.9		94	21	<20	<30	30	4	<40	<10	40	
	8/31/92	11:35	D	1	5900	8	9.2	<0.2	<0.1	0.6	0.7		25	23								
	9/30/92	11:20	D	1	5000	5.9	9.2	0.8	<0.1	1	0.7		17	10								
	10/29/92	14:10	D	1	28000	8.3	8.7	1.8	<0.1	1	0.4		67	26								
	11/25/92	13:30	D	1	14000	5.6	8.8	1.3	<0.1	1	0.8		37	18								
	12/29/92	8:40	ST	3	2400	330	7.6	2.9	0.4	1.9	4.5		430	54	<20	<30	23	8	<40	14	100	
	12/29/92	16:40																				
	12/29/92	18:40	ST	3	1900	210	7.7	2.6	0.3	1.1	5.6		270	36	<20	<30	<20	3	<40	<10	47	
	12/30/92	4:40																				
	6/29/93	10:45	D	23	12000	15	8.2	0.6	<0.1	2	0.5		42	18								
	6/30/93	9:45																				
	7/21/93	13:15	D	1	9300	5	8.1	0.87	0.19	1.6	1.4		50	22								
	8/9/93	13:09	D	14	13000	12	8.2	1.9	<0.1	1.4	0.24		61	23								
	8/10/93	2:09																				
	12/29/93	12:50	D	1	28000	9.1	8.1	1.3	0.17	<0.1	<0.1		135	20								
	1/12/94	10:21	D	24	15000	5.3	8.2	6.6	<0.1	0.86	1.2		49	20								
	1/13/94	9:21																				
	1/25/94	3:00	DT	1											57	23	170	180	360	<10	2800	800
	2/3/94	19:30	ST	5	1900	90	7.3	5.6	0.61	2.4	1.8		190	32	<5	14	55	24	<40	<10	170	370
	2/4/94	3:30																				
	2/7/94	2:29	ST	4	1500	46	8	4.4	0.55	0.93	1		96	14	<5	<10	<20	3.8	<40	<10	43	330
	2/7/94	8:29																				
	2/7/94	10:29	ST	9	1000	120	8	4.2	0.6	<0.1	2		230	25	<5	<10	<20	5.6	<40	<10	61	244
	2/8/94	8:29																				
	2/8/94	10:30	ST	5	2700	40	8.2	2.7	<0.1	0.53	1.1		84	12	<5	<10	20	<2	<40	<10	38	670
	2/8/94	18:30																				

STATION	DATE	TIME	SAMPLES Type	#	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd ug/L	Cr ug/L	Cu ug/L	Pb ug/L	Ni ug/L	Ag ug/L	Zn ug/L	Hardness mg/L
SDCM02	2/10/94	13:45	ST	7	9300	2.3	8.3	3.1	<0.1	0.44	0.57		47	8	<5	<10	<20	<2	58	<10	90	2250
	2/11/94	0:29																				
	2/17/94	5:48	ST	3	2400	80	7.6	7.6	0.23	4	1.9		260	28	<5	29	52	36	<40	<10	250	452
	2/17/94	9:48																				
	2/17/94	11:48	ST	11	2200	72	7.8	<0.2	0.26	2.2	2.7		160	12	<5	20	26	4.6	<40	<10	85	548
	2/18/94	7:48																				
	2/18/94	9:48	ST	12	1400	100	7.5	3.2	0.21	1.2	1.9		190	11	<5	21	<20	9.6	<40	<10	79	370
	2/19/94	7:48																				
	2/19/94	9:48	ST	5	3400	12	8.5	6.2	<0.1	1.8	2		26	<5	<5	<10	<20	<2	<40	<10	27	745
	2/19/94	17:48																				
	2/20/94	7:48	ST	13	2100	120	8.4	6.3	<0.1	1.6	2.1		280	10	<5	20	23	6.4	<40	<10	84	498
	2/20/94	15:48																				
	3/19/94	1:03	ST	2				1.7	<0.1	1.8	1.5				<5	15	29	3.2	<40	<10	84	1350
	3/19/94	3:03																				
	3/19/94	5:03	ST	7	790	160	7.7	2.3	0.17	1.6	2.2		260	38	<5	15	24	9.4	<40	<10	72	214
	3/19/94	17:03																				
	3/20/94	3:03	ST	3	610	460	7.7	2	0.2	1.1	2.1		380	92	<5	50	40	11	<40	<10	180	160
	3/20/94	7:03																				
	3/25/94	5:41	ST	14	3700	44	7.9	3.5	<0.1	<0.2	1.7		68	13	<5	<10	<20	<2	<40	<10	47	615
	3/26/94	7:41																				
	3/26/94	9:41	ST	5											<5	<10	<20	<2	46	<10	19	1800
	3/26/94	17:41																				
	3/28/94	10:41	ST	5	8300	5.1	8.8	0.81	<0.1	0.56	1.1		14	7	<5	<10	<20	<2	<40	<10	17	1728
	3/28/94	17:41																				
	4/25/94	13:50	ST	4	2800	330	7.9	3.9	<0.1	3.7	4.8		1500	5	5.5	43	49	17	54	<10	230	480
	4/25/94	19:50																				
	4/25/94	21:50	ST	19	3900	130	8.2	3.5	<0.1	1.5	2		380	26	<5	14	27	6.1	<40	<10	110	690
	4/27/94	9:50																				
	4/27/94	11:50	ST	2				1.8	0.12	1.7	0.84				<5	11	23	19	<40	<10	59	2226
	4/27/94	13:50																		1		
	5/3/94	10:44	DT	24	10000	100	8.2	2.4	0.1	2.6	7.5		300	21	5.1	<10	28	<2	<40	0.7	14	
	5/4/94	9:44																				
	5/25/94	12:00	DT	24	9600	13	8.4	4.3	0.13	1.2	0.56		59	16	6.2	<10	17	<2	46	<0.3	63	1750
	5/26/94	11:00																				
	6/23/94	10:05	D	1	4900	2.8	9.5	0.27	<0.1	0.8	0.48		13	<5								
	7/19/94	10:48	D	24	13000	2.3	8.4	3.4	0.18	0.95	1.3		77	11								
	7/20/94	9:48																				
	10/26/94	10:09	D	24	8600	23	8.3	11	0.5	2.5	2.1		440	17								
	10/27/94	9:09																				
	11/7/94	9:26	D	24	9900	2.2	8.4	1.4	<0.2	1.4	0.46		37	14								
	11/8/94	8:26																				
	11/10/94	15:06	ST	4	940	310	6.1	5.1	0.48	3.3	2.8		760	70	7.8	30	65	19	<40	<0.3	250	565
	11/10/94	21:06																				
	5/25/95	14:15	D	1	11000	1.6	8.3	2.4	<0.1	0.77	0.21		24	13								
	6/21/95	12:09	D	24	11000	2.7	8.2	<0.2	0.1	1.2	0.28		18	11								
	6/22/95	11:09																				
	7/25/95	12:45	D	24	960	4.7	8.4	<0.2	<0.10	1.00	<0.20		18	13								
	7/26/95	11:45																				
	8/28/95	10:50	D	24	1200	5.1	8.4	1.4	0.47	1.70	0.47		32	15								
	8/29/95	9:50																				
	9/11/95	14:31	DT	24	12000	7.0	8.5	1.5	0.18	2.30	0.67		35	16	4	<10	31	<2	59	<1	63	
	9/12/95	13:31																				
	10/18/95	12:00	D	24	12000	9.7	8.4	2.1	0.11	1.80	0.65		36	14								
	10/19/95	11:00																				
	11/20/95	11:24	D	24	11000	6.7	8.4	5.3	0.20	2.20	1.00		43	29								
	11/21/95	10:24																				
	12/20/95	9:40	D	1	25000	6.9	8.1	7.0	0.69	2.00	0.75		49	23								
	1/19/96	6:13	ST	5	2700	100.0	7.7	11.0	0.86	4.00	2.70		140	37	5	<10	38	46	34	<1	250	652
	1/19/96	7:13																				
	1/19/96	9:13	ST	5	8500	24.0	8.7	6.1	<0.10	1.50	0.66		42	12	2	<10	17	2	22	<1	44	1266

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd ug/L	Cr ug/L	Cu ug/L	Pb ug/L	Ni ug/L	Ag ug/L	Zn ug/L	Hardness mg/L
SDCM02	1/19/96	17:13																				
	1/19/96	19:13	ST	23	6500	5.5	8.4	3.2	<0.10	1.10	0.46		19	9	5	<10	17	<2	77	<1	43	1906
	1/21/96	15:13																				
	1/21/96	17:13	ST	11	2300	74.0	7.6	3.3	<0.10	1.30	1.10		100	20	3	<10	23	11	26	<1	110	520
	1/22/96	13:13																				
	1/22/96	15:13	ST	8	5100	5.2	8.2	4.0	<0.10	1.10	0.46		13	9	4	<5	14	<2	36	2	63	1140
	1/23/96	5:13																				
	1/31/96	3:17	ST	5	1200	140.0	7.5	3.6	0.36	6.00	2.20		280	48	4	27	46	24	30	<1	250	278
	1/31/96	4:17																				
	1/31/96	6:17	ST	6	1900	92.0	7.9	3.3	<0.10	1.70	2.00		230	36	2	18	30	15	26	<1	140	62
	1/31/96	16:17																				
	2/15/96	10:00	DT	1	13000	2.6	7.9	2.4	0.25	1.00	<0.20		28	15	8	15	52	<2	78	3	26	14044
	2/20/96	2:50	ST	5	1500	360.0	7.1	3.9	0.38	5.20	2.70		540	84	8	22	77	44	37	1	380	415
	2/20/96	3:50																				
	2/20/96	5:50	ST	24	1600	350.0	7.7	4.1	0.24	2.70	3.00		700	62	7	40	40	13	41	<1	190	395
	2/22/96	3:50																				
	2/22/96	11:50	ST	3	5600	24.0	8.8	6.1	0.24	1.80	1.70		47	15	5	16	21	<2	50	<1	23	1610
	2/22/96	15:50																				
	3/12/96	14:14	ST	5	3400	340.0	7.9	4.0	0.39	5.30	2.50		530	75	<1	27	48	24	61	<1	320	682
	3/12/96	15:14																				
	3/12/96	17:14	ST	11	2300	240.0	8.0	3.2	0.20	2.10	1.90		470	64	<1	29	36	8	36	<1	120	396
	3/13/96	15:14																				
	3/13/96	17:14	ST	35	11000	2.1	8.4	1.9	0.15	<0.50	0.26		23	9	4	<5	26	<2	75	<1	46	2500
	3/16/96	13:14																				
	4/17/96	13:35	DT	1	9300	100.0	8.0	0.5	0.70	9.60	3.80		770	130	15	18	150	24	83	2	360	1770
	5/28/96	14:40	DT	1	23000	2.6	9.6	<0.2	0.11	1.10	0.32		55	20	<1	<10	17	<2	30	<1	43	
	6/19/96	13:00	DT	1	8440	3.3	9.6	<0.2	0.23	1.50	0.46		36	<6	<1	<10	12	<2	26	<1	23	1816
	7/24/96	14:25	DT	23	12000	130.0	8.4	<0.2	0.27	6.30	3.40		350	84	12	<10	52	19	98	<1	62	1965
	7/25/96	13:25																				
	8/27/96	12:45	DT	24	7100	54.0	8.4	1.8	0.26	2.60	1.40		150	1962	10	<10	41	9	53	<1	190	56
	8/28/96	11:45																				
	9/24/96	13:00	DT	23	10000	47.0	8.3	1.2	<0.1	2.30	0.74		140	25	8	<10	32	5	44	<1	180	2356
	9/25/96	11:00																				
	11/6/96	12:50	DT	1	6800	3.2	9.0	4.0	0.20	1.90	1.10		19	6								
	11/21/96	12:37	ST	5	2200	350.0	7.5	9.8	1.30	9.70	5.20		660	140	7	26	110	80	58	<1	700	440
	11/21/96	13:37																				
	11/21/96	15:37	ST	10	970	830.0	7.8	4.4	0.18	3.40	5.80		1800	120	5	81	90	17	80	<1	280	292
	11/22/96	9:37																				

SOUTH[illegible]NTY WATERSHED

STATION	DATE	TIME	SAMPLES Type	#	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd ug/L	Cr ug/L	Cu ug/L	Pb ug/L	Ni ug/L	Ag ug/L	Zn ug/L	Hardness mg/L
SDCM02	11/22/96	11:37	ST	36	5700	40.0	8.2	20.0	0.28	2.10	0.89		78	15	28	15	29	1	228	<0.1	125	1792
	11/25/96	13:05																				
	12/4/96	13:45	DT	1	29000	15.0	8.2	2.3	0.25	0.89	0.27		83	23	6	<10	12	<2	72	<1	52	5780
	1/29/97	12:25	DT	1	17000	7.3	8.6	7.8	<0.1	2.00	0.72		60	28	11	<10	10	<2	150	<1	78	3470
	2/26/97	13:35	DT	1	27000	4.4	8.8	0.9	<0.1	1.90	0.27		54	12	2	<2	12	1	42	<0.1	25	4220
	3/18/97	13:11	DT	22	14000	140.0	8.2	2.5	<0.5	6.80	2.20		660	260	18	<10	37	15	110	1	350	3300
	3/19/97	12:11																				
	4/8/97	9:00	DT	24	14000	5.1	8.1	5.9	<0.5	1.80	0.69		37	17	6	<10	42	<2	75	<1	<10	2650
	4/9/97	8:00																				
	5/6/97	13:00	DT	22	14000	3.7	8.3	1.2	<0.1	1.50	0.38		33	15	5	<10	53	<2	52	<1	54	2700
	5/7/97	10:00																				
	6/5/97	8:20	D		15000	4.1	8.2	1.2	0.44	1.80	0.89		59	22								
	7/2/97	8:50	D	1	8600	3.2	8.4	1.9	0.23	4.6	1.40		46	24								
	8/7/97	8:15	D	1	19000	5.3	7.9	2.9	0.40	2.0	0.85		48	20								
	9/17/97	10:10	D	1	20000	8.9	8.5	3.8	0.43	2.6	1.50		70	32								
	10/9/97	12:45	D	1	14000	4.0	9.9	1.7	<0.1	1.8	1.10		35	12								
	1/9/98	5:18	ST	6	5500	110	7.8	9.7	0.76	4.0	3.10	<0.5	400	72	<10	10	43	22	62	<1	480	1320
	1/9/98	6:19	SF												<10	<10	14	<2	37	<1	93	
	1/9/98	6:19	ST	19	1900	240	7.6	3.7	<0.5	2.4	2.40	1	630	63	1.0	14	32	8	30	<1	14	710
	1/10/98	18:19	SF												<1	10	25	4	19	<1	<10	
	1/10/98	20:19	ST	18	5400	8.3	8.1	5.8	<0.5	2.0	0.90	<0.5	17	10	3	<10	18	<2	67	<1	110	1430
	1/12/98	6:19	SF												3	<10	16	<2	59	<1	99	
	2/14/98	9:38	ST	6	1300	130	7.5	8.4	0.55	3.0	1.70		370	72	4	14	40	25	30	<1.00	131	230
	2/14/98	10:39	SF												1	7.70	14	1	17	1	32	
	2/14/98	12:39	ST	14	1800	510	7.8	7.1	<0.5	1.6	10.40		1500	200	5	50	54	13	63.0	<1.00	91	544
	2/15/98	14:39	SF												1.10	3	16	<2	32	<1.00	9	
	2/16/98	20:39	ST	12	1500	440	7.7	5.8	<0.5	3.7	9.80				4	46	39	14	49	<1.00	119	300
	2/17/98	18:39	SF												<1.00	7	19	<1.00	28	<1.00	13	
	3/25/98	6:12	ST	5	2860	140	7.38	12.8	0.2	5.5	0.10		2620	81	17	10.0	36	19	105	<1.00	175	865
	3/25/98	7:12	SF												3.40	3	28	2	59.0	<1.00	53.0	
	3/25/98	9:12	ST	6	718	1900	7.60	7.1	0.3	3.5	0.90		968	211	8	78	58	28	69	1.30	191	240
	3/25/98	19:12	SF												<1.00	3	19	2	12	<1.00	23	
	3/25/98	21:12	ST	18	26700	600	7.89	7.5	0.5	3.7	1.20		1260	103	6	58	44	22	73	2.10	143	684
	3/27/98	19:12	SF												2	2	19	1	41	<1.00	30	
	3/27/98	21:12	ST	18	2050	610	7.97	1.8	0.3	3.1	0.90		1400	106	8	46	51	18	80	<1.00	158	655
	3/29/98	7:12	SF												2	2	10	2	39	<1.00	13	
	6/22/98	9:40	D	1	25600	4.7	8.0	<1.3	<0.05	2.0	0.18		48	30								
	7/20/98	12:40	D	1	10200	3	8.7	1.4	<0.05	2.50	0.06		100	26								
	8/11/98	12:44	D	1	5830	9	8.9	02	0.06	3.50	0.61		44	15								
	9/2/98	10:04	D	1	14400	5	8.4	3.1	0.28	2.70	1.19		64	22								
	10/1/98	10:15	D	1	11000	3	8.5	1.3	<0.05	1.60	0.31		50	12								
	11/8/98	4:26	ST	1											46	45	178	205	143	<2	1530	921
	12/7/98	11:00	D	1	38300	38	8.0	8.7	<0.05	1.76	0.89		260	34								
	1/13/99	10:00	D	1	7450	4	8.5	10.0	<0.05	1.36	0.37		25	6								
	2/9/99	16:29	ST	5	5130	80	8.1	11.0	0.10	4.73	1.99		260	48	6	14	37	11	55	<2	169	1352
	2/9/99	17:29	SF												1	<8	10	<2	22	<2	18	
	2/18/99	12:00	D	1	18100	6	8.6	3.8	0.05	0.78	0.28		61	16								
	3/1/99	11:41	D	1	23700	8	8.6	3.3	<0.05	1.90	0.52		85	20								
	3/11/99	10:58	ST	5	3740	68	8.5	5.0	0.32	2.30	1.47		250	60	10	12	71	24	60	<2	360	1080
	3/11/99	11:58	SF												2	<8	34	<2	30	<2	42	
	3/11/99	13:58	ST	6	2290	72	8.1	5.2	0.06	1.44	0.43		160	32	4	10	33	4	38	<2	94	618
	3/11/99	23:58	SF												2	<8	21	<2	31	<2	24	
	3/12/99	1:58	ST	39	7170	4	8.4	5.2	0.08	1.50	0.18		28	10	4	<8	34	2	54	<2	42	1908
	3/15/99	5:58	SF												3	<8	31	<2	51	<2	29	
	3/15/99	8:26	ST	5	2040	76	7.7	5.5	0.61	2.98	1.01		360	130	6	11	47	22	36	<2	285	688
	3/15/99	9:26	SF												2	<8	22	4	23	<2	79	
	3/15/99	11:26	ST	2	900	124	7.7	3.4	0.17	2.30	1.04		510	130	7	17	38	9	30	<2	193	232
	3/15/99	13:26																				

SOUTH COUNTY WATERSHED

STATION	DATE	TIME	SAMPLES Type	#	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd ug/L	Cr ug/L	Cu ug/L	Pb ug/L	Ni ug/L	Ag ug/L	Zn ug/L	Hardness mg/L
SDCM02	4/6/99	13:41	ST	5	3080	122	7.9	4.8	0.60	6.11	1.41		280	130	6	10	52	19	44	<2	264	800
	4/6/99	14:41	SF												<1	<8	29	<2	19	<2	29	
	4/6/99	16:41	ST	15	1760	161	8.1	3.8	0.20	1.23	1.49		230	30	2	9	26	3	23	<2	82	440
	4/7/99	20:22	SF												<1	<8	15	<2	15	<2	16	
	4/7/99	22:41	ST	8	5060	47	8.3	7.5	0.36	1.33	0.89		86	14	3	<8	27	<2	39	<2	53	1400
	4/8/99	20:41	SF												2	<8	18	<2	35	<2	22	
	4/8/99	22:41	ST	2	3460	38	8.0	6.6	0.26	2.13	0.78		60	17	3	<8	25	4	37	<2	93	855
	4/9/99	0:41	SF												2	<8	20	<2	33	<2	47	
	4/9/99	2:41	ST	17	6130	3.8	8.3	4.8	0.10	1.18	0.25		21	6	4	<8	21	<2	65	<2	41	1658
	4/10/99	13:44	SF												4	<8	20	<2	63	<2	23	
	4/29/99	10:15	D	1	7760	5.9	8.8	<0.44	<0.05	1.64	0.34		53	15								
	6/9/99	12:15	D	1	5370	2.2	9.6	0.92	<0.05	2.05	0.35		22	13								
	7/12/99	11:35	D	1	4510	1.0	9.5	<0.44	<0.05	0.94	0.25		17	<1								
	10/26/99	12:23	D	24	6380	6.2	8.4	45.8	0.538	1.9	0.83		57	28								
	10/27/99	11:23																				
	12/16/99	10:56	D	24	7230	5.1	8.2	48.4	0.265	1.3	1.10		19	10								
	12/17/99	9:56																				
	1/7/00	10:06	D	24	7150	7.6	8.2	30.7	1.79	4.1	1.84		24	11								
	1/8/00	9:06																				
	3/23/00	13:21	D	24	7140	2.4	8.5	3.4	<0.05	1.10	0.31		54	30								
	3/24/00	11:49																				
	4/6/00	12:54	D	24	5640	28	8.6	5.3	0.28	2.30	1.07		150	50								
	4/7/00	11:07																				
	5/30/00	13:18	D	24	5240	3.7	8.7	5.5	0.05	1.90	0.43		42	30								
	5/31/00	11:50																				
	6/29/00	10:24	D	24	4290	45	8.5	<0.44	<0.05	3.70	2.45		120	15								
	6/30/00	9:24																				

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	pH	NH3 mg/L	PO4 mg/L	TSS mg/L	Cd ug/L	Cu ug/L	Ni ug/L	Ag ug/L	Hardness mg/L
SCDAM	3/5/92	17:00	ST	4	930	7.5	<0.1	0.8	<5	<2	11	30	<2	300
	3/6/92	2:00												
	3/6/92	5:00	ST	15	920	7.5	<0.1	0.8	<5	<2	6	20	<2	318
	3/9/92	17:00												
	3/19/92	19:59	ST	4	1700	7.9	<0.1	1.7	12	<20	<20	50	<10	608
	3/19/92	21:59												
	3/19/92	22:59	ST	10	1400	7.6	0.2	1.5	12	<20	<20	<40	<10	522
	3/21/92	7:59												
	3/21/92	13:59	ST	10	1100	7.5	0.3	2.3	<5	<20	<20	<40	<10	356
	3/23/92	19:59												
	1/6/93	12:52	ST	12	960	7.7	0.2	1.2	45	<20	<20	<40	<10	270
	1/7/93	8:52												
	1/7/93	9:52	ST	12	930	7.7	0.3	1.2	46	<20	<20	<40	<10	280
	1/8/93	6:52												
	1/8/93	12:05	ST	10	990	7.9	0.3	0.9	48	<20	<20	<40	<10	304
	1/9/93	6:05												
	1/9/93	8:05	ST	13	1000	7.9	0.3	1.3	24	<20	<20	<40	<10	344
	1/10/93	10:05												
	1/15/93	10:30	ST	12	1000	7.8	0.2	1.2	66	<7	<30	33	<4	416
	1/16/93	8:30												
	1/16/93	10:30	ST	12	790	7.7	0.2	1.5	99	7	<30	29	<4	312
	1/17/93	8:30												
	1/17/93	11:22	ST	12	820	7.8	0.2	1.2	64	<7	<30	45	<4	288
	1/18/93	9:22												
	1/18/93	11:22	ST	12	800	7.8	0.2	1.1	57	32	<30	51	5	296
	1/19/93	9:22												
	2/8/93	10:50	ST	8	940	7.5	0.2	1.9	75	<20	<20	<40	<10	432
	2/9/93	0:51												
	2/9/93	2:51	ST	6	920	7.8	0.2	1.9	55	<20	<20	<40	<10	320
	2/9/93	14:51												
	2/10/93	11:00	ST	12	920	7.7	1.5	0.8	23	<7	<30	<3	<4	304
	2/11/93	9:10												
	2/11/93	11:10	ST	11	1100	7.7	0.1	1	18	<7	33	37	<4	385
	2/12/93	7:10												
	1/25/94	2:20	ST	4	3200	8.2	0.54	0.48	19	<5	53	<40	<10	1010
	1/25/94	8:20												
	1/25/94	10:20	ST	12	3100	8.2	0.58	0.62	19	<5	44	<40	<10	980
	1/26/94	8:20												
	1/26/94	10:20	ST	14	3200	8.1	0.5	12	20	<5	39	<40	<10	880
	1/27/94	12:20												
	1/27/94	13:00	ST	9	3100	8.2	0.58	0.83	14	<5	41	<40	<10	1036
	1/28/94	5:00												
	1/28/94	7:00	ST	10	3100	8.2	0.56	0.7	13	<5	38	<40	<10	992
	1/29/94	1:00												
	2/3/94	22:00	ST	4	3400	7.9	0.73	0.34	23	<5	44	<40	<10	1034
	2/4/94	4:00												
	2/4/94	6:00	ST	15	3000	8	0.57	17	18	<5	33	<40	<10	
	2/5/94	10:00												
	2/5/94	12:00	ST	12	2800	8.1	0.41	0.37	16	<5	<20	<40	<10	904
	2/6/94	10:00												
	2/6/94	12:00	ST	11	2800	6.1	0.25	0.48	18	<5	<20	<40	<10	944
	2/7/94	8:00												
	2/7/94	10:00	ST	6	2500	8.2	0.27	1.1	35	<5	<20	<40	<10	760
	2/7/94	20:00												
	2/7/94	22:00	ST	10	2300	8.1	0.24	0.21	21	<5	<20	<40	<10	678
	2/8/94	16:00												

Appendix 5.2

SOUTH COUNTY WATERSHED

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	pH	NH3 mg/L	PO4 mg/L	TSS mg/L	Cd ug/L	Cu ug/L	Ni ug/L	Ag ug/L	Hardness mg/L
SCDAM	2/9/94	11:20	ST	14	2300	8.3	0.24	1	18	<5	<20	<40	<10	770
	2/10/94	13:20												
	2/17/94	5:29	ST	4	2900	8	0.61	1.2	32	<5	<20	<40	<10	1014
	2/17/94	11:29												
	2/17/94	13:29	ST	11	1700	8.2	0.19	0.77	28	<5	<20	<40	<10	506
	2/18/94	9:29												
	2/18/94	11:29	ST	12	1600	7.6	0.16	1.3	43	<5	<20	<40	<10	500
	2/19/94	9:29												
	2/19/94	11:29	ST	14	1800	6.7	0.12	1.2	31	<5	21	<40	<10	509
	2/20/94	13:29												
	2/20/94	15:29	ST	10	1300	8	0.17	1.1	56	<5	<20	<40	<10	327
	2/21/94	9:29												
	3/25/94	14:35	ST	10	1700	7.6	0.34	1.3	8	<5	<20	<40	<10	570
	3/26/94	8:35												
	3/26/94	10:35	ST	12	1600	8.2	0.3	1.2	<5	<5	<20	<40	<10	440
	3/27/94	8:35												
	3/27/94	10:35	ST	12	1700	8.1	0.21	0.91	<5	<5	<20	<40	<10	416
	3/28/94	8:35												
	3/28/94	10:32	ST	5	1700	8.5	<0.1	1.1	<5	<5	<20	<40	<10	508
	3/28/94	18:32												
	3/12/96	15:42	ST	5	1800	8.4	<0.10	0.87	23	3	22	28	<1	574
	3/12/96	16:42												
	3/12/96	18:42	ST	8	180	8.3	<0.10	0.91	21	2	21	33	<1	570
	3/13/96	8:42												
	3/13/96	10:42	ST	39	1700	8.3	<0.10	0.55	12	1	25	27	<1	600
	3/16/96	14:42												
	4/18/96	0:33	ST	5	2100	9.0	0.57	1.30	25	2	14	23	<1	686
	4/18/96	1:33												
	4/18/96	3:33	ST	4	2100	9.3	0.11	1.60	42	1	33	25	<1	750
	4/18/96	9:33												
	4/18/96	11:33	ST	40	2100	8.8	<0.10	1.50	25	1	15	20	<1	706
	4/21/96	17:33												

SOUTH[illegible]NTY WATERSHED

STATION	DATE	TIME	SAMPLES Type	#	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd ug/L	Cr ug/L	Cu ug/L	Pb ug/L	Ni ug/L	Ag ug/L	Zn ug/L	Hardness mg/L
SJNL01	2/7/92	14:15	ST		1400	7.9	8	7.4	0.06	<0.5	0.5		<5	<5	<20	<30	<20	<2	<40	<10	20	
	3/6/92	13:45	ST	12	940	24	8	5.4	<0.1	1.2	1.15		27	9	3	<10	6	<2	<10	<2	<10	322
	3/7/92	11:45																				
	3/7/92	13:45	ST	11	900	90	7.9	5.3	<0.1	1.4	1.15		100	18	<2	<10	6	3	<10	<2	20	190
	3/8/92	11:45																				
	6/17/92	13:40	DT	24	1400	7.1	8.1	<0.2	<0.1	0.4	0.2		18	6	<20	<30	<20	3	<40	<10	10	
	6/18/92	12:40																				
	2/8/93	12:18	ST	12	370	700	8.1	2.3	0.2	1.2	3.2		1100	110	<20	<30	<20	24	<40	<10	60	124
	2/9/93	10:18																				
	2/9/93	12:18	ST	12	340	250	8.2	1.7	0.2	0.6	1.4		280	27	<20	<30	<20	3	<40	<10	19	108
	2/10/93	10:18																				
	2/10/93	12:10	ST	12	390	100	8	1.8	0.1	0.6	0.6		130	14	<7	10	60	3	8	<4	27	125
	2/11/93	10:10																				
	2/11/93	12:10	ST	11	420	66	8.1	1.8	0.1	0.5	0.6		110	12	<7	<10	40	<2	4	<4	<20	145
	2/12/93	8:10																				
	2/18/93	12:50	ST	7	440	830	8.1	2.6	0.1	2.2	5.3		1200	120	<7	32	40	10	20	<4	59	164
	2/19/93	0:50																				
	2/19/93	2:50	ST	15	250	640	8.1	1.4	<0.1	1.2	3.2		1500	130	<7	10	<30	9	8	<4	43	104
	2/20/93	7:10																				
	2/20/93	8:48	ST	12	260	320	8	1.7	0.1	1.1	1.4		620	65	<7	<10	<30	<2	5	<4	24	100
	2/21/93	6:48																				
	2/21/93	8:48	ST	12	320	140	8.1	2.2	0.1	0.4	0.6		230	23	<7	<10	<30	<2	<3	<4	<20	110
	2/22/93	6:48																				
	2/23/93	9:00	ST	12	400	200	8	1.8	0.2	0.6	1.5		390	41	<7	<10	<30	3	7	<4	85	116
	2/24/93	7:00																		<4		
	2/24/93	9:00	ST	12	400	120	8	2.1	0.1	0.5	0.8		200	22	<7	<10	<30	<2	3	<4	69	120
	2/25/93	7:00																				
	2/25/93	13:54	ST	11	480	58	8	1.8	0.1	0.3	0.5		110	19	<7	<10	<30	<2	3	<4	<20	172
	2/26/93	9:54																				
	2/26/93	11:54	ST	11	430	260	8	1.9	0.1	0.8	1.7		620	70	<7	<10	<30	6	<3	<4	<20	136
	2/27/93	7:36																				
	6/29/93	13:05	D	24	900	1.2	8.2	0.7	<0.1	0.3	<0.1		<5	<5								
	6/30/93	12:05																				
	7/21/93	14:10	D	1	990	0.89	8.2	0.66	<0.1	0.41	0.28		<5	<5								
	8/9/93	14:11	D	24	1000	2.2	8	1.1	<0.1	0.1	<0.1		<5	<5								
	8/10/93	13:11																				
	9/7/93	10:44	D	24	1100	3.8	8.4	<0.2	<0.1	0.28	0.51		15	7								
	9/8/93	9:44																				
	10/5/93	13:00	D	24	1100	0.75	8.5	<0.2	<0.1	0.32	0.31		9	9								
	10/6/93	12:00																				
	11/3/93	9:48	D	24	1100	0.5	8.2	<0.4	<0.1	0.41	6		<5	<5								
	11/4/93	8:48																				
	11/11/93	3:55	ST	9	1100	360	7.8	5.4	<0.1	4.7	3.9		670	120	8.1	<10	25	3.6	<40	<10	130	340
	11/11/93	19:55																				
	11/11/93	21:55	ST	9	970	110	8	4.7	0.11	2.1	1.6		260	40	<5	<10	<20	<2	<40	<10	55	290
	11/12/93	13:50																				
	11/12/93	14:00	ST	1	990	11	8.1	4.9							<5	<10	70	<50	<40	<10	100	370
	11/13/93	15:55	ST	11	1000	10	8.2	2.8	<0.1	1.1	0.57		82	15	<5	<10	<20	<2	<40	<10	15	324
	11/14/93	11:55																				
	11/14/93	11:50	ST	1	1000	1.7	8.2	2.9							<5	<10	<20	<50	<40	<100	10	660
	11/14/93	13:55	ST	6	1000	2.5	8.2	2.6	<0.1	0.59	0.56		63	6	<5	<10	<20	<2	<40	<10	15	390
	11/15/93	23:55																				
	11/15/93		ST	1	1000	1.1	8.1	2.8					100	<5	<5	<10	<20	<50	<40	<100	<10	440
	12/29/93	13:30	D	1	1100	0.72	8.6	1.8	<0.1	0.21	<0.1		5	<5								
	1/12/94	11:09	D	24	1100	12	8.4	2.9	<0.1	0.61	0.39		31	9								
	1/13/94	10:09																				
	1/25/94	2:56	ST	4	920	95	8	3.8	<0.1	0.77	0.84		240	33	<5	<10	<20	7.3	<40	<10	85	304
	1/25/94	8:56																				
	1/25/94	10:56	ST	12	1100	24	8.1	5.3	<0.1	0.4	<0.1		65	8	<5	<10	<20	<2	<40	<10	30	362
	1/26/94	8:56	SF												<5	<10	<20	<2	<40	<10	<10	

STATION	DATE	TIME	SAMPLES Type	#	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd ug/L	Cr ug/L	Cu ug/L	Pb ug/L	Ni ug/L	Ag ug/L	Zn ug/L	Hardness mg/L
SJNL01	1/26/94	10:56	ST	6	1000	5.6	8.2	1.7	<0.1	0.97	0.46		24	8	<5	<10	<20	<2	<40	<10	14	328
	1/26/94	20:56																				
	1/27/94	10:56	ST	6	990	12	8.3	3.6	<0.1	0.8	0.39		48	16	<5	<10	<20	<2	<40	<10	17	330
	1/28/94	4:15																				
	1/28/94	6:15	ST	11	1000	6.4	8.3	3.4	<0.1	0.6	0.32		22	5	<5	<10	<20	<2	<40	<10	10	354
	1/29/94	2:15																				
	2/4/94	16:46	ST	12	900	74	8.1	5.5	<0.1	1.5	0.88		<5	<5	<5	<10	<20	<2	<40	<10	11	290
	2/5/94	14:46																				
	2/5/94	16:46	ST	12	960	10	8.1	4.9	<0.1	0.7	0.32		130	26	<5	<10	<20	<2	<40	<10	<10	344
	2/6/94	14:46																				
	2/7/94	11:10	ST	4	760	120	8	6.6	0.16	2.6	2		220	7	<5	<10	<20	3.5	<40	<10	48	242
	2/7/94	17:10																				
	2/7/94	19:10	ST	8	710	490	8	6.6	0.26	3.7	3.3		910	33	<5	<10	<20	8	<40	<10	74	260
	2/8/94	9:10																				
	2/8/94	11:10	ST	12	690	260	8	6.9	0.44	3	2.1		330	10	<5	<10	<20	2.9	<40	<10	52	226
	2/9/94	9:10																				
	2/9/94	11:10	ST	12	790	18	8.3	5.6	0.36	0.93	1.2		81	<5	<5	<10	<20	<2	<40	<10	26	330
	2/10/94	9:10																				
	2/10/94	11:10	ST	12	850	21	8.2	5.3	0.23	0.95	1.2		110	9	<5	<10	<20	<2	<40	<10	28	320
	2/11/94	9:10																				
	2/17/94	9:42	ST	5	670	690	7.5	8.2	0.23	1.9	3.5		1000	62	<5	32	45	20	<40	<10	130	254
	2/17/94	17:42																				
	2/17/94	19:42	ST	19	710	310	7.5	8.3	0.42	2.6	2.5		460	27	<5	14	20	11	<40	<10	56	275
	2/19/94	7:42																				
	2/19/94	9:42	ST	12	800	160	8.1	9.7	0.34	1.8	1.6		270	27	<5	14	<20	7.7	<40	<10	33	254
	2/20/94	7:42																				
	2/20/94	9:42	ST	10	590	560	8	8.3	0.27	2.9	4.2		1100	100	<5	30	35	21	<40	<10	120	190
	2/21/94	7:42																				
	5/4/94	12:00	D	1	960	4	8.3	9.8	<0.1	0.79	0.97		8	<5								
	5/26/94	10:15	D	1	1100	1	8.5	7.4	<0.1	0.27	0.23		<5	<5								
	6/23/94	11:20	D	1	1800	0.71	8.8	0.79	0.11	<0.2	0.43		9	<5								
	5/25/95	11:45	D	1	720	1.2	8.3	0.9	<0.1	<0.2	<0.2		<6	<6								
	6/21/95	11:06	D	24	720	1.3	8.3	<0.2	<0.1	0.23	0.28		<6	<6								
	6/22/95	10:06																				
	7/25/95	12:30	D	24	940	24.0	8.4	<0.2	0.21	1.00	<0.20		45	18								
	7/26/95	11:30																				
	8/28/95	9:50	D	24	1100	13.0	8.3	<0.2	0.18	0.48	<0.20		39	8								
	8/29/95	8:50																				
	9/11/95	12:40	D	24	1100	1.0	8.5	<0.2	0.19	0.54	<0.20		<6	<6								
	9/12/95	11:40																				
	10/18/95	10:45	D	24	1200	9.9	8.4	<0.2	<0.10	0.52	0.23		18	8								
	10/19/95	9:45																				
	11/20/95	10:57	D	24	1100	0.4	8.3	1.0	<0.10	<0.50	<0.20		<6	<6								
	11/21/95	9:57																				
	12/20/95	9:00	D	1	1200	1.0	8.0	4.2	<0.10	0.62	<0.20		<6	<6								
	2/14/96	12:30	DT	1	1100	2.5	8.5	2.0	0.14	0.56	<0.20		<6	<6	3	27	3	<2	<2	2	20	340
	3/12/96	14:22	ST	5	530	260.0	7.6	2.2	0.34	1.70	1.20		360	46	<1	19	43	31	15	<1	300	180
	3/12/96	15:22																				
	3/12/96	15:22	ST	13	630	230.0	7.9	3.7	0.20	1.10	1.60		430	60	<1	<10	32	18	8	<1	120	226
	3/13/96	19:22																				
	3/13/96	21:22	ST	33	6100	31.0	8.3	12.0	0.14	1.10	0.57		78	25	24	<10	26	<2	180	<1	110	2200
	3/16/96	13:22																				
	3/27/96	14:10	DT	1	940	5.2	8.0	<0.2	0.10	0.72	0.25		20	9	<1	<10	4	<2	4	<1	39	350
	4/2/96	3:13	ST	5	1000	5.8	7.6	0.6	0.14	<0.50	0.27		13	<6	<1	<10	40	11	7	<1	22	340
	4/2/96	4:13																				
	4/2/96	6:13	ST	47	870	14.0	8.0	1.4	0.17	<0.50	0.25		32	11	<1	<10	15	<2	5	<1	17	314
	4/6/96	2:13																				
	4/17/96	11:30			910	5.6	8.3	<0.2	0.10	<0.50	<0.20		25	9	<1	<10	15	<2	6	<1	19	290
	4/18/96	1:02	ST	5	810	9.1	8.0	0.3	0.18	0.78	0.37		37	9	<1	<10	16	<2	7	<1	18	280
	4/18/96	2:02																				

STATION	DATE	TIME	SAMPLES Type	#	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd ug/L	Cr ug/L	Cu ug/L	Pb ug/L	Ni ug/L	Ag ug/L	Zn ug/L	Hardness mg/L
SJNL01	4/18/96	4:02	ST	5	830	160.0	8.1	<0.2	<0.10	1.70	1.10		270	46	<1	<10	19	7	4	<1	44	260
	4/18/96	12:02																				
	4/18/96	14:02	ST	41	900	7.2	8.4	<0.2	0.10	0.58	0.24		20	8	<1	<10	11	3	<2	<1	11	290
	4/22/96	0:02																				
	5/28/96	15:15	DT	1	1100	0.9	8.4	0.8	<0.10	<0.50	<0.20		<6	<6	<1	<10	<2	<2	6	<1	17	
	6/19/96	12:00	DT	1	1000	2.8	8.2	<0.2	0.11	<0.50	<0.20		21	12	<1	<10	<2	<2	5	<1	12	230
	11/6/96	15:35	DT	1	1400	0.9	8.1	<0.2	0.23	0.85	<0.2		<6	<6								
	12/4/96	14:20	DT	1	1200	1.6	8.7	5.0	0.23	<0.5	<0.2		<6	<6	<1	<10	<4	<2	<4	<1	<10	395
	1/29/97	12:00	DT	1	480	25.0	7.9	1.4	<0.1	<0.5	0.39		69	10	<1	<10	4	<2	<4	2	53	160
	2/26/97	13:20	DT	1	760	3.1	8.4	1.2	0.11	0.54	0.23		<6	<6	1	<10	<4	<2	<4	<1	94	240
	3/18/97	13:45	DT	1	780	0.9	9.0	1.1	<0.5	<0.5	<0.2		<6	<6	<1	<10	<4	<2	<4	<1	20	225
	4/8/97	9:50	DT	1	940	<0.5	8.3	<0.2	<0.5	<0.5	<0.2		<6	<6	<1	<10	<4	<2	<4	<1	<10	300
	5/6/97	9:45	DT	1	1100	0.7	8.0	<0.2	<0.1	<0.5	<0.2		<6	<6	<1	<10	12	<2	23	<1	15	370
	6/5/97	9:15	DT	1	1200	0.5	8.2	0.2	0.10	0.50	0.20		6	6								
	7/2/97	9:35	DT	1	1400	<0.5	8.2	<0.2	<0.1	<0.5	<0.2		<6	7								
	6/30/98	13:00	DT	1	605	1.4	9.1	<1.3	<0.05	<1.0	0		7	5								
	7/20/98	13:40	D	1																		
	8/11/98	11:51	D	1	830	3.3	8.7	<1.3	<0.05	<1	<0.061		37	14								
	9/2/98	9:10	D	1	1140	0.2	8.4	<1.3	<0.05	<1	<0.061		27	9								
	10/1/98	9:15	D	1	1050	0.3	8.0	<1.3	<0.05	0.39	<0.061		<4	<1								
	12/7/98	12:00	D	1	930	14.0	8.4	7.08	<0.05	0.52	0.89		20	7								
	1/13/99	9:35	D	1	1170	4.4	8.3	4.40	<0.05	0.45	0.12		17	8								
	2/18/99	13:00	D	1	975	1.3	8.7	1.89	<0.05	0.37	<0.061		9	6								
	3/1/99	13:25	D	1	930	0.4	8.9	<0.44	<0.05	0.45	<0.061		<4	<1								
	4/29/99	10:00	D	1	1070	0.8	8.3	<0.44	<0.05	0.28	0.08		<4	<1								
	5/20/99	13:13	DT	1	1280	0.3	8.3	<0.44	<0.05	0.43	0.13		4	<1	<1	8	2K	<2	<4	<2	<10	
	5/20/99	13:13	DF												<1	11	2K	<2	<4	<2	<10	
	6/9/99	11:15	D	1	1150	0.5	8.4	0.62	<0.05	0.40	0.10		6	4								
	3/23/00	12:22	D	24	1240	3.4	8.3	1.40	<0.05	0.54	0.245		44	20								
	3/24/00	11:05																				
	4/6/00	12:00	D	19	1370	3.2	8.3	1.90	<0.05	0.44	0.153		10	6								
	4/7/00	6:00																				
	5/30/00	12:35	D	24	1600	0.8	8.1	<0.44	0.069	0.20	0.214		<4	<1								
	5/31/00	11:35																				

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd ug/L	Cr ug/L	Cu ug/L	Pb ug/L	Ni ug/L	Ag ug/L	Zn ug/L	Hardness mg/L
SJOL01	7/21/93	15:00	D	1	480	0.66	8.2	<0.2	0.15	0.14	0.11		<5	<5								
	8/9/93	14:41	D	24	500	0.6	7.9	<0.2	<0.1	<0.1	<0.1		<5	<5								
	8/10/93	13:41																				
	11/11/93	11:00	ST	1	1300	8200	7.6	2.4	8.7	45	21		11000	4000	<5	<10	37	<2	<40	<10	42	
	11/11/93	18:00	ST	3	830	1200	7.5	0.54	2.9	36	33		4200	1200	<5	<10	<20	8.5	<40	<10	100	310
	11/12/93	14:30																				
	11/12/93	14:30	ST	1	780	400	7.8	<0.2							<5	<10	70	<50	<40	<10	200	350
	11/12/93	20:00	ST	9	760	600	7.7	20	0.52	14	11		1100	150	<5	<10	<20	17	<40	<10	100	300
	11/15/93	7:30																				
	11/14/93	12:30	ST	1	850	870	8.2	0.52							<5	<10	<20	<50	<40	<10	420	410
	11/15/93		ST	1	720	99	8	<0.2					150	37	<5	<10	<20	<50	<40	<10	40	310
	12/29/93	14:00	DT	1	640	5.3	8.7	<0.2	<0.1	0.23	0.29		16	<5								
	1/12/94	11:46	D	24	630	2.6	8.5	0.49	<0.1	0.18	0.32		<5	<5								
	1/13/94	10:46																				
	1/26/94	12:20	ST	11	620	410	8.2	2.7	0.46	5.4	4.9		590	82	<5	<10	<20	5.9	<40	<10	35	200
	1/27/94	9:20																				
	1/27/94	12:00	ST	1											<5	<10	<20	21	<40	<10	48	147
	1/28/94	11:37	ST	7	630	170	8.4	0.45	0.35	2.2	1.6		300	96	<5	<10	<20	9.6	<40	<10	30	226
	1/28/94	23:37																				
	1/28/94	12:00	ST	1	620	120	7.3	0.51	0.28	1.5	1.5		220	49	<5	<10	<20	<2	<40	<10	22	220
	2/7/94	10:30	ST	1	540	120	8.1	0.44	0.2	2.8	2.6		310	120	<5	<10	<20	3.2	<40	<10	<10	210
	2/9/94	11:00	ST	1	530	440	8	2.9	0.47	5.2	3.1		730	24	<5	<10	<20	14	<40	<10	38	176
	4/25/94	13:00	DT	2				<0.2	<0.1	4.7	3.2				<5	29	34	33	<40	<10	110	160
	4/25/94	15:00																				
	5/3/94	12:32	D	4	570	380	8.2	0.41	<0.1	4	4.7		1300	140								
	5/4/94	11:32																				
	5/26/94	10:45	D	1	610	190	8.1	0.6	<0.1	0.84	1.4		49	41								
	6/23/94	10:55	D	1	1100	0.96	7.9	0.67	0.15	<0.2	0.8		22	8								
	5/25/95	13:30			400	0.7	8.1	<0.2	<0.1	<0.2	<0.2		<6	<6								
	6/21/95	11:42	D	24	490	1	8.1	<0.2	<0.1	<0.2	<0.2		<6	<6								
	6/22/95	10:42																				
	7/25/95	11:30	D	24	470	20.0	8.2	<0.2	0.21	0.88	<0.20		42	24								
	7/26/95	10:30																				
	8/28/95	10:30	D	24	530	32.0	8.3	<0.2	0.21	0.29	0.27		65	24								
	8/29/95	9:30																				
	9/11/95	14:03	D	24	980	3.4	8.4	<0.2	<0.10	0.76	<0.20		<6	<6								
	9/12/95	13:03																				
	2/14/96	13:00	ST	1	490	1.4	8.3	<0.2	0.32	<0.50	<0.20		15	10	<1	13	3	<2	<2	<1	20	135
	3/12/96	15:18	ST	5	440	1.1	7.9	0.6	<0.10	<0.50	<0.20		<6	<6	<1	<10	12	<2	5	<1	17	142
	3/12/96	16:18																				
	3/12/96	18:18	ST	11	370	32.0	7.9	0.2	<0.10	<0.50	0.41		40	12	<1	<10	15	3	3	<1	20	198
	3/13/96	14:18																				
	3/13/96	16:18	ST	36	360	3.6	8.0	0.2	<0.10	<0.50	<0.20		<6	<6	<1	<10	16	<2	<4	<1	110	128
	3/16/96	14:18																				
	3/27/96	14:35	D	1	440	1.4	7.8	1.0	<0.10	<0.50	<0.20		<6	<6	<1	<10	3	<2	<2	<1	37	320
	4/17/96	13:00	D	1	450	0.3	7.6	<0.2	0.10	<0.50	<0.20		<6	<6	<1	<10	<2	<2	<4	<1	23	115
	5/28/96	15:45	D	1	450	0.6	7.6	<0.2	<0.10	<0.50	<0.20		<6	<6	<1	<10	<2	<2	7	<1	23	
	1/29/97	14:15	D	1	260	4.0	7.8	1.1	<0.1	<0.5	<0.2		<6	<6	<1	<10	<4	<2	<4	<1	28	70
	2/26/97	12:50	D	1	390	0.9	7.7	0.8	<0.1	<0.5	<0.2		<6	<6	<1	<10	<4	<2	<4	<1	<10	140
	3/18/97	14:20	D	1	410	<0.5	7.7	0.6	<0.5	<0.5	<0.2		<6	47	<1	<10	<4	<2	<4	<1	16	135

STATION	DATE	TIME	SAMPLES Type	#	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd ug/L	Cr ug/L	Cu ug/L	Pb ug/L	Ni ug/L	Ag ug/L	Zn ug/L	Hardness mg/L
SJOL01	4/8/97	10:20	D	1	400	<0.5	7.5	<0.2	<0.5	<0.5	<0.2		<6	<6	<1	<10	<4	<2	<4	<1	<10	140
	5/6/97	10:15	D	1	430	<0.5	7.6	<0.2	<0.1	<0.5	<0.2		<6	<6	<1	<10	4	<2	5	<1	21	134
	6/5/97	9:55	D	1	450	0.5	7.2	0.2	0.10	0.50	0.20		6	6								
	6/30/98	13:30	D	1	390	0.40	7.8	<1.3	<0.05	<1.0	0.06		4	2								
	7/20/98	14:00	D	1	400	0.3	7.8	<1.3	<0.05	1.40	<0.061		<4	<1								
	8/11/98	12:14	D	1	430	0.9	7.6	<1.3	<0.05	<1	<0.061		10	6								
	9/2/98	9:37	D	1	410	0.2	7.7	<1.3	<0.05	<1	0.09		<4	<1								
	10/1/98	9:45	D	1	435	0.3	7.5	<1.3	<0.05	<0.2	<0.061		<4	<1								
	12/7/98	12:40	D	1	425	0.2	7.9	<1.3	<0.05	0.26	0.06		<4	<1								
	1/13/99	9:15	D	1	460	0.1	7.6	0.53	<0.05	<0.2	<0.061		<4	5								
	2/18/99	12:20	D	1	460	0.2	7.8	<0.44	<0.05	0.21	0.06		<4	<1								
	3/1/99	13:15	D	1	445	0.2	7.7	<0.44	<0.05	<0.2	<0.061		<4	<1								
	4/29/99	9:30	D	1	430	0.2	7.6	<0.44	<0.05	<0.2	<0.061		<4	<1								
	5/20/99	12:35	DT	1	455	0.2	7.7	<0.44	<0.05	0.36	<0.061		<4	<1	<1	<8	<2	4	<4	<2	<10	
	5/20/99	12:35	DF												4	<8	3	<2	<4	<2	13	
	6/9/99	10:45	D	1	405	0.2	7.7	0.75	<0.05	1.54	0.06		<4	<1								
	3/23/00	11:24	DT	24	500	1.2	8.2	1.9	0.188	0.73	<0.061		4	2								
	3/24/00	9:54																				
	4/6/00	11:15	DT	24	505	2.1	8.2	2.3	<0.05	0.3	<0.061		8	5								
	4/7/00	9:50																				
	5/30/00	11:40	DT	24	505	5.7	8.0	<0.44	<0.05	0.92	0.0612		19	7								
	5/31/00	10:40																				

STATION	DATE	TIME	SAMPLES Type	#	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd ug/L	Cr ug/L	Cu ug/L	Pb ug/L	Ni ug/L	Ag ug/L	Zn ug/L	Hardness mg/L
TCOL02	3/19/94	1:21	ST	3	390	110	7.8	4.1	0.57	3.1	1.8		240	54	<5	18	30	55	<40	<10	220	120
	3/19/94	5:21																				
	3/19/94	7:21	ST	7	520	220	7.7	2.4	0.15	1.6	1.6		270	44	<5	16	<20	6.9	<40	<10	44	170
	3/19/94	19:21																				
	3/19/94	21:21	ST	6	530	120	7.7	3.5	0.18	1	0.94		75	28	<5	<10	<20	8.8	<40	<10	15	180
	3/20/94	7:21																				
	3/20/94	9:21	ST	12	600	27	8.3	3	<0.1	0.77	0.57		13	<5	<5	<10	<20	<2	<40	<10	14	196
	3/21/94	7:21																				
	3/21/94	9:21	ST	12	660	16	8.3	2.8	<0.1	0.91	0.57		7	<5	<5	<10	<20	<2	<40	<10	10	204
	3/22/94	7:21																				
	3/22/94	9:21	ST	8	700	8.1	8.1	3.1	<0.1	0.2	0.35		<5	<5	<5	<10	<20	<2	<40	<10	21	254
	3/22/94	23:21																				
	3/24/94	18:25	ST	3	420	76	8.1	2.6	0.1	1.7	5.8		150	6	<5	<10	23	37	<40	<10	84	108
	3/24/94	22:25																				
	3/25/94	0:25	ST	7	500	320	8	2.3	<0.1	0.9	1.9		350	36	<5	19	24	8.5	<40	<10	55	172
	3/25/94	12:25																				
	3/25/94	14:25	ST	10	530	120	8	2.6	<0.1	1.3	4.6		92	14	<5	<10	<20	4.1	<40	<10	20	178
	3/26/94	8:25																				
	3/26/94	10:25	ST	12	610	28	8.2	2.6	<0.1	0.66	0.64		11	6	<5	<10	<20	2.6	<40	<10	<10	200
	3/27/94	8:25																				
	3/27/94	10:25	ST	12	680	15	8.2	2.6	<0.1	0.73	0.38		9	<5	<5	<10	<20	<2	<40	<10	<10	222
	3/28/94	8:25																				
	3/28/94	10:25	ST	5	730	12	8.6	2.8	<0.1	0.28	0.85		<5	<5	<5	<10	<20	<2	<40	<10	<10	256
	3/28/94	18:25																				
	4/25/94	14:25	ST	4	670	15	8.2	1.2	<0.1	0.78	0.75		12	6	<5	<10	<20	7.8	<40	<10	35	210
	4/25/94	20:25																				
	4/25/94	22:25	ST	19	710	34	8.3	1.6	<0.1	0.47	0.88		35	7	<5	<10	<20	<2	<40	<10	19	212
	4/27/94	10:25																				
	4/27/94	12:25	ST	10	710	16	8.2	2.3	0.1	0.68	0.52		5	<5	<5	11	<20	<2	<40	<10	14	234
	4/28/94	6:25																				
	4/28/94	8:25	ST	10	750	8.2	8.2	2	<0.2	0.27	0.42		<5	<5	<5	<10	<20	<2	<40	<10	12	236
	4/29/94	2:25																				
	1/21/96	18:56	ST	33	490	1200.0	7.9	2.6	0.15	5.10	4.60		2000	210	3	72	84	39	76	<1	380	330
	1/21/96	23:56																				
	2/20/96	13:22	ST	15	370	700.0	7.9	3.3	<0.10	2.20	3.10		1400	100	1	50	54	<2	<2	<1	180	120
	2/21/96	17:22																				
	11/21/96	14:30	ST	1	500	240.0	8.9	3.0	0.56	2.50	1.80		430	68	1	28	55	57	18	<1	380	160
	11/21/96	16:30	ST	3	480	770.0	8.3	4.0	0.16	3.20	3.50		1200	110	11	47	72	24	24	<1	240	208
	11/21/96	20:30																				
	5/20/99	11:00	DT	1	1040	1	8	<0.44	<0.05	1	0		7	3	<1	8	2	<2	<4	<2	<10	
	5/20/99	11:00	DF												<1	8	2	<2	<4	<2	<10	

STATION	DATE	TIME	SAMPLES Type	#	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd ug/L	Cr ug/L	Cu ug/L	Pb ug/L	Ni ug/L	Ag ug/L	Zn ug/L	Hardness mg/L
SCBJ03	3/24/94	18:32	ST	5	1500	150	8	3.4	0.25	0.83	2.7		320	28	<5	25	26	6.8	<40	<10	99	375
	3/25/94	2:32																				
	3/25/94	4:32	ST	15	1900	21	8.1	6.7	0.31	0.53	1.4		32	9	<5	<10	<20	<2	<40	<10	36	514
	3/26/94	8:32																				
	3/26/94	10:32	ST	12	3500	1.8	8.5	6.4	<0.1	<0.2	0.61		5	<5	<5	<10	<20	<2	<40	<10	24	1020
	3/27/94	8:32																				
	3/27/94	10:32	ST	12	4800	1.1	8.4	5.5	<0.1	<0.2	0.33		6	6	<5	<10	<20	<2	<40	<10	17	1414
	3/28/94	8:32																				
	3/28/94	10:32	ST	4	5000	1.4	8.6	4.9	<0.1	0.89	0.48		<5	<5	<5	<10	<20	<2	<40	<10	<10	1496
	11/21/95	11:30			3500	5.8	8.5	1.4	<0.10	1.30	2.00		<6	<6	<10	<10	<20	<2	<40	<1	18	
	3/13/96	8:00	ST	8	990	24.0	8.0	2.8	<0.10	1.10	0.97		56	14	2	<10	21	4	18	<1	68	342
	3/13/96	15:00																				
	3/13/96	17:00	ST	28	3300	14.0	8.4	5.0	<0.10	0.66	0.58		34	8	3	<10	20	<2	33	<1	37	1180
	3/16/96	13:00																				
	4/18/96	0:08	ST	5	2300	110.0	8.0	0.2	0.43	7.10	2.70		320	68	8	11	33	7	35	<1	120	765
	4/18/96	1:08																				
	4/18/96	3:08	ST	4	790	48.0	8.0	<0.2	0.14	1.70	1.40		98	21	2	<10	29	5	15	<1	64	246
	4/18/96	9:08																				
	4/18/96	11:08	ST	40	2800	4.7	8.5	<0.2	0.13	1.60	0.96		29	12	2	<10	13	<2	21	<1	33	1036
	4/21/96	19:08																				
	5/20/99	10:30	DT	1	2650	1	8	2	<0.05	0	1		22	8	2	9	6	<2	22	<2	12	
	5/20/99	10:30	DF												2	9	6	<2	20	<2	<10	

SOUTH COUNTY WATERSHED

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd ug/L	Cr ug/L	Cu ug/L	Pb ug/L	Ni ug/L	Ag ug/L	Zn ug/L	Hardness mg/L
SILE17	3/4/96	14:15	S	3	1100	4.2	8.4	0.7	0.23	<0.50	<0.20	20	11	<1	<10	9	<2	8	<1	39	512	
	3/4/96	18:15																				
	3/5/96	14:15	S	36	800	2.8	8.4	1.2	<0.10	<0.50	<0.20	6	<6	<1	<5	16	8	5	<1	34	420	
	3/8/96	12:15																				
	5/24/99	11:00	DT	1	1050	0	8	<0.44	<0.05	<0.2	<0.061		6	5	<1	8	<2	<2	<4	<2	13	
	5/26/99	11:00	DF												<1	<8	<2	<2	<4	<2	11	

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
F06P08	5/19/99		D	1				67														
	5/19/99		D	1				34														
	5/19/99		D	1				71														
	9/13/99	10:00	D	24	3710	0.6	8.2	66	0.46	<0.5	0.31		3									
	9/14/99	9:00																				
	9/14/99	10:00	D	24	3510	0.7	8.2	66	<0.05	0.26	0.40		9	6								
	9/15/99	9:00																				
	9/15/99	10:00	D	24	3890	0.9	8.2	66	<0.05	<0.20	0.30		24	6								
	9/16/99	9:00																				
	9/16/99	10:00	D	24	3740	0.8	8.3	115	<0.05	1.32	0.46		4	1								
	9/17/99	9:00																				
	9/17/99	10:00	D	24	3570	1.0	8.2	115	<0.05	0.29	1.10		13	8								
	9/18/99	9:00																				
	9/18/99	10:00	D	24	3630	0.7	8.2	58.1	<0.05	0.5	0.64		10	5								
	9/19/99	9:00																				
	9/19/99	10:00	D	6	3730	0.5	8.4	95.5	<0.05	0.26	0.37		14	9								
	9/19/99	15:00																				
	9/20/99	11:00	D	1	3760	1.1	8.0	62.5	<0.05	0.31	0.37		8	6								
	5/12/00	13:45	D	1																		
	6/20/00	10:00	D	24	3130	1.1	8.1	62	<0.05	<0.20	0.55		<10	<1								
	6/21/00	9:00																				
	6/21/00	10:00	D	24	3640	0.4	8.1	66	<0.05	0.63	0.52		13	13								
	6/22/00	9:00																				
	6/22/00	10:00	D	24	2430	0.8	8.1	66	<0.05	<0.20	0.43		<10	<1								
	6/23/00	9:00																				
	6/23/00	10:00	D	24	3630	2.4	8.1	70	<0.05	0.32	0.49		<10	<1								
	6/24/00	9:00																				
	6/24/00	10:00	D	24	3480	4.5	8.1	62	<0.05	0.39	0.52		12	7								
	6/25/00	9:00																				
	6/25/00	9:00	D	24	3460	1.1	8.0	66	<0.05	0.43	0.73		<10	<1								
	6/26/00	10:00																				
	6/26/00	10:00	D	24	3620	1.0	8.0	66	0.07	0.35	0.52		<10	<1								
	6/27/00	9:00																				

STATION	DATE	TIME	SAMPLES Type	#	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
SADF01	3/18/91	22:00	ST	8	260	270.0	6.7	3.3	0.40	1.40	5.60		480	68	<20	<40	40	53	<40	<10	260	
	3/19/91	6:00																				
	6/18/91	13:00	DT	21	1600	5.3	8.1	6.0	0.20	0.60	0.40		<5	<5	<7	<10	<30	<20	<10	<2	<10	
	6/19/91	9:00																				
	7/22/91	11:15	DT	22	1700	5.2	8.1	3.1	0.30	4.20	2.50		25	<5	<20	<40	20	6	<40	<10	70	498
	7/23/91	8:15																				
	9/16/91	9:00	DT	24	1500	40.0	8.4	5.5	0.10	0.70	1.50		62	19								
	9/17/91	7:45																				
	1/5/92	12:25	ST	24	750	27.0	7.7	5.6	0.30	1.30	1.10		170	29	<20	<30	30	45	<40	<10	130	
	1/6/92	11:25																				
	1/6/92	15:45	ST	4	266	42.0	7.8	1.9	0.90	0.50	170.00		740	86	<20	40	70	100	<40	<10	310	
	1/6/92	18:45																				
	2/6/92	2:00	ST	4	530	390.0	7.5	5.0	0.93	3.60	41.00		2100	180	<20	50	100	84	50	<10	380	
	2/6/92	5:00																				
	4/21/92	7:45	DT	24	2500	0.6	7.9	8.5	0.10	0.80	0.20		17	<5	<20	<30	<20	3	<40	<10	10	978
	4/22/92	6:45																				
	5/26/92	9:00	DT	24	1800	2.3	8.1	4.6	0.10	1.00	0.80		36	14								
	5/27/92	8:00																				
	7/21/92	10:40	DT	23	2100	76.0	8.2	120.0	0.30	0.70	1.30		120	21								
	7/22/92	8:40																				
	9/22/92	9:00	DT	24	1400	130.0	8.2	3.6	0.30	2.00	4.30		350	<5								
	9/23/92	8:00																				
	10/27/92	9:10	DT	24	1300	180.0	8.0	2.9	0.63	2.80	3.00		270	5	<20	<30	<20	12	<40	<10	58	76
	10/28/92	8:10																				
	11/18/92	8:20	DT	1	1900	16.0	8.0	6.1	0.19	0.86	0.56		31	8								
	1/6/93	1:26	ST	7	230	140.0	7.8	2.4	0.25	0.92	1.10		240	44	<20	<30	24	42	<40	<10	120	74
	1/6/93	12:08																				
	1/6/93	13:08	ST	7	150	120.0	7.6	2.4	0.19	1.00	1.60		170	49	<20	<30	25	37	<40	<10	130	69
	1/6/93	19:08																				
	1/6/93	20:08	ST	8	130	140.0	7.8	1.8	0.18	0.94	0.84		280	33	<20	<30	26	45	<40	<10	140	46
	1/7/93	3:08																				
	1/8/93	16:00	ST	12	420	57.0	8.0	4.1	0.10	0.91	2.30		74	20	<20	<30	20	21	<40	<10	78	116
	1/9/93	14:00																				
	1/9/93	16:00	ST	11	840	29.0	8.2	7.3	0.14	0.77	1.80		34	9	<20	<30	<20	11	<40	<10	65	268
	1/10/93	14:00																				
	1/15/93	13:05	ST	17	220	130.0	7.9	2.4	0.17	0.55	1.20		250	26	<7	12	<30	33	11	<4	170	66
	1/16/93	21:05																				
	1/16/93	23:05	ST	7	730	84.0	7.8	10.0	0.19	0.61	0.97		98	15	<7	<10	<30	15	7.7	<4	66	230
	1/17/93	11:05																				
	1/17/93	10:10	ST	16	340	110.0	8.0	3.8	0.15	0.85	1.10		150	20	12	10	<30	23	5.4	<4	98	107
	1/18/93	16:10																				
	1/18/93	18:10	ST	8	790	54.0	7.8	9.2	0.14	0.88	0.99		57	14	<7	<10	<30	14	<3	<4	67	254
	1/19/93	8:10																				
	1/27/93	8:30	DT	1	2800	18.0	8.0	22.0	0.18	0.85	0.42		19	6								
	2/7/93	20:15	ST	10	280	160.0	7.7	2.7	0.21	0.69	1.40		210	26	<20	<30	23	34	<40	<10	110	83
	2/8/93	14:00																				
	2/8/93	16:00	ST	10	400	160.0	7.6	3.7	0.22	0.72	1.10		150	22	<20	<30	<20	46	<40	<10	97	116
	2/9/93	9:45																				
	2/9/93	10:00	ST	7	900	9.8	8.1	7.7	0.15	0.78	0.60		7	5	<7	<10	23	2.5	<5	<4	20	270

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
	2/9/93	23:30																				
SADF01	2/18/93	10:20	ST	11	430	96.0	7.4	3.5	0.11	0.79	1.00		150	31	<7	<10	30	24	7.4	<4	110	124
	2/19/93	6:20																				
	2/19/93	8:20	ST	13	200	220.0	7.7	2.1	0.11	0.77	1.50		380	47	<7	<10	<30	40	7.3	<4	120	68
	2/20/93	8:20																				
	2/20/93	11:19	ST	15	1400	19.0	8.2	11.0	0.10	0.69	0.54		25	11	<7	<10	<30	5.4	<3	<4	27	508
	2/21/93	15:19																				
	3/17/93	7:30	DT	1	3200	5.2	7.7	20.0	0.10	1.10	0.44		17	7								
	5/26/93	7:10	DT	1	2600	3.2	8.1	7.9	0.14	1.20	0.30		13	9	<20	<30	<20	<2	<40	<10	20	860
	7/13/93	9:15	DT	24	2600	26.0	8.1	6.4	0.10	1.10	0.64		81	9								
	7/14/93	8:15																				
	9/14/93	10:20	DT	23	2100	2.7	8.2	7.7	0.27	1.00	0.43		<5	<5								
	9/15/93	8:20																				
	10/16/93	11:56	ST	12	1700	180.0	7.8	13.0	0.88	8.00	3.40		280	45	<5	17	70	140	<40	<10	320	554
	10/17/93	9:56																				
	10/17/93	11:56	ST	12	1900	90.0	7.9	6.5	0.77	6.50	2.50		170	32	<5	15	42	86	<40	<10	220	626
	10/18/93	9:56																				
	10/18/93	19:56	ST	7	2000	40.0	8.2	7.1	1.40	4.20	1.40		54	7	<5	<10	26	26	<40	<10	100	680
	10/18/93	3:56																				
	10/26/93	10:20	DT	23	2500	85.0	8.1	9.9	0.92	3.10	1.20		240	4	<5	<10	36	81	<40	<10	130	884
	10/27/93	8:20																				
	11/11/93	10:45	ST	1											8.1	<10	43	170	<40	<10	400	
	11/11/93	10:50	ST	6	540	160.0	7.3	12.0	0.37	5.10	3.00		300	67	5.1	<10	62	100	<40	<10	330	146
	11/11/93	20:50																				
	11/12/93	15:00	ST	11	1500	18.0	8.2	7.8	0.33	2.20	0.78		31	12	<5	<10	<20	7.8	<40	<10	42	460
	11/13/93	11:00																				
	11/13/93	13:00	ST	12	1800	5.1	8.2	7.0	0.21	1.10	0.76		7.0	5.0	<5	<10	<20	<2	<40	<10	41	582
	11/14/93	11:00																				
	11/14/93	13:00	ST	11	1700	1.3	8.1	4.6	0.12	0.72	1.50		<5	<5	<5	<10	<20	<2	<40	<10	26	544
	11/15/93	9:00																				
	11/23/93	4:00	ST	4	1900	46.0	7.4	13.0	0.47	3.90	2.10		100	<5	<5	<10	41	31	<40	<10	130	602
	11/23/93	10:00																				
	11/23/93	12:00	ST	6	1700	32.0	7.4	11.0	0.50	3.70	1.20		43	7	<5	<10	33	16	<40	<10	78	512
	11/23/93	22:00																				
	11/24/93	0:00	ST	6	1600	16.0	7.4	7.6	0.40	2.50	0.84		12	<5	<5	<10	26	8.0	<40	<10	52	456
	11/24/93	10:00																				
	11/24/93	12:00	ST	12	1500	8.4	8.0	4.2	0.10	1.30	0.53		15	<5	<5	<10	<20	4.2	<40	<10	34	452
	11/25/93	10:00																				
	11/25/93	12:00	ST	11	1500	8.7	7.9	3.1	0.10	0.94	0.52		<5	<5	<5	11	<20	4.8	<40	<10	30	458
	11/26/93	10:03																				
	11/26/93	12:00	ST	8	1300	9.9	8.3	0.6	0.10	0.83	0.39		22	<5	<5	<10	21	5.1	<40	<10	41	256
	11/27/93	2:00																				
	11/30/93	2:00	ST	6	520	230.0	7.5	6.2	0.43	5.10	4.10		553	5.0	5.6	<10	62	180	<40	<10	470	140
	11/30/93	12:00																				
	1/17/94	8:20	DT	24	2400	28.0	8.2	12.0	0.32	0.90	0.67		37	6.0								
	1/18/94	7:20																				
	4/19/94	9:30	DT	21	2700	15.0	7.9	13.0	0.10	1.40	0.99		55	6								
	4/20/94	5:30																				

NEWPORT BAY WATERSHED

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
SADF01	4/24/94	2:04	ST	4	1500	76.0	7.3	9.6	1.50	5.50	2.20		250	42	<5	11	72	32	<40	<10	350	440
	4/24/94	8:04																				
	4/24/94	10:04	ST	14	1200	13.0	7.4	4.9	0.11	4.10	1.10		18	8	<5	<10	25	6.8	<40	<10	100	336
	4/25/94	14:04																				
	4/25/94	14:04	ST	6	470	72.0	7.4	3.9	0.26	3.20	2.90		150	18	<5	<10	54	50	<40	<10	250	120
	4/26/94	0:04																				
	4/26/94	2:04	ST	12	520	54.0	7.7	3.6	0.10	1.50	1.70		67	11	<5	<10	33	36	<40	<10	130	132
	4/27/94	0:04																				
	4/27/94	2:04	ST	12	1200	32.0	8.0	5.3	0.10	1.20	0.95		9	<5	<5	<10	<20	4.9	<40	<10	53	330
	4/28/94	0:04																				
	10/4/94	12:07	ST	1	1400	120.0	6.8	15.0	7.70	30.00	3.70		140	14	26	21	310	54	130	0.5	2200	400
	10/4/94	14:07	ST	10	2000	21.0	7.5	14.0	0.69	6.30	0.70		45	<5	2.8	<10	46	16	<40	0.67	290	555
	10/5/94	8:07																				
	10/5/94	10:07	ST	12	1700	52.0	7.6	9.2	0.89	6.50	0.99		110	19	1.4	<10	36	16	<40	3.8	190	450
	10/6/94	8:07																				
	10/6/94	12:39	ST	24	1700	28.0	7.7	4.5	0.37	0.51	1.10		91	31	1	<10	27	8.5	<40	9.8	120	440
	10/8/94	10:39																				
	10/26/94	8:15	DT		3000	7.6	7.8	18.0	0.22	1.10	0.20		41	<5	<1	<10	4.4	2.6	<40	<0.3	14	
	11/8/94	4:35	ST	3	1100	120.0	7.1	13.0	2.20	7.00	2.10		240	48	3.9	12	310	51	<40	0.53	67	275
	11/8/94	8:35																				
	11/8/94	10:35	ST	3	1400	64.0	7.2	15.0	0.86	4.70	1.10		87	18	<1	<10	120	13	<40	<0.3	190	365
	11/8/94	14:35																				
	11/8/94	16:35	ST	14	2300	34.0	7.6	13.0	0.70	3.60	0.70		30	11	<1	<10	45	5.7	<40	<0.3	120	650
	11/10/94	2:35																				
	11/10/94	4:35	ST	3	550	600.0	6.3	4.7	0.80	7.50	7.10		1300	95	5.2	51	240	160	<40	0.45	720	160
	11/10/94	8:35																				
	11/10/94	10:35	ST	5	360	360.0	6.2	8.2	0.55	4.60	4.40		840	50	2.2	36	100	63	<40	<0.3	360	80
	11/10/94	18:35																				
	11/10/94	20:35	ST	15	640	72.0	6.2	10.0	0.44	2.60	1.40		160	16	<1	<10	26	15	<40	<0.3	92	135
	11/12/94	0:35																				
	12/5/94	2:00	ST	3	1400	12.0	7.4	11.0	0.97	5.10	2.20		240	48	1.4	<10	56	21	<40	0.52	230	402
	12/5/94	6:00																				
	3/21/95	6:37	ST	3	680	144.0	7.6	6.8	0.10	2.40	1.90		260	45	<1	<10	30	19	<40	1.2	95	172
	3/21/95	12:37																				
	3/21/95	14:37	ST	16	1600	12.0	8.2	9.7	0.10	0.96	0.78		35	11	<1	<10	15	4.9	<40	<1	<10	440
	3/23/95	6:37																				
	3/23/95	8:37	ST	8	580	33.0	8.0	3.8	0.10	1.20	1.40		160	32	<1	<10	32	9.8	<40	1.8	80	150
	3/23/95	22:37																				
	3/24/95	0:37	ST	15	1900	13.0	8.0	12.0	0.10	0.82	0.58		17	6	<1	<10	16	2.5	<40	1	<10	542
	3/25/95	4:37																				
	5/16/95	12:15	DT	24	2300	190.0	8.0	4.4	0.35	1.30	1.40		240	30	<1	<10	33	17	<40	<1	31	720
	5/17/95	11:15																				
	7/25/95	9:00	DT	24	2300	30.0	8.4	6.6	0.23	0.99	0.38		160	34								
	7/26/95	8:00																				
	10/24/95	9:47	DT	24	2600	53.0	8.4	16.0	0.10	1.80	0.99		86	23	<1	71	270	29	<40	<1	370	
	10/25/95	8:47																				

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
SADF01	12/12/95	22:14	ST	5	680	550.0	7.1	24.0	2.30	13.00	7.60		1100	120	6	55	220	340	64	<1	910	156
	12/12/95	23:14																				
	12/13/95	1:14	ST	7	380	290.0	7.2	10.0	1.10	9.40	4.30		580	61	2	27	120	110	<40	<1	500	138
	12/13/95	13:14																				
	1/21/96	15:07	ST	3											6	18	110	92	96	<1	390	78
	1/21/96	15:37																				
	1/31/96	2:36	ST	5	420	190.0	7.6	5.4	0.73	2.70	1.40		200	38	1	18	66	45	24	<1	250	112
	1/31/96	3:36																				
	1/31/96	5:36	ST	5	220	160.0	7.5	3.0	0.13	2.40	1.90		240	46	1	<10	55	49	16	<1	250	105
	1/31/96	13:36																				
	2/1/96	11:09	ST	24	1400	34.0	8.0	11.0	0.22	1.60	0.67		29	10	<1	<10	30	12	5	5	93	478
	2/3/96	9:09																				
	2/19/96	23:08	ST	5	2200	310.0	7.6	16.0	0.53	7.40	2.40		460	56	2	15	60	28	13	1	220	880
	2/20/96	0:08																				
	2/20/96	2:08	ST	17	370	180.0	7.5	6.8	0.38	2.50	4.70		380	60	8	31	88	<2	<2	<1	510	110
	2/22/96	6:08																				
	2/22/96	8:08	ST	20	2000	80.0	8.3	28.0	0.29	1.60	0.70		87	15	<1	30	23	6	8	1	27	680
	2/23/96	22:08																				
	3/4/96	12:10	ST	5	1000	110.0	7.5	11.0	1.00	3.70	1.00		110	29	1	<10	44	19	10	<1	210	304
	3/4/96	13:10																				
	3/4/96	15:10	ST	10	350	150.0	7.6	3.4	0.48	1.90	1.30		200	33	<1	11	32	34	10	<1	190	104
	3/5/96	11:10																				
	3/5/96	13:10	ST	36	1400	3.0	8.4	9.6	0.28	0.50	0.24		7	<6	<1	<5	15	<2	<4	<1	50	608
	3/8/96	11:10																				
	4/23/96	9:15	DT	24	2500	14.0	8.2	22.0	0.47	2.10	0.38		49	16	<1	<10	49	<2	3	<1	34	1010
	4/24/96	8:15																				
	7/24/96	8:21	DT	24	2200	73.0	8.1	4.7	<0.1	1.80	0.65		100	24	<1	<10	27	6	10	<1	54	820
	7/25/96	7:21																				
	10/30/96	7:40	ST	5	770	1200.0	7.0	18.0	2.00	15.00	9.20		2100	260	5	83	130	190	73	1	1300	270
	10/30/96	8:40	SF												<1	<10	11	<2	19	<1	130	
	10/30/96	10:40	ST	5	280	350.0	7.1	7.8	0.88	4.50	3.30		580	78	2	23	49	56	26	<1	440	90
	10/30/96	18:40																				
	10/30/96	20:40	ST	43	1500	30.0	8.1	13.0	0.35	1.90	0.60		37	10	<1	<10	18	4	5	<1	76	556
	11/3/96	8:40																				
	11/5/96	9:20	DT	1	2400	3.4	8.0	14.0	0.50	0.88	0.50		9	<6								
	11/21/96	8:35	ST	5	530	360.0	7.3	8.8	1.10	6.80	3.80		670	78	<1	30	87	11	20	<1	360	194
	11/21/96	9:35																				
	11/21/96	11:35	ST	9	230	170.0	7.5	6.4	0.45	3.00	2.20		350	46	<1	20	57	45	15	<1	270	84
	11/22/96	3:35																				
	11/22/96	5:35	ST	34	1600	12.0	8.2	16.0	0.28	1.00	0.54		16	8	<1	<10	21	3	5	<1	110	594
	11/25/96	8:07																				

STATION	DATE	TIME	SAMPLES Type	#	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
SADF01	12/9/96	16:30	ST	5	130	300.0	7.5	2.1	0.11	1.90	1.90		210	24	<1	19	48	54	13	<1	280	50
	12/9/96	17:30																				
	12/9/96	19:30	ST	7	390	100.0	7.5	6.0	<0.1	1.20	0.77		95	16	<1	<10	25	22	5	<1	97	156
	12/10/96	7:30																				
	12/10/96	9:30	ST	7	1100	14.0	8.1	13.0	<0.1	1.60	0.67		14	8	<1	<10	20	3	<4	<1	42	394
	12/10/96	21:30																				
	12/10/96	23:30	ST	15	320	92.0	7.7	5.1	<0.1	1.90	0.98		120	18	<1	<10	24	18	6	<1	91	92
	12/12/96	3:30																				
	12/12/96	5:30	ST	17	1600	8.6	8.1	13.0	0.40	1.70	0.38		9	6	<1	<10	17	6	<4	<1	83	700
	12/13/96	13:30																				
	1/1/97	11:00	ST	5	740	98.0	7.5	5.8	0.50	1.60	0.69		140	45	1	<10	45	38	18	<1	240	224
	1/1/97	12:00																				
	1/1/97	14:00	ST	9	840	60.0	7.6	6.2	0.28	1.20	0.65		51	15	<1	<10	23	10	8	<1	89	256
	1/2/97	6:00																				
	1/29/97	8:35	DT	1	3100	4.4	7.9	26.0	0.23	0.73	0.20		<6	<6	<1	<10	22	<2	4	<1	57	1200
	4/15/97	8:30	DT	24	2000	<0.5	5.6	33.0	0.68	3.30	3.50		<6	<6	24	95	23	21	110	22	110	940
	4/16/97	7:30																				
	7/8/97	8:30	DT	1	2100	1.9	8.0	15.0	0.12	0.8	0.23		14	6	<1	<10	6	2	<4	<1	31	
	9/25/97	11:33	ST	5	500	1500	7.3	3.0	1.10	16.0	9.40	<0.5	2100	330	<1	54	310	260	67	<1	1400	160
	9/25/97	12:33	SF												2	<10	56	45	23	<1	260	
	9/25/97	14:33	ST	11	840	200	7.3	8.1	0.29	4.0	2.00	<0.5	270	51	4	<10	65	52	23	<1	300	270
	9/26/97	10:33	SF												1	<10	40	20	14	<1	170	
	9/26/97	12:33	ST	23	2000	5.2	8.2	10.0	0.16	1.5	0.58	<0.5	15	12	<1	<10	24	<2	5	<1	50	624
	9/28/97	8:33	SF												<1	<10	20	<2	<4	<1	65	
	9/28/97	10:33	ST	13	2100	2.1	7.9	9.1	<0.1	1.2	0.48	<0.5	7	<6	<1	<10	20	<2	4.0	<1	13	704
	9/29/97	10:33	SF												<1	<10	18	<2	<4	<1	48	
	10/29/97	8:40	DT	1	2600	12	7.8	16.0	<0.1	1.6	0.54		28	<6	<1	<10	12	3	5	<1	66	
	11/10/97	8:17	SF	5				45.0				<0.5			2	<10	74	19	27	<1	440	610
	11/10/97	9:17																				
	11/10/97	11:17	SF	5				20.0				<0.5			<1	<10	52	23	19	<1	290	440
	11/10/97	19:17																				
	11/10/97	21:17	ST	29	1600	35	7.6	19.0	<0.1	3.2	1.10	<0.5	34	15	<1	<10	33	9	11	<1	130	460
	11/13/97	3:17	SF												<1	<10	28	5	9	<1	100	
	11/13/97	5:17	ST	14	450	130	7.4	6.6	0.54	3.4	1.60	<0.5	180	46	<1	13	54	33	11	<1	280	142
	11/14/97	7:17	SF												<1	<10	25	19	8	<1	130	
	11/19/97	8:46	DT	12	2600	5.1	8.1	24.0	0.37	1.2	0.43	<0.5	18	<6	<1	<10	26	<2	<4	<1	76	1064
	11/19/97	19:46	SF												20	<10	21	<2	5	<1	98	
	11/26/97	9:39	ST	5	270	730	8.5	5.6	1.10	7.3	4.80		1100	910	3	53	180	230	38	<1		70
	11/26/97	10:39	SF												<1	<10	11	<2	<4	<1	37	
	11/26/97	12:39	ST	16	500	90	7.4	7.3	0.20	3.1	1.30	<0.5	110	70	<1	<10	42	31	8	<1	180	134
	11/26/97	18:39	SF												<1	<10	18	<2	<4	<1	50	
	11/27/97	20:39	ST	30	2300	7	8.1	25.0	<0.1	0.88	0.31	<0.5	17	12	<1	<10	20	2	<4	<1	66	776
	11/30/97	5:00	SF												<1	<10	16	<2	<4	<1	62	

NEWPORT BAY WATERSHED

STATION	DATE	TIME	SAMPLES Type	#	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
SADF01	12/6/97	4:06	ST	5	110	250	8.1	1.6	0.26	2.4	2	<0.5	410	360	<1	12	42	43	15	<1	240	35
	12/6/97	5:06	SF												<1	<10	13	9.0	<4	<1	70	
	12/6/97	7:06	ST	5	160	170	7.7	2.9	0.19	2.0	2	<0.5	250	200	<1	<10	43	34	9	<1	190	50
	12/6/97	15:06	SF												<1	<10	22	11	<4	<1	91	
	12/6/97	17:06	ST	8	370	84	7.7	5.4	0.21	1.8	1	<0.5	120	110	<1	<10	36	24	7	<1	140	95
	12/7/97	7:06	SF												<1	<10	17	<2	<4	<1	65	
	12/7/97	9:06	ST	34	1500	22	7.9	19.0	0.26	1.4	0.52	<0.5	27	13	<1	<10	19	5	4	<1	56	504
	12/10/97	3:06	SF												<1	<10	13	<2	<4	<1	32	
	1/3/98	3:18	ST	5				11.0	1.30	4.7	0.96		57		<1	<10	76	18	10	<1	180	256
	1/3/98	4:18	SF												<1	<10	53	6	8	<1	110	
	1/3/98	6:18	ST	14	970	34	7.2	9.2	<0.5	2.8	0.84	<0.5	28	18	<1	<10	37	6	6	<1	84	288
	1/4/98	8:18	SF												<1	<10	29	<2	5	<1	46	
	1/4/98	10:18	ST	34	1800	15	7.9	14.0	0.21	1.3	0.40	<0.5	21	9	<1	<10	25	4	<4	<1	34	594
	1/7/98	4:18	SF												<1	<10	22	<2	<4	<1	97	
	1/9/98	5:19	ST	5				18.0	<0.5	0.85	<0.2				<10	<10	25	<2	13	<1	83	870
	1/9/98	6:19	SF												<10	<10	23	<2	8.0	<1	110	
	1/9/98	7:33	ST	13	570	100	7.6	4.1	<0.5	1.8	1	<0.5	170	36	<1	<10	40	29	8	<1	<10	164
	1/10/98	12:09	SF												<1	<10	20	8	13	<1	<10	
	1/10/98	14:09	ST	33	1900	6.6	8.1	15.0	<0.5	1.6	0.41	<0.5	10	8	<1	<10	120	14	29	<1	94	694
	1/13/98	6:09	SF												<1	<10	18	<2	<4	<1	110	
	1/20/98		DT	24	2500	1.9	8.1	17.0	0.11	1.2	<0.2	<0.5	<6	<6	<1	<10	12	<2	<4	<1	<10	
	1/21/98														<1	<10	14	<2	<4	<1	<10	
	2/14/98	8:58	ST	5	500	85	7.4	8.4	<0.5		8.6		190	33	<1.00	12	36	22	7	<1.00	195	110
	2/14/98	9:58	SF												<1.00	2	18	2	4	<1.00	297	
	2/14/98	11:58	ST	7	210	75	7.6	4.4	<0.5		9.5		140	23	<1.00	8	33	19	9	<1.00	229	70
	2/14/98	23:58	SF												<1.00	2	14	2	2	1.40	15	
	2/19/98	20:07	ST	5	670	75	7.7	11.5	<0.5	3.3	0.9				<1.00	16	37	35	10	<1.00	145	176
	2/19/98	21:07	SF												<1.00	3	15	5.20	3	<1.00	31	
	2/19/98	23:07	ST	5	390	60	7.6	6.2	<0.5	1.5	14.1				<1.00	5	26	14	5	<1.00	57	150
	2/20/98	7:07	SF												<1.00	2	11	<1.00	2	<1.00	19	
	2/20/98	9:07	ST	20	2400	11	8.0	26.6	0.5	1.2	8.9				<1.00	2	19.0	3	5	<1.00	44	850
	2/21/98	23:07	SF												<1.00	2	27	3	6	<1.00	23	
	2/22/98	1:07	ST	7		27	7.8	8.4	<0.5	1.4	9				<1.00	4	23	13	4	<1.00	48	234
	2/22/98	13:07	SF												<1.00	2	15	2	2	<1.00	20	
	2/22/98	15:07	ST	13		18	7.9	13.3	<0.5	1.1	10				<1.00	5	23	7	6	<1.00	49	298
	2/23/98	15:07	SF												<1.00	2	17	1	4	<1.00	20.0	
	2/23/98	17:07	ST	10		64	7.1	4.4	<0.5	2.1	12				<1.00	7	26.0	19.0	6	<1.00	71	64
	2/24/98	11:07	SF												<1.00	2.10	12	1	2.00	<1.00	10	
	3/25/98	5:27	ST	8	264	78	7.53	6.2	0	<1.0	<0.1		542	21	<1.00	7	42	26	7	<1.00	133	100
	3/25/98	19:13	SF												<1.00	3	17	2	3	<1.00	60	
	3/25/98	21:13	ST	28	2340	6.9	8.26	26.1	<0.1	<1.0	0.9		4	<1	<1.00	2	36	4.00	5	<1.00	47	850
	3/28/98	3:13	SF												<1.00	3	32	2	5	<1.00	50	
	3/28/98	9:13	ST	14	1500	10	8.16	10.2	<0.1	1.3	0.3		3	<1	<1.00	3	57	6	5.70	<1.00	57	512
	3/29/98	11:13	SF												<1.00	2	15	3	9	<1.00	57	
	4/20/98	13:11	DT	20	3050	2.1	8.10	19.9	<0.1	<1.0	<0.1		2	1								
	4/21/98	8:11																				

STATION	DATE	TIME	SAMPLES Type	#	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
SADF01	11/8/98	2:41	ST	5	835	80	7.0	9.2	1.74	12.20	4.59		500	240	3	16	99	48	21	<2	850	230
	11/8/98	3:41	SF												<1	<8	24	4	13	<2	326	
	11/8/98	5:41	ST	10	755	28	7.5	11.0	0.29	2.18	2.75		140	100	<1	<8	28	13	7	<2	117	245
	11/8/98	23:41	SF												<1	<8	18	4	4	<2	61	
	11/9/98	1:41	ST	37	2060	6	7.9	17.0	0.17	1.30	0.34		14	10	<1	<8	18	3	<4	<2	64	705
	11/12/98	1:41	SF												<1	<8	13	<2	<4	<2	43	
	2/4/99	19:13	ST	5	1810	15	7.9	16.7	0.52	2.25	0.46		29	19	<1	<8	23	6	<4	<2	117	600
	2/4/99	20:13	SF												<1	<8	17	4	<4	<2	90	
	2/4/99	22:13	ST	14	560	24	7.5	6.2	0.28	1.38	0.61		52	44	<1	<8	23	12	6	<2	193	208
	2/6/99	0:13	SF												<1	<8	14	<2	4	<2	222	
	2/6/99	2:13	ST	33	2360	2	8.1	18.9	0.07	1.03	0.31		6	3	<1	<8	16	<2	6	<2	28	868
	2/8/99	18:13	SF												<1	<8	13	<2	7	<2	29	
	2/9/99	17:00	ST	4	1050	28	7.8	10.6	0.26	2.56	0.61		120	40	<1	<8	39	25	8	<2	223	340
	2/9/99	17:45	SF												<1	<8	17	<2	5	<2	81	
	2/9/99	20:00	ST	9	985	24	7.7	11.4	0.08	1.89	0.77		66	42	<1	<8	31	15	8	<2	108	308
	2/10/99	12:00	SF												<1	<8	18	<2	8	<2	53	
	2/10/99	14:00	ST	38	2370	2	8.1	19.4	<0.05	0.90	0.28		<4	<1	<1	<8	21	<2	6	<2	64	872
	2/13/99	16:00	SF												<1	<8	19	<2	7	<2	64	
	3/15/99	8:32	ST	5	780	28	7.5	9.2	0.76	3.49	0.64		130	46	1	10	58	24	7	<2	299	220
	3/15/99	9:32	SF												<1	<8	27	<2	<4	<2	120	
	3/15/99	11:32	S	3	325	92	7.5	5.7	0.53	4.23	1.16		270	110								
	3/15/99	15:32	S																			
	3/15/99	17:32	ST	41	1810	3	8.2	16.4	<0.05	0.88	0.21		05	2	<1	<8	21	<2	<4	<2	33	724
	3/19/99	8:32	SF												<1	<8	17	<2	<4	<2	30	
	3/25/99	12:02	ST	5	595	26	7.3	6.6	0.72	3.76	0.73		120	14	1	<8	59	21	10	<2	375	195
	3/25/99	13:02	SF												<1	<8	25	3	7	<2	163	
	3/25/99	15:02	ST	9	505	23	7.6	6.9	0.13	1.14	0.67		52	18	<1	<8	35	15	4	<2	115	158
	3/26/99	7:02	SF												<1	<8	22	<2	<4	<2	49	
	3/26/99	9:02	ST	38	1800	4	8.3	17.7	0.08	0.59	0.18		11	7	<1	<8	27	2	<4	<2	43	666
	3/29/99	11:02	SF												<1	<8	16	<2	<4	<2	30	
	4/6/99	13:07	ST	5	1050	62	7.5	11.9	1.05	7.44	0.46		110	50	1	<8	68	14	8	<2	384	372
	4/6/99	14:07																				
	4/6/99	16:07	ST	12	405	98	7.6	4.1	0.18	2.51	1.08		140	46	1	8	46	26	7	<2	185	168
	4/7/99	20:07	SF												<1	<8	20	<2	<4	<2	54	
	4/7/99	22:07	ST	12	1430	13	8.3	13.8	<0.05	0.76	0.32		16	10	<1	<8	21	3	<4	<2	41	480
	4/8/99	20:07	SF												<1	<8	18	<2	<4	<2	30	
	4/8/99	22:07	ST	3	900	38	8.0	7.1	0.43	2.12	0.57		44	24								300
	4/9/99	2:07																				
	4/9/99	4:04	ST	17	1950	4	8.1	15.0	<0.05	1.13	0.46		6	4	<1	<8	17	<2	4	<2	35	730
	4/10/99	13:44	SF												<1	<8	19	<2	5	<2	31	
	11/8/99	10:47	ST	5	1120	180.0	6.8	44.0	3.76	13.00	3.37		460	220	3	15	168	40	54	<2	901	320
	11/8/99	11:47	SF												<1	<8	45	10	39	<2	532	
	11/8/99	13:47	ST	4	1770	80.0	7.1	38.3	1.85	11.00	1.81		300	160	1	<8	77	11	28	<2	365	504
	11/8/99	19:47	SF												<1	<8	40	4	27	<2	290	
	1/25/00	8:14	ST	11	420	190.0	7.3	14.0	1.10	4.40	3.67	0.17	370	230	2	14	96	52	19	<2	364	316
	1/25/00	19:14	SF												2	<8	36	16	12	<2	137	84
	1/26/00	7:40	ST	4	810	19.0	7.8	12.0	0.62	2.20	1.22		30	12	<1	<8	29	8	8	<2	74	184
	1/26/00	13:40	SF												<1	<8	19	<2	6	<2	46	
	1/26/00	15:40	ST	4	1910	5.6	8.1	16.0	0.23	1.40	0.46		22	12	<1	<8	13	2	<4	<2	32	50
	1/28/00	5:40	SF												<1	<8	11	<2	<4	<2	27	

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
SADF01	2/4/00	10:00	D	24	2330	19.0	8.1	15.0	0.06	0.97	0.34	0.04	11	4								
	2/5/00	23:00																				
	2/10/00	0:39	ST	5	2640	2.3	8.1	16.0	<0.05	0.82	0.12	<0.01	6	4	<1	<8	13	<2	<4	<2	19	920
	2/10/00	1:39	SF												<1	<8	13	<2	<4	<2	17	
	2/10/00	3:39	ST	20	1140	65.0	7.6	8.9	0.22	2.00	1.19	0.08	160	50	<1	<8	44	19	6	<2	167	296
	2/11/00	7:39	SF												<1	<8	15	<2	<4	<2	51	
	2/11/00	11:39	ST	8	1150	9.2	7.9	11.0	<0.05	0.69	0.44	0.09	12	7	<1	<8	14	3	<4	<2	47	296
	2/12/00	1:39	SF												<1	<8	10	<2	<4	<2	34	
	2/12/00	3:29	ST	6	305	100.0	7.6	4.1	0.24	1.70	1.49	0.12	220	90	<1	<8	55	38	8	<2	208	64
	2/12/00	13:39	SF												<1	<8	9	<2	<4	<2	21	
	2/12/00	8:46	DT	21	765	32.0	7.5	7.7	0.14	1.70	0.72	0.15	37	23	<1	<8	26	9	4	<2	85	295
	2/14/00	23:39	DF												<1	<8	19	4	<4	<2	59	
	2/16/00	6:55	ST	9	495	45.0	7.5	7.7	0.13	2.20	0.86	0.12	62	36	<1	<8	32	14	6	<2	98	160
	2/17/00	0:55	SF												<1	<8	25	7	5	<2	74	
	2/17/00	9:50	D	31	2100	6.1	8.2	15.0	<0.05	0.84	0.34	0.07	14	7								
	2/20/00	4:32																				
	2/29/00	10:48	D	24	2420	2.2	8.2	23.0	0.06	0.79	0.18	0.04	8	4								
	3/2/00	8:48																				
	3/3/00	19:40	ST	5	750	32.0	7.4	12.0	0.67	2.30	0.64	0.04	70	58	<1	<8	38	13	7	<2	166	280
	3/3/00	20:40	SF												<1	<8	23	4	4	<2	90	
	3/3/00	22:40	ST	9	535	37.0	7.6	8.1	0.24	1.30	0.58	0.07	58	38	<1	<8	20	8	<4	<2	72	232
	3/4/00	14:40	SF												<1	<8	13	<2	<4	<2	37	
	3/4/00	16:40	ST	10	330	45.0	7.6	6.9	0.30	1.20	0.83	0.12	76	32	<1	<8	47	14	<4	<2	97	136
	3/5/00	10:40	SF												<1	<8	34	7	<4	<2	59	
	3/5/00	12:40	S	1				1.9	0.08	0.94	0.98	0.16										
	3/5/00	12:40																				
	3/6/00	18:40	S	18	2200	5.4	8.2	25.0	<0.05	0.71	0.49	0.08	13	6								
	3/8/00	2:40																				
	3/8/00	4:40	S	11	585	50.0	7.7	5.5	0.10	1.00	0.83	0.09	66	28								200
	3/9/00	0:40																				
	3/22/00	11:48	D	22	2850	3.3	8.2	22.0	<0.05	0.88	0.14	<0.01	30	10								
	3/23/00	8:48																				
	4/4/00	12:58	D	24	2380	2.3	8.2	14.0	<0.05	1.10	0.21	0.02	110	68								
	4/5/00	11:58																				
	4/20/00	11:30	D	1	2220	1.5	8.0	19.0	0.07	0.70	0.46	0.10	20	12								
	4/20/00	11:30																				
	5/4/00	10:42	D	24	2610	6.4	8.2	14.0	0.12	1.00	0.34	0.15	46	26								
	5/5/00	9:42																				
	5/30/00	12:15	D	24	2070	2.8	8.3	10.0	<0.05	0.55	0.15	0.01	13	7								
	5/31/00	11:15																				
	6/6/00	12:22	D	24	930	10.0	8.4	1.9	0.06	1.20	0.25	0.02	26	18								
	6/7/00	11:22																				
	6/27/00	13:15	D	1	2330	9.5	8.0	10.0	<0.05	0.63	0.18	0.02	<10	<1								
	6/27/00	13:15																				

NEWPORT BAY WATERSHED

STATION	DATE	TIME	SAMPLES Type	#	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
BCF04	6/19/91	10:15	DT	1	3000	37	8.2	21	0.2	0.5	0.7		64	10	<7	<10	<30	20	<10	<2	<10	
	7/23/91	10:15	DT	1	2800	3.4	8.2	17	<0.1	2.9	9.8		29	7	<20	<40	<20	<2	<40	<10	30	710
	9/17/91	8:55	DT	1	2700	23	8.2	13	<0.1	0.1	1.1		36	9								
	10/16/91	9:10	DT	1	1800	66	8.2	5.6	<0.1	0.8	3.8		110	19								
	3/20/92	15:50	ST	4	920	21	7.7	6.4	0.2	1.1	2.1		760	96	<20	<30	20	12	<40	<10	90	242
	3/20/92	17:50																				
	3/20/92	18:50	ST	10	340	6700	8.1	2.9	0.1	0.9	7.4		5200	600	<20	<30	30	7	50	<10	60	88
	3/22/92	3:50																				
	3/22/92	9:50	ST	10	700	57	8.0	5.1	0.1	0.9	2.4		1600	190	<20	<30	<20	3	<40	<10	40	168
	3/24/92	15:50																				
	3/26/92	18:20	ST	4	1100	38	8.1	5.3	<0.1	0.4	0.5		27	9	<7	<10	6	4	<10	<2	<10	271
	3/26/92	20:20																				
	3/26/92	21:20	ST	8	770	2400	8.0	5.4	<0.1	0.7	3.9		2200	240	<7	130	120	25	100	<2	110	194
	3/27/92	18:20																				
	3/28/92	0:20	ST	12	2400	58	8.4	15	<0.1	0.7	0.6		67	12	<7	<10	130	5	<10	<2	<10	628
	3/30/92	18:20																				
	4/22/92	9:00	DT	1	2730	3.2	8.3	13	<0.1	0.5	0.7		46	5	<20	<30	<20	<2	<40	<10	<10	726
	5/27/92	8:35	DT	1	3100	1.6	8.1	7.0	<0.1	0.4	0.3		11	11								
	7/22/92	9:20	DT	1	3000	11	8.2	98	<0.1	0.3	0.5		11	5								
	9/23/92	8:40	DT	1	2900	3.5	8.3	6.4	<0.1	0.54	0.35		11	6								
	10/28/92	9:10	DT	1	3000	30	8.1	7.0	<0.1	3.9	1		120	13	<20	<30	<20	4	<40	<10	26	940
	11/18/92	9:00	DT	1	2900	2.4	8.2	9.0	<0.1	0.31	0.49		<5	<5								
	1/27/93	9:15	ST	1	2600	200	7.9	18	0.13	0.81	0.86		290	23								
	2/18/93	11:49	ST	6	970	480	7.8	5.7	0.19	1.5	2.4		790	70	<7	<10	30	13	13	<4	57	214
	2/19/93	11:49																				
	2/19/93	13:30	ST	7	970	400	8.0	7.4	0.14	1.1	2.1		640	56	<7	<10	<30	10	12	<4	35	175
	2/19/93	15:48																				
	3/17/93	8:00	DT	1	2800	3.7	8.4	14	<0.1	0.47	0.2		29	<5								
	5/26/93	7:30	DT	1	2200	6.2	8.4	11	<0.1	0.82	0.21		42	<5	<20	<30	<20	<2	<40	<10	<10	520
	7/14/93	8:20	DT	1	2800	6.3	8.1	7.2	<0.1	0.41	0.17		<5	<5								
	9/15/93	9:10	DT	1	2900	2.6	8.1	6.6	<0.1	0.43	0.21		<5	<5								
	1/18/94	9:30	DT	1	2900	2.0	8.1	9.4	<0.1	0.57	0.14		<5	<5								
	2/6/94	18:00	ST	5	3100	5.2	8.3	13	<0.1	0.79	<0.1		120	14	<5	<10	<20	<2	<40	<10	27	780
	2/7/94	2:00	SF												<5	<10	<20	<2	<40	<10	<10	780
	2/7/94	4:00	ST	4	820	290	8.4	4.2	0.66	0.75	1.8		740	50	<5	<10	<20	5.4	<40	<10	58	186
	2/7/94	10:00																				
	2/7/94	12:00	ST	11	640	1900	8.5	4.2	0.75	5.3	0.59		14000	880	5.9	<10	41	6.6	120	<10	140	368
	2/8/94	11:00	SF												<5	<10	<20	<2	<40	<10	<10	368
	2/8/94	12:43	ST	12	1800	500	8.2	9.1	0.18	0.81	3.5		790	34	<5	84	45	9.0	48	<10	97	668
	2/9/94	10:43	SF												<5	<10	<20	<2	<40	<10	<10	668
	2/9/94	12:43	ST	11	2700	88	8.3	14	0.14	0.51	1.3		170	7.0	<5	21	<20	<2	<40	<10	25	448
	2/10/94	8:43																				
	2/10/94	12:43	ST	8	2900	38	8.4	13	0.13	15	0.83		170	<5	<5	13	<20	<2	<40	<10	27	730
	2/11/94	2:00																				

STATION	DATE	TIME	SAMPLES Type	#	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
BCF04	2/17/94	6:00	ST	5	1100	4000	8.1	5.8	0.22	2.4	20		9000	530	17	870	500	100	690	<10	1200	230
	2/17/94	14:00	SF												<5	11	<20	<2	<40	<10	13	230
	2/17/94	16:00	ST	10	630	7000	8.4	3.6	0.27	19	31		23000	1200	<5	1900	1100	290	1500	<10	2200	150
	2/18/94	10:00	SF												<5	11	<20	<2	<40	<10	<10	150
	2/18/94	12:00	ST	11	890	1800	7.7	4.9	0.18	4.0	8.6		3100	116	<5	330	160	47	230	<10	380	210
	2/19/94	8:00	SF												<5	13	<20	<2	<40	<10	<10	210
	2/19/94	10:00	ST	11	2300	210	8.4	14	<0.1	1.1	1.5		390	12	<5	44	25	4.6	<40	<10	52	518
	2/20/94	6:00																				
	2/20/94	8:00	ST	13	450	3500	8.5	3.4	0.10	4.9	14		7000	260	7.2	490	280	87	400	<10	630	190
	2/20/94	8:00																				
	2/21/94	10:00	ST	7	600	170	7.9	3.8	0.16	0.39	3.5		340	14	<5	33	26	6.0	<40	<10	46	140
	2/21/94	22:00	SF												<5	<10	<20	<2	<40	<10	<10	140
	2/22/94	0:00	ST	17	2200	400	8.4	11	0.15	0.83	3.5		1100	56	5.9	91	52	13	68	<10	110	560
	2/23/94	8:00	SF												<5	<10	<20	<2	<40	<10	<10	560
	2/23/94	10:00	ST	12	2500	600	8.6	12	<0.1	0.78	8.1		960	28	<5	<10	<20	<2	<40	<10	17	686
	2/24/94	8:00																				
	2/24/94	10:00	ST	12	2700	160	8.5	13	<0.1	0.34	1.8		320	5.0	<5	<10	<20	3.0	<40	<10	20	704
	2/25/94	8:00	SF												<5	<10	<20	<2	<40	<10	<10	704
	3/24/94	19:00	ST	3	880	2300	8.4	2.7	0.12	0.83	11		3300	310	11	300	150	55	210	<10	450	234
	3/24/94	23:00																				
	3/25/94	1:00	ST	3	630	11000	8.5	3.2	0.26	3.0	7.3		15000	1200	55	1400	730	250	1100	<10	1800	374
	3/25/94	5:00																				
	3/25/94	7:00	ST	18	1500	460	8.2	6.6	0.12	1.4	2.6		580	40	<5	77	36	10	47	<10	84	234
	3/26/94	9:00																				
	3/26/94	9:00	ST	12	2800	23	8.5	9.4	0.12	<0.2	1.1		110	9	<5	26	<20	<2	<40	<10	23	656
	3/27/94	7:00																				
	3/27/94	9:00	ST	12	3100	18	8.5	10.5	<0.1	0.68	2.1		45	9	<5	15	<20	<2	<40	<10	11	732
	3/28/94	7:00																				
	3/28/94	11:00	ST	4	3000	24	8.5	9.8	<0.1	0.49	1.3		52	20	<5	11	<20	<2	<40	<10	<10	694
	3/28/94	17:00																				
	4/20/94	8:30	DT	1	3200	3.9	7.9	8.4	<0.10	0.48	0.56		<5	<5								
	11/10/94	9:00	ST	4	990	620	6.6	5.1	0.34	4.2	5.2		1200	45	1.9	96	120	32	65	<0.3	250	205
	11/10/94	15:00																				
	11/10/94	17:00	ST	13	1400	12	6.8	2.2	0.13	0.63	0.85		32	<5	<1	<10	21	<2	<40	<0.3	28	290
	11/11/94	17:00																				
	11/12/94	9:04	ST	24	1500	0.55	8.3	0.26	<0.1	0.36	<0.2		<5	<5	<1	<10	6.3	<2	<40	<2	26	580
	11/14/94	7:04																				
	11/30/94	8:00	DT	1											<1	<10	26	5.5	<40	0.7	36	
	3/3/95	10:00	ST	3	2200	360	7.9	8.5	0.15	2.8	1.93		490	31	<1	56	40	9.1	<40	<1	96	464
	3/3/95	14:00																				
	3/3/95	16:00	ST	18	3400	120	8.2	10.0	<0.1	1.5	0.96		180	22	<1	<10	16	<2	<40	1.5	12	738
	3/5/95	0:00																				
	3/5/95	2:00	ST	13	490	2000	7.8	2.7	0.51	4.2	11		4600	99	6.8	310	210	84	270	<1	540	155
	3/6/95	8:00																				
	3/6/95	10:00	ST	12	1000	300	8.0	5.7	<0.1	2.3	2.2		360	31	<1	40	31	6.5	51	<1	65	
	3/7/95	8:00																				
	3/10/95	22:30	ST	3	1200	4200	8.0	4.2	<0.1	11	16		7500	750	10	520	270	110	420	<1	760	280
	3/11/95	2:30																				
	3/11/95	4:30	ST	14	550	2100	7.8	3.3	<0.1	4.6	7.2		2800	280	4.7	240	110	37	190	<1	320	158
	3/12/95	6:30																				
	3/12/95	8:30	ST	8	1000	150	8.0	6.1	0.14	1.6	1.4		200	24	<1	24	24	4.9	<40	<1	41	236
	3/12/95	22:30																				
	5/16/95	11:45	DT	24											<1	<10	13	<2	<40	<1	<10	850
	5/17/95	10:45																				
	7/25/95	9:00	DT	24											<1	<10	8	<2	<40	<1	19	
	7/26/95	8:00																				
	9/19/95	10:00	DT	24											<1	<10	19	3	<40	1	29	745

NEWPORT BAY WATERSHED

STATION	DATE	TIME	SAMPLES Type	#	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
BCF04	9/20/95	9:00																				
	1/21/96	15:36	ST	5	1200	370.0	7.2	2.8	0.37	2.60	2.60		250	68	1	40	48	22	28	<1	160	298
	1/21/96	16:36																				
	1/21/96	18:36	ST	10	970	160.0	7.6	3.0	<0.10	1.30	1.20		130	18	<1	14	32	6	<20	<1	42	224
	1/22/96	12:36																				
	1/22/96	14:36	ST	31	2100	15.0	8.3	2.8	0.18	0.68	0.33		15	6	<1	<10	31	<2	6	<1	17	
	1/25/96	14:36																				
	1/31/96	3:43	ST	5	650	50.0	7.4	2.7	<0.10	1.40	1.00		69	15	<1	14	33	5	9	<1	77	138
	1/31/96	4:43																				
	1/31/96	6:43	ST	20	1000	170.0	8.2	4.9	0.11	1.60	1.60		184	24	<1	20	32	5	24	11	150	238
	2/1/96	20:43																				
	2/1/96	22:43	ST	12	2000	32.0	8.3	6.3	<0.10	2.50	0.81		37	6	<1	10	19	<2	9	3	26	490
	2/2/96	20:43																				
	2/3/96	10:43	ST	10	1300	86.0	7.9	4.2	0.12	1.50	1.00		61	15	<1	<10	39	4	10	8	23	260
	2/4/96	4:43																				
	2/20/96	2:18	ST	5	2300	26.0	7.8	3.4	<0.10	2.50	0.68		48	20	<1	<10	29	2	19	<1	45	576
	2/20/96	3:18																				
	2/20/96	5:18	ST	27	690	340.0	7.7	7.9	0.21	1.00	1.60		330	48	<1	35	34	<2	<2	<1	68	160
	2/22/96	9:18																				
	2/22/96	11:18	ST	20	1400	110.0	8.1	9.0	0.22	1.70	1.10		88	13	<1	13	26	<2	16	<1	<10	345
	2/24/96	1:18																				
	3/27/96	10:25	DT	1											<1	<10	4	2	5	<1	35	850
	7/24/96	8:45	DT	1											<1	<10	6	<2	7	<1	14	790
	9/24/96	8:35	DT	1											<1	<10	4	<2	5	<1	34	710
	1/29/97	8:55	DT	1											<1	16	12	4	18	<1	100	800
	4/16/97	8:55	DT	1											<1	<10	11	4	10	<1	28	900
	5/20/97	8:30	DT	1											<1	<10	4.1	<2	<6	<1	48	780
	7/8/97	8:55	DT	1											<1	<10	<4	<2	6	<1	24	
	9/24/97	8:45	DT	1											<1	<10	6	<2	7	<1	<10	
	9/25/97	10:15	ST	5	2400	190	7.3	10.0	0.29	4.5	2.50	<0.5	280	72	<1	15	43	8	23	<1	110	590
	9/25/97	11:15	SF												<1	<10	30	3	14	<1	76	
	9/25/97	13:15	ST	11	2000	59	7.5	5.1	<0.1	2.1	1.10	<0.5	79	31	<1	<10	18	<2	12	<1	51	500
	9/26/97	9:15	SF												<1	<10	16	2	8	<1	35	
	9/26/97	11:15	ST	23	2500	24	8.4	2.8	0.11	1.4	0.55	<0.5	34	17	<1	<10	20	<2	<4	<1	36	648
	9/28/97	7:15	SF												<1	<10	21	<2	6	<1	39	
	9/28/97	9:15	ST	13	2900	23	8.0	4.7	<0.1	1.6	0.49	<0.5	31	<6	<1	<10	20	<2	5	<1	29	800
	9/29/97	9:15	SF												1.0	<10	21	<2	7	<1	15	
	11/19/97	11:00	DT	12	3000	22	8.1	5.4	0.16	1.8	0.39	<0.5	58	6	<1	<10	24	<2	5	<1	80	790
	11/19/97	22:00	DF												<1	<10	15	<2	4	<1	110	
	12/6/97	1:46	ST	5											<1	18	49	9	12	<1	110	265
	12/6/97	2:46	SF												<1	<10	150	<2	<4	<1	38	
	12/6/97	4:46	ST	16	520	1700	7.4	5.0	0.31	3.8	5.0	0.50	1800	1600	1	190	110	25	120	<1	370	150
	12/7/97	10:46	SF												<1	<10	15	<2	4.0	<1	38	
	1/20/98		DT	24											<1	<10	9	<2	<4	<1	<10	
	1/21/98		DF												<1	<10	10	<2	4.0	<1	<10	
	2/14/98	9:01	ST	5									330		<1.00	24	34	6	18	<1.00	43.0	410
	2/14/98	10:01	SF												<1.00	2	18	<1.00	5	<1.00	8	
	2/14/98	12:01	ST	4									2500		<5.00	265	57	32	158	<1.00	323	70
	2/14/98	18:01	SF												<1.00	3	93	4	19	<1.00	42	
	2/15/98	10:01	ST	18	1300	210	8.2	6.6	<0.5	1.7	11.0		280	42	<1.00	28	29	5	22	2	51	328
	2/16/98	20:01	SF												<1.00	4	15	<2	10	<1.00	27	
	2/16/98	22:01	ST	11	490	1100	7.9	6.2	<0.5	1.6	11				<1.00	77	41	17	50	<1.00	84	116
	2/17/98	18:01	SF												<1.00	7	138	6	8	<1.00	47	
	2/17/98	20:01	ST	7	800	180	8.0	4.9	<0.5	2.6	10				<1.00	29	55	5.60	21	2	45	208
	2/18/98	8:01	SF												<1.00	3	21	1	5	<1.00	19	
	2/19/98	22:20	ST	5	520	310	7.8	4.9	<0.5	1.6	2				<1.00	33	21	11	20	<1.00	55	124
	2/19/98	23:20	SF												<1.00	3	16	<1.00	3	<1.00	5.60	

STATION	DATE	TIME	SAMPLES Type	#	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
BCF04	2/20/98	1:20	ST	8	520	750	7.8	4.4	0.50	2.6	10				<1.00	74	38	14	47	<1.00	84	125
	2/20/98	15:20	SF												<1.00	3	13	<1.00	6	<1.00	22	
	2/20/98	17:20	ST	16	1400	89	8.1	6.2	<0.5	2.1	10				<1.00	13.0	12	3	11	<1.00	17	340
	2/21/98	23:20	SF												<1.00	3	11	<1.00	5	<1.00	9	
	2/22/98	1:20	ST	8		1300	8.0	6.6	0.60	2.9	9				<1.00	120	69	20	78	<5.00	175	141
	2/22/98	15:20	SF												<1.00	3.90	14	2	5	<1.00	9	
	2/22/98	19:20	ST	11		460	7.9	4.0	<0.5	2.4	11.0				<1.00	51.0	38	14	32.0	<1.00	138	135
	2/23/98	15:20	SF												<1.00	3.80	27	3	6	<1.00	11	
	2/23/98	17:20	ST	10		3000	7.7	5.3	0.8	3.9	9.5				<5.00	239	110	29	161	<5.00	242	85
	2/24/98	11:20	SF												<1.00	4	17	1	4	<1.00	11	
	3/25/98	8:56	ST	5	490	2900	8.21	13.7	0.7	3.6	0.3		4720	353	<20	345	134	67	235	<20	659	330
	3/25/98	9:56	SF												1	4	9	<1.00	5	<1.00	14	
	3/25/98	11:56	ST	5	328	1500	8.19	3.1	<0.1	2.8	0.6		2060	162	<5.00	215	62	36	141	<5.00	274	70
	3/25/98	21:56	SF												2	2	3	2	12	<1.00	40	
	3/25/98	23:56	ST	26	1340	240	8.50	9.3	<0.1	<1.0	0.9		267	10	<1.00	39	34.0	8	30	<1.00	76	336
	3/28/98	1:56	SF												1	4	13	44	6	<1.00	20.0	
	3/28/98	3:56	ST	16	1580	80	8.48	4.4	0.10	1.20	0.60		103	13	<1.00	17	19	4	17	<1.00	43.0	390
	3/29/98	9:56	SF												<1.00	1.90	7	<1.00	7	<1.00	9	
	11/8/98	6:40	ST	5	805	320	7.6	5.3	0.23	4.85	5.20		920	160	2	70	55	18	47	<2	172	190
	11/8/98	7:40	SF												<1	34	28	7	23	<2	76	
	11/8/98	9:40	ST	9	1170	58	7.8	6.6	0.11	4.28	1.35		220	120	<1	22	28	3	17	<2	40	320
	11/9/98	1:40	SF												<1	<8	14	<2	6	<2	12	
	11/9/98	3:40	ST	14	2350	6	8.3	3.7	<0.05	1.10	0.28		18	10	<1	<8	17	<2	5	<2	19	640
	11/10/98	15:40	SF												<1	<8	15	2	5	<2	13	
	11/28/98	6:27	ST	5	1030	320	7.7	5.7	0.07	4.63	4.04		850	130	2	47	41	16	32	<2	164	248
	11/28/98	7:27	SF												<1	<8	9	<2	5	2	<10	
	11/28/98	9:27	ST	12	1310	27	8.1	4.8	<0.05	1.79	0.64		290	80	<1	11	19	<2	10	<2	22	334
	11/29/98	7:27	SF												<1	<8	14	<2	6	<2	<10	
	11/29/98	9:27	ST	27	2110	8	8.3	2.9	<0.05	0.86	0.25		40	20	<1	<8	13	<2	6	<2	14	605
	12/1/98	13:27	SF												<1	<8	12	<2	5	<2	<10	
	12/1/98	15:27	ST	9	705	152	8.0	2.7	<0.05	1.78	1.93		300	240	<1	30	29	6	20	<2	64	185
	12/2/98	7:27	SF												<1	<8	10	<2	<4	<2	<10	
	1/25/99	9:31	ST	5	650	116	8.0	4.6	0.06	1.60	1.93		300	100	<1	21	32	6	17	<2	67	168
	1/25/99	10:31	SF												<1	<8	12	<2	5	<2	18	
	1/25/99	12:31	ST	11	1070	30	8.1	4.4	<0.05	0.99	0.70		62	18	<1	<8	14	<2	5	<2	16	300
	1/26/99	8:31	SF												<1	<8	10	<2	5	<2	<10	
	1/26/99	10:31	ST	14	645	350	8.0	3.1	0.09	1.84	2.78		670	90	<1	51	35	13	33	<2	120	115
	1/27/99	12:31	SF												<1	<8	63	9	<4	<2	82	
	1/27/99	14:31	ST	22	1860	750	8.2	4.1	0.05	0.89	4.28		430	100	<1	51	29	14	31	<2	106	552
	1/29/99	8:31	SF												<1	<8	9	<2	<4	<2	<10	
	4/6/99	13:09	ST	5	1470	436	8.0	3.9	0.28	3.09	2.45		580	120	<1	31	43	11	29	<2	118	250
	4/6/99	14:09	SF												<1	<8	17	<2	<4	<2	<10	
	4/6/99	16:09	ST	14	985	154	8.2	1.5	0.05	0.84	0.89		200	30	<1	17	25	4	12	<2	46	250
	4/7/99	18:09	SF												<1	<8	14	<2	<4	<2	<10	
	4/7/99	20:09	ST	13	1710	25	8.4	1.0	<0.05	0.55	0.31		56	18	<1	<8	12	<2	<4	<2	13	450
	4/8/99	20:09	SF												<1	<8	11	<2	<4	<2	<10	
	4/8/99	22:09	ST	3	1630	107	8.4	1.3	0.05	0.71	0.65		140	20	<1	14	23	3	9	<2	33	448
	4/9/99	2:09																				
	4/9/99	4:09	ST	17	1850	8	8.4	1.1	<0.05	0.44	0.19		18	6	<1	<8	11	<2	5	<2	<10	522
	4/10/99	12:09	SF												<1	<8	10	<2	4	<2	<10	
	1/25/00	10:15	ST	1											<1	9.4	15.7	4.26	9.9	<2	40.7	
	1/25/00	10:15	SF	1											<1	<8	8.43	<2	4.55	<2	15.7	360
	2/11/00	12:19	ST	8	1300	12	8.2	1.6	<0.05	0.61	0.441	0.1	230	130	<1	<8	12.9	<2	<4	<2	14	320
	2/12/00	2:19	SF												<1	<8	10.5	<2	<4	<2	<10	
	2/12/00	4:19	ST	5	575	550	8.0	3.9	0.085	1.3	1.89	0.22	750	290	1.25	69.3	57.9	7.66	49.1	<2	114	130
	2/12/00	12:19	SF												<1	<8	6.96	<2	<4	<2	<10	
	2/12/00	14:19	ST	36	1800	21	8.3	1.3	<0.05	0.71	0.502	0.107	30	16	<1	<8	10.2	<2	<4	<2	<10	585

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
BCF04	2/15/00	9:19	SF												<1	<8	9.77	<2	<4	<2	<10	
	2/29/00	9:11	DT	24	2450	13	8.4	1.5	<0.05	1.1	0.291	0.065	26	22								
	3/2/00	7:11																				
	3/3/00	19:42	ST	3											<1	<8	11.4	2.09	6.79	<2	16.9	264
	3/3/00	23:42	SF												<1	<8	7.07	<2	<4	<2	<10	
	3/5/00	11:42	ST	10	475	750	8.0	3.3	<0.05	1.2	2.2	0.408	830	420	1.4	68.6	54.7	6.47	53.2	<2	114	115
	3/6/00	5:42	SF												<1	34.9	29.7	3.14	26.8	<2	58.6	
	3/6/00	7:42	S	24	785	60	8.4	3.4	<0.05	0.77	0.612	0.061	88	60								
	3/8/00	2:42																				
	3/8/00	4:42	S	11	1670	670	8.1	<0.44	<0.05	1.2	2.11	0.154	750	370								
	3/9/00	0:42																				
	4/5/00	11:37	D	24	2740	24	8.4	1.4	<0.05	0.41	0.398	0.038	93	20								
	4/6/00	10:37																				
	5/11/00	10:00	D	1	2820	38	8.3	1.3	<0.05	0.71	0.37	0.047	88	50								
	5/11/00	10:00																				
	6/6/00	11:48	D	24	2960	35.2	8.4	2.5	<0.05	1.1	0.643	0.099	88	44								
	6/7/00	10:48																				

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STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
SDMF05	6/18/91	13:30	DT	21	3600	36	8.5	54	0.1	0.5	1		73	11	12	<10	<30	30	<10	6	<10	
	6/19/91	9:30																				
	7/22/91	11:45	DT	22	3800	3	8.5	130	<0.1	4.3	2.9		36	8	<20	<40	<20	<2	<40	10	<20	940
	7/23/91	8:45																				
	8/20/91	8:40	DT	25	3500	3.9	8.4	54	<0.1	1.3	1.2		52	28								
	8/21/91	9:10																				
	9/16/91	9:40	DT	24	3600	16	8.5	65	<0.1	0.2	1.3		44	10								
	9/17/91	8:40																				
	10/15/91	10:00	DT	23	3400	11	8.5	110	<0.1	0.9	1.7		39	8								
	10/16/91	8:00																				
	12/18/91	8:45	DT	1	3600	1.6	8.2	84	1.1	<0.5	2		<5	<5								
	4/21/92	8:10	DT	24	3400	1.2	8.2	79	<0.1	2.1	0.9		99	12	<20	<30	<20	2	<40	<10	10	924
	4/21/92	7:10																				
	5/26/92	9:20	DT	24	3600	4.7	8.4	39	0.1	1.2	0.9		70	16								
	5/27/92	8:20																				
	6/23/92	9:20	DT	24	3400	22	8.5	63	<0.1	1.5	0.2		50	11								
	6/24/92	8:20																				
	7/21/92	11:00	DT	24	3400	23	8.6	49	0.7	1.1	1.1		51	12								
	7/22/92	10:00																				
	8/25/92	10:00	DT	24	3000	12	8.4	55	0.2	0.9	0.97		30	11								
	8/26/92	9:00																				
	9/22/92	9:25	DT	24	3200	7.8	8.7	50	0.2	1.3	1.5		31	7								
	9/23/92	8:25																				
	10/28/92	9:25	DT	1	3100	19	8.0	58	0.29	1.5	1.8		33	7	<20	<30	<20	4	<40	<10	36	930
	11/18/92	9:10	DT	1	3300	35	8.1	84	0.31	0.99	1.2		55	12								
	12/7/92	12:00	ST	1	290	1000	8.2	5.9	0.53	2.9	7.4		2300	200	<20	<30	22	17	<40	<10	130	
	12/7/92	15:10	ST	1	230	980	8.4	3.8	0.42	3.2	7.7		2400	240	<20	<30	<20	18	<40	<10	130	
	12/7/92	18:30	ST	1	1830	1100	8.1	7.6	0.43	2.9	6.9		2000	250	<20	<30	<20	13	<40	<10	79	
	12/16/92	9:05	DT	1	3400	16	8.2	43	<0.1	0.78	0.81		21	7								
	12/29/92	15:45	ST	1	290	2100	8.1	3.6	0.48	3	14		4000	460	<20	<30	<20	12	<40	<10	110	
	1/6/93	0:50	SF	3	700	8700	7.8	13	0.14	2.2	1.4		1700	80	<20	<30	<20	8.9	<40	<10	100	170
	1/6/93	10:30																				
	1/15/93	13:00	SF	8	400	1200	8.0	4.9	0.17	2.7	9.5		2600	210	8.8	84	58	16	56	<4	310	196
	1/16/93	13:00																				
	1/27/93	9:45	DT	1	2800	56	8.3	58	0.14	1	1.9		140	12								
	3/17/93	8:15	DT	1	3400	9.8	8.2	72	0.19	0.85	0.86		32	6								
	4/21/93	9:00	DT	1	3400	33	8.1	82	0.56	1	1.2		300	13								
	5/26/93	8:00	DT	1	3400	7.2	8.2	79	0.51	1.5	1.1		68	11	<20	<30	<20	<2	<40	<10	<10	920
	6/9/93	8:45	DT	1	2600	15	8.3	49	0.28	1.1	0.59		130	9								
	7/13/93	9:45	DT	24	3100	4.8	8.3	70	<0.1	1	0.38		22	5								
	7/14/93	8:45																				
	8/17/93	11:30	DT	9	3300	3.9	8.5	50	<0.1	0.75	0.16		21	9								
	8/17/93	23:30																				
	9/14/93	10:45	DT	24	3200	3.4	7.8	56	0.17	0.77	0.8		11	7								
	9/15/93	9:45																				

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STATION	DATE	TIME	SAMPLES Type	#	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
SDMF05	10/26/93	10:50	DT	24	3200	6.3	8.5	39	<0.1	0.79	0.47		20	5	<5	<10	<20	<2	<40	<10	24	870
	10/27/93	9:50																				
	11/17/93	10:50	DT	1	3400	2.5	8.1	79	0.22	1.3	1.4		32	9								
	1/17/94	8:45	DT	24	3300	9.8	8.3	77	0.16	1.6	0.97		10	<5								
	1/18/94	7:45																				
	1/25/94	2:30	SF	3	530	300	7.4	16	1.4	3.4	3.7		620	39	<5	<10	21	8.3	<40	<10	150	
	1/25/94	6:30																				
	2/17/94	11:15	SF	1	240	290	8.6	4.9	0.48	1.0	4.2		2200	<10	6.4	40	46	40	<40	<10	230	
	2/17/94	13:30	SF	1	250	760	8.5	6.8	0.45	3.8	0.90		3300	16	20	84	84	110	60	<10	420	
	4/19/94	10:00	DT	10	3400	7.3	8.6	68	<0.1	1.2	0.61		59	9								
	4/20/94	19:00																				
	5/25/94	10:43	DT	24	3600	11	8.5	81	<0.4	1.3	1.3		46	20								
	5/26/94	9:43																				
	6/30/94	8:45	DT	1	3300	3.0	8.1	48	<0.4	0.80	0.87		32	<5								
	10/25/94	11:30	DT	23	2900	2.9	8.4	130	0.34	<0.2	<0.2		11	19								
	10/26/94	7:30																				
	11/30/94	8:40	DT	1	3700	3.9	7.8	70	0.18	1.1	0.66		22	12								
	3/23/95	12:30	SF	1	430	40	8.2	7.8	0.29	3.3	11		2500	270	5	51	45	33	41	1.7	230	
	5/16/95	11:30	DT	24	3100	18	8.4	55	0.25	1.0	0.78		29	7								
	5/17/95	10:30																				
	6/13/95	10:00	DT	24	3300	6.8	8.3	59	0.24	1.8	0.75		100	21								
	6/14/95	9:00																				
	7/25/95	9:00	DT	24	3200	6.3	8.6	36.0	<0.10	0.53	0.37		62	15								
	7/26/95	8:00																				
	8/29/95	9:00	DT	24	3000	19.0	8.4	41.0	0.16	1.40	0.55		54	12								
	8/30/95	8:00																				
	9/20/95	9:35	DT	1	3100	61.0	8.0	55.0	0.56	2.00	1.50		140	28	<1	<10	14	3	<40	<1	60	
	10/24/95	11:00	DT	24	3300	56.0	8.5	71.0	<0.10	1.30	1.10		110	27								
	10/25/95	10:00																				
	11/15/95	8:10	DT	1	3400	28.0	8.1	81.0	0.42	0.97	0.69		44	24								
	12/6/95	8:25	DT	1	3400	10.0	8.0	86.0	0.30	0.62	0.75		52	6								
	1/21/96	10:00	SF	1	330	1100	6.8	8.3	0.32	2.40	4.20		1100	88	4	34	32	22	30	<1	180	170
	1/21/96	12:00	SF	1	390	750	7.0	9.5	0.35	2.20	3.10		680	32	2	22	31	21	18	<1	150	160
	1/31/96	20:30	SF	1	390	1800	8.1	12.0	0.64	8.60	12.00		3100	420	18	110	100	56	<2	32	640	70
	2/14/96	9:30	DT	1	3100	7.2	6.9	74.0	0.36	0.88	0.28		29	14								
	3/27/96	10:40	DT	1	3100	4.6	8.4	78.0	0.13	0.93	0.31		15	<6								
	4/24/96	9:45	DT	1	3100	3.6	8.3	81.0	<0.10	1.2	0.48		70	19								
	5/30/96	10:30	DT	1	3100	3.5	8.6	79.0	<0.10	1.2	0.67		13	7								
	6/20/96	8:05	DT	1	3000	4.0	8.0	84.0	0.43	1.3	0.88		21	7								
	7/24/96	9:10	DT	1	2700	17	8.1	13.0	<0.1	0.8	0.40		37	12								
	8/27/96	9:15	DT	1	3200	16	8.1	65.0	0.24	0.8	0.66		42	17								
	9/24/96	8:45	DT	1	2700	16	8.0	56.0	0.15	1.2	0.77		29	10								
	11/5/96	10:05	DT	1	3100	54	8.0	28.0	1.60	3.8	2.50		88	11								
	12/4/96	11:05	DT	1	2900	6.7	8.4	74.0	0.29	1.0	0.59		18	<6								
	1/14/97	10:00	SF	14	2500	100	7.8	40.0	<0.1	1.6	1.10		140	22	<1	<10	9	3	<4	<1	48	576
	1/15/97	12:00																				

STATION	DATE	TIME	SAMPLES Type	#	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
SDMF05	1/15/97	16:00	SF	3	660	2500	7.8	5.5	0.47	7.7	13.00		4900	480	10	75	100	70	73	<1	320	180
	1/15/97	20:00																				
	1/16/97	11:23	SF	7	2600	180.0	8.3	36.0	0.10	1.8	1.70		270	37	2	1K	14	6	5K	<0.1	32	530
	1/16/97	23:23																				
	1/29/97	9:05	DT	1	16000	80.0	8.2	51.0	0.16	0.8	0.82		66	17								
	2/27/97	10:30	DT	1	3100	6.0	8.0	79.0	2.00	2.9	1.10		16	<6								
	3/11/97	8:45	DT	23	2800	5.7	8.3	16.0	1.20	1.8	1.50		11	<6								
	3/12/97	6:45																				
	4/15/97	9:30	DT	24	3100	8.7	8.3	80.0	<0.5	1.1	0.57		15	9								
	4/16/97	8:30																				
	5/20/97	8:50	DT	24	3200	5.2	8.2	78.0	0.35	1.3	1.00		11	11								
	5/21/97	7:50																				
	6/10/97	9:54	DT	24	3100	6.1	8.4	64.0	<0.1	1.4	0.38		19	11								
	6/11/97	0:54																				
	7/8/97	9:10	DT	1	3100	6.6	8.3	59	0.15	1.5	0.27		20	8								
	8/15/97	10:00	DT	1	2900	17	7.8	55	<0.1	0.8	0.51		42	19								
	9/24/97	8:55	DT	1	2900	14	8.0	37	<0.1	2.4	0.76		50	28								
	9/25/97	10:53	ST	5	2500	120	7.6	35	<0.1	5.1	2.60	<0.5	290	75	2	<10	24	8	12	<1	180	632
	9/25/97	11:53	SF												1	<10	16	3	6	<1	110	
	9/25/97	13:53	ST	3	800	300	7.3	13	0.34	4.2	2.20	<0.5	420	77	2.0	13	35	20	20	<1	220	260
	9/25/97	17:53	SF												<1	<10	11	<2	7	<1	78	
	9/26/97	9:48	ST	24	1500	21	8.0	25	0.47	2.6	1.30	<0.5	35	<6	<1	<10	21	3	7	<1	46	348
	9/28/97	7:48	SF												<1	<10	15	2	5	<1	49	
	9/28/97	10:13	ST	12	1900	26	7.8	28	0.35	2.5	1.20	<0.5	33	<6	<1	<10	21	<2	5	<1	19	550
	9/29/97	8:13	SF												<1	<10	15	<2	6	<1	16	
	10/29/97	9:20	DT	1	3100	28	8.3	50	0.22	1.8	1.50		57	9								
	11/10/97	10:30	SF	1				35				<0.5			<1	<10	17	3.0	8	<1	110	400
	11/11/97	8:30	ST	24	2000	50	7.7	29	0.54	3.7	1.40	<0.5	66	19	<1	<10	20	3	7	<1	56	508
	11/13/97	4:30	SF												<1	<10	11	<2	4.0	<1	62	
	11/13/97	10:39	ST	5	450	480	7.9	16.0	0.63	4.1	3.60		720	98	1	26	32	15	14	<1	230	228
	11/13/97	18:39	SF												<1	<10	5	<2	6	<1	48	
	11/19/97	10:29	DT	12	2700	29	8.2	43	0.25	1.5	0.92	<0.5	71	10	<1	<10	27	2	6	<1	99	725
	11/19/97	21:29	SF												<1	<10	20	<2	7	<1	150	
	11/26/97	11:23	ST	5	670	1600	8.1	11	0.62	9.4	8.20		2200	1900	8	72	150	97	46	<1	850	122
	11/26/97	12:23	SF												<1	<10	6	<2	<4	<1	44	
	11/26/97	14:23	ST	15	590	500	7.6	15	0.38	4.1	3.80	0.86	440	370	2	21	38	20	19	<1	170	166
	11/27/97	18:23	SF												<1	<10	9	<2	<4	<1	30	
	11/27/97	20:23	ST	28	2100	55	8.0	32	<0.1	1.8	1.20	<0.5	77	68	<1	<10	16	3.0	7	<1	56	520
	11/30/97	7:01	SF												<1	<10	9	<2	<4	<1	42	
	12/6/97	4:25	ST	5	280	1200	7.8	4.3	0.22	6.1	7	0.78	2000	1800	5	75	98	63	66	<1	510	85
	12/6/97	5:25	SF												<1	<10	14	6	5	<1	72	
	12/6/97	7:25	ST	5	320	2600	8.1	6.0	0.51	8.9	18	0.92	2600	2400	13	150	110	91	98	1	670	160
	12/6/97	15:25	SF												2	29	24	15	20	<1	150	
	12/6/97	17:25	ST	8	470	1500	7.9	7.7	0.29	4.4	8.0	1.90	1700	1500	6	74	51	39	60	<1	350	155
	12/7/97	7:25	SF												<1	<10	15	4	7	<1	82	
	12/7/97	9:25	ST	28	1200	21	7.9	22	<0.1	2.1	2.2	<0.5	400	52	<1	13	18	5	9.0	<1	63	360
	12/10/97	3:25	SF												<1	<10	9.0	<2	<4	<1	14	

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STATION	DATE	TIME	SAMPLES Type	#	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
SDMF05	12/18/97	15:04	ST	5	1600	240	7.9	41	<0.5	2.2	2.0	<0.5	430	51	<1	<10	27	13	14	<1	110	460
	12/18/97	16:04	SF												<1	<10	11	<2	<4	<1	25	
	12/18/97	18:04	ST	8	610	950	7.7	16	<0.5	3.2	4.30	0.85	1100	130	2	20	37	18	22	<1	140	176
	12/19/97	8:04	SF												<1	<10	11	<2	<4	<1	11	
	12/19/97	10:04	ST	30	1600	100	8.0	19	<0.5	1.6	1.40		90	17	<10	<10	16	3	<4	<1	21	420
	12/22/97	10:15	SF												<10	<10	11	<2	<4	<1	34	
	1/3/98	6:46	ST	5	3000	18	8.2	81	<0.5	1.0	0.49	<0.5	26	9	<1	<10	18	3	<4	<1	15	694
	1/3/98	7:46	SF												<1	<10	16	<2	<4	<1	<10	
	1/3/98	9:46	ST	12	1800	28	7.8	21	<0.5	2.1	0.77	<0.5	28	11	<1	<10	22	<2	4.0	<1	<10	420
	1/4/98	7:46	SF												<1	<10	18	<2	<4	<1	<10	
	1/4/98	13:46	ST	30	1500	95	7.6	16	0	1.5	1.00	<0.5	110	22	<1	11	23	3	5	<1	22	496
	1/6/98	23:46	SF												<1	<10	16	<2	5	<1	11	
	1/9/98	15:31	ST	5	3100	15	8.4	570	<0.5	1.2	0.39	<0.5	28	11	<10	<10	18	1	4	<1	52	800
	1/9/98	16:31	SF												<10	<10	13	<2	<4	<1	64	
	1/9/98	17:31	ST	21	730	740	7.9	17	<0.5	4.2	5	0.590	1400	160	2	28	210	120	130	<1	28	186
	1/11/98	5:31	SF												<1	<10	14	<2	<4	<1	<10	
	1/11/98	7:31	ST	29	1700	34	8.0	33	<0.5	1.5	1.10	<0.5	54	15	<1	<10	17	<2	<4	<1	45	464
	1/13/98	15:31	SF												<1	<10	14	<2	<4	<1	94	
	1/20/98		DT	24	1800	22	8.2	41	0.10	1.4	0.64	<0.5	30	8								
	1/21/98																					
	2/3/98	8:34	ST	5												41	58	29	40	<1	170	
	2/3/98	9:34													4							
	2/3/98	11:34	ST	12	1500	680	1.8	12	<0.5	3.0	5.4		1500	<6	1	25	43	18	23	<1	120	
	2/4/98	9:34	SF													<10	18	3	8	<1	<10	
	2/4/98	11:34	ST	23	1200	95	8.0	22	<0.5	2.0	1.5		190	22		<10	46	5	11	<1	42	
	2/6/98	7:34													<1							
	2/6/98	13:31	ST	11	500	1300	7.7	14	<0.5	5.2	8.6		3200	290		80	80	45	62	<1	292	215
	2/7/98	9:31													7							
	2/7/98	21:31	ST	3				8.0	<0.5	3.4	8.6					58	70	47	<20	<1	285	130
	2/8/98	1:31																				
	2/8/98	3:31	ST	8				9.3	<0.5	3	6.5											
	2/8/98	17:31																				
	2/8/98	19:31	ST	20	920	300	7.8	15.9	0.07		2.6		540	72								
	2/10/98	9:31	SF																			
	2/14/98	10:12	ST	5	2000	160	8.0	53.2	<0.5	1.6	1.9		370	42	<1.00	12	25	11	9	<1.00	77	510
	2/14/98	11:12	SF												<1.00	2	12	1	6	<1.00	14	
	2/14/98	13:12	ST	7	320	1200	8.2	8.4	<0.5	2.8	8.0		2900	270	<5.00	82	53	38	51	<1.00	225	80
	2/15/98	1:12	SF												<1.00	2	9	<1.00	1	<1.00	5	
	2/15/98	1:12	ST	9	1100	230	7.9	17.3	0.5	1.9	9.5		380	64	<1.00	13	27	6	9	<1.00	52	288
	2/15/98	19:12	SF												<1.00	2	15	<1.00	3	<1.00	5	
	2/19/98	20:46	ST	5	2200	59	8.0	53.2	<0.5	1.0	2.4				<1.00	8	16	6	6	<1.00	23	640
	2/19/98	21:46	SF												<1.00	2	11.0	2	3	<1.00	9	
	2/19/98	23:46	ST	4	330	540	7.9	7.1	<0.5	3.6	9.2				3	43	32	34	27	<1.00	108	85
	2/20/98	5:46	SF												<1.00	2	7	1	3	<1.00	11	
	2/20/98	9:46	ST	20	1800	93	7.9	44.3	<0.5	1.8	5.50				<1.00	8	24	4	8	<1.00	27	505
	2/21/98	23:46	SF												<1.00	2	13.0	<1.00	4	<1.00	9	
	2/22/98	1:46	ST	11		580	7.9	15.9	<0.5	3.9	10				3.00	37	30	25	26	<1.00	104	235
	2/22/98	21:46	SF												<1.00	2	10	<1.00	3	<1.00	12	
	2/22/98	23:46	ST	10		460	7.6	10.2	0.7	3.4	11.0				2	27.0	176	17	18	<1.00	84	80
	2/23/98	17:46	SF												<1.00	2	11	<1.00	3.40	<1.00	13	
	2/23/98	19:46	ST	9		1500	7.8	4.9	0.5	3.3	9.80				7	72	59	40	53	<5.00	234	88
	2/24/98	11:46	SF												<1.00	6	11	2	9	<1.00	13	

NEWPORT BAY WATERSHED

STATION	DATE	TIME	SAMPLES Type	#	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
SDMF05	3/25/98	8:02	ST	5	2460	21	7.84	41.2	<0.1	<1.0	0.30		3090	21	<1.00	6	29	4	5	4	57	590
	3/25/98	9:02	SF												<1.00	4	28	2	5	1	75.0	
	3/25/98	11:02	ST	5	377	1500	8.08	14.2	0.1	3.2	0.90		92	275	6	64	46	52	44	2	220	120
	3/25/98	19:02	SF												<1.00	3	18	3	4	<1.00	55	
	3/25/98	21:02	ST	29	1480	120	8.25	28.3	<0.1	1.3	1.20		148	13	<1.00	10	22	9	9	2	89	394
	3/28/98	5:02	SF												<1.00	3	18	2	6	<1.00	75	
	3/28/98	7:02	ST	13	978	181	8.12	17.3	0.2	1.8	1.20		307	38	1	14	27	10	13	<1.00	92.0	276
	3/29/98	7:02	SF												<1.00	3	19	<1.00	6	<1.00	16	
	4/20/98	12:56	DT	8	2880	4.6	8.48	64.7	<0.1	1.1	0.90		13	2								
	4/21/98	19:56																				
	5/12/98	15:25	ST	5	1690	39	8.1	37.0	<0.05	~~2.7~~	~~1.20~~		200	40	<0.50	12	24	5	4	<2.00	45	460
	5/12/98	16:25	SF												<0.50	7	15	<2.00	<4.00	<2.00	14	
	5/12/98	18:25	ST	15	500	600	7.8	17.0	<0.05	2.7	2.69		1600	60	4	42	48	32	27	<2.00	230	190
	5/13/98	22:25	SF												<0.50	7	14	<2.00	<4.00	<2.00	<10	
	5/14/98	0:25	ST	31	2120	70	8.2	37.0	<0.05	1.2	1.07		200	32	<0.50	9	15	3	5	<2.00	32	560
	5/16/98	11:40	SF												<0.50	5	10	<2.00	<4.00	<2.00	<10	
	6/22/98	12:40	DT	24	3090	20	8.4	57.0	<0.05	1.3	0.61		56	8								
	6/23/98	11:40																				
	7/15/98	9:45	D	24	3060	32	8.5	79.0	<0.05	2.4	0.06		130	32								
	7/16/98	8:45																				
	8/17/98	9:48	D	13	2980	37	8.4	35.0	0.06	4.60	0.61		140	42								
	8/17/98	21:48																				
	9/8/98	13:01	D	24																		
	9/9/98	12:01																				
	10/13/98	10:43	D	24	2620	28	8.5	43.6	0.12	1.78	0.98		62	24								
	10/14/98	9:43																				
	11/3/98	12:59	D	7	2630	26	8.3	42.4	0.21	1.64	0.95		84	30								
	11/3/98	18:59																				
	11/8/98	4:59	ST	5	2220	48	8.1	44.0	0.51	2.80	1.47		150	70	<1	11	20	5	8	<2	55	600
	11/8/98	5:59	SF												<1	<8	10	<2	6	<2	15	
	11/8/98	7:59	ST	9	695	500	7.7	26.0	0.51	4.94	8.57		1620	210	6	42	47	33	27	<2	472	210
	11/8/98	23:59	SF												<1	10	14	3	7	<2	38	
	11/9/98	1:59	ST	38	1880	29	7.7	37.0	0.51	2.10	1.25		54	14	<1	<8	21	4	5	<2	30	550
	11/12/98	4:00	SF												<1	<8	18	<2	5	<2	20	
	11/28/98	6:12	ST	5											<1	9	20	4	6	<2	47	820
	11/28/98	7:12	SF												<1	<8	14	<2	5	<2	23	
	11/28/98	9:12	ST	12											4	30	34	20	21	<2	224	236
	11/29/98	7:12	SF												<1	<8	10	<2	4	<2	<10	
	11/29/98	9:12	ST	29	1430	24	8.1	26.0	<0.05	2.12	1.25		62	18	<1	<8	25	<2	6	<2	28	160
	12/1/98	19:50	SF												<1	<8	20	<2	5	<2	14	
	12/1/98	21:50	ST	5	450	540	7.9	8.8	0.13	4.11	7.28		1140	140	5	43	44	31	30	<2	248	410
	12/2/98	7:50	SF												<1	<8	9	<2	<4	<2	<10	
	12/9/98	8:30	D	24	2320	26	8.3	44.0	<0.05	0.89	0.67		76	28								
	12/10/98	7:30																				
	1/5/99	10:07	D	24	2450	23	8.5	47.0	<0.05	1.84	0.28		64	24								
	1/6/99	9:07																				

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STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
SDMF05	1/19/99	10:04	D	24	2640	15	8.3	134.0	0.14	0.85	0.43		32	18								
	1/20/99	9:04																				
	1/25/99	5:15	ST	5	2520	21	8.3	58.1	0.15	1.41	0.98		80	20	<1	<8	29	3	4	<2	26	700
	1/25/99	6:15	SF												<1	<8	19	<2	5	<2	11	
	1/25/99	8:15	ST	12	720	160	7.9	22.7	0.31	2.35	2.42		360	42	1	17	36	8	13	<2	82	192
	1/26/99	6:15	SF												<1	<8	14	<2	4	<2	21	
	1/26/99	10:15	ST	19	585	500	7.8	15.0	0.31	3.11	4.16		1040	160	2	31	39	21	22	<2	151	115
	1/27/99	22:15	SF												<1	<8	9	<2	<4	<2	<10	
	1/28/99	0:15	ST	14	1450	33	8.0	33.3	0.12	1.37	1.22		68	13	<1	<8	19	<2	<4	<2	20	384
	1/29/99	2:15	SF												<1	<8	15	<2	<4	<2	10	
	2/2/99	10:30	D	24	1820	24	8.2	44.0	<0.05	1.64	0.70		62	19								
	2/3/99	9:30																				
	2/4/99	20:31	ST	5	2490	16	8.3	48.4	<0.05	1.63	0.67		43	13	<1	<8	20	<2	<4	<2	17	700
	2/4/99	21:31	SF												<1	<8	14	<2	<4	<2	11	
	2/4/99	23:31	ST	5	1420	72	8.1	37.0	0.68	2.57	1.19		150	88	<1	11	27	5	6	<2	49	360
	2/5/99	7:31	SF												<1	10	25	5	6	<2	47	
	2/5/99	9:31	ST	40	1730	28	8.3	37.0	0.25	1.84	0.86		64	24	<1	<8	20	2	5	<2	30	458
	2/8/99	19:31	SF												<1	<8	13	<2	4	<2	17	
	2/9/99	19:16	ST	5	2460	23	8.5	48.4	<0.05	2.02	0.52		64	22	<1	<8	23	<2	6	<2	30	686
	2/9/99	20:16	SF																			
	2/9/99	22:16	ST	8	1070	88	8.0	22.9	0.14	2.16	1.13		170	55	<1	<8	31	5	8	<2	58	284
	2/10/99	12:16	SF												<1	<8	16	<2	4	<2	15	
	2/10/99	14:16	ST	32	1580	34	8.3	28.7	0.12	1.86	0.86		92	28	<1	<8	27	3	7	<2	37	402
	2/13/99	4:16	SF												<1	<8	16	<2	6	<2	24	
	2/18/99	9:39	D	24	2670	17	8.4	56.3	0.05	1.31	0.34		62	32								
	2/19/99	8:39																				
	2/22/99	10:50	D	24	2640	16	8.5	77.0	0.59	2.22	0.46		70	30								
	2/23/99	9:50																				
	3/1/99	12:11	D	24	2780	13	8.6	71.3	0.42	1.45	0.43		52	20								
	3/2/99	11:11																				
	3/8/99	10:45	D	24	2640	12	8.3	51.5	0.16	1.97	0.40		37	25								
	3/9/99	9:45																				
	3/11/99	13:09	ST	5	2560	14	8.4	56.8	0.11	1.33	0.21		36	12	<1	<8	35	2	<4	<2	31	660
	3/11/99	14:09	SF												<1	<8	27	<2	<4	<2	17	
	3/11/99	16:09	ST	8	1970	16	8.3	44.4	0.31	1.88	0.25		38	18	<1	<8	31	<2	<4	<2	37	565
	3/12/99	6:09	SF												<1	<8	25	<2	<4	<2	19	
	3/12/99	8:09	ST	13	1560	18	8.0	41.4	0.60	1.89	0.70		38	12	<1	<8	30	<2	5	<2	52	386
	3/13/99	8:09																				
	3/15/99	10:10	ST	5	2380	13	8.2	65.6	0.32	1.45	0.37		44	16	<1	10	27	3	<4	<2	39	1875
	3/15/99	11:10	SF												<1	<8	11	<2	<4	<2	12	
	3/15/99	13:10	ST	8	635	105	7.7	26.0	0.73	2.70	1.13		210	60	<1	14	23	7	9	<2	59	186
	3/16/99	1:10	SF												<1	9	11	<2	4	<2	12	
	3/16/99	3:10	ST	41	1700	21	8.2	54.6	0.54	1.39	0.77		41	10	<1	<8	21	3	5	<2	25	420
	3/19/99	11:10	SF												<1	<8	17	<2	4	<2	15	

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
SDMF05	3/22/99	12:11	D	24	2210	17	8.4	66.9	0.42	1.93	1.01		48	14								
	3/23/99	11:11																				
	3/25/99	13:19	ST	5	2200	88	8.2	46.2	0.16	2.63	1.41		280	46	<1	13	29	10	12	<2	99	440
	3/25/99	14:19	SF												<1	<8	8	<2	<4	<2	<10	
	3/25/99	16:19	ST	8	545	250	7.6	21.3	0.39	3.24	3.58		780	110	3	27	47	19	24	<2	165	142
	3/26/99	6:19	SF												<1	<8	11	<2	4	<2	14	
	3/26/99	8:19	ST	39	2040	19	8.3	54.1	0.25	1.30	0.83		49	13	<1	<8	26	<2	4	<2	26	566
	3/29/99	12:19	SF												<1	<8	22	<2	<4	<2	13	
	3/31/99	9:30	D	12	2960	31	8.5	53.7	<0.05	1.28	0.09		63	18								
	4/1/99	8:30																				
	4/6/99	15:07	ST	5	2810	27	8.5	48.0	0.05	1.50	0.28		45	15	<1	<8	23	2	<4	<2	40	746
	4/6/99	16:07																				
	4/6/99	18:07	ST	6	800	201	7.5	14.9	0.33	2.56	1.34		230	38	1	13	31	6	11	<2	74	254
	4/7/99	6:07	SF												<1	<8	18	<2	7	<2	14	
	4/27/99	10:55	D	24	2710	20	8.7	55.9	0.14	1.54	0.54		44	18								
	4/28/99	9:55																				
	5/4/99	9:33	D	24	2680	20	8.7	56.8	0.16	1.53	0.61		38	16								
	5/5/99	8:33																				
	5/26/99	10:07	D	24	2490	8	8.2	35.6	0.48	1.59	0.80		36	12								
	5/27/99	9:07																				
	6/2/99	14:30	D	1	990	29	7.0	20.7	1.27	3.76	1.22		34	16								
	6/7/99	9:35	D	24	2750	11	8.4	34.1	0.06	2.02	0.52		18	11								
	6/8/99	8:35																				
	6/17/99	14:30	D	1	2580	18	8.5	35.8	0.06	0.88	0.26		42	12								
	6/24/99	15:00	D		2590	28	8.6	27.3	0.19	1.00	0.69		53	18								
	7/1/99	15:30	D	1	2630	32	8.7	24.6	0.118	0.78	0.542		72	68								
	7/7/99	12:01	D	21	2730	48	8.5	25.3	0.06	0.77	<0.061		76	20								
	7/8/99	8:01																				
	7/8/99	9:01	ST	3	2600	37	8.3	30.1	0.20	1.29	0.64	0.19	64	14	<1	<8	9	<2	<4	<2	27	520
	7/8/99	11:01	SF												<1	<8	7	<2	<4	<2	18	
	7/14/99	10:01	D	24	2560	27	8.5	21.2	0.22	1.14	0.73		52	23								
	7/15/99	9:01																				
	7/15/99	15:01	D	24	2630	35	8.6	22.7	0.18	1.09	0.67		89	23								
	7/19/99	10:11																				
	7/19/99	12:15	D	18	2700	50	8.6	14.0	0.14	1.11	0.37		178	38								
	7/22/99	8:15																				
	7/22/99	12:30	D	24	2840	74	8.2	23.6	0.61	0.31	1.27		140	32								
	7/26/99	8:30																				
	8/4/99	14:40	D	12	2920	48	8.5	4.2	<0.05	0.78	0.46		120	80								
	8/5/99	1:40																				
	8/9/99	10:53	D	24	2290	110	8.5	20.5	0.07	0.94	0.73	0.16	188	46								
	8/10/99	9:53																				
	8/16/99	13:22	D	24	2750	55	8.5	19.9	<0.05	0.94	0.58	<0.01	68	22								
	8/17/99	12:22																				
	8/23/99	12:12	D	24	2660	65	8.6	20.2	<0.05	1.16	0.86	0.02	120	40								
	8/24/99	12:11																				

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STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
SDMF05	9/2/99	13:42	D	24	2840	60	8.4	21.9	0.10	1.23	0.52	0.13	100	30								
	9/3/99	12:42																				
	9/8/99	14:43	D	24	2510	50	8.5	22.2	<0.05	1.03	0.58	0.18	100	48								
	9/9/99	13:43																				
	9/13/99	11:00	D	5	2730	39	8.3	16.7	<0.05	1.48	0.49	0.16	62	26								
	9/13/99	15:00																				
	9/13/99	16:00	D	6	2720	35	8.3	16.3	<0.05	1.50	0.40	0.24	59	25								
	9/13/99	21:00																				
	9/13/99	22:00	D	6	2690	35	8.3	15.0	<0.05	1.48	0.46	0.08	58	25								
	9/14/99	3:00																				
	9/14/99	4:00	D	6	2640	39	8.3	18.0	<0.05	1.45	0.31	0.09	64	25								
	9/14/99	9:00																				
	9/14/99	10:00	D	6	2540	37	8.3	21.6	<0.05	1.08	0.31	0.09	60	22								
	9/14/99	15:00																				
	9/14/99	16:00	D	6	2560	40	8.4	16.3	<0.05	1.47	0.43	0.09	71	24								
	9/14/99	21:00																				
	9/14/99	22:00	D	6	2500	40	6.3	22.4	<0.05	1.60	0.37	0.12	78	21								
	9/15/99	3:00	D																			
	9/15/99	4:00		6	2480	45	8.3	21.6	<0.05	1.53	0.34	0.10	83	24								
	9/15/99	9:00	D																			
	9/15/99	10:00		6	2760	40	8.3	41.2	<0.05	1.08	0.45	0.11	73	26								
	9/15/99	15:00	D																			
	9/15/99	16:00		6	2770	55	8.4	43.2	<0.05	1.73	0.61	0.12	110	26								
	9/15/99	21:00	D																			
	9/15/99	16:00		6	1650	26	8.1	38.2	<0.05	1.35	0.52	0.11	11	4								
	9/15/99	21:00	D																			
	9/15/99	22:00		6	2710	32	8.4	43.6	<0.05	1.47	0.56	0.12	120	29								
	9/16/99	3:00	D																			
	9/16/99	4:00		6	2730	27	8.4	45.3	<0.05	1.20	0.49	0.12	94	17								
	9/16/99	9:00	D																			
	9/16/99	10:00		6	2720	55	8.4	52.4	<0.05	1.09	0.63	0.18	100	8								
	9/16/99	15:00	D																			
	9/16/99	16:00		6	2750	65	8.4	48.8	<0.05	1.37	0.63	0.24	120	10								
	9/16/99	21:00	D																			
	9/16/99	22:00		6	2730	60	8.5	54.6	<0.05	0.97	0.70	0.22	130	29								
	9/17/99	3:00	D																			
	9/17/99	4:00		6	2720	55	8.4	44.9	<0.05	1.05	0.53	0.11	96	26								
	9/17/99	9:00	D																			
	9/17/99	10:00	D	6	2700	45	8.5	50.6	<0.05	1.21	0.43	0.08	72	24								
	9/17/99	15:00																				
	9/17/99	16:00	D	6	2660	38	8.5	45.3	<0.05	1.07	0.37	0.07	62	32								
	9/17/99	21:00																				
	9/17/99	22:00	D	6	2670	39	8.5	54.6	<0.05	1.12	0.34	0.07	70	24								
	9/18/99	3:00																				
	9/18/99	4:00	D	6	2670	37	8.4	41.0	<0.05	1.11	0.37	0.07	62	20								
	9/18/99	9:00																				

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
SDMF05	9/18/99	10:00	D	6	2700	38	8.4	31.7	<0.05	1.27	0.46	0.10	62	33								
	9/18/99	15:00																				
	9/18/99	16:00	D	6	2680	34	8.5	31.7	<0.05	1.41	0.46	0.08	55	31								
	9/18/99	21:00																				
	9/18/99	22:00	D	6	2660	39	8.4	80.1	<0.05	1.30	0.58	0.08	77	43								
	9/19/99	3:00																				
	9/18/99	22:00	D	6	2670	39	8.4	53.2	<0.05	1.06	0.43	0.10	65	41								
	9/19/99	3:00																				
	9/19/99	4:00	D	6	2720	35	8.4	53.2	0.06	1.47	0.43	0.03	62	46								
	9/19/99	9:00																				
	9/19/99	10:00	D	6	2760	33	8.4	59.0	0.07	1.12	0.43	0.10	66	30								
	9/19/99	15:00																				
	9/19/99	16:00	D	6	2710	29	8.5	55.4	<0.05	0.96	0.37	0.10	68	24								
	9/19/99	21:00																				
	9/19/99	22:00	D	6	2720	38	8.5	57.2	<0.05	1.26	0.67	0.21	70	44								
	9/20/99	3:00																				
	9/20/99	4:00	D	6	2700	37	8.5	55.0	<0.05	1.08	0.46	0.11	67	40								
	9/20/99	9:00																				
	9/20/99	10:00	D	24	2760	33	8.6	54.1	<0.05	1.28	0.64	0.11	58	30								
	9/21/99	9:00																				
	9/21/99	10:00	D	24	2460	40	8.5	28.6	<0.05	1.00	0.70	0.14	77	33								
	9/22/99	9:00																				
	9/22/99	10:00	D	24	2610	70	8.5	24.6	<0.05	1.59	0.55		120	66								
	9/23/99	9:00																				
	9/23/99	10:00	D	24	2620	95	8.5	26.0	<0.05	1.78	0.89	0.14	170	60								
	9/24/99	9:00																				
	9/29/99	10:30	DT	8	2970	26	8.5	34.8	<0.05	1.05	0.56	0.13	52	34	<1	<8	71	3	<4	<2	31	
	9/30/99	17:30	DF												<1	<8	42	<2	<4	<2	10	650
	10/5/99	12:48	D	24	2760	41	8.5	18.9	<0.05	1.18	0.52	0.13	84	52								
	10/6/99	11:48																				
	10/13/99	13:30	D	12	2730	38	8.5	28.9	<0.05	1.43	0.31	0.14	74	42								
	10/14/99	0:33																				
	10/26/99	12:33	D	24	2900	2	8.6	24.8	<0.05	0.85	0.83	0.08	70	25								
	10/27/99	11:33																				
	11/4/99	10:51	D	24	2660	25	8.5	34.8	<0.05	1.60	4.90	0.45	68	34								
	11/5/99	9:51																				
	11/10/99	9:00	D	1	2790	27	8.0	48.4	0	3.80	0.67	0.20	54	44								
	11/10/99	9:00																				
	11/18/99	11:39	D	1	2870	40	8.4	11.9	<0.05	1.20	0.61		79	46								
	12/1/99	12:40	D	24	2900	33	8.4	33.4	<0.05	0.94	0.77		92	52								
	12/2/99	11:40																				
	12/7/99	8:50	D	24	2810	50	8.4	48.4	<0.05	1.30	1.38	0.39	97	68								
	12/8/99	7:50																				
	12/15/99	10:31	DT	24	2600	27	8.3	52.8	0	1.20	1.29	0.18	48	28	<1	<8	5	3	<4	<2	40	
	12/16/99	9:31	DF												<1	<8	2	<2	<4	<2	<10	
	12/21/99	9:21	D	24	2470	24	8.4	61.6	0	1.30	1.53		43	22								
	12/22/99	8:21																				
	12/29/99	10:00	D	1	2710	23	8.5	61.6	<0.05	0.73	1.22	0.14	92	64								
	12/29/99	10:00																				

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STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
SDMF05	1/5/00	9:23	D	24	2240	23	8.3	46.6	0.128	1.60	1.74	0.21	44	32								
	1/6/00	8:23																				
	1/12/00	9:30	D	24	2920	29	8.5	52.8	<0.05	1.40	1.07		58	28								
	1/13/00	8:30																				
	1/21/00	10:17	D	24	3010	45	8.5	59.8	<0.05	1.00	1.16	0.21	78	54								
	1/22/00	9:17																				
	1/25/00	9:12	ST	5	2190	120	8.3	55.0	0.459	2.00	2.02	0.17	150	120	<1	8	25	5	7	<2	50	700
	1/25/00	10:12	SF												1	<8	21	3	7	<2	33	
	1/26/00	8:10	ST	12	885	131	7.8	30.0	0.668	2.30	2.42	0.06	180	130	<1	<8	25	7	13	<2	58	192
	1/27/00	6:10	SF												<1	<8	19	3	9	<2	35	
	1/27/00	8:10	ST	12	1380	62	7.8	36.0	0.641	2.70	1.93		92	54	<1	<8	17	4	8	<2	34	115
	1/28/00	6:10	SF												<1	<8	10	<2	5	<2	12	
	2/2/00	12:30	D	1	1820	31	8.1	33.0	0.235	1.90	0.92	0.15	42	26								
	2/10/00	14:44	ST	5	2350	25	8.3	31.0	0.118	1.30	0.50	0.02	45	22	<1	<8	12	<2	<4	<2	<10	700
	2/10/00	15:44	SF												<1	<8	14	<2	<4	<2	<10	
	2/10/00	17:44	ST	13	915	230	7.7	22.0	0.345	2.40	1.95	0.23	270	70	<1	<8	22	8	9	<2	74	360
	2/11/00	17:44	SF												<1	<8	15	4	6	<2	39	
	2/11/00	19:44	ST	5	1020	100	7.8	20.0	0.287	1.20	1.23	0.29	130	62	<1	<8	13	4	5	<2	37	458
	2/12/00	3:44	SF												<1	<8	12	3	4	<2	28	
	2/12/00	5:44	ST	6	525	650	7.9	16.0	0.319	2.00	4.53	0.37	980	830	3	34	45	26	26	<2	221	686
	2/12/00	15:44	SF												2	17	22	11	13	<2	95	
	2/12/00	17:44	ST	23	1310	90	7.8	26.0	0.193	1.80	1.53	0.31	120	56	<1	<8	13	3	<4	<2	31	284
	2/14/00	15:44	SF												<1	<8	8	<2	<4	<2	12	
	2/27/00	17:57	ST	5	2690	40	8.3	42.0	<0.05	0.96	0.86	0.06	150	30	<1	<8	9	<2	<4	<2	19	402
	2/27/00	18:57	SF												<1	<8	9	<2	<4	<2	18	
	2/27/00	20:57	ST	17	1250	50	7.9	22.0	<0.05	1.10	0.98	0.10	100	40	<1	<8	14	3	<4	<2	28	
	2/29/00	4:57	SF												<1	<8	13	<2	<4	<2	21	
	2/29/00	6:57	ST	31	2260	60	8.3	38.0	<0.05	1.20	0.89	0.04	110	70	<1	<8	11	3	4	<2	35	
	3/2/00	18:57	SF												<1	<8	8	<2	<4	<2	14	
	3/3/00	21:20	ST	4	2430	90	8.2	45.0	0.15	1.50	1.32	0.05	200	104	<1	<8	21	6	7	<2	52	660
	3/3/00	22:00	SF												<1	<8	<2	<4	<2	11		
	3/4/00	0:05	ST	8	1440	160	8.0	32.0	0.31	1.70	1.59	0.16	240	120	<1	<8	20	7	12	<2	58	420
	3/4/00	14:05	SF												<1	<8	8	<2	5	<2	15	
	3/4/00	16:05	ST	10	670	150	7.8	18.0	0.42	1.50	1.84	0.18	250	120	<1	<8	19	8	13	<2	63	220
	3/5/00	10:05	SF												<1	<8	7	<2	<4	<2	16	
	3/5/00	12:05	ST	8	450	590	7.8	9.5	0.17	2.30	4.28	0.73	900	600	2	24	27	16	18	<2	131	
	3/6/00	2:05	SF												1	2	15	7	10	<2	65	
	3/6/00	4:05	S	24	1270	100	8.0	22.0	0.13	1.50	1.71	0.36	140	68								
	3/8/00	2:04																				
	3/8/00	4:04	S	15	1300	500	8.0	14.0	0.12	2.00	3.67	0.45	830	590								
	3/9/00	8:04																				
	3/9/10	9:45	D	25	1390	70	8.4	22.0	0.11	1.50	0.06	0.41	98	32								
	3/10/00	9:45																				
	3/15/00	11:42	D	24	2990	40	8.6	48.0	<0.05	1.50	0.58	0.20	90	46								
	3/16/00	10:42																				
	3/22/00	13:09	D	19	2810	22	8.5	55.0	0.16	22.00	0.46	0.11	52	22								
	3/23/00	7:09																				
	3/28/00	11:04	D	22	2390	33	8.7	49.0	0.10	1.20	0.46	<0.01	100	62								
	3/29/00	8:04																				

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STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
SDMF05	4/5/00	11:30	D	1	2810	36	8.6	66.0	0.16	1.60	0.70	<0.01	160	33								
	4/5/00	11:30																				
	4/12/00	14:08	D	18	2940	32	8.5	70.0	0.34	2.60	1.04	0.10	72	45								
	4/13/00	7:08																				
	4/17/00	14:50	S	5	2670	38	8.4	65.0	0.32	1.50	1.41	0.17	110	66								
	4/17/00	15:50																				
	4/17/00	17:50	S	4	460	482	7.6	18.0	0.08	5.80	4.90	0.17	960	270								
	4/17/00	23:50																				
	4/18/00	1:50	D	3	595	208	7.6	24.0	<0.05	3.10	2.69		330	170								
	4/18/00	5:50																				
	4/18/00	7:50	ST	10	610	782	7.8	22.0	0.06	2.00	6.43	0.24	1600	580	5	35	55	58	33	<2	300	320
	4/19/00	1:50	SF												<1	<8	11	3	4	<2	15	260
	4/19/00	3:50	ST	32	2030	39	8.2	40.0	0.20	0.95		0.24	100	56								
	4/21/00	15:50	SF												<1	<8	14	<2	<4	<2	<10	552
	4/25/00	11:11	D	24	2840	76	8.4	51.0	0.07	0.96	0.86	0.09	160	90								
	4/26/00	10:11																				
	5/4/00	8:58	D	24	2730	123	8.4	110.0	3.13	4.20	2.26	0.32	200	72								
	5/5/00	7:58																				
	5/4/00	8:58	D	24	2710	110	8.4	110.0	3.23	3.90	2.33	0.43	200	86								
	5/5/00	7:58																				
	5/11/00	9:15	D	1	2890	76	8.4	80.0	1.45	3.00	1.71	0.31	150	42								
	5/11/00	9:15																				
	5/16/00	12:00	D	24	2290	59	8.3	57.0	<0.05	1.10	0.92	0.08	78	17								
	5/17/00	11:00																				
	5/26/00	12:12	D	1	2710	53	8.4	41.0	0.30	0.84	0.92	0.11	94	58								
	5/26/00	12:12																				
	5/30/00	10:09	D	24	2830	76	8.6	23.0	<0.05	1.50	0.83	0.05	140	66								
	5/31/00	9:09																				
	6/6/00	9:29	D	24	2860	71	8.9	16.0	<0.05	3.00	0.86	0.01	130	64								
	6/7/00	8:29																				
	6/19/00	11:00	D	5	2990	44	8.4	11.0	0.18	1.90	0.73	0.03	74	30								
	6/19/00	15:00																				
	6/19/00	16:00	D	6	2930	25	8.7	11.0	<0.05	1.60	0.55	0.01	62	30								
	6/19/00	21:00																				
	6/19/00	22:00	D	6	2940	38	8.6	11.0	<0.05	1.80	0.64	<0.01	68	30								
	6/20/00	3:00																				
	6/20/00	4:00	D	6	2920	41	8.5	9.7	0.14	2.10	0.70	0.01	65	30								
	6/20/00	9:00																				
	6/20/00	4:00	D	6	3010	42	8.4	11.0	0.15	2.50	0.80	0.01	65	30								
	6/20/00	9:00																				
	6/20/00	10:00	D	6	2660	45	8.4	11.0	0.14	1.30	0.73	0.03	62	28								
	6/20/00	15:00																				
	6/20/00	22:00	D	6	2630	34	8.7	12.0	<0.05	1.70	0.55	<0.01	66	26								
	6/21/00	3:00																				
	6/21/00	4:00	D	6	2610	39	8.3	9.5	0.14	1.80	0.86	<0.01	61	26								
	6/21/00	9:00																				
	6/21/00	10:00	D	6	3060	9	8.5	13.0	0.12	2.10	0.70	0.02	72	26								
	6/21/00	15:00																				
	6/21/00	16:00	D	6	3050	31	8.8	12.0	<0.05	3.00	0.70	<0.01	78	31								
	6/21/00	21:00																				

NEWPORT BAY WATERSHED

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
SDMF05	6/21/00	22:00	D	6	3040	31	8.5	11.0	<0.05	2.50	0.61	<0.01	60	18								
	6/22/00	3:00																				
	6/22/00	4:00	D	6	3060	41	8.7	12.0	<0.05	2.10	0.55	0.43	67	22								
	6/22/00	9:00																				
	6/22/00	10:00	D	6	3310	54	8.4	13.0	0.10	2.60	0.83	0.02	66	23								
	6/22/00	15:00																				
	6/22/00	16:00	D	6	3290	53	8.7	14.0	<0.05	3.00	0.92	<0.01	77	28								
	6/22/00	21:00																				
	6/22/00	22:00	D	6	3320	44	8.6	9.2	<0.05	1.80	0.70	0.02	79	28								
	6/23/00	3:00																				
	6/23/00	4:00	D	6	3350	45	8.6	11.0	<0.05	2.80	0.77	<0.01	65	23								
	6/23/00	9:00																				
	6/23/00	10:00	D	6	3140	70	8.6	11.0	0.051	0.72	0.73	<0.01	94	29								
	6/23/00	15:00																				
	6/23/00	16:00	D	6	3110	70	8.7	15.0	<0.05	2.30	0.70	<0.01	80	24								
	6/23/00	21:00																				
	6/23/00	22:00	D	6	3130	60	8.6	14.0	<0.05	1.70	0.64	<0.01	75	20								
	6/24/00	3:00																				
	6/24/00	4:00	D	6	3140	65	8.6	12.0	<0.05	1.80	0.58	<0.01	78	32								
	6/24/00	9:00																				
	6/24/00	10:00	D	6	3170	70	8.6	14.0	0.06	1.60	0.77	<0.01	95	28								
	6/24/00	15:00																				
	6/24/00	16:00	D	6	3130	65	8.6	15.0	<0.05	2.40	0.83	<0.01	94	27								
	6/24/00	21:00																				
	6/24/00	22:00	D	6	3140	50	8.6	13.0	0.06	2.30	0.52	<0.01	55	24								
	6/25/00	3:00																				
	6/25/00	4:00	D	6	3120	60	8.5	11.0	<0.05	2.20	0.73	<0.01	69	25								
	6/25/00	9:00																				
	6/25/00	10:00	D	6	3120	65	8.5	11.0	0.08	46.00	0.77	<0.01	85	25								
	6/25/00	15:00																				
	6/25/00	16:00	D	6	3090	70	8.5	17.0	<0.05	1.60	0.83	<0.01	91	32								
	6/25/00	21:00																				
	6/25/00	22:00	D	6	3140	55	8.5	15.0	<0.05	1.50	0.64	<0.01	68	26								
	6/26/00	3:00																				
	6/26/00	4:00	D	6	3060	60	8.4	13.0	<0.05	2.10	0.77	0.02	70	24								
	6/26/00	9:00																				
	6/26/00	10:00	D	6	3100	80	8.5	13.0	0.10	2.00	0.83	<0.01	110	31								
	6/26/00	15:00																				
	6/26/00	16:00	D	6	3080	80	8.6	13.0	<0.05	2.00	0.77	<0.01	120	44								
	6/26/00	21:00																				
	6/26/00	22:00	D	6	3100	60	8.4	13.0	<0.05	2.00	0.77	<0.01	81	25								
	6/27/00	3:00																				
	6/27/00	4:00	D	6	3060	75	8.4	13.0	<0.05	1.70	0.73	<0.01	84	14								
	6/27/00	9:00																				

STATION	DATE	TIME	SAMPLES Type	#	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
BCF04	6/19/91	10:15	DT	1	3000	37	8.2	21	0.2	0.5	0.7		64	10	<7	<10	<30	20	<10	<2	<10	
	7/23/91	10:15	DT	1	2800	3.4	8.2	17	<0.1	2.9	9.8		29	7	<20	<40	<20	<2	<40	<10	30	710
	9/17/91	8:55	DT	1	2700	23	8.2	13	<0.1	0.1	1.1		36	9								
	10/16/91	9:10	DT	1	1800	66	8.2	5.6	<0.1	0.8	3.8		110	19								
	3/20/92	15:50	ST	4	920	21	7.7	6.4	0.2	1.1	2.1		760	96	<20	<30	20	12	<40	<10	90	242
	3/20/92	17:50																				
	3/20/92	18:50	ST	10	340	6700	8.1	2.9	0.1	0.9	7.4		5200	600	<20	<30	30	7	50	<10	60	88
	3/22/92	3:50																				
	3/22/92	9:50	ST	10	700	57	8.0	5.1	0.1	0.9	2.4		1600	190	<20	<30	<20	3	<40	<10	40	168
	3/24/92	15:50																				
	3/26/92	18:20	ST	4	1100	38	8.1	5.3	<0.1	0.4	0.5		27	9	<7	<10	6	4	<10	<2	<10	271
	3/26/92	20:20																				
	3/26/92	21:20	ST	8	770	2400	8.0	5.4	<0.1	0.7	3.9		2200	240	<7	130	120	25	100	<2	110	194
	3/27/92	18:20																				
	3/28/92	0:20	ST	12	2400	58	8.4	15	<0.1	0.7	0.6		67	12	<7	<10	130	5	<10	<2	<10	628
	3/30/92	18:20																				
	4/22/92	9:00	DT	1	2730	3.2	8.3	13	<0.1	0.5	0.7		46	5	<20	<30	<20	<2	<40	<10	<10	726
	5/27/92	8:35	DT	1	3100	1.6	8.1	7.0	<0.1	0.4	0.3		11	11								
	7/22/92	9:20	DT	1	3000	11	8.2	98	<0.1	0.3	0.5		11	5								
	9/23/92	8:40	DT	1	2900	3.5	8.3	6.4	<0.1	0.54	0.35		11	6								
	10/28/92	9:10	DT	1	3000	30	8.1	7.0	<0.1	3.9	1		120	13	<20	<30	<20	4	<40	<10	26	940
	11/18/92	9:00	DT	1	2900	2.4	8.2	9.0	<0.1	0.31	0.49		<5	<5								
	1/27/93	9:15	ST	1	2600	200	7.9	18	0.13	0.81	0.86		290	23								
	2/18/93	11:49	ST	6	970	480	7.8	5.7	0.19	1.5	2.4		790	70	<7	<10	30	13	13	<4	57	214
	2/19/93	11:49																				
	2/19/93	13:30	ST	7	970	400	8.0	7.4	0.14	1.1	2.1		640	56	<7	<10	<30	10	12	<4	35	175
	2/19/93	15:48																				
	3/17/93	8:00	DT	1	2800	3.7	8.4	14	<0.1	0.47	0.2		29	<5								
	5/26/93	7:30	DT	1	2200	6.2	8.4	11	<0.1	0.82	0.21		42	<5	<20	<30	<20	<2	<40	<10	<10	520
	7/14/93	8:20	DT	1	2800	6.3	8.1	7.2	<0.1	0.41	0.17		<5	<5								
	9/15/93	9:10	DT	1	2900	2.6	8.1	6.6	<0.1	0.43	0.21		<5	<5								
	1/18/94	9:30	DT	1	2900	2.0	8.1	9.4	<0.1	0.57	0.14		<5	<5								
	2/6/94	18:00	ST	5	3100	5.2	8.3	13	<0.1	0.79	<0.1		120	14	<5	<10	<20	<2	<40	<10	27	780
	2/7/94	2:00	SF												<5	<10	<20	<2	<40	<10	<10	780
	2/7/94	4:00	ST	4	820	290	8.4	4.2	0.66	0.75	1.8		740	50	<5	<10	<20	5.4	<40	<10	58	186
	2/7/94	10:00																				
	2/7/94	12:00	ST	11	640	1900	8.5	4.2	0.75	5.3	0.59		14000	880	5.9	<10	41	6.6	120	<10	140	368
	2/8/94	11:00	SF												<5	<10	<20	<2	<40	<10	<10	368
	2/8/94	12:43	ST	12	1800	500	8.2	9.1	0.18	0.81	3.5		790	34	<5	84	45	9.0	48	<10	97	668
	2/9/94	10:43	SF												<5	<10	<20	<2	<40	<10	<10	668
	2/9/94	12:43	ST	11	2700	88	8.3	14	0.14	0.51	1.3		170	7.0	<5	21	<20	<2	<40	<10	25	448
	2/10/94	8:43																				
	2/10/94	12:43	ST	8	2900	38	8.4	13	0.13	15	0.83		170	<5	<5	13	<20	<2	<40	<10	27	730
	2/11/94	2:00																				

STATION	DATE	TIME	SAMPLES Type	#	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
BCF04	2/17/94	6:00	ST	5	1100	4000	8.1	5.8	0.22	2.4	20		9000	530	17	870	500	100	690	<10	1200	230
	2/17/94	14:00	SF												<5	11	<20	<2	<40	<10	13	230
	2/17/94	16:00	ST	10	630	7000	8.4	3.6	0.27	19	31		23000	1200	<5	1900	1100	290	1500	<10	2200	150
	2/18/94	10:00	SF												<5	11	<20	<2	<40	<10	<10	150
	2/18/94	12:00	ST	11	890	1800	7.7	4.9	0.18	4.0	8.6		3100	116	<5	330	160	47	230	<10	380	210
	2/19/94	8:00	SF												<5	13	<20	<2	<40	<10	<10	210
	2/19/94	10:00	ST	11	2300	210	8.4	14	<0.1	1.1	1.5		390	12	<5	44	25	4.6	<40	<10	52	518
	2/20/94	6:00																				
	2/20/94	8:00	ST	13	450	3500	8.5	3.4	0.10	4.9	14		7000	260	7.2	490	280	87	400	<10	830	190
	2/20/94	8:00																				
	2/21/94	10:00	ST	7	600	170	7.9	3.8	0.16	0.39	3.5		340	14	<5	33	26	6.0	<40	<10	46	140
	2/21/94	22:00	SF												<5	<10	<20	<2	<40	<10	<10	140
	2/22/94	0:00	ST	17	2200	400	8.4	11	0.15	0.83	3.5		1100	56	5.9	91	52	13	68	<10	110	560
	2/23/94	8:00	SF												<5	<10	<20	<2	<40	<10	<10	560
	2/23/94	10:00	ST	12	2500	600	8.6	12	<0.1	0.78	8.1		960	28	<5	<10	<20	<2	<40	<10	17	686
	2/24/94	8:00																				
	2/24/94	10:00	ST	12	2700	160	8.5	13	<0.1	0.34	1.8		320	5.0	<5	<10	<20	3.0	<40	<10	20	704
	2/25/94	8:00	SF												<5	<10	<20	<2	<40	<10	<10	704
	3/24/94	19:00	ST	3	880	2300	8.4	2.7	0.12	0.83	11		3300	310	11	300	160	55	210	<10	450	234
	3/24/94	23:00																				
	3/25/94	1:00	ST	3	630	11000	8.5	3.2	0.26	3.0	7.3		15000	1200	55	1400	790	250	1100	<10	1800	374
	3/25/94	5:00																				
	3/25/94	7:00	ST	18	1500	460	8.2	6.6	0.12	1.4	2.6		580	40	<5	77	36	10	47	<10	84	234
	3/26/94	9:00																				
	3/26/94	9:00	ST	12	2800	23	8.5	9.4	0.12	<0.2	1.1		110	9	<5	26	<20	<2	<40	<10	23	656
	3/27/94	7:00																				
	3/27/94	9:00	ST	12	3100	18	8.5	10.5	<0.1	0.68	2.1		45	9	<5	15	<20	<2	<40	<10	11	732
	3/28/94	7:00																				
	3/28/94	11:00	ST	4	3000	24	8.5	9.8	<0.1	0.49	1.3		52	20	<5	11	<20	<2	<40	<10	<10	694
	3/28/94	17:00																				
	4/20/94	8:30	DT	1	3200	3.9	7.9	8.4	<0.10	0.48	0.56		<5	<5								
	11/10/94	9:00	ST	4	990	620	6.6	5.1	0.34	4.2	5.2		1200	45	1.9	96	120	32	65	<0.3	250	205
	11/10/94	15:00																				
	11/10/94	17:00	ST	13	1400	12	6.8	2.2	0.13	0.63	0.85		32	<5	<1	<10	21	<2	<40	<0.3	28	290
	11/11/94	17:00																				
	11/12/94	9:04	ST	24	1500	0.55	8.3	0.26	<0.1	0.36	<0.2		<5	<5	<1	<10	6.3	<2	<40	<2	26	580
	11/14/94	7:04																				
	11/30/94	8:00	DT	1											<1	<10	26	5.5	<40	0.7	36	
	3/3/95	10:00	ST	3	2200	360	7.9	8.5	0.15	2.8	1.93		490	31	<1	56	40	9.1	<40	<1	96	464
	3/3/95	14:00																				
	3/3/95	16:00	ST	18	3400	120	8.2	10.0	<0.1	1.5	0.96		180	22	<1	<10	16	<2	<40	1.5	12	738
	3/5/95	0:00																				
	3/5/95	2:00	ST	13	490	2000	7.8	2.7	0.51	4.2	11		4600	99	6.6	310	210	84	270	<1	540	155
	3/6/95	8:00																				
	3/6/95	10:00	ST	12	1000	300	8.0	5.7	<0.1	2.3	2.2		360	31	<1	40	31	6.5	51	<1	65	
	3/7/95	8:00																				
	3/10/95	22:30	ST	3	1200	4200	8.0	4.2	<0.1	11	16		7500	750	10	520	270	110	420	<1	760	280
	3/11/95	2:30																				
	3/11/95	4:30	ST	14	550	2100	7.8	3.3	<0.1	4.6	7.2		2800	280	4.7	240	110	37	190	<1	320	158
	3/12/95	6:30																				
	3/12/95	8:30	ST	8	1000	150	8.0	6.1	0.14	1.6	1.4		200	24	<1	24	24	4.9	<40	<1	41	236
	3/12/95	22:30																				
	5/16/95	11:45	DT	24											<1	<10	13	<2	<40	<1	<10	850
	5/17/95	10:45																				
	7/25/95	9:00	DT	24											<1	<10	8	<2	<40	<1	19	
	7/26/95	8:00																				
	9/19/95	10:00	DT	24											<1	<10	19	3	<40	1	29	745

STATION	DATE	TIME	SAMPLES Type	#	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
BCF04	9/20/95	9:00																				
	1/21/96	15:36	ST	5	1200	370.0	7.2	2.8	0.37	2.60	2.60		250	68	1	40	46	22	28	<1	160	298
	1/21/96	16:36																				
	1/21/96	18:36	ST	10	970	160.0	7.6	3.0	<0.10	1.30	1.20		130	18	<1	14	32	6	<20	<1	42	224
	1/22/96	12:36																				
	1/22/96	14:36	ST	31	2100	15.0	8.3	2.8	0.18	0.68	0.33		15	6	<1	<10	31	<2	6	<1	17	
	1/25/96	14:36																				
	1/31/96	3:43	ST	5	650	50.0	7.4	2.7	<0.10	1.40	1.00		69	15	<1	14	33	5	9	<1	77	138
	1/31/96	4:43																				
	1/31/96	6:43	ST	20	1000	170.0	8.2	4.9	0.11	1.60	1.60		184	24	<1	20	32	5	24	11	150	238
	2/1/96	20:43																				
	2/1/96	22:43	ST	12	2000	32.0	8.3	6.3	<0.10	2.50	0.81		37	6	<1	10	19	<2	9	3	26	490
	2/2/96	20:43																				
	2/3/96	10:43	ST	10	1300	86.0	7.9	4.2	0.12	1.50	1.00		61	15	<1	<10	39	4	10	8	23	260
	2/4/96	4:43																				
	2/20/96	2:18	ST	5	2300	26.0	7.8	3.4	<0.10	2.50	0.68		48	20	<1	<10	29	2	19	<1	45	576
	2/20/96	3:18																				
	2/20/96	5:18	ST	27	690	340.0	7.7	7.9	0.21	1.00	1.60		330	48	<1	36	34	<2	<2	<1	68	160
	2/22/96	9:18																				
	2/22/96	11:18	ST	20	1400	110.0	8.1	9.0	0.22	1.70	1.10		88	13	<1	13	26	<2	16	<1	<10	345
	2/24/96	1:18																				
	3/27/96	10:25	DT	1											<1	<10	4	2	5	<1	35	850
	7/24/96	8:45	DT	1											<1	<10	6	<2	7	<1	14	790
	9/24/96	8:35	DT	1											<1	<10	4	<2	5	<1	34	710
	1/29/97	8:55	DT	1											<1	16	12	4	18	<1	100	800
	4/16/97	8:55	DT	1											<1	<10	11	4	10	<1	28	900
	5/20/97	8:30	DT	1											<1	<10	4.1	<2	<6	<1	48	780
	7/8/97	8:55	DT	1											<1	<10	<4	<2	6	<1	24	
	9/24/97	8:45	DT	1											<1	<10	6	<2	7	<1	<10	
	9/25/97	10:15	ST	5	2400	190	7.3	10.0	0.29	4.5	2.50	<0.5	280	72	<1	15	43	8	23	<1	110	590
	9/25/97	11:15	SF												<1	<10	30	3	14	<1	76	
	9/25/97	13:15	ST	11	2000	59	7.5	5.1	<0.1	2.1	1.10	<0.5	79	31	<1	<10	18	<2	12	<1	51	500
	9/26/97	9:15	SF												<1	<10	16	2	8	<1	35	
	9/26/97	11:15	ST	23	2500	24	8.4	2.8	0.11	1.4	0.55	<0.5	34	17	<1	<10	20	<2	<4	<1	36	648
	9/28/97	7:15	SF												<1	<10	21	<2	6	<1	39	
	9/28/97	9:15	ST	13	2900	23	8.0	4.7	<0.1	1.6	0.49	<0.5	31	<6	<1	<10	20	<2	5	<1	29	800
	9/29/97	9:15	SF												1.0	<10	21	<2	7	<1	15	
	11/19/97	11:00	DT	12	3000	22	8.1	5.4	0.16	1.8	0.39	<0.5	58	6	<1	<10	24	<2	5	<1	80	790
	11/19/97	22:00	DF												<1	<10	15	<2	4	<1	110	
	12/6/97	1:46	ST	5											<1	18	49	9	12	<1	110	265
	12/6/97	2:46	SF												<1	<10	150	<2	<4	<1	38	
	12/6/97	4:46	ST	16	520	1700	7.4	5.0	0.31	3.8	5.0	0.50	1800	1600	1	190	110	25	120	<1	370	150
	12/7/97	10:46	SF												<1	<10	15	<2	4.0	<1	38	
	1/20/98		DT	24											<1	<10	9	<2	<4	<1	<10	
	1/21/98		DF												<1	<10	10	<2	4.0	<1	<10	
	2/14/98	9:01	ST	5									330		<1.00	24	34	6	18	<1.00	43.0	410
	2/14/98	10:01	SF												<1.00	2	18	<1.00	5	<1.00	8	
	2/14/98	12:01	ST	4									2500		<5.00	265	87	32	158	<1.00	323	70
	2/14/98	18:01	SF												<1.00	3	93	4	19	<1.00	42	
	2/15/98	10:01	ST	18	1300	210	8.2	6.6	<0.5	1.7	11.0		280	42	<1.00	28	29	5	22	2	51	328
	2/16/98	20:01	SF												<1.00	4	15	<2	10	<1.00	27	
	2/16/98	22:01	ST	11	490	1100	7.9	6.2	<0.5	1.6	11				<1.00	77	41	17	50	<1.00	84	116
	2/17/98	18:01	SF												<1.00	7	138	6	8	<1.00	47	
	2/17/98	20:01	ST	7	800	180	8.0	4.9	<0.5	2.6	10				<1.00	29	55	5.60	21	2	45	208
	2/18/98	8:01	SF												<1.00	3	21	1	5	<1.00	19	
	2/19/98	22:20	ST	5	520	310	7.8	4.9	<0.5	1.6	2				<1.00	33	21	11	20	<1.00	55	124
	2/19/98	23:20	SF												<1.00	3	16	<1.00	3	<1.00	5.60	

STATION	DATE	TIME	SAMPLES Type	#	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
BCF04	2/20/98	1:20	ST	8	520	750	7.8	4.4	0.50	2.6	10				<1.00	74	38	14	47	<1.00	84	125
	2/20/98	15:20	SF												<1.00	3	13	<1.00	6	<1.00	22	
	2/20/98	17:20	ST	16	1400	89	8.1	6.2	<0.5	2.1	10				<1.00	13.0	12	3	11	<1.00	17	340
	2/21/98	23:20	SF												<1.00	3	11	<1.00	5	<1.00	9	
	2/22/98	1:20	ST	8		1300	8.0	6.6	0.60	2.9	9				<1.00	120	89	20	78	<5.00	175	141
	2/22/98	15:20	SF												<1.00	3.90	14	2	5	<1.00	9	
	2/22/98	19:20	ST	11		460	7.9	4.0	<0.5	2.4	11.0				<1.00	51.0	38	14	32.0	<1.00	138	135
	2/23/98	15:20	SF												<1.00	3.80	27	3	6	<1.00	11	
	2/23/98	17:20	ST	10		3000	7.7	5.3	0.8	3.9	9.5				<5.00	239	110	29	161	<5.00	242	85
	2/24/98	11:20	SF												<1.00	4	17	1	4	<1.00	11	
	3/25/98	8:56	ST	5	490	2900	8.21	13.7	0.7	3.6	0.3		4720	353	<20	345	164	67	235	<20	859	330
	3/25/98	9:56	SF												1	4	9	<1.00	5	<1.00	14	
	3/25/98	11:56	ST	5	328	1500	8.19	3.1	<0.1	2.8	0.6		2060	162	<5.00	215	82	36	141	<5.00	274	70
	3/25/98	21:56	SF												2	2	3	2	12	<1.00	40	
	3/25/98	23:56	ST	26	1340	240	8.50	9.3	<0.1	<1.0	0.9		267	10	<1.00	39	34.0	8	30	<1.00	76	336
	3/28/98	1:56	SF												1	4	13	41	6	<1.00	20.0	
	3/28/98	3:56	ST	16	1580	80	8.48	4.4	0.10	1.20	0.60		103	13	<1.00	17	19	4	17	<1.00	43.0	390
	3/29/98	9:56	SF												<1.00	1.90	7	<1.00	7	<1.00	9	
	11/8/98	6:40	ST	5	805	320	7.6	5.3	0.23	4.85	5.20		920	160	2	70	53	18	47	<2	172	190
	11/8/98	7:40	SF												<1	34	28	7	23	<2	76	
	11/8/98	9:40	ST	9	1170	58	7.8	6.6	0.11	4.28	1.35		220	120	<1	22	28	3	17	<2	40	320
	11/9/98	1:40	SF												<1	<8	14	<2	6	<2	12	
	11/9/98	3:40	ST	14	2350	6	8.3	3.7	<0.05	1.10	0.28		18	10	<1	<8	17	<2	5	<2	19	640
	11/10/98	15:40	SF												<1	<8	15	2	5	<2	13	
	11/28/98	6:27	ST	5	1030	320	7.7	5.7	0.07	4.63	4.04		850	130	2	47	41	16	32	<2	164	248
	11/28/98	7:27	SF												<1	<8	9	<2	5	2	<10	
	11/28/98	9:27	ST	12	1310	27	8.1	4.8	<0.05	1.79	0.64		290	80	<1	11	19	<2	10	<2	22	334
	11/29/98	7:27	SF												<1	<8	14	<2	6	<2	<10	
	11/29/98	9:27	ST	27	2110	8	8.3	2.9	<0.05	0.86	0.25		40	20	<1	<8	13	<2	6	<2	14	605
	12/1/98	13:27	SF												<1	<8	12	<2	5	<2	<10	
	12/1/98	15:27	ST	9	705	152	8.0	2.7	<0.05	1.78	1.93		300	240	<1	30	25	6	20	<2	64	185
	12/2/98	7:27	SF												<1	<8	10	<2	<4	<2	<10	
	1/25/99	9:31	ST	5	650	116	8.0	4.6	0.06	1.60	1.93		300	100	<1	21	32	6	17	<2	67	168
	1/25/99	10:31	SF												<1	<8	12	<2	5	<2	18	
	1/25/99	12:31	ST	11	1070	30	8.1	4.4	<0.05	0.99	0.70		62	18	<1	<8	14	<2	5	<2	16	300
	1/26/99	8:31	SF												<1	<8	10	<2	5	<2	<10	
	1/26/99	10:31	ST	14	645	350	8.0	3.1	0.09	1.84	2.78		670	90	<1	41	35	13	33	<2	120	115
	1/27/99	12:31	SF												<1	<8	63	9	<4	<2	82	
	1/27/99	14:31	ST	22	1860	750	8.2	4.1	0.05	0.89	4.28		430	100	<1	51	29	14	31	<2	106	552
	1/29/99	8:31	SF												<1	<8	9	<2	<4	<2	<10	
	4/6/99	13:09	ST	5	1470	436	8.0	3.9	0.28	3.09	2.45		580	120	<1	41	43	11	29	<2	118	250
	4/6/99	14:09	SF												<1	<8	17	<2	<4	<2	<10	
	4/6/99	16:09	ST	14	985	154	8.2	1.5	0.05	0.84	0.89		200	30	<1	17	25	4	12	<2	46	250
	4/7/99	18:09	SF												<1	<8	14	<2	<4	<2	<10	
	4/7/99	20:09	ST	13	1710	25	8.4	1.0	<0.05	0.55	0.31		56	18	<1	<8	12	<2	<4	<2	13	450
	4/8/99	20:09	SF												<1	<8	11	<2	<4	<2	<10	
	4/8/99	22:09	ST	3	1630	107	8.4	1.3	0.05	0.71	0.65		140	20	<1	14	23	3	9	<2	33	448
	4/9/99	2:09																				
	4/9/99	4:09	ST	17	1850	8	8.4	1.1	<0.05	0.44	0.19		18	6	<1	<8	11	<2	5	<2	<10	522
	4/10/99	12:09	SF												<1	<8	10	<2	4	<2	<10	
	1/25/00	10:15	ST	1											<1	9.4	15.7	4.26	9.9	<2	40.7	
	1/25/00	10:15	SF	1											<1	<8	8.43	<2	4.55	<2	15.7	360
	2/11/00	12:19	ST	8	1300	12	8.2	1.6	<0.05	0.61	0.441	0.1	230	130	<1	<8	12.9	<2	<4	<2	14	320
	2/12/00	2:19	SF												<1	<8	10.5	<2	<4	<2	<10	
	2/12/00	4:19	ST	5	575	550	8.0	3.9	0.085	1.3	1.89	0.22	750	290	1.25	69.3	57.9	7.66	49.1	<2	114	130
	2/12/00	12:19	SF												<1	<8	6.96	<2	<4	<2	<10	
	2/12/00	14:19	ST	36	1800	21	8.3	1.3	<0.05	0.71	0.502	0.107	30	16	<1	<8	10.2	<2	<4	<2	<10	585

STATION	DATE	TIME	SAMPLES Type	#	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
BCF04	2/15/00	9:19	SF												<1	<8	9.77	<2	<4	<2	<10	
	2/29/00	9:11	DT	24	2450	13	8.4	1.5	<0.05	1.1	0.291	0.065	26	22								
	3/2/00	7:11																				
	3/3/00	19:42	ST	3											<1	<8	11.4	2.09	6.79	<2	16.9	264
	3/3/00	23:42	SF												<1	<8	7.07	<2	<4	<2	<10	
	3/5/00	11:42	ST	10	475	750	8.0	3.3	<0.05	1.2	2.2	0.408	830	420	1.4	68.6	54.7	6.47	53.2	<2	114	115
	3/6/00	5:42	SF												<1	34.9	29.7	3.14	26.8	<2	58.6	
	3/6/00	7:42	S	24	785	60	8.4	3.4	<0.05	0.77	0.612	0.061	88	60								
	3/8/00	2:42																				
	3/8/00	4:42	S	11	1670	670	8.1	<0.44	<0.05	1.2	2.11	0.154	750	370								
	3/9/00	0:42																				
	4/5/00	11:37	D	24	2740	24	8.4	1.4	<0.05	0.41	0.398	0.038	93	20								
	4/6/00	10:37																				
	5/11/00	10:00	D	1	2820	38	8.3	1.3	<0.05	0.71	0.37	0.047	88	50								
	5/11/00	10:00																				
	6/6/00	11:48	D	24	2960	35.2	8.4	2.5	<0.05	1.1	0.643	0.099	88	44								
	6/7/00	10:48																				

NEWPORT BAY WATERSHED

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
LANF08	6/18/91	14:00	DT	23	7700	5.7	8.7	14	0.5	0.8	0.6		<5	<5	<7	<10	<30	<20	<10	<2	<10	
	6/19/91	12:00																				
	7/23/91	12:10	DT	1											<20	<40	<20	5	<40	<10	50	
	8/20/91	9:45	DT	25											<2	<10	<20	7	180	70	<20	1848
	8/21/91	10:20																				
	9/16/91	10:25	DT	24	7500	24	8.2	8.2	0.1	0.9	1.2		61	22	<1	<5	30	6	<40	<10	100	1494
	9/17/91	9:25																				
	10/15/91	10:30	DT	25											<20	<30	40	4	<40	<10	30	
	10/16/91	10:05																				
	12/17/91	9:15	DT	24											<20	<30	40	21	<40	<10	120	2532
	12/18/91	8:15																				
	2/10/92	14:20	ST	10	300	91	7.6	2.1	0.2	<0.5	0.7		150	24	2	10	21	35	<10	<2	100	52
	2/11/92	1:20																				
	2/11/92	2:20	ST	12	110	32	7.8	5.6	0.21	<0.5	0.7		45	10	<2	<6	11	9	<10	<2	70	272
	2/11/92	13:20																				
	2/12/92	14:45	ST	12	810	15	7.5	5.6	0.22	<0.5	0.7		110	20	<2	<6	16	12	<10	<2	90	204
	2/13/92	1:45																				
	2/13/92	2:45	ST	12	830	14	7.6	4.8	0.2	<0.5	0.9		200	31	2	<6	44	33	<10	<2	160	170
	2/13/92	13:45																				
	2/13/92	15:30	ST	12	2800	5.6	7.8	13	<0.1	<0.5	0.7		19	6	<2	<6	43	6	10	<2	70	596
	2/14/92	2:30																				
	2/14/92	3:30	ST	11	3800	5.5	7.9	23	0.1	<0.5	0.8		7	<5	<2	<6	37	3	<10	<2	60	888
	2/14/92	13:30																				
	4/21/92	8:50	DT	24	8500	0.8	8.1	27	0.3	1.2	0.4		67	5	<20	<30	<20	3	<40	<10	40	>1000
	4/22/92	7:50																				
	5/26/92	10:00	DT	24	8100	1.8	8.2	19	0.5	1.7	0.8		40	11	<2	<6	21	5	<10	<2	60	1620
	5/27/92	9:00																				
	6/23/92	10:35	DT	1											<20	<30	<20	2	<40	<10	<10	1155
	7/22/92	11:00	DT	1	8400	5.2	8.4	8.6	0.1	0.6	0.5		19	9	<20	<30	70	<2	<40	<10	<20	1500
	8/26/92	9:35	DT	1											<20	<30	<20	<2	<40	<10	30	1600
	9/23/92	10:10	DT	1	4900	3	8.7	4.5	<0.1	0.99	8		12	7	<20	<30	37	<2	<40	<10	17	
	10/26/92	11:10	DT	1	9100	5.6	8.5	14	0.17	0.93	1.1		27	12	<20	<30	41	2	<40	11	34	1500
	11/18/92	10:15	DT	1	7800	5.2	8.7	17	0.12	0.64	0.53		18	8	<20	<30	33	2	<40	<10	26	1614
	12/16/92	10:10	DT	1											<20	<30	21	<2	<40	<10	40	>1000
	1/6/93	1:18	ST	3	2000	50	7.6	8.5	0.23	1.1	0.78		110	73	<20	<30	40	16	<40	<10	110	380
	1/6/93	3:18																				
	1/6/93	5:21	ST	13	250	75	7.8	1.8	0.16	0.69	0.78		190	50	<20	<30	34	16	<40	<10	97	67
	1/7/93	5:21																				
	1/7/93	7:00	ST	4	680	46	7.7	4.3	0.18	0.72	0.78		79	27	<20	<30	32	11	69	<10	100	160
	1/7/93	13:00																				
	1/8/93	15:07	ST	10	1600	48	8.0	9.6	0.18	0.87	0.21		76	13	<20	<30	<20	12	<40	<10	92	364
	1/9/93	9:07																				
	1/10/93	9:07	ST	3	1200	39	7.9	7.8	0.13	0.64	0.25		61	13	<20	<30	22	11	<40	<10	86	292
	1/10/93	13:07																				

STATION	DATE	TIME	SAMPLES Type	#	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
LANF08	1/17/93	9:45	ST	17	600	97	8.0	3.9	0.13	0.73	0.87		160	19	<7	12	<30	12	8.1	<4	83	154
	1/18/93	17:45																				
	1/18/93	19:45	ST	7	2300	35	8.0	15	0.16	0.76	0.64		46	10	11	<10	<30	4.2	25	<4	76	592
	1/19/93	7:45																				
	1/19/93	9:40	ST	12	4900	5.4	8.3	33	0.14	0.92	0.84		16	5	<20	<30	24	<2	<40	<10	62	1206
	1/20/93	7:40																				
	1/20/93	9:40	ST	10	6000	4.2	8.3	46	0.15	0.86	0.51		18	<5	<20	<30	23	<2	<40	<10	55	1436
	1/21/93	7:40																				
	1/27/93	11:00	ST	1	7600	3	8.2	45	0.11	0.8	0.42		15	6	<7	<10	<30	<2	<3	<4	<2	1500
	2/7/93	22:00	ST	10	720	95	7.7	4.0	0.18	0.93	2.6		220	27	<20	<30	24	24	<40	<10	130	155
	2/8/93	16:00																				
	2/8/93	18:00	ST	10	920	60	7.8	5.2	0.21	0.73	1.8		120	15	<20	<30	<20	15	<40	<10	65	215
	2/9/93	10:50																				
	2/18/93	11:20	ST	5	650	130	8.0	8.1	0.14	1	1.3		270	37	<7	<10	<30	3.5	3.9	<4	150	172
	2/18/93	19:20																				
	2/18/93	21:20	ST	6	860	74	7.9	4.8	0.15	0.63	0.66		180	26	<7	11	<30	21	4.5	<4	120	184
	2/19/93	7:20																				
	2/19/93	9:20	ST	13	380	140	8.1	2.6	0.22	0.55	1.1		280	32	<7	18	<30	28	8.8	<4	130	128
	2/20/93	2:20																				
	2/20/93	11:20	ST	13	3700	11	8.2	21	0.11	0.81	0.4		24	<5	<7	<10	<30	4.1	16	<4	35	926
	2/21/93	11:20																				
	3/17/93	9:15	DT	1	8200	3.7	8.1	38	0.11	0.96	0.38		22	6	<7	<10	34	<2	<3	<4	<20	1842
	4/21/93	9:30	DT	1											<20	<30	<20	<2	<40	10	43	>1500
	5/26/93	9:30	DT	1	7300	17	8.2	19	0.14	1.2	0.32		48	<5	<20	<30	<20	<2	<40	<10	61	1480
	6/9/93	10:00	DT	1											<20	<30	<20	4.1	<40	<10	33	
	7/14/93	9:40	DT	1	6500	9.3	8.3	22	<0.1	1.4	0.41		150	110	<20	<30	<20	<2	<40	<10	17	1400
	8/17/93	12:20	DT	22											<20	<30	<20	<2	<40	<10	46	1272
	8/18/93	9:20																				
	9/14/93	12:00	DT	24	6600	9.1	8.3	17	<0.1	1.2	0.47		45	10	<5	<10	<20	<2	<40	<10	43	
	9/15/93	11:00																				
	10/16/93	7:17	ST	6	2500	50	7.8	27	1.4	6.8	2.4		62	23	<5	12	70	<50	<40	<10	320	560
	10/16/93	17:17																				
	10/18/93	7:17	ST	12	6100	7.5	8.4	19	0.26	1.8	0.83		19	7	<5	<10	24	<2	<40	<10	37	1460
	10/19/93	5:17																				
	10/19/93	7:17	ST	12	6700	9.5	8.3	20	0.21	1.6	0.87		28	13	<5	<10	20	8.9	<40	<10	44	
	10/20/93	5:17																				
	10/26/93	12:15	DT	24	6800	2.6	8.4	33	0.13	0.91	0.56		15	9	<5	<10	<20	<2	<40	<10	27	1610
	10/27/93	11:15																				
	11/11/93	4:37	ST	5	780	280	7.6	11	0.76	7.7	3.9		640	120	6.3	10	110	55	<40	<10	550	160
	11/11/93	12:37																				
	11/14/93	15:54	ST	7	7700	2.6	8.2	35	0.34	1.4	1.0		28	14	<5	<10	<20	<2	<40	14	56	1694
	11/15/93	3:54																				
	11/17/93	11:40	DT	1											<5	<10	<20	<2	<40	11	24	1774

NEWPORT BAY WATERSHED

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
LANF08	11/30/93	4:03	ST	4	1000	34	7.6	8.5	0.29	2.7	1.7		150	<5	<5	<10	33	26	<40	<10	200	188
	11/30/93	10:03																				
	11/30/93	10:37	ST	11	4700	8	7.9	13	0.39	1.9	1.1		10	<5	<5	<10	<20	<2	<40	<10	62	818
	12/1/93	8:37																				
	12/1/93	10:37	ST	12	7100	5.8	8.2	33	0.28	1.2	0.76		5	<5	<5	<10	<20	<2	<40	<10	44	1550
	12/2/93	8:37																				
	12/11/93	14:23	ST	1											<5	20	100	<50	<40	<10	500	
	12/11/93	16:23	ST	4	410	100	7.7	6.3	0.30	1.1	0.74		180	33	<5	13	40	32	<40	<10	210	86
	12/11/93	22:23																				
	12/12/93	0:23	ST	19	4900	7	8.1	21	0.32	1.2	0.72		18	12	<5	<10	<20	<2	<40	<10	57	825
	12/13/93	12:23																				
	12/13/93	14:23	ST	13	6900	5	8.1	16	0.28	1.3	0.75		17	<5	<5	<10	<20	<2	<40	<10	41	1532
	12/14/93	14:23																				
	12/14/93	16:23	ST	11	2500	50	7.7	17	0.74	1.5	1.2		62	<5	<5	<10	30	10	<40	<10	120	442
	12/15/93	12:23																				
	1/17/94	10:00	DT	24	6700	14	8.3	30	0.10	0.65	0.73		23	<5	<5	<10	24	<2	<40	<10	61	1496
	1/18/94	9:00																				
	4/19/94	11:30	DT	24	7700	4.8	8.3	36	0.13	1.2	0.56		15	<5	<5	<10	<20	<2	<40	<10	34	1804
	4/20/94	10:30																				
	5/25/94	10:00	DT	24											1.5	<10	17	<2	<40	<0.3	34	1608
	5/26/94	9:00																				
	6/30/94	9:55	DT	1											<1	13	9.3	<2	<40	0.5	36	1460
	10/4/94	14:39	ST	11	5900	6.8	8.2	11	0.60	2.8	0.37		39	9	<1	<10	25	<2	<40	0.58	50	1160
	10/5/94	8:39																				
	10/5/94	10:39	ST	13	4500	28	7.6	13	1.00	7.8	1.1		120	21	1.4	<10	41	11	<40	1	250	800
	10/6/94	10:39																				
	10/6/94	12:39	ST	24	5700	3.9	8.1	10	0.62	4.8	0.44		8	<5	<1	<10	19	<2	<40	0.82	40	860
	10/8/94	10:20																				
	10/25/94	12:09	DT	23											<1	<10	23	2.4	<40	<0.3	26	940
	10/26/94	8:09																				
	11/8/94	11:06	ST	3	2900	40	7.0	28	2.5	11	2.3		54	21	<1	<10	54	8.7	<40	<0.3	450	610
	11/8/94	15:06																				
	11/9/94	9:06	ST	9	7500	14	8.2	19	0.41	2.4	0.7		38	10	<1	<10	25	<2	<40	<0.3	80	1405
	11/10/94	5:06																				
	11/10/94	9:00	ST	4	2200	60	6.4	15	0.57	3.1	1.4		120	11	1.1	<10	44	11	<40	<0.3	180	105
	11/10/94	11:00																				
	11/10/94	7:06	ST	4	560	230	6.1	8.3	0.67	4.7	3.2		660	53	4.3	28	160	58	<40	<0.3	580	85
	11/10/94	13:06																				
	11/30/94	9:50	DT												1.5	<10	19	<2	<40	3	53	
	12/5/94	2:00	ST	3	3400	33	7.6	18	0.74	3.7	1.2		160	40	2.1	<10	47	18	<40	0.39	170	746
	12/5/94	6:00																				
	5/16/95	13:45	DT	24	7800	5.7	8.4	28	<0.1	0.74	0.31		21	8	<1	<10	21	<2	<40	<1	<10	1585
	5/17/95	12:45																				
	6/14/95	10:00	DT	1											<1	<10	8.8	<2	<40	5	36	1720
	7/25/95	9:00	DT	24											1	<10	20	3	<40	<1		58
	7/26/95	8:00																				
	8/29/95	10:20	DT	24											<1	<10	21	2	<40	<1	52	1348
	8/30/95	9:20																				

STATION	DATE	TIME	SAMPLES Type	#	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
LANF08	9/19/95	10:30	DT	24											1	<10	28	<2	<40	<1	50	
	9/20/95	9:30																				
	10/24/95	12:30	DT	23											<1	<10	31	2	<40	<1	340	
	10/25/95	10:30																				
	11/14/95	10:00	DT	23											4	<10	29	3	<40	<1	55	1737
	11/15/95	8:00																				
	12/5/95	8:30	DT	24											3	<10	64	3	<40	<1	35	1844
	12/6/95	7:30																				
	12/12/95	21:00	ST	5	3700	350	7.3	52	3.70	14	4.60		690	100	3	27	180	39	<40	<1	1100	790
	12/12/95	22:00																				
	12/13/95	2:00	ST	7	890	74	7.3	14	0.82	4.1	1.70		120	26	1	11	83	33	<40	<1	350	155
	12/13/95	14:00																				
	12/14/95	12:50	ST	29	7000	12	8.2	30	0.48	1.6	0.74		41	10	<1	<10	21	<2	<40	<1	94	1440
	12/16/95	20:50																				
	1/21/96	15:34	ST	14	1500	220	7.7	8.8	0.13	3.4	2.50		480	71	3	20	95	35	17	<1	320	334
	1/22/96	10:34																				
	1/22/96	12:34	ST	36	5600	16	8.2	21	0.11	0.79	0.42		24	11	1	<10	27	<2	8	<1	50	1570
	1/25/96	14:34																				
	1/25/96	15:30	ST	1	4300	39	8.1	27	0.36	2.0	0.59		39	13	<1	<10	35	4	9	<1	120	1350
	1/31/96	2:55	ST	4	20000	290	7.9	15	0.85	8.3	2.60		650	93	4	34	90	60	32	1	450	412
	1/31/96	3:40																				
	1/31/96	5:55	ST	8	390	150	7.8	3.9	0.45	2.5	4.10		350	67	5	27	70	5	20	1	340	70
	1/31/96	21:55																				
	1/31/96	23:55	ST	10	1800	35	7.7	12	0.37	2.0	0.83		35	13	<1	<10	40	7	9	2	120	384
	2/2/96	17:55																				
	2/2/96	19:55	ST	19	4900	18	8.4	21	0.19	2.2	0.68		8	7	<1	<10	29	2	10	1	110	1092
	2/3/96	7:55																				
	2/13/96	9:15	DT	24											<1	<10	35	<2	5	2	74	1840
	2/14/96	8:15																				
	2/19/96	19:06	ST	5	4400	74	7.5	41	0.72	5.5	1.40		90	34	<1	<10	71	7	14	2	230	1210
	2/19/96	20:06																				
	2/19/96	22:06	ST	22	780	170	7.4	7	0.33	2.6	2.80		440	50	15	60	100	<2	<2	1	700	182
	2/22/96	2:03																				
	2/22/96	4:03	ST	20	4000	8	8.4	28	0.19	0.81	0.70		24	14	1	<10	22	<2	8	<1	30	1025
	2/23/96	18:06																				
	3/27/96	11:40	DT	1											<1	<5	9	<2	7	<1	39	2110
	4/23/96	11:30	DT	24											<1	<10	63	2	5	1	50	1758
	4/24/96	10:30																				
	5/29/96	11:30	DT	8											<1	<10	28	<2	7	<1	31	
	5/30/96	18:30																				
	6/20/96	8:50	DT												<1	<10	5	<2	10	<1	42	
	7/24/96	10:20	DT	24											<1	<10	21	<2	15	<1	27	1390
	7/25/96	9:20																				
	8/27/96	10:15	DT	23											<1	<10	21	<2	6	<1	60	1566
	8/28/96	8:15																				

NEWPORT BAY WATERSHED

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
LANF08	9/24/96	10:00	DT	23											<1	<10	23	4	6	<1	120	2015
	9/25/96	8:00																				
	11/5/96	12:25	DT	1											<1	21	58	<2	<4	<1	110	
	11/21/96	9:23	ST	4	410	110	7.1	6	0.68	3.4	1.40		130	28	2	<10	78	32	19	<1	260	112
	11/21/98	10:23																				
	11/21/96	12:23	ST	9	230	140	7.8	2.8	0.27	1.7	1.40		270	34	2	15	42	31	12	<1	230	82
	11/22/96	4:23																				
	12/4/96	12:15	DT	1											<1	<10	7	2	4	<1	55	1680
	12/9/96	12:55	ST	5	1800	180	7.6	16	0.30	3.9	1.80		320	51	1	12	48	21	10	<1	300	474
	12/9/96	13:52																				
	12/9/96	14:22	ST	7	810	150	7.5	6	0.19	1.8	1.30		220	30	1	11	42	25	11	<1	210	182
	12/10/96	2:22																				
	12/10/96	4:22	ST	10	2900	18	8.0	19	0.23	1.2	<0.2		43	9	<1	<10	17	<2	7	<1	71	745
	12/10/96	22:22																				
	12/11/96	0:22	ST	13	460	69	7.7	3.8	0.27	0.91	<0.2		100	14	<1	<10	25	10	11	<1	100	110
	12/12/96	0:22																				
	12/12/96	0:22	ST	15	3200	12	8.1	100	0.20	1.1	<0.2		19	8	<1	<10	12	<2	5	<1	89	1240
	12/13/96	6:22																				
	1/1/97	22:12	ST	5	1900	64	7.6	14	0.39	1.9	0.51		81	20	<1	<10	38	7	6	<1	120	504
	1/1/97	23:12																				
	1/2/97	1:12	ST	5	880	52	7.5	6.3	0.40	0.98	0.41		26	9	<1	<10	25	5	6	<1	71	200
	1/2/97	9:12																				
	1/2/97	11:12	ST	42	3300	11	8.0	20	0.23	1.1	0.47		20	6	1.8	<10	25	2.5	12	<1	70	3950
	1/5/97	23:12																				
	1/21/97	20:42	ST	2				48	<0.1	1.1	0.66				1.2	<10	33	3.9	5.9	<1	<10	1850
	1/21/97	21:42																				
	1/22/97	1:42	ST	12	3600	11	7.8	19	0.36	1.1	0.52		24	6	6.7	<10	25	2.6	11	<1	<10	790
	1/22/97	23:42																				
	1/23/97	1:42	ST	3	630	150	7.5	6.8	0.23	1.2	0.50		89	11	1.2	<10	26	9.1	7.6	<1	10	170
	1/23/97	5:42																				
	1/23/97	11:42	ST	4	4700	11	8.1	38	0.25	0.86	0.31		29	22	2.2	<10	34	<2	20	<1	120	1304
	1/24/97	23:42																				
	1/29/97	10:15	DT	1											1.2	<10	19	<2	8.1	<1	82	1760
	2/11/97	0:41	ST	5	3000	98	7.8	37	1.0	4.3	1.0		120	32	1.2	<10	40	5.1	9.8	1.0	170	940
	2/11/97	1:41																				
	2/27/97	10:00	DT	1											<1	<10	8.4	<2	4.3	<1	17	
	3/12/97	8:45	DT	1											<1	<10	14	<2	4.1	<1	50	1460
	4/15/97	10:45	DT	24											<1	<10	49	11	7.7	<1	70	1590
	4/16/97	9:45																				
	5/20/97	9:50	DT	1											<1	<10	6.4	<2	<4	<1	39	1300
	6/10/97	10:50	DT	1											<1	<10	6.2	<2	4.0	<1	30	1436
	7/8/97	10:00	DT	1											2	<10	5	<2	<4	<1	26	
	8/15/97	10:50	DT	1											<1	<10	<4	<2	4	<1	20	
	9/24/97	9:45	DT	1											<1	<10	7	<2	5	<1	<10	
	10/29/97	10:05	DT	1											<1	<10	8	<2	12	<1	160	

NEWPORT BAY WATERSHED

STATION	DATE	TIME	SAMPLES Type	#	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
LANF08	11/10/97	8:47	SF	4				40				<30			<1	<10	73	4	18	<1	250	1350
	11/10/97	9:32																				
	11/10/97	10:02	SF	8				13				<0.5			<1	<10	49	15	20	<1	280	195
	11/11/97	0:02																				
	11/11/97	2:02	ST	25	3900	33	7.7	23	0.62	3.1	0.94	<0.5	31	11	<1	<10	33	6	15	<1	150	894
	11/13/97	2:02	SF												<1	20	20	4	11	<1	120	
	11/13/97	4:02	ST	9	470	55	7.2	6.7	0.69	2.5	1.00	<0.5	150	36	<1	11	25	17	6	<1	240	72
	11/14/97	21:27	SF												<1	<10	20	9	11	<1	160	
	11/19/97	11:25	DT	10								<0.5			<1	<10	23	<2	13	<1	87	1640
	11/19/97	20:25	SF												<1	<10	34	<2	6	<1	56	
	11/26/97	9:36	ST	5	1400	630	8.2	8.7	0.21	5.0	3.50	<0.5	1100	910	3	38	150	100	43	<1	640	304
	11/26/97	10:36	SF												<1	<10	14	<2	<4	<1	42	
	11/26/97	14:36	ST	13	1400	66	7.6	8.2	0.50	2.1	0.91	<0.5	72	52	<1	<10	35	15	12	2	150	262
	11/27/97	14:36	SF												<1	<10	16	<2	6	<1	98	
	11/27/97	16:36	ST	32	5900	11	8.0	33	0.17	0.97	0.40	<50	33	33	<1	<10	19	<2	7	<1	68	1416
	11/30/97	6:36	SF												<1	<10	13	<2	5	<1	81	
	12/6/97	3:59	ST	5	460	200	7.7	4.2	0.32	2.8	2	<0.5	310	260	1	10	5	35	16	3	260	90
	12/6/97	4:59	SF												<1	<10	6	<2	<4	<1	45	
	12/6/97	5:59	ST	6	200	210	7.8	1.7	0.18	0.93	1	<0.5	210	170	<1	12	31	18	11	<1	170	40
	12/6/97	15:59	SF												<1	<10	6	<2	<4	<1	41	
	12/6/97	17:59	ST	8	980	150	7.6	7.2	0.18	1.4	1	<0.5	200	180	<1	11	24	15	10.0	<1	130	250
	12/7/97	7:59	SF												<1	<10	8	<2	<4	<1	71	
	12/7/97	9:59	ST	34	3900	16	7.9	28	<0.1	0.91	0.44	<0.5	31	8	1.0	<10	18	<2	6	<1	60	950
	12/10/97	3:59	SF												<1	<10	12	<2	4	<1	42	
	12/18/97	13:43	ST	5	1400	360	7.4	14	0.70	5.6	2.8	<0.5	660	100	3	29	94	44	22	<1	420	328
	12/18/97	14:43	SF												<1	<10	20	<2	4.0	<1	36	
	12/18/97	16:43	ST	7	1500	120	7.6	7.2	<0.5	2.1	1.4	<0.5	210	31	<1	<10	43	19	12	<1	160	280
	12/19/97	4:43	SF												<1	<10	33	9	6	<1	84	
	12/19/97	10:43	ST	38	5800	7.7	8.0	23	<0.5	0.92	0.30		12	10	<10	<10	14	<2	<4	<1	61	1580
	12/22/97	12:43	SF												<10	<10	11	<2	<4	<1	58	
	1/9/98	17:37	ST	5	320	250	7.7	2.0	0.50	3.2	2.3	<0.5	800	110	<10	28	80	59	25	<1	470	70
	1/9/98	18:37	SF												<10	<10	10	<2	5	<1	84	
	1/9/98	20:37	ST	9	450	54	7.4	2.9	<0.5	1.2	0	1	94	17	<1	<10	31	11	9	<1	<10	108
	1/10/98	12:37	SF												<1	<10	13	<2	<4	<1	<10	
	1/10/98	14:37	ST	38	400	11	8.0	27	<0.5	1.3	0.40	<0.5	21	8	1.0	<10	26	2	5	<1	140	980
	1/13/98	16:37	SF												<1	<10	15	<2	6	<1	100	
	1/20/98		DT	24											<1	<10	14	<2	<4	<1	<10	
	1/21/98														<1	<10	14	<2	<4	<1	<10	
	2/14/98	9:09	ST	5	2000	50	7.7	20	<0.5	1.9	0.83		180	32	1	10	38	17	9	1.40	91	420
	2/14/98	10:09	SF												<1.00	4	15	2	5	<1.00	24	
	2/14/98	12:09	ST	7	570	62	7.7	4.9	<0.5	0.8	1		160	22	<1.00	11	27	14	8.40	<1.00	56	100
	2/15/98	0:09	SF												<1.00	5	10	<1.00	2	<1.00	9	
	2/15/98	2:09	ST	20	4300	5.9	8.1	29	<0.5	1.2	8		21	8	1	4	48	3	6	<1.00	30.6	1334
	2/16/98	16:09	SF												1.10	5	15	<1.00	67	1	19	
	2/16/98	18:09	ST	10	1900	34	7.9	16	<0.5	1.2	10		74	18	<1.00	5	22	7	5	<1.00	38	430
	2/17/98	12:09	SF												<1.00	4	18	2	4.00	<1.00	20	

NEWPORT BAY WATERSHED

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
LANF08	2/17/98	14:09	ST	11	4200	8.1	8.0	4	<0.5	1.1	10		15	8	<1.00	60	30	3	19	<1.00	79	1060
	2/18/98	10:09	SF												<1.00	52	23	1	20.0	<1.00	38	
	2/19/98	12:30	ST	5	4800	2.1	8.1	35	<0.5	<1	10				<1.00	4	17	4	5	<1.00	30	>1500
	2/19/98	13:30	SF												<1.00	4	15	2	6.40	<1.00	22	
	2/19/98	21:30	ST	7	1100	510	7.7	12	<0.5	2.0	12				<1.00	9	26	11	9	<1.00	60	320
	2/20/98	9:30	SF												<1.00	3	15	1	3	<1.00	20.0	
	2/20/98	11:30	ST	18	4800	3.4	8.0	33	<0.5	1.0	11				<1.00	4	125	3	7	<1.00	36.0	1200
	2/21/98	21:30	SF												<1.00	3	103	1	7	<1.00	32	
	2/21/98	23:30	ST	8		41	7.8	12	0.8	<1	12				<1.00	9	33	13	7	<1.00	45	224
	2/22/98	13:30	SF												<1.00	2	19.0	1	4	<1.00	17	
	2/22/98	15:30	ST	11		12	8.0	16	<0.5	1.1	12				<1.00	4	22	5	5.60	<1.00	43	428
	2/23/98	11:30	SF												<1.00	4.00	18	1	6	<1.00	54	
	3/25/98	5:44	ST	5	2940	42	7.55	31	0.5	1.5	<0.1		143	34	1	17	70	15	9	<1.00	157	775
	3/25/98	6:44	SF												<1.00	15	59	2	8.80	<1.00	119	
	3/25/98	8:44	ST	6	315	100	7.75	5.3	<0.1	<1.0	<0.1		51	23	6	12	54.0	22	11	<1.00	132	80
	3/25/98	18:44	SF												<1.00	4	17.0	2	3	<1.00	103	
	3/25/98	20:44	ST	28	4430	12	8.24	33.2	0.30	<1.0	0.3		9	1	1	28	34	6	6	<1.00	53	1110
	3/28/98	2:44	SF												<1.00	25	17	<1.00	6	<1.00	39	
	3/28/98	4:44	ST	13	2600	17	8.13	10.2	0.20	<1.0	<0.1		11	2	1	29	34	32	7	<1.00	71	606
	3/29/98	4:44	SF												1	27.0	22	<1.00	7	<1.00	44	
	4/20/98	12:31	DT	23											<1.00	30	19	2	4	<1.00	23	1450
	4/21/98	10:31																				
	6/22/98	13:00	DT	1											<0.50	28	10	<2	<4	<2	22	
	7/15/98	9:30	DT	24											<1	16	27	<4	11	<4	45	
	7/16/98	8:30	DF												<1	17	20	<4	10	<4	35	
	8/17/98	8:26	DT	13											<1	9	30	<2	<8	<2	36	1260
	8/17/98	20:26	DF												<1	<8	22	<2	<8	<2	20	
	9/8/98	11:24	DT	22											<1	11	28	<2	7	<2	47	1190
	9/9/98	9:24	DF												<1	10	21	<2	6	<2	26	
	10/13/98	12:20	DT	24											<1	<8	25	<2	<4	<2	40	1430
	10/14/98	11:20	DF												<1	<8	21	<2	<4	<2	35	
	11/3/98	11:02	DT	24											<1	<8	19	<2	<4	<2	122	
	11/4/98	10:02	DF												<1	<8	14	<2	<4	<2	76	
	11/8/98	2:50	ST	3	1940	150	7.3	19.0	0.98	16.60	5.81		700	260	3	33	119	42	28	<2	698	435
	11/8/98	3:20	SF												<1	<8	22	<2	14	<2	95	
	11/8/98	5:50	ST	10	1630	24	7.6	13.0	0.20	2.48	1.01		140	100	<1	9	33	6	18	<2	91	395
	11/8/98	23:50	SF												<1	<8	24	3	16	<2	67	
	11/9/98	1:50	ST	37	3330	17	7.9	25.0	0.21	2.20	0.55		50	16	1	<8	22	3	13	<2	71	825
	11/12/98	1:50	SF												1	<8	22	2	13	<2	68	
	11/28/98	4:50	ST	5											2	21	77	29	20	<2	406	434
	11/28/98	5:50	SF												2	<8	25	<2	9	<2	73	
	11/28/98	7:50	ST	13											5	10	43	6	20	<2	109	332
	11/29/98	7:50	SF												4	<8	31	<2	18	<2	67	
	11/29/98	9:50	ST	27	3730	21	8.1	28.0	<0.05	1.45	0.61		66	14	2	<8	23	3	11	<2	53	1120
	12/1/98	13:50	SF												1	<8	18	<2	10	<2	35	
	12/1/98	15:50	ST	9	730	60	8.5	7.0	0.14	2.42	1.41		210	42	6	20	58	31	18	<2	222	195

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
LANF08	12/2/98	7:50	SF												<1	8	19	<2	7	<2	15	
	12/8/98	9:33	DT	24											<1	4	<10	18	<4	<2	41	1540
	12/9/98	8:33																				
	1/5/99	8:52	DT	24											<1	<8	16	<2	6	<2	30	1246
	1/6/99	7:52	DF												<1	<8	13	<2	6	<2	23	
	1/25/99	3:23	ST	5											2	11	62	15	9	27	199	280
	1/25/99	4:23	SF												<1	<8	21	<2	4	<2	40	
	1/25/99	6:23	ST	13											1	8	43	9	12	<2	104	860
	1/26/99	6:23	SF												<1	<8	18	<2	9	<2	32	
	1/26/99	8:23	ST	15	815	35.0	7.7	6.34	0.27	1.55	0.86		160	34	2	13	53	19	13	<2	151	175
	1/27/99	12:23	SF												<1	<8	15	<2	6	<2	25	
	1/27/99	14:23	ST	19	3700	18.0	7.8	40.20	0.23	1.42	1.38		17	10	<1	10	26	5	8	<2	53	1048
	1/29/99	2:23	SF												<1	<8	21	2	6	<2	39	
	2/2/99	10:50	D	24	4630	3.1	8.1	52.80	0.13	0.73	0.28		16	7								
	2/3/99	9:50																				
	2/4/99	18:24	ST	5	3630	28.0	8.1	17.20	0.21	2.42	0.37		70	12	1	9	32	6	<4	<2	110	1020
	2/4/99	19:24	SF												<1	<8	18	2K	<4	<2	55	
	2/4/99	21:24	ST	14	1190	27.0	7.7	10.10	0.44	1.92	0.64		60	52	2	9	43	9	11	<2	140	276
	2/5/99	23:24	SF												1	<8	28	<2	9	<2	242	
	2/6/99	1:24	ST	33	4600	5.3	8.2	48.40	0.10	0.97	0.28		30	14	1	<8	26	<2	10	<2	49	1300
	2/8/99	17:24	SF												1	<8	22	<2	11	<2	37	
	2/9/99	17:09	ST	5	1490	26.0	7.5	14.50	0.15	3.31	0.70		230	100	1	12	100	19	11	<2	316	470
	2/9/99	18:09	SF												<1	<8	19	2	6	<2	76	
	2/9/99	20:09	ST	7	1110	27.0	7.8	7.04	0.24	1.09	0.64		64	20	2	9	50	13	12	<2	149	238
	2/10/99	8:09	SF												1	<8	26	2	10	<2	55	
	2/10/99	10:09	ST	40	4580	4.5	8.2	49.3	<0.05	0.88	0.21		9	6	1	<8	27	3	11	<2	51	1320
	2/13/99	16:09	SF												<1	<8	22	<2	12	<2	50	
	2/18/99	9:10	DT	1											<1	<8	11	<2	9	<2	36	1030
	2/18/99	9:10	DF												<1	<8	12	<2	8	<2	28	
	3/1/99	12:20	DT	24											<1	<8	31	<2	10	<2	32	1490
	3/2/99	11:20	DF												<1	<8	27	<2	10	<2	27	
	3/11/99	10:40	ST	5				25.60	0.70	3.34	0.92				1	10	77	12	10	<2	220	752
	3/11/99	11:40																				
	3/11/99	13:40	ST	6	2000	24.0	7.9	11.00	0.61	2.97	0.67		46	24	1	<8	90	20	21	<2	148	404
	3/11/99	23:40																				
	3/12/99	1:40	ST	40	5170	4.3	8.2	41.40	0.16	0.80	0.47		28	7	<1	<8	32	2	<4	<2	56	1414
	3/15/99	7:40	SF												<1	<8	32	<2	7	<2	42	
	3/15/99	9:35	ST	5	1380	68.0	7.5	18.30	0.35	3.65	0.67		280	90	2	20	64	31	10	<2	264	430
	3/15/99	10:35	SF												<1	<8	15	<2	<4	<2	48	
	3/15/99	12:35	S	2	325	29.0	7.3	5.50	0.39	2.17	0.55		76	26								
	3/15/99	14:35																				
	3/15/99	16:35	ST	46	4600	7.7	8.1	35.40	0.20	1.16	0.31		22	9	<1	<8	35	3	8	<2	62	1204
	3/19/99	10:35	SF												<1	<8	26	<2	8	<2	43	
	3/25/99	12:09	ST	5	2070	68.0	7.5	24.90	0.51	4.46	1.32		380	92	2	18	72	30	17	<2	370	476
	3/25/99	13:09	SF												<1	<8	14	<2	6	<2	33	
	3/25/99	15:09	ST	9	1300	23.0	7.7	5.76	0.29	1.00	0.58		60	10	<1	<8	45	9	8	<2	351	222
	3/26/99	7:09	SF												<1	<8	21	<2	7	<2	90	

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
LANF08	4/27/99	10:14	DT	24											2	<8	35	<2	<4	<2	239	958
	4/28/99	9:14	DF												2	<8	30	<2	<4	<2	130	
	5/4/99	10:10	DT	24											<1	<8	26	<2	<4	<2	35	850
	5/5/99	9:10	DF												<1	<8	24	9	<4	<2	31	
	6/17/99	15:00	DT	1											<1	<8	18	<2	<4	<2	27	1600
	6/17/99	15:00	DF												<1	<8	16	<2	<4	<2	27	
	7/2/99	11:35	DT	1											<1	<8	18	<2	<4	<2	12	1818
	7/2/99	11:35	DF												<1	<8	16	<2	<4	<2	15	
	7/2/99	11:16	DT	24											<1	<8	31	<2	<4	<2	44	1730
	7/5/99	8:16	DF												<1	<8	31	<2	<4	<2	40	
	7/6/99	12:00	DT	1											<1	<8	38	<2	<4	<2	30	1620
	7/6/99	12:00	DF												<1	<8	35	<2	<4	<2	32	
	7/19/99	12:13	DT	1											<1	<8	9	<2	<4	<2	15	1322
	7/19/99	12:13	DF	1											<1	<8	8	4	<4	<2	19	
	9/14/99	7:21	D	1	5460	5.4	7.8	23.3	0.20	0.72	0.46		17	10								
	9/15/99	7:31	D	1	4160	4.2	7.8	24.2	0.21	0.86	0.37		17	10								
	9/16/99	7:33	D	1	4500	7.3	7.8	44.4	0.16	0.95	0.40		21	14								
	9/17/99	7:35	D	1	5760	4.6	7.8	46.6	0.24	0.20	0.43		18	7								
	9/18/99	7:32	D	1	5120	13.0	7.8	45.3	0.27	1.12	0.58		28	21								
	9/19/99	7:30	D	1	4150	10.0	7.9	49.3	0.32	0.81	0.55		25	15								
	9/20/99	7:36	D	1	5290	6.3	7.8	47.5	0.22	0.59	0.43		21	10								
	1/25/00	8:35	ST	1											3	29	113	42	21	<2	536	
	1/25/00	8:35	SF	1											<1	<8	12	<2	4	<2	42	592
	2/4/00	10:00	DT	24	4760	55.0	8.2	32.0	0.23	1.20	1.62	0.24	94	64								
	2/5/00	23:00	DF																			
	2/10/00	16:45	ST	5	1140	200.0	7.9	9.9	0.16	3.10	1.13	0.08	440	140	2	18	82	30	10	<2	300	280
	2/10/00	17:45	SF												<1	<8	16	<2	<4	<2	23	
	2/10/00	19:45	ST	10	835	60.0	7.7	6.9	0.27	1.30	0.88	0.12	78	44	<1	<8	35	10	9	<2	131	136
	2/11/00	11:45	SF												<1	<8	13	<2	5	<2	35	
	2/11/00	13:45	DT	6	1580	15.0	8.3	11.0	<0.05	0.31	0.44	0.12	30	14	<1	<8	10	2	<4	<2	32	284
	2/11/00	23:45	DF												<1	<8	5	<2	<4	<2	13	
	2/12/00	1:45	ST	5	630	190.0	7.9	6.3	0.23	2.60	1.93	0.09	310	80	2	16	70	30	16	<2	265	395
	2/12/00	9:45	SF												<1	<8	7	<2	<4	<2	14	
	2/12/00	11:45	DT	28	1370	21.0	7.9	10.0	0.10	0.72	0.50	0.09	25	14	<1	<8	15	3	<4	<2	46	720
	2/14/00	17:45	DF												<1	<8	9	<2	<4	<2	23	
	2/16/00	5:30	ST	5	2790	40.0	7.8	25.0	0.24	2.60	1.01	0.21	86	64	<1	<8	33	6	<4	<2	108	168
	2/16/00	6:30	SF												<1	<8	16	<2	<4	<2	74	
	2/16/00	8:30	ST	3	700	60.0	7.5	7.0	0.20	2.10	0.90	0.16	84	44	1	11	39	12	10	<2	138	
	2/16/00	12:30	SF																			
	2/16/00	14:30	D	44	5060	20.0	8.1	32.0	0.05	0.98	1.07	0.27	44	24								1097
	2/20/00	4:30																				
	2/27/00	16:46	ST	5	3110	45.0	8.0	42.0	0.21	1.10	1.41	0.25	140	50	1	<8	26	6	<4	<2	90	1090
	2/27/00	17:46	SF												<1	<8	30	<2	<4	<2	38	
	2/27/00	19:46	ST	3	1510	36.0	7.5	9.1	<0.05	1.40	0.73	0.08	90	50	1	<8	35	4	12	<2	87	290
	2/27/00	23:49	SF																			
	2/28/00	1:46	DT	45	5260	9.6	8.3	41.0	<0.05	0.63	0.89	0.16	35	21	1	<8	15	<2	6	<2	48	450

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
LANF08	3/2/00	19:37	DF												<1	<8	11	<2	4	<2	46	
	3/3/00	19:47	ST	5	2370	60.0	6.8	23.0	0.54	2.30	1.29		140	48	1	9	47	15	11	<2	202	475
	3/3/00	20:47																				
	3/3/00	22:47	S	10	2100	17.0	7.8	14.0	0.29	1.10	0.83		44	28								
	3/4/00	18:47																				
	3/4/00	20:47	S	5	640	38.0	7.6	9.9	0.27	0.98	0.73	0.12	70	54								
	3/5/00	4:47																				
	3/5/00	6:47	S	12	835	31.0	7.6	6.6	0.16	0.77	0.83	0.15	74	48								
	3/6/00	3:03																				
	3/6/00	5:03	D	23	3830	9.3	8.1	120.0	0.06	0.76	0.89	0.21	27	10								
	3/8/00	2:27																				
	3/8/00	4:27	S	12	1590	36.0	8.0	8.4	0.22	0.85	0.61	0.13	43	12								
	3/9/00	2:27																				
	3/15/00	12:15	D	24	5950	4.1	8.5	47.0	<0.05	0.53	0.80	0.12	20	8								
	3/16/00	11:15																				
	4/5/00	13:03	D	24	5510	26.0	8.4	47.0	<0.05	1.10	1.35	0.15	100	39								
	4/6/00	12:03																				
	5/11/00	10:15	D	1	5240	7.4	8.3	37.0	0.09	1.30	1.10	0.24	54	36								
	5/11/00	10:15																				
	6/6/00	11:30	D	24	6210	30.1	8.4	23.0	<0.05	2.30	0.70	<0.01	110	42								
	6/7/00	10:30																				
	6/20/00	10:20	D	1	6420	7.4	8.1	17.0	<0.05	1.60	0.34		30	22								
	6/20/00	10:00	D	24	5340	14.0	8.5	13.0	<0.05	1.30	0.40		49	25								
	6/21/00	9:00																				
	6/21/00	10:00	D	24	5370	33.0	8.3	32.0	<0.05	1.70	1.32		155	33								
	6/22/00	9:00																				
	6/21/00	10:00	D	24	5310	67.0	8.3	24.0	<0.05	1.40	1.10		160	42								
	6/22/00	9:00																				
	6/22/00	10:00	D	24	5640	41.0	8.4	20.0	<0.05	1.30	1.10		78	22								
	6/23/00	9:00																				
	6/23/00	10:00	D	24	5600	23.0	8.3	40.0	0.07	2.20	1.04		45	12								
	6/24/00	9:00																				
	6/24/00	10:00	D	24	5380	27.0	8.4	26.0	0.10	1.50	1.25		50	15								
	6/25/00	9:00																				
	6/25/00	10:00	D	24	4930	17.0	8.3	21.0	0.14	1.40	0.98		33	26								
	6/26/00	9:00																				
	6/25/00	10:00	D	24	4910	19.0	8.3	22.0	0.14	1.60	1.04		24	11								
	6/26/00	9:00																				
	6/26/00	10:00	D	24	5370	18.0	8.4	24.0	0.12	0.73	0.92		31	13								
	6/27/00	9:00																				

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
BRCF09	6/18/91	14:30	DT	23	6100	5.9	9.2	0.2	0.2	0.9	1.4		<5	<5	14	<10	<30	<20	<10	<2	<10	
	6/19/91	12:30																				
	7/23/91	12:45	DT	1	3100	4.8	9.0	0.6	<0.1	4.4	1.9		12	9	<20	<40	<20	<2	110	<10	30	484
	8/20/91	10:10	DT	25											<2	<10	<20	<2	<40	<10	<20	1110
	8/21/91	10:55																				
	6/23/92	0:00	DT	1											<20	<30	<20	2	<40	<10	<10	1155
	9/16/91	10:50	DT	24	4100	36	8.3	1.8	<0.1	1.8	2.7		51	16	1	<5	<20	3	<40	<10	50	708
	9/17/91	9:50																				
	10/15/91	11:00	DT	24											<20	<30	30	8	<40	<10	50	876
	10/16/91	10:00																				
	12/17/91	9:30	DT	24											<20	<30	<20	18	<40	<10	100	1286
	12/18/91	8:30																				
	2/15/92	11:00	ST	12	580	430	7.9	3.5	<0.1	<0.5	1.3		270	32	<2	14	64	10	<10	<2	90	244
	2/15/92	22:00																				
	2/15/92	23:00	ST	12	1600	1300	7.8	6.9	<0.1	<0.5	0.5		13	5	<2	<6	58	7	<10	<2	90	
	2/16/92	10:00																				
	4/21/92	8:40	DT	24	4900	15	8.1	1.1	0.7	1.7	0.9		24	6	<20	<30	<20	6	<40	<10	50	968
	4/22/92	7:40																				
	5/27/92	10:00	DT	1	5100	13	8.4	0.7	1.3	1.9	0.5		<5	<5	<2	<6	6	<2	<10	<2	40	1098
	1/10/93	8:47	ST	3	2000	60	8.1	14	0.14	1	1.7		84	12	<20	<30	<20	3.4	<40	<10	78	428
	1/10/93	12:47																				
	1/15/93	11:30	ST	8	360	450	8.1	1.9	0.14	0.81	2.6		850	61	9.7	37	43	8.1	26	<4	180	124
	1/16/93	1:30																				
	1/16/93	3:30	ST	10	720	290	7.9	4.3	0.13	0.71	2.2		540	10	<7	25	<30	5.3	16	<4	120	214
	1/16/93	21:30																				
	1/16/93	23:30	ST	3	1700	70	7.9	11	0.18	0.43	0.88		0.87	11	<7	<10	<30	2.5	<3	<4	36	484
	1/17/93	3:30																				
	1/17/93	9:25	ST	9	1100	220	8.1	6.7	0.12	0.72	1.1		260	23	<7	<10	<30	5.1	27	<4	72	285
	1/18/93	1:25																				
	1/18/93	3:25	ST	8	570	1100	8.2	3.3	0.14	1.1	2.4		740	64	<7	30	<30	9.6	38	<4	140	168
	1/18/93	17:25																				
	1/18/93	19:25	ST	7	2000	57	8.0	14	0.15	0.75	0.74		60	10	<7	<10	<30	2.6	21	<4	45	569
	1/27/93	10:45			8600	7.5	8.2	64	0.13	0.82	0.98		22	5	<7	<10	<30	<2	<3	<4	22	>1500
	2/7/93	22:00	ST	10	640	200	7.6	2.2	0.15	0.94	1.5		290	30	<20	<30	<20	13	<40	<10	91	140
	2/8/93	16:00																				
	2/8/93	18:00	ST	9	890	240	7.6	4.6	0.15	1	5.1		450	41	<20	<30	24	11	<40	<10	63	255
	2/9/93	10:00																				
	5/26/93	9:00	DT	1	5900	20	8.5	1.6	0.48	2.2	0.34		64	9	<20	<30	<20	<2	<40	<10	<10	1280
	6/9/93	9:45	DT	1											<20	<30	<20	<2	<40	<10	23	
	7/14/93	9:20	DT	1	6100	15	8.0	<0.2	<0.1	1	0.3		33	10	<20	<30	<20	<2	<40	<10	<10	1180
	8/18/93	10:00	DT	1											<20	<30	<20	<2	<40	<10	25	1300

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
BC2F09	9/14/93	11:40	DT	24	4800	34	8.5	0.26	<0.1	0.93	0.76		<5	<5	<5	<10	<20	<2	<40	<10	28	
	9/15/93	10:40																				
	10/26/93	12:00	DT	24	5100	27	8.4	<0.2	<0.1	1.1	0.92		52	13	<5	<10	<20	<2	<40	<10	31	1100
	10/27/93	11:00																				
	11/11/93	4:22	DT	3											<5	<10	50	<50	<40	<10	500	660
	11/11/93	8:22																				
	11/11/93	10:22	ST	12	1400	45	7.4	<0.4	0.56	3.1	0.66		75	12	<5	<10	20	6.7	<40	<10	89	272
	11/12/93	8:22																				
	11/12/93	20:22	ST	6	3200	6.7	8.1	2.8	0.46	2.0	1.0		28	<5	<5	<10	<20	<2	<40	<10	74	712
	11/13/93	6:22																				
	11/13/93	8:22	ST	17	3400	9.0	8.2	2.63	0.44	1.5	1.6		15	15	<5	<10	<20	<2	<40	<10	37	740
	11/14/93	18:22																				
	11/14/93	18:22	ST	5	2900	1.4	8.1	21	<0.1	0.59	0.30		<5	<5	<5	<10	<20	<2	<40	<10	26	778
	11/15/93	2:22																				
	11/17/93	11:30	DT	1											<5	<10	<20	<2	<40	<10	46	1320
	11/23/93	2:52	ST	4	2600	32	7.2	16	0.80	4.1	1.6		47	<5	<5	<10	33	<2	<40	<10	98	522
	11/23/93	8:52																				
	11/23/93	10:52	ST	7	1700	14	7.2	16	1.1	4.7	1.2		22	<5	<5	<10	26	<2	<40	<10	65	386
	11/23/93	22:52																				
	11/24/93	0:52	ST	7	1700	14	7.6	5.5	1.1	3.4	1.3		21	5	<5	<10	24	<2	<40	<10	46	348
	11/24/93	12:52																				
	11/24/93	14:52	ST	12	2400	11	7.8	3.6	0.46	2.2	1.2		14	7.0	<5	<10	<20	<2	<40	<10	36	478
	11/25/93	12:52																				
	11/25/93	14:52	ST	12	3500	19	8.0	2.2	0.19	1.3	0.81		22	7.0	<5	<10	<20	<2	<40	<10	33	718
	11/26/93	10:52																				
	1/17/94	9:30	DT	24	5500	20	8.2	2.9	0.13	0.56	0.97		26	<5	<5	<10	<20	<2	<40	<10	35	1220
	1/18/94	8:30																				
	1/24/94	23:03	ST	1											<5	13	46	22	<40	<10	330	520
	1/25/94	1:03	ST	3	540	180	8.0	6.3	0.78	1.5	0.76		200	6.0	<5	11	<20	9.3	<40	<10	100	130
	1/25/94	5:03																				
	1/25/94	7:03	ST	6	910	34	7.9	5.7	0.38	0.95	0.22		43	6.0	<5	<10	<20	2.3	<40	<10	45	196
	1/25/94	17:03																				
	4/19/94	11:00	DT	18	4700	22	8.4	9.2	0.30	1.3	0.70		52	5	<5	<10	<20	3.5	<40	<10	31	1077
	4/20/94	4:00																				
	5/25/94	9:30	DT	24											<1	<10	11	<2	<40	0.3	41	1268
	5/26/94	8:30																				
	6/30/94	9:40	DT	1											<1	<10	2.7	<2	<40	<30	25	1284
	10/25/94	12:00	DT	23											<1	<10	19	6.5	<40	<0.3	47	1060
	10/26/94	8:00																				
	11/30/94	9:35	DT	1											<1	<10	21	<2	<40	22	43	

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
BC2F09	5/16/95	10:44	DT	24											<1	<10	26	2.6	<40	<1	<10	
	5/17/95	9:44																				
	6/14/95	9:30	DT	1											<1	<10	3.8	2	<40	<1	28	1146
	7/26/95	11:10	DT	1											<1	<10	6	<2	<40	<1	41	
	8/29/95	10:00	DT	23											<1	<10	24	5	<40	<1	64	1040
	8/30/95	8:00																				
	9/19/95	10:25	DT	24											1	<10	70	4	<40	<1	63	959
	9/20/95	9:25																				
	10/24/95	11:50	DT	21											<1	<10	32	5	<40	<1	64	
	10/25/95	7:00																				
	11/14/95	9:09	DT	24											<1	<10	33	5	<40	<1	72	1486
	11/15/95	8:09																				
	12/5/95	8:15	DT	24											3	17	49	7	<40	<1	140	1200
	12/6/95	7:15																				
	12/12/95	22:05	ST	5	3000	350.0	7.3	45.0	2.50	11.00	4.20		580	86	2	32	120	28	49	<1	920	595
	12/12/95	23:05																				
	12/13/95	1:05	ST	17	1500	95.0	7.3	13.0	0.67	4.60	2.40		120	25	<1	<10	70	10	<40	<1	220	306
	12/14/95	9:05																				
	12/14/95	11:05	ST	30	4200	29.0	7.9	6.6	3.10	4.90	10.00		45	8	<1	<10	22	<2	<40	<1	72	956
	12/16/95	21:05																				
	1/19/96	5:33	ST	5	3100	72.0	7.9	15.0	0.70	3.50	1.10		120	25	<1	<10	36	6	9	<1	130	684
	1/19/96	6:33																				
	1/19/96	8:33	ST	5	910	51.0	7.8	16.0	0.59	3.10	0.73		48	13	<1	<10	30	4	5	<1	76	218
	1/19/96	16:33																				
	1/19/96	18:33	ST	17	3400	34.0	8.0	3.5	0.43	1.60	0.75		33	7	<1	<10	25	3	<20	<1	46	646
	1/21/96	14:33																				
	1/21/96	16:33	ST	5	720	230.0	7.6	2.3	0.57	1.90	2.10		340	46	<1	11	44	21	<20	<1	200	154
	1/22/96	0:33																				

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
BC2F09	1/31/96	3:07	ST	5	3100	120.0	8.1	13.0	0.30	2.90	1.00		190	32	<1	<10	44	10	16	<1	150	662
	1/31/96	4:07																				
	1/31/96	6:07	ST	20	890	71.0	8.0	5.6	0.12	1.30	0.65		82	13	<1	<10	34	8	5	7	100	190
	2/1/96	20:07																				
	2/1/96	22:07	ST	18	2800	25.0	8.1	7.5	0.21	1.40	0.42		17	13	<1	<10	23	3	5	3	53	484
	2/3/96	8:07																				
	2/3/96	10:07	ST	10	1300	29.0	7.7	4.5	0.33	1.70	0.59		29	<6	<1	<10	34	3	4	1	36	344
	2/4/96	4:07																				
	2/13/96	9:00	DT	24											2	<10	43	2	6	2	100	1300
	2/14/96	8:00																				
	2/19/96	20:18	ST	5	4300	98.0	8.2	33.0	0.42	2.90	0.62		92	22	<1	<10	31	5	<4	<1	100	1186
	2/19/96	21:18																				
	2/19/96	23:18	ST	28	780	160.0	7.5	5.3	0.18	1.40	0.84		210	28	<1	<10	78	<2	<2	<1	120	174
	2/22/96	9:18																				
	2/22/96	11:18	ST	16	3100	15.0	8.4	11.0	0.26	0.65	0.93		18	11	<1	<10	21	<2	10	<1	<10	820
	2/23/96	17:18																				
	3/27/96	11:15	DT	1											<1	<5	8	<2	4	<1	17	1770
	4/23/96	10:45	DT	24											<1	<10	83	<2	<2	1	58	1446
	4/24/96	9:45																				
	5/29/96	12:00	DT	24											<1	<10	29	<2	7	<1	27	1240
	5/30/96	11:00																				
	6/20/96	8:45	DT	1											<1	<10	12	<2	8	<1	12	
	7/24/96	10:00	DT	19											<1	<10	28	<2	3	<1	35	975
	7/25/96	9:00																				
	8/27/96	10:00	DT	24											<1	<10	35	6	9	<1	100	1055
	8/28/96	9:00																				
	9/25/96	9:20	DT	1											<1	<10	15	<2	<4	<1	37	945
	11/5/96	12:35	DT	1											<1	<10	14	<2	5	<1	110	
	12/4/96	12:00	DT	1											<1	<10	6	<2	<4	<1	24	1280
	1/29/97	10:30	DT	1											<1	<10	7	<2	<4	<1	60	2160
	2/27/97	10:15	DT	1											<1	<10	8	<2	<4	<1	<10	
	3/11/97	9:20	DT	24											<1	<10	48	10	13	1	210	1565
	3/12/97	8:20																				
	4/15/97	10:20	DT	24											<1	<10	13	<2	<4	<1	29	1500
	4/16/97	9:20																				
	5/20/97	9:30	DT	1											<1	<10	6.7	<2	23	<1	47	1400
	6/10/97	10:40	DT	1											<1	<10	16	2.7	15	<1	35	1012
	7/8/97	10:20	DT	1											<1	<10	4	<2	<4	<1	30	

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
BC2F09	8/15/97	10:40	DT	1											<4	<10	4	<2	4	<1	24	
	9/24/97	9:30	DT	1											<1	<10	7	3	7	<4	<10	
	10/29/97	10:20	DT	1											<1	<10	5	<2	8	<1	65	
	6/24/98	9:00	DT	1											<0.50	9	9	<2.00	<4.00	<2.00	21	1350
	6/24/98		DF												<0.50	21	8	<2.00	<4.00	<2.00	17	
	7/14/98	13:00	DT	1											<1	10	<10	<4	<8	<4	22	1340
	7/14/98	13:00	DF												<1	10	<10	<4	<8	<4	17	
	8/12/98	8:23	DT	1											<1	<8	9	<2	<8	<2	21	1050
	8/12/98	8:23	DF												<1	<8	9	2	<8	<2	21	
	9/9/98	9:00	DT	1											<1	<8	13	<2	4	<2	25	930
	9/9/98	9:00	DF												<1	8	9	<2	5	<2	15	
	10/20/98	12:00	DT	1											<1	<8	8	<2	<4	<2	17	1070
	10/20/98	12:00	DF												<1	<8	8	<2	<4	<2	16	
	11/30/98	0:00	DT												<1	<8	3	<2	<4	<2	<10	
	11/30/98	10:00	DF	1											<1	<8	12	<2	5	<2	32	880
	12/14/98	10:20	DT	1											<1	<8	10	2	<4	<2	44	1040
	12/14/98	10:20																				
	1/14/99	10:20	DT	1											<1	<8	9	<2	<4	<2	21	1100
	1/14/99	10:20	DF												<1	<8	8	<2	<4	<2	18	
	2/8/99	10:30	DT	1											<1	<8	11	<2	<4	<2	24	1296
	2/8/99	10:30	DF												<1	<8	12	<2	<4	<2	20	
	3/2/99	12:00	DT	1											<1	20	6	<2	6	<2	10	670
	3/2/99	12:00	DF												<1	<8	7	3	7	<2	<10	
	4/1/99	10:50	DT	1											<1	<8	11	<2	<4	<2	12	
	4/1/99	10:50	DF												<1	<8	10	<2	<4	<2	12	
	5/26/99	10:00	DT	1											<1	<8	13	<2	<4	<2	21	
	5/26/99	10:00	DF												<1	<8	14	<2	<4	<2	20	
	6/18/99	11:30	DT	1											<1	<8	8	<2	<4	<2	17	620
	6/18/99	11:30	DF	1											<1	<8	6	<2	<4	<2	19	
	7/14/99	10:10	DT	1											<1	<8	7.67	<2	<4	<2	13.7	830
	7/14/99	10:10	DF	1											<1	<8	8.49	<2	<4	<2	14	
	9/14/99	7:41	D	1	3810	14	7.8	<0.44	0.306	0.173	1.03		13									
	9/15/99	7:49	D	1	2920	9.7	7.7	2.95	0.185	0.77	0.245		16	10								
	9/16/99	7:48	D	1	3730	7.6	7.8	0.44	0.124	0.83	0.245		140	8								
	9/17/99	7:57	D	1	3450	13	7.7	3.78	0.241	1.03	0.278		19	15								
	9/18/99	7:49	D	1	3310	14	7.7	6.03	0.298	0.92	0.214		25	13								
	9/19/99	7:48	D	1	3320	12	7.8	2.2	0.519	1.02	0.275		28	<22								
	9/20/99	7:56	D	1	3120	20	7.8	1.85	0.301	1.1	0.337		26	11								

STATION	DATE	TIME	SAMPLES Type	#	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
SJQF14	6/19/91	10:50	DT	1	1900	9.9	8.3	40	0.80	1.60	6.50		<5	<5	<7	<10	<30	<20	<10	<2	<10	
	7/23/91	11:00	DT	1	1900	3.9	8.0	72	0.40	3.80	9.20		21	10	<20	<40	<20	6	<40	<10	60	450
	9/17/91	9:05	DT	1	1700	34.0	8.1	49	0.80	0.90	7.20		41	13								
	4/22/92	9:20	DT	1	1900	0.9	8.0	52	2.30	3.00	2.90		5	5	<20	<30	<20	21	<40	<10	100	512
	5/27/92	9:10	D	1	2000	2.3	8.1	24	0.10	1.20	2.20		<5	<5								
	1/27/93	9:50	D	1	2600	7.3	7.9	110	0.16	1.20	0.86		32	7								
	3/17/93	8:25	D	1	2400	3.4	8.0	91	0.75	1.70	1.30		7	5								
	5/26/93	8:20	DT	1	2000	8.9	8.0	51	0.13	1.60	1.10		17	7	<20	<30	<20	<2	<40	<10	12	628
	7/14/93	9:00	D	1	2000	13.0	7.9	51	0.10	1.20	1.70		17	7								
	9/15/93	9:45	D	1	1600	8.2	8.0	25	0.14	1.20	2.00		6	<5								
	10/27/93	9:45	DT	1	1900	11.0	7.9	45	0.10	2.60	1.40		12	12	<5	<10	<20	<2	<40	<10	34	478
	1/18/94	10:00	D	1	1900	76.0	7.9	41	0.49	0.88	1.60		61	11								
	4/20/94	8:45	D	1	2300	2.6	7.7	67	0.34	1.30	1.30		18	10								
	10/26/94	8:50	D	1	2600	3.7	7.9	53	0.57	1.40	1.40		25	11								
	5/17/95	9:00	D	1	2700	2.3	7.8	56	0.12	0.94	1.10		<6	<6								
	7/25/95	10:45	D	1	2100	3.5	8.2	28	0.25	1.40	1.40		14	6								
	10/25/95	11:20	D	1	2200	8.4	8.2	46	0.25	1.40	1.40		14	6								
	1/3/96	8:50	D	1					0.10	1.40	1.20		13	<6								
	4/23/96	10:00	D	1	2000	4.6	7.8	45	0.10	1.00	0.88		7	<6								
	7/24/96	9:20	D	1	1800	14.0	7.8	15	<0.1	1.40	1.30		19	8								
	11/5/96	10:35	D	1	1900	3.7	8.2	39	0.22	1.20	1.20		9	<6								
	1/29/97	9:20	D	1	2500	4.9	7.9	48	0.16	0.67	0.68		9	9								
	4/15/97	9:45	D	1	2000	3.2	7.9	49	<0.5	1.20	1.10		<6	<6								
	7/8/97	9:30	D	1	1800	5.3	8.0	42	0	2.4	4		13	7								
	10/29/97	9:30	D	1	1300	33	8.1	16	0	2.0	2		34	7								
	4/21/98	9:25	D	1	2040	7.9	8.13	68	<0.1	<1.0	1		4	1								

NEWPORT BAY WATERSHED

STATION	FIXED DATE	FIXED TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
SCCF15	6/19/91	11:00	DT	1	1700	53	8.3	7.9	0.4	0.8	6.9		40	12	<7	<10	<30	<20	<40	<2	<10	
	7/22/91	13:05	DT	23	1800	8.9	8.3	4.2	<0.1	6.8	6.7		12	6	<20	<40	<20	2	<40	<10	<20	414
	7/23/91	11:05																				
	8/20/91	9:10	D	25	2000	6	8.2	2.5	<0.1	0.7	3.7		36	15								
	8/21/91	10:00																				
	9/16/91	10:00	D	24	2100	11	8.3	5.6	<0.1	0.8	3		<5	<5								
	9/17/91	9:00																				
	12/17/91	8:25	D	24	2500	1.2	8.2	15	0.4	<0.5	2.1		<5	<5								
	12/18/91	7:25																				
	2/6/92	16:00	ST	24	980	49	7.6	25	0.12	<0.5	70		410	55	<20	<30	30	34	<40	<40	110	
	2/7/92	15:00																				
	2/13/92	15:00	ST	1	800	12	7.6	22	0.1	2	140		240	66	<2	8	15	11	10	<2	70	184
	3/2/92	10:36	ST	10	560	740	7.5	9.9	0.2	3.2	60		1000	120	<2	26	62	61	30	<2	170	140
	3/2/92	21:36																				
	3/2/92	22:36	ST	12	760	640	7.8	9.3	0.2	2.7	39		650	97	<2	16	29	48	20	<2	100	152
	3/3/92	9:36																				
	3/3/92	11:00	ST	12	1600	8.3	8.3	9.2	0.2	1.4	4.5		100	15	<20	<30	<20	95	<40	<10	30	406
	3/4/92	20:00																				
	3/4/92	23:00	ST	12	1600	13	8.4	10	0.2	1.3	4.4		55	12	<20	<30	<20	5	<40	<10	30	432
	3/6/92	8:00																				
	3/6/92	9:25	ST	12	910	520	7.9	14	<0.1	2.5	5.2		160	40	<2	10	12	16	10	<2	50	200
	3/7/92	7:25																				
	3/7/92	9:25	ST	12	880	320	7.8	13	0.1	1.6	4.3		180	23	<2	<10	8	12	<10	<2	40	194
	3/8/92	7:25																				
	4/21/92	8:30	DT	24	4700	3.4	8.2	5.9	<0.1	0.7	2		32	10	<20	<30	<20	3	<40	<10	10	446
	4/22/92	7:30																				
	5/26/92	9:35	D	24	2500	3.8	8.4	5.6	0.1	1	1		27	9								
	5/27/92	8:35																				
	6/23/92	9:40	D	24	2300	3	8.4	2.2	<0.1	1	0.6		8	6								
	6/24/92	8:40																				
	7/21/92	11:30	D	24	1300	14	8.4	5.6	16	18	14		11	6								
	7/22/92	10:30																				
	8/25/92	10:15	D	24	2100	3.1	8.4	0.4	<0.1	0.4	1.1		8	6								
	8/26/92	9:15																				
	9/22/92	9:50	D	5	2200	2.9	8.4	1.3	<0.1	0.64	1.4		6	<5								
	9/23/92	8:50																				
	10/28/92	10:20	DT	1	2100	4.7	8.1	8.7	0.2	1	1.9		13	7	<20	<30	<20	<2	<40	<10	31	760
	11/18/92	9:30	DT	1	2300	2	8.2	6.8	<0.1	0.39	0.75		44	8								
	12/16/92	9:30	DT	1	2800	3.2	8.0	3.2	<0.1	0.51	0.69		6	7								
	1/6/93	7:48	ST	5	550	1800	7.8	11	0.11	2.2	4.8		750	100	<20	<30	<20	18	<40	<10	63	110
	1/6/93	15:48																				
	1/6/93	17:48	ST	10	600	1200	7.8	12	<0.1	1.6	4.3		450	66	<20	<30	<20	16	<40	<10	61	130
	1/7/93	11:48																				
	1/7/93	13:48	ST	9	490	630	7.8	10	0.1	1.8	5		730	92	<20	<30	<20	17	<40	<10	63	110
	1/8/93	5:48																				
	1/8/93	14:26	ST	5	1400	260	8.2	14	0.1	1.6	2.5		260	39	<20	<30	<20	15	<40	<10	34	320
	1/8/93	22:26																				
	1/15/93	12:45	ST	9	560	740	7.7	5.8	0.81	2	5		1100	80	<7	53	<30	20	34	<4	15	200
	1/16/93	10:45																				

STATION	FIXED DATE	FIXED TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
SCCF15	1/16/93	12:45	ST	12	480	470	7.7	5.2	0.62	2.4	3.9		750	57	<7	48	<30	11	31	<4	100	162
	1/17/93	10:45																				
	1/17/93	13:00	ST	12	440	590	7.9	6.1	0.37	2.2	3.6		750	60	<7	40	<30	12	43	<4	11	1156
	1/18/93	11:00																				
	1/18/93	13:00	ST	12	460	400	7.9	6.1	0.35	0.58	2.4		360	35	<7	28	<30	5.1	35	<4	70	1160
	1/19/93	11:00																				
	1/27/93	10:10	DT	1	1200	90	8.1	8.9	<0.1	1	1.6		49	7								
	2/7/93	20:45	ST	11	480	500	7.8	5.9	0.16	1.7	3.5		870	72	<20	<30	<20	17	<40	<10	66	130
	2/8/93	16:45																				
	2/8/93	18:45	ST	9	450	540	7.9	5.8	0.21	1.7	3.3		990	68	<20	<30	<20	13	<40	<10	34	127.8
	2/9/93	10:15																				
	2/9/93	10:30	ST	13	510	350	7.9	5.9	0.19	1.7	2.8		420	39	<7	31	35	11	22	<4	43	132
	2/10/93	13:30																				
	3/17/93	8:45	DT	1	2800	2.9	8.2	8.1	0.1	0.49	1.1		6	5								
	4/21/93	9:20	DT	1	2900	7.1	8.1	6.2	<0.1	0.58	0.86		31	7								
	5/26/93	8:40	DT	1	2800	18	8.4	5.7	0.11	0.78	0.65		46	9	<20	<30	<20	<2	<40	<10	11	836
	6/9/93	9:30	DT	1	2500	6.5	8.1	<0.2	0.14	0.86	1.3		19	13								
	7/14/93	9:10	DT	1	2600	5.2	8.2	8.6	<0.1	0.53	0.69		11	7								
	8/17/93	11:50	DT	22	2700	19	8.2	7.0	<0.1	0.77	0.44		43	13								
	8/18/93	8:50																				
	9/14/93	11:00	DT	24	2300	9.7	8.0	7.7	<0.1	0.59	0.8		5	<5								
	9/15/93	10:00																				
	10/26/93	11:00	DT	24	2600	29	8.3	8.7	0.15	1.2	0.94		71	10	<5	<10	<20	<2	<40	<10	34	754
	10/27/93	10:00																				
	11/11/93	8:00	ST	3											<5	<10	50	<50	<40	<10	500	540
	11/11/93	12:00																				
	11/17/93	11:10	DT	1	2200	1.3	8.1	7.8	0.15	0.72	1.3		10	10								
	1/18/94	10:10	DT	1	2400	6.2	8.0	7.8	<0.1	0.40	0.67		17	8.0								
	1/25/94	1:17	ST	4	760	40	7.9	7.9	0.43	1.4	1.8		67	<5	<5	<10	<20	3.9	<40	<10	45	130
	1/25/94	7:17																				
	1/25/94	9:17	ST	14	1700	22	8.2	18	<0.1	1.1	1.0		24	<5	<5	<10	<20	<2	<40	<10	26	480
	1/26/94	11:17																				
	1/27/94	3:17	ST	3	1800	18	8.0	11	0.34	1.4	1.2		41	7.0	<5	<10	<20	3.8	<40	<10	50	792
	1/27/94	7:17																				
	1/27/94	9:17	ST	2	1500	24	8.0	8.7	0.30	0.27	1.9		29	8.0	<5	<10	<20	<2	<40	<10	34	386
	1/27/94	11:17																				
	1/27/94	13:17	ST	4	1500	9.7	8.0	3.2	0.28	0.16	1.5		11	7.0	<5	<10	<20	<2	<40	<10	25	370
	1/27/94	19:17																				
	1/27/94	21:17	ST	10	1900	6.4	8.4	4.2	<0.1	<0.1	1.1		10	11	<5	<10	<20	<2	<40	<10	24	510
	1/28/94	15:17																				
	2/7/94	2:43	ST	3	1200	310	7.9	14	0.46	1.8	3.1		35	8	<5	<10	<20	2.0	<40	<10	60	282
	2/7/94	6:43																				
	2/7/94	8:43	ST	14	720	20	8.0	6.2	0.49	<0.1	1.6		360	38	<5	<10	<20	23	<40	<10	42	172
	2/7/94	10:43																				
	2/8/94	12:43	ST	9	1900	56	8.0	17	0.16	0.90	2.3		60	6.0	<5	<10	29	3.9	<40	<10	22	424
	2/9/94	4:43																				
	2/9/94	6:43	ST	9	2300	17	8.2	10	0.14	0.48	1.7		22	<5	<5	<10	<20	<2	<40	<10	11	608
	2/9/94	22:43																				
	2/10/94	12:43	ST	7	2500	6.7	8.3	4.4	<0.1	0.39	1.5		20	<5	<5	<10	<20	2.8	<40	<10	17	628
	2/11/94	0:43																				
	2/17/94	9:40	ST	3	460	400	8.2	7.4	0.11	3.3	4.4		600	36	<5	52	39	36	<40	<10	150	108
	2/17/94	13:40																				
	2/17/94	15:40	ST	9	1400	190	7.9	21	0.31	2.7	3.2		240	18	<5	29	21	13	<40	<10	80	348
	2/18/94	7:40																				
	2/18/94	11:45	ST	12	970	170	8.1	7.9	0.12	1.8	2.9		220	12	<5	24	<20	8.7	<40	<10	53	260
	2/19/94	9:45	ST												<5	<10	<20	<2	<40	<10	<10	260
	2/19/94	11:45	ST	10	2000	37	8.3	13	<0.1	1.3	1.4		44	8.0	<5	<10	<20	2.0	<40	<10	18	454

STATION	FIXED DATE	FIXED TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
SCCF15	2/20/94	5:45																				
	2/20/94	7:45	ST	5	530	400	8.1	9.7	<0.1	2.1	3.3		440	32	<5	35	25	34	<40	<10	91	116
	2/20/94	15:45																				
	2/20/94	17:45	ST	9	1600	120	8.1	20	<0.1	1.9	2.3		130	6	<5	12	<20	7.8	<40	<10	31	352
	2/21/94	9:45																				
	4/19/94	10:30	D	15	2400	10	8.4	0.85	<0.1	0.68	1.1		28	<5								
	4/20/94	0:30																				
	5/26/94	12:00	D	1	2300	4.8	8.2	1.7	<0.1	0.54	0.92		<5	<5								
	6/30/94	9:10	D	1	2100	12	8.0	2.4	0.13	0.66	1.6		18	<5								
	10/26/94	9:00	D	1	2200	8	7.9	6.1	0.23	1.2	1.3		40	<5								
	11/30/94	9:20	D	1	2300	2	7.8	3.9	0.12	1.2	1.3		5	<5								
	5/17/95	8:30	D	1	2800	7.1	8.2	2.9	<0.1	0.77	1		14	6								
	6/13/95	10:11	D	24	2600	4.8	8.2	4.6	0.12	0.74	1.1		12	6								
	6/14/95	9:11																				
	7/25/95	9:50	D	18	2300	5.7	8.5	2.4	<0.10	0.78	1.00		21	8								
	7/26/95	2:00																				
	8/30/95	8:35	D		2300	23.0	8.2	3.8	0.18	0.83	1.50		35	6								
	9/19/95	10:15	DT	24	2200	13.0	8.4	5.5	0.13	1.00	1.60		24	9	2	<10	8	<2	<40	<1	39	
	9/20/95	9:15																				
	10/24/95	11:30	D	15	2500	40.0	8.5	11.0	<0.10	1.40	1.60		49	<6								
	10/25/95	10:30																				
	11/14/95	9:45	D	23	2700	8.2	8.4	8.5	<0.10	0.95	0.72		25	14								
	11/15/95	7:45																				
	12/6/95	8:35	D	1	2400	7.8	8.3	11.0	0.19	0.81	1.00		50	<6								
	1/19/96	4:37	ST	5	850	15.0	7.3	7.8	1.20	3.40	1.20		28	14	<1	<10	28	5	7	<1	130	216
	1/19/96	5:37																				
	1/19/96	7:37	ST	8	860	6.9	7.6	4.6	0.12	2.50	1.40		9	6	<1	<10	22	<2	7	<1	28	228
	1/19/96	21:37																				
	1/21/96	5:37	ST	9	750	110.0	7.4	3.1	0.24	1.80	2.00		110	23	<1	<10	33	6	9	<1	86	170
	1/22/96	7:37																				
	1/22/96	13:37	ST	8	970	17.0	7.5	1.8	0.30	1.10	1.60		7	<6	<1	<10	19	<2	4	1	35	228
	1/23/96	3:37																				
	1/31/96	2:27	ST	5	660	21.0	7.4	2.1	0.34	1.70	0.86		38	18	<1	<10	24	6	9	1	120	148
	1/31/96	3:27																				
	1/31/96	5:27	ST	10	640	57.0	7.7	2.9	0.20	1.40	1.80		47	13	<1	<10	28	4	15	3	70	134
	1/31/96	23:27																				
	2/1/96	1:27	ST	28	1500	13.0	8.1	2.3	<0.10	2.20	1.40		<6	<6	<1	<10	21	2	61	2	31	376
	2/3/96	7:27																				
	2/3/96	9:27	ST	10	1400	8.4	7.8	1.3	<0.10	1.20	1.40		8	<6	<1	<10	15	<2	6	2	15	348
	2/4/96	3:27																				
	2/13/96	8:45	D	24	2000	7.5	7.3	1.8	0.21	1.00	0.77		23	13								
	2/14/96	7:45																				

STATION	FIXED DATE	FIXED TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
SCCF15	2/20/96	10:18	ST	24	790	86.0	7.7	3.9	0.20	1.40	2.20		72	20	<1	<10	19	<2	8	<1	46	170
	2/22/96	8:18																				
	2/22/96	10:18	ST	23	2000	4.6	8.4	3.0	0.13	0.75	1.10		8	7	<1	<10	13	<2	9	<1	<10	546
	2/24/96	8:18																				
	3/27/96	10:50	S		2100	5.3	8.2	2.3	<0.10	0.74	0.61		9	6								
	4/23/96	10:30	S	24	2300	3.0	8.3	4.1	<0.10	1.50	0.99		<6	<6								
	4/24/96	9:30																				
	5/29/96	10:30	S	24	2200	8.7	8.4	1.0	0.27	1.80	1.50		74	19								
	5/30/96	9:30																				
	6/6/96	15:20	DT	1	1900	2.8	7.8	3.5	<0.10	<0.50	<0.20		16	10	<1	<5	4	<2	7	<1	<10	
	6/20/96	8:20	D	1	2000	14.0	8.0	7.0	0.22	1.90	1.50		36	<6								
	7/24/96	9:30	D	24	2000	12.0	8.5	1.9	<0.1	0.91	0.96		19	7								
	7/25/96	8:30																				
	8/27/96	9:10	D	24	1900	25.0	8.3	5.8	0.26	1.10	1.20		33	11								
	8/28/96	8:10																				
	9/25/96	9:05	D	1	2000	110.0	8.3	7.9	0.37	2.70	2.00		210	46								
	11/5/96	10:50	D	1	2300	13.0	8.3	5.4	<0.1	0.55	1.00		95	7								
	12/4/96	11:15	D	1	2500	2.5	8.2	3.9	0.31	0.53	0.60		7	<6								
	1/29/97	9:30	D	1	960	170.0	8.0	3.5	0.19	1.50	1.10		74	18								
	2/27/97	11:00	D	1	2700	35.0	8.0	1.5	0.33	1.20	0.81		38	11								
	3/12/97	8:35	D	1	2600	15.0	8.1	2.9	<0.1	0.87	1.40		21	<6								
	4/15/97	10:00	D	22	2700	31.0	8.2	2.6	<0.5	1.40	1.10		37	11								
	4/16/97	7:00																				
	5/20/97	8:50	D	1	2100	3.7	7.7	<0.2	0.3	3.50	0.84		8	8								
	6/10/97	9:20	D	1	1800	8.5	7.8	0.96	<0.1	0.61	1		28	17								
	7/8/97	9:40	D	1	1900	3.7	7.9	2	<0.1	1.3	1		16	6								
	8/15/97	10:30	D	1	1900	12	7.8	10	0	1.3	2		21	7								
	9/24/97	9:10	D	1	2000	23	7.6	9	<0.1	1.9	2		33	9								
	10/29/97	9:45	D	1	2400	7.1	8.1	8	<0.1	1.4	2		14	7								
	4/21/98	9:15	D	1	2670	3.5	8.04	5	<0.1	1.2	1		10	2								
	6/24/98	8:45	D	1	2490	1.7	8.0	7.0	<0.05	1.0	1		6	2								
	7/14/98	11:51	D	1	2250	4	8	4	<0.05	3	1		15	5								
	8/12/98	8:08	D	1	2430	8	8	3	0	1	1		86	14								
	9/9/98	10:03	S	1	2070	9.4	8.3	6.2	<0.05	2.5	0.49		56	21								
	10/20/98	11:45	D	1	2350	115	8	<1.3	1	34	24		640	190								
	11/30/98	10:15	D	1	1620	15	8	5	0	4	2		70	22								
	12/14/98	9:40	D	1	2550	8	8	9	<0.05	1	1		30	18								
	1/14/99	9:50	D	1	2570	3	8	7	<0.05	1	0		19	8								
	2/8/99	10:15	D	1	2710	14	8	5	<0.05	1	1		84	26								
	3/2/99	12:25	D	1	2600	1	8	3	<0.05	1	0		8	6								
	4/1/99	9:30	D	1	2750	9	8	2	<0.05	1	1		26	12								
	5/26/99	9:45	D	1	2010	6	8	<0.44	0	1	1		30	16								
	6/18/99	11:00	D	1	1950	15	8	2	0	1	3		58	17								

NEWPORT BAY WATERSHED

STATION	FIXED DATE	FIXED TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
SCCF15	7/14/99	9:50	D	1	2130	5.4	8.0	<0.44	<0.05	0.98	1.44		410	160								
	9/14/99	9:51	D	1	1590	17	8.0	3.61	0.857	0.20	1.35		<16									
	9/15/99	9:24	D	1	1620	16	8.0	5.72	0.064	1.53	0.949		23	14								
	9/16/99	9:15	D	1	1840	12	8.1	10.1	0.076	1.37	0.906		14.4	10								
	9/17/99	9:27	D	1	1520	13	8.0	9.72	0.183	1.93	0.927		18	15								
	9/18/99	9:25	D	1	1450	14	8.0	9.02	0.191	2.02	0.887		22	8								
	9/19/99	9:40	D	1	1500	21	8.0	10.6	0.229	1.63	1.68		43	12								
	9/20/99	9:34	D	1	1560	9.5	8.0	11	0.149	1.38	1.07		24	16								
	6/20/00	8:30	D	1	2460	4.1	8.1	0.7	<0.05	0.35	0.826		11	11								
	6/21/00	7:45	D	1	2140	4.9	8.1	<0.44	<0.05	0.32	0.857		<10	<1								
	6/21/00	0:00	D		2430	9.9	8.2	1.0	<0.05	3.60	0.857		12	7								
	6/23/00	7:15	D	1	2350	11	8.0	<0.44	<0.05	0.27	0.95		22	<5								
	6/24/00	7:36	D	1	2340	4.4	8.1	<0.44	<0.05	0.42	0.92		<10	<1								
	6/25/00	7:24	D	1	2340	13	8.0	<0.44	<0.05	0.39	1.01		15	<10								
	6/26/00	7:50	D	1	2390	8	8.0	<0.44	<0.05	0.31	1.0		10	7								
	6/27/00	8:09	D	1	2560	6	8.1	<0.44	<0.05	0.40	1		<10	<1								

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
BEEF17	2/13/92	15:00	ST	12	580	480	7.9	3.6	0.2	<0.5	45		540	66	4	17	32	13	20	<2	120	100
	2/14/92	2:00																				
	2/14/92	3:00	ST	12	600	190	7.8	3.4	0.1	<0.5	35		220	30	2	9	32	7	<10	<2	60	90
	2/14/92	14:00																				
	2/15/92	11:40	ST	12	440	1400	7.7	3.3	<0.1	<0.5	31		680	82	4	11	44	18	20	<2	140	88
	2/15/92	22:40																				
	2/15/92	23:40	ST	9	460	160	7.8	3.4	0.1	<0.5	51		230	36	2	<6	64	12	10	<2	70	61
	2/16/92	7:40																				
	3/5/92	15:30	ST	8	680	110	7.9	<0.2	0.6	1.1	1.4		150	25	<2	<10	10	4	<10	<2	30	88
	3/6/92	3:30																				
	3/6/92	6:30	ST	2											<2	<10	14	10	<10	<2	60	
	3/6/92	9:30																				
	3/20/92	3:50	ST	4	190	7.5	7.4	6.8	0.4	0.7	2.1		370	45	<20	<30	20	14	<40	<10	150	75
	3/20/92	5:50																				
	3/20/92	6:30	ST	8	370	3100	8.1	2.5	0.1	1.2	10		2400	300	<20	<30	<20	7	<40	<10	70	94
	3/21/92	19:00																				
	3/26/92	18:21	ST	4	110	110	7.5	4.1	0.1	0.8	2		210	24	<7	10	21	16	<10	<2	80	44
	3/26/92	20:21																				
	3/26/92	21:21	ST	8	230	280	7.4	6.9	0.3	1.3	2.9		250	42	<7	10	28	17	<10	<2	70	92
	3/28/92	0:21																				
	3/28/92	6:21	ST	11	590	18	7.7	11	0.1	0.9	1.9		26	10	<7	<10	21	8	<10	4	60	160
	3/30/92	18:21																				
	5/27/92	12:15	D	1	1300	4.4	8.2	8.2	0.1	1.6	3.6		43	16								
	6/23/92	11:45	D	1	1200	42	7.3	2.0	3.7	21	6.3		110	60								
	12/29/92	10:30	ST		80	360	8.2	1.1	0.21	1.6	9.1		670	82	<20	<30	<20	<2	<40	<10	90	
	1/27/93	12:40			570	36	8.2	7.2	0.11	0.64	1.2		59	8								
	2/7/93	20:00	ST	6	340	3100	8.2	3.7	0.55	3.9	20		7800	770	<20	<30	<20	5.6	<40	<10	67	204
	2/8/93	10:00																				
	5/17/95	13:00	DT	1	1300	27	8.2	22	2	1.8	0.43		44	8	<1	<10	6	<2	<40	<1	<10	292
	6/14/95	11:15	D	1	1100	12	8.4	7.7	0.13	0.57	0.84		58	12								
	7/26/95	12:30	D	1	1300	4.2	9.3	7.5	<0.10	1.90	2.80		32	13								
	8/30/95	10:30	D	1	1400	39.0	8.4	11.0	0.30	1.20	3.00		64	12								
	9/20/95	12:00	D	1	1500	120.0	8.1	18.0	6.50	11.00	7.10		210	37	1	<10	21	7	<40	<1	130	
	10/24/95	14:00	D	1	880	42.0	7.9	20.0	2.10	2.40	0.84		88	20								
	11/15/95	10:05	D	1	1500	35.0	8.2	10.0	0.47	2.20	1.80		28	13								
	12/6/95	10:00	D	1	1600	6.5	8.2	17.0	0.23	1.70	2.80		92	17								
	3/12/96	14:16	ST	5	200	300.0	7.2	4.5	1.20	4.00	2.00		620	96	1	21	54	34	18	<1	350	54
	3/12/96	15:16																				
	3/12/96	17:16	ST	9	460	480.0	7.8	4.1	0.38	2.50	3.10		900	120	3	27	50	22	22	<1	160	120
	3/13/96	23:16																				
	3/13/96	1:16	ST	31	1100	16.0	8.0	2.7	<0.10	0.69	0.62		17	7	<1	<10	45	4	13	<1	33	320
	3/16/96	13:16																				
	3/27/96	12:20	DT	1	1500	3.8	8.4	28.0	3.30	6.00	4.60		12	8								
	4/1/96	17:52	ST	4				40.0	4.30	16.00	3.10				<1	<10	110	10	35	<1	1100	180
	4/1/96	18:37																				

NEWPORT BAY WATERSHED

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
BEEF17	4/24/96	13:00	D	1	1400	7.0	8.9	17.0	0.10	3.60	4.50		120	23								
	5/30/96	12:30	D	1	1600	8.8	9.2	9.6	0.24	1.00	2.10		37	11								
	6/20/96	9:40	D	1	950	5.6	8.1	6.4	0.16	1.00	1.20		8	8								
	7/24/96	11:20	D	1	1200	4.6	8.6	2.0	<0.1	0.85	0.69		9	<6								
	8/27/96	11:00	D	1	900	11.0	8.6	6.5	0.34	1.50	2.00		32	9								
	9/24/96	10:50	D	1	1300	4.9	8.5	19.0	0.16	2.10	3.70		16	7								
	11/5/96	13:35	D	1	1700	62.0	8.4	120.0	0.57	3.50	3.00		130	20								
	12/4/96	13:00	D	1	860	4.3	8.6	1.1	0.28	<0.5	0.21		10	<6								
	1/29/97	11:05	D	1	770	34.0	8.3	1.8	<0.1	0.86	1.30		39	10								
	2/27/97	14:30	D	1	460	16.0	8.0	8.7	0.64	1.90	1.20		6	<6								
	3/12/97	10:20	D	1	1300	3.8	8.3	20.0	2.80	5.40	2.90		11	15								
	5/20/97	10:40	D	1	1400	5.4	8.9	12.0	0.3	1.40	2.40		9	<6								
	6/10/97	9:00	D	1	1100	4.7	8.4	7.6	<0.1	1.90	1.50		10	6								
	7/8/97	12:30	D	1	1400	5.1	9.0	4	0	2.7	3		76	21								
	8/15/97	13:00	D	1	1200	6.2	8.6	14	<0.1	2.5	2		6	<6								
	9/24/97	11:45	D	1	1200	7.3	8.5	7	<0.1	1.6	6		21	10								
	10/29/97	12:25	D	1	1400	67	8.8	21	0	2.0	4		140	23								
	4/21/98	8:55	D	1	1110	1.6	8.35	3	0	<1.0	<0.1		2	1								
	6/24/98	9:20	D	1	870	3.9	8.5	7.0	<0.05	~~1.1~~	2		4	2								
	7/14/98	12:16	D	1	715	5.8	8.5	0	0	<1	0		36	10								
	8/12/98	8:57	D	1	1190	4.1	8.3	10	0	2	3		10	6								
	9/14/98	11:04	D	1																		
	10/8/98	11:50	D	1	1290	8.9	8.2	7.80	0.22	1.69	1.77		17	7								
	11/30/98	11:50	D	1	1380	8.2	8.5	5.70	<0.05	<0.2	1.41		17	11								
	12/14/98	9:30	D	1	775	30.0	7.1	25.90	2.43	8.94	2.94		130	60								
	1/14/99	9:38	D	1	1120	3.1	8.4	7.30	0.08	0.86	0.98		8	5								
	2/3/99	9:55	D	1	2040	125.0	8.4	17.20	<0.05	1.73	0.86		250	36								
	3/2/99	11:00	D	1	1110	4.5	8.3	14.00	0.07	5.41	3.24		23	15								
	4/15/99		D	1	1160	5.2	7.6	19.10	0.08	1.39	3.98		10	7								
	5/26/99	11:00	D	1	1210	19.0	8.6	13.60	0.16	1.56	2.75		28	12								
	6/18/99	12:15	D	1	1360	37.0	8.4	32.90	0.13	1.30	4.68		93	19								
	7/13/99	14:00	D	1	1450	160.0	8.0	24.90	0.44	2.98	4.53		400	180								
	9/14/99	6:46	D	1	1110	4.0	8.4	9.24	0.05	0.98	1.65		7	4								
	9/15/99	6:55	D	1	1080	4.2	8.4	14.50	0.05	0.98	2.02		7	2								
	9/16/99	6:58	D	1	1160	4.9	8.4	14.10	1.23	2.30	2.90		7.2	3								
	9/17/99	6:54	D	1	1140	7.6	8.3	25.20	0.43	1.59	3.18		10	7								
	9/18/99	6:58	D	1	1120	3.5	8.3	23.60	2.63	3.71	3.98		6	2								
	9/19/99	7:03	D	1	1290	3.9	8.3	32.30	0.13	1.45	3.67		13	8								
	9/20/99	7:01	D	1	1370	4.1	8.4	27.30	0.26	1.31	3.64		7	3								

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STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
ACWF18	2/15/92	11:50	ST	4	220	4000	7.4	19	<0.1	<0.5	29		1100	140	7	42	54	24	40	<2	290	70
	2/15/92	14:50																				
	3/5/92	15:30	ST	8	1200	9.7	7.8	33	<0.1	1.9	8.6		17	8	<2	<10	10	<2	<10	<2	40	122
	3/6/92	3:30																				
	3/6/92	6:30	ST	8	650	5200	7.1	45	<0.1	7	26		2800	340	11	90	70	37	70	<2	400	140
	3/7/92	15:30																				
	3/7/92	21:30	ST	8	190	1200	6.9	8.1	0.2	3.3	4.98		500	70	3	20	24	8	20	<2	10	58
	3/9/92	15:30																				
	12/29/92	10:15	ST		380	1200	7.7	17	0.65	5.4	24		2700	240	<20	<30	<20	<2	<40	<10	150	
	2/18/93	14:00	ST	11	420	1500	7.1	40	0.19	4.6	19		2400	280	12	46	43	8.7	38	<4	210	162
	2/19/93	10:00																				
	2/19/93	12:00	ST	11	310	1400	7.5	19	0.2	3.6	18		1900	240	10	16	<30	4.4	19	<4	110	136
	2/20/93	7:40																				
	2/20/93	9:40	ST	12	370	740	7.8	15	0.18	2.7	11		910	140	<7	21	<30	18	17	<4	97	140
	2/21/93	7:40																				
	2/21/93	9:40	ST	12	310	140	7.9	9.5	0.12	0.88	4.2		58	12	<7	<10	<30	3.7	6.2	<4	47	104
	2/22/93	7:40																				
	2/23/93	13:00	ST	8	320	980	7.8	1.7	0.16	0.28	0.63		1200	170	<7	<10	<30	<2	17	<4	160	210
	2/24/93	3:00																				
	2/24/93	5:00	ST	8	580	240	7.6	48	0.17	1.6	6.5		190	30	<7	<10	<30	<2	9.3	<4	110	200
	2/24/93	19:00																				
	2/25/93	9:44	ST	10	520	48	7.8	38	0.18	1.5	4.2		18	11	<7	<10	<30	<2	8	<4	<20	172
	2/26/93	3:44																				
	2/26/93	7:44	ST	3	100	66	7.3	2.7	0.17	0.88	0.96		62	16	<7	<10	<30	6.3	6.5	<4	<20	36
	2/26/93	11:44																				
	2/26/93	13:44	ST	10	470	350	7.4	33	0.13	2	7.3		370	62	<7	<10	<30	3.5	9.9	<4	<20	160
	2/27/93	7:44																				
	2/27/93	9:44	ST	24	600	56	9.5	63	0.19	1.6	5.2		42	14	<7	<10	<30	2.7	6.2	<4	<20	300
	3/1/93	7:44																				
	2/7/94	7:45	ST	3	720	1200	7.8	12	1.2	9.2	22		2700	240	11	<10	<20	5.1	<40	<10	98	316
	2/7/94	11:46																				
	2/7/94	14:15	ST	10	890	760	7.6	23	1.3	5.9	13		1300	130	7.3	<10	<20	10	<40	<10	80	290
	2/8/94	7:45																				
	3/19/94	1:36	ST	3	330	1200	6.9	20	1.2	7.1	19		2200	240	8.7	75	63	49	57	<10	520	120
	3/19/94	5:36																				
	3/19/94	7:36	ST	7	760	1000	6.9	22	0.17	6.8	17		1600	200	8.3	59	60	26	51	<10	280	280
	3/19/94	19:36																				
	3/24/94	17:41	ST	3	420	1000	7.4	16	0.62	2.0	9.5		1800	190	8.3	73	69	40	51	<10	420	144
	3/24/94	21:41																				
	3/25/94	15:41	ST	3	1900	110	7.2	73	0.13	1.4	3.7		200	24	<5	13	<20	4.4	<40	<10	49	388
	3/25/94	19:41																				
	11/15/95	10:20	DT	1	1300	550.0	8.9	4.7	2.10	4.20	4.20		770	150								
	3/12/96	14:30	ST	5	500	1300.0	5.1	16.0	0.79	7.20	11.00		3000	280	7	99	79	47	57	<1	440	254
	3/13/96	2:30																				
	3/13/96	9:30	ST	6	720	120.0	7.5	19.0	0.52	4.20	4.70		160	38	1	12	73	17	21	<1	760	248
	3/14/96	13:30																				
	3/14/96	15:30	ST	23	1100	11.0	7.8	9.4	0.33	1.60	6.20		18	15	<1	<10	45	8	15	<1	130	418
	3/16/96	12:00																				
	3/27/96	12:35	DT	1	1600	37.0	7.5	13.0	0.83	5.80	9.50		26	18								

NEWPORT BAY WATERSHED

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
ACWF18	4/1/96	17:32	ST	5	890	380.0	6.3	27.0	6.60	25.00	8.30		600	150	2	34	440	33	62	1	850	300
	4/1/96	18:32																				
	4/1/96	20:32	ST	23	1700	34.0	7.4	58.0	1.50	7.10	13.00		45	23	1	<10	150	6	27	<1	110	520
	4/3/96	6:32																				
	4/3/96	10:32	ST	21	1800	88.0	7.4	52.0	2.10	6.40	11.00		120	26	2	<10	74	4	19	<1	81	540
	4/5/96	16:00																				
	4/17/96	20:26	ST	5	2000	870.0	7.5	2.1	0.68	8.50	23.00		1400	170	7	50	77	27	43	2	440	710
	4/17/96	21:26																				
	4/17/96	23:26	ST	3	990	410.0	6.7	5.1	1.10	12.00	12.00		1000	140	4	33	110	30	48	1	530	314
	4/18/96	3:26																				
	4/18/96	5:26	ST	35	1700	51.0	7.6	2.2	0.79	5.60	11.00		92	21	1	<10	50	5	25	<1	94	524
	4/21/96	19:26																				
	4/23/96	13:04	S	24	1600	98.0	7.7	16.0	0.33	5.40	23.00		180	57								
	7/24/96	11:30	D	1	1200	18.0	7.7	<0.2	0.58	2.40	3.50		49	16								
	8/27/96	11:20	D	1	1100	4.7	7.5	1.4	0.87	2.00	1.90		13	8								
	9/24/96	11:05	D	1	1200	150.0	7.6	5.3	1.40	4.90	5.40		390	170								
	11/5/96	13:50	DT	1	3600	22.0	6.2	4.5	97	240	560		23	10	5	28	9600	10	32	<1	470	
	12/4/96	13:15	D	1	1400	29.0	7.8	7.2	5.50	6.80	2.90		58	15								
	9/24/97	11:25	D	1	960	72	7.3	2	0.60	2.6	1.1		62	24								
	10/29/97	12:35	D	1	1200	51	7.3	1.0	0.59	2.5	2.2		71	13								
	4/21/98	8:45	D	1	1120	34	7.71	6	0.70	4.6	0.9		29	20								
	6/24/98	10:00	D	1	1230	9.6	7.5	<1.3	0.35	~~2.7~~	2.0		22	10								

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STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
SERF19	8/20/91	11:45	D	26	1600	1.7	8.7	4.8	0.4	2.4	0.8		11	<5								
	8/21/91	13:35																				
	9/17/91	11:30	D	1	1600	8	8.6	5.2	0.2	1.2	1.9		13	8								
	10/15/91	13:00	D	24	1400	5.3	8.9	4.8	1	2.5	1.5		27	8								
	10/16/91	12:00																				
	12/17/91	10:30	D	24	1600	1.2	8.6	18	1.7	1.1	1.8		<5	<5								
	12/18/91	9:30																				
	2/15/92	12:20	ST	4	240	2800	8.0	3.1	0.1	<0.5	84		5100	640	16	69	480	71	100	<2	520	72
	2/15/92	15:20																				
	3/6/92	6:30	ST	11	1000	490	7.6	8.8	<0.1	3.1	2.3		400	60	<2	<10	11	5	<10	<2	50	324
	3/8/92	9:30																				
	4/22/92	12:50	D	1	1400	1.7	8.8	16	2.2	3.3	5.3		190	24								
	5/27/92	12:30	D	1	1500	5.3	9.6	1.9	0.3	2.5	2.1		58	16								
	6/23/92	12:05	D	1	1300	10	9.8	2.1	1.7	5.1	1.7		63	13								
	7/22/92	12:35	D	1	2600	3	10.0	2.3	0.3	1.1	0.8		<5	<5								
	8/26/92	10:30	D	1	1500	3.5	9.2	2.4	0.2	1	1.2		9	9								
	9/23/92	11:10	D	1	1500	10	10.0	0.9	0.2	1.7	1.6		19	8								
	10/28/92	13:20	D	1	1500	82	7.9	7.1	1.2	2.8	2		110	27								
	11/18/92	11:10	D	1	1400	4.7	10.2	7.0	<0.1	1.1	0.7		14	7								
	12/16/92	11:10	D	1	1500	23	8.4	3.5	0.59	1.2	0.87		30	11								
	12/29/92	10:00	ST	1	300	510	8.3	8.4	0.38	2.5	10		1300	150	<20	<30	<20	3	<40	<10	150	
	1/27/93	13:00	D	1	1800	58	8.4	17	0.26	1.1	1.1		100	17								
	2/18/93	12:00	ST	12	250	1400	8.2	3.2	0.19	2.5	14		3500	310	<7	<10	<30	5.1	8.4	<4	66	166
	2/19/93	10:00																				
	2/19/93	12:00	ST	11	250	1000	8.2	1.9	0.18	1.8	10		3000	230	<7	<10	<30	14	8.8	<4	60	98
	2/20/93	8:00																				
	2/23/93	9:00	ST	5	300	950	8.0	1.8	0.22	1.9	8.2		2300	250	<7	17	<30	2.7	16	<4	150	120
	2/23/93	23:00																				
	2/24/93	1:00	ST	5	650	450	8.1	4.2	0.64	1.4	3.4		720	99	<7	<10	<30	2.3	11	<4	110	220
	2/24/93	9:00																				
	2/26/93	14:57	ST	4	240	900	8.0	2.1	0.19	1.8	6.9		1700	230	7.4	<10	<30	3.1	11	<4	<20	128
	2/26/93	20:57																				
	2/26/93	22:57	ST	6	760	350	8.4	6.6	0.17	1.2	2.8		560	88	<7	<10	<30	<2	7	<4	<20	232
	3/1/93	8:07																				
	3/17/93	10:05	D	1	1500	8.8	8.9	8.7	0.13	0.85	0.64		32	<5								
	4/21/93	10:35	D	1	1500	4.4	9.1	5.6	<0.1	1.2	0.75		16	9								
	5/26/93	11:00	D	1	1400	7.2	9.6	0.74	0.14	1.8	0.94		21	10								
	6/9/93	11:00	D	1	1400	8.4	8.8	8.7	<0.1	1.4	1.3		27	6								
	7/14/93	11:05	D	1	1400	4.6	9.9	1.6	<0.1	1.8	0.71		5	<5								
	8/18/93	11:30	D	1	1500	4	10.0	0.21	0.11	1.9	0.34		13	9								
	9/15/93	12:50	D	1	1400	22	9.9	13	0.18	4.0	2.0		<5	<5								
	10/27/93	13:30	D	1	1700	8.1	9.8	1.7	0.28	4.1	1.6		62	20								
	11/17/93	13:30	D	1	1600	1.3	9.3	8.9	<0.1	0.92	1.1		<5	<5								
	2/4/94	13:30	ST	1											<5	<10	<20	8.2	<40	<10	170	84

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STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
BCWG04	7/22/92	9:00	D	1	5500	3.9	7.9	5	<0.1	0.3	2.6		<2	<5								
	9/23/92	8:10	D	1	42000	7.5	7.8	0.9	0.3	0.7	1.2		71	27								
	10/28/92	8:40	DT	1	4100	12	7.5	0.4	0.53	0.9	2.3		97	42	<20	<30	<20	<2	<40	13	30	
	11/18/92	8:45	D	1	5400	5.9	7.8	4.1	0.21	0.56	1.5		15	7								
	9/15/93	8:35	D	1	43000	7.8	7.8	0.72	0.35	0.93	0.51		76	40								
	10/27/93	9:00	DT	1	28000	4.5	7.8	3.9	0.23	0.9	<0.1		65	25	<5	<10	<20	<2	<40	15	31	
	1/18/94	9:00	D	1	5500	1.4	7.9	7.4	<0.1	0.42	1.4		15	<5								
	4/20/94	8:00	D	1	5000	3.4	7.7	6.2	<0.1	0.65	2.3		27	8								

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
F06P06	9/13/99	10:00	D	24	5950	80	8.4	55	<0.05	0.86	0.61		100	30								
	9/14/99	9:00																				
	9/14/99	9:45	D	1	5100	50	8.3	44	0.06	0.96	0.46		41	22								
	9/15/99	10:00	D	24	6250	31	8.3	63	<0.05	1.07	0.55		180	40								
	9/16/99	9:00																				
	9/16/99	10:00	D	18	6040	55	8.3	107.0	0.05	0.70	0.77		76	50								
	9/17/99	3:00																				
	9/17/99	10:00	D	24	5380	130	9.2	76.10	0.09	2.60	2.66		1630	600								
	9/18/99	9:00																				
	9/18/99	10:00	D	24	5290	700	8.8	80.5	0.11	1.65	1.77	0.14	1270	750								
	9/19/99	9:00																				
	9/19/99	10:00	D	24	5970	180	8.2	77.0	0.08	0.95	0.58		236	132								
	9/20/99	9:00																				
	5/12/00	14:45	D	1				210.0														
	6/19/00	10:00	D	24	5250	280	8.5	110.0	<0.05	0.84	0.58	<0.01	350	40								
	6/20/00	9:00																				
	6/20/00	10:00	D	24	4690	99	8.3	110.0	<0.05	0.83	0.49		140	30								
	6/21/00	9:00																				
	6/22/00	10:00	D	5	5910	85	8.2	130.0	<0.05	0.80	0.46		110	37								
	6/22/00	15:00																				
	6/23/00	10:00	D	24	5410	130	8.4	97.0	<0.05	1.60	1.10		180	33								
	6/24/00	10:00	D	24	5820	31	8.2	120.0	<0.05	0.69	0.43		36	12								
	6/24/00	9:00																				
	6/25/00	10:00	D	24	5020	100	8.2	92	<0.05	2.5	1.3		150	32								
	6/26/00	9:00																				
	6/26/00	10:00	D	22	5570	160	8.4	92	<0.05	1.3	1.3	0.047	180	34								
	6/27/00	7:00																				

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STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
MIRF07	9/13/99	10:00	D	24	1170	13.0	8.7	10	<0.05	1	1		39	24								
	9/13/99	13:00	D	6	1030	45.0	9.4	11	<0.05	1	2		100	50								
	9/13/99	18:00																				
	9/14/99	10:00	D	24	1250	4.5	8.9	4.84	0.08	1.28	0.83		25	18								
	9/15/99	9:00																				
	9/15/99	10:00	D	24	1310	17.0	8.8	14.10	0.19	2.76	0.80		48	24								
	9/16/99	9:00																				
	9/16/99	10:00	D	24	1220	9.2	8.7	8.80	0.11	1.87	0.69		25	15								
	9/17/99	9:00																				
	9/17/99	10:00	D	24	1160	4.6	8.7	11.40	0.10	1.3	0.83		19	8								
	9/18/99	9:00																				
	9/18/99	10:00	D	24	1310	3.6	8.5	19.40	0.27	1.26	0.73		14	8								
	9/19/99	9:00																				
	9/19/99	10:00	D	24	1240	3.9	8.9	14.80	0.09	1.33	0.58		11	5								
	9/20/99	9:00																				
	2/16/00	5:32	ST	5	285	55.0	7.5	8.10	0.29	2.40	1.16	0.13	140	110	<1	<8	30	5	4	<2	69	225
	~~2/16/00~~	~~6:32~~	~~SF~~												<1	<8	~~21~~	~~<2~~	<4	~~<2~~	~~23~~	
	2/16/00	10:32	ST	4	270	37.0	7.9	8.30	0.12	1.30	0.78	0.19	54	24	<1	<8	37	5	<4	<2	51	110
	2/16/00	20:32																				
	2/17/00	4:32	S	28	1120	8.1	8.8	7.50	0.46	1.70	0.70	0.19	13	7								
	2/20/00	4:38																				
	3/14/00	10:33	D	24	1640	6.2	8.7	11.00	0.28	3.00	0.58	0.14	100	50								
	3/15/00	9:33																				
	4/5/00	12:30	D	24	1340	13.0	8.8	7.20	<0.05	1.90	0.95	0.08	53	34								
	4/6/00	11:30																				
	5/12/00	13:05	D	1	1280	2.8	9.0	2.80	<0.05	0.48	0.77	0.17	12	6								
	5/12/00	13:05																				
	6/7/00	9:50	D	1	1290	5.7	9.1	4.70	0.21	3.80	1.07	0.45	12	5								
	6/7/00	9:50																				
	6/20/00	10:00	D	24	1210	17.0	8.5	10.00	0.34	2.10	1.10		28	21								
	6/21/00	9:00																				
	6/21/00	10:00	D	24	1380	7.1	8.6	6.60	0.53	4.80	1.32		13	11								
	6/22/00	9:00																				
	6/22/00	10:00	D	24	1360	8.7	8.6	10.00	0.34	2.30	1.32		<10	<1								
	6/23/00	9:00																				
	6/23/00	10:00	D	24	1390	11.0	8.5	13.00	0.22	1.40	1.22		<10	<1								
	6/24/00	9:00																				
	6/24/00	10:00	D	24	1380	5.0	8.5	5.30	0.95	5.50	1.25		<10	<1								
	6/25/00	9:00																				
	6/24/00	10:00	D	24	1390	12.0	8.5	5.30	0.94	5.51	1.19		<10	<1								
	6/25/00	9:00																				
	6/25/00	10:00	D	24	1300	6.5	8.6	2.80	0.77	3.80	1.19		<10	<1								
	6/26/00	9:00																				
	6/26/00	10:00	D	24	1530	6.5	8.5	7.00	0.53	2.40	1.04		10	9								
	6/27/00	9:00																				

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
BARSED	4/18/91	13:30	DT	1	3000	7.8	8.6	98.0	0.10	1.25	1.40		49	16	<2	<6	<4	<2	<10	<2	10	
	7/22/91	14:30	DT	24	3000	2.8	8.4	170.0	0.10	0.50	14.00		12	<5								
	7/23/91	13:15																				
	8/20/91	10:30	D	25	2800	3.5	8.3	79.0	0.10	0.60	0.60		48	23								
	8/21/91	11:20																				
	9/16/91	11:05	D	24	2400	32.0	8.5	58.0	0.10	0.30	1.00		41	10								
	9/17/91	10:25																				
	10/15/91	12:00	D	24	2600	5.5	8.5	74.0	0.50	0.70	0.90		34	7								
	10/16/91	10:50																				
	12/11/91	11:50	ST	1	1900	2.0	8.0	63.0	0.40	0.10	0.10		<5	<5	<20	<30	<20	4	<40	<10	20	510
	12/17/91	9:45	DT	24	2800	1.0	8.3	80.0	0.10	0.50	0.80		<5	<5								
	12/18/91	10:15																				
	2/7/92	16:40	ST	2	370	34.0	7.8	13.0	0.27	0.50	95.00		1100	140	<2	18	50	41	20	<2	230	
	2/7/92	17:20																				
	2/8/92	10:40	ST	14	2400	14.0	8.0	76.0	0.18	0.50	130.00		650	72	<2	10	37	20	10	<2	120	
	2/11/92	10:40																				
	4/21/92	9:05	D	24	3000	0.9	8.1	88.0	0.10	1.00	0.40		19	5								
	4/22/92	9:05																				
	5/26/92	10:15	D	24	3000	1.6	8.2	30.0	0.10	0.80	0.80		<5	<5								
	5/27/92	9:15																				
	6/23/92	11:00	D	1	2700	15.0	8.7	65.0	0.10	1.50	0.60		42	<5								
	7/22/92	11:45	D	1	2600	22.0	8.8	110.0	0.10	0.50	0.80		36	14								
	8/26/92	10:00	D	1	2600	16.0	8.8	68.0	0.10	0.60	1.00		39	12								
	9/23/92	10:30	D	1	2600	13.0	8.8	71.0	0.10	0.78	0.75		29	5								
	10/28/92	12:10	D	1	2700	12.0	8.5	68.0	0.10	0.97	1.20		<20	6								
	11/18/92	10:30	D	1	2800	5.2	8.6	87.0	0.10	0.72	1.10		16	6								
	12/7/92	9:45	ST	1	320	880.0	8.3	4.3	0.44	3.20	7.70		1900	160	<20	<30	<20	24	<40	<10	160	
	12/7/92	13:30	ST	1	430	570.0	8.1	9.3	0.39	1.80	4.40		1200	85	<20	<30	<20	17	<40	<10	96	
	12/7/92	16:15	ST	1	650	650.0	8.0	17.0	0.37	2.40	4.40		1100	140	<20	<30	<20	20	<40	<10	81	
	12/16/92	10:30	DT	1	3300	12.0	8.2	51.0	0.10	0.58	0.40		18	7								
	12/29/92	13:00	ST	1	470	1900.0	7.8	6.5	0.41	3.30	14.00		2800	290	<20	<30	26	16	<40	<10	110	
	1/27/93	12:00	D	1	5300	8.5	8.0	140.0	0.12	0.93	0.10		20	6								
	3/17/93	9:30	D	1	3100	5.3	8.3	97.0	1.20	1.20	1.10		13	<5								
	4/21/93	10:00	D	1	3100	13.0	8.2	83.0	0.10	0.79	0.39		27	6								
	5/26/93	10:00	D	1	2900	13.0	8.5	96.0	0.15	1.10	0.86		27	6								
	7/13/93	11:45	D	24	3000	28.0	8.2	67.0	0.10	1.20	0.58		37	5								
	7/14/93	10:45																				
	8/17/93	13:30	D	22	2200	15.0	8.1	23.0	0.17	0.51	0.10		25	5								
	8/18/93	10:45																				
	9/14/93	13:30	D	23	2200	60.0	8.2	21.0	0.10	1.20	0.78		100	19								
	9/15/93	11:30																				
	10/27/93	11:45	D		2200	12.0	8.4	29.0	0.10	0.93	0.59		23	4								
	11/17/93	12:45	D		2700	1.4	8.3	75.0	0.10	0.42	0.54		12	9								
	1/17/94	10:15	D	24	2500	11.0	8.3	68.0	0.10	0.68	0.58		29	7.0								
	1/18/94	9:15																				

NEWPORT BAY WATERSHED

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
BARSED	1/24/94	20:10	ST	1											<5	12	28	9.4	<40	<10	100	
	1/24/94	22:10	ST	4	590	260.0	8.1	17.0	0.47	2.10	2.40		530	22	<5	11	32	21	<40	<10	150	430
	1/25/94	4:10																				
	1/25/94	6:00	ST	8	1900	22.0	8.0	33.0	0.39	1.20	0.63		46	<5	<5	<10	<20	<2	<40	<10	24	172
	1/25/94	20:10																				
	1/26/94	12:10	ST	12	2100	30.0	8.0	20.0	0.11	1.80	1.30		51	14	<5	<10	<20	2.4	<40	<10	21	830
	1/27/94	10:00																				
	1/27/94	12:10	ST	10	1400	170.0	8.2	21.0	0.34	0.74	1.90		310	46	<5	<10	<20	5.4	<40	<10	100	
	1/28/94	6:10																				
	1/28/94	8:10	ST	6	1900	20.0	8.3	12.0	0.10	0.10	0.30		67	13	<5	<10	<20	<2	<40	<10	190	
	1/28/94	18:10																				
	2/7/94	3:19	ST	3	730	79.0	7.9	16.0	0.63	4.70	2.10		130	24	<5	<10	<20	7.7	<40	<10	47	196
	2/7/94	7:19																				
	2/7/94	9:19	ST	6	290	220.0	8.3	9.8	0.58	3.80	2.20		430	48	<5	<10	20	16	<40	<10	78	332
	2/7/94	19:19																				
	2/8/94	13:19	ST	14	2700	18.0	8.1	14.0	0.10	1.50	1.30		50	<5	<5	<10	<20	<2	<40	<10	41	900
	2/9/94	15:19																				
	2/9/94	15:20	ST	11	3300	13.0	8.3	75.0	0.10	0.17	0.51		35	<5	<5	<10	<20	<2	<40	<10	16	1140
	2/10/94	11:20																				
	2/10/94	13:20	ST	11	3300	5.2	8.3	71.0	0.10	0.17	0.49		27	<5	<5	<10	<20	<2	<40	<10	17	1130
	2/11/94	9:20	SF											<5	<10	<20	<2	<40	<10	<10	<10	1130
	2/17/94	9:30	ST	1	220	120.0	8.5	6.1	0.55	0.91	2.50		370	<5	<5	13	25	21	<40	<10	120	
	2/17/94	12:30	ST	1	320	740.0	8.5	7.8	0.46	3.40	16.00		2900	<10	23	110	110	65	60	<10	500	
	2/17/94	5:31	ST	3	1300	68.0	8.0	25.0	0.23	2.40	1.50		150	15	<5	17	25	9.7	<40	<10	77	374
	2/17/94	9:31																				
	2/17/94	11:31	ST	8	1900	120.0	8.0	24.0	0.27	1.90	1.50		240	16	<5	21	<20	6.7	<40	<10	75	590
	2/18/94	9:31																				
	2/18/94	11:30	ST	5	2500	78.0	7.9	20.0	0.14	1.40	1.30		150	5.0	<5	<10	<20	5.3	<40	<10	41	830
	2/18/94	19:30																				
	2/18/94	21:30	ST	6	1400	160.0	7.8	26.0	0.25	1.90	2.30		230	10	<5	15	<20	12	<40	<10	70	410
	2/19/94	7:30																				
	2/19/94	9:30	ST	11	3300	20.0	8.2	22.0	0.10	1.10	0.77		36	<5	<5	<10	<20	<2	<40	<10	16	944
	2/20/94	5:30																				
	2/20/94	11:30	ST	1											<5	26	22	19	<40	<10	99	
	4/19/94	11:50	DT	11	3000	10.0	8.4	43.0	0.10	1.10	0.20		23	7								
	4/20/94	21:50																				
	5/25/94	10:16	D	24	3300	13.0	8.4	19.0	0.37	1.40	7.30		20	<5								
	5/26/94	9:16																				
	6/30/94	10:10	D	1	2600	3.0	8.3	66.0	0.40	0.86	0.87		16	<5								
	10/25/94	12:30	D	23	2600	32.0	8.4	46.0	0.16	1.30	0.69		140	18								
	10/26/94	8:30																				

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
BARSED	11/8/94	9:00	ST	5	2000	90.0	7.6	40.0	0.67	3.80	1.10		150	23	<1	10	33	7.2	<40	<0.3	88	460
	11/8/94	17:00																				
	11/9/94	9:00	ST	13	2500	75.0	8.3	48.0	0.10	1.10	0.72		56	9	<1	<10	20	7.6	<40	<0.3	62	605
	11/10/94	7:00																				
	11/30/94	10:20			2700	3.0	8.3	51.0	0.13	1.10	0.47		11	<5								
	12/5/94	4:00	ST	3	1500	12.0	7.6	18.0	0.40	3.10	1.40		68	20	2.3	<10	30	5.1	<40	0.54	62	350
	12/5/94	8:00																				
	3/2/95	17:43	ST	3	2700	63.0	7.9	55.0	0.20	3.30	1.40		140	26	<1	<10	5.4	4.3	<40	<1	47	720
	3/2/95	21:43																				
	3/2/95	23:43	ST	17	2100	100.0	7.9	39.0	0.35	2.70	1.50		200	36	<1	<10	30	14	<40	1.1	95	534
	3/4/95	7:43																				
	3/21/95	7:45	ST	2	1600	240.0	7.8	42.0	0.31	2.80	2.20		300	59	<1	<10	30	9.4	<40	1	53	402
	3/21/95	9:45																				
	3/21/95	11:45	ST	20	4100	9.4	8.2	47.0	0.14	1.10	1.20		160	23	<1	<10	15	3.5	<40	1	<10	1230
	3/22/95	5:45																				
	3/23/95	7:45	ST	9	2000	88.0	8.1	31.0	0.15	1.50	2.30		220	32	<1	<10	23	9.5	<40	1	39	436
	3/23/95	23:45																				
	5/16/95	14:15	D	23	3100	20.0	8.4	71.0	0.55	0.83	0.52		34	6								
	5/17/95	13:15																				
	6/13/95	10:45	D	24	2900	22.0	8.2	74.0	0.11	1.60	1.30		250	29								
	6/14/95	9:45																				
	7/25/95	9:00	D	6	2800	2.4	8.6	42.0	0.10	0.74	0.51		25	6								
	7/25/95	14:00																				
	8/29/95	10:00	D	24	2400	61.0	8.5	49.0	0.10	1.10	0.55		76	16								
	8/30/95	9:00																				
	9/19/95	10:40	DT	24	2400	86.0	8.5	78.0	0.10	1.60	0.99		130	30	1	<10	21	7	<40	<1	57	
	9/20/95	9:40																				
	10/24/95	13:20	D	20	2400	48.0	8.4	57.0	0.10	1.50	0.84		40	18								
	10/25/95	8:20																				
	11/14/95	11:15	D	23	2600	27.0	8.3	76.0	0.32	1.20	0.46		53	40								
	11/15/95	9:45																				
	12/5/95	9:00	D	24	2400	8.5	8.2	86.0	0.23	1.60	0.96		95	22								
	12/6/95	8:00																				
	12/12/95	22:48	ST	5	1800	1100.0	7.4	42.0	1.80	20.00	10.00		1300	200	7	58	150	60	63	<1	840	430
	12/12/95	23:48																				
	12/13/95	1:48	ST	13	1300	140.0	7.7	35.0	1.20	5.70	2.20		190	38	<1	15	49	<10	<40	2	140	344
	12/14/95	1:48																				
	12/14/95	11:48	ST	27	2400	6.4	8.3	60.0	0.27	0.62	0.42		15	<6	<1	<10	22	<2	<40	<1	13	732
	12/16/95	21:48																				
	1/19/96	6:18	ST	5	1300	220.0	7.8	48.0	0.58	4.50	2.30		380	69	1	16	46	13	13	<1	140	366
	1/19/96	7:18																				
	1/19/96	9:18	ST	4	1000	51.0	7.9	43.0	0.54	2.50	0.91		66	14	<1	13	25	5	6	<1	42	330
	1/19/96	15:18																				
	1/19/96	17:18	ST	20	2200	10.0	8.2	51.0	0.10	0.74	0.44		20	<6	<1	<10	22	<2	4	<1	56	652
	1/21/96	13:18																				
	1/21/96	15:18	ST	1											<1	<10	28.00	<2	<20	<1	140	348

NEWPORT BAY WATERSHED

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
BARSED	1/31/96	3:51	ST	5	1300	360.0	8.1	33.0	0.20	6.90	2.60		470	71	1	25	49	16	17	2	130	354
	1/31/96	4:51																				
	1/31/96	6:51	ST	8	400	800.0	8.1	18.0	0.10	7.80	6.40		1500	190	7	60	68	36	37	3	310	125
	1/31/96	20:51																				
	1/31/96	22:51	ST	30	2100	110.0	7.8	49.0	0.13	1.60	1.20		140	24	1	<10	25	7	6	3	96	630
	2/3/96	8:51																				
	2/3/96	10:51	ST	10	1600	66.0	7.8	36.0	0.29	2.10	1.10		83	21	1	<10	32	6	8	2	40	476
	2/4/96	4:51																				
	2/13/96	9:25	DT	24	2700	5.3	7.6	67.0	0.18	0.89	0.24		9	6								
	2/14/96	8:25																				
	2/19/96	20:47	ST	5	2000	130.0	7.8	65.0	0.72	5.00	1.60		210	16	<1	<10	26	6	8	<1	91	536
	2/19/96	21:47																				
	2/19/96	23:47	ST	25	590	500.0	7.8	23.0	0.53	3.70	3.50		800	84	2	38	51	<2	<2	<1	200	192
	2/22/96	1:47																				
	2/22/96	3:47	ST	21	3800	24.0	8.4	230.0	0.16	0.50	0.36		31	7	<1	14	<2	<2	<2	<1	<10	1490
	2/23/96	19:47																				
	3/27/96	11:50	D	1	2900	4.4	8.5	94.0	0.11	0.92	0.44		19	7								
	4/23/96	12:05	D	24	2800	30.0	8.6	90.0	0.40	1.30	0.58		57	20								
	4/24/96	11:05																				
	5/29/96	11:50	D	24	3200	15.0	8.7	120.0	0.13	1.20	1.10		75	17								
	5/30/96	10:50																				
	6/20/96	9:00	D	1	2100	50.0	8.0	100.0	1.00	2.50	2.40		150	30								
	7/24/96	10:30	D	24	2400	43.0	8.6	42.0	<0.1	1.40	0.81		8	23								
	7/25/96	9:30																				
	8/27/96	10:30	D	24	2500	33.0	8.4	82.0	0.28	1.30	0.89		77	20								
	8/28/96	9:30																				
	9/25/96	9:50	DT	1	2000	38.0	8.3	59.0	0.14	1.40	0.50		90	13								
	10/30/96	9:55	ST	6											6	68	170	58	63	2	890	380
	10/30/96	11:10	SF												<1	<10	14	2	9	<1	48	
	10/30/96	13:10	ST	7	1100	420.0	7.4	22.0	0.95	4.50	3.90		730	100	2	27	46	23	24	1	240	240
	10/31/96	1:10																				
	10/31/96	3:10	ST	36	2100	65.0	8.5	46.0	0.20	0.85	1.10		92	17	<1	<10	26	4	5	<1	66	722
	11/3/96	1:10																				
	11/5/96	12:20	DT	1	2800	66.0	8.3	71.0	0.12	0.65	0.77		90	11								
	11/21/96	9:59	ST	5	540	530.0	7.6	19.0	1.10	5.80	3.90		970	95	1	38	76	23	27	<1	240	200
	11/21/96	10:59																				
	11/21/96	12:59	ST	10	360	770.0	8.0	11.0	0.42	3.90	5.70		1600	140	2	47	76	35	34	<1	270	122
	11/22/96	6:59																				
	11/22/96	8:59	ST	9	2600	34.0	8.2	120.0	0.17	1.20	0.92		60	17	<1	<10	19	<2	<4	<1	79	1134
	11/23/96	0:59																				
	11/23/96	10:59	ST	23	3300	22.0	8.3	210.0	0.15	0.96	0.86		51	14	2	<10	11	<2	<4	<1	96	1424
	11/25/96	4:59																				

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
BARSED	12/4/96	12:35	D	1	3100	8.9	8.5	110.0	0.32	0.63	0.51		17	<6								
	12/9/96	14:43	ST	4	700	1100.0	7.6	19.0	0.33	5.70	5.90		1800	180	5	55	71	46	41	<1	400	206
	12/9/96	15:28																				
	12/9/96	17:28	ST	6	610	600.0	7.7	15.0	0.15	2.00	2.70		540	56	<1	18	29	18	15	<1	120	184
	12/10/96	3:28																				
	12/10/96	5:28	ST	11	1900	73.0	8.1	48.0	<0.1	1.70	1.10		77	16	<1	<10	15	4	5	<1	43	664
	12/11/96	1:28																				
	12/11/96	3:28	ST	11	430	270.0	7.9	13.0	0.62	1.30	1.70		380	39	<1	16	23	10	12	<1	93	120
	12/11/96	23:28																				
	12/12/96	1:28	ST	20	3300	11.0	8.1	42.0	0.22	1.10	0.60		18	<6	<1	<10	14	<2	6	<1	110	1015
	12/13/96	15:28																				
	1/29/97	10:40	DT	1	4700	15.0	8.0	130.0	<0.1	0.76	0.28		25	9								
	2/11/97	0:54	ST	5	2000	1000.0	8.0	74.0	0.85	9.80	4.70				4	30	83	17	32	1	190	490
	2/11/97	1:54																				
	2/27/97	14:10	D	1	1800	56.0	8.1	77.0	2.90	7.50	0.75		58	17								
	3/12/97	9:20			2900	82.0	8.4	140.0	1.90	3.40	2.00											
	4/15/97	11:00	D	24	2900	72.0	8.3	96.0	<0.5	1.30	1.40		87	14								
	4/16/97	10:00																				
	5/20/97	10:06	D	24	2900	34.0	8.3	100.0	0.46	1.60	1.70		87	20								
	5/21/97	9:06																				
	6/10/97	10:02	D	24	2900	29.0	8.3	94.0	<0.1	1.70	0.87		67	16								
	6/11/97	9:02																				
	7/8/97	10:35	D	1	3000	7.8	8.6	79	<0.1	7.2	3.1		84	22								
	8/15/97	11:15	D	1	2800	29	8.3	92	0.14	1.4	1.4		46	16								
	9/24/97	10:05	D	1	2500	46	8.2	65	<0.1	1.8	1.9		79	24								
	10/29/97	10:30	D	1	2400	64	8.4	53	0.29	2.0	2.3		83	10								
	11/10/97	9:25	SF	5				50				<0.5			<1	<10	48	20	15	<1	280	550
	11/10/97	10:25																				
	11/10/97	12:25	ST	8	1200	300	7.4	29	1.10	6.6	3.2	<0.5	390	84	1	14	44	11	37	<1	290	324
	11/11/97	2:25	SF												<1	<10	29	5	12	<1	170	
	11/11/97	4:25	ST	24	2300	78	8.1	55	<0.1	2.8	1.5	<0.5	96	20	<1	<10	34	6	6	<1	100	720
	11/13/97	2:25	SF												<1	<10	28	4	4	<1	79	
	11/13/97	4:25	ST	13	750	270	7.6	24	0.55	3.5	2.8	<0.5	490	72	<1	15	34	12	9	<1	200	210
	11/14/97	5:45	SF												<1	<10	15	<2	<4	<1	42	
	11/20/97	11:25	DT	1	1200	53	7.9	16	0.22	1.5	0.9	<0.5	64	8								
	11/26/97	9:30	ST	5	1500	1000	7.9	39	0.34	6.1	6.0	<0.5	1600	1300	3	53	96	50	39	<1	550	314
	11/26/97	10:30	SF												<1	<10	8	<2	<4	<1	43	
	11/26/97	12:30	ST	13	970	620	7.6	30	0.32	4.4	5.7	1.2	620	530	3	30	61	27	27	<1	210	274
	11/27/97	18:30	SF												<1	<10	16	<2	<4	<1	36	
	11/27/97	20:30	ST	21	2700	15	8.2	68	<0.1	1.2	0.81	<0.5	23	20	<1	<10	21	<2	13	<1	37	818
	11/30/97	6:30	SF												<1	<10	18	<2	<4	<1	58	

NEWPORT BAY WATERSHED

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
BARSED	12/6/97	3:37	ST	5	240	760	7.9	4.6	0.4	4.7	6	<0.5	1200	1000	3	44	67	38	35	<1	410	50
	12/6/97	4:37	SF												<1	<10	7	<2	<4	<1	39	
	12/6/97	6:37	ST	6	300	3700	7.9	8.1	0.4	11	20	1.3	4400	4000	13	160	150	100	110	<1	850	200
	12/6/97	16:37	SF												<1	<10	9	<2	<4	<1	34	
	12/6/97	18:37	ST	8	430	880	7.8	7.9	0.3	3.8	6.0	1.0	1300	1200	4	44	51	33	39	<1	270	150
	12/7/97	8:37	SF												<1	<10	10	<2	<4	<1	48	
	12/7/97	14:37	ST	6	600	46	7.8	24	<0.1	1.1	0.91	<0.5	78	19	<1	<10	25	3	<4	<1	34	200
	12/8/97	0:37	SF												<1	<10	17	<2	<4	<1	18	
	12/18/97	14:58	ST	5	490	940	7.5	13	0.55	5.3	5.20	<0.5	1700	190	3	42	93	43	35	<1	380	144
	12/18/97	15:58	SF												<1	<10	16	<2	<4	<1	<10	
	12/18/97	17:58	ST	6	730	1400	7.7	27	0.70	4.1	5.90	1.10	1500	170	4	49	80	28	32	<1	240	230
	12/19/97	9:58	SF												<1	<10	19	<2	<4	<1	<10	
	12/19/97	11:58	ST	33	3900	21	8.2	9.1	<0.5	0.90	0.62		25	12	<10	<10	17	<2	<4	<1	25	1208
	12/22/97	13:58	SF												<10	<10	15	<2	<4	<1	53	
	1/9/98	13:38	ST	5	1700	140	8.0	19	<0.5	2.8	1.20	<0.5	210	44	<10	<10	44	11	9.0	<1	280	500
	1/9/98	14:38	SF												<10	<10	13	<2	<4	<1	220	
	1/9/98	16:38	ST	19	560	780	7.8	18	<0.5	3.3	4.80	0.68	1100	140	3	32	48	26	23	<1	32	145
	1/11/98	4:38	SF												1	19	34	15	12	<1	19	
	1/11/98	4:38	ST	28	2500	23	8.1	70	<0.5	1.3	0.63	<0.5	48	12	<1	<10	22	2	<4	<1	120	756
	1/13/98	12:38	SF												<1	<10	22	<2	<4	<1	160	
	2/14/98	9:36	ST	5	2000	300	8.0	53	<0.5	2.3	2.10		620	87	1	20	50	18	15	<1.00	86	440
	2/14/98	10:36	SF												<1.00	3	20	2	8	<1.00	7	
	2/14/98	12:36	ST	7	280	1500	8.1	11	<0.5	2.2	6.20		2600	270	5	55	70	46	33	<1.00	126	60
	2/15/98	0:36	SF												<1.00	3	14	1	2	<1.00	9	
	3/25/98	9:22	ST	5	442	470	7.79	16	0.2	3.3	0.60		1390	104	3	26	76	37	22.0	4.60	178	140
	3/25/98	10:22	SF												<1.00	4	36	1	4.50	<1.00	39	
	3/25/98	12:22	ST	6	438	790	7.62	21	0.5	4.1	1.20		43	125	4	33	52	31	24	<1.00	140	100
	3/25/98	22:22	SF												<1.00	3	15	4.00	4	<1.00	29	
	3/26/98	12:22	ST	20	2930	40	8.41	72	0.1	<1.0	0.90		28	2	<1.00	4	23	3.80	5	<1.00	37	904
	3/28/98	2:22	SF												<1.00	3	12	1.30	6	<1.00	24	
	3/28/98	4:22	ST	16	1620	81	8.31	34	0.2	1.5	2.10		112	7	<1.00	7.10	15	5	6.10	<1.00	35	478
	3/29/98	10:22	SF												<1.00	3	11	<1.00	7	<1.00	25.0	
	4/20/98	13:40	D	23	2470	6.1	8.28	76	0.2	1.1	0.60		9	1								
	4/21/98	11:40																				
	6/23/98	13:10	D	1	2460	4.4	8.8	92	0.1	1.3	1.10		16	2								
	7/15/98	9:15	D	24	2810	12	8.5	110	<0.05	1.7	0.38		40	10								
	7/16/98	8:15																				
	8/17/98	8:55	D	24	2690	19	8.2	66	0.05	2.50	1.32		52	12								
	8/18/98	7:55																				
	9/8/98	12:05	D	15	3020	21	8.3	66	0.18	0.42	0.95		70	28								
	9/9/98	3:05																				
	10/13/98	8:33	D	24	2250	34	8.4	66	0.27	2.17	1.62		98	13								
	10/14/98	7:33																				
	11/3/98	11:22	D	24	2400	22	8.3	53	0.07	1.21	1.01		78	18								
	11/4/98	10:22																				

NEWPORT BAY WATERSHED

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
BARSED	11/8/98	3:23	ST	5	1120	200	7.5	25	0.35	9.60	6.43		880	260	2	27	57	32	20	<2	280	290
	11/8/98	4:23	SF												1	14	30	13	11	<2	123	
	11/8/98	6:23	ST	11	1410	170	7.6	38	0.64	4.07	6.12		700	200	2	21	37	16	14	<2	162	380
	11/9/98	2:23	SF												<1	<8	13	<2	4	<2	12	
	11/9/98	4:23	ST	36	2240	27	8.4	46	0.22	1.40	0.80		76	22	<1	<8	16	3	<4	<2	32	740
	11/12/98	2:23	SF												<1	<8	12	<2	<4	<2	10	
	11/28/98	5:30	ST	5	605	260	7.9	10	0.09	3.72	5.66		1020	170	3	29	63	53	21	<2	386	182
	11/28/98	6:30	SF												<1	<8	12	<2	<4	<2	11	
	11/28/98	8:30	ST	13	1270	185	7.7	43	0.23	4.03	5.08		710	110	3	21	34	19	15	<2	164	376
	11/29/98	8:30	SF												<1	<8	12	<2	<4	<2	15	
	11/29/98	10:30	ST	26	2750	18	8.3	67	<0.05	1.84	1.59		50	12	6	9	29	9	9	<2	94	935
	12/1/98	12:30	SF												<1	<8	18	<2	<4	<2	<10	
	12/1/98	14:30	ST	10											3	26	45	33	19	<2	249	235
	12/2/98	8:30	SF												<1	<8	13	<2	9	<2	<10	
	12/8/98	10:11	D	24	3170	17	8.4	121	0.06	0.70	0.83		34	2								
	12/9/98	9:11																				
	1/5/99	9:27	D	24	2730	5	8.7	87	0.31	1.17	1.04		32	22								
	1/6/99	8:27																				
	1/25/99	4:00	S	5	1010	140	8.0	34	0.12	3.60	2.72		390	50								
	1/25/99	5:00	S																			
	1/25/99	7:00	S	12	1290	90	7.9	43	0.24	2.25	2.45		380	110								
	1/26/99	5:00	S																			
	1/26/99	19:00	S	8	3530	120	8.2	92	0.11	1.16	0.73		250	32								
	1/27/99	7:00																				
	1/27/99	9:16	S	10	4360	26	8.1	135	0.05	0.74	0.52		70	18								
	1/29/99	3:16																				
	2/2/99	9:35	D	24	1590	21	8.2	62	0.07	0.77	0.86		53	10								
	2/3/99	8:35																				
	2/9/99	17:04	ST	5	1260	240	8.0	38	0.07	3.58	2.48		390	132	1	18	42	29	14	<2	183	470
	2/9/99	18:04	SF												<1	<8	12	<2	4	<2	17	
	2/9/99	20:04	ST	9	1870	300	8.0	41	0.05	6.37	5.51		460	150	4	32	73	45	26	<2	353	282
	2/10/99	12:04	SF												<1	<8	19	2	6	<2	28	
	2/10/99	14:04	ST	38	2770	38	8.1	77	0.57	1.92	1.38		130	26	<1	9	25	8	7	<2	80	850
	2/13/99	16:04	SF												<1	<8	16	<2	7	<2	26	
	3/1/99	12:39	D	24	2880	9.3	8.5	116	2.51	3.51	1.19		58	24								
	3/2/99	11:39																				
	3/11/99	10:02	ST	5	1590	340	8.2	29	0.07	6.24	4.07		720	200	3	32	89	55	25	<2	481	444
	3/11/99	11:02	SF												<1	<8	19	<2	<4	<2	15	
	3/11/99	13:02	ST	6	2110	76	8.1	69	1.42	4.21	1.41		190	34	<1	<8	40	6	6	<2	74	706
	3/11/99	23:02	SF												<1	<8	17	<2	<4	<2	17	
	3/12/99	2:02	ST	40	2900	12	8.3	97.7	0.59	1.42	2.45		43	11	<1	<8	24	<2	<4	<2	32	900
	3/15/99	4:01	SF												<1	<8	18	<2	<4	<2	14	

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STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
BARSED	3/15/99	10:36	ST	5	630	350	7.7	25.1	1.19	9.92	3.06		1410	220	4	37	79	36	25	<2	374	205
	3/15/99	11:36	SF												<1	8	16	4	5	<2	69	
	3/15/99	13:36	S	2				37	1.34	4.51	1.87											
	3/15/99	15:36																				
	3/15/99	17:36	ST	45	2330	16	8.3	79	0.27	0.97	0.73		23	9	<1	<8	18	<2	<4	<2	20	768
	3/19/99	10:36	SF												<1	<8	14	<2	<4	<2	15	
	4/27/99	11:29	D	24	2320	7.8	9.1	103	0.42	2.24	0.92		34	20								
	4/28/99	10:29																				
	5/4/99	10:50	D	24	2560	9.1	8.5	82.3	0.27	1.92	1.17		26	10								
	5/5/99	9:50																				
	6/17/99	15:15	D	1	1910	3.8	9.1	55.4	0.05	1.16	0.49		17	8								
	7/19/99	13:58	D	24	2330	8	8.4	15.8	0.11	1.03	0.73		23	12								
	7/20/99	12:58																				
	7/20/99	11:30	D	24	2080	26.0	8.4	38.2	0.06	0.49	0.31		57	22								
	7/22/99	9:30																				
	7/22/99	12:01	D	24	2240	56.0	8.3	5.4	1.10	0.27	1.27		130	32								
	7/26/99	8:01																				
	9/13/99	10:00	D	6	2100	29.0	8.8	35.2	<0.05	0.98	0.52	0.11	47	45								
	9/13/99	15:00																				
	9/13/99	16:00	D	6	2070	38.0	8.6	32.1	<0.05	0.92	0.49	0.10	51	12								
	9/13/99	21:00																				
	9/13/99	22:00	D	6	2190	27.0	8.2	39.2	<0.05	0.91	0.40	0.10	42	16								
	9/14/99	3:00																				
	9/14/99	4:00	D	6	2290	36.0	8.3	42.7	<0.05	1.12	0.58	0.13	60	18								
	9/14/99	9:00																				
	9/14/99	10:00	D	6	2240	35.0	8.8	40.9	<0.05	1.01	0.55	0.08	65	25								
	9/14/99	15:00																				
	9/14/99	16:00	D	6	2340	20.0	8.6	37.4	<0.05	0.85	0.28	0.07	31	16								
	9/14/99	21:00																				
	9/14/99	22:00	D	6	2440	22.0	8.2	44.0	<0.05	0.83	0.25	0.07	32	17								
	9/15/99	3:00																				
	9/15/99	4:00	D	6	2380	23.0	8.2	48.4	<0.05	0.82	0.37	0.08	33	13								
	9/15/99	9:00																				
	9/15/99	10:00	D	6	2480	27.0	8.6	41.4	<0.05	1.13	0.48	0.12	89.6	23								
	9/15/99	15:00																				
	9/15/99	16:00	D	6	2400	35.0	8.5	37.8	<0.05	1.10	0.35	0.06	56.8	28								
	9/15/99	21:00																				
	9/15/99	22:00	D	6	2450	36.0	8.2	42.7	<0.05	1.00	0.40	0.12	52.8	19								
	9/16/99	3:00																				
	9/16/99	4:00	D	6	2410	21.0	8.2	40.5	<0.05	1.18	0.67	0.09	66.4	20								
	9/16/99	9:00																				
	9/16/99	10:00	D	6	2270	45.0	8.6	32.1	<0.05	1.75	0.60	0.13	72	29								

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
BARSED	9/16/99	15:00																				
	9/16/99	16:00	D	6	2310	36.0	8.6	34.4	<0.05	1.21	0.43	0.11	56	17								
	9/16/99	21:00																				
	9/16/99	22:00	D	6	2470	34.0	8.2	41.3	<0.05	1.16	0.37	0.09	38	15								
	9/17/99	3:00																				
	9/17/99	4:00	D	6	2350	38.0	8.2	40.3	<0.05	1.29	0.53	0.13	65	52								
	9/17/99	9:00																				
	9/17/99	10:00	D	6	2280	45.0	8.6	52.8	<0.05	1.04	0.64	0.15	75	44								
	9/17/99	15:00																				
	9/17/99	16:00	D	6	2430	60.0	8.4	55.9	<0.05	1.15	0.37	0.06	98	46								
	9/17/99	21:00																				
	9/17/99	22:00	D	6	2470	36.0	8.2	63.8	<0.05	0.94	0.43	0.10	60	46								
	9/18/99	3:00																				
	9/18/99	4:00	D	6	2350	40.0	8.2	75.7	<0.05	0.99	0.64	0.13	73	26								
	9/18/99	9:00																				
	9/18/99	10:00	D	6	2310	37.0	8.6	44.9	<0.05	1.46	0.83	0.15	65	35								
	9/18/99	15:00																				
	9/18/99	16:00	D	6	2290	30.0	8.4	37.0	0.05	1.38	0.58	0.17	52	40								
	9/18/99	21:00																				
	9/18/99	22:00	D	6	2260	29.0	8.2	35.2	0.17	1.40	0.70	0.19	47	26								
	9/19/99	3:00																				
	9/19/99	4:00	D	6	2310	39.0	8.2	39.6	0.14	1.28	0.92	0.22	66	39								
	9/19/99	9:00																				
	9/19/99	10:00	D	6	2340	28.0	8.8	73.0	<0.05	1.08	0.83	0.18	64	23								
	9/19/99	15:00																				
	9/19/99	16:00	D	6	2240	25.0	8.6	71.3	<0.05	1.09	0.61	0.10	68	52								
	9/19/99	21:00																				
	9/19/99	22:00	D	6	2430	32.0	8.2	71.3	<0.05	1.01	0.58	0.13	56	27								
	9/20/99	3:00																				
	9/20/99	4:00	D	6	2440	32.0	8.2	77.9	<0.05	0.79	0.70	0.15	58	20								
	9/20/99	9:00																				
	9/20/99	10:00	D	20	2450	50.0	8.5	71.3	<0.05	1.37	0.58	0.13	80	62								
	9/21/99	5:00																				
	9/21/99	10:00	D	24	1980	85.0	8.4	35.6	0.12	0.98	0.98	0.14	150	63								
	9/22/99	9:00																				
	9/22/99	10:00	D	24	2400	23.0	8.4	40.0	0.06	2.17	1.07		170	90								
	9/23/99	9:00																				
	9/23/99	10:00	D	24	2660	120.0	8.4	46.6	0.10	1.92	0.98	0.23	190	98								
	9/24/99	9:00																				
	1/25/00	9:45	ST	1											6	54	140	63	40	<2	601	172
	1/25/00	9:45	SF												<1	<8	15	4	9	<2	44	228
	2/10/00	13:26	ST	2	1700	60.0	8.3	58.0	0.05	3.60	2.75	0.54	120	104								
	2/10/00	14:26	SF																			
	2/10/00	15:26	ST	10	1150	250.0	7.8	34.0	0.42	2.60	3.27	0.34	430	230	2	15	50	21	11	<2	204	296
	2/11/00	0:26	SF												<1	<8	13	<2	<4	<2	20	

NEWPORT BAY WATERSHED

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
BARSED	2/11/00	10:00	ST	5	1550	45.0	7.9	66.0	0.07	1.80	2.11	0.56	63	50	<1	<8	20	2	<4	<2	45	595
	2/11/00	18:00	SF												<1	<8	13	<2	<4	<2	22	
	2/16/00	7:10	ST	2	970	320.0	7.8	31.0	0.13	3.50	3.55	0.17	1980	830	2	19	46	22	14	<2	215	340
	2/16/00	8:10	SF																			
	2/16/00	9:10	ST	4	755	210.0	7.7	19.0	0.31	2.00	2.23	0.29	350	140	1	12	32	13	10	<2	120	248
	2/16/00	12:10	SF												<1	<8	16	4	<4	<2	48	
	2/17/00	8:40	D	17	2130	31.0	8.1	66.0	<0.05	1.20	1.01	0.23	58	34								
	2/18/00	22:13																				
	2/27/00	15:57	ST	5	1620	220.0	7.9	39.0	<0.05	2.00	2.02	0.10	410	260	<1	<8	33	6	5	<2	66	635
	2/27/00	16:57	SF												<1	<8	20	<2	<4	<2	13	
	2/27/00	18:57	ST	8	1300	75.0	7.9	31.0	0.07	1.30	0.98	0.15	140	60	<1	<8	31	8	5	<2	84	445
	2/28/00	8:57	SF												<1	<8	17	<2	<4	<2	21	
	2/29/00	9:57	ST	28	2030	17.0	8.3	65.0	<0.05	0.73	0.58	0.16	31	19	<1	<8	18	2	<4	<2	35	375
	3/2/00	17:46	SF												<1	<8	12	<2	<4	<2	20	
	3/3/00	20:46	ST	3	635	500.0	7.6	22.0	0.66	4.10	4.28	0.11	900	500								
	3/3/00	21:46	SF																			
	3/3/00	1:16	ST	8	1320	100.0	7.7	47.0	1.01	2.20	2.11	0.34	210	100								
	3/4/00	15:16	SF																			
	3/4/00	17:16	D	10	870	130.0	7.7	27.0	0.47	1.50	1.93	0.30	250	180								
	3/5/00	17:16																				
	3/5/00	13:16	ST	9	745	330.0	7.7	22.0	0.28	2.20	3.37	0.41	570	410								
	3/6/00	5:16	SF																			
	3/6/00	7:16	ST	23	2310	29.0	8.2	69.0	<0.05	0.99	0.92	0.23	42	24								
	3/8/00	3:16	SF																			
	3/8/00	5:16	ST	10	685	300.0	7.9	18.0	0.08	1.60	2.60	0.22	390	80								
	3/9/00	23:16	SF																			
	3/14/00	9:30	D	24	3110	7.6	8.3	77.0	0.37	2.40	0.15	0.08	<4	<1								
	3/15/00	8:30																				
	3/28/00	9:16	D	24	2820	7.0	8.6	110.0	1.15	1.80	0.92	0.16	42	20								
	3/29/00	8:16																				
	4/4/00	12:27	D	22	2840	21.0	8.7	140.0	2.05	3.40	2.26	0.57	56	28								
	4/5/00	9:27																				
	4/17/00	15:32	S	5	1200	375.0	7.8	37.0	0.12	14.00	7.65		1460	1110								
	4/17/00	16:32																				
	4/17/00	18:32	S	3	400	194.0	7.4	24.0	<0.05	3.60	3.98		460	200								
	4/17/00	22:32																				
	4/18/00	0:32	D	3				46.0	<0.05	1.10	2.30											
	4/18/00	4:32																				
	4/18/00	6:32	S	8				46.0	<0.05	1.90	3.67	0.39										
	4/18/00	20:32																				
	4/18/00	22:32	D	27	2460	16.0	8.4	93.0	0.20	0.64	1.50	0.28	70	40								
	4/21/00	16:32																				
	5/4/00	11:15	D	24	2410	16.0	8.4	190.0	10.60	9.40	3.98	0.90	44	16								
	5/5/00	10:15																				
	5/11/00	10:40	D	1	2640	12.0	8.4	130.0	2.85	5.00	2.36	0.66	32	14								
	5/11/00	10:40																				

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
BARSED	6/6/00	10:09	D	24	2490	16.0	8.6	54.0	<0.05	1.80	0.70	0.12	66	48								
	6/7/00	9:19																				
	6/19/00	11:00	D	5	2350	27.0	8.6	44.0	0.07	1.40	0.73	0.09	50	20								
	6/19/00	15:00																				
	6/19/00	16:00	D	6	2310	13.0	8.7	48.0	<0.05	0.83	0.70	0.15	25	17								
	6/19/00	21:00																				
	6/19/00	22:00	D	6	2360	13.0	8.3	44.0	0.06	1.30	0.80	0.18	21	16								
	6/20/00	3:00																				
	6/20/00	4:00	D	6	2400	27.0	8.3	44.0	0.05	1.10	0.80	0.13	61	25								
	6/20/00	9:00																				
	6/20/00	10:00	D	6	2170	30.0	8.6	37.0	<0.05	1.20	0.98	0.12	72	23								
	6/20/00	15:00																				
	6/20/00	16:00	D	3				38.0	<0.05	0.77	0.67	0.12										
	6/20/00	18:00																				
	6/21/00	10:00	D	6	2480	23.0	8.5	44.0	<0.05	0.63	0.58	0.10	44	16								
	6/21/00	15:00																				
	6/21/00	16:00	D	6	2440	32.0	8.5	48.0	<0.05	0.70	0.70	0.13	41	12								
	6/21/00	21:00																				
	6/21/00	22:00	D	6	2530	6.2	8.3	44.0	<0.05	0.60	0.70	0.16	<10	<1								
	6/22/00	3:00																				
	6/22/00	4:00	D	6	2610	4.0	8.2	48.0	0.05	0.71	0.67	0.14	<10	<1								
	6/22/00	9:00																				
	6/22/00	10:00	D	6	2690	11.0	8.5	42.0	<0.05	0.87	0.55	0.10	<10	<1								
	6/22/00	15:00																				
	6/22/00	16:00	D	6	2400	23.0	8.4	40.0	<0.05	1.10	0.61	0.10	12	12								
	6/22/00	21:00																				
	6/22/00	22:00	D	6	2700	6.9	8.2	40.0	<0.05	0.80	0.70	0.15	<10	<1								
	6/23/00	3:00																				
	6/23/00	4:00	D	6	2740	9.5	8.1	42.0	0.06	1.10	0.70	0.13	14	10								
	6/23/00	9:00																				
	6/23/00	10:00	D	6	2590	7.5	8.5	44.0	<0.05	0.87	0.46	0.09	13	2								
	6/23/00	15:00																				
	6/23/00	16:00	D	6	2570	9.7	8.5	30.0	<0.05	0.89	0.52	0.11	<10	<1								
	6/23/00	21:00																				
	6/23/00	22:00	D	6	2620	9.7	8.2	44.0	<0.05	4.00	0.64	0.13	13	6								
	6/24/00	3:00																				
	6/24/00	4:00	D	6	2580	50.0	8.3	44.0	0.05	0.98	0.77	0.14	41	10								
	6/24/00	9:00																				
	6/24/00	10:00	D	6	2530	11.0	8.0	33.0	<0.05	1.30	0.49	0.11	15	6								
	6/24/00	15:00																				
	6/24/00	16:00	D	6	2470	9.3	8.6	28.0	<0.05	1.40	0.67	0.17	11	9								
	6/24/00	21:00																				
	6/24/00	22:00	D	6	2490	10.3	8.2	31.0	<0.05	0.98	0.64	0.16	18	13								
	6/25/00	3:00																				
	6/25/00	4:00	D	6	2600	6.5	8.2	40.0	0.06	1.10	0.58	0.15	<10	<1								
	6/25/00	9:00																				
	6/25/00	10:00	D	6	2570	7.6	8.5	44.0	<0.05	1.50	0.52	8.10	<10	<1								
	6/25/00	15:00																				
	6/25/00	16:00	D	6	2600	8.6	8.5	44.0	<0.05	1.30	0.67	0.14	<10	<1								
	6/25/00	21:00																				

NEWPORT BAY WATERSHED

STATION	DATE	TIME	SAMPLES Type	#	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
BARSED	6/25/00	22:00	D	6	2650	8.4	8.2	44.0	<0.05	1.10	0.67	0.17	11	9								
	6/26/00	3:00																				
	6/26/00	4:00	D	6	2710	14.0	8.2	48.0	<0.05	0.76	0.67	0.16	13	7								
	6/26/00	9:00																				
	6/26/00	10:00	D	6	2490	36.0	8.5	48.0	<0.05	1.10	0.77	<0.01	43	13								
	6/26/00	15:00																				
	6/26/00	16:00	D	3	2460	15.0	8.6	44.0	0.13	0.70	0.73	0.09	23	15								
	6/26/00	18:00																				
	6/26/00	23:00	D	5	2510	12.0	8.2	41.0	0.07	0.61	0.73	0.15	15	7								
	6/27/00	3:00																				
	6/27/00	4:00	D	6	2580	15.0	8.2	44.0	0.06	0.94	0.67	0.13	20	1								
	6/27/00	9:00																				

NEWPORT BAY WATERSHED

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
SAFF10	5/19/99		D	1				71														
	6/2/99	10:40	D	1				3														
	6/7/99	11:11	D	1				14														
	6/16/99	9:00	D	1				23														
	6/21/99	11:20	D	1				26	<0.05	0.34	0.20											
	7/2/99	9:30	D	1				57														
	7/7/99	9:10	D	1				57														
	7/14/99	10:30	D	1				54														
	7/20/99	12:22	D	1				41														
	8/16/99	11:30	D	1				57														
	8/23/99	14:40	D	1				64														
	9/13/99	10:00	D	24	1310	9.0	8.0	36	<0.05	0.58	0.37		23	16								
	9/14/99	9:00																				
	9/13/99	10:00	D	24	1320	9.6	8.0	34	<0.05	0.48	0.34		19	8								
	9/14/99	9:00																				
	9/14/99	10:00	D	24	1770	3.8	8.0	57	<0.05	0.43	0.25		11	5								
	9/15/99	9:00																				
	9/15/99	10:00	D	24	2080	3.8	8.0	62	<0.05	0.73	0.17		16	12								
	9/16/99	9:00																				
	9/16/99	10:00	D	24	2060	2.6	7.9	113	<0.05	0.68	0.29		10	3								
	9/17/99	9:00																				
	9/17/99	10:00	D	24	1980	3.6	7.9	83	<0.05	0.62	0.23		12	8								
	9/18/99	9:00																				
	9/18/99	10:00	D	24	2000	3.1	7.9	92	<0.05	0.6	0.28		10	5								
	9/19/99	9:00																				
	9/19/99	10:00	D	24	1970	13.0	8.0	90	<0.05	0.66	0.40		37	12								
	9/20/99	9:00																				
	5/12/00	14:00	D	1				68														
	6/20/00	10:00	D	24	1790	2.1	7.9	66	<0.05	0.23	0.15		<10	<1								
	6/21/00	9:00																				
	6/21/00	10:00	D	24	2190	1.1	7.9	66	<0.05	0.47	0.12		<10	<1								
	6/22/00	9:00																				
	6/22/00	10:00	D	24	2120	1.1	7.9	66	<0.05	0.36	0.09		<10	<1								
	6/23/00	9:00																				
	6/23/00	10:00	D	24	2080	3.5	7.9	17	<0.05	0.50	0.12		<10	<1								
	6/24/00	9:00																				
	6/24/00	10:00	D	24	2090	6.9	7.9	57	<0.05	0.59	0.15		<10	<1								
	6/25/00	9:00																				
	6/25/00	10:00	D	24	2060	3.6	7.8	66	<0.05	0.72	0.21		<10	<1								
	6/26/00	9:00																				
	6/26/00	10:00	D	24	2010	4.6	7.8	62	<0.05	0.26	0.21		<10	<1								
	6/27/00	9:00																				

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
MSHF16	9/14/99	5:50	D	1	990	0.6	7.7	<0.44	<0.05	0.23	0.46		4	2								
	9/15/99	6:13	D	1	680	1.0	7.7	<0.44	<0.05	0.4	0.55		<4	<1								
	9/16/99	6:25	D	1	945	0.6	7.7	1.54	<0.05	0.40	0.45		<4	<1								
	9/17/99	6:22	D	1	905	0.2	7.7	<0.44	<0.05	0.4	0.45		<4	<1								
	9/18/99	6:26	D	1	920	0.3	7.6	1.45	<0.05	0.50	1.32		<4	<1								
	9/19/99	6:35	D	1	930	1.4	7.7	<0.44	<0.05	0.54	0.61		11	7								
	9/20/99	6:28	D	1	1430	0.2	7.6	174	<0.05	1.2	0.34		<4	<1								

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
USHPCW	9/13/99	10:00	D	24	1720	100	8.6	12.30	<0.05	0.98	1.16		180	56								
	9/14/99	9:00																				
	9/14/99	10:00	D	24	1720	34	8.6	7.04	<0.05	0.79	0.80		120	20								
	9/15/99	9:00																				
	9/15/99	10:00	D	24	1800	85	8.6	36.70	1.30	2.58	1.89		160	54								
	9/16/99	9:00																				
	9/16/99	10:00	D	13	1600	120	8.6	8.10	0.29	1.55	1.31		250	142								
	9/17/99	9:00																				
	9/17/99	10:00	D	24	1600	110	8.5	7.92	0.11	1.68	1.55		200	92								
	9/18/99	9:00																				
	9/17/99	10:00	D	5	1400	200	8.6	15.40	0.19	2.32	1.68		330	200								
	9/17/99	14:00																				
	9/18/99	10:00	D	24	1700	100	8.5	15.90	0.21	1.81	1.68		210	148								
	9/18/99	9:00																				
	9/18/99	10:00	D	7	1420	250	8.6	12.80	0.24	2.07	2.66		370	212								
	9/18/99	16:00																				
	9/18/99	3:00	D	7	1680	45	8.4	15.40	0.18	1.13	1.35		130	90								
	9/19/99	9:00																				
	9/19/99	10:00	D	24	1810	19	8.5	9.24	0.31	0.95	1.19		62	30								
	9/20/99	9:00																				
	5/12/00	10:43	D	1				5.10														
	6/19/00	10:00	D	24	1530	5	8.7	3.20	<0.05	1.30	0.61		16	14								
	6/20/00	9:00																				
	6/20/00	10:00	D	24	1360	5	8.6	5.80	<0.05	1.30	0.46		<10	<1								
	6/21/00	9:00																				
	6/21/00	10:00	D	24	1700	7	8.4	2.20	<0.05	1.30	0.55		12	10								
	6/22/00	9:00																				
	6/22/00	10:00	D	24	1640	4	8.5	1.50	<0.05	0.91	0.37		<10	<1								
	6/23/00	9:00																				
	6/23/00	10:00	D	24	1590	13	8.5	2.50	0.12	1.10	0.64		14	10								
	6/24/00	9:00																				
	6/24/00	10:00	D	24	1570	21	8.6	2.00	0.06	1.40	0.89		27	17								
	6/25/00	9:00																				
	6/25/00	10:00	D	24	1600	15	8.5	1.80	0.06	1.30	0.61		<10	<1								
	6/26/00	9:00																				
	6/26/00	10:00	D	24	1560	8	8.6	2.00	0.12	1.50	0.80		13	8								
	6/27/00	9:00																				

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
WYLSED	6/19/91	13:00	D	1				80														
	7/22/91	14:45	D	24	2100	0.4	8.0	13	0.10	3.80	3.80		<5	<5								580
	7/23/91	13:45																				
	8/20/91	10:30	D	25	2000	0.5	8.1	64	0.10	1.30	2.10		<5	<5								
	8/20/91	10:30																				
	9/16/91	11:30	D	24	1900	1.8	8.8	100	0.10	0.60	2.00		<5	<5								
	9/17/91	10:30																				
	10/15/91	12:20	D	23	1800	2.3	8.4	74	0.10	1.40	3.60		16	8								
	10/16/91	10:20																				
	11/12/91	11:50	D	1	1900	1.2	9.0	140	0.10	0.50	1.40		12	7								
	12/11/91	12:15	S	1	1400	9.0	8.1	18	0.10	3.40	74.00		<5	<5								
	12/17/91	10:30	D	24	1800	0.9	8.3	74	0.30	0.50	59.00		<5	<5								
	12/18/91	9:30																				
	4/21/92	9:15	D	24	1700	0.2	8.2	67	0.10	1.20	1.30		19	<5								
	4/22/92	8:15																				
	5/27/92	11:15	D	1	2100	1.0	8.4	57	0.10	1.10	0.50		<5	<5								
	6/23/92	11:20	D	1	2000	2.1	9.0	91	0.10	1.00	0.30		65	<5								
	7/22/92	12:00	D	1	1600	4.2	8.9	95	0.10	0.60	0.90		8	8								
	8/26/92	10:10	D	1	1900	1.4	8.8	57	0.10	0.60	3.20		16	7								
	9/23/92	10:40	D	1	1600	2.4	8.3	41	0.10	1.10	0.49		<5	<5								
	10/28/92	12:25	D	1	1500	2.6	7.9	42	0.16	2.00	2.20		<5	<5								
	11/18/92	10:45	D	1	2100	1.6	8.4	82	0.10	0.47	0.73		<5	<5								
	12/7/92	11:00	ST	1	300	2000	8.1	0.5	0.56	4.50	14.00		5500	660	26	<30	<20	18	<40	<10	160	
	12/7/92	14:30	ST	1	340	1400	8.1	10	0.46	3.80	11.00		3800	400	<20	<30	<20	11	<40	<10	96	
	12/7/92	17:15	ST	1	430	1500	7.9	8	0.47	3.70	12.00		4400	450	<20	<30	<20	14	<40	<0.0	81	
	12/16/92	10:40	D	1	1500	180	8.2	17	0.10	1.20	1.80		210	25								
	12/29/92	15:00	ST	1	300	3100	8.1	3.8	0.50	4.00	19.00		7600	810	<20	<30	<20	11	<40	<10	97	
	1/27/93	12:10	DT	1	1400	35.0	8.2	23	0.29	1.00	3.00		120	9								
	3/17/93	9:40	D	1	1700	18.0	8.5	29	0.10	0.74	1.80		74	7								
	4/21/93	10:15	D	1	2000	10.0	8.5	42	0.10	0.78	0.76		30	<5								
	5/26/93	10:15	DT	1	2000	3.2	8.8	55	0.18	1.10	0.39		37	8	<0.4	1.2	0.79		<0.8	<0.2	4.5	
	6/9/93	10:50	D	1	1600	80.0	8.5	32	0.10	1.00	1.90		170	14								
	7/14/93	10:30	D	1	2000	7.3	8.5	56	0.25	1.30	1.20		70	5								
	8/17/93	13:45	D	22	2200	3.2	1.6	38	0.10	0.74	0.29		45	11								
	8/18/93	11:10																				
	9/14/93	14:00	D	24	1900	2.9	8.5	56	0.20	0.88	1.30		<5	<5								
	9/15/93	13:00																				
	10/27/93	12:30	D	1	2000	8.7	8.6	120	0.10	1.10	0.63		51	8								

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
WYLSED	11/11/93	12:20	ST	3	700	890.0	7.7	20	0.26	7.40	8.40		1900	250	7.7	<10	30	15	<40	<10	210	222
	11/11/93	16:20																				
	11/12/93	16:04	ST	12	1400	29.0	8.2	32	0.31	2.00	1.50		46	11	<5	<10	<20	<2	<40	<10	27	396
	11/13/93	14:04																				
	11/13/93	16:04	ST	12	1700	4.4	8.3	64	0.34	1.40	1.20		22	12	<5	<10	<20	<2	<40	<10	16	512
	11/14/93	14:04																				
	11/14/93	16:04	ST	9	1900	0.9	8.3	75	0.41	1.50	1.80		<5	<5	<5	<10	<20	<2	<40	<10	18	632
	11/15/93	8:04																				
	11/17/93	13:00	D	1	1900	1.8	8.5	62	0.10	0.33	0.54		22	10								
	1/18/94	12:30	D	1	2400	2.3	8.5	140	0.10	0.62	0.20		15	<5								
	1/25/94	14:00	ST	1											<5	<10	21	9.3	<40	<10	150	230
	2/17/94	10:30	ST	1	460	340	8.2	9.9	0.41	1.80	6.80		1200	<10	9.9	47	39	30	<40	<10	230	
	2/17/94	13:00	ST	1	250	720	8.4	6.1	0.39	3.60	16.00		6300	54	36	160	120	120	110	<10	690	
	3/24/94	19:04	ST	3	630	580	8.1	10	0.10	1.80	9.80		740	64	<5	51	54	31	<40	<10	240	160
	3/24/94	23:04																				
	3/25/94	4:39	ST	14	990	230	8.0	16	0.10	1.20	4.00		430	48	<5	15	<20	8.7	<40	<10	48	254
	3/26/94	9:04																				
	3/26/94	11:04	ST	12	1500	20.0	8.4	39	0.11	0.95	1.30		34	8	<5	10	<20	<2	<40	<10	12	412
	3/27/94	9:04																				
	3/27/94	11:04	ST	12	1700	6.6	8.4	45	0.10	5.30	2.10		<5	<5	<5	11	<20	<2	<40	<10	<10	462
	3/28/94	9:04																				
	3/28/94	11:04	ST	4	1700	4.4	8.6	45	0.10	1.10	0.85		11	<5	<5	<10	<20	<2	<40	<10	<10	456
	3/28/94	17:04																				
	4/19/94	12:00	DT	23	2000	1.4	8.4	74	0.10	0.98	0.20		8	<5								
	4/20/94	10:00																				
	4/24/94	5:52	ST	4	1100	68.0	7.6	15	0.23	3.60	2.00		130	21	<5	<10	27	3.1	<40	<10	50	280
	4/24/94	11:52																				
	4/24/94	13:52	ST	13	1900	5.5	8.2	66	0.11	2.10	0.87		<5	<5	<5	<10	<20	<2	<40	<10	17	500
	4/25/94	13:52																				
	4/25/94	15:52	ST	6	1100	380	7.9	19	0.21	4.50	4.30		890	32	<5	32	58	20	<40	<10	180	305
	4/26/94	1:52																				
	4/26/94	3:52	ST	15	660	350	7.9	17	0.44	3.30	5.10		850	34	<5	36	49	23	<40	<10	170	178
	4/27/94	7:52																				
	4/27/94	9:52	ST	14	890	160	8.1	21	0.19	3.20	3.90		530	68	<5	15	25	11	<40	<10	80	244
	4/28/94	11:52																				
	5/25/94	9:30	DT	24	150	1.6	8.4	110	0.15	0.71	0.31		<5	<5								
	5/26/94	8:30																				
	6/30/94	10:25			2200	1.7	8.3	89	0.40	0.80	0.50		9	<5								

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
WYLSED	10/4/94	17:00	ST	9	2100	16.0	7.8	10	0.52	6.10	1.10		74	6	<1	<10	23	2.2	<40	0.97	84	544
	10/5/94	9:00																				
	10/5/94	11:00	ST	5	1200	350.0	7.5	13	0.50	13.00	4.90		950	56	4.1	32	56	29	<40	0.77	260	300
	10/5/94	19:00																				
	10/25/94	12:40	DT	23	3400	17.0	8.0	58	0.25	1.20	0.53		130	8								
	10/26/94	8:40																				
	11/10/94	8:01	ST	1											3.7	11	46	22	<40	<0.3	360	620
	11/30/94	10:30			2700	1.5	8.3	59	0.11	1.30	0.76		<5	<5								
	3/3/95	8:58	ST	3	970	240	8.0	15	0.10	4.60	4.30		1100	65	1.7	31	45	24	<40	1	160	240
	3/3/95	12:58																				
	3/3/95	14:58	ST	10	940	210	8.0	23	0.11	2.60	2.40		320	48	<1	10	3.6	9.2	<40	1.4	64	248
	3/4/95	8:58																				
	3/23/95	8:00	ST	8	630	280	8.1	8.4	0.25	2.40	6.80		1300	150	4	30	38	20	<40	1.5	140	104
	3/24/95	0:00																				
	3/24/95	0:00	ST	40	1600	68	8.4	28	0.20	1.40	1.60		120	16	<1	10	17	4	<40	<1	27	416
	3/27/95	8:00																				
	5/16/95	14:30	D	24	1900	380	8.4	46	0.10	1.10	2.60		550	70								
	5/17/95	13:30																				
	6/13/95	11:00	D	24	2200	4.6	8.3	72	0.11	0.99	0.60		18	7								
	6/14/95	10:00																				
	7/26/95	12:25	D		2400	1700	8.5	56	0.10	4.10	9.80		2500	280								
	8/29/95	11:00	D	24	2300	120	8.3	82	0.11	0.84	1.10		220	30								
	8/30/95	10:00																				
	9/20/95	11:30	DT	1	2200	24	8.3	91	0.12	1.00	0.25		33	10	<1	<10	20	4	<40	<1	45	
	10/24/95	13:40	D	6	2300	54	8.4	110	0.10	1.60	0.64		78	6								
	10/25/95	18:40																				
	11/15/95	9:40	D	1	2600	130	8.1	130	0.14	0.82	0.80		180	43								
	12/6/95	9:30	D	1	2400	34	8.2	130	0.60	0.89	1.10		140	21								
	12/13/95	0:00	ST	4	1200	800	7.3	45	1.50	9.20	6.10		940	120	3	32	88	27	40	<1	290	340
	12/13/95	6:00																				
	1/19/96	5:51	ST	5	1000	87	7.9	43	0.47	3.30	1.60		140	22	<1	11	32	7	8	<1	70	314
	1/19/96	13:51																				
	1/19/96	15:51	ST	22	1600	29	8.0	53	0.17	1.10	0.60		52	12	<1	<10	22	3	9	<1	30	494
	1/21/96	14:51																				
	1/21/96	16:51	ST	4	620	950	7.8	21	0.31	2.80	5.60		1800	240	3	50	<20	26	34	<1	300	220
	1/22/96	8:51																				
	1/22/96	10:51	ST	10	1000	230	8.0	23	0.23	1.70	2.00		360	41	<1	13	24	8	11	2	77	236
	1/23/96	4:51																				
	1/31/96	3:05	ST	4	1200	210	8.0	35	0.28	5.30	2.10		320	53	1	26	41	9	11	2	110	254
	1/31/96	9:05																				
	1/31/96	11:05	ST	21	660	840	7.5	16	0.52	4.60	8.60		1200	160	<1	<10	64	24	32	2	210	196
	2/2/96	3:05																				
	2/2/96	5:05	ST	15	1400	57	8.1	36	0.10	1.50	1.80		94	17	<1	<10	18	<2	8	<1	41	366
	2/3/96	9:05																				
	2/3/96	11:05	ST	8	750	230	7.7	18	0.26	3.10	2.70		330	52	<1	<10	36	11	12	9	72	208
	2/4/96	1:05																				

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
WYLSED	2/13/96	9:40	D	24	2000	1.6	7.9	59	0.10	1.20	0.54		10	10								
	2/14/96	8:40																				
	2/20/96	10:10	ST	22	440	1100	7.9	8.1	0.48	4.50	8.80		3400	330	6	78	69	<2	<2	<1	320	110
	2/22/96	8:10																				
	3/4/96	16:40	ST	5	1500	50	8.4	41	0.17	2.00	0.75		64	16	<1	<10	19	<2	7	<1	35	402
	3/4/96	17:40																				
	3/4/96	19:40	ST	9	460	730	8.0	8.9	0.47	4.30	6.20		2500	200	4	69	56	27	37	<1	310	58
	3/5/96	11:40																				
	3/5/96	13:40	ST	36	1300	43	8.3	43	0.10	0.94	1.20		340	42	<1	8	32	10	<4	<1	72	207
	3/8/96	11:40																				
	3/27/96	12:00	D	1	1900	1.1	8.6	74	0.10	0.84	0.20		<6	<6								
	4/24/96	12:15	D	1	2000	1.2	8.7	78	0.10	0.92	0.20		<6	<6								
	5/29/96	12:00	D	24	2200	2.3	8.4	97	0.10	1.00	0.26		17	8								
	5/30/96	11:00																				
	6/20/96	9:15	D	1	2100	3.0	8.0	110	0.20	0.95	0.20		18	12								
	7/24/96	11:00	D	24	2300	10.0	8.5	62	<0.1	1.10	<0.2		25	12								
	7/25/96	10:00																				
	8/27/96	10:45	D	23	2100	7.2	8.3	120	0.26	1.20	0.46		13	8								
	8/28/96	8:45																				
	9/24/96	10:30	D	24	2100	16	8.2	110	0.29	1.30	<0.2		90	21								
	9/25/96	9:30																				
	10/30/96	7:59	ST	5	1400	160	7.2	78	2.20	11.00	3.20		340	90	1	<10	41	3	24	<1	340	400
	10/30/96	8:59	SF												<1	<10	20	<2	17	<1	180	
	10/30/96	11:14	ST	5	610	690	7.3	23	0.96	8.40	6.60		1700	260	4	50	30	34	39	1	380	195
	10/30/96	19:14																				
	10/30/96	21:14	ST	17	1500	160	8.0	39	0.43	2.30	2.00		220	37	<1	12	24	5	8	<1	100	1650
	11/1/96	4:14																				
	11/5/96	12:05	DT	1	2000	4.4	8.4	120	0.51	1.10	0.69		9	<6								
	11/21/96	10:12	ST	5	1200	78	7.6	32	0.77	5.10	2.30		130	27	<1	<10	58	5	13	<1	81	344
	11/21/96	11:12																				
	11/21/96	13:12	ST	13	480	1000	7.8	10	0.53	4.90	7.00		2100	190	4	50	68	31	36	<1	270	188
	11/22/96	13:12																				
	11/22/96	15:12	ST	15	940	210	8.1	16	0.10	2.00	1.80		270	37	<1	11	26	7	10	<1	120	274
	11/24/96	1:12																				
	12/4/96	12:45	D	1	1900	2.2	8.9	62	0.25	0.80	0.45		7	<6								
	12/9/96	13:18	ST	5	1400	30	8.1	52	<0.1	1.50	0.56		13	9	<1	<10	24	<2	4	<1	48	440
	12/9/96	14:18																				
	12/9/96	16:18	ST	11	500	580	7.8	11	0.16	3.00	4.40		1200	110	2	33	42	21	24	<1	180	148
	12/10/96	12:18																				
	12/10/96	14:18	ST	12	620	450	7.9	12	0.19	2.20	2.90		980	86	1	24	26	12	16	<1	140	150
	12/11/96	12:18																				
	12/11/96	14:18	ST	11	550	410	7.8	8.9	0.19	2.10	2.70		760	74	2	20	25	10	16	<1	100	165
	12/12/96	10:18																				
	12/12/96	12:18	ST	12	1100	22	8.1	19	0.16	1.50	0.96		57	10	<1	<10	22	2	4	<1	77	310
	12/13/96	10:18																				

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
WYLSED	1/22/97	0:18	ST	5	1100	360	7.8	16	0.18	2.50	2.40		580	86	1	15	27	12	12	<1	48	295
	1/22/97	1:18																				
	1/22/97	3:18	ST	11	1100	140	7.8	27	0.28	1.80	1.40		200	34	<1	<10	21	5	7	<1	<10	321
	1/22/97	23:18																				
	1/23/97	1:18	ST	8	550	770	7.7	11	0.35	3.10	4.40		1400	180	3	27	40	19	210	<1	120	170
	1/23/97	15:18																				
	1/23/97	17:18	ST	23	1100	75	8.0	31	0.26	1.10	0.94		82	19	<1	<10	21	<2	5	<1	120	370
	1/25/97	13:18																				
	1/25/97	15:18	ST	6	690	780	8.0	20	0.43	3.30	4.20		1300	160	2	29	41	19	28	<1	260	230
	1/26/97	1:18																				
	1/29/97	10:50	D	1	1400	66.0	8.3	36	<0.1	0.86	1.00		54	11								
	2/11/97	1:55	ST	5	1300	31.0	7.8	38	<0.1	2.30	0.64		54	30	<1	<10	21	<2	6	<1	37	474
	2/11/97	2:55																				
	2/27/97	14:20	D	1	<10	<0.5	8.1	6.3	0.47	2.40	3.30		9	6								
	3/12/97	9:35	D	1	1800	2.9	8.6	46	0.36	1.50	1.20		110	<6								
	4/16/97	11:35	D	1	2200	0.8	8.4	93	<0.5	0.87	0.41		<6	<6								
	5/20/97	10:10	D	1	2400	5.1	8.1	110	0.25	0.71	0.43		14	8								
	6/10/97	10:05	D	1	2300	5.8	8.3	100	<0.1	0.67	0.31		17	8								
	7/8/97	11:00	D	1	2100	2	8.7	57	<0.1	1.3	0.92		12	8								
	8/15/97	11:35	D	1	2300	5.1	8.1	78	0.19	1.5	0.60		6	8								
	9/24/97	10:15	D	1	2400	5.5	8.1	93	<0.1	1.1	0.71		30	19								
	10/29/97	10:45	D	1	2000	4.2	8.5	76	<0.1	1.1	1.40		8	<6								
	11/10/97	9:46	SF	5				85				<0.5			<1	<10	28	2	7	<1	120	496
	11/10/97	10:46																				
	11/10/97	12:46	ST	10	1200	170	7.5	39	0.86	6.1	2.80	<0.5	200	47	1	<10	41	4	12	<1	160	332
	11/11/97	6:46	SF												<1	<10	29	<2	11	<1	110	
	11/11/97	8:46	ST	22	1300	37	7.9	36	0.19	2.8	1.40	<0.5	51	15	<1	<10	27	3	6	<1	85	512
	11/13/97	2:46	SF												<1	<10	17	<2	<4	<1	73	
	11/13/97	4:46	ST	14	570	490	7.7	19	0.57	4.7	4.50	<0.5	910	23	2	25	41	15	14	<1	240	178
	11/14/97	8:00	SF												<1	11	28	7	9.0	<1	88	
	11/19/97	13:21	D	10	1700	6.1	8.3	44	<0.1	1.4	1.40	<0.5	15	6								
	11/19/97	22:21	D		1200	9.1	8.6	42	<0.1	1.2	0.66	<0.5	23	<6								
	11/26/97	9:40	ST	5	740	250	8.1	30	0.37	3.9	2.50		540	460	<1	16	85	36	16	<1		190
	11/26/97	10:40	SF												<1	<10	16	<2	<4	<1	34	
	11/26/97	12:40	ST	16	660	1000	7.6	12	0.42	5.3	6.10	0.90	1000	880	4	39	80	31	35	<1	280	140
	11/27/97	18:40	SF												<1	<10	11	<2	<4	<1	33	
	11/27/97	20:40	ST	29	1700	19	8.1	49	<0.1	1.4	0.93	<0.5	25	19	<1	<10	13	<2	5	<1	40	472
	11/30/97	6:36	SF												<1	<10	13	<2	<4	<1	57	
	1/3/98	10:33	ST	14	390	16	5.6	3	<0.5	1.6	2.00	<0.5	10	8	<1	<10	32	6.0	<4	<1	53	80
	1/4/98	7:33	SF												<1	<10	28	<2	<4	<1	51	
	1/4/98	9:33	ST	36	1300	130	7.7	19	0.18	1.4	1.20	<0.5	180	30	<1	<10	19	4	6	<1	43	390
	1/7/98	7:33	SF												<1	<10	14	<2	4	<1	<10	
	1/9/98	17:30	ST	2				17	0.50	4.9	4.60				<10	33	59	24	29	<1	330	260
	1/9/98	18:30	SF												<10	<10	17	<2	5	<1	90	
	1/9/98	20:30	ST	9	330	1400	7.9	6	<0.5	6.0	9.80	0.79	3900	360	5	71	73	37	57	<1	71	66
	1/10/98	12:30	SF												<1	<10	8	<2	<4	<1	<10	
	1/20/98		D	24	1400	14	8.1	44	0.11	1.6	0.58	<0.5	18	9								
	1/21/98																					

STATION	DATE	TIME	SAMPLES Type	#	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
WYLSED	2/14/98	9:13	ST	5	690	120	7.8	22.2	<0.5	2.4	1.90		500	46	<1.00	11	27	7	13	<1.00	64	190
	2/14/98	10:13	SF												<1.00	2	12	<1.00	12	<1.00	9	
	2/14/98	11:13	ST	7	290	1600	8.0	7.5	<0.5	3.2	8.60		3600	330	4.70	53	61	36	36.0	<1.00	122	90
	2/15/98	0:13	SF												<10	<10	<10	<10	<10	<10	<50	
	2/15/98	2:13	ST	22	710	330	7.9	12.4	<0.5	2.5	10.70		650	96	1.10	17	35	9	14	<1.00	72	188
	2/16/98	20:13	SF												<1.00	1	14	<1.00	3	<1.00	6.30	
	2/16/98	22:13	ST	10	410	700	7.9	7.1	<0.5	3.4	8.00				4	39	38	35	29	<1.00	121	100
	2/17/98	16:13	SF												<1.00	2	21	1	2	<1.00	21	
	2/17/98	18:13	ST	8	680	190	8.0	11.1	<0.5	1.6	4.90				1	13	30	8	9	1	54	185
	2/18/98	8:13	SF												<1.00	3	13	1	4	2	10	
	2/19/98	12:54	ST	5	870	140	7.9	15.5	0.50	2.3	5.20				<1.00	10	26	6	8	<1.00	39	232
	2/19/98	13:54	SF												<1.00	8	18	1	7	<1.00	29	
	2/19/98	21:54	ST	6	390	710	7.6	6.2	<0.5	4.6	7.00				<5.00	50	46	31	34	<5.00	174	135
	2/20/98	7:54	SF												<1.00	3	10	2	3	<1.00	11	
	2/20/98	9:54	ST	16	870	150	7.7	13.3	<0.5	1.8	8.30				<1.00	11	18	13	10	<1.00	36	240
	2/21/98	15:54	SF												<1.00	3	12	6	5	<1.00	9	
	2/22/98	11:54	ST	14		1200	7.7	4.9	0.70	2.7	10.40				3	28	17.0	18	20	2	68	94
	2/23/98	13:54	SF												<1.00	4	13	12	5	<1.00	48	
	3/25/98	6:29	ST	5	1410	30	7.6	51.8	0.20	<1.0	0.90		525	11	<1.00	4	20	2.80	7	<1.00	55	450
	3/25/98	7:29	SF												<1.00	3	18	1	8	<1.00	62	
	3/25/98	21:29	ST	21	1100	220	8.2	3.1	0.30	1.0	0.90		365	36	1	16	39	10	15	<1.00	76	302
	3/28/98	1:29	SF												<1.00	4	18	4	7	<1.00	51.0	
	3/28/98	1:29	ST	15	812	113	8.1	12.8	0.10	2.0	1.20		444	30	2	16.0	31	11	16	<1.00	84	280
	3/29/98	7:29	SF												1	27	22	<1.00	7	<1.00	44	
	4/20/98	13:25	D	2	1900	4.2	8.7	55.8	0.20	<1.0	0.60		6	5								
	4/21/98	14:25																				
	6/23/98		D	1	2300	2.5	8.3	106	<0.05	<1.0	0.12		4	<1.0								
	7/15/98	8:55	D	24	2380	6	8.2	145	<0.05	<1	<0.061		21	9								
	7/16/98	7:55																				
	8/17/98	8:21	D	16	2360	96	8.2	97	<0.05	4.40	1.04		380	60								
	8/17/98	23:21																				
	9/4/98	13:44	ST	4	1290	475	7.5	36	0.83	8.20	2.08		1050	190	3	24	27	17	17	<2	494	400
	9/4/98	14:29	SF												1	13	19	5	11	<2	301	
	9/4/98	16:29	ST	5	1310	152	7.6	33	0.47	6.30	1.62		460	110	2	18	24	10	12	<2	149	378
	9/5/98	0:29	SF												1	12	21	5	10	<2	145	
	9/8/98	12:38	D	21																		
	9/9/98	9:38																				
	10/13/98	9:05	D	24	1900	220	8.3	38.8	0.08	7.02	3.06		680	110								
	10/14/98	8:05																				
	11/3/98	11:19	D	10	1960	56	8.3	53.7	<0.05	1.08	1.41		200	30								
	11/3/98	20:19																				
	12/9/98	8:00	D	24	1660	150	8.0	41	<0.05	1.23	1.50		310	52								
	12/10/98	7:00																				
	1/5/99	9:27	D	24	2180	36	8.3	63	<0.05	0.80	0.52		90	20								
	1/6/99	8:27																				

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
WYLSED	1/25/99	6:16	ST	5											8	85	270	47	75	<2	484	180
	1/25/99	7:16	SF												<1	<8	13	<2	7	<2	<10	
	1/25/99	9:16	ST	9	720	350	7.9	22	0.25	4.15	5.48		290	42	4	63	108	29	45	<2	260	216
	1/26/99	3:16	SF												3	41	68	19	30	<2	176	
	2/2/99	10:01	D	24	2560	18	8.3	83.6	0.15	<0.2	1.35		44	13								
	2/3/99	9:01																				
	2/4/99	21:26	ST	6	540	650	7.9	11.4	0.25	4.11	5.51		1730	370	4	48	71	28	36	<2	256	164
	2/4/99	22:41	SF												<1	<8	10	<2	<4	<2	11	
	2/5/99	0:41	ST	6	740	190	7.9	30.4	0.33	2.39	2.51		780	310	1	19	33	10	13	<2	84	220
	2/5/99	10:41	SF												<1	<8	12	<2	<4	<2	<10	
	2/5/99	12:41	ST	41	1610	30	8.3	61.6	0.06	1.30	0.92		74	28	<1	<8	18	<2	6	<2	19	430
	2/8/99	20:41	SF												<1	<8	13	<2	5	<2	<10	
	3/1/99	12:50	D	24	1930	5	8.3	62.0	<0.05	0.93	0.25		28	18								
	3/2/99	11:50																				
	3/11/99	11:14	ST	5	1270	60	8.2	38.2	0.54	2.65	0.89		160	28	<1	8	43	6	8	<2	100	460
	3/11/99	12:14	SF												<1	<8	21	<2	5	<2	19	
	3/11/99	14:14	ST	6	1070	260	8.1	29.8	0.16	3.13	1.84		860	150	3	22	87	21	78	<2	314	360
	3/12/99	0:14	SF												<1	<8	16	<2	5	<2	10	
	3/12/99	2:14	ST	39	1720	25	8.3	66.9	<0.05	0.99	0.40		79	16	<1	<8	20	<2	<4	<2	26	494
	3/15/99	8:14	SF												<1	<8	13	<2	<4	<2	10	
	3/15/99	9:12	ST	5	910	78	7.7	30.8	0.25	2.79	0.70		440	110	1	14	35	8	10	<2	122	264
	3/15/99	10:12	SF												<1	<8	12	<2	5	<2	15	
	4/27/99	11:40	D	24	1920	279	8.4	62.9	<0.05	1.33	1.86		370	224								
	4/28/99	10:40																				
	5/4/99	10:33	D	24	1880	18	8.5	70.8	<0.05	0.53	0.42		25	7								
	5/5/99	9:33																				
	6/17/99	15:45	D	1	1830	5	8.8	80.5	<0.05	0.52	0.15		15	2								
	7/19/99	14:20	D	24	2010	456	8.3	28.2	0.09	0.86	3.30		750	268								
	7/20/99	13:20																				
	7/20/99	11:01	D	24	2510	18	8.6	23.9	0.55	0.12	1.08		50	20								
	7/22/99	9:01																				
	7/22/99	11:40	D	24	1940	16	8.4	76.1	0.22	0.15	0.71		49	15								
	7/26/99	7:40																				
	8/17/99	14:46	D	24	2190	9.7	8.3	87.1	<0.05	0.61	0.31		<4	<1								
	8/18/99	13:46																				
	9/13/99	10:00	D	6	2040	9.5	8.5	70.4	<0.05	0.77	0.21	0.04	32	25								
	9/13/99	15:00																				
	9/13/99	16:00	D	6	2030	25.0	8.4	61.6	<0.05	1.07	0.37	0.10	48	22								
	9/13/99	21:00																				
	9/13/99	22:00	D	6	2120	9.4	8.3	70.4	<0.05	0.43	0.21	0.06	20	13								
	9/13/99	3:00																				
	9/13/99	4:00	D	6	2150	9.1	8.3	79.2	<0.05	0.69	0.21	0.06	18	10								
	9/14/99	9:00																				
	9/14/99	10:00	D	6	2030	7.8	8.5	88.0	<0.05	1.17	0.12	0.04	18	10								
	9/14/99	15:00																				
	9/14/99	16:00	D	6	2010	12.0	8.4	83.6	<0.05	0.59	0.15	0.04	26	13								
	9/14/99	21:00																				

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
WYLSED	9/14/99	22:00	D	6	1940	14.0	8.3	70.4	<0.05	0.52	0.18	0.04	26	10								
	9/15/99	3:00																				
	9/15/99	4:00	D	6	1920	12.0	8.3	74.8	<0.05	0.68	0.12	0.05	21	13								
	9/15/99	9:00																				
	9/15/99	10:00	D	6	2040	31.0	8.4	70.4	<0.05	1.50	0.60	0.10	82	18								
	9/15/99	15:00																				
	9/15/99	16:00	D	6	2060	13.0	8.4	81.0	<0.05	0.98	0.18	0.03	42	13								
	9/15/99	21:00																				
	9/15/99	22:00	D	6	2020	12.0	8.2	66.0	<0.05	0.73	0.18	0.04	24	6								
	9/16/99	3:00																				
	9/16/99	4:00	D	6	2120	8.6	8.3	72.6	<0.05	0.68	0.10	0.02	18	12								
	9/16/99	9:00																				
	9/16/99	10:00	D	6	2070	8.7	8.4	102.0	<0.05	0.55	0.25	0.28	32	4								
	9/16/99	15:00																				
	9/16/99	16:00	D	6	2010	11.0	8.3	94.2	<0.05	0.74	0.24	0.18	30	7								
	9/16/99	21:00																				
	9/16/99	22:00	D	6	2050	8.8	8.2	91.1	<0.05	0.53	0.15	0.03	16	7								
	9/17/99	3:00																				
	9/17/99	4:00	D	6	2050	8.9	8.3	89.3	<0.05	0.65	0.21	0.04	16	7								
	9/17/99	9:00																				
	9/17/99	10:00	D	6	1970	7.0	8.3	95.5	<0.05	0.24	0.14	0.03	14	5								
	9/17/99	15:00																				
	9/17/99	16:00	D	6	2010	6.8	8.4	125.0	<0.05	0.69	0.11	0.02	16	9								
	9/17/99	21:00																				
	9/17/99	22:00	D	6	1990	9.5	8.2	87.1	<0.05	0.45	0.15	0.05	20	8								
	9/18/99	3:00																				
	9/18/99	4:00	D	6	2000	7.1	8.2	96.8	<0.05	0.69	0.13	0.05	19	13								
	9/18/99	9:00																				
	9/18/99	10:00	D	6	2010	7.3	8.4	121.0	<0.05	0.69	0.21	0.05	18	13								
	9/18/99	15:00																				
	9/18/99	16:00	D	6	2080	7.7	8.2	81.8	<0.05	0.8	0.18	0.05	14	5								
	9/18/99	21:00																				
	9/18/99	22:00	D	6	2060	7.3	8.2	78.3	0.06	0.84	0.21	0.06	12	7								
	9/19/99	3:00																				
	9/19/99	4:00	D	6	2020	9.8	8.2	65.1	<0.05	0.81	0.31	0.08	38	12								
	9/19/99	9:00																				
	9/19/99	10:00	D	6	2000	8.2	8.4	128	<0.05	0.60	0.25	0.08	18	15								
	9/19/99	15:00																				
	9/19/99	16:00	D	6	1970	7.8	8.3	123	<0.05	0.63	0.15	0.04	24	10								
	9/19/99	21:00																				
	9/19/99	22:00	D	6	2060	6.5	8.2	128	<0.05	0.67	0.12	0.04	27	16								
	9/20/99	3:00																				
	9/20/99	4:00	D	6	2040	5.7	8.2	96.8	<0.05	0.65	0.21	0.13	14	6								
	9/20/99	9:00																				
	9/20/99	10:00	D	24	2290	11.0	8.3	139.0	<0.05	0.72	0.15	0.04	18	10								
	9/21/99	9:00																				
	9/21/99	10:00	D	6	2070	5.8	8.5	153.0	<0.05	0.60	0.12	0.04	17	6								
	9/21/99	15:00																				

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
WYLSED	9/21/99	16:00	D	6	2090	9.3	8.4	92.8	<0.05	0.52	0.12	0.02	12	6								
	9/21/99	21:00																				
	9/21/99	22:00	D	6	2110	12.0	8.3	83.2	<0.05	0.64	0.14	0.02	19	11								
	9/22/99	3:00																				
	9/22/99	4:00	D	6	2010	13.0	8.3	79.2	<0.05	0.57	0.27	0.03	27	15								
	9/22/99	9:00																				
	9/22/99	10:00	D	24	2060	13.0	8.3	81.8	<0.05	0.71	0.25		31	13								
	9/23/99	9:00																				
	9/23/99	10:00	D	24	2010	11.0	8.2	78.8	<0.05	0.58	0.12	0.15	20	13								
	9/24/99	9:00																				
	10/13/99	12:40	D	24	1790	8.2	8.1	57.6	<0.05	1.11	0.34		36	18								
	10/14/99	11:40										0.26										
	12/2/99	14:03	D	24	2110	13.0	8.2	79.2	<0.05	0.62	0.25		30	22								
	12/3/99	13:03																				
	12/28/99	13:33	D	24	2060	3.7	8.2	92.4	<0.05	0.32	0.21		18	6								
	12/29/99	12:33																				
	1/5/00	10:10	D	24	1820	3.1	8.2	58.5	<0.05	0.89	0.98		8	6								
	1/6/00	9:10																				
	2/2/00	10:20	D	24	1770	126	8.3	53	0.20	2.00	1.25	0.10	200	90								
	2/3/00	9:20																				
	2/9/00	13:43	D	16	1790	120	8.4	60	0.19	1.80	1.24	0.07	220	56								
	2/10/00	18:43																				
	2/29/00	9:15	D	23	2980	6.3	8.3	85	0.06	0.64	0.67	0.17	12	5								
	3/2/00	5:15																				
	3/4/00	10:35	ST	10	620	200	7.6	21	0.19	1.60	2.17	0.28	330	210	<1	11	25	8	11	<2	74	244
	3/5/00	10:35	SF												<1	<8	9	<2	<4	<2	13	
	3/5/00	12:35	ST	13	590	450	7.8	11	0.08	2.10	3.37	0.41	570	300	2	18	37	14	20	<2	134	200
	3/6/00	12:35	SF												<1	<8	8	<2	<4	<2	21	
	3/6/00	14:35	S	15	1220	55	8.2	27	<0.05	1.40	1.29	0.27	80	51								
	3/8/00	2:35																				
	3/8/00	4:35	S	12	595	400	8.0	11	<0.05	2.20	2.82	0.21	590	290								
	3/9/00	2:35																				
	3/22/00	12:11	D	21	2100	7.2	8.2	68	0.15	1.30	<0.061	0.02	34	14								
	3/23/00	8:11																				
	4/5/00	9:15	D	1	2010	1.2	8.1	66	0.09	0.75	<0.061	0.01	7	3								
	4/5/00	9:15																				
	4/20/00	14:00	D	1	1490	20.0	8.5	47	<0.05	86.00	95.00	0.22	130	12								
	4/20/00	14:00																				
	5/4/00	11:42	D	24	1870		8.3	59	<0.05	0.76	0.12	0.17	11	6								
	5/5/00	10:42																				
	5/30/00	11:42	D	24	1980	6.2	8.3	75	<0.05	0.76	0.15	<0.01	24	9								
	5/31/00	10:42																				
	6/6/00	10:03	D	24	2070	4.1	8.3	73	<0.05	0.90	0.09	<0.01	12	6								
	6/7/00	9:03																				

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
WYLSED	6/19/00	16:00	D	6	1980	3.0	8.3	75	<0.05	0.68	0.09	<0.01	<10	<1								
	6/19/00	21:00																				
	6/19/00	22:00	D	6	2030	2.6	8.1	75	<0.05	0.65	0.15	<0.01	<10	<1								
	6/20/00	3:00																				
	6/20/00	4:00	D	4	2010	1.4	8.0	70	<0.05	0.68	0.15	<0.01	<10	<1								
	6/20/00	7:00																				
	6/20/00	10:00	D	6	1750	7.9	8.2	62	<0.05	0.67	0.12	0.01	52	22								
	6/20/00	15:00																				
	6/20/00	16:00	D	6	1680	4.2	6.3	37	<0.05	0.60	0.18	<0.01	14	9								
	6/20/00	21:00																				
	6/20/00	22:00	D	6	1790	4.0	8.1	79	<0.05	0.55	0.09	<0.01	<10	<1								
	6/21/00	3:00																				
	6/20/00	10:00	D	6				38	<0.05	0.20	0.12	<0.01										
	6/20/00	15:00																				
	6/21/00	4:00	D	6	1800	3.0	8.1	62	<0.05	0.48	0.12	0.01	<10	<1								
	6/21/00	9:00																				
	6/21/00	10:00	D	6	2000	4.7	8.3	66	<0.05	1.10	0.21	0.01	28	13								
	6/21/00	15:00																				
	6/21/00	16:00	D	6	1970	5.0	8.3	66	<0.05	0.94	0.12	<0.01	<10	<1								
	6/21/00	21:00																				
	6/21/00	22:00	D	6	2020	2.4	8.2	70	<0.05	0.80	0.12	<0.01	<10	<1								
	6/22/00	3:00																				
	6/22/00	4:00	D	6	2060	2.3	8.2	66	<0.05	0.68	0.09	<0.01	<10	<1								
	6/22/00	9:00																				
	6/22/00	10:00	D	6	1960	6.6	8.3	62	<0.05	0.82	0.09	<0.01	17	10								
	6/22/00	15:00																				
	6/22/00	16:00	D	6	2080	5.1	8.4	70	<0.05	0.87	0.09	<0.01	<10	<1								
	6/22/00	21:00																				
	6/22/00	22:00	D	6	2190	3.7	8.2	79	<0.05	0.71	0.12	<0.01	<10	<1								
	6/23/00	3:00																				
	6/23/00	4:00	D	6	2290	3.6	7.5	37	<0.05	0.63	0.12	<0.01	<10	<1								
	6/23/00	9:00																				
	6/23/00	10:00	D	6	2040	8.7	8.3	17	<0.05	1.10	0.12	<0.01	19	4								
	6/23/00	15:00																				
	6/23/00	16:00	D	6	2020	7.6	8.3	13	<0.05	0.90	0.12	<0.01	13	4								
	6/23/00	21:00																				
	6/23/00	22:00	D	6	2070	7.8	8.2	30	0.06	0.94	0.09	<0.01	19	11								
	6/24/00	3:00																				
	6/24/00	4:00	D	6	2090	6.2	8.2	19	<0.05	1.00	0.15	<0.01	<10	<1								
	6/24/00	9:00																				
	6/24/00	10:00	D	6	2100	4.5	8.3	75	<0.05	0.86	0.09	0.01	<10	<1								
	6/24/00	15:00																				
	6/24/00	16:00	D	6	2090	6.6	8.3	75	<0.05	0.92	0.12	0.01	<10	<1								
	6/24/00	21:00																				
	6/24/00	22:00	D	6	2150	11.0	8.2	75	0.06	0.76	0.15	0.01	<10	<1								
	6/25/00	3:00																				
	6/25/00	4:00	D	6	2180	5.3	8.2	66	<0.05	0.80	0.12	0.01	<10	<1								
	6/25/00	9:00																				
	6/25/00	10:00	D	6	2040	11.0	8.3	14	<0.05	1.00	0.21		18	6								
	6/25/00	15:00																				
	6/25/00	16:00	D	6	2030	5.8	8.3	21	<0.05	1.10	0.21	<0.01	11	9								

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
WYLSED	6/25/00	21:00																				
	6/25/00	22:00	D	6	2100	4.2	8.1	19	0.07	0.97	0.12	0.01	<10	<1								
	6/26/00	3:00																				
	6/26/00	4:00	D	6	2090	5.6	8.2	29	<0.05	0.74	0.12	0.01	<10	<1								
	6/26/00	9:00																				
	6/26/00	10:00	D	6	2060	5.1	8.3	62	<0.05	0.64	0.09	<0.01	16	9								
	6/26/00	15:00																				
	6/26/00	16:00	D	6	2150	5.5	8.2	79	<0.05	0.53	0.06	<0.01	<10	<1								
	6/26/00	21:00																				
	6/26/00	22:00	D	6	2030	12.0	8.3	70	<0.05	0.82	0.15	<0.01	36	13								
	6/27/00	3:00																				
	6/27/00	4:00	D	6	2200	5.1	8.2	75	<0.05	0.69	0.09	<0.01	<10	<1								
	6/27/00	9:00																				

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
WARF06	5/19/99		D	1				55.34														
	9/13/99	10:00	D	24	2760	4.4	8.2	68.60	<0.05	0.43	0.64		11	6								
	9/14/99	9:00																				
	9/14/99	10:00	D	24	2620	3.6	8.2	66.00	<0.05	0.55	0.61		11	10								
	9/15/99	9:00																				
	9/15/99	10:00	D	24	2620	3.9	8.2	63.40	<0.05	0.83	0.91		10	7								
	9/16/99	9:00																				
	9/16/99	10:00	D	24	2990	2.8	8.2	80.50	<0.05	1.3	0.58		8	4								
	9/17/99	9:00																				
	9/17/99	10:00	D	24	2650	2.2	8.2	91.50	0.08	0.63	0.65		12	6								
	9/18/99	9:00																				
	9/18/99	10:00	D	24	2670	3.9	8.1	56.30	<0.05	0.54	0.64		12	4								
	9/19/99	9:00																				
	9/19/99	10:00	D	24	2740	1.2	8.2	125.00	<0.05	0.53	0.67		10	6								
	9/20/99	9:00																				
	5/12/00	14:30	D	1				69.00														
	6/19/00	12:00	D	22	2590	1.5	8.0	66.00	<0.05	0.34	0.64	0.19	<10	<1								
	6/20/00	9:00																				
	6/20/00	10:00	D	24	2340	5.5	8.0	66.00	<0.05	0.38	0.64		10	8								
	6/21/00	9:00																				
	6/21/00	10:00	D	24	2740	4.9	8.0	62.00	<0.05	0.20	0.67		<10	<1								
	6/22/00	9:00																				
	6/22/00	10:00	D	4	2490	5.1	8.2	57.00	<0.05	0.73	0.67		<10	<1								
	6/22/00	14:00																				
	6/23/00	10:00	D	24	2620	6.4	7.9	57.00	<0.05	0.43	0.73		12	7								
	6/24/00	9:00																				
	6/23/00	10:00	D	24	2560	5.1	8.0	57.00	<0.05	0.73	0.70		<10	<1								
	6/24/00	9:00																				
	6/24/00	10:00	D	24	2660	6.5	8.0	62.00	<0.05	0.96	0.73		<10	<1								
	6/25/00	9:00																				
	6/25/00	10:00	D	24	2630	4.2	7.9	66.00	<0.05	0.67	0.64		<10	<1								
	6/26/00	9:00																				
	6/26/00	10:00	D	24	2710	5.3	7.9	62.00	<0.05	0.20	0.70		<10	<1								
	6/27/00	9:00																				

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
VALS02	5/19/99		D	1				74														
	6/2/99	11:00	D	1				75														
	6/7/99	11:15	D	1				16														
	6/16/99	9:15	D	1				62														
	6/21/99	11:30	D	1				62	<0.05	1	0											
	7/2/99	9:45	D	1				75														
	7/7/99	9:20	D	1				63														
	7/14/99	10:50	D	1				48														
	7/20/99	12:39	D	1				57														
	8/16/99	12:10	D	1				8														
	8/23/99	15:00	D	1				41														
	9/13/99	10:00	D	24	2730	4	8	60	0	0.74	1		10	6								
	9/14/99	9:00																				
	9/14/99	10:00	D	24	2540	3	8	57	0	11	1		0.72	14								
	9/15/99	9:00																				
	9/15/99	10:00	D	24	2880	3	8	66	0	1	1		11	8								
	9/16/99	9:00																				
	9/16/99	10:00	D	24	2730	4	8	90	0	0.37	0		14	8								
	9/17/99	9:00																				
	9/18/99	10:00	D	24	2530	9	8	49	0	0.86	1		42	18								
	9/19/99	9:00																				
	9/19/99	10:00	D	24	2620	3	8	78	0	0.81	1		13	7								
	9/20/99	9:00																				
	5/12/00	14:15	D	1				81														
	6/19/00	13:00	D	21	2740	1	8	66	<0.05	0	1	0	<10	<1								
	6/20/00	9:00																				
	6/20/00	10:00	D	24	2380	2	8	66	<0.05	0	1		<10	<1								
	6/21/00	9:00																				
	6/21/00	10:00	D	24	2850	4	8	66	<0.05	1	1		<10	<1								
	6/22/00	9:00																				
	6/22/00	10:00	D	24	2800	2	8	70	<0.05	1	1		<10	<1								
	6/23/00	9:00																				
	6/23/00	10:00	D	24	2780	6	8	66	<0.05	1	1		<10	<1								
	6/24/00	9:00																				
	6/24/00	10:00	D	24	2780	6	8	70	<0.05	1	1		<10	<1								
	6/25/00	9:00																				
	6/25/00	10:00	D	24	2740	3	8	75	<0.05	1	1		<10	<1								
	6/26/00	9:00																				
	6/26/00	10:00	D	24	2790	5	8	66	0	0	1		<10	<1								
	6/27/00	9:00																				

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
SERF19	3/19/94	9:39	ST	4	540	420	6.6	13	0.66	4.0	4.2		660	110	<5	27	26	7.7	<40	<10	110	180
	3/19/94	15:39																				
	3/20/94	5:39	ST	2											<5	<10	39	6.6	<40	<10	42	130
	3/20/94	7:39																				
	3/24/94	18:04	ST	6	360	400	8.1	7.3	0.33	2.6	8.1		1100	120	<5	37	51	15	<40	<10	190	110
	3/25/94	6:04																				
	3/26/94	8:04	ST	23	1800	4.7	8.5	8.5	0.15	<0.2	0.40		17	12	<5	<10	<20	<2	<40	<10	14	548
	3/28/94	6:04																				
	3/28/94	10:04	ST	4	1200	7.3	8.8	6.7	<0.1	1.5	0.97		11	6	<5	<10	<20	<2	<40	<10	14	385
	3/28/94	16:04																				
	4/20/94	11:30	D	1	1500	3.0	8.6	16	0.56	1.8	0.40		5	<5								
	5/6/94	2:34	ST	4	780	150	7.5	18	0.86	4.3	2.5		420	11	1.3	13	34	5.5	<40	1.4	110	390
	5/6/94	8:34																				
	5/6/94	20:34	ST	5	580	160	7.6	11	0.19	2.5	2.7		440	39	1.4	15	32	9.3	<40	1.4	120	190
	5/7/94	4:34																				
	5/26/94	13:35	D	1	2100	1.9	9.2	1.5	0.16	1.2	0.85		5	<5								
	6/30/94	10:45	D	1	1400	8.8	9.2	7.6	0.36	1.6	1.6		27	<5								
	10/25/94	15:00	D	22	1800	9.8	8.8	9	2.0	2.8	1		72	<5								
	10/26/94	9:00																				
	11/30/94	11:25	D	1	1800	9.6	8.4	14	1.5	3.8	1.5		25	18								
	5/16/95	15:30	D	24	1700	53	8.8	9.5	<0.1	1.6	5.5		120	12								
	5/17/95	14:30																				
	6/14/95	11:35	D	1	1300	3	9.8	11	0.93	3	0.82		<6	<6								
	7/25/95	9:00	D	24	1600	4.0	11.0	<0.2	<0.10	2.00	0.80		<6	11								
	7/26/95	8:00																				
	8/29/95	11:15	D	24	1400	7.2	8.9	3.5	0.31	1.20	0.78		15	8								
	8/30/95	10:15																				
	9/19/95	11:00	D	24	1500	6.5	8.9	2.4	0.26	2.60	1.10		14	12	<1	<10	25	3	<40	<1	28	
	9/20/95	10:00																				
	10/25/95	10:00	D	1	1700	25.0	8.6	8.8	<0.10	2.70	5.50		11	<6								
	11/14/95	11:20	D	23	1700	21.0	8.6	13.0	0.29	2.70	1.90		<6	<6								
	11/15/95	9:20																				
	12/6/95	10:30	D	1	1600	4.6	8.8	19.0	0.46	2.80	2.20		56	21								
	1/21/96	15:25	ST	5	170	120.0	7.2	2.8	0.53	2.20	3.20		340	56	1	12	180	17	13	<1	260	48
	1/21/96	23:25																				
	1/31/96	15:47	ST	4	350	740.0	8.1	15.0	0.65	7.60	11.00		3100	350	4	53	44	31	41	2	260	155
	1/31/96	21:47																				
	2/14/96	12:00	D	1	1500	1.3	8.4	5.2	0.16	1.00	0.84		10	7								
	3/27/96	15:15	D	1	1400	2.1	10.0	<0.2	<0.10	2.00	0.21		7	<6								
	4/24/96	13:25	D	1	1100	2.1	9.5	0.9	0.26	1.40	0.50		11	<6								
	5/30/96	13:15	D	1	920	5.2	8.8	2.4	<0.10	1.10	0.88		38	10								
	6/20/96	9:55	D	1	1200	4.0	8.9	9.1	0.24	2.30	0.60		6	7								
	7/24/96	15:15	D	1	950	19.0	10.0	<0.2	<0.1	1.50	0.55		25	14								
	8/27/96	14:30	D	1	1300	4.6	11.0	<0.2	0.25	1.80	0.73		110	8								
	9/24/96	14:15	D	1	1400	3.9	11.0	<0.2	0.18	2.60	1.50		6	9								
	11/5/96	14:05	D	1	1400	5.5	8.9	4.1	0.16	1.40	1.20		28	12								
	12/4/96	16:05	D	1	1400	2.6	8.6	6.2	0.29	0.77	0.89		17	7								
	1/29/97	14:50	D	1	1600	8.8	8.6	7.4	<0.1	1.30	1.00		13	8								
	2/27/97	15:15	D	1	530	460.0	7.9	20.0	1.30	6.70	3.50		590	60								
	3/12/97	10:45	D	1	1200	3.6	9.2	0.9	0.36	1.50	1.50		7	7								
	4/15/97	12:45	D	1	1200	2.1	9.5	<0.4	0.64	2.00	0.84		<6	<6								
	5/20/97	11:05	D	1	970	8.2	9.2	0.72	0.62	2.20	1.4		17	12								
	6/10/97	8:40	D	1	990	10.0	9.0	1.2	0.54	2.40	1.2		17	9								
	8/15/97	13:30	D	1	1300	5.2	10.0	2	0	3.2	1		23	20								
	9/24/97	11:00	D	1	1500	25	9.7	19	0	2.7	1		60	28								

NEWPORT BAY WATERSHED

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
SERF19	10/29/97	12:50	D	1	1600	22	8.8	11	0	5.3	1		45	12								
	4/21/98	8:30	D	1	1350	1.8	8.18	2	0	1.7	1		<1	<1								
	6/24/98	10:15	D	1	850	26	9.5	4.0	0	1.6	0		56	22								

STATION	DATE	TIME	SAMPLES Type	#	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
CICF25	6/19/91	13:20	DT	1	1800	7.8	9.0	96	0.30	1.20	4.80		<5	<5	8	<10	40	<20	<10	3	<10	
	7/23/91	15:35	DT	1	1800	4.1	9.2	37	0.10	7.90	8.30		35	12	70	<40	<20	8	<40	<10	30	445
	8/21/91	14:10	D	1				45														
	9/17/91	12:05	D	1	1600	140.0	9.0	110	0.30	2.40	5.80		130	28								
	10/16/91	13:15	D	1				240														
	4/22/92	13:25	DT	1	1600	0.6	8.5	240	11.00	9.70	6.90		32	9	<20	<30	<20	<2	<40	<10	10	672
	5/27/92	13:00	D	1	1800	6.0	8.5	120	0.10	3.80	7.30		7	10								
	1/27/93	13:30	D	1	1100	19.0	9.0	140	0.54	3.00	3.00		47	7								
	3/17/93	10:25	D	1	2100	53.0	7.6	550	46.00	49.00	24.00		52	11								
	4/21/93	10:45	D	1				110														
	5/26/93	11:30	DT	1	1100	16.0	9.0	86	0.64	2.50	3.70		20	8	<20	<30	<20	<2	<40	<10	<10	400
	6/9/93	11:25	D	1				74														
	7/14/93	12:30	D	1	1900	3.4	8.7	35	0.10	1.60	1.90		7	6								
	8/18/93	12:00	D	1				5.2														
	9/15/93	13:10	D	1	1400	6.5	8.8	46	0.18	1.70	3.00		8	<5								
	10/27/93	14:00	D	1	1600	18.0	8.6	45	0.32	3.20	3.80		21	12	<5	<10	25	2.5	<40	<10	43	
	11/17/93	13:55	D	1				19														
	1/18/94	13:15	D	1	1500	35.0	8.4	92	3.70	5.00	3.20		29	<5								
	4/20/94	11:50	D	1	1700	5.8	8.2	200	15.00	13.00	13.00		12	<5								
	5/26/94	14:00	D	1				290														
	6/30/94	11:10	D	1				73														
	10/26/94	11:30	D	1	2600	1.3	7.5	230	4.90	7.50	5.50		10	5								
	5/17/95	14:00	D	1	2400	54.0	8.2	460	26.00	30.00	5.20		71	12								
	7/26/95	13:15	D	1	2000	14.0	9.0	390	10.00	15.00	4.90		17	10								
	10/24/95	15:00	D	1	1100	280.0	8.3	70	2.60	4.80	4.00		280	20								
	4/24/96	13:50	D	1	2000	8.9	8.7	440	16.00	12.00	5.90		13	9								
	7/24/96	15:40	D	1	2000	11.0	9.1	170	4.60	8.10	2.30		15	12								
	11/5/96	14:25	D	1	1700	11.0	9.0	160	2.90	4.10	2.70		24	7								
	1/29/97	13:25	D	1	1900	21.0	8.4	65	<0.1	1.30	0.79		22	<6								
	4/15/97	13:10	D	1	1800	23.0	8.5	270	1.40	2.80	6.50		20	9								
	7/8/97	13:20	D	1	2100	18	9.2	140	0	3.2	3		59	15								
	10/29/97	11:30	D	1	1800	60	8.2	76	3	5.1	5		63	15								
	4/21/98	8:15	D	1	1570	104	7.38	314	13.0	14.0	5		115	23								
	5/19/99		D	1				306														
	6/2/99	10:00	D	1				<0.44														
	6/7/99	10:48	D	1				44														
	6/16/99	8:30	D	1				220														
	6/21/99	11:00	D	1				12	2.46	4.31	6.88											
	7/2/99	9:00	D	1				299														
	7/7/99	8:30	D	1				130														
	7/14/99	11:28	D	1				144														
	7/20/99	12:12	D	1				40														
	8/16/99	11:15	D	1				129														
	8/23/99	14:00	D	1				66														
	9/13/99	10:00	D	6	1780	29.0	8.7	110	2.51	0.13	1.73	0.78	20									
	9/13/99	15:00																				
	9/14/99	9:35	D	1	1630	45.0	8.2	75	0.18	1.61	3.30	0.97	55	18								
	9/14/99	10:00	D	6	1630	27.0	8.4	88	0.22	1.91	3.06	0.97	32	18								
	9/14/99	15:00																				
	9/14/99	16:00	D	6	1610	26.0	8.4	123	0.09	1.51	2.82	0.88	32	17								
	9/14/99	21:00																				
	9/14/99	22:00	D	6	1600	28.0	8.4	92	0.22	1.53	3.03	0.94	32	17								
	9/15/99	3:00																				
	9/15/99	4:00	D	6	1600	28.0	8.4	88	0.21	2.15	3.06	0.93	35	16								
	9/15/99	9:00																				

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STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
CICF25	9/15/99	10:00	D	6	1630	21.0	8.6	66	0.11	2.20	2.65	0.79	55	18								
	9/15/99	15:00																				
	9/15/99	16:00	D	6	1400	36.0	8.7	43	0.10	2.01	1.78	0.67	47	20								
	9/15/99	21:00																				
	9/15/99	22:00	D	6	1570	13.0	8.2	75	0.15	2.07	2.27	0.62	15	11								
	9/16/99	3:00																				
	9/16/99	4:00	D	6	2720	11.0	8.5	79	0.17	1.99	2.62	0.74	92	38								
	9/16/99	9:00																				
	9/16/99	10:00	D	6	1640	25.0	8.6	170	0.18	1.69	2.74	0.83	28	18								
	9/16/99	15:00																				
	9/16/99	16:00	D	6	1340	20.0	8.7	78	0.05	1.51	1.65	0.64	32	9								
	9/16/99	21:00																				
	9/16/99	22:00	D	6	1530	17.0	8.2	89	0.09	1.71	2.76	1.00	26	3								
	9/17/99	3:00																				
	9/17/99	4:00	D	6	1600	37.0	8.2	118	1.10	2.97	3.58	1.37	32	12								
	9/17/99	9:00																				
	9/17/99	10:00	D	24	1610	55.0	8.2	106	0.76	3.10	3.64		90	58								
	9/18/99	9:00																				
	9/18/99	12:00	D	5	1570	130.0	8.4	193	2.43	4.83	4.71		230	140								
	9/18/99	16:00																				
	9/19/99	3:00	D	6	1640	28.0	8.0	79	0.24	1.90	3.52	0.57	36	25								
	9/19/99	9:00																				
	9/19/99	10:00	D	6	1640	10.0	8.2	142	0.19	1.93	3.37	1.21	32	22								
	9/19/99	16:00																				
	9/19/99	22:00	D	6	1800	40.0	8.5	178	0.20	2.25	3.37	1.00	56	42								
	9/19/99	4:00																				
	9/20/99	15:00	D	6	1560	140.0	8.1	117	0.33	2.54	3.98	1.18	174	72								
	9/20/99	21:00																				
	9/20/99	3:00	D	6	1460	40.0	8.1	119	0.17	1.53	2.75	0.81	56	28								
	9/20/99	9:00																				
	9/20/99	10:00	D	6	1890	14.0	8.2	120	0.10	1.09	2.36	0.78	26	12								
	9/20/99	15:00																				
	9/20/99	16:00	D	6	1790	16.0	8.2	181	0.08	1.11	2.26	0.73	26	16								
	9/20/99	21:00																				
	9/20/99	22:00	D	6	1720	8.7	8.2	146	0.11	1.31	2.26	0.64	6	4								
	9/21/99	3:00																				
	9/21/99	4:00	D	6	1700	10.3	8.1	161	0.15	1.57	2.20	0.65	14	7								
	9/21/99	9:00																				
	10/5/99	11:42	D	24	1300	100.0	8.3	53	0.81	1.84	3.21		140	90								
	10/6/99	10:42										0.84										
	11/4/99	10:30	D	24	1700	450.0	8.0	207	7.08	12.00	13.60		1500	800								
	11/5/99	9:30										1.76										
	12/1/99	10:03	D	24	1790	140.0	8.0	136	4.29	6.00	9.18		100	51								
	12/2/99	9:03										0.31										
	12/14/99	11:40	D	24	1870	450.0	7.8	172	11.40	13.00	12.50		510	290								
	12/15/99	10:40										2.90										
	12/28/99	9:17	D	24	1690	170.0	8.1	110	0.06	2.80	2.23		230	100								
	12/29/99	8:17										1.69										
	1/12/00	10:01	D	24	1860	130.0	7.9	169	3.55	2.90	8.57		180	120								
	1/13/00	9:01																				
	1/21/00	9:18	D	24	2070	320.0	7.9	322	18.80	17.00	27.80	4.17	480	380								
	1/22/00	8:18																				
	1/26/00	10:45	ST	1											2	25	55	25	21	<2	207	100
	1/26/00	10:45	SF												<1	<8	22	6	12	<2	72	108
	2/2/00	10:44	D	24	2070	383.0	7.9	<0.44	14.00	19.00	11.60	2.10	630	500								

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
CICF25	2/3/00	9:44																				
	2/10/00	8:19	D	10	1230	250.0	7.8	140	1.19	4.40	4.96	2.30	430	120								
	2/10/00	17:19																				
	2/10/00	18:19	D	14	1240	340.0	7.5	180	1.25	5.00	11.00	2.50	450	330								
	2/11/00	7:19																				
	3/9/00	8:23	D	24	1560	34.0	8.1	87	0.08	1.60	2.30	0.76	44	34								
	3/10/00	7:23																				
	3/22/00	13:35	D	20	2040	23.0	8.0	340	19.30	26.00	9.79	2.61	50	12								
	3/23/00	8:35																				
	4/4/00	10:42	D	24	2130	25.0	8.1	300	14.90	0.23	11.00	3.34	62	26								
	4/5/00	9:42																				
	4/20/00	9:00	D	1	1840	3.4	8.2	110	<0.05	1.10	1.35	0.37	11	8								
	4/20/00	9:00																				
	5/12/00	11:39	D	1	2110	126.0	7.8	400	20.80	19.00	10.40	3.48	120	38								
	5/12/00	11:39																				
	5/30/00	12:39	D	24	1710	16.0	8.8	69	0.05	1.70	1.81	0.43	36	14								
	5/31/00	11:39																				
	6/7/00	10:14	D	1	1880	10.4	8.9	110	0.35	3.80	3.67	0.93	26	12								
	6/7/00	10:14																				
	6/19/00	12:00	D	4	1730	2.7	9.2	120	0.36	2.10	1.25	0.25	<10	<1								
	6/19/00	15:00																				
	6/19/00	16:00	D	6	1780	11.0	9.0	130	0.30	2.50	1.84	0.41	25	19								
	6/19/00	21:00																				
	6/19/00	22:00	D	8	1770	4.7	8.1	120	0.37	1.80	3.98	1.26	<10	<1								
	6/20/00	5:00																				
	6/20/00	6:00	D	4	1720	28.0	8.5	110	0.31	2.20	3.67	0.99	34	18								
	6/20/00	9:00																				
	6/20/00	10:00	D	6	1600	11.0	9.0	26	0.29	2.40	1.99	0.32	29	13								
	6/20/00	15:00																				
	6/20/00	16:00	D	6	1450	30.0	8.9	16	0.19	2.10	2.23	0.37	43	20								
	6/20/00	21:00																				
	6/20/00	22:00	D	6	1430	8.7	8.2	92	0.13	1.30	3.37	0.91	<10	<1								
	6/20/00	3:00																				
	6/20/00	4:00	D	6	1390	11.0	8.3	79	0.12	1.30	3.37	1.28	26	12								
	6/21/00	9:00																				
	6/21/00	10:00	D	6	1630	6.3	9.0	57	0.20	1.20	1.68	0.38	21	13								
	6/21/00	15:00																				
	6/21/00	16:00	D	6	1730	12.0	8.9	62	0.20	2.20	2.05	0.39	37	20								
	6/21/00	21:00																				
	6/21/00	22:00	D	6	1850	8.7	8.1	84	0.15	1.10	3.67	0.92	11	<1								
	6/22/00	3:00																				
	6/22/00	4:00	D	6	1800	23.0	8.1	88	0.12	1.20	3.67	0.92	43	18								
	6/22/00	9:00																				
	6/22/00	10:00	D	6	1790	27.0	8.9	16	0.22	2.80	2.05	0.33	61	24								
	6/22/00	15:00																				
	6/22/00	16:00	D	6	2010	27.0	8.8	88	0.19	3.10	1.96	0.33	43	13								
	6/22/00	21:00																				
	6/22/00	22:00	D	6	1950	14.0	8.1	100	0.15	2.70	3.98	0.94	26	7								
	6/23/00	3:00																				
	6/23/00	4:00	D	6	1800	60.0	8.1	100	0.14	3.40	5.81	0.98	140	33								
	6/23/00	9:00																				
	6/23/00	10:00	D	6	1670	50.0	9.0	15	0.23	2.60	2.54	0.39	82	28								
	6/23/00	15:00																				
	6/23/00	16:00	D	6	1890	50.0	9.0	14	0.26	4.00	2.60	0.35	53	14								
	6/23/00	21:00																				

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
CICF25	6/23/00	22:00	D	6	2870	25.0	8.1	26	0.19	6.90	4.28	1.35	25	10								
	6/24/00	3:00																				
	6/24/00	4:00	D	6	1880	37.0	8.3	19	0.16	2.60	3.98	0.89	55	10								
	6/24/00	9:00																				
	6/24/00	10:00	D	6	1780	30.0	9.2	62	0.24	4.30	1.77	0.29	30	9								
	6/24/00	15:00																				
	6/24/00	16:00	D	6	1910	55.0	8.9	70	0.19	3.20	1.99	0.34	18	4								
	6/24/00	21:00																				
	6/24/00	22:00	D	6	1860	18.0	8.1	79	0.15	2.00	3.37	0.91	36	12								
	6/25/00	3:00																				
	6/25/00	4:00	D	6	1780	50.0	8.4	75	0.12	3.10	3.67	0.89	<10	<1								
	6/25/00	9:00																				
	6/25/00	10:00	D	1	1710	55.0	8.9	21	0.23	3.10	2.36		48	12								
	6/26/00	9:36	D	1	1610	27.0	8.8	20	0.15	2.20	2.66	0.66	29	12								
	6/26/00	10:00	D	7	1840	55.0	9.0	34	0.18	3.10	2.94	0.38	82	24								
	6/26/00	16:00																				
	6/26/00	22:00	D	6	2200	50.0	8.5	140	0.14	4.30	2.85	0.57	52	20								
	6/26/00	10:00																				
	6/27/00	10:00	D	6	2040	280.0	8.7	48	0.67	8.90	7.96	0.67	460	110								
	6/27/00	15:00																				
	6/27/00	16:00	D	6	2100	95.0	8.9	120	0.22	6.30	3.37	0.47	98	28								
	6/27/00	21:00																				
	6/27/00	22:00	D	6	2010	21.0	8.2	57	0.16	2.70	4.28	1.17	20	18								
	6/28/00	3:00																				
	6/28/00	4:00	D	6	1880	230.0	8.3	42	0.13	4.20	6.43	1.10	310	280								
	6/28/00	9:00																				
	6/28/00	10:00	D	6	1850	380.0	8.7	100	0.46	7.70	7.96	0.81	490	126								
	6/28/00	15:00																				
	6/28/00	16:00	D	6	1880	140.0	8.8	120	0.18	3.30	3.67	0.47	160	46								
	6/28/00	21:00																				
	6/28/00	22:00	D	6	1710	19.0	8.3	70	0.13	2.50	4.59	1.48	12	8								
	6/29/00	3:00																				
	6/29/00	4:00	D	6	1610	160.0	8.3	57	0.10	2.60	4.59	1.09	76	21								
	6/29/00	9:00																				
	6/29/00	10:00	D	6	1590	100.0	8.9	44	0.29	4.40	3.00		120	23								
	6/29/00	15:00																				
	6/29/00	16:00	D	6	1610	60.0	8.8	53	0.20	4.30	2.14		65	7								
	6/29/00	21:00																				
	6/29/00	22:00	D	6	2340	22.0	8.1	30	0.14	2.70	3.98		28	14								
	6/30/00	3:00																				
	6/30/00	4:00	D	6	1950	110.0	8.1	28	0.12	3.80	5.20		120	34								
	6/30/00	9:00																				

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
DSBRCP	5/19/99		D	1				<0.44														
	9/13/99	10:00	D	24	920	2.30	8.60	3.16	<0.05	<0.2	0.21		8	3								
	9/14/99	9:00																				
	9/14/99	10:00	D	24	870	1.60	8.50	2.38	<0.05	<0.2	0.15		14	10								
	9/15/99	9:00																				
	9/14/99	10:00	D	24	870	1.50	8.50	2.42	<0.05	<0.2	0.15		4	1								
	9/15/99	9:00																				
	9/15/99	10:00	D	24	950	1.00	8.60	4.31	<0.05	<0.2	0.09		4	1								
	9/16/99	9:00																				
	9/16/99	10:00	D	24	925	1.80	8.50	4.71	0.06	<0.2	0.18		6	4								
	9/17/99	9:00																				
	9/17/99	10:00	D	6	905	1.60	8.50	4.13	<0.05	<0.2	0.09	0.02	9	5								
	9/17/99	15:00																				
	9/17/99	16:00	D	6	905	0.45	8.50	4.14	<0.05	<0.2	0.10	0.02	6	2								
	9/17/99	21:00																				
	9/17/99	22:00	D	6	900	0.60	8.60	4.58	<0.05	<0.2	0.07	0.01	4	1								
	9/18/99	3:00																				
	9/18/99	4:00	D	6	895	2.30	8.50	4.71	<0.05	<0.2	0.18	0.05	20	5								
	9/18/99	9:00																				
	9/18/99	10:00	D	24	915	2.90	8.50	4.60	<0.05	<0.2	0.25		9	5								
	9/19/99	9:00																				
	9/19/99	10:00	D	20	895	0.55	8.50	5.02	<0.05	<0.2	0.12		8	3								
	9/20/99	7:00																				
	9/19/99	10:00	D	24	915	0.65	8.50	4.75	<0.05	<0.2	0.15		6	4								
	9/20/99	9:00																				
	5/12/00	11:16	D	1				2.70														
	6/20/00	10:00	D	6	800	2.20	8.50	0.47	<0.05	<0.2	0.12		<10	<1								
	6/20/00	15:00																				
	6/20/00	10:00	D	24	790	4.0	8.4	2.0	<0.05	<0.2	0.31		<10	<1								
	6/21/00	15:00																				
	6/21/00	10:00	D	4	565	13.0	7.8	8.4	0.13	1.60	1.38		14	9								
	6/21/00	13:00																				
	6/21/00	17:00	D	17	845	2.1	8.4	2.1	<0.05	0.27	0.31		<10	<1								
	6/21/00	9:00																				
	6/22/00	9:50	D	1	850	1.3	8.2	1.5	<0.05	<0.2	0.12		<10	<1								
	6/22/00	10:00	D	24	850	1.3	8.4	1.8	<0.05	<0.2	0.15		<10	<1								
	6/23/00	9:00																				
	6/23/00	10:00	D	24	760	12.0	8.4	4.0	0.09	6.00	1.84		22	19								
	6/24/00	9:00																				
	6/24/00	10:00	D	3				<0.44	<0.05	1.30	3.67											
	6/24/00	12:00																				
	6/25/00	10:00	D	24	740	20.0	7.6	3.1	0.9	7.20	3.37		11	9								
	6/26/00	9:00																				
	6/27/00	10:00	D	24	590	3.0	8.4	14.0	0.3	1.80	4.90		<10	<1								
	6/26/00	9:00																				

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STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
CSCS03	5/19/99		D	1				84.1														
	6/2/99	10:15	D	1				44.9														
	6/7/99	10:24	D	1				17.8														
	6/16/99	9:30	D	1				70.4														
	6/21/99	12:00	D	1				7.9	<0.05	0.52	0.08											
	7/2/99	9:15	D	1				66.0														
	7/7/99	8:50	D	1				68.6														
	7/14/99	11:00	D	1				68.6														
	7/20/99	12:55	D	1				36.1														
	8/16/99	11:45	D	1				59.0														
	8/23/99	14:20	D	1				69.1														
	9/13/99	10:00	D	24	2800	9.1	8.4	69.5	<0.05	0.37	0.21		15	8								
	9/14/99	9:00																				
	9/14/99	10:00	D	24	2640	8.3	8.6	70.4	<0.05	0.65	0.18		19	14								
	9/15/99	9:00																				
	9/15/99	10:00	D	24	2900	7.0	8.4	74.8	<0.05	0.72	0.15		14	5								
	9/16/99	9:00																				
	9/16/99	10:00	D	24	2840	5.8	8.4	130.0	<0.05	0.36	0.19		12	3								
	9/17/99	9:00																				
	9/16/99	10:00	D	24	2810	5.8	8.4	118.0	<0.05	0.54	0.15		11	8								
	9/17/99	9:00																				
	9/17/99	10:00	D	24	2700	4.1	8.4	128.0	<0.05	0.48	0.12		9	6								
	9/18/99	9:00																				
	9/17/99	10:00	D	24	2760	3.5	8.4	94.6	<0.05	0.43	0.18		13	6								
	9/18/99	9:00																				
	9/18/99	10:00	D	24	2650	5.3	8.4	81.4	<0.05	0.65	0.34		14	5								
	9/19/99	9:00																				
	9/19/99	10:00	D	24	2780	3.9	8.4	96.4	<0.05	0.57	0.12		12	3								
	9/20/99	9:00																				
	5/12/00	13:33	D	1				75.0														
	6/19/00	12:00	D	22	2700	2.7	8.3	75.0	<0.05	0.39	0.06	0.13	<10	<1								
	6/20/00	9:00																				
	6/20/00	10:00	D	24	2470	3.2	8.4	79.0	<0.05	0.35	0.15		<10	<1								
	6/21/00	9:00																				
	6/21/00	10:00	D	24	2840	2.3	8.4	75.0	<0.05	0.42	<0.061		<10	<1								
	6/22/00	9:00																				
	6/22/00	10:00	D	24	2820	2.0	8.4	79.0	<0.05	0.51	0.06		<10	<1								
	6/23/00	9:00																				
	6/22/00	10:00	D	24	2780	2.3	8.4	79.0	<0.05	0.69	0.06		<10	<1								
	6/23/00	9:00																				
	6/23/00	10:00	D	24	2840	4.3	8.3	75.0	<0.05	0.56	0.06		<10	<1								
	6/24/00	9:00																				
	6/24/00	10:00	D	4	2720	7.9	8.5	53.0	<0.05	0.73	0.09		<10	<1								
	6/24/00	13:00																				
	6/25/00	9:00	D	1	2760	10.7	8.4	57.0	<0.05	0.70	0.12		15	7								
	6/26/00	10:00	D	24	2770	5.1	8.3	75.0	<0.05	0.30	0.09		<10	<1								
	6/27/00	9:00																				

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
RCWF26	8/21/91	14:20	D	1	1500	2.7	8.4	150	1.2	2.1	11		8	<5								
	3/20/92	18:00	ST	7	340	7000	7.9	15	0.3	1.4	10		7800	900	<20	<30	60	43	<40	<10	110	140
	3/21/92	7:43																				
	3/27/92	5:43	ST	4	220	1000	7.6	18	0.1	1	2.5		1000	130	<7	40	63	48	20	<2	150	89
	3/27/92	7:43																				
	4/22/92	14:00	D	1	1700	10	7.9	310	13	14	3.8		180	27								
	5/27/92	13:50	D	1	1700	13	7.7	190	6.4	9.1	4.7		310	51								
	6/23/92	13:00	D	1	1600	33	8.4	190	1.8	3	2.4		66	11								
	7/22/92	13:35	D	1	1100	19	8.8	77	0.3	0.5	1.7		30	9								
	11/18/92	11:45	D	1	1100	2.9	8.2	31	0.25	0.6	3.9		<5	<5								
	12/29/92	11:00	ST	1	240	6100	8.3	4.7	0.26	9.3	25		10000	870	<20	<30	47	2	<40	<10	<120	
	2/18/93	15:00	ST	4	510	3100	8.3	19	0.58	7.9	19		6700	580	9.6	30	51	110	27	<4	69	180
	2/19/93	1:00																				
	2/23/93	15:00	ST	3	320	2000	8.1	6.9	0.86	5.3	13		4500	520	7.4	12	<30	9.6	20	<4	170	140
	2/23/93	19:00																				
	4/21/93	11:05	S	1	1200	680	8.2	75	8.4	10	6.7		1300	75								
	5/26/93	12:00	DT	1	1800	42	7.9	330	25	22	2.6		100	12	<0.4	1.2	1.3		<0.8	<0.2	4.8	
	8/18/93	12:15	D	1	1500	15.4	8.0	200	6.2	6.8	6.6		41	14								
	11/17/93	14:15	D	1	1400	3.3	7.9	200	6.6	8.3	12		7	7								
	4/20/94	12:15	D	1	2200	22	7.3	<0.2	56	55	10		230	11								
	5/26/94	14:15	D	1	1300	46	8.3	100	6.1	5.4	3.0		130	20								
	6/30/94	11:25	D	1	1400	3.4	8.5	110	0.25	0.79	3.0		9	<5								
	10/26/94	12:00	D	1	1100	1.7	8.2	18	0.21	0.65	0.36		46	7								
	11/30/94	12:00	D	1	1200	26	8.3	3.2	<0.1	0.82	1		64	16								
	7/26/95	13:45	D	1	1200	18.0	9.3	26.0	0.60	1.60	2.00		90	15								
	3/12/96	21:23	ST	5	180	510.0	7.7	6.9	0.55	3.60	4.30		1300	130	4	40	63	50	32	<1	310	56
	3/12/96	22:23																				
	3/13/96	0:23	ST	5	320	3700.0	7.5	27.0	0.94	12.00	14.00		5800	720	10	96	160	300	110	2	450	350
	3/13/96	20:23																				
	4/1/96	13:42	ST	5	1800	62.0	7.8	120.0	1.80	5.10	5.10		100	19	2	<10	32	6	8	<1	42	480
	4/1/96	17:42																				
	4/1/96	18:42	ST	5	900	270.0	7.1	58.0	2.00	9.80	4.40		480	78	3	16	260	23	27	1	170	324
	4/1/96	22:42																				
	4/3/96	8:24	ST	11	1500	76.0	7.8	69.0	9.00	9.90	9.50		135	29	<1	<10	42	5	7	<1	40	592
	4/4/96	16:24																				
	4/17/96	20:54	DT	1				10.0	28.00	98.00	44.00		43	1	200							
	4/23/96	14:15	DT	8	1200	140.0	8.3	130.0	0.96	2.50	2.50		320	60	2	12	50	7	3	<1	71	420
	4/24/96	10:15																				
	5/29/96	12:30	DT	12	1300	140.0	8.6	68.0	0.17	1.60	6.10		190	30	2	<10	30	4	11	<1	55	356
	5/30/96	8:30																				
	6/20/96	10:30	DT	1	1100	9.8	8.4	110.0	0.20	1.80	4.20		17	10	<1	<10	5	<2	10	<1	43	
	7/24/96	16:00	DT	23	1400	20.0	8.1	75.0	7.20	7.80	2.50		27	10	<1	<10	21	<2	8	<1	26	406
	7/25/96	14:00																				
	8/27/96	14:30	DT	18	1100	11.0	8.4	28.0	0.21	1.10	1.40		14	5	<1	<10	10	<2	<4	<1	56	265
	8/28/96	8:30																				
	9/24/96	13:30	DT	4	1000	20.0	8.9	29.0	0.19	1.60	1.10		26	8	<1	<10	29	<2	<4	<1	29	425
	9/24/96	16:30																				
	11/21/96	10:38	ST	5	700	150.0	7.3	61.0	0.47	3.80	2.90		230	38	<1	<10	60	12	13	<1	140	262
	11/21/96	11:38																				

NEWPORT BAY WATERSHED

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
RCWF26	11/22/96	3:38	ST	7	610	1900.0	7.9	32.0	0.45	4.40	8.00		3000	230	6	79	110	47	49	<1	390	570
	11/22/96	19:38																				
	2/27/97	11:30	DT	1	780	180.0	7.5	6.5	7.00	13.00	2.30		190	48								
	3/12/97	11:05	DT	1	1700	330.0	7.9	300.0	25.00	2.60	19.00		370	55	2	<10	24	8	14	<1	29	514
	4/16/97	13:30	DT	1	1300	450.0	8.3	130.0	0.51	3.50	5.70		480	74	4	20	24	10	14	2	110	458
	5/20/97	13:10	DT	5				110.0	2.70	5.50	6.70				1	11	24	54	11	<1	120	
	5/20/97	17:10																				
	6/10/97	8:02	DT	21	1500	25.0	8.0	160.0	3.40	4.30	3.20		<6	<6	<1	<10	18	2	5	<1	35	
	6/11/97	4:02																				
	6/20/00	10:00	DT	3				8.9	<0.05	2.20	2.60				<1	<10	5	<2	<4	<1	25	
	6/20/00	12:00													1.2	<10	17	5	8	<1	54	
	6/21/00	19:00	D	3				4.8	<0.05	3.60	2.45											
	6/22/00	2:00																				

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
HCWF27	6/19/91	14:00	D	1				0.9														
	7/23/91	16:00	D	1	1400	3.5	7.2	0.7	0.1	3.2	6.4		180	52								
	8/21/91	14:40	D	1	1400	4.6	7.4	28	0.2	1.8	4.8		250	160								
	9/17/91	12:20	D	1	920	15	7.6	0.2	<0.1	1.2	8.5		37	16								
	10/16/91	13:30	D	1	830	15	7.4	1.8	<0.1	1.2	5.2		94	17								
	12/18/91	12:15	D	1	1300	1.4	7.6	2.9	0.6	<0.5	72		<5	<5								
	4/22/92	13:50	D	1	1200	1.2	7.6	2.5	<0.1	0.7	5.1		48	15								
	5/27/92	13:30	D	1	1300	4	7.8	21	0.2	12	4.3		<5	<5								
	6/23/92	12:40	D	1	1300	80	7.8	1.9	<0.1	2.4	6.7		180	29								
	7/22/92	13:20	D	1	870	6.6	8.2	2.1	0.1	0.5	3.4		6	5								
	8/26/92	11:00	D	1	880	9	8.3	1.6	0.1	0.2	0.7		18	7								
	9/23/92	11:40	D	1	1000	2.6	8.3	53	2.9	4	3.8		<5	<5								
	10/28/92	14:10	D	1	1500	31	7.4	200	1.5	4	7		31	12								
	11/18/92	11:35	D	1	1300	3.8	7.7	7.9	0.21	1.2	6.7		<5	<5								
	12/16/92	11:40	D	1	1900	15	7.4	50	<20	21	17		13	9								
	12/29/92	10:45	DT	1				5.7	0.35	12	38				<20	<30	21	2	<40	<10	240	
	3/17/93	10:35	D	1	2100	45	7.4	530	48	48	19		30	8								
	4/21/93	10:50	D	1	3000	100	7.1	800	69	67	5.7		120	22								
	5/26/93	11:45	DT	1	1100	7.8	7.8	120	2.2	4.1	5.2		8	<5	<0.4	1.9	2.6		1.7	<0.2	13	
	6/9/93	11:40	D	1	2400	25	7.5	600	53	55	4.8		17	8								
	7/14/93	12:40	D	1	1100	3	8.4	8.4	<0.1	1.4	2.6		<5	<5								
	8/18/93	12:00	D	1	2300	11	7.5	450	31	33	6.9		<5	<5								
	9/15/93	13:20	D	1	1400	10	7.7	160	6.2	7.5	6.0		<5	<5								
	10/27/93	14:10	D	1	1500	19	7.2	17	0.23	3.8	9.6		23	16								
	11/17/93	14:00	D	1	1300	1.4	7.6	26	0.18	1.8	5.1		<5	<5								
	1/18/94	13:30	D	1	1200	68	7.9	16	0.19	1.3	2.7		14	<5								
	4/20/94	12:10	D	1	1400	4.4	7.6	4.8	0.36	1.5	4.9		12	<5								
	6/30/94	11:15	D	1	1300	2.3	7.6	0.47	0.22	0.85	3.9		5	<5								
	10/26/94	11:45	D	1	2900	1.4	7.5	110	16	32	21		210	46								
	11/30/94	11:45	D	1	1500	2.9	7.7	19	0.12	2.1	3.9		22	7								
	5/17/95	14:15	D	1	8000	7	7.7	7.9	0.40	0.74	3.8		14	<6								
	7/26/95	13:30	D	1	1500	27.0	7.6	160.0	8.50	9.70	4.50		73	11								
	8/30/95	12:00	D	1	1400	81.0	8.1	100.0	0.32	2.30	5.90		160	23								
	9/20/95	13:25	DT	1	1900	9.1	7.6	320.0	0.54	5.20	3.40		12	6	<1	<10	17	2	<40	<1	35	
	11/15/95	10:55	D	1	1300	9.0	8.0	3.6	<0.10	1.20	3.30		<6	<6								
	12/6/95	11:00	D	1	1100	9.3	8.2	4.9	0.15	1.30	3.60		20	<6								
	2/14/96	12:20	D	1	1300	3.9	8.0	64.0	2.60	8.90	4.00		13	7								
	4/24/96	14:00	D	1	1100	8.3	8.8	0.5	0.12	1.70	2.50		81	18								
	5/30/96	13:30	D	1	1000	17.0	9.1	<0.2	0.16	2.70	3.80		100	23								
	6/20/96	10:15	D	1	1200	2.0	9.6	7.3	0.25	13.00	2.40		13	10								
	7/24/96	15:50	D	1	1800	8.5	8.0	180.0	33.00	26.00	4.90		10	<6								
	8/27/96	14:50	D	1	1400	3.8	8.3	120.0	0.27	2.20	3.00		12	7								
	9/24/96	14:25	D	1	980	18.0	8.5	31.0	0.20	1.70	3.60		55	20								
	1/29/97	15:15	D	1	930	12.0	7.8	67.0	0.50	2.70	2.70		<6	<6								
	2/27/97	11:20	D	1	1600	15.0	7.5	240.0	28.00	22.00	1.80		<6	<6								
	3/12/97	10:55	D	1	1900	55.0	7.7	460.0	42.00	38.00	24.00		51	14								
	4/15/97	13:20	D	1	1400	39.0	7.7	150.0	0.64	2.00	6.00		48	12								
	5/20/97	11:20	D	1	1400	44.0	7.3	190.0	20.00	19.00	11.00		42	<6								
	6/10/97	8:30	D	1	1700	16.0	7.4	240.0	18.00	16.00	4.40		13	7								
	7/8/97	13:35	D	1	970	11	8.1	21	<0.1	2.2	4.80		80	19								
	8/15/97	14:00	D	1	840	56	7.8	36	1	4.4	6.10		77	18								
	9/24/97	10:30	D	1	920	8.4	7.9	2.4	<0.1	1.3	2.40		7	<6								
	10/29/97	12:05	D	1	1100	15	7.7	1.0	0.20	1.7	4.00		22	9								
	6/24/98	11:00	D	1	700	7.9	7.7	2.0	0	1.6	5.50		24	10								

NEWPORT BAY WATERSHED

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
HINF28	6/19/91	13:30	DT	1	2000	12.0	8.8	300	0.80	3.60	7.90		<5	<5	<7	<10	<30	<20	<10	<2	<10	
	7/23/91	15:20	DT	1	1700	4.8	9.2	170	0.60	11.00	6.10		<5	<5	<20	<40	30	<2	<40	<10	30	476
	8/21/91	14:00	D	1				320														
	9/17/91	11:55	D	1	2000	13.0	8.4	300	3.10	5.50	6.60		25	14								
	10/16/91	13:10	D	1				230														
	4/22/92	13:15	DT	1	1500	5.3	7.9	290	9.60	9.80	4.50		110	16	<20	<30	<20	2	<40	<10	20	520
	5/27/92	12:50	D	1	1700	12.0	8.0	140	5.20	6.80	6.90		30	13								
	1/27/93	13:10	D	1	1900	150.0	7.7	360	28.00	30.00	14.00		170	25								
	3/17/93	10:20	D	1	1600	140.0	7.7	370	13.00	15.00	13.00		160	22								
	5/26/93	11:15	DT	1	1100	120.0	8.4	120	2.90	5.10	5.90		210	27	<20	<30	<20	<2	<40	<10	18	660
	6/9/93	11:20	D	1				280														
	7/14/93	12:20	DT	1	1600	27.0	8.5	120	0.18	3.30	4.40		40	17								
	8/18/93	11:45	D	1				200														
	9/15/93	12:55	DT	1	2100	11.0	7.0	270	5.00	9.40	9.70		5.0	4								
	11/17/93	13:45	D	1				20														
	1/18/94	13:00	DT	1	1300	190.0	8.2	120	7.20	8.10	6.30		220	35								
	4/20/94	11:45	D	1	2000	25.0	7.8	170	26.00	27.00	18.00		410	6								
	5/26/94	13:50	D	1				720														
	6/30/94	11:00	D	1				170														
	10/26/94	11:10	D	1	2500	65.0	7.8	300	8.70	10.00	9.80		160	20								
	5/17/95	13:50	D	1	2400	52.0	8.0	460	24.00	27.00	4.70		60	12								
	10/24/95	14:50	D	1	1000	1200.0	8.0	77	4.00	11.00	11.00		1300	88								
	4/24/96	13:35	D	1	2300	26.0	7.8	580	40.00	31.00	6.70		24	12								
	7/24/96	15:25	D	1	1800	28.0	7.8	140	7.80	7.80	5.20		30	12								
	11/5/96	14:20	D	1	1600	62.0	8.1	210	4.30	5.40	5.30		57	10								
	12/4/96	16:20	D	1	1100	47.0	8.3	79	1.00	2.10	2.90		46	10								
	4/15/97	13:05	D	1	2000	250.0	7.2	260	11.00	12.00	13.00		310	53								
	7/8/97	13:00	D	1	2200	20	9.0	85	0	3.1	4		74	16								
	10/29/97	11:45	D	1	2200	390	8.0	210	12	14	14		550	62								
	4/21/98	8:05	D	1	1520	26	7.51	346	13	13.2	3		31	13								
	10/5/99	11:10	D	12	1390	950.0	7.9	70.4	2.62	6.00	12.50	1.15	<2300	<1900								
	10/5/99	22:10																				
	11/4/99	9:40	D	24	2130	1000.0	7.7	317	15.00	9.40	48.30	5..35	4100	<1700								
	11/5/99	8:40																				
	12/1/99	4:25	D	24	1810	210.0	7.8	132	1.12	3.20	8.26	0.21	140	<110								
	12/2/99	18:25																				
	12/14/99	12:03	D	24	2020	320.0	7.2	154	7.06	12.00	11.90	1.54	430	150								
	12/15/99	11:03																				
	12/28/99	13:33	D	24	1730	290.0	7.7	96.8	0.24	6.30	10.10	2.10	<440	<320								
	12/29/99	12:33																				
	1/12/00	10:25	D	24	2010	340.0	7.8	212	8.65	9.40	13.50		410	260								
	1/13/00	9:25																				
	1/21/00	9:33	D	24	1620	290.0	7.9	169	8.61	11.00	10.70	2.45	330	230								
	1/22/00	8:33																				
	1/26/00	10:15	ST	1											<16	70.5	107	57.2	<71	<2	514	324
	1/26/00	10:15	SF												9.97	11	52.3	14.1	<39	<2	149	368
	2/10/00	8:00	D	10	1880	1100.0	7.9	240	4.10	9.30	3.52	2.46	<1440	<580								
	2/10/00	17:00																				
	2/10/00	18:00	D	14	1500	460.0	7.5	250	1.24	5.20	2.82	3.10	830	<360								
	2/11/00	7:00																				

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
HINF28	3/9/10	8:44	D	22	1260	18.0	8.3	36	0.06	0.79	3.06	0.97	34	20								
	3/10/00	5:44																				
	3/22/00	14:10	D	18	2330	80.0	7.6	590	47.90	52.00	20.50	5.48	140	42								
	3/23/00	7:10																				
	4/4/00	10:19	D	24	2370	51.0	7.3	540	32.00	0.20	22.60	6.21	80	20								
	4/5/00	9:19																				
	4/20/00	9:15	D	1	1930	142.0	7.5	450	23.90	31.00	23.60	4.65	150	104								
	4/20/00	9:15																				
	5/12/00	12:30	D	1	2070	78.0	7.6	400	18.10	15.00	13.20	4.27	74	24								
	5/12/00	12:30																				
	5/31/00	12:00	D	1	1670	74.0	8.7	77	<0.05	2.60	5.20	1.31	98	66								
	5/31/00	12:00																				
	6/7/00	10:30	D	1	1820	86.2	8.6	73	0.13	3.10	9.79	2.25	150	96								
	6/7/00	10:30																				
	6/27/00	12:30	D	1								1.35										
	6/27/00	12:30																				

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STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
CMCG02	2/12/92	14:00	ST	6	110	19.0	7.0	2.3	0.15	0.50	1.40		42	16	2	<6	20	18	<10	<2	100	32
	2/12/92	19:00																				
	2/13/92	13:10	ST	4	600	12.0	7.7	3.1	0.10	0.50	1.70		<5	<5	<2	<6	37	9	<10	<2	70	32
	2/13/92	16:10																				
	2/15/92	9:00	ST	12	140	21.0	7.3	1.2	0.10	0.50	1.40		24	11	<2	<6	41	22	<10	<2	100	50
	2/15/92	20:00																				
	2/15/92	21:00	ST	9	180	11.0	7.3	1.5	0.10	0.50	1.10		13	8	<2	<6	46	8	<10	<2	80	52
	2/16/92	8:00																				
	3/1/92	19:46	ST	4	170	34.0	6.8	5.2	0.30	1.80	0.80		72	30	<2	<6	32	26	<10	<2	190	64
	3/1/92	23:46																				
	3/1/92	22:46	ST	10	140	30.0	7.0	3.3	0.20	1.40	0.90		18	13	<2	<6	23	10	<10	<2	120	58
	3/2/92	7:46																				
	3/2/92	9:46	ST	10	110	38.0	7.1	1.3	0.10	1.30	1.00		37	23	<2	<6	22	22	<10	<2	120	40
	3/2/92	18:46																				
	3/3/92	10:05	ST	8	450	100.0	7.5	7.7	0.10	2.30	0.70		60	13	<2	<6	27	13	<10	<2	90	130
	3/3/92	17:05																				
	2/7/93	20:00	ST	3	130	8.2	7.1	2.1	0.23	0.55	0.97		14	9	<20	<30	<20	8.3	<40	<10	110	37.6
	2/8/93	4:00																				
	2/8/93	6:00	ST	5	300	39.0	7.1	1.8	0.16	1.00	1.20		47	22	<20	<30	25	21	<40	<10	140	70
	2/8/93	14:00																				
	2/8/93	16:00	ST	3	88	24.0	7.1	1.0	0.16	0.62	1.00		52	20	<20	<30	<20	18	<40	<10	120	24.8
	2/8/93	20:00																				
	2/18/93	12:50	ST	8	180	27.0	7.6	1.8	0.14	0.65	1.00		30	16	<7	<10	<30	14	<3	<4	120	50
	2/19/93	10:50																				
	2/19/93	12:50	ST	8	210	20.0	7.5	1.7	0.14	0.51	0.89		13	11	<7	<10	<30	7.3	<3	<4	72	56
	2/20/93	10:50																				
	2/20/93	12:49	ST	2	260	44.0	7.7	1.4	0.10	0.69	0.61		35	21	<7	<10	<30	19	<3	<4	90	86
	2/20/93	14:49																				
	2/23/93	11:48	ST	4	140	46.0	7.4	0.8	0.10	1.10	1.30		68	30	<7	<10	32	21	8.6	<4	240	36
	2/23/93	17:48																				
	2/23/93	19:48	ST	3	430	25.0	7.7	1.8	<0.1	55.00	0.80		15	<5	<7	<10	<30	6.3	9.4	<4	180	96
	2/24/93	3:48																				
	2/25/93	10:42	ST	11	2000	7.0	8.6	8.5	0.11	0.56	0.25		<5	<5	<7	<10	<30	<2	<3	<4	<20	412
	2/26/93	6:42																				
	2/26/93	8:42	ST	6	180	46.0	7.5	1.4	0.18	0.75	0.72		43	21	<7	11	<30	19	10	<4	71	44
	2/26/93	18:42																				
	3/1/93	14:00	ST	1	1900	4.1	9.6	3.6	0.10	0.44	0.66		5	9	<7	<10	<30	<2	<3	<4	<20	320
	10/17/93	6:41	ST	7	570	24.0	7.4	8.1	0.22	3.60	2.30		66	37	<5	11	67	<50	<40	<10	330	142
	10/17/93	18:41																				
	10/17/93	20:41	ST	8	990	5.3	8.0	2.0	0.26	1.50	1.90		12	10	<5	<10	30	<50	<40	<10	100	254
	10/18/93	10:41																				
	10/18/93	12:41	ST	12	1100	4.7	8.0	0.2	0.17	2.30	1.50		6	5	<5	<10	37	<2	<40	<10	72	364
	10/19/93	10:41																				
	10/19/93	12:41	ST	12	1200	5.0	8.1	0.7	0.10	1.40	1.50		<5	<5	<5	<10	31	<2	<40	<10	31	320
	10/20/93	10:41																				

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
CMCG02	11/11/93	3:30	ST	6	440	45.0	7.1	11.0	0.20	6.20	3.70		160	81	<5	<10	65	42	<40	<10	400	102
	11/11/93	13:30																				
	11/11/93	15:30	ST	12	880	7.8	7.8	4.4	0.10	2.20	1.60		21	10	<5	<10	36	7.8	<40	<10	100	234
	11/12/93	13:30																				
	11/12/93	15:30	ST	11	1200	2.3	8.1	1.2	0.55	1.30	1.30		<5	<5	<5	<10	21	<2	<40	<10	47	402
	11/13/93	11:30																				
	11/13/93	13:30	ST	12	1700	2.4	8.1	4.1	0.29	13.00	1.70		17	6.0	<5	<10	41	<2	<40	<10	63	404
	11/14/93	11:30																				
	11/14/93	13:30	ST	7	1200	2.3	8.0	0.4	0.21	0.97	1.40		<5	<5	<5	<10	38	<2	<40	<10	77	316
	11/15/93	1:30																				
	11/30/93	1:36	ST	8	460	15.0	7.2	4.0	0.10	2.30	2.00		68	<5	<5	<10	39	20	<40	<10	170	112
	11/30/93	15:36																				
	11/30/93	17:36	ST	8	860	2.5	7.9	4.6	0.25	1.00	0.88		<5	<5	<5	<10	21	2	<40	<10	57	236
	12/1/93	5:36																				
	12/19/93	2:31	ST	3	180	9.0	6.9	4.0	0.62	1.80	2.20		11	<5	<5	<10	26	9.4	<40	<10	89	48
	12/19/93	6:31																				
	12/19/93	8:31	ST	14	770	2.6	8.0	1.7	0.10	1.30	1.30		<5	<5	<5	<10	23	2.3	<40	<10	49	209
	12/20/93	10:31																				
	12/20/93	12:31	ST	11	1000	1.4	8.0	0.2	0.10	0.47	3.80		<5	<5	<5	<10	23	<2	<40	<10	23	350
	12/21/93	8:31																				
	12/22/93	8:30	ST	9	1000	6.8	8.0	3.9	0.10	1.40	1.00		7.0	<5	<5	<10	26	<2	<40	<10	33	298
	12/23/93	0:30																				
	3/3/95	6:59	ST	3	310	25.0	6.9	4.3	0.10	3.00	2.50		50	26	<1	<10	11	14	<40	1.8	150	49
	3/3/95	10:59																				
	3/3/95	12:59	ST	18	830	16.0	8.6	1.3	0.13	1.70	0.90		10	9	<1	<10	41	6.4	<40	2.1	90	166
	3/4/95	22:59																				
	3/5/95	0:59	ST	11	81	11.0	7.2	0.4	0.11	0.91	0.77		22	7	<1	<10	27	6.3	<40	<1	69	23
	3/6/95	0:59																				
	3/10/95	22:01	ST	3	160	32.0	6.9	2.5	0.10	2.10	1.40		50	27	<1	<10	37	18	<40	<1	180	28
	3/11/95	2:01																				
	3/11/95	4:01	ST	15	730	12.0	7.6	3.3	0.12	2.30	1.30		17	11	<1	<10	24	6.7	<40	<1	100	134
	3/12/95	8:01																				
	3/12/95	10:01	ST	25	2400	2.1	8.5	10.0	0.18	1.40	0.63		<6	<6	<1	<10	12	<2	<40	<1	71	490
	3/14/95	20:20																				
	3/21/95	5:57	ST	3	250	92.0	6.9	4.5	0.43	2.90	1.80		91	39	<1	<10	40	26	<40	1	220	110
	3/21/95	9:57																				
	3/21/95	11:57	ST	22	1800	4.0	8.5	7.2	0.10	0.72	0.62		<6	<6	<1	<10	16	<2	<40	<1	15	375
	3/22/95	5:57																				
	3/23/95	7:57	ST	6	430	15.0	8.0	1.7	0.10	0.97	1.20		24	10	<1	<10	27	4	<40	1	53	64
	3/23/95	17:57																				
	3/23/95	19:57	ST	17	2300	2.4	8.4	10.0	0.10	0.99	1.60		7	6	<1	<10	15	<2	<40	1	17	446
	3/25/95	3:57																				

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STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
CMCG02	12/12/95	21:13	ST	5	580	300.0	6.7	29.0	4.00	23.00	13.00		700	250	5	36	300	150	82	<1	1900	164
	12/12/95	22:13																				
	12/13/95	0:13	ST	8	190	78.0	6.8	6.8	0.64	3.30	2.20		89	31	<1	<10	50	24	<40	<1	310	52
	12/13/95	14:13																				
	12/14/95	12:13	ST	29	1000	9.7	8.4	4.4	0.56	2.10	1.90		9	7	<1	<10	70	3	<40	<1	87	240
	12/16/95	20:13																				
	1/19/96	4:39	ST	5	150	20.0	7.5	7.3	0.84	3.60	1.10		51	28	<1	10	34	15	9	<1	210	42
	1/19/96	5:39																				
	1/19/96	7:39	ST	3	170	11.0	7.4	3.5	0.22	1.90	0.82		15	15	<1	<10	34	4	5	<1	130	44
	1/19/96	11:39																				
	1/21/96	15:03	ST	5											1	<10	49	33	34	<1	230	36
	1/21/96	16:35																				
	1/31/96	2:29	ST	5	100	61.0	7.1	2.7	0.48	3.20	1.40		50	25	2	12	34	<2	11	<1	210	30
	1/31/96	3:29																				
	1/31/96	5:29	ST	10	130	45.0	7.2	2.2	0.24	1.80	1.20		29	17	1	16	39	15	10	<1	110	40
	1/31/96	23:29																				
	2/1/96	1:29	ST	29	830	13.0	8.8	2.3	1.10	3.20	1.20		8	12	<1	<10	31	3	11	1	100	198
	2/2/96	9:33																				
	2/3/96	11:29	ST	8	430	19.0	7.3	2.6	0.16	5.60	1.60		12	11	<1	<10	44	9	7	3	100	90
	2/4/96	1:29																				
	2/19/96	20:00	ST	4	340	170.0	7.1	4.6	0.95	9.50	5.20		200	130	2	<10	100	36	19	2	730	116
	2/20/96	2:00																				
	2/20/96	4:00	ST	28	210	24.0	7.7	1.9	0.18	1.50	1.40		56	20	<1	<10	34	<2	<2	<1	140	50
	2/22/96	10:00																				
	2/22/96	12:00	ST	16	1100	11.0	9.1	1.7	0.22	3.30	2.20		7	10	<1	<10	27	2	10	<1	160	240
	2/23/96	18:00																				
	10/30/96	5:45	ST	2											15	110	410	500	130	24	5800	330
	10/30/96	6:00																				
	10/30/96	8:45	ST	6	270	62.0	6.9	6.2	0.16	3.30	2.40		94	32	2	<10	70	25	19	<1	320	60
	10/30/96	20:45																				
	10/30/96	22:45	ST	41	1100	8.2	8.3	1.0	0.60	1.60	1.60		<6	<6	<1	<10	26	4	6	<1	98	320
	11/3/96	6:45																				
	11/21/96	8:05	ST	5	170	42.0	6.7	9.6	0.64	3.80	1.90		39	23	<1	<10	79	18	16	<1	260	50
	11/21/96	9:05																				
	11/21/96	11:05	ST	9	130	28.0	7.0	3.7	0.19	1.90	1.60		36	15	<1	<10	46	16	7	<1	180	54
	11/22/96	3:05																				
	12/9/96	12:24	ST	5	350	72.0	6.7	5.8	0.37	3.60	2.00		89	41	<1	<10	64	34	12	<1	320	90
	12/9/96	13:24																				
	12/9/96	15:24	ST	5	270	82.0	7.3	2.9	0.14	1.30	1.40		29	16	<1	<10	25	9	7	<1	120	76
	12/10/96	3:24																				
	12/10/96	5:24	ST	10	720	17.0	8.2	2.4	0.11	2.80	1.30		44	10	2	<10	34	9	6	<1	130	194
	12/10/96	23:24																				
	12/12/96	13:24	ST	11	1000	9.3	8.9	3.3	0.26	4.20	<0.2		8	6	<1	<10	19	5	4	<1	120	265
	12/13/96	9:24																				
	1/1/97	15:21	ST	5	410	140.0	7.0	0.7	0.99	3.60	2.00		100	51	<1	11	49	31	15	<1	480	90
	1/1/97	16:21																				
	1/1/97	18:21	ST	6	420	44.0	7.3	2.1	0.30	1.60	0.92		20	11	<1	<10	34	8	11	<1	190	112
	1/2/97	4:21																				
	1/2/97	6:21	ST	16	610	20.0	8.5	1.3	0.34	1.20	0.73		15	8	<1	<10	34	7	8	<1	120	597
	1/3/97	14:21																				

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
CMCG02	1/21/97	20:49	ST	5	320	68.0	7.3	2.1	0.66	<0.5	0.21		130	49	<1	<10	31	28	6	<1	140	144
	1/21/97	21:49																				
	1/21/97	23:49	ST	13	580	17.0	8.3	3.8	0.30	2.10	1.40		10	<6	<1	<10	26	5	<4	<1	40	140
	1/22/97	23:49																				
	1/23/97	1:49	ST	5	220	6.4	7.6	1.6	0.31	0.81	0.68		<6	<6	<1	<10	28	3	<4	<1	<10	60
	1/23/97	9:49																				
	1/23/97	11:49	ST	26	1300	9.8	8.8	2.2	0.28	2.10	0.66		<6	<6	<1	<10	28	<2	<4	<1	160	340
	1/25/97	13:49																				
	1/25/97	15:49	ST	4	150	64.0	8.8	1.2	0.38	1.10	0.81		82	45	<1	<10	37	20	4	<1	260	40
	1/25/97	21:49																				
	9/4/97	13:36	D	15	1400	4.3	8.0	0.59	0.18	2.7	2.10	1.40	10	8								
	9/5/97	3:36																				
	9/5/97	4:36	D	9	1300	3.9	8.2	0.4	<0.1	2.4	2.7	2	16	19								
	9/5/97	12:36																				
	9/25/97	11:56	ST	5	110	60	6.9	7.4	0.15	2.6	1.80	<0.5	74	40	1	10	44	25	8	<1	270	50
	9/25/97	12:56	SF												2	<10	34	53	6	<1	400	
	11/10/97	8:58	SF	5				34.0				<0.5			<1	<10	49	7	23	<1	320	406
	11/10/97	9:58																				
	11/10/97	11:58	ST	9	700	130	6.8	8.2	1.70	15	5.90	<0.5	140	100	<1	<10	100	14	28	<1	580	174
	11/11/97	3:58	SF												<1	<10	67	5	23	<1	340	
	11/11/97	5:58	ST	24	740	14	8.1	1.8	0.28	3.0	2.00	<0.5	8	<6	<1	<10	<4	5	11	<1	120	162
	11/13/97	3:58	SF												<1	<10	34	2	12	<1	94	
	11/13/97	5:58	ST	14	300	37	7.6	4.6	0.41	2.0	1.40	<0.5	78	27	<1	<10	28	18	<4	<1	210	96
	11/14/97	7:58	SF												<1	<10	19	7	8	<1	120	
	11/19/97	9:24	DT	12	780	4.8	9.2	1.0	<0.1	1.6	0.48	<0.5	18	6								
	11/19/97	20:24																				
	12/6/97	12:10	ST	9	350	21	7.4	3.8	0.12	2.9	~~1.70~~	3.4	24	<20	<1	<10	31	8	4	<1	93	75
	12/7/97	8:10	SF												<1	<10	24	3	<4	<1	93	
	12/7/97	10:10	ST	31	1100	11	7.8	3.8	<0.1	2.9	0.90	<0.5	<6	<6	<1	<10	22	3	<4	<1	85	234
	12/10/97	22:10	SF												<1	<10	16	<2	4	<1	62	
	12/18/97	12:06	ST	5	290	100	6.8	6.1	0.60	4.8	2.20	0.79	140	61	<1	10	75	31	11	<1	310	64
	12/18/97	13:06	SF												<1	<10	30	2	6	<1	130	
	12/18/97	15:06	ST	10	500	18	7.6	3.6	<0.5	1.3	1.00	0.74	9	9	<1	<10	24	6	<4	<1	77	134
	12/19/97	9:06	SF												<1	<10	19	<2	<4	<1	66	
	12/19/97	11:06	ST	23	1300	3.2	8.4	2.5	<0.5	0.73	1.30		<6	<6	<10	<10	22	<2	<4	<1	61	336
	12/22/97	11:06	SF												<10	<10	19	<2	<4	<1	100	
	12/23/97	8:47	D	13	1400	3.6	8.9	1.4	0.16	1.9	2.00		<6	<6								
	12/23/97	19:47																				
	12/23/97	20:47	D	11	1500	1.5	8.4	1.8	<0.1	1.0	1.80		<6	<6								
	12/24/97	7:47																				
	1/3/98	3:41	ST	5	190	40	6.3	7.8	0.72	3.8	1.90	<0.5	57	32	<1	<10	53	14	7	<1	170	60
	1/3/98	4:41	SF												<1	<10	39	2	7	<1	100	
	1/3/98	6:41	ST	14	1300	160	7.7	29.0	<0.5	2.2	1.40	<0.5	170	29	<1	<10	21	3	5	<1	30	360
	1/4/98	8:41	SF												<1	<10	19	<2	7	<1	<10	
	1/4/98	10:41	ST	34	750	9.0	8.4	2.8	0.69	1.1	0.73	<0.5	6	6	<1	<10	20	2	<4	<1	44	104
	1/7/98	2:41	SF												<1	<10	18	<2	<4	<1	32	
	1/20/98		D	24	1300	6.0	9.0	0.9	0.13	2.2	0.74	<0.5	<6	<6								
	1/21/98																					

NEWPORT BAY WATERSHED

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
CMCG02	2/6/98	9:56	ST	5	350	22	6.8	4.4	<0.5	2.4	0.98		65	31	<1	5	35	15	6	<1	90	68
	2/6/98	10:56	SF												<1	5	24	6	5	<1	55	
	2/6/98	12:56	ST	11	300	19	7.5	3.5	<0.5	2.3	1.30		23	10	<1	4	22	9	<4	<1	47	74
	2/7/98	8:56	SF												6	2	21	3	<4	<1	27	
	2/7/98	18:56	ST	10	390	11.0	7.3	4.4	<0.5	2.1	1.50		11	7	<1.00	3	17	7	2	<1.00	40	65
	2/8/98	12:56	SF												<1.00	2	19	1	2	<1.00	32	
	2/8/98	18:56	ST	5	220	8.6	7.2	2.6	<0.5	1.6	1.40		<6	<6	<1.00	2	23	5	1	<1.00	37	50
	2/9/98	2:56	SF												<1.00	2	16	1	3	4	32	
	2/14/98	8:47	ST	5	200	22	7.0	5.3	<0.5	1.3	0.82		49	21	<1.00	5	30	19	5	<1.00	90	50
	2/14/98	9:47	SF												<1.00	2	31	1	2	<1.00	26.0	
	2/14/98	11:47	ST	7	240	12	7.6	4.9	<0.5	0.82	1.10		17	8	<1.00	3	21	8	1.70	<1.00	36	50
	2/14/98	23:47	SF												<1.00	6	13	20	3	<1.00	97	
	2/15/98	1:47	ST	21	1900	4.4	8.2	12.4	<0.5	1.6	11.00		7	7	<1.00	2	12	1.80	5	<1.00	26	384
	2/16/98	17:47	SF												<1.00	2	19	<1.00	3	<1.00	31	
	2/16/98	19:47	ST	10	450	11	8.0	4.0	<0.5	1.2	9.80				<1.00	13.0	18	6	3	14	71	80
	2/17/98	13:47	SF												<1.00	3	25	1	2	<1.00	33	
	2/17/98	15:47	ST	9	2000	4.9	8.2	13.3	<0.5	1.1	10.40				<1.00	4	48	4	14	<1.00	65	580
	2/18/98	7:47	SF												<1.00	17	13	<1.00	8.20	1	30	
	3/25/98	4:54	ST	5	532	52	7.5	11.1	0.2	2.5	0.90		109	40	2	9	97	25	12	<1.00	256	90
	3/25/98	5:54	SF												<1.00	3	31	3	9	<1.00	123	
	3/25/98	7:54	ST	7	161	15	7.6	2.6	<0.1	<1.0	0.60		11	2	<1.00	4	31	11	3	<1.00	80	40
	3/25/98	19:54	SF												<1.00	3	35	3	4	7	64	
	3/25/98	21:54	ST	27	1500	5.1	8.6	11.5	0.4	<1.0	0.90		3	<1	<1.00	3	35.0	6	5	<1.00	52	344
	3/28/98	1:54	SF												<1.00	2	31	2	3.20	<1.00	38.0	
	3/28/98	3:54	ST	13	1170	3.7	8.5	4.0	0.1	<1.0	0.30		5	1	<1.00	2	18	4	4	<1.00	48	276
	3/29/98	3:54	SF												18	3	16	1	5	<1.00	39	
	4/20/98	11:45	D	23	1730	17	8.5	6.6	0.2	4.30	1.50		136	40								
	4/21/98	9:45																				
	6/22/98	11:40	D	1	1310	2.4	9.3	<1.3	<0.05	1.70	1.10		6.0	8.0								
	7/15/98	10:00	D	24	1370	3.3	8.9	<1.3	<0.05	2.90	0.44		26	18								
	7/16/98	9:00																				
	8/17/98	10:14	D	24	1370	3.7	8.6	<1.3	<0.05	3.60	0.70		22	10								
	8/18/98	9:14																				
	9/4/98	8:58	ST	5	885	16	7.0	15	1.22	22.00	4.59		240	130	2	13	115	25	32	<2	584	250
	9/4/98	9:58	SF												<1	12	63	10	31	<2	513	
	9/4/98	11:58	ST	7	1290	5.9	7.5	4.8	0.27	4.80	1.96		35	20	<1	11	37	7	15	<2	159	260
	9/4/98	23:58	SF												<1	13	31	4	15	<2	167	
	9/5/98	1:58	ST	12	1000	3.1	8.1	<1.3	0.24	2.60	1.04		11	7	<1	<8	26	<2	5	<2	60	236
	9/5/98	23:58	SF												<1	<8	20	<2	5	<2	50	
	9/6/98	7:58	ST	23	1210	3.7	8.4	<1.3	0.12	2.20	1.04		11	8	<1	<8	24	<2	5	<2	49	284
	9/8/98	3:58	SF												<1	<8	18	<2	4	<2	35	
	9/8/98	9:11	D	24	1200	3.7	8.8	<1.3	<0.05	2.80	1.35		26	14								
	9/9/98	8:11																				
	9/14/98	8:45	D	24	1250	43	8.9	1.5	0.1	8.12	2.20		150	68								
	9/15/98	7:45																				
	9/21/98	9:18	D	24	1090	15	8.2	2.2	0.2		1.74											
	9/22/98	8:18																				
	9/28/98	12:00	D	24	960	3.6	8.2	1.9	<0.05	2.03	0.77		12	6								
	9/29/98	11:00																				

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
CMCG02	10/13/98	12:15	D	24	1080	3.4	8.8	1.4	0.16	2.54	1.62		24	<1								
	10/14/98	11:15																				
	10/20/98	11:55	D	24	1210	5.3	7.8	6.2	0.70	7.50	2.54		14	7								
	10/21/98	10:55																				
	10/26/98	10:04	D	24	1480	9.8	7.9	10.5	1.63	7.10	6.12		40	20								
	10/27/98	9:04																				
	11/2/98	10:30	D	24	1050	4.4	8.7	<1.3	0.07	1.91	1.53		26	16								
	11/3/98	9:30	D																			
	11/7/98	22:47	ST	5	1340	14	7.9	<1.3	0.06	4.47	5.81		80	40	<1	<8	29	5	6	<2	327	295
	11/7/98	23:47	SF												<1	<8	18	<2	4	<2	211	
	11/8/98	1:47	ST	12	630	6.4	7.7	5.7	0.11	2.62	2.36		40	20	<1	<8	32	11	5	<2	118	165
	11/8/98	23:47	SF												<1	<8	27	2	6	<2	89	
	11/9/98	1:47	ST	35	3010	6.2	8.3	6.2	0.77	4.20	1.53		16	12	<1	<8	42	5	6	<2	98	222
	11/11/98	21:47	SF												<1	<8	32	3	6	<2	69	
	11/18/98	11:34	D	24	1060	2.3	8.9	<1.3	0.08	1.40	1.29		24	14								
	11/19/98	10:34																				
	11/28/98	4:49	ST	5	205	22	6.9	4.8	0.11	4.80	1.87		180	82	1	11	76	37	12	<2	362	60
	11/28/98	5:49	SF												<1	<8	28	<2	7	<2	91	
	11/28/98	7:49	ST	13	350	16	7.4	4.0	0.07	2.48	2.42		30	18	<1	<8	40	8	7	<2	123	88
	11/29/98	7:49	SF												<1	<8	32	3	6	<2	79	
	11/29/98	9:49	ST	26	875	2.6	8.5	<1.3	<0.05	1.50	1.87		12	8	<1	<8	27	2	<4	<2	47	208
	12/1/98	11:49	SF												<1	<8	24	<2	<4	<2	39	
	12/1/98	13:49	ST	10	310	17	7.8	3.20	0.06	1.34	1.44		24	18	<1	<8	30	7	<4	<2	<10	84
	12/2/98	7:49	SF												<1	<8	<10	4	<4	75	<10	
	12/7/98	10:03	D	24	745	290	8.2	1.36	<0.05	1.89	1.77		140	30								
	12/8/98	9:03																				
	12/23/98	10:15	D	23	965	3.9	8.6	2.40	<0.05	0.82	0.73		50	6								
	12/24/98	8:15																				
	12/28/98	8:11	D	24	1010	5.9	8.8	0.97	0.11	0.85	0.83		23	12								
	12/29/98	7:11																				
	1/4/99	9:24	D	24	4450	2.8	8.4	4.60	<0.05	2.21	2.82		24	12								
	1/5/99	8:24																				
	1/13/99	12:05	D	24	1050	2.9	8.5	4.30	0.21	1.21	0.67		4	2								
	1/14/99	11:05																				
	1/19/99	8:53	DT	24	975	7.7	8.8	0.70	<0.05	2.28	1.74		40	24	5	28	5	5	24	4	27	
	1/20/99	7:53																				
	1/25/99	3:34	ST	5	160	19	6.8	3.39	0.67	3.55	2.75		140	74	<1	9	70	19	10	<2	240	60
	1/25/99	4:34	SF												<1	<8	30	<2	7	<2	76	
	1/25/99	6:34	ST	13	325	17	7.6	3.30	0.08	1.84	1.22		20	16	<1	<8	33	7	5	<2	96	120
	1/26/99	6:34	SF												<1	<8	23	<2	6	<2	65	
	1/26/99	8:35	ST	15	260	17	7.5	2.38	0.14	1.26	1.13		46	24	<1	<8	26	9	<4	<2	89	34
	1/27/99	12:35	SF												<1	<8	17	<2	<4	<2	38	
	1/27/99	14:35	ST	19	825	3.4	8.3	3.87	0.12	1.34	1.04		7	4	<1	<8	20	<2	<4	<2	34	216
	1/29/99	2:35	SF												<1	<8	18	<2	<4	<2	26	
	2/2/99	8:20	D	24	855	4.0	9.3	2.02	0.11	2.57	0.70		11	6								
	2/3/99	7:20																				

STATION	DATE	TIME	SAMPLES Type	#	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
CMCG02	2/4/99	18:07	ST	5	250	32	7.4	7.48	1.01	3.59	1.59		72	26	<1	10	50	14	9	<2	228	75
	2/4/99	19:07	SF												<1	<8	38	2	7	<2	128	
	2/4/99	21:07	ST	13	235	15	7.6	4.84	0.24	1.53	0.98		18	13	<1	<8	35	5	<4	<2	121	40
	2/5/99	21:07	SF												<1	<8	30	<2	<4	<2	208	
	2/5/99	23:07	ST	34	905	4.2	9.0	3.74	0.08	1.18	0.92		10	6	<1	<8	25	<2	<4	<2	38	195
	2/8/99	17:07	SF												<1	<8	21	<2	<4	<2	23	
	2/9/99	16:04	ST	5	260	24	7.4	5.72	0.32	4.52	1.71		100	48	<1	9	97	22	14	<2	327	86
	2/9/99	17:04																				
	2/9/99	19:04	ST	6	235	15	7.8	2.68	0.09	1.61	0.77		20	12	<1	<8	37	6	4	<2	99	88
	2/10/99	5:04	SF												<1	<8	28	<2	5	<2	65	
	2/10/99	7:04	ST	8	835	3.9	8.5	3.21	<0.05	0.86	0.92		10	6	<1	<8	23	<2	<4	<2	38	234
	2/10/99	21:04	SF												<1	<8	22	2	<4	<2	122	
	2/18/99	10:24	D	24	965	2.9	8.7	2.99	0.06	1.13	1.04		9	6								
	2/19/99	9:24																				
	2/22/99	11:44	D	24	1200	3.6	8.6	<0.44	<0.05	3.11	2.17		18	14								
	2/23/99	10:44																				
	3/1/99	11:15	D	24	1050	17	8.8	1.45	0.32	3.53	3.58		78	38								
	3/2/99	10:15																				
	3/8/99	10:18	D	24	1030	7.6	8.5	0.70	1.46	3.28	5.36		16	4								
	3/9/99	9:18																				
	3/11/99	11:18	ST	5	410	27	7.4	4.97	0.81	5.03	0.58		78	48	1	11	97	18	14	<2	294	110
	3/11/99	12:18																				
	3/11/99	14:18	ST	6	160	16	7.7	3.17	0.09	1.42	1.38		16	12	<1	8	50	8	5	<2	87	40
	3/12/99	0:18																				
	3/12/99	2:18	ST	37	1090	4.1	8.8	1.94	0.11	1.57	0.95		6	4	<1	<8	31	2	4	<2	48	276
	3/15/99	2:18	SF												<1	<8	24	<2	5	<2	27	
	3/22/99	11:39	D	24	1150	4.6	9.0	1.72	0.38	5.57	1.13		8	6								
	3/23/99	10:39																				
	3/25/99	11:26	ST	5	185	30	6.6	2.68	0.44	4.00	1.99		200	36	<1	9	62	22	12	<2	368	48
	3/25/99	12:26	SF												<1	<8	25	<2	7	<2	134	
	3/25/99	14:26	ST	9	270	8.5	7.7	2.16	0.08	0.80	0.77		8	6	<1	<8	22	4	<4	<2	82	78
	3/26/99	6:26	SF												1	<8	18	<2	<4	<2	69	
	3/31/99	9:03	D	24	1330	9.7	8.7	<0.44	<0.05	1.24	2.97		14	10								
	4/1/99	8:03																				
	4/27/99	9:55	D	24	980	14	9.0	1.58	0.22	3.18	0.98		52	34								
	4/28/99	8:55																				
	5/4/99	9:06	D	24	1260	86	9.0	<0.44	<0.05	7.98	2.80		270	190								
	5/5/99	8:06																				
	5/26/99	9:17	D	24	990	5.9	8.8	<0.44	0.08	1.95	0.86		24	16								
	5/26/99	9:17	DT	24											<1	9	36	4	6	<2	184	330
	5/27/99	8:17																				
	5/27/99	8:17	DF												2	9	28	2	5	<2	124	
	6/1/99	12:20	DT	24											<2	<8	30	16	5	<2	53	310
	6/2/99	11:20																				
	6/2/99	12:20	DT	24	750	4.3	9.1	<0.44	0.051	1.85	1.84		150	42	<2	<8	36	9	5	<2	81	200
	6/3/99	11:20																				
	6/7/99	9:18	DT	24	1160	25	8.9	4.09	<0.05	4.40	2.08		27	16	<2	<8	59	16	<4	<2	89	260
	6/7/99	9:18	D	24																		
	6/8/99	8:18	DF												<2	<8	33	6	4	<2	31	
	6/8/99	8:18																				

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
CMCG02	6/16/99	10:25	DT	24	1180	12	8.9	0.79	1.920	2.96	1.99		40	30	<1	<8	36	3	5	<2	47	360
	6/17/99	9:25	DF												<1	<8	31	<2	4	<2	32	
	6/23/99	15:00	DT	24	965	15	9.0	<0.44	0.165	5.03	0.903		16	10	<2	<8	30	<2	5	<2	32	352
	6/24/99	14:00	DF												<2	<8	24	<2	5	<2	22	
	6/30/99	14:31	DT	24	1140	4.3	8.8	<0.44	<0.05	2.36	1.61	0.36	<4	<1	<1	<8	35	6	6	<2	41	312
	7/1/99	13:31	DF												<1	<8	29	2	6	<2	35	
	7/7/99	12:29	DT	18	2060	30.0	8.5	4.5	<0.05	17.60	1.10	0.19	80	32	<1	<8	30	5	<4	<2	78	450
	7/8/99	5:29	DF												<1	<8	18	<2	<4	<2	23	
	7/8/99	6:29	ST	6	365	38.0	7.8	10.6	0.57	3.71	1.81	0.28	34	14	<1	<8	63	12	19	<2	383	110
	7/8/99	11:29	SF												<1	<8	52	53	6	<2	221	
	7/14/99	9:59	DT	24	1020	7.5	8.9	<0.44	0.18	2.07	1.41	0.26	20	<1	<1	<8	36	5	<4	<2	57	224
	7/15/99	8:59	DF												<1	<8	30	<2	4	<2	33	
	7/15/99	14:27	DT	20	985	2.8	8.5	<0.44	0.17	1.65	1.50	0.38	16	8	<1	<8	34	2	<4	<2	84	192
	7/18/99	20:27	DF												<1	<8	30	<2	<4	<2	77	
	7/29/99	10:00	DT	1	1100	28.0	7.9	2.0	0.22	1.61	3.34	0.87	240	160	<1	<8	20	4	7	<2	79	266
	7/29/99	10:00	DF												<1	<8	11	<2	4	<2	34	
	8/4/99	15:03	DT	24	1070	31.0	8.5	1.2	0.09	2.51	1.74	0.47	170	80	<1	<8	109	18	9	<2	123	330
	8/5/99	14:03	DF												<1	<8	31	2	<4	<2	27	
	8/9/99	10:34	DT	24	1050	5.0	8.8	0.6	0.05	5.10	1.10	0.46	180	14	<1	<8	30	3	<4	<2	37	402
	8/9/99	10:34	DT	24											<1	<8	28	<2	<4	<2	31	
	8/16/99	13:01	DT	24	1670	4.4	8.3	3.6	0.39	12.00	1.29	0.31	16	6	<1	<8	27	<2	<4	<2	42	330
	8/17/99	12:01	DF												<1	<8	22	<2	<4	<2	36	
	8/23/99	13:05	DT	24	940	6.9	8.6	0.8	0.10	1.99	1.71	0.34	30	14	<1	<8	40	4	<4	<2	40	316
	8/24/99	12:05	DF	24											<1	<8	32	<2	<4	<2	21	
	9/2/99	9:00	DT	24	1780	100.0	8.9	<0.44	0.32	7.38	2.42	0.45	40	22	<1	<8	16	5	4	<2	67	290
	9/3/99	8:00	DF	24											<1	<8	6	<2	<4	<2	48	
	9/8/99	14:21	DT	12	1230	12.0	8.6	<0.44	0.06	2.53	2.75	0.55	48	38	<1	<8	42	4	<4	<2	73	434
	9/9/99	1:21	DF												<1	<8	31	<2	<4	<2	27	
	9/16/99	9:15	DT	1	955	8.3	8.5	1.3	0.10	1.62	1.44	0.47	26	18	<1	<8	11	2	<4	<2	29	390
	9/16/99	9:15	DF	1											<1	<8	12	2	<4	<2	27	
	9/23/99	12:00	DT	1	970	6.9	9.1	<0.44	0.23	2.67	1.35	0.32	20	12	<1	<8	12	2	<4	<2	25	378
	9/23/99	12:00	DF												<1	<8	10	<2	<4	<2	27	
	9/29/99	10:15	DT	8	975	14.0	8.3	1.9	0.40	2.69	3.86	0.25	46	31	<1	<8	64	5	7	<2	93	310
	9/30/99	9:15	DF												<1	<8	42	2	6	<2	61	
	10/5/99	12:31	DT	24	1040	6.7	8.4	<0.44	0.14	1.31	2.54	0.78	36	16	<1	<8	28	<2	6	<2	49	444
	10/6/99	11:31	DF												<1	<8	46	4	7	<2	69	
	10/13/99	13:05	DT	24	1120	13.0	8.4	<0.44	0.40	3.50	3.37	1.07	48	26	<1	<8	53	7	24	<2	92	308
	10/14/99	12:05	DF												<1	<8	26	<2	6	<2	39	
	10/26/99	12:10	DT	24	1140	6.3	8.7	<0.44	0.79	7.20	1.87	0.51	23	18	<1	<8	27	3	<4	<2	70	210
	10/27/99	11:10	DF												1	<8	19	<2	<4	<2	52	
	11/4/99	11:13	DT	24	895	18.0	8.3	<0.44	<0.05	0.50	3.06	0.87	70	40	<1	<8	36	8	<4		<2	209
	11/5/99	10:13	DF												<1	<8	15	<2	<4		<2	69
	11/8/99	9:50	ST	5											2	8	109	17	30	<2	932	120
	11/8/99	10:50	SF												<1	<8	83	6	25	<2	749	
	11/8/99	12:50	ST	8	570	24.0	7.5	20.7	1.17	7.00	2.36	0.06	240	80	<1	<8	69	8	23	<2	331	164
	11/9/99	2:50	SF												<1	<8	55	3	22	<2	303	
	11/18/99	11:00	DT	1	875	9.4	8.6	1.9	<0.05	1.40	2.53		6	3	<1	<8	20	2	6	<2	58	248
	11/18/99	11:00	DF												<1	<8	15	<2	5	<2	45	
	12/1/99	13:35	DT	24	770	280.0	9.2	1.9	0.13	2.70	5.20		890	460	4	26	209	106	25	<2	1350	420
	12/2/99	12:35	DF												<1	<8	11	<2	<4	<2	24	
	12/7/99	8:17	DT	24	1030	7.2	8.2	1.8	0.69	0.88	6.43	0.96	7	3	<1	<8	21	2	<4	<2	140	330
	12/8/99	7:17	DF												<1	<8	16	<2	<4	<2	101	

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
CMCG02	12/14/99	9:55	D	24	1020	3.0	8.1	2.3	<0.05	0.76	3.06	0.95	14	6								
	12/15/99	8:55																				392
	12/21/99	8:53	D	24	855	33.0	8.0	2.6	1.18	2.70	3.27		98	50								412
	12/22/99	7:53																				
	12/28/99	9:40	DT	24	1010	7.3	8.2	1.3	<0.05	1.20	2.20	0.48	30	18	<1	<8	28	<2	<4	<2	21	376
	12/29/99	8:40	DF												<1	<8	20	<2	<4	<2	16	
	1/5/00	9:49	DT	24	885	27.0	8.0	1.8	0.09	0.82	3.37	0.47	80	36	2	<8	35	7	5	<2	158	422
	1/6/00	8:49	DF												<1	<8	13	<2	<4	<2	32	
	1/12/00	9:10	DT	24	945	6.1	8.2	9.0	2.75	4.10	2.91		24	14	<1	<8	18	<2	<4	<2	49	446
	1/13/00	8:10	DF												<1	<8	13	<2	<4	<2	36	
	1/21/00	10:50	DT	24	1030	17.0	8.3	3.5	0.18	1.80	2.88	0.48	42	22	<1	<8	23	4	4	<2	76	172
	1/22/00	9:50	DF												<1	<8	14	<2	6	<2	42	
	1/25/00	6:43	ST	5											3	23	236	71	43	3	970	152
	1/25/00	7:43	SF												<1	<8	26	2	24	<2	154	
	2/2/00	9:00	DT	24	915	8.5	8.5	2.0	0.12	3.00	1.90	0.40	15	8	<1	23	635	3	4	<2	198	132
	2/3/00	8:00	DF												<1	15	446	<2	4	<2	160	
	2/4/00	10:00	DT	24	645	10.0	7.8	4.0	0.19	2.60	2.42	0.54	24	14	<1	25	36	5	6	<2	101	132
	2/5/00	23:00	DF												1	25	31	3	7	<2	83	
	2/8/00	10:00	D	24	865	3.0	8.5	<0.44	<0.05	0.97	1.15	0.25	12	6								
	2/9/00	9:00																				
	2/10/00	15:38	ST	5	240	150.0	7.2	4.8	0.48	4.80	3.46	0.62	240	130								
	2/10/00	16:38	SF																			
	2/10/00	18:38	ST	10	265	23.0	7.8	3.4	0.11	1.70	1.87	0.55	100	50	<1	<8	37	6	6	<2	82	66
	2/11/00	14:38	SF												<1	<8	30	<2	5	<2	47	
	2/11/00	16:38	ST	5	465	6.9	8.6	1.0	<0.05	0.89	0.99	0.28	6	3	<1	<8	29	2	<4	<2	55	120
	2/12/00	0:38	SF												<1	<8	28	<2	<4	<2	44	
	2/12/00	6:38	ST	3											<1	<8	26	2	<4	<2		58
	2/12/00	10:38																				
	2/12/00	12:38	ST	24	500	23.0	7.6	2.1	<0.05	1.70	1.09	0.29	24	14	<1	<8	31	5	5	<2	87	160
	2/14/00	10:38	SF												<1	<8	26	<2	4	<2	61	
	2/14/00	12:38	ST	6	245	60.0	7.4	4.2	0.06	2.00	1.62	0.42	52	20	<1	<8	49	15	15	<2	158	60
	2/14/00	22:38	SF												<1	<8	38	3	16	<2	92	
	2/16/00	5:01	ST	5	165	50.0	6.9	6.1	0.59	2.70	1.41	0.38	86	38	<1	<8	39	17	8	<2	204	68
	2/16/00	6:01	SF																			
	2/16/00	8:01	ST	4	170	50.0	7.8	3.0	0.10	2.00	1.66	0.38	5	2	<1	<8	31	6	5	<2	92	72
	2/16/00	14:01	SF																			
	2/16/00	16:01	D	43	600	26.0	8.7	5.5	<0.05	1.80	1.16	0.33	30	20								
	2/20/00	4:01																				
	2/27/00	14:29	ST	5	230	40.0	6.8	4.5	0.35	3.30	1.16	0.07	160	90	<1	<8	56	16	10	<2	276	60
	2/27/00	15:29	SF												<1	<8	45	7	9	<2	217	
	2/29/00	10:19	DT	24	1440	6.2	8.9	5.7	0.09	3.90	1.01	0.21	8	3	<1	<8	28	<2	<4	<2	84	320
	3/2/00	8:19	DF												<1	<8	27	<2	<4	<2	66	

STATION	DATE	TIME	SAMPLES Type	#	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
CMCG02	3/3/00	18:01	ST	5	375	70.0	6.9	8.9	1.61	7.70	2.75		130	88	1	<8	79	26	18	<2	431	170
	3/3/00	19:01	SF												<1	<8	48	7	15	<2	284	
	3/3/00	21:01	ST	7	245	20.0	7.6	3.8	0.38	5.20	1.32	0.22	36	24	<1	<8	26	8	8	<2	177	124
	3/4/00	9:01	SF												<1	<8	25	3	12	<2	136	
	3/7/00	9:22	D	10	765	7.7	8.8	1.5	0.06	2.70	0.83	0.13	13	5								
	3/8/00	1:01																				
	3/8/00	3:01	S	7	285	12.0	7.7	2.8	0.10	1.50	1.10	0.29	15	8								
	3/8/00	17:01																				
	3/9/00	13:15	DT	24	800	13.0	9.1	1.4	<0.05	0.23	0.46	0.18	9	6	<1	<8	18	<2	<4	<2	41	200
	3/10/00	11:45	DF												2	<8	16	<2	<4	<2	35	
	3/14/00	9:58	DT	24	965	9.0	9.1	0.4	0.06	0.92	0.77	0.10	10	5	<1	<8	19	<2	<4	<2	51	410
	3/15/00	8:58	DF												<1	<8	18	<2	<4	<2	41	
	3/22/00	12:30	DT	22	940	5.3	8.9	1.0	0.16	1.70	1.07	0.20	14	7	<1	<8	22	2	4	<2	54	340
	3/23/00	9:30	DF												<1	<8	20	<2	4	<2	43	
	3/28/00	10:42	DT	23	1030	11.0	8.6	0.9	0.12	1.90	2.14	0.40	38	16	<1	<8	22	2	4	<2	90	362
	3/29/00	8:42	DF												<1	<8	18	<2	<4	<2	66	
	4/4/00	11:03	DT	24	1570	54.0	8.3	6.8	0.10	17.00	3.98	0.38	180	150	<1	<8	32	13	5	<2	160	
	4/5/00	10:03	DF												<1	<8	14	<2	<4	<2	35	
	4/12/00	13:24	D	19	1080	5.2	8.9	0.5	0.11	2.60	1.77	0.36	15	18								404
	4/13/00	6:24																				
	4/20/00	12:00	DT	1	810	6.2	9.9	0.5	0.09	1.70	0.98	0.10	22	12	<1	<8	5	<2	<4	<2	17	
	4/20/00	12:00	DF												<1	<8	5	<2	<4	<2	14	
	4/25/00	10:42	DT	24	960	7.7	8.6	1.7	0.07	0.82	1.10	0.15	30	16								330
	4/26/00	9:42	DF																			
	5/4/00	8:32	DT	24	860	22.0	8.8	<0.44	0.09	3.10	1.25	0.22	54	38								
	5/5/00	7:32	DF																			296
	5/11/00	9:30	DT	1	3100	34.0	8.4	7.0	0.49	24.00	1.41	0.25	110	72								
	5/11/00	9:30	DF																			
	5/16/00	12:00	DT	24	825	4.4	8.6	0.5	<0.05	0.95	1.04	0.15	8	4	<1	<8	24	3	<4	<2	42	302
	5/17/00	11:00	DF												3	<8	19	<2	<4	<2	26	
	5/26/00	11:35	DT	1	1030	21.0	9.5	<0.44	0.09	1.90	1.56	0.14	46	16								
	5/26/00	11:35	DF																			
	5/30/00	10:37	DT	24	1030	13.0	8.8	<0.44	<0.05	2.50	3.06	0.58	36	24								
	5/31/00	9:37	DF																			
	6/6/00	9:11	DT	24	1240	10.6	8.6	<0.44	0.52	4.80	2.39	0.44	36	16								
	6/7/00	8:11	DF																			
	6/22/00	8:00	DT	1	1080	13.0	8.1	<0.44	<0.05	2.40	2.91	0.71	23	23								
	6/22/00	8:00	DF	1																		
	6/27/00	13:40	DT	1	955	39.0	8.3	<0.44	0.13	2.80	3.06	0.46	58	39								
	6/27/00	13:40	DF																			

NEWPORT BAY WATERSHED

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
SICG03	11/11/93	3:30	ST	6	1700	130	7.8	13	<0.1	2.8	1.9		320	37	<5	<10	39	21	<40	<10	160	308
	11/11/93	13:30																				
	11/12/93	13:30	ST	11	2800	11	8.1	20	<0.1	0.76	1.6		12	<5	<5	<10	<20	<2	<40	<10	26	524
	11/13/93	9:30																				
	11/13/93	11:30	ST	12	2800	2.9	8.1	20	<0.1	0.60	0.64		8.0	<5	<5	<10	<20	<2	<40	<10	24	300
	11/14/93	9:30																				
	11/14/93	13:30	ST	7	3700	13	8.1	1.6	0.21	1.4	1.8		19	<5	<5	<10	<20	<2	<40	<10	25	542
	11/15/93	1:30																				
	11/22/93	21:30	ST	4	2100	8.0	7.9	19	0.28	2.2	2.0		6	<5	<5	<10	24	3.5	<40	<10	52	418
	11/23/93	3:30																				
	11/23/93	5:30	ST	8	2300	3.0	8.2	16	0.13	1.2	1.3		<5	<5	<5	<10	20	<2	<40	<10	28	440
	11/23/93	19:30																				
	11/23/93	21:30	ST	8	2700	0.84	8.0	24	<0.1	0.87	1.0		<5	<5	<5	<10	<20	<2	<40	<10	21	512
	11/24/93	11:30																				
	11/29/93	23:43	ST	5	1600	18	8.0	12	0.18	2.2	1.9		64	<5	<5	<10	31	13	<40	<10	120	300
	11/30/93	7:45																				
	11/30/93	9:45	ST	12	2400	9.9	8.2	20	<0.1	1.0	0.78		15	<5	<5	<10	<20	<2	<40	<10	31	450
	12/1/93	7:45																				
	12/1/93	9:45	ST	12	2400	5.0	8.2	18	<0.1	1.8	0.88		<5	<5	<5	<10	<20	<2	<40	<10	38	462
	12/2/93	7:45																				
	12/2/93	9:45	ST	19	2700	31	8.5	24	<0.1	1.1	1.1		120	<5	<5	<10	23	4.7	<40	<10	56	529
	12/3/93	21:45																				
	12/11/93	13:41	ST												<5	10	<20	<50	<40	<10	20	
	12/11/93	15:41	ST	4	1000	44	7.9	9.1	0.17	1.3	1.5		75	13	<5	<10	35	17	<40	<10	92	232
	12/11/93	21:41																				
	12/11/93	23:41	ST	19	2400	3.9	8.2	24	<0.1	0.61	0.66		<5	<5	<5	<10	<20	<2	<40	<10	24	464
	12/13/93	11:41																				
	12/13/93	13:41	ST	13	2500	0.66	8.2	11	<0.1	0.89	0.76		<5	<5	<5	<10	<20	<2	<40	<10	18	490
	12/14/93	13:41																				
	12/14/93	15:41	ST	11	1900	6.8	8.0	25	0.22	2.2	1.2		8	<5	<5	<10	<20	3.4	<40	<10	38	332
	12/15/93	11:41																				

Appendix 5.3
Water Quality Data from Harbors

STATION	DATE	TIME	Sample Type	Depth feet	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L
LNBTUB	4/24/91	13:00			50000	0.7	8.2	0.20	0.90	0.20	26.00	18	7	<2	<6	4	<2	<10	<2	<10
	6/20/91	13:15			50000	1.2	8.3	0.20	0.10	0.10	0.40	<5	<5	<7	<10	<30	<20	<10	<2	<10
	7/25/91	11:30			50000	1.2	8.1	0.40	0.70	0.90	3.20	45	21	<1	<5	<5	<10	<40	<3	<20
	3/21/92	12:40	S		13000	6.8	7.8	5.40	0.20	0.60	1.00	<5	<5	<2	<6	4	<2	<10	66	10
	3/21/92	12:40	S	22.0										<2	<6	7	5.0	<10	<2	20
	3/23/92	12:35	S		20000	5.3	7.9	4.10	0.20	0.70	0.50	<5	<5	3	<6	4	<2	<10	<2	20
	3/23/92	12:35	S	22.0										2	<6	8	<2	<10	<2	10
	3/25/92	13:50	S		24000	2.3	7.8	3.80	0.10	0.10	1.30	<5	<5	<20	<30	<20	<2	<40	<10	30
	3/25/92	13:50	S	21.0										<20	<30	<20	<2	<40	<10	20
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													**>1**	**<14**	**>5**	**>1**	**<20**	**<4**	**16**
	4/23/92	11:15			49000	0.2	8.3	0.20	0.10	0.10	0.10	86	22	<20	<30	<20	<2	<40	<10	30
	8/27/92	11:05												<20	<30	<20	<2	<40	20	20
	10/29/92	11:45			50000	2.1	8.0	0.20	0.15	0.40	0.18	89	41	<20	<30	<20	<2	<40	15	25
	1/7/93	11:25	S		9500	660.0	7.8	1.80	0.23	0.58	4.80	1000	120	<20	<30	<20	13.0	<40	<10	67
	1/7/93	11:30	S	16.0	8800	930.0	7.9	3.90	0.23	2.10	4.80	1200	140	<20	<30	<20	18.0	<40	<10	72
	1/9/93	11:05	S		33000	11.0	8.0	2.70	0.32	0.45	5.00	47	17	<20	<30	<20	<2	<40	12	27
	1/9/93	11:10	S	17.6	40000	29.0	8.1	1.40	0.28	0.50	6.80	150	37	<20	<30	<20	<2	<40	<10	19
	1/11/93	15:10	S		35000	16.0	8.0	3.60	0.41	0.96	0.82	91	20	<20	<30	<20	<2	<40	13	17
	1/11/93	15:15	S	16.0	37000	18.0	8.1	3.20	0.40	0.92	0.56	120	23	<20	<30	<20	<2	<40	12	17
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													**<20**	**<30**	**<20**	**>6**	**<40**	**>4**	**36**
	2/19/93	11:00	S		22000	180.0	8.0	4.60	0.24	0.74	2.00	290	33	<7	<10	<30	7.2	<3	<4	<20
	2/19/93	11:00	S	23.9	23000	220.0	8.0	5.10	0.21	0.80	1.60	360	39	<7	<12	<30	7.7	<3	<4	50
	2/21/93	10:40	S		20000	9.4	8.0	3.30	0.21	0.41	0.75	43	17	<7	<10	<30	<2	<3	<4	<20
	2/21/93	10:40	S	13.1	34000	330.0	8.1	1.70	0.23	0.40	0.76	770	66	<7	16	<30	13.0	3	<4	71
	2/23/93	10:45	S		40000	4.1	8.2	2.20	0.16	0.48	0.10	72	14	<7	<10	<30	<2	<3	<4	<20
	2/23/93	10:45	S	19.7	44000	4.8	8.2	1.10	0.15	0.33	0.10	66	14	<7	<10	<30	<2	<3	<4	<20
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													**<7**	**>5**	**<30**	**>7**	**<3**	**<4**	**>40**

STATION	DATE	TIME	Sample Type	Depth feet	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L
LNBTUB	3/18/93	10:30			46000	15.0	8.4	1.40	0.12	0.56	0.30	96	22							
	10/27/93	12:00			47000	0.8	8.0	0.20	0.34	0.90	0.23	250	74	<5	<10	<20	<2	<40	16	25
	1/20/94	12:00												<5	<10	<20	<2	<40	17	62
	1/25/94	13:15	S		34000	1.2	8.0	0.78	0.25	0.64	0.34	210	21	<5	<10	<20	<2	<40	17	30
	1/25/94	13:20	S	18.7										<5	<10	26	<2	<40	15	56
	1/27/94	12:45	S		43000	5.1	8.0	2.20	0.37	0.46	0.14	120	42	<5	<10	20	<2	<40	<10	32
	1/27/94	12:50	S	19.7										<5	<10	<20	<2	<40	<10	25
	1/29/94	11:30	S		45000	0.3	8.0	1.30	0.41	0.61	0.10	170	20	<5	<10	<20	<2	<40	20	31
	1/29/94	11:35	S	23.0										<5	<10	23	4.1	<40	20	47
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													**<5**	**<10**	**>16**	**>1**	**<40**	**>12**	**43**
	2/7/94	12:25	S		26000	15.0	7.7	2.90	0.68	0.79	0.87	79	20	<5	<10	<20	<2	<40	<10	65
	2/7/94	12:30	S	19.7										<5	<10	<20	<2	<40	<10	57
	2/9/94	12:15	S		33000	1.0	7.9	2.70	0.18	0.17	0.35	120	22	<5	<10	<20	<2	<40	<10	30
	2/9/94	12:20	S	21.0										<5	<10	<20	<2	<40	<10	40
	2/11/94	11:45	S		42000	0.6	7.9	1.20	0.16	0.52	0.21	170	37	<5	<10	<20	<2	<40	12	17
	2/11/94	11:50	S	23.0										<5	<10	<20	<2	<40	13	24
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													**<5**	**<10**	**<20**	**<2**	**<40**	**>4**	**40**
	4/21/94	11:30			50000	1.1	8.2	15.00	0.18	0.54	0.56	91	5	<5	<10	<20	<2	<40	<10	24
	3/5/95	13:50	S		47000	3.5	8.0	1.10	0.17	0.71	0.32	68	32	<1	<10	5	<2	<40	<1	29
	3/5/95	13:55	S	20										<1	<10	4	<2	<40	1.7	25
	3/7/95	11:00	S		14000	5.5	7.9	4.00	0.24	1.10	0.91	14	10	<1	<10	6	<2	<40	<1	<10
	3/7/95	11:05	S	22										<1	<10	<4	<2	60	<1	18
	3/9/95	10:00	S		28000	1.3	8.0	3.40	0.41	0.96	0.61	29	13	<1	<10	7	<2	<40	<1	23
	3/9/95	10:05	S	20										<1	<10	<20	<2	50	<1	20
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													**<1**	**<10**	**>1**	**<2**	**>37**	**>0.56**	**21.6**
	3/23/95	13:45	S		47000	1.1	8.1	3.10	0.35	0.68	0.58	56	23	<1	<10	5	<2	67	1.3	36
	3/23/95	13:50	S	20										<1	<10	11	4	55	<1	54
	3/25/95	10:45	S		50000	1.1	8.1	1.60	0.19	0.20	0.21	66	21	<1	<10	<4	<2	<40	<1	<10
	3/25/95	10:50	S	19										<1	<10	8	<2	<40	<1	<10
	3/27/95	12:30	S		51000	1.0	8.1	1.10	0.21	0.82	0.37	58	22	<1	<10	6	<2	50	<1	25
	3/27/95	12:35	S	18										<1	<10	22	6	50	<1	54
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													**<1**	**<10**	**13.7**	**>3**	**>35**	**<1**	**>36**

STATION	DATE	TIME	Sample Type	Depth feet	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L
LNBTUB																				
	2/1/96	12:30	S		38000	1.7	8.1	2.20	0.10	2.70	0.32	36	24	2	<5	7	<2	<2	<1	35
	2/1/96	12:35	S	18										5	<5	2	<2	<2	<1	14
	2/3/96	10:40	S		33000	1.2	8.2	2.70	0.10	2.00	0.35	41	12	<1	<5	<8	<2	<20	<1	49
	2/3/96	10:45	S	23										<1	<5	3	<2	<20	<1	19
	2/5/96	12:20	S		40000	1.4	8.1	1.10	0.14	0.96	0.23	57	18	<1	<5	5	<2	<2	4	14
	2/5/96	12:25	S	22										<1	<5	11	<2	22	<2	13
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													**>1.7**	**<5**	**5.3**	**<2**	**>7.3**	**<2**	**15.3**
	2/20/96	11:45	S		27000	12.0	7.9	0.50	0.10	0.75	0.40	67	18	<1	<5	12	<2	5	<1	55
	2/20/96	11:50	S	24										<1	<5	4	<2	5	<1	28
	2/22/96	11:50	S		25000	5.3	8.0	4.00	0.13	0.70	0.58	34	14	<1	<5	<4	<2	<4	<1	35
	2/22/96	11:55	S	22										<1	<5	2	<2	<8	<1	74
	2/24/96	9:30	S		33000	1.4	8.1	2.10	0.35	0.82	0.63	66	18	<1	<5	<8	<8	<8	<5	52
	2/24/96	9:35	S	16										<1	<5	6	<2	<8	<5	24
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													**<1**	**<5**	**4**	**<2**	**>1.7**	**<5**	**42**
	11/22/96	11:45	S		14000	9.2	7.9	5.4	0.53	1.20	0.77	37	7	0.2	5	6	3	<10	<0.1	16
	11/22/96	11:45	S	20										0.3	7	13	7	<10	<0.1	22
	11/24/96	10:20	S		21000	0.9	7.8	3.1	0.51	0.96	0.68	50	9	<0.1	6	9	<0.1	<10	<0.1	20
	11/24/96	10:20	S	26										<0.1	9	8	4	<10	<0.1	16
	11/26/96	10:35	S		29000	1.0	7.9	1.7	0.39	0.69	0.41	36	11	<0.1	13	8	<0.2	<10	<0.1	21
	11/26/96	10:35	S	23										<0.1	16	7	2	13	<0.1	18
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													**<0.1**	**10.6**	**9.3**	**4.3**	**>4.3**	**<0.1**	**18.6**
	1/27/99	11:45	ST		33700	3.3	7.8	4.6	0.61	0.22	0.28	61	8	<1	<8	11.6	<2	4.4	<2	24.3
	1/27/99		SF	10										<1	<8	10.9	<2	7.1	<2	26.7
	1/29/99	13:35	ST		42300	0.7	7.9	2.4	0.45	0.16	0.15	58	5	<1	<8	13.3	<2	8.3	<2	25.7
	1/29/99		SF	18										<1	<8	12.9	<2	7.9	<2	24.7
	4/12/99	13:00	ST		30400	5.1	8.0	1.7	0.51	0.09	0.23	63	10	<1	<8	12.2	<2	10.7	<2	23.9
	4/12/99		SF	19										<1	<8	11.1	<2	10.6	<2	21.6
	4/14/99	13:00	ST		42800	1.1	8.0	1.7	0.49	<0.05	0.15	73	7	<1	<8	10.5	<2	14.5	<2	<10
	4/14/99		SF	20										<1	<8	10.9	<2	11.9	<2	10.4
	4/16/99	14:10	ST		49500	1.6	8.0	3.4	0.47	<0.05	0.12	150	14	<1	<1	11.1	<2	<4	<2	<10
	4/16/99		SF	20										<1	<8	11.3	<2	<4	<2	<10
										4-day average [dissolved metals]				**<1**	**<1**	**11.0**	**<2**	**>8.3**	**<2**	**>10.6**

STATION	DATE	TIME	Sample Type	Depth feet	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L
LNBTUB	2/12/00	12:43	ST		50400	1.8	8.0	<0.44	0.13	0.64	0.14	84	28	<1	<8	24.1	<2	<4	<2	14.3
	2/12/00	12:43	SF	21.0										<1	<8	23.4	<2	<4	<2	24.0
	2/14/00	11:18	ST		37600	1.9	7.9	2.6	0.20	0.68	0.24	78	22	<1	<8	18.5	<2	<4	<2	19.0
	2/14/00	11:18	SF	19.0										<1	<8	18.0	<2	<4	<2	21.8
	2/16/00	11:50	ST		46000	1.3	7.9	1.0	0.14	0.67	0.18	100	42	<1	<8	22.3	<2	8.6	<2	16.6
	2/16/00	11:50	SF	18.0										<1	<8	22.0	<2	7.5	<2	15.4
									4-day average [dissolved metals]					<1	<8	21.1	<2	2.5	<2	20.4
	3/8/00	12:43	ST		30200	8.1	8.0	1.6	0.17	0.79	0.37	67	33	<1	<8	20.7	<2	7.4	<2	23.5
	3/8/00	12:43	SF	22.6										<1	<8	17.9	<2	7.4	<2	27.9
	3/10/00	11:45	ST		38200	1.6	8.0	1.8	0.14	0.64	0.28	70	30	<1	<8	26.6	<2	17.1	<2	26.1
	3/10/00	11:45	SF	21.5										<1	<8	18.5	<2	10.7	<2	12.9
	3/12/00	11:55	ST		42100	1.3	8.0	0.9	0.13	0.91	0.21	78	34	<1	<8	21.3	<2	10.3	<2	27.5
	3/12/00	11:55	SF											<1	<8	21.4	<2	10.5	<2	29.5
									4-day average [dissolved metals]					<1	<8	19.3	<2	3.5	<2	23.4

STATION	DATE	TIME	Sample Type	Depth feet	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L
LNBRIN	4/24/91	13:30			50000	0.7	8.1	<0.20	0.70	0.30	1.00	17	5	<2	<6	15	<2	<10	<2	<10
	6/20/91	13:50			50000	1.6	8.1	<0.20	0.30	0.30	0.10	5	<5	<7	<10	<30	<20	<10	<2	<10
	7/25/91	11:30			50000	2.5	8.0	0.20	0.70	1.00	1.60	59	<5	<1	<5	<6	<10	<40	<3	20
	3/21/92	13:15	S		15000	4.1	7.9	5.40	0.30	0.90	0.90	<5	<5	<2	7	6	<2	<10	<2	20
	3/21/92	13:15	S	12										<2	<6	<4	<2	<10	<2	20
	3/23/92	13:05	S		24000	2.5	8.0	4.30	0.20	0.50	0.60	<5	<5	<2	<6	8	<2	<10	<2	50
	3/23/92	13:05	S	21										<2	<6	7	<2	<10	<2	30
	3/25/92	14:15	S		22000	3.6	7.9	3.90	0.10	<0.10	0.50	27	14	<20	<30	<20	<2	<40	<10	20
	3/25/92	14:15	S	15										<20	<30	80	23.0	<40	<10	60
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													**<8**	**<14**	**>29**	**>7**	**<20**	**<5**	**36.7**
	4/23/92	12:20			49000	0.7	8.2	<0.20	<0.10	0.20	0.10	85	23	<20	<30	30	<20	<40	<10	90
	7/22/92	12:20												<20	<30	30	<2	<40	10	90
	8/27/92	11:55												<20	<30	<20	<2	70	10	40
	9/24/92	11:00												<20	<30	<20	<2	<40	<10	18
	10/29/92	12:50			50000	0.9	7.9	0.20	0.21	0.48	0.25	89	31	<20	<30	<20	<2	<40	<10	36
	11/19/92	11:20												<20	<30	20	<2	<40	<10	150
	12/17/92	11:20												<20	<30	<20	<2	<40	15	31
	1/7/93	13:35	S		27000	7.4	7.8	0.90	0.36	0.56	0.13	30	13	<20	<30	<20	<2	<40	<10	44
	1/7/93	13:40	S	9	16000	10.0	7.8	4.20	0.24	0.57	0.95	29	14	<20	<30	<20	<2	<40	<10	22
	1/9/93	12:35	S		27000	2.3	7.9	2.50	0.31	0.44	4.00	68	24	<20	<30	<20	<2	<40	12	32
	1/9/93	12:40	S	14	44000	3.8	7.9	1.00	0.46	0.14	<0.10	91	27	<20	<30	<20	<2	<40	15	21
	1/12/93	12:45			37000	4.1	8.0	2.30	0.40	0.83	0.73	69	21	<20	<30	<20	<2	<40	10	39
	2/19/93	12:50	S		28000	5.2	8.0	6.30	0.22	0.55	0.38	46	14	<7	<10	<30	<2	<3	<4	<20
	2/19/93	12:50	S	12	37000	5.3	8.1	3.30	0.18	0.34	0.38	59	16	<7	<10	<30	<2	<3	<4	20
	2/21/93	12:55	S		22000	3.7	8.1	3.60	0.14	0.35	0.53	47	17	<7	<10	<30	<2	<3	<4	<20
	2/21/93	12:55	S	13	40000	11.0	8.0	1.70	0.23	0.31	0.34	70	22	<7	<10	33	3.3	10	<4	25
	2/23/93	13:00	S		37000	1.3	8.1	2.50	0.15	0.63	<0.10	63	13	<7	<10	<30	<2	<3	<4	<20
	2/23/93	13:00	S	14	40000	2.7	8.1	1.70	0.22	0.50	0.20	67	16	<7	<10	<30	<2	<3	<4	22
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													**<7**	**<10**	**>11**	**>1**	**>3**	**<4**	**22**
	3/18/93	11:45												<7	<10	<30	<2	<3	<4	<20
	7/13/93	11:15												<20	<30	<20	<2	<40	<10	19
	10/27/93	12:20			47000	6.6	7.9	<0.2	0.43	1.00	0.21	110	41	<5	<10	25	<2	<40	22	33
	1/20/94	13:00												<5	<10	<20	<2	<40	13	46

STATION	DATE	TIME	Sample Type	Depth feet	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L
LNBRIN																				
	1/25/94	13:45	S		48000	1.9	8.1	0.87	0.21	0.62	0.13	170	17	<5	<10	30	<2	<40	22	57
	1/25/94	13:50	S	11										<5	<10	310	38.0	<40	12	190
	1/27/94	13:20	S		42000	1.2	8.0	1.90	0.30	0.36	<0.1	88	30	<5	<10	29	<2	<40	<10	35
	1/27/94	13:25	S	10										<5	<10	25	<2	<40	<10	38
	1/29/94	12:00	S		43000	0.3	7.9	2.00	0.49	0.86	0.14	160	18	<5	<10	20	<2	<40	15	32
	1/29/94	12:05	S	13										<5	<10	<20	<2	<40	13	32
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													**<5**	**<10**	**>112**	**>13**	**<40**	**>8**	**87**
	2/7/94	13:30	S		36000	2.2	7.8	3.70	0.72	0.70	0.97	68	17	<5	<10	26	<2	<40	12	100
	2/7/94	13:35	S	10										<5	<10	24	<2	<40	<10	94
	2/9/94	13:30	S		32000	2.0	7.9	3.00	0.22	0.13	0.33	130	22	<5	<10	<20	<2	<40	<10	24
	2/9/94	13:35	S	11										<5	<10	<20	<2	<40	<10	23
	2/11/94	13:00	S		43000	0.4	8.0	1.30	0.12	0.55	0.62	180	35	<5	<10	<20	<2	<40	<10	43
	2/11/94	13:05	S	12										<5	<10	<20	<2	<40	11	26
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													**<5**	**<10**	**>8**	**<2**	**<40**	**>4**	**48**
	4/21/94	12:00			50000	2.1	8.3	0.31	0.22	1.70	0.80	64	6	<5	<10	<20	<2	<40	<10	22
	12/1/94	12:00												1.1	<10	7.8	<2	<40	<0.3	38
	3/5/95	14:20	S		40000	3.7	8.1	1.2	0.17	0.61	0.28	62	22	<1	<10	13	<2	<40	<1	42
	3/5/95	14:25	S	14										<1	<10	17	<2	<40	<1	33
	3/7/95	11:20	S		13000	6.1	7.9	3.5	0.23	1.2	0.92	12	<6	<1	<10	8	<2	<40	<1	<10
	3/7/95	11:25	S	12										<1	<10	14	<2	51	<1	28
	3/9/95	10:30	S		28000	1.9	8.0	3.2	0.2	0.92	0.69	28	12	<1	<10	8	<2	<40	<1	23
	3/9/95	10:35	S	10										<1	<10	16	<2	<40	<1	46
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													**<1**	**<10**	**>16**	**<2**	**>17**	**<1**	**36**
	3/23/95	14:00	S		48000	0.6	8.1	2.3	0.19	0.68	0.57	50	24	<1	<10	6	<2	62	1.8	37
	3/23/95	14:05	S	11										<1	<10	9	<2	53	<1	31
	3/25/95	11:10	S		43000	1.8	8.1	2.9	0.24	0.25	0.38	46	18	<1	<10	5	<2	<40	<1	<10
	3/25/95	11:15	S	11										<1	<10	4	<2	<40	<1	20
	3/27/95	13:00	S		51000	1.0	8.1	1	0.25	0.81	0.37	59	22	<1	<10	10	<2	<40	<1	26
	3/27/95	13:05	S	13										<1	<10	53	5	54	<1	52
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													**<1**	**<10**	**22**	**>2**	**>36**	**<1**	**34.3**

STATION	DATE	TIME	Sample Type	Depth feet	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L
LNBRIN	5/18/95	10:15												<1	<10	9	<2	<40	<1	<10
	10/31/95	9:50												<1	<10	11	<2	<40	<1	80
	2/1/96	12:55	S		31000	4.5	8.1	4	<0.1	1	0	49	30	<1	<5	5	<2	7	<1	21
	2/1/96	13:00	S	12										<1	<5	26	<2	3	<1	31
	2/3/96	11:15	S		34000	0.9	8.2	3	<0.1	2	0	27	11	<1	<5	<2	<2	<20	<1	85
	2/3/96	11:20	S	13										<1	<5	14	<2	<20	<1	40
	2/5/96	13:45	S		40000	0.6	8.1	2	<0.1	1	0	62	13	<1	<5	31	<2	<2	7	20
	2/5/96	12:45	S	14										<1	<5	6	<2	<4	<2	22
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													**<1**	**<5**	**15**	**<2**	**>1**	**<2**	**31**
	2/20/96	12:00	S		36000	2.2	8.0	<0.2	<0.1	1	0	62	18	1	<5	33	<2	8	<1	58
	2/20/96	12:05	S	16										<1	<5	30	<2	6	<1	42
	2/22/96	12:10	S		24000	4.0	8.0	5	0	1	1	44	15	<1	<5	6	<2	<4	<1	31
	2/22/96	12:15	S	13										1	<5	15	<2	<8	<1	80
	2/24/96	9:50	S		31000	1.8	8.1	2	0	1	1	66	20	<1	9	11	<8	<8	<5	35
	2/24/96	9:55	S	13										<1	<5	13	<2	19	<5	40
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													**>0.3**	**<5**	**19**	**<2**	**>8.3**	**<5**	**54**
	4/25/96	10:45												<1	<5	9	<2	<2	<1	30
	11/7/96	11:20												0.20	6	24	<0.1	4	<0.1	28
	11/22/96	13:35	S		13000	9.4	7.9	5.7	0.42	1.20	0.74	37	9	<0.1	<3	<5	1	<10	<0.1	9
	11/22/96	13:35	S	10										0.20	6	9	1	<10	<0.1	16
	11/24/96	10:45	S		20000	1.7	7.8	3.6	0.57	0.98	0.73	43	11	0.30	6	15	<0.1	<10	<0.1	25
	11/24/96	10:45	S	15										0.20	9	7	0.3	<10	<0.1	16
	11/26/96	10:50	S		28000	0.8	7.9	1.8	0.36	0.66	0.44	38	11	0.30	14	6	<0.2	<10	<0.1	29
	11/26/96	10:50	S	15										0.30	19	75	15	15	<0.1	44
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													**0.23**	**11.3**	**30.3**	**5.4**	**>5**	**<0.1**	**25.3**
	4/17/97	11:35												0.10	3	8	0	<5	<0.1	18
	10/30/97	12:15	M											<1	6	15	<2	<4	4	89
	3/26/98		S	22										<1	<8	29	3	<4	<2	30
	3/26/98		S/F	22										<1	<8	17	<2	<4	<2	14
	3/28/98		S	22										<1	<8	17	<2	<4	<2	11
	3/28/98		S/F	22										<1	<8	16	<2	<4	<2	<10
	3/30/98	13:00	S	22										<1	<8	15	<2	<4	<2	<10
	3/30/98	13:00	S/F	22										2	<8	14	<2	<4	<2	11
													4-day average [dissolved metals]	**>0.66**	**<8**	**12**	**<2**	**<4**	**<2**	**>8.3**

STATION	DATE	TIME	Sample Type	Depth feet	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L
LNBTUB	11/4/98	11:30	D	14																
	1/25/99	15:50	ST		45100	0.8	8.0	1.7	0.45	0.09	0.12	73	6	<1	<8	16.8	<2	<4	<2	26.8
	1/25/99		SF	14										<1	<8	16.8	<2	<4	<2	26.2
	1/27/99	11:00	ST		34600	3.4	7.8	5.0	1.23	0.21	0.28	60	11	<1	<8	17.3	<2	6.5	<2	37.7
	1/27/99		SF	11										<1	<8	13.8	<2	4.9	<2	35.3
	1/29/99	13:20	ST		43600	0.7	7.9	2.7	0.63	0.16	0.18	54	8	<1	<8	21.2	<2	9.3	<2	32.2
	1/29/99		SF	7										<1	<8	16.9	<2	9.9	<2	30.4
									4-day average [dissolved metals]					**<1**	**<8**	**16.0**	**<2**	**>5**	**<2**	**30.3**
	4/12/99	12:00	ST		35100	4.3	8.1	3.0	0.35	0.06	0.24	30	17	<1	<8	14.2	<2	11.9	<2	23.3
	4/12/99		SF	11										<1	<8	13.2	<2	11.1	<2	20.8
	4/14/99	11:45	ST		40000	0.7	8.0	2.0	0.32	<0.05	0.19	65	7	<1	<8	14.2	<2	11.1	<2	20.0
	4/14/99		SF	13										<1	<8	13.6	<2	11.3	<2	19.3
	4/16/99	13:40	ST		49200	0.7	8.0	1.0	0.51	<0.05	0.15	150	14	<1	<8	19.6	<2	7.2	<2	16.9
	4/16/99		SF	13										<1	<8	19.6	<2	7.4	<2	14.3
									4-day average [dissolved metals]					**<1**	**<8**	**15.6**	**<2**	**9.6**	**<2**	**18.0**
	2/12/00	11:28	ST		51200	2.3	8.0	<0.44	0.150	0.64	0.18	93	16	<1	<8	27.5	<2	<4	<2	17.2
	2/12/00	11:28	SF	13.5										<1	<8	25.9	<2	<4	<2	20.0
	2/14/00	11:45	ST		37200	2.5	7.9	2.8	0.206	0.74	0.23	77	52	<1	<8	22.2	<2	<4	<2	29.4
	2/14/00	11:45	SF	12.9										<1	<8	19.9	<2	<4	<2	31.4
	2/16/00	11:30	ST		45600	1.0	7.9	1.1	0.147	0.72	0.24	100	50	<1	<8	28.8	<2	8.4	<2	28.4
	2/16/00	11:30	SF	12.3										<1	<8	25.8	<2	8.4	<2	27.2
									4-day average [dissolved metals]					**<1**	**<8**	**23.9**	**<2**	**2.7**	**<2**	**26.2**
	3/8/00	13:30	ST		32100	2.3	7.9	2.1	0.167	0.77	0.40	68	45	<1	<8	29.9	<2	6.1	<2	40.9
	3/8/00	13:30	SF	13.3										<1	<8	26.9	<2	6.5	<2	40.9
	3/10/00	12:10	ST		37700	1.6	8.0	1.9	0.150	0.64	0.31	70	37	<1	<8	21.4	<2	9.1	<2	14.7
	3/10/00	12:10	SF	15.5										<1	<8	20.5	<2	10.1	<2	21.8
	3/12/00	11:40	ST		45200	0.8	8.0	0.69	0.112	0.88	0.18	62	37	<1	<8	23.5	<2	9.8	<2	105.0
	3/12/00	11:40	SF	22.0										<1	<8	21.7	<2	9.8	<2	21.3
									4-day average [dissolved metals]					**<1**	**<8**	**23.0**	**<2**	**8.8**	**<2**	**28.0**

STATION	DATE	TIME	Sample Type	Depth feet	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L
LNBHIR	4/24/91	14:00			50000	2.1	8.1	<0.20	0.90	0.40	0.60	27	9	<2	<6	4	<2	<10	<2	<10
	6/20/91	14:15			50000	1.9	8.2	0.60	0.20	<0.10	0.20	<5	<5	<7	<10	<30	<20	<10	<2	<10
	7/25/91	14:00			50000	2.1	8.1	0.20	0.60	0.90	3.00	76	32	<1	<5	<5	<10	<40	<3	<20
	3/21/92	13:45	S		16000	20.0	7.9	5.20	0.20	0.50	1.00	25	9	<2	<6	9	<2	<10	<2	5
	3/21/92	13:45	S	20										<2	<6	4	<2	<10	<2	10
	3/23/92	14:05	S		9900	12.0	7.8	4.80	0.10	0.50	0.50	6	5	3	<6	<4	<2	<10	<2	<10
	3/23/92	14:05	S	24										2	<6	5	<2	<10	<2	10
	3/25/92	14:40	S		27000	2.4	7.9	3.30	0.30	3.10	1.20	33	14	<2	<3	<2	<2	<4	<10	20
	3/25/92	14:40	S	20										<20	<30	<20	<2	<40	<10	30
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													**>0.67**	**<14**	**>1**	**<2**	**<20**	**<5**	**12**
	4/23/92	12:45			49000	0.4	8.2	0.90	<0.10	0.10	<0.10	86	20	<20	<30	<20	<2	<40	<10	20
	10/29/92	13:15			50000	2.0	8.0	0.20	0.14	0.33	0.16	70	23	<20	<30	<20	<2	<40	<10	19
	1/7/93	14:20	S		23000	170.0	7.9	0.90	0.39	0.94	1.10	270	32	<20	<30	<20	4.0	<40	<10	38
	1/7/93	14:25	S	15	9700	97.0	7.8	4.30	0.18	0.84	1.90	120	18	<20	<30	<20	<2	<40	<10	<10
	1/9/93	14:05	S		32000	68.0	8.0	3.50	0.33	0.18	<0.10	190	38	<20	<30	<20	<2	<40	11	16
	1/9/93	14:10	S	17	39000	51.0	8.0	2.20	0.37	0.57	8.90	170	32	<20	<30	<20	<2	<40	12	15
	1/12/93	12:45			46000	4.3	8.1	1.50	0.49	0.76	0.19	100	29	<20	<30	<20	<2	<40	13	16
	2/19/93	13:20	S		17000	66.0	8.0	5.80	0.18	0.66	0.79	130	20	<7	<10	<30	5.9	<3	<4	<20
	2/19/93	13:20	S	17	35000	180.0	8.1	3.50	0.19	0.70	1.50	350	40	<7	11	<30	8.7	<3	<4	59
	2/21/93	13:25	S		28000	25.0	8.0	3.00	0.16	0.35	0.64	88	21	<7	<10	<30	<2	<3	<4	<20
	2/21/93	13:25	S	17	37000	28.0	8.1	1.80	0.15	0.30	0.40	110	27	<7	<10	<30	2.6	<3	<4	<20
	2/23/93	13:30	S		42000	9.8	8.2	1.60	0.21	0.57	0.27	76	15	<7	<10	<30	<2	<3	<4	<20
	2/23/93	13:30	S	19	43000	9.8	8.2	1.30	0.20	0.43	<0.10	90	20	<7	<10	<30	<2	<3	<4	<20
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													**<7**	**<10**	**<30**	**>4**	**<3**	**<4**	**>19**
	10/27/93	13:15			47000	5.4	8.0	0.46	0.36	1.10	0.19	100	30	<5	<10	<20	<2	<40	12	23
	1/25/94	14:20	S		41000	7.2	8.1	3.70	0.33	0.84	0.16	130	12	<5	<10	<20	<2	<40	10	23
	1/25/94	14:25	S	16										<5	<10	33	3.6	<40	<10	50
	1/27/94	14:00	S		40000	4.0	8.0	3.60	0.38	0.46	<0.10	110	32	<5	<10	<20	<2	<40	<10	24
	1/27/94	14:05	S	14										<5	<10	<20	<2	<40	12	28
	1/29/94	13:00	S		44000	0.7	8.0	1.50	0.44	0.59	<0.10	140	17	<5	<10	<20	<2	<40	17	25
	1/29/94	13:05	S	14										<5	<10	<20	<2	<40	<10	27
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													**<5**	**<10**	**>11**	**>1**	**<40**	**>4**	**35**
	2/7/94	13:10	S		31000	13.0	7.8	5.50	0.67	0.68	0.87	74	9	<5	<10	<20	<2	<40	<10	37
	2/7/94	13:15	S	10										<5	<10	41	3.9	<40	<10	70
	2/9/94	13:50	S		35000	11.0	8.0	2.80	0.25	0.15	0.34	140	<5	<5	<10	<20	<2	<40	<10	24
	2/9/94	13:55	S	20										<5	<10	<20	<2	<40	<10	18
	2/11/94	13:20	S		41000	0.8	8.1	1.50	<0.10	0.69	0.38	94	17	<5	<10	<20	<2	<40	15	19
	2/11/94	13:25	S	18										<5	<10	<20	<2	<40	<10	26
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													**<5**	**<10**	**>14**	**>1**	**<40**	**<10**	**38**

STATION	DATE	TIME	Sample Type	Depth feet	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L
	4/21/94	13:10			49000	2.6	8.3	<0.20	0.24	1.00	1.10	68	8							
LNBHIR	3/5/95	14:45	S		23000	68.0	8.1	4.20	0.23	0.94	0.96	91	17							
	3/5/95	14:50	S	20										<1	<10	7	<2	<40	<1	23
	3/7/95	12:40	S		13000	12.0	7.9	3.30	0.24	1.30	1.10	10	<6	<1	<10	7	<2	<40	<1	28
	3/7/95	12:45	S	18										<1	<10	7	<2	<40	<1	<10
	3/9/95	11:30	S		27000	7.3	8.0	6.10	0.26	1.10	0.80	42	19	<1	<10	<4	<2	44	<1	19
	3/9/95	11:35	S	16										<1	<10	<20	<2	<40	<1	14
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													<1	<10	<20	<2	47	<1	32
	3/23/95	14:30	S		46000	2.1	8.1	2.80	0.25	0.80	0.64	51	23	**<1**	**<10**	**>2**	**<2**	**>30.3**	**<1**	**26**
	3/23/95	14:35	S	15										<1	<10	<4	<2	61	<1	29
	3/25/95	11:40	S		42000	5.4	8.1	3.10	0.24	0.95	0.90	55	20	1	19	17	6	<40	1.1	95
	3/25/95	11:45	S	15										<1	<10	<4	<2	<40	<1	<10
	3/27/95	14:15	S		50000	4.5	8.0	1.50	0.25	0.86	0.49	69	25	<1	<10	<4	<2	<40	<1	<10
	3/27/95	14:20	S	14										<1	<10	<4	<2	<40	<1	22
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													<1	<10	6	<2	<40	<1	30
	5/18/95	11:30			52000	3.2	7.9	0.85	0.58	0.58	0.22	71	20	**>0.67**	**<19**	**>8**	**>2**	**<40**	**>0.36**	**42**
	10/31/95	9:30			49000	3.1	8.2	0.50	0.18	<0.50	<0.20	80	27							
	12/1/95	12:10			50000	1.7	8.1	0.89	0.21	0.57	0.27	110	27							
	2/1/96	14:00	S		20000	16.0	8.1	7.10	0.13	2.40	0.83	37	15	<1	<5	8	<2	<2	<1	13
	2/1/96	14:05	S	18										<1	<5	3	<2	<2	<1	23
	2/3/96	12:20	S		38000	2.3	8.3	2.00	<0.10	1.70	0.38	45	23	<1	<5	3	<2	<20	<1	23
	2/3/96	12:25	S	13										<1	<5	2	<2	<20	<1	24
	2/5/96	13:45	S		39000	3.8	8.1	1.50	0.14	0.74	0.31	56	21	<1	<5	2	<2	11	<2	<10
	2/5/96	13:50	S	14										<1	<5	6	<2	<4	<2	19
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													**<1**	**<5**	**3.7**	**<2**	**<20**	**<2**	**22**
	2/20/96	12:50	S		26000	130.0	8.0	4.60	0.35	1.30	1.30	190	32	<1	8	10	<2	10	3	61
	2/20/96	12:55	S	13										<1	8	11	2	11	4	62
	2/22/96	13:20	S		23000	4.6	8.1	4.50	0.11	0.74	0.64	43	13	<1	<5	<4	<2	<4	<1	16
	2/22/96	13:25	S	16										<1	<5	<2	<2	<8	<1	31
	2/24/96	10:20	S		34000	3.0	8.1	1.90	0.32	0.79	0.56	66	18	<1	<5	<8	<8	<8	<5	14
	2/24/96	10:25	S	16										<1	<5	28	<2	100	<5	24
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													**<1**	**>2.7**	**>13**	**>0.7**	**>37**	**>1.3**	**39**

STATION	DATE	TIME	Sample Type	Depth feet	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L
LNBHIR	4/25/96	11:20			38000	2.4	8.4	1.70	0.23	0.68	<0.20	86	11							
	11/7/96	11:45			32000	0.7	8.0	1.1	0.18	0.70	0.31	85	28							
	11/22/96	14:05	S		8500	21.0	7.8	6.1	0.44	0.94	0.91	37	7	<0.1	<3	<5	2	<10	<0.1	16
	11/22/96	14:05	S	15.6										0.2	6	<5	0.7	<10	<0.1	10
	11/24/96	11:05	S		24000	8.5	8.0	1.9	0.39	0.69	0.61	66	12	<0.1	7	<5	0	<10	<0.1	9
	11/24/96	11:05	S	18.8										<0.1	9	<5	0.4	<10	<0.1	9
	11/26/96	11:25	S		29000	2.5	8.0	1.4	0.25	0.67	0.42	79	16	<0.1	13	<5	<0.2	<10	<0.1	8
	11/26/96	11:25	S	16										<0.1	16	6	<0.2	13	<0.1	10
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													**>0.07**	**10.3**	**>2**	**>0.36**	**>4.3**	**<0.1**	**9.6**
	4/17/97	12:45			47000	4.0	8.0	<0.8	<0.50	0.73	0.45	83	19							
	10/30/97	12:45	M		50000	2.5	8.1	0	0	0.9	<0.2	84	15							
	2/7/98	11:05	S		16000	75	7.9	5.3	<0.5	1.0	1.3	170	21							
	2/7/98	11:05	S	9.8	47000	63	7.8	3.1	<0.5	0.7	0.6	190	28							
	3/28/98		S		41800	10	8.0	0.9	<0.1	1.0	0.3	2.0	<1	<10	<10	<10	<10	<10	<10	<50
	3/28/98		S	19.7										<1	<8	13	<2	<4	<2	27
	3/28/98		S/F	19.7										<1	<8	13	<2	<4	<2	19
	3/30/98	13:15	S		45700	3.0	8.1	1.3	0.3	1.0	0.3	13	7							
	3/30/98	13:15	S	19.0										<1	<8	13	<2	<4	<2	<10
	3/30/98	13:15	S/F	19.0										<1	<8	14	<2	<4	<2	<10
	6/23/98	14:10	M		49200	5.8	7.8	<1.3	<0.05	<1.0	0.2	190	17							
	11/4/98	12:10	D	18.6	49000	1.9	8.0	2.2	0.6	<0.05	0.18	100	18							
	1/25/99	16:25	ST		46100	1.6	8.0	1.9	0.3	0.1	0.12	72	10	<1	<8	14.3	<2	<4	<2	54.0
	1/25/99		SF	18.0										<1	<8	13.5	<2	<4	<2	22.3
	1/27/99	10:45	ST		31500	22.0	7.9	4.6	0.6	0.2	0.43	160	22	<1	<8	9.3	<2	6.3	<2	22.8
	1/27/99		SF	19.4										<1	<8	8.5	<2	5.4	<2	16.2
	1/29/99	12:50	ST		39600	12.0	7.9	3.0	1.0	0.2	0.28	82	13	<1	14	19.3	6	11.1	<2	36.4
	1/29/99	12:50	SF	18.7										<1	<8	8.2	<2	7.5	<2	<10
									4-day average [dissolved metals]					**<1**	**<8**	**10.0**	**<2**	**>4.0**	**<2**	**>9.0**
	4/12/99	11:35	ST		26600	8.9	8.0	6.1	0.4	0.2	0.39	54	11	<1	<8	10.7	<2	11.9	<2	15.7
	4/12/99		SF	13.1										<1	<8	9.9	<2	11.0	<2	13.0
	4/14/99	11:20	ST		40800	1.0	8.0	2.0	<0.2	<0.05	0.17	66	5	<1	<8	11.0	<2	10.7	<2	12.9
	4/14/99		SF	20.3										<1	<8	10.9	<2	11.1	<2	11.1
	4/16/99	12:30	ST		48200	1.7	8.0	0.9	0.5	<0.05	0.12	150	17	<1	<8	16.3	<2	7.1	<2	<10
	4/16/99		SF	19.7										<1	<8	16.7	<2	<4	<2	<10
									4-day average [dissolved metals]					**<1**	**<8**	**12.6**	**<2**	**>7.3**	**<2**	**>7.6**

STATION	DATE	TIME	Sample Type	Depth feet	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L
LNBHIR	5/27/99	11:45	D		47200	1.8	8.1	<0.44	<0.2	<0.05	0.12	79	7							
	10/12/99	12:25	DT	22	46300	4	8.1	<0.44	<0.05	0.47	<0.061	110	55							
	2/12/00	10:58	S,ST		35700	11.0	7.9	4.4	0.35	1.10	0.32	61	30	<1	<8	20.5	<2	<4	<2	<10
	2/12/00		M,SF		52100	7.0	8.0	<0.44	0.11	0.62	0.19	100	70	<1	<8	20.2	<2	<4	<2	<10
	2/12/00		B	21	52400	5.9	8.1	<0.44	0.06	0.44	0.23	99	16							
	2/14/00	10:35	S,ST		38500	5.6	7.8	3.4	0.27	0.73	0.30	68	18	<1	<8	15.6	<2	<4	<2	12.7
	2/14/00		M,SF		50100	5.3	8.0	<0.44	0.08	0.36	0.22	96	61	<1	<8	16.1	<2	<4	<2	17.7
	2/14/00		B	21	48600	5.3	8.0	<0.44	0.08	0.28	0.22	100	72							
	2/16/00	10:45	S,ST		45500	4.5	8.0	1.3	0.16	0.77	0.25	89	60	<1	<8	22.9	<2	9.4	<2	13.9
	2/16/00		M,SF		45700	4.2	8.0	1.1	0.13	0.75	0.21	120	56	<1	<8	22.3	<2	9.6	<2	12.2
	2/16/00		B	21	50400	4.7	8.1	<0.44	<0.05	0.62	0.13	110	76							
									4-day average [dissolved metals]					**<1**	**<8**	**19.5**	**<2**	**>3**	**<2**	**>10**
	3/8/00	12:21	ST	20.1	41800	2.70	8.0	0.82	0.11	0.91	0.28	94	17	<1	<8	26.4	<2	9.4	<2	14.3
	3/8/00	12:21	SF											<1	<8	26.3	<2	10.2	<2	18.0
	3/10/00	11:20	ST	21.7	36200	2.80	8.1	1.90	0.15	0.79	0.34	66	27	<1	<8	19.5	<2	9.5	<2	19.8
	3/10/00	11:20	SF											<1	<8	19.2	<2	8.7	<2	16.3
	3/12/00	11:11	ST	16.5	45300	2.10	8.1	0.73	0.13	0.96	0.18	62	24	<1	<8	24.4	<2	10.4	<2	27.0
	3/12/00	11:11	SF											<1	<8	19.8	<2	9.3	<2	14.4
									4-day average [dissolved metals]					**<1**	**<8**	**21.7**	**<2**	**9.4**	**<2**	**16.2**
	6/2/00	13:00	S	19.7	48500	3.7	7.9	<0.44	0.06	0.66	0.21	100	61							
	6/29/00	14:00	S		45400	3.9	8.0	<0.44	<0.05	1.10	0.18	<10	<1							
	6/29/00	14:00	M		47100	11.0	8.0	<0.44	<0.05	1.10	0.18	60	15							
	6/29/00	14:00	B	19.5	47500	210	8.0	<0.44	<0.05	1.30	0.80	520	87							

STATION	DATE	TIME	Sample Type	Depth feet	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L
LNBHAR	4/24/91	14:45			50000	1.1	8.1	0.30	0.70	0.20	1.20	6	1	<2	<6	<4	<2	<10	<2	<10
	6/20/91	14:35			50000	0.2	8.3	<0.20	0.30	0.20	0.10	<5	<5	<7	<10	<30	<20	<10	<2	<10
	7/25/91	14:45			51000	0.8	8.2	<0.20	0.60	1.10	4.10	39	17	<1	<5	<5	<10	<40	<3	<20
	3/21/92	14:15	S		18000	5.7	8.0	4.70	0.30	0.60	1.00	7	5	<2	<6	7	<2	<10	<2	<10
	3/23/92	14:25	S		23000	3.8	7.9	4.20	0.20	0.60	0.50	7	5	3	12	<4	<2	<10	<2	10
	4/23/92	13:50			51000	0.1	8.2	<0.20	<0.10	0.10	<0.10	78	21	<20	<30	<20	<2	<40	<10	10
	10/29/92	13:45			50000	2.3	8.1	0.20	0.10	0.23	0.41	89	29	<20	<30	<20	<2	<40	<10	36
	1/7/93	14:50	S		18000	26.0	7.9	1.40	0.21	0.51	0.29	49	14	<20	<30	<20	<2	<40	<10	52
	1/9/93	14:35	S		38000	18.0	8.0	2.30	0.28	0.45	7.30	110	28	<20	<30	<20	<2	<40	11	21
	1/12/93	13:20	S		48000	3.0	8.1	0.90	0.50	0.89	0.28	57	17	<20	<30	<20	<2	<40	13	23
	2/19/93	14:00	S		33000	22.0	8.1	3.90	0.19	0.44	0.40	85	16	<7	<10	<30	2.5	<3	<4	<20
	2/21/93	14:00	S		33000	9.6	8.0	2.20	0.15	0.29	0.43	52	17	<7	<10	<30	<2	<3	<4	<20
	2/23/93	14:00	S		44000	3.7	8.2	0.99	0.17	0.50	0.11	85	21	<7	<10	<30	<2	<3	<4	<20
	10/27/93	14:00			47000	3.4	8.0	0.31	0.33	0.85	0.16	61	25	<5	<10	<20	<2	<40	16	19
	1/25/94	14:50	S		47000	1.8	8.1	1.60	0.22	0.59	<0.10	190	19	10	25	43	<2	<40	<10	27
	1/27/94	14:30	S		46000	1.5	7.4	1.50	0.40	0.34	<0.10	130	43	<5	<10	21	<2	<40	<10	19
	1/29/94	13:45	S		46000	0.9	8.0	0.74	0.39	0.55	<0.10	160	18	<5	<10	<20	<2	<40	18	34
	2/7/94	13:20	S		41000	5.5	7.8	2.70	0.64	0.50	1.20	88	13	<5	<10	<20	<2	<40	<10	28
	2/9/94	14:30	S		39000	4.0	8.0	1.90	0.33	0.26	0.46	120	<5	<5	<10	<20	<2	<40	<10	12
	2/11/94	13:30	S		43000	1.7	7.6	1.10	0.16	0.69	0.15	160	30	<5	<10	<20	<2	<40	17	12
	4/21/94	13:40			48000	1.6	8.2	<0.20	0.15	1.70	0.39	96	<5							
	3/5/95	15:15	S		32000	11.0	8.1	3.30	0.17	0.83	0.45	44	17	<1	<10	4	<2	<40	<1	18
	3/7/95	13:15	S		17000	6.0	8.0	3.00	0.20	1.20	0.94	22	11	<1	<10	<4	<2	<40	<1	<10
	3/9/95	12:15	S		39000	1.2	8.2	2.00	0.13	0.98	0.47	41	19	<1	<10	14	<2	<40	<1	20
	3/23/95	15:00	S		48000	1.8	8.1	2.30	0.15	0.87	0.56	63	23	<1	<10	<4	<2	57	<1	22
	3/25/95	12:00	S		50000	1.9	8.1	1.30	0.16	0.79	0.49	58	20	<1	<10	<4	<2	<40	<1	<10
	3/27/95	15:00	S		52000	3.5	8.1	0.75	0.30	0.82	0.47	69	26	<1	<10	<4	<2	<40	<1	21
	2/1/96	14:40	S		36000	4.9	8.1	2.60	<0.10	2.70	0.41	71	29	<1	<5	2	<2	2	<1	<10
	2/3/96	12:45	S		40000	1.4	8.3	1.40	<0.10	1.80	0.35	31	14	<1	<5	2	<2	<20	<1	45
	2/5/96	14:15	S		42000	1.5	8.2	0.90	<0.10	0.65	0.23	71	13	<1	<5	<2	<2	<2	<2	<10
	2/20/96	13:30	S		39000	7.5	8.1	1.80	<0.10	0.75	0.39	68	20	<1	48	<2	<2	7	<1	28
	2/22/96	13:50	S		26000	5.2	8.1	3.80	0.18	0.72	0.62	35	8	<1	<5	<4	<2	<4	<1	33
	2/24/96	10:50	S		40000	1.5	8.1	0.60	0.20	0.53	0.24	85	23	<1	5	<8	<8	<8	<5	18
	11/22/96	14:30	S		15000	11.0	7.9	4.4	0.47	1.00	0.78	33	6	<0.1	<3	<5	0.4	<10	<0.1	7
	11/24/96	11:25	S		25000	1.3	8.0	1.7	0.31	0.61	0.53	79	20	<0.1	8	<5	<0.1	<10	<0.1	8
	11/26/96	12:05	S		30000	1.4	8.0	0.9	0.19	<0.50	0.33	59	14	<0.1	13	<5	<0.2	<10	<0.1	8
	2/7/98	11:45	M		17000	22.0	7.8	4.4	<0.5	0.75	1	62	16							

STATION	DATE	TIME	Sample Type	Depth feet	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	o-PO4 mg/L
UNBJAM	4/24/91	11:30			38000	7.0	8.4	17.00	0.50	0.60	2.00	34	10	<2	<6	8	<2	<10	<2	<10	
	6/20/91	11:15			41000	29.0	8.2	7.10	0.30	0.50	0.70	9	8	64	50	50	60	50	38	<10	
	7/24/91	12:00			46000	10.0	8.1	3.90	0.60	1.10	2.70	23	9	<1	<5	<5	<10	<40	<3	<20	
	8/22/91	9:40			46000	0.4	8.4	2.80	0.60	2.10	0.20	61	32								
	9/18/91	9:10			41000	5.6	8.2	8.10	0.20	2.40	1.60	8	8								
	10/17/91	9:30			40000	3.7	8.3	11.00	<0.10	0.80	0.90	12	6								
	12/19/91	9:15			44000	0.3	7.8	6.00	0.60	<0.50	0.40	<5	<5								
	4/23/92	9:10			40000	0.9	8.1	13.00	0.50	0.80	0.30	83	18	<20	<30	<20	<2	<40	<10	10	
	5/28/92	9:10			37000	1.9	8.1	7.10	0.30	1.00	0.60	68	31								
	7/22/92	9:40			40000	2.8	8.6	8.80	0.10	0.30	0.40	7	8								
	8/27/92	9:05			48000	3.1	8.0	1.00	0.40	0.80	<0.10	70	34								
	9/24/92	9:00			47000	2.0	8.1	0.90	0.30	0.64	0.34	100	31								
	10/29/92	9:35			48000	3.4	7.8	1.00	0.42	0.82	0.34	86	28	<20	<30	<20	<2	<40	13	31	
	11/19/92	9:05			40000	4.3	7.5	9.80	0.51	0.60	0.39	70	16								
	1/7/93	9:20	S		290	670	7.4	2.60	0.21	0.97	6.80	860	94	<20	<30	<20	8.0	<40	<10	50	
	1/7/93	9:25	S	5	410	1,100	8.1	2.60	0.17	1.90	5.40	1500	180	<20	<30	<20	6.0	<40	<10	59	
	1/9/93	9:05	S		770	120	7.9	13.00	0.17	1.00	1.70	130	46	<20	<30	<20	2.0	<40	<10	14	
	1/9/93	9:10	S	6	18000	157	7.9	8.00	0.20	0.70	2.70	100	49	<20	<30	<20	2.0	<40	<10	21	
	1/11/93	12:55	S		8500	17.0	7.9	9.00	0.25	0.66	0.66	35	15	<20	<30	<20	<2	<40	<10	13	
	1/11/93	13:00	S	8	24000	55.0	7.9	6.50	0.34	0.70	0.56	160	29	<20	<30	<20	<2	<40	<10	14	
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													**<20**	**<30**	**<20**	**>3**	**<40**	**<10**	**31**	
	2/19/93	9:20	S		460	460.0	8.1	8.40	0.18	1.30	4.10	280	37	<7	<10	<30	12.0	7	<4	22	
	2/19/93	9:20	S	6	1400	700.0	8.1	7.10	0.27	2.50	5.70	1200	120	<7	<10	<30	25.0	7	<4	59	
	2/21/93	8:30	S		5100	34.0	7.7	7.90	0.22	0.71	1.10	30	11	<7	<10	<30	3.2	<3	<4	<20	
	2/21/93	8:30	S	8	23000	96.0	8.0	4.00	0.28	0.50	0.99	200	33	<7	<11	<30	9.1	<3	<4	79	
	2/23/93	9:00	S		20000	12.0	8.1	17.00	0.24	0.62	0.76	59	11	<7	<10	<30	<2	<3	<4	<20	
	2/23/93	9:00	S	5	30000	12.0	8.1	8.70	0.27	0.43	0.76	61	13	<7	<10	<30	<2	<3	<4	20	
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													**<7**	**<10**	**<30**	**>11.3**	**>2**	**<4**	**53**	
	3/18/93	9:00			14000	6.2	8.4	49.00	0.23	0.78	0.55	31	11								
	4/22/93	10:30			43000	9.6	8.3	5.90	0.14	0.24	0.11	100	27								
	7/13/93	9:00			27000	18.0	8.4	26.00	0.19	0.94	0.27	62	21								
	8/19/93	11:00			45000	3.2	8.0	1.80	0.36	0.72	<0.10	87	31								
	9/16/93	9:15			45000	4.5	8.0	0.79	0.39	0.98	0.38	79	36								

STATION	DATE	TIME	Sample Type	Depth feet	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	o-PO4 mg/L
UNBJAM	10/27/93	9:30			33000	5.8	7.9	18.00	0.32	1.10	0.27	46	22	<5	<10	<20	<2	<40	11	22	
	11/18/93	10:00			42000	4.8	7.7	5.20	0.44	0.92	0.55	100	33								
	1/25/94	10:45	S		7600	110.0	7.7	16.00	0.96	2.20	1.60	150	6	<5	<10	<20	3.3	<40	<10	42	
	1/25/94	10:50	S	9										<5	<10	35	20.0	<40	12	180	
	1/27/94	10:45	S		24000	24.0	7.8	24.00	0.41	1.00	0.14	80	28	<5	<10	<20	<2	<40	<10	28	
	1/27/94	10:50	S	4										<5	<10	<20	<2	<40	<10	49	
	1/29/94	9:30	S		37000	4.1	8.0	3.90	0.47	1.30	<0.10	160	16	<5	<10	40	<2	<40	14	76	
	1/29/94	9:35	S	6										<5	<10	<20	<2	<40	19	50	
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													**<5**	**<10**	**>12**	**>7**	**<40**	**>10**	**93**	
	2/7/94	10:15	S		15000	64.0	7.8	9.60	0.70	1.40	1.40	140	25	<5	<10	<20	<2	<40	<10	38	
	2/7/94	10:20	S	6										<5	<10	<20	<2	<40	<10	54	
	2/9/94	10:10	S		4900	26.0	8.0	20.00	0.18	1.50	1.60	56	<5	<5	<10	<20	<2	<40	<10	23	
	2/9/94	10:15	S	4										<5	<10	<20	<2	<40	<10	39	
	2/11/94	10:00	S		36000	5.6	7.8	4.90	0.23	0.30	1.20	170	30	<5	<10	<20	<2	<40	15	15	
	2/11/94	10:05	S	5										<5	<10	<20	<2	<40	12	31	
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													**<5**	**<10**	**<20**	**<2**	**<40**	**>4**	**41**	
	12/1/94	10:25			44000	2.7	7.9	6.00	0.44	0.93	0.38	83	28								
	3/5/95	11:55	S		390	680.0	7.4	7.20	0.26	3.30	5.30	1300	180	2	40	36	8	<40	<1	160	
	3/5/95	12:00	S	4										3	49	39	15	40	<1	190	
	3/23/95	12:00	S		510	190.0	7.8	6.10	0.25	2.40	5.90	1500	150	3	53	46	32	<40	2.3	220	
	3/23/95	12:05	S	3										4	29	62	45	<40	2.6	110	
	3/25/95	8:45	S		30000	6.6	7.6	11.00	0.23	1.10	1.20	65	14	<1	<10	<4	<2	<40	<1	<10	
	3/25/95	8:50	S	1										<1	<10	6	<2	<40	<1	52	
	3/27/95	10:00	S		35000	6.6	8.0	14.00	0.26	0.85	0.89	49	18	<1	<10	<4	<2	<40	<1	16	
	3/27/95	10:05	S	2										<1	<10	<4	<2	<40	<1	40	
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													**>1**	**>10**	**>23**	**15**	**<40**	**>0.86**	**67**	
	5/18/95	12:15			45000	10.0	7.8	4.40	0.74	0.95	0.48	53	17								
	6/15/95	11:15			44000	19.0	7.7	3.10	0.37	0.96	0.52	110	33								
	7/28/95	10:45			44000	7.8	8.2	1.60	0.26	0.59	0.39	85	29								
	8/31/95	11:25			44000	4.5	8.6	1.00	0.55	0.66	0.21	67	35								
	9/21/95	11:00			26000	10.0	8.2	15.00	0.17	1.40	0.54	56	23								
	10/31/95	11:30			41000	5.2	8.1	10.00	0.50	0.86	0.44	66	31								
	11/16/95	11:00			40000	4.0	8.1	9.30	0.53	1.00	0.52	180	32								
	12/7/95	11:00			38000	4.7	8.0	14.00	0.31	0.98	0.42	130	38								
	1/4/96	12:00			41000	3.0	8.0	5.10	0.18	1.00	0.36	77	19								

STATION	DATE	TIME	Sample Type	Depth feet	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	o-PO4 mg/L
UNBJAM	2/1/96	10:00	S		870	140.0	7.8	15.00	1.00	2.20	2.00	110	22	<1	5	9	4	8	5	37	
	2/1/96	10:05	S	3										4	12	130	4	13	6	34	
	2/3/96	8:45	S		18000	14.0	7.9	11.00	0.38	2.30	0.86	50	19	<1	<5	<2	<2	<20	<1	35	
	2/3/96	8:50	S	2										<1	6	52	21	<20	2	33	
	2/5/96	10:30	S		21000	14.0	7.8	21.00	0.18	1.20	0.85	55	13	1	<5	180	<2	4	<2	<10	
	2/5/96	10:35	S	3										<1	<5	8	<2	8	<2	17	
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													**>1.3**	**>6.0**	**63**	**>8.3**	**>7.0**	**>2.7**	**28**	
	2/20/96	9:30	S		330	530.0	6.7	10.00	0.45	2.90	3.80	690	94	2	27	29	19	16	16	140	
	2/20/96	9:35	S	6										6	33	65	46	42	30	480	
	2/22/96	11:10	S		3000	70.0	7.7	7.40	0.19	1.20	1.20	40	11	6	<5	6	3	<4	<1	35	
	2/22/96	11:15	S	1										<1	<5	5	2	<4	<1	39	
	2/24/96	12:20	S		21000	7.7	7.8	14.00	0.35	0.97	0.84	42	14	<1	<5	<8	<8	<8	<5	22	
	2/24/96	12:25	S	5										<1	<5	<8	<2	<8	<5	45	
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													**>2.0**	**>11.0**	**>23.3**	**>16.0**	**>14.0**	**>10.0**	**188**	
	5/31/96	9:00			36000	5.1	8.3	6.50	0.16	0.85	0.48	90	29								
	7/30/96	10:57			38000	2.1	8.0	<0.2	0.26	0.67	0.47	96	28								
	8/29/96	10:45			34000	3.1	8.0	1.6	0.35	0.96	0.62	76	40								
	9/26/96	8:35			33000	3.3	7.9	2.0	0.45	0.88	0.35	88	23								
	11/7/96	9:35			19000	14.0	7.8	13.0	1.80	2.20	1.50	53	16								
	11/22/96	9:35	S		550	200.0	8.0	8.8	0.62	1.70	2.50	200	17	0.8	<3	7	3	<10	<0.1	30	
	11/22/96	9:35	S	1.5										0.7	<3	8	4	<10	<0.1	25	
	11/24/96	8:20	S		11000	17.0	7.9	12.0	0.59	1.60	1.20	39	9	<0.1	6	5	0.6	<10	<0.1	11	
	11/24/96	8:20	S	5										0.3	9	6	1	<10	<0.1	18	
	11/26/96	8:50	S		19000	12.0	7.7	19.0	0.59	1.10	0.96	54	14	<0.1	15	<5	<0.2	<10	<0.1	10	
	11/26/96	8:50	S	1.5										0.3	15	17	0.7	<10	<0.1	24	
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													**0.43**	**>8**	**10.3**	**1.9**	**<10**	**<0.1**	**22.3**	
	3/13/97	9:05			41000	3.6	8.3	7.9	<0.5	1.20	0.47	130	39								
	4/17/97	8:45			31000	4.8	7.9	22.0	0.53	1.40	0.69	67	20								
	5/22/97	10:30			40000	13.0	7.9	5.5	0.59	1.10	0.69	98	18								
	6/12/97	14:05			36000	7.4	8.3	8.3	<0.1	0.90	0.60	61	13								
	7/10/97	13:25	M		44000	3	8.3	3	0	0.5	<0.2	140	75								
	8/14/97	14:00	M		37000	5	8.2	6.0	<0.5	1.5	0.8	68	20								
	10/30/97	9:45	M		38000	6	8.0	8	0	1.1	0.6	85	21								
	11/21/97	13:00	M		23000	10	7.7	10	0.90	1.6	0.7	180	72								<0.5
	12/6/97	9:50	S		290	2500	8.4	5	1	9.0	15.0	3000	270	10	180	110	67	100	<1	560	1
	12/6/97	9:50	S/F											<1	<10	5	<2	<4	<1	33	
	12/6/97	9:50	S	7.9										12	220	110	77	110	<1	710	
	12/6/97	9:50	S/F	7.9										<1	<10	<4	<2	4.0	<1	53	
	12/10/97	7:25	S		19000	15	7.8	13	0.4	0.7	0.7	44	16	<1	<4	24	3	7	<1	23	<30
	12/10/97	7:25	S/F											<1	<4	15	<2	5	<1	<10	
	12/10/97	7:25	S	2.6										<1	<4	15	<2	5	<1	66	
	12/10/97	7:25	S/F	2.6										<1	<4	15	<2	5	<1	48	

STATION	DATE	TIME	Sample Type	Depth feet	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	o-PO4 mg/L
UNBJAM	**4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)**													**>4**	**>73.3**	**>41.7**	**>25.7**	**>38.4**	**<1**	**>259**	
	1/21/98	8:30	M		17000	10	7.9	19	<0.5	1.3	0.5	28	10								
	2/7/98	8:50	M		590	100	7.8	9.7	<0.5	1.6	1.7	86	15								
	3/26/98	9:50	S		1100	78	7.7	104.7	0.6	1.1	1.2	29	5								
	3/26/98	9:50	S	2.6										<1	16	11	5	7	<2	46	
	3/26/98	9:50	S/F	2.6										<1	<8	5	<2	<4	<2	12	
	3/28/98	10:30	S		1140	320	7.8	7.5	0.3	1.7	0.9	367	21	<10	26	<10	11	17	<10	146	
	3/28/98	10:30	S	3.3										1	19	16	9	10	<2	89	
	3/28/98	10:30	S/F	3.3										<1	<8	6	<2	<4	<2	11	
	3/30/98	9:45	S		30400	3.4	8.0	4.4	0.2	1.0	0.6	4	2								
	3/30/98	9:45	S	3.6										<10	<10	<10	<10	<10	<10	<50	
	3/30/98	9:45	S/F	3.6										<1	<8	11	<2	<4	<2	<10	
									4-day average [dissolved metals]					**<1**	**<8**	**>7.3**	**<2**	**<4**	**<2**	**>7.6**	

STATION	DATE	TIME	Sample Type	Depth feet	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	o-PO4 mg/L
UNBJAM	4/21/98	9:55	M		18100	4.6	8.3	37	0.3	1.3	0.3	10	7								
	6/23/98	11:10	M		41800	7.6	8.0	4.0	<0.05	2.0	0.6	160	42								
	7/16/98	11:30	D	4.0																	
	8/13/98	10:00	D	1.6	39000	18.0	7.7	4.0	<1	0.36	0.428	120	16								
	10/15/98	9:30	D		30900	8.2	7.8	11.3	1.20	0.38	0.490	31	8								
	11/4/98	9:30	D	13.3	41800	6.5	7.8	5.2	1.08	0.22	0.398	170	38								
	12/15/98	9:15	D	15.1	35700	5.6	7.8	7.4	0.72	0.29	0.306	78	16								
	1/7/99	9:20	D	14.3	41200	7.5	7.9	11.0	0.77	0.20	0.153	74	10								
	1/25/99	12:25	ST		7700	75.0	7.9	15.1	1.44	0.42	1.070	120	20	<1	<8	7.0	<2	4.6	<2	20.7	
	1/25/99		SF	13.1										<1	<8	5.2	<2	4.2	<2	11.0	
	1/27/99	13:30	ST		4590	25.0	7.7	8.9	1.08	0.31	1.040	78	40	<1	<8	5.5	2	4.9	<2	18.4	
	1/27/99		SF	14.1										<1	<8	3.4	<2	5.2	<2	19.1	
	1/29/99	10:23	ST		18300	16.0	7.9	11.6	0.75	0.28	0.551	54	8	<1	<8	6.3	<2	5.0	<2	12.1	
	1/29/99	10:23	SF	16.4										<1	<8	6.9	<2	5.7	<2	14.4	
									4-day average [dissolved metals]					**<1**	**<8**	**5.0**	**<2**	**5.0**	**<2**	**14.7**	
	3/3/99	9:00	D	16.4	38500	5.9	8.0	11.9	0.52	0.29	0.184	73	10								
	4/12/99	10:45	ST		8760	45.0	7.9	13.7	0.78	0.36	1.010	70	15	<1	<8	6.3	<2	7.8	<2	<10	
	4/12/99		SF	13.1										2.6	<8	6.0	<2	8.9	<2	11.6	
	4/14/99	8:35	ST		25800	11.0	7.8	9.3	0.73	0.27	0.535	55	9	<1	<8	6.9	<2	9.9	<2	<10	
	4/14/99		SF	14.1										<1	<8	8.2	<2	9.6	<2	28	
	4/16/99	10:05	ST		28900	7.2	8.0	22.4	0.74	0.15	0.428	93	13	<1	<8	13.9	<2	7.1	<2	11.6	
	4/16/99		SF	12.1										<1	<8	13.3	<2	6.7	<2	10.1	
									4-day average [dissolved metals]					**<1**	**<8**	**9.0**	**<2**	**8.7**	**<2**	**13.3**	
	5/27/99	10:00	D	3.1	27300	4.2	8.1	11.6	0.91	0.21	0.337	50	9								
	6/30/99	12:15	D	2.5	37100	6.2	8.4	1.6	0.54	0.07	0.254	60	16								
	7/27/99	13:50	DT	2.1	36800	6.5	8.5	<0.44	<0.05	0.57	0.09	66	12								
	8/10/99	14:40	DT	6.0	33200	5.1	8.5	1.35	<0.05	0.59	0.37	83	13								
	9/30/99	10:31	DT	3.0	35200	5.6	8.2	8.36	0.11	0.20	0.34	70	39								
	10/12/99	11:05	DT	3.6	31900	7.9	8.3	5.46	0.08	0.38	0.37	160	84								
	12/16/99	13:55	DT	1.9	42300	3.7	8.0	4.84	0.26	0.89	0.21	81	51								
	1/27/00	9:10	DT	8.0	10800	38	7.5	17.0	0.84	1.40	1.90	82	38								
	2/12/00	9:16	S,ST		4730	130	7.8	8.2	0.44	1.30	1.27	170	32	<1	<8	9.8	3	<4	<2	18.5	
	2/12/00	9:16	M,SF		6680	120	7.8	8.1	0.44	1.50	1.21	180	146	<1	<8	7.0	<2	<4	<2	12.5	
	2/12/00	9:16	B	12.9	37500	50	7.8	4.2	0.38	1.10	0.68	250	72								
	2/14/00	9:41	S,ST		975	26	7.7	18.0	0.40	1.40	1.05	46	22	<1	<8	16.0	<2	<4	<2	14.8	
	2/14/00	9:41	M,SF		46300	9	7.7	1.4	0.35	1.00	0.26	97	8	<1	<8	17.1	<2	<4	<2	18.7	
	2/14/00	9:41	B	9.6	48500	17	7.7	<0.44	0.35	0.83	0.31	120	47								
	2/16/00	9:30	S,ST		11900	24	7.7	11.0	0.31	1.00	0.68	51	40	<1	<8	21.7	<2	8.1	<2	29.4	
	2/16/00	9:30	M,SF		45300	4	7.7	1.1	0.39	1.20	0.24	78	51	<1	<8	21.4	<2	8.2	<2	16.7	
	2/16/00	9:30	B	16.2	46200	13	7.7	0.9	0.49	1.20	0.35	110	59								

STATION	DATE	TIME	Sample Type	Depth feet	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	o-PO4 mg/L
														<1	**<8**	**15.2**	**<2**	**2.7**	**<2**	**16.0**	
UNBJAM	3/8/00	11:00	ST	9.3	18200	16	7.9	11.0	0.25	0.79	0.73	51	26	<1	<8	17.2	2.3	5.6	<2	19.4	
	3/8/00	11:00	SF											<1	<8	16.2	<2	5.6	<2	17.6	
	3/10/00	10:15	ST	12.3	4820	50	7.9	9.9	0.20	0.97	1.50	68	26	<1	<8	15.4	<2	6.9	<2	12.9	
	3/10/00	10:15	SF											<1	<8	14.9	<2	7.2	<2	10.9	
	3/12/00	9:50	ST	12.4	19300	8	7.9	11.0	0.27	0.74	0.89	42	19	<1	<8	15.0	<2	7.6	<2	58.4	
	3/12/00	9:50	SF											<1	<8	15.6	<2	8.4	<2	17.1	
														<1	**<8**	**15.6**	**<2**	**7.0**	**<2**	**15.2**	
	4/12/00	8:15	S		25600	12	8.2	27.0	0.23	0.84	0.34	120	56								
	4/12/00	8:15	M		46000	4	8.0	2.0	0.10	0.54	0.28	94	58								
	4/12/00	8:15	B	12.4	46200	3	7.8	1.5	0.27	0.58	0.37	130	53								
	6/2/00	9:30	S		34100	8	7.8	4.4	0.31	3.20	0.43	73	41								
	6/2/00	9:30	M		33700	13	7.8	4.4	0.32	0.41	0.43	73	37								
	6/2/00	9:30	B	3.3	35400	11	7.7	4.6	0.27	0.50	0.43	87	58								
	6/29/00	12:25	S		35200	6	8.3	<0.44	<0.05	0.96	0.31	<10	<1								
	6/29/00	12:25	M		35300	7	8.3	<0.44	<0.05	1.00	0.34	39	22								
	6/29/00	12:25	B	6.2	40800	22	8.2	<0.44	<0.05	0.97	0.37	71	39								

STATION	DATE	TIME	Sample Type	Depth feet	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	o-PO4 mg/L
UNBSDC	4/24/91	11:45			44000	4.3	8.4	7.70	0.60	0.60	14.00	23	7	<2	<6	4	<2	<10	<2	<10	
	6/20/91	11:35			43000	9.6	8.4	4.60	0.30	0.20	0.40	<5	<5	7	<10	<30	<20	<10	<2	<10	
	7/24/91	12:20			47000	1.0	8.1	2.80	0.70	1.10	7.40	40	25	<1	<5	<5	<10	<40	<3	<20	
	8/22/91	10:00			46000	0.2	8.4	2.30	0.60	2.40	0.20	59	44								
	9/18/91	9:30			45000	4.1	8.4	3.90	0.20	2.40	1.50	<5	<5								
	10/17/91	9:45			44000	3.1	8.5	5.60	0.50	1.20	0.30	11	7								
	12/19/91	9:25			48000	0.3	7.9	1.80	0.50	<0.50	0.40	<5	<5								
	3/21/92	10:30	S		720	950.0	8.0	6.30	0.20	1.00	2.50	530	72	<2	<6	9	6.0	<10	<2	60	
	3/21/92	10:30	S	14										2	<6	58	12.0	10	<2	140	
	3/23/92	10:40	S		1800	62.0	7.7	4.90	0.10	0.60	1.00	32	9	3	<6	6	3.0	<10	<2	60	
	3/23/92	10:40	S	11										5	18	36	12.0	30	<2	90	
	3/25/92	10:15	S		3500	21.0	7.6	11.00	0.10	1.10	1.50	7	6	<20	<30	<20	<2	<40	<10	<10	
	3/25/92	10:15	S	6										<20	<30	<20	2.0	<40	<10	<10	
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													**>2**	**>6**	**>31**	**8.0**	**>13**	**<5**	**>76**	
	4/23/92	9:40			41000	0.6	8.2	12.00	0.60	0.70	0.30	75	19	<20	<30	<20	<2	<40	<10	<10	
	5/28/92	9:25			42000	1.4	8.2	4.00	0.20	0.90	0.40	70	34								
	6/25/92	8:00			41000	7.9	8.1	8.50	<0.10	8.10	5.90	76	27								
	7/22/92	9:55			43000	3.2	8.8	1.30	0.10	0.10	0.30	9	9								
	8/27/92	9:35			50000	4.1	8.1	0.30	0.40	0.80	<0.10	120	45								
	9/24/92	9:15			48000	1.9	8.1	0.80	0.30	0.61	0.32	95	30								
	10/29/92	10:00			48000	3.1	7.8	0.80	0.38	0.89	0.32	72	27	<20	<30	<20	<2	<40	10	25	
	11/19/92	9:20			44000	3.0	8.0	6.60	0.51	0.53	0.43	73	16								
	12/17/92	9:15			38000	6.2	7.9	5.40	0.32	0.72	2.20	60	21								
	1/7/93	9:45	S		620	500.0	7.9	2.10	0.20	0.89	6.50	540	62	<20	<30	<20	10.0	<40	<10	46	
	1/7/93	9:50	S	4	1600	520.0	7.9	2.20	0.18	1.60	4.00	710	88	<20	<30	<20	12.0	<40	<10	52	
	1/9/93	9:35	S		2500	31.0	7.7	7.60	0.15	0.78	1.10	17	<5	<20	<30	<20	<2	<40	<10	27	
	1/9/93	9:40	S	15	31000	22.0	8.0	3.00	0.15	0.52	4.10	44	7	<20	<30	<20	<2	<40	<10	30	
	1/11/93	13:35	S		17000	14.0	7.9	8.10	0.24	0.60	0.41	49	15	<20	<30	<20	<2	<40	<10	13	
	1/11/93	13:40	S	12	30000	87.0	8.0	4.50	0.37	0.57	0.31	270	43	<20	<30	<20	<2	<40	<10	16	
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													**<20**	**<30**	**<20**	**>4**	**<40**	**<10**	**33**	
	2/19/93	9:35	S		3200	280.0	8.3	7.30	0.18	1.10	2.60	300	40	<7	<10	<30	10.0	3	<4	<20	
	2/19/93	9:35	S	10	9700	250.0	7.9	6.30	0.22	1.10	2.40	320	37	<7	<10	<30	11.0	6	<4	52	
	2/21/93	9:00	S		2400	38.0	8.1	8.50	0.21	0.84	1.30	28	9	<7	<10	<30	2.2	<3	<4	<20	
	2/21/93	9:00	S	12	30000	620.0	8.0	2.90	0.28	0.85	2.30	1200	120	<7	<10	<30	7.9	<3	<4	<20	
	2/23/93	9:15	S		30000	8.2	8.1	9.30	0.17	0.39	0.59	60	11	<7	<10	<30	3.3	<3	<4	<20	
	2/23/93	9:15	S	11	37000	11.0	8.1	3.90	0.23	0.33	0.50	67	17	<7	<10	<30	<2	<3	<4	<20	
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													**<7**	**<10**	**<30**	**>6**	**>2**	**<4**	**>17**	

STATION	DATE	TIME	Sample Type	Depth feet	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	o-PO4 mg/L
UNBSDC	3/18/93	9:15			28000	8.0	8.7	26.00	0.22	0.86	0.57	77	25								
	4/22/93	10:45			44000	11.0	8.3	4.50	0.15	0.68	0.03	81	27								
	6/10/93	9:30			30000	13.0	8.1	14.00	<0.10	1.60	0.52	52	10								
	7/13/93	9:15			41000	11.0	8.5	4.50	0.24	0.99	0.19	98	28								
	8/19/93	11:10			49000	5.2	8.0	<0.20	0.40	0.63	<0.10	67	23								
	9/16/93	9:25			45000	7.8	8.0	0.30	0.52	0.97	0.39	80	24								
	10/27/93	9:45			45000	3.4	7.9	2.20	0.47	1.00	0.20	100	26	<5	<10	<20	<2	<40	17	16	
	11/18/93	10:20			46000	3.1	7.8	8.40	0.42	0.82	0.78	87	33								
	1/20/94	10:30			39000	5.6	8.0	11.00	0.34	0.52	0.95	140	25								
	1/25/94	11:15	S		11000	69.0	7.8	15.00	1.10	2.00	0.94	110	6	<5	<10	<20	<2	<40	10	41	
	1/25/94	11:20	S	12										<5	<10	25	3.9	<40	16	72	
	1/27/94	11:00	S		16000	160.0	8.0	4.40	0.61	1.00	0.84	240	34	<5	<10	21	40.0	<40	<10	120	
	1/27/94	11:05	S	10										<5	<10	21	<2	<40	<10	63	
	1/29/94	9:45	S		37000	2.8	8.0	3.40	0.55	1.10	0.24	160	17	<5	<10	<20	<2	<40	15	28	
	1/29/94	9:50	S	9										<5	<10	<20	<2	<40	17	26	
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													**<5**	**<10**	**>15**	**>1**	**<40**	**>11**	**54**	
	2/7/94	10:30	S		10000	80.0	7.7	4.50	0.70	2.80	2.50	140	28	<5	<10	<20	32.0	<40	<10	93	
	2/7/94	10:35	S	8										<5	<10	27	28	<40	<10	190	
	2/9/94	10:35	S		19000	11.0	7.8	5.70	0.33	0.50	0.70	85	<5	<5	<10	<20	<2	<40	<10	16	
	2/9/94	10:40	S	13										<5	<10	<20	<2	<40	<10	30	
	2/11/94	10:20	S		40000	0.7	7.9	3.40	0.25	0.29	0.28	190	33	<5	<10	<20	<2	<40	13	21	
	2/11/94	10:25	S	13										<5	<10	<20	<2	<40	<10	29	
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													**<5**	**<10**	**>9**	**>9**	**<40**	**<10**	**83**	
	4/21/94	9:30			36000	5.0	8.4	13.00	0.20	1.40	0.45	65	<5								
	10/28/94	10:00			35000	2.0	8.4	10.00	0.44	0.95	0.30	74	8								
	12/1/95	10:45			47000	3.3	8.0	2.90	0.34	0.89	0.12	87	25								
	3/5/95	12:10	S		710	470.0	8.0	5.60	0.31	1.50	4.10	600	80	1	23	26	4	<40	<1	96	
	3/5/95	12:15	S	13										1	30	32	14	<40	<1	120	
	3/7/95	9:20	S		2100	40.0	7.7	11.00	0.37	1.80	1.60	24	6	<1	<10	7	<2	<40	<1	14	
	3/7/95	9:25	S	9										<1	18	15	5	<40	<1	71	
	3/9/95	8:40	S		6800	9.9	8.0	28.00	0.32	1.80	1.10	17	7	<1	<10	4	<2	<40	<1	<10	
	3/9/95	8:45	S	7										<1	<10	20	<2	<40	<1	46	
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													**>0.3**	**>16**	**22.3**	**>6**	**<40**	**<1**	**79**	
	3/23/95	12:30	S		150	40.0	7.8	10.00	0.29	1.60	2.70	440	56	<1	22	18	11	<40	2.3	74	
	3/23/95	12:35	S	9										2	39	35	24	<40	1.2	160	
	3/25/95	9:10	S		13000	9.1	7.9	14.00	0.29	0.91	1.30	24	10	<1	<10	5	<2	<40	1.6	<10	
	3/25/95	9:15	S	10										<1	<10	5	<2	<40	<1	19	
	3/27/95	10:30	S		32000	6.5	8.0	17.00	0.25	0.90	0.88	48	19	<1	<10	<4	<2	<40	<1	<10	
	3/27/95	10:35	S	9										1	22	25	8	<40	<1	92	
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													**>1**	**>20**	**22**	**>10.6**	**<40**	**>0.4**	**90.3**	

STATION	DATE	TIME	Sample Type	Depth feet	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	o-PO4 mg/L
UNBSDC	7/28/95	11:00			45000	6.8	8.2	1.30	0.10	0.53	0.28	110	39								
	8/31/95	11:45			48000	3.4	8.5	<0.20	0.71	0.64	<0.20	67	32								
	9/21/95	11:20			41000	3.1	8.4	3.90	<0.10	1.10	0.32	75	33								
	10/31/95	11:15			38000	5.4	8.2	12.00	0.39	1.00	0.48	62	29								
	11/16/95	11:20			39000	3.7	8.2	11.00	0.47	0.92	0.38	180	38								
	12/7/95	11:15			43000	3.5	7.9	8.30	0.29	0.93	0.82	88	23								
	1/4/96	12:20			42000	3.2	8.1	3.50	0.14	1.10	0.36	69	19								
	2/1/96	10:30	S		1100	140.0	7.8	15.00	0.45	1.80	2.00	100	16	<1	7	8	5	8	5	27	
	2/1/96	10:35	S	9										1	7	13	<2	6	4	38	
	2/3/96	9:00	S		24000	6.5	8.1	7.40	0.37	2.30	0.79	53	19	<1	<5	<2	<2	<20	<1	28	
	2/3/96	9:05	S	10										<1	<5	6	<2	<20	1	20	
	2/5/96	10:45	S		32000	7.3	8.0	8.20	0.23	1.30	0.65	52	18	3	<5	77	<2	3	2	<10	
	2/5/96	10:45	S	13										<1	<5	9	<2	8	4	29	
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													**>0.3**	**>2.3**	**9.3**	**<2**	**>4.7**	**3.0**	**29.0**	
	2/15/96	11:10			36000	5.9	6.5	5.00	0.44	0.70	0.57	75	21								
	2/20/96	9:45	S		650	530.0	6.8	10.00	0.45	3.20	3.40	660	70	2	24	27	17	17	14	140	
	2/20/96	9:50	S	3										4	21	35	13	23	15	210	
	2/22/96	10:45	S		3900	82.0	7.8	8.10	0.25	1.60	1.30	48	17	<1	5	6	3	<4	<1	34	
	2/22/96	10:50	S	4										<1	<5	4	<2	<4	<1	29	
	2/24/96	12:00	S		29000	8.2	8.0	7.60	0.41	0.85	0.75	61	19	<1	<5	<8	<8	<8	<5	26	
	2/24/96	12:05	S	7										<1	<5	8	<2	<8	<5	39	
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													**>1.3**	**>7.0**	**15.7**	**>4.3**	**>7.7**	**>5.0**	**92.7**	

STATION	DATE	TIME	Sample Type	Depth feet	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	o-PO4 mg/L
UNBSDC	3/28/96	9:30			31000	6.9	8.5	12.00	0.31	0.88	0.26	84	25								
	4/25/96	11:30			28000	9.6	8.4	11.00	0.35	1.10	0.39	84	22								
	5/31/96	9:15			33000	8.2	8.3	7.10	0.15	1.00	0.48	100	43								
	6/21/96	10:20			27000	4.0	8.6	6.20	0.21	0.73	0.45	260	96								
	7/30/96	11:11			37000	2.6	8.0	<0.2	0.27	0.66	0.46	110	35								
	8/29/96	11:00			34000	3.1	8.0	1.1	0.34	0.76	0.50	83	27								
	9/26/96	8:50			36000	5.4	8.0	0.3	0.24	0.74	0.28	82	22								
	11/7/96	9:50			26000	7.9	7.7	6.3	0.99	1.90	1.10	55	15								
	11/22/96	9:50	S		1100	180.0	7.9	8.0	0.45	1.60	2.10	200	16	1	<3	7	4	<10	<0.1	22	
	11/22/96	9:50	S	10										1	<3	13	9	<10	<0.1	47	
	11/24/96	8:35	S		15000	9.1	7.8	7.5	0.61	1.30	1.00	52	10	<0.1	7	<5	0	<10	<0.1	8	
	11/24/96	8:35	S	7										0.3	9	<5	2	<10	<0.1	13	
	11/26/96	9:05	S		22000	4.6	7.8	11.0	0.61	1.00	0.74	45	15	<0.1	15	<5	<0.2	<10	<0.1	9	
	11/26/96	9:05	S	3										<0.1	16	5	0.7	<10	<0.1	20	
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													**0.43**	**>8.3**	**>6**	**3.9**	**>10**	**<0.1**	**26.6**	
	12/5/96	13:35			30000	5.2	8.2	7.3	0.20	0.81	0.42	100	29								
	1/31/97	11:35			28000	8.1	8.0	16.0	0.15	1.00	0.52	60	18								
	3/13/97	9:25			41000	7.4	8.1	7.5	0.57	1.00	0.40	91	24								
	4/17/97	9:05			35000	3.0	7.9	12.0	0.53	1.30	0.58	68	21								
	5/22/97	10:45			43000	12.0	7.9	4.9	0.43	0.82	0.49	84	29								
	6/12/97	13:50			43000	8.1	8.2	3.6	0.21	0.82	0.50	140	38								
	7/10/97	13:10	M		47000	2	8.3	1.4	0.2	0.5	<0.2	160	89								
	8/14/97	14:20	M		41000	4	8.3	6.0	<0.5	1.1	0.6	81	27								
	10/30/97	10:05	M		43000	4.0	8.0	3.8	0.3	1.1	0.5	85	21								
	11/21/97	13:25	M		28000	9	7.8	7.6	0.8	1.4	0.5	120	50								<0.5
	12/6/97	10:30	S		360	2200	8.5	4.2	0.6	7.2	12	1600	1400	8	170	100	75	94	<1	620	1
	12/6/97	10:30	S/F											<1	<10	<4	<2	<4	<1	15	
	12/6/97	10:30	S	9.8										10	180	110	80	110	<1	600	
	12/6/97	10:30	S/F	9.8										<1	<10	5	<2	<4	<1	24	
	12/10/97	7:45	S		27000	10	7.9	6.2	0.2	0.6	0.6	60	20	<1	<4	21	<2	7	<1	32	<30
	12/10/97	7:45	S/F																		
	12/10/97	7:45	S	7.2										<1	<4	18	<2	6	<1	21	
	12/10/97	7:45	S/F	7.2										<1	<4	14	<2	7	<1	29	
									4-day average [dissolved metals]					<1	**>60**	**>42.7**	**>26.7**	**>38.7**	**<1**	**>207**	

STATION	DATE	TIME	Sample Type	Depth feet	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	o-PO4 mg/L
UNBSDC	1/21/98	8:50	M		17000	7.2	8.0	18	<0.5	1.1	1	36	19								
	2/7/98	9:15	M		640	130	7.8	6.6	<0.5	1.3	2	120	18								
	3/26/98	10:15	S		7390	44	7.6	11	0.7	1.2	10	42	7								
	3/26/98	10:15	S	8.9										<1	9	7	<2	4	<2	22	
	3/26/98	10:15	S/F	8.9										<1	<8	5	<2	<4	<2	<10	
	3/26/98	10:15	S	6.6	17700	100	7.9	8.8	0.6	1.0	11	116	16								
	3/28/98	10:45	S		3690	220	8.0	7.0	0.4	2.0	0.9	13	3	<10	17	<10	<10	<10	<10	<50	
	3/28/98	10:45	S	6.6										2	27	23	17	16	<2	127	
	3/28/98	10:45	S/F	6.6										<1	<8	5	<2	<4	<2	10	
	3/28/98	10:45	S		25900	120	8.1	4.4	0.3	1.0	0.6	176	11	<10	12	<10	<10	<10	<10	<50	
	3/30/98	10:15	S		31700	1.7	8.2	4.0	0.2	1.0	0.6	3	1								
	3/30/98	10:15	S	9.8										<1	<8	13	<2	<4	<2	<10	
	3/30/98	10:15	S/F	9.8										<1	<8	11	<2	<4	<2	12	
									4-day average [dissolved metals]					<1	<8	7	<2	<4	<2	>7.3	
	4/21/98	10:08	M		21400	3.4	8.4	25	<0.1	1.0	0.6	13	2								
	6/23/98	11:30	M		42700	8.4	8.0	3.0	<0.05	1.5	0.5	190	52								
	7/16/98	11:00	D	3.1																	
	8/13/98	9:30	D	11.8	43100	13.0	7.7	2.7	1.10	0.30	0.40	120	14								
	10/15/98	9:45	D		39200	3.8	7.8	6.4	1.15	0.28	0.37	29	7								
	11/4/98	10:30	D	15.5	45200	5.2	7.9	2.2	0.87	0.15	0.28	190	24								
	12/15/98	9:45	D	14.3	36600	8.0	7.8	6.3	0.75	0.30	0.28	72	12								
	1/7/99	8:55	D	13.6	38400	4.4	7.8	8.0	0.45	0.19	0.15	75	10								
	1/25/99	13:45	ST		10700	22.0	7.8	8.8	1.52	0.42	0.64	56	14	<1	<8	9.9	3.9	<4	<2	28.5	
	1/25/99		SF	13.8										<1	<8	5.2	<2	<4	<2	17.0	
	1/27/99	14:30	ST		6310	19.0	7.7	7.7	1.03	0.32	0.77	52	16	<1	<8	8.0	4.3	7.2	<2	30.5	
	1/27/99		SF	7.5										<1	<8	3.4	<2	<4	<2	22.5	
	1/29/99	9:15	ST		34600	11.0	7.8	3.6	0.77	0.18	0.31	89	9	<1	<8	7.6	<2	5.7	<2	14.4	
	1/29/99	9:15	SF	13.1										<1	<8	6.4	<2	5.0	<2	<10	
									4-day average [dissolved metals]					<1	<8	5.0	<2	>1.6	<2	>13.3	
	3/3/99	9:50	D	15.5	42800	4.2	8.0	5.2	<0.2	0.22	0.18	76	10								
	4/12/99	10:30	ST		7220	18.0	7.8	7.0	0.78	0.27	0.63	33	9	<1	<8	14.0	<2	7.9	<2	15.3	
	4/12/99		SF	13.1										<1	<8	6.5	<2	8.2	<2	<10	
	4/14/99	8:50	ST		32100	3.4	7.9	5.2	0.72	0.14	0.35	56	8	<1	<8	9.9	<2	10.5	<2	13.2	
	4/14/99		SF	6.6										<1	<8	9.1	<2	10.1	<2	<10	
	4/16/99	10:25	ST		27200	6.6	8.0	17.7	0.63	0.18	0.43	84	12	<1	<8	15.9	<2	7.6	<2	28.3	
	4/16/99		SF	4.3										<1	<8	12.6	<2	7.0	<2	11.8	
									4-day average [dissolved metals]					<1	<8	9.3	<2	8.3	<2	>4.0	
	5/27/99	10:30	D	13.6	36000	3.4	8.1	7.1	0.68	0.08	0.25	64	9								
	6/30/99	11:55	D	9.3	42000	5.3	8.2	<0.44	0.44	0.09	0.22	78	14								

STATION	DATE	TIME	Sample Type	Depth feet	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	o-PO4 mg/L
UNBSDC	1/21/98	8:50	M		17000	7.2	8.0	18	<0.5	1.1	1	36	19								
	2/7/98	9:15	M		640	130	7.8	6.6	<0.5	1.3	2	120	18								
	3/26/98	10:15	S		7390	44	7.6	11	0.7	1.2	10	42	7								
	3/26/98	10:15	S	8.9										<1	9	7	<2	4	<2	22	
	3/26/98	10:15	S/F	8.9										<1	<8	5	<2	<4	<2	<10	
	3/26/98	10:15	S	6.6	17700	100	7.9	8.8	0.6	1.0	11	116	16								
	3/28/98	10:45	S		3690	220	8.0	7.0	0.4	2.0	0.9	13	3	<10	17	<10	<10	<10	<10	<50	
	3/28/98	10:45	S	6.6										2	27	23	17	18	<2	127	
	3/28/98	10:45	S/F	6.6										<1	<8	5	<2	<4	<2	10	
	3/28/98	10:45	S		25900	120	8.1	4.4	0.3	1.0	0.6	176	11	<10	12	<10	<10	<10	<10	<50	
	3/30/98	10:15	S		31700	1.7	8.2	4.0	0.2	1.0	0.6	3	1								
	3/30/98	10:15	S	9.8										<1	<8	13	<2	<4	<2	<10	
	3/30/98	10:15	S/F	9.8										<1	<8	11	<2	<4	<2	12	
									4-day average [dissolved metals]					<1	<8	7	<2	<4	<2	>7.3	
	4/21/98	10:08	M		21400	3.4	8.4	25	<0.1	1.0	0.6	13	2								
	6/23/98	11:30	M		42700	8.4	8.0	3.0	<0.05	1.5	0.5	190	52								
	7/16/98	11:00	D	3.1																	
	8/13/98	9:30	D	11.8	43100	13.0	7.7	2.7	1.10	0.30	0.40	120	14								
	10/15/98	9:45	D		39200	3.8	7.8	6.4	1.15	0.28	0.37	29	7								
	11/4/98	10:30	D	15.5	45200	5.2	7.9	2.2	0.87	0.15	0.28	190	24								
	12/15/98	9:45	D	14.3	36600	8.0	7.8	6.3	0.75	0.30	0.28	72	12								
	1/7/99	8:55	D	13.6	38400	4.4	7.8	8.0	0.45	0.19	0.15	75	10								
	1/25/99	13:45	ST		10700	22.0	7.8	8.8	1.52	0.42	0.64	56	14	<1	<8	9.9	3.9	<4	<2	28.5	
	1/25/99		SF	13.8										<1	<8	5.2	<2	<4	<2	17.0	
	1/27/99	14:30	ST		6310	19.0	7.7	7.7	1.03	0.32	0.77	52	16	<1	<8	8.0	4.3	7.2	<2	30.5	
	1/27/99		SF	7.5										<1	<8	3.4	<2	<4	<2	22.5	
	1/29/99	9:15	ST		34600	11.0	7.8	3.6	0.77	0.18	0.31	89	9	<1	<8	7.6	<2	5.7	<2	14.4	
	1/29/99	9:15	SF	13.1										<1	<8	6.4	<2	5.0	<2	<10	
									4-day average [dissolved metals]					<1	<8	5.0	<2	>1.6	<2	>13.3	
	3/3/99	9:50	D	15.5	42800	4.2	8.0	5.2	<0.2	0.22	0.18	76	10								
	4/12/99	10:30	ST		7220	18.0	7.8	7.0	0.78	0.27	0.63	33	9	<1	<8	14.0	<2	7.9	<2	15.3	
	4/12/99		SF	13.1										<1	<8	6.5	<2	8.2	<2	<10	
	4/14/99	8:50	ST		32100	3.4	7.9	5.2	0.72	0.14	0.35	56	8	<1	<8	9.9	<2	10.5	<2	13.2	
	4/14/99		SF	6.6										<1	<8	9.1	<2	10.1	<2	<10	
	4/16/99	10:25	ST		27200	6.6	8.0	17.7	0.63	0.18	0.43	84	12	<1	<8	15.9	<2	7.6	<2	28.3	
	4/16/99		SF	4.3										<1	<8	12.6	<2	7.0	<2	11.8	
									4-day average [dissolved metals]					<1	<8	9.3	<2	8.3	<2	>4.0	
	5/27/99	10:30	D	13.6	36000	3.4	8.1	7.1	0.68	0.08	0.25	64	9								
	6/30/99	11:55	D	9.3	42000	5.3	8.2	<0.44	0.44	0.09	0.22	78	14								
	7/27/99	13:30	DT	13.0	41700	3.9	8.4	1	<0.05	0.42	0.10	76	11								
	8/10/99	14:20	DT	12.6	36000	3.4	8.2	1	<0.05	0.47	0.31	96	18								
	9/30/99	10:10	DT	13.5	41800	2.8	8.1	2	0.122	0.33	0.26	79	36								
	10/12/99	10:45	DT	9.9	43000	2.1	8.2	<0.44	0.052	0.27	0.18	87	50								
	12/16/99	13:20	DT	10.2	44300	3.3	8.0	3	0.224	1.10	0.18	77	60								
	1/27/00	8:40	DT	12.3	10100	29.0	7.5	17	0.851	3.40	1.47	66	36								
	2/12/00	8:54	S,ST		8960	60.0	7.7	8	0.473	1.40	0.79	92	50	<1	<8	13.0	2	<4	<2	15.9	

NEWPORT BAY

STATION	DATE	TIME	Sample Type	Depth feet	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	o-PO4 mg/L
UNSDC	2/12/00	8:54	M,SF		26800	39.0	7.8	7	0.420	1.10	0.58	160	40	<1	<8	11.1	<2	<4	<2	13.6	
	2/12/00	8:54	B	12.5	44700	16.0	7.8	5	0.413	1.00	0.44	180	88								
	2/14/00	9:15	S,ST		7240	27.0	7.5	15	0.361	1.50	1.07	42	38	<1	<8	15.8	<2	<4	<2	15.1	
	2/14/00	9:15	M,SF		46800	6.8	7.7	1	0.339	0.81	0.29	84	46	<1	<8	14.9	<2	<4	<2	15.1	
	2/14/00	9:15	B	12.6	47300	7.4	7.8	<0.44	0.276	0.77	0.19	83	61								
	2/16/00	9:10	S,ST		25100	8.6	7.7	5	0.352	0.94	0.47	78	59	<1	<8	19.0	<2	7.7	<2	16.2	
	2/16/00	9:10	M,SF		43200	5.4	7.8	1.7	0.305	1.00	0.27	97	51	<1	<8	16.6	<2	7.2	<2	13.1	
	2/16/00	9:10	B	9.9	44600	6.5	7.9	1.2	0.283	0.95	0.24	100	45								
									4-day average [dissolved metals]					**<1**	**<8**	**14.2**	**<2**	**>2.4**	**<2**	**13.9**	
	3/8/00	11:20	ST	9.6	15700	17.0	7.9	7.8	0.273	0.80	0.86	57	15	<1	<8	15.8	<2	5.6	<2	24.1	
	3/8/00	11:20	SF											<1	<8	17.4	<2	5.6	<2	25.3	
	3/10/00	9:55	ST	16.5	10800	15.0	7.9	5.1	0.232	0.69	1.01	66	54	<1	<8	14.9	<2	7.3	<2	19.6	
	3/10/00	9:55	SF											<1	<8	15.7	<2	7.1	<2	<10	
	3/12/00	9:30	ST	12.4	24100	8.1	7.8	7.5	0.306	0.80	0.77	73	27	<1	<8	16.6	<2	9.4	<2	22.8	
	3/12/00	9:30	SF											<1	<8	16.4	<2	9.1	<2	13.5	
									4-day average [dissolved metals]					**<1**	**<8**	**16.5**	**<2**	**7.2**	**<2**	**>12.9**	
	4/12/00	7:45	S		36600	2.7	8.2	9.6	0.130	0.56	0.21	63	23								
	4/12/00	7:45	M		48530	3.8	8.1	1.9	0.130	0.53	0.28	88	59								
	4/12/00	7:45	B	12.5	45900	4.0	8.1	1.4	0.120	0.20	0.25	98	39								
	6/2/00	10:05	S		47800	3.2	7.8	<0.44	0.138	0.55	0.21	90	52								
	6/2/00	10:05	M		47300	11.0	7.7	<0.44	0.153	0.66	0.28	120	56								
	6/2/00	10:05	B	12.4	47100	7.2	7.7	<0.44	0.138	0.44	0.21	120	62								
	6/29/00	12:44	S		38700	5.4	8.3	<0.44	<0.05	1.20	0.34	20	11								
	6/29/00	12:44	M		43900	7.0	8.0	<0.44	0.155	1.20	0.46	41	22								
	6/29/00	12:44	B	15.5	44800	45.0	8.0	<0.44	0.111	1.20	0.37	110	21								

STATION	DATE	TIME	Sample Type	Depth feet	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	o-PO4 mg/L
UNBBCW	4/24/91	12:05			44000	11.0	8.4	3.00	0.70	0.50	0.70	38	8	<2	<6	5	<2	<10	<2	<10	
	6/20/91	11:35			46000	13.0	8.4	5.60	0.30	0.50	0.60	11	5	<7	<10	<30	<20	<10	<2	<10	
	7/24/91	12:45			48000	8.4	8.4	0.40	0.70	0.90	2.60	72	27	<1	<5	<5	<10	<40	<3	<20	
	8/22/91	10:15			49000	0.3	8.2	<0.20	0.50	2.50	0.20	78	46								
	9/18/91	9:40			48000	3.6	8.1	0.70	0.10	2.10	1.30	8	7								
	10/17/91	10:05			46000	3.0	8.4	2.30	1.00	1.60	0.40	10	7								
	12/19/91	9:45			47000	0.3	7.8	1.70	0.50	<0.50	0.30	<5	<5								
	3/21/92	11:15	S		4200	80.0	7.6	5.50	0.20	0.70	1.10	85	17	<2	<6	5	<2	<10	<2	60	
	3/21/92	11:15	S	1										5	<6	27	16.0	20	<2	300	
	3/23/92	11:10	S		2300	49.0	7.7	4.60	0.10	0.60	1.10	31	9	3	<6	6	<2	<10	<2	30	
	3/23/92	11:10	S	2										4	<6	14	4.0	<10	<2	30	
	3/25/92	10:45	S		3700	32.0	7.5	14.00	0.10	1.10	2.40	20	10	<20	<30	<20	2.0	<40	<10	<10	
	3/25/92	10:45	S	2										<20	<30	<20	<2	<40	<10	20	
4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)														**<3**	**<15**	**>13**	**>6.6**	**>6**	**<5**	**116**	
	4/23/92	10:00			41000	0.5	8.2	12.00	0.30	0.30	0.20	74	19	<20	<30	<20	<2	<40	<10	<10	
	5/28/92	9:40			44000	1.6	8.1	2.30	0.30	0.80	0.20	90	18								
	6/25/92	8:15			42000	6.1	8.2	7.80	<0.10	0.90	0.50	80	28								
	7/22/92	10:15			45000	0.2	8.8	0.50	0.10	0.10	<0.10	12	11								
	8/27/92	10:05			50000	4.3	8.1	0.20	0.40	0.80	0.30	130	53								
	9/24/92	9:30			50000	4.5	8.1	0.20	0.20	0.38	0.29	83	28								
	10/29/92	10:20			49000	3.1	8.0	0.20	0.26	0.60	0.12	94	30	<20	70	<20	<2	42	11	33	
	11/19/92	9:35			48000	11.0	7.5	2.20	0.37	0.53	0.39	100	23								
	12/17/92	9:25			42000	5.2	8.0	2.60	0.33	0.58	0.43	72	20								
	1/7/93	10:20	S	3	810	300.0	7.9	2.10	0.17	1.10	2.20	270	37	<20	<30	<20	7.0	<40	<10	40	
	1/9/93	10:05	S		11000	18.0	7.7	7.20	0.15	0.57	1.60	31	13	<20	<30	<20	<2	<40	<10	24	
	1/9/93	10:10	S	6	32000	14.0	8.0	2.30	0.28	0.52	3.90	48	29	<20	<30	<20	<2	<40	<10	32	
	1/11/93	14:05	S		25000	12.0	8.0	6.00	0.32	0.53	0.27	53	15	<20	<30	<20	<2	<40	12	59	
	1/11/93	14:10	S	3	25000	20.0	8.0	6.20	0.28	0.63	0.42	93	27	<20	<30	<20	<2	<40	<10	16	
4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)														**<20**	**<30**	**<20**	**>2.3**	**<40**	**<10**	**29**	
	2/19/93	10:00	S		11000	20.0	8.0	6.20	0.14	0.62	1.20	33	14	<7	<10	<30	2.7	<3	<4	<20	
	2/19/93	10:00	S	4	13000	93.0	7.8	6.80	0.24	0.74	1.30	150	21	<7	<10	<30	2.5	<3	<4	21	
	2/21/93	9:30	S		14000	14.0	8.1	3.90	0.18	0.46	0.80	30	14	<7	<10	<30	<2	<3	<4	<20	
	2/21/93	9:30	S	4	19000	50.0	8.0	3.70	0.22	0.46	0.74	100	31	<7	<10	<30	3.4	<3	<4	<20	
	2/23/93	9:45	S		36000	6.4	8.2	4.30	0.21	0.70	<0.10	46	6	<7	<10	<30	<2	<3	<4	<20	
	2/23/93	9:45	S	3	39000	5.5	8.2	2.80	0.20	0.47	<0.10	92	19	<7	16	<30	<2	<3	<4	<20	
4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)														**<7**	**>5.3**	**<30**	**>2**	**<3**	**<4**	**>7**	

NEWPORT BAY

STATION	DATE	TIME	Sample Type	Depth feet	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	o-PO4 mg/L
UNBBCW	3/18/93	9:35			40000	10.0	8.6	7.90	0.16	0.85	0.24	84	22								
	4/22/93	11:05			48000	8.0	8.2	1.00	<0.10	0.29	<0.10	88	20								
	6/10/93	9:50			30000	33.0	8.1	14.00	<0.10	1.70	0.66	100	16								
	7/13/93	9:30			44000	7.1	8.3	1.30	0.33	0.73	<0.10	91	29								
	8/19/93	11:30			49000	5.3	8.0	<0.20	0.36	0.68	<0.10	67	22								
	9/16/93	9:45			47000	8.1	8.1	0.28	0.46	1.10	0.53	82	17								
	10/27/93	10:10			46000	4.6	7.9	0.56	0.39	0.94	0.22	97	29	<5	<10	<20	<2	<40	13	18	
	11/18/93	10:35			41000	4.8	7.9	0.79	0.27	0.36	0.49	56	19								
	1/20/94	10:45			39000	6.3	8.1	10.00	0.36	0.56	0.71	150	14								
	1/25/94	11:40	S		20000	42.0	7.8	11.00	0.82	1.60	0.87	100	6	<5	<10	<20	<2	<40	<10	36	
	1/25/94	11:45	S	8										<5	<10	26	2.1	<40	17	81	
	1/27/94	11:30	S		33000	33.0	7.9	4.20	0.43	0.61	<0.10	120	37	<5	<10	<20	<2	<40	<10	43	
	1/27/94	11:35	S	>3										<5	<10	21	4.0	<40	13	47	
	1/29/94	10:00	S		44000	1.1	8.1	1.20	0.42	0.76	<0.10	150	15	<5	<10	<20	<2	<40	18	28	
	1/29/94	10:05	S	3										<5	<10	<20	<2	<40	18	31	
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													**<5**	**<10**	**>16**	**>2**	**<40**	**16**	**53**	
	2/7/94	10:45	S		27000	44.0	7.6	6.50	0.72	1.90	1.60	120	18	<5	<10	<20	5.8	<40	11	49	
	2/7/94	10:50	S	3										<5	<10	<20	14.0	<40	<10	100	
	2/9/94	11:00	S		24000	13.0	7.9	4.60	<0.10	0.58	0.60	87	<5	<5	<10	<20	<2	<40	<10	25	
	2/9/94	11:05	S	1										<5	<10	27	11.0	<40	<10	120	
	2/11/94	10:30	S		41000	5.1	8.0	2.70	0.15	0.28	0.25	110	20	<5	<10	<20	<2	<40	12	23	
	2/11/94	10:35	S	3										<5	<10	<2	<2	<40	11	28	
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													**<5**	**<10**	**>9**	**>8.3**	**<40**	**>4**	**83**	
	4/21/94	9:45			40000	3.9	8.4	7.70	0.29	2.20	0.59	82	5								
	10/28/94	10:10			41000	1.7	8.4	1.30	0.27	0.76	0.52	65	12								
	12/1/94	11:00			49000	1.3	8.0	1.70	0.30	0.95	0.35	97	22								
	3/5/95	12:35	S		1400	270.0	8.0	5.60	0.29	1.80	2.80	280	48	<1	19	19	<2	<40	<1	66	
	3/5/95	12:40	S	2										<1	25	24	11	<40	<1	93	
	3/7/95	9:40	S		2200	44.0	7.7	9.30	0.30	1.80	1.60	32	10	<1	<10	8	<2	<40	<1	15	
	3/7/95	9:45	S	1										<1	15	15	6	<40	<1	53	
	3/9/95	8:50	S		8400	10.0	8.0	22.00	0.23	1.60	1.10	42	10	<1	<10	6	<2	<40	<1	<10	
	3/9/95	8:55	S	12										<1	<10	<20	<2	51	<1	25	
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													**<1**	**>13**	**>13**	**>5.6**	**>17**	**<1**	**57**	
	3/23/95	12:45	S		7100	12.0	7.9	22.00	0.29	1.10	1.30	58	11	<1	<10	7	<2	<40	1.6	21	
	3/23/95	12:50	S	9										<1	<10	11	<2	46	<1	48	
	3/25/95	9:25	S		14000	10.0	8.0	12.00	0.33	0.96	1.40	24	9	<1	<10	5	<2	<40	<1	<10	
	3/25/95	9:30	S	1										<1	<10	6	<2	<40	<1	19	
	3/27/95	10:45	S		38000	5.7	8.0	11.00	0.20	0.86	0.76	55	22	<1	<10	<4	<2	<40	<1	14	
	3/27/95	10:50	S	3										1	11	23	6	<40	<1	81	
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													>0.3	>3.6	13	>2	>15	<1	49	

STATION	DATE	TIME	Sample Type	Depth feet	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	o-PO4 mg/L
UNBBCW	5/18/95	9:00			46000	9.7	7.9	4.90	0.37	0.49	0.32	72	21								
	6/15/95	11:40			49000	9.1	8.0	0.43	0.13	0.63	<0.20	85	24								
	7/28/95	11:10			48000	6.3	8.6	<0.20	<0.10	0.60	0.36	110	45								
	8/31/95	12:05			49000	3.8	8.4	<0.20	<0.10	0.53	<0.20	68	34								
	9/21/95	11:45			43000	2.9	8.4	3.20	<0.10	1.00	0.33	63	27								
	10/31/95	11:00			40000	8.1	8.2	9.90	0.34	0.78	0.42	54	23								
	11/16/95	11:45			39000	3.8	8.3	10.00	0.39	0.80	0.34	59	24								
	12/7/95	11:30			48000	4.6	8.1	1.70	0.18	0.81	0.53	81	21								
	1/4/96	12:45			43000	2.1	8.1	3.20	<0.10	1.00	0.32	81	19								
	2/1/96	10:55	S		9300	47.0	7.7	9.30	0.18	1.40	1.20	38	14	<1	<5	5	<2	12	3	22	
	2/1/96	11:00	S	0										<1	<5	26	<2	4	3	<10	
	2/3/96	9:15	S		34000	4.6	8.2	3.00	0.10	1.90	0.43	61	20	<1	<5	<2	<2	<20	<1	28	
	2/3/96	9:20	S	3										<1	<5	3	<2	<20	2	50	
	2/5/96	11:05	S		35000	6.2	8.0	3.90	0.19	1.20	0.48	55	8	<1	<5	2	<2	<2	6	26	
	2/5/96	11:10	S	2										<1	<5	2	<2	5	<2	13	
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													**<1**	**<5**	**10.3**	**<2**	**>3.0**	**>1.7**	**>21.0**	
	2/15/96	11:30			37000	7.9	7.2	4.50	0.47	0.60	0.67	93	27								

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STATION	DATE	TIME	Sample Type	Depth feet	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	o-PO4 mg/L
UNBBCW	2/20/96	10:15	S		5500	150.0	6.9	10.00	0.47	1.60	1.40	150	23	1	9	12	3	8	4	42	
	2/20/96	10:20	S	17										<1	8	16	<2	8	5	73	
	2/22/96	10:15	S		9100	42.0	7.7	6.80	0.26	0.98	0.94	31	7	<1	<5	<4	<2	<4	<1	23	
	2/22/96	10:20	S	2										<1	<5	<4	<2	<4	<1	31	
	2/24/96	11:45	S		27000	6.0	8.1	6.30	0.37	0.78	0.81	54	17	4	<5	<8	<8	<8	<5	23	
	2/24/96	11:50	S	10										<1	<5	13	<2	<8	<5	41	
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													**<1**	**>2.7**	**>9.7**	**<2**	**>2.7**	**>1.7**	**48**	
	3/28/96	9:45			31000	4.6	8.5	12.00	0.31	0.94	0.29	90	24								
	4/25/96	12:00			29000	5.4	8.4	9.50	0.34	1.00	0.31	73	21								
	5/31/96	9:30			39000	4.3	8.3	<0.20	<0.10	0.85	0.24	140	59								
	6/21/96	9:50			30000	3.3	8.6	5.00	0.25	0.70	0.44	290	110								
	7/30/96	11:27			37000	1.7	8.1	<0.2	0.15	<0.50	0.26	120	38								
	8/29/96	11:15			33000	3.0	8.1	<0.2	0.21	0.60	0.25	86	31								
	9/26/96	9:15			35000	5.2	8.1	<0.2	0.29	0.65	0.36	99	29								
	11/7/96	10:05			30000	6.6	7.7	2.4	0.77	1.50	0.92	69	23								
	11/22/96	10:20	S		1100	200.0	7.9	7.0	0.48	1.60	2.10	250	24	1	<3	8	5	<10	<0.1	25	
	11/22/96	10:20	S	11.6										2	6	23	16	<10	<0.1	102	
	11/24/96	8:50	S		22000	5.3	7.9	2.8	0.40	0.91	0.76	61	11	<0.1	8	<5	<0.1	<10	<0.1	8	
	11/24/96	8:50	S	9.2										0.2	7	<5	0.6	<10	<0.1	11	
	11/26/96	9:25	S		30000	4.3	7.9	1.6	0.27	0.68	0.43	48	12	<0.1	12	<5	<0.2	<10	<0.1	9	
	11/26/96	9:40	S	7										0.3	15	6	0.9	10	<0.1	18	
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													**0.83**	**9.3**	**>9.6**	**5.8**	**>3.3**	**<0.1**	**43.6**	
	12/5/96	13:55			31000	3.8	8.2	6.2	0.47	0.68	0.34	86	22								
	1/31/97	11:50			28000	6.8	8.1	16.0	0.23	1.20	0.52	65	17								
	3/13/97	9:35			44000	5.1	8.1	4.8	0.58	0.97	0.47	110	36								
	4/17/97	9:25			40000	3.1	7.9	6.9	<0.50	1.30	0.55	82	26								
	5/22/97	11:00			47000	8.0	8.0	0.9	0.31	0.62	0.56	120	33								
	6/12/97	13:35			45000	10.0	8.2	2.4	<0.10	0.81	0.45	170	40								

STATION	DATE	TIME	Sample Type	Depth feet	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	o-PO4 mg/L
UNBBCW	7/10/97	12:55	M		45000	1.7	8.3	1.7	<0.1	0.5	<0.2	190	110								
	8/14/97	14:45	M		40000	4.6	8.3	1.3	<0.5	1.1	0.5	83	26								
	10/30/97	10:20	M		49000	3.2	8.0	0.5	0.2	0.7	0.3	95	22								
	11/21/97	13:50	M		35000	5.8	7.8	4.3	0.6	1.1	0.3	180	73								<0.5
	12/6/97	10:50	S		1200	2000	8.2	3.6	0.5	4.4	6.3	1100	970	4	110	66	37	59	<1	310	1
	12/6/97	10:50	S/F											<1	<10	<4	<2	<4	<1	34	
	12/6/97	10:50	S	3.9										5	120	77	43	68	<1	320	
	12/6/97	10:50	S/F	3.9										<1	<10	4.0	<2	<4	<1	25	
	12/10/97	8:05	S		37000	19	7.9	3	0	0.6	0.6	120	29	1	4	23	<2	8	<1	52	<30
	12/10/97	8:05	S/F											<1	<4	6	<2	7	<1	27	
	12/10/97	8:05	S	3.9										<1	<4	22	<2	7	<1	17	
	12/10/97	8:05	S/F	3.9										<1	<4	20	<2	6	<1	22	
								4-day average [dissolved metals]						**<1**	**<6**	**10**	**<2**	**>4.3**	**<1**	**25**	
	1/21/98	9:05	M		22000	5.9	8.0	12	<0.5	1.2	0.4	46	17								
	2/7/98	9:40	S		2400	100	7.8	7.9	<0.5	1.5	2.0	310	31								
	3/26/98	10:30	S		9810	55	7.9	9.2	0.6	1.1	1.2	43	8								
	3/26/98	10:30	S	3.3										<1	11	10	4	6	<2	36	
	3/26/98	10:30	S/F	3.3										<1	<8	6	<2	<4	<2	<10	
	3/28/98	11:00	S		1780	45	8.0	6.6	0.1	1.0	0.9	45	7	<10	<10	<10	<10	<10	<10	<50	
	3/28/98	11:00	S	3.3										<10	<10	<10	<10	<10	<10	<50	
	3/28/98	11:00	S/F	3.3										<1	<8	7	<2	<4	<2	22	
	3/30/98	10:45	S		41000	1.9	8.1	1.8	0.2	1.0	<0.1	2	<1								
	3/30/98	10:45	S	7.9										<1	<8	20	<2	<4	<2	<10	
	3/30/98	10:45	S/F	7.9										<1	<8	13	<2	<4	<2	<10	
								4-day average [dissolved metals]						**<1**	**<8**	**8.7**	**<2**	**<4**	**<2**	**>12.0**	
	4/21/98	10:24	M		24900	3.2	8.5	22.44	0.10	1.60	0.100	6	1								
	6/23/98	12:10	M		47200	14	7.8	1.3	0.10	<1	0.280	110	26								
	7/16/98	10:45	D	6.2	41600	7.7	8.1	1.7	2.60	0.15	0.092	200	44								
	8/13/98	9:00	D	5.6	43600	7.6	7.7	2.4	1.00	0.35	0.337	110	12								
	10/15/98	10:10	D		42600	4.4	7.9	3.1	1.11	0.22	0.337	37	8								
	11/4/98	10:50	D	4.0	48500	5.8	7.9	1.3	0.79	0.10	0.275	190	28								
	12/15/98	10:00	D	9.3	40300	5.4	7.8	3.56	0.30	0.20	0.245	78	17								
	1/7/99	8:35	D	13.6	47800	13.0	7.9	3.8	0.36	0.15	0.153	110	14								
	1/25/99	12:00	ST		17500	19.0	7.9	14.0	1.38	0.46	0.581	72	11	<1	<8	8.8	2	<4	<2	20.9	
	1/25/99		SF	14.4										<1	<8	6.3	<2	<4	<2	14.7	
	1/27/99	15:00	ST		6290	15.0	7.6	7.0	1.0	0.31	0.734	54	14	<1	<8	4.6	<2	4.3	<2	19.2	
	1/27/99		SF	13.5										<1	<8	3.5	<2	4.2	<2	11.4	
	1/29/99	11:06	ST		29500	12.0	7.8	6.4	0.6	0.28	0.428	69	9	<1	<8	9.5	<2	5.4	<2	19.8	
	1/29/99	11:06	SF	14.8										<1	<8	7.6	<2	5.5	<2	12.9	
									4-day average [dissolved metals]					<1	<8	5.7	<2	>3.3	<2	13.0	

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STATION	DATE	TIME	Sample Type	Depth feet	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	o-PO4 mg/L
UNBBCW	3/3/99	10:15	D	14.0	47400	2.5	8.1	1.5	0.4	0.06	0.092	69	10								
	4/12/99	11:00	ST		10300	22.0	7.9	9.2	0.8	0.30	0.673	52	13	<1	<8	10.0	<2	9.0	<2	13.7	
	4/12/99		SF	15.1										2	<8	8.8	<2	8.7	<2	15.0	
	4/14/99	9:30	ST		38500	1.7	8.0	2.9	0.7	0.05	0.226	26	5	<1	<8	9.7	<2	10.3	<2	10.8	
	4/14/99		SF	18.4										<1	<8	9.0	<2	10.3	<2	11.1	
	4/16/99	10:50	ST		46100	3.3	8.0	1.1	0.6	0.05	0.153	150	13	<1	<8	15.2	<2	7.3	<2	11.8	
	4/16/99		SF	12.8										<1	<8	13.8	<2	6.8	<2	<10	
									4-day average [dissolved metals]					**<1**	**<8**	**10.0**	**<2**	**8.7**	**<2**	**>8.7**	
	5/27/99	10:45	D	15.5	41000	2.3	8.0	3.3	0.5	0.09	0.214	70	8								
	6/30/99	11:40	D	9.9	47500	2.3	8.2	0.4	0.2	<0.05	0.101	81	16								
	7/27/99	13:15	D	3.4	43500	3.8	8.3	<0.44	<0.05	0.49	0.10	71	10								

STATION	DATE	TIME	Sample Type	Depth feet	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	o-PO4 mg/L
UNBNSB	6/20/91	12:10			48000	5.8	8.3	1.00	<0.10	<0.10	0.30	<5	<5	9	30	<30	<20	30	<2	<10	
	7/24/91	13:20			50000	5.3	8.1	0.60	0.70	0.80	4.30	64	24	<1	<5	<5	<10	<40	<3	<20	
	8/22/91	10:30			50000	0.3	8.1	0.80	0.60	1.40	0.20	68	34								
	9/18/91	9:50			49000	2.9	8.2	0.70	0.10	1.80	1.40	7	7								
	10/17/91	10:20			48000	2.6	8.2	1.30	1.00	0.60	0.80	19	11								
	12/19/91	9:55			48000	0.5	7.9	1.50	0.50	0.60	0.30	<5	<5								
	3/21/92	11:35	S		6400	29.0	7.7	5.40	0.20	0.80	1.00	23	8	<2	<6	<4	<2	<10	<2	10	
	3/21/92	11:35	S	16										<2	<6	6	3.0	<10	520	50	
	3/23/92	11:25	S		3700	23.0	7.7	5.00	0.10	0.50	1.00	14	5	3	<6	6	3.0	<10	<2	20	
	3/23/92	11:25	S	13										3	<6	10	<2	<10	<2	20	
	3/25/92	11:50	S		4900	19.0	7.4	9.20	0.20	0.90	1.90	6	15	<20	<30	<20	<2	<40	<10	<10	
	3/25/92	11:50	S	11										<20	<30	<20	33.0	<40	<10	20	
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													**>1**	**<15**	**>5**	**>12**	**<20**	**>173**	**30**	
	4/23/92	10:15			42000	0.5	8.2	11.00	<0.10	0.30	0.10	73	19	<20	<30	<20	<2	<40	<10	<10	
	5/28/92	9:50			48000	1.2	8.0	0.70	0.20	0.50	<0.10	200	90								
	6/25/92	9:35			46000	4.9	8.1	2.20	0.10	0.90	0.50	65	23								
	7/22/92	10:30			47000	1.9	8.6	0.20	0.10	0.30	0.50	12	12								
	8/27/92	10:15			50000	4.1	8.1	0.20	0.30	0.40	<0.10	140	57								
	9/24/92	9:40			50000	1.8	8.1	0.20	0.20	0.39	<0.10	78	28								
	10/29/92	10:55			50000	2.5	8.0	2.00	0.21	0.38	0.29	84	28	<20	<30	<20	<2	<40	14	24	
	11/19/92	9:50			47000	3.4	8.0	2.20	0.45	0.48	0.31	92	20								
	12/17/92	9:50			44000	4.5	8.0	1.50	0.27	0.42	0.31	79	20								
	1/7/93	10:35	S		3400	280.0	7.8	2.00	0.18	0.69	5.30	310	42	<20	<30	<20	7.0	170	<10	56	
	1/7/93	10:40	S	3	8200	570.0	7.8	1.70	0.19	1.80	3.70	790	90	<20	<30	<20	11.0	<40	<10	68	
	1/9/93	10:20	S		23000	9.6	7.9	4.10	0.26	0.53	2.80	49	43	<20	<30	<20	<2	<40	12	35	
	1/9/93	10:25	S	>3	36000	17.0	8.1	4.10	0.38	0.47	5.50	120	26	<20	<30	<20	<2	<40	11	21	
	1/11/93	14:25	S		30000	14.0	8.0	5.20	0.36	0.52	0.38	88	27	<20	<30	<20	<2	<40	<10	18	
	1/11/93	14:30	S	13	31000	18.0	8.0	4.90	0.32	0.63	0.37	92	27	<20	<30	<20	<2	<40	<10	19	
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													**<20**	**<30**	**<20**	**>3.6**	**<40**	**>3.6**	**36**	
	2/19/93	10:20	S		10000	160.0	7.8	6.90	0.25	0.60	2.10	220	29	<7	<10	<30	7.2	<3	<4	<20	
	2/19/93	10:20	S	4J	15000	290.0	7.9	7.10	0.25	0.97	2.30	490	56	<7	<10	<30	9.4	<3	<4	37	
	2/21/93	9:50	S		19000	11.0	7.6	3.60	0.19	0.36	0.61	17	10	<7	<10	<30	2.2	<3	<4	<20	
	2/21/93	9:50	S	17	36000	92.0	8.0	1.80	0.29	0.44	0.80	230	38	<7	<10	<30	5.9	<3	<4	20	
	2/23/93	10:00	S		37000	4.7	8.1	3.10	0.19	0.61	<0.10	55	7	<7	<10	<30	<2	<3	<4	<20	
	2/23/93	10:00	S	7	40000	5.4	8.2	2.40	0.18	0.41	<0.10	64	19	<7	<10	<30	<2	<3	<4	22	
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													**<7**	**<10**	**<30**	**>5**	**<3**	**<4**	**26**	
	3/18/93	9:50			44000	4.9	8.6	3.60	0.12	0.72	0.19	91	23								
	4/22/93	11:25			48000	5.8	8.1	1.00	<0.10	0.19	0.13	84	24								
	6/10/93	10:10			38000	11.0	8.0	5.80	0.11	1.30	0.27	80	17								

STATION	DATE	TIME	Sample Type	Depth feet	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	o-PO4 mg/L
UNBNSB	7/13/93	9:45			46000	4.6	8.3	0.29	0.39	0.70	<0.10	93	29								
	8/19/93	12:00			49000	4.7	8.0	<0.20	0.34	1.20	0.15	34	14								
	9/16/93	9:55			47000	7.4	8.2	<0.20	0.30	0.65	0.12	55	28								
	10/27/93	10:30			47000	5.9	7.9	0.38	0.38	1.10	0.20	96	30	<5	<10	<20	<2	<40	14	19	
	11/18/93	10:45			46000	2.3	7.9	0.55	0.23	0.35	<0.10	65	24								
	1/20/94	11:00			41000	4.9	8.1	9.50	0.32	0.51	0.61	150	16								
	1/25/94	12:00	S		27000	32.0	7.9	8.50	0.64	1.60	0.84	130	8	<5	<10	<20	<2	<40	14	39	
	1/25/94	12:05	S	4										<5	<10	23	4.0	<40	11	68	
	1/27/94	12:45	S		39000	29.0	7.9	3.50	0.41	0.40	<0.10	130	34	<5	<10	<20	<2	<40	12	32	
	1/27/94	12:50	S	N/A										<5	<10	25	3.4	<40	10	59	
	1/29/94	10:15	S		43000	1.0	8.1	1.40	0.40	0.72	<0.10	180	17	<5	<10	<20	<2	<40	18	20	
	1/29/94	10:20	S	2										<5	<10	<20	<2	<40	13	26	
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													**<5**	**<10**	**>16**	**>3**	**<40**	**11**	**51**	
	2/7/94	11:00	S		30000	37.0	7.6	6.10	0.67	0.95	0.77	130	21	<5	<10	<20	4.6	<40	<10	44	
	2/7/94	11:05	S	7										<5	<10	<20	11.0	<40	12	77	
	2/9/94	11:10	S		28000	12.0	7.9	3.90	<0.10	0.30	0.50	120	<5	<5	<10	<20	<2	<40	<10	25	
	2/9/94	11:15	S	>3										<5	<10	<20	<2	<40	<10	30	
	2/11/94	11:00	S		43000	10.0	8.0	1.20	<0.10	0.17	0.14	250	40	<5	<10	<20	<2	<40	12	16	
	2/11/94	11:05	S	8										<5	<10	<20	<2	<40	11	28	
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													**<5**	**<10**	**<20**	**>4**	**<40**	**>8**	**45**	
	4/21/94	10:00			45000	2.7	8.3	3.20	0.25	1.50	0.34	70	6								
	10/28/94	10:20			49000	1.4	8.3	1.00	0.21	0.74	0.21	79	13								
	12/1/95	11:10			49000	1.2	8.1	1.40	0.26	0.85	0.28	99	33								
	3/5/95	12:55	S		3000	310.0	7.9	5.30	0.33	1.80	3.20	410	54	<1	14	20	3	<40	<1	70	
	3/5/95	13:00	S	6										6	95	76	39	62	<1	410	
	3/7/95	10:00	S		2800	50.0	7.7	7.10	0.29	1.90	1.60	29	8	1	<10	8	<2	<40	<1	25	
	3/7/95	10:05	S	3										<1	<10	7	<2	<40	<1	31	
	3/9/95	9:10	S		9600	9.4	8.0	17.00	0.24	1.60	1.10	21	<6	<1	<10	6	<2	<40	<1	<10	
	3/9/95	9:15	S	8										<1	<10	<20	<2	<40	<1	18	
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													**>2**	**>32**	**>28**	**>13**	**>21**	**<1**	**153**	
	3/23/95	13:00	S		13000	8.0	7.9	13.00	0.29	0.96	1.10	40	11	<1	<10	8	<2	<40	1.8	25	
	3/23/95	13:05	S	3										<1	<10	6	<2	<40	1.7	28	
	3/25/95	9:45	S		18000	9.2	7.9	9.70	0.25	0.85	1.20	30	12	<1	<10	5	<2	<40	<1	<10	
	3/25/95	9:50	S	8										<1	<10	4	<2	<40	<1	<10	
	3/27/95	11:00	S		43000	7.3	8.1	6.20	0.20	0.86	0.66	50	14	<1	<10	5	<2	<40	<1	19	
	3/27/95	11:05	S	5										<1	10	16	3	<40	<1	55	
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													**<1**	**>3**	**>8**	**>1**	**<40**	**<1**	**>27**	
	5/18/95	9:10			48000	6.5	8.0	3.20	0.60	0.50	0.24	64	20								
	6/15/95	11:55			49000	7.4	8.0	0.32	0.11	0.71	<0.20	65	23								

STATION	DATE	TIME	Sample Type	Depth feet	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	o-PO4 mg/L
UNBNSB	7/28/95	11:25			50000	3.6	8.2	<0.20	<0.10	0.54	0.21	94	35								
	8/31/95	12:20			50000	3.6	8.3	<0.20	<0.10	0.53	<0.20	57	27								
	9/21/95	12:10			46000	3.5	8.3	1.50	<0.10	0.77	0.23	79	30								
	10/31/95	10:40			47000	3.4	8.2	4.00	0.25	0.77	0.36	90	38								
	11/16/95	12:00			42000	3.0	8.3	8.20	0.37	0.78	0.24	71	33								
	12/7/95	11:45			48000	5.0	8.1	1.60	0.20	0.70	0.33	80	23								
	1/4/96	12:55			43000	1.7	8.1	2.70	<0.10	0.94	0.31	97	27								
	2/1/96	11:15	S		8900	76.0	7.9	11.00	0.26	3.20	1.40	47	13	<1	<5	8	<2	8	3	<10	
	2/1/96	11:20	S	12										3	8	26	3	8	5	45	
	2/3/96	9:30	S		35000	3.4	8.2	2.90	<0.10	1.90	0.45	87	30	<1	<5	2	<2	<20	<1	22	
	2/3/96	9:35	S	7										<1	6	9	<2	<20	1	90	
	2/5/96	11:20	S		36000	6.1	8.0	2.80	0.16	1.20	0.49	74	16	<1	<5	2	<2	<2	2	<10	
	2/5/96	11:25	S	13										<1	<5	4	<2	<4	5	21	
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													**>1**	**>4**	**13**	**>1**	**>2.7**	**3.7**	**52**	
	2/15/96	11:45			38000	6.4	7.4	4.30	0.37	<0.50	0.42	95	24								

STATION	DATE	TIME	Sample Type	Depth feet	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	o-PO4 mg/L
UNBNSB	2/20/96	10:35	S		13000	72.0	7.4	7.90	0.44	1.20	0.91	84	17	<1	<5	13	<2	5	1	30	
	2/20/96	10:40	S	16										<1	6	12	<2	10	3	75	
	2/22/96	10:00	S		10000	17.0	7.8	6.70	0.17	0.98	0.88	29	10	<1	6	<4	<2	<4	<1	21	
	2/22/96	10:05	S	3										<1	<5	4	<2	10	<1	34	
	2/24/96	11:30	S		26000	4.3	8.0	5.50	0.51	0.98	0.70	55	14	<1	<5	<8	<8	<8	<5	41	
	2/24/96	11:35	S	10										<1	<5	8	<2	<8	<5	55	
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													**<1**	**>2**	**8**	**<2**	**>7**	**>1**	**55**	
	3/28/96	10:00			30000	4.7	8.5	11.00	0.31	0.75	0.21	91	25								
	4/25/96	9:15			29000	4.5	8.4	9.30	0.31	1.00	0.30	78	23								
	5/31/96	9:40			39000	2.6	8.3	0.70	<0.10	0.50	0.23	130	53								
	6/21/96	9:30			31000	3.5	8.6	4.80	0.19	0.80	0.42	250	91								
	7/30/96	11:42			37000	1.4	8.1	<0.2	0.10	<0.50	0.24	120	41								
	8/29/96	11:45			32000	2.3	8.1	<0.2	<0.10	0.58	<0.20	72	35								
	9/26/96	9:35			35000	3.5	8.0	<0.2	0.28	0.63	0.30	110	28								
	11/7/96	10:20			31000	5.4	7.8	1.8	<0.10	1.30	0.66	110	27								
	11/22/96	10:45	S		3200	250.0	7.9	7.2	0.49	1.80	2.40	380	33	1	<3	9	7	<10	<0.1	32	
	11/22/96	10:45	S	12.4										3	7	26	22	<10	<0.1	122	
	11/24/96	9:15	S		25000	4.5	8.0	2.3	0.39	0.82	0.72	71	14	<0.1	8	<5	<0.1	<10	<0.1	8	
	11/24/96	9:15	S	13										0.3	9	<5	1	<10	<0.1	15	
	11/26/96	9:40	S		29000	2.0	7.9	1.6	0.24	0.70	0.43	66	14	<0.1	13	<5	<0.2	<10	<0.1	11	
	11/26/96	9:40	S	15.4										<0.1	14	<5	<0.2	11	<0.1	11	
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													**>1.1**	**10**	**>8.6**	**>7.3**	**>3.6**	**<0.1**	**49.3**	
	12/5/96	14:15			33000	2.9	8.1	4.3	0.37	0.63	0.20	94	26								
	1/31/97	12:05			33000	3.9	8.0	8.4	0.19	0.77	0.53	67	17								
	3/13/97	9:50			45000	5.5	8.0	3.0	<0.50	0.81	0.31	110	32								
	4/17/97	10:05			45000	4.4	7.9	0.9	<0.50	1.00	0.49	100	23								
	5/22/97	11:15			48000	12.0	8.1	0.7	0.26	0.60	0.28	90	31								
	6/12/97	13:20			46000	9.1	8.2	1.3	<0.1	0.69	0.41	180	39								
	7/10/97	12:40			49000	1.7	8.1	0.3	<0.1	0.5	<0.2	190	100								
	8/14/97	15:00			46000	4.5	8.2	0.2	<0.5	0.6	0.4	100	30								
	10/30/97	10:35			48000	3.9	8.0	0.5	0.2	0.8	0.3	50	17								
	11/21/97	14:05			40000	4.0	7.9	3.5	0.6	0.9	0.2	160	65								<0.5

STATION	DATE	TIME	Sample Type	Depth feet	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	o-PO4 mg/L
UNBNSB	12/6/97	11:15	S		380	2300	8.6	4.5	0.6	7.4	13	2800	2600	8	160	98	68	83	<1	520	1
	12/6/97	11:15	S/F											<1	<10	<4	<2	<4	<1	29	
	12/6/97	11:15	S	17.7										8	180	110	74	90	<1	570	
	12/6/97	11:15	S/F	17.7										<1	<10	<4	<2	<4	<1	22	
	12/8/97	12:20	S		4800	37	7.6	13.0	<0.5	1.3	1.3	57	44	<10	<40	14	<20	<10	<10	<100	<0.5
	12/8/97	12:20	S/F											<10	<40	33	<20	<10	<10	<100	
	12/8/97	12:20	S	6.6										<10	<40	16	<20	<10	<10	<100	
	12/8/97	12:20	S/F	6.6										<10	<40	17	<20	<10	<10	<100	
	12/10/97	8:20	S		37000	20	7.9	3.5	0.2	1.1	0.7	110	29	<1	<4	21	<2	7	<1	16	<30
	12/10/97	8:20	S/F											<1	<4	350	<2	6	<1	12	
	12/10/97	8:20	S	14.8										<1	<4	39	<2	7	<1	18	
	12/10/97	8:20	S/F	14.8										<1	<4	20	<2	7	<1	17	
									4-day average [dissolved metals]					<4	<12	>12.3	>8.0	>2.3	<3	22	
	1/21/98	9:25	M		25000	5	8.0	11	<0.5	0.9	0.5	57	23								
	2/7/98	10:05	S		4000	110	7.8	7.5	<0.5	1.4	2.0	290	30								
	2/7/98	10:05	S	9.8	11000	450	7.7	7.5	<0.5	2.1	3.6	880	61								
	3/26/98	11:00	S		12600	58	7.9	9	0.5	1.1	1.2	57	6								
	3/26/98	11:00	S	3.3										<1	12	12	3	5	<2	29	
	3/26/98	11:00	S/F	3.3										<1	<8	7	<2	<4	<2	<10	
	3/26/98	11:00	S	3.3	22700	250	8.0	7.5	0.6	1.3	0.9	341	29								
	3/28/98	11:45	S		28300	11	8.0	4.0	<0.1	1.0	0.9	5	<1	<10	<10	<10	<10	<10	<10	<50	
	3/28/98	11:45	S	3.3										<1	10	14	4	5	<2	44	
	3/28/98	11:45	S/F	3.3										<1	<8	9	<2	<4	<2	20	
	3/30/98	11:00	S		43400	2.1	8.7	1.8	0	1.0	<0.1	5	3								
	3/30/98	11:00	S	16.7										<1	<8	13	<2	<4	<2	<10	
	3/30/98	11:00	S/F	16.7										6	<8	13	<2	<4	<2	<10	
									4-day average [dissolved metals]					<1	<8	9.7	<2	<4	<2	>6.7	
	4/21/98	10:35	M		29300	2.6	8.5	16	<0.1	1.0	<0.1	15	4								
	6/23/98	12:40	M		48900	8.5	7.8	<1.3	<0.05	<1.0	0.210	220	42								
	7/16/98	10:30	D	12.4	44300	7.30	8.10	<1.3	<0.05	1.6	0.092	180	36								
	8/13/98	8:45	D	10.9	47700	7.3	7.8	<1.3	<1	0.21	0.245	120	14								
	10/15/98	10:25	D		46600	5.4	7.8	<1.3	1.0	0.13	0.214	51	9								
	11/4/98	11:15	D	9.3	48600	5.5	7.9	1.7	0.9	0.09	0.245	260	30								
	12/15/98	10:20	D	13.3	41700	7.3	7.8	3.1	0.5	0.15	0.214	140	25								
	1/7/99	8:20	D	14.3	48900	6.0	7.9	3.1	0.3	0.12	0.092	98	11								

STATION	DATE	TIME	Sample Type	Depth feet	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	o-PO4 mg/L
UNBNSB	1/25/99	11:05	ST		20100	17.0	7.9	6.4	1.5	0.39	0.551	67	13	<1	<8	9.6	<2	<4	<2	23	
	1/25/99		SF	13.1										<1	<8	8.0	<2	<4	<2	23	
	1/27/99	15:33	ST		13900	15.0	7.7	7.5	1.0	0.31	0.612	62	34	<1	<8	5.0	<2	5	<2	13	
	1/27/99		SF	8.9										<1	<8	4.6	<2	5	<2	12	
	1/29/99	10:40	ST		36100	10.0	7.8	3.8	0.6	0.19	0.306	90	10	<1	<8	8.4	<2	7	<2	17	
	1/29/99	10:40	SF	12.1										<1	<8	7.3	<2	6	<2	12	
									4-day average [dissolved metals]					**<1**	**<8**	**6.7**	**<2**	**>3.7**	**<2**	**15.7**	
	3/3/99	10:35	D	16.4	47600	02	8.1	1.1	0.3	0.05	0.092	90	11								
	4/12/99	10:00	ST		11800	17.0	7.9	10.1	0.9	0.27	0.652	49	31	<1	<8	8.8	<2	9	<2	19	
	4/12/99		SF	11.2										<1	<8	5.9	<2	8	<2	13	
	4/14/99	9:50	ST		41500	1.6	8.0	1.8	0.4	<0.05	0.171	57	9	<1	<8	10.6	<2	11	<2	11	
	4/14/99		SF	15.4										<1	<8	14.6	<2	<4	<2	10	
	4/16/99	11:10	ST		45600	2.4	8.0	1.1	0.7	<0.05	0.153	150	14	<1	<8	15.6	<2	8	<2	11	
	4/16/99		SF	11.2										<1	<8	15.3	<2	7	<2	<10	
									4-day average [dissolved metals]					**<1**	**<8**	**12.3**	**<2**	**>5.0**	**<2**	**>7.7**	
	5/27/99	11:15	D	12.4	46300	1.5	8.1	1.1	0.3	<0.05	0.153	78	9								
	6/30/99	11:30	D	13.0	47700	2.8	8.1	<0.44	0.2	<0.05	0.101	75	14								
	7/27/99	12:55	DT	10.2	46900	2.3	8.1	<0.44	<0.05	0.34	<0.061	62	10								
	8/10/99	13:50	DT	9.6	38100	2.4	8.1	<0.44	<0.05	0.61	0.21	66	10								
	9/30/99	9:40	DT	12.9	46300	1.4	8.0	<0.44	0.157	0.45	0.20	87	56								
	10/12/99	10:25	DT	12.3	46200	2.6	8.1	<0.44	<0.05	0.27	0.10	110	40								
	12/16/99	13:00	DT	13.8	45700	1.5	8.0	2.9	0.181	0.98	0.18	74	47								
	1/27/00	8:05	DT	12.8	15200	33.0	7.6	15.0	0.782	2.10	1.07	94	50								
	2/12/00	8:20	S,ST		13700	40.0	7.7	9.4	0.468	1.50	0.72	110	42	<1	<8	12.8	2.1	<4	<2	12.6	
	2/12/00	8:20	M,SF		33500	20.0	7.7	6.1	0.418	1.10	0.48	160	32	<1	<8	11.1	<2	<4	<2	11.8	
	2/12/00	8:20	B	12.6	41800	11.0	7.8	3.1	0.384	0.86	0.30	190	72								
	2/14/00	8:45	S,ST		13300	16.0	7.6	11.0	0.377	1.50	0.81	39	22	<1	<8	12.7	<2	<4	<2	12.2	
	2/14/00	8:45	M,SF		44500	5.3	7.8	1.7	0.307	0.84	0.25	81	43	<1	<8	11.2	<2	4.2	<2	16.1	
	2/14/00	8:45	B	12.5	47200	5.0	7.8	0.95	0.278	0.75	0.18	82	47								
	2/16/00	8:40	S,ST		42300	3.1	7.9	1.9	0.188	0.87	0.18	89	61	<1	<8	22.5	<2	9.3	<2	16.5	
	2/16/00	8:40	M,SF		45200	4.5	7.9	1.3	0.155	0.91	0.16	99	80	<1	<8	21.2	<2	9.4	<2	13.9	
	2/16/00	8:40	B	16.5	45400	5.0	7.9	1.3	0.148	0.82	0.16	96	52								
									4-day average [dissolved metals]					**<1**	**<8**	**14.5**	**<2**	**>5**	**<2**	**13.9**	
	3/8/00	11:43	ST	13.3	37700	3.6	8.0	1.2	0.155	1.00	0.37	62	24	<1	<8	26.2	<2	9.5	<2	12.1	
	3/8/00	11:43	SF											<1	<8	27.6	<2	9.3	<2	13.8	
	3/10/00	9:30	ST	15.5	19700	7.6	7.9	3.9	0.207	0.54	0.73	94	56	<1	<8	17.7	<2	8.6	<2	<10	
	3/10/00	9:30	SF											<1	<8	17.9	<2	8.3	<2	21.6	
	3/12/00	9:10	ST	12.4	23800	6.2	7.9	6.8	0.298	0.87	0.73	48	25	<1	<8	23.4	<2	17.5	<2	35.8	
	3/12/00	9:10	SF											<1	<8	14.9	<2	9.3	<2	14.3	
									4-day average [dissolved metals]					**<1**	**<8**	**20.1**	**<2**	**8.9**	**<2**	**16.6**	
	6/2/00	9:00	S		47600	6.1	7.8	<0.44	0.107	0.74	0.21	100	63								
	6/2/00	9:00	M		48600	5.2	7.8	<0.44	0.110	0.65	0.21	100	14								
	6/2/00	9:00	B	15.5	48100	4.9	7.8	<0.44	0.104	4.80	0.25	85	36								
	6/29/00	11:45	S		46200	3.5	8.1	<0.44	<0.05	1.10	0.25	25	21								
	6/29/00	11:45	M		46300	4.6	8.0	<0.44	<0.05	1.10	0.25	40	21								
	6/29/00	11:45	B	12.3	46300	17.0	8.0	<0.44	<0.05	0.97	0.21	55	22								

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STATION	DATE	TIME	Sample Type	Depth feet	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	o-PO4 mg/L
UNBCHB	4/24/91	12:30												<2	<6	<4	<2	<10	<2	<10	
	6/20/91	12:40												33	<10	<30	<20	<10	<2	<10	
	7/24/91	14:30			50000	2.4	8.1	0.50	0.70	1.10	4.30	30	16	<1	<5	<5	<10	<40	<3	<20	
	3/21/92	12:15	S		7400	22.0	7.7	5.60	0.20	0.90	0.90	16	7	<2	<6	<4	<2	<10	<2	40	
	3/21/92	12:15	S											<2	<6	<4	<2	<10	<2	20	
	3/23/92	12:05	S		9200	9.0	7.7	5.00	0.10	0.40	0.80	6	7	4	<6	5	<2	<10	<2	20	
	3/23/92	12:05	S	15										2	<6	8	4.0	<10	<2	<10	
	3/25/92	13:15	S		19000	6.9	7.7	4.40	0.10	<0.10	1.10	7	9	<20	<30	<20	<2	<40	<10	10	
	3/25/92	13:15	S	13										<20	<30	<20	<2	<40	<10	20	
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													**>0.6**	**<14**	**>2**	**>1**	**<20**	**<4**	**>13**	
	4/23/92	10:45			47000	1.2	8.2	3.70	<0.10	0.10	<0.10	86	22	<20	<30	<20	<2	<40	<10	20	
	10/29/92	11:45			50000	2.1	8.0	0.20	0.15	0.40	0.18	89	41	<20	<30	<20	<2	<40	15	25	
	1/7/93	11:25	S		9500	660.0	7.8	1.80	0.23	0.58	4.80	1000	120	<20	<30	<20	13	<40	<10	67	
	1/7/93	11:30	S	16	8800	930.0	7.9	3.90	0.23	2.10	4.80	1200	140	<20	<30	<20	18	<40	<10	72	
	1/9/93	11:05	S		33000	11.0	8.0	2.70	0.32	0.45	5.00	47	17	<20	<30	<20	<2	<40	12	27	
	1/9/93	11:10	S	18	40000	29.0	8.1	1.40	0.28	0.50	6.80	150	37	<20	<30	<20	<2	<40	<10	19	
	1/11/93	15:10	S		35000	16.0	8.0	3.60	0.41	0.96	0.82	91	20	<20	<30	<20	<2	<40	13	17	
	1/11/93	15:15	S	16	37000	18.0	8.1	3.20	0.40	0.92	0.56	120	23	<20	<30	<20	<2	<40	12	17	
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													**<20**	**<30**	**<20**	**>6**	**<40**	**>4**	**36**	
	2/19/93	11:00	S		22000	180.0	8.0	4.60	0.24	0.74	2.00	290	33	<7	<10	<30	7.2	<3	<4	<20	
	2/19/93	11:00	S	N/A	23000	220.0	8.0	5.10	0.21	0.80	1.60	360	39	<7	<12	<30	7.7	<3	<4	50	
	2/21/93	10:40	S		20000	9.4	8.0	3.30	0.21	0.41	0.75	43	17	<7	<10	<30	<2	<3	<4	<20	
	2/21/93	10:40	S	13	34000	330.0	8.1	1.70	0.23	0.40	0.76	770	66	<7	16	<30	13.0	<3	<4	71	
	2/23/93	10:45	S		40000	4.1	8.2	2.20	0.16	0.48	<0.10	72	14	<7	<10	<30	<2	<3	<4	<20	
	2/23/93	10:45	S	20	44000	4.8	8.2	1.10	0.15	0.33	<0.10	66	14	<7	<10	<30	<2	<3	<4	<20	
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													**<7**	**>5.3**	**<30**	**>7**	**<3**	**<4**	**>40**	
	3/18/93	10:30			46000	15.0	8.4	1.40	0.12	0.56	0.30	96	22								
	10/27/93	11:00			47000	5.0	7.9	0.32	0.38	1.20	0.25	76	25	<5	<10	<20	<2	<40	15	20	

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STATION	DATE	TIME	Sample Type	Depth feet	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	o-PO4 mg/L
UNBCHB	1/25/94	12:50	S		36000	13.0	7.9	5.30	0.47	1.10	0.42	150	13	<5	<10	<20	<2	<40	11	29	
	1/25/94	12:55	S	14										<5	<10	<20	<2	<40	17	48	
	1/27/94	12:30	S		40000	23.0	8.0	3.10	0.35	0.50	<0.10	130	30	<5	<10	<20	<2	<40	11	26	
	1/27/94	12:35	S	N/A										<5	<10	<20	<2	<40	11	37	
	1/29/94	11:00	S		46000	1.0	8.0	0.94	0.39	0.81	<0.10	160	15	<5	<10	<20	<2	<40	16	35	
	1/29/94	11:05	S	13										<5	<10	<20	<2	<40	14	22	
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													**<5**	**<10**	**<20**	**<2**	**<40**	**14**	**36**	
	2/7/94	11:50	S		34000	31.0	7.8	5.20	0.64	0.84	0.79	150	24	<5	<10	<20	3.4	<40	10	77	
	2/7/94	11:55	S	10										<5	<10	<20	6.4	<40	12	56	
	2/9/94	11:45	S		35000	24.0	7.9	2.80	0.13	0.15	0.43	150	23	<5	<10	<20	<2	<40	<10	20	
	2/9/94	11:50	S	12										<5	<10	<20	<2	<40	<10	20	
	2/11/94	11:30	S		48000	8.2	8.1	1.20	0.13	0.43	0.15	220	34	<5	<10	<20	<2	<40	10	15	
	2/11/94	11:35	S	N/A										<5	<10	<20	<2	<40	11	23	
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													**<5**	**<10**	**<20**	**>2**	**<40**	**>8**	**33**	
	4/21/94	11:00			48000	3.0	8.3	1.60	0.24	1.10	0.34	82	<5								
	3/5/95	13:25	S		9900	100.0	8.0	5.10	0.27	1.10	1.60	130	20	<1	<10	11	3	<40	<1	28	
	3/5/95	13:30	S	N/A										<1	<10	14	5	<40	1.1	60	
	3/7/95	10:30	S		5900	26.0	7.8	5.10	0.25	1.60	1.30	32	10	<1	<10	6	<2	<40	<1	<10	
	3/7/95	10:35	S	13										<1	<10	<4	<2	49	<1	30	
	3/9/95	9:40	S		17000	11.0	8.0	11.00	0.27	1.20	1.00	36	14	<1	<10	<4	<2	<40	<1	<10	
	3/9/95	9:45	S	14										<1	<10	16	<2	<40	<1	15	
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													**<1**	**<10**	**>10**	**>1**	**>16**	**>0.36**	**35**	
	3/23/95	13:30	S		21000	4.2	8.0	9.10	0.29	0.92	1.10	34	13	<1	<10	5	<2	<40	1.5	16	
	3/23/95	13:35	S	13										<1	<10	<4	<2	51	<1	42	
	3/25/95	10:25	S		25000	6.8	8.0	7.00	0.29	0.81	1.00	41	16	<1	<10	<4	<2	<40	<1	<10	
	3/25/95	10:30	S	9										<1	<10	7	<2	<40	<1	<10	
	3/27/95	12:00	S		46000	10.0	8.1	3.70	0.21	0.81	0.65	69	21	<1	<10	<4	<2	<40	<1	20	
	3/27/95	12:05	S	13										<1	<10	7	<2	<40	<1	46	
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													**<1**	**<10**	**>4**	**<2**	**>17**	**<1**	**>29**	

STATION	DATE	TIME	Sample Type	Depth feet	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	o-PO4 mg/L
UNBCHB	2/1/96	12:05	S		18000	36.0	7.8	7.70	0.33	1.60	0.97	47	18	8	<5	6	<2	5	2	<10	
	2/1/96	12:10	S	8										2	<5	6	2	9	2	16	
	2/3/96	10:15	S		37000	2.1	8.3	2.10	0.10	1.80	0.38	32	12	<1	<5	<2	<2	<20	<1	39	
	2/3/96	10:20	S	20										<1	<5	2	<2	<20	<1	21	
	2/5/96	11:50	S		41000	4.8	8.1	1.40	<0.10	0.64	0.30	95	27	<1	<5	3	<2	<2	<2	<10	
	2/5/96	11:55	S	13										<1	<5	22	<2	<10	4	29	
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													**>0.7**	**<5**	**10**	**>0.7**	**>3.0**	**>2.0**	**22**	
	2/20/96	11:15	S		28000	20.0	7.7	4.60	0.25	1.00	0.51	97	25	<1	<5	5	<2	6	2	30	
	2/20/96	11:20	S	13										<1	<5	<2	<2	6	2	<10	
	2/22/96	11:25	S		21000	6.1	7.9	4.80	0.16	0.88	0.67	28	6	<1	<5	<4	<2	<4	<1	20	
	2/22/96	11:30	S	18										<1	<5	<2	<2	<8	<1	73	
	2/24/96	8:30	S		25000	5.6	8.1	6.50	0.42	0.92	0.80	62	17	<1	<5	<8	<8	<8	<5	23	
	2/24/96	8:35	S	13										<1	<5	<2	<2	<8	<2	33	
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													**<1**	**<5**	**<2**	**<2**	**>2.0**	**>0.7**	**>35.3**	
	11/22/96	11:25	S		5400	200.0	8.0	6.8	0.41	1.70	2.00	290	25	1	<3	8	5	<10	<0.1	36	
	11/22/96	11:25	S	14.2										1	8	16	11	<10	<0.1	47	
	11/24/96	9:45	S		23000	3.1	7.9	2.3	0.37	0.76	0.64	60	11	<0.1	7	<5	<0.1	<10	<0.1	7	
	11/24/96	9:45	S	16										<0.1	9	<5	0.5	<10	<0.1	9	
	11/26/96	10:05	S		31000	2.2	8.0	1.5	0.27	0.70	0.49	70	15	0	13	<5	<0.2	<10	<0.1	9	
	11/26/96	10:05	S	16										<0.1	16	5	0.6	11	<0.1	18	
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													**>0.3**	**11**	**>7.0**	**4.0**	**>3.6**	**<0.1**	**25**	
	12/6/97	12:00	S		950	1800	8.4	4.7	0.6	7.6	12	3000	2700	9	170	110	78	84	<1	560	1
	12/6/97	12:00	S/F											<1	<10	<4	<2	<4	<1	18	
	12/6/97	12:00	S	20.7										8	170	110	76	91	<1	530	
	12/6/97	12:00	S/F	20.7										<1	<10	<4	<2	<4	<1	16	
	12/8/97	12:40	S					8.4	<0.5	1.6	1.1			<10	<40	18	<20	<10	<10	<100	
	12/8/97	12:40	S/F											<10	<40	17	<20	<10	<10	<100	
	12/8/97	12:40	S	22.6										<10	<40	14	<20	<10	<10	<100	
	12/8/97	12:40	S/F	22.6										<10	<40	16	<20	<10	<10	<100	
	12/10/97	9:00	S		41000	40	8.0	1.7	0.1	0.7	0.6	170	37	<1	<4	23	<2	8.0	<1	23	<30
	12/10/97	9:00	S/F											<1	<4	18	<2	7	<1	12	
	12/10/97	9:00	S	16.4										<1	<4	59	<2	8	<1	20	
	12/10/97	9:00	S/F	16.4										<1	<4	29	<2	7	<1	16	
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													>2.8	>56.7	61	>25.3	>32.9	<4	>183	

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STATION	DATE	TIME	Sample Type	Depth feet	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	o-PO4 mg/L
UNBCHB	1/21/98	10:00	M		37000	5.2	8.0	4.9	<0.5	0.8	0.3	53	22								
	2/7/98	10:40	S		7900	140	7.8	6.6	<0.5	1.3	1.9	350	35								
	2/7/98	10:40	S	13.1	28000	330	7.9	7.0	<0.5	1.9	2.8	860	80								
	3/26/98	11:45	S		21300	93	7.9	7.9	0.5	1.2	0.6	97	7								
	3/26/98	11:45	S	16.4										<1	14	16	5	7	<2	41	
	3/26/98	11:45	S/F	16.4										<1	<8	9.0	<2	<4	<2	<10	
	3/28/98		S		33700	14	8.1	2.2	0.2	1.0	0.6	18	4	<10	<10	<10	<10	<10	<10	<50	
	3/28/98		S	16.4										2	33	31	21	18	<2	148	
	3/28/98		S/F	16.4										<1	<8	11	<2	5	<2	15	
	3/30/98	11:45	S		45800	4.1	8.1	0.9	0.3	1.0	0.3	8	4								
	3/30/98	11:45	S	12.1										<1	<8	13	<2	<4	<2	<10	
	3/30/98	11:45	S/F	12.1										2	<8	13	<2	<4	<2	<10	
									4-day average [dissolved metals]					**>0.7**	**<8**	**14.3**	**<2**	**>1.7**	**<2**	**>5**	
	4/21/98	11:08	M		40800	4.3	8.3	3.1	<0.1	1.0	<0.1	23	2								
	1/25/99	15:15	ST		36700	4.0	7.9	5.0	0.99	0.32	0.245	54	10	<1	<8	11.6	<2	<4	<2	20.3	
	1/25/99		SF	16.1										<1	<8	12.2	<2	<4	<2	24.6	
	1/27/99	9:50	ST		15700	26.0	7.7	7.5	0.85	0.30	0.673	98	14	<1	<8	4.7	<2	4.3	<2	11.4	
	1/27/99		SF	16.4										<1	<8	4.5	<2	4.3	<2	12.4	
	1/29/99	12:30	ST		37800	11.0	7.8	3.5	0.60	0.18	0.306	81	8	<1	<8	9.2	<2	5.8	<2	17.4	
	1/29/99	12:30	SF	13.1										<1	<8	7.5	<2	7.9	<2	<10	
									4-day average [dissolved metals]					**<1**	**<8**	**8.3**	**<2**	**>4.0**	**<2**	**<12**	
	4/12/99	11:00	ST		17600	15.0	8.0	8.8	0.76	0.25	0.551	59	12	<1	<8	7.8	<2	10.5	<2	11.5	
	4/12/99		SF	13.1										<1	<8	8.3	<2	9.6	<2	11.0	
	4/14/99	11:00	ST		40400	1.1	8.0	2.1	0.33	0.06	0.205	62	7	<1	<8	9.9	<2	11.2	<2	11.1	
	4/14/99		SF	18.0										<1	<8	10.4	<2	11.7	<2	<10	
	4/16/99	12:10	ST		49500	2.3	8.0	1.3	0.53	<0.05	0.153	150	13	<1	<8	16.7	<2	7.3	<2	12	
	4/16/99		SF	4.3										<1	<8	16.1	<2	7.3	<2	10	
									4-day average [dissolved metals]					**<1**	**<8**	**11.3**	**<2**	**9.7**	**<2**	**>7.0**	
	2/12/00	10:41	S,ST		22900	24.0	7.7	8.2	0.44	1.20	0.57	190	112	<1	<8	18.8	<2	<4	<2	10.0	
	2/12/00	10:41	M,SF		50800	4.6	8.0	<0.44	0.11	0.48	0.20	72	49	<1	<8	15.7	<2	<4	<2	12.1	
	2/12/00	10:41	B	13.0	52100	3.6	8.0	<0.44	0.12	0.56	0.19	67	17								
	2/14/00	13:00	S,ST		20800	11.0	7.7	8.7	0.36	1.10	0.64	42	22	<1	<8	13.6	<2	<4	<2	12.4	
	2/14/00	13:00	M,SF		48200	3.1	7.9	<0.44	0.20	0.61	0.17	88	57	<1	<8	14.5	<2	<4	<2	13.9	
	2/14/00	13:00	B	12.8	50500	3.6	8.0	<0.44	0.09	0.62	0.22	100	24								
	2/16/00	10:25	S,ST		44300	5.2	7.9	1.7	0.19	0.88	0.19	100	39	<1	<8	19.9	<2	9.1	<2	11.0	
	2/16/00	10:25	M,SF		44000	6.1	7.9	1.7	0.20	0.85	0.21	110	67	<1	<8	20.2	<2	9.1	<2	14.6	
	2/16/00	10:25	B	16.2	44200	7.9	7.9	1.7	0.19	0.83	0.20	120	83								
									4-day average [dissolved metals]					<1	<8		<2		<2	

STATION	DATE	TIME	Sample Type	Depth feet	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	o-PO4 mg/L
UNBCHB	3/8/00	12:06	ST	13.3	35700	6.6	8.0	0.7	0.14	0.88	0.37	76	48	<1	<8	26.5	<2	9.7	<2	16.5	
	3/8/00	12:06	SF											<1	<8	27.0	<2	9.3	<2	15.9	
	3/10/00	11:10	ST	18.6	38400	2.2	8.1	1.7	0.14	0.68	0.31	67	40	<1	<8	19.8	<2	8.5	<2	10.1	
	3/10/00	11:10	SF											<1	<8	18.0	<2	8.4	<2	17.4	
	3/12/00	10:43	ST	9.3	39400	2.3	8.0	2.0	0.21	0.63	0.37	74	30	<1	<8	18.8	<2	10.3	<2	13.2	
	3/12/00	10:43	SF											<1	<8	18.0	<2	9.7	<2	12.8	
									4-day average [dissolved metals]					**<1**	**<8**	**21.0**	**<2**	**9.1**	**<2**	**15.4**	
	6/2/00	13:35	S					<0.44	0.06	0.62	0.21										
	6/2/00	13:35	M		49200	4.2	7.9					96	40								
	6/2/00	13:35	B	15.5	48300	4.0	7.9	<0.44	0.06	0.55	0.21	98	34								
	6/29/00	13:25	S		46100	3.2	8.0	<0.44	<0.05	1.10	0.21	40	21								
	6/29/00	13:25	M		45700	3.4	8.0	<0.44	<0.05	1.10	0.21	<10	<1								
	6/29/00	13:25	B	18.9	45900	4.7	8.0	<0.44	0.06	0.96	0.25	<10	<1								

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STATION	DATE	TIME	Sample Type	Depth feet	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	o-PO4 mg/L
UNBNDB	4/24/91	12:15			46000	8.0	8.4	3.00	0.70	0.40	1.20	44	14	<2	<6	5	<2	<10	<2	<10	
	7/24/91	14:00			49000	2.7	8.1	0.90	0.70	0.90	2.80	43	17								
	8/22/91	10:45			48000	0.3	8.3	1.00	0.50	2.00	0.30	71	34								
	9/18/91	10:05			49000	2.0	8.3	0.80	<0.10	2.10	1.30	8	8								
	10/17/91	10:30			50000	1.3	8.2	0.90	0.40	0.50	0.80	11	10								
	12/19/91	10:05			49000	1.4	7.9	1.30	0.50	<0.50	0.20	<5	<5								
	3/21/92	12:00	S		3200	35.0	7.6	5.80	0.20	0.70	1.20	24	8	<2	<6	<4	<2	<10	<2	<10	
	3/21/92	12:00	S	10										<2	<6	<4	<2	<10	<2	30	
	3/23/92	11:45	S		4800	16.0	7.7	5.10	0.10	0.50	0.90	7	7	3	<6	4	<2	<10	<2	20	
	3/23/92	11:45	S	10										3	<6	5	<2	<10	<2	<10	
	3/25/92	12:20	S		8900	8.8	7.6	5.40	0.10	1.20	1.30	<5	8	<20	<30	<20	<2	<40	<10	10	
	3/25/92	12:20	S	8										<20	<30	<20	<2	<40	<10	30	
					4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)									**>1**	**<14**	**>1**	**<2**	**<20**	**<5**	**>20**	
	4/23/92	10:30			44000	0.4	8.2	8.70	<0.10	0.30	0.10	72	19								
	5/28/92	10:00			47000	1.3	8.1	0.90	0.30	0.50	<0.10	90	53								
	6/25/92	9:45			47000	1.3	8.3	1.20	0.10	1.70	0.30	100	33								
	7/22/92	10:45			48000	3.8	8.4	0.20	0.10	0.10	<0.10	13	13								
	8/27/92	10:35			49000	2.1	8.1	0.20	0.30	0.40	0.40	140	50								
	9/24/92	9:50			49000	0.9	8.1	0.60	0.20	0.54	0.24	100	32								
	10/29/92	11:05			49000	1.5	7.9	0.60	0.28	0.58	0.22	95	31								
	11/19/92	10:00			48000	1.4	8.0	1.10	0.41	0.50	0.22	86	20								
	12/17/92	10:00			46000	1.2	8.0	0.90	0.29	0.46	0.43	73	22								
	1/7/93	11:00	S		4200	32.0	7.8	2.10	0.24	1.70	1.30	22	8	<20	<30	<20	<2	<40	<10	43	
	1/7/93	11:05	S	4	6100	190.0	7.8	4.00	0.18	0.85	1.40	300	32	<20	<30	<20	5.0	<40	<10	52	
	1/9/93	10:45	S		12000	9.5	7.9	5.60	0.19	0.58	1.50	25	15	<20	<30	<20	<2	<40	<10	19	
	1/9/93	10:50	S	5	29000	12.0	8.0	3.30	0.31	0.47	3.70	50	16	<20	<30	<20	<2	<40	<10	26	
	1/11/93	14:45	S		34000	11.0	8.0	4.00	0.41	0.63	0.14	97	27	<20	<30	<20	<2	<40	11	21	
	1/11/93	14:50	S	12	39000	28.0	8.1	2.60	0.49	0.61	0.14	150	37	<20	<30	<20	<2	<40	11	20	
					4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)									**<20**	**<30**	**<20**	**>1.6**	**<40**	**>3.6**	**33**	
	2/19/93	10:40	S		18000	14.0	7.9	8.00	0.24	0.51	0.72	35	13	<7	<10	<30	<2	<3	<4	<20	
	2/19/93	10:40	S	9	26000	100.0	8.0	6.40	0.22	1.10	2.10	230	26	<7	<10	<30	9.4	<3	<4	<20	
	2/21/93	10:15	S		9400	11.0	8.1	3.70	0.17	0.48	0.78	15	11	46	10	<30	2.2	<3	<4	<20	
	2/21/93	10:15	S	13	31000	240.0	8.0	2.20	0.27	0.48	0.99	460	51	<7	<10	<30	14.0	<3	<4	43	
	2/23/93	10:20	S		36000	4.7	8.2	3.20	0.19	0.57	<0.10	67	13	<7	<10	<30	<2	<3	<4	24	
	2/23/93	10:20	S	10	39000	5.2	8.2	1.50	0.19	0.40	<0.10	72	19	<7	<10	<30	<2	<3	<4	<20	
					4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)									**<7**	**<10**	**<30**	**>7.6**	**<3**	**<4**	**>14**	

STATION	DATE	TIME	Sample Type	Depth feet	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	o-PO4 mg/L
UNBNDB	3/18/93	10:00			47000	4.6	8.5	0.54	0.12	0.48	0.21	85	21								
	4/22/93	11:35			46000	5.1	8.2	2.70	<0.10	1.10	1.00	69	20								
	6/10/93	10:20			42000	9.3	8.0	3.40	0.11	0.96	<0.10	90	23								
	7/13/93	10:00			46000	3.5	8.3	0.53	0.31	0.79	<0.10	51	19								
	8/19/93	12:10			48000	2.5	8.0	0.22	0.33	1.00	0.10	100	30								
	9/16/93	10:10			45000	3.0	8.0	0.28	0.32	0.66	0.15	79	24								
	10/27/93	10:45			46000	16.0	7.3	0.56	0.36	1.30	0.17	110	34								
	11/18/93	11:00			46000	1.4	7.9	1.20	0.29	0.38	0.37	58	19								
	1/20/94	11:10			44000	6.3	8.0	5.80	0.30	0.51	0.63	180	8								
	1/25/94	12:20	S		35000	13.0	7.9	5.90	0.45	1.20	0.57	140	10	<5	<10	<20	<2	<40	21	38	
	1/25/94	12:25	S	7										<5	<10	27	2.9	<40	21	65	
	1/27/94	12:00	S		45000	2.0	8.0	2.40	0.46	0.32	<0.10	98	36	<5	<10	<20	<2	<40	11	25	
	1/27/94	12:05	S	2										<5	<10	<20	<2	<40	13	26	
	1/29/94	10:30	S		37000	1.0	8.0	3.60	0.44	0.97	<0.10	140	14	<5	<10	<20	<2	<40	14	24	
	1/29/94	10:35	S	7										<5	<10	<20	<2	<40	14	25	
					4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)									**<5**	**<10**	**>9**	**>1**	**<40**	**16**	**39**	
	2/7/94	11:30	S		36000	11.0	7.7	4.60	0.67	0.93	0.28	71	<5	<5	<10	<20	<2	<40	10	27	
	2/7/94	11:35	S	6										<5	<10	24	9.3	<40	10	110	
	2/9/94	11:30	S		18000	6.0	7.9	5.10	0.13	0.45	0.63	72	<5	<5	<10	<20	<2	<40	<10	27	
	2/9/94	11:35	S	8										<5	<10	<20	<2	<40	<10	30	
	2/11/94	11:15	S		40000	0.5	8.0	1.70	0.22	0.64	0.19	150	26	<5	<10	<20	<2	<40	12	16	
	2/11/94	11:20	S	6										<5	<10	<20	<2	<40	11	24	
														<5	**<10**	**>8**	**>3**	**<40**	**>7**	**55**	
	4/21/94	10:15			48000	2.1	8.3	0.78	0.24	1.00	0.32	88	<5								
	10/28/94	10:30			50000	0.8	8.5	1.00	0.18	0.80	<0.20	90	18								
	3/5/95	13:10	S		6000	80.0	7.8	5.30	0.27	1.10	1.40	71	10	<1	<10	8	<2	<40	<1	21	
	3/5/95	13:15	S	5										<1	25	30	13	<40	<1	97	
	3/7/95	10:15	S		3500	16.0	7.7	4.10	0.34	1.40	1.10	12	<6	<1	<10	<4	<2	<40	<1	<10	
	3/7/95	10:20	S	1										<1	<10	6	<2	<40	<1	20	
	3/9/95	9:20	S		13000	9.1	7.9	5.50	0.24	1.40	1.00	19	11	<1	<10	6	<2	<40	<1	<10	
	3/9/95	9:25	S	1										<1	<10	12	<2	<40	<1	12	
					4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)									**<1**	**>8**	**16**	**>4**	**<40**	**<1**	**43**	

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STATION	DATE	TIME	Sample Type	Depth feet	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	o-PO4 mg/L
UNBNDB	3/23/95	13:15	S		16000	8.5	7.9	9.40	0.30	1.20	1.10	35	11	<1	<10	5	<2	<40	1.3	20	
	3/23/95	13:20	S	2										<1	<10	5	<2	<40	1.2	24	
	3/25/95	10:00	S		17000	5.1	8.1	9.10	0.20	0.76	0.96	22	9	<1	<10	6	<2	<40	<1	19	
	3/25/95	10:05	S	4										<1	<10	6	<2	<40	<1	14	
	3/27/95	11:30	S		42000	8.6	8.1	3.90	0.22	0.88	0.65	63	21	<1	<10	5	<2	<40	<1	23	
	3/27/95	11:35	S	4										2	24	37	12	51	<1	120	
					4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)									**>0.6**	**>8**	**16**	**>4**	**>17**	**>0.4**	**53**	
	5/18/95	9:20			49000	7.9	8.0	2.60	0.49	0.65	0.29	79	21								
	6/15/95	12:10			48000	6.8	8.0	0.89	0.14	0.60	<0.20	79	25								
	7/28/95	11:35			48000	2.9	8.3	<0.20	0.26	0.60	0.29	110	40								
	8/31/95	12:30			49000	2.4	8.4	<0.20	0.67	0.54	<0.20	68	32								
	9/21/95	12:30			46000	1.8	8.4	1.20	<0.10	0.70	<0.20	78	42								
	10/31/95	12:15			48000	3.1	8.2	2.90	0.32	0.93	0.29	75	27								
	11/16/95	12:20			45000	1.4	8.3	4.50	0.32	0.67	<0.20	100	41								
	12/7/95	12:00			48000	3.3	8.1	2.20	0.22	0.78	0.64	76	23								
	1/4/96	13:10			46000	2.7	8.2	0.60	<0.10	1.50	0.25	71	7								
	2/1/96	11:40	S		9600	18.0	7.8	9.00	0.20	1.40	0.76	29	20	<1	<5	6	<2	6	1	16	
	2/1/96	22:45	S	4										<1	<5	7	<2	5	3	28	
	2/3/96	9:40	S		35000	2.9	8.2	3.10	0.12	2.00	0.47	38	18	<1	<5	<2	<2	<20	<1	24	
	2/3/96	9:45	S	10										<1	7	9	<2	<20	2	34	
	2/5/96	11:35	S		33000	2.8	8.1	3.70	0.38	0.86	0.45	58	21	<1	<5	2	<2	<2	<2	<10	
	2/5/96	11:40	S	4										<1	<5	5	<2	<4	4	26	
					4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)									**<1**	**>2.3**	**7**	**<2**	**>1.7**	**3**	**29**	
	2/15/96	12:00			40000	2.9	7.6	1.80	0.39	<0.50	0.24	68	26								

STATION	DATE	TIME	Sample Type	Depth feet	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	o-PO4 mg/L
UNBNDB	2/20/96	11:00	S		29000	22.0	7.7	4.30	0.26	0.92	0.65	69	19	<1	<5	11	<2	5	<1	27	
	2/20/96	11:05	S	6										<1	<5	8	<2	8	3	51	
	2/22/96	9:45	S		8300	15.0	7.8	7.00	0.23	1.40	0.93	18	12	<1	<5	<4	<2	<4	<1	61	
	2/22/96	9:50	S	7										<1	<5	2	<2	<8	<1	69	
	2/24/96	8:15	S		17000	4.2	8.0	5.50	0.36	0.93	0.96	37	14	<1	<5	<8	<8	<8	<5	37	
	2/24/96	8:20	S	23										<1	<5	12	<2	<8	<5	54	
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													**<1**	**<5**	**7.3**	**<2**	**>2.7**	**>1.0**	**58**	
	3/28/96	10:10			35000	1.6	8.4	4.10	0.13	0.59	<0.20	99	27								
	4/25/96	9:30			36000	3.7	8.4	<0.20	0.30	0.86	<0.20	88	22								
	5/31/96	9:50			38000	2.7	8.4	1.80	<0.10	0.62	0.31	140	61								
	6/21/96	9:15			35000	2.1	8.5	2.80	0.25	0.73	0.35	220	74								
	7/30/96	12:00			36000	1.8	8.1	<0.2	0.10	0.56	0.30	120	40								
	8/29/96	12:00			32000	1.7	8.1	0.6	<0.10	0.72	0.32	95	35								
	9/26/96	10:05			33000	1.7	8.1	0.6	0.27	0.77	0.39	91	27								
	11/7/96	10:35			31000	1.4	7.9	1.9	0.48	1.20	0.57	78	27								
	11/22/96	11:05	S		2300	38.0	7.7	7.4	0.58	1.50	1.00	19	<6	<0.1	<3	<5	1	<10	<0.1	11	
	11/22/96	11:05	S	3										0.9	<3	14	10	<10	<0.1	53	
	11/24/96	9:25	S		19000	3.6	7.8	3.9	0.47	0.98	0.85	48	9	<0.1	7	<5	<0.1	<10	<0.1	8	
	11/24/96	9:25	S	6.6										<0.1	8	<5	0.3	<10	<0.1	9	
	11/26/96	9:55	S		30000	2.2	7.9	1.9	0.34	<0.50	0.25	76	18	<0.1	14	6	<0.2	<10	<0.1	10	
	11/26/96	9:55	S	3										<0.1	16	6	0.7	11	<0.1	16	
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													**>0.3**	**>8.0**	**>6.6**	**3.6**	**>3.6**	**<0.1**	**26**	
	12/5/96	14:35			34000	4.0	8.1	2.8	0.47	0.60	<0.20	100	27								
	1/31/97	12:15			34000	1.7	8.1	3.3	<0.10	0.84	0.44	69	19								
	3/13/97	10:00			44000	3.5	8.0	4.3	<0.50	0.79	0.30	120	39								
	4/17/97	10:35			46000	3.6	8.2	<0.8	<0.50	0.87	0.42	110	27								
	5/22/97	11:30			46000	4.7	8.0	2.4	0.26	0.73	0.34	93	34								
	6/12/97	12:45			46000	5.5	8.3	1.1	<0.10	0.90	1.40	160	38								

NEWPORT BAY

STATION	DATE	TIME	Sample Type	Depth feet	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	o-PO4 mg/L
UNBNDB	7/10/97	12:20	M		49000	1.9	8.4	0.4	<0.1	0.5	<0.2	180	100								
	8/14/97	13:30	M		45000	3.1	8.2	0.4	<0.5	0.8	0.4	85	31								
	10/30/97	10:55	M		48000	2.8	8.0	1.0	0.3	1.0	0.3	78	14								
	11/21/97	14:30	M		40000	2.8	7.9	3.8	<0.5	0.9	<0.2	150	38								<0.5
	12/6/97	11:45	S		2000	400	8.2	4.2	0.4	2.0	2.8	560	480	<1	15	11	5	7	<1	45	2
	12/6/97	11:45	S/F											<1	<10	<4	4	<4	<1	17	
	12/6/97	11:45	S	5.6										10	210	130	100	110	<1	700	
	12/6/97	11:45	S/F	5.6										<1	<10	<4	<2	<4	<1	14	
	12/8/97	13:40	S		4300	29	7.7	4.3	<0.5	1.1	1.0	47	34	<10	<40	14	<20	<10	<10	<100	<0.5
	12/8/97	13:40	S/F											<10	<40	11	<20	<10	<10	<100	
	12/8/97	13:40	S	6.6										<10	<40	14	<20	<10	<10	<100	
	12/8/97	13:40	S/F	6.6										<10	<40	15	<20	<10	<10	<100	
	12/10/97	8:40	S		35000	6.0	7.8	2.3	0.2	0.8	0.6	82	24	<1	<4	21	<2	7	<1	20	<30
	12/10/97	8:40	S/F											<1	<4	18	<2	6	<1	15	
	12/10/97	8:40	S	10.8										<1	<4	19	<2	7	<1	25	
	12/10/97	8:40	S/F	10.8										<1	<4	18	<2	6	<1	16	
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													>3.3	>70	54	>33.3	>38.9	<4	>242	
	1/21/98	10:20	M		36000	1.6	8.0	7.2	<0.5	0.8	0.3	43	17								
	2/7/98	10:25	S		2400	27	7.8	4.4	<0.5	0.9	0.9	20	8								
	2/7/98	10:25	S	3.3	1900	48	7.8	4.4	<0.5	0.9	1.0	70	17								
	3/26/98	11:30	S		6970	16	7.7	8.8	0.1	1.0	1.2	2	<1								
	3/26/98	11:30	S	7.9										<1	9	9	<2	<4	<2	20	
	3/26/98	11:30	S/F	7.9										<1	<8	7	<2	4	<2	11	
	3/26/98	11:30	S	7.9	16400	16	7.8	7.5	0.7	1.1	0.6	6	4								
	3/28/98		S		32900	15	8.1	2.2	<0.1	1.0	0.3	6	1	<10	<10	<10	<10	<10	<10	<50	
	3/28/98		S	7.9										<1	10	16	4	5	<2	48	
	3/28/98		S/F	7.9										<1	<8	11	<2	<4	<2	23	
	3/30/98	11:15	S		35600	7.0	8.1	2.6	0	1.0	0.6	10	5								
	3/30/98	11:15	S	7.9										<1	<8	14	<2	<4	<2	12	
	3/30/98	11:15	S/F	7.9										3	<8	12	<2	<4	<2	11	
									4-day average [dissolved metals]					**>1**	**<8**	**10**	**<2**	**>1.6**	**<2**	**15**	
	4/21/98	10:50	M		37500	3.2	8.4	15	<0.1	1.0	<0.1	26	4								
	6/23/98	9:55	M		46500	3.1	7.9	1.3	<0.05	<1.0	0.090	140	23								
	7/16/98	9:15	D		46000	2.8	8.0	<1.3	<1	0.07	0.122	110	18								
	8/13/98	8:30	D	7.1	47300	5.1	7.8	<1.3	<1	0.20	0.214	110	14								
	10/15/98	10:35	D		46100	2.4	8.0	<1.3	0.85	0.11	0.214	52	7								
	11/4/98	9:00	D	9.3	47500	0.9	7.9	2.8	0.69	0.13	0.275	67	10								
	12/15/98	8:30	D	11.5	43100	3.7	7.8	2.2	<0.2	0.12	0.184	90	17								
	1/7/99	8:00	D	9.3	49700	1.9	7.9	1.9	0.45	0.10	0.092	69	10								

STATION	DATE	TIME	Sample Type	Depth feet	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	o-PO4 mg/L
UNBNDB	1/25/99	10:45	ST		35200	5.8	7.8	5.3	1.07	0.28	0.245	70	9	<1	<8	11.4	<2	<4	<2	22.9	
	1/25/99		SF	6.60										<1	<8	11.1	<2	<4	<2	23.6	
	1/27/99	9:40	ST		16000	14.0	7.7	7.3	0.98	0.30	0.551	70	18	<1	<8	4.8	<2	<4	<2	17.9	
	1/27/99		SF	4.6										<1	<8	4.9	<2	4.2	<2	16.1	
	1/29/99	8:31	ST		30800	2.4	7.8	5.0	0.61	0.24	0.337	51	8	<1	<8	8.2	<2	4.8	<2	16.2	
	1/29/99	8:31	SF	9.8										<1	<8	8.2	<2	4.4	<2	17.9	
									4-day average [dissolved metals]					<1	<8	8.0	<2	2.8	<2	19.3	
	3/3/99	8:30	D	10.5	47200	1.8	8.1	2.2	0.36	0.10	0.122	82	12								
	4/12/99	9:40	ST		18200	11.0	8.0	5.4	0.62	0.16	0.407	50	27	<1	<8	9.4	<2	10.6	<2	16.8	
	4/12/99		SF	15.7										<1	<8	9.9	<2	10.3	<2	23.5	
	4/14/99	8:15	ST		34400	1.7	8.0	4.2	0.47	0.11	0.282	58	7	<1	<8	9.7	<2	10.6	<2	12.3	
	4/14/99		SF	7.5										<1	<8	9.6	<2	10.5	<2	10.7	
	4/16/99	9:20	ST		39800	1.7	7.9	2.7	1.74	0.12	0.184	130	14	<1	<8	13.5	<2	8.3	<2	12.4	
	4/16/99		SF	7.2										<1	<8	15.3	<2	7.2	<2	13.6	
									4-day average [dissolved metals]					<1	<8	11.7	<2	9.3	<2	16.3	
	5/27/99	9:15	D	7.8	43800	1.1	8.1	2.0	0.40	0.05	0.153	74	8								
	6/30/99	11:15	D	4.3	46200	2.0	8.2	<0.44	<0.2	<0.05	0.162	70	10								

HUNTINGTON HARBOUR

STATION	DATE	TIME		Depth feet	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L
HUNSUN	8/13/91	11:15			51000	0.4	8.0	<0.20	0.70	<0.20	<0.10	5	<5							
	6/30/92	10:55			49000	1.9	7.8	<0.20	<0.10	0.80	0.20	30	19							
	11/18/92	11:20			50000	1.5	7.8	0.20	0.40	<0.10	0.31	94	24							
	12/7/92	10:15	S		18000	220.0	8.2	1.90	0.49	1.20	1.70	390	31	<20	<30	<20	2.5	<40	<10	52
	12/7/92	10:15	S	11.5	46000	5.5	7.9	0.27	0.25	0.32	0.23	97	31	<20	<30	150	2.1	<40	<10	39
	12/9/92	9:30	S		47000	4.1	8.1	<0.20	0.35	0.39	0.18	110	37	<20	<30	<20	<2	<40	14	24
	12/11/92	10:00	S		50000	4.0	8.1	<0.20	0.28	0.26	0.11	100	28	<20	<30	<20	<4	<40	<10	530
	12/11/92	10:00	S	17.4	50000	4.6	8.1	<0.20	0.15	0.28	<0.10	98	29	<20	<30	350	<4	<40	<10	29
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLE)													**<20**	**<30**	**250**	**>1.1**	**<40**	**<10**	**34**
	1/8/93	9:45	S		33000	7.0	8.0	0.64	0.35	0.94	0.41	60	25	<20	<30	<20	<2	<40	12	28
	1/8/93	9:45	S	8.9	36000	6.7	8.0	0.50	0.40	0.60	0.20	66	20	<20	<30	<20	<2	<40	<10	32
	1/10/93	8:45	S		48000	3.3	8.1	<0.20	0.46	0.64	0.13	110	30	<20	<30	<20	<2	<40	11	25
	1/10/93	8:45	S	6.6	48000	5.6	8.1	<0.2	0.52	0.67	0.20	107	26	<20	<30	<20	<2	<40	<10	20
	1/12/93	12:45	S		49000	4.5	8.1	0.38	0.52	0.62	<0.10	92	24	<20	<30	<20	<2	<40	18	25
	1/12/93	12:45	S	16.7	50000	6.9	8.1	0.22	0.48	0.5	0.21	81	19	<20	<30	<20	<2	<40	13	22
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLE)													**<20**	**<30**	**<20**	**<2**	**<40**	**>4.3**	**24.7**
	6/15/93	9:00			50000	3.2	8.0	<0.20	0.27	0.66	0.18	120	39							
	10/21/93	11:10			46000	1.5	7.9	<0.20	0.29	0.82	0.17	140	60							
	2/17/94	11:00	S		18000	38.0	8.3	3.20	0.43	0.91	3.60	130	<5	<5	<10	<20	<2	<40	<10	35
	2/17/94	11:00	S											<5	<10	<20	<2	<40	<10	36
	2/19/94	9:15	S		15000	9.6	7.3	3.20	0.25	0.85	0.70	53	<5	<5	<10	6.8	<2	<40	<10	460
	2/19/94	9:15	S	4.3										<5	11	5.4	<2	<40	<10	59
	2/21/94	11:05	S		27000	6.6	8.0	1.60	0.18	1.10	0.23	77	14	<5	<10	<20	<2	<40	<10	17
	2/21/94	11:05	S	4.9										<5	<10	<20	<2	<40	<10	16
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLE)													**<5**	**>3.7**	**>1.8**	**<2**	**<40**	**<10**	**37**
	3/19/94	10:50	S		27000	18.0	8.1	2.60	0.46	3.50	1.80	66	28	<5	<10	<20	<2	<40	<10	38
	3/19/94	10:50	S	2.6										<5	25	47	32	<40	<10	170
	3/21/94	12:30	S		40000	2.0	7.9	0.82	0.30	<0.20	0.39	62	<5	<5	<10	<20	<2	<40	<10	390
	3/21/94	12:30	S	4.3										<5	<10	<20	<2	<40	<10	41
	3/23/94	12:00	S		50000	4.3	8.1	0.22	0.17	0.52	0.31	60	24	<5	<10	<20	<2	<40	16	19
	3/23/94	12:00	S											<5	<10	<20	<2	<40	18	24
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLE)													**<5**	**>8.3**	**>15.7**	**>10.7**	**<40**	**>6**	**78.3**

STATION	DATE	TIME		Depth feet	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L
HUNSUN	4/13/94	12:05	S		50000	1.4	8.0	<0.20	0.23	1.00	0.22	100	46							
	11/8/94	13:00			54000	1.4	8.2	<0.20	<0.20	2.50	0.25	82	12							
	11/10/94	13:00	S		22000	48.0	8.0	4.10	0.49	1.20	0.54	83	18	<1	<10	9.2	5.5	<40	0.4	40
	11/10/94	13:05	S	12.2										<1	<10	6.3	<2	<40	<0.3	28
	11/12/94	9:30	S		50000	2.3	6.8	<0.20	<0.10	0.79	0.39	69	5	<1	<10	<10	<2	<40	<0.3	19
	11/12/94	9:35	S	10.0										<1	<10	<10	<2	<40	<0.3	30
	11/14/94	12:30	S		51000	2.4	8.1	<0.20	0.12	0.78	0.26	89	11	<1	<10	5	<2	<40	2	31
	11/14/94	12:35	S	7.0										<1	<10	<2	<2	<40	<2	26
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLE)													**<1**	**<10**	**>2**	**<2**	**<40**	**>0.67**	**28**
	3/11/95	9:30	S		12000	43.0	8.0	1.30	0.13	0.77	0.64	54	9	<1	<10	8	3.6	<40	<1	23
	3/11/95	9:35	S	10.2										<1	<10	6.2	<2	63	<1	33
	3/13/95	11:00	S		31000	3.3	7.9	0.88	0.11	0.45	0.35	46	16	<1	<10	<4	<2	<40	<1	32
	3/13/95	11:05	S	8.2										<1	<10	<4	<2	<40	<1	73
	3/15/95	10:00	S		50000	4.5	8.2	<0.20	0.24	0.58	0.24	73	31	<1	<10	<4	<2	<40	<1	17
	3/15/95	10:05	S	10.8										<1	<10	<4	<2	<40	<1	23
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLE)													**<1**	**<10**	**>2**	**<2**	**>21**	**<1**	**43**
	5/10/95	9:30			55000	1.9	7.8	<0.20	0.55	0.63	0.28	68	36							
	10/11/95	12:20			51000	3.0	8.1	<0.20	0.16	0.53	<0.20	95	31							
	12/13/95	9:15	S		25000	33.0	7.8	6.70	0.93	2.20	1.00	75	24	1	<10	5	<2	<40	<1	110
	12/13/95	9:20	S	1.8	42000									10	<10	11	<2	<40	<1	42
	12/15/95	8:35	S		41000	2.7	7.9	1.00	0.58	1.20	0.39	64	21	<1	<10	10	<2	<40	<1	21
	12/15/95	8:40	S	4.2	43000									<1	<10	8	<2	<40	<1	10
	12/17/95	10:00	S		46000	5.2	7.9	<0.20	0.35	1.10	0.25	95	25	<1	<10	<5	<2	<40	<1	<10
	12/17/95	10:05	S	4.2	46000									<1	<10	7	<2	<40	<1	16
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLE)													**>3.3**	**<10**	**8.7**	**<2**	**<40**	**<1**	**68**
	3/5/96	9:35	S		33000	15.0	8.2	1.20	0.30	0.59	0.37	73	18	<1	<5	18	<2	<4	<1	35
	3/5/96	9:40	S	13.0										<1	<5	3	<2	3	<1	29
	3/7/96	10:10	S		40000	3.5	8.2	0.20	0.19	0.75	<0.20	100	25	<1	<5	17	<2	3	<1	53
	3/7/96	10:15	S	7.6										<1	7	20	<2	<2	<1	46
	3/9/96	9:35	S		40000	1.3	8.1	<0.20	<0.10	<0.50	<0.20	110	28	<1	<5	<2	6	<4	<1	60
	3/9/96	9:40	S	9.2										<1	<5	<2	<4	<4	<1	11
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLE)													**<1**	**>2.3**	**>7.7**	**<4**	**>1.0**	**<1**	**28.7**

HUNTINGTON HARBOUR

STATION	DATE	TIME		Depth feet	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L
HUNSUN	5/1/96	11:15			40000	3.4	8.2	<0.20	0.14	<0.50	<0.20	130	33							
	10/9/96	12:20			39000	5.6	8.0	<0.2	0.21	0.74	0.29	120	31							
	10/30/96	10:55	S		24000	39.0	7.9	9.5	1.20	3.70	0.72	67	18	0.4	3	9	5	4	<0.9	62
	10/30/96	10:55	S	13.0										<0.1	5	<3	0.7	<4	<0.9	8
	11/1/96	9:05	S		29000	7.3	7.6	2.3	0.50	1.00	0.74	55	21	0.4	4	4	2	<4	<0.1	43
	11/1/96	9:05	S	11.6										0.6	4	<3	0.9	<4	<0.1	21
	11/3/96	9:50	S		35000	2.8	7.9	1.0	0.27	<0.50	0.46	98	28	<0.1	5	<3	0.3	<4	<0.1	55
	11/3/96	9:50	S	10.0										0.2	6	<3	0.6	<4	<0.1	15
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLE)													**>0.26**	**5**	**<3**	**0.73**	**<4**	**<0.1**	**14.6**
	1/23/97	10:05	S		23000	22.0	8.2	0.9	0.11	0.64	0.39	57	19	<0.1	<3	5	2	<5	<0.1	13
	1/23/97	10:05	S	15.2										<0.1	<3	<3	4	<5	<0.1	7
	1/25/97	10:15	S		48000	2.1	8.1	<0.2	<0.10	0.65	<0.20	110	22	<0.1	<3	<3	0.3	6	<0.1	<2
	1/25/97	10:15	S	13.0										<0.1	<3	<3	0.8	6	<0.1	5
	1/27/97	11:35	S		30000	4.9	8.1	0.9	0.23	0.72	0.37	110	38	<0.1	<3	<3	0.7	6	<0.1	10
	1/27/97	11:35	S	12.6										<0.1	<3	<3	0.6	9	<0.1	5
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLE)													**<0.1**	**<3**	**<3**	**1.8**	**>5**	**<0.1**	**5.6**
	4/29/97	11:05			49000	3.8	7.9	<0.8	<0.50	0.78	0.35	110	31							
	10/2/97	12:45	M		50000	5.1	7.9	<0.2	0.22	0.7	0.29	100	31							
	1/29/98	13:15	S		41000	8.5	8.0	0.67	0.16	0.8	0.35	110	34							
	1/29/98	13:15	S	9.8										<10	<10	10	<10	<10	<10	<50
	1/29/98	13:15	S/F	9.8										<10	<10	<10	<10	<10	<10	<50
	1/31/98	8:25	S		47000	4.9	8.1	<0.2	0.15	0.5	<0.2	66	22							
	1/31/98	8:27	S	11.8										<10	<10	18.7	<10	<10	<10	<50
	1/31/98	8:29	S/F	11.8										<10	<10	<10	<10	<10	<10	<50
	2/2/98		S		47000	2.5	8.0	<0.2	<0.5	0.5	<0.2	130	39							
	2/2/98		S	9.8										<10	<10	12.5	<10	<10	<10	<50
	2/2/98		S/F	9.8										<10	<10	<10	13.1	<10	<10	<50
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													**<10**	**<10**	**<10**	**>4**	**<10**	**<10**	**<50**

HUNTINGTON HARBOUR

STATION	DATE	TIME		Depth feet	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L
HUNSUN	5/13/98	10:25	S		27500	19	8.0	<0.5	0.07	1.0	0.37	230	32							
	5/13/98	10:25	S	10.8										<2	<10	19	<2	<10	<2	20.3
	5/13/98	10:25	S/F	10.8										<2	<10	16	<2	<10	<2	10
	5/15/98		S		45300	2.3	8.2	<0.5	<0.05	1.0	<0.05	270	36							
	5/15/98		S	9.2										<2	<10	17	<2	<10	<2	<10
	5/15/98		S/F	9.2										<2	<10	18	<2	11.5	<2	15.4
	5/17/98	11:00	S		47100	1.9	8.2	<0.5	<0.05	<1.0	<0.05	350	48							
	5/17/98	11:00	S	6.6										<2	<10	13	<2	<10	<2	17.3
	5/17/98	11:00	S/F	6.6										<2	<10	14	<2	<10	<2	17.9
									4-day average [dissolved metals]					**<2**	**<10**	**16**	**<2**	**3.8**	**<2**	**14.4**
	6/25/98	10:10	M		51300	2.1	7.9	<1.3	<0.05	<1.0	0.15	34	10							
	10/21/98	10:45	D	14.4																
	3/25/99	15:50	ST	10.2	49000	1.6	8.0	<0.44	<0.2	<0.05	0.061	210	34	<1	<8	19.9	<2	12.9	<2	12
	3/25/99		SF	10.8										<1	<8	13.4	<2	14.5	<2	<10
	3/27/99	10:35	ST	9	46300	2.2	8.0	<0.44	0.32	<0.05	0.122	78	6	<1	<8	13.6	<2	12.3	<2	<10
	3/27/99		SF	9.5										<1	<8	13.0	<2	13.1	<2	<10
	3/29/99	12:15	ST	7.4	46300	1.9	8.2	<0.44	1.11	<0.05	0.092	79	8	<1	<8	12.5	<2	<4	<2	<10
	3/29/99		SF	7.8										<1	<8	13.9	<2	<4	<2	<10
									4-day average [dissolved metals]					**<1**	**<8**	**13.4**	**<2**	**>9.2**	**<2**	**<10**
	6/24/99	13:15	D	8.4	48100	2.8	8.0	<0.44	<0.2	<0.05	0.073	94	10							
	10/27/99	11:20	ST	9	52800	2.16	7.9	<0.44	<0.05	0.6	<0.061	110	40							
	2/23/00	14:00	ST	16.5	35100	5	8	<0.44	0.18	0.89	0.205	58	33	<1	11.4	21.2	<2	15.8	<2	14.6
	2/23/00	14:00	SF											<1	11.3	21.7	<2	17.2	<2	19
	2/25/00	12:15	ST	13.0	31600	4.8	8	0.73	0.19	0.63	0.196	49	30	<1	9.7	23.4	<2	13.3	<2	15.4
	2/25/00	12:15	SF											1	10.7	26.6	<2	15.3	<2	19.2
	2/27/00	8:10	ST	9.6	40500	2.4	7.9	<0.44	0.18	0.91	0.086	71	37	<1	8.9	26.8	<2	15.2	<2	17.1
	2/27/00	8:10	SF											<1	8.2	25.3	<2	13.4	<2	17.2
									4-day average [dissolved metals]					**<1**	**10.0**	**24.7**	**<2**	**15.3**	**<2**	**18.5**
	6/28/00	8:50	S	12.3	52500	5.8	7.9	<0.44	<0.05	0.41	0.153	33	16							

HUNTINGTON HARBOUR

STATION	DATE	TIME		Depth feet	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L
HUNWAR	8/13/91	12:00			51000	0.4	7.9	<0.20	0.70	<0.10	0.10	11	<5							
	6/30/92	11:50			50000	2.0	7.7	<0.20	<0.10	0.80	0.20	25	12							
	11/18/92	12:00		3.8	50000	1.9	8.0	0.14	0.44	0.50	0.31	91	22							
	12/7/92	11:15	S		14000	130.0	8.2	1.80	0.37	1.10	2.00	300	35	<20	<30	<20	17	<40	<10	77
	12/7/92	13:00	S	12.5	12000	120.0	8.1	2.00	0.48	2.70	3.90	330	36	<20	<30	41	24	<40	11	150
	12/9/92	11:00	S		26000	6.8	7.9	1.20	0.37	0.53	0.55	58	24	<20	<30	<20	<2	<40	11	52
	12/11/92	11:15	S		41000	1.9	7.9	<0.20	0.42	0.56	0.29	64	19	<20	<30	<20	<4	<40	<10	50
	12/11/92	11:15	S	14.8	46000	4.0	8.0	<0.20	0.39	0.54	0.37	90	24	<20	<30	<20	<4	<40	11	26
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLE)													**<20**	**<30**	**>20.5**	**>12**	**<40**	**11**	**88**
	1/8/93	11:00	S		18000	13.0	7.9	1.30	0.25	0.63	0.49	52	21	<20	<30	<20	<2	<40	<10	37
	1/8/93	11:00	S	11.2	27000	9.8	8.0	1.00	0.34	0.68	0.49	57	17	<20	<30	<20	<2	<40	<10	39
	1/10/93	11:45	S		25000	2.1	7.8	1.40	0.34	0.71	0.40	39	15	<20	<30	<20	<2	<40	<10	40
	1/10/93	11:45	S	17.1	40000	2.6	8.0	0.40	0.45	0.66	0.18	71	8	<20	<30	<20	<2	<40	13	20
	1/12/93	13:45	S		35000	1.2	8.0	0.89	0.40	0.87	0.22	110	30	<20	<30	<20	<2	<40	11	48
	1/12/93	13:45	S	15.4	45000	12.0	8.0	0.37	0.48	0.77	0.37	120	29	<20	<30	<20	<2	<40	14	26
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLE)													**<20**	**<30**	**<20**	**<2**	**<40**	**>9**	**28.3**
	6/15/93	10:15			48000	2.8	7.9	<0.20	0.41	0.69	0.26	120	38							
	10/21/93	12:05	S		46000	1.5	7.9	<0.20	0.34	0.86	0.19	120	38							
	2/17/94	9:20	S		24000	15.0	7.8	1.90	0.45	0.80	1.60	150	<5	<5	<10	<20	4	<40	<10	41
	2/17/94	9:20	S	11.5										<5	<10	<20	3.7	<40	<10	44
	2/19/94	11:15	S		24000	18.0	6.9	2.10	0.37	1.50	0.84	140	13	<5	<10	2.8	<2	<40	<10	32
	2/19/94	11:15	S	14.1										<5	<10	9.4	3.5	<40	<10	33
	2/21/94	9:30	S		27000	9.8	7.8	1.70	0.28	1.70	0.64	150	22	<5	16	<20	<2	<40	<10	20
	2/21/94	9:30	S	12.1										<5	10	<20	<2	<40	<10	38
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLE)													**<5**	**>3.3**	**>3**	**>2.4**	**<40**	**<10**	**38.3**
	3/19/94	9:10	S		26000	46.0	7.9	2.70	0.55	1.90	1.70	89	68	<5	<10	<20	5.5	<40	<10	38
	3/19/94	9:10	S	11.2										<5	17	63	39	<40	<10	250
	3/21/94	10:45	S		40000	3.5	7.9	0.65	0.39	<0.20	<0.20	72	17	<5	<10	<20	<2	<40	16	140
	3/21/94	10:45	S	9.5										<5	<10	<20	<2	<40	17	32
	3/23/94	11:00	S		45000	3.6	8.0	0.41	0.25	0.23	0.42	58	16	<5	<10	<20	<2	<40	18	40
	3/23/94	11:00	S	6.6										<5	<10	<20	<2	<40	18	60
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLE)													**<5**	**>5.7**	**>21**	**>13**	**<40**	**>11.7**	**114**

HUNTINGTON HARBOUR

STATION	DATE	TIME		Depth feet	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L
HUNWAR	4/13/94	10:30	S		47000	1.1	8.0	<0.20	0.40	1.50	0.48	85	40							
	11/8/94	11:30			51000	0.5	8.1	<0.20	<0.10	0.63	0.54	100	25							
	11/10/94	12:00	S		21000	48.0	7.9	5.00	0.59	1.80	0.58	89	22	<1	<10	8.1	8.2	<40	<0.3	40
	11/10/94	12:05	S	13.8										<1	<10	9.2	4	<40	<0.3	60
	11/12/94	8:30	S		34000	2.4	7.3	3.40	0.27	1.60	0.44	75	<5	<1	<10	35	<2	<40	<0.3	54
	11/12/94	8:35	S	13.8										<1	<10	28	9.1	<40	<0.3	82
	11/14/94	11:00	S		47000	0.5	7.8	0.81	0.33	0.97	0.33	<5	<5	<1	<10	8.6	<2	<40	<2	62
	11/14/94	11:05	S	12.6										<1	<10	3	<2	<40	<2	110
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLE)													**<1**	**<10**	**13.3**	**>1.3**	**<40**	**<0.86**	**84**
	3/11/95	9:00	S		9700	40.0	7.9	1.50	0.15	0.99	1.00	68	16	<1	<10	12	8	<40	<1	40
	3/11/95	9:05	S	13.1										<1	<10	7.7	2.2	55	<1	41
	3/13/95	9:30	S		21000	7.0	7.8	1.30	0.16	0.79	0.51	36	17	<1	<10	5.9	<2	<40	<1	37
	3/13/95	9:35	S	11.5										<1	<10	<4	<2	45	<1	36
	3/15/95	11:45	S		41000	3.3	8.2	1.10	0.31	0.89	0.46	56	34	<1	<10	5.5	<2	46	<1	16
	3/15/95	11:50	S	10.8										<1	<10	<4	<2	<40	<1	36
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLE)													**<1**	**<10**	**>2.6**	**>0.67**	**>33.3**	**<1**	**38**
	5/10/95	10:00			52000	1.6	7.8	<0.20	0.49	0.78	0.26	60	29							
	10/11/95	10:45						<0.20	0.21	1.1	0.28									
	12/13/95	10:00	S		14000	27.0	7.2	6.90	1.50	2.50	1.10	59	21	<1	<10	6	5	<40	<1	47
	12/13/95	10:05	S	7.0	41000									<1	<10	8	<2	<40	<1	49
	12/15/95	9:30	S		37000	2.8	7.3	1.40	0.70	1.40	0.48	52	16	<1	<10	8	<2	<40	<1	28
	12/15/95	9:35	S	13.0	40000									<1	<10	8	<2	<40	<1	20
	12/17/95	8:45	S		43000	1.5	7.8	0.70	0.62	1.10	0.39	86	27	<1	<10	<5	<2	<40	<1	110
	12/17/95	8:50	S	13.4	44000									<1	<10	<5	<2	<40	<1	23
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLE)													**<1**	**<10**	**>5.3**	**<2**	**<40**	**<1**	**30.7**
	3/5/96	8:45	S		21000	15.0	8.1	1.90	0.33	0.84	0.46	37	11	<1	<5	4	<2	<4	1.5	37
	3/5/96	8:50	S	13.0										<1	<5	8	<2	<4	<1	46
	3/7/96	9:00	S		27000	1.5	8.1	1.40	1.20	0.62	0.32	44	13	<1	18	21	3	5	<1	72
	3/7/96	9:05	S	10.0										<1	5	10	10	9	<1	71
	3/9/96	10:00	S		36000	1.3	8.1	0.50	0.39	0.57	0.30	95	25	<1	6	3	<4	<4	<1	26
	3/9/96	10:05	S	9.2										<1	<5	3	5	5	<1	27
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLE)													**<1**	**>1.7**	**7**	**>3.0**	**>4.7**	**<1**	**48**
	5/1/96	9:45			40000	1.7	8.1	<0.20	0.11	0.51	0.21	100	31							
	10/9/96	10:50			41000	2.6	7.9	<0.2	0.44	<0.50	0.28	96	28							
	10/30/96	10:25	S		35000	3.4	8.1	1.0	0.48	0.97	<0.20	79	26	0.2	5	3	1	<4	<0.9	29
	10/30/96	10:25	S	15.2										<0.1	5	<3	0.6	<4	<0.9	11
	11/1/96	9:50	S		24000	10.0	7.0	4.5	<0.10	2.00	<0.20	44	18	0.3	<2	10	2	5	<0.1	46
	11/1/96	9:50	S	14.2										0.3	5	<3	1	<4	<0.1	23
	11/3/96	11:05	S		34000	1.2	7.9	0.9	0.22	0.56	0.48	81	24	<0.1	4	<3	0.4	<4	<0.1	13
	11/3/96	11:05	S	12.8										<0.1	5	<3	0.7	<4	<0.1	12
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLE)													**<0.1**	**5**	**<3**	**<0.6**	**<4**	**<0.1**	**15.3**

HUNTINGTON HARBOUR

STATION	DATE	TIME		Depth feet	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L
HUNWAR	1/23/97	8:50	S		17000	21.0	8.1	1.2	0.28	0.70	0.41	43	11	<0.1	<3	<3	2	<5	<0.1	17
	1/23/97	8:50	S	15.8										<0.1	<3	<3	1	<5	<0.1	9
	1/25/97	10:35	S		32000	1.6	7.9	0.9	0.29	0.73	0.46	110	36	<0.1	<3	8	0.3	6	<0.1	22
	1/25/97	10:35	S	15.2										<0.1	<3	<3	0.9	<5	<0.1	7
	1/27/97	12:15	S		22000	3.9	7.9	1.3	0.27	0.87	0.49	82	31	<0.1	<3	7	0.7	<5	<0.1	20
	1/27/97	12:15	S	10.8										<0.1	<3	<3	0.7	8	<0.1	10
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLE)													**<0.1**	**<3**	**<3**	**0.9**	**>2.6**	**<0.1**	**8.7**
	4/29/97	9:05			46000	3.1	7.9	<0.8	<0.50	0.74	0.50	100	29							
	10/2/97	13:45	M		50000	3.2	7.9	<0.2	0.26	0.9	0.40	100	28							
	1/29/98	12:25	S		31000	10	7.8	1.7	0.42	1.2	0.39	68	28							
	1/29/98	12:25	S	12.1										<10	<10	13.8	<10	<10	<10	<50
	1/29/98	12:25	S/F	12.1										<10	<10	<10	<10	<10	<10	<50
	1/31/98	9:00	S		39000	2.5	7.8	0.43	0.29	0.6	0.27	85	29							
	1/31/98	9:00	S	14.1										<10	<10	<10	<10	<10	<10	<50
	1/31/98	9:00	S/F	14.1										<10	<10	<10	<10	<10	<10	<50
	2/2/98		S		43000	2.8	7.8	<0.2	<0.5	0.7	0.32	53	24							
	2/2/98		S	12.5										<10	<10	12.6	<10	<10	<10	<50
	2/2/98		S/F	12.5										<10	<10	<10	<10	<10	<10	<50
									4-day average [dissolved metals]					**<10**	**<10**	**<10**	**<10**	**<10**	**<10**	**<50**
	5/13/98	9:56	S		12800	29	7.9	1.8	0.15	1.0	0.7	200	36							
	5/13/98	9:56	S	11.2										<2	<10	19.4	11.6	<10	<2	56.5
	5/13/98	9:56	S/F	11.2										<2	<10	12.8	<2	<10	<2	14.4
	5/15/98		S		26900	1.7	7.0	<0.5	0.07	1.0	0.15	170	32							
	5/15/98		S	7.9										<2	<10	15.3	<2	<10	<2	17.4
	5/15/98		S/F	7.9										<2	<10	15.5	<2	<10	<2	13
	5/17/98	9:30	S		41200	2.2	8.0	<0.5	<0.05	<1.0	0.12	280	44							
	5/17/98	9:30	S	10.5										<2	<10	14.8	2.32	<10	<2	41.4
	5/17/98	9:30	S/F	10.5										<2	<10	13.7	<2	<10	<2	25.5
									4-day average [dissolved metals]					**<2**	**<10**	**14.0**	**<2**	**<10**	**<2**	**17.6**
	6/25/98		M		49200	1.8	7.9	<1.3	<0.05	<1.0	0.12	26	5							
	10/21/98	9:30	D	12.4																

HUNTINGTON HARBOUR

STATION	DATE	TIME		Depth feet	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L
HUNWAR	3/25/99	14:50	ST	9.3	46200	1.8	8.1	0.44	0.61	<0.05	0.061	70	12	<1	<8	20.3	5.96	12.2	<2	39.0
	3/25/99		SF	9.8										<1	<8	11.8	<2	10.5	<2	13.4
	3/27/99	9:40	ST	9.3	44600	0.9	8.0	<0.44	0.38	0.09	0.092	59	9	<1	<8	14.1	<2	12.1	<2	20.7
	3/27/99		SF	9.8										<1	<8	13.3	<2	12.6	<2	15.1
	3/29/99	10:45	ST	8.1	45600	1.0	8.1	<0.44	0.29	<0.05	0.122	82	12	<1	<8	14.7	<2	<4	<2	15.2
	3/29/99		SF	8.5										<1	<8	12.2	<2	<4	<2	10.2
									4-day average [dissolved metals]					**<1**	**<8**	**12.4**	**<2**	**>7.7**	**<2**	**12.9**
	6/24/99	14:10	D	6.2	47100	2.7	8.1	<0.44	0.45	<0.05	0.184	73	8							
	10/27/99	10:30	ST	9.6	53100	1.2	7.9	<0.44	0.11	0.69	<0.061	110	32							
	2/23/00	13:26	ST	7.0	42300	7.6	8	<0.44	0.14	1.25	0.15	86	10	<1	12.0	23.9	<2	19.6	<2	14.6
	2/23/00	13:26	SF											<1	12.9	24.4	<2	19.7	<2	17.4
	2/25/00	11:20	ST	9.6	26500	5.6	7.9	0.56	0.20	0.51	0.257	50	38	<1	11.3	24.9	5.37	10.8	<2	41.7
	2/25/00	11:20	SF											<1	9.8	20.2	<2	10.9	<2	29.5
	2/27/00	10:00	ST	13.3	35200	4.3	8	<0.44	0.21	0.79	0.22	50	31	<1	8.9	22.6	<2	12.7	<2	15.0
	2/27/00	10:00	SF											<1	9.2	21.6	<2	12.3	<2	32.6
									4-day average [dissolved metals]					**<1**	**10.7**	**22.0**	**<2**	**14.3**	**<2**	**25.6**
	6/28/00	10:50	S	9.6	53600	5.6	7.9	<0.44	0.08	0.2	0.275	46	22							

HUNTINGTON HARBOUR

STATION	DATE	TIME		Depth feet	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L
HUNCRB	8/13/91	13:00			51000	0.5	7.9	<0.20	0.70	<0.10	0.20	15	<5							
	6/30/92	13:40			50000	2.9	7.8	<0.20	<0.10	1.00	0.20	25	8							
	11/18/92	13:00			50000	3.4	8.0	0.33	0.41	0.34	0.26	98	24							
	12/7/92	13:15	S		8600	120.0	7.6	<0.20	0.45	0.92	1.60	190	22	<20	<30	<20	9.4	<40	<10	54
	12/7/92	13:15	S	10.5	28000	140.0	7.8	0.67	0.42	0.69	0.89	380	40	<20	<30	21	4.3	<40	<10	56
	12/9/92	12:00	S		24000	7.0	7.8	1.20	0.34	0.53	0.57	49	19	<20	<30	<20	<2	<40	12	32
	12/11/92	11:45	S		39000	1.9	7.9	<0.20	0.43	0.59	0.31	69	21	<20	<30	<20	<4	<40	<10	43
	12/11/92	11:45	S	13.1	45000	36.0	7.9	<0.20	0.38	0.79	2.8	150	30	<20	<30	<20	<4	<40	<10	26
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLE)													**<20**	**<30**	**>10.5**	**>2.2**	**<40**	**<10**	**41**
	1/8/93	12:15	S		11000	11.0	7.8	2.10	0.15	0.66	0.60	40	20	<20	<30	<20	<2	<40	<10	35
	1/8/93	12:15	S	13.8	34000	28.0	7.9	1.00	0.37	0.85	0.74	130	26	<20	<30	<20	11	<40	<10	59
	1/10/93	11:15	S		32000	2.0	7.9	0.89	0.40	0.76	0.34	51	18	<20	<30	<20	<2	<40	<10	34
	1/10/93	11:15	S	17.4	44000	16.0	8.0	0.23	0.51	0.63	0.13	92	55	<20	<30	<20	<2	<40	<10	24
	1/12/93	14:15	S		34000	12.0	8.1	0.76	0.40	0.51	0.28	95	26	<20	<30	<20	<2	<40	12	35
	1/12/93	14:15	S	14.8	44000	4.3	8.0	0.40	0.48	0.51	0.23	120	29	<20	<30	<20	<2	<40	13	26
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLE)													**<20**	**<30**	**<20**	**>3.7**	**<40**	**>4.3**	**36.3**
	6/15/93	10:50			47000	1.0	8.1	<0.20	0.23	0.58	0.23	110	36							
	10/21/93	12:35	S		46000	2.5	7.9	<0.20	0.35	1.20	0.24	110	45							
	2/17/94	9:45	S		31000	66.0	8.2	0.79	0.27	0.59	1.10	270	<5	<5	<10	32	3.9	<40	<10	61
	2/17/94	9:45	S	11.8										<5	<10	<20	4	<40	<10	41
	2/19/94	10:45	S		12000	9.6	7.4	2.60	0.26	0.84	0.68	46	9	<5	<10	28	<2	<40	<10	31
	2/19/94	10:45	S	12.8										<5	<10	6.4	<2	<40	11	35
	2/21/94	10:00	S		17000	9.3	7.9	2.60	0.28	1.80	0.67	81	14	<5	<10	<20	<2	<40	<10	25
	2/21/94	10:00	S	12.8										<5	11	<20	<2	<40	<10	24
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLE)													**<5**	**>3.7**	**>2.1**	**>1.3**	**<40**	**>3.7**	**33.3**
	3/19/94	9:30	S		34000	12.0	8.0	1.30	0.43	1.10	1.00	64	29	<5	<10	<20	<2	<40	<10	65
	3/19/94	9:30	S	11.5										<5	13	55	24	<40	<10	170
	3/21/94	11:00	S		35000	1.6	7.9	1.40	0.26	0.21	0.41	50	21	<5	<10	<20	<2	<40	16	56
	3/21/94	11:00	S	10.2										<5	<10	<20	3.6	<40	13	69
	3/23/94	11:15	S		45000	1.8	8.0	0.63	0.22	0.54	0.51	37	14	<5	<10	<20	<2	<40	19	63
	3/23/94	11:15	S											<5	<10	<20	<2	<40	18	40
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLE)													**<5**	**>4.3**	**>18.3**	**>9.2**	**<40**	**>10.3**	**93**

HUNTINGTON HARBOUR

STATION	DATE	TIME		Depth feet	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L
HUNCRB	4/13/94	11:05	S		47000	0.9	8.0	<0.20	0.24	0.98	0.38	78	40							
	11/8/94	12:00			53000	0.5	8.1	<0.20	0.33	0.40	0.25	99	20							
	11/10/94	12:30	S		29000	16.0	7.9	3.80	0.46	1.40	0.59	50	5	<1	<10	18	4	<40	<0.3	84
	11/10/94	12:35	S	13.8										<1	<10	22	6	<40	<0.3	68
	11/12/94	9:00	S		35000	2.4	6.9	2.90	0.27	1.50	0.45	22	<5	<1	<10	13	<2	<40	<0.3	45
	11/12/94	9:05	S	13.0										<1	<10	27	11	<40	<0.3	77
	11/14/94	11:30	S		46000	0.5	7.9	0.90	0.34	0.84	0.31	66	10	<1	<10	10	<2	<40	<2	42
	11/14/94	11:35	S	12.2										<1	<10	2	<2	<40	<2	50
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLE)													**<1**	**<10**	**17**	**>5.6**	**<40**	**<0.86**	**65**
	3/11/95	8:30	S		8600	48.0	8.0	2.20	0.13	1.00	1.10	57	9	<1	<10	15	3	<40	<1	29
	3/11/95	8:35	S	13.8										<1	<10	15	7	65	<1	57
	3/13/95	10:00	S		16000	6.4	8.0	1.70	<0.10	0.72	0.59	18	9	<1	<10	7	<2	<40	<1	36
	3/13/95	10:05	S	13.1										<1	<10	9	3	<40	<1	64
	3/15/95	12:15	S		33000	1.2	8.0	1.90	0.29	0.86	0.52	22	12	<1	<10	4	<2	<40	<1	22
	3/15/95	12:20	S	11.5										<1	<10	<4	<2	<40	<1	25
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLE)													**<1**	**<10**	**>8**	**>3.3**	**>21.6**	**<1**	**49**
	5/10/95	10:30			46000	1.4	8.0	<0.20	0.39	0.41	<0.20	62	26							
	10/11/95	11:20						<0.20	0.22	1.9	0.53									
	12/13/95	10:30	S		29000	16.0	7.5	5.80	0.71	2.30	0.86	49	17	<1	<10	10	<2	<40	<1	65
	12/13/95	10:35	S	15.0	40000									<1	<10	14	<2	<40	<1	76
	12/15/95	9:45	S		38000	2.2	7.8	1.70	0.56	1.70	0.48	68	17	<1	<10	12	<2	<40	<1	33
	12/15/95	9:45	S	12.0	41000									<1	<10	10	<2	<40	<1	27
	12/17/95	9:00	S		43000	1.0	7.8	0.60	0.58	6.10	1.10	84	21	<1	<10	8	<2	<40	<1	27
	12/17/95	9:05	S	13.0	43000									<1	<10	20	12	<40	<1	45
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLE)													**<1**	**<10**	**14.7**	**>4**	**<40**	**<1**	**49.3**
	3/5/96	9:00	S		23000	12.0	8.2	1.80	0.36	0.75	0.45	60	14	<1	<5	5	<2	17	<1	46
	3/5/96	9:05	S	16.4										<1	<5	10	<2	<4	<1	38
	3/7/96	9:15	S		30000	1.6	8.1	1.70	0.28	0.91	0.53	76	18	<1	<5	22	6	8	<1	69
	3/7/96	9:20	S	13.0										<1	<5	27	4	9	<1	45
	3/9/96	10:30	S		35000	0.7	8.1	0.90	0.13	0.57	0.35	85	22	<1	<5	4	<4	<4	<1	43
	3/9/96	10:35	S	12.0										<1	<5	2	5	<4	<1	61
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLE)													**<1**	**<5**	**13**	**>3**	**>3**	**<1**	**48**

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STATION	DATE	TIME		Depth feet	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L
HUNCRB	5/1/96	10:20			39000	1.2	8.2	<0.20	<0.10	<0.50	<0.20	110	35							
	10/9/96	11:20			40000	3.2	8.0	0.2	0.23	0.54	0.33	77	25							
	10/30/96	10:05	S		24000	28.0	8.1	4.9	0.84	2.20	0.56	83	22	0.4	4	15	6	5	<0.9	76
	10/30/96	10:05	S	15.6										<0.1	6	<3	2	<4	<0.9	20
	11/1/96	10:20	S		30000	8.4	7.6	2.8	0.47	1.60	<0.20	16	16	<0.1	<2	6	2	<4	<0.1	30
	11/1/96	10:20	S	15.0										0.2	5	<3	2	<4	<0.1	22
	11/3/96	11:35	S		31000	1.6	7.8	1.6	0.38	0.84	0.51	69	24	<0.1	5	5	0.3	<4	<0.1	24
	11/3/96	11:35	S	13.4										<0.1	6	<3	3	<4	<0.1	17
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLE)													**>0.06**	**5.7**	**<3**	**2.3**	**<4**	**<0.4**	**19.6**
	1/23/97	9:20	S		20000	15.0	8.0	1.3	0.27	0.75	0.44	50	17	<0.1	<3	5	1	<5	<0.1	19
	1/23/97	9:20	S	16.0										<0.1	<3	5	6	7	<0.1	15
	1/25/97	10:50	S		35000	1.6	8.0	0.6	0.32	0.76	0.35	87	26	<0.1	<3	<3	0.4	<5	<0.1	12
	1/25/97	10:50	S	15.4										<0.1	<3	<3	1	7	<0.1	9
	1/27/97	12:35	S		18000	8.1	7.9	2.2	0.24	0.81	0.57	66	24	<0.1	<3	10	1	<5	<0.1	32
	1/27/97	12:35	S	14.6										<0.1	<3	<3	0.7	8	<0.1	11
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLE)													**<0.1**	**<3**	**>1.67**	**2.6**	**7.3**	**<0.1**	**11.7**
	4/29/97	10:05			49000	1.7	8.0	<0.8	<0.50	0.52	0.30	110	32							
	10/2/97	14:10	M		48000	3.4	8.1	<0.2	<0.1	1.0	0.38	91	27							
	1/29/98	12:50	S		25000	7.9	8.0	1.9	0.38	1.2	0.46	59	27							
	1/29/98	12:50	S	13.8										<10	<10	14.4	<10	<10	<10	<50
	1/29/98	12:50	S/F	13.8										<10	<10	10	<10	<10	<10	<50
	1/31/98	9:20	S		41000	2.9	8.0	0.27	0.23	0.6	0.24	49	16							
	1/31/98	9:20	S	14.8										<10	<10	<10	<10	40.4	<10	<50
	1/31/98	9:20	S/F	14.8										<10	<10	14.2	13.2	<10	<10	<50
	2/2/98		S		43000	1.1	7.9	0.91	<0.5	0.7	0.22	76	22							
	2/2/98		S	13.1										<10	<10	<10	<10	<10	<10	<50
	2/2/98		S/F	13.1										<10	<10	<10	<10	<10	<10	<50
	4-day average [dissolved metals]													**<10**	**<10**	**>8.1**	**>4.1**	**<10**	**<10**	**<50**
	5/13/98	9:35	S		18600	18	7.9	<0.5	0.08	1.0	0.4	160	24							
	5/13/98	9:35	S	14.1										<2	<10	19.9	2.29	<10	<2	26.9
	5/13/98	9:35	S/F	14.1										<2	<10	18.9	<2	<10	<2	19.1
	5/15/98		S		27100	2.5	8.0	1.3	0.07	1.3	0.52	200	36							
	5/15/98		S	11.5										<2	<10	17	<2	10.7	<2	19.2
	5/15/98		S/F	11.5										<2	<10	17	<2	11.2	<2	15.7
	5/17/98	10:00	S		38900	0.7	8.4	<0.5	<0.05	<1.0	<0.05	330	40							
	5/17/98	10:00	S	9.8										<2	<10	14.8	<2	<10	<2	25.4
	5/17/98	10:00	S/F	9.8										<2	<10	13.5	<2	11.4	<2	21.3
	4-day average [dissolved metals]													**<2**	**<10**	**16.5**	**<2**	**>7.8**	**<2**	**18.7**

HUNTINGTON HARBOUR

STATION	DATE	TIME		Depth	EC	Turb	pH	NO3	NH3	TKN	PO4	TSS	VSS	Cd	Cr	Cu	Pb	Ni	Ag	Zn
				feet	umhos	NTU		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
HUNCRB	6/25/98		M		49800	1.0	8.0	<1.3	<0.05	<1.0	0.12	33	8							
	10/21/98	10:15	D	12.7	50200	2.9	7.9	<1.3	0.88	0.09	<0.061	140	15							
	3/25/99	15:10	ST	12.4	21500	14.0	8.1	14	1.07	0.24	0.367	84	20	<1	<8	17.2	3.01	12.9	<2	28.8
	3/25/99		SF	13.1										<1	<8	15.2	<2	13.9	<2	21.2
	3/27/99	10:00	ST	11.2	35700	1.6	8.0	0.84	0.58	0.12	0.153	58	9	<1	<8	15.8	<2	11.7	<2	18.2
	3/27/99		SF	11.8										<1	<8	14.1	<2	12.5	<2	17.5
	3/29/99	11:15	ST	11.2	44300	0.5	8.1	<0.44	0.34	<0.05	0.092	68	12	<1	<8	13.4	<2	<4	<2	37.6
	3/29/99		SF	11.8										<1	<8	13.4	<2	<4	<2	34.9
									4-day average [dissolved metals]					<1	<8	14.2	<2	>8.8	<2	24.8
	6/24/99	13:55	D	11.2	47200	2.2	8.1	<0.44	<0.2	<0.05	<0.061	84	10							
	10/27/99	10:50	ST	14.8	53400	1	7.9	<0.44	0.09	0.69	0.08	100	31							
	2/23/00	13:09	ST	12.9	24200	100	7.9	0.84	0.20	0.98	0.551	200	164	<1	12.8	22.7	<2	17.1	<2	20.3
	2/23/00	13:09	SF											2	12.3	22.1	<2	17.8	<2	21.0
	2/25/00	11:40	ST	12.3	24100	3.1	7.9	0.72	0.21	0.33	0.266	34	26	<1	11.0	21.0	2.2	11.8	<2	23.6
	2/25/00	11:40	SF											<1	10.1	19.5	<2	12.0	<2	21.4
	2/27/00	9:30	ST	13.4	33400	0.6	7.9	0.64	0.24	0.36	0.202	46	28	<1	<8	23.9	<2	11.8	<2	24.3
	2/27/00	9:30	SF											<1	9.1	23.2	<2	12.5	<2	19.1
									4-day average [dissolved metals]					>0.7	10.3	23	<2	14.1	<2	20.5
	6/28/00	11:10	S	15.5	52400	4.7	7.9	<0.44	<0.05	0.86	0.214	41	15							

HUNTINGTON HARBOUR

STATION	DATE	TIME		Depth feet	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L
HUNBCC	8/13/91	14:00			51000	0.3	7.9	<0.20	0.70	<0.10	0.10	16	<5							
	6/30/92	14:25			50000	0.9	7.8	<0.20	<0.10	1.00	0.20	34	8							
	11/18/92	13:30			49000	1.6	8.0	0.24	0.41	0.15	0.26	92	22							
	12/7/92	14:00	S		3300	240.0	8.5	2.70	0.41	1.80	3.90	820	60	<20	<30	25	39	<40	<10	130
	12/7/92	14:00	S	5.9	5900	320.0	8.1	2.50	0.40	1.80	4.50	930	71	<20	<30	60	96	<40	<10	320
	12/9/92	12:30	S											<20	<30	<20	<2	<40	10	28
	12/11/92	12:15	S		42000	1.3	8.0	<0.20	0.28	0.58	0.31	73	21	<20	<30	<20	<4	<40	<10	56
	12/11/92	12:15	S	9.8	46000	92.0	8.0	<0.20	0.22	0.54	0.92	280	37	<20	<30	<20	<4	<40	<10	28
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLE)													**<20**	**<30**	**>30**	**>48**	**<40**	**<10**	**174**
	1/8/93	13:00	S		6900	31.0	7.8	1.70	0.23	0.66	0.63	45	12	<20	<30	<20	5.1	<40	<10	35
	1/8/93	13:00	S	12.8	30000	73.0	8.0	0.86	0.32	1.00	1.30	250	35	<20	<30	<20	<2	<40	<10	47
	1/10/93	10:45	S		29000	5.9	7.9	1.30	0.38	0.74	0.33	41	22	<20	<30	<20	<2	<40	<10	31
	1/10/93	10:45	S	14.1	41000	62.0	8.0	0.43	0.47	0.74	0.36	290	55	<20	<30	<20	11	<40	<10	56
	1/12/93	14:45	S		40000	4.2	8.0	0.86	0.42	1.20	0.14	110	30	<20	<30	<20	<2	<40	11	32
	1/12/93	14:45	S	12.1	44000	5.4	8.0	0.51	0.46	1.30	0.21	30	17	<20	<30	<20	<2	<40	12	24
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLE)													**<20**	**<30**	**<20**	**>3.7**	**<40**	**>4**	**42.3**
	6/15/93	11:30			43000	5.2	8.1	1.30	0.30	0.92	0.17	100	32							
	10/21/93	11:35	S		45000	1.2	8.0	<0.20	0.28	0.91	0.24	120	39							
	2/17/94	10:15	S		1200	400.0	8.7	3.50	0.54	1.50	4.10	1100	<13	<5	43	63	44	<40	<10	260
	2/17/94	10:15	S	11.8										<5	23	53	20	<40	<10	190
	2/19/94	10:20	S		3600	24.0	7.5	5.70	0.40	1.60	0.89	52	9	<5	14	14	6.9	<40	<10	100
	2/19/94	10:20	S	10.5										<5	11	18	2.8	<40	14	54
	2/21/94	10:30	S		8300	36.0	8.0	3.70	0.25	1.50	0.67	48	10	<5	<10	<20	3.5	<40	<10	57
	2/21/94	10:30	S	12.8										<5	<10	<20	<2	<40	<10	28
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLE)													**<5**	**11.3**	**>23.7**	**>7.6**	**<40**	**>4.7**	**90.7**
	3/19/94	10:10	S		1600	100.0	8.4	4.50	0.53	1.70	1.30	140	21	<5	16	<20	9.8	<40	<10	69
	3/19/94	10:10	S	11.2										<5	19	46	25	<40	<10	200
	3/21/94	11:30	S		26000	5.1	7.8	2.30	0.34	0.27	0.42	50	19	<5	<10	<20	<2	<40	13	56
	3/21/94	11:30	S	12.8										<5	<10	<20	<2	<40	10	26
	3/23/94	11:40	S		39000	3.8	8.0	1.50	0.17	0.41	0.39	53	21	<5	<10	<20	<2	<40	18	24
	3/23/94	11:40	S											<5	<10	<20	<2	<40	21	28
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLE)													**<5**	**6.3**	**>15.3**	**>8.3**	**<40**	**>10.3**	**84.7**

HUNTINGTON HARBOUR

STATION	DATE	TIME		Depth feet	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L
HUNBCC	8/13/91	14:00			51000	0.3	7.9	<0.20	0.70	<0.10	0.10	16	<5							
	6/30/92	14:25			50000	0.9	7.8	<0.20	<0.10	1.00	0.20	34	8							
	11/18/92	13:30			49000	1.6	8.0	0.24	0.41	0.15	0.26	92	22							
	12/7/92	14:00	S		3300	240.0	8.5	2.70	0.41	1.80	3.90	820	60	<20	<30	25	39	<40	<10	130
	12/7/92	14:00	S	5.9	5900	320.0	8.1	2.50	0.40	1.80	4.50	930	71	<20	<30	60	96	<40	<10	320
	12/9/92	12:30	S											<20	<30	<20	<2	<40	10	28
	12/11/92	12:15	S		42000	1.3	8.0	<0.20	0.28	0.58	0.31	73	21	<20	<30	<20	<4	<40	<10	56
	12/11/92	12:15	S	9.8	46000	92.0	8.0	<0.20	0.22	0.54	0.92	280	37	<20	<30	<20	<4	<40	<10	28
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLE)													**<20**	**<30**	**>30**	**>48**	**<40**	**<10**	**174**
	1/8/93	13:00	S		6900	31.0	7.8	1.70	0.23	0.66	0.63	45	12	<20	<30	<20	5.1	<40	<10	35
	1/8/93	13:00	S	12.8	30000	73.0	8.0	0.86	0.32	1.00	1.30	250	35	<20	<30	<20	<2	<40	<10	47
	1/10/93	10:45	S		29000	5.9	7.9	1.30	0.38	0.74	0.33	41	22	<20	<30	<20	<2	<40	<10	31
	1/10/93	10:45	S	14.1	41000	62.0	8.0	0.43	0.47	0.74	0.36	290	55	<20	<30	<20	11	<40	<10	56
	1/12/93	14:45	S		40000	4.2	8.0	0.86	0.42	1.20	0.14	110	30	<20	<30	<20	<2	<40	11	32
	1/12/93	14:45	S	12.1	44000	5.4	8.0	0.51	0.46	1.30	0.21	30	17	<20	<30	<20	<2	<40	12	24
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLE)													**<20**	**<30**	**<20**	**>3.7**	**<40**	**>4**	**42.3**
	6/15/93	11:30			43000	5.2	8.1	1.30	0.30	0.92	0.17	100	32							
	10/21/93	11:35	S		45000	1.2	8.0	<0.20	0.28	0.91	0.24	120	39							
	2/17/94	10:15	S		1200	400.0	8.7	3.50	0.54	1.50	4.10	1100	<13	<5	43	63	44	<40	<10	260
	2/17/94	10:15	S	11.8										<5	23	53	20	<40	<10	190
	2/19/94	10:20	S		3600	24.0	7.5	5.70	0.40	1.60	0.89	52	9	<5	14	14	6.9	<40	<10	100
	2/19/94	10:20	S	10.5										<5	11	18	2.8	<40	14	54
	2/21/94	10:30	S		8300	36.0	8.0	3.70	0.25	1.50	0.67	48	10	<5	<10	<20	3.5	<40	<10	57
	2/21/94	10:30	S	12.8										<5	<10	<20	<2	<40	<10	28
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLE)													**<5**	**11.3**	**>23.7**	**>7.6**	**<40**	**>4.7**	**90.7**
	3/19/94	10:10	S		1600	100.0	8.4	4.50	0.53	1.70	1.30	140	21	<5	16	<20	9.8	<40	<10	69
	3/19/94	10:10	S	11.2										<5	19	46	25	<40	<10	200
	3/21/94	11:30	S		26000	5.1	7.8	2.30	0.34	0.27	0.42	50	19	<5	<10	<20	<2	<40	13	56
	3/21/94	11:30	S	12.8										<5	<10	<20	<2	<40	10	26
	3/23/94	11:40	S		39000	3.8	8.0	1.50	0.17	0.41	0.39	53	21	<5	<10	<20	<2	<40	18	24
	3/23/94	11:40	S											<5	<10	<20	<2	<40	21	28
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLE)													**<5**	**6.3**	**>15.3**	**>8.3**	**<40**	**>10.3**	**84.7**

HUNTINGTON HARBOUR

STATION	DATE	TIME		Depth feet	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L
HUNBCC	11/8/94	12:30			52000	0.7	8.2	<0.20	0.26	0.36	<0.20	87	9							
	11/10/94	11:30	S		390	120.0	7.6	5.60	0.80	1.30	1.40	260	33	<1	14	28	31	<40	0.4	180
	11/10/94	11:35	S	15.0										<1	11	57	17	<40	<0.3	220
	11/12/94	9:15	S		33000	4.4	6.3	3.20	0.36	1.70	0.61	49	9	<1	<10	<10	<2	<40	<0.3	39
	11/12/94	9:20	S	15.2										<1	<10	61	14	<40	<0.3	160
	11/14/94	12:00	S		45000	1.8	7.8	1.10	0.39	1.20	0.40	78	8	<1	<10	6	<2	<40	<2	31
	11/14/94	12:05	S	13.0										<1	<10	<2	<2	<40	<2	61
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLE)													**<1**	**>3.6**	**>39.3**	**>10.3**	**<40**	**<2**	**147**
	3/11/95	8:15	S		950	80.0	8.3	1.40	<0.10	0.90	1.00	110	20	<1	<10	14	9	<40	<1	55
	3/11/95	8:20	S	12.1										<1	<10	9	<2	50	<1	48
	3/13/95	10:30	S		17000	7.1	7.8	2.70	0.12	0.71	0.48	27	10	<1	<10	6	<2	<40	<1	34
	3/13/95	10:35	S	10.5										<1	<10	<4	<2	<40	<1	27
	3/15/95	11:15	S		34000	2.4	8.1	5.10	0.31	0.78	0.45	44	22	<1	<10	13	<2	<40	<1	25
	3/15/95	11:20	S	9.5										<1	<10	<4	<2	<40	<1	19
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLE)													**<1**	**<10**	**>3**	**<2**	**>16.6**	**<1**	**31**
	5/10/95	11:00			38000	4.4	8.1	1.70	0.29	0.79	<0.20	53	21							
	10/11/95	12:00			51000	1.8	8.0	<0.20	0.24	0.81	0.22	93	29							
	12/13/95	10:50	S		4500	74.0	7.5	6.50	0.54	2.40	1.70	97	20	3	<10	13	8	<40	<1	86
	12/13/95	10:55	S	15.0	40000									<1	<10	8	<2	<40	<1	47
	12/15/95	9:10	S		24000	11.0	7.7	4.20	0.60	2.10	0.62	45	17	<1	<10	8	<2	<40	<1	46
	12/15/95	9:15	S	10.0	42000									<1	<10	7	<2	<40	<1	15
	12/17/95	9:30	S		38000	4.4	7.8	1.40	0.78	1.90	0.46	120	29	<1	<10	54	<2	<40	<1	47
	12/17/95	9:35	S	9.6	44000									<1	<10	13	<2	<40	<1	32
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLE)													**<1**	**<10**	**9.3**	**<2**	**<40**	**<1**	**31.3**
	3/5/96	8:15	S		32000	120.0	8.6	1.60	0.35	0.89	0.65	68	10	<1	7	9	11	9	<1	79
	3/5/96	8:20	S	13.4										<1	<5	15	<2	4	<1	73
	3/7/96	9:50	S		36000	2.4	8.2	0.60	0.16	0.69	0.22	95	22	<1	9	21	3	8	<1	82
	3/7/96	9:55	S	8.8										<1	52	24	8	5	<1	48
	3/9/96	10:50	S		38000	1.2	8.2	0.60	0.10	<0.50	0.27	87	21	<1	<5	3	<4	16	<1	78
	3/9/96	10:55	S	8.0										<1	9	2	9	<4	<1	19
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLE)													**<1**	**>20.3**	**41**	**>5.7**	**>3.0**	**<1**	**46.7**
	5/1/96	10:50			39000	1.8	8.1	<0.10	0.11	0.55	0.20	110	33							
	10/9/96	11:55			49000	3.8	8.0	<0.2	0.12	0.70	0.34	120	31							

HUNTINGTON HARBOUR

STATION	DATE	TIME		Depth feet	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L
HUNBCC	10/30/96	9:35	S		6000	150.0	7.7	21.0	2.30	8.80	1.80	160	32	0.9	4	18	14	13	<0.9	142
	10/30/96	9:35	S	12.8										0.3	<2	4	4	<4	<0.9	38
	11/1/96	10:45	S		29000	7.4	7.7	2.4	0.47	1.40	<0.20	65	24	<0.1	4	4	2	<4	<0.1	27
	11/1/96	10:50	S	12.2										<0.1	5	5	5	<4	<0.1	28
	11/3/96	12:05	S		30000	1.2	7.7	2.0	0.59	0.87	0.61	69	21	0.2	5	8	0.3	<4	<0.1	24
	11/3/96	12:05	S	10.8										<0.1	6	<3	0.4	<4	<0.1	14
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLE)													**>0.1**	**>3.7**	**>3**	**3.1**	**<4**	**<0.4**	**26.7**
	1/23/97	8:25	S		1300	65.0	8.5	1.0	0.21	0.72	0.50	62	11	<0.1	<3	4	5	<5	<0.1	23
	1/23/97	8:25	S	13.8										<0.1	<3	<3	2	<5	<0.1	8
	1/25/97	11:05	S		35000	2.6	8.0	1.2	0.30	0.58	0.40	77	20	<0.1	<3	<3	0.4	8	<0.1	8
	1/25/97	11:05	S	12.2										<0.1	<3	<3	0.7	8	<0.1	5
	1/27/97	13:05	S		24000	4.4	7.9	1.3	0.25	0.72	0.44	89	32	<0.1	<3	6	0.8	<5	<0.1	17
	1/27/97	13:05	S	12.8										<0.1	<3	<3	0.8	8	<0.1	11
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLE)													**<0.1**	**<3**	**<3**	**1.2**	**>5.3**	**<0.1**	**8**
	4/29/97	10:35			38000	5.7	8.0	<0.8	<0.50	0.74	0.27	87	26							
	10/2/97	13:10	M		50000	4.2	7.9	<0.2	0.17	0.8	0.32	120	33							
	1/29/98	11:45	S		490	53	8.9	1.9	0.36	1.3	0.99	220	34							
	1/29/98	11:45	S	12.5										<10	10.6	14.1	23.7	<10	<10	75.9
	1/29/98	11:45	S/F	12.5										<10	<10	16.5	19.8	46.1	<10	92.1
	1/31/98	8:40	S		41000	2.4	8.0	0.23	0.2	0.6	0.21	66	21							
	1/31/98	8:40	S	13.4										<10	<10	14.1	<10	<10	<10	<50
	1/31/98	8:40	S/F	13.4										<10	<10	12.8	<10	<10	<10	<50
	2/2/98		S		40000	2.3	7.7	1.4	<0.5	0.8	0.24	80	28							
	2/2/98		S	12.5										<10	<10	10.3	<10	<10	<10	<50
	2/2/98		S/F	12.5										<10	<10	<10	<10	<10	<10	<50
	4-day average [dissolved metals]													**<10**	**>3.5**	**>9.8**	**>6.6**	**>15.4**	**<10**	**>30.7**
	5/13/98	9:12	S		1280	120	8.4	2.6	0.12	1.6	1.2	360	48							
	5/13/98	9:12	S	9.5										<2	22.6	43.1	33.6	18.2	<2	209
	5/13/98	9:12	S/F	9.5										<2	<10	9.87	<2	<10	<2	14.6
	5/15/98		S		23600	3.5	8.0	3.5	0.1	1.3	0.09	180	32							
	5/15/98		S	7.5										<2	<10	15.9	<2	<10	<2	16.7
	5/15/98		S/F	7.5										<2	<10	16.3	<2	11.4	<2	20.6
	5/17/98	10:30	S		34900	2.4	8.6	<0.5	<0.05	1.1	<0.05	290	32							
	5/17/98	10:30	S	9.2										<2	<10	14.7	<2	11.3	<2	23
	5/17/98	10:30	S/F	9.2										<2	<10	13.2	<2	<10	<2	14.4
	4-day average [dissolved metals]													**<2**	**<10**	**13.1**	**<2**	**>3.8**	**<2**	**16.5**

HUNTINGTON HARBOUR

STATION	DATE	TIME		Depth feet	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L
HUNBCC	6/25/98	10:25	M		50100	1.9	7.8	<1.3	0.07	<1.0	0.12	32	6							
	10/21/98	9:00	D	12.4																
	3/25/99	15:30	ST	9.3	15800	21.0	8.0	4.53	1.24	0.31	0.428	100	28	<1	<8	17.4	2.64	11.7	<2	29.7
	3/25/99		SF	9.8										<1	<8	11.5	<2	11.4	<2	15.0
	3/27/99	10:20	ST	9.3	37300	2.9	7.9	1.23	0.54	0.2	0.245	53	6	<1	<8	12.2	<2	11.5	<2	13.3
	3/27/99		SF	7.5										<1	<8	11.9	<2	11.7	<2	11.6
	3/29/99	11:45	S	9.9	40300	2.2	8.0	1.23	0.48	0.11	0.153	64	12	<1	<8	12.8	<2	<4	<2	<10
	3/29/99		ST	10.5										<1	<8	11.3	<2	<4	<2	<10
									4-day average [dissolved metals]					**<1**	**<8**	**11.2**	**<2**	**>7.4**	**<2**	**>8.9**
	6/24/99	13:30	D	7.4	45400	2.3	8.1	<0.44	0.35	<0.05	0.07	74	12							
	10/27/99	9:50	ST	9.9	52100	1.8	7.8	<0.44	0.10	0.73	<0.061	110	69							
	2/23/00	12:30	ST	13.0	27600	8.8	7.9	1.4	0.24	1	0.272	59	40	<1	11.5	24.2	<2	14.7	<2	18.7
	2/23/00	12:30	SF											<1	12.1	24.6	<2	15.7	<2	19.7
	2/25/00	10:51	ST	9.3	18200	13	7.9	2.5	0.24	0.58	0.367	35	24	<1	13.5	24.1	4.79	11.4	<2	39.4
	2/25/00	10:51	SF											<1	12.0	23.4	3.12	11.6	<2	31.3
	2/27/00	9:05	ST	13.5	27100	5.2	7.9	3.8	0.32	0.78	0.248	50	41	<1	8.7	22.9	<2	12.7	<2	11.3
	2/27/00	9:05	SF											<1	9.0	23.1	<2	13.4	<2	13.5
									4-day average [dissolved metals]					**<1**	**11.0**	**16.4**	**>1.0**	**13.57**	**<2**	**21.5**
	6/28/00	9:39	S	12.3	48600	4.8	8	<0.44	0.05	0.52	0.153	33	8							

HUNTINGTON HARBOUR

STATION	DATE	TIME		Depth feet	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L
BBOLR	8/14/91	9:30			54000	0.7	8.1	0.30	<0.10	<0.10	0.10	11	<5							
	6/30/92	11:45			53000	3.8	8.1	<0.20	0.10	2.30	0.30	46	20							
	11/18/92	15:15			49000	6.4	8.0	<0.20	0.50	0.53	0.35	100	25							
	1/8/93	14:30	S		20000	12.0	7.7	1.10	0.35	0.84	0.49	37	16	<20	<30	<20	<2	<40	<10	27
	1/8/93	14:30	S	2.6	22000	14.0	7.8		0.36	0.69	0.36	57	18	<20	<30	<20	<2	<40	<10	30
	1/10/93	13:30	S		27000	3.8	8.0	0.55	0.34	1.00	0.33	46	20	<20	<30	<20	<2	<40	<10	19
	1/10/93	13:30	S	3.6	33000	7.4	8.0	0.43	0.44	0.80	0.21	55	21	<20	<30	<20	<2	<40	<10	50
	1/12/93	16:15	S		33000	5.2	8.3	<0.20	0.30	1.00	0.37	100	31	<20	<30	<20	<2	<40	13	21
	1/12/93	16:15	S	3.3	35000	4.5	8.2	0.24	0.29	0.68	0.45	12	12	<20	<30	<20	<2	<40	<10	29
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLE)													**<20**	**<30**	**<20**	**<2**	**<40**	**<10**	**36**
	6/15/93	13:20			48000	5.1	8.3	<0.20	0.26	2.20	1.40	88	28							
	10/21/93	13:00	S		46000	2.3	8.1	<0.20	0.31	1.30	0.37	100	40							
	2/17/94	11:45	S		17000	26.0	8.2	1.50	0.39	0.74	1.20	120	<5	<5	<10	<20	3.1	<40	<10	28
	2/17/94	11:45	S											<5	<10	<20	2.3	<40	<10	25
	2/19/94	13:30	S		27000	4.9	7.3	0.76	0.25	0.87	0.51	74	9	<5	<10	<20	<2	<40	<10	100
	2/19/94	13:30	S	3.3										<5	<10	2.3	<2	<40	<10	17
	2/21/94	12:00	S		29000	5.2	8.1	1.20	0.26	1.00	0.23	77	17	<5	12	<20	<2	<40	<10	15
	2/21/94	12:00	S	2.0										<5	13	<20	<2	<40	<10	16
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLE)													**<5**	**4.3**	**>0.8**	**>0.8**	**<40**	**<10**	**19.3**
	3/19/94	12:15	S		45000	60.0	8.9	0.33	0.35	1.00	1.00	190	41	<5	<10	<20	2.7	<40	<10	18
	3/19/94	12:15	S	0.3										<5	<10	<20	6	<40	<10	21
	3/21/94	13:30	S		44000	3.8	9.0	<0.20	0.23	<0.20	<0.20	80	14	<5	<10	<20	<2	<40	12	66
	3/21/94	13:30	S	1.3										<5	<10	<20	<2	<40	14	21
	3/23/94	13:30	S		47000	3.2	9.0	<0.20	0.14	0.40	0.61	73	25	<5	<10	<20	<2	<40	20	27
	3/23/94	13:30	S											<5	<10	<20	<2	<40	16	18
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLE)													**<5**	**<10**	**<20**	**>2**	**<40**	**>10**	**20**

HUNTINGTON HARBOUR

STATION	DATE	TIME		Depth feet	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L
BBOLR	4/13/94	13:15	S		48000	1.6	8.4	<0.20	0.19	1.20	0.25	110	36							
	11/8/94	14:00			51000	1.6	8.3	<0.20	<0.20	1.00	0.32	76	14							
	11/10/94	14:00	S		39000	14.0	8.0	1.90	0.14	0.89	0.42	78	11	<1	17	3	4	45	<0.3	<10
	11/10/94	14:05	S	1.8										<1	<10	4	<2	<40	<0.3	18
	11/12/94	11:00	S		44000	1.7	7.0	0.60	<0.10	1.20	0.43	31	<5	<1	<10	<10	<2	<40	<0.3	24
	11/12/94	11:05	S	1.8										<1	<10	<10	<2	<40	<0.3	25
	11/14/94	13:45	S		46000	1.7	8.1	<0.20	0.15	0.95	0.39	79	10	<1	<10	5	<2	<40	<2	23
	11/14/94	13:50	S	1.5										<1	<10	<2	<2	<40	<2	26
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLE)													**<1**	**<10**	**>1.3**	**<2**	**<40**	**<0.86**	**23**
	3/11/95	10:45	S		14000	18.0	8.2	1.30	0.25	1.00	0.63	31	11	<1	<10	6	2	<40	<1	20
	3/11/95	10:50	S	2.3										<1	<10	4	<2	48	<1	20
	3/13/95	12:15	S		26000	2.6	8.7	<0.20	<0.10	0.89	0.44	47	18	<1	<10	<4	<2	<40	<1	<10
	3/13/95	12:20	S	2.3										<1	<10	<4	<2	<40	<1	16
	3/15/95	13:45	S		32000	2.6	8.8	<0.20	0.16	0.99	0.57	39	20	<1	<10	<4	<2	<40	<1	11
	3/15/95	13:50	S	1.0										<1	<10	<4	<2	<40	<1	15
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLE)													**<1**	**<10**	**>1.3**	**<2**	**>16**	**<1**	**17**
	5/10/95	11:45			52000	3.0	8.5	<0.20	0.42	0.69	0.55	69	26							
	10/11/95	13:15			51000	1.9	8.2	<0.20	0.16	0.73	0.27	94	34							
	12/13/95	12:00	S		19000	25.0	7.4	8.40	1.20	3.00	0.98	62	20	<1	<10	6	<2	<40	<1	63
	12/13/95	12:05	S	1.2	35000									<1	<10	9	<2	<40	<1	55
	12/15/95	11:00	S		39000	3.8	8.0	0.40	0.38	1.00	0.48	67	18	<1	<10	6	<2	<40	<1	<10
	12/15/95	11:05	S	1.4	39000									<1	<10	8	<2	<40	<1	<10
	12/17/95	11:00	S		40000	2.2	8.2	<0.20	0.48	1.60	0.43	83	22	<1	<10	<5	<2	<40	<1	<10
	12/17/95	11:05	S	1.4	39000									<1	<10	<5	<2	<40	<1	14
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLE)													**<1**	**<10**	**>5.7**	**<2**	**<40**	**<1**	**>23**
	3/5/96	11:00	S		34000	7.7	8.4	0.80	0.31	0.68	1.70	77	22	<1	<5	3	21	20	<1	31
	3/5/96	11:05	S	2.1										<1	<5	5	<2	5	<1	30
	3/7/96	11:00	S		30000	1.9	8.7	0.20	0.31	1.00	0.33	82	20	<1	<5	19	<2	3	<1	37
	3/7/96	11:05	S	2.1										<1	<5	28	25	8	<1	54
	3/9/96	12:00	S		34000	1.7	8.7	<0.20	<0.10	0.57	0.31	94	21	<1	<5	<2	<4	<4	<1	<10
	3/9/96	12:05	S	1.2										<1	5	<2	5	4	<1	28
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLE)													**<1**	**>1.7**	**>11**	**>10**	**5.7**	**<1**	**37.3**
	5/1/96	12:10			40000	1.9	8.4	<0.20	0.11	0.90	0.45	110	33							
	10/9/96	12:55			39000	2.8	8.2	<0.2	0.14	1.40	0.63	83	24							

HUNTINGTON HARBOUR

STATION	DATE	TIME		Depth feet	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L
BBOLR	11/1/96	11:50	S		33000	3.7	7.9	1.3	0.33	1.10	0.73	66	22	0.4	4	<3	1	<4	<0.1	25
	11/1/96	11:50	S	1.8										0.5	6	<3	1	<4	<0.1	33
	11/3/96	13:00	S		34000	1.8	8.3	0.4	0.16	0.60	0.57	72	24	<0.1	5	<3	0.4	<4	<0.1	8
	11/3/96	13:00	S	2.4										<0.1	6	<3	0.4	<4	<0.1	8
	2-DAY AVERAGE (DEPTH INTEGRATED SAMPLE)													**>0.3**	**6**	**<3**	**0.7**	**<4**	**<0.1**	**20.5**
	1/23/97	11:10	S		19000	21.0	8.1	1.4	0.17	0.74	0.51	62	19	<0.1	<3	5	3	<5	<0.1	20
	1/23/97	11:10	S	2.7										<0.1	<3	<3	2	<5	<0.1	10
	1/25/97	11:20	S		37000	3.2	8.2	<0.8	0.27	0.85	0.40	82	19	<0.1	<3	<3	0.8	6	<0.1	11
	1/25/97	11:20	S	2.1										<0.1	<3	<3	1	8	<0.1	8
	1/27/97	10:05	S		27000	5.3	8.1	<0.8	0.26	0.94	0.48	75	34	<0.1	<3	<3	1	6	<0.1	7
	1/27/97	10:05	S	1.5										<0.1	<3	<3	1	7	<0.1	7
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLE)													**<0.1**	**<3**	**<3**	**1.3**	**>5**	**<0.1**	**8.3**
	4/29/97	11:25			44000	2.7	8.0	<0.8	<0.50	0.96	0.55	110	29							
	10/2/97	15:20	M		49000	2.3	8.2	<0.2	<0.1	1.4	0.74	130	32							
	1/29/98	11:20	S		46000	2.4	7.9	0.2	0.52	0.9	0.24	86	31	<10	<10	12.6	<10	<10	<10	<50
	1/29/98	11:20	S/F											<10	<10	12.4	<10	<10	<10	<50
	1/31/98	10:15	S		45000	4.1	8.1	<0.2	0.22	0.8	0.24	72	29	<10	<10	10.9	<10	<10	<10	<50
	1/31/98	10:15	S/F											<10	<10	10.9	<10	<10	<10	<50
	2/2/98		S		43000	2.4	8.0	<0.2	<0.5	0.8	0.26	89	25	<10	<10	<10	<10	<10	<10	<50
	2/2/98		S/F											<10	<10	<10	<10	<10	<10	<50
	4-day average [dissolved metals]													**<10**	**<10**	**>7.9**	**<10**	**<10**	**<10**	**<50**
	5/13/98	12:05	S		25800	13	8.3	<0.5	<0.05	1.2	0.37	190	28	<2	<10	13.2	4.52	<10	<2	30.6
	5/13/98	12:05	S/F											<2	<10	9.57	<2	<10	<2	<10
	5/15/98		S		41900	0.75	8.9	<0.5	<0.05	1.3	0.34	310	36							
	5/15/98		S/F											<2	<10	17.1	<2	10.9	<2	<10
	5/17/98	11:45	S		42000	0.7	9.0	<0.5	<0.05	1.1	0.12	340	40	<2	<10	13.2	<2	<10	<2	17
	5/17/98	11:45	S/F											<2	<10	12.9	<2	<10	<2	10.8
	4-day average [dissolved metals]													**<2**	**<10**	**13.2**	**<2**	**>3.6**	**<2**	**>3.6**
	6/25/98	13:00	M		50500	2.2	8.0	<1.3	<0.05	1.4	0.24	32	10							
	10/21/98	11:45	D		50500	21.0	8.5	<1.3	2.93	0.07	1.22	330	52							
	3/25/99		ST		47800	1.7	8.6	<0.44	0.89	<0.05	0.092	81	12	<1	<8	13.3	<2	11.9	<2	<10
	3/25/99		SF											<1	<8	12.8	<2	12.5	<2	<10
	3/27/99	11:20	ST		43400	1.6	8.4	<0.44	0.51	<0.05	0.122	62	6	<1	<8	12.7	<2	12.8	<2	<10
	3/27/99		SF											<1	<8	12.9	<2	12.1	<2	<10
	3/29/99	13:00	ST		43300	1.7	8.7	<0.44	0.34	<0.05	0.122	74	10	<1	<8	12.2	<2	<4	<2	<10
	3/29/99		SF											<1	<8	10.8	<2	<4	<2	<10
	4-day average [dissolved metals]													**<1**	**<8**	**12.2**	**<2**	**>8.5**	**<2**	**<10**

HUNTINGTON HARBOUR

STATION	DATE	TIME		Depth feet	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L
BBOLR	6/24/99	15:30	D		51100	27	8.5	<0.44	0.75	<0.05	0.263	140	55							
	10/27/99	12:20	ST	1.0	53400	2.4	8.3	<0.44	<0.05	0.73	0.251	130	59							
	2/25/00	9:00	ST	1.0	37100	3.8	8.3	<0.44	0.05	0.89	0.19	65	25	<1	10.0	19.4	<2	11.4	<2	10
	2/25/00	9:00	SF											<1	9.7	16.7	<2	10.2	<2	<10
	2/27/00	7:07	ST	1.0	37300	1.6	8.3	<0.44	0.10	0.65	0.26	69	46	<1	10.2	18.7	<2	10.4	<2	13.6
	2/27/00	7:07	SF											<1	10.3	20.2	<2	11.2	<2	12.5
	6/28/00	12:45	S	1.0	56100	5.4	8.2	<0.44	0.05	0.85	0.367	44	21							

HUNTINGTON HARBOUR

STATION	DATE	TIME		Depth feet	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L
TGDC05	1/29/98	11:35	S		8400	25	7.8	4.6	0.66	2.0	0.49	58	21	<10	<10	12	14	<10	<10	85.5
	1/29/98	11:35	S/F											<10	<10	<10	<10	<10	<10	<50
	1/31/98	10:45	S		43000	4.6	8.0	<0.2	0.26	0.7	0.29	72	25	<10	<10	12.3	<10	<10	<10	<50
	1/31/98	10:45	S/F											<10	<10	<10	<10	<10	<10	<50
	2/2/98		S		42000	2.3	7.9	<0.2	<0.5	0.7	0.25	68	20	<10	<10	11	<10	<10	<10	<50
	2/2/98		S/F											<10	<10	<10	<10	<10	<10	<50
								4-day average [dissolved metals]						**<10**	**<10**	**<10**	**<10**	**<10**	**<10**	**<50**
	5/13/98	11:56	S		285	27	8.2	1.8	<0.05	1.6	0.83	72	28	<2	5.34	8.49	14.4	<10	<2	47
	5/13/98	11:56	S/F											<2	<10	2.33	<2	<10	<2	<10
	5/15/98		S		39400	1.3	8.4	<0.5	0.06	1.2	0.31	260	24							
	5/15/98		S/F											<2	<10	14.7	<2	<10	<2	<10
	5/17/98	12:00	S		42800	1.7	8.3	<0.5	<0.05	1.0	0.06	340	36	<2	<10	14.9	<2	<10	<2	23.5
	5/17/98	12:00	S/F											<2	<10	12.7	<2	<10	<2	11.6
								4-day average [dissolved metals]						**<2**	**<10**	**9.9**	**<2**	**<10**	**<2**	**>3.9**
	6/25/98		M		48300	1.8	7.9	<1.3	0.08	1.4	0.18	25	9							
	6/25/98		M		49800	8.9	8.0	<1.3	0.09	1.2	0.34	120	22							
	10/26/98	9:45	D	S	47700	0.6	8.1	<1.3	0.98	0.06	0.245	18	12							
	3/25/99		ST	S	8220	21	8.2	2.02	2.0	0.2	0.337	84	28	<1	<8	12.1	7.4	8.4	<2	82.4
	3/25/99		SF	S										<1	<8	5.02	<2	6.9	<2	16.7
	3/27/99	11:40	ST	S	28600	6.4	8.0	1.06	0.84	0.18	0.306	63	51	<1	<8	10.9	<2	10.1	<2	18.0
	3/27/99		SF	S										<1	<8	9.24	<2	17.8	<2	10.9
	3/29/99	13:25	ST	S	34900	5.2	8.2	<0.44	0.6	0.11	0.245	68	13	<1	<8	12.4	2.5	<4	<2	16.1
	3/29/99		SF	S										<1	<8	10.7	<2	<4	<2	<10
								4-day average [dissolved metals]						**<1**	**<8**	**8.3**	**<2**	**>8.2**	**<2**	**>9.2**
	6/24/99	15:35	D	S	50200	7.6	8.2	<0.44	0.68	<0.05	0.343	130	34							
	2/25/00	9:20	ST	1.0	33100	4.3	8.2	<0.44	0.134	0.64	0.187	52	36	<1	10.3	17.9	<2	10.4	<2	13.7
	2/25/00	9:20	SF											<1	9.7	17.2	<2	10.7	<2	15.7
	2/27/00	7:24	ST	1.0	28400	4.5	7.9	0.98	0.215	0.62	0.266	48	38	<1	9.3	16.5	<2	7.6	<2	19.1
	2/27/00	0:00	SF											<1	9.3	15.8	<2	8.1	<2	17.6

HUNTINGTON HARBOUR

STATION	DATE	TIME		Depth feet	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L
HUNHAR	12/7/92	15:00			29000	36.0	8.0	1.20	0.34	0.46	0.71	100	22	<20	<30	<20	<2	<40	16	34
	12/9/92	10:00			46000	6.4	8.1	<0.20	<0.10	0.36	0.14	86	28	<20	<30	<20	<2	<40	13	16
	12/11/92	10:30			48000	2.7	8.0	<0.20	0.28	0.33	0.11	110	29	<20	<30	<20	<4	<40	<10	17
	1/8/92	10:15	S		39000	16.0	8.1	0.74	0.44	0.72	0.36	100	32	<20	<30	<20	<2	<40	12	22
	1/10/93	9:15	S		44000	3.1	8.1	0.27	0.48	0.67	0.36	120	33	<20	<30	<20	<2	<40	11	20
	1/12/93	13:15	S		48000	3.5	8.1	0.47	0.52	0.68	0.23	54	16	<20	<30	<20	<2	<40	14	24
	2/17/94	10:30	S		39000	7.2	8.1	0.22	0.37	0.59	5.80	190	<5	<5	<10	<20	<2	<40	<10	19
	2/19/94	9:55	S		31000	4.9	7.0	1.10	0.32	0.76	0.47	130	14	<5	<10	2.1	<2	<40	<10	48
	2/21/94	10:50	S		41000	2.1	8.0	0.77	0.12	1.20	0.26	110	17	<5	<10	<20	<2	<40	10	21
	3/19/94	10:30	S		48000	2.3	8.1	0.24	0.42	0.61	0.45	91	42	<5	<10	<20	<2	<40	<10	<10
	3/21/94	12:10	S		45000	2.1	8.0	0.48	0.31	<0.20	0.31	77	<5	<5	<10	21	<2	<40	15	28
	3/23/94	12:15	S		50000	2.2	8.1	0.31	0.26	0.47	0.37	88	24	<5	<10	<20	<2	<40	19	23
	11/10/94	13:15	S		53000	3.0	8.2	<0.20	<0.10	0.60	<0.20	70	14	<1	<10	3	<2	<40	<0.3	20
	11/12/94	10:00	S		51000	1.4	6.9	<0.20	<0.10	0.77	0.28	69	19	<1	<10	<10	<2	<40	<0.3	26
	11/14/94	12:45	S		52000	1.4	8.2	<0.20	0.16	0.60	0.27	86	10	<1	<10	9	<2	<40	<2	17
	3/11/95	9:45	S		20000	16.0	8.0	1.30	0.12	0.78	0.45	34	11	<1	<10	5	<2	<40	<1	20
	3/13/95	11:15	S		39000	2.4	8.1	0.40	<0.10	0.34	0.25	59	19	<1	<10	<4	<2	<40	<1	16
	3/15/95	10:30	S		50000	1.9	8.2	<0.20	0.29	0.58	0.25	80	40	<1	<10	<4	<2	<40	<1	13
	12/13/95	9:35	S		40000	12.0	7.7	3.80	0.51	1.90	0.78	66	23	<1	<10	<4	<4	<2	<40	<1
	12/15/95	8:45	S		44000	1.9	8.0	0.40	0.44	0.74	0.27	97	26	<1	<10	6	<2	<40	<1	11
	12/17/95	9:45	S		48000	2.6	8.1	<0.20	0.35	0.76	<0.20	100	26	<1	<10	<5	<2	<40	<1	<10
	3/5/96	9:55	S		44000	3.7	8.2	0.80	0.29	0.58	0.25	89	24	<1	<5	<2	8	<4	<1	24
	3/7/96	10:30	S		39000	1.4	8.2	0.40	0.17	0.62	<0.20	100	24	<1	7	12	2	6	<1	38
	3/9/96	9:10	S		41000	1.1	8.2	0.20	<0.10	<0.50	<0.20	100	24	<1	<5	<2	6	4	<1	22
	10/30/96	11:15	S		61000	2.7	8.2	<0.2	0.33	0.57	<0.20	120	30	<0.1	5	<3	0.3	<4	<0.9	<2
	11/1/96	9:20	S		35000	2.5	8.0	1.0	0.33	0.86	<0.20	59	22	<0.1	<2	<3	0.5	<4	<0.1	9
	11/3/96	10:20	S		36000	1.7	8.0	0.5	0.12	<0.50	0.29	100	31	<0.1	5	<3	<0.1	<4	<0.1	6
	1/23/97	10:35	S		41000	6.6	8.1	0.3	0.13	0.69	0.30	110	37	<0.1	<3	<3	0.6	7	<0.1	<2
	1/25/97	9:55	S		44000	1.7	8.1	<0.2	<0.10	0.66	0.20	87	23	<0.1	<3	<3	0.2	8	<0.1	<2
	1/27/97	11:05	S		41000	4.7	8.1	<0.8	<0.10	0.60	0.26	56	59	<0.1	<3	<3	0.5	8	<0.1	<2
	2/23/00	14:30	ST	0.1	44100	5.4	8	<0.44	0.092	0.72	0.153	220	122	<1	13.3	122	<2	220	<2	421
	2/23/00	14:30	SF											<1	13.8	25.6	<2	22	<2	22.5
	2/25/00	12:30	ST	0.1	45300	3	8	<0.44	0.094	0.84	0.0704	76	58	<1	11.5	25.3	<2	17.8	<2	<10
	2/25/00	12:30	SF											<1	9.69	21.5	<2	13.8	<2	<10
	2/27/00	8:35	ST	0.1	48100	1.7	8	<0.44	0.078	1.1	<0.061	84	49	<1	9.76	25.1	<2	15.5	<2	<10
	2/27/00	8:35	SF											<1	10.1	24.8	<2	15.2	<2	11.6
									4-day average [dissolved metals]					**<1**	**11.2**	**24.0**	**<2**	**17**	**<2**	**11.4**
	6/28/00	9:20	S	0.1	52800	4.4	8	<0.44	<0.05	0.58	0.122	21	15							

STATION	DATE	TIME		Depth feet	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L
TGUC05	10/26/98	9:30	D		15100	7.7	8.3	<1.3	2.93	0.57	0.153	46	34							
	6/24/99	15:40	D		48300	2.6	8.2	<0.44	0.83	<0.05	0.285	98	10							
	6/28/00	13:00	D	1.0	53400	4.8	8.1	<0.44	0.072	1.4	0.337	36	14							

DANA POINT HARBOR

STATION	DATE	TIME	Sample Type	Depth feet	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L
DAPTEB	8/29/91	11:20			51000	0.7	8.0	0.30	<0.10	<0.10	<0.10	180	130							
	6/24/92	11:30			49000	0.8	8.0	<0.20	<0.10	0.90	<0.10	27	17							
	11/24/92	11:30			51000	2.5	8.1	<0.20	<0.10	0.23	0.17	120	38							
	2/18/93	13:00	S		41000	14.0	8.1	0.45	0.51	0.70	<0.10	74	7	<7	<10	<30	<2	<3	<4	59
	2/18/93		S	10	47000	82.0	8.1	<0.2	0.55	1.30	0.31	260	37	<7	18	84	13.0	<3	<4	140
	2/20/93	9:30	S		44000	6.1	8.2	0.55	0.28	1.00	0.14	78	26	<7	<10	<30	<2	<3	<4	29
	2/20/93		S	11	47000	7.8	8.1	0.36	0.10	0.32	0.17	83	25	<7	<10	<30	3.4	<3	<4	<20
	2/22/93	12:30	S		47000	4.2	8.1	0.97	0.16	0.52	<0.03	94	26	9	<10	<30	<2	<3	<4	61
	2/22/93		S	10	49000	5.2	8.1	0.40	0.12	0.28	<0.10	63	30	<7	<10	<30	<2	<3	<4	27
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													**<7**	**>6**	**>28**	**>5.5**	**<3**	**<4**	**>55.7**
	6/5/93	12:44	S		41000	5.6	8.1	0.60	0.22	0.83	0.56	67	20	<20	<30	<20	<2	<40	<10	17
	6/5/93		S	11	48000	3.6	8.1	<0.20	0.20	0.70	0.28	62	20	<20	<30	23	<2	<40	40	48
	6/7/93	13:45	S		50000	1.0	8.1	<0.20	<0.10	0.57	0.22	110	28	<20	<30	61	<2	<40	42	51
	6/7/93		S	13	50000	7.5	8.0	<0.20	<0.10	0.60	0.32	150	38	<20	<30	57	<2	<40	35	48
	6/9/93	13:00	S		50000	1.1	8.1	<0.20	<0.10	1.20	0.23	90	23	<20	<30	31	3.4	<40	18	150
	6/9/93		S	12	50000	5.3	8.0	<0.20	<0.10	0.66	0.21	90	22	<20	<30	24	<2	<40	27	35
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													**<20**	**<30**	**34**	**<2**	**<40**	**34**	**44**
	10/27/93	10:00	S	9	48000	6.6	8.0	<0.20	0.24	0.89	<0.10	62	18							
	4/26/94	10:30	S		48000	4.3	8.0	0.67	0.19	1.10	<0.20	80	10	<5	<10	<20	<2	<40	13	26
	4/26/94		S	11										<5	<10	21	<2	<40	12	27
	4/28/94	9:30	S		52000	1.5	8.0	0.53	0.15	0.54	0.62	79	31	<5	<10	<20	<2	<40	<10	28
	4/28/94		S	10										<5	<10	<20	<2	<40	<10	19
	4/30/94	8:30	S		52000	2.4	8.0	0.23	0.20	0.49	0.40	130	37	<5	<10	<20	<2	<40	<10	23
	4/30/94		S	7										<5	<10	<20	<2	<40	<10	26
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													**<5**	**<10**	**>7**	**<2**	**<40**	**>4**	**24**
	5/5/94	12:45		8	48000	1.3	8.1	<0.20	0.37	0.54	0.26	89	<5							
	11/9/94	10:00			55000	0.7	8.2	<0.20	<0.20	0.50	0.28	6	<5							
	5/31/95	10:30			47000	1.0	8.1	<0.20	0.14	0.51	<0.20	<6	<6							
	10/23/95	13:10			51000	1.6	8.0	<0.20	<0.10	0.65	<0.20	87	16							

DANA POINT HARBOR

STATION	DATE	TIME	Sample Type	Depth feet	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L
DAPTEB	12/23/95	10:45	S		46000	4.0	8.2	<0.20	<0.10	<0.50	<0.20	110	36	<1	<10	160	<2	<40	<10	48
	12/23/95	10:50	S	13	46000									<1	<10	<20	<20	<40	<10	35
	12/25/95	7:30	S		47000	2.2	8.2	<0.20	0.24	<0.50	<0.20	110	34	<1	<10	<20	32	<40	<10	31
	12/25/95	7:35	S	11.6	47000									<1	<10	<20	<20	<40	<10	26
	12/27/95	10:30	S		48000	1.7	8.1	<0.20	<0.10	0.54	<0.20	100	30	<1	<10	<20	<20	<40	<10	44
	12/27/95	10:35	S	10.8	47000									<1	<10	<20	<20	<40	<10	33
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													**<1**	**<10**	**<20**	**<20**	**<40**	**<10**	**31.3**
	2/21/96	10:20	S		34000	10.0	8.1	0.60	0.15	0.76	0.66	90	25	<1	<5	15	<4	17	<1	38
	2/21/96	10:25	S	12										<1	<5	19	<2	16	<1	30
	2/23/96	10:30	S		43000	1.2	8.1	0.30	0.19	<0.50	<0.20	83	24	<1	14	10	<8	<8	<5	27
	2/23/96	10:35	S	7										<1	<5	<8	<8	<8	<5	35
	2/25/96	9:30	S		40000	6.6	2.1	0.40	0.29	0.75	0.40	80	26	<1	<5	<8	<8	<8	<5	37
	2/25/96	9:35	S	16										<1	<5	<8	<8	11	<5	36
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													**<1**	**<5**	**>6.3**	**<8**	**>9**	**<5**	**33.7**
	10/16/96	13:35			43000	2.3	8.1	<0.2	0.36	<0.5	<0.2	98	19							
	1/15/97	17:05	S		25000	22.0	8.0	0.4	<0.1	0.82	0.62	96	24	<0.1	<1	5	1	<5	<0.1	17
	1/15/97	17:05	S	7										0.3	4	7	2	<5	<0.1	22
	1/17/97	11:35	S		30000	1.9	7.9	<0.4	<0.1	<0.5	<0.2	180	34	0.9	3	7	<0.1	<5	<0.1	21
	1/17/97	11:35	S	8										0.3	3	5	0.7	<5	<0.1	18
	1/19/97	9:50	S		32000	5.8	8.0	0.3	<0.1	0.72	0.43	99	29	1	3	4	0.6	<5	<0.1	10
	1/19/97	9:50	S	10										0.3	3	7	0.5	<5	<0.1	14
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													**0.3**	**3.3**	**6.3**	**1.1**	**<5**	**<0.1**	**18**
	4/30/97	10:25			48000	5.0	7.9	<0.8	0.23	<0.5	0.22	110	38							
	10/17/97	8:30	M		49000	5.7	8.0	<0.2	0.19	0.5	0.47	120	40	<1	7.2	7.6	<2	23	<1	56
	10/28/98	9:40	D	8.1	51400	5.1	7.9	<1.3	0.5	<0.05	0.09	170	27	2	7	57	11.3	8.1	<1	86
	6/23/99	9:00	D	9.3	47000	3.9	8.1	<0.44	<0.2	<0.05	0.06	63	9	3	14	96	16	9	<1	143
	10/28/99	10:55	DT	10.6	50800	2.1	8	<0.44	<0.05	0.29	<0.061	100	32							
	4/17/00	17:43	ST		37200	6.4	7.3	0.66	<0.05	0.2	0.306	100	63	<1	<8	29	<2	7.9	<2	27
	4/17/00	17:43	SF											<1	<8	27	<2	10	<2	28
	4/19/00	8:45	ST	9.3	47300	2	8.2	<0.44	<0.05	0.59	0.153	94	54	<1	<8	29	<2	11	<2	16
	4/19/00	8:45	SF											<1	<8	27	<2	11	<2	16
	4/21/00	11:21	ST	13.3	44100	2.4	8	<0.44	<0.05	0.44	0.153	95	24	<1	8.2	39	<2	17	<2	19
	4/21/00	10:30	SF											<1	9	39	<2	15	<2	19
									4-day average [dissolved metals]					**<1**	**>3**	**31**	**<2**	**12**	**<2**	**21**
	6/7/00	11:05	DT	9.5	49900	4	8.1	<0.44	<0.05	0.48	0.092	79	28							

DANA POINT HARBOR

STATION	DATE	TIME	Sample Type	Depth feet	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L
DAPTWB	8/29/91	12:00			51000	0.5	8.0	0.30	<0.10	<0.10	1.40	170	110							
	6/24/92	12:10			50000	2.2	8.0	0.30	<0.10	0.70	0.30	83	30							
	11/24/92	12:00			51000	1.5	8.2	<0.20	<0.10	0.30	0.18	82	27							
	2/18/93	13:30	S		46000	9.7	8.1	0.28	0.53	0.66	0.17	110	22	<7	<10	<30	2.7	<3	<4	38
	2/18/93		S	9	47000	37.0	8.1	0.24	0.56	1.20	1.60	180	77	<7	<10	34	8.6	<3	<4	110
	2/20/93	10:00	S		46000	5.9	8.2	0.41	0.27	0.45	0.43	63	23	<7	<10	<30	<2	<3	<4	<20
	2/20/93		S		48000	10.0	8.1	0.33	0.12	0.47	0.37	110	32	<7	<10	<30	<2	<3	<4	<20
	2/22/93	13:00	S		49000	2.3	8.1	0.40	0.16	0.43	<0.10	84	24	<7	<10	<30	<2	<3	<4	30
	2/22/93		S	9	49000	13.0	8.1	0.40	0.11	0.34	<0.10	100	27	<7	<10	<30	<2	<3	<4	44
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													**<7**	**<10**	**>11.3**	**>2.9**	**<3**	**<4**	**>51.3**
	6/5/93	13:15	S		45000	5.6	8.1	0.58	0.19	0.75	0.35	68	22	<20	<30	<20	<2	<40	<10	24
	6/5/93		S	10	49000	4.3	8.1	<0.20	0.12	0.61	0.24	91	22	<20	<30	<20	35	<40	<10	<10
	6/7/93	14:35	S		50000	1.4	8.1	<0.20	0.13	0.51	0.20	100	28	<20	<30	46	<2	<40	34	28
	6/7/93		S	10	50000	3.9	8.1	<0.20	0.10	0.55	0.28	72	21	<20	<30	53	<2	<40	25	38
	6/9/93	13:30	S		50000	1.1	8.1	<0.20	<0.10	0.55	0.48	95	22	<20	<30	21	<2	<40	18	26
	6/9/93		S	10	50000	3.0	8.1	<0.20	0.11	0.45	0.18	100	20	<20	<30	23	<2	<40	27	28
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													**<20**	**<30**	**>25**	**>12**	**<40**	**>17**	**>22**
	10/27/93	10:40	S	10	48000	4.7	8.0	<0.20	0.24	0.63	<0.10	91	22							
	4/26/94	11:00	S		50000	3.4	8.0	0.65	0.26	0.73	<0.20	37	10	<5	<10	<20	<2	<40	13	23
	4/26/94		S	8										<5	<10	20	<2	<40	14	26
	4/28/94	10:00	S		52000	1.2	8.0	0.56	0.20	1.40	0.69	87	36	<5	<10	<20	<2	<40	<10	15
	4/28/94		S	7										<5	<10	<20	<2	<40	<10	18
	4/30/94	9:00	S		53000	1.4	8.0	0.31	0.26	1.20	1.10	100	36	<5	<10	<20	<2	<40	<10	14
	4/30/94		S	5										<5	<10	<20	<2	<40	<10	16
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													**<5**	**<10**	**>6.7**	**<2**	**<40**	**>4.7**	**20**
	5/5/94	13:10		8	48000	1.1	8.2	<0.20	0.40	0.65	0.31	110	18							
	11/9/95	10:10			56000	0.4	8.2	<0.20	<0.20	0.45	<0.20	85	<5							
	5/31/95	11:00			48000	2.0	8.1	<0.20	<0.10	0.42	0.22	82	38							
	10/23/95	13:30			52000	2.1	8.0	<0.20	<0.10	0.57	0.20	78	12							

DANA POINT HARBOR

STATION	DATE	TIME	Sample Type	Depth feet	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L
DAPTWB	12/23/95	11:00	S		45000	4.4	8.2	<0.20	0.18	1.00	0.26	110	40	<1	<10	<20	<2	<40	<10	19
	12/23/95	11:05	S	11.2	47000									<1	<10	<20	<20	<40	<10	22
	12/25/95	7:40	S		48000	1.2	8.2	<0.20	0.25	<0.50	<0.20	170	69	<1	<10	<20	<20	<40	<10	100
	12/25/95	7:45	S	4.6	46000									<1	<10	<20	<20	<40	<10	26
	12/27/95	11:00	S		47000	0.9	8.1	<0.20	<0.10	0.53	<0.20	89	24	<1	<10	<20	<20	<40	<10	13
	12/27/95	11:05	S	10.8	48000									<1	<10	<20	<20	<40	<10	64
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													**<1**	**<10**	**<20**	**<20**	**<40**	**<10**	**37.3**
	2/21/96	10:45	S		34000	8.9	8.2	0.40	<0.10	0.66	0.52	82	27	2	<5	12	<4	15	<1	25
	2/21/96	11:15	S	3.8										<1	<5	8	2	16	<1	22
	2/23/96	10:50	S		42000	1.0	8.2	<0.20	0.16	<0.5	<0.20	71	28	<1	<5	97	<8	<8	<5	28
	2/23/96	10:55	S	7.8										<1	8	11	<8	<8	<5	34
	2/25/96	9:50	S		41000	5.3	2.1	0.50	0.23	0.62	0.43	73	25	<1	<5	<8	<8	<8	<5	46
	2/25/96	9:55	S	15.6										<1	<5	<8	<8	8	<5	20
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													**<1**	**>2.7**	**>6.3**	**>0.7**	**>8.0**	**<5**	**25.3**
	10/16/96	12:35			42000	1.2	8.2	<0.2	0.40	0.60	<0.2	100	21							
	1/15/97	16:05	S		26000	36.0	8.0	<0.2	<0.1	0.59	0.47	170	40	0.2	4	9	6	<5	<0.1	39
	1/15/97	16:05	S	10										0.2	4	14	4	<5	<0.1	32
	1/17/97	12:05	S		30000	1.8	8.0	<0.4	0.27	<0.5	0.30	130	31	<0.1	3	5	<0.1	<5	<0.1	13
	1/17/97	12:05	S	7.6										<0.1	3	10	0.5	<5	<0.1	14
	1/19/97	10:20	S		32000	1.6	8.1	<0.2	<0.1	<0.5	0.25	96	25	<0.1	3	5	0.3	7	<0.1	16
	1/19/97	10:20	S	9.2										<0.1	3	4	0.3	<5	<0.1	8
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													**<0.06**	**3.3**	**9.3**	**1.6**	**<5**	**<0.1**	**18**
	4/30/97	10:10			49000	2.1	8.0	<0.8	0.18	<0.5	<0.2	100	38							
	10/17/97	9:00	M		48000	3.9	8.2	<0.2	<0.1	0.6	0.37	140	40	<1	<5	9.3	<2	<4	3.3	76
	10/28/98	10:00	D	7.8	51800	2.6	8	<1.3	0.43	<0.05	0.15	160	24	<1	13	68	14	7	<0.1	67
	6/23/99	9:30	D	9.3	47300	4.7	8.1	<0.44	<0.2	<0.05	0.08	82	13	<1	15	81	16	8	<0.1	90
	10/28/99	11:20	DT	11.3	51300	2.6	8	<0.44	<0.05	0.2	<0.061	94	34							
	4/17/00	18:00	ST		42200	3.5	8.1	0.78	<0.05	0.35	0.28	63		<1	<8	30	<2	24	<2	20
	4/17/00	18:00	SF									25		<1	<8	28	<2	9.9	<2	18
	4/19/00	9:00	ST	9.3	42400	1.2	8.2	<0.44	<0.05	0.2	0.28	86	50	<1	<8	26	<2	11	<2	11
	4/19/00	9:00	SF											<1	<8	25	<2	11	<2	14
	4/21/00	11:21	SF	9.6	45200	1.1	7.9	<0.44	<0.05	0.2	0.15	90	24	<1	9	37	<2	21	<2	18
	4/21/00	11:08	ST											<1	9	37	<2	18	<2	15
									4-day average [dissolved metals]					**<1**	**>3**	**30**	**<2**	**13**	**<2**	**15.7**
	6/7/00	11:35	DT	9.6	50200	4.1	8.1	<0.44	<0.05	0.6	0.09	97	9							

DANA POINT HARBOR

STATION	DATE	TIME	Sample Type	Depth feet	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L
DAPTLR	6/24/92	13:05			50000	1.8	8.0	0.20	<0.10	0.80	0.30	81	29							
	11/24/92	12:30			50000	1.6	8.1	<0.20	<0.10	0.21	0.29	99	36							
	2/18/93	14:00	ST		47000	9.8	8.1	<0.20	0.58	1.60	<0.10	78	19	<7	<10	68	2.7	<3	<4	46
	2/18/93		S	16	48000	14.0	8.1	0.34	0.56	1.00	0.15	120	73	<7	<10	<30	<2	<3	<4	39
	2/20/93	10:30	ST		43000	15.0	8.1	0.54	0.17	0.30	0.30	81	24	<7	<10	<30	<2	<3	<4	<20
	2/20/93		S	15	47000	25.0	8.1	0.38	0.12	0.41	0.37	110	30	<7	<10	<30	<2	<3	<4	<20
	2/22/93	13:30	ST		49000	3.6	8.1	0.39	0.14	0.32	0.23	83	23	<7	<10	<30	<2	<3	<4	<20
	2/22/93		S	13	48000	7.8	8.1	0.38	0.10	0.21	<0.3	94	28	<7	<10	<30	<2	<3	<4	<20
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													**<7**	**<10**	**<30**	**<2**	**<3**	**<4**	**>13**
	6/5/93	14:45	S		46000	5.3	8.1	0.25	0.16	0.73	0.36	49	16	<20	<30	<20	<2	<40	<10	24
	6/5/93		S	13	49000	7.2	8.0	<0.20	0.11	0.61	0.35	140	37	<2	<30	<20	<2	<40	<10	24
	6/7/93	15:30	S		50000	2.4	8.1	<0.20	0.12	0.57	0.14	78	23	<20	<30	46	<2	<40	22	19
	6/7/93		S	13	50000	6.2	8.1	<0.20	0.11	0.59	0.19	100	26	<20	<30	52	<2	<40	<10	31
	6/9/93	14:15	S		50000	2.3	8.1	<0.20	0.11	0.44	<0.10	94	19	<20	<30	52	<2	<40	20	18
	6/9/93		S	13	50000	6.2	8.1	<0.20	0.13	0.66	0.14	97	20	<20	<30	<20	<2	<40	25	22
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													**<20**	**<30**	**>17**	**<2**	**<40**	**>8**	**>18**
	10/27/93	11:10	S	16	48000	5.1	7.9	<0.20	0.23	0.71	<0.10	89	22							
	4/26/94	12:00	S		52000	2.2	8.0	0.74	0.16	0.69	<0.20	52	16	<5	<10	<20	<2	<40	11	18
	4/26/94		S	13										<5	<10	22	<2	<40	<10	24
	4/28/94	10:35	S		52000	1.6	8.0	0.41	0.19	0.56	0.51	60	29	<5	<10	<20	<2	<40	<10	13
	4/28/94		S	13										<5	<10	<20	<2	<40	<10	15
	4/30/94	9:30	S		52000	1.4	8.0	<0.20	0.19	0.58	0.43	32	18	<5	<10	<20	<2	<40	<10	10
	4/30/94		S	10										<5	<10	<20	<2	<40	<10	13
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													**<5**	**<10**	**>7.3**	**<2**	**<40**	**<10**	**17.3**
	5/5/94	14:10		12	48000	2.6	8.3	<0.20	0.32	0.65	0.14	93	<5							
	11/9/95	10:45			55000	0.6	8.2	<0.20	<0.20	0.84	<0.20	74	14							
	5/31/95	12:00			48000	3.1	8.1	0.29	0.13	0.56	0.52	39	21							

DANA POINT HARBOR

STATION	DATE	TIME	Sample Type	Depth feet	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L
DAPTLR	10/23/95	14:10			54000		8.1	<0.20	<0.10	0.5	<0.20	71	12							
	12/23/95	11:45	S		48000	4.0	8.2	<0.20	0.16	0.85	<0.20	120	26	<1	<10	<20	<20	<40	<10	15
	12/23/95		S	16	47000									<1	<10	<20	<20	<40	<10	31
	12/25/95	8:10	S		47000	0.9	8.2	<0.20	<0.10	<0.50	<0.20	120	33	<1	<10	<20	<20	<40	<10	33
	12/25/95		S	16	46000									<1	<10	<20	<20	<40	<10	27
	12/27/95	11:35	S		48000	1.9	8.2	<0.20	<0.10	<0.50	<0.20	88	22	<1	<10	<20	<20	<40	<10	16
	12/27/95		S	12.6	47000									<1	<10	<20	<20	<40	<10	13
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													**<1**	**<10**	**<20**	**<20**	**<40**	**<10**	**23.7**
	2/21/96	11:30	S		35000	3.2	8.1	0.30	<0.10	0.52	0.25	76	27	28	<5	11	<4	21	<1	25
	2/21/96		S	15										<1	<5	9	<2	9	<1	26
	2/23/96	11:40	S		43000	1.3	8.1	0.20	0.15	<0.50	<0.20	72	23	<1	<5	<8	<8	<8	13	24
	2/23/96		S	7										<1	8	10	<8	<8	<5	19
	2/25/96	10:30	S		44000	2.6	2.0	0.30	0.23	<0.50	0.24	73	21	<1	<5	56	<8	8	<5	31
	2/25/96		S	18										<1	<5	78	9	<8	<5	20
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													**<1**	**>2.7**	**32.3**	**>3**	**>3**	**<5**	**21.7**
	10/16/96	13:50			41000	5.6	8.2	<0.2	0.51	<0.5	0.28	83	17							
	1/15/97	17:50	S		26000	8.2	8.0	<0.2	<0.1	<0.5	0.20	110	28	0.2	3	20	1	<5	<0.1	12
	1/15/97		S	12.8										<0.1	3	8	0.7	<5	<0.1	11
	1/17/97	12:50	S		30000	2.0	8.0	<0.4	<0.1	0.55	<0.2	72	22	<0.1	3	<3	<0.1	<5	<0.1	8
	1/17/97		S	13										<0.1	3	<3	0.3	<5	<0.1	9
	1/19/97	11:05	S		32000	3.0	8.1	<0.2	<0.1	<0.5	<0.2	110	26	<0.1	3	<3	<0.1	<5	<0.1	8
	1/19/97		S	14.2										<0.1	3	4	0.3	<5	<0.1	8
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													**<0.1**	**3**	**>4**	**0.43**	**<5**	**<0.1**	**9.3**
	4/30/97	10:40			49000	2.4	8.0	<0.8	<0.1	<0.5	<0.2	86	29							
	10/28/98	9:40	D	8.1	51400	5.1	7.9	<1.3	0.5	<0.05	0.09	170	27	<1	11	63	9	7	<0.5	54
	6/23/99	9:00	D	9.3	47000	3.9	8.1	<0.44	<0.2	<0.05	0.06	63	9	2	15	1117	10	9	<0.5	65
	4/17/00	17:23	ST		47300	2.7	7.7	<0.44	<0.05	0.27	0.245	100	43	<1	<8	38	<2	19	<2	14
	4/17/00	17:23	SF											<1	<8	26	<2	11	<2	17
	4/19/00	9:30	ST	16.8	41600	3.6	8.2	<0.44	<0.05	0.2	0.275	98	55	<1	<8	22	<2	21	<2	<10
	4/19/00	9:30	SF											<1	<8	21	<2	11	<2	<10
	4/21/00	10:39	ST	15.5	43600	2.4	7.7	.44K	0.05K	0.44	0.153	110	76	<1	<8	32	<2	13	<2	18
	4/21/00	10:39	SF											<1	<8	35	<2	20	<2	21
									4-day average [dissolved metals]					**<1**	**<8**	**27.3**	**<2**	**14**	**<2**	**16**

DANA POINT HARBOR

STATION	DATE	TIME	Sample Type	Depth feet	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L
DAPTLB	8/29/91	13:25			51000	3.00	8.00	<0.20	<0.10	<0.10	<0.10	93	59							
	6/24/92	13:30			50000	2.20	8.00	<0.20	<0.10	0.60	<0.10	150	47							
	11/24/92	12:45			51000	2.90	8.20	<0.20	<0.10	0.27	0.30	49	20							
	2/18/93	14:15	S		44000	16.00	8.10	<0.20	0.57	1.30	0.21	120	25	15	16	32	2.3	<3	22	74
	2/18/93		S	9	48000	15.00	8.10	<0.20	0.59	0.74	0.29	140	29	<7	<10	<30	<2	<3	<4	56
	2/20/93	10:45	S		43000	9.10	8.10	0.56	0.11	0.31	0.36	85	26	<7	<10	<30	<2	<3	<4	<20
	2/20/93		S	13	47000	15.00	8.10	0.40	0.10	0.26	0.57	110	29	<7	<10	<30	2.2	<3	<4	<20
	2/22/93	14:00	S		49000	4.20	8.10	0.39	0.13	0.28	<0.10	76	23	<7	<10	<30	<2	<3	<4	<20
	2/22/93		S	9	49000	5.30	8.10	0.37	0.12	0.26	<0.10	88	28	<7	<10	<30	<2	<3	<4	21
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													**<7**	**<10**	**<30**	**>0.7**	**<3**	**<4**	**>25.7**
	6/5/93	14:45	S		48000	5.50	8.00	<0.20	0.13	0.75	0.32	91	25	<20	<30	<20	<2	<40	<10	26
	6/5/93		S	10	49000	7.50	8.00	<0.20	0.11	0.71	0.43	81	21	<20	<30	50	<2	<40	48	43
	6/7/93	15:50	S		50000	3.30	8.10	<0.20	0.10	1.80	0.19	60	18	<20	<30	44	<2	<40	15	23
	6/7/93		S	12	50000	4.30	8.00	<0.20	0.10	0.59	0.22	84	25	<20	<30	39	<2	<40	<10	23
	6/9/93	14:30	S		50000	2.80	8.00	<0.20	0.12	0.38	0.12	87	16	<20	<30	<20	<2	<40	20	34
	6/9/93		S	13	50000	5.20	8.10	<0.20	0.11	0.33	0.12	100	24	<20	<30	<20	<2	<40	19	19
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													**<20**	**<30**	**>30**	**<2**	**<40**	**>22**	**28**
	10/27/93	11:30	S	11	47000	3.80	8.00	<0.20	0.33	0.46	<0.10	100	31							
	4/26/94	12:25	S		51000	3.10	8.00	0.59	0.16	0.45	<0.20	41	10	<5	<10	<20	<2	<40	15	21
	4/26/94		S	11										<5	<10	<20	<2	<40	11	25
	4/28/94	11:45	S		48000	1.80	8.00	0.33	0.17	0.53	0.52	77	32	<5	<10	<20	<2	<40	<10	14
	4/28/94		S	15										<5	<10	<20	<2	<40	<10	16
	4/30/94	10:00	S		52000	1.80	8.00	<0.20	0.18	0.66	0.44	57	25	<5	<10	<20	<2	<40	<10	<10
	4/30/94		S	11										<5	<10	<20	<2	<40	<10	16
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													**<5**	**<10**	**<20**	**<2**	**<40**	**>3.7**	**19**
	5/5/94	14:30		8	48000	1.80	8.20	<0.20	0.25	0.7	0.33	75	13							
	11/9/94	11:00			55000	0.42	8.20	<0.20	0.22	0.54	<0.20	110	21							
	5/31/95	12:15			55000	2.20	8.10	0.21	<0.10	0.32	0.37	42	20							

DANA POINT HARBOR

STATION	DATE	TIME	Sample Type	Depth feet	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L
DAPTLB	10/23/95	14:25			54000	0.60	8.10	<0.20	0.13	0.52	0.20	57	10							
	12/23/95	11:55	S		47000	3.70	8.20	<0.20	0.17	0.52	<0.20	110	27	<1	<10	<20	<20	<40	<10	16
	12/23/95	12:00	S	12.6	47000									<1	<10	<20	<20	<40	<10	55
	12/25/95	8:20	S		48000	1.30	8.20	<0.20	0.13	0.57	<0.20	180	62	<1	<10	<20	<20	<40	<10	23
	12/25/95	8:25	S	12.6	46000									<1	<10	<20	<20	<40	<10	28
	12/27/95	11:45	S		48000	1.00	8.10	<0.20	0.19	0.53	<0.20	89	44	<1	<10	<20	<20	<40	<10	10
	12/27/95	11:50	S	12.2	48000									<1	<10	5	<2	<40	<10	<10
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													**<1**	**<10**	**>1.7**	**<20**	**<40**	**<10**	**>27.7**
	2/21/96	11:40	S		36000	2.10	7.90	0.30	<0.10	<0.50	0.30	49	11	<1	<5	11	<4	14	<1	26
	2/21/96	11:45	S	12										<1	<5	8	<2	14	<1	20
	2/23/96	11:50	S		43000	1.50	8.20	<0.20	0.20	<0.50	0.24	91	34	<1	<5	12	<8	<8	<5	24
	2/23/96	11:55	S	8.4										<1	7	<8	<8	<8	<5	26
	2/25/96	10:40	S		45000	2.10	2.10	0.20	0.22	<0.50	<0.20	84	27	<1	<10	<8	<8	<8	<5	16
	2/25/96	10:45	S	16										<1	8	22	<8	11	<5	41
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													**<1**	**>5**	**>10**	**<8**	**>8.3**	**<5**	**29**
	10/16/96	14:05			40000	1.0	8.2	<0.2	0.34	<0.5	0.65	110	20							
	1/15/97	18:05	S		27000	3.4	8.1	<0.2	<0.1	<0.5	<0.2	90	26	<0.1	3	<3	0.5	<5	<0.1	9
	1/15/97	18:05	S	9.6										<0.1	3	<3	0.8	<5	<0.1	9
	1/17/97	13:05	S		31000	2.0	8.0	<0.4	<0.1	<0.5	<0.2	120	26	<0.1	3	<3	<0.1	<5	<0.1	10
	1/17/97	13:05	S	8.4										<0.1	3	4	0.6	<5	<0.1	10
	1/19/97	11:10	S		32000	1.9	8.1	<0.2	<0.1	<0.5	<0.2	120	32	<0.1	3	<3	<0.1	<5	<0.1	6
	1/19/97	11:10	S	9.6										<0.1	3	<3	0.4	<5	<0.1	7
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													**<0.1**	**3**	**<3**	**0.6**	**<5**	**<0.1**	**8.6**
	4/30/97	10:55			49000	2.2	8.0	<0.8	0.38	<0.5	0.20	78	28							
	10/17/97	10:15	M		48000	2.6	8.1	<0.2	<0.1	0.5	0.24	99	30	<1	<5	5.2	<2	21	<1	46
	10/28/98	9:00	D	9.3	52200	3	8	<1.3	0.42	<0.05	0.153	150	22	<1	15	77	13	8	<1	84
	6/23/99	8:45	D	12.4	47600	5.2	8	<0.44	<0.2	0.056	<0.061	84	10	<1	17	81	14	8	<1	84
	10/28/99	11:48	DT	13.3	51000	1.5	8	<0.44	<0.05	0.29	<0.061	110	55							
	4/17/00	17:30	ST		42500	2.2	7.8	<0.44	<0.05	0.41	0.245	94	25	<1	<8	33	<2	14	<2	17
	4/17/00	17:30	SF											<1	<8	30	<2	16	<2	20
	4/19/00	9:15	ST	6.3	43400	3.6	8.2	<0.44	<0.05	0.23	0.245	96	41	<1	<8	24	<2	13	<2	10
	4/19/00	9:15	SF											<1	<8	22	<2	11	<2	<10
	4/21/00	10:51	SF	12.4	43600	2.4	7.7	<0.44	<0.05	0.44	0.153	110	76	<1	10	40	<2	20	<2	18
	4/21/00	10:30	ST											<1	10	35	<2	19	<2	15
									4-day average [dissolved metals]					**<1**	**>3**	**29**	**<2**	**15.3**	**<2**	**<15**
	6/7/00	12:00	DT	9.3	49600	7.1	8.1	<0.44	<0.05	0.65	0.092	110	14							

DANA POINT HARBOR

STATION	DATE	TIME		Depth feet	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L
DAPTHE	2/18/93	13:45	S		48000	32.0	8.1	<0.20	0.54	0.67	0.43	190	70	<7	<10	<30	<2	<3	<4	27
	2/20/93	10:15	S		48000	11.0	8.1	0.46	0.14	0.27	0.25	80	25	<7	<10	<30	<2	<3	<4	<20
	2/22/93	13:15	S		48000	5.1	8.1	0.40	0.20	1.30	<0.10	87	34	<7	<10	<30	<2	<3	<4	<30
	6/5/93	13:45	S		49000	4.2	8.1	<0.20	0.12	0.73	0.24	120	33	<20	<30	52	<2	<40	10	17
	6/7/93	15:15	S		50000	3.6	8.1	<0.20	<0.10	0.47	0.26	120	33	<20	<30	33	<2	<40	22	12
	6/9/93	14:00	S		50000	2.2	8.1	<0.20	0.11	0.44	<0.10	94	20	<20	<30	52	<2	<40	20	18
	4/26/94	11:30	S		40000	1.8	8.0	0.67	0.17	0.63	<0.20	40	<5	<5	<10	<20	<2	<40	11	23
	4/28/94	10:20	S		52000	1.6	8.1	<0.20	0.16	0.86	0.64	70	28	<5	<10	<20	<2	<40	<10	<10
	4/30/94	9:20	S		52000	4.7	8.2	<0.20	0.21	0.87	0.66	66	32	<5	<10	<20	<2	<40	<10	<10
	5/5/94	13:50			49000	2.4	8.2	<0.20	0.32	0.67	0.11	81	9							
	11/9/95	11:15			54000	0.6	8.2	<0.20	<0.20	0.41	<0.20	86	8							
	5/31/95	11:30			48000	3.1	8.2	1.70	<0.10	0.38	<0.20	81	32							
	10/23/95	13:55			54000	0.9	8.1	<0.20	<0.10	<0.50	<0.20	61	10							
	12/23/95	11:35	S		48000	3.4	8.2	<0.20	<0.10	0.76	<0.20	130	43	<1	<10	<20	<2	<40	<10	21
	12/25/95	0:00	S		48000	0.9	8.3	<0.20	0.22	0.51	<0.20	130	41	<1	<10	<20	<20	<40	<10	<10
	12/27/95	11:25	S		48000	1.1	8.1	<0.20	<0.10	0.52	<0.20	100	27	<1	<10	<20	<20	<40	<10	<10
	2/21/96	11:10	S		37000	5.8	8.2	<0.20	<0.10	0.52	0.39	89	29	<1	<5	9	<4	11	<1	17
	2/23/96	11:20	S		42000	1.1	8.2	0.20	0.16	<0.50	<0.20	69	20	4	<5	<8	<8	<8	<5	22
	2/25/96	10:15	S		47000	1.5	2.1	<0.20	0.17	0.54	0.21	94	26	<1	<5	<8	<8	8	<5	17
	10/16/96	13:05			43000	0.9	8.2	<0.2	0.41	0.71	0.20	100	20							
	1/15/97	14:50	S		27000	9.1	8.1	0.3	<0.1	<0.5	0.25	77	26	<0.1	3	<3	<0.1	<5	<0.1	<2
	1/17/97	12:35	S		31000	3.4	8.0	<0.4	<0.1	<0.5	0.22	120	34	<0.1	3	<3	<0.1	<5	<0.1	13
	1/19/97	10:50	S		31000	3.1	8.1	<0.2	<0.1	0.62	<0.2	110	20	<0.1	3	<3	<0.1	<5	<0.1	<2
	4/30/97	9:20			48000	1.4	8.1	<0.8	0.22	<0.5	<0.2	82	30							
	10/17/97	9:30	M		49000	0.8	8.2	<0.2	<0.1	0.5	0.22	130	34	<1	<5	<4	<2	11	<1	65
	4/17/00	17:15	ST		43600	2.3	8.1	<0.44	0.064	0.52	0.275	120	60	<1	<8	33	<2	13	<2	11
	4/17/00	17:15	SF											<1	<8	21	<2	11	<2	12
	4/19/00	10:00	ST	21.1	43300	1.2	8.2	<0.44	<0.05	0.35	0.275	42	30	<1	<8	22	<2	14	<2	<10
	4/19/00	10:00	SF											<1	<8	20	<2	12	<2	<10
	4/21/00	11:08	SF		44700	1.6	8.0	<0.44	<0.05	0.2	0.153	96	22	<1	9.1	30	<2	20	<2	11
	4/21/00	10:51	ST											<1	9.7	31	<2	19	<2	<10
									4-day average [dissolved metals]					<1	>3	24	<2	14	<2	>10.7

Appendix 5.4
Sediment Quality Data

Semiannual Sediment Sampling

STATION	DATE	TIME	Cd mg/kg	Cr mg/kg	Cu mg/kg	Pb mg/kg	Ni mg/kg	Ag mg/kg	Zn mg/kg	Fe mg/kg	Clay %	Silt+Clay %	Tot PO_4 as P mg/Kg	DDD µg/kg	DDE µg/kg	DDT µg/kg	gamma BHC µg/kg	2,4-D µg/kg	2,4,5-TP Silvex µg/kg	Benzo(b) µg/kg	Benzo(k) µg/kg	Chrysene µg/kg	Flranth µg/kg	Pyrene µg/kg	Mthxy µg/kg	Dznon µg/kg	Endo I µg/kg	Aroclor 1254 µg/kg	Aroclor 1260 µg/kg
NEWPORT BAY WATERSHED																													
BCF04	7/23/91	10:15	1.1	37	20	<10.0	32.0	<0.2	47.0					5.0	<5	<5	<5	<500	<200	-	<500	-	-	<500	-	-	-		
	4/22/92	9:00	0.4	5	2.9	<4.0	4.9	<0.2	7.3					1.0	<1	<1	-	-	-	-	<200	-	-	<400	-	-	-		
	10/28/92	9:10	<0.6	13	7.9	<6	12	<0.3	26					2.0	<2	<2	<2	-	-	-	<400	-	-	<700	-	-	-		
	5/26/93	7:30	<0.5	19	13	7	22	<0.2	30					1.0	1.8	<1	<1	<1400	<140	-	<300	-	-	<300	-	-	-		
	4/20/94	8:30	<0.8	48	28	<8	41	<2	66					1.1	1.6	2.4	<0.6	<300	<200	-	<300	-	-	<300	-	-	-		
	11/30/94	8:00	<1.2	26	19	<0.9	35	<2	79					1.2	4.0	1.2	<0.7	<40	<20	<400	<400	<400	<400	<400	<2	<50	<1.2		
	5/17/95	9:45	<1.0	18	9.2	<10	19	<2	29					<18	<8	<18	<8.0	-	-	-	-	-	-	-	-	-	-		
	10/24/95	9:15	<0.6	14	11	7.1	19	<1	38					4.3	3.4	<0.8	<0.5	<30	<10	<300	<300	<300	<300	<300	1.0	<40	<0.8		
	4/23/96	9:30	<2.0	27	16	9.8	21	<2	48					3.6	8.4	5.0	<0.7	<71	<36	<360	<360	<360	<360	<360	<2	<54	<1.7		
	11/5/96	9:40	<1.0	21	12	<7	16	<1	46					<1.5	3.2	2.2	<0.6	<29	<15	<290	<290	<290	<290	<290	<1	<44	<1.5	<44	<44
	4/15/97	8:50	<0.7	20	11	<7	16	<1	37					<0.9	2.1	1.5	<0.5	<27	<13	<270	<270	<270	<270	<270	<1	<40	<0.9	<40	<40
	10/29/97	9:05	<2.0	36	30	13	36	<2	81	23,000	33.2	79.1		<2	3.0	<2	<0.9	<40	<20	-	-	-	-	-	<2	<60	<2	<60	<60
	6/23/98	12:30	<1	23.3	15.5	4.8	18.6	<0.5	47.1	12,710	6.4	15.1		<4	<3	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	6/18/99	10:30	0.46	19.1	<0.22	2.2	11.9	<0.5	29.9	13,760	25.3	71.0	346	<4	<3	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	5/9/00	9:00	2.16	40.3	14.7	4.5	22.6	<0.5	19.6	28,300	28.4	88.2		<4	<3	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
SDMF05	7/23/91	9:30	<0.4	2.3	1.6	<10.0	2.0	<0.2	7.3					<5	<5	<5	<5	<500	<200	-	<500	-	-	<500	-	-	-		
	4/22/92	8:30	<0.4	6.6	3.8	<4.0	4.0	<0.2	16.0					3	6	3	-	-	-	-	<200	-	-	<400	-	-	-		
	10/28/92	9:25	1.3	13.0	19.0	12	7.7	<0.4	60					<30	25	<30	<30	-	-	-	<700	-	-	<1400	-	-	-		
	5/26/93	8:00	<0.6	2.5	1.9	<6	1.8	0.5	10					<1	3.8	3	<1	<1300	<130	-	<300	-	-	<300	-	-	-		
	10/27/93	9:20	1	2.6	<2.6	<6.4	<5.1	<1.3	11					<1	2	<1	<1	<30	<10	-	<300	-	-	<300	-	-	-		
	4/20/94	8:00	<0.7	<5	<8	<7	<5	<1	11					<3	3.2	<3	<10	<300	<100	-	<300	-	-	<300	-	-	-		
	11/30/94	8:40	<0.7	5.2	7.8	<7	<6	<1	27					3.5	6.8	5.2	<0.5	<30	<10	<300	<300	<300	<300	<300	<1	<40	<1		
	5/17/95	9:30	<0.7	1.8	<3	<7	<5	<1	6.2					<5	<3	<5	<3	-	-	-	-	-	-	-	-	-	-		
	10/24/95	10:50	<0.6	2.3	<3	<6	<5	<1	23.0					<0.8	<2	<0.8	<0.5	<30	<10	<300	<300	<300	<300	<300	<1	<40	<0.8		
	4/23/96	9:45	<1.0	4.4	4.7	<6	<5	<1	18.0					<0.9	3.4	1.6	<0.5	<52	<26	<260	<260	<260	<260	<260	<1	<39	<0.9		
	11/5/96	10:00	<1.0	4.7	4.4	<6	<5	<1	27.0					<0.9	2.9	1.3	<0.5	<26	<13	<260	<260	<260	<260	<260	<1	<38	<0.9	<38	<38
	4/15/97	9:30	<0.6	2.4	<3	<6	<5	<1	13.0					<0.9	1.9	<0.9	<0.5	<25	<13	<250	<250	<250	<250	<250	<1	<38	<0.9	<38	<38
	10/29/97	9:20	<2.0	10	18	11	9.1	<2.0	67.0	13,000	12.3	30.2		4.7	13	2.1	<0.7	<40	<20	-	-	-	-	-	<2	<50	<1	<50	<50
	6/23/98	12:10	<0.2	2.3	4.7	3.7	3.5	<0.5	16.4	4,570	1.2	3.0		<4	<3	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	10/27/98	10:40	<0.2	3.3	1.3	2.3	2.6	<0.5	13.5	3,310	1.3	3.7		<4	7.0	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	6/17/99	14:30	0.33	2.4	<0.22	1.5	0.9	<0.5	16.9	2,540	0.5	1.3	157	<4	<3	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	10/14/99	11:15	0.23	1.7	0.75	1.6	<0.7	<0.5	7.5	1,980	0.9	1.3		<4	<3	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	5/9/00	10:00	1.68	12.8	13.80	2.0	7.7	0.2	62.1	10,600	2.7	23.0		<4	<7	<11	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25

All organic compounds unless otherwise noted were below the detection limits of the laboratory.

Benzo (b) - Benzo(b) flouranthene Flranth - Flouranthene Dznon - Diazinon

Benzo(k) - Benzo(k)flouranthene Mthxy - Methoxychlor Endo I - Endosulfan I

ND - Not Detected (below detection limit of laboratory).

Semiannual Sediment Sampling

006826

STATION	DATE	TIME	Cd mg/kg	Cr mg/kg	Cu mg/kg	Pb mg/kg	Ni mg/kg	Ag mg/kg	Zn mg/kg	Fe mg/kg	Clay %	Silt+Clay %	Tot PO_4 as P mg/Kg	DDD µg/kg	DDE µg/kg	DDT µg/kg	gamma BHC µg/kg	2,4-D µg/kg	2,4,5-TP Silvex µg/kg	Benzo(b) µg/kg	Benzo(k) µg/kg	Chrysene µg/kg	Flranth µg/kg	Pyrene µg/kg	Mthxy µg/kg	Dznon µg/kg	Endo I µg/kg	Aroclor 1254 µg/kg	Aroclor 1260 µg/kg
LANF08	7/23/91	12:10	0.9	21	11	23	13	<0.2	50.0					<5	<5	<5	<5	<500	<200	-	<500	-	-	<500	-	-	-		
	4/22/92	10:45	<0.4	10	11	<4.0	8.4	<0.2	42.0					<1	<1	<1	-	-	-	-	<200	-	-	<400	-	-	-		
	10/28/92	11:10	0.6	3.9	6.6	6	2.6	<0.3	29					<2	<2	<2	<2	-	-	-	<400	-	-	<800	-	-	-		
	5/26/93	9:30	<0.5	4.7	7.8	12	2.5	<0.3	30					<1	2	<1	<1	<1400	<140	-	<400	-	-	<400	-	-	-		
	10/27/93	11:15	4.8	18	48	31	8.7	2.1	190					<30	<30	<30	<30	<30	<20	-	<300	-	-	<300	-	-	-		
	4/20/94	10:10	<0.7	12	7.7	330	17	<1	40					<3	<1	<3	<1	<100	<60	-	<300	-	-	<300	-	-	-		
	11/30/94	9:50	<1.1	15	10	7.1	6.2	<1	54					<0.9	2	<0.9	<0.5	<30	<10	<300	<300	<300	<300	<300	<1	<40	<0.9		
	5/17/95	11:45	<0.6	3.5	<3	7	<5	<1	25					<8	7	<8	<0.5	-	-	-	-	-	-	-	-	-	-		
	10/24/95	11:15	<0.6	1.6	4	83	<5	<1	28					<0.8	<0.8	<0.8	<0.4	<20	<10	<200	<200	<200	<200	<200	<1	<40	<0.8		
	4/23/96	11:00	<2.0	32	25	63	21	<2	110					320	160	<35	<19.0	<35	<18	<350	<350	<350	<350	<350	<35	<53	<35		
	11/5/96		<1.0	9	10	11	7	<1	59					<0.9	2	<0.9	<0.5	<25	<12	<250	<250	<250	<250	<250	<1	<37	<0.9	<37	<37
	4/15/97	10:45	<0.6	5	6	6	5	<1	26					1.3	2.0	1.3	<0.5	<24	<12	<240	<240	<240	<240	<240	<1	<35	<0.8	<35	<35
	10/29/97	10:05	1.4	6.2	16	<5.0	1	<1	49	6,000	0.0	0.3		<0.9	<0.9	<0.9	<0.5	<50	<30	<3000	<3000	<3000	#####	<3000	<1	<40	<0.9	<40	<40
	6/22/98	13:00	<1.0	15.7	24.2	8.8	15.6	<0.5	61	23,640	37.9	78.2		<4	<3	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	10/27/98	11:45	0.9	8.9	8.1	14.7	4.6	<0.5	35	5,530	1.1	3.4		<4	<3	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	6/17/99	15:00	0.6	7.5	5.7	20.5	3.7	<0.5	35	10,040	0.5	1.1	181	<4	<3	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
BC2F09	7/23/91	12:45	0.9	15	13	74	45	<0.2	69					<10	<10	<10	<10	<500	<200	-	<500	-	-	<500	-	-	-		
	4/23/96	11:30	<2	25	24	27	19	<2	120					<1.6	<1.6	<1.6	<0.7	<170	<85	<340	<340	<340	<340	<340	<2	<51	<1.6		
	4/22/92	10:15	<0.4	6.2	6.3	23.0	5.8	<0.2	26.0					<1	<1	<1	-	-	-	-	<200	-	-	<400	-	-	-		
	10/28/92	10:50	2	16	27	22	17.0	<0.4	120					<5	<5	<5	<5	-	-	-	<600	-	-	<1300	-	-	-		
	5/26/93	9:00	<0.6	18	14	17	9.4	<0.3	100					<8	<8	<8	<8	<1500	<150	-	<400	-	-	<400	-	-	-		
	10/27/93	10:50	4.8	23	29	<18	16	<3.7	170					<8	22	<8	<8	<30	<20	-	<300	-	-	<300	-	-	-		
	4/20/94	9:45	1	14	17	<9	14	<2	90					<4	7.8	<4	<14	<200	<90	-	<400	-	-	<400	-	-	-		
	5/17/95	10:45	2	21	21	16	18	<2	130					<19	26.0	<19	<9	-	-	-	-	-	-	-	-	-	-		
	10/24/95	11:50	<0.9	10	38	12	11	<2	180					<1.7	<1.7	<1.7	<0.7	<40	<20	<400	<400	<400	<400	<400	<2	<50	<1.7		
	11/5/96	12:30	<2.0	15	20	13	12	<2	110					<1.5	2.1	<1.5	<0.6	<30	<15	<300	<300	<300	<300	<300	<2	<30	<1.5	<45	<45
	10/29/97	10:20	<2.0	20	47	16	21	<2	200	21,000	17.1	33.3		<2	<2	<2	<0.9	<40	<20	-	-	-	-	-	<2	<70	<2	<70	<70
	6/24/98	9:00	<0.3	23.6	7.1	7.1	22.3	<0.5	43.1	5,410	7.1	25.7		<4	<3	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	10/20/98	12:00	0.5	8.4	12.8	5.6	6.9	-	65.4	6,570				<4	<3	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
SCCF15	7/23/91	11:10	<0.4	2.0	0.9	<10.0	2.7	<0.2	2.9					<1	<1	<1	<1	<500	<200	-	<500	-	-	<500	-	-	-		
	4/22/92	10:00	<0.4	2.6	1.6	<4.0	1.9	<0.2	8.9					<1	<1	<1	-	-	-	-	<200	-	-	<400	-	-	-		
	10/28/92	10:20	<0.6	5.6	4.6	7	3.9	<0.3	25					<2	<2	<2	<2	-	-	-	<1300	-	-	<2500	-	-	-		
	5/26/93	8:40	<0.6	18	8.6	9	12.0	<0.3	31					<2	<2	<2	<2	<1800	<180	-	<300	-	-	<300	-	-	-		
	10/27/93	10:00	7	35	30	<25	21	<5	200					<50	<50	<50	<50	<100	<50	-	<1000	-	-	<1000	-	-	-		
	4/20/94	9:00	<0.6	3.5	6.9	8.7	<5	<1	22					<2	<0.9	<2	<0.9	<100	<60	-	<200	-	-	<200	-	-	-		
	11/30/94	9:20	<0.7	4.9	<3	<7	<6	<1	18					<6	<3	<6	<3	<30	<10	<300	<300	<300	<300	<300	<7	<40	<6		
	5/17/95	8:30	1	19	7.9	<7	14.0	<1	32					<15	<5	<15	<0.5	-	-	-	-	-	-	-	-	-	-		
	10/24/95	11:30	<0.7	7.8	8.4	11	8.4	<1	<45					<0.9	1.4	<0.9	<0.5	<30	<10	<300	<300	<300	<300	<300	<1	<40	<0.9		
	4/23/96	10:30	<1.0	15	7.5	10	11	<1	31					<0.9	1.2	<0.9	<0.5	<53	<27	<270	<270	<270	<270	<270	<1	<40	<0.9		
	11/5/96	10:45	<1.0	10	5.1	<6	8	<1	23					<0.9	<0.9	<0.9	<0.5	<25	<12	<250	<250	<250	<250	<250	<1	<37	<0.9	<37	<37
	4/15/97	10:00	<0.7	22	14.0	8.1	18.0	<1	46					<1.0	1.2	<1.0	<0.6	<28	<14	<280	<280	<280	<280	<280	<1	<42	<1.0	<42	<42
	10/29/97	9:45	<2	6.5	7.3	10	6.0	<2	32	5,400	0.0	0.0		<6	<6	<6	<3	<30	<20	-	-	-	-	-	<8	<50	<6	<300	<300
	6/24/98	8:45	ND	2.3	0.6	2.3	2.1	<0.5	7	2,250	0.9	1.8		<4	<3	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	10/20/98	11:45	0.3	5.4	2.8	6.5	3.2	<0.5	19.4	3,820	2.2	5.0		<4	<3	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	6/18/99	11:00	0.4	6.5	10.0	6.3	4.8	<0.5	65.8	4,470	17.0	35.9	388	<4	<3	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
BEEF1	6/24/98	9:20	ND	1.1	0.5	1.3	1.1	<0.5	10.1	2,030	0.0	0.2		<4	<3	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	10/20/98	12:30	0.6	6.7	7.9	4.2	4.3	-	47.8	6,040	4.1	12.4		<4	<3	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25

Semiannual Sediment Sampling

STATION	DATE	TIME	Cd mg/kg	Cr mg/kg	Cu mg/kg	Pb mg/kg	Ni mg/kg	Ag mg/kg	Zn mg/kg	Fe mg/kg	Clay %	Silt+Clay %	Tot PO_4 as P mg/Kg	DDD µg/kg	DDE µg/kg	DDT µg/kg	gamma BHC µg/kg	2,4-D µg/kg	2,4,5-TP Silvex µg/kg	Benzo(b) µg/kg	Benzo(k) µg/kg	Chrysene µg/kg	Firanth µg/kg	Pyrene µg/kg	Mthxy µg/kg	Dznon µg/kg	Endo I µg/kg	Aroclor 1254 µg/kg	Aroclor 1260 µg/kg
ACWF18	7/23/91	14:25	<0.4	1.1	2.8	<10.0	2.3	<0.2	27.0					<5	<5	<5	<5	<500	<200	-	<500	-	-	<500	-	-	-		
	4/22/92	12:30	<0.4	1.4	1.1	<4.0	1.5	<0.2	5.3					<1	<1	<1	-	-	-	-	<400	-	-	<200	-	-	-		
	10/28/92	12:50	<0.5	2.0	1.1	<5	1.6	<0.2	7					<1	<1	<1	<1	-	-	-	<400	-	-	<800	-	-	-		
	4/22/92	12:40	<0.4	6.5	5.2	<4.0	4.8	<0.2	33.0					20	100	20	-	-	-	-	<400	-	-	<200	-	-	-		
	10/28/92	13:00	3.7	21	35	21	14.0	0.5	180					<32	89	12	<1	-	-	-	<600	-	-	<1100	-	-	-		
	10/27/93	13:00	5.4	16	33	12	10	<1.4	72					<10	120	<10	<10	<30	<10	-	<300	-	-	<300	-	-	-		
	4/20/94	11:15	1.6	11	10	7.9	10.0	<1	63					<40	250	180	<14	<400	<200	-	<400	-	-	<400	-	-	-		
	5/17/95	13:15	3.7	22	16	17.0	17.0	<2	95					30	210	62	<18	-	-	-	-	-	-	-	-	-	-		
	10/24/95	14:10	<0.7	5.6	6.9	6.7	6.7	<1	32					5	31	8	<2	<30	<10	<300	<300	<300	<300	<300	<3	<40	<3		
	4/23/96	13:15	<1.0	4.2	12	6.5	<5	<1	22					3.1	18	6.2	<2	<51	<26	<260	<260	<260	<260	<260	<3	<38	<3		
	11/5/96	13:45	<1.0	14.0	16	7.1	11	<1	48					<5	53	16.0	<3	<27	<14	<270	<270	<270	<270	<270	<7	<41	<5	<270	<270
	4/15/97		<0.6	8.4	9	<6	6.2	<1	30					<2	28	7.5	<1	<25	<12	<250	<250	<250	<250	<250	<2	<37	<25	<74	<74
	10/29/97	12:35	<1.0	7.1	12	9	<6	<1	44	8,800	4.1	12.1		<1	9	<1	<0.6	<30	<10	-	-	-	-	-	<1	<40	<1	<40	<40
	6/24/98	10:00	<3.7	4.3	5.3	3.4	4.2	<0.5	27	4,490	5.2	15.4		<4	<1	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	6/18/99	12:00	0.3	19.0	33.5	10.3	6.8	<0.5	139		17.1	43.8	457	<4	<3	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	5/9/00	12:00	-	-	-	-	-	-	-	-	0.0	0.0		<4	<3	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
SERF19	7/23/91	15:00	<0.4	<0.8	<0.4	<10.0	2.4	<0.2	2.9					<5	<5	<5	<5	<500	<200	-	<500	-	-	<500	-	-	-		
	4/22/92	12:50	<0.4	2.9	1.3	<4.0	1.4	<0.2	11.0					<1	<1	<1	-	-	-	-	<400	-	-	<200	-	-	-		
	10/28/92	13:20	<0.6	2.8	4.1	<6	1.3	<0.3	19					<1	<1	<1	<1	-	-	-	<600	-	-	<1100	-	-	-		
	5/26/93	11:00	<0.5	<1	0.8	<5	<1	<0.3	4					<1	<1	<1	<1	<1300	<130	-	<300	-	-	<300	-	-	-		
	10/27/93	13:30	1	1.3	<2.4	<6	<4.8	<1.3	15					<3	<3	<3	<3	<30	<10	-	<300	-	-	<300	-	-	-		
	4/20/94	11:30	1.7	<1	<3	<6	<5	<1	10.0					<3	<1	<3	<1	<100	<60	-	<300	-	-	<300	-	-	-		
	11/30/94	11:25	<0.7	3.9	10.0	<7	<6	<1	67					<6	<3	<6	<3	<30	<10	<300	<300	<300	<300	<300	<7	49	<6		
	5/17/95	13:30	<0.6	<1	<2	<6	<5	<1	<1					<0.8	<0.4	<0.8	<0.4	-	-	-	-	-	-	-	-	-	-		
	10/24/95	14:15	<0.6	<1	<3	<6	<5	<1	9.5					<0.9	<0.9	<0.9	<0.5	<30	<10	<300	<300	<300	<300	<300	<1	<40	<0.9		
	4/23/96	13:25	<1.0	2.0	<3	<6	<5	<1	6.8					<0.9	<0.9	<0.9	<0.5	<51	<25	<250	<250	<250	<250	<250	<1	<38	<0.9		
	11/5/96	14:00	<1.0	2.8	<2	<6	<5	<1	8.5					<0.9	<0.9	<0.9	<0.5	<25	<12	<250	<250	<250	<250	<250	<1	<37	<0.9	<37.0	<37.0
	4/15/97	12:40	<0.6	<1	<2	<6	<5	<1	7.8					<0.8	<0.8	<0.8	<0.5	<23	<12	<230	<230	<230	<230	<230	<1	<35	<23.0	<35.0	<35.0
	10/29/97	12:50	<1	<1	<3	<6	<5	<1	7.1	900	10.6	19.7		<0.9	<0.9	<0.9	<0.5	<30	<10	-	-	-	-	-	<1	<40	<0.9	<40	<40
	6/24/98	10:15	<1	-	-	<1	<1	<0.5	5.7	940	0.0	0.1		<4	<3	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	10/20/98	13:00	0.4	1.7	3.6	0.9	1.1	<0.5	8.1		0.0	0.5		<4	<3	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	6/18/99	12:30	<0.2	0.8	<0.2	0.8	<0.7	<0.5	6.0	914	0.0	0.2	159	<4	<3	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
RCWF26	7/23/91	15:50	<0.4	1.1	1.1	<10.0	<0.8	<0.2	3.4					<5	<5	<5	<5	<200	<500	-	<500	-	-	<500	-	-	-		
	4/22/92	14:00	<0.4	1.0	1.3	<4.0	1.1	<0.2	5.2					<1	<1	<1	<1	<20	<10	-	<400	-	-	<200	-	-	-		
	10/28/92	14:00	<0.4	1.3	1.3	<4	1.0	<0.2	5.8					<1	<1	<1	<1	<200	<100	-	<200	-	-	<500	-	-	-		
	5/26/93	12:00	<0.5	1.6	1.8	<5	<1.1	<0.3	6.5					<1	<1	<1	<1	<1300	<130	-	<300	-	-	<300	-	-	-		
	10/27/93	14:30	1	2.1	<2.4	<5.9	<4.7	<1.2	8.4					<1	<1	<1	<1	<30	<10	-	<300	-	-	<300	-	-	-		
	4/20/94	12:15	<0.7	<1	<3	<7	<5	<1	7.6					<3	2.4	<3	<1	<100	<60	-	<300	-	-	<300	-	-	-		
	11/30/94	12:00	<0.7	<3.1	<3	<7	<6	<1	8.2					<1	<0.5	<1	<0.5	<30	<10	<300	<300	<300	<300	<300	<1	40	<1.0		
	5/17/95	14:20	<0.6	<1	<3	<6	<5	<1	6.8					<5	<3	<5	<3	-	-	-	-	-	-	-	-	-	-		
	10/24/95	15:15	<0.6	<1	<3	<6	<5	<1	7.0					<0.8	2	<0.8	<0.5	<30	<10	<300	<300	<300	<300	<300	<1	<40	<0.8		
	4/23/96	14:15	<1	2.9	<3	<6	23	<5	<1					<0.9	1.3	<0.9	<0.5	<130	<65	<260	<260	<260	<260	<260	<1	<39	<0.9		
	11/5/96		<1	3.5	3.1	6.5	<5	<1	20					<2.0	15.0	3.2	<1.0	<25	<12	<250	<250	<250	<250	<250	<2	<37	<2.0	<74	<74
	4/15/97		<0.6	1.8	<2	<6	<5	<1	11					<0.8	2.5	<0.8	<0.5	<24	<12	<240	<240	<240	<240	<240	<1	<35	<0.8	<35	<35
	10/29/97	11:55	2.4	17.0	15.0	<8	15.0	<1	75.0	30,000	10.3	29.1		<1	1.5	<1	<0.6	<30	<20	-	-	-	-	-	<2	<50	<1	<50	<50
	6/24/98	10:40	0.3	4.5	2.3	10	4.1	<0.5	20.7	4,650	2.2	4.8		<4	<1	<1	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	10/20/98	13:30	0.8	1.9	2.9	1.2	<0.2	<0.5	11.9	1,980	2	3.6		<4	<3	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4		

Semiannual Sediment Sampling

006828

STATION	DATE	TIME	Cd mg/kg	Cr mg/kg	Cu mg/kg	Pb mg/kg	Ni mg/kg	Ag mg/kg	Zn mg/kg	Fe mg/kg	Clay %	Silt+Clay %	Tot PO_4 as P mg/Kg	DDD µg/kg	DDE µg/kg	DDT µg/kg	gamma BHC µg/kg	2,4-D µg/kg	2,4,5-TP Silvex µg/kg	Benzo(b) µg/kg	Benzo(k) µg/kg	Chrysene µg/kg	Flrnthr µg/kg	Pyrene µg/kg	Mthxy µg/kg	Dznon µg/kg	Endo I µg/kg	Aroclor 1254 µg/kg	Aroclor 1260 µg/kg
HCWF27	7/23/91	16:00	0.7	4.5	4.9	<10	2.1	<0.2	20.0					<5	<5	<5	<5	<200	<500	-	<500	-	-	<500	-	-	-		
	4/22/92	13:50	<0.4	1.6	1.6	<4	1.1	<0.2	8.5					1	10	1	<1	<20	<10	-	<400	-	-	<200	-	-	-		
	10/28/92	14:10	0.6	2.7	2.6	<5	1.7	<0.3	17					<2	4	<2	<2	<400	<200	-	<400	-	-	<800	-	-	-		
	5/26/93	11:45	<0.5	2.5	3.4	<5	2.2	<0.3	17					<10	61	33	<10	<1300	<130	-	<300	-	-	<300	-	-	-		
	10/27/93	14:10	7.4	18	53	17	13	<2.9	160					10	<8	29	<8	<30	<20	-	<300	-	-	<300	-	-	-		
	4/20/94	12:10	<0.7	2.7	4.3	<7	<6	<1	19					2.5	12	2.8	<1	<300	<100	-	<300	-	-	<300	-	-	-		
	11/30/94	11:45	<0.7	1.8	3.4	<7	<5	<1	15					1.9	7.5	<0.9	<0.5	<30	<10	<300	<300	<300	<300	<300	<1	<40	<0.9		
	5/17/95	14:00	1.8	8.8	14	<6	11	<1	41					<5	3.2	6.5	<3	-	-	-	-	-	-	-	-	-	-		
	10/24/95	15:10	<0.7	4.7	12	<7	6	<1	51					<5	95	22	<3	<30	<10	<300	<300	<300	<300	<300	<7	<40	<5		
	4/23/96	14:00	<2	14	14	13	13	<2	59					<16	29	<16	<7	<68	<34	<340	<340	<340	<340	<340	<17	<51	<16		
	11/5/96		<1	4	5	<6	<5	<1	26					3.6	<3	5	<2	<26	<13	<260	<260	<260	<260	<260	<3	<38	<3	<77	<77
	4/15/97	13:15	<0.7	6	10	<7	<6	<1	44					<6	64	13	<3	<28	<14	<280	<280	<280	<280	<280	<7	<42	<28	<280	<280
	10/29/97	12:05	<1	4.1	7.9	<7	<6	<1	34	7,000	2.0	4.0		5	12	<1	<0.6	<30	<10	-	-	-	-	-	<1	<40	<1	<40	<40
	6/24/98	11:00	<0.2	3.0	4.4	2.3	2.1	<0.5	20	3,010	1.7	3.9		<4	<3	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	6/18/99	13:05	0.9	9.1	10.1	5.0	5.2	<0.5	54	10,030	8.3	30.6	571	<4	<39	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	5/9/00	11:30	-	-	-	-	-	-	-	-	19.7	69.3		21	93	66	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
BARSED	7/23/91	13:15	<0.4	<0.8	1.1	<10.0	<0.8	<0.2	6.9					<5	<5	<5	<5	<200	<500	-	<500	-	-	<500	-	-	-		
	4/22/92	11:05	<0.4	1.1	1.2	<4.0	1.3	<0.2	8.3					1	8	5	-	-	-	-	<400	-	-	<200	-	-	-		
	10/28/92	12:10	<0.5	2.0	2.3	<5	1.9	<0.3	10					3	8.8	4	<2	-	-	-	<400	-	-	<800	-	-	-		
	5/26/93	10:00	<0.5	1.6	1.6	<5	1.1	<0.2	6.9					1	7	2.5	<1	<1300	<130	-	<300	-	-	<300	-	-	-		
	10/27/93	11:45	1	1.9	<2.5	<6.2	<4.9	<1.2	8.5					<3	4.6	<3	<3	<30	<10	-	<300	-	-	<300	-	-	-		
	4/20/94	10:30	<0.7	2.5	6.7	<7	<5	<1	18					3	9.8	4	<1	<300	<100	-	<300	-	-	<300	-	-	-		
	11/30/94	10:20	1	2.3	3	7.7	<6	<1	10					<0.9	3	2.3	<0.5	<30	<10	<300	<300	<300	<300	<300	<1	<40	<0.9		
	5/17/95	12:15	<0.6	<1	<2	<6	<5	<1	3.9					<5	4	<5	<2	-	-	-	-	-	-	-	-	-	-		
	10/24/95	13:15	<0.6	<1	<3	<6	<5	<1	13					1	3.5	1.6	<0.5	<30	<10	<300	<300	<300	<300	<300	<1	<40	<0.8		
	4/23/96	12:15	<1	2.7	2.7	<6	<5	<1	12					2.6	7.6	3.6	<1.5	<130	<64	<260	<260	<260	<260	<260	<3	<38	<3		
	11/5/96		<1	1.9	<3	<6	<5	<1	12					1.9	5.6	2.9	<0.5	<25	<13	<250	<250	<250	<250	<260	<1	<38	<0.9	<38	<38
	4/15/97	11:00	<0.6	2.5	2.7	<6	<5	<1	11					1.9	4.3	2.3	<0.5	<25	<12	<250	<250	<250	<250	<250	<1	<37	<25.0	<37	<37
	10/29/97	10:30	2.4	10	22	<10.0	8.7	<2	67	13,000	29.4	53.2		<2	4.3	<2	<0.[illegible]	<40	<20	-	-	-	-	-	<2	<70	<2.0	<70	<70
	6/23/98	13:10	<1	1.7	1.9	1.7	1.8	<0.5	5.8	1,500	0.0	1.2		<4	<4	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	10/27/98	9:45	0.7	11.1	7.6	5.2	8.1	<0.5	35.2	11,780	9.4	18.5		<4	6	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	6/17/99	15:15	0.3	3.7	1.9	2.3	2.7	<6.3	19.6	3,300	0.9	2.4	123	<4	<3	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
WYLSED	7/23/91	13:50	<0.4	<0.8	0.5	<10.0	<0.8	<0.2	2.9					<5	<5	<5	<5	<200	<500	-	<500	-	-	<500	-	-	-		
	4/22/92	11:25	<0.4	2.2	1.2	<4.0	1.4	<0.2	8.4					<1	<1	<1	-	-	-	-	<400	-	-	<200	-	-	-		
	10/28/92	12:25	<0.9	2.6	2.0	<9	<1.7	<0.4	10					<2	<2	<2	<2	-	-	-	<400	-	-	<900	-	-	-		
	5/26/93	10:15	<0.5	1.5	1.0	<5	<1	<0.3	5.8					4	4	8	<1	<1400	<140	-	<300	-	-	<300	-	-	-		
	10/27/93	12:30	#####	2.3	<2.6	<6.5	<5.2	<1.3	29					<10	<10	<10	<10	<30	<10	-	<300	-	-	<300	-	-	-		
	4/20/94	10:45	<0.7	1.4	<3	<7	<5	<1	5.5					<3	<1	<3	<1	<300	<100	-	<300	-	-	<300	-	-	-		
	11/30/94	10:30	<0.7	<1	<3	<7	<6	<1	7.1					<0.9	1.1	<0.9	<0.5	<30	<10	<300	<300	<300	<300	<300	<1	<40	<0.9		
	5/17/95	12:30	<0.7	1.9	<3	<7	<5	<1	7.5					<5	<3	<5	<3	-	-	-	-	-	-	-	-	-	-		
	10/24/95	13:45	<0.6	<1.0	<2.0	<6	<5	<1	6.5					<0.8	1.4	<0.8	<0.4	<20	<10	<200	<200	<200	<200	<200	<1	<40	<0.8		
	4/23/96	12:15	<1.0	3.3	<3.0	<7	<5	<5	13					1.8	<0.9	<0.9	<0.5	<130	<66	<260	<260	<260	<260	<260	<1	<39	<0.9		
	10/29/97	10:45	<2	3	5	<8	<6	<2	18	3,900	0.9	4.5		<4	<3	<3	<11	<800	<110	-	-	-	-	-	<2	<50	<1	50	50
	10/27/98	10:00	0.3	6.5	2.8	3.0	5.1	<2	26	7,200	6.9	34.2		<4	6	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	6/17/99	15:45	0.4	3.5	1.0	1.5	1.5	<0.5	10	3,300	0.8	1.2	185	<4	<3	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	5/9/00	10:30	0.5	2.8	3.5	2.0	1.9	<0.5	15	2,860	0.9	4.0		<4	<3	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25

Semiannual Sediment Sampling

STATION	DATE	TIME	Cd mg/kg	Cr mg/kg	Cu mg/kg	Pb mg/kg	Ni mg/kg	Ag mg/kg	Zn mg/kg	Fe mg/kg	Clay %	Silt+Clay %	Tot PO_4 as P mg/Kg	DDD µg/kg	DDE µg/kg	DDT µg/kg	gamma BHC µg/kg	2,4-D µg/kg	2,4,5-TP Silvex µg/kg	Benzo(b) µg/kg	Benzo(k) µg/kg	Chrysene µg/kg	Flrantl µg/kg	Pyrene µg/kg	Mthxy µg/kg	Dznon µg/kg	Endo I µg/kg	Aroclor 1254 µg/kg	Aroclor 1260 µg/kg
NEWPORT BAY																													
LNBRIN	7/25/91	11:30	0.6	18	210	43	10	<0.2	130					<1	<1	<1	<5	<500	<200	-	<500	-	-	<500	-	-	-		
	4/23/92	12:20	<0.4	13	160	31	5.9	<0.2	86					2	8	5	<1	<20	<10	-	<400	-	-	<200	-	-	-		
	10/29/92	12:50	2.4	53	500	130	24	<0.6	300					<2	5.9	<2	<2	<300	<200	-	<600	-	-	<1200	-	-	-		
	5/27/93	11:00	<1	50	530	140	23	<0.5	330					<20	26	<20	<20	<2000	<200	-	<400	-	-	<400	-	-	-		
	10/28/93	12:20	11	46	460	120	20	4.9	320					<14	37	<14	<14	<60	<30	-	<600	-	-	<600	-	-	-		
	4/21/94	12:00	3.1	38	330	110	16	<2	240					<5	41	<5	<1.9	<500	<200	-	<500	-	-	<500	-	-	-		
	12/1/94	12:45	<1.6	52	420	110	21	<3	280					<6	52	<6	<3.2	<60	<30	<600	<600	<600	<600	<600	<6	<100	<6		
	5/18/95	10:00	<0.9	21	330	65	11	<2	150					<7	28	<7	<4	-	-	-	-	-	-	-	-	-	-		
	10/31/95	9:50	<1.7	46	410	130	24	<2	270					<2.2	2	<2.2	<0.9	<50	<20	<500	<500	<500	<500	<500	<2	<70	<2.2		
	4/25/96	10:45	<2.0	23	29	26	18	<2	100					6.4	60	<5	<2.4	<480	<240	<480	<480	<480	<480	<480	<5	<71	<5.0	400	
	11/7/96	11:15	<3.0	60	490	110	31	<3	340					<2.4	37	<2.4	<1.6	<57	<29	<570	<570	<570	<570	<570	<3	<86	<2.4	120	<86
	4/17/97	11:30	<21	25	430	110	17	<3	240					6.0	40	<2.4	<1.6	<57	<29	<570	<570	<570	<570	<570	<3	<86	<2.4	150	<86
	10/30/97	12:15	<3.0	36	530	120	23	<3	280	39,000	46.2	56.9		2.6	47	<2	<1	<60	<30	<600	<600	<600	<600	<600	<600	<80	<2	<80	<80
	6/23/98	13:45	<1	14.2	193	40.2	7.3	<0.5	99	12,290	67.8	86.9		6	22	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	11/4/98	11:30	2.6	13.3	159	36.3	5.7	<0.5	91	11,100	23.9	55.7		<4	19	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	5/27/99	12:15	0.2	15.1	167	30.9	6.7	<0.5	93	11,580	68.8	85.3	297	10	26	13	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	10/12/99	13:25	<0.20	16.3	180	28.0	7.3	<0.5	113	12,200	52.9	73.0		<4	21	11	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	6/2/00	12:10	<0.20	17.0	169	33.3	7.6	<0.5	101		30.9	75.0		<4	16	8	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
LNBHIR	7/25/91	14:00	0.8	18	15	<10.0	5.8	<0.2	52					<1	<1	<1	<10	<500	<200	-	<500	-	-	<500	-	-	-		
	4/23/92	12:45	<0.4	15	13	5	9	<0.2	62					4	10	3	<1	<20	<10	-	<400	-	-	<200	-	-	-		
	10/29/92	13:15	2.0	26	41	26	15	<0.4	100					2.5	13	<2	<2	<400	<200	-	<500	-	-	<900	-	-	-		
	5/27/93	11:20	<1	40	31	36	24	<0.5	120					12.0	52	8	<5	<2000	<200	-	<500	-	-	<500	-	-	-		
	10/28/93	13:15	7	39	35	26	19	<2.2	120					<10	20	<10	<10	<40	<20	-	<400	-	-	<400	-	-	-		
	4/21/94	13:10	4.0	36	29	27	18	<2	110					<8	65	<8	<4	<400	<200	-	<400	-	-	<400	-	-	-		
	12/1/94	13:00	<1.3	38	33	22	20	<3	120					<5	55	<5	<2.0	<50	<30	<500	<500	<500	<500	<500	<5	<80	<5		
	5/18/95	11:30	2.8	28	31	17	24	<3	120					<24	47	<24	<16	-	-	-	-	-	-	-	-	-	-		
	10/31/95	9:30	<0.9	28	32	28	19	<2	110					4.7	23	2	<0.7	<40	<20	<400	<400	<400	<400	<400	<2	<60	<1.8		
	4/25/96	11:20	<2.0	36	30	28	47	<2	110					7.2	42	4	<2.0	<380	<190	<380	<380	<380	<380	<380	<4	<57	<4.0		
	11/7/96	11:40	<1.0	3.0	5.0	6.5	<5	<1	18					<0.9	1.4	<0.9	<0.5	<130	<63	<250	<250	<250	<250	<250	<1	<38	<0.9	<38	<38
	4/17/97	12:40	7.9	8.6	37.0	19.0	7.4	<2	75					4.4	25	<1.7	<0.7	<35	<18	<350	<350	<350	<350	<350	<2	<53	<1.7	<53	<53
	10/30/97	12:45	<2.0	29.0	49.0	31.0	22.0	<2	130	33,000	39.1	70.6		<1	29	<1	<0.8	<40	<20	-	-	-	-	-	<2	<60	<1	<60	<60
	6/23/98	14:10	<1	12.6	14.4	7.9	10.2	<0.5	48	13,760	29.2	59.5		<4	29	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	11/4/98	12:10	0.8	11.6	6.3	6.3	7.5	<0.5	43	11,060	53.7	78.1		<4	28	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	5/27/99	11:45	<0.2	15.1	11.5	13.5	8.0	<0.5	49		62.7	79.9		<4	26	12	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	10/12/99	12:25	<0.2	16.6	22.5	8.2	8.2	<0.5	70	14,000	48.2	82.4		<4	21	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	6/2/00	13:00	0.26	17.7	23.2	14.8	10.0	<0.5	61	16,100	54.0	71.6		<7	26	6	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25

Above NOAA Effects Range Median (ERM) concentration

Anthropogenically Enriched - 99% Confidence using SCCWRP Iron Normalization Database

Semiannual Sediment Sampling

006830

STATION	DATE	TIME	Cd mg/kg	Cr mg/kg	Cu mg/kg	Pb mg/kg	Ni mg/kg	Ag mg/kg	Zn mg/kg	Fe mg/kg	Clay %	Silt+Clay %	Tot PO_4 as P mg/Kg	DDD µg/kg	DDE µg/kg	DDT µg/kg	gamma BHC µg/kg	2,4-D µg/kg	2,4,5-TP Silvex µg/kg	Benzo(b) µg/kg	Benzo(k) µg/kg	Chrysene µg/kg	Flrantl µg/kg	Pyrene µg/kg	Mthxy µg/kg	Dznon µg/kg	Endo I µg/kg	Aroclor 1254 µg/kg	Aroclor 1260 µg/kg
UNBJAM	7/24/91	12:00	0.6	22	10	<10.0	10.0	<0.2	45.0					<1	<1	<1	<5	<5000	<2000	-	-	-	-	-	-	-	-		
	4/23/92	9:10	<0.4	22	11	<4.0	13.0	<0.2	34.0					<1	2	<1	<1	<20	<10	-	-	-	-	-	-	-	-		
	10/29/92	9:35	<0.8	12	8.7	10	7.5	<0.4	38					<2	5.2	<2	<2	<400	<200	-	-	-	-	-	-	-	-		
	10/28/93	9:30	3.8	12	8.9	<7.7	7.1	<1.5	52					<8	16	<8	<8	<30	<20	-	-	-	-	-	-	-	-		
	12/1/94	10:25	<0.9	10	12	<9.0	7.7	<2	58					<1.3	12	<1.3	<0.7	<40	<20	<400	<400	<400	<400	<400	<2	60	<1.3		
	5/18/95	12:15	<0.6	<1	<3	<6	<5	<1	4					<9	4.8	<9	<5	-	-	-	-	-	-	-	-	-	-		
	10/31/95	11:30	<0.7	5	5	7	<6	<1	24					<0.9	3.2	<0.9	<0.5	<30	<10	<300	<300	<300	<300	<300	<1	<40	<0.9		
	4/25/96	11:30	<2.0	42	38	47	29	<2	170					<20	69	<20	<9.0	<890	<440	<440	<440	<440	<440	<440	<22	<67	<20.0		
	11/7/96	9:30	<2.0	17	18	15	9.3	<2	84					<1.7	18	<1.7	<0.7	<36	<18	<360	<360	<360	<360	<360	<2	<360	<1.7	<54	<54
	4/17/97	8:40	<6.2	6	12	9	6.8	<1	45					1.4	8.0	<1.5	<0.6	<29	<14	<290	<290	<290	<290	<290	<1	<43	<1.5	<43	<43
	10/30/97	9:45	<2.0	7	12	<9.0	<7.0	<2	41	9,100	25.7	38.3		2.9	15	<1.0	<0.7	<40	<20	-	-	-	-	-	<2	<50	<1.0	<50	<50
	6/24/98	11:10	<1	9.2	10.6	6.8	6.6	<0.5	41.6	11,210	7.1	16.7		<4	27	<3	<11	<800	<110	-	-	-	-	-	<2	<50	<1	50	50
	11/4/98	9:30	1.0	10.3	6.5	5.6	6.4	<0.5	38.5	10,490	33.1	67.6		<4	10	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	5/27/99	10:00	0.6	23.6	7.5	4.1	13.9	<0.5	31.0	15,010	40.1	77.4	287	<4	7	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	10/12/99	11:05	0.2	11.6	4.4	3.3	4.1	<0.5	26.8	7,010	0.6	1.3	346	<4	<3	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	6/2/00	9:30	0.6	14.0	11.6	17.2	8.8	<0.5	54.8	13,300	29.3	62.2		4	18	7	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
LNBTUB	10/12/99	13:55	<0.2	18.9	30.5	21.1	10.4	<0.5	72	15,300	49.8	70.0		<4	17	9	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	6/2/00	12:30	<0.2	16.0	25.8	17.2	8.0	<0.5	55.7		71.3	98.0		<16	41	7	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
UNBSDC	7/24/91	12:20	1.1	15	17	<10.0	7.8	<0.2	64.0					<1	<1	<1	<10	<500	<200	-	<500	-	-	<500	-	-	-		
	4/23/92	9:40	<0.4	14	13	8.0	8.0	<0.2	50.0					1	5	<1	<1	<20	<10	-	<400	-	-	<200	-	-	-		
	10/29/92	10:00	17.0	24	17	17	13	<0.4	71					4.3	18	<2	<2	<400	<200	-	<500	-	-	<900	-	-	-		
	5/27/93	8:45	<0.7	27	30	27	15	<0.3	100					4.6	24	<4	<4	<2000	<200	-	<300	-	-	<300	-	-	-		
	10/28/93	9:45	5.9	23	32	36	13	<1.8	110					9.2	35	<4	<4	<40	<20	-	<400	-	-	<400	-	-	-		
	4/21/94	9:30	3.9	31	31	27	16	<2	130					<4	15	<4	<1.6	<4000	<2000	-	<400	-	-	<400	-	-	-		
	12/1/94	10:45	<0.8	15	15	13	8.0	<2	68					<1.1	19	<1.1	<0.6	<30	<20	<300	<300	<300	<300	<300	<25	50	<1.1		
	5/18/95	8:45	2.8	25	20	18	21	<3	95					<22	33	<22	<15	-	-	-	-	-	-	-	-	-	-		
	10/31/95	11:15	<1.5	19	19	16	14	<2	81					2.7	11	1.9	<0.8	<40	<20	<400	<400	<400	<400	<400	<2	<60	<1.9		
	4/25/96	11:30	<2.0	42	38	47	29	<2	170					<20	69	<20	<9.0	<890	<440	<440	<440	<440	<440	<440	<22	<67	<20.0		
	11/7/96	9:45	<3.0	30	45	33	18	<3	210					4.3	43	<2	<1.5	<50	<25	<500	<500	<500	<500	<500	<3	<75	<2.2	<75	<75
	4/17/97	9:00	11.0	9.4	30	26	11	<2	110					5.4	28	2.8	<0.8	<40	<20	<400	<400	<400	<400	<400	<2	<60	<1.9	<60	<60
	10/30/97	10:05	<2.0	15.0	19	14	11	<2	76	16,000	18.5	35.9		4.4	16	<1	<0.7	<30	<20	-	-	-	-	-	<2	<50	<1.0	<50	<50
	6/23/98	11:30	1.1	15.5	16.6	10.9	10.7	<0.5	57.5	14,110	44.1	94.6		<4	<21	<3	<11	<800	<110	-	-	-	-	-	#####	<0.4	#####		
	11/4/98	10:30	0.6	12.7	6.9	11.4	8.0	<0.5	49.9	11,130	17.5	42.3		<4	24	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	5/27/99	10:30	0.8	21.0	10.8	42.5	11.6	<0.5	70.4	17,500	55.1	84.7	388	<4	150	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	10/12/99	10:45	0.9	23.7	14.1	9.7	16.4	<0.5	68.7	18,100	45.2	94.4	624	<7	38	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	6/2/00	10:05	0.6	12.5	15.6	10.9	7.8	<0.5	60.3	10,400	19.8	57.4		5	17	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25

Above NOAA Effects Range Median (ERM) concentration

Anthropogenically Enriched - 99% Confidence using SCCWRP Iron Normalization Database

Semiannual Sediment Sampling

STATION	DATE	TIME	Cd mg/kg	Cr mg/kg	Cu mg/kg	Pb mg/kg	Ni mg/kg	Ag mg/kg	Zn mg/kg	Fe mg/kg	Clay %	Silt+Clay %	Tot PO_4 as P mg/Kg	DDD µg/kg	DDE µg/kg	DDT µg/kg	gamma BHC µg/kg	2,4-D µg/kg	2,4,5-TP Silvex µg/kg	Benzo(b) µg/kg	Benzo(k) µg/kg	Chrysene µg/kg	Firanth µg/kg	Pyrene µg/kg	Mthxy µg/kg	Dznon µg/kg	Endo I µg/kg	Aroclor 1254 µg/kg	Aroclor 1260 µg/kg
JNBBCW	7/24/91	12:45	1.2	12	18	<10.0	7.8	<0.2	65.0					<1	<1	<1	<10	<500	<200	-	<500	-	-	<500	-	-	-		
	4/23/92	10:00	<0.4	11	11	5.0	6.1	<0.2	41.0					2	7	1	<1	<20	<10	-	<400	-	-	<200	-	-	-		
	10/29/92	10:20	2.5	33	40	36	18.0	<0.4	130					<2	<4	<4	<2	<10	<200	-	<400	-	-	<800	-	-	-		
	5/27/93	9:00	<0.6	11	13	12	6.3	<0.3	45					1.5	5.6	<1	<1	<1000	<100	-	<300	-	-	<300	-	-	-		
	10/28/93	10:10	4.7	18	20	14	12	<2	84					<40	<40	<40	<40	<40	<20	-	<400	-	-	<400	-	-	-		
	4/21/94	9:45	3.2	26	30	20	15	<2	110					14.0	24	<14	<8	<400	<200	-	<400	-	-	<400	-	-	-		
	12/1/94	11:00	<0.9	23	28	18	11	<2	100					<1.3	28	<1.3	<0.7	<40	<20	<400	<400	<400	<400	<400	<2	<60	<1.3		
	5/18/95	9:00	2.3	19	14	14	14	<2	66					<18	23	<18	<8	-	-	-	-	-	-	-	-	-	-		
	10/31/95	11:00	<0.7	18	28	19	13	<2	90					1.5	11	<1.5	<0.5	<30	<10	<300	<300	<300	<300	<300	<1	<40	<1.5		
	4/25/96	12:00	<2.0	2.5	<3	<8	<6	<2	8					7.0	38	<6.0	<3.0	<31	<16	<310	<310	<310	<310	<310	<8	<47	<6.0		
	11/7/96	10:00	<2.0	18	22	15	8.6	<2	83					<1.7	15	<1.7	<0.7	<34	<17	<340	<340	<340	<340	<340	<2	<340	<1.7	<52.0	<52.0
	4/17/97		12	11	24	17	<11	<2	85					4.1	27	3.2	<0.7	<34	<17	<340	<340	<340	<340	<340	<2	<51	<1.6		
	10/30/97	10:20	<2.0	22.0	25.0	17.0	17.0	2.0	98.0	25,000	24.3	58.2		2	27	2	<0.	<50	<1	-	-	-	-	-	<2	<70	<2	<70	<70
	6/23/98	12:10	<1	14.8	190	7.2	7.5	<0.5	99.6	12,810	20.7	52.1		<4	<18	<3	<11	<800	<110	-	-	-	-	-	#####	<0.4	#####		
	11/4/98	10:50	0.3	8.9	5	5.2	4.8	<0.5	34.0	7,860	21.9	54.4		<4	19	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	5/27/99	10:45	0.3	11.9	9	8.2	6.1	<0.5	47.6	10,110	42.6	76.0	416	<4	21	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
UNBNDB	7/24/91	14:00	0.6	6.4	11	<10.0	7.0	<0.2	34					<1	<1	<1	<10	<500	<200	-	<500	-	-	<500	-	-	-		
	4/23/92	10:30	<0.4	15	11	<4.0	8.5	<0.2	46					2	9	2	<1	<20	<10	-	<400	-	-	<200	-	-	-		
	10/29/92	11:05	<0.6	8.2	10	9.4	5.6	<0.3	39					<2	9.5	<2	<2	<400	<200	-	<400	-	-	<800	-	-	-		
	5/27/93	0:00	<1	37	32	32.0	24.0	<0.5	110					11	59	9	<5	<2000	<200	-	<500	-	-	<500	-	-	-		
	10/28/93	10:45	7.6	31	38	24	19	<2.4	130					9.7	46	2.8	<3	<50	<30	-	<500	-	-	<500	-	-	-		
	4/21/94	10:15	4.9	40	35	35	21.0	<2	150					<9	30	<9	<4	<400	<200	-	<400	-	-	<400	-	-	-		
	12/1/94	11:35	1.5	43	51	32	25.0	<3	180					<5	73	<5	7	<50	<30	<500	<500	<500	<500	<500	<5	<80	<5		
	5/18/95	9:20	3.5	29	25	20	23.0	<2	100					<19	48	<19	<8	-	-	-	-	-	-	-	-	-	-		
	10/31/95	12:15	<0.8	16	16	14	11.0	<2	60					2	9.2	<1.6	<0.6	<30	<20	<300	<300	<300	<300	<300	<2	<50	<1.6		
	4/25/96	9:30	<3.0	47	53	38	32.0	<3	180					6.8	38	<6	<2.8	<290	<150	<590	<590	<590	<590	<590	<6	<88	<6	530	
	11/7/96	10:30	<2.0	35	48	31	23.0	<2	150					<8	23	<8	<4.0	<38	<19	<380	<380	<380	<380	<380	<10	<380	<8	<380	<380
	4/17/97	10:30	9.8	8.6	34	19	9.8	<2	79					4.8	29	2.6	<0.7	<34	<17	<340	<340	<340	<340	<340	<2	<34	<17	<52	<52
	10/30/97	10:55	<3.0	39	87	39	29.0	<3	200	48,000	62.7	98.2		7.7	35	<2	<1	<70	<30	-	-	-	-	-	<3	<100	<2	<100	<100
	6/23/98	9:55	<1.1	17.0	17.3	7.8	10.9	<0.5	50	15,680	50.1	92.6		<4	24	<3	<11	<800	<110	-	-	-	-	-	ND	ND	ND		
	11/4/98	9:00	1.1	12.6	11.8	7.8	6.0	<0.5	53	11,160	44.0	92.1		<4	34	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	5/27/99	9:15	0.3	18.4	19.6	11.7	9.3	<0.5	66	15,600	54.5	95.1	402	<4	40	13	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25

Above NOAA Effects Range Median (ERM) concentration

Anthropogenically Enriched - 99% Confidence using SCCWRP Iron Normalization Database

Semiannual Sediment Sampling

006832

STATION	DATE	TIME	Cd mg/kg	Cr mg/kg	Cu mg/kg	Pb mg/kg	Ni mg/kg	Ag mg/kg	Zn mg/kg	Fe mg/kg	Clay %	Silt+Clay %	Tot PO_4 as P mg/Kg	DDD µg/kg	DDE µg/kg	DDT µg/kg	gamma BHC µg/kg	2,4-D µg/kg	2,4,5-TP Silvex µg/kg	Benzo(b) µg/kg	Benzo(k) µg/kg	Chrysene µg/kg	Flrantr µg/kg	Pyrene µg/kg	Mthxy µg/kg	Dznon µg/kg	Endo I µg/kg	Aroclor 1254 µg/kg	Aroclor 1260 µg/kg
HUNTINGTON HARBOUR																													
HUNWAR	8/13/91	12:00	<0.4	12	26	34	9.2	<0.2	120					<1	<1	<1	<1	<5000	<2000	-	<200	-	-	<400	-	-	-		
	6/30/92	11:50	<0.4	12	26	39	8.3	<0.2	110					<1	<1	<1	<5	<100	<50	-	<200	-	-	<400	-	-	-		
	11/18/92	12:00	<0.7	20	46	59	15	<0.3	190					<9	16	<9	<9	<40	<20	-	<800	-	-	<400	-	-	-		
	6/15/93	10:15	9.8	29	71	98	24	<0.5	330					10	40	<2	<2	<2000	<200	-	<4000	-	-	<4000	-	-	-		
	10/21/93	12:05	7.3	29	69	87	20	<2.1	290					<20	93	20	<20	<50	<20	-	<2000	-	-	<2000	-	-	-		
	4/13/94	10:30	1.1	30	52	69	22	<2	260					<40	55	40	<16	<400	<200	-	<400	-	-	<400	-	-	-		
	11/8/94	11:30	2.0	28	49	70	18	<2	260					<15	<9	<15	<9	<40	<20	<400	<400	<400	<400	<400	<20	<60	<15		
	5/10/95	10:00	4.1	20	46	61	20	<2	190					<16	<7	<16	<7	-	-	-	-	-	-	-	-	-	-		
	10/11/95	10:45	1.0	15	32	41	15	<2	130					5.8	29	<2	<1	<40	<20	-	<400	-	-	<400	<2	<50	-		
	5/2/96	9:45	<2	26	62	76	16	<2	300					12.0	46	11	<4	<40	<20	<400	<400	<400	<400	<400	<8	<60	<6		
	10/9/96	10:45	<2	26	68	85	23	<2	340					<43	<43	<43	<21	<43	<21	<430	<430	<430	<430	<430	<64	<64	<43	<1700	<1700
	4/29/97	9:00	<0.9	23	58	64	18	<2	260					6.4	32	5.3	<1	<38	<19	<380	<380	<380	<380	<380	<2	<57	<1.8	<57	<57
	10/2/97	13:45	<2	23	70	67	19	<2	260		18.7	45.2		5.6	37	<5	<2	<50	<20	-	-	-	-	-	<5	<70	<5	<100	<100
	6/25/98		<1	11.4	23.7	35	8.1	<0.5	133	8,930	16.1	33.4		<4	17	<3	<11	<800	<110	-	-	-	-	-	<24	<400	<4	<11	<25
	10/21/98	9:30	<1	13.7	24.4	30	10.6	<0.5	126	12,990	15.0	44.2		<4	11	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	6/24/99	14:10	0.65	14.1	27.4	28.6	8.35	<0.50	131	12,870	16.2	38.3	439	<20	34	<15	<55	<800	<110	-	-	-	-	-	<125	<2000	<20	<50	<125
	10/27/99	10:30	0.38	11.7	20.7	20.9	7.52	<0.51	93	10,700	10.4	23.7		<4	14	<2	<54	<800	<110	-	-	-	-	-	<125	<2000	<20	<50	<125
	6/28/00	10:50	<0.20	12.0	33.9	27.3	8.40	<0.50	146	9,620	15.7	50.7		<4	<3	<3	<55	<800	<110	-	-	-	-	-	<125	<2000	<20	<50	<125
HUNCRB	8/13/91	13:00	<0.4	17	38	56	9.4	<0.2	100					<1	<1	<1	<10	<5000	<2000	-	<200	-	-	<400	-	-	-		
	6/30/92	13:40	<0.4	17	41	62	11	<0.2	110					2	8	<1	<1	<20	<10	-	<200	-	-	<400	-	-	-		
	11/18/92	13:00	<0.8	40	92	130	25	<0.4	230					3	13	<2	<2	<50	<20	-	<900	-	-	<500	-	-	-		
	6/15/93	10:50	9.3	33	84	120	21	<0.5	210					9	33	6	<2	<2000	<200	-	<5000	-	-	#####	-	-	-		
	10/21/93	12:35	6.5	27	65	100	18	<2	180					19	55	<10	<10	<40	<20	-	<400	-	-	<400	-	-	-		
	4/13/94	11:05	1.2	49	120	140	36	<2	310					11	67	8.4	<2	<300	<130	-	<500	-	-	<500	-	-	-		
	11/8/94	12:00	1.7	48	83	150	28	<2	240					<1.5	22	<1.5	<0.8	<40	<20	<400	<400	<400	<400	<400	<2	<70	<1.5		
	5/10/95	10:30	5.2	30	80	100	26	<2	210					19	<4	<7	<4	-	-	-	-	-	-	-	-	-	-		
	10/11/95	11:20	<1.6	53	100	180	35	<2	280					<2.1	23	<2.1	<1	<50	<20	-	<500	-	-	<500	<2	<70	-		
	5/2/96	10:20	<2.0	35	92	130	23	3.1	230					<11	52	<8	<4	<42	<21	<420	<420	<420	<420	<420	<8	<62	<6		
	10/9/96	11:15	<2.0	26	85	130	22	<2	240					<20	35	<20	<9	<43	<22	<430	<430	<430	<430	<430	<22	<65	<20	<650	<650
	4/29/97	10:00	<1.5	32.0	120	120	26	<2	230					<9	28	<9	<4	<43	<21	<430	<430	<430	<430	<430	<9	<64	<9	<430	<430
	10/2/97	14:10	<2.0	30	84	120	23	<2	200		48.1	89.3		8	44	<5	<2	<50	<20	-	-	-	-	-	<5	<70	<5	<100	<100
	6/25/98		<0.8	17.3	34	46.6	11.8	<0.5	103	15,400	43.8	90.3		<4	16	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	10/21/98	10:15	<0.5	17.6	33	52.1	12.8	<0.5	108	17,020	43.4	92.5		<4	20	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	6/24/99	13:55	0.259	19.6	29.3	47.6	11.1	<0.5	99	17,700	47.4	94.9	503	<20	131	24	<55	<800	<110	-	-	-	-	-	<125	<2000	<20	<50	<125
	10/27/99	10:50	<0.20	20.8	37.1	48.4	12.2	<0.6	108	18,800	44.0	93.0		<4	37	3	<56	<800	<110	-	-	-	-	-	<125	<2000	<20	<50	<125
	6/28/00	11:40	<0.20	18.0	36.0	51.6	11.7	<0.5	107	14,800	45.9	90.6		<4	36	6	-	<800	<110	-	-	-	-	-	<125	<2000	<20	<50	<125

Above NOAA Effects Range Median (ERM) concentration

Anthropogenically Enriched - 99% Confidence using SCCWRP Iron Normalization Database

Semiannual Sediment Sampling

STATION	DATE	TIME	Cd mg/kg	Cr mg/kg	Cu mg/kg	Pb mg/kg	Ni mg/kg	Ag mg/kg	Zn mg/kg	Fe mg/kg	Clay %	Silt+Clay %	Tot PO_4 as P mg/Kg	DDD µg/kg	DDE µg/kg	DDT µg/kg	gamma BHC µg/kg	2,4-D µg/kg	2,4,5-TP Silvex µg/kg	Benzo(b) µg/kg	Benzo(k) µg/kg	Chrysene µg/kg	Flrantr µg/kg	Pyrene µg/kg	Mthxy µg/kg	Dznon µg/kg	Endo I µg/kg	Aroclor 1254 µg/kg	Aroclor 1260 µg/kg
HUNBCC	8/13/91	14:00	<0.4	15	23	24	7.5	<0.2	110					<1	<1	<1	<10	<5000	<2000	-	<200	-	-	<400	-	-	-		
	6/30/92	14:25	<0.4	13	19	26	8.8	<0.2	83					3	10	2	<1	<20	<10	-	<200	-	-	<400	-	-	-		
	11/18/92	13:30	<0.7	23	37	40	16	<0.3	140					8	26	<8	<8	<30	<20	-	<700	-	-	<300	-	-	-		
	6/15/93	11:30	9.2	30	51	38	21	<0.4	190					6	21	4	<2	<2000	<200	-	<4000	-	-	<4000	-	-	-		
	10/21/93	11:35	8.1	31	44	41	22	<1.9	170					20	57	12	<9	<40	<20	-	<2000	-	-	<2000	-	-	-		
	4/13/94	11:40	<0.8	20	28	23	16	<2	120					6.7	28	4.6	<1.2	<600	<300	-	<300	-	-	<300	-	-	-		
	11/8/94	12:30	<1.1	19	25	25	13	<2	100					7.0	20	<6	<3	<30	<20	<300	<300	<300	<300	<300	<8	<50	<6		
	5/10/95	10:45	1.1	4.9		11	<5.0	<1	27					13.0	<3	<4	<3	-	-	-	-	-	-	-	-	-	-		
	10/11/95	12:00	<0.7	13	25	19	9.6	<1	60					3.8	7.2	8.6	<0.5	<30	<10	-	<300	-	-	<300	<1	<50	<6		
	5/2/96	10:50	<2.0	22	52	44	22	2.1	235					4.3	34	24	<2.0	<39	<20	<410	<410	<410	<410	<410	<2	<61	<1.9		
	10/9/96	11:50	<2.0	28	56	44	24	<2	240					46.0	<19	72	<8.0	<40	<20	<400	<400	<400	<400	<400	<20	<60	<19	<600	<600
	4/29/97	10:30	<1.5	28	60	44	21	<2	210					9.6	35	<1.9	<0.8	<42	<21	<420	<420	<420	<420	<420	<2	<62	<1.9	<62	<62
	10/2/97	13:10	<2	20	44	36	18	<2	180		16.0	44.2		8.6	26	4	<2	<200	<100	-	-	-	-	-	<4	<60	<4	<100	<100
	6/25/98		<1	16.6	28.7	21.7	10.9	<0.5	119	14,000	17.6	54.4		<4	15	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	10/21/98	9:00	<1	15.8	20.2	20.9	10.7	<0.5	122	13,820	12.9	47.0		<4	<3	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	6/24/99	13:30	<0.2	18.9	24.4	18.9	10.3	<0.5	123	15,020	30.9	71.8	430	<20	36	<15	<55	<800	<110	-	-	-	-	-	<125	<2000	<20	<50	<125
	10/27/99	9:50	<0.5	14.2	25.5	17.2	8.1	<0.5	117	12,700	20.1	69.3		<4	15	<3	<56	<800	<110	-	-	-	-	-	<125	<2000	<20	<50	<125
	6/25/00	9:39	0.33	16.8	30.5	27.2	11.5	<0.5	130	13,500	22.1	76.2		17	31	11	<55	<800	<110	-	-	-	-	-	<125	<2000	<20	<50	<125
BBOLR	8/14/91	9:30	<0.4	4.7	6.7	24	<0.8	<0.2	30					<1	<1	<1	<10	<5000	<2000	-	<200	-	-	<400	-	-	-		
	6/30/92	11:45	<0.4	10	6.5	22	5.6	<0.2	32					<1	<1	<1	<1	<20	<10	-	<200	-	-	<400	-	-	-		
	11/19/92	15:15	<0.5	13	8.0	23	11	<0.3	26					<9	<9	<9	<9	<30	<20	-	<600	-	-	<300	-	-	-		
	6/15/93	13:20	3.3	10	13	31	7.7	<0.3	62					<3	<3	<3	<3	<2000	<200	-	<4000	-	-	<4000	-	-	-		
	10/21/93	13:00	3.3	12	18	43	8.9	1.6	87					<3	12	<3	<3	<30	<20	-	<300	-	-	<300	-	-	-		
	4/13/94	13:15	<1.9	22	37	120	22	<4	120					<4	9.6	<4	1.5	<800	<400	-	<400	-	-	<400	-	-	-		
	11/8/94	14:00	1	11	14	51	8.7	<1	77					<6	6.6	<6	<3	<30	<10	<300	<300	<300	<300	<300	<7	<40	<6		
	5/10/95	11:45	2.5	12	29	44	12	2	98					<18	<8	<18	<8	-	-	-	-	-	-	-	-	-	-		
	10/11/95	13:15	1.5	22	28	120	18	2	140					<1.9	6	<1.9	<0.8	<40	<20	-	<400	-	-	<400	-	<60	-		
	5/2/96	12:10	2.0	8	14	28	<7	2	71					<1.7	7.2	<1.7	<0.7	<34	<17	<340	<340	<340	<340	<340	<2	<52	<1.7		
	10/9/96	12:50	<1	8	11	24	8.8	<1	88					<30	<30	<30	<15.0	<30	<15	<300	<300	<300	<300	<300	<45	<45	<30	<1200	<1200
	4/29/97	11:20	<1.5	10	19	35	9.4	<2	90					<1.9	4.2	<1.9	<0.8	<42	<21	<420	<420	<420	<420	<420	<2	<62	<1.9	<62	<62
	10/2/97	15:20	<2.0	6.7	9.3	16	<7	<2	41		4.8	7.3		<2	<2	<2	<0.7	<30	<20	-	-	-	-	-	<2	<50	<2	<50	<50
	6/25/98		<0.5	7.3	8.9	15.3	4.4	<0.5	49	6,820	17.1	28.0		<4	15	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	10/21/98	11:45	<0.15	8.2	5.1	15.8	5.0	<0.5	47	8,590	2.0	6.8		<4	<3	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	6/24/99	15:30	<0.2	11.2	3.57	11.7	5.52	<0.5	34.5	7,960	6.4	14.4	434	<20	<15	<15	<55	<800	<110	-	-	-	-	-	<125	<2000	<20	<50	<125
	10/27/99	12:20	<0.2	8.9	1.89	8.5	3.10	<0.6	15.5	5,890	1.2	4.2		<4	<3	<3	<54	<800	<110	-	-	-	-	-	<125	<2000	<20	<50	<125
	6/28/00	12:45	<0.2	8.2	10.60	18.3	5.51	<0.5	57.4	7,140				<4	<3	<3	<55	<800	<110	-	-	-	-	-	<125	<2000	<20	<50	<125
TGDC05	10/3/97		<2.0	6.7	8.2	11	6.2	<2	30		0.1	32.3		<2.0	5.5	<2	<0.6	<30	<20	-	-	-	-	-	<2	<50	<2	<50	<50
	6/25/98										4.2	14.6																	
	10/26/98	9:45	<0.3	11.6	16.8	35.6	6.64	<.5	85	10,270	11.4	43.6		<4	20	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	6/24/99	15:35	<0.2	15	6	36	8.8	<0.5	54	8,250	3.0	9.2	284	<20	32	<15	<55	<800	<110	-	-	-	-	-	<125	<2000	<20	<50	<125
TGUCO5	10/3/97	0:00	<2	14	26	41	14	<2	160					<3.7	<18	<2	<0.7	<40	<20	-	-	-	-	-	<2	<60	<2	<60	<60
	6/25/98	0:00	<0.3	10.5	8.4	18	6.7	<0.5	63	10,300	8.6	32.8		<4	<3	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	10/26/98	9:30	<0.6	5.25	7.55	11.80	6.31	<0.5	50	4,830	7.0	19.6		<4	8	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	6/24/99	15:40	<0.2	10.3	3.18	17.4	6.68	<0.5	57	10,860	4.1	18.9	499	<20	16	<15	<55	<800	<110	-	-	-	-	-	<125	<2000	<20	<50	<125

Above NOAA Effects Range Median (ERM) concentration

Anthropogenically Enriched - 99% Confidence using SCCWRP Iron Normalization Database

Semiannual Sediment Sampling

STATION	DATE	TIME	Cd mg/kg	Cr mg/kg	Cu mg/kg	Pb mg/kg	Ni mg/kg	Ag mg/kg	Zn mg/kg	Fe mg/kg	Clay %	Silt+Clay %	Tot PO_4 as P mg/Kg	DDD µg/kg	DDE µg/kg	DDT µg/kg	gamma BHC µg/kg	2,4-D µg/kg	2,4,5-TP Silvex µg/kg	Benzo(b) µg/kg	Benzo(k) µg/kg	Chrysene µg/kg	Flrantl µg/kg	Pyrene µg/kg	Mthxy µg/kg	Dznon µg/kg	Endo I µg/kg	Aroclor 1254 µg/kg	Aroclor 1260 µg/kg
SANTA ANA RIVER WATERSHED																													
SARIMP	9/12/91	11:30	<0.4	10.0	21.0	9.8	8.0	<0.2	53					<5.0	<5.0	<5.0	<5.0	<300	<100	-	<200	-	-	<200	-	-	-		
	4/14/94	10:30	<0.8	15.0	20.0	15.0	12.0	<2	77					<2.0	<0.9	<2.0	<0.9	<100	<60	-	<200	-	-	<200	-	-	-		
	11/7/94	13:00	<0.8	8.0	7.3	7.1	<5.0	<1	34					<0.8	0.5	<0.8	<0.5	30	<10	<300	<300	<300	<300	<300	<1	<40			
	5/9/95	8:15	<0.7	4.5	2.9	<7.0	<5.0	<1	19					-	-	-	-	-	-	-	-	-	-	-	-	-	-		
	10/12/95	14:15	<0.6	5.1	4.8	<6.0	<5.0	<1	20					<0.8	<0.8	<0.8	<0.4	<20	<10	-	<200	-	-	<200	<1	<40	-		
	6/30/98	12:00	ND	2.3	1.8	1.9	1.8	<0.5	11.2	3,010	12.2	42.8		<4	<3	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	10/27/98	11:45	0.6	13.5	11.7	7.6	10.9	<0.5	46.7	11,300	11.0	28.6		<4	5	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
SANEO8	4/14/94	10:00	<0.5	4.8	8.7	6.5	7.5	<1	39					<3	<1	<3	<1	<100	<60	-	<300	-	-	<300	-	-	-		
	5/9/95	8:30	<0.6	3.5	7.1	<6.0	4.9	<1	27					-	-	-	-	-	-	-	-	-	-	-	-	-	-		
	10/12/95	14:40	<0.6	6.5	20.0	96	9.6	<1	120					<0.8	4.2	<0.8	<0.5	<100	<60	-	<500	-	-	<500	<1	<40	-		
SILE17	2/26/92	10:45	2.1	9.8	25.0	<10.0	16.0	<0.2	95					<1	<1	<1	<1	<20	<10	-	<400	-	-	<200	-	-	-		
	5/9/95	9:20	1.8	5.1	24.0	<7.0	18.0	<1	150					-	-	-	-	-	-	-	-	-	-	-	-	-	-		
	6/30/98	12:30	1.7	10.6	32.4	141	15.9	<0.5	193	23,360	0.0	0.4		<4	<3	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	10/27/99	9:30	<0.6	0.7	4.6	2	2.7	<0.5	29	2,310	0.6	3.0		<4	<3	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	10/27/99	9:30	<0.6	0.7	4.6	2	2.7	<0.5	29	2,310	0.6	3.0		<4	<3	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
SOUTH COUNTY WATERSHED																													
ACJ01	8/29/91	10:45	<0.4	0.9	0.7	<10	3.1	<0.2	4.5					<1	<1	<1	<1	<500	<200	-	<500	-	-	<500	-	-	-		
	6/18/92	14:45	<0.5	1.8	1.0	<5	3.7	<0.3	4.9					<1	<1	<1	<1	<20	<10	-	<200	-	-	<400	-	-	-		
	11/5/92	10:00	<0.5	2.2	1.2	<5	4.3	<0.2	5.6					<1	<1	<1	<1	<300	<100	-	<500	-	-	<300	-	-	-		
	6/14/93	11:00	<0.5	3.6	1.7	<5	6.4	<0.2	5.4					<1	<1	<1	<1	<1000	<100	-	<200	-	-	<200	-	-	-		
	10/6/93	14:00	1.0	3.1	<0.2	<0.6	8.0	<1.2	6.5					<1	<1	<1	<1	<20	<10	-	<200	-	-	<200	-	-	-		
	5/4/94	15:00	0.8	1.9	<3	<6	<5	<1	7.9					<0.9	<0.7	2.2	<0.5	<30	<10	-	<300	-	-	<300	-	-	-		
	11/8/94	9:00	0.9	3.2	3.1	<6	5.9	<1	11					<0.8	<0.5	<0.8	<0.5	30	<10	<300	<300	<300	<300	<300	<1	<40	<0.8		
	5/25/95	10:15	<0.6	<1	<3	<6	<5	<1	2.7					<5	<3	<5	<3	-	-	-	-	-	-	-	-	-	-		
	10/19/95	12:30	<0.7	3	3.6	<7	6.6	<1	36					<0.9	<0.9	<0.9	<0.5	<30	<10	-	<300	-	-	<300	<1	<40	-		
	4/17/96	9:45	<1.0	6	<3	<7	8.5	<1	15					<0.9	<0.9	<0.9	<0.5	<27	<14	<270	<270	<270	<270	<270	<1	<41	<0.9		
	11/6/96	15:45	<1.0	6	2.6	<8	7.4	<1	12					<0.8	<0.8	<0.8	<0.5	<36	<24	<240	<240	<240	<240	<240	<1	<36	<24	<36	<36
	4/8/94	.	3.8	5.2	<3	<6	7.1	<1	16					<0.9	<0.9	<0.9	<0.5	<25	<13	<250	<250	<250	<250	<250	<1	<38	<1	<38	<38
	10/9/97	15:00	<1	20.0	11.0	<6	23.0	<1	21	8,100	8.0	17.8		<0.9	<0.9	<0.9	<0.5	<30	<10	-	-	-	-	-	<1	<40	<0.9	<40	<40
	6/19/98	13:40	<1.7	10.2	3.0	<2	8.7	<0.5	22.2	4,260	2.4	5.7		<4	<3	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	10/19/98	10:00	0.6	3.5	0.9	0.9	3.4	<0.5	8.2	2,650	0.2	0.6		<4	<3	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	5/20/99	12:35	0.6	6.9	2.2	<10.0	3.5	<0.5	7.2	2,340	0.0	0.0		<4	<3	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	10/27/99	12:05	0.5	5.7	1.1	0.74	6.2	<0.5	10.2	2,280	0.2	0.9		<4	<3	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	5/31/00	13:45	0.3	5.2	1.8	1.9	4.4	<0.5	21.0	3,800				<4	<3	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25

Semiannual Sediment Sampling

STATION	DATE	TIME	Cd mg/kg	Cr mg/kg	Cu mg/kg	Pb mg/kg	Ni mg/kg	Ag mg/kg	Zn mg/kg	Fe mg/kg	Clay %	Silt+Clay %	Tot PO_4 as P mg/Kg	DDD µg/kg	DDE µg/kg	DDT µg/kg	gamma BHC µg/kg	2,4-D µg/kg	2,4,5-TP Silvex µg/kg	Benzo(b) µg/kg	Benzo(k) µg/kg	Chrysene µg/kg	Flranth µg/kg	Pyrene µg/kg	Mthxy µg/kg	Dznon µg/kg	Endo I µg/kg	Aroclor 1254 µg/kg	Aroclor 1260 µg/kg
SCDAM	8/29/91	11:45	7.4	8.3	47	<10.0	25	<0.2	55					<50	<50	<50	<50	<500	<200	-	<500	-	-	<500	-	-	-		
	6/18/92	11:00	0.9	28	25	19	25	<0.4	95					<1	<1	<1	<1	<20	<10	-	<400	-	-	<700	-	-	-		
	11/5/92	12:30	8.2	12	42	10	38	<0.3	73					<10	<10	<10	<10	<300	<100	-	<500	-	-	<300	-	-	-		
	6/14/93	11:30	0.9	25	16	9.3	25	<0.4	53					<1	<1	<1	<1	<1000	<100	-	<300	-	-	<300	-	-	-		
	10/6/93	10:00	9.4	12	15	11	51	<1.4	73					<2	<2	<2	<2	<40	<20	-	<400	-	-	<400	-	-	-		
	5/4/94	14:30	3.3	23	14	<8	14	<2	55					<1	<0.6	<1	<0.6	<30	<20	-	<300	-	-	<300	-	-	-		
	11/8/94	9:30	2.0	15	15	<7	16	<1	39					<0.9	<0.5	<0.9	<0.5	30	<10	<300	<300	<300	<300	<300	<1	<40	<0.9		
	5/25/95	9:45	4.4	7.5	13	<7	40	<1	53					<30	<16	<30	<16	-	-	-	-	-	-	-	-	-	-		
	10/19/95	13:15	14.0	12	130	<15.0	78	<2	150					<9	<9	<9	<4	<40	<20	-	<400	-	-	<400	<15	<70	-		
	4/17/95	10:20	3.8	29	18	12	38	<2	67					<1.7	<1.7	<1.7	<0.7	<36	<18	<360	<360	<360	<360	<360	<2	<55	<1.7		
	11/6/96	15:30	4.1	11	16	8	25	<2	71					<1.6	<1.6	<1.6	<0.6	<32	<16	<320	<320	<320	<320	<320	<2	<48	<1.6	<48	<48
	4/8/97		24.0	14	13	12	14	<1	43					<1.5	<1.5	<1.5	<0.6	<29	<14	<290	<290	<290	<290	<290	<1	<43	<1.5	<43	<43
	10/9/97	14:30	2.7	2.8	6.5	<7	28	<1	28	2,600	0.1	0.3		<4	<3	<3	<0.5	<100	<70	-	-	-	-	-	<1	<40	<1	<40	<40
	10/27/99	11:10	9.1	5.0	30.3	2.3	38	<0.5	76	3,220	28.4	69.8																	
	5/31/00	13:00	9.8	8.0	13.6	<3	69	<0.5	80	5,300	12.0	37.5																	
OHBL01	2/26/92	9:05	1.0	15	14.0	<10.0	6.6	<0.2	31					<1	<1	<1	<1	<20	<10	-	<200	-	-	<400	-	-	-		
	11/5/92																												
	6/14/93	14:30	<0.5	1.8	1.8	<5	<1.0	<0.3	7.7					<1	<1	<1	<1	<1000	<100	-	<300	-	-	<300	-	-	-		
	4/17/96	13:00	<1.0	12.0	10.0	9.4	8.3	<1.0	24.0					<1	<0.9	<0.9	<0.5	<26	<13	<260	<260	<260	<260	<260	<1	<38	<0.9		
SJNL01	8/29/91	13:45	<0.4	2.2	1.6	<10.0	1.5	<0.2	8.9					<1	<1	<1	<1	<500	<200	-	<500	-	-	<500	-	-	-		
	6/18/92	13:00	<0.4	3.5	2.8	<4.0	2.9	<0.2	15					<1	<1	<1	<1	<20	<40	-	<200	-	-	<400	-	-	-		
	11/5/92																												
	6/14/93	14:00	<0.5	4.9	3.3	<5	2.8	<0.2	16					<1	<1	<1	<1	<1000	<100	-	<300	-	-	<300	-	-	-		
	10/6/93	12:45	1.4	5.7	5.1	<0.6	<0.6	<1.4	25					<7	<7	<7	<7	<30	<10	-	<300	-	-	<300	-	-	-		
	5/4/94	12:00	<0.6	3.6	<3	<6	<5	<1	10					<0.8	<0.5	<0.8	<0.5	<30	<10	-	<300	-	-	<300	-	-	-		
	5/25/95	11:45	<0.6	2.2	<3	<6	<5	<1	14					<5	<3	<5	<3	-	-	-	-	-	-	-	-	-	-		
	10/19/95	14:15	<0.7	5.3	4.1	7.1	<5	<1	33					<0.9	<0.9	<0.9	<0.5	<30	<10	-	<300	-	-	<300	<1	<40	-		
	4/17/96	11:30	2.0	6.5	6.1	9.8	46.0	<7	24					<1.7	<1.7	<1.7	<0.7	<37	<19	<370	<370	<370	<370	<370	<2	<56	<1.7		
	11/6/96	14:00	1.0	3.4	2.6	<6	<5	<1	12					<0.9	<0.9	<0.9	<0.5	<24	<12	<240	<240	<240	<240	<240	<1	<37	<0.9	<37	<37
	4/8/97		4.6	4.0	2.7	<6	<5	<1	15					<0.9	<0.9	<0.9	<0.5	<25	<12	<250	<250	<250	<250	<250	<1	<37	<0.9	<37	<37
	10/9/97	11:35	<1	2.6	<2	<5	<4	<1	5.5	26,000	0.0	0.2		<0.7	<0.7	<0.7	<0.4	<20	<10	-	-	-	-	-	<1	<30	<0.7	<30	<30
	6/30/98	13:00	0.3	1.7	1.0	1.6	1.2	<0.5	9	2,580	1.7	4.9		<4	<3	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	10/19/98	12:18	0.5	4.2	1.3	1.1	2.3	<0.5	9	4,000	0.9	3.1		<4	<3	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	5/20/99	13:13	0.4	6.3	2.4	<10.0	1.3	<0.5	10	3,840	0.0	0.2		<4	<3	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	5/31/00	11:00	<0.3	3.0	1.5	1.7	1.3	<0.5	18	3,460	0.0	0.0		<4	<3	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
TCOL02	8/29/91	14:30	0.9	15	27	<10.0	13	<0.2	95					<20	<20	<20	<20	<500	<200	-	<500	-	-	<500	-	-	-		
	6/14/93	13:00	5.1	39	36	13.0	36	0.5	98					<2	<2	<2	<2	<2000	<200	-	<300	-	-	<300	-	-	-		
	10/6/93	11:00	3.1	6.0	6.5	7.4	7.3	<1.3	25					<1	<1	<1	<1	<30	<10	-	<300	-	-	<300	-	-	-		
	5/4/94	13:45	2.0	8.6	7.3	<8	<6	<2	28					<1	<0.6	<1	<0.6	<30	<20	-	<300	-	-	<300	-	-	-		
	11/8/94	10:30	0.96	5.8	12.0	<9	<7	<2	40					<7	<4	<7	<4	40	<20	<400	<400	<400	<400	<400	<9	<50	<7		
	5/25/95	11:15	<0.7	5.4	8.2	<7	7.3	<1	31					<6	3.0	<6	<3	-	-	-	-	-	-	-	-	-	-		
	10/19/95	13:45	<0.9	21	21	<14	18	<2	94					2.1	4.0	<2	<0.7	40	<20	-	<400	-	-	<400	<2	<60	-		
	4/17/96	10:55	<1.0	17	20	<23	17	<1	74					<1.5	<1.5	<1.5	<0.6	<29	<14	<290	<290	<290	<290	<290	<1	<43	<1.5	46	
	11/6/96	14:45	<1.0	11	8.8	7.1	7	<1	41					<0.9	<0.9	<0.9	<0.5	<24	<12	<240	<240	<240	<240	<240	<1	<37	<0.9	<37	<37
	4/8/97		12.0	6.4	8.7	9.8	12	<1	40					<0.8	<0.8	<0.8	<0.5	<24	<12	<240	<240	<240	<240	<240	<1	<36	<0.8	<36	<36
	10/9/97	13:50	<2.0	6.5	9.1	<10	<9	<2	28	6,700	3.7	18.3		<2	<2	<2	<0.9	<200	<100	-	-	-	-	-	<2	<70	<2	<70	<70
	6/19/98	14:50	0.4	11.3	9.6	5.4	8.2	<0.5	47.3	12,790	3.1	24.9		<4	<3	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25

Semiannual Sediment Sampling

006836

STATION	DATE	TIME	Cd mg/kg	Cr mg/kg	Cu mg/kg	Pb mg/kg	Ni mg/kg	Ag mg/kg	Zn mg/kg	Fe mg/kg	Silt+Clay %	Tot Clay %	PO_4 as P mg/Kg	DDD µg/kg	DDE µg/kg	DDT µg/kg	gamma BHC µg/kg	2,4-D µg/kg	2,4,5-TP Silvex µg/kg	Benzo(b) µg/kg	Benzo(k) µg/kg	Chrysene µg/kg	Firanth µg/kg	Pyrene µg/kg	Mthxy µg/kg	Dznon µg/kg	Endo I µg/kg	Aroclor 1254 µg/kg	Aroclor 1260 µg/kg
OSOL03	8/29/91	10:30	0.4	1.4	9.6	<10	0.9	<0.2	11.0					<20	<20	<20	<10	<500	<200	-	<500	-	-	<500	-	-	-		
	6/18/92	11:30	0.6	1.1	1.3	<5	1.2	<0.2	5.5					<1	<1	<1	<1	<20	<10	-	<200	-	-	<400	-	-	-		
	11/5/92	10:40	<0.5	4.7	3.9	<5	2.8	<0.3	11.0					<1	<1	<1	<1	<300	<100	-	<500	-	-	<300	-	-	-		
	6/14/93	12:15	<0.5	3.5	1.5	7.9	2.0	<0.2	5.4					<1	<1	<1	<1	<1000	<100	-	<300	-	-	<300	-	-	-		
	10/6/93	10:30	0.7	1.5	<0.2	<0.6	<0.5	<1.2	41					<2	<2	<2	<2	<30	<20	-	<300	-	-	<300	-	-	-		
	5/4/94	14:00	0.9	2.9	<3	<6	<5	<1	11					<0.9	<0.5	<0.9	<0.5	<30	<10	-	<300	-	-	<300	-	-	-		
	11/8/94	10:00	<0.7	2.6	3.5	<7	<5	<1	13					<5	<3	<5	<3	30	<10	<300	<300	<300	<300	<300	<7	<40	<5		
	5/25/95	10:45	<0.7	<1.0	<3	<7	<5	<1	8.9					<5	<3	<5	<3	-	-	-	-	-	-	-	-	-	-		
	10/19/95	13:30	<0.7	2.5	3.5	<7	<6	<1	34					<1.5	<1.5	<1.5	<0.5	<30	<10	-	<300	-	-	<300	<1	<40	-		
	4/17/96	10:35	<1.0	4.6	5.8	<7	<5	<1	21					<0.9	<0.9	<0.9	<0.5	<26	<13	<260	<260	<260	<260	<260	<1	<39	<0.9		
	11/6/96	15:00	<1.0	4.1	2.6	<6	<5	<1	13					<0.8	<0.8	<0.8	<0.5	<34	<12	<240	<240	<240	<240	<240	<1	<35	<0.8	<35	<35
	4/8/97		4.0	1.7	<3	<6	7.9	<1	26					<0.9	<0.9	<0.9	<0.5	<26	<13		<260	<260	<260	<260	<1	<38	<0.9	<38	<38
	10/9/97	14:10	<2	2.5	4.3	<8	<6	<2	16	3,400	0.0	0.2		<1	<1	<1	<0.6	<30	<20	-	-	-	-	-	<2	<50	<1	<50	<50
	6/30/98	12:50	0.4	13.0	5.3	2	<5	<0.5	25.5	8,010	28.4	58.6		<4	<3	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	10/19/98	10:40	2.8	4.3	2.5	1.8	2.1	<0.5	12.7	2,620	3.3	10.3		<4	<3	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	5/20/99	14:00	4.3	10.1	13.0	<10	8.9	<0.5	51.3	7,100	2.7	12.1		<4	<3	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
SCBJ03	6/19/98	14:10	10.2	4.8	10.7	2.2	68.2	<0.5	78.1	3,350				<4	<3	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	5/20/99	10:30	0.5	12.4	5.8	<10	8.0	<0.5	21.6	8,460				<4	<3	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
SJOL01	5/4/94	13:00	2.0	11	9.2	8.2	<5	<1	42					<0.9	<0.5	<0.9	<0.5	<30	<10	-	<300	-	-	<300	-	-	-		
	5/25/95	13:30	<0.7	5.0	5.3	<7	<6	<1	21					<6	<3	<6	<3	-	-	-	-	-	-	-	-	-	-		
	4/8/97		17	20.0	6.5	<6	<5	<1	26					<0.9	<0.9	<0.9	<0.5	<25	<12	250	<250	<250	<250	<250	<1	<37	<0.9	<37	<37
	10/9/97	11:15	<1	4.1	4.1	<5	<4	<1	9.5	4,900	0.0	0.1		<0.7	<0.7	<0.7	<0.	<20	<10	-	-	-	-	-	<1	<30	<0.7	<30	<30
	6/30/98	13:30	####	2.4	2.7	1.5	0.7	<0.5	8.3	3,120				<4	<3	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	10/19/98	13:15	0.4	8.7	3.3	2.8	3.5	<0.5	16.4	9,640	13.9	22.1		<4	<3	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	5/20/99	12:35	<0.5	7.9	4.0	<10	2.7	<0.5	17.4	7,610	0.0	0.3		<4	<3	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	5/31/00	10:20	<0.3	6.4	3.4	3.42	2.6	<0.5	20.6	8,290	0.0	0.0		<4	<3	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
PDCM01	5/4/94	10:30	1.6	4.9	3.3	<6	10	<1	20					<0.8	<0.5	3.2	<0.5	<30	<10	-	<300	**1100**	**1400**	**250**	-	-	-		
	10/19/95	15:15	44.0	20	66	<27	110	<2	410					<50	<50	<50	<24	200	<170	-	<500	-	-	<500	<50	51	-		
	5/20/99	12:00	1.0	22	15	<10	15	<0.5	51					<4	<3	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
SDCM02	6/18/92	13:30	22.0	19	96	61.0	120	0.7	570					<4	<3	<3	<11	<800	<110	-	<200	-	-	<400	-	-	-		

Semiannual Sediment Sampling

STATION	DATE	TIME	Cd mg/kg	Cr mg/kg	Cu mg/kg	Pb mg/kg	Ni mg/kg	Ag mg/kg	Zn mg/kg	Fe mg/kg	Clay %	Silt+Clay %	Tot PO4 as P mg/Kg	DDD µg/kg	DDE µg/kg	DDT µg/kg	gamma BHC µg/kg	2,4-D µg/kg	2,4,5-TP Silvex µg/kg	Benzo(b) µg/kg	Benzo(k) µg/kg	Chrysene µg/kg	Flrantl µg/kg	Pyrene µg/kg	Mthxy µg/kg	Dznon µg/kg	Endo I µg/kg	Aroclor 1254 µg/kg	Aroclor 1260 µg/kg
DANA POINT HARBOR																													
DAPTEB	8/29/91	11:20	<0.4	18	82	10	7.9	<0.2	92					<10	<10	<10	<10	<500	<200	-	<500	-	-	<500	-	-	-		
	6/24/92	11:30	<0.9	33	140	42	17	<0.5	220					<20	<20	<20	<10	<200	<100	-	<200	-	-	<400	-	-	-		
	11/24/92	11:30	1.3	45	216	58	26	<0.5	289					<8	<8	<8	<1	<20	<10	-	<400	-	-	<200	-	-	-		
	6/7/93	13:45	0.8	25	120	43	18	<0.4	200					<20	<20	<20	<20	<2000	<200	-	<5000	-	-	<5000	-	-	-		
	10/27/93	10:00	5.5	25	98	28	11	<1.9	160					<11	<11	<11	<11	<40	<120	-	<400	-	-	<400	-	-	-		
	5/5/94	12:45	4.3	26	120	40	13	<2	230					<1.4	<0.8	<1.4	<0.8	**2100**	**120**	-	<400	-	-	<570	-	-	-		
	11/9/94	10:00	4.0	23	160	44	18	<2	260					<9	<5	<9	<5	<50	**20**	<500	<500	<500	<500	<500	<12	<70	<9		
	5/31/95	10:30	3.0	18	120	50	26	<2	240					<6	<4	<6	**4**	-	-	-	-	-	-	-	-	-	-		
	10/23/95	13:10	<1.5	33	200	57	24	<2	350					<9	<9	<9	<4	<40	<20	-	<900	-	-	<900	<15	<70	**22**		
	5/22/96	10:20	3.7	20	150	31	16	<2	290					<8	<8	<8	<4	<41	<20	<410	<410	<410	<410	<410	<4	<410	<8		
	11/14/96		3.5	29	190	41	20	<2	310					<1.9	**11**	<1.9	<0.8	<41	<20	<410	<410	<410	<410	<410	<2	<410	<1.9	63	<61
	4/30/97	10:20	3.3	19	170	37	14	<2	310					<1.8	**7**	<1.8	<0.8	<38	<19	<380	<380	<380	<380	<380	<2	<58	<1.8	58	<58
	10/17/97	8:30	5.6	44	240	59	22	<2	440	32,000	32.9	54.9		<1	13	<1	<1	<200	<100	<2000	<2000	<2000	#####	<2000	<2	<50	<1	<70	<70
	7/28/98	12:30	1.5	18	87	20	9	<0.5	143		33.2	60.7		<4	<3	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	10/28/98	9:40	2.2	6.9	56.8	11.3	8.1	<0.5	86	5,340	36.2	63.9		<4	<3	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	6/23/99	9:00	3.2	14	96	18	9	<0.5	143	9,310	25.5	49.7		<4	<3	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	10/28/99	10:55	1.7	15	83	14	7	<0.5	127	9,650	40.7	72.7		<4	<15	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	6/7/00	11:05	1.4	11	44	18	8	<0.5	98	8,420				<4	<3	<3	<11	<800	<110	-	-	78	173	177	<25	<400	<4	<11	<25
DAPTWB			-	-	84	22	8.9	<0.2	92					<20	<20	<20	<20	<500	<200	-	<500	-	-	<500	-	-	-		
	6/24/92	12:10	<0.7	16	63	33	8.1	<0.4	86					<2	<2	<2	<1	<20	<10	-	<200	-	-	<400	-	-	-		
	11/24/92	12:00	<0.8	32	160	40	15	<0.4	162					<2	**2.4**	<2	<1	<20	<10	-	<400	-	-	<200	-	-	-		
	6/7/93	14:35	<0.7	26	95	59	14	0.3	120					<20	**20**	<20	<20	<2000	<200	**380**	<380	-	-	**640**	-	-	-		
	10/27/93	10:40	5.6	24	140	40	11	<2	180					<4	**6.9**	<4	<4	<40	<20	-	<400	-	-	**1100**	-	-	-		
	5/5/94	13:10	2.5	25	18	15	9.2	<2	73					<1.4	<0.8	<1.4	<0.8	**1600**	**81**	-	<400	-	-	**690**	-	-	-		
	11/9/94	10:10	1.4	23	130	32	12	<3	160					<1.8	<1	<1.8	<1	<50	<30	<500	<500	<500	<500	<500	<3	<80	<1.8		
	5/31/95	11:00	<1.5	17	98	34	15	<2	120					<1.9	**12**	<1.9	<0.8	-	-	-	<400	-	-	<400	**19**	-	-		
	10/23/95	13:30	<0.8	22	110	37	11	<2	130					<1.6	**5.5**	<1.6	<0.6	<30	<20	**370**	<300	**330**	**560**	**920**	<2	<50	<1.6		
	5/22/96	10:45	<2.0	24	130	32	12	<2	130					<1.6	**6.1**	**2.5**	<0.7	<34	<17	<340	<340	<340	<340	<340	<2	<51	<1.6		**3500**
	11/14/96		<2.0	18	93	33	14	<2	120					<1.6	**6.4**	<1.6	<0.7	<160	<82	<330	<330	<330	<330	<330	<2	<49	<1.6	<49	<49
	4/30/97	10:05	<0.9	16	120	26	10	<2	120					3.9	**7.8**	<1.7	<0.7	<37	<19	<370	<370	<370	<370	<370	<2	<56	<37.0	<56	<56
	10/17/97	9:00	<3	48	250	55	18	<3	280	35,000	39.9	63.2		<1	<1	<1	<1	<300	100	<500	<500	<500	<500	<500	<3	<80	<1	<80	<80
	7/28/98	13:00	0.39	22.8	109	16	10	<0.5	98		22.6	50.4		<4	<3	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	10/28/98	10:00	<0.15	13.2	68.1	14.1	6.6	<0.5	66.5	8,180	31.1	63.4		<4	<3	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	6/23/99	9:30	0.3	14.7	81.2	19.0	7.6	<0.5	90	10,210	21.0	41.8		<4	<3	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	10/28/99	11:20	<0.2	15.5	81.5	11.5	5.0	<0.5	92	6,860	29.0	58.4		<4	<3	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	6/7/00	11:35	<0.2	14.7	37.1	18.4	7.3	<0.5	60	6,330	11.5	25.8		5	6	8	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25

Above NOAA Effects Range Median (ERM) concentration

Anthropogenically Enriched - 99% Confidence using SCCWRP Iron Normalization Database

Semiannual Sediment Sampling

006838

STATION	DATE	TIME	Cd mg/kg	Cr mg/kg	Cu mg/kg	Pb mg/kg	Ni mg/kg	Ag mg/kg	Zn mg/kg	Fe mg/kg	Clay %	Silt+Clay %	Tot PO_4 as P mg/Kg	DDD µg/kg	DDE µg/kg	DDT µg/kg	gamma BHC µg/kg	2,4-D µg/kg	2,4,5-TP Silvex µg/kg	Benzo(b) µg/kg	Benzo(k) µg/kg	Chrysene µg/kg	Flrantr µg/kg	Pyrene µg/kg	Mthxy µg/kg	Dznon µg/kg	Endo I µg/kg	Aroclor 1254 µg/kg	Aroclor 1260 µg/kg
DAPTLB	8/29/91	13:25	<0.4	15	91	17	7.7	<2.0	84					<20	<20	<20	<20	<500	<200	-	<500	-	-	<500	-	-	-		
	6/24/92	13:30	<0.9	25	130	32	12	<5.0	140					<2	<2	<2	<1	<20	<10	-	<200	-	-	<400	-	-	-		
	11/24/92	12:45	<0.9	41	168	41	17	<5.0	193					<2	<2	<2	<1	<20	<10	-	<400	-	-	<200	-	-	-		
	6/7/93	15:50	<0.7	29	110	40	14	0.5	130					<9	<9	<9	<9	<2000	<20	-	<400	-	-	<400	-	-	-		
	10/27/93	11:30	6.4	45	150	45	16	2.3	190					2	9	<2	<2	<40	<20	-	<400	-	-	<400	-	-	-		
	5/5/94	14:10	2.0	35	140	40	14	<2	200					<1.6	3	<1.6	<0.9	<2000	<1200	-	<500	-	-	<500	-	-	-		
	11/9/94	11:00	4.3	40	150	36	19	<2	200					<1.6	<0.9	<1.6	<0.9	<50	<20	<500	<500	<500	<500	<500	<2	<70	<1.6		
	5/31/95	12:15	1.7	23	160	30	18	<2	170					<1.9	7	<1.9	<0.8	-	-	-	-	-	-	-	-	-	-		
	10/23/95	14:25	<1.6	36	160	34	19	<2	230					<2	7	<2	<0.9	<50	<20	<500	<500	<500	<500	<500	<2	<70	<2		
	5/22/96	11:40	<3.0	31	200	38	19	<3	210					<2	2	<2		<51	<26	<510	<510	<510	<510	<510	<3	<77	<2		
	10/16/96	14:00	<2.0	24	180	36	17	<2	220					<95	<95	<95	<48.0	<48	<24	<480	<480	<480	<480	<480	<120	<71	<95	<4800	<4800
	4/30/97	10:50	<1.4	24	180	36	15	<2	180					<2.1	8.1	<2.1	<1.0	<48	<24	<480	<480	<480	<480	<480	<2	<71	<48	<71	<71
	10/17/97	10:20	<3	54	200	46	18	<3	230	43,000	36.9	83.3		<1	<1	<1	<1	<50	<30	<500	<500	<500	<500	<500	<3	<80	<1	<80	<80
	7/28/98	14:00	<0.15	22.4	81.0	10.8	9.3	<0.5	88		39.7	80.3		<4	<3	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	10/28/98	9:00	<0.15	14.7	76.8	13.0	7.8	<0.5	84	11,750	33.8	77.1		<4	<3	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	6/23/99	8:45	<0.15	17.4	80.7	13.5	7.6	<0.5	84	11,890	42.0	78.3		<4	<3	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	10/28/99	11:48	0.3	18.2	74.2	12.4	6.7	6.7	81	12,400	32.8	93.4		<4	<3	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	6/7/00	12:00	<0.20	12.5	79.6	12.8	6.6	<0.5	95	9,760				<4	6	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
DAPTLR	8/29/91	13:30	0.4	16	39	<10.0	12	<0.2	61					<20	<20	<20	<20	<500	<200	-	<500	-	-	<500	-	-	-		
	6/24/92	13:05	<0.7	33	42	16	15	<0.4	93					<2	<2	<2	<1	<20	<10	-	<200	-	-	<400	-	-	-		
	11/24/92	12:30	<0.9	32	100	23	18	<0.4	130					<3	<3	<3	<1	<20	<10	-	<400	-	-	<200	-	-	-		
	6/7/93	15:30	<0.9	34	220	41	19	0.6	160					<10	<10	<10	<10	<2000	<200	-	<400	-	-	<400	-	-	-		
	10/27/93	11:10	8.3	43	110	29	18	<2.4	160					<2	6	2	<2	<40	<20	-	<400	-	-	<400	-	-	-		
	5/5/94	14:30	2.6	39	140	30	19	<2	140					<1.5	1.7	<1.5	<0.8	<400	<200	-	<400	-	-	<400	-	-	-		
	11/9/94	10:45	1.5	40	130	24	11	<2	140					<1.6	<0.9	<1.6	<0.9	<50	<20	<500	<500	<500	<500	<500	<2	<70	3.3		
	5/31/95	12:45	2.1	22	150	20	20	<2	150					<2	2.6	<2	<0.8		-	-	-	-	-	-	-	-	-		
	10/23/95	14:10	<1.6	29	150	31	58	<2	150					<2	5.2	<2	<0.9	<50	<20	<500	<500	<500	<500	<500	<2	<70	<2.1		
	5/22/96	11:40	<2.0	27	140	27	17	<2	140					<2	<2	<2	<0.8	<42	<21	<420	<420	<420	<420	<420	<2	<62	<1.9		
	11/14/96		<2.0	16	81	14	13	<2	75					<1.6	3.2	<1.6	<0.6	<32	<16	<320	<320	<320	<320	<320	<2	<48	<1.6	<48.0	<48.0
	4/30/97	10:35	<1.6	29	220	29	19	<2	180					<2.0	7.1	<2.0	<0.9	<44	<22	<440	<440	<440	<440	<440	<2	<67	<2.0	<67.0	<67.0
	10/17/97	9:45	<2	36	120	28	14	2	140	32,000	25.0	39.3		<1	<1	<1	<0.8	<200	<100	<400	<400	<400	<400	<400	<2	<60	<1	<60	<60
	7/28/98	13:30	<0.3	21	106	11	9	<0.5	93		38.7	82.2		<4	<3	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	10/28/98	9:15	<0.2	10.6	63.1	9.3	6.8	<0.5	54	8,960	36.9	79.7		<4	<3	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	6/23/99	10:00	2	15.4	####	10.3	9.4	<0.5	65	11,120	45.7	86.4		<4	<3	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	10/24/99	10:05	0.18	18.3	63.7	9.3	7.7	<0.5	96	14,200	37.2	82.0		<4	<3	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	6/7/00	12:15	<0.2	17.9	61.5	10.9	8.3	<0.5	78	13,500				<4	5	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
DAPTOP	6/24/92	12:35	<0.9	21	72	16	11	<0.5	98					<2	<2	<2	<1	<20	<10	-	<200	-	-	<400	-	-	-		

Above NOAA Effects Range Median (ERM) concentration

Anthropogenically Enriched - 99% Confidence using SCCWRP Iron Normalization Database

Appendix 5.5
Stream Hydrographs during Sampled Storms

Stormwater Sampling in Anaheim Barber City Channel

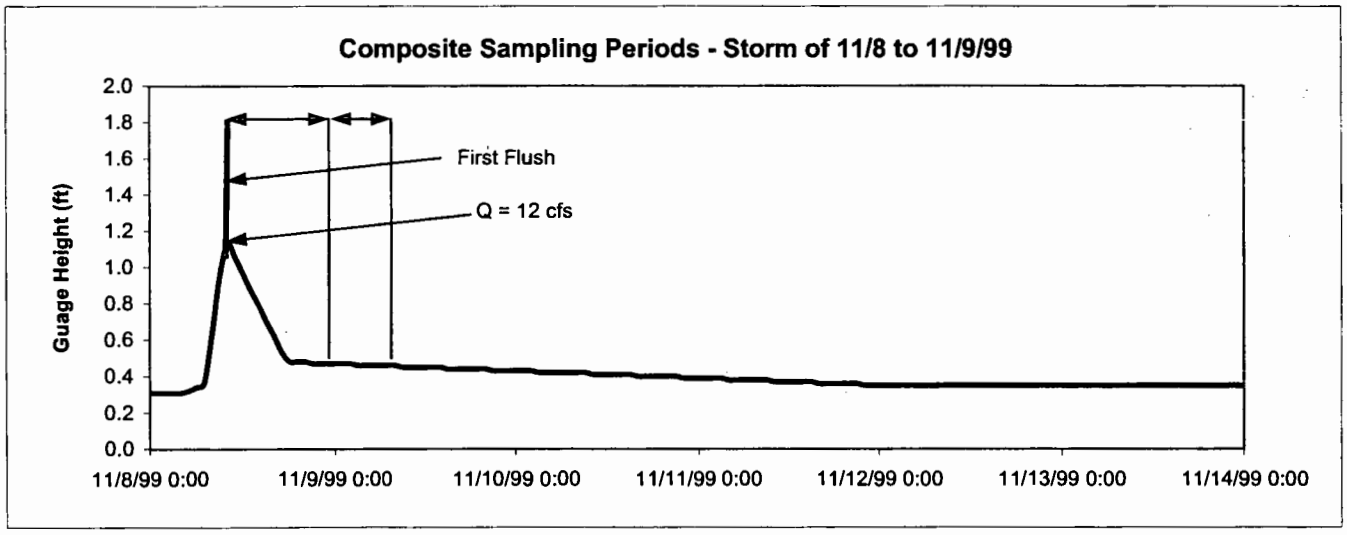

Stormwater Sampling in Peters Canyon Wash @ Barranca Parkway

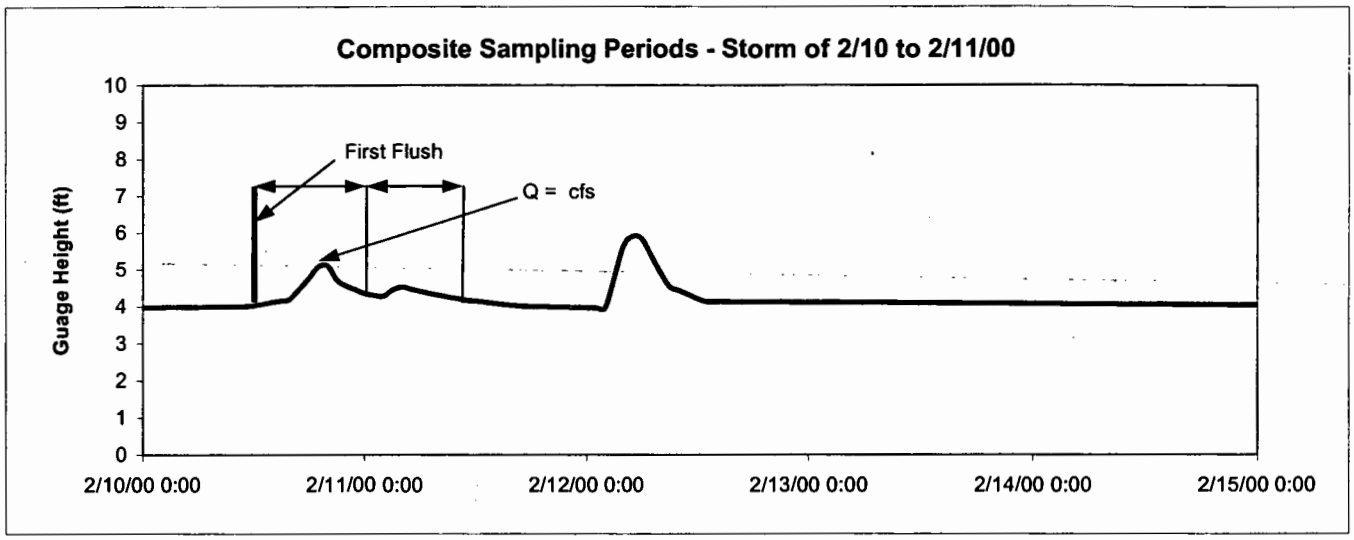

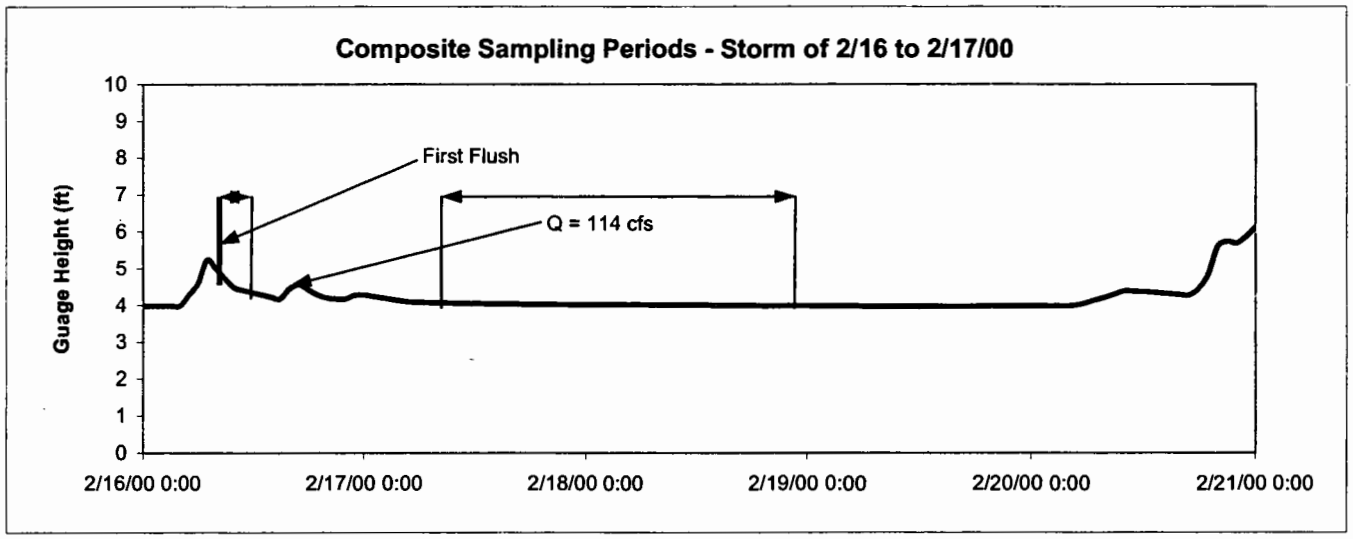

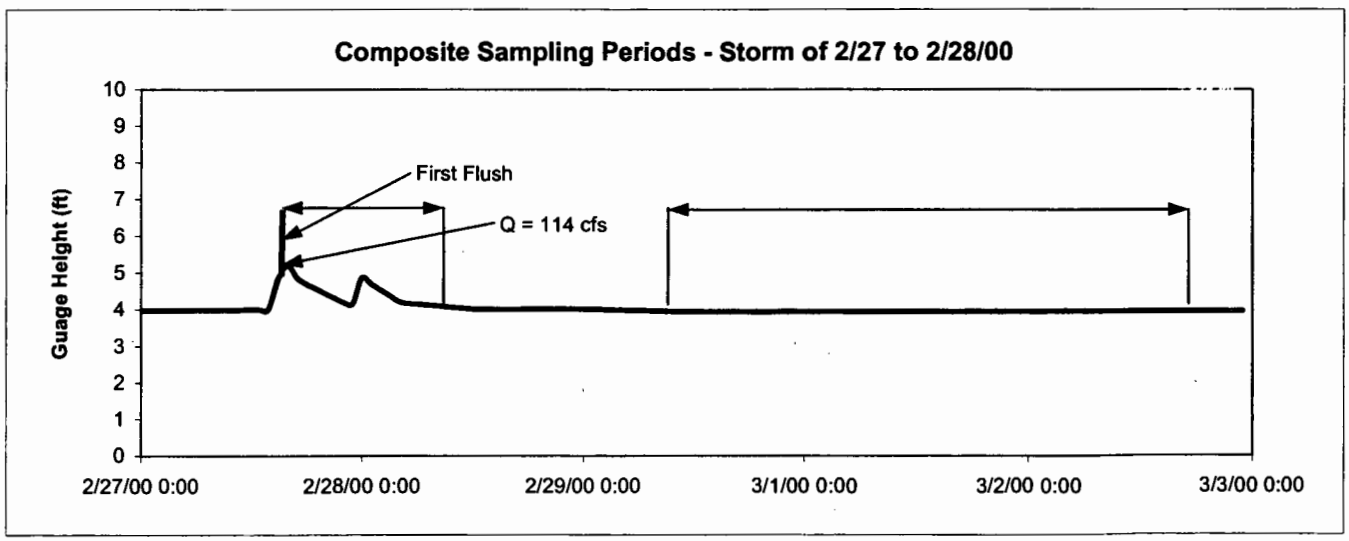

Stormwater Sampling in Peters Canyon Wash @ Barranca Parkway

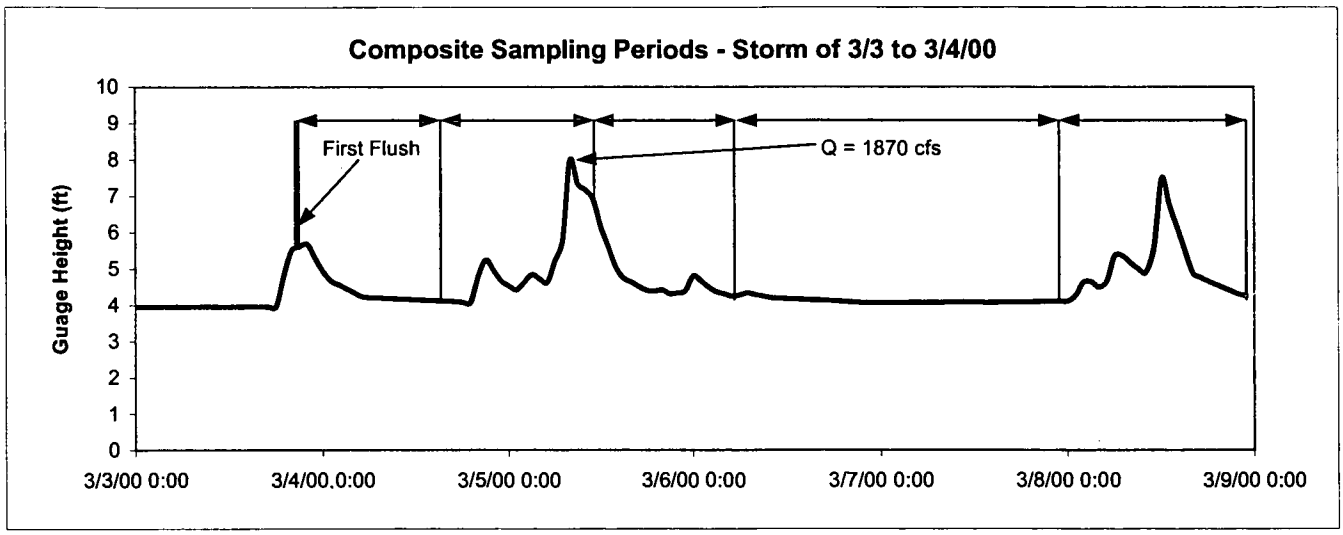

Stormwater Sampling in Costa Mesa Channel

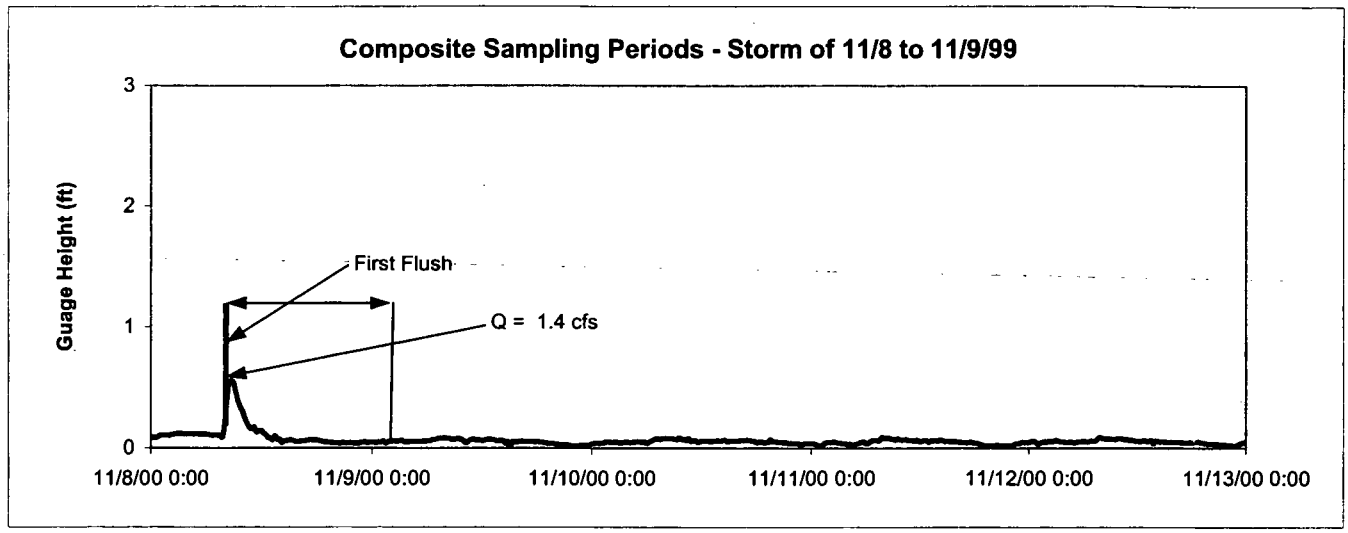

Stormwater Sampling in East Garden Grove Wintersburg Channel

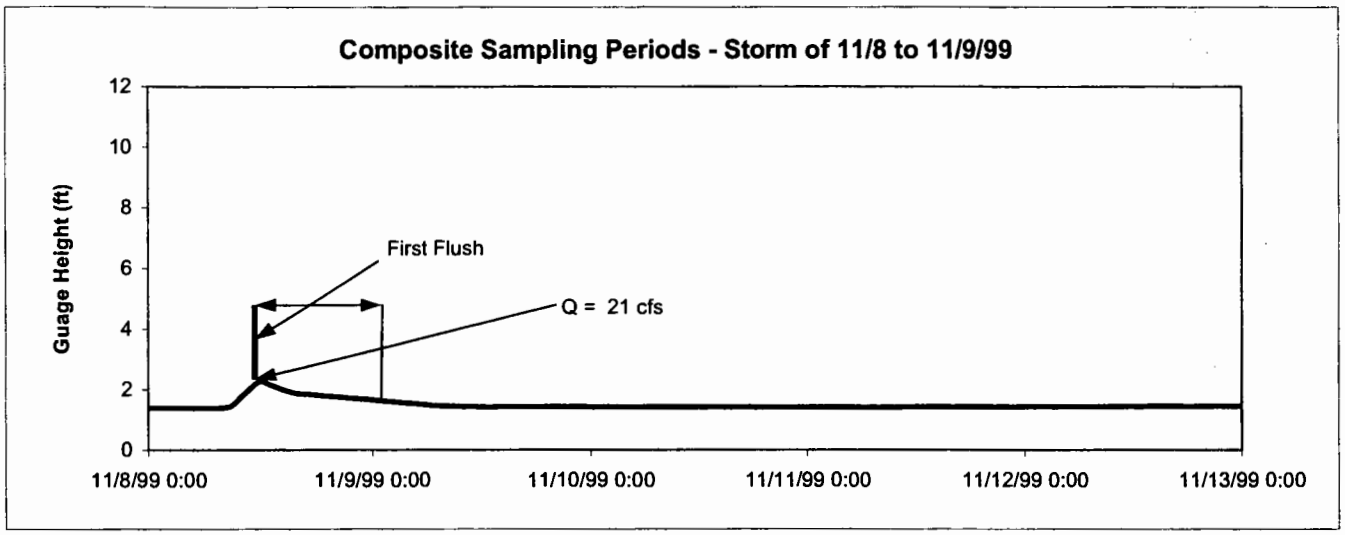

Stormwater Sampling in El Modena-Irvine @ Michelle

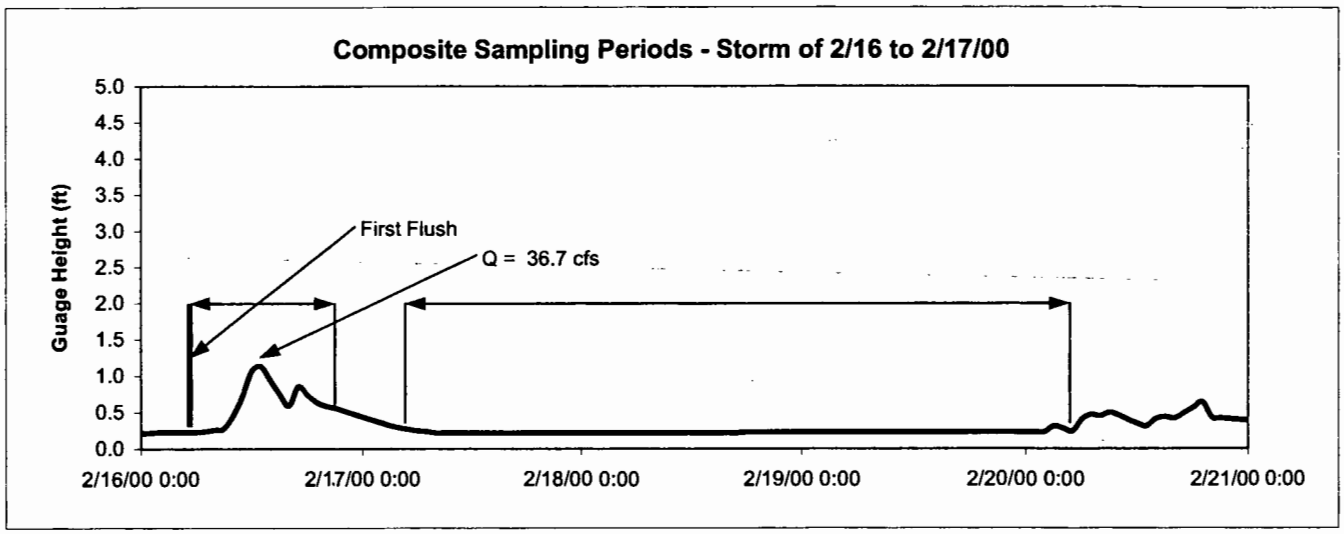

Stormwater Sampling in Santa Ana Delhi Channel

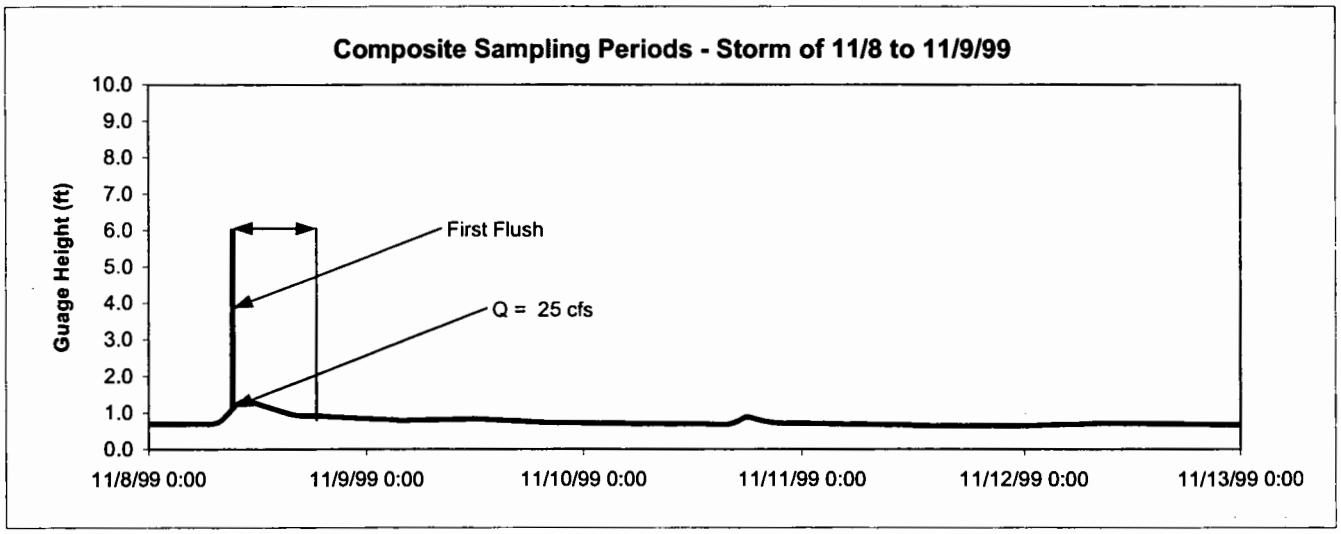

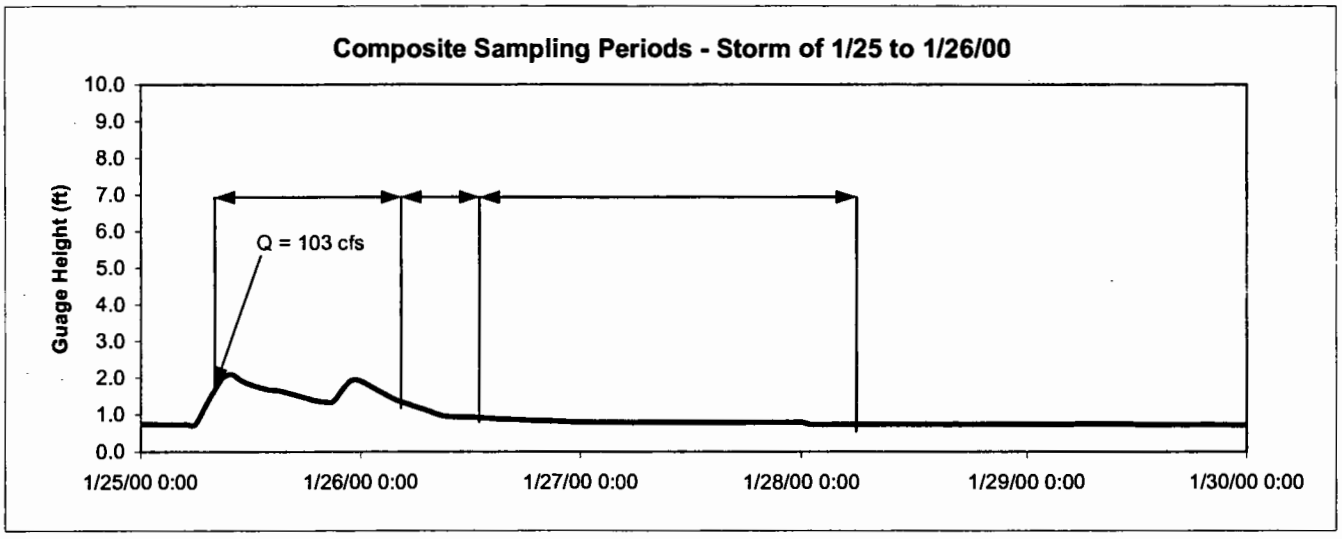

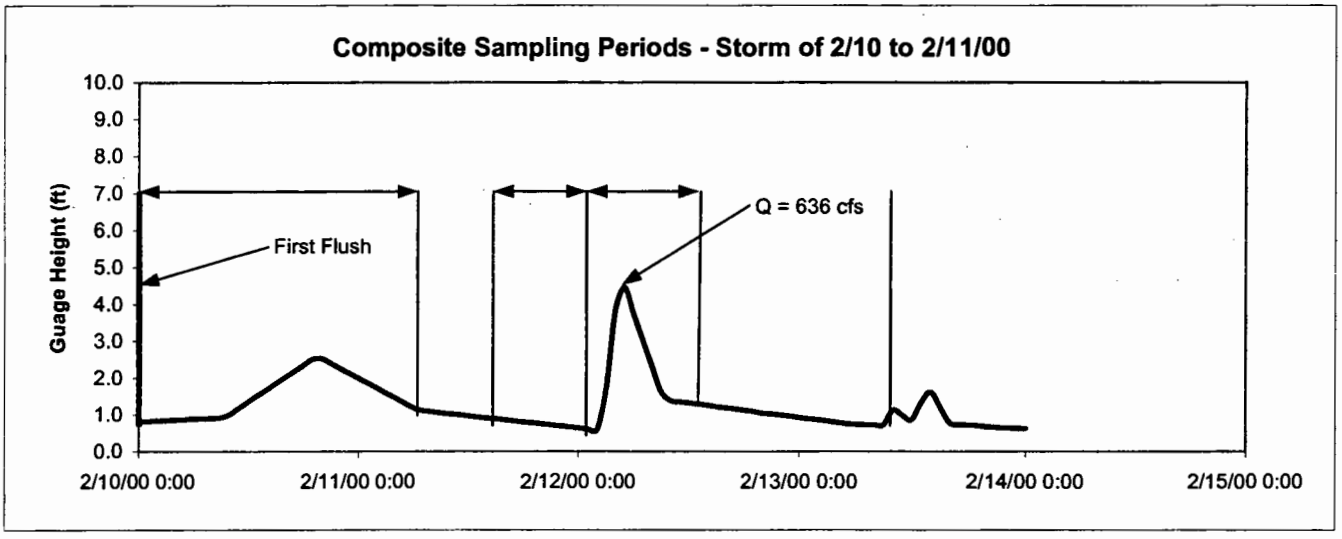

Stormwater Sampling in Santa Ana Delhi Channel

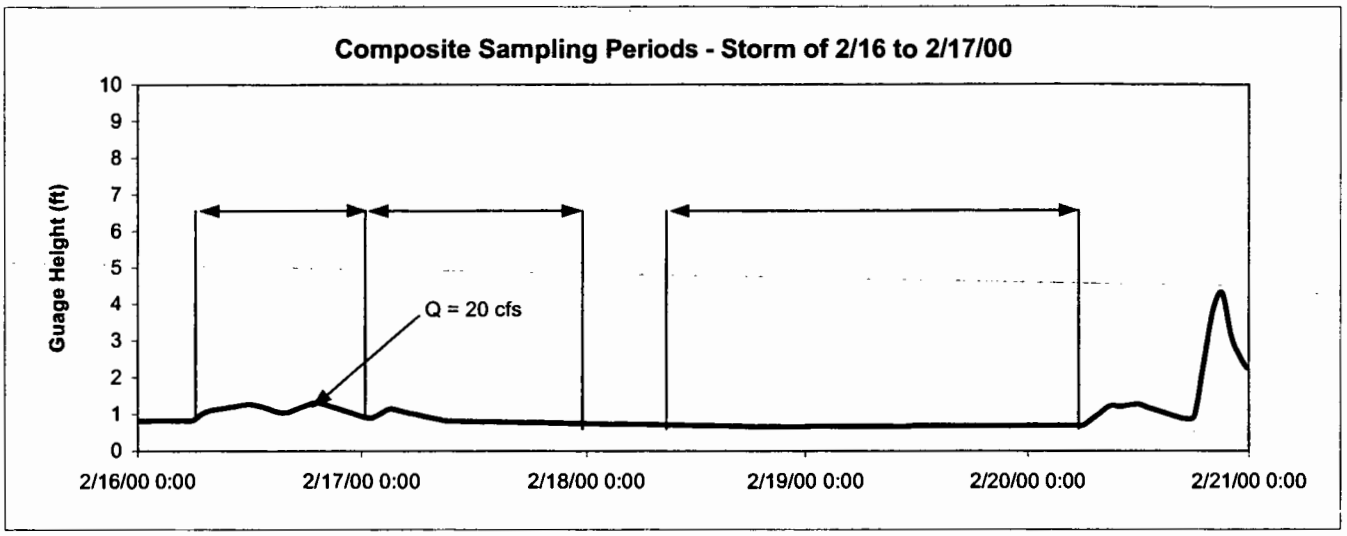

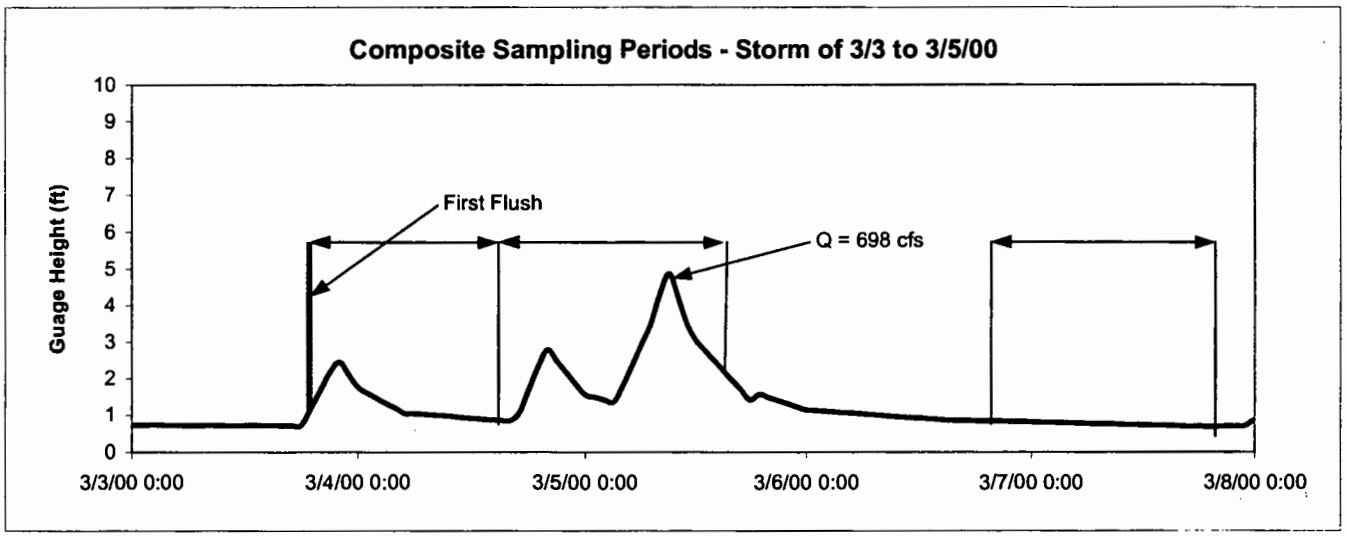

Stormwater Sampling in San Diego Creek @ Campus Drive

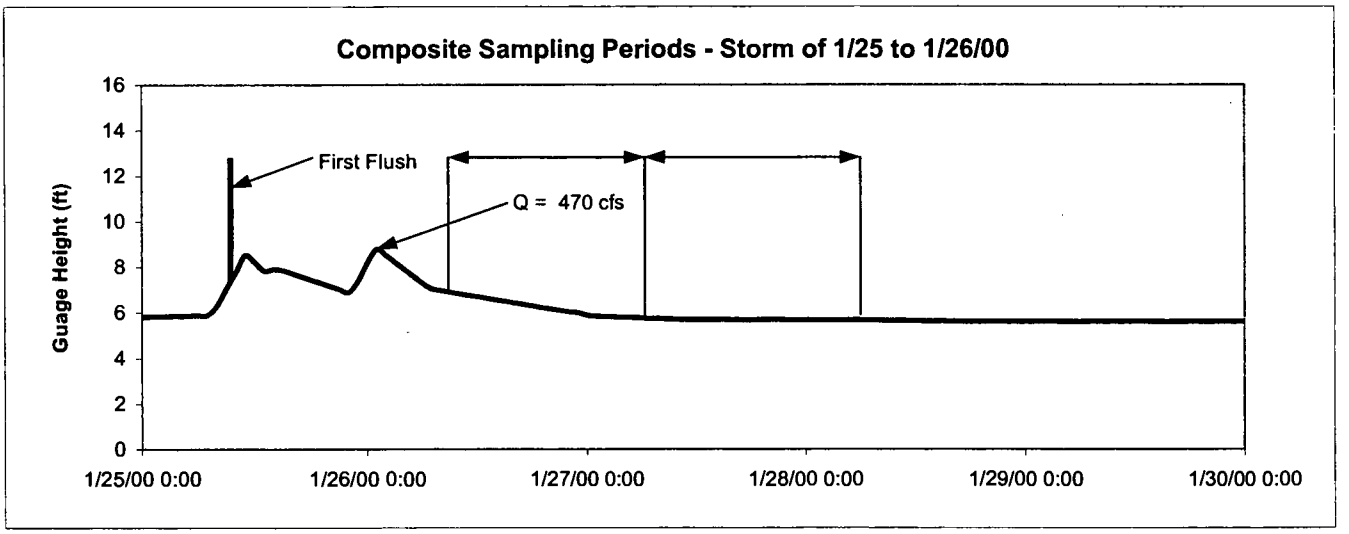

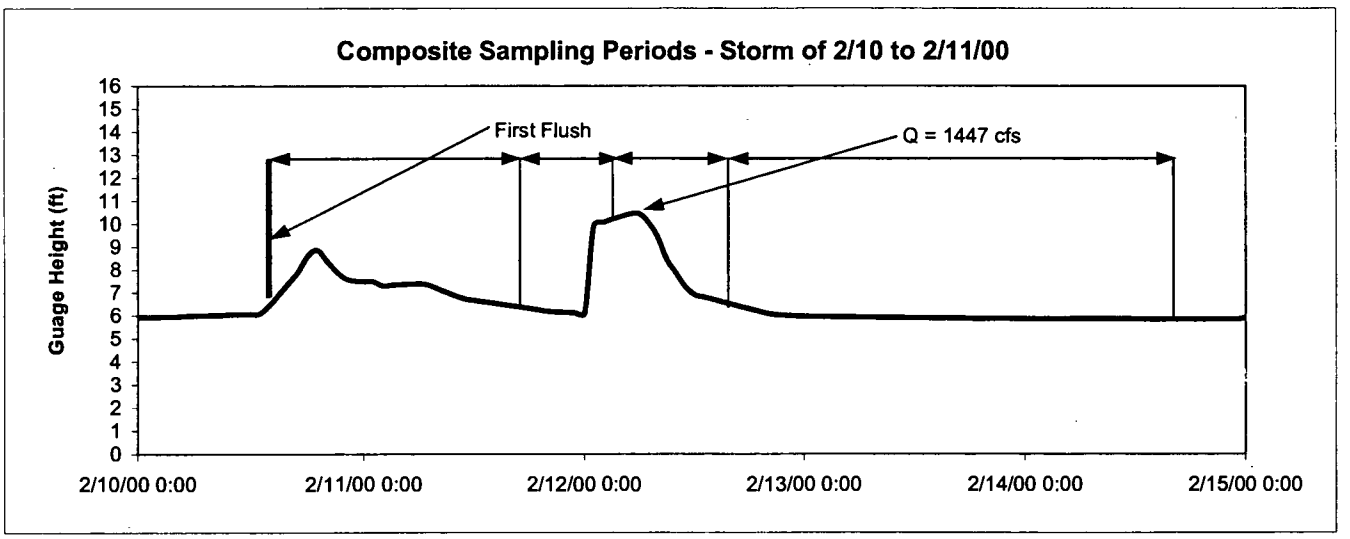

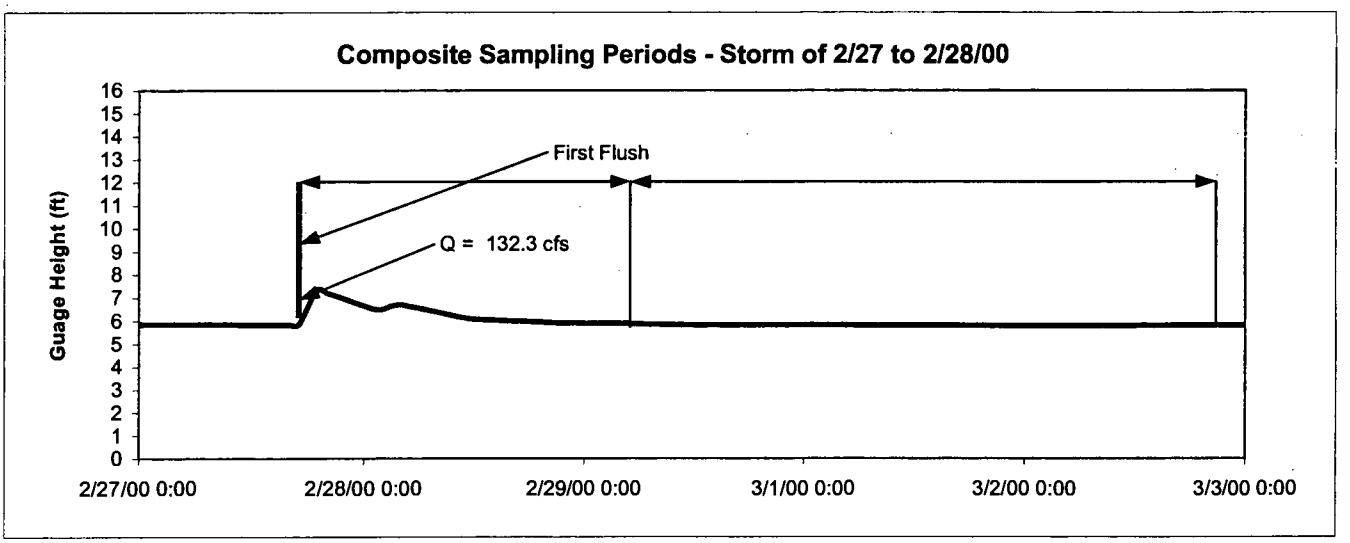

Stormwater Sampling in San Diego Creek @ Campus Drive

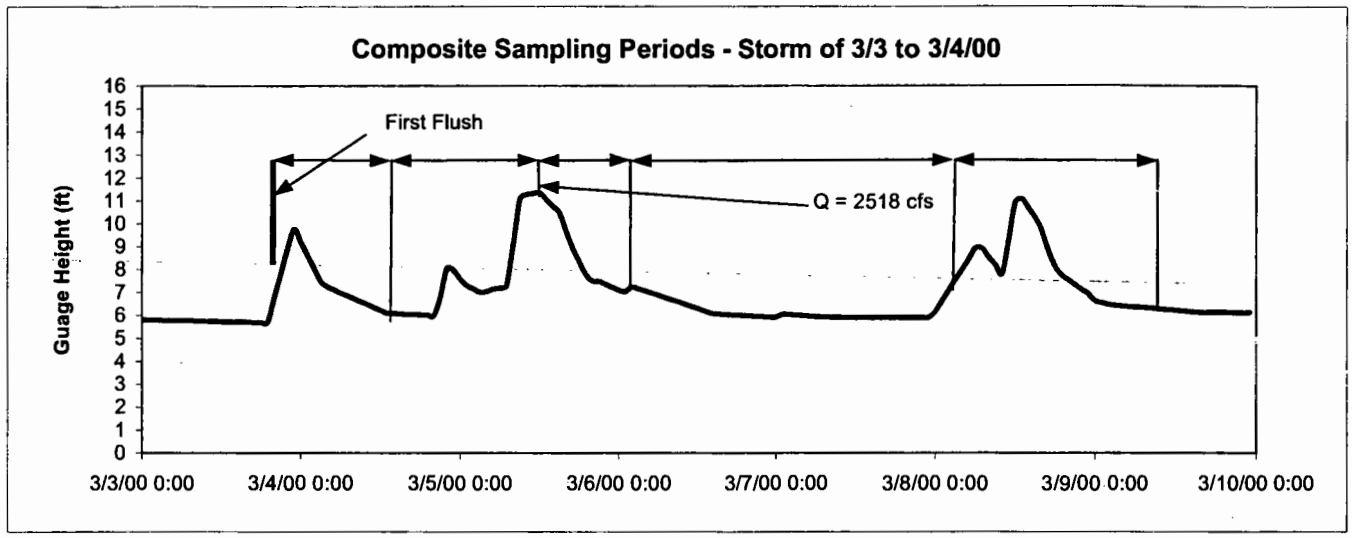

Stormwater Sampling in San Diego Creek @ Harvard Ave.

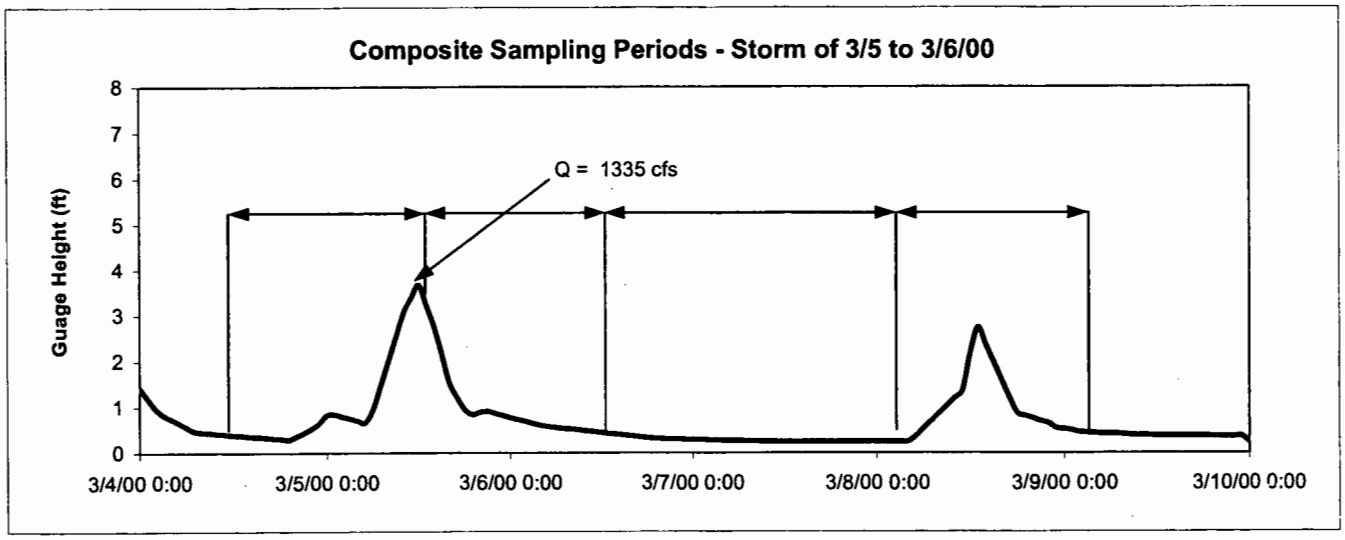

Stormwater Sampling in Lane Channel

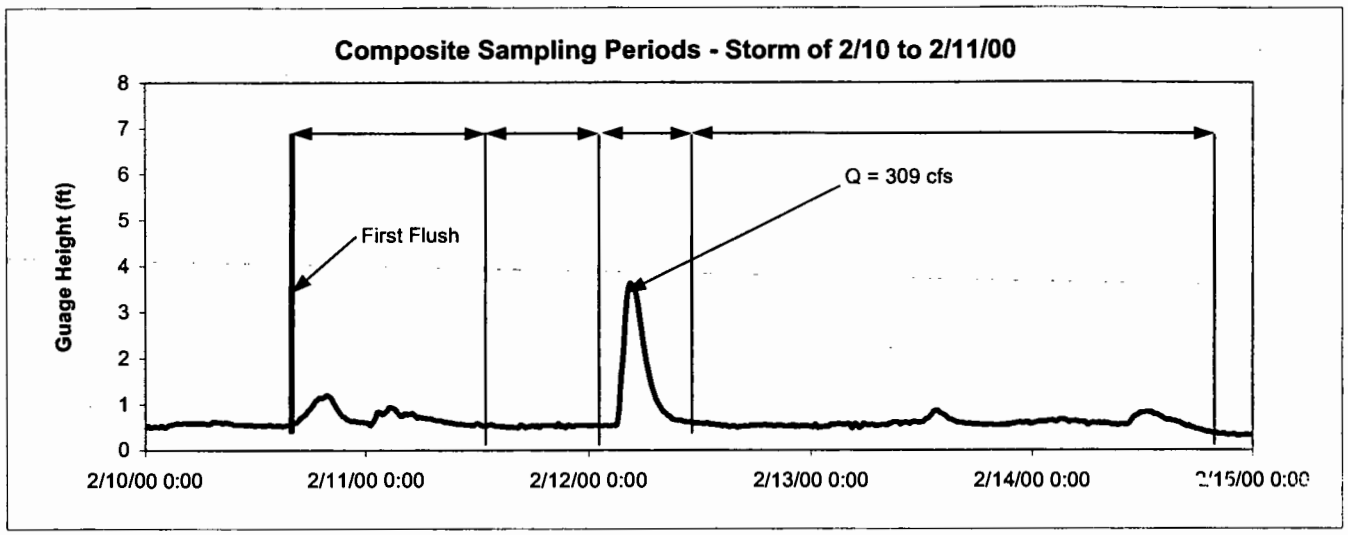

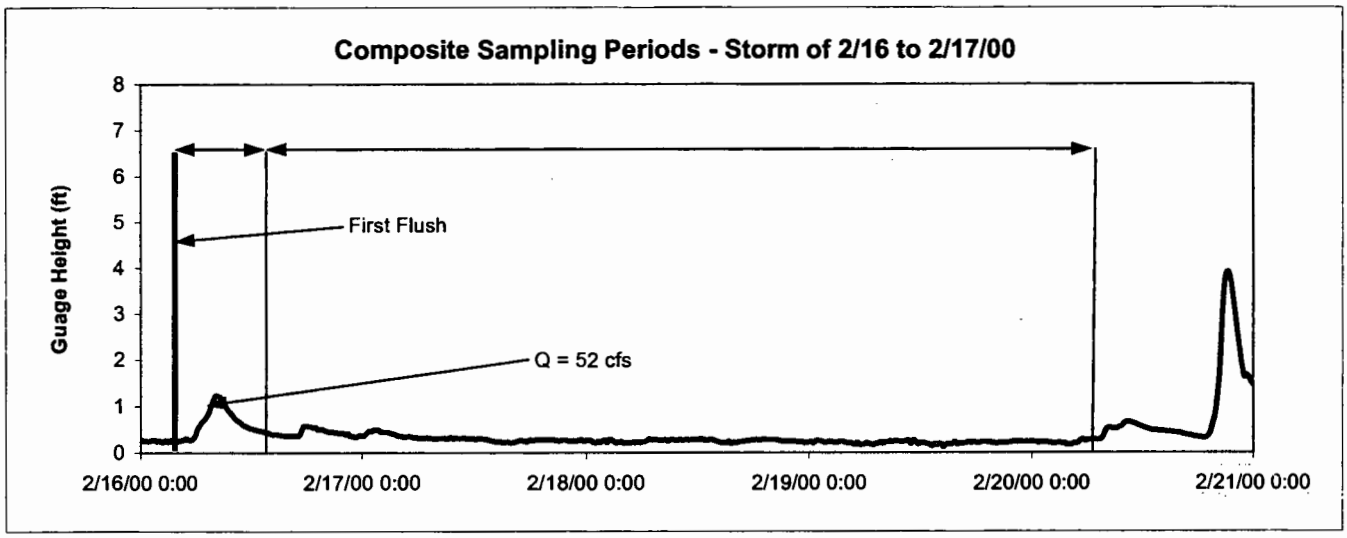

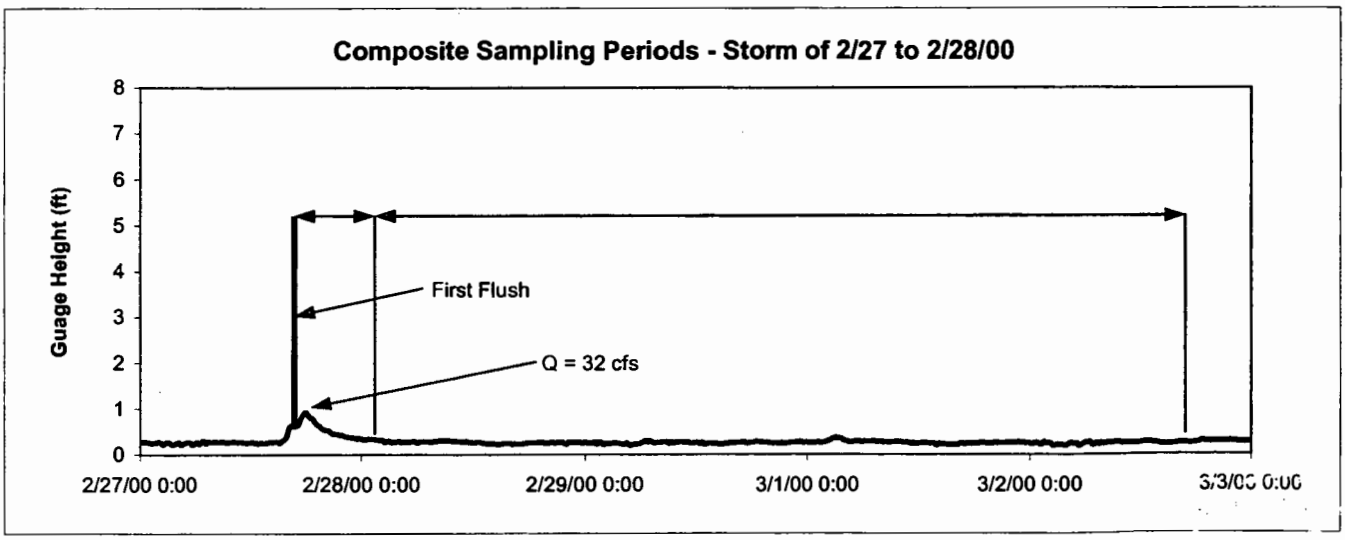

Stormwater Sampling in Lane Channel

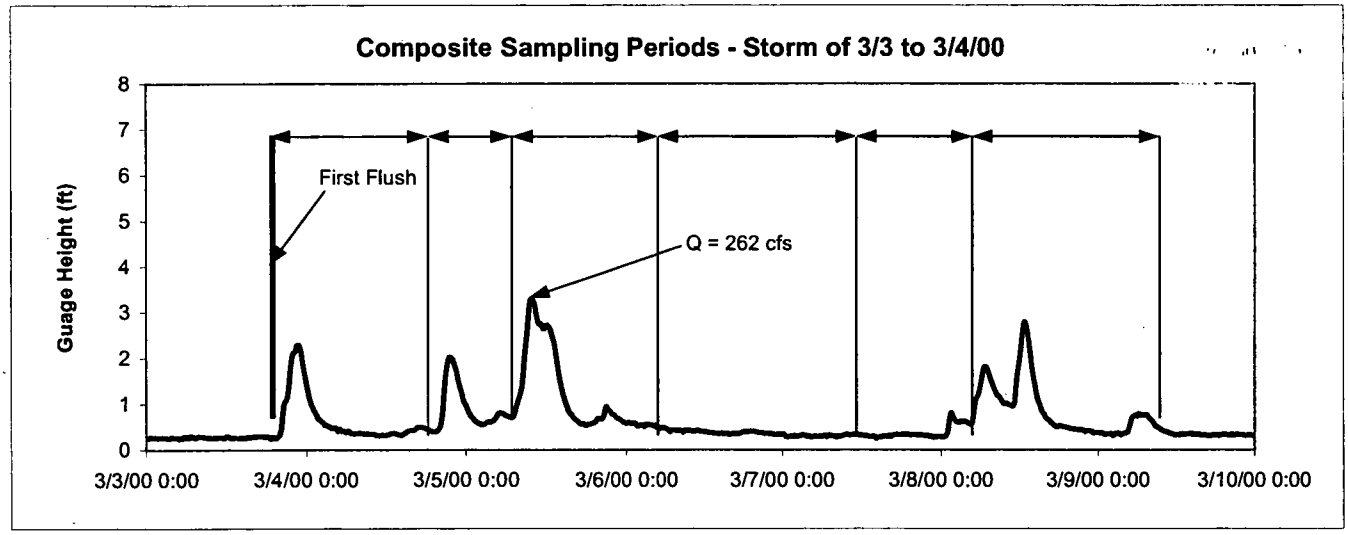

Stormwater Sampling in Westminster Channel

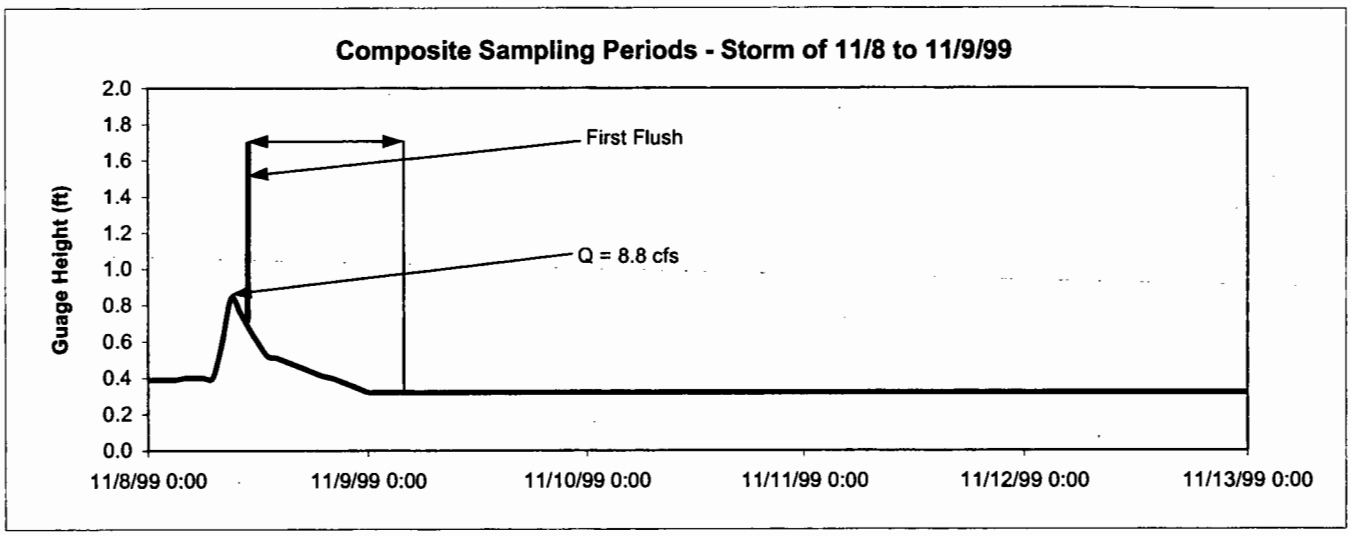

Appendix 5.6
Mass Loads from Sampled Storms

Massloads of Sampled Storms - 1999/00 Season

STATION	DATE / TIME	SAMPLES Type	#	Volume ac-ft	Storm Volume	NO_3 mg/L	NH_3 mg/L	TKN mg/L	PO_4 mg/L	o-PO_4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
ABCC03	11/8/99 10:52	ST	5	1.42		37.8	2.51	9.6	3.67		400	220	1.81	12.8	102	26.5	34.5	1	684	220
ABCC03	11/8/99 11:52	SF											0.5	4	41.6	3.79	29.7	1	382	
						145.7	*9.7*	*37.0*	*14.1*		*1,542*	*848*	*0.01*	*0.05*	*0.39*	*0.10*	*0.13*	*0.00*	*2.64*	*848.1*
ABCC03	11/8/99 13:52	ST	6	8.01		33.4	1.38	12	1.62		320	180	0.5	4	95.3	11.2	27.8	1	394	360
ABCC03	11/8/99 23:52	SF											0.5	4	42.4	2.87	25.3	1	251	
						727.0	*30.0*	*261.2*	*35.3*		*6,965*	*3,918*	*0.01*	*0.09*	*2.07*	*0.24*	*0.61*	*0.02*	*8.58*	*7,835.9*
Period Totals (lbs)			*11*	*9.4*	*16.2*	*873*	*40*	*298*	*49*		*8,507*	*4,766*	*0.02*	*0.14*	*2.5*	*0.35*	*0.74*	*0.03*	*11.2*	*8,684*
BCC02	11/8/99 10:36	ST	5	4.12		39.2	1.67	12	2.05		660	150	0.5	9.99	47.4	17.7	17.2	1	194	336
BCC02	11/8/99 11:36	SF																		
						438.7	*18.7*	*134.3*	*22.9*		*7,386*	*1,679*	*0.01*	*0.11*	*0.53*	*0.20*	*0.19*	*0.01*	*2.17*	*3,760.2*
BCC02	11/8/99 12:36	ST	6	18.17		38.3	3.1	9.1	1.16		260	100	0.5	4	72.8	8.17	52.5	1	223	216
BCC02	11/8/99 23:36	SF											0.5	4	31	2.81	35.6	1	162	
						1,891.1	*153.1*	*449.3*	*57.3*		*12,838*	*4,938*	*0.02*	*0.20*	*3.59*	*0.40*	*2.59*	*0.05*	*11.01*	*10,665.0*
Period Totals (lbs)			*11*	*22.3*	*28.9*	*2,330*	*172*	*584*	*80*		*20,224*	*6,616*	*0.03*	*0.31*	*4.12*	*0.60*	*2.78*	*0.06*	*13.18*	*14,425*
EGWC05	11/8/99 11:10	ST	5	4.35		29	2.7	11	2.36		360	220	0.5	8.79	63.9	19.6	31	1	346	212
EGWC05	11/8/99 12:10	SF											0.5	4	26.3	4	29.7	1	203	
						342.4	*31.9*	*129.9*	*27.9*		*4,251*	*2,598*	*0.01*	*0.10*	*0.75*	*0.23*	*0.37*	*0.01*	*4.09*	*2,503.4*
EGWC05	11/8/99 14:10	ST	6	27.40		25.5	1.72	13	1.32		180	80	0.5	4	50.6	8.25	30.7	1	245	292
EGWC05	11/9/99 0:10	SF											0.5	4	30.9	2.62	28.2	1	185	
						1,898.3	*128.0*	*967.8*	*98.3*		*13,400*	*5,956*	*0.04*	*0.30*	*3.77*	*0.61*	*2.29*	*0.07*	*18.24*	*21,737.7*
Period Totals (lbs)			*11*	*31.7*	*43.7*	*2,241*	*160*	*1,098*	*126*		*17,651*	*8,553*	*0.04*	*0.4*	*4.5*	*0.8*	*2.7*	*0.1*	*22.3*	*24,241*
WMCC04	11/8/99 11:18	ST	5	1.18	12.26	40	4.66	1.5	3.37		400	240	1.45	12.9	160	26.5	48.2	1	555	300
WMCC04	11/8/99 12:18	SF											0.5	13.7	54.7	3.83	42	1	302	
						128.0	*14.9*	*4.8*	*10.8*		*1,280*	*768*	*0.00*	*0.04*	*0.51*	*0.08*	*0.15*	*0.003*	*1.78*	*960.0*

Mass Loads of Sampled Storms - 1999/00 Season
San Diego Creek at Campus Drive

STATION	DATE / TIME	SAMPLES Type	SAMPLES #	Volume ac-ft	Storm Volume	NO_3 mg/L	NH_3 mg/L	TKN mg/L	PO_4 mg/L	o-PO_4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
SDMF05	7/8/99 9:01	ST	3	8.09	70.11	30.1	0.2	1.29	0.643	0.19	64	14	0.5	4	9.21	1	2	1	26.6	520
SDMF05	7/8/99 11:01	SF											0.5	4	7.1	1	2	1	18.4	
						661.3	4.4	28.3	14.1	4.2	1,406	308	0.01	0.09	0.20	0.02	0.04	0.02	0.58	11,425
SDMF05	1/25/00 9:12	ST	5	15.04		55	0.459	2	2.02	0.17	150	120	0.5	8.03	25.2	4.8	6.54	1	49.9	700
SDMF05	1/25/00 10:12	SF											1.17	4	21.1	2.62	6.5	1	32.7	
						2,247.9	18.8	81.7	82.6	6.9	6,131	4,905	0.02	0.33	1.03	0.20	0.27	0.04	2.04	28,610
SDMF05	1/26/00 8:10	ST	12	69.46		30	0.668	2.3	2.42	0.06	180	130	0.5	4	25.2	6.86	12.5	1	58	192
SDMF05	1/27/00 6:10	SF											0.5	4	18.9	3.3	8.71	1	34.7	
						5,661.9	126.1	434.1	456.7	11.3	33,972	24,535	0.09	0.75	4.76	1.29	2.36	0.19	10.95	36,236
SDMF05	1/27/00 8:10	ST	12	19.04		36	0.641	2.7	1.93		92	54	0.5	4	17.3	3.93	8.3	1	34.4	115
SDMF05	1/28/00 6:10	SF											0.5	4	10.4	1	5.2	1	12.4	
						1,862.4	33.2	139.7	99.8		4,759	2,794	0.03	0.21	0.89	0.20	0.43	0.05	1.78	5,949
Period Totals (lbs)			29	103.5	453.0	9,772	178	656	639	18	44,862	32,233	0.1	1.3	6.7	1.7	3.1	0.3	14.8	70,796
SDMF05	2/10/00 14:44	ST	5	8.42		31	0.118	1.3	0.499	0.02	45	22	0.5	4	12.4	1	2	1	5	700
SDMF05	2/10/00 15:44	SF											0.5	4	14.1	1	2	1	5	
						709.5	2.7	29.8	11.4	0.5	1,030	504	0.01	0.09	0.28	0.02	0.05	0.02	0.11	16,021
SDMF05	2/10/00 17:44	ST	13	321.36		22	0.345	2.4	1.95	0.23	270	70	0.5	4	21.8	8.02	8.91	1	73.9	360
SDMF05	2/11/00 17:44	SF											0.5	4	14.5	3.84	5.59	1	39.2	
						19,210.7	301.3	2,095.7	1,702.8	200.8	235,768	61,125	0.44	3.49	19.04	7.00	7.78	0.87	64.53	314,357
SDMF05	2/11/00 19:44	DT	5	287.05		20	0.287	1.2	1.23	0.29	130	62	0.5	4	13	3.61	5.14	1	37.3	458
SDMF05	2/12/00 3:44	DF											0.5	4	11.6	2.58	4.43	1	27.7	
						15,600.0	223.9	936.0	959.4	226.2	101,400	48,360	0.39	3.12	10.14	2.82	4.01	0.78	29.09	357,240
SDMF05	2/12/00 5:44	ST	6	547.98		16	0.319	2	4.53	0.37	980	830	3.36	33.7	44.6	25.5	25.5	1	221	686
SDMF05	2/12/00 15:44	SF											1.92	17.3	22.2	11.3	12.7	1	94.7	
						23,824.3	475.0	2,978.0	6,745.2	550.9	1,459,237	1,235,884	5.00	50.18	66.41	37.97	37.97	1.49	329.07	1,021,466
SDMF05	2/12/00 17:44	DT	23	71.94		26	0.193	1.8	1.53	0.306	120	56	0.5	4	12.6	2.93	2	1	30.9	284
SDMF05	2/14/00 15:44	DF											0.5	4	7.64	1	2	1	11.9	
						5,082.2	37.7	351.8	299.1	59.8	23,456	10,946	0.10	0.78	2.46	0.57	0.39	0.20	6.04	55,513
Period Totals (lbs)			52	1236.7	1192.7	64,427	1,041	6,391	9,718	1,038	1,820,890	1,356,819	5.9	57.7	98.3	48.4	50.2	3.4	428.9	1,764,596

Mass Loads of Sampled Storms - 1999/00 Season
San Diego Creek at Campus Drive

STATION	DATE / TIME	SAMPLES Type	SAMPLES #	Volume ac-ft	Storm Volume	NO_3 mg/L	NH_3 mg/L	TKN mg/L	PO_4 mg/L	o-PO_4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
SDMF05	2/27/00 17:57	SF	5	8.08		42	0.025	0.96	0.857	0.064	150	30	0.5	4	9.47	1	2	1	18.5	402
SDMF05	2/27/00 18:57	ST											0.5	4	8.82	1	2	1	18	
						922.0	0.5	21.1	18.8	1.4	3,293	659	0.01	0.09	0.21	0.02	0.04	0.02	0.41	8,825
SDMF05	2/27/00 20:57	SF	17	113.45		22	0.025	1.1	0.979	0.095	100	40	0.5	4	13.8	2.63	2	1	27.7	
SDMF05	2/29/00 4:57	ST											0.5	4	12.7	1	2	1	21.4	
						6,782.1	7.7	339.1	301.8	29.3	30,828	12,331	0.15	1.23	4.25	0.81	0.62	0.31	8.54	
SDMF05	2/29/00 6:57	DT	31	62.25		38	0.025	1.2	0.887	0.042	110	70	0.5	4	10.9	2.8	4.08	1	35.2	
SDMF05	3/2/00 18:57	DF											0.5	4	8.35	1	2	1	14	
						6,427.9	4.2	203.0	150.0	7.1	18,607	11,841	0.08	0.68	1.84	0.47	0.69	0.17	5.95	
Period Totals (lbs)			53	183.8	114.6	14,132	12	563	471	38	52,727	24,830	0.2	2.0	6.3	1.3	1.4	0.5	14.9	
SDMF05	3/3/00 21:20	ST	4	18.73		45	0.146	1.5	1.32	0.051	200	104	0.5	4	20.9	6.36	6.94	1	52.3	660
SDMF05	3/3/00 22:00	SF											0.5	4	1	2	1	11		
						2,290.6	7.4	76.4	67.2	2.6	10,180	5,294	0.03	0.20	1.06	0.32	0.35	0.05	2.66	33,595
SDMF05	3/4/00 0:05	ST	8	265.87		32	0.31	1.7	1.59	0.16	240	120	0.5	4	20.4	7	11.8	1	57.6	420
SDMF05	3/4/00 14:05	SF											0.5	4	8.45	1	4.52	1	15.3	
						23,118.5	224.0	1,228.2	1,148.7	115.6	173,389	86,694	0.36	2.89	14.74	5.06	8.52	0.72	41.61	303,431
SDMF05	3/4/00 16:05	DT	10	470.91		18	0.417	1.5	1.84	0.184	250	120	0.5	4	18.9	7.51	13.4	1	63.2	220
SDMF05	3/5/00 10:05	DF											0.5	4	7.17	1	2	1	15.7	
						23,032.6	533.6	1,919.4	2,354.4	235.4	319,897	153,551	0.64	5.12	24.18	9.61	17.15	1.28	80.87	281,509
SDMF05	3/5/00 12:05	DT	8	1130.09		9.5	0.171	2.3	4.28	0.728	900	600	2.16	23.5	26.5	15.8	18.1	1	131	
SDMF05	3/6/00 2:05	DF											1.08	1.5	15.3	7.3	9.7	1	65.2	
						29,172.2	525.1	7,062.8	######	2,235.5	2,763,685	1,842,457	6.63	72.16	81.38	48.52	55.58	3.07	402.27	
Period Totals (lbs)			30.0	1885.6	1987.0	77,614	1,290	10,287	16,713	2,589	3,267,152	2,087,996	7.7	80.4	121.4	63.5	81.6	5.1	527.4	618,536
SDMF05	4/18/00 7:50	ST	10	423.25		22	0.06	2	6.43	0.244	1,600	580	4.6	35	55	58	33	1	300	320
SDMF05	4/19/00 1:50	SF											0.5	4	11	2.5	4.2	1	15	260
						25,301.9	69.0	2,300.2	7,395.1	280.6	1,840,140	667,051	5.29	40.25	63.25	66.71	37.95	1.15	345.03	368,028
SDMF05	4/19/00 3:50	DT	32	84.26		40	0.201	0.95		0.237	100	56								
SDMF05	4/21/00 15:50	DF											0.5	4	14	1	2	1	5	552
						9,158.6	46.0	217.5		54.3	22,897	12,822								
Period Totals (lbs)			42	507.5	1562.3	34,461	115	2,518	7,395	335	1,863,037	679,873	5.3	40.3	63.3	66.7	38.0	1.2	345.0	368,028

Mass Loads of Sampled Storms - 1999/00 Season
Lane Channel

STATION	DATE / TIME	SAMPLES Type	#	Volume ac-ft	Storm Volume	NO_3 mg/L	NH_3 mg/L	TKN mg/L	PO_4 mg/L	o-PO_4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
LANF08	2/10/00 16:45	ST	5	1.71		9.9	0.163	3.1	1.13	0.08	440	140	2.32	17.6	81.8	29.6	10.4	1	300	280
LANF08	2/10/00 17:45	SF											0.5	4	15.5	1	2	1	23.2	
						46.1	*0.8*	*14.4*	*5.3*	*0.4*	*2,049*	*652*	*0.01*	*0.08*	*0.38*	*0.14*	*0.05*	*0.00*	*1.40*	*1,304.1*
LANF08	2/10/00 19:45	ST	10	35.29		6.9	0.273	1.3	0.881	0.12	78	44	0.5	4	34.6	9.83	8.8	1	131	136
LANF08	2/11/00 11:45	SF											0.5	4	12.9	1	5.2	1	35.4	
						661.6	*26.2*	*124.7*	*84.5*	*11.5*	*7,479*	*4,219*	*0.05*	*0.38*	*3.32*	*0.94*	*0.84*	*0.10*	*12.56*	*13,040.9*
LANF08	2/11/00 13:45	DT	6	9.34		11	0.025	0.31	0.444	0.12	30	14	0.5	4	10.4	2.3	2	1	32.4	284
LANF08	2/11/00 23:45	DF											0.5	4	5.17	1	2	1	12.6	
						279.3	*0.6*	*7.9*	*11.3*	*3.0*	*762*	*355*	*0.01*	*0.10*	*0.26*	*0.06*	*0.05*	*0.03*	*0.82*	*7,211.0*
LANF08	2/12/00 1:45	ST	5	67.72		6.3	0.234	2.6	1.93	0.09	310	80	2.44	16.2	70.3	29.5	15.8	1	265	395
LANF08	2/12/00 9:45	SF											0.5	4	7.36	1	2	1	14	
						1,159.3	*43.1*	*478.4*	*355.1*	*16.6*	*57,042*	*14,721*	*0.45*	*2.98*	*12.94*	*5.43*	*2.91*	*0.18*	*48.76*	*72,683.1*
LANF08	2/12/00 11:45	DT	28	70.57		10	0.096	0.72	0.502	0.091	25	14	0.5	4	15.2	3.13	2	1	46.3	720
LANF08	2/14/00 17:45	DF											0.5	4	8.92	1	2	1	23	
						1,917.7	*18.4*	*138.1*	*96.3*	*17.5*	*4,794*	*2,685*	*0.10*	*0.77*	*2.91*	*0.60*	*0.38*	*0.19*	*8.88*	*138,075.2*
Period Totals (lbs)			*54*	*184.6*	*188.2*	*4,064*	*89*	*763*	*552*	*49*	*72,127*	*22,632*	*0.6*	*4.3*	*19.8*	*7.2*	*4.2*	*0.5*	*72.4*	*232,314*
LANF08	2/16/00 5:30	ST	5	0.57		25	0.24	2.6	1.01	0.21	86	64	0.5	4	32.7	5.52	2	1	108	168
LANF08	2/16/00 6:30	SF											0.5	4	15.6	1	2	1	74.2	
						38.7	*0.4*	*4.0*	*1.6*	*0.3*	*133*	*99*	*0.00*	*0.01*	*0.05*	*0.01*	*0.00*	*0.00*	*0.17*	*260.3*
LANF08	2/16/00 8:30	ST	3	13.76		7	0.195	2.1	0.903	0.16	84	44	1.37	10.7	38.9	11.8	10.4	1	138	
LANF08	2/16/00 12:30	ST																		
						261.7	*7.3*	*78.5*	*33.8*	*6.0*	*3,140*	*1,645*	*0.05*	*0.40*	*1.45*	*0.44*	*0.39*	*0.04*	*5.16*	
Period Totals (lbs)			*8*	*14.3*	*16.2*	*300*	*8*	*83*	*35*	*6*	*3,274*	*1,744*	*0.1*	*0.4*	*1.5*	*0.4*	*0.4*	*0.0*	*5.3*	*260*
LANF08	2/27/00 16:46	ST	5	1.54		42	0.206	1.1	1.41	0.248	140	50	1.18	4	25.9	5.97	2	1	89.7	1090
LANF08	2/27/00 17:46	SF											0.5	4	29.9	1	2	1	37.8	
						176.2	*0.9*	*4.6*	*5.9*	*1.0*	*587*	*210*	*0.00*	*0.02*	*0.11*	*0.03*	*0.01*	*0.00*	*0.38*	*4,573.9*
LANF08	2/27/00 19:46	ST	3	7.25		9.1	0.025	1.4	0.734	0.083	90	50	1	4	35.2	4.36	12.3	1	86.9	290
LANF08	2/27/00 23:49	ST																		
						179.4	*0.5*	*27.6*	*14.5*	*1.6*	*1,774*	*985*	*0.02*	*0.08*	*0.69*	*0.09*	*0.24*	*0.02*	*1.71*	*5,715.9*
LANF08	2/28/00 1:46	DT	45	28.81		41	0.025	0.63	0.887	0.161	35	21	1.02	4	15.1	1	5.65	1	48.1	450
LANF08	3/2/00 19:37	DF											0.5	4	11.4	1	4.35	1	45.9	
						3,209.8	*2.0*	*49.3*	*69.4*	*12.6*	*2,740*	*1,644*	*0.08*	*0.31*	*1.18*	*0.08*	*0.44*	*0.08*	*3.77*	*35,229.1*
Period Totals (lbs)			*53*	*37.6*	*15.1*	*3,565*	*3*	*82*	*90*	*15*	*5,101*	*2,839*	*0.1*	*0.4*	*2.0*	*0.2*	*0.7*	*0.1*	*5.9*	*45,519*

Mass Loads of Sampled Storms - 1999/00 Season
Santa Ana Delhi Channel

STATION	DATE / TIME	SAMPLES Type	#	Volume ac-ft	Storm Volume	NO_3 mg/L	NH_3 mg/L	TKN mg/L	PO_4 mg/L	o-PO_4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
SADF01	11/8/99 10:47	ST	5	1.80		44	3.76	13	3.37		460	220	3.46	14.8	168	40.4	54.2	1	901	320
SADF01	11/8/99 11:47	SF											0.5	4	45.4	9.82	39.3	1	532	
						214.9	*18.4*	*63.5*	*16.5*		*2,247*	*1,075*	*0.02*	*0.07*	*0.82*	*0.20*	*0.26*	*0.00*	*4.40*	*1,563.0*
SADF01	11/8/99 13:47	ST	4	5.68		38.3	1.85	11	1.81		300	160	1.37	4	76.6	11.3	27.6	1	365	504
SADF01	11/8/99 19:47	SF											0.5	4	40.2	3.96	27.4	1	290	
						591.2	*28.6*	*169.8*	*27.9*		*4,631*	*2,470*	*0.02*	*0.06*	*1.18*	*0.17*	*0.43*	*0.02*	*5.63*	*7,779.4*
Period Totals (lbs)			*9*	*7.5*	*10.7*	*806*	*47*	*233*	*44*		*6,877*	*3,544*	*0.0*	*0.1*	*2.0*	*0.4*	*0.7*	*0.0*	*10.0*	*9,342*
SADF01	1/25/00 8:14	ST	11	48.33		14	1.1	4.4	3.67	0.17	370	230	1.88	13.6	96.1	52.1	18.5	1	364	316
SADF01	1/25/00 19:14	SF											1.93	4	35.8	15.6	12.3	1	137	84
						1,838.4	*144.4*	*577.8*	*481.9*	*22.3*	*48,587*	*30,203*	*0.25*	*1.79*	*12.62*	*6.84*	*2.43*	*0.13*	*47.80*	*41,495.9*
SADF01	1/26/00 7:40	ST	4	2.39		12	0.615	2.2	1.22		30	12	0.5	4	28.5	7.59	8.26	1	74.4	184
SADF01	1/26/00 13:40	SF											0.5	4	18.5	1	6.31	1	45.9	
						77.9	*4.0*	*14.3*	*7.9*		*195*	*78*	*0.00*	*0.03*	*0.18*	*0.05*	*0.05*	*0.01*	*0.48*	*1,193.8*
SADF01	1/26/00 15:40	ST	4	7.58		16	0.225	1.4	0.459		22	12	0.5	4	13	2.25	2	1	31.9	50
SADF01	1/28/00 5:40	SF											0.5	4	10.7	1	2	1	27.3	
						329.6	*4.6*	*28.8*	*9.5*		*453*	*247*	*0.01*	*0.08*	*0.27*	*0.05*	*0.04*	*0.02*	*0.66*	*1,029.9*
Period Totals (lbs)			*19*	*58.3*	*88.0*	*2,246*	*153*	*621*	*499*	*22*	*49,235*	*30,528*	*0.3*	*1.9*	*13.1*	*6.9*	*2.5*	*0.2*	*48.9*	*43,720*
SADF01	2/10/00 0:39	ST	5	0.26		16	0.025	0.823	0.121	0.005	6	4	0.5	4	13.3	1	2	1	18.5	920
SADF01	2/10/00 1:39	SF											0.5	4	12.8	1	2	1	16.8	
						11.5	*0.0*	*0.6*	*0.1*	*0.0*	*4*	*3*	*0.00*	*0.00*	*0.01*	*0.00*	*0.00*	*0.00*	*0.01*	*661*
SADF01	2/10/00 3:39	ST	20	132.96		8.9	0.215	2	1.19	0.08	160	50	0.5	4	43.9	19.3	5.94	1	167	296
SADF01	2/11/00 7:39	SF											0.5	4	15.4	1	2	1	51	
						3,215.4	*77.7*	*722.6*	*429.9*	*28.9*	*57,804*	*18,064*	*0.18*	*1.45*	*15.86*	*6.97*	*2.15*	*0.36*	*60.33*	*106,938*
SADF01	2/11/00 11:39	DT	8	6.15		11	0.025	0.69	0.444	0.09	12	7	0.5	4	14.2	2.8	2	1	46.5	296
SADF01	2/12/00 1:39	DF											0.5	4	10.1	1	2	1	34.4	
						183.7	*0.4*	*11.5*	*7.4*	*1.5*	*200*	*117*	*0.01*	*0.07*	*0.24*	*0.05*	*0.03*	*0.02*	*0.78*	*4,943*
SADF01	2/12/00 3:29	ST	6	167.55		4.1	0.243	1.7	1.49	0.12	220	90	0.5	4	55.4	37.9	8	1	208	64
SADF01	2/12/00 13:39	SF											0.5	4	9.25	1	2	1	21.2	
						1,866.6	*110.6*	*774.0*	*678.4*	*54.6*	*100,161*	*40,975*	*0.23*	*1.82*	*25.22*	*17.25*	*3.64*	*0.46*	*94.70*	*29,138*
SADF01	2/13/00 8:46	DT	21	11.88		7.7	0.139	1.7	0.719	0.145	37	23	0.5	4	25.5	9.17	4.16	1	85	295
SADF01	2/14/00 23:39	DF											0.5	4	18.7	3.59	2	1	58.9	
						248.6	*4.5*	*54.9*	*23.2*	*4.7*	*1,195*	*743*	*0.02*	*0.13*	*0.82*	*0.30*	*0.13*	*0.03*	*2.74*	*9,525*
Period Totals (lbs)			*60*	*318.8*	*326.7*	*5,526*	*193*	*1,564*	*1,139*	*90*	*159,365*	*59,901*	*0.4*	*3.5*	*42.2*	*24.6*	*6.0*	*0.9*	*158.6*	*151,206*

Mass Loads of Sampled Storms - 1999/00 Season
Santa Ana Delhi Channel

STATION	DATE / TIME	SAMPLES Type	SAMPLES #	Volume ac-ft	Storm Volume	NO_3 mg/L	NH_3 mg/L	TKN mg/L	PO_4 mg/L	o-PO_4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
SADF01	2/16/00 6:55	ST	9	0.88		7.7	0.125	2.2	0.857	0.12	62	36	0.5	4	31.5	13.7	5.8	1	97.9	160
SADF01	2/17/00 0:55	SF											0.5	4	24.7	7.25	4.9	1	73.5	
						18.4	*0.3*	*5.3*	*2.0*	*0.3*	*148*	*86*	*0.00*	*0.01*	*0.08*	*0.03*	*0.01*	*0.00*	*0.23*	*383*
SADF01	3/3/00 19:40	ST	5	4.77		12	0.669	2.3	0.643	0.041	70	58	0.5	4	38.1	12.7	7.03	1	166	280
SADF01	3/3/00 20:40	SF											0.5	4	23.4	3.63	4.3	1	89.5	
						155.4	*8.7*	*29.8*	*8.3*	*0.5*	*907*	*751*	*0.01*	*0.05*	*0.49*	*0.16*	*0.09*	*0.01*	*2.15*	*3,626*
SADF01	3/3/00 22:40	ST	9	47.70		8.1	0.235	1.3	0.581	0.065	56	38	0.5	4	20.1	8.44	2	1	71.6	232
SADF01	3/4/00 14:40	SF											0.5	4	13.3	1	2	1	37.2	
						1,049.9	*30.5*	*168.5*	*75.3*	*8.4*	*7,258*	*4,925*	*0.06*	*0.52*	*2.61*	*1.09*	*0.26*	*0.13*	*9.28*	*30,071*
SADF01	3/4/00 16:40	DT	10	284.65		6.9	0.301	1.2	0.826	0.12	76	32	0.5	4	47.3	13.7	2	1	97.2	136
SADF01	3/5/00 10:40	DF											0.5	4	34	7.12	2	1	58.5	
						5,336.9	*232.8*	*928.2*	*638.9*	*92.8*	*58,783*	*24,751*	*0.39*	*3.09*	*36.58*	*10.60*	*1.55*	*0.77*	*75.18*	*105,191*
Period Totals (lbs)			*24*	*337.1*	*457.0*	*6,542*	*272*	*1,126*	*723*	*102*	*66,948*	*30,427*	*0.5*	*3.7*	*39.7*	*11.9*	*1.9*	*0.9*	*86.6*	*138,888*

Mass Loads of Sampled Storms - 1999/00 Season
San Diego Creek at Harvard and El Modena Irvine Channel

STATION	DATE / TIME	SAMPLES Type	#	Volume ac-ft	Storm Volume	NO_3 mg/L	NH_3 mg/L	TKN mg/L	PO_4 mg/L	o-PO_4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
WYLSED	3/4/00 10:35	ST	10	352.41		21	0.188	1.6	2.17	0.282	330	210	0.5	10.9	25.1	8.05	10.7	1	74	244
WYLSED	3/5/00 10:35	SF											0.5	4	9.47	1	2	1	13	
						20,110	*180.0*	*1,532.2*	*2,078.0*	*270.0*	*316,006*	*201,095*	*0.48*	*10.44*	*24.04*	*7.71*	*10.25*	*0.96*	*70.86*	*233,653*
WYLSED	3/5/00 12:35	ST	13	665.49		11	0.077	2.1	3.37	0.414	570	300	1.95	17.8	37.4	13.7	19.5	1	134	200
WYLSED	3/6/00 12:35	SF											0.5	4	8.14	1	2	1	21	
						19,891	*139.2*	*3,797.5*	*6,094.0*	*748.6*	*1,030,740*	*542,495*	*3.53*	*32.19*	*67.63*	*24.77*	*35.26*	*1.81*	*242.31*	*361,663*
Period Totals (lbs)			*23*	*1017.9*	*1189.1*	*40,001*	*319*	*5,330*	*8,172*	*1,019*	*1,346,746*	*743,590*	*4.0*	*42.6*	*91.7*	*32.5*	*45.5*	*2.8*	*313.2*	*595,316*
MIRF07	2/16/00 5:32	ST	5	0.13		8.1	0.294	2.4	1.16	0.13	140	110	0.5	4	29.9	4.54	4.24	1	68.6	225
MIRF07	2/16/00 6:32	SF											0.5	4	20.6	1	2	1	22.7	
						2.9	*0.1*	*0.9*	*0.4*	*0.05*	*50*	*40*	*0.000*	*0.001*	*0.01*	*0.002*	*0.002*	*0.000*	*0.02*	*80.8*
MIRF07	2/16/00 10:32	ST	4	15.09		8.3	0.122	1.3	0.777	0.19	54	24	0.5	4	36.6	5.4	2	1	50.7	110
MIRF07	2/16/00 20:32	ST																		
						340.4	*5.0*	*53.3*	*31.9*	*7.8*	*2,215*	*984*	*0.02*	*0.16*	*1.50*	*0.22*	*0.08*	*0.04*	*2.08*	*4,511.1*
Period Totals (lbs)			*9*	*15.2*	*18.2*	*343*	*5*	*54*	*32*	*8*	*2,265*	*1,024*	*0.02*	*0.17*	*1.5*	*0.2*	*0.1*	*0.04*	*2.1*	*4,592*

Mass Loads of Sampled Storms - 1999/00 Season
Peters Canyon Wash at Barranca Parkway

STATION	DATE / TIME	SAMPLES Type	#	Volume ac-ft	Storm Volume	NO_3 mg/L	NH_3 mg/L	TKN mg/L	PO_4 mg/L	o-PO_4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
BARSED	2/10/00 13:26	ST	2	0.78		58	0.053	3.6	2.75	0.54	120	104								
BARSED	2/10/00 14:26	SF																		
						122.5	*0.1*	*7.6*	*5.8*	*1.1*	*254*	*220*								
BARSED	2/10/00 15:26	ST	10	31.08		34	0.419	2.6	3.27	0.34	430	230	1.86	14.6	49.7	20.6	11.4	1	204	296
BARSED	2/11/00 0:26	SF											0.5	4	12.9	1	2	1	19.9	
						2,871.5	*35.4*	*219.6*	*276.2*	*28.7*	*36,316*	*19,425*	*0.16*	*1.23*	*4.20*	*1.74*	*0.96*	*0.08*	*17.23*	*24,999.1*
BARSED	2/11/00 10:00	DT	5	6.10		66	0.074	1.8	2.11	0.563	63	50	0.5	4	19.6	2.35	2	1	45.3	595
BARSED	2/11/00 18:00	DF											0.5	4	13.2	1	2	1	22.3	
						1,094.7	*1.2*	*29.9*	*35.0*	*9.3*	*1,045*	*829*	*0.01*	*0.07*	*0.33*	*0.04*	*0.03*	*0.02*	*0.75*	*9,868.8*
Period Totals (lbs)			*17*	*38.0*	*52.8*	*4,089*	*37*	*257*	*317*	*39*	*37,615*	*20,474*	*0.17*	*1.3*	*4.5*	*1.8*	*1.00*	*0.10*	*18.0*	*34,868*
BARSED	2/16/00 7:10	ST	2	6.05		31	0.129	3.5	3.55	0.17	1,980	830	2.32	18.7	45.9	21.6	13.6	1	215	340
BARSED	2/16/00 8:10	SF																		
						509.9	*2.1*	*57.6*	*58.4*	*2.8*	*32,570*	*13,653*	*0.04*	*0.31*	*0.76*	*0.36*	*0.22*	*0.02*	*3.54*	*5,592.9*
BARSED	2/16/00 9:10	ST	4	15.17		19	0.31	2	2.23	0.29	350	140	1.44	12.4	32.1	12.7	9.74	1	120	248
BARSED	2/16/00 12:10	SF											0.5	4	15.6	4.01	2	1	48.3	
						783.3	*12.8*	*82.5*	*91.9*	*12.0*	*14,429*	*5,772*	*0.06*	*0.51*	*1.32*	*0.52*	*0.40*	*0.04*	*4.95*	*10,224.3*
Period Totals (lbs)			*6*	*21.2*	*48.3*	*1,293*	*15*	*140*	*150*	*15*	*47,000*	*19,425*	*0.10*	*0.82*	*2.08*	*0.88*	*0.63*	*0.06*	*8.48*	*15,817*
BARSED	2/27/00 15:57	SF	5	6.27		39	0.025	2	2.02	0.098	410	260	0.5	4	32.8	6.29	4.78	1	65.7	635
BARSED	2/27/00 16:57	ST					–						0.5	4	19.9	1	2	1	13.4	
						664.9	*0.4*	*34.1*	*34.4*	*1.7*	*6,990*	*4,433*	*0.01*	*0.07*	*0.56*	*0.11*	*0.08*	*0.02*	*1.12*	*10,825.8*
BARSED	2/27/00 18:57	SF	8	38.30		31	0.068	1.3	0.979	0.147	140	60	0.5	4	30.8	8.36	5.29	1	84.3	445
BARSED	2/28/00 8:57	ST											0.5	4	16.5	1	2	1	21	
						3,226.1	*7.1*	*135.3*	*101.9*	*15.3*	*14,570*	*6,244*	*0.05*	*0.42*	*3.21*	*0.87*	*0.55*	*0.10*	*8.77*	*46,310.5*
Period Totals (lbs)			*13*	*44.6*	*48.0*	*3,891*	*8*	*169*	*136*	*17*	*21,559*	*10,677*	*0.06*	*0.48*	*3.76*	*0.98*	*0.63*	*0.12*	*9.89*	*57,136*

Appendix 5.7
Site-Mean EMCs

Site Mean EMCs : 1992 - 2000

Date	Vol. Storm ac-ft	Sampled ac-ft	Percent Characterized	NO3 mg/l	PO4 mg/l	TSS mg/l	Cu ug/l	Pb ug/l	Zn ug/l
Anaheim Barber City Channel									
Feb 7-11, 1993	590	555	94	3.7	1.2	50	33	11	88
Feb 18-21, 1993	599	594	99	2.5	0.9	89	16	19	104
Nov 11-15, 1993	185	172	93	5.9	1.0	51	48	45	361
Nov 22-26, 1993	23	22	93	12.6	1.7	28	42	7	52
Feb 17-21, 1994	1,404	1,401	100	5.4	1.3	65	17	19	117
Mar 10-14,1995	528	510	97	5.9	0.8	68	22	13	87
Dec 12-14, 1995	275	294	107	11.9	2.9	144	114	40	403
Jan 16-17,1996	73	67	91	7.7	2.0	123	57	22	234
Jan 19,1996	37	31	84	12.4	0.8	32	49	9	139
Jan 31-Feb 4, 1996	332	330	99	7.1	1.2	49	43	3	184
Mar 4-8,1996	412	470	114	6.0	0.7	36	26	12	112
Oct 30-31, 1996	431	430	100	6.4	1.8	84	47	47	326
Nov 21-25, 1996	652	658	101	3.5	0.9	34	40	16	139
Dec 9-13, 1996	621	621	100	2.2	0.6	20	20	9	90
Jan 1-5, 1997	136	140	103	6.5	0.4	12	29	5	79
Sep 25-29, 1997	169	161	95	6.8	2.0	175	100	50	465
Nov 10-14, 1997	170	177	104	7.9	2.3	143	45	22	323
Dec 18-19, 1997	383	383	100	4.2	0.8	65	30	14	130
Jan 29-Feb 2, 1998	191	196	103	10.2	0.6	105	27	12	77
May 12-16, 1998	265	223	84	5.0	2.2	122	27	15	112
Nov 8 - Nov 12, 1998	467	553	118	10.7	3.1	83	39	11	152
			Distribution	normal	lognormal	normal	lognormal	lognormal	lognormal
			sample median	6.4	1.2	65.3	39.3	14.1	130.2
			true median		1.2		34.8	13.8	137.9
			mean or μ	**6.7**	**1.3**	**74.7**	**41.1**	**19.7**	**179.0**
			Sx or Sinx	3.07	0.70	46.54	0.51	0.74	0.64
			COV	0.46	0.79	0.62	0.55	0.86	0.71
			+ or -	1.4	0.3	21.8			
			lower limit	5.3	1.0	53.0	34.1	15.1	142.4
			upper limit	8.1	1.6	96.5	52.5	29.6	247.6
Bolsa Chica Channel									
Jan 15-18, 1993	595	529	89	3.1	2.0	344	15	22	123
Feb 7-11, 1993	365	322	88	5.4	2.2	380	10	22	71
Feb 18-22, 1993	334	320	96	3.3	2.7	724	15	28	109
Nov 11-15, 1993	204	203	99	9.4	1.9	191	40	36	334
Nov 23-27, 1993	9	8	85	21.4	1.3	136	27	13	92
Nov 30-Dec 4, 1993	83	80	97	13.6	4.2	657	34	39	201
Feb 17-20, 1994	1,098	1,102	100	9.8	2.8	480	37	28	151
Nov 10, 1994	143	135	94	9.4	6.7	~~1,616~~	137	91	565
Mar 2-6,1995	431	425	99	4.3	1.3	135	22	13	69
Mar 10-14,1995	491	492	100	8.4	2.2	229	32	25	132
Dec 12-16, 1996	162	169	104	13.1	2.0	154	20	17	156
Jan 19-23,1997	48	54	113	10.2	1.3	115	35	15	123
Jan 31-Feb 4, 1997	141	144	102	7.4	1.5	136	32	22	139
Mar 4-8, 1997	179	183	102	4.4	1.0	116	19	15	108
Oct 30-Nov 3, 1996	227	229	101	11.5	2.1	171	47	30	280
Nov 21-25, 1996	395	383	97	5.3	1.8	199	59	31	196
Dec 9-13, 1996	562	561	100	4.6	1.3	125	23	18	91
Dec 27-31, 1996	150	153	102	6.6	0.9	113	25	14	151
Sep 25-29, 1997	473	473	100	10.1	2.5	263	35	25	216
Nov 10-13, 1997	669	601	90	11.2	2.2	355	35	27	327
Jan 29-Feb 2, 1998	310	280	90	8.4	1.6	180	31	18	135
May 13 - May 16, 1998	271	273	101	8.6	0.7	103	23	9	67
Nov 8 - Nov 12, 1998	308	325	105	12.8	2.7	121	43	12	120
Jan 25 - Jan 29, 1999	182	181	99	7.2	1.5	60	30	11	95
Mar 15 - Mar 19, 1999	124	109	88	7.4	2.1	199	46	18	135
Mar 25 - Mar 29, 1999	95	103	108	6.7	1.3	49	22	7	94
			Distribution	lognormal	lognormal	lognormal	lognormal	lognormal	lognormal
			sample median	8.4	1.9	171.3	31.6	20.0	103.3
			true median	7.8	1.8	207.9	29.1	22.3	147.9
			mean or μ	**8.6**	**2.1**	**247.7**	**33.4**	**25.0**	**171.7**
			Sx or Sinx	0.46	0.50	0.59	0.53	0.48	0.55
			COV	0.49	0.53	0.65	0.57	0.51	0.59
			+ or -						
			lower limit	7.4	1.7	201.1	27.9	21.2	142.3
			upper limit	10.3	2.6	329.6	42.5	30.9	220.4

Site Mean EMCs : 1992 - 2000

Date	Vol. Storm ac-ft	Sampled ac-ft	Percent Characterized	NO3 mg/l	PO4 mg/l	TSS mg/l	Cu ug/l	Pb ug/l	Zn ug/l
Westminster									
Feb 9-13, 1992	826	725	88	4.0	~~15.1~~	235	27	45	141
Mar 20-21, 1992	234	216	92	2.4	2.0	160	26	104	300
Mar 26-27, 1992	79	71	90	3.7	0.8	68	18	23	71
Jan 15-19, 1993	683	614	90	2.1	1.3	174	25	18	99
Feb 18-22, 1993	198	182	92	5.2	2.1	443	20	27	91
Nov 22-26, 1993	8	6	85	16.4	0.6	5	31	2	54
Nov 30-Dec 3, 1993	18	17	95	11.2	1.7	69	25	12	104
Nov 10, 1994	71	71	100	6.1	4.1	313	194	51	327
Mar 10-14,1995	330	330	100	8.6	1.0	129	25	24	88
Dec 12-16, 1995	94	108	114	11.9	2.3	178	97	29	266
Jan 16-17, 1996	31	30	96	2.8	0.8	62	16	7	56
Jan 19-23, 1996	70	78	110	6.4	0.2	10	93	8	167
Jan 31-Feb 4, 1996	165	162	99	12.0	1.9	157	62	42	305
Mar 4-8, 1996	111	115	104	4.2	1.4	159	34	19	123
Oct 30-Nov 3, 1996	102	108	106	12.5	3.2	388	68	39	414
Nov 21-25, 1996	260	253	97	4.1	1.7	178	47	32	170
Dec 9-13, 1996	345	341	99	4.1	0.9	68	22	15	86
Dec 27-31, 1996	113	134	118	6.0	2.3	534	35	31	206
Sep 25-27, 1997	73	74	102	7.5	2.1	164	83	25	208
Nov 10-14, 1997	18	23	132	8.7	2.0	147	62	16	303
Dec 18-22, 1997	133	166	125	10.0	0.8	190	20	17	80
May 12-16, 1998	251	277	110	7.1	0.9	57	52	15	81
Mar 25 - Mar 29, 1999	94	102	108	9.3	1.4	110	31	13	121
			Distribution	normal	normal	normal	lognormal	lognormal	lognormal
			sample median	6.4	1.6	159.4	31.2	22.5	123.1
			true median	5.7			38.7	20.7	140.2
			mean or μ	**7.1**	**1.6**	**176.7**	**47.9**	**28.3**	**170.0**
			S_x or S_{lnx}	3.87	0.93	136.16	0.66	0.80	0.62
			COV	0.54	0.57	0.77	0.73	0.94	0.69
			+ or -	1.7	0.4	60.4			
			lower limit	5.4	1.2	116.3	38.3	21.4	137.3
			upper limit	8.8	2.1	237.1	65.9	43.6	228.4
E. Garden Grove Wintersburg									
Dec 10-11, 1991	56	56	100	6.4	~~62.9~~	2	60	50	469
Mar 26-27, 1992	239	229	96	3.3	0.9	37	10	7	37
Jan 15-19, 1993	2,981	2,346	79	1.8	1.4	103	25	15	87
Feb 7-11, 1993	635	594	94	2.6	1.7	176	14	24	88
Nov 30-Dec 4, 1993	83	78	94	5.5	1.6	65	25	16	25
Oct 4-8, 1994	51	50	99	4.9	2.4	192	42	25	183
Mar 2-6, 1995	959	932	97	3.6	0.9	61	36	13	62
Mar 10-14, 1995	1,176	1,171	100	4.1	1.2	111	30	16	84
Dec 12-16, 1995	375	418	111	11.9	2.5	162	41	22	193
Jan 16-22, 1996	404	357	88	5.0	2.1	40	35	47	54
Mar 4-8, 1996	428	423	99	2.9	0.8	59	29	8	86
Oct 30-Nov 3, 1996	113	103	91	7.2	1.5	121	34	15	148
Nov 21-25, 1996	953	957	100	4.3	2.1	272	49	26	181
Dec 9-13, 1996	1,253	1,231	98	2.2	1.1	75	23	16	73
Dec 27-31, 1996	365	392	107	4.9	0.7	54	22	10	112
Sep 25, 1997	222	193	87	0.2	0.2	27	3	3	29
Nov 10-14, 1997	285	315	111	7.0	1.7	197	37	22	226
Nov 26-30, 1997	331	362	109	5.3	1.5	69	29	26	133
Dec 18-22, 1997	661	663	100	6.4	1.2	120	27	16	114
Jan 29 - Feb 2, 1998	331	391	118	5.0	0.8	98	32	17	78
Feb 14 - Feb 18, 1998	1489	1375	92	7.0	2.8	103	22	15	53
May 12 - May 13, 1998	586	506	86	2.4	1.3	238	41	46	166
Nov 8 - Nov 12, 1998	688	723	105	6.0	~~13.6~~	~~423~~	70	71	357
			Distribution	normal	normal	normal	normal	lognormal	lognormal
			sample median	4.9	1.4	100.5	30.0	16.4	87.8
			true median	4.2				17.3	95.1
			mean or μ	**4.7**	**1.4**	**108.2**	**30.3**	**21.0**	**113.2**
			S_x or S_{lnx}	2.46	0.66	70.93	12.62	0.62	0.56
			COV	0.52	0.46	0.66	0.42	0.68	0.60
			+ or -	1.1	0.3	31.5	5.6		
			lower limit	3.6	1.1	76.8	24.7	17.0	90.5
			upper limit	5.8	1.7	139.7	35.9	28.1	155.3

Site Mean EMCs : 1992 - 2000

Date	Vol. Storm ac-ft	Sampled ac-ft	Percent Characterized	NO3 mg/l	PO4 mg/l	TSS mg/l	Cu ug/l	Pb ug/l	Zn ug/l
Santa Ana Delhi									
Jan 5-6, 1992	704	704	100	5.6	1.6	172	30	45	130
Jan 15-19, 1993	3,142	2,463	78	3.0	1.2	217	15	30	147
Feb 7-9, 1993	754	747	99	3.2	1.3	182	22	38	103
Feb 18-21, 1993	847	843	100	2.8	1.3	312	19	35	114
Oct 16-19, 1993	18	16	88	11.6	3.1	250	63	123	291
Nov 23-27, 1993	23	20	84	7.3	1.0	35	24	12	64
Oct 4-8, 1994	27	23	87	7.3	1.0	89	32	12	166
Nov 8-12, 1994	211	204	96	8.5	4.1	754	111	78	348
Mar 21-25, 1995	419	399	95	6.8	1.3	147	26	11	60
Dec 12-13, 1995	150	130	87	11.4	4.6	630	130	132	539
Feb 19-23, 1996	882	879	100	7.1	4.6	376	87	1	502
Mar 4-8, 1996	246	258	105	4.3	1.2	174	30	30	172
Oct 30-Nov 3, 1996	239	241	101	9.0	3.1	554	47	55	416
Nov 21-25, 1996	918	933	102	7.4	2.0	318	54	41	254
Dec 9-13, 1996	963	859	89	11.1	0.9	46	24	11	80
Sep 25-29, 1997	174	180	103	7.2	3.3	604	109	89	493
Nov 10-14, 1997	274	283	103	9.9	1.3	137	52	30	273
Nov 26-30, 1997	280	294	105	8.1	1.3	116	42	32	172
Dec 6-10, 1997	2804	2465	88	3.7	1.5	237	41	32	182
Jan 3-7, 1998	84	90	108	12.5	0.5	23	29	5	50
Jan 9-13, 1998	225	245	109	5.5	0.7	150	50	27	
Feb 14, 1997	1328	1176	89	4.5	9.5	141	33	19	228
Feb 19-24, 1998	2329	2248	97	6.4	11.5		25	16	64
Mar 25-29, 1998	711	725	102	8.8	0.2	436	50	23	110
Nov 8 - Nov 12, 1998	299	331	110	11.1	2.6	154	31	14	150
Feb 4 - Feb 8, 1999	32	37	117	8.5	1.3	44	22	10	163
Apr 6 - Apr 10, 1999	181	183	101	6.1	2.4	115	40	20	158
Feb 10 - 14, 2000	327	319	97.6	6.4	1.3	184	49	28	183
			Distribution	normal	lognormal	lognormal	lognormal	lognormal	lognormal
			sample median	7.2	1.3	173.9	36.5	29.0	165.7
			true median		1.7		39.1	23.9	167.3
			mean or μ	**7.3**	**2.5**	**255.3**	**45.4**	**38.4**	**208.5**
			S_x or S_{lnx}	2.74	0.87	0.88	0.55	0.98	0.67
			COV	0.37	1.06	1.09	0.59	1.27	0.75
			+ or -	1.1					
			lower limit	6.3	1.9	192.9	38.4	28.2	169.3
			upper limit	8.4	3.7	390.9	56.4	62.4	277.0
San Diego Creek at Campus Drive									
Nov 26-30, 1997	1191	1127	95	15.1	4.4	690.6	54.0	30.9	268.0
Dec 6-10, 1997	20430	20298	99	7.0	15.7	2,361.1	99.3	79.8	~~596.9~~
Dec 18-22, 1997	971	948	98	20.7	3.4	797.3	31.4	14.2	112.5
Jan 3-6, 1998	352	320	91	17.3	1.0	95.6	22.8	2.9	19.9
Jan 9-13, 1998	2333	2338	100	19.4	5.0	1,287.1	~~193.8~~	110.0	25.8
Feb 3-6, 1998	3954	3915	99	12.2	4.8	1,322.5	44.1	17.9	118.5
Feb 6-10, 1998	11742	11581	99	12.0	7.5	1,492.0	55.4	33.3	205.0
Feb 14-15, 1998	6445	6409	99	9.6	8.1	2,642.0	50.3	34.8	207.5
Feb 19-24, 1998	13881	13265	96	9.1	9.6		57.7	34.0	181.2
Mar 25-29, 1998	3194	3191	100	16.9	1.0	149.2	38.8	36.9	175.0
May 12-16, 1998	2317	2380	103	18.8	2.5	1,475.2	45.3	29.5	212.4
Nov 8 - Nov 12, 1998	895	940	105	28.3	4.6	1,389.0	42.7	28.4	406.6
Nov 28 - Dec 2, 1998	1221	1237	101	9.2	2.1	463.6	35.6	19.8	186.7
Jan 25 - Jan 29, 1999	1730	1915	111	17.8	2.8	812.7	37.9	16.9	127.1
Mar 25 - Mar 29, 1999	847	897	106	24.6	3.1	707.1	44.8	17.1	169.6
Feb 10 - 14, 2000	1193	1237	104	19.2	2.9	541.8	29.3	14.4	127.6
Mar 3 - 6, 2000	1987	1886	95	15.1	3.3	637.6	23.7	12.4	102.9
			Distribution	normal	lognormal	normal	lognormal	lognormal	lognormal
			sample median	16.9	3.4	805.0	43.4	28.4	172.3
			true median		3.7		41.6	23.3	131.8
			mean or μ	**16.0**	**4.8**	**1,054.0**	**44.4**	**32.0**	**177.7**
			S_x or S_{lnx}	5.76	0.73	718.15	0.36	0.80	0.78
			COV	0.36	0.84	0.68	0.38	0.95	0.91
			+ or -	3.0		382.7			
			lower limit	13.1	3.6	671.4	38.3	23.5	130.4
			upper limit	19.0	7.5	1,436.7	53.4	52.9	294.3

Site Mean EMCs : 1992 - 2000

Date	Vol. Storm ac-ft	Sampled ac-ft	Percent Characterized	NO3 mg/l	PO4 mg/l	TSS mg/l	Cu ug/l	Pb ug/l	Zn ug/l
	Oso Creek								
Mar 5-9, 1992	48	37	78	5.6	1.1	54	13	1.7	22
Mar 20-24, 1992	902	898	100	2.9	2.1	386	12	3.4	78
Mar 26-29, 1992	27	27	100	5.3	0.4	14	9	4.5	16
Dec 17-20, 1992	49	49	100	3.0	1.7	104	10	1.2	39
Dec 29, 1992 - Jan 2, 1993	493	400	81	1.8	9.0	983	10	5.6	68
Jan 6-10, 1993	2,582	2,514	97	3.5	4.7	1,113	10	4.1	76
Dec 19-23,1993	21	21	101	5.9	1.1	60	17	2.6	34
Feb 7-11, 1994	620	611	99	4.2	2.6	503	22	6.6	84
Feb 17-21, 1994	926	922	100	5.3	2.9	645	36	12.1	131
Mar 2-6, 1995	2,107	2,081	99	2.0	4.1	857	31	10.9	108
Mar 10-13, 1995	2,285	2,271	99	3.3	3.3	674	41	10.9	119
Jan 19-23, 1996	154	134	87	6.8	1.4	190	38	5.4	80
Jan 31-Feb 2, 1996	342	310	91	5.9	2.9	427	44	14.6	139
Feb 20-24, 1996	1,250	1,247	100	7.7	1.6	171	24	1.9	60
Oct 30-Nov 3, 1996	344	381	111	6.7	4.5	803	40	19.1	253
Dec 9-13, 1996	1,067	1,073	101	4.7	1.5	213	21	4.6	68
Jan 25 - Jan 29, 1999	327	330	101	4.3	1.5	212	25	6.3	62
			Distribution	normal	lognormal	normal	lognormal	lognormal	lognormal
			sample median	4.7	2.1	386.4	22.0	5.4	76.0
			true median		2.2		20.0	5.0	68.5
			mean or μ	**4.7**	**2.8**	**450.0**	**23.7**	**6.9**	**87.6**
			s_x or s_{inx}	1.77	0.73	358.66	0.59	0.80	0.71
			COV	0.38	0.85	0.80	0.64	0.95	0.81
			+ or -	0.9		191.1			
			lower limit	3.7	2.1	258.9	18.7	5.1	66.1
			upper limit	5.6	4.5	641.0	33.2	11.1	135.8

COV = Coefficient of Variation
= s/μ for normal distributions
= (EXP(s)^2 - 1)^0.5 for lognormal distributions

Site Mean EMCs : 1992 - 2000

Date	Vol. Storm ac-ft	Sampled ac-ft	Percent Characterized	NO3 mg/l	PO4 mg/l	TSS mg/l	Cu ug/l	Pb ug/l	Zn ug/l
Santa Ana Delhi									
Jan 5-6, 1992	704	704	100	5.6	1.6	172	30	45	130
Jan 15-19, 1993	3,142	2,463	78	3.0	1.2	217	15	30	147
Feb 7-9, 1993	754	747	99	3.2	1.3	182	22	38	103
Feb 18-21, 1993	847	843	100	2.8	1.3	312	19	35	114
Oct 16-19, 1993	18	16	88	11.6	3.1	250	63	123	291
Nov 23-27, 1993	23	20	84	7.3	1.0	35	24	12	64
Oct 4-8, 1994	27	23	87	7.3	1.0	89	32	12	166
Nov 8-12, 1994	211	204	96	8.5	4.1	754	111	78	348
Mar 21-25, 1995	419	399	95	6.8	1.3	147	26	11	60
Dec 12-13, 1995	150	130	87	11.4	4.6	630	130	132	539
Feb 19-23, 1996	882	879	100	7.1	4.6	376	87	1	502
Mar 4-8, 1996	246	258	105	4.3	1.2	174	30	30	172
Oct 30-Nov 3, 1996	239	241	101	9.0	3.1	554	47	55	416
Nov 21-25, 1996	918	933	102	7.4	2.0	318	54	41	254
Dec 9-13, 1996	963	859	89	11.1	0.9	46	24	11	80
Sep 25-29, 1997	174	180	103	7.2	3.3	604	109	89	493
Nov 10-14, 1997	274	283	103	9.9	1.3	137	52	30	273
Nov 26-30, 1997	280	294	105	8.1	1.3	116	42	32	172
Dec 6-10, 1997	2804	2465	88	3.7	1.5	237	41	32	182
Jan 3-7, 1998	84	90	108	12.5	0.5	23	29	5	50
Jan 9-13, 1998	225	245	109	5.5	0.7	150	50	27	
Feb 14, 1997	1328	1176	89	4.5	9.5	141	33	19	228
Feb 19-24, 1998	2329	2248	97	6.4	11.5		25	16	64
Mar 25-29, 1998	711	725	102	8.8	0.2	436	50	23	110
Nov 8 - Nov 12, 1998	299	331	110	11.1	2.6	154	31	14	150
Feb 4 - Feb 8, 1999	32	37	117	8.5	1.3	44	22	10	163
Apr 6 - Apr 10, 1999	181	183	101	6.1	2.4	115	40	20	158
Feb 10 - 14, 2000	327	319	97.6	6.4	1.3	184	49	28	183
			Distribution	normal	lognormal	lognormal	lognormal	lognormal	lognormal
			sample median	7.2	1.3	173.9	36.5	29.0	165.7
			true median		1.7		39.1	23.9	167.3
			mean or μ	**7.3**	**2.5**	**255.3**	**45.4**	**38.4**	**208.5**
			S_x or S_{lnx}	2.74	0.87	0.88	0.55	0.98	0.67
			COV	0.37	1.06	1.09	0.59	1.27	0.75
			+ or -	1.1					
			lower limit	6.3	1.9	192.9	38.4	28.2	169.3
			upper limit	8.4	3.7	390.9	56.4	62.4	277.0
San Diego Creek at Campus Drive									
Nov 26-30, 1997	1191	1127	95	15.1	4.4	690.6	54.0	30.9	268.0
Dec 6-10, 1997	20430	20298	99	7.0	15.7	2,361.1	99.3	79.8	~~596.9~~
Dec 18-22, 1997	971	948	98	20.7	3.4	797.3	31.4	14.2	112.5
Jan 3-6, 1998	352	320	91	17.3	1.0	95.6	22.8	2.9	19.9
Jan 9-13, 1998	2333	2338	100	19.4	5.0	1,287.1	~~193.8~~	110.0	25.8
Feb 3-6, 1998	3954	3915	99	12.2	4.8	1,322.5	44.1	17.9	118.5
Feb 6-10, 1998	11742	11581	99	12.0	7.5	1,492.0	55.4	33.3	205.0
Feb 14-15, 1998	6445	6409	99	9.6	8.1	2,642.0	50.3	34.8	207.5
Feb 19-24, 1998	13881	13265	96	9.1	9.6		57.7	34.0	181.2
Mar 25-29, 1998	3194	3191	100	16.9	1.0	149.2	38.8	36.9	175.0
May 12-16, 1998	2317	2380	103	18.8	2.5	1,475.2	45.3	29.5	212.4
Nov 8 - Nov 12, 1998	895	940	105	28.3	4.6	1,389.0	42.7	28.4	406.6
Nov 28 - Dec 2, 1998	1221	1237	101	9.2	2.1	463.6	35.6	19.8	186.7
Jan 25 - Jan 29, 1999	1730	1915	111	17.8	2.8	812.7	37.9	16.9	127.1
Mar 25 - Mar 29, 1999	847	897	106	24.6	3.1	707.1	44.8	17.1	169.6
Feb 10 - 14, 2000	1193	1237	104	19.2	2.9	541.8	29.3	14.4	127.6
Mar 3 - 6, 2000	1987	1886	95	15.1	3.3	637.6	23.7	12.4	102.9
			Distribution	normal	lognormal	normal	lognormal	lognormal	lognormal
			sample median	16.9	3.4	805.0	43.4	28.4	172.3
			true median		3.7		41.6	23.3	131.8
			mean or μ	**16.0**	**4.8**	**1,054.0**	**44.4**	**32.0**	**177.7**
			S_x or S_{lnx}	5.76	0.73	718.15	0.36	0.80	0.78
			COV	0.36	0.84	0.68	0.38	0.95	0.91
			+ or -	3.0		382.7			
			lower limit	13.1	3.6	671.4	38.3	23.5	130.4
			upper limit	19.0	7.5	1,436.7	53.4	52.9	294.3

Site Mean EMCs : 1992 - 2000

Date	Vol. Storm ac-ft	Sampled ac-ft	Percent Characterized	NO3 mg/l	PO4 mg/l	TSS mg/l	Cu ug/l	Pb ug/l	Zn ug/l
San Diego Creek @ Harvard									
Mar 24-28, 1994	385	356	92	11.3	9.5	709	52	30	230
Apr 24-28, 1994	345	341	99	21.0	4.4	731	43	18	141
Jan 19-23, 1996	361	335	93	26.6	5.1	1,585	14	24	270
Jan 31-Feb 4, 1996	783	777	99	17.9	7.4	1,024	58	21	185
Feb 20-22, 1996	2,411	1,983	82	8.1	8.8	3,396	69	1	320
Mar 4-8, 1996	487	484	99	13.2	5.6	2,220	53	25	279
Oct 30-Nov 5, 1996	449	449	100	26.7	5.5	1,358	29	27	315
Nov 21-24, 1996	1,902	1,903	100	10.4	6.7	1,995	66	30	261
Dec 9-13, 1996	2272	2272	100	11.0	3.2	973	30	14	139
Nov 10 - Nov 14, 1997	367	365	100	27.9	3.8	659	40	11	210
Nov 26 - Nov 30, 1997	581	613	106	14.4	5.8	935	57	29	264
Jan 9 - Jan 10, 1998	655	610	93	6.8	9.5	3,709	72	36	84
Feb 14 - Feb 18, 1998	3021	3024	100	8.1	8.7	2,218	51	32	114
Feb 4 - Feb 8, 1999	87	88	101	33.8	2.7	901	42	14	127
Mar 4 - 6, 2000	1189	1018	86	14.5	3.0	487	33	12	113
			Distribution	normal	normal	lognormal	normal	normal	normal
			sample median	14.4	5.6	1024.4	51.1	23.6	209.8
			true median			1256.7			
			mean or μ	**16.8**	**6.0**	**1516.7**	**47.3**	**21.5**	**203.6**
			S_x or S_{lnx}	8.48	2.38	0.62	16.40	9.70	79.53
			COV	0.51	0.40	0.68	0.35	0.45	0.39
			+ or -	4.7	1.3		9.1	5.4	44.0
			lower limit	12.1	4.7	1,177.1	38.2	16.1	159.5
			upper limit	21.5	7.3	2,211.5	56.4	26.9	247.6
Peters Canyon									
Jan 24-28, 1994	269	238	88	20.4	1.7	281	19	10	91
Feb 7-11, 1994	988	788	80	13.1	2.1	360	18	14	70
Dec 5, 1994	4	4	100	18.0	1.4	68	30	5	62
Mar 21-23, 1995	500	483	97	39.7	1.8	205	20	7	26
Dec 12-16, 1995	125	144	115	39.4	2.0	170	43	5	123
Jan 31-Feb 4, 1996	369	386	105	23.5	4.6	1,041	82	32	269
Feb 19-23, 1996	1,112	1,131	102	33.9	3.3	758	48	1	189
Oct 30-Nov 3, 1996	712	747	105	23.4	3.7	685	45	22	231
Nov 21-25, 1996	1,815	1,834	101	16.4	5.5	1,539	74	34	263
Dec 9-13, 1996	1,268	1,256	99	15.9	2.0	415	25	12	101
Nov 10-14, 1997	924	935	101	25.2	2.8	473	34	12	201
Nov 26-30, 1997	222	251	113	34.8	5.2	631	59	26	218
Dec 6-8, 1997	6,040	6,007	99	8.4	~~16.8~~	3,682	128	85	~~720~~
Jan 9-13, 1998	526	574	109	24.2	4.3	971	45	23	29
Feb 14-15, 1998	2,135	2,111	99	10.7	6.2	2,594	70	46	126
Mar 25-29, 1998	1,141	1,207	106	25.1	1.3	78	45	26	120
Jan 25 - Jan 29, 1999	653	671	103	80.5	1.4	276			
Feb 27 - 28, 2000	48	45	93	32.1	1.1	178	31	8	82
			Distribution	lognormal	normal	lognormal	lognormal	lognormal	normal
			sample median	23.8	2.1	443.9	44.9	13.8	121.2
			true median	23.2		445.6	41.2	13.8	
			mean or μ	**26.8**	**3.0**	**800.4**	**47.9**	**23.4**	**137.4**
			S_x or S_{lnx}	0.53	1.65	1.10	0.55	1.04	80.19
			COV	0.58	0.56	1.53	0.60	1.40	0.58
			+ or -		0.8				42.7
			lower limit	21.9	2.1	526.3	38.7	15.6	94.7
			upper limit	35.3	3.8	1,773.6	64.6	50.0	180.2

COUNTY OF ORANGE

PUBLIC FACILITIES & RESOURCES DEPARTMENT

1999 Peters Canyon Wash/San Diego Creek Nutrient Study

September 2000

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Executive Summary

In August 1990, May 1991, and May 1993, the County of Orange and the Santa Ana Regional Water Quality Control Board collaborated on three nutrient studies in the San Diego Creek watershed. These studies were limited by the available inventory of automatic sampling and flow monitoring equipment and did not fully reconcile all of the contributions from the nutrient sources in the watershed.

In September of 1999 the first comprehensive study of nutrient loads was initiated. It was conducted over a seven-day period and utilized automatic sampling equipment and portable flowmeters to quantify the daily nitrate and phosphate load contributed by ten tributaries of the Peters Canyon Wash. Automatic samplers were also used in Peters Canyon Wash downstream of these tributaries and in the San Diego Creek at Harvard Avenue and Campus Drive. Grab samples and instantaneous discharge measurements were used to calculate the daily loads from seven other tributaries of San Diego Creek.

The following are major findings of the study:

- During the period of this study the average nitrate nitrogen load transported by Peters Canyon Wash, measured at Barranca Parkway, was 318.8 lbs/day with an average water discharge rate of 5.61 cfs.

- The greatest contributors to the nitrate nitrogen load in Peters Canyon Wash were Valencia Storm Channel (88.2 lbs/day), Santa Ana-Santa Fe (78.1 lbs/day), Central Irvine Channel (67.4 lbs/day), Como Storm Channel (63.4 lbs/day), and the Warner Channel (49.5 lbs/day).

- Central Irvine Channel contributed the greatest phosphate load to Peters Canyon Channel during this study. The average load of 2.96 lbs/day as P, was more than half of the average load measured in Peters Canyon Wash at Barranca Parkway. Approximately 96% of this phosphate load was in the form of orthophosphate.

- The average nitrate nitrogen load in San Diego Creek measured at Harvard Avenue, above the confluence with Peters Canyon Wash was 126 lbs/day. The average of the tributary loads measured upstream was 9.4 lbs/day. The average discharge rate at Harvard Avenue (measured at Culver Drive) during the study was 1.15 cfs. The sum of the average discharges from the three tributaries upstream was 0.36 cfs. Therefore the majority of the tributary discharge volumes and nitrate loads were not identified in this study.

- The average daily nitrate nitrogen load measured in San Diego Creek at Campus Drive was 381.5 lbs/day with an average water discharge rate of 7.81 cfs.

- During the study, the Irvine Ranch Water District (IRWD) was diverting some water from San Diego Creek (upstream of Campus Drive) through its wetlands treatment system to remove nitrate. Another portion of the diverted water was sent to the San

Joaquin Marsh, the Irvine Company (TIC) Mitigation site and the Carlson Marsh. The average pumping rate from the Creek (September 14-20) was 5.10 cfs. The average return rate to the creek from IRWDs wetlands system was 1.82 cfs yielding a net water removal from the Creek of 3.28 cfs. The mean nitrate nitrogen load pumped from the Creek was 201 lbs/day. The mean nitrate nitrogen load returned to the Creek was 15.3 lbs/day. The net load removed from the creek during the study was 186 lbs/day.

- The average daily Total Nitrogen (TN) loads from San Diego Creek at Campus Drive, Peters Canyon Wash at Barranca Pkwy and San Diego Creek at Harvard Avenue were 435, 353, and 131 lbs/day, respectively.

- The average daily total phosphate (as P) loads from San Diego Creek at Campus Drive, Peters Canyon Wash at Barranca Parkway and San Diego Creek at Harvard Avenue were 5.03, 5.24, and 0.39 lbs/day, respectively.

- The average daily nitrate nitrogen load in San Diego Creek measured at Campus Drive (382 lbs/day) was substantially lower during this study than during previous studies conducted in August 1990 (1,149), May 1991 (894), and May 1993 (1,569). Compensating for the removal by the IRWD treatment / diversion still yields a value (567 lbs/day) that was lower than each of the previous studies.

- From the calculated average daily load for total nitrogen at San Diego Creek at Campus Drive, the extrapolated total load for the period April 1 - September 30 would be approximately 80,000 pounds. This value is much less than the Summer 2002 goal of 200,097 pounds established in the TMDL. Without diversion to the IRWD wetlands the total would be approximately 121,000 pounds.

1999 Peters Canyon Wash / San Diego Creek Nutrient Study

1.0 Introduction

In August 1990, May 1991, and May 1993, the County of Orange and the Santa Ana Regional Water Quality Control Board collaborated on three nutrient studies in the San Diego Creek watershed. These studies were limited by the available inventory of automatic sampling and flow monitoring equipment and a thorough assessment of the nutrient load from every major tributary channel was not possible.

Since the early 1990's the County acquired much of the monitoring equipment that would allow a more thorough study. This report is a summary of the results of the first comprehensive nutrient study of nutrient loads from the tributaries of Peters Canyon Wash and San Diego Creek during the period September 13 -20, 1999. The objectives of the study were:

- To quantitatively determine the total daily nitrogen and phosphorus loads from the tributaries of Peters Canyon Wash and San Diego Creek during a seven-day period; and to compare the sum of the daily loads from these two segments to that of San Diego Creek at Campus Drive.

- To initiate the monitoring of Central Irvine Channel as described in Orange County's NPDES Reconnaissance and Source Identification Element of the Water Quality Monitoring Program (May 1999).

- To evaluate the total nitrogen load from San Diego Creek relative to the TMDL targets.

2.0 Study Area

San Diego Creek, the primary tributary to the Upper Newport Bay, has a watershed area upstream of Campus Drive, Irvine of approximately 111 mi^2. Its headwaters are in the City of Lake Forest and it receives drainage from many tributaries before discharging to the Upper Newport Bay at Jamboree Road in Newport Beach.

In its Water Quality Control Plan for the Santa Ana River Basin, the Regional Water Quality Control Board has divided San Diego Creek into two reaches. The lower reach designated as Reach 1 is the segment from the Upper Newport Bay to Jeffrey Road in Irvine. The segment above Jeffrey Road to the headwaters is designated as Reach 2.

Reach 2 drains the eastern portion of the watershed and receives runoff from several tributaries including Marshburn, Agua Chinon, Bee Canyon, Serrano Creek, and Canada Channels.

Reach 1 has many manmade and natural tributaries including Sand Canyon Channel, Bonita Canyon Channel, San Joaquin Channel, Lane Channel, Barranca Channel, and

Peters Canyon Wash. With its 45 mi^2 watershed area, Peters Canyon Wash contributes the greatest water volume of any tributary to San Diego Creek.

Peters Canyon Wash has several tributaries including Rattlesnake Canyon Wash, El Modena Irvine Channel, Como Storm Channel, Santa Ana-Santa Fe Channel, Valencia Channel, and Warner Storm Drain.

3.0 Background

Studies to quantify the nutrient loads from tributaries to San Diego Creek have been conducted three times during the 1990's. In 1990, the County of Orange and the Santa Ana Regional Water Quality Control Board (RWQCB) initiated a cooperative project to monitor these loads and evaluate the compliance of three major nurseries with recently-issued NPDES permits. Seven sites were monitored with automatic sampling equipment and eight others were grab-sampled during a two to three day period in August. The load calculations suggested that the nurseries were in compliance with the waste discharge requirements (WDRs) of their respective permits. Both the Peters Canyon Channel and Reach 2 of San Diego Creek showed significant amounts of nitrate in their discharges. Hines Channel and Rattlesnake Canyon Channel were the greatest contributors to the nitrate load in Peters Canyon Wash. Unexplainably the El Modena-Irvine Channel, which had a predominately urbanized watershed, with limited agriculture, also discharged a high load of nitrate to Peters Canyon Channel.

Between-study comparisons can only be made for monitoring site on the San Diego Creek at Campus Drive. This was the only site at which nitrate concentrations and water volumes were measured using the same methods during each of the three studies.

In May of 1991 the County of Orange and the RWQCB repeated a portion of the August 1990 study to assess the difference between seasons. Although the average nitrate-nitrogen concentration at Campus Drive increased from 13.8 to 17.0 mg/L (23%) the average water discharge rate decreased from 15.6 to 10 cfs (42%). The average nitrate-nitrogen load consequently decreased from 1150 to 894 lbs/day (22%).

In May of 1993, another watershed assessment was conducted. The average daily nitrate-nitrogen load at Campus Drive was measured at 1570 lbs/day.

In May of 1999, the County completed development of a revised stormwater quality monitoring program to comply with the requirements of its new NPDES Stormwater and Urban Runoff Permits. The data from the previous monitoring program were statistically evaluated to identify areas where levels of pollutants were higher than the system-wide mean values. Central Irvine Channel and its tributary Hines Channel had the highest mean values for nitrate concentrations in dry weather discharges of any channel monitored in the County. These data however were the result of grab and not composite samplings and represented only distinct moments in time. The September 1999 study was therefore designed to meet the commitments in this plan to further study the Central Irvine Channel in addition to other broader watershed objectives.

4.0 1999 Study

The San Diego Creek watershed has changed considerably since 1993. Examples include the construction of the Eastern Transportation Corridor, the Tustin Marketplace, Strawberry Farms Golf Course, Oak Creek Golf Course, operation of the Irvine Ranch Water District's (IRWD) Wetlands for nutrient removal from San Diego Creek, and the closures of the Marine Air Corps Stations at El Toro and Tustin. The intent of the 1999 study was to evaluate the current nutrient budget for San Diego Creek and to initiate the investigation of Central Irvine Channel for the Reconnaissance and Source Identification Element of the revised NPDES Stormwater Monitoring Program.

Automatic samplers and continuously monitoring flow measurement devices were used at all stations that were believed to be significant contributors to the nutrient load. A pre-study reconnaissance was performed to identify new tributaries to the system and semi-quantitatively assess the contributions of each significant source. To accomplish this task, County of Orange staff conducted a visual survey of the Peters Canyon Channel (F06) and Reach 2 of San Diego Creek (F05) and assessed each tributary. Both channel segments and their respective watersheds had changed significantly since the last survey in 1993.

4.1 Reconnaissance Monitoring Results

The following are the results of the Peters Canyon Channel (F06) reconnaissance conducted on May 18, 1999. Tributary points are described using the perspective: left or right looking downstream on Peters Canyon Wash. The locations of these channels are shown on **Figure 1** and are designated with letters A-P.

A. Approximately ¼ mile u/s Irvine Boulevard, a 16x11 Reinforced Concrete Box (RCB), Rattlesnake Canyon Wash (F26) discharges to F06 from the left side (looking downstream) with a flowrate ~ 0.2 cfs. The stream course of Rattlesnake Canyon Wash has been altered by construction during the last two years. The segment downstream of Viewpark Avenue was eliminated and the upstream flow was combined with that of Hicks Canyon Wash (F27). The discharge from the two channels flow into Peters Canyon Channel through this RCB.

B. Just upstream of the confluence with Rattlesnake Canyon Wash the flow in Peters Canyon Channel was ~ 1 cfs.

C. Just upstream of Bryan Avenue a small flow (~0.1 cfs) was observed in a fairly large Reinforced Concrete Pipe (RCP), apparently draining the agricultural area on the south side of the channel (left side looking d/s).

D. Downstream of Bryan Avenue and upstream of the 5 Fwy a large RCP (approximately 65") discharges to F06 from the left. The site can be accessed from the south levee and the pipe appears to run ESE. The flowrate was ~ 0.25 cfs. The laterals to this pipe include three agricultural field drains on the north side of Bryan

and the agricultural irrigation pump station drain on Culver and Bryan. These drainage areas used to discharge into the lower segment of Rattlesnake Canyon Wash before it was rerouted (see first bullet).

E. Just u/s of the 5 FWY, on the south (left) side of F06, a very small flow enters from a large, Reinforced Concrete Box (RCB). The drainage area appears to be a new development visible from the levee of the channel.

F. At the 5 FWY, underneath the bridge, Central Irvine Channel (F25) flows into F06 on the left. The flowrate was ~1 cfs.

G. At Walnut Avenue an 84" RCP Lyon Storm Drain (F06P07) flows from the left into F06. Discharge measurement was assessed as difficult at this station.

H. About ¼ mile d/s of Walnut an RCP from the Eastern Transportation Corridor (ETC) groundwater treatment plant's holding basin discharges to F06 from the right. The flow was ~ 1.5 cfs.

I. Less than ¼ mile d/s of the drain described above the El-Modena Irvine Channel (F07) discharges to F06 from the right.

J. At the railroad bridge overcrossing Como Channel (F06S03) discharges to F06 from the left.

K. At Edinger Avenue / Irvine Center Drive on the left side of F06 a relatively small discharge was observed in from 96" RCP (F06P08). The watershed of this stormdrain contains the area bounded by Irvine Center Drive on the southwest, Peters Canyon Channel on the northwest, the AT & SF Railway on the northeast and Culver Drive on the southeast.

L. On the opposite (right) side of F06, is the confluence with Santa Ana – Santa Fe Channel (F10).

M. Midway between Edinger/Irvine Center and Warner is the Valencia Channel (F06S02) outfall (left side). The flow was ~ 1 cfs.

N. Also in this reach of F06 there is a sloping, concrete box culvert that parallels Warner Avenue and is confluent with Peters Canyon Wash on the left side.

O. Downstream of Warner in the right bank of F06 is a 54" RCP that drains the transfer station in Construction Circle.

P. On the u/s side of Barranca Parkway on the right side looking d/s, an 84" RCP (F06P06) drains the western half of Construction Circle a section of Jamboree along the southeast side of the USMCAS in Tustin.

On May 19, 1999 samples were collected from these locations. The results are presented in **Table 1**.

On July 1, 1999 a reconnaissance of Reach 2 of the San Diego Creek (F05) was conducted. The following are a list of observations.

- There was no observable flow in F05 until its confluence with the **Canada Channel (F23)** confluence. Canada Channel introduced approximately 1 cfs.

- The flowrate into San Diego Creek from **Agua Chinon Wash (F18)** was estimated to be about 0.5 cfs; for **Bee Canyon Channel (F17)** <0.05 cfs; and in **Marshburn Channel (F16)** about 0.25 cfs.

- There are small trickles observed from various stormdrains but nothing significant enough to sample.

- There appeared to be some significant infiltration along the natural bottom stretches.

- There were two large in-channel construction projects that impacted the normal flowrate. One was near Irvine Center Drive and Bake Parkway and the other was between Laguna Canyon and Jeffrey. At the upper (Irvine Center) project there was no surface water but they encountered groundwater at < 10 feet below the surface. The second project involved a diversion of the ~ 2 cfs surface flow and a substantial amount of groundwater dewatering since they were deepening the channel.

The results from the two reconnaissance investigations showed that the water discharge from Peters Canyon Wash was much greater than that from Reach 2 of San Diego Creek. Investigation of the NPDES database showed that the average dry-weather concentrations of nitrate during the 98/99 monitoring year were 16.5 and 18.5 mg/L as N in San Diego Creek at Harvard Avenue and Peters Canyon Wash at Barranca Parkway respectively. With these facts, the decision was made to focus the 1999 study primarily on the tributaries of Peters Canyon Wash. The following is a summary of the activities that were performed.

5.0 Monitoring Program Design

The monitoring was conducted during a seven-day period in September of 1999. Unless otherwise specified, monitoring methodologies adhered to the guidelines described in the County's NPDES Sampling Manual. The sampling locations are listed in **Table 2**.

5.1 Primary Monitoring Sites

The daily nutrient load was monitored at primary stations:

- San Diego Creek @ Campus Drive
- San Diego Creek @ Harvard Avenue, and

- Peters Canyon Wash @ Barranca Parkway.

Automatic samplers were used to collect 24 discrete samples per day from each site. The sampling period at each location that represented a daily discharge was from 10 a.m. to 9 a.m. Four six-hour composite samples were prepared from each site and submitted for analysis by the contract laboratory. Each of these three primary stations has a continuously recording water level gage from which discharge rates were determined. A discharge measurement was made at each of these sites during the study period to verify or adjust the channel rating. The locations of these sites are shown in **Appendix A**.

5.2 Secondary Sites

Secondary sampling stations included the following tributary channels to Peters Canyon Wash. With the exception of the monitoring location on the El-Modena Irvine Channel, all tributary monitoring sites were located at the confluences of the tributaries and Peters Canyon Wash. The El Modena-Irvine Channel has a permanent streamgage at Michelle Drive that was used for flowrate monitoring.
The secondary sites are listed below and are shown on **Appendix A**.

- Central Irvine Channel
- El Modena-Irvine Channel
- Como Storm Channel
- Santa Ana-Santa Fe Channel
- F06P08 at Moulton Parkway
- Valencia Channel
- Warner Avenue Drain
- Construction Circle Drain (F06P06)

It should be noted that the ETC drain and Lyons Channel (F06P07) were originally intended to be secondary sampling sites. Two construction projects, the Walnut Street Bridge widening by the City of Irvine and the Peters Canyon Channel west bank stabilization (u/s Walnut Avenue) by the Irvine Company interfered with sampling. The ETC discharge was redirected to the sanitary sewer, and the dam created to divert water around the construction impeded the flow in Lyons channel.

The eight secondary stations were monitored with automatic samplers and temporary streamgages during the same seven-day period. At each site the automatic samplers collected one sample each hour beginning at 10 a.m.. When the sampler bases were brought into the laboratory, the individual samples were visually inspected for indications of abnormal discharges. An aliquot (~250 ml) of each bottle was be used to prepare a daily composite sample. If several consecutive bottles in the base exhibited an unusual coloration or sediment load an additional composite sample was prepared. Aliquots of the series of unusual samples (denoted as a sub-sample) were composited into a sample that was also submitted for analysis.

5.3 Additional sites

Additional sites that were sampled during the study included the following.

- Peters Canyon Channel upstream of its confluence with Rattlesnake Canyon Wash was sampled with an automatic sampler to evaluate the load from the most upstream reaches of the watershed. The channel was sandbagged to direct the flow of water through a well-defined reach. An area-velocity flowmeter was used to monitor the water level in this reach.

- Rattlesnake Canyon Wash was also monitored with an automatic sampler. Instantaneous flow measurements were made each time the sampler was serviced.

- The 65" RCP d/s Bryan Avenue on the left side was also monitored with an automatic sampler. A flowmeter will be used to continuously monitor the water depth in the pipe. Discharge rates were calculated using the Manning Equation. The Manning coefficients (diameter, slope, roughness coefficient) for the pipe were obtained from the as-built plans.

- Reach 2 tributaries Agua Chinon Wash (F18), Bee Canyon Channel (F17) and Marshburn Channel (F16) were grab sampled each day. Bee Canyon and Marshburn Channels. The flowrates were estimated.

- Reach 1 tributaries Lane Channel (F08), Barranca Channel (F09), San Joaquin Channel (F14), and San Canyon Channel (F15) were grab sampled each day. Instantaneous discharge measurements were made in Barranca, San Joaquin, and Sand Canyon Channels. Flowrates were estimated for Lane Channel from a discharge measurement conducted in the week following the study and water level records from the period prior to the study.

- The total daily mass load of nitrogen and phosphorus into and out of the IRWD wetlands area was monitored as part of on-going work by IRWD. Grab samples were collected each morning for analysis of nitrate+nitrite, ammonia, Total Kjeldahl Nitrogen (TKN) and total phosphorus. Daily averages for flowrates were determined from the pump flowmeters.

Table 3 is a summary of the activities that were conducted during this study.

5.4 Streamgages

Four of the automatic sampler sites were located near permanent streamgages operated by the County of Orange. Water levels at these sites are measured with Fluid Data manometers connected to continuous strip-chart recorders and electronic data-loggers. Discharge rates for each location are computed from the recorded water levels and a rating (water level vs. discharge) table, specific to that channel.

The temporary streamgages were composed of a fiberglass flume and a water level recording device. The equipment used for these temporary gages is listed in **Table 3**. The flowing water of each channel was directed with sandbags to the entrance of a flume. Visquene plastic sheeting was used to reduce the loss of water past the sandbags and the flume. Water level recording was performed with ISCO ultrasonic, bubbler, or area-velocity flowmeters. The ultrasonic probes were positioned above the flumes at the measurement points specified by the flume manufacturer. For flumes that were operated with bubbler flowmeters the bubbler tubing was attached to the orifice line molded into the flume by the manufacturer or attached to bottom of the floor of the converging section of the flume.

A digital record of water level was logged into the internal memory of each flowmeter, or the ISCO model 6700 autosampler if flow modules were used. These data were downloaded at the midpoint and end of the study using a laptop computer or ISCO RTD (rapid transfer device). The water level dataset was adjusted with the appropriate flume dimensions (e.g. height of floor of the flume throat) to achieve the correct stage-discharge relationship for that flume. The adjusted water level data was converted to discharge rates using the formula supplied by the flume manufacturer. The total volume of water that flows past the sampling site during each composite sampling period was then calculated from the discharge data.

No flumes were necessary for the area-velocity flowmeter. The discharges in the channels where these devices were used were directed, with sandbags, through reaches six feet long and 1-2 feet wide. The probes for the area velocity meters were placed in the center of the reaches. The probes monitored the depth and velocity of the water. Discharge rates were calculated from the product of the cross-sectional areas and the velocities.

With the exception of Central Irvine Channel, for each secondary sampling site a composite sample representing the discharge over a 24-hour period (10a.m.-9a.m.) were submitted for analysis each day. For Central Irvine Channel, 4 six-hour composite samples were submitted each day reflecting its study objective focus.

5.5 Land Use Evaluation

A field reconnaissance of the watershed of Peters Canyon Wash was conducted during the week of the study to document construction projects and crop distributions on agricultural fields. Significant water discharges into the drainage system were documented. The UCI Cooperative Extension Program provided specific information on crops at single-usage, agricultural fields and general information on the types of crops planted in the watershed during this time of year. This information can be found in **Appendix E**. Color photographs were taken as part of the documentation and were scanned and appear in **Appendix F**.

5.6 Sample Analyses

Montgomery Watson Laboratories in Pasadena provided analytical services using the following methods at all sites.

Analysis	Standard Method	Corresponding EPA method
Conductivity	2510 B.	Conductivity (EPA 120.1)
Turbidity	2130 B.	Nephelometric Method (EPA 180.1)
pH	4500-H B.	pH Value (EPA 150.1)
Nitrate Nitrogen	4500-NO3 F.	Automated Cadmium Reduction (EPA 353.2)
Ammonia Nitrogen	4500-NH3 B.	Preliminary Distillation (EPA 350.2)
	4500-NH3 C.	Nesslerization Method (EPA 350.2)
	4500-NH3 E.	Titrimetric Method (EPA 350.2)
Total Kjeldahl Nitrogen		4500-Norg B. Macro Kjeldahl Method (EPA 351.3)
Total Phosphate	4500-P B1.	Preliminary Filtration Step (EPA 365.2)
	4500-P B2.	Preliminary Acid Hydrolysis Step (EPA 365.2)
	4500-P B3,4.	Preliminary Digestion (EPA 365.2)
	4500-P E.	Ascorbic Acid Method (EPA 365.1)
Orthophosphate	4500-P E.	Ascorbic Acid Method (EPA 365.1)
Total Non-Filterable Residue (TSS)	2540 D.	Total Non-Filterable Residue Dried @ 103-105°C (EPA 160.2)
Volatile Solids (VSS)	2540 E.	Total Volatile and Fixed Results @ 550°C (EPA 160.4)

Analyses on samples from Central Irvine Channel, Peters Canyon Wash @ Barranca Parkway, and San Diego Creek at Harvard Avenue and Campus Drive included orthophosphate. Orthophosphate concentrations were determined on filtered replicate samples. Filtering was performed using a Gelman Sciences Magnetic Filter Holder and 0.45 micron glass fiber filters.

5.7 Quality Assurance

A study of equipment blanks was performed during the week prior to monitoring. Equipment blanks included samples of water from the County of Orange PFRD laboratory's deionization tanks and ultrapure water system, ultrapure water in I-Chem sample bottles, ultrapure water that has come in contact with a compositing basin, ultrapure water that has been filtered with the Gelman Science Magnetic filter holder and 0.45 micron filter. An equipment blank was prepared by passing ultrapure water through an automatic sampler strainer, tygon tubing, automatic sampler internal pump tubing and collected in an automatic sampler bottle.

Equipment blanks were collected in the field on the initial day of sampling. These blanks included the following:

- Analyzing ultrapure water that has passed through the internal pump tubing of the automatic sampler at the Campus Drive station on San Diego Creek.

- Analyzing ultrapure water that has passed through the strainer, tygon strainer tubing and pump tubing of the sampler at the Barranca Parkway station on Peters Canyon Wash.

- Analyzing ultrapure water that has been collected in a bottle of an automatic sampler after passing through the strainer, tygon line, and pump tubing at the Harvard Avenue station on San Diego Creek.

At least one synthetic nutrient sample, prepared by the County of Orange, was submitted with each daily batch of samples. At least one replicate sample was also submitted daily.

6.0 Data Analyses

6.1 Flow data

The data from ISCO flowmeters were downloaded to a portable datalogger called a rapid transfer device (RTD). These data were then transferred to a computer for processing. The raw data (date/time, water level and/or flowrate) were imported into Microsoft Excel spreadsheets. These data were adjusted, when necessary for flume dimensions (e.g. floor height), and compared to field staff readings at the time of automatic sampler servicing. The water level datum from each five-minute reading was converted into an instantaneous discharge rate using the respective formula from the flume manufacturer.

The strip-chart records from the permanent water level gages at El Modena-Irvine Channel @ Michelle, Peters Canyon Wash @ Barranca, San Diego Creek @ Culver, and San Diego Creek @ Campus were brought in from the field for processing with software from Western Hydrologic Services, Inc.
The pen tracings, representing continuous water level measurements that were recorded onto the strip charts, were first digitized. These records were adjusted for time and measurement shifts according to the streamgage maintenance logs. The adjusted, digital, water level records were converted, using the respective channel rating curves, to discharge rates.

6.2 Data Presentation

The results from each site are summarized in **Table 4** and **Appendix C**. Nitrate was the dominant form of nitrogen at most sites. Using Microsoft Excel, the nitrate concentration from each grab sampling or 24-hour composite sampling was plotted against time in a bar graph. For sites at which four 6-hr composite samples were submitted for analyses, the mean of the four samples was used to represent the 24-hr average. For replicate samples submitted to Montgomery Watson, the mean value of the two analyses was used. The x-axis label for each tick mark represents the ending

day of the 24-hr composite sampling period. For grab samples, the tick label represents the day on which the sample was collected.

The digital discharge record from each recording streamgage was plotted (x-y scatter plot) using Microsoft Excel. A bar graph representing the average discharge rate during each composite sampling period (10 a.m. - 10 a.m.) was also created for each site.

Using the flowrates and concentration data the mass load of nitrate in pounds was calculated for each 24-hr composite period and plotted as bar graphs. The following formula was used.

$$Massload\ (lbs\ /\ day) = \frac{C_{ave} \times Q_{ave} \times 3600\ \text{sec}/\ hr \times 24 hr\ /\ day \times 28.3 L\ /\ ft^3}{454{,}000 mg\ /\ lb}$$

Where C_{ave} is the average concentration in mg/L and Q_{ave} is the 24-hr average discharge rate in ft^3/sec.

7.0 Results

- During the period of this study the average nitrate nitrogen load transported by Peters Canyon Wash, measured at Barranca Parkway, was 318.8 lbs/day. The sum of the average loads from the monitoring points upstream of Barranca Parkway was 392.9 lbs/day. The average water discharge rate for Peters Canyon Wash at Barranca Parkway was 5.61 cfs. The sum of the average discharge rates from the monitoring points upstream of Barranca Parkway was 5.25 cfs. **Figure 2** shows the average discharge rate of each monitored tributary of Peters Canyon Wash as well as tributaries to Reach 1 of San Diego Creek. The lengths of the arrows are proportional to the discharge rates.

- The greatest contributors to the nitrate nitrogen load in Peters Canyon Wash were Valencia Storm Channel (88.2 lbs/day), Santa Ana-Santa Fe (78.1 lbs/day), Central Irvine Channel (67.4 lbs/day), Como Storm Channel (63.4 lbs/day), and the Warner Channel (49.5 lbs/day). **Table 5** shows the mean daily loads from the monitoring points during the study. **Figure 3** shows the average nitrate concentrations measured in each tributary and **Figure 4** shows the average nitrate load.

- The average daily total phosphate (as P) loads from San Diego Creek at Campus Drive, Peters Canyon Wash at Barranca Parkway and San Diego Creek at Harvard Avenue were 5.03, 5.24, and 0.39 lbs/day, respectively. The tributary that contributed the greatest phosphate load to Peters Canyon Channel during the study was Central Irvine Channel. The average load of 2.96 lbs/day as P, was more than half of the average load from Peters Canyon Wash at Barranca Parkway. **Figure 5** shows the average total phosphate load as P from each

tributary. Approximately 96% of this phosphate load was in the form of orthophosphate.

- The nitrate load in San Diego Creek measured at Harvard Avenue was 126.3 lbs/day. The average of the loads measured upstream was 9.37 lbs/day. The average discharge rate at Harvard Avenue (measured at Culver Drive) during the study was 1.15 cfs. The sum of the average discharges from the three tributaries upstream was 0.36 cfs.

- The average daily nitrate nitrogen load measured in San Diego Creek at Campus Drive was 381.5 lbs/day. The sum of the average daily nitrate loads measured at Peters Canyon Wash at Barranca Parkway, San Diego Creek at Harvard Avenue, and those estimated for Lane, Barranca, San Joaquin, and Sand Canyon Channels was 550.3 lbs/day. The average discharge rate at Campus Drive was 7.81 cfs. The sum of the average discharge rates, measured and estimated, from the locations cited above (upstream of Campus Drive) was 9.86 cfs.

- During the study, the Irvine Ranch Water District (IRWD) was diverting some water from San Diego Creek through its wetlands treatment system to remove nitrate. Another portion of the diverted water was sent to the San Joaquin Marsh, the TIC Mitigation site and the Carlson Marsh. The quality and volume of the water diverted from and returned to the Creek was monitored by IRWD.

  The water that was pumped from and returned to the creek was done so in the reach between Michaelson Avenue and Campus Drive. The average pumping rate from the Creek (September 14-20) was 5.10 cfs. The average return rate to the creek was 1.82 cfs yielding a net removal of 3.28 cfs. The mean nitrate load pumped from the Creek was 201 lbs/day as NO_3. The mean nitrate load returned to the Creek was 15.3 lbs/day. The net load removed from the creek during the study was 186 lbs/day.

- The average daily Total Nitrogen (TN) loads from San Diego Creek at Campus Drive, Peters Canyon Wash at Barranca Pkwy and San Diego Creek at Harvard Avenue were 435, 353, and 131 lbs/day, respectively. **Figure 6** shows the average TN load from each of the monitored tributaries.

- Sub-samples of several 24-hr composite samples were submitted for analyses (see sub-samples in **Appendix B**). Many of these samples were submitted because of their high level of suspended and settleable solids relative to other samples collected during the 24-hr composite period. With the exception of one location, nitrate levels in sub-samples were relatively unchanged from the larger composite sample. Phosphate levels were slightly higher in the sub-samples which is consistent (due to particulate forms of phosphate) with their higher suspended sediment concentrations.

- Synthetic and replicate samples were sent to Montgomery Watson Laboratories on each sampling day to evaluate accuracy and precision. Accuracy check-samples were synthesized from aliquots of standards prepared from Analytical Grade reagents. Nanopure (18 megaohm) water was used for dilutions. Replicate samples were made with aliquots taken from the composite samples.

  The accuracy of the laboratory was acceptable on most of the analyses. The range in recoveries on the nitrate analyses was 104.5 to 125 % with a mean of 115 %. The range in recoveries on phosphate analyses was 84.5 to 96.6 % with a mean of 90.3 %. Ammonia nitrogen (56 to 101.5%) and orthophosphate (62.2 to 110.3 %) analyses showed the greatest ranges in recoveries. TKN analyses were the most accurate with the range in recoveries being 88.5 to 107.1 % and a mean of 96.2 %.

  The precision of the analyses by Montgomery Watson was measured by the results from replicate samples. For nitrate analyses, the differences between samples ranged from 1.7 to 50.6 % with a mean of 17 %.
  An inter-laboratory comparison was also conducted by submitting replicate samples to Associated Laboratories in Orange. Seven samples were submitted to each laboratory on each day for this evaluation. While Montgomery Watson Laboratories ran a complete suite of analyses on each sample Associated Laboratories analyzed only nitrate concentration. Associated Laboratories used ion chromatography (IC) for its analytical method and Montgomery Watson used automated cadmium reduction for nitrate analyses. Both methods are EPA approved; samples run by IC however, have only a 48-hr holding time versus a 28-day holding time if preserved with sulfuric acid and analyzed by automated cadmium reduction. On the first two days of sampling Montgomery Watson results were predominately lower than those of Associated. On the other two days that samples were submitted, the Montgomery Watson results were predominately higher than those of Associated were.

  Quality Assurance results are contained in **Appendix D**.

8.0 Conclusions

- The average discharge rate from Peters Canyon Wash at Barranca and the sum of the average discharge rates from its measured tributaries were very close. The sum of the average discharge rates from the tributaries comprised 94% of the measured discharge at the end of the system at Barranca Parkway. The mass load of nitrate calculated from these same sites showed a reduction of approximately 20% from the collective points of tributary input to the endpoint. This reduction may be due to several factors including nitrate assimilation by aquatic plants and denitrification.

- The greatest sources of nitrate to Peters Canyon Wash are the Valencia, Santa Ana-Santa Fe, Central Irvine, Como and Warner Channels. These channels

contain discharges from nurseries (Central Irvine) and potential areas of groundwater infiltration (Santa Ana-Santa Fe and Como Channels).

- There were large disparities between the discharge rates and nitrate loads of San Diego Creek at Harvard Avenue and the collective discharge rates and nitrate loads from monitored upstream tributaries. Only 7% of the load measured at Harvard Avenue were attributed to upstream monitoring sites. Some of this unassigned load may have been attributed to the nitrate in the groundwater (extracted and subsequently discharged downstream) in the construction zone between Jeffrey Road and Sand Canyon Avenue.

- The sum of the average nitrate loads from Peters Canyon Wash, San Diego Creek at Harvard, Lane Channel, Barranca Channel, San Joaquin Channel, and Sand Canyon Channel were much greater than that measured at Campus Drive. Subtraction of the average rate of removal of nitrate by IRWD's diversion yielded a 95% recovery (364 / 382 lbs/day as N). The net water discharge rate from the tributaries and IRWD diversion was 84% (6.58 / 7.81 cfs) of the total measured at Campus Drive. The relatively small differences in water discharge rates may have been attributable to the fact that instantaneous discharge measurements or estimates were used in the Reach 1 tributaries of San Diego Creek rather than continuous discharge measurements as in the Peters Canyon Wash tributaries.

- The average daily nitrate nitrogen load in San Diego Creek measured at Campus Drive (382 lbs/day) was substantially lower during this study than during previous studies conducted in August 1990 (1,149), May 1991 (894), and May 1993 (1,569). Compensating for the removal by the IRWD treatment / diversion still yields a value (567 lbs/day) that was lower than each of the previous studies.

- From the calculated average daily load for total nitrogen (TN) at San Diego Creek at Campus Drive, the extrapolated total load for the period April 1 - September 30 would be approximately 80,000 pounds. This value is much less than the Summer 2002 goal of 200,097 pounds established in the TMDL. Without diversion to the IRWD wetlands the total would be approximately 121,000 pounds. **Figure 7** is a graphical representation of these results. It should be noted that the extrapolated value is based on one week of data near the end of the summer period.

Tables

Table 1
Results of 5/19/99 Reconnaissance on Peters Canyon Wash

Location from Fig. 1	PFRD Facility No	Station Description	5/19/99 NO_3 (mg/L)
A	F26	Rattlenake Canyon Wash	0.4
B	F06	Peters Canyon Upper Reach	4.3
C		Bryan Avenue Ag Flow	0.4
D		65" RCP d/s Bryan	1.7
F	F25	Central Irvine	306.0
G	F06P07	Lyon Storm Drain	53.2
H		ETC Treatment Plant	33.7
I	F07	El Modena Irvine Channel	22.6
J	F06S03	Como Storm Drain	84.2
K	F06P08	Edinger / Irvine Center	70.9
L	F10	Santa Ana - Santa Fe Channel	70.9
M	F06S02	Valencia Channel	73.5
N		Warner Avenue Drain	55.4
O		Const. Cir. Transfer Station Drain	0.4
P	F06P06	Construction Circle West Drain	84.6

Table 2
Equipment Inventory

Number	Manufacturer	Device	Model No.	Notes
17	ISCO	Automatic Sampler	3700	
3	ISCO	Automatic Sampler	6700	
5	ISCO	Ultrasonic Flowmeter	3210	
1	American Sigma	Ultrasonic Flowmeter		*
1	ISCO	Ultrasonic Flow Module	710	
1	ISCO	Bubbler Flow Module	730	
1	ISCO	Bubbler Flow Module	730	#
1	ISCO	Area Velocity Flow Module	750	
1	ISCO	Bubbler Flowmeter	4230	
1	ISCO	Bubbler Flowmeter	4230	#
1	Manning	6" Palmer-Bowlus Flume		*
1	Manning	8" Palmer-Bowlus Flume		*
1	Manning	12" Palmer-Bowlus Flume		*
1	Plastifab	1.5' H Flume		
1	Plastifab	6" Palmer-Bowlus Cutback Flume		
1	Plastifab	18" Palmer-Bowlus Cutback Flume		
1	Plastifab	6" Parshall Flume		
1	Plastifab	Large 60° V Trapezoidal Flume		
1	Plastifab	2" 45° WSC Trapezoidal Flume		

* On loan from IRWD
# On loan from MRC Technologies

T[illegible] 3
Summary of Activities

Station	Period	Sample Type	Discrete Samples per day	Composite Samples per day	Flowrate Measurement
San Diego Creek @ Campus Drive	Mon-Sun	Composite (10AM-9AM)	24	4	Manometer Gage
San Diego Creek @ Harvard Avenue	Mon-Sun	Composite (10AM-9AM)	24	4	Manometer Gage
Peters Canyon Channel @ Barranca Parkway	Mon-Sun	Composite (10AM-9AM)	24	4	Manometer Gage
Central Irvine Channel	Mon-Sun	Composite (10AM-9AM)	24	4	45° 2" Trapezoidal flume + ISCO ultrasonic flowmeter
El Modena-Irvine Channel	Mon-Sun	Composite (10AM-9AM)	24	1	Area-velocity gage
Como Storm Channel	Mon-Sun	Composite (10AM-9AM)	24	1	1.5' H Flume + bubbler flowmeter
Santa Ana-Santa Fe Channel	Mon-Sun	Composite (10AM-9AM)	24	1	18" Palmer-Bowlus Cutback Flume + bubbler flowmeter
F06P08 at Moulton Parkway	Mon-Sun	Composite (10AM-9AM)	24	1	12" Palmer Bowlus Flume + ultrasonic flowmeter
Valencia Channel	Mon-Sun	Composite (10AM-9AM)	24	1	6" Parshall Flume + ultrasonic flowmeter
Warner Avenue Drain	Mon-Sun	Composite (10AM-9AM)	24	1	Area Velocity Flowmeter
Construction Circle Drain (F06P06)	Mon-Sun	Composite (10AM-9AM)	24	1	Bubbler Flowmeter
Peters Canyon Channel u/s Hicks Canyon Wash	Mon-Sun	Composite (10AM-9AM)	24	1	Bubbler Flowmeter
Hicks Canyon Wash	Mon-Sun	Composite (10AM-9AM)	24	1	Instantaneous Discharge Measurement
65" RCP d/s Bryan	Mon-Sun	Composite (10AM-9AM)	24	1	Bubbler Flowmeter and Manning Coefficients
Agua Chinon Channel	Tue-Mon	Grab (5AM-10 AM)	1		Estimate
Bee Canyon Channel	Tue-Mon	Grab (5AM-10 AM)	1		Instantaneous Discharge Measurement
Marshburn Channel	Tue-Mon	Grab (5AM-10 AM)	1		Instantaneous Discharge Measurement
Lane Channel	Tue-Mon	Grab (5AM-10 AM)	1		Ultrasonic flowmeter and Manning Coefficients
Barranca Channel	Tue-Mon	Grab (5AM-10 AM)	1		Estimate
San Joaquin Channel	Tue-Mon	Grab (5AM-10 AM)	1		Estimate
Sand Canyon Channel	Tue-Mon	Grab (5AM-10 AM)	1		Estimate

Table 4
Average Daily Discharge, Nitrate and Phosphate Concentrations
September 14-20, 1999

Site No.	Location	Avg. Q (cfs)	Avg. [Nitrate] as NO_3 (mg/L)	Avg. [Nitrate] as N (mg/L)	Avg. [Phosphate] as PO_4 (mg/L)	Avg. [Phosphate] as P (mg/L)	Avg. [ortho-PO_4] as P (mg/L)
1	Peters Canyon Wash u/s Rattlesnake Canyon Wash	0.29	13.89	3.14	1.37	0.45	
2	Rattlesnake Canyon Wash		7.46	1.69	3.04	0.99	
3	65" RCP u/s Bryan Avenue	0.10	4.09	0.92	0.16	0.05	
4	Central Irvine Channel	0.55	99.15	22.39	3.06	0.90	0.86
5	El Modena Irvine Channel	1.04	11.95	2.70	0.73	0.24	
6	Como Storm Channel	0.56	89.64	20.24	0.19	0.06	
7	F06P08	0.23	81.02	18.29	0.56	0.18	
8	Santa Ana - Santa Fe Channel	0.89	75.77	17.11	0.28	0.09	
9	Valencia Channel	1.01	71.91	16.24	0.75	0.25	
10	Warner Ave Drain	0.52	78.76	17.78	0.67	0.22	
11	Construction Circle Drain	0.06	63.09	14.25	1.16	0.38	
12	Peters Canyon @ Barranca Pkwy	5.61	47.46	10.72	0.54	0.19	0.12
	Sum of 1-11	**5.25**					
13	Agua Chinon Wash	0.25(i)	24.91(g)	5.63	1.85	0.60	
14	Bee Canyon Wash	0.06(i)	20.89(g)	4.72	3.01	0.98	
15	Marshburn Channel	0.05(i)	25.54(g)	5.77	0.60	0.19	
16	San Diego Creek @ Harvard	1.15	88.99	20.09	0.20	0.06	0.06
	Sum of 13-15	**0.36**					
17	Lane Channel	1.20(i)	40.09(g)	9.05	0.46	0.15	
18	Barranca Channel	0.53(i)	2.53(g)	0.57	0.27	0.09	
19	San Joaquin Channel	0.70(i)	39.83(g)	8.99	0.83	0.27	
20	Sand Canyon Channel	0.58(i)	8.54(g)	1.93	1.04	0.34	
001	IRWD inflow into wetlands#	5.10	32.54	7.35	0.45	0.15	
002	IRWD outflow from wetlands	1.82	7.42	1.68	0.41	0.13	
	Net Removal by IRWD	**3.27**					
21	San Diego Creek @ Campus	7.81	40.03	9.04	0.36	0.16	0.12
	Sum of 12 + 16 + 17 + 18 + 19 - (001 - 002)	**6.49**					

Analyses performed by IRWD
(I) = instantaneous discharge measurement or estimate
(g) = daily grab samples

Table 5
Average Daily Discharge Nitrate and Phosphate Loads
September 14-20, 1999

Site No.	Location	Avg. Q (cfs)	Avg. Nitrate Load as NO_3 (lbs/day)	Avg. Nitrate Load as N (lbs/day)	Avg. Phosphate Load as PO_4 (lbs/day)	Avg. Phosphate Load as P (lbs/day)
1	Peters Canyon Wash u/s Rattlesnake Canyon Wash	0.29	16.09	3.63	2.24	0.73
2	Rattlesnake Canyon Wash					
3	65" RCP u/s Bryan Avenue	0.10	2.25	0.51	0.09	0.03
4	Central Irvine Channel	0.55	298.64	67.44	9.06	2.96
5	El Modena Irvine Channel	1.04	68.64	15.50	4.10	1.34
6	Como Storm Channel	0.56	280.53	63.35	0.57	0.19
7	F06P08	0.23	99.69	22.51	0.69	0.22
8	Santa Ana - Santa Fe Channel	0.89	345.80	78.08	1.36	0.44
9	Valencia Channel	1.01	390.49	88.18	4.14	1.35
10	Warner Ave Drain	0.52	219.07	49.47	1.88	0.61
11	Construction Circle Drain	0.06	18.92	4.27	0.36	0.12
12	Peters Canyon @ Barranca Pkwy	5.61	1411.65	318.76	16.05	5.24
	Sum of 1-11	**5.25**	**1740.12**	**392.93**	**24.47**	**7.99**
13	Agua Chinon Wash	0.25(i)	31.67(g)	7.15	2.50	0.82
14	Bee Canyon Wash	0.06(i)	7.05(g)	1.59	1.02	0.33
15	Marshburn Channel	0.05(i)	2.83(g)	0.64	0.14	0.04
16	San Diego Creek @ Harvard	1.15	559.09	126.25	1.20	0.39
	Sum of 13-15	**0.36**	**41.55**	**9.38**	**3.66**	**1.20**
17	Lane Channel	1.30(i)	280.66(g)	63.37	2.97	0.97
18	Barranca Channel	0.53(i)	7.33(g)	1.66	0.76	0.25
19	San Joaquin Channel	0.70(i)	149.85(g)	33.84	3.09	1.01
20	Sand Canyon Channel	0.58(i)	27.98(g)	6.32	3.36	1.10
001	IRWD inflow into wetlands#	5.10	891.08	201.21	12.49	4.08
002	IRWD outflow from wetlands	1.82	67.56	15.26	3.41	1.11
	Net Removal by IRWD	**3.27**	**823.52**	**185.96**	**9.08**	**2.96**
21	San Diego Creek @ Campus	7.81	1689.68	381.54	15.42	5.03
	Sum of 12 + 16 + 17 + 18 + 19 - (001 - 002)	**6.59**	**1613.04**	**364.23**	**18.36**	**5.99**

Analyses performed by IRWD
(I) = instantaneous discharge measurement or estimate
(g) = daily grab samples

Figure 1
Reconnaisance of Peters Canyon Wash - May 18, 1999

006895

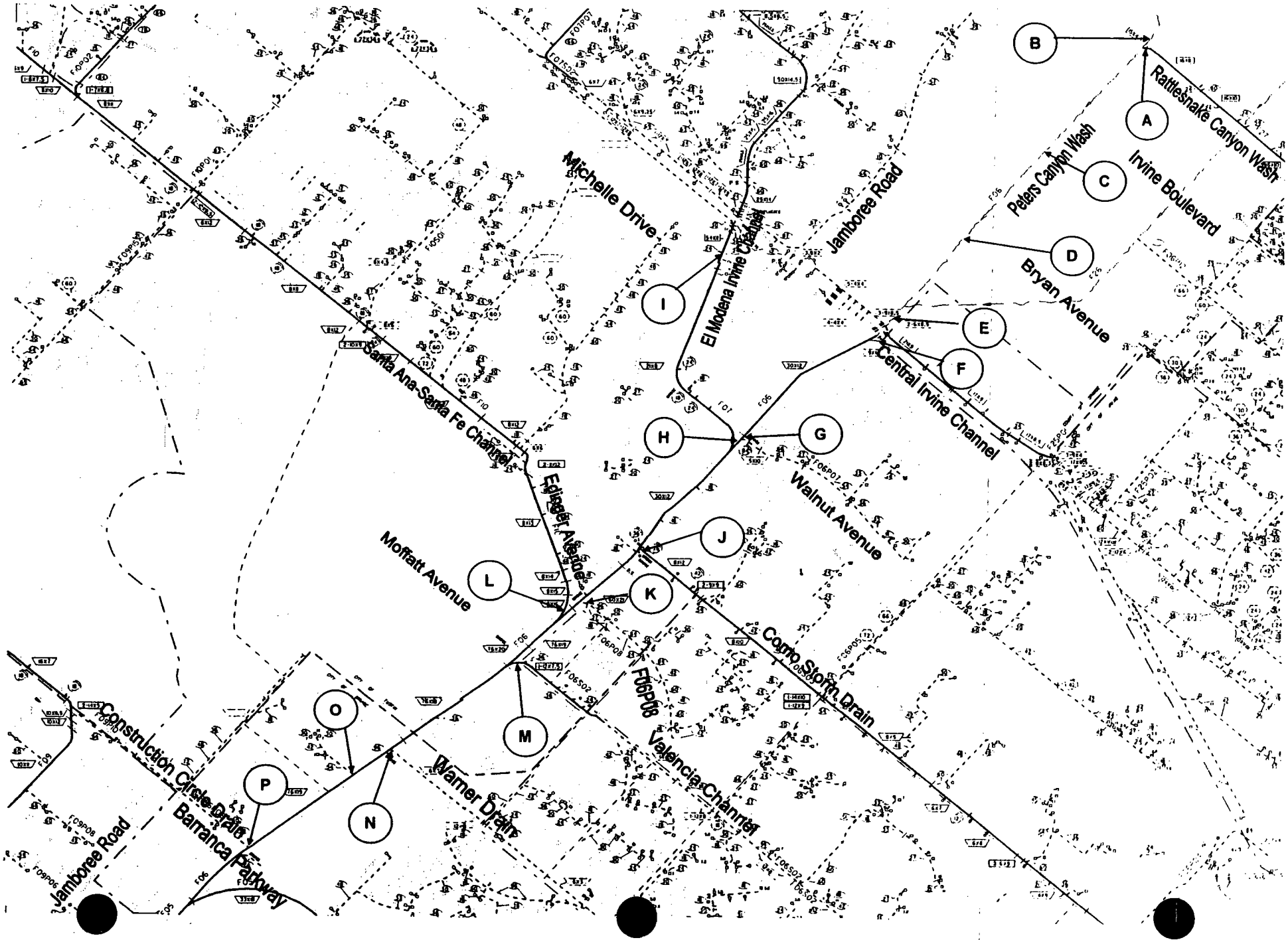

Figure 2
Average Daily Flow Rates
cubic feet / second
September 14-20, 1999

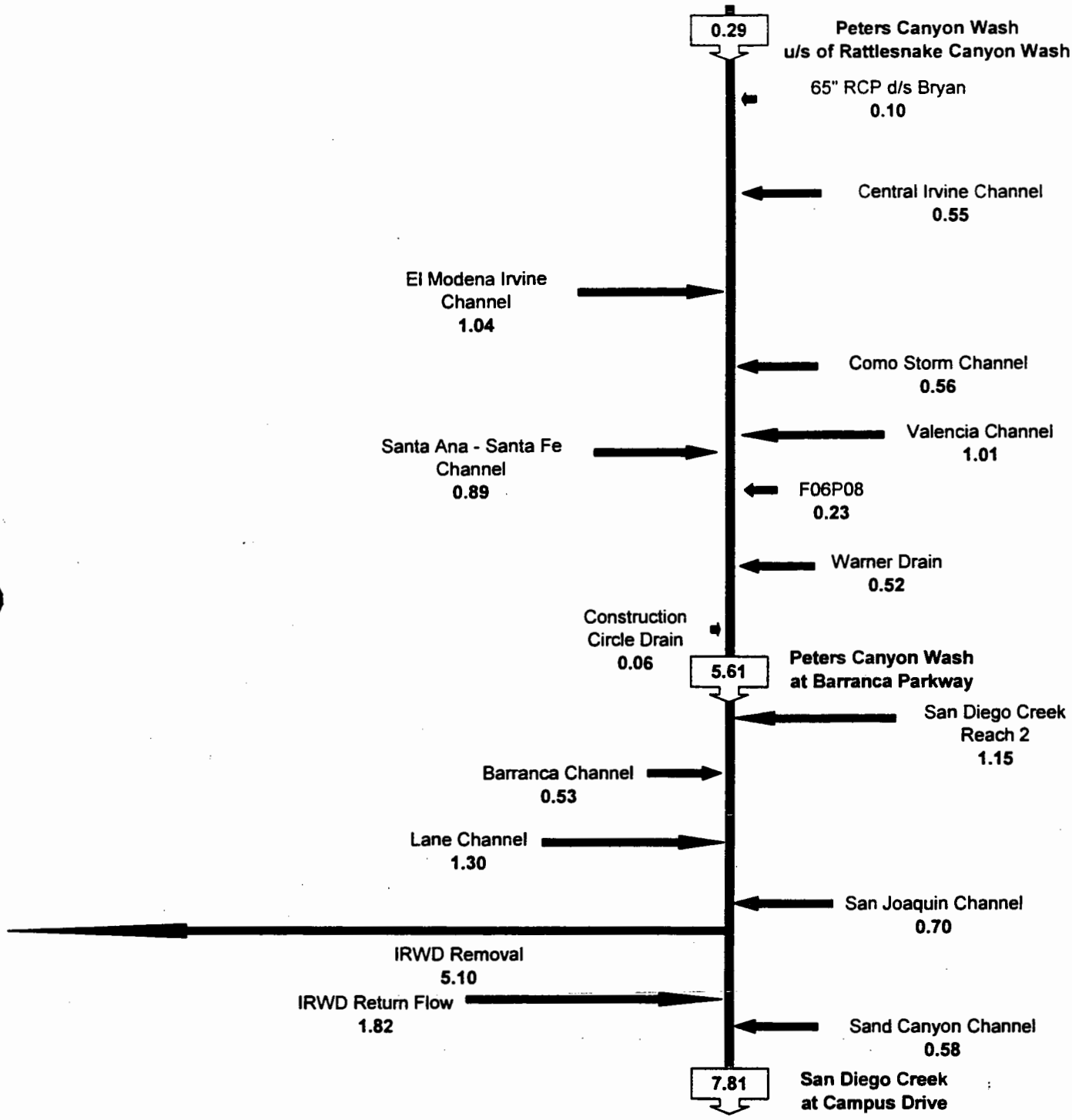

Figure 3
Average Daily Nitrate Nitrogen Concentration
mg/L NO_3 as N
September 14-20, 1999

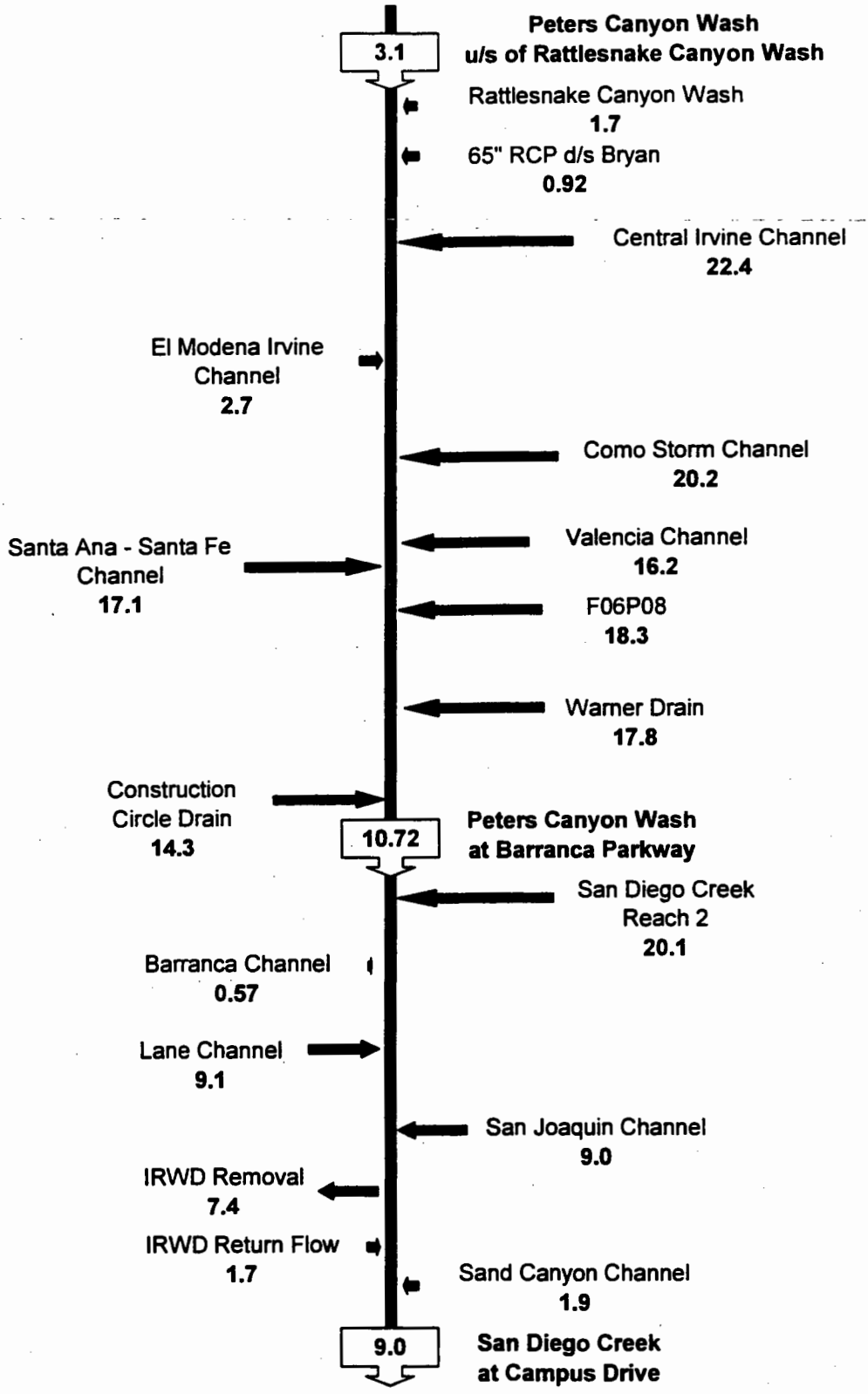

Figure 4
Average Daily Nitrate Nitrogen Load
NO_3 as N (lbs/day)
September 14-20, 1999

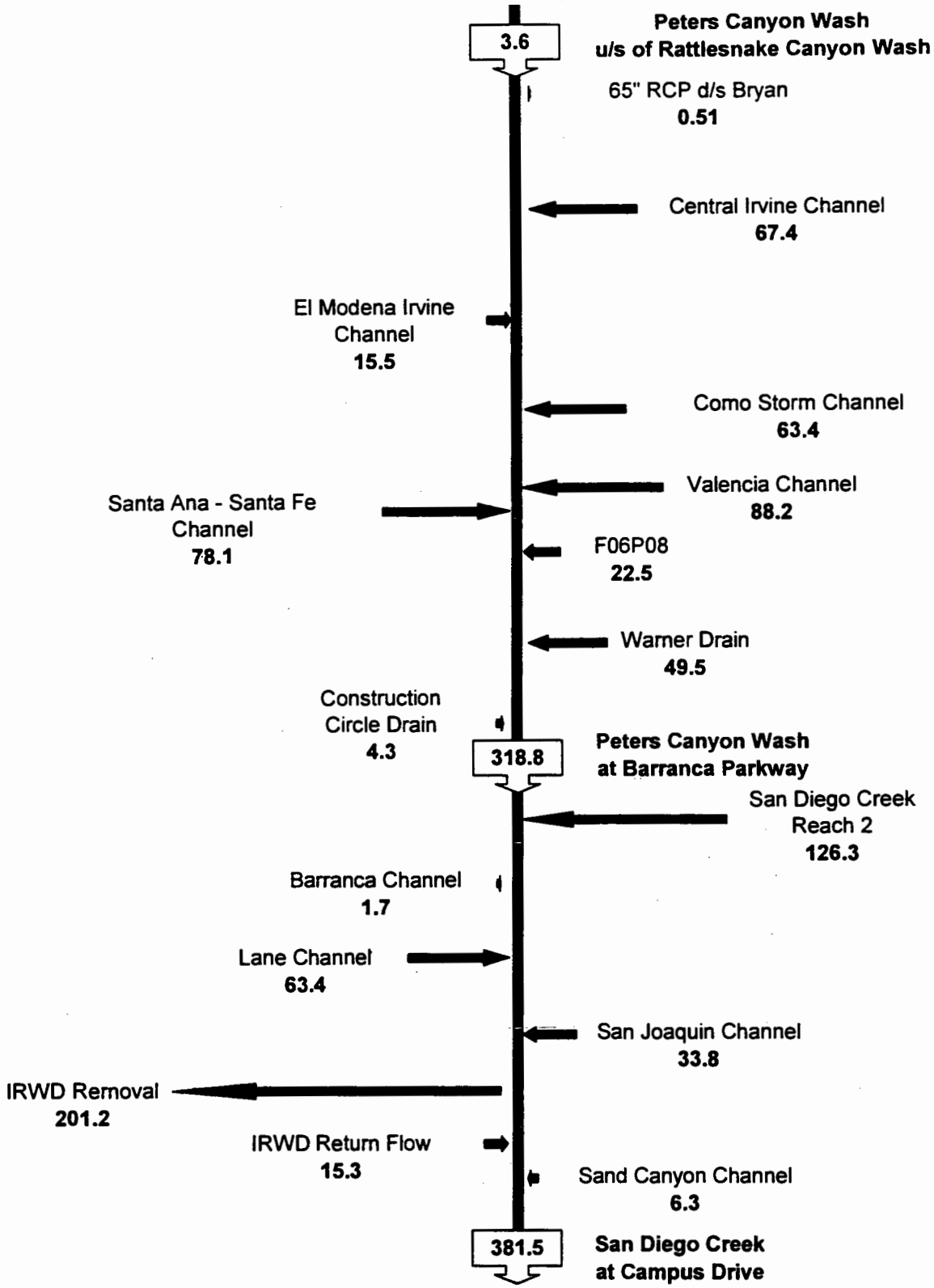

Figure 5
Average Daily Phosphorus Load
PO_4 as P (lbs/day)
September 14-20, 1999

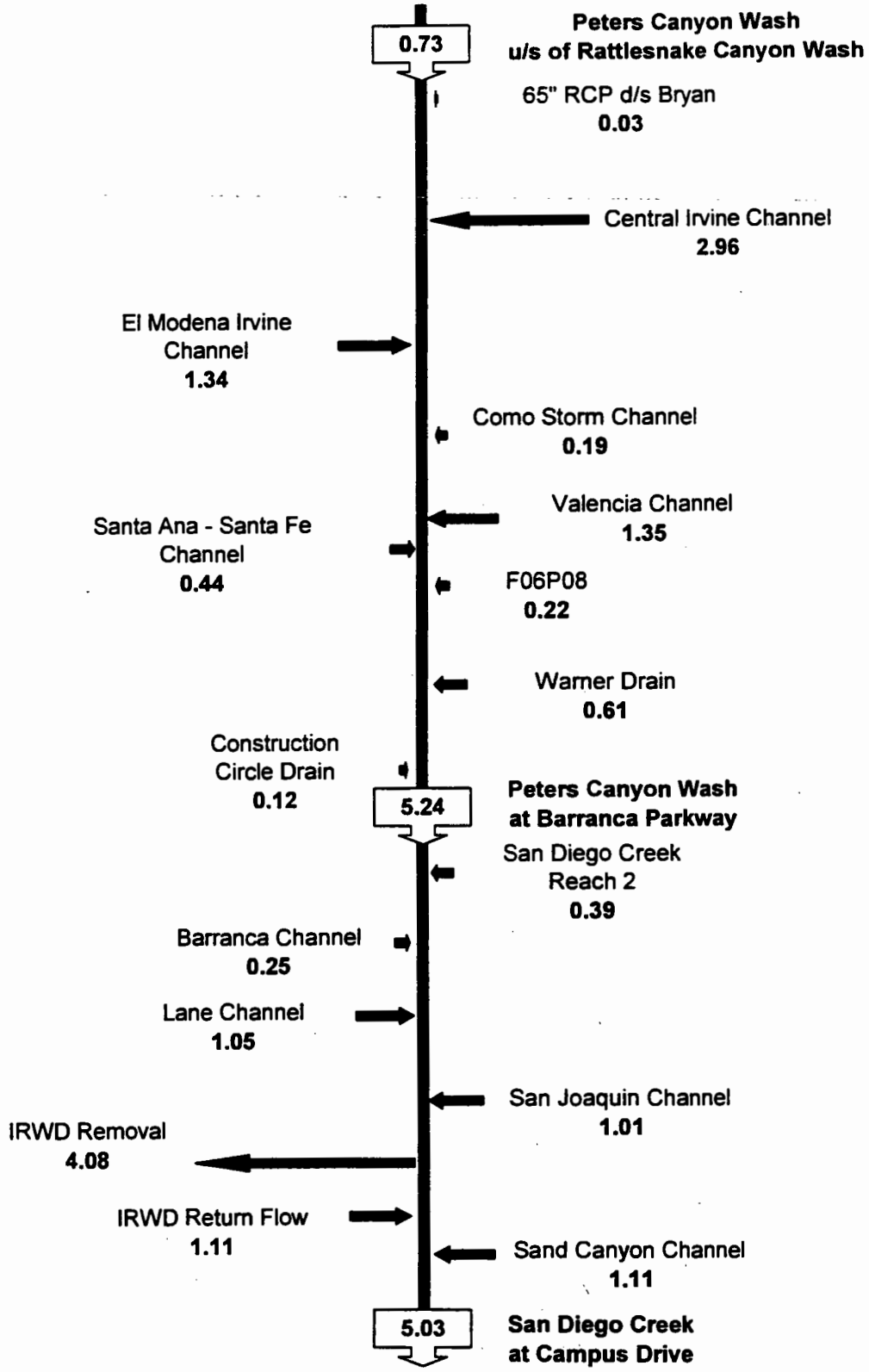

Figure 6
Average Daily Total Nitrogen Load
TN (lbs/day)
September 14-20, 1999

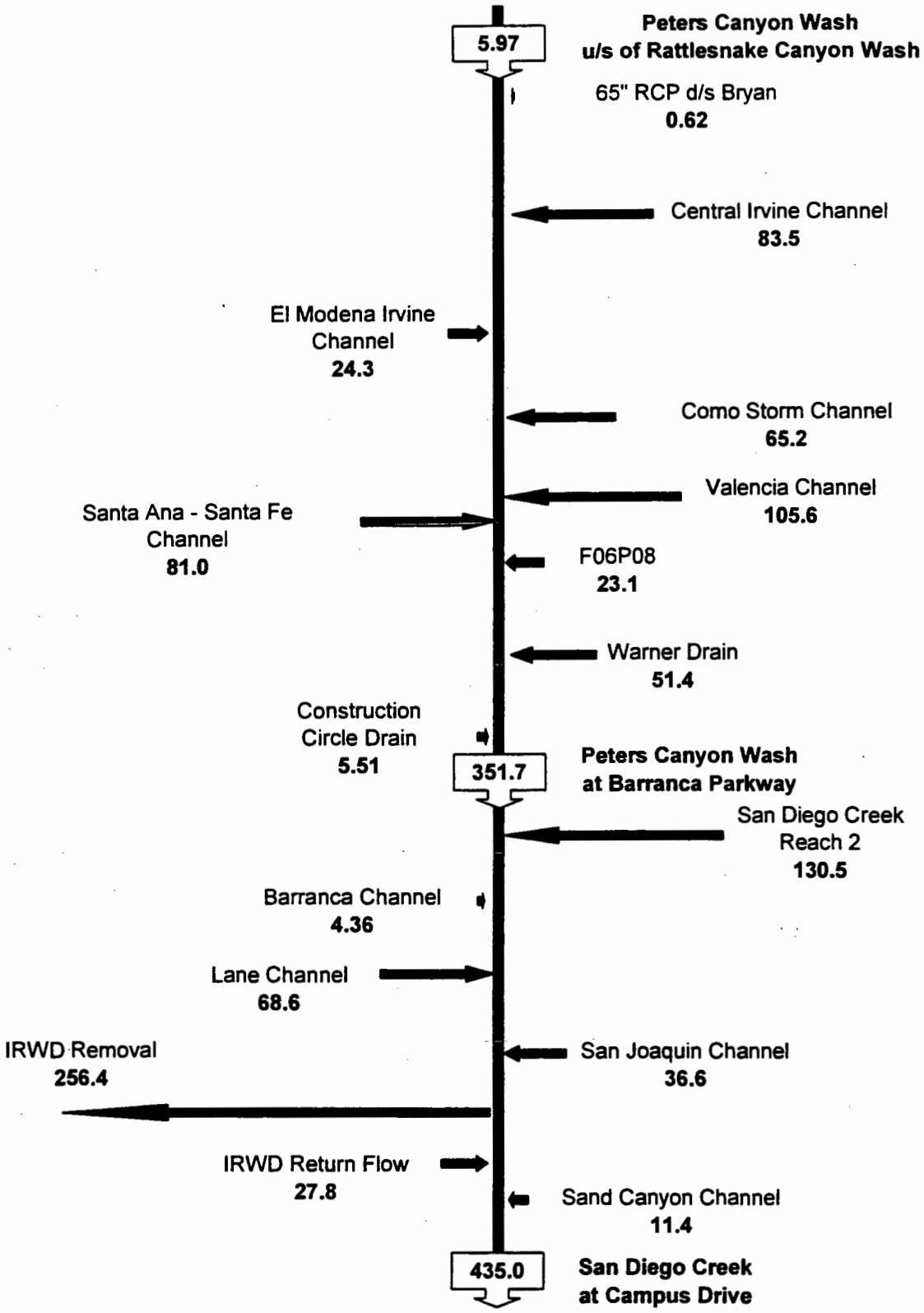

Figure 7

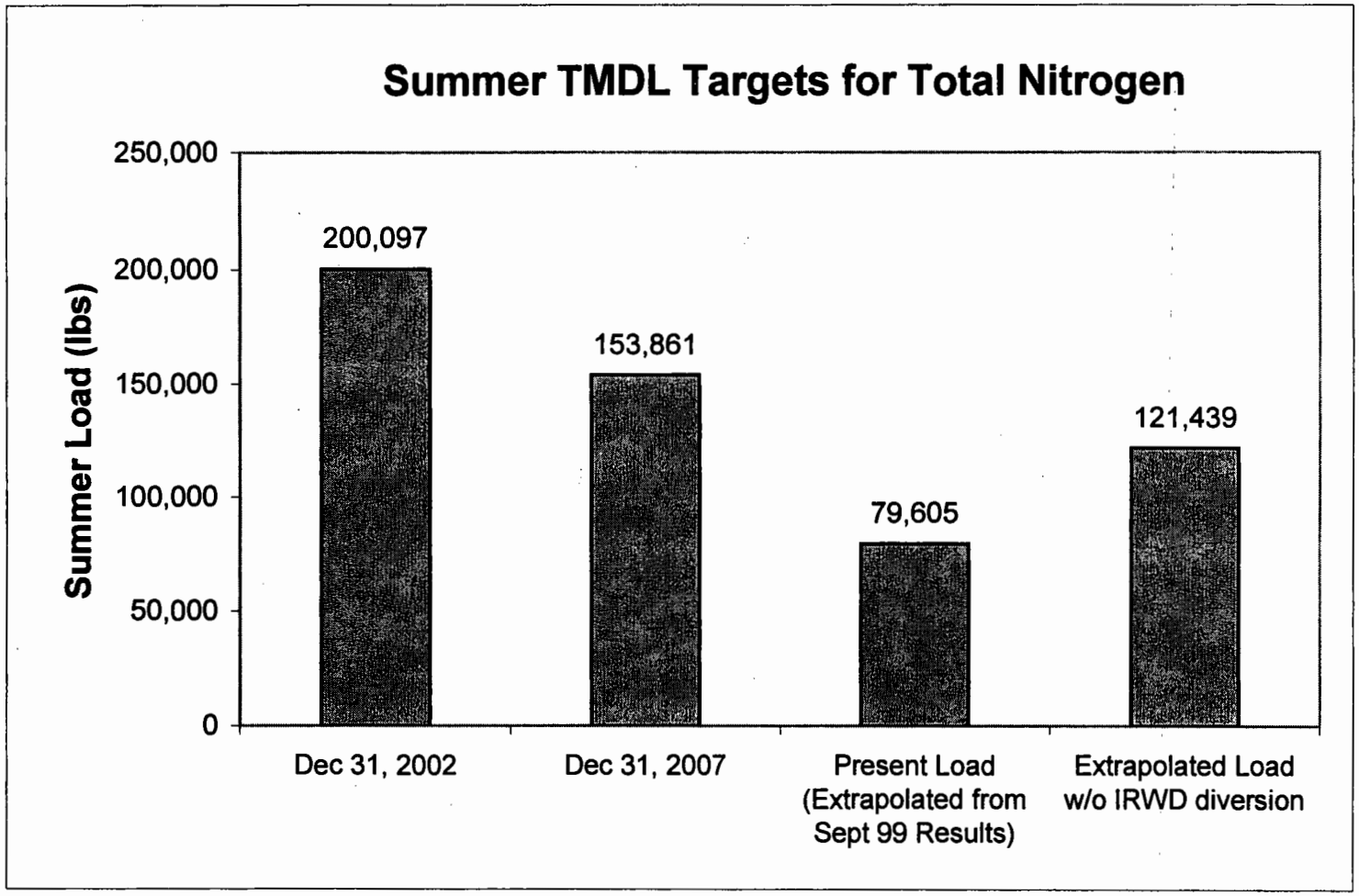

Summer = April 1 - September 30
Total Nitrogen includes nitrate nitrogen, ammonia nitrogen, and organic nitrogen.

Appendix A
Maps

Peters Canyon Wash

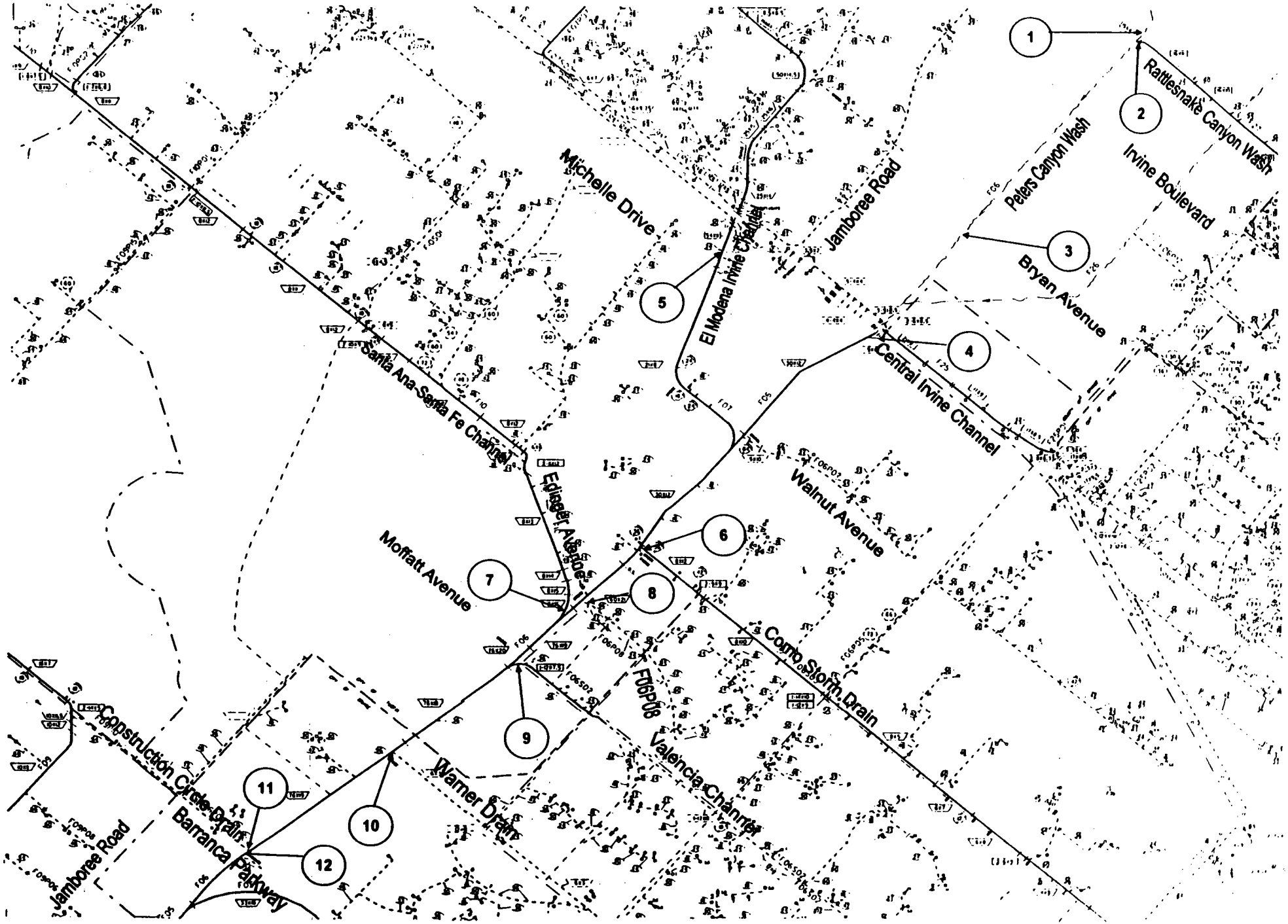

Reach 1 of San Diego Creek

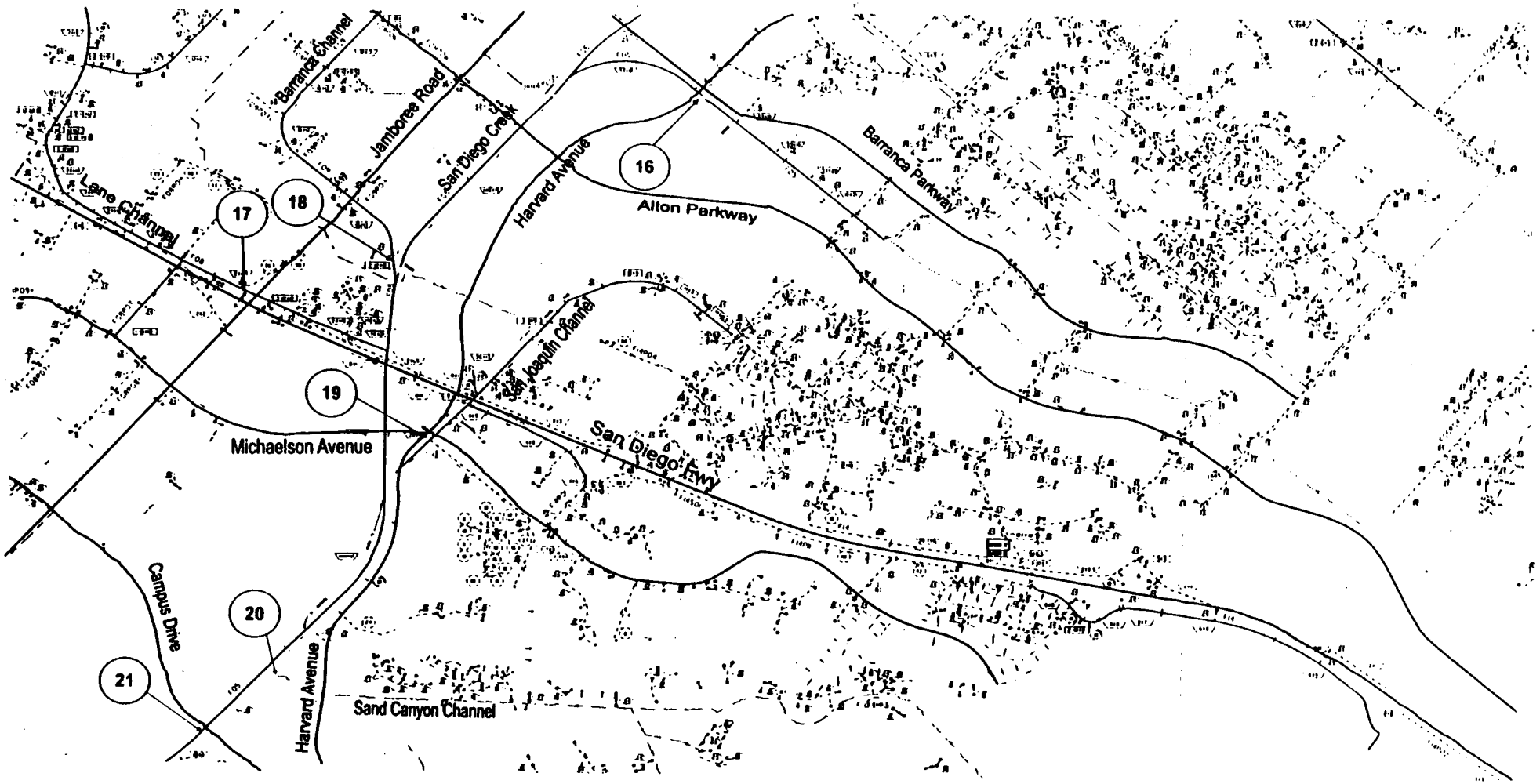

Reach 2 of San Diego Creek

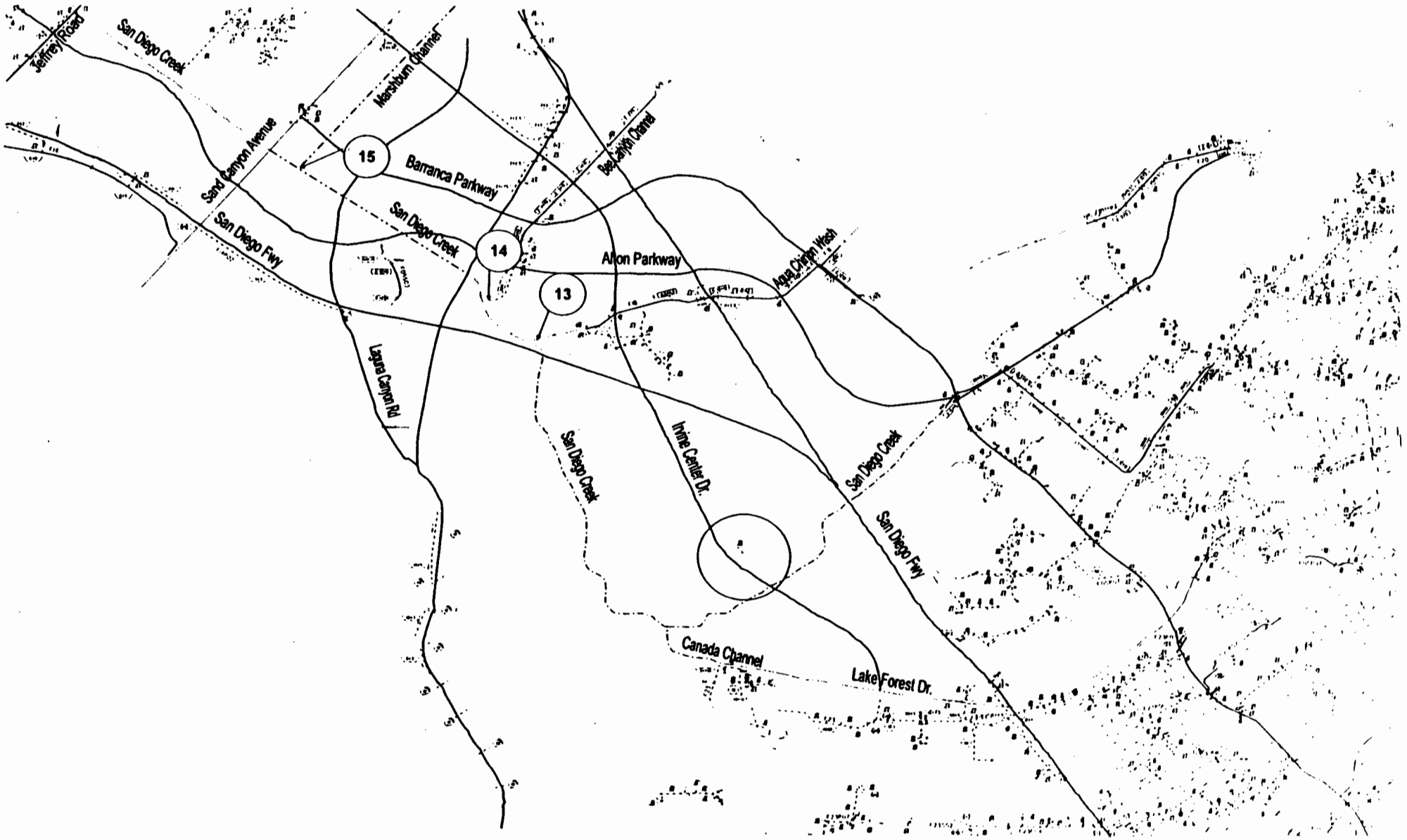

Appendix B
Analytical Data

1999 Peters Canyon Wash / San Diego Creek Nutrient Study
Datasheet Explanation

006907

STATION	Date Time	SAMPLES Type	#	EC µmhos	Turb NTU	pH	NO_3 mg/L	NO_3 as N mg/L	NH_3 as N mg/L	TKN mg/L	Total N mg/L	PO_4 mg/L	o-PO_4 as P mg/L	TSS mg/L	VSS mg/L

1999 Peters Canyon Wash / San Diego Creek Nutrient Study
Peters Canyon Watershed

STATION	Date Time	SAMPLES Type	#	EC µmhos	Turb NTU	pH	NO_3 mg/L	NO_3 as N mg/L	NH_3 as N mg/L	TKN mg/L	Total N mg/L	PO_4 mg/L	o-PO_4 as P mg/L	TSS mg/L	VSS mg/L
				Peters Canyon Wash upstream of Rattlesnake Canyon Wash Confluence											
USRPCW	9/13/99 10:00	D	24	1720	100	8.6	12.3	2.8	0.052	0.98	3.8	1.16		180	56
	9/14/99 9:00	D													
	9/14/99 10:00	D	24	1720	34	8.6	7.04	1.6	<0.05	0.79	2.4	0.796		120	20
	9/15/99 9:00	D													
	9/15/99 10:00	D	24	1800	85	8.6	36.7	8.3	1.3	2.58	10.9	1.89		160	54
	9/16/99 9:00	D													
	9/16/99 10:00	Part	13	1600	120	8.6	8.1	1.8	0.29	1.55	3.4	1.31		250	142
	9/16/99 22:00	Part													
	9/17/99 10:00	D	24	1600	110	8.5	7.92	1.8	0.111	1.68	3.5	1.55		200	92
	9/18/99 9:00	D													
	9/17/99 10:00	SUB	5	1400	200	8.6	15.4	3.5	0.187	2.32	5.8	1.68		330	200
	9/17/99 14:00	SUB													
	9/18/99 10:00	D	24	1700	100	8.5	15.9	3.6	0.207	1.81	5.4	1.68		210	148
	9/19/99 9:00	D													
	9/18/99 10:00	SUB	7	1420	250	8.6	12.8	2.9	0.239	2.07	5.0	2.66		370	212
	9/18/99 16:00	SUB													
	9/19/99 3:00	SUB	7	1680	45	8.4	15.4	3.5	0.181	1.13	4.6	1.35		130	90
	9/19/99 9:00	SUB													
	9/19/99 10:00	D	24	1810	19	8.5	9.24	2.1	0.309	0.95	3.0	1.19		62	30
	9/20/99 9:00	D													
						Rattlesnake Canyon Wash									
RCWF26	9/13/99 10:00	D	24	945	60	8.5	6.82	1.5	0.067	1.56	3.1	2.42		140	54
	9/14/99 9:00	D													
	9/14/99 2:00	SUB	8	940	60	8.5	4.21	1.0	<0.05	1.36	2.3	2.72		160	44
	9/14/99 9:00	SUB													
	9/14/99 10:00	D	24	920	100	8.5	6.6	1.5	1.39	4.77	6.3	2.69		1720	630
	9/15/99 9:00	D													
	9/14/99 15:00	SUB	4	820	450	8.7	4.4	1.0	0.564	4.72	5.7	4.5		1170	220
	9/14/99 18:00	SUB													
	9/15/99 10:00	D	24	890	110	8.4	8.76	2.0	0.157	2.33	4.3	2.85		180	60
	9/16/99 9:00	D													
	9/15/99 14:00	SUB	4	870	220	8	11	2.5	0.411	3.99	6.5	3.79		180	
	9/15/99 17:00	SUB													
	9/16/99 10:00	D	24	900	380	8.5	5.81	1.3	0.281	2.65	4.0	4.16		780	700
	9/17/99 9:00	D													
	9/16/99 11:00	SUB	6	740	750	8.7	4.09	0.9	<0.05	2.67	3.6	6.03		1220	1040
	9/16/99 16:00	SUB													
	9/17/99 10:00	D	24	875	250	8.3	3.96	0.9	0.143	3.81	4.7	4.59		380	96
	9/18/99 9:00	D													
	9/17/99 12:00	SUB	10	890	390	8.2	8.67	2.0	0.228	3.6	5.6	<0.06		780	550
	9/17/99 21:00	SUB													
	9/18/99 10:00	D	24	900	45	8.3	10.7	2.4	0.226	1.82	4.2	2.23		100	48
	9/19/99 9:00	D													
	9/19/99 10:00	D	24	935	9	8.4	9.59	2.2	0.086	1.68	3.8	2.33		108	83
	9/20/99 9:00	D													
					65" RCP downstream of Bryan Avenue										
DSBRCP	9/13/99 10:00	D	24	920	2.3	8.6	3.16	0.7	<0.05	<0.20	0.9	0.214		8	3
	9/14/99 9:00	D													
	9/14/99 10:00	D	24	870	1.6	8.5	2.38	0.5	<0.05	<0.20	0.7	0.153		14	10
	9/15/99 9:00	D													
	9/14/99 10:00	DUP	24	870	1.5	8.5	2.42	0.5	<0.05	<0.20	0.7	0.153		<4	<1
	9/15/99 9:00	DUP													
	9/15/99 10:00	D	24	950	1	8.6	4.31	1.0	<0.05	<0.20	1.2	0.089		<4	<1
	9/16/99 9:00	D													
	9/16/99 10:00	D	24	925	1.8	8.5	4.71	1.1	0.057	<0.20	1.3	0.177		6	4
	9/17/99 9:00	D													

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STATION	Date Time	SAMPLES Type	#	EC µmhos	Turb NTU	pH	NO_3 mg/L	NO_3 as N mg/L	NH_3 as N mg/L	TKN mg/L	Total N mg/L	PO_4 mg/L	o-PO_4 as P mg/L	TSS mg/L	VSS mg/L
						65" RCP downstream of Bryan Avenue									
DSBRCP	9/17/99 10:00	D	6	905	1.6	8.5	4.13	0.9	<0.05	<0.20	1.1	0.086	0.02	9	5
	9/17/99 15:00	D													
	9/17/99 16:00	D	6	905	0.45	8.5	4.14	0.9	<0.05	<0.20	1.1	0.101	0.02	6	2
	9/17/99 21:00	D													
	9/17/99 22:00	D	6	900	0.6	8.6	4.58	1.0	<0.05	<0.20	1.2	0.073	0.01	<4	<1
	9/18/99 3:00	D													
	9/18/99 4:00	D	6	895	2.3	8.5	4.71	1.1	<0.05	<0.20	1.3	0.177	0.05	20	5
	9/18/99 9:00	D													
	9/18/99 10:00	D	24	915	2.9	8.5	4.75	1.1	<0.05	<0.20	1.3	0.245		9	5
	9/19/99 9:00	D													
	9/19/99 10:00	D	20	895	0.55	8.5	5.02	1.1	<0.05	<0.20	1.3	0.122		8	3
	9/20/99 7:00	D													
	9/19/99 10:00	DUP	20	915	0.65	8.5	4.75	1.1	<0.05	<0.20	1.3	0.153		6	4
	9/20/99 9:00	DUP													
						Central Irvine Channel @ 5 Fwy									
CICF25	9/13/99 10:00	D	6	1780	29	8.7	110	24.8	0.134	1.73	26.6	2.51		36	20
	9/13/99 15:00	D													
	9/14/99 9:35	D	1	1630	45	8.2	74.8	16.9	0.176	1.61	18.5	3.3	0.97	55	18
	9/14/99 10:00	D	6	1630	27	8.4	88	19.9	0.221	1.91	21.8	3.06	0.966	32	18
	9/14/99 15:00	D													
	9/14/99 16:00	D	6	1610	26	8.4	123	27.8	0.091	1.51	29.3	2.82	0.88	32	17
	9/14/99 21:00	D													
	9/14/99 22:00	D	6	1600	28	8.4	92.4	20.9	0.221	1.53	22.4	3.03	0.94	32	17
	9/15/99 3:00	D													
	9/15/99 4:00	D	6	1600	28	8.4	88	19.9	0.214	2.15	22.0	3.06	0.93	35	16
	9/15/99 9:00	D													
	9/15/99 10:00	D	6	1630	21	8.6	66	14.9	0.107	2.2	17.1	2.65	0.79	55	18
	9/15/99 15:00	D													
	9/15/99 16:00	D	6	1400	36	8.7	43.1	9.7	0.102	2.01	11.7	1.78	0.668	47	20
	9/15/99 21:00	D													
	9/15/99 22:00	D	6	1570	13	8.2	74.8	16.9	0.152	2.07	19.0	2.27	0.62	15	11
	9/16/99 3:00	D													
	9/16/99 4:00	D	6	1650	26	8.1	79.2	17.9	0.171	1.99	19.9	2.62	0.74	11	4
	9/16/99 9:00	D													
	9/16/99 10:00	D	6	1640	25	8.6	170	38.4	0.175	1.69	40.1	2.74	0.83	28	18
	9/16/99 15:00	D													
	9/16/99 16:00	D	6	1340	20	8.7	77.9	17.6	<0.05	1.51	19.1	1.65	0.636	32	9
	9/16/99 21:00	D													
	9/16/99 22:00	D	6	1530	17	8.2	89.3	20.2	0.087	1.71	21.9	2.76	1	26	3
	9/17/99 3:00	D													
	9/17/99 4:00	D	6	1600	37	8.2	118	26.6	1.1	2.97	29.6	3.58	1.37	32	12
	9/17/99 9:00	D													
	9/17/99 10:00	D	24	1610	55	8.2	106	23.9	0.763	3.1	27.0	3.64		90	58
	9/18/99 9:00	D													
	9/17/99 12:00	SUB	5	1570	130	8.4	193	43.6	2.43	4.83	48.4	4.71		230	140
	9/17/99 16:00	SUB													
	9/19/99 3:00	D	6	1640	28	8	79.2	17.9	0.235	1.9	19.8	3.52	0.573	36	25
	9/19/99 9:00	D													
	9/19/99 10:00	D	6	1640	10	8.2	142	32.1	0.193	1.93	34.0	3.37	1.21	32	22
	9/19/99 15:00	D													
	9/19/99 16:00	D	6	1800	40	8.5	178	40.2	0.204	2.25	42.4	3.37	1	56	42
	9/19/99 21:00	D													
	9/19/99 22:00	D	6	1560	140	8.1	117	26.4	0.331	2.54	29.0	3.98	1.18	174	72
	9/20/99 3:00	D													
	9/20/99 4:00	D	6	1460	40	8.1	119	26.9	0.17	1.53	28.4	2.75	0.808	56	28
	9/20/99 9:00	D													
	9/20/99 10:00	D	6	1890	14	8.2	120	27.1	0.097	1.09	28.2	0.77	0.775	26	12
	9/20/99 15:00	D													
	9/20/99 16:00	D	6	1790	16	8.2	181	40.9	0.079	1.11	42.0	2.26	0.728	26	16
	9/20/99 21:00	D													
	9/20/99 22:00	D	6	1720	8.7	8.2	146	33.0	0.106	1.31	34.3	2.26	0.636	6	4
	9/21/99 3:00	D													
	9/21/99 4:00	D	6	1700	10.3	8.1	161	36.4	0.146	1.57	37.9	2.2	0.648	14	7

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STATION	Date Time	SAMPLES Type	#	EC µmhos	Turb NTU	pH	NO_3 mg/L	NO_3 as N mg/L	NH_3 as N mg/L	TKN mg/L	Total N mg/L	PO_4 mg/L	o-PO_4 as P mg/L	TSS mg/L	VSS mg/L
						El Modena Irvine Channel @ Michelle Dr.									
MIRF07	9/13/99 10:00	D	24	1170	13	8.7	10.3	2.3	<0.05	1.08	3.4	0.673		39	24
	9/14/99 9:00	D													
	9/13/99 13:00	SUB	6	1030	45	9.4	10.6	2.4	<0.05	0.76	3.2	1.84		100	50
	9/13/99 18:00	SUB													
	9/14/99 10:00	D	24	1250	4.5	8.9	4.84	1.1	0.075	1.28	2.4	0.826		25	18
	9/15/99 9:00	D													
	9/15/99 10:00	D	24	1310	17	8.8	14.1	3.2	0.191	2.76	5.9	0.802		48	24
	9/16/99 9:00	D													
	9/16/99 10:00	D	24	1220	9.2	8.7	8.8	2.0	0.107	1.87	3.9	0.692		25	15
	9/17/99 9:00	D													
	9/17/99 10:00	D	24	1160	4.6	8.7	11.4	2.6	0.104	1.3	3.9	0.826		19	8
	9/18/99 9:00	D													
	9/18/99 10:00	D	24	1310	3.6	8.5	19.4	4.4	0.266	1.26	5.6	0.734		14	8
	9/19/99 9:00	D													
	9/19/99 10:00	D	24	1240	3.9	8.9	14.8	3.3	0.09	1.33	4.7	0.581		11	5
	9/20/99 9:00	D													
						Como Storm Channel									
CSCS03	9/13/99 10:00	D	24	2800	9.1	8.4	69.5	15.7	<0.05	0.37	16.1	0.214		15	8
	9/14/99 9:00	D													
	9/14/99 10:00	D	24	2640	8.3	8.6	70.4	15.9	<0.05	0.65	16.5	0.184		19	14
	9/15/99 9:00	D													
	9/15/99 10:00	D	24	2900	7	8.4	74.8	16.9	<0.05	0.72	17.6	0.15		14	5
	9/16/99 9:00	D													
	9/16/99 10:00	D	24	2840	5.8	8.4	130	29.4	<0.05	0.36	29.7	0.19		12	3
	9/17/99 9:00	D													
	9/16/99 10:00	DUP	24	2810	5.8	8.4	118	26.6	<0.05	0.54	27.2	0.153		11	8
	9/17/99 9:00	DUP													
	9/17/99 10:00	D	24	2700	4.1	8.4	128	28.9	<0.05	0.48	29.4	0.122		9	6
	9/18/99 9:00	D													
	9/17/99 10:00	DUP	24	2760	3.5	8.4	94.6	21.4	<0.05	0.43	21.8	0.184		13	6
	9/18/99 9:00	DUP													
	9/18/99 9:00	D													
	9/18/99 10:00	D	24	2650	5.3	8.4	81.4	18.4	<0.05	0.65	19.0	0.337		14	5
	9/19/99 9:00	D													
	9/19/99 10:00	D	24	2780	3.9	8.4	96.4	21.8	<0.05	0.57	22.3	0.122		12	3
	9/20/99 9:00	D													
						Box Culvert @ Moulton Pkwy									
F06P08	9/13/99 10:00	D	24	3710	0.55	8.2	66	14.9	<0.05	0.31	15.2	0.459		7	3
	9/14/99 9:00	D													
	9/14/99 10:00	D	24	3510	0.7	8.2	66	14.9	<0.05	0.26	15.2	0.398		9	6
	9/15/99 9:00	D													
	9/15/99 10:00	D	24	3890	0.85	8.2	66	14.9	<0.05	<0.20	15.1	0.3		24	6
	9/16/99 9:00	D													
	9/16/99 10:00	D	24	3740	0.75	8.3	115	26.0	<0.05	1.32	27.3	0.459		<4	<1
	9/17/99 9:00	D													
	9/17/99 10:00	D	24	3570	1	8.2	115	26.0	<0.05	0.29	26.3	1.1		13	8
	9/18/99 9:00	D													
	9/18/99 10:00	D	24	3630	0.7	8.2	58.1	13.1	<0.05	0.5	13.6	0.643		10	5
	9/19/99 9:00	D													
	9/19/99 10:00	D	6	3730	0.45	8.4	95.5	21.6	<0.05	0.26	21.8	0.367		14	9
	9/19/99 15:00	D													
	9/20/99 11:00	D	1	3760	1.1	8	62.5	14.1	<0.05	0.31	14.4	0.367		8	6

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STATION	Date Time	SAMPLES Type	#	EC µmhos	Turb NTU	pH	NO_3 mg/L	NO_3 as N mg/L	NH_3 as N mg/L	TKN mg/L	Total N mg/L	PO_4 mg/L	o-PO_4 as P mg/L	TSS mg/L	VSS mg/L
						Santa Ana-Santa Fe Channel									
SAFF10	9/13/99 10:00	D	24	1310	9	8	35.5	8.0	<0.05	0.58	8.6	0.367		23	16
	9/14/99 9:00	D													
	9/13/99 10:00	DUP	24	1320	9.6	8	33.6	7.6	<0.05	0.48	8.1	0.337		19	8
	9/14/99 9:00	DUP													
	9/14/99 10:00	D	24	1770	3.8	8	57.2	12.9	<0.05	0.43	13.3	0.245		11	5
	9/15/99 9:00	D													
	9/15/99 10:00	D	24	2080	3.8	8	61.6	13.9	<0.05	0.73	14.6	0.168		16	12
	9/16/99 9:00	D													
	9/16/99 10:00	D	24	2060	2.6	7.9	113	25.5	<0.05	0.68	26.2	0.288		10	3
	9/17/99 9:00	D													
	9/17/99 10:00	D	24	1980	3.6	7.9	82.7	18.7	<0.05	0.62	19.3	0.229		12	8
	9/18/99 9:00	D													
	9/18/99 10:00	D	24	2000	3.1	7.9	91.5	20.7	<0.05	0.6	21.3	0.275		10	5
	9/19/99 9:00	D													
	9/19/99 10:00	D	24	1970	13	8	89.8	20.3	<0.05	0.66	20.9	0.398		37	12
	9/20/99 9:00	D													
						Valencia Channel @ Moffett Ave.									
VALS02	9/13/99 10:00	D	24	2730	3.5	8.4	59.8	13.5	<0.05	0.74	14.2	0.887		10	6
	9/14/99 9:00	D													
	9/14/99 10:00	D	24	2540	2.6	8.4	57.2	12.9	<0.05	11	23.9	0.612		0.72	14
	9/15/99 9:00	D													
	9/15/99 10:00	D	24	2880	3.3	8.4	66	14.9	<0.05	0.84	15.7	0.514		11	8
	9/16/99 9:00	D													
	9/16/99 10:00	D	24	2730	3.9	8.4	89.8	20.3	<0.05	0.37	20.6	0.496		14	8
	9/17/99 9:00	D													
	9/17/99 10:00	D	24	2620	3	8.3	103	23.3	<0.05	0.67	23.9	0.942		8	5
	9/18/99 9:00	D													
	9/18/99 10:00	D	24	2530	8.8	8.3	49.3	11.1	<0.05	0.86	12.0	0.949		42	18
	9/19/99 9:00	D													
	9/19/99 10:00	D	24	2620	2.8	8.3	78.3	17.7	<0.05	0.81	18.5	0.857		13	7
	9/20/99 9:00	D													
						Warner Channel									
WARF06	9/13/99 10:00	D	24	2760	4.4	8.2	68.6	15.5	<0.05	0.43	15.9	0.643		11	6
	9/14/99 9:00	D													
	9/14/99 10:00	D	24	2620	3.6	8.2	66	14.9	<0.05	0.55	15.5	0.612		11	10
	9/15/99 9:00	D													
	9/15/99 10:00	D	24	2620	3.9	8.2	63.4	14.3	<0.05	0.83	15.1	0.912		10	7
	9/16/99 9:00	D													
	9/16/99 10:00	D	24	2990	2.8	8.2	80.5	18.2	0.051	1.3	19.5	0.581		8	4
	9/17/99 9:00	D													
	9/17/99 10:00	D	24	2650	2.2	8.2	91.5	20.7	0.082	0.63	21.3	0.646		12	6
	9/18/99 9:00	D													
	9/18/99 10:00	D	24	2670	3.9	8.1	56.3	12.7	<0.05	0.54	13.3	0.643		12	4
	9/19/99 9:00	D													
	9/19/99 10:00	D	24	2740	1.2	8.2	125	28.2	<0.05	0.53	28.8	0.673		10	6
	9/20/99 9:00	D													
						Construction Circle Drain @ Barranca Pkwy									
F06P06	9/13/99 10:00	D	24	5950	80	8.4	54.6	12.3	<0.05	0.86	13.2	0.612		100	30
	9/14/99 9:00	D													
	9/15/99 9:45	D	1	5100	50	8.3	44	9.9	0.055	0.96	10.9	0.459		41	22
	9/15/99 10:00	D	24	6250	31	8.3	63.4	14.3	<0.05	1.07	15.4	0.554		180	40
	9/16/99 9:00	D													
	9/16/99 10:00	D	18	6040	55	8.3	107	24.2	0.052	0.7	24.9	0.774		76	50
	9/17/99 3:00	D													
	9/17/99 10:00	D	24	5380	130	9.2	76.1	17.2	0.086	2.6	19.8	2.66		1630	600
	9/18/99 9:00	D													
	9/17/99 13:00	SUB	8	5160	900	9.7	81.4	18.4	0.273	2.3	20.7	6.46		1760	380
	9/17/99 20:00	SUB													
	9/18/99 10:00	D	24	5290	700	8.8	80.5	18.2	0.109	1.65	19.8	1.77	0.14	1270	750
	9/19/99 9:00	D													
	9/19/99 10:00	D	24	5970	180	8.2	77	17.4	0.076	0.95	18.3	0.581		236	132
	9/20/99 9:00	D													
	9/19/99 12:00	SUB	1	3840	6600	11.2	<0.44	0.1	1.43	11	11.1	19.9		14700	11500
	9/19/99 13:00	SUB	2	5180	800	9.1	90.2	20.4	0.137	1.18	21.5	1.01		1430	340
	9/19/99 15:00	D													

1999 Peters Canyon Wash / San Diego Creek Nutrient Study
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STATION	Date Time	SAMPLES Type	#	EC µmhos	Turb NTU	pH	NO_3 mg/L	NO_3 as N mg/L	NH_3 as N mg/L	TKN mg/L	Total N mg/L	PO_4 mg/L	o-PO_4 as P mg/L	TSS mg/L	VSS mg/L
					Peters Canyon Wash @ Barranca Pkwy.										
BARSED	9/13/99 10:00	D	6	2100	29	8.8	35.2	7.9	<0.05	0.98	8.9	0.52	0.11	47	45
	9/13/99 15:00	D													
	9/13/99 16:00	D	6	2070	38	8.6	32.1	7.2	<0.05	0.92	8.2	0.49	0.1	51	12
	9/13/99 21:00	D													
	9/13/99 22:00	D	6	2190	27	8.2	39.2	8.9	<0.05	0.91	9.8	0.398	0.1	42	16
	9/14/99 3:00	D													
	9/14/99 4:00	D	6	2290	36	8.3	42.7	9.6	<0.05	1.12	10.8	0.581	0.13	60	18
	9/14/99 9:00	D													
	9/14/99 10:00	D	6	2240	35	8.8	40.9	9.2	<0.05	1.01	10.2	0.551	0.08	65	25
	9/14/99 15:00	D													
	9/14/99 16:00	D	6	2340	20	8.6	37.4	8.4	<0.05	0.85	9.3	0.275	0.07	31	16
	9/14/99 21:00	D													
	9/14/99 22:00	D	6	2440	22	8.2	44	9.9	<0.05	0.83	10.8	0.245	0.07	32	17
	9/15/99 3:00	D													
	9/15/99 4:00	D	6	2380	23	8.2	48.4	10.9	<0.05	0.82	11.7	0.367	0.08	33	13
	9/15/99 9:00	D													
	9/15/99 10:00	D	6	2480	27	8.6	41.4	9.3	<0.05	1.13	10.5	0.477	0.12	89.6	23
	9/15/99 15:00	D													
	9/15/99 16:00	D	6	2400	35	8.5	37.8	8.5	<0.05	1.1	9.6	0.346	0.06	56.8	28
	9/15/99 21:00	D													
	9/15/99 22:00	D	6	2450	36	8.2	42.7	9.6	<0.05	1.0	10.6	0.401	0.12	52.8	19
	9/16/99 3:00	D													
	9/16/99 4:00	D	6	2410	21	8.2	40.5	9.1	<0.05	1.18	10.3	0.673	0.09	66.4	20
	9/16/99 9:00	D													
	9/16/99 10:00	D	6	2270	45	8.6	32.1	7.2	<0.05	1.75	9.0	0.597	0.13	72	29
	9/16/99 15:00	D													
	9/16/99 16:00	D	6	2310	36	8.6	34.4	7.8	<0.05	1.21	9.0	0.428	0.11	56	17
	9/16/99 21:00	D													
	9/16/99 22:00	D	6	2470	34	8.2	41.3	9.3	<0.05	1.16	10.5	0.37	0.09	38	15
	9/17/99 3:00	D													
	9/17/99 4:00	D	6	2350	38	8.2	40.3	9.1	<0.05	1.29	10.4	0.529	0.13	65	52
	9/17/99 9:00	D													
	9/17/99 10:00	D	6	2280	45	8.6	52.8	11.9	<0.05	1.04	13.0	0.643	0.15	75	44
	9/17/99 15:00	D													
	9/17/99 16:00	D	6	2430	60	8.4	55.9	12.6	<0.05	1.15	13.8	0.367	0.06	98	46
	9/17/99 21:00	D													
	9/17/99 22:00	D	6	2470	36	8.2	63.8	14.4	<0.05	0.94	15.3	0.428	0.1	60	46
	9/18/99 3:00	D													
	9/18/99 4:00	D	6	2350	40	8.2	75.7	17.1	<0.05	0.99	18.1	0.643	0.13	73	26
	9/18/99 9:00	D													
	9/18/99 10:00	D	6	2310	37	8.6	44.9	10.1	<0.05	1.46	11.6	0.826	0.15	65	35
	9/18/99 15:00	D													
	9/18/99 16:00	D	6	2290	30	8.4	37	8.4	0.053	1.38	9.7	0.581	0.17	52	40
	9/18/99 21:00	D													
	9/18/99 22:00	D	6	2260	29	8.2	35.2	7.9	0.172	1.4	9.3	0.704	0.19	47	26
	9/19/99 3:00	D													
	9/19/99 4:00	D	6	2310	39	8.2	39.6	8.9	0.142	1.28	10.2	0.918	0.22	66	39
	9/19/99 9:00	D													
	9/19/99 10:00	D	6	2340	28	8.8	73	16.5	<0.05	1.08	17.6	0.826	0.18	64	23
	9/19/99 15:00	D													
	9/19/99 16:00	D	6	2240	25	8.6	71.3	16.1	<0.05	1.09	17.2	0.612	0.1	68	52
	9/19/99 21:00	D													
	9/19/99 22:00	D	6	2430	32	8.2	71.3	16.1	<0.05	1.01	17.1	0.581	0.13	56	27
	9/20/99 3:00	D													
	9/20/99 4:00	D	6	2440	32	8.2	77.9	17.6	<0.05	0.79	18.4	0.704	0.15	58	20
	9/20/99 9:00	D													
	9/20/99 10:00	D	20	2450	50	8.5	71.3	16.1	<0.05	1.37	17.5	0.581	0.13	80	60
	9/21/99 5:00	D													
	9/21/99 10:00	D	24	1980	85	8.4	35.6	8.0	0.118	0.98	9.0	0.979	0.136	150	63
	9/22/99 9:00	D													
	9/22/99 10:00	D	24	2400	23	8.4	40	9.0	0.061	2.17	11.2	1.07		170	90
	9/23/99 9:00	D													

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006913

STATION	Date Time	SAMPLES Type	#	EC µmhos	Turb NTU	pH	NO_3 mg/L	NO_3 as N mg/L	NH_3 as N mg/L	TKN mg/L	Total N mg/L	PO_4 mg/L	o-PO_4 as P mg/L	TSS mg/L	VSS mg/L
							Agua Chinon Wash								
CWF18	9/14/99 6:27	D	1	1300	8.1	8.1	13.8	3.1	<0.05	0.42	3.5	1.68		11	7
	9/15/99 6:40	D	1	1190	12	8.2	14.1	3.2	0.098	0.77	4.0	1.9		18	10
	9/16/99 6:43	D	1	1500	2.6	7.9	37.8	8.5	0.588	1.09	9.6	2.33		5.6	4
	9/17/99 6:43	D	1	1040	80	8.4	17	3.8	<0.05	0.79	4.6	2.05		120	84
	9/18/99 6:46	D	1	1320	4.7	8	25.5	5.8	0.126	0.71	6.5	1.35		10	6
	9/19/99 6:53	D	1	1230	13	8.3	29.2	6.6	<0.05	0.56	7.2	1.84		22	5
	9/20/99 6:52	D	1	1440	4.6	8	37	8.4	<0.05	0.45	8.8	1.81		13	8
							Bee Canyon Wash								
BEEF17	9/14/99 6:46	D	1	1110	4	8.4	9.24	2.1	<0.05	0.98	3.1	1.65		7	4
	9/15/99 6:55	D	1	1080	4.2	8.4	14.5	3.3	<0.05	0.98	4.3	2.02		7	2
	9/16/99 6:58	D	1	1160	4.9	8.4	14.1	3.2	1.23	2.3	5.5	2.9		7.2	3
	9/17/99 6:54	D	1	1140	7.6	8.3	25.2	5.7	0.431	1.59	7.3	3.18		10	7
	9/18/99 6:58	D	1	1120	3.5	8.3	23.6	5.3	2.63	3.71	9.0	3.98		6	2
	9/19/99 7:03	D	1	1290	3.9	8.3	32.3	7.3	0.133	1.45	8.7	3.67		13	8
	9/20/99 7:01	D	1	1370	4.1	8.4	27.3	6.2	0.26	1.31	7.5	3.64		7	[illegible]
							Marshburn Channel								
MSFF16	9/14/99 5:50	D	1	990	0.55	7.7	<0.44	<0.10	<0.05	0.23	0.3	0.459		4	
	9/15/99 6:13	D	1	680	0.95	7.7	<0.44	<0.10	<0.05	0.4	0.5	0.551		<4	
	9/16/99 6:25	D	1	945	0.6	7.7	1.54	0.3	<0.05	0.4	0.7	0.45		<4	
	9/17/99 6:22	D	1	905	0.2	7.7	<0.44	<0.10	<0.05	0.4	0.5	0.447		<4	
	9/18/99 6:26	D	1	920	0.3	7.6	1.45	0.3	<0.05	0.5	0.8	1.32		<4	
	9/19/99 6:35	D	1	930	1.4	7.7	<0.44	<0.10	<0.05	0.54	0.6	0.612		11	
	9/20/99 6:28	D	1	1430	0.15	7.6	174	39.3	<0.05	1.2	40.5	0.337		<4	
							San Diego Creek @ Harvard Ave.								
WYLSED	9/13/99 10:00	D	6	2040	9.5	8.5	70.4	15.9	<0.05	0.77	16.7	0.214	0.04	32	25
	9/13/99 15:00	D													
	9/13/99 16:00	D	6	2030	25	8.4	61.6	13.9	<0.05	1.07	15.0	0.367	0.1	48	22
	9/13/99 21:00	D													
	9/13/99 22:00	D	6	2120	9.4	8.3	70.4	15.9	<0.05	0.43	16.3	0.214	0.06	20	13
	9/14/99 3:00	D													
	9/14/99 4:00	D	6	2150	9.1	8.3	79.2	17.9	<0.05	0.69	18.6	0.214	0.06	18	10
	9/14/99 9:00	D													
	9/14/99 10:00	D	6	2030	7.8	8.5	88	19.9	<0.05	1.17	21.0	0.122	0.04	18	10
	9/14/99 15:00	D													
	9/14/99 16:00	D	6	2010	12	8.4	83.6	18.9	<0.05	0.59	19.5	0.153	0.04	26	13
	9/14/99 21:00	D													
	9/14/99 22:00	D	6	1940	14	8.3	70.4	15.9	<0.05	0.52	16.4	0.184	0.04	26	10
	9/15/99 3:00	D													
	9/15/99 4:00	D	6	1920	12	8.3	74.8	16.9	<0.05	0.68	17.6	0.122	0.05	21	13
	9/15/99 9:00	D													
	9/15/99 10:00	D	6	2040	31	8.4	70.4	15.9	<0.05	1.5	17.4	0.603	0.1	82	18
	9/15/99 15:00	D													
	9/15/99 16:00	D	6	2060	13	8.4	81	18.3	<0.05	0.98	19.3	0.177	0.03	42	13
	9/15/99 21:00	D													
	9/15/99 22:00	D	6	2020	12	8.2	66	14.9	<0.05	0.73	15.6	0.177	0.04	24	6
	9/16/99 3:00	D													
	9/16/99 4:00	D	6	2120	8.6	8.3	72.6	16.4	<0.05	0.68	17.1	0.101	0.02	18	12
	9/16/99 9:00	D													
	9/16/99 10:00	D	6	2070	8.7	8.4	102	23.0	<0.05	0.55	23.6	0.248	0.284	32	4
	9/16/99 15:00	D													
	9/16/99 16:00	D	6	2010	11	8.3	94.2	21.3	<0.05	0.74	22.0	0.236	0.178	30	7
	9/16/99 21:00	D													
	9/16/99 22:00	D	6	2050	8.8	8.2	91.1	20.6	<0.05	0.53	21.1	0.153	0.03	16	7
	9/17/99 3:00	D													
	9/17/99 4:00	D	6	2050	8.9	8.3	89.3	20.2	<0.05	0.65	20.8	0.211	0.04	16	7
	9/17/99 9:00	D													
	9/17/99 10:00	D	6	1970	7	8.3	95.5	21.6	<0.05	0.24	21.8	0.144	0.03	14	5
	9/17/99 15:00	D													
	9/17/99 16:00	D	6	2010	6.8	8.4	125	28.2	<0.05	0.69	28.9	0.113	0.02	16	9
	9/17/99 21:00	D													
	9/17/99 22:00	D	6	1990	9.5	8.2	87.1	19.7	<0.05	0.45	20.1	0.153	0.05	20	8
	9/18/99 3:00	D													
	9/18/99 4:00	D	6	2000	7.1	8.2	96.8	21.9	<0.05	0.69	22.5	0.125	0.05	19	13
	9/18/99 9:00	D													

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006914

STATION	Date Time	SAMPLES Type	#	EC µmhos	Turb NTU	pH	NO_3 mg/L	NO_3 as N mg/L	NH_3 as N mg/L	TKN mg/L	Total N mg/L	PO_4 mg/L	o-PO_4 as P mg/L	TSS mg/L	VSS mg/L
							San Diego Creek @ Harvard Ave.								
WYLSED	9/18/99 10:00	D	6	2010	7.3	8.4	121	27.3	<0.05	0.69	28.0	0.214	0.05	18	[illegible]
	9/18/99 15:00	D													
	9/18/99 16:00	D	6	2080	7.7	8.2	81.8	18.5	<0.05	0.8	19.3	0.184	0.05	14	5
	9/18/99 21:00	D													
	9/18/99 22:00	D	6	2060	7.3	8.2	78.3	17.7	0.057	0.84	18.5	0.214	0.06	12	7
	9/19/99 3:00	D													
	9/19/99 4:00	D	6	2020	9.8	8.2	65.1	14.7	0.051	0.81	15.5	0.306	0.08	38	12
	9/19/99 9:00	D													
	9/19/99 10:00	D	6	2000	8.2	8.4	128	28.9	<0.05	0.6	29.5	0.245	0.08	18	15
	9/19/99 15:00	D													
	9/19/99 16:00	D	6	1970	7.8	8.3	123	27.8	<0.05	0.63	28.4	0.153	0.04	24	10
	9/19/99 21:00	D													
	9/19/99 22:00	D	6	2060	6.5	8.2	128	28.9	<0.05	0.67	29.6	0.122	0.04	27	16
	9/20/99 3:00	D													
	9/20/99 4:00	D	6	2040	5.7	8.2	96.8	21.9	<0.05	0.65	22.5	0.214	0.13	14	6
	9/20/99 9:00	D													
	9/20/99 10:00	D	24	2290	11	8.3	139	31.4	<0.05	0.72	32.1	0.153	0.04	18	10
	9/21/99 9:00	D													
	9/21/99 10:00	D	6	2070	5.8	8.5	153	34.5	<0.05	0.6	35.1	0.122	0.04	17	6
	9/21/99 15:00	D													
	9/21/99 16:00	D	6	2090	9.3	8.4	92.8	21.0	<0.05	0.52	21.5	0.122	0.02	12	6
	9/21/99 21:00	D													
	9/21/99 22:00	D	6	2110	12	8.3	83.2	18.8	<0.05	0.64	19.4	0.138	0.02	19	11
	9/22/99 3:00	D													
	9/22/99 4:00	D	6	2010	13	8.3	79.2	17.9	<0.05	0.57	18.5	0.266	0.03	27	15
	9/22/99 9:00	D													
	9/22/99 10:00	D	24	2060	13	8.3	81.8	18.5	<0.05	0.71	19.2	0.245		31	13
	9/23/99 9:00	D													
							Lane Channel @ Jamboree Blvd.								
LANF08	9/14/99 7:21	D	1	5460	5.4	7.8	23.3	5.3	0.2	0.72	6.0	0.459		17	10
	9/15/99 7:31	D	1	4160	4.2	7.8	24.2	5.5	0.211	0.86	6.3	0.367		17	10
	9/16/99 7:33	D	1	4500	7.3	7.8	44.4	10.0	0.164	0.95	11.0	0.404		20.8	[illegible]
	9/17/99 7:35	D	1	5760	4.6	7.8	46.6	10.5	0.242	<0.20	10.7	0.428		18	[illegible]
	9/18/99 7:32	D	1	5120	13	7.8	45.3	10.2	0.269	1.12	11.3	0.581		28	21
	9/19/99 7:30	D	1	4150	10	7.9	49.3	11.1	0.319	0.81	11.9	0.551		25	15
	9/20/99 7:36	D	1	5290	6.3	7.8	47.5	10.7	0.217	0.59	11.3	0.428		21	10
							Barranca Channel @ Main St.								
BC2F09	9/14/99 7:41	D	1	3810	14	7.8	<0.44	<0.10	0.173	1.03	1.1	0.306		21	13
	9/15/99 7:49	D	1	2920	9.7	7.7	2.95	0.7	0.185	0.77	1.4	0.245		16	10
	9/16/99 7:48	D	1	3730	7.6	7.8	<0.44	<0.10	0.124	0.83	0.9	0.245		140	8
	9/17/99 7:57	D	1	3450	13	7.7	3.78	0.9	0.241	1.03	1.9	0.278		19	15
	9/18/99 7:49	D	1	3310	14	7.7	6.03	1.4	0.298	0.92	2.3	0.214		25	13
	9/19/99 7:48	D	1	3320	12	7.8	2.2	0.5	0.519	1.02	1.5	0.275		28	22
	9/20/99 7:56	D	1	3120	20	7.8	1.85	0.4	0.301	1.1	1.5	0.337		26	11
							San Joaquin Channel @ Michaelson Ave.								
SJQF14	9/14/99 9:21	D	1	1550	8.2	8	23.3	5.3	0.123	0.97	6.2	1.1		26	17
	9/15/99 9:07	D	1	1510	1.8	7.9	29.5	6.7	0.1	0.73	7.4	0.734		7	4
	9/16/99 9:01	D	1	1580	2.6	7.9	46.6	10.5	<0.05	0.72	11.2	0.646		5.6	4
	9/17/99 9:03	D	1	1530	1.7	7.9	40	9.0	0.069	0.84	9.9	0.808		6	4
	9/18/99 9:03	D	1	1460	2.4	7.9	40.3	9.1	0.097	0.8	9.9	0.887		7	2
	9/19/99 9:15	D	1	1540	1.5	8	58.1	13.1	0.12	0.72	13.8	0.918		<4	<1
	9/20/99 9:14	D	1	1560	1.2	8	41	9.3	0.082	0.43	9.7	0.704		<4	<1
							Sand Canyon Channel @ Culver Dr.								
SCCF15	9/14/99 9:51	D	1	1590	17	8	3.61	0.8	0.202	1.35	2.2	0.857		23	16
	9/15/99 9:24	D	1	1620	16	8	5.72	1.3	0.064	1.53	2.8	0.949		23	14
	9/16/99 9:15	D	1	1840	12	8.1	10.1	2.3	0.076	1.37	3.7	0.906		14.4	10
	9/17/99 9:27	D	1	1520	13	8	9.72	2.2	0.183	1.93	4.1	0.927		18	15
	9/18/99 9:25	D	1	1450	14	8	9.02	2.0	0.191	2.02	4.1	0.887		22	8
	9/19/99 9:40	D	1	1500	21	8	10.6	2.4	0.229	1.63	4.0	1.68		43	12
	9/20/99 9:34	D	1	1560	9.5	8	11	2.5	0.149	1.38	3.9	1.07		24	16

1999 Peters Canyon Wash / San Diego Creek Nutrient Study
San Diego Creek Watershed

006915

STATION	Date Time	SAMPLES Type	#	EC µmhos	Turb NTU	pH	NO_3 mg/L	NO_3 as N mg/L	NH_3 as N mg/L	TKN mg/L	Total N mg/L	PO_4 mg/L	o-PO_4 as P mg/L	TSS mg/L	VSS mg/L
						San Diego Creek @ Campus Dr.									
MF05	9/13/99 11:00	D	5	2730	39	8.3	16.7	3.8	<0.05	1.48	5.3	0.49	0.156	62	26
	9/13/99 15:00	D													
	9/13/99 16:00	D	6	2720	35	8.3	16.3	3.7	<0.05	1.5	5.2	0.398	0.237	59	25
	9/13/99 21:00	D													
	9/13/99 22:00	D	6	2690	35	8.3	15	3.4	<0.05	1.48	4.9	0.459	0.08	58	25
	9/14/99 3:00	D													
	9/14/99 4:00	D	6	2640	39	8.3	18	4.1	<0.05	1.45	5.5	0.306	0.09	64	25
	9/14/99 9:00	D													
	9/14/99 10:00	D	6	2540	37	8.3	21.6	4.9	<0.05	1.08	6.0	0.306	0.09	60	22
	9/14/99 15:00	D													
	9/14/99 16:00	D	6	2560	40	8.4	16.3	3.7	<0.05	1.47	5.2	0.428	0.09	71	24
	9/14/99 21:00	D													
	9/14/99 22:00	D	6	2500	40	8.3	22.4	5.1	<0.05	1.6	6.7	0.367	0.12	78	21
	9/15/99 3:00	D													
	9/15/99 4:00	D	6	2480	45	8.3	21.6	4.9	<0.05	1.53	6.4	0.337	0.1	83	24
	9/15/99 9:00	D													
	9/15/99 10:00	D	6	2760	40	8.3	41.2	9.3	<0.05	1.08	10.4	0.447	0.11	73	26
	9/15/99 15:00	D													
	9/15/99 16:00	D	6	2770	55	8.4	43.2	9.8	<0.05	1.73	11.5	0.612	0.12	110	26
	9/15/99 21:00	D													
	9/15/99 16:00	DUP	6	2720	11	8.5	38.2	8.6	<0.05	1.35	10.0	0.523	0.11	92	38
	9/15/99 21:00	DUP													
	9/15/99 22:00	D	6	2710	32	8.4	43.6	9.8	<0.05	1.47	11.3	0.557	0.12	120	29
	9/16/99 3:00	D													
	9/16/99 4:00	D	6	2730	27	8.4	45.3	10.2	<0.05	1.2	11.4	0.493	0.12	94	17
	9/16/99 9:00	D													
	9/16/99 10:00	D	6	2720	55	8.4	52.4	11.8	<0.05	1.09	12.9	0.627	0.175	100	8
	9/16/99 15:00	D													
	9/16/99 16:00	D	6	2750	65	8.4	48.8	11.0	<0.05	1.37	12.4	0.633	0.24	120	10
	9/16/99 21:00	D													
	9/16/99 22:00	D	6	2730	60	8.5	54.6	12.3	<0.05	0.97	13.3	0.701	0.224	130	29
	9/17/99 3:00	D													
	9/17/99 4:00	D	6	2720	55	8.4	44.9	10.1	<0.05	1.05	11.2	0.529	0.11	96	26
	9/17/99 9:00	D													
	9/17/99 10:00	D	6	2700	45	8.5	50.6	11.4	<0.05	1.21	12.6	0.428	0.08	72	24
	9/17/99 15:00	D													
	9/17/99 16:00	D	6	2660	38	8.5	45.3	10.2	<0.05	1.07	11.3	0.367	0.07	62	32
	9/17/99 21:00	D													
	9/17/99 22:00	D	6	2670	39	8.5	54.6	12.3	<0.05	1.12	13.4	0.337	0.07	70	24
	9/18/99 3:00	D													
	9/18/99 4:00	D	6	2670	37	8.4	41	9.3	<0.05	1.11	10.4	0.367	0.07	62	20
	9/18/99 9:00	D													
	9/18/99 10:00	D	6	2700	38	8.4	31.7	7.2	<0.05	1.27	8.4	0.459	0.1	62	33
	9/18/99 15:00	D													
	9/18/99 16:00	D	6	2680	34	8.5	31.7	7.2	<0.05	1.41	8.6	0.459	0.08	55	31
	9/18/99 21:00	D													
	9/18/99 22:00	D	6	2660	39	8.4	80.1	18.1	0.051	1.3	19.4	0.581	0.08	77	43
	9/19/99 3:00	D													
	9/18/99 22:00	DUP	6	2670	39	8.4	53.2	12.0	<0.05	1.06	13.1	0.428	0.095	65	41
	9/19/99 3:00	DUP													
	9/19/99 4:00	D	6	2720	35	8.4	53.2	12.0	0.059	1.47	13.5	0.428	0.03	62	46
	9/19/99 9:00	D													
	9/19/99 10:00	D	6	2760	33	8.4	59	13.3	0.065	1.12	14.4	0.428	0.1	66	30
	9/19/99 15:00	D													
	9/19/99 16:00	D	6	2710	29	8.5	55.4	12.5	<0.05	0.96	13.5	0.367	0.1	68	24
	9/19/99 21:00	D													
	9/19/99 22:00	D	6	2720	38	8.5	57.2	12.9	<0.05	1.26	14.2	0.673	0.205	70	44
	9/20/99 3:00	D													
	9/20/99 4:00	D	6	2700	37	8.5	55	12.4	<0.05	1.08	13.5	0.459	0.11	67	40
	9/20/99 9:00	D													
	9/20/99 10:00	D	24	2760	33	8.6	54.1	12.2	<0.05	1.28	13.5	0.643	0.107	58	30
	9/21/99 9:00	D													
	9/21/99 10:00	D	24	2460	40	8.5	28.6	6.5	<0.05	1.0	7.5	0.704	0.143	77	33
	9/22/99 9:00	D													
	9/22/99 10:00	D	24	2610	70	8.5	24.6	5.6	<0.05	1.59	7.1	0.551		120	66
	9/23/99 9:00	D													

Appendix C
Nitrate Load Summary

Nitrate Study in Peters Canyon Wash and its Tributaries
Sept. 14-20, 1999

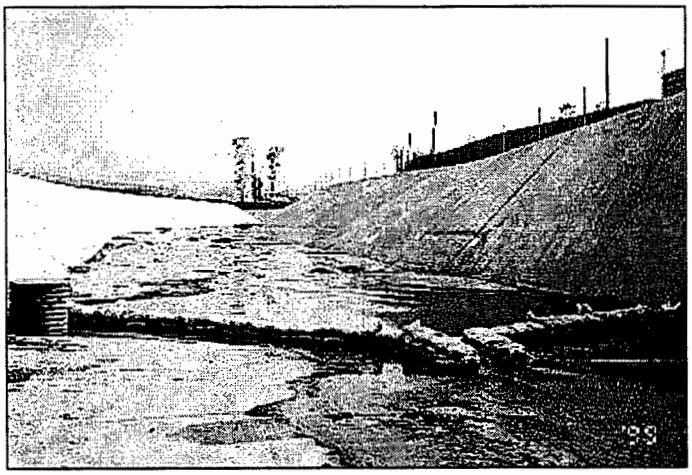

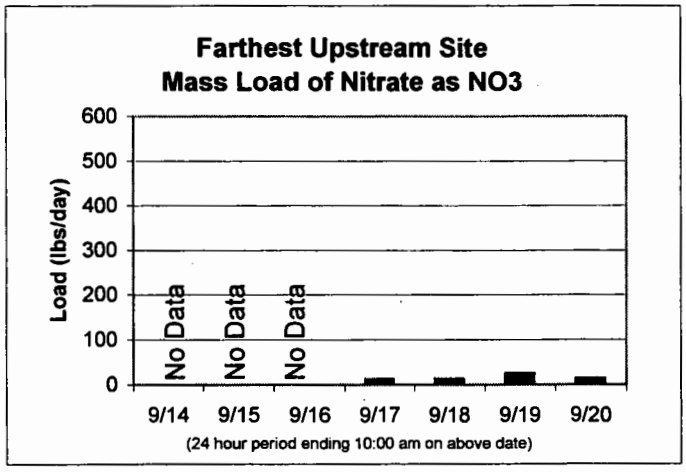

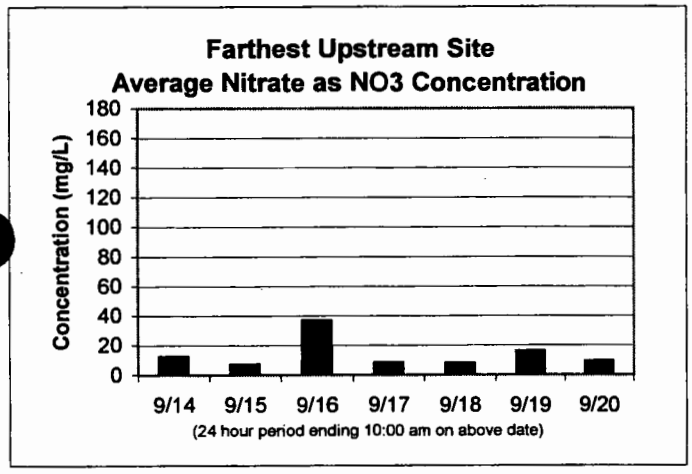

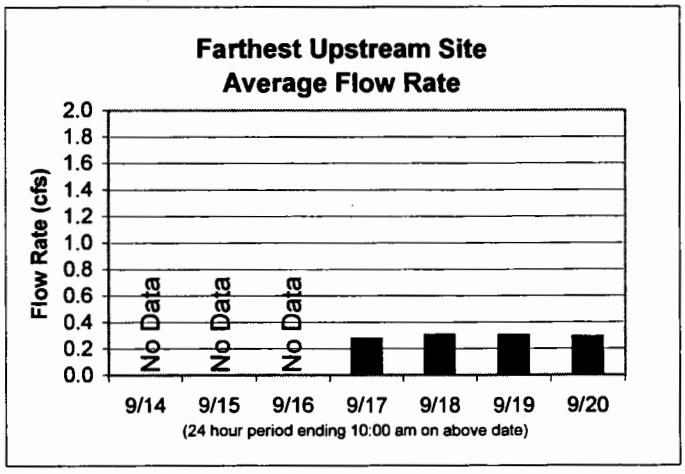

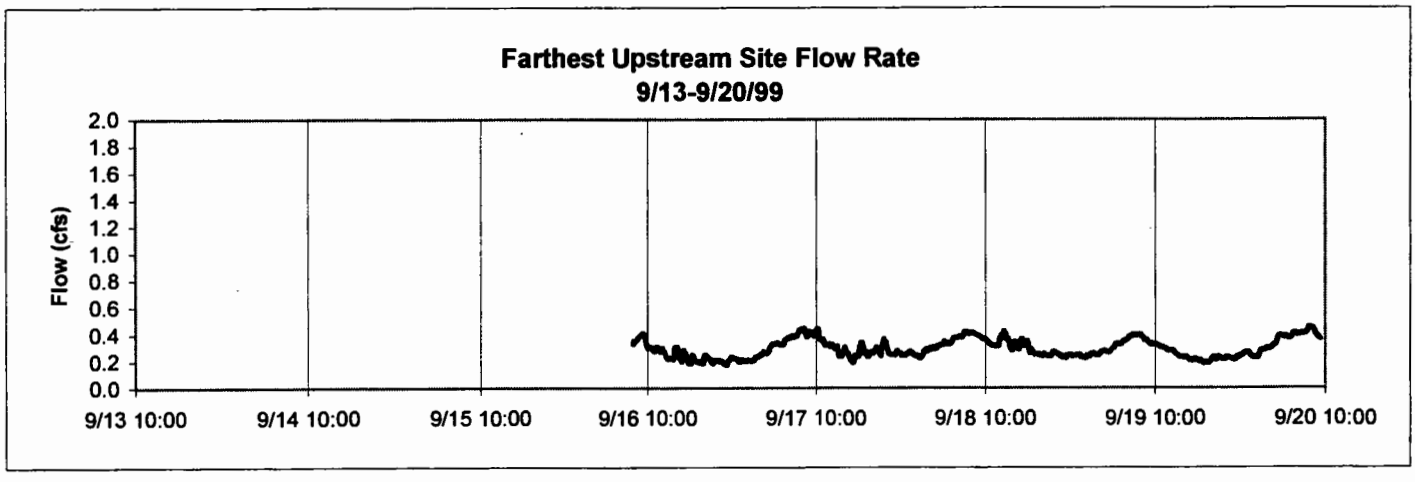

Nitrate Study in Peters Canyon Wash and its Tributaries
Sept. 14-20, 1999

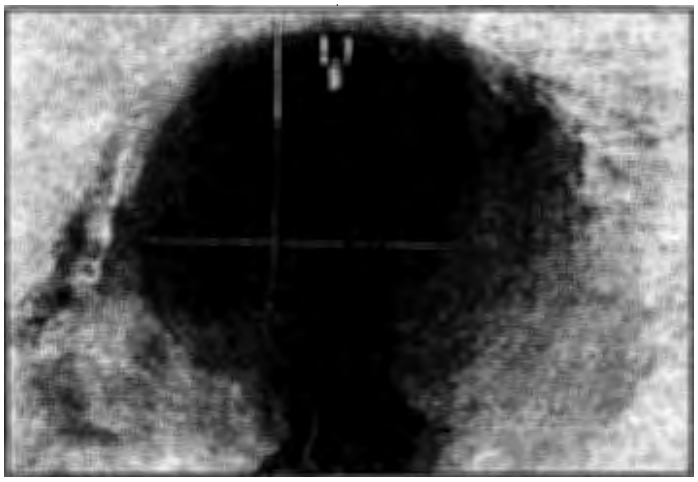

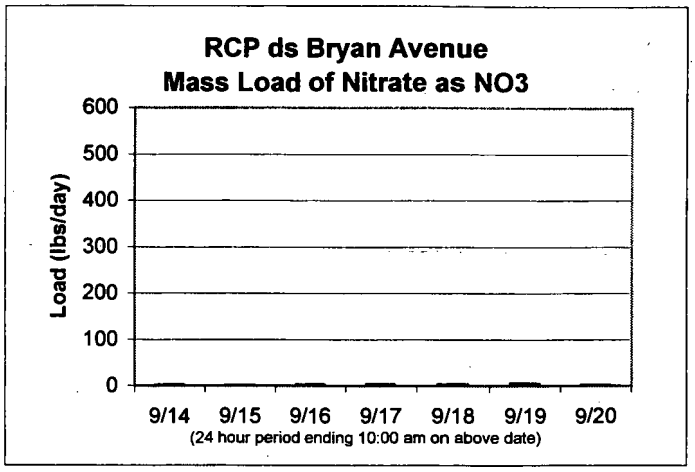

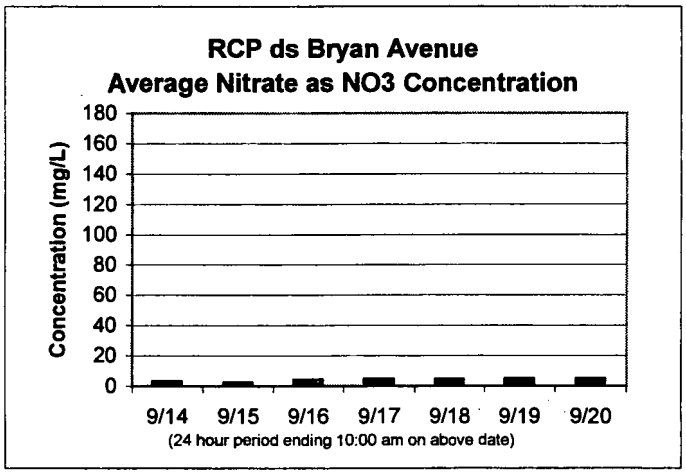

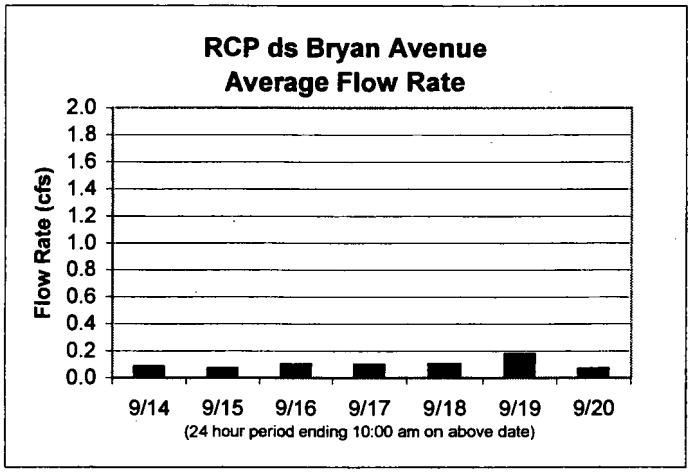

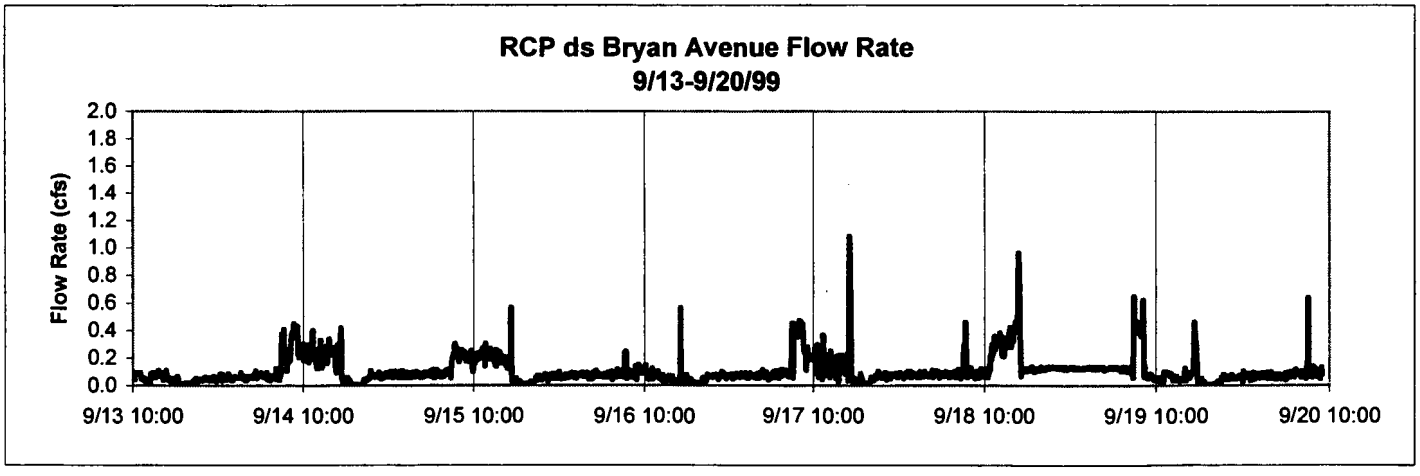

Nitrate Study in Peters Canyon Wash and its Tributaries
Sept. 14-20, 1999

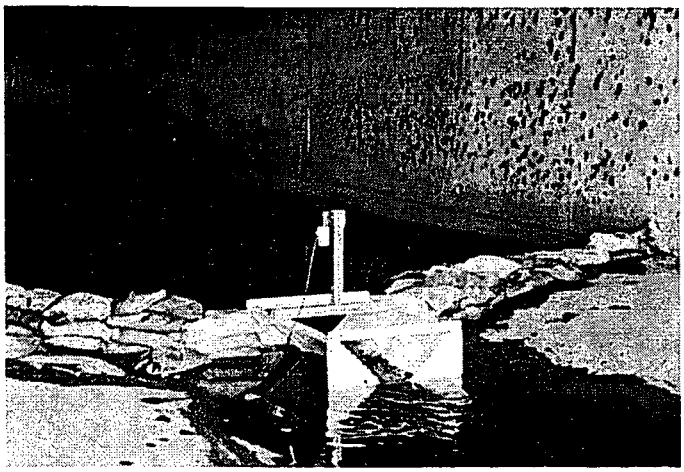

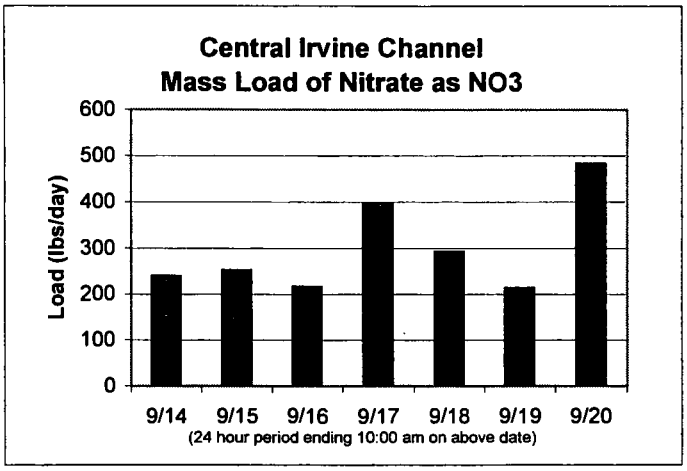

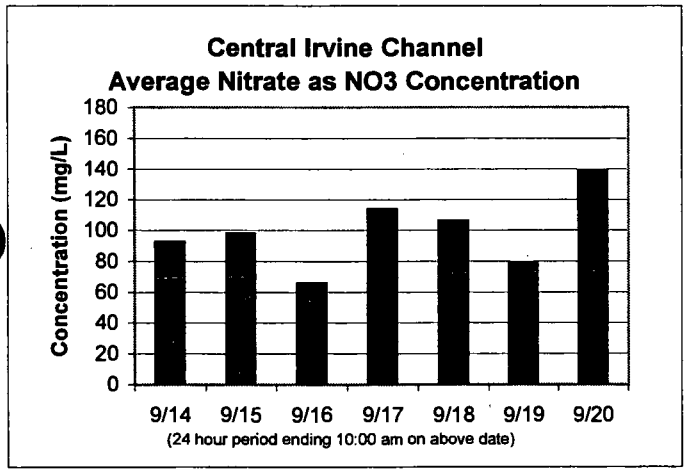

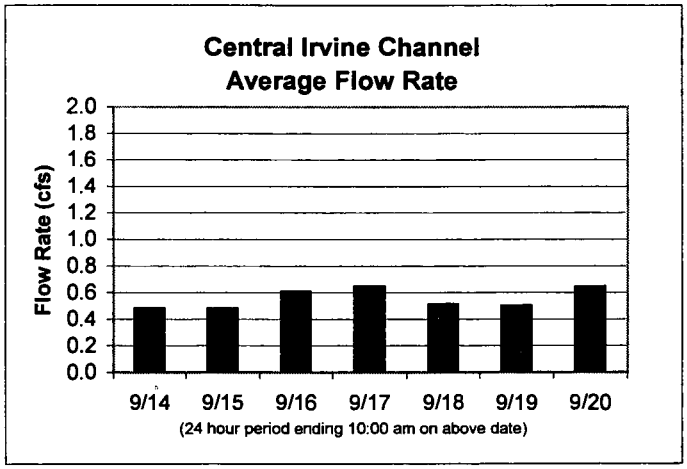

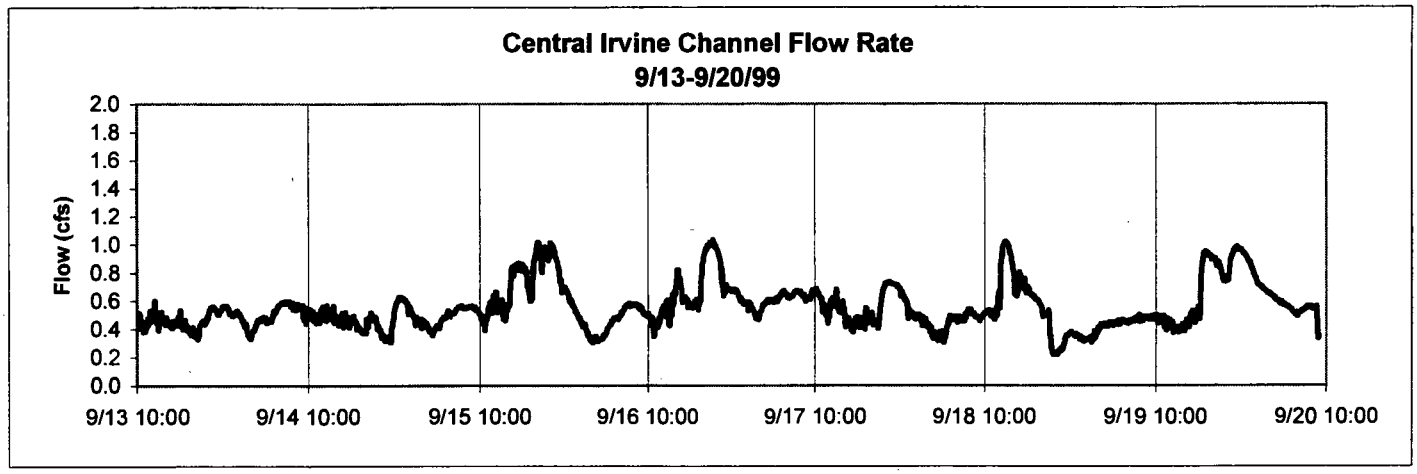

Nitrate Study in Peters Canyon Wash and its Tributaries
Sept. 14-20, 1999

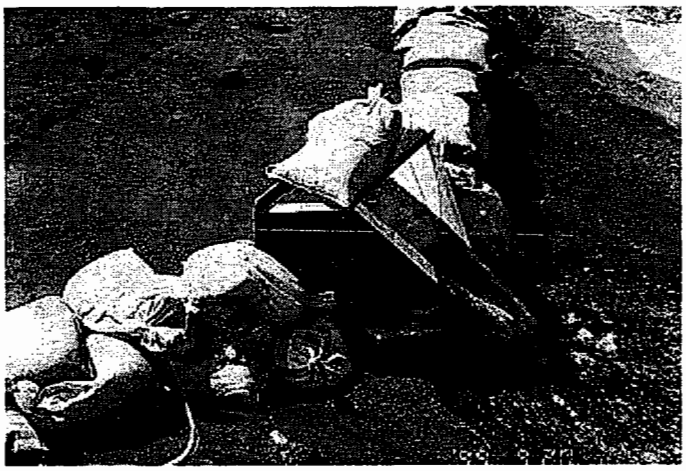

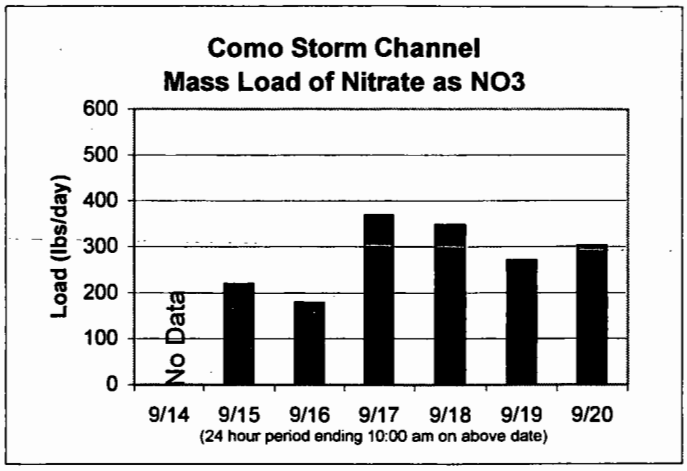

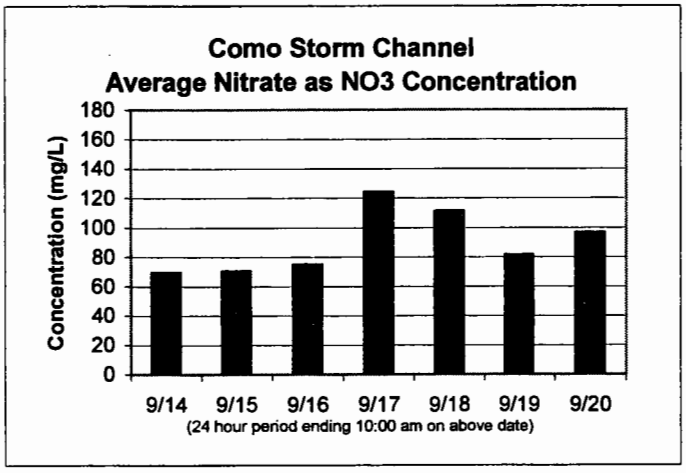

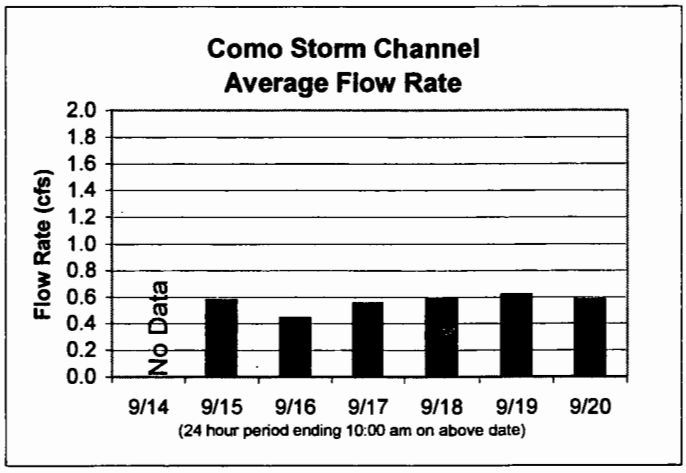

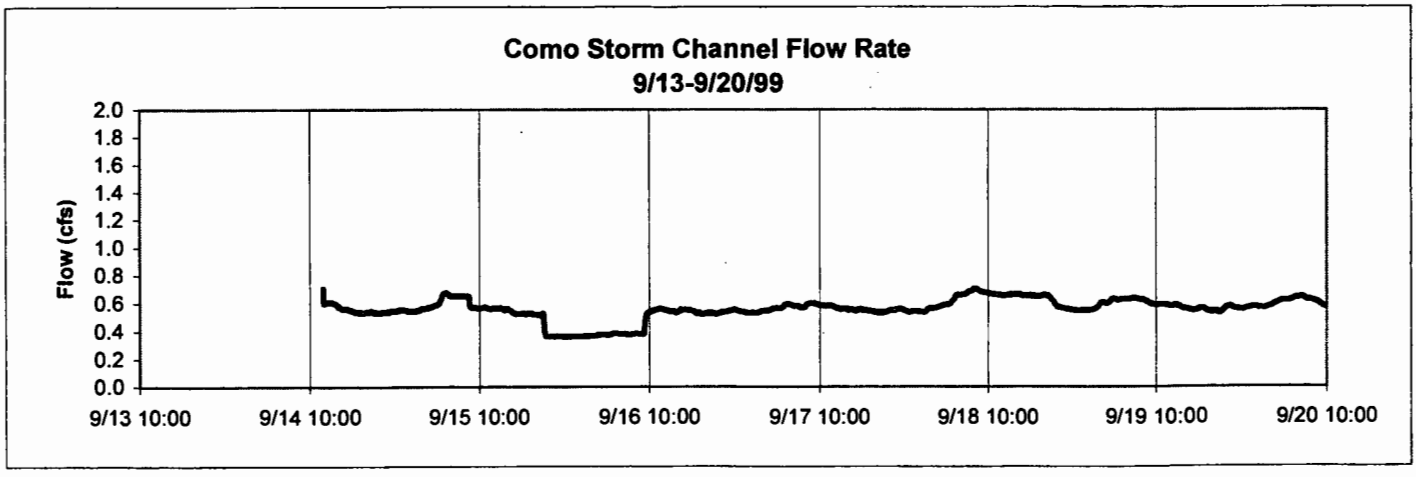

Nitrate Study in Peters Canyon Wash and its Tributaries
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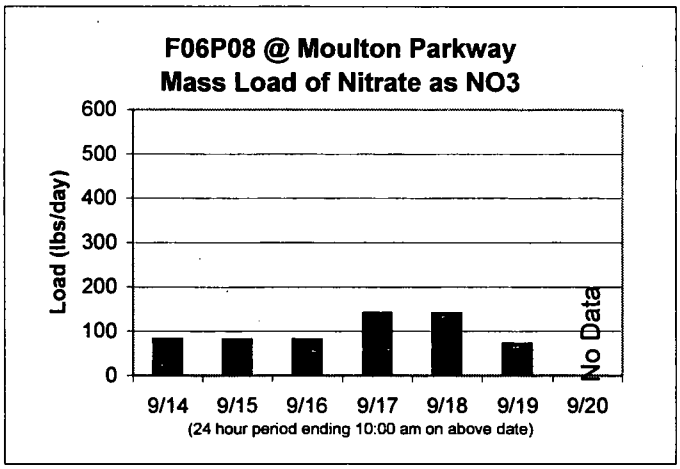

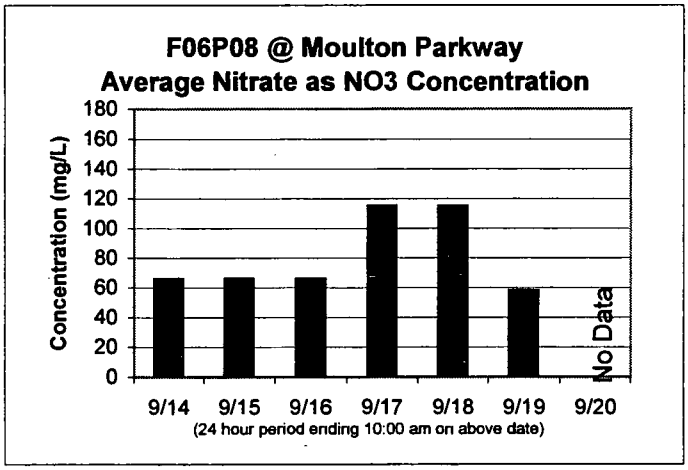

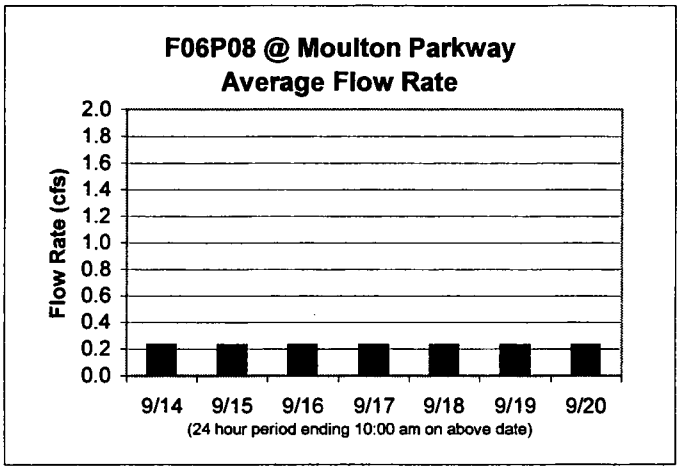

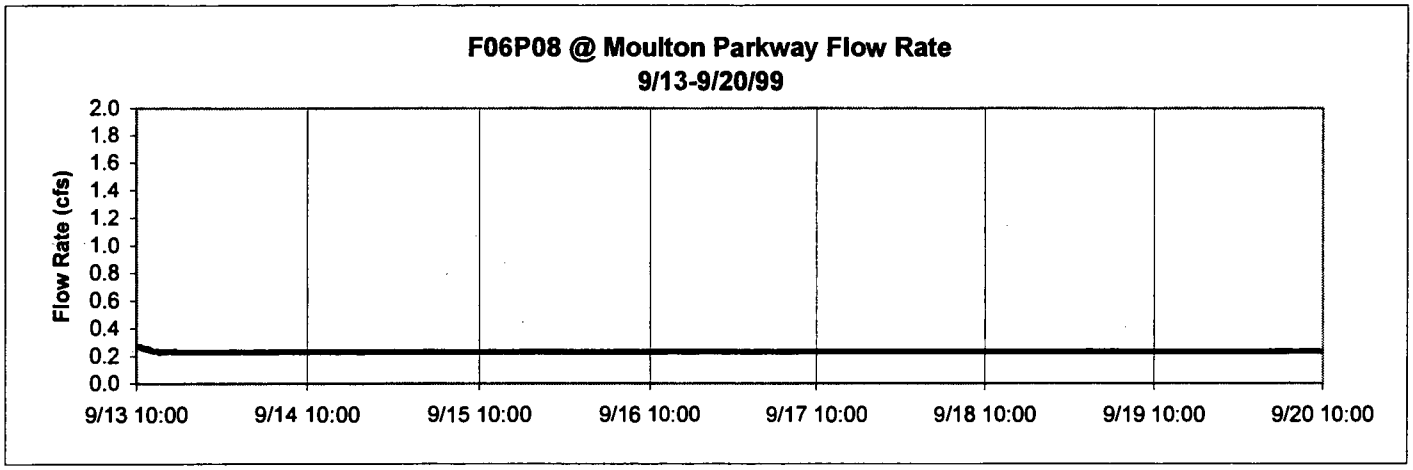

Nitrate Study in Peters Canyon Wash and its Tributaries
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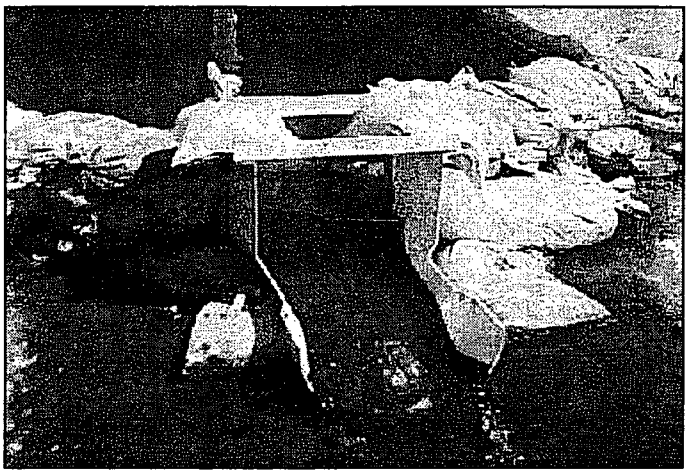

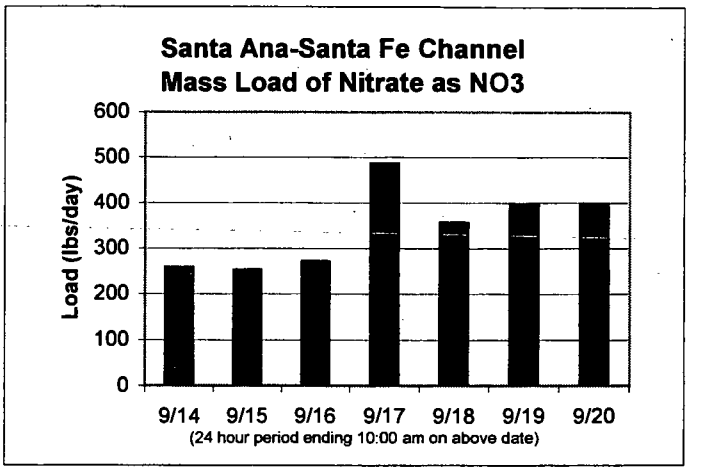

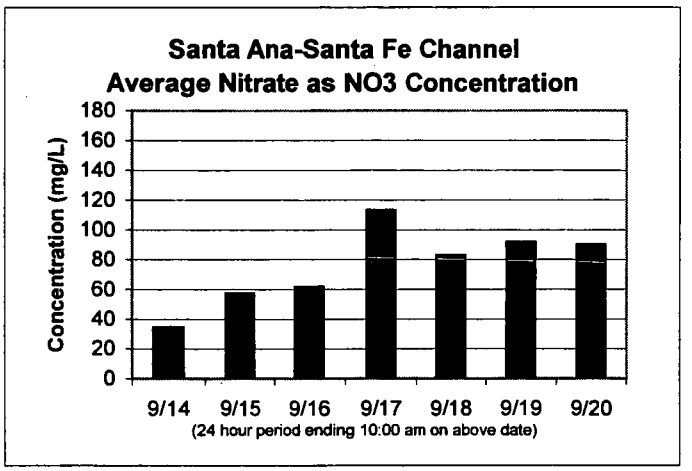

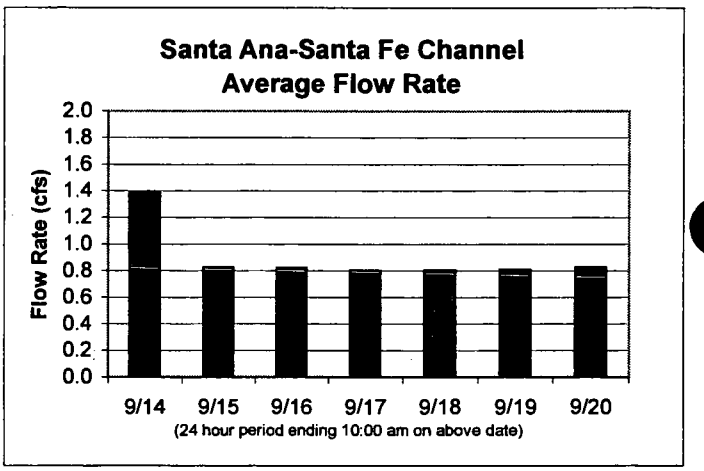

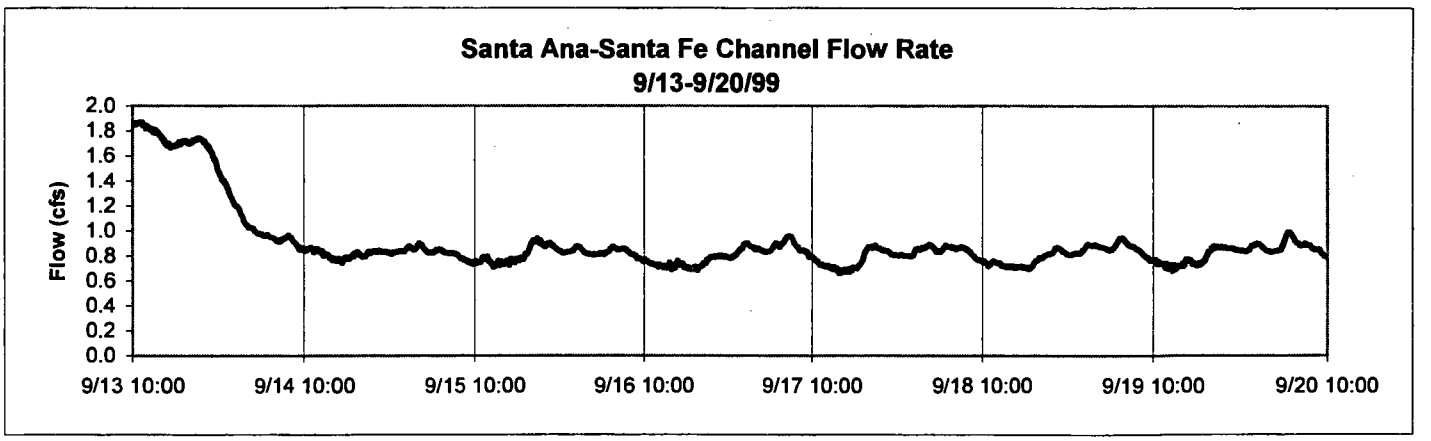

Nitrate Study in Peters Canyon Wash and its Tributaries
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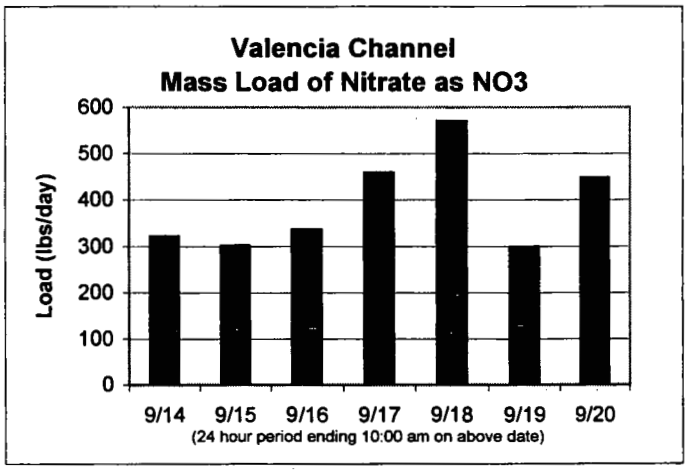

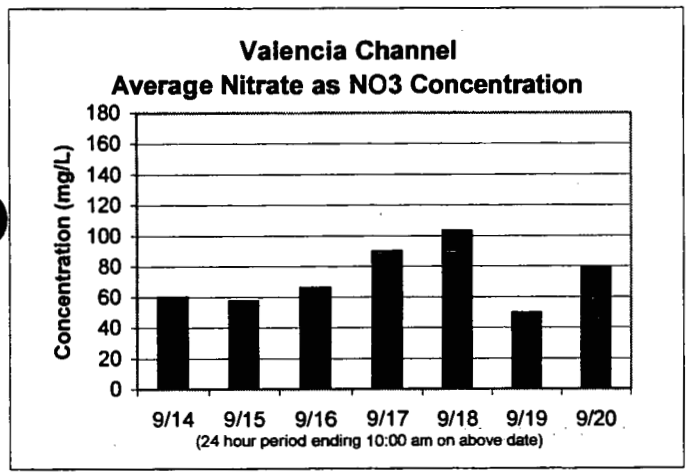

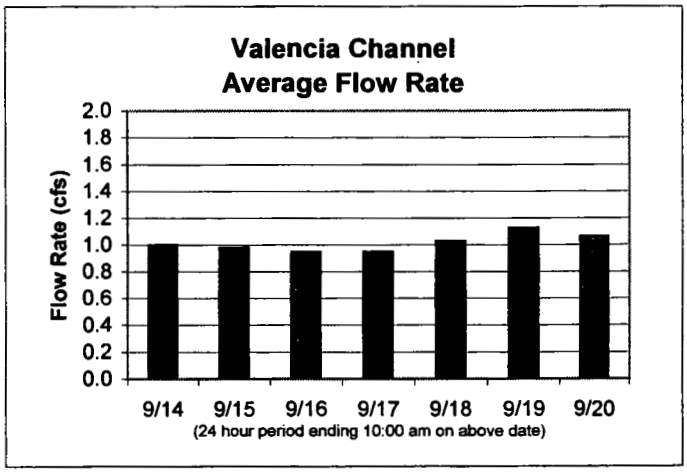

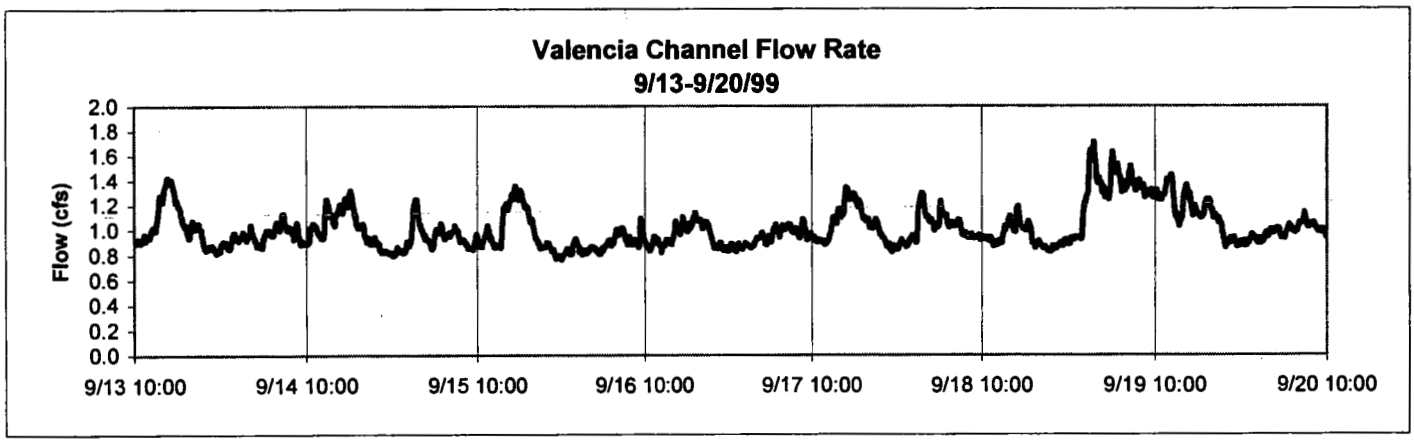

Nitrate Study in Peters Canyon wash and its Tributaries
Sept. 14-20, 1999

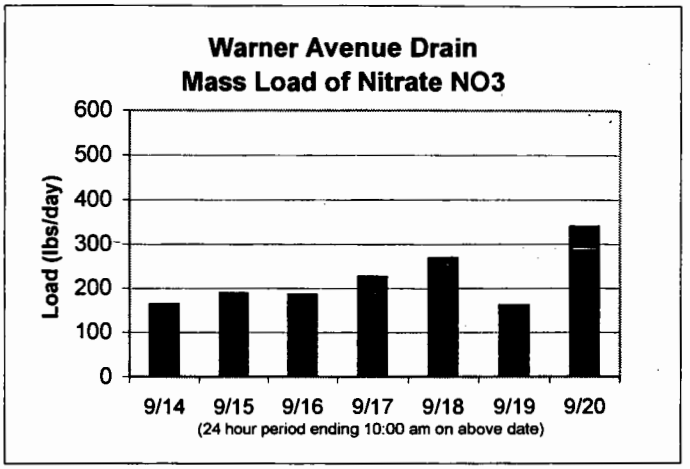

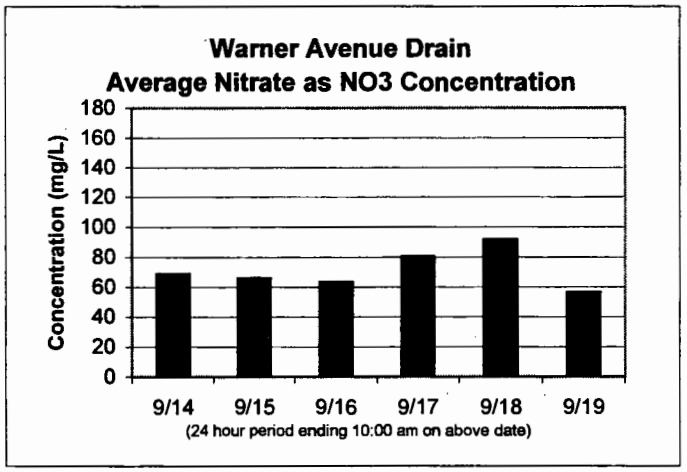

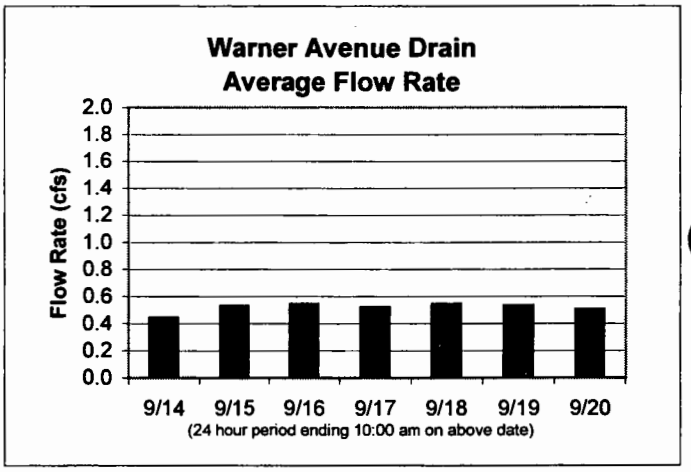

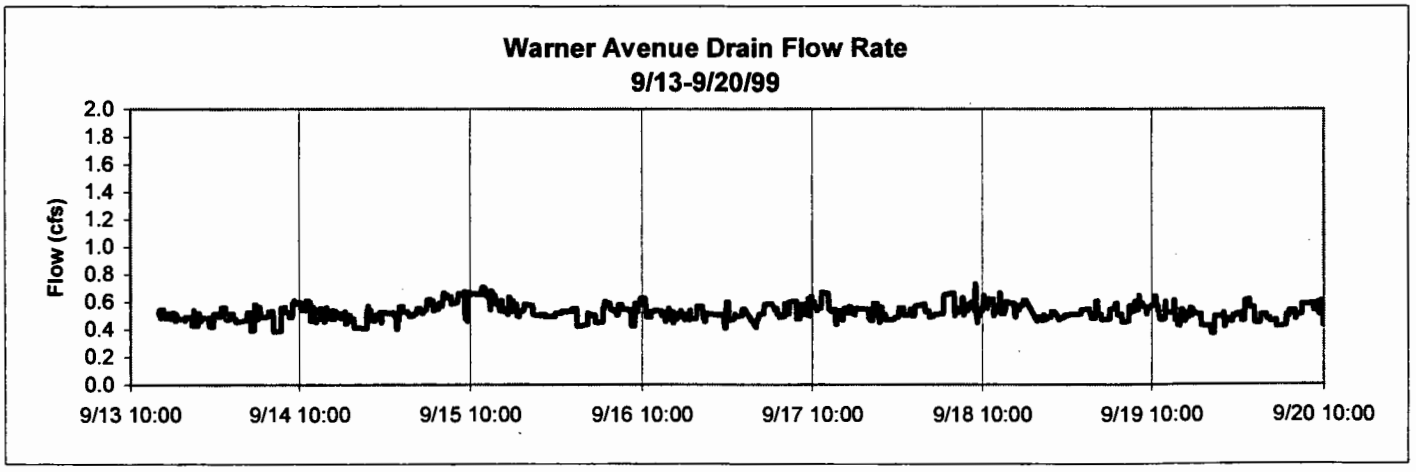

Nitrate Study in Peters Canyon Wash and its Tributaries
Sept. 14-20, 1999

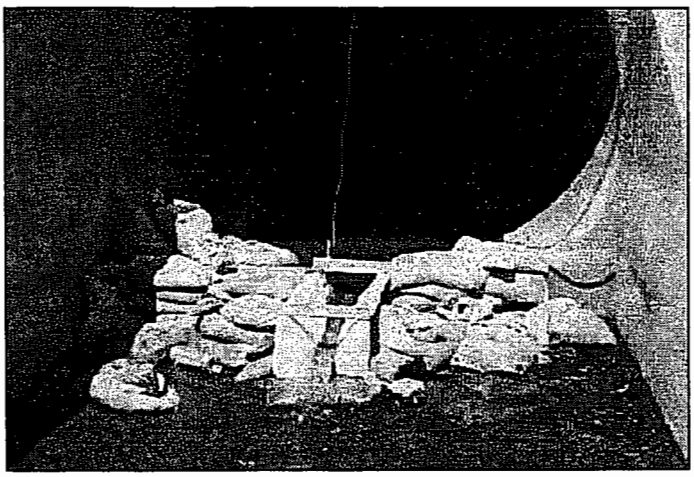

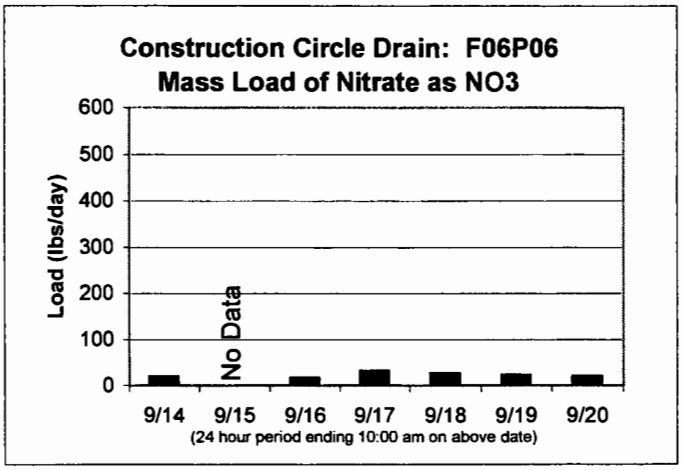

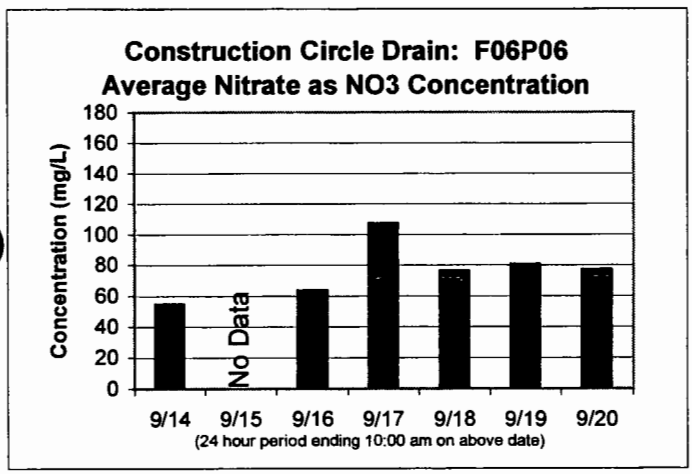

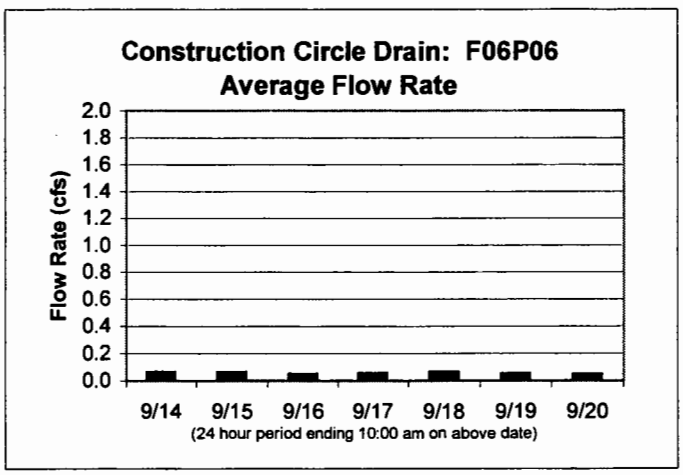

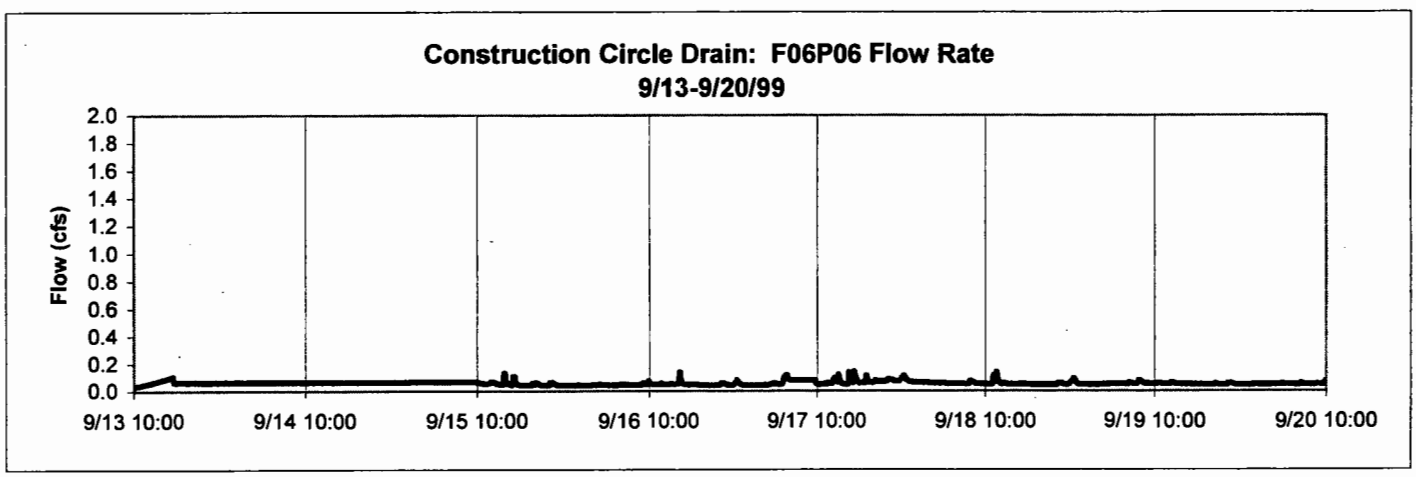

Appendix D
Quality Assurance Summary

Synthetic Sample Analyses
Montgomery Watson Laboratories

	Date Submitted	EC umhos	Turb NTU	pH	NO_3 mg/L	NH_3 as N mg/L	TKN mg/L	PO_4 mg/L	o-PO_4 mg/L	TSS mg/L	VSS mg/L
Synthetic Samples											
MW	9/14/99	2040	0.05	5.7	43.1	1.1	1.3	1.53	0.626	<4	<1
Actual					36.47	1.31	1.31	1.74	0.57		
% difference					**-18.2**	**16.0**	**0.8**	**12.1**	**-10.3**		
MW	9/15/99	1950	0.1	5.7	20.5	0.897	1.16	1.47	0.39	<4	<1
Actual					18.23	1.31	1.31	1.74	0.57		
% difference					**-12.5**	**31.5**	**11.5**	**15.5**	**31.3**		
MW	9/16/99	2110	<0.05	5.6	42.2	1.33	1.12	1.62	0.54	<4	<1
Actual					36.47	1.31	1.31	1.74	0.57		
% difference					**-15.7**	**-1.5**	**14.5**	**6.9**	**4.9**		
MW	9/17/99	2040	0.1	5.7	22.0	1.26	1.23	1.54		<4	<1
Actual					18.23	1.31	1.31	1.74			
% difference					**-20.7**	**3.8**	**6.1**	**11.5**			
MW	9/18/99	2040	0.05	5.6	38.1	0.615	2.91	3.27	1.1	4	<1
Actual					36.47	0.65	2.99	3.49	1.14		
% difference					**-4.5**	**5.4**	**2.7**	**6.3**	**3.4**		
MW	9/19/99	1970	<0.05	5.6	9.99	0.364	1.14	1.53	0.353	<4	<1
Actual					9.12	0.65	1.12	1.74	0.57		
% difference					**-9.5**	**44.0**	**-1.8**	**12.1**	**37.8**		
MW	9/20/99	2060	<0.05	5.6	11.4	0.634	1.2	1.68		<4	<1
Actual					9.12	0.65	1.12	1.74			
% difference					**-25.0**	**2.5**	**-7.1**	**3.4**			
			Mean % Difference		**-15.1**	**14.5**	**3.8**	**9.7**	**13.4**		

Synthetic Sample Analyses
Montgomery Watson Laboratories

	Date Submitted	EC umhos	Turb NTU	pH	NO_3 mg/L	NH_3 as N mg/L	TKN mg/L	PO_4 mg/L	o-PO_4 mg/L	TSS mg/L	VSS mg/L
Synthetic Samples											
MW	9/14/99	2040	0.05	5.7	43.1	1.1	1.3	1.53	0.626	<4	<1
Actual					36.47	1.31	1.31	1.74	0.57		
% difference					**118.2**	**84.0**	**99.2**	**87.9**	**110.3**		
MW	9/15/99	1950	0.1	5.7	20.5	0.897	1.16	1.47	0.39	<4	<1
Actual					18.23	1.31	1.31	1.74	0.57		
% difference					**112.5**	**68.5**	**88.5**	**84.5**	**68.7**		
MW	9/16/99	2110	<0.05	5.6	42.2	1.33	1.12	1.62	0.54	<4	<1
Actual					36.47	1.31	1.31	1.74	0.57		
% difference					**115.7**	**101.5**	**85.5**	**93.1**	**95.1**		
MW	9/17/99	2040	0.1	5.7	22.0	1.26	1.23	1.54		<4	<1
Actual					18.23	1.31	1.31	1.74			
% difference					**120.7**	**96.2**	**93.9**	**88.5**			
MW	9/18/99	2040	0.05	5.6	38.1	0.615	2.91	3.27	1.1	4	<1
Actual					36.47	0.65	2.99	3.49	1.14		
% difference					**104.5**	**94.6**	**97.3**	**93.7**	**96.6**		
MW	9/19/99	1970	<0.05	5.6	9.99	0.364	1.14	1.53	0.353	<4	<1
Actual					9.12	0.65	1.12	1.74	0.57		
% difference					**109.5**	**56.0**	**101.8**	**87.9**	**62.2**		
MW	9/20/99	2060	<0.05	5.6	11.4	0.634	1.2	1.68		<4	<1
Actual					9.12	0.65	1.12	1.74			
% difference					**125.0**	**97.5**	**107.1**	**96.6**			
			Mean % Difference		**115.1**	**85.5**	**96.2**	**90.3**	**86.6**		

Replica Samples
Montgomery Watson Laboratories

STATION	Date Time	SAMPLES Type	#	EC µmhos	Turb NTU	pH	NO_3 mg/L	NH_3 as N mg/L	TKN mg/L	PO_4 mg/L	o-PO_4 as P mg/L	TSS mg/L	VSS mg/L
SASF10	9/13/99 10:00	D	24	1310	9	8.0	35.5	<0.05	0.58	0.367		23	16
	9/14/99 9:00	D											
	9/13/99 10:00	DUP	24	1320	9.6	8.0	33.6	<0.05	0.48	0.337		19	8
	9/14/99 9:00	DUP											
		% Difference		**0.8**	**6.3**	**0.0**	**5.7**	**0.0**	**20.8**	**8.9**		**21**	**100**
DSBRCP	9/14/99 10:00	D	24	870	1.6	8.5	2.38	<0.05	<0.20	0.153		14	10
	9/15/99 9:00	D											
	9/14/99 10:00	DUP	24	870	1.5	8.5	2.42	<0.05	<0.20	0.153		<4	<1
	9/15/99 9:00	DUP											
		% Difference		**0.0**	**6.7**	**0.0**	**1.7**	**0.0**	**0.0**	**0.0**		**250**	**900**
SDMF05	9/15/99 16:00	D	6	2770	55	8.4	43.2	<0.05	1.73	0.612	0.12	110	26
	9/15/99 21:00	D											
	9/15/99 16:00	DUP	6	2720	11	8.5	38.2	<0.05	1.35	0.523	0.11	92	38
	9/15/99 21:00	DUP											
		% Difference		**1.8**	**400.0**	**1.2**	**13.1**	**0.0**	**28.1**	**17.0**	**9.1**	**20**	**32**
CSCS03	9/16/99 10:00	D	24	2840	5.8	8.4	130	<0.05	0.36	0.19		12	3
	9/17/99 9:00	D											
	9/16/99 10:00	DUP	24	2810	5.8	8.4	118	<0.05	0.54	0.153		11	8
	9/17/99 9:00	DUP											
		% Difference		**1.1**	**0.0**	**0.0**	**10.2**	**0.0**	**33.3**	**24.2**		**9**	**63**
CSCS03	9/17/99 10:00	D	24	2700	4.1	8.4	128	<0.05	0.48	0.122		9	6
	9/18/99 9:00	D											
	9/17/99 10:00	DUP	24	2760	3.5	8.4	94.6	<0.05	0.43	0.184		13	6
	9/18/99 9:00	DUP											
		% Difference		**2.2**	**17.1**	**0.0**	**35.3**	**0.0**	**11.6**	**33.7**		**31**	**0**
SDMF05	9/18/99 22:00	D	6	2660	39	8.4	80.1	0.051	1.3	0.581	0.08	77	43
	9/19/99 3:00	D											
	9/18/99 22:00	DUP	6	2670	39	8.4	53.2	<0.05	1.06	0.428	0.095	65	41
	9/19/99 3:00	DUP											
		% Difference		**0.4**	**0.0**	**0.0**	**50.6**	**2.0**	**22.6**	**35.7**	**15.8**	**18**	**5**
DSBRCP	9/19/99 10:00	D	20	895	0.55	8.5	5.02	<0.05	<0.20	0.122		8	3
	9/20/99 7:00	D											
	9/19/99 10:00	DUP	20	915	0.65	8.5	4.75	<0.05	<0.20	0.153		6	4
	9/20/99 9:00	DUP											
		% Difference		**2.2**	**15.4**	**0.0**	**5.7**	**0.0**	**0.0**	**20.3**		**33**	**25**

Interlaboratory Comparison
Montgomery Watson vs. Associated

		NO_3 Concentration (mg/L)		
Station	WR #	Montgomery Watson	Associated	% Difference
MSFF16	34220	<0.44	<0.5	0%
ACWF18	34221	13.8	18.6	26%
BEEF17	34222	9.24	16.4	44%
LANF08	34223	23.3	25.4	8%
BRCF09	34225	<0.44	<0.5	0%
SJQF14	34226	23.3	31.6	26%
SCCF15	34227	3.6	4.9	27%
MSFF16	34261	<0.44	<0.5	0%
ACWF18	34262	14.1	18.2	23%
BEEF17	34263	14.5	18.6	22%
LANF08	34264	24.2	27.3	11%
BRCF09	34265	2.95	3.5	16%
SJQF14	34266	29.5	33.2	11%
SCCF15	34267	5.72	6.9	17%
MSFF16	34305	1.54	1.2	-28%
ACWF18	34306	37.8	25.5	-48%
BEEF17	34307	14.1	16.8	16%
LANF08	34308	44.4	31.6	-41%
BRCF09	34309	<0.44	<0.5	0%
SJQF14	34310	46.6	31.8	-47%
SCCF15	34311	10.1	6.7	-51%
MSFF16	34420	<0.44	<0.5	0%
ACWF18	34421	29.2	17.8	-64%
BEEF17	34422	32.3	19.6	-65%
LANF08	34423	49.3	31	-59%
BRCF09	34424	2.2	1.3	-69%
SJQF14	34425	58.1	29.4	-98%
SCCF15	34426	10.6	6.5	-63%

Appendix E
Crop Summary
University of California Cooperative Extension

Agricultural Acreage Estimates for the County of Orange Nutrient Study
September 1999
Source: UC Cooperative Extension (UCCE)

The acreage estimates below represent various agricultural activities that were in place during the County of Orange Nutrient Study that was conducted from September 13-21, 1999. It should be noted that the acreage numbers are estimates and may be subject to error since no definitive drainage map or drain/channel outfall map was available at the time the records were compiled. The agricultural acreage numbers reported were compiled from the County of Orange Agricultural Commissioners records dated November 1999. Since the study period occurred two months prior, every effort was made by UCCE to reconstruct the crop composition upstream of the sampling stations. Crops listed here as "miscellaneous crops" were recorded by the County Agricultural Commissioner as "misc. truck", "vegetable", and "misc. vegetable". These sites are often mixed crops planted as part of roadside produce stands or planted by schools/residents as large-scale backyard or demonstration gardens. These types of planting generally have a wide variety of fruits and vegetables planted on under 10 acres, though some operations occupy larger acreages.

The acreage estimates listed below each County sampling station reflect the maximum agricultural acreage that may have been a contributing surface water source during a significant storm event. Under dry conditions, such as during the September sampling period, agricultural runoff would have been minimal from many sources. September is a month of transition for many row crops and signifies a period when summer crops (tomatoes, peppers, corn, squash) are approaching the end of their growing season and some growers are beginning the field preparation operations for various winter crops (cole crops, celery, lettuce, etc.). Crops that should have had no runoff include: box tree nurseries, avocados, lemons, citrus, tomatoes, peppers, and cucumbers. This is based upon the maturity of the crop at the time of sampling and the method of irrigation applied (drip or micro).

Strawberries in the Newport Bay Watershed are most frequently planted during the last week in September and the first two weeks of October, though some growers do plant earlier. Runoff from strawberry fields during the sampling period would have been a result of crop establishment irrigations for berries that were transplanted in late August and September. Crop establishment irrigations for strawberries are only applied for the first 3 to 6 weeks of the crop, depending upon the prevailing weather. For strawberry crops, the irrigation events associated with the establishment of the crop are often the period when most surface runoff occurs outside of storm runoff.

Agricultural activities upstream of the Central Irvine Channel sampling station (4) include 603 acres of nursery operations that have current Waste Discharge Permits from RWQCB.

Data provided for San Diego Creek at Harvard sampling station (20) includes acreage that occurs on channels that were not sampled under this study, such as acreage that occurs upstream at Bake and Dimension and acreage that occurs in Laguna Woods. Since much of this acreage occurs at input points well upstream of the County sampling station, there is some question as to whether or not nutrients added at these extreme points would degrade prior to reaching the County sampling point.

1. Peters Canyon Wash u/s Hicks Canyon Confluence
   Estimated agricultural acreage: 938
   Composition:

Avocado	680 acres
Nursery	3
Lemons	84
Tomatoes	171

2. Hicks Canyon Wash at Peters Canyon Wash
   Estimated agricultural acreage: 102
   Composition:

Avocados	102 acres

3. 65" RCP d/s Bryan Avenue at Peters Canyon Wash
   Estimated agricultural acreage: 286

Lemons	35 acres
Strawberries	200
Tomatoes	50
Misc. crops	1

4. Central Irvine Channel
   Estimated agricultural acreage: 1955
   Composition:

Nursery	604 acres
Lemons	35
Peppers	140
Strawberries	966
Tomatoes	77
Misc. crops (Not specified)	133

5. El Modena Irvine Channel
   Estimated agricultural acreage: 66
   Composition:

Nursery	5 acres
Misc. crops	1
Oranges	31
Mixed orchard (Citrus/avo)	23

6. Como Storm Channel
   Estimated agricultural acreage: 43
   Composition:

Misc. crops	11 acres
Oranges	30
Strawberry	2

7. Santa Ana-Santa Fe Channel (F10)
   Estimated agricultural acreage: 197
   Composition:

Cole crops	78 acres
Misc. crops	42
Strawberries	7
Tomatoes	65
Mixed orchard (Citrus/avo)	5

8. F06P08 (runs parallel to Irvine Center Dr.; enters PCW from opposite side that F10 does)
   None

9. Valencia Channel
   None

10. Warner Drain
    None

11. Construction Circle Drain
    None

12. Peters Canyon Wash at Barranca Pkwy
    Estimated agricultural acreage: 117
    Composition:

Strawberry	2 acres
Tomatoes	115

13. Agua Chinon Channel
    Estimated agricultural acreage: 320
    Composition:

Misc. crops	130 acres (includes Musick Facility)
Strawberry	190

14. Bee Canyon Channel
    Estimated agricultural acreage: 784
    Composition:

Avocados	384
Box Tree	40
Nursery	142
Lemons	45
Misc. crops	19
Oranges	57
Strawberries	67
Fallow field	30

15. Marshburn Channel
    Estimated agricultural acreage: 398
    Composition:

Avocado	101
Box tree	22
Nursery	170
Strawberries	105

16. Lane Channel
    Estimated agricultural acreage: 1
    Composition:

Nursery	1

17. Barranca Channel
    Estimated agricultural acreage: 94
    Composition:

Green beans	60
Misc. crops	34

18. San Joaquin Channel
    Estimated agricultural acreage: 709
    Composition:

Artichoke	60
Cucumber	50
Green beans	100
Nursery	4
Strawberries	240
Tomatoes	255

19. Sand Canyon Channel
    None.

20. San Diego Creek at Harvard Avenue
    Estimated agricultural acreage: 793
    Composition:

Avocado	50
Box tree	62
Cole crops	145
Corn	15
Fallow field	75
Green beans	50
Nursery	170
Misc. Crops	86
Oranges	40
Strawberries	100

21. San Diego Creek at Campus Drive
    Estimated agricultural acreage: 177
    Composition:

Misc. crops	157
Nursery	20

Appendix F
Photos

PCW-01, TG 800 H3
Grading South of Santiago Canyon
Upstream of Peters Canyon Reservoir

PCW-02, TG 800 H3
Grading South of Santiago Canyon
Upstream of Peters Canyon Reservoir

PCW-03, TG 800 J5
Peters Canyon Reservoir Dam

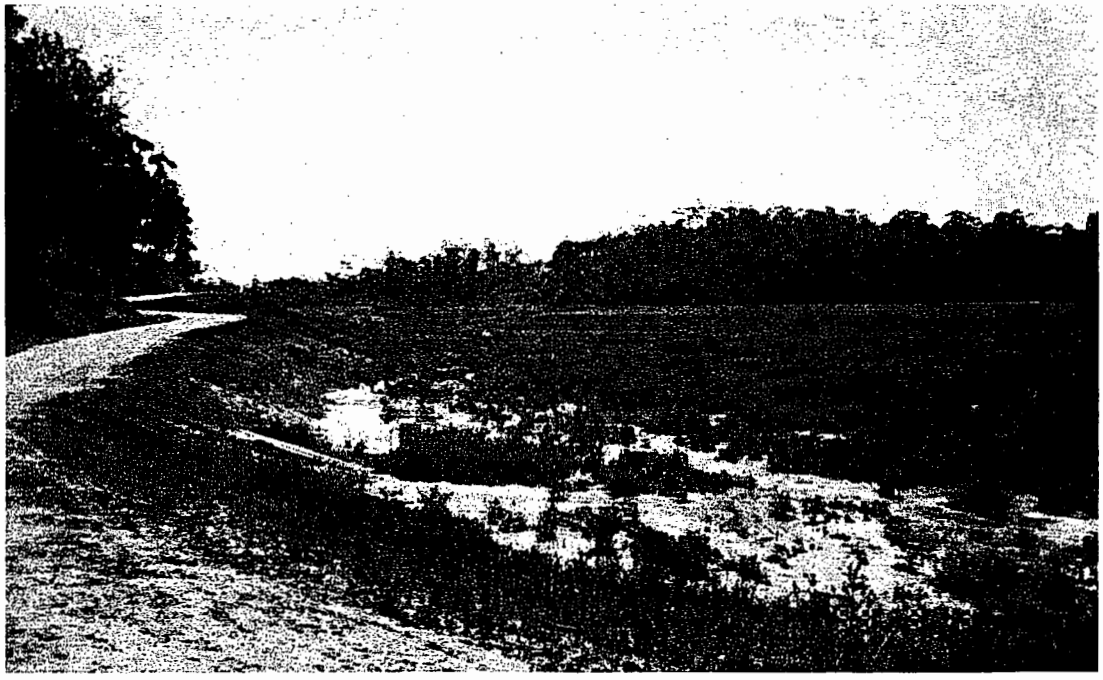

PCW-04, TG 830 H1
View from North End of Retarding Basin

PCW-05, TG 830 H1
View from North End of Retarding Basin

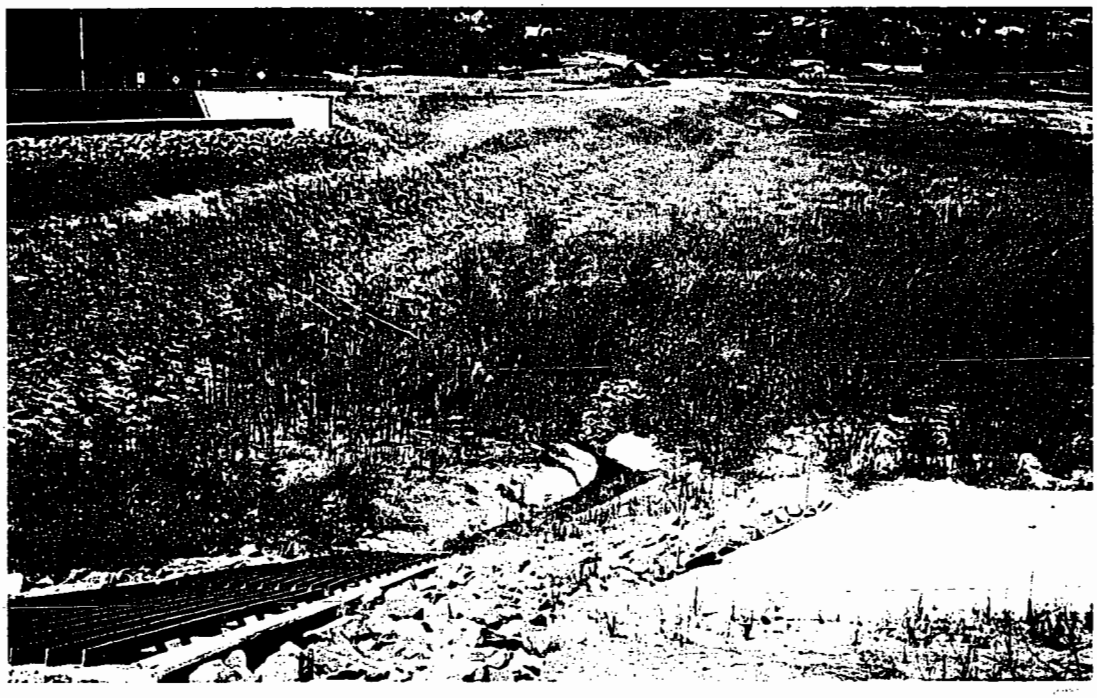

PCW-06, TG 830 H2
View of South End of Retarding Basin
Basin Outlet

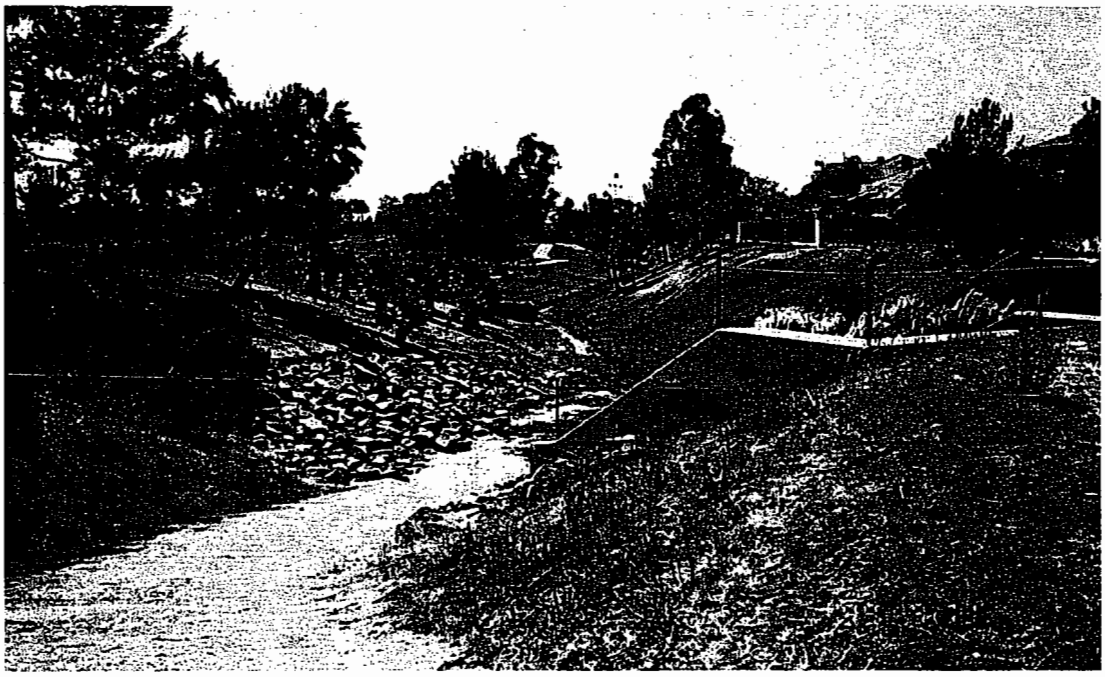

PCW-07, TG 830 G3
Peters Canyon Wash Discharge into Tustin Ranch
Golf Course

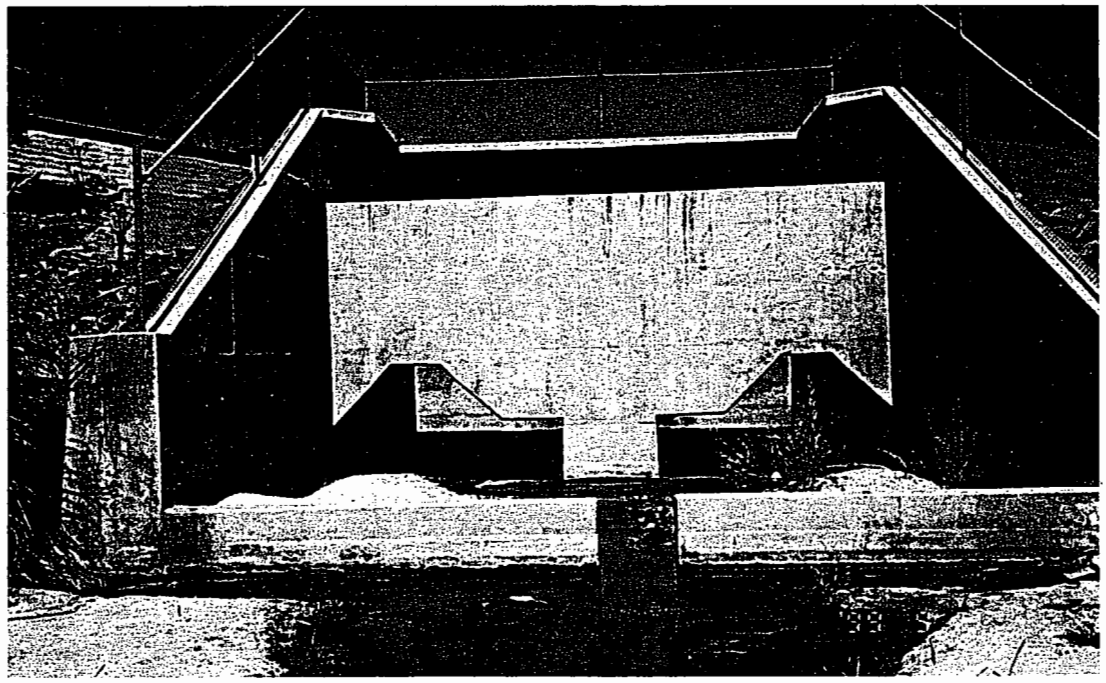

PCW-08, TG 830 G3
Peters Canyon Wash Discharge into Tustin Ranch
Golf Course

PCW-09, TG 830 G4
Potable Water Pumping Station
Next to Peters Canyon Wash Box
Culvert East Side of Jamboree Road

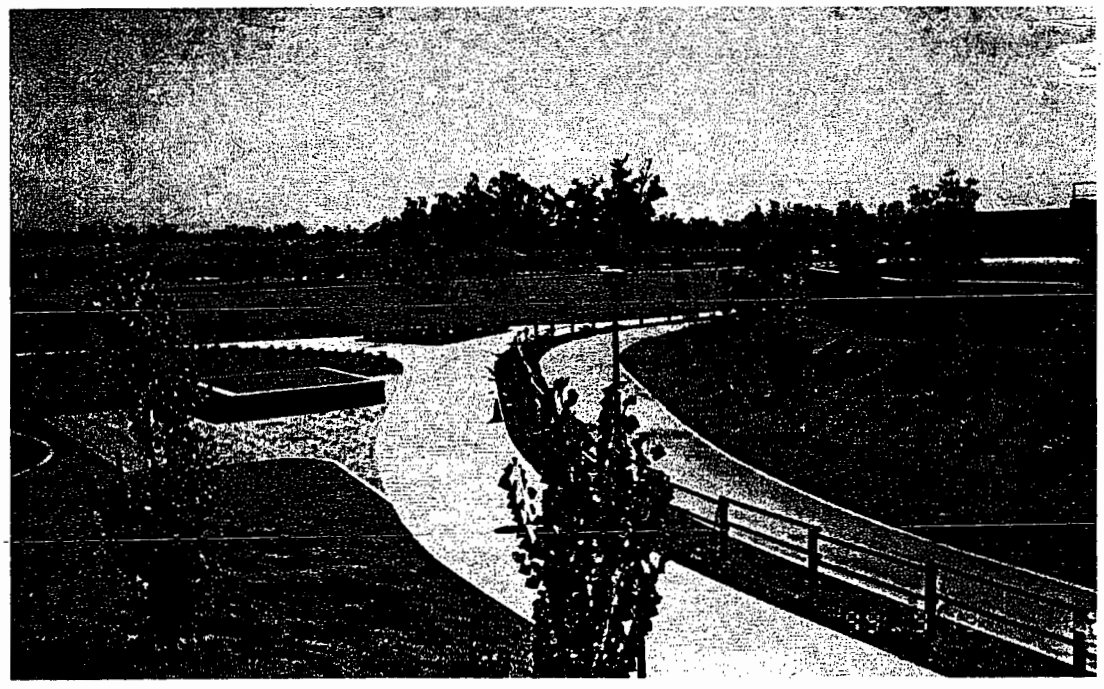

PCW-10, TG 830 G4
Peters Canyon Wash Box Culvert
Vent East Side of Jamboree Road

PCW-11, TG 830 G4
Old Location of Peters Canyon Wash
East of Jamboree Road

PCW-12, TG 830 G4
Row Crops (Beans), Irvine Ranch
South of Old Channel East of
Old Channel, East of Jamboree Road

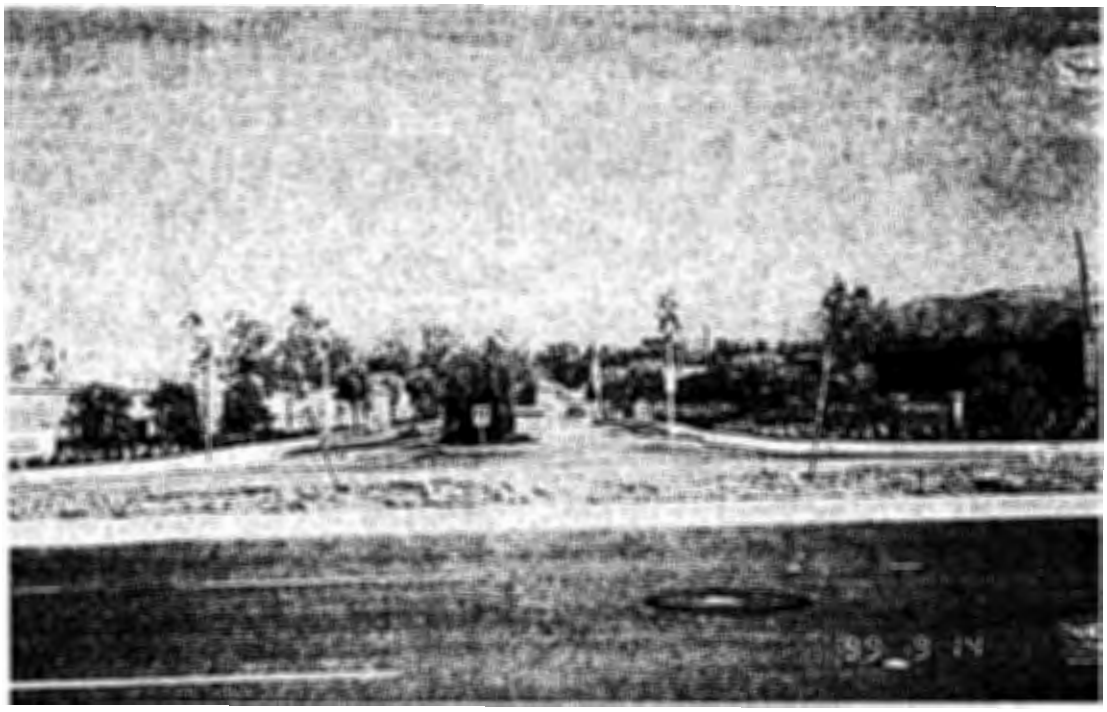

PCW-13, TG 830 H3
New Housing Development
North Side of Portola Parkway
Between Jamboree and Transportation Corridor

PCW-14, TG 830 H4
Recent Grading and Row Crops
South of Portola Parkway and East
Of the Transportation Corridor

PCW-15, TG 830 H4
Construction Along East Side of Transportation Corridor
South of Portola Parkway

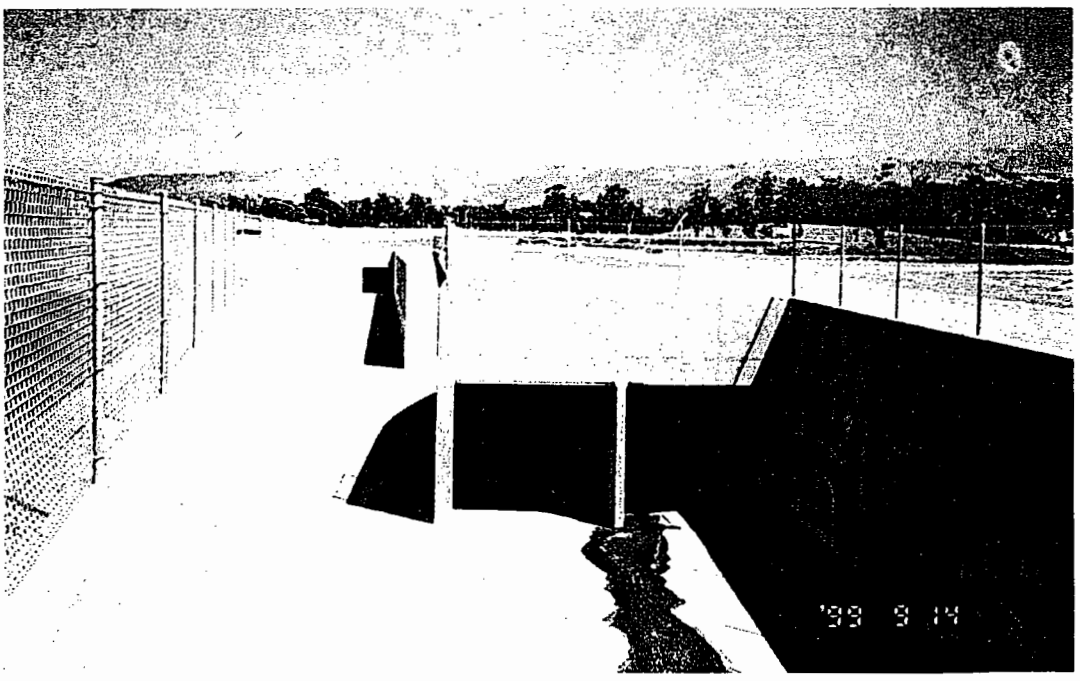

PCW-16, TG 830 H5
Confluence of Hicks Canyon Wash and
Eastfoot Box Culverts

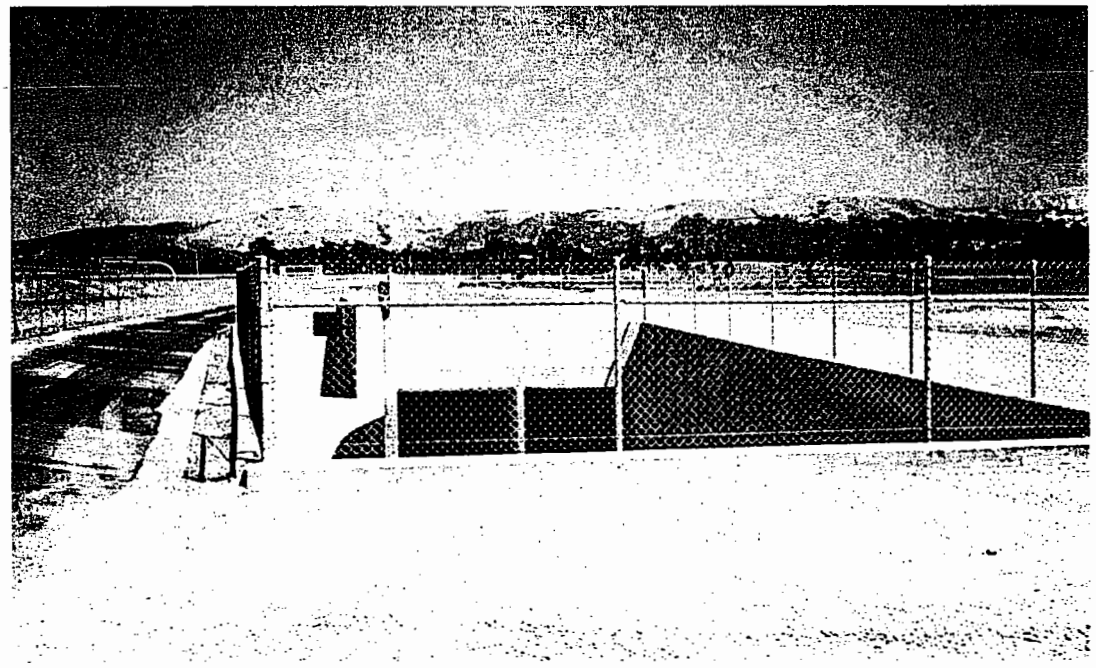

PCW-17, TG 830 H5
Confluence of Hicks Canyon Wash and Eastfoot
Box Culverts

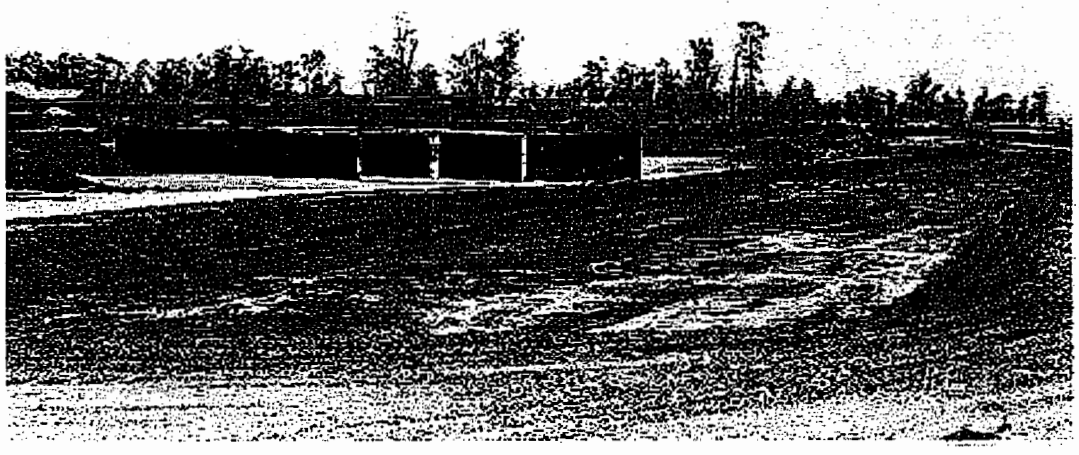

PCW-18, TG 830 H5
New Housing Development
East of Transportation Corridor

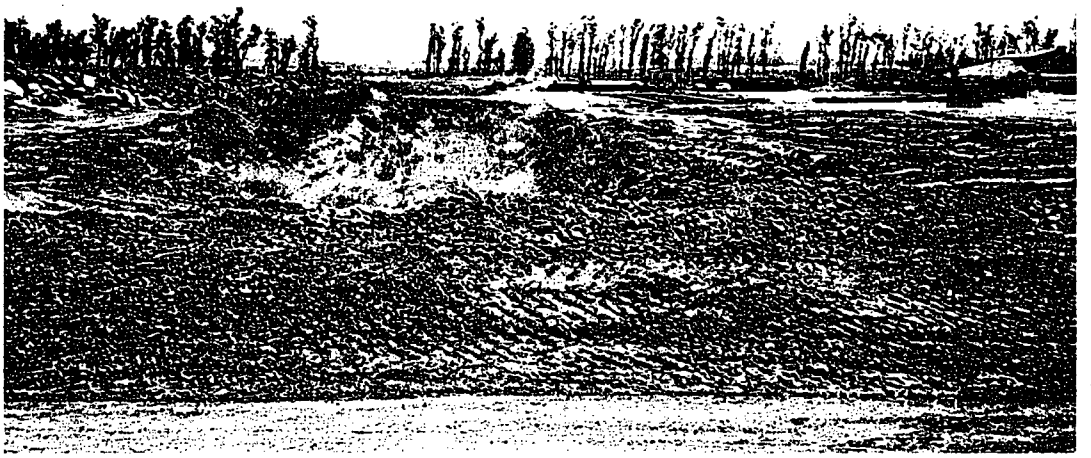

PCW-19, TG 830 H5
Old Channel Location (Hicks Canyon Wash)
East of Transportation Corridor
South of Confluence Hicks Canyon/ Eastfoot
Box Culverts

PCW-20, TG 830 H5
New Housing Development
East of Transportation Corridor
F-10

PCW-21, TG H5
New Swale Along Hicks Canyon Box Culvert

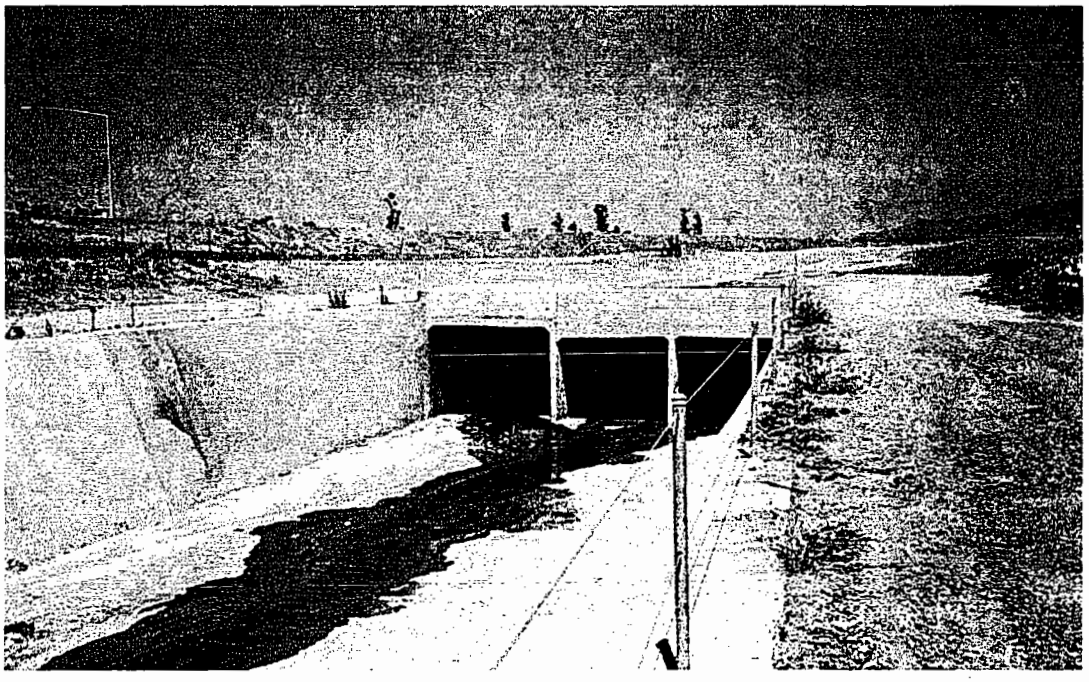

PCW-22, TG 830 G5
Box Culvert Confluence and Discharge
Into Trapezodial Channel
Hicks Canyon Wash and Peters Canyon Wash

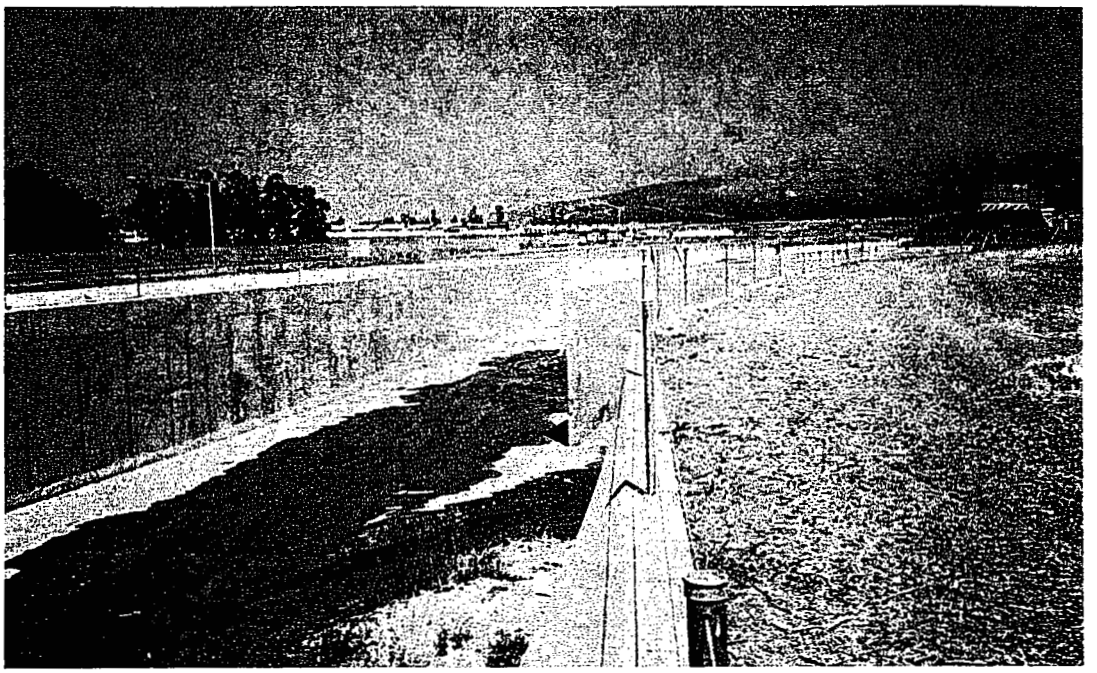

PCW-23, TG 830 G5
Confluence of Peters Canyon Wash Channel
With Rattlesnake Canyon Wash Box Culvert

PCW-24, TG 830 G5
New Housing Development East of Peters
Canyon Wash

PCW-25, TG 830 G6
Grading for New Housing Development
North of Irvine Boulevard
East of Peters Canyon Wash

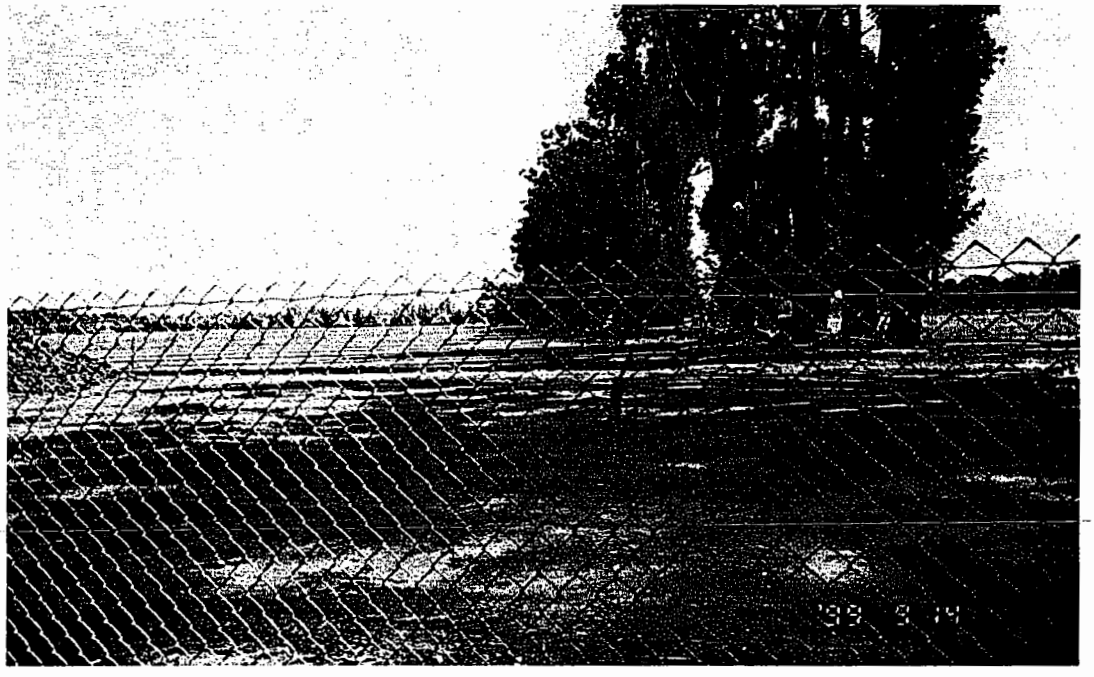

PCW-26, TG 830 G6
Newly Planted Row Crops
South of Irvine Boulevard
East of Peters Canyon Wash

PCW-27, TG 830 G6
Newly Planted Row Crops
And Old Drainage Channel
South of Irvine Boulevard
East of Peters Canyon Wash

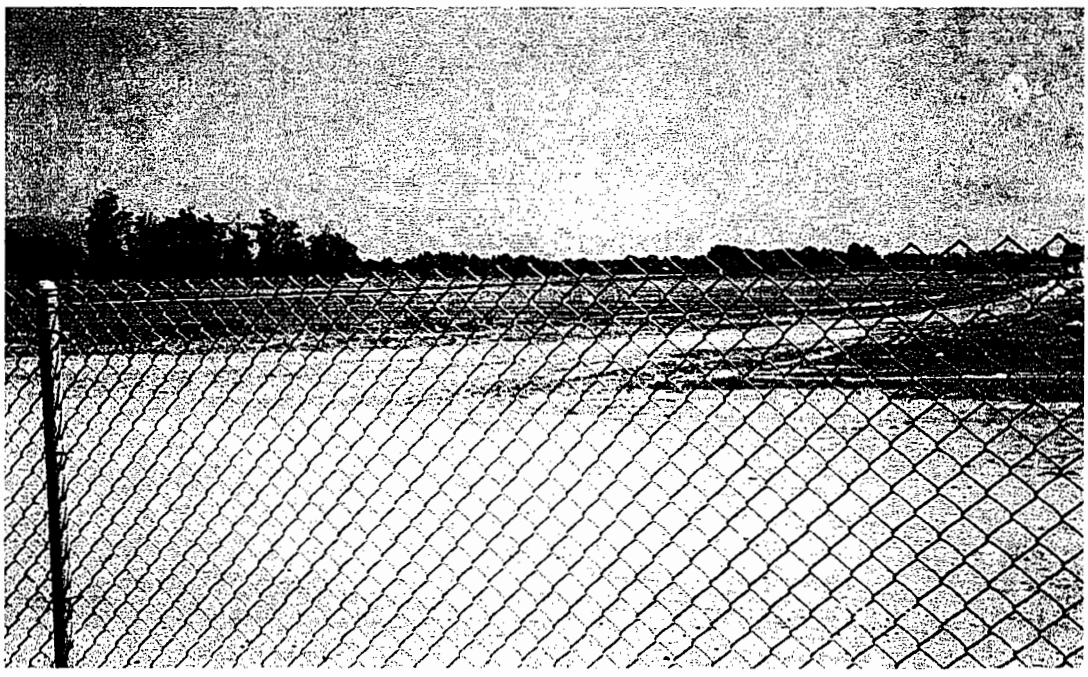

PCW-28, TG 830 G6
Newly Planted Row Crops
North of Bryan Avenue
East of Peters Canyon Wash

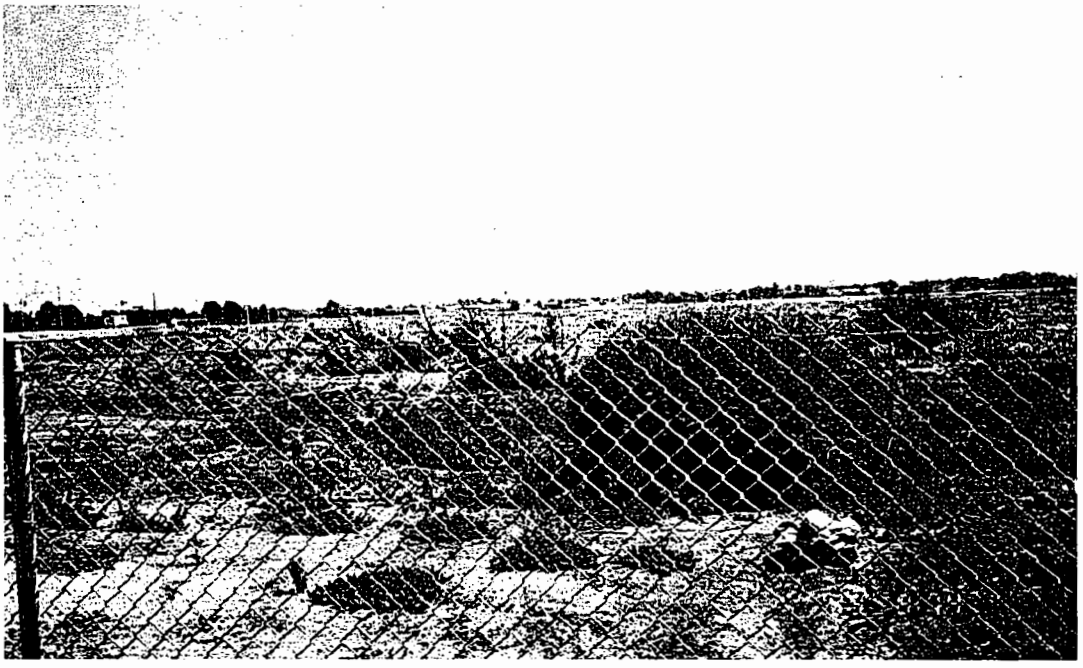

PCW-29, TG 830 F6
Vacant Land
South of Bryan Avenue
East of Peters Canyon Wash

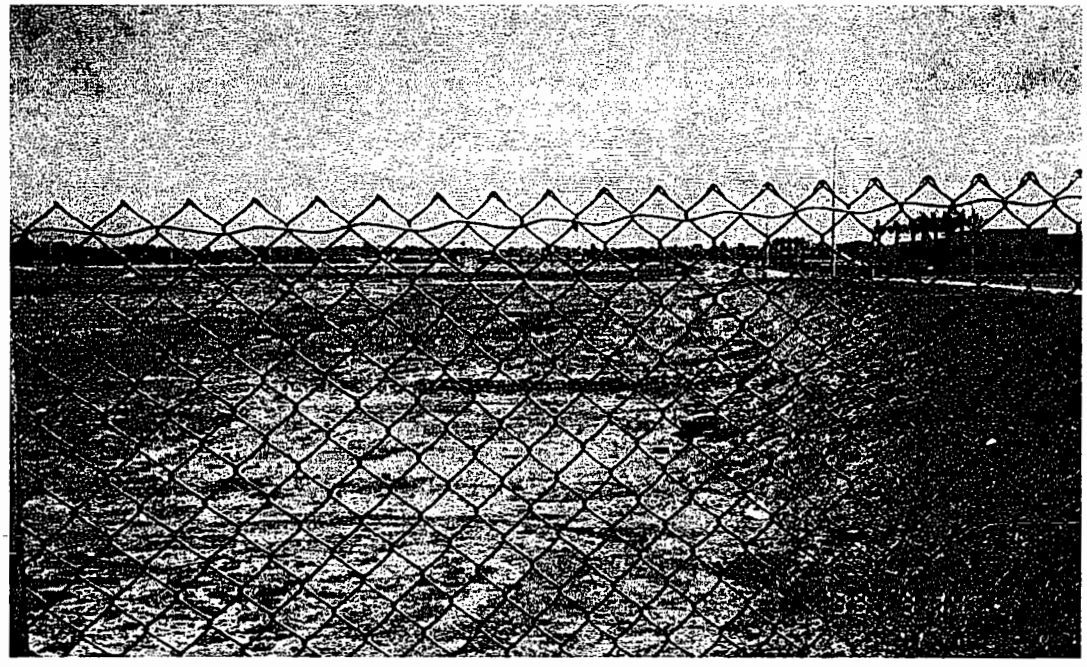

PCW-30, TG 830 F6
Vacant Land
Along North Side El Camino Real
East of Peters Canyon Wash

PCW-31, TG 830 J4
Hicks Canyon Wash on the North Side
Off Portola Parkway
Note: No Irrigation Runoff was Observed Along Portola
Parkway at this Location

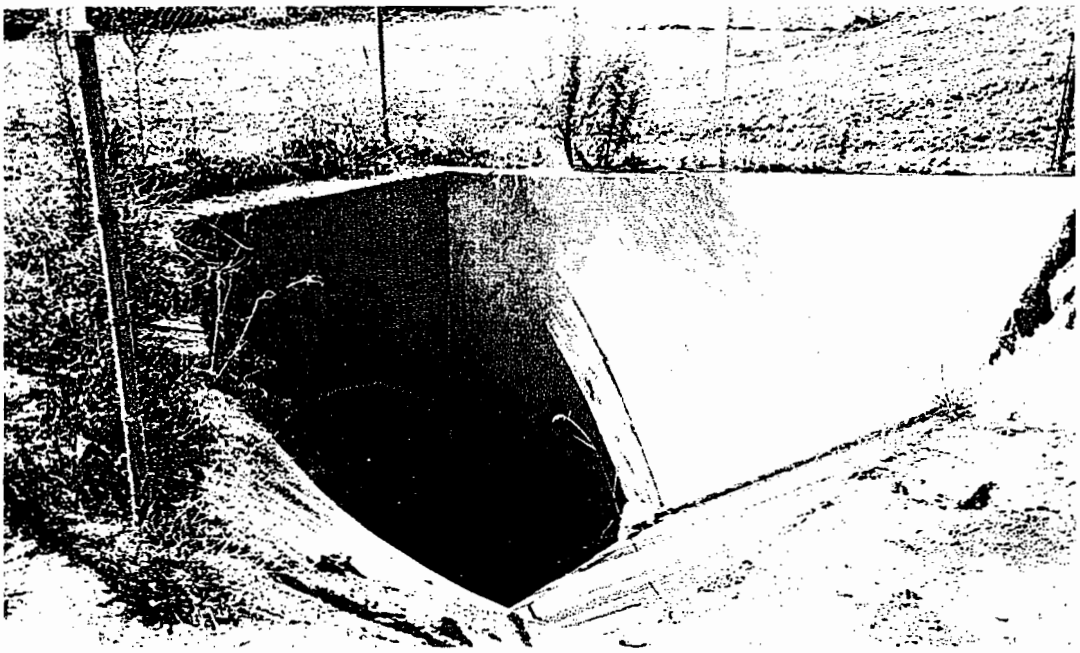

PCW-32, TG 830 J4
Hicks Canyon Wash Box Culvert Inlet
On the North Side of Portola Parkway
Note: No Irrigation Runoff was Observed Along Portola
Parkway at this Location

PCW-33, TG 830 J4
Hicks Canyon Wash on the North Side
Of Portola Parkway
Note: No Irrigation Runoff was Observed Along Portola
Parkway at this Location

PCW-34, TG 830 J4
Orange Hill Retarding Basin
North of Portola Parkway
Note: No Irrigation Runoff was Observed Along Portola
Parkway at this Location

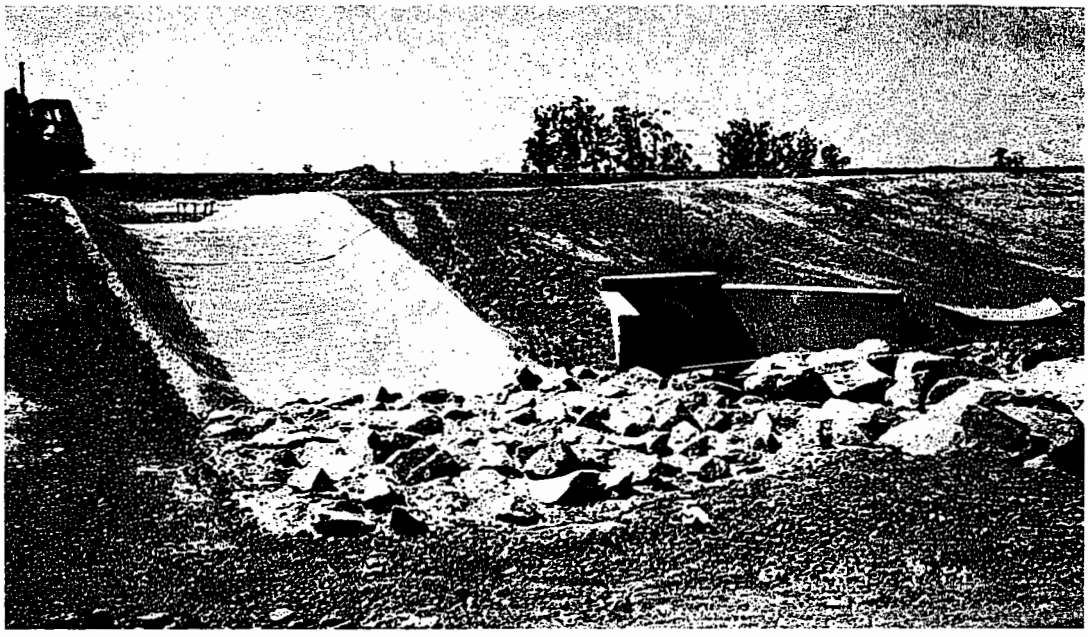

PCW-35, TG 830 J4
Inlet to Eastfoot Box Culvert
North Side of Portola Parkway
Note: No Irrigation Runoff was Observed Along Portola Parkway at this Location

PCW-36, TG 830 J4
Agricultural Crops (Beans and Citrus)
At Orange Hill Retarding Basin North Side of Portola Parkway
Note: No Irrigation Runoff was Observed Along Portola Parkway at this Location

PCW-37, TG 830 J4
Agricultural Crops (Beans and Citrus)
At Orange Hill Retarding Basin North
Side of Portola Parkway
Note: No Irrigation Runoff was Observed Along Portola
Parkway at this Location

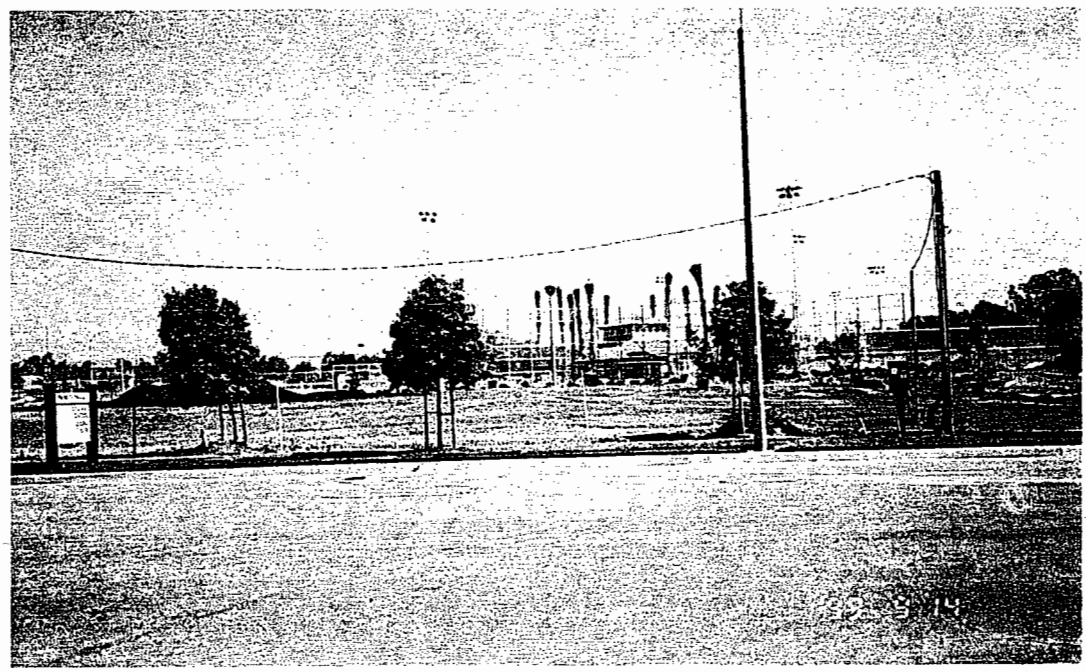

PCW-38, TG 830 H6
Park Landscaping Activities
West of Culver Drive
At Location of Rattlesnake Wash Box Culvert

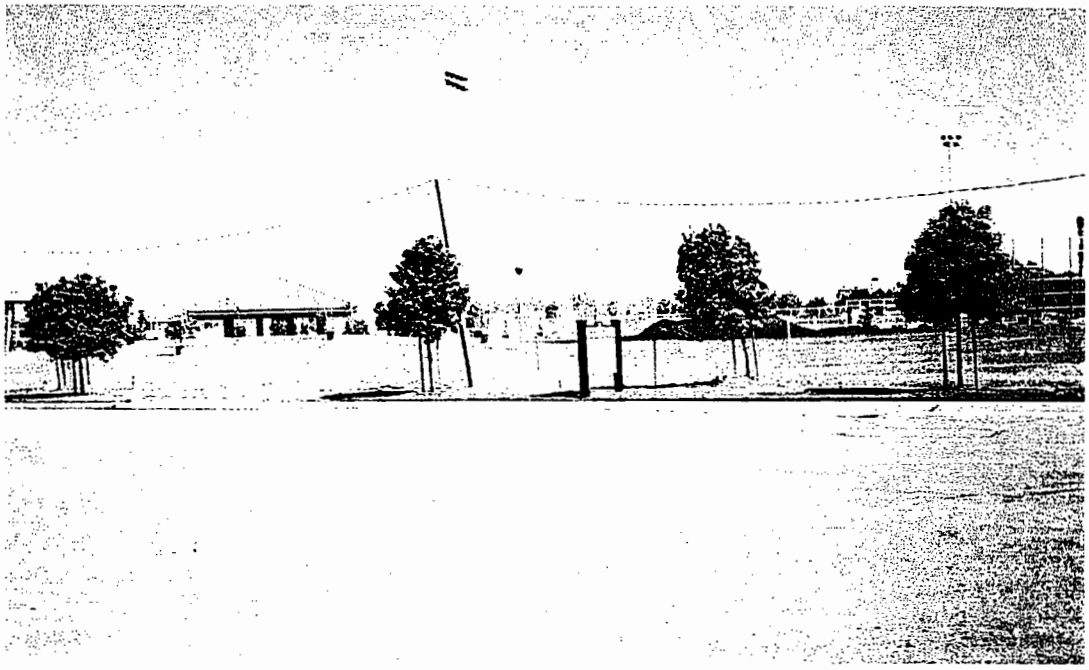

PCW-39, TG 830 H6
Park Landscaping Activities
West of Culver Drive
At Location of Rattlesnake Wash Box Culvert

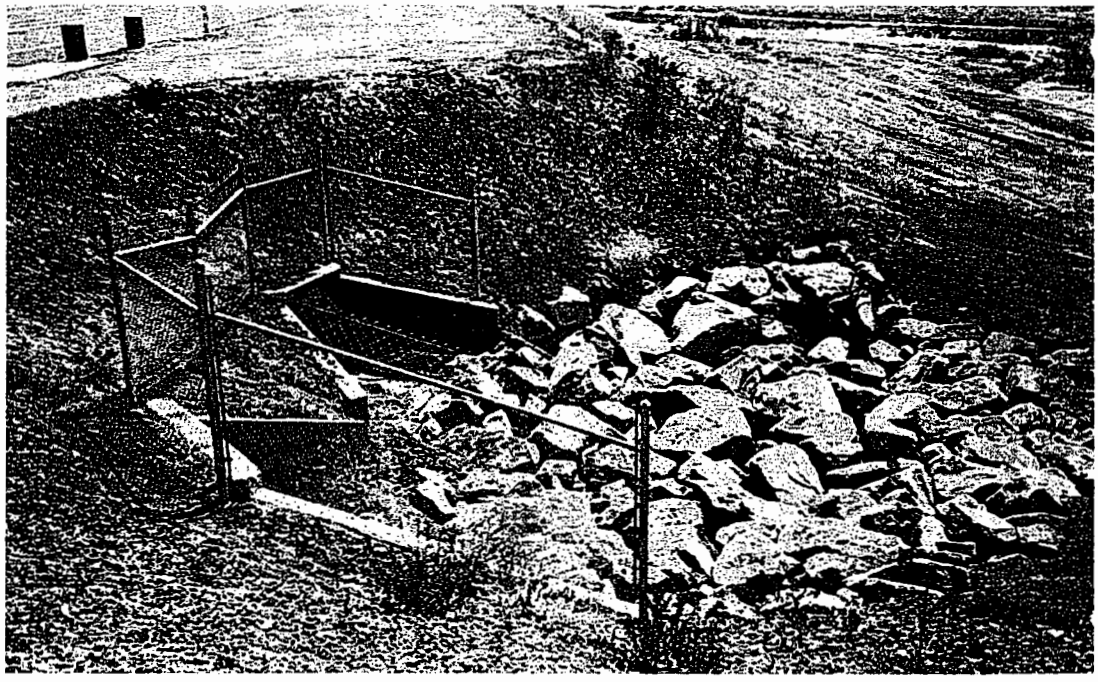

PCW-40, TG 830 J4
Eastfoot Box Culvert Inlet
On South Side of Portola Parkway
At Orange Hill Retarding Basin

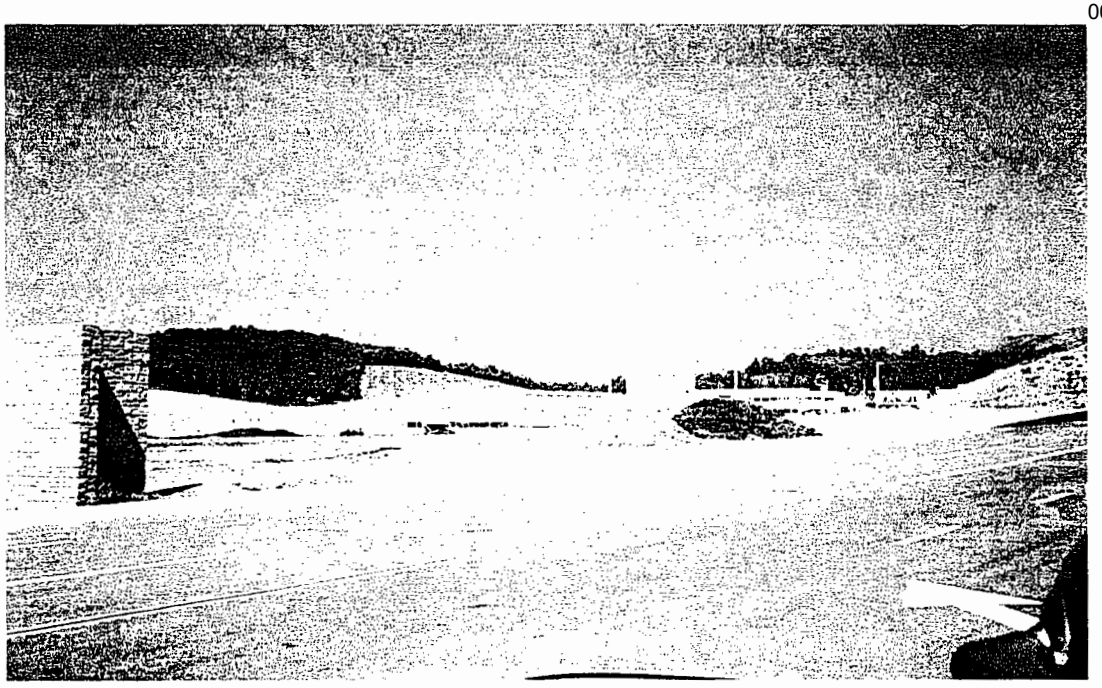

PCW-41, TG 831 A5
New High School Landscaping
And Avocado Groves
North of Portola Parkway at Yale Avenue

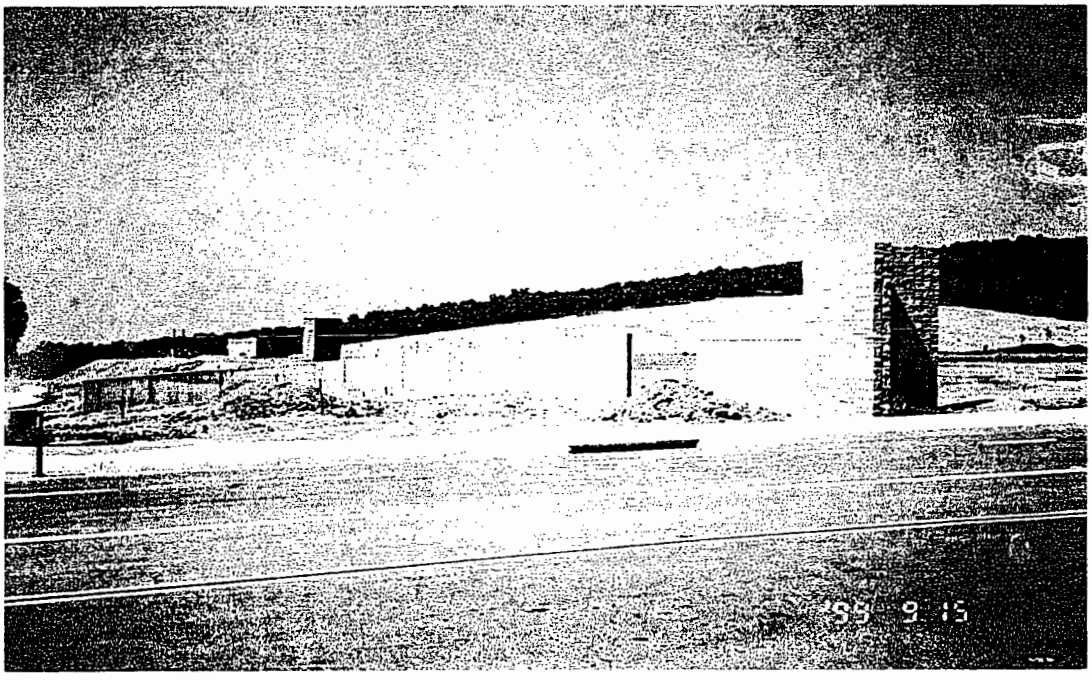

PCW-42, TG 831 A5
New High School Landscaping
And Avocado Groves
North of Portola Parkway at Yale Avenue

PCW-43, TG 830 J5
Vacant Land on South East Corner
Of Portola Parkway and Culver Drive

PCW-44, TG 831 B7
Nursery Hines on East Side of Jeffery
Road South of Portola Parkway
(No Nuisance Flows were Observed Coming from the
Nursery Location Along Jeffery Road or Irvine Avenue

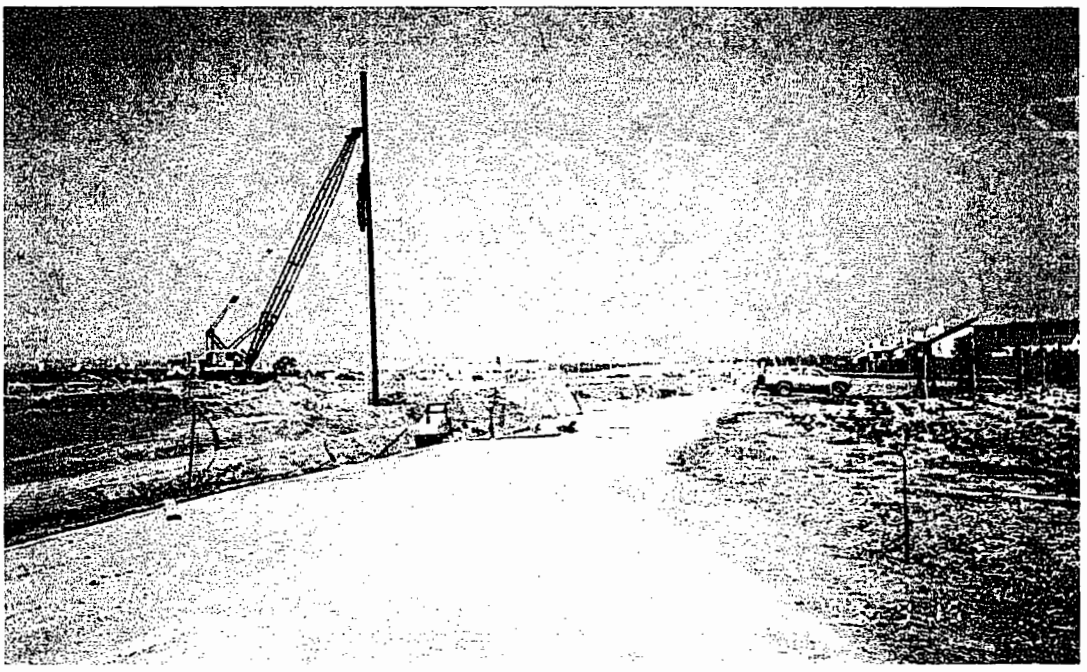

PCW-45, TG 860 E1
Construction Activities on Peters
Canyon Wash North of Walnut Avenue

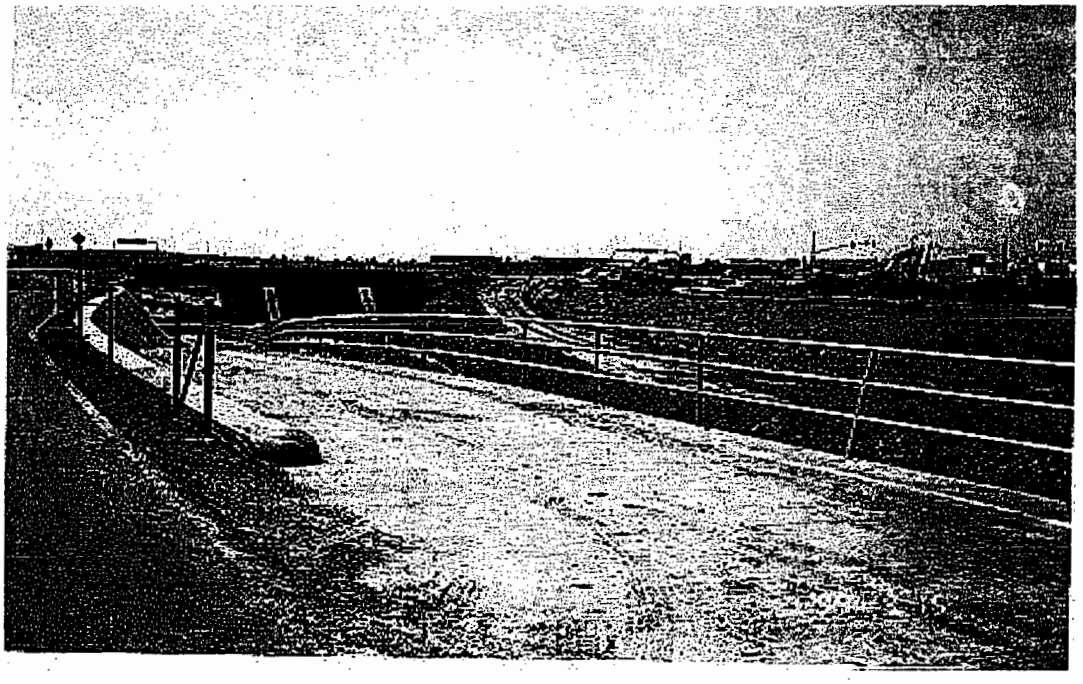

PCW-46, TG 860 E1
Construction Activities on Peters
Canyon Wash North of Walnut Avenue

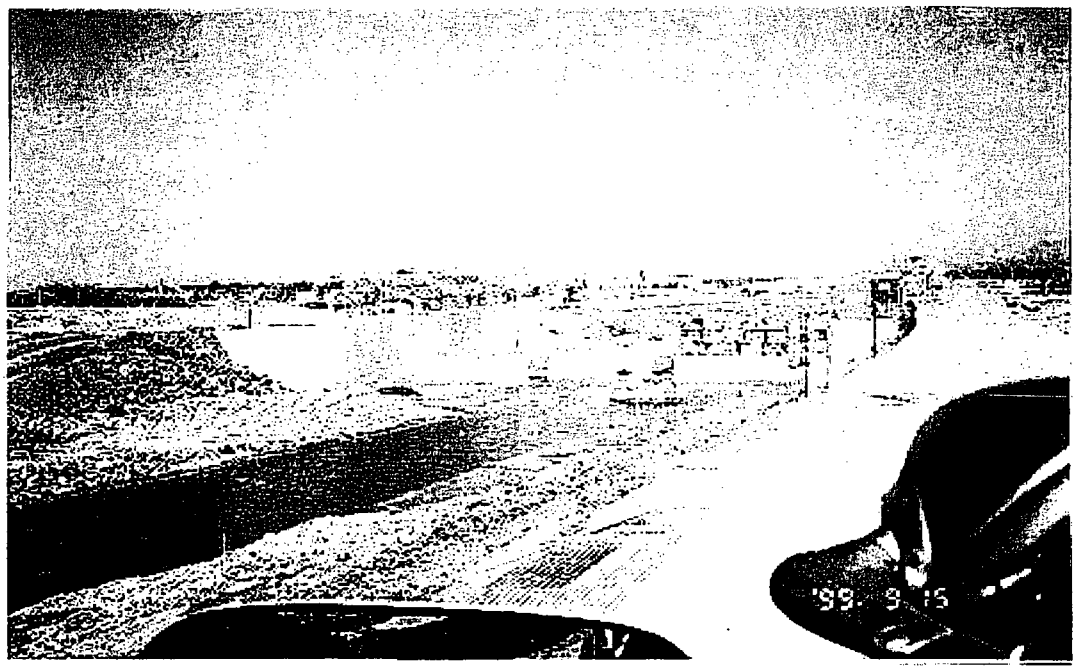

PCW-47, TG830 E7
Construction Activities on Peters Canyon Wash
Between Walnut Avenue and the Santa Ana Freeway

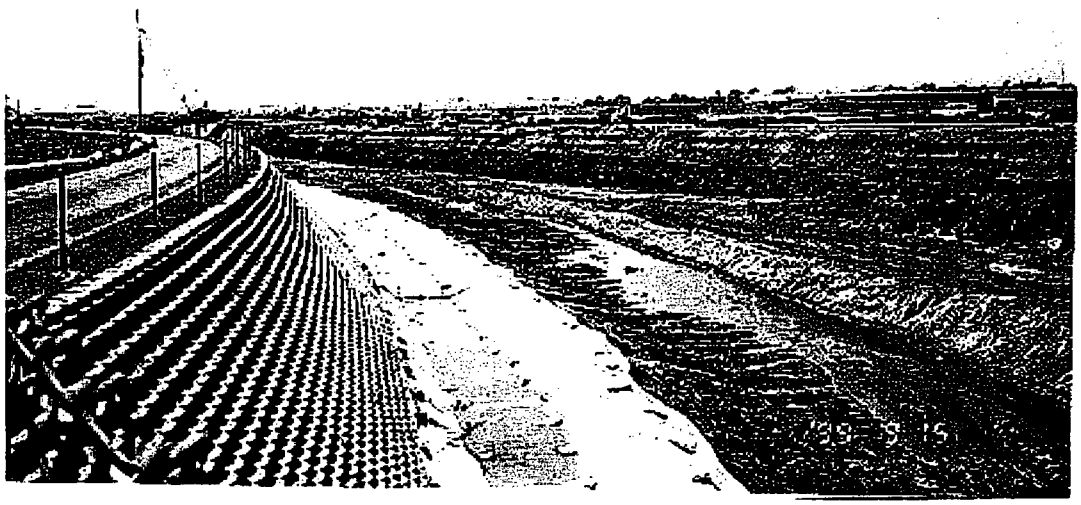

PCW-48, TG 830 E7
Construction Activities on Peters Canyon Wash
Between Walnut Avenue and the Santa Ana Freeway

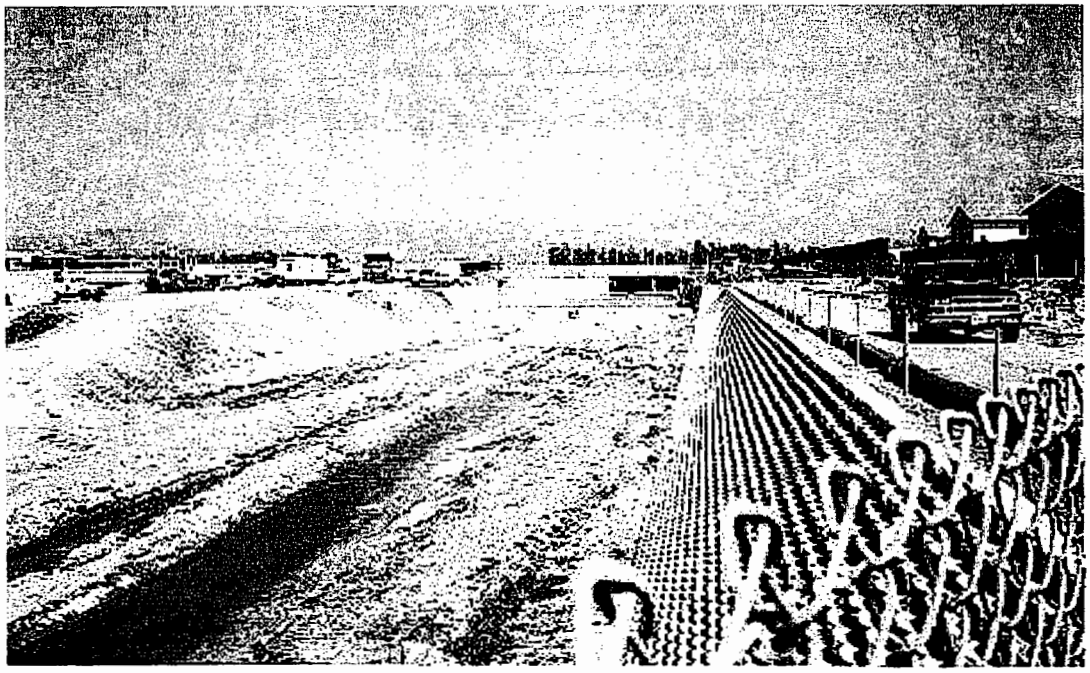

PCW-49,TG 830 E7
Construction Activities on Peters Canyon Wash
South of the Santa Ana Freeway

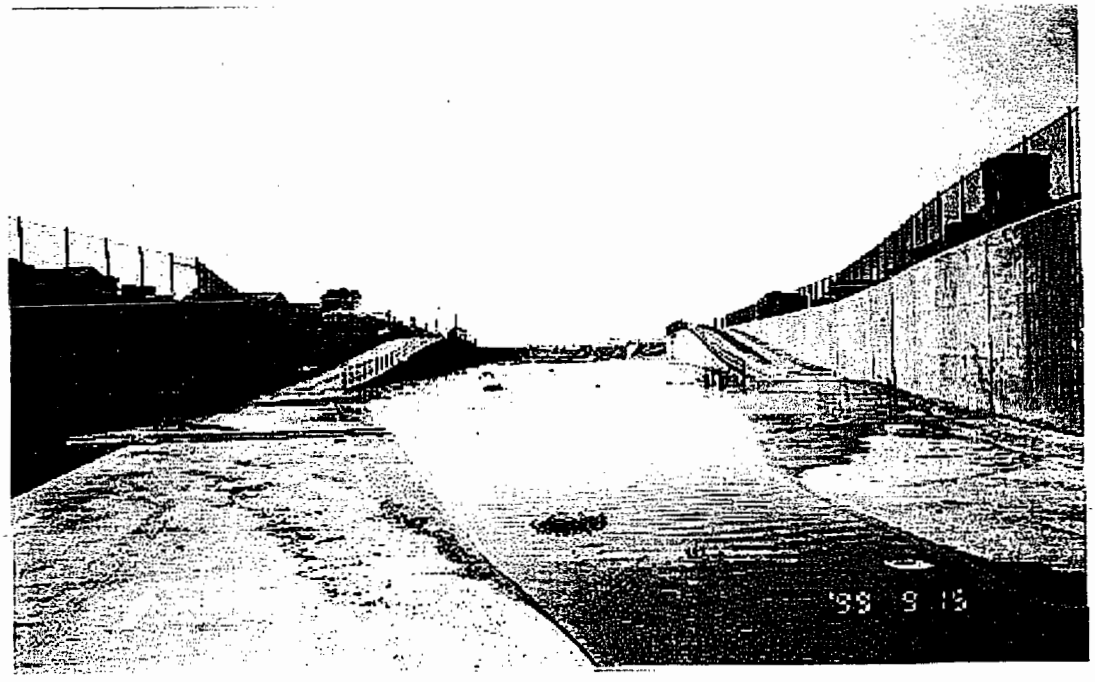

PCW-50, TG 830 E7
Construction Activities on Peters Canyon Wash
South of the Santa Ana Freeway

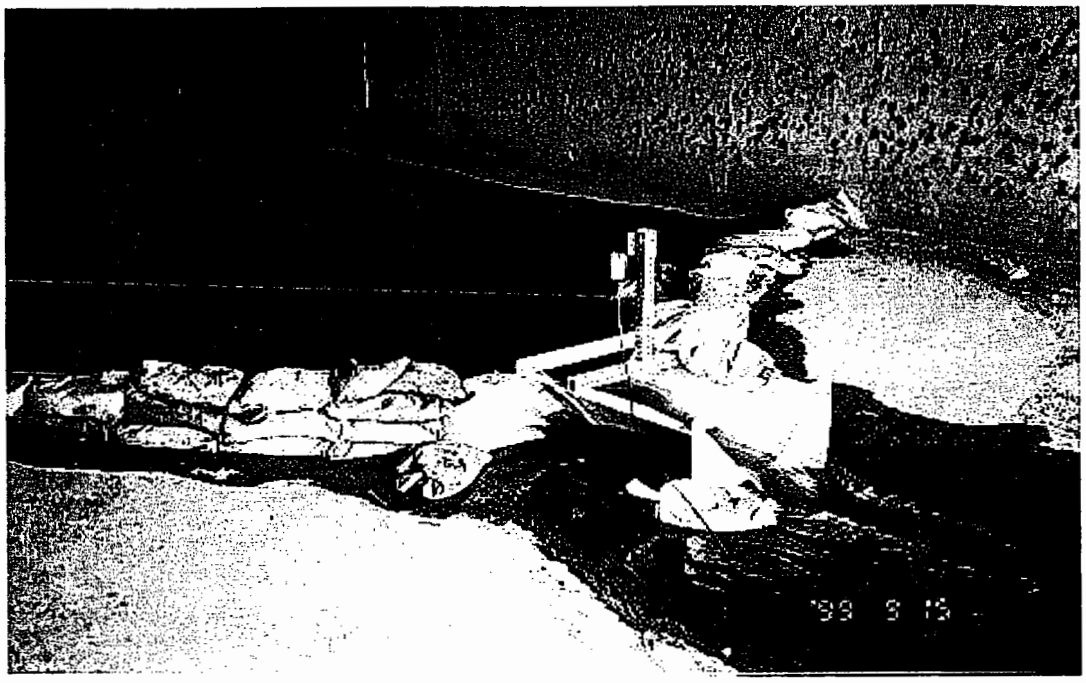

PCW-51, TG 830 E7
Water Quality Sampling on Central
Irvine Channel Under the Santa Ana Freeway

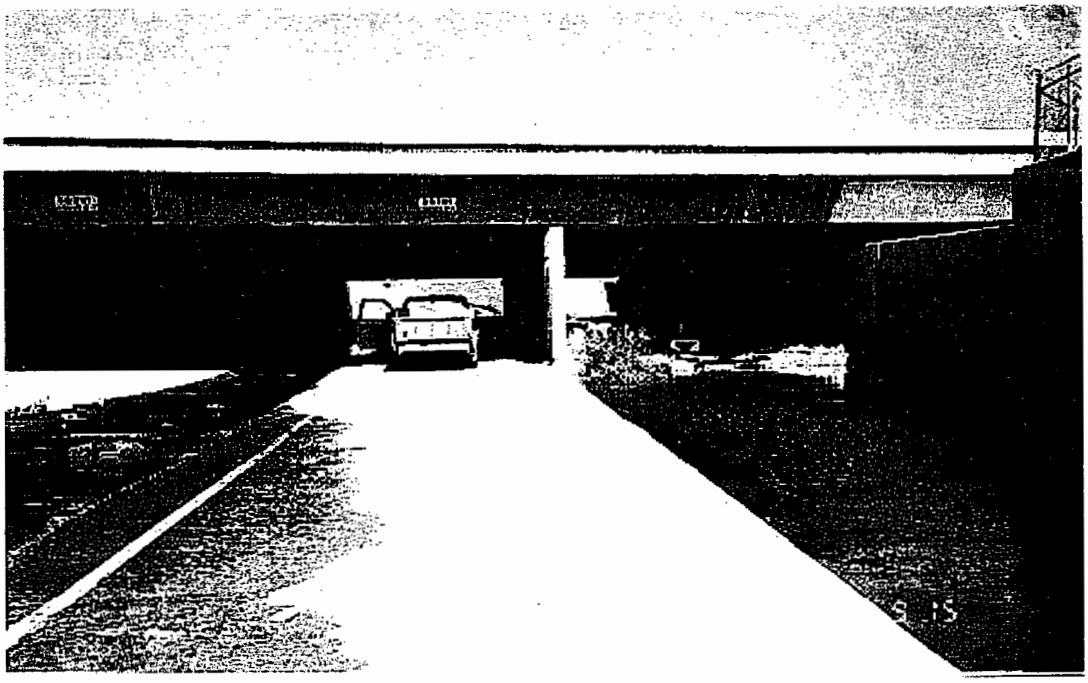

PCW-52, TG 830 E7
Confluence of Peters Canyon Wash
And Central Irvine Channel

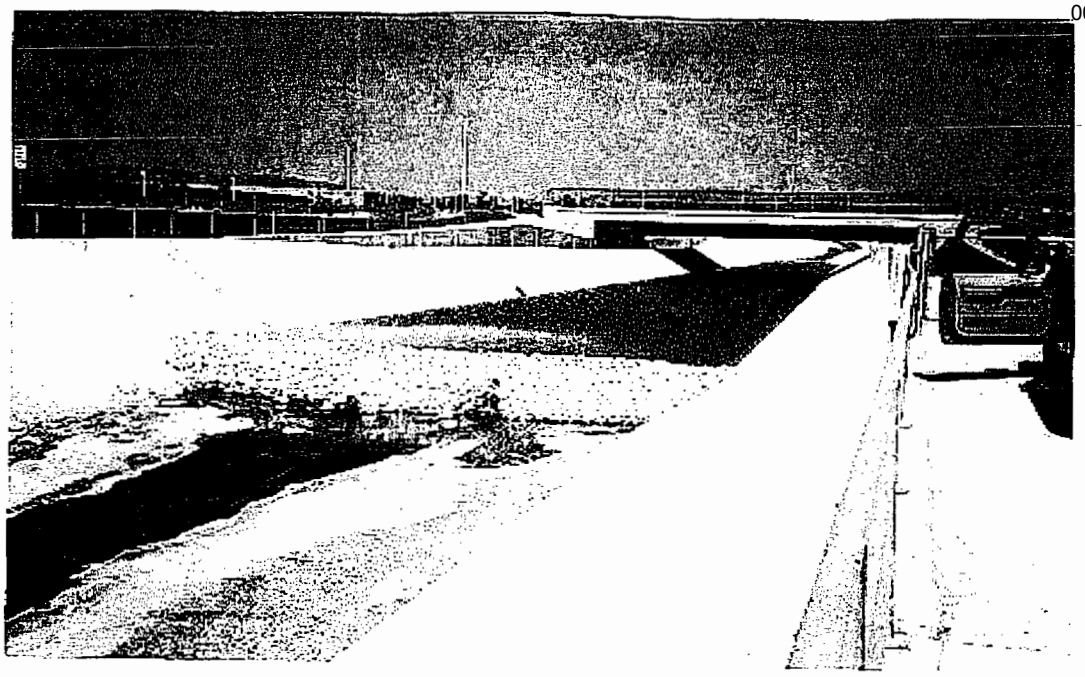

PCW-53, TG 830 F6
Peters Canyon Wash
Temporary Retarding Dam
South of El Camino Real

PCW-54, TG 830 F6
Area East of Peters Canyon Wash
Between El Camino Real and Central Irvine Channel
Note: The Buildings Viewed area a New Research Complex that is
Located Immediately North of the Channel. During the Reconnaissance,
Landscaping of the Property was Observed

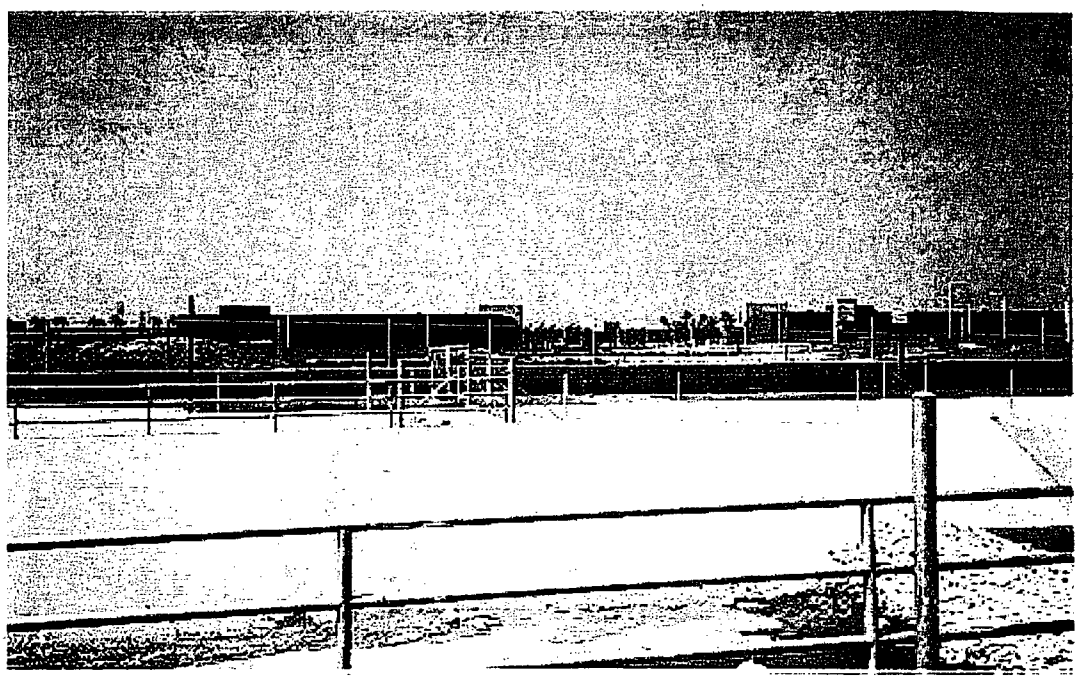

PCW-55, TG 830 F6
Area West of Peters Canyon Wash South of El Camino Real
Note: New Construction with Landscaping Activities were observed
On the Southeast Corner of Jamboree and Bryan Avenue

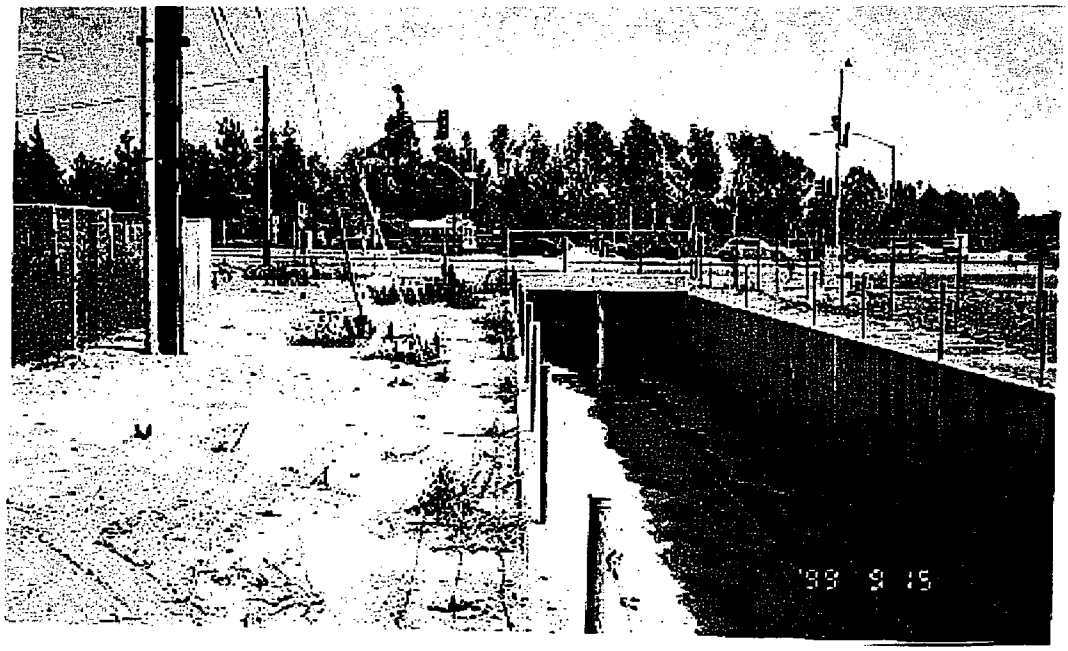

PCW-56, TG 830 F7
Central Irvine Channel Box Culvert
Under Culver Drive

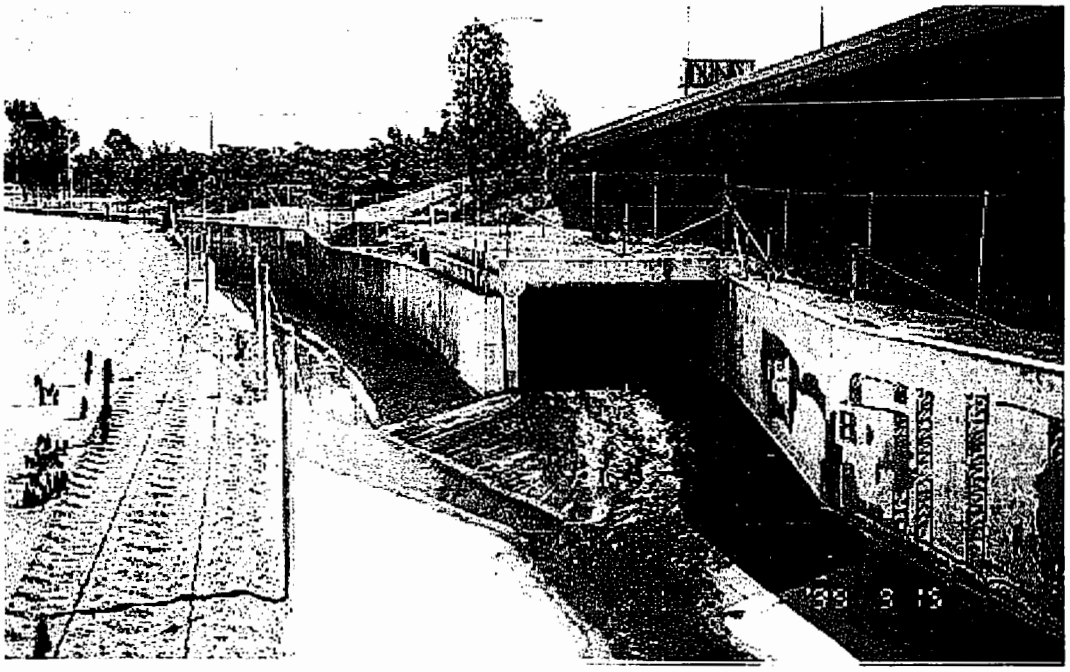

PCW-57, TG 830 F7
Confluence of (?) Channel Box Culvert with
Central Irvine Channel West of Culver Drive
Note: More than Half fo the Flow In Central Irvine Channel
Downstream of this Point is from the Box Culvert

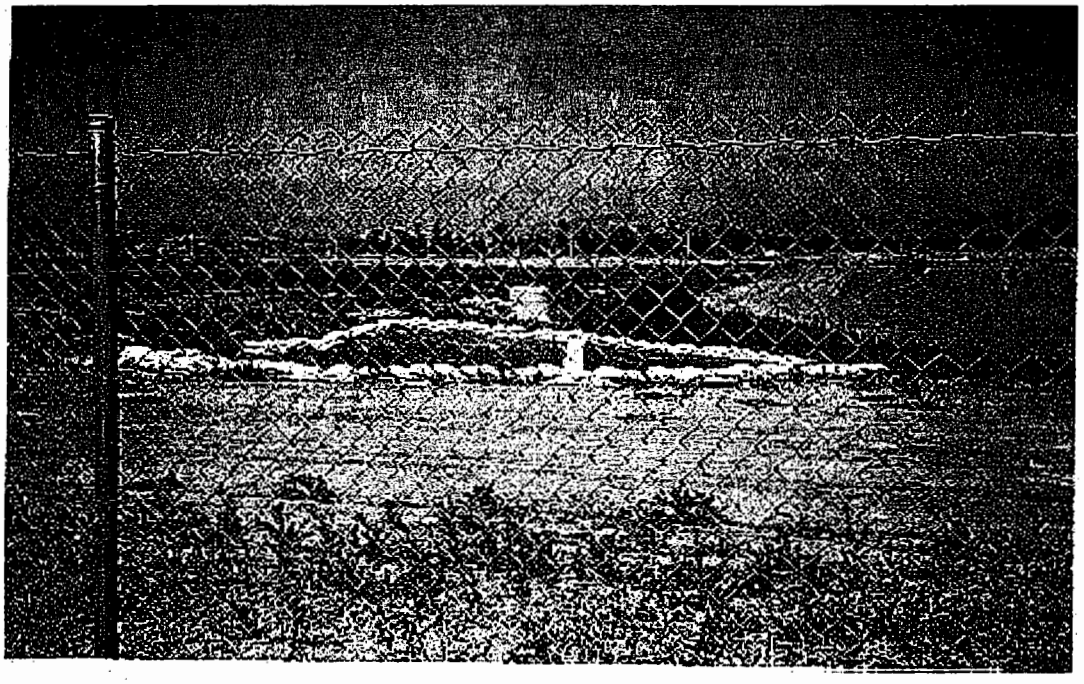

PCW-58, TG 830 F7
Retarding Basin on the North Side of
Central Irvine Channel West of Culver Drive

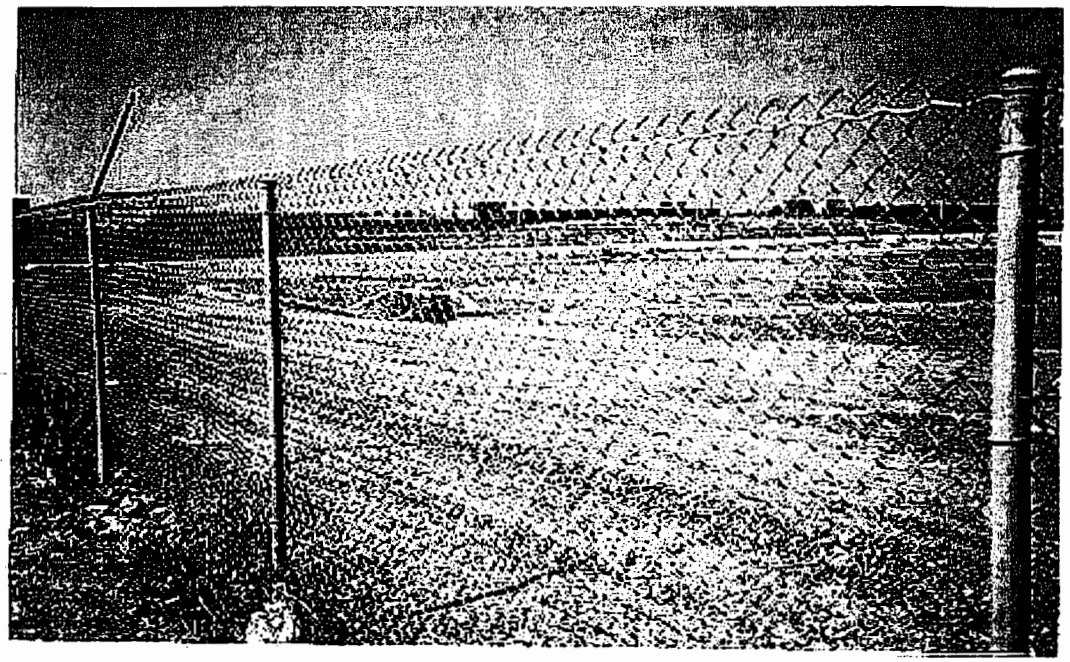

PCW-59, TG 830 F7
Retarding Basin on the North Side of
Central Irvine Channel East of Peters Canyon Wash

PCW-60, TG 830 F6
Central Irvine Channel Immediately Up Channel
Off the Confluence with Peters Canyon Wash
Note: The Channel Flow Appears to be Ponding at this Location

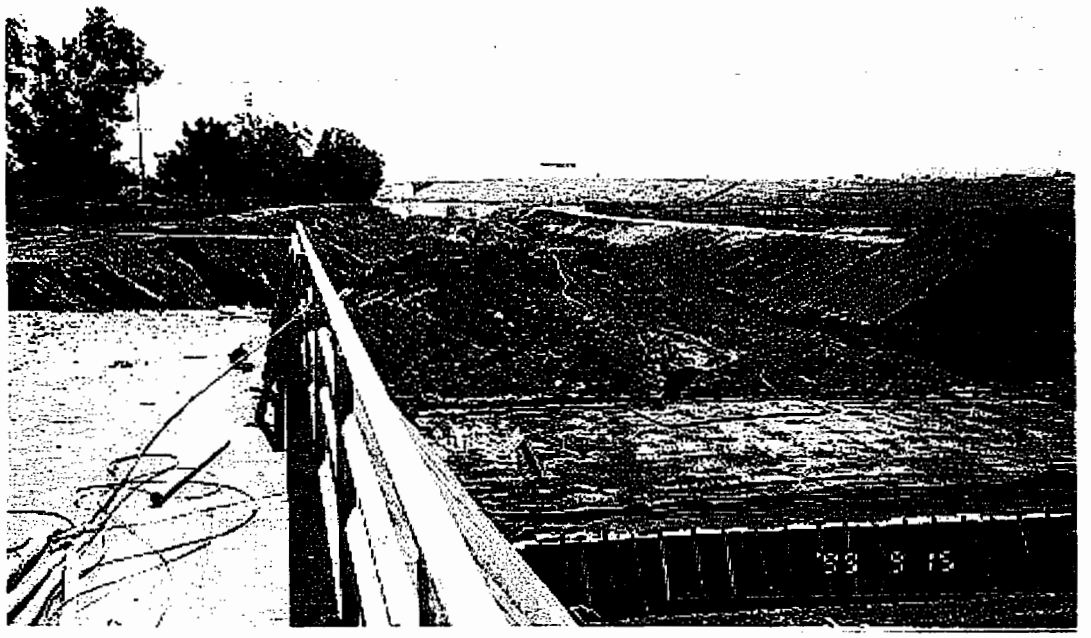

PCW-61, TG 860 E1
Down Stream End of Peters Canyon Wash Construction
Area South of Walnut Avenue Adjacent to
Harvard Community Athletic Park

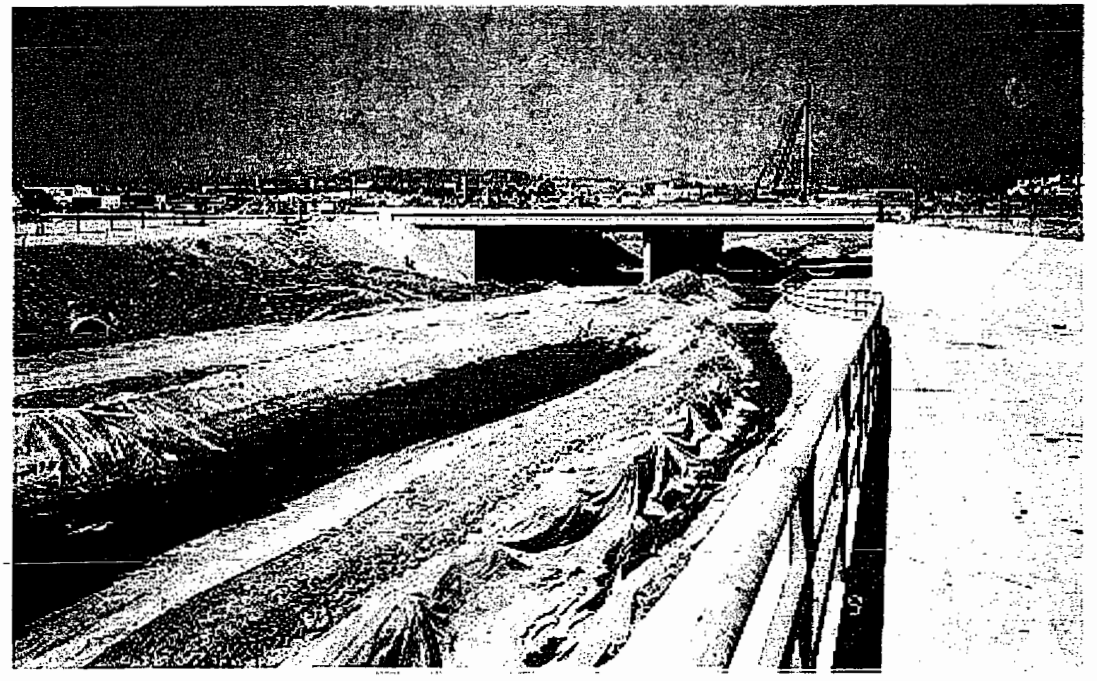

PCW-62, TG 860 E1
Peters Canyon Wash Construction
South of Walnut Avenue
Note: Bridge in Photo is Walnut Avenue

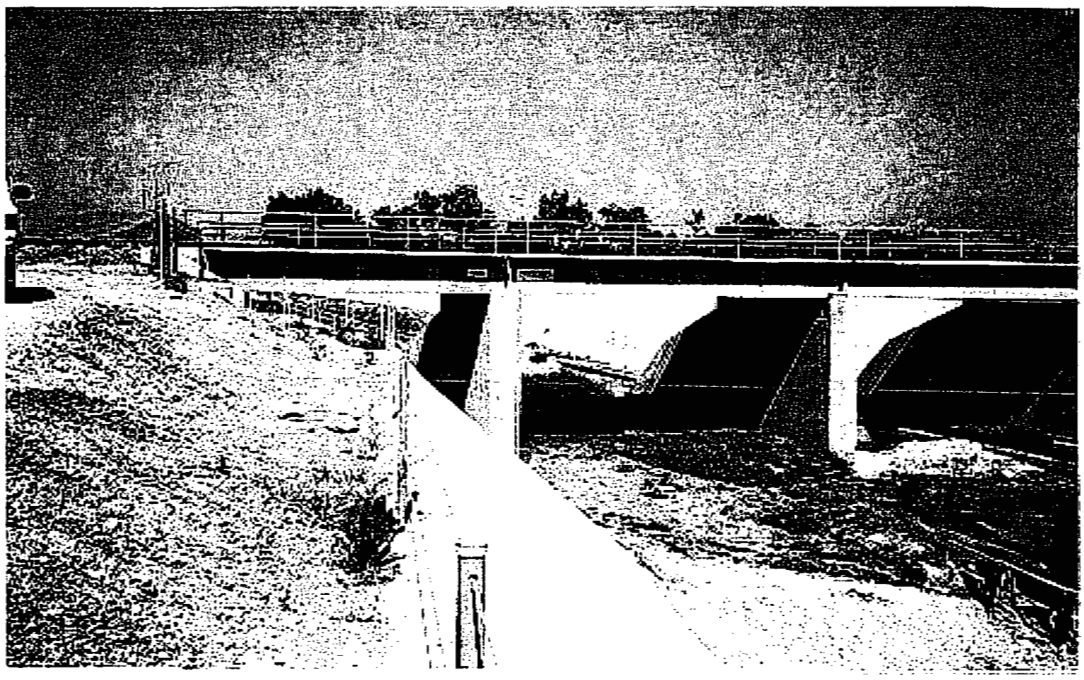

PCW-63, TG 860 D1
Peters Canyon Wash
At Rail Bridge North of Edinger Avenue

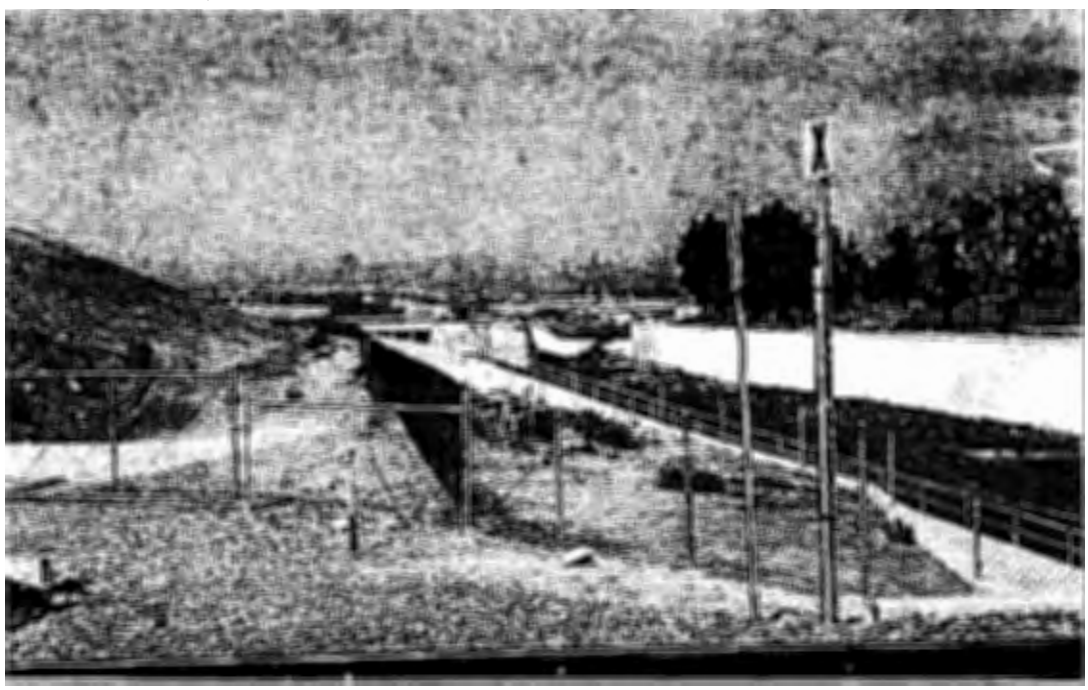

PCW-64, TG 830 F6
Confluence of Peters Canyon Wash
With El Modena Irvine Channel
Note: Construction Up Channel from Confluence

PCW-65, TG 860 B3
Peters Canyon Wash Up Stream Barranca Parkway

PCW-66, TG 860 B3
Peters Canyon Wash Down Stream Barranca Parkway

PCW-67, TG 860 B3
Construction Circle Drain
Measuring Depth of Water in Flume

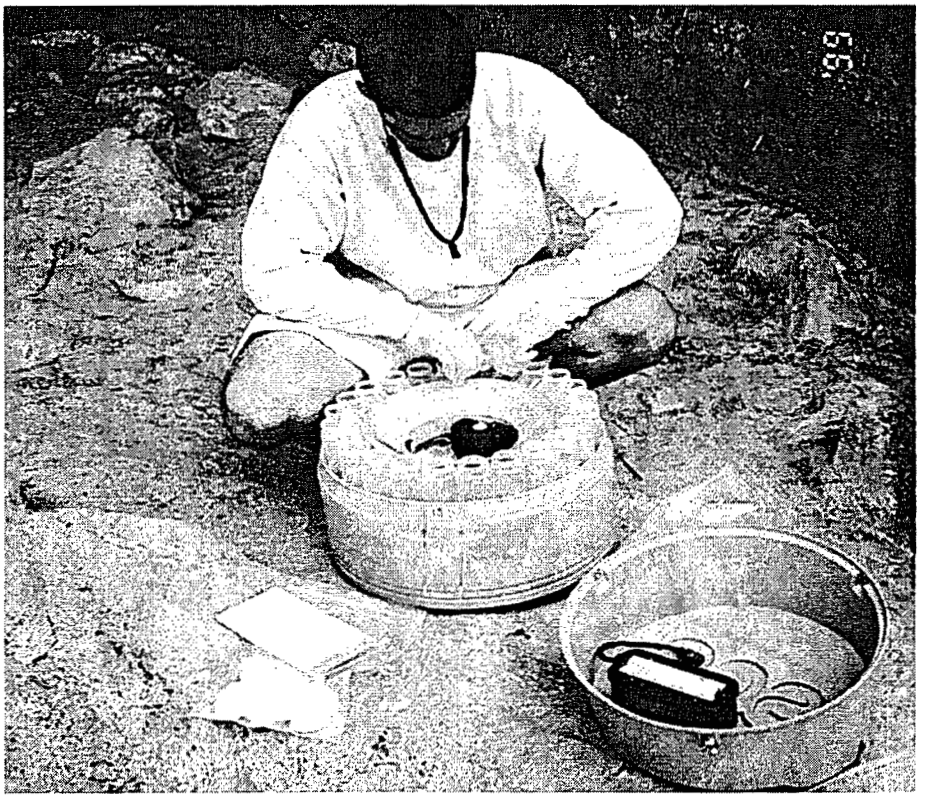

SDC-68, TG 889 J1
San Diego Creek Beneath Campus Drive
Servicing Automatic Sampler

IMAGE-69
3700 ISCO Sampler

IMAGE-70
6700 ISCO Sampler

PCW-74
Marshburn Channel

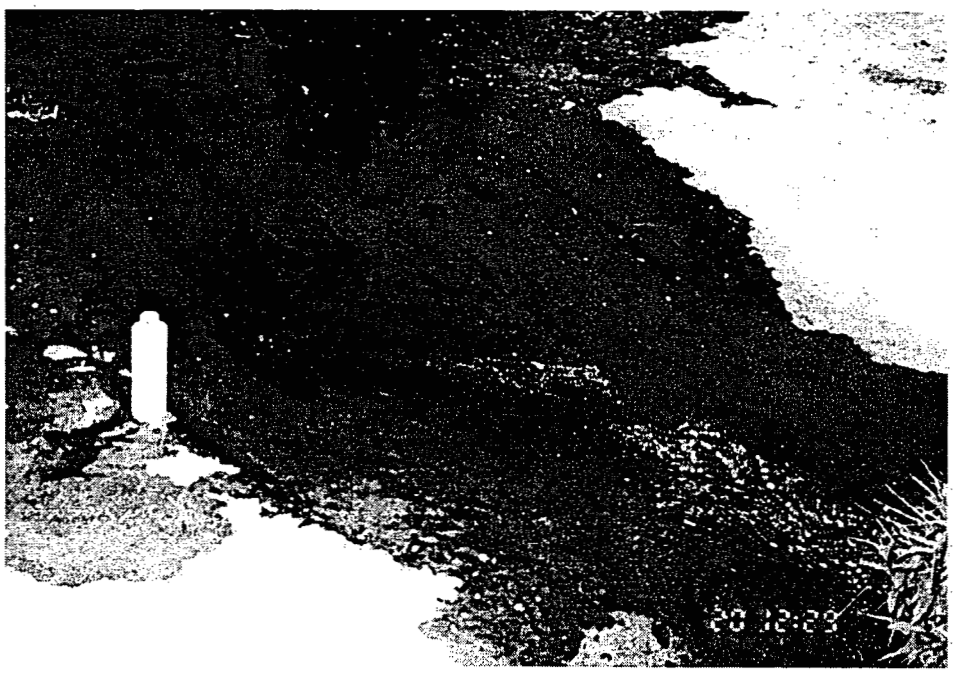

PCW-75
Marshburn Channel

PCW-76
Agua Chinon Channel

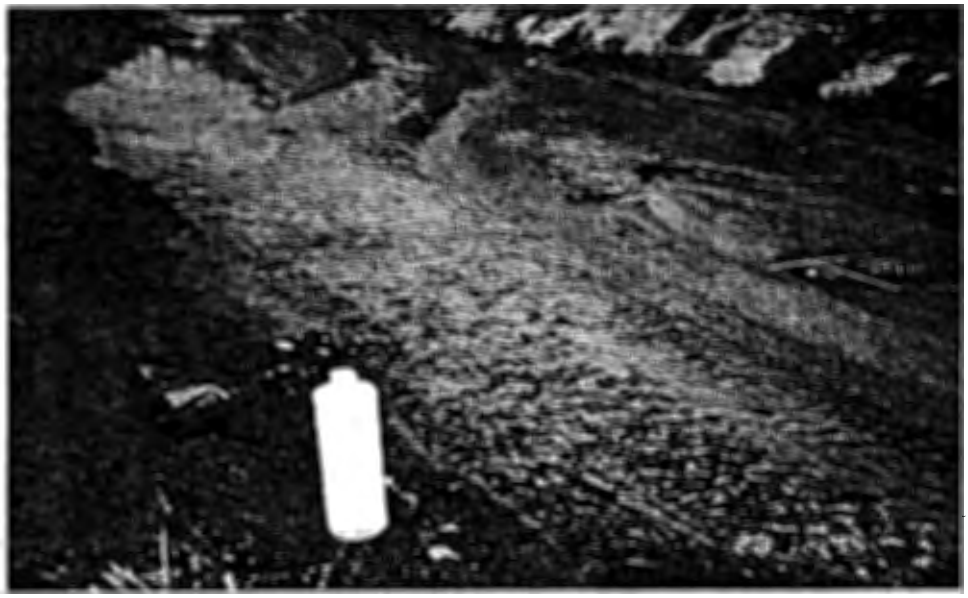

PCW-77
Agua Chinon Channel

PCW-78
Bee Canyon Channel

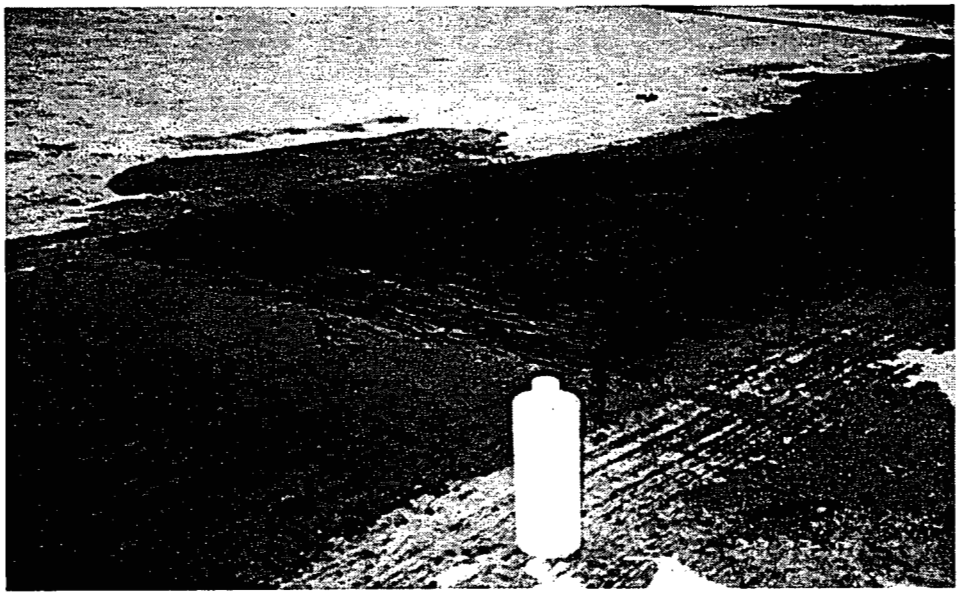

PCW-79
Bee Canyon Channel

PCW-80
Barranca Channel

PCW-81
Barranca Channel

PCW-82
Lane Channel

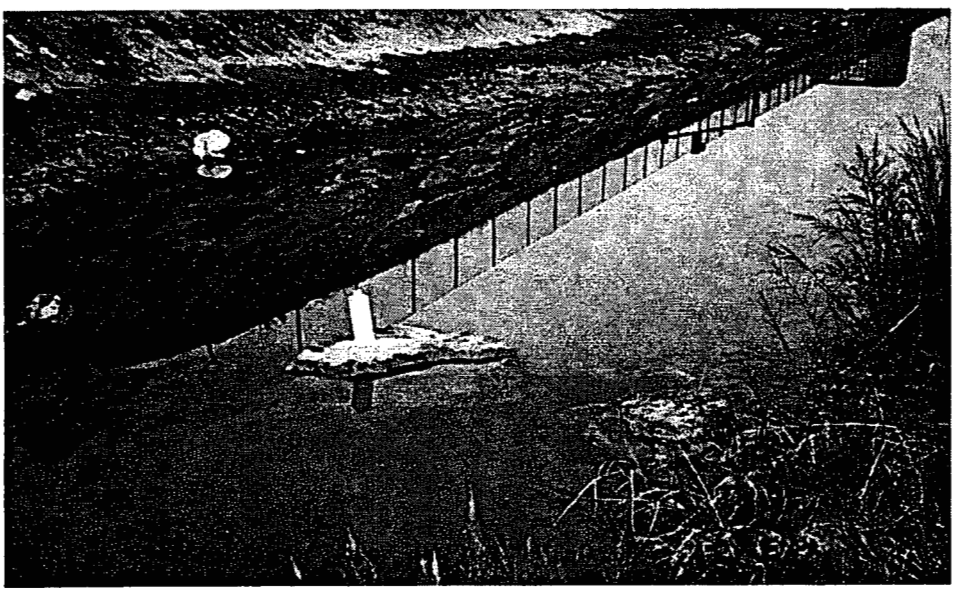

PCW-83
Lane Channel

PCW-84
Lane Channel

PCW-85
San Joaquin Channel

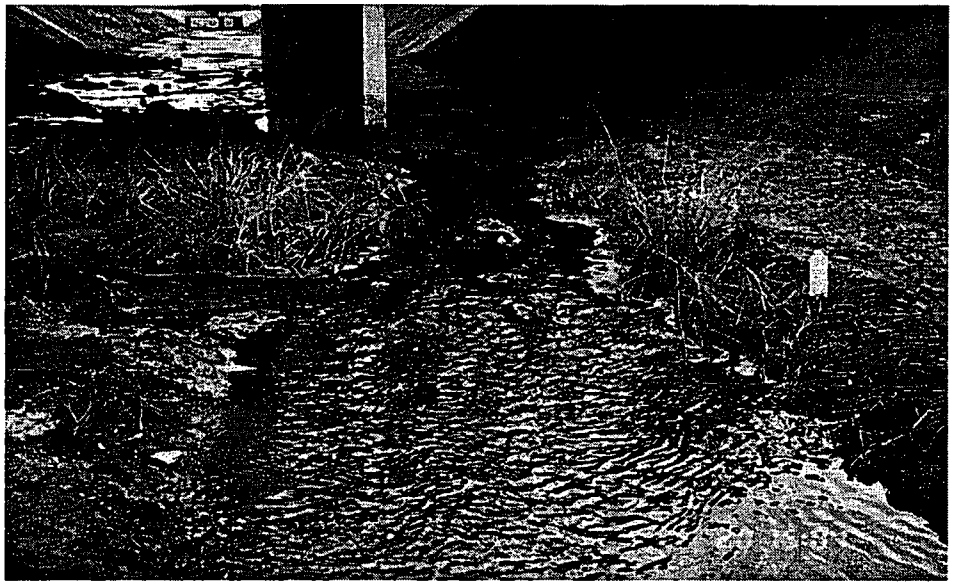

PCW-86
San Joaquin Channel

PCW-87
Sand Canyon Channel

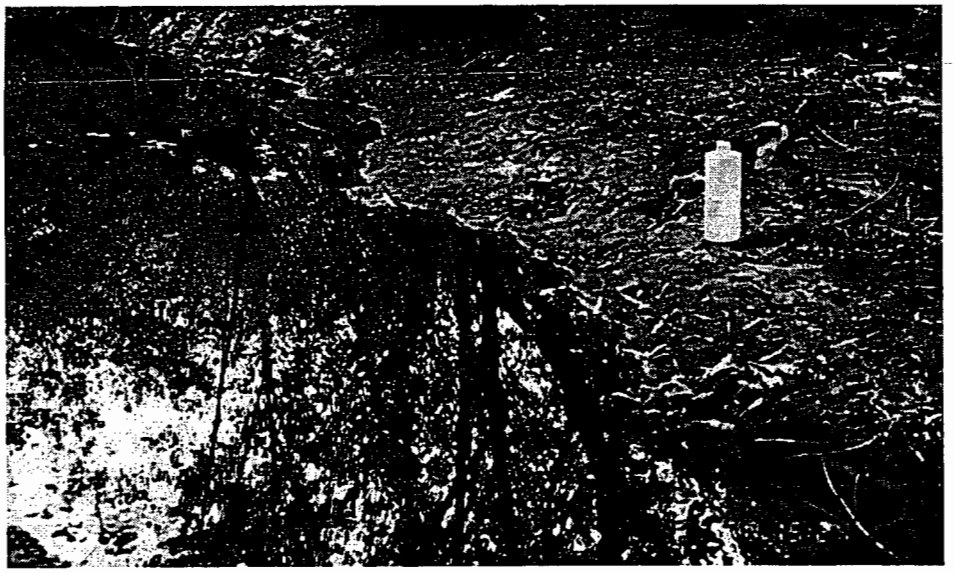

PCW-88
Sand Canyon Channel

PCW-89
Sand Canyon Channel

COUNTY OF ORANGE

PUBLIC FACILITIES & RESOURCES DEPARTMENT

2000 Peters Canyon Wash/San Diego Creek Nutrient Study

November 2000

VICKI L. WILSON
Director

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CYNTHIA P. COAD
Fourth District

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Executive Summary

In June of 2000, the County of Orange performed a follow-up investigation to a nutrient study that was conducted in the San Diego Creek watershed in September of 1999. The two studies, each of which spanned seven days, sought to quantify the daily nitrogen and phosphate loads contributed by ten tributaries of Peters Canyon Wash and four tributaries to Reach 1 of San Diego Creek. Automatic samplers were used to collect composite samples from fifteen locations including two points on Peters Canyon Wash, two points on San Diego Creek, Lane Channel in Reach 1, and all of the 10 tributaries to Peters Canyon Wash. Discharge rates were continuous monitored at thirteen sites with either permanent or temporary streamgages. Grab samples and instantaneous discharge measurements were used to estimate the daily loads from the monitoring points.

The purpose of the June 2000 study was to determine if the rate of nutrient loading from all areas was consistent during summer months and if the estimate from the 1999 study for the summertime total nitrogen load was accurate. Examining the results of both studies the following was found.

- The flowrates in Peters Canyon Wash at Barranca Parkway and San Diego Creek at Campus Drive were greater in the June 2000 study. The 43% increase (7.81 to 11.16 cfs) at Campus Drive was primarily due to the increase in the outflow from the Irvine Ranch Water District's (IRWD) wetland treatment project for nitrate removal. In 1999 the average inflow into the wetlands exceeded the outflow by more than 3 cfs. During the June 2000 study the average inflow and outflow were more in equilibrium with outflow exceeding inflow by only 0.4 cfs.

- The average nitrate nitrogen concentration in San Diego Creek at Campus Drive was 2.84 mg/l in June 2000 compared to 9.04 in September 1999. The total nitrogen concentrations were 6.45 and 10.31 mg/l for June 2000 and September 1999 respectively.

- The average daily nitrate nitrogen loads from Peters Canyon Wash at Barranca Parkway were 319 and 328 lbs/day for September 1999 and June 2000 respectively. The average daily total nitrogen load was 352 and 367 lbs/day for September 1999 and June 2000 respectively.

- The average reduction in nitrate concentration of water treated from San Diego Creek by IRWD's wetlands was 92% (from 33.2 to 2.7 mg/l) compared to 77% observed in the previous study. The average reduction in total nitrogen was about the same between studies (62% in June 2000 and 59% in September 1999).

- The average daily nitrate nitrogen loads from San Diego Creek at Campus Drive were 382 and 169 lbs/day for September 1999 and June 2000. The average daily total nitrogen loads were 435 and 376 lbs/day for September 1999 and June 2000 respectively. The latter study showed a decrease in nitrate concentration and load from the previous study but an increase in organic nitrogen concentration and load.

The increase in organic nitrogen was primarily due to the increase in outflow from the IRWD wetlands (see above). The decrease in nitrate nitrogen load is most likely the result of a substantial increase in efficiency of nitrate removal by the wetlands and a reduction in the loads contributed by Reach 2 of San Diego Creek. San Joaquin and Sand Canyon Channels.

- Using the June 2000 data to estimate the summertime (April 1 – September 30) total nitrogen load from San Diego Creek yields a value lower than that calculated from the September 1999 data. Both are less than one-half of the December 31, 2002 target of 200,097 pounds developed by the Regional Board. The estimates were compared to the average monthly load calculated from NPDES data collected from San Diego Creek by Orange County between July 1, 1999 and June 30, 2000. Using the study values for June and September and the NPDES values for the remaining four months yields a total of 116,000 pounds. Without IRWD's removal of approximately 125 lbs/day the total nitrate nitrogen load would be approximately 139,000 pounds, still well below the December 2002 target.

2000 Peters Canyon Wash / San Diego Creek Nutrient Study

1.0 Introduction

In September of 1999 the County of Orange conducted a comprehensive seven-day study of the total mass (loads) of nutrients transported by Peters Canyon Wash. San Diego Creek and their respective major tributaries *1999 Peters Canyon Wash / San Diego Creek Nutrient Study – June 2000*. Peters Canyon Wash was found to be the greatest contributor of nitrate nitrogen to San Diego Creek. Several tributaries to Peters Canyon Wash including Valencia, Santa Ana – Santa Fe, Como, and Central Irvine Channels each contributed on average more than 60 pounds of nitrate nitrogen per day.

One of the objectives of the 1999 study was to evaluate the total nitrogen load from San Diego Creek relative to nutrient TMDL targets established by the Santa Ana Regional Water Quality Control Board. From the data collected the projected total nitrogen load from San Diego Creek for the period between April 1st and September 30th was estimated. This estimate was well below the summertime TMDL target that was set by the Regional Water Quality Control Board for attainment by December 31, 2002.

In June of 2000 a follow-up investigation was conducted to determine if the nutrient concentrations and loads at each site vary between months during the summer. The 1999 study was conducted at the end of the summer; the 2000 study was conducted at the beginning of the summer.

The monitoring locations in the Peters Canyon Wash watershed were the same as in the 1999 study. The tributaries of reach 2 of San Diego Creek were not sampled because of their relatively small nutrient contribution measured in the 1999 study. Monitoring protocols and analytical methods were the same in both studies. This report is a summary of the results.

2.0 Study Area

San Diego Creek, the primary tributary to the Upper Newport Bay, has a watershed area upstream of Campus Drive, Irvine of approximately 111 mi^2. Its headwaters are in the City of Lake Forest and it receives drainage from many tributaries before discharging to the Upper Newport Bay at Jamboree Road in Newport Beach.

In its Water Quality Control Plan for the Santa Ana River Basin, the Regional Water Quality Control Board has divided San Diego Creek into two reaches. The lower reach designated as Reach 1 is the segment from the Upper Newport Bay to Jeffrey Road in Irvine. The segment above Jeffrey Road to the headwaters is designated as Reach 2.

Reach 2 drains the eastern portion of the watershed and receives runoff from several tributaries including Marshburn, Agua Chinon, Bee Canyon, Serrano Creek, and Canada Channels.

Reach 1 has many manmade and natural tributaries including Sand Canyon Channel, Bonita Canyon Channel, San Joaquin Channel, Lane Channel, Barranca Channel, and Peters Canyon Wash. With its 45 mi^2 watershed area, Peters Canyon Wash contributes the greatest water volume of any tributary to San Diego Creek.

Peters Canyon Wash has several tributaries including Rattlesnake Canyon Wash, El Modena-Irvine Channel, Como Storm Channel, Santa Ana-Santa Fe Channel, Valencia Channel, and Warner Storm Drain.

3.0 Background

Studies to quantify the nutrient loads from tributaries to San Diego Creek have been conducted four times during the 1990's. In 1990, the County of Orange and the Santa Ana Regional Water Quality Control Board (RWQCB) initiated a cooperative project to monitor these loads and evaluate the compliance of three major nurseries with recently-issued NPDES permits. Seven sites were monitored with automatic sampling equipment and eight others were grab-sampled during a two to three day period in August. The load calculations suggested that the nurseries were in compliance with the waste discharge requirements (WDRs) of their respective permits. Both the Peters Canyon Channel and Reach 2 of San Diego Creek showed significant amounts of nitrate in their discharges. Hines Channel and Rattlesnake Canyon Channel were the greatest contributors to the nitrate load in Peters Canyon Wash. Unexplainably the El Modena-Irvine Channel, which had a predominately urbanized watershed, with limited agriculture, also discharged a high load of nitrate to Peters Canyon Channel.

In May of 1991 the County of Orange and the RWQCB repeated a portion of the August 1990 study to assess the difference between seasons. Although the average nitrate-nitrogen concentration at Campus Drive increased from 13.8 to 17.0 mg/l (23%) the average water discharge rate decreased from 15.6 to 10 cfs (42%). The average nitrate-nitrogen load consequently decreased from 1150 to 894 lbs/day (22%).

In May of 1993, another watershed assessment was conducted. The average daily nitrate-nitrogen load at Campus Drive was measured at 1570 lbs/day.

In May of 1999, the County completed development of a revised stormwater quality monitoring program to comply with the requirements of its new NPDES Stormwater and Urban Runoff Permits. The data collected under the previous NPDES permits were statistically evaluated to identify areas where levels of pollutants were higher than the system-wide mean values. Central Irvine Channel and its tributary Hines Channel had the highest mean values for nitrate concentrations in dry weather discharges of any channel monitored in the County. These data however were the result of grab and not composite samplings and represented only fixed moments in time.

In September 1999 a comprehensive watershed study was conducted to meet the commitments in the revised NPDES monitoring program to further study the Central

Irvine Channel in addition to other broader watershed objectives. From the September 1999 study the following was found.

- The average nitrate nitrogen load transported by Peters Canyon Wash, measured at Barranca Parkway, was 318.8 lbs/day. The total nitrogen load was 351.7 lbs/day.
- The average nitrate nitrogen load from reach 2 of San Diego Creek, measured at Harvard Avenue, was 126.3 lbs/day. The total nitrogen load was 130.5 lbs/day
- The average nitrate nitrogen load transported by San Diego Creek, measured at Campus Drive, was 351.5 lbs/day. The total nitrogen load was 435.1 lbs/day. The average nitrate nitrogen load was well below those found in 1990, 1991, and 1993.
- The tributaries to Peters Canyon Wash that contributed the greatest nitrate load were Valencia, Santa Ana-Santa Fe, Central Irvine, Como, and Warner Channels.
- The projected summertime (April 1 – September 30) total nitrogen load from San Diego Creek at Campus Drive would be approximately 80,000 pounds compared to the TMDL target of 200,097 pounds for 2003.

4.0 2000 Study

The intent of the 2000 study was to determine if summertime concentrations and loads are a function of the month in which they are sampled and if the 1999 study estimate of the total summertime nitrogen load from San Diego Creek was accurate.

Automatic samplers and continuously monitoring flow measurement devices were used at all sites that were found to be significant contributors to the nutrient load in September of 1999. The monitoring protocols and analytical methods described in the 1999 study report were also used in the 2000 study.

4.1 Monitoring Locations

As in the previous study the primary monitoring locations were Peters Canyon Wash at Barranca Parkway, San Diego Creek at Harvard Avenue, and San Diego Creek at Campus Drive. The Peters Canyon Wash tributaries monitored in 1999 were again monitored in 2000 as was Peters Canyon Wash upstream of the furthest-upstream, monitored tributary (Rattlesnake Canyon Wash). Dr. Barry Hibbs of California State University Los Angeles assisted with the study by collecting grab samples and making instantaneous water discharge measurements daily at San Joaquin, Barranca, and Sand Canyon Channels.

Table 1 is a list of the sites that were monitored during this study. Alphanumeric station identification codes are listed in the first column. These codes are used throughout this report. **Figure 1** is a map of the monitoring sites.

4.2 Results

- The average daily water discharge rate in San Diego Creek at Campus Drive (11.16 cfs) was greater than measured in September 1999 (7.81 cfs). The sum of the average discharges from all measured upstream inputs was 10.58 cfs, approximately 5% lower than measured at Campus Drive.

- The average discharge rate at Peters Canyon Wash at Barranca Parkway was 6.59 cfs compared to 5.61 cfs in the 1999 study. The sum of the average discharges from all upstream measured inputs to Peters Canyon Wash was 7.37 cfs, approximately 12% greater than measured at Barranca Parkway.

- Of the tributaries that were monitored, the Santa Ana – Santa Fe Channel showed the greatest change in average discharge rate between the two studies. The rate increased from 0.89 cfs in 1999 to 1.78 cfs in 2000. **Figure 2** shows the average discharge rate of each monitored tributary of Peters Canyon Wash as well as tributaries to Reach 1 of San Diego Creek. The lengths of the arrows representing flow into and out of the system are proportional to the discharge rates. **Figure 3** is a bar graph showing the differences in average flowrates between studies.

- At nearly every monitoring location the average nitrate nitrogen concentration was less than was measured in 1999. In San Diego Creek at Campus Drive the 2000 level was approximately 31% (2.84 vs. 9.04 mg/l) of that measured in 1999. At two sites the levels were the same (65" RCP d/s Bryan and Barranca Channel) between studies and at one site (IRWD 001 – inflow to wetlands) the 2000 level was slightly higher. The greatest average nitrate nitrogen concentration (24.1 mg/l) was measured in the Construction Circle drain. This was more than double the average concentration at this site in 1999. **Figure 4** shows the nitrate nitrogen concentrations measured at all sites during the 2000 study. **Figure 5** shows the differences between studies. **Appendix A** contains the laboratory results for all samples collected during this study. **Table 2** is a summary of the average concentrations found at each locations during this study.

- In the 2000 study the average nitrate nitrogen load transported by Peters Canyon Wash, measured at Barranca Parkway, was 328.2 lbs/day. The sum of the average loads from the monitoring points upstream of Barranca Parkway was 397.9 lbs/day. **Table 3** is a summary of the average daily loads measured at each site during the study.

- The greatest contributors to the nitrate nitrogen load in Peters Canyon Wash were the Santa Ana-Santa Fe (123 lbs/day), Como Storm Channel (58.4 lbs/day), Warner Drain (47.9 lbs/day), and the Central Irvine Channel (47.4 lbs/day). The load measured at the Santa Ana –Santa Fe Channel was approximately 45 lbs/day greater than measured in 1999. **Figure 6** shows the average daily nitrate nitrogen loads measured at each site.

- The average daily nitrate nitrogen load measured in San Diego Creek at Campus Drive was 169.0 lbs/day. The sum of the average daily nitrate loads measured at Peters Canyon Wash at Barranca Parkway, San Diego Creek at Harvard Avenue, and those estimated for Lane, Barranca, San Joaquin, and Sand Canyon Channels was 263.8 lbs/day. **Appendix B** shows graphical summaries of results from each site monitored with an automatic sampler.

- As in the 1999 study, the Irvine Ranch Water District (IRWD) was diverting water from San Diego Creek through its constructed wetlands to reduce the nitrate load in the creek. The quality and volume of the water diverted from and returned to the Creek was monitored by IRWD.

  The water that was pumped from and returned to the creek was done so in the reach between Michaelson Avenue and Campus Drive. The average pumping rate from the Creek (June 20-26) was 4.96 cfs. The average return rate to the creek was 5.37 cfs yielding a net addition of 0.41 cfs. The mean nitrate nitrogen load pumped from the Creek was 202 lbs/day as NO_3. The mean nitrate nitrogen load returned to the Creek was 25.7 lbs/day. The net load removed from the Creek during the study was 176 lbs/day.

- The average daily Total Nitrogen (TN) loads from San Diego Creek at Campus Drive, Peters Canyon Wash at Barranca Pkwy and San Diego Creek at Harvard Avenue were 376, 367, and 50.8 lbs/day, respectively. **Figure 7** shows the average TN load from each of the monitored tributaries. **Figure 8** is a between study comparison.

- The average daily total phosphate (as P) loads from San Diego Creek at Campus Drive, Peters Canyon Wash at Barranca Parkway and San Diego Creek at Harvard Avenue were 14.2, 7.87, and 0.16 lbs/day, respectively. The tributaries that contributed the greatest phosphate load to Peters Canyon Channel during the 2000 study were Rattlesnake Canyon Wash (3.14), El Modena Irvine (2.53) and the Central Irvine Channel (3.00). Lane Channel (2.90) and the outflow from the IRWD wetlands (11.6 lbs/day gross, ~6 lbs/day net) contributed the greatest phosphate load to reach 1 of San Diego Creek. **Figure 9** shows the average total phosphate load as P from each tributary. Contrary to the 1999 study where approximately 75% of the phosphate load measured at Campus Drive was in the form of orthophosphate only 5% of the load in 2000 was orthophosphate.

- Synthetic and replicate samples were sent to Montgomery Watson Laboratories on each sampling day to evaluate accuracy and precision. Accuracy check-samples were synthesized from aliquots of standards prepared from Analytical Grade reagents. Nanopure (18 megaohm) water was used for dilutions. Replicate samples were made with aliquots taken from the composite samples.

  The range in recoveries for the nitrate analyses of synthetically prepared samples was 63 to 115 % with a mean of 89 %. Ammonia nitrogen showed a range in

recoveries of 95 to 128% with a mean of 107%. Phosphate analyses were the most accurate with a range in recoveries of 96 to 105 % with a mean of 98 %. TKN analyses were the least accurate with the range in recoveries being 45 to 103 % and a mean of 76.4 %. The two samples in which no organic nitrogen was present produced the poorest results. The two samples that contained over 2 mg/l organic nitrogen produced recoveries of 96 and 103%.

The precision of the analyses by Montgomery Watson was measured by the results from seven replicate samples. For nitrate analyses, the percentage recovery ranged from 67 to 115% with a mean of 89 %.

Quality Assurance results are contained in **Appendix C.**

4.3 Conclusions

- The average water discharge from San Diego Creek at Campus Drive was more than 30% (3.35 cfs) greater than measured in the 1999 study. The primary reason was the increase in the average outflow from the IRWD wetlands. In September of 1999 the average discharge rate out of the wetlands was more than 3 cfs less (1.82 vs. 5.10 cfs) than the average flowrate into the wetlands. This difference was due to the fact that during the period of this study IRWD was providing water to the San Joaquin Marsh, the Irvine Company mitigation site, and the Carlson Marsh. In June 2000 the discharge rate out of the wetlands was approximately 0.4 cfs greater than that flowing in.

- The average discharge rate from Peters Canyon Wash at Barranca Parkway was about 19% (1.1 cfs) greater than measured in 1999. The sum of the measured upstream discharges was about 12% higher than measured at Barranca Parkway.

- The near doubling of the discharge rate from the Santa Ana – Santa Fe Channel over last year may have been the result of irrigation runoff from the agricultural field on the northeast side of the USMCAS Tustin facility. A photo of this field is included in **Appendix D**.

- The average daily nitrate nitrogen load (328 lbs/day) at Barranca Parkway was similar to that measured in the 1999 study (319 lbs/day). The sum of the measured nitrate nitrogen loads upstream of Barranca Parkway was 21% higher than was measured at the Barranca Parkway site. This is consistent with 1999 study when at 23% difference was observed. As hypothesized last year, the difference in load is probably due to assimilation by the higher order plants and attached algae in Peters Canyon Wash. The presence of this vegetation is documented by photos in **Appendix D**.

- The IRWD Wetland Treatment Project removed on average, 176 lbs/day of nitrate nitrogen or about 87% of nitrate nitrogen pumped into the wetlands. The total nitrogen removal efficiency of the wetlands was about 50%. With respect to

concentrations the efficiencies for nitrate and total nitrogen reduction were 92% and 62% respectively.

- The average nitrate nitrogen load measured in San Diego Creek at Campus Drive was 169 lbs/day. The total load from the measured upstream tributaries was nearly 100 lbs greater. There was a similar reduction in orthophosphate load from Peters Canyon Wash to San Diego Creek, which suggests that assimilation of nutrients by aquatic vegetation is occurring in that reach.

- The total acreage dedicated to agriculture in the San Diego Creek and Peters Canyon Wash watershed was calculated from estimates provided by the University of California Cooperative Extension (UCCE). The estimates from each watershed are provided in a UCCE report in **Appendix E**. The total agricultural acreage during the September 1999 study was 6880 compared to 6029 in June of 2000.

- Using data from this study the projected total nitrogen load between April 1st and September 30th would be 69,000 lbs. The estimate from the previous study was 80,000 lbs. Both of these estimates are well below the December 31, 2002 target of 200,000 lbs. These estimates however may not be representative of the entire 6-month period between April and October. NPDES data collected from San Diego Creek during the 1999 – 2000 monitoring year show a higher daily total nitrogen load in April and May. **Figure 10** shows the daily total nitrogen load at Campus Drive calculated from NPDES water quality and streamgaging data. Using the study values for June and September and the NPDES values for the remaining four months yields a total nitrogen load of 116,000 pounds. Without IRWD's removal of approximately 125 lbs/day the total nitrate nitrogen load would be approximately 139,000 pounds, still well below the December 2002 target.

Tables

Table 1
Monitoring Locations

Station Code	Location	Period	Sample Type	Discrete Samples per day	Composite Samples per day	Flowrate Measurement
SDMF05	San Diego Creek @ Campus Drive	Tues-Mon	Composite (10AM-9AM)	24	4	Manometer Gage
WYLSED	San Diego Creek @ Harvard Avenue	Tues-Mon	Composite (10AM-9AM)	24	4	Manometer Gage
BARSED	Peters Canyon Channel @ Barranca Parkway	Tues-Mon	Composite (10AM-9AM)	24	4	Manometer Gage
CICF25	Central Irvine Channel	Tues-Mon	Composite (10AM-9AM)	24	4	Area-velocity flowmeter
MIRF07	El Modena-Irvine Channel	Tues-Mon	Composite (10AM-9AM)	24	1	Manometer Gage
CSCS03	Como Storm Channel	Tues-Mon	Composite (10AM-9AM)	24	1	1.5' H Flume + bubbler flowmeter
SASF10	Santa Ana-Santa Fe Channel	Tues-Mon	Composite (10AM-9AM)	24	1	18" Palmer-Bowlus Cutback Flume + bubbler flowmeter
F06P08	F06P08 at Moulton Parkway	Tues-Mon	Composite (10AM-9AM)	24	1	8" Palmer-Bowlus flume + ultrasonic flowmeter
VALS02	Valencia Channel	Tues-Mon	Composite (10AM-9AM)	24	1	6" Parshall Flume + ultrasonic flowmeter
WARF06	Warner Avenue Drain	Tues-Mon	Composite (10AM-9AM)	24	1	Area-velocity flowmeter
F06P06	Construction Circle Drain (F06P06)	Tues-Mon	Composite (10AM-9AM)	24	1	XL 60° V Trapezoidal Flume + ultrasonic flowmeter
USRF06	Peters Canyon Channel u/s Rattlesnake Canyon Wash	Tues-Mon	Composite (10AM-9AM)	24	1	12" Palmer Bowlus Flume + bubbler flowmeter
RCWF26	Rattlesnake Canyon Wash	Tues-Mon	Composite (10AM-9AM)	24	1	Instantaneous discharge measurements
DSBRCP	65" RCP d/s Bryan	Tues-Mon	Composite (10AM-9AM)	24	1	Bubbler Flowmeter and Manning Coefficients
LANF08	Lane Channel	Tues-Mon	Composite (10AM-9AM)	1		Ultrasonic flowmeter + instantaneous discharge measurement
BC2F09	Barranca Channel	Tues-Mon	Grab (5AM-10 AM)	1		Instantaneous discharge measurements
SJCF14	San Joaquin Channel	Tues-Mon	Grab (5AM-10 AM)	1		Instantaneous discharge measurements
SCCF15	Sand Canyon Channel	Tues-Mon	Grab (5AM-10 AM)	1		Instantaneous discharge measurements
IRWD 001	San Diego Creek flow into wetlands	Tues-Mon		1		In-line flowmeter
IRWD 002	Discharge from wetlands to San Diego Creek	Tues-Mon		1		In-line flowmeter

Table 2
Average Daily Nitrate and Phosphate Concentrations
June 20-26, 2000

Location	Avg. Q (cfs)	Avg. [Nitrate] as NO3 (mg/L)	Avg. [Nitrate] as N (mg/L)	Avg. [TN] (mg/L)	Avg. [Phosphate] as PO4 (mg/L)	Avg. [Phosphate] as P (mg/L)	Avg. [ortho-PO4] as P (mg/L)
Peters Canyon Wash u/s Rattlesnake Canyon Wash	0.74	2.54	0.57	1.83	0.62	0.20	
Rattlesnake Canyon Wash	0.57	9.79	2.21	6.02	3.13	1.02	
65" RCP u/s Bryan Avenue	0.07	4.09	0.92	3.38	2.11	0.69	
Central Irvine Channel	0.58	66.34	14.98	17.92	2.96	0.96	0.63
El Modena Irvine Channel	1.20	7.81	1.76	4.95	1.20	0.39	
Como Storm Channel	0.66	72.80	16.44	16.93	0.09	0.03	
F06P08	0.22	65.43	14.77	15.13	0.54	0.18	
Santa Ana - Santa Fe Channel	1.78	57.14	12.90	13.35	0.15	0.05	
Valencia Channel	0.78	68.43	15.45	16.11	0.73	0.24	
Warner Ave Drain	0.64	61.71	13.94	14.47	0.68	0.22	
Construction Circle Drain	0.14	106.83	24.12	25.41	0.85	0.28	
Peters Canyon @ Barranca Pkwy	6.59	41.01	9.26	10.34	0.68	0.22	0.12
San Diego Creek @ Harvard	0.73	52.96	11.96	12.76	0.13	0.04	0.01
Lane Channel	1.70(i)	24.07(g)	5.44	6.85	0.97	0.32	
Barranca Channel	0.37(i)	2.53(g)	0.57	1.41	0.37	0.12	
San Joaquin Channel	0.68(i)	15.78(g)	3.56	4.56	1.34	0.44	
Sand Canyon Channel	0.10(i)	0.56(g)	0.13	0.93	0.91	0.30	
IRWD inflow into wetlands#	4.97	33.15	7.49	9.36	<0.61	<0.20	<0.20
IRWD outflow from wetlands#	5.37	2.74	0.62	3.54	1.03	0.34	<0.20
San Diego Creek @ Campus	11.16	12.56	2.84	6.45	0.73	0.24	0.03

Analyses performed by IRWD
(I) = instantaneous discharge measurement or estimate
(g) = daily grab samples

Table 3

Average Daily Discharge Nitrate and Phosphate Loads
June 20-26, 2000

Location	Avg. Q (cfs)	Avg. Nitrate Load as NO_3 (lbs/day)	Avg. Nitrate Load as N (lbs/day)	Avg. TN load lbs/day	Avg. Phosphate Load as PO_4 (lbs/day)	Avg. Phosphate Load as P (lbs/day)	ortho-P lbs/day
Peters Canyon Wash u/s Rattlesnake Cyn Wash	0.74	10.28	2.32	7.31	2.45	0.80	
Rattlesnake Canyon Wash	0.57	29.80	6.73	18.61	9.63	3.14	
65" RCP u/s Bryan Avenue	0.07	1.14	0.26	0.51	0.25	0.08	
Central Irvine Channel	0.58	209.72	47.36	56.80	9.21	3.00	
El Modena Irvine Channel	1.20	51.60	11.65	31.97	0.39	2.53	
Como Storm Channel	0.66	258.74	58.43	60.18	0.31	0.10	
F06P08	0.22	77.35	17.47	17.89	0.64	0.21	
Santa Ana - Santa Fe Channel	1.78	544.74	123.01	127.28	1.46	0.48	
Valencia Channel	0.78	287.59	64.94	67.72	3.09	1.01	
Warner Ave Drain	0.64	211.89	47.85	49.69	2.35	0.77	
Construction Circle Drain	0.14	79.10	17.86	18.80	0.62	0.20	
Peters Canyon Wash @ Barranca	6.59	1453.26	328.15	366.51	24.10	7.87	4.31
Sum of 1-11 2000	**7.37**	**1761.95**	**397.86**	**456.74**	**30.41**	**12.33**	
San Diego Creek @ Harvard	0.73	210.70	47.58	50.76	0.50	0.16	0.04
Lane Channel	1.70(i)	219.74(g)	49.62	62.57	8.89	2.90	
Barranca Channel	0.37(i)	5.42(g)	1.22	3.08	0.58	0.19	
San Joaquin Channel	0.68(i)	57.88(g)	13.07	16.70	4.95	1.62	
Sand Canyon Channel	0.10(i)	0.34(g)	0.08	0.70	0.49	0.16	
IRWD inflow into wetlands#	4.96	892.92	201.63	251.90	<16.50	<5.38	<5.38
IRWD outflow from wetlands#	5.37	113.83	25.70	126.90	35.55	11.60	<5.35
Net Removal by IRWD	-0.41	779.09	175.92	124.99	-19.06	-6.22	
San Diego Creek @ Campus	11.16	748.26	168.96	376.21	43.43	14.17	1.86
Sum of 12 + 16 + 17 + 18 + 19 - (001 - 002)	**10.58**	**1168.25**	**263.80**	**375.32**	**58.57**	**19.11**	
Without IRWD Wetlands Removal	10.76	1527.35	344.89	501.20	24.38	7.95	

Analyses performed by IRWD
(I) = instantaneous discharge measurement or estimate
(g) = daily grab samples

Figures

Figure 1
2000 Peters Canyon Wash / San Diego Creek Nutrient Study
Monitoring Site Location Map

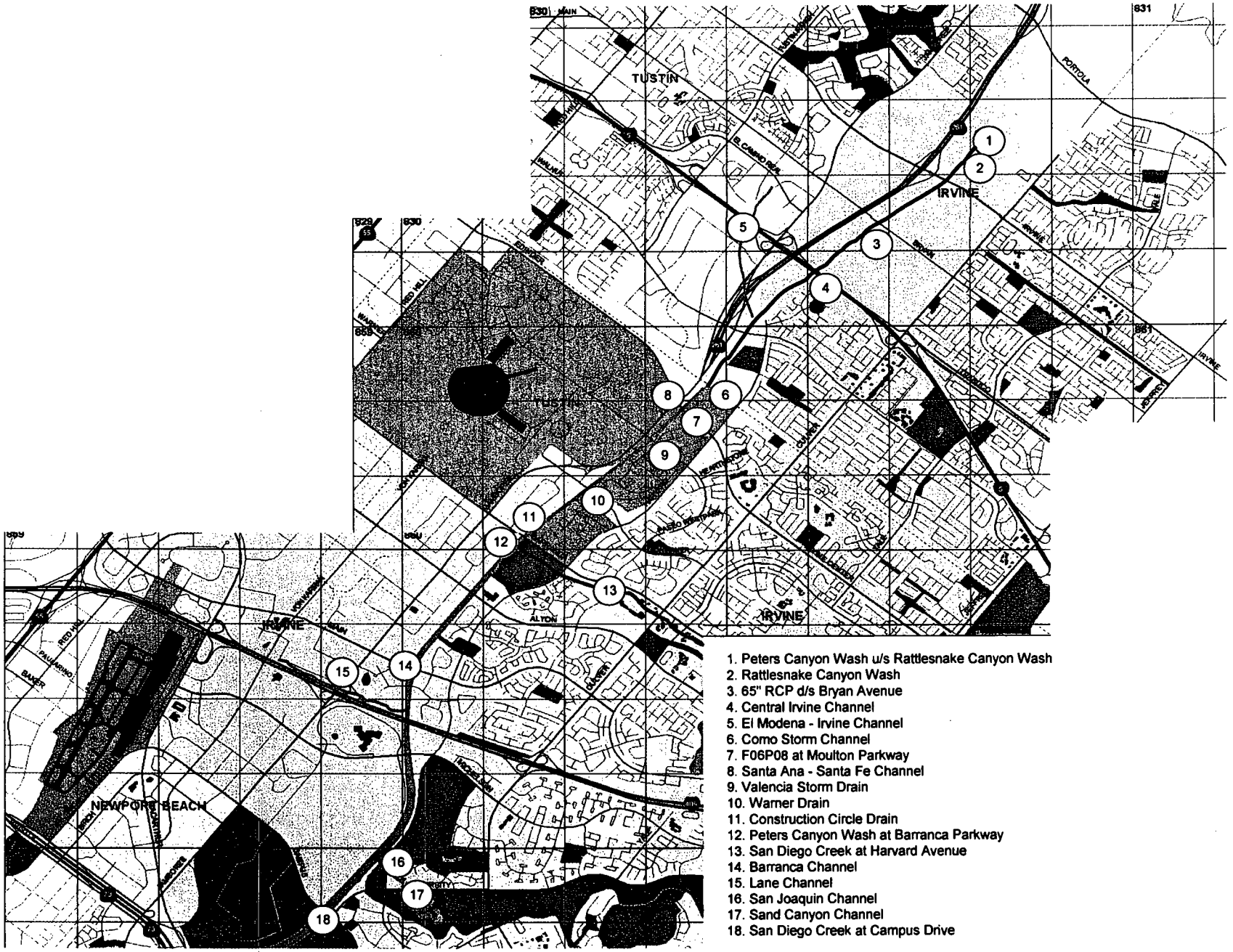

1. Peters Canyon Wash u/s Rattlesnake Canyon Wash
2. Rattlesnake Canyon Wash
3. 65" RCP d/s Bryan Avenue
4. Central Irvine Channel
5. El Modena - Irvine Channel
6. Como Storm Channel
7. F06P08 at Moulton Parkway
8. Santa Ana - Santa Fe Channel
9. Valencia Storm Drain
10. Warner Drain
11. Construction Circle Drain
12. Peters Canyon Wash at Barranca Parkway
13. San Diego Creek at Harvard Avenue
14. Barranca Channel
15. Lane Channel
16. San Joaquin Channel
17. Sand Canyon Channel
18. San Diego Creek at Campus Drive

Figure 2
Average Daily Flow Rates
cubic feet / second
June 20 - 26, 2000

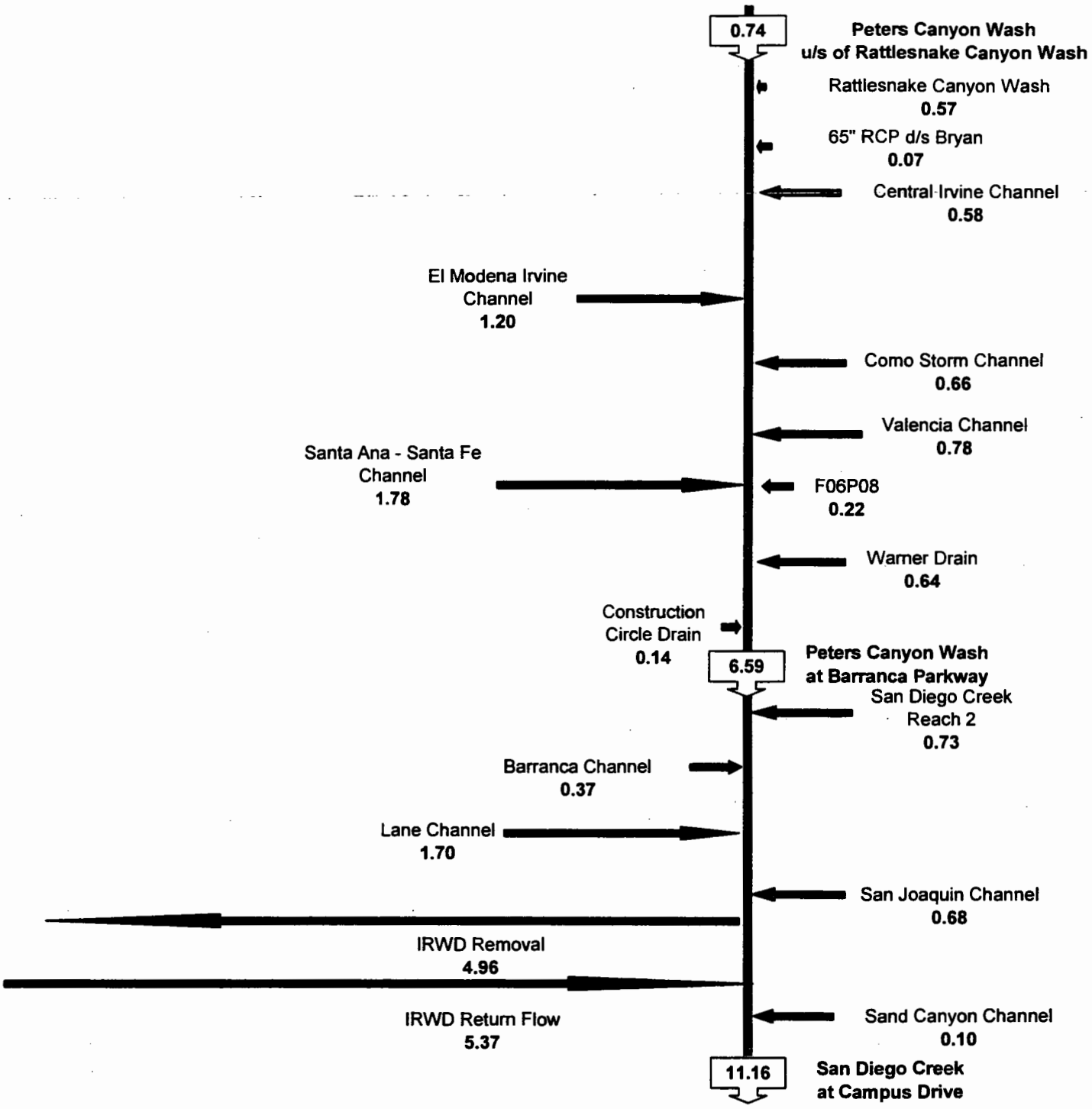

Figure 3

Differences in Average Daily Water Discharges Between Studies

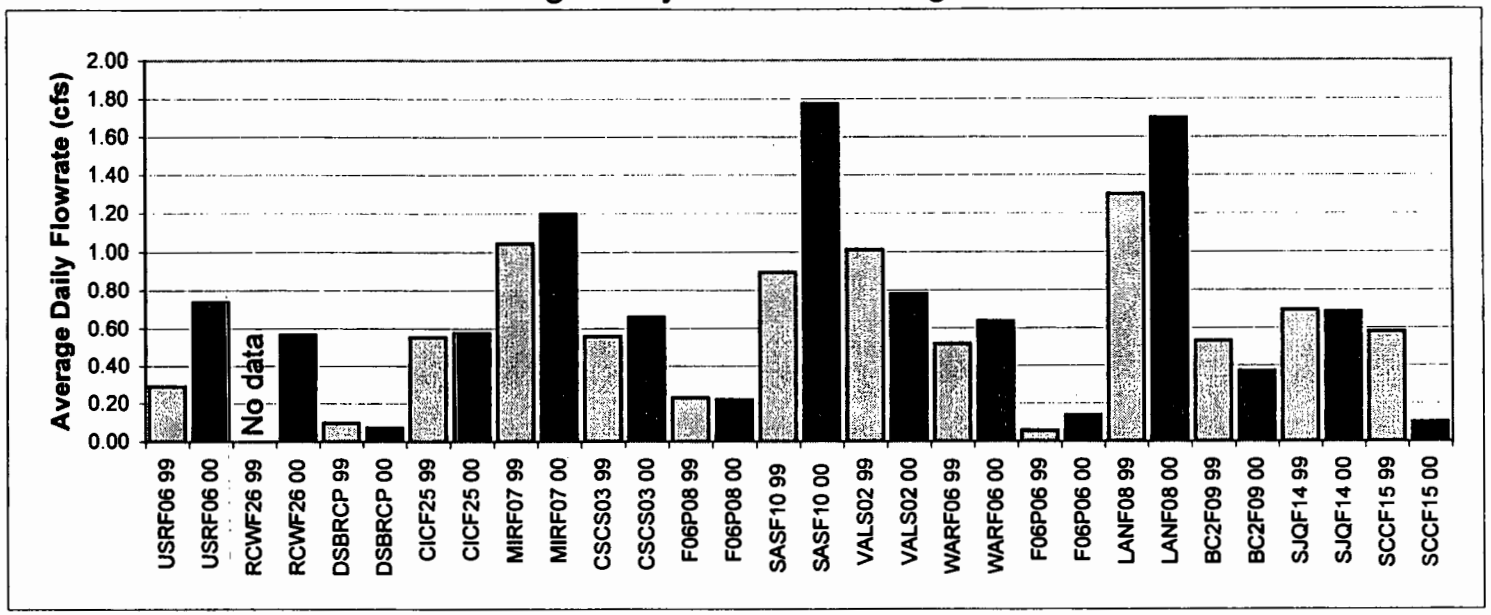

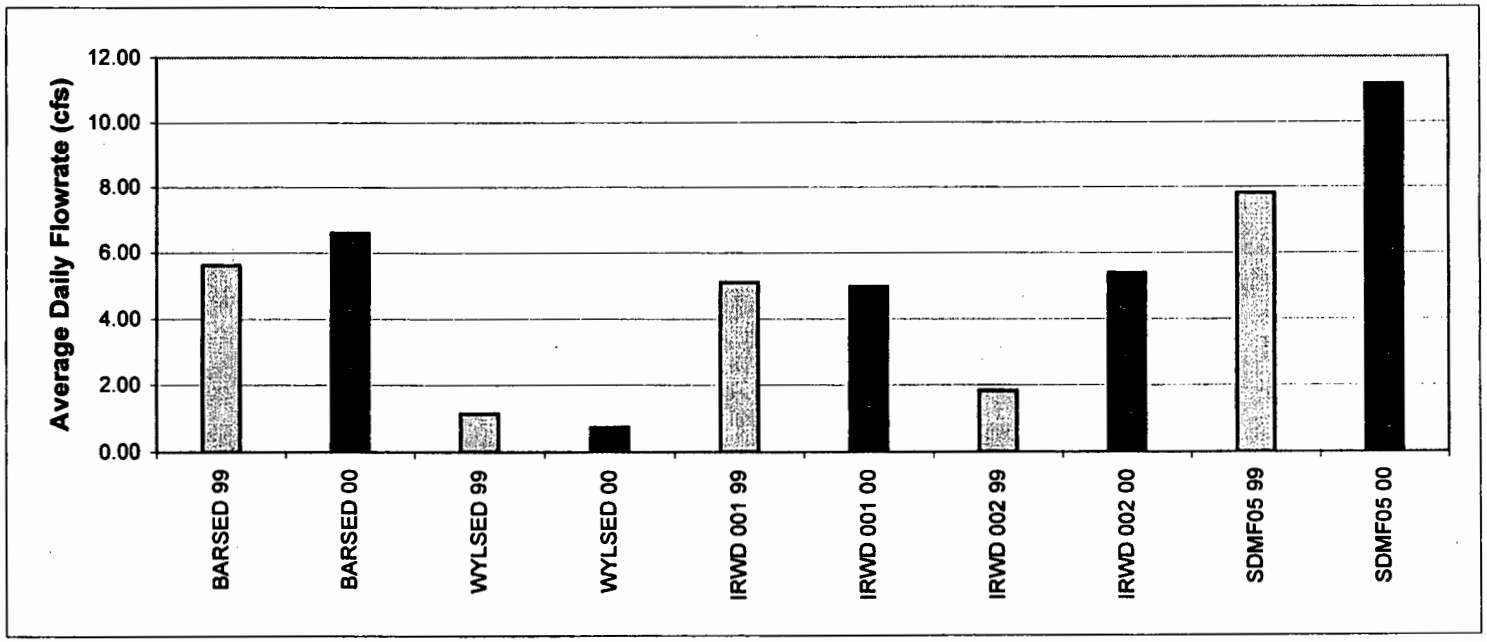

006999

Figure 4
Average Daily Nitrate Nitrogen Concentration
mg/L NO_3 as N
June 20 - 26, 2000

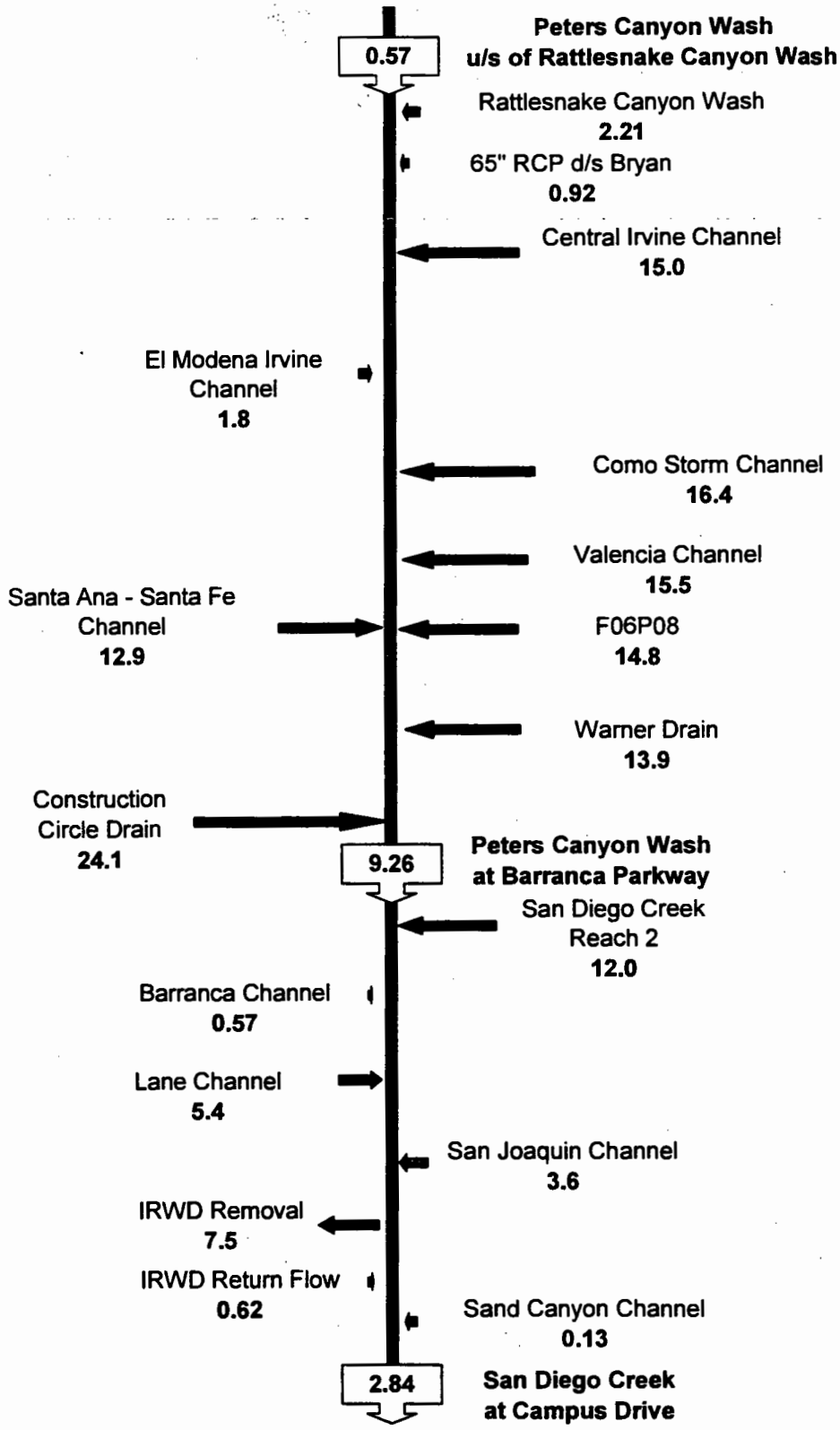

007001

Figure 5
Differences in Nitrate Concentrations Between Studies

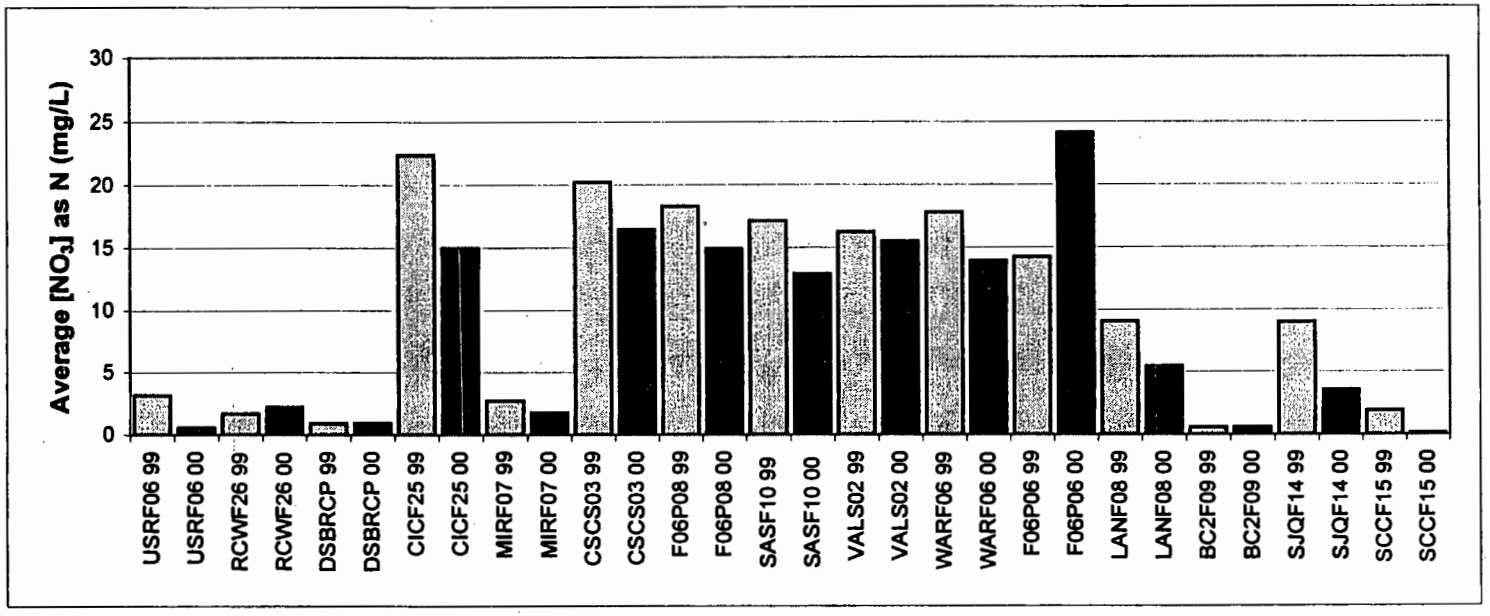

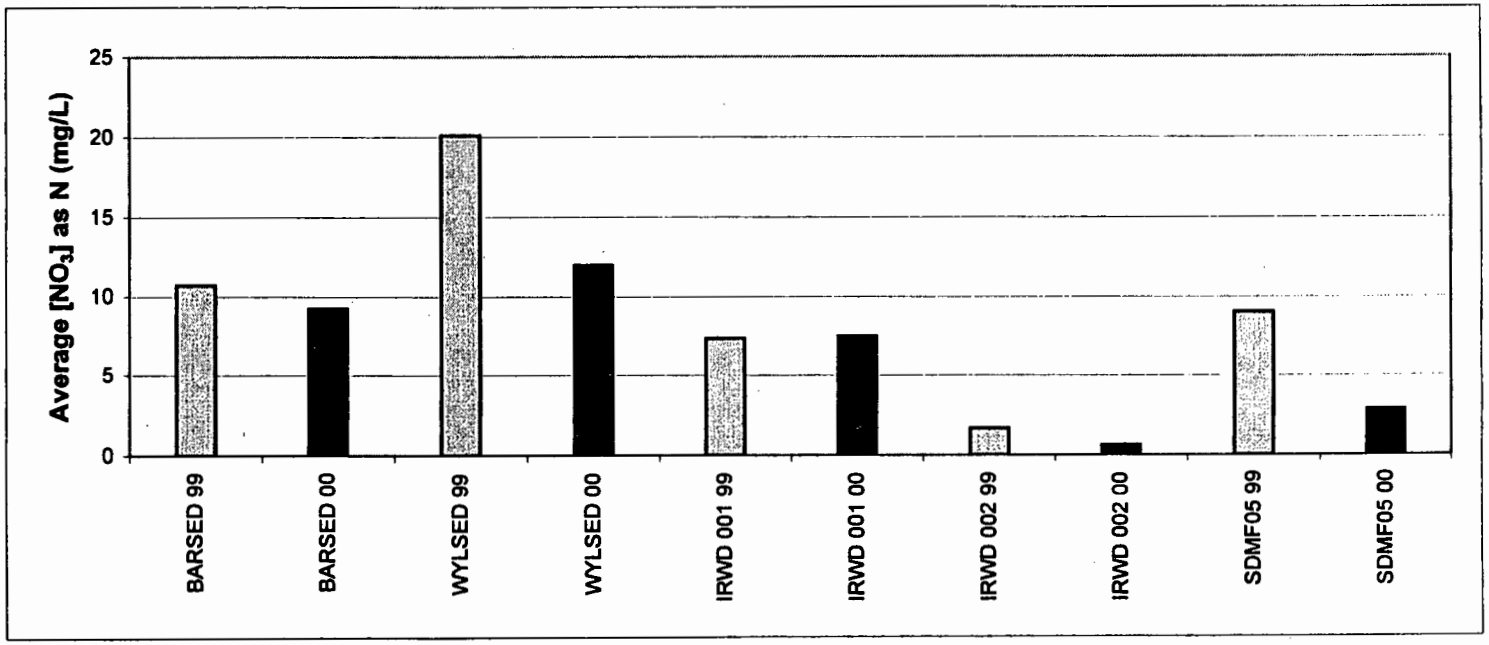

Figure 6
Average Daily Nitrate Nitrogen Load
NO_3 as N (lbs/day)
June 20 -26, 2000

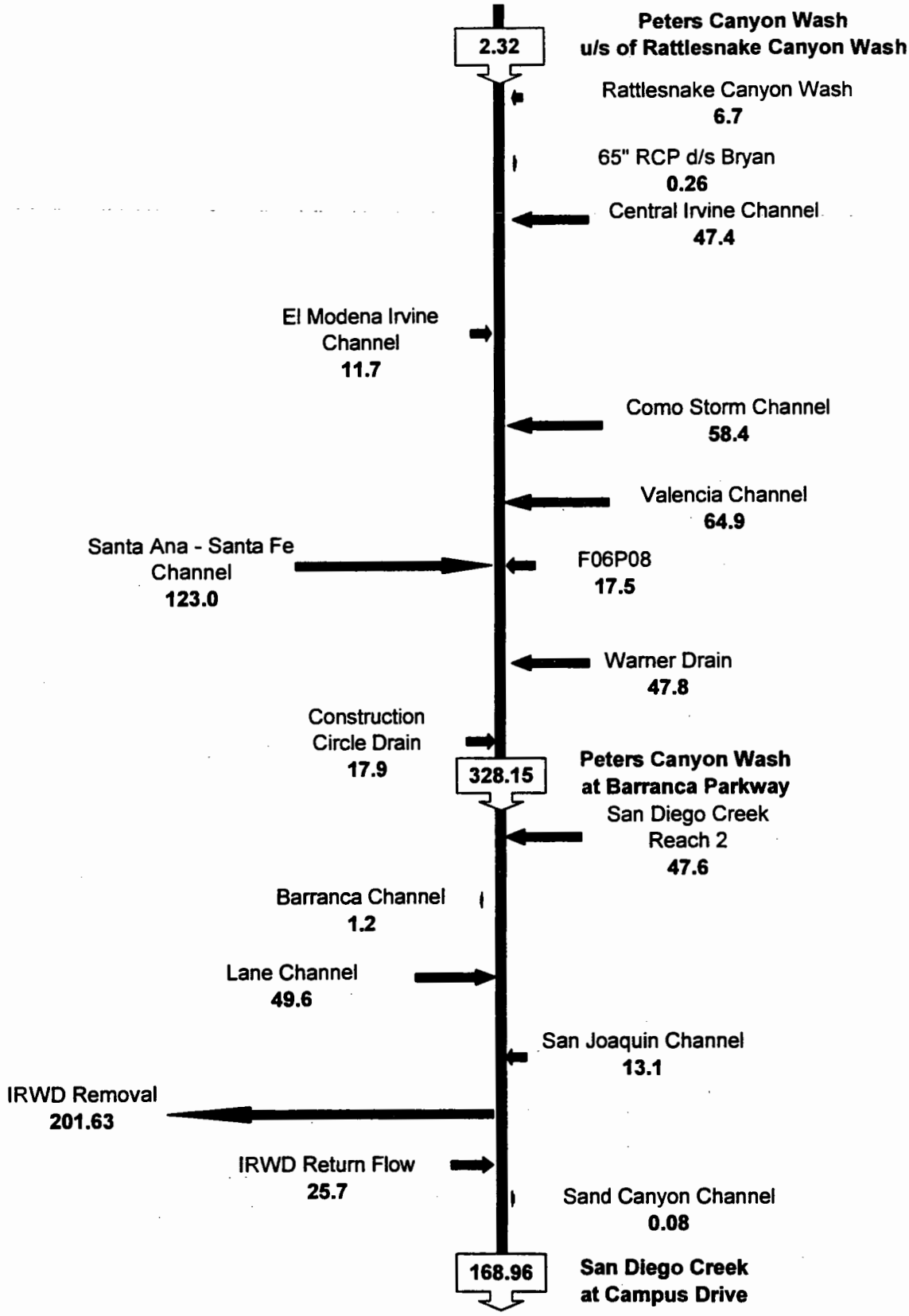

Figure 7
Average Daily Total Nitrogen Load
TN (lbs/day)
June 20 - 26, 2000

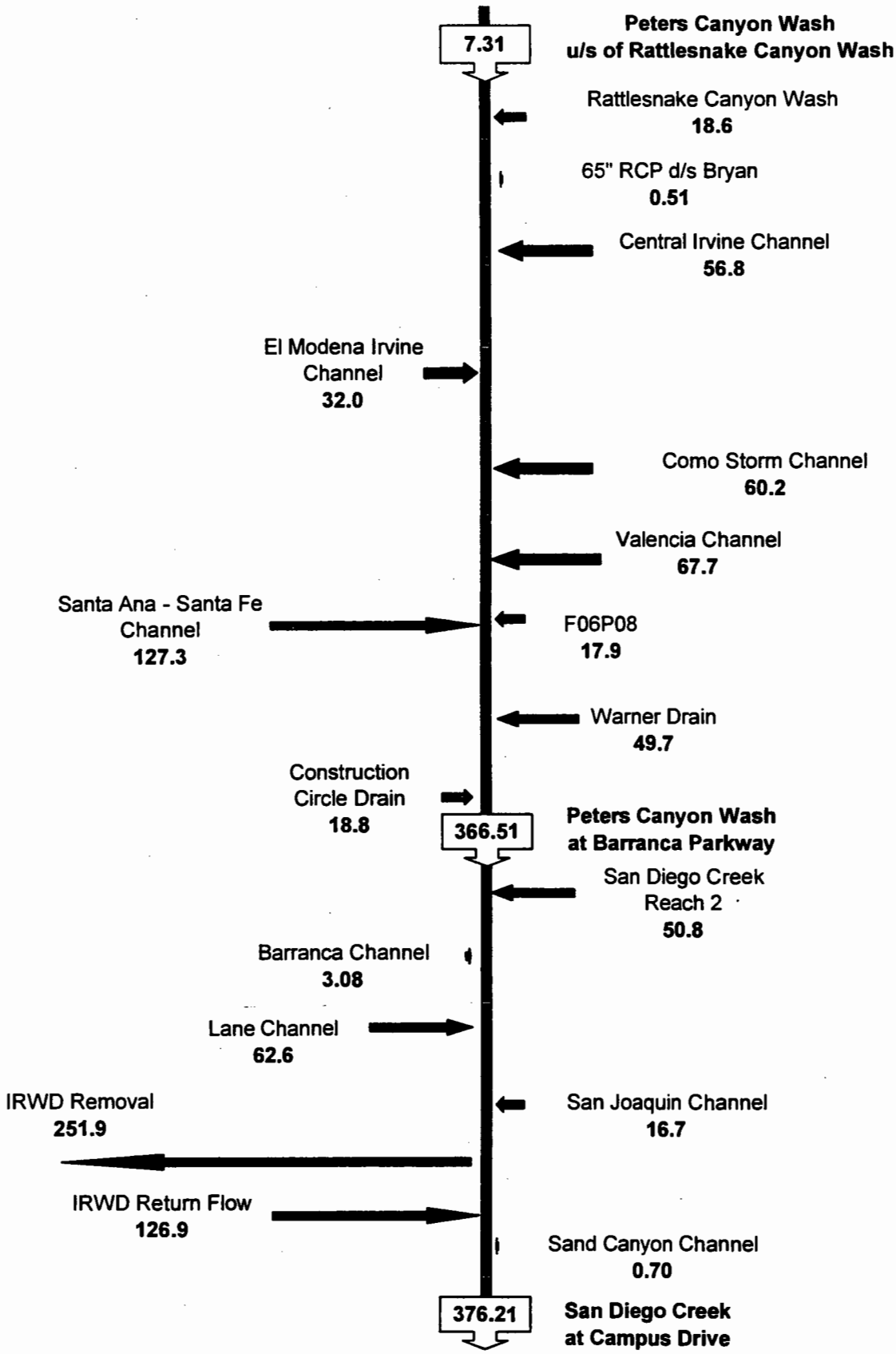

Figure 8
Differences in Total Nitrogen Loads Between Studies

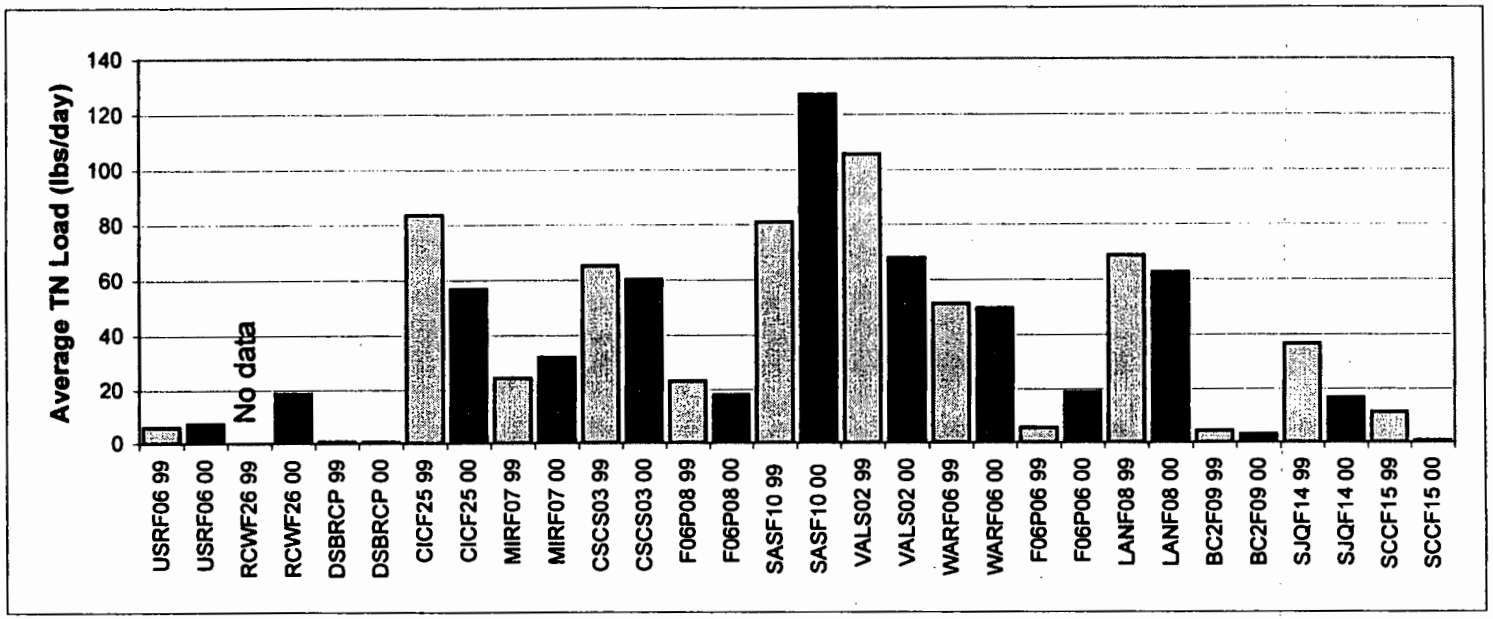

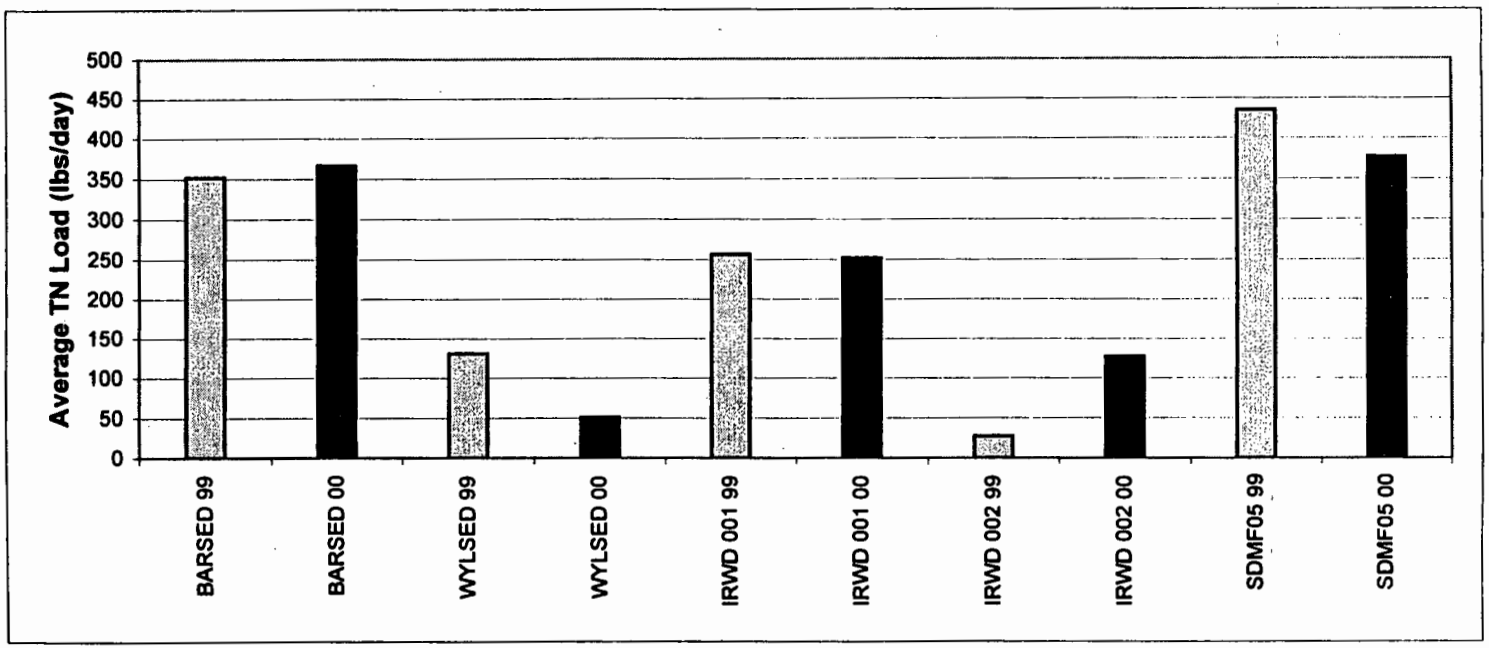

007004

Figure 9
Average Daily Phosphorus Load
PO_4 as P (lbs/day)
June 20 - 26, 2000

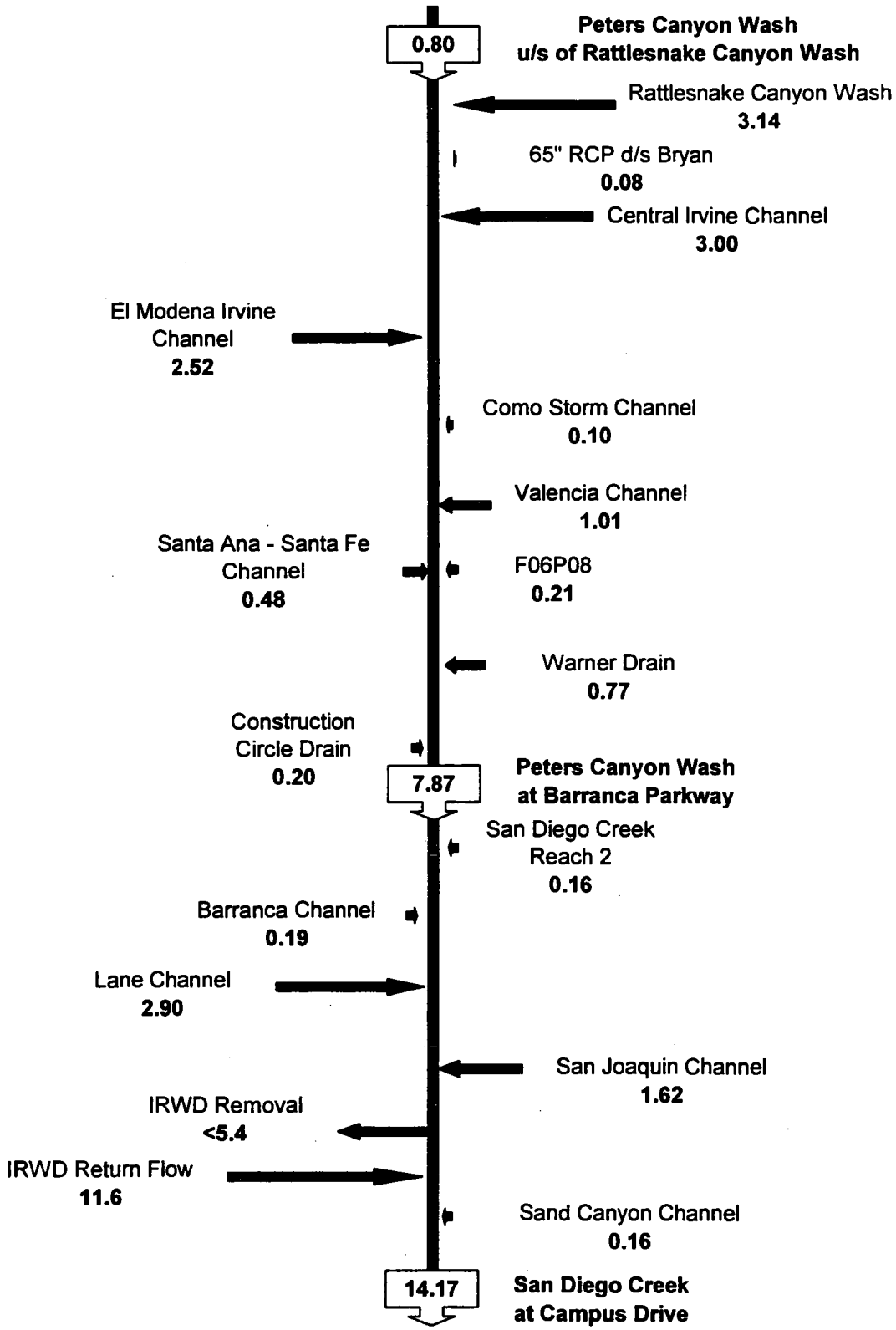

Figure 10
Daily Loads of Total Nitrogen in San Diego Creek at Campus Drive

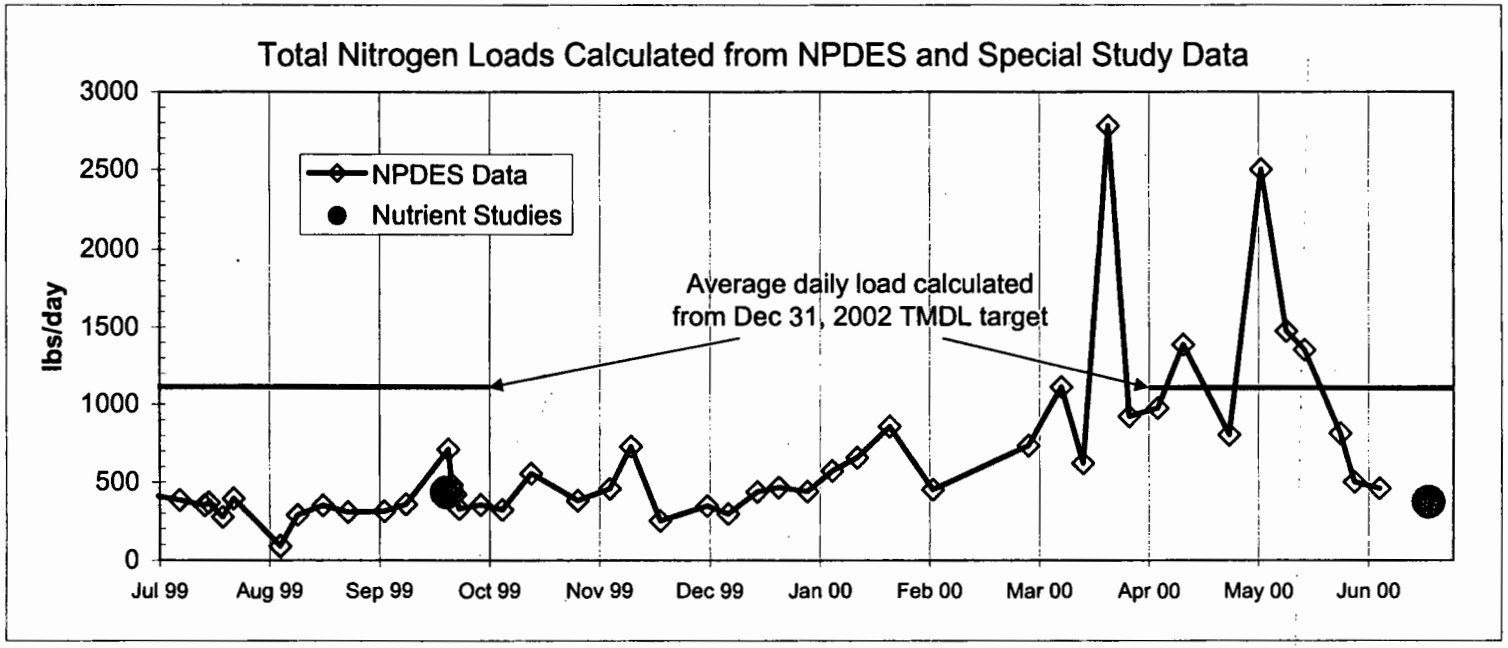

Appendix A
Analytical Data

2000 Peters Canyon Wash / San Diego Creek Nutrient Study
Peters Canyon Wash Watershed

STATION	DATE	TIME	SAMPLES Type	#	EC µmhos	Turb NTU	pH	NO3 mg/L	NO3 as N mg/L	NH3 as N mg/L	TKN mg/L	TN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L
							Peters Canyon Wash upstream of Rattlesnake Canyon Wash									
USRPCW	6/19/00	10:00	D	24	1530	5.4	8.7	3.2	0.72	<0.05	1.30	2.02	0.61		16	14
	6/20/00	9:00														
	6/20/00	10:00	D	24	1360	5.2	8.6	5.8	1.31	<0.05	1.30	2.61	0.46		<10	<1
	6/21/00	9:00														
	6/21/00	10:00	D	24	1700	6.5	8.4	2.2	0.50	<0.05	1.30	1.80	0.55		12	10
	6/22/00	9:00														
	6/22/00	10:00	D	24	1640	4.3	8.5	1.5	0.34	<0.05	0.91	1.25	0.37		<10	<1
	6/23/00	9:00														
	6/23/00	10:00	D	24	1590	13.0	8.5	2.5	0.56	0.12	1.10	1.66	0.64		14	10
	6/24/00	9:00														
	6/24/00	10:00	D	24	1570	21.0	8.6	2.0	0.45	0.06	1.40	1.85	0.89		27	17
	6/25/00	9:00														
	6/25/00	10:00	D	24	1600	15.0	8.5	1.8	0.41	0.06	1.30	1.71	0.61		<10	<1
	6/26/00	9:00														
	6/26/00	10:00	D	24	1560	7.6	8.6	2.0	0.45	0.12	1.50	1.95	0.80		13	8
	6/27/00	9:00														
							Rattlesnake Canyon Wash									
RCWF26	6/20/00	10:00	Part	3				8.90	2.01	<0.05	2.20	4.21	2.60			
	6/20/00	12:00														
	6/21/00	19:00	Part	3				4.80	1.08	<0.05	3.60	4.68	2.45			
	6/22/00	2:00														
	6/22/00	10:00	D	24	1210	140	8.0	8.80	1.99	0.24	4.30	6.29	3.06		190	150
	6/23/00	9:00														
	6/23/00	10:00	D	24	1060	270	8.4	11.00	2.48	0.39	3.10	5.58	3.67		300	64
	6/24/00	9:00														
	6/24/00	9:15	Part	1	875	1000	8.6	10.00	2.26	0.69	4.50	6.76	4.28		720	91
	6/24/00	10:00	D	24	1100	120	8.3	13.00	2.94	0.21	4.30	7.24	3.06		250	36
	6/25/00	9:00														
	6/25/00	10:00	Part	1				9.70	2.19	0.08	5.00	7.19	5.51			
	6/25/00	20:00	Part	1				7.00	1.58	0.16	4.70	6.28	5.81			
	6/26/00	1:00	Part	3				6.20	1.40	0.06	7.30	8.70	2.60			
	6/26/00	3:00														
	6/26/00	6:00	Part	3	1050	110	8.2	5.30	1.20	0.10	7.30	8.50	3.67		280	36
	6/26/00	9:00														
	6/26/00	10:00	D	24	1090	130	8.3	16.00	3.61	0.42	2.90	6.51	3.37	0.630	275	41
	6/27/00	9:00														
	6/26/00	10:00	DUP	24	1080	29	8.3	14.00	3.16	0.41	2.80	5.96	3.06		254	40
	6/27/00	9:00														
							65" RCP d/s Bryan Avenue									
DSBRCP	6/20/00	10:00	Part	6	800	2.20	8.5	0.47	0.11	<0.05	<0.20	0.31	0.12		<10	<1
	6/20/00	15:00														
	6/20/00	10:00	D	24	790	4.0	8.4	2.00	0.45	<0.05	<0.20	0.65	0.31		<10	<1
	6/21/00	9:00														
	6/21/00	10:00	Part	4	565	13.0	7.8	8.40	1.90	0.13	1.60	3.50	1.38		14	9
	6/21/00	13:00														
	6/21/00	17:00	Part	17	845	2.1	8.4	2.10	0.47	<0.05	0.27	0.74	0.31		<10	<1
	6/22/00	9:00														
	6/22/00	9:50	Part	1	850	1.3	8.2	1.50	0.34	<0.05	<0.20	0.54	0.12		<10	<1
	6/22/00	10:00	D	24	850	1.3	8.4	1.80	0.41	<0.05	<0.20	0.61	0.15		<10	<1
	6/23/00	9:00														
	6/23/00	10:00	D	24	760	12.0	8.4	4.00	0.90	0.09	6.00	6.90	1.84		22	19
	6/24/00	9:00														
	6/24/00	10:00	SUB	3				0.44	0.10	<0.05	1.30	1.40	3.67			
	6/24/00	12:00														
	6/25/00	10:00	D	24	740	20.0	7.6	3.10	0.70	0.94	7.20	7.90	3.37		11	9
	6/26/00	9:00														
	6/26/00	10:00	D	24	590	3.0	8.4	14.00	3.16	0.31	1.80	4.96	4.90		<10	<1
	6/27/00	9:00														

2000 Peters Canyon Wash / San Diego Creek Nutrient Study
Peters Canyon Wash Watershed

STATION	DATE	TIME	SAMPLES Type	#	EC µmhos	Turb NTU	pH	NO3 mg/L	NO3 as N mg/L	NH3 as N mg/L	TKN mg/L	TN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L
								Central Irvine Channel								
CICF25	6/19/00	12:00	Part	4	1730	2.7	9.2	120.00	27.10	0.36	2.10	29.20	1.25	0.250	<10	<1
	6/19/00	15:00														
	6/19/00	16:00	D	6	1780	11.0	9.0	130.00	29.35	0.30	2.50	31.85	1.84	0.411	25	19
	6/19/00	21:00														
	6/19/00	22:00	D	8	1770	4.7	8.1	120.00	27.10	0.37	1.80	28.90	3.98	1.260	<10	<1
	6/20/00	5:00														
	6/20/00	6:00	D	4	1720	28.0	8.5	110.00	24.84	0.31	2.20	27.04	3.67	0.992	34	18
	6/20/00	9:00														
	6/20/00	10:00	D	6	1600	11.0	9.0	26.00	5.87	0.29	2.40	8.27	1.99	0.317	29	13
	6/20/00	15:00														
	6/20/00	16:00	D	6	1450	30.0	8.9	16.00	3.61	0.19	2.10	5.71	2.23	0.368	43	20
	6/20/00	21:00														
	6/20/00	22:00	D	6	1430	8.7	8.2	92.00	20.77	0.13	1.30	22.07	3.37	0.914	<10	<1
	6/20/00	3:00														
	6/20/00	4:00	D	6	1390	11.0	8.3	79.00	17.84	0.12	1.30	19.14	3.37	1.280	26	12
	6/21/00	9:00														
	6/21/00	10:00	D	6	1630	6.3	9.0	57.00	12.87	0.20	1.20	14.07	1.68	0.382	21	13
	6/21/00	15:00														
	6/21/00	16:00	D	6	1730	12.0	8.9	62.00	14.00	0.20	2.20	16.20	2.05	0.389	37	20
	6/21/00	21:00														
	6/21/00	22:00	D	6	1850	8.7	8.1	84.00	18.97	0.15	1.10	20.07	3.67	0.920	11	<1
	6/22/00	3:00														
	6/22/00	4:00	D	6	1800	23.0	8.1	88.00	19.87	0.12	1.20	21.07	3.67	0.916	43	18
	6/22/00	9:00														
	6/22/00	10:00	D	6	1790	27.0	8.9	16.00	3.61	0.22	2.80	6.41	2.05	0.330	61	24
	6/22/00	15:00														
	6/22/00	16:00	D	6	2010	27.0	8.8	88.00	19.87	0.19	3.10	22.97	1.96	0.328	43	13
	6/22/00	21:00														
	6/22/00	22:00	D	6	1950	14.0	8.1	100.00	22.58	0.15	2.70	25.28	3.98	0.939	26	7
	6/23/00	3:00														
	6/23/00	4:00	D	6	1800	60.0	8.1	100.00	22.58	0.14	3.40	25.98	5.81	0.977	140	33
	6/23/00	9:00														
	6/23/00	10:00	D	6	1670	50.0	9.0	15.00	3.39	0.23	2.60	5.99	2.54	0.386	82	28
	6/23/00	15:00														
	6/23/00	16:00	D	6	1890	50.0	9.0	14.00	3.16	0.26	4.00	7.16	2.60	0.345	53	14
	6/23/00	21:00														
	6/23/00	22:00	D	6	2870	25.0	8.1	26.00	5.87	0.19	6.90	12.77	4.28	1.350	25	10
	6/24/00	3:00														
	6/24/00	4:00	D	6	1880	37.0	8.3	19.00	4.29	0.16	2.60	6.89	3.98	0.891	55	10
	6/24/00	9:00														
	6/24/00	10:00	D	6	1780	30.0	9.2	62.00	14.00	0.24	4.30	18.30	1.77	0.292	30	9
	6/24/00	15:00														
	6/24/00	16:00	D	6	1910	55.0	8.9	70.00	15.81	0.19	3.20	19.01	1.99	0.338	18	4
	6/24/00	21:00														
	6/24/00	22:00	D	6	1860	18.0	8.1	79.00	17.84	0.15	2.00	19.84	3.37	0.906	36	12
	6/25/00	3:00														
	6/25/00	4:00	D	6	1780	50.0	8.4	75.00	16.94	0.12	3.10	20.04	3.67	0.885	<10	<1
	6/25/00	9:00														
	6/25/00	10:00	Part	1	1710	55.0	8.9	21.00	4.74	0.23	3.10	7.84	2.36		48	12
	6/26/00	9:36	Part	1	1610	27.0	8.8	20.00	4.52	0.15	2.20	6.72	2.66	0.657	29	12

2000 Peters Canyon Wash / San Diego Creek Nutrient Study
Peters Canyon Wash Watershed

STATION	DATE	TIME	SAMPLES Type	#	EC µmhos	Turb NTU	pH	NO3 mg/L	NO3 as N mg/L	NH3 as N mg/L	TKN mg/L	TN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L
								Central Irvine Channel								
CICF25	6/26/00	10:00	D	6	1840	55.0	9.0	34.00	7.68	0.18	3.10	10.78	2.94	0.384	82	24
	6/26/00	15:00														
	6/26/00	16:00	D	7	2200	50.0	8.5	140.00	31.61	0.14	4.30	35.91	2.85	0.572	52	20
	6/26/00	22:00														
	6/27/00	10:00	D	6	2040	280.0	8.7	48.00	10.84	0.67	8.90	19.74	7.96	0.674	460	110
	6/27/00	15:00														
	6/27/00	16:00	D	6	2100	95.0	8.9	120.00	27.10	0.22	6.30	33.40	3.37	0.465	98	28
	6/27/00	21:00														
	6/27/00	22:00	D	6	2010	21.0	8.2	57.00	12.87	0.16	2.70	15.57	4.28	1.170	20	18
	6/28/00	3:00														
	6/28/00	4:00	D	6	1880	230.0	8.3	42.00	9.48	0.13	4.20	13.68	6.43	1.100	310	280
	6/28/00	9:00														
	6/28/00	10:00	D	6	1850	380.0	8.7	100.00	22.58	0.46	7.70	30.28	7.96	0.809	490	126
	6/28/00	15:00														
	6/28/00	16:00	D	6	1880	140.0	8.8	120.00	27.10	0.18	3.30	30.40	3.67	0.469	160	46
	6/28/00	21:00														
	6/28/00	22:00	D	6	1710	19.0	8.3	70.00	15.81	0.13	2.50	18.31	4.59	1.480	12	8
	6/29/00	3:00														
	6/29/00	4:00	D	6	1610	160.0	8.3	57.00	12.87	0.10	2.60	15.47	4.59	1.090	76	21
	6/29/00	9:00														
	6/29/00	10:00	D	6	1590	100.0	8.9	44.00	9.94	0.29	4.40	14.34	3.00		120	23
	6/29/00	15:00														
	6/29/00	16:00	D	6	1610	60.0	8.8	53.00	11.97	0.20	4.30	16.27	2.14		65	7
	6/29/00	21:00														
	6/29/00	22:00	D	6	2340	22.0	8.1	30.00	6.77	0.14	2.70	9.47	3.98		25	14
	6/30/00	3:00														
	6/30/00	4:00	D	6	1950	110.0	8.1	28.00	6.32	0.12	3.80	10.12	5.20		130	34
	6/30/00	9:00														
								El Modena Irvine Channel								
MIRF07	6/20/00	10:00	D	24	1210	17.0	8.5	10.00	2.26	0.34	2.10	4.36	1.10		25	21
	6/21/00	9:00														
	6/21/00	10:00	D	24	1380	7.1	8.6	6.60	1.49	0.53	4.80	6.29	1.32		13	11
	6/22/00	9:00														
	6/22/00	10:00	D	24	1360	8.7	8.6	10.00	2.26	0.34	2.30	4.56	1.32		<10	<1
	6/23/00	9:00														
	6/23/00	10:00	D	24	1390	11.0	8.5	13.00	2.94	0.22	1.40	4.34	1.22		<10	<1
	6/24/00	9:00														
	6/24/00	10:00	D	24	1380	5.0	8.5	5.30	1.20	0.95	5.50	6.70	1.25		<10	<1
	6/25/00	9:00														
	6/24/00	10:00	DUP	24	1390	12.0	8.5	5.30	1.20	0.94	5.51	6.71	1.19		<10	<1
	6/25/00	9:00														
	6/25/00	10:00	D	24	1300	6.5	8.6	2.80	0.63	0.77	3.80	4.43	1.19		<10	<1
	6/26/00	9:00														
	6/26/00	10:00	D	24	1530	6.5	8.5	7.00	1.58	0.53	2.40	3.98	1.04		10	9
	6/27/00	9:00														

2000 Peters Canyon Wash / San Diego Creek Nutrient Study
Peters Canyon Wash Watershed

007011

STATION	DATE	TIME	SAMPLES Type	#	EC µmhos	Turb NTU	pH	NO3 mg/L	NO3 as N mg/L	NH3 as N mg/L	TKN mg/L	TN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L
								Como Storm Channel								
Como	6/19/00	12:00	Part	22	2700	2.7	8.3	75.00	16.94	<0.05	0.39	17.33	0.06	0.130	<10	<1
	6/20/00	9:00														
	6/20/00	10:00	D	24	2470	3.2	8.4	79.00	17.84	<0.05	0.35	18.19	0.15		<10	<1
	6/21/00	9:00														
	6/21/00	10:00	D	24	2840	2.3	8.4	75.00	16.94	<0.05	0.42	17.36	#####		<10	<1
	6/22/00	9:00														
	6/22/00	10:00	D	24	2820	2.0	8.4	79.00	17.84	<0.05	0.51	18.35	0.06		<10	<1
	6/23/00	9:00														
	6/22/00	10:00	DUP	24	2780	2.3	8.4	79.00	17.84	<0.05	0.69	18.53	0.06		<10	<1
	6/23/00	9:00														
	6/23/00	10:00	D	24	2840	4.3	8.3	75.00	16.94	<0.05	0.56	17.50	0.06		<10	<1
	6/24/00	9:00														
	6/24/00	10:00	Part	4	2720	7.9	8.5	53.00	11.97	<0.05	0.73	12.70	0.09		<10	<1
	6/24/00	13:00														
	6/25/00	9:00	Part	1	2760	10.7	8.4	57.00	12.87	<0.05	0.70	13.57	0.12		15	7
	6/26/00	10:00	D	24	2770	5.1	8.3	75.00	16.94	<0.05	0.30	17.24	0.09		<10	<1
	6/27/00	9:00														
								Santa Ana - Santa Fe Channel								
F10	6/20/00	10:00	D	24	1790	2.1	7.9	66.00	14.90	<0.05	0.23	15.13	0.15		<10	<1
	6/21/00	9:00														
	6/21/00	10:00	D	24	2190	1.1	7.9	66.00	14.90	<0.05	0.47	15.37	0.12		<10	<1
	6/22/00	9:00														
	6/22/00	10:00	D	24	2120	1.1	7.9	66.00	14.90	<0.05	0.36	15.26	0.09		<10	<1
	6/23/00	9:00														
	6/23/00	10:00	D	24	2080	3.5	7.9	17.00	3.84	<0.05	0.50	4.34	0.12		<10	<1
	6/24/00	9:00														
	6/24/00	10:00	D	24	2090	6.9	7.9	57.00	12.87	<0.05	0.59	13.46	0.15		<10	<1
	6/25/00	9:00														
	6/25/00	10:00	D	24	2060	3.6	7.8	66.00	14.90	<0.05	0.72	15.62	0.21		<10	<1
	6/26/00	9:00														
	6/26/00	10:00	D	24	2010	4.6	7.8	62.00	14.00	<0.05	0.26	14.26	0.21		<10	<1
	6/27/00	9:00														
								F06P08 at Moulton Parkway								
F06P08	6/20/00	10:00	D	24	3130	1.1	8.1	62.00	14.00	<0.05	0.20	14.20	0.55		<10	<1
	6/21/00	9:00														
	6/21/00	10:00	D	24	3640	0.4	8.1	66.00	14.90	<0.05	0.63	15.53	0.52		13	13
	6/22/00	9:00														
	6/22/00	10:00	D	24	2430	0.8	8.1	66.00	14.90	<0.05	0.20	15.10	0.43		<10	<1
	6/23/00	9:00														
	6/23/00	10:00	D	24	3630	2.4	8.1	70.00	15.81	<0.05	0.32	16.13	0.49		<10	<1
	6/24/00	9:00														
	6/24/00	10:00	D	24	3480	4.5	8.1	62.00	14.00	<0.05	0.39	14.39	0.52		12	7
	6/25/00	9:00														
	6/25/00	10:00	D	24	3460	1.1	8.0	66.00	14.90	<0.05	0.43	15.33	0.73		<10	<1
	6/26/00	9:00														
	6/26/00	10:00	D	24	3620	1.0	8.0	66.00	14.90	0.07	0.35	15.25	0.52		<10	<1
	6/27/00	9:00														

2000 Peters Canyon Wash / San Diego Creek Nutrient Study
Peters Canyon Wash Watershed

STATION	DATE	TIME	SAMPLES Type	#	EC µmhos	Turb NTU	pH	NO3 mg/L	NO3 as N mg/L	NH3 as N mg/L	TKN mg/L	TN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L
								Valencia Channel								
VALS02	6/19/00	13:00	Part	21	2740	1.4	8.2	66.00	14.90	<0.05	0.49	15.39	0.73	0.205	<10	<1
	6/20/00	9:00														
	6/20/00	10:00	D	24	2380	2.3	8.2	66.00	14.90	<0.05	0.42	15.32	0.73		<10	<1
	6/21/00	9:00														
	6/21/00	10:00	D	24	2850	4.4	8.3	66.00	14.90	<0.05	0.64	15.54	0.70		<10	<1
	6/22/00	9:00														
	6/22/00	10:00	D	24	2800	2.0	8.2	70.00	15.81	<0.05	0.58	16.39	0.58		<10	<1
	6/23/00	9:00														
	6/23/00	10:00	D	24	2780	5.7	8.2	66.00	14.90	<0.05	1.30	16.20	0.89		<10	<1
	6/24/00	9:00														
	6/24/00	10:00	D	24	2780	6.4	8.3	70.00	15.81	<0.05	0.57	16.38	0.77		<10	<1
	6/25/00	9:00														
	6/25/00	10:00	D	24	2740	2.8	8.2	75.00	16.94	<0.05	0.60	17.54	0.67		<10	<1
	6/26/00	9:00														
	6/26/00	10:00	D	24	2790	5.4	8.2	66.00	14.90	0.07	0.48	15.38	0.80		<10	<1
	6/27/00	9:00														
								Warner Storm Drain								
WARF06	6/19/00	12:00	Part	22	2590	1.5	8.0	66.00	14.90	<0.05	0.34	15.24	0.64	0.189	<10	<1
	6/20/00	9:00														
	6/20/00	10:00	D	24	2340	5.5	8.0	66.00	14.90	<0.05	0.38	15.28	0.64		10	8
	6/21/00	9:00														
	6/21/00	10:00	D	24	2740	4.9	8.0	62.00	14.00	<0.05	0.20	14.20	0.67		<10	<1
	6/22/00	9:00														
	6/22/00	10:00	Part	4	2490	5.1	8.2	57.00	12.87	<0.05	0.73	13.60	0.67		<10	<1
	6/22/00	14:00														
	6/23/00	10:00	D	24	2620	6.4	7.9	57.00	12.87	<0.05	0.43	13.30	0.73		12	7
	6/24/00	9:00														
	6/23/00	10:00	DUP	24	2560	5.1	8.0	57.00	12.87	<0.05	0.73	13.60	0.70		<10	<1
	6/24/00	9:00														
	6/24/00	10:00	D	24	2660	6.5	8.0	62.00	14.00	<0.05	0.96	14.96	0.73		<10	<1
	6/25/00	9:00														
	6/25/00	9:00	D	24	2630	4.2	7.9	66.00	14.90	<0.05	0.67	15.57	0.64		<10	<1
	6/26/00	10:00														
	6/26/00	10:00	D	24	2710	5.3	7.9	62.00	14.00	<0.05	0.20	14.20	0.70		<10	<1
	6/27/00	9:00														
								Construction Circle Drain								
Const Cir	6/19/00	10:00	D	24	5250	280	8.5	110.00	24.84	<0.05	0.84	25.68	0.58	<0.01	350	40
	6/20/00	9:00														
	6/20/00	10:00	D	24	4690	99	8.3	110.00	24.84	<0.05	0.83	25.67	0.49		140	30
	6/21/00	9:00														
	6/22/00	10:00	Part	5	5910	85	8.2	130.00	29.35	<0.05	0.80	30.15	0.46		110	37
	6/22/00	15:00														
	6/23/00	10:00	D	24	5410	130	8.4	97.00	21.90	<0.05	1.60	23.50	1.10		180	33
	6/24/00	9:00														
	6/24/00	10:00	D	24	5820	31	8.2	120.00	27.10	<0.05	0.69	27.79	0.43		36	12
	6/25/00	9:00														
	6/25/00	10:00	D	24	5020	100	8.2	92.00	20.77	<0.05	2.50	23.27	1.29		150	32
	6/26/00	9:00														
	6/26/00	10:00	Part	22	5570	160	8.4	92.00	20.77	<0.05	1.30	22.07	1.32	0.047	180	34
	6/27/00	7:00														

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Peters Canyon Wash Watershed

STATION	DATE	TIME	SAMPLES Type	#	EC µmhos	Turb NTU	pH	NO3 mg/L	NO3 as N mg/L	NH3 as N mg/L	TKN mg/L	TN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L
						Peters Canyon Wash at Barranca Parkway										
BARSED	6/19/00	11:00	Part	5	2350	27.0	8.6	44.00	9.94	0.07	1.40	11.34	0.73	0.087	50	20
	6/19/00	15:00														
	6/19/00	16:00	D	6	2310	13.0	8.7	48.00	10.84	<0.05	0.83	11.67	0.70	0.145	25	17
	6/19/00	21:00														
	6/19/00	22:00	D	6	2360	13.0	8.3	44.00	9.94	0.06	1.30	11.24	0.80	0.178	21	16
	6/20/00	3:00														
	6/20/00	4:00	D	6	2400	27.0	8.3	44.00	9.94	0.05	1.10	11.04	0.80	0.131	61	25
	6/20/00	9:00														
	6/20/00	10:00	D	6	2170	30.0	8.6	37.00	8.35	<0.05	1.20	9.55	0.98	0.120	72	23
	6/20/00	15:00														
	6/20/00	16:00	Part	3				38.00	8.58	<0.05	0.77	9.35	0.67	0.120		
	6/20/00	18:00														
	6/21/00	10:00	D	6	2480	23.0	8.5	44.00	9.94	<0.05	0.63	10.57	0.58	0.104	44	16
	6/21/00	15:00														
	6/21/00	16:00	D	6	2440	32.0	8.5	48.00	10.84	<0.05	0.70	11.54	0.70	0.134	41	12
	6/21/00	21:00														
	6/21/00	22:00	D	6	2530	6.2	8.3	44.00	9.94	<0.05	0.60	10.54	0.70	0.156	<10	<1
	6/22/00	3:00														
	6/22/00	4:00	D	6	2610	4.0	8.2	48.00	10.84	<0.05	0.71	11.55	0.67	0.136	<10	<1
	6/22/00	9:00														
	6/22/00	10:00	D	6	2690	11.0	8.5	42.00	9.48	<0.05	0.87	10.35	0.55	0.098	<10	<1
	6/22/00	15:00														
	6/22/00	16:00	D	6	2400	23.0	8.4	40.00	9.03	<0.05	1.10	10.13	0.61	0.103	12	12
	6/22/00	21:00														
	6/22/00	22:00	D	6	2700	6.9	8.2	40.00	9.03	<0.05	0.80	9.83	0.70	0.150	<10	<1
	6/23/00	3:00														
	6/23/00	4:00	D	6	2740	9.5	8.1	42.00	9.48	0.06	1.10	10.58	0.70	0.130	14	10
	6/23/00	9:00														
	6/23/00	10:00	D	6	2590	7.5	8.5	44.00	9.94	<0.05	0.87	10.81	0.46	0.090	13	2
	6/23/00	15:00													28	21
	6/23/00	16:00	D	6	2570	9.7	8.5	30.00	6.77	<0.05	0.89	7.66	0.52	0.111	<10	<1
	6/23/00	21:00													13	11
	6/23/00	22:00	D	6	2620	9.7	8.2	44.00	9.94	<0.05	4.00	13.94	0.64	0.131	13	6
	6/24/00	3:00													<10	1
	6/24/00	4:00	D	6	2580	50.0	8.3	44.00	9.94	0.05	0.98	10.92	0.77	0.136	41	10
	6/24/00	9:00													<10	
	6/24/00	10:00	D	6	2530	11.0	8.0	33.00	7.45	<0.05	1.30	8.75	0.49	0.108	15	6
	6/24/00	15:00													10	
	6/24/00	16:00	D	6	2470	9.3	8.6	28.00	6.32	<0.05	1.40	7.72	0.67	0.167	11	9
	6/24/00	21:00													8	
	6/24/00	22:00	D	6	2490	10.3	8.2	31.00	7.00	<0.05	0.98	7.98	0.64	0.158	18	13
	6/25/00	3:00														
	6/25/00	4:00	D	6	2600	6.5	8.2	40.00	9.03	0.06	1.10	10.13	0.58	0.147	<10	<1
	6/25/00	9:00														
	6/25/00	10:00	D	6	2570	7.6	8.5	44.00	9.94	<0.05	1.50	11.44	0.52	0.100	<10	<1
	6/25/00	15:00														
	6/25/00	16:00	D	6	2600	8.6	8.5	44.00	9.94	<0.05	1.30	11.24	0.67	0.140	<10	<1
	6/25/00	21:00														
	6/25/00	22:00	D	6	2650	8.4	8.2	44.00	9.94	<0.05	1.10	11.04	0.67	0.166	11	9
	6/26/00	3:00														
	6/26/00	4:00	D	6	2710	14.0	8.2	48.00	10.84	<0.05	0.76	11.60	0.67	0.155	13	7
	6/26/00	9:00														
	6/26/00	10:00	D	6	2490	36.0	8.5	48.00	10.84	<0.05	1.10	11.94	0.77	0.090	43	13
	6/26/00	15:00														
	6/26/00	16:00	Part	3	2460	15.0	8.6	44.00	9.94	0.13	0.70	10.64	0.73	<0.01	23	15
	6/26/00	18:00														
	6/26/00	23:00	Part	5	2510	12.0	8.2	41.00	9.26	0.07	0.61	9.87	0.73	0.145	15	7
	6/27/00	3:00														
	6/27/00	4:00	D	6	2580	15.0	8.2	44.00	9.94	0.06	0.94	10.88	0.67	0.131	20	1
	6/27/00	9:00														

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STATION	DATE	TIME	SAMPLES Type	#	EC µmhos	Turb NTU	pH	NO_3 mg/L	NO_3 as N mg/L	NH3 as N mg/L	TKN mg/L	TN mg/L	PO_4 mg/L	o-PO_4 mg/L	TSS mg/L	VSS mg/L
							San Diego Creek at Harvard Avenue									
WYLSED	6/19/00	16:00	D	6	1980	3.0	8.3	75.00	16.94	<0.05	0.68	17.62	0.09	<0.01	<10	<1
	6/19/00	21:00														
	6/19/00	22:00	D	6	2030	2.6	8.1	75.00	16.94	<0.05	0.65	17.59	0.15	<0.01	<10	<1
	6/20/00	3:00														
	6/20/00	4:00	Part	4	2010	1.4	8.0	70.00	15.81	<0.05	0.68	16.49	0.15	<0.01	<10	<1
	6/20/00	7:00														
	6/20/00	10:00	D	6	1750	7.9	8.2	62.00	14.00	<0.05	0.67	14.67	0.12	0.014	52	22
	6/20/00	15:00														
	6/20/00	10:00	Dup	6				38.00	8.58	<0.05	0.20	8.78	0.12	<0.01		
	6/20/00	15:00														
	6/20/00	16:00	D	6	1680	4.2	8.3	37.00	8.35	<0.05	0.60	8.95	0.18	<0.01	14	9
	6/20/00	21:00														
	6/20/00	22:00	D	6	1790	4.0	8.1	79.00	17.84	<0.05	0.55	18.39	0.09	<0.01	<10	<1
	6/21/00	3:00														
	6/21/00	4:00	D	6	1800	3.0	8.1	62.00	14.00	<0.05	0.48	14.48	0.12	0.010	<10	<1
	6/21/00	9:00														
	6/21/00	10:00	D	6	2000	4.7	8.3	66.00	14.90	<0.05	1.10	16.00	0.21	0.012	28	13
	6/21/00	15:00														
	6/21/00	16:00	D	6	1970	5.0	8.3	66.00	14.90	<0.05	0.94	15.84	0.12	<0.01	<10	<1
	6/21/00	21:00														
	6/21/00	22:00	D	6	2020	2.4	8.2	70.00	15.81	<0.05	0.80	16.61	0.12	<0.01	<10	<1
	6/22/00	3:00														
	6/22/00	4:00	D	6	2060	2.3	8.2	66.00	14.90	<0.05	0.68	15.58	0.09	<0.01	<10	<1
	6/22/00	9:00														
	6/22/00	10:00	D	6	1960	6.6	8.3	62.00	14.00	<0.05	0.82	14.82	0.09	<0.01	17	10
	6/22/00	15:00														
	6/22/00	16:00	D	6	2080	5.1	8.4	70.00	15.81	<0.05	0.87	16.68	0.09	<0.01	<10	<1
	6/22/00	21:00														
	6/22/00	22:00	D	6	2190	3.7	8.2	79.00	17.84	<0.05	0.71	18.55	0.12	<0.01	<10	<1
	6/23/00	3:00														
	6/23/00	4:00	D	6	2290	3.6	7.5	37.00	8.35	<0.05	0.63	8.98	0.12	<0.01	<10	<1
	6/23/00	9:00														
	6/23/00	10:00	D	6	2040	8.7	8.3	17.00	3.84	<0.05	1.10	4.94	0.12	<0.01	19	4
	6/23/00	15:00														
	6/23/00	16:00	D	6	2020	7.6	8.3	13.00	2.94	<0.05	0.90	3.84	0.12	<0.01	13	4
	6/23/00	21:00														
	6/23/00	22:00	D	6	2070	7.8	8.2	30.00	6.77	0.06	0.94	7.71	0.09	<0.01	19	11
	6/24/00	3:00														
	6/24/00	4:00	D	6	2090	6.2	8.2	19.00	4.29	<0.05	1.00	5.29	0.15	<0.01	<10	<1
	6/24/00	9:00														
	6/24/00	10:00	D	6	2100	4.5	8.3	75.00	16.94	<0.05	0.86	17.80	0.09	0.010	<10	<1
	6/24/00	15:00														
	6/24/00	16:00	D	6	2090	6.6	8.3	75.00	16.94	<0.05	0.92	17.86	0.12	0.010	<10	<1
	6/24/00	21:00														
	6/24/00	22:00	D	6	2150	11.0	8.2	75.00	16.94	0.06	0.76	17.70	0.15	0.012	<10	<1
	6/25/00	3:00														
	6/25/00	4:00	D	6	2180	5.3	8.2	66.00	14.90	<0.05	0.80	15.70	0.12	0.013	<10	<1
	6/25/00	9:00														

2000 Peters Canyon Wash / San Diego Creek Nutrient Study
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STATION	DATE	TIME	SAMPLES Type	#	EC µmhos	Turb NTU	pH	NO_3 mg/L	NO_3 as N mg/L	NH3 as N mg/L	TKN mg/L	TN mg/L	PO_4 mg/L	o-PO_4 mg/L	TSS mg/L	VSS mg/L
								San Diego Creek at Harvard Avenue								
WYLSED	6/25/00	10:00	D	6	2040	11.0	8.3	14.00	3.16	<0.05	1.00	4.16	0.21		18	6
	6/25/00	15:00														
	6/25/00	16:00	D	6	2030	5.8	8.3	21.00	4.74	<0.05	1.10	5.84	0.21	<0.01	11	9
	6/25/00	21:00														
	6/25/00	22:00	D	6	2100	4.2	8.1	19.00	4.29	0.07	0.97	5.26	0.12	0.010	<10	<1
	6/26/00	3:00														
	6/26/00	4:00	D	6	2090	5.6	8.2	29.00	6.55	<0.05	0.74	7.29	0.12	0.012	<10	<1
	6/26/00	9:00														
	6/26/00	10:00	D	6	2060	5.1	8.3	62.00	14.00	<0.05	0.64	14.64	0.09	<0.01	16	9
	6/26/00	15:00														
	6/26/00	16:00	D	6	2150	5.5	8.2	79.00	17.84	<0.05	0.53	18.37	0.06	<0.01	<10	<1
	6/26/00	21:00														
	6/26/00	22:00	D	6	2030	12.0	8.3	70.00	15.81	<0.05	0.82	16.63	0.15	<0.01	36	13
	6/27/00	3:00														
	6/27/00	4:00	D	6	2200	5.1	8.2	75.00	16.94	<0.05	0.69	17.63	0.09	<0.01	<10	<1
	6/27/00	9:00														
								Lane Channel								
LANF08	6/20/00	10:20	Part	1	6420	7.4	8.1	17.00	3.84	<0.05	1.60	5.44	0.34		30	22
	6/20/00	10:00	D	24	5340	14.0	8.5	13.00	2.94	<0.05	1.30	4.24	0.40		49	25
	6/21/00	9:00														
	6/21/00	10:00	D	24	5370	33.0	8.3	32.00	7.23	<0.05	1.70	8.93	1.32		155	33
	6/22/00	9:00														
	6/21/00	10:00	DUP	24	5310	67.0	8.3	24.00	5.42	<0.05	1.40	6.82	1.10		160	42
	6/22/00	9:00														
	6/22/00	10:00	D	24	5640	41.0	8.4	20.00	4.52	<0.05	1.30	5.82	1.10		78	22
	6/23/00	9:00														
	6/23/00	10:00	D	24	5600	23.0	8.3	40.00	9.03	0.07	2.20	11.23	1.04		45	12
	6/24/00	9:00														
	6/24/00	10:00	D	24	5380	27.0	8.4	26.00	5.87	0.10	1.50	7.37	1.25		50	15
	6/25/00	9:00														
	6/25/00	10:00	D	24	4930	17.0	8.3	21.00	4.74	0.14	1.40	6.14	0.98		33	26
	6/26/00	9:00														
	6/25/00	10:00	DUP	24	4910	19.0	8.3	22.00	4.97	0.14	1.60	6.57	1.04		24	11
	6/26/00	9:00														
	6/26/00	10:00	D	24	5370	18.0	8.4	24.00	5.42	0.12	0.73	6.15	0.92		31	13
	6/27/00	9:00														
								Barranca Channel								
BC2F09	9/14/99	7:41	D	1	3810	14	7.8	<0.44	0.10	0.306	0.173	0.27	1.03		13	
	9/15/99	7:49	D	1	2920	9.7	7.7	2.95	0.67	0.185	0.77	1.44	0.245		16	10
	9/16/99	7:48	D	1	3730	7.6	7.8	0.44	0.10	0.124	0.83	0.93	0.245		140	8
	9/17/99	7:57	D	1	3450	13	7.7	3.78	0.85	0.241	1.03	1.88	0.278		19	15
	9/18/99	7:49	D	1	3310	14	7.7	6.03	1.36	0.298	0.92	2.28	0.214		25	13
	9/19/99	7:48	D	1	3320	12	7.8	2.2	0.50	0.519	1.02	1.52	0.275		28	<22
	9/20/99	7:56	D	1	3120	20	7.8	1.85	0.42	0.301	1.1	1.52	0.337		26	11
								San Joaquin Channel								
SJQF14	6/20/00	9:20	D	1	1490	3.0	7.8	19.00	4.29	0.08	1.00	5.29	1.25		<10	<1
	6/21/00	8:35	D	1	1310	3.9	7.8	15.00	3.39	0.08	0.82	4.21	1.19		<10	<1
	6/22/00	na	D	1	1490	7.4	7.8	18.00	4.06	0.07	0.75	4.81	1.41		<10	<1
	6/23/00	8:07	D	1	1540	6.3	7.7	18.00	4.06	0.12	0.93	4.99	1.68		<10	<1
	6/24/00	8:42	D	1	1490	5.4	7.8	18.00	4.06	0.11	1.40	5.46	1.38		<10	<1
	6/25/00	8:15	D	1	1540	12.0	7.8	<0.44	<0.10	0.13	1.10	1.20	1.32		<10	<1
	6/26/00	8:30	D	1	1590	6.5	7.7	22.00	4.97	0.11	1.00	5.97	1.16		<10	<1
	6/27/00	8:56	D	1	1570	7.1	7.8	18.00	4.06	0.09	1.00	5.06	1.25		<10	<1

2000 Peters Canyon Wash / San Diego Creek Nutrient Study
San Diego Creek Watershed

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC µmhos	Turb NTU	pH	NO_3 mg/L	NO_3 as N mg/L	NH3 as N mg/L	TKN mg/L	TN mg/L	PO_4 mg/L	o-PO_4 mg/L	TSS mg/L	VSS mg/L
								Sand Canyon Channel								
SCCF15	6/20/00	8:30	D	1	2460	4.1	8.1	0.70	0.16	<0.05	0.35	0.51	0.83		11	11
	6/21/00	7:45	D	1	2140	4.9	8.1	<0.44	0.10	<0.05	0.32	0.42	0.86		<10	<1
	6/22/00	NA	D	1	2430	9.9	8.2	1.00	0.23	<0.05	3.60	3.83	0.86		12	7
	6/23/00	7:15	D	1	2350	11.0	8.0	<0.44	0.10	<0.05	0.27	0.37	0.95		22	<5
	6/24/00	7:36	D	1	2340	4.4	8.1	<0.44	0.10	<0.05	0.42	0.52	0.92		<10	<1
	6/25/00	7:24	D	1	2340	13.0	8.0	<0.44	0.10	<0.05	0.39	0.49	1.01		15	<10
	6/26/00	7:50	D	1	2390	8.4	8.0	<0.44	0.10	<0.05	0.31	0.41	0.98		10	7
	6/27/00	8:09	D	1	2560	5.9	8.1	<0.44	0.10	<0.05	0.40	0.50	0.77		<10	<1
								San Diego Creek at Campus Drive								
SDMF05	6/19/00	11:00	Part	5	2990	44	8.4	11.00	2.48	0.18	1.90	4.38	0.73	0.027	74	30
	6/19/00	15:00														
	6/19/00	16:00	D	6	2930	25	8.7	11.00	2.48	<0.05	1.60	4.08	0.55	0.010	62	30
	6/19/00	21:00														
	6/19/00	22:00	D	6	2940	38	8.6	11.00	2.48	<0.05	1.80	4.28	0.64	<0.01	68	30
	6/20/00	3:00														
	6/20/00	4:00	D	6	2920	41	8.5	9.70	2.19	0.14	2.10	4.29	0.70	0.014	65	30
	6/20/00	9:00														
	6/20/00	4:00	DUP	6	3010	42	8.4	11.00	2.48	0.15	2.50	4.98	0.80	0.014	65	30
	6/20/00	9:00														
	6/20/00	10:00	D	6	2660	45	8.4	11.00	2.48	0.14	1.30	3.78	0.73	0.026	62	28
	6/20/00	15:00														
	6/20/00	22:00	D	6	2630	34	8.7	12.00	2.71	<0.05	1.70	4.41	0.55	<0.01	66	26
	6/21/00	3:00														
	6/21/00	4:00	D	6	2610	39	8.3	9.50	2.15	0.14	1.80	3.95	0.86	<0.01	61	26
	6/21/00	9:00														
	6/21/00	10:00	D	6	3060	9	8.5	13.00	2.94	0.12	2.10	5.04	0.70	0.016	72	26
	6/21/00	15:00														
	6/21/00	16:00	D	6	3050	31	8.8	12.00	2.71	<0.05	3.00	5.71	0.70	<0.01	78	31
	6/21/00	21:00														
	6/21/00	22:00	D	6	3040	31	8.5	11.00	2.48	<0.05	2.50	4.98	0.61	<0.01	60	18
	6/22/00	3:00														
	6/22/00	4:00	D	6	3060	41	8.7	12.00	2.71	<0.05	2.10	4.81	0.55	0.434	67	22
	6/22/00	9:00														
	6/22/00	10:00	D	6	3310	54	8.4	13.00	2.94	0.10	2.60	5.54	0.83	0.021	66	23
	6/22/00	15:00														
	6/22/00	16:00	D	6	3290	53	8.7	14.00	3.16	<0.05	3.00	6.16	0.92	<0.01	77	28
	6/22/00	21:00														
	6/22/00	22:00	D	6	3320	44	8.6	9.20	2.08	<0.05	1.80	3.88	0.70	0.015	79	28
	6/23/00	3:00														
	6/23/00	4:00	D	6	3350	45	8.6	11.00	2.48	<0.05	2.80	5.28	0.77	<0.01	65	23
	6/23/00	9:00														
	6/23/00	10:00	D	6	3140	70	8.6	11.00	2.48	0.05	0.72	3.20	0.73	<0.01	94	29
	6/23/00	15:00														
	6/23/00	16:00	D	6	3110	70	8.7	15.00	3.39	<0.05	2.30	5.69	0.70	<0.01	80	24
	6/23/00	21:00														
	6/23/00	22:00	D	6	3130	60	8.6	14.00	3.16	<0.05	1.70	4.86	0.64	<0.01	75	20
	6/24/00	3:00														
	6/24/00	4:00	D	6	3140	65	8.6	12.00	2.71	<0.05	1.80	4.51	0.58	<0.01	78	32
	6/24/00	9:00														

2000 Peters Canyon Wash / San Diego Creek Nutrient Study
San Diego Creek Watershed

STATION	DATE	TIME	SAMPLES Type	#	EC µmhos	Turb NTU	pH	NO_3 mg/L	NO_3 as N mg/L	NH3 as N mg/L	TKN mg/L	TN mg/L	PO_4 mg/L	o-PO_4 mg/L	TSS mg/L	VSS mg/L
							San Diego Creek at Campus Drive									
SDMF05	6/24/00	10:00	D	6	3170	70	8.6	14.00	3.16	0.06	1.60	4.76	0.77	<0.01	95	28
	6/24/00	15:00														
	6/24/00	16:00	D	6	3130	65	8.6	15.00	3.39	<0.05	2.40	5.79	0.83	<0.01	94	27
	6/24/00	21:00														
	6/24/00	22:00	D	6	3140	50	8.6	13.00	2.94	0.06	2.30	5.24	0.52	<0.01	55	24
	6/25/00	3:00														
	6/25/00	4:00	D	6	3120	60	8.5	11.00	2.48	<0.05	2.20	4.68	0.73	<0.01	69	25
	6/25/00	9:00														
	6/25/00	10:00	D	6	3120	65	8.5	11.00	2.48	0.08	46.00	48.48	0.77	<0.01	85	25
	6/25/00	15:00														
	6/25/00	16:00	D	6	3090	70	8.5	17.00	3.84	<0.05	1.60	5.44	0.83	<0.01	91	32
	6/25/00	21:00														
	6/25/00	22:00	D	6	3140	55	8.5	15.00	3.39	<0.05	1.50	4.89	0.64	<0.01	68	26
	6/26/00	3:00														
	6/26/00	4:00	D	6	3060	60	8.4	13.00	2.94	<0.05	2.10	5.04	0.77	0.016	70	24
	6/26/00	9:00														
	6/26/00	10:00	D	6	3100	80	8.5	13.00	2.94	0.10	2.00	4.94	0.83	<0.01	110	31
	6/26/00	15:00														
	6/26/00	16:00	D	6	3080	80	8.6	13.00	2.94	<0.05	2.00	4.94	0.77	<0.01	120	44
	6/26/00	21:00														
	6/26/00	22:00	D	6	3100	60	8.4	13.00	2.94	<0.05	2.00	4.94	0.77	<0.01	81	25
	6/27/00	3:00														
	6/27/00	4:00	D	6	3060	75	8.4	13.00	2.94	<0.05	1.70	4.64	0.73	<0.01	84	14
	6/27/00	9:00														

Appendix B
Nitrate Load Summary

Nitrate Levels in Peters Canyon Wash and its Tributaries
June 20 - 26, 2000

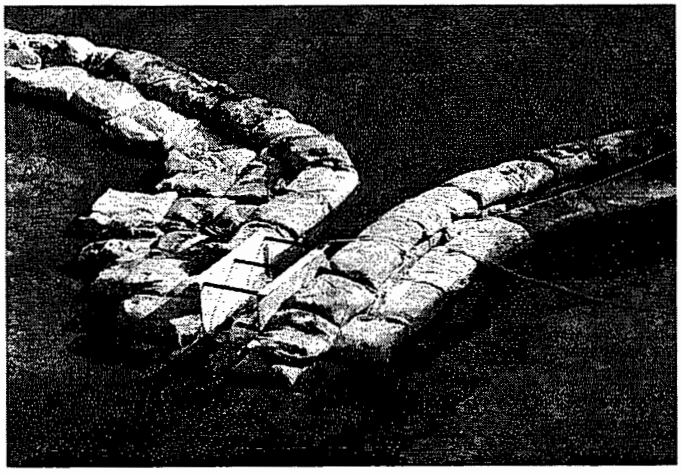

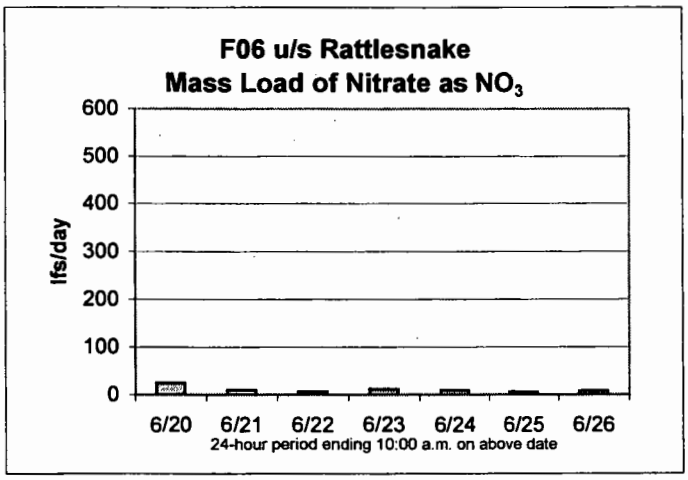

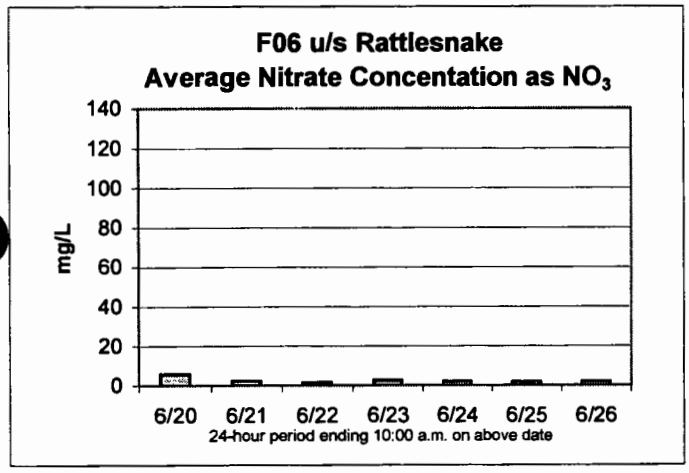

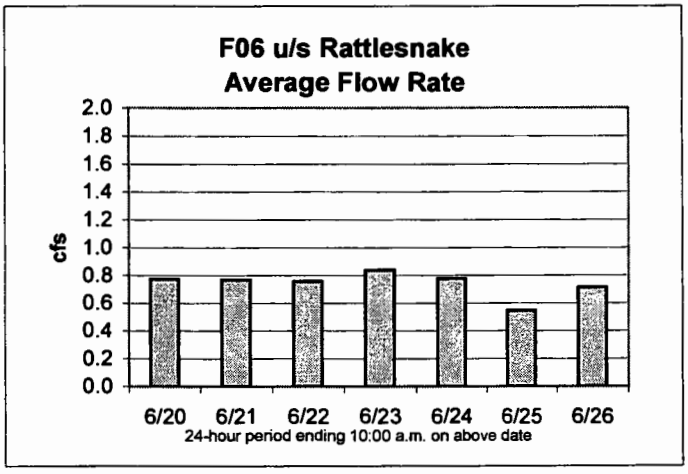

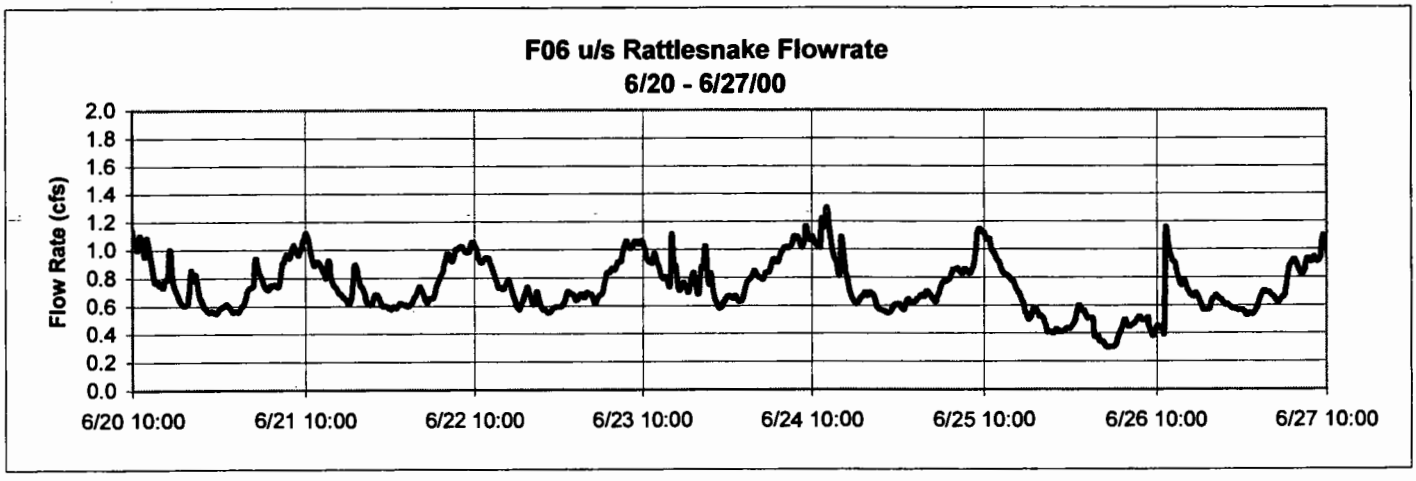

Nitrate Levels in Peters Canyon Wash and its Tributaries
June 20 - 26, 2000

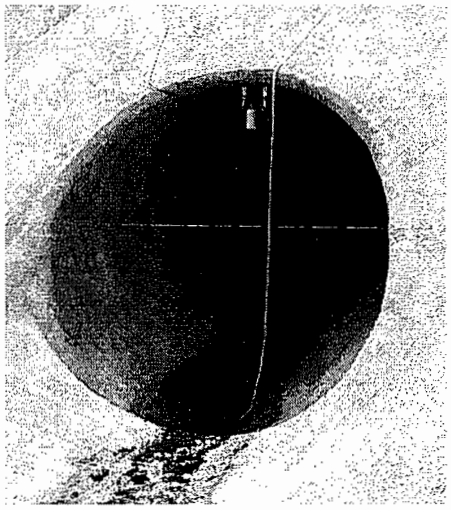

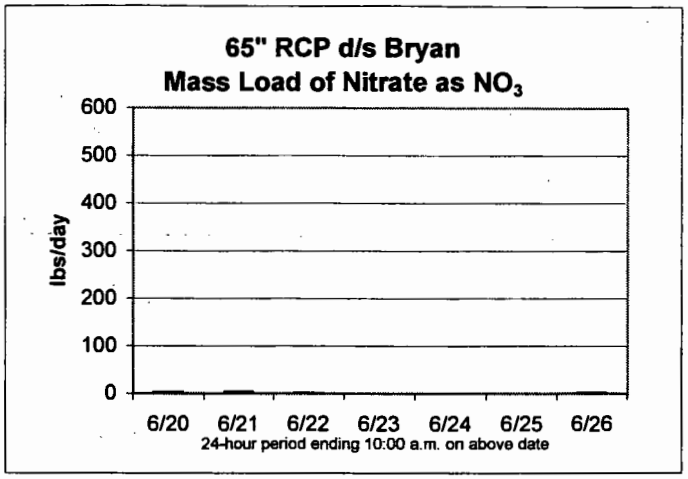

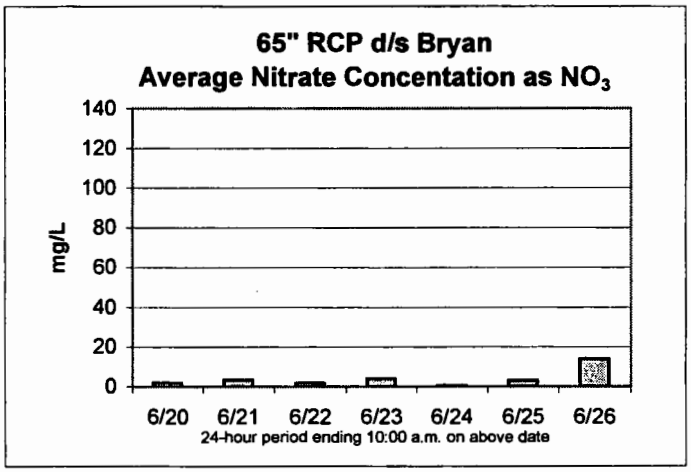

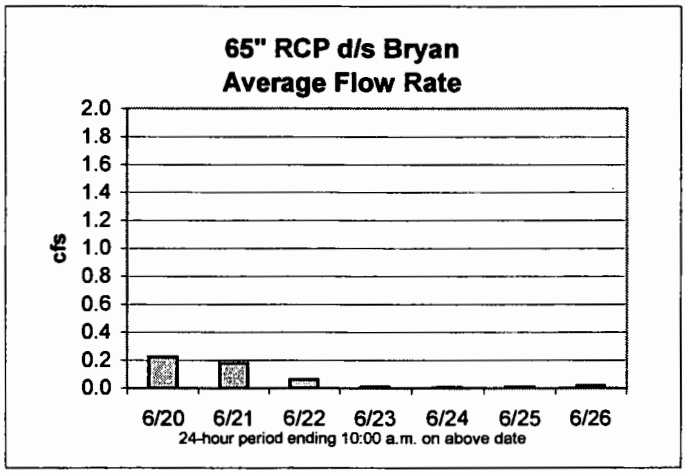

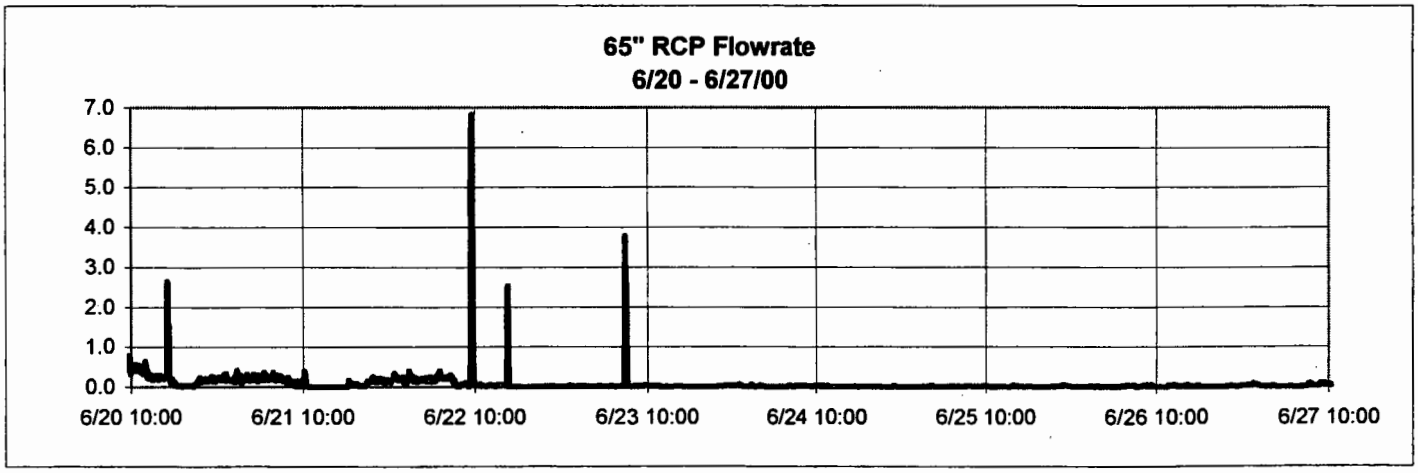

Nitrate Levels in Peters Canyon Wash and its Tributaries
June 20 - 26, 2000

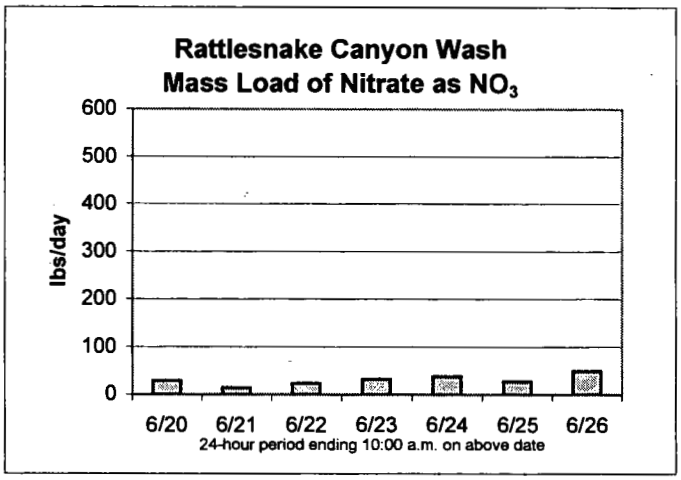

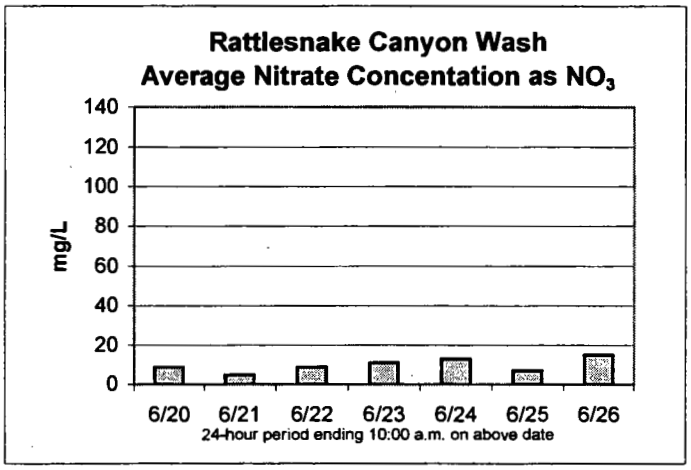

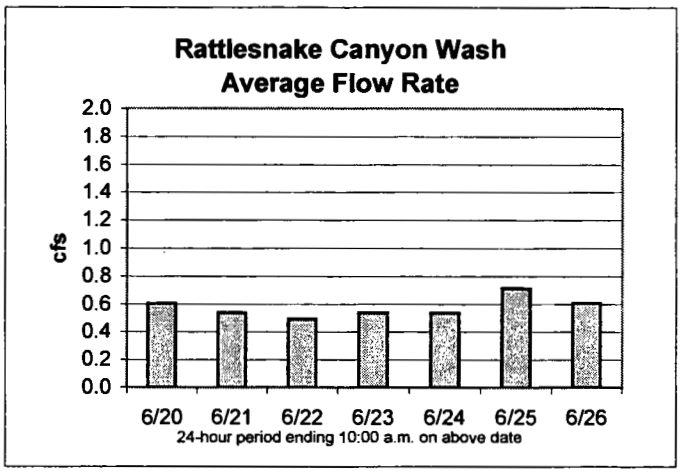

Nitrate Levels in Peters Canyon Wash and its Tributaries
June 20 - 26, 2000

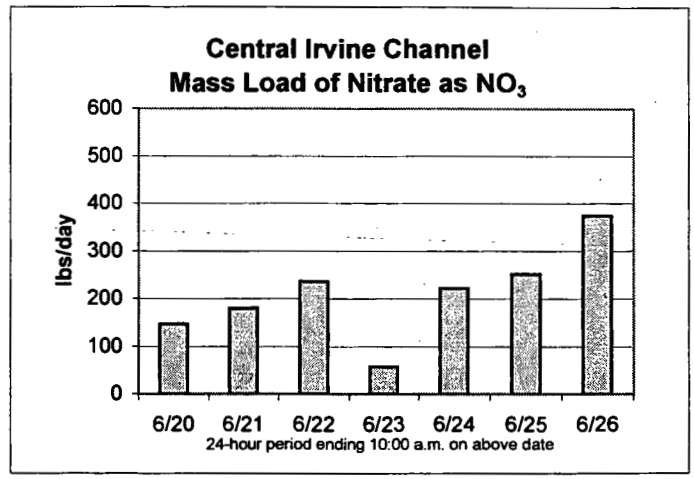

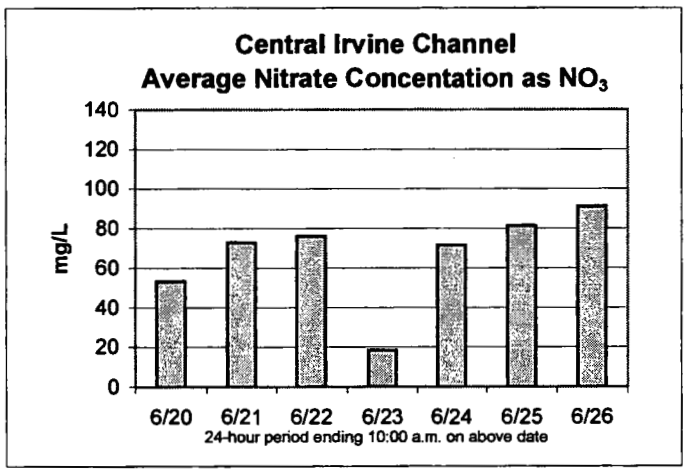

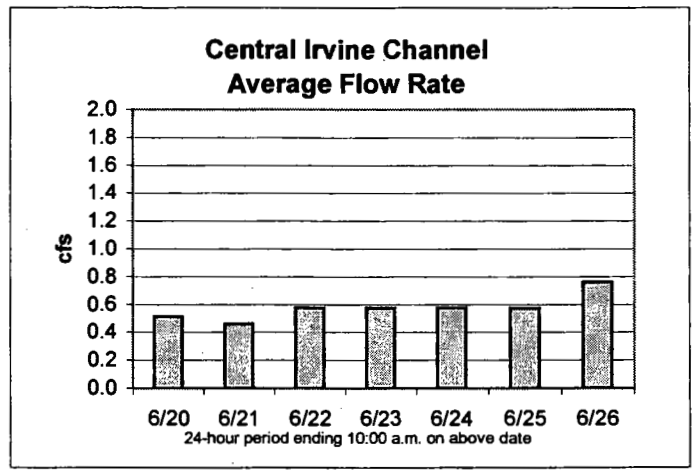

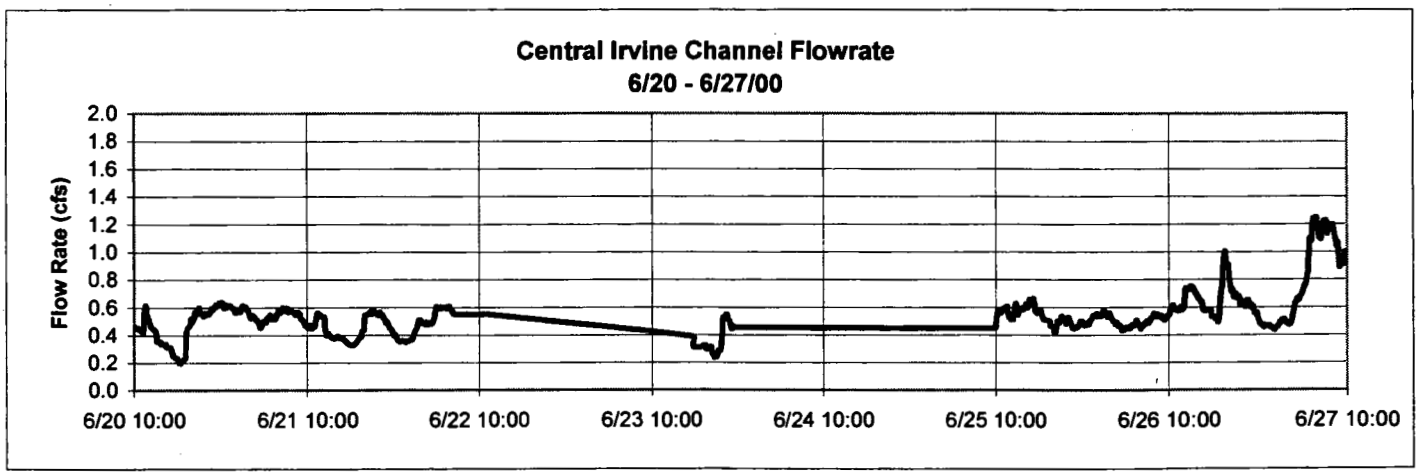

Nitrate Levels in Peters Canyon Wash and its Tributaries
June 20 - 26, 2000

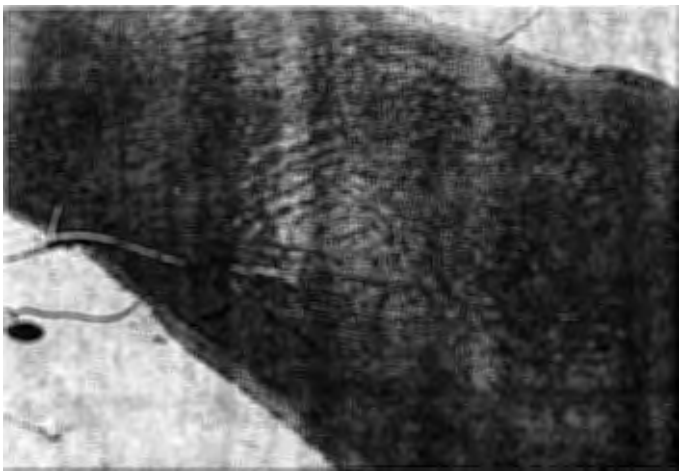

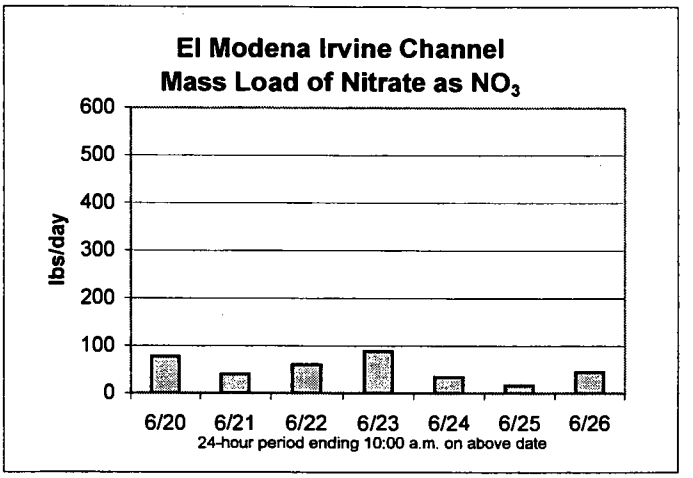

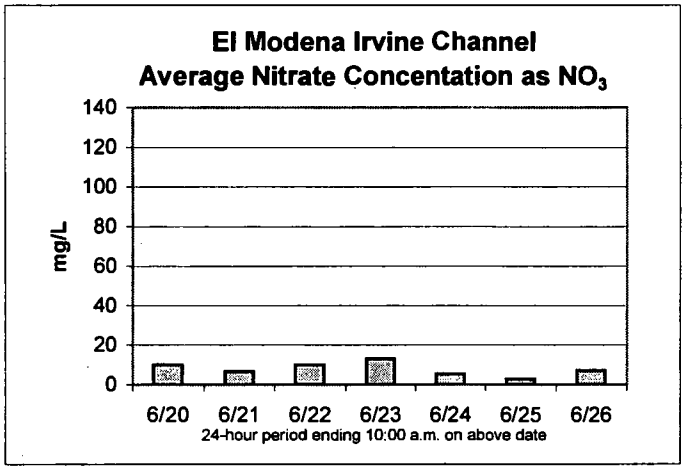

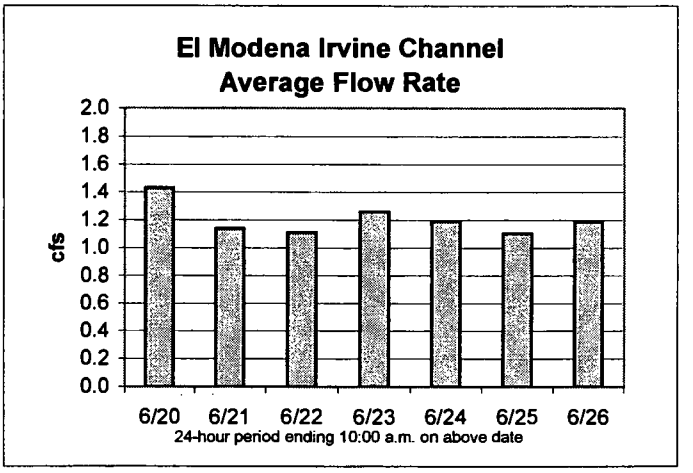

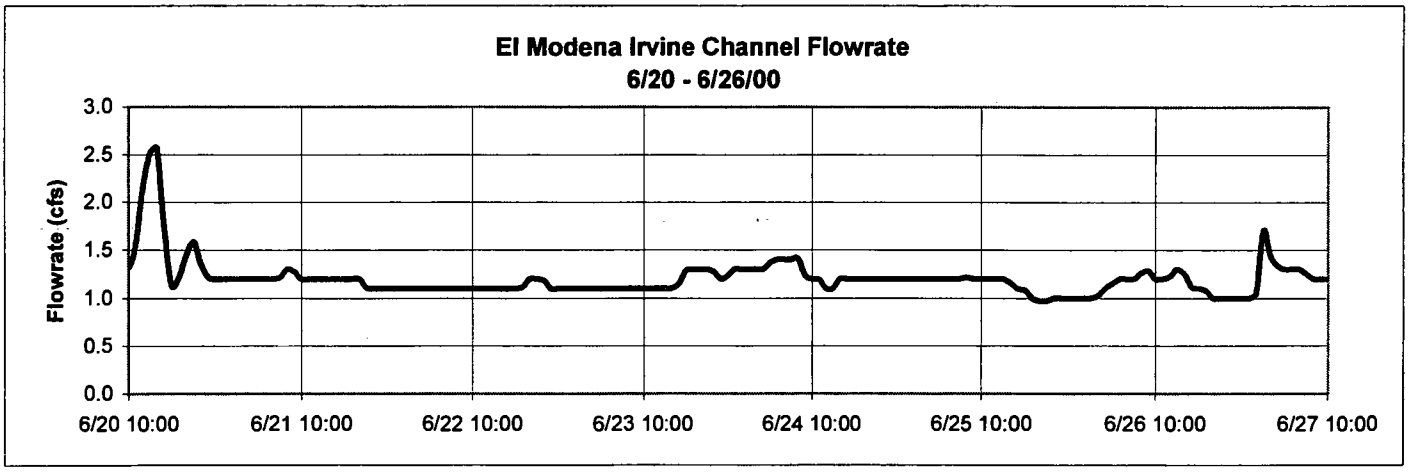

Nitrate Levels in Peters Canyon Wash and its Tributaries
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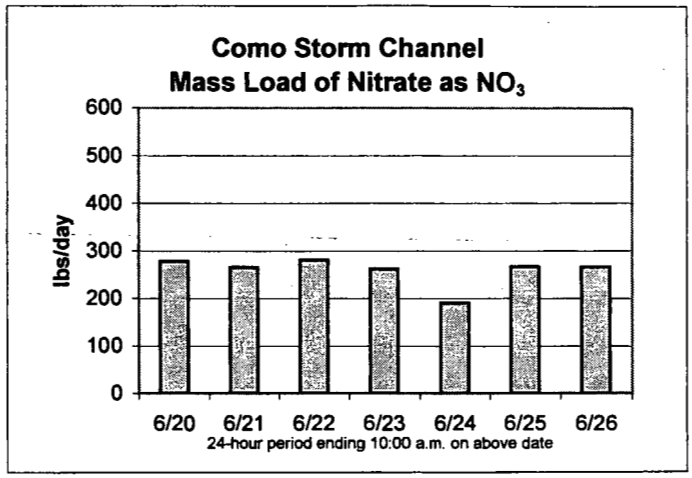

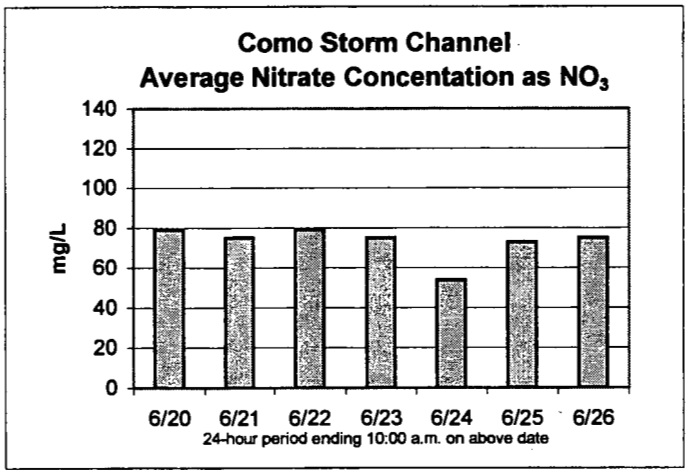

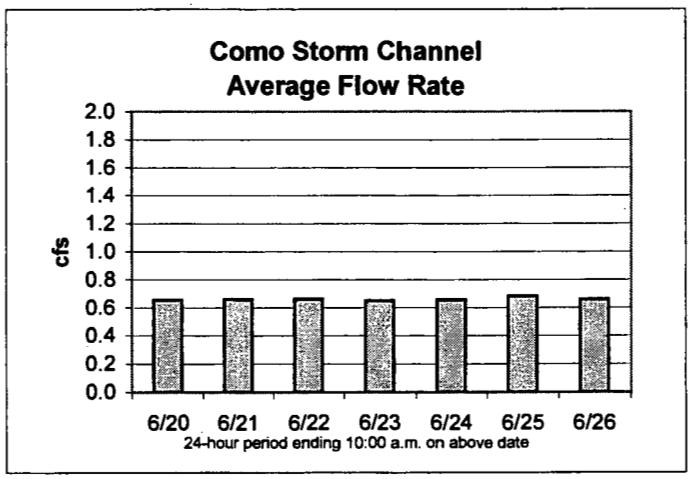

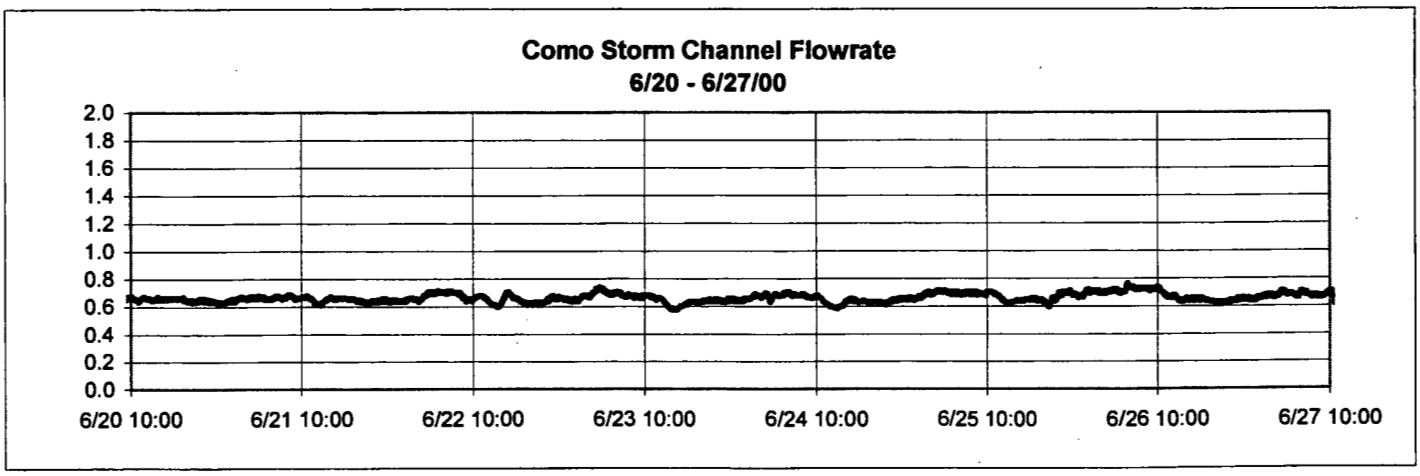

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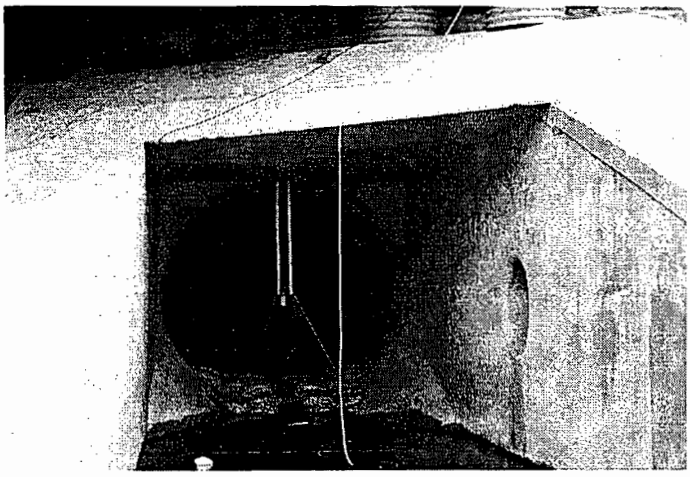

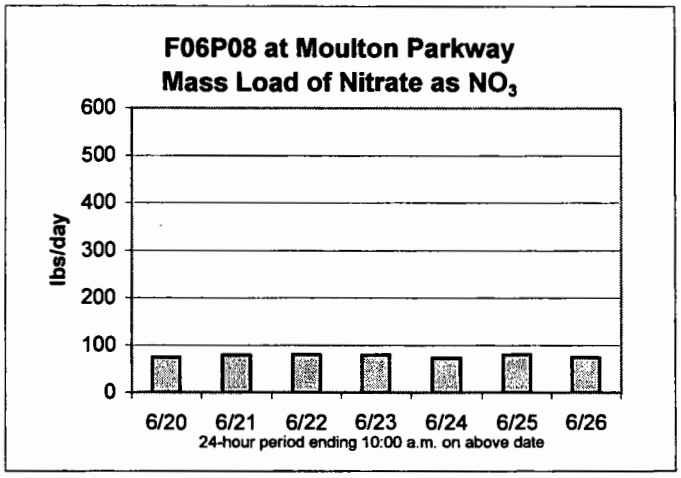

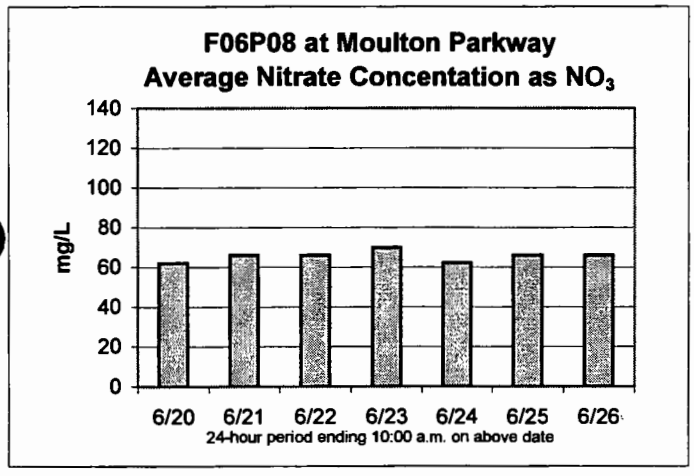

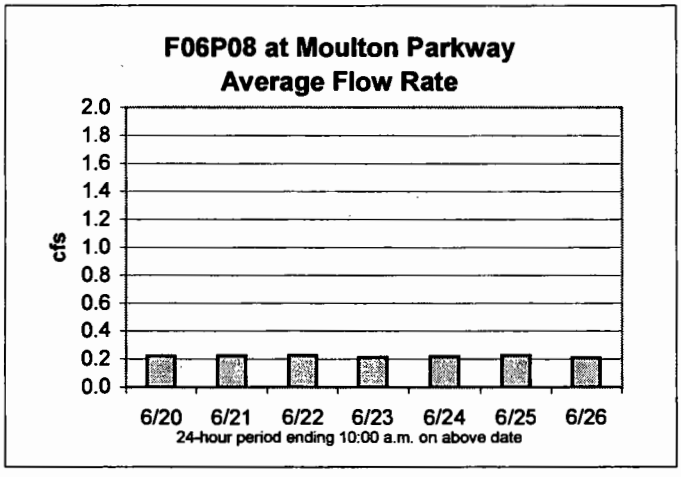

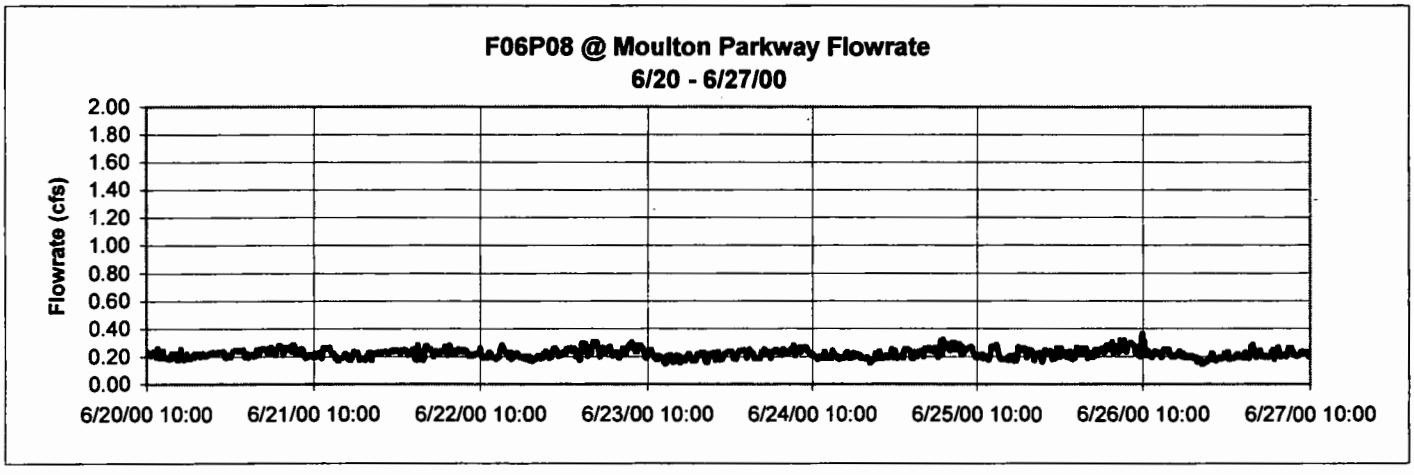

Nitrate Levels in Peters Canyon Wash and its Tributaries
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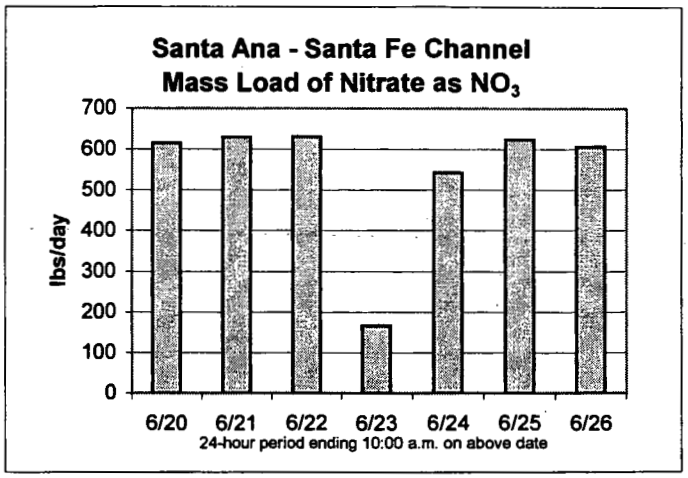

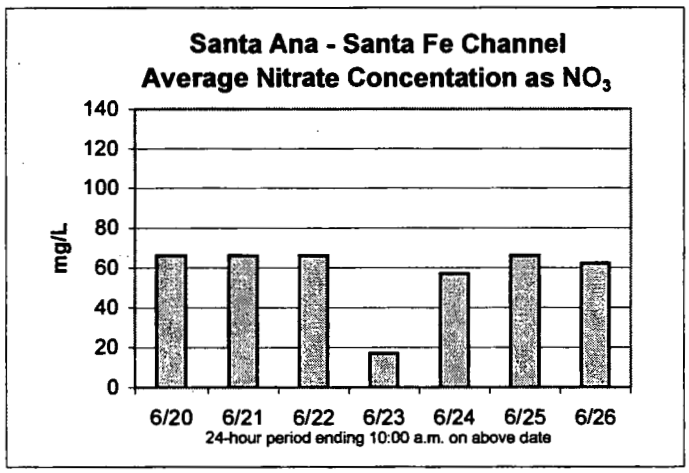

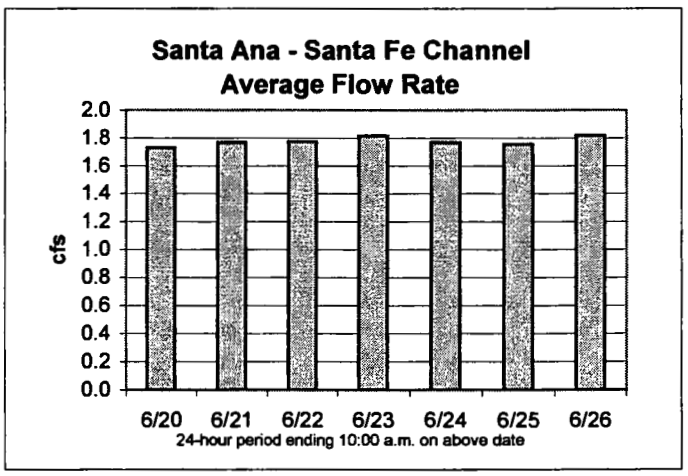

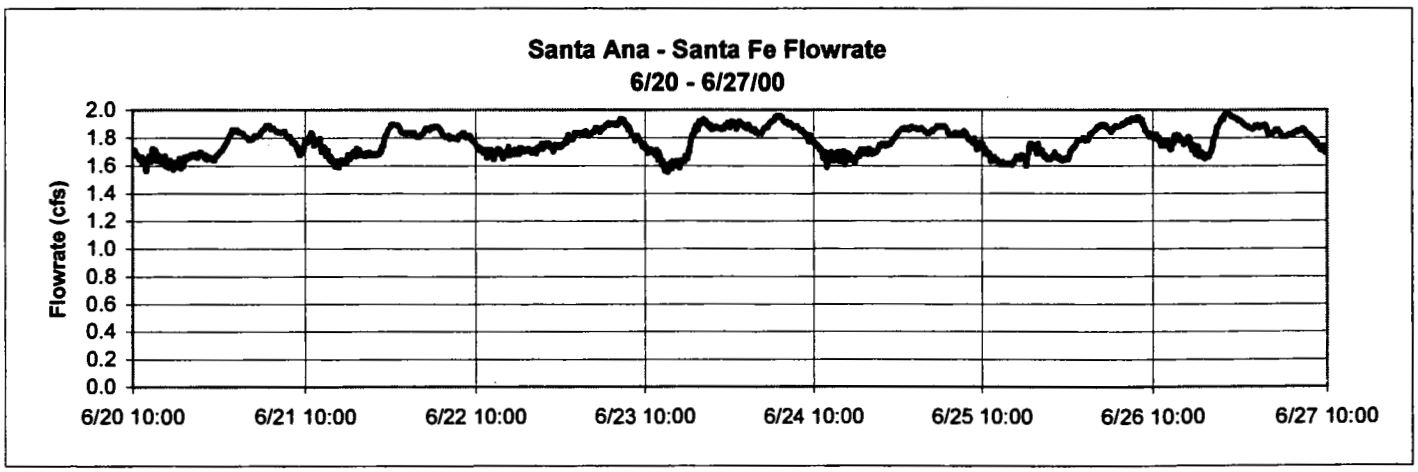

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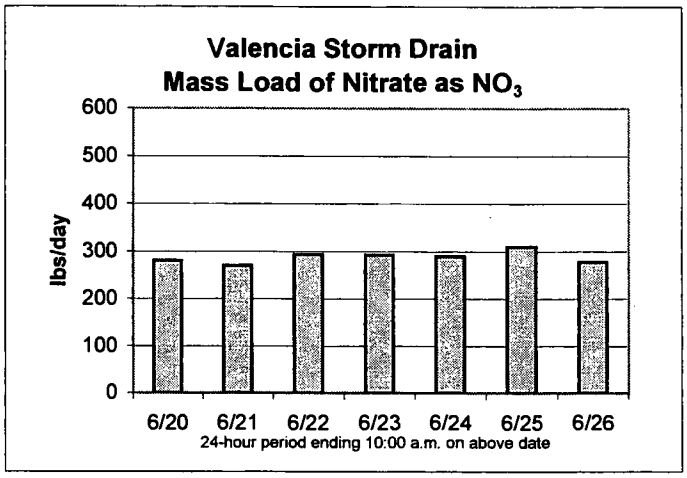

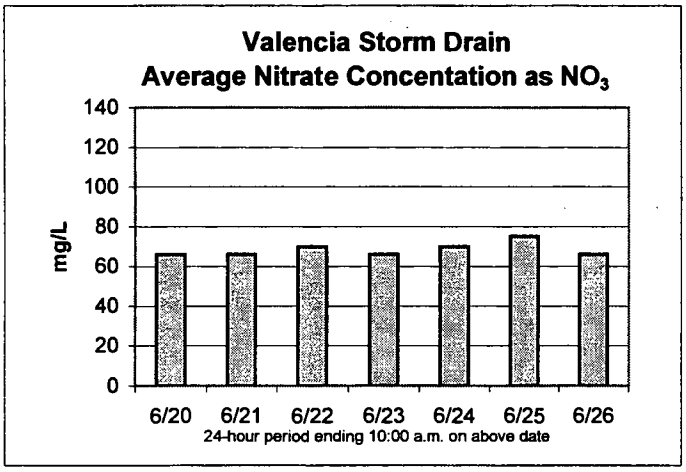

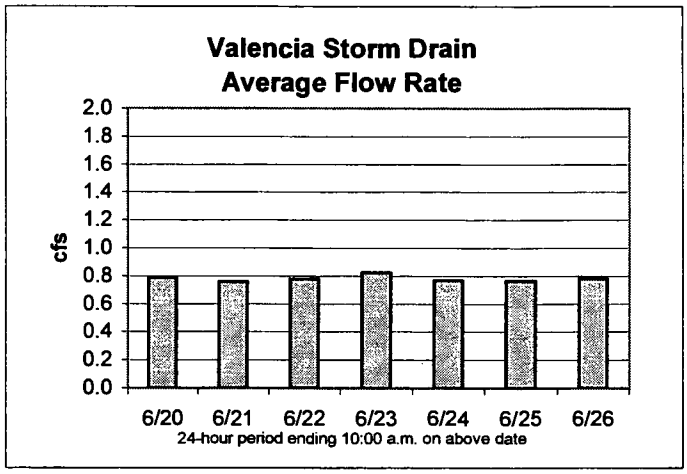

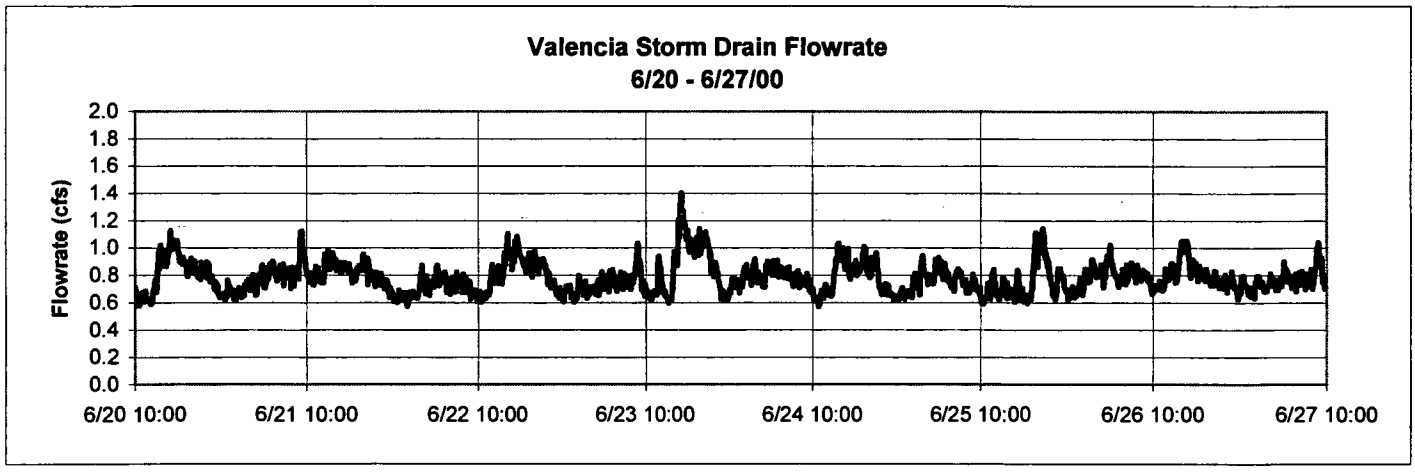

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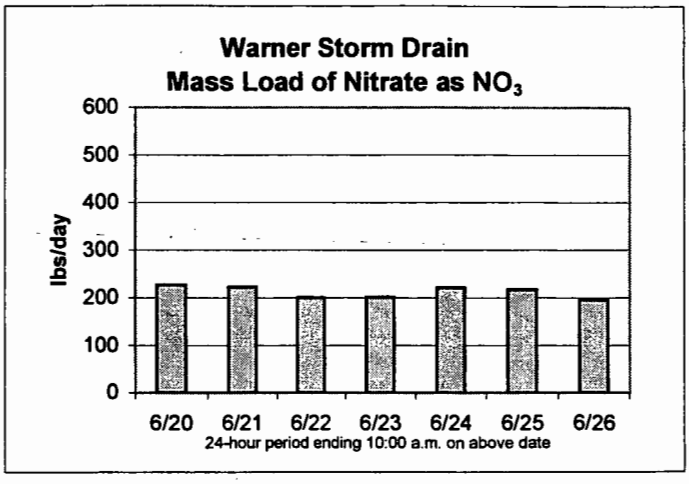

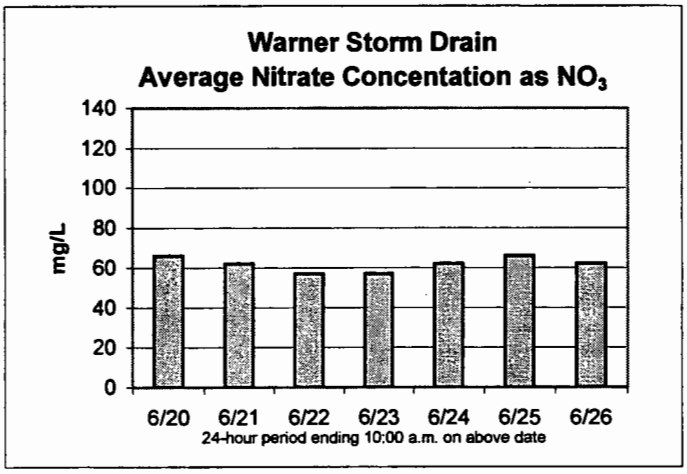

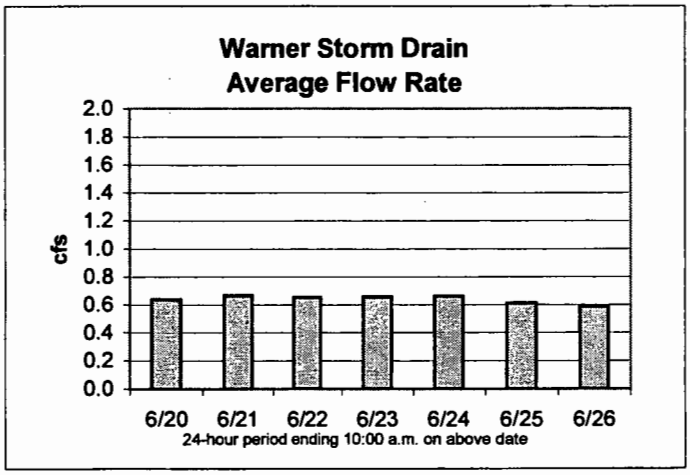

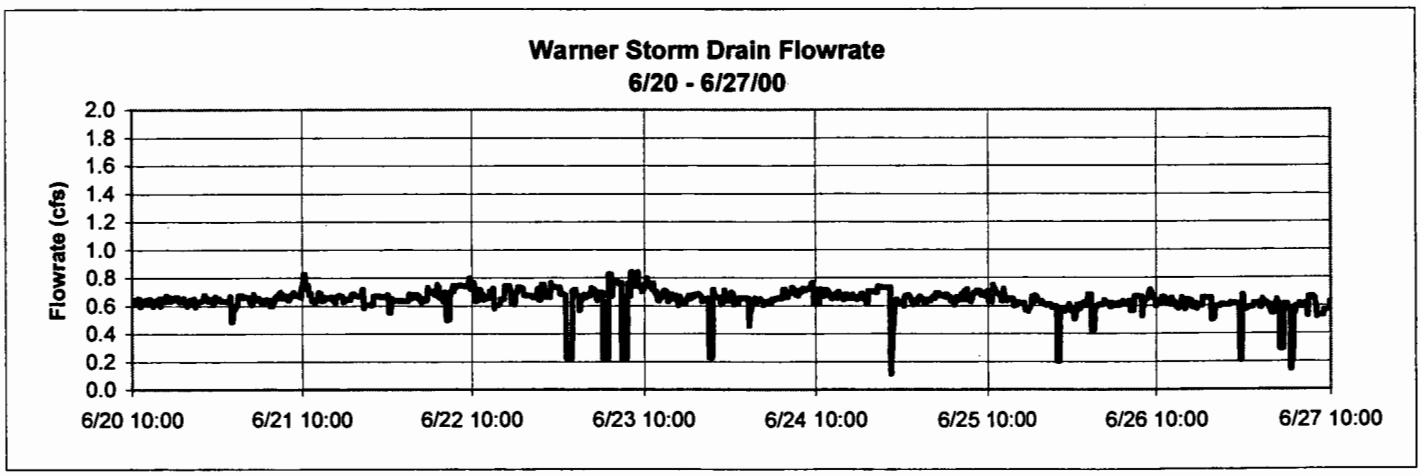

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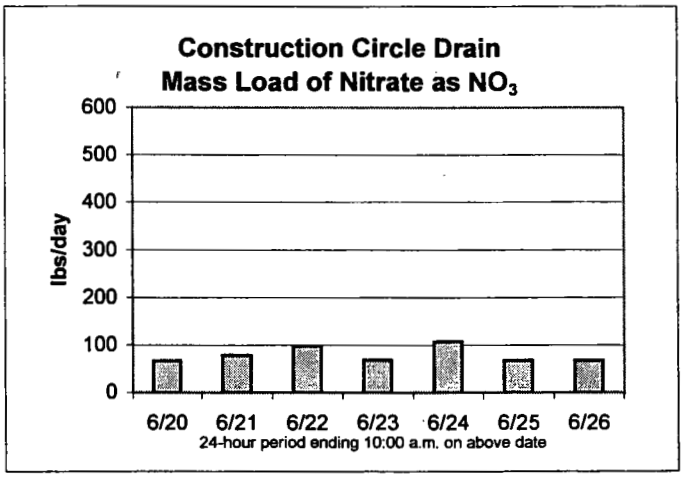

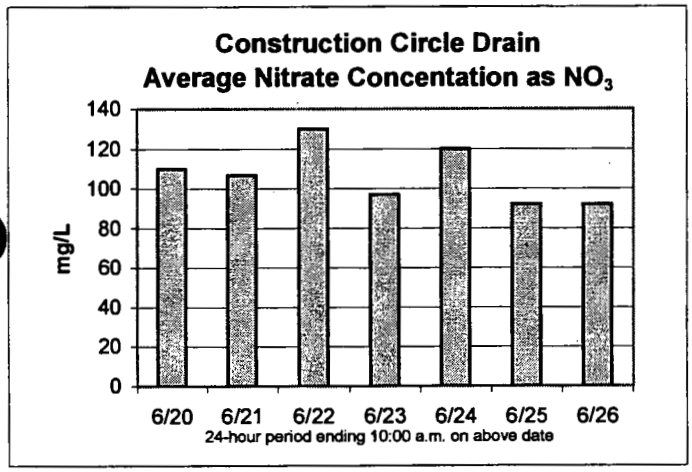

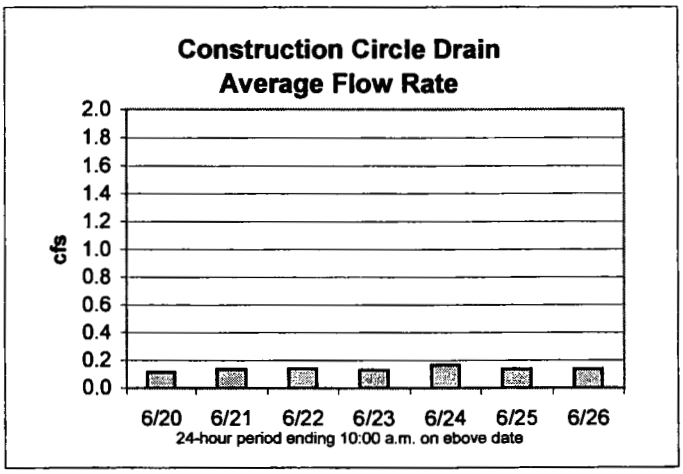

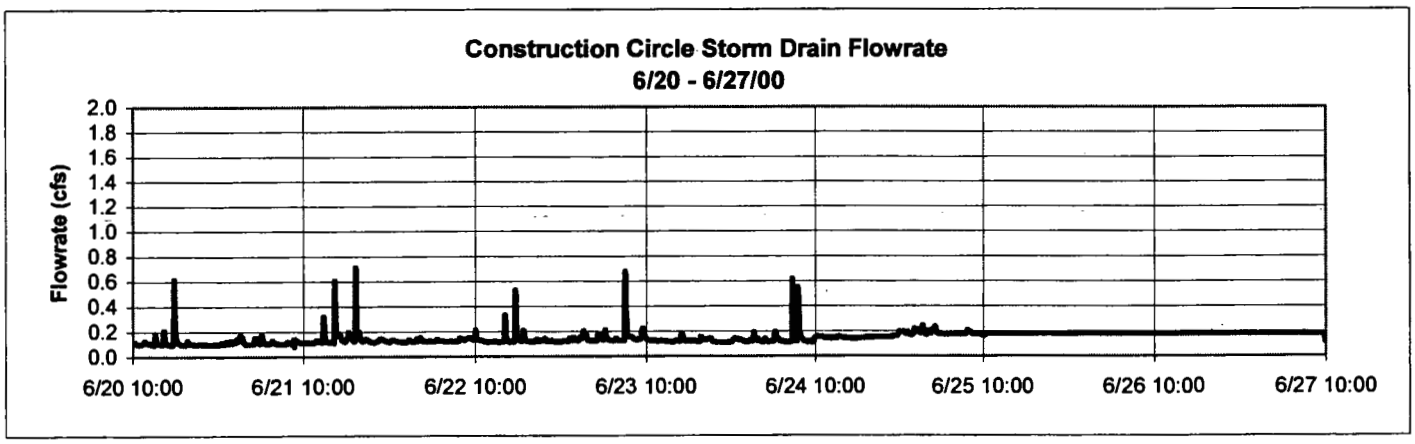

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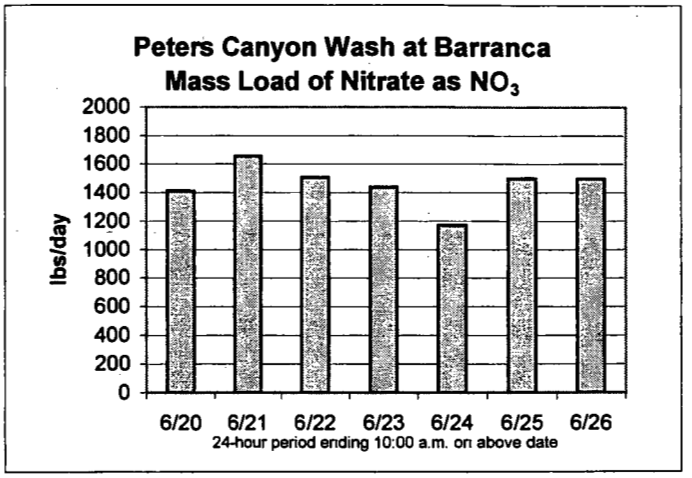

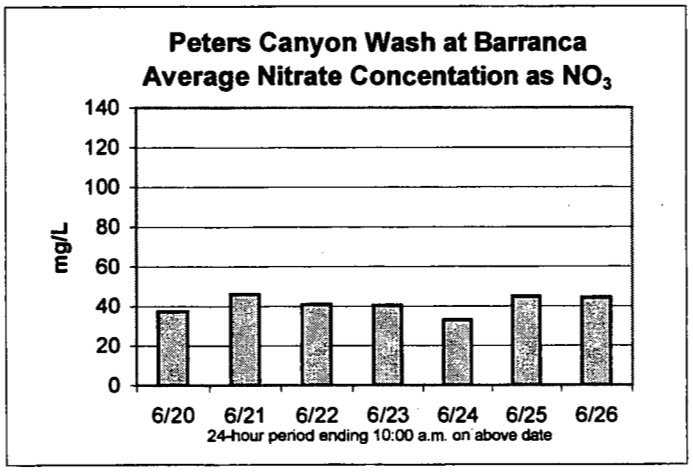

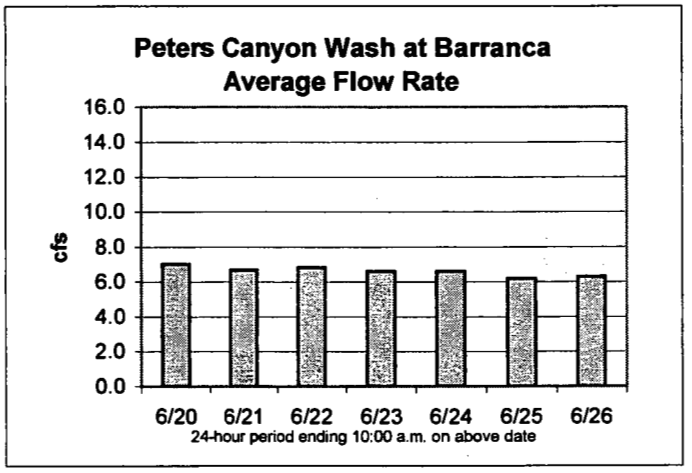

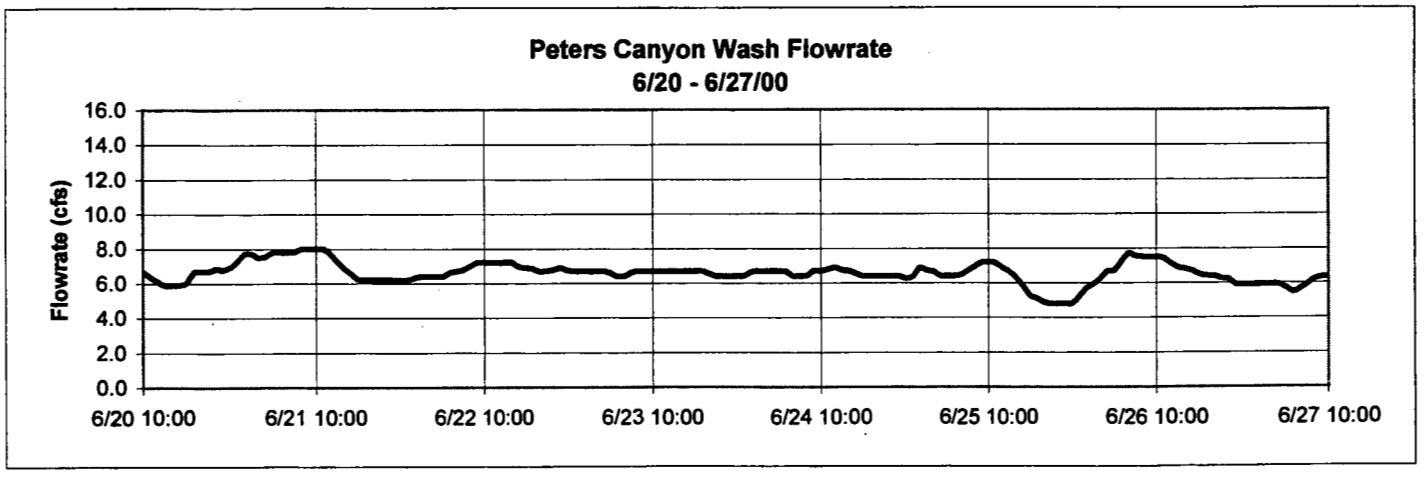

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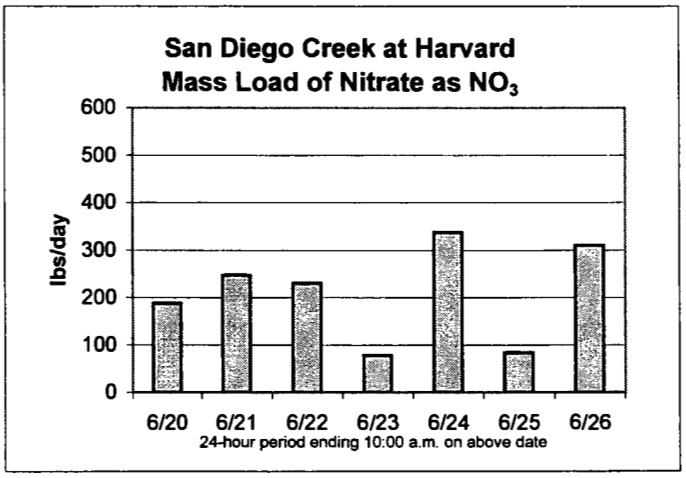

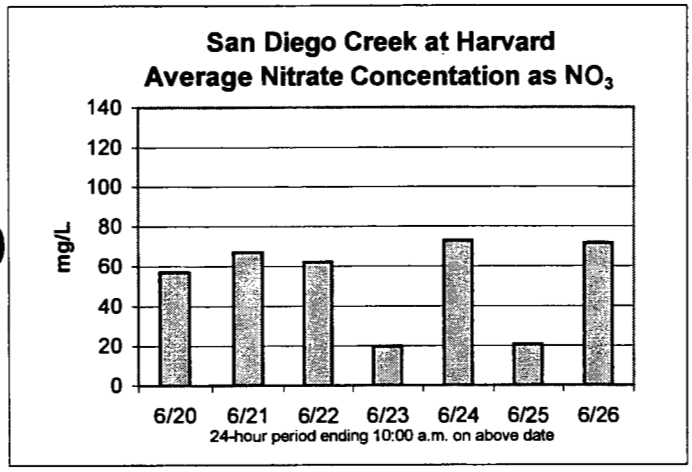

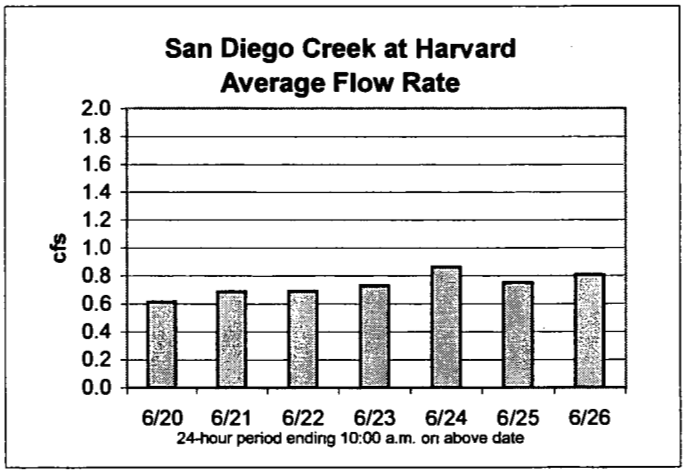

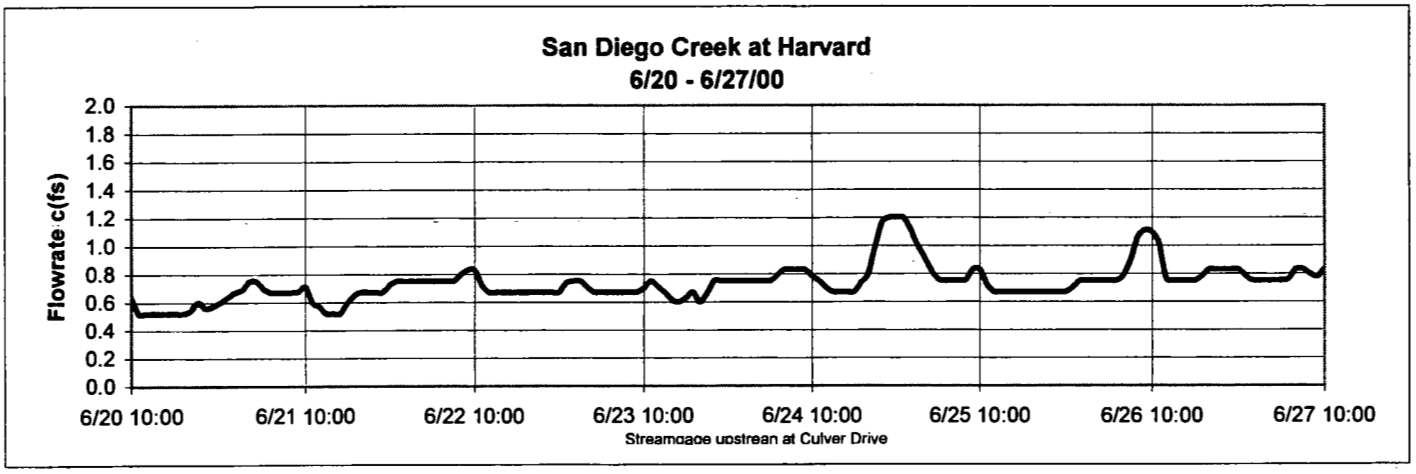

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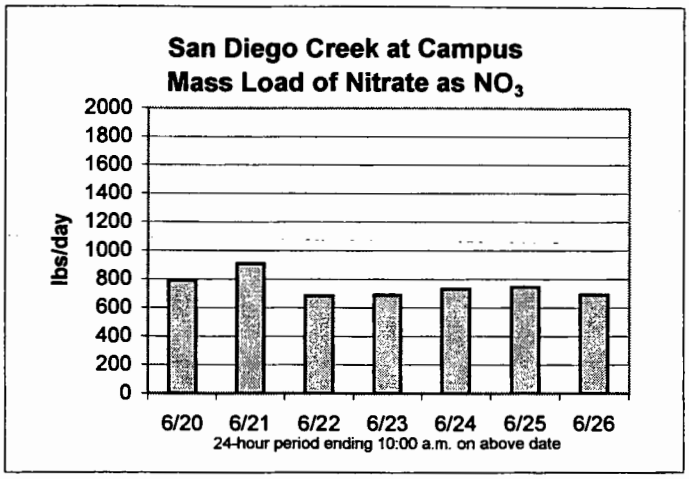

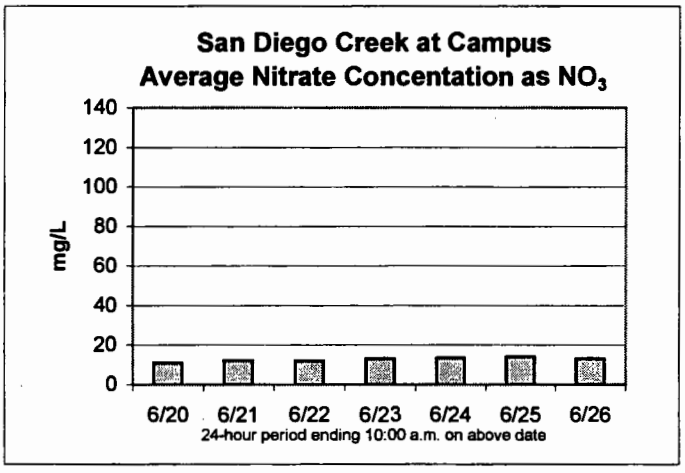

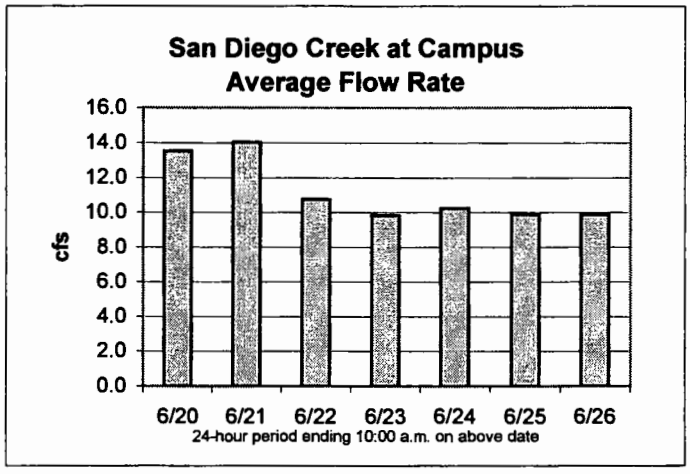

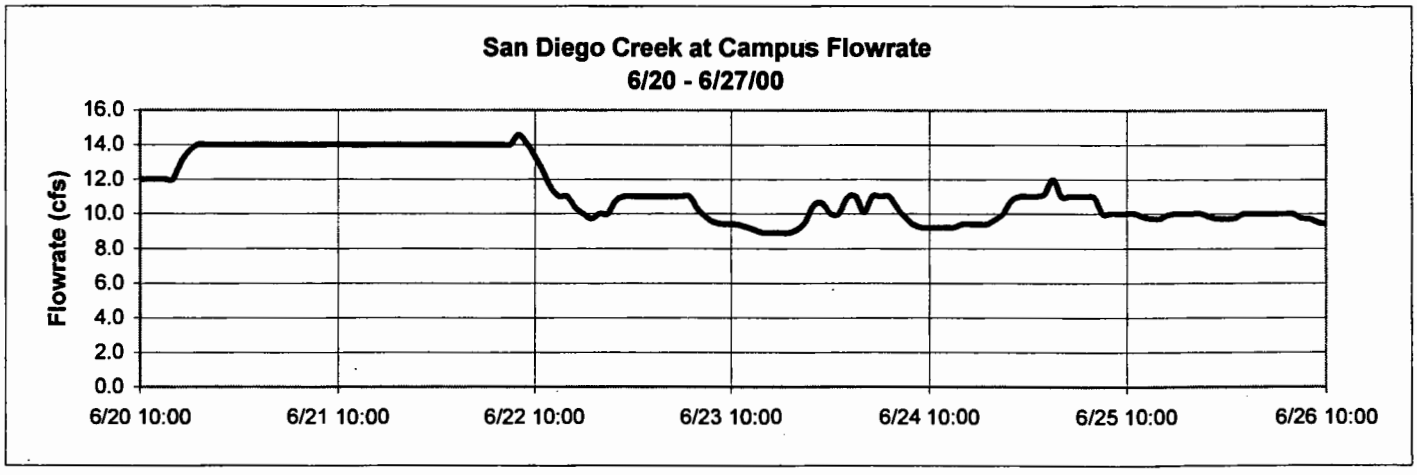

Appendix C
Quality Assurance Summary

Accuracy of Contract Laboratory

Date Submitted	PFRD Sample ID		NO3 mg/L	NH4-N mg/L	TKN mg/L	PO4 mg/L	O-PO4 mg/L
Jun 20	WR 36239	Actual	0.73	0.26	0.73	0.35	0.114
		Reported	0.62	0.25	0.51	0.34	0.112
		Difference	-0.11	-0.01	-0.22	-0.01	0.00
		% difference	-15.07	-2.69	-30.14	-3.71	-1.75
		% Recovery	84.93	97.31	69.86	96.29	98.25
Jun 21	WR 36283	Actual	36.47	1.31	1.31	1.74	0.567
		Reported	23.00	1.29	0.82	1.71	0.563
		Difference	-13.47	-0.02	-0.49	-0.03	0.00
		% difference	-36.93	-1.53	-37.40	-1.72	-0.71
		% Recovery	63.07	98.47	62.60	98.28	99.29
Jun 22	WR 36294	Actual	18.23	1.31	1.31	1.74	0.567
		Reported	21.00	1.33	0.59	1.71	0.581
		Difference	2.77	0.02	-0.72	-0.03	0.01
		% difference	15.19	1.53	-54.96	-1.72	2.47
		% Recovery	115.19	101.53	45.04	98.28	102.47
Jun 23	WR 36361	Actual	9.12	0.65	1.12	1.74	0.568
		Reported	8.40	0.61	0.94	1.74	0.60
		Difference	-0.72	-0.04	-0.18	0.00	0.03
		% difference	-7.89	-5.54	-16.07	0.00	5.63
		% Recovery	92.11	94.46	83.93	100.00	105.63
Jun 24	WR 36383	Actual	36.47	0.65	2.99	3.49	1.13
		Reported	36.00	0.77	2.20	3.37	1.49
		Difference	-0.47	0.12	-0.79	-0.12	0.36
		% difference	-1.29	18.00	-26.42	-3.44	31.86
		% Recovery	98.71	118.00	73.58	96.56	131.86
Jun 25	WR 36424	Actual	1.82	0.26	2.60	0.35	0.114
		Reported	1.70	0.33	2.50	0.34	0.12
		Difference	-0.12	0.07	-0.10	-0.01	0.01
		% difference	-6.59	28.46	-3.85	-3.71	5.26
		% Recovery	93.41	128.46	96.15	96.29	105.26
Jun 26	WR 36461	Actual	3.65	0.26	1.19	0.35	0.114
		Reported	2.50	0.31	0.91	0.37	0.12
		Difference	-1.15	0.05	-0.28	0.02	0.01
		% difference	-31.51	20.00	-23.53	4.86	5.26
		% Recovery	68.49	120.00	76.47	104.86	105.26
Jun 27	WR 36499	Actual	36.47	1.31	10.64	3.49	1.14
		Reported	34.00	1.30	11.00	3.37	1.29
		Difference	-2.47	-0.01	0.36	-0.12	0.15
		% difference	-6.77	-0.76	3.38	-3.44	13.16
		% Recovery	93.23	99.24	103.38	96.56	113.16
	Mean Recovery		**88.64**	**107.18**	**76.38**	**98.39**	**107.65**

Analytical Precision of Contract Laboratory

STATION	DATE	TIME	SAMPLES Type	#	EC µmhos	Turb NTU	pH	NO_3 mg/L	NH3 as N mg/L	TKN mg/L	TN mg/L	PO_4 mg/L	o-PO_4 mg/L	TSS mg/L	VSS mg/L
SDMF05	6/20/00	4:00	D	6	2920	41	8.5	9.70	0.14	2.10	4.29	0.70	0.014	65	30
	6/20/00	9:00													
SDMF05	6/20/00	4:00	DUP	6	3010	42	8.4	11.00	0.15	2.50	4.98	0.80	0.014	65	30
	6/20/00	9:00													
			% Difference		**3.0**	**2.4**	**1.2**	**11.8**	**4.8**	**16.0**	**13.9**	**11.6**	**0.0**	**0.0**	**0.0**
LANF08	6/21/00	10:00	D	24	5370	33.0	8.3	32.00	<0.05	1.70	8.93	1.32		155	33
	6/22/00	9:00													
LANF08	6/21/00	10:00	DUP	24	5310	67.0	8.3	24.00	<0.05	1.40	6.82	1.10		160	42
	6/22/00	9:00													
			% Difference		**1.1**	**50.7**	**0.0**	**33.3**	**0.0**	**21.4**	**30.9**	**20.0**		**3.1**	**21.4**
Como	6/22/00	10:00	D	24	2820	2.0	8.4	79.00	<0.05	0.51	18.35	0.06		<10	<1
	6/23/00	9:00													
Como	6/22/00	10:00	DUP	24	2780	2.3	8.4	79.00	<0.05	0.69	18.53	0.06		<10	<1
	6/23/00	9:00													
			% Difference		**1.4**	**13.0**	**0.0**	**0.0**	**0.0**	**26.1**	**1.0**	**0.0**		**0.0**	**0.0**
Warner	6/23/00	10:00	D	24	2620	6.4	7.9	57.00	<0.05	0.43	13.30	0.73		12	7
	6/24/00	9:00													
Warner	6/23/00	10:00	DUP	24	2560	5.1	8.0	57.00	<0.05	0.73	13.60	0.70		<10	<1
	6/24/00	9:00													
			% Difference		**2.3**	**25.5**	**1.3**	**0.0**	**0.0**	**41.1**	**2.2**	**4.3**		**20.0**	**600.0**
MIRF07	6/24/00	10:00	D	24	1380	5.0	8.5	5.30	0.95	5.50	6.70	1.25		<10	<1
	6/25/00	9:00													
MIRF07	6/24/00	10:00	DUP	24	1390	12.0	8.5	5.30	0.94	5.51	6.71	1.19		<10	<1
	6/25/00	9:00													
			% Difference		**0.7**	**58.3**	**0.0**	**0.0**	**1.2**	**0.2**	**0.1**	**5.0**		**0.0**	**0.0**
LANF08	6/25/00	10:00	D	24	4930	17.0	8.3	21.00	0.14	1.40	6.14	0.98		33	26
	6/26/00	9:00													
LANF08	6/25/00	10:00	DUP	24	4910	19.0	8.3	22.00	0.14	1.60	6.57	1.04		24	11
	6/26/00	9:00													
			% Difference		**0.4**	**10.5**	**0.0**	**4.5**	**0.7**	**12.5**	**6.5**	**5.9**		**37.5**	**136.4**
RCWF26	6/26/00	10:00	D	24	1090	130	8.3	16.00	0.42	2.90	6.51	3.37	0.630	275	41
	6/27/00	9:00													
RCWF26	6/26/00	10:00	DUP	24	1080	29	8.3	14.00	0.41	2.80	5.96	3.06		254	40
	6/27/00	9:00													
			% Difference		**0.9**	**348.3**	**0.0**	**14.3**	**2.7**	**3.6**	**9.3**	**10.1**		**8.3**	**2.5**

Appendix D
Photos

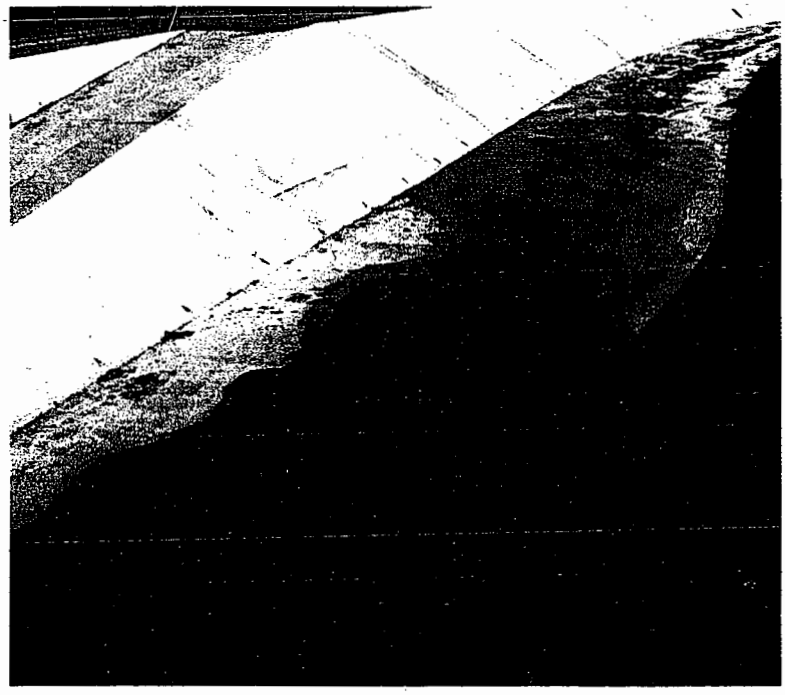

Peters Canyon Wash upstream of Rattlesnake Canyon Wash

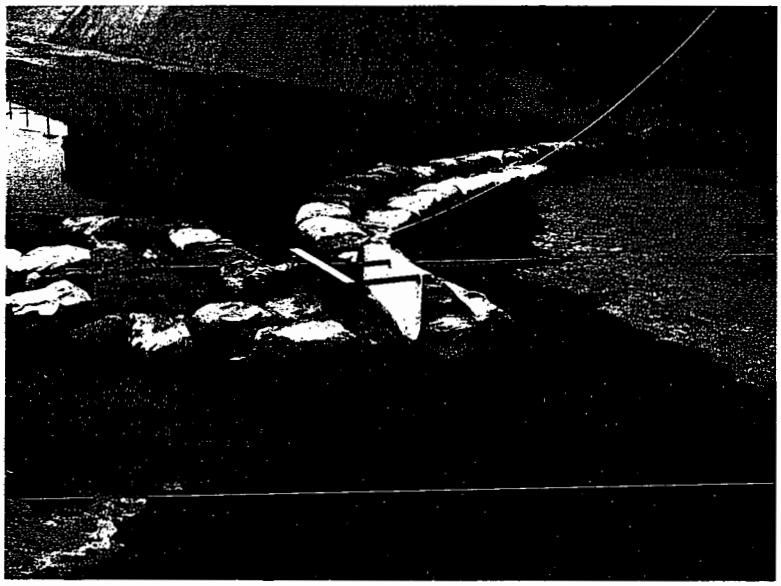

Peters Canyon Wash upstream of Rattlesnake Canyon Wash
12" Palmer Bowlus Flume and ISCO Bubbler Flowmeter

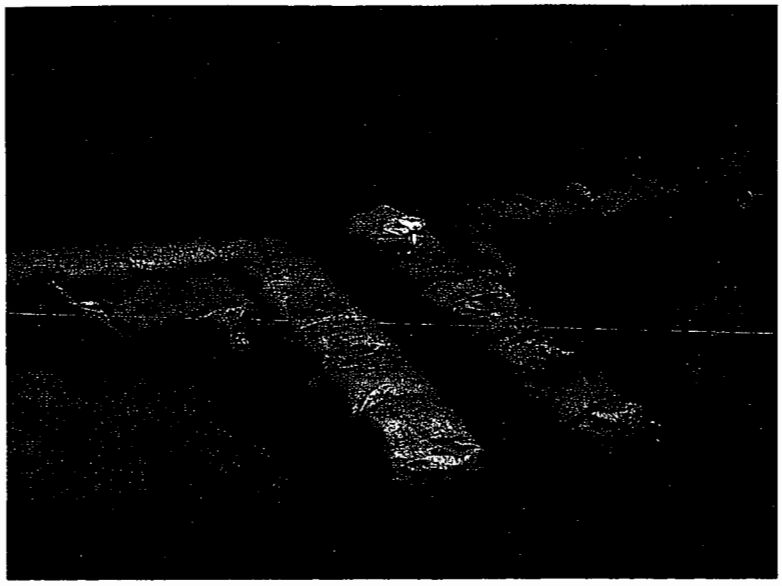

Rattlesnake Canyon Wash

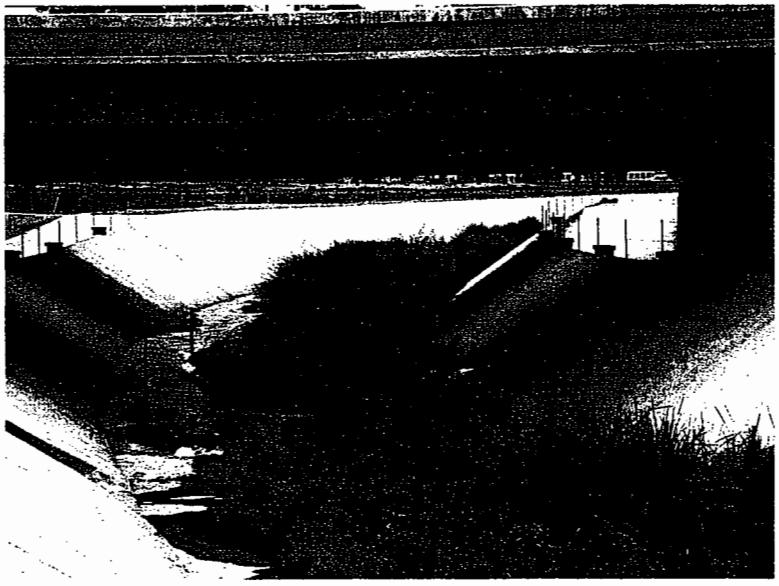

Peters Canyon Wash upstream of Irvine Boulevard looking downstream

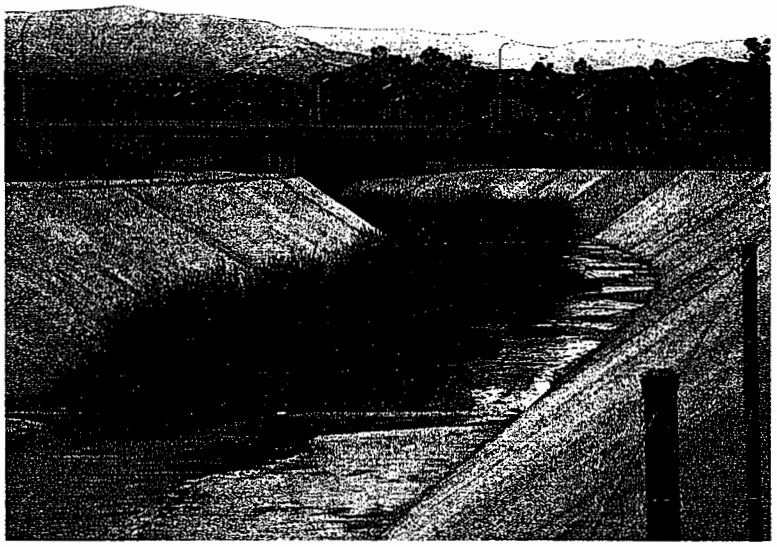

Peters Canyon Wash downstream of Irvine Boulevard looking upstream

65" RCP downstream of Bryan Avenue

Peters Canyon Wash downstream of 65" RCP outlet looking upstream

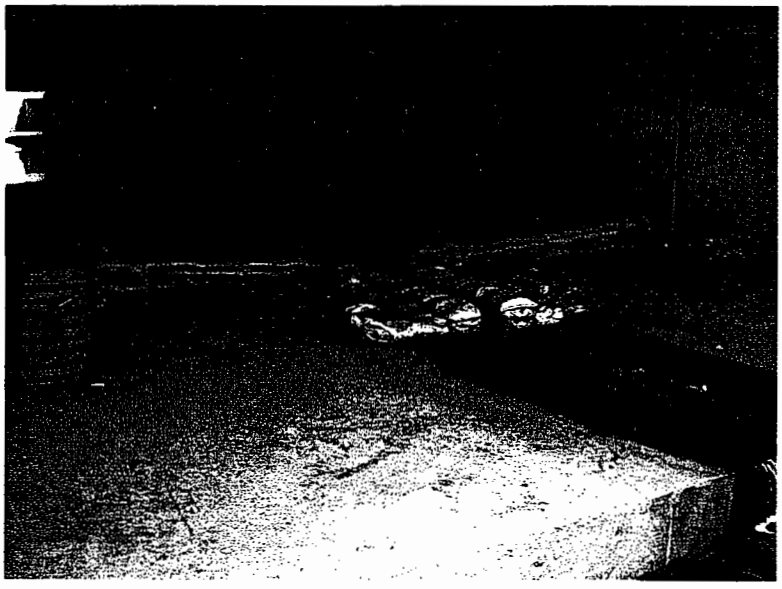

Central Irvine Channel beneath I-5
ISCO Area Velocity Flowmeter

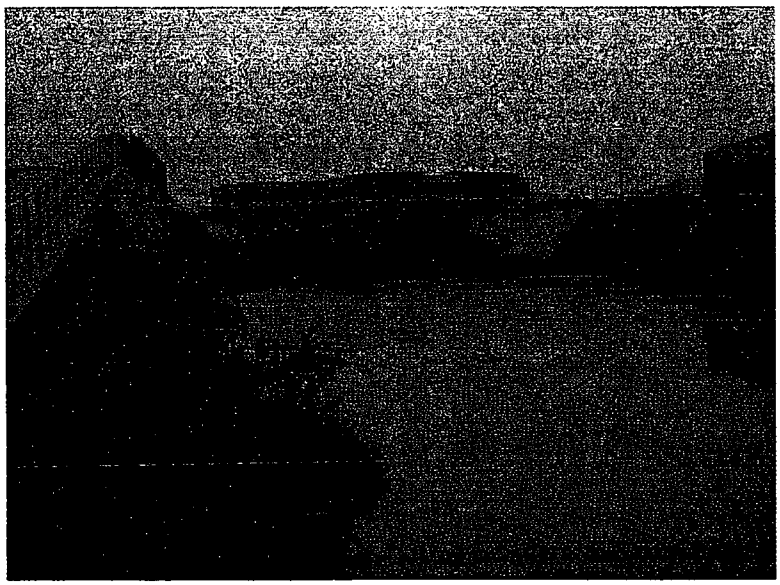

Peters Canyon Wash downstream of I-5 looking downstream

Peters Canyon Wash upstream of Walnut Avenue looking upstream

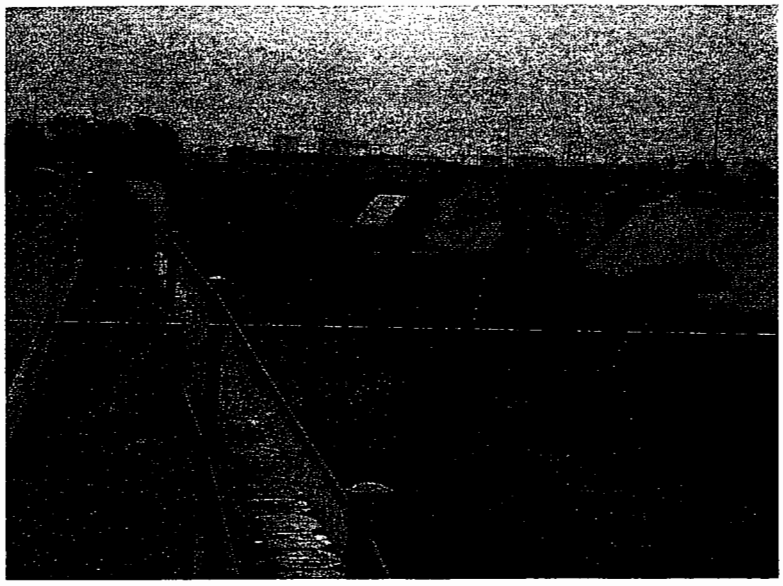

Peters Canyon Wash upstream of Walnut Avenue looking downstream

Peters Canyon Wash looking upstream from Como Storm Channel

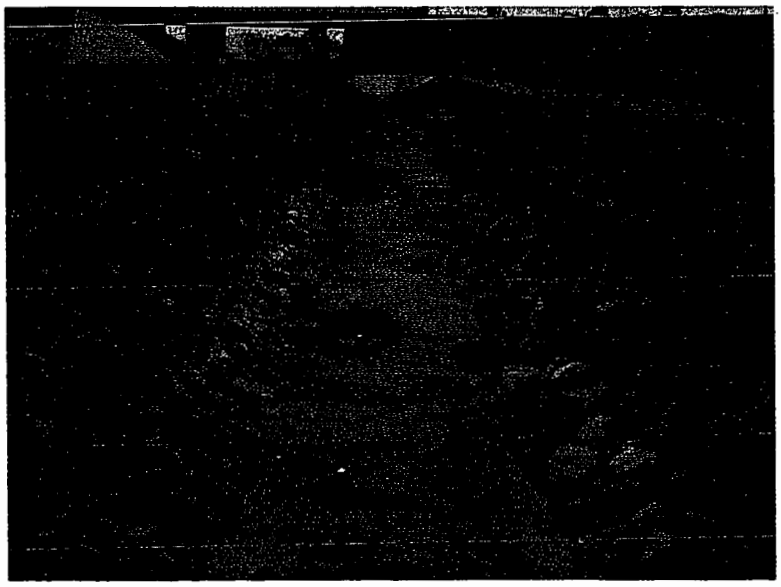

Como Storm Channel looking downstream toward Peters Canyon Wash

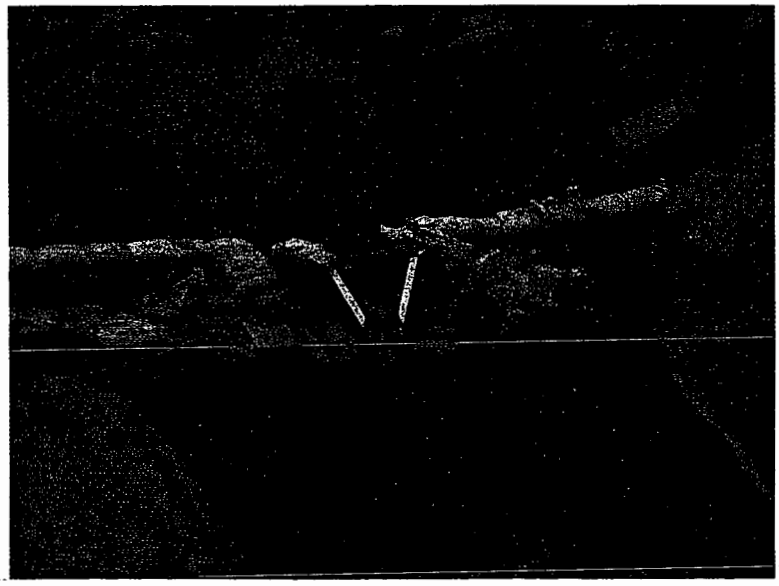

Como Storm Channel
1.5' H Flume with Bubbler Flowmeter

Peters Canyon Wash at Como Storm Channel looking downstream

Peters Canyon Wash at Moulton Parkway – F06P08 Stormdrain

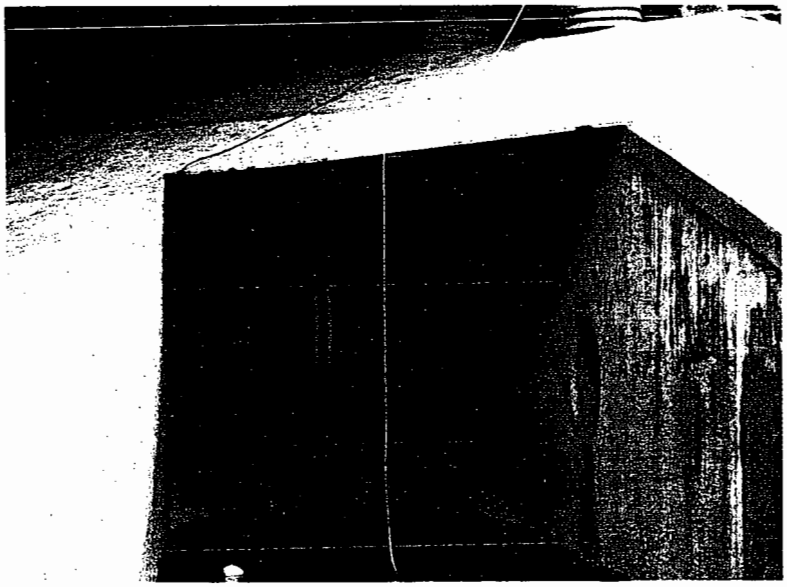

F06P08 Stormdrain
8" Palmer Bowlus Flume with Ultrasonic Flowmeter

Santa Ana – Santa Fe Channel at Peters Canyon Wash Confluence

Santa Ana – Santa Fe Channel
18" Palmer Bowlus Cutback Flume with Bubbler Flowmeter

Agricultural field near Jamboree and Moulton Parkway
Northeastern edge of MCAS Tustin

Valencia Storm Drain
6" Parshall Flume with Ultrasonic Flowmeter

Peters Canyon Wash downstream of Valencia Storm Drain looking downstream

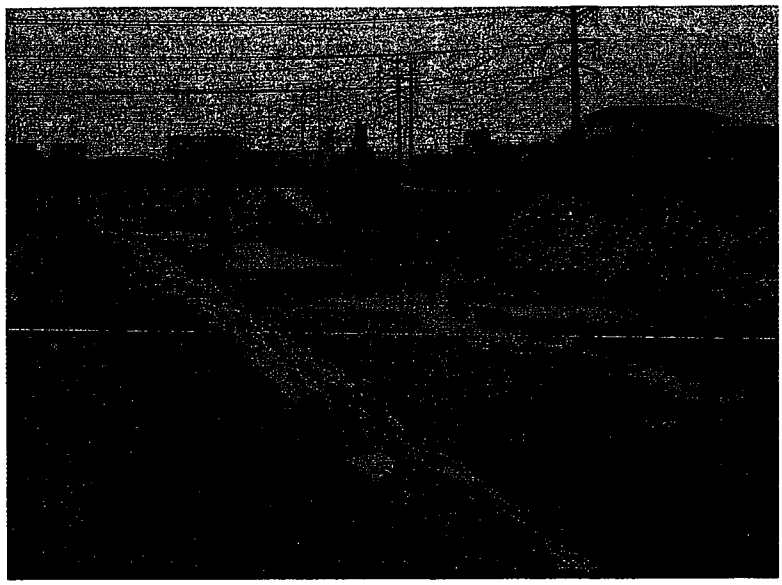

Peters Canyon Wash upstream Warner looking downstream

Peters Canyon Wash just upstream of Warner Storm Drain

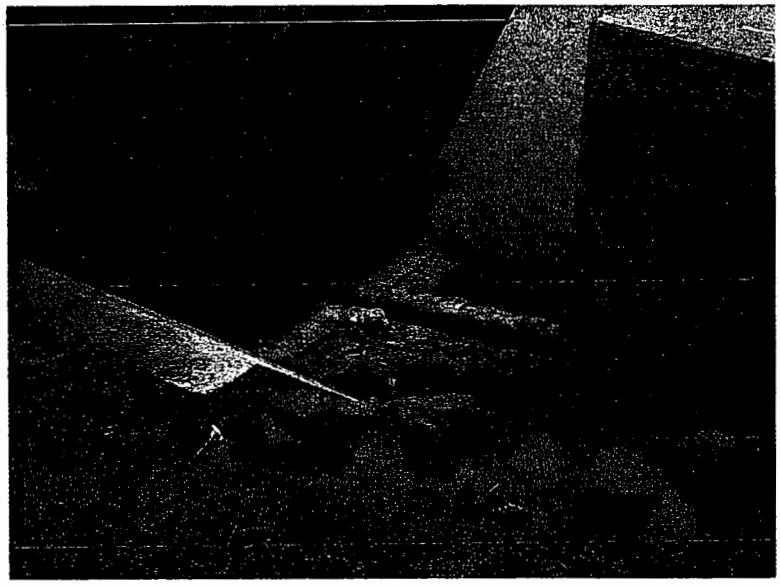

Warner Storm Drain
Area Velocity Flowmeter

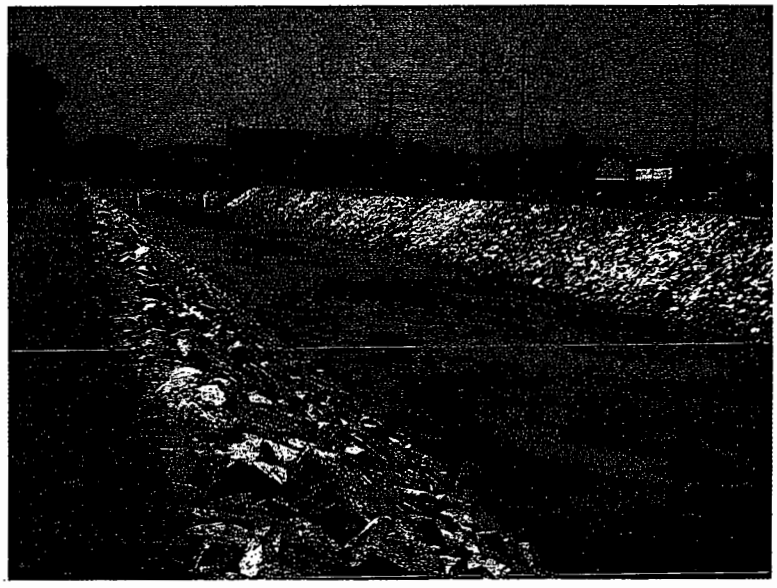

Peters Canyon Wash upstream of Barranca Parkway looking downstream

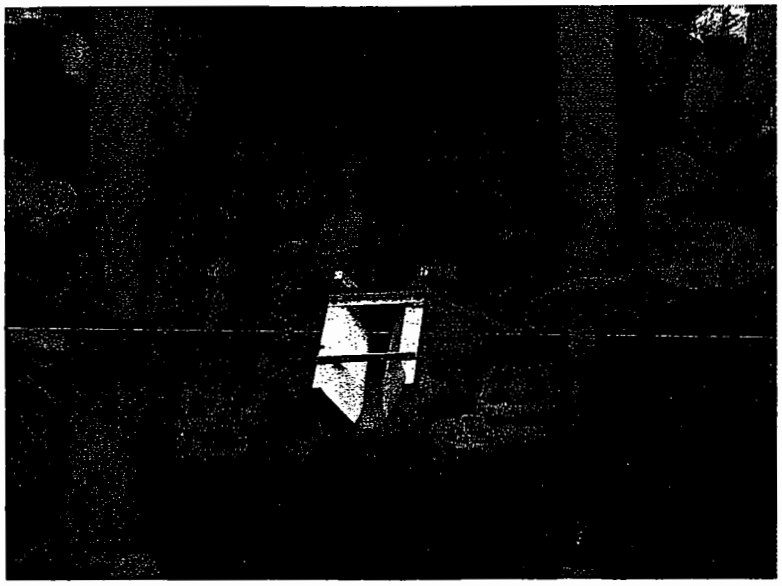

Construction Circle Drain
XL 60° V Trapezoidal Flume with Ultrasonic Flowmeter

Peters Canyon Wash at Barranca Parkway

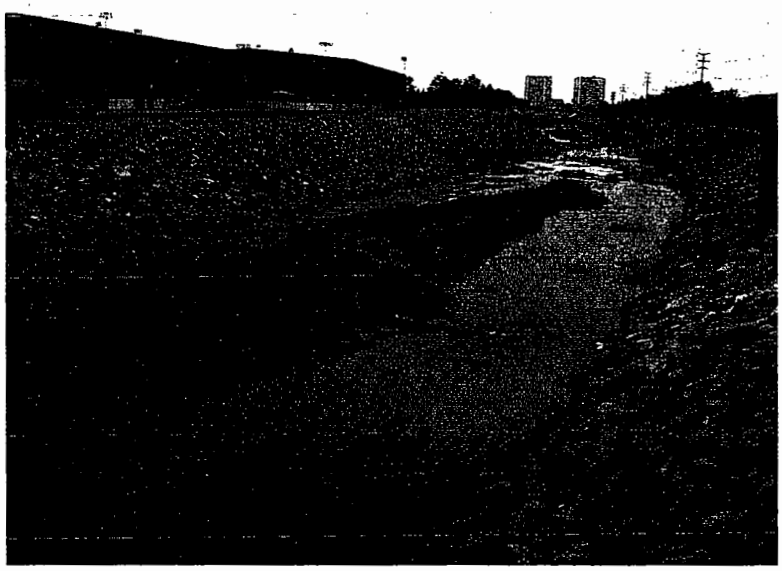

Peters Canyon Wash at Barranca Parkway looking downstream

San Diego Creek at Harvard Avenue

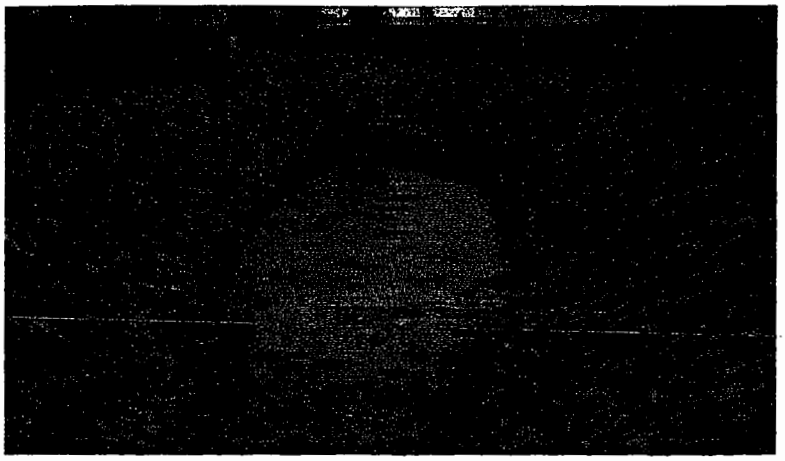

Barranca Channel looking upstream from Main Street

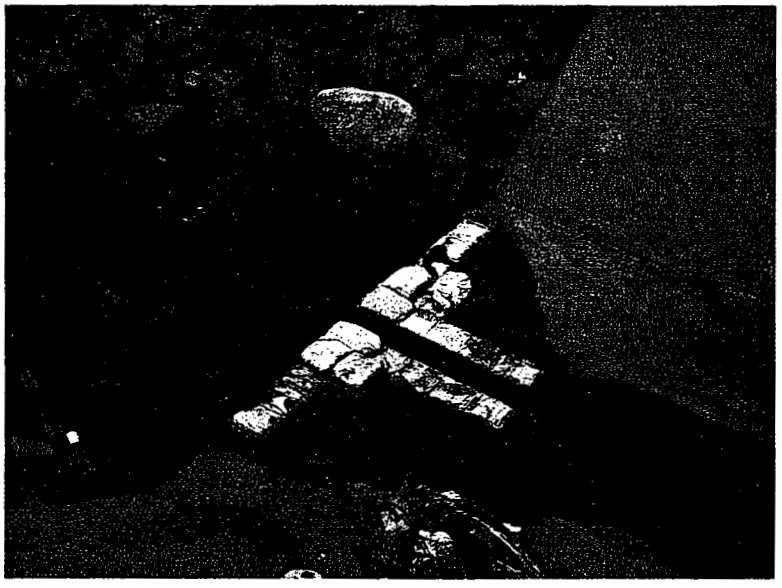

Barranca Channel at Main Street

Lane Channel upstream of Jamboree Boulevard

San Joaquin Channel looking downstream from Michaelson Avenue

San Diego Creek at Campus looking upstream

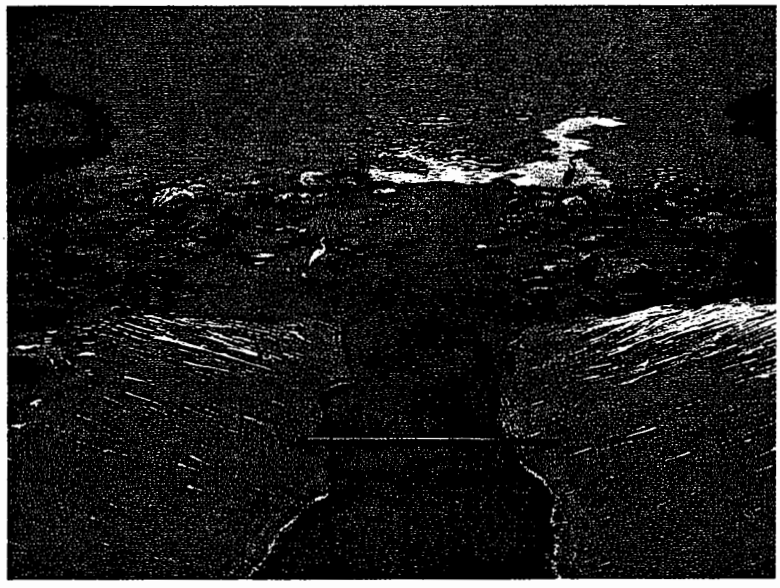

San Diego Creek at Campus below bridge

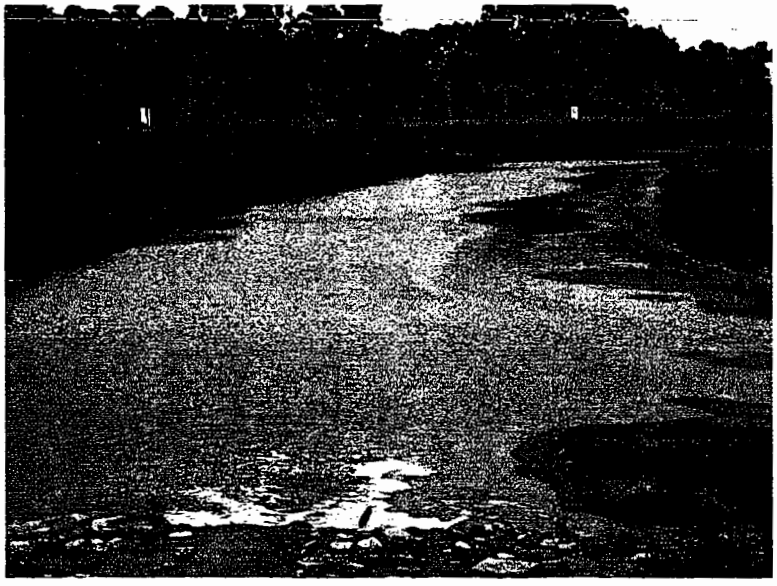

San Diego Creek looking downstream from Campus Drive

Appendix E
Crop Summary - UC Cooperative Extension

Agricultural Acreage Estimates for the County of Orange Nutrient Study 007057
June 2000
Source: UC Cooperative Extension (UCCE)

The acreage estimates below represent various agricultural activities that were most likely in place during the County of Orange Nutrient Study that was conducted in June 20-26, 2000. It should be noted that the acreage numbers are estimates and may be subject to error since no definitive drainage map or drain/channel outfall map was available at the time the records were compiled. The agricultural acreage numbers reported were compiled from the County of Orange Agricultural Commissioners records dated November 1999 and updated to reflect crops and acreage in place for June 2000. Since the study period occurred four months prior, every effort was made by UCCE to reconstruct the crop composition upstream of the sampling stations. Crops listed here as "miscellaneous crops" were recorded by the County Agricultural Commissioner as "misc. truck", "vegetable", and "misc. vegetable". In addition, if the actual crop that was in the ground at the time was unknown, UCCE designated these sites as "misc. crop".

The acreage estimates listed below each County sampling station reflect the maximum agricultural acreage that may have been a contributing surface water source during a significant storm event. Under dry conditions, such as during the June sampling period, agricultural runoff would have been minimal or non-existent from many sources. Crops that should have had no runoff during the sampling period include: box tree nurseries, avocados, strawberries, citrus, tomatoes, peppers, and cucumbers. This is based upon the maturity of the crop at the time of sampling and the method of irrigation applied (drip or micro).

The strawberry production season in the Newport Bay Watershed is finished in late June to early July depending on grower preference. The summer months are generally reserved for field tillage practices in preparation for September and October plantings. The acreage listed for strawberry production assumes that field preparation did not occur until after the June sampling period. Surface runoff, however, would be absent due to the continued use of drip irrigation as well as the decreased frequency of irrigation as the end of the growing season approaches.

Agricultural activities upstream of the Central Irvine Channel sampling station (4) include 603 acres of nursery operations that have current Waste Discharge Requirements (WDRs) from RWQCB.

Data provided for San Diego Creek at Harvard sampling station (20) includes acreage that occurs on channels that were not sampled under this study, such as acreage that occurs upstream at Bake and Dimension and acreage that occurs in Laguna Woods. Since much of this acreage occurs at input points well upstream of the County sampling station, there is some question as to whether or not nutrients added at these extreme points would degrade prior to reaching the County sampling point.

From the September 1999 sampling period to the June 2000 sampling period, the agricultural acreage in the Newport Bay Watershed decreased over 1000 cropped acres to an estimated total of 6461 acres.

1. Peters Canyon Wash u/s Hicks Canyon Confluence
   Estimated agricultural acreage: 935
   Composition:

Avocado	680 acres
Strawberry	131
Tomatoes	40
Fallow	84

2. Hicks Canyon Wash at PCW
   Estimated agricultural acreage: 102
   Composition:

Avocados	102 acres

3. 65" RCP d/s Bryan Avenue-PCW
   Estimated agricultural acreage: 150

Beans	115 (out of production after this crop)
Fallow	35

4. Central Irvine Channel at PCW
   Estimated agricultural acreage: 1905
   Composition:

Nursery	604 acres (WDRs issued for this acreage)
Peppers	70
Strawberries	817
Tomatoes	157
Beans	165
Misc. crops	92

5. El Modena Irvine Channel-PCW
   Estimated agricultural acreage: 65
   Composition:

Nursery	5 acres
Oranges	31
Avocados	5
Mixed orchard (Citrus/avocado)	24

6. Como Storm Channel-PCW
   Estimated agricultural acreage: 17
   Composition:

Misc. crops	4 acres
Fallow	10
Strawberry	3

7. Santa Ana-Santa Fe Channel (F10)
   Estimated agricultural acreage: 197
   Composition:

Misc. crops	192 acres
Mixed orchard (Citrus/avocado)	5

8. F06P08 (runs parallel to Irvine Ctr Dr.: enters PCW from opposite side that F10 does)
   None

9. Valencia Channel-PCW
   None

10. Warner Drain-PCW
    None

11. Construction Circle Drain-PCW
    None

12. Peters Canyon Wash at Barranca Pkwy
    Estimated agricultural acreage: 117
    Composition:

Strawberry	2 acres
Tomatoes	115

13. Agua Chinon Channel-SD Creek
    Estimated agricultural acreage: 320
    Composition:

Misc. crops	180 acres (includes Musick Facility)
Beans	100
Strawberry	40

14. Bee Canyon Channel-SD Creek
    Estimated agricultural acreage: 784
    Composition:

Avocados	384
Box Tree	40
Nursery	142
Misc. crops	19
Oranges	57
Strawberries	67
Fallow field	75

15. Marshburn Channel-SD Creek
    Estimated agricultural acreage: 398
    Composition:

Avocados	101
Box tree	22
Nursery	170
Strawberries	80
Peppers	25

16. Lane Channel -SD Creek
    Estimated agricultural acreage: 1
    Composition:

Nursery	1

17. Barranca Channel-SD Creek
    Estimated agricultural acreage: 94
    Composition:

Green beans	60
Misc. crops	34

18. San Joaquin Channel-SD Creek
    Estimated agricultural acreage: 164
    Composition:

Nursery	4
Tomatoes	160

19. Sand Canyon Channel -SD Creek
    None.

20. San Diego Creek at Harvard Avenue
    Estimated agricultural acreage: 603
    Composition:

Box tree	62
Green beans	110
Nursery	170
Misc. Crops	161
Strawberries	100

21. San Diego Creek at Campus Drive
    Estimated agricultural acreage: 177
    Composition:

Misc. crops	157
Nursery	20

Appendix 5.9
Tide, Rainfall and Runoff during Harbor and Bay Sampling

Newport Bay Sampling during a February 2000 Storm

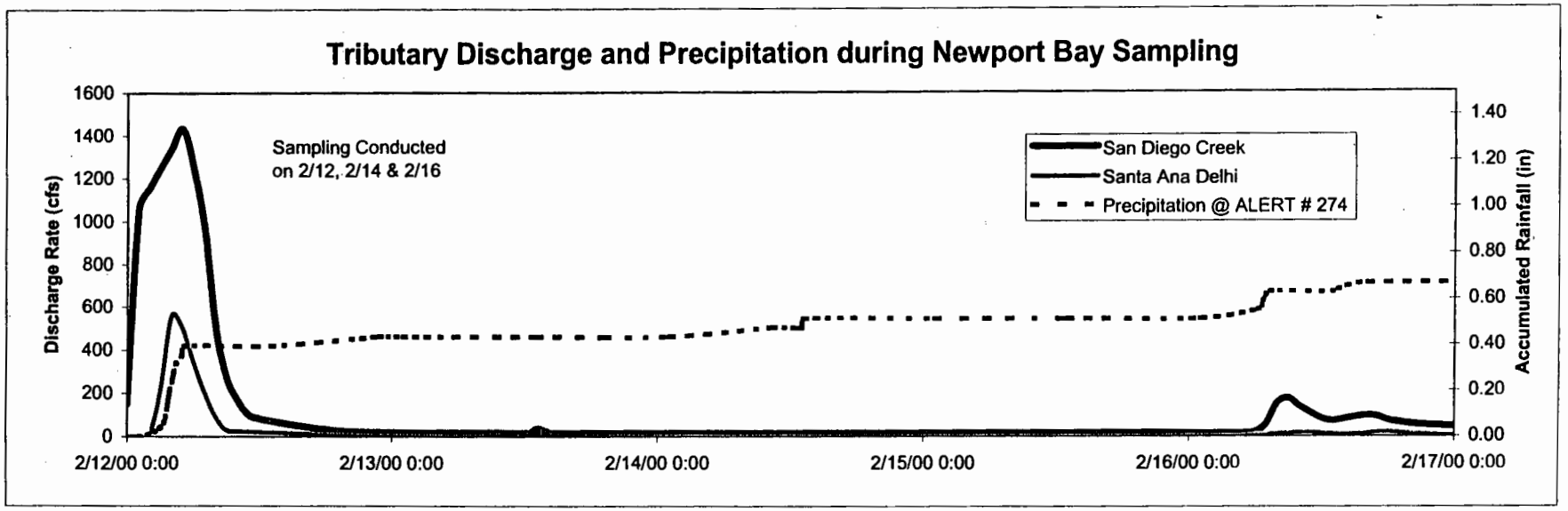

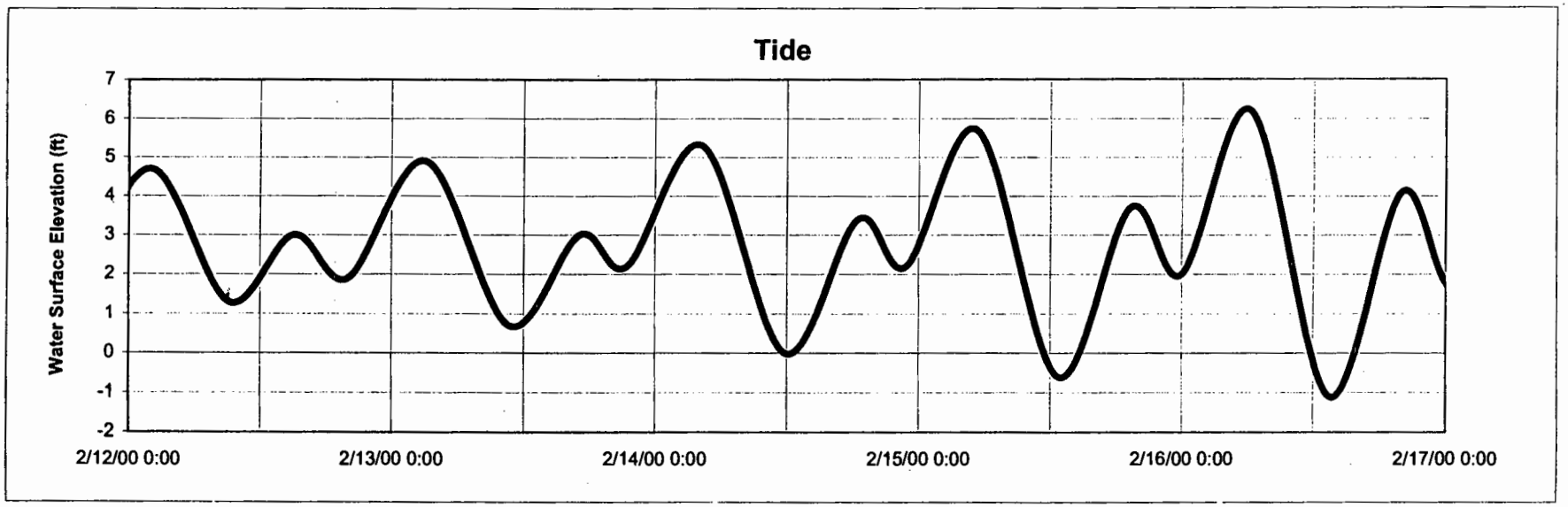

Huntington Harbour Sampling during a February 2000 Storm

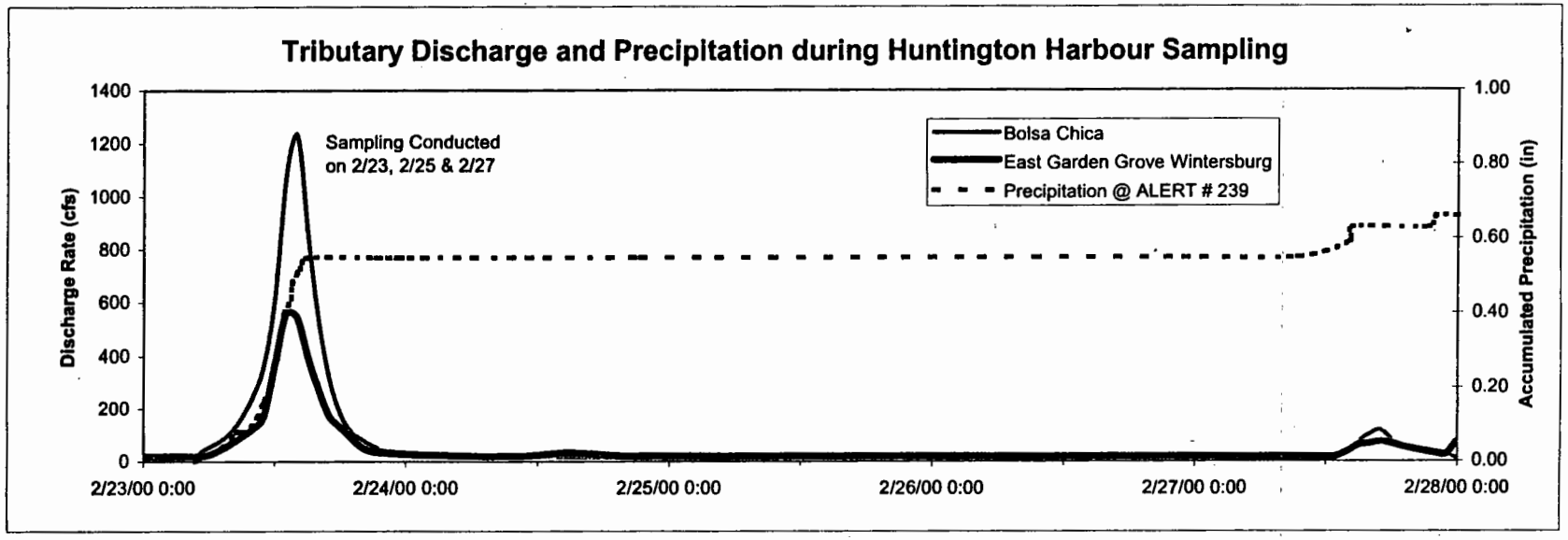

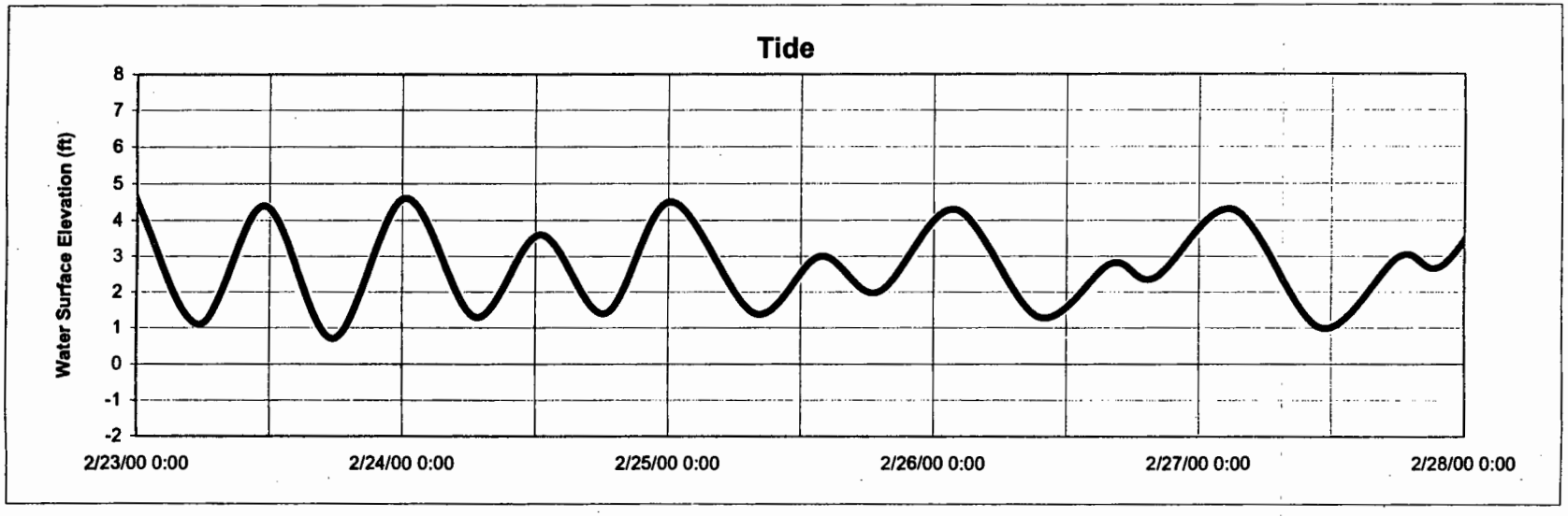

Bolsa Chica discharge includes Anaheim Barber City and Westminster Channels

Newport Bay Sampling during a March 2000 Storm

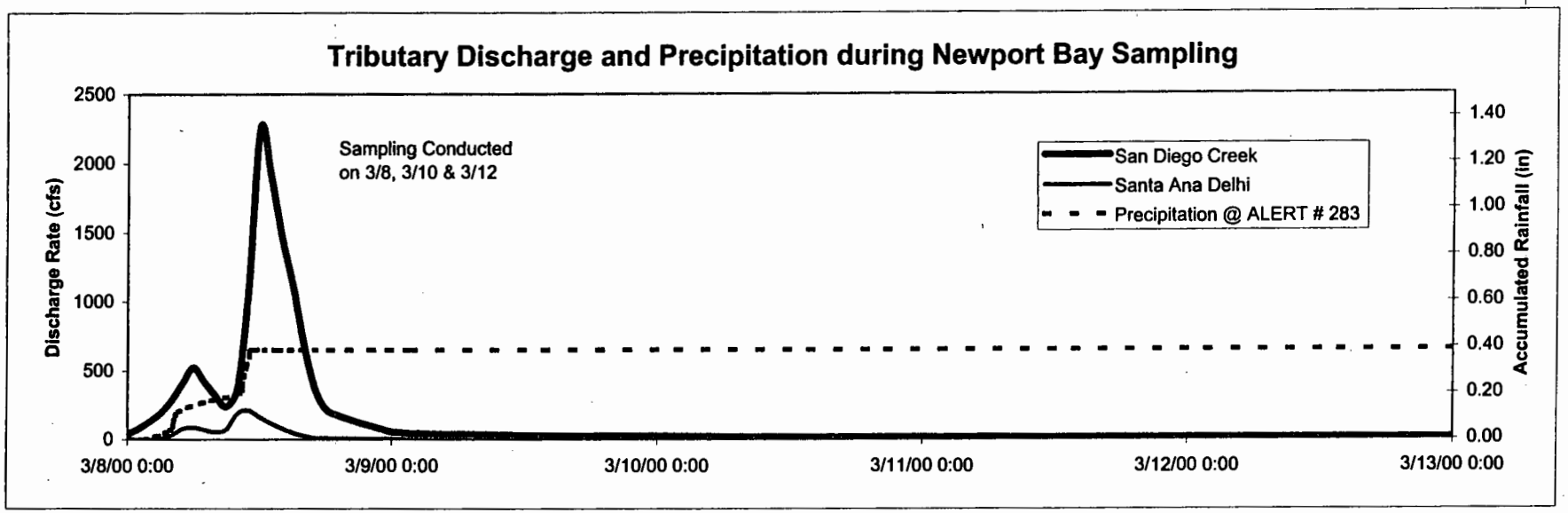

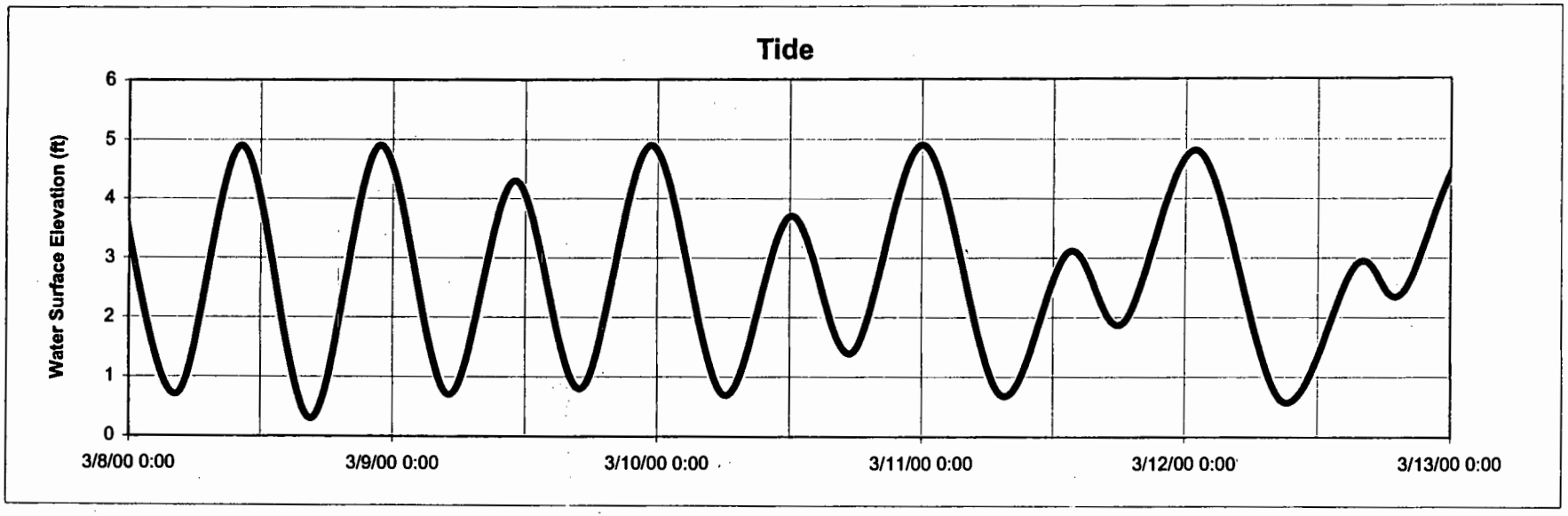

Appendix 5.10
Nutrient TMDL Data

STATION	DATE	TIME	SAMPLES Type	#	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Physicals Date	Time	EC umhos	pH	TEMP. (C)	DO mg/L
ACWF18	3/28/00	10:00	DT	1	1710	2.0	7.8	32.0	0.17	0.64	1.6	0.34	12	4						
	3/28/00		DF																	
	4/7/00	13:00	DT	1	1440	17.0	8.2	28.0	0.42	0.67	1.8	0.52	26	14	4/7/00	13:00	1018	8.1	22.6	9.4
	4/7/00		DT																	
	4/20/00	9:30	DT	1	800	14.0	9.9	24.0	0.14	0.54	2.1	0.11	38	16						
	4/20/00		DF																	
	5/11/00	11:10	DT	1	940	155.0	8.4	13.0	0.09	1.10	2.3	0.48	230	120	5/11/00	11:10	900	8.2	22.7	10.5
	5/11/00		DF																	
	6/7/00	11:00	DT	1	1050	59.5	8.5	11.0	0.06	0.91	1.8	0.46	130	92	6/7/00	11:00	1167	8.5	24.0	10.5
	6/7/00		DF																	
SADF01	2/4/00	10:00	DT	24	2330	19.0	8.1	15.0	0.06	0.97	0.34	0.04	11	4						
	2/5/00	23:00	DF																	
	2/10/00	0:39	ST	5	2640	2.3	8.1	16.0	<0.05	0.82	0.12	<0.01	6	4						
	2/10/00	1:39	SF																	
	2/10/00	3:39	ST	20	1140	65.0	7.6	8.9	0.22	2.00	1.19	0.08	160	50						
	2/11/00	7:39	SF																	
	2/11/00	11:39	DT	8	1150	9.2	7.9	11.0	<0.05	0.69	0.44	0.09	12	7						
	2/12/00	1:39	DF																	
	2/12/00	3:29	ST	6	305	100.0	7.6	4.1	0.24	1.70	1.49	0.12	220	90						
	2/12/00	13:39	SF																	
	2/12/00	8:46	DT	21	765	32.0	7.5	7.7	0.14	1.70	0.72	0.15	37	23						
	2/14/00	23:39	DF																	
	2/16/00	6:55	ST	9	495	45.0	7.5	7.7	0.13	2.20	0.86	0.12	62	36						
	2/17/00	0:55	SF																	
	2/17/00	9:50	DT	31	2100	6.1	8.2	15.0	<0.05	0.84	0.34	0.07	14	7						
	2/20/00	4:32	DF																	
	2/29/00	10:48	DT	24	2420	2.2	8.2	23.0	0.06	0.79	0.18	0.04	8	4	3/2/00	9:11	2361	7.7	14.3	10.9
	3/2/00	8:48	DT																	
	3/3/00	19:40	ST	5	750	32.0	7.4	12.0	0.67	2.30	0.64	0.04	70	58	3/5/00	12:40	112	7.2	12.5	11.1
	3/3/00	20:40	SF																	
	3/3/00	22:40	ST	9	535	37.0	7.6	8.1	0.24	1.30	0.58	0.07	56	38						
	3/4/00	14:40	SF																	
	3/4/00	16:40	DT	10	330	45.0	7.6	6.9	0.30	1.20	0.83	0.12	76	32						
	3/5/00	10:40	DF																	
	3/5/00	12:40	ST	1				1.9	0.08	0.94	0.98	0.16								
	3/5/00	12:40	SF																	
	3/6/00	18:40	DT	18	2200	5.4	8.2	25.0	<0.05	0.71	0.49	0.08	13	6						
	3/8/00	2:40	DF																	
	3/8/00	4:40	ST	11	585	50.0	7.7	5.5	0.10	1.00	0.83	0.09	66	28	3/9/00	12:30	na	8.0	17.3	14.7
	3/9/00	0:40	SF																	
	3/22/00	11:48	DT	22	2850	3.3	8.2	22.0	<0.05	0.88	0.14	<0.01	30	10	3/23/00	8:30	2810	7.9	16.3	14.9
	3/23/00	8:48	DF																	
	4/4/00	12:58	DT	24	2380	2.3	8.2	14.0	<0.05	1.10	0.21	0.02	110	68	4/5/00	12:30	1910	8.0	17.0	12.1
	4/5/00	11:58	DF																	
	4/20/00	11:30	DT	1	2220	1.5	8.0	19.0	0.07	0.70	0.46	0.10	20	12	4/20/00	11:30	2190	8.0	20.3	9.9
	4/20/00	11:30	DF																	
	5/4/00	10:42	DT	24	2610	6.4	8.2	14.0	0.12	1.00	0.34	0.15	46	26	5/5/00	11:00	2410	8.2	20.9	10.9
	5/5/00	9:42	DF																	
	5/30/00	12:15	DT	24	2070	2.8	8.3	10.0	<0.05	0.55	0.15	0.01	13	7						
	5/31/00	11:15	DF																	
	6/6/00	12:22	DT	24	930	10.0	8.4	1.9	0.06	1.20	0.25	0.02	26	18	6/7/00	12:23	890	8.7	29.4	11.3
	6/7/00	11:22	DF																	
	6/27/00	13:15	DT	1	2330	9.5	8.0	10.0	<0.05	0.63	0.18	0.02	<10	<1						
	6/27/00	13:15																		

STATION	DATE	TIME	SAMPLES Type	#	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Physicals Date	Time	EC umhos	pH	TEMP. (C)	DO mg/L
BARSED	2/10/00	13:26	ST	2	1700	60.0	8.3	58.0	0.05	3.60	2.75		120	104						
	2/10/00	14:26	SF									0.54								
	2/10/00	15:26	ST	10	1150	250.0	7.8	34.0	0.42	2.60	3.27		430	230						
	2/11/00	0:26	SF									0.34								
	2/11/00	10:00	DT	5	1550	45.0	7.9	66.0	0.07	1.80	2.11		63	50						
	2/11/00	18:00	DF									0.56								
	2/16/00	7:10	ST	2	970	320.0	7.8	31.0	0.13	3.50	3.55		1980	830						
	2/16/00	8:10	SF									0.17								
	2/16/00	9:10	ST	4	755	210.0	7.7	19.0	0.31	2.00	2.23		350	140						
	2/16/00	12:10	SF									0.29								
	2/17/00	8:40	DT	17	2130	31.0	8.1	66.0	<0.05	1.20	1.01		58	34						
	2/18/00	22:13	DF									0.23								
	2/27/00	15:57	SF	5	1620	220.0	7.9	39.0	<0.05	2.00	2.02		410	260						
	2/27/00	16:57	ST									0.10								
	2/27/00	18:57	SF	8	1300	75.0	7.9	31.0	0.07	1.30	0.98		140	60						
	2/28/00	8:57	ST									0.15								
	2/29/00	9:57	DT	28	2030	17.0	8.3	65.0	<0.05	0.73	0.58		31	19	3/3/00	12:18	2660	8.1	21.3	15.4
	3/2/00	17:46	DF									0.16								
	3/3/00	20:46	ST	5	635	500.0	7.6	22.0	0.66	4.10	4.28		900	500	3/5/00	12:20	187	9.5	13.1	10.9
	3/3/00	21:46	SF									0.11								
	3/3/00	1:16	ST	8	1320	100.0	7.7	47.0	1.01	2.20	2.11		210	100						
	3/4/00	15:16	SF									0.34								
	3/4/00	17:16	DT	10	870	130.0	7.7	27.0	0.47	1.50	1.93		250	180						
	3/5/00	17:16	DF									0.30								
	3/5/00	13:16	ST	9	745	330.0	7.7	22.0	0.28	2.20	3.37		570	410						
	3/6/00	5:16	SF									0.41								
	3/6/00	7:16	DT	23	2310	29.0	8.2	69.0	<0.05	0.99	0.92		42	24	3/7/00	10:00	1500	7.5	14.7	9.6
	3/8/00	3:16	DF									0.23								
	3/8/00	5:16	ST	10	685	300.0	7.9	18.0	0.08	1.60	2.60		390	80	3/9/00	10:45	2350	7.8	17.8	9.2
	3/9/00	23:16	SF									0.22								
	3/14/00	9:30	DT	24	3110	7.6	8.3	77.0	0.37	2.40	0.15		<4	<1						
	3/15/00	8:30	DF									0.08								
	3/28/00	9:16	DT	24	2820	7.0	8.6	110.0	1.15	1.80	0.92		42	20	3/29/00	8:08	3139	8.3	16.1	17.5
	3/29/00	8:16	DF									0.16								
	4/4/00	12:27	DT	22	2840	21.0	8.7	140.0	2.05	3.40	2.26		56	28	4/5/00	9:30	2730	8.4	17.3	19.9
	4/5/00	9:27	DF									0.57								
	4/17/00	15:32	ST	5	1200	375.0	7.8	37.0	0.12	14.00	7.65		1460	1110						
	4/17/00	16:32	SF																	
	4/17/00	18:32	ST	3	400	194.0	7.4	24.0	<0.05	3.60	3.98		460	200						
	4/17/00	22:32	SF																	
	4/18/00	0:32	DT	3				46.0	<0.05	1.10	2.30									
	4/18/00	4:32	DF																	
	4/18/00	6:32	ST	8				46.0	<0.05	1.90	3.67				4/20/00	14:35	990	7.9	21.0	11.4
	4/18/00	20:32	SF									0.39								
	4/18/00	22:32	DT	27	2460	16.0	8.4	93.0	0.20	0.64	1.50		70	40	4/21/00	13:00	1420	7.9	18.4	13.4
	4/21/00	16:32	DF									0.28								
	5/4/00	11:15	DT	24	2410	16.0	8.4	190.0	10.60	9.40	3.98		44	16	5/5/00	13:15	2220	8.0	20.3	12.5
	5/5/00	10:15	DF									0.90								
	5/11/00	10:40	DT	1	2640	12.0	8.4	130.0	2.85	5.00	2.36		32	14	5/11/00	10:40	2430	8.1	22.3	13.9
	5/11/00	10:40	DF									0.66								
	6/6/00	10:09	DT	24	2490	16.0	8.6	54.0	<0.05	1.80	0.70		66	48	6/7/00	13:55	2511	6.5	26.3	11.8
	6/7/00	9:19	DF									0.12								
	8/19/00	11:00	DT/DF	5	2350	27.0	8.6	44.0	0.07	1.40	0.73	0.09	50	20						
	6/19/00	15:00	DT/DF																	
	6/19/00	16:00	DT/DF	6	2310	13.0	8.7	48.0	<0.05	0.83	0.70	0.15	25	17						
	6/19/00	21:00	DT/DF																	

STATION	DATE	TIME	SAMPLES Type	#	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Physicals Date	Time	EC umhos	pH	TEMP. (C)	DO mg/L
BARSED	6/19/00	22:00	DT/DF	6	2360	13.0	8.3	44.0	0.06	1.30	0.80	0.18	21	16						
	6/20/00	3:00	DT/DF																	
	6/20/00	4:00	DT/DF	6	2400	27.0	8.3	44.0	0.05	1.10	0.80	0.13	61	25						
	6/20/00	9:00	DT/DF																	
	6/20/00	10:00	DT/DF	6	2170	30.0	8.6	37.0	<0.05	1.20	0.98	0.12	72	23						
	6/20/00	15:00	DT/DF																	
	6/20/00	16:00	DT/DF	3				38.0	<0.05	0.77	0.67	0.12								
	6/20/00	18:00	DT/DF																	
	6/21/00	10:00	DT/DF	6	2480	23.0	8.5	44.0	<0.05	0.63	0.58	0.10	44	16						
	6/21/00	15:00																		
	6/21/00	16:00	DT/DF	6	2440	32.0	8.5	48.0	<0.05	0.70	0.70	0.13	41	12						
	6/21/00	21:00																		
	6/21/00	22:00	DT/DF	6	2530	6.2	8.3	44.0	<0.05	0.60	0.70	0.16	<10	<1						
	6/22/00	3:00																		
	6/22/00	4:00	DT/DF	6	2610	4.0	8.2	48.0	0.05	0.71	0.67	0.14	<10	<1						
	6/22/00	9:00																		
	6/22/00	10:00	DT/DF	6	2690	11.0	8.5	42.0	<0.05	0.87	0.55	0.10	<10	<1						
	6/22/00	15:00																		
	6/22/00	16:00	DT/DF	6	2400	23.0	8.4	40.0	<0.05	1.10	0.61	0.10	12	12						
	6/22/00	21:00																		
	6/22/00	22:00	DT/DF	6	2700	6.9	8.2	40.0	<0.05	0.80	0.70	0.15	<10	<1						
	6/23/00	3:00																		
	6/23/00	4:00	DT/DF	6	2740	9.5	8.1	42.0	0.06	1.10	0.70	0.13	14	10						
	6/23/00	9:00																		
	6/23/00	10:00	DT/DF	6	2590	7.5	8.5	44.0	<0.05	0.87	0.46	0.09	13	2						
	6/23/00	15:00																		
	6/23/00	16:00	DT/DF	6	2570	9.7	6.5	30.0	<0.05	0.89	0.52	0.11	<10	<1						
	6/23/00	21:00																		
	6/23/00	22:00	DT/DF	6	2620	9.7	8.2	44.0	<0.05	4.00	0.64	0.13	13	6						
	6/24/00	3:00																		
	6/24/00	4:00	DT/DF	6	2580	50.0	8.3	44.0	0.05	0.98	0.77	0.14	41	10						
	6/24/00	9:00																		
	6/24/00	10:00	DT/DF	6	2530	11.0	8.0	33.0	<0.05	1.30	0.49	0.11	15	6						
	6/24/00	15:00																		
	6/24/00	16:00	DT/DF	6	2470	9.3	8.6	28.0	<0.05	1.40	0.67	0.17	11	9						
	6/24/00	21:00																		
	6/24/00	22:00	DT/DF	6	2490	10.3	8.2	31.0	<0.05	0.98	0.64	0.16	18	13						
	6/25/00	3:00																		
	6/25/00	4:00	DT/DF	6	2600	6.5	8.2	40.0	0.06	1.10	0.58	0.15	<10	<1						
	6/25/00	9:00																		
	6/25/00	10:00	DT/DF	6	2570	7.6	8.5	44.0	<0.05	1.50	0.52	8.10	<10	<1						
	6/25/00	15:00																		
	6/25/00	16:00	DT/DF	6	2600	8.6	8.5	44.0	<0.05	1.30	0.67	0.14	<10	<1						
	6/25/00	21:00																		
	6/25/00	22:00	DT/DF	6	2650	8.4	8.2	44.0	<0.05	1.10	0.67	0.17	11	9						
	6/26/00	3:00																		
	6/26/00	4:00	DT/DF	6	2710	14.0	8.2	48.0	<0.05	0.76	0.67	0.16	13	7						
	6/26/00	9:00										<0.01								
	6/26/00	10:00	DT/DF	6	2490	36.0	8.5	48.0	<0.05	1.10	0.77	0.09	43	13						
	6/26/00	15:00																		
	6/26/00	16:00	DT/DF	3	2460	15.0	8.6	44.0	0.13	0.70	0.73		23	15						
	6/26/00	18:00																		
	6/26/00	23:00	DT/DF	5	2510	12.0	8.2	41.0	0.07	0.61	0.73	0.15	15	7						
	6/27/00	3:00																		
	6/27/00	4:00	DT/DF	6	2580	15.0	8.2	44.0	0.06	0.94	0.67	0.13	20	1						
	6/27/00	9:00																		

STATION	DATE	TIME	SAMPLES Type	#	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Physicals Date	Time	EC umhos	pH	TEMP. (C)	DO mg/L
WYLSED	2/2/00	10:20	DT	24	1770	126.0	8.3	53.0	0.20	2.00	1.25	0.10	200	90						
	2/3/00	9:20	DF																	
	2/9/00	13:43	DT	16	1790	120.0	8.4	60.0	0.19	1.80	1.24	0.07	220	56						
	2/10/00	18:43	DF																	
	2/29/00	9:15	DT	23	2980	6.3	8.3	85.0	0.06	0.64	0.67	0.17	12	5	3/2/00	11:25	1630	7.6	18.4	16.2
	3/2/00	5:15	DT																	
	3/4/00	10:35	ST	10	620	200.0	7.6	21.0	0.19	1.60	2.17	0.28	330	210						
	3/5/00	10:35	SF																	
	3/5/00	12:35	ST	13	590	450.0	7.8	11.0	0.08	2.10	3.37	0.41	570	300						
	3/6/00	12:35	SF																	
	3/6/00	14:35	DT	15	1220	55.0	8.2	27.0	<0.05	1.40	1.29	0.27	80	51	3/7/00	9:30	950	7.5	13.5	8.3
	3/8/00	2:35	DF																	
	3/8/00	4:35	ST	12	595	400.0	8.0	11.0	<0.05	2.20	2.82	0.21	590	290	3/9/00	10:30	775	7.9	14.9	11.6
	3/9/00	2:35	SF																	
	3/22/00	12:11	DT	21	2100	7.2	8.2	68.0	0.15	1.30	<0.061	0.02	34	14	3/23/00	8:15	2810	7.9	14.8	12.9
	3/23/00	8:11	DF																	
	4/5/00	9:15	DT	1	2010	1.2	8.1	66.0	0.09	0.75	<0.061	0.01	7	3	4/5/00	9:15	3210	8.2	16.1	14.5
	4/5/00	9:15	DF																	
	4/20/00	14:00	DT	1	1490	20.0	8.5	47.0	<0.05	86.0	95.00	0.22	130	12	4/20/00	14:00	1650	8.4	25.6	14.3
	4/20/00	14:00	DF																	
	5/4/00	11:42	DT	24	1870		8.3	59.0	<0.05	0.76	0.12	0.17	11	6	5/5/00	13:30	1790	8.3	19.8	8.7
	5/5/00	10:42	DF																	
	5/30/00	11:42	DT	24	1980	6.2	8.3	75.0	<0.05	0.76	0.15	<0.01	24	9						
	5/31/00	10:42	DF																	
	6/6/00	10:03	DT	24	2070	4.1	8.3	73.0	<0.05	0.90	0.09	<0.01	12	6	6/7/00	13:30	3210	8.4	24.9	10.9
	6/7/00	9:03	DF																	
	6/19/00	16:00	DT/DF	6	1980	3.0	8.3	75.0	<0.05	0.68	0.09	<0.01	<10	<1						
	6/19/00	21:00	DT/DF																	
	6/19/00	22:00	DT/DF	6	2030	2.6	8.1	75.0	<0.05	0.65	0.15	<0.01	<10	<1						
	6/20/00	3:00	DT/DF																	
	6/20/00	4:00	DT/DF	4	2010	1.4	8.0	70.0	<0.05	0.68	0.15	<0.01	<10	<1						
	6/20/00	7:00	DT/DF																	
	6/20/00	10:00	DT/DF	6	1750	7.9	8.2	62.0	<0.05	0.67	0.12	0.01	52	22						
	6/20/00	15:00	DT/DF																	
	6/20/00	16:00	DT/DF	6	1680	4.2	8.3	37.0	<0.05	0.60	0.18	<0.01	14	9						
	6/20/00	21:00	DT/DF																	
	6/20/00	22:00	DT/DF	6	1790	4.0	8.1	79.0	<0.05	0.55	0.09	<0.01	<10	<1						
	6/21/00	3:00	DT/DF																	
	6/20/00	10:00	DT/DF	6				38.0	<0.05	0.20	0.12	<0.01								
	6/20/00	15:00	DT/DF																	
	6/21/00	4:00	DT/DF	6	1800	3.0	8.1	62.0	<0.05	0.48	0.12	0.01	<10	<1						
	6/21/00	9:00	DT/DF																	
	6/21/00	10:00	DT/DF	6	2000	4.7	8.3	66.0	<0.05	1.10	0.21	0.01	28	13						
	6/21/00	15:00																		
	6/21/00	16:00	DT/DF	6	1970	5.0	6.3	66.0	<0.05	0.94	0.12	<0.01	<10	<1						
	6/21/00	21:00																		
	6/21/00	22:00	DT/DF	6	2020	2.4	8.2	70.0	<0.05	0.80	0.12	<0.01	<10	<1						
	6/22/00	3:00																		
	6/22/00	4:00	DT/DF	6	2060	2.3	8.2	66.0	<0.05	0.68	0.09	<0.01	<10	<1						
	6/22/00	9:00																		
	6/22/00	10:00	DT/DF	6	1960	6.6	8.3	62.0	<0.05	0.82	0.09	<0.01	17	10						
	6/22/00	15:00																		
	6/22/00	16:00	DT/DF	6	2080	5.1	8.4	70.0	<0.05	0.87	0.09	<0.01	<10	<1						
	6/22/00	21:00																		

STATION	DATE	TIME	SAMPLES Type	#	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Physicals Date	Time	EC umhos	pH	TEMP. (C)	DO mg/L
WYLSED	6/22/00	22:00	DT/DF	6	2190	3.7	8.2	79.0	<0.05	0.71	0.12	<0.01	<10	<1						
	6/23/00	3:00																		
	6/23/00	4:00	DT/DF	6	2290	3.6	7.5	37.0	<0.05	0.63	0.12	<0.01	<10	<1						
	6/23/00	9:00																		
	6/23/00	10:00	DT/DF	6	2040	8.7	8.3	17.0	<0.05	1.10	0.12	<0.01	19	4						
	6/23/00	15:00																		
	6/23/00	16:00	DT/DF	6	2020	7.6	6.3	13.0	<0.05	0.90	0.12	<0.01	13	4						
	6/23/00	21:00																		
	6/23/00	22:00	DT/DF	6	2070	7.8	8.2	30.0	0.06	0.94	0.09	<0.01	19	11						
	6/24/00	3:00																		
	6/24/00	4:00	DT/DF	6	2090	6.2	8.2	19.0	<0.05	1.00	0.15	<0.01	<10	<1						
	6/24/00	9:00																		
	6/24/00	10:00	DT/DF	6	2100	4.5	8.3	75.0	<0.05	0.86	0.09	0.01	<10	<1						
	6/24/00	15:00																		
	6/24/00	16:00	DT/DF	6	2090	6.6	8.3	75.0	<0.05	0.92	0.12	0.01	<10	<1						
	6/24/00	21:00																		
	6/24/00	22:00	DT/DF	6	2150	11.0	8.2	75.0	0.06	0.76	0.15	0.01	<10	<1						
	6/25/00	3:00																		
	6/25/00	4:00	DT/DF	6	2180	5.3	8.2	66.0	<0.05	0.80	0.12	0.01	<10	<1						
	6/25/00	9:00																		
	6/25/00	10:00	DT/DF	8	2040	11.0	8.3	14.0	<0.05	1.00	0.21		18	6						
	6/25/00	15:00																		
	6/25/00	16:00	DT/DF	6	2030	5.8	8.3	21.0	<0.05	1.10	0.21	<0.01	11	9						
	6/25/00	21:00																		
	6/25/00	22:00	DT/DF	6	2100	4.2	8.1	19.0	0.07	0.97	0.12	0.01	<10	<1						
	6/26/00	3:00																		
	6/26/00	4:00	DT/DF	6	2090	5.6	8.2	29.0	<0.05	0.74	0.12	0.01	<10	<1						
	6/26/00	9:00																		
	6/26/00	10:00	DT/DF	6	2060	5.1	8.3	62.0	<0.05	0.64	0.09	<0.01	16	9						
	6/26/00	15:00																		
	6/26/00	16:00	DT/DF	6	2150	5.5	8.2	79.0	<0.05	0.53	0.06	<0.01	<10	<1						
	6/26/00	21:00																		
	6/26/00	22:00	DT/DF	6	2030	12.0	8.3	70.0	<0.05	0.82	0.15	<0.01	36	13						
	6/27/00	3:00																		
	6/27/00	4:00	DT/DF	6	2200	5.1	8.2	75.0	<0.05	0.69	0.09	<0.01	<10	<1						
	6/27/00	9:00																		
BCF04	2/11/00	12:19	DT	8	1300	12	8.2	1.6	<0.05	0.61	0.441	0.1	230	130						
	2/12/00	2:19	DF																	
	2/12/00	4:19	ST	5	575	550	8	3.9	0.085	1.3	1.89	0.22	750	290						
	2/12/00	12:19	SF																	
	2/12/00	14:19	DT	36	1800	21	8.3	1.3	<0.05	0.71	0.502	0.107	30	16						
	2/15/00	9:19	DF																	
	2/29/00	9:11	DT	24	2450	13	8.4	1.5	<0.05	1.1	0.291	0.065	26	22	3/2/00	11:08	1900	7.2	18.5	9.1
	3/2/00	7:11	DT																	
	3/5/00	11:42	DT	10	475	750	8	3.3	<0.05	1.2	2.2	0.408	830	420	3/7/33	8:40	1300	7.4	16.0	9.0
	3/6/00	5:42	DF																	
	3/6/00	7:42	DT	24	785	60	8.4	3.4	<0.05	0.77	0.612	0.061	88	60	3/7/00	8:40	1300	7.4	16.0	4.0
	3/8/00	2:42	DF																	
	3/8/00	4:42	ST	11	1670	670	8.1	<0.44	<0.05	1.2	2.11	0.154	750	370	3/9/00	9:45	1440	7.5	15.7	5.0
	3/9/00	0:42	SF																	
	4/5/00	11:37	DT	24	2740	24	8.4	1.4	<0.05	0.41	0.398	0.038	93	20	4/6/00	12:30	1940	8.6	18.1	10.6
	4/6/00	10:37	DF																	
	5/11/00	10:00	DT	1	2820	38	8.3	1.3	<0.05	0.71	0.37	0.047	88	50	5/11/00	10:00	2590	8.4	20.2	12.7
	5/11/00	10:00	DF																	
	6/6/00	11:48	DT	24	2960	35.2	8.4	2.5	<0.05	1.1	0.643	0.099	88	44	6/7/00	12:12	3190	8.4	20.4	10.8
	6/7/00	10:48	DF																	

STATION	DATE	TIME	SAMPLES Type	#	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Physicals Date	Time	EC umhos	pH	TEMP. (C)	DO mg/L
LANF08	2/4/00	10:00	DT	24	4760	55.0	8.2	32.0	0.23	1.20	1.62	0.24	94	64						
	2/5/00	23:00	DF																	
	2/11/00	13:45	DT	8	1580	15.0	8.3	11.0	<0.05	0.31	0.44	0.12	30	14						
	2/11/00	23:45	DF																	
	2/12/00	1:45	ST	5	630	190.0	7.9	6.3	0.23	2.60	1.93	0.09	310	80						
	2/12/00	9:45	SF																	
	2/12/00	11:45	DT	28	1370	21.0	7.9	10.0	0.10	0.72	0.50	0.09	25	14						
	2/14/00	17:45	DF																	
	2/16/00	5:30	ST	5	2790	40.0	7.8	25.0	0.24	2.60	1.01	0.21	86	64						
	2/16/00	6:30	SF																	
	2/16/00	8:30	ST	3	700	60.0	7.5	7.0	0.20	2.10	0.90	0.16	84	44						
	2/16/00	12:30	SF																	
	2/16/00	14:30	DT	44	5060	20.0	8.1	32.0	0.05	0.98	1.07	0.27	44	24						
	2/20/00	4:30	DF																	
	2/27/00	16:46	ST	5	3110	45.0	8.0	42.0	0.21	1.10	1.41	0.25	140	50						
	2/27/00	17:46	SF																	
	2/27/00	19:46	ST	3	1510	36.0	7.5	9.1	<0.05	1.40	0.73	0.08	90	50						
	2/27/00	23:49	SF																	
	2/28/00	1:46	DT	45	5260	9.6	8.3	41.0	<0.05	0.63	0.89	0.16	35	21	3/3/00	9:00	6300	8.0	20.3	20.7
	3/2/00	19:37	DF																	
	3/3/00	19:47	DT	5	2370	60.0	6.8	23.0	0.54	2.30	1.29		140	48						
	3/3/00	20:47	DF																	
	3/3/00	22:47	DT	10	2100	17.0	7.8	14.0	0.29	1.10	0.83		44	28						
	3/4/00	18:47	DF																	
	3/4/00	20:47	ST	5	640	38.0	7.6	9.9	0.27	0.98	0.73	0.12	70	54						
	3/5/00	4:47	SF																	
	3/5/00	6:47	DT	12	835	31.0	7.6	6.6	0.16	0.77	0.83	0.15	74	48						
	3/6/00	3:03	DF																	
	3/6/00	5:03	DT	23	3830	9.3	8.1	120.0	0.06	0.76	0.89	0.21	27	10	3/7/00	12:30	5150	8.0	20.2	11.5
	3/8/00	2:27	DF																	
	3/8/00	4:27	ST	12	1590	36.0	8.0	8.4	0.22	0.85	0.61	0.13	43	12	3/9/00	10:30	4900	8.0	19.3	10.0
	3/9/00	2:27	SF																	
	3/15/00	12:15	DT	24	5950	4.1	8.5	47.0	<0.05	0.53	0.80	0.12	20	8						
	3/16/00	11:15	DF																	
	4/5/00	13:03	DT	24	5510	26.0	8.4	47.0	<0.05	1.10	1.35	0.15	100	39	4/6/00	13:00	4050	8.0	19.0	9.5
	4/6/00	12:03	DF																	
	5/11/00	10:15	DT	1	5240	7.4	8.3	37.0	0.09	1.30	1.10	0.24	54	36	5/11/00	10:15	5010	8.1	21.1	9.3
	5/11/00	10:15	DF																	
	6/6/00	11:30	DT	24	6210	30.1	8.4	23.0	<0.05	2.30	0.70	<0.01	110	42	6/7/00	13:10	6500	8.8	31.2	8.8
	6/7/00	10:30	DF																	
	6/20/00	10:20	DT	1	6420	7.4	8.1	17.0	<0.05	1.60	0.34		30	22						
	6/20/00	10:00	DT	24	5340	14.0	8.5	13.0	<0.05	1.30	0.40		49	25						
	6/21/00	9:00																		
	6/21/00	10:00	DT	24	5370	33.0	8.3	32.0	<0.05	1.70	1.32		155	33						
	6/22/00	9:00																		
	6/21/00	10:00	DT	24	5310	67.0	8.3	24.0	<0.05	1.40	1.10		160	42						
	6/22/00	9:00																		
	6/22/00	10:00	DT	24	5640	41.0	8.4	20.0	<0.05	1.30	1.10		78	22						
	6/23/00	9:00																		
	6/23/00	10:00	DT	24	5600	23.0	8.3	40.0	0.07	2.20	1.04		45	12						
	6/24/00	9:00																		
	6/24/00	10:00	DT	24	5380	27.0	8.4	26.0	0.10	1.50	1.25		50	15						
	6/25/00	9:00																		
	6/25/00	10:00	DT	24	4930	17.0	8.3	21.0	0.14	1.40	0.98		33	26						
	6/26/00	9:00																		
	6/25/00	10:00	DT	24	4910	19.0	8.3	22.0	0.14	1.60	1.04		24	11						
	6/26/00	9:00																		
	6/26/00	10:00	DT	24	5370	18.0	8.4	24.0	0.12	0.73	0.92		31	13						
	6/27/00	9:00																		

STATION	DATE	TIME	SAMPLES Type	#	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Physicals Date	Time	EC umhos	pH	TEMP. (C)	DO mg/L
CICF25	2/2/00	10:44	DT/DF	24	2070	383.0	7.9	<0.44	14.00	19.00	11.60	2.10	630	500						
	2/3/00	9:44																		
	2/10/00	8:19	DT/DF	10	1230	250.0	7.8	140	1.19	4.40	4.96	2.30	430	120						
	2/10/00	17:19																		
	2/10/00	18:19	DT/DF	14	1240	340.0	7.5	180	1.25	5.00	11.00	2.50	450	330						
	2/11/00	7:19																		
	3/9/00	8:23	DT/DF	24	1560	34.0	8.1	87	0.08	1.60	2.30	0.76	44	34	3/10/00	12:40	1760	8.2	23.2	10.4
	3/10/00	7:23																		
	3/22/00	13:35	DT/DF	20	2040	23.0	8.0	340	19.30	26.00	9.79	2.61	50	12	3/23/00	7:30	2380	7.9	13.5	13.3
	3/23/00	8:35																		
	4/4/00	10:42	DT/DF	24	2130	25.0	8.1	300	14.90	0.23	11.00	3.34	62	26	4/5/00	13:13	3410	8.0	15.3	12.0
	4/5/00	9:42																		
	4/20/00	9:00	DT/DF	1	1840	3.4	8.2	110	<0.05	1.10	1.35	0.37	11	8	4/20/00	9:00	1900	8.3	18.6	10.1
	4/20/00	9:00																		
	5/12/00	11:39	DT/DF	1	2110	126.0	7.8	400	20.80	19.00	10.40	3.48	120	38	5/12/00	11:39	2060	8.0	23.7	13.4
	5/12/00	11:39																		
	5/30/00	12:39	DT/DF	24	1710	16.0	8.8	69	0.05	1.70	1.81	0.43	36	14						
	5/31/00	11:39																		
	6/7/00	10:14	DT/DF	1	1880	10.4	8.9	110	0.35	3.80	3.67	0.93	26	12	6/7/00	10:14	1900	8.8	25.3	16.1
	6/7/00	10:14																		
	6/19/00	12:00	DT/DF	4	1730	2.7	9.2	120	0.36	2.10	1.25	0.25	<10	<1						
	6/19/00	15:00																		
	6/19/00	16:00	DT/DF	6	1780	11.0	9.0	130	0.30	2.50	1.84	0.41	25	19						
	6/19/00	21:00																		
	6/19/00	22:00	DT/DF	8	1770	4.7	8.1	120	0.37	1.80	3.98	1.26	<10	<1						
	6/20/00	5:00																		
	6/20/00	6:00	DT/DF	4	1720	28.0	8.5	110	0.31	2.20	3.67	0.99	34	18						
	6/20/00	9:00																		
	6/20/00	10:00	DT/DF	6	1600	11.0	9.0	26	0.29	2.40	1.99	0.32	29	13						
	6/20/00	15:00																		
	6/20/00	16:00	DT/DF	6	1450	30.0	8.9	16	0.19	2.10	2.23	0.37	43	20						
	6/20/00	21:00																		
	6/20/00	22:00	DT/DF	6	1430	8.7	8.2	92	0.13	1.30	3.37	0.91	<10	<1						
	6/20/00	3:00																		
	6/20/00	4:00	DT/DF	6	1390	11.0	8.3	79	0.12	1.30	3.37	1.28	26	12						
	6/21/00	9:00																		
	6/21/00	10:00	DT/DF	6	1630	6.3	9.0	57	0.20	1.20	1.68	0.38	21	13						
	6/21/00	15:00																		
	6/21/00	16:00	DT/DF	6	1730	12.0	8.9	62	0.20	2.20	2.05	0.39	37	20						
	6/21/00	21:00																		
	6/21/00	22:00	DT/DF	6	1850	8.7	8.1	84	0.15	1.10	3.67	0.92	11	<1						
	6/22/00	3:00																		
	6/22/00	4:00	DT/DF	6	1800	23.0	8.1	88	0.12	1.20	3.67	0.92	43	18						
	6/22/00	9:00																		
	6/22/00	10:00	DT/DF	6	1790	27.0	8.9	16	0.22	2.80	2.05	0.33	61	24						
	6/22/00	15:00																		
	6/22/00	16:00	DT/DF	6	2010	27.0	8.8	88	0.19	3.10	1.96	0.33	43	13						
	6/22/00	21:00																		
	6/22/00	22:00	DT/DF	6	1950	14.0	8.1	100	0.15	2.70	3.98	0.94	26	7						
	6/23/00	3:00																		
	6/23/00	4:00	DT/DF	6	1800	60.0	8.1	100	0.14	3.40	5.81	0.98	140	33						
	6/23/00	9:00																		
	6/23/00	10:00	DT/DF	6	1670	50.0	9.0	15	0.23	2.60	2.54	0.39	82	28						
	6/23/00	15:00																		

STATION	DATE	TIME	SAMPLES Type	#	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Physicals Date	Time	EC umhos	pH	TEMP. (C)	DO mg/L
CICF25	6/23/00	16:00	DT/DF	6	1890	50.0	9.0	14	0.26	4.00	2.60	0.35	53	14						
	6/23/00	21:00																		
	6/23/00	22:00	DT/DF	6	2870	25.0	8.1	26	0.19	6.90	4.28	1.35	25	10						
	6/24/00	3:00																		
	6/24/00	4:00	DT/DF	8	1880	37.0	8.3	19	0.16	2.60	3.98	0.89	55	10						
	6/24/00	9:00																		
	6/24/00	10:00	DT/DF	6	1780	30.0	9.2	62	0.24	4.30	1.77	0.29	30	9						
	6/24/00	15:00																		
	8/24/00	16:00	DT/DF	6	1910	55.0	8.9	70	0.19	3.20	1.99	0.34	18	4						
	6/24/00	21:00																		
	6/24/00	22:00	DT/DF	6	1860	18.0	8.1	79	0.15	2.00	3.37	0.91	36	12						
	6/25/00	3:00																		
	6/25/00	4:00	DT/DF	6	1780	50.0	8.4	75	0.12	3.10	3.67	0.89	<10	<1						
	6/25/00	9:00																		
	6/25/00	10:00	DT/DF	1	1710	55.0	8.9	21	0.23	3.10	2.36		48	12						
	6/26/00	9:36	DT/DF	1	1610	27.0	8.8	20	0.15	2.20	2.66	0.66	29	12						
	6/26/00	10:00	DT/DF	7	1840	55.0	9.0	34	0.18	3.10	2.94	0.38	82	24						
	6/26/00	16:00																		
	6/26/00	22:00	DT/DF	6	2200	50.0	8.5	140	0.14	4.30	2.85	0.57	52	20						
	6/26/00	10:00																		
	6/27/00	10:00	DT/DF	6	2040	280.0	8.7	48	0.67	8.90	7.96	0.67	460	110						
	6/27/00	15:00																		
	6/27/00	16:00	DT/DF	6	2100	95.0	8.9	120	0.22	6.30	3.37	0.47	98	28						
	6/27/00	21:00																		
	6/27/00	22:00	DT/DF	6	2010	21.0	8.2	57	0.16	2.70	4.28	1.17	20	18						
	6/28/00	3:00																		
	6/28/00	4:00	DT/DF	6	1880	230.0	8.3	42	0.13	4.20	6.43	1.10	310	280						
	6/28/00	9:00																		
	6/28/00	10:00	DT/DF	6	1650	380.0	8.7	100	0.46	7.70	7.96	0.81	490	126						
	6/28/00	15:00																		
	6/28/00	16:00	DT/DF	6	1880	140.0	8.8	120	0.18	3.30	3.67	0.47	160	46						
	6/28/00	21:00																		
	6/28/00	22:00	DT/DF	6	1710	19.0	8.3	70	0.13	2.50	4.59	1.48	12	8						
	6/29/00	3:00																		
	6/29/00	4:00	DT/DF	6	1610	160.0	8.3	57	0.10	2.60	4.59	1.09	76	21						
	6/29/00	9:00																		
	6/29/00	10:00	DT/DF	6	1590	100.0	8.9	44	0.29	4.40	3.00		120	23						
	6/29/00	15:00																		
	6/29/00	16:00	DT/DF	8	1610	60.0	8.8	53	0.20	4.30	2.14		65	7						
	6/29/00	21:00																		
	6/29/00	22:00	DT/DF	6	2340	22.0	8.1	30	0.14	2.70	3.98		28	14						
	6/30/00	3:00																		
	6/30/00	4:00	DT/DF	6	1950	110.0	8.1	28	0.12	3.80	5.20		120	34						
	6/30/00	9:00																		
MIRF08	2/17/00	4:32	DT	28	1120	8.1	8.8	7.50	0.46	1.70	0.70	0.19	13	7						
	2/20/00	4:38	DF																	
	3/14/00	10:33	DT	24	1840	6.2	8.7	11.00	0.28	3.00	0.58	0.14	100	50						
	3/15/00	9:33	DF																	
	4/5/00	12:30	DT	24	1340	13.0	8.8	7.20	<0.05	1.90	0.95	0.08	53	34	4/6/00	11:00	1100	8.1	19.3	9.3
	4/6/00	11:30	DF																	
	5/12/00	13:05	DT	1	1280	2.6	9.0	2.80	<0.05	0.48	0.77	0.17	12	8	5/12/00	13:05	1160	8.5	23.6	7.9
	5/12/00	13:05	DF																	
	6/7/00	9:50	DT	1	1290	5.7	9.1	4.70	0.21	3.80	1.07	0.45	12	5	6/7/00	9:50	3096	6.7	25.1	28.0

STATION	DATE	TIME	SAMPLES Type	#	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Physicals Date	Time	EC umhos	pH	TEMP. (C)	DO mg/L
MIRF07	6/20/00	10:00	DT	24	1210	17.0	8.5	10.00	0.34	2.10	1.10		28	21						
	6/21/00	9:00																		
	6/21/00	10:00	DT	24	1380	7.1	8.6	6.60	0.53	4.80	1.32		13	11						
	6/22/00	9:00																		
	6/22/00	10:00	DT	24	1360	6.7	8.6	10.00	0.34	2.30	1.32		<10	<1						
	6/23/00	9:00																		
	6/23/00	10:00	DT	24	1390	11.0	8.5	13.00	0.22	1.40	1.22		<10	<1						
	6/24/00	9:00																		
	6/24/00	10:00	DT	24	1380	5.0	8.5	5.30	0.95	5.50	1.25		<10	<1						
	6/25/00	9:00																		
	6/24/00	10:00	DT	24	1390	12.0	8.5	5.30	0.94	5.51	1.19		<10	<1						
	6/25/00	9:00																		
	6/25/00	10:00	DT	24	1300	6.5	6.6	2.80	0.77	3.80	1.19		<10	<1						
	6/26/00	9:00																		
	6/26/00	10:00	DT	24	1530	6.5	6.5	7.00	0.53	2.40	1.04		10	9						
	6/27/00	9:00																		

Appendix 5.11
QA/QC Summary

Analyses of Synthetically Prepared Samples: 99/00

Nutrient Analyses

Date	Sample #	Laboratory	NO3 mg/L	NH4-N mg/L	TKN mg/L	PO4 mg/L
Jul 14	WR 33965	Mont. - Wat.	36.47	0.65	1.12	1.74
	laboratory		20.30	0.67	1.12	1.74
	difference		-16.17	0.02	0.00	0.00
	% difference		-44.34	2.92	0.00	0.00
Jul 21	WR 34023	Mont. - Wat.	9.12	1.31	1.78	3.49
	laboratory		5.10	1.33	2.01	3.40
	difference		-4.02	0.02	0.23	-0.09
	% difference		-44.08	1.53	12.92	-2.58
Jul 22	WR 34045	Mont. - Wat.	9.12	0.65	1.12	1.74
	laboratory		5.02	0.65	1.18	1.65
	difference		-4.10	0.00	0.06	-0.09
	% difference		-44.96	-0.31	5.36	-5.17
Sep 14	WR 34224	Mont. - Wat.	36.47	1.31	1.31	1.74
	laboratory		43.10	1.10	1.30	1.53
	difference		6.63	-0.21	-0.01	-0.21
	% difference		18.18	-16.03	-0.76	-12.07
Sep 15	WR 34278	Mont. - Wat.	18.23	1.31	1.31	1.74
	laboratory		20.50	0.90	1.16	1.47
	difference		2.27	-0.41	-0.15	-0.27
	% difference		12.45	-31.53	-11.45	-15.52
Sep 16	WR 34312	Mont. - Wat.	36.47	1.31	1.31	1.74
	laboratory		42.20	1.33	1.12	1.62
	difference		-5.73	-0.02	0.19	0.12
	% difference		-13.58	-1.50	16.96	7.41
Sep 17	WR 34343	Mont. - Wat.	18.23	1.31	1.31	1.74
	laboratory		20.50	1.26	1.23	1.54
	difference		2.27	-0.05	-0.08	-0.20
	% difference		12.45	-3.82	-6.11	-11.49
Sep 18	WR 34380	Mont. - Wat.	36.47	0.65	2.99	3.49
	laboratory		38.10	0.62	2.91	3.27
	difference		1.63	-0.04	-0.08	-0.22
	% difference		4.47	-5.38	-2.68	-6.30
Sep 19	WR 34427	Mont. - Wat.	9.12	0.65	1.12	1.74
	Laboratory		9.90	0.36	1.14	1.53
	difference		0.78	-0.29	0.02	-0.21
	% difference		8.55	-44.00	1.79	-12.07

Trace Metal Analyses

Synthetic Samples

Date	Sample #	Laboratory	Cd ug/L	Cr ug/L	Cu ug/L	Pb ug/L	Ni ug/L	Ag ug/L	Zn ug/L
Aug 5	WR 34103	Weck	10	40	10	10	100	10	50
	Laboratory		10.40	40.40	10.20	10.60	99.40	8.98	52.00
	difference		-0.40	-0.40	-0.20	-0.60	0.60	1.02	-2.00
	% difference		-3.85	-0.99	-1.96	-5.66	0.60	11.36	-3.85
Aug 17	WR 34141	Weck	10	40	10	10	100	10	50
	Laboratory		9.96	41.40	10.50	9.82	102.00	9.08	52.80
	difference		0.04	-1.40	-0.50	0.18	-2.00	0.92	-2.80
	% difference		0.40	-3.38	-4.76	1.83	-1.96	10.13	-5.30
Nov 10	WR 34645	Weck	10	40	10	10	100	10	50
	Laboratory		9.12	51.80	9.62	9.28	95.70	10.10	47.70
	difference		0.88	-11.80	0.38	0.72	4.30	-0.10	2.30
	% difference		9.65	-22.78	3.95	7.76	4.49	-0.99	4.82
Nov 18	WR 34662	Weck	10	40	10	10	100	10	50
	Laboratory		9.05	50.90	8.88	9.44	92.50	10.00	45.60
	difference		0.95	-10.90	1.12	0.56	7.50	0.00	4.40
	% difference		10.50	-21.41	12.61	5.93	8.11	0.00	9.65
Dec 2	WR 34743	Weck	25	100	25	25	100	25	100
	Laboratory		24.50	98.80	25.20	23.90	98.90	23.50	93.00
	difference		-0.50	-1.20	0.20	-1.10	-1.10	-1.50	-7.00
	% difference		-2.00	-1.20	0.80	-4.40	-1.10	-6.00	-7.00
Jan 25	WR 34958	Weck	25	100	25	25	100	25	100
	Laboratory		25.30	95.40	24.30	22.30	91.60	14.30	101.00
	difference		0.30	-4.60	-0.70	-2.70	-8.40	-10.70	1.00
	% difference		1.20	-4.60	-2.80	-10.80	-8.40	-42.80	1.00
Feb 11	WR 35063	Weck	5	25	5	5	25	5	30
	Laboratory		4.94	22.90	5.17	5.41	21.40	4.70	22.30
	difference		-0.06	-2.10	0.17	0.41	-3.60	-0.30	-7.70
	% difference		-1.20	-8.40	3.40	8.20	-14.40	-6.00	-25.67
Feb 12	WR 35114	Weck	15	50	15	15	120	15	50
	Laboratory		13.40	52.10	14.20	15.80	116.00	16.90	44.20
	difference		-1.60	2.10	-0.80	0.80	-4.00	1.90	-5.80
	% difference		-10.67	4.20	-5.33	5.33	-3.33	12.67	-11.60
Feb 13	WR 35145	Weck	50	100	50	50	50	50	100
	Laboratory		48.80	96.60	48.30	45.00	45.40	42.10	93.80
	difference		-1.20	-3.40	-1.70	-5.00	-4.60	-7.90	-6.20
	% difference		-2.40	-3.40	-3.40	-10.00	-9.20	-15.80	-6.20

Analyses of Synthetically Prepared Samples: 99/00

Nutrient Analyses

Date	Sample #	Laboratory	NO3 mg/L	NH4-N mg/L	TKN mg/L	PO4 mg/L
Sep 19	WR 34456	Mont. - Wat.	9.12	0.65	1.12	1.74
	laboratory		11.40	0.63	1.20	1.68
	difference		2.28	-0.02	0.08	-0.06
	% difference		25.00	-2.46	7.14	-3.45
Sep 29	WR 34550	Mont. - Wat.	36.47	0.65	2.99	3.49
	laboratory		42.70	0.64	2.43	3.46
	difference		6.23	-0.01	-0.56	-0.03
	% difference		17.08	-1.54	-18.73	-0.86
Sep 30	WR 34515	Mont. - Wat.	1.82	0.26	2.60	0.35
	laboratory		1.58	0.25	2.56	0.34
	difference		-0.24	-0.01	-0.04	-0.01
	% difference		-13.19	-5.38	-1.54	-3.71
Oct 13	NHWR34546	Mont. - Wat.	1.82	0.65	1.12	1.74
	laboratory		1.45	0.65	1.24	1.65
	difference		-0.37	0.00	0.12	-0.09
	% difference		-20.33	-0.46	10.71	-5.17
Oct 15	WR 34553	Mont. - Wat.	9.12	1.31	1.78	3.49
	laboratory		8.89	1.32	1.73	3.27
	difference		-0.23	0.01	-0.05	-0.22
	% difference		-2.52	0.76	-2.81	-6.30
Oct 27	WR 34588	Mont. - Wat.	0.73	0.26	0.73	0.35
	laboratory		<0.44	0.22	0.26	0.25
	difference		-0.29	-0.04	-0.47	-0.11
	% difference		-39.73	-16.54	-64.38	-30.00
Oct 27	HHWR 34577	Mont. - Wat.	3.65	0.26	1.19	1.74
	laboratory		3.52	0.26	0.86	1.59
	difference		-0.13	0.00	-0.33	-0.15
	% difference		-3.56	-1.54	-27.73	-8.62
Oct 28	DPWR34589	Mont. - Wat.	0.73	0.13	0.60	0.35
	laboratory		>0.44	0.10	0.20	0.25
	difference		-0.29	-0.03	-0.40	-0.11
	% difference		-39.73	-21.54	-66.67	-30.00
Nov 10	WR 34644	Mont. - Wat.	0.73	0.26	0.73	0.35
	laboratory		1.32	0.25	0.83	0.27
	difference		0.59	-0.01	0.10	-0.08
	% difference		80.82	-4.23	13.70	-24.00
Nov 18	WR 34663	Mont. - Wat.	3.65	0.26	1.19	0.35
	laboratory		3.21	0.25	1.10	0.25
	difference		-0.44	-0.02	-0.09	-0.11
	% difference		-12.05	-5.77	-7.56	-30.00

Trace Metal Analyses

Date	Sample #	Laboratory	Cd ug/L	Cr ug/L	Cu ug/L	Pb ug/L	Ni ug/L	Ag ug/L	Zn ug/L
Feb 14	NHWR 35144	Weck	15	50	15	15	120	15	50
	laboratory		14.30	50.80	13.60	17.70	114.00	15.50	44.30
	difference		-0.70	0.80	-1.40	2.70	-6.00	0.50	-5.70
	% difference		-4.67	1.60	-9.33	18.00	-5.00	3.33	-11.40
Feb 15	WR 35166	Weck	50	100	50	50	50	50	100
	Laboratory		49.60	99.30	50.50	45.00	47.40	44.30	97.40
	difference		-0.40	-0.70	0.50	-5.00	-2.60	-5.70	-2.60
	% difference		-0.80	-0.70	1.00	-10.00	-5.20	-11.40	-2.60
Feb 16	NHWR 35195	Weck	15	50	15	15	120	15	50
	Laboratory		13.90	47.40	12.80	12.80	114.00	14.40	45.10
	difference		-1.10	-2.60	-2.20	-2.20	-6.00	-0.60	-4.90
	% difference		-7.33	-5.20	-14.67	-14.67	-5.00	-4.00	-9.80
Feb 17	WR 35218	Weck	5	25	5	5	25	5	30
	Laboratory		4.92	23.20	5.11	4.53	24.50	4.76	29.70
	difference		-0.08	-1.80	0.11	-0.47	-0.50	-0.24	-0.30
	% difference		-1.60	-7.20	2.20	-9.40	-2.00	-4.80	-1.00
Feb 20	WR 35225	Weck	12	40	12	12	25	12	40
	laboratory		13.80	49.50	14.00	13.90	23.90	15.20	49.60
	difference		1.80	9.50	2.00	1.90	-1.10	3.20	9.60
	% difference		15.00	23.75	16.67	15.83	-4.40	26.67	24.00
Feb 23	HHWR 35259	Weck	15	50	15	15	120	15	50
	laboratory		14.40	52.20	13.00	16.30	112.00	14.40	53.50
	difference		-0.60	2.20	-2.00	1.30	-8.00	-0.60	3.50
	% difference		-4.00	4.40	-13.33	8.67	-6.67	-4.00	7.00
Feb 25	HHWR 35284	Weck	20	50	20	20	50	20	100
	Laboratory		20.00	54.20	24.20	21.40	43.80	22.50	107.00
	difference		0.00	4.20	4.20	1.40	-6.20	2.50	7.00
	% difference		0.00	8.40	21.00	7.00	-12.40	12.50	7.00
Feb 27	HHWR 35306	Weck	20	50	20	20	50	20	100
	laboratory		17.50	45.00	18.40	20.00	40.00	21.20	98.60
	difference		-2.50	-5.00	-1.60	0.00	-10.00	1.20	-1.40
	% difference		-12.50	-10.00	-8.00	0.00	-20.00	6.00	-1.40
Feb 29	WR 35309	Weck	12	40	12	12	25	12	40
	Laboratory		12.60	43.30	14.60	12.90	25.60	13.40	46.60
	difference		0.60	3.30	2.60	0.90	0.60	1.40	6.60
	% difference		5.00	8.25	21.67	7.50	2.40	11.67	16.50
Mar 2	WR 35352	Weck	15	50	15	15	120	15	50
	laboratory		13.80	43.60	14.80	13.80	102.00	15.60	48.10
	difference		-1.20	-6.40	-0.20	-1.20	-18.00	0.60	-1.90
	% difference		-8.00	-12.80	-1.33	-8.00	-15.00	4.00	-3.80

Analyses of Synthetically Prepared Samples: 99/00

Nutrient Analyses

Date	Sample #	Laboratory	NO3 mg/L	NH4-N mg/L	TKN mg/L	PO4 mg/L
Dec 1	WR 34737	Mont. - Wat.	18.23	1.31	1.31	1.74
	laboratory		17.10	1.05	1.10	1.62
	difference		-1.13	-0.26	-0.21	-0.12
	% difference		-6.20	-19.85	-16.03	-6.90
Dec 15	WR 34788	Mont. - Wat.	9.12	1.31	1.78	3.49
	laboratory		9.68	1.33	1.50	3.37
	difference		0.56	0.02	-0.28	-0.12
	% difference		5.79	1.53	-15.73	-3.44
Dec 16	WR 34794	Mont. - Wat.	3.65	0.26	1.19	0.35
	laboratory		3.74	0.26	1.10	0.28
	difference		0.09	0.00	-0.09	-0.08
	% difference		2.47	-1.15	-7.56	-21.43
Dec 17	NHWR 34797	Mont. - Wat.	3.65	0.26	1.19	1.74
	laboratory		3.61	0.25	0.56	1.68
	difference		-0.04	-0.01	-0.63	-0.06
	% difference		-1.10	-3.46	-52.94	-3.45
Jan 7	WR 34851	Mont. - Wat.	36.47	1.31	1.31	1.74
	laboratory		34.70	1.36	1.10	1.35
	difference		-1.77	0.05	-0.21	-0.39
	% difference		-4.85	3.82	-16.03	-22.41
Jan 13	WR 34894	Mont. - Wat.	36.47	1.31	1.31	1.74
	laboratory		39.10	1.31	1.10	1.62
	difference		2.63	0.00	-0.21	-0.12
	% difference		7.21	0.00	-16.03	-6.90
Jan 27	NHWR 34984	Mont. - Wat.	1.82	0.26	0.73	0.70
	laboratory		1.40	0.27	0.26	0.64
	difference		-0.42	0.01	-0.47	-0.06
	% difference		-23.08	1.92	-64.38	-8.14
Feb 12	NHWR35087	Mont. - Wat.	3.65	0.65	0.65	0.70
	laboratory		2.90	0.72	0.38	0.46
	difference		-0.75	0.07	-0.27	-0.24
	% difference		-20.55	10.31	-41.54	-34.86
Feb 13	WR 35145	Mont. - Wat.	36.47	0.65	2.99	3.49
	laboratory		37.00	0.73	2.70	3.37
	difference		0.53	0.08	-0.29	-0.12
	% difference		1.45	11.69	-9.70	-3.44
Feb 14	NHWR35144	Mont. - Wat.	3.65	0.65	0.65	0.70
	laboratory		2.90	0.65	0.40	0.50
	difference		-0.75	0.00	-0.25	-0.20
	% difference		-20.55	0.00	-38.46	-28.29

Trace Metal Analyses

Date	Sample #	Laboratory	Cd ug/L	Cr ug/L	Cu ug/L	Pb ug/L	Ni ug/L	Ag ug/L	Zn ug/L
Mar 3	WR 35359	Weck	15	50	15	15	120	15	50
	Laboratory		14.30	48.10	14.50	14.30	110.00	14.30	51.80
	difference		-0.70	-1.90	-0.50	-0.70	-10.00	-0.70	1.80
	% difference		-4.67	-3.80	-3.33	-4.67	-8.33	-4.67	3.60
Mar 6	WR 35396	Weck	15	50	15	15	120	15	50
	Laboratory		15.80	50.90	14.00	14.90	113.00	15.70	52.60
	difference		0.80	0.90	-1.00	-0.10	-7.00	0.70	2.60
	% difference		5.33	1.80	-6.67	-0.67	-5.83	4.67	5.20
Mar 8	NHWR 35446	Weck	40	50	40	25	100	40	50
	Laboratory		39.40	54.50	38.40	24.70	100.00	41.00	50.00
	difference		-0.60	4.50	-1.60	-0.30	0.00	1.00	0.00
	% difference		-1.50	9.00	-4.00	-1.20	0.00	2.50	0.00
Mar 9	WR 35480	Weck	15	50	15	15	120	15	50
	laboratory		14.20	47.70	13.60	13.90	108.00	15.20	47.50
	difference		-0.80	-2.30	-1.40	-1.10	-12.00	0.20	-2.50
	% difference		-5.33	-4.60	-9.33	-7.33	-10.00	1.33	-5.00
Mar 9	WR 35489	Weck	5	25	5	5	25	5	30
	Laboratory		5.02	25.50	5.18	3.88	23.60	3.64	27.40
	difference		0.02	0.50	0.18	-1.12	-1.40	-1.36	-2.60
	% difference		0.40	2.00	3.60	-22.40	-5.60	-27.20	-8.67
Mar 10	WR 35523	Weck	5	25	5	5	25	5	30
	laboratory		4.84	24.20	4.59	3.80	25.30	3.32	26.20
	difference		-0.16	-0.80	-0.41	-1.20	0.30	-1.68	-3.80
	% difference		-3.20	-3.20	-8.20	-24.00	1.20	-33.60	-12.67
Mar 10	NHWR 35524	Weck	40	50	40	25	100	40	50
	laboratory		40.00	58.30	41.20	29.00	94.00	45.30	45.00
	difference		0.00	8.30	1.20	4.00	-6.00	5.30	-5.00
	% difference		0.00	16.60	3.00	16.00	-6.00	13.25	-10.00
Mar 12	NHWR 35553	Weck	40	50	40	25	100	40	50
	laboratory		40.60	55.00	41.40	27.20	95.70	40.80	49.70
	difference		0.60	5.00	1.40	2.20	-4.30	0.80	-0.30
	% difference		1.50	10.00	3.50	8.80	-4.30	2.00	-0.60
Mar 15	WR 35576	Weck	10	40	10	10	100	10	50
	Laboratory		9.52	50.90	8.88	9.44	92.50	10.00	45.60
	difference		-0.48	10.90	-1.12	-0.56	-7.50	0.00	-4.40
	% difference		-4.80	27.25	-11.20	-5.60	-7.50	0.00	-8.80
Mar 29	WR 35665	Weck	10	40	10	10	100	10	50
	Laboratory		9.90	53.00	9.32	11.00	78.00	10.00	25.00
	difference		-0.10	13.00	-0.68	1.00	-22.00	0.00	-25.00
	% difference		-1.00	32.50	-6.80	10.00	-22.00	0.00	-50.00

Analyses of Synthetically Prepared Samples: 99/00

Nutrient Analyses

Date	Sample #	Laboratory	NO3 mg/L	NH4-N mg/L	TKN mg/L	PO4 mg/L
Feb 15	WR 35166	Mont. - Wat.	36.47	1.31	1.31	1.74
	laboratory		36.00	1.34	1.30	1.48
	difference		-0.47	0.03	-0.01	-0.26
	% difference		-1.29	2.29	-0.76	-14.94
Feb 16	NHWR 35195	Mont. - Wat.	0.73	0.13	0.60	0.35
	laboratory		<0.44	0.13	0.33	0.30
	difference		-0.29	-0.01	-0.27	-0.05
	% difference		-39.73	-3.85	-45.00	-14.57
Feb 17	WR 35218	Mont. - Wat.	36.47	1.31	1.31	1.74
	laboratory		37.00	1.34	1.70	1.52
	difference		0.53	0.03	0.39	-0.22
	% difference		1.45	2.29	29.77	-12.64
Feb 20	WR 35225	Mont. - Wat.	18.23	1.31	1.31	1.74
	laboratory		18.00	1.34	1.30	1.62
	difference		-0.23	0.03	-0.01	-0.12
	% difference		-1.26	2.29	-0.76	-6.90
Feb 23	HHWR 35259	Mont. - Wat.	3.65	0.26	1.19	1.74
	laboratory		3.30	0.30	0.60	1.77
	difference		-0.35	0.04	-0.59	0.03
	% difference		-9.59	15.77	-49.58	1.72
Feb 25	HHWR 35284	Mont. - Wat.	1.82	0.65	1.12	1.74
	laboratory		1.20	0.70	0.56	1.59
	difference		-0.62	0.05	-0.56	-0.15
	% difference		-34.07	7.23	-50.00	-8.62
Feb 28	HHWR 35306	Mont. - Wat.	0.73	0.13	0.60	0.35
	laboratory		<0.44	0.14	0.33	0.25
	difference		-0.29	0.01	-0.27	-0.10
	% difference		-39.73	3.85	-45.00	-28.29
Mar 1	WR 35333	Mont. - Wat.	1.82	0.26	2.60	0.35
	laboratory		1.80	0.28	2.10	0.27
	difference		-0.02	0.02	-0.50	-0.08
	% difference		-1.10	7.31	-19.23	-24.00
Mar 2	WR 35352	Mont. - Wat.	1.82	0.26	2.60	0.35
	laboratory		1.60	0.29	2.20	0.24
	difference		-0.22	0.03	-0.40	-0.11
	% difference		-12.09	11.15	-15.38	-31.71
Mar 3	WR 35359	Mont. - Wat.	1.82	0.26	2.60	0.35
	laboratory		1.90	0.29	2.20	0.28
	difference		0.08	0.03	-0.40	-0.07
	% difference		4.40	9.62	-15.38	-19.43

Trace Metal Analyses

Date	Sample #	Laboratory	Cd ug/L	Cr ug/L	Cu ug/L	Pb ug/L	Ni ug/L	Ag ug/L	Zn ug/L
Apr 13	WR 35775	Weck	10	40	10	10	100	10	50
	laboratory		9.70	57.00	9.50	11.00	78.00	10.00	26.00
	difference		-0.30	17.00	-0.50	1.00	-22.00	0.00	-24.00
	% difference		-3.00	42.50	-5.00	10.00	-22.00	0.00	-48.00
Apr 18	WR 35815	Weck	10	40	10	10	100	10	50
	laboratory		9.40	50.00	11.00	10.00	78.00	11.00	25.00
	difference		-0.60	10.00	1.00	0.00	-22.00	1.00	-25.00
	% difference		-6.00	25.00	10.00	0.00	-22.00	10.00	-50.00
Apr 18	WR 35814	Weck	40	50	40	25	100	40	50
	laboratory		40.00	54.00	42.00	24.00	110.00	40.00	49.00
	difference		0.00	4.00	2.00	-1.00	10.00	0.00	-1.00
	% difference		0.00	8.00	5.00	-4.00	10.00	0.00	-2.00
Apr 19	WR 35841	Weck	25	100	25	25	100	25	100
	Laboratory		24.00	96.00	17.00	26.00	97.00	21.00	88.00
	difference		-1.00	-4.00	-8.00	1.00	-3.00	-4.00	-12.00
	% difference		-4.00	-4.00	-32.00	4.00	-3.00	-16.00	-12.00
Apr 19	DPWR 35842	Weck	20	50	20	20	50	20	100
	Laboratory		20.00	51.00	14.00	17.00	43.00	22.00	94.00
	difference		0.00	1.00	-6.00	-3.00	-7.00	2.00	-6.00
	% difference		0.00	2.00	-30.00	-15.00	-14.00	10.00	-6.00
Apr 20	WR 35856	Weck	25	100	25	25	100	25	100
	Laboratory		24.00	95.00	16.00	26.00	95.00	21.00	87.00
	difference		-1.00	-5.00	-9.00	1.00	-5.00	-4.00	-13.00
	% difference		-4.00	-5.00	-36.00	4.00	-5.00	-16.00	-13.00
Apr 21	DPWR 35875	Weck	20	50	20	20	50	20	100
	laboratory		19.00	45.00	15.00	16.00	48.00	23.00	91.00
	difference		-1.00	-5.00	-5.00	-4.00	-2.00	3.00	-9.00
	% difference		-5.00	-10.00	-25.00	-20.00	-4.00	15.00	-9.00
Jun 7	WR 36220	Weck	50	100	50	50	50	50	100
	Laboratory		51.00	100.00	54.00	46.00	52.00	44.00	76.00
	difference		1.00	0.00	4.00	-4.00	2.00	-6.00	-24.00
	% difference		2.00	0.00	8.00	-8.00	4.00	-12.00	-24.00

Analyses of Synthetically Prepared Samples: 99/00

Nutrient Analyses

Date	Sample #	Laboratory	NO3 mg/L	NH4-N mg/L	TKN mg/L	PO4 mg/L
Mar 6	WR 35396	Mont. - Wat.	0.73	0.26	0.73	0.35
	laboratory		0.59	0.28	0.61	0.34
	difference		-0.14	0.02	-0.12	-0.01
	% difference		-19.18	6.54	-16.44	-3.71
Mar 7	WR 35424	Mont. - Wat.	9.12	1.31	1.78	3.49
	laboratory		10.00	1.38	1.60	3.67
	difference		0.88	0.07	-0.18	0.18
	% difference		9.65	5.34	-10.11	5.16
Mar 8	NHWR 35446	Mont. - Wat.	9.12	1.31	2.24	1.74
	laboratory		8.10	1.27	1.00	1.50
	difference		-1.02	-0.04	-1.24	-0.24
	% difference		-11.18	-3.05	-55.36	-13.79
Mar 9	WR 35478	Mont. - Wat.	9.12	1.31	1.78	3.49
	laboratory		9.10	1.38	1.50	3.37
	difference		-0.02	0.07	-0.28	-0.12
	% difference		-0.22	5.34	-15.73	-3.44
Mar 9	WR 35489	Mont. - Wat.	0.73	0.26	0.73	0.35
	laboratory		0.66	0.29	0.59	0.37
	difference		-0.07	0.03	-0.14	0.02
	% difference		-9.59	11.15	-19.18	4.86
Mar 10	NHWR 35524	Mont. - Wat.	9.12	1.31	2.24	1.74
	laboratory		7.40	1.60	1.00	1.38
	difference		-1.72	0.29	-1.24	-0.36
	% difference		-18.86	22.14	-55.36	-20.69
Mar 12	NHWR 35553	Mont. - Wat.	9.12	1.31	2.24	1.74
	laboratory		17.00	2.29	1.30	3.00
	difference		7.88	0.98	-0.94	1.26
	% difference		86.40	74.81	-41.96	72.41
Mar 15	WR 35576	Mont. - Wat.	9.12	0.65	1.12	1.74
	laboratory		8.60	0.73	1.00	1.71
	difference		-0.52	0.08	-0.12	-0.03
	% difference		-5.70	12.15	-10.71	-1.72
Mar 16	WR 35590	Mont. - Wat.	9.12	0.65	1.12	1.74
	laboratory		8.60	0.70	0.87	1.59
	difference		-0.52	0.04	-0.25	-0.15
	% difference		-5.70	6.92	-22.32	-8.62
Mar 23	WR 35624	Mont. - Wat.	9.12	0.65	1.12	1.74
	laboratory		9.50	0.69	1.20	1.68
	difference		0.38	0.04	0.08	-0.06
	% difference		4.17	6.62	7.14	-3.45

Trace Metal Analyses

Date	Sample #	Laboratory	Cd ug/L	Cr ug/L	Cu ug/L	Pb ug/L	Ni ug/L	Ag ug/L	Zn ug/L

Analyses of Synthetically Prepared Samples: 99/00

Nutrient Analyses

Date	Sample #	Laboratory	NO3 mg/L	NH4-N mg/L	TKN mg/L	PO4 mg/L
Mar 29	WR 35665	Mont. - Wat.	36.47	0.65	2.99	3.49
	laboratory		41.00	0.64	2.40	3.37
	difference		4.53	-0.01	-0.59	-0.12
	% difference		12.42	-1.69	-19.73	-3.44
Apr 5	WR 35701	Mont. - Wat.	18.23	1.31	1.31	1.74
	laboratory		17.00	1.33	0.82	1.71
	difference		-1.23	0.02	-0.49	-0.03
	% difference		-6.75	1.53	-37.40	-1.72
Apr 19	DPWR 35842	Mont. - Wat.	0.73	0.13	0.60	0.35
	laboratory		0.78	0.13	>0.2	0.34
	difference		0.05	0.00	-0.40	-0.01
	% difference		6.85	2.31	-66.67	-3.71
Apr 19	WR 35841	Mont. - Wat.	36.47	0.65	2.99	3.49
	laboratory		36.00	0.69	1.50	3.37
	difference		-0.47	0.04	-1.49	-0.12
	% difference		-1.29	5.54	-49.83	-3.44
Apr 20	WR 35856	Mont. - Wat.	36.47	0.65	2.99	3.49
	laboratory		34.00	0.68	1.90	3.37
	difference		-2.47	0.03	-1.09	-0.12
	% difference		-6.77	4.62	-36.45	-3.44
Apr 21	DPWR 35875	Mont. - Wat.	0.73	0.13	0.60	0.35
	laboratory		0.79	0.13	0.44	0.34
	difference		0.06	0.00	-0.16	-0.01
	% difference		8.22	0.00	-26.67	-3.71
May 11	WR 35990	Mont. - Wat.	9.12	1.31	1.78	3.49
	laboratory		9.50	1.34	1.40	3.37
	difference		0.38	0.03	-0.38	-0.12
	% difference		4.17	2.29	-21.35	-3.44
May 31	WR 36144	Mont. - Wat.	3.65	0.26	1.19	0.35
	laboratory		3.60	0.31	1.60	0.34
	difference		-0.05	0.05	0.41	-0.01
	% difference		-1.37	19.62	34.45	-3.71
May 31	WR 36151	Mont. - Wat.	3.65	0.26	1.19	0.35
	laboratory		3.60	0.32	1.20	0.37
	difference		-0.05	0.06	0.01	0.02
	% difference		-1.37	24.23	0.84	4.86
Jun 2	NHWR 36180	Mont. - Wat.	1.82	0.65	1.12	1.74
	laboratory		1.70	0.70	0.73	1.71
	difference		-0.12	0.05	-0.39	-0.03
	% difference		-6.59	7.23	-34.82	-1.72

Trace Metal Analyses

Date	Sample #	Laboratory	Cd ug/L	Cr ug/L	Cu ug/L	Pb ug/L	Ni ug/L	Ag ug/L	Zn ug/L

Analyses of Synthetically Prepared Samples: 99/00

Nutrient Analyses

Date	Sample #	Laboratory	NO3 mg/L	NH4-N mg/L	TKN mg/L	PO4 mg/L
Jun 7	WR 36220	Mont. - Wat.	36.47	1.31	10.64	3.49
	laboratory		34.00	1.30	11.00	3.37
	difference		-2.47	-0.01	0.36	-0.12
	% difference		-6.77	-0.76	3.38	-3.44
Jun 7	NHWR36191	Mont. - Wat.	3.65	0.65	0.65	0.70
	laboratory		3.60	0.71	0.51	0.64
	difference		-0.05	0.06	-0.14	-0.06
	% difference		-1.37	9.54	-21.54	-8.14
Jun 20	WR 36239	Mont. - Wat.	0.73	0.26	0.73	0.35
	laboratory		0.62	0.25	0.51	0.34
	difference		-0.11	-0.01	-0.22	-0.01
	% difference		-15.07	-2.69	-30.14	-3.71
Jun 21	WR 36283	Mont. - Wat.	36.47	1.31	1.31	1.74
	laboratory		23.00	1.29	0.82	1.71
	difference		-13.47	-0.02	-0.49	-0.03
	% difference		-36.93	-1.53	-37.40	-1.72
Jun 22	WR 36294	Mont. - Wat.	18.23	1.31	1.31	1.74
	laboratory		21.00	1.33	0.59	1.71
	difference		2.77	0.02	-0.72	-0.03
	% difference		15.19	1.53	-54.96	-1.72
Jun 23	WR 36361	Mont. - Wat.	9.12	0.65	1.12	1.74
	laboratory		8.40	0.61	0.94	1.74
	difference		-0.72	-0.04	-0.16	0.00
	% difference		-7.89	-5.54	-16.07	0.00
Jun 24	WR 36383	Mont. - Wat.	36.47	0.65	2.99	3.49
	laboratory		36.00	0.77	2.20	3.37
	difference		-0.47	0.12	-0.79	-0.12
	% difference		-1.29	18.00	-26.42	-3.44
Jun 25	WR 36424	Mont. - Wat.	1.82	0.26	2.60	0.35
	laboratory		1.70	0.33	2.50	0.34
	difference		-0.12	0.07	-0.10	-0.01
	% difference		-6.59	28.46	-3.85	-3.71
Jun 26	WR 36461	Mont. - Wat.	3.65	0.26	1.19	0.35
	laboratory		2.50	0.31	0.91	0.37
	difference		-1.15	0.05	-0.28	0.02
	% difference		-31.51	20.00	-23.53	4.86
Jun 27	WR 36499	Mont. - Wat.	36.47	1.31	10.64	3.49
	laboratory		34.00	1.30	11.00	3.37
	difference		-2.47	-0.01	0.36	-0.12
	% difference		-6.77	-0.76	3.38	-3.44

Trace Metal Analyses

Date	Sample #	Laboratory	Cd ug/L	Cr ug/L	Cu ug/L	Pb ug/L	Ni ug/L	Ag ug/L	Zn ug/L

Analyses of Synthetically Prepared Samples: 99/00

Nutrient Analyses

Date	Sample #	Laboratory	NO3 mg/L	NH4-N mg/L	TKN mg/L	PO4 mg/L
Jun 29	HHWR 36556	Mont. - Wat.	0.73	0.13	0.60	0.35
	laboratory		<0.44	0.14	0.59	0.37
	difference		-0.29	0.01	-0.01	0.02
	% difference		-39.73	7.69	-1.67	4.86
Jun 29	WR 36557	Mont. - Wat.	0.73	0.13	0.60	0.35
	laboratory		<0.44	0.15	0.61	0.37
	difference		-0.29	0.02	0.01	0.02
	% difference		-39.73	15.38	1.67	4.86

Trace Metal Analyses

Date	Sample #	Laboratory	Cd ug/L	Cr ug/L	Cu ug/L	Pb ug/L	Ni ug/L	Ag ug/L	Zn ug/L

Recovery outside 70 - 130% range
Nutrient and trace QCs spiked at levels ≤ 5 times laboratory detection limit not flagged unless laboratory result is >50% lower or >100% higher than spike level
N/A - not analyzed

Analyses of Blank Equipment Test Samples: 99/00

Nutrient Analyses

Date	Sample #	Laboratory	NO3 mg/L	NH4-N mg/L	TKN mg/L	PO4 mg/L
Equipment Test Samples						
Dishwasher Sink D.I. Water						
Jul 20	WR 34003	Mont. - Wat.	>0.44	>0.05	>0.2	>0.06
	laboratory		>0.44	>0.05	>0.2	>0.06
	difference		0.00	0.00	0.00	0.00
	% difference		0.00	0.00	0.00	0.00
50 Liter Lab Carboy						
Jul 20	WR 34004	Mont. - Wat.	>0.44	>0.05	>0.2	>0.06
	laboratory		>0.44	>0.05	>0.2	>0.06
	difference		0.00	0.00	0.00	0.00
	% difference		0.00	0.00	0.00	0.00
Laboratory Supplied Bottles						
Jul 20	WR 34005	Mont. - Wat.	>0.44	>0.05	>0.2	>0.06
	laboratory		>0.44	>0.05	>0.2	>0.06
	difference		0.00	0.00	0.00	0.00
	% difference		0.00	0.00	0.00	0.00
1 Liter and 2 Liter Volumetric Flasks						
Jul 20	WR 34006	Mont. - Wat.	>0.44	>0.05	>0.2	>0.06
	laboratory		>0.44	>0.05	>0.2	>0.06
	difference		0.00	0.00	0.00	0.00
	% difference		0.00	0.00	0.00	0.00
Compositing Basin						
Jul 20	WR 34007	Mont. - Wat.	>0.44	>0.05	>0.2	>0.06
	laboratory		>0.44	>0.05	>0.2	>0.06
	difference		0.00	0.00	0.00	0.00
	% difference		0.00	0.00	0.00	0.00
ISCO Bottles						
Jul 20	WR 34008	Mont. - Wat.	>0.44	>0.05	>0.2	>0.06
	laboratory		>0.44	>0.05	>0.2	0.67
	difference		0.00	0.00	0.00	-0.61
	% difference		0.00	0.00	0.00	-90.94
Tygon Tubing and Strainer						
Jul 20	WR 34009	Mont. - Wat.	>0.44	>0.05	>0.2	>0.06
	laboratory		>0.44	>0.05	>0.2	0.58
	difference		0.00	0.00	0.00	0.52
	% difference		0.00	0.00	0.00	852.46
1680 Pump and Filtering Method						
Jul 20	WR 34010	Mont. - Wat.	>0.44	>0.05	>0.2	>0.06
	laboratory		>0.44	>0.05	>0.2	0.40
	difference		0.00	0.00	0.00	0.34
	% difference		0.00	0.00	0.00	552.46

Trace Metal Analyses

Date	Sample #	Laboratory	Cd ug/L	Cr ug/L	Cu ug/L	Pb ug/L	Ni ug/L	Ag ug/L	Zn ug/L

Analyses of Blank Equipment Test Samples: 99/00

Nutrient Analyses

Date	Sample #	Laboratory	NO3 mg/L	NH4-N mg/L	TKN mg/L	PO4 mg/L
Weight Room Sink						
Sep 8	WR 34186	Mont. - Wat.	>0.44	>0.05	>0.2	>0.06
	laboratory		>0.44	>0.05	>0.2	>0.06
	difference		0.00	0.00	0.00	0.00
	% difference		0.00	0.00	0.00	0.00
20 Liter Lab Carboy						
Sep 8	WR 34187	Mont. - Wat.	>0.44	>0.05	>0.2	>0.06
	laboratory		>0.44	>0.05	>0.2	>0.06
	difference		0.00	0.00	0.00	0.00
	% difference		0.00	0.00	0.00	0.00
Laboratory Supplied Bottles						
Sep 8	WR34188	Mont. - Wat.	>0.44	>0.05	>0.2	>0.06
	laboratory		>0.44	>0.05	>0.2	0.07
	difference		0.00	0.00	0.00	0.01
	% difference		0.00	0.00	0.00	19.67
1 Liter and 2 Liter Volumetric Flasks						
Sep 8	WR 34189	Mont. - Wat.	>0.44	>0.05	>0.2	>0.06
	laboratory		>0.44	>0.05	>0.2	>0.06
	difference		0.00	0.00	0.00	0.00
	% difference		0.00	0.00	0.00	0.00
Compositing Basin						
Sep 8	WR 34190	Mont. - Wat.	>0.44	>0.05	>0.2	>0.08
	laboratory		>0.44	>0.05	>0.2	>0.08
	difference		0.00	0.00	0.00	0.00
	% difference		0.00	0.00	0.00	0.00
ISCO Bottles						
Sep 8	WR 34191	Mont. - Wat.	>0.44	>0.05	>0.2	>0.06
	laboratory		>0.44	>0.05	>0.2	>0.06
	difference		0.00	0.00	0.00	0.00
	% difference		0.00	0.00	0.00	0.00
Internal Pump Tubing						
Sep 8	WR34192	Mont. - Wat.	>0.44	>0.05	>0.2	>0.06
	laboratory		>0.44	>0.05	>0.2	>0.06
	difference		0.00	0.00	0.00	0.00
	% difference		0.00	0.00	0.00	0.00
Tygon Tubing and Strainer						
Sep 8	WR 34193	Mont. - Wat.	>0.44	>0.05	>0.2	>0.06
	laboratory		>0.44	>0.05	>0.2	>0.06
	difference		0.00	0.00	0.00	0.00
	% difference		0.00	0.00	0.00	0.00

Trace Metal Analyses

Date	Sample #	Laboratory	Cd ug/L	Cr ug/L	Cu ug/L	Pb ug/L	Ni ug/L	Ag ug/L	Zn ug/L
Sep 8	WR 34186	Weck	>1.0	>8.0	>2.0	>2.0	>4.0	>2.0	>10.0
	Laboratory		>1.0	>8.0	13.60	>3.0	7.20	>3.0	21.40
	difference		0.00	0.00	11.60	1.00	3.20	1.00	11.40
	% difference		0.00	0.00	580.00	50.00	80.00	50.00	114.00
Sep 8	WR 35187	Weck	>1.0	>8.0	>2.0	>2.0	>4.0	>2.0	>10.0
	Laboratory		>1.0	>8.0	>2.0	>2.0	>4.0	>2.0	>10.0
	difference		0.00	0.00	0.00	0.00	0.00	0.00	0.00
	% difference		0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sep 8	WR 35188	Weck	>1.0	>8.0	>2.0	>2.0	>4.0	>2.0	>10.0
	Laboratory		>1.0	>8.0	>2.0	>2.0	>4.0	>2.0	>10.0
	difference		0.00	0.00	0.00	0.00	0.00	0.00	0.00
	% difference		0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sep 8	WR 35189	Weck	>1.0	>8.0	>2.0	>2.0	>4.0	>2.0	>10.0
	Laboratory		>1.0	>8.0	>2.0	>2.0	>4.0	>2.0	>10.0
	difference		0.00	0.00	0.00	0.00	0.00	0.00	0.00
	% difference		0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sep 8	WR 35190	Weck	>1.0	>8.0	>2.0	>2.0	>4.0	>2.0	>10.0
	laboratory		>1.0	>8.0	>2.0	>2.0	>4.0	>2.0	>10.0
	difference		0.00	0.00	0.00	0.00	0.00	0.00	0.00
	% difference		0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sep 8	WR 35191	Weck	>1.0	>8.0	>2.0	>2.0	>4.0	>2.0	>10.0
	Laboratory		>1.0	>8.0	>2.0	>2.0	>4.0	>2.0	>10.0
	difference		0.00	0.00	0.00	0.00	0.00	0.00	0.00
	% difference		0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sep 8	WR 35192	Weck	>1.0	>8.0	>2.0	>2.0	>4.0	>2.0	>10.0
	Laboratory		>1.0	>8.0	>2.0	>2.0	>4.0	>2.0	>10.0
	difference		0.00	0.00	0.00	0.00	0.00	0.00	0.00
	% difference		0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sep 8	WR 35193	Weck	>1.0	>8.0	>2.0	>2.0	>4.0	>2.0	>10.0
	Laboratory		>1.0	>8.0	>2.0	>2.0	>4.0	>2.0	>10.0
	difference		0.00	0.00	0.00	0.00	0.00	0.00	0.00
	% difference		0.00	0.00	0.00	0.00	0.00	0.00	0.00

Analyses of Blank Equipment Test Samples: 99/00

Nutrient Analyses

Date	Sample #	Laboratory	NO3 mg/L	NH4-N mg/L	TKN mg/L	PO4 mg/L
1680 Pump and Filtering Method						
Sep 8	WR 34194	Mont. - Wat.	>0.44	>0.05	>0.2	>0.06
	laboratory		>0.44	>0.05	>0.2	>0.06
	difference		0.00	0.00	0.00	0.00
	% difference		0.00	0.00	0.00	0.00
ISCO Pump Tubing						
Sep 13	WR 34205	Mont. - Wat.	>0.44	>0.05	>0.2	>0.06
	laboratory		>0.44	>0.05	>0.2	>0.06
	difference		0.00	0.00	0.00	0.00
	% difference		0.00	0.00	0.00	0.00
Strainer, Tygon Tubing and ISCO Bottles						
Sep 13	WR 34206	Mont. - Wat.	>0.44	>0.05	>0.2	>0.06
	laboratory		>0.44	>0.05	>0.2	0.18
	difference		0.00	0.00	0.00	0.12
	% difference		0.00	0.00	0.00	190.16
Strainer, Tygon Tubing and Pump Tubing						
Sep 13	WR 34207	Mont. - Wat.	>0.44	>0.05	>0.2	>0.08
	laboratory		>0.44	>0.05	>0.2	0.08
	difference		0.00	0.00	0.00	0.02
	% difference		0.00	0.00	0.00	31.15

Trace Metal Analyses

Date	Sample #	Laboratory	Cd ug/L	Cr ug/L	Cu ug/L	Pb ug/L	Ni ug/L	Ag ug/L	Zn ug/L
1680 Pump and Filtering Method									
Sep 8	WR 35194	Weck	>1.0	>8.0	>2.0	>2.0	>4.0	>2.0	>10.0
	laboratory		>1.0	>8.0	>2.0	>2.0	>4.0	>2.0	>10.0
	difference		0.00	0.00	0.00	0.00	0.00	0.00	0.00
	% difference		0.00	0.00	0.00	0.00	0.00	0.00	0.00
ISCO Pump Tubing									
Sep 13	WR 35205	Weck	>1.0	>8.0	>2.0	>2.0	>4.0	>2.0	>10.0
	laboratory		>1.0	>8.0	>2.0	>2.0	>4.0	>2.0	>10.0
	difference		0.00	0.00	0.00	0.00	0.00	0.00	0.00
	% difference		0.00	0.00	0.00	0.00	0.00	0.00	0.00
Strainer, Tygon Tubing and ISCO Bottles									
Sep 13	WR 35206	Weck	>1.0	>8.0	>2.0	>2.0	>4.0	>2.0	>10.0
	Laboratory		>1.0	>8.0	>2.0	>2.0	>4.0	>2.0	>10.0
	difference		0.00	0.00	0.00	0.00	0.00	0.00	0.00
	% difference		0.00	0.00	0.00	0.00	0.00	0.00	0.00
Strainer, Tygon Tubing and Pump Tubing									
Sep 13	WR 35207	Weck	>1.0	>8.0	>2.0	>2.0	>4.0	>2.0	>10.0
	laboratory		>1.0	>8.0	>2.0	>2.0	>4.0	>2.0	>10.0
	difference		0.00	0.00	0.00	0.00	0.00	0.00	0.00
	% difference		0.00	0.00	0.00	0.00	0.00	0.00	0.00

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COUNTY OF ORANGE

PUBLIC FACILITIES & RESOURCES DEPARTMENT

REPORT OF WASTE DISCHARGE
Volume 1 of 2

SECOND TERM PERMIT PROGRAM SUMMARY

September 2000

A COOPERATIVE PROJECT OF THE COUNTY OF ORANGE, THE CITIES OF ORANGE COUNTY AND THE ORANGE COUNTY FLOOD CONTROL DISTRICT

ORANGE COUNTY COPERMITTEES
STORM WATER CONVEYANCE SYSTEM
NPDES ORDER: 96-03
REPORT **FILE:** 25 09/2000-09/2000
10-6000.03 STATUS: C

COUNTY OF ORANGE

PUBLIC FACILITIES & RESOURCES DEPARTMENT

REPORT OF WASTE DISCHARGE
Volume 1 of 2

SECOND TERM PERMIT PROGRAM SUMMARY

September 2000

VICKI L. WILSON
Director

ORANGE COUNTY BOARD OF SUPERVISORS

CHARLES V. SMITH
First District

TODD SPITZER
Third District

JAMES W. SILVA
Second District

CYNTHIA P. COAD
Fourth District

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Fifth District

file 10-6000.03

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PROPOSED PLAN: DRAFT DRAINAGE AREA MANAGEMENT PLAN

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EXECUTIVE SUMMARY

This report was prepared in response to the requirements of municipal National Pollutant Discharge Elimination System (NPDES) Stormwater Permit Nos. CAS618030 and CAS0108740, issued to the County of Orange, the Orange County Flood Control District and the 31 incorporated cities of Orange County by the Santa Ana and San Diego Regional Water Quality Control Boards. These permits require that, in accordance with Title 23, Chapter 3, subchapter 9, of the California Code of Regulations, the Permittees submit a Report of Waste Discharge (ROWD) 180 days prior to permit expiration. This Report of Waste Discharge has been prepared by the County of Orange in cooperation with the cities in Orange County. The report constitutes a review of all NPDES Stormwater Program activities for the Second Term Permit period (March 1996 - June 2000) and a proposed plan for the Third Term Permit. It is comprised of four volumes. ?

Volume One is the program summary and includes discussions on the Detection and Elimination of Illegal Discharges and Illicit Connections (Section 2.0), the Status of BMP Implementation (Section 3.0), the Program Effectiveness (Section 5.0), a Fiscal Analysis (Section 6.0).

Volume Two provides the proposed plan for the next permit. In order to effectively address the revisions to the NPDES Stormwater Program from the First and Second Term permits and to incorporate the programs developed since 1993, the April 1993 version of the Drainage Area Management Plan (DAMP) was updated. The September 2000 version of the DAMP proposes a wide range of continuing and enhanced Best Management Practices (BMPs), which will be implemented over the upcoming 2001 – 2006 permit period.

1.0 INTRODUCTION

1.1 2000 Report Of Waste Discharge

This report was prepared in response to the requirements of municipal NPDES Stormwater Permit Nos. CAS618030 and CAS0108740 (subsequently referred to as the Second Term Permits), issued to the County of Orange (subsequently referred to as the Principal Permittee), the Orange County Flood Control District and the 31 incorporated cities of Orange County (subsequently collectively referred to as the Permittees) by the Santa Ana and San Diego Regional Water Quality Control Boards (subsequently collectively referred to as the Regional Boards and individually as the Santa Ana Board and the San Diego Board), respectively.

These permits require that, in accordance with Title 23, Chapter 3, subchapter 9, of the California Code of Regulations, the Permittees submit a Report of Waste Discharge (ROWD) 180 days prior to permit expiration. The permits collectively require the report to, at a minimum, include the following (the items are listed in the order of their appearance in the permits with the corresponding location of each item in the report noted in parentheses):

- Any revisions to the Drainage Area Management Plan (DAMP) including, but not limited to, all the activities the permittees propose to undertake during the next permit term, goals and objectives of such activities, an evaluation of the need for additional source control and/or structural BMPs, any proposed pilot studies, etc.; (Section 7.0 and Volume 2);

- Changes in land use and/or population including map updates (Section 3.0);

- Any significant changes to the storm drain systems, outfalls, detention or retention basins or dams, and other controls including map updates of the storm drain systems (Section 3.0); and

- Any new or revised program elements and compliance schedule(s) necessary to comply with Receiving Water Limitations Section of this order (Volume 2 DAMP Sections 3.0, 11.0 and 12.0).

In addition, the Report of Waste discharge also includes:

- A summary of the procedures implemented to detect illegal discharges and illicit disposal practices (Section 2.0);

- A summary of enforcement procedures and actions taken to require stormwater discharges to comply with the approved stormwater management programs (Section 2.0);

- A summary of the public agency activity BMPs implemented (Section 3.0);

- A summary of the results of the monitoring program (Section 4.0);
- A summary of the program effectiveness (Section 5.0); and
- A fiscal analysis (Section 6.0).

In order to effectively address the revisions to the Orange County Municipal NPDES Stormwater Program (subsequently referred to as the NPDES Stormwater Program) from the First Term Permit period and provide the proposed plan for the Third Term Permit period, the Permittees updated the April 1993 version of the DAMP (subsequently referred to as 1993 DAMP) and are submitting it concurrently with the ROWD as the proposed plan for the Third Term Permit period (see Section 7.0 and Volume 2).

The Report of Waste Discharge: Proposed Plan Draft Drainage Area Management Plan (subsequently referred to as the DAMP) addresses the requirements of the Second Term Permits, incorporates the programs developed since 1993 and proposes a wide range of continuing and enhanced Best Management Practices (BMPs) to be implemented during the Third Term Permit period. Any references to the DAMP throughout this report shall refer to the 2000 DAMP included as Volume 2 of this report unless otherwise noted

1.2 NPDES Permit Requirements

The Second Term Permits, issued by the Santa Ana Regional Board in March 1996 and by the San Diego Regional Board in August 1996, require the Permittees to:

1. Prohibit illicit/illegal discharges from entering into the municipal stormwater conveyance systems and require controls to reduce the discharge of pollutants to the maximum extent practicable;

2. Develop and implement Best Management Practices (BMPs) to control/reduce the discharge of pollutants to waters of the United States to the maximum extent practicable (MEP), and

1.3 Program Objectives (DAMP Section 1.0)

The specific water pollutant control program elements of the NPDES Stormwater Program are documented in the 1993 DAMP, which has served as the Permittees' primary policy and implementation document regarding compliance with the NPDES Stormwater. The 1993 DAMP was originally completed through a process that involved public and private sector representation and was formally approved in June of 1994 by the Santa Ana Regional Board and in 1996 by the San Diego Board. As stated in Section 1.1, the 1993 DAMP has been revised and is being submitted concurrently with the ROWD as Volume 2.

The DAMP will serve to:

1. Provide the framework for the program management activities and plan development;

2. Provide the legal authority for prohibiting unpermitted discharges to the storm drain system and for requiring BMPs in new development and significant redevelopment;

3. Improve existing city and county pollution prevention and removal BMPs to further reduce the amount of pollutants entering the storm drain system;

4. Educate the public about the issue of stormwater and non-stormwater pollution and obtain their support in implementing pollution prevention BMPs;

5. Ensure that all new development and significant redevelopment incorporates appropriate post construction nonstructural and structural BMPs and evaluate "special" structural BMPs to address specific water quality problems as identified through the water quality planning process;

6. Ensure that construction sites implement pollutant control practices that address control of construction related pollutants including erosion and sediment control and on-site hazardous materials and waste management;

7. Identify industrial stormwater dischargers in Orange County and notify them of State Industrial stormwater permit requirements;

8. Detect and eliminate unpermitted discharges and illegal connections to the storm drain system;

9. Conduct a stormwater monitoring program to identify areas with water quality problems, to assist in the prioritization of watersheds for analysis and planning, and to assist in the prioritization of pollutants to facilitate the development of specific controls to address these problems; and

10. Address the special focus within the Newport Bay/San Diego Creek watershed due to its impaired status and the resulting development of TMDLs for sediment, nutrients, bacteria and toxics.

lack a clear commitment to dual regulation.

1.4 Program Management (DAMP Section 2.0)

The NPDES Stormwater Program is a cooperative effort between the 33 current Permittees (35 with the recently incorporated cities of Laguna Woods and Rancho Santa Margarita). A formal agreement (the Implementation Agreement) underpins Permittee cooperation and recognizes the additional role of the County of Orange as the Principal Permittee. The Implementation Agreement, originally entered into in December of 1990, was amended in October of 1993 to include two additional Permittees (Laguna Hills and Lake Forest) and formally established the Technical Advisory Committee (TAC) (**DAMP Appendix C and D**). The Implementation Agreement establishes the responsibilities of each party and a funding mechanism for the shared costs of the NPDES Stormwater Program and recognizes the oversight function of the TAC.

The County of Orange, as Principal Permittee, is responsibile for coordinating compliance with permit terms and conditions and overall program management. The Permittee Committee provides the overall program guidance with designated representatives from each Permittee. The advisory group for program development and implementation is the NPDES Technical Advisory Committee (TAC), comprised of a City Engineer, or selected representative, from each of five County Supervisorial Districts and a representative from the Principal Permittee.

2.0 DETECTION/ELIMINATION OF ILLEGAL DISCHARGES AND ILLICIT CONNECTIONS

2.1 Introduction

This section includes a discussion of the specific requirements for legal authority to control pollutant contributions to the storm drain system, the use of this authority to eliminate illegal discharges, the ability to abate discharges that have occurred or are occurring and efforts to identify and eliminate illicit connections to the storm drain system through routine facility inspections.

2.2 Legal Authority (DAMP Section 4.0)

The Second Term Permits required that the Permittees establish "adequate legal authority" to implement the necessary DAMP programs by July 31, 1997. This included adequate authority to regulate the discharge of pollutants to municipal separate storm drain systems in Orange County and to implement pollution control programs.

Although adequate legal authority existed for most potential pollutant discharges at the inception of the stormwater program, in 1993 the permittees determined that a Model Water Quality Ordinance should be prepared to provide a more uniform Countywide approach and to provide a legal underpinning to the entire NPDES Stormwater Program.

A consultant law firm was retained for this purpose, and the Ordinance and accompanying Enforcement Consistency Guide (**DAMP Appendix E1 and E2**) were prepared under the aegis of the TAC and with input from representative City and County Attorneys, Sanitation Districts of Orange County, the Orange County Building Industry Association (BIA), the Food Sanitation Advisory Council, Western States Petroleum Association (WSPA) and the Permittees.

All of the Permittees adopted the Water Quality Ordinance and corresponding Enforcement Consistency Guide and provided certifications regarding this to the Regional Boards the 1997-98 Annual Status Report. In addition, each Permittee has designated the Authorized Inspector(s) responsible for enforcing the Ordinance and provides updates to this list annually. The Authorized Inspector is the person designated to investigate compliance with, detect violations of and/or take actions pursuant to the Ordinance.

The detection, elimination and enforcement activities undertaken by the Permittees are described below in Sections 2.3 and 2.4. In addition to prohibiting illicit connections and illegal discharges, the Water Quality Ordinance also provides for requiring BMPs in new development and significant redevelopment (see Section 3.4).

2.3 Detection of Illegal Discharges (DAMP Section 10.0)

An illegal discharge is any discharge to a municipal separate storm sewer that is not composed entirely of stormwater and that is not covered by an NPDES permit or identified in the NPDES Stormwater permit as an allowed discharge. An illegal discharge refers to the disposal of non-stormwater materials such as paint or waste oil into the storm drain or the discharge of waste streams containing pollutants to the storm drain. The elimination of these discharges to the storm drain system requires the sequential detection, investigation, and enforcement using supporting statutory authority

The Permittees have a number of programs that have facilitated the detection of sources of non-stormwater discharges. These programs include industrial facility inspection (Section 2.3.1), drainage facility inspection (Section 2.3.2), water quality monitoring (see Section 4.0), and the wide distribution of public education materials that provide phone numbers and encourage the reporting of spills (Section 3.3).

2.3.1 Industrial Facility Inspection

Should we call these agencies and ask them what they know?

A number of public agencies routinely conduct inspections of industrial facilities in Orange County. These agencies and their areas of responsibility include the following:

- The Orange County Health Care Agency regulates the storage and disposal of hazardous wastes. Approximately 6,339 businesses are inspected annually to ensure proper waste management.

- The Fire Departments in Orange County regulate the storage of hazardous materials through disclosure ordinances such as OCC Sec 4-3-200-300 and Article 80 of the Fire Code. This regulation involves inspection at approximately 7,000 business.

- Agricultural chemicals, notably pesticides, are regulated by the Agriculture Commissioner through the State Agriculture Code (CCR Title 3, Sec. 6000 et seq.). The Commissioner's office performs facility inspections at about 200 facilities/year out of a total of approximately 700 facilities that use/store pesticides. The Commissioners office also initiates enforcement action for non-compliance.

- Discharges to the sanitary sewers are regulated by the County Sanitation Districts of Orange County, and the Aliso Water Management Agency/South East Regional Reclamation Authority who routinely conduct pre-treatment facility inspections.

Routine coordination with staff of these inspection programs occurs through Principal Permittee participation with the Orange County Hazardous Materials Strike Force and the Stormwater Awareness training developed and presented by the Principal Permittee. These coordination efforts ensure that the staff of these inspection programs are cognizant of stormwater issues and regularly notify the Principal Permittee of situations that may present a source of water pollution.

2.3.2 Drainage Facility Inspection

Through routine maintenance activities within the municipal storm drain system, Permittee field personnel continue to report suspected problems and/or discharges to the system (Section 3.2.3).

2.3.3 Countywide Reconnaissance

During the First Term Permit and part of the Second Term Permit the Permittees conducted field screening/reconnaissance every year which included conducting a site investigation and chemical analyses once during dry weather and once during storm events. While the primary objective of this component of the water quality monitoring program was to detect gross contamination from illegal discharges through field analyses minimal incidences were detected.

monitoring has the greater purpose of determining the status of H_2O quality - not just detecting "gross contamination"

New monitoring program objectives set in the Second Term Permit prompted a re-evaluation of the monitoring program starting in 1997. In May 1999, a final report outlining a new monitoring program that addressed the requirements of this permit was submitted to the Regional Boards (**DAMP Appendix K**) and the program was implemented.

The reconnaissance and source identification section of the new water quality monitoring program addresses the need to determine if an identified water quality problem is the result of an illicit connection or illegal discharge through a series of source identification studies. If problems are found they are referred to the Permittees' Authorized Inspectors.

2.3.4 Incident Reporting

The public reporting of spills is facilitated by a listing of:

- Permittee business telephone numbers in materials produced and distributed by the NPDES Stormwater Program's public education activities (brochures and magnets).
- The 24 hour water pollution problem reporting hotline and corresponding e-mail address in materials produced and distributed by the NPDES Stormwater Program's public education activities
- The Principal Permittee's water pollution telephone number in the Orange County "white page" telephone directories

2.4 Elimination Of Illegal Discharges (DAMP Section 10.0 and Appendix E1/E2)

2.4.1 Investigations

Investigations of water pollution incidents are routinely undertaken by Permittee Authorized Inspector staff and various fire and police departments (Section 3.2.8). Although investigations may be unilateral efforts, more serious incidents are typically coordinated with federal, state, and local agencies through the Orange County Hazardous Materials Strike Force. The Strike Force is headed by the Orange County District Attorney's Office and includes representatives of a wide variety of local, regional, and state agencies.

In addition, the Permittees also coordinate with Regional Board staff on an ongoing basis with a particular focus on facilities regulated by an NPDES permit.

Although figures are not available regarding the number of water pollution investigations conducted during the 1996-2000 reporting period, commencing with the 1999/00 reporting period, the Permittees began to collectively provide a summary of the types and total numbers of water pollution incidents that have been reported within their jurisdiction. A summary of these investigations can be found in **Table 2.1.**

During the 1999/00 reporting period, the Permittees reported a total of 819 water pollution incidents. This total consisted of 281 Notifications, 269 Complaints and 167 Response Requests and 102 referrals to other agencies. **Figure 2.1** illustrates the sources of water pollution incident reports received by the Principal Permittee with the cities and the public constituting over 60% of the sources and **Figure 2.2** illustrates the types of materials involved **(Table 2.2).**

The Principal Permittee investigations constituted approximately half (409) of the total. The number of incidents addressed by the Principal Permittee illustrates its effective countywide role as the local agency with primary responsibility for surface water pollution investigations.

For comparison, from July 1, 1996 - June 30, 2000 a total of 1,508 water pollution incident reports were received by the Principal Permittee. Beginning in FY 1996/97 to FY 1999/00, the Principal Permittee received 390, 374, 337 and 407 contacts regarding water pollution problems.

There was an increase in the incident reporting from 808 in the four year period 1990-1994 (202/year) to 1872 in the five year period 1995-2000 (375/year). **Figures 2.3 and 2.4** illustrate the types of materials that were reported in the 808 water pollution incidents reported during 1990-1994. Similarly, **Figures 2.5 and 2.6** illustrate the types of materials that were reported in the 1872 water pollution incidents during 1995-2000. The types of materials involved the most in the incidents for both the First and Second Permit Terms were miscellaneous waste and petroleum products (1990-1994 67%, 1995-2000 66%).

2.4.2 Enforcement

Enforcement activities are undertaken according to the Water Quality Ordinance and accompanying Enforcement Consistency Guide (DAMP Section 4.0 and **Appendix E2**). Water pollution cases may be handled administratively or in more serious instances, have been prepared for prosecution by the Orange County District Attorney who may prosecute under the applicable sections of the Water Quality Ordinance, State Fish and Game Code, State Water Code, Uniform Fire Code, and Penal Code that address pollutant discharges.

The Permittees have formerly designated the staff responsible for carrying out the enforcement services according to the Enforcement Consistency Guide and update these designations every year in the Annual Status Report (Section 3.0). The Permittees will continue to have responsibility for water pollution enforcement within their jurisdiction unless that authority has been designated to the Orange County Flood Control District.

During the 1997/98 and 1998/99 reporting periods, the Principal Permittee provided Water Quality Ordinance Enforcement Consistency Guide training to approximately 40 Permittees and support staff. This training was designed to assist with the establishment or implementation of the Water Quality Ordinance enforcement program.

Commencing with the 1999/00 reporting period, the Permittees began to provide a summary of the enforcement actions that have been taken against offenders within their jurisdiction. This information includes the types and total numbers of the various enforcement actions that have been taken against the violators, the number of repeat violators and the incremental enforcement actions taken against them, and additional information regarding any prosecutions that are either currently underway of that have been settled.

As provided for in the Enforcement Consistency Guide, when selecting enforcement options, it is important that the Permittees ensure that violations of a similar nature are subjected to similar types of enforcement remedies. Nonetheless, a more severe enforcement option may be selected when a violator has either a history of noncompliance or has failed to take good faith actions to eliminate continuing violations or meet a previously imposed compliance schedule.

The Permittees have five types of remedies including educational letters, Notices of Noncompliance, Administrative Compliance Orders, Cease and Desist Orders and commencement of other civil or criminal enforcement action. The Enforcement Consistency Guide provides a framework to the Permittees for selecting the type of enforcement that should be pursued. Some of the factors that influence this decision include the duration and significance of the violation of threat, the cooperativeness and willingness of the responsible party to remedy the conditions, whether the incident is isolated or re-occurring and whether the violation or threat will affect or harm human health or the environment.

Why isn't everyone doing enforcement?

The Permittees reported a total of 367 enforcement actions during the 1999/00 reporting period (**Table 2.3**). Of these, 216 were educational letters, 62 Citations, 30 Cease and Desist Orders, and 25 Notices of Noncompliance. **Table 2.4** provides a summarization of the incremental enforcement actions taken by twelve Permittees with respect to repeat violators as well as any ongoing prosecutions. A total of eleven prosecutions were reported. Of these, two resulted in guilty pleas and subsequent fines, while the others are still pending.

2.5 Detection/Elimination of Illicit Connections

An illicit connection to the storm drain system is an undocumented and/or unpermitted physical connection from a facility to the storm drain system. The First Term Permit required the Permittees to undertake programs to identify and eliminate illicit connections to the storm drain system. In response, the Permittees developed a facility inspection and documentation program to identify such connections (**DAMP Appendix J**).

The Second Term Permit required the Permittees to certify the completion of the reconnaissance of the storm drain system by February 28, 1997, and, in instances where illicit connections are detected, a schedule be provided for their elimination. The Reconnaissance Survey Report of February, 1997, reported finding two illicit connections countywide and inspection of drainage facilities is now conducted as part of routine maintenance.

Any illicit connection identified during routine inspections is investigated by the affected Permittee. Appropriate actions are then taken to approve undocumented connections by permit procedure and/or pursue removal of those connections that are determined to be illicit connections and not permissible.

From 1996 to 2000, the Permittees reported a total of 178 illicit connections to the storm drain system. Of these, at least 56 received permits and 46 were either plugged or removed; the remainder are still pending. **(Table 2.5).** Pool drains constituted the majority of these connections.

TABLES

Table 2.1 1999/00 Incident Investigation Summary

Permittee	Investigative/Enforcement Status			Type of Incident				Total Reported
	County Provides All	City Provides Some	City Provides All	Notification	Complaint	Response Request	Referral to Other Agency	
Anaheim		X		8	5	0	0	13
Brea		X		0	0	0	0	0
Buena Park	X			3	0	0	2	5
Costa Mesa			X	3	3	14	3	23
Cypress		X		0	9	0	0	9
Dana Point		X		10	38	0	0	48
Fountain Valley		X		No Report				
Fullerton		X		0	14	0	0	14
Garden Grove		X		6	9	3	0	18
Huntington Beach		X		0	1	1	0	2
Irvine			X	0	0	9	0	9
La Habra		X		2	11	0	0	13
La Palma	X			0	0	0	0	0
Laguna Beach			X	2	4	3	0	9
Laguna Hills	X			0	0	0	0	0
Laguna Niguel		X		3	10	2	4	19
Lake Forest	X			0	0	0	0	0
Los Alamitos		X		0	0	0	2	2
Mission Viejo	X			1	19	0	0	20
Newport Beach			X	16	6	20	2	44
Orange			X	1	6	6	0	13
Placentia	X			0	0	6	0	6
San Clemente			X	0	0	9	0	9
San Juan Capistrano		X		0	9	0	0	9
Santa Ana	X			0	16	45	22	83
Seal Beach		X		10	0	0	0	10
Stanton		X		0	0	0	0	0
Tustin		X		0	3	2	1	6
Villa Park		X		No Report				
Westminster			X	16	3	6	0	25
Yorba Linda		X		0	3	0	0	3
County of Orange/OCFCD	X			200	100	41	66	407
Total				281	269	167	102	819

County referrals column consists of referrals to cities

= Co-permittees in our region

Table 2.2 Materials Involved in Water Pollution Incidents

Materials Involved in Water Pollution Incidents					
Inorganic	Paint	Petroleum Products	Sewage	Miscellaneous	Unidentified
Acids	Dry Scrapings/Residuals	Automotive Fluids	Greywater/Sewage	Animal Waste/Remains	Liquid
Bases	Latex	Crude Oil	Odor	Carpet Cleaning Washwater	Material
Chemicals	Mixtures	Degreasers		Chemicals	Residue
Metals	Oil Based	Diesel		Construction Runoff	Solid
Process Solutions/Wastewater	Wastewater	Gasoline		Dye	Did Not Observe
		Hydraulic Fluid		Ethylene Glycol	
		Jet Fuel		Fire Supression Runoff	
		Miscellaneous		Food Process Wastewater	
		Odor		Grease	
		Sheen		Green Waste/Material	
		Waste Oil/Mixture		Miscellaneous	
				Odor	
				Pool Wastewater	
				Process Wastewater	
				Detergents/Washwater	
				Trash/Debris	
				Silt/Mud	
				Surface/Groundwater	

Table 2.3 FY 1999/00 . ..rcement Summary

Permittee	Investigative/Enforcement Status			Type of Enforcement								
	County Provides All	City Provides Some	City Provides All	Education Letter (EL)	Administrative Enforcement			Criminal Enforcement			Other	Total
					NON	ACO	CDO	Mis	Inf	IOC		
Anaheim		X		0	5	0	0	0	0	0	0	5
Brea		X		0	0	0	0	0	0	0	0	0
Buena Park	X			0	0	0	0	0	0	0	0	0
Costa Mesa			X	3	0	0	0	2	0	0	0	5
Cypress		X		6	0	0	0	0	0	0	3	9
Dana Point		X		38	0	0	0	0	0	0	0	38
Fountain Valley		X		No Report								
Fullerton		X		14	0	0	0	0	0	0	0	14
Garden Grove		X		18	1	0	0	0	0	0	9	28
Huntington Beach		X		0	2	0	0	0	0	0	0	2
Irvine			X	0	6	2	1	1	0	0	0	10
La Habra		X		10	0*	0	13	0	0	0*	0	23
La Palma	X			1	0	0	0	0	0	0	0	0
Laguna Beach			X	2	1	0	0	0	0	0	6	9
Laguna Hills	X			0	0	0	0	0	0	0	0	0
Laguna Niguel		X		11	1	0	0	0	0	0	0	12
Lake Forest	X			0	0	0	0	0	0	0	0	0
Los Alamitos		X		1	1	0	0	0	0	0	0	2
Mission Viejo	X			19	0	0	0	0	0	0	0	19
Newport Beach			X	4	3	0	0	0	0	62	0	69
Orange			X	13	0	0	0	0	0	0	0	13
Placentia	X			5	0	0	0	0	0	0	0	5
San Clemente			X	0	0	0	0	0	0	0	0	0
San Juan Capistrano		X		2	0	0	0	0	0	0	0	2
Santa Ana	X			4	0	0	0	0	0	0	0	4
Seal Beach		X		0	0	0	0	0	0	0	10	10
Stanton		X		0	0	0	0	0	0	0	0	0
Tustin		X		2	3	0	0	1	0	0	0	6
Villa Park		X		No Report								
Westminster			X	14	2	0	16	0	1	0	0	33
Yorba Linda		X		0	0	0	0	0	0	0	0	0
County of Orange/OCFCD	X			49	0	0	0	0	0	0	0	49
Total				216	25	2	30	4	1	62	28	367

NON = Notice of Noncompliance
ACO = Administrative Compliance Order
CDO = Cease and Desist Order

Mis = Misdemeanor
Inf = Infraction
IOC = Issuance of Citation

Table 2.4 1999/00 Repeat Violators/Prosecutions Summary

Violator Type	Type of Enforcement Action								Information on Violators Prosecuted						
	EL	NON	ACO	CDO	Mis	Inf	IOC	Other	Name	Address	Contact	Pollutant of Concern	Nature of Violation	Status of Judgment/Settlement	Nature of Judgment/Settlement
City of Costa Mesa															
Business					1				EZ Lube	3599 Harbor Blvd.	Kenneth Spaugy	Fuel injection chemicals	Fuel injection testing outdoors	Found guilty	Fined $700
Residence					1				Martin Gonzalez	2252 Pomona	Martin Gonzalez	Oil into stormdrain	Vehicle repair in street illegal	Pending	Pending
City of Cypress															
Business	1														
City of Garden Grove															
Business	1	1													
City of Huntington Beach															
Business		2							Pat's Garage	19791 Beach Blvd	Pat Fuentes	Automotive Fluids	Draining into storm system		Monitor
									New York Seafood Buffet	6842 Edinger	Jose Ose - Manager	Kitchen Grease	Draining into storm system		Monitor
City of Irvine															
Business									Holiday Rock	16351 1/2 Construction Cir.	John Holiday, V.P.	Diesel Fuel	Spill into Stormdrain	Pending	
City of Laguna Beach															
Business		1						1							
City of Laguna Niguel															
Residence	1	1													
Business	1														
City of Los Alamitos															
Business	2														
City of Orange															
Business	3	3													
City of Tustin															
Business		3			1										
Residence	2								Roddy Giacomini	1206 Via Presa	Same	Concrete	Improper disposal	Guilty plea	$1360 fine
City of Westminster															
Business	2	2		2											
County of Orange															
Business	3								El Toro Material	Rocky Rd. & Portola Pkwy Lake Forest 92630	R.N. Basich	Concrete Slurry	Discharge of contaminants to state waters	Pending	Pending
									Newport Harbor Shipyard	151 Shipyard Way Newport Beach		Wastewater	Discharge of contaminants to state waters	Pending	Pending
									Coast Grain	5355 E Airport Dr; Ontario, CA 91761	Don Holmes	Sewage	Discharge of sewage to storm drain	Pending	Pending
Residence	2								Gaston Vilaba	221 Main St, #F Huntington Beach 92684	Same	Diesel Fuel	Discharge of contaminants to state waters	Pending	Pending
									Rick Coleman c/o OCDA	405 W 5th St, Ste 606 Santa Ana 92701	Same	Diesel Fuel	Discharge of contaminants to state waters	Pending	Pending

EL = Education Letter
NON = Notice of Noncompliance
ACO = Administrative Compliance Order
CDO = Cease and Desist Order

Mis = Misdemeanor
Inf = Infraction
IOC = Issuance of Citation

Table 2.5 1996-2000 Detection and Elimination of Illicit Connections to Storm Drain Systems

	1996-97			1997-98			1998-99			1999-2000		
Permittee	# Illicit Connections Found	Type of Connection	Resulting Action	# Illicit Connections Found	Type of Connection	Resulting Action	# Illicit Connections Found	Type of Connection	Resulting Action	# Illicit Connections Found	Type of Connection	Resulting Action
Anaheim	0			0			4	Residential connections to surface drains	All pipes removed	10	Residential connections to surface drains, clogged sewers	All pipes removed
Brea	0			0			0			0		
Buena Park	0			0			0			0		
Costa Mesa	0			0			0			0		
Cypress	0			0			0			0		
Dana Point	0			0			0			0		
Fountain Valley	0			0			0			0		
Fullerton	0			0			0			0		
Garden Grove	0			0			0			0		
Huntington Beach	0			0			0			0		
Irvine	0			0			0			0		
La Habra	37	Lot & Pool Drains	Education on Pollution	0			0			1	Pool Drain	Education on Pollution
La Palma	Not Reported											
Laguna Beach	0			0			0			1	Restaurant Floor Drain to OCFCD Channel	City working with property owner to resolve issue
Laguna Hills	0			0			0			0		
Laguna Niguel	0			0			0			0		
Lake Forest	0			0			0			0		
Los Alamitos	Not Reported											
Mission Viejo	0			0			0			0		
Newport Beach	0			0			0			0		
Orange	5	Pool Drains, Misc. business connections	All notified complied	2	Pool Drains, Misc. business connections	All notified complied	9	Pool Drains, Misc. business connections	All notified complied	7	Pool Drains, Misc. business connections	All notified complied
Placentia	0			0			0			0		
San Clemente	0			0			0			0		
San Juan Capistrano	0			0			0			0		
Santa Ana	0			0			0			0		
Seal Beach	0			0			0			0		
Stanton	Not Reported											
Tustin	2	12" Residential & 18" Industrial	Undocumented, but legal surface drains									
Villa Park	Not Reported											
Westminster	0			0			0			0		
Yorba Linda	0			0			0			0		
County of Orange*	17		13 Permits, 3 Plugged/Removed, 1 Pending	41		37 Permits, 4 Plugged/Removed	8		5 Permits, 3 Pending	34		1 Permit, 2 Plugged/Removed, 31 Pending
Total	61			43			21			53		

* County of Orange totals are for calender years. 1996 figures are reported for 1996-97, 1997 figures for 1997-98, 1998 figures for 1998-99, while 1999 (25) and 2000 (9) figures are combined for 1999-2000

FIGURES

Figure 2.1

Water Pollution Incidents
Notification Sources (1999-2000)

Total of 407 Incidents

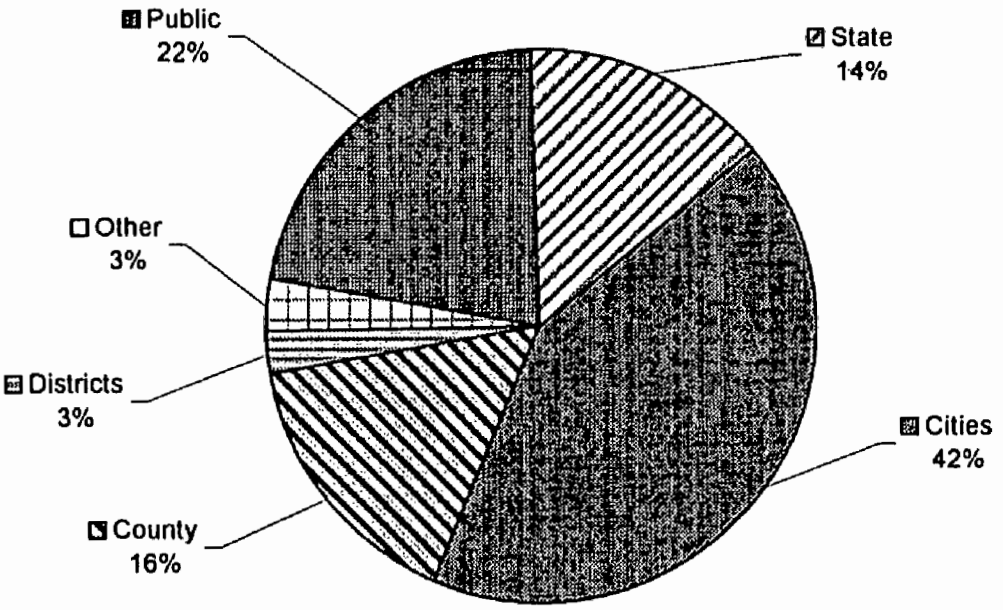

Figure 2.2

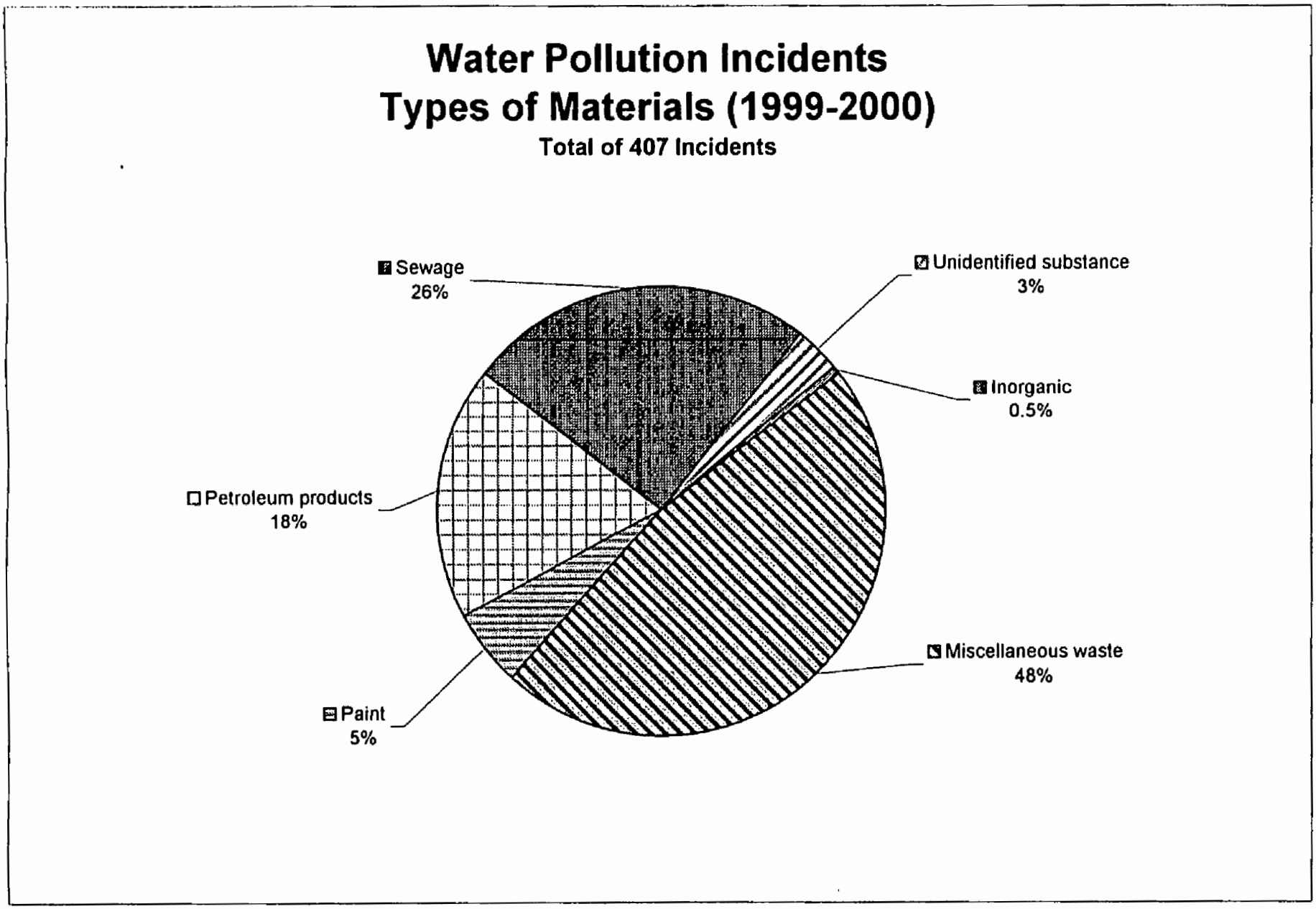
Water Pollution Incidents
Types of Materials (1999-2000)
Total of 407 Incidents
Sewage
26%
Unidentified substance
3%
Inorganic
0.5%
Petroleum products
18%
Miscellaneous waste
48%
Paint
5%

Figure 2.3

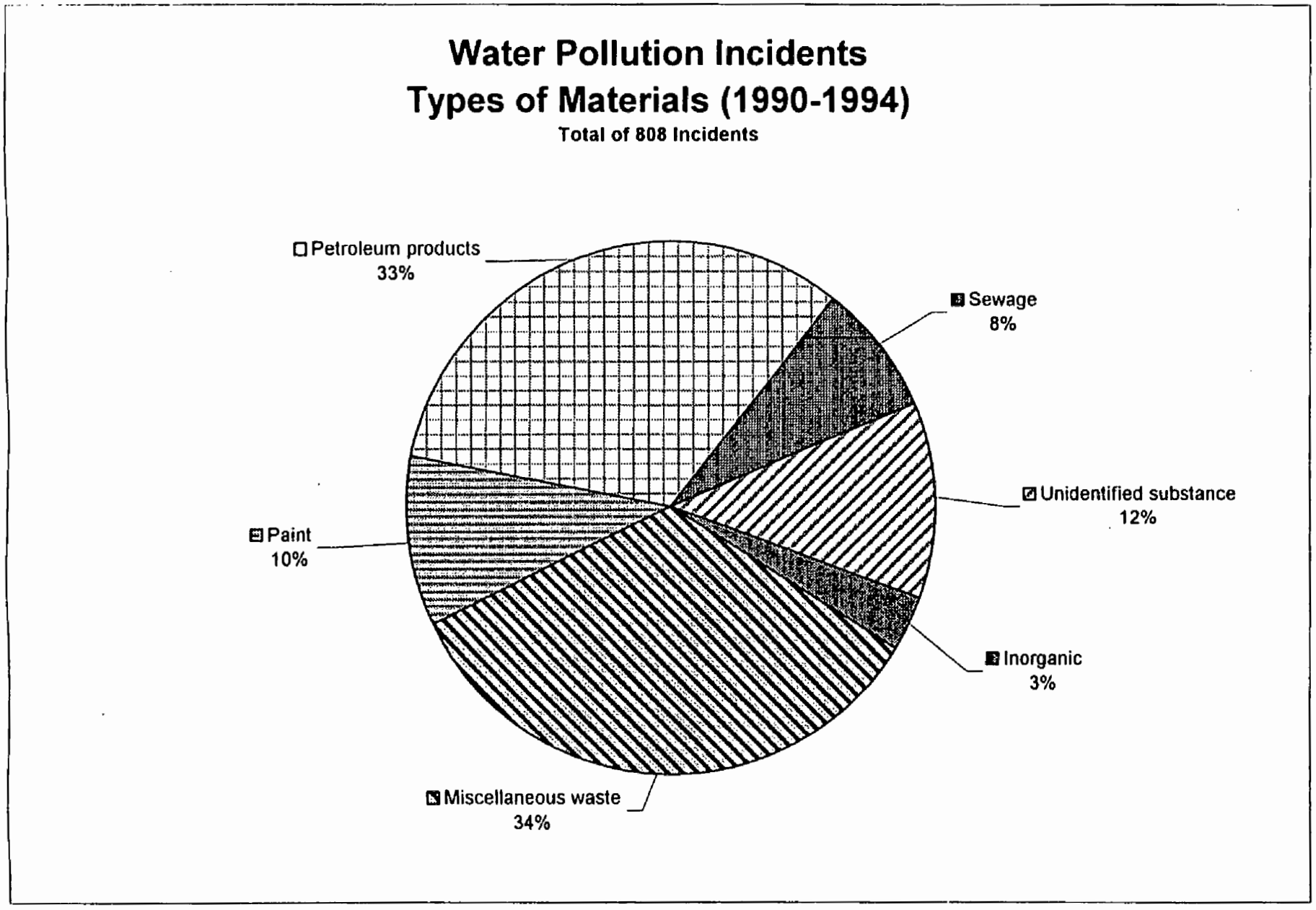
Water Pollution Incidents
Types of Materials (1990-1994)
Total of 808 Incidents
Petroleum products
33%
Sewage
8%
Unidentified substance
12%
Inorganic
3%
Miscellaneous waste
34%
Paint
10%

Figure 2.4

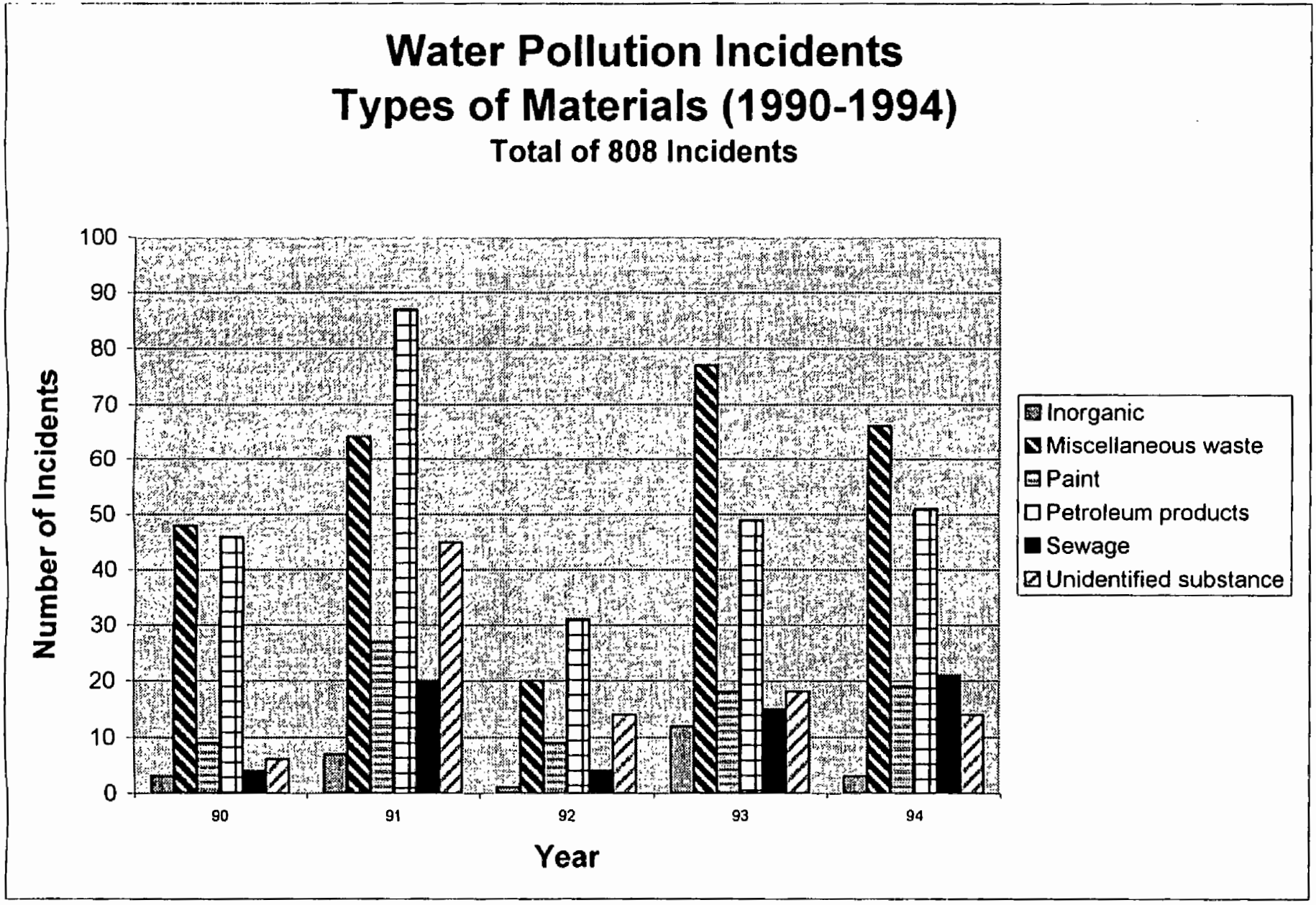
Water Pollution Incidents
Types of Materials (1990-1994)
Total of 808 Incidents
Number of Incidents
100
90
80
70
60
50
40
30
20
10
0
90
91
92
93
94
Year
Inorganic
Miscellaneous waste
Paint
Petroleum products
Sewage
Unidentified substance

Figure 2.5

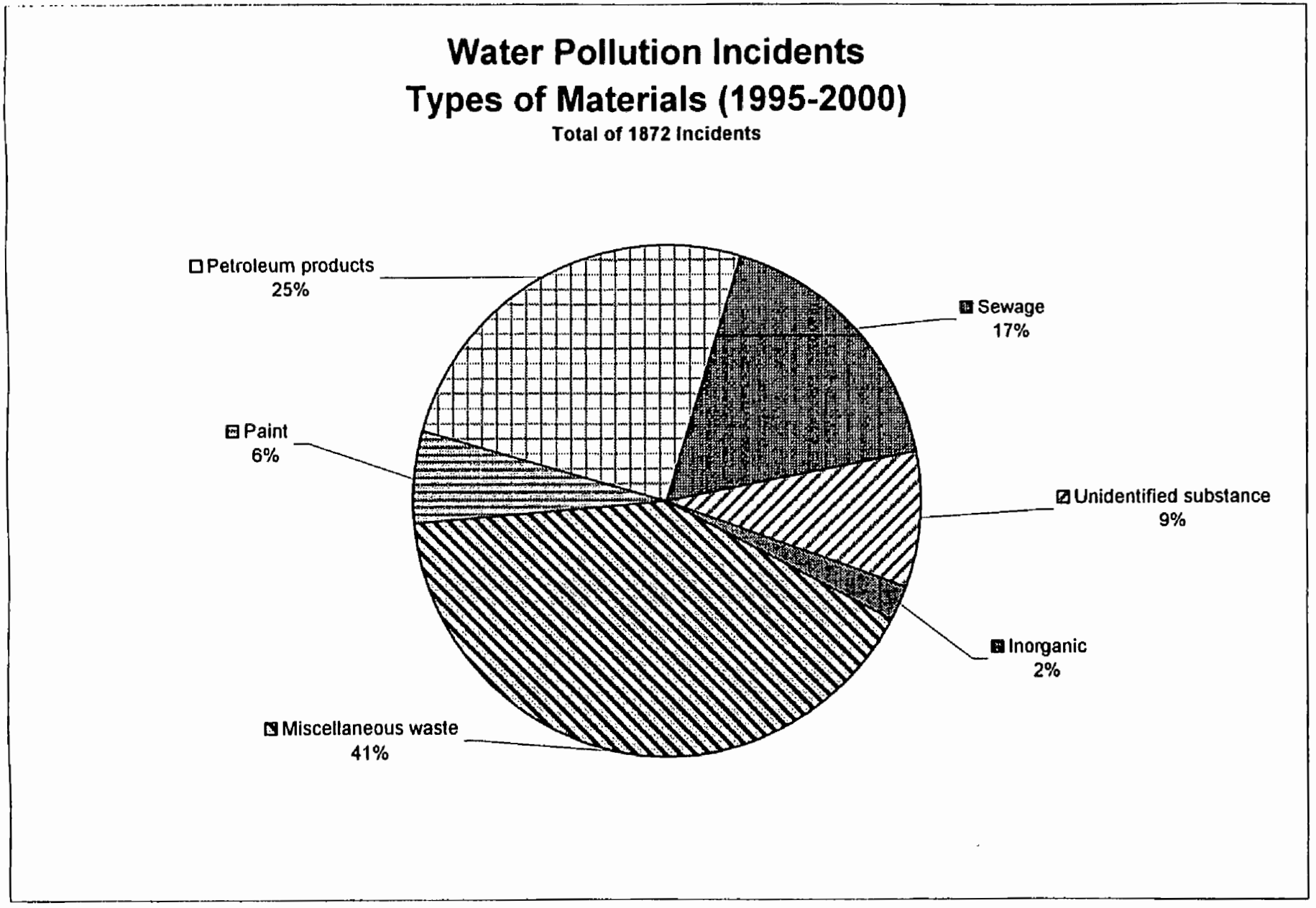
Water Pollution Incidents
Types of Materials (1995-2000)
Total of 1872 Incidents
Petroleum products
25%
Sewage
17%
Paint
6%
Unidentified substance
9%
Inorganic
2%
Miscellaneous waste
41%

Figure 2.6

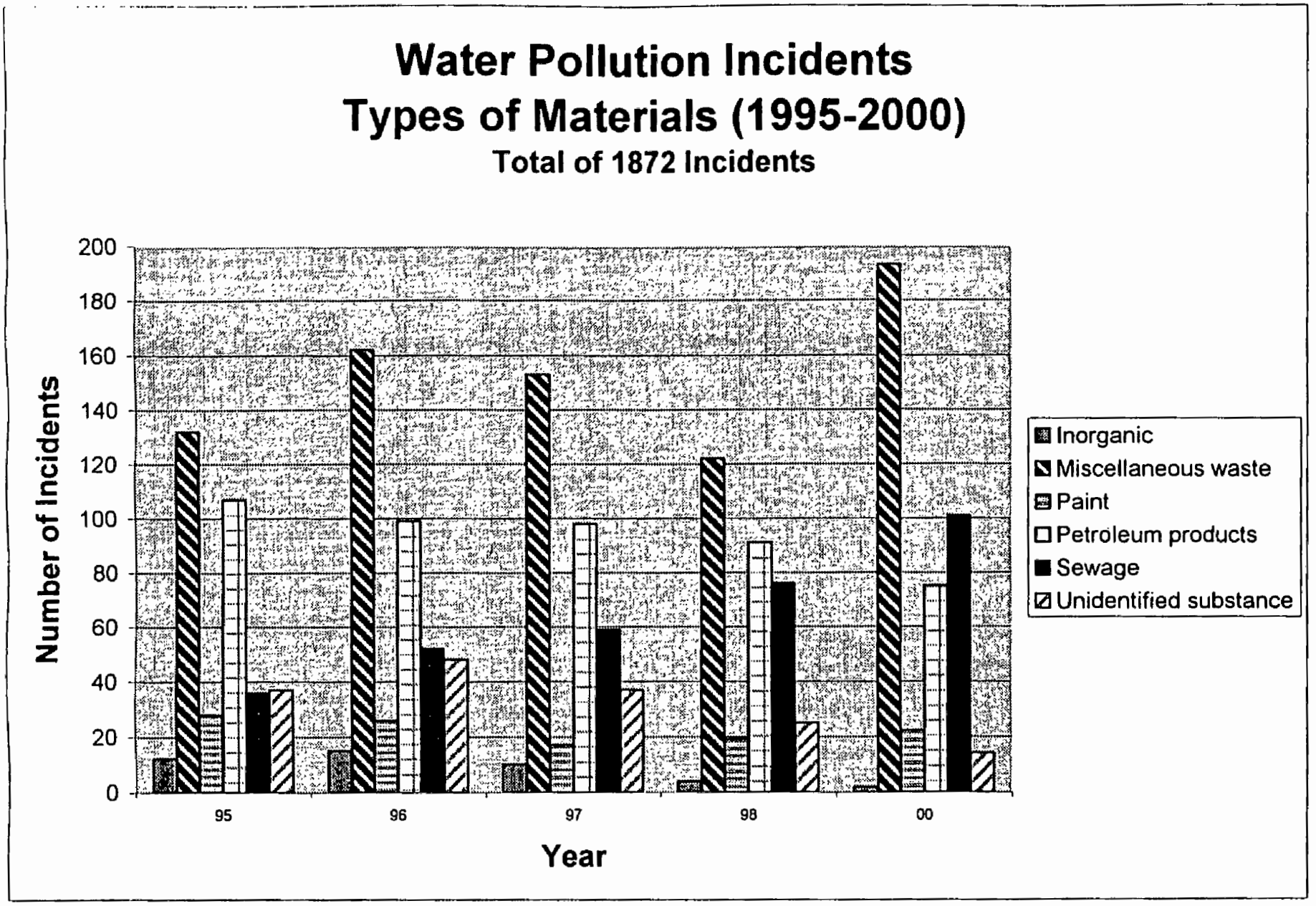
Water Pollution Incidents
Types of Materials (1995-2000)
Total of 1872 Incidents
Number of Incidents
200
180
160
140
120
100
80
60
40
20
0
95
96
97
98
00
Year
Inorganic
Miscellaneous waste
Paint
Petroleum products
Sewage
Unidentified substance

3.0 STATUS OF BMP IMPLEMENTATION

3.1 Introduction

This Section details the Permittees' programs to implement Best Management Practices (BMPs) as part of routine public agency activities (DAMP Section 5.0), in the construction and post construction phases of new development (DAMP Section 7.0 and 8.0) and the participation with several water quality planning initiatives.

The Second Term Permits added an additional requirement for BMP implementation related to the operation of municipal facilities through an environmental performance evaluation and reporting program. This program is now in its third year of implementation and is discussed in Section 3.2.6.

3.2 Public Agency Activities (DAMP Section 5.0)

All of the Permittees routinely conduct preventive maintenance activities that are widely recognized as effective BMPs for pollutant control. These activities include litter control, solid waste collection/recycling, drainage facility maintenance, catch basin stenciling, street sweeping, hazardous materials management/environmental performance reporting, household hazardous waste collection, emergency spill response and fertilizer and pesticide management.

The DAMP requires evaluation of these activities and, where appropriate, improvements or new practices to further reduce the amount of pollutants discharged into the storm drain system. An important component of this evaluation process is the documentation and collection of data related to these selected activities. The data presented in the subsequent sections has been compiled for the period of July 1, 1995 to June 30, 2000 and compares the status of the program from the 1994 Report of Waste Discharge (ROWD) submittal to the 2000 ROWD submittal.

3.2.1 Litter Control

Litter control is an important element in the diversion of trash and other materials from the storm drain system. Although most Permittees historically viewed litter control as a public service program (i.e., preventing visual blight, etc.), rather than as a pollution control problem, they now consider it equally important as a visual indicator of water quality.

In 1994, eighteen Permittees had specific municipal litter control ordinances and fifteen planned to utilize the new sections in the Model Water Quality Ordinance to achieve effective litter control authority. All Permittees now have the legal authority to control littering in public areas either through the Water Quality Ordinance or existing municipal code sections.

Other DAMP-recognized elements of litter control include provision of trash receptacles and special clean-up events **(Table 3.1)**. During the 1999/00 reporting period, twenty-seven Permittees reported that trash receptacles are maintained in public areas. Other initiatives included the allocation of staff to litter and debris control, arrangements to facilitate the disposal of large waste items by residents, and organized community/neighborhood clean-ups.

Garden Grove, for example, coordinated volunteer groups to clean litter twice monthly. Another example was the organization of Neighborhood Enhancement Programs by the City of Orange, wherein each year specifically targeted community areas clean-up litter. Several other cities reported organizing, or participating in, initiatives related to litter control such as "Beach Clean-Up Day", "Volunteer Connection Day", "Earth Day Clean-Up," "Coastal Clean-Up Day," and "Pride Days."

Every year the California Coastal Commission sponsors a Coastal Cleanup Day to help cleanup the trash and debris that accumulates along the coastline, fouling the beaches and tidal zone **(Table 3.2)**. During the first cleanup day in Orange County in 1996, 4,649 volunteers collected 38,906 pounds of trash and 3,914 pounds of recyclables (9.2 pounds/person). In 1999, 4,382 volunteers joined in and collected 65,900 pounds of trash and 8,841 pounds of recyclables (17 pounds/person).

The top five items collected during the 1999 event were 14,587 cigarette butts; 9,650 foamed plastic pieces; 5,621 plastic food bags/wrappers; 5,288 paper pieces and 4,630 plastic pieces; which corresponded closely with the results from the debris characterization study conducted within the Newport Watershed (Section 3.9.1).

3.2.2 Solid Waste Collection/Recycling

The Permittees have solid waste collection programs for public, residential, commercial and industrial areas. The Permittees recognize that the public must be encouraged to properly dispose of their trash and educated that the storm drain is not a waste receptacle. The Permittees conduct public education outreach through a variety of methods including community newsletters, radio and television public service announcements, brochures and utility bill inserts.

In 1994, the Permittees reported recycling information that they were separately required to collate under the requirements of AB 939 In the 1993/94 reporting period, seventeen Permittees reported data regarding the breakdown of constituent materials for recycling, as required under AB 939. These Permittees diverted 177,000 tons from the waste stream, marking an increase of 67,000 tons from the prior year. Since the AB 939 reporting requirements have changed, the Permittees no longer provide this information.

In the 1999/00 reporting period, twenty-nine of the Permittees reported the collection of 3.4 million tons of solid waste **(Table 3.3)**. In addition, the Permittees reported on the types of solid waste and recycling education materials made available to the public and the frequency with which they were distributed or broadcast **(Table 3.4)**.

Twenty-three Permittees indicated that they distributed community newsletters, while 16 jurisdictions reported the distribution of utility bill inserts containing information regarding recycling and/or proper waste disposal at least annually. Certain educational efforts have increased since 1994. For example, in 1999/2000 ten Permittees reported that they broadcast public service announcements via radio and/or television; this compares to only five Permittees in 1994. Moreover, Cypress, Mission Viejo, Placentia, and San Clemente all reported the inclusion of information about recycling and waste disposal on their city web sites.

Another example is Tustin which reported the continuance of an ad hoc committee, "Tustin Pride", that organizes events such as their Christmas Tree recycling program. Anaheim reported contracting with a private communications firm for public relations services to promote "Recycle Anaheim."

Examples of recycling public education materials are included in **Appendix 3.1.** Reflected in the program materials is that fact that many jurisdictions have combined the recycling, litter control and hazardous materials disposal messages.

3.2.3 Drainage Facility Maintenance

Maintenance

During the First and Second Term Permit periods, the Permittees developed and implemented drainage facility inspection and maintenance procedures and created inspection logsheets in order to document the total volume of material removed from their facilities and the percentages of each type of material. Through their routine inspections, the Permittees also notify the appropriate Authorized Inspectors of any evidence of chemical contamination or suspected illegal discharges.

The Permittees inspect the drainage system within their jurisdictions on a regular basis and clean out accumulated debris on an as-needed basis. Removal of accumulated debris and sediment is carried out either manually or by mechanical methods using flushing in emergency situations only.

In 1993/94 seventeen Permittees reported removing more than 7,500 cubic yards of debris from the drainage system. This debris was cleared from 114 miles of channel and pipe and 13,650 storm drains and catch basins.

Comparatively, in the 1999/00 reporting period, twenty-eight Permittees reported the removal of 15,381 cubic yards and 23,907 tons of material from 218.8 miles of storm drains and 21,284 drain inlets. Thus, over the last permit term the efforts to clean out the drainage facilities and the quantity of material removed have doubled.

Debris characterization varied significantly between jurisdictions but averaged 43% soil, 38% vegetation, 9% paper, 4% plastic, and 5% **(Table 3.5)**. These figures do not vary greatly from those tabulated in 1993/94

Drainage Facility Changes

The NPDES permit requires that the Permittees provide information regarding any significant changes to the storm drain systems, outfalls, detention or retention basins, dams or other controls, including map updates of the storm drain system. During 1990 – 1995, the Permittees reported approximately 270 changes to their municipal storm drain systems.

Comparatively, during 1996-2000, twenty-five Permittees reported a total of 220 changes to their municipal storm drain systems (**Table 3.6**). In addition, Brea reported nine changes occurring between 1990 and 1994 and Huntington Beach and Westminster each reported a change occurring in 1994.

The Permittees also reported that they provide the Principal Permittee with drainage facility map updates on a continual basis. These maps can be made available to the Regional Boards upon request.

Low Flow Diversions

The Permittees have implemented a limited number of drainage system diversions to the sanitary sewer system at several coastal locations. Diversion projects take low flow flood control channel water and divert them to sanitary sewer or ocean outfall to avoid direct discharge to recreational and other use areas.

Talbert/Lower Santa Ana River Watershed

Elevated bacteria indicator levels in the surfzone off Huntington State Beach in 1999 were attributed, in part, to the storm drain system of the Talbert/Lower Santa Ana River Watershed (see Section 3.8.2). As part of an early action plan, all storm drain and pump station discharges in this watershed have been temporarily diverted during the summer months.

As an added measure to prevent bacteria in the Santa Ana River from impacting Huntington State Beach, low flow runoff from the lower Santa Ana River Watershed is being diverted to the sanitary sewer at four locations. These locations are: the Santa Ana River just upstream of Talbert; the Greenville Banning Channel upstream of Hamilton; and two Huntington Beach pump stations at Hamilton and Meredith.

Aliso Creek Watershed

The lower mile of Aliso Creek has been listed as impaired for the presence of elevated levels of fecal coliform (see also Section 3.8.3). Pursuant to a 205(j) grant the Principal Permittee initiated a water quality planning study. One of the results of the study was the identification of elevated fecal coliform levels at a number of points along Aliso Creek and in its tributaries. One storm drain (identified as J03P02) exhibiting elevated fecal coliform levels was issued a Clean Up Abatement Order by the San Diego Board. As an early action, the flows from J03P02 have been temporarily diverted during the summer months to the sanitary sewer by the City of Laguna Niguel.

As a further watershed step, the Principal Permittee and the Aliso Water Management Agency installed, operated and maintained a diversion project to remove summer flows in Aliso Creek from an area immediately upstream of Aliso Beach. This diversion project utilizes a summer-season-only sand berm to allow pumping of creek water to an adjacent ocean outfall line.

Laguna Beach Coastal Storm Drains

The city of Laguna Beach installed their first diversion in 1987. Since that time they have installed five additional diversions and plan to install fourteen more by the year 2007. Currently the diversions cover 960 urban acres, 38% of the 2,500 total urban acres in Laguna Beach. By the year 2007 the diversions will cover 2,130 (85%) of the 2,500 total urban acres in Laguna Beach.

3.2.4 Catch Basin Stenciling

The goal of the stenciling program is to label and subsequently maintain labels on stormdrain catch basins throughout Orange County. Initially the label was comprised of "No Dumping - Drains To Ocean" written in 3" black letters on either the top of the curb or the curb face adjacent to the inlet.

This format was later revised to 3" blue letters on a white background. Each Permittee, however, may implement its own version of the catchbasin stenciling program including variations on the phrase or the method of labeling such as the use of hot/tape decals or thermoplastic plaques.

In the 1993/94 reporting period, the Permittees reported stenciling approximately 21,250 catch basins (63%) and twenty Permittees reported completing stenciling all of their catch basins in their jurisdiction.

In the 1999/00 reporting period the Permittees reported that over 33, 300 catch basins (98%) of the total inventory of over 34,000 drain inlets have been stenciled at least once. The number of Permittees who have stenciled 100% of their catch basins at least once has increased from twenty to twenty-five. Seventeen Permittees reported re-stenciling over 11,600 catch basins (over one third) during 1999/2000 **(Table 3.7)**.

Most Permittees use the recommended stencil: "No Dumping - Drains To Ocean". There are, however, a few variations. Newport Beach uses "Drains to Ocean" or "Drains to Bay" depending on the storm drain's receiving water, Irvine uses "No Dumping Waste – Drains To Ocean", and Laguna Beach designed its own logo to accompany the phrase: "Keep It Clean – Drains To Ocean". Seal Beach and Placentia both use "No Dumping", with Placentia including the corresponding municipal code (P.M.C. Section 16.08.040).

All but four of the Permittees used spray paint to stencil their inlets, with nine using either blue or black paint on a white background instead of only black with no background color. Alternative application methods included hot tape/decals (Irvine, Orange), thermo-plastic (Brea), and adhesive plaques (Laguna Beach and Orange).

Several Permittees, including Brea, Buena Park, La Habra, and Orange reported positive public reaction to the stenciling programs. Still others noted an apparent decrease in the amount of litter in the catch basins since the initiation of stenciling programs.

The use of volunteer resources was reported by a number of Permittees; in 1999/00 over 4,700 catch basins were stenciled by volunteer groups. Fullerton, San Clemente, and Lake Forest all utilized Boy/Eagle Scouts, while Costa Mesa, Irvine, La Habra, and San Clemente reported stenciling assistance from the Orange County Conservation Corps.

3.2.5 Street Sweeping

All Permittees maintain street sweeping programs in residential, commercial and/or industrial areas. In 1993 the Permittees compiled information regarding their existing street sweeping schedules and practices and subsequently changed elements of their programs such as the types of sweepers purchased, the frequency of sweeping, and the use of parking restrictions in order for the street sweeping program to aid in water quality improvements.

During the Second Term Permit period, the Principal Permittee recommended that the Permittees apply a standard of pollutant control removal effectiveness in the purchase of new street sweeper equipment. This recommendation was based upon a preponderance of research literature suggesting that regenerative air sweepers are superior in performance to vacuum and mechanical brush. The research is not, however, unequivocal.

In the 1999/00 reporting period, twenty-six Permittees reported using a fleet of street sweepers consisting of at least 36 mechanical broom, 66 vacuum and 7 regenerative air sweepers. It is expected that, over the next permit period, these numbers will continue to change as Permittees replace aging equipment. The Permittees also reported removing at least 410,483 tons and 111,301 cubic yards of material with the sweepers.

Monthly sweeping of residential, commercial, and industrial public street areas was the minimum reported sweeping frequency with the Principal Permittee frequency commencing in the 2000/01 reporting period. Approximately half of the Permittees reported conducting weekly sweeping in industrial and commercial areas, with sixteen conducting weekly sweeping in residential areas. Six Permittees reported a sweeping frequency of twice weekly or greater for at least one of the three designated areas. Laguna Beach, Newport Beach, and Santa Ana all reported daily sweeping in some commercial areas **(Table 3.8)**.

Twenty-two Permittees reported the use of parking restrictions to improve street sweeping effectiveness, two more than in 1996. All reporting Permittees noted visual inspection of streets to verify street sweeper effectiveness, with nineteen Permittees indicating that their street sweeping equipment is monitored at least weekly for adherence to manufacturer's specifications for optimal performance. In addition, several Permittees noted that they actively encourage citizen comment on their street sweeping programs and will repeat the sweeping of an area when a complaint is received.

3.2.6 Hazardous Materials Management/Environmental Performance Reporting

Prior to 1997, the Permittees annually reviewed their hazardous materials management practices. Specific information was submitted in the annual reports regarding product substitution, structural modifications to storage areas, elimination of hazardous waste streams, installation of a clarifier for site drainage, the use of off-site facilities for vehicle cleaning, employee training, and site audits.

As a result, in 1993/94 eight Permittees reported making physical improvements to their hazardous materials storage facilities and five Permittees reported that they no longer manage hazardous materials. The improvements included major structural changes in the waste storage facilities and the replacement of hazardous materials with non-hazardous substitutes.

The Second Term Permit required the Permittees to prepare an Environmental Performance Reporting Program and include in subsequent Annual Reports a discussion of the actions taken by the Permittees to eliminate pollutant discharges at public agency facilities. This program was implemented in 1997 and was applied to municipal facilities whose operations include hazardous materials storage, waste storage, and/or vehicle and equipment maintenance.

Permittee facility operators were required to:

1. Determine which operations are the most significant contributors to stormwater pollution; and then to
2. Identify significant issues at each facility and develop and implement action plans to control the discharge of pollutants.

The program is iterative, involving an annual evaluation of municipal facility environmental performance and the implementation of corrective actions until all identified significant issues are addressed. The action plans that have been developed by the Permittees to address the significant issues have demonstrated a commitment by the Permittees to implement both structural and non-structural controls. **Table 3.9** summarizes the number of significant issues and action plans that have been identified and corrected over the past four years in addition to those made in the old program.

Since the inception of the program the Permittees have been committed to reducing the pollutants from their fixed facilities. This is evidenced by the 94 municipal facilities and 244 significant issues identified during the first year of the program decreasing to 17 facilities and 47 significant issues by the end of the 1999/00 reporting period.

The initial compilation of the significant issues and action plans identified at each facility were provided in the 1996/97 report. In that initial report Dana Point, Laguna Hills, Laguna Niguel, Lake Forest, Mission Viejo, San Clemente and San Juan Capistrano reported no significant issues for any of their facilities, primarily due to the fact that they are either smaller jurisdictions or they contract out the majority of their municipal activities. In 1996/97 the Permittees identified 94 facilities with approximately 244 significant issues.

In 1997/98 the Permittees completed 158 (65%) of the 244 significant issues action plans identified in the 1996/97 report. Ten new significant issues were identified during this reporting period bringing the total number of outstanding issues to 96. At the end of 1997/98 the number of facilities with significant issues had decreased to 58, and thirteen Permittees (compared to seven at the end of the previous year) were able to report no significant issues at any of their facilities.

In 1998/99 the Permittees completed 25 (26%) of the 96 remaining significant issues action plans identified in the 1997/98 report. Three new significant issues were identified during this reporting period bringing the total number of outstanding issues to 74 from 51 facilities.

In 1999/2000 24 Permittee facilities completed 29 (39%) of the 74 remaining significant issues action plans identified in the 1998/99 report. Two new significant issues were identified during this reporting period bringing the total number of outstanding issues to 47 from 17 facilities. At the end of 1999/2000, sixteen Permittees were able to report the completion of all outstanding significant issues.

Some examples of action plans completed during the last reporting period include the City of Anaheim which relocated vehicle washing areas at ten of its Fire Stations, and the City of Garden Grove which reported hazardous material storage training for employees at eight of its facilities. Of the 29 action plans completed during 1999/00, eight (28%) involved the implementation of structural controls such as the construction of berms to contain runoff, while 24 action plans (72%) required the implementation of non-structural controls, for example, employee training or the relocation of wash areas **(Table 3.10).** Of the 47 uncompleted action plans, the majority (83%) require the implementation of structural controls. For example, the city of Cypress is in the process of constructing berms and installing a storage area roof at its Corporation Yard facility, while La Habra is re-budgeting for the installation of a clarifier at its Public Works Yard. New end dates have been provided for instances in which the implementation of the control will extend beyond the previous end date provided.

The completed Significant Issues Action Plans forms are included in **Appendix 3.2.**

3.2.7 Household Hazardous Waste Collection

Collection Centers

Orange County has an effective household hazardous waste collection program administered by the Integrated Waste Management Department (IWMD). The program comprises four sites (Anaheim, Huntington Beach, San Juan Capistrano, and Irvine) that operate 5 days per week for a total of 259 days per center (excluding partial or full day closures due to rainy weather).

From 1993 - 2000, the Permittees reported that through their trash collection services and various public education initiatives residents are directed to use these IWMD facilities for disposal of their household hazardous waste.

Table 3.11 includes the quantities of the various types of household hazardous waste dropped off by County residents at the four IWMD collection centers during 1993/94 and 1999/2000. A total of 2,896,967 pounds of household hazardous waste was collected in 1999/2000 (compared to 2,689,560 pounds in 1998/99). The amount of waste dropped off at these four sites has increased since 1994 when approximately 2,449,902 pounds of waste was collected.

Household Hazardous Waste Events

In 1993/94 four Permittees reported conducting at least one special event in their jurisdiction to pickup household hazardous waste and/or educate the public regarding proper disposal.

In 1999/00, seven Permittees reported separate household hazardous waste collection efforts which brought in an additional 190,905 pounds of waste. This figure excludes materials collected by Laguna Beach since totals for its new door-to-door collection program are unavailable. These efforts included three waste oil collection initiatives (Costa Mesa, Garden Grove, and Orange) and four programs involving household hazardous waste collection days (Laguna Beach, Lake Forest, Mission Viejo, and Placentia) **(Table 3.12 & 3.13).**

Oil Recycling

All Permittees and the County's Health Care Agency currently implement used oil recycling programs. These programs involve comprehensive public outreach including television and newspaper advertising, displays at community events, and the distribution, at no cost to residents, of used oil containers. In addition, some Permittees also conduct household hazardous round-ups or drop off events for their residents.

The public outreach efforts associated with the used oil recycling programs are comprehensive as is reflected in the public education materials that have been developed and distributed **(Appendix 3.1).** Several Permittees also reported advertising the locations of used oil collection centers as well as participating in various used oil recycling programs and/or grants.

In 1999-00, the Permittees updated and distributed the used oil collection brochures for North, Central and South Orange County. The brochure provides information regarding locations within each city that will accept water motor oil and information regarding the proper disposal of oil filters.

In 1996-97, the County, in conjunction with the cities of Brea, Dana Point, Laguna Beach, Laguna Niguel, San Clemente, San Juan Capistrano, Villa Park and Yorba Linda applied for and received a three-year Used Oil Recycling Grant to help encourage recycling or appropriate disposal of used oil. The County also received a two-year Used Oil Recycling opportunity grant for Dana Point Harbor. Additionally, in 1999/00 20 Permittees reported that they received a Used Oil Recycling grant (compared to 17 in 1998/99).

3.2.8 Emergency Spill Response

The Orange County Hazardous Materials Area Plan or a city equivalent has been adopted by most of the Permittees. This Plan is a set of planned responses to hazardous materials emergencies, addressing chain-of-command, public agency participation and allocation of authority.

The Permittees have all enacted the authority to control releases to the storm drain system through a common Water Quality Ordinance. The Permittees have formerly designated the Authorized Inspectors according to the Enforcement Consistency Guide **(Table 3.14 – 3.16).** The Permittees will continue to have responsibility for water pollution enforcement within their jurisdiction unless that authority has been designated to the Orange County Flood Control District (see also Section 2.3 and 2.4).

3.2.9 Fertilizer and Pesticide Management

Careful fertilizer application and management is the most effective means of controlling nutrient loss from landscaped areas. Similarly, careful pesticide management addresses both acute toxicity and chronic exposure concerns associated with all insecticides, rodenticides and herbicides.

During the First Term Permit period, a model plan, entitled "Management Guidelines for Use of Fertilizers and Pesticides," **(DAMP Appendix F)** was developed to provide guidelines for application methods for fertilizers and pesticides, surface runoff minimization, accident mitigation and Integrated Pest Management. This model was subsequently implemented by the Permittees.

Table 3.23 summarizes the total acreage and quantity of fertilizers and pesticides applied by the Permittees within their jurisdiction. It also summarizes the number of Permittees applying integrated pest management techniques and the corresponding reduction in the amount of pesticides applied.

Fertilizer Management

In 1999/00, at least 1,883,905 pounds of fertilizers were applied to a reported total of 5,637 acres of public land in Orange County compared to 5,900 acres in 1993/94 **(Table 3.17)**. **Table 3.18** provides information on the number and types of fertilizers used by the Permittees in 1999/00; however, numbers on the different forms of fertilizer applied are currently not available.

Nineteen Permittees (compared to twenty one in 1993/94) reported consulting a qualified fertilizer specialist within the past year regarding application rates, application timing, storage and/or handling of fertilizers, while fourteen Permittees (compared to fifteen in 1993/94) reported that, during 1999/00, soil testing was conducted to determine compatibility with the fertilizers being used.

Seventeen Permittees (compared to ten in 1993/94) reported using organic or slow release fertilizers to a greater extent than the year before. No spills of fertilizers were reported.

Pesticide Management

The Permittees reported individually applying 306 pesticides, 45 of which were Category I or restricted, to 12,110 acres of public land in 1999/00. Similar figures were reported in 1998/99 when Permittees reported applying 325 pesticides, 48 of which were Category I or restricted, to a reported 12,310 acres of public land **(Tables 3.19 & 3.20).** It should be noted that the total number of pesticides reported here do not represent the number of distinct pesticides used by the Permittees; rather, they are simple aggregations that do not account for the possibility that two or more Permittees may use the same pesticide. At least 32,223 pounds and 10,600 gallons of pesticides were applied by Permittees in the last year. These figures, however, represent low-range estimates since not all Permittees reported their figures in total pounds or gallons while some failed to report quantities altogether.

In 1999/00 six permittees (compared to one in 1993/94) reported that soil testing was conducted at some point during the past two years for compatibility with the pesticides being used **(Table 3.21)**.

Nineteen Permittees (compared to seventeen in 1993/94) reported requiring that all pest control personnel (applicators) obtain a Qualified Applicators License (QAL) from the State. It should be noted that at the minimum, all Permittees require either a QAL or equivalent County training for pesticide applicator personnel.

Twenty-seven Permittees (compared to 28 in 1993/94) reported conducting inspections of the pesticide application equipment and contract or in-house pest control crews during the last year. These inspections were typically conducted on a routine basis.

Twenty-eight Permittees reported having the appropriate measures implemented for the application, storage, disposal and/or transportation of pesticides. Although no spills of pesticides were reported, 26 Permittees reported implementing an accident mitigation plan in case of a spill.

Integrated Pest Management (IPM)

Twenty-three (compared to twenty in 1993/94) Permittees reported implementing IPM techniques as recommended in the Management Guidelines for Fertilizer and Pesticides **(Table 3.22 & 3.23).**

Specific alternatives to the use of chemical pesticides included mechanical or manual weeding (16 Permittees), mulching (eight Permittees), water management/drip irrigation (one Permittee), the use of disease resistant plants (one Permittee), the use of biological controls (nine Permittees) and basic agronomic practices. Overall, nine Permittees reported a 5-50% decrease in the use of pesticides after implementing IPM techniques.

Costa Mesa, Seal Beach, Laguna Hills, and Anaheim reported the largest decreases in pesticide usage (50%, 20%, 12%, and 12%, respectively). Examples of IPM techniques included the utilization of predatory wasps for controlling giant whiteflies (Costa Mesa and Santa Ana), water pressure for controlling aphids and whiteflies (Santa Ana), and the use of parraffinitic oil to control whiteflies (Tustin). Seal Beach, Anaheim, and Laguna Hills achieved their reductions through mechanical controls and mulching.

3.3 Public Information (DAMP Section 6.0)

The primary goal of the public education program is to inform the community about the origins and causes of stormwater pollution and to constructively involve the public, municipalities, businesses, industries and the development community in the NPDES Stormwater Program's objective of controlling pollutants at their source (ie: pollution prevention). Achievement of this goal involves the development of materials to explain the nature of urban stormwater pollution and its effect on water quality and to identify and promote behavioral changes that will contribute to controlling pollutants at the source. The educational materials developed and distributed by the Permittees are included in **Appendix 3.2**.

3.3.1 Countywide Efforts

During the First and Second Term Permit periods the Principal Permittee, took the lead in developing a regional awareness program and provided the Permittees with copies of educational materials for distribution to the public. The public education program consisted of public, business and household hazardous waste elements. The Permittees were encouraged, but not required, to enhance the information provided with educational efforts more specific to local issues of importance related to water quality.

During the initial permit period 1990 - 1995, the following educational elements were completed:

- Participation in the 1994 Orange County Annual Survey co-directed by Mark Baldassare and Cheryl Katz of the University of California, Irvine (Section 5.2.1);

- Publication of four editions and 17,000 copies of the *Floodline* newsletter that featured articles on stormwater issues. *Floodline is* distributed to residents and businesses in Orange County;

- Distribution of a Flood Awareness Guide by direct mail with a back page on stormwater pollution prevention to over 700,000 homes;

- Distribution of more than 20,000 copies of "The Ocean Begins at Your Front Door" brochure and over 6,000 copies of the recycling brochure, "Preventing Sea Sickness", to libraries, cities and community groups;

- Providing stormwater pollution prevention PSA's for broadcast on local cable television and public television (KOCE) and movie theaters, and produced a 30-minute educational video, titled "The Ocean Begins at Our Front Door";

- Staffing of booths at the Orange County Fair, the Earth Day Fair, and the Beach Clean Up Days;

- Coordination of clean-up events under the auspices of the California Coastal Commission's Annual Coastal Clean Up Program;

- Presentations on the stormwater mandate and the Orange County Stormwater Program at workshops and seminars, including, Business Environmental Assistance Center (BEAC), Orange County Water Task Force, Public Utilities Liaison Committee, Association of Environmental Professionals, HazMat West Conference and Exposition, Council of Car Care Centers, Southern California Professional Detailers Association. In addition staff organized, in conjunction with the Building Industry Association and the Consulting Engineers and Land Surveyors of California, a workshop on the DAMP as it pertains to new development; and

- Participation in Statewide "Pollution Prevention Week(s)" in 1993 and 1994. In 1993, this effort was augmented by organization of a workshop, titled "Turning the Tide on Trash: A Watershed/Marine Action Plan Workshop," aimed at highlighting both the widespread occurrence of trash and debris in coastal and watershed receiving waters and successful trash and debris control strategies.

During the Second Term Permit period, specific public educational efforts included the creation and distribution of additional public educational materials and BMP guidelines for those potentially polluting activities not otherwise regulated, establishing and advertising a 24 hour water pollution problem reporting hotline, participating in community outreach events, participating in joint outreach programs, workshops and seminars. The specific efforts are listed below:

- Distributing copies of the color brochure "The Ocean Begins at Your Front Door": Commencing in July 1999 the County began track the distributed public education materials. From July 1999 through June 2000 10,968 copies of this brochure had been distributed;

- Creating and distributing a new brochure in 1998-99, "Do You Know Where the Water In Your Storm Drain Goes?" From July 1999 through June 2000, 10,299 of these brochures had been distributed;

- Updating and distributing North, Central and South Orange County Waste Oil Collection Center brochures in 1998-99 (Section 3.2.7);

- Procedures began to be developed for certain potentially polluting activities not otherwise regulated (**Appendix 3.3**). Efforts included:
  - Creating and distributing Auto Service Center Pressure Washing guidelines to approximately 200 large automotive service centers in 1997-98;
  - Creating and distributing Pool Maintenance Discharges guidelines in 1998-99;
  - Updating and distributing the Mobile Detailing Brochure in 1999-00;
  - Distributing Auto Service Center Pressure Washing Guidelines to approximately 2,000 small to medium automotive service centers in 1999-00; and
  - Creating and distributing Restaurant Cleaning Operations guidelines in 1999-00.

- Providing a Principal Permittee 24-hr telephone line for inquiries about stormwater and public education material;

- In an effort to encourage the public to report illegal dumping, creating and distributing magnets and bookmarks that utilize graphics from the "Do You Know Where the Water In Your Storm Drain Goes?" brochure to the general public, interested groups, the County's libraries and the Permittees. From July 1999 through June 2000, 2,792 of these magnets, as well as 1,128 bookmarks were distributed;

- Distributing appropriate educational materials with enforcement letters sent out as a result of a water pollution complaint.

- Providing the video, "The Ocean Begins At Your Front Door" for broadcast by Huntington Beach Television;

- Participating in public information activities including community outreach events such as the Orange County Fair, the Children's Drinking Water Festival, National Pollution Prevention Week, Beach and Watershed Cleanup Days;

- In 2000-01 the Principal Permittee, County of Orange/HCA, County of Orange/IWMD and Orange County Sanitation participated in a coordinated "Environmental Partners" public education effort aimed at educating the public about the proper disposal of wastes. This effort merged several similar messages about proper waste disposal;

- Principal Permittee staff participated as presenters at workshops and seminars addressing stormwater management issues;

- The initiation of a volunteer monitoring program (Section 3.3.2);

- Principal Permittee staff participated in the State Stormwater Quality Task Force: Public Information and Participation Committee (PIPP). The exchange of material has served to augment current information currently provided to new development and industries including participation in the 1-800-CLEANUP phone line and web site;

- Participation in the LA Times in Education Program in 1999-00. This environmental study unit, which was distributed to approximately 180 schools, included newspaper-based lessons, classroom explorations and the opportunity for students and their families to participate in a survey to help Orange County understand how pesticides move through our watersheds;

- Participation in the Upper Newport Bay Cleanup Day;

- Participation in the American Oceans Campaign stormwater resources web page at www.americanoceans.org/runoff/epa.htm; and

- Participation in two water quality/urban runoff issues workshops for both North and South Orange County and Watershed 101 presentations.

In late 1999, the Permittees developed a comprehensive long-term NPDES public and business education strategy (subsequently referred to as the Public Education Program) in order to effectively educate the public and targeted business groups about the effects of stormwater pollution and encourage their participation in the protection of surface waters (DAMP Section 6.0 and **Appendix L**). The Public Education Program includes a comprehensive planning approach and "tool box" of implementable educational elements based upon the desired direction of the program.

Other County agencies also provide information to the public that aids in controlling stormwater pollution. The County of Orange/HCA manages the county's used oil program that encourages the recycling of used motor oil and filters. The program assists the NPDES Stormwater Program by eliminating the number of incidents of people dumping used oil down the storm drain system. The County of Orange/IWMD manages the household hazardous waste program. The agency utilizes a variety of educational materials to recommend alternatives to hazardous products as well as proper disposal of household hazardous waste.

3.3.2 Local Efforts

In 1999/00 all Permittees (compared to twenty six in 1993/94) made the countywide educational materials available to their residents at public facilities such as city halls, libraries, fire stations, etc.

In addition many Permittees developed and distributed their own materials to the general public. In 1999/00, twenty five Permittees (compared to eighteen in 1993/94) reported enhancing local materials and/or conducting their own initiatives. For example, Laguna Hills reported the development and distribution of public education literature expanding upon the County's "The Ocean Begins at Your Front Door" brochure, while Santa Ana produced waste disposal and recycling information in English, Spanish, and Vietnamese. Five Permittees reported that they display information regarding storm drains, water quality, and/or recycling on their city websites.

The education materials separately prepared by the Permittees are summarized in **Table 3.24**. Examples of these materials are included in **Appendix 3.2**.

3.3.3 Volunteer Monitoring

During the Second Term Permit period, the Principal Permittee continued its previously initiated volunteer monitoring program. Several students/interns, one under the direction of Dr. Prem Saint of the California State University at Fullerton, were instrumental in:

1) gathering and analyzing trash/debris and sedimentation data;
2) collection of trash/debris samples for analyses;
3) maintenance of the field equipment and scientific instruments they used; and
4) preparation of statistical reporting spreadsheets;

The focus in the last several years was on quantifying and characterizing the types of trash/debris that were collected a debris boom during storm flows. The debris boom is located in the Santa Ana Delhi Channel just prior to where it discharges into the Newport Bay (Section 3.9.1).

Several students under the direction of Dr. Stanley Grant, with the University of California Irvine, conducted a monitoring program in the Talbert Channel and produced a report. The Principal Permittee assisted this effort.

3.4 New Development (DAMP Section 7.0)

3.4.1 Requirements

In 1993, the New Development/Construction Task Force comprising representatives from the Principal Permittee, Building Industry Association (BIA), Association of General Contractors (AGC) and Civil Engineers & Land Surveyors of California (CELSOC), completed a report that provides the basis for requiring the incorporation of structural and non-structural Best Management Practices (BMPs) into new development and significant redevelopment. The report, entitled "Best Management Practices For New Development Including Nonresidential Construction Projects (1-5 acres)" (**DAMP Section 7.0 and Appendix G**), involved additional contributions on specific BMPs from the Western States Petroleum Association (WSPA), Food Sanitation Advisory Council (FSAC), and Orange County's sanitary districts.

In 1997 the Permittees certified that they were implementing **Appendix G**. Since that time, the Permittees and development industry have gained considerable experience in implementing hundreds of Water Quality Management Plans (WQMPs) countywide. Tables 1 and 2 of **Appendix G** provide an outline of standard practice site specific structural and non-structural BMPs for special developments such as residential, industrial, retail/office centers, restaurants, warehouses/grocery, fuel dispensing areas and vehicle repair/maintenance facilities.

3.4.2 Educational Outreach On New Development Requirements

The Principal Permittee provided training to other Permittee planning staffs to facilitate uniform countywide implementation of the requirements of **Appendix G**. In December 1993, the report was the subject of a workshop for Permittee planning staff held at Santiago Oaks Regional Park. This training has since been complimented by individual presentations, conducted by Principal Permittee staff, to Permittee development processing staff.

In April 1994, in cooperation with CELSOC and the BIA, the report was the subject of a second workshop at the Irvine Hyatt Regency Hotel. Targeted at the development community, the second workshop attracted over 100 attendees.

In November 1998 an Urban Stormwater Runoff Water Quality Management Short Course was held. This course provided an introduction to the technical base of information that is being used to regulate urban area and highway stormwater runoff under the Best Management Practices ratcheting-down process. Twenty one Permittee representatives and support staff attended.

The Permittees continue to provide educational brochures and **Appendix G** with its attachments to acquaint developers and contractors with the NPDES program. In addition, several Permittees reported working closely with developers and contractors in an effort to educate them about stormwater BMPs and various other water quality/runoff issues. For instance, San Juan Capistrano provided samples of BMPs for new developments to all developers and their engineers upon the initial submission of applications, while the city of Tustin sent training opportunity notices to developers and provided them a model set of plans to illustrate the BMPs required.

Additionally, the city of Irvine hosted numerous workshops addressing the topic of watershed BMPs. Topics included: "Water Quality Ordinance and Enforcement Consistency," "Construction Site Planning and Management," and "New Developments."

In limited instances, Principal Permittee staff also provided third party review of Water Quality Management Plans. Permittees receiving this assistance from 1995-2000 include Buena Park, Dana Point, Fullerton, Garden Grove, Irvine, La Habra, Los Alamitos, Stanton and Westminster.

3.4.3 Implementation

At the end of 1999/00 the Permittees reported that, since the implementation of the program in 1997, a total of 1094 WQMPs had been approved, covering 10,627 acres which represents approximately 2.5% of the area within Orange County subject to the NDPES Stormwater Permit. This is consistent with the incremental implementation of BMPs over the life of development envisaged by the Clean Water Act. Catch basin stenciling was the most frequent structural control implemented (4743) followed by common area runoff minimizing landscape design (934) and common area efficient irrigation (926) **(Table 3.25)**.

BMP maintenance (903), common area landscape management (853), and common area litter control (832) were the three most frequently implemented non-structural controls **(Table 3.26)**.

The report also recognizes that "Special" structural BMPs, specifically, engineered facilities designed to address specific pollutant problems, may be required through a new development runoff management plan, CEQA process, or similar water quality planning process. An example of a "special" structural BMP that has been implemented includes the water quality detention/infiltration basins for the Las Flores Planned Community.

In addition, since the implementation of **Appendix G**, Principal Permittee staff have reviewed Non-County and County lead projects for water quality issues.

3.5 Construction (DAMP Section 8.0)

Permittee initiatives relating to the control of sediment and related pollutants are based upon established programs that involve implementation of both source control and treatment control measures at construction sites and within certain portions of the San Diego Creek watershed (DAMP Section 8.0).

The problem of construction site erosion and sediment loss has long been recognized by the Permittees. Consequently Permittee grading ordinances and codes, the Green Book, and Public Works construction specifications already contain requirements for construction practices for erosion control.

The First Term Permits required changes in grading practices to recognize sediment balance concepts, control of regulated materials used on the job site, and control of sediments polluted by contaminants. The control of stormwater pollution associated with construction is handled through the existing grading, building permit, and public works contracting process.

During the First Term Permit period the Best Management Practices For Public Works Construction report was developed and incorporated as part of the DAMP (**Appendix H**). This Appendix applies to Permittee public works construction projects and requires that such activities will implement non-structural and structural BMPs to control contaminated stormwater run-off.

At a minimum BMP selection for public works projects shall be consistent with the Construction Permit and Green Book standards for site maintenance and environmental protection. In 1997 the Permittees certified to the Regional Boards that the **Appendix H** guidelines or their equivalent were being implemented.

In 1999/00 the Permittees were actively involved with and/or attended two Construction Site Planning workshops sponsored by both Regional Boards. The focus of the workshop was planning and implementation of appropriate erosion and sediment controls.

In addition, in 1998/99 several Permittees and support staff attended a two hour workshop on storm water pollution prevention that was sponsored by Cal Trans. The focus of the workshop was on the proper implementation and maintenance for erosion and sediment controls during the construction phase.

Beyond Orange County, during the 1990-95 and again during the 1996-01 permit period, the NPDES Stormwater Program contributed both staff time and monies to the working groups that successfully developed the Statewide General Construction and Industrial Discharge Permits under the NPDES program, as well as the creation and revision of the Municipal, Construction, and Industrial BMP Manual/Handbooks which lead to a number of American Public Works workshops.

3.6 Industrial Discharger Identification (DAMP Section 9.0)

In 1992 a central database was developed which consolidated the 40 CFR 122.26 (a) (4) notifications, current NPDES permit holders and industries whose Standard Industrial Classification (SIC) codes were identified by the State Water Resources Control Board as requiring coverage under the Industrial Permit. The database provided the basis for a single notification to all the identified industrial facilities informing the facilities' staff of the existence of the NPDES stormwater program and possible industrial permit application requirements.

This early program commitment was completed in 1992 by the Principal Permittee with the distribution of educational flyers to more than 10,000 potentially affected industrial businesses in Orange County. More than 7,000 flyers were also sent to construction-related businesses in Orange County to notify them of the obligations under the General Construction Permit **(DAMP Appendix I)**.

Subsequently, in 1997-98 and in 1999-00 the Principal Permittee distributed additional guidance for the cleaning of automotive service centers to over 2,100 businesses, which included some industrial facilities subject to the Industrial Permit (Section 3.3).

In 1999/00 the Permittees were surveyed regarding their ability to identify new businesses by Standard Industrial Classification (SIC) codes in order to be able to identify those businesses that are subject to the Industrial Activities Storm Water General Permit.

As a result of the survey, fifteen Permittees indicated that they currently had a business licensing or similar mechanism in place that would facilitate this type of notification. The remaining Permittees are continuing to determine the ways in which they will be able to notify businesses within jurisdiction. This will be a focus in the next permit term.

3.6.1 Management of Significant Industrial Discharges

The Permittees already identify large industrial facilities where hazardous/toxic substances are stored, used, manufactured or disposed of, as well as local landfills, hazardous waste disposal, treatment, and recovery facilities, and any known spills, leaks or other problems in their municipal area. A number of municipalities that perform general annual fire code inspections coincidentally examine site pollution issues.

Managing the significant industrial discharges includes both a training program provided by Principal Permittee staff and coordination with various public agency organizations to encourage participation in implementing the stormwater program (Section 2.3.1).

3.7 Coordination With Other Agencies

Successful implementation of the NPDES Stormwater Program requires cooperation and coordination with other public agencies or organizations within and adjacent to Orange County that have programs or activities that have an impact on stormwater quality.

During the Second Term Permit period, a significant example of such an approach was the joint participation with Riverside, Orange and San Bernardino Counties in the Bight 98' regional monitoring program, which was coordinated by SCCWRP. This represented a collective opportunity for the three Counties to cooperatively participate in an integrated watershed monitoring program and meet a common permit objective (DAMP Section 11.3.4).

This coordination on monitoring has further developed into a region-wide monitoring and research cooperative program with the neighboring counties, SCCWRP and the three Regional Boards and will be implemented during the Third Term Permit period (DAMP Section 11.3.4).

The Principal Permittee has also been actively involved with Cal Trans and has been attending their quarterly NPDES meetings. This joint participation has allowed for the sharing of information and resources and has provided for a greater understanding of the respective programs and challenges.

The Permittees also anticipate that there may be additional opportunities for cooperative efforts with other stormwater dischargers that may be permitted separately under Phase II of the federal stormwater regulations. These dischargers include federal and state lands, including, but not limited to, military bases, national forest, hospitals, colleges and universities, and highways; utilities and special districts; Native American tribal lands; non-urbanized areas; and agricultural lands.

3.8 Water Quality Planning Initiatives

During the Second Term Permit period, the Permittees initiated several water quality planning efforts. These priority water quality planning initiatives are intended to identify and better understand site-specific urban water quality problems in Newport Bay (nutrients), Aliso Creek (bacteria) and Talbert/Lower Santa Ana River (bacteria).

3.8.1 Newport Bay/San Diego Creek Watershed (DAMP Section 11.4.1, **Appendix N**)

Newport Bay and certain sections of San Diego Creek have been listed as impaired for the presence of excess levels of fecal coliform, sediment and nutrients as well as toxicity to organisms.

The development of Total Maximum Daily Loads (TMDLs) allocations pursuant to Section 303(d) of the Clean Water Act has imposed additional requirements on the Newport Permittees (the County, Orange County Flood Control District and the cities of Costa Mesa, Irvine, Lake Forest, Laguna Hills, Laguna Woods, Newport Beach, Orange, Santa Ana and Tustin) which include significant additional requirements on these Permittees for monitoring and program development. These issues are addressed in their entirety in DAMP Section 12.

3.8.2 Talbert/Lower Santa Ana River Watershed (DAMP Section 11.4.2)

Elevated bacteria indicator levels in the surfzone off Huntington State Beach in 1999 were attributed, in part, to the storm drain system of the Talbert/Lower Santa Ana River Watershed. In response to a Section 13267 letter from the Regional Board, the Talbert/Lower Santa Ana River Watershed Permittees (the County, Orange County Flood Control District, and the cities of Costa Mesa, Fountain Valley, Huntington Beach, Newport Beach and Santa Ana) committed to conducting monitoring investigations and research studies in conjunction with the University of California Irvine and the National Water Research Institute. These studies have been initiated by these Permittees and subsequently expanded to include watershed-scale monitoring and investigations, including extensive dispersion monitoring in the surfzone.

The studies are anticipated to be completed during the renewal process for the Third Term Permit and surfzone fecal coliform impacts attributable to urban sources will be addressed through a revision of current BMPs pursuant to the water quality planning process. As part of an early action plan, all storm drain and pump station discharges in this watershed have been temporarily diverted during the summer months.

3.8.3 Aliso Creek Watershed (DAMP Section 11.4.3)

The lower mile of Aliso Creek has been listed as impaired for the presence of elevated levels of fecal coliform. Pursuant to a 205(j) grant the County initiated a water quality planning study to compliment ongoing watershed restoration efforts being conducted by the Corps of Engineers in conjunction with watershed cities and special districts.

One of the results of the study was the identification of elevated fecal coliform levels at many points along Aliso Creek and in its tributaries. One storm drain (identified as J03P02) exhibited higher fecal coliform levels than the rest and was issued a Clean Up Abatement Order by the Regional Board pursuant to violations of the NPDES Stormwater Permit. The Order, as one action, assigns additional monitoring requirements to the J03P02 Permittees (the County, Orange County Flood Control District, and City of Laguna Niguel).

The Corps of Engineers Feasibility studies and the 205(j) water quality planning study are anticipated to be completed during the renewal process for the Third Term Permit and will provide the first comprehensive restoration plan for an entire watershed in Orange County with subsequent project implementation over a multi-year period. As an early action, the flows from Lower Aliso Creek and J03P02 have been temporarily diverted during the summer months to the sanitary sewer.

3.9 Methodology For Examining BMP Retrofit Opportunities (DAMP Section 3.0)

The NPDES Stormwater program elements fall into two general categories: prevention of pollutant introduction into the drainage system and removal of pollutants from the drainage system.

The removal-oriented programs identified in the DAMP include:

- Structural BMPs identified through the water quality planning process; and
- Site specific special BMPs for new developments necessary pursuant to DAMP Section 7.0 and Appendix G.

Water quality problems are identified through the monitoring program and other water quality assessments. Watersheds determined to require additional BMPs are surveyed for potential retrofitting and considered using the principles of MEP. Existing flood control, retarding, sediment control, water conservation, recreation, habitat, and greenbelt facilities are evaluated in terms of their potential for modification to provide water quality benefits. Where retrofitting opportunities are not found, new structural BMPs will be considered, using the principles of MEP.

In the 1994 Report of Waste Discharge, the Permittees committed to develop a methodology to evaluate opportunities to incorporate stormwater quality features into existing flood control structures in each Orange County watershed.

In 1997-98, the feasibility of incorporating these types of retrofits to optimize beneficial use attainment began to mainly be addressed in the context of the long-term water quality planning initiatives being conducted within Orange County a number of which are in cooperation with the Army Corps of Engineers (Section 3.8).

The feasibility for establishing various types of improvements such as separate high and low flow channels, re-establishing pool/riffle sequences or enhancing the shading within the watersheds continue to be examined.

3.9.1 Trash and Debris Booms

In an effort to reduce the amount of debris entering the County's coastal waters, trash and debris booms have been installed in several flood control channels to remove floatable material. To date, the booms have proven effective in reducing the amount of floatable material entering the County's channels especially during the first rains of the storm season when accumulated debris finds its way into the ocean's waters.

Huntington Watershed

Four debris booms have been deployed in the Huntington watershed. The booms are located at: 1) tide gates of East Garden Grove-Wintersburg Channel, 2) upstream of Edinger in the Bolsa Chica Channel and 3) at the confluence of Westminster and Bolsa Chica Channel.

Talbert/Lower Santa Ana River Watershed

To reduce floatable debris, a debris boom was installed upstream of Hamilton in the Greenville Banning Channel/Lower Santa Ana River.

Newport Watershed

In 1999, the Principal Permittee received a Clean Water Act 319(h) grant to implement additional trash and vegetative debris booms in the watershed and focus on enhanced source control measures. The additional debris booms were installed in El Modena-Irvine and Peters Canyon Channel. One of the grant tasks also required the characterization of debris collected by the trash and debris booms and the comparison of the results with similar data obtained from the existing debris boom located on the Santa Ana-Delhi channel.

During the 1998-1999 and 1999-2000 storm seasons, a debris characterization study was initiated to collect trash and debris samples from the containment boom in the Santa Ana Delhi channel. Samples were collected from a total of seven storm events. Although an attempt was made to collect data from the newly installed containment systems in Peters Canyon Wash and El Modena-Irvine channels, due to the infrequency of storms during the recent storm season and upstream construction activities in the Peters Canyon channel, no data could be obtained from these channels. Data from these containment systems will be collected in the 2000-2001 storm season.

The results of the debris characterization study at the Santa Ana Delhi channel indicated that the percent composition of the trash and debris are similar for each of the storms. The study showed that the adjusted (excluding the weight of water and sediment) composition percentage of organic and plastic categories averaged 47% and 34%, respectively. The remaining five categories averaged less than 20%. These results provide the basis for targeting source control measures for trash and debris reduction in the Santa Ana-Delhi watershed on organics and plastics.

3.9.2 Additional Retrofit Projects

An additional operational retrofits that have been implemented within the Newport Watershed are the installation of separate high and low flow channels on portions of Bonita Creek by the San Joaquin Hills Transportation Corridor Agency.

Within the San Gabriel River watershed the addition of pump stations to the standard detention basin outlet structures leading to the San Gabriel River to allow for easier retrieval of floatables are in the design stage.

In addition, some of the low flow diversions discussed in Section 3.2.3 may become an engineered facility during the third term permit period.

3.10 Land Use and Population Changes

Orange County's population has increased by approximately 5.1% (from 2,641,355 to 2,775,675) in the last five years **(Table 3.27)**. This increase has occurred fairly uniformly across Permittees, with all but four Permittees experiencing a population increase of between one and ten percent. Exceptions included Irvine and San Juan Capistrano, which each experienced population growth of 10.2% over the last five years, as well as the County of Orange and Los Alamitos, which each experienced negative population growth rates of -10.2% and –3.0%, respectively, the former due to recent incorporations.

As a result, Permittees reported only modest changes in land usage from 1996 to 2000 **(Table 3.28)**. Of the sixteen Permittees submitting land use distribution figures for both 1996 and 2000, only Irvine and San Juan Capistrano reported any substantial change. Irvine reported a decrease in residential land use from 38.5% of its total to 33.1%, and increases in the amount of both industrial (13.9% to 15.5%) and open space (36.8% to 38.8%) land uses.

In San Juan Capistrano, residential land uses increased as a percentage of the total from 26% to 29%, as did open space (33% to 38%). The amount of vacant and undeveloped land in San Juan Capistrano decreased from 24% of the total in 1995 to 14% in 2000.

Seven Permittees, Cypress, Fullerton, Garden Grove, Huntington Beach, Orange, San Juan Capistrano and Westminster, reported that they would be able to provide a 1996 land use map with corresponding percentages in hard copy format. Six Permittees, Cypress, Fullerton, Garden Grove, Huntington Beach, San Clemente and San Juan Capistrano, reported that they would be able to provide a 2000 land use map with corresponding percentages.

TABLES

Table 3.1 1999/00 Elements of Litter Control

Permittee	Litter Ordinance	Clean-Up Programs	Special or Bulky Item Pickup	Trash Receptacles	Other
Anaheim	X	X	X	X	Roll off boxes for trash collection in target neighborhoods
Brea	X			X	City of Brea Beautification Day
Buena Park	X	X	X	X	City holds "Spring Clean-Up" and "Fall Clean-Up"
Costa Mesa	X	X	X	X	Court referrals and community service programs used for debris cleanup; City hosted a clean-up event for the Fillmore/Coolidge neighborhood.
Cypress	X		X	X	None
Dana Point		X	X	X	Twice weekly litter pick up; City sponsored weekend litter cleanup in conjunction with Lantern Village Association and Solag Inc.
Fountain Valley	No Report				
Fullerton			X		Maintenance crews remove litter and debris in high accumulation public areas; Each residential customer allowed an unlimited number of trash receptacles.
Garden Grove	X	X	X	X	City hosts Volunteer Connection/Earth Day event; Used Tire Round-Up Event; City coordinates volunteer groups to clean City parks & other public right-of-ways twice monthly.
Huntington Beach	X		X	X	None
Irvine	X	X	X	X	Trash receptacles at bus stops and pedestrian walkways and expansion of residential recycling program.
La Habra	X	X	X	X	City-wide cleanup day events held three times. Also provided dumpsters at no cost for "Pride Day" cleanups.
La Palma	X			X	City targets one area a year to clean and beautify during Volunteer Connection Day
Laguna Beach	X	X	X	X	Beach Cleanup Day; Vacuuming of sidewalks with "Clean Machine" in business districts; Weekly sand sifting and litter control on beaches, Urban Runoff Diversion Program to divert nuisance flow to City sewer system.
Laguna Hills	X		X	X	Daily litter pickup in parks.
Laguna Niguel	X	X		X	"Doggie Clean-up Bags", Volunteer Connection Day beautifies the Community Park in the Botanical Preserve
Lake Forest		X	X		Sponsored 2 Neighborhood Pride Clean-up Days
Los Alamitos		X	X	X	None
Mission Viejo	X	X	X	X	City sponsored "Tierra Nativa", an annual event celebrating Earth Day, National Trails Day, Arbor Day & Volunteer Connection Day.
Newport Beach	X	X	X	X	Community Cleanup events, Clean Harbor Day, Clean Estuary Day. City operates a Harbor Debris Boat to clean up the harbor area. Periodic events at request of homeowners associations.
Orange	X	X	X	X	Special recycling days and Neighborhood Enhancement Programs wherein specifically targeted areas clean up litter
Placentia	X	X	X	X	X
San Clemente	X	X	X	X	Neighborhood Pride Clean Up Day, Public recycling bin for cardboard & other recyclables
San Juan Capistrano	X		X	X	None
Santa Ana	X	X	X	X	Housing Department conducts neighborhood clean-ups throughout the year
Seal Beach	X		X	X	Bi-annual City Clean Up Week
Stanton			X		None
Tustin	X		X	X	Lanscaping contractors required to include litter pick-up in their activities
Villa Park	No Report				
Westminster	X		X	X	Christmas Tree Recycling Program
Yorba Linda	X	X	X	X	Holiday Collection Days
County of Orange	X	X	X	X	Collection bins for special events, America Recycles Day, Earth Day

Table 3.2 California Coastal Commission Clean Up Day - Orange County Totals, 1996-1999

		1996	1997	1998	1999
	Volunteers	4,649	4,052	3,310	4,382
	Trash (lbs)	38,906	41,114	67,112	65,900
	Recyclables (lbs)	3,914	4,211	1,243	8,841
	Total (lbs)	42,820	45,325	68,355	74,741
Top Five Items Collected	Cigarette Butts	N/A	N/A	5,720	14,587
	Foamed Plastic Pieces	N/A	N/A	4,361	9,650
	Plastic Pieces	N/A	N/A	1,360	4,630
	Paper Pieces	N/A	N/A	1,188	5,288
	Plastic Food Bags/Wrappers	N/A	N/A	1,360	5,621

Data obtained from http://www.coastal.ca.gov/publiced/ccd/ccd.html

Table 3.3 1999/00 Solid Waste Collection

Permittee	Total Quantity of Solid Waste Collected (Tons)	Comments
Anaheim	324,492	
Brea	68,106	
Buena Park	115,000	
Costa Mesa	166,339	Includes residential and commercial waste
Cypress	47,927	
Dana Point	41,637	Includes 11,479 tons of recyclables
Fountain Valley	No Report	
Fullerton	159,424	
Garden Grove	158,724	
Huntington Beach	246,923	
Irvine	366,565	Per California Integrated Waste Management Board for calender year 1999
La Habra	67,000	
La Palma	14,700	
Laguna Beach	42,794	Significant increase in recycled waste since implementation of cart program in April.
Laguna Hills	40,412	
Laguna Niguel	33,966	
Lake Forest	57,796	
Los Alamitos	No Report	
Mission Viejo	160,506	Includes 64,188 diversion tonnage
Newport Beach	112,000	
Orange	196,909	Includes 25% diversion of 49,228 tons
Placentia	53,232	
San Clemente	60,832	
San Juan Capistrano	66,077	Does not include data for Second Quarter '00
Santa Ana	347,634	
Seal Beach	26,802	
Stanton	28,601	
Tustin	78,146	
Villa Park	No Report	
Westminster	40,456	9,913 tons diverted from landfill as recycled waste; 55 tons of recycled X-Mas trees
Yorba Linda	74,994	
County of Orange	157,700	

Table 3.4 1999/00 Solid Waste Public Education Materials

Permittee	Types of Litter Public Education Materials					
	Community Newsletters	Public Service Announcements: Radio	Public Service Announcements: Television	Recycling Brochures	Utility Bill Inserts	Other
Anaheim	Continuously	Numerous		Continuously		Promotion of "Recycle Anaheim"
Brea	Quarterly			Annually	Monthly	
Buena Park	Quarterly				Bi-annually	Promotion of Spring and Fall Clean-up
Costa Mesa	Quarterly		Quarterly	Continuously		Orange County Fair Recycling Booth
Cypress	Quarterly		Monthly	Continuously		Local newspaper & City website advertise Used Oil Collection Centers. Free used oil containers distributed at City Hall.
Dana Point	Quarterly			Annually		Recycling Video: Quarterly
Fountain Valley	No Report					
Fullerton	Quarterly			Annually and As Needed	Quarterly	
Garden Grove	Annually		35/year	Continuously	Bi-annually	Cable News: 76/Year
Huntington Beach	Quarterly		Weekly	Monthly		Daily
Irvine				Annually and As Needed		Various State, County and City materials & newspaper ads
La Habra	Bi-annually		Bi-annually	Annually		
La Palma	X			X		
Laguna Beach	Quarterly			Annually	As Needed	
Laguna Hills	Semi-annually			Quarterly		
Laguna Niguel				Unknown*	Unknown*	*Materials are provided by Solag Inc. in their bills
Lake Forest	Annually			Continuously	Annually	
Los Alamitos	Annually			Annually		
Mission Viejo	Quarterly		Daily	Continuously	Quarterly	Web site: Continuously
Newport Beach				Annually	Annually	
Orange	Randomly	Event Based	Event Based	Randomly	Randomly	Special events as requested
Placentia	Quarterly			Annually		Waste disposal information posted on City website
San Clemente	Quarterly			Continuously	Bi-annually	Web site: Continuously
San Juan Capistrano				Quarterly	Quarterly	
Santa Ana				Annually	Bi-annually	
Seal Beach						
Stanton						Door Hangers: Annually
Tustin	Annually			Annually		Committee: Tustin Pride
Villa Park	No Report					
Westminster	Annually		X	Upon Request	Annually	Trash Bin Stickers: Bi-annually
Yorba Linda	Semi-annually		Continuously	Continuously	Quarterly	
County of Orange	Annually			Continuously	Quarterly	Solag Annual Award Program

Table 3.5 1999/00 Drainage Fac... Maintenance - Debris Removal

Permittee	Total Volume From Facilities		Length of Channel/Pipe	Number of Catchbasins	Debris Characterization (as a percentage of total removed)					Method of Removal		
	Cu Yards	Tons	Cleaned (miles)	Drains Cleaned	Soil	Vegetation	Paper	Plastic	Other	Vacuum Truck	Hand Crews	Other
Anaheim	8	1572	47.4	3095	20	70	5	5		X	X	Skip Loader
Brea		2	Not available	800	0	75	20	5	5		X	
Buena Park	2		0.0	25	50	10	20	10	10		X	
Costa Mesa		80	1.3	1065	60	30	5	5		99%	1%	
Cypress	Not available		0.4	487		50	50			X	X	
Dana Point	218		0.4	395	60	30	4	4	2	X	X	Confined Space Teams
Fountain Valley	No Report											
Fullerton	2142		47.0	1267	25	60	5	5	5	X	X	
Garden Grove		92	29.8	775	40	25	25	5	5		X	
Huntington Beach		44	7.2	1680	40	10	25	15	10	30%	70%	
Irvine	8876		1.9	3,220	90	5	3	2	0	6%	4%	90%
La Habra		0.3	2.7	300	15	55	25	5		X	X	
La Palma	12		5.2	157	40	30	5	5	20		X	
Laguna Beach	65		0.6	445	49	41	0	0	10	X	X	
Laguna Hills	4		Not available	136	50	40	5	5		X		
Laguna Niguel	196.3		0.8	400	46	42	6	5	1	1%	99%	
Lake Forest	8		Not available	328	85	10	2	2.5	0.5	X		
Los Alamitos	5		1.3	40	20	20	20	20	20	X	X	
Mission Viejo	600		3.6	268	40	50	3	2	5	X	X	
Newport Beach	415		3.6	561	70	10	10	10	0	X	X	
Orange	1688		18.9	766		50	0.5	0.5	49		X	Equipment used for unusual debris
Placentia		20	0.4	360	70	20	5	5		X	X	
San Clemente	869		14.8	1974	70	20	7	2	1	X	X	
San Juan Capistrano		0.5	0.6	42	40	55	3	2		X	X	
Santa Ana	158		602.9 SF	515	2	87	3	2	6		X	
Seal Beach	55			197	20	80	0	0	0	20%	80%	
Stanton	No Report											
Tustin		1.5	0.0	500	80	15	2	2	1		X	
Villa Park	No Report											
Westminster		15	0.2	744	3	95	1	1		X	X	Bobcat & Backhoe
Yorba Linda	60		0.13	290	90	10	0	0		X	X	
County of Orange		22080	30.7	452	80	15	5	0	0	X		

Table 3.6: 1996-2000 Storm Drain System Changes

Facility	Reach Changed	Type of Change	Date
City of Anaheim — No Report			
City of Brea			
A01	Roscoe St. - Central to Elkwood	MC	1990-1994
A04	W. of Brea Blvd./ S. of Central Ave.	MC	1990-1994
A04	Orange Ave. - Cypress St. to Brea Blvd.	MC	1990-1994
A04	Birch St. - Randolph to Poplar	MC	1990-1994
A04	Birch St. @ Flower Ave.	MC	1990-1994
A04	From AO4 to Orange Ave. b/w Imperial & Birch	MC	1990-1994
A04	Sycamore - Imperial to Elm	MC	1990-1994
A04	Imperial - Flower - Randolph	MC	1990-1994
A04	W. of Brea Blvd./ N. of Central Ave.	MC	1990-1994
City of Buena Park — None			
City of Costa Mesa			
	Mesa Verde Dr./Mindanao Dr.	Lateral/CB	1997
	Harbor Blvd./Greenville Banning Channel	SD	1997
	Harbor Blvd. N. of 405 Fwy. To Sunflower	SD/MH	1997
	Harbor Blvd./Sunflower Ave.	SD/CB/Laterals	1997
	19th St./Park Ave.	CB/SD	1998
	Maple St. N. of 19th St.	SD/MH	1998
	Bernard St.	SD/MH	1998
	Harbor Blvd./Bernard St.	SD/JS	1998
	262 & 263 & 265 21st St.	Lateral/CB	2000
City of Cypress			
A01	Gay St. & on Crescent	SD	1999
City of Dana Point			
M00-P01	Calle Naranja/Calle Monterey	SD/CB	Under Construction
M00-P01	Calle Loma - Camino Capistrano & Avenue Las Palmas	SD/CB	Under Construction
M00-P05	Camino Capistrano & Camino de Estrella	SD/CB	Under Construction
M00-P01	Camino Capistrano - Mira Costa & Via Bella	SD/CB	Under Construction
	Copper Lantern (PCH & La Cresta)	SD/CB	1997
	PCH Copper Lantern - 400' East	SD/CB	1997
	PCH & Crown Valley	SD/CB	1999
City of Fountain Valley			
E01	Newhope - b/w Herman & Southpark	SD	1992
City of Fullerton			
	Domingo Inlets	SD/CB	1996
	Commonwealth	SD/CB	1996
	State College SD	SD/CB	1997
	Richman/Walnut	SD/CB	1997
	Dorothy Dr	SD/CB	1997
	Orchard	SD/CB	1997
	Raymond	SD/CB	1997
	Chapman/Commonwealth	SD/CB	1998
	Highland Grade Separation	SD/CB	1999

SD = Storm Drain Extension, Addition or Replacement
CB = New Catch Basin
JS = Junction Structure
IS = Inlet Structure
RR = Rip Rap

OC = Open Channel Construction
BC = Box Culvert
SB = Stilling Basin
MC = Miscellaneous Construction
RCP = Reinforced Concrete Pipe

Table 3.6: 1996-2000 Storm Drain System Changes

Facility	Reach Changed	Type of Change	Date
City of Garden Grove			
H-1	Roxey - Westminster to Woodbury	SD	1998
D-6	Garden Grove Blvd. - Village to Galway	SD	1999
B-4	Lampson - Beach to Haga	SD	Ongoing
G-1	Ninth - Chapman to Reva	SD	1999
D-2	Gilbert - Lampson to Bixby	SD	1996
D-9	Westminster - Deodara to Erin	SD	1998
C-6	Gilbert - Railroad to Shannon	SD	1998
D-14	Trask - Flower to Westlake	SD	1996
F-9	Trask - Euclid to Lynwood	SD	1996
F-1	Nelson to Lampson	SD	1996
A-2	Springdale - SR 22 to Stanford	SD	1996
City of Huntington Beach			
Not Available	Not Available	84" RCP	1998
Not Available	Not Available	72" RCP	1998
Not Available	Not Available	CB	1998
Not Available	Not Available	96" RCP	1996
Not Available	Not Available	Retention Basin	1998
Not Available	Not Available	CB	1998
Not Available	Not Available	42" RCP	1998
Not Available	Not Available	36" RCP	1998
Not Available	Not Available	CB	1998
Not Available	Not Available	60" RCP	1998
Not Available	Not Available	42" RCP	1999
Not Available	Not Available	CB	1999
Not Available	Not Available	60" RCP	1998
Not Available	Not Available	42" RCP	1999
Not Available	Not Available	CB	1999
Not Available	Not Available	48" RCP	1999
Not Available	Not Available	42" RCP	1997
Not Available	Not Available	72" RCP	1997
Not Available	Not Available	CB	1997
Not Available	Not Available	48" RCP	1997
Not Available	Not Available	48", 60" RCP	1996-1999
Not Available	Not Available	42" RCP	1998
Not Available	Not Available	48" RCP	1998
Not Available	Not Available	CB	1998
Not Available	Not Available	54" RCP	1996
Not Available	Not Available	48" RCP	1996
Not Available	Not Available	42" RCP	1996
Not Available	Not Available	42" RCP	1998
Not Available	Not Available	Pump Station	1994
Not Available	Not Available	48" RCP	1996
Not Available	Not Available	42"	1999
Not Available	Not Available	54" RCP	1999
Not Available	Not Available	51" RCP	1999
Not Available	Not Available	60 " RCP	1996
Not Available	Not Available	78 " RCP	1996

SD = Storm Drain Extension, Addition or Replacement
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IS = Inlet Structure
RR = Rip Rap
OC = Open Channel Construction
BC = Box Culvert
SB = Stilling Basin
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Table 3.6: 1996-2000 Storm Drain System Changes

Facility	Reach Changed	Type of Change	Date
City of Irvine			
Culver Dr.	N. of Portola	54" RCP	1996
Royal Oak	Hawk Creek to Alton	60" RCP	1997
Alton Pkwy.	Royal Oak to Valley Oak	60" RCP	1997
Valley Oak	E. of Alton	39" RCP	1997
Alton Pkwy.	E. of Jefferey to Royal Oak	54" & 60" RCP	1997
Royal Oak	S. of Alton	66" RCP	1997
Jefferey	N. of Quail Creek	66" RCP	1997
Quail Creek	E. of Jefferey	54" & 60" RCP	1997
Royal Oak	Quail Creek to Dove Creek	42" RCP	1997
Dove Creek	Royal Oak - Valley Oak	42" RCP	1997
Pacifica	E. of Fortune	42" RCP	1997
Enterprise	E. of Fortune	42" RCP	1997
Old Pacifica	E. of Fortune	48" RCP	1997
Irvine Entertainment Center	SE of Agua Chinon Channel	48" RCP	1997
Myford Rd.	N. of Walnut	42", 48", 54", 60" RCP	1997
Irvine Center Dr.	Jefferey to Sand Canyon	48", 54", 66", 72", 78" RCP	1997
Walnut Ave	Myford to Peters Canyon Wash	60" RCP	1998
Myford Rd.	S. of Walnut	42", 48", 60", 72" RCP	1998
Culver Dr.	Trabuco to Portola	66" RCP	1998
Bryan Ave.	SR 261 to Culver	42", 48", 60", 72" RCP	1998
Barranca Pkwy.	Jefferey to Sand Canyon	84" RCP	1998
Portola Pkwy.	Jamboree to Culver	42" RCP	1998
City of La Habra — None			
City of La Palma — No Report			
City of Laguna Beach			
Pacific Ocean	Mystic Way	SD	1999
Pacific Ocean	Virginia Park Dr.	SD/CB	1999
Pacific Ocean	Blumont/Hilledge	SD/CB	1999
Pacific Ocean	Tenth Avenue	SD/CB	1998
Pacific Ocean	Terry Rd.	SD/CB	1999
Pacific Ocean	South Laguna	SD/CB	1998
Pacific Ocean	Nyes Pl.	CB	1999
Pacific Ocean	Lower Nyes Pl.	CB	1999
Pacific Ocean	Victoria Beach	CB	1997
Pacific Ocean	Cliff Dr.	CB	1999
Pacific Ocean	Rimrock Canyon	SD	1996
Pacific Ocean	Park Ave. & Glenneyre	SD/CB	1998
Pacific Ocean	South Laguna - Ocean Vista	SD/CB	1998
I02	1900 Laguna Canyon Rd.	SD/CB	2000
City of Laguna Hills			
J05P02	El Conejo Park (Largo Dr. & Creek Dr.)	SD	1997
J05P01	Community Center (Via Lomas - Alicia)	SD	1999
City of Laguna Niquel			
J03P09	Via Portola - Vista Plaza	SD	1998-99
City of Lake Forest — None			
City of Los Alamitos — No Report			
City of Mission Viejo			
L03P14 - 713.3	Sileros to 1000' NLY	RR	2000
Not Available	I-5 to Via Grande	42", 48", 72" RCP	2000
Not Available	Upstream El Toro Rd. to Rte. 241	SD	2000
Not Available	Olympiad/Alicia	SD	1999
L03	Via Angelina to Marguerite Pkwy	RR	1996
L03	La Paz to 1000' NLY	RR	1996

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Table 3.6: 1996-2000 Storm Drain System Changes

Facility	Reach Changed	Type of Change	Date
City of Newport Beach			
Newport Bay	Newport - 14th to 16th	SD/CB/JS	1996
Newport Bay	Kings Rd. to PCH	SD/JS	1997
Newport Bay	Hoag Dr. to Lower Campus/PCH	SD/CB/JS	1998
Newport Bay	Hospital Rd. to W. Service Rd.	SD/CB	1999
Newport Bay	PCH/Newport Center Dr.	SD/CB	1998
Newport Bay	PCH/Avocado Ave.	SD/CB/JS	1998
Newport Bay	Bayside Dr. adj. County Road	SD	1999
Newport Bay	E. PCH/Avocado Ave.	SD/CB/JS	1997
Newport Bay	Newport Center Dr./E. PCH	SD/CB/JS	1998
Newport Bay	Bayview Way/Jamboree Rd.	CB	1996
Newport Bay	Newport Blvd/PCH	SD/CB/JS	1999
Newport Bay	El Paseo/Bayside Dr.	SD/CB	1997
Newport Bay	Castaway Lane/Dover Dr.	SD/CB/JS	200
Newport Bay	MacArthur Blvd - PCH to Bonita Canyon	SD/CB/JS	1999
Newport Bay	Ford Rd/Jamboree Blvd.	SD/CB/JS	1997
City of Orange			
	Milford	SD	1999
	Sacramento	SD	1998
	Glassel	SD	1998
	Walnut	SD	1998/1999
City of Placentia			
E03	Alta Vista - Chapman	BC	1999
City of San Clemente			
MOO-P02	Trafalgar Ln.	SD	1999
MOO-S07	Palizada/El Camino Real	SD/CB/JS	1999
MOO-P10	San Fernando/El Camino Real	SD/CB	1999
MOO-P10	Dominguez/El Camino Real	SD/CB	1999
MOO-P02	Rosa/Montgomery	SD/CB/JS	1998
MO2-P02	Calle Valle	SD/CB/JS	1999
MO1-P05	Laing	RR/IS/JS/CB/SD	1999/2000
MO2-P02	Talega	RR/IS/JS/CB/SD	1999/2000
MO3-P01	Talega	RR/IS/JS/CB/SD	1999/2000
MOO-P01	Los Alamos	SD/CB/JS	2000
City of San Juan Capistrano — None			
City of Santa Ana			
Euclid St. Stormdrain	First St. - Sixth St.	SD	1999
Penn Way Stormdrain	Santa Ana Blvd. - 15th St.	SD	2000
Eastside Stormdrain	First St. - I-5 Fwy.	SD	36039
City of Seal Beach — No Report			
City of Stanton — No Report			
City of Tustin			
F10-P02	Newport/Sycamore	SD/MC	1997
F10-101-4	SCRRA/Newport	IS/RR/SD	1996
City of Villa Park — No Report			

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Table 3.6: 1996-2000 Storm Drain System Changes

Facility	Reach Changed	Type of Change	Date
City of Westminster			
	Trask - Hoover to Richardson	SD/CB/JS	1996
	Trask/Beach	SD/CB/JS	1997
	Tract 15539	SD/CB	1999
	Tract 15539	SD/CB	1998
	Tract 15556	SD/CB/JS	1998
	Riata - Miami to Newland	SD/CB	1994
	Hoover: North of Hazard	SD/CB	1996
	Pacific/Bucknell	SD/CB/JS	1999
City of Yorba Linda			
E04-P03	Yorba Linda - Marcala	SD	1996
E04-S04	Yorba Linda - Imperial	OC	1996
E04-P05	Via Del Caballo - Palm	SD	1996
E03-S01	W. of Briarhill - S. of Yorba Linda	MC	1997
E05-P02	Yorba Linda - Eureka	SD	1996
E05-P06	Plumosa - Bastanchury	SD	1998
E05-P01	Mariposa - E. of Richfield	SD	1999
E08-P08	Jamestown Dr.	SD	1999
E05-P03	Arroyo St.	SD	1999
E05-P03	Lakeview - Lemon	SD	1999
County of Orange			
A02	250' upstream A01 - 150' downstream Beach		1996
B01	Downstream I-5 Fwy		1996
C00-PS1	Seal Beach Pump Station		1996
C01-S02	Rochelle - Lexington		1996
C05	I-405 - Quartz		1996
D02	Hamilton - Atlanta		1996
D02	Atlanta - Indianapolis		1996-1999
D03	Sunflower - Alton	Repairs	1996
D03	Alton - Warner/ South Coast - Sunflower/ Harbor - South Coast		1996
F25-B01	Trabuco Retarding Basin		1996
F01	Sunflower - S.P. RR		1996
F02	Edinger - McFadden		1996
L03-B02	Gallivan Retarding Basin I		1996
A02	200' upstream Beach - 400' downstream Dale		1997-1999
A03	Knott - Beach		1997-1999
B01	SPTC RR - Knott		1997-1998
B01	Downstream I-5 Fwy @ RR crossing		1997
C05	411 M downstream Goldenwest - 349 M upstream		1997-1999
D02	Hamilton - Atlanta		1997
L03-B02	Galivan Retarding Basin II		1997-1998
C02	I-405 Fwy - Belgrave		1998-2000
C05	349 M downstream Goldenwest - 13 M upstream Gothard		1998
D02	Indianapolis - Adams		1998-2000
D01	1750' upstream Newland - Atlanta		2000
F07	Walnut - Michelle		1997
F27-B01	Upstream Foothill Corridor		1996
F27-B02	Retarding Basin		1996
F06	Walnut - I-5 Fwy		1999

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Table 3.6: 1996-2000 Storm Drain System Changes

Facility	Reach Changed	Type of Change	Date
County of Orange (continued)			
F26	F06 - Portola Pkwy		1998
F26-P02	F26 - Portola Pkwy		1998
F05	Sand Canyon - Jeffrey		1998
F26-B02	Near Culver & Irvine Blvd		1998
F06	I-5 Fwy - Bryan Ave		1998
F27	F06 - Culver Dr		1998
F06	Walnut - I-5 Fwy		1997
E03	Chapman - Alta Vista		1997
F26	Culver - Yale		1996
F05	Bake - Irvine Center Dr		1999
F18-B01	N/0 ETMCAS		1997

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Table 3.7 1999/00 Drain Inlet Stenciling

Permittee	Total Number of Catch Basins	% of Basins Stenciled at Least Once	# Of Basins Re-Stenciled 1999-2000	Phrase Used	Type of Application Used			Volunteer/Other Organizations	# of Basins Re-Stenciled During 1999-2000	Comments
					Spray Paint	Heat	Adhesives			
Anaheim	3500	100	1110	No Dumping - Drains To Ocean	X (blue,black,red)					
Brea	800	100	5	No Dumping - Drains To Ocean		X				Positive public reaction to stenciling
Buena Park	791	100	0	No Dumping - Drains To Ocean	X (blue on white)					Positive public reaction to stenciling; City has budgeted funds to purchase acrylic catch basin markers for the next fiscal year.
Costa Mesa	1300	100	1300	No Dumping - Drains to Ocean	X (blue on white)			Orange County Conservation Corps	1300	Stenciling information article in the Winter, 2000 Community Newsletter
Cypress	487	100	0	No Dumping - Drains To Ocean	X					Promotion of stenciling program in the City newsletter; Majority of re-stenciling performed by Boy Scouts.
Dana Point	395	100	0	No Dumping - Drains To Ocean	X (black)					15 new catch basins currently under construction. City provided stencils for use in private communities.
Fountain Valley	No Report									
Fullerton	1684	100	600	No Dumping - Drains To Ocean	X			Boy Scouts of America - Eagle Scout Project	600	
Garden Grove	775	100	775	No Dumping - Drains To Ocean	X (blue)			City Maintenance Personnel	24	
Huntington Beach	1680	100	1680	No Dumping - Drains To Ocean	X					
Irvine	4600	100	500	No Dumping Waste - Drains To Ocean	X	X		Orange County Conservation Corps	500	
La Habra	552	100	552	No Dumping - Drains To Ocean	X (blue on white)			Orange County Conservation Corps	552	Positive public reaction to stenciling
La Palma	180	87	0	No Dumping - Drains To Ocean	X					
Laguna Beach	445	56	195	Keep It Clean - Drains To Ocean			X (Blue)			No illegally dumped material discovered since installation of new vinyl medallion "stencils"
Laguna Hills	340	100	0	No Dumping - Drains To Ocean	X (black on white)					
Laguna Niguel	1035	90	50	No Dumping - Drains To Ocean	X (blue)					
Lake Forest	438	100	50	No Dumping - Drains To Ocean	X			Eagle Scout Candidate	50	
Los Alamitos	80	100	0	No Dumping - Drains To Ocean	X (blue on white)					
Mission Viejo	1850	100	0	No Dumping - Drains To Ocean	X (blue)					
Newport Beach	2298	100	892	No Dumping - Drains To Ocean No Dumping Drains To Bay	X (black)					
Orange	3100	100	0	No Dumping - Drains To Ocean		X	X			Positive public reaction to stenciling, vandalism almost nil
Placentia	240	100	0	No Dumping - P.M.C. Section 16.08.040	X					
San Clemente	1705	100	1974	No Dumping - Drains To Ocean	X (black)			Orange County Conservation Corps & Boy Scouts	OCCC - 1380; Boy Scouts - 316	269 catch basins stenciled twice during this reporting period
San Juan Capistrano	782	80	0	No Dumping - Drains To Ocean	X					
Santa Ana	1230	100	100	No Dumping - Drains To Ocean	X (blue on white)					
Seal Beach	197	100	0	No Dumping	X (black)					
Stanton	0	100	0	No Dumping - Drains To Ocean	X (black on white)					
Tustin	660	94	450	No Dumping - Drains To Ocean	X (blue on white)					Road median catch basins are not required to be stenciled
Villa Park	No Report									
Westminster	744	100	744	No Dumping - Drains To Ocean	X (blue)					
Yorba Lin[illegible]	1080	65	700	No Dumping - Drains To Ocean	[illegible]ck)					
County of [illegible]	1237	100	0	No Dumping - Drains To Ocean	X [illegible] white)					

Table 3.8 1999/00 Street Sweeping Practices By City

Permittee	Type of Sweeper			Frequency			Volume of Material Collected			Parking Restrictions	Performance Standards	Sweeping Monitored	Monitoring Method
	Brush	Vacuum	Other	Commercial	Industrial	Residential	Commercial	Industrial	Residential				
Anaheim	7	21		W	W	W	322,690 tons			Yes	D	D	Visual
Brea		3		W	W	W	3840 CY	3840 CY	3840 CY	No	M	M	Visual
Buena Park		3		2/W	W	W	3.5 tons	1.5 tons	30 tons	Yes	D	D	Visual
Costa Mesa	1		Regenerative Air - 4	W	W	W	2.5 tons/W	2.5 tons/W	26.75 tons/W	Yes	M	O	Visual
Cypress	1	2		W	W	W	No Report			Yes	BW	D	Visual
Dana Point		X	Regenerative Air	BW	N/A	BW	86 tons	N/A	344 tons	Yes	BW	BW	Visual
Fountain Valley	No Report												
Fullerton		5		W	W	W	2678 CY	8093 CY	874 CY	Yes	D	D	Visual
Garden Grove		3		W	BW	BW	60 tons/Month	30 tons/Month	105 tons/Month	Yes	O	O	Visual
Huntington Beach		5		BW	BW	BW	20 yards	40 yards	890 yards	Yes	2/W	2/M	Visual
Irvine	2	1		BW	BW	BW	1500 tons	1500 tons	1248 tons	No	W	W	Visual
La Habra		3		W	W	W	3.5 tons (data from 1 sweeper only)			No	D	W	Visual
La Palma	1	1		W	W	W	4-5 CY/day	4-5 CY/day	4-5 CY/day	Yes	W	W	Visual
Laguna Beach	2			D	N/A	BW	680 CY	N/A	1356 CY	Yes	D	D	Visual
Laguna Hills		1		W	N/A	BW	312 tons		260 tons	No	W	W	Visual
Laguna Niguel		X		M	M	M	No Report			No	No	M	Visual
Lake Forest	X	X		W	W	W	809.7 tons			No	O	O	Visual
Los Alamitos	1			2/W	2/W	W	.25 tons	.25 tons	1 ton	Yes	Q	Q	Visual
Mission Viejo		3		W	W	BW	10 tons	10 tons	80 tons	No	D	D	Visual
Newport Beach	5	1		D	N/A	W	5384 CY			Yes	D	D	Visual
Orange	4	3		BW	BW	W	15,250 CY			Yes	D	D	Visual
Placentia		2		M	M	M	346 tons	346 tons	346 tons	Yes	D	D	Visual
San Clemente			Regenerative Air (2)	3.5/W	3.5/W	M	364 CY	273 CY	1080 CY	Yes	D	D	Visual
San Juan Capistrano	No Report			BW	BW	BW	No Report			Yes	M	M	Visual
Santa Ana	10			D	W	W	2184 CY	16,380 CY	36,400 CY	Yes	W	W	Visual
Seal Beach	1	1		W	W	W				Yes	W	Variable	Visual
Stanton		1		W	W	W	2 tons	2 tons	8 tons	Yes	No Report	W	Visual
Tustin	1	2		W	W	W	750 tons			Yes	D	D	Visual
Villa Park	No Report												
Westminster		2		BW	BW	BW	778.8 CY	401.2 CY	1180 CY	Yes	BM	W	Visual
Yorba Linda		X		W	W	BW	76,552 tons			No	A	W	Visual
County of Orange		3				M	No Report			Yes	M	M	Visual

D: Daily Frequency
W: Weekly Frequency
BW: Every Other Week
M: Monthly Frequency
BM: Every Other Month
BA: Every Other Year
O: On-Going
Q: Quarterly

Table 3.9 1996-2000 Environmental Performance Reporting Overview

Permittee	1996/1997		1997/1998				1998/1999				1999/2000					
	New Significant Issues	Facilities With Significant Issues	Existing Significant Issues	Facilities With Significant Issues	New Significant Issues	Significant Issues Resolved	Existing Significant Issues	Facilities With Significant Issues	New Significant Issues	Significant Issues Resolved	Existing Significant Issues	Facilities With Significant Issues	New Significant Issues	Significant Issues Resolved	Remaining Significant Issues	Facilities With Significant Issues
Anaheim	83	24	83	24	0	68	15	13	0	1	14	13	0	12	2	1
Brea	3	1	3	1	0	0	3	1	0	3	0	0	0	0	0	0
Buena Park	5	1	5	1	0	4	1	1	1	1	1	0	0	0	1	0
Costa Mesa	14	10	14	10	0	12	2	2	0	0	2	2	0	0	2	2
Cypress	5	1	5	1	0	0	5	1	0	0	5	1	2	2	5	1
Dana Point	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fountain Valley	10	3	10	3	0	2	8	2	0	0	8	2	0	0	8	2
Fullerton	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0
Garden Grove	12	10	12	10	0	1	11	10	0	0	11	10	0	10	1	1
Hunt. Beach	27	9	27	9	2	12	17	8	0	6	11	7	0	3	8	4
Irvine	1	1	1	1	0	1	0				0				0	
La Habra	5	1	5	1	0	2	3	1	0	0	3	1	0	1	2	1
La Palma	2	2	2	2	0	0	2	2	0	2	0	0	0	0	0	0
Laguna Beach	0	0	0	4	4	0	4	4	0	1	3	3	0	0	3	0
Laguna Hills	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Laguna Niguel	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lake Forest	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Los Alamitos	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0
Mission Viejo	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Newport Beach	5	3	5	3	0	5	0	0	0	0	0	0	0	0	0	0
Orange	6	4	6	4	0	6	0	0	0	0	0	0	0	0	0	0
Placentia	4	1	4	1	0	4	0	0	0	0	0	0	0	0	0	0
San Clemente	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
S.J. Capistrano	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Santa Ana	5	1	5	1	0	4	1	1	2	1	2	1	0	0	2	0
Seal Beach	5	4	5	4	1	1	5	0	0	0	5	0	0	0	5	0
Stanton	5	1	5	1	0	4	1	1	0	0	1	1	0	0	1	1
Tustin	3	1	3	1	0	0	3	1	0	2	1	1	0	0	1	1
Villa Park	7	2	7	2	0	3	4	2	0	0	4	2	0	0	4	2
Westminster	5	1	5	1	0	4	1	1	0	1	0	0	0	0	0	0
Yorba Linda	2	1	2	1	0	0	2	1	0	0	2	1	0	0	2	1
County of Orange	28	10	28	10	3	23	8	6	0	7	1	6	0	1	0	0
Total	244	94	244	98	10	158	96	58	3	25	74	51	2	29	47	17

= All Significant Issues Addressed

Table 3.10 Environmental Pe1999/00 Performa. .eport Significant Issues Action Plan Updates

Location	Significant Issue	Type Of Control	ACTION 1	ACTION 2	START DATE	END DATE	Action Plan Complete & Revised End Date	Any Additional Significant Issues
City of Anaheim								
Streets & Sanitation #28	Material Storage - Asphalt/Dirt	Structural	Construct metal roofing to cover bunkers (Action plan changed from: Install clarifier)	Install drain inlet filters (Action plan changed from: Construct berm)	11/24/97	12/31/99	No - 6/30/01	No
	General Stormwater Runoff	Structural	Install and service 4 stormwater inlet filters (Action plan changed from: Install clarifier)		11/24/97	6/30/99	No - 6/30/01	
Dad Miller Golf Course	Material Storage	Non-structural	Purchase tarps		11/15/97	On going	Yes	No
Anaheim Hills Yard	Material Storage	Non-structural	Purchase tarps		11/15/97	On going	Yes	No
Fire Station One	Vehicle Washing	Non-structural	Relocate wash area		3/1/98	3/1/99	Yes	No
Fire Station Two	Vehicle Washing	Non-structural	Relocate wash area		3/1/98	3/1/99	Yes	No
Fire Station Four	Vehicle Washing	Non-structural	Relocate wash area		3/1/98	3/1/99	Yes	No
Fire Station Five	Vehicle Washing	Non-structural	Relocate wash area		3/1/98	3/1/99	Yes	No
Fire Station Six	Vehicle Washing	Non-structural	Relocate wash area		3/1/98	3/1/99	Yes	No
Fire Station Seven	Vehicle Washing	Non-structural	Relocate wash area		3/1/98	3/1/99	Yes	No
Fire Station Eight	Vehicle Washing	Non-structural	Relocate wash area		3/1/98	3/1/99	Yes	No
Fire Station Nine	Vehicle Washing	Non-structural	Relocate wash area		3/1/98	3/1/99	Yes	No
Fire Station Ten	Vehicle Washing	Non-structural	Relocate wash area		3/1/98	3/1/99	Yes	No
Convention Center	Material Storage - Chemical Coolant	Structural	Install containment system		2/1/98	7/31/98	Yes	No
City of Brea								
Service Center	Vehicle/Equipment Wash Water	Structural	Construct new wash facility with water recycling		5/1/97	3/1/99	Yes - Completed prior to last reporting period	No
	Steam Cleaning	Structural	Provide new location (move to newly constructed facility)		5/1/97	3/1/99	Yes - Completed prior to last reporting period	
	Sweeper Transfer Area	Structural	Capture and treat runoff from dump pile		5/1/97	3/1/99	Yes - Completed prior to last reporting period	
City of Buena Park								
Vehicle Maintenance Yard	Fuel Spills - Small and Large	Structural	Construct Berm		11/1/97	Ongoing	No - Specs under review	No
City of Costa Mesa								
New Corporation Yard	Sweeper Transfer Area	Structural	Develop industrial waste system		12/1/00	2/1/00	No - Budget 12/15/00	No
Old Corporation Yard	Large & Small Spills	Structural	Construct roof for paint cleaning area & fence		9/1/00	10/1/00	No - Budget 10/00	No
City of Cypress								
Corporation Yard	Waste Storage - Paint	Structural	Provide covered storage area		11/1/00	1/1/01	No - 1/1/01	Yes
	Fluid Transfer Area	Structural	Construct berm around perimeter		11/1/00	1/1/01	No - 1/1/01	
	Fluid Transfer Area	Non-structural	Utilize effective housekeeping techniques		2/1/98	2/1/99	Yes	
	Spills - Small	Non-structural	Relocate landscape equipment to cover		2/1/98	8/1/99	No - 8/1/00	
	Material Storage	Structural	Install roof over storage area	Temporarily cover bins	9/1/98	10/1/98	No - 1/1/01	
	Vehicle/Equipment Wash Water	Non-structural	Inspect wash rack drainage system regularly		1/1/98	2/1/99	Yes	
	Fluid Storage	Structural	Install berm around fluid drums in garage		9/1/00	9/30/00	New	
	Vehicle Maintenance	Non-structural	Increase frequency of vehicle maintenance		9/1/00	Ongoing	New	
City of Dana Point - No Significant Issues								

Table 3.10 Environmental Pe1999/00 Performance Report Significant Issues Action Plan Updates

Location	Significant Issue	Type Of Control	ACTION 1	ACTION 2	START DATE	END DATE	Action Plan Complete & Revised End Date	Any Additional Significant Issues
City of Fountain Valley								
Fire Station #2	Material Storage - Fuel Tanks	Structural	Install clarifier and roof cover		10/1/98	10/1/99	No - Facility Moving 12/99	No
City Yard	Material Storage - Lube Oil Drums	Structural	Install clarifier and roof cover		4/1/98	10/1/98	No - Facility Moving 12/99	No
	Vehicle/Equipment Wash Water	Structural	Install clarifier and roof cover		4/1/97	10/1/98	No - Facility Moving 12/99	
	Sweeper Transfer Area	Structural	Install clarifier and roof cover		4/1/98	10/1/98	No - Facility Moving 12/99	
	Fuel Spills	Structural	Install clarifier and roof cover		4/1/97	10/1/98	No - Facility Moving 12/99	
	Vehicle Storage	Structural	Install clarifier and roof cover		6/1/98	6/1/99	No - Facility Moving 12/99	
	Material Storage - Waste Oil	Structural	Install clarifier/separator and roof cover		6/1/98	10/1/98	No - Facility Moving 12/99	
	Vehicle/Equipment Wash Water	Structural	Install roof		6/1/98	6/1/99	No - Facility Moving 12/99	
City of Fullerton - No Significant Issues								
City of Garden Grove								
Municipal Service Center	Hazardous Materials Storage	Non-structural	Training of personnel		12/1/98	4/1/00	Yes	No
Fire Station #2	Hazardous Materials Storage	Non-structural	Training of personnel		12/1/98	4/1/00	Yes	No
Fire Station #3	Hazardous Materials Storage	Non-structural	Training of personnel		12/1/98	4/1/00	Yes	No
Fire Station #4	Hazardous Materials Storage	Non-structural	Training of personnel		12/1/98	4/1/00	Yes	No
Fire Station #5	Hazardous Materials Storage	Non-structural	Training of personnel		12/1/98	4/1/00	Yes	No
Fire Station #6	Hazardous Materials Storage	Non-structural	Training of personnel		12/1/98	4/1/00	Yes	No
Fire Station #7	Hazardous Materials Storage	Non-structural	Training of personnel		12/1/98	4/1/00	Yes	No
City Hall	Materials Storage	Structural	Replace generator		TBD	12/22/99	No - 2005	No
Police & Fire Station	Hazardous Materials Storage	Non-structural	Training of personnel		12/1/98	4/1/00	Yes	No
Willowick Golf Course	Waste Storage	Structural	Build berm	Train personnel	11/1/98	12/1/98	Yes - Incorrectly identified as a municipal facility	No
	Vehicle & Equipment Washing	Structural	Install a clarifier		12/1/98	6/1/99		
City of Huntington Beach								
Park Maintenance Facility	Material Storage/Trash Bin	Structural	Construct berm		11/15/97	On going	No - In Design	No
	Fuel Spills - Large	Structural	Construct roof		11/15/97	On going	No - Under Construction	
Joint Powers Train Center	Trash Bin	Structural	Construct roof		12/1/98	Ongoing	No	No
	Trash Bin	Non-structural	Provide spill clean up materials		11/15/97	On going	No	
Civic Center	Fuel Spills	Structural	Replace fuel system		11/15/97	12/1/98	Yes - Completed prior to last reporting period	No
	Trash Bin - Police Parking Lot	Structural	Construct roof and berm		N/A	Pending Funding	No - In progress	
	Trash Bin - City Hall	Structural	Construct roof and berm		N/A		Yes - Completed prior to last reporting period	
	Vehicle/Equipment Wash Water	Structural	Construct vehicle washing bay		N/A	Pending Funding	No - In Progress	
19001 Huntington Street	Fluoride Bulk Storage	Structural	Construct Roof For Area		1/1/98	12/1/1998 (Pending funding)	No - In Design	No
	Fuel Spill - Small	Structural	Replace fuel system		11/15/97	4/1/99	Yes - Completed prior to last reporting period	
	Material Storage	Structural	Relocate and construct covered storage area		1/1/00	12/1/01 (Funding needed)	No - 12/1/01	
Beach Maintenance Yard	Material Storage - Oil	Structural	Construct berm		10/1/98	10/1/99	Yes	No

Table 3.10 Environmental Pe1999/00 Performa. .eport Significant Issues Action Plan Updates

Location	Significant Issue	Type Of Control	ACTION 1	ACTION 2	START DATE	END DATE	Action Plan Complete & Revised End Date	Any Additional Significant Issues
City of Huntington Beach (continued)								
Beach Maintenance Yard	Fuel Spills	Structural	Construct berm		10/1/98	10/1/99	Yes	No
	Underground Storage Tank	Structural	Remove underground storage tanks		12/1/98	12/1/99	Yes	
Gothard Fire Station	Underground Storage Tank	Structural	Remove & replace underground storage tank		N/A	4/4/99	Yes - Completed prior to last reporting period	No
Warner Fire Station	Underground Storage Tank	Structural	Remove & replace underground storage tank		N/A	4/1/99	Yes - Completed prior to last reporting period	No
Corporate Yard	Fuel Spills	Structural	Construct berm		12/1/98	1/1/99	Yes - Completed prior to last reporting period	No
City of Irvine - No Significant Issues								
City of La Habra								
Public Works Yard	Vehicle/Equipment Wash Water	Structural	Install clarifier		7/1/01	6/30/02 (Pending funding)	No - Rebudget for clarifier 7/1/01	No
	Trash Bin	Structural	Construct a containment berm		7/1/01	6/30/02 (Pending funding)	No - Design containment cover 7/1/00	
	Material Storage - Chemicals	Structural	Construct new chemical shed		7/1/98	1999	Yes	
City of La Palma								
Walker Well & Pump Stn	Material Storage - Chlorine/Aquameg	Structural	Construct a containment berm		11/15/97	7/1/98	Yes - no sig issues chemicals housed in a pump station	No
City Yard & Pump Stn	Material Storage - Building Materials	Structural	Construct a containment area	Construct a berm - water division	11/15/97	7/1/98	Yes - no sig issues chemicals housed in a pump station	No
City of Laguna Beach								
Nursery	Material Storage - Chemicals		Identify improvements needed		1/1/99	8/30/99	No - 10/00	No
Fire Station	Vehicle/Equipment Wash Water		Identify improvements needed		1/1/99	1/1/00	No - 10/00	
Corporate Yard	Vehicle/Equipment Wash Water		Identify improvements needed		1/1/99	1/1/00	No - 10/00	
Dumpster Facility	Waste Storage	Non-structural	Cover during wet weather		12/1/98	On going	Yes - Completed prior to last reporting period	
City of Laguna Hills - No Significant Issues								
City of Laguna Niguel - No Significant Issues								
City of Lake Forest - No Significant Issues								
City of Los Alamitos - No Significant Issues								
City of Mission Viejo - No Significant Issues								
City of Newport Beach - No Significant Issues								
City of Orange - No Significant Issues								
City of Placentia - No Significant Issues								
City of San Clemente - No Significant Issues								
City of San Juan Capistrano - No Significant Issues								
City of Santa Ana								
Corporation Yard	Material Storage - (Out Door) Chemicals	Structural	Construct a roof & containment berm	Train employees	1/5/98	7/1/98	Yes - Training/ No - Berm Completion Date = 10/00	No
	Leakage from fluid transfer area	Structural	Move drums to covered area & add containment berms	Train employees	1/1/00	7/1/00	Yes - Training/ No - Berm Completion Date = 10/00	
City of Seal Beach								
Beverly Manor	Liquefied Petroleum Gas	Structural	Construct a containment berm		11/15/97	7/1/98	No - 7/1/00 Budget Item	No

Table 3.10 Environmental Pe1999/00 Performance Report Significant Issues Action Plan Updates

Location	Significant Issue	Type Of Control	ACTION 1	ACTION 2	START DATE	END DATE	Action Plan Complete & Revised End Date	Any Additional Significant Issues
City of Seal Beach (continued)								
Beverly Manor	Material Storage - Oil	Structural	Construct a containment berm & roof	Install an oil/water separator			No - 7/1/00 Budget Item	No
Bolsa Chica	Material Storage	Structural	Construct a containment berm & roof	Install an oil/water separator	11/15/97	7/1/00	No	No
Public Works Yard	Fuel Island	Structural	Remove underground storage tank and relocate		11/15/97	7/1/98	No - UST to be removed 1/99	No
City of Stanton								
10652 Bell Street	Material Storage	Non-structural	Increase inspections of storage area	Train employees	11/15/97	On going	No - In Progress	No
City of Tustin								
Corporate Yard	Sweeper Transfer Area	Structural	Temporarily use sandbags as berms	Design/install canopy; Obtain wastewater discharge permit for wash rack discharge to sanitary sewer	N/A	N/A	Yes (Action 1)/ No (Action 2)	No
City of Villa Park								
17855 Santiago Boulevard	Vehicle/Equipment Maintenance	Structural	Construct a containment berm, remove pump	Reduce size of on-site storage containers	1/1/98	1/1/05	No - Still need berm	No
	Fluid Transfer Areas	Structural	Remove gasoline pump, install clarifier	Construct a containment berm, effluent to sewer	1/1/99	1/1/02	No - Pump and Tank Removed	
	Waste Storage	Structural	Construct a containment berm & roof		1/1/99	1/1/02	No 1/1/02	
18021 Lincoln Street	Waste Storage	Structural	Cover waste bins		1/1/00	12/1/00	No - 12/1/00	No
City of Westminster								
Corporation Yard	Paint Drying Area	Structural	Construct a canopy	Remove drying area	1/1/98	5/1/98	Yes - Completed prior to last reporting period	No
City of Yorba Linda								
City Yard	Fuel Spills - Small & Large	Structural	Construct a containment berm		11/15/97	On going	No	
	Fuel Spills - Small & Large	Non-structural	Purchase spill clean up materials	Train employees, inspect daily, sweep	10/3/97	On going	No	
County of Orange								
Laguna Niguel Park	Materials Storage - Paint	Structural	Reconstruct a portion of the containment berm	Construct berm	1/1/98	6/30/98	Yes - Completed prior to last reporting period	No
Irvine Regional Park	Materials Storage - 55 gal. drums	Non-structural	Remove and dispose of		1/1/98	12/30/98	Yes - Completed prior to last reporting period	No
Central Utility Facility	Materials Storage - Chemicals	Structural	Construct new berm		2/15/98	10/30/98	Yes - Completed prior to last reporting period	No
Health Care Complex	Waste Storage - Biohazards	Non-structural	Train employees	Put up signs	2/1/98	6/30/98	Yes - Completed prior to last reporting period	No
Katella Yard	Fuel Spills - Small	Non-structural	Place pan underneath vehicles	Conduct degreasing on wash pad	12/1/98	On going	Yes - Completed prior to last reporting period	No
	Vehicle & Equipment Washing	Non-structural	Train employees		12/1/98	On going	Yes - Completed prior to last reporting period	
	Waste Storage	Non-structural	Train employees	Conduct inspections	12/1/98	On going	Yes - Completed prior to last reporting period	
Sheriff-Coroner Civic Center	Vehicle Washing	Structural	Discontinue runoff		7/1/98	12/30/99	Yes	No

Table 3.11 Household Hazardous Waste Collection (1993-2000 Comparison)

	Collection Center Waste Volumes Collected (pounds)									
	Anaheim		Huntington Beach		Irvine		San Juan Capistrano		Totals	
	1993-94	1999-00	1993-94	1999-00	1993-94	1999-00	1993-94	1999-00	1993-94	1999-00
Flammable Solid/Liquid		165,443		158,110		82,010		72,200	0	477,763
Bulked Flammable Liquids		—		—		—		—	0	0
Oil-Base Paint		119,095		152,309		104,615		97,726	0	473,745
Poison (Excl aerosols)		38,385		36,524		17,516		15,620	0	108,045
Reactive & Explosive		10		—		—		10	0	20
Inorganic Acid		5,728		6,046		3,573		2,610	0	17,957
Organic Acid		4,600		6,600		2,200		1,200	0	14,600
Inorganic Base		1,328		846		773		1,000	0	3,947
Organic Base		5,600		11,600		2,800		2,600	0	22,600
									0	
Neutral Oxidizer		400		1,000		400		200	0	2,000
Organic Peroxides		20		6		10		10	0	46
Oxidizing Acid		—		200		200		200	0	600
Oxidizing Base		1,328		846		373		—	0	2,547
PCB Containing Paint		—		—		—		—	0	0
Other PCB Waste		10		—		200		300	0	510
Corrosive Aerosols		600		1,200		800		200	0	2,800
Flammable Aerosols	34,040	25,864	44,400	36,060	2,035	14,148	15,540	12,000	96,015	88,072
Poison Aerosols		3,000		3,600		1,200		1,200	0	9,000
Antifreeze	23,652	24,379	22,543	29,410	884	15,114	5,746	8,585	52,825	77,488
Car Batteries (Avg = 30 lbs)	63,760	95,840	56,130	111,840	3,510	35,360	36,420	44,720	159,840	287,760
Fluorescent Bulbs		—		—		—		—	0	0
Latex Paint	363,833	201,444	434,348	214,832	31,275	158,117	149,078	71,825	978,534	646,218
Motor Oil/Oil Products (1 gal = 8.34 lbs)	313,834	208,962	300,574	177,221	17,681	85,973	85,535	63,750	717,624	535,906
Oil Filters (Avg = 1 lbs)		4,200		2,800		1,800		1,000	0	9,800
Mercury (Metallic)		30		40		40		1	0	111
Medical Waste		—		—		—		—	0	0
Household Batteries		400		100		700		500	0	1,700
Other	175,140	42,722	192,546	32,987	7,756	24,748	69,622	13,275	445,064	113,732
Collection Center Totals	974,279	949,388	1,050,541	984,177	63,141	552,670	361,941	410,732	2,449,902	2,896,967

Table 3.12 1999/00 Household Hazardous Waste Management

Permittee	Does The City Collect Household Hazardous Waste?	City Household Hazardous Waste Examples	Does the City Have or Participate in a Used Oil Grant?	Types of Materials Collected	Does The City Refer Residents to the County Collection Centers?
Anaheim	No	—	No Report	—	Yes
Brea	No	—	No	—	Yes
Buena Park	No	—	July 2000 - June 2003	—	Yes
Costa Mesa	Yes	Roundups	July 2000 - June 2003	Used Oil	Yes
Cypress	No	—	July 2000 - June 2001	—	Yes
Dana Point	No	—	July 2000 - June 2003	—	Yes
Fountain Valley	No Report				
Fullerton	No	—	July 1997 - July 2000	—	Yes
Garden Grove	Yes	Door to Door	July 2000 - June 2003	Used Oil	Yes
Huntington Beach	No	—	July 2000 - June 2001	—	Yes
Irvine	No	—	July 2000 - July 2001	—	Yes
La Habra	No	—	July 2000 - June 2003	—	Yes
La Palma	No	—	No	—	Yes
Laguna Beach	Bi-annually	Door to Door, 5/00	July 1999 - June 2000	Not Available	Yes
Laguna Hills	No	—	July 1997 - July 2000	—	Yes
Laguna Niguel	No	—	Through the County	—	Yes
Lake Forest	Yes	—	June 1997 - June 2002	Household Hazardous Waste	Yes
Los Alamitos	No	—	No	—	No
Mission Viejo	Yes	Drop Off Location	July 2000 - June 2003	Household Hazardous Waste	Yes
Newport Beach	No	—	No	—	Yes
Orange	Yes	Used Oil Pick-Up	July to June	Household Hazardous Waste	Yes
Placentia	Yes	—	June 1997 - June 2000	—	Yes
San Clemente	No	—	No	—	Yes
San Juan Capistrano	No	—	No	—	Yes
Santa Ana	No	—	January 2000 - April 2002	—	Yes
Seal Beach	No	—	Yes	—	Yes
Stanton	No	—	No	—	Yes
Tustin	No	—	July 1997 - July 2002	—	Yes
Villa Park	No Report				
Westminster	No	—	June 1997 - June 2000	—	Yes
Yorba Linda	No	—	No	—	Yes
County of Orange	Operate Collection Centers	Drop Off Location	June 2000 - June 2003	Household Hazardous Waste	Yes

Table 3.13 1999/00 Permittee Household . .dous Waste Program Collection Efforts

Category	Type Of Waste	Costa Mesa	Garden Grove	Orange	Lake Forest	Mission Viejo	Placentia
			Oil Collection			HHW Roundup/Event	
1. Flammable & Poison	Flammable Solid/Liquid	0	0	0	305	9,415	137
	Bulked Flammable Liquids	0	0	0	0	0	0
	Oil-Base Paint	0	0	0	5,404	26,090	128
	Poison (Excl aerosols)	0	0	0	12,510	2,499	19
	Reactive & Explosive	0	0	0	0	0	0
	Subtotal	0	0	0	18,219	38,004	284
2. Acid	Inorganic Acid	0	0	0	300	645	1
	Organic Acid	0	0	0	0	70	8
	Subtotal	0	0	0	300	715	9
3. Base	Inorganic Base	0	0	0	300	980	0
	Organic Base	0	0	0	0	0	1
	Subtotal	0	0	0	300	980	1
4. Oxidizer	Neutral Oxidizer	0	0	0	35	0	0
	Organic Peroxides	0	0	0	0	5	0
	Oxidizing Acid	0	0	0	0	10	0
	Oxidizing Base	0	0	0	0	972	0
	Subtotal	0	0	0	35	987	0
5. PCB -containing	PCB Containing Paint	0	0	0	0	0	0
	Other PCB Waste	0	0	0	0	11	0
	Subtotal	0	0	0	0	11	0
6. Aerosol	Corrosive Aerosols	0	0	0	0	168	0
	Flammable Aerosols	0	0	0	600	1,176	23
	Poison Aerosols	0	0	0	0	336	0
	Subtotal	0	0	0	600	1,680	23
7. Reclaimable	Antifreeze	74	80	0	167	1,275	0
	Car Batteries (Avg 30 Lbs)	6,335	1,465	0	870	6,840	280
	Fluorescent Bulbs	0	0	0	0	0	0
	Latex Paint	13,680	0	0	1,835	16,150	272
	Motor Oil/Oil Products (1 gal = 8.34 Lbs)	5,425	31,973	29,600	917	6,800	298
	Oil Filters (Avg 1 Lbs)	9	1,154	997	0	0	5
	Mercury (Metallic)	0	0	0	0	20	0
	Subtotal	25,523	34,672	30,597	3,789	31,085	855
8. Other	Medical Waste	949	0	0	0	0	0
	Household Batteries	0	0	0	0	300	0
	Other	0	0	0	950	0	12
	Subtotal	949	0	0	950	300	12
9. Asbestos		0	0	0	0	25	0
	Collection Center Totals	26,472	34,672	30,597	24,193	73,787	1,184
	Grand Total Collected	190,905					

Table 3.14

City To Provide Partial Water Pollution Incident Services
1999/2000 Designated Authorized Inspector(s)

City	24 Hour Number	City Designated Authorized Inspectors		
		Name	Department	Phone
Anaheim		Code Enforcement Division During Normal Work Hours 714-765-5158		
		Al Brady	Dan Dominguez	David Gensler
		Mark Ilagan	Lee Kull	Matt Letteriello
		Ken Marsh	Chris Martel	Chet Panique
		Arlene Ruelaz-Hernandez	Bill Small	Richard Steenbergen
		Denny Tucker	Max Wilson	
		Code Enforcement After Normal Work Hours		
	Pager 714-346-9939	Richard LaRochelle	Code Enforcement Supervisor	714-765-5158 x4413
	Pager 714-346-9935	John Polle	Code Enforcement Manager	714-765-5158 x5190
	Pager 714-346-9930	Roger Bennion	Code Enforcement Supervisor	714-765-5158 x4470
	Pager 714-346-9924	Fred Fix	Senior Code Enforcement Officer	714-765-5158 x4471
	Pager 714-346-4617	Don Yourstone	Senior Code Enforcement Officer	714-765-5158 x4451
	Pager 714-346-9929	Linda Eaves	Senior Code Enforcement Officer	714-765-5158 x4472
Brea		Sam Hanna	Assoc. City Engineer	714-990-7760
		Phil Wray	City Engineer	714-990-7763
		Roger Gary	Code Enforcement Officer	714-990-7139
Cypress		Gonzalo Vasquez	Public Works	714-229-6752
Dana Point		Bob Warren	Director of Public Works	949-248-3554
Fountain Valley		Bill Ault	Director of Public Works	714-593-4434
Fullerton	Fullerton Police Department 714-738-6715	Jinny Barton	Code Enforcement Supervisor	714-738-5799
		Steve Long	Hazardous Materials Specialist	714-738-3160
		Gene Viramontes	Street Superintendent	714-738-6897
		Hadi Tabatabaee-Pour	Building Official	714-738-6558
		Ron Wallin	Sr. Civil Engineer	714-738-6853
Garden Grove		Les M. Jones, II	Public Works/Director	714-741-5378
Huntington Beach		George Munsey	Fire Dept/Captain	714-536-5411
		Tom Shaw	Fire Dept/Captain	714-536-5411
		Frank Mead	Fire Dept/Captain	714-536-5411
		*Mike Strange	Community Dev/Sr. Planner	714-536-5253
		*Code Enforcement		
		Eric Charlonne	Public Works	714-536-5430
		Chuck Burney	Fire Dept	714-536-5979
La Habra		Vaughn Herrick	Police/Code Enforcement	562-905-9750 x228
		Gary Sins	Fire	562-905-9618
		Paul Hamilton	Public Services/Streets	562-905-9792
		Alan Leung	Public Works	562-905-9720
Laguna Niguel		Jean Jambon	Public Works Inspector	949-362-4345
Los Alamitos		Michael M. Kim	Public Services/City Engineer	562-431-3538x100
		David Cox	Public Services/Superintendent	562-431-3538x105
San Juan Capistrano		Jack Galaviz	Public Works/Manager	949-443-6364
		William Huber	Engineering/Building	949-443-6336
Seal Beach		Steve Stockett	Public Works Supervisor	562-493-8660x432
		George Bernard	Public Works Assistant	562-431-2527x343
Stanton		Mike Kim	Engineering/Public Works	714-379-9222 x204
		Craig Stubbe	Public Works	714-379-9222 x202
Tustin		Tim D. Serlet	Dir. Of PW/City Engineer	714-573-3150
		Nick Anderson	Community Development	714-573-3130
Villa Park		Gary Johnson	City Engineer	714-998-1500
		Ron Hagley	Street Superintendent	714-998-1500
Yorba Linda		Tom Wheeler	Engineering	714-961-7170
		Bill Krelle	PW Inspector	714-961-7170
		Pat Guzik	PW Inspector	714-961-7170

As of 8/29/00

Table 3.15
City To Provide ALL Water Pollution Incident Services
1999/2000 Designated Authorized Inspector(s)

City	24 Hour Response Number	City Designated Authorized Inspectors		
		Name	Department	Phone
Costa Mesa	Communications Division	Tom Banks	Public Serv. Construction Mgr	714-754-5222
	714-754-5250	Sandra Benson	Dev Services - Code Enforcement	714-754-5059
		Victor Cliff	Private Right of Way	714-754-5293
		Edward Petros	Dev Services - Building	714-754-5295
Irvine	Irvine Police Department	Jan Helf	Community Development	949-724-6326
	949-724-7200	Terry Trytten	Community Development	949-724-6329
		Manuel Garcia	Community Development	949-724-6333
		Mel Harwell	Community Development	949-724-6333
		Gary Sager	Community Development	949-724-6324
		Julie Clift	Community Development	949-724-6400
Laguna Beach	949-497-0701	Louis Kirk	Senior Code Enforcement Officer	949-497-0301
		Kyle Butterwise	Community Development	949-497-0332
Newport Beach	Newport Beach P.D.	Jim Sinasek	Planning	949-644-3215
	949-644-3711	Lloyd Whisenant	Police	949-644-3652
		Wes Armand	Harbor Resources	949-644-3043
Orange	Orange Police Department	John Loertscher	Public Works - Mtce Supt	714-532-6455
	714-538-1961	George Pedroza	Public Works - Mtce Inspector	714-532-6461
		Jim Woods	Public Works - Mtce Inspector	714-532-6474
San Clemente	City Dispatch	John Bressan	Public Works	949-361-8200
	949-366-1553	Mike Parness	City Manager	949-361-6150
Westminster	Westminster P.D.	Vicki Morgan	Sr. Code Enforcement Officer	714-898-3311x276
	898-3311 x421	Jeff Jones	Code Enforcement Officer	714-898-3311x206
	898-3315			

As of 8/29/00

Table 3.16
County/OCFCD to Provide ALL Water Pollution Incident Services
1999/2000 Designated Authorized Inspectors

		County Designated Authorized Inspectors		
		Name	Department	Phone
Buena Park	Mission Viejo	Duc Nguyen	Environmental Resources	714-567-6336
La Palma	Placentia	Karen Ashby	Environmental Resources	714-567-6297
Laguna Hills	Santa Ana	Lane Waldner	Environmental Resources	714-567-6370
Laguna Woods	Unicorporated County	Bruce Moore	Environmental Resources	714-567-6373
Lake Forest		Eric Klein	Environmental Resources	714-567-6371
24 Hour Response Number: 714-567-6363				

Table 3.17 1999/00 Permittee . ...izer Management Practices

Permittee	Fertilizers In Your Jurisdiction Are Managed By:		Acres on Which Fertilizers in use	Soils Tested for Compatibility	Qualified Fertilizer Specialist Consulted Regarding				Have Fertilizer Storage Facilities Been Upgraded	Organic/Slow Release Fertilizers Used?	Organic/Slow Release Fertilizers Used To Greater Extent?	Did Any Fertilizer Spills Occur In The Last Year
	City Personnel	Contractor			Application Rates/Timing	Application Methods	Storage	Handling				
Anaheim	X	X	449	No	Yes				Yes	Yes	Yes	No
Brea	X		75	No	No				No	No	No	No
Buena Park		X	66	No	1998		No		N/A	No	No	No
Costa Mesa	X	X	200	Ongoing	Yes				Yes	Yes	No	No
Cypress	X		3	No	No				1997/1998	Yes	Yes	No
Dana Point		X	50	Mar-99	Jun-99				Jun-99	Yes	No	No
Fountain Valley	No Report											
Fullerton	X		20	Jul-99	No				1997	Yes	No	No
Garden Grove	X	X	160	1998	1999				Not needed	Yes	Yes	No
Huntington Beach	X		429	Yes	Yes				Yes	Yes	Yes	No
Irvine	X	X	568	Ongoing	Ongoing				No	Yes	Yes	No
La Habra	X	X	44	No	No				No	Yes	Yes	No
La Palma	X		30	No	Yes				No	No	No	No
Laguna Beach	X		30	No	No				No	Yes	No	No
Laguna Hills		X	102	Apr-00	Jun-00				Yes	Yes	Yes	No
Laguna Niguel	X	X	151	1999	1999	No	No	No	No	Yes	Yes	No
Lake Forest		X	175	Yes	Yes	Yes	No	No	No	Yes	No	No
Los Alamitos	X		22	1997	1997				1997	Yes	Yes	No
Mission Viejo		X	798	Yes	Ongoing				No	Yes	Yes	No
Newport Beach	X	X	260	Dec-99	Jun-00		No	No	1995	Yes	Yes	No
Orange	X		125	No	Ongoing				1998	Yes	Yes	No
Placentia	X		130	Yes	Ongoing				No	Yes	Yes	No
San Clemente	X		100	No	No				1998	Yes	Yes	No
San Juan Capistrano		X	75	No	No				Yes	Yes	Yes	No
Santa Ana	X	X	480	Feb-00	Yes				Yes	Yes	Yes	No
Seal Beach	X		15	Ongoing	Yes				Yes	Yes	No	No
Stanton		X	27	No	No				No	Yes	No	No
Tustin	X	X	77	Yes	Yes	No			No	Yes	Yes	No
Villa Park	No Report											
Westminster	X		18	No	No				Yes	No	No	No
Yorba Linda		X	400	Ongoing	Yes		No		No	No	No	No
County of Orange	X	X	560	No	No				Varies by park	Yes	No	No

Table 3.18 1999/00 Fertilizer Application by Permittee

Permittee	Fertilizer	Amount Applied
Anaheim	Best 16-6-8	20,550 lbs
	Calcium Nitrate 25-0-0	6250 lbs
	Ammorium	6000 lbs
	Cro-power	6000 lbs
	46-0-0	Not Reported
	35-3-11	Not Reported
	Turf Supreme 15-5-7	86,665 lbs
	Scottss High K 13-2-26	2,000 lbs
	Nutriculture 10-20-30	497 lbs
	Scotts Minors 26-4-12	2313 lbs
	Scotts Super Fairway 36-3-7	450 lbs
	Scotts Nit/Pot 21-3-20	709 lbs
	Scotts Supergreen 19-0-17	150 lbs
	Scotts Turf 32-3-16	550 lbs
	Scotts Fug II 14-3-3	14,577 lbs
	Persell Pyon 0-0-46	2700 lbs
	Plant Marvel 28-8-18	4550 lbs
	Scotts Starter 19-25-5	500 lbs
	Scotts Weed II 21-3-20	360 lbs
	Scottss Complete 31-3-10	1210 lbs
	Scottss 30-3-9	3800 lbs
	Calcium Nitrate 15-0-0	3990 lbs
	Ammonium Nitrate 34-0-0	1160 lbs
	Scottss Weed Plus 22-0-6	17,850 lbs
	Sulfate of Ammonium 21-0-0	100 lbs
	Grow Power 5-3-1	1230 lbs
	Best Nitra King 22-3-9	31,698 lbs
	Ammonium Nitrate 35-0-0	120 lbs
Brea	Turf Royale 21-7-14	50 lbs/ 10,000 sq. ft.
	Best w/ Trimec 16-6-8	50 lbs/ 10,000 sq. ft.
	Best Ammonium Phosphate 16-20-20	50 lbs/ 6,000 sq. ft.
	Best Super Iron 9-9-9	50 lbs/ 4,500 sq. ft.
Buena Park	Turf Supreme	6 lbs/ 1000 sq. ft.
Costa Mesa	Turf Royale 21-7-14	5 lbs/ 1000 sq. ft.
	Best XB 6-20-20	15 lbs/ 1000 sq. ft.
	Best Turf Supreme 16-6-8	6.2 lbs/ 1000 sq. ft.
	Ammonium Nitrate 34-0-0	3 lbs/ 1000 sq. ft.
Cypress	Turf Royale 21-7-14	10,500 lbs
Dana Point	Best 16-6-8	20,000 lbs
	Calcium Nitrate	6000 lbs
	Ammonium	6000 lbs
	Gro-Power	6000 lbs
Fountain Valley	No Report	
Fullerton	16-6-8	6000 lbs
	15-15-15	200 lbs
Garden Grove	Best 16-20-20 Preplant	20 bags
	Best Turf Supreme 16-6-8	6000 lbs

Table 3.18 1999/00 Fertilizer Application by Permittee

Permittee	Fertilizer	Amount Applied
Huntington Beach	Super Iron 9-9-9	1000 lbs
	Turf Supreme/Trimec	300 lbs
	Nitra King 22-3-9	10,400 lbs
	Scotts Pro Turf 36-3-7	113,000 lbs
Irvine	16-6-8	38,750 lbs
	9-9-9 w/ iron	3500 lbs
	21-0-0	2200 lbs
	46-0-0	500 lbs
	25-5-5	500 lbs
	16-20-0	1900 lbs
	37-0-0	8000 lbs
	29-3-8	2000 lbs
	39-0-0 SCU	26,000 lbs
	20-20-20	12 lbs
	Security Iron & Zinc Chelate	5 quarts
	Gypsum	4,000 lbs
La Habra	Nitra King 22-3-9	3250 lbs
	Turf Supreme 16-6-8	3750 lbs
	Slow Release 28-3-7	8500 lbs
	Organic Mulch	100 yards
La Palma	Turf Supreme (Beat Cote)	4 tons
Laguna Beach	Best Turf Supreme 16-6-8	28 Acres @ 4lbsper 1000sq ft. X 6.25 Actual Nitrogen
	Peters Professional 20-20-20	200 lbs
Laguna Hills	Best 16-66-8	16,000 lbs
	Nitraking 21-7-7	8000 lbs
	Ammonium Sulfate 21-0-0	32,000 lbs
Laguna Niguel	Best 16-6-8	1 lb./ 1000 sq. ft.
	Best Super Turf 25-5-5	1 lb./ 1000 sq. ft.
	Best Soil Buster	20 lbs/ 1000 sq. ft.
Lake Forest	Turf Supreme 16-6-8	180,000 lbs
Los Alamitos	Best Super Turf	350 lbs
	Best Turf Supreme PLVS Trimec	2300 lbs
Mission Viejo	Sulfate of Ammonium	6 lbs/ 1000 sq. ft. per year
	Sulphur Coated Urea	12 lbs/ 1000 sq. ft. per year
	Humate (Humic Acid)	100 lbs/ 1000 sq. ft per year
	IBDU	8 lbs/ 1000 sq. ft. per year
	NitraKing	6 lbs/1000 sq. ft. per year
	9-9-9	2 lbs/ 1000 sq. ft. per year
	16-6-8	2 lbs/ 1000 sq. ft. per year
Newport Beach	Best 16-6-8	22,500 lbs
	Best 21-0-0	6,000 lbs
	Best 30 -39	33,5000 lbs
	Best 9-9-9	800 lbs
	Best 15-15-15	55,000 lbs
Orange	Best 16-68	24,000 lbs
	Best 16-6-8	300 gallons

Table 3.18 1999/00 Fertilizer Application by Permittee

Permittee	Fertilizer	Amount Applied
	Best 15-15-15	24,000 lbs
	Best 2239	24,000 lbs
	Agri-Form	129 lbs
	Ammonium Sulfate	20,000 lbs
Placentia	Turf Supreme 16-6-8	2000 lbs
	Best Super Turf 25-5-5	9000 lbs
	Best 6-20-20xb	2000 lbs
San Clemente	KN03 13-0-6	2000 lbs
	CaNO3 15-0-0	6000 lbs
	PolyCoated Urua 34-0-0	20,000 lbs
	5-16-22 Ammoniacal N	2000 lbs
San Juan Capistrano	16-6-8	3600 lbs
	21-0-0	6000 lbs
Santa Ana	Turf Supreme 16-6-8	26045 lbs
	Nirta King Fertilizer	4020 lbs
	Potassium Sulphate 0-0-50	216 lbs
	Gypsum	1080 lbs
	Calcium Nitrate 15-5-0-0	5 lbs
	Ground Calcium Carbonate	360 lbs
	Ammonium Sulphate	1050 lbs
Seal Beach	Super Turf 25-5-5	2050 lbs
Stanton	No Report	
Tustin	23-4-7	1000 lbs
	Best Turf Supreme 16-6-8	1400 lbs
	16-6-8	1400 lbs
	Planer/Soil Mix	25 yards
Villa Park	No Report	
Westminster	Super Turf 16-8-4	1900 lbs
	Custom Fertilizer 7-7-7	650 lbs
	Rose Food	1200 lbs
	Weed Control/Lawn Food 12-4-4	500 lbs
Yorba Linda	16-6-8	36,250 lbs
	15-0-0	1100 lbs
	22-0-6	1200 lbs
	9-9-9	18,642 lbs
	21-0-0	14280 lbs
	22-3-9	16,800 lbs
County of Orange	Turf Supreme 16-6-8	19,150 lbs
	Turf Royale 21-7-14	43,000 lbs
	8-8-16	25 lbs
	Best Super Turf 25-5-5	174 lbs
	Ammonium Nitrate 33-0-0	500 lbs
	Classic Royale 15-15-15	100 lbs
	Scotts Starter Fertilizer 16-25-2	272 lbs
	Urea 45% Nitrogen	Not Available
	Vigaro 28-3-3	16 lbs

Table 3.19 1999/00 Permittee Pesticide Use

Permittee	Number of Acres On Which Pesticides are in Use	Tested Soils for Compatibility	Number Of Pesticides Used	Number of Restricted/Category I Pesticides
Anaheim	809	No	40	4
Buena Park	No Report	No	1	1
Brea	75	No	4	0
Costa Mesa	250	No	14	3
Cypress	16	No	2	0
Dana Point	3	Sep-98	3	2
Fountain Valley	No Report			
Fullerton	130	No	11	1
Garden Grove	130	Yes	11	0
Huntington Beach	No Report	No	12	2
Irvine	1,400	No	42	6
La Habra	126	No	5	1
La Palma	5	No	8	0
Laguna Beach	20	No	6	0
Laguna Hills	102	Apr-00	4	0
Laguna Niguel	25	No	7	Not Available
Lake Forest	175	No	6	6
Los Alamitos	10	1997	7	0
Mission Viejo	796	No	7	7
Newport Beach	250	Dec-99	8	2
Orange	25	1999	5	0
Placentia	130	No	4	0
San Clemente	2	No	11	0
San Juan Capistrano	7	No	5	2
Santa Ana	456	No	16	1
Seal Beach	3	No	3	0
Stanton	No Report	No	4	No Report
Tustin	166	No	12	0
Villa Park	No Report			
Westminster	No Report	No	8	1
Yorba Linda	60	No	12	Not Available
County of Orange	6,939	No	28	6

Table 3.20 1999/00 Permittee Pesticide Use

Permittee	Pesticide	Amount Applied	Restricted/Category I	
			Restricted	Category I
Anaheim	Empire 20	83 lbs		
	Garlon	29.75 lbs		
	Triplet	15 lbs		X
	Roundup Pro	447 lbs		
	Fumigiation	301 lbs	X	
	Maki	151 lbs		
	Trimec	10 gal	X	
	Telstar	No Report		
	TruPower	No Report	X	
	Turflon Ester	No Report		
	Mamase	No Report		
	Eagle WSP	No Report		
	Snapshot 2-5	No Report		
	Amdro	10 lbs		
	Cutrine Plus	208 lbs		
	Award	68 lbs		
	Aquashade	35.75 lbs		
	Daconil	509 lbs		
	Subdue	22 lbs		
	Primo	10 lbs		
	Heritage	16.5 lbs		
	Merit	21 lbs		
	Dursban Pro	38 lbs		
	Chipco	190 lbs		
	Bayleton	37.5 lbs		
	Fur/Fug II	18.5		
	3336 Up	156 lbs		
	Crabgrass Control	39 lbs		
	Dicot Weed II	22.5 lbs		
	Banner Max	145 lbs		
	Pro-Starr	17 lbs		
	Golden Eagle	15 lbs		
	Spotrete	394 lbs		
	Dylox	20 lbs		
	Chloropyrifos	2.25 lbs		
	Fungo Flo	9.5 lbs		
	Eagle	67.5 lbs		
	Fore-Flo	80 lbs		
	Pendimethanin	14,280 lbs		
	Plus Pre	490 lbs		
Buena Park	Roundup Pro	7.6 HR		
Brea	Fusilade	.75 oz / gallon		
	Ronstar	100 lbs / acre		
	Roundup Pro	2 oz / gallon		
	Surflan	3 oz / gallon		
Costa Mesa	Aluminum Phosphate	No Report	X	
	Cutrine	No Report		
	Florel	No Report		

Table 3.20 1999/00 Permittee Pesticide Use

Permittee	Pesticide	Amount Applied	Restricted/Category I	
			Restricted	Category I
Costa Mesa	Fusilade	No Report		
	Lontrel	No Report		
	MSMA	No Report	X	
	Nalcotrol	No Report		
	No Foam	No Report		
	Ronstar	No Report		
	Roundup Pro	No Report		
	Safer Soap	No Report		
	Trimec	No Report		
	Wasp Free	No Report		
	Zinc Phosphate	No Report	X	
Cypress	Monsanto Roundup Pro	149 lbs		
	Valent Distance	1.5 lbs		
Dana Point	Fumitoxin	2.5 lbs	X	
	Maki	9 lbs		
	Trimec/Triple	17 gal	X	
Fountain Valley	No Report			
Fullerton	Award	1.2 lbs		
	Cutrine Plus	45 lbs		
	Fusilade II	.5 lbs		
	Orthene	1 lbs		
	Ramik Green	312 lbs		
	Ronstar G	225 lbs		
	Roundup Pro	324 gal		
	Surflan AS	130.5 gal		
	Turflon Ester	.25 gal		
	Wilco Gopher Getter	386 lbs		
	Wilco Squirrel Bait	212 lbs		
Garden Grove	Agrimycin	1 lb		
	Aquazine	4.25 lbs		
	Copper Bordeaux	15 lbs		
	Dursban 2E	.25 lbs		
	Fusilade 2000	.1 lb		
	Manage	64 gal		
	Oust	1 lb		
	Roundup Pro	120.25 gal		
	Simazine 90DF	261 lbs		
	Surflan	8 gal		
	Turflon	51.5 lbs		
Huntington Beach	Deadline	100 lbs		
	Fumitoxin	39 lbs	X	
	Fusilade	1.75 gal		
	Gallery	19.5 lbs		
	M-Pede	3.5 gal		
	No Foam B	11 gal		
	Orthene	7 lbs		
	Rodeo	5 gal		
	Roundup Pro	267.5 gal		

Table 3.20 1999/00 Permittee Pesticide Use

Permittee	Pesticide	Amount Applied	Restricted/Category I	
			Restricted	Category I
Huntington Beach	Rozol	120 lbs		
	Surflan	92.5 gal		
	Trimec Plus	1 gal	X	
Irvine	Anti-stress 550	2.5 gal		
	Aquashade	8 gal		
	Atrimec	67 gal		
	Blazon	2.5 gal		
	Chipco 26019	4 lbs		
	Cleary's 3336	1 lb		
	Cutrine Plus	60 gal		
	Daconil 2787	.25 gal		
	Dimension	19.63 gal		
	Diphacinone	3 lbs		
	Diquat	2 quarts		
	Dissolve	10 lbs		X
	Ditrac	25.62 lbs		
	Dursban Pro	.75 lbs		
	Fumitoxin	91 lbs		X
	Fusilade II	12.1 lbs		
	Garlon	.75 gal		
	Greenzit	1 gal		
	Honcho	1 gal		
	Hyvar	3 gal		
	Kinetic	1.5 gal		
	Mavrick	2 lbs		
	Merit 75 WP	3.4 lbs		
	M-Pede	1 gal		
	Oust	.75 lbs		
	Pentac	.5 lbs		
	Reward	1 gal		
	Rodeo	.75 gal		
	Ropel	8 gal		
	Roundup	135 gal		
	Royal Slow Grow	16 gal		
	Scythe	4.25 gal		
	Subdue	.5 lbs		
	Telar	.75 lbs		
	Tempo	.2 lbs		
	Three Way	.02 lbs		X
	Tracker	.75 gal		
	Trimec	26.75 gal		X
	Triplet	124 lbs		X
	Triplet	7.5 gal		X
	Turflon	.5 gal		
	Veteran	2.25 gal		
	Zinc Phosphide	44 lbs		X
La Habra	Fumitoxin	Not Available	X	
	Gro Tarll	5 gal		

Table 3.20 1999/00 Permittee Pesticide Use

Permittee	Pesticide	Amount Applied	Restricted/Category I	
			Restricted	Category I
La Habra	Roundup Pro	50.03 gal		
	Surflan	11 gal		
La Palma	Roundup	No Report		
	Roundup Pro	17 lbs		
	Turf Supreme	No Report		
	Malathion 50	No Report		
	Spectracide	No Report		
	Tectron	No Report		
	E1 Inspecticide	No Report		
	Deadline	75 lbs		
Laguna Beach	Chipco Ronstar	45 lbs		
	Fusilade II	6.8 lbs		
	Garlon 4	384 lbs		
	Metaldyhyde 3.5	290 lbs		
	Ramik Green	4 lbs		
	Roundup Pro	16.3 gal		
Laguna Hills	Fusilade	1.75 gal		
	Orthene	1 gal		
	Roundup	35 gal		
	Turflon	6 gal		
Laguna Niguel	Dicamba 4S	No Report		
	Gophergetter	No Report		
	MCPA 4 Amine	No Report		
	Pendimethalin 60 WDG	No Report		
	Roundup	No Report		
	Triplet	No Report		
	Turflon 4E	No Report		
Lake Forest	Diazinon	20 gal		X
	Fumitoxin	1500 lbs	X	
	Fusilade	18 gal		X
	Ronstar	1000 lbs	X	
	Roundup Pro	70 gal		X
	Surflar	80 gal		X
Los Alamitos	Rodeo	No Report		
	Surflan	No Report		
	Roundup Pro	No Report		
	Pendulum 2G	No Report		
	Turflan	No Report		
	Fusilade	No Report		
	Scotts 26-4-4 w/24D fertilizer	No Report		
Mission Viejo	2, 4-D	No Report	X	
	Aluminum Phospate	No Report	X	
	Dicamba	No Report	X	
	MCPA	No Report	X	
	Oxydemetonmethyl	No Report	X	
	Strychnine	No Report	X	
	Zinc Phosphide	No Report	X	
Newport Beach	Barricade	5 lbs		

Table 3.20 1999/00 Permittee Pesticide Use

Permittee	Pesticide	Amount Applied	Restricted/Category I	
			Restricted	Category I
Newport Beach	Diazinon	50 lbs		
	Fumitoxin	5 lbs	X	
	Fusilade II	2 gal		
	Ronstar G	100 lbs		
	Roundup Pro	150 gal		
	Sluggo	150 lbs		
	Trimec for Turf	32 gal	X	
Orange	Fusilade II	77.22 gal		
	Pendulum	32 gal		
	Rodeo	38.38 gal		
	Roundup	410.68 gal		
	Surflan	11.62 gal		
Placentia	Fusilade 2000	.5 lbs		
	Manage	.02 lbs		
	Pennant 56	46 lbs		
	Roundup	68 lbs		
San Clemente	Alliette	32 lbs		
	Banner	12 gal		
	Bayleton 25	11 lbs		
	Chipco 266 T	5 gal		
	Fore	112 lbs		
	Fusilade 2000	1.5 lbs		
	Primo Maxx	4 gal		
	Primo NSB	12 lbs		
	Roundup Pro	6 gal		
	Subdue Granular	25 lbs		
	Surflan	3 gal		
San Juan Capistrano	Amine 2-4-D	160 gal		X
	Fumitoxin	50 lbs		X
	Merit	2.5 lbs		
	Roundup	4.5 gal		
	Surflan	1.5 gal		
Santa Ana	Aquashade	104 gal		
	Blazom	2.25 lbs		
	Cutrine Plus G	120 lbs		
	Cutrine Plus Liquid	94 gal		
	Fusilade	20.6 lbs		
	Glyfos	12 lbs		
	Merit 75 WSP	1 gal		
	Metaldehyde	167 lbs		
	Non-ionic Surfactant	.25 lbs		
	Reward	21 gal		
	Roundup Pro	111 lbs		
	Surflan	2 lbs		
	Target Pro Spreader	16 gal		
	Trimec	14.75 lbs		
	Turflon Ester	5 lbs		
	Weedhoe 108	1.5 gal		

Table 3.23 Fertilizer and Pesticide Management Annual Comparison

	Fertilizer Management		Pesticide Management					Integrated Pest Management	
Reporting Year	Total Acres	Quantity Applied (lbs)*	Total Acres	# of Pesticides	# Restricted	Quantity Applied (lbs)*	Quantity Applied (gals)*	# Implementing	# Reduced Pesticide Use
1994 - 1995	5,900	N/A	11,800	N/A	N/A	N/A	N/A	20	N/A
1995 - 1996	6,011	N/A	11,361	340	N/A	N/A	N/A	17	N/A
1996 - 1997	4,054	N/A	12,159	303	N/A	N/A	N/A	22	11
1997 - 1998	4,813	N/A	12,439	307	24	N/A	N/A	26	9
1998 - 1999	4,616	N/A	12,408	254	34	N/A	N/A	23	10
1999 - 2000	5,637	1,883,905	12,310	306	45	32,223	10,600	23	9

*Since not all Permittees reported quantities in pounds and/or gallons, while others reported application rates instead of totals, these figures should be interpreted as low-range estimates.
N/A Indicates data not previously requested in Annual Status Reports

Table 3.21 1999/00 Permittee Pesticide Management Practices

Permittee	Pesticides Are Managed By:		Have All Applicators Obtained State Licenses?	Or Completed Equivalent County Applicator Training?	Has A Qualified Pest Control Advisor Been Consulted?	Inspection Conducted For		Appropriate Measures Implemented				Has An Accident Mitigation Plan Been Implemented In Case Of A Spill?	Pesticide Spills In The Last Year?
	City Personnel	Contractor				ApplicationEquipment	Application Crews	Application	Storage	Disposal	Transport		
Anaheim	X	X	No	Yes	Apr-00	Ongoing		Ongoing				Yes	No
Buena Park		X	Yes	---------	No	No		No				No	No
Brea	X		No	Yes	No	Jun-99		Annually				Yes	No
Costa Mesa	X	X	Yes	---------	Yes	1999		Yes				Yes	No
Cypress	X		Yes	---------	Ongoing	Dec-98		Yes				Yes	No
Dana Point		X	Yes	---------	Jan-98	Oct-98		Oct-99				Yes	No
Fountain Valley	X		No Report										
Fullerton	X	X	Yes	Yes	Ongoing	Jul-00		Jan-00				Yes	No
Garden Grove	X	X	No	Yes	Ongoing	Daily		Annually				Yes	No
Huntington Beach	X	X	Yes	---------	Ongoing	Daily		Ongoing				Yes	No
Irvine	X	X	No	Yes	Jan-99	Apr-99		Apr-99				Yes	No
La Habra	X	X	No	Yes	Yes	Jul-00		Mar-00				Yes	No
La Palma	X		Yes	---------	1997	1999		Yes				Yes	No
Laguna Beach	X		Yes	---------	Annually	Spring 1999		Fall 1997				Yes	No
Laguna Hills		X	Yes	---------	Apr-00	Jun-00		Nov-99				Yes	No
[illegible]		[illegible]	Yes	[illegible]	Yes	Yes	No	Ongoing				Yes	No

Table 3.20 1999/00 Permittee Pesticide Use

Permittee	Pesticide	Amount Applied	Restricted/Category I: Restricted	Restricted/Category I: Category I
Seal Beach	Fusilade	2 gal		
	Oust	4 lbs		
	Roundup Pro	25 gal		
Stanton	Aluminum Phosphide	No Report		
	Diphacinone	No Report		
	Strychnine	No Report		
	Zinc Phosphide	No Report		
Tustin	Biobarrier	15 ft		
	Eatons Bait Block	5 blocks		
	Fusilade	2 lbs		
	Manage	.02 lbs		
	Metaldehyde	243 lbs		
	M-Pede	10.75 gal		
	Pendulum WDG	117.2 lbs		
	Ronstar G	256 lbs		
	Roundup Pro	98.67 gal		
	Turflon Ester	4.7 lbs		
	Ultrafine	2.5 gal		
	ZP Rodent Bait	.25 lbs		
Villa Park	No Report			
Westminster	Banner Maxx	2.6 lbs		
	Fumitoxin	14.59 gal	X	
	Fusilade	2.28 gal		
	Manage	.2 lbs		
	Pro Spreader Activator	1.2 gal		
	Rodeo	3 gal		
	Ronstar	30 lbs		
	Roundup Pro	71.38 gal		
	Roundup	101.5 gal		
	Ronstar	1510 lbs		
Yorba Linda	Deadline Bullets	280 lbs		
	Turflow	11 lbs		
	Embark	15 gal		
	Surflow	18.5 gal		
	Trimel	5 gal	X	
	Atrimel	41 gal		
	Fusilade	4 gal		
	No Foam	8 gal		
	Rodeo Herdflide	2.5 gal		
	Diazinon	10 gal		

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Table 3.21 1999/00 Permittee, ..cide Management Practices

Permittee	Pesticides Are Managed By:		Have All Applicators Obtained State Licenses?	Or Completed Equivalent County Applicator Training?	Has A Qualified Pest Control Advisor Been Consulted?	Inspection Conducted For		Appropriate Measures Implemented				Has An Accident Mitigation Plan Been Implemented In Case Of A Spill?	Pesticide Spills In The Last Year?
	City Personnel	Contractor				Application Equipment	Application Crews	Application	Storage	Disposal	Transport		
Anaheim	X	X	No	Yes	Apr-00	Ongoing	Ongoing	Ongoing				Yes	No
Buena Park		X	Yes	.....	No	No	No	No				No	No
Broa	X		No	Yes	No	Jun-99	Jun-99	Annually				Yes	No
Costa Mesa	X	X	Yes	.....	Yes	1999	1999	Yes				Yes	No
Cypress	X		Yes	.....	Ongoing	Dec-98	Dec-98	Yes				Yes	No
Dana Point		X	Yes	.....	Jan-98	Oct-98	Oct-98	Oct-99				Yes	No
Fountain Valley	X					No Report							
Fullerton	X	X	Yes	Yes	Ongoing	Jul-00	Jul-00	Jan-00				Yes	No
Garden Grove	X	X	No	Yes	Ongoing	Daily	Daily	Annually				Yes	No
Huntington Beach	X	X	Yes	.....	Ongoing	Daily	Daily	Ongoing				Yes	No
Irvine	X	X	No	Yes	Jan-99	Apr-99	Apr-99	Apr-99				Yes	No
La Habra	X	X	No	Yes	Yes	Jul-00	Jul-00	Mar-00				Yes	No
La Palma	X		Yes	.....	1997	1999	1999	Yes				Yes	No
Laguna Beach	X		Yes	.....	Annually	Spring 1999	Spring 1999	Fall 1997				Yes	No
Laguna Hills		X	Yes	.....	Apr-00	Jun-00	Jun-00	Nov-99				Yes	No
Laguna Niguel		X	Yes	.....	Yes	Yes	No	Ongoing				Yes	No
Lake Forest		X				No Report							
Los Alamitos	X		Yes	.....	Annually	Feb-00	Feb-00	1999				Yes	No Report
Mission Viejo		X	Yes	.....	Annually	No	Yes	No				No	No
Newport Beach	X	X	No	Yes	Ongoing	Jun-00	Jun-00	1994				Yes	No

Table 3.20 1999/00 Permittee Pesticide Use

Permittee	Pesticide	Amount Applied	Restricted/Category I	
			Restricted	Category I
Seal Beach	Fusilade	2 gal		
	Oust	4 lbs		
	Roundup Pro	25 gal		
Stanton	Aluminum Phosphide	No Report		
	Diphacinone	No Report		
	Strychnine	No Report		
	Zinc Phosphide	No Report		
Tustin	Biobarrier	15 ft		
	Eatons Bait Block	5 blocks		
	Fusilade	2 lbs		
	Manage	.02 lbs		
	Metaldehyde	243 lbs		
	M-Pede	10.75 gal		
	Pendulum WDG	117.2 lbs		
	Ronstar G	256 lbs		
	Roundup Pro	98.67 gal		
	Turflon Ester	4.7 lbs		
	Ultrafine	2.5 gal		
	ZP Rodent Bait	.25 lbs		
Villa Park	No Report			
Westminster	Banner Maxx	2.6 lbs		
	Fumitoxin	14.59 gal	X	
	Fusilade	2.28 gal		
	Manage	.2 lbs		
	Pro Spreader Activator	1.2 gal		
	Rodeo	3 gal		
	Ronstar	30 lbs		
	Roundup Pro	71.38 gal		
Yorba Linda	Roundup	101.5 gal		
	Ronstar	1510 lbs		
	Deadline Bullets	280 lbs		
	Turflow	11 lbs		
	Embark	15 gal		
	Surflow	18.5 gal		
	Trimel	5 gal	X	
	Atrimel	41 gal		
	Fusilade	4 gal		
	No Foam	8 gal		
	Rodeo Herdilide	2.5 gal		
	Diazinon	10 gal		

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Table 3.20 1999/00 Permittee Pesticide U

Permittee	Pesticide	Amount Applied
County of Orange	41A	179 gal
	Altosid Pellets	2.5-10 lbs/applicatio
	Andro	74 lbs
	Award	297 lbs
	Bactimos Pellets	10-16 lbs/applicatio
	Cutrine Plus	50 gal
	Cutrine Plus Granular	30 lbs
	Diazinon	12.3 lbs / 7 gals
	Diphacinone	601 lbs
	Endurance	2 lbs
	Fumitoxin	300 lbs
	Garlon 3A	.75 gal
	Garlon 4	78.75 gal
	Lesco Cavalier 2G	37.5 lbs
	Lesco Pre-M	300 lbs
	Lorsban 4E	2.5 gal
	Manage	.025 lbs
	Mosquito Larvicide GB-111	3 gal/application
	M-Pede	.25 gal
	Oust	246 gal
	Pendulum 3.3 EC	653 gal
	Pendulum WDG	1592 lbs
	Pointer	.25 lbs
	Pro Spreader	1635 gal
	Reward	171 gal
	Rodent Gas Cartridge	9.94 lbs
	Rodeo	1353 gal
	Roundup	2657 gal
	Sevin	.25 gal
	Spike 8OW	Not Available
	Stalker	1.25 gal
	Strychnine	331 lbs
	Surflan	1.25 gal
	Telar	113 lbs
	Triplet	10 lbs
	Turflon	4 lbs
	Weedone LV4	78 gal
	Zinc Phosphide	1274 lbs
	Zoecon	2.5-10 lbs/applicati

Table 3.22 199/00 Permittee Integrated Pest Management Techniques

			Integrated Pest Management Alternatives						
Permittee	Implement Techniques	Manual or Mechanical Weeding/Pruning	Mulch	Water Mgmt/Drip Irrigation	Use of Disease Resistant Plants	Use of Biological Controls	Other	Reduction in Pesticide Usage
Anaheim	Yes	X	X			X		12%
Buena Park	N/A							N/A
Brea	Yes						Horticulture practices to reduce plant stress and thus the need for pesticides	10%
Costa Mesa	Yes	X	X		X	X		50%
Cypress	Yes		X			X	Timing of growth and volume of plant material reduces need for pesticides	No
Dana Point	Yes	X				X	Botanical Insecticieds	No
Fountain Valley							No Report	
Fullerton	Yes	X				X		5%
Garden Grove	Yes	X	X	X				No
Huntington Beach	Yes	X	X			X	Foliar Applications, Trapping, Exclusion	5%
Irvine	Yes	X					Flail moving	No
La Habra	Yes	X	X				Flaying, Disking, Mowing	No
La Palma	No							No
Laguna Beach	Yes	X					Weed abatement conducted by hang crews	No
Laguna Hills	Yes	X	X					12%
Laguna Niguel	Yes							No
Lake Forest	Yes							Yes
Los Alamitos	Yes	X						No
Mission Viejo							No Report	
Newport Beach	Yes	X				X		5%
Orange	Yes	X						No
Placentia	Yes							No
San Clemente	Yes							No
San Juan Capistrano							Conservative cultural practices	No
							No Report	
Santa Ana	Yes	X					Water pressure - aphids & whitefly	No
Seal Beach	Yes	X	X			X	Wasps for whitefly	20%
Stanton	No							
							No Report	
Tustin	Yes						Parraffinitic oil/M-Pede Safer Soap used on whitefly	No
Villa Park							No Report	
Westminster	No							No
Yorba Linda	No							No
County of Orange	Yes	X					Beehive removal	No

Table 3.20 1999/00 Permittee Pesticide Use

Permittee	Pesticide	Amount Applied	Restricted/Category I	
			Restricted	Category I
Seal Beach	Fusilade	2 gal		
	Oust	4 lbs		
	Roundup Pro	25 gal		
Stanton	Aluminum Phosphide	No Report		
	Diphacinone	No Report		
	Strychnine	No Report		
	Zinc Phosphide	No Report		
Tustin	Biobarrier	15 ft		
	Eatons Bait Block	5 blocks		
	Fusilade	2 lbs		
	Manage	.02 lbs		
	Metaldehyde	243 lbs		
	M-Pede	10.75 gal		
	Pendulum WDG	117.2 lbs		
	Ronstar G	256 lbs		
	Roundup Pro	98.67 gal		
	Turflon Ester	4.7 lbs		
	Ultrafine	2.5 gal		
	ZP Rodent Bait	.25 lbs		
Villa Park	No Report			
Westminster	Banner Maxx	2.6 lbs		
	Fumitoxin	14.59 gal	X	
	Fusilade	2.28 gal		
	Manage	.2 lbs		
	Pro Spreader Activator	1.2 gal		
	Rodeo	3 gal		
	Ronstar	30 lbs		
	Roundup Pro	71.38 gal		
Yorba Linda	Roundup	101.5 gal		
	Ronstar	1510 lbs		
	Deadline Bullets	280 lbs		
	Turflow	11 lbs		
	Embark	15 gal		
	Surflow	18.5 gal		
	Trimel	5 gal		X
	Atrimel	41 gal		
	Fusilade	4 gal		
	No Foam	8 gal		
	Rodeo Herdilide	2.5 gal		
	Diazinon	10 gal		

Table 3.20 1999/00 Permittee Pesticide Use

Permittee	Pesticide	Amount Applied	Restricted/Category I	
			Restricted	Category I
County of Orange	41A	179 gal		
	Altosid Pellets	2.5-10 lbs/application		
	Andro	74 lbs		
	Award	297 lbs		
	Bactimos Pellets	10-16 lbs/application		
	Cutrine Plus	50 gal		X
	Cutrine Plus Granular	30 lbs		
	Diazinon	12.3 lbs / 7 gals		
	Diphacinone	601 lbs		
	Endurance	2 lbs		
	Fumitoxin	300 lbs	X	X
	Garlon 3A	.75 gal		X
	Garlon 4	78.75 gal		
	Lesco Cavalier 2G	37.5 lbs		
	Lesco Pre-M	300 lbs		
	Lorsban 4E	2.5 gal	X	
	Manage	.025 lbs		
	Mosquito Larvicide GB-111	3 gal/application		
	M-Pede	.25 gal		
	Oust	246 gal		
	Pendulum 3.3 EC	653 gal		
	Pendulum WDG	1592 lbs		
	Pointer	.25 lbs		
	Pro Spreader	1635 gal		
	Reward	171 gal		
	Rodent Gas Cartridge	9.94 lbs		
	Rodeo	1353 gal		
	Roundup	2657 gal		
	Sevin	.25 gal		
	Spike 80W	Not Available		
	Stalker	1.25 gal		
	Strychnine	331 lbs	X	
	Surflan	1.25 gal		
	Telar	113 lbs		
	Triplet	10 lbs		
	Turflon	4 lbs		
	Weedone LV4	78 gal	X	
	Zinc Phosphide	1274 lbs	X	
	Zoecon	2.5-10 lbs/application		

Table 3.21 1999/00 Permittee ‹ ..cide Management Practices

Permittee	Pesticides Are Managed By:		Have All Applicators Obtained State Licenses?	Or Completed Equivalent County Applicator Training?	Has A Qualified Pest Control Advisor Been Consulted?	Inspection Conducted For		Appropriate Measures Implemented				Has An Accident Mitigation Plan Been Implemented In Case Of A Spill?	Pesticide Spills In The Last Year?
	City Personnel	Contractor				ApplicationEquipment	Application Crews	Application	Storage	Disposal	Transport		
Anaheim	X	X	No	Yes	Apr-00	Ongoing		Ongoing				Yes	No
Buena Park		X	Yes	---------	No	No		No				No	No
Brea	X		No	Yes	No	Jun-99		Annually				Yes	No
Costa Mesa	X	X	Yes	---------	Yes	1999		Yes				Yes	No
Cypress	X		Yes	---------	Ongoing	Dec-98		Yes				Yes	No
Dana Point		X	Yes	---------	Jan-98	Oct-98		Oct-99				Yes	No
Fountain Valley	X		No Report										
Fullerton	X	X	Yes	Yes	Ongoing	Jul-00		Jan-00				Yes	No
Garden Grove	X	X	No	Yes	Ongoing	Daily		Annually				Yes	No
Huntington Beach	X	X	Yes	---------	Ongoing	Daily		Ongoing				Yes	No
Irvine	X	X	No	Yes	Jan-99	Apr-99		Apr-99				Yes	No
La Habra	X	X	No	Yes	Yes	Jul-00		Mar-00				Yes	No
La Palma	X		Yes	---------	1997	1999		Yes				Yes	No
Laguna Beach	X		Yes	---------	Annually	Spring 1999		Fall 1997				Yes	No
Laguna Hills		X	Yes	---------	Apr-00	Jun-00		Nov-99				Yes	No
Laguna Niguel		X	Yes	---------	Yes	Yes	No	Ongoing				Yes	No
Lake Forest		X	No Report										
Los Alamitos	X		Yes	---------	Annually	Feb-00		1999				Yes	No Report
Mission Viejo		X	Yes	---------	Annually	No	Yes	No				No	No
Newport Beach	X	X	No	Yes	Ongoing	Jun-00		1994				Yes	No
Orange		X	Yes	---------	No	Monthly		1999				Yes	No
Placentia	X		No	Yes	Ongoing	Jul-00		Jul-00				Yes	No
San Clemente	X		Yes	---------	Yes	Ongoing		1997				Yes	No
San Juan Capistrano		X	Yes	---------	Yes	Mar-00		Ongoing				Yes	No
Santa Ana	X	X	No	Yes	Ongoing	Jun-00		Apr-00				Yes	No
Seal Beach	X	X	No	Yes	Jan-00	Jan-00		Ongoing				Yes	No
Stanton		X	Yes	---------	No	No		1998				No Report	No
Tustin	X	X	No	Yes	Annually	Ongoing		Yes				Yes	No
Villa Park		X	No Report										
Westminster	X		Yes	---------	No	Oct-98		Ongoing				Yes	No
Yorba Linda		X	Yes	---------	Aug-98	Aug-00		1997				Yes	No
County of Orange	X	X	Yes	---------	Varies by park	Varies by park		Ongoing				Yes	No

Table 3.22 199/00 Permittee Integrated Pest Management Techniques

		Integrated Pest Management Alternatives						
Permittee	Implement Techniques	Manual or Mechanical Weeding/Pruning	Mulch	Water Mgmt/Drip Irrigation	Use of Disease Resistant Plants	Use of Biological Controls	Other	Reduction in Pesticide Usage
Anaheim	Yes	X	X			X		12%
Buena Park	N/A							N/A
Brea	Yes						Horticulture practices to reduce plant stress and thus the need for pesticides	10%
Costa Mesa	Yes	X	X		X	X		50%
Cypress	Yes		X			X	Timing of growth and volume of plant material reduces need for pesticides	No
Dana Point	Yes	X				X	Botanical Insecticleds	No
Fountain Valley	No Report							
Fullerton	Yes	X				X		5%
Garden Grove	Yes	X	X	X				No
Huntington Beach	Yes	X	X			X	Foliar Applications, Trapping, Exclusion	5%
Irvine	Yes	X					Flail moving	No
La Habra	Yes	X	X				Flaying, Disking, Mowing	No
La Palma	No							No
Laguna Beach	Yes	X					Weed abatement conducted by hang crews	No
Laguna Hills	Yes	X	X					12%
Laguna Niguel	Yes							No
Lake Forest	Yes							Yes
Los Alamitos	Yes	X						No
Mission Viejo	No Report							
Newport Beach	Yes	X				X		5%
Orange	Yes	X						No
Placentia	Yes							No
San Clemente	Yes						Conservative cultural practices	No
San Juan Capistrano	No Report							
Santa Ana	Yes	X				Wasps for whitefly	Water pressure - aphids & whitefly	No
Seal Beach	Yes	X	X			X		20%
Stanton	No	No Report						
Tustin	Yes						Parraffinitic oil/M-Pede Safer Soap used on whitefly	No
Villa Park	No Report							
Westminster	No							No
Yorba Linda	No							No
County of Orange	Yes	X					Beehive removal	No

Table 3.23 Fertilizer and Pesticide Management Annual Comparison

	Fertilizer Management		Pesticide Management					Integrated Pest Management	
Reporting Year	Total Acres	Quantity Applied (lbs)*	Total Acres	# of Pesticides	# Restricted	Quantity Applied (lbs)*	Quantity Applied (gals)*	# Implementing	# Reduced Pesticide Use
1994 - 1995	5,900	N/A	11,800	N/A	N/A	N/A	N/A	20	N/A
1995 - 1996	6,011	N/A	11,361	340	N/A	N/A	N/A	17	N/A
1996 - 1997	4,054	N/A	12,159	303	N/A	N/A	N/A	22	11
1997 - 1998	4,813	N/A	12,439	307	24	N/A	N/A	26	9
1998 - 1999	4,616	N/A	12,408	254	34	N/A	N/A	23	10
1999 - 2000	5,637	1,883,905	12,310	306	45	32,223	10,600	23	9

*Since not all Permittees reported quantities in pounds and/or gallons, while others reported application rates instead of totals, these figures should be interpreted as low-range estimates.
N/A indicates data not previously requested in Annual Status Reports

Table 3.24 1999/00 Permittee Stormwater Quality Public and Business Education Efforts

Permittee	Describe Steps Taken By The City To Further Stormwater Quality Public Education	Describe Steps Taken By The City To Conduct Special Education Initiatives For Developers and Contractors
Anaheim	Attended NPDES erosion control seminar in Irvine; Developed and distributed numerous water pollution brochures and newsletters. Sewer/stormdrain information on City website.	———
Brea	County water pollution brochures are distributed at the public counter and at the Community Center.	———
Buena Park	City refers residents to used oil collection sites.	City informs developers of NPDES requirements as part of the conditions of development
Costa Mesa	———	———
Cypress	Staffed a Public Works Department and Oil Recycling Booth at the Cypress Community Festival; Developed brochures pertaining to good housekeeping techniques; Distributed County brochures and attended an erosion control BMP workshop in Irvine. Aired water quality and used oil public service announcements.	———
Dana Point	Earth Day Festival sponsored by Solag, Inc. & associated cities; Display booth at Festival of Whales; Distributed urban runoff brochures; Staff attended Erosion and Sediment Control Training and participated in Trails 4 All Annual Watershed Clean-up and Exposition	Erosion control notes on all grading plans; Pre-grading meeting where urban runoff was discussed
Fountain Valley	No Report	No Report
Fullerton	Website and weekly advertisements in the newspaper about used oil collection. Participated in Used Oil Public Education Booth at the Orange County Fair.	———
Garden Grove	America Recycles Day; Earth Day; Fire Services Day; Garden Grove Pride; Public Works Educational Display; Staff attended Erosion & Sediment Control Workshops; Distributed pamphlets describing stormdrain protection measures at City Hall and the Municipal Service Center; Public Service Announcements focusing on stormwater quality aired on local Cable TV.	Co-hosted a Trash Reduction & Stormwater Workshop; City promoted the New General Construction Stormwater Permit: Permit Overview & Compliance Strategies Workshop offered by the APWA
Huntington Beach	Public Works "Open House" included a stormwater program; Distributed County water pollution brochures	Distributed "blueprint" for a clean ocean with every encroachment/grading permit. City produced several half hour programs on Cable TV discussing urban runoff issues.
Irvine	City distributed brochures at the City's Public Works Open House, Irvine Harvest Festival, Children's Water Festival and through the City Hall lobby public information rack. Public service announcements on cable TV promoting proper solid waste and used oil disposal.	Hosted workshops on watershed BMPs, "Water Quality Ordinance & Enforcement Consistency", "Construction Site Planning & Mgmt.", and "New Development"
La Habra	Stormwater brochures handed out concurrent with sandbag distribution & at "I Love La Habra" Fair; Composting workshop at Fullerton Arboretum	———
La Palma	———	———
Laguna Beach	Posted Ocean Water Quality Advisory Committee meeting agendas on City's web page; Distributed water quality literature at City's Vision Fair; City Engineer gave presentation to Grand Jury; Developed a brochure expanding on County's "Ocean Begins at Your Front Door" brochure	———
Laguna Hills	Distributed public education brochures and attended NPDES, Aliso Creek, and San Juan Creek meetings; City website with link to O.C. Integrated Waste Management Department	———
Laguna Niguel	Letters regarding the J03P02 watershed and associated problems were sent to 1400 residents - "Report Cards" will update residents on progress in the future; Distributed County water pollution brochures; City held workshop for South County City Managers regarding the Clean Water Act and its effect on cities.	City informs developers of requirements during pre-grading meetings prior the start of construction activities. City requires developers to prepare Water Quality Management Plans as a condition of project approval.
Lake Forest	———	City sponsored a barbeque luncheon to which developers and contractors were invited to learn more about the permitting process and the need to comply with all stormwater quality requirements.
Los Alamitos	———	———
Mission Viejo	City distrubuted several recyclying and pollution prevention brochures; Ran an article regarding stormwater pollution in a local newsletter; Promoted and advertised a Household Hazardous Waste Round-up on Cable TV and on the City website	City routinely meets one-on-one with developers to educate them on the importance of stormwater pollution prevention. City provides assistance to developers in preparing erosion control plans, preparing WQMPs, and incorporating public education documents.
Newport Beach	Distributed several brochures to the public	———

Table 3.24 1999/00 Permittee Stormwater Quality Public and Business Education Efforts

Permittee	Describe Steps Taken By The City To Further Stormwater Quality Public Education	Describe Steps Taken By The City To Conduct Special Education Initiatives For Developers and Contractors
Orange	Worked with local groups (e.g. Girl Scouts) to promote recycling and water quality, including providing teaching materials; Staff attended County PFRD training classes; Earth Day; Neighborhood Enhancement Program; and Street Fair with booth on reclycling and water quality; Coordinated with local courts to use juvenile offenders to perform community cleanups	Major projects included special plan review meetings with developers to ensure that they meet all NPDES regulations; Similar activities are being undertaken with CalTrans for the I-5 Modernization and the proposed Centerline Rail Project; City BMP materials are also made available to developers as appropriate.
Placentia	Earth Week Run: promotes oil recycling and household hazardous waste programs; Maintenance personnel view new videos on stormwater BMPs; City newsletter and website provide information to the public.	Send training opportunity notices to developers and provide developers a model set of plans to illustrate required BMPs
San Clemente	———	———
San Juan Capistrano	———	Samples of BMPs for new developments are distributed to all developers and/or their engineers when the application is initially submitted.
Santa Ana	Produced waste disposal and recycling information in English, Spanish and Vietnamese; Recycling presentations at 5 area elementary schools centered around CYCLER - Waste Management's Environmental Robot.	———
Seal Beach	At the issuance of permits, staff informs applicant of proper construction practices.	———
Stanton	———	———
Tustin	Stormwater brochures and "The Tustin Recycle News" available to residents; Catch basin stenciling program educates the public on the relationship between stormdrain flows and the ocean	Provided literature to contractors and developers; Notes on construction plans include stormwater pollution prevention requirements; Building Division conducted an onsite workshop.
Villa Park	No Report	No Report
Westminster	Staff attended RWQCB, APWA, and City of Irvine (erosion control) seminars.	———
Yorba Linda	Flyers distributed at Fiesta Days City Booth and available to residents; Public announcements on Cable TV; Recycling Program information with City trash bills.	———
County of Orange	Stormwater brochures available to residents	———

Table 3.25 1996-2000 WQMP Structural Controls Summary

			Structural Controls Implemented															
Permittee	# WQMPs approved	Acreage covered by WQMPs	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	S13	S14	S15	S16
Anaheim	51	U	51	51	51	U	1	54	1	U	7	7	7	U	U	16	U	U
Brea	10	U	10	0	0	0	0	2	0	0	0	0	0	0	10	1	0	0
Buena Park	4	6	1	2	2	0	0	4	0	1	0	0	0	0	1	0	2	0
Costa Mesa	44	215	37	38	37	3	6	28	4	3	4	3	3	3	21	1	7	10
Cypress	4	25	3	3	3	0	0	2	0	1	0	0	0	0	3	0	1	0
Dana Point	5	32	23	23	24	0	0	4	0	0	0	1	0	0	30	0	0	32
Fountain Valley	No Report		No Report															
Fullerton	7	465	5	4	4	0	1	7	0	3	2	2	2	4	0	3	0	2
Garden Grove	40	88	33	34	28	0	12	30	0	4	9	7	8	4	19	8	5	13
Hunt. Beach	55	391	54	55	55	0	12	61	7	0	3	3	3	2	268	23	284	188
Irvine	161	2526	101	113	156	8	18	63	17	16	12	11	11	21	114	18	53	28
La Habra	33	U	24	17	17	4	9	20	11	2	2	2	2	15	15	9	15	20
La Palma	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Laguna Beach	1	20	1	1	1	0	0	1	0	0	0	0	0	3	22	1	2	4
Laguna Hills	1	1	1	0	0	0	0	1	0	0	0	1	0	0	0	0	0	1
Laguna Niguel	5	112	3	5	5	1	0	2	1	1	0	0	0	1	5	1	1	3
Lake Forest	39	263	38	40	40	6	8	39	5	2	4	4	4	7	38	17	30	37
Los Alamitos	3	5	3	0	2	0	0	0	0	0	0	0	0	0	0	0	0	
Mission Viejo	90	390	4	90	90	2	0	90	0	0	11	11	11	5	90	6	4	4
Newport Beach	8	U	3	8	8	0	4	8	4	0	0	0	1	6	0	0	0	0
Orange	6	580	0	0	0	0	0	0	1	0	1	1	0	0	3100	0	0	0
Placentia	5	50	5	0	0	0	0	0	0	0	0	0	0	2	25	0	0	0
San Clemente	22	944	Unavailable at this time															
S.J. Capistrano	12	113	0	12	12	0	0	7	0	0	0	0	0	0	610	0	0	0
Santa Ana	66	340	10	50	20	3	11	60	7	2	10	10	4	2	20	5	0	5
Seal Beach	1	157	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0
Stanton	No Report		2	2	2			1	1	1				1	1			1
Tustin	10	173	8	9	9	5	0	4	2	1	2	1	2	7	9	0	8	3
Villa Park	No Report		No Report															
Westminster	23	68	7	10	10	3	2	5	2	3	2	2	2	4	6	2	3	2
Yorba Linda	4	1	2	1	2	0	2	4	1	1	3	3	2	1	1	0	1	1
County of Orange	384	3662	269	358	356	46	31	150	24	15	15	12	14	27	335	42	165	24
Total	1094	10627	698	926	934	81	117	648	89	56	87	81	76	115	4743	153	581	373

S1 = Filtration
S2 = Common Area Efficient Irrigation
S3 = Common Area Landscape Design
S4 = Community Car Wash Racks
S5 = Wash Water Controls Food Prep Areas
S6 = Trash Container Areas
S7 = Self-Contained Areas Washing/Steam Cleaning
S8 = Outdoor Storage
S9 = Motor Fuel Concrete Dispensing Areas
S10 = Motor Fuel Dispensing Area Canopy
S11 = Motor Fuel Interruptable Drainage
S12 = Energy Dissipator
S13 = Catch Basin Stenciling
S14 = Diversion of Loading Dock Drainage
S15 = Inlet Trash Racks
S16 = Water Quality Inlets
U = Unknown

Table 3.26 1996-2000 WQMP Non-Structural Control Summary

Permittee	# WQMPs approved	Acreage covered by WQMPs	Non-Structural Controls Implemented															
			N1	N2	N3	N4	N5	N6	N7	N8	N9	N10	N11	N12	N13	N14	N15	N16
Anaheim	51	U	U	51	0	U	U	U	U	7	U	U	51	51	U	U	51	U
Brea	10	U	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Buena Park	4	6	2	2	2	2	0	0	2	0	0	1	1	4	1	0	2	0
Costa Mesa	44	215	36	30	33	40	16	2	15	4	14	13	29	27	8	18	23	2
Cypress	4	25	3	3	4	2	0	0	3	0	0	0	3	3	1	3	4	0
Dana Point	5	32	6	6	7	6	0	0	0	0	0	0	8	6	1	1	6	0
Fountain Valley	No Report		No Report															
Fullerton	7	465	7	7	7	7	7	3	6	2	5	7	7	7	7	7	7	3
Garden Grove	40	88	28	33	34	37	15	10	17	10	16	18	39	31	15	22	24	5
Hunt. Beach	55	391	55	55	55	55	14	11	14	3	14	14	55	55	23	51	55	0
Irvine	161	2526	115	117	123	124	32	34	47	12	36	39	113	84	24	105	112	9
La Habra	33	U	15	33	15	33	11	4	11	4	11	11	33	29	11	33	15	9
La Palma	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Laguna Beach	1	20	1	1	1	1	0	0	0	0	0	0	1	1	1	1	1	1
Laguna Hills	1	1	1	1	0	1	0	0	1	1	1	0	0	1	0	0	0	0
Laguna Niguel	5	112	4	4	5	5	1	1	2	0	1	1	4	2	1	5	4	1
Lake Forest	39	263	40	39	40	40	27	24	33	5	28	27	39	40	25	38	38	6
Los Alamitos	3	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mission Viejo	90	390	90	10	90	90	10	10	10	10	10	10	90	90	6	90	90	10
Newport Beach	8	U	Not available at this time															
Orange	6	580	0	0	2	0	0	0	2	1	0	0	0	6	0	0	1	1
Placentia	5	50	0	0	3	5	0	0	5	1	0	5	5	1	0	25	5	0
San Clemente	22	944	Not available at this time															
S.J. Capistrano	12	113	0	0	10	9	9	0	0	0	0	9	0	4	0	0	9	0
Santa Ana	66	340	10	10	50	66	10	6	16	10	10	10	10	66	5	20	66	4
Seal Beach	1	157	0	0	1	1	1	0	0	0	1	1	0	0	0	0	1	0
Stanton	No Report		2	2	2	2	1	1	1	0	1	1	1	2	0	2	2	1
Tustin	10	173	9	9	8	8	1	1	2	1	1	2	9	3	0	7	8	2
Villa Park	No Report		No Report															
Westminster	23	68	10	8	10	10	3	2	3	2	3	4	9	5	3	6	9	1
Yorba Linda	4	1	3	3	1	4	3	2	4	2	3	3	4	4	3	3	1	0
County of Orange	384	3662	368	345	350	355	34	14	36	18	30	47	321	241	56	313	271	10
Total	1094	10627	805	769	853	903	195	125	230	93	185	223	832	763	191	750	805	65

N1 = Education POA
N2 = Activity Restrictions
N3 = Common Area Landscape Mgmt.
N4 = BMP Maintenance
N5 = Title 22 CCR Compliance
N6 = Local Industrial Permit Compliance
N7 = Spill Contingency Plan
N8 = Underground Storage Tank Compliance
N9 = Hazardous Materials Disclosure Compliance
N10 = Uniform Fire Code Implementation
N11 = Common Area Litter Control
N12 = Employee Training
N13 = Housekeeping of Loading Docks
N14 = Common Area Catch Basin Inspection
N15 = Street Sweeping
N16 = Commercial Vehicle Washing

U = Unknown

Table 3.27 Population Change: 1995-2000

Permitee	1995 Population	2000 Population	% Change
Anaheim	296,497	306,300	3.3%
Brea	35,122	36,400	3.6%
Buena Park	73,864	75,900	2.8%
Costa Mesa	103,823	105,600	1.7%
Cypress	46,963	48,500	3.3%
Dana Point	36,289	37,350	2.9%
Fountain Valley	55,171	56,400	2.2%
Fullerton	123,692	126,800	2.5%
Garden Grove	153,824	156,500	1.7%
Huntington Beach	189,795	196,700	3.6%
Irvine	123,909	136,600	10.2%
La Habra	54,907	55,800	1.6%
La Palma	15,781	16,400	3.9%
Laguna Beach	23,985	24,950	4.0%
Laguna Hills	30,413	30,750	1.1%
Laguna Niguel	55,724	59,200	6.2%
Laguna Woods	—	18,000	—
Lake Forest	58,558	59,400	1.4%
Los Alamitos	12,425	12,050	-3.0%
Mission Viejo	89,841	96,300	7.2%
Newport Beach	70,098	74,000	5.6%
Orange	120,078	127,600	6.3%
Placentia	45,339	49,150	8.4%
Rancho Santa Margarita	—	38,936	—
San Clemente	46,764	49,250	5.3%
San Juan Capistrano	29,121	32,100	10.2%
Santa Ana	311,491	315,000	1.1%
Seal Beach	26,795	27,200	1.5%
Stanton	32,404	33,850	4.5%
Tustin	62,497	66,800	6.9%
Villa Park	6,445	6,625	2.8%
Westminster	83,287	86,200	3.5%
Yorba Linda	58,069	61,800	6.4%
County of Orange	168,384	151,264	-10.2%
Total	2,641,355	2,775,675	5.1%

Table 3.28 Land Use Changes: 1996-2000

Land Use Type	1996 Land Use (%)	2000 Land Use (%)	Is it possible to provide a land use map with corresponding land use percentages? What format?	
			1996	2000
Anaheim — Not Available			No	No
Brea — Not Available			No	No
Buena Park			No	No
Residential	41	42.6		
Commercial	11.1	10.7		
Industrial	11.1	11.1		
Open Space	4.9	4.9		
Public/Institutional	6.2	6.2		
Streets/Freeways	21.8	21.8		
Vacant	3	1.9		
Costa Mesa			No	No
Residential	51.4	51.4		
Commercial	12.4	12.8		
Industrial	14.5	14.2		
Public/Institutional	21.6	21.6		
Cypress			Yes - Hard Copy	Yes - Hard Copy
Residential	40	40		
Commercial/Office	7	7		
Light Industrial	7	7		
Park	5	5		
Government/Schools	13	13		
Vacant/Agriculture	6	6		
Streets/Transportation	22	22		
Dana Point			No	No
Residential	60	61		
Commercial	8	8		
Open Space	19	19		
Community Facility	4	3		
Harbor/Marina	1	1		
Transportation Corridor	8	8		
Fountain Valley — Not Available			No	No
Fullerton			Yes - ArcView GIS	Yes - ArcView GIS
Industrial	11	11		
Commercial	5	5		
Residential	40	40		
Public Lands	7	7		
Other	15	15		
Circulation	22	22		
Garden Grove			Yes - Hard Copy	Yes - Hard Copy
Residential	50	50		
Commercial	6	6		
Office/Professional	1	1		
Mixed Use	4	4		
Industrial	6	6		
Open Space	9	9		
Roadways	24	24		
Huntington Beach			Yes - Hard Copy	Yes - Hard Copy
Residential	46.3	46		
Commercial	3.7	3.8		
Mixed Use	9.5	9.5		
Public	0.3	0.3		
Open Space	9.3	9.3		
Industrial	9.3	9.3		
Irvine			No	No
Residential	38.5	33.1		
Multi-Use	0.43	0.4		
Commercial	5.2	6		
Industrial	13.9	15.5		
Institutional	5.1	6.1		
Conservation/Open Space	36.8	38.8		

Table 3.28 Land Use Changes: 1996-2000

Land Use Type	1996 Land Use (%)	2000 Land Use (%)	Is it possible to provide a land use map with corresponding land use percentages? What format?	
			1996	2000
La Habra			No	No
C2 - R4 Zone	Not Available	2		
M1 - PCI		63		
CU - M1		15		
C2 PUD - R4 PUD		20		
La Palma — No Report				
Laguna Beach — No Significant change in land use distribution between 1996 & 2000			No	No
Laguna Hills			No	No
Residential	64	64		
Commercial	8	8		
Office	8	8		
Public/Institution	5	5		
Park	3	3		
Open Space	12	12		
Laguna Niguel — Not Available			No	No
Lake Forest — Not Available			No	No
Los Alamitos — No Report				
Mission Viejo			No	No
Residential	65.26	65.6		
Commercial	4.23	4.1		
Office	0.94	0.6		
Industrial	1.43	1.45		
Mixed Use	0.4	0.4		
Other	27.74	27.85		
Newport Beach			No	No
Residential	54.4	53.7		
Commercial	15.3	14.7		
Industrial	-	1.3		
Institutional	6.3	6.2		
Open Space	23.9	24.1		
Orange			Yes - Hard Copy	No
Residential	36	Not Available		
Commercial	7			
Industrial	5			
Agricultural	5			
Circulation	14			
Open Space	6			
Other	27			
Placentia — Not Available			No	No
San Clemente — Not Available			No	Yes
San Juan Capistrano			Yes - Hard Copy	Yes - Hard Copy
Residential	26	29		
Non-Residential	6	7		
Open Space	33	38		
Streets/Highways	11	12		
Vacant/Undeveloped	24	14		
Santa Ana			No	No
Low Density Residential	41.6	42.7		
District Center	1.6	2.1		
Prof/Admin Offices	2	3.1		
Business/Commercial	8	6.5		
Industrial	16	14.8		
Public/Institution	4.2	4.6		
Open Space	4.9	5		
Other	21.7	21.2		

Table 3.28 Land Use Changes: 1996-2000

Land Use Type	1996 Land Use (%)	2000 Land Use (%)	Is it possible to provide a land use map with corresponding land use percentages? What format?	
			1996	2000
Seal Beach			Not Reported	Not Reported
Residential	21	Not Available		
Commercial	0.03			
Industrial	0.02			
Public	0.03			
Military	68			
Other	11			
Stanton — No Report				
Tustin			No	No
Residential	21	21		
Commercial	4	4		
Industrial	2	2		
Public	26	26		
PC Residential	21	21		
PC Commercial	12	12		
PC Public Institutional	6	6		
Transportation	8	8		
Villa Park — No Report				
Westminster			Yes - Hard Copy	No
Residential	46.2	Not Available		
Commercial	9.6			
Industrial	2.9			
Public Facilities/Schools	7.1			
Parks/Memorial/Agr	4			
Vacant/Undeveloped	0.8			
Railroad/Utility/Flood Control	3.4			
Streets/Freeway ROW	26			
Yorba Linda			No	No
Residential	58.9	Not Available		
Commercial	1.8	1.7		
Industrial	2.7	1.9		
Open Space	38.6	Not Available		
County of Orange			No	No
Residential	Not Available	24		
Commercial		7.4		
Industrial		4.7		
Vacant/Undeveloped		34		
Agricultural		5.5		
Road/Freeway ROW		17		
Other		7.4		

4.0 WATER QUALITY MONITORING SUMMARY AND ANALYSES

4.1 Introduction

The data presented in this section are the result of the water quality monitoring conducted from July 1994 to June 30, 1999. Much of the data collected during the 1999-2000 season had not been fully processed by the date of this report. A more detailed analysis of this season will be found in the Annual Status Report on November 15, 2000. More detailed information specific to data from prior years can be found in the 94/95, 95/96, 96/97, 97/98, and 98/99 Analysis of Data and Annual Status Reports.

From February 20, 1991 to May 1999, a water quality monitoring program was implemented to address the objectives of First and Second Term Permits. This program consists of four elements: field screening, channel monitoring, harbor/bay monitoring, and sediment quality monitoring. Sampled waterbodies include natural creeks, streams, and rivers; constructed flood control facilities (channels and basins); and harbors and bays.

- The intent of field screening was to detect the presence of illegal discharges or illicit connections. Physical and chemical analyses are conducted in the field; positive tests for contamination were referred for source identification and possible enforcement action.

- Channel monitoring was conducted with automatic samplers to evaluate the average concentrations of nutrients and heavy metals in dry weather and stormwater discharges. From these average concentrations comparisons to applicable water quality guidance were made. Data from these samplings were also used to compute mass loads of pollutants and site mean event mean concentrations (EMCs).

- Harbor and bay monitoring provided information on the effects of tributary inputs to these receiving waters. These data were also compared to applicable water quality guidance.

- Sediment quality was evaluated prior and subsequent to the storm season to evaluate pollutant deposition through sedimentation or removal by scouring. These data were also compared to National Oceanographic and Atmospheric Administration (NOAA) screening levels and to results of biological testing conducted by the Dept. of Fish and Game (DF&G), the State Water Resources Control Board and others.

To support these elements of the monitoring program precipitation and streamflow data were obtained through the County's ALERT (Automated Local Evaluation in Real Time) flood detection system. The ALERT system consists of a network of precipitation and water level sensors throughout the County.

Rainfall accumulation or changes in water level are transmitted from these remote sites to the base station computer at Principal Permittee's Katella facility. The computer transforms these data into useable formats for flood forecasting, precipitation intensity evaluation, stream hydrographs, discharge calculations, etc. This report uses these hydrographic data for rainfall-runoff relationships, mass load calculations, and to evaluate sampling periods relative to rainfall in respective watersheds.

On July 15, 1997, a revised monitoring plan was submitted to the Regional Boards and finalized in May 1999. The final report entitled Orange County Water Quality Monitoring Program – Final Monitoring Plan is hereinafter referred to as the 99-04 Program. These revisions were made to more adequately address the objectives of the Second Term Permit. Some elements of this revised program were implemented during the 98/98 monitoring year while most of the others were implemented during 99/00 season.

4.2 Study Area

Under the First Term Permit, water quality monitoring could be characterized as areawide rather than focused to any specific area or areas. The field screening element was designed to be the most comprehensive with respect to numbers of monitoring sites and area encompassed. The 89 monitoring locations were chosen using watershed drainage area and land uses as primary selection criteria. Those channels designated by the County as "Regional Facilities" (watershed greater than 1 square mile in area) were chosen if the land uses in the watershed were residential, commercial, light industrial as opposed to open space or undeveloped). "Local Facilities" (watersheds less than 1 square mile) were also selected if the corresponding land use was primarily commercial or industrial. The stations and their locations can be found in **Table 4.1.**

The monitoring of channels with automatic samplers was more comprehensive than field screening with respect to monitoring duration for a specific event (e.g. storm) and the suite of chemical analyses. Most of the 34 sites which were originally chosen are in waterbodies that are designated in the First Term Permits as "Waters of the State." The others are major tributaries to the Huntington Harbour/Bolsa Bay Complex. A listing of these monitoring locations is provided in **Table 4.2**. Many of these watercourses have specific beneficial uses identified in the Basin Plans of the respective Regional Boards. For each watercourse, these beneficial uses can include one or more of the following: municipal water supply, agricultural water supply, non-contact recreation, groundwater recharge, warm water habitat, cold water habitat, wildlife refuge, spawning areas and habitats of rare and endangered species. See **Table 4.3** for a summary of the designated beneficial uses for each channel.

The land uses upstream of each of these channel locations are generally mixed. A land use characterization was performed for nine monitoring locations using data from 1990. A summary of the distributions is presented in **Table 4.4** and **Figure 4.1**. **Table 4.5** gives a more detailed description of the land uses included into each of the nine major categories. The predominant land use in the Huntington Harbour watershed is residential, whereas Lane Channel and Barranca Channels in the San Diego Creek watershed have high percentages of industrial activity. San Diego Creek upstream of Campus Drive in Irvine has significant Vacant Land (23%) and Farm & Ranch (10%) landuses. It should be noted that this watershed is still developing rapidly and from 1990 to present, some of the vacant land has been converted to residential and commercial land uses. Roads (streets, highways, freeways and easements) are a considerable influence in each watershed with percentages ranging from 22 to 36 percent.

Three Harbor/Bay complexes were monitored: Upper/Lower Newport Bay, Huntington Harbour/Bolsa Bay, and Dana Point Harbor. Monitoring sites were chosen based on (1) proximity of major tributaries (or storm drain) inputs, (2) location of commercial boat maintenance operations, and (3) areas of ecological significance. Other stations were selected to evaluate the influence of runoff during storms. **Table 4.6** describes the locations of these monitoring sites and **Table 4.3** contains a summary of the designated beneficial uses of the area surrounding the site.

4.3 Description of Monitoring Procedures

The following are brief descriptions of the procedures used during this reporting period. More detailed information is contained within the Orange County Water Quality Monitoring Program **(DAMP Appendix K)**.

4.3.1 Field Screening

Field screening consisted of physical and chemical evaluations on site. The annual evaluation of each station included two dry weather samplings, at least four hours apart, and one sampling of storm runoff. Physical measurements included electrical conductivity, temperature (air and water), pH, dissolved oxygen, and water discharge rate. These measurements were performed with electro-analytical instruments that were calibrated prior to field visits. Chemical tests included dissolved copper, hexavalent chromium, and zinc; free cyanide; total chlorine; total phenolic compounds; nitrate and hardness. The hardness test was titrametric while the others were colorimetric. A sample was also collected and analyzed in the Environmental Resources Laboratory for Chemical Oxygen Demand (COD). Other testing methods which were available but were not used routinely included Methylene Blue Active Substances (MBAS), tannin and lignin, ethlyene glycol, and dissolved sulfide. **Appendix 4.1** contains the database for Field Screening information.

4.3.2 Channel Monitoring

Channel monitoring is conducted using automatic samplers that consist of programmable pumps (peristaltic) which transport water from the channel to a collection reservoir in the autosampler base. The collection reservoir can be a single large composite bottle or a series of up to 24 bottles. The autosampler program can be modified to vary sample volumes and frequency of collection. In the monitoring program, 24 discrete sample bottles are used in each autosampler base.

For dry weather discharge evaluations, the automatic samplers are programmed to collect a discrete sample once an hour for a 24-hour period. During storms, sampling is initiated when the water level in the channel rises above a triggering device hardwired to the autosampler. The frequency of collection during the first hour of the storm is set at 1 sample/15 minutes. After the fifth sample is collected at the one-hour mark, the collection frequency is decreased to once every 2 hours. A storm event sampling spans approximately 96 hours to allow comparison of the data to 96-hour guidance criteria for chronic aquatic toxicity from the California Toxics Rule (CTR). Autosampler maintenance is performed periodically to change bottles, icepacks, and power supplies.

The first five samples collected during a storm are composited and represent the first flush. The concentrations of heavy metals in this sample can be compared to acute toxicity criteria. The remaining bi-hourly storm samples are composited using the stage hydrograph or by evaluating the electrical conductivities of the discrete samples. Using the hydrograph from the ALERT system, samples collected beyond the first flush and representing the storm peak and recession are composited into a single sample. In the absence of a streamgage hydrograph, the conductivity of each sample (in order of collection) is measured. Changes in conductivity usually denote the beginning or end of storm runoff. After the "first flush" of a storm, conductivities tend to immediately decrease during the rise of the storm hydrograph and slowly rise after the recession. Sample appearance (turbidity or fluvial sediment) can also be used in the compositing process. Composite samples are analyzed for pH, electrical conductivity, turbidity, nitrate, ammonia, total Kjehldahl Nitrogen (TKN), phosphate, total suspended and settleable solids; volatile suspended solids; and total recoverable and dissolved copper, chromium, lead, cadmium, zinc, silver and nickel (see **Appendix 4.2**). The frequency of channel monitoring is dependent on "Waters of the State" designation. "Waters of the State" are monitored monthly and during storms. Other channels in the network are monitored during storms only.

The Principal Permittee's precipitation and streamgaging network consists of recording and/or transmitting ALERT gages (see **Appendix 4.3**). Mechanical recording raingages are weighing bucket type. Accumulated rainfall is recorded in analog format on drum charts. The ALERT precipitation gages are tipping bucket type with dataloggers. Data are recorded and transmitted in digital format; sensitivity is 1 mm (0.04 inches) of accumulated rainfall.

The Principal Permittee uses several types of streamgages to monitor changes in water level. The oldest design is the stilling well with water level float; the newer types are manometer gages or pressure transducers. Data (water level versus time) are recorded on stripcharts. The ALERT interface to these gages consists of a connection from the recorder chart drive to an ALERT shaft encoder. ALERT information is recorded on a datalogger and transmitted to the Principal Permittee Katella yard base station in digital format. Sensitivity of the transmitted and recorded ALERT record is user-variable with the greatest sensitivity being a change in water level of 0.01 feet.

4.3.3 Harbor/Bay Monitoring

Harbor/bay monitoring is conducted semiannually and during storms (see **Appendix 4.4**). Monthly sampling in the Upper Newport Bay is also conducted to evaluate nutrient loading from the San Diego Creek. Monthly monitoring of nitrogen and phosphorus in the sediments was added in 99/00. The semiannual monitoring includes sampling for nutrients in the water column, and trace metals and organic contaminants in the sediments. Storm monitoring consists of surface water sampling for nutrient concentrations and depth-integrated sampling to evaluate the magnitude of heavy metal contamination in the water column.

4.3.4 Semiannual Sediment Sampling

On a semiannual schedule, sediment samples are collected from the channels designated as "Waters of the State" and several locations in the harbors and bays to evaluate concentrations of copper, chromium, cadmium, lead, zinc, silver, nickel, chlorinated hydrocarbon and organophosphate pesticides, herbicides, PCBs, and Polynuclear Aromatic Hydrocarbons (PAHs) (see **Appendix 4.5**).

4.4 Transition to 99-04 Program

The intent of the 99-04 Program is to focus monitoring resources to waterbodies that have high ecological significance or areas which had been shown, by past monitoring data or investigations, to have potential to cause impairment of beneficial uses.

In developing the 99-04 Program the waterbodies of Orange County were prioritized to form a list of Critical Aquatic Resources (CARs). Newport Bay and its watershed topped the list. A timeline for studying the top priority waterbodies was established. Although the initial focus of the CARs Program would be the Newport Bay and its watershed, a monitoring schedule was established for the other CARs to maintain their respective databases before the primary focus could be shifted to them.

A list of "Warm Spots" was generated from the complete NPDES (1991-1998) channel monitoring and sediment monitoring databases. A "Warm Spot" was defined as a waterbody or segment thereof where the mean concentration of a monitored constituent exceeded the Countywide mean by two standard deviations or three interquartile ranges above the third quartile. A power analysis was conducted on the database of each "Warm Spot" to determine the annual monitoring frequency and length of time needed to detect a significant change in the constituent causing the warm spot designation.

The Principal Permittee's Pollution, Notification, Investigation, and Response (PNIR) database was interrogated to identify channels or drainage areas that had high incidences of water pollution activity during the period from 1991 through 1998. From these database evaluations was created a priority list for reconnaissance and source evaluation studies.

The transition to the 99-04 Program was initiated during the 98/99 monitoring year. The revisions to the program as it was conducted during 1994-97 include discontinuation of the areawide field-screening program. This program, which was very labor intensive, detected only a few incidents of illegal discharges and illicit connections. The 99-04 Program includes a Reconnaissance and Source Identification component that targets areas that are known to exhibit unusually high levels of stormwater pollutants.

4.4.1 Incorporation of the Nutrient TMDL Regional Monitoring Program

The Regional Monitoring Program (RMP) for San Diego Creek Nutrient TMDL was initiated in February of 2000. The chemical monitoring for this program includes many of the same sites in the Newport Bay and watershed as the NPDES water quality monitoring program. Monitoring frequencies for some of the sites were increased above existing levels and orthophosphate was been added to the suite of nutrient analyses. The NPDES water quality monitoring program and the RMP are intended to complement each other. Therefore the chemical data from both programs will be included in this report.

Table 4.7 summarizes the intended annual frequencies of channel monitoring during the period from 94/95 to 98/99. **Table 4.8** shows the monitoring frequencies from 94/95 through 98/99 for all harbor/bay stations. **Table 4.9** shows the monitoring frequencies of the 99-04 Program with the Nutrient TMDL additions in bold letters.

4.5 Methods of Data Analysis

The stormwater system monitoring program objectives as stated in the First Term Permits were:

a. To define the type, magnitude (concentration and mass load), and sources of pollutants in the stormwater system discharges within each permittee's respective jurisdiction so that appropriate pollution prevention and correction measures can be identified;

b. To evaluate the effectiveness of pollution prevention and correction measures; and

c. To evaluate the compliance with water quality objectives established for the stormwater system or its components.

The objectives of the Receiving Water Program were to "assess the effects of pollutants from stormwater system discharges on receiving water bodies, and to evaluate compliance with water quality objectives of the receiving water bodies."

This report will present a compilation of the results that addressed these objectives from the Annual Analysis of Data and Annual Status Reports for monitoring years 94/95 through 98/99. These results include mass loads and event mean concentrations from sampled storms and comparison of stormwater data to applicable water and sediment quality objectives.

Acute and chronic aquatic toxicity criteria from the CTR were used as guidance to evaluate dissolved metals data collected from storm channels and harbors. Water quality criteria from the CTR and other sources are presented in **Table 4.10.**

Sediment quality criteria from the National Oceanographic and Atmospheric Administration's (NOAA) Effects Range database were used as guidance to evaluate the toxicity of sediments in the harbors and bays. The Southern California Coastal Water Research Project's (SCCWRP) iron normalization procedure was also used evaluate harbor sediment quality relative to statistically predicted anthropogenic amounts of trace metals. Beginning in the 97/98 season iron was added to the suite of sediment analyses to allow this assessment. A summary of the sediment guidance criteria is found in **Table 4.11**.

4.5.1 Comparison to Water Quality Guidance

California Water Code Section 13170 authorizes the State Water Resources Control Board (SWRCB) to adopt water quality control plans for waters where standards are required by the Federal Clean Water Act (CWA) and its 1987 amendments, the Water Quality Act (WQA). According to Section 303(c)(2)(B) of the CWA, these plans must contain water quality objectives for priority pollutants that could be reasonably expected to affect the beneficial uses of the waters of the State. In April 1991, the SWRCB adopted the Inland Surface Waters Plan (ISWP) and the Enclosed Bays and Estuaries Plan (EBEP).

On October 15, 1993, Sacramento Superior Court Judge James L. Long granted a temporary injunction holding the ISWP and EBEP in abeyance. In March of 1994, a final Superior Court decision concluded that the plans were not adopted pursuant to California law, and as a result, the SWRCB rescinded the plans in September of 1994. The USEPA is required to promulgate standards for states that have not complied with the CWA to adopt standards for toxic pollutants. Currently both EPA and the SWCRB are beginning a process to implement replacement standards for California. These related processes where EPA establishes the standards (California Toxics Rule) and the State adopts an implementation policy are not expected to be completed until late 2000.

On August 5, 1997 the USEPA published Proposed Rules establishing numeric water quality criteria for priority toxic pollutants (commonly referred to as the California Toxics Rule [CTR]) for the State of California. The CTR proposes criteria for dissolved heavy metals in freshwater that are based on water hardness. Criteria for saltwater are also proposed. Although the Proposed Rule has not been formally implemented, the dissolved metals data were compared to the acute and chronic criteria for guidance purposes. Hereinafter, the water quality objectives contained in the CTR are identified as guidance rather than objectives. **Table 4.12** presents these guidance criteria for freshwater relative to water hardness. The saltwater guidance criteria are found in **Table 4.10**.

It has been argued that the CTR criteria for dissolved metals in fresh and saltwater are more scientifically valid for evaluating potential impairment to aquatic life than the ISWP and EBEP criteria for total recoverable metals since dissolved metals are considered more biologically available to aquatic organisms. Some dissolved metals however can be made non-toxic by interaction with organic compounds and still remain in the dissolved state. Toxicity testing should therefore be used to confirm impairment.

If the time period to which the guidance applies is less than the length of the sampled period, a measured concentration greater than that guidance value will constitute an exceedance. For example, if the 1-hour guidance for lead (at a hardness of 100 mg/L as $CaCO_3$) is 65 µg/L, a concentration of 68 µg/L during a 24-hour period will be considered an exceedance of the guidance.

In computing the mean concentration during a sampled period with multiple composite samples, values below the detection limit were assumed to be zero. This assumption allows for a more consistent evaluation from year to year as detection limits lowered with alternative methods of analyses or new technology. The assumption also gives greater confidence to a designation of an exceedance of a guidance criterion as it reduces the likelihood that the exceedance was caused by an erroneous estimation of a non-detected value.

In the early years of the program, metals analyses were performed using Inductively Coupled Plasma Spectroscopy (ICP). In some cases one half of the detection limit of this method exceeded the ISWP or EBEP guidance. Later in the program, Graphite Furnace Atomic Absorption Spectrophotometry (GFAA) replaced ICP for some of the metals analyses. The resultant detection limits decreased almost ten-fold for some metals. In 1996/97 Inductively Coupled Plasma Mass Spectrometry (ICP-MS) was used for seawater samples to lower detection limits below the applicable guidance criteria. In the 99-04 program ICP-MS will be used for all metals analyses.

With respect to the saltwater guidance from the CTR, the average concentrations of dissolved metals in depth-integrated samplings from each 4-day storm monitoring of the Harbors and Bays were compared to the 4-day guidance criteria. The dissolved metals concentrations in each grab sample were compared to the 1-hr acute toxicity guidance criteria. There is no chronic guidance criterion for silver so only the acute criterion was used. Since total chromium was analyzed only the Chromium III criteria were used.

4.5.2 Mass Load Calculations

Mass loads were calculated using chemical and hydrographic data. **Appendix 4.3** contains watershed maps for all of the channels monitored to date, with automatic samplers. On each map, the watershed boundary upstream of the monitoring site, hydrographic (water level station) and representative precipitation station are shown. Water level records from streamgaging stations at or near the sampling site were processed using Western Hydrologic Software. Water levels from the station's continuous stripchart recorder were digitized and converted to discharge rates using stage-discharge relationships (channel ratings). The digitized streamflow record was converted to ASCII format and imported to a Microsoft Excel file. Graphs of time vs. water level stage are contained in **Appendix 4.6**. The total discharge in ac-ft during each sampled period was computed. By multiplying the total water discharge per sampled period by the pollutant concentration of the composite sample from the period and applying the proper conversion factors (acre-feet to lbs. of water), a mass load in pounds or tons of contaminant was calculated. For data reported as ND (non-detected), one-half of reported laboratory detection limits were used in the calculations. **Appendix 4.7** contains the mass load data from each monitored storm.

The use of 1/2 the detection limit in the load calculation is consistent with the recommendations of the Water Quality Monitoring Program audit performed by Larry Walker and Associates during the 1994/95 season.

4.5.3 Event Mean Concentrations (EMCs)

Event mean pollutant concentrations were calculated to produce a site mean EMC that would be used in the estimation of the mass loads from unsampled storms and for comparison to data from the National Urban Runoff Program. To calculate the EMC of a monitored storm the sum of the mass load from each composite sampling during a storm was divided by the total sampled volume of water during the same period. After applying the appropriate conversion factors, an event mean concentration in mg/L or µg/L was calculated. The site mean EMCs were updated each year with the EMC data from that year. **Appendix 4.8** contains the calculated EMCs of each monitored storm. **Table 4.13** contains a year by year summary of the changes to the EMCs at each station.

4.5.4 Statistical Methods

Site mean EMCs were used to estimate mass loads from unsampled storms. To estimate these mass loads, the site mean EMC for a stormwater contaminant from a particular station was multiplied by the total annual volume of water discharged during unsampled storms, and the appropriate conversion factors. The site mean EMC was calculated from the set of calculated EMCs from each sampled storm from the beginning of the NPDES program. Only EMCs in which the 75-120% of the total storm runoff volume was sampled were used in the calculation. Each year the site means were updated with the data from that year.

The distribution of each EMC dataset was first evaluated for normality using the W Test developed by Shapiro and Wilk (1965). The W statistic was compared to a tabled value for a given value of α. To calculate W, the data from each station was first ordered from smallest to largest to obtain the sample order statistics $x_1 \leq x_2 \ldots \leq x_n$. k was then calculated from n where

$$k = \frac{n}{2} \text{ if n is even or}$$

$$k = \frac{n-1}{2} \text{ if n is odd}$$

$$W = \frac{1}{d}\left[\sum_{i=1}^{k} a_i \left(x_{(n-i+1)} - x_i\right)\right]^2$$

where $$d = \sum_{i=1}^{n} (x_i - \bar{x})^2 = \sum_{i=1}^{n} x_i^2 - \frac{1}{n}\left(\sum_{i=1}^{n} x_i\right)^2$$

Values of a_i were found in Table A6[1]. If the calculated W was less than the tabled value at the a (0.05) significance level, the null hypothesis was rejected and the distribution was considered normal. If the distribution was not normal at the α significance level the data was log-transformed and the W test was repeated to test for log-normality. If the distribution was not lognormal, the dataset was inspected for possible outliers. The Dixon test (for $n < 25$) was used to determine if the suspected points were outliers to a normal distribution. The procedure was performed as follows:

The dataset was ordered from smallest to largest that is $X_1 < X_2 < X_3 < \ldots X_n$. The Dixon ratio r, which is a function of n was calculated.

Number of Points	**Ratio Calculated**
n = 3 to 7	r_{10}
n = 8 to 10	r_{11}
n = 11 to 13	r_{21}
n = 14 to 25	r_{22}

Depending on which point was suspected of being the outlier, the ratio was calculated in the following manner:

r	**If X_n is Suspect**	**If X_1 is Suspect**
r_{10}	$(X_n-X_{n-1})/(X_n-X_1)$	$(X_2-X_1)/(X_n-X_1)$
r_{11}	$(X_n-X_{n-1})/(X_n-X_2)$	$(X_2-X_1)/(X_{n-1}-X_1)$
r_{21}	$(X_n-X_{n-2})/(X_n-X_2)$	$(X_3-X_1)/(X_{n-1}-X_1)$
r_{22}	$(X_n-X_{n-2})/X_n-X_3)$	$(X3-X_1)/X_{n-2}-X_1)$

Using Table A.7[2], the calculated ratio was compared to the critical value at a confidence level of 95%. If the calculated value was greater than the tabled value the suspected point was rejected and the distribution was retested to confirm normality.

For normal distributions the mean is calculated as the arithmetic mean, that is

$$\bar{x} = \frac{1}{n}\sum_{i=1}^{n} x_i$$

the confidence limits for the mean of a normal distribution with unknown variance is given by

[1]Gilbert, Richard O. Statistical Methods of Environmental Pollution Monitoring, 1987. Van Nostrand Reinhold, p259.
[2]Taylor, John Keenan. Statistical Techniques for Data Analysis, 1990. Lewis Publishers, Inc., p168.

$$\bar{x} - t_{(1-\alpha/2,n-1)}\frac{s}{\sqrt{n}} \le \mu \le \bar{x} + t_{(1-\alpha/2,n-1)}\frac{s}{\sqrt{n}}$$

where s is the standard deviation of the dataset and $t_{(1-\alpha/2,n-1)}$ is from table A2[3]. Using $\alpha = 0.05$ the upper and lower limits are calculated. The true mean μ will occur outside of this range 5% of the time.

For lognormal distributions the arithmetic mean and standard deviation of the log-transformed data were first computed. The estimate of the mean is given by the minimum variance unbiased estimate μ_1 which is defined as

$$\mu_1 = [\exp(\bar{x})]\Psi_n\left(\frac{s^2}{2}\right)$$

where $\Psi_n(t)$ is the infinite series defined by

$$\Psi_n(t) = 1 + \frac{(n+1)t}{n} + \frac{(n+1)^3 t^2}{2!n^2(n+1)} + \frac{(n-1)^5 t^3}{3!n^3(n+1)(n+3)} + \frac{(n-1)^7 t^4}{4!n^4(n+1)(n+3)(n+5)} + \bullet\bullet\bullet$$

$\frac{s^2}{2}$ is substituted for t and values for Ψ_n are calculated using formulas in a Microsoft EXCEL 7.0 spreadsheet.

The lower confidence limit of the mean is given by

$$LL_\alpha = \exp\left(\bar{x} + 0.5s^2 + \frac{sH_\alpha}{\sqrt{n-1}}\right)$$

and the upper limit is given by

$$UL_{1-\alpha} = \exp\left(\bar{x} + 0.5s^2 + \frac{sH_{1-\alpha}}{\sqrt{n-1}}\right)$$

The values of H_α and $H_{1-\alpha}$ were found in Table A10 - A13[4]

The sample median of each normal distribution was calculated by first ordering the sample population from smallest to largest.

sample median = $x_{(n-1)/2}$ if n is odd

[3]Gilbert, Richard O. Statistical Methods of Environmental Pollution Monitoring, 1987. Van Nostrand Reinhold, p255.

[4]Gilbert, Richard O. Statistical Methods of Environmental Pollution Monitoring, 1987. Van Nostrand Reinhold, pp264-265.

$$= \frac{1}{2}\left(x_{(n/2)} + x_{(n+2)/2}\right) \text{ if n is even}$$

The true median of a lognormal distribution can be estimated by

$$M_2 = \exp(\bar{x})\Psi_n(t)$$

where $\Psi_n(t)$ is the infinite series described above. In this case the value of $t = -s^2/[2(n-1)]$.

4.5.5 Assessing Anthropogenic Influence in Harbor Sediments

The SCCWRP database for iron normalization[5] was used to determine the presence of anthropogenic enrichment in sediments collected from Orange County harbors. SCCWRP developed regression equations for the each relationship between a heavy metal and the percentage of iron in sediments collected from non-impacted sites in the Southern California Bight. 99% confidence limits (2 standard deviations) were calculated for each regression equation. Concentrations of heavy metals greater than the upper confidence limits are considered to be the result of anthropogenic enrichment.

4.6 Analysis of Data

4.6.1 Field Screening

The intent of the Field Screening program was to identify areas where illegal discharges were occurring or where illicit connections to the stormdrain system were present. The data from this monitoring period identified only one illegal discharge that occurred from a golf course in southern Orange County. Unusually high dissolved copper concentrations in a channel were traced to golf course that had used copper sulfate for algae control in one of its lakes. The golf course superintendent was informed that release of water containing copper in such high concentrations was not allowed and the maintenance practices of this facility were modified to prevent future occurrences.

Appendix 4.1 contains the data from the Field Screening Program. **Appendix 4.9** contains rainfall graphs showing the time of each Field Screening sampling of rainfall runoff. Wet weather screening was performed at 26 stations during the 96/97 season. The greatest concentration of dissolved metals were found during the sampling of the first storm of the season on October 30, 1996. The data from these samplings are shown below.

[5] Southern California Coastal Water Research Project. Annual Report, 1996. Southern California Coastal Water Research Project Authority, pp68-76.

Station No.	Channel Name	Cu µg/L	Zn µg/L
1	Coyote Creek @ Monte Vista	12	195
6	Loftus Diversion Channel	20	140
7	Imperial Channel @ Imperial Hwy	24	259
11	Carbon Creek @ Placentia	14	86
32	Carbon Creek Div Ch. @ Santa Ana River	21	75
37	Collins Channel @ Santa Ana River	15	120
41	Bitterbush Channel u/s Santa Ana River	36	386
42	SE Anaheim Channel @ Santa Ana River	21	75

4.6.2 Channel Monitoring

Using the methods described in Section 4.5 data from each sampled storm event were used to compute the EMC and mass pollutant load for that storm. **Appendix 4.7** contains a summary of the mass load of sampled pollutants for storms sampled during monitoring years 94/95 through 98/99. **Appendix 4.8** contains the EMCs of each storm during that same period. **Appendix 4.10** contains the annual measured and estimated (from site mean EMCs) stormwater loads at selected stations. The 96/97 monitoring year was the most productive with respect to percentage of total stormwater volume sampled. At 5 of the 9 sites more than 50% of the total stormwater runoff was sampled.

As expected the years generating the greatest stormwater loads also had the greatest rainfall and runoff. The greatest loads were observed during the El Niño year (97/98). **Figure 4.2** shows the annual precipitation totals at three raingages in north, central and south Orange County. **Figure 4.3** shows the accumulated total throughout the year at the Santa Ana gage for seasons 94/95 through 99/00. As can be seen by **Figure 4.2**, the 94/95 and 97/98 seasons produced nearly double the annual rainfall of other years. The 97/98 season produced three times the amount of rain as the 98/99 or the 99/00 seasons. **Figure 4.3** shows that the greatest month of rainfall during the 94/95 season was January while February produced the greatest rainfall in 97/98.

The annual loads of nitrate, TSS, copper, lead, and zinc from each of the ten channels are graphically shown in **Appendix 4.11**. As expected the greatest annual water discharge and loads were observed from San Diego Creek at Campus Drive. An interesting anomaly was found in the data from San Diego and Peters Canyon Wash. In both 97/98 and 98/99, the total nitrate load calculated for San Diego Creek at Campus Drive was less than the sum of the loads from the upstream tributaries of San Diego Creek at Harvard and Peters Canyon Wash at Barranca Parkway. However, the sum of the water discharges, and loads of TSS, phosphate, copper, lead, and zinc from the two upstream tributaries were less their respective loads at Campus Drive.

The nitrate anomaly may have arisen from the fact that the EMC database for San Diego Creek at Campus was initiated during the El Niño year whereas the Peters Canyon Wash and San Diego Creek at Harvard databases were initiated during the 93/94 season. The stormwater concentration of nitrate unlike TSS, phosphate, and metals decreases with increasing stormwater runoff. The El Niño season had storms of record magnitude. The mean EMC is a year-to-year running average concentration. The EMCs from fourteen storms were monitored at Campus Drive during the El Niño season; only four were included from the following year. The average nitrate EMC during the El Niño season was 14.4 mg/L. The average during the next season was 20.0 mg/L. The site mean EMC only increased to 15.9 mg/L.

Dissolved metals data from each composite sampling were compared to the acute (1-hr) toxicity CTR guidance criteria from **Table 4.12**. Events characterized by at least 3.5 days of sampling were compared to the chronic (4-day) toxicity guidance criteria. The receiving water of each channel was also considered in this evaluation. If the channel discharged to a salt water receiving water the CTR salt water guidance criteria were also used. For channels that discharge to San Diego Creek, the freshwater CTR guidance criteria was used with the average water hardness from San Diego Creek. **Table 4.14** is a summary of these comparisons for seasons 96/97 through 98/99. As can be seen from the results, the constituents of concern are copper and zinc in channels that discharge to the ocean or the harbors and bays.

The first flush of a storm tends to exhibit the poorest water quality with respect to concentrations of metals. Since water hardness is typically very high during this period the probability of exceedance of the CTR acute toxicity guidance criteria for metals in freshwater is about the same as during other periods of a storm. Since the CTR toxicity guidance criteria for saltwater is not a function of hardness first flush discharges pose a greater concern. **Appendix 4.12** is a compilation of all of the first flush data collected from 95/96 to 98/99. The data representing the first storm of each respective season is highlighted.

Of the 153 samplings for dissolved metals 31 exceeded the CTR acute toxicity guidance criteria for copper and 16 exceeded the criteria for zinc. Nearly all samples (96 of 97) from channels discharging to salt water exceeded the CTR salt water guidance criterion for copper and about a third (33 of 97) of the zinc concentrations exceeded the saltwater guidance criterion.

4.6.3 Harbor/Bay Monitoring

Beginning in monitoring year 97/98 dissolved metals analyses were conducted on depth integrated stormwater samples from the bays. The dissolved metals data from each storm were compared to water quality guidance criteria (acute and chronic toxicity) from the CTR. Values below detection limits were considered zero when calculating means. Means calculated from detection limit values are preceded by a ">" in **Appendix 4.3**. Nearly every sample contained copper above the acute toxicity guidance criterion of 3.1 µg/L. The four-day average concentrations at each site exceeded the chronic toxicity guidance criterion of 4.8 µg/L.

Time series plots of the tributary discharge, precipitation and tide stage during each monitored storm can be found in **Appendix 4.13**.

Newport Bay

On December 6 - 10, 1997 the runoff of a record storm was monitored in the Newport Bay. Nearly 7 inches of rain and a peak discharge of nearly 40,000-cfs in San Diego Creek were measured on December 6th.

On March 26-30, 1998, the bacteriological quality of the Newport Bay was monitored. Nearly an inch of rainfall and a peak discharge rate of approximately 5,000 cfs in San Diego Creek were recorded on the 25th. Approximately 0.5 inches of rainfall and a peak discharge of approximately 1,000 cfs were recorded on the the 28th. A summary of the results in MPN/100 ml are presented below.

Date	Analysis	UNBJAM	UNBSDC	UNBBCW	UNBNSB	UNBNDB
3/26	Total Coliform	≥160,000	≥160,000	≥160,000	160,000	≥160,000
	Fecal Coliform	17,000	11,000	5,000	14,000	160,000
3/28	Total Coliform	90,000	230	8,000	24,000	3,000
	Fecal Coliform	24,000	230	3,000	5,000	800
3/30	Total Coliform	5,000	7,000	3,000	1,700	5,000
	Fecal Coliform	500	300	230	230	110

The data show significant reduction in total and fecal coliform levels after the initial stormwater discharge.

The bacteriological quality in Newport Bay was monitored during two storms in 98/99. Samples for total fecal coliform were collected at the surface and mid-depth at each station in the Upper Bay on each day of storm sampling. **Figure 4.4** and **Figure 4.5** show the results of these samplings. Consulting these figures and the respective time series plots of rainfall, runoff and tide stage from Appendix 4.13 it can be seen that the bacteria levels decline significantly after two days of tidal flushing and no precipitation. From **Figure 4.4** the fecal coliform levels at all but the most upstream sampling location decreased to below the detection limit (200 MPN/100 ml) after 4 days of tidal flushing and no precipitation.

Huntington Harbour

In March of 1999 the influence of storm runoff into Huntington Harbour was monitored. As can be seen from these plots the total precipitation during the four days of sampling was approximately 0.55" and the discharge from the Bolsa Chica Channel peaked at approximately 700 cfs at about 2 PM on the first day of sampling. Bacteriological samples were collected from the surface at four sites in Huntington Harbour on the first day of sampling (March 25, 1999). The results of this sampling are presented below.

DATE	Analysis	HUNWAR	HUNCRB	HUNSUN	HUNBCC
3/25/99	Total Coliform	170	11,000	300	22,000
3/25/99	Fecal Coliform	170	5,000	170	4,000

The data show that bacterial levels are greatest nearest the discharge points of flood control channels. HUNBCC is near the outlet of the Bolsa Chica Channel and HUNCRB is near the outlet of the Sunset Channel.

4.6.4 Semiannual Sediment Sampling

Beginning in 97/98 analyses for iron concentration and particle size distribution were conducted on sediment samples collected from the bays and harbors. These additional analyses were added to provide information that could be used to explain differences between stations or between samplings at the same station.

Particle size distribution data from the basin downstream of Campus Drive show that the sediment after the El Nino season was predominately sand. Prior to the El Niño year the sediment was approximately 70% sand; three subsequent samples collected in the Summer of 1998, Fall of 1998, and Spring of 1999 show 97%, 96%, and 99% sand respectively. The data from UNBSDC in the Upper Newport Bay showed an interesting pattern of higher sand content prior to each of the last two storm seasons. These data are presented below.

Date	10/30/97	6/23/98	11/4/98	5/27/99
%Sand	64.1	5.4	57.7	15.3

SCCWRP's iron normalization procedure was again used to determine the presence of trace metal enrichment in the sediments from the bays and harbors. Using the regression equations and 99% prediction intervals (**Table 4.11**) it was determined that almost every site in Huntington Harbour and Dana Point Harbor was anthropogenically (caused by the actions of man) enriched with lead, copper, and zinc. The Rhine Channel showed similar results. The furthest upstream sampling point in the Upper Bay (UNBJAM) showed almost no anthropogenic influence. This observation may be due to limited sedimentation of finer stormwater particulates contaminated with metals or less influence by powered recreational boats in the area.

The database for harbor and bay sediments was evaluated using NOAA's guidance criteria for sediment toxicity. These criteria are used by SCCWRP in assessing the toxicity of sediments collected from the Southern California Bight. Concentrations of metals and organic compounds from Newport Bay, Bolsa Bay, Huntington Harbour and Dana Point Harbor were compared to NOAA's ER-Ms (Effects Range Median). An ER-M is a predicted concentration at which half of the test organisms in a toxicity test would show a toxic effect.

In the Rhine Channel of the Lower Newport Bay several exceedances of the ER-M for copper were found. Several exceedances of the ER-M for the DDT metabolite p,p' DDE were found in the samples collected from the Upper and Lower Newport Bays and Huntington Harbour (see **Appendix 4.5).** Other studies conducted in these harbors have found significant sediment toxicity or the same constituents of concern in the tissues of indicator organisms. These studies include the SWRCB's State Mussel Watch (SMW) and Toxic Substance Monitoring Program (TSMP); and the study conducted by NOAA, SWRCB and various other agencies, entitled "Chemistry, Toxicity, and Benthic Community Conditions in Sediments of Selected Southern California Bays and Estuaries." Data from these reports that were collected in Orange County waterbodies during the period of the permit (1991 - present) are presented in **Appendix 4.14**. The results of these studies were used to evaluate some of the impairments of the beneficial uses of the CARs.

5.0 MEASURING PROGRAM EFFECTIVENESS

5.1 Introduction

There are generally two accepted methodologies for assessing the performance of the BMP effectiveness: conventional monitoring (such as water quality monitoring) and non-conventional monitoring.

An accurate, quantifiable assessment of the cumulative effectiveness of current BMPs is difficult for a variety of reasons that include:

1. Non-structural BMPs began to be implemented prior to the stormwater mandate, meaning no "baseline" monitoring data representative of "pre-BMP" conditions can be identified;

2. The BMPs identified in the DAMP are being implemented incrementally on a countywide basis. Since, to date, no watershed has been uniquely subject to a single BMP, the influence of an individual BMP upon the overall surface water quality cannot be readily determined yet;

3. There is considerable variability in water quality data that complicates any statistical correlation of the data with storm frequency, storm length and intensity, land use, or land management practices. This is even more compounded by storm seasons in recent years that have varied much in their intensity, duration and volume;

4. Many of the BMPs identified in the DAMP are implemented to address the issues associated with a specific land use. However, since the land uses are so blended within the watersheds, it has not proven possible to characterize the effects of those specific BMPs; and

5. Factors other than chemical water quality may be more directly responsible for impairment of beneficial uses, yet all these factors combine in their effects and are difficult to separate one from another.

Assessing the cumulative effect of BMPs employed countywide on the water quality of receiving waterbodies may take a number of years. There are however, a number of programs that are currently contributing to the assessment of individual project BMP performance.

The Permittees will continue to assess and evaluate the data from these and other studies in order to try and determine the overall effectiveness of the implementation of the BMPs on the water quality within Orange County. The following sections discuss these methodologies and detail Permittee efforts in each.

Additional studies of the Newport Coast development have been proposed for the winter-spring period of 1999-2000 in Muddy Canyon. This initial data collection will provide baseline information on the storm runoff from Muddy Canyon and will likely be repeated as project build out occurs providing information on the impact of the development and the effectiveness of the BMPs implemented.

Newport Bay Watershed Nitrate Reduction

Newport Bay currently faces an eutrophication problem due primarily to the excessive use of nutrients in the watershed. The nutrient loads (nitrate) reaching Newport Bay reached a peak of approximately 1.6 million pounds in 1985-1986. At that point the nitrate loads reaching the bay began to decrease reaching an annual average of just over 0.8 million (50% reduction) from 1990 to 1997.

This reduction can be partially attributed to the use of drip irrigation on agricultural areas owned by The Irvine Company and increased runoff controls at the watershed's major nurseries. As additional measures to reduce the nitrate loading in the watershed are implemented by the watershed's stakeholders in the coming years, the total nitrate load and the eutrophication problem in the bay will also be reduced.

One project potentially contributing to a further reduction of nitrate is the San Joaquin Marsh Pond Demonstration Project. Installed and monitored by the Irvine Ranch Water District, these ponds have been supplied with water from San Diego Creek from June 1998 to the present. Total nitrogen reduction (difference between the influent total nitrogen and the pond effluent total nitrogen returned to the creek) has ranged from 7-10 mg N/l during the spring, summer and fall months to a reduction of 5mg n/l or less during January. The variability of nitrogen reduction was dependent upon temperature. Total nitrogen removal (difference in mass of total nitrogen entering the ponds and leaving the ponds) over the 405 day monitoring period was 51 tons. This equates to 46 tons annually, or 252 pounds of nitrogen removed per day.

In addition to the watershed actions pursued to date, the Co-permittees have initiated a program to study in greater detail the urban nutrient loading in this watershed and to identify additional BMPs for more intensive study (Newport Bay Watershed Urban Nutrient TMDL Technical Report, September 1999 and Newport Bay Watershed Urban Nutrient TMDL Compliance Evaluation, July 2000 **Appendix N**).

5.0 MEASURING PROGRAM EFFECTIVENESS

5.1 Introduction

There are generally two accepted methodologies for assessing the performance of the BMP effectiveness: conventional monitoring (such as water quality monitoring) and non-conventional monitoring.

An accurate, quantifiable assessment of the cumulative effectiveness of current BMPs is difficult for a variety of reasons that include:

1. Non-structural BMPs began to be implemented prior to the stormwater mandate, meaning no "baseline" monitoring data representative of "pre-BMP" conditions can be identified;

2. The BMPs identified in the DAMP are being implemented incrementally on a countywide basis. Since, to date, no watershed has been uniquely subject to a single BMP, the influence of an individual BMP upon the overall surface water quality cannot be readily determined yet;

3. There is considerable variability in water quality data that complicates any statistical correlation of the data with storm frequency, storm length and intensity, land use, or land management practices. This is even more compounded by storm seasons in recent years that have varied much in their intensity, duration and volume;

4. Many of the BMPs identified in the DAMP are implemented to address the issues associated with a specific land use. However, since the land uses are so blended within the watersheds, it has not proven possible to characterize the effects of those specific BMPs; and

5. Factors other than chemical water quality may be more directly responsible for impairment of beneficial uses, yet all these factors combine in their effects and are difficult to separate one from another.

Assessing the cumulative effect of BMPs employed countywide on the water quality of receiving waterbodies may take a number of years. There are however, a number of programs that are currently contributing to the assessment of individual project BMP performance.

The Permittees will continue to assess and evaluate the data from these and other studies in order to try and determine the overall effectiveness of the implementation of the BMPs on the water quality within Orange County. The following sections discuss these methodologies and detail Permittee efforts in each.

5.2 Conventional Monitoring

5.2.1 Water Quality Monitoring

Orange County has been implementing a water quality monitoring program since the Regional Boards approved its program in January 1991. In accordance with the requirements of the initial permit, one specific objective of this program is to evaluate the effectiveness of pollution prevention and correction methods. The channel monitoring element of the monitoring program discussed in Section 4.0 directly addresses this objective. Additional information on specific monitoring programs dealing with BMP implementation and effectiveness on individual development projects is discussed in Section 5.2.2.

Data from the channel monitoring program discussed in Section 4.0 highlights the broad spatial differences with regard to suspended/settleable solids, nutrient loading and potential for aquatic toxicity due to dissolved metals in channels draining predominantly urban watersheds. Aquatic toxicity guidance criteria were provided by the California Toxics Rule (CTR). The spatial variations in water quality may be interpreted as reflecting differences in watershed land uses, imperviousness and the very low hardness of rainwater draining off into flood control facilities.

In the context of stormwater quality management, the use of CTR criteria exceedances as an indicator of adverse impact will need to be validated since it now recognized that water quality is only one of many determinants that include water temperature, habitat, bank stability, etc., of beneficial use attainment.

5.2.2 Effectiveness of Pollution Prevention and Correction Measures

The paragraphs above have discussed the difficulty in assessing the cumulative effect of BMPs employed countywide on the water quality of receiving waterbodies. That assessment cannot be made for many years. There are however, a number of programs that are contributing to the assessment of individual project BMP performance. There are also monitoring programs in place that are intended to measure the quality of runoff from individual project sites. The following discussion provides information on some of these programs.

Las Flores Storm Water Quality Basins

The Las Flores community, located easterly of Mission Viejo, has two water quality basins that were constructed in the early 90's by the Santa Margarita Company to treat the first flush (1/2" of rain) effects of urban runoff from the 592 acre planned development. The conditions of approval for the development called for the developer to begin monitoring wet and dry weather runoff from the community once the tributary area to each basin was 50% complete.

The Northwest Water Quality Basin (8 ac-ft volume) has been treating wet and dry weather runoff from 189 acres of the development for the past three storm seasons. Analysis of grab samples taken from the inlet and outlet of the basin has thus far provided inconclusive results on the basin's effectiveness. In an effort to improve on the sampling techniques and obtain samples more representative of the water flowing in and out of the basin, automatic storm sampling equipment was used during the 1998-1999 storm season. Although this sampling is complete the results have not been made available. This might be attributed to an efficient source control BMP program that utilizes drought resistant plants, reduced applications of pesticides and fertilizers and public education.

The southerly portion of the development serviced by the Southwest Detention Basin, the larger of the two basins (16 ac-ft volume, 403 acres tributary), has reached 50% development and was scheduled to start monitoring during the 1997-1998 storm season. However, due to vandalism of the sampling equipment the sampling schedule was delayed and only one dry monitoring sequence was completed. Additional sampling was scheduled for 1998-1999. Up to now the basin has served primarily to intercept sediment from construction within the development which would naturally drain directly to Trabuco Creek, a natural creek.

Newport Coast Golf Course and Muddy Canyon Studies

In 1992, The Irvine Company initiated a water quality monitoring program to assess the runoff from Pelican Hills Golf Course as part of the condition of approval for the project. For the monitoring program, stations were located on land, in the surf zone and in the offshore subtidal areas. Additional stations were also located southerly of the golf course as reference control monitoring sites for comparison with the runoff stations. The monitoring program included chemical monitoring for nutrients (nitrate and phosphate) and a marine ecological component conducted in the ocean's waters in the 1995-1996 storm season to assess the runoff's impact on three indicator plants (Eisenia, Egregia and Phyllospadix) that are known to react quickly to increased nutrient levels by increasing their growth rates. The ecological study also evaluated animal epibionts living on these plants.

The general conclusions of the study found that the nutrient levels measured at the fresh water monitoring stations were reduced to such low concentrations by the time they reached the surf and subtidal stations that there were no significant differences between the runoff monitoring stations and the reference control stations. The low levels of nutrients from the golf course may be partially attributed to computer controlled fertilizer rates and efficient irrigation. In addition, the 1995-1996 marine ecological component of the study found that there were no statistical significant or detectable effects from storm water between the control stations and runoff stations on the three indicator plants studied.

Additional studies of the Newport Coast development have been proposed for the winter-spring period of 1999-2000 in Muddy Canyon. This initial data collection will provide baseline information on the storm runoff from Muddy Canyon and will likely be repeated as project build out occurs providing information on the impact of the development and the effectiveness of the BMPs implemented.

Newport Bay Watershed Nitrate Reduction

Newport Bay currently faces an eutrophication problem due primarily to the excessive use of nutrients in the watershed. The nutrient loads (nitrate) reaching Newport Bay reached a peak of approximately 1.6 million pounds in 1985-1986. At that point the nitrate loads reaching the bay began to decrease reaching an annual average of just over 0.8 million (50% reduction) from 1990 to 1997.

This reduction can be partially attributed to the use of drip irrigation on agricultural areas owned by The Irvine Company and increased runoff controls at the watershed's major nurseries. As additional measures to reduce the nitrate loading in the watershed are implemented by the watershed's stakeholders in the coming years, the total nitrate load and the eutrophication problem in the bay will also be reduced.

One project potentially contributing to a further reduction of nitrate is the San Joaquin Marsh Pond Demonstration Project. Installed and monitored by the Irvine Ranch Water District, these ponds have been supplied with water from San Diego Creek from June 1998 to the present. Total nitrogen reduction (difference between the influent total nitrogen and the pond effluent total nitrogen returned to the creek) has ranged from 7-10 mg N/l during the spring, summer and fall months to a reduction of 5mg n/l or less during January. The variability of nitrogen reduction was dependent upon temperature. Total nitrogen removal (difference in mass of total nitrogen entering the ponds and leaving the ponds) over the 405 day monitoring period was 51 tons. This equates to 46 tons annually, or 252 pounds of nitrogen removed per day.

In addition to the watershed actions pursued to date, the Co-permittees have initiated a program to study in greater detail the urban nutrient loading in this watershed and to identify additional BMPs for more intensive study (Newport Bay Watershed Urban Nutrient TMDL Technical Report, September 1999 and Newport Bay Watershed Urban Nutrient TMDL Compliance Evaluation, July 2000 **Appendix N**).

Newport Bay/San Diego Creek Sediment Reduction

The Newport Bay watershed, like the County of Orange, has transitioned from predominantly agricultural land uses to a more urban setting over the years. As a result of development, agriculture and land erosion, the amount of sediment discharged from the watershed created sediment deposition problems in Newport Bay.

To address the bay's sediment problems, a 208 Areawide Study Plan was completed in 1982. That plan recommended that foothill, in-channel and in-bay basins in Upper Newport Bay be constructed within the watershed to intercept sediment reaching Newport Bay. To date, as recommended by the report, foothill, in-channel and in-bay basins have been constructed and are achieving their intended function. There are three in-channel basins in San Diego Creek. In-channel basin 1 is located downstream of Campus Drive, while in-channel basins 2 and 3 are located upstream. In-channel basin 1 is currently maintained by the Irvine Ranch Water District and is being cleaned to design capacity. Basins 2 and 3 have greater than 50% catch capacity and do not currently require cleaning. With continued basin and channel maintenance, individual construction project BMPs, and other BMPs employed by the watershed's stakeholders, it is expected that the sediment load into the bay will continue to be significantly reduced in the coming years with the objective of meeting TMDL targets.

A new sediment monitoring program adopted by the Santa Ana Regional Water Quality Control Board on November 19, 1999 is designed to determine compliance with sediment TMDL land use allocations. The program will result in additional data collection in the Santa Ana-Delhi Channel in 1999-2000 and additional load monitoring stations being added in the subsequent two years.

Additional sediment analyses have recently been completed (Preliminary Sediment Load Allocation Analysis for San Diego Creek and Newport Bay, Tetra Tech 1999 and Hydraulic/Sediment Analysis for San Diego Creek Watershed, Tetra Tech, July 2000) that will form the basis for financing erosion and sediment control further during the next permit term.

In addition to the basins in the watershed, a special effort worth noting is the experimental program conducted at Round Canyon Detention Basin. The basin had the lower part of its outlet tower wrapped by filter fabric in an attempt to capture the finer sediment particles leaving the basin. It was felt that decreasing the openings at the lower part of the tower would prevent the finer sediment particles such as silt and clay from flowing out the basin. It was also felt that the filter fabric would increase the storm water detention time in the basin resulting in increased sediment deposition.

Capturing the finer particles is important because nutrients from the watershed may attach themselves to these particles as they leave the basin and find their way to Newport Bay. If the Bay's tidal exchange is unable to carry these particles into the ocean, the particles will end up as sediment deposition in the Bay. The preliminary results indicated an increase in the percentage of silt and clay captured. Based upon these results, the outlet tower at Bee Canyon was also wrapped with filter fabric. Both towers will remain wrapped in the future.

San Joaquin Hills Transportation Corridor Water Quality Basins

The Transportation Corridor Agencies have installed a number of water quality basins along the San Joaquin Hills Transportation Corridor to treat storm water runoff from the toll road. The water quality basins are open-aired, rectangular in shape, made of concrete and are divided into a number of different cells. Treatment of the storm water is through layers of compost material that acts as a filter. The treated water is removed from the basins by underdrain pipes surrounded by rock and filter fabric below the compost material.

To assess the treatment efficiency of these basins, Caltrans initiated a study of two basins during 1998-99. One basin was located in North Hollywood at a maintenance yard and the second basin was the Bonita Canyon basin located off the San Joaquin Hills Corridor in Orange County. The recently concluded study (Caltrans Compost Stormwater Filters Bonita Canyon & North Hollywood Maintenance Yard, Storm Water Monitoring 1997/1998 Wet Season, June 10, 1998) provides only one season's worth of monitoring but generally seems consistent with a similar type basin tested by Stormwater Management (manufacturer) in the early 1990's.

The results of the study for the five 5 storms monitored in 1997-98 show event mean concentration reductions for motor oil, diesel, and oil and grease ranging from 14 % to 64 %; fecal coliform (80%), Chemical Oxygen Demand (32%), metal removal (chromium, copper, lead, nickel and zinc) ranging from 33 to 72% and removal efficiencies of 72% for total suspended solids. The results also show that there was an increase in the effluent concentrations for total dissolved solids (24%) and nutrients (nitrate, nitrite, total phosphorous, total Kjeldahl nitrogen (TKN), dissolved phosphorous) ranging from 133% (TKN) to 1633% (dissolved phosphorous). The adverse reactions indicate that there were ongoing reactions in the basin that added to the effluent concentration of these water quality parameters. The original tests conducted by Stormwater Management also showed increases for nitrate nitrogen (145%) and dissolved phosphorous (197%) but not TKN and total phosphorous. However, the event mean effluent concentrations are still fairly small, 0.52mg/l for dissolved phosphorous and 3.46 mg/l for nitrate.

Additional information regarding these water quality basins has not been received.

Eastern Transportation Corridor Evaluation Monitoring Program

In contrast to the normal chemical monitoring program usually undertaken to assess storm water impacts, the monitoring program for the Eastern Transportation Corridor utilizes direct measurements of the receiving water quality in Newport Bay. While the project still utilizes conventional BMPs such as detention basins, erosion control measures, litter control and public education, it focuses on measuring the toxicity of the receiving waters to assess storm water impacts.

Preliminary studies conducted by Dr. Fred Lee, a consultant to the Transportation Corridor Agencies, showed a significant toxicity on the test organism, *Ceriodaphnia dubia*, in the runoff waters of San Diego Creek. A Toxicity Identification Evaluation (TIE) test found that a portion of the toxicity was attributed to the organophosphate pesticides Diazinon and Chlorpyriphos. These pesticides were found at levels below 1 ppb, but are very toxic to *Ceriodaphnia*. Since the initial study the project was expanded to include seven stormwater runoff events, four dry weather flow samples, the Santa Ana Delhi Channel and another test organism, *Americamysis bahia*.

The first phase of the study concluded that San Diego Creek stormwater runoff is toxic to *Ceriodaphnia* and mysids, primarily due to the organophosphate pesticides diaznon and chlorpyrifos and additional unknown constituents. The source of this toxicity is speculated to be urban residential use for lawn and garden pest control and commercial nurseries. The study suggests that the water quality significance of this toxicity primarily lies in the exposure to marine zooplankton that migrate into the mixed water lens formed at the interface of San Diego Creek and Upper Newport Bay. The report also concludes that further study is necessary to identify the water quality significance of the toxicity on marine zooplankton based upon exposure and migration patterns. In addition, it will be necessary to perform specific monitoring of a small residential subdivision defining organophosphate usage to determine if pesticides are a significant source of runoff toxicity.

City of Irvine Oil/Water Separators

The City of Irvine has installed two oil/water separators to treat water at their City Hall and Operations Support Fueling Facility. The results of two tests indicated that the oil/water separator is removing diesel fuel, gasoline and oil and grease to limits below detection where the initial amount was measurable. In addition, a new fueling system installed concurrently with the separators has reduced operator drive off with the pump engaged. The combination of the oil/water separators and the new fueling system has reduced contaminant levels to non-measurable amounts.

5.3 Non-Conventional Monitoring

The California Best Management Practices (BMP) Handbook defines "non-conventional monitoring" as the enumeration of some quantity other than water quality data to infer pollution reduction or water quality improvement. Examples cited include surveys of public opinion to demonstrate increasing environmental awareness, monitoring of the amount of used oil being delivered to household hazardous waste collection centers, etc.

Section 3.0 presents data on the extent of BMP implementation and the volume of potential pollutants that are being diverted from the storm drain system: pollutants that would otherwise contribute to water quality problems.

5.3.1 Public Opinion Survey

1994 Stormwater Pollution Prevention and Flood Awareness Survey

In 1994 the University of California at Irvine (UCI) conducted a public education survey on behalf of the NPDES Stormwater Program as a part of the Orange County Annual Survey. This survey was co-directed by Mark Baldassare and Cheryl Katz of the University of California, Irvine. The Stormwater Pollution Prevention and Flood Awareness Survey comprised 10 questions on topics such as awareness and knowledge. The intent of the survey was to gather information on the public's perception regarding storm water.

For this telephone survey, random samples of 1,000 Orange County adults were interviewed over the period August 19-29, 1994. The sampling error was three percent for the total sample. The key results of this survey were:

- Eighty-six percent say it is illegal to throw materials into the storm drain. However, nearly half of Orange county adults believe that the storm drain system and the sewer system are the same (44%) and that the water in storm drains is filtered and tested before it leaves the system (48%). Older Anglo, South County and higher socioeconomic status residents tend to know more about stormwater pollution.

- Thirty-three percent have seen public service announcements on television about dumping in storm drains, while 8 percent have seen brochures and 60 percent have noticed the "No Dumping" messages stenciled on curbs or storm drains. The study notes that, in general, exposure to announcements and warning signs on curbs lead to greater awareness of stormwater pollution prevention.

The main finding of the survey was that the public assumed that storm water was being treated. As a result of that finding, an effort was made to stencil storm water inlets with a uniform message throughout the county that informs the public that storm water drains directly to the ocean.

2000-2001 Public Opinion Survey

During 1998/99 the Permittees developed a long term NPDES public and business education strategy (Section 3.3). The strategy was finalized in September 1999 and began to be implemented in 1999/2000. The Permittees shall complete a public awareness survey by December 2001 to determine the effectiveness of the public and business education strategy to date and to provide direction to the overall program for the Third Term Permit period. The results of this survey will be available in the 2002 Annual Status Report.

5.3.2 Illegal Discharges

Section 2.4.1 presents information relating to the incidents involving hazardous materials to which the Principal Permittee and/or other Permittees responded. For FY 1999/00, **Figure 2.1** illustrates the sources of water pollution incident reports received by the Principal Permittee with the cities and the public constituting over 60% of the sources and **Figure 2.2** illustrates the types of materials involved **(Table 2.2).**

There was a marked increase in the number of water pollution incidents that were reported from 1990-1994 (808) and 1995-2000 (1872). This increase is likely due to the increased public and agency awareness regarding the problem of disposing or washing materials into the storm drains and that the storm drains flows directly to the ocean.

5.3.3 Public Agency Activities

It is recognized in the DAMP that there are many existing public agency activities that contribute to the control of urban stormwater pollution. Consequently, a major part of DAMP implementation involves instituting regular documentation of such activities for the purpose of non-conventional monitoring (see section 3.0). This report marks the seventh year of "full" DAMP implementation.

Over the second permit term, this data has yielded information on the extent of BMP implementation and the volume of specific pollutants that are being diverted from the storm drain system.

Drainage Facility Maintenance

From 1993 to 1999 the efforts to clean out the drainage facilities and the quantity of material removed have doubled. During FY 1999/00 twenty-eight Permittees reported the removal of 15,381 cubic yards and 23,907 tons of material from 218.8 miles of storm drains and 21,284 drain inlets. By removing this amount of material from the catch basin inlets and stormdrain system, the Permittees made a significant contribution in preventing problems downstream.

Household Hazardous Waste Collection

Orange County has an effective household hazardous waste collection program administered by the Integrated Waste Management Department (IWMD). The amount of material collected by these four sites has increased by over 400,000 pounds since 1994 (2,896,967 pounds of household hazardous waste in 1999/00 and 2,449,902 pounds of waste in 1994).

In addition, some Permittees also conduct special events such as waste oil or household hazardous waste roundups. In 1994 four Permittees reported conducting such events and in 1999/00 seven Permittees reported conducting similar events. These events resulted in the collection and proper disposal of an additional 190,905 pounds of household hazardous waste.

The increase in the amount of household hazardous waste collected and properly disposed of is encouraging since these materials can pose a serious threat to human health and the environment if disposed of incorrectly.

6.0 FISCAL ANALYSIS (DAMP Section 2.2.2)

6.1 Introduction

This Section provides a fiscal summary and analysis of the activities of the Permittees for 1999/00 and provides a trend analysis of program costs over the second term permit.

"Capital costs" refers to expenditures for land, large equipment, and structures. "Operations and Maintenance costs" refers to normal costs of operation including the cost of keeping equipment and facilities in working order.

Information on the funding sources for these expenditures are located in Section 6.4 of this report. The individual costs and funding sources for each Permittee for 1999/00 are summarized in **Tables 6.1 through 6.99** of this report. The six year summary is provided in **Table 6.100**.

6.2 Shared Costs

Shared costs are those that fund activities performed by the Principal Permittee, on behalf of the Permittees as established under the stormwater program's Implementation Agreement. Each municipality's contribution to the shared costs is determined by a formula established in the Implementation Agreement, based on the population and land area of each jurisdiction.

Program management activities handled by the Principal Permittee include development and execution of intergovernmental agreements, representation on the California Storm Water Quality Task Force, preparation of compliance reports, budgets and other program documentation, representation of the program before appropriate agencies such as the Regional Water Quality Control Boards and the State Water Resources Control Board, procurement and subsequent coordination of consultant studies and coordination with Permittee representatives.

Total shared cost expenditures have increased incrementally over the last five years from $748,980 in 1995/96 to a projected $1,089,397 in 2000/01. **Figure 6.1** illustrates this gradual increase.

6.3 Individual Costs

Individual costs are those incurred by each Permittee through implementation of the various Best Management Practices (BMPs) discussed in the DAMP. These BMPs, as discussed in Section 3.0, include a wide range of existing activities, such as street sweeping, litter control and emergency spill response, as well as new programs, such as facility inspection, drain inlet/catchbasin stenciling and dissemination of public education materials.

The individual costs incurred by each Permittee vary widely for each municipal activity identified as a BMP. This variation reflects a number of factors, including area, population and land use. These costs are detailed for each Permittee for FY 1999/00 in **Table 6.1 through 6.99** and are presented separately as costs incurred specifically to implement DAMP programs and as costs incurred for previously existing programs that meet DAMP objectives. Estimates of costs to be incurred in fiscal year 2000/01 are also included in **Tables 6.1 through 6.99.**

Total individual cost expenditures attributable to the DAMP have increased from $2,625,025 in 1996/97 to $6,924,985 in 1999/00. The most significant increase occurred last year; individual cost expenditures rose from $3,470,398 in 1998/99 to $6,924,985 in 1999/00. **Figure 6.1** illustrates these increases.

6.4 Funding Sources

Funding sources to implement DAMP programs and funding sources to implement previously existing programs that meet DAMP objectives include both general and specific funds, taxes, maintenance and user fees, and grants.

In 1999/00, General Funds were the most utilized funding source (66%) followed by Gas Taxes (9%), Sewer and Storm Drain Maintenance Fees (7%), Sanitation Fees (5%), Benefit Assessments (3%) and a Special District Fund (1%). This distribution has remained fairly consistent over the last five years. A breakdown of funding sources by Permittee is presented in specific tables throughout **Tables 6.1 through 6.99.**

In number of cases, certain DAMP elements were implemented by such groups as the Boy Scouts of America and Surfrider. No fiscal value is attributed to these volunteer contributions.

6. 5 Funding Changes Over the Second Term Permit Period

Over the last five years, the total cost of the activities undertaken by the Principle Permittee (shared costs) and the activities undertaken by the Permittees implementing those programs required specifically by the DAMP (Individual Costs attributable to the DAMP) increased from $3,434,627 in 1996/97 to$7,868,052 in 1999/00 **(Table 6.100).**

Similarly, the total reported cost of the municipal activities that contribute to nonpoint source pollutant control, identified in the subsequent tables as pre-existing programs, increased from $47,619,624 in 1996/97 to $88,256,559 in 1999/00. For 1999/00 the areas of greatest cost, based upon the information provided, in order of significance were:

1. Recycling
2. Street Sweeping
3. Drainage Facility Maintenance
4. Public Property & Street Chemical Spill Response
5. Program Administration

TABLES

Table 6.1

County of Orange
Fiscal Analysis Summary

CAPITAL COSTS
(land, large equipment, and structures)

DAMP Cost Elements		1999/2000 FY Costs		Projected 2000/01 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$0	$0	$0	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$0	$0	$0
	Recycling	$0	$0	$0	$0
	Drainage Facility Maintenance	$0	$0	$0	$0
	Catch Basin Stenciling	$0	$0	$0	$0
	Street Sweeping	$0	$0	$0	$0
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$0	$0	$0	$0
	Pesticide & Fertilizer Management	$0	$0	$0	$0
PUBLIC INFORMATION DAMP (Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	$0	$0	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$0	$0	$0	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$0	$0	$0	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$0	$0	$0	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$0	$0	$0
TOTALS		$0	$0	$0	$0

Table 6.2

County of Orange

Fiscal Analysis Summary

OPERATIONS AND MAINTENANCE

DAMP Cost Elements		1999/2000 FY Costs		Projected 2000/01 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$42,322	$280,678	$51,597	$273,973
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$660,615	$0	$1,078,774
	Recycling	$0	$0	$0	$0
	Drainage Facility Maintenance	$144,247	$1,632,599	$255,568	$1,101,260
	Catch Basin Stenciling	$17,245	$0	$13,563	$0
	Street Sweeping	$63,000	$52,853	$190,000	$52,853
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$0	$0	$0	$0
	Pesticide & Fertilizer Management	$0	$1,347,368	$0	$2,427,196
PUBLIC INFORMATION DAMP (Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	$0	$0	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$0	$0	$0	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$0	$0	$0	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$259,450	$0	$279,415	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$0	$0	$0
TOTALS		$526,264	$3,974,113	$790,143	$4,934,056

Table 6.3

County of Orange

Fiscal Analysis Summary

FUNDING SOURCES

DAMP FUNDING SOURCES	FUNDING PERCENTAGES	
	FISCAL YEAR 1999-2000	FISCAL YEAR 2000-01 (Projected)
GENERAL FUND		
UTILITY TAX / CHARGES		
SEPARATE UTILITY BILLING ITEM		
GAS TAX	14	17
SPECIAL DISTRICT FUND	86	83
OTHERS (Specify) User Fees for Recycling and Hazardous Waste Collection. Integrated Waste Management Interest Earnings Sanitation Fee Benefit Assessment Fleet Maintenance Fund Community Services District Used Oil Grant Water Fund Sewer & Storm Drain Maintenance Fee		
TOTALS (must add up to 100%)	100	100

Table 6.4

City of Anaheim
Fiscal Analysis Summary

CAPITAL COSTS
(land, large equipment, and structures)

DAMP Cost Elements		1999/2000 FY Costs		Projected 2000/01 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$0	$0	$0	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$0	$0	$0
	Recycling	$0	$1,710,171	$0	* $83,000
	Drainage Facility Maintenance	$17,047	$0	$0	$0
	Catch Basin Stenciling	$0	$0	$0	$0
	Street Sweeping	$0	$0	$0	$0
	Environmental Performance	$0	$0	$35,000	$0
	Public Property & Street Chemical Spill Response	$0	$0	$0	$0
	Pesticide & Fertilizer Management	$0	$0	$0	$0
PUBLIC INFORMATION DAMP (Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	$0	$0	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$0	$0	$0	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$0	$0	$0	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$0	$0	$0	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$0	$0	$0
TOTALS		$17,047	$1,710,171	$35,000	$83,000

*Reduced projection is because the COP's have been paid off for past recycling truck purchases, and no new recycling truck purchases are planned until 2005. The projected $83,000 is for Automatic Recycling Barrels.

Table 6.5

City of Anaheim
Fiscal Analysis Summary

OPERATIONS AND MAINTENANCE

DAMP Cost Elements		1999/2000 FY Costs		Projected 2000/01 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$31,084	$224,345	$32,226	$232,470
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$1,000,761	$0	$1,055,508
	Recycling	$0	$8,807,437	$0	$8,982,851
	Drainage Facility Maintenance	$0	$216,438	$0	$220,767
	Catch Basin Stenciling	$0	$400	$9,500	$400
	Street Sweeping	$0	$3,123,854	$0	$3,186,231
	Environmental Performance	$1,339	$0	$4,500	$0
	Public Property & Street Chemical Spill Response	$0	$0	$0	$0
	Pesticide & Fertilizer Management	$19,330	$61,008	$25,000	$66,339
PUBLIC INFORMATION DAMP (Section 6.0)	Nonpoint Source Pollution Awareness	$9,906	$0	$10,000	$0
	Household Hazardous Waste Collection	$0	$446,871	$0	$455,808
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$0	$3,302	$0	$3,401
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$0	$0	$0	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$0	$0	$0	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$44,890	$0	$45,788	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$0	$0	$0
From Public Works Department		$0	$0	$0	$0
TOTALS		$106,549	$13,884,416	$127,014	$14,203,775

Table 6.6

City of Anaheim
Fiscal Analysis Summary

FUNDING SOURCES
Design Services

DAMP FUNDING SOURCES	FUNDING PERCENTAGES	
	FISCAL YEAR 1999-2000	FISCAL YEAR 2000-01 (Projected)
GENERAL FUND	0	0
UTILITY TAX / CHARGES		
SEPARATE UTILITY BILLING ITEM		
GAS TAX		
SPECIAL DISTRICT FUND	0	0
OTHERS (Specify) User Fees for Recycling and Hazardous Waste Collection. Integrated Waste Management Interest Earnings Sanitation Fee Benefit Assessment Fleet Maintenance Fund Community Services District Used Oil Grant Water Fund Sewer & Storm Drain Maintenance Fee	100	100
TOTALS (must add up to 100%)	100	100

Table 6.7

City of Brea
Fiscal Analysis Summary

CAPITAL COSTS
(land, large equipment, and structures)

DAMP Cost Elements		1999/2000 FY Costs		Projected 2000/01 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$0	$0	$0	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$0	$0	$0
	Recycling	$0	$0	$0	$0
	Drainage Facility Maintenance	$0	$0	$0	$0
	Catch Basin Stenciling	$0	$0	$0	$0
	Street Sweeping	$0	$0	$0	$0
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$0	$0	$0	$0
	Pesticide & Fertilizer Management	$0	$0	$0	$0
PUBLIC INFORMATION DAMP (Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	$0	$0	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$0	$0	$0	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$0	$0	$0	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$0	$0	$0	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$0	$0	$0
TOTALS		$0	$0	$0	$0

Table 6.8

City of Brea
Fiscal Analysis Summary

OPERATIONS AND MAINTENANCE

DAMP Cost Elements		1999/2000 FY Costs		Projected 2000/01 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$0	$0	$0	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$0	$0	$0
	Recycling	$0	$0	$0	$0
	Drainage Facility Maintenance	$0	$0	$0	$0
	Catch Basin Stenciling	$0	$0	$0	$0
	Street Sweeping	$0	$1,689,751	$0	$1,694,712
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$0	$0	$0	$0
	Pesticide & Fertilizer Management	$0	$0	$0	$0
PUBLIC INFORMATION DAMP (Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	$0	$0	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$0	$0	$0	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$0	$0	$0	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$0	$0	$0	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$0	$0	$0
TOTALS		$0	$1,689,751	$0	$1,694,712

Table 6.9

City of Brea
Fiscal Analysis Summary

FUNDING SOURCES

DAMP FUNDING SOURCES	FUNDING PERCENTAGES	
	FISCAL YEAR 1999-2000	FISCAL YEAR 2000-01 (Projected)
GENERAL FUND	5	5
UTILITY TAX / CHARGES	20	20
SEPARATE UTILITY BILLING ITEM	25	25
GAS TAX		
SPECIAL DISTRICT FUND	50	50
OTHERS (Specify) User Fees for Recycling and Hazardous Waste Collection. Integrated Waste Management Interest Earnings Sanitation Fee Benefit Assessment Fleet Maintenance Fund Community Services District Used Oil Grant Water Fund Sewer & Storm Drain Maintenance Fee		
TOTALS (must add up to 100%)	100	100

Table 6.10

City of Buena Park
Fiscal Analysis Summary

CAPITAL COSTS
(land, large equipment, and structures)

DAMP Cost Elements		1999/2000 FY Costs		Projected 2000/01 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$0	$0	$0	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$0	$0	$0
	Recycling	$0	$0	$0	$0
	Drainage Facility Maintenance	$0	$0	$0	$0
	Catch Basin Stenciling	$0	$0	$0	$0
	Street Sweeping	$0	$0	$0	$0
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$0	$0	$0	$0
	Pesticide & Fertilizer Management	$0	$0	$0	$0
PUBLIC INFORMATION DAMP (Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	$0	$0	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$0	$0	$0	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$0	$0	$0	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$0	$0	$0	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$0	$0	$0
TOTALS		$0	$0	$0	$0

Table 6.11

City of Buena Park
Fiscal Analysis Summary

OPERATIONS AND MAINTENANCE

DAMP Cost Elements		1999/2000 FY Costs		Projected 2000/01 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$0	$8,150	$0	$8,150
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$0	$0	$0
	Recycling	$0	$0	$0	$0
	Drainage Facility Maintenance	$0	$10,500	$0	$10,500
	Catch Basin Stenciling	$0	$0	$0	$15,000
	Street Sweeping	$0	$211,260	$0	$211,260
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$0	$4,200	$0	$4,200
	Pesticide & Fertilizer Management	$0	$17,850	$0	$17,850
PUBLIC INFORMATION DAMP (Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	$0	$0	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$0	$0	$0	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$0	$0	$0	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$0	$0	$0	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$0	$0	$0
TOTALS		$0	$251,960	$0	$266,960

Table 6.12

City of Buena Park
Fiscal Analysis Summary

FUNDING SOURCES

DAMP FUNDING SOURCES	FUNDING PERCENTAGES	
	FISCAL YEAR 1999-2000	FISCAL YEAR 2000-01 (Projected)
GENERAL FUND	100	100
UTILITY TAX / CHARGES		
SEPARATE UTILITY BILLING ITEM		
GAS TAX		
SPECIAL DISTRICT FUND		
OTHERS (Specify) User Fees for Recycling and Hazardous Waste Collection. Integrated Waste Management Interest Earnings Sanitation Fee Benefit Assessment Fleet Maintenance Fund Community Services District Used Oil Grant Water Fund Sewer & Storm Drain Maintenance Fee		
TOTALS (must add up to 100%)	100	100

Table 6.13

City of Costa Mesa
Fiscal Analysis Summary

CAPITAL COSTS
(land, large equipment, and structures)

DAMP Cost Elements		1999/2000 FY Costs		Projected 2000/01 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$0	$0	$0	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$0	$0	$0
	Recycling	$0	$0	$0	$0
	Drainage Facility Maintenance	$0	$485,000	$0	$0
	Catch Basin Stenciling	$0	$0	$0	$0
	Street Sweeping	$0	$0	$0	$0
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$0	$0	$0	$0
	Pesticide & Fertilizer Management	$0	$0	$0	$0
PUBLIC INFORMATION DAMP (Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	$0	$0	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$0	$0	$0	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$0	$0	$0	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$0	$0	$0	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$0	$0	$0
TOTALS		$0	$485,000	$0	$0

Table 6.14

City of Costa Mesa
Fiscal Analysis Summary

OPERATIONS AND MAINTENANCE

DAMP Cost Elements		1999/2000 FY Costs		Projected 2000/01 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$25,000	$0	$25,000	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$0	$0	$0
	Recycling	$0	$0	$0	$0
	Drainage Facility Maintenance	$0	$126,000	$0	$485,000
	Catch Basin Stenciling	$0	$0	$0	$0
	Street Sweeping	$0	$0	$0	$0
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$0	$0	$0	$0
	Pesticide & Fertilizer Management	$0	$0	$0	$0
PUBLIC INFORMATION DAMP (Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	$0	$0	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$0	$0	$0	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$0	$0	$0	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$0	$0	$0	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$0	$0	$0
TOTALS		$25,000	$126,000	$25,000	$485,000

Table 6.15

City of Costa Mesa
Fiscal Analysis Summary

FUNDING SOURCES

DAMP FUNDING SOURCES	FUNDING PERCENTAGES	
	FISCAL YEAR 1999-2000	FISCAL YEAR 2000-01 (Projected)
GENERAL FUND	100	100
UTILITY TAX / CHARGES		
SEPARATE UTILITY BILLING ITEM		
GAS TAX		
SPECIAL DISTRICT FUND		
OTHERS (Specify) User Fees for Recycling and Hazardous Waste Collection. Integrated Waste Management Interest Earnings Sanitation Fee Benefit Assessment Fleet Maintenance Fund Community Services District Used Oil Grant Water Fund Sewer & Storm Drain Maintenance Fee		
TOTALS (must add up to 100%)	100	100

Table 6.16

City of Cypress
Fiscal Analysis Summary

CAPITAL COSTS
(land, large equipment, and structures)

DAMP Cost Elements		1999/2000 FY Costs		Projected 2000/01 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$0	$0	$0	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$0	$0	$0
	Recycling	$0	$0	$0	$0
	Drainage Facility Maintenance	$0	$0	$0	$0
	Catch Basin Stenciling	$0	$0	$0	$0
	Street Sweeping	$301,700	$0	$0	$0
	Environmental Performance	$0	$0	$12,000	$0
	Public Property & Street Chemical Spill Response	$0	$0	$0	$0
	Pesticide & Fertilizer Management	$0	$0	$0	$0
PUBLIC INFORMATION DAMP (Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	$0	$0	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$0	$0	$0	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$0	$0	$0	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$0	$0	$0	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$0	$0	$0
TOTALS		$301,700	$0	$12,000	$0

Table 6.17

City of Cypress
Fiscal Analysis Summary

OPERATIONS AND MAINTENANCE

DAMP Cost Elements		1999/2000 FY Costs		Projected 2000/01 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$0	$2,500	$0	$2,500
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$0	$0	$0
	Recycling	$0	$5,462	$0	$13,963
	Drainage Facility Maintenance	$0	$163,815	$0	$151,670
	Catch Basin Stenciling	$0	$0	$800	$0
	Street Sweeping	$0	$181,764	$0	$169,409
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$0	$1,000	$0	$1,000
	Pesticide & Fertilizer Management	$0	$191,000	$0	$191,000
PUBLIC INFORMATION DAMP (Section 6.0)	Nonpoint Source Pollution Awareness	$2,000	$0	$2,000	$0
	Household Hazardous Waste Collection	$10,000	$0	$10,000	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$0	$19,346	$0	$14,404
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$0	$19,346	$0	$14,404
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$0	$0	$0	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$0	$0	$0
TOTALS		$12,000	$584,233	$12,800	$558,350

Table 6.18

City of Cypress
Fiscal Analysis Summary

FUNDING SOURCES

DAMP FUNDING SOURCES	FUNDING PERCENTAGES	
	FISCAL YEAR 1999-2000	FISCAL YEAR 2000-01 (Projected)
GENERAL FUND	100	100
UTILITY TAX / CHARGES		
SEPARATE UTILITY BILLING ITEM		
GAS TAX		
SPECIAL DISTRICT FUND		
OTHERS (Specify) User Fees for Recycling and Hazardous Waste Collection. Integrated Waste Management Interest Earnings Sanitation Fee Benefit Assessment Fleet Maintenance Fund Community Services District Used Oil Grant Water Fund Sewer & Storm Drain Maintenance Fee		
TOTALS (must add up to 100%)	100	100

Table 6.19

City of Dana Point
Fiscal Analysis Summary

CAPITAL COSTS
(land, large equipment, and structures)

DAMP Cost Elements		1999/2000 FY Costs		Projected 2000/01 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$0	$0	$0	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$0	$0	$0
	Recycling	$0	$0	$0	$0
	Drainage Facility Maintenance	$0	* $1,535,715	$0	* $2,700,000
	Catch Basin Stenciling	$0	$0	$0	$0
	Street Sweeping	$0	$0	$0	$0
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$0	$0	$0	$0
	Pesticide & Fertilizer Management	$0	$0	$0	$0
PUBLIC INFORMATION DAMP (Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	$0	$0	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$0	$0	$0	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$0	$0	$0	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$0	$0	$0	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$0	$475,000	$0
TOTALS		$0	$1,535,715	$475,000	$2,700,000

*Installed 3 new storm drain lines with thirteen new catch basin inlets in 1999-2000
Will install 2 new storm drain lines 2000/01

Table 6.20

City of Dana Point
Fiscal Analysis Summary

OPERATIONS AND MAINTENANCE

DAMP Cost Elements		1999/2000 FY Costs		Projected 2000/01 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$4,000	$13,564	$4,000	$12,763
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$5,207	$20,829	$3,963	$15,853
	Recycling	$0	$0	$0	$0
	Drainage Facility Maintenance	$0	$97,522	$0	$47,437
	Catch Basin Stenciling	$0	$2,071	$0	$4,000
	Street Sweeping	$0	$45,953	$0	$100,859
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$0	$0	$0	$0
	Pesticide & Fertilizer Management	$0	$12,850	$0	$12,000
PUBLIC INFORMATION DAMP (Section 6.0)	Nonpoint Source Pollution Awareness	$500	$0	$2,000	$0
	Household Hazardous Waste Collection	$0	$0	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$2,262	$0	$4,000	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$3,003	$10,010	$3,600	$12,000
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$13,865	$0	$6,000	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$0	$84,000	$0
TOTALS		$28,837	$202,799	$107,563	$204,912

Table 6.21

City of Dana Point
Fiscal Analysis Summary

FUNDING SOURCES

DAMP FUNDING SOURCES	FUNDING PERCENTAGES	
	FISCAL YEAR 1999-2000	FISCAL YEAR 2000-01 (Projected)
GENERAL FUND	100	90
UTILITY TAX / CHARGES		
SEPARATE UTILITY BILLING ITEM		
GAS TAX		
SPECIAL DISTRICT FUND		
OTHERS (Specify) User Fees for Recycling and Hazardous Waste Collection. Integrated Waste Management Interest Earnings Sanitation Fee Benefit Assessment Fleet Maintenance Fund Community Services District Used Oil Grant Water Fund Sewer & Storm Drain Maintenance Fee		10 (Measure M)
TOTALS (must add up to 100%)	100	100

Table 6.22

City of Fountain Valley
Fiscal Analysis Summary

CAPITAL COSTS
(land, large equipment, and structures)

DAMP Cost Elements		1999/2000 FY Costs		Projected 2000/01 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		0	0	0	0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	0	0	0	0
	Recycling	0	0	0	0
	Drainage Facility Maintenance	0	0	0	0
	Catch Basin Stenciling	0	0	0	0
	Street Sweeping	0	0	0	0
	Environmental Performance	0	0	0	0
	Public Property & Street Chemical Spill Response	0	0	0	0
	Pesticide & Fertilizer Management	0	0	0	0
PUBLIC INFORMATION DAMP (Section 6.0)	Nonpoint Source Pollution Awareness	0	0	0	0
	Household Hazardous Waste Collection	0	0	0	0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		0	0	0	0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		0	0	0	0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	0	0	0	0
	Other Efforts to Identify & Eliminate Illicit Connections	0	0	0	0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		0	0	0	0
TOTALS		$0	$0	$0	$0

Table 6.23

City of Fountain Valley
Fiscal Analysis Summary

OPERATIONS AND MAINTENANCE

DAMP Cost Elements		1999/2000 FY Costs		Projected 2000/01 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$0	$0	$0	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$0	$0	$0
	Recycling	$0	$0	$0	$0
	Drainage Facility Maintenance	$0	$0	$0	$0
	Catch Basin Stenciling	$0	$0	$0	$0
	Street Sweeping	$0	$0	$0	$0
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$0	$0	$0	$0
	Pesticide & Fertilizer Management	$0	$0	$0	$0
PUBLIC INFORMATION DAMP (Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	$0	$0	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$0	$0	$0	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$0	$0	$0	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$0	$0	$0	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$0	$0	$0
TOTALS		$0	$0	$0	$0

Table 6.24

City of Fountain Valley
Fiscal Analysis Summary

FUNDING SOURCES

DAMP FUNDING SOURCES	FUNDING PERCENTAGES	
	FISCAL YEAR 1999-2000	FISCAL YEAR 2000-01 (Projected)
GENERAL FUND	0	0
UTILITY TAX / CHARGES		
SEPARATE UTILITY BILLING ITEM		
GAS TAX	0	0
SPECIAL DISTRICT FUND		
OTHERS (Specify) User Fees for Recycling and Hazardous Waste Collection. Integrated Waste Management Interest Earnings Sanitation Fee Benefit Assessment Fleet Maintenance Fund Community Services District Used Oil Grant Water Fund Sewer & Storm Drain Maintenance Fee	0	0
TOTALS (must add up to 100%)	0	0

Table 6.25

City of Fullerton
Fiscal Analysis Summary

CAPITAL COSTS
(land, large equipment, and structures)

DAMP Cost Elements		1999/2000 FY Costs		Projected 2000/01 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$0	$0	$0	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$0	$0	$0
	Recycling	$0	$0	$0	$0
	Drainage Facility Maintenance	$0	$0	$0	$0
	Catch Basin Stenciling	$0	$0	$0	$0
	Street Sweeping	$0	$0	$0	$0
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$0	$0	$0	$0
	Pesticide & Fertilizer Management	$0	$0	$0	$0
PUBLIC INFORMATION DAMP (Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	$0	$0	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$0	$0	$0	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$0	$0	$0	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$0	$0	$0	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$0	$0	$0
TOTALS		$0	$0	$0	$0

Table 6.26

City of Fullerton
Fiscal Analysis Summary

OPERATIONS AND MAINTENANCE

DAMP Cost Elements		1999/2000 FY Costs		Projected 2000/01 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$0	$0	$0	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$15,816	$0	$16,300
	Recycling	$0	$0	$0	$0
	Drainage Facility Maintenance	$0	$473,280	$0	$487,500
	Catch Basin Stenciling	$0	Included Above	$0	Included Above
	Street Sweeping	$0	$453,910	$0	$467,500
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$0	$95,070	$0	$97,900
	Pesticide & Fertilizer Management	$124,470	$0	$126,740	$0
PUBLIC INFORMATION DAMP (Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	$0	$0	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$0	$0	$0	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$0	$0	$0	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$0	$0	$0	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$0	$0	$0
TOTALS		$124,470	$1,038,076	$126,740	$1,069,200

Table 6.27

Fullerton

Fiscal Analysis Summary

FUNDING SOURCES

DAMP FUNDING SOURCES	FUNDING PERCENTAGES	
	FISCAL YEAR 1999-2000	FISCAL YEAR 2000-01 (Projected)
GENERAL FUND	1	1
UTILITY TAX / CHARGES		
SEPARATE UTILITY BILLING ITEM		
GAS TAX		
SPECIAL DISTRICT FUND	11	11
OTHERS (Specify) User Fees for Recycling and Hazardous Waste Collection. Integrated Waste Management Interest Earnings Sanitation Fee Benefit Assessment Fleet Maintenance Fund Community Services District Used Oil Grant Water Fund Sewer & Storm Drain Maintenance Fee	80 8	80 8
TOTALS (must add up to 100%)	100	100

Table 6.28

City of Garden Grove
Fiscal Analysis Summary

CAPITAL COSTS
(land, large equipment, and structures)

DAMP Cost Elements		1999/2000 FY Costs		Projected 2000/01 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$0	$0	$0	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$0	$0	$0
	Recycling	$0	$0	$0	$0
	Drainage Facility Maintenance	$0	$0	$0	$0
	Catch Basin Stenciling	$0	$0	$0	$0
	Street Sweeping	$0	$0	$0	$0
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$0	$0	$0	$0
	Pesticide & Fertilizer Management	$0	$0	$0	$0
PUBLIC INFORMATION DAMP (Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	$0	$0	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$0	$0	$0	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$0	$0	$0	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$0	$0	$0	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$0	$0	$0
TOTALS		$0	$0	$0	$0

Table 6.29

City of Garden Grove
Fiscal Analysis Summary

OPERATIONS AND MAINTENANCE

DAMP Cost Elements		1999/2000 FY Costs		Projected 2000/01 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$5,250	$0	$5,648	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$0	$0	$0
	Recycling	$0	$11,848	$0	$13,310
	Drainage Facility Maintenance	$0	$148,967	$0	$210,741
	Catch Basin Stenciling	$550	$0	$550	$0
	Street Sweeping	$0	$426,759	$0	$439,871
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$0	$64,318	$0	$78,371
	Pesticide & Fertilizer Management	$5,000	$0	$5,000	$0
PUBLIC INFORMATION DAMP (Section 6.0)	Nonpoint Source Pollution Awareness	$500	$0	$500	$0
	Household Hazardous Waste Collection	$0	$46,170	$0	$54,398
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		* $7,955	$0	* $5,740	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		* $4,546	$0	* $3,279	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$1,048	$0	$1,573	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$524	$0	$787	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$35,000	$0	$30,000	$0
TOTALS		$60,373	$698,062	$53,077	$796,691

*Figures are costs estimates

Table 6.30

City of Garden Grove
Fiscal Analysis Summary

FUNDING SOURCES

DAMP FUNDING SOURCES	FUNDING PERCENTAGES	
	FISCAL YEAR 1999-2000	FISCAL YEAR 2000-2001 (Projected)
GENERAL FUND	53	51
UTILITY TAX / CHARGES		
SEPARATE UTILITY BILLING ITEM		
GAS TAX	29	26
SPECIAL DISTRICT FUND		
OTHERS (Specify) User Fees for Recycling and Hazardous Waste Collection. Integrated Waste Management Interest Earnings Sanitation Fee Benefit Assessment Fleet Maintenance Fund Community Services District Used Oil Grant Water Fund Sewer & Storm Drain Maintenance Fee	6 12	6 17
TOTALS (must add up to 100%)	100	100

Table 6.31

City of Huntington Beach
Fiscal Analysis Summary

CAPITAL COSTS
(land, large equipment, and structures)

DAMP Cost Elements		1999/2000 FY Costs		Projected 2000/01 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$0	$0	$0	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$0	$0	$0
	Recycling	$0	$0	$0	$0
	Drainage Facility Maintenance	* $200,000	$83,500	$50,000	$284,000
	Catch Basin Stenciling	$0	$0	$0	$0
	Street Sweeping	$0	$0	$0	$0
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$0	$0	$0	$0
	Pesticide & Fertilizer Management	$0	$0	$0	$0
PUBLIC INFORMATION DAMP (Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	$0	$0	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$0	$0	$0	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$0	$0	$0	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$0	$0	$0	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$0	$0	$0
TOTALS		$200,000	$83,500	$50,000	$284,000

* Diversion of Pump Stations to Sewer Facilities

Table 6.32

City of Huntington Beach
Fiscal Analysis Summary

OPERATION AND MAINTENANCE COSTS

DAMP Cost Elements		1999/2000 FY Costs		Projected 2000/01 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$250,000	$900,000	$200,000	$900,000
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$15,000	$0	$15,000
	Recycling	$0	$2,200,000	$0	$2,200,000
	Drainage Facility Maintenance	$630,000	$1,200,000	$500,000	$1,200,000
	Catch Basin Stenciling	$1,000	$0	$1,000	$0
	Street Sweeping	$375,000	$560,000	$385,000	$600,000
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$10,000	$1,100,000	$10,000	$1,200,000
	Pesticide & Fertilizer Management	$3,000	$0	$3,000	$0
PUBLIC INFORMATION DAMP (Section 6.0)	Nonpoint Source Pollution Awareness	* $1,500,000	$0	* $500,000	$0
	Household Hazardous Waste Collection	$0	**	$0	**
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$2,000	$0	$5,000	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$5,000	$0	$15,000	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$0	$0	$0	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$7,500	$0	$10,000	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		***	$0	***	$0
TOTALS		$2,783,500	$5,975,000	$1,629,000	$6,115,000

* Includes urban runoff studies
** Included in recycling program
*** Not tracked as separate costs

Table 6.33

City of Huntington Beach
Fiscal Analysis Summary

FUNDING SOURCES

DAMP FUNDING SOURCES	FUNDING PERCENTAGES	
	FISCAL YEAR 1999-2000	FISCAL YEAR 2000-01 (Projected)
GENERAL FUND	100	100
UTILITY TAX / CHARGES		
SEPARATE UTILITY BILLING ITEM		
GAS TAX		
SPECIAL DISTRICT FUND		
OTHERS (Specify) User Fees for Recycling and Hazardous Waste Collection. Integrated Waste Management Interest Earnings Sanitation Fee Benefit Assessment Fleet Maintenance Fund Community Services District Used Oil Grant Water Fund Sewer & Storm Drain Maintenance Fee		
TOTALS (must add up to 100%)	100	100

Table 6.34

City of Irvine
Fiscal Analysis Summary

CAPITAL COSTS
(land, large equipment, and structures)

DAMP Cost Elements		1999/2000 FY Costs		Projected 2000/01 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$0	$0	$0	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$0	$0	$0
	Recycling	$0	$0	$0	$0
	Drainage Facility Maintenance	$0	$0	$0	$0
	Catch Basin Stenciling	$0	$0	$0	$0
	Street Sweeping	$0	$0	$0	$0
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$0	$0	$0	$0
	Pesticide & Fertilizer Management	$0	$0	$0	$0
PUBLIC INFORMATION DAMP (Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	$0	$0	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$0	$0	$0	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$0	$0	$0	$0
ILLICIT CONNJ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$0	$0	$0	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$243,650	$0	$114,700	$0
TOTALS		$243,650	$0	$114,700	$0

Table 6.35

City of Irvine
Fiscal Analysis Summary

OPERATIONS AND MAINTENANCE

DAMP Cost Elements		1999/2000 FY Costs		Projected 2000/01 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$0	$0	$0	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$0	$0	$0
	Recycling	$0	$505,984	$0	$505,984
	Drainage Facility Maintenance	$0	$0	$0	$0
	Catch Basin Stenciling	$0	$5,000	$0	$5,000
	Street Sweeping	$0	$661,792	$0	$661,792
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$3,000	$0	$3,600	$0
	Pesticide & Fertilizer Management	$0	$0	$0	$0
PUBLIC INFORMATION DAMP (Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	$0	$0	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		* $6,000	$0	* $6,000	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		** $8,000	$0	** $9,600	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$0	$0	$0	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$0	$0	$0
TOTALS		$17,000	$1,172,776	$19,200	$1,172,776

*Assumes 1 hour of Engineering @ $75.92/hour, 2 hours of Planning @ $85.70/hour, and 2 hours of Inspection @ $68.35/hour - for each of 36 projects
**Assumes static Planning 20% increase to spill response plus Inspection and Plan Check

Table 6.36

City of Irvine
Fiscal Analysis Summary

FUNDING SOURCES

DAMP FUNDING SOURCES	FUNDING PERCENTAGES	
	FISCAL YEAR 1998-99	FISCAL YEAR 1999-00 (Projected)
GENERAL FUND		
UTILITY TAX / CHARGES		
SEPARATE UTILITY BILLING ITEM		
GAS TAX		
SPECIAL DISTRICT FUND		
OTHERS (Specify) User Fees for Recycling and Hazardous Waste Collection. Integrated Waste Management Interest Earnings Sanitation Fee Benefit Assessment Fleet Maintenance Fund Community Services District Used Oil Grant Water Fund Sewer & Storm Drain Maintenance Fee		
TOTALS (must add up to 100%)	0	0

Table 6.37

City of La Habra
Fiscal Analysis Summary

CAPITAL COSTS
(land, large equipment, and structures)

DAMP Cost Elements		1999/2000 FY Costs		Projected 2000/01 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$0	$0	$0	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$0	$0	$0
	Recycling	$0	$0	$0	$0
	Drainage Facility Maintenance	$0	$0	$0	$0
	Catch Basin Stenciling	$0	$0	$0	$0
	Street Sweeping	$0	$0	$0	$0
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$0	$0	$0	$0
	Pesticide & Fertilizer Management	$0	$0	$0	$0
PUBLIC INFORMATION DAMP (Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	$0	$0	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$40,000	$6,000	$40,000	$6,000
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$0	$20,000	$0	$20,000
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$0	$0	$0	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$200,000	$0	$200,000
TOTALS		$40,000	$226,000	$40,000	$226,000

Table 6.38

City of La Habra
Fiscal Analysis Summary

OPERATIONS AND MAINTENANCE

DAMP Cost Elements		1999/2000 FY Costs		Projected 2000/01 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$0	$0	$0	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$0	$0	$120,100
	Recycling	$0	$275,500	$0	$500,000
	Drainage Facility Maintenance	$0	$0	$0	$10,000
	Catch Basin Stenciling	$600	$0	$600	$0
	Street Sweeping	$0	$200,000	$0	$210,000
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$0	$0	$0	$0
	Pesticide & Fertilizer Management	$0	$3,300	$0	$4,000
PUBLIC INFORMATION DAMP (Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	$0	$0	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$0	$0	$0	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$0	$0	$0	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$0	$0	$0	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$2,200	$0	$2,300	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$0	$0	$0
TOTALS		$2,800	$478,800	$2,900	$844,100

Table 6.39

City of La Habra

Fiscal Analysis Summary

FUNDING SOURCES

DAMP FUNDING SOURCES	FUNDING PERCENTAGES	
	FISCAL YEAR 1999-2000	FISCAL YEAR 2000-01 (Projected)
GENERAL FUND	100	100
UTILITY TAX / CHARGES		
SEPARATE UTILITY BILLING ITEM	Recycling is part of customer billing	Recycling is part of customer billing
GAS TAX		
SPECIAL DISTRICT FUND		
OTHERS (Specify) User Fees for Recycling and Hazardous Waste Collection. Integrated Waste Management Interest Earnings Sanitation Fee Benefit Assessment Fleet Maintenance Fund Community Services District Used Oil Grant Water Fund Sewer & Storm Drain Maintenance Fee		
TOTALS (must add up to 100%)	100	100

Table 6.40

City of La Palma
Fiscal Analysis Summary

CAPITAL COSTS
(land, large equipment, and structures)

DAMP Cost Elements		1999/2000 FY Costs		Projected 2000/01 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$0	$0	$0	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$0	$0	$0
	Recycling	$0	$0	$0	$0
	Drainage Facility Maintenance	$0	$0	$0	$0
	Catch Basin Stenciling	$0	$500	$0	$0
	Street Sweeping	$0	$2,000	$0	$2,000
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$0	$0	$0	$0
	Pesticide & Fertilizer Management	$0	$500	$0	$1,500
PUBLIC INFORMATION DAMP (Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	$0	$0	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$0	$0	$0	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$0	$0	$0	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$0	$0	$0	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$0	$0	$0
TOTALS		$0	$3,000	$0	$3,500

Table 6.41

City of La Palma
Fiscal Analysis Summary

OPERATIONS AND MAINTENANCE

DAMP Cost Elements		1999/2000 FY Costs		Projected 2000/01 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$0	$0	$0	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$0	$0	$0
	Recycling	$0	$0	$0	$0
	Drainage Facility Maintenance	$0	$55,600	$0	$55,100
	Catch Basin Stenciling	$0	$0	$0	$0
	Street Sweeping	$0	$74,000	$0	$74,000
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$0	$0	$0	$0
	Pesticide & Fertilizer Management	$0	$8,500	$0	$1,200
PUBLIC INFORMATION DAMP (Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	$0	$0	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$0	$0	$0	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$0	$0	$0	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$0	$0	$0	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$0	$0	$0
TOTALS		$0	$138,100	$0	$130,300

Table 6.42

City of La Palma
Fiscal Analysis Summary

FUNDING SOURCES

DAMP FUNDING SOURCES	FUNDING PERCENTAGES	
	FISCAL YEAR 1999-2000	FISCAL YEAR 2000-01 (Projected)
GENERAL FUND	85	85
UTILITY TAX / CHARGES		
SEPARATE UTILITY BILLING ITEM		
GAS TAX	15	15
SPECIAL DISTRICT FUND		
OTHERS (Specify) User Fees for Recycling and Hazardous Waste Collection. Integrated Waste Management Interest Earnings Sanitation Fee Benefit Assessment Fleet Maintenance Fund Community Services District Used Oil Grant Water Fund Sewer & Storm Drain Maintenance Fee		
TOTALS (must add up to 100%)	100	100

Table 6.43

City of Laguna Beach
Fiscal Analysis Summary

CAPITAL COSTS
(land, large equipment, and structures)

DAMP Cost Elements		1999/2000 FY Costs		Projected 2000/01 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$0	$0	$0	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$0	$0	$0
	Recycling	$0	$0	$0	$0
	Drainage Facility Maintenance	$0	$0	$0	$6,500
	Catch Basin Stenciling	$0	$2,680	$0	$0
	Street Sweeping	$0	$0	$0	$0
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$0	$4,000	$0	$0
	Pesticide & Fertilizer Management	$0	$3,000	$0	$0
PUBLIC INFORMATION DAMP (Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	$0	$0	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$0	$0	$0	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$0	$0	$0	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$0	$0	$0	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$75,000	$0	$200,000
TOTALS		$0	$84,680	$0	$206,500

Table 6.44

City of Laguna Beach
Fiscal Analysis Summary

OPERATIONS AND MAINTENANCE

DAMP Cost Elements		1999/2000 FY Costs		Projected 2000/01 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$0	$0	$0	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$0	$0	$0
	Recycling	$0	$445,370	$0	$454,410
	Drainage Facility Maintenance	$0	$95,000	$0	$100,000
	Catch Basin Stenciling	$0	$0	$0	$0
	Street Sweeping	$0	$68,300	$0	$71,000
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$0	$6,900	$0	$10,000
	Pesticide & Fertilizer Management	$0	$55,500	$0	$57,000
PUBLIC INFORMATION DAMP (Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	$0	*$62,000	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$0	$0	$0	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$0	$0	$0	$0
ILLICIT CONNJ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$0	$0	$0	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$0	$0	$0
TOTALS		$0	$733,070	$0	$692,410

*The City's HHW Collection Program is a bi-annual program, and was significantly augmented in June, 2000.

Table 6.45

City of Laguna Beach
Fiscal Analysis Summary

FUNDING SOURCES

DAMP FUNDING SOURCES	FUNDING PERCENTAGES	
	FISCAL YEAR 1999-2000	FISCAL YEAR 2000-01 (Projected)
GENERAL FUND	90	90
UTILITY TAX / CHARGES		
SEPARATE UTILITY BILLING ITEM		
GAS TAX		
SPECIAL DISTRICT FUND		
OTHERS (Specify) User Fees for Recycling and Hazardous Waste Collection. Integrated Waste Management Interest Earnings Sanitation Fee Benefit Assessment Fleet Maintenance Fund Community Services District Used Oil Grant Water Fund Sewer & Storm Drain Maintenance Fee	10	10
TOTALS (must add up to 100%)	100	100

Table 6.46

City of Laguna Hills
Fiscal Analysis Summary

CAPITAL COSTS
(land, large equipment, and structures)

DAMP Cost Elements		1999/2000 FY Costs		Projected 2000/01 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$0	$0	$0	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$0	$0	$0
	Recycling	$0	$0	$0	$0
	Drainage Facility Maintenance	$0	$0	$0	$0
	Catch Basin Stenciling	$0	$0	$0	$0
	Street Sweeping	$0	$0	$0	$0
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$0	$0	$0	$0
	Pesticide & Fertilizer Management	$0	$0	$0	$0
PUBLIC INFORMATION DAMP (Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	$0	$0	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$0	$0	$0	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$0	$0	$0	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$0	$0	$0	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$0	$0	$0
TOTALS		$0	$0	$0	$0

Table 6.47

City of Laguna Hills
Fiscal Analysis Summary

OPERATIONS AND MAINTENANCE

DAMP Cost Elements		1999/2000 FY Costs		Projected 2000/01 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$0	$0	$0	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$3,000	$0	$3,000
	Recycling	$0	$0	$0	$0
	Drainage Facility Maintenance	$7,509	$0	$10,000	$0
	Catch Basin Stenciling	$5,000	$0	$0	$0
	Street Sweeping	$0	$98,000	$0	$100,000
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$0	$0	$0	$0
	Pesticide & Fertilizer Management	$0	$0	$0	$0
PUBLIC INFORMATION DAMP (Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	$0	$0	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$0	$0	$0	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$0	$0	$0	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$0	$0	$0	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$0	$0	$0
TOTALS		$12,509	$101,000	$10,000	$103,000

Table 6.48

City of Laguna Hills
Fiscal Analysis Summary

FUNDING SOURCES

DAMP FUNDING SOURCES	FUNDING PERCENTAGES	
	FISCAL YEAR 1999-2000	FISCAL YEAR 2000-01 (Projected)
GENERAL FUND	100	100
UTILITY TAX / CHARGES		
SEPARATE UTILITY BILLING ITEM		
GAS TAX		
SPECIAL DISTRICT FUND		
OTHERS (Specify) User Fees for Recycling and Hazardous Waste Collection. Integrated Waste Management Interest Earnings Sanitation Fee Benefit Assessment Fleet Maintenance Fund Community Services District Used Oil Grant Water Fund Sewer & Storm Drain Maintenance Fee		
TOTALS (must add up to 100%)	100	100

Table 6.49

City of Laguna Niguel
Fiscal Analysis Summary

CAPITAL COSTS
(land, large equipment, and structures)

DAMP Cost Elements		1999/2000 FY Costs		Projected 2000/01 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$0	$0	$0	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$0	$0	$0
	Recycling	$0	$0	$0	$0
	Drainage Facility Maintenance	$10,000	$100,000	$38,000	$100,000
	Catch Basin Stenciling	$0	$0	$0	$0
	Street Sweeping	$0	$0	$0	$0
	Environmental Performance	$0	$0	$200,000	$0
	Public Property & Street Chemical Spill Response	$0	$0	$0	$0
	Pesticide & Fertilizer Management	$0	$0	$0	$0
PUBLIC INFORMATION DAMP (Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	$0	$0	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$0	$0	$0	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$0	$0	$0	$0
ILLICIT CONNJ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$1,000	$0	$2,000	$3,000
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$0	$0	$0
TOTALS		$11,000	$100,000	$240,000	$103,000

Table 6.50

City of Laguna Niguel
Fiscal Analysis Summary

OPERATIONS AND MAINTENANCE

DAMP Cost Elements		1999/2000 FY Costs		Projected 2000/01 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$40,000	$2,000	$20,000	$2,000
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$7,800	$0	$7,800
	Recycling	$0	$0	$0	$0
	Drainage Facility Maintenance	$113,386	$0	$4,000	$0
	Catch Basin Stenciling	$400	$0	$500	$0
	Street Sweeping	$0	$62,755	$18,000	$62,755
	Environmental Performance	$0	$0	$110,000	$0
	Public Property & Street Chemical Spill Response	$0	$1,000	$0	$600
	Pesticide & Fertilizer Management	$0	$1,000	$0	$1,000
PUBLIC INFORMATION DAMP (Section 6.0)	Nonpoint Source Pollution Awareness	$2,000	$0	$1,000	$0
	Household Hazardous Waste Collection	$0	$0	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$0	Yes (no cost)	$0	Yes (no cost)
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$3,000	Yes (no cost)	$4,000	Yes (no cost)
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$0	$0	$0	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$0	$0	$0
TOTALS		$158,786	$74,555	$157,500	$74,155

Table 6.51

City of Laguna Niguel
Fiscal Analysis Summary

FUNDING SOURCES

DAMP FUNDING SOURCES	FUNDING PERCENTAGES	
	FISCAL YEAR 1999-2000	FISCAL YEAR 2000-01 (Projected)
GENERAL FUND	20	20
UTILITY TAX / CHARGES		
SEPARATE UTILITY BILLING ITEM		
GAS TAX	65	65
SPECIAL DISTRICT FUND		
OTHERS (Specify) User Fees for Recycling and Hazardous Waste Collection. Integrated Waste Management Interest Earnings Sanitation Fee Benefit Assessment Fleet Maintenance Fund Community Services District Used Oil Grant Water Fund Sewer & Storm Drain Maintenance Fee	15	15
TOTALS (must add up to 100%)	100	100

Table 6.52

City of Lake Forest
Fiscal Analysis Summary

CAPITAL COSTS
(land, large equipment, and structures)

DAMP Cost Elements		1999/2000		Projected 2000/01 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$0	$0	$0	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$0	$0	$0
	Recycling	$0	$0	$0	$0
	Drainage Facility Maintenance	$0	$0	$0	$0
	Catch Basin Stenciling	$0	$0	$0	$0
	Street Sweeping	$0	$0	$0	$0
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$0	$0	$0	$0
	Pesticide & Fertilizer Management	$0	$0	$0	$0
PUBLIC INFORMATION DAMP (Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	$0	$0	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$0	$0	$0	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$0	$0	$0	$0
ILLICIT CONNJ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$0	$0	$0	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$0	$0	$0
TOTALS		$0	$0	$0	$0

Table 6.53

City of Lake Forest
Fiscal Analysis Summary

OPERATIONS AND MAINTENANCE

DAMP Cost Elements		1999/2000 FY Costs		Projected 2000/01 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$2,950	$10,327	$3,251	$13,960
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$56,206	$0	$112,312
	Recycling	$57,310	$0	$60,000	$0
	Drainage Facility Maintenance	$29,563	$56,206	$45,354	$74,108
	Catch Basin Stenciling	$0	$0	$0	$0
	Street Sweeping	$0	$0	$0	$0
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$0	$0	$0	$0
	Pesticide & Fertilizer Management	$0	$33,354	$0	$53,696
PUBLIC INFORMATION DAMP (Section 6.0)	Nonpoint Source Pollution Awareness	$16,500	$0	$18,000	$0
	Household Hazardous Waste Collection	$14,793	$0	$19,500	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$0	$0	$0	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$0	$0	$0	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$402	$0	$1,000	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$704	$0	$500	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$0	$0	$0
TOTALS		$122,222	$156,093	$147,605	$254,076

Table 6.54

City of Lake Forest
Fiscal Analysis Summary

FUNDING SOURCES

DAMP FUNDING SOURCES	FUNDING PERCENTAGES	
	FISCAL YEAR 1999-2000	FISCAL YEAR 2000-01 (Projected)
GENERAL FUND	10	10
UTILITY TAX / CHARGES		
SEPARATE UTILITY BILLING ITEM		
GAS TAX	90	90
SPECIAL DISTRICT FUND		
OTHERS (Specify) User Fees for Recycling and Hazardous Waste Collection. Integrated Waste Management Interest Earnings Sanitation Fee Benefit Assessment Fleet Maintenance Fund Community Services District Used Oil Grant Water Fund Sewer & Storm Drain Maintenance Fee		
TOTALS (must add up to 100%)	100	100

Table 6.55

City of Los Alamitos
Fiscal Analysis Summary

CAPITAL COSTS
(land, large equipment, and structures)

DAMP Cost Elements		1999/2000 FY Costs		Projected 2000/01 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$0	$0	$0	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$0	$0	$0
	Recycling	$0	$0	$0	$0
	Drainage Facility Maintenance	$0	$0	$0	$0
	Catch Basin Stenciling	$0	$0	$0	$0
	Street Sweeping	$0	$0	$0	$0
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$0	$0	$0	$0
	Pesticide & Fertilizer Management	$0	$0	$0	$0
PUBLIC INFORMATION DAMP (Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	$0	$0	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$0	$0	$0	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$0	$0	$0	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$0	$0	$0	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$0	$0	$0
TOTALS		$0	$0	$0	$0

Table 6.56

City of Los Alamitos
Fiscal Analysis Summary

OPERATIONS AND MAINTENANCE

DAMP Cost Elements		1999/2000 FY Costs		Projected 2000/01 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$0	$0	$0	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$0	$0	$0
	Recycling	$0	$0	$0	$0
	Drainage Facility Maintenance	$0	$5,000	$0	$5,000
	Catch Basin Stenciling	$0	$0	$0	$0
	Street Sweeping	$0	$51,000	$0	$51,800
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$0	$1,500	$0	$1,500
	Pesticide & Fertilizer Management	$0	$5,000	$0	$5,000
PUBLIC INFORMATION DAMP (Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	$0	$0	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$0	$0	$0	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$0	$0	$0	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$0	$0	$0	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$0	$0	$0
TOTALS		$0	$62,500	$0	$63,300

Table 6.57

City of Los Alamitos
Fiscal Analysis Summary

FUNDING SOURCES

DAMP FUNDING SOURCES	FUNDING PERCENTAGES	
	FISCAL YEAR 1999-2000	FISCAL YEAR 2000-01 (Projected)
GENERAL FUND	100	100
UTILITY TAX / CHARGES		
SEPARATE UTILITY BILLING ITEM		
GAS TAX		
SPECIAL DISTRICT FUND		
OTHERS (Specify) User Fees for Recycling and Hazardous Waste Collection. Integrated Waste Management Interest Earnings Sanitation Fee Benefit Assessment Fleet Maintenance Fund Community Services District Used Oil Grant Water Fund Sewer & Storm Drain Maintenance Fee		
TOTALS (must add up to 100%)	100	100

Table 6.58

City of Mission Viejo
Fiscal Analysis Summary

CAPITAL COSTS
(land, large equipment, and structures)

DAMP Cost Elements		1999/2000 FY Costs		Projected 2000/01 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$0	$0	$0	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$0	$0	$0
	Recycling	$0	$0	$0	$0
	Drainage Facility Maintenance	$0	$0	$0	$0
	Catch Basin Stenciling	$0	$0	$0	$0
	Street Sweeping	$0	$0	$0	$0
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$0	$0	$0	$0
	Pesticide & Fertilizer Management	$0	$0	$0	$0
PUBLIC INFORMATION DAMP (Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	$0	$0	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$2,500	$0	$10,000	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$5,000	$0	$20,000	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$0	$0	$0	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$5,000	$0	$5,000	$0
TOTALS		$12,500	$0	$35,000	$0

Table 6.59

City of Mission Viejo
Fiscal Analysis Summary

OPERATIONS AND MAINTENANCE

DAMP Cost Elements		1999/2000 FY Costs		Projected 2000/01 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$65,013	$0	$61,463	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$11,735	$0	$20,000
	Recycling	$0	$0	$0	$0
	Drainage Facility Maintenance	$215,270	$645,800	$152,500	$457,500
	Catch Basin Stenciling	$0	$0	$0	$0
	Street Sweeping	$0	$240,278	$0	$320,000
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$0	$2,152	$0	$5,000
	Pesticide & Fertilizer Management	$0	$425	$0	$1,835
PUBLIC INFORMATION DAMP (Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	$0	$0	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$9,500	$0	$10,000	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$5,000	$0	$5,000	$0
ILLICIT CONNJ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$0	$0	$0	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$5,000	$0	$10,000	$0
TOTALS		$299,783	$900,390	$238,963	$804,335

Table 6.60

City of Mission Viejo
Fiscal Analysis Summary

FUNDING SOURCES

DAMP FUNDING SOURCES	FUNDING PERCENTAGES	
	FISCAL YEAR 1999-2000	FISCAL YEAR 2000-01 (Projected)
GENERAL FUND	85	85
UTILITY TAX / CHARGES		
SEPARATE UTILITY BILLING ITEM		
GAS TAX		
SPECIAL DISTRICT FUND		
OTHERS (Specify) User Fees for Recycling and Hazardous Waste Collection. Integrated Waste Management Interest Earnings Sanitation Fee Benefit Assessment Fleet Maintenance Fund Community Services District Used Oil Grant Water Fund Sewer & Storm Drain Maintenance Fee	15	15
TOTALS (must add up to 100%)	100	100

Table 6.61

City of Newport Beach
Fiscal Analysis Summary

CAPITAL COSTS
(land, large equipment, and structures)

DAMP Cost Elements		1999/2000 FY Costs		Projected 2000/01 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$0	$0	$0	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$0	$0	$0
	Recycling	$0	$0	$0	$0
	Drainage Facility Maintenance	$0	$235,000	$0	$0
	Catch Basin Stenciling	$0	$0	$0	$0
	Street Sweeping	$0	$105,000	$0	$110,000
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$0	$8,000	$0	$8,500
	Pesticide & Fertilizer Management	$0	$0	$0	$0
PUBLIC INFORMATION DAMP (Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	$0	$0	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$0	$0	$0	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$0	$0	$0	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$0	$0	$0	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$0	$0	$0
TOTALS		$0	$348,000	$0	$118,500

Table 6.62

City of Newport Beach
Fiscal Analysis Summary

OPERATIONS AND MAINTENANCE

DAMP Cost Elements		1999/2000 FY Costs		Projected 2000/01 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$40,000	$0	$40,000	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$349,000	$0	$352,000
	Recycling	$0	$630,000	$0	$742,860
	Drainage Facility Maintenance	$0	$185,000	$0	$190,000
	Catch Basin Stenciling	$0	$1,200	$0	$1,200
	Street Sweeping	$0	$345,000	$0	$355,000
	Environmental Performance	$0	$42,000	$0	$42,000
	Public Property & Street Chemical Spill Response	$0	$15,000	$0	$1,500
	Pesticide & Fertilizer Management	$0	$3,000	$0	$3,000
PUBLIC INFORMATION DAMP (Section 6.0)	Nonpoint Source Pollution Awareness	$3,500	$3,500	$3,500	$0
	Household Hazardous Waste Collection	$0	$4,000	$0	$4,000
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$0	$2,500	$0	$2,500
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$0	$2,500	$0	$2,500
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$18,000	$0	$18,000	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$7,000	$0	$8,000	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$0	$0	$0
TOTALS		$68,500	$1,582,700	$69,500	$1,696,560

Table 6.63

City of Newport Beach
Fiscal Analysis Summary

FUNDING SOURCES

DAMP FUNDING SOURCES	FUNDING PERCENTAGES	
	FISCAL YEAR 1999-2000	FISCAL YEAR 2000-01 (Projected)
GENERAL FUND	100	100
UTILITY TAX / CHARGES		
SEPARATE UTILITY BILLING ITEM		
GAS TAX		
SPECIAL DISTRICT FUND		
OTHERS (Specify) User Fees for Recycling and Hazardous Waste Collection. Integrated Waste Management Interest Earnings Sanitation Fee Benefit Assessment Fleet Maintenance Fund Community Services District Used Oil Grant Water Fund Sewer & Storm Drain Maintenance Fee		
TOTALS (must add up to 100%)	100	100

Table 6.64

City of Orange
Fiscal Analysis Summary .

CAPITAL COSTS
(land, large equipment, and structures)

DAMP Cost Elements		1999/00 FY Costs		Projected 2000/01 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$0	$0	$0	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$0	$0	$0
	Recycling	$0	$0	$0	$0
	Drainage Facility Maintenance	$0	$0	$0	$0
	Catch Basin Stenciling	* $375	$0	* $200	$0
	Street Sweeping	$0	** $417,500	$0	** $150,000
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$0	$25,000	$0	$25,000
	Pesticide & Fertilizer Management	$10,000	$22,000	$10,000	$22,000
PUBLIC INFORMATION DAMP (Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	# $1,500	$0	# $1,500	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$0	$0	$0	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$0	$0	$0	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	^ $16,750	$0	^ $16,750	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$0	$0	$0
TOTALS		$28,625	$464,500	$28,450	$197,000

* Program complete. Very few reapplications and new catch basins required
** Replaced entire fleet (7: 4 brush/3 vacuum)
# Non-grant reimbursed costs for used oil recycling
^ Increase from 1998-99 due to increased inspections

Table 6.65

City of Orange
Fiscal Analysis Summary

OPERATIONS AND MAINTENANCE

DAMP Cost Elements		1999/00 FY Costs		Projected 2000/01 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$33,000	$6,000	$35,000	$6,000
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$75,000	$0	$75,000
	Recycling	$0	$2,200,000	$0	$2,200,000
	Drainage Facility Maintenance	$0	$215,000	$0	$215,000
	Catch Basin Stenciling	$0	$1,250	$0	$250
	Street Sweeping	$0	$649,000	$0	$650,000
	Environmental Performance	$21,000	$113,500	$0	$115,000
	Public Property & Street Chemical Spill Response	$0	$64,500	$0	$65,000
	Pesticide & Fertilizer Management	$0	$13,500	$0	$15,000
PUBLIC INFORMATION DAMP (Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	$109,500	$2,500	$110,000	$3,000
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$0	$0	$0	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$20,000	$0	$0	$22,000
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$0	$0	$0	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$10,500	$0	$12,000
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$0	$0	$0
TOTALS		$183,500	$3,350,750	$145,000	$3,378,250

1: State Grant Money

Table 6.66

City of Orange
Fiscal Analysis Summary

FUNDING SOURCES

DAMP FUNDING SOURCES	FUNDING PERCENTAGES	
	FISCAL YEAR 1999-2000	FISCAL YEAR 2000-01 (Projected)
GENERAL FUND		
UTILITY TAX / CHARGES		
SEPARATE UTILITY BILLING ITEM		
GAS TAX		
SPECIAL DISTRICT FUND		
OTHERS (Specify)		
User Fees for Recycling and Hazardous Waste Collection.		
Integrated Waste Management	15	15
Interest Earnings		
Sanitation Fee	75	75
Benefit Assessment		
Fleet Maintenance Fund	10	10
Community Services District		
Used Oil Grant		
Water Fund		
Sewer & Storm Drain Maintenance Fee		
TOTALS (must add up to 100%)	100	100

Table 6.67

City of Placentia
Fiscal Analysis Summary

CAPITAL COSTS
(land, large equipment, and structures)

DAMP Cost Elements		1999/2000 FY Costs		Projected 2000/01 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$2,266	$0	$2,575	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$1,236	$0	$1,339
	Recycling	$0	$0	$0	$0
	Drainage Facility Maintenance	$0	$5,150	$0	$6,695
	Catch Basin Stenciling	$0	$0	$0	$0
	Street Sweeping	$30,900	$30,900	$30,900	$103,000
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$0	$0	$0	$0
	Pesticide & Fertilizer Management	$0	$4,120	$0	$4,635
PUBLIC INFORMATION DAMP (Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	$0	$0	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$0	$0	$0	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$1,030	$0	$1,030	$0
ILLICIT CONNJ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$721	$0	$1,030	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$515	$0	$1,030	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$0	$0	$0
TOTALS		$35,432	$41,406	$36,565	$115,669

Table 6.68

City of Placentia
Fiscal Analysis Summary

OPERATIONS AND MAINTENANCE

DAMP Cost Elements		1999/2000 FY Costs		Projected 2000/01 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$22,660	$0	$25,750	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$15,450	$0	$20,600
	Recycling	$0	$0	$0	$0
	Drainage Facility Maintenance	$0	$4,558	$0	$6,180
	Catch Basin Stenciling	$8,755	$0	$8,755	$0
	Street Sweeping	$103,000	$0	$103,000	$0
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$0	$20,600	$0	$20,600
	Pesticide & Fertilizer Management	$0	$3,090	$0	$3,090
PUBLIC INFORMATION DAMP (Section 6.0)	Nonpoint Source Pollution Awareness	$1,545	$0	$1,545	$0
	Household Hazardous Waste Collection	$0	$6,695	$0	$72,100
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$1,339	$0	$1,545	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$5,150	$0	$6,180	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$7,210	$0	$8,240	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$10,300	$5,150	$10,300	$5,150
TOTALS		$159,959	$55,543	$165,315	$127,720

Table 6.69

City of Placentia
Fiscal Analysis Summary

FUNDING SOURCES

DAMP FUNDING SOURCES	FUNDING PERCENTAGES	
	FISCAL YEAR 1999-2000	FISCAL YEAR 2000-01 (Projected)
GENERAL FUND	33	33
UTILITY TAX / CHARGES	34	34
SEPARATE UTILITY BILLING ITEM		
GAS TAX	33	33
SPECIAL DISTRICT FUND		
OTHERS (Specify) User Fees for Recycling and Hazardous Waste Collection. Integrated Waste Management Interest Earnings Sanitation Fee Benefit Assessment Fleet Maintenance Fund Community Services District Used Oil Grant Water Fund Sewer & Storm Drain Maintenance Fee		
TOTALS (must add up to 100%)	100	100

Table 6.70

City of San Clemente
Fiscal Analysis Summary

CAPITAL COSTS
(land, large equipment, and structures)

DAMP Cost Elements		1999/2000 FY Costs		Projected 2000/01 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		0	0	0	0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	0	0	0	0
	Recycling	0	0	0	0
	Drainage Facility Maintenance	247,566	0	0	0
	Catch Basin Stenciling	0	0	0	0
	Street Sweeping	0	0	0	0
	Environmental Performance	0	0	0	0
	Public Property & Street Chemical Spill Response	0	0	0	0
	Pesticide & Fertilizer Management	0	0	0	0
PUBLIC INFORMATION DAMP (Section 6.0)	Nonpoint Source Pollution Awareness	0	0	0	0
	Household Hazardous Waste Collection	0	0	0	0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		0	0	0	0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		0	0	0	0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	0	0	0	0
	Other Efforts to Identify & Eliminate Illicit Connections	0	0	0	0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		0	0	0	0
TOTALS		247,566	0	0	0

Table 6.71

City of San Clemente
Fiscal Analysis Summary

OPERATIONS AND MAINTENANCE

DAMP Cost Elements		1999/2000 FY Costs		Projected 2000/01 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		161,130	0	162,780	0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	0	0	0	0
	Recycling	114,200	0	124,490	0
	Drainage Facility Maintenance	108,762	0	103,506	0
	Catch Basin Stenciling	18,127	0	17,251	0
	Street Sweeping	118,400	0	122,220	0
	Environmental Performance	0	0	0	0
	Public Property & Street Chemical Spill Response	0	0	0	0
	Pesticide & Fertilizer Management	0	0	0	0
PUBLIC INFORMATION DAMP (Section 6.0)	Nonpoint Source Pollution Awareness	0	0	0	0
	Household Hazardous Waste Collection	0	0	0	0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		0	0	0	0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		0	0	0	0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	54,381	0	51,753	0
	Other Efforts to Identify & Eliminate Illicit Connections	0	0	0	0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		0	0	0	0
TOTALS		575,000	0	582,000	0

Table 6.72

City of San Clemente
Fiscal Analysis Summary

FUNDING SOURCES

DAMP FUNDING SOURCES	FUNDING PERCENTAGES	
	FISCAL YEAR 1999-2000	FISCAL YEAR 2000-01 (Projected)
GENERAL FUND	20 street sweeping	21 street sweeping
UTILITY TAX / CHARGES		
SEPARATE UTILITY BILLING ITEM		
GAS TAX		
SPECIAL DISTRICT FUND		
OTHERS (Specify) User Fees for Recycling and Hazardous Waste Collection. Integrated Waste Management Interest Earnings Sanitation Fee Benefit Assessment Fleet Maintenance Fund Community Services District Used Oil Grant Water Fund Sewer & Storm Drain Maintenance Fee	16 solid waste fee 64	21 solid waste fee 58
TOTALS (must add up to 100%)	100	100

Table 6.73

City of San Juan Capistrano
Fiscal Analysis Summary

CAPITAL COSTS
(land, large equipment, and structures)

DAMP Cost Elements		1999/2000 FY Costs		Projected 2000/01 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$0	$0	$0	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$0	$0	$0
	Recycling	$0	$0	$0	$0
	Drainage Facility Maintenance	$0	$0	$0	$0
	Catch Basin Stenciling	$0	$0	$0	$0
	Street Sweeping	$0	$0	$0	$0
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$0	$0	$0	$0
	Pesticide & Fertilizer Management	$0	$0	$0	$0
PUBLIC INFORMATION DAMP (Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	$0	$0	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$0	$0	$0	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$0	$0	$0	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$0	$0	$0	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$10,000	$0	$10,000	$10,000
TOTALS		$10,000	$0	$10,000	$10,000

Table 6.74

City of San Juan Capistrano
Fiscal Analysis Summary

OPERATIONS AND MAINTENANCE

DAMP Cost Elements		1999/2000 FY Costs		Projected 2000/01 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$0	$0	$0	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$2,000	$16,000	$2,000	$16,000
	Recycling	Contracted	$0	$0	$0
	Drainage Facility Maintenance	$6,000	$18,500	$8,000	$18,500
	Catch Basin Stenciling	$600	$0	$2,000	$0
	Street Sweeping	$6,000	$62,000	$7,000	$69,000
	Environmental Performance	$5,000	$0	$25,000	$0
	Public Property & Street Chemical Spill Response	$500	$1,500	$500	$1,500
	Pesticide & Fertilizer Management	$0	$11,000	$0	$11,000
PUBLIC INFORMATION DAMP (Section 6.0)	Nonpoint Source Pollution Awareness	$100	$0	$100	$0
	Household Hazardous Waste Collection	$0	$0	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$1,700	$0	$2,000	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$1,400	$0	$2,000	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$300	$0	$15,000	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$500	$0	$700	$0
TOTALS		$24,100	$109,000	$64,300	$116,000

Table 6.75

City of San Juan Capistrano
Fiscal Analysis Summary

FUNDING SOURCES

DAMP FUNDING SOURCES	FUNDING PERCENTAGES	
	FISCAL YEAR 1999-2000	FISCAL YEAR 2000-01 (Projected)
GENERAL FUND	70	86
UTILITY TAX / CHARGES	15	7
SEPARATE UTILITY BILLING ITEM		
GAS TAX	15	7
SPECIAL DISTRICT FUND		
OTHERS (Specify) User Fees for Recycling and Hazardous Waste Collection. Integrated Waste Management Interest Earnings Sanitation Fee Benefit Assessment Fleet Maintenance Fund Community Services District Used Oil Grant Water Fund Sewer & Storm Drain Maintenance Fee		
TOTALS (must add up to 100%)	100	100

Table 6.76

City of Santa Ana
Fiscal Analysis Summary

CAPITAL COSTS
(land, large equipment, and structures)

DAMP Cost Elements		1999/2000 FY Costs		Projected 2000/01 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$0	$0	$0	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$0	$0	$0
	Recycling	$0	$0	$0	$0
	Drainage Facility Maintenance	$0	$0	$0	$0
	Catch Basin Stenciling	$0	$0	$0	$0
	Street Sweeping	$0	$0	$0	$0
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$0	$0	$0	$0
	Pesticide & Fertilizer Management	$0	$0	$0	$0
PUBLIC INFORMATION DAMP (Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	$0	$0	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$0	$0	$0	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$0	$0	$0	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$0	$0	$0	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$0	$0	$0
TOTALS		$0	$0	$0	$0

Table 6.77

City of Santa Ana
Fiscal Analysis Summary

OPERATIONS AND MAINTENANCE

DAMP Cost Elements		1999/00 FY Costs		Projected 2000/01 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$15,000	$0	$19,000	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$0	$0	$0
	Recycling	$0	$0	$0	$0
	Drainage Facility Maintenance	$0	$53,300	$0	$75,000
	Catch Basin Stenciling	$5,000	$0	$5,000	$0
	Street Sweeping	$0	$3,555,395	$0	$3,555,000
	Environmental Performance	$13,313	$35,930	$13,312	$35,930
	Public Property & Street Chemical Spill Response	$0	$1,068,000	$0	$1,125,150
	Pesticide & Fertilizer Management	$0	$162,426	$0	$163,000
PUBLIC INFORMATION DAMP (Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	$0	$0	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$6,600	$0	$6,800	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$0	$0	$0	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$0	$0	$0	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$0	$0	$0
TOTALS		$39,913	$4,875,051	$44,112	$4,954,080

Table 6.78

City of Santa Ana
Fiscal Analysis Summary

FUNDING SOURCES

DAMP FUNDING SOURCES	FUNDING PERCENTAGES	
	FISCAL YEAR 1999-2000	FISCAL YEAR 2000-01 (Projected)
GENERAL FUND	26	24
UTILITY TAX / CHARGES		
SEPARATE UTILITY BILLING ITEM		
GAS TAX		
SPECIAL DISTRICT FUND		
OTHERS (Specify) User Fees for Recycling and Hazardous Waste Collection. Integrated Waste Management Interest Earnings Sanitation Fee Benefit Assessment Fleet Maintenance Fund Community Services District Used Oil Grant Water Fund Sewer & Storm Drain Maintenance Fee	74	76
TOTALS (must add up to 100%)	100	100

Table 6.79

City of Seal Beach
Fiscal Analysis Summary

CAPITAL COSTS
(land, large equipment, and structures)

DAMP Cost Elements		1999/2000 FY Costs		Projected 2000/01 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$0	$0	$0	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$7,000	$0	$7,000
	Recycling	$0	$166,000	$0	$166,000
	Drainage Facility Maintenance	$0	$45,500	$0	$50,000
	Catch Basin Stenciling	$0	$164	$0	$164
	Street Sweeping	$0	$98,000	$0	$99,000
	Environmental Performance	$3,000	$12,000	$3,000	$12,000
	Public Property & Street Chemical Spill Response	$500	$0	$500	$0
	Pesticide & Fertilizer Management	$0	$2,000	$0	$2,000
PUBLIC INFORMATION DAMP (Section 6.0)	Nonpoint Source Pollution Awareness	$500	$0	$500	$0
	Household Hazardous Waste Collection	$1,400	$0	$1,400	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$500	$0	$500	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$1,000	$0	$1,000	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$10,000	$0	$10,000	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$1,000	$0	$1,000	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$500	$0	$500	$0
TOTALS		$18,400	$330,664	$18,400	$336,164

Table 6.80

City of Seal Beach
Fiscal Analysis Summary

OPERATIONS AND MAINTENANCE

DAMP Cost Elements		1999/2000 FY Costs		Projected 2000/01 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$0	$0	$0	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$0	$0	$0
	Recycling	$0	$0	$0	$0
	Drainage Facility Maintenance	$0	$0	$0	$0
	Catch Basin Stenciling	$0	$1,200	$0	$1,200
	Street Sweeping	$0	$0	$0	$0
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$0	$0	$0	$0
	Pesticide & Fertilizer Management	$0	$0	$0	$0
PUBLIC INFORMATION DAMP (Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	$0	$0	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$0	$0	$0	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$0	$0	$0	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$0	$0	$0	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$0	$0	$0
TOTALS		$0	$1,200	$0	$1,200

Table 6.81

City of Seal Beach
Fiscal Analysis Summary

FUNDING SOURCES

DAMP FUNDING SOURCES	FUNDING PERCENTAGES	
	FISCAL YEAR 1999-2000	FISCAL YEAR 2000-01 (Projected)
GENERAL FUND	100	100
UTILITY TAX / CHARGES		
SEPARATE UTILITY BILLING ITEM		
GAS TAX		
SPECIAL DISTRICT FUND		
OTHERS (Specify) User Fees for Recycling and Hazardous Waste Collection. Integrated Waste Management Interest Earnings Sanitation Fee Benefit Assessment Fleet Maintenance Fund Community Services District Used Oil Grant Water Fund Sewer & Storm Drain Maintenance Fee		
TOTALS (must add up to 100%)	100	100

Table 6.82

City of Stanton
Fiscal Analysis Summary

CAPITAL COSTS
(land, large equipment, and structures)

DAMP Cost Elements		1999/2000 FY Costs		Projected 2000/01 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$0	$0	$0	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$0	$0	$0
	Recycling	$0	$0	$0	$0
	Drainage Facility Maintenance	$0	$0	$0	$0
	Catch Basin Stenciling	$0	$0	$0	$0
	Street Sweeping	$0	$0	$0	$0
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$0	$0	$0	$0
	Pesticide & Fertilizer Management	$0	$0	$0	$0
PUBLIC INFORMATION DAMP (Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	$0	$0	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$0	$0	$0	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$0	$0	$0	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$0	$0	$0	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$0	$0	$0
TOTALS		$0	$0	$0	$0

Table 6.83

City of Stanton

Fiscal Analysis Summary

OPERATIONS AND MAINTENANCE

DAMP Cost Elements		1999/2000 FY Costs		Projected 2000/01 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$0	$0	$0	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$0	$0	$0
	Recycling	$0	$0	$0	$0
	Drainage Facility Maintenance	$2,500	$2,500	$2,500	$2,500
	Catch Basin Stenciling	$1,000	$0	$1,000	$0
	Street Sweeping	$88,000	$88,000	$88,000	$88,000
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$500	$0	$500	$0
	Pesticide & Fertilizer Management	$0	$0	$0	$0
PUBLIC INFORMATION DAMP (Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	$0	$0	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$0	$0	$0	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$500	$0	$500	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$0	$0	$0	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$500	$0	$500	$0
TOTALS		$93,000	$90,500	$93,000	$90,500

Table 6.84

City of Stanton
Fiscal Analysis Summary

FUNDING SOURCES

DAMP FUNDING SOURCES	FUNDING PERCENTAGES	
	FISCAL YEAR 1999-2000	FISCAL YEAR 2000-01 (Projected)
GENERAL FUND	100	100
UTILITY TAX / CHARGES		
SEPARATE UTILITY BILLING ITEM		
GAS TAX		
SPECIAL DISTRICT FUND		
OTHERS (Specify) User Fees for Recycling and Hazardous Waste Collection. Integrated Waste Management Interest Earnings Sanitation Fee Benefit Assessment Fleet Maintenance Fund Community Services District Used Oil Grant Water Fund Sewer & Storm Drain Maintenance Fee		
TOTALS (must add up to 100%)	100	100

Table 6.85

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City of Tustin
Fiscal Analysis Summary

CAPITAL COSTS
(land, large equipment, and structures)

DAMP Cost Elements		1999/2000 FY Costs		Projected 2000/01 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$0	$0	$0	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$0	$0	$0
	Recycling	$0	$0	$0	$0
	Drainage Facility Maintenance	$0	$0	$0	$0
	Catch Basin Stenciling	$0	$0	$0	$0
	Street Sweeping	$0	$0	$0	$0
	Environmental Performance	$0	$20,000	$0	$140,000
	Public Property & Street Chemical Spill Response	$0	$0	$0	$0
	Pesticide & Fertilizer Management	$0	$0	$0	$0
PUBLIC INFORMATION DAMP (Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	$0	$0	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$0	$0	$0	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$0	$0	$0	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$0	$0	$0	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$0	$0	$0
TOTALS		$0	$20,000	$0	$140,000

Table 6.88

City of Villa Park
Fiscal Analysis Summary

CAPITAL COSTS
(land, large equipment, and structures)

DAMP Cost Elements		1999/2000 FY Costs		Projected 2000/01 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$0	$0	$0	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$0	$0	$0
	Recycling	$0	$0	$0	$0
	Drainage Facility Maintenance	$0	$0	$0	$0
	Catch Basin Stenciling	$0	$0	$0	$0
	Street Sweeping	$0	$0	$0	$0
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$0	$0	$0	$0
	Pesticide & Fertilizer Management	$0	$0	$0	$0
PUBLIC INFORMATION DAMP (Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	$0	$0	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$0	$0	$0	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$0	$0	$0	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$0	$0	$0	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$0	$0	$0
TOTALS		$0	$0	$0	$0

Table 6.89

City of Villa Park
Fiscal Analysis Summary

OPERATIONS AND MAINTENANCE

DAMP Cost Elements		1999/2000 FY Costs		Projected 2000/01 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$0	$0	$0	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$0	$0	$0
	Recycling	$0	$0	$0	$0
	Drainage Facility Maintenance	$0	$0	$0	$0
	Catch Basin Stenciling	$0	$0	$0	$0
	Street Sweeping	$0	$0	$0	$0
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$0	$0	$0	$0
	Pesticide & Fertilizer Management	$0	$0	$0	$0
PUBLIC INFORMATION DAMP (Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	$0	$0	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$0	$0	$0	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$0	$0	$0	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$0	$0	$0	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$0	$0	$0
TOTALS		$0	$0	$0	$0

Table 6.90

City of Villa Park
Fiscal Analysis Summary

FUNDING SOURCES

DAMP FUNDING SOURCES	FUNDING PERCENTAGES	
	FISCAL YEAR 1998-99	FISCAL YEAR 1999-00 (Projected)
GENERAL FUND	100	100
UTILITY TAX / CHARGES		
SEPARATE UTILITY BILLING ITEM		
GAS TAX		
SPECIAL DISTRICT FUND		
OTHERS (Specify) User Fees for Recycling and Hazardous Waste Collection. Integrated Waste Management Interest Earnings Sanitation Fee Benefit Assessment Fleet Maintenance Fund Community Services District Used Oil Grant Water Fund Sewer & Storm Drain Maintenance Fee		
TOTALS (must add up to 100%)	100	100

Table 6.91

City of Westminster
Fiscal Analysis Summary

CAPITAL COSTS
(land, large equipment, and structures)

DAMP Cost Elements		1999/2000 FY Costs		Projected 2000/01 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$0	$0	$0	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$0	$0	$0
	Recycling	$0	$0	$0	$0
	Drainage Facility Maintenance	$0	$0	$0	$0
	Catch Basin Stenciling	$0	$0	$0	$0
	Street Sweeping	$0	$0	$0	$0
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$0	$0	$0	$0
	Pesticide & Fertilizer Management	$0	$0	$0	$0
PUBLIC INFORMATION DAMP (Section 6.0)	Nonpoint Source Pollution Awareness	$0	$0	$0	$0
	Household Hazardous Waste Collection	$0	$0	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$0	$0	$0	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$0	$0	$0	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$0	$0	$0	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$0	$0	$0
TOTALS		$0	$0	$0	$0

Table 6.92

City of Westminster
Fiscal Analysis Summary

OPERATIONS AND MAINTENANCE

DAMP Cost Elements		1999/2000 FY Costs		Projected 2000/01 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$25,000	$0	$25,000	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$208,180	$0	$208,180
	Recycling	$0	$0	$0	$0
	Drainage Facility Maintenance	$30,000	$5,400	$35,000	$5,400
	Catch Basin Stenciling	$7,000	$0	$7,000	$0
	Street Sweeping	$0	$243,000	$0	$245,000
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$0	$12,000	$0	$12,000
	Pesticide & Fertilizer Management	$0	$75,000	$0	$82,000
PUBLIC INFORMATION DAMP (Section 6.0)	Nonpoint Source Pollution Awareness	$3,000	$0	$3,000	$0
	Household Hazardous Waste Collection	$23,500	$0	$30,000	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$3,000	$0	$3,000	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$2,500	$0	$3,500	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$0	$0	$0	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$10,000	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$28,000	$0	$40,000	$0
TOTALS		$122,000	$543,580	$156,500	$552,580

Table 6.93

City of Westminster
Fiscal Analysis Summary

FUNDING SOURCES

DAMP FUNDING SOURCES	FUNDING PERCENTAGES	
	FISCAL YEAR 1999-2000	FISCAL YEAR 2000-01 (Projected)
GENERAL FUND	100	100
UTILITY TAX / CHARGES		
SEPARATE UTILITY BILLING ITEM		
GAS TAX		
SPECIAL DISTRICT FUND		
OTHERS (Specify) User Fees for Recycling and Hazardous Waste Collection. Integrated Waste Management Interest Earnings Sanitation Fee Benefit Assessment Fleet Maintenance Fund Community Services District Used Oil Grant Water Fund Sewer & Storm Drain Maintenance Fee		
TOTALS (must add up to 100%)	100	100

Table 6.94

City of Yorba Linda
Fiscal Analysis Summary

CAPITAL COSTS
(land, large equipment, and structures)

DAMP Cost Elements		1999/2000 FY Costs		Projected 2000/01 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$0	$0	$0	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$0	$0	$0	$0
	Recycling	$0	$0	$0	$0
	Drainage Facility Maintenance	$0	$0	$0	$0
	Catch Basin Stenciling	$3,000	$0	$3,200	$0
	Street Sweeping	$5,000	$0	$5,300	$0
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$0	$0	$0	$0
	Pesticide & Fertilizer Management	$0	$0	$0	$0
PUBLIC INFORMATION DAMP (Section 6.0)	Nonpoint Source Pollution Awareness	$3,000	$0	$3,000	$0
	Household Hazardous Waste Collection	$0	$0	$0	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$0	$0	$0	$0
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$0	$0	$0	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$5,000	$0	$5,300	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$0	$0	$0	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$0	$0	$0	$0
TOTALS		$16,000	$0	$16,800	$0

Table 6.95

City of Yorba Linda
Fiscal Analysis Summary

OPERATIONS AND MAINTENANCE

DAMP Cost Elements		1999/2000 FY Costs		Projected 2000/01 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		$0	$0	$0	$0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	$12,000	$0	$12,500	$0
	Recycling	$10,000	$0	$10,000	$0
	Drainage Facility Maintenance	$25,000	$0	$25,000	$0
	Catch Basin Stenciling	$2,000	$0	$2,000	$0
	Street Sweeping	$95,000	$55,000	$95,000	$55,000
	Environmental Performance	$0	$0	$0	$0
	Public Property & Street Chemical Spill Response	$0	$0	$0	$0
	Pesticide & Fertilizer Management	$5,000	$5,000	$5,000	$5,000
PUBLIC INFORMATION DAMP (Section 6.0)	Nonpoint Source Pollution Awareness	$2,000	$0	$2,000	$0
	Household Hazardous Waste Collection	$2,000	$0	$2,000	$0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		$3,000	$1,000	$3,000	$1,000
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		$2,000	$0	$2,000	$0
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	$3,000	$0	$3,000	$0
	Other Efforts to Identify & Eliminate Illicit Connections	$2,000	$0	$2,000	$0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		$6,000	$0	$6,000	$0
TOTALS		$169,000	$61,000	$169,500	$61,000

Table 6.96

City of Yorba Linda
Fiscal Analysis Summary

FUNDING SOURCES

DAMP FUNDING SOURCES	FUNDING PERCENTAGES	
	FISCAL YEAR 1999-2000	FISCAL YEAR 2000-01 (Projected)
GENERAL FUND	75	75
UTILITY TAX / CHARGES		
SEPARATE UTILITY BILLING ITEM		
GAS TAX		
SPECIAL DISTRICT FUND		
OTHERS (Specify) User Fees for Recycling and Hazardous Waste Collection. Integrated Waste Management Interest Earnings Sanitation Fee Benefit Assessment Fleet Maintenance Fund Community Services District Used Oil Grant Water Fund Sewer & Storm Drain Maintenance Fee	2 23	2 23
TOTALS (must add up to 100%)	100	100

Table 6.97

Grand Totals
Fiscal Analysis Summary

CAPITAL COSTS
(land, large equipment, and structures)

DAMP Cost Elements		1999/2000 FY Costs		Projected 2000/01 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		2,266	0	2,575	0
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	0	8,236	0	8,339
	Recycling	0	1,876,171	0	249,000
	Drainage Facility Maintenance	474,613	2,489,865	88,000	3,147,195
	Catch Basin Stenciling	3,375	3,344	3,400	164
	Street Sweeping	337,600	653,400	36,200	464,000
	Environmental Performance	3,000	32,000	250,000	152,000
	Public Property & Street Chemical Spill Response	500	37,000	500	33,500
	Pesticide & Fertilizer Management	10,000	31,620	10,000	30,135
PUBLIC INFORMATION DAMP (Section 6.0)	Nonpoint Source Pollution Awareness	3,500	0	3,500	0
	Household Hazardous Waste Collection	2,900	0	2,900	0
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		43,000	6,000	50,500	6,000
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		7,030	20,000	22,030	20,000
ILLICIT CONN./ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	33,471	0	35,080	3,000
	Other Efforts to Identify & Eliminate Illicit Connections	1,515	0	2,030	0
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		259,150	275,000	605,200	410,000
Totals		1,181,920	5,432,636	1,111,915	4,523,333

Table 6.98

Grand Totals

Fiscal Analysis Summary

OPERATIONS AND MAINTENANCE

DAMP Cost Elements		1999/2000 FY Costs		Projected 2000/01 Costs	
		Attributable to DAMP	Pre-existing Program	Attributable to DAMP	Pre-existing Program
Supportive of Program Administration (DAMP Section 2.0)		796,409	1,447,564	744,715	1,451,816
MUNICIPAL ACTIVITIES (DAMP Section 5.0)	Litter Control	19,207	2,525,392	18,463	3,186,427
	Recycling	181,510	15,081,601	194,490	15,613,378
	Drainage Facility Maintenance	1,312,237	5,466,985	1,141,428	5,185,163
	Catch Basin Stenciling	73,277	11,121	75,519	27,050
	Street Sweeping	848,400	13,434,624	1,008,220	13,726,042
	Environmental Performance	40,652	191,430	152,812	192,930
	Public Property & Street Chemical Spill Response	14,000	2,472,740	14,600	2,639,321
	Pesticide & Fertilizer Management	156,800	2,088,171	164,740	3,198,206
PUBLIC INFORMATION DAMP (Section 6.0)	Nonpoint Source Pollution Awareness	1,541,551	3,500	543,645	0
	Household Hazardous Waste Collection	147,793	602,236	171,500	623,306
REQUIRING NEW DEVELOPMENT BMPS (Supportive of Planning, etc.)		43,356	26,148	47,085	21,305
REQUIRING CONSTRUCTION BMPS (Supportive of Plan Check & Inspection)		60,099	31,856	54,659	50,904
ILLICIT CONN/ DISCHARGE ID & ELIMINATION (DAMP Sec. 10.0)	Facility Inspection	357,656	0	383,981	0
	Other Efforts to Identify & Eliminate Illicit Connections	64,818	10,500	79,375	12,000
BMPS INCORPORATED INTO PUBLIC WORKS CAPITAL PROJECTS		85,300	5,150	181,500	5,150
	Totals	5,743,065	43,399,018	4,976,732	45,932,998

Table 6.99

Grand Totals

Fiscal Analysis Summary

AVERAGE FUNDING SOURCES

DAMP FUNDING SOURCES	FUNDING PERCENTAGES	
	FISCAL YEAR 1998-99	FISCAL YEAR 1999-00 (Projected)
GENERAL FUND	65.6%	65.7%
UTILITY TAX / CHARGES	2.3%	2.0%
SEPARATE UTILITY BILLING ITEM		
GAS TAX	8.7%	8.4%
SPECIAL DISTRICT FUND	4.9%	4.8%
OTHERS (Specify)	1.0%	1.5%
User Fees for Recycling and Hazardous Waste Collection	0.0%	0.0%
Integrated Waste Management	0.5%	0.5%
Interest Earnings	0.0%	0.0%
Sanitation Fee	5.0%	5.0%
Benefit Assessment	2.7%	2.7%
Fleet Maintenance Fund	0.3%	0.3%
Community Services District	0.5%	0.5%
Used Oil Grant	0.3%	0.3%
Water Fund	0.4%	0.6%
Sewer & Storm Drain Maintenance Fee	6.8%	6.6%
TOTALS (must add up to 100%)	99.2%	99.2%

Table 6.100 Shared and Individual NPDES Stormwater Program Expenditures (1995-2000)

	Actual Shared Cost Expenditures	Total Individual Cost Expenditures Attributable to DAMP
1995-96	$748,980	N/A
1996-97	$809,602	$2,625,025
1997-98	$945,241	$2,634,848
1998-99	$758,439	$3,470,398
1999-00	$943,067	$6,924,985
2000-01	$1,089,397	N/A

* Total Individual Expenditures represent only those costs attributable to the DAMP
* The 2000-01figure is a projected expenditure estimate

FIGURES

Figure 6.1 Shared and Individual NPDES Stormwater Program Expenditures (1995-2000)

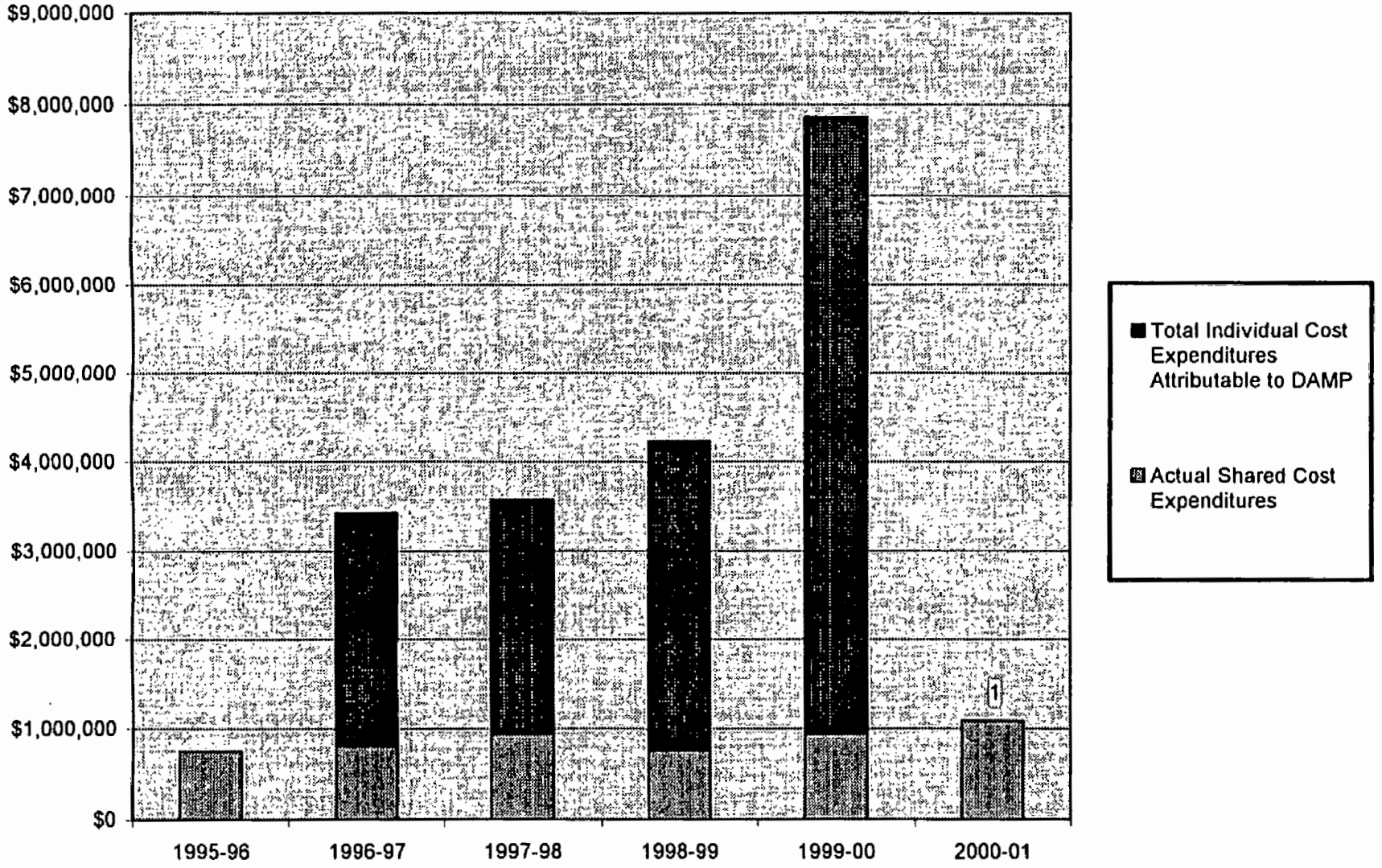

1 - 2000-01 figure is a budget projection

7.0 PROPOSED PLAN OF ACTIVITIES

The 2000 DAMP, which is being submitted as Volume 2 of 4 of the ROWD, represents the Permittees proposed plan of activities. The plan proposes a wide range of continuing and enhanced Best Management Practices (BMPs) which will be implemented over Third Term Permit period. Within each section of the DAMP, there is a discussion regarding the regulatory requirements, the development, implementation, modifications and performance commitments for the program element. In order to develop an effective NPDES Stormwater Program, careful consideration was given to the objectives and importance of each element.

APPENDIX 3.1

REPRESENTATIVE PUBLIC EDUCATION MATERIALS

REPRESENTATIVE PUBLIC EDUCATION MATERIALS

COUNTY OF ORANGE

TRANSPORTATION AND HANDLING

- A maximum of 15 gallons or 125 pounds may be transported per vehicle, per trip (Department of Transportation regulation).
- Materials should be in original containers (except motor oil, fuels and antifreeze).
- All containers must have lids, be sturdy, non-leaking, and protected from breakage.
- Do not combine types of waste.
- Do not mix oil-base paint with latex paint.
- Dry out empty paint cans and discard in regular trash.
- If you wish to have a container returned (i.e. oil containers and boxes/crates used to transport materials), please notify the attendant in advance. Some containers may not be returnable.

WHY SHOP ' _ YOU DROP?

VISIT THE STOP & SWAP!

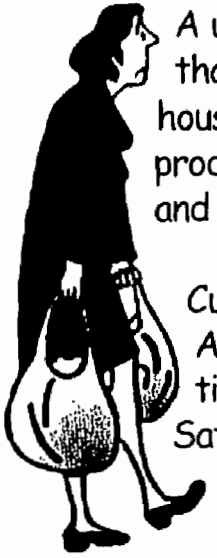

A unique and FREE program that allows you to drop off household, yard, and car care products you no longer need and pick up others you can use.

Currently available at the Anaheim and Irvine locations only. (Tuesday through Saturday, 9 a.m. to 1 p.m.)

FOR MORE INFORMATION ABOUT THE HOUSEHOLD HAZARDOUS WASTE COLLECTION PROGRAM AND THE STOP & SWAP CALL:

(714) 834-6752

Or see our webiste: www.oc.ca.gov/iwmd

Orange County Recycles!

Printed on recycled paper.

Integrated Waste Management Department

DISPOSAL OF HOUSEHOLD HAZARDOUS WASTE

Household Hazardous Waste Collection Program

DID YOU KNOW?

- Most home, car, and yard care products can't be thrown in the trash?
- Paint, used motor oil, and most cleaning products are considered to be "hazardous waste"?
- If these products are put in the landfill they can contaminate our groundwater?

SO WHAT CAN YOU DO?

EASY AS 1-2-3!

1. Pack unwanted home, yard, and car care products in your car.
2. Drive to the Household Hazardous Waste Center closest to you.
3. Sit in your car and fill out a simple form while an attendant removes the unwanted products.

AND AWAY YOU GO!

LOCATIONS

Tuesday through Saturday
9 a.m. to 1 p.m.
except for rainy days and major holidays: Independence, Thanksgiving, Christmas and New Years Days)

STOP & SWAP*

ANAHEIM
1071 N. Blue Gum Street
(Located between the 91 and 57 Freeways on the corner of La Palma and Blue Gum)

STOP & SWAP*

HUNTINGTON BEACH
17121 Nichols Street
(Between Beach Blvd. and Gothard St. off Warner Ave. at Rainbow Recycling and Disposal. Use Gate 6.)

STOP & SWAP*

IRVINE
6411 Oak Canyon
(Off Sand Canyon between the 5 and 405 Freeways (next to the City Corporate Yard and Animal Shelter)

MATERIALS ACCEPTED

- Automotive products (antifreeze, motor oil, fluids)
- Batteries (home and car)
- Cosmetics
- Herbicides
- Hobby supplies
- Household cleaners
- Fuels
- Medicines
- Paints (latex and oil)
- Paint products
- Personal care products
- Pesticides
- Polishes and waxes
- Pool and spa chemicals
- Propane tanks from barbecues
- Unused road flares
- Wood preservatives

WASTE NOT ACCEPTED

Ammunition
Asbestos
Biological
Business-generated
Explosives
Radioactive
Compressed gas cylinders

* See reverse for Stop & Swap info!

GREEN WASTE ONLY

DO'S

- Grass
- Leaves
- Green Plants
- Weeds
- Garden Trimmings
- Tree Limbs
- Wood Chips
- Sawdust
- Small Wood Scraps

DON'TS

- Plastic Bags
- Pet Waste
- Palm Branches
- Soil
- Dirt
- Tree Stumps
- Painted Wood
- Treated Wood

WM WASTE MANAGEMENT
(949) 642-1191
(714) 558-7761

TAKE ME

WM WASTE MANAGEMENT

Waste Management will discard your old trash can(s). Place this sticker on your trash can to be discarded and place at the curb on your trash collection day.

TAKE ME

WM WASTE MANAGEMENT

Waste Management will discard your old trash can(s). Place this sticker on your trash can to be discarded and place at the curb on your trash collection day.

LARGE BIN SERVICE

For large household and yard projects, special bin rental service is available. Please call the Waste Management Customer Service Center at (949) 642-1191 or (714) 558-7761 for rates and information.

BULKY ITEM PICKUP

Each household is entitled to two free bulky item pickups each year. We will collect up to four large items or 20 plastic bags of refuse per pickup (bags not to exceed 50 pounds). Bulky items include large, hard-to-handle items such as furniture, major appliances, and other household items that require two individuals to move. To schedule your free bulky item pickup, please call the Waste Management Customer Service Center at (949) 642-1191 or (714) 558-7761.

HOUSEHOLD HAZARDOUS WASTE

The County of Orange operates regional household hazardous waste collection centers for homeowners to take and dispose of their paint, oil, pesticides, cleaners, solvents, etc. The two centers for South County residents are San Juan Capistrano and Irvine. For more information, call the County's Information Hotline at (714) 834-6752.

CHRISTMAS TREE RECYCLING

We will collect and recycle Christmas trees for the first two weeks following Christmas. Trees must be placed at the curb no later than Friday, January 7, 2000. Trees longer than six feet must be cut in half. Please remove all tinsel, metal ornaments and metal stands from trees. Flocked trees will be collected but not recycled.

HOLIDAY SCHEDULE

Waste Collection does not occur on the following holidays:

New Year's Day	Memorial Day
4th of July	Labor Day
Thanksgiving Day	Christmas Day

When any of these holidays is observed on a weekday, collections for the remainder of the week are delayed one day.

COUNTY OF ORANGE CALIFORNIA

Printed on recycled paper

WM WASTE MANAGEMENT

Your New Expanded Recycling Program

007334

Presented by The County of Orange and Waste Management of Orange County

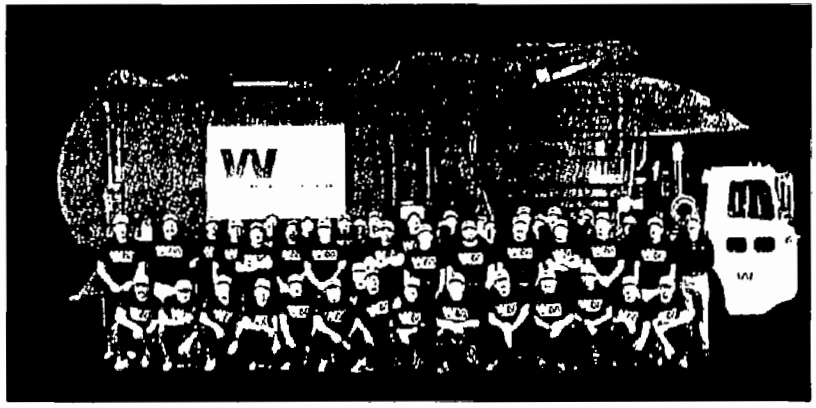

Dear Resident:

Welcome to the County of Orange's new expanded recycling program. The County of Orange, like all cities and counties in California, is required by state law to reduce the waste it sends to landfills by 50 percent by the year 2000. We need your help to accomplish this goal.

Today Waste Management is beginning its new program by making it more convenient for you to recycle. We are doing this in three ways:

- *Providing you with a new cart that you will use for your trash*
- *Increasing recycling service from every other week to every week*
- *Beginning a new green waste (yard trimmings) recycling program for those customers who generate significant quantities of green waste*

Best of all there is no increase in rates.

We are excited about the expanded recycling program and are confident that you will find the program easy to use and convenient for your household. Please take a few minutes to review the information about the new program we have included in your Starter Kit. If you have any questions, please call the Waste Management Customer Service Center at (949) 642-1191 or (714) 558-7761.

Thank you for your help in assisting the County of Orange in reaching its recycling goals.

Sincerely,

Robert J. Coyle
Division President

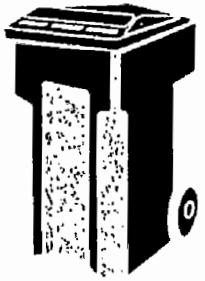

YOUR NEW TRASH CART (BLUE LID)

Each resident with curbside trash service will receive a new trash cart that has a distinctive blue lid with "Trash" stamped on the lid to identify it. Based on the neighborhood you live in you will receive either a 64-gallon cart (equivalent to TWO regular 32-gallon trash cans) or a 96-gallon cart (equivalent to THREE regular trash cans.) If you need either a larger or smaller size after you have used the cart for a few weeks, please call our Customer Service Center at (949) 642-1191 or (714) 558-7761 and we will exchange your cart at no charge. The trash cart is for household waste that cannot be recycled.

Sorted recyclable materials whi will be made into new products

RECYCLABLES (GREEN OR GRAY LID)

Beginning next week you can put your recycling cart out every week. One of the biggest requests from County residents was that they wanted to recycle more items and they wanted more frequent service. The expanded recycling program provides a solution for both requests.

We are also expanding the list of material that you can recycle. You can now put the following materials in the recycling cart with the green or gray lid:

- Newspapers
- Cardboard
- Mixed Paper
- Junk Mail
  Cereal Boxes
- Plastic Bottles
- Magazines, Catalogs & Phone Books
- Aluminum Cans
- Steel/Tin Cans
- Glass Food & Beverage Containers

You no longer need to separate your newspapers within your recyclin cart. All recycling materials can now be mixed together. And rememb if it tears, recycle it.

To avoid contamination, please do not place liquid or food waste, pla bags or styrofoam in the recycling cart. <u>If you are not sure if a produ can be recycled please put it in the trash cart with the blue lid.</u>

GREEN WASTE. IT'S NEW!

The expanded recycling program also includes a new "Green Waste" service. Green waste is commonly referred to as yard trimmings, and includes the following:

- Grass/Leaves
- Tree Branches
- Wood Chips
- Garden Trimmings
- Green Plants/Weeds
- Sawdust/Small Pieces of Wood

How does it work? If you generate green waste, place the enclosed "Green Waste" stickers on your old trash can(s).* Please remember that green waste cans cannot exceed 35-gallons or weigh more than 50 pounds.

Green waste can be put out for collection every week. Plastic is a major contaminant of green waste. Do not place green waste in plastic bags. All of your green waste should be loose in the cans. Tree branches may be tied in 4-foot long bundles and placed next to your green waste cans.

*Note: The County of Orange and Waste Management of Orange County have identified some areas outside the designated green waste collection areas. If you did not receive "Green Waste" stickers, you are located outside the "Green Waste" service areas and you may place green waste in your trash cart.

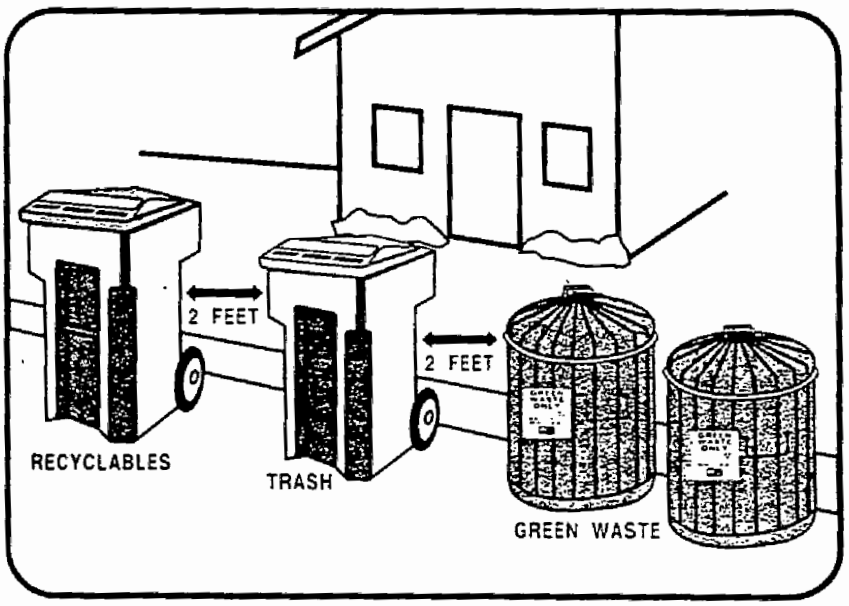

REMINDER: Please place all items in the carts or cans. Cart lids must close to prevent spillage.

CR&R would like to advise the residence of Rossmoor that we acknowledge the following Holidays:

New Years Day
Memorial Day
4th of July
Labor Day
Thanksgiving
Christmas

If one of these Holidays falls during the week (Monday-Friday), your pick-up will be **delayed** one day. If these Holidays fall on the week end (Saturday or Sunday) your pick up day will **not** be changed.

Rossmoor Clean-up

CR&R will have our annual bulky item **clean-up** on October 23, 1999 at Rossmoor Park on Pemberton St. The clean-up program will give you the opportunity to dispose of unwanted bulky items. Please put all items inside the dumpsters. **Do not place items on the ground outside the trash boxes.**

Saturday October 23RD 8:00 AM to 2:00 PM

Proof of residence in the Community of Rossmoor must be provided

No hazardous waste: batteries, paint, paint thinners, tires or oil

MRF RESOURCE CENTER

MRF RESOURCE CENTER was a two year dream of the Environmental Education Team (made up of community members from Huntington Beach, Fountain Valley, and Rainbow Disposal).

MRF RESOURCE CENTER is made from about 500 pounds of recycled materials, items that were at one time, someone else's trash!

MRF RESOURCE CENTER is constructed from:

- Recycled aluminum
- Rumber (a recycled tire and recycled plastic composite)
- Recycled melamine
- Particle board (made from recycled wood product)
- Recycled Polyethylene Terephthalate (a plastic from which soda bottles are made)
- Recycled tin, and
- Recycled, expanded polyvinyl chloride.
- The featured garbage can holds more than 100 cubic feet of trash.

MRF RESOURCE CENTER artist/designer is **Rob Hardin**, owner/operator of **Innovative Design,** 17401 Nichols Street, Suite K, Huntington Beach, CA 92647.

The recycled promotional items inside the "garbage can" were generously donated by **Adapt Consulting – The Environmental Resource Experts,** 13618 Lemay Street, Van Nuys, CA 91401

MRF RESOURCE CENTER was made possible by a grant from the California Department of Conservation, Division of Recycling

RAINBOW
DISPOSAL CO., INC.
O. BOX 1026 • HUNTINGTON BEACH, CA 92647-1026 • PH: (714) 847-3581 FAX: (714) 841-4660

RAINBOW DISPOSAL TOUR APPLICATION

NAME /ORGANIZATION: _____

ADDRESS: _____

CONTACT PERSON: _____

PHONE: ( )_____ FAX: ( )_____

ACTIVITIES OR OBJECTIVES OF ORGANIZATION:

_____

_____NON PROFIT: YES___ NO___

DATES & TIME REQUESTED

Date:_____Day_____Time:_____A.M._____P.M.
Date:_____Day_____Time:_____A.M._____P.M.
Date:_____Day_____Time:_____A.M._____P.M.
Date:_____Day_____Time:_____A.M._____P.M.

APPROXIMATE NUMBER OF PEOPLE TO TOUR THE FACILITY:_____

"MRF"
RAINBOW'S MATERIALS RECOVERY FACILITY
INTERACTIVE EDUCATIONAL DISPLAY

TOURS ARE CONDUCTED TUESDAY THROUGH THURSDAY
10:00 A.M. TO 3:00 P.M.
Tours are approximately one hour
(Please arrive 10 minutes before your tour begins)

Rainbow is located at:
17121 Nichols St.
Huntington Beach, CA 92647

Your request will be answered within ten (10) days from receipt of this application
If you have any questions please call:
(714) 847-3581
Sandra Jacobs Ext. 245
or
Ron Shenkman Ext. 230

Thank you for your interest in Rainbow Disposal and the Environment ! !

PRINTED ON RECYCLED PAPER

RAINBOW DISPOSAL
SCHOOL TOUR APPLICATION

DATE: _____ TEACHER/S: _____
SCHOOL: _____ _____
DISTRICT: _____ PHONE: _____
FAX NO: _____

DATE/S REQUESTED

Date:_____Day:_____Time:_____a.m._____p.m.
Grade/s:_____No. of Students:_____Adults:_____
Date:_____Day:_____Time:_____a.m._____p.m.
Grade/s:_____No. of Students:_____Adults:_____

"PLANET MRF"
RAINBOW'S MATERIALS RECOVERY FACILITY
INTERACTIVE EDUCATIONAL DISPLAY

TOURS ARE CONDUTED TUESDAY, WEDNESDAY & THURSDAY
FROM 9:30 A.M. TO 3:00 P.M. AND ARE APPROXIMATELY ONE (1) HOUR

- *Schools are limited to one (1) Back to Back tour per month (two classes of 30 to 34 Students).*
- *Two adults must accompany each class. Each class will be divided into two groups*
- *Bus will transport 30 to 34 students per trip (one class), drop off one group - return to school, pick up and transport second group - (Turn around time approximately one (1) hour). When second group arrives for tour - the first group will be picked up and transported back to school. The bus will then return for the remaining students.*
- *Before Completing Form (if busing) contact your School Transportation Department for available dates and times.*
- *Tour Requests will be confirmed promptly by FAX or mail.*
- *Keep copy as a reminder. We will make every attempt to fulfill your requests .*

LOOKING FORWARD TO YOUR VISIT!!!!
RAINBOW IS LOCATED AT:
17121 Nichols St.
Huntington Beach, Ca 92647

Sandra Jacobs - Rainbow Disposal
(714) 847-3581, Ext. 245
Fax: (714) 841-4660

AFRAID OF YOUR HAZARDOUS WASTE?

HURRY to a HOUSEHOLD HAZARDOUS WASTE COLLECTION CENTER... IT'S FREE!

CITY OF FOUNTAIN VALLEY ♻ RAINBOW DISPOSAL ♻ CITY OF HUNTINGTON BEACH

WHERE ARE WE GOING TO THROW IT... WHEN THERE IS NO MORE "AWAY"?...

Follow these Waste Prevention tips today!

- Buy products with less packaging
- Use both sides of the paper
- Buy in bulk

CITY OF FOUNTAIN VALLEY ♻ RAINBOW DISPOSAL ♻ CITY OF HUNTINGTON BEACH

Out of Sorts?

We Sort For You!!

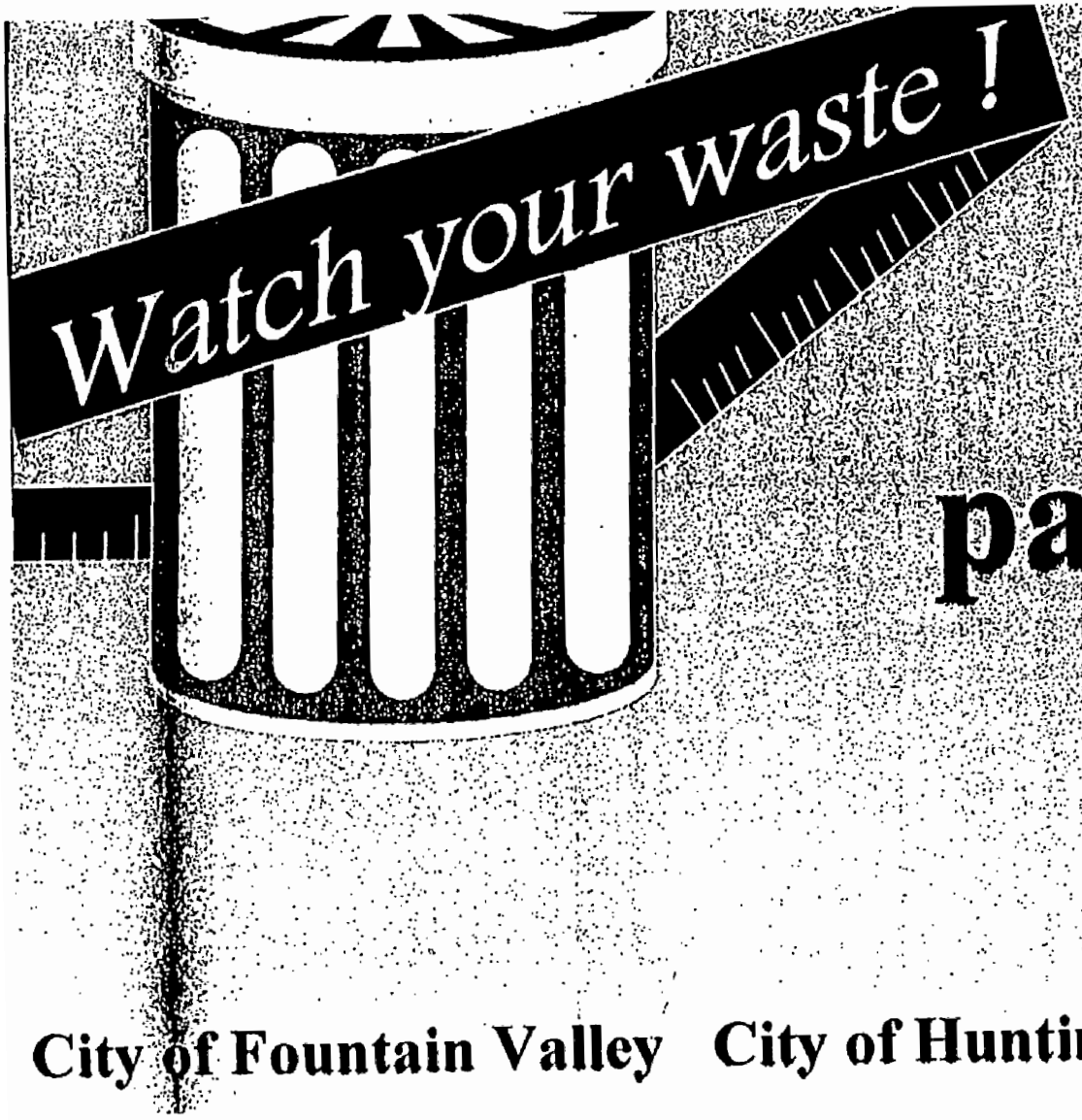

Extra packaging is garbage

City of Fountain Valley City of Huntington Beach Rainbow Disposal

WHAT YOU PUT HERE

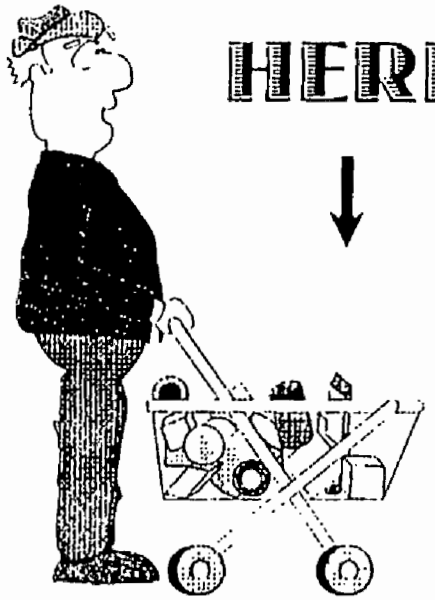

MAY WIND UP HERE

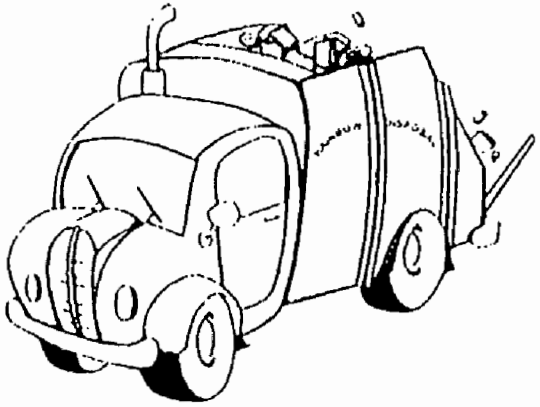

SHOP WISELY, REDUCE WASTE !

CITY OF FOUNTAIN VALLEY *RAINBOW DISPOSAL* *CITY OF HUNTINGTON BEACH*

REDUCE
REUSE
RECYCLE
Out of Sorts?
We Sort For You!!
Recycling Made Easy
TAKE ONE

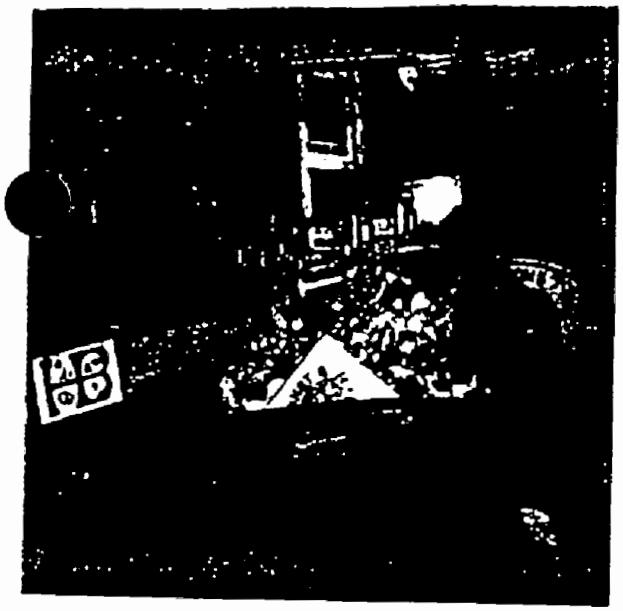

REDUCE
REUSE
RECYCLE

Out of Sorts?
We Sort For You!!
Recycling Made Easy

TAKE ONE

HOW MUCH TRASH

HOUSEHOLD HAZARDOUS WASTE

Don't be a Household Hazardous Waste Generator...

You can make a Difference!

DO YOU HAVE

- Used Motor Oil
- Old Paint
- Solvents
- Pesticides
- Used Automotive Batteries
- Household Cleaning Products
- Pool Chemicals

IN YOUR HOME?

The County of Orange provides a ***FREE...***

HOUSEHOLD HAZARDOUS WASTE COLLECTION CENTER

Located at: Rainbow Disposal
17121 Nichols St., Huntington Beach
Hours: 9:00 A.M. to 1:00 P.M.
Tuesday thru Saturday
For Hazardous Waste Information
Call - (714) 834-6752

ENVIRONMENTAL EDUCATION TEAM

Earth-friendly ideas for a brighter future...

City of Fountain Valley–Rainbow Disposal–City of Huntington Beach
P.O. Box 1026 – Huntington Beach, CA 92647

007348

WHERE ARE WE GOING TO THROW IT...

WHEN THERE IS NO MORE AWAY?

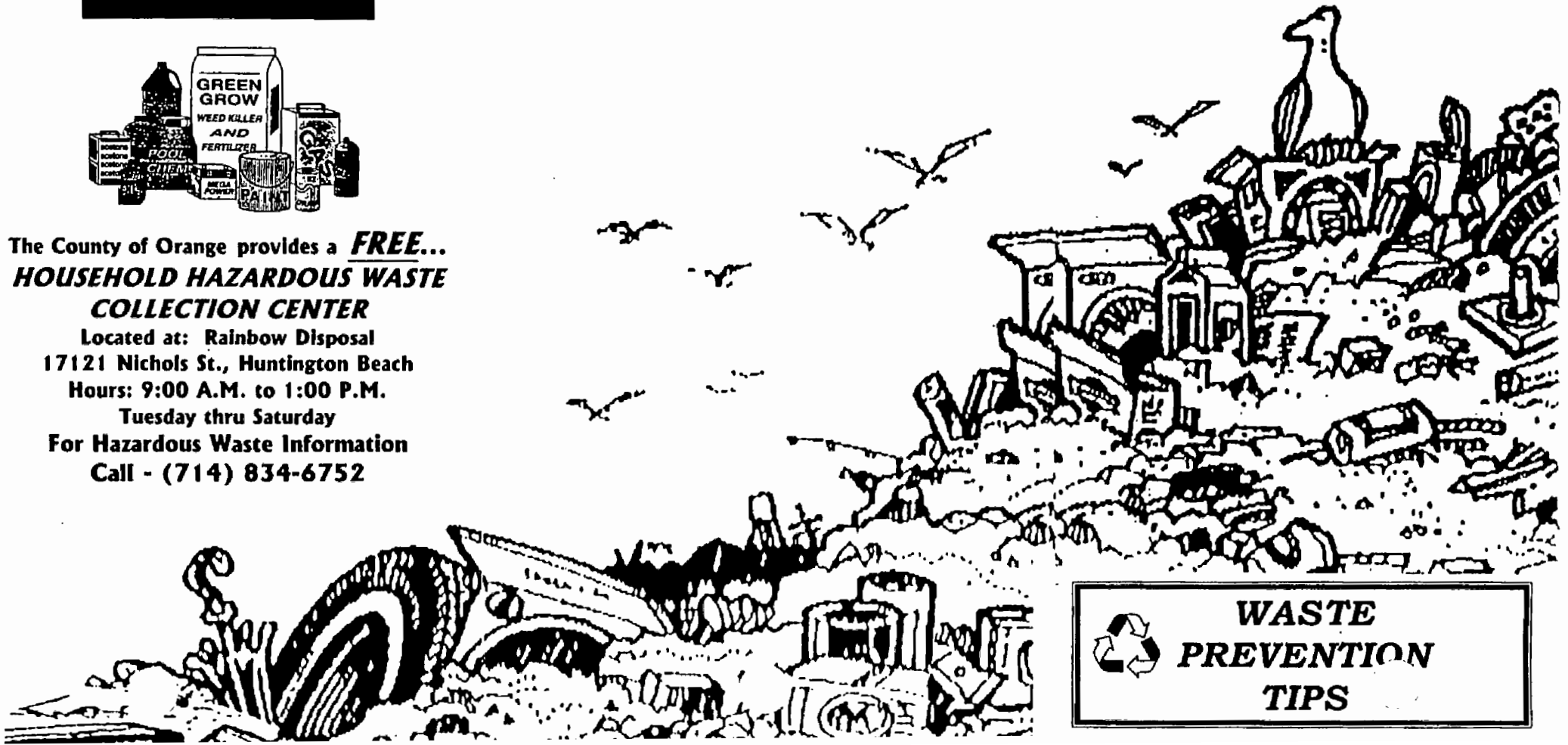

WASTE PREVENTION TIPS

WASTE PREVENTION TIPS

STOP TRASH BEFORE IT STARTS!

Many people believe that recycling is the only solution to the trash problem. While recycling can divert valuable materials from the landfill, it is only one part of an efficient Waste Management Program. Controlling waste, conserving landfill space and improving the environment requires the "3R's.

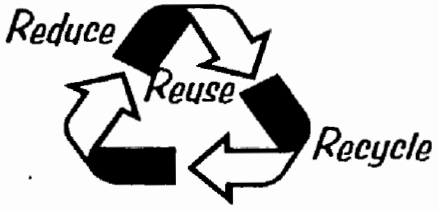

Lets start with *"Reduce"*

Californians generate 4.4 million tons of garbage each year. This equals 8 lbs. per person per day. Let's go one step further and think about how to reduce waste in the first place by going to the source.

THINK BEFORE YOU TOSS!!
IF YOU'RE NOT PREVENTING WASTE
YOU'RE WASTING RESOURCES!!
LOOK AT WHAT YOU BUY
AND WHAT YOU THROW AWAY!

FOLLOW THE "STOP BUYING TRASH" CHECK LIST!!

Did you know that packaging represents 30% of all waste?

- BUY RECYCLED PRODUCTS WHENEVER POSSIBLE
- SELECT PRODUCTS WITH MINIMAL PACKAGING
- BUY IN BULK, ECONOMY SIZES & CONCENTRATES
- AVOID DISPOSABLE DIAPERS, AND PAPER PRODUCTS SUCH AS ... PLATES, NAPKINS & TOWELS

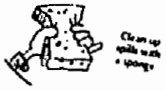

- BUY REFILLABLE ITEMS SUCH AS PENS & RAZORS

Make something new from something old *"Reuse"*

- REPAIR DURABLE PRODUCTS
- BORROW, RENT OR SHARE ITEMS USED INFREQUENTLY
- USE REUSABLE PRODUCTS SUCH AS SPONGES, CLOTH TOWELS, DISHES, UTENSILS, CLOTH NAPKINS, CUPS & RAZORS

BE A PAPER SAVER

- USE BOTH SIDES OF THE PAPER
- USE GROCERY BAGS TO LINE HOUSEHOLD TRASH CANS
- MAKE NOTE PADS FROM USED PAPER

007349

Give it away, don't throw it away *"Recycle"*

Many schools and community groups could benefit from receiving your used:

- *CLOTHING*
- *TOYS*
- *BOOKS*
- *FURNITURE*
- *APPLIANCES & MORE*

- DONATE BOOKS TO LIBRARIES, MAGAZINES TO NURSING HOMES, SCHOOLS, & FRIENDS
- REUSE PACKAGING MATERIAL AGAIN – STYROFOAM PEANUTS, BUBBLE WRAP, WRAPPING PAPER ETC. FOR

ZERO WASTE LUNCH

- NO DISPOSABLES, USE LUNCH BOXES OR FABRIC BAGS & CLOTH NAPKINS

- NO PREPACKAGED SINGLE SERVING CONTAINERS FOR CHIPS, DRINKS FRUIT, ETC.
- USE TUPPERWARE OR RUBBERMAID TYPE DURABLE CONTAINERS.
- USE REFILLABLE THERMOS CONTAINERS

ENVIRONMENTAL EDUCATION TEAM

Earth friendly ideas for a brighter future

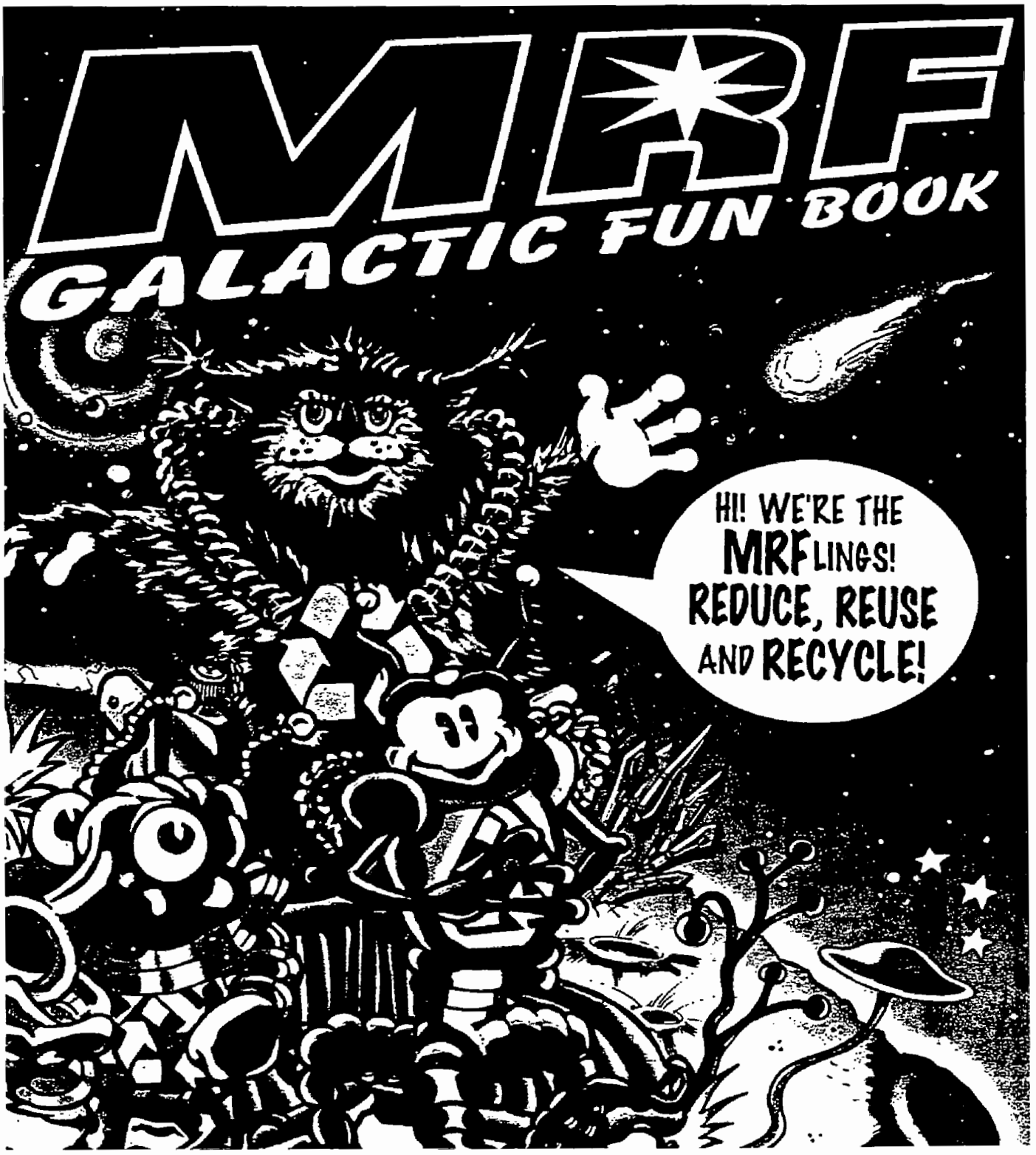
MRF
GALACTIC FUN BOOK
HI! WE'RE THE MRFLINGS! REDUCE, REUSE AND RECYCLE!

MATERIALS
RECOVERY
FACILITY
ENVIRONMENTAL EDUCATION TEAM
Earth-friendly ideas for a brighter future ...
City of Fountain Valley–Rainbow Disposal–City of Huntington Beach

007352

Recycle Now There's A Future In It!

Recycling News

July 1, 1999 Volume VII, No 3

IMPORTANT NOTICE

NO DELAY IN TRASH COLLECTION THIS JULY 4TH

This year the Fourth of July falls on a Sunday. Currently the County landfills operate Monday through Saturday so you will not experience delay in trash service. On your normal collection day, please place your trash/recyclables out at the curb for collection.

PROPER DISPOSAL OF THE AMERICAN FLAG

As we celebrate America's Independence this Fourth of July we may notice that the flags we display have become torn or tattered beyond repair. This past year the editors of Recycling News received a letter from a World War II Veteran regarding proper disposal of an American Flag.

The Orange County Veterans will forward the flags to the American Legion Post where they will be Disposed of in conformance with tradition and local laws. Please mail your old American Flags to:

ORANGE COUNTY VETERANS
SERVICE CENTER OFFICE
1300 South Grand Avenue, building B
Santa Ana, CA 92705

TIPS TO REMEMBER WHEN YOU'RE AT THE BEACH OR PARK

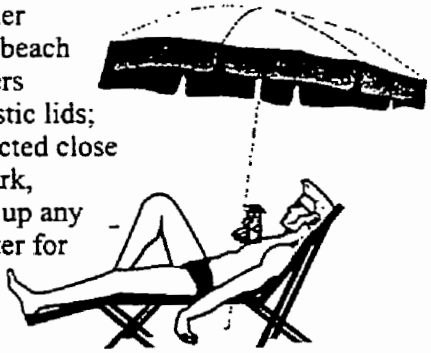

Did you know that our oceans provide most of the planet's oxygen, moisture and weather patterns? Every year, the Center of Marine Conservation sponsors a nationwide 3-hour beach clean-up, which has proven to be extremely effective. In 1987, in Texas alone, volunteers collected: 31,773 plastic bags; 30,295 plastic bottles; 15,631 six pack rings; 28,450 plastic lids; and 1,914 disposable diapers. And around the nation, the volunteer clean-up crew collected close to 2 million pounds of debris in just 3 hours. So next time you go to the beach or the park, remember to bring a trash bag and before you leave try to spend a few minutes picking up any litter you find. If you are interested in beach clean-up activities, please contact the Center for Marine Conservation at (202) 429-5609 or the Surfrider Foundation at (800) 743-7873.

IMPORTANT Y2K INFORMATION

By December 31, 2000 your city will need to be in compliance with the regulations set forth by state law AB 939. As you are already aware, AB 939 is the state-mandated requirement for each City throughout California to divert 50% of their waste stream away from the landfill by the Year 2000. Over the past several years the Editors of *Recycling News* have been discussing the 50% goal and the importance of reducing your waste, recycling and buying recycled products. Over the next year, your city will evaluating the programs currently in place and will review new ideas to promote the goals or the state law. Keep up the good work!!!!

Holiday Collection Schedule

We will not pick-up on these holidays:
- New Years Day - Memorial Day - Independence Day - Labor Day - Thanksgiving Day - Christmas Day
However, trash collection will resume one day later.

TRASH FRIENDLY WEBSITES

Each quarter the editor of *Recycling News* will be reviewing website and e-mail addresses on the Internet that may be of interest to our readers. The sites examine ways to **reduce** waste, avenues to **reuse** unwanted materials (such as donations to non-profit organizations), lists of **recyclable** material and directions to **backyard composting**.

http://www.1800cleanup.com -
For information on clean-up projects throughout the state.

http://www.envirofind.com -
To find information on all types of environmental businesses and other information.

Solag Disposal, Inc. - www.solag.com
Laguna Niguel - www.ci.laguna-niguel.ca.us
San Clemente - www.cty.org/san-clemente/
County of Orange - www.oc.ca.gov/iwmd/
Dana Point - www.ci.dana-point.ca.us
San Juan Capistrano - www.sanjuancapistrano.org

For a "buy-back" or "drop-off" recycling center near you contact the Department of Conservation at 1-800-RECYCLE (1-800-732-9253) or the California Integrated Waste Management Board at 1-800-253-2687.

FIND A NEW USE FOR AN OLD ITEM

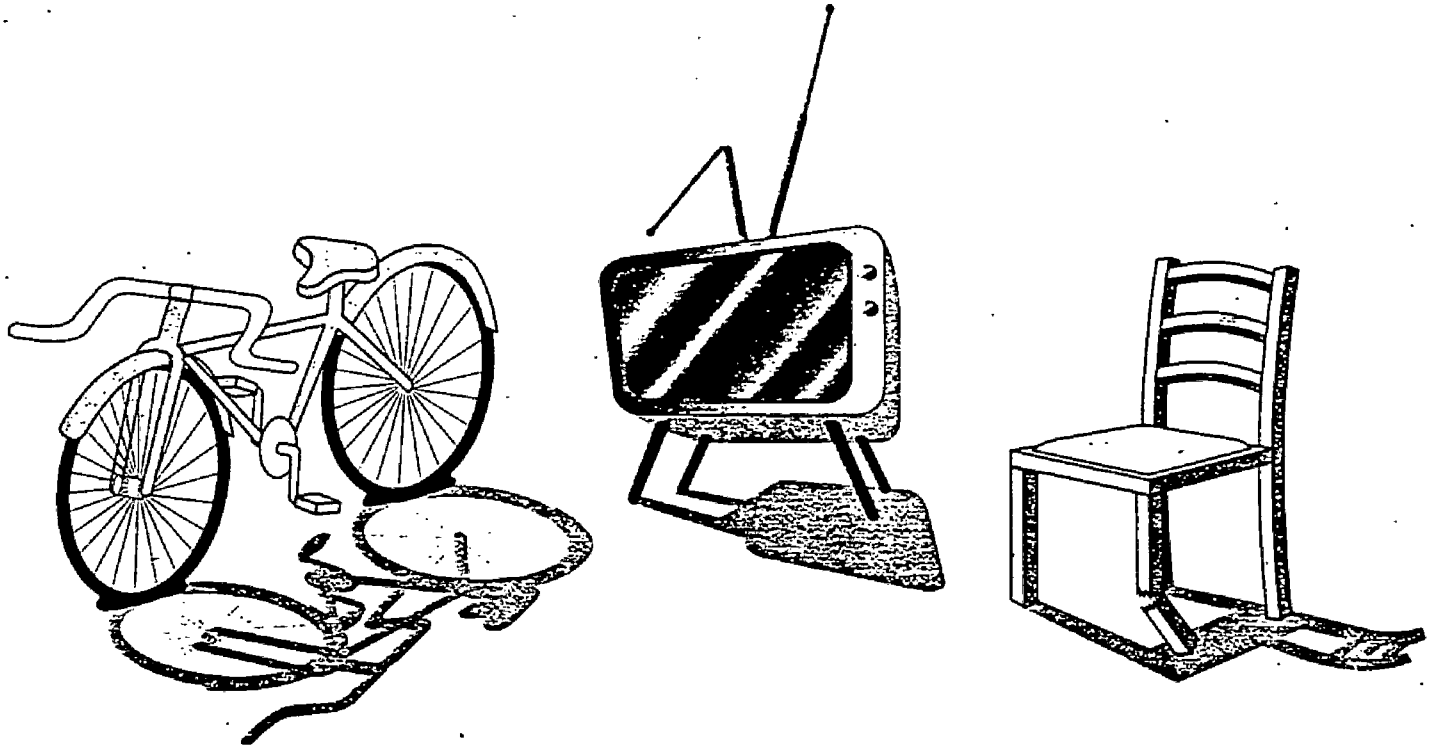

Have an old bike that needs fixing or a chair that is missing a leg? Or how about some other large item that needs some minor repairs? Before you throw that item away, why not give it to someone who could put it to good use? There are many organizations such as Goodwill Industries, Children's Hospital of Orange County (CHOC) and the Salvation Army that make it their business to bring new life to older, reusable items. In the spirit of goodwill and less waste, SOLAG Disposal, Inc. together with your City encourage you to contact these organizations before you throw a reusable item in the trash. For telephone numbers to these organizations, please look in the yellow pages under "Thrift Shops." Also remember that your contribution may also be tax deductible.

Recycle Now
There's A Future In It!

Recycling News

007354

October 1, 1999 Volume VII, No. 4

KEEP RECYCLING WORKING - AMERICA RECYCLES

On November 13, California cities will have the opportunity to participate in the second annual America Recycles Day - a national campaign designed specifically to reinforce public support of recycling. Your City, the County of Orange and SOLAG Disposal would like to "Keep Recycling Working." You can help by remembering to reduce, reuse, recycle and compost your waste, but most importantly... purchase products that contain recycled materials. By working together we can preserve our planet, promote a healthier environment and secure the future of recycling.

AMERICA RECYCLES DAY NOVEMBER 13, 1999

SPECIAL GIVEAWAY

To celebrate America Recycles Day, on Saturday, November 13 from 8:00 a.m. to 12:00 p.m. Tierra Verde Industries, a green waste recycling facility located in San Juan Capistrano, has offered to donate compost for use in your yard. Bring a shovel and a large container/bag to Federal Doc Loading, located on Alicia Parkway between Avila and Aliso Creek Road in the City of Laguna Niguel to collect the free compost material.

FIND A NEW USE FOR AN OLD ITEM

Have an old bike that needs fixing or a chair that is missing a leg? Or how about some other large item that needs some minor repairs? Before you throw that item away, why not give it to someone who could put it to good use? There are many organization such as Goodwill Industries, Children's Hospital of Orange County (CHOC) and the Salvation Army that make it their business to bring new life to older, reusable items. In the spirit of goodwill and less waste, SOLAG Disposal, Inc. together with your City encourage you to contact these organizations before you throw a reusable item in the trash. For telephone numbers to these or other non-profit organizations, please look in the yellow pages under "Thrift Shops," or you may contact Solag Disposal for more information. Also remember that your contribution may be tax deductible.

ENVIRONMENTAL AWARDS

The Cities of Dana Point, Laguna Niguel, San Clemente, San Juan Capistrano and the County of Orange would like to recognize the following businesses for their outstanding efforts to reduce waste and recycle in their community:

Doubletree Guest Suites, Dana Point • Flex Foot, Inc. • Trade Winds Motel
Unichem Industries, Inc. • Tall Mouse Arts & Crafts, Inc. • Auto Care
Launderland • Mission Yamaha, Inc. • Saturn of San Juan Capistrano

Each of these businesses are being recognized by their respective cities for their dedication to help keep our environment clean and their commitment to recycling and source reduction.

TRASH FRIENDLY WEBSITES

Solag Disposal - www.solag.com
www.choose2reuse.org - This website will give you valuable information and on-line resources to help in your efforts to re-use everyday items.

Dana Point - www.ci.dana-point.ca.us
Laguna Niguel - www.ci.laguna-niguel.ca.us
San Juan Capistrano - www.sanjuancapistrano.org
San Clemente - www.cty.org/san-clemente/
County of Orange - www.oc.ca.gov/iwmd/

IS YOUR TRASH WEIGHING YOU DOWN?

Items that are too large to fit in your container are considered bulky-items. As a customer of SOLAG Disposal you are entitled to two bulky-item pick-ups per calendar year, at no extra charge. Almost anything that can be managed by a two-person crew will be picked up as a bulky-item. This includes old furniture, appliances, carpet, mattresses, water heaters, etc. Loose items need to be bagged or bundled, and no liquids or drums of any kind will be accepted. Before you put out large items to be landfilled, consider donating these items to a non-profit organization. If you would like more information about bulky-item pick-ups or non-profit organizations willing to pick-up your reusable items, please contact one of the customer service representatives at (949) 240-0446, Ext. 1.

Recycle Now There's A Future In It!

Recycling News

January 1, 2000 Volume VIII, No 1

SEASONAL RECYCLING TIPS (Some thoughts)

During this Holiday season remember that one of the biggest gifts you can give your children is a clean environment. Here are some of the ways you can recycle and reuse holiday leftovers.

Types of things that can be recycled include:

Tin Jars	Wrapping Paper	Glass Containers	Cardboard Boxes/Packaging

Cannot be recycled:

Tinsel	Bows/Ribbons	Holiday Lights	Styrofoam Peanuts*

* = Clean Styrofoam packaging peanuts can be reused or are accepted at several packaging/delivering companies (such as Mail Boxes, Etc.), please check your local listings.

Some products may not be recyclable in our program, but that doesn't mean they should go in the trash!!! Many nonprofit organizations around the area can reuse your seasoned clothing, toys, exercise equipment, bicycles and other items. If you have any questions, please contact one of our customer service representatives at (949) 240-0446.

RECYCLING YOUR CHRISTMAS TREE IS AS EASY AS 1-2-3....

Can you believe that the Holiday Season is already behind us? Well it's time again to recycle your Christmas Trees. Depending on where you live, collection of your trees will take place on your normal collection day during a two week period shortly after Christmas or after the New Year. Just follow these three simple steps:

FIRST, please review the front of your bill for the dates of the curbside collection of your Christmas trees.

SECOND, Remove all decorations, tinsel and stands (wood or metal) from the tree before collection. If your tree is over 8feet in height, please cut the tree in half.

THIRD, Place your tree at the curb next to your container on collection day. **On trash day a separate collection vehicle will pick up your Christmas tree.**

NOTE: Flocked trees or trees with nails, stands or ornaments cannot be recycled, but will be picked up and disposed of at the landfill. Please do your part to help recycle your trees.

ITS NEVER TOO LATE TO RECYCLE OLD CHRISTMAS CARDS

For the past 20 years St. Jude's Ranch for Children has recycled holiday, birthday, get well and all other occasion cards. St. Jude's Ranch is a non-profit home for abused and homeless children located in Boulder City, Nevada. People from across the United States and around the world send used cards to the Ranch. In 1992 nearly one and a half million cards were collected. If you would like to recycle your Christmas cards, please send them to:

St. Jude's Ranch for Children
P.O. Box 60100
Boulder City, NV 89006

If sending by United Parcel Service, send to:
St. Jude's Ranch for Children
100 St. Jude Street
Boulder City, NV 89005

The Ranch requests that you send the front of cards only and please do not include cards that have writing or other markings.

SOLAG DISPOSAL
Quad Cities Recycling Program

Unwanted Computer Parts - Help Your Community Recycle

Recently there has been a lot of talk about the year 2000 (Y2K) and the potential of imbedded computer chips disabling thousands of appliances, electronic products, etc. While the editors of ***Recycling News*** can neither confirm nor deny these reports, we would like to request our customers' help to try and locate alternatives to disposing of these items in the landfill. If you or someone you know can direct us to a non-profit organization willing to accept these items or a remanufacturer that would be interested in securing this material, please contact our office in writing.

Some locations that may take old computers (via the internet)
CALMAX - http://www.ciwmb.ca.gov/calmax
Detwiler Foundation - http:/www.detwiler.org
Goodwill Industries of Orange County - http:/ocgoodwill.org/computer_donations.html

More Trash Friendly Websites

Solag Disposal, Inc. - www.solag.com
County of Orange - www.oc.ca.gov./iwmd/
Laguna Hills - www.ci.laguna-hills.ca.us

007358

Recycling News

April 1, 2000 Volume VIII, No. 2

EARTH DAY CELEBRATION

Come celebrate Earth Day with students and residents from the surrounding communities. On Saturday, April 22, 2000 from 8:00 a.m. to 12:00 p.m. your city together with SOLAG Disposal, Inc. will be hosting an Earth Day celebration and Children's Invention & Art Fair in the City of Laguna Niguel.

INVENTION & ART FAIR:

Bring the entire Family for a fun-filled morning including an Easter Egg Hunt (for children ages 1-12), members of the local fire department, Environmental Booths, Invention and Art Displays by local elementary students.

Hey Kids: before you throw that object in the trash, think about other things you can do with it?

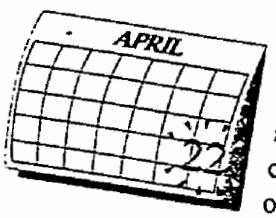

Every day hundreds of items are thrown into the trash that could have served a better or more useful purpose. Your City is sponsoring an Invention and Art Fair to determine the best way to reuse old items. Can you invent something that is used around the house, in the garage or at school? How about designing an art project that can be shared with your friends and family? We want you to be creative, serious or silly. Your idea could be anything from a floor mat, a napkin holder or thousand of other inventive ideas. Most important, we want you to have fun! Each entry in the Invention and Art Fair will be judged based on innovation, creativity and usefulness. The top three winners from each category (Kindergarten - Second, Third - Fourth and Fifth - Sixth) will receive an award. All children participating in the Inventions & Art Show will receive recognition in the June 2000 Issue of *Recycling News*. Once your project is complete, call Dan Batty at (949) 240-0446 to reserve a spot at Earth Day 2000. To receive a free T-shirt, you must RSVP no later than April 10, 2000.

SPECIAL GIVE-A-WAY

To celebrate Earth Day, on Saturday, April 22 from 8:00 a.m. to 12:00 p.m. Tierra Verde Industries, a green waste recycling facility located in San Juan Capistrano has offered to donate compost for use in your yard. Bring a shovel and large container or bag to the site of the Earth Day Celebration in the City of Laguna Niguel located on Golden Lantern and Camino Los Padres to collect the free compost material.

TRASH FRIENDLY WEBSITES

Each quarter the editor of ***Recycling News*** will be reviewing website and e-mail addresses on the internet that may be of interest to our readers. The sites examine: ways to reduce waste, avenues to reuse unwanted materials (such as donations to non-profit organizations), types of recyclable material and instructions for backyard composting.

SOLAG Disposal - www.solag.com
www.choose2reuse.org - This website will give you valuable information and on-line resources to help in your efforts to re-use everyday items.
ecoboard.cc - Alternative material for decks, playground equipment, outdoor furniture.

Dana Point - www.ci.dana-point.ca.us
Laguna Niguel - www.ci.laguna-niguel.ca.us
San Juan Capistrano - www.sanjuancapistrano.org
San Clemente - www.cty.org/san-clemente/
County of Orange - www.oc.ca.gov/iwmd/
www.inkbank.com - Ink cartridges

Holiday Collection Schedule

We will not pick-up on these holidays:
New Years • Memorial Day • Independence Day • Labor Day • Thanksgiving Day • Christmas Day
However, trash collection will resume one day later.

EARTHY SAYS,

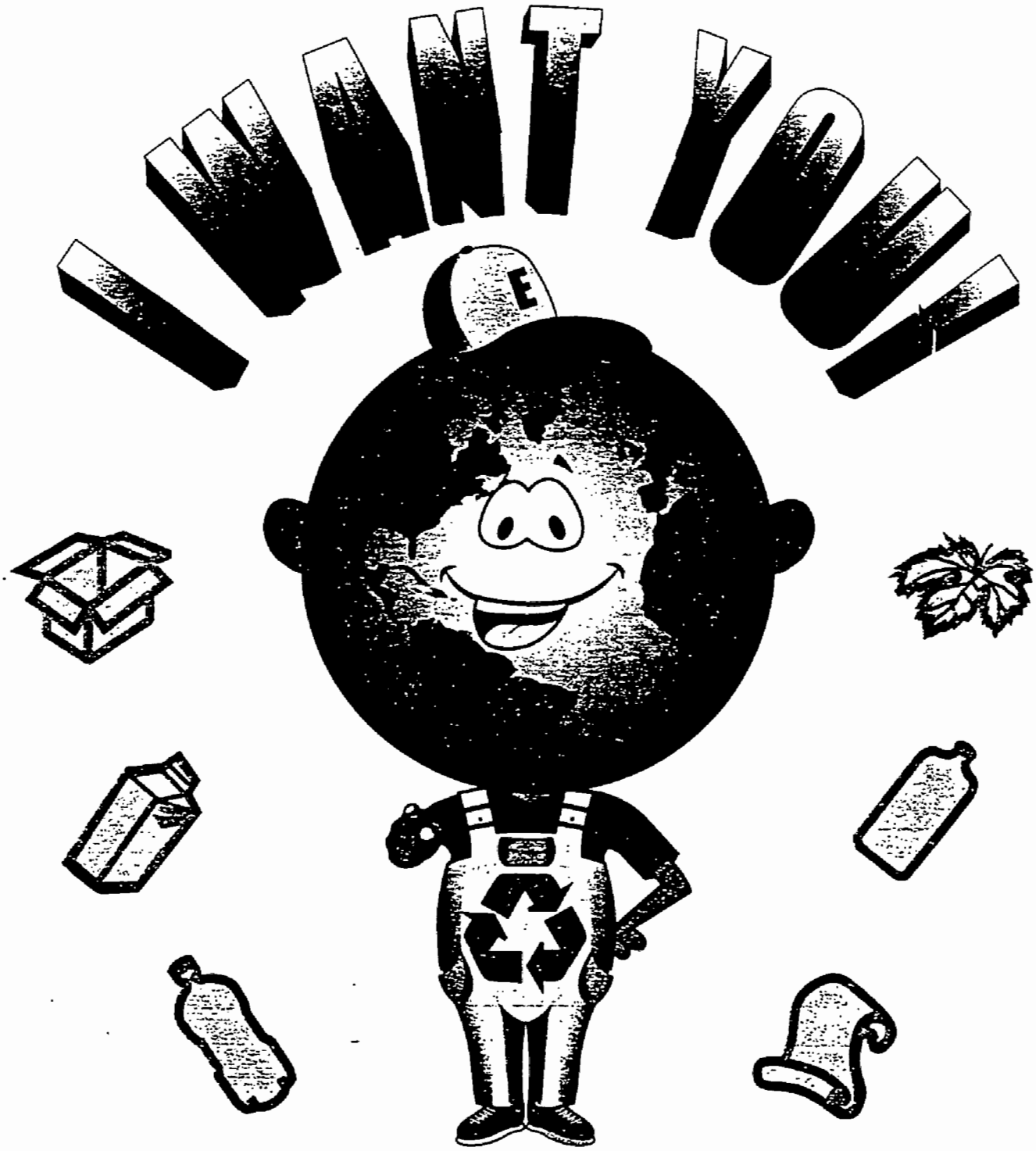

The beginning of the millennium is upon us and we need your help. In 1989 (eleven short years ago) all cities in the state of California were mandated to divert 50% of their waste stream away from the landfill by the end of the year 2000 (Public Resources Code 40000 et. seq,, tter known as AB939). Your city has one of the most progressive programs available in the state of California, however it is more important now than ever before to stop and look at what items are being placed in your trash or recycling containers.

Over the past several years the Editors of *Recycling News* have been discussing the 50% goal and the importance of reducing your waste, recycling and buying recycled products. Over the next year, your city will be re-evaluating the programs currently in place throughout your City and will review new ideas to help us achieve the state-mandated goals. If you have questions about recycling or waste reduction, there is a detailed brochure that we would be happy to send to you (in English or Spanish) that will help explain the types of material that can be recycled. Earthy says, "Keep up the good work!"

WHAT DOES SOLAG DO WITH THE GREEN WASTE?

Once green waste is collected by SOLAG Disposal, it is taken to a composting facility. At the facility the yard waste is shredded, mixed with a balance of other organic material and placed in rows for composting.

HOW DOES GREEN WASTE BECOME COMPOST?

Compost requires four basic elements:

1. Green waste such as grass clippings.
2. Brown waste such as leaves and wood chips.
3. Air.
4. Water.

In an effective compost pile, micro-organisms and earthworms help to decompose the organic materials, thus heating the compost and accelerating the process. If the compost pile is turned regularly, the organic materials can become compost in 4 to 6 weeks. If left untouched, the material will decompose in 6 to 8 months.

WHAT IF I WOULD LIKE COMPOST MATERIAL FOR HOME USE?

Compost is a vital addition to all soils. It adds nutrients to the soil for planting and makes good top soil for most plants. At this time, the smallest quantity sold at most compost facilities is one cubic yard.

SOLAG DISPOSAL, INC.
P.O. Box 1100
San Juan Capistrano, CA 92693

GREEN WASTE RECYCLING PROGRAM

arting: July

New, Voluntary Service
Added To Curbside llection

GREEN WASTE RECYCLING PROGRAM

GREEN WASTE COLLECTION PROGRAM

In cooperation with the County of Orange, SOLAG Disposal, Inc. is offering a FREE, VOLUNTARY curbside green waste collection program.

For more information about the program, please contact SOLAG Disposal, Inc. at (949) 240-0446, Ext. 1.

WHY SHOULD WE PARTICIPATE?

Approximately 20% of Aliso Viejo's residential waste is green waste. By collecting this material separately to be composted and not landfilled, the residents are helping to meet the state-mandated waste reduction goal.

WHAT IS GREEN WASTE?

Green waste is almost all organic landscape waste materials. The most common types of green waste include:

- grass clippings
- wood scraps
- weeds
- branches (not to exceed 4' in length and 2" in diameter)
- plant materials
- garden trimmings
- leaves

WHAT IS NOT GREEN WASTE

The following items must be disposed of in the black container unless otherwise noted:

- animal waste
- diseased plants
- palm branches
- meat/fish or bones
- dairy products
- dirt/sod*
- construction materials

* Dirt, sod and construction materials cannot be disposed of in the automated program. Please call our office for details on disposal alternatives.

IS THERE A COST FOR THIS PROGRAM?

No. The County and SOLAG Disposal reached an agreement that would allow for this program at no additional charge to the resident.

HOW DOES THE PROGRAM WORK?

Residents are asked to put their green waste at the curb on their regular trash collection day. The green waste may be bagged, bundled, or placed in a container. Residential subscribers may place no more than 6 bags, bundles or containers of green waste generated from their homes at the curb for collection.

BAGS - The weight of any green waste item should not surpass the physical strength of the bag and not exceed 40 lbs.

BUNDLES - Trimmings and branches may be tied together in bundles with string only, not exceeding 2' x 4' and not to exceed 40 lbs.

CONTAINERS - Any standard trash container, up to 32-gallons and weighing less than 40 lbs. Only six (6) may be placed at the curb for weekly green waste collection.

WHAT ABOUT MY CHRISTMAS TREE?

Trees may be placed curbside, once the ornaments, garland, stakes and stands are removed. Collection of trees will take place on each of your normal collection days for the two weeks following New Years.

IS THIS PROGRAM AVAILABLE TO ALL RESIDENTS?

SOLAG Disposal has surveyed the Aliso Viejo residentia community and is initiating this program in th neighborhoods that generate large amounts of gree waste. The program will be monitored frequently t determine how the service area will be expanded o changed.

DO I HAVE TO PARTICIPATE IN THIS PROGRAM?

No. This is a voluntary program. Some residents like t recycle as much as possible and will place a containe curbside each week. For those residents whose yards require less maintenance, they may find that this progran is beneficial only when they do their major trimming.

WHEN DO I PUT MY GREEN WASTE OUT FOR COLLECTION?

The collection of your green waste is the same day as your regular trash day. The green waste will be collected manually using a separate truck in addition to the recycling and refuse collection vehicles.

WHERE SHOULD I PLACE THE GREEN WASTE?

The bundled/bagged/containerized green waste should be placed curbside before 7:00 a.m. to ensure collection. Remember to place the material at least 1' away from the recycling and trash containers.

REPRESENTATIVE PUBLIC EDUCATION MATERIALS

CITY OF ANAHEIM

RECYCLE ANAHEIM

VOLUME 10 AN ANNUAL RECYCLING NEWSLETTER FOR CITY OF ANAHEIM RESIDENTS WINTER 1999

Residents Approach 2000 with Recycling Success

Residents of Anaheim approach the new Millennium with recycling success. In 1999, your efforts helped the City of Anaheim recycle over 46,743,888 pounds of recyclable material.

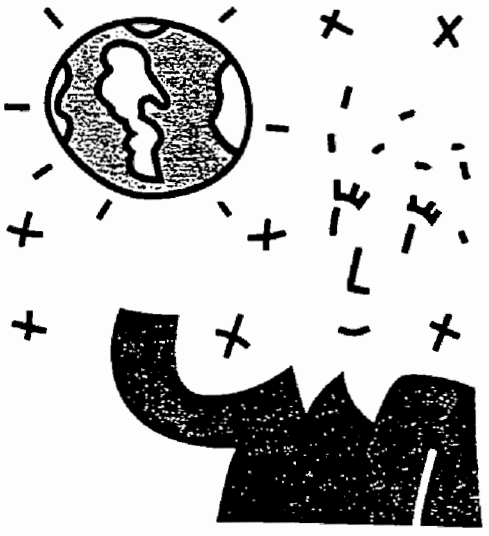

As we draw near the turn of the century, we meet recycling challenges set by the state of California with great success. In 1989, Assembly Bill 939 mandated each city to reduce their amount of waste by 50 percent by the year 2000. By participating in ***Recycle Anaheim***, the city is poised to smoothly meet the state's challenge. But we should not stop there. With or without state mandated laws, the Earth's resources are still precious and landfill space is still limited. What can we do in addition to recycling to make our community healthier? We can take the next step in preserving our environment: we can focus on reuse.

Reuse vs. Recycle

There are subtle but important differences between reuse and recycle. Recycling means taking a product, such as a aluminum can, deconstructing it, and using the materials to remanufacture something new. Although this is greatly preferred over starting from scratch, it is clear that if you don't have to spend the time, energy, or resources deconstructing and remanufacturing a product, you are saving resources.

Reuse is the process of taking idle goods and materials and reemploying them in a manner that does not require altering their original form. Reuse can also mean just reusing something over and over again. Popular examples of reusable goods include cloth shopping bags; plastic insulated coffee mugs and eraser boards.

The Benefits of Reuse

The benefits of reuse are as plentiful as the diversity of reuse options. By reusing items instead of disposing of them, we are saving landfill space. But equally important, there is no need to spend energy or raw materials to manufacture new items. Reuse not only saves resources, but also puts materials into the hands of those in need like schools, community organizations, and businesses. Reuse allows us to save money and contribute to our community.

Recycling ... it works because of you!

County Sponsors New Landscape Performance Program

Today, more than one-third of landfill material is green waste. The organic material is ideal for recycling and reusing to improve the health and appearance of valuable landscapes. To combat the increasing amount of green waste, the County of Orange is sponsoring a new *Landscape Performance Certification Program*. The program is available to all businesses, public agencies, parks, schools and homeowner associations. "We will help every landscaper and property manager develop more efficient landscape practices and in turn, help reduce green waste for site owners," says Tom Ash, project coordinator and horticultural consultant. Getting started in the program is easy. Call Tom Ash at CTSI Corporation, (714) 669-4303 or send an e-mail to toma@ctsicorp.com.

Q & A

Q. What should I do if one of my containers gets damaged?

A. If your container is damaged, contact our Customer Service Department at 238-2444. Damaged containers will be repaired or replaced at no charge, unless the damage is due to negligence or abuse.

Q. If I have service questions, whom do I call?

A. For questions regarding your service, call our Customer Service Department at 238-2444. We are open Monday - Friday from 7:00 a.m. - 5:30 p.m., and Saturday, for phone calls only, from 7:00 a.m. to 3:00 p.m.

Q. How do I dispose of household hazardous waste?

A. The County of Orange operates a FREE household hazardous waste collection center at 1071 N. Blue Gum Street in Anaheim. Call the H.H.W. hotline for days and hours - (714) 834-6752.

Q. I have a hard time maneuvering my trash containers, can I get a smaller one(s)?

A. If it is difficult for you to maneuver your containers as a result of a physical disability or if you are a senior citizen, you may call our Customer Service Department at 238-2444 to arrange for assistance.

Used Oil Recycling Making a Difference One Drop at a Time

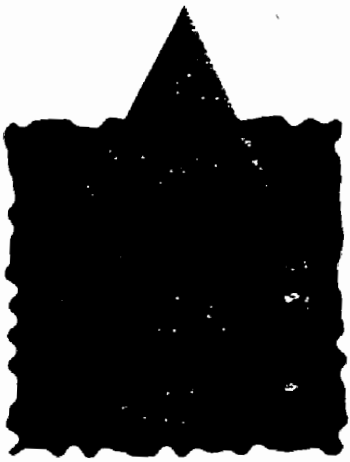

The improper disposal of used oil poses a threat to both the public and the environment. That's why it's illegal to throw used oil in the trash. Used oil can hurt our environment, family members, trash handlers and landfill workers. If used oil is poured into household drains or dumped into storm drains, it can upset operations at wastewater treatment plants and cause damage to local waterways and beaches. Recycling is the only safe and legal way to handle used motor oil.

Through funding from the California Integrated Waste Management Board, the Anaheim Fire Department has made recycling used motor oil and oil filters easy and convenient. Residents can have their used oil picked up from their doorsteps or take it to a local collection center FREE of charge! For a collection center near you call 1-800-CLEAN-UP, or for information on Anaheim's FREE residential services, call (714) 765-4154.

Experience the Environment at the Oak Canyon Nature Center

Don't throw away that egg carton or that paper cup...it can be art! Learn many different ways to use recyclable trash to create beautiful art projects at the Oak Canyon Nature Center.

The Oak Canyon Nature Center is a 58-acre natural park nestled in Anaheim Hills. It consists of three adjoining canyons, a year-round stream and four miles of hiking trails. Individuals and families are invited to see, hear and touch the natural environment. The center offers a wide variety of programs for all age groups throughout the year. The center is also home to a variety of seasonal events such as the annual Environmental Faire hosted by the City of Anaheim.

Bring the family to visit the Oak Canyon Nature Center! And while you're there, take a look at the three picnic benches located at the entrance. They are made out of recycled plastic and were donated by ***Recycle Anaheim***.

For location, park hours and program or event schedules, call (714) 998-8380.

Anti-litter Campaign Puts Kids to Draw

Recycle Anaheim co-sponsored an anti-litter campaign in the Jeffrey-Lynne neighborhood with the Anaheim Police Department's D.A.R.E. program. Elementary school children were asked to illustrate through drawings how they were helping to keep their neighborhood litter free.

The D.A.R.E. program was started in 1982 to help children learn ways to resist drugs. It has since expanded to teach gang and violence resistance, how to handle stress and peer pressure how to find alternatives to drugs and violence and conflict resolution as well as build self esteem.

The program is taught in 43 elementary schools citywide and includes visits to junior and senior high schools. More than 5,000 students are reached each year. Teachers and students can send D.A.R.E. questions to DARE@anaheim.net.

Jeffrey-Lynne Neighborhood Center's Ida Duran, Officer Jim Farley, Sgt. Kirt Robertson and Recycle Anaheim's Marcia Myers with anti-litter contest winners. The prizes - boom boxes, sports radios and a T.V. set were all made possible by generous donations from the following sponsors: Nobest, Inc., R.J. Noble Co., Shield Security, Inc., Anaheim Disposal and Zumar Industries.

Incidents of Scavenging on the Decrease

The city's Anti-Scavenging Enforcement Program continues to address complaints from citizens regarding individuals removing recyclables from the green recycle container. As a result, scavenging incidents have decreased.

The city asks for your continued assistance in reporting scavengers by calling the Code Enforcement Division at (714) 765-5158. You can also discourage scavenging by placing your green container out by 7:00 a.m. instead of the night before.

CHOOSE TO REUSE

AT HOME:

- Compost or grasscycle
- Rent or borrow machines, tools and sports equipment
- Repair broken appliances instead of replacing
- Use your local library

AT WORK:

- Use both sides of paper
- Reuse envelopes and folders
- Donate used magazines, journals and publications
- Sell or donate old furniture
- Bring your lunch in a reusable container

IN THE COMMUNITY:

- Shop at thrift stores
- Support local yard sales
- Coordinate a community rummage sale

Service Costs

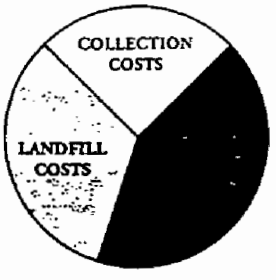

HOLIDAY COLLECTION

Your regular pickup day for trash and recycling during the holidays will not change unless your collection day falls on one of only six holidays.

CHRISTMAS DAY: Saturday, December 25, 1999. Trash collection services will not be affected.

NEW YEAR'S DAY: Saturday, January 1, 2000. Trash collection services will not be affected.

MEMORIAL DAY: If your collection day falls on Monday, May 29, your trash will be collected on Tuesday, May 30. If your collection day falls on any other day than Monday, your service will not be affected.

INDEPENDENCE DAY: If your collection day falls on Tuesday, July 4, your trash will be collected on Wednesday, July 5. If your collection day falls on any other day than Tuesday, your service will not be affected.

LABOR DAY: If your collection day falls on Monday, September 4, your trash will be collected on Tuesday, September 5. If your collection day falls on any other day than Monday, your service will not be affected.

THANKSGIVING DAY: If your collection day falls on Thursday, November 23, your trash will be collected on Friday, November 24. If your collection day falls on Friday, November 24, your trash will be collected on Saturday. If your collection day falls on any other day than Thursday or Friday your service will not be affected.

Recycle Your Christmas Tree

To help divert waste from the landfill, the city asks you to recycle your Christmas tree. Just follow these three simple steps:

1. REMOVE the TREE STAND (wood or metal), decorations and tinsel from your tree.
2. TREES OVER SIX FEET TALL must be CUT IN HALF before they are placed out for collection. Also, please do not bag your tree.
3. ON YOUR COLLECTION DAY only, starting DECEMBER 27 until JANUARY 7, place your tree at curbside with your containers. Trees will be picked up separately by a special collection truck.

Waste Wise Holiday Greetings

Did you know that 2.65 billion Christmas cards sold each year in the U.S. could fill a football field 10 stories high? If we each sent one card less, we'd save 50,000 cubic yards of paper. Here are some good ideas to reduce the amount of waste from holiday cards.

- Send electronic greetings to family and friends who are on-line.
- Save yourself some time, money and hard feelings between friends – and reduce mail volume by updating and paring down your holiday mailing list.
- Be creative. Instead of buying placemats or table decorations, make your own. Cut old cards into shapes and press between two pieces of clear contact paper.
- Make gift tags from last years holiday cards, or use them as name tags for arranged seating at formal dinners.

WHAT WHERE?

Save this list of accepted recyclables (green can) and non-recyclables (black can) as a guide for separating your trash.

Non-recyclable...

- Animal waste
- Bathroom waste
- Carbon paper
- Carpet
- Car parts
- Cat litter
- Cigarette butts
- Dirt/cement/rock (do not fill more than 1/3 of container)
- Disposable diapers
- Drinking glasses
- Electronics
- Flooring
- Food waste
- Freezer/refrigerator food boxes
- Furniture
- Glass and ceramic plates/cups
- Liquid waste
- Light bulbs
- Mirrors
- Needles (sealed in thick plastic container)
- Old clothes/shoes
- Plastic toys
- Rags/sponges
- Tires
- Toothpaste tubes/pumps
- Soiled paper plates
- Waxed paper
- Window glass
- Yard waste (can be composted)

Recyclable...

- Aerosol cans (completely empty)
- Aluminum cans (do not crush)
- Aluminum foil
- Beverage cans
- Bottle caps
- Brochures
- Cardboard
- Cereal boxes (remove inner lining)
- Computer paper
- Drink boxes
- Egg cartons (cardboard and foam)
- Foam cups/plates (unsoiled)
- Food cans
- Frozen food boxes (no wax coating)
- Glass bottles/jars
- Juice cartons
- Junk mail/coupons
- Laundry bottles
- Ledger paper
- Magazines
- Metal coat hangers
- Milk type cartons
- Newspapers
- Paint cans (only empty, dry cans with lids off)
- Paper/paper tubes
- Phone books
- Pizza boxes
- Plastics (#1- 6)
- Plastic bottles (small mouthed)
- Plastic containers
- Plastic cups/plates
- Plastic utensils
- Plastic milk jugs
- Tin cans
- Used envelopes (includes plastic windows)
- Wrapping paper

Questions or comments? Call the Customer Service Department at (714) 238-2444

CVT Public Recycling Center

Located at the corner of Blue Gum & La Palma

TOP PRICES PAID.

Open Mon. - Fri., 7 a.m. to 5 p.m.,
Sat. 8 a.m. to 5 p.m. and
Sun. 11 a.m. to 4 p.m.
No hazardous materials accepted.

(714) 238-3301

1071 N. Blue Gum St., Anaheim, CA 92806

Household Hazardous Waste

(Dispose of properly at an Orange County Collection Center)

HOTLINE
(714) 834-6752

- Oil / latex paint and paint products
- Automotive products (batteries, motor oil, antifreeze, etc.)
- Auto / furniture polish
- Household cleaners
- Wood preservatives
- Pesticides and herbicides
- Hobby and pool supplies
- Empty compressed gas cylinders
- Unused road flares
- Smoke detectors
- Household batteries
- Fluorescent light ballasts

THE TOP 10 REASONS TO SAVE THE EARTH

It's the only one there is.

Clean water is good for life.

We are not alone here.

It stinks to live with garbage.

Earth Care means the world to us.

© 1999 Great Events Publishing
1-888-43-EVENT

THE TOP 10 REASONS TO SAVE THE EARTH

Pollution will take your breath away.

Your children will need a place to live.

Plants don't grow well in acid rain.

Global warming would put much of the world under water.

Mother Nature smells much sweeter than toxic waste.

RECYCLE ANAHEIM

TRAILS4ALL

& Trail Users Bringing it Together

Finally!... an organization that brings together all trail user groups – hikers, runners, equestrians and mountain cyclists to establish and maintain trails in Orange County and improve the environment.

All it takes is people who care!

For information on membership, upcoming events, or to answer any questions, please call us at (714) 834-3136.

☐ ***Yes!***

I want to make a commitment to help TRAILS4ALL keep our parks open, maintain our trials and clean up the environment. Enclosed is my tax-deductible donation...

Individual Memberships

- ☐ Active ..... $ 16
- ☐ Family ..... $ 26
- ☐ Supporter ..... $ 50
- ☐ Trail Builder ..... $ 100
- ☐ Benefactor ..... $ 250
- ☐ Other ..... $____

Club / Organization:

- ☐ Basic ..... $ 50
- ☐ Supporting ..... $ 100

Merchant/Retailer:

- ☐ Basic ..... $ 100
- ☐ Supporting ..... $ 250

☐ ***I am interested in volunteering to help Trails4All!***

- ☐ Trail Projects
- ☐ Fundraising
- ☐ Clean-Ups
- ☐ In Kind Services
- ☐ Other

Name: _____

Address: _____

City/Zip: _____

Organization: _____

Phone: _____

Work: _____

Fax: _____

E-Mail: _____

Please mail with check to:

Trails4All
P.O. Box 4048 • Santa Ana, CA 92702-4048

All Donations are Tax Deductible!

Trails4All is a qualified charitable organization under IRC 501(c)(3). All donations are deductible as provided by law.

Fed ID# 33-0719807

300 North Flower
Box 4048
Santa Ana, CA 92702-4048

(714) 834-3136
fax (714) 834-7657
E-Mail: info@trails4all.org
Web Site: www.trails4all.org

007370

TRAILS4ALL
An Organization for Everyone

Trails4All has helped organize hundreds of trail projects, helped clean up our creeks and watersheds, provided vital funds for new trail construction, and sponsored trail construction seminars. From urban trails to remote locations in the Cleveland National Forest, Trails4All has coordinated thousands of volunteers who have donated tens of thousands of hours of time to keep our trails open.

TRAILS4ALL
At the Forefront

Trails4All is at the forefront in helping repair trails, improving the environment and encouraging a spirit of cooperation among all trail users throughout Orange County.

Trails4All has undertaken ambitious projects to improve our environment and keep trails open.

- Cleaned Up Trabuco Canyon, removing more than 118,000 pounds of trash, recyclables and debris with the help of over 400 volunteers.
- Organizes and Hosts the Annual "(Non)-Coastal and Watershed Cleanup Day" held at 6 Regional and Wilderness Park locations resulting in the removal of tons of trash and recyclables from our creeks and streams.
- Helped reopen County Parks closed as a result of winter storm damage (including recent "El Nino" storms). Trails4All was instrumental in getting the volunteers out to repair the damage and get you back onto the trails.

TRAILS4ALL
Filling the Gap

Each year, our parks see more visitors and our trails get more use. Yet since 1992, the budget for the Orange County Park System has been reduced by over $50 Million, and is diminishing at $10 Million annually. In response, Trails4All is expanding its efforts to reach more locations, more parks and more trails. If you are using trails in Orange County, chances are, you are directly benefiting from Trails4All's efforts. Your help is vital to these efforts. Think about what it would be like if you couldn't use your favorite trail because no one maintained it. Whether you hike, trail run, mountain bike or ride horseback, Trails4All's efforts directly benefit you by keeping our trails open and our parks clean.

TRAILS4ALL
A Chance for You to Give Something Back

Your support of Trails4All has a direct benefit for our trails and parks. In 1998, over 87% of Trails4All's resources go directly to providing services to improve our trails and parks. Less than 13% was used for fundraising and administrative expenses. Yet, Trails4All can only survive if you support its mission. Your membership is the most effective way to keep Trails4All working for you. In addition to knowing that you are helping our parks, as a member you will be kept informed about upcoming trail projects and events. Please return your tax-deductible contribution with the attached application. Thank you in advance for *"sharing the responsibility!"*

Printing Compliments of

LADERA RANCH

007371

HERE'S YOUR ANNUAL UPDATE & 2000 RECYCLE CALENDAR

Anti-litter Campaign Puts Kids to Draw

CHOOSE TO REUSE

WHAT WHERE?

HOLIDAY COLLECTION

Recycle Your Christmas Tree

ANAHEIM DISPOSAL P.O. Box 309 • Anaheim, CA 92815

Para recibir información sobre el reciclamiento en español favor de llamar al numero (714) 238-3300.

Printed on recycled paper with soy-based inks.

Bulk Rate
U.S. Postage
PAID
DXII

007372

ANAHEIM WEB PAGE

Department of Public Works
Street and Sanitation Division

400 E. Vermont Avenue
Anaheim, CA 92805
(714) 765-6860

Storm Drain and Sewer Maintenance
Swimming Pool and Spa Area

Water containing chlorine is harmful to aquatic life. Whenever possible, drain pool and spa water into the sewer system. There are established guidelines on the amount of residual chlorine, acceptable ph range, coloration, filter media and acid cleaning wastes when draining into the storm drain system, and some areas may require a permit. Check with your city or call the county at (714) 567-6363 for a copy of the guidelines.

*O.C. Household Hazardous Waste Information (714) 834-6752 or www.oc.ca.gov/IWMD

Main	Street and Sidewalk Maintenance	Storm Drain and Sewer	Street Sweeping and Parking Control/Citations	Solid Waste and Disposal	Useful Links

ANAHEIM WEB PAGE

Department of Public Works
Street and Sanitation Division

400 E. Vermont Avenue
Anaheim, CA 92805
(714) 765-6860

Storm Drain and Sewer Maintenance

Sandbag Information

Storm Water & Urban Runoff Pollution

Swimming Pool and Spa Area

It is our goal to maintain the City's network of 503 miles of sanitary sewer lines and 67 miles of storm drain lines in a clean and safe condition. To achieve this, the City's storm and sewer lines, pump stations, drain easements and other related facilities are cleaned and inspected for good operating and environmental condition. For more information, call (714) 765-6935 or e-mail us at CALLAN@anaheim.net.<>

Transfer interrupted!

Main	Street and Sidewalk Maintenance	Storm Drain and Sewer	Street Sweeping and Parking Control/Citations	Solid Waste and Disposal	Useful Links

ANAHEIM WEB PAGE

Department of Public Works
Street and Sanitation Division

400 E. Vermont Avenue
Anaheim, CA 92805
(714) 765-6860

Storm Drain and Sewer Maintenance

Sandbag Information

During inclement weather, the Streets & Sanitation Division will provide sandbags to residents for their use. The City provides a maximum of 10 bags for each single-family dwelling and 25 for multi-family or commercial complexes. They are available at two locations:

Streets and Sanitation Yard
400 E. Vermont Avenue
Monday - Thursday and every other Friday, 7 AM - 5 PM
Hours may be extended during severe weather conditions.
Call (714) 765-6860 for more information.

Anaheim City Hall
Engineering Public Counter, Second Floor
200 S. Anaheim Blvd.
Monday - Friday, 8 AM - 5 PM
(714) 765-5176

Proof of Anaheim residency or business ownership must be provided when picking up sandbags. Please note that only the bags are provided; fill materials are the responsibility of the recipient. If sand is not available, substitute dirt from your planters. Sandbags can also be purchased from major hardware stores and home centers.

Sandbags may be available at the Orange County Public Facilities and Resources yard at 10852 Douglass Road (714) 567-6300.

Sandbagging Information:

Fill the bag about ½ full. Use soil from your planter areas. Then after the storms, the soil can be returned to the planter and you will not have excess soil to discard.

Sandbags will rot in the sun. Placing them out too early in the storm season may cause more problems if the bags are rotting. Check the bags for rips or weak spots/seams.

Keep plastic sheeting available in case of an emergency.

Clean out your drains, roof gutters, down spouts, and any other water path that may be impeded. Check these frequently as debris will collect after each rain.

Main	Street and Sidewalk Maintenance	Storm Drain and Sewer	Street Sweeping and Parking Control/Citations	Solid Waste and Disposal	Useful Links

Home

Department of Public Works
Street and Sanitation Division

400 E. Vermont Avenue
Anaheim, CA 92805
(714) 765-6860

ANAHEIM WEB PAGE

SOLID WASTE COLLECTION & DISPOSAL

Orange County Storm Water & Urban Runoff Prevention Program

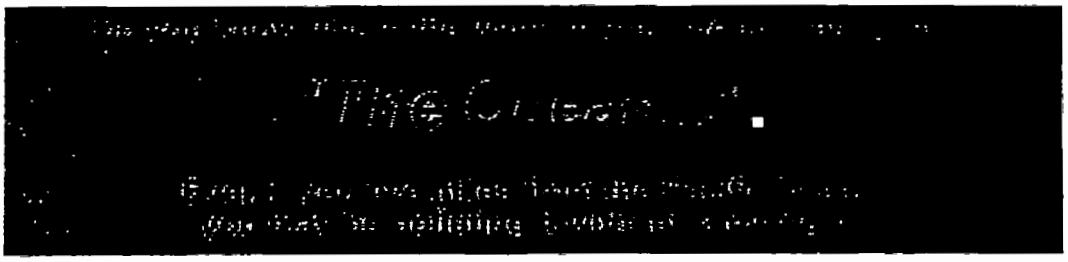

STORM WATER & URBAN RUNOFF POLLUTION (SWURP) AND WHAT YOU CAN DO TO STOP IT

- Before you pour anything into the gutter or down the drain, stop and think! Storm Drains go directly into channels and creeks...and through wetlands and bays to the ocean.

- **DID YOU KNOW...**Anything we use in our home, car and business like motor oil, paint, pesticides, fertilizers and cleaners can wind up in the street.

- A little water from rain or a garden hose can carry automotive and household materials through the storm drain causing the pollution of bays, wetlands and the ocean. Storm drains are there to drain water off the street-not for disposal of hazardous materials.

- **WHERE DOES IT GO?**These pollutants flow together on a journey from the storm drain to the flood control channel where it can eventually empty into the ocean. This type of pollution is called Storm Water & Urban Runoff (SWURP) and is a serious threat to the beaches and ocean of Southern California.

- **WHAT IS STORM WATER & URBAN RUNOFF POLLUTION (SWURP)?** Storm water runoff refers to seasonal rainfall flows. It is very noticeable during a heavy rain storm when large volumes of water drain off paved areas. Urban runoff can happen anytime of the year when excessive water use from irrigation, car washing and other sources carries litter, lawn clippings and other urban pollutants into storm drains. Even an automobile leaking motor oil 20 miles inland can still pollute the ocean.

HOW IS IT DIFFERENT FROM OTHER FORMS OF WATER POLLUTION? SWURP can include anything that washes into the storm drain from the community. Unlike water pollution linked to factories or sewage treatment plants, SWURP can come from city streets, neighborhoods, farms, construction sites and parking lots.

STORM WATER & URBAN RUNOFF POLLUTION COMES FROM: Automotive leaks and spills. Disposal of used oil and other engine fluids down the storm drain. Metals in vehicle exhaust, paint, rust, metal plating and tires. Pesticides, herbicides and fertilizers from lawns, gardens and farms. Improper disposal of cleaners, paint and paint removers. Soil erosion and dust debris from landscape and construction activities. Litter, lawn clippings, animal waste and other organic matter. Oil stains on parking lots and paved surfaces.

STORM WATER & URBAN RUNOFF POLLUTION AND THE OCEAN SWURP may have a serious impact on water quality in Orange County. Pollutants from the storm drain system can harm marine life as well as coastal and wetland habitats. It can also

ANAHEIM WEB PAGE

degrade recreation areas such as beaches, harbors and bays.

THE OCEAN IS CLOSER THAN YOU THINK. THERE ARE WAYS TO REDUCE STORM WATER & URBAN RUNOFF POLLUTION (SWURP)

HOME MAINTENANCE

- Buy household products such as cleaners and furniture polish labeled "non toxic". Use small quantities and purchase only the amount you need.
- Properly use and store all toxic products, including cleaners, solvents and paints. Use up paint cleaners and other products or share leftovers with a neighbor.
- Take household hazardous materials and containers to a hazardous material collection center.
- Use kitty litter or other absorbent materials to clean spills. Depending on the substance, dispose absorbents in the trash can or at a hazardous materials collection center.
- Rinse water based paint brushes in the sink. Filter and reuse paint thinner or brush cleaners. Dispose of used thinner, oil and latex paint at a hazardous materials collection center.
- Recycle reusable materials. Throw litter into trash cans and keep cans tightly covered to prevent foraging by animals.
- Control erosion at construction and landscape sites to prevent dirt and debris from entering storm drains.

LAWN AND GARDEN

- Use pesticides, herbicides and fertilizers in accordance with label instructions. Do not apply before rain and dispose leftovers at a hazardous materials collection center.
- Use a broom rather than a hose to clean up garden clippings. Put leaves and clippings in a trash can or a compost pile.
- Divert rain spouts and garden hoses from paved surfaces onto grass to allow water to filter through the soil. Water only your lawn and garden. Caution! Do not use this suggested action in areas with steep slopes or landslide potential.
- Pick up animal waste and dispose in the trash can.

AUTOMOTIVE

- Take used motor oil and antifreeze to gas stations that accept recyclable automotive fluids, or to a hazardous materials collection center.
- Have your car maintained regularly to prevent oil, antifreeze and other fluid leaks.
- Reduce automotive emissions through routine auto maintenance, ride sharing and public transportation.
- Conserve water when washing your car and use biodegradable soap. Clean engines at a "Do It Yourself Car Wash" where the drainage is not connected to the storm drain.
- You can control SWURP by supporting city and county activities to keep your streets clean. You can help by participating in recycling, beach clean-ups, and the proper disposal of hazardous materials.
- Since many businesses and residents are unaware of the storm water & urban runoff problem, encourage neighbors and co-workers to be careful in not polluting the storm drain system.
- Together, you, your neighbors and city can make a difference in keeping the ocean and beaches clean for ourselves and wildlife. Contact the Storm Water Participant in your area to share ideas or ask questions on keeping storm drains clean.

DID YOU KNOW THAT DUMPING ONE QUART OF MOTOR OIL DOWN A STORM DRAIN CONTAMINATES 250,000 GALLONS OF WATER?

Storm Water Quality Management Programs have been developed by the Orange County Environmental Management Agency, local cities, and other agencies which participate in the National Pollutant Discharge Elimination System (NPDES). Their

responsibilities involve encouraging the public to help protect water quality, monitoring runoff in the storm drain system, managing the NPDES permit process for municipalities, investigating illegal disposal and maintaining storm drains.

ANAHEIM WEB PAGE

IMPORTANT PHONE NUMBERS AND LINKS
Orange County Hazardous Materials Hotline (714) 834-6752

Severe Emergencies Only 911

For information on service stations that accept used motor oil.
California Integrated Waste Management Board (800) 253-2687

For information on agricultural chemicals, pesticides and possible alternatives
O.C. Agriculture Commissioner (714) 447-7100

Information for industries regarding Hazardous Waste And Underground Storage Tank Requirements:
O.C. Health Care Agency / Environmental Health Division / Hazardous Materials Management Section (714) 667-3700 or www.oc.ca.gov/IWMD

For a list of other participants in the Orange County Storm Water Program, click here.

Main	Street and Sidewalk Maintenance	Storm Drain and Sewer	Street Sweeping and Parking Control/Citations	Solid Waste and Disposal	Useful Links

Do You Know Where The Water In Your Storm Drain Goes?

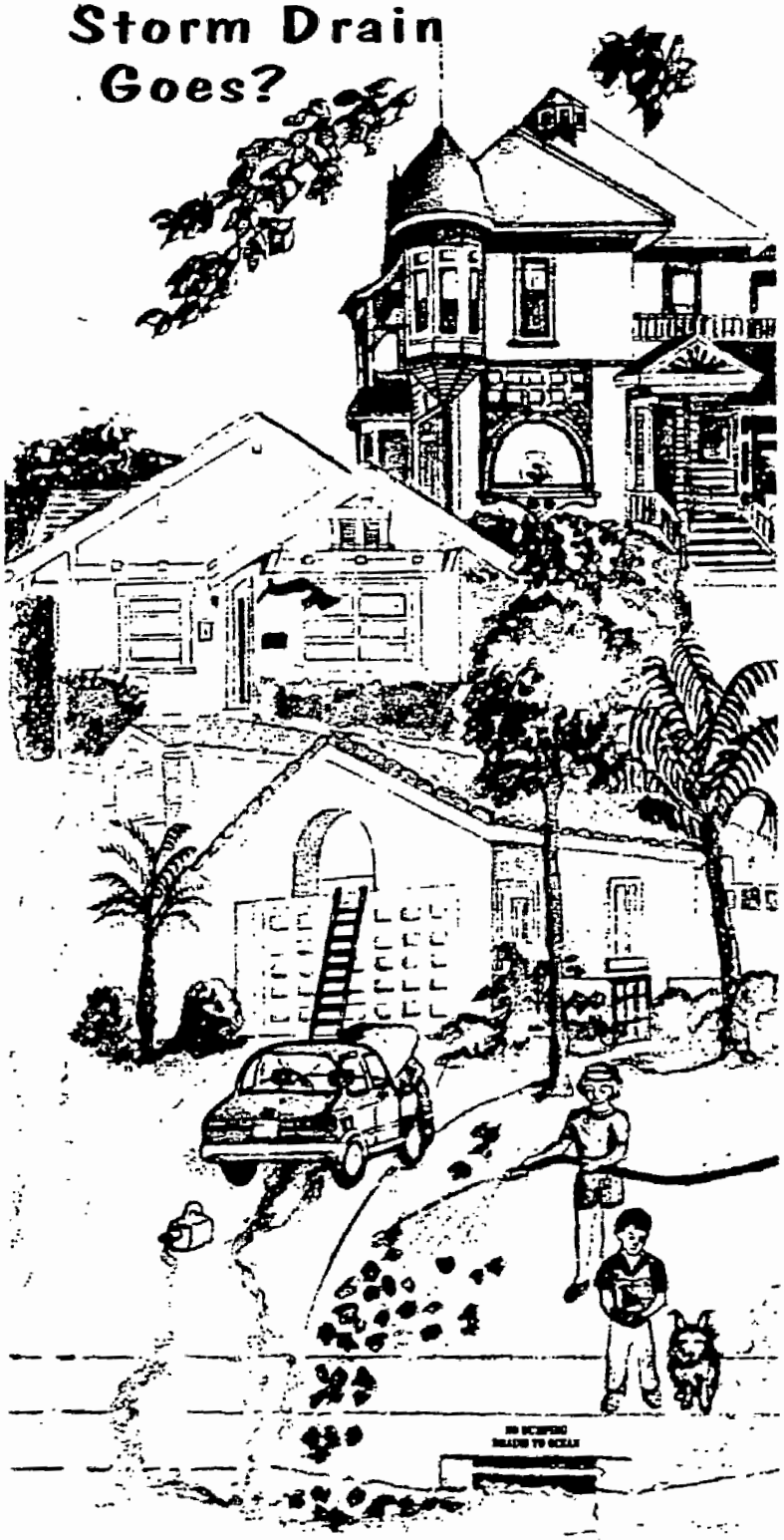

To The Ocean...

REPRESENTATIVE PUBLIC EDUCATION MATERIALS

CITY OF COSTA MESA

Costa Mesa
SUMMER 2000
Community Report

The Costa Mesa Community Report is the official newsletter of the City of Costa Mesa. It is intended to aid in informing residents of programs, services and activities available to them. Editorial guidelines have been adopted regulating contents to ensure that the newsletter remains accurate and unbiased.

Annual FREE Large Item Collection Program

Single and small multi-family dwellings using curbside trash collection (not dumpsters) may participate in the Annual Large Item Collection Program. The program runs for ten weeks, beginning the week of June 19 and ending August 25. Residents have the opportunity to dispose of items too large or bulky for their trash containers. Water heaters, washers, dryers, refrigerators, carpeting and furniture will be collected, recycled and/or disposed of, at no additional cost to the resident.

Watch for your **bright yellow door hanger!** A notice will be hung at the door of your residence two weeks in advance of the collection date for your neighborhood.

In addition, residents are entitled to a one-time call in during the year for a large item pick up. To schedule your one-time pick up, call (949) 646-4617.

Factlet: Last year approximately 918,000 pounds of large items were collected. Appliances accounted for 172,800 pounds or 19% of the total.

FREE
Large Item Collection Program "Multi-Family Residences"

Residents living in apartment, condominium, duplex, and other multi-family complexes that utilize dumpster trash service will be able to participate in a large-item pick-up program offered in June. The City is offering this program for a limited time free of charge to residents. Your waste hauler will collect large items such as water heaters, washers, dryers, refrigerators, and furniture.

Additional information is available on the City of Costa Mesa's cable channel 74, the City's web page, from your waste hauler, or by calling the City at (714) 754-5024.

Update: Downtown Recreation Facility

Construction is in progress on the new Downtown Recreation Facility located in Lions Park. The facility will house a new gymnasium, meeting rooms and a 25-meter swimming pool. Pictures of the finished facility are posted at the construction site and can be viewed on the City's web page. (www.cityofcostamesa.com)

Construction is expected to be complete by March 2001. The existing Downtown Community Center will remain open during the construction.

Attention First Time Homebuyers!

You may qualify for down payment assistance of up to $35,000 or 15% of the purchase price, whichever is less, for the purchase of a home in the City of Costa Mesa. You must meet the following program requirements:

1. You have not had ownership interest in residential real estate within the last three (3) years, unless you are a 'displaced home maker.' (Please contact Agency for additional information on displaced home maker.)
2. Your total gross household income is less than 120% of the Area Median Income for the County of Orange:

Household Size	*Maximum Income
1	$58,450
2	$66,800
3	$75,150
4	$83,500
5	$90,200
6	$96,900

3. You have enough funds in savings to contribute 5% of the purchase price as your portion of the down payment plus cover closing costs for the purchase of a home.
4. You plan on purchasing a home in the City of Costa Mesa not to exceed *$252,700 in price.

To request an application, please call the City's Housing hotline at (714) 754-4892 and leave your name, address and telephone number. Applications will be processed on a first-come/first-served basis and are subject to funding availability.

*Housing purchase price and income limit guidelines are subject to change.

Residential Pick-up of Used Oil

The City of Costa Mesa and the Costa Mesa Sanitary District offer a "free" service for the pick up of used motor oil and oil filters from city residents. The used motor oil will be recycled into replacement fuel and/or re-refined motor oil. The used oil filters will be recycled into new metal products. This program is funded by a grant from the California Integrated Waste Management Board.

Residents can call 1-800-576-0041 to schedule the home pick-up. If you prefer to take your used motor oil and filters to a certified collection center in Costa Mesa, call the Used Oil Recycling Hotline at (714) 754-4861 for locations.

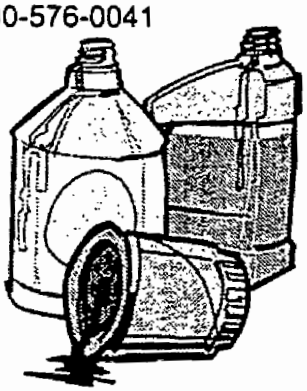

Telephone Book Recycling

New Pacific Bell yellow page directories are arriving between May 30 and June 7. Recycle your outdated books by dropping them off at one of our collection bins located in front of City Hall or at the Orange Coast College Recycling Center located on Adams between Harbor and Fairview. For more information, please call the Recycling Hotline (714) 754-5600

Factlet: In 1999, Costa Mesa residents recycled 23,500 telephone directories.

Recycling Hotline

Recorded information about current recycling programs in Costa Mesa is available 24 hours a day by calling (714) 754-5600. Recycling information is also available on the City's website: www.cityofcostamesa.com

Christmas Tree Recycling

Once again the City of Costa Mesa and the Costa Mesa Sanitary District will be providing the annual Christmas Tree Recycling Program. Residents are asked to remove the stands and all decorations from their trees and place them at the curb on their regular trash collection day.

Costa Mesa Disposal will be sending a special truck to pick up the trees from December 28 through January 8, 1999. The recycled trees are used for weed abatement and erosion control.

Residents and businesses who use a dumpster are advised to contact their own hauler (phone number is on you bin) and inquire about tree recycling at their location.

Factlet: *10,002 trees weighing 130 tons were collected and recycled in 1997.*

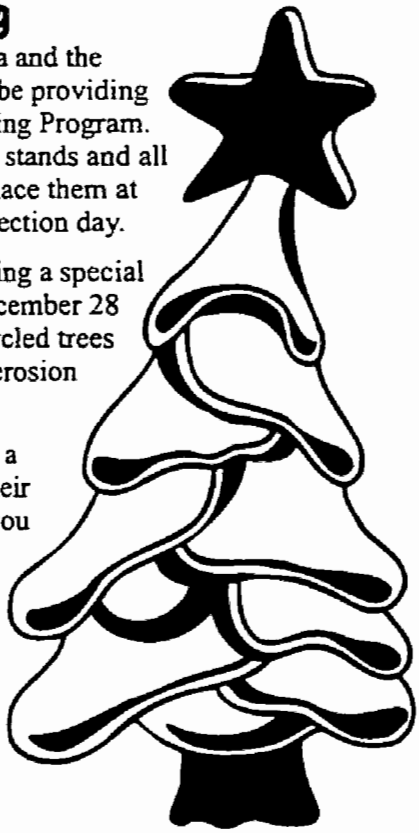

The Costa Mesa Fire Department wishes you

Happy Holidays

- ☆Place tree away from heat.
- ☆Use only noncombustible decorations.
- ☆Inspect lighting for frayed wire, broken plugs and sockets, etc.
- ☆Keep base of tree in water and check it daily.
- ☆Be sure to remove tree soon after the holidays, before needles get too dry.

Recycling Made Easy!

Did you know that the trash collected each week from your household is sorted and separated for the recyclables? All of the recyclables and trash are delivered to a large plant in Stanton that uses mechanical and manual sorting techniques. The recyclables are separated, baled, and shipped to manufacturers throughout the world. About 35% of the trash arriving at the plant is able to be be recycled. The leftover debris is landfilled within Orange County. For more information, call (714) 754-5307.

ABOP Collection Program for Household Hazardous Waste

ABOP? That's trash tech For antifreeze, auto Batteries, used oil, and Latex paint! Can't make it to one of the four County hazardous waste collection centers (714) 834-6752, then let us pick it up at your house for you! The Costa Mesa Sanitary District is funding a one year program to collect recyclable household hazardous waste. To schedule a FREE pickup at your home, call 800-HHW-PKUP. *Residents who use dumpsters are not eligible for this program.*

Holiday Schedule For Trash Collection

The collection for Friday, December 25 and January 1, will be picked up on *Saturday!*

Annual Large Item Collection Program

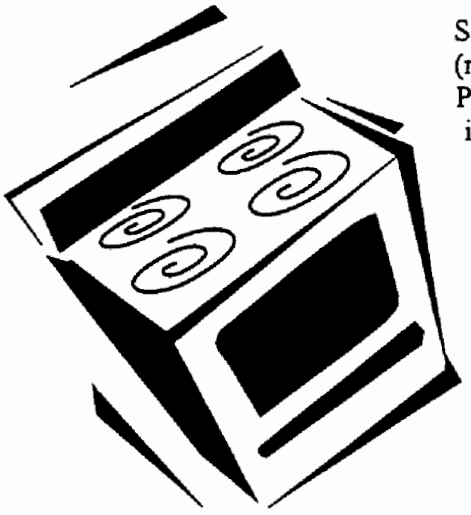

Single and small multi-family dwellings that use curbside trash collection (not dumpsters) may participate in the Annual Large Item Collection Program. The program runs for ten weeks, beginning late June and ending in August. Residents have the opportunity to dispose of items that are too large or bulky for their trash containers. Water heaters, washers, dryers, refrigerators, carpeting, and furniture will be collected, recycled and/or disposed, at no additional cost to the resident.

A notice will be hung on each resident's door two weeks in advance of the collection date for their neighborhood. Watch for your **bright yellow door hanger**! In addition, residents are entitled to a one-time call-in during the year for a large item pick up.

For additional information, call (949) 646-4617 or (714) 754-5307.

Factlet: Last year approximately 1.1 million pounds of large items were collected. Appliances accounted for 170,200 pounds or 16% of the total.

Telephone Book Recycling

New Pacific Bell yellow page directories are arriving! Recycle your outdated books by dropping them off at one of our collection bins located in front of City Hall or at the Orange Coast College Recycling Center located on Adams between Harbor and Fairview. For more information, please call the Recycling Hotline, (714) 754-5600.

Factlet: In 1998, Costa Mesa residents recycled 21,000 telephone directories.

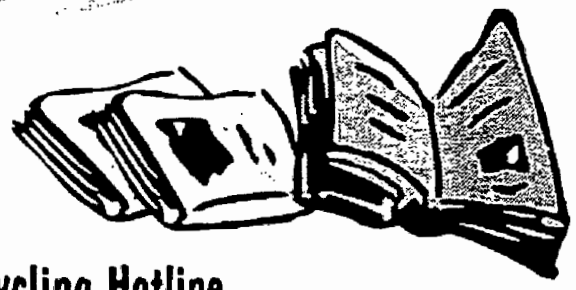

Recycling Hotline

Recorded information about current recycling programs in Costa Mesa is available 24 hours a day by calling (714) 754-5600. Recycling information is also available on the City's website: www.cityofcostamesa.com.

Residential Pick-up of Used Oil

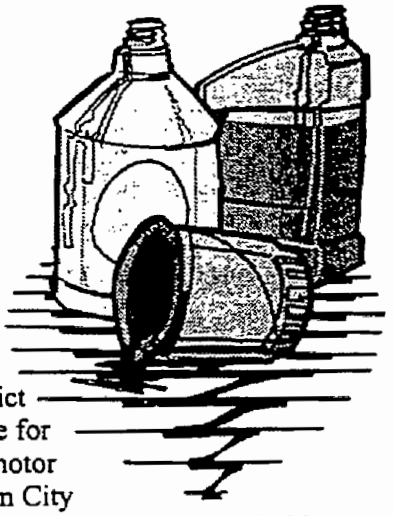

The City of Costa Mesa and the Costa Mesa Sanitary District offer a "free" service for the pick up of used motor oil and oil filters from City residents. The used motor oil will be recycled into replacement fuel and/or re-refined motor oil. The used oil filters will be recycled into new metal products. This program is being funded by a grant from the California Integrated Waste Management Board. Residents can call 1-800-576-0041 to schedule the home pick-up. If you prefer to take your used motor oil and filters to a certified collection center in Costa Mesa, call the City's Used Oil Recycling Hotline, (714) 754-4861 for locations.

Westside Specific Plan Update

Westside Specific Plan is a long-range strategic plan to improve and enhance the southwest portion of the community. The study area is bounded on the north by Fairview Park, on the east by Harbor and Newport Boulevards, and on the west by the Santa Ana River. Major issues to be addressed by the plan include revitalization of the West 19th Street commercial district and resolution of land use conflicts within the southwest industrial area.

The plan has been developed over the past year with input from members of the community through a series of public workshops and neighborhood meetings. The draft plan will be completed in December 1999 and ready for public hearings in early 2000. Please call the Planning Division at (714) 754-5245 if you would like additional information or if you would like to be placed on the mailing list for the upcoming public hearings.

Holiday Tree Recycling

The City of Costa Mesa and the Costa Mesa Sanitary District will be providing the annual Holiday Tree Recycling Program. Residents are asked to remove the stands and all decorations from their trees and place them at the curb on their regular trash collection Costa Mesa Disposal will be sending a special truck to pick up the trees from December 27, 1999, through January 9, 2000. The recycled trees are used for weed abatement and erosion control.

Residents and businesses who use a dumpster for their normal trash collection service are advised to contact their own hauler (phone number is on the bin) and inquire about tree recycling at their location.

Catch Basin Stenciling

In August, 1999, a two-man volunteer team from the Orange County Conservation Corp applied curb markers at each of the City's storm drain inlets. In an effort to preserve and protect the quality of our oceans and waterways, the inlets are being marked to discourage people from dumping and washing used motor oil and other contaminants down the storm drain inlet.

The curb markers are a 3-3/4 x 8 inch rectangle plastic tile with a clear protective urethane coating. The curb markers are permanently affixed to the concrete surface near the storm drain inlet. The curb markers are impact and theft resistant and will remain legible for up to ten years. The message on the curb marker reads "No Dumping, Drains to Ocean" in blue and green letters with a picture of a dolphin.

Used oil recycling grant funds from the California Integrated Waste Management Board were used to purchase and install the curb markers.

These curb markers have been installed throughout the City in an effort to discourage people from dumping and washing contaminants down the storm drain inlets, which drain to the ocean.

Scavenging is Illegal

Anyone going through your trash is a scavenger and is illegally stealing your recyclables. Scavenging is also a front for other crimes such as obtaining blank checks or discarded credit card receipts. Please report scavenging activity to the District at 714/754-5307.

Holiday Schedule For Trash Collection

Memorial Day, Monday, May 29

All week, trash collection will be one day late

Large Item Call-In

Our summertime Large Item Collection Program helps residents dispose of unwanted furniture and appliances. Watch for your bright yellow door hanger about two weeks before your neighborhood collection date between June and August.

In addition to the summer program, residents may call 949/646-4617 and arrange a FREE special large item pickup, one time during the calendar year.

Do You Have Any Of These Items At Your House?

Used oil, Batteries, Cleaning Products
Pesticides, Paint, Pool Chemicals
Propane Tanks, Road Flares
Fuels, Antifreeze, Paint Thinner
Polishes & Waxes

Most home, car and yard care products cannot be thrown into the trash. The Orange County Household Hazardous Waste Collection centers will accept your materials for FREE. Your nearest center is in Huntington Beach at 17121 Nichols Street, near Warner & Beach Blvd. For hours of operation and directions, call 714/394-6752.

Can't make it to the one of the four County hazardous waste collection centers, then let us pick it up at your house for you! To schedule a FREE pickup at your home, call 800-HHW-PKUP. This program is partially funded by the State of California, Integrated Waste Management Department.

Sharps Program

A FREE home generated sharps (syringes/needles) recycling program is available to Costa Mesa and Santa Ana Heights residents. Three local pharmacies, RiteAid at 3029 Harbor Blvd., Steven's Pharmacy at 1525 Mesa Verde Dr. East, and Ramsey Rexall at 2246 Newport Blvd. in Costa Mesa are participating in this unique program.

Residents who use needles at home are invited to visit the pharmacies and pick up a FREE quart-sized container. The containers hold approximately 100 used syringes. Residents may return filled containers to the pharmacies for collection, and will receive a new one in exchange. For more information, please call (714) 754-5307.

Watch Your Weight

Containers weighing more than 50 pounds can easily injure the waste collection workers. The District requires that the combined weight of the container and contents may not exceed 50 pounds. If in doubt, please separate the items into two containers or heavy-duty trash bags. Plastic and paper grocery bags are not acceptable containers. A maximum of 200 pounds per household can be collected each week.

Recycling Hotline

Recorded information about current recycling programs in Costa Mesa is available 24 hours a day by call (714) 754-5600. Recycling information is also available on the City's website www.cityofcostamesa.com

Honey, before you go shopping, please check the Stop & Swap for:

- ✔ Latex Paint
- ✔ Bug Spray
- ✔ Chlorine
- ✔ Cleaning products

Thanks!

COUNTY OF ORANGE

HOUSEHOLD HAZARDOUS WASTE PROGRAM

For free disposal of old paints, pesticides, and other household toxic products, call:

(714) 834-6752

County of Orange Stop and Swaps are funded by a Grant from the California Integrated Waste Management Board.

Printed on recycled paper.

Integrated Waste Management Department

Before you shop...

Stop!

Drop!

and

Swap!

Household Hazardous Waste Collection Program

TRANSPORTATION AND HANDLING

- A maximum of 15 gallons or 125 pounds may be transported per vehicle, per trip (Department of Transportation regulation).
- Materials should be in original containers (except motor oil, fuels and antifreeze).
- Containers larger than 5 gallons in size will not be accepted.
- All containers must have lids, be sturdy, non-leaking, and protected from breakage.
- Do not combine types of waste.
- Do not mix oil-base paint with latex paint.
- Dry out empty paint cans and discard in regular trash.
- If you wish to have a container returned (i.e. oil containers and boxes/crates used to transport materials), please notify the attendant in advance. Some containers may not be returnable.

WHY SHOP TIL YOU DROP?

VISIT THE STOP & SWAP!

A unique and FREE program that allows you to drop off household, yard, and car care products you no longer need and pick up others you can use.

Currently available at the Anaheim, Huntington Beach and Irvine locations only. (Tuesday through Saturday, 9 a.m. to 1 p.m.)

FOR MORE INFORMATION ABOUT THE HOUSEHOLD HAZARDOUS WASTE COLLECTION PROGRAM AND THE STOP & SWAP CALL:

(714) 834-6752

Or see our website: www.oc.ca.gov/iwmd

Orange County Recycles!

Printed on r[illegible]d paper.

Integrated Waste Management Department

DISPOSAL OF HOUSEHOLD HAZARDOUS WASTE

Household Hazardou[illegible] Waste Collection Program

HOUSEHOLD HAZARDOUS WASTE

The County of Orange has four Household Hazardous Waste Collection Centers available FREE to Orange County citizens. (Proof of residency may be required.)

COLLECTION CENTER LOCATIONS

ANAHEIM REGIONAL COLLECTION CENTER

1071 N. BLUE GUM STREET
Located between the 91 & 57 Fwys
at the corner of La Palma Avenue
and Blue Gum Street in Anaheim
**Visit the Stop & Swap to obtain partially used household products at no charge.*

IRVINE REGIONAL COLLECTION CENTER

6411 OAK CANYON
Next to City of Irvine Corporate Yard.
From the (5) freeway take the Sand Canyon exit, go Southwest to Oak Canyon and turn right.
**Visit the Stop & Swap to obtain partially used household products at no charge.*

HUNTINGTON BEACH REGIONAL COLLECTION CENTER

17121 NICHOLS STREET
Next to Rainbow Recycling and Disposal.
Major cross streets are Beach Blvd.
and Warner Ave. in Huntington Beach.

SAN JUAN CAPISTRANO REGIONAL COLLECTION CENTER

PRIMA DESHECHA LANDFILL
From the (5) freeway take Ortega Hwy. (74),
east to La Pata Avenue, turn right and
follow road to Landfill entrance.

COLLECTION CENTER HOURS OF OPERATION:

Tuesday through Saturday
9:00 a.m. to 1:00 p.m.

Collection Centers are Closed:

Rainy Days; Christmas, Independence, New Years and Thanksgiving Days.

Hazardous waste is not accepted from businesses, schools, government agencies, churches, non-profit organizations.

Printed on recycled paper

Attention All Residents of Costa Mesa and Sanitary District Customers!

FREE Home Pick-Up Program For Used Oil and Other Household Hazardous Waste!

How Does It Work?

1.) Resident Calls the HHW Hotline (800)-HHW-PKUP to Request a Collection: When a Resident calls our Household Hazardous Waste (HHW) Hotline at 1-800-449-7587 we ask for the caller's address, age and the type and amount of material available for collection.

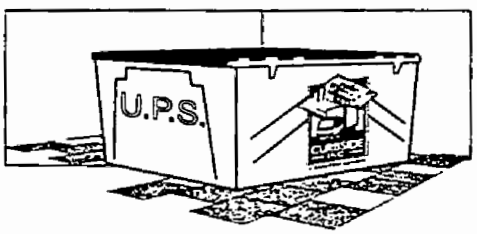

2.) A Collection Date is Scheduled by Phone, and an HHW Kit is Shipped via UPS to the Home: A pickup date is scheduled over the phone based on the next available collection day. The program is fully explained and safety procedures reviewed. An HHW Kit is sent via UPS to the resident's home prior to the collection date. The kit can hold up to 75 pounds of the most hazardous chemicals.

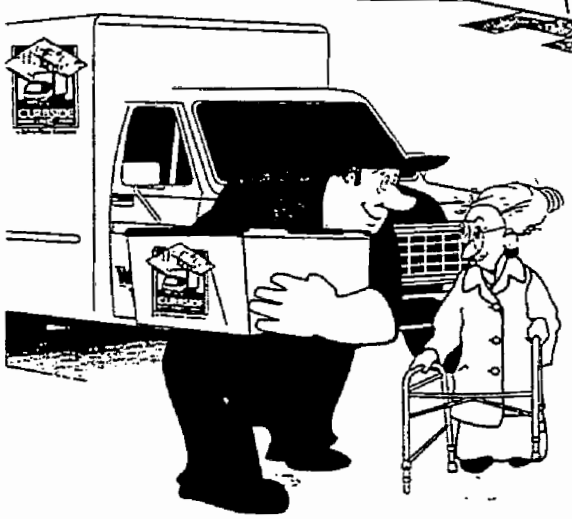

3.) The HHW Material is Collected: On the scheduled date, our team will collect the eligible HHW directly from the resident's home. The program satisfaction survey card (included in the kit) should now be completed by the participant and mailed directly to the City to help track the program.

4.) HHW is Transported to the Appropriate Facility for Recycling or Disposal: Used oil will be transported by Safety-Kleen to its refinery in East Chicago, Indiana. There the oil will be refined into new lubricants. Other materials will be sorted and lab packed for recycling or proper disposal. Paint will be recycled into more usable paint. More than 90% of all materials collected Safety-Kleen/Curbside are recycled.

Don't Forget to Recycle Your Used Oil and Filters! Help to ensure clean land and water for the future. One gallon of oil pollutes one-million gallons of water. Also, a drained oil filter still retains up to 44% of its original capacity. That's 9 oz. of oil!

This program is made possible, in part, by a grant from the California Integrated Waste Management Board.

Don't dump used motor oil in the trash, down the storm drain, or on the ground . . .

Recycle your used motor oil at any of the Certified Collection Centers listed on the back of this brochure.

If you need more information regarding the City of Costa Mesa Used Oil Recycling Program, call the City's Used Oil Hotline:

714-754-4861

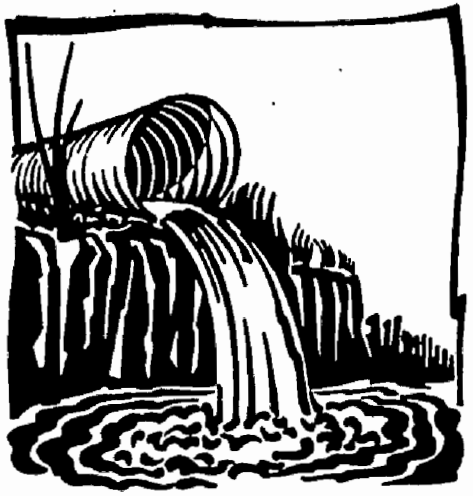

Certified C tion Centers In the City Costa Mesa:

Big O Tires
3181 Harbor Blvd.
(714) 549-4022
Hrs: M-F, 8 a.m.to 6 p.m.
Sat., 8 a.m. to 5 p.m
Sun., 9 a.m. to 4 p.m

Econo Lube N' Tune
1550 Newport Blvd.
(714) 631-9146
Hrs: M-Sat., 7:30 a.m. to 5 p.m.

Haus of Performance
3017 Enterprise St.
(714) 545-2755
Hrs: M-F, 8a.m. to 6 p.m.

Jiffy Lube
2255 Fairview Rd.
(714) 557-5823
Hrs: M-Sat., 8 a.m. to 6 p.m.
Sun., 9 a.m. to 5 p.m.

Parnelli Jones
1739 Superior Ave.
(714) 631-7712
Hrs: M-F,
7:30 a.m. to 6:30 p.m.
Sat., 7:30 a.m. to 5 p.m.

Purrfect Auto Service
2049 Harbor Blvd.
(714) 722-2424
Hrs: M-Sat., 8 a.m. to 6 p.m.

Texaco Xpress Lube
300 E. 17th Street
(714) 548-2505
Hrs: M-Sat., 8 a.m. to 6 p.m.
Sun., 9 a.m. to 5 p.m.

Kragen Auto Parts
1739 Superior Avenue
(714) 642-3384
Hrs: M-F, 8 a.m. to 9 p.m.
Sat., 8 a.m. to 8 p.m
Sun., 9 a.m. to 7 p.m.

Coast General Tire
2855 Harbor Blvd.
(714) 540-5710
Hrs: M-F, 8 a.m. to 5:30 p.m.
Sat., 8a.m. to 4 p.m

Fedco Tire Center
1450 Baker
(714) 438-6783
Hrs: M-F, 7 a.m. to 9 p.m
Sat., 8 a.m to 6 p.m.
Sun., 9 a.m. to 6 p.m.

Jiffy Lube
375 Bristol St.
(714) 650-5823
Hrs: M-Sat., 8 a.m. to 6 p.m.
Sun., 9 a.m. to 5 p.m.

Kymco Motorsport
2121 Harbor Blvd.
(714) 642-1835
Hrs: M-Sat., 8 a.m. to 6 p.m.
Sun., 9 a.m. to 5 p.m.

Plaza Chevron
3048 Bristol St.
(714) 545-4257
Hrs: M-F, 7 a.m. to 5:30 p.m.
Sat., 7 a.m. to 4 p.m.

Superior Texaco
1695 Superior Ave.
(714) 645-3793
Hrs: M-F, 8 a.m. to 5 p.m.

Tire Station
475 E. 17th Street
(714) 646-2444
Hrs: M-F, 8 a.m. to 6 p.m.
Sat., 8 a.m. to 5 p.m.

Kragen Auto Parts
1175 Baker Blvd. Unit E
(714) 662-2005
Hrs: M-F, 8 a.m. to 9 p.m.
Sat., 8 a.m. to 8 p.m.
Sun., 9 a.m. to 7 p.m.

Recycle Used Motor Oil at NO CHARGE & Receive a $0.16 per Gallon REBATE!

007390

City of Costa Mesa Used Oil Recycling Guide

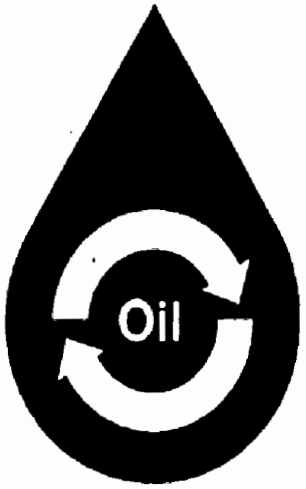

Presented by
City of Costa Mesa Public Services Department

Paid for by a grant from the
California Integrated Waste Management Board

Biggest Water Polluter? Used Motor Oil

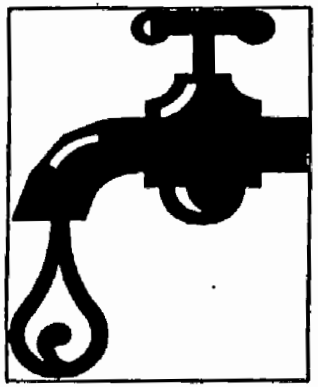

Thousands of Costa Mesa's residents are changing their own used motor oil; but according to the Environmental Protection Agency, only 10% of all "Do-It-Yourselfers" (DIYers) properly dispose of this hazardous waste. Every year, more than 200 million gallons of used motor oil are being dumped into our environment by DIYers. That's more than 20 Exxon Valdez oil spills!

Illegally disposed DIY oil is the largest pollutant to our oceans and underground drinking water resources. One gallon of motor oil can contaminate one million gallons of water! Fortunately, this problem has a solution.

The State of California passed a Used Oil Recycling Enhancement Act to promote convenient recycling. The City of Costa Mesa is participating in this program and is pleased to announce the opening of sixteen (16) Certified Collection Centers (CCC's) where City residents can take their used motor oil for recycling AT NO COST. In fact, CCC's will pay you a $0.16 per gallon rebate for your used motor oil!

How to Recycle Used Motor Oil

1. Drain your car's motor oil before working on other parts of the engine. This will help prevent contamination of the oil.
2. Place used oil in clean, empty plastic containers with tight lids.
3. Do not place oil in metal containers or containers that once held paint, bleach, antifreeze or gasoline. The residues can contaminate the oil. **Do not mix any other substances with the oil.**
4. During regular business hours, take uncontaminated used oil to one of the Certified Collection Centers listed on the back of this brochure. Contaminated oil will not be accepted.
5. You may bring oil in containers no larger than 5 gallons. Call the Certified Collection Center[illegible] onfirm hours and amounts accepted.

Recycle Used Motor Oil

Because the Earth ca[illegible]t!

June 2000 Volume 6.1

Fire Prevention News

How to Reach Us

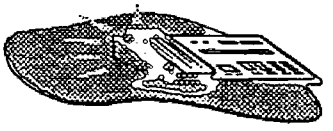

327.7400	Rebekah Tapie
327.7401	Bill Halley
327.7402	Michelle Rudaitis
327.7403	Dave Hollister
327.7404	Tom Macduff
327.7405	Teri Durnall
327.7406	Lisa Yarnell
327.7407	Planning Desk
327.7408	FAX

SPARKY THE FIRE DOG'S CYBERSURFARI

NFPA's Sparky the Fire Dog web site (www.sparky.org) will be among the featured destinations on this year's CyberSurfari, a free Internet treasure hunt sponsored by Lycos. CyberSurfari lets kids safely explore more than 100 educational web sites, solve clues, and win prizes. By exploring the exciting and safe destinations featured on this year's CyberSurfari, players will improve their deductive reasoning, Web savvy, and reading skills. Whatever your child's age, or surfing skill level, there is a division of play suitable for them. To prepare for an expedition, visit www.cybersurfari.org.

DID YOU KNOW...

THE HOUSEHOLD BATH IS THE MOST COMMON SITE FOR DROWNING IN THE FIRST YEAR OF LIFE?

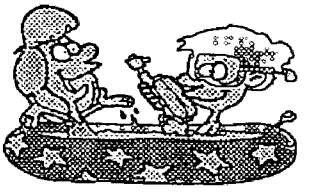

POOL SAFETY

Each year hundreds of children needlessly succumb to drowning in swimming pools. Drowning is the leading cause of death and permanent brain damage among children ages one to five years old. The following considerations should be followed to help prevent an accidental drowning.

- Remove toys from around pool decking and on water surface. Brightly colored pool accessories add to the attraction children already have for pools.
- Surround pool with a fence at least five feet high with a self-closing, self-latching gate. Do not consider the house as part of the fence.
- Pool covers provide a false sense of security. Children can still drown, even with a pool cover. Follow the manufacturer's directions. Make sure the cover fits well and read any consumer product surveys before purchasing.
- Never leave a child unattended. Remember, it only takes seconds to drown.
- Know CPR if something does occur and activate 911 immediately.
- Teach children the danger of pools and how to swim as early as possible.

Remember, children can drown in as little as a gallon of water. Wading pools, buckets, and toilets are all potential dangers.

Follow these simple rules to prevent accidents at home, when vacationing, or leaving your child in someone else's care.

SUMMER SAFETY ISSUE

1. POOL SAFETY
2. Spotlight on Safety -- Who's EDITH?
3. DANGEROUS ASSUMPTIONS
4. SWURP – The ocean is closer than you think
5. SPARKLERS – What Parents Should Know

spotlight on safety

HOME ESCAPE PLANNING ON THE RISE

In 1997, the NFPA commissioned a national survey, which showed that only 16% of Americans had developed a "practiced" home fire escape plan. Earlier this year, another survey was conducted that showed a significant increase in the number of people who have participated in this life-saving activity. Use the following safety information to educate your family members and PRACTICE IT!

FIRE SAFETY For Your Family

Who's EDITH?

EDITH stands for EXIT DRILLS IN THE HOME, a standard approach to formulating escape plans recommended by NFPA, the National Fire Protection Association.

Every family should DRAW A FLOOR PLAN of their home, marking two ways out (including windows) of every room.

DISCUSS THE ESCAPE ROUTES with every member of the household.

PICK A MEETING PLACE outside the home where everyone can meet, so you can count heads and tell the Fire Department if anyone is trapped inside.

The most important element of any escape plan is to PRACTICE IT.

DANGEROUS ASSUMPTIONS

When the NFPA asked Americans, "How long do you have to escape from a fire in your home?", 58% said two minutes or more—and that includes 24% who estimated they have more than ten minutes to escape a home fire.

The truth is, you may have much less time to escape. A typical living-room fire can threaten the entire house in just a few minutes—producing life-threatening conditions in upstairs bedrooms less than two minutes after the smoke alarm sounds.

Storm Water & Urban Runoff Pollution (SWURP)

Even though you might live miles from the Pacific Ocean, you may be polluting it without knowing it.

Anything we use in our home, car and business like motor oil, paint, pesticides, fertilizers and cleaners can wind up in the street.

A little water from rain or a garden hose can carry automotive and household materials through the storm drain polluting bays, wetlands and the ocean. Storm drains are there to drain water off the street, not for disposal of hazardous materials.

Before you pour anything into the gutter or down the drain, stop and think! These pollutants flow together on a journey from the storm drain to the flood control channel where it can eventually empty into the ocean. This type of pollution is called Storm Water & Urban Runoff Pollution (SWURP). It is a serious threat to the beaches and ocean of Southern California. The July issue of *Fire Prevention News* will include ways to reduce SWURP.

Safety Tips

Sparklers

what every parent should know...

- Wood or metal core sparklers are illegal in California.
- Sparklers are the most frequent cause of injuries to children under age 10.
- Sparklers burn at temperatures as high as 1,800 degrees and can cause severe burns to children.
- Sparklers can also easily and quickly ignite children's clothing.
- Fireworks purchased in Mexico are illegal and can be even more deadly because manufacturing codes are non-existent.

SUMMER CERT CLASSES

Call Teri Durnall in the Fire Prevention Bureau at 714.327.7405 to schedule an upcoming class.

- June 17
- July 15
- August 19

THINK

THE SAFE WAY IS THE BEST WAY

Newsletter designed by Rebekah C. Tapie

007394

July 2000 Volume 7.1

Fire Prevention News

Fire Prevention Numbers

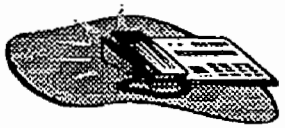

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327.7401	Bill Halley
327.7402	Michelle Rudaitis
327.7403	Dave Hollister
327.7404	Tom Macduff
327.7405	Teri Durnall
327.7406	Lisa Yarnell
327.7407	Planning Desk
327.7408	FAX

COSTA MESA EMERGENCY SERVICES EXPO

A GREAT SUCCESS

IT'S GOOD FOR THE CITY! AN ESTIMATED 5,000 PEOPLE ATTENDED THE MAY 21, 2000, EMERGENCY SERVICES EXPO AT FIRE STATION #4 THIS YEAR.

A BIG THANK YOU TO EMCEE BATTALION CHIEF JAMES ELLIS, CAPTAINS SCOTT BROUSSARD AND KIRK DOMINIC, AS WELL AS NUMEROUS OTHER INDIVIDUALS WHO PLANNED AND PREPARED FOR THIS EVENT. EVERYONE INVOLVED IN THIS YEAR'S EXPO DONATED COUNTLESS HOURS TO ENSURE THOSE WHO ATTENDED LEFT WITH A BETTER UNDERSTANDING OF EMERGENCY SERVICES PROVIDED BY THE CITY.

BESIDES INFORMATION AND EDUCATIONAL BOOTHS, THE FOLLOWING DEMONSTRATIONS WERE PROVIDED:

- AUTO EXTRICATION
- CSFA VINTAGE FIRE ENGINE, FOR PHOTOS AND NOSTALGIA BENEFITS
- FIRE DEPARTMENT HIGH-RISE RAPPELLING
- ISIS, SEARCH CANINE, PERFORMING "STOP, DROP, & ROLL"
- MAKESHIFT BUILDING USED FOR A "LIVE FIRE"
- POLICE CANINE APPREHENDING A PERPETRATOR
- MCDONNELL DOUGLAS FOAM DISPENSING UNIT
- MINIATURE TRAIN RIDES AND FIRE APPARATUS RIDES
- O. C. FIRE AUTHORITY EXTINGUISHMENT OF JET FUEL BY FOAM BLANKET

ORANGE COUNTY FAIR JULY 19-30, 2000

"Hot...Hot...Hot" We're spicing it up! is the theme for the millennium Orange County fair! Costa Mesa Fire Prevention Officers will be staffing the Fire Prevention Spanish Village booth on July 19th.

Make sure you stop by to say hello, play a Water Watchers game, find out "What's Hot, What's Not", and pick up a free safety electrical plug. We hope to see you all there!

Saluting Peppers

Features This Month

1 EMERGENCY SERVICES EXPO SUCCESS
2 ORANGE COUNTY FAIR – FIRE PREVENTION BOOTH
3 Halogen Floor Lamps
4 SWURP – Ways to Reduce SWURP
5 Costa Mesa Retail and Construction

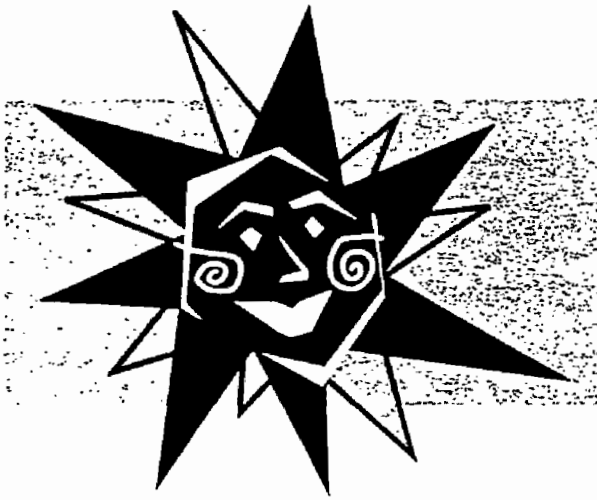

CONVIERTA SU BASURA EN ABONO

ASI RECICLA LA NATURALEZA

CALIFORNIA INTEGRATED WASTE MANAGEMENT BOARD

¿QUE ES CONVERTIR BASURA EN ABONO (COMPOSTAJE) Y POR QUE HAY QUE HACERLO?

La manera como recicla la naturaleza, es decir, el compostaje, es la desintegración controlada de materias orgánicas tales como hojas, ramas, recortes de pasto y residuos de alimentos vegetales. El producto que resulta de esta descomposición se llama "compost" o abono orgánico.

El compostaje reduce la acumulación de grandes cantidades de materias orgánicas en nuestros basureros municipales y las convierte en un producto útil. Las materias orgánicas representan más de la mitad de la basura municipal de California. Por lo tanto, el compostaje en casa reduce los costos tanto del transporte de la basura como de la operación de los basureros municipales.

El abono o "compost" es excelente para los jardines y los prados. Además, usted ahorra dinero al no tener que comprar acondicionadores de suelo, paja y fertilizante.

EL COMPOSTAJE ES FACIL

El compostaje puede efectuarse en el patio de la casa en un recipiente fabricado para este propósito, o simplemente amontonando los desechos orgánicos (algunas ciudades requieren recipientes cerrados). Los negocios, las escuelas y otras instituciones también pueden transformar fácilmente los desechos en abono. Comuníquese con el gobierno del condado o de la ciudad para obtener información acerca de clases gratuitas sobre compostaje y de cómo adquirir recipientes gratis o a precio de descuento.

Los recipientes caseros se pueden construir con pedazos de madera, malla para gallineros, e incluso en recipientes viejos para basura (con agujeros perforados en los lados y en el fondo).

Los recipientes fabricados incluyen unidades de rotación, conos y unidades verticales formadas por varios recipientes; estos recipientes se pueden comprar en tiendas o a través del correo. Dedique suficiente tiempo a considerar sus opciones y luego seleccione el recipiente que mejor se ajuste a sus necesidades.

Para obtener una descripción sobre cómo construir su propio recipiente, o una lista de vendedores de recipientes pre-fabricados para compostaje casero, llame a California Integrated Waste Management Board al 1-800-553-2962.

METODO DE COMPOSTAJE

Se requieren cuatro ingredientes básicos en la elaboración de abono; nitrógeno, carbono, agua y aire. El método más sencillo consiste en:

- mezclar en capas, partes aproximadamente iguales de materiales verdes (ricos en nitrógeno) y materiales de color café o secos (ricos en carbono), formando una pila al aire libre o colocando los materiales en una estructura cerrada;
- agregar agua;
- revolver para que entre el aire; y
- permitir que los microorganismos e insectos desintegren los materiales con el transcurso del tiempo.

NITROGENO

Los materiales verdes tales como recortes de césped y desechos del jardín son fuentes ideales de nitrógeno (una vez que se secan se convierten en fuentes de carbono). Las cáscaras y trozos de fruta o verduras también pueden proporcionar nitrógeno. Para reducir la posibilidad de plagas o malos olores, es mejor evitar los residuos de carnes o productos lácteos y enterrar hasta el fondo de la pila otros residuos de alimentos.

CARBONO

El césped seco y los recortes de jardinería tales como hojas secas, ramas o heno pueden proporcionar el balance necesario de carbono a una pila de abono. Corte o desmenuce las piezas grandes a un tamaño de 12" o más pequeñas (las ramas gruesas con bastante madera, deben cortarse en pedazos pequeños, molerse o no usarse).

Las astillas de madera sin tratar y el aserrín son una fuente útil de carbono; pueden ser usados si la pila contiene demasiado nitrógeno.

AGUA

Su pila de abono debe tener la misma humedad que una "esponja exprimida". El contenido de humedad debe ser de 40 a 60 por ciento. Para verificar que existe la humedad adecuada, introduzca la mano en la pila de abono, tome un puñado de material y oprímalo; si escurren unas cuantas gotas de agua, probablemente contiene suficiente humedad, si no, agregue agua.

Al agregar agua es mejor introducir la manguera de manera que no se humedezca únicamente la parte de arriba de la pila. También puede humedecer la pila cuando la esté revolviendo. En clima seco, tal vez tenga que añadir agua con regularidad, además, quizás también sea necesario cubrir la pila. Una pila de abono debidamente construido elimina el exceso de agua.

INTEGRATED WASTE MANAGEMENT BOARD

ANTIFREEZE

What is Antifreeze?

Antifreeze, made up of mainly water and ethylene glycol, is added to radiator water in motor vehicles. Ethylene glycol lowers the freezing point and raises the boiling point of radiator fluid. In other words, it keeps the water from freezing on very cold days and boiling over on hot days.

Auto maintenance experts recommend that radiators should be flushed every 1-2 years. This presents a question of what to do with the radiator fluid. Care must be taken to store new antifreeze safely and also to dispose of used antifreeze properly.

What are the Hazards?

Antifreeze contains ethylene glycol, a hazardous chemical. Because ethylene glycol is a clear, colorless, and sweet-tasting liquid, it is very attractive to pets and small children. If swallowed, ethylene glycol may cause depression, followed by respiratory and cardiac failure, renal and brain damage.

According to the U.S. Consumer Product Safety Commission, between 1986 and 1988 more than 3,000 injuries related to antifreeze occurred.

Other hazardous chemicals found in used antifreeze could include a variety of elements such as gasoline, copper, zinc, and lead. These materials become trapped in and contaminate antifreeze over time in an operating vehicle.

Antifreeze, carelessly disposed of, such as poured into a storm drain or ditch, into a river or stream, onto the ground, or into the regular trash, presents a health threat to humans, animals and the environment. The hazardous chemicals may seep into the ground and contaminate the groundwater.

In addition, antifreeze should be stored properly to avoid accidents to children and pets attracted by its sweet smell and taste.

Can Antifreeze Be Recycled?

Used antifreeze can be recycled for use by the mining industry, which sprays it on coal to keep it from sticking together and the glycol industry, which uses it as an airplane de-icing solution. It is also used in cement grinding and brake fluid.

Call nearby radiator shops to find out if they collect used antifreeze for recycling or accept it for proper disposal.

Antifreeze should be stored properly to reduce accidents to children and pets

How do I Dispose of Antifreeze?

Follow these proper disposal and storage methods:

Store antifreeze in its original container away from children and pets. Children may mistake the antifreeze for beverages.

If the antifreeze is new, give it away to a friend or neighbor who could use it.

Take your used antifreeze to a household hazardous waste collection facility or save it for a collection event.

Call your local health department or the California Integrated Waste Management Board's Recycling Hotline at 1-800-553-2962 to find the location of a household hazardous waste collection program in your community.

8800 Cal Center Drive
Sacramento, CA 95826

For more information contact
The California Integrated Waste Management Board
At 916.255.2296

INTEGRATED WASTE MANAGEMENT BOARD

AEROSOLS

What are Aerosols?

Aerosol cans contain propellants and active ingredients such as pesticides or paint. Propellants are gases under normal conditions, but when they are placed under pressure (as in aerosol containers), they liquify and occupy far less space. When the nozzle is pressed, pressure is released and the propellant quickly returns to its gaseous state, spraying into the air and carrying the product with it.

What are the Hazards?

Aerosol products include: Oven cleaners, tile cleaners, pesticides, disinfectants, hair sprays, room deodorizers, paints, and furniture polishes.

Hazards associated with aerosols vary greatly. For example, pesticides include toxic materials, while some oven cleaners contain corrosive chemicals. Since aerosol-propelled particles are very small, they are easily absorbed into the lungs and bloodstream. Many of the propellants used with these products, such as butane or propane, are flammable and may be explosive.

A variety of aerosol products still contain chlorofluorocarbons, which are harmful to the ozone layer (present approximately 70,000 feet above the earth's surface). The ozone layer provides a protective shield against harmful radiation.

How Do I Avoid Accidents?

The following safety rules should be observed when using aerosol products:

Never puncture or subject an aerosol can to sharp impact; a sudden puncture may cause an explosion.

Never leave or place an aerosol can near a high heat source such as a heater, direct sunlight, or fire. Heat causes the propellants to expand which may cause an explosion. Also, many propellants are flammable.

Never place an aerosol can in a trash compactor; the increased pressure may cause an explosion.

Never throw a full or partially-full aerosol can into the regular trash. Refuse collectors may be injured by exploding cans and/or be sprayed with hazardous chemicals.

Buy non-aerosol, pump-type sprays or powders

How Do I Dispose of Aerosols?

The following procedures should be observed when disposing of aerosols:

Use the product completely or give it away to a friend or neighbor who may be able to use it.

If the product cannot be given away for reuse or if the nozzle is broken, take it to a household hazardous waste collection facility or store it safely, away from heat, until a community collection day is held.

Empty aerosol cans (no product emits when nozzle is depressed) may be thrown away with the regular trash.

Buy non-aerosol, pump-type sprays or powders.

Call your local health department or the California Integrated Waste Management Board's Recycling Hotline at 1-800-553-2962 to find the location of a household hazardous waste collection program in your area.

8800 CAL CENTER DRIVE
SACRAMENTO, CA 95826

FOR MORE INFORMATION CONTACT
THE CALIFORNIA INTEGRATED WASTE MANAGEMENT BOARD
AT 916.255.2296

Costa Mesa Sanitary District

NEWS

Winter 1999

P.O. Box 1200 • Costa Mesa • CA • 92628-1200

Congratulations!

50% of Your Trash is Being Recycled!

Our recycling program has accomplished its goal! Recycle 50% of your trash by the year 2000. How did it happen? In two easy steps!! Step one, take your containers to the curb. Step two, you're done. That's it! We sort and separate the recyclables from your trash, so you don't have to! Since we recycle for you, there is no need to sort your waste before placing it at the curb for collection.

All of the recyclables and trash are delivered to a large recycling plant that uses mechanical and hand sorting techniques. We recycle efficiently and can also easily adapt to changes in the science of recycling. Our recycler is currently diverting 50% of the total waste stream, all with no effort from residents.

COLOR ME

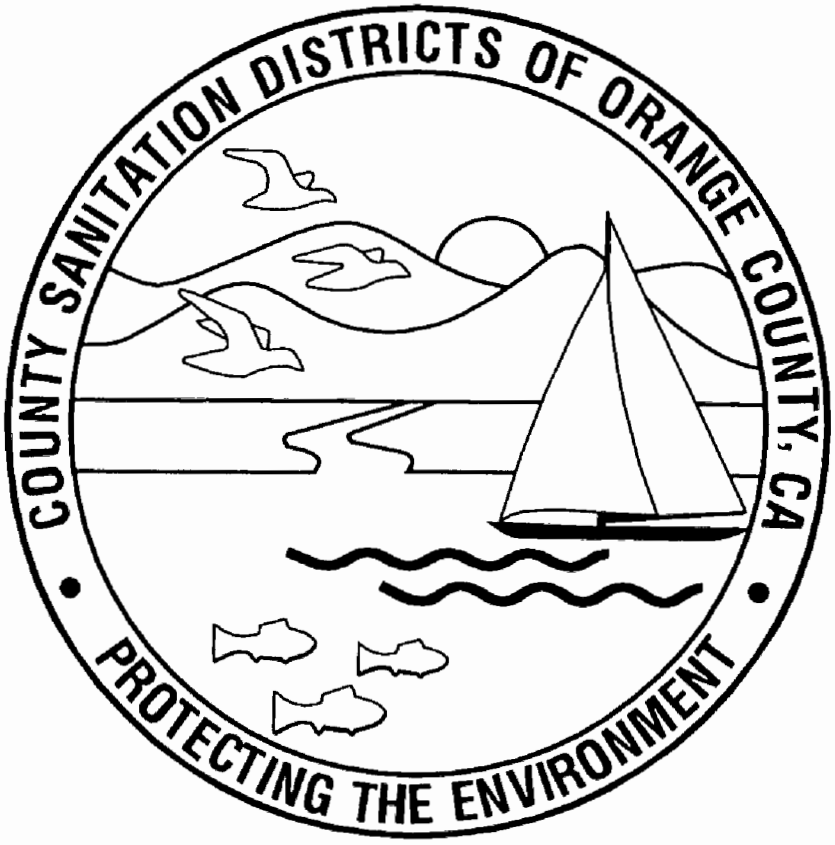

County Sanitation Districts of Orange County, California
P.O. Box 8127
Fountain Valley, CA 92728-8127
(714) 962-2411

Made with post-consumer content

007399

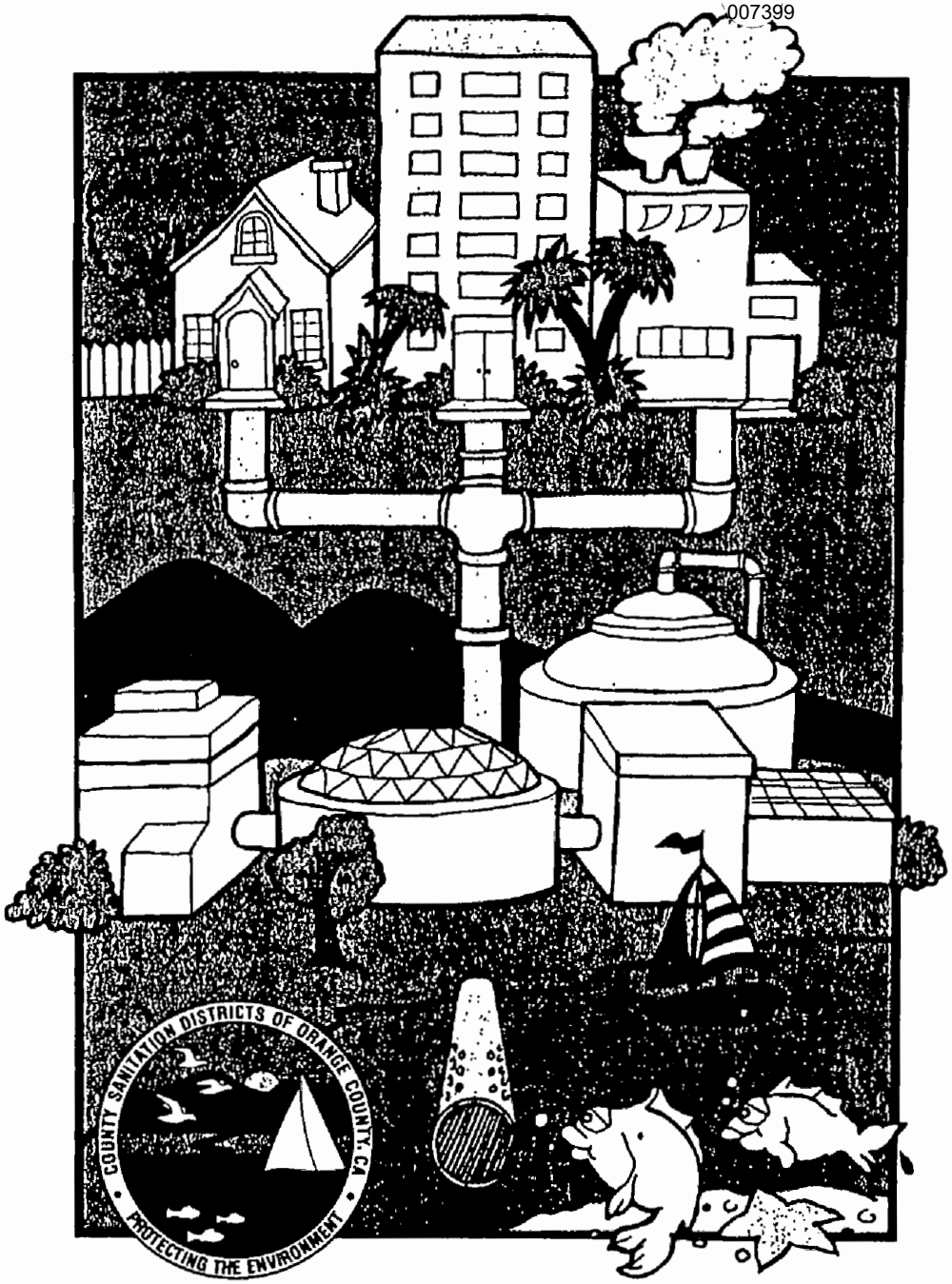

County Sanitation Districts of Orange County, California

WASTEWATER TREATMENT PROCESS

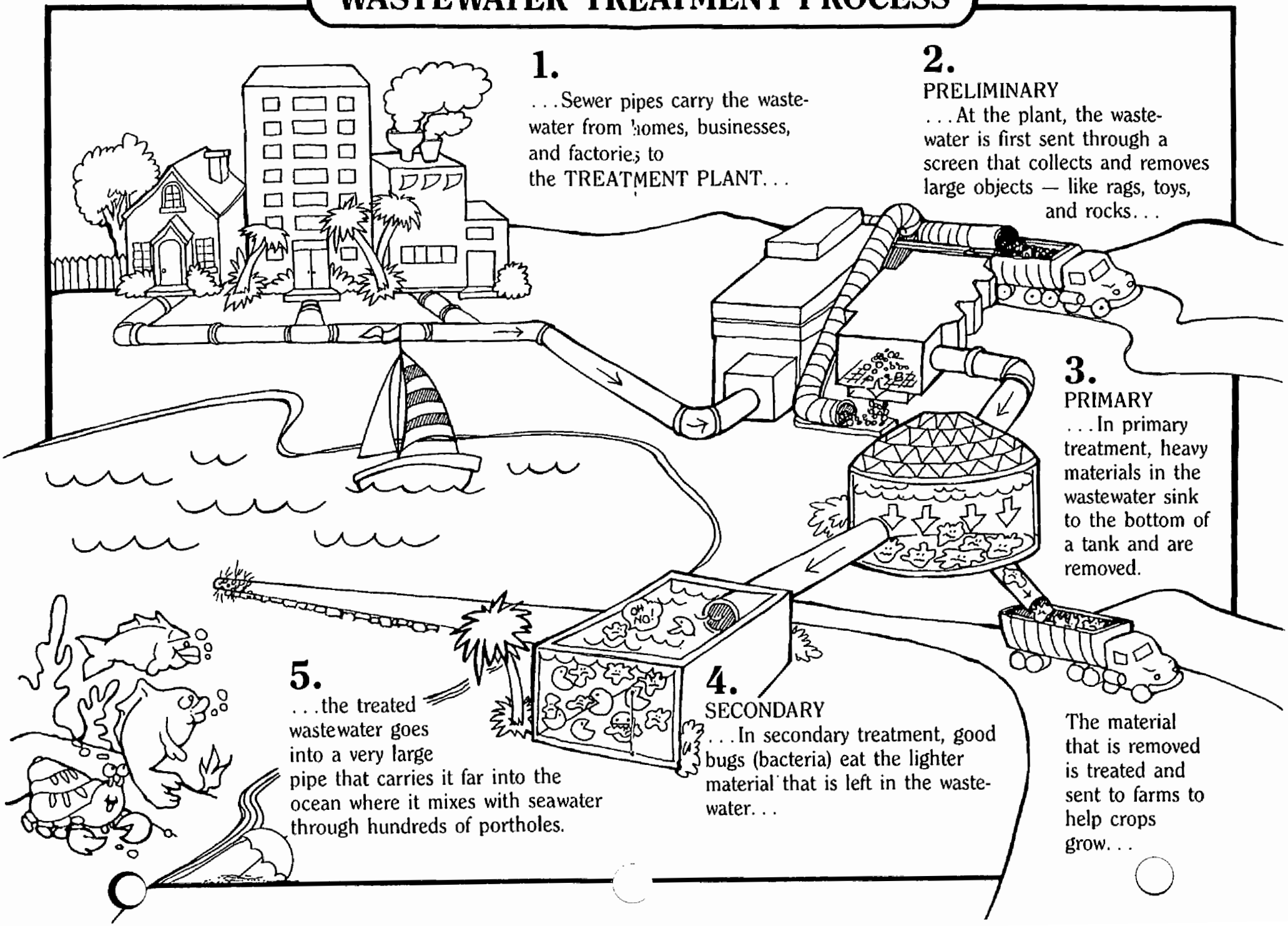

1.

. . . Sewer pipes carry the wastewater from homes, businesses, and factories to the TREATMENT PLANT. . .

2.

PRELIMINARY

. . . At the plant, the wastewater is first sent through a screen that collects and removes large objects — like rags, toys, and rocks. . .

3.

PRIMARY

. . . In primary treatment, heavy materials in the wastewater sink to the bottom of a tank and are removed.

The material that is removed is treated and sent to farms to help crops grow. . .

4.

SECONDARY

. . . In secondary treatment, good bugs (bacteria) eat the lighter material that is left in the wastewater. . .

5.

. . . the treated wastewater goes into a very large pipe that carries it far into the ocean where it mixes with seawater through hundreds of portholes.

Do You Know Where The Water In Your Storm Drain Goes?

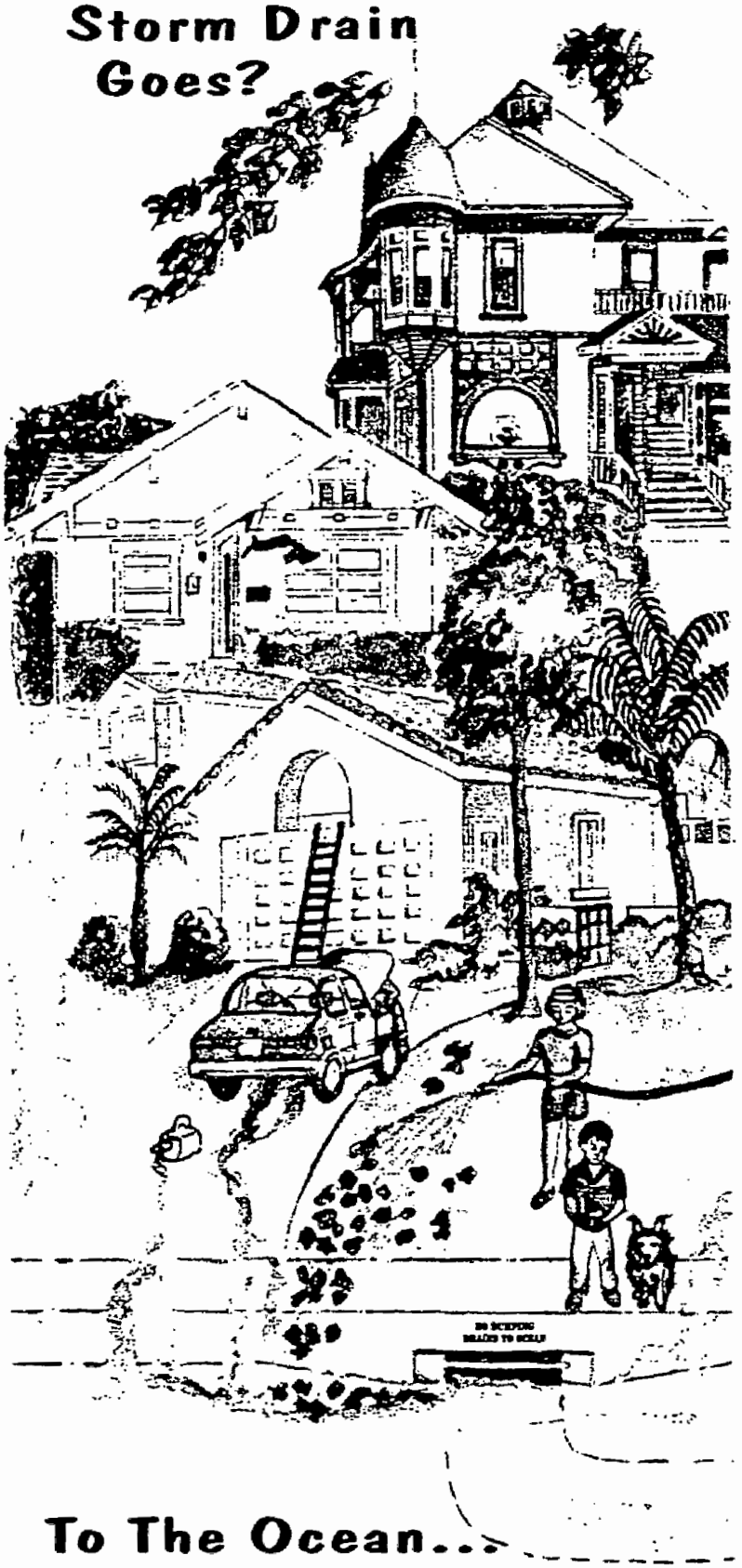

To The Ocean...

Source Reduction

SDA

The Soap and Detergent Association
475 Park Avenue South
New York, NY 10016
(212) 725-1262

©1995
The Soap and Detergent Association

This paper is made from 50% recycled content that includes 10% post-consumer waste

Es La Ley

El California Integrated Waste Management Act requiere que las ciudades reduscan las cantidades de basura, que se depòsitan en los basureros, por 50% para el año 2000. En California se genera mas de 29 millones de llantas usadas cada año. Pocos basureros aceptan llantas usadas por lo que tienden a flotar arriba de los basureros una vez que la basura es cubierta con tierra.

Millones de toneladas de llantas usadas son almacenadas en el estado de California, causando problemas de salud y seguridad. Llantas que son tiradas en las calles y callejones pueden causar incendios y depositar sustancias venenosas al ambiente.

Cerrando El Circulo

Llantas usadas se pueden procesar para sacarles el hule que se puede usar para construir carreteras y otros productos. Reciclando sus llantas usadas puede usted ayudar a la ciudad llegar alcanzar la meta de reducir la basura que se tiene que llevar a los basureros, y al mismo tiempo ayudar a que Costa Mesa sea un lugar mas limpio y saludable adonde vivir. Usted puede cerrar el circulo de reciclage al comprar productos que sean fabricados de materiales reciclados, como algunas mangueras de regar y alfombras para la puerta de su hogar. Para mayor informacion llame al 714/754-5043 o al 714/754-5024Para basura peligrosa que se genera en los hogares, llame al 714/834-6752

Simples Medidas Que Puede Tomar

Compre las llantas mas eficientes, que duren mas tiempo en gastarse y le ahorren gasolina a su vehiculo. Si todos los carros en Los Estados Unidos estuvieran equipados con llantas eficientes, se ahorrarian 400,000 barriles de aceite al dia.

Para incrementar la vida de sus llantas y reducir el consumo de gasolina de su carro asegurese que sus llantas esten infladas correctamente, balancee e intercambie sus llantas de posisión en el vehiculo, para que se desgasten igualmente, cada 6-8000 millas.

Se calcula que 50% a 80% de las llantas en los vehicules son usadas sin suficiente aire, lo cual reduce las eficiencia de se vehiculo por 5%. Mantenga sus llantas infladas correctamente y ayude a ahorrar al pais 2 billones de galones de gasolina al año.

Traiga sus llantas usadas a los eventos de coleccion de llantas o llevelas a los lugares donde venden llantas para que sean recicladas. En Costa Mesa hay dos lugares que acceptan llantas usadas sin cobrar or por una pequeña cantidad de dinero:

Just Tires	**Big O Tires**
3005 Harbor Blvd.	322 E. 17th St.

007402

TIRE RECYCLING

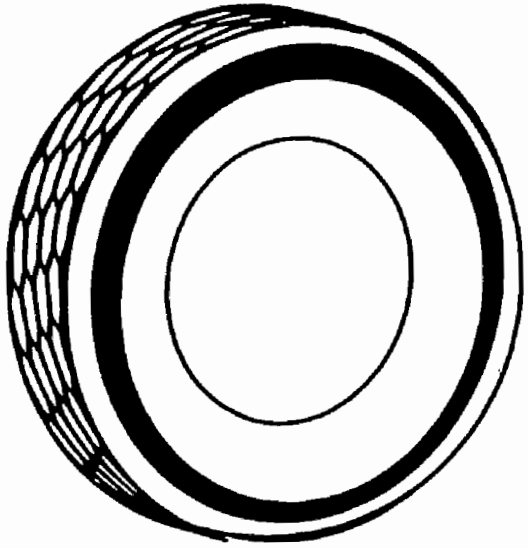

Costa Mesa Sanitary District

City of Costa Mesa

907403

Tire Recycling

IT'S THE LAW!

The California Integrated Waste Management Act requires cities to reduce the amount of waste disposed in landfills by 50% by the year 2000. Californian's generate over 29 million scrap tires per year. Fewer landfills are accepting tires for disposal because they tend to "float" to the landfill surface after being covered. Millions of tons of tires are stockpiled around the state, creating health and safety concerns. Tires illegally dumped in streets and alleys may catch fire and release toxins into the air

COMPLETING THE LOOP

Old tires are processed into crumb rubber, which can be used to make things like roadways and carpet padding. By recycling your used tires, you will be helping the City to meet reduction goals, and helping to make Costa Mesa a healthier place to live. You can complete the recycling loop by buying products made from recycled material, like soaker hoses and doormats.

Call For Further Information

714/754-5043 714/754-5024

Household Hazardous Waste Hotline 714/834-6752

Tire Recycling

SIMPLE THINGS YOU CAN DO

Purchase the longest lasting, most fuel efficient tires available. If all cars in the U.S. were equipped with the most efficient tires possible, the fuel savings would equal 400,000 barrels of oil a day.

To increase the life of your tires and improve your car's fuel efficiency make sure they are properly inflated, balanced and rotated every 6-8,000 miles.

It is estimated that 50-80% of tires are underinflated which decreases the car's fuel efficiency by 5%. Maintaining properly inflated tires could save Americans up to 2 billion gallons of gasoline per year.

Bring old tires to collection events or to businesses that sell tires to ensure they are recycled or properly disposed. Costa Mesa sites that accept tires for free or for a nominal fee are:

Just Tires	**Big O Tires**
3005 Harbor Blvd.	322 E. 17th St.

Support local and state efforts to recycle tires, to use more recycled rubber in tires, to purchase materials manufactured from recycled tires, and to convert discarded tires into energy.

RECICLAJE DE LLANTAS

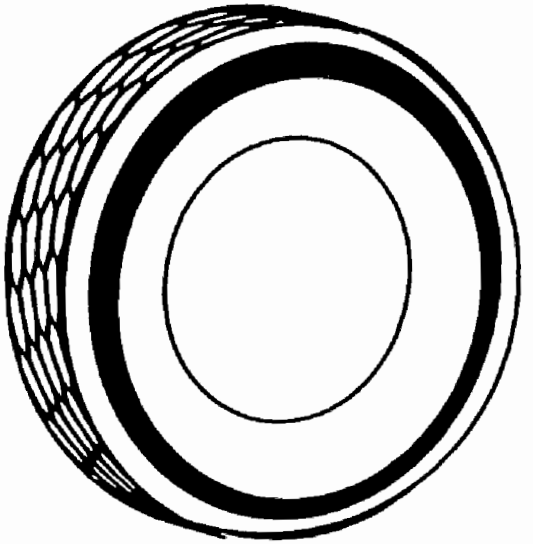

Costa Mesa Sanitary District

City of Costa Mesa

WHAT IS CONSTRUCTION AND DEMOLITION DEBRIS?

C&D debris is material generated in the construction and demolition of buildings and roads. According to the California Integrated Waste Management Board, C&D debris makes up approximately 28% of the state's waste stream. Orange County businesses generate large quantities of C&D debris and could save money by diverting this material through reuse and recycling. Reducing the amount of C&D debris that is landfilled will also help Orange County cities meet the 50% diversion rate required by the California Integrated Waste Management Act of 1989.

Disposal rates are determined by the quality of material. Some processors will give estimates of disposal rates over the phone. Ultimately, the condition of the material will be determined upon delivery of the material.

Tips for managing your C&D debris for recycling:

- Develop a C&D waste management plan
- Assess the amounts and composition of your waste
- Assess the space available for separation of materials on site
- Assess the location of nearby recycling facilities

Educating employees, contractors, and sub-contractors about the benefits of recycling C&D debris will improve your bottom line and help your community conserve natural resources.

Printed on recycled content paper.

County of Orange
Integrated Waste Management Department
320 N. Flower Street, Suite 400
Santa Ana, CA 92703

007404

Construction and Demolition Debris Facilities

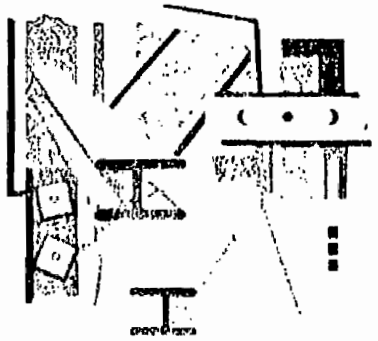

This brochure provides alternatives to landfilling specific types of Construction and Demolition (C&D) Debris

Integrated Waste Management Department

Construction and Demolition Debris Facilities

NOTE: The Integrated Waste Management Department is not liable for any errors or changes on this list, nor does it guarantee the accuracy of any information regarding materials, services or products. To make corrections, please call (714) 834-4000.

COMPANY KEY: b = buyback n/c = no charge f=fee	Appliance	Asphalt	Brick	Carpet	Concrete	Dirt	Drywall	Flooring	Glass	Greenwaste	Metal	Paint	Plastic	Rebar	Wood	Other	Description of Materials Accepted
Adams Steel, Inc. 3200 E. Frontera Street, Anaheim (714) 630-6523	b										b			b		b	I- beams, any scrap metal, car bodies, pick up service available.
Aguinaga Fertilizer Company 7992 Irvine Boulevard, Irvine (949) 786-9558										f					f		Clean lumber, clean pallets, trees sized to 5'x3', wood chips. Entrance from N Street
All Variety Metals, Inc. 1016 Santiago, Santa Ana (714) 835-9235											b			b	b		Ferrous and non-ferrous metals, usable wood, occasional rebar
Amazon Environmental 7048 Elmer Avenue, Whittier (562) 789-9191												f					Latex paint only. Call ahead.
Brea Green Recycling 1952 Valencia Avenue, Brea (714) 529-0100										f					f		Woody trees and shrubs and clean lumber
Consolidated Volume Transporter 1131 Blue Gum, Anaheim (714) 238-3300	f	f	f	f	f	f	f	f	f	f	f		f	f	f		No liquid, or hazardous waste
CR Transfer 11232 Knott Avenue, Stanton (714) 891-2776	f	f	f	f	f	f	f	f	f	f	f		f	f	f		No liquid, or hazardous waste
Dan Copp Crushing Corp. 1120 N. Richfield Road, Irvine (949) 777-6400		f			f									f		f	Clean concrete, asphalt, rebar, and mesh. Mesh and rebar have to be sized.
Du Pont Carpet Reclamation/Recycle Center 1355 S. Acacia Avenue, Fullerton (714) 518-1068				f													DuPont Antron Carpet. Winner of CIWMB 1999 WRAP award.
El Toro Materials Company Rocky Road at Portola Pkwy, Lake Forest (949) 458-7993		f	f		f			f								f	Broken concrete w/rebar ok; roofing tiles, floor tiles, concrete and asphalt
Ewles Materials 16081 Construction Circle, Irvine (714) 552-6008		f			f												Clean concrete and asphalt
Ewles Materials 32501 Ortega Hwy, San Juan Capistrano (949) 728-0436		f			f												Clean concrete and asphalt
Ewles Materials 6182 Katella Avenue, Stanton (714) 894-0032		f			f												Clean concrete and asphalt
Hanson Aggregates California South of Spring, Long Beach (800) 300-6120		f			f												Clean concrete and asphalt
Hanson Aggregates 6956 Cherry, Long Beach (800) 300-6120		f			f												Clean concrete and asphalt
Hanson Aggregates Gothard & Talbert, Huntington Beach (800) 300-6120		f			f												Clean concrete and asphalt
Hanson Aggregates 6145 Santiago Canyon, Orange (800) 300-6120		n/c			n/c												Clean concrete and asphalt
J&P Rebon Wholesaler 1301 Hancock Street, Suite C, Anaheim (714) 779-1565				f												f	Carpet and sofa cushions
Waste Management of Orange 2050 N. Glassell, Orange (714) 282-0200	f	f	f	f			f	f	f	f	f		f	f	f		No dirt, concrete, liquid, or hazardous waste
Ortiz Enterprises, Inc. Locations vary throughout Orange County (949) 753-1414 ext. 114		f			f												Concrete and asphalt need to be sized to 2'x2'x1', any wires need to be cut flush
Rainbow Disposal 17121 Nichols, Huntington Beach (714) 847-3581	f	f	f	f	f	f	f	f	f	f	f		f	f	f		No liquid or hazardous waste
RJ Noble 15505 E. Lincoln Avenue @ Batavia, Orange (714) 637-1550		f	f		f	f	f	f									Concrete, asphalt, dirt, tile, sand, brick, rock, plaster
Sunset Environmental 16122 Construction Circle W., Irvine (949) 552-8764	f	f	f	f	f	f	f	f	f	f	f		f	f	f		No liquid or hazardous waste
Sun West Metals 1150 N. Lemon Street, Anaheim (714) 635-0470	f				f												Scrap metals, stoves, washers, dryers. No refrigerators.
Tierra Verde Industries 7982 Irvine Boulevard, Irvine (949) 551-0363	f	f	f	f	f	f	f	f	f	f	f		f	f	f		No liquid or hazardous waste
Tierra Verde Industries 31748 La Pata Road, San Juan Capistrano (949) 728-0401										f					f		Greenwaste - no Palms or succulents Wood - painted or nails ok

FREE HOUSEHOLD HAZARDOUS WASTE DISPOSAL

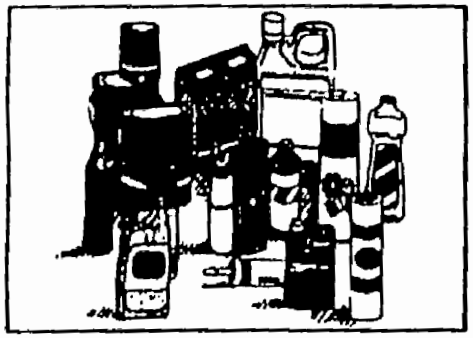

- Paint • Used Motor Oil • Batteries •
- Pesticides • Fertilizers •
- Household Cleaners • Antifreeze •
- Pool Chemicals •
- And Other Household Waste Containing Hazardous Chemicals •

EASY AS 1-2-3!

1. Pack those unwanted household and car-care products in the back seat or trunk of your car.
2. Drive to the convenient location listed on back.
3. Sit in the comfort of your car, fill out an easy form and attendant will remove products.

COUNTY OF ORANGE CALIFORNIA

SEE BACK SIDE FOR LOCATION AND MAP

We'll Make It Worth Your Drive!

FREE

Your Choice

(While supplies last)

- Southern California Edison Night Light
- 15 qt. Reusable Oil Drain Container*
- 1 Gallon Of 100% Recycled Paint (in white, beige or green)

When you bring in your hazardous [illegible] San Juan Capistrano [illegible]

Printed on Recyclable Paper/Advertise with Val-Pak, America's Favorite Mailer (949) 757-7500 ©Val-Pak, 1/1999. Val-Pak of Coastal Orange County, 624303.0181

REPRESENTATIVE PUBLIC EDUCATION MATERIALS

CITY OF CYPRESS

• Use and Disposal

- Compost soiled bedding and manure for your own use, or give it away to local greenhouses, nurseries and botanical parks.
- Transport manure to topsoil companies or composting centers.
- Fertilize pastures, cropland and lawns with manure and soil bedding. Do not apply fertilizer just before or during rainstorms.

• Pesticide Alternatives

The "chemicals-only approach" to pest control is only a temporary fix. Intergrated pest management is a more common-sense approach for a long-term solution. Plan to use:

Physical controls, such as pheromone traps, tarps, bug zappers, fly-tight storage sheds.

Biological controls, such as swallows, bats and other insect-eating animals.

Chemical controls, such as pyrethrin-based insecticides, dehydrating dusts, insecticidal soaps and horticultural oils. If pesticides must be used:

- Rinse empty pesticide containers and use rinse water as you would the product. Dispose of empty rinsed containers in the trash.
- Dispose of unused pesticide at the Household Hazardous Waste Roundups, instead of dumping it into the sink, street, gutter or storm drain. Call (714) 834-6752.

Spill Response Agencies

Orange County Fire Authority
Health/Hazardous Matererials Program
(714) 288-2541

Recycling & Hazardous Waste Disposal

City of Cypress
Department of Public Works
(714) 229-6740

Orange County
Recycling & Household Hazardous Waste Hotline
(714) 834-6752
Orange County

To Report Illegal Dumping

Deparment of Public Works
(800) 69-TOXIC
City of Cypress

To Report a Clogged Catch Basin

Department of Public Works, Division
(714) 229-6760

For more information about storm drain protection or additional brochures, please call the City of Cypress Public Works Department at (714) 229-6741.

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Pamphlets include: Painting • Food Service Industry • Fresh Concrete and Mortar Application • General Construction and Site Supervision • Heavy Equipment and Earth-Moving Activities • Landscaping, Gardening and Pest Control • Home Repair and Remodeling • Automotive Maintenance and Car Care • Roadwork and Paving • Horse Owners and Equine Industry.

007408

Preventing Storm Water Pollution During

Horse Owners and the Equine Industry

A Guide For

- **Urban Horse Owners**
- **Small Farms**
- **Equestrian Centers**
- **Boarding Stables**

Published by:
City of Cypress
Public Works Department
Engineering Division

Ocean Pollution Prevention: It's Up To Us

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This pamphlet tells you how to prevent ocean pollution from "stormwater" or "urban runoff."

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Urban runoff pollution contaminates the ocean, closes beaches, harms aquatic life and increases the risk of inland flooding by clogging gutters and catch basins.

These Best Management Practices (BMPs) will ensure a cleaner city and ocean.

Animal Waste Problems

Animal waste contributes to ocean pollution when it is improperly stored or left uncovered near small streams and storm drains. During rainfall, it is washed into storm drains and flows untreated, directly into the ocean.

Animal waste contains some nutrients — phosphorus and nitrogen — as well as bacteria. The nutrients fertilize the aquatic plants causing their proliferation, which depletes oxygen in the water killing sea life. The high bacteria levels in the water can cause gastro-intestinal problems for swimmers.

Sediment is also a common pollutant washed from pastures and livestock facilities. It creates multiple problems once it enters the ocean. It harms sea life by clogging the gills of fish, blocking light transmission and increasing ocean water temperature.

Solutions

• Facilities Design

- Situate barns, corrals and other high-use areas on the portion of property that drains away from the nearest creek or stream.
- Install gutters that will divert runoff away from livestock areas.
- Design diversion terraces which drain into area with sufficient vegetation to filter the flow.
- Protect manure storage facilities from rainfall and surface runoff.

• Pasture Management

007409

- Confine animals in properly fenced areas except for exercise and gazing time.
- Corrals, stables and barns should be located on higher ground when possible and surrounded by pasture to act as a natural filtration sysytem.
- Use fencing to keep horses away from environmentally sensitive areas and protect stream banks from contamination.
- Use manure and soiled bedding sparingly to fertilize pastures and croplands.

• Grazing Management

- Establish healthy and vigorous pastures with at least 3 inches of leafy material present.
- Subdivide grazing areas into three or more units of equal size. Clip tall weeds and old grass.
- Rotate animals to clean pasture when grass is grazed down to 3-4 inches. Let pasture regrow to 8-10 inches before allowing regrazing.
- Keep animals away from wet fields if possible.
- During heavy rainfall, consider indoor feeding, a practice which keeps more manure under roof and away from runoff.

• Collection and Storage

Collect soiled bedding and manure on a daily basis from stalls and paddocks and place in temporary or long-term storage s. Store in sturdy, insect-resistant and seepage-free units.

• During Construction

- Cover catch basins and maintenance holes when applying seal coat, slurry seal, fog seal, etc.
- Use check dems, ditches or berms to divert runoff around excavations.
- Never wash excess materials from exposed aggregate concrete or similar treatments into a street, gutter or storm drain.
- Collect and recycle excess abrasive gravel or sand.
- Avoid over-application by water trucks during dust control.

• Spills

• Never hose down "dirty" pavement or surfaces. Clean up all spills and leaks using "dry" methods (with absorbent materials and/or rags), or dig up and remove contaminated soil. For disposal information contact the Orange County Hazardous Waste Hotline at (714) 288-2541.

Spill Resp e Agencies

Orange County Fire Authority
Health/Hazardous Matererials Program
(714) 288-2541

Recycling & Hazardous Waste Disposal

City of Cypress
Department of Public Works
(714) 229-6741

Orange County
Recycling & Household Hazardous Waste Hotline
(714) 834-6752
Orange County

To Report Illegal Dumping

Deparment of Public Works
(800) 69-TOXIC

To Report a Clogged Catch Basin

City of Cypress
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(714) 229-6760

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007410

Preventing Storm Water Pollution During

Roadwork and Paving

A Guide For

- **Driveway, Sidewalk & Parking Lot Construction Crews**
- **Seal Coat Contractors**
- **Construction Inspectors**
- **General Contractors**
- **Operators of grading equipment, paving machines, dump trucks and cement mixers**

Published by:
City of Cypress
Public Works Department
Engineering Division

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Roadwork and Paving Problems

Road paving, surfacing and pavement removal activities contribute to urban runoff pollution because they take place right in the street, where urban runoff contaminatoin can result from asphalt saw-cut slurry or excavated material.

Rain or runoff can carry these toxic substances to the ocean through the storm drain system, posing a hazard to human and sea life.

Extra planning is required to store and dispose of materials properly and guard against stormwater and ocean pollution. This brochure tells you how.

Solutions

Handling, storing, and disposing of materials properly can prevent pollutants from entering the storm drains.

• General Business Practices

- Keep materials out of the rain. Store them under cover, with temporary roofs or plastic sheets, protected from rainfall, runoff and wind.
- Plan excavation and grading for dry weather.
- Develop and implement erosion and sediment control plans for embankments.
- Recycle used oil, concrete, asphalt, etc.

007411

• Paint Removal

- Maintain all vehicles and heavy equipment. Inspect frequency for leaks.
- Conduct all vehicle/equipment maintenance and refueling at one location—away from storm drains.

- Perform equipment/ vehicle repairs and washing off-site.
- Do not use diesel oil to lubricate equipment or parts.

• Asphalt & Concrete Removal

- After breaking up paving, be sure to remove all chunks and pieces. Recycle them at a crushing company.
- Dispose of small amounts of dry concrete in the trash. Make sure broken pavement does not come in contact with rainfall or runoff.

- Shovel or vacuum saw-cut slurry and remove from the site.
- Cover or barricade storm drain openings during saw-cutting.

• Disposal Options

Use a crushing company to recycle cement, asphalt and porcelain rather than taking them to a landfill.

- When breaking up paving (cement or asphalt), be sure to pick up all the pieces. Recycle them at a crushing company.
- Dispose of small amounts of excess dry concrete, grout and mortar in the trash.
- Never bury waste material. Recycle or dispose of it as hazardous waste material.

Handling Materials & Wastes

- Practice source reduction—minimize waste when ordering materials. Ordering materials. Order only the amounts needed to complete the job.
- Use recycled and recyclable materials whenever possible.
- Recycle broken asphalt, concrete, wood, and cleared vegetation. Unrecycled materials must be taken to an appropriate landfill or disposed of as hazardous waste. Call the numbers on the back of this pamphlet for disposal information.

Disposal Options

Use a crushing company like to recycle cement, asphalt and porcelain rather than taking them to a landfill. To locate a crushing company near you contact the Integrated Waste Management Department by calling (714) 834-4000.

Spill Response Agencies

Orange County Fire Authority
Health/Hazardous Matererials Program
(714) 288-2541

Recycling & Hazardous Waste Disposal

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Orange County
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To Report Illegal Dumping

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To Report a Clogged Catch Basin

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Preventing Storm Water Pollution During

Concrete & Mortar Application

A Guide For

- **Masons and Bricklayers**
- **Sidewalk Construction Crews**
- **Patio Construction Workers**
- **Construction Inspectors**
- **Home Builders**
- **Developers**
- **Do-It-Yourselfers**

Published by:
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Concrete & Mortar Application Problems

Fresh concrete and mortar activities are frequent sources of urban runoff pollution. Materials and waster blown or washed into a street, gutter or storm drain have a direct impact on the ocean.

Sediment is the most common pollutant washed from worksites. Sediment clogs the gills of fish, blocks light transmission and increases ocean water temperature, all of which harm sea life, disrupting the food chain upon which both fish and people depend.

Sediment carries with it other worksite pollutants such as cement wash, gravel, asphalt, pesticides, cleaning solvents, motor oil, grease and fuel. Poorly maintained equipment and vehicles leaking fuel and oil also contribute to ocean pollution.

Solutions

Handling, storing, and disposing of materials properly can prevent pollutants from entering the storm drains.

• General Business Practices

- Schedule projects for dry weather periods.
- Keep materials out of the rain. Store both dry and wet materials under cover, protected from rainfall and runoff. Also, protect dry materials from the wind.
- Secure open bags of cement to keep wind-blown cement powder away from streets, gutter, storm drains, rainfall and runoff.

• Cleaning Up

- When cleaning up after driveway or sidewalk construction, wash concrete dust onto dirt areas, not down the driveway or into the street or storm drain.
- Wash out concrete mixers and equipment only in designated wash-out areas, where the water flows into containment ponds or onto dirt.
- Recycle cement wash water by pumping it back into cement mixers for reuse.

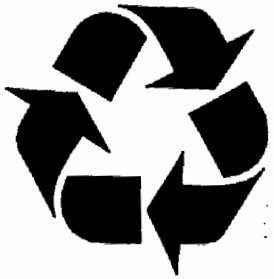

- Never dispose of cement washout into driveways, streets, gutters, storm drains or ditches.

• During Construction

- Place erosion controls (berms or temporary vegetation) down-slope to capture runoff carrying mortar or cement before it reaches the gutter.
- Do not order or mix up more fresh concrete or cement than you will use.
- Set up and operate small mixers on tarps or heavy drop cloths.

Recycle oil and grease wastes. Never dump them down storm drains or on the ground. Look in the yellow for "renders" or call one of the disposal numbers listed in this brochure.

• Employee & Client Education

Include urban runoff training in employee orientations and reviews. Promote these Best Management Practices (BMPs):

Storage containers should be regularly inspected and kept in good condition.

• Place materials inside rigid, durable, watertight and rodent-proof containers with tight fitting covers.

• Store materials inside a building or build a covered area that is paved and designed to prevent runoff from entering storm drains.

• Place temporary plastic sheeting over materials or containers and secure the cover with ties and weighted objects. (Not appropriate for storing liquids.)

Post BMPs where employees and customers can see them. Showing customers you protect the ocean is good public relations.

Explain BMPs to other food businesses through you business associations or chamber of commerce.

Stencil catch basins near the workplace with a stencil that says "No Dumping: This drains to the ocean."

Spill Response Agencies

Orange County Fire Authority
Health/Hazardous Matererials Program
(714) 288-2541

Recycling & Hazardous Waste Disposal

City of Cypress
Department of Public Works
(714) 229-6740

Orange County
Recycling & Household Hazardous Waste Hotline
(714) 834-6752
Orange County

To Report Illegal Dumping

Deparment of Public Works
(800) 69-TOXIC
City of Cypress

To Report a Clogged Catch Basin

Department of Public Works, Division
(714) 229-6760

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Preventing Storm Water Pollution During

Food Service Industry

A Guide For

- **Restraunts**
- **Grocery Stores**
- **Bakeries**
- **Food Producers**
- **Food Distributors**

Published by:
City of Cypress
Public Works Department
Engineering Division

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Food Service Problems

The by-products of food-related businesses can harm the ocean and sea life if they enter the storm drain system. Food businesses can cause harm by putting food waste in leaky dumpsters, not cleaning up outdoor food or chemical spills, or by washing outdoor spills into the storm drain system.

Other routine activities such as cleaning oily vents and operating and maintaining delivery trucks are sourcs of pollution, unless proper precautions are taken. When it rains, motor oil that has dripped onto parking lot from business and customer vehicles is washed into the ocean via the storm drain system.

Oil and grease can clog fish gills and block oxygen from entering the water. Also, toxics found in oven and floor cleaners can, in high concentrations, harm aquatic life.

Solutions

• Keep Work Sites Clean

Handling, storing, and disposing of materials properly can prevent pollutants from entering the storm drains.

• Minimize Wastes

Use non-disposable products. Serve food on ceramic dishware rather than paper, plastic or styrofoam and use cloth napkins rather than paper ones. If you must use cloth napkins rather than paper ones. If you must use disposable products, use paper instead of styrofoam and look for recycled and recyclable containers.

Buy the least toxic products available.

- Look for "non-toxic," "non-petroleum based," "free of ammonia, phosphates, dye or perfume," or "biodegradable" on the label.
- Avoid chlorinated compounds, petroleum distillates, phenols and formaldehyde.
- Use water-based products.

• Parking Lot Drainage

Cover, repair or replace leaky dumpsters and compactors, and/or drain the pavement beneath them to the sewer. Rain can wash oil, grease, and substances into the storm drain system.

Wash greasy equipment such as vents and vehicles before storing outside and only in designated wash areas properly connected to the sewer system with an appropriate oil/water separator.

• Recycle Wastes

Purchase recycled products. By doing so, you help ensure a use for the recyclable materials that people collect and recycle.

Recycle the following: food waste (non-greasy, non-animal food waste can be composted); paper and cardboard, container glass, aluminum, and tin, pallets and drums; and oil and grease.

Separate wastes. Keep your recyclable wastes in separate containers according to the type of material. They are easier to recycle if separated

- Control surf runoff to reduce erosion, especially du..g excavation. Use drainage ditches to divert water flow.
- Use gravel approaches to reduce soil com paction and limit the tracking of sediments into streets,, where truck traffic is frequent.
- Prevent erosion by planting fast-growing annual and perennial grasses. These will shield and bind the soil.
- Do not remove trees or shrubs unnecessary. They help decrease erosion.

Handling Materials & Waste

- Practice source reduction—minimize waste when ordering materials. Order only the amounts needed to complete the job.
- Use recycled and recycled materials.
- Never bury waste or leave it in the street.
- Dispose of all waste properly. Many construction materials, including solvents, water-based paints, vehicle fluids, broken asphalt and concrete, wood, and cleared vegetation can be recycled. Unrecycled materials must be taken to an appropriate landfill or diposed of as hazardous waste.

Disposal Options

- Use a crushing company to recycle concrete, asphalt and porcelain rather than taking them to a landfill.

Spill Resp e Agencies

Orange County Fire Authority
Health/Hazardous Matererials Program
(714) 288-2541

Recycling & Hazardous Waste Disposal

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007416

Preventing Storm Water Pollution During

General Construction and Site Supervision

A Guide For

- General Contractors
- Construction Inspectors
- Home Builders
- Developers
- Masons and Bricklayers
- Patio Construction Workers
- Sidewalk Construction Crews

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General Construction Problems

Construction sites are common sources of urban runoff pollution. Materials and wastes blown or washed into a street, gutter or storm drain flow directly to the ocean.

Sediment is the most common pollutant washed from worksites, creating multiple problems once it enters the ocean. Sediment clogs the gills of fish, blocks light transmission and increases ocean water temperture, all of which harm sea life, disturbing the food chain upon which both fish and people depend.

Sediment also carries with it other worksite pollutants such as pesticides, cleaning solvents, cement wash, asphalt and car fluids like motor oil, grease and fuel. Thus, poorly maintained vehicles and heavy equipment leaking fuel and oil at the construction site also contribute to ocean pollution.

As a contractor, site supervisor, owner, of operator of a site, you may be responsible for the environmental demage cused by subcontractors or employees.

Solutions

Handling, storing, and disposing of materials properly can prevent pollutants from entering the storm drains.

• General Business Practices

- Cover and maintain dumpsters. Check frequently for leaks. Place dumpsters under a roof or cover with tarps or plastic sheeting. Never clean a dumpster by hosing it down on site.
- Keep pollutants off exposed surfaces. Put trash cans and recycling receptacles around the site.
- Keep materials out of the rain. Cover exposed piles of soil or construction materials with plastic sheeting or temporary roofs.
- Designate one area for auto parking, vehicle refueling and routine equipment maintenance. The area should be well away from gutters or storm drains. Make major repairs off site.
- Use as little reclaimed water as possible for dust control.

• Clean Up Spills

- Clean up leaks, drips and other spills immediately. This will prevent contaminated soil or residue on paved surfaces.
- Never hose down "dirty" pavement or impermeable surfaces wherefluids have spilled. Usedry cleanup methods (saw dust, cat litter, and/or rags).

• Planning to Prevent Pollution

An erosion control program, worked out before construction begins, prevents or minimizes problems.

- Train your employees and subcontractors. Make these brochures available to everyone working on site. Inform subcontractors about stormwater requirements and responsibilities.
- Schedule excavation and gr[illegible] activities for dry weather periods.

- Don't use diesel fuel to lubricate equipment or part.
- Use drip pans or drop cloths to catch drips and spill, if you drain and replace motor oil, radiator coolant or other fluids on site. Collect all used fluids, store in separate containers and recycle.

• Erosion Prevention

- After cleaning, grading or excavating, exposed soil poses a clear and immediate danger of stormwater pollution. Revegetation (permanent or temporary) is an excellent form of erosion control for any site.
- Avoid excavation or grading in wet weather.
- Construct diversion dikes to channel runoff around the site. Line channels with grass or roughened pavement to reduce runoff velocity.
- Cover stockpiles and excavated soil with secured tarps or plastic sheeting.
- Remove existing vegetation only when absolutely necessary. Large projects should be done in phases.
- Consider planting temporary vegetation for erosion control on slopes or where construction is not immediately planned.
- Plant permanent vegeation as soon as possible, once excavation and grading activities are complete.

Spill Response Agencies

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(714) 229-6760

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This brochure is one of a series of pamphlets describing storm drain protection measures.
Pamphlets include: Painting • Food Service Industry • Fresh Concrete and Mortar Application • General Construction and Site Supervision • Heavy Equipment and Earth-Moving Activities • Landscaping, Gardening and Pest Control • Home Repair and Remodeling • Automotive Maintenance and Car Care • Roadwork and Paving • Horse Owners and Equine Industry.

Preventing Storm Water Pollution During

Heavy Equipment Use & Earth Moving

A Guide For

- **Site Supervisors**
- **Bulldozer and Backhoe Operators**
- **Gardening Machine Operators**
- **Dump Truck Drivers**
- **General Contractors**
- **Home Builders**

Published by:
City of Cypress
Public Works Department
Engineering Division

Ocean Pollution Prevention: It's Up To Us

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This pamphlet tells you how to prevent ocean pollution from "stormwater" or "urban runoff."

Rain, industrial and household water mixed with urban pollutants creates stormwater pollution. The pollutants include: oil and other automotive fluids, paint and construction debris, yard and pet wastes, pesticides and litter.

Urban runoff pollution flows to the ocean through the storm drain system which takes water and debris straight from the streets to the ocean. Each day 100 million gallons of polluted urban runoff enter the ocean untreated, leaving toxic chemical in our surf and tons of trash on our beaches.

Urban runoff pollution contaminates the ocean, closes beaches, harms aquatic life and increases the risk of inland flooding by clogging gutters and catch basins.

These Best Management Practices (BMPs) will ensure a cleaner city and ocean.

Heavy Equipment Operations Problems

Soil excavation and grading operations often contribute to urban runoff pollution. By loosening large amounts of soil and sediment, earthmoving activities can cause sediment to flow into gutters, storm drains and the ocean.

Sediment is the most common pollutant washed from worksites, creating multiple problems once it enters the ocean. Sediment clogs the gills of fish, blocks light transmission and increases ocean water temperture, all of which harm sea life, disturbing the food chain upon which both fish and people depend.

Sediment also carries with it other worksite pollutants such as pesticides, cleaning solvents, cement wash, asphalt and car fluids like motor oil, grease and fuel. Thus, poorly maintained vehicles and heavy equipment leaking fuel and oil at the construction site also contribute to ocean pollution.

Solutions

Handling, storing, and disposing of materials properly can prevent pollutants from entering the storm drains.

• General Business Practices

- Plan excavation and grading for dry weather.
- Use as little water as possible for dust control.

• Clean Up Spills

- Never hose down "dirty" pavement or impermeable surfaces where fluids have spilled. Use dry cleanup methods (saw dust, cat litter, and/or rags).

- Sweep up dry spilled materials immediately. Never attempt to bury them or "wash them away with water.
- Clean up spills on dirt areas by digging up and properly disposing of contaminated soil.
- Report significant spills to the appropriate spill response agencies immediately, listed on the back of this pamphlet.

• Vehicles & Equipment

- Maintain all vehicles and heavy equipment. Inspect frequently for leaks.
- Conduct all vehicle/equipment maintenance and refueling at one location away from storm drains.
- Perform major maintenance, repair jobs and vehicle/equipment washing off site.
- Use gravel approaches where truck traffic is frequent to reduce soil compaction and limit the tracking of sediment into streets.

Design [illegible]ing areas so that spills are contained and runoff cannot carry spills into storm drains. Slope the containment area toward drain connected to the sewer system. Equip the drain with a shutoff valve in the event of a large spill.

Keep absorbent materials on-site to allow prompt cleanup of all spills.

Post signs instructing people not to overfill gas tanks, which causes spills and gas fumes.

Recycle

Recycle what you must:

- Division 20 of the Health and Safety Code requires motor oil to be recycled.
- Section 66822 of the California Code requires lead acid batteries to be recycled.

Recycle what you can, including metal scraps, water-based paints, used tires, paper and cardboard, container glass, aluminum, and tin.

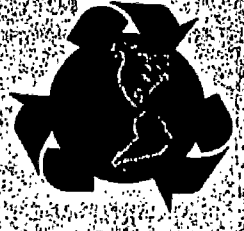

Call the referral numbers to the right for information.

Employee & Customer Education

Educate your employees. Include water quality training in new-employee orientations and conduct annual review sessions.

Educate your customers. Raise both employee and customer awareness by stenciling storm drains near the word place with the stencil: "No Dumping — This Drains to the Ocean."

Spill Response Agencies

Orange County Fire Authority
Health/Hazardous Matererials Program
(714) 288-2541

Recycling & Hazardous Waste Disposal

City of Cypress
Department of Public Works
(714) 229-6740

Orange County
Recycling & Household Hazardous Waste Hotline
(714) 834-6752

To Report Illegal Dumping

Orange County
Deparment of Public Works
(800) 69-TOXIC

To Report a Clogged Catch Basin

City of Cypress
Department of Public Works, Division
(714) 229-6760

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Preventing Storm Water Pollution During

Automotive Maintenance & Car Care

A Guide For

- Gas Stations
- Auto Repair Shops
- Auto Body Shops
- Car Dealerships
- Mobile Fleet Manager
- Mobile Fleet Washing Businesses

Published by:
City of Cypress
Public Works Department
Engineering Division

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These Best Management Practices BMPs) will ensure a cleaner city and cean.

Car Maintenance Problems

Many car maintenance routines, such as washing a car or pouring used motor oil into a gutter or storm drain, contribute to ocean pollution.

Water runoff from streets, parking lots and driveways picks up oil and grease dripped from cars, asbestos worn from brake linings, zinc from tires and organic compounds and metals from spilled fuels.

Chemicals drain into the ocean, harming sea life. Oil and grease, for example, clog fish gills and block oxygen from entering the water. If oxygen levels in the water are too low, aquatic animals die.

Solutions

Handling, storing, and disposing of materials properly can prevent pollutants from entering the storm drains.

• Cleaning Work Sites

Don't hose down your shop floor. It is best to sweep. Use non-toxic cleaners. For instance, baking soda mixed with a mild, biodegradable dishwashing soap works well on battery heads, cable clamps and chrome. For window, mix white vinegar or lemon juice with water.

• Spills

Prepare and use easy-to-fill spill containment and cleanup kits. Include safety equipment and cleanup materials appropriate to the type and quantity of materials that could spill. Pour kitty litter, sawdust or corn[illegible]l on spills.

• Fluids

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Your customers regular car maintenance prevents fluids from leaking onto streets and washing into storm drains. It is also good for business.

Change fluids carefully — use a drip pan.

Prevent fluid leaks by draining gas, transmission and hydraulic oil, brake and radiator fluid from vehicles or parts kept in storage.

Implement simple work practices to reduce spills. Use a funnel when pouring liquids (like lubricants or motor oil) and place a tray underneath to catch spills. Place drip pans under the spouts of liquid storage containers.

Clean up spills immediately.

• Washing Vehicles

Prevent oil and grease, suspended solids and toxics from washing into storm drains.

Wash vehicles with biodegradable phosphatefree detergent. Use a bucket (not a running hose) to wash and rinse the car to conserve water.

Designate a washing site where water drains to the sewer system. The area must be paved and well marked as a wash area. Post signs prohibiting oil changes and washing with solvents. Train all employees to use the designated area.

• Fueling Vehicles

Cover the fueling area to keep rain from washing away spilled materials. Extend the cover several feet beyond t[illegible] containment

- When stripping or cleaning building exteriors with high-pressure water, block storm drains. Wash water onto a dirt area, or into the sewer system.

Paint Cleanup

- Never clean brushes or rinse paint containers into a street, gutter, or sewer system.
- For water-based paints, paint out brushes to the extent possible, and rinse in the sink.
- For oil-based paints, paint out brushes to the extent possible. Clean with thinner, then filter and reuse thinner or solvent.

Disposal Options

- Reuse leftover paint for touch-ups.
- Recycle or use up excess paint. Call the Orange County House hold Hazardous Waste Hotline for disposal or recycling information at (714)834-6752.

Spill Response Agencies

Orange County Fire Authority
Health/Hazardous Matererials Program
(714) 288-2541

Recycling & Hazardous Waste Disposal

City of Cypress
Department of Public Works
(714) 229-6741

Orange County
Recycling & Household Hazardous Waste Hotline
(714) 834-6752
Orange County

To Report Illegal Dumping

Deparment of Public Works
(800) 69-TOXIC

To Report a Clogged Catch Basin

City of Cypress
Department of Public Works, Maintenance
(714) 229-6760

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007422

Preventing Storm Water Pollution During

Painting

A Guide For

- Professional Painters
- Dry Wall Crews and Plasterers
- Paper Hangers
- Floor Covering Installers
- General Contractors
- Home Builders and Developers
- Do-It-Yourselfers

Published by:
City of Cypress
Public Works Department
Engineering Division

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These Best Management Practices (BMPs) will ensure a cleaner city and ocean.

Painting

All paints, solvents, and adhesives contain chemicals that are harmful to wildlife and humans. That is why proper handling and disposal of these products is so important.

Toxic chemicals from liquid or solid products or from cleaning residues or rags may enter the ocean via storm drains.

It is especially important not to clean brushes in an area where paint residue can flow to a street, gutter or storm drain. Once residue enters the storm drain system, it flows directly to the ocean.

Solutions

Handling, storing, and disposing of materials properly can prevent pollutants from entering the storm drains.

• General Business Practices

- Keep all liquid paint products and wastes away from the street, gutter, and storm drains. Liquid residues from paints, thinners, solvents, glues and cleaning fluids are hazardous wastes. When thor oughly dry, used brushes, rags, drop cloths and empty paint cans (lids off), may be disposed of as trash.
- Use water-based paints instead of oil based paints. Look for the words "Latex" or "Clean up with water" on the label.

- Don't use paints over 15 years old. They may contain toxic levels of lead.
- Reuse paint thinner. Set used thinner aside in a closed jar to out paint particles. Then pour off clear liquid for future use. Wrap the residue in newspaper and dis pose of it in the trash.

• Paint Removal

- Chemical paint stripping residue is a hazardous waste. For disposal information call the Orange County Household Hazardous Waste Hotline at (714) 834-6752.
- Chips and dust from marine paints or paints containing lead or tributyl tin are hazardous wastes. Dry sweep and call the Orange County Household Hazardous waste Hotline at (714) 834-6752.

- Paint chips and dust from non-hazardous dry stripping and stripping and sand blasting may be swept up.

- Use organic or non-toxic fertilizers and pesticides. Do not fertilize or use pesticides near ditches, gutters or storm drains.
- Store pesticides, fertilizers, and other chemicals in a covered area to prevent runoff.
- Do not blow, sweep or rake leaves into the street, gutter or strom drain.
- Conserve water by using drip irrigation, soaker hoses, or micro-spray systems.

• Costruction

Sediment, from excavation and other construction projects, ist he most common pollutant washed from worksites. Sediment entering the ocean harms sea life and disrupts the food chain upon which both fish and people depend.

- Keep all construction debris away from street, gutter and storm drain. Look for and clean up material that may have traveled away from your property.
- Keep materials out of the rain by storing them indoors or outdoors with a secure cover.
- Plan grading and excavation for dry weather.
- Cover excavated material and stockpiles of asphalt, sand, etc., with plastic tarps.
- Prevent erosion by planting fast-growing annual and perennial grasses.
- Use a crushing company to recycle cement, asphalt and porcelain.

Spill Response Agencies

Orange County Fire Authority
Health/Hazardous Matererials Program
(714) 288-2541

Recycling & Hazardous Waste Disposal

City of Cypress
Department of Public Works
(714) 229-6740

Orange County
Recycling & Household Hazardous Waste Hotline
(714) 834-6752
Orange County

To Report Illegal Dumping

Deparment of Public Works
(800) 69-TOXIC
City of Cypress

To Report a Clogged Catch Basin

Department of Public Works, Division
(714) 229-6760

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007424

Preventing Storm Water Pollution During

Home Repair and Remodeling

A Guide For

- **Homeowners**
- **Do-It-Yourself Remodelers**
- **Do-It-Yourself Painters**
- **Do-It-Yourself Landscapers**

Published by:
City of Cypress
Public Works Department
Engineering Division

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• Household Hazardous Waste

Household toxics, such as common household cleaners, paint products and motor oil, can pollute the ocean and poison the groundwater if not disposed of as hazardous waste.

- Take your household chemicals and toxics to a local Household Hazardous Waste Roundup instead of dumping them on the ground, down the sink or into a gutter, street or storm drain.
- Call the Los Angeles County Household Hazardous Waste Department (714) 834-6752 to find out when a neighborhood roundup event will take place in your community.

• Concrete & Masonry

Fresh concrete and mortar application materials can wash down or blow into the street, gutter or storm drain, posing a hazard to sea life humans.

- Don't mix more cement than you will use.
- Store bags of cement and plaster under cover, protected from rainfall, runoff and wind, and away from gutters and storm drains.
- Never dispose of cement washout or concrete dust on driveways, streets, gutters or stormdrains.

• Painting

All paints and solvents contain chemicals that are harmful to sea life. Toxic chemicals can come from liquid or solid products or from cleaning residues on rags. It is especially important to prevent these chemicals from entering drains.

- Never clean brushes or rinse paint containers into a street, gutter or storm drain.
- For oil-based paints, paint out brushes to the maixmum extent possible. Clean with thinner and then filter and reuse thinner.
- For water-based paints, paint out brushes to the extent possible, then rinse in the sink.
- When thoroughly dry, used brushes, empty paint cans (lids off), rags and drop cloths may be disposed of as trash.
- Chemical paint stripping residue, including saturated rags, is a hazardous waste and should be taken to a household hazardous waste collection event.
- Chips and dust from marine paints or paints containing lead or tributyl tin are also hazardous wastes. Sweep them up and save them for a household hazardous waste collection event.
- Reuse leftover paint for touch-ups or recycle it at a local household hazardous waste collection event, where it will be recycled or donated to a local graffiti paint-out program.

• Landscaping & Gardening

Intensive gardening and landscaping increase the likelihood that garden chemicals and soil will wash into storm drains. Pesticides and herbicides not only kill garden invaders, they also harm insects, poison fish and contaminate ground and ocean water.

• Safe Substitutes

Garden aphids and mites: mix one tablespoon of liquid soap and one cup of vegetable oil. Add one teaspoon of this mixture to a cup of water and spray.

Catepillars: apply products containing Bacillus thuringiensis to leaves

Ants: place boric acid dust or hydramethylnon baits in problem areas. Be sure it is inaccessible to children and pets (it is a mild poison.)

Roaches: apply boric acid dust to cracks and entry points (see ants above.) Place bay leaves on pantry shelves.

• If You Must Use Pesticides

- Use a pesticide that is specifically designed to control your pest. The insect should be listed on the label. Use only as directed.

• Pesticide Disposal

- Rinse empty pesticide containers and use rinse water as you would the product. Dispose of empty rinsed containers in the trash.
- Orange County residents can dispose of unused household toxics at the House hold Hazardous Waste Roundups, instead of dumping them into the sink, street, gutter or storm drain. Call (714) 834-6752 for more information.

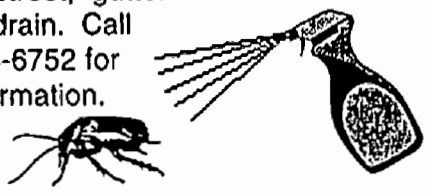

Spill Response Agencies

Orange County Fire Authority
Health/Hazardous Matererials Program
(714) 288-2541

Recycling & Hazardous Waste Disposal

City of Cypress
Department of Public Works
(714) 229-6740

Orange County
Recycling & Household Hazardous Waste Hotline
(714) 834-6752

To Report Illegal Dumping

Orange County
Deparment of Public Works
(800) 69-TOXIC

To Report a Clogged Catch Basin

City of Cypress
Department of Public Works, Division
(714) 229-6760

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007426

Preventing Storm Water Pollution During

Landscaping Gardening & Pest Control

A Guide For

- **Home Owners**
- **Gardeners**
- **Landscapers**

Published by:
City of Cypress
Public Works Department
Engineering Division

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Landscaping Problems

Landscaping and garden maintenance activites can be major contribitors to ocean pollution. Soils, yard wastes, overwatering and garden chemicals become part of the urban runoff mix that winds its way through the streets, gutters and storm drains before entering the ocean. Poorly functioning sprinklers and overwatering, for example, waste water and increase the number of pollutants flowing into storm drains.

Fertilizers, pesticides and herbicides are washed off lawns and landscaped areas. These chemicals not only kill garden invaders, they also harm useful insects, poison fish and contaminate ground and ocean water.

Leaves, grass clippings and tree trimmings that are swept or blown into the street and gutter are also ocean polluters. These wastes clog catch basins, increasing the risk of flooding on your street, and carry garden chemicals into the ocean. As they decompose, they also absorb oxygen fish need to survive.

Solutions

• General Landscaping Practices

- Protect stockpiles and materials from wind and rain by storing them under tarps or plastic sheets.
- Plan grading adn excavation for dry weather.
- Use temporary check dams or ditches to divert runoff away from storm drains.

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- Prevent erosion by planting fast-growing annuals and perennial grasses. These will shield and bind the soil.

• Garden & Lawn Maintenance

- Conserve water by using drip irrigation, soaker, hoses or micro-spray systems.
- Do not blow or rake leaves into the street, gutter or storm drains.
- Use organic or non-toxic fertilizers.
- Do not overfertilize and do not fertiliize near ditches, streams or other water bodies.
- Store pesticides, fertilizers and other chemicals in a covered area to prevent runoff.

• Pesticide Alternatives

The "chemicals-only" approach to pest control is ony a temporary fix. A more common-sense approach is needed for a long-term solution, called "Intergrated Pest Management."

Physical pest control includes caulking holes, building barriers, hand picking pests and setting traps. Biological pest control includes purchasing and spreading predatory insects and bacterial insects. Chemical pest control, a last resort includes dehydrating dust, insecticidal soaps, boric acid, horticultural oils and pyrethrin based insecticides.

Problem

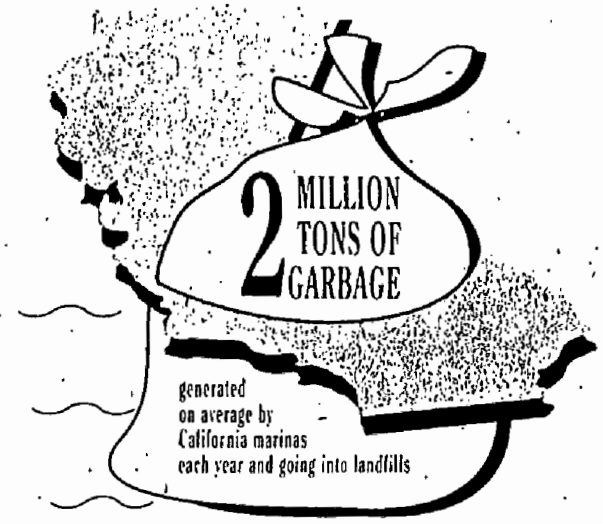

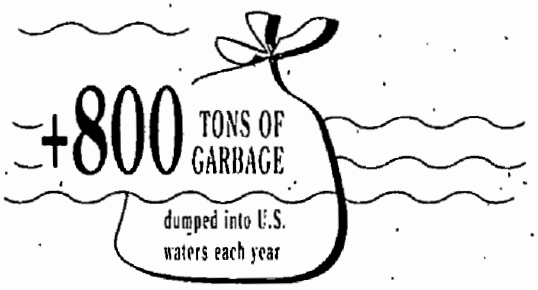

Over 60% of marine debris could be recycled now!

Get Involved Now!

In addition to recycling your marine debris you can participate on a larger scale by:

- starting a recycling program at your marina if one does not currently exist
- joining a beach or bay clean-up campaign
- supporting organizations actively working to protect the marine environment

For more information on recycling programs, contact:
Coastal Resources Center
P.O. Box 3084
San Rafael, CA 94912
(415) 527-3346

Department of Conservation
Division of Recycling
Program Development Branch
1025 P Street, Room 325
Sacramento, CA 95814
(916) 323-3508

RECYCLE MARINE DEBRIS

Design by Mark Hall Graphic Design, Copywriting by SDR Consulting, Illustration by Diane Varner Illustration. Printed on recycled paper.

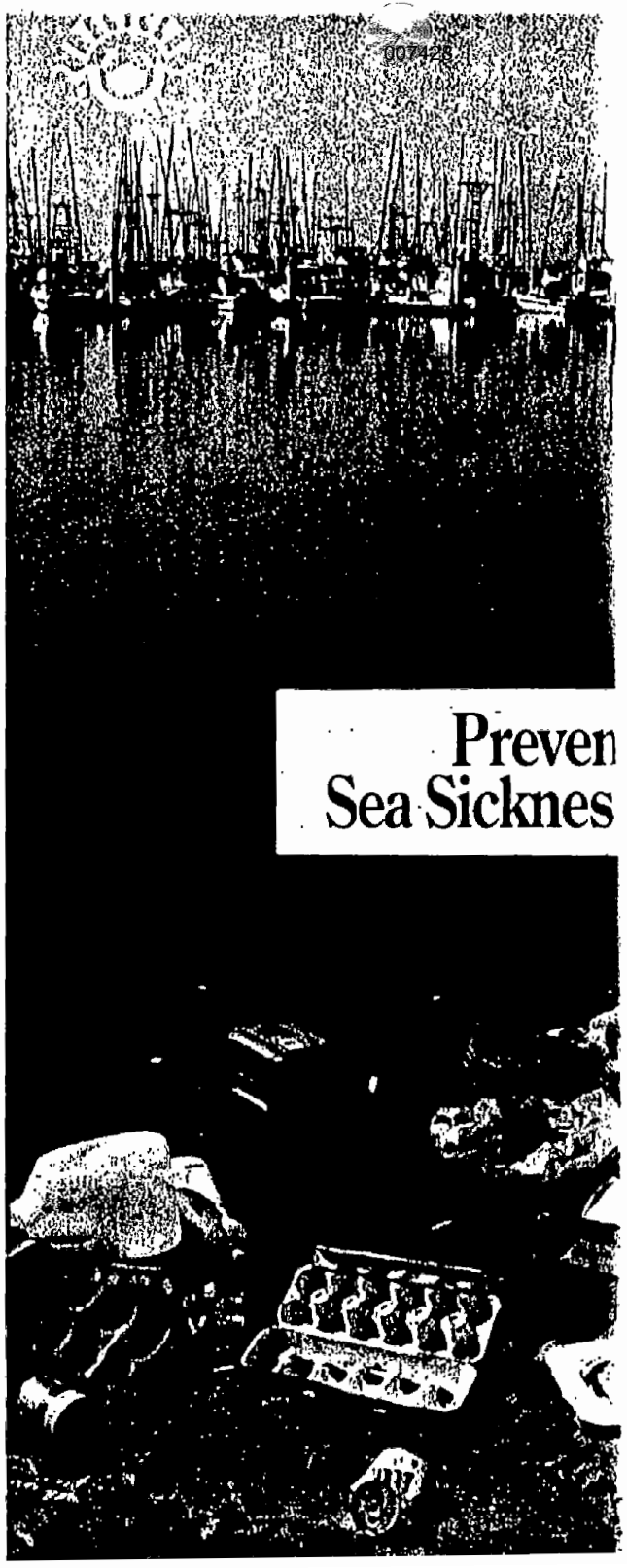

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The Solution Is To Recycle

Marine Debris — A Preventable Sickness

The next time you are out on your boat or casually stroll down a dock, take a look around. Is the water clean, is the shoreline free of debris, is animal life abundant? The answer is probably no. The ocean is threatened. Threatened by a sickness that you can prevent—the dumping of your debris into the water.

The U.S. Coast Guard estimates that over 800 tons of garbage are dumped annually into U.S. waters. California marinas alone, generate 5 to 3,000 tons of garbage per marina each year.

Every time you toss your trash into the ocean you become part of the problem. Your trash could be responsible for the death of an animal, a boating accident, or a polluted beach.

There is a solution — something you can do — stow your trash and recycle it.

Four Easy Steps to Recycling

Successful marine debris recycling requires that you...

1. Stop dumping trash into the ocean. Whether you are on a boat or enjoying the ocean from shore, don't carelessly toss your debris. Every can, cigarette butt, and plastic bag hurts!

2. On shore or at sea, stow your trash and separate recyclable items. You can recycle newspaper, glass jars and bottles, some plastics, paper, aluminum and steel cans, cardboard, scrap metal, wood, oil, batteries, and more. Recent studies indicate that over 60% of a marina's garbage can be recycled. Dispose of your non-recyclable trash in an appropriate receptacle.

3. Take your recyclable items to a recycling center. Centers are available in most communities and many marinas have their own recycling program.

4. Purchase wisely. When you buy new products look for items packaged in recyclable materials, or better yet, purchase reusable items. The less you need to throw away or recycle, the better for the ocean, the environment, and your pocket book.

There are obvious reasons to recycle:

- *saves natural resources*
- *eliminates trash in the ocean*
- *provides an alternative to the use of landfills*

There are also some not so obvious reasons to recycle:

- *provides a cost-effective way to eliminate trash*
- *helps maintain a marina's waste management costs (which eventually come back to you, the consumer)*
- *provides positive PR for you, your vessel, and your marina*

CITIES OF CYPRESS, LA PALMA,
LOS ALAMITOS & SEAL BEACH
PROTECT THE ENVIRONMENT WHEN WE RECYCLE
FUNDED BY A USED OIL RECYCLING GRANT FROM THE
CALIFORNIA INTEGRATED WASTE MANAGEMENT BOARD
State Oil Recycling Hotline 1-800-CLEAN UP

AUTO RECYCLER®

The Automobile Care for the Environment Guide

USED MOTOR OIL

PROPER MANAGEMENT

Bring to service station, "quick lube" shop, drop-off location, or household hazardous waste collection for recyclir Inquire about curbside collection. D not mix with other automotive fluid

BENEFITS OF PROPER MANAGEMENT

Prevents:
- soil and water contamination:
- damage to septic systems an wastewater treatment facilitie

Can be rerefined and reused as fuel.

HAZARD PROPERTIES

Toxic

OIL FILTERS

GASOLINE

ANTIF

AUTO BATTERIES

ABOUT TIRES:

Nearly 200 million worn passenger tires are generated each year. Some are recycled into products like rubber mats or footwear, while others are burned as fuel or retreaded and sold again. Recycling and retreading keep millions of scrap tires out of landfills each year.

PROPER TIRE MANAGEMENT

- **Purchase retreaded tires!** Currently, approximately 400 million gallons of oil are saved each year due to the use of retreaded tires. Doing so, also reduces municipal tire procurement and disposal costs, and saves you money! For more information on retreaded tires, call the Tire Retread Information Bureau at (408) 372-1917.
- **Properly maintain tires!** This extends wear and increases the chance that they can be retreaded.
  1) Keep tires inflated at recommended inflation level. Underinflation can waste up to 5% of a car's fuel! Check every two weeks.
  2) Repair punctures; maintain alignment; rotate tires every 6,000 - 8,000 miles.
  3) Check tread wear indicators (on tires) periodically. When tire tread is worn to same height as tread wear indicator, retread or replace tire.

For more information on tire safety and maintenance, contact the Tire Industry Safety Council at (202) 783-1022.

HAZARD PROPERTIES:

Toxic: May cause injury or death upon ingestion, inhalation, or skin absorption (depends on dose, length of exposure).
Flammable: Can be ignited by a flame, spark, ignition source or hot surface, under almost all temperature conditions.
Corrosive: A chemical (or its vapors) that can burn or destroy living tissues at the site of contact, and deteriorate or wear away the surface of a material.

Prepared by EHMI,
Environmental Hazards Management Institute,
10 Newmarket Road,
P.O. Box 932,
Durham, NH 03824

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WIPER FLUID

TRANSMISSION FLUID

POWER STEERING FLUID

BRAKE FLUID

HOUSEHOLD HAZARDOUS WASTE

The County of Orange has four Household Hazardous Waste Collection Centers available FREE to Orange County citizens. (Proof of residency may be required.)

COLLECTION CENTER LOCATIONS

ANAHEIM REGIONAL COLLECTION CENTER

1071 N. BLUE GUM STREET
Located between the 91 & 57 Fwys
at the corner of La Palma Avenue
and Blue Gum Street in Anaheim
**Visit the Stop & Swap to obtain partially used household products at no charge.*

IRVINE REGIONAL COLLECTION CENTER

6411 OAK CANYON
Next to City of Irvine Corporate Yard.
From the (5) freeway take the Sand Canyon exit, go Southwest to Oak Canyon and turn right.
**Visit the Stop & Swap to obtain partially used household products at no charge.*

HUNTINGTON BEACH REGIONAL COLLECTION CENTER

17121 NICHOLS STREET
Next to Rainbow Recycling and Disposal.
Major cross streets are Beach Blvd.
and Warner Ave. in Huntington Beach.

SAN JUAN CAPISTRANO REGIONAL COLLECTION CENTER

PRIMA DESHECHA LANDFILL
From the (5) freeway take Ortega Hwy. (74),
east to La Pata Avenue, turn right and
follow road to Landfill entrance.

COLLECTION CENTER HOURS OF OPERATION:

Tuesday through Saturday
9:00 a.m. to 1:00 p.m.

Collection Centers are Closed:

Rainy Days; Christmas, Independence, New Years and Thanksgiving Days.

Hazardous waste is not accepted from businesses, schools, government agencies, churches, non-profit organizations.

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City of Cypress
Department of Public Works

Best Management Practices for Construction Activities

The following represents the minimum standards of good housekeeping which must be implemented on all construction sites regardless of size.

- Eroded sediments and other pollutants must be retained on site and may not be transported from the site via sheetflow swales, area drains, natural drainage courses or wind.
- Stockpiles of earth and other construction related materials must be protected from being transported from the site by the forces of wind or water.
- Fuels, oils, solvents and other toxic materials must be stored in accordance with their listing and are not to contaminate the soil and surface waters. All approved storage containers are to be protected from the weather. Spills must be cleaned up immediately and disposed of in a proper manner. Spills may not be washed into the drainage system.
- Excess or waste concrete may not be washed into the public way or any drainage system. Provisions shall be made to retain concrete waste on sites until they can be disposed of as solid waste.
- Trash and construction related solid wastes must be deposited into a covered receptacle to prevent contamination of rainwater and dispersal by wind.
- Sediments and other materials may not be tracked from the site by vehicular traffic. The construction entrance roadways must be stabilized so as to inhibit sediments from being deposited into the public way. Accidental depositions must be swept up immediately and may not be washed down by rain or other means.
- Any slopes with disturbed soils or denuded of vegetation must be stabilized so as to inhibit erosion by wind and water.
- Other

---

* The above Best Management Practices are detailed in the California Storm Water Best Management Practices Handbook March 1993.
* Questions regarding these practices should be directed to the Cypress Dept. of Public Works (714) 229-6752.

City of Cypress

Department of Public Works

GUIDELINES FOR CLEANING AUTOMOTIVE SERVICE FACILITIES

Steam/Pressure Washing of Vehicle Maintenance Areas & Fuel Dispensing Areas

* Block the storm drain and collect water/waste for disposal to the sanitary sewer (with the prior approval of the local sanitation district).

Pressure Washing Sidewalks, Parking Lots, Common Areas

* If soap or any other cleaning agent is used, block the storm drain and collect water/waste and discharge to the sanitary sewer (with the approval of the local sanitation district).

* If only tap water with no cleaning agent is used, then the following Best Management Practices (BMPs) must be implemented before pressure washing:

  ⇒ Prior to washing, clean and/or sweep all large debris from the area, and

  ⇒ Clean any oil/auto fluid spills with an appropriate dry method, such as kitty litter or other absorbent, and dispose of appropriately.

  ⇒ To the extent practicable, the wash water must be directed to vegetative or unpaved areas where it would percolate,

  ⇒ If visual observance of the wash water indicates contamination (cloudy, colored, presence of suspended solids), additional Best Management Practices such as temporary retention of wash water (sandbags around storm drain inlets) or filtration methods must be implemented prior to discharge.

◊ Questions regarding these practices should be directed to the Cypress Dept. of Public Works (714) 229-6752.

The Cypress Federal Little League Major All-Stars won the California District 29 tournament that took place July 1-19, and featured 15 different area league all-star teams. Cypress won the tournament with a come-from-behind victory in the 6th inning of the final game. The team now moves on to the California Sectional Tournament in Huntington Beach. Team members include (from left, front row) John Short, Matt Gras, Brett Ianos, Chad Colvin, Michael Raines, Jacob Novy, (middle) Jeff Fenoglio, Adam Wilk, Trey Meeker, Jordan Lara, Matt Sherren, Michael Morrison, Billy Swanson, Bradford Belote, (back) Coach Tom Gras, Coach Robin Rice, Coach Alan Meeker, Player Agent Lisa Morrison, Coach Frank Sherren and Manager Randy Ianos.

Cypress Stars Head to National Championships

A team of local baseball players from the Cypress area will be competing in the AAU National Championship Tournament in Peoria, Ariz., from July 28 to Aug. 5.

Participating players include, from Cypress High School, Steve Clark, Robert Hook, Andrew Lara, J.J. Lovejoy, Justin Masigila, Rusty Murray, Brian Parkhill, Rosel Samala and Richard Zarate; from Kennedy High School, Shawn Benevante, Kevin and Matthew Monahan.

Other players inclduе Steve Fabela, Doug Ford, Nick Henry, Kyle Stanley and A.J. Sappi.

They will be competing with teams from all over the nation for this title for 17-year-old players.

Many of the players have been playing tournament ball together for five years.

Team Needs Uniforms

The Cypress High School Girls Basketball Program is trying to purchase new uniforms and warm-up outfits for the upcoming 2000-2001 basketball season.

Donations of $100 are rewarded with recognition in the annual program; $500 donators will receive a complimentary team photo, a half-page recognition in the program and two complimentary admissions to all Cypress High School girls' basketball home games. For information, call (714) 746-1358 or 746-8336.

Photo by Amy Myers

Alex Kostich, 30, of Burbank won the 10-mile event at the 32nd Annual Seal Beach Rough Water Swim on July 15, with a time of 3:08:25.

Photo by Amy Myers

Mission Viejo's Jennifer McLeod, 25, was the top female finisher in the Seal Beach 10-mile swim on July 15, and finished second overall among all finishers, with a time of 3:21:49.

Photo by Amy Myers

Sarah Alvy, 11, writes "Eat My Bubbles" on the back of Kelsey Myers, 10, at the Seal Beach Rough Water Swim held on July 15.

32ND ANNUAL SEAL BEACH ROUGH WATER SWIM RESULTS

July 15, 2000

200 Yard - Ages 7-8

Male

Place	Name	Age	Time
1	Scott Goodall	8	4:34
2	Brock Redondo	8	4:53
3	Kurt Buchholzer	8	5:14
4	Lee Myers	8	5:20

Female

Place	Name	Age	Time
1	Mallie Calhoun	7	4:33
2	Blair Elliott	8	4:39
3	Dani Wasmus	7	5:10
4	Rachel Fatka	6	5:31

400 Yard - Ages 9-10

Male

Place	Name	Age	Time
1	Jonathan Hammel	10	8:00
2	Ryan Fatka	9	8:24
3	Daniel Larry	9	8:36
4	Curtis Bunger	10	8:58

Female

Place	Name	Age	Time
1	Alexis Schauer	10	8:03
2	Margaret Speich	9	8:13
3	Kelsey Buchholzer	10	8:23
4	Meghan Dwyer	9	8:24

800 Yard - Ages 11-12

Male

Place	Name	Age	Time
1	Nick Owen	12	10:29
2	Tristan Freund	12	11:05
3	Larry Rubinski	12	11:06
4	Greg Goodall	12	11:19

Female

Place	Name	Age	Time
1	Brett Pedley	11	11:31
2	Anna Rodriguez	11	11:41
3	Sofia Pedroza	12	11:57
4	Elizabeth Kraus	12	12:32

1200 Yard - Ages 13-14

Male

Place	Name	Age	Time
1	Chris Hammel	14	13:18
2	Paul Dwyer	14	13:37
3	Kevin Bruton	14	14:57
4	Kaiser Lee	14	15:04

Female

Place	Name	Age	Time
1	Alexis Quan	14	13:07
2	Samantha Rodriguez	13	13:10
3	Kerri Wasmuth	13	13:12
4	Jacqueline Kraus	13	15:16

1 Mile

Male

Place	Name	Age	Time
1	Lee Moss	15	18:27
2	Grant Levy	37	19:03
3	Marc Weiss	32	19:06

Age Division Winners

Group	Name	Age	Time	Overall
1-18	Lee Moss	15	18:27	1
25-29	Jaime Rodriguez	26	19:37	9
30-34	Marc Weiss	32	19:06	3
35-39	Grant Levy	37	19:03	2
40-44	Tracy Edwards	43	19:25	5
45-49	Bob Phelps	46	19:50	6
50-54	Patrick Owen	51	20:53	14
55-59	Cliff Hunter	57	21:04	15
60-64	Ted Pirtle	63	29:36	45
65-69	Irene Reynolds	68	29:36	45

Female

Place	Name	Age	Time
1	Ashley Stachowski	19	
2	Stiffany Pierce	23	
3	Jean Boys	31	

Age Division Winners

Group	Name	Age	Time	Overall
1-18	Kelly Bradshaw	13	21:20	5
19-24	Ashley Stachowski	19	20:41	5
25-29	Wendy Alcock	29	20:57	4
30-34	Jean Boys	31	20:49	3
35-39	Kathy Hunt	39	22:13	7
40-44	Karin Rauchut	43	23:34	10
45-49	Pat Hengstberg	46	27:31	21
50-54	Linda Gordon	52	28:35	28
55-59	Linda Bird	57	26:41	18
60-64	Jeanne Little	63	28:29	27
65-69	Audrey Hughey	65	1:32:45	43

5 Mile

Male

Place	Name	Age	Time
1	Peter Hay	32	49:40
2	Marc Weiss	32	50:00
3	Chris Guest	40	50:16

Age Division Winners

Group	Name	Age	Time	Overall
19-24	Lance Dawson	24	1:00:43	21
25-29	Mike Rothschild	26	54:29	11
30-34	Peter Hay	32	49:40	1
35-39	Grant Levy	37	50:41	4
40-44	Chris Guest	40	50:16	3
45-49	Jack Angstadt	45	57:01	16
50-54	Patrick Owen	51	55:32	12
55-59	Tiagra Tee Hernandez	59	56:31	13
60-64	Peter Buttle	62	1:15:48	47
65-69	Buddy Belshe	66	1:04:15	33
70-74	Bud Schumacher	70	1:14:21	45

Female

Place	Name	Age	Time
1	Heidi Christensen	41	51:01
2	Meghan Quan	15	51:03
3	Jenny Cook	42	51:47

Age Division Winners

Group	Name	Age	Time	Overall
1-18	Meghan Quan	15	51:03	2
19-24	Elizabeth Schlapia	22	57:15	4
25-29	Elizabeth Hagy	25	1:00:14	8
35-39	Cynthia Myers	35	57:45	5
40-44	Heidi Christensen	41	51:01	1
45-49	Elise Meers	45	1:12:41	15
50-54	Kristin Hamilton	51	1:15:37	17
55-59	Ellen Shockey	57	1:16:17	19
60-64	Betty Jordan	63	1:11:43	16

10 Mile

Male

Place	Name	Age	Time
1	Alex Kostich	30	3:08:25
2	Peter Egan	36	3:23:06
3	Scott Zarrug	40	3:30:32

Age Division Winners

Group	Name	Age	Time	Overall
25-29	Trevor Gabriel	26	4:13:14	10
30-34	Alex Kostich	30	3:08:25	1
35-39	Peter Egan	36	3:23:06	2
40-44	Scott Zarrug	40	3:30:32	3
45-49	Michael Sartin	47	4:16:01	12
50-54	Don Van Cleve	50	3:48:36	10

Female

Place	Name	Age	Time
1	Jennifer McLeod	25	3:21:49
2	Laura Meeker	26	3:34:46
3	Sherry Kalnay	48	4:22:27

RECYCLE MOTOR OIL

Did you know that one gallon of used oil can pollute 1 million gallons of drinking water! So don't be a quack SEND IT BACK!!

THE RIGHT WAY!
- Change your oil
- Put used oil in sealable containers
- Bring to used oil collection center

THE QUACKED WAY! (THE WRONG WAY)
- Pour used oil down the storm drain
- Put used oil in the trash
- Dump oil into the ground
- Mix used oil with other products

THIS IS A FREE SERVICE TO THE PUBLIC

Locations...

CYPRESS

Auto Zone
5471 Lincoln Ave.
Mon.-Sat. 8am-10pm
Sun 8am-8pm

Discount Auto Service
Ball Rd. at Holder
Mon.-Fri. 8:30am-10pm
Sun 8am-8pm

Mario Motors of Cypress
6042 Cerritos Ave.
Mon.-Fri. 7:30am-6pm
Some Sat. 8am-2pm

Masterlube
5971 Ball Rd.
Mon.-Fri. 8:00am-6pm
Sat. 8am-5pm

Econo Lube N'Tune
Cerritos Ave at Walker
Mon.-Sat. 8am-6pm

Jiffy Lube Center
4542 Lincoln Ave.
Mon.-Sat. 7am-7pm
Sun 8am-6pm

M&N Coastline Auto & Tire Service
4005 Ball Rd.
Mon.-Fri. 7:30am-6pm
Sat. 7:30am-4pm
Sun. 9am-4pm

Big O Tires
6052 Cerritos Ave.
Mon.-Fri. 8am-6pm
Sat. 8am-6pm
Sun. 9am-4pm

Masterlube
5904 Lincoln Blvd.
Mon.-Fri. 8:00am-6pm
Sat 8am-4pm

Call Center For Hours of Operation & Quantities Accepted

HOTLINE FOR: Cypress, La Palma, Los Alamitos & Seal Beach
(714)229-6708
STATE HOTLINE: 1-800-CLEAN UP (253-2687)

LA PALMA

Firestone Store
Orangethorpe & Valley View
Mon.-Fri. 7:30am-6pm
Sat. 8am-5pm

LOS ALAMITOS

Jiffy Lube Center
3311 Katella Ave.
Mon.-Sat. 7:00am-7pm
Sun. 8am-6pm

SEAL BEACH

Lacey World Union 76
Seal Beach Blvd. at Westminster
Mon.-Sat. 7am-6pm
Sat 7am-1pm

M&N Coastline Auto & Tire Service
12239 Seal Beach Blvd.
Mon.-Fri. 7:30am-6pm
Sat. 7:30am-4pm
Sun. 8am-4pm

RECYCLE USED OIL

Funded by a Used Oil Recycling Grant from the California Integrated Waste Management Board

Self Storage, Low Prices

$20 OFF FIRST 3 MONTHS With Any 10x10 or Bigger NEW STORAGE RENTAL WEAD - EXP 7/31/00

OR

PAY 2 MONTHS GET 1 MONTH FREE With Any 5x10 or Bigger NEW STORAGE RENTAL WEAD - EXP 7/31/00

FREE Gift Certificate AT LOCAL RESTAURANTS With each NEW STORAGE RENTAL • Any Size One Coupon Per Rental • No Other Offers Apply WEAD - EXP 7/31/00

OR

FREE Phone Card $10.00 One Coupon Per Rental • No Other Offers Apply WEAD - EXP 7/31/00

• Open 7 Days • Gated Entrance • Clean • Individual Private Units

Mini Public & RV Storage

11342 Western, Stanton (714) 894-4724

PROFESSIONALLY MANAGED BY WEBSCO PROPERTIES WWW.BUSINESS RECORDS STORAGE.COM

Olympic Teams to Compete in Los Al

By KENDRA KRAUSE
For the News-Enterprise

From June 29 to July 9, all of the world's Olympic water polo teams will be in Los Alamitos at the Water Polo National Aquatic Center on the Joint Forces Training Base, competing in two tournaments.

The men's Olympic team will engage in a fierce competition for the UPS Cup, from June 27 to July 2.

The women's teams will face, each other from July 4 to 9 for the Holiday Cup.

The opportunity to witness these competitions is one that, simply put, should not be passed up; it means watching Olympic athletes who are representing America.

"This is a great opportunity to test us, to see where we are as far as world water polo," said John Vargas, head coach of the men's team.

He recounted the medals that the team has won in recent Olympic years, also mentioning that the last gold medal came home in 1904.

He sees a great opportunity to bring one home this year.

According to the women's team captain, Julie Swail, "This is the last chance for the Olympic teams to get a look at one another."

It's a definite precursor to the Olympic games, especially since the six teams playing in this event are the same teams playing in Australia.

It's also just an amazing way to spend an evening.

The teams see a golden opportunity to educate the community about water polo, as well as garner some "home town support," which they may lack in Australia.

"The more people we can get, the better, to show what water polo is; it's good to have fans, especially when you're at home, but mostly we would like to teach people about water polo," said player Heather Petri.

Maureen O'Toole, who has seen six World Championships and who will retire after Sydney, sees the importance of fan support.

"When you play in Italy, the fans just go off, and the place is packed. We're proud to be at home and representing our country, and having a crowd would be helpful. We don't get to play at home very often," O'Toole said.

Fanna Fugua, not a member of the team but spending the summer practicing with them, has a unique view of the teams.

"Everyone knows what they want, and they pull themselves together for a common goal. They're all role models," she said.

And maybe that in itself is a valid reason to attend; good role models are sometimes hard to find.

So grab the youngsters and watch a game. For information, call (562) 430-1071.

Team USA Tournament Schedule

All games at 11200 Lexington Drive, off Farquhar in Los Alamitos.

Date	Opponent	Time
Men's UPS Cup		
Thursday, June 29	vs. Australia	8:30 p.m.
Wednesday, June 28	vs. Canada	8:30 p.m.
Thursday, June 29	vs. USA	8:30 p.m.
Friday, June 30	vs. Yugoslavia	8:30 p.m.
Saturday, July 1	vs. Italy	1:30 p.m.
Sunday, July 2	FINALS	12 or 3 p.m.
Women's Holiday Cup		
Tuesday, July 4	vs. Canada	7:00 p.m.
Wednesday, July 5	vs. Australia	8:30 p.m.
Thursday, July 6	vs. France	8:30 p.m.
Friday, July 7	vs. Kazakhstan	8:30 p.m.
Saturday, July 8	vs. Netherlands	3:30 p.m.
Sunday, July 9	FINALS	4 or 5 p.m.

Tickets:
$10 adults; $6 students with ID
Finals:
$12 adults; $8 students

Photo by Kendra Krause

U.S. Women's Olympic Water Polo team members, (from left) Brenda Villa, Courtney Johnson and Julie Swail, discuss the upcoming pre-Olympic tournaments to be held at the Joint Forces Training Base in Los Alamitos.

Australia Trip Proves Costly

The U.S Women's water polo national team returned home on June 18 from a productive two weeks of training in Australia, but two-meter defender Robin Beauregard injured her knee prior to the team's final match with the Aussies on Thursday, June 15.

Having played three test matches with the Aussies in Sydney, drawing two losses and a tie in the process, the U.S. was eager to cap off its trip in winning fashion. That opportunity came on Thursday night, June 15, in Kawana on Australia's Sunshine Coast.

The U.S. joined their hosts in an Olympic torch relay that night, with team members perched atop Harley Davidson motorcycles. The fanfare in the streets, however, would give way to the fourth contest in a week's time between the U.S. and Australia.

Unfortunately, it was a game marred by rain, shot clock problems and freak injuries. When the storm had calmed, the sunshine saw Australia coming out on top, 5-4.

The team's arrival at the pool was less than pleasant. As the team was walking across the rain-soaked pool deck, Beauregard slipped awkwardly, injuring her knee.

The U.S. misfortune snowballed after the game's first sprint, with the Aussies drawing first blood.

"Individually, we had some great performances," said USA coach Guy Baker. "Notably, Nicolle Payne in goal, Brenda Villa from the outside, and Ellen Estes and Gubba Sheehy out of set."

It is uncertain when Beauregard will be able to return.

The team will make its Holiday Cup debut at 7 p.m. on July 4 against Canada, which will be followed by a fireworks spectacular.

For information, visit www.holidaycup.com.

2000 USA WATER POLO ROSTERS

Men's Roster

Name	Position	Height	Weight	Hometown	College
Chris Apallera	GK	6-3	195	Saratoga	Stanford
Gavin Arroyo	2M Def	6-3	190	Orange	UC Berkeley
Tony Azevedo	Driver	6-0	188	Long Beach	Stanford
Ryan Bailey	2M	6-5	245	Long Beach	UC Irvine
Layne Beaubien	2M Def	6-5	205	Coronado	Stanford
Ryan Flynn	2M	6-8	245	Los Angeles	UC Berkeley
Dan Hackett	GK	6-6	195	Irvine	UCLA
Chris Humbert	2M	6-7	230	Lodi	UC Berkeley
Sean Kern	2M	6-6	230	Honolulu, HI	UCLA
Kyle Knapp	2M Def	6-8	235	Long Beach	Cal State Long Beach
Chi Kridell	2M Def	6-2	210	Seal Beach	Cal State Long Beach
Robert Lynn	2M Def	6-2	200	Long Beach	USC
Merrill Moses	GK	6-2	205	Palos Verdes	Pepperdine
Sean Nolan	GK	6-6	215	Palo Alto	UC Berkeley
Chris Oosting*	Driver	6-1	195	Newport Beach	UC Berkeley
Jeremy Pope	Utility	6-5	240	Clovis	Pepperdine
Brad Schumacher	Utility	6-4	200	Bowie, MD	Pacific
Wolf Wigo	Driver	6-2	190	New York, NY	Stanford

Head Coach: John Vargas
Assistant Coaches: Monte Nitzkowski, John Tanner

Women's Roster

Name	Position	Height	Weight	Hometown	College
Robin Beauregard	2M Def	5-9	175	Huntington Beach	UCLA
Ellen Estes	2M	6-1	165	Newport	Stanford
Courtney Johnson	Driver	5-4	130	Salt Lake City, UT	UC Berkeley
Ericka Lorenz	Attacker	5-11	155	San Diego	UC Berkeley
Heather Moody	2M	6-1	170	Green River, WY	San Diego State
Bernice Orwig	GK	6-0	175	Anaheim	USC
Maureen O'Toole	Playmaker	5-11	145	Piedmont	Hawaii
Nicolle Payne	GK	5-9	150	Corona	UCLA
Heather Petri	2M Def	5-11	155	Orinda	UC Berkeley
Rachel Scott	2M Def	5-11	150	Bainbridge Island, WA	San Diego State
Kathy "Gubba" Sheehy	2M	5-10	155	San Diego, CA	San Diego State
Coralie Simmons	Playmaker	5-8	140	Hemet	UCLA
Julie Swail*	Def	5-8	145	Placentia	UCSD
Brenda Villa	Playmaker	5-4	150	Commerce, CA	Stanford
Catherine von Schwerdtner	2M	5-8	170	Annapolis, MD	UCLA

Head Coach: Guy Baker
Assistant Coaches: Ken Lindgren, Chris Duplanty

* Team Captain

Do It Right!

Bring your household hazardous waste to a collection center. Items accepted include: automotive products, oil & latex paint, pesticides & herbicides, household cleaners, hobby & pool supplies, and household batteries. This is a FREE public service.

COLLECTION CENTERS ARE OPEN: Tuesday thru Saturday, 9:00 am to 1:00 pm. Collection Centers are closed on rainy days, Christmas, Independence, Labor, Memorial, New Year's, and Thanksgiving Days.

The County of Orange has several Household Hazardous Waste Collection Centers available to residents upon proof of residency.

COLLECTION CENTER LOCATIONS

Anaheim Regional Collection Center

Huntington Beach Regional Collection Center

Hazardous waste is not accepted from businesses, schools, government agencies, churches, and non-profit organizations.

Call the Household Hazardous Waste HOTLINE at: (714) 834-6752 for quantity instructions and additional information.

RECYCLE USED OIL

Advertising funded by a grant from the California Integrated Waste Management Board.

Do You Know Where The Water In Your Storm Drain Goes?

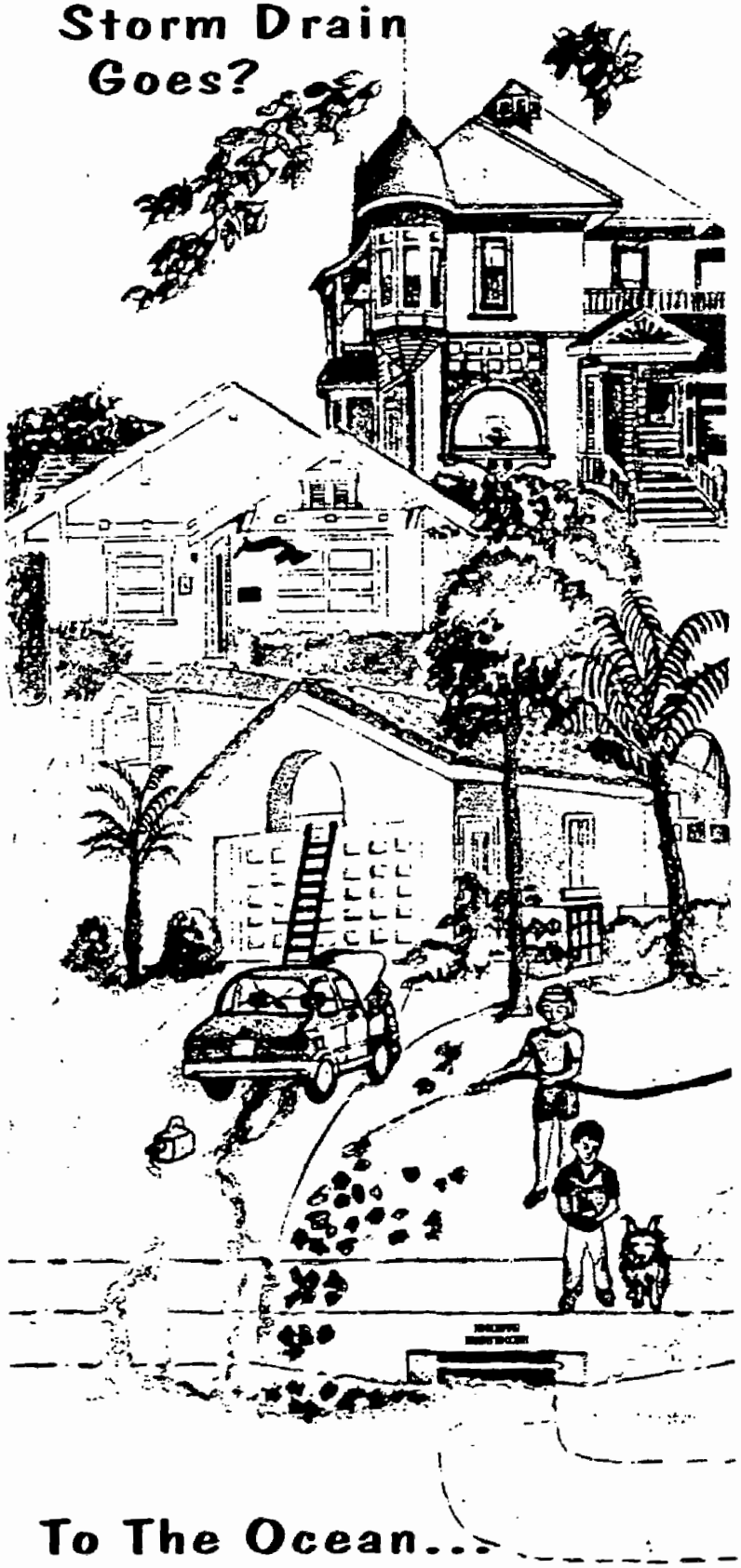

To The Ocean...

For More Information...

Questions regarding this notice may be directed to:

The Orange County Public Facilities and Resources Department's Stormwater Section at (714)567-6363

Or

Pavlova Vitale of the Santa Ana Regional Water Quality Control Board at (909) 782-4130

ORANGE COUNTY • STORMWATER • PROGRAM

Orange County Stormwater Program
10852 Douglass Rd.
Anaheim, CA 92806

007437

MOBILE DETAILING AND THE WATER QUALITY ACT

This flyer has been prepared at the request of the mobile detailing industry to provide direction with regard to compliance with the federal Water Quality Act of 1987.

007438

Tips to Keep Our Oceans Clea

Recent incidents of beaches being closed due to polluted waters should b concern to all of us. Not only do our beaches provide a recreational are southern California residents, they also serve as the home for marine Protecting our coastal waters begins with you.

To help protect our ocean waters, we need to eliminate the source pollution which enter the ocean via catch basins and storm drains. The phr "NO DUMPING - DRAINS TO OCEAN", which is stenciled on city cc basins, means just that - whatever enters goes directly to the ocean. paper cup or grass clippings you thought about tossing in the catch basin end up at the beach and will not be removed at a treatment facility as m people believe.

You can help keep our oceans clean by practicing the following:

- Place all litter in a trash receptacle. Do not throw trash on the grou because it could eventually end up in a catch basin and, subsequently, ocean.
- Follow manufacturer's instructions while applying fertilizers, herbicides, pesticides at your home. Excessive use may cause the material to run your lawn and into the gutter.
- If your automobile is leaking oil, have it repaired. Oil on the driveway street will enter the storm drain system with irrigation water or during rai weather.
- Be sure to pick up after your pets while taking them for walks around th neighborhood.
- Prevent construction materials, such as concrete, plaster, or paint, fror entering the storm drain system by using appropriate containment barrie when working with these materials.

For additional water quality information, please call the Department of Publi Works at (714) 229-6740. Remember, it is up to you to make sure that ou ocean waters remain safe for future generations.

Cypress City Channel 36 Programming

2nd and 4th Mondays

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10:00 a.m. & 6:00 p.m.

Discover Cypress
10:30 a.m. & 6:30 p.m.

Crime File
11:00 a.m. & 7:00 p.m.

Your City Your Police
11:30 a.m. & 7:30 p.m.

Cypress Cares
12:00 p.m. & 8:00 p.m.

Modern Video
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Annenberg CPB
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Youth Commission
1st & 3rd Tuesday, 6:30 p.m., Community Center

Friends of Cypress Cultural Arts
1st Wednesday, 7:00 p.m., Senior Center

Friends of Cypress Recreation and Parks, Inc.
2nd Wednesday, 7:00 p.m., Senior Center

Cable TV and Technology Commission
1st Thursday, 4:00 p.m., City Hall

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2nd Wednesday, 3:00 p.m., Senior Center

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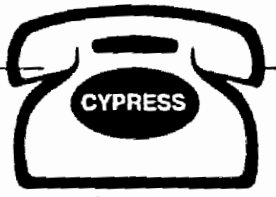

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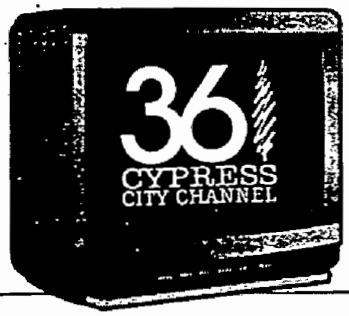

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Recycling In Cypress

When it comes to recycling, Cypress is right on track. Recycling has be[illegible] alive and well in the City for years. In 1989, the California S[illegible] Legislature passed recycling legislation that required every city a[illegible] county in California to divert 25% of its trash from landfills by 1995 and 50% by the year 2000. Cypress can proudly say that by 1995 the City had surpassed the State's year 2000 goal by diverting 63% of its trash from nearby landfills. To continue on this great endeavor of protecting the environment, here are some recycling tips:

- Shop carefully and buy only what you need. All too often we purchase products that we don't really need and end up never using.
- Don't use a bag if you're buying only one item or if you will be consuming or using the item as soon as you leave the store.
- Buy non-perishable products in large quantities or in bulk. One large container creates less garbage than several smaller ones.
- Reduce the amount of junk mail you receive.
- Use reusable containers with lids instead of aluminum foil, plastic bags, or plastic wrap.
- Say "NO" to items you're not going to use. If you don't need napkins, straws, plastic utensils or condiments, leave them behind at the restaurant or store.
- Buy appropriately packaged products. Packaging represents about 30% of all our waste, and much of the packaging isn't even needed to protect the product.

Recycling and reducing the amount of waste your household generates helps the environment and saves a variety of resources, including energy, water, minerals and trees. It also helps reduce pollution. Finally, by recycling you are helping the City continue to meet a state mandate [illegible] reduce waste.

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Recreation and Park District	
Community Center Facilities & Programs	229-6[illegible]
Senior Citizens Center	229-20[illegible]
Senior Citizens Nutrition	229-2007
Cypress City Hall Information	229-6700

Recycling in 2000

A special "Thank You" goes out to all Cypress residents for their participation in the City's curbside recycling program. Your outstanding participation resulted in less trash generated which means less trash hauled to the landfills. This is significant because it means that our local landfills will not reach capacity as early as originally predicted in the late 1980's and the City met the State requirement of diverting 25% of the waste stream away from the landfill. Recycling really does work!

The year 2000 is important for the City of Cypress as this is the year when the State required diversion of 50% must be met by all California cities and counties. Cypress residents are encouraged to continue practicing the three "R"s - Reduce, Reuse and Recycle - so that we can meet this goal. Only with your support can we meet these requirements.

To further demonstrate the benefits of recycling, here are some recycling facts:

- Recycling aluminum results in 95% less air pollution and 97% less water pollution than producing aluminum from natural resources.
- We save over a ton of resources for every ton of glass recycled - 1,330 lbs. of sand, 433 lbs. of soda ash, 433 lbs. of limestone and 151 lbs. of feldspar.
- If the Pilgrims had six-packs, we'd still have the plastic rings from them today. The long decomposition period of material such as plastic makes it even more important to recycle.

Recycling - it not only benefits you - it benefits all of us.

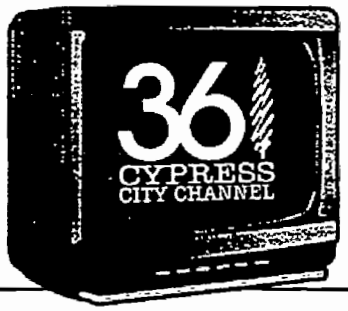

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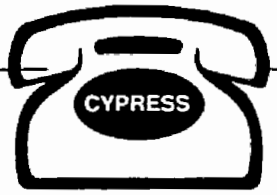

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Prevent Water Pollution While Making Home Improvements

With summer right around the corner, many Cypress residents are thinking about making improvements to their homes to improve their appearance and property values. While making these improvements, keep in mind that the construction activity which takes place on your property can have a significant impact on water quality.

If your home improvements include things such as installation of a concrete driveway or walkway, brick wall or planter, re-stuccoing or painting the outside of your home, or even re-plastering your swimming pool, please be sure that you, or the contractor hired to do the work, take all the necessary steps to make sure that debris does not go into the gutter. Often times the City receives reports of discharges, such as concrete or plaster, which originated from a home improvement project, flowing down the gutter and into the storm drain. This debris can build up in a catch basin and damage the storm drain system. More importantly, it eventually flows into the ocean and poses a threat to water quality and sea life.

If you or your contractor are identified as the contributor to this illegal discharge, you will be required to clean up the impacted area and could be subject to a fine. This is why it is so important to prevent any debris resulting from home improvement projects from going into the gutter. Make sure that all debris gets properly disposed of in a trash container so we can protect the storm drain system and our coastal waters. We all like to make our homes look nice. Let's also do our part to make our oceans look nice too.

To obtain a brochure about the best management practices for home improvement projects, call the Department of Public Works at (714) 229-6740.

NO DUMPING! DRAINS TO OCEAN

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Lincoln Avenue Scheduled For Facelift

On September 28, 1998, the Cypress City Council approved the $4.3 million Lincoln Avenue Streetscape Project which includes construction of aesthetic improvements to the Lincoln Avenue Bridge across the Coyote Creek. Construction on this project began in October 1998 and is estimated to be completed in July 1999.

The construction of entrance monuments at the Lincoln Avenue bridge is only part of the major improvements scheduled for this street. Other improvements will include new roadway surface treatments, bridge and ornamental street lighting, landscape treatments at both ends of the bridge and parkway planter extensions located at major intersections. Also included is planting of several new street trees in conjunction with the reconstruction and relandscaping of medians. Finally, new storm drains and asphalt are planned for this major thoroughfare. All scheduled construction will occur between Valley View Street and Bloomfield Avenue.

The streetscape improvements to Lincoln Avenue are a major component of the Rediscover Lincoln Project. This is a multifaceted effort to revitalize the Lincoln Avenue corridor. Recognizing that a facelift is not enough, the City Council is working in partnership with the community to consider implementing land use and design standards for private development on Lincoln Avenue, including strategies for stimulating economic development.

1998 Business Appreciation Breakfast

On October 6, 1998, the Cypress City Council held its annual Business Appreciation Breakfast. This event was hosted in the Cypress Ballroom at the Courtyard Marriott. Approximately 50 business leaders attended representing many of the City's major corporations. The purpose of the breakfast is to recognize the efforts of the business community in preserving and promoting a stable tax base and healthy local economy for the City of Cypress.

The Mayor highlighted some of the major economic development activities which took place in the past year. During this time Home Depot, OfficeMax, Sizzlers and IHOP all opened their doors for business. Joining the roster of business park tenants were companies such as TDK, Johnson Controls, G-Tech and the Exhibit Group/Giltspur. Homestead Village arrived to service the growing demand for additional hotel rooms. In summary, a total of over one million square feet of new commercial, office and warehouse industrial space was approved during the past year, valued at over 30 million dollars.

The Mayor concluded by saying that the City is an active partner for economic development. By working in partnership with the business community, the City can continue to provide the high quality of life which has become the calling card for the City of Cypress.

Protecting Our Beaches and Environment

Guess where pollutants go when they are poured into the gutter or find their way into the storm drain? You guessed it, straight to the ocean. Although our community has no ocean-front property, the City of Cypress is only seven miles from the nearest beach.

The City of Cypress has a great record of recycling and properly disposing of hazardous materials. Protecting the environment for current and future generations is of utmost concern to the city. But, like most cities, Cypress has two drainage systems: sewers and storm drains. The storm drain system was designed to prevent flooding by carrying excess rainwater from our city streets to the ocean. Unlike the sewer system, the storm drain system contains no filters. So where the storm drains keep us safe from flooding, they can also serve the unintended and unfortunate function of carrying urban pollution straight to the ocean.

The most hazardous conditions arise when rain is mixed with industrial or household water containing pollutants, creating dangerous runoff pollution. These pollutants can include oil and other automotive fluids, paint and construction debris, yard fertilizers, pesticides and pet wastes.

Each day polluted urban runoff enters the ocean untreated, leaving toxic chemicals in our surf and trash on our beaches. Urban runoff pollution contaminates the ocean, closes beaches, harms aquatic life and increases the risk of inland flooding by clogging gutters and catch basins.

This can be a serious problem, but there are manageable solutions. If hazardous materials from the workplace, garage, or home are handled, stored and disposed of properly, pollution can be reduced dramatically. To do your part in protecting the environmental well-being of our city and nearby oceans, please follow these easy guidelines:

- Take cleaners, paints, thinners, automotive fluids and pesticides to a Hazardous Materials Collection Center. For locations and operating hours call the Household Hazardous Waste Hotline at (714)834-6752.
- Never clean brushes or rinse paint containers into a street, gutter or storm drain.
- Use organic or non-toxic fertilizers and pesticides and avoid dispensing them near ditches, gutters and storm drains.

Working together we can insure a beautiful clean future. For more information or a brochure on urban runoff pollution, please call the **Cypress Public Works Department at (714)229-6740.**

West-Comm Celebrates A Successful First Year

On October 1, 1998, West-Comm, the consolidated police communications center formed by the cities of Cypress, Los Alamitos and Seal Beach celebrated its first year of operation. The center was established as a three-city joint venture to provide state of the art public safety communications and cost savings.

In the first year of operation, West-Comm received 19,000 9-1-1 calls, 81,000 requests for service and handled an average of 163 incidents per day. West-Comm's first year in operation is considered a success and is well on its way to saving the three cities an estimated $500,000 during its first five years of operations.

REPRESENTATIVE PUBLIC EDUCATION MATERIALS

CITY OF DANA POINT

Recycle Now There's A Future For Us

Recycling News

October 1, 1999 Volume VII, No. 4

KEEP RECYCLING WORKING - AMERICA RECYCLES

On November 13, California cities will have the opportunity to participate in the second annual America Recycles Day - a national campaign designed specifically to reinforce public support of recycling. Your City, the County of Orange and SOLAG Disposal would like to "Keep Recycling Working." You can help by remembering to reduce, reuse, recycle and compost your waste, but most importantly... purchase products that contain recycled materials. By working together we can preserve our planet, promote a healthier environment and secure the future of recycling.

SPECIAL GIVEAWAY

To celebrate America Recycles Day, on Saturday, November 13 from 8:00 a.m. to 12:00 p.m. Tierra Verde Industries, a green waste recycling facility located in San Juan Capistrano, has offered to donate compost for use in your yard. Bring a shovel and a large container/bag to Federal Doc Loading, located on Alicia Parkway between Avila and Aliso Creek Road in the City of Laguna Niguel to collect the free compost material.

FIND A NEW USE FOR AN OLD ITEM

Have an old bike that needs fixing or a chair that is missing a leg? Or how about some other large item that needs some minor repairs? Before you throw that item away, why not give it to someone who could put it to good use? There are many organization such as Goodwill Industries, Children's Hospital of Orange County (CHOC) and the Salvation Army that make it their business to bring new life to older, reusable items. In the spirit of goodwill and less waste, SOLAG Disposal, Inc. together with your City encourage you to contact these organizations before you throw a reusable item in the trash. For telephone numbers to these or other non-profit organizations, please look in the yellow pages under "Thrift Shops," or you may contact Solag Disposal for more information. Also remember that your contribution may be tax deductible.

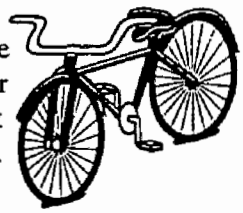

ENVIRONMENTAL AWARDS

The Cities of Dana Point, Laguna Niguel, San Clemente, San Juan Capistrano and the County of Orange would like to recognize the following businesses for their outstanding efforts to reduce waste and recycle in their community:

Doubletree Guest Suites, Dana Point • Flex Foot, Inc. • Trade Winds Motel
Unichem Industries, Inc. • Tall Mouse Arts & Crafts, Inc. • Auto Care
Launderland • Mission Yamaha, Inc. • Saturn of San Juan Capistrano

Each of these businesses are being recognized by their respective cities for their dedication to help keep our environment clean and their commitment to recycling and source reduction.

TRASH FRIENDLY WEBSITES

www.choose2reuse.org - This website will give you valuable information and on-line resources to help in your efforts to re-use everyday items.

Solag Disposal - www.solag.com
County of Orange - www.oc.ca.gov/iwmd/
City of Laguna Hills - www.ci.laguna-hills.ca.us/

Holiday Collection Schedule

We will not pick-up on these holidays:
New Years • Memorial Day • Independence Day • Labor Day • Thanksgiving Day • Christmas Day
However, trash collection will resume one day later.

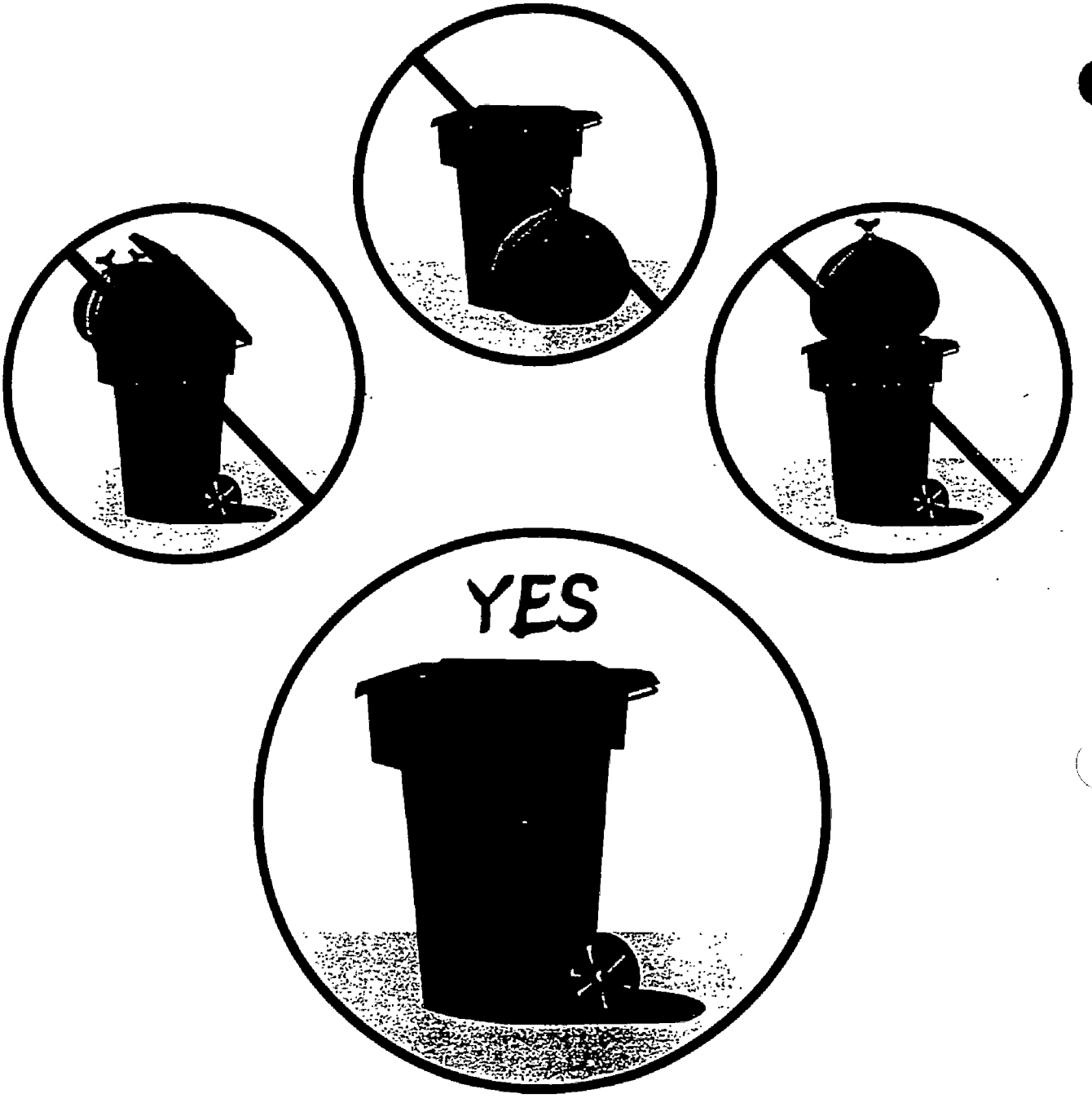

IS YOUR TRASH WEIGHING YOU DOWN?

Items that are too large to fit in your container are considered bulky-items. As a customer of SOLAG Disposal you are entitled to two bulky-item pick-ups per calendar year, at no extra charge. Almost anything that can be managed by a two-person crew will be picked up as a bulky-item. This includes old furniture, appliances, carpet, mattresses, water heaters, etc. Loose items need to be bagged or bundled, and no liquids or drums of any kind will be accepted. Before you put out large items to be landfilled, consider donating these items to a non-profit organization. If you would like more information about bulky-item pick-ups or non-profit organizations willing to pick-up your reusable items, please contact one of the customer service representatives at (949) 240-0446, Ext. 1.

Dana Point tackles runoff in storm drains

■ The city is testing different filters to catch pollution. It hopes to set an example for other municipalities.

Eric C Sanitate
OUR TIMES

DANA POINT—The city is testing two types of storm drain filters as part of an urban runoff prevention program that water quality officials hope will spawn imitators in other Orange County coastal cities.

The filtration systems have been installed in 21 of the city's 300 catch basins and storm drain inlets. The city will monitor their effectiveness for several months before deciding whether to expand the program or purchase more of the filters.

"One of the things that we as an agency set out to do is clean up [pollution] into the creeks and streams and ocean," Robert Warren, public works director, said. "If we take a proactive stance and help shame our upstream neighboring cities to do something similar — then it's going to do a whole lot of good."

The city installed large, metal mesh baskets called DrainPacs in six storm drains near San Juan Creek, Salt Creek and Dana Point Harbor late last year. The baskets run the length of the drain to catch trash and debris that would otherwise wash into the ocean.

The DrainPacs were chosen because they were relatively inexpensive and easy to maintain, Warren said. The filters cost about $1,600 to install and will cost about $700 a year in upkeep.

Warren said the city will analyze the pollutants collected from the DrainPacs during routine maintenance and determine what sort of particles are being filtered out of the water.

"If they work well, we may buy a few more this next summer," Warren said. "How many more of those depends on how well they work."

South Coast Water District General Manager Michael Dunbar said the program could prove useful to other coastal cities that may look at Dana Point's field tests before implementing urban runoff prevention programs.

"I think it's an excellent way to look at two different techniques and kind of do a comparison test," Dunbar said. "That data can be used by other cities and agencies when looking at installing similar systems."

The city is also testing a more elaborate filter, similar to those found in swimming pools, to remove petroleum and other fluid pollutants from the runoff in 15 catch basins.

Those devices, called Fossil Filters, use highly absorbent material to soak up oil and grease while allowing water to pass through. The filters are housed in a structure that captures solid particles as well.

Because these filters are relatively new, the city has not determined the maintenance costs, Warren said.

Proper maintenance will be the key to the program's success, said Monica Mazur, spokeswoman for the Orange County Health Care Agency.

Although she applauded the city's efforts, Mazur warned that the filters could actually create problems around storm drains if they aren't cleaned regularly.

"They need to be maintained properly so they don't cause other problems, such as odors," she said.

Warren said every inlet in the city could feature some type of filtration device within the next five years if the filters being tested get city approval.

"We're in the process of trying to discover what products there are and which work best," he said. "Anything we can do is to our own benefit, particularly since we're at the end of the stream. We're the recipients of everyone else's waste."

MEDHA FEIZAGI/DI MARTINO/OUR TIMES

Victor Armenta, assistant project manager at United Storm Water, inspects a filter in a storm drain in Dana Point. The city is testing filters in 21 of its storm drains to see they

JOIN us on TRASH AWARENESS DAY to make OUR neighborhood a cleaner place to live!

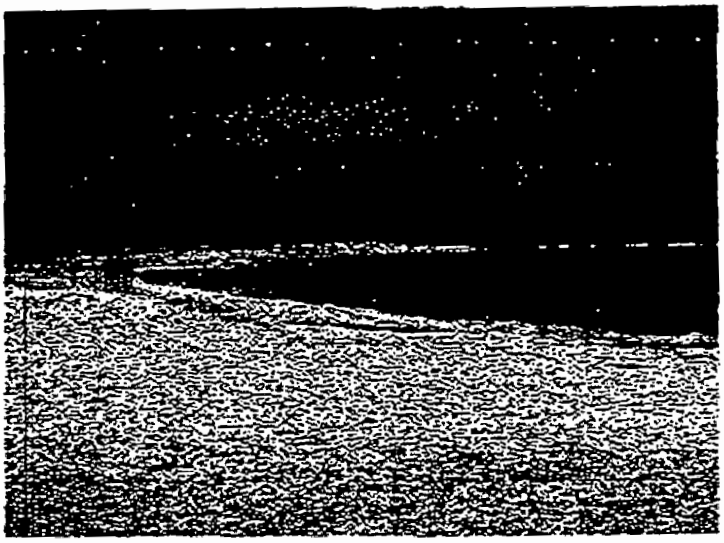

July 10, 1999

On Saturday, July 10th, we will be coming together as a neighborhood to clean up our streets and yards. A dumpster will be available for you to dump at the following site:

The red house on the corner of Violet Lantern and La Cresta.

Come join us on Saturday. The trash dumpster will be manned from 8am to 2pm. Trash bags will be provided at the dumpster site. If you can help for an hour or all day, please call 460-8108. This event is being sponsored by Lantern Village Association, Dana Point City, and Solag.

City News

GREEN WASTE COLLECTION PROGRAM

On November 4, 1996, Solag Disposal in cooperation with the City of Dana Point implemented Phase I of the Curbside Green Waste Collection Program. Residential subscribers may place green waste generated from their residence at the curb using any of the following methods: standard trash containers (up to 35 gallon), plastic bags or bundled trimmings/branches (not to exceed 2 ft., by 4 ft.). The maximum weight of the containers should not exceed the physical strength of the plastic bag or be over 50 pounds. This program is voluntary and there is not an additional fee for this service. Recycling green waste will assist Dana Point towards the 50% State mandated recycling goal by the year 2000.

Phase II of the program which encompasses all the private/gated communities was implemented May 1997. Solag must have the homeowner association's permission to bring a third truck on private streets. If you live in a private/gated community and would like to participate in the green waste collection program, request that your homeowners association call Solag.

Here is a list of green waste material, which will be collected:

- **Grass Clippings**
- **Wood Scraps**
- **Branches (not to exceed 4" in diameter and 4' in length)**
- **Leaves**
- **Weeds**
- **Plant Materials**
- **Garden Trimmings**

If you have any questions regarding the Green Waste Collection Program or would like to know if your area is included in the program, call Solag at **(949) 240-0446.**

STREET LIGHT REPAIRS

San Diego Gas & Electric (SDG&E) own and maintains the City's streetlights located within the public right-of-way. SDG&E has been providing this service since the City incorporated in 1989.

If you find a street light that is out, flickering or continuously on (day and night) you should either call SDG&E directly at 1-800-411-7343, or call Francisco Sanchez, City of Dana Point Public Works Department at (949) 248-3509. If you call the City we will log your call and notify SDG&E of the problem. When you call either number please leave the following information.

1. Approximate address of street light
2. Your name
3. Your phone number
4. Nature of the problem

This information will help to properly locate the troubled light and will help us to follow up to be sure the light has been repaired. Repairs are usually completed within a week, barring unforeseen circumstances such as inclement weather and local emergencies.

In case of an emergency, such as a light being damaged by a traffic accident, you should call 1-800-411-7343. This number can also be called for damaged electrical wires and utility poles.

NEIGHBORHOOD WATCHERS FALL OFF

Crime is down and so is the number of block captains for Dana Point's Neighborhood Watch program.

"Everyone is becoming complacent," said Scotty Smith, who as a member of Volunteers In Police Services spearheaded the program's growth over the past five years.

According to Smith and VIPS Program Director Peggy Nunes, the total Neighborhood Watch block captains fell in the last quarter of 1998 from a one-time high of 175 to 100.

"People get burned out and they want someone else to take over the job," Smith said. "But so far, we haven't found replacements."

Smith said in addition to block captains tiring of the commitment, media reports of falling crime rates have made some people believe that the program has done its job.

"People think they can just leave their doors open now and their home unattended," Smith said. "The criminals just love that."

Lt. Paul Ratchford, Chief of Dana Point Police Services agrees that despite the fact that crime is down, the Neighborhood Watch program is a vital weapon in the war against crime.

Ratchford said much of the successful police work done over the past few years was directly related to residents acting as extra eyes and ears for the police.

In fact, the Neighborhood Watch program was created to teach people how to protect themselves from crime and how to work with the Sheriff's Department. The goal of the program is crime prevention through community involvement.

Key elements of the program are the Neighborhood Watch meetings. During these meetings, neighbors gather at a home and become acquainted with the proper procedures in reporting possible crimes.

"Neighborhood Watch is based on the theory that if you know your neighbors, and they know you, you can keep the sheriff's (deputies) alert to suspicious activity," said Smith. "Hosting a Neighborhood Watch meeting in your home is simple."

According to Smith, to arrange for a meeting, call 248-3517/3585.

The program will then supply the resident with flyers to notify neighbors of the meeting, the time and address.

A Neighborhood Watch representative and a sheriff's deputy will speak at the meeting, addressing specific concerns in the area.

"Once the neighbors have met, talking about crime prevention is easier," said Smith. "Then people feel more comfortable reporting suspicious activity to the police. And your street will feel more like a community than just a place where you live."

Smith said the program is constantly looking for volunteers and block captains. For more information call the number above.

Registration on page 35

For registration see page 35

WHAT TO DO WITH BULKY ITEMS?

A bulky item is an item that cannot fit into the blue recycling or black trash containers, such as a chair or a couch. Other bulky items include any item that can be easily handled by a two- (2) man crew and may include the following: a refrigerator, washer, dryer, table and lawn furniture.

Each residential unit is entitled to two (2) free-of-charge bulky item pick-ups per year from Solag Disposal, a maximum of four (4) items per pick up; however, additional pick-ups can be arranged at a nominal fee per pick-up. Refrigerators and freezers can also be picked up. If you are interested in a bulky item pick-up, please call one of the Solag Disposal customer service representatives at (949) 240-0446. All items must be placed at curbside on the scheduled collection day by 6:30 a.m.

HOW DO I GET TO THE HOUSEHOLD HAZARDOUS COLLECTION CENTER?

Remember it is illegal to dispose of Household Hazardous Waste (HHW) through the automated residential program. There are four HHW Collection Centers in operation throughout Orange County. To ensure proper disposal of the HHW it must be disposed of at a certified collection center. The nearest collection centers are located at the Prima Deshecha landfill in San Juan Capistrano and in the City of Irvine (see maps above).

Prima Deshecha Landfill

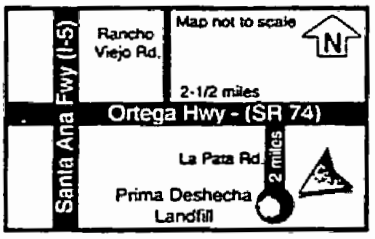

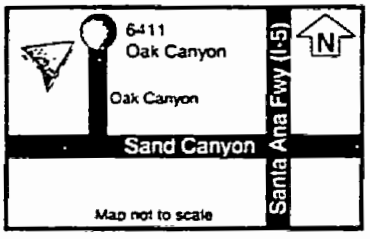

6411 Oak Canyon

HOUSEHOLD HAZARDOUS WASTE INCLUDES, BUT IS NOT LIMITED TO:

- Motor Oil
- Batteries
- Cleaning Products
- Wood Preservative
- Road Flares
- Pool Chemicals
- Pesticides
- Paint
- Solvents

The hours of operation are Tuesday through Saturday, 9:00 a.m. - 1:00 p.m. and closed Sundays, Mondays, holidays and rainy days. A maximum of 15 gallons or 125 lbs. of hazardous materials may be brought to the collection center per vehicle, per visit. If you need directions to the additional HHW facilities located throughout the county, please call the Orange County Integrated Waste Management information line at (714) 834-6752.

POOL WATER DISCHARGES

This notice is to explain the regulatory issues regarding the discharge of pool water and the two methods by which it may be discharged.

1. Many pools are plumbed to allow the discharge to go directly to the sanitary sewer. This is an acceptable and preferred method of disposal.
2. Where the discharge of pool water to the sanitary sewer is not feasible, federal law allows the release of dechlorinated swimming pool water. In Orange County the guidance for such releases requires pool owners to ensure that the following criteria are met:

a The residual chlorine does not exceed 0.1 mg/L (parts per million)
b The pH is between 6.5 and 8.5
c The water is free of any unusual coloration
d There is no discharge of filter media
e There is no discharge of acid cleaning wastes; and
f Any pipe connection to the storm drain system has permits from the city or county having jurisdiction

Compliance with this guidance can be verified using a pool testing kit. Excess chlorine can be removed by removing the chlorine tablets for a couple of days prior to discharge or by purchasing dechlorinating chemicals from local pool supply companies.

By ensuring compliance with these criteria, you will make a significant contribution toward keeping pollutants out of Orange County's creeks, streams, and receiving waters and help protect organisms that are sensitive to pool chemicals.

DANA POINT SUMMER CONCERT SERIES

August 15	UPSTREAM - Calypso Music
August 22	PAM LOE & HIP SHOT - Western Music
August 29	COVINA CONCERT BAND - Marches, Show Tunes and Dixieland,
Time:	4:30 p.m.
Location:	Heritage Park (Dana Point) - Old Golden Lantern Road
Cost:	Free
Sponsored by:	Lawn Chair & Picnic Society & City of Dana Point

COMMUNITY GROUPS

DANA POINT/CAPISTRANO BEACH HISTORICAL SOCIETY

Meetings - 4th Wednesday of every month (no meeting in July or August) Fax # (949) 248-5166

HERITAGE MUSEUM

Hours: 11:00 a.m. - 4:00 p.m.
Days: Tuesday through Saturday

 For registration see page 34

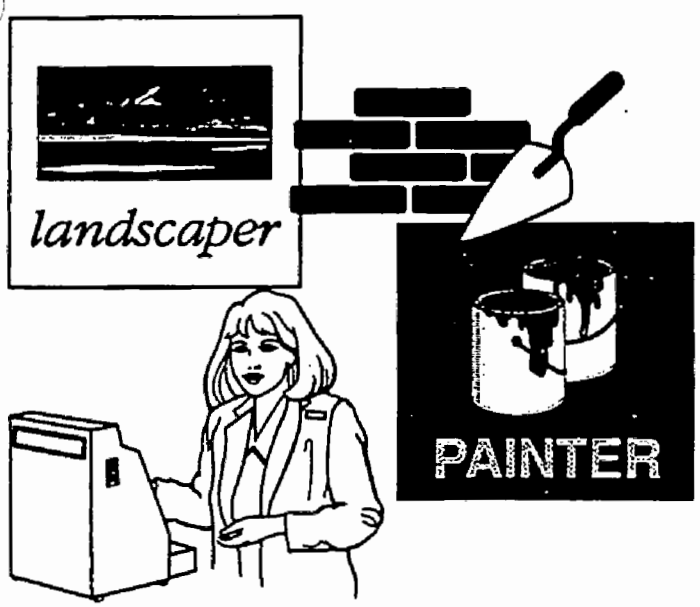

DAY WORKER PHONE EXCHANGE

"A Community Service by the City of Dana Point"

The City of Dana Point offers a convenient way to fill your temporary or permanent

'abor needs:

hone: 949- 248-3558

Skills Offered Included:

- Painters
- Masonry
- Landscaping
- Cashiers
- Domestic Help
- Construction Helpers
- Companion to the Elderly

SPRING CLEANING
WHAT TO DO WITH BULKY ITEMS?

Spring is almost upon us and that means it will soon be time for "spring cleaning." For those items that are too large for the automated containers, call Solvang Disposal to arrange for a "bulky-item" pick up. Almost anything that can be managed by a two-man crew will be picked up as a bulky-item. This includes old furniture, appliances, carpet, mattresses, water heaters, etc. Items such as refrigerators, washers, dryers and water heaters (or white goods for short) are sent to a metal recycler, where the hazardous material is extracted and the remaining metal is melted down and reused. All other items are delivered to the landfill for disposal. Remember, before you put out large items to be landfilled, consider donating working appliances and reusable supplies to a non-profit organization. If you would like more information about bulky-item pickups or non-profit organizations willing to pick-up your reusable items, please contact Solag Disposal at (949) 240-0446, Ext. 1.

POOL WATER DISCHARGES

This notice is to explain the regulatory issues regarding the discharge of pool water and the two methods by which it may be discharged.

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2. Where the discharge of pool water to the sanitary sewer is not feasible, federal law allows the release of dechlorinated swimming pool water. In Orange County the guidance for such releases required pool owners to ensure that the following criteria are met.
   - **(a) The residual chlorine does not exceed 0.1 mg/L (parts per million);**
   - **(b) The pH is between 6.5 and 8.5;**
   - **(c) The water is free of any unusual coloration;**
   - **(d) There is no discharge of filter media;**
   - **(e) There is no discharge of acid cleaning wastes; and**
   - **(f) Any pipe connection to the stormdrain system has permits from the city or county having jurisdiction.**

Compliance with this guidance can be verified using a pool testing kit. Excess chlorine can be removed by removing the chlorine tablets for a couple of days prior to discharge or by purchasing dechlorinating chemicals from local pool supply companies.

By ensuring compliance with these criteria, you will make a significant contribution toward keeping pollutants out of Orange County's creeks, streams, and receiving waters and help to protect organisms that are sensitive to pool chemicals.

 For registration see page 26

007451

Recycle Now There's A Future In It!

Recycling News

July 1, 1999 Volume VII, No 3

IMPORTANT NOTICE

NO DELAY IN TRASH COLLECTION THIS JULY 4TH

This year the Fourth of July falls on a Sunday. Currently the County landfills operate Monday through Saturday so you will not experience delay in trash service. On your normal collection day, please place your trash/recyclables out at the curb for collection.

PROPER DISPOSAL OF THE AMERICAN FLAG

As we celebrate America's Independence this Fourth of July we may notice that the flags we display have become torn or tattered beyond repair. This past year the editors of Recycling News received a letter from a World War II Veteran regarding proper disposal of an American Flag.

The Orange County Veterans will forward the flags to the American Legion Post where they will be Disposed of in conformance with tradition and local laws. Please mail your old American Flags to:

ORANGE COUNTY VETERANS
SERVICE CENTER OFFICE
1300 South Grand Avenue, building B
Santa Ana, CA 92705

TIPS TO REMEMBER WHEN YOU'RE AT THE BEACH OR PARK

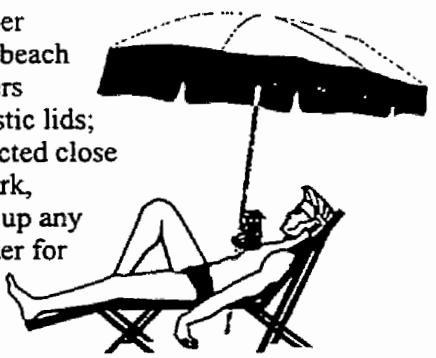

Did you know that our oceans provide most of the planet's oxygen, moisture and weather patterns? Every year, the Center of Marine Conservation sponsors a nationwide 3-hour beach clean-up, which has proven to be extremely effective. In 1987, in Texas alone, volunteers collected: 31,773 plastic bags; 30,295 plastic bottles; 15,631 six pack rings; 28,450 plastic lids; and 1,914 disposable diapers. And around the nation, the volunteer clean-up crew collected close to 2 million pounds of debris in just 3 hours. So next time you go to the beach or the park, remember to bring a trash bag and before you leave try to spend a few minutes picking up any litter you find. If you are interested in beach clean-up activities, please contact the Center for Marine Conservation at (202) 429-5609 or the Surfrider Foundation at (800) 743-7873.

IMPORTANT Y2K INFORMATION

By December 31, 2000 your city will need to be in compliance with the regulations set forth by state law AB 939. As you are already aware, AB 939 is the state-mandated requirement for each City throughout California to divert 50% of their waste stream away from the landfill by the Year 2000. Over the past several years the Editors of *Recycling News* have been discussing the 50% goal and the importance of reducing your waste, recycling and buying recycled products. Over the next year, your city will evaluating the programs currently in place and will review new ideas to promote the goals or the state law. Keep up the good work!!!!

Holiday Collection Schedule

We will not pick-up on these holidays:
- New Years Day - Memorial Day - Independence Day - Labor Day - Thanksgiving Day - Christmas Day
However, trash collection will resume one day later.

Unwanted Computer Parts - Help Your Community Recycle

Recently there has been a lot of talk about the year 2000 (Y2K) and the potential of imbedded computer chips disabling thousands of appliances, electronic products, etc. While the editors of ***Recycling News*** can neither confirm nor deny these reports, we would like to request our customers' help to try and locate alternatives to disposing of these items in the landfill. If you or someone you know can direct us to a non-profit organization willing to accept these items or a remanufacturer that would be interested in securing this material, please contact our office in writing.

Some locations that may take old computers (via the internet)
CALMAX - http://www.ciwmb.ca.gov/calmax
Detwiler Foundation - http:/www.detwiler.org
Goodwill Industries of Orange County - http:/ocgoodwill.org/computer_donations.html

More Trash Friendly Websites

Solag Disposal, Inc. - www.solag.com
County of Orange - www.oc.ca.gov./iwmd/
Laguna Hills - www.ci.laguna-hills.ca.us

007453

Recycle Now There's A Future In It!

Recycling News

January 1, 2000 Volume VIII, No 1

SEASONAL RECYCLING TIPS (Some thoughts)

During this Holiday season remember that one of the biggest gifts you can give your children is a clean environment. Here are some of the ways you can recycle and reuse holiday leftovers.

Types of things that can be recycled include:

Tin Jars	Wrapping Paper	Glass Containers	Cardboard Boxes/Packaging

Cannot be recycled:

Tinsel	Bows/Ribbons	Holiday Lights	Styrofoam Peanuts*

* = Clean Styrofoam packaging peanuts can be reused or are accepted at several packaging/delivering companies (such as Mail Boxes, Etc.), please check your local listings.

Some products may not be recyclable in our program, but that doesn't mean they should go in the trash!!! Many nonprofit organizations around the area can reuse your seasoned clothing, toys, exercise equipment, bicycles and other items. If you have any questions, please contact one of our customer service representatives at (949) 240-0446.

RECYCLING YOUR CHRISTMAS TREE IS AS EASY AS 1-2-3....

Can you believe that the Holiday Season is already behind us? Well it's time again to recycle your Christmas Trees. Depending on where you live, collection of your trees will take place on your normal collection day during a two week period shortly after Christmas or after the New Year. Just follow these three simple steps:

FIRST, please review the front of your bill for the dates of the curbside collection of your Christmas trees.

SECOND, Remove all decorations, tinsel and stands (wood or metal) from the tree before collection. If your tree is over 8feet in height, please cut the tree in half.

THIRD, Place your tree at the curb next to your container on collection day. **On trash day a separate collection vehicle will pick up your Christmas tree.**

NOTE: Flocked trees or trees with nails, stands or ornaments cannot be recycled, but will be picked up and disposed of at the landfill. Please do your part to help recycle your trees.

ITS NEVER TOO LATE TO RECYCLE OLD CHRISTMAS CARDS

For the past 20 years St. Jude's Ranch for Children has recycled holiday, birthday, get well and all other occasion cards. St. Jude's Ranch is a non-profit home for abused and homeless children located in Boulder City, Nevada. People from across the United States and around the world send used cards to the Ranch. In 1992 nearly one and a half million cards were collected. If you would like to recycle your Christmas cards, please send them to:

St. Jude's Ranch for Children
P.O. Box 60100
Boulder City, NV 89006

If sending by United Parcel Service, send to:
St. Jude's Ranch for Children
100 St. Jude Street
Boulder City, NV 89005

The Ranch requests that you send the front of cards only and please do not include cards that have writing or other markings.

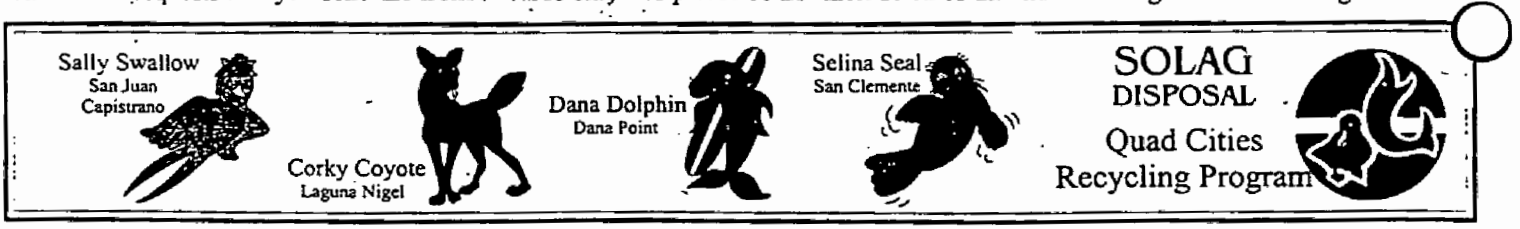

TRASH FRIENDLY WEBSITES

Each quarter the editor of ***Recycling News*** will be reviewing website and e-mail addresses on the Internet that may be of interest to our readers. The sites examine ways to **reduce** waste, avenues to **reuse** unwanted materials (such as donations to non-profit organizations), lists of **recyclable** material and directions to **backyard composting**.

http://www.1800cleanup.com -
For information on clean-up projects throughout the state.

http://www.envirofind.com -
To find information on all types of environmental businesses and other information.

Solag Disposal, Inc. - www.solag.com
Laguna Niguel - www.ci.laguna-niguel.ca.us
San Clemente - www.cty.org/san-clemente/
County of Orange - www.oc.ca.gov/iwmd/
Dana Point - www.ci.dana-point.ca.us
San Juan Capistrano - www.sanjuancapistrano.org

For a "buy-back" or "drop-off" recycling center near you contact the Department of Conservation at 1-800-RECYCLE (1-800-732-9253) or the California Integrated Waste Management Board at 1-800-253-2687.

FIND A NEW USE FOR AN OLD ITEM

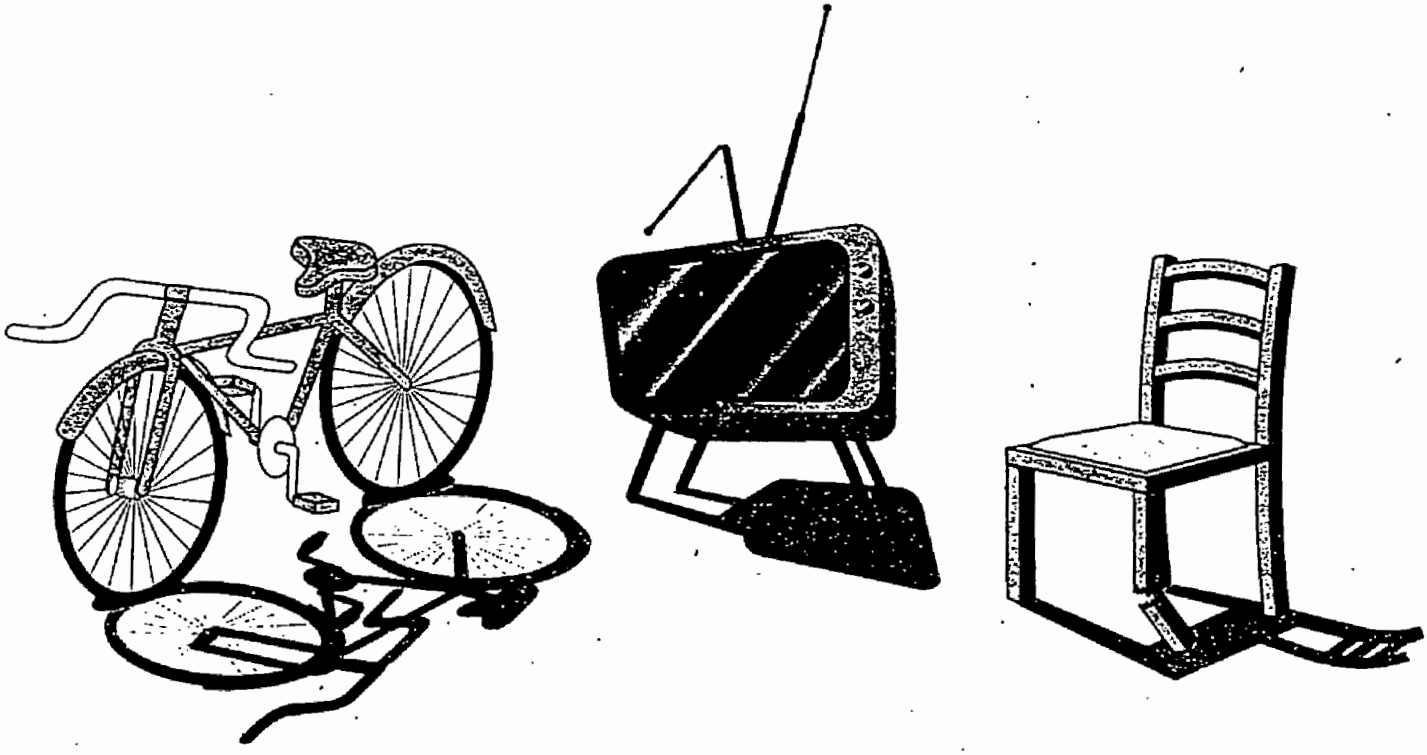

Have an old bike that needs fixing or a chair that is missing a leg? Or how about some other large item that needs some minor repairs? Before you throw that item away, why not give it to someone who could put it to good use? There are many organizations such as Goodwill Industries, Children's Hospital of Orange County (CHOC) and the Salvation Army that make it their business to bring new life to older, reusable items. In the spirit of goodwill and less waste, SOLAG Disposal, Inc. together with your City encourage you to contact these organizations before you throw a reusable item in the trash. For telephone numbers to these organizations, please look in the yellow pages under "Thrift Shops." Also remember that your contribution may also be tax deductible.

Recycle Now
There's A Future In It!

Recycling News

April 1, 2000 Volume VIII, No. 2

EARTH DAY CELEBRATION

Come celebrate Earth Day with students and residents from the surrounding communities. On Saturday, April 22, 2000 from 8:00 a.m. to 12:00 p.m. your city together with SOLAG Disposal, Inc. will be hosting an Earth Day celebration and Children's Invention & Art Fair in the City of Laguna Niguel.

INVENTION & ART FAIR:

Bring the entire Family for a fun-filled morning including an Easter Egg Hunt (for children ages 1-12), members of the local fire department, Environmental Booths, Invention and Art Displays by local elementary students.

Hey Kids: before you throw that object in the trash, think about other things you can do with it?

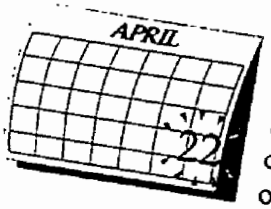

Every day hundreds of items are thrown into the trash that could have served a better or more useful purpose. Your City is sponsoring an Invention and Art Fair to determine the best way to reuse old items. Can you invent something that is used around the house, in the garage or at school? How about designing an art project that can be shared with your friends and family? We want you to be creative, serious or silly. Your idea could be anything from a floor mat, a napkin holder or thousa of other inventive ideas. Most important, we want you to have fun! Each entry in the Invention Art Fair will be judged based on innovation, creativity and usefulness. The top three winners from each category (Kindergarten - Second, Third - Fourth and Fifth - Sixth) will receive an award. All children participating in the Inventions & Art Show will receive recognition in the June 2000 Issue of *Recycling News*. Once your project is complete, call Dan Batty at (949) 240-0446 to reserve a spot at Earth Day 2000. To receive a free T-shirt, you must RSVP no later than April 10, 2000.

SPECIAL GIVE-A-WAY

To celebrate Earth Day, on Saturday, April 22 from 8:00 a.m. to 12:00 p.m. Tierra Verde Industries, a green waste recycling facility located in San Juan Capistrano has offered to donate compost for use in your yard. Bring a shovel and large container or bag to the site of the Earth Day Celebration in the City of Laguna Niguel located on Golden Lantern and Camino Los Padres to collect the free compost material.

TRASH FRIENDLY WEBSITES

Each quarter the editor of ***Recycling News*** will be reviewing website and e-mail addresses on the internet that may be of interest to our readers. The sites examine: ways to reduce waste, avenues to reuse unwanted materials (such as donations to non-profit organizations), types of recyclable material and instructions for backyard composting.

SOLAG Disposal - www.solag.com
www.choose2reuse.org - This website will give you valuable information and on-line resources to help in your efforts to re-use everyday items.
ecoboard.cc - Alternative material for decks, playground equipment, outdoor furniture.

Dana Point - www.ci.dana-point.ca.us
Laguna Niguel - www.ci.laguna-niguel.ca.us
San Juan Capistrano - www.sanjuancapistrano.org
San Clemente - www.cty.org/san-clemente/
County of Orange - www.oc.ca.gov/iwmd/
www.inkbank.com - Ink cartridges

Holiday Collection Schedule

We will not pick-up on these holidays:
New Years • Memorial Day • Independence Day • Labor Day • Thanksgiving Day • Christmas Day
However, trash collection will resume one day later.

EARTHY SAYS,

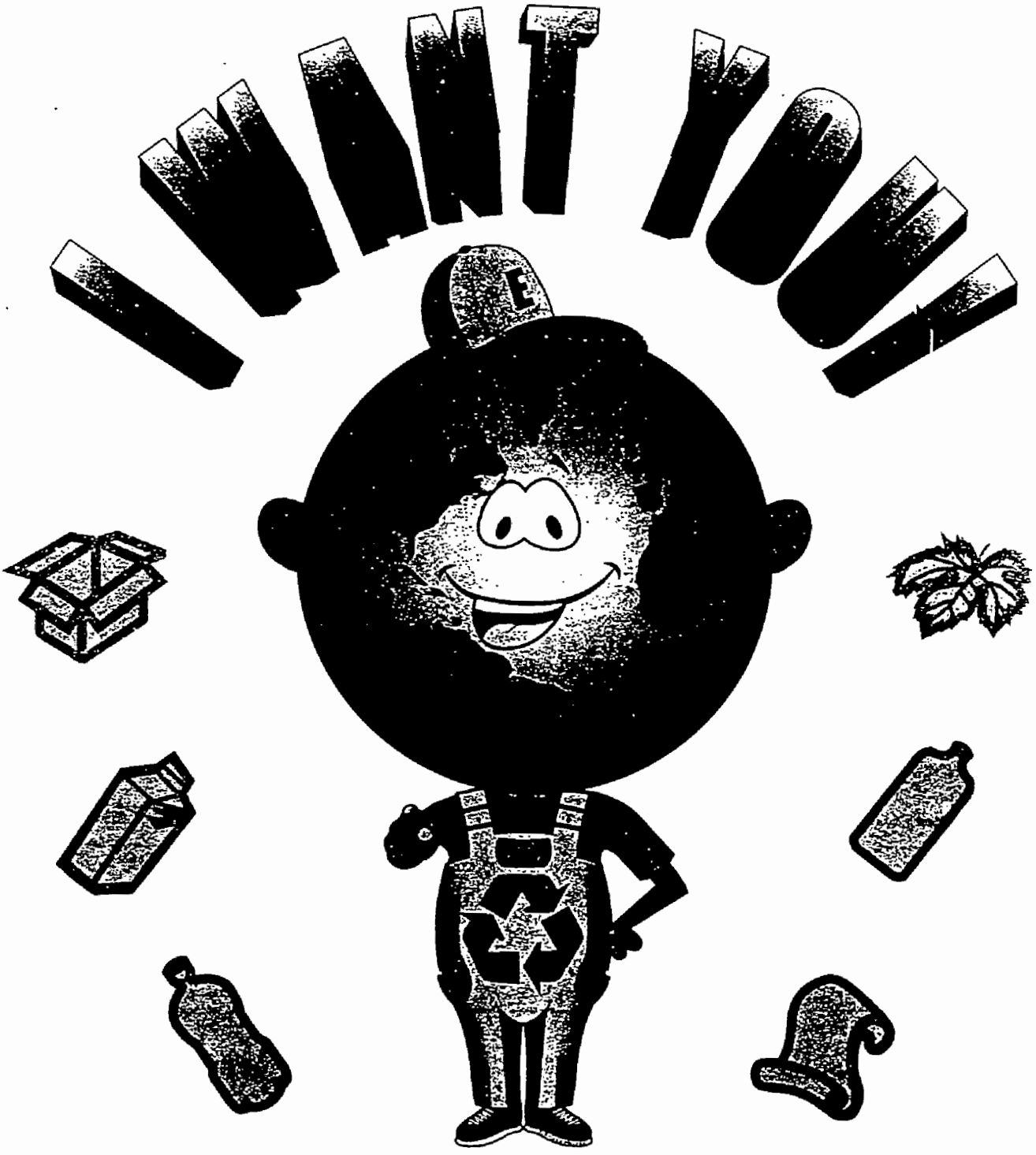

The beginning of the millennium is upon us and we need your help. In 1989 (eleven short years ago) all cities in the state of California were mandated to divert 50% of their waste stream away from the landfill by the end of the year 2000 (Public Resources Code 40000 et. seq., better known as AB939). Your city has one of the most progressive programs available in the state of California, however it is more important now than ever before to stop and look at what items are being placed in your trash or recycling containers.

Over the past several years the Editors of *Recycling News* have been discussing the 50% goal and the importance of reducing your waste, recycling and buying recycled products. Over the next year, your city will be re-evaluating the programs currently in place throughout your City and will review new ideas to help us achieve the state-mandated goals. If you have questions about recycling or waste reduction, there is a detailed brochure that we would be happy to send to you (in English or Spanish) that will help explain the types of material that can be recycled. Earthy says, "Keep up the good work!"

NO DUMPING

Dana Point

RECYCLE USED MOTOR OIL

REPRESENTATIVE PUBLIC EDUCATION MATERIALS

CITY OF FULLERTON

007459

Green Waste Collection Program

A Green Waste Collection Program is in effect for single and multi-family homes with curbside collection service. Regular weekly trash collection days are not altered in each neighborhood, however, a separate truck which collects only green waste comes before the regular trash truck.

The program uses "yellow stickers" which are to be placed on regular trash barrels, or other designated containers, to identify them as containing green waste. Plastic trash bags are not acceptable for this program, as plastic is not an acceptable material that can be introduced into the composting process and workers are not able to determine if disposed green waste is on the list of 'acceptable' items.

"Yard Waste Only" stickers and Recycle Fullerton brochures are available through MG Disposal or City Hall. Contact MG Disposal's Customer Service line at 238-3300 or the Planning/Environmental Programs office at 738-6884 for information. Items are also available at the Cashier's Desk at City Hall, where water and trash bills are paid in person.

Used Oil Collection Program

The City of Fullerton, in its commitment to protecting the environment, sponsors a Used Oil Collection Program aimed at encouraging residents to recycle their used motor oil. Under the program, residents may bring used motor oil to any of the following state-certified collection centers, where it is disposed of safely and properly. In addition, center operators offer residents 16 cents per gallon of used oil collected.

EZ Lube Inc. 4002 N. Harbor Blvd. 477-1223	North County Automotive 146-B W. Wilshire Ave. 870-9936
Fox Service Center 1018 W. Orangethorpe Ave. 879-1430	Fullerton College Auto. Tech. 321 E. Chapman Ave. 992-7275
University Chevron 2950 E. Nutwood Ave. 528-0302	Kragen Auto Parts #731 2978 Yorba Linda Blvd. 966-4780
Pep Boys # 642 - Region 3 1530 S. Harbor Blvd. 870-0700	Auto Zone #2898 146 N. Raymond Ave. 870-9772
Sunnyside Unocal 2701 N. Brea Blvd. 256-0773	Tire Station 1933 N. Placentia Ave. 993-7100

Household Hazardous Waste

(pesticides, paints, cleaners, etc.)

can be taken to:

County of Orange Household Hazardous Waste Collection Center

1071 N. Blue Gum Avenue, Anaheim
Phone # 834-6752
Open Tuesday - Saturday, 9am - 1pm
(closed Holidays and rainy days)

CITY OF FULLERTON CALIFORNIA

Recycle Fullerton

Development Services Department
Planning/Environmental Programs
303 W. Commonwealth Avenue
Fullerton, CA 92832

Phone: (714) 738-6884
Fax: (714) 738-3110

Website: www.ci.fullerton.ca.us

Reduce

Even with the good job Californians are doing of recycling, the landfills are filling up fast. Fortunately, there is something positive that every resident can do. If you, and your neighbors, help reduce the amount of garbage you generate, we can help keep our disposal bills, and our number of landfills, low at the same time.

State law requires that all cities cut their amount of garbage going to landfills in half by the year 2000. And that law is why we encourage you to reduce and reuse, then recycle and buy recycled. The fact is, over 75% of what we throw away can be reduced, reused or recycled. And it's easier than you think.

You can significantly reduce your garbage by selecting products with the least amount of packaging, buying items in bulk, and buying products that can be used over and over again.

Reuse

Learning to reuse is easy and after a little practice, it will become second nature. Here are some great ways to reuse our precious resources.

Reuse shopping bags or buy canvas bags and use them when you shop. Buy durable high quality goods for a longer life outside the landfill. Although durable goods may cost a little more at first, they will save you money and help save the environment in the long run.

Before throwing anything away, think about how each item can be reused. Donate clothing, furniture, and appliances to charity. Hospitals and nursing homes often accept old magazines and schools reuse many items in their art and theater classes. Almost all glass, plastic, and metal containers can be reused for storage in the kitchen or garage. Think before you toss.

Recycle

Recycling means collecting, processing, marketing, and ultimately using materials that were once discarded. For example, this morning's newspaper can be recycled into insulation, packing material, wrapping paper, and more newspaper. Plastic soda and milk jugs are recycled into lumber that is used for making durable playground equipment and park benches.

Many different materials can be recycled. Among these are aluminum cans, glass bottles and jars, plastics, tin cans, steel cans, brass, copper, car batteries, computer paper, office paper, corrugated cardboard, motor o[illegible] rap iron and steel, and tires.

Recycle Fullerton

The City does not have a "curbside" recycling program - where separate bins for recyclables are used. However, the City has chosen to implement a program known as ***"murfing"***, which involves processing of the waste stream at a Materials Recovery Facility (MRF) ***AFTER*** being picked up by our refuse company, MG Disposal.

At the MRF, items which are placed in the trash and which can be recycled are placed on a conveyer belt and processed by CVT Recycling. The City feels that sorting the trash this way makes sure that recyclable materials are retrieved and not taken to the landfills along with the regular trash.

There are some guidelines that residents and businesses should follow in order to assist the MRF in retrieving recyclable items from the waste stream. First of all, make sure all *non-recyclable* items are bagged tightly before being placed in your waste containers. All ***recyclable*** items should then be placed loosely in your containers and prepare as follows: wipe or lightly rinse all cans and make sure they are dry, fold newspapers into brown paper bags or bundle with string into one foot stacks, break down corrugated cardboard boxes, rinse plastic and glass containers and remove metal or plastic rims and lids. (If plastic is recyclable, it will [illegible]ve a number on the bottom of the c[illegible]ainer.)

Do You Know Where The Water In Your Storm Drain Goes?

To The Ocean...

The Ocean begins at your front door!

Storm Water & Urban Runoff Pollution (SWURP)
And What You Can Do To Stop It!

CITY OF FULLERTON CALIFORNIA

Recycling...
It works because of you!

MOBILE DETAILING AND THE WATER QUALITY ACT

This flyer has been prepared at the request of the mobile detailing industry to provide direction with regard to compliance with the federal Water Quality Act of 1987.

Orange County Stormwater Program
10852 Douglass Rd.
Anaheim, CA 92806

lerton

Re

(Turn over for English version.)

For More Information...

Questions regarding this notice may be directed to:

The Orange County Public Facilities and Resources Department's Stormwater Section at (714)567-6363

Or

Pavlova Vitale of the Santa Ana Regional Water Quality Control Board at (909) 782-4130

ORANGE COUNTY • STORMWATER • PROGRAM

WHAT IS CONSTRUCTION AND DEMOLITION DEBRIS?

C&D debris is material generated in the construction and demolition of buildings and roads. According to the California Integrated Waste Management Board, C&D debris makes up approximately 28% of the state's waste stream. Orange County businesses generate large

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Preparing Trash for Recycling, Yard Waste	4-5
Special Services	6
Household Hazardous Waste	6
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Customer Service

Call MG Disposal at (714) 238-3300

1131 N. Blue Gum St. • Anaheim, California 92806

MG Disposal Customer Service hours are

Monday - Friday, 7:00 AM to 5:30 PM

Saturday (for phone calls only) 7:00 AM to 3:00 PM

• Residential Containers • Roll Off Services
• Construction Containers • Portable Storage Containers
• Public Dump & Recycling Center • Bulky Item Collection

Fullerton City Hall (714) 738-6300

RECYCLING... as easy as 1-2-3

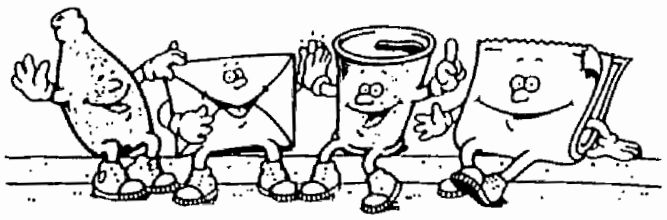

Printed on Recycled Paper

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Construction and Demolition Debris Facilities

Introduction...

The City of Fullerton takes a unique approach to waste disposal with ***Recycle Fullerton***, an innovative program that recovers recyclables from the waste stream and includes a separate yard waste program. In a joint effort by the City and MG Disposal, ***Recycle Fullerton*** is designed to reduce the volume of waste dumped in our local landfills and to conserve our natural resources.

By participating in ***Recycle Fullerton***, residents have the chance to significantly help decrease the amount of trash buried in local landfills and to help the City comply with the state's strict recycling laws. According to Assembly Bill 939, each city must reduce their waste by 50 percent by the year 2000. The ***Recycle Fullerton*** program allows the City to recycle many types and greater quantities of recyclable items and yard waste, instead of dumping it in the landfill. Recycling allows us to conserve our country's natural resources by providing alternative sources for aluminum, paper, glass, plastics and other recyclable items.

How It Works...

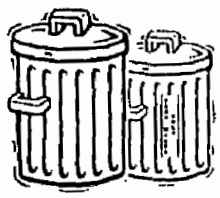

The ***Recycle Fullerton*** program was designed with you in mind and requires very little extra effort. The waste generated from residents and businesses is taken to the CVT Material Recovery Facility in Anaheim. There the waste travels through a system of conveyor belts, magnets and sifting devices and the recovered recyclable material is then manually sorted and bundled into bales for shipping.

The separated yard waste is collected from containers marked by the resident with "yard waste only" stickers. MG Disposal sends separate trucks to collect only yard waste. The yard waste is taken to the CVT Material Recovery Facility and prepared for compost, mulch or a variety of other uses. For your added convenience, regular household trash and yard waste will be collected on the same day each week.

To make ***Recycle Fullerton*** a success, please follow the guidelines outlined within this booklet and adopt the new disposal practices. Your participation and support of ***Recycle Fullerton*** is a big step towards solving our waste problems now and into the future. *Recycling... it works because of you!*

Bulky Item Collection

To aid in the disposal of large, bulky items such as furniture, stoves, and water heaters, MG Disposal provides a FREE bulky item pick up service. These special collections are provided on the same day of regular collection service. To inform MG Disposal of a bulky item pick up, call our Customer Service Department at (714) 238-3300. Please be prepared to list the items you need picked up. (A $31.00 charge is added for pick up of air conditioners and refrigerators due to special handling requirements of freon.)

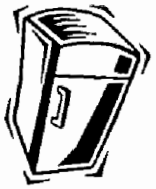

Temporary Rental Bins

MG Disposal offers clean up solutions for the house, garage, or yard. Residents can rent bins in a variety of sizes on a daily, weekly, or monthly basis for a fee. Prompt delivery and pick up are available on a scheduled basis. For more information call MG Disposal's Customer Service Department at (714) 238-3300.

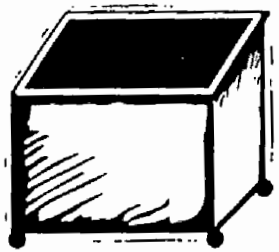

Household Hazardous Waste

Do your part to protect the environment. Dispose of old paint, pesticides, used motor oil, and household chemicals properly at a designated facility. Orange County residents can take "household hazardous waste" to a County Household Hazardous Waste Collection Center at 1071 N. Blue Gum St. in Anaheim. To locate additional FREE Collection Centers closest to you or for information call **(714) 834-6752.** To dispose only of used motor oil call the City's Used Oil Collection Program Hotline at **(714) 871-4OIL.**

1. What type of containers must be used?

Residents will use their own selected containers for trash and yard waste collection. Containers must not exceed a 40 gallon capacity. Residents should designate yard waste containers with the special "yard waste only" stickers provided by MG Disposal. Yard waste stickers should face the street where they are visible to the collection crew.

2. What should I do if I don't have enough trash containers for my trash?

MG Disposal will pick up an unlimited amount of trash left in household trash containers or tied plastic trash bags. If at times you have less yard waste and more trash, simply place the extra trash in your yard waste container with the sticker facing away from the street, so that it is not visible to the collection crew.

3. What should I do if I don't have enough yard waste stickers for my containers?

If you fill your yard waste containers and still have more yard waste, you should use additional containers. Group the containers with yard waste away from your regular trash. Place containers with yard waste stickers facing the street so that the stickers are visible to the collection crew. Yard waste cannot be collected if it is placed in plastic bags.

4. What should I do on collection day?

Place your containers in the street at curbside, near the corner of your driveway. All containers must be at curbside or alley by 7 AM or earlier on your collection day. Also, please check your containers before removing them from the curb, as the yard waste containers will be emptied by a separate truck.

Basura recicable

Estos pasos sensillos asistarán el recogimiento y el proceso de reciclables. Por favor úse estos pasos cuando tira su basura:

- **Periódico** — Coloquelos en una bolsa abierta en su recipiente de basura.

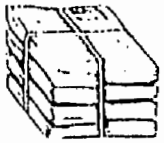

- **Papél mezclado/ cartón** — Coloquelos en una bolsa abierta o sueltos en su recipiente de basura.
- **Jarros de vídrio** — Tienen que estar vacío. No tiene que quitar los sellos.

- **Botes de aluminio** — Tiene que estar vacío. No tiene que estar aplastado.
- **Plástico** — Recipientes transparentes o de color de plástico tienen que estar vacíos.

- **Metál** — Recipientes y botes de metál tienen que estar vacíos. No tiene que quitar los sellos.

Basura que no puede ser reciclada

Estos artículos deberían de ser puestos en bolsas cellados ántes de colocarlos en los recipientes de basura.

- Desechos de baño

- Desechos de camas de gatos
- Desechos de alimentos

- Pañales desechables
- Ropa

- Papél de cera
- Jugetes de plástico

Desechos de Yarda

007466

Coloque las etiquetas engomadas que dicen "Yard Waste Only" en los recipientes que va usar para los desechos de yarda. Los desechos de yarda deberían estar sueltos en los recipientes designados para desechos de yarda. No se ponen en bolsas de plástico.

Desechos de yarda aceptable

- Zacate y hojas (suelto, no en bolsas)
- Ramas podadas y maleza
- Retoños y ramas pequeñas (Pueden ponerse en bulto, no mas de 4 pies o menos de largo y no exceder 16 pulgadas de diámetro.)

Desechos de yarda no aceptable

- Desechos de animales y de alimentos
- Residuos de construcción
- Tierra y piedras
- Hojas de palma
- Bolsas plásticas

Importante Puntos Claves - Desechos de Patios y Jardines

- Se consideran desechos de Patios y Jardines solamente la vegetación que crece en ellos (desecho "verde").
- Recorte las ramas podadas para ampliar la capacidad del recipiente.
- NO empaque el desecho de patios y jardines en bolsas plásticas de basura. Coloque una hoja de papel periódico en el fondo del recipiente, evitando así que el zacate se adhiera a éste.

¿Porqué Reciclar?...

El residente americano desecha un promedio de 4 1/2 libras de basura al día. Anteriormente, la mayor parte de esta basura era enterrada en terrenos de relleno. Hoy en día, esos terrenos se están llenando demasiado rápido. El reciclar es uno de los métodos más fáciles para reducir la cantidad de desechos destinados a los terrenos de relleno. A su vez, el reciclar ayuda a estabilizar las tarifas de colección de basura, pues controla el volúmen de desechos depositados en terrenos de desechos.

REPRESENTATIVE PUBLIC EDUCATION MATERIALS

CITY OF GARDEN GROVE

One person's trash could be another person's treasure! The next time you have clothes, furniture, or other household items to get rid of, give them to a thrift store rather than sending them to the landfill. By fostering the reuse of products, you help save resources and valuable landfill space, while providing inexpensive goods to people who want them. Some thrift stores even offer free collection service. In addition, circulars such as the Pennysaver, (800) 995-3333 and the Recycler, (714) 449-2900, offer free listings of services for private parties with merchandise under a certain value to sell (usually about $100).

This **Thrift Store Directory** is a public service, and is not an endorsement of stores by the City of Garden Grove or its departments.

This list of thrift stores will be up dated periodically. Please keep us informed of thrift stores that are not listed and would like to be included.

Provided as a public service by:

City of Garden Grove

☎ (714) 741-5554

Printed on recycled paper

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Garden Grove
And Area

Thrift Store Directory

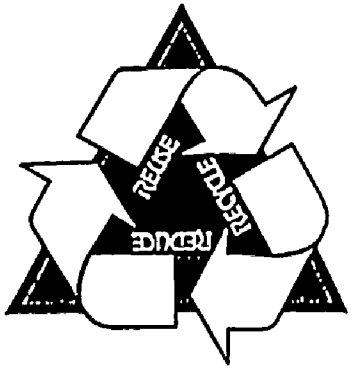

- ❑ Pipe
  - Used
- ❑ Plastics
  - Scrap

RRR

- ❑ Rackets
  - Restringing & Repairing
- ❑ Ranges & Ovens
  - Dealers - Used
- ❑ Re-Sale Clothes
- ❑ Recycling Centers
- ❑ Rendering Companies
- ❑ Rubbish Containers & Hauling

SSS

- ❑ Safes & Vaults
  - Used
- ❑ Salvage Merchandise
- ❑ Salvage Merchandise Buyers
- ❑ Sawdust & Shavings
- ❑ Scrap Metals
- ❑ Second Hand Stores
- ❑ Sewing Machines
  - Service & Repair
- ❑ Sharpening Service
- ❑ Shoe Repairing
- ❑ Shoes
  - Used
- ❑ Slag
- ❑ Sporting Goods
  - Repairing
- ❑ Surplus Merchandise
- ❑ Swap Meets & Shops

TTT

- ❑ Thrift Shops
- ❑ Tire Recapping, Retreading & Repair
- ❑ Tire Shredding
- ❑ Tools
  - Repairing & Parts
- ❑ Trash Removal Services
- ❑ Truck Equipment & Parts
  - Used & Rebuilt

UUUU

- ❑ Upholsterers

WWWW

- ❑ Washing Machines & Dryers
  - Dealers - Used
- ❑ Waste Paper
- ❑ Waste Reduction, Disposal & Recycling

ZZZ

- ❑ Zippers
  - Repairing & Replacing

Provided as a public service by:

City of Garden Grove
Integrated Waste Management
13802 Newhope St.
Garden Grove, CA 92843
(714) 741-5554

Printed on recycled paper

DON'T TRASH IT!

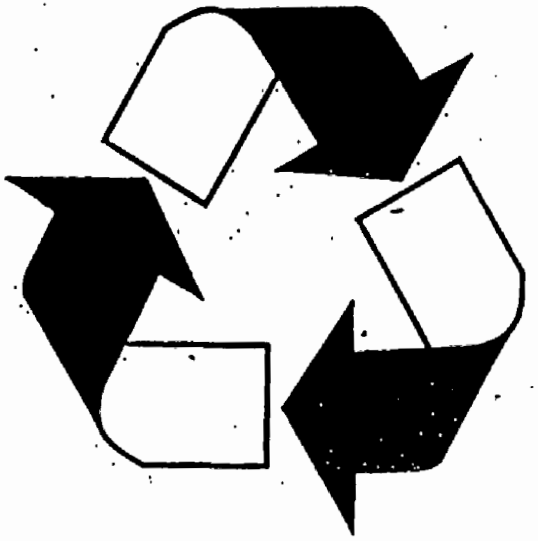

REUSE IT!

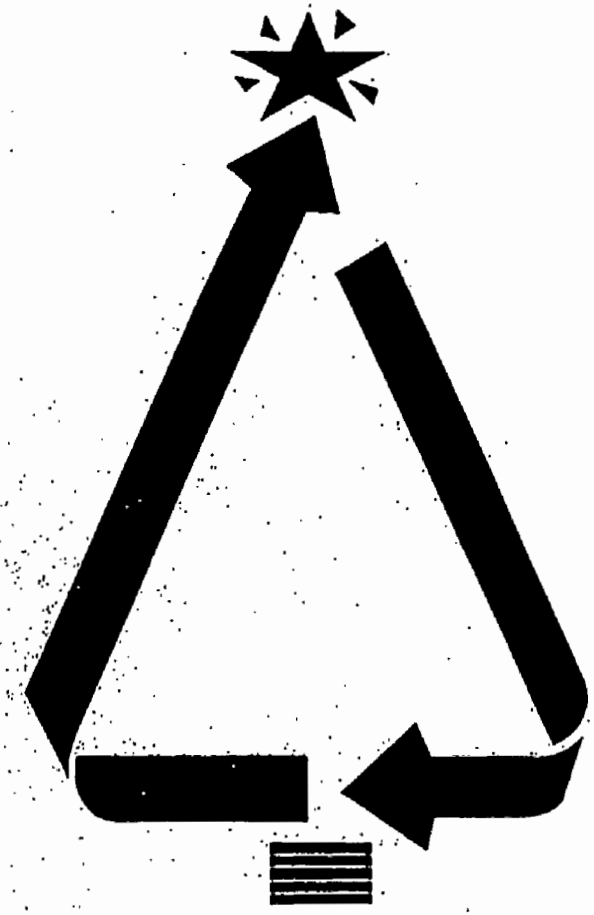

PEACE ON EARTH

Christmas Holiday Ways to Recycle

Printed on Recycled Paper

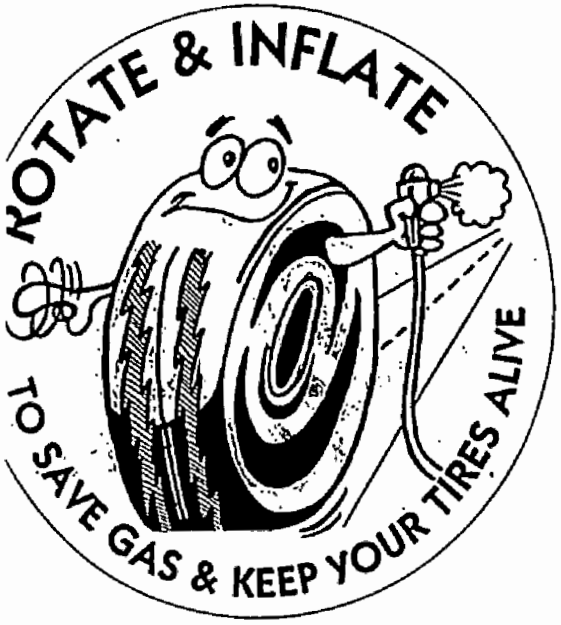

Sponsored by

Ventura County Solid Waste Management Department

California Integrated Waste Management Board

Local Government Commission

AND

GARDEN GROVE

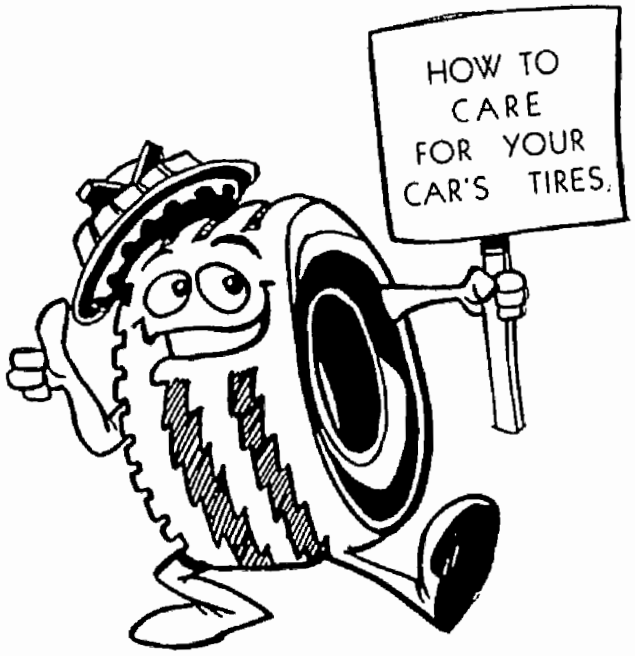

Don't Let Your Tires Get Tired

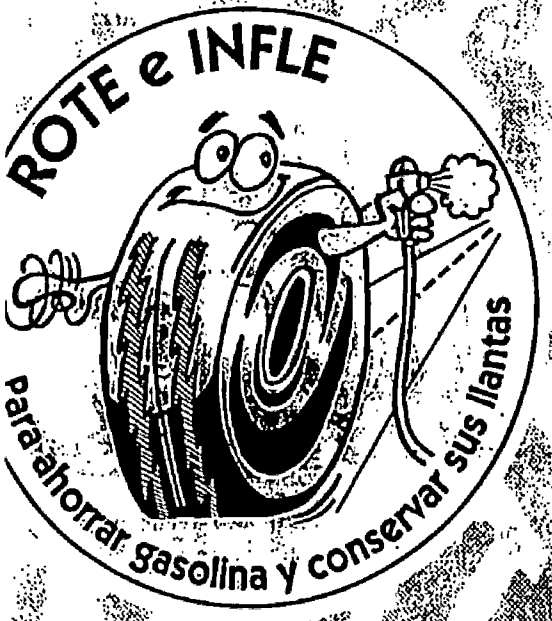

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Patrocinado por

Ventura County Solid Waste Management Department

California Integrated Waste Management Board

Local Government Commission

y

GARDEN GROVE

No Permita Que Sus Llantas Se Desgasten

Provided as a public service by:
The City of Garden Grove
Waste Management Division
13802 Newhope Street
Garden Grove, CA 92843
(714) 741-5389

Printed On

007473

LEAVE LESS BEHIND FOR THE FUTURE

NATURE'S WAY TO RECYCLE

VOLUME 10 AN ANNUAL RECYCLING NEWSLETTER FOR CITY OF GARDEN GROVE SANITARY DISTRICT RESIDENTS WINTER 1999

Residents Approach 2000 with Recycling Success

Residents of Garden Grove Sanitary District approach the new Millennium with recycling success. In 1999, your efforts helped the City of Garden Grove Sanitary District recycle over 31,972,272 pounds of recyclable material.

As we draw near the turn of the century, we meet recycling challenges set by the state of California with great success. In 1989, Assembly Bill 939 mandated each city to reduce their amount of waste by 50 percent by the year 2000. By participating in ***Recycle Garden Grove Sanitary District***, the city is poised to smoothly meet the state's challenge. But we should not stop there. With or without state mandated laws, the Earth's resources are still precious and landfill space is still limited. What can we do in addition to recycling to make our community healthier? We can take the next step in preserving our environment: we can focus on reuse.

Reuse vs. Recycle

There are subtle but important differences between reuse and recycle. Recycling means taking a product, such as a aluminum can, deconstructing it, and using the materials to remanufacture something new. Although this is greatly preferred over starting from scratch, it is clear that if you don't have to spend the time, energy, or resources deconstructing and remanufacturing a product, you are saving resources.

Reuse is the process of taking idle goods and materials and reemploying them in a manner that does not require altering their original form. Reuse can also mean just reusing something over and over again. Popular examples of reusable goods include cloth shopping bags; plastic insulated coffee mugs and eraser boards.

The Benefits of Reuse

The benefits of reuse are as plentiful as the diversity of reuse options. By reusing items instead of disposing of them, we are saving landfill space. But equally important, there is no need to spend energy or raw materials to manufacture new items. Reuse not only saves resources, but also puts materials into the hands of those in need like schools, community organizations, and businesses. Reuse allows us to save money and contribute to our community.

Recycling ... it works because of you!

AT WORK:

- Use both sides of paper
- Donate unneeded clothes and toiletries
- Donate used magazines, journals and publications
- Sell or donate old furniture
- Bring your lunch in a reusable container

IN THE COMMUNITY:

- Shop at thrift stores
- Support local yard sales
- Coordinate a community rummage sale

Q & A

Q. What should I do if one of my containers gets damaged?

A. If your container is damaged, contact our Customer Service Department at 238-2444. Damaged containers will be repaired or replaced at no charge, unless the damage is due to negligence or abuse.

Q. If I have service questions, whom do I call?

A. For questions regarding your service, call our Customer Service Department at 238-2444. We are open Monday - Friday from 7:00 a.m. - 5:30 p.m., and Saturday, for phone calls only, from 7:00 a.m. to 3:00 p.m.

Q. How do I dispose of household hazardous waste?

A. The County of Orange operates a FREE household hazardous waste collection center at 1071 N. Blue Gum Street in Anaheim. Call the H.H.W. hotline for days and hours: (714) 834-6752.

Q. I have a hard time maneuvering my trash containers, can I get a smaller one(s)?

A. If it is difficult for you to maneuver your containers as a result of a physical disability or if you are a senior citizen, you may call our Customer Service Department at 238-2444 to arrange for assistance.

GRASSCYCLING
Simply a Terrific Idea

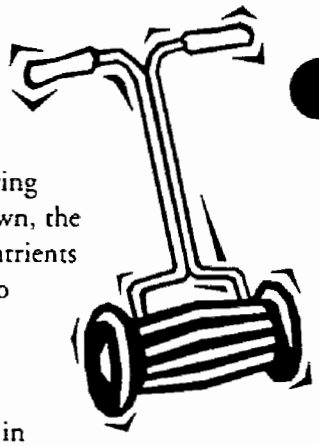

It seemed like a good idea at the time: attaching a grass catcher to your mower. But, as it turns out, leaving those clippings over the lawn is actually better for the lawn, the environment and you. For starters, it returns valuable nutrients back to the soil. Grass consists of 80-85 percent water, so essentially you get an irrigating effect too. Grasscycling conserves water and limited landfill space as well.

More good news. Grasscycling hands you a nifty refund in the form of time and money. It will take you less time to mow the lawn if you leave the clippings on the grass. Plus, with the nutrient benefits of the grass clippings, you'll spend less money on fertilizer and water.

So now that you are more familiar with the benefits of grasscycling, give it a try. For more information on how you can help the environment, call 1-800-CLEANUP.

Help Shopping Carts Find Their Homes

Help a stray shopping cart find its way back home. You can help reduce clutter in our neighborhood by reporting stray shopping carts that have been abandoned.

- If the cart has a label, call the telephone number provided.
- If the cart does not have a label or is not picked up within 24 hours from the time it was reported, call the City of Garden Grove's Shopping Cart Hotline at 741-5053.

STORM DRAINS & HOUSEHOLD HAZARDOUS WASTE
What's the Problem?

Did you know that water flowing down driveways and streets and into gutters goes into a storm drain which flows directly to a lake, river or the ocean? This water may pick up pollutants which are never treated. Most of the pollutants consist of Household Hazardous Waste, or H.H.W. Some common contaminants include motor oil, pesticides, pet wastes and paint. When these items are improperly disposed of into our storm drains, they can be harmful to our drinking water, recreational use and wildlife. But there are ways you can prevent storm water pollution. You can take your H.H.W. to a local FREE collection center. Call the County operated H.H.W. hotline for times and locations: (714) 834-6752.

FREE PICK UP SERVICE FOR USED OIL

Just one gallon of oil will pollute one million gallons of water

Recycling is the only environmentally safe and legal method to dispose of used oil. In Garden Grove, there are two ways to recycle used oil **FREE!** One of the easiest ways to recycle your used oil is through the **Residential Used Oil Collection Program**. This program allows you to have your used oil collected directly from your home. After you change your motor oil, simply pour the used oil into a plastic container with a secure cap. On the pre-scheduled day, place the container by your front or garage door. The used motor oil, container(s), used oil filters, and oily rags will be collected. There is a limit of five (5) gallons per home on each pick up, and pick ups will be available every two weeks. To schedule a convenient pick up day, call the **Used Oil Hotline:** (714) 289-7661.

Another easy and convenient way to recycle used oil is to take it to a State Certified Used Oil Collection Center right here in Garden Grove. These centers will accept used oil from the public during normal business hours. Call the center to confirm hours of operation and the amounts accepted. The service is **FREE!** In fact, a $.16 per gallon incentive will be offered. To locate the certified center nearest you, call (714) 289-7661.

Residents of Garden Grove Qualify for FREE Toilet Upgrades

The Metropolitan Water District of Orange County is currently offering an Ultra Low Flush Toilet (ULF) Retrofit Program. Under this program Garden Grove Sanitary District customers can recycle their old water-wasting toilet and get a brand new water efficient model at not cost (limit 3 per household).

Program Requirements:

- Participants must provide the dimensions from the wall to the toilet bolts and a current water bill.
- New toilets must be installed at the address designated on application - no exceptions (applications provided when toilets are delivered).
- Participants are responsible for installation (seniors, 65 and older, are eligible for two free installs).
- To avoid a $100 program cost charge, participants must return one old toilet for each new toilet received.
- Program sponsor reserves the right to verify installation through visual on-site inspections.

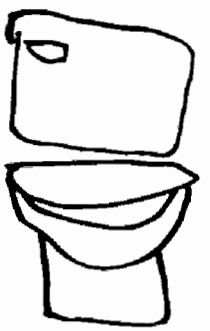

For more information on the Ultra Low Flush Toilet Retrofit Program, call 1-800-424-8538.

County Sponsors New Landscape Performance Program

The organic material is ideal for mulching, amending to improve the health and appearance of valuable land scapes. To combat the increasing amount of green waste the County of Orange is sponsoring a new Landscape Performance Certification Program. The program is available to all businesses, public agencies, parks, schools and home owner associations. We will help every landscape and property manager develop more efficient landscape practices and in turn, help reduce green waste for our owners, says Tom Ash, project coordinator and horticultural consultant. Getting started in the program is easy. Call Tom Ash at CTSI Corporation, (714) 669-4303 or send an e-mail to toma@ctsicorp.com.

Remember to Remove 'Em

By being a good neighbor and remembering to remove your trash and recycle containers on collection day, you will be helping to keep your neighborhood looking neat and clean.

Sanitary District Ordinance 3592 requires that after trash containers have been emptied, they are to be removed from the curb on the same day, and placed in an area not visible from the public street.

HOLIDAY COLLECTION

Your regular pickup day for trash and recycling during the holidays will not change unless your collection day falls on one of only six holidays.

CHRISTMAS DAY: Saturday, December 25, 1999.
Trash collection services will not be affected.

NEW YEAR'S DAY: Saturday, January 1, 2000.
Trash collection services will not be affected.

MEMORIAL DAY: If your collection day falls on Monday, May 29, your trash will be collected on Tuesday, May 30. If your collection day falls on any other day than Monday, your service will not be affected.

INDEPENDENCE DAY: If your collection day falls on Tuesday, July 4, your trash will be collected on Wednesday, July 5. If your collection day falls on any other day than Tuesday, your service will not be affected.

LABOR DAY: If your collection day falls on Monday, September 4, your trash will be collected on Tuesday, September 5. If your collection day falls on any other day than Monday, your service will not be affected.

THANKSGIVING DAY: If your collection day falls on Thursday, November 23, your trash will be collected on Friday, November 24. If your collection day falls on Friday, November 24, your trash will be collected on Saturday. If your collection day falls on any other day than Thursday or Friday your service will not be affected.

Recycle Your Christmas Tree

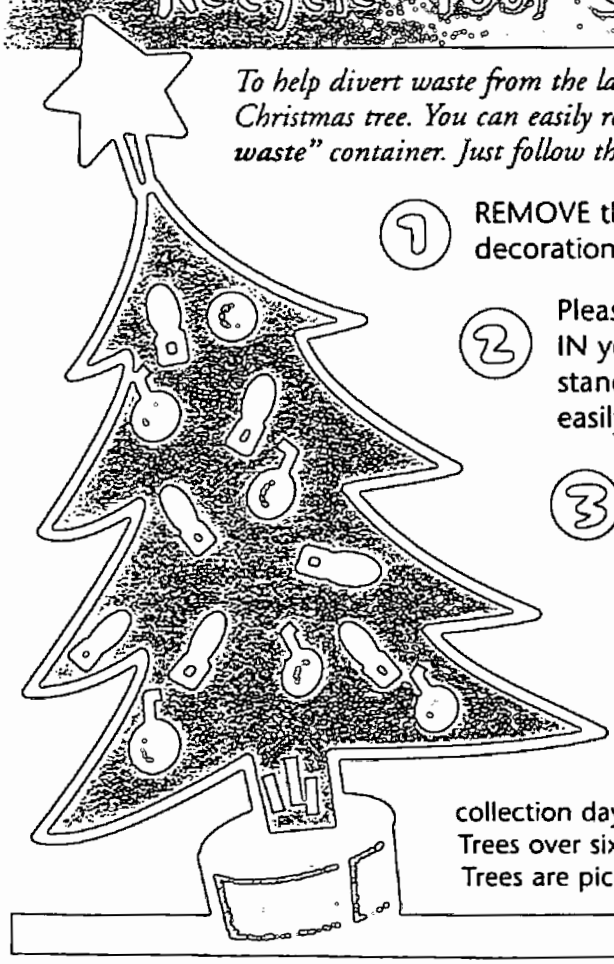

To help divert waste from the landfill, the city asks you to recycle your Christmas tree. You can easily recycle your tree ***in your brown "yard waste"*** *container. Just follow these three simple steps:*

1. REMOVE the TREE STAND (wood or metal), decorations and tinsel from your tree.
2. Please CUT UP your TREE* and PLACE IN your BROWN CONTAINER (no tree stands please). The pieces should fit easily in your container.
3. PLACE your BROWN CONTAINER AT THE CURB along with your other containers on your regular collection day.

*If you're unable to cut up your tree and put it in a brown container, place the tree at the curb for pick up on your regular collection day from December 27 until January 7. Trees over six (6) feet tall must be cut in half. Trees are picked up by a special collection truck.

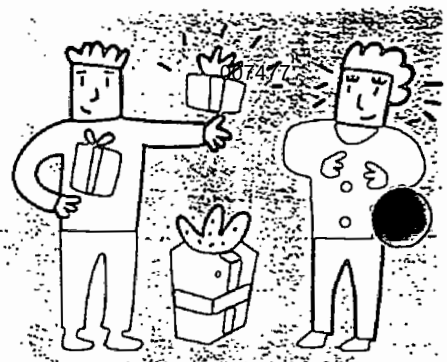

Waste Wise Holiday Greetings

Did you know that 2.65 billion Christmas cards sold each year in the U.S. could fill a football field 10 stories high? If we each sent one card less, we'd save 50,000 cubic yards of paper. Here are some good ideas to reduce the amount of waste from holiday cards.

- Send electronic greetings to family and friends who are on-line.
- Save yourself some time, money and hard feelings between friends – and reduce mail volume by updating and paring down your holiday mailing list.
- Be creative. Instead of buying place mats or table decorations, make your own. Cut old cards into shapes and press between two pieces of clear contact paper.
- Make gift tags from last years holiday cards, or use them as name tags for arranged seating at formal dinners.

WHAT WHERE?

Save this list of accepted recyclables (green can) and non-recyclables (black can) as a guide for separating your trash.

Non-recyclable...

- Animal waste
- Bathroom waste
- Carbon paper
- Carpet
- Car parts
- Cat litter
- Cigarette butts
- Dirt/cement/rock (do not fill more than 1/3 of container)
- Disposable diapers
- Drinking glasses
- Electronics
- Flooring
- Food waste
- Freezer/refrigerator food boxes
- Furniture
- Glass and ceramic plates/cups
- Liquid waste
- Light bulbs
- Mirrors
- Needles (sealed in thick plastic container)
- Old clothes/shoes
- Plastic toys
- Rags/sponges
- Tires
- Toothpaste tubes/pumps
- Soiled paper plates
- Waxed paper
- Window glass
- Yard waste (can be composted)

Recyclable...

- Aerosol cans (completely empty)
- Aluminum cans (do not crush)
- Aluminum foil
- Beverage cans
- Bottle caps
- Brochures
- Cardboard
- Cereal boxes (remove inner lining)
- Computer paper
- Drink boxes
- Egg cartons (cardboard and foam)
- Foam cups/plates (unsoiled)
- Food cans
- Frozen food boxes (no wax coating)
- Glass bottles/jars
- Juice cartons
- Junk mail/coupons
- Laundry bottles
- Ledger paper
- Magazines
- Metal coat hangers
- Milk type cartons
- Newspapers
- Paint cans (only empty, dry cans with lids off)
- Paper/paper tubes
- Phone books
- Pizza boxes
- Plastics (#1- 6)
- Plastic bottles (small mouthed)
- Plastic containers
- Plastic cups/plates
- Plastic utensils
- Plastic milk jugs
- Tin cans
- Used envelopes (includes plastic windows)
- Wrapping paper

Questions or comments? Call the Customer Service Department at (714) 238-2444

007478

Household Hazardous Waste

Dispose of properly at a free Collection Center

HAZARDOUS HOTLINE
(714) 834-6752

Oil / latex paint
Automotive products (battenes, oil, anti-freeze)
Household cleaners
Pesticides / herbicides
Hobby and pool supplies

Yard Waste Collection

(for residents with brown containers)

- **Grass** (loose, not bagged)
- **Leaves** (loose, not bagged)
- **Prunings** (NO palm fronds)
- **Twigs & small branches** *(4 inches or less in diameter and 3 feet or less in length)*
- **Weeds** (loose, not bagged)
- **Vegetation** (from the yard)

HELPFUL TIPS

- Place a sheet of newspaper in the bottom of the brown container to prevent sticking.
- Do not place any yard waste in plastic bags. Plastic bags are not compostable and they will contaminate the yard waste.
- Cut up trimmings to increase the amount of yard waste that fits in the brown container.

HERE'S YOUR ANNUAL UPDATE

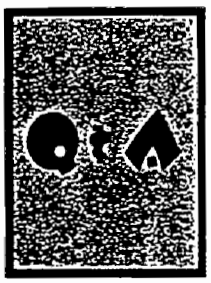

Questions & Answers

CHOOSE TO REUSE

WHAT GOES WHERE?

HOLIDAY COLLECTION

Recycle Your Christmas Tree

GARDEN GROVE DISPOSAL . P.O. Box 309 • Anaheim, CA 92815

1131 North Blue Gum Street Anaheim, CA 92805

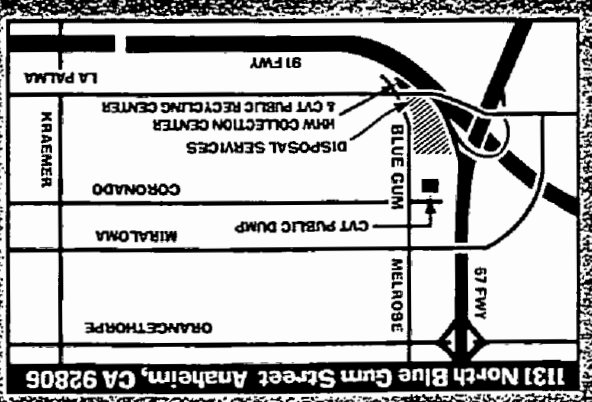

Para recibir informacion sobre el reciclamiento en español favor de llamar al numero (714) 238-3300.

Printed on recycled paper with soy-based inks

Bulk Rate
U.S. Postage
PAID
DMI

007480

You Can Make A Difference

Coloring Book

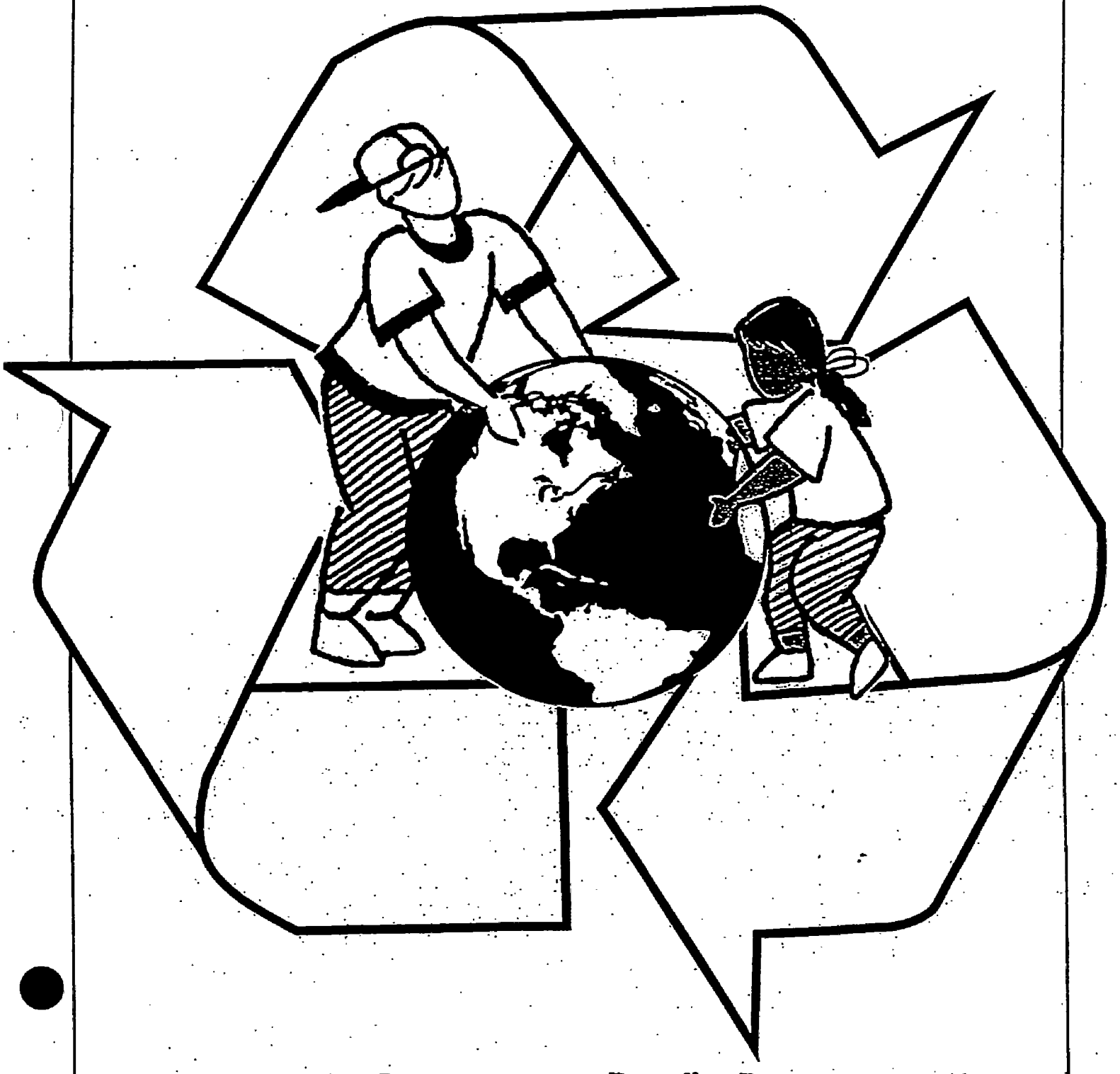

City of Garden Grove
Recycling Education Program

Recycling Resource Center at
The Garden Grove Regional Library

007481

Conserving Earth's Resources

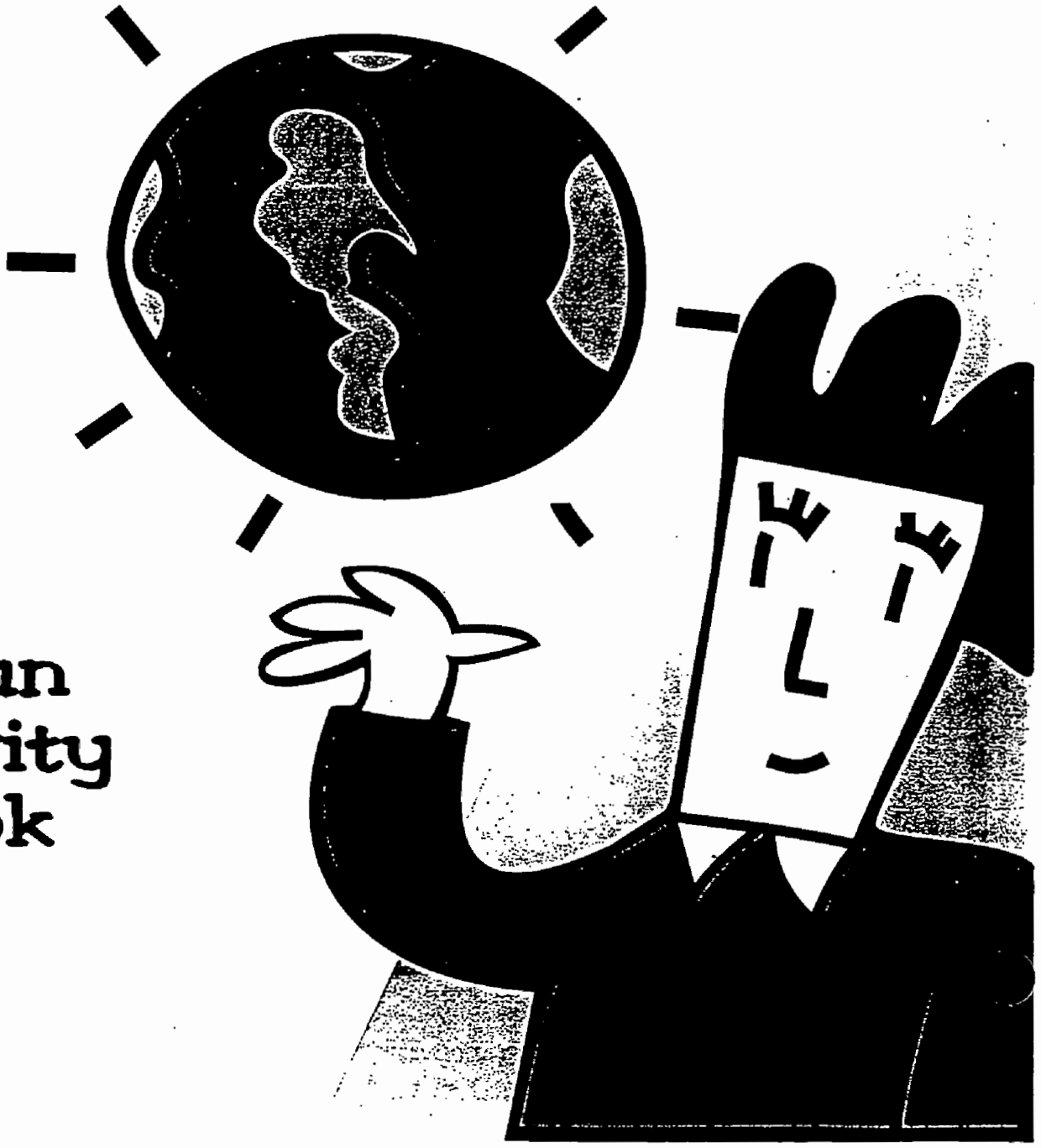

A Fun Activity Book

007482

CARE FOR THE EARTH

A Kid's Guide To Recycling

An Educational Activity Book

CONSERVING EARTH'S RESOURCES™

CVT RECYCLING
A DIVISION OF TAORMINA INDUSTRIES

1131 NORTH BLUE GUM STREET
ANAHEIM, CALIFORNIA 92806
(714)238-3300

What Goes Where?

Recycle Garden Grove

Save this list of accepted recyclables (green can) and non-recyclables (black can) as a reference.

Recyclable...

- Aerosol cans (completely empty)
- Aluminum cans (do not crush)
- Aluminum foil
- Beverage cans
- Bottle caps
- Brochures
- Cardboard
- Cereal boxes (remove inner lining)
- Computer paper
- Drink boxes
- Egg cartons (cardboard and foam)
- Foam cups/plates (unsoiled)
- Food cans
- Frozen food boxes (no wax coating)
- Glass bottles/jars
- Juice cartons
- Junk mail/coupons
- Laundry bottles
- Ledger paper
- Magazines
- Metal coat hangers
- Milk type cartons
- Newspapers
- Paint cans (only empty, dry cans with lids off)
- Paper/paper tubes
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- Wrapping paper

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- Cigarette butts
- Dirt/cement/rock
- Disposable diapers
- Drinking glasses
- Electronics
- Flooring
- Food waste
- Freezer/refrigerator food boxes
- Furniture
- Glass and ceramic plates/cups
- Liquid waste
- Light bulbs
- Mirrors
- Needles (sealed in thick plastic container)
- Old clothes/shoes
- Plastic toys
- Rags/sponges
- Tires
- Toothpaste tubes/pumps
- Soiled paper plates
- Waxed paper
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- Yard waste (can be composted)

Household Hazardous Waste

(Dispose at an Orange County Collection Center)

Oil / latex paint
Automotive products (batteries, oil, anti-freeze)
Household cleaners
Pesticides / herbicides
Hobby and pool supplies

County's Hazardous Hotline # (714) 834-6752

Yard Waste

(For residents with brown containers)

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- **Leaves** (loose, not bagged)
- **Prunings** (NO palm fronds)
- **Twigs & small branches** *(4 inches or less in diameter and 3 feet or less in length)*
- **Weeds** (loose, not bagged)
- **Vegetation** (from the yard)
- **Christmas tree** (cut up)

HELPFUL TIPS

- Place a sheet of newspaper in the bottom of the brown container to prevent sticking.
- Do not place any yard waste in plastic bags. Plastic bags are not compostable, and they will contaminate the yard waste.
- Cut up trimmings to increase the amount of yard waste that fits in the brown container.

Questions or comments? Call the Customer Service Department at (714) 238-2444

Where Can I Take My Old Tires?

Old tires cannot simply be thrown into the trash, or left in illegal stockpiles.

The following businesses and public landfill accept old tires for disposal. Remember, only four tires can be legally hauled without permits. Anyone hauling five or more tires must have the appropriate permits as issued by the State of California.

In Garden Grove and Area.....

Gordon Tire Company
7031 Garden Grove Blvd., Garden Grove
714/898-2696
$1.00 /Tire Disposal Fee
(maximum four tires)
$1.75/Tire Fee for pick-up

Ecology Tire CO
1881 Crystal St., Huntington Beach
714/848-8260
$2.00/Tire Disposal Fee

Brea Olinda Landfill
57 Freeway North
Exit Imperial - East
North on Valencia until it ends.
714/834-6752
$10.00 for 1-4 tires
$55.50 per ton (5 or more tires)

Where Can I Take Household Hazardous Waste?

For Orange County residents....

Anaheim Regional Collection Center
1131 Blue Gum Street
Located between the 91 & 57 Fwys at the corner of La Palma Avenue and Blue Gum Street in Anaheim

Huntington Beach Regional Collection Center
17121 Nichols Street
Located next to Rainbow Disposal at the cross streets Beach Blvd. and Warner in Huntington Beach

San Juan Capistrano Regional Collection Center
Prima Deshecha Landfill
Take the Ortega (74) Hwy exit from the 5 Fwy in San Juan Capistrano to La Pata Avenue.

Collection Centers will accept old paint, solvents, pesticides, pool chemicals, used motor oil and used automotive batteries at no cost. The Centers are open Tuesday - Saturday, from 9 a.m. to 1 p.m., and are closed on rainy days.

For more information, please call the County Hazardous Hotline at 714/834-6752.

Provided as a public service by the California Integrated Waste Management Board and the City of Garden Grove and is not an endorsement of stores by either party.

Winter Wonderland

See Some Snow, See Some Snow, See Some Snow

Atlantis Park will be transformed into a frosty funhouse when the Winterfest Carnival takes over on Saturday, December 4, from 10 a.m. to 3 p.m. Kids will delight in a snow play area, a snow hill for sledding, craft booths to make presents and ornaments, and games and contests. And, of course, Santa will be on hand taking requests.

This once-a-year event is $4 per person. Atlantis Park is located at 9301 Westminster Avenue. For more information, call Community Services at 741-5200.

Don't Trash That Tannenbaum

Pine Pick-Up As Easy As 1-2-3

To help divert waste from the landfills, recycle the holiday tree. Here's how:

1. Remove the stand, decorations and tinsel.
2. Cut up the tree and put it in your brown trash container. Trees over six feet need to be cut in half.
3. Put the brown container at the curb on your regular collection day.

If you're unable to cut up the tree, place it at the curb for pick-up on your regular collection day between December 27 and January 7.

Green Is Good

Keep That Tree The Tops

They're common sense safety tips, but they bear repeating, because, sadly, every year fires are caused by unattended tannenbaums. So, remember these:

- Keep water in it.
- Get the tree in the house late - get it out early.
- Keep candles away from it.
- Don't put it near heating vents.

Stick It!

In this issue, look for your complimentary Garden Grove bumper sticker. It comes courtesy of the Garden Grove Community Foundation - the non-profit fundraising arm for the Renaissance Garden Grove program - developed to promote the progress and spirit of the community.

If you'd like to contribute to the Foundation, look for the insert card inside this newsletter or call 741-5280.

Renaissance Garden Grove

City Calendar

- City Hall Closures
  November 12, 25, 26
  December 10, 24
  January 3, 2000
  January 7, 21
- Volunteer Paint-Outs
  November 6, 12, 20
  December 4, 10, 18
- Speaker Series
  Jim Rohn
  November 18 - Noon
  Community Center
  11300 Stanford Avenue
  Tickets: $20
  544-5679
- Speaker Series
  Dr. Leonard Olguin
  December 1 - Noon
  Community Center
  11300 Stanford Avenue
  Tickets: $20
  544-5679
- Winterfest Carnival
  December 4
  Atlantis Park
  9301 Westminster Avenue
  10 a.m. - 3 p.m.
  $4 per person
- Spark of Love Toy Drive
  Month of December
  All seven Fire Stations
  741-5600

GARDEN GROVE

Cityworks

007485

GARDEN GROVE CITY HALL November 14, 1905

The Garden Grove Newsletter • November 1999

'Tis The Last Season of The Century

The Holidays Are Here & Here Comes The Millennium!

December 31, 1999 ... 11:59 p.m... a memorable moment in history - a new century will be upon us. How will you commemorate this once-in-a-thousand-year's event and are you prepared for any technical glitches which may occur? Here's an answer to both of those questions.

Leave A Legacy

This holiday season, why not give a truly unique gift with real staying power. Want a clue? It's red, made of clay, weighs about five pounds and has a personal message on it which you wrote. Need another hint? Okay, you won't have to wrap it, and lots of people will walk on it, including generations of your family.

It's a brick, and for $125, you and your loved ones can become a permanent part of the community through the Brick Walkway Project. Clusters of personally-inscribed bricks will be placed at 32 areas along Main Street beginning in January, running the length of the historic shopping plaza.

To purchase one, call 741-5280.

Going to Great Heights

Buy a brick this holiday season, and during the next one, see the result of your contribution. In December, 2000, a Millennium Clock Tower (pictured left) will be dedicated in the Village Green Park at the point where Euclid and Main Streets meet. This Mission-era, steel-crafted, 45-foot landmark will forever mark the Year 2000 for residents and visitors of Garden Grove.

A seven-foot marble obelisk inscribed with the names of Garden Grove Community Foundation sponsors will sit at the base of the Clock Tower, which will be encircled with glazed, colorful, inscribed tiles, also available for sale for $500 each.

Y2K - You Ready?

Free Seminar

If you'd like some helpful hints to prepare you for the Year 2000, attend a free seminar hosted by the City of Garden Grove on November 17, at the Community Meeting Center, from 5:30 to 7:30 p.m.

Representatives from companies like Pacific Bell, Southern California Edison, Emergency Management Systems, and Garden Grove Hospital will be on hand to answer questions and detail their preparations.

For more information, call 741-5280.

Inside . . .

Warm A Heart 2
Giving Back 2
State Of The City 3
Winter Wonderland 4

SAFETY NET

New Program Has Parents Talking

Do you know the names and phone numbers of your children's friends? Or their parents? These are two questions that developers of a new citywide program say some day soon every parent in the community will be able to answer "yes" to.

"Parent Networks - Keeping Our Kids Safe" is a self-help parenting tool designed to open communication among moms, dads and guardians, so that all become more aware of their kids' activities outside of the home and classroom.

The program was initiated in an effort to stem the rising tide of youth-related crime and injuries. Sponsors include the City's Community Services and Police Departments, the Garden Grove Unified School District, the Girls and Boys Clubs of Garden Grove and the Garden Grove Unified Council of Parent/Teacher Students' Association.

For more information about Parent Networks, call Community Services at 741-5200.

DEVELOPMENT DETAILS

A Lowdown On What's Going Up

Higher Learning

The City's downtown is looking a lot more upscale with the near completion of the second Higher Education building. Nicknamed "Ed 2," this sequel is sure to be a top-seller with students seeking to extend their education this fall.

Tenants include the University of LaVerne and Concord Career College, both of which will offer Bachelor's and Master's degrees in business and medical-related fields. Enrollment is sure to get cooking when the building's third tenant, the California Culinary Academy, opens its doors. This Garden Grove site becomes just the second such culinary academy in the state.

Big Screen Debut

Movie-lovers get ready to celebrate this fall when the Regal Cinema's 16-screen theater complex makes its Garden Grove debut at the Garden Promenade Center at Brookhurst and Chapman. Stadium-style seating and a state-of-the-art sound system are sure to make this development a blockbuster hit.

Fund-Raisers

By the end of the millennium, Harbor Boulevard in Garden Grove should be home to six more hotels. That's 2,400 hotel rooms and suites catering to Disneyland tourists and business travelers. More guests to Garden Grove means more revenue, in the form of bed tax, for the City's General Fund, which pays for public safety, clean streets and parks, and much more.

The Crowne Plaza - Just broke ground

The Renaissance Suites - Ground breaking set for late summer

Hampton Inn - Opening doors late summer

Hilton Garden Inn - Also set to start business late summer

Homewood Suites - Construction underway

Embassy Suites - Construction starting in September

STICK IT!

In this issue, look for your complimentary Garden Grove bumper sticker. For more stickers, stop by City Hall - they're for sale for $2 each.

FIRE FACTS

Be Water Wiser

Just days after City Fire Departments and the County Fire Authority launched their annual Drowning Prevention Education campaign at the beginning of the summer, tragedy struck - two children drowned - one in just inches of a bucket of water, the other in a spa.

The Garden Grove Fire Department urges you to remember the simple, life-saving tips listed below, and not just during the summer months, but year-round. Look for more prevention pointers in the next issue of *Citywork*s or call the Injury Prevention Program at (714) 834-2228 for a free brochure.

Safeguard Pool/Spa

- Remove toys and chairs from area
- Gates and doors should be self-closing and self-latching
- Add safety covers on doors and windows leading to water
- Use a non-climbable 5-foot fence children can't squeeze through

Be Emergency Prepared

- Learn CPR
- Install a backyard phone
- Keep rescue equipment nearby and teach everyone to use it
- Ensure all household members know how to swim and dial 911

POLICE DETAIL

Another Set of Eyes

Going on a trip this summer? The Police Department has someone to watch over your house while you're away, thanks to their Vacation Home Check program. A daily inspection of your property will be provided by members of the Department's Volunteers-In-Policing.

To take advantage of this free service, call the Police Department at 741-5704 on the day of your departure, no earlier.

"JUST BEAUTIFUL" "SIMPLY DELICIOUS" "CAN'T WAIT TO SEE NEXT YEAR'S"

- Overheard at Tour & Tea Event

The rave reviews are still coming in from the over 250 attendees of the 1999 Garden Tour & Tea held in June. The seven distinctly unique and enchanting Garden Grove backyards showcased for the event definitely impressed the guests, as did the authentic Victorian Tea held at the Courtyard Center.

Mark your calendars for the next Tour & Tea, set for Saturday, June 10, 2000. If you'd like to volunteer your backyard for consideration or if you'd like to serve on a panel of volunteer judges selecting next year's gardens, call Administrative Services at 741-5280.

DON'T DUMP 'EM -

It's Illegal!

Did you know that pouring anything but clean water into a gutter or storm drain is against the law? The City adopted a water quality ordinance two years ago prohibiting the placement of a laundry list of items into these kinds of receptacles. They include:

- Clippings, soil, fertilizer
- Trash, animal waste, paint
- Oil, antifreeze, radiator fluid
- Pool chemicals, detergents, cleaners

REMEMBER, THE OCEAN IS JUST A STORM DRAIN AWAY.

The Garden Grove Newsletter • August 1999

REPRESENTATIVE PUBLIC EDUCATION MATERIALS

CITY OF HUNTINGTON BEACH

The Ocean begins at your front door!

Storm Water & Urban Runoff Pollution (SWURP)
And What You Can Do To Stop It!

TRANSPORTATION AND HANDLING

- A maximum of 15 gallons or 125 pounds may be transported per vehicle, per trip (Department of Transportation regulation).
- Materials should be in original containers (except motor oil, fuels and antifreeze).
- All containers must have lids, be sturdy, non-leaking, and protected from breakage.
- Do not combine types of waste.
- Do not mix oil-base paint with latex paint.
- Dry out empty paint cans and discard in regular trash.
- If you wish to have a container returned (i.e. oil containers and boxes/crates used to transport materials), please notify the attendant in advance. Some containers may not be returnable.

WHY SHOP 'TIL YOU DROP?

VISIT THE STOP & SWAP!

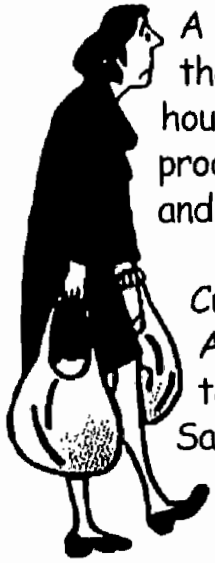

A unique and FREE program that allows you to drop off household, yard, and car care products you no longer need and pick up others you can use.

Currently available at the Anaheim and Irvine locations only. (Tuesday through Saturday, 9 a.m. to 1 p.m.)

FOR MORE INFORMATION ABOUT THE HOUSEHOLD HAZARDOUS WASTE COLLECTION PROGRAM AND THE STOP & SWAP CALL:

(714) 834-6752

Or see our webiste: www.oc.ca.gov/iwmd

Orange County Recycles!

Printed on r[illegible]ed paper.

Integrated Waste Management Department

007489

safe! easy! free!

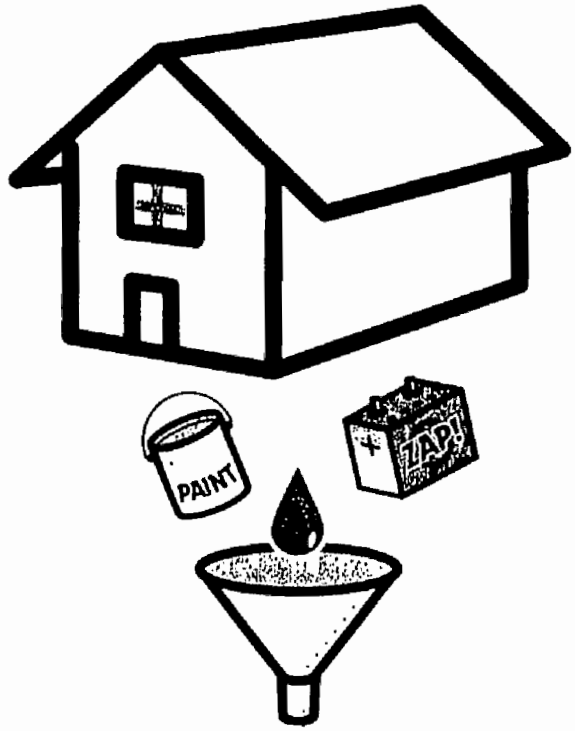

DISPOSAL OF HOUSEHOLD HAZARDOUS WASTE

Household Hazardous Waste Collection Program

007490

Blueprint for a Clean Ocean

Best Management Practices to Prevent Stormwater Pollution from Construction-Related Activities

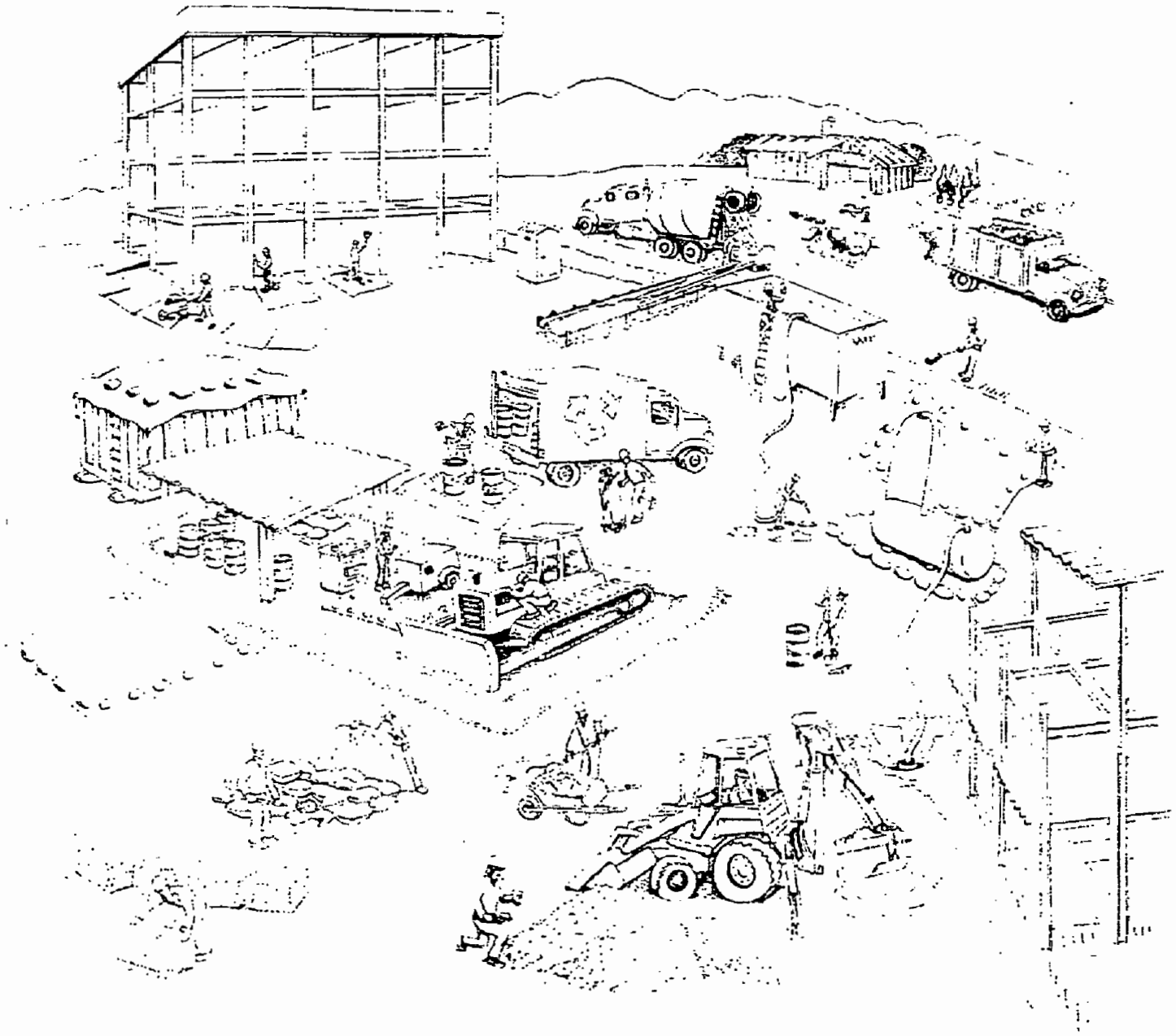

CITY OF HUNTINGTON BEACH

NO DUMPING • THIS DRAINS TO OCEAN •

This booklet has been developed as a resource for all general contractors, home builders, and subcontractors working on construction sites.

GOOD NEWS ABOUT RECYCLING

It works!
Every newspaper, aluminum can, glass bottle or plastic product recycled saves pollution, landfill space and valuable natural resources. Recycling in our community is easy to understand, effective, and involves you.

SCAVENGING

Scavenging is illegal and poses many problems, such as invasion of personal privacy, neighborhood theft, speeding vehicles and strewn trash. Please help your City uphold the law! When you observe scavengers at work, please record:

- ✓ vehicle description and license plate number
- ✓ description of scavenger and goods taken
- ✓ area/address of incident
- ✓ date/time of incident
- ✓ your name, address & phone #

Then, call:

- **536-5271 (HB incidents)** or
- **965-4483 (FV incidents)**

The Huntington Beach and Fountain Valley environmental education partnership is dedicated to providing the latest information about recycling and related programs. To learn more, call the City environmental affairs representative.

Huntington Beach — 536-5431
Fountain Valley — 965-4400

REMEMBER . . .

Individual and group tours of the Rainbow Recycling facility are available by calling (714) 847-3581.

Printed on recycled paper

OUR COMMUNITY RECYCLING PLAN

CITY OF HUNTINGTON BEACH

CITY OF FOUNTAIN VALLEY

HOUSEHOLD HAZARDOUS WASTE

Don't be a Household Hazardous Waste Generator...

You can make a Difference!

DO YOU HAVE

- Used Motor Oil
- Old Paint
- Solvents
- Pesticides
- Used Automotive Batteries
- Household Cleaning Products
- Pool Chemicals

IN YOUR HOME?

The County of Orange provides a ***FREE...***

HOUSEHOLD HAZARDOUS WASTE COLLECTION CENTER

Located at: Rainbow Disposal
17121 Nichols St., Huntington Beach
Hours: 9:00 A.M. to 1:00 P.M.
Tuesday thru Saturday
For Hazardous Waste Information
Call - (714) 834-6752

ENVIRONMENTAL EDUCATION TEAM

Earth-Friendly ideas for a brighter future...

City of Fountain Valley–Rainbow Disposal–City of Huntington Beach
P.O. Box 1026 – Huntington Beach, CA 92647

92

WHERE ARE WE GOING TO THROW IT...

WHEN THERE IS NO MORE AWAY?

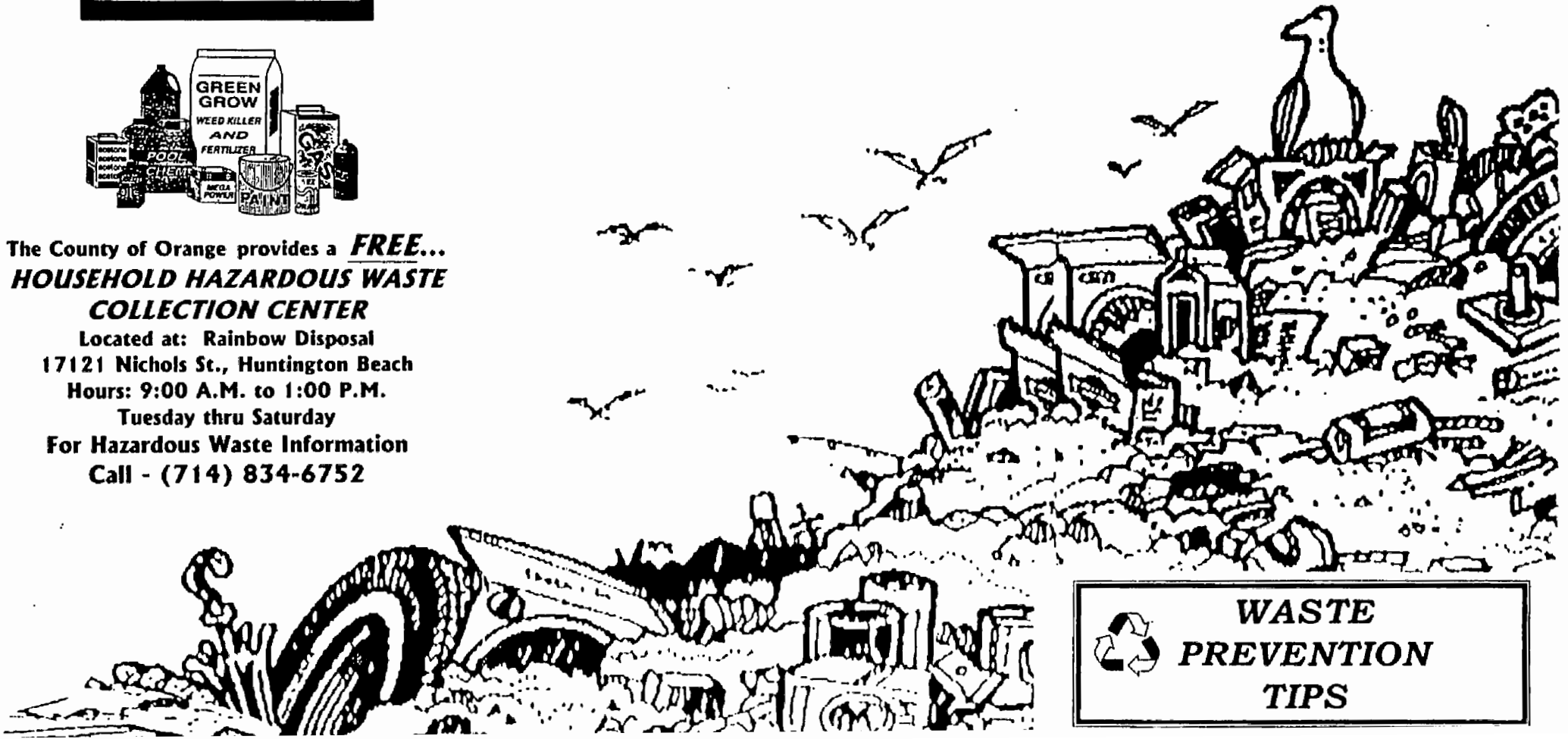

WASTE PREVENTION TIPS

WHAT IS CONSTRUCTION AND DEMOLITION DEBRIS?

C&D debris is material generated in the construction and demolition of buildings and roads. According to the California Integrated Waste Management Board, C&D debris makes up approximately 28% of the state's waste stream. Orange County businesses generate large quantities of C&D debris and could save money by diverting this material through reuse and recycling. Reducing the amount of C&D debris that is landfilled will also help Orange County cities meet the 50% diversion rate required by the California Integrated Waste Management Act of 1989.

Disposal rates are determined by the quality of material. Some processors will give estimates of disposal rates over the phone. Ultimately, the condition of the material will be determined upon delivery of the material.

Tips for managing your C&D debris for recycling:

- Develop a C&D waste management plan
- Assess the amounts and composition of your waste
- Assess the space available for separation of materials on site
- Assess the location of nearby recycling facilities

Educating employees, contractors, and sub-contractors about the benefits of recycling C&D debris will improve your bottom line and help your community conserve natural resources.

Printed on recycled content paper.

County of Orange
Integrated Waste Management Department
320 N. Flower Street, Suite 400
Santa Ana, CA 92703

Construction and Demolition Debris Facilities

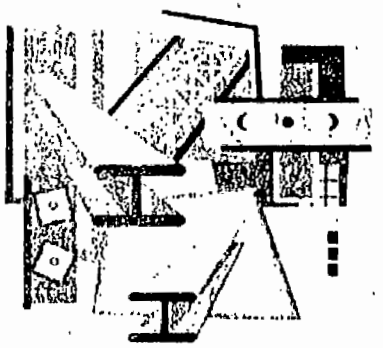

This brochure provides alternatives to landfilling specific types of Construction and Demolition (C&D) Debris

Integrated Waste Management Department

REPRESENTATIVE PUBLIC EDUCATION MATERIALS

CITY OF IRVINE

Used Oil Recycling Wheel

PREVENT POLLUTION!

HT THING...
CLE USED OIL!

)!
RM DRAIN!
K or TOILET!
USED OIL and
TER sections for
directions.
iners/cans:
onmental
cepted recy-
al method.

USED RAGS, CAT LITTER, AND OTHER ABSORBENTS

• Oil soaked rags an
can be combustible
disposed of immed
• Contact your lo
coordinator or e
agency to dete
accepted disp
in your area.

PREVENT SPILLS CHECK FOR LEAKS

STORE SAFELY

TIPS FOR AN ENVIRONMENT FRIENDLY OIL CHANGE

...it is **easy** being green!

BE PREPARED! Have ground cloth, rags, funnel, tools, oil pan, and a CLEAN plastic container with secure lid ready (if you use a plastic milk jug with snap-on cap, tape down securely). Clearly label container as "Used Oil." Avoid working on grass or dirt.

DRAIN used oil filter for at least 12 hours. Both the used oil and the metal from the filter must be recycled.

PREVENT SPILLS. Use a funnel when pouring. Make sure the new oil filter is secure. Do not overfill. Check your vehicle owner's manual for oil specifications and amount.

CLEAN ALL SPILLS. On concrete/asphalt: soak up spilled oil with rags or cat litter; wash area with mild cleaner. On dirt/gravel: dig up visibly contaminated area. Call your local used oil coordinator or environmental agency for specific disposal information.

NEVER MIX USED OIL with any other liquids! Mixed automotive fluids *cannot* be recycled.

CLOSE THE LOOP!

RECYCLE OIL FILTER

RECYCLE USED OIL

RECYCLING USED OIL BENEFITS YOU, YOUR FAMILY, AND THE ENVIRONMENT!

Recycling used oil:

- Protects the water supply, including your drinking water, by keeping oil from seeping into the ground;
- Prevents oil pollution in recreational waterways—storm drains commonly lead to streams, bays, rivers, and oceans;
- Prevents plant, soil, surface water, and ground water contamination; and
- Helps you keep your communities' environment safe and clean.

More reasons to recycle used oil:

- Used oil can be re-refined for reuse. Purchasing re-refined motor oil saves natural resources and lessens US dependence on imported oil.
- **IT IS AGAINST THE LAW** to dump used oil—from vehicles, lawn mowers, etc.—on the ground, in the trash, down storm drains, or down the sink or toilet.
- Receive $0.16 for every gallon of used oil returned to a certified used oil collection center.

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SIDE 1 (Round 1)

CITY OF IRVINE

RECYCLES USED OIL

TIPS FOR RECYCLING USED OIL:

- Please call FREE drop-off sites to verify hours of acceptance.
- CONTAMINATED OIL IS NOT ACCEPTED!
- Carry oil in clean, non-breakable containers—not metal.
- Do not mix with bleach, paint, solvents, or automotive fluids.
- Maximum container size: 5 gallons.
- Maximum drop-off: 20 gallons per day.

Funded by California Integrated Waste Management Board.

Become The Center of Attention

It's Good For You and Your Community

RECYCLE
USED OIL

A Slick Solution to Water Pollution

...RECYCLE

- **If dumped in the trash, on the ground, into household drains, or down storm drains, used motor oil can work its way into our groundwater and oceans.**
- **One gallon of oil pollutes 1,000,000 gallons of water - equivalent to:**
  - **1 year supply of water for 50 people**
  - **28 home swimming pools**
  - **6 footballs fields covered by 1 foot of water**
- **A single pint of oil can cause an oil slick one acre in size.**

DROP-OFF USED OIL....FREE

Irvine City Auto Parts
(Culver Dr. & Walnut Ave.)
(714) 551-5588

Auto Service 2000
(Red Hill Ave. & Reynolds Ave.)
(714) 852-1616- CALL FIRST

Household Hazardous Waste Collection Center (Oak Canyon Rd.)
(Proof of County residence required here - drivers license)

For the FREE drop-off site nearest you
Call (800) 553-2962

Funded by the California
Integrated Waste Management Board

Jan Noce' (714) 724-6356
Business & Environmental Assistance

CITY OF IRVINE

City of Irvine

CHANGING YOUR OIL?

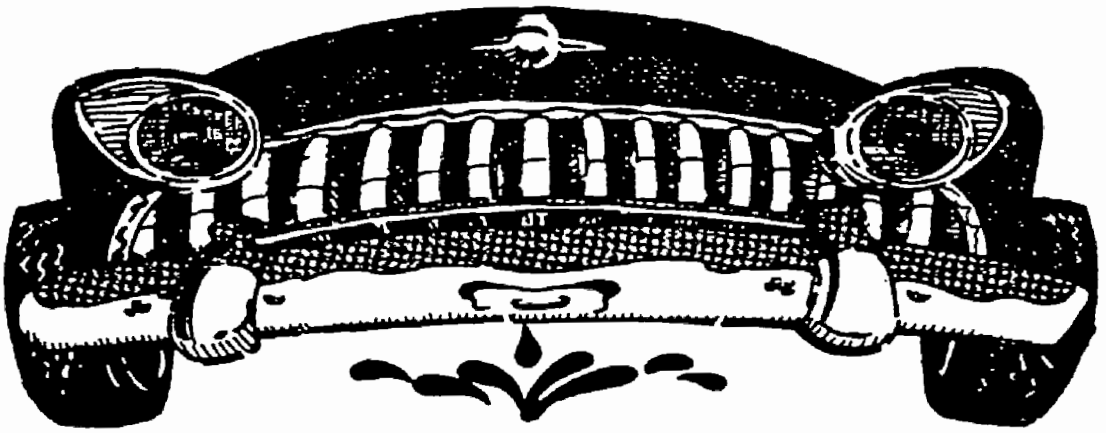

RECYCLE IT!

REMEMBER .....IF USED OIL IS DUMPED IN THE TRASH, ON THE GROUND, INTO HOUSEHOLD DRAINS, OR DOWN STORM DRAINS, USED MOTOR OIL CAN WORK ITS WAY INTO OUR GROUNDWATER AND OCEANS. . . . .

CITY OF IRVINE

GOOD FOR 1 FREE 15 - QUART USED OIL RECYCLING CONTAINER

(ONE PER HOUSEHOLD + MUST BE AN IRVINE RESIDENT)

Name _____

Address _____
Street City State Zip

Phone # _____

MAIL COUPON TO: Jan Noce', P.O. Box 19575, Irvine, California 92713
(714) 724-6356

~Clip and send~

Funded by the California Integrated Waste Management Board

Moving In?

Moving Out?

Recycles USED OIL

IRVINE RECYCLES USED MOTOR OIL!

You can recycle your used motor oil for FREE!

Call 1-800-CLEANUP

for a State Certified Used Motor Oil Collection Center Near You.

RECYCLE USED OIL

CITY OF IRVINE

Irvine Recycles

WM
WASTE MANAGEMENT

Waste Truck Banner

IRVINE RECYCLES USED MOTOR OIL!

Irvine Recycles

RECYCLING USED MOTOR OIL PRESERVES A VALUABLE NATURAL RESOURCE AND PROTECTS THE ENVIRONMENT!

WM
WASTE MANAGEMENT

IRVINE RECYCLES USED MOTOR OIL!

Oil poured down drains or onto the ground can work its way into our ground and surface waters and cause serious pollution. One gallon of used oil can foul one million gallons of drinking water!

Irvine has five State Certified Used Oil Collection Centers standing by to help you recycle your used motor oil. Recycling oil is easy! When you do an oil change, just drain your vehicle's old oil into a clean container, seal the container well with a lid and bring it to one of the five conveniently located State Certified Used Oil Collection Centers in Irvine. So don't throw good oil down the drain. Recycle now!

1. Caylin Environmental
(Accepts oil filters too!)
1350 Reynolds Ave, Suite 121
Irvine, CA 92614
(949) 852-1616

2. Firestone
(Accepts oil filters too!)
51 Auto Center Drive
Irvine, CA 92618
(949) 829-8710

3. Irvine City Auto Parts
(Accepts oil filters too!)
14427 Culver Drive
Irvine, CA 92604
(949) 551-5588

4. Jiffy Lube
8777 Irvine Center Drive
Irvine, CA 92618
(949) 753-0485

5. Jiffy Lube
3080 Main Street
Irvine, CA 92614
(949) 863-0625

*Note: It is advisable to call before taking oil to any of the State Certified Used Oil Collection Centers listed. Centers will pay you $.04 for each quart you recycle. If you have additional questions about used motor oil recycling, please contact the California Environmental Hotline at **1-800-CLEANUP** or **www.1800CLEANUP.org**. You can take other hazardous household wastes, such as paint, pesticides, cleaners, solvents, etc., to a nearby County of Orange Collection Center: 32250 La Pata Ave., San Juan Capistrano or 6411 Oak Canyon, Irvine. Please call (714) 834-6752 for more information.

RECYCLE USED OIL

WMA WASTE MANAGEMENT

CITY OF IRVINE

Irvine Recycles

This program is brought to you by the City of Irvine and made possible by a grant from the California Integrated Waste Management Board.

Printed on Recycled Paper

IRVINE RECYCLES USED MOTOR OIL!

Did you know that you can recycle your used motor oil safely and easily right here in the City of Irvine? That's right...

All you need to do is bring your used motor oil in a clean, sealed container to one of the conveniently located State Certified Used Oil Collection Centers in Irvine.

And, State Certified Used Oil Collection Centers will pay you $.04 for each quart you recycle!

FOR ADDITIONAL INFORMATION ABOUT THIS PROGRAM, OR TO OBTAIN A FREE 15-QUART USED OIL CONTAINER, PLEASE CALL THE IRVINE RECYCLES HOTLINE AT 949/724-7669.

1. Caylin Environmental
1350 Reynolds Avenue
Suite 120
Irvine, CA 92614
(949) 852-1616

2. Firestone Store
51 Auto Center Drive
Irvine, CA 92618
(949) 829-8710

3. Irvine City Auto Parts
14427 Culver Drive
Irvine, CA 92604
(949) 551-5588

4. Jiffy Lube
8777 Irvine Center Drive
Irvine, CA 92618
(949) 753-0485

5. Jiffy Lube
3080 Main Street
Irvine, CA 92614
(714) 961-5491

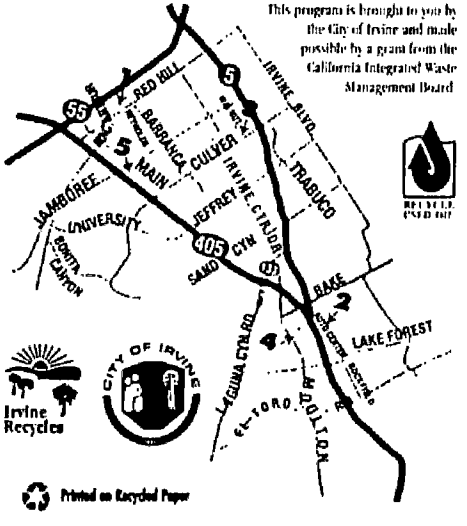

This program is brought to you by the City of Irvine and made possible by a grant from the California Integrated Waste Management Board

Printed on Recycled Paper

IRVINE RECYCLES USED MOTOR OIL!

You can recycle your used motor oil for FREE!

Call 1-800-CLEANUP

for a State Certified Used Motor Oil Collection Center Near You.

RECYCLE USED OIL

WASTE MANAGEMENT

*Note: It is advisable to call before taking oil to any of the listed State Certified Used Oil Collection Centers listed. Centers will pay you $.04 for each quart you recycle.

This program is brought to you by the City of Irvine and made possible by a grant from the California Integrated Waste Management Board.

Bus Stop Poster

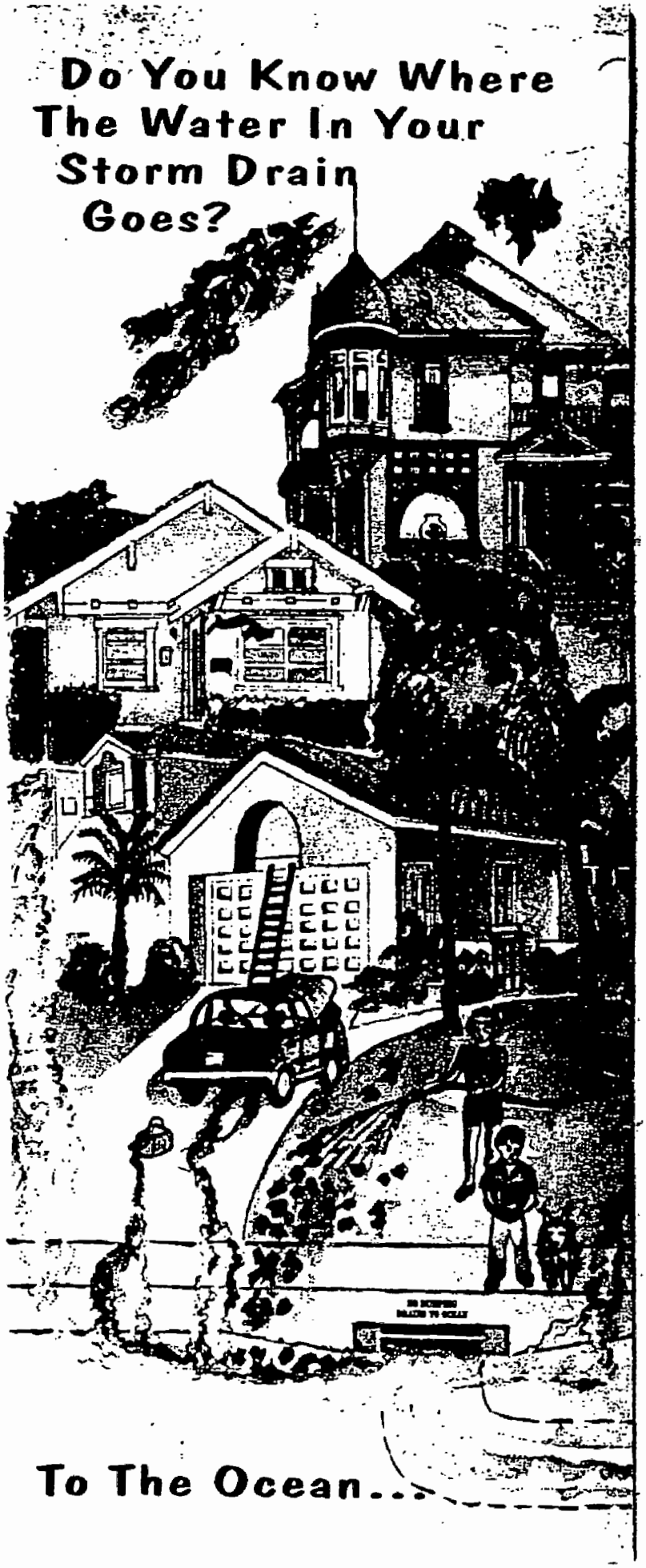
Do You Know Where
The Water In Your
Storm Drain
Goes?
To The Ocean...

When you're at the park...

RECYCLE!

When you bring drinks to the park in glass, aluminum or pl
containers, be sure to look for the specially-marked recy
bins. Separate your trash and put recyclables in their pr
place. It's easy, it's responsible, and it's great for Irv

IT'S GOOD FOR OUR PARKS

The special-lidded containers for glass and aluminum
products discourage littering and help keep our park
clean and family friendly.

Waste Management has joined forces with the Orange
County Conservation Corps to help collect our parks'
recyclables. At the current rate, we expect to collect
over 15,000 pounds of glass and aluminum every year.
And that means that a lot of valuable resources will b
used again and again, and kept out of the landfills.

OUR SUCCESS DEPENDS ON YO

Please remember to use the new recycling containe
next time you visit the park.

For more information, please call the Irv
Recycles Hotline at (949) 724-7669.

Irvine Recycles

When you're at the park...

RECYCLE!

Irvine Recycles

WM

WASTE MANAGEMENT
OF ORANGE COUNTY

MAKING IRVINE
...AN EVEN BETTER PLACE TO LIVE

WASTE & RECYCLING SERVICE GUIDE

IRVINE RECYCLES USED MOTOR OIL!

Did you know that you can recycle your used motor oil safely and easily right here in the City of Irvine? That's right...

All you need to do is bring your used motor oil in a clean, sealed container to one of the conveniently located State Certified Used Oil Collection Centers in Irvine.

And, State Certified Used Oil Collection Centers will pay you $.04 for each quart you recycle!

FOR ADDITIONAL INFORMATION ABOUT THIS PROGRAM, OR TO OBTAIN A FREE 15-QUART USED OIL CONTAINER, PLEASE CALL THE IRVINE RECYCLES HOTLINE AT 949/724-7669.

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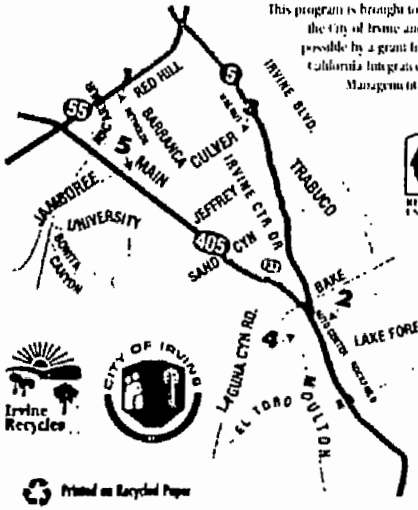

This program is brought to you by the City of Irvine and made possible by a grant from the California Integrated Waste Management Board

Printed on Recycled Paper

Integrated Waste
Management Department

Before you shop...

Stop!

Drop!

and

Swap!

Household Hazardous Waste Collection Program

CITY OF IRVINE

(800) 553-2962

REPRESENTATIVE PUBLIC EDUCATION MATERIALS

CITY OF LA HABRA

City Communicator

"A Caring Community"

CDBG Committee Vacancies

The La Habra City Council is currently accepting applications from residents who are interested in appointment to the Community Development Citizen Participation Committee. The primary purpose of the Committee is to identify needs, prioritize activities, and recommend to the City Council proposed use of Community Development Block Grant (CDBG) funds as allocated by the U. S. Department of Housing and Urban Development. Applicants must be residents of the incorporated area of the City of La Habra, and appointment shall be made on the basis of the interests of applicants. Members of the CDBG Committee serve a three-year term.

Applications and additional information is available in the City Clerk's Office, located in the Administration Building, 201 E. La Habra Boulevard, Monday through Thursday, 8:00 a.m. to 5:00 p.m., 562.905.9701. Applications must be filed with the City Clerk no later than November 22, 1999. The City Council will hold interviews during the month of December, 1999, and make appointments shortly thereafter.

"I Love La Habra"

Community Fair Seeks Vendors

Interested in selling your wares and crafts at the annual I Love La Habra Community Fair? Please call the Community Services Department now for an application!

Safely Dispose Hazardous Waste From Homes

Did you know that old paint cans, used motor oil, car batteries, and yard care products are considered "hazardous waste?" If dumped in our landfills or storm drains, these products can contaminate our groundwater and pollute our beaches.

The City of La Habra participates in a County-wide program to address this issue. Household Hazardous Waste Collection Centers are available to provide a safe, easy and free means to dispose of hazardous products stored in your home. Unwanted products can be easily disposed of at the Collection Center located at 1071 N. Blue Gum Street, Anaheim (located between the 91 and 57 Freeways on the corner of La Palma and Blue Gum). The Collection Center is open Tuesday through Sunday, 9:00 a.m to 1:00 p.m.; closed on rainy days and major holidays.

The City of La Habra has also implemented a Used Oil Recycling Program and has established the following four certified collection centers near you. Bring in all used motor oil to any one of these La Habra retailers during normal business hours:

- √ Firestone, 1071 S. Beach Boulevard
- √ Speedee Oil Change, 1580 W. Imperial Highway
- √ Pep Boys, 125 W. Imperial Highway
- √ Burch Ford, 201 N. Harbor Boulevard

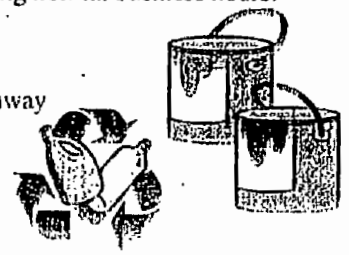

Recycling used oil, paints and other hazardous products is a way to help preserve our environment. Plus it's safe, easy, and free! Let's all do our part and recycle today.

La Habra

FOR YOUR INFORMATION

New Number for Waste Management

Effective October 18, 1999, the trucks servicing the City of La Habra residences and commercial businesses will be operated from Orange County facilities. If you have service issues or questions, please call Waste Management's Customer Service at either 714-558-7761 or 562-694-3730. Customer Service hours are 7 a.m. to 7 p.m. Monday through Friday and 8 a.m. – Noon on Saturday.

Storm Water Pollutants

Even living miles away, you may be polluting the Pacific Ocean without even knowing it. Unlike the sewer system which carries water to a wastewater treatment plant, the storm drain system empties untreated water directly into channels, rivers and ultimately the ocean. If this water is polluted, it ultimately affects our ocean as was the case recently with the Orange County beach closures. Common storm drain pollutants are detergents and cleansers, paints, oil and other automotive fluids, swimming pool chemicals, yard waste, and outdoor trash and litter. Before you let anything go into the gutter or storm drain, stop and think! It's up to all of us working together and doing our part to make a difference by keeping gutters, storm drains and waterways free of pollutants. Yard waste and trash/ litter can be disposed of in your regular trash pick-up, while the other pollutants are considered hazardous and must be taken to a special collection center.

Where to dispose of old paints, batteries, detergents and chemicals, and used oil... The City of La Habra participates in a county-wide program to address hazardous waste disposal. Just pack your car with unwanted home, yard and car care products, drive up to the Household Hazardous Collection Center, and sit in your car and fill out a simple form while an attendant removes your unwanted products. The nearest collection center to La Habra is located at 1071 N. Blue Gum Street, Anaheim (located between the 91 and 57 freeways on the corner of La Palma and Blue Gum). the Center is open Tuesday - Saturday, from 9 a.m. to 1 p.m. and closed on rainy days and major holidays.

For more information, call (714) 834-6752 or access via the Internet at www.oc.ca.gov/IWMD

Pick up Free Recycled Material

The Household Hazardous Collection Center also recycles a large portion of the dropped off material. There's a "Stop and Swap" area at the Collection Center where you have the opportunity to obtain recycled products such as paint and cleaning products at no cost.

007517

Used Oil Recycling Program

Used Oil can also be dropped off here in the City of La Habra. The City has implemented a Used Oil Recycling program and has established the following four certified collection centers near you. Bring used motor oil to any one of these La Habra retailers during normal business hours.

Firestone, 1071 S. Beach Blvd. - (562) 691-1731
Speedee Oil Change, 1580 W. Imperial Highway - (562) 697-3513
Pep Boys, 125 W. Imperial Highway - (714) 447-0601
Burch Ford, 201 N. Harbor Boulevard - (562) 691-3225

Tree Trimming

City Tree Trimming services are contracted through West Coast Arborists, Inc. This past year, the contractor was able to trim over 2500 city trees. At this rate, the city anticipates each city tree will be trimmed on a cycle of every four years. The program also includes the replacement of trees. If you are interested in a parkway tree, please contact the Public Works - Parks and Landscape Division at (562) 905-9792 and your request will be placed on a waiting list. Once the tree is planted in the parkway area, we ask that the resident water the tree for at least two years until the tree roots are established at the site. The City already has a plot plan describing which tree species will be planted at your location.

Composting Classes

The Friends of the Fullerton Arboretum offer Saturday Home Composting Workshop classes held at 10 a.m. at the Fullerton Arboretum located at 1900 Associated Road, Fullerton. These 90-minute composting workshops demonstrate how to naturally recycle yard waste and food scraps and are sponsored by several cities including La Habra and MG Disposal. The following is a schedule of future workshops:

February 19, 2000 – Home Composting II Workshop (for those who have attended Home Composting I, this workshop builds on previous information)
April 8 – Home Composting Workshop
June 17 – Home Composting Workshop

The workshops are presented by Dr. Bill Roley, Applied Ecological Systems and Pat McNelly, Orange County Sanitation District. For more information, please contact (714) 278-3404.

BROUGHT TO YOU BY . . .

PUBLIC WORKS DEPARTMENT
562-905-9792

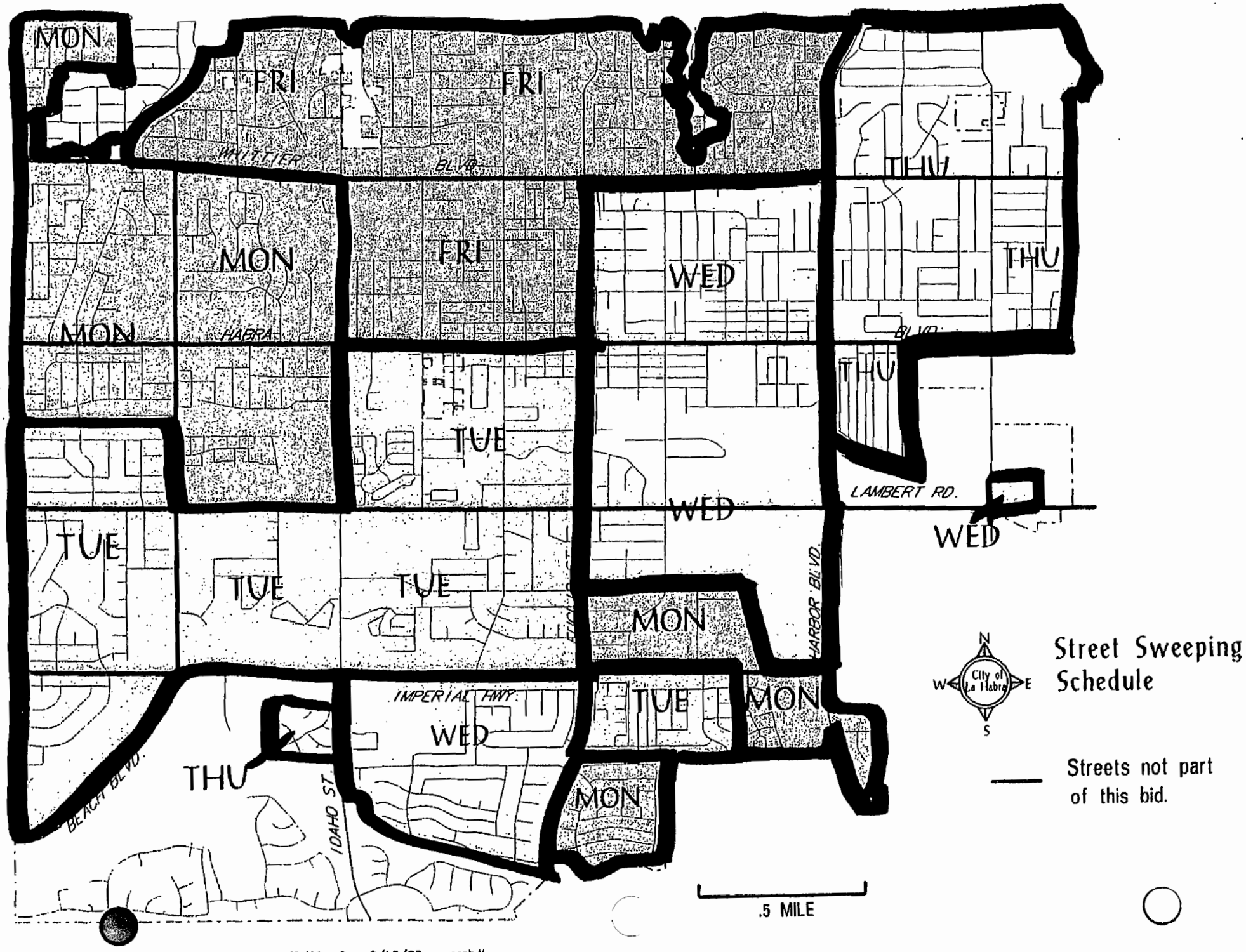

Map produced by La Habra Planning Dept. GIS 12/8/99 Rev. 2/15/00 sweepb.ttl

007519

"Go with the Flow"

Currently two options are available for La Habra residents to receive water-saving toilets

- La Habra residents can pick up a standard 12" or 10", white round ultra-flush toilet bowl with a $15 co-payment. Toilets can be picked up at the Toilet Program Warehouse located at CTSI Corporation, 2722 Walnut Ave., Tustin. Please bring current water bill and a photo identification.
- La Habra residents may receive a $65 rebate toward the purchase of a toilet of your choice.

Both programs are provided courtesy of the City of La Habra Public Works, Municipal Water District of Orange County, Orange County Sanitation District and Metropolitan Water District of Southern California. For more information, please call (800) 424-8538.

Cleaner Streets in La Habra

Street sweeping frequency increases throughout the city beginning March 2000. To better enhance and provide for a cleaner community, street sweeping will be performed weekly in your residential area the day following your refuse collection. Residential street sweeping will be cleaned by contractor Nationwide Environmental Services while the major arterial city streets will be swept three times per week by city staff. (see map next page)

FREE Household Hazardous Waste Disposal

Wet paint, used motor oil, and most cleaning products are considered to be hazardous waste and can't be thrown in the trash. If these products are placed in the landfill, they can contaminate our groundwater. For this public safety concern and to conserve our environment, drop these products off at the Household Hazardous Waste Center, located at 1071 N. Blue Gum Street, Anaheim. It's absolutely free.

New Greenwaste Container

The City of La Habra and Waste Management are pleased to announce an enhancement to the city's existing recycling program. Over 85% of the requests received by the city for a second trash container since the automated collection/recycling system began in 1998 are requests for space to contain and dispose of yard waste. Because of this need and the need to divert waste away from landfills, the residents of La Habra will be receiving a third 96-gallon container solely for yard waste. Instead of placing grass clippings, leaves and weeds in your gray trash container, this yard waste will be placed in these new green containers. Material in the green containers will be collected separately and recycled. We hope this new program set be begin **Summer 2000** will fulfill the need expressed by many residents to get rid of yard waste while simultaneously reduce the waste tonnage at the landfills and help our environment. For more information about this upcoming program, please call the Public Works Department at (562) 905-9792.

Composting Classes

Learn the tips and technique on how to turn your yard waste into productive material for your garden. Fullerton Arboretum will be hosting composting workshops **free** to La Habra residents. Attendees will receive a voucher good for $25 off an "Earth Machine" composting bin redeemable at James Hardware. The workshops will be held on Saturday at 10 a.m., April 8 and June 17 at the Fullerton Arboretum, 1900 Associated Road, Fullerton. No need to pre-register. Call (714) 278-4790 for more details.

"Go with the Flow"

Currently two options are available for La Habra residents to receive water-saving toilets

- La Habra residents can pick up a standard 12" or 10", white round ultra-flush toilet bowl with a $15 co-payment. Toilets can be picked up at the Toilet Program Warehouse located at CTSI Corporation, 2722 Walnut Ave., Tustin. Please bring current water bill and a photo identification.
- La Habra residents may receive a $65 rebate toward the purchase of a toilet of your choice.

Both programs are provided courtesy of the City of La Habra Public Works, Municipal Water District of Orange County, Orange County Sanitation District and Metropolitan Water District of Southern California. For more information, please call (800) 424-8538.

Cleaner Streets in La Habra

Street sweeping frequency increas throughout the city beginning March 2000. better enhance and provide for a cleaner community, street sweeping will be performed weekly in your residential area the day following your refuse collection. Residential street sweeping will be cleaned by contractor Nationwide Environmental Services while the major arterial city streets will be swept three times per week by city staff. (see map next page)

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Recycle Used Oil and Oil Filters

Recycle used motor oil and oil filters in La Habra by taking them to a State Certified Used Oil Collection Center. These businesses will accept your motor oil and filters during normal business hours. Call the center to confirm hours of operations and amounts accepted. The service is FREE. In fact, $0.16 per gallon incentive will be offered.

State Certified Used Oil Collection Centers in La Habra

Auto Zone 1200 W. Imperial Hwy. (562) 694-5337	**Kragen Auto Parts** 1621 W. Whittier Blvd. (562) 905-2538	**Speedee Oil*** 1580 W. Imperial Hwy. (562) 697-3513
Burch Ford 201 N. Harbor Blvd. (562) 691-3225	**Pep Boys** 125 W. Imperial Hwy. (714) 447-0601	**USA Express*** 421 E. Imperial Hwy. (714) 680-4890
Firestone 1071 S. Beach Blvd. (562) 691-1731	*Does not accept oil filters This program is brought to you by the City of La Habra and funded by the California Integrated Waste Management Board.	

RECYCLE
USED OIL

Placed 007522

GTE SAVING ALL PHONE BOOKS

Telephone Book Recycling Drive

Single family residents & businesses in Azusa, Baldwin Park, Bradbury, Covina, Duarte, La Habra, La Miranda, La Puente, Monrovia, Pico Rivera, Whittier:

Place your outdated telephone books in your curbside recycling container for pick-up

Multi family residents in La Miranda, Residents & businesses in West Covina, Multi family residents & businesses in La Habra:

Place your outdated telephone books in your regular trash container and they will be sorted out and recycled later

Drop-Off Locations:

Azusa Public Works Yard
809 N. Angeleno Ave.
in Azusa

Allan Company
14618 Arrow Hwy.
in Baldwin Park

Glendora Chamber of Commerce
131 E. Foothill Blvd., at Glendora Ave.
recycling bin behind building
in parking lot

Guirado Park
at Pioneer & Orange
in Whittier

Parnell Park
at Lambert & Scott
in Whittier

Call GTE Recycling at 1-800-610-4992 for further information

GTE thanks the cities for their participation and support.

WM · BURRTEC · Athens Services · IVM Metropolitan Waste Disposal · Consolidated Disposal Service, Inc. · BVS

GTE RECYCLING

568 E. Foothill Blvd., Suite 107 - Azusa, California 91702 - (626) 969-7816 - Fax: (626) 969-7854

FAX

TO:	Louie Pedroza, City of Azusa	**FAX:** 626-334-5464
	Wendy Harris, City of Baldwin Park	**FAX:** 626-337-1753
	Cary Kalscheuer, City of Covina	**FAX:** 626-858-5556
	Dianne Herring, City of Glendora	**FAX:** 626-914-9053
	Steve Hauerwass, City of La Puente	**FAX:** 626-961-4626
	Diann Paul, City of West Covina	**FAX:** 626-813-8663
	Greg Grammer, City of Bradbury	**FAX:** 626-303-5154
	Mike Yelton, City of Duarte	**FAX:** 626-358-0018
	Kandee Forbes, City of Monrovia	**FAX:** 626-359-8507
	Gina Nila, City of Whittier	**FAX:** 562-464-3572
	Marlin Munoz, City of La Mirada	**FAX:** 562-943-3666
	Karen Sulekian, City of La Habra	**FAX:** 562-691-1626
FROM:	Sandy Costandi, GTE Recycling	
DATE:	December 2, 1999	
PAGES:	2, including this one	
RE:	1999 Telephone Book Recycling Drive	

Attached is the ad that will be placed in the Tribune, the Pasadena Star, and the Whittier Daily News advertising GTE's telephone book recycling drive. Please verify that all information is correct and let me know of any revisions.

Sent a news release to La Habra Star + La Habra Journ

Thank You,

Sandy

City of La Habra Community Services 562/905-9708

INFORMATION FOR CHANNEL 3

Today's Date: December 1, 1999

Name of Non-Profit Organization: Public Works Department

Contact Person: Tina Truebe Telephone: 562-905-9792 ext. 633

Message Start Date: December 10, 1999 Message Stop Date: January 14, 2000

Information for Message*

Organization Name: City of La Habra

Event: Xmas Tree Recycling

Date of Event: December 26,1999 - January 15, 2000

Time of Event: N/A

Location of Event:

Contact Name and Number (If you want it broadcast)

Public Works Department at 562-905-9792

Additional Information:

Waste Management of Orange County will collect and recycle Christmas trees for three weeks immediately following Christmas (December 26, 1999 – January 15, 2000) on your regular pick-up day. Please remember not to obstruct refuse and recycling containers as it will interfere with the regular collection.

***MATERIAL MAY BE EDITED BY THE COMMUNITY SERVICES DEPARTMENT**

DIRECTOR'S APPROVAL

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City of La Habra Community Services 562/905-9708

INFORMATION FOR CHANNEL 3

Today's Date: March 9, 2000

Name of Non-Profit Organization: Public Works Department

Contact Person: Tina Truebe Telephone: 562-905-9792 ext. 633

Message Start Date: Now Message Stop Date: May 7, 2000

Information for Message*

Organization Name: City of La Habra

Event: Clean-Up Day Event

Date of Event: May 6, 2000

Time of Event: 8 a.m. – 3 p.m.

Location of Event: Various drop-off sites throughout city

Contact Name and Number (If you want it broadcast)

Public Works Department at 562-905-9792

Additional Information:

La Habra residents will have an opportunity to get rid of unwanted items normally not picked up on regular trash pick-up day at no charge. Items such as appliances, furniture as well as loose items such as lumber and yard waste will be accepted. Loose items are not to exceed 20 bags/bundles securely fastened no more than 8 inches in diameter and 4 feet in length. Drop-off sites are La Bonita, Montwood, Vista Grande, Oeste and El Centro Parks and Sierra Vista Elementary School. No Hazardous or Toxic Material accepted. Questions about hazardous and toxic waste, please call (714) 834-6752. **LA HABRA RESIDENTS ONLY—NO BUSINESS WASTE ACCEPTED. PROOF OF RESIDENCY WILL BE REQUIRED.**

*MATERIAL MAY BE EDITED BY THE COMMUNITY SERVICES DEPARTMENT

DIRECTOR'S APPROVAL

Dec Communications

Christmas Tree Recycling Program

The City of La Habra and Waste Management invite you to participate in the Christmas Tree Recycling Program. Waste Management of Orange County will collect and recycle Christmas Trees for three weeks immediately following Christmas, from December 27, 1999 through January 14, 2000. Trees must be free of metal ornaments and stands. Flocked trees will be collected but not recycled. Place your tree at the curbside on your regular collection day. Please remember to keep clear the refuse and recycling collection containers as any obstructions will interfere with regular collection.

For more information, please contact Waste Management of Orange County Customer Service Center at (562) 694-3730 or (714) 558-7761 Monday through Friday, from 7 a.m. – 7 p.m. and Saturday from 8 a.m. until 12 noon.

REPRESENTATIVE PUBLIC EDUCATION MATERIALS

CITY OF LAGUNA BEACH

- **Have your car inspected** and maintained regularly to avoid leaks. Don't spill oil when changing it.
- **Use kitty litter** or other absorbent materials to clean spills and dispose of it properly.
- **Eliminate septic tanks** where possible and tie into the City's sewer system.
- **Take unwanted household hazardous wastes,** such as motor oil, auto batteries, chemicals and paint, to County centers for safe disposal.
- **Report illegal dumping** into storm drains and any catch basins to the Police Department at (949) 497-0701 or call 1-(800)-69-TOXIC.
- **Purchase less toxic, biodegradable gardening and household products.** Use vinegar and baking soda as substitutes.
- **Dispose of pet waste** in the trash. Pet wastes, containing harmful bacteria, can be washed into the ocean whenever you water or when it rains.
- Start your own compost program or place yard waste in your trash. **Do not sweep debris into the streets or catch basins.** Keep streets cleared on street sweeping days.
- **Recycle and reuse** everything you can.
- **Control erosion** at construction and landscape sites to prevent dirt and debris from entering storm drains.
- **Conserve water** and keep it out of the gutter. Take your car to a car wash that recycles its water. **Do not overwater your lawn or garden.** Use a broom, not water, to sweep driveways and sidewalks.
- **Never pour anything down a storm drain** that you wouldn't want to swim in.

Hazardous Materials Emergencies -- **911**

Spills of Contaminants/ Police Department
(949) 497-0701

For information on City streets, sewer system, storm drains: Municipal Services Department
(949) 497-0706

Recycling Information
(949) 497-0323 **www.lagunabeachcity.org**

County of Orange

Household Hazardous Waste Hotline and Information on collection center locations and requirements
(714) 834-6752 **www.oc.ca.gov/iwmd**

For information on agricultural chemicals, pesticides and possible alternatives
(714) 447-7100

Information on beach closures, industrial hazardous waste and underground storage tanks and to report illegal disposal of hazardous, medical or solid waste
(714) 667-3700

Additional Information

Used oil collection centers and recycling referral
1-(800)-CLEAN-UP **www.1800cleanup.org**
www.clwmb.ca.gov

Waste Alert to report illegal, industrial dumping or for referral information on toxic substances
1-(800)-69-TOXIC

City of Laguna Beach
505 Forest Avenue Laguna Beach, CA 92651
(949) 497-3311

Special thanks to the City of Los Angeles Department of Public Works and artist Oscar J. Amaro for use of their artwork.

Printed on recycled paper 11/99

The Ocean Begins at Your Front Door

Runoff from Aliso Creek and Laguna Canyon is a key source of pollution at our beaches.

Things you can do to reduce storm water pollution

rash and household toxins dumped on the street go straight to the beaches. Unlike household sewer drains which lead to a sewage treatment plant, public storm drains and flood channels carry water, litter and toxic substances directly to the ocean.

Urban pollutants, such as **oil** and other **automotive fluids, paint, yard** and **pet wastes, construction debris, pesticides, fertilizers and cleaners** can wind up in the street.

A little water from rain or a garden hose can carry automotive and household toxic materials through the storm drains to the flood control channel and ocean.

Polluted urban runoff contaminates the ocean and beaches, harms aquatic life and increases the risk of flooding by clogging gutters and catch basins.

You can help control water contamination by being aware of the sources and the activities that contribute to storm water pollution.

This pamphlet provides information on the Laguna Canyon Flood Control Channel, Aliso Creek and tips on reducing pollution of storm water.

The Laguna Canyon Flood Control Channel and Aliso Creek collect water from **28,122** acres of watershed area and transport this runoff directly to the Pacific Ocean at Main Beach and at Aliso Beach.

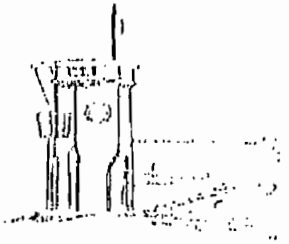

These natural waterways and the connecting storm drain system are designed to prevent flooding by carrying excess rainwater from city streets to the ocean.

Unfortunately, **whatever enters these channels and storm drains ends up in the ocean.**

For this reason, storm water and urban runoff have become a focus of environmental and legislative action. Your assistance will ensure we protect our resources.

We must work together to keep Laguna Beach

clean and

pollution free!

007529

HANDLING HOUSEHOLD HAZARDOUS WASTE

Residents can dispose of household hazardous wastes at County Collection Centers located at 6411 Oak Canyon Road in Irvine or at the Prima Deshecha Landfill off Ortega Highway and La Pata in San Juan Capistrano.

The centers are open from 9 a.m. to 1 p.m., Tuesday through Saturday, and are closed on rainy days and major holidays. There is no charge for residents to deposit household waste up to a maximum of 15 gallons or 125 pounds per visit. The County centers do not accept hazardous waste from businesses, schools, government agencies, churches and non-profit organizations.

To reach the **Irvine** center from Laguna, take 133 to I-5 north, exit Sand Canyon and go west to Oak Canyon and turn right. To reach the center located in **San Juan Capistrano,** take I-5 south, exit Ortega Highway (SR74) and go east 2½ miles to La Pata and turn right. The center is two miles down La Pata next to the landfill.

Also, Laguna Pete's Automotive, located at 890 South Coast Highway, accepts used motor oil free of charge! The Chevron station at South Coast Highway and Legion accepts used motor oil for a nominal charge.

TRANSPORTATION AND HANDLING

- A maximum of 15 gallons or 125 pounds may be transported per vehicle, per trip (Department of Transportation regulation).
- Materials should be in original containers (except motor oil, fuels and antifreeze).
- All containers must have lids, be sturdy, non-leaking, and protected from breakage.
- Do not combine types of waste.
- Do not mix oil-base paint with latex paint.
- Dry out empty paint cans and discard in regular trash.
- If you wish to have a container returned (i.e. oil containers and boxes/crates used to transport materials), please notify the attendant in advance. Some containers may not be returnable.

WHY SHOP [illegible] YOU DROP?

VISIT THE STOP & SWAP!

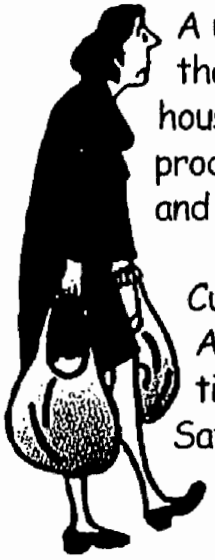

A unique and FREE program that allows you to drop off household, yard, and car care products you no longer need and pick up others you can use.

Currently available at the Anaheim and Irvine locations only. (Tuesday through Saturday, 9 a.m. to 1 p.m.)

FOR MORE INFORMATION ABOUT THE HOUSEHOLD HAZARDOUS WASTE COLLECTION PROGRAM AND THE STOP & SWAP CALL:

(714) 834-6752

Or see our webiste: www.oc.ca.gov/iwmd

Orange County Recycles!

Printed on recycled paper.

Integrated Waste Management Department

DISPOSAL OF HOUSEHOLD HAZARDOUS WASTE

Household Hazardous Waste Collection Program

5. On the new filter, wet the rubber seal with oil, then spin it on. **Do not** use a filter wrench to tighten the new filter. Tighten it snugly with your fingers. Replace the oil pan plug and make sure it's tight. Add the new oil. Don't overfill! (Most cars take 4 or 5 quarts. Check the owner's manual.)

6. Start the engine. Be sure the area is well ventilated. The oil pressure warning light may be on; it should go out after a few seconds. Let the engine run a few seconds.

7. Turn the engine off and check the oil level. Also check around the filter and drain plug for leaks.

8. Pour the used oil into an empty **clean**, plastic screw-top container. Use a funnel if necessary.

WARNING! WARNING!

DO NOT MIX ANYTHING WITH THE USED OIL! WHEN MIXED WITH SOLVENTS, WATER, GASOLINE, THINNER, ANTIFREEZE, ETC., THE USED MOTOR OIL CANNOT BE RECYCLED.

9. Take the oil container to a used oil collection center for RECYCLING.

For your convenience, the following Used Oil Collection Centers will accept your used motor oil. Call to confirm hours of operation and amount accepted.

BREA
Firestone Tires and Service
891 East Imperial Highway
(714) 529-8404

Imperial Unocal
525 S. Valencia
(714) 993-7770

LAGUNA BEACH
Laguna Pete's Automotive
890 S. Coast Highway
(714) 494-7408

VILLA PARK
Phil's Unocal
17771 Santiago Blvd.
(714) 637-0854

YORBA LINDA
Firestone Tires and Service
18500 Yorba Linda Blvd.
(714) 779-1966

Jiffy Lube
16751 Yorba Linda Blvd.
(714) 528-2800

* Chief Auto Parts
18528 Yorba Linda Blvd.
(714) 970-8933

For additional centers ca[illegible] 800-253-2687
*does not offer 4¢ per qu[illegible] incentive

RECYCLE USED OIL

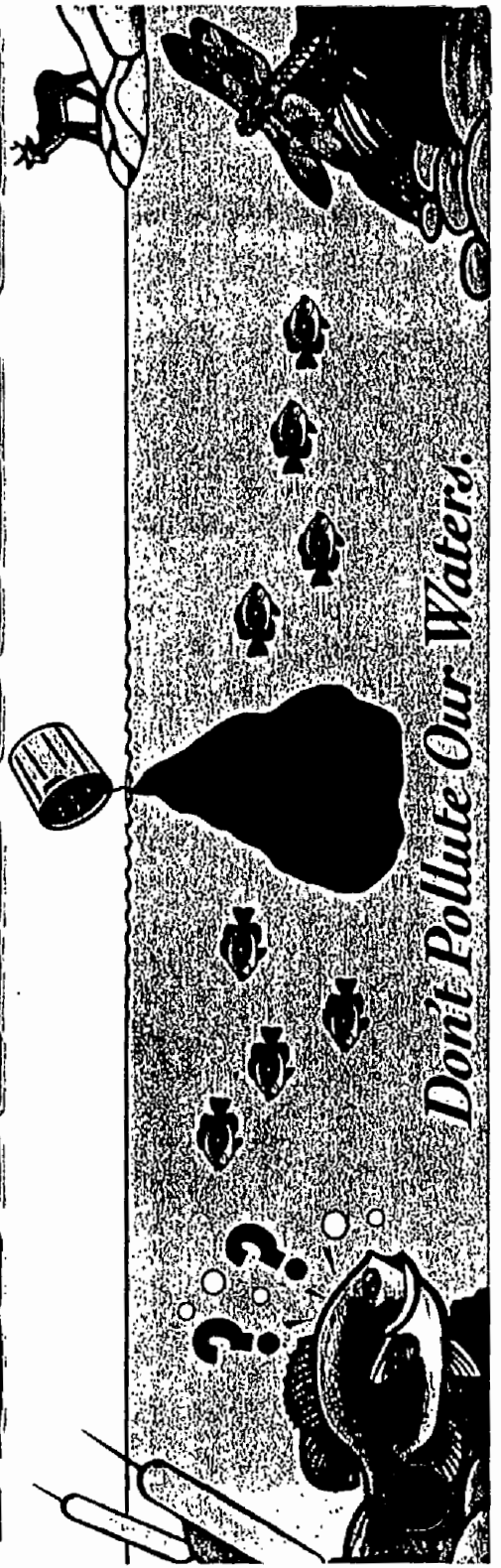

Each year millions of gallons of oil are dumped into our environment. The oil that pollutes our oceans, harms our wildlife and aquatic species and contaminates our groundwater comes from seemingly harmless drips that leak onto the street, and from do-it-yourselfers who dump oil in vacant lots, trash cans, or storm drains. These actions are not only harmful to the environment, they are also illegal.

You can help by disposing of your used motor oil properly. To make it easier and convenient for you to recycle your used oil, the California Integrated Waste Management Board and participating local businesses have joined together to establish collection centers throughout the community that will accept your used oil.

By taking your used oil to a State Certified Collection Center you not only help the environment, you are also rewarded 4¢ for each quart of oil recycled.

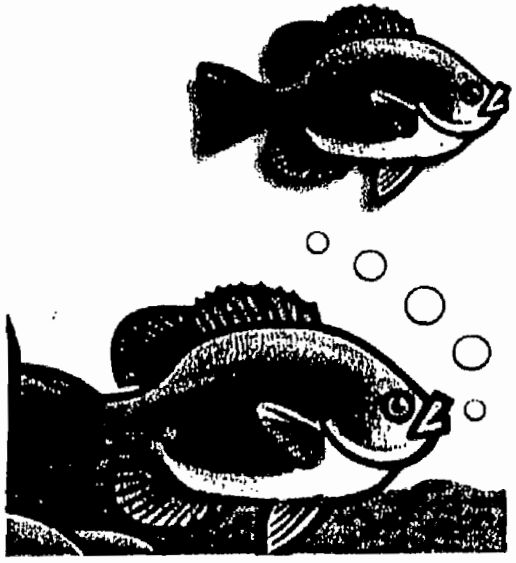

Knowing some facts about used oil helps us understand why recycling used motor oil is important but it is up to you to do your part and make sure the oil reaches a collection center.

1. Oil does not wear out, it simply gets dirty and can be re-refined and turned into a usable fuel for your vehicle or used as fuel for ships.

2. Over 1.3 billion gallons of used oils, lubricating and industrial, are generated each year in the U.S.

3. Less than 60% of the oil is recycled

4. Over 41 million gallons of oil are disposed of in an unknown manner in California.

5. One gallon of oil can ruin the taste of one million gallons of water.

6. A film of oil on the water surface prevents replenishment of dissolved oxygen, impairs the photosynthetic process and blocks sunlight needed by some organisms.

7. One in four households in California have a do-it-yourself oil changer.

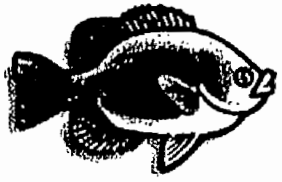

RE-REFINED OIL

When adding or changing your car's oil, consider re-refined oil. Re-refined oil is the oil that is produced from the manufacturing process in which the water, metal contaminants and other impurities are taken out of the used oil. It is as good or better than virgin oil produced from a barrel of crude oil and helps conserve energy and natural resources. When you consider that it take 42 gallons of high quality crude oil to produce the same 2.5 quarts of base stock for lubricants that is produced from 1 gallon of recycled used oil, it makes sense to use re-refined oil.

OIL FILTERS

Oil filters can also be recycled to conserve our resources. Oil filters, which are made of 80% steel can be recycled to make rebar, utility covers and other products. The amount of oil contained in a used oil filter can be as much as 1 quart and can be recycled with ordinary used motor oil. Be sure to take used oil filters to a recycling facility so that they do not pollute our environment.

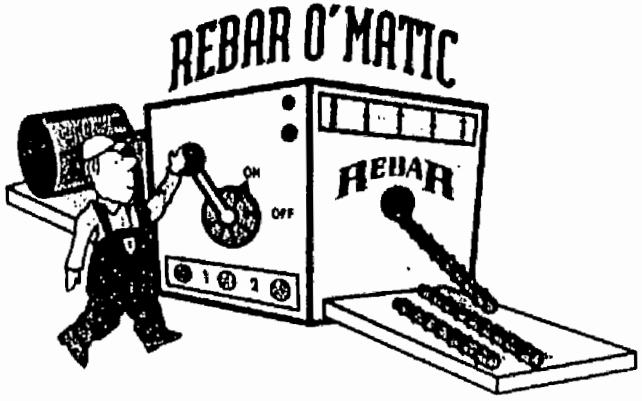

LAGUNA BEACH Recycling News

WM

MAY 2000

A publication of the City of Laguna Beach in cooperation with Waste Management of Orange County with funding provided by the California Integrated Waste Management Board

Printed on recycled paper.

Introducing FREE Pick-up of Household Hazardous Waste at Your Home!

Getting rid of your unwanted motor oil, oil filters, paint, batteries and other pesticides and chemicals is as easy as picking up the phone. From **May 15th** through **June 2nd** (excluding weekends) you can have your household hazardous waste picked up right at your doorstep. Just call **1-800-HHW-PKUP (1-800-449-7587)** and ask for the next available pick-up date in Laguna Beach.

The City's contractor, Curbside Inc., will send you a kit and instructions prior to your collection date. Eligible materials will be picked up between 8 a.m. and 5 p.m. Residents do not have to be home when materials are collected. Also, senior and disabled residents can request in-home assistance in gathering and packing their materials.

Explosives, ammunition, solid waste for landfill or recycling, tires, and biological and radioactive wastes cannot be accepted. Curbside Inc. recycles more than 90 percent of all materials it collects. Call by **May 26th** to schedule your free appointment.

Be a Good Neighbor! Place Your Carts Out of Public View

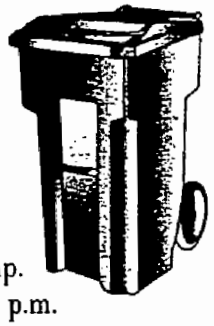

Please be kind to your neighbors - and your neighborhood. Make sure that your trash collection carts are put away following pick-up. Residential collection is from 7:00 a.m. to 6:00 p.m. You may set your carts out as early as the evening prior to your scheduled collection. Residents should remove empty carts on the same day trash is collected to an area not visible from the street. All of Laguna Beach thanks you for your cooperation.

Recycle Motor Oil Here

RECYCLE USED OIL

Located at 890 South Coast Highway at Thalia Street, Laguna Pete's Automotive will accept your used motor oil free of charge. Laguna Pete's is certified by the State of California and is a good neighbor providing this important service. For details, call 494-7408. For the locations of additional certified collection centers and other recycling information, call **1-800-CLEANUP** or visit **www.1800cleanup** on the web.

Commercial Recycling... It's Good Business!

About 30 percent of Laguna Beach's solid wastes come from the commercial sector, yet less than four percent of it is collected as recycling. To help boost this number, the Laguna Beach Commercial Recycling Program allows "commingled" collection, that is, all acceptable materials can be placed in the same container. This means businesses do not need to invest time or space separating recyclables to help cut down on the amount of waste we send to our overburdened landfills.

Recycling services are offered to any Laguna Beach business with a commercial trash account. Recycling containers can be emptied up to 3 times each week and it's free! To begin commercial recycling, call Waste Management of Orange County at **(949) 642-1191**. Your customers will appreciate it. Recycling sends a positive message that your company cares about the future and the environment.

Stop, Drop & Swap at County Collection Centers!

Popcorn, Peanuts... Crackerjacks

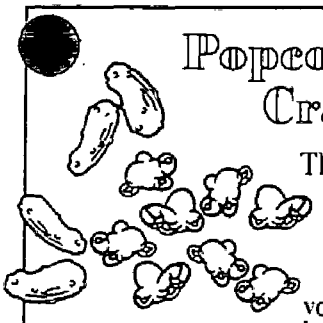

The dictionary defines crackerjack as "someone or something of marked excellence." Be a "crackerjack" yourself and take proper care of your popcorn and peanuts – packing materials, that is. Loose-fill, polystyrene packaging chips, often referred to as "peanuts" or "popcorn" because of their shape, are commonly used in mailing and shipping fragile items. Due to their small size and near weightlessness, such materials are difficult to recycle and can cause litter problems when placed loosely in dumpsters and trash carts.

If you need packing material, look for opportunities to take unwanted materials from local businesses. If you have extra packing material, consider donating your peanuts so others can reuse them. Canyon Box & Packaging (494-3523) and Mail Boxes Etc. (494-4420) will gladly accept and reuse your clean packing materials. If you must dispose of small packing materials, please place them in secured boxes or bags so they do not fly about when dumped into trash collection trucks.

Managing Your Waste Stream Keeps Our Waters Clean

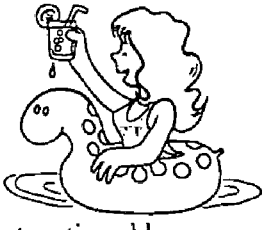

City departments are working hard to improve our ocean water quality by reconstructing old sewer lines, by building additional facilities to capture runoff before it reaches beaches and the ocean, and by addressing pollution problems at its various sources. Many times, sewer line breaks and spills are caused by grease buildup and tree root invasion. You can help prevent system failures by keeping grease products out of the sink and by alerting the City when you clean or rod your laterals. Be aware of sources of contamination and choose to do something about it. To make a report, call Municipal Services at **497-0706**.

got vision?

Think about what you really love about Laguna Beach. Now imagine what would make Laguna Beach even better. Vision Laguna is a community based project designed to capture your dreams about the future of Laguna Beach and to cultivate an action plan to make these dreams come true. Kick-off events begin **May 12th** and **13th**. To learn more about public environmental programs in Laguna Beach, visit the Municipal Services Department booth at the Vision Fair on Saturday, **May 13th**, at Laguna Beach High School from 8:30 a.m. to 4:30 p.m. For more information about Vision

5 Easy Ways To Cut Your Trash In Half

For over a decade, you have been doing a great job recycling bottles, cans and newspapers. In the first year of the expanded recycling program, you've been equally enthusiastic about recycling green waste. Is there anything more you can do? Absolutely!

1 Recycle Beverage Containers at Home and On the Go

The increasing popularity of 20-oz. plastic bottles is contributing to a noticeable drop in the plastic beverage container recycling rate. These containers are recyclable, so whether you are on the road for business, vacation, or a weekend outing, deposit your empty beverage containers in a recycling bin. Look for new recycling containers at Main Beach this summer!

2 Grasscycle and Compost in Your Backyard

Mow without a bag and leave your grass clippings on the lawn to provide mulch and nutrients, save water, and save time. Composting yard waste and some food scraps make outstanding free topsoil. Check out the State's website **www.ciwmb.ca.gov** for great tips.

3 Xeriscape

In arid climates such as ours, xeriscaping, landscaping with plants that don't need much water, may help reduce your costs. In addition, drought-tolerant plants tend to be slower growing and require less maintenance. Mowing, watering, and fertilizing chores take less time and money, and yard waste and water runoff are minimized. With xeriscaping, you save water, you save landfill space, and you save the ocean from contamination – now that's integrated management!

4 Reduce Household Waste

Find a home for unneeded items. Give them to charity or have a yard sale. Buy in bulk and, like your mom said, eat your leftovers. Use cloth bags at the grocery store instead of paper or plastic. At home, use reusable containers to store leftovers and other items. Avoid overpackaged products.

5 Buy Recycled

Earth's resources are too precious to waste. For recycling to succeed we all need to check the labels and to buy products made with recycled content. Everything from clothes to carpeting, cans to comic books are made from recycled materials.

Take your Used Oil to the following Used Oil Collection Center.
Call to confirm hours of operation and amount accepted.

LAGUNA BEACH

Laguna Pete's Automotive, 890 S. Coast Highway • (714) 494-7408

Call (800) 553-2962 for additional centers in the county.

Sponsored by the City of Laguna Beach.
Funded by a grant from the California Integrated Waste Management Board.

Printed on recycled paper.

007535

RECYCLE USED OIL

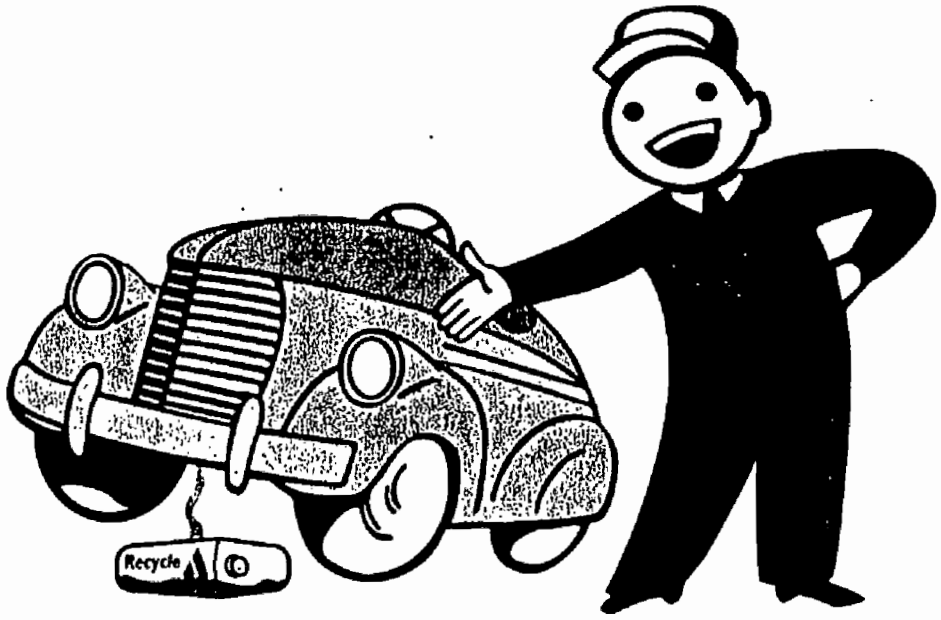

A HANDBOOK FOR DO-IT-YOURSELFERS!

WHY SHOULD WE RECYCLE USED MOTOR OIL?

Each year millions of gallons of used oil are dumped down storm drains, buried in backyards or emptied in trash dumpsters.

HOW YOU CAN HELP

If you change your car's oil be sure to recycle it and take it to one of the many certified collection centers located in the county. By doing so you not only protect the environment but you will also receive 4¢ per quart.

The following ten tips will help to eliminate hazardous used oil waste and protect our environment.

10 TIPS FOR THE DO-IT-YOURSELF OIL CHANGER

BEFORE YOU START, PROTECT YOURSELF BY WEARING APPROPRIATE GLOVES AND SAFETY GLASSES.

1. If possible, change the oil after the car has warmed up. The old oil will drain out more quickly.

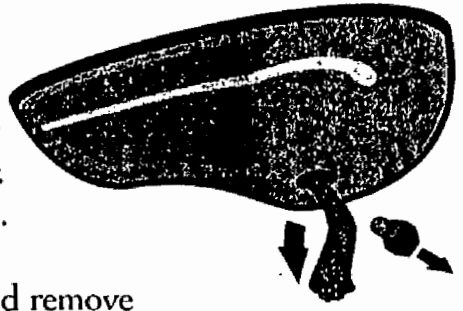

2. Make sure the engine is off. Block the wheels and apply the parking brake before getting under the car. (Be careful the engine is not hot).

3. Use a clean container or pan and remove the drain plug on the bottom of the oil pan allowing the oil to drain into your drain pan.

4. Use a filter wrench to loosen the old filter, then spin it off. Invert the oil filter and drain all the used oil into the pan. If you're changing your oil filter, be sure it is completely drained, seal it in a leak-proof plastic zip-lock bag, and bring it to a collection center with your used oil. Not all centers accept oil filters. **Check first.** Call 1-800-553-2962.

5. Wet the rubber seal on the new filter with oil, then spin it on. **Do not** use a filter wrench to tighten the new filter. Tighten it snugly with your fingers. Replace the oil pan plug and make sure it's tight.

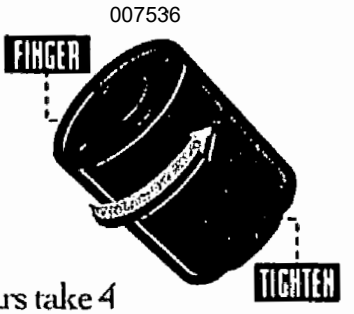

6. Add the new oil. Don't overfill! (Most cars take 4 or 5 quarts. Check the owner's manual.)

7. Start the engine. Be sure the area is well ventilated. The oil pressure warning light may be on; it should go out in a few seconds. Let the engine run a few seconds.

8. Turn the engine off and check the oil level. Also check around the filter and drain plug for leaks.

9. Pour the used oil from the pan into an empty clean, plastic screw-top container. Use a funnel if necessary.

10. Take the oil container to a used oil collection center for RECYCLING.

WARNING! WARNING! WARNING!

DO NOT MIX ANYTHING WITH THE USED OIL! WHEN MIXED WITH SOLVENTS, WATER, GASOLINE, THINNERS, ETC., THE USED MOTOR OIL CANNOT BE RECYCLED!

WHY SHOULD I RECYCLE USED MOTOR OIL?

- Certified collection centers will pay you 4¢ a quart to recycle oil.
- Used motor oil is a hazardous waste. It must be recycled properly.
- California state law prohibits the disposal of oil by dumping it in sewers or storm drains, putting it in the garbage, or pouring it on the ground.
- One quart can pollute 250,000 gallons of drinking water!
- Both conventional motor oil and synthetic motor oil can be recycled.

MAINTENANCE RECORD

MAKE:	YEAR:
MODEL:	LICENSE #:
DATE PURCHASED:	
ENGINE TYPE:	
SPARK PLUG GAP:	AIR FILTER:
OIL FILTER:	
OIL WEIGHT:	
OIL CAPACITY:	
FRONT TIRE PRESSURE:	
REAR TIRE PRESSURE:	

DATE	MILEAGE	CHANGED MOTOR OIL (Y/N)	OTHER TYPE OF SERVICE PERFORMED

Place
Stamp
Here

007538

California Integrated Waste Management Board
#23 - Waste Reduction Awards Program
8800 Cal Center Drive
Sacramento, CA 95826

WRAP
WASTE REDUCTION AWARDS PROGRAM

WRAP recognizes businesses that are reducing waste.

Does your business...

...reduce, reuse, recycle waste?

...buy recycled products?

...educate employees about waste reduction?

YOU DESERVE TO BE RECOGNIZED!
You may be eligible for a ***WRAP*** award.

Learn more, Look inside!

CIWMB
#23-WRAP
8800 Cal Center Drive
Sacramento, CA 95826

YES! I would like to apply for **WRAP** WASTE REDUCTION AWARDS PROGRAM

Please send me an application.

business name

contact name

address

city state zip code

phone fax email

☐ **I am not eligible but will forward the application to another business.**

cut here

What is WRAP?

WRAP, the **Waste Reduction Awards Program,** is sponsored by the California Integrated Waste Management Board. CIWMB annually recognizes California businesses that make outstanding efforts to reduce waste and send less garbage to landfills.

Who can apply?

California businesses and nonprofit organizations that have taken effective measures to reduce the amount of nonhazardous waste they send to landfills can apply for a WRAP award. We encourage multi-year winners! Government agencies and public schools are not eligible.

How do you qualify for a WRAP award?

WRAP awards are given to businesses that reduce, reuse, recycle waste, purchase recycled products, and educate employees on waste reduction opportunities. Each business is evaluated on its efforts to reduce its OWN nonhazardous waste. For example, a recycling business is eligible based on activities that reduce its OWN waste, rather than recycling the waste of others.

How do you apply?

To request an application, simply do one of the following:

- ✉ Complete, stamp, and return the attached postcard.
- ☎ Leave a phone message at (916) 255-2497.
- ☎ Send a fax to CIWMB - (916) 255-4580.
- Send e-mail to lhenness@ciwmb.ca.gov.

You may also obtain a copy of the application through the Internet at: http://www.ciwmb.ca.gov/wrap. Once you receive the application, fill it out according to the directions and return it to CIWMB.

When is the deadline?

Your completed application must be received or postmarked by June 30.

What is the WRAP award?

Winners will receive an award from the State of California along with a WRAP WINNER logo. Previous WRAP winners have used the logo on their Web sites, in advertising, and on products such as telephone directories, beverage containers, and packaging.

CIWMB does not discriminate on the basis of disability in access to its programs. CIWMB publications are available in accessible formats upon request by calling the Public Affairs Office at (916) 255-2296. Persons with hearing impairments can reach CIWMB through the California Relay Service. 1-800-735-2929.

A successful business is measured by the bottom line.

Remember, **REDUCING WASTE INCREASES PROFIT!**

REPRESENTATIVE PUBLIC EDUCATION MATERIALS

CITY OF LAGUNA HILLS

THERE'S ONLY ONE WAY TO DISPOSE OF USED OIL

Recycling is the only environmentally safe and legal method to dispose of used oil. When used oil is dumped on the ground or sent to landfills, it works its way into streams, rivers and lakes. When dumped into storm drains, used oil flows to the ocean where it poisons marine life. Poured down sewers, used oil can damage sewage treatment plants and cause costly delays.

RECYCLING TIPS

- When you change your motor oil, drain the used oil into a clean plastic drain pan or container with a tight lid.
- Do not mix oil with other substances.
- Use a reusable container which holds five (5) gallons or less.
- Take your used oil to a Certified Used Oil Collection Center and give the container to an attendant during business hours.

Used motor oil is 100% recyclable and reusable. There is no practical limit to the number of times that used oil can be reused. The oil does not wear out; it just becomes dirty.

Once the oil is changed and is collected for recycling, the oil can be used in one of two ways. It can either be re-refined into neutral oil, a base with which to make other automotive lubricants, or it can be consumed as bunker fuel by ships.

The City of Laguna Hills has established State Certified Used Oil Collection Centers in the City. These public minded businesses will accept used oil from the public during normal business hours. The service is free. In fact, a $0.16 per gallon incentive will be offered. You can call the State Used Oil Hotline at 1-800 CLEAN UP to locate the Certified Used Oil Collection Center nearest you.

To locate a convenient Certified Used Oil Collection Center

1-800-CLEAN UP

RECYCLE USED OIL

This program is brought to you by the City of Laguna Hills and made possible through funding from the California Integrated Waste Management Board.

Laguna Hills Certified Used Oil Collection Centers

Alicia Mobil Services
25491 Alicia Parkway
Laguna Hills, CA 92653
(714)472-9692

David J. Phillip's Buick
24888 Alicia Parkway
Laguna Hills, CA 92653
(714)837-2400

EZ Lube, Inc
24281 Moulton Parkway
Laguna Hills, CA 92653
(714)830-9840

Kragen Auto Parts #715
26562 Moulton Ave. Ste. C
Laguna Hills, CA 92653
(714)831-0434

La Paz & I-5 Chevron
25172 Cabot Rd.
Laguna Hills, CA 92653
(714)830-5814

Tire Station
24196 Laguna Hills Mall
Laguna Hills, CA 92653
(714)581-4700

CALL CENTERS TO CONFIRM HOURS OF OPERATION AND AMOUNTS ACCEPTED.

Do You Know Where The Water In Your Storm Drain Goes?

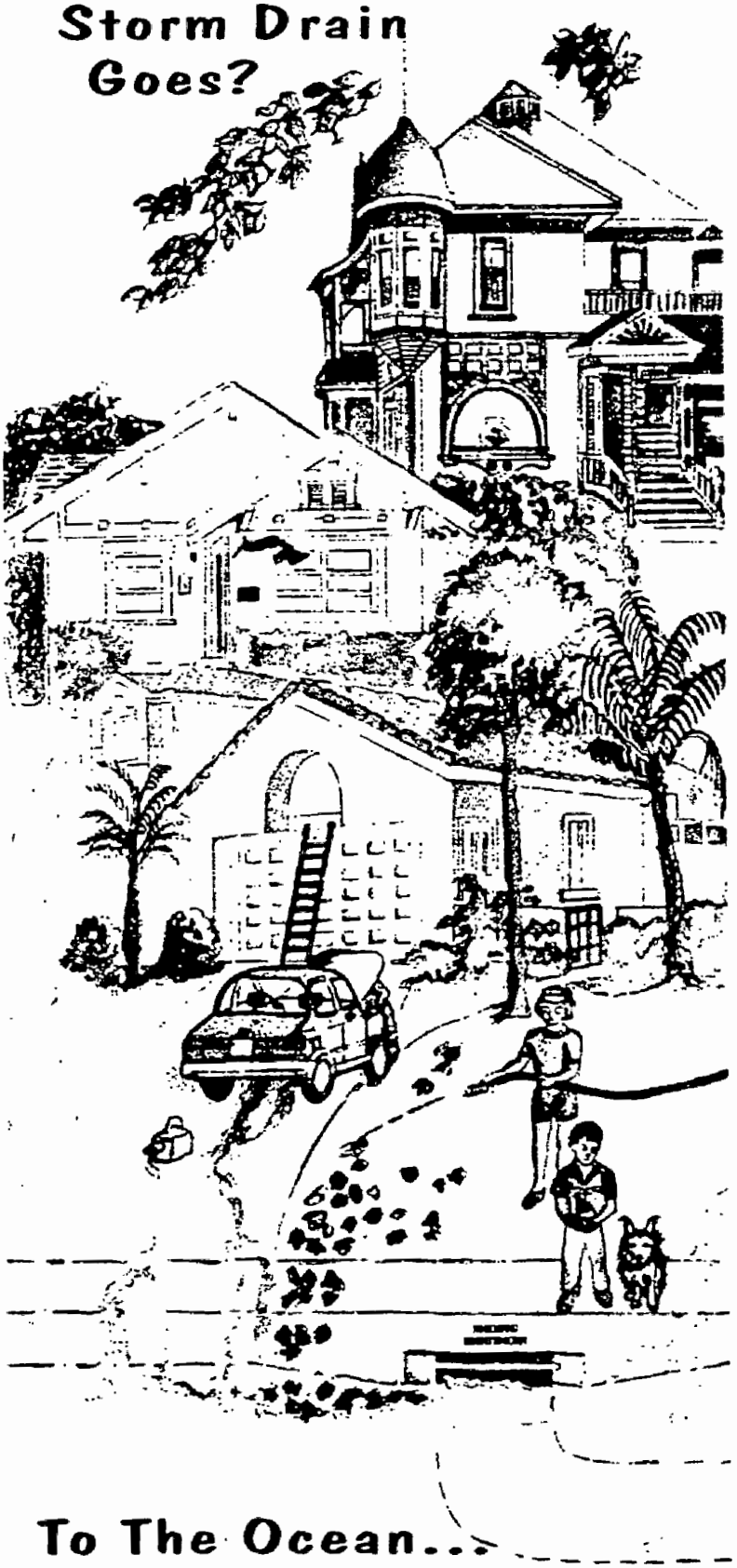

To The Ocean...

REPRESENTATIVE PUBLIC EDUCATION MATERIALS

CITY OF LAGUNA NIGUEL

ORANGE COUNTY STORM WATER PROGRAM PARTICIPANTS:

SOUTH COUNTY:

Irvine Public Works	949-724-6315
Laguna Beach Municipal Services	949-497-0711
Laguna Hills Engineering	949-707-2600
Laguna Niguel Public Works	949-362-4337
Lake Forest Public Works	949-461-3480
Mission Viejo Public Works	949-470-3095
San Clemente Engineering	949-361-6100
San Juan Capistrano Engineering	949-493-1171
O.C. Storm Water Program	714-567-6363
O. C. Urban Runoff Plan Review	714-834-3526
24 Hour Water Pollution Problem Reporting Hotline	714-567-6363

or dolcl@ocpd.ci.orange.ca.us

OTHER IMPORTANT PHONE NUMBERS:

O.C. Household Hazardous Waste Information 714-834-6752
or www.oc.ca.gov/IWMD

Chemical and Hazardous Material Spill Emergencies 911

Information on locations that accept used motor oil, California Integrated Waste Management Board ... (800) 553-2962
or www.CIWMB.ca.gov

Information on agriculture chemicals, pesticides and possible alternatives. O. C. Agriculture Commissioner 714-447-7100

Information for industries regarding Hazardous Waste and Underground Storage Tank Requirements: O.C. Healthcare Agency /Environmental Health Division/Hazardous Materials Management Section .. 714-667-3700

NO DUMPING! DRAINS TO OCEAN

PLEASE

HELP KEEP OUR GUTTERS AND STORM DRAINS CLEAN.
THEY EMPTY OUT TO STREAMS THAT FLOW TO THE OCEAN.

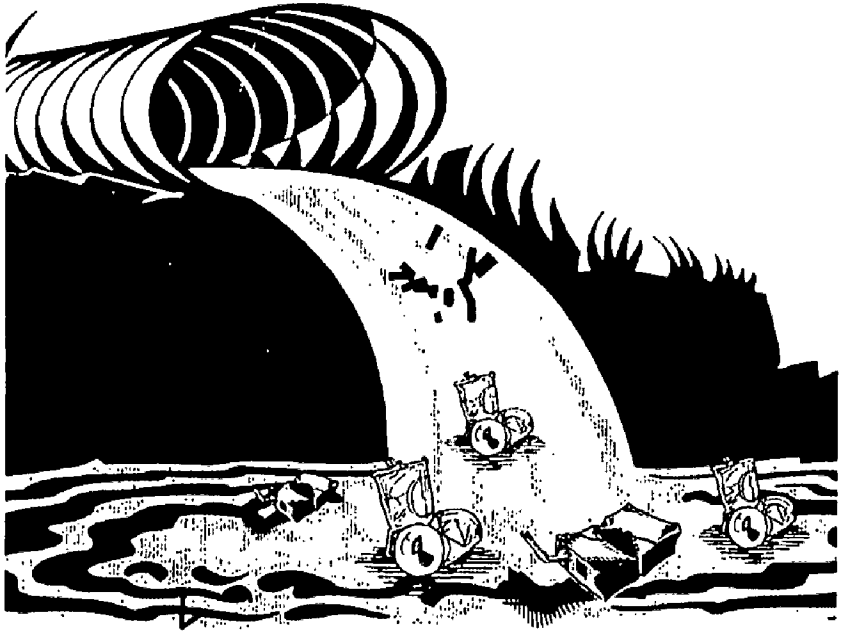

BY PUTTING ANIMAL WASTE, TRASH, AND GARBAGE IN THE PROPER CONTAINER, YOU HELP PROTECT THE ENVIRONMENT AND YOU SAVE THE CITY TAXPAYERS MONEY TOO!

CITY OF LAGUNA NIGUEL

DUMPING ON CITY STREETS AND SIDEWALKS IS NOT ALLOWED!!

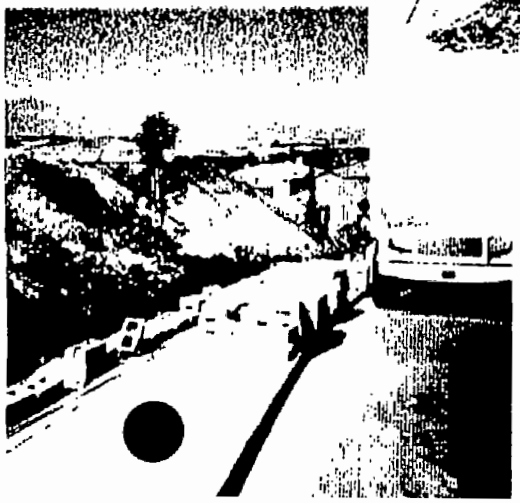

WATER YOUR LAWN

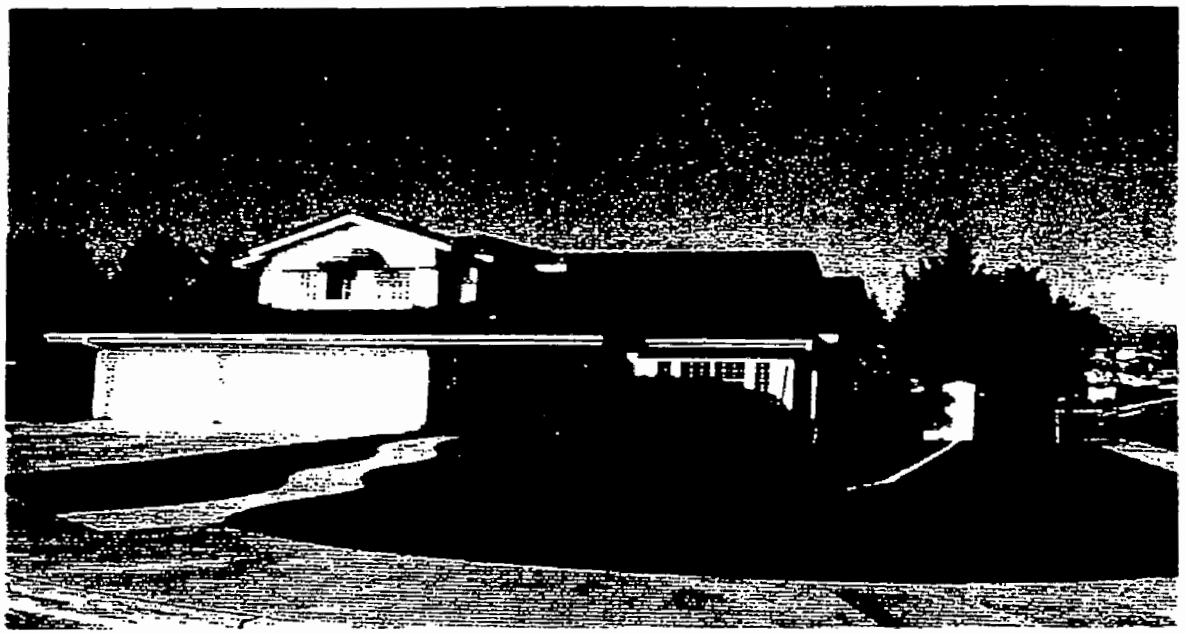

NOT THE STREET !!

SAVES WATER • SAVES TIME • SAVES ENERGY • SAVES MONEY

PLEASE DON'T OVER WATER

CITY of LAGUNA NIGUEL

Public Works/Engineering
27791 La Paz Road • Laguna Niguel, California 92677
Phone/949•362•4300 Fax/949•362•4385

CITY COUNCIL

Joe Br
Cathryn DeY
Mark J.Goodman
Linda Lindholm
Mimi Walters

February 24, 1997

Contractors Working in the City of Laguna Niguel

Subject: Compliance Requirements for the Clean Water Act

The Clean Water Act, which the Regional Water Quality Board enforces through the County and the city members, prohibits certain discharges to the storm water drainage system. Any discharge, which is not composed entirely of storm water or which contains any pollutant, shall not be discharged to: the storm water drainage system; any upstream flow which is tributary to the storm water drainage system; river; stream; creek; wash; dry arroyo; wetlands; marsh; coastal slough/bay/harbor; or Pacific Ocean.

Only clean potable water can be dumped onto the street or into the gutter.

Any work that creates a slurry of asphalt or cement, such as saw cutting, must be picked up by vacuum and disposed of other than in the street or gutter.

Please inform your sub-contractors that it is an illegal discharge that can result in, large fines (and even prison) if they choose to ignore the law.

Thank you for your cooperation.

Sincerely,

Ken Montgomery
Director of Public Works/City Engineer

KM:rm

G:\PUBWRKS\WP70DATA\LETTERS\CLEAN WATER ACT.JJ
RM

Do You Know Where The Water In Your Storm Drain Goes?

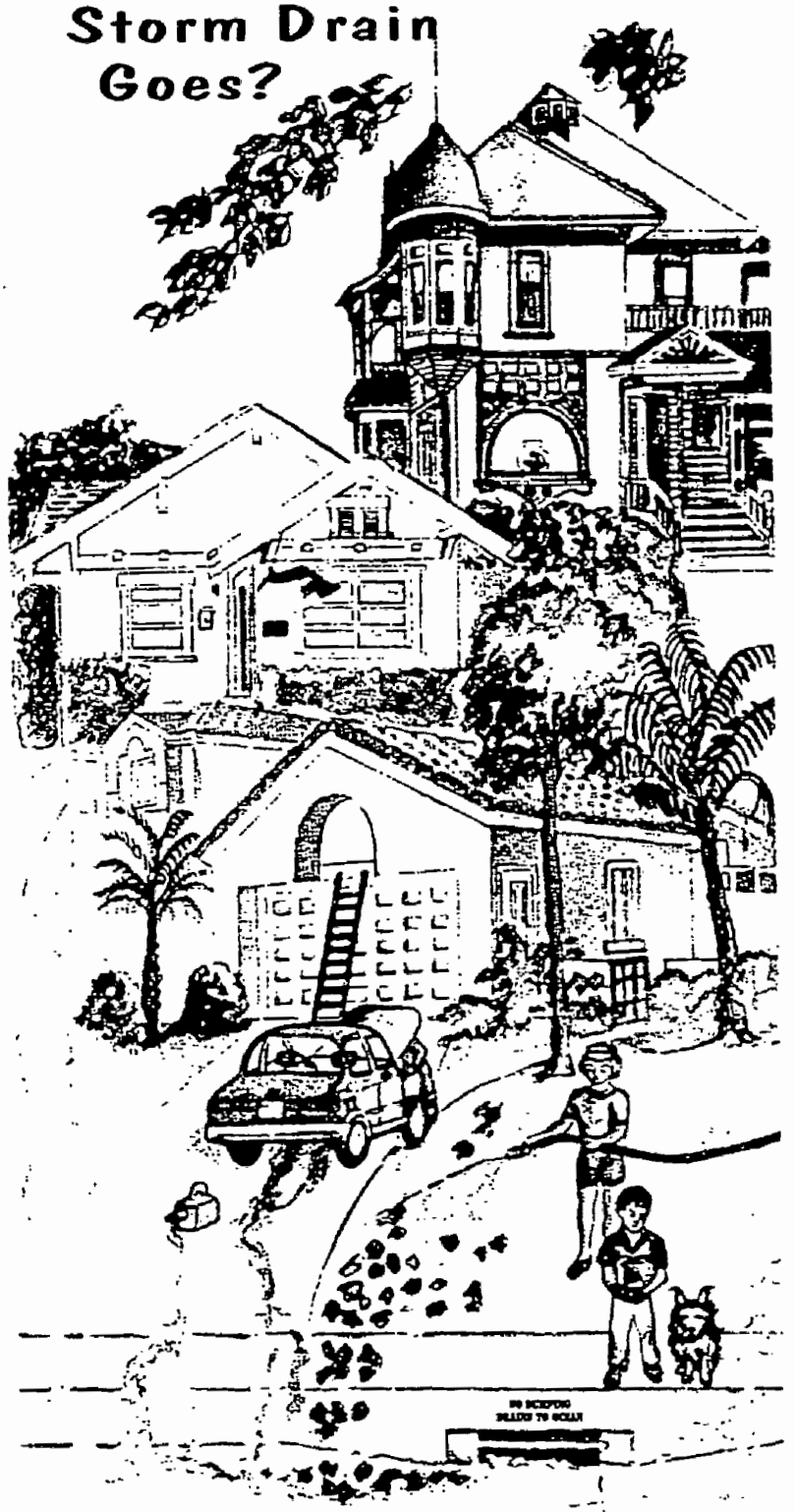

To The Ocean...

REPRESENTATIVE PUBLIC EDUCATION MATERIALS

CITY OF LAKE FOREST

CITY OF LAKE FOREST

ATTACHMENT "A"
PAGE 1 OF 9

February 11, 2000

Mayor
Richard T. Dixon

Mayor Pro Tem
Helen Wilson

Council Members
Peter Herzog
Kathryn McCullough
Marcia Rudolph

City Manager
Robert C. Dunek

City Clerk
Jeri L. Stately

RE: Neighborhood Pride Clean Up Day
Saturday, March 11, 2000

Dear Lake Forest Resident:

The City of Lake Forest is coordinating efforts in your neighborhood for Neighborhood Pride Clean-up Day on Saturday, March 11, 2000, from 8:30 a.m. to 2:00 p.m. All residents are encouraged to join in and help one another with clearing out garages and moving or discarding old items.

Large items such as old furniture, mattresses, and appliances will be picked up if placed on your front curb by 8:00 a.m. on Saturday, March 11th.

Hazardous waste, such as used oil and paint, cannot be left at the curb for pick up. The City's Household Hazardous Waste Collection event will be held in the rear parking lot of El Toro High School on Saturday, May 6, 2000 from 9:00 a.m. to 1:00 p.m. While this service is provided free of charge, space is limited. Please call (949) 642-1191 to make an appointment.

Please note that each household is allocated two bulky item pick-ups per calendar year and a pick-up on Saturday, March 11, 2000, will count as one of the two allowable pick-ups for the year.

The City looks forward to a successful Neighborhood Pride Clean Up Day and we appreciate your cooperation and assistance.

Sincerely,
CITY OF LAKE FOREST

Kathy Lancaster

Kathy Lancaster
Community Preservation Technician

DRUG USE IS LIFE ABUSE

007552

El 1 de febrero 2000

RE: Dia de Orgullo del Vecindario y Día de Limpeza
Sábado, el 11 de marzo 2000

Estimado Residente de Lake Forest:

La Ciudad de Lake Forest esta haciendo esfuerzos en su vecindario para el Dia de Orgullo del Vecindario y Dia de Limpeza, el sábado, 11 de marzo 2000, de 8: 30 de la mañana a 2: 00 de la tarde. Se pide a todo los residentes a unirse y ayudar el uno al otro en limpiar sus garajes mover y o votar artículos viejos.

Artículos grandes tal como mueble viejo, colchones, y aparatos electronicos se recojerán si lo pónen enfrente de su casa antes de las 8: 00 de la mañana el sábado, marzo 11.

Las cosas peligrosas, tal como aceite usado y pintura, no se recojerán este dia. El evento para recolectar estos materiales se sostendra en el parque de estacionamiento trasero de la escuela secundaria El Toro el sábado, 6 de mayo 2000 de 9: 00 de la mañana a 1: 00 de la tarde. Este servicio es gratis, y hay espacio limitado. Favor de llamar (949) 642-1191 para hacer su citar.

Favor de notar que cada casa pueda pedir que recogan artículo voluminoso dos veces al año. Articulos que se recojen el sábado, 11 de marzo 2000, contará como uno de estas veces.

La Ciudad espera un gran exito en el Dia de Orgullo del Vecindario y Dia de Limpieza y apreciamos su cooperación y ayuda.

Sinceramente,
CIUDAD DE LAKE FOREST

Kathy Lancaster
Community Development Technician

City of Lake Forest

NEIGHBORHOOD PRIDE CLEAN-UP DAY!

The City of Lake Forest is sponsoring a Neighborhood Pride Clean-Up Day in your neighborhood on Saturday, March 11, 2000. We encourage you to participate and support this effort by placing your unused bulky household items, such as refrigerators, water heaters, washer/dryer machines, and furniture, at your curb for pick up service prior to 8:00 a.m. on Saturday, March 11th. By taking advantage of this opportunity to dispose of your unused bulky items, you will be helping to improve the quality and appearance of your neighborhood.

Note: Paint, motor oil, chemicals or other hazardous household wastes <u>may not be discarded</u> at the curb. These items can be disposed of on May 6, 2000 at El Toro High School. Please see the enclosed flier for additional information.

Again, we encourage you to support this effort by doing some Spring-cleaning and remove all unused bulky items from your property.

If you have any questions concerning Neighborhood Pride Clean-Up Day, please contact Kathy Lancaster at 461-3474.

Neighborhood Pride Clean-Up Day

The residential neighborhoods bounded by Rockfield, Ridge Route, Muirlands and El Toro Road as well as the residential neighborhoods northeast of the railroad tracks bounded by Farthing, Ridge Route and Jeronimo will be the site of spring-cleaning activity on Saturday, March 11, 2000. Residents will join forces to clear out homes and garages of large unused furniture and appliances for bulky-item curbside pick-up.

Well-maintained neighborhoods are vital to a community's health, attractiveness and desirability as a place to live. Neighborhood Pride Clean-Up Day is intended to promote a sense of pride in our community and to encourage visual improvements. The older residential neighborhoods of Lake Forest have been targeted for this on-going program and annual clean-up days will be held in designated neighborhoods to help improve the appearance of our community.

For more information about this event, call the Community Preservation Technician at 461-3474. This event is coordinated and sponsored by the City and funded through Community Development Block Grants.

Volunteers

Here is your chance to work for your community. There is currently one vacancy on the Parks and Recreation Commission. As a Parks and Recreation Commissioner, the volunteer will advise the City on matters pertaining to the acquisition, development, and maintenance of public parks and recreational facilities. The Commission also advises the City Council on matters relating to recreational programs and provides advice to the Community Services Department.

Please call 461-3400 for an application or download the form from www.city-lakeforest.com.

Orange County Public Library

The Orange County Public Library has installed seventeen new computers and seven new printers in the El Toro Library at 24672 Raymond Way. The new computers will provide full access to the internet for library users, increasing access from the one internet terminal previously available. They will also provide access to Orange County Library databases, which include the catalog of the 2.5 million books and other items owned by the library, indexed full text articles from over 800 magazines and periodicals, and the text of selected encyclopedias, reference books, and other sources, and interactive patron services.

Children's access to the internet will be limited to "filtered" terminals which eliminate sites and materials which could be deemed inappropriate for minors; written permission must be provided by a parent or guardian for a child to access the unfiltered internet. The Library provides pathfinders to specially selected sites for children and also information for parents in guiding their children's web surfing.

Clean Sweep

The public residential and arterial streets in the City of Lake Forest, and the communities of Foothill Ranch and Portola Hills, are swept weekly by Sunset Property Services of Irvine, California. Sweeping day in your neighborhood occurs on the day after trash collection. If your trash is collected on Friday, sweeping will be done on Monday. As you know, when your trash collection day occurs on a holiday, collection is postponed by one day, with Friday collection sometimes moving to Saturday. Street sweeping day still remains the day after trash collection, which may mean that sweeping occasionally is done on Saturday. If your trash collection day is moved to Saturday due to a holiday, sweeping will be done on the following Monday.

The residential streets are swept between the hours of 7:00 a.m. and 5:00 p.m. The arterial routes through the City, such as Lake Forest Drive, El Toro Road and Trabuco Road, are swept between 10:00 p.m. and 7:00 a.m. Under normal circumstances, no residential sweeping is done on weekends, before 7:00 a.m. or after 10:00 p.m. Additional street sweeping may occur, occasionally, because of a special event, severe windstorm, or other unplanned occurrence.

Please help the street sweeping program by parking your vehicles off the street (in your garage or your driveway) on the designated sweeping day. Keeping debris out of the gutters helps the storm drains to accommodate rainfall and water from irrigation runoff. Your neighborhood's appearance will reflect your cooperation with this request! If you have questions or concerns, please feel free to contact Sunset Property Services directly at 551-5151, or the Public Works Department Street Sweeping Hotline at 461-3497.

Fair Housing Opportunity is the Law

The City of Lake Forest is committed to furthering fair housing practices in the community. If you or someone you know has a fair housing question or issue that needs to be addressed, please call the Community Development Block Grant Manager at 461-3471. The City cooperates with the Fair Housing Council of Orange County to eliminate discriminatory practices Countywide.

An impediment to fair housing opportunity is any policy or practice that denies or adversely affects the provision of housing to persons in any protected class.

CITY OF LAKE FOREST
DECEMBER 20, 1991

NEIGHBORHOOD PRIDE CLEAN-UP DAY

Saturday, March 11, 2000

Saturday, March 11, 2000, is Neighborhood Pride Clean-Up Day. The City will arrange for pick-up of large items such as furniture, mattresses, and large appliances that you may wish to discard.

If you wish to participate with curbside collection, you **MUST** mplete the postcard questionnaire below. Detach and return self-addressed, stamped postcard to the City no later than March 6, 2000. Only items placed in front of your home on the curb ***on Saturday, March 11, before 9:00 a.m. will be collected.***

IMPORTANT: ONLY LARGE ITEMS MAY BE LEFT ON THE CURB. EVERYDAY HOUSEHOLD TRASH, YARD CLIPPINGS, TIRES, OR POISONOUS MATERIALS (USED AUTOMOTIVE OIL AND PAINT) ***WILL NOT*** BE COLLECTED.

For more information call:
Elaine Nagano or Kathy Lancaster at
(949) 461-3474

I am interested in

Having curbside pick-up of large items.

Name: _____

dress: _____
Lake Forest, CA 92630

Telephone: (949) _____

Number of Items to be Picked Up: _____

NEIGHBORHOOD PRIDE CLEAN-UP DAY

Saturday, November 20, 1999

Saturday, November 20, 1999, is Neighborhood Pride Clean-Up Day. The City will arrange for pick-up of large items such as furniture, mattresses, and large appliances that you may wish to discard.

If you wish to participate with curbside collection, you **MUST** complete the postcard questionnaire below. Detach and return the self-addressed, stamped postcard to the City no later than November 12, 1999. Only items placed in front of your home on the curb ***on Saturday, November 20th before 9:00 a.m. will be collected.***

IMPORTANT: ONLY LARGE ITEMS MAY BE LEFT ON THE CURB. EVERYDAY HOUSEHOLD TRASH, YARD CLIPPINGS, TIRES, OR POISONOUS MATERIALS (USED AUTOMOTIVE OIL AND PAINT) *WILL NOT* BE COLLECTED.

For more information call:
Elaine Nagano or Kathy Lancaster at
(949) 461-3474

I am interested in

☐ **Having curbside pick-up of large items.**

Name: _____

Address: _____
Lake Forest, CA 92630

Telephone: (949) _____

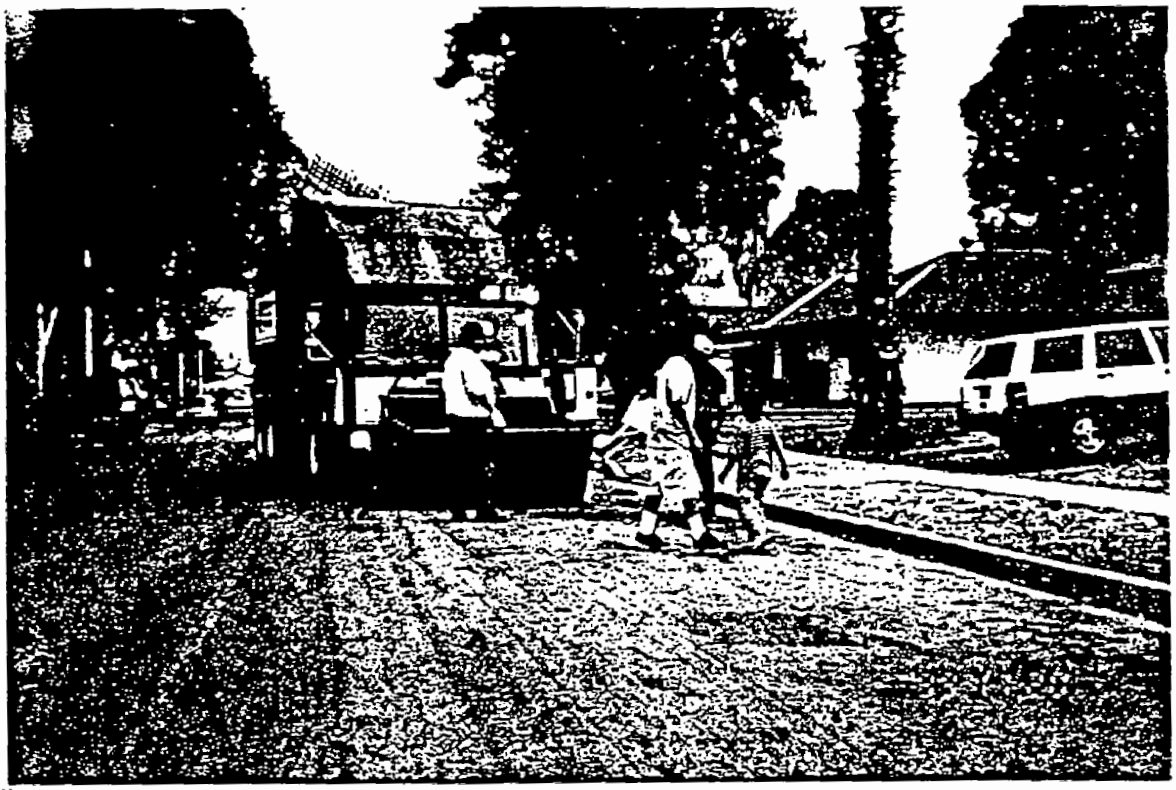

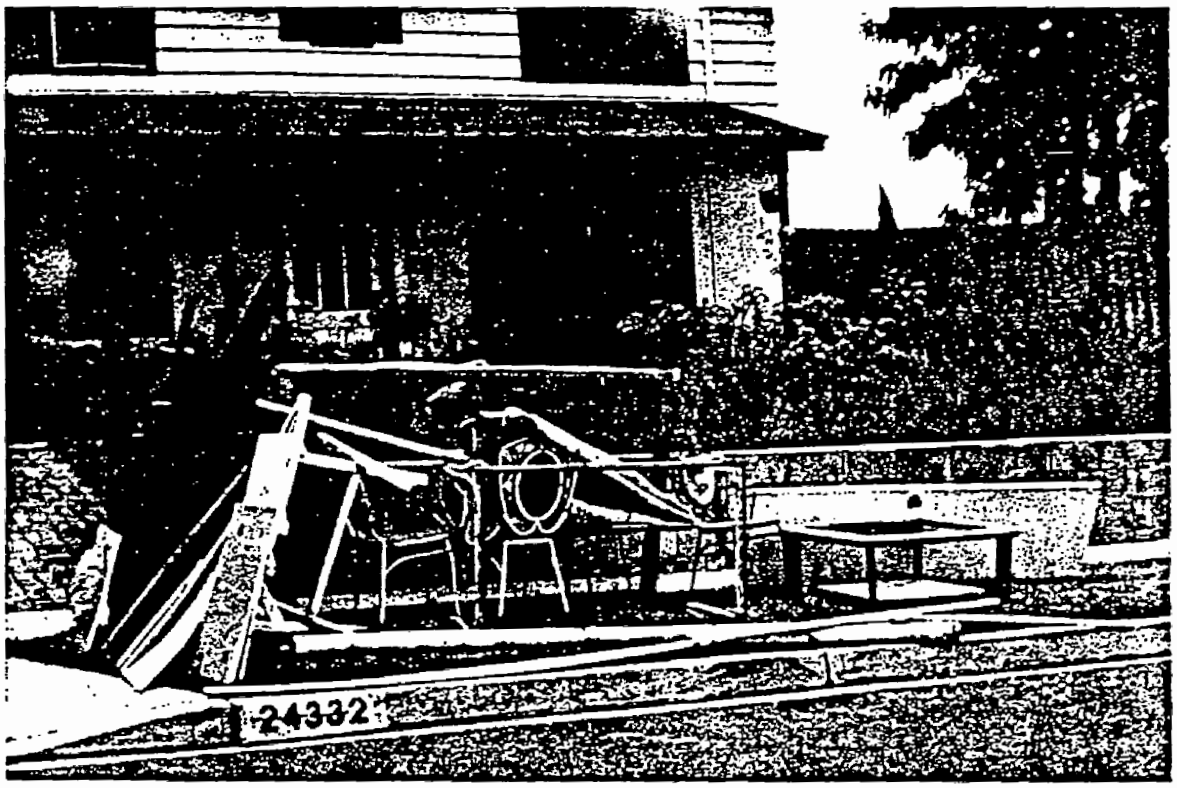
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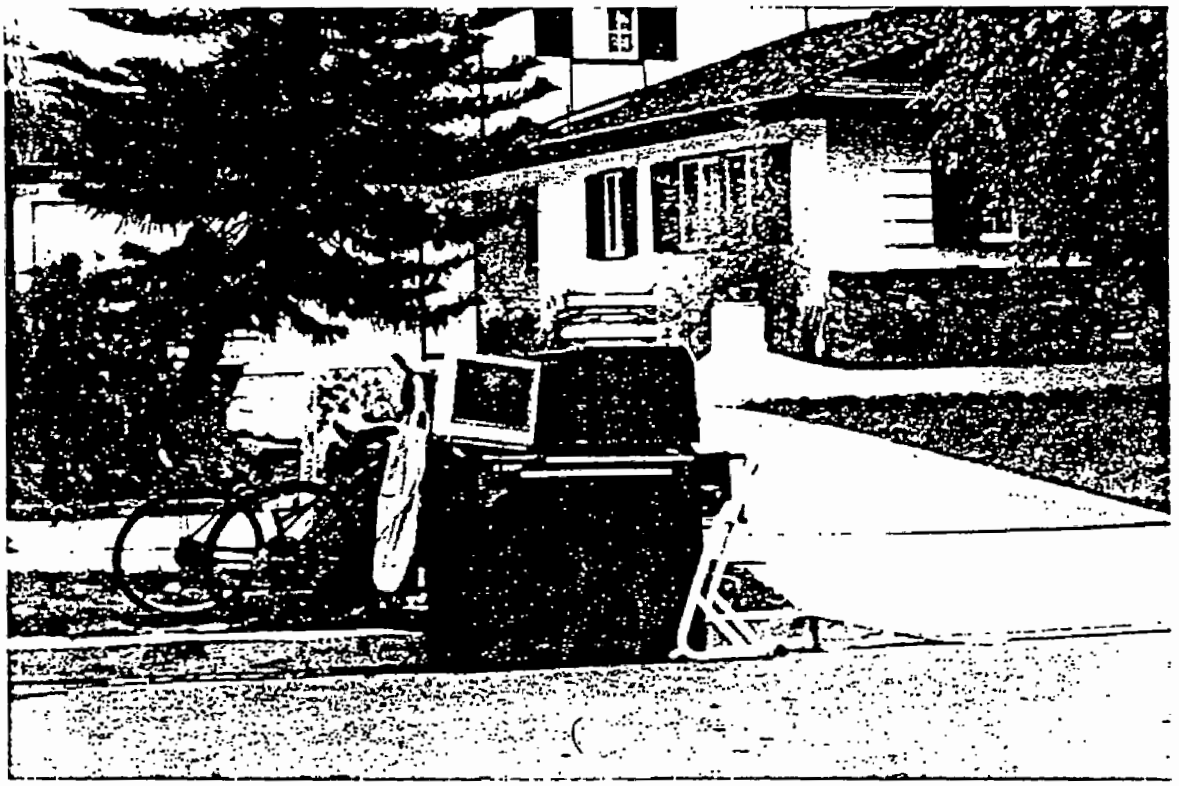

Household Hazardous Waste (HHW) Collection Event!

On **Saturday, May 6, 2000**, Waste Management of Orange County will hold a free **HHW Collection Event** for Lake Forest residents at El Toro High School, 25255 Toledo Way (enter from Serrano Road through the student parking lot behind the school).

Residents must schedule an appointment by calling (949) 642-1191 before 5:00 p.m. on Thursday May 4th, and bring an I.D. and proof of Lake Forest residence to the appointment. This service is FREE to Lake Forest residents but HHW is limited to 5 gallons or 50 lbs. per vehicle.

What is HHW? HHW is materials and substances which cannot be safely sent to the landfill, such as paint, household cleaners, pesticides, pool supplies, and automotive products such as batteries, motor oil, antifreeze, etc.

If you are unable to attend the HHW Collection Event, you can dispose of HHW at County of Orange permanent Household Hazardous Waste Collection Centers. Please call (714) 834-6752 for more information.

Bulky Item Collection

Did you know that the residents of Lake Forest have free curbside bulky item collection service? Each single family residence is entitled to two free bulky item pickups each year (up to four items per pickup). Bulky items include large, hard-to-handle items such as sofas, furniture and appliances that can be lifted by two persons. Just contact our Customer Service Center at (949) 642-1191 to schedule a pickup.

Printed on recycled paper

Fiesta Days and Rodeo at Foothill Ranch!

CASA (Community Activities and Service Association) and the Lake Forest Chamber of Commerce have joined forces to present the Fiesta Days and Rodeo at Foothill Ranch in Lake Forest. The event will be held Thursday May 18th through Sunday May 21st at the corner of Portola Parkway and Glenn Ranch Road in Foothill Ranch.

And you are invited to participate!

Weekend activities include: Professional Rodeo Cowboys Association Competition, Business Expo, full carnival, live entertainment, food vendors and more. KIKFM will be airing their program live from the rodeo.

Admission is $3.00 for adults and $2.00 for children. Tickets for the rodeo are $13.00 for adults and $11.00 for children. You may save $3.00 on the rodeo by purchasing advance tickets from any Boot Barn, AIM Mail Center or De Nault's True Value Hardware.

Waste Management of Orange County will have a booth with Cycler the Robot. Come on down and join in the fun!

If you have any questions, please contact Marion Algier at the Lake Forest Chamber of Commerce at (949) 460-7942, or Janet Coe, Economic Development Manager, at the City of Lake Forest, (949) 461-3477.

Did you know that Lake Forest Recycles Used Motor Oil?

007560

RECYCLE USED OIL

Did you know that you can dispose of your used motor oil safely and easily at 12 convenient locations right here in Lake Forest?

If you have questions about used motor oil recycling or to find the center nearest you, please call the California Integrated Waste Management Board Recycling Hotline at (800) CLEAN-UP.

Park Recycling in Lake Forest

The City of Lake Forest is continuing recycling at various public parks for a simple reason: It's the right thing to do! When you go to throw out your trash, you will now find a container near the trash receptacle at most city parks for recycling glass, aluminum and plastic.

So, the next time you visit the park, please look for these recycling containers.

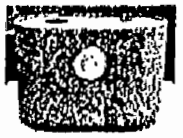

This program is funded by

CA Department Of Conservation

Source Reduction

Source Reduction means reducing waste at its source and preventing garbage from being created in the first place. This includes reducing unnecessary packaging of items, purchasing reusable and repairable items instead of disposable goods, purchasing in bulk, and making a conscious choice to create less garbage. Please join us in our e[illegible] to reduce, reuse and recycle!

ATTACHMENT 1 PAGE 1 of [illegible]

ATTACHMENT "B"
PAGE 2 OF 5

007561

KEEP THE FOREST in Lake Forest

Saturday, May 6th, 2000 - City of Lake Forest Household Hazardous Waste Collection Event

What is Household Hazardous Waste?

Household hazardous waste, or "HHW", is generated by everyone. HHW is materials and substances which cannot be safely collected with your refuse and sent to the landfill such as paint, automotive products (batteries, motor oil, antifreeze), pesticides, gasoline, pool chemicals, poisons, etc. When improperly discarded, HHW can pollute our landfills, contaminate the city's water supply or drain into the ocean.

Upcoming Lake Forest HHW Collection Event!

On Saturday, May 6th, Waste Management of Orange County will hold the 3rd Annual Lake Forest HHW Collection Day Event at El Toro High School, 25255 Toledo Way (enter from Serrano Road through the student parking lot behind the school).

This service is FREE to City of Lake Forest residents, but HHW is limited to 5 gallons or 50 lbs. per vehicle.

Call to Schedule an Appointment...

Residents must schedule an appointment by calling (949) 642-1191 before 5:00 p.m. on May 4th. You must bring an I.D. and proof of Lake Forest residence to the appointment!

If you are unable to attend the Waste Management HHW Collection Event, the County of Orange operates permanent HHW Collection Centers. The nearest center is located at 6411 Oak Canyon in Irvine (take the Sand Canyon exit off the 5 Freeway and go west). For more information, please call the Orange County HHW Hotline at (714) 834-6752.

For additional information and customer service, please call (949) 642-1191.

In the best interest of the health and well-being of students, employees and the general public, the Governing Board of the Saddleback Valley Unified School District is proud to provide a healthy, tobacco free environment. In accordance with California State Assembly Bill 816, board policy prohibits the use of tobacco products at any time on school district property. We therefore request that all people refrain from using any tobacco products while on or in school or district grounds, buildings or vehicles. We thank you for your cooperation.

WM WASTE MANAGEMENT

"JUST SAY NO" TO HOUSEHOLD HAZARDOUS WASTE!

Have you been meaning to check under your sink, in the garage, out in the storage shed and in secret hiding places throughout your home for "treasures" that no longer have any value? Did you ever wonder if there was a place that you could take these items? There is, it's called the Household Hazardous Waste Collection Center. Household Hazardous Waste (HHW) consists of materials and substances which cannot be safely sent to the landfill, such as paint, household cleaners, pesticides, antifreeze, batteries and motor oil.

Just call the HHW Hotline at (714) 834-6752 (press 2) for information about no-fee collection centers in Orange County. This Hotline also provides a complete list of what products are classified as HHW and may be helpful to you in gathering items for disposal.

VINTAGE PARK IMPROVEMENT UPDATE

The City of Lake Forest would like to thank you for your patience during the construction of the park improvements at Vintage Park. Because of ongoing concerns, the City felt that it was in the best interest of the community to terminate the contract with the original contractor. The process of selecting a replacement contractor must be adhered to in a strictly-defined legal manner, thus resulting in an unfortunate delay to the project and inconvenience to our residents. We are now anticipating that the project will be completed during July 2000. We hope that residents will use and enjoy Vintage and other City parks and their new additions.

HOME IMPROVEMENT AND REPAIR LOANS AVAILABLE THIS SUMMER

The City's CDBG (Community Development Block Grant) Rehabilitation Program continues to offer assistance to those who are in need of repairs to their home. Homeowners who are eligible can receive deferred 0% interest loans or 3% amortized loans for home improvements. Homeowners can receive up to $10,000 and mobile home owners can receive up to $5,000 for repairs. Eligible residents in Foothill Ranch and Portola Hills can now participate in the Lake Forest Program. Annual income cannot exceed 80% of the HUD median income (See chart below). Eligible items include painting, flooring, roofing, plumbing, heating, garage doors, driveways, and other common home improvement items. The City will be accepting applications for this Program during the months of July and August 2000. All applications will be reviewed after the application period has ended. For more information or to be put on the mailing list to receive an application when available, please call (949) 461-3473.

2000 HUD INCOME RESTRICTIONS

Combined gross household income may not exceed 80% of HUD median income. Income is adjusted annually.

Household Size	Income Limits for 0% Deferred Loan	Income Limits for 3% Loan
1	$24,350	$35,150
2	27,850	40,150
3	31,300	45,200
4	34,800	50,200
5	37,600	54,200
6	40,350	58,250
7	43,150	62,250
8	45,950	66,250

COMMUNITY SPIRIT SOARS

Neighborhood Pride Volunteer Paint Day

The efforts of 146 wonderful volunteers made a very successful second annual Neighborhood Pride Volunteer Paint Day. This year's event took place on April 8th and April 15th and volunteers assisted seven families with the exterior painting of their homes.

Sponsored by the City's Community Development Block Grant (CDBG) and coordinated through efforts of Code Enforcement and Parks and Recreation, the volunteer groups that participated in painting included: Saddleback Valley Foursquare Church, the Trabuco and Lake Forest Wards of the Chur[illegible] of Jesus Christ of Latter Day Saints, Wells Fargo [illegible] Foothill Corridor Area, the Kiwanis Club of Lake Forest, and the Promise Keepers Men's Group from Saddleback Church.

To qualify for painting at no cost, homes must be owner occupied, homeowners must income-qualify, and the home must be located in one of the City's CDBG Target Areas. A professional paint crew reviewed each home and all prep work was completed prior to the arrival of the volunteers. Volunteers masked all the required areas, painted the exterior walls and trim, and assisted with the necessary clean up.

This program also provides an opportunity for volunteer organizations to "adopt" the home that they painted and to provide further clean-up and rehab/repair/maintenance assistance throughout the year. One volunteer organization has already indicated they will "adopt" the home that they painted in April.

Many thanks to all whom participated in this year's event who will be honored at an upcoming City Council meeting. Paint Day helps to foster community pride and is instrumental in m[illegible]taining and improving the character of our n[illegible]borhoods. If you or your organization would like to volunteer for next year's Neighborhood Pride Volunteer Paint Day, or if your home could benefit from this program, please contact the City of Lake Forest Community Preservation Technician at 461-3474.

ATTACHMENT "C"
PAGE 1 OF 1

INVITATION

Calling All Architects, Builders, Contractors And Developers!

Get To Know The People Who Make Things So Much Easier In The City Of Lake Forest

The City's Development Services Team – Planning, Building and Engineering – is hosting a lunchtime "meet and greet" for architects, builders, contractors, developers and others involved in projects in Lake Forest. We'll serve a barbecue lunch and drinks.

Learn how our team can make your projects easier. We will explain our permitting processes and introduce you to the staff members who can answer your questions and help you move your projects ahead. Come and put faces with the names.

DATE:	Wednesday, June 14, 2000
TIME:	11:30 a.m. to 1:00 p.m.
PLACE:	Lake Forest City Hall – Council Chambers 23161 Lake Center Drive, Lake Forest
RSVP:	To Peggy Samantha at (949) 461-3460 Or FAX to (949) 461-3512 Or Email: psamantha@city-lakeforest.com

007564

AGENDA
DEVELOPMENT & BUILDING ROUNDTABLE
JUNE 14, 2000

WELCOME	Kathy Graham Community Development Director
PLANNING PROCEDURES	Gayle Ackerman Development Services Manager
ENGINEERING PROCEDURES	Bob Woodings Public Works Director/City Engineer
BUILDING PERMITS	Jim Brogan Building Official

INTRODUCTION OF OTHER AGENCIES

- Orange County Fire Authority
- Cal EPA – Permit Assistance Center
- Irvine Water District
- Southern California Edison

LAKE FOREST RECYCLES USED MOTOR OIL!

Used oil can contain such contaminants as lead, magnesium, copper, zinc, chromium, arsenic, chlorides, cadmium and chlorinated compounds. Oil poured down storm drains or onto the ground can work its way into our ground and surface waters and cause serious pollution. One gallon of used oil can foul one million gallons of drinking water!

Lake Forest has 10 State Certified Used Oil Collection Centers standing by to help you recycle your used motor oil. Recycling oil is easy. When you do an oil change, just drain your vehicle's old oil into a clean container, seal the container well with a lid and bring it to one of the 10 conveniently located State Certified Used Oil Collection Centers in Lake Forest. So don't throw good oil down the drain. Recycle now!

It's Easy! It's Free!

Did you know that you can dispose of your used motor oil safely and easily right here in Lake Forest? When you change your oil, drain your used motor oil into a container, seal the container well with a lid, and bring it to one of the conveniently located State Certified Used Oil Collection Centers in Lake Forest. Be sure that your motor oil is not mixed with other substances, such as antifreeze, solvents, gasoline or water.

Why Recycle Used Motor Oil?

Because it never wears out! Your used motor oil can be recycled, cleaned and used again. And that means you can conserve a natural resource. Motor oil which is poured into the ground, or your trash, can pollute the soil, groundwater, streams and rivers... your environment. When you take your used motor oil to a State Certified Used Oil Collection Center for recycling, you are protecting the environment and conserving a valuable resource. And, State Certified Used Oil Collection Centers will pay you $.04 for each quart you recycle.

Used Oil Recycling Tips

- When draining used oil, use a clean plastic oil pan or container with a tight lid.
- Reuse your used oil container, and store it safely, away from children and pets.
- Don't mix used oil with chemicals, gasoline, water or other substances.
- Use a reusable 5-gallon or smaller sized container.
- State Certified Used Oil Collection Centers will take between 5 and 20 gallons per day, per person.

State Certified Used Oil Collection Centers*

Firestone Store
24421 Rockfield
Lake Forest (714) 581-2660

El Toro Texaco
23751 El Toro Road
Lake Forest (714) 457-9892

Jiffy Lube # 1301
20781 Lake Forest Drive
Lake Forest (714) 583-0470

Lake Forest Texaco
23652 Rockfield Blvd.
Lake Forest (714) 581-5770

Midas
22757 Centre Drive
Lake Forest (714) 855-1218

Pep Boys
22671 Lake Forest Drive
Lake Forest (714) 855-9593

Purrfect Auto Service
20732 Lake Forest Drive
Lake Forest (714) 457-1150

Purrfect Auto Service
20751 Bake Parkway
Lake Forest (714) 830-7624

Ryan's Foothill Ranch Transmission
20622 Pascal Way
Lake Forest (714) 770-6888

* Please telephone these centers before taking in your used oil.

Printed on Recycled Paper

If you have additional questions about used motor oil recycling, please call the California Integrated Waste management Board Recycling Hotline at 800-553-2962.

REPRESENTATIVE PUBLIC EDUCATION MATERIALS

CITY OF MISSION VIEJO

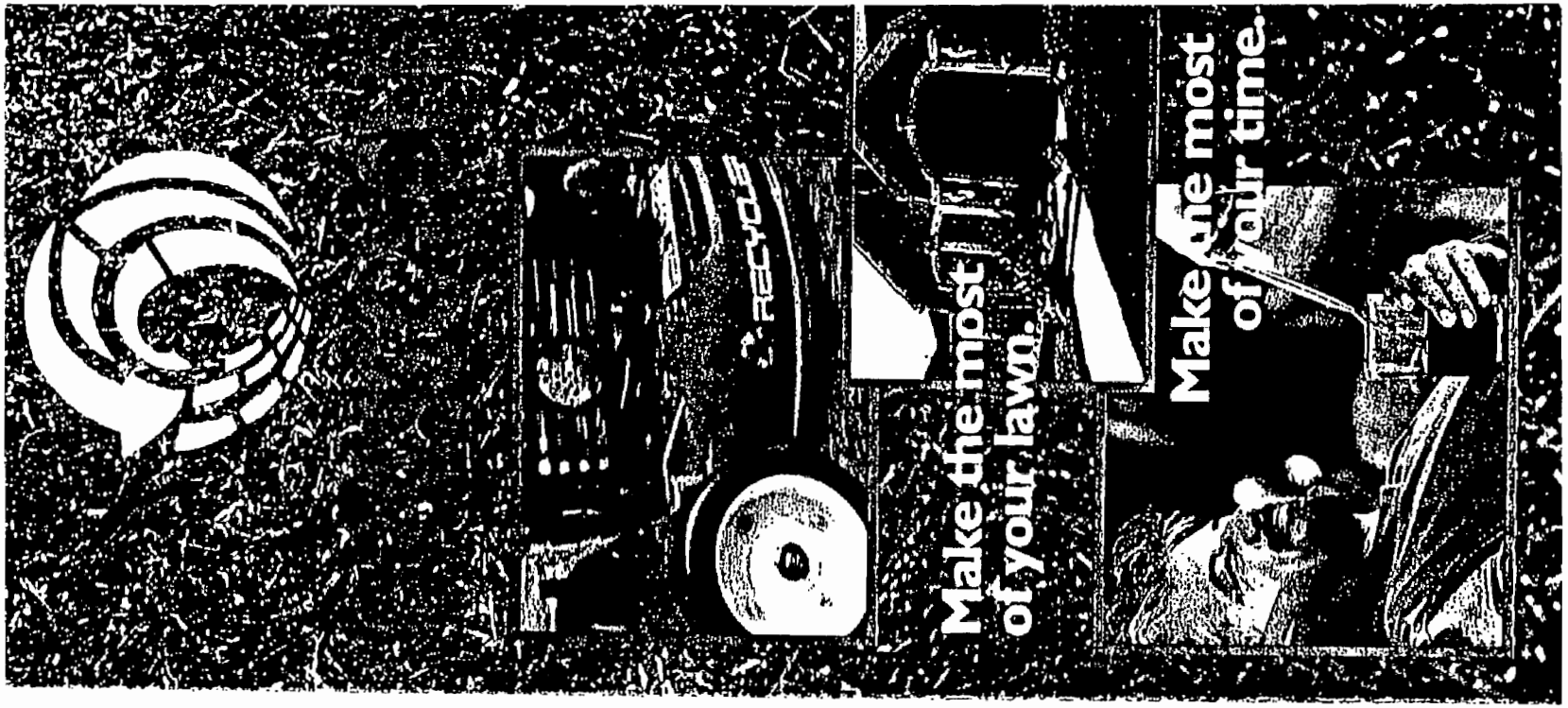

California Environmental Protection Agency
Integrated Waste Management Board

8800 Cal Center Drive MS 23
Sacramento CA 95826

50% BY 2000

Visit our Web site at: www.ciwmb.ca.gov/Organics/

007568

Save time!

The average person spends less time on lawn care when they grasscycle. You save time and the hassle of raking, sweeping, bagging, and throwing out grass clippings.

Help the environment!

Grasscycling cuts the amount of green materials going to landfills. Grasscycling slows evaporation from the soil surface, enhancing your lawn's drought tolerance and conserving water. Grasscycling helps reduce fertilizer and water usage, which means less runoff from your lawn that can lead to surface and groundwater pollution. Grasscycling with electric mulching mowers also is better for the air.

Will grasscycling make my lawn look bad?

No! The key to maintaining a neat appearance is to cut the lawn often enough to produce short grass clippings. If you follow the 1/3 rule—mow often enough so that no more than 1/3 of the length of the grass is cut—the short clippings decompose quickly and will not cover the grass surface. Also remember to mow when the grass is dry to prevent grass clippings from clumping in piles on the lawn.

Does grasscycling cause thatch buildup?

No! Short grass clippings left on a lawn do not smother the grass underneath or cause thatch buildup. Research has shown that grass roots and stems are the primary cause of thatch, not grass clippings. Roots and stems contain large amounts of lignin (wood), a substance that decomposes very slowly. In contrast, grass clippings are approximately 80-85 percent water with only small amounts of lignin, and they decompose rapidly.

Is grasscycling always appropriate?

Grasscycling does not work in every situation. Prolonged wet weather, mower breakdowns, or infrequent mowing are situations where grass clippings should probably be bagged since a large number of clippings may be generated. But do not throw the clippings away! Add clippings to your compost pile, or use them as mulch around trees, flowerbeds, and shrubs.

Does grasscycling spread lawn disease?

No! Improper watering and fertilizing are the primary cause of turfgrass disease. If an environment for disease is present, it will occur whether clippings are left on the lawn or not. Most grasses in California need about 1 inch of water every 5 to 7 days in the growing season and much less during slow-growth months. Lawns watered too frequently tend to develop shallow root systems that may make them more susceptible to stress and disease. Overfertilization can also weaken a lawn by causing excessive top growth. It is better for the lawn to apply smaller quantities of fertilizer more frequently rather than larger amounts occasionally.

Does grasscycling require special equipment?

You may be able to use your existing mower to grasscycle. Refer to your owner's manual or contact a local lawnmower dealer to learn if you can grasscycle. You may need to purchase a retrofit kit, and your mower dealer can assist you with selecting the correct one.

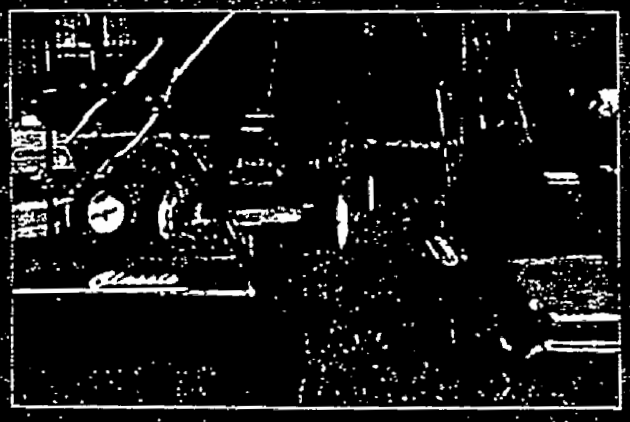

Remember:

Grasscycling is faster, cheaper, and easier!

Saves time

(no more bagging)

Saves money

(less fertilizer is needed, no disposal fees)

Encourages a healthier lawn

(clippings contain valuable nutrients)

Benefits the environment

(conserves landfill space and water resources)

For more information about grasscycling, contact your local recycling coordinator or call the Waste Board at (916) 255-2708.

www.ciwmb.ca.gov/Organics/

The Integrated Waste Management Board (IWMB) does not discriminate on the basis of disability in access to its programs. IWMB publications are available in accessible formats upon request by calling the Public Affairs Office at (916) 255-2296. Persons with hearing impairments can reach the IWMB through the California Relay Service, 1-800-735-2929.

Pub# 443-99-011
Printed On Recycled Paper

Grass clippings make up a surprisingly large portion of California's waste stream. Increasingly, as California communities work to meet the State mandate to cut the amount of trash sent to landfills, they are looking at grasscycling to reduce the amount of green materials generated.

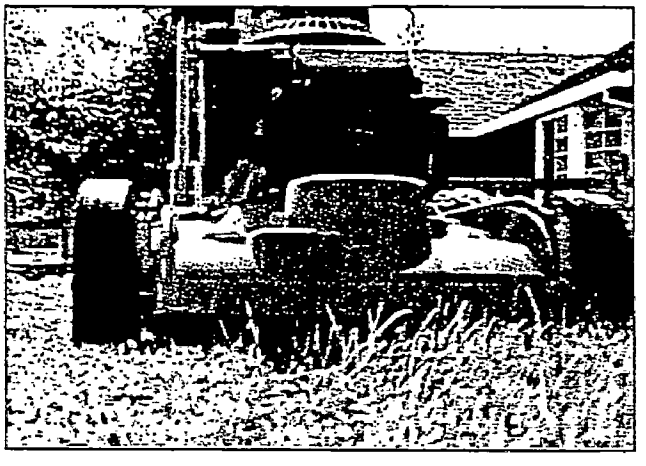

What is grasscycling?

Grasscycling is the natural recycling of grass by leaving clippings on the lawn when mowing. When you grasscycle with a mulching mower, the clippings stay in the chamber longer and are cut and recut before falling back to the soil. Once on the ground, the clippings decompose quickly, returning valuable nutrients back to the soil. Grasscycling is simple, easy, and it works!

Enjoy a healthier Lawn!

The valuable nutrients released through grasscycling make lawns greener and encourage a healthier stand of grass. Grass clipping decomposition enhances soil microbial activity and adds beneficial organic matter to the soil.

Save money!

Since grasscycling returns valuable nutrients to the soil, you can reduce the amount of fertilizer you purchase by 15 to 20 percent. In addition, even if your community has a green waste collection program, it is costly to collect this material and grasscycling can help keep garbage collection rates down.

It's best to be prepared!

Living in California means living with the reality that a major **earthquake** can hit at any minute. Preparing for such an event will help you get safely through a disaster.

We depend so much on household utilities for both comfort and security that it's hard to imagine living without them. But, putting all comfort aside, there's one household utility that offers more than simple comfort; it also protects your health and the environment around you. That household utility is your sewer system.

Knowing what to do if your sewer system becomes damaged or inoperable will not only help you get through a disaster such as an earthquake, it will also help protect your health and the environment.

NO ILLEGAL DUMPING TO SEWERS OR STORM DRAINS
PROTECT OUR ENVIRONMENT

Checklist for an EMERGENCY provisional toilet

- ☐ 5-gallon plastic bucket with a tight-fitting lid
- ☐ 2 boxes heavy-duty trash can liners (8-10 gallon size) with ties
- ☐ 1 gallon liquid chlorine bleach or other toilet disinfectant
- ☐ 2 boxes baking soda
- ☐ 2 large boxes heavy-duty trash can liners (30-gallon size) with ties
- ☐ 6-8 rolls toilet paper
- ☐ Hand sanitizer to clean and disinfect hands without water
- ☐ Feminine products
- ☐ Paper towels
- ☐ Moist towelettes or baby wipes

It's easy, so be prepared!

OCSD
Rev. 2/99

ORANGE COUNTY SANITATION DISTRICT · PROTECTING THE ENVIRONMENT

For additional information, contact
the Orange County Sanitation District
Communications Department (714) 962-2411
or visit our website at www.ocsd.com

Orange County Sanitation District

EARTHQUAKE PREPAREDNESS

What to do if your sewer system becomes damaged or inoperable

HOUSEHOLD HAZARDOUS WASTE DISPOSAL

FREE

Tuesday - Saturday 9AM - 1PM

6411 OAK CANYON, IRVINE

(between the 5 & 405 off Sand Canyon)

For Info Call

714-834-6752

Waste Systems

BROWNING-FERRIS INDUSTRIES

PACIFIC BELL

B.F.I. CURBSIDE

PHONE BOOK RECYCLING

APRIL 6TH TO MAY 15TH

FOR MORE INFO CALL

1-800-953-4400

007573

FREE COMPOST GIVEAWAY

SPONSORED BY BFI

SATURDAY, APRIL 24TH

9AM UNTIL ITS GONE

AT THE

NORMAN P. MURRAY COMMUNITY CENTER

BRING YOUR SHOVEL

FREE FREE FREE

HOUSEHOLD HAZARDOUS WASTE ROUND-UP 1999

BFI

MISSION VIEJO CALIFORNIA

Saturday, November 6th 1999

9am - 2pm

Unisys Parking Lot

25725 Jeronimo Road

pacific clippings
p m b 181789
santa ana, calif. 92711
The Register NOV 6 - 1999
Daily

MISSION VIEJO

Hazardous waste: The Annual Waste Collection Day is today. Residents are encouraged to collect old paints, aerosols, flammable liquids, pesticides and corrosive materials and properly discard them from 9 a.m. to 2 p.m. at Unisys Corp., 24725 Jeronimo Road, between Los Alisos and Alicia Parkway. Last year, 1,500 people hauled 73,000 pounds of hazardous materials to the site.

— Joan Hansen
(949) 454-7377
Saddleback@link.freedom.com

007577

Where Does the Water in Your Storm Drain Go?

Sewer drains and pipes lead to a sewage treatment plant, but storm drains are designed to prevent flooding by carrying excess rainwater from city streets to the ocean. If this urban runoff is polluted, it can contaminate the ocean and beaches, harm aquatic life, and increase the risk of flooding by clogging gutters and catch basins.

Common household pollutants poured into gutters flow to the ocean. Similarly, waste material washed from driveways, lawns, and grasslands flows to the sea. Recently, this drainage has increased levels of bacteria and other toxins along beaches where streams and storm drains empty, causing frequent closure of these southland recreational areas to surfers and swimmers.

Although some of this pollution may be the result of sewage leaks or industrial dumping, most of it appears to be caused by natural processes and individual carelessness or indifference. Together, you and your neighbors can make a difference to keep gutters, storm drains, and waterways clean.

You can help prevent polluted urban runoff from contaminating southland streams, oceans, and beaches by taking the following steps:

- Never pour anything down a storm drain that you would not want to swim in.
- Use absorbent material or kitty litter to clean up spills of oil or other similar toxic liquids and dispose of them in the trash.
- Dispose of unwanted paint and other toxic liquids at Mission Viejo's annual Household Hazardous Waste Roundup.
- Avoid overwatering your lawn. Runoff from lawn irrigation may contain fertilizer, pesticides, and/or animal waste.
- Clean patios, driveways, porches, and sidewalks with a broom, not a hose.
- Take your vehicle to a car wash that recycles water rather than washing it in your driveway.
- Flush pet waste down the toilet or place it in a plastic bag in the trash so that the harmful bacteria this waste contains will not be washed into streams and onto beaches.
- Control erosion at construction and landscape sites with sandbags or other devices to prevent dirt and debris from entering storm drains.

Even if you live miles from the Pacific Ocean you may be polluting it without knowing it. Before you let anything go into the gutter or the storm drain, stop and think!

Prepare for Medical Emergencies

The Orange County Fire Authority (OCFA) responds to a variety of situations, including fires, earthquakes, floods, and medical emergencies. In a medical emergency, it is essential that firefighter paramedics quickly assess the patient to determine his condition and decide upon proper stabilizing treatment.

Yet in situations of this kind, the patient may be unconscious or in shock and so not able to describe his general health, name the medications he is taking, or alert emergency responders regarding physical conditions like diabetes that may be cause for extra concern or require special care.

At times like these, a Medical Information Sheet may be a lifesaver. This sheet should be prepared before an emergency arises and should include the following information:

- A brief medical history that mentions all physical conditions, ailments, or diseases that may be cause for additional concern or require special care
- Prescription medications that are being taken regularly
- Allergies, especially those to medications
- Insurance carrier or health care provider along with group and/or policy numbers
- Name and telephone number for primary care physician
- Hospital preference
- Name of attorney in fact
- Name and telephone number for family member or friend who should be contacted in an emergency

For additional information call the OCFA Community Relations and Education Section at (714) 744-0496.

Critter Corner

During the past two years, the California legislature has passed several laws that will dramatically change the philosophies and daily operations of animal shelters throughout the state.

For example, Senate Bill 1785 (referred to as the Hayden Bill) requires all animal shelters, humane societies, and animal welfare groups to adhere to improved care, custody, animal adoption, and euthanasia standards for stray and homeless animals.

California animal shelters are now required to lengthen their animal holding periods and extend operating hours to allow working pet owners time to redeem their lost animals.

Shelters must spay and neuter all animals before they are released for adoption and collect fines (required by Food and Agricultural Code Section 30804.7) for all impounded dogs that have not been spayed or neutered.

Last year 1,958 animals were impounded by the Mission Viejo Animal Services center. Over 950 of these animals were adopted. Another 658 were reunited with their owners.

The Mission Viejo Animal Services Center is proud of its commitment to caring for stray and homeless animals and encouraged by this new legislation, which improves the standards for shelter operations statewide.

If you lose your pet or are interested in adopting a dog or cat, please contact the Mission Viejo Animal Services Center at 470-3045.

Insert to be included in the October Billing.....

Unlimited Recycling

Printed on Recycled Paper

Do you have extra recycling material?

BFI will take all of your extra recycling material! Just put the extra material in any 32 gallon trash can and place it next to your BFI blue recycling can. Our drivers will collect it at NO extra cost. Please no plastic bags.

Help the City of Mission Viejo reach the 50% reduction of trash goal by 2000.

Unlimited Green Waste Recycling

Printed on Recycled Paper

Do you have extra green waste?

BFI will take all of your extra green waste! Just put the extra material in any 32 gallon trash can and place it next to your BFI can. Our drivers will collect it at NO extra cost. Bundles are also accepted. Please no plastic bags.

Help the City of Mission Viejo reach the 50% reduction of trash goal by 2000.

The Only Weekly Newspaper Exclusively For The Mission Viejo Area

Mission Viejo News

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KATHERINE LARA: Art Director
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E-MAIL: cotonews @ deltanet.com

"Good News For A Change in Mission Viejo"

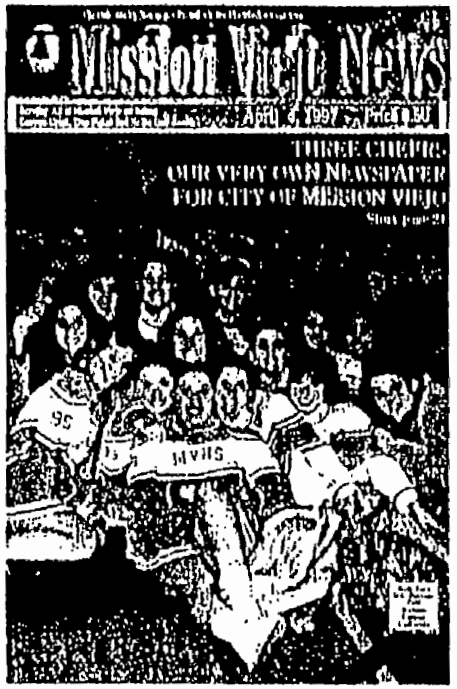

LOCAL NEWS

MISSION VIEJO OFFERS HOUSEHOLD HAZARDOUS WASTE COLLECTION DAY

The City of Mission Viejo is pleased to announce its annual Household Hazardous Waste Collection Event. This year's event is scheduled for Saturday, November [illegible] from 9:00 AM to 2:00 PM at the Unisys Corporation, [illegible] between Alicia Parkway and Los Alisos in Mission Viejo.

There is no charge for this service, and all Mission Viejo residents are invited to bring up to 15 gallons or 125 pounds of household hazardous waste, such as used motor oil, antifreeze, batteries, paint, paint thinner, pesticides, herbicides, pool acids, cleaning supplies and photo chemicals.

To minimize the potential for a delay, residents are invited to arrive between designated times according to first initial of last name, as follows:

A-I 9:00 AM to 10:30 AM; J-Q 10:30 AM to noon; R-Z noon to 2:00 PM.

For more information, please refer to the notice on BFI trash collection bill, the fall edition of City Outlook, or call (888)PICK-BFI.

GREAT NEW CHRISTMAS BOUTIQUE IN RANCHO

Santa Margarita Catholic High School will be holding its Tenth [illegible]ual Christmas Boutique to benefit Boys' Volleyball and Grad Night 2000. It will be held on Friday, November 5th from 6:00 p.m. to 10:00 p.m. and Saturday, November 6th from 9:00 a.m. to 4:00 p.m. in the Santa Margarita Catholic High School Moiso Pavilion at 22062 Antonio Parkway in Rancho Santa Margarita.

More than 160 vendors from throughout Southern California will offer hand-crafted and manufactured gifts, clothing, ceramics and holiday items. The boutique will also [illegible]ture

25 Ways You Can Help Save Our Planet

1. Buy products that feature the recycling mark.
2. Bring a lunch box to school instead of throwing out those paper lunch bags every day.
3. Use cloth instead of paper napkins and a sponge instead of paper towels.
4. Give outgrown toys and clothes to someone who can use them.
5. Bring a container filled with your favorite drink to lunch every day instead of individual cartons.
6. Avoid buying items that have excessive packaging.
7. Decorate a shoe box with old wrapping paper and use it to store small toys and other things.
8. Save used paper and use the clean side whenever you need scrap paper.
9. Refuse a paper bag when you buy something small.
10. Find out if there are any other uses before throwing things out.
11. Take shorter showers.
12. Be careful not to disturb plants and animals when outdoors.
13. Volunteer to work at the recycling center.
14. Save and reuse bubble and foam packing.
15. Turn off appliances when not in use.
16. Ride your bike instead of in the car.
17. Buy toys that are well made and last.
18. Get some friends and visit a local stream to collect trash.
19. Cut six-pack plastic rings.
20. Don't let the water run unnecessarily when brushing your teeth.
21. Build a bird house for the backyard.
22. Save empty cardboard containers for craft projects.
23. Pick up at least one piece of litter every day.
24. Leave grass clippings on the lawn.
25. Let grass grow taller in dry weather.

©1996 GREAT [illegible]

Reduce Reuse Recycle

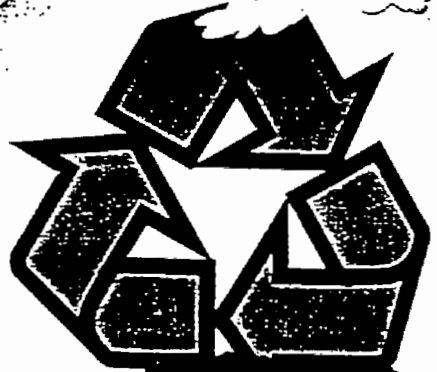

For Today Tomorrow Forever!

Do You Know Where The Water In Your Storm Drain Goes?

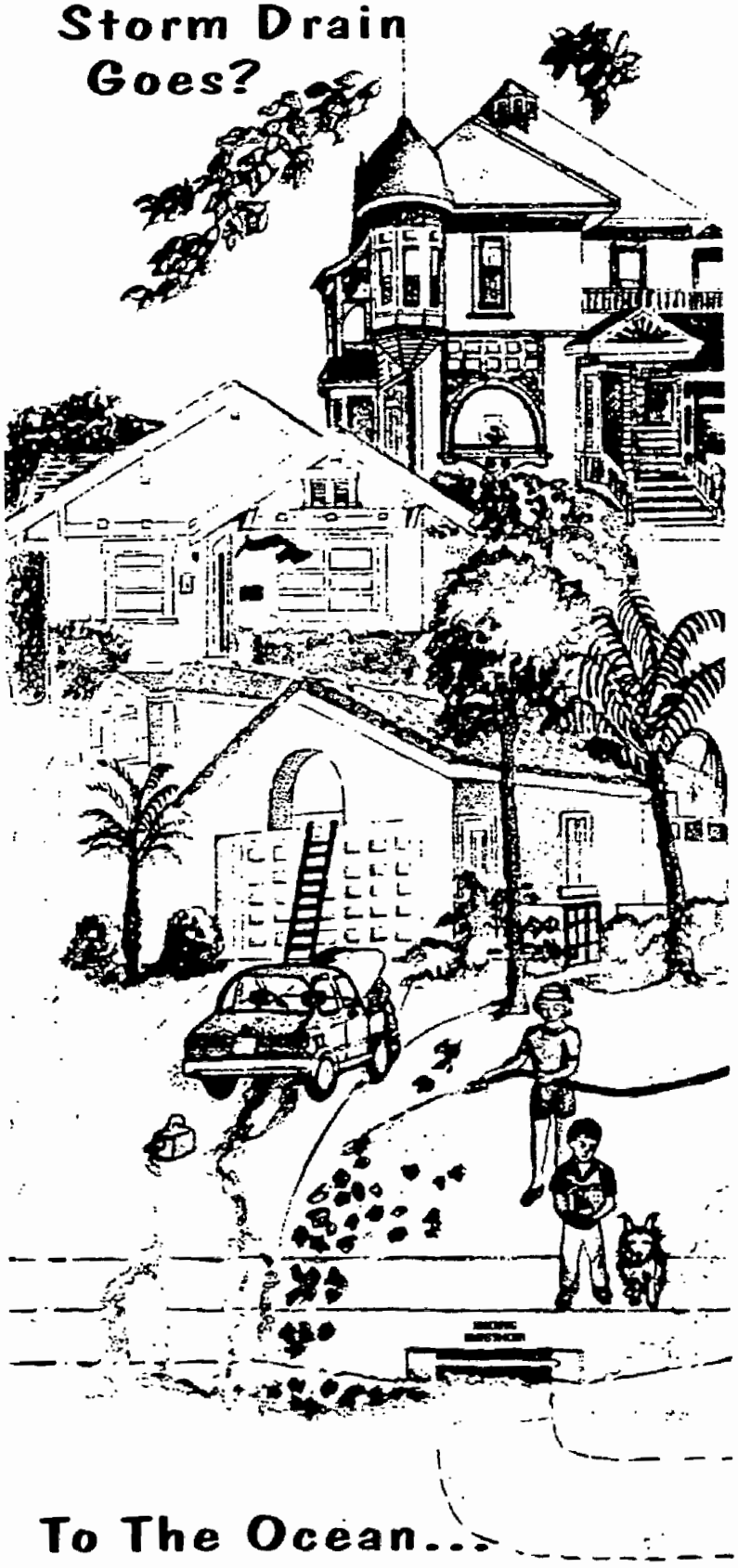

To The Ocean...

RECEIVED

NOV 22 1999

CITY OF
MISSION VIEJO

007582

MSE ENVIRONMENTAL, I
a division of environmental systems com

880 West Verdulera Street
Camarillo, CA 93010

Telephone (805) 987-0217
Fax (805) 987-8718

November 19, 1999

Ms. Karen Wiley
CITY OF MISSION VIEJO
25909 Pala, Suite 200
Mission Viejo, California 92691

Dear Ms. Wiley:

MSE Environmental, Inc. (MSE) wishes to thank you for the opportunity to assist in the management of your recent household hazardous waste program held November 6, 1999, in the City of Mission Viejo.

Enclosed please find a summary of all pertinent documentation organized in a booklet format. This year's event was a success servicing 1,120 residents. Almost 75,000 pounds of waste was collected with 78% of this material being recycled.

The MSE team looks forward to working with the City of Mission Viejo again on future programs. Should you have any questions or need additional information, please contact me at (805) 987-0217.

Sincerely,

MSE ENVIRONMENTAL, INC.

Scott Bauwens
HHW Program Coordinator, Southern California

Enclosures

Printed on

MISSION VIEJO
WASTE MANAGEMENT SUMMARY

RECYCLABLE	**78.0%**		
	Oil Base Paint		26,090 lbs.
	Motor Oil		6,800 lbs.
	Latex Paint		16,150 lbs.
	Antifreeze		1,275 lbs.
	Lead Acid Batteries		6,840 lbs.
	Propane Cylinders		525 lbs.
	Household Batteries		300 lbs.
	Ni-Cad Batteries		30 lbs.
	Mercury Thermometers		20 lbs.
		Total	**58,030 lbs.**
INCINERATION	**22.0%**		
	Flammable Liquids		6,800
	Flammable Solids		2,580
	Pesticide Liquids		2,094
	Pesticide Solids		405
	Alkaline Liquids		980
	Corrosive Liquids		645
	Aerosols		1,680
	Oxidizing Liquids, Corrosive		982
	Compressed Gases		80
	Organic Peroxide		5
	PCB's		11
	Fusses		25
	Corrosive Liquids, Organic		70
	Gopher Gases		10
	Isocyanates		10
		Total	**16,377 lbs.**
LANDFILL	**<1%**		
	Asbestos		25 lbs.
		Total	**25 lbs.**
TOTAL WASTE MANAGED			**74,432 lbs.**

Printed on Recycled Paper

007584

City OUTLOOK

Fall - 1999 A Quarterly Newsletter for Mission Viejo Residents and Businesses

Shops at Mission Viejo Open in September

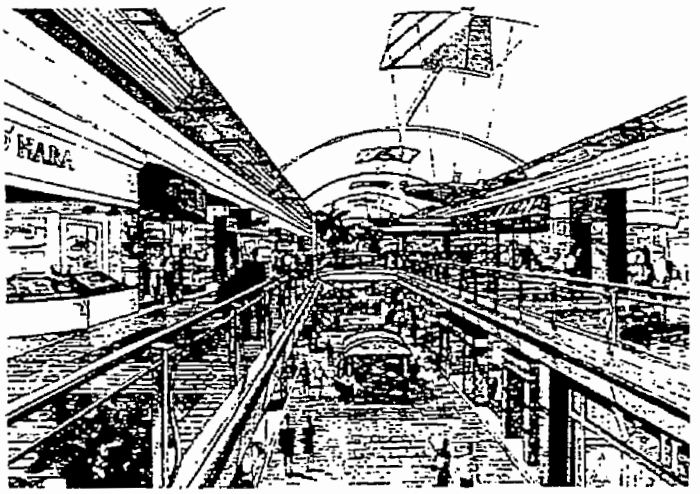

The Shops at Mission Viejo - Gallery View

Attention, shoppers! Friday, September 10, marks the grand reopening of the Shops at Mission Viejo.

Festivities begin with a ribbon cutting at 9:30 a.m. in the new West Court. At 9:50 a.m., Orange County's newest Nordstrom store opens its doors.

Throughout the weekend, shoppers will be treated to music and will have hourly opportunities to win prizes worth at l[illegible] $1,000 or to walk o[illegible] ith the grand prize, an Infiniti I30.

New Mall Hours

Monday - Friday
10:00 a.m. to 9:00 p.m.
Saturday
10:00 a.m. to 7:00 p.m.
Sunday
11:00 a.m. to 6:00 p.m.

Built in the late 1970s, during the energy crisis, the Mission Viejo Mall had reached its twentieth year and was showing its age. Its sharp edges, dark woods, and enclosed feel reflected the pessimism of that period. And since 1999, its retail sales tax revenues had declined 20 percent.

The mall owner, Simon Property Group, invested $150 million in a major makeover that increased the mall's size by 400,000 square feet, attracted more than 60 new stores and restaurants, and transformed it into a regional shopping destination whose graceful curves, stately palm trees, and teal accents bespeak a casual elegance.

To fund construction of two parking structures with space for 2,500 cars, Mission Viejo's Community Development Agency issued bonds valued at $35 million.

According to projections, the cumulative effect of the Simon and Mission Viejo investments will be to generate retail [illegible] equal to that of the top 10 percent of super regional malls in the western United States and to increase Mission Viejo's retail sales tax revenues by more than $3 million annually over the next ten years.

The mall revitalization is important to Mission Viejo because the city derives one-third of its operating revenues from retail sales taxes.

Mission Viejo Considers City Hall Options

Mission Viejo does not have its own city hall. Instead, the city leases office space in a building located at 25909 Pala in the High Park business complex. Effective October 1, 1999, rent payments for this space will increase from $389,985 to $514,780 annually. The present lease expires on September 30, 2001.

The Mission Viejo City Council is responsible for ensuring that the city's [illegible]mployees have a safe and adequate space in which to do their jobs. The Council must decide whether to (1) renew the lease in the present building at a much higher rate, (2) begin the search for space to lease in another building in a very tight office space market, (3) purchase an existing building and remodel it to meet current access requirements and seismic codes, or (4) recommend construction of a new building on land the city already owns.

To evaluate these four options, the Council sought advice from Keyser Marston Associates, a firm specializing in the economic analysis of real estate transactions. **A summary of the report prepared by Keyser Marston appears as an insert in this issue of the Mission Viejo *City Outlook*.**

Also in this Issue . . .

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Mission Viejo City Council

Sherri M. Butterfield	Mayor
Thomas R. Potocki	Mayor Pro Tempore
William S. Craycraft	Council Member
John Paul Ledesma	Council Member
Susan Withrow	Council Member

Under Construction

As a part of Mission Viejo's ongoing capital improvement program, changes will soon be made to the intersections of Alicia Parkway with Jeronimo Road and with Via Fabricante.

At Jeronimo, the roadway will be widened to accommodate dual left-turn lanes for all four legs of the intersection and designated right-turn lanes for three legs of the intersection. At Via Fabricante, dual left-turn lanes will be added for traffic eastbound on Alicia.

As a part of this project, the medians on Alicia Parkway will be reconstructed and relandscaped to feature more plant material in place of the current hardscape.

Construction will begin in September and be completed by the end of the year. To minimize the inconvenience to users of this busy arterial, much of the work will be performed at night.

Most of the funding for this $800,000 project will be provided by contributions from the Ladera Ranch development, now under construction east of the city.

For more information regarding Mission Viejo's capital improvement projects, visit the city's web site at ci.mission-viejo.ca.us.

City Outlook is a quarterly publication of the City of Mission Viejo. To submit comments or suggestions, please call 470-3051.

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Fifth Annual DAWG Walk Raises Money for Animal Shelter

The Dedicated Animal Welfare Group (DAWG) will hold its fifth annual DAWG Walk from 7:30 a.m. until 9:30 a.m. on Saturday, September 25, at the Market on the Lake, 27762 Vista del Lago in Mission Viejo.

This annual amble around Lake Mission Viejo benefits the Mission Viejo Animal Shelter and features a dog-owner look-alike contest and prize drawings with a chance to win theme park tickets, dinners for two, and a wide assortment of pet-related merchandise and services.

Grand marshal for this year's stroll is a blue merle Queensland heeler named Blue, who is an alumna of the shelter. When found abandoned, Blue had been hit by a car. Previous surgery apparently intended to help her had been unsuccessful, leaving her in pain and unable to walk. DAWG paid for the orthopedic surgery needed to correct the problem.

DAWG Walk registration forms are available at the Mission Viejo Animal Shelter, located at 28095 Hillcrest, one block south of the Crown Valley–Marguerite Parkway intersection. A $5 discount on the $20 entry fee is available to those who register in advance at the Pet and Wildlife Faire on Saturday, September 18, at the Animal Shelter.

The DAWG Walk is sponsored by Big Dog Sportswear, the Coach House, El Torito Grill, IAMS Company, Medix Ambulance Service, Mimi's Café, Morning Dove Farms, Six Flags, and Waste Management of Orange County.

The Mission Viejo Animal Services Center serves the communities of Mission Viejo and Laguna Niguel. Its purpose is to provide humane shelter for lost and homeless animals, to offer life-saving treatment for animals that are injured or ill, and to find homes for "orphaned" animals.

Since the center opened in October 1993, it has welcomed and cared for more than 10,000 lost pets, reuniting some with their grateful owners and finding families for others who needed new homes.

For more information about DAWG or the upcoming DAWG Walk, call 582-9332.

Walk Against Drugs Opens Red Ribbon Week

Mission Viejo's eleventh annual Walk Against Drugs is set for Saturday, October 23. Walkers will meet at 8:00 a.m. in the Mission Viejo High School football stadium, 25025 Chrisanta Drive, for a pep rally and then move east on La Paz Road to Oso Viejo Park for a fair.

Slated to last until noon, the fair will feature food, music, game booths, and informational displays provided by the Orange County Fire Authority and the Orange County Sheriff's Department.

First held in 1989, the Mission Viejo Walk Against Drugs coincides with Red Ribbon Week, a time set aside for communities nationwide to recall the death of federal drug agent Enrique Camarena in the line of duty and renew their no-tolerance pledges.

Household Hazardous Waste Round-up

Mission Viejo's annual Household Hazardous Waste Round-up will take place between 9:00 a.m. and 2:00 p.m. on Saturday, November 6, 1999, in the Unisys Corporation parking lot located at 25725 Jeronimo Road.

Sponsored jointly by the city and its residential waste-hauler, BFI, this convenient drive-through event offers Mission Viejo residents an opportunity to dispose safely and legally of toxic items with a limit of 5 gallons or 125 pounds per vehicle.

Participants must show proof that they are Mission Viejo residents, should place materials to be disposed of in the trunk of their vehicle, and are asked to arrive between the times indicated below based on the first letter of their last name.

A-I	9:00 a.m. to 10:30 a.m.
J-Q	10:30 a.m. to noon
R-Z	Noon to 2:00 p.m.

City of Mission Viejo

Office of the City Manager

Sherri M. Butterfield
Mayor
Thomas R. Potocki
Mayor Pro Tempore
William S. Craycraft
Council Member
John Paul "J.P." Ledesma
Council Member
Susan Withrow
Council Member
Daniel P. Joseph
City Manager

October 18, 1999

FOR IMMEDIATE RELEASE
Press Release Number: 99-68

Contact: Karen Wylie, Assistant to the City Manager
(949) 470-8409 Phone
(714) 859-1386 Fax Number

MISSION VIEJO TO OFFER HOUSEHOLD HAZARDOUS WASTE COLLECTION DAY

The City of Mission Viejo is pleased to announce its annual Household Hazardous Waste Collection Event. This year's event is scheduled for Saturday, November 6, 1999 from 9:00 a.m. to 2:00 p.m. at the Unisys Corporation, located at 24725 Jeronimo Road between Alicia Parkway and Los Alisos in Mission Viejo.

There is no charge for this service and all Mission Viejo residents are invited to bring up to 15 gallons or 125 pounds household hazardous waste such as used motor oil, antifreeze, batteries, paint, paint thinner, pesticides, herbicides, pool acids, cleaning supplies and photo chemicals.

To minimize the potential for a delay, residents are invited to arrive between designated times.

A-I 9:00 a.m. to 10:30 a.m.

J-Q 10:30 a.m. to Noon

R-Z Noon to 2:00 p.m.

For more information, please refer to the notice on BFI trash collection bill, the fall edition of City Outlook or call 1-888-PICK-BFI.

# # #

pacific clippings
post office box 11789
santa ana, calif. 92711

Mission Viejo News Weekly OCT 2 1 199

LOCAL NEWS

MISSION VIEJO OFFERS HOUSEHOLD HAZARDOUS WASTE COLLECTION DAY

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City of Mission Viejo - Volunteer Connection Day Project

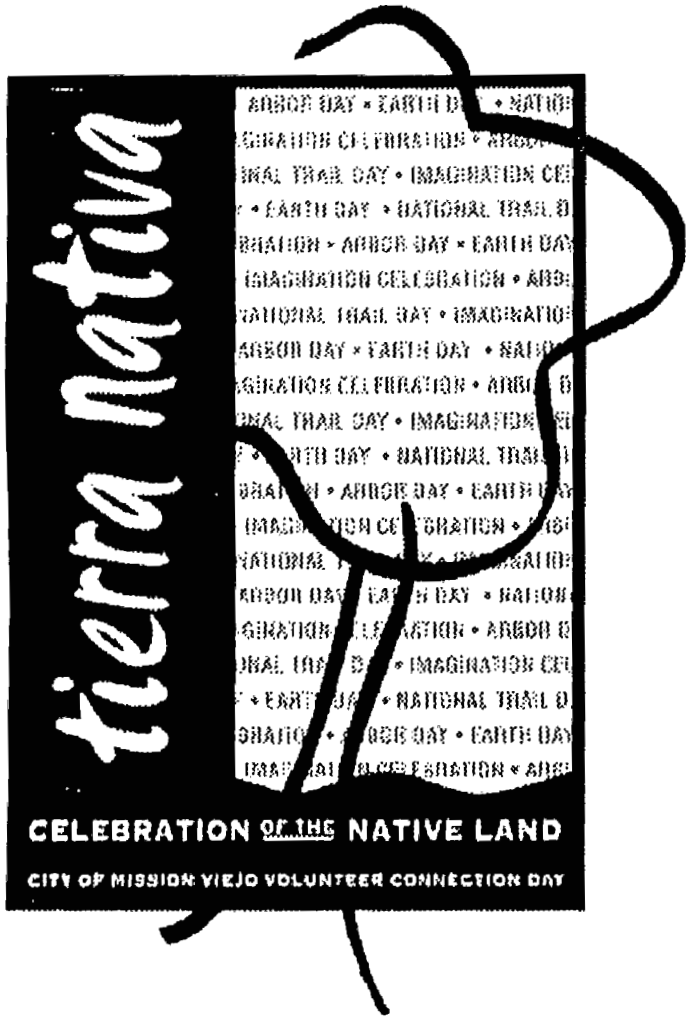

To commemorate Arbor Day, Earth Day, National Trail Day and Imagination Celebration as one event entitled

Tierra Nativa'99

Celebration of the Native Land

8:00 am - 12:00 Planting
10:00 am - 1:00 pm Festival Activities

To Volunteer or Sponsorship

Call (949) 470-3064

Tierra Nativa'99

Saturday, April 24, 1999

City of Mission Viejo 007589
Volunteer Connection Day Project

tierra nativa'99

Saturday, April 24, 1999 • 8AM-1PM

Weather Permitting

• Volunteer Planting • 8:00AM - 12NOON •

• Festival • 10AM - 1PM •

On! Saturday, April 24 the City has planned a day full of activities. This event is for the whole family, no minimum age limit!

8:00AM - 12NOON
PLANTING & RENOVATION OF OSO CREEK TRAIL

Starting on the west side of Oso Creek, volunteers will be planting small tree, native plants, flowers, shrubs, painting and scattering seeds.

10:00AM - 1:00 PM •
FESTIVAL & CHILDREN'S ACTIVITIES
FREE CRAFTS - MISSION VIEJO ACTIVITIES COMMITTEE

- BOUQUET OF FLOWERS
  Take home an arrangement of tulips, sunflowers, and daffodils.
- TIERRA NATIVA NOTECARDS
  Make personalized stationary for that special person, yourself.
- POTATO HEAD
  Cherish your own pet potato, designed and painted with love and care.
- WINDSOCK - Design a colorful windsock to flutter in the air.
- NATURE MOBILES
  Use your imagination, to create a dangling mobile which moves with the wind.
- BUTTERFLY PENCILS
  Make your own special butterfly with bright ribbon and your delightful imagination.

10:30 - 1:00 P.M.
ENTERTAINMENT

- STEELY PAN - Listen to the calypso beat of this steel drum band.
- Storytelling
- Clowns
- Raffle
- Balloon Making

11:30AM BUTTERFLY RELEASE

See the sky filled with brilliant colored butterfly to help the environment.

SMOKEY THE BEAR

Take a picture with the most famous Oso of all.

FAMILY & GROUP PHOTO

A special thank you for all volunteer participants.

EXHIBITORS

- CANYON CREST GARDEN CLUB - Information on programs & services.
- CITY OF MV - Keeping you informed on the latest services & programs. Make your own flower garden.
- CITY OF MV ANIMAL SERVICES - Come learn about the best animal shelter in South County.
- CITY OF MV CULTURAL ARTS COMM. - Help paint a butterfly banner or a tile for Oympiad Park.
- CITY OF MV HERITAGE COMM. - A peek of the past with information on local history & heritage projects.
- CITY OF MV RECREATION, FITNESS & TENNIS CENTERS - Be informed on what's happening at these local facilities.
- N.P.M COMMUNITY & SENIOR CENTER - Highlights of services & programs.
- O.C. VESTOR CONTROL DIST. - Killer bees, fire ants, mosquitoes, and other information on pesty critters.
- RMV LAND CONSERVANCY - Learn how to track and make your own "track cards."
- SADDLEBACK VALLEY YMCA - Hear about a place for the whole family.
- WEST COAST ARBORISTS - Lessons on how to take care of your trees & participate in a special raffle.

B.F.I. PLANTING MULCH

Take a bag of planting mulch home to your garden.

FREE MULCH

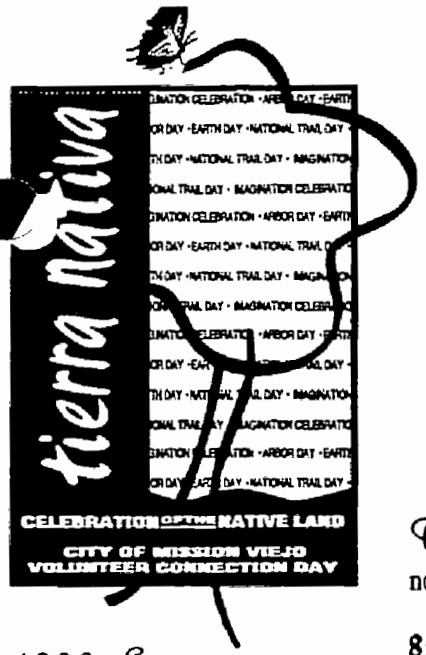

1999 Sponsors

MIGHTY OAKS • $1,000+
BFI
Granich Construction
RJM Design Group
Waste Management OC
West Coast Arborist
Wm. Vandergeest Landscape

TREE • $100 - $999
an Controller Reparir
..pple Bagels
Bongo Construction Inc.
California Pizza Kitchen
Easterday Janitorial Supply
Hardy & Harpers Inc.
Hydro-Scape Products
Mervyn's - Mission Viejo
Miracle Park, Inc.
Santa Margarita Ford
Sunset Properties
Target Stores - Mission Viejo

SEEDLINGS • $50-$99
Claim Jumper • In & Out Burgers • Wild Rivers • Waxie

1999 Participants

City of Mission Viejo
- Rec. & Community Services Dept.
- Public Works Department
- Animal Services
- Cultural Arts Committee
- Heritage Committee
- Senior Citizens Activities Committee

Mission Viejo Activities Committee
Volunteer Center of Greater Orange County

FT March 16, 1999

For More Information Call (949) 470-3064

City of Mission Viejo

January 5, 1999

FOR IMMEDIATE RELEASE
98-12
Contact Person: Karen Wylie, Assistant to the City Manager
Phone Number: (949) 470-3051

HOLIDAY TREE COLLECTION SERVICE EXTENDED BY BFI

Browning-Ferris Industries (BFI) has extended holiday tree collection services in Mission Viejo through Friday, January 15, 1999. Holiday trees should be placed out at the curb for pick up on your regular trash collection day. Trees over 6 feet need to be cut in half and should be free of ornaments and the tree stand. Flocked and fake holiday trees will be collected when a bulky item pick up is scheduled with BFI. Flocked trees are not recyclable but they may be cut and placed in the large blue trash container.

To dispose of a holiday tree after January 15, 1999, place the cut up tree in either the large blue trash container or the green waste recycling container.

For more information or to schedule a bulky item pickup, contact BFI at 1-888-742-5234.

###

City of Mission Viejo

Office of the City Manager

Sherri M. Butterfield
Mayor
Thomas R. Potocki
Mayor Pro Tempore
William S. Craycraft
Council Member
John Paul "J.P." Ledesma
Council Member
Susan Withrow
Council Member
Daniel P. Joseph
City Manager

January 22, 1999

FOR IMMEDIATE RELEASE
#99-5

Contact: Keith Rattay, Manager of Maintenance Services, (949) 470-3056
Karen Wylie, Assistant to the City Manager, (949) 470-3051

CITY OF MISSION VIEJO'S TIERRA NATIVA WINS STATE SPECIAL EVENT AWARD

The City of Mission Viejo's Tierra Nativa will soon be honored with the 1998 State Merit Award for Special Events by the California Park and Recreation Society. This event is held annually in April to plant along the Oso Creek Trail and is the city's celebration of Volunteer Connection Day, Earth Day, Arbor Day, Imagination Celebration, and Trails Day.

Keith Rattay, Manager of Maintenance Services will accept the award on behalf of the City at the California Parks and Recreation Society's Annual Conference in February 1999.

###

25909 Pala • Suite 200 • Mission Viejo, California 92691
http://www.ci.mission-viejo.ca.us

949/470-3051
FAX 949/859-1386

City of Mission Viejo

Recreation and Community Services Department

Sherri M. Butterfield
Mayor
Thomas R. Potocki
Mayor Pro Tempore
William S. Craycraft
Council Member
John Paul "J.P." Ledesma
Council Member
Susan Withrow
Council Member

PRESS RELEASE

April 22, 1999

FOR IMMEDIATE RELEASE #99-27

Contact: Virginia Nonaca Chavez, Community Services Coordinator
(949) 470-3072 Office (949) 581-0795 Fax
E-mail: vchavez@mission-viejo.com

Tierra Nativa '99 Celebration

Over 450 volunteers have pre-registered to participate in this year's Tierra Nativa'99 Celebration on Saturday, April 24, 1999 from 8:00 AM-1:00 PM. The following is a schedule of events and special highlights for the day:

8:00 AM - Noon	Shovel Aerobics and the planting of Oso Creek Trail
10:00 AM – 1:00 PM	Festival Booths with crafts, environmental groups, and entertainment
10:30 AM – 1:00 PM	Steely Pan Steel Drum Band
11:00 AM - 11:30 AM	Storytellers – Debra Weller and Bathgate Elementary School Storytellers
11:30AM	Butterfly Release – Butterfly Poem

-MORE-

Mission Viejo Te vision Channel 31 Octobe 999

007503

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
26	27	28	29	30	1 4:00p American Cinema #4 5:00p High Performance Home 5:30p Earth Cafe #6 6:00p Navy/Marine Corp. News 6:30p Heart Break Cafe #19 7:00p MVTV News 7:30p Animal House 8:00p Everybody is an Artist 28 8:30p HOLA O.C. 10 9:00p Project Wipe Out 9:30p Growing Old In America #2	2 4:00p American Cinema #4 5:00p High Performance Home 5:30p Earth Cafe #6 6:00p Navy/Marine Corp. News 6:30p Heart Break Cafe #19 7:00p MVTV News 7:30p Animal House 8:00p Everybody is an Artist 28 8:30p HOLA O.C. 10 9:00p Project Wipe Out 9:30p Growing Old In America #2
3 4:00p MVTV News 4:30p Animal House 5:00p Cross & Flame 5:30p Human Geography 6:00p Living Life 6:30p The Missing Link 7:00p Strength for Today 7:30p Cross & Flame 8:00p Human Geography 8:30p Living Life 9:00p The Missing Link	4 4:00p MVTV News 4:30p Animal House 5:00p Mission Viejo City Council Meeting	5 4:00p Mustangs in Motion 4:30p Earth Revealed 24/25 5:30p Action @ Aliso October 6:00p City Talk OCFA 6:30p IWMD Hazardous Waste 7:00p MVTV News 7:30p Animal House 8:00p Grass Recycle 8:30p Diablo Heat 9:00p Ethics in America #2 10:00p Food Rules	6 4:00p Mustangs in Motion 4:30p Earth Revealed 24/25 5:30p Action @ Aliso October 6:00p City Talk OCFA 6:30p IWMD Hazardous Waste 7:00p MVTV News 7:30p Animal House 8:00p Grass Recycle 8:30p Diablo Heat 9:00p Ethics in America #2 10:00p Food Rules	7 4:00p Mustangs in Motion 4:30p Earth Revealed 24/25 5:30p Action @ Aliso October 6:00p City Talk OCFA 6:30p IWMD Hazardous Waste 7:00p MVTV News 7:30p Animal House 8:00p Grass Recycle 8:30p Diablo Heat 9:00p Ethics in America #2 10:00p Food Rules	8 4:00p American Cinema #4 5:00p High Performance Home 5:30p Earth Cafe #6 6:00p Navy/Marine Corp. News 6:30p Heart Break Cafe #19 7:00p MVTV News 7:30p Animal House 8:00p Everybody is an Artist 28 8:30p HOLA O.C. 10 9:00p Project Wipe Out 9:30p Growing Old In America #2	9 4:00p American Cinema #4 5:00p High Performance Home 5:30p Earth Cafe #6 6:00p Navy/Marine Corp. News 6:30p Heart Break Cafe #19 7:00p MVTV News 7:30p Animal House 8:00p Everybody is an Artist 28 8:30p HOLA O.C. 10 9:00p Project Wipe Out 9:30p Growing Old In America #2
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24 4:00p MVTV News 4:30p Animal House 5:00p Cross & Flame 5:30p Human Geography 6:00p Living Life 6:30p The Missing Link 7:00p Strength for Today 7:30p Cross & Flame 8:00p Human Geography 8:30p Living Life 9:00p The Missing Link	25 4:00p MVTV News 4:30p Animal House 5:00p Mission Viejo City Council Meeting	26 4:00p Mustangs in Motion 4:30p Earth Revealed 24/25 5:30p Action @ Aliso October 6:00p City Talk OCFA 6:30p IWMD Hazardous Waste 7:00p MVTV News 7:30p Animal House 8:00p Grass Recycle 8:30p Diablo Heat 9:00p Ethics in America #2 10:00p Food Rules	27 4:00p Mustangs in Motion 4:30p Earth Revealed 24/25 5:30p Action @ Aliso October 6:00p City Talk OCFA 6:30p IWMD Hazardous Waste 7:00p MVTV News 7:30p Animal House 8:00p Grass Recycle 8:30p Diablo Heat 9:00p Ethics in America #2 10:00p Food Rules	28 4:00p Mustangs in Motion 4:30p Earth Revealed 24/25 5:30p Action @ Aliso October 6:00p City Talk OCFA 6:30p IWMD Hazardous Waste 7:00p MVTV News 7:30p Animal House 8:00p Grass Recycle 8:30p Diablo Heat 9:00p Ethics in America #2 10:00p Food Rules	29 4:00p American Cinema #4 5:00p High Performance Home 5:30p Earth Cafe #6 6:00p Navy/Marine Corp. News 6:30p Heart Break Cafe #19 7:00p MVTV News 7:30p Animal House 8:00p Everybody is an Artist 28 8:30p HOLA O.C. 10 9:00p Project Wipe Out 9:30p Growing Old In America #2	30 4:00p American Cinema #4 5:00p High Performance Home 5:30p Earth Cafe #6 6:00p Navy/Marine Corp. News 6:30p Heart Break Cafe #19 7:00p MVTV News 7:30p Animal House 8:00p Everybody is an Artist 28 8:30p HOLA O.C. 10 9:00p Project Wipe Out 9:30p Growing Old In America #2
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MVTV Community Notices

Week Ending 1/16/99

Order	#	Name of Notice	Start Date	End Date
1	1A	MVTV Station ID	12/4/98	None
2	1B	Come Visit the M.V. Library	12/4/98	None
3	1C	Report Fire Ants	12/27/98	None
4	1D	Hospice family care	11/24/97	None
5	1E	Modjeska House	6/11/98	None
6	1F	MVTV News " Got a story?"	4/1/97	None
7	1G	Graffiti Hotline	1/1/99	None
8	1H	Activity Clubs	3/17/98	None
9	1J	MVTV Community Notice Charges		None
10	1K	MVTV Phone Number For Info	4/5/98	None
11	1M	MVTV Greeting Promo		None
12	1N	NARFE		None
13	1O	MV Animal Shelter		None
14	1P	Saddleback Community Outreach	7/1/98	None
15	1Q	Dayle Macintosh center for the disabled	7/1/98	None
16	1R	Disabled Vets	1/1/99	None
15	1S	Lions Club	7/21/98	None
16	1T	Daughter's of the American Revolution	9/27/98	None
17	1U1	MVTV Public Access station ID (Animation)	1/5/97	None
18	1V	MV Fine Arts		None
19	1W	Grandparenting Today		None
20	1X	AFS		None
21	1Y	Council Meeting Notice	7/27/97	None
22	1Z	Council Meeting Replay	8/1/97	None
23	2E	Food Rules	7/24/98	None
24	1U	MVTV station ID Global	1/5/97	None
25	2A	MVTV Programming Sched Sun/Mon 4-7	1/4/99	None
26	2B	MVTV Programming Sched Sun/Mon 7-10	1/4/99	None
27	2C	MVTV Programming Sched Tues-Sat 4-7	1/4/99	None
28	2D	MVTV Programming Sched Tues-Sat 7-10	1/4/99	None
29	2F	Library Volunteers	1/4/99	None
30	2G	YMCA Pancake Breakfast	1/9/99	1/16/99
31	3A	Elks Members	4/19/98	4/19/99
32	3B	The Byte Brothers	12/19/97	3/19/99
33	3C	Elks Bingo	5/20/98	5/20/99
34	3D	Bower Automotive 1	7/31/98	1/31/99
35	3E	Bower Automotive 2	7/31/98	1/31/99
36	3F	Elks Police & Fire Appreciation	1/4/99	1/16/99
37	3G	Alicia Village	1/4/99	4/4/99
38	3H	Elks Old Timers Night	1/9/99	1/19/99
39	3I	Christmas Tree Pick up *	1/9/99	1/15/99
40	3J	Library Auction	1/9/99	1/30/99
41	3K	Underwater Archaeology	1/9/99	1/29/99
42	2H	Mission Viejo Community Calender January	1/9/99	2/1/99

Items in Blue are new or updated ads

Graphics YTD: 103 Month: 18 Current: 42 New: 8

Item in green has been Fixed

MVTV Community Notices

Week Ending 1/23/99

Order	#	Name of Notice	Start Date	End Date
1	1A	MVTV Station ID	12/4/98	None
2	1B	Come Visit the M.V. Library	12/4/98	None
3	1C	Report Fire Ants	12/27/98	None
4	1D	Hospice family care	11/24/97	None
5	1E	Modjeska House	6/11/98	None
6	1F	MVTV News " Got a story?" (Animation)	1/16/99	None
7	1G	Graffiti Hotline	1/1/99	None
8	1H	Activity Clubs	3/17/98	None
9	1J	MVTV Community Notice Charges		None
10	1K	MVTV Phone Number For Info	4/5/98	None
11	1L	Household Waste	1/16/99	None
12	1M	MVTV Greeting Promo		None
13	1N	NARFE		None
14	1O	MV Animal Shelter		None
15	1P	Saddleback Community Outreach	7/1/98	None
16	1Q	Dayle Macintosh center for the disabled	7/1/98	None
17	1R	Disabled Vets	1/1/99	None
18	1S	Lions Club	7/21/98	None
19	1T	Daughter's of the American Revolution	9/27/98	None
20	1U1	MVTV Public Access station ID (Animation)	1/5/97	None
21	1V	MV Fine Arts		None
22	1W	Grandparenting Today		None
23	1X	AFS		None
24	1Y	Council Meeting Notice	7/27/97	None
25	1Z	Council Meeting Replay	8/1/97	None
26	2E	Food Rules (Animation)	1/16/99	None
27	1U	MVTV station ID Global	1/5/97	None
28	2A	MVTV Programming Sched Sun/Mon 4-7	1/4/99	None
29	2B	MVTV Programming Sched Sun/Mon 7-10	1/4/99	None
30	2C	MVTV Programming Sched Tues-Sat 4-7	1/4/99	None
31	2D	MVTV Programming Sched Tues-Sat 7-10	1/4/99	None
32	2F	Library Volunteers	1/4/99	None
33	2G	YMCA Pancake Breakfast	1/9/99	1/16/99
34	2H	Community Calender January	1/16/99	2/1/99
35	3A	Elks Members	4/19/98	4/19/99
36	3B	The Byte Brothers	12/19/97	3/19/99
37	3C	Elks Bingo	5/20/98	5/20/99
38	3D	Bower Automotive 1	7/31/98	1/31/99
39	3E	Bower Automotive 2	7/31/98	1/31/99
40	3G	Alicia Village	1/4/99	4/4/99
41	3H	Elks Old Timers Night	1/9/99	1/19/99
42	3J	Library Auction	1/9/99	1/30/99
43	3K	Underwater Archaeology	1/9/99	1/29/99

Items in Blue are new or updated ads

Graphics YTD: 107 Month: 22 Current: 43 New: 4

MVTV Community Notices

Week Ending 3/28/99

Order	#	Name of Notice	Start Date	End Date
1	1A	MVTV Station ID	12/4/98	None
2	1B	Come Visit the M.V. Library	12/4/98	None
3	1C	Report Fire Ants	12/27/98	None
4	1D	Hospice family care	11/24/97	None
5	1E	Modjeska House	6/11/98	None
6	1F	MVTV News " Got a story?" (Animation)	1/16/99	None
7	1G	Graffiti Hotline	1/1/99	None
8	1H	Activity Clubs	3/17/98	None
9	1J	MVTV Community Notice Charges		None
10	1K	MVTV Phone Number For Info	4/5/98	None
11	1L	Household Waste	1/16/99	None
12	1M	MVTV Greeting Promo		None
13	1N	NARFE		None
14	1O	MV Animal Shelter		None
15	1P	Saddleback Community Outreach	7/1/98	None
16	1Q	Dayle Macintosh center for the disabled	7/1/98	None
17	1R	Disabled Vets	1/1/99	None
18	1S	Lions Club	7/21/98	None
19	1T	Daughter's of the American Revolution	9/27/98	None
20	1U1	MVTV Public Access station ID (Animation)	1/5/97	None
21	1V	MV Fine Arts		None
22	1W	Grandparenting Today		None
23	1X	AFS		None
24	1Y	Council Meeting Notice	7/27/97	None
25	1Z	Council Meeting Replay	8/1/97	None
26	2E	Food Rules (Animation)	1/16/99	None
27	1U	MVTV station ID Global	1/5/97	None
28	3A	Elks Members	4/19/98	4/19/99
29	3C	Elks Bingo	5/20/98	5/20/99
30	2A	MVTV Programming Sched Sun/Mon 4-7	2/28/99	4/1/99
31	2B	MVTV Programming Sched Sun/Mon 7-10	2/28/99	4/1/99
32	2C	MVTV Programming Sched Tues-Sat 4-7	2/28/99	4/1/99
33	2D	MVTV Programming Sched Tues-Sat 7-10	2/28/99	4/1/99
34	2F	Library Volunteers	1/4/99	None
35	2H	Community Calendar February PG 1	2/28/99	4/1/99
36	2H	Community Calendar February PG 2	2/28/99	4/1/99
37	3G	Alicia Village	1/4/99	4/4/99
38	3F	Elks Officers	3/7/99	4/3/99
39	3J	SVUSD	2/4/99	3/21/99
40	3K	Youth Fair	2/4/99	4/24/99
41	3L	Lifeguard	2/8/99	3/31/99
42	3M	CMV JOB1 (Life Guard)	2/8/99	3/19/99
43	3N	CMV JOB2 (Dept Asst.)	2/9/99	3/25/99
44	3O	CMV JOB3 (Lib Page)	3/10/99	3/31/99
45	3P	CMV JOB4 (Animal Officer)	3/10/99	4/5/99
46	3Q	CMV JOB5 (Library Clerk)	3/10/99	3/31/99
46	3R	CMV JOB6 (Com. Service Aide)	3/10/99	3/31/99
48	4A	SVUSD Bingo	1/24/99	None
49	4B	YMCA Spring Break	3/7/99	4/9/99
50	4C	Bahai Art Contest #1	3/19/99	3/31/99
51	4D	Bahai Art Contest #2	3/19/99	3/31/99
52	4E	Bahai Art Contest #3	3/19/99	3/31/99
53	4F	Tour d'Olympiad	3/19/99	4/12/99
54	4G	SVUSD Recreation	3/19/99	3/26/99
55	4H	Tierra Nativa	3/19/99	4/24/99

Items in Blue are new or updated ads

Graphics YTD: 147 Month: 21 Current: 55 New: 10

MVTV Community Notices

Week Ending 4/4/99

Order	#	Name of Notice	Start Date	End Date
1	1A	MVTV Station ID	12/4/98	None
2	1B	Come Visit the M.V. Library	12/4/98	None
3	1C	Report Fire Ants	12/27/98	None
4	1D	Hospice family care	11/24/97	None
5	1E	Modjeska House	6/11/98	None
6	1F	MVTV News " Got a story?" (Animation)	1/16/99	None
7	1G	Graffiti Hotline	1/1/99	None
8	1H	Activity Clubs	3/17/98	None
9	1J	MVTV Community Notice Charges		None
10	1K	MVTV Phone Number For Info	4/5/98	None
11	1L	Household Waste	1/16/99	None
12	1M	MVTV Greeting Promo		None
13	1N	NARFE		None
14	1O	MV Animal Shelter		None
15	1P	Saddleback Community Outreach	7/1/98	None
16	1Q	Dayle Macintosh center for the disabled	7/1/98	None
17	1R	Disabled Vets	1/1/99	None
18	1S	Lions Club	7/21/98	None
19	1T	Daughter's of the American Revolution	9/27/98	None
20	1U1	MVTV Public Access station ID (Animation)	1/5/97	None
21	1V	MV Fine Arts		None
22	1W	Grandparenting Today		None
23	1X	AFS		None
24	1Y	Council Meeting Notice	7/27/97	None
25	1Z	Council Meeting Replay	8/1/97	None
26	2E	Food Rules (Animation)	1/16/99	None
27	1U	MVTV station ID Global	1/5/97	None
28	1B	Elks Members	4/19/98	4/19/99
29	1C	Elks Bingo	5/20/98	5/20/99
30	1D	Norman P. Murray "Speak your language"	3/27/99	None
31	2A	MVTV Programming Sched Sun/Mon 4-7	2/28/99	4/1/99
32	2B	MVTV Programming Sched Sun/Mon 7-10	2/28/99	4/1/99
33	2C	MVTV Programming Sched Tues-Sat 4-7	2/28/99	4/1/99
34	2D	MVTV Programming Sched Tues-Sat 7-10	2/28/99	4/1/99
35	2F	Library Volunteers	1/4/99	None
36	2H	Community Calendar April PG 1	3/27/99	5/1/99
37	2H	Community Calendar April PG 2	3/27/99	5/1/99
38	3G	Alicia Village	1/4/99	4/4/99
39	3F	Elks Officers	3/7/99	4/3/99
40	3K	Youth Fair	2/4/99	4/24/99
41	3L	Lifeguard	2/8/99	3/31/99
42	3M	CMV JOB1 (Life Guard)	2/8/99	3/19/99
43	3O	CMV JOB3 (Lib Page)	3/10/99	3/31/99
44	3P	CMV JOB4 (Animal Officer)	3/10/99	4/5/99
45	3Q	CMV JOB5 (Library Clerk)	3/10/99	3/31/99
46	3R	CMV JOB6 (Com. Service Aide)	3/10/99	3/31/99
47	3S	Pac Bell/BFI Phone Book Recycle	3/27/99	5/5/99
48	4A	SVUSD Bingo	1/24/99	None
49	4B	YMCA Spring Break	3/7/99	4/9/99
50	4F	Tour d'Olympiad	3/19/99	4/12/99
51	4G	SVUSD Recreation	3/19/99	4/9/99
52	4H	Tierra Nativa	3/19/99	4/24/99
53	4I	Library Book Sale	3/27/99	4/10/99
54	4J	Killian Church Casino Night	3/27/99	4/24/99
55	4K	Christian Fellowship	3/27/99	4/4/99
56	4L	Norman P. Murray "Stroke info"	3/27/99	4/20/99
57	4M	Norman P. Murray "Long Term Care"	3/27/99	4/21/99
58	4N	Norman P. Murray "International Day"	3/27/99	4/21/99

Items in Blue are new or updated ads

Graphics YTD: 161 Month: 14 Current: 58 New: 14

007598

THE RECYCLE CYCLE

MOBIUS Fun Book

REPRESENTATIVE PUBLIC EDUCATION MATERIALS

CITY OF NEWPORT BEACH

Your Wastes Become.

Since 1990, the City of Newport Beach has partnered with CR&R to process the City's residential waste stream at CR&R's Material Recovery Facility, or MRF, located in the City of Stanton. Designed to handle the recycling needs of cities with narrow streets and small lots like those in Newport Beach, the MRF has provided the City with effective recycling services by recycling a monthly average of 30% of the residential waste stream collected in Newport Beach. An added benefit is that waste diversion is achieved without the congestion, noise and pollution associated with the additional trucks needed to implement a conventional curbside recycling program. In addition, by utilizing the MRF, the City eliminates the need to continually educate a changing residential population of which approximately 42% are renters.

Newport Beach collection vehicles pick up commingled wastes from your residence. The contents of fully-loaded trucks are then transferred into specialized semi-trailers for shipment to CR&R's MRF. At the MRF, the waste is unloaded onto conveyor belts and transported into a recycling building which has a full acre under roof. In this building, materials that can be recovered for reuse are separated from non-recyclable wastes.

A giant rotating machine known as a trommel separates large materials, such as bundles of newspapers, from small materials such as dirt and grit. Once separated, the material is distributed to three sorting lines where additional machines and laborers pick out recyclable materials such as cardboard, steel and aluminum.

Useable Products

Recyclable materials then fall into huge storage containers. When the containers are full, the recyclables are hydraulically pushed onto another conveyor that sends them into a baler. Once baled, the materials become commodities that are shipped into the world marketplace where they are used to make new products.

Old cardboard becomes new boxboard; old newspapers are returned for reuse at the LA Times and Orange County Register; aluminum becomes new beverage containers; plastics are processed into carpet and made into fiberglass; and steel is used for new cars, refrigerators and steel cans.

Organic materials such as grass clippings and garden shrubs are also separated from the waste, through an additional mechanical process. This material is used as a daily cover for landfills and can be processed for use as a soil amendment known as compost.

Any material that cannot be recovered through this process is shipped to Orange County landfills for disposal.

R E C Y C L I N G

007602

do

- **Know what's recyclable**
  Newspaper, mixed paper (scrap paper, junk mail, cartons, etc.), cardboard, glass, plastic, metals and yard wastes are all recyclable.

do

- **Keep recyclable materials dry.** Recyclable materials become unmarketable when contaminated with food wastes, animal wastes, yard wastes and other wet wastes.

do

- **Use your in sink garbage disposal** for disposal of food wastes.

do

- **Use a plastic bag for any wet wastes,** diapers and animal wastes that you put in your trash. Bagging wet wastes helps keep recyclable materials dry and marketable.

do

- **Tie your newspapers in bundles.**

do

- **Put your yard wastes in a plastic bag.**

do

- **Scrape/rinse** glass, plastics, aluminum cans and other metals that you put in your trash. Clean recyclable materials increase their marketability.

- **Don't mix wet wastes with recyclable materials.** Contaminated recyclable materials usually end up in a landfill.

- **Don't put hazardous wastes in your trash.** Paints, oils, pesticides, home cleaning products, car batteries, etc. are all considered to be hazardous wastes and require special disposal.

  Call the County of Orange at (714) 834-6752 for the location of the nearest household hazardous waste collection center.

  Call the City of Newport Beach at (949) 644-3066 for all other refuse related questions.

PLEASE TEAR OFF AND SAVE

REGIONAL HAZARDOUS MATERIALS COLLECTION CENTERS

e County residents (proof of residency required) lispose of household hazardous materials (limit allons or 50 pounds per visit) at these locations:

ntington Beach Regional Collection Center
17121 Nichols

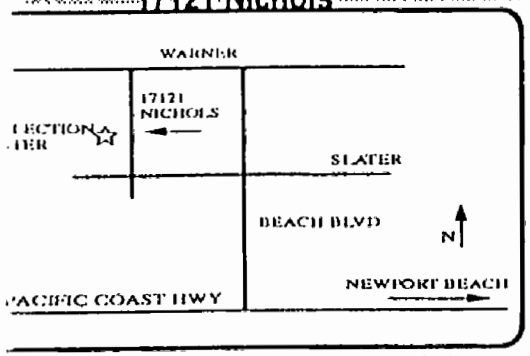

Irvine Regional Collection Center
6411 Oak Canyon

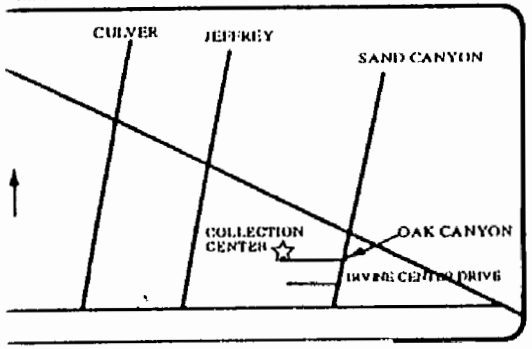

HOURS OF OPERATION:
9AM to 1PM
TUESDAY - SATURDAY
Closed on rainy days and holidays

• Wood Preservatives • Batteries • Auto ncts • Motor Oil • Antifreeze • Hobby and Supplies • Household Chemicals • Drain ners • Pesticides • Herbicides • Fertilizer

COMPOSTING & GRASSCYCLING

Compost consists of decomposed organic wastes that are ecologically recycled as a soil conditioner. In addition to air and water, carbon derived from newspaper, leaves, and twigs and nitrogen originating from manure, grass clippings, and kitchen wastes are key ingredients for nutrient-rich compost. Compost is beneficial because not only does it improve the soil fertility and air and water movement in soil but also saves landfill space and costs by recycling yard and kitchen wastes.

Grasscycling is the natural recycling of grass by leaving clippings on the lawn when mowing. Nutrients such as nitrogen released from the decomposition of grass clippings increase the biological activity near the soil surface, resulting in a healthier-looking lawn. Through grasscycling, the need for fertilizers decreases and yard waste is recycled and diverted from landfills.

Visit the Oasis Senior Citizen Center located at 5th and Marguerite Avenues in Corona del Mar to view active compost displays and to obtain helpful tips on creating your own backyard compost. Informative brochures on composting and grasscycling are available at the center.

INFO PHONE NUMBERS

General Services Department
644-3066
Oasis Senior Citizen Center
644-3244
Household Hazardous Materials Hotline
834-6752
Hazardous Materials Program Office
834-8892
Orange County Integrated Waste
834-4000
CA Integrated Waste Recycling Hotline
1-800-553-2962

PRINTED ON RECYCLED PAPER

7603

REFUSE RECYCLING HAZARDOUS WASTE & YARD WASTE

INFORMATION

CITY OF NEWPORT BEACH

General Services Department

644-3066

7am to 4pm Monday-Friday

REFUSE COLLECTION

The following regulations should be observed in order to help us continue to provide you with high quality, efficient municipal refuse service.

Refuse is collected once each week.

Property owners must provide a sufficient number of containers to accommodate all refuse accumulated on the premises. Containers should be constructed of metal or plastic and equipped with handles and a tight fitting lid. Any one refuse container must not exceed 45 gallons and 50 pounds in weight, including contents. The use of sturdy, nonreturnable garbage plastic bags is highly recommended.

Containers should be placed for collection on the street side of the sidewalks, in the parkway, or in driveways next to the street. Containers should not be placed in the gutter or in the street. When the premises border an alley, containers should be placed at or next to the property line in the alley, but in no case shall the containers obstruct any vehicular travel through the alley. Refuse containers must be set out by 7 AM on collection days, but not earlier than 7 PM the night before. Emptied containers should be removed as soon as possible after collection, but no later than 7 AM of the day following collection.

Your cooperation in keeping alleys clear of parked cars will be greatly appreciated.

HOLIDAY SERVICE

Refuse collection services will not be provided on NEW YEAR'S DAY, MEMORIAL DAY, JULY 4th, LABOR DAY, THANKSGIVING, or CHRISTMAS. When a specified holiday falls on a week day, collections will be delayed one day for the remainder of the week.

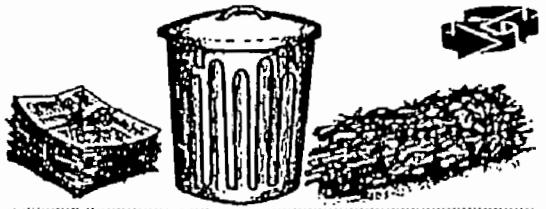

Materials Accepted for Collection

- Food refuse such as meats and vegetables.
- Meat, game, or fish cleanings that are thoroughly drained and securely wrapped to prevent leakage, odor, and access to flies and animals.
- Paper, rags, cardboard, fiber, metals, glass, cartons, containers, boxes, bottles, jars, and other materials of similar nature normally discarded as household or business refuse.
- Newspapers and magazines that are tied into bundles which do not exceed 50 pounds in weight.
- Animal waste that is securely wrapped to prevent leakage, odor, and access to flies and insects.
- Vacuum cleaner sweepings, ashes, sawdust, or similar powdery materials that are securely wrapped so they will not spill or be inhaled when collected.
- Tree or shrub trimmings, limbs and branches, plants, and grass cuttings that are placed in bags and/or tied into bundles less than four feet long, 18 inches in diameter, and not to exceed 50 pounds in weight.

Materials Prohibited from Collection

Household hazardous materials; ammunition; explosives; industrial wastes; chemicals; pathological, toxic, and radioactive waste; acids; drugs; unwrapped human and animal waste; large pieces of metal; machine parts; logs; tree stumps; and building scraps such as lumber, shingles, plaster, bricks, stones, concrete, asphalt, and drywall.

Do NOT place those materials in the trash. Use a Hazardous Materials Collection Center or rent a disposal bin.

FREQUENTLY ASKED QUESTIONS

How do I sign up for refuse collection?
It is not necessary to sign up for collection since no disposal fees are collected; however, a recycling surcharge is included in your water billing.

Why are "Red Tags" placed on containers?
Red tags indicate non-compliance with refuse regulations.

May I rent a disposal bin from the City?
The City does NOT rent bins. Private refuse collection contractors who have such bins may be found in the Yellow Pages listed under *Rubbish Hauling*.

Does the City collect bulky items such as sofas, water heaters, etc., during normal weekly pickups?
The City does NOT provide this service except on those special pickup days which have been arranged by homeowners associations.

Where can I take my recyclables?
Charities and citizens are encouraged to redeem their recyclables at their local recycling center. To find a recycling center near you, call the Recycling Hotline at (800) 553-2962 or our General Services Dept. at 644-3066.

Recycle Today!

SOURCE REDUCTION

Source reduction is the design, manufacture, purchase, or use of materials to reduce the amount or toxicity of waste generated. Source reduction strategies include:

- Choose products that are recycled, reusable, refillable, repairable, reliable, and recyclable.
- Invest in reusable rather than disposable products. Use mugs, cloth towels, and reusable shopping bags.
- Buy products in bulk and with minimal packaging.
- Repair or donate appliances and clothing rather than discarding them.
- Adopt practices that reduce waste toxicity.
- Compost and grasscycle yard wastes.
- Avoid impulse shopping - buy only what you need

Do You Know Where The Water In Your Storm Drain Goes?

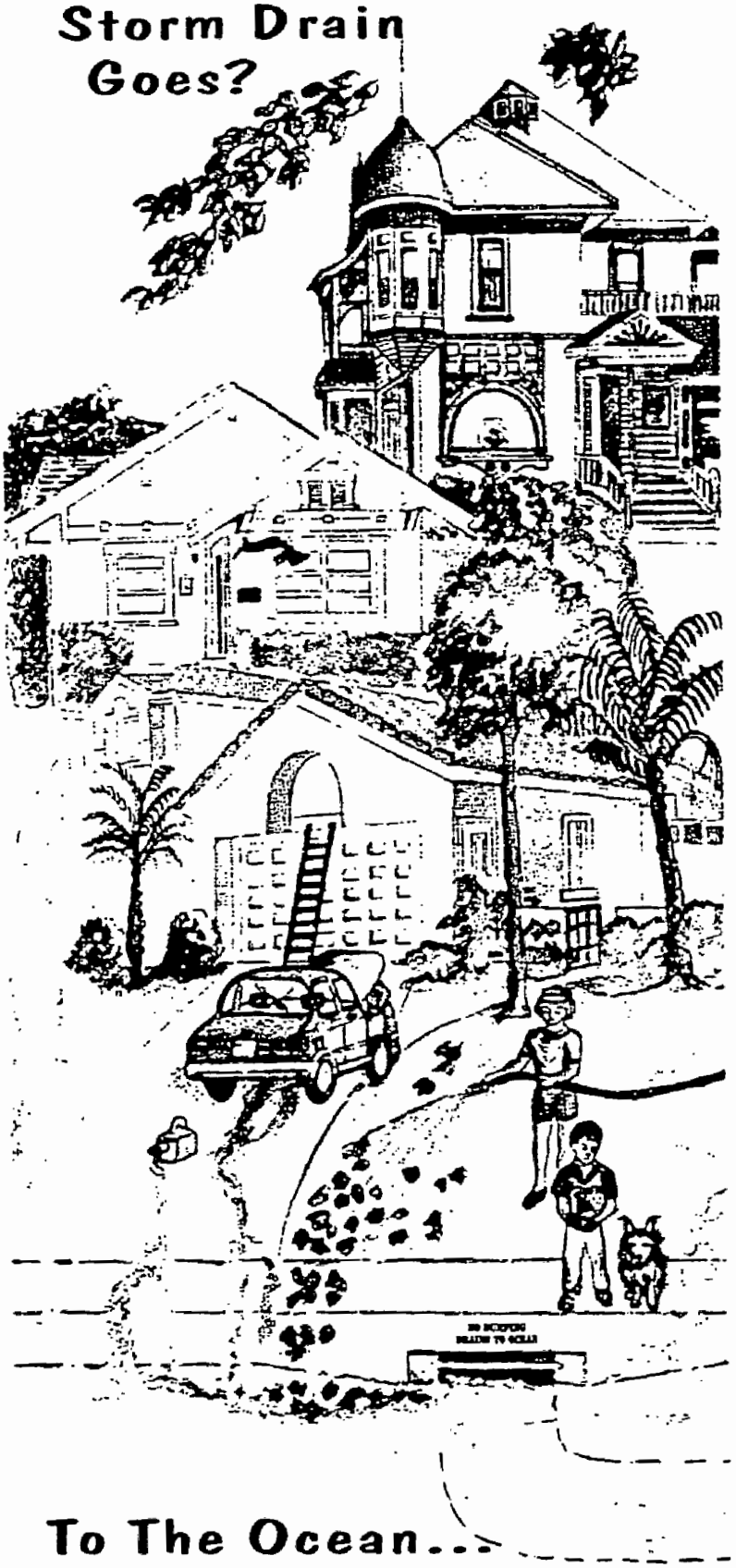

To The Ocean...

ALTE ATIVE CLEANERS

ALL PURPOSE HOUSEHOLD CLEANER

1 Quart Warm Water
1 Teaspoon Liquid Soap
1 Teaspoon Borax, or squeeze of lemon

GOOD FOR A MULTITUDE OF JOBS, INCLUDING COUNTER TOPS, FLOORS, WALLS, RUGS, AND UPHOLSTERY

DISINFECTANT

½ cup of Borax in one gallon of hot water. To inhibit mold and mildew, do not rinse off Borax Solution.

AIR FRESHENER

Leave open box of baking soda in places where odors are present. Open doors and windows for ventilation. Use flowers, herbs and spices. (Example: cinnamon in boiling water.)

GLASS CLEANER

¼ cup of vinegar in one quart of warm water. (Do not use as windshield wiper solution as it may damage pump.)

DRAINS

Never pour liquid grease down a drain. Mix one cup baking soda, one cup salt, ¼ cup of Cream of Tartar. Pour ¼ cup of mixture down the drain once a week.

ALTERNATI PESTICIDES

ANTS

Locate the place of entry, squeeze a lemon in path and leave the peel. Ants will also retreat from lines of talcum powder, chalk, damp coffee grounds, bone meal, charcoal, dust and cayenne pepper.

SILVERFISH

Traps can be made with a mixture of one part molasses to two parts vinegar. Place near cracks and holes where pests live.

COCKROACHES

Plug all small cracks along baseboards, wall shelves, cupboards, around pipes, sinks and bathtub fixtures. A light dusting of Borax around the refrigerator, stove and ductwork is effective in controlling cockroaches. For a trap, lightly grease the inner neck of a glass bottle and put a little stale beer or a raw potato inside.

HOUSE PLANT PESTS

Hot pepper spray will help to control pests on the leaves. Don't forget soap and water, be sure to rinse the plants with fresh water after treating.

NEWPORT BEACH FIRE DE TMENT

007606

HOW TO HANDLE COMMON HOUSEHOLD HAZARDOUS WASTE

REDUCE • REUSE • RECYCLE

HOUSEHOLD HAZARDOUS WASTE DISPOSAL INFORMATION

HOURS - MATERIALS & AMOUNTS ACCEPTED - DIRECTIONS

COUNTY OF ORANGE
INTEGRATED WASTE MANAGEMENT
HOTLINE
(714) 834-6752

- COLLECTION CENTERS -

Huntington Beach
17121 Nichols Street

Anaheim
1131 Blue Gum Avenue

San Juan Capistrano
Prima Deshecha Landfill
La Pata off Ortega Highway

NEWPORT BEACH FIRE DEPARTMENT
HAZARDOUS MATERIALS DIVISION
644-3113

TOXIC TIPS

DO'S

DO Remember that *most* storm drains in Newport Beach empty into the bay.

DO Remind those working on your property such as painters, masons, carpet cleaners and others that it is *illegal* to discharge any material other than clean water into the storm drain system.

DO Remember that you as property owner are ultimately responsible for spills caused by those who are employed to work on your property.

DO Reduce the amount of Hazardous Products you purchase by reading the labels and purchasing the least hazardous, also store all products in original containers.

DO Recycle leftover materials by offering unused paints to your church, school, theater group or neighbors.

DO Rinse water base paint brushes and rollers in the sink. Filter and reuse paint thinner and brush cleaners. Dispose of carpet cleaning solutions in sinks or toilet.

DO Dispose of old oil base paint by painting cardboard, plastic or waste wood and placing in trash container for pick-up when dry.

DO Dispose of used motor oil and antifreeze at a service station that is an approved collection site or take to a Hazardous Materials Collection Center.

DO Call the Household Hazardous Waste Disposal Hotline (714) 834-6752 for information on site locations, hours and materials accepted.

THIS SERVICE IS FREE TO ALL COUNTY – RESIDENTS

TOXIC TIPS

DON'TS

DON'T Throw products such as motor oil or paints into the trash. Dispose of properly.

DON'T Rinse paint brushes or rollers in the street *regardless* of whether latex or oil base paint was used.

DON'T Pour poisons or toxic chemicals down the drain.

DON'T Dump waste oil, flammable liquids or paint on the ground. Dispose of properly at a service station collection site or Hazardous Materials Collection Center.

DON'T Smoke while handling hazardous materials or store these products near any heat source.

DON'T Store or mix different hazardous product types together. Also, keep materials in original, labeled containers.

DON'T Allow commercial contractors, painters or carpet cleaners working on your property to dispose of waste water and cleaning solutions in the storm drain system.

DON'T Rinse garage floor cleaners and auto or motorcycle engine cleaning products into the storm drain system.

DON'T Dispose of swimming pool products such as acids and neutralizers in your household trash. It is *illegal* and the main cause of respiratory injuries to City of Newport Beach refuse personnel. Pool chemicals are accepted at your local Household Hazardous Waste Collection site, call (714) 834-6752 for information.

POLLUTER BEWARE

007607

Laws were developed to protect the life and safety of the public, and to prevent subsequent damage to the environment. By following the tips in this handout, you will be able to avoid hidden costs associated with accidental and illegal discharges of hazardous waste. Listed below are fines, penalties, and responsible party costs.

An incident involving a misdemeanor, for example, cleaning of latex paint brushes or rollers in the street, is punishable by up to a $1,000 fine and/or possibly up to one year in jail.

An incident involving a felony, for example, the willful discharge of crank case oil that enters the storm drain is punishable by up to a $25,000 fine and/or up to three years in state prison.

A violator will be responsible for costs associated with the clean-up of the spill or discharge. Violators shall be responsible for costs incurred by a responding agency, such as the fire department, public works, police, and/or any other required agency, and/or the combination of all agencies.

These costs will be based on the quantity of material spilled and hours spent cleaning up the spill. These costs may be paid to either the private firm or governmental agency that cleaned up the spill.

HOUSEHOLD HAZARDOUS WASTE

The County of Orange has four Household Hazardous Waste Collection Centers available FREE to Orange County citizens. (Proof of residency may be required.)

COLLECTION CENTER LOCATIONS

ANAHEIM REGIONAL COLLECTION CENTER

1071 N. BLUE GUM STREET
Located between the 91 & 57 Fwys
at the corner of La Palma Avenue
and Blue Gum Street in Anaheim
**Visit the Stop & Swap to obtain partially used household products at no charge.*

IRVINE REGIONAL COLLECTION CENTER

6411 OAK CANYON
Next to City of Irvine Corporate Yard.
From the (5) freeway take the Sand Canyon exit, go Southwest to Oak Canyon and turn right.
**Visit the Stop & Swap to obtain partially used household products at no charge.*

HUNTINGTON BEACH REGIONAL COLLECTION CENTER

17121 NICHOLS STREET
Next to Rainbow Recycling and Disposal.
Major cross streets are Beach Blvd.
and Warner Ave. in Huntington Beach.

SAN JUAN CAPISTRANO REGIONAL COLLECTION CENTER

PRIMA DESHECHA LANDFILL
From the (5) freeway take Ortega Hwy. (74),
east to La Pata Avenue, turn right and
follow road to Landfill entrance.

COLLECTION CENTER HOURS OF OPERATION:

Tuesday through Saturday
9:00 a.m. to 1:00 p.m.

Collection Centers are Closed:

Rainy Days; Christmas, Independence, New Years and Thanksgiving Days.

Hazardous waste is not accepted from businesses, schools, government agencies, churches, non-profit organizations.

Printed on recycled paper

In order to reach the State mandated recycling goal of 50% by 2000, the City transports all City collected solid waste to a Materials Recovery Facility (MRF) where the waste is sorted for recyclable materials. The MRF is equipped with conveyors and other mechanized systems which separate and process recyclables. This innovative recycling program seeks to maximize recycling while minimizing costs and inconvenience to residents.

A monthly recycling surcharge is included in your bi-monthly utility billing. This fee covers direct costs associated with the City's recycling program only and does not pay for refuse collection nor disposal costs.

Newport Beach surpassed the 1995 State goal of 25% by recycling over 30% of the residential waste stream between 1995-97.
Newport Beach Recycles!

What Can I Do To Help?

Although separation of refuse is not mandatory, please remember that all of your trash will be mechanically or manually sorted. In order to minimize contamination of recyclables materials, please *separate* the following items in bags, bundles, or a different container:

Newspapers
Yard and Food Waste
Animal Waste and Diapers

Residents are not asked to sort their refuse, but are reminded to seal wet refuse in bags to prevent contamination of newsprint.

With your continued support and conscious effort to recycle, Newport Beach will successfully meet its recycling challenge!

REDUCE, REUSE, RECYCLE

- Harbor View Hills
- CDM (North of Coast Hwy. to 5th Avenue – MacArthur –to Hazel)
- 5th Avenue-Hazel to MacArthur
- Broadmoors
- Jasmine Creek
- Jasmine Park
- Lusk Tract
- CDM Terrace
- Point Del Mar
- Spyglass Hill
- Canyon Crest
- Seaview Broadmoor
- Harbor Ridge
- Harbor View Knoll
- Harbor View Homes
- Harbor Hill
- Seawind

HOUSEHOLD HAZARDOUS MATERIALS

A material is hazardous when it exhibits corrosive, poisonous, flammable, and/or reactive properties and has the potential to harm human health and the environment. In fact, thousands are injured each year due to improper use or disposal of household hazardous materials, particularly refuse collectors who fall victims to fumes, spills, and explosions. Hazardous materials may also contaminate air and water sources through landfill seepage and introduction into storm and sewer drains.

TIPS ON TOXICS

Be an **INFORMED** consumer. Follow these guidelines for the **SAFE** storage, and disposal of household chemicals.

SAFE STORAGE:

- Separate and store like products together.
- Check label for storing instructions.
- Check expiration dates.
- Store out of reach of children and animals.

SAFE DISPOSAL:

- Do NOT pour products down drain, in storm drains, on ground , in trash, or in the street.
- Share unused products with others.
- Use Hazardous Materials Collection Centers.

CITY OF NEWPORT BEACH CALIFORNIA

RESIDENTIAL REFUSE, RECYCLING, & HAZARDOUS WASTE

INFORMATION

CITY OF NEWPORT BEACH

GENERAL SERVICES DEPARTMENT
REFUSE DIVISION
(949) 644-3066
7 am to 4 pm Monday-Friday

REFUSE COLLECTION

The following regulations should be observed in order to help us continue to provide you with high quality, efficient municipal refuse service:

1. Refuse is collected once each week.

2. Property owners must provide a sufficient number of containers to accommodate all refuse accumulated on the premises. Containers should be constructed of metal or plastic and equipped with handles and tight fitting lids. Any one refuse container must not exceed 45 gallons and 50 pounds in weight, including can weight. **The use of sturdy, nonreturnable garbage plastic bags is highly recommended.**

3. Containers should be placed for collection on the street side of the sidewalks, in the parkway, or in driveways next to the street. Containers should not be placed in the gutter or in the street. When the premises border an alley, containers should be placed at or next to the property line in the alley, but in no case shall the containers obstruct any vehicular travel through the alley. Refuse containers must be set out by 7 A.M. on collection days, but not earlier than 7 P.M. the night before. Emptied containers should be removed as soon as possible after collection, but no later than 7 A.M. of the day following collection.

4. Your cooperation in keeping alleys clear of parked cars will be greatly appreciated.

HOLIDAY SERVICE

Refuse collection services will not be provided on NEW YEAR'S DAY, MEMORIAL DAY, JULY 4th, LABOR DAY, THANKSGIVING, NOR CHRISTMAS. When a specified holiday falls on a weekday, collections will be delayed one day for the remainder of the week.

Materials Accepted for Collection

- Food waste such as meats and vegetables.
- Meat, game, or fish cleanings that are thoroughly drained and securely wrapped to prevent leakage, odor, and access to flies and animals.
- Paper, rags, cardboard, fiber, metals, glass, cartons, containers, boxes, bottles, jars, and other materials of similar nature normally discarded as household refuse.
- Newspapers and magazines that are tied into bundles which do not exceed 50 pounds in weight.
- Animal waste that is securely wrapped to prevent leakage, odor, and access to flies and insects.
- Vacuum cleaner sweepings, ashes, sawdust, or similar powdery materials that are securely wrapped so they will not spill or be inhaled when collected.
- Tree or shrub trimmings, limbs and branches, plants, and grass cuttings that are placed in bags and/or tied into bundles less than four feet long, 18 inches in diameter, and do not exceed 50 pounds in weight.

Non-Collectible Materials

Household hazardous materials; ammunition; explosives; industrial wastes; chemicals; pathological, toxic, and radioactive waste; acids; drugs; unwrapped human and animal waste; large pieces of metal; machine parts; logs; tree stumps; building scraps such as lumber, shingles, plaster, bricks, stones, concrete, asphalt and drywall. Bulky items such as water heaters, mattress and sofas. Unusually large amounts of refuse such as tree trimmings, house cleaning debris, packing boxes, etc. Sod, containers over 50 lbs.

Do NOT place these materials at the curb. Use a Hazardous Materials Collection Center or rent a disposal bin.

FREQUENTLY ASKED QUESTIONS

007610

How do I sign up for refuse collection?
It is not necessary to sign up for collection since no disposal fees are collected; however, a recycling surcharge is included in your utility billing.

Why are "Red Tags" placed on containers?
Red tags indicate non-compliance with refuse regulations and are a warning only.

May I rent a disposal bin from the City?
The City does NOT rent bins. The General Services Department has a list of licensed franchised haulers from whom you may contract bin services.

Where can I take my recyclables?
Charities and citizens are encouraged to redeem their recyclables at their local recycling center. To find a recycling center near you, call the Recycling Hotline at (800) 553-2962.

Recycle Today!

Information Phone Numbers

General Service Department, Refuse Division
(949) 644-3066
Household Hazardous Materials
Orange County Hotline
(714) 834-6752
County of Orange Hazardous Materials Program Office
(714) 834-8892
Orange County Integrated Waste Management Department
(714) 834-4000
California Integrated Waste Management Board Recycling Hotline
(800) 553-2962
Orange County Vector Control
(800) 734-2421

Printed on Recycled Paper

TRANSPORTATION AND HANDLING

- A maximum of 15 gallons or 125 pounds may be transported per vehicle, per trip (Department of Transportation regulation).
- Materials should be in original containers (except motor oil, fuels and antifreeze).
- All containers must have lids, be sturdy, non-leaking, and protected from breakage.
- Do not combine types of waste.
- Do not mix oil-base paint with latex paint.
- Dry out empty paint cans and discard in regular trash.
- If you wish to have a container returned (i.e. oil containers and boxes/crates used to transport materials), please notify the attendant in advance. Some containers may not be returnable.

WHY SHOP 'TIL YOU DROP?

VISIT THE STOP & SWAP!

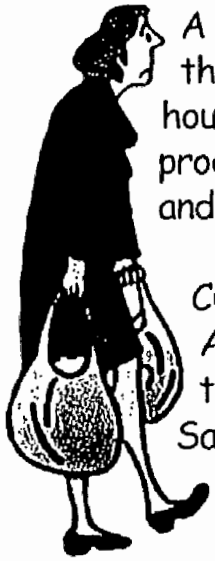

A unique and FREE program that allows you to drop off household, yard, and car care products you no longer need and pick up others you can use.

Currently available at the Anaheim and Irvine locations only. (Tuesday through Saturday, 9 a.m. to 1 p.m.)

FOR MORE INFORMATION ABOUT THE HOUSEHOLD HAZARDOUS WASTE COLLECTION PROGRAM AND THE STOP & SWAP CALL:

(714) 834-6752

Or see our webiste: www.oc.ca.gov/iwmd

Orange County Recycles!

Printed on r[illegible]led paper.

Integrated Waste Management Department

007611

DISPOSAL OF HOUSEHOLD HAZARDOUS WASTE

Household Hazardous Waste Collection Prog[illegible]

DID YOU KNOW?

- Most home, car, and yard care products can't be thrown in the trash?
- Paint, used motor oil, and most cleaning products are considered to be "hazardous waste"?
- If these products are put in the landfill they can contaminate our groundwater?

SO WHAT CAN YOU DO?

EASY AS 1-2-3!

1. Pack unwanted home, yard, and car care products in your car.
2. Drive to the Household Hazardous Waste Center closest to you.
3. Sit in your car and fill out a simple form while an attendant removes the unwanted products.

AND AWAY YOU GO!

LOCATIONS

Tuesday through Saturday
9 a.m. to 1 p.m.
except for rainy days and major holidays: Independence, Thanksgiving, Christmas and New Years Days)

STOP & SWAP

ANAHEIM
1071 N. Blue Gum Street
(Located between the 91 and 57 Freeways on the corner of La Palma and Blue Gum)

HUNTINGTON BEACH
17121 Nichols Street
(Between Beach Blvd. and Gothard St. off Warner Ave. at Rainbow Recycling and Disposal. Use Gate 6.)

STOP & SWAP

IRVINE
6411 Oak Canyon
(Off Sand Canyon between the 5 and 405 Freeways. Next to the City Corporate Yard and Animal Shelter.)

SAN JUAN CAPISTRANO
Prima Deseecha Landfill
(From the 5 Freeway, exit Ortega Highway, go east to La Pata and turn right.)

MATERIALS ACCEPTED

- Automotive products (antifreeze, motor oil, fluids)
- Batteries (home and car)
- Cosmetics
- Herbicides
- Hobby supplies
- Household cleaners
- Fuels
- Medicines
- Paints (latex and oil)
- Paint products
- Personal care products
- Pesticides
- Polishes and waxes
- Pool and spa chemicals
- Propane tanks from barbecues
- Unused road flares
- Wood preservatives

WASTE NOT ACCEPTED

Ammunition, Asbestos
Biological, Business-generated
Explosives, Radioactive
Compressed gas cylinders

* See reverse for Stop & Swap info!

CITY OF NEWPORT BEACH

RESTAURANT CLEANING AND MAINTENANCE GUIDE

August 7, 1998

TO ALL RESTAURANT OWNERS, MANAGERS AND STAFF

The City of Newport Beach has recently experienced several beach closures due to high bacteria counts in the Bay. Orange County Environmental Health Division's stormdrain bacteriological monitoring has indicated that this high bacterium count may be associated with Newport Beach Restaurants. During the course of cleaning equipment and facilities some materials, cleaning agents and/or rinse waters may migrate into the storm drain system and finally into the bay. In addition dumpsters provide a perfect incubator for bacteria and fluids may leak from the dumpster into the storm drain system. The storm drain system consists of the curb and gutter, catch basins and pipes, which carry rainwater from our streets into the bay.

The City seeks the support and assistance of all restaurant owners, managers and staff in eliminating the possibility of this type of occurrence. It is in our mutual best interest to maintain the recreational waters in Newport Beach to high standards in order to promote and facilitate the tourism that contributes to our local economy.

In order to eliminate potential undesirable material, dumpster effluent and cleaning agents from migrating into the storm drain system and bay, it is necessary that all cleaning and dumpster storage be confined to a dedicated area with a hard surface where any discharge is connected to the sewer system. This area must also have a cover to keep rain from entering the sewer connection. Any new connections to the sewer system will require a permit from the Building Department. Absolutely no material, dumpster effluent, cleaning agents and/or rinse waters should be allowed to migrate into the storm drain system. Allowing any material, dumpster effluent, cleaning agents and/or rinse waters to enter the storm drain system is a violation of numerous municipal, state and federal laws.

In addition it is important to periodically sweep your parking lot area in order to remove any potential contaminants. Sweeping of the parking lot should be conducted on a weekly basis, at a minimum.

You should also be aware the City will be increasing it's efforts to enforce these requirements and the fines can be severe, starting at $100.00 for the first occurrence.

Thank you for your support in making our community a better place to visit and dine in. If you have any questions please call the City's Code Enforcement Supervisor, Jim Sinasek, at (949) 644-3215 or the City's National Pollutant Discharge Elimination System Coordinator Stephen Luy, at (949) 644-3330.

Sincerely,

Don Webb
Public Works Director

COLLECTION CENTER LOCATIONS

HAZARDOUS WASTE ACCEPTED

Oil & latex paint and paint products
Automotive products
(batteries, motor oil, antifreeze, etc.)
Auto & furniture polish
Household cleaners
Wood preservatives
Pesticides & herbicides
Hobby & pool supplies
Propane barbecue cylinders
Unused road flare
Household batteries
(alkaline, nickel-cadmium and mercury [button])
Fluorescent light ballasts

HAZARDOUS WASTE NOT ACCEPTED

Business generated waste
Biological waste
Radioactive waste
Ammunition
Compressed gas cylinders
Explosives
Asbestos

For more information, call our HOTLINE at (714) 834-6752 or visit our web site at *www.oc.ca.gov/iwmd*

TRANSPORTATION

CAUTION should be used when transporting hazardous waste to a Collection Center due to the potential for spillage and/or exposure.

- A maximum of 15 gallons or 125 pounds may be brought in per vehicle, per visit.
- Hazardous Waste must be in its original container (**except motor oil and antifreeze**).
- **Containers will NOT be returned**, except for oil containers in good condition (upon request).
- All containers must be sturdy, non-leaking and protected from breakage.
- Containers must have lids.
- Do NOT mix or combine Hazardous Waste (Exception: consolidate like paints — combine partial cans of oil-base paint with oil base paint, and combine partial cans of latex paint with latex or water-based paint).
- Dry out empty paint cans and discard in regular trash.
- **DO NOT MIX OIL-BASE PAINT WITH LATEX PAINT!!**

FOR ADDITIONAL INFORMATION CALL:

911 . . . . . Household Hazardous Materials Emergencies
834-4000 . . . . . Integrated Waste Management Department
667-3700 . . . . . Health Care Agency (HCA) Environmental Health
800 553-2962 . . . . . CIWMB* Recycling Hotline – Motor Oil
800 777-6476. . . . . Orange County Poison Center
800 69-TOXIC . . . . . Waste Alert to report illegal dumping

* California Integrated Waste Management Board

REPRESENTATIVE PUBLIC EDUCATION MATERIALS

CITY OF ORANGE

HAPPY S.O.R.T. SINGS...

WE'VE GOT A PROBLEM, BOYS AND GIRLS, THAT SPEAKS OF DOOM AND GLOOM!
WE'RE THROWIN' SO MUCH STUFF AWAY, WE'RE RUNNING OUT OF ROOM.
NOW, JUST BECAUSE YOU THREW IT OUT, IT HASN'T DISAPPEARED—
IT'S SITTING IN THE LANDFILL FOR A COUPLE HUNDRED YEARS!

SO HAVE A CLUE AND HELP THE EARTH! NOW DON'T YOU BE A CHUMP!
IF YOU KNOW IT CAN BE USED AGAIN, DON'T SEND IT TO THE DUMP!

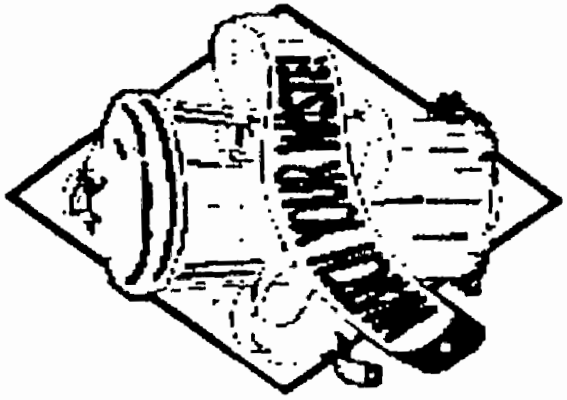

LEAVE LESS BEHIND FOR THE *FUTURE*

Compliments of the City of Orange;
Orange Disposal Service;
CIWMB; and the
Ca. League of Cities

007617

It's best to be prepared!

Living in California means living with the reality that a major **earthquake** can hit at any minute. Preparing for such an event will help you get safely through a disaster.

We depend so much on household utilities for both comfort and security that it's hard to imagine living without them. But, putting all comfort aside, there's one household utility that offers more than simple comfort; it also protects your health and the environment around you. That household utility is your sewer system.

Knowing what to do if your sewer system becomes damaged or inoperable will not only help you get through a disaster such as an earthquake, it will also help protect your health and the environment.

NO ILLEGAL DUMPING TO SEWERS OR STORM DRAINS
PROTECT OUR ENVIRONMENT

Checklist for an EMERGENCY provisional toilet

- ☐ 5-gallon plastic bucket with a tight-fitting lid
- ☐ 2 boxes heavy-duty trash can liners (8-10 gallon size) with ties
- ☐ 1 gallon liquid chlorine bleach or other toilet disinfectant
- ☐ 2 boxes baking soda
- ☐ 2 large boxes heavy-duty trash can liners (30-gallon size) with ties
- ☐ 6-8 rolls toilet paper
- ☐ Hand sanitizer to clean and disinfect hands without water
- ☐ Feminine products
- ☐ Paper towels
- ☐ Moist towelettes or baby wipes

It's easy, so be prepared!

OCSD
Rev. 2/99

For additional information, contact the Orange County Sanitation District Communications Department at (714) 962-2411 or visit our website at www.ocsd.com

Orange County Sanitation District

EARTHQUAKE PREPAREDNESS

What to do if your sewer system becomes damaged or inoperable

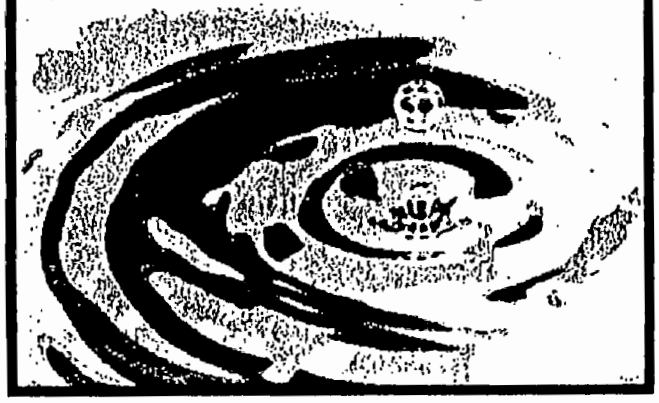

Importance of your household sewer system

In the event of a major disaster such as an earthquake, the sewer system in your area may become damaged or inoperable. Damaged sewer systems are health hazards. It is important to get damaged septic tanks, cesspools, pits and leaching systems into service as soon as possible. Trained personnel from local environmental regulatory agencies can help with these problems.

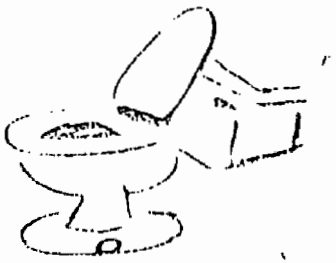

If your local sewer system becomes inoperable, there are proper procedures you can use to temporarily replace your toilet and safely dispose of sewage while service is being restored. In our continuing effort to protect public health and the environment, the Orange County Sanitation District has prepared the following step-by-step plan to assist you if an earthquake or any other disaster causes your local sewer system to fail. We recommend that you keep these guidelines close at hand because you never know when you might need them.

How to create a provisional toilet

1 If sewage lines are broken but the toilet bowl is usable, place a trash can liner inside the bowl and follow the disinfectant procedures below.

If the toilet is completely backed up, use a bucket with a trash can liner and make a toilet seat out of two boards placed parallel to each other across the bucket. For greater comfort, you can remove the seat from your household toilet and place it on the bucket.

2 Every time you use the provisional toilet, pour or sprinkle a small amount of regular household disinfectant, such as chlorine bleach (**DO NOT** mix chlorine with other disinfectants as it can produce a dangerous chemical reaction), baking soda or laundry detergent to keep down odors and germs.

3 Cover the container tightly when not in use and replace the trash can liner when waste has accumulated. **NEVER use a provisional toilet that is not lined with a plastic bag!**

. . .and safely dispose of sewage

4 After using the provisional toilet, you will need another container to empty the contents for later disposal.

The second container should be lined with a 30-gallon size trash can liner. As bags from the provisional toilet fill up, they should be placed in the second container for safe disposal.

NEVER deposit human waste or garbage on the open ground. This will not only pollute the environment but it can also create a serious health hazard.

If you have **no other** alternative for disposal, it is safe to bury waste in trenches 24-30 inches deep.

HEALTH – SAFETY – ENVIRONMENT

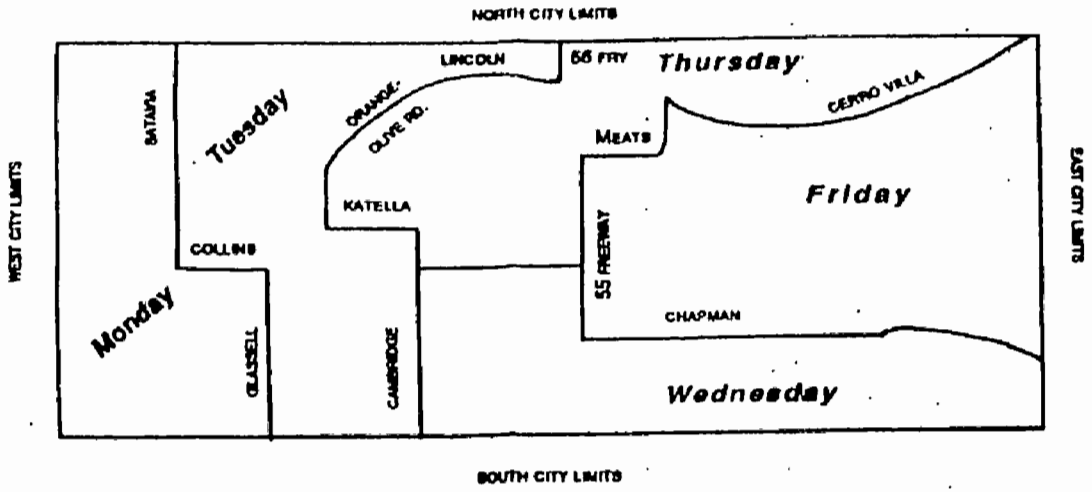

TRASH AND RECYCLING COLLECTION SCHEDULE

The map above shows the general boundaries of each day's trash collection area for Monday through Friday. Please put your trash and recyclables at the curbside or other designated collection point by 6:00 a.m. on your scheduled day. Please remove your containers after pick up a soon as possible. If you have bulky items to discard, call Orange Disposal Service at 637-3010 to schedule. There is no charge for this service, but an appointment must be made. For replacement of recycling bins, or other pick up related questions, please call Orange Disposal Service at 637-3010.

For other questions relating to City business or programs, please call 532-6480. Thank you!

HOLIDAY SCHEDULE

Our curbside recycling and regular trash pickup service observes six holidays a year:

NEW YEAR'S DAY
OBSERVED MEMORIAL DAY
FOURTH OF JULY
LABOR DAY
THANKSGIVING DAY
CHRISTMAS DAY

If your collection day falls on one of these holidays, your service will be one day late. If your collection day does not fall on one of these six holidays, but is within a holiday week, place your containers at curbside on your regular trash collection day. Any other holidays other than those listed will have regularly scheduled service with no delays.

STREET SWEEPING INFORMATION

NOTICE

Street sweeping services are provided the day following your regular trash day. **Exception:** If your trash day is Thursday, your street sweeping day will be on Monday or Tuesday, as posted. (Friday's trash day is swept on Monday.)

NOTE: On inclement weather days, such as rain or high winds, there will be no street sweeping, and no makeups.

CITY OF ORANGE
SOLID WASTE DIVISION

General Information About Your Curbside Trash and Recycling Collection Services

DEPARTMENT OF PUBLIC WORKS
637 West Struck Avenue
Orange, CA 92867
(714) 532-6480

Rev. 4/98

Trash Collection Information:

- Refuse shall be in approved containers only and placed on the curb in the parkway (or alley) no earlier than noon of the day before, nor later than 6:00 a.m. the day of collection.
- Containers shall be removed by noon of the day after collection. Failure to comply will result in a violation notice, and /or a citation being issued.
- Approved containers include:
  - Sheet metal or plastic 20 - 45 gallon container with tight fitting lid.
  - Large plastic bags designed for exterior use, tied or secured in a closed position.
- Containers not approved for regular use:
  - Small plastic bags designed for interior use
  - 50 or 55 gallon drums
  - Cardboard boxes as regular containers
    Note: If used, boxes will be taken and not returned. (Corrugated cardboard boxes may be set out with recycling program if broken down and flattened.)
- Food wastes should be drained, and wrapped before placing in regular trash container.
- Wooden boxes and packing crates must be broken up or flattened before setting out.
- Brush, tree, and shrub trimmings shall not exceed 4 feet in length. Tie in bundles not over 2 feet in diameter. Limit 50 lbs per bundle.
- Refuse exceeding 60 lbs., including container, will not be removed by the City's contractor. Please keep containers within this limit for maximum service.
- **NO building or construction materials** sand, rock, gravel, broken concrete, dirt, sod, tree stumps, auto bodies, tires, animal droppings, used motor oil or other hazardous waste. *(for used oil pick up call 289-7661)*
  For the Household Hazardous Waste hotline: 834-6752 (County of Orange)
- It is unlawful to dump debris of any kind loosely in the streets, parkway or alley. Failure to comply will result in a violation notice and/ or a citation being issued.

Special Programs:

⇒ **Bulky Items** such as refrigerators stoves, washers, dryers, freezers, water heaters, and other general household furniture or appliances may be picked up at no charge by calling the City's contractor, Orange Disposal Service at 637-3010.
Please call at least 5 days in advance of your trash day to schedule.

⇒ **No lumber or construction** material will be picked up as bulky items. To dispose of these items, call 637-3010 to rent a commercial bin, or take mat-material to the Material Recovery Facility, 2050 N. Glassell or to a County Landfill. *(see information at right).*

⇒ **RECYCLING:**
The City's recycling program is with a three small basket container system. To obtain containers, call 282-0200
Recyclable material includes:

- **Orange Bin:**
  Newspapers, mixed waste paper, magazines, catalogs, phone books.
- **Green Bin:**
  Aluminum cans, and all steel or bi-metal cans. Plastics/ #1 or #2 only.
- **Yellow Bin:**
  Glass bottles and jars. No mirror, panes or ceramics.

For more information on the recycling program, please consult the Orange Recycles brochure, or call 282-0200

Scavenging of recyclable materials is illegal! If observed, call 532-6461

WHO TO CALL 007621

Trash & Recycling Information

Street/Sanitation Office (City)	532-6480
Orange Disposal Service (contractor)	637-3010
Trash Collection	637-3010
Sanitation Inspections	532-6480
Scavenging Reports	532-6461
Street Sweeping	532-6480
Bulky Item Pick Up	637-3010
Rental Bin/Drop Off Box	637-3010
Recycling Information	282-0200
Recycling Container Replacement	282-0200
Used Motor Oil Pick Up *(Residential Only)*	289-7661
Household Hazardous Waste Hotline	834-6752
Public Dump/Buy Back Center *(contractor)*	282-0200
Olinda Landfill *(County dump)*	834-6752

(call for hours open, location and materials accepted)

Other Important Numbers

Drainage Problems	744-5544
Pothole Repair	532-6480
Street/Parkway Trees	532-6480
Waste Water	532-6480
Missing Street Signs	744-5536
Street Light/Traffic Signal Malfunctions	532-6426
Evening & Weekend Emergency	**538-1961**
Street Sweeping Parking Control	744-7444
Utility Billing	744-2233
Water Plant	288-2475
Community Services/Parks	744-7272
Building Code Enforcement	744-7220
Police Department	744-7444
Fire Department	288-2500

Emergency Safety (Fire/Police) 911

OLINDA LANDFILL
(Valencia Ave., N. of Imperial Hwy.)
Closed on 4th of July, Memorial Day, Labor Day, Columbus Day, Thanksgiving, Christmas and New Year's. Gate fees, hours, and materials accepted are included on hotline information line: (714) 834-6752
Public dumping also available at Orange Resource Recovery Systems, 2050 Glassell, Orange: (714) 282-0200

Printed on Recycled Paper, of Course!

Do You Know Where The Water In Your Storm Drain Goes?

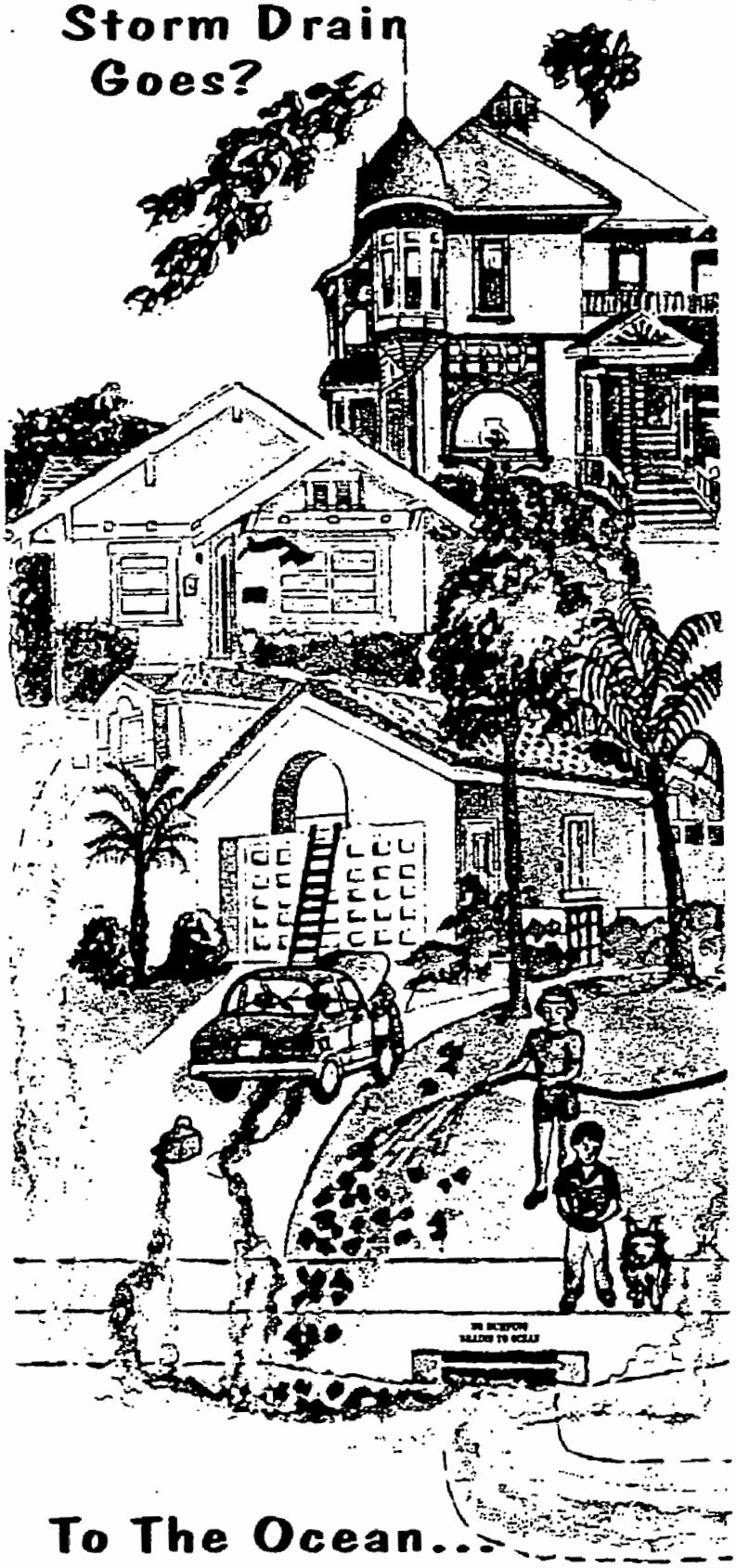

To The Ocean...

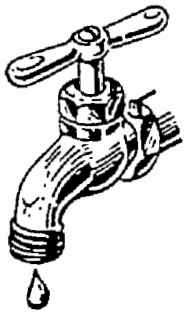

4 ways to save water in the Bathroom

- **Check your toilet for leaks.**
  Put a few drops of food coloring in your toilet tank. If the coloring begins to appear in the toilet bowl with out flushing, you have a wasteful leak that should be repaired at once.
- **Put a plastic bottle in your toilet tank.**
  Put an inch or two of sand or pebbles in the bottom of a quart bottle and fill the rest of the bottle with water. Then place the bottle in your toilet tank, safely away from the operating mechanism. The bottle will save water on each flush without impairing the efficiency of the toilet.
- **Take shorter showers.**
- **Check faucets and pipes for leaks.**

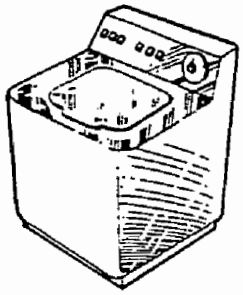

3 ways to save water in the kitchen and laundry.

- **Use your automatic dishwasher only for full loads.**
- **Use your automatic washing machine only for full loads.**
- **Keep a bottle of drinking water in the refrigerator.**
  This beats the wasteful habit of running tap water to cool it for drinking.

The Orange City Council and the Water Department Staff ask that you adopt a program of water conservation at home and at work.

100 cubic feet = 750 gallons

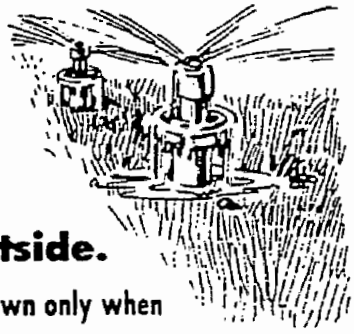

7 ways to save water outside.

- **Water your lawn only when it needs it.**
  Step on the grass. If it springs back when you take your foot off, it doesn't need water.
- **Deep-soak your lawn.**
  When you do water your lawn, water it just long enough to seep down to the roots where it is needed. A light sprinkling, which sits on the surface, will evaporate and be wasted.
- **Water during the cool parts of the day.**
  Early morning is better than dusk since it helps prevent the growth of fungus.
- **Don't water the gutter.**
  Position your sprinklers so that water lands on your lawn or garden, not on concrete or other paved areas. Also, avoid watering on windy days.
- **Use a broom instead of a hose to clean driveways and sidewalks.**
- **Don't run the hose while washing your car.**
- **Check for leaks in pipes, hoses faucets and couplings.**
  Leaks outside the house can be extremely wasteful, especially when they occur in your main water line. To check for hidden leaks in your pipes, shut off all faucets and taps around the house for 15 minutes. If the water meter shows some movement during that time, you have a leak.

CITY OF ORANGE · INCORPORATED APRIL 6, 1888 · ORANGE COUNTY CALIFORNIA

Billing 714/744-2233
Engineering 714/288-2475

SOURCE OF SUPPLY

Approximately 75% of the City's supply is groundwater pumped from City-owned wells. About 22% is treated water purchased from the Metropolitan Water District which imports its water from the Colorado and the State Water Project. The remaining 3% is treated water Irvine Lake purchased from the Serrano Water District.

FIRE PROTECTION RATING

The Insurance Services Office, a national organization representing the insurance industry, performed a comprehensive study and analysis of the reliability of the water system to supply water for emergency fire fighting purposes. The City of Orange water system received a near perfect score and a Class 1 Water Utility Rating.

▶ GENERAL WATER SYSTEM STATISTICS ◀

Active Wells	15
Total Well Capacity	31,275 GPM
Imported Water Connections	7
Total Imported Capacity	26,400 GPM
Miles of Pipe	430
Active Service Connections	32,800
Pressure Zones	5
Elevations Served	110-930 feet
Pumping Stations	16
Storage Tanks	18
Total Storage Capacity	43.2 MG
Hydrants	4,079
Average Day Demand	30 MG
Maximum Day Demand	50 MG

GPM = Gallons Per Minute
MG = Million Gallons
Gallons = 100 Cubic Feet = 1 Billing Unit

NEED TO CONTACT US?

Address: City of Orange Water Department
189 South Water Street
P.O. Box 449
Orange, California 92866

Water Quality (714) 288-2475
Willie Kralich .....*Sr. Water Quality Inspector*
Roger Westergard....*Water Quality Inspector*
Water Engineering (714) 288-2475
24 Hour Emergency (714) 538-1961
Water Billing (714) 744-2233

CLASS 1
WATER UTILITY

Annual Water Quality Report 1998

OWD Tower
1929-1969

CITY OF ORANGE WATER DEPARTMENT
CLASS I WATER UTILITY

CITY OF ORANGE ANNUAL WAT

"Primary Standards - Mandatory Health-Related Standards Established by the State of California, Department of Health Services"

PARAMETER (units)	MCLG OR (PHG)	MAXIMUM CONTAMINANT LEVEL	SURFACE WATER RANGE	SURFACE WATER AVERAGE	GROUNDWATER RANGE	GROUNDWATER AVERAGE
ORGANIC CHEMICALS (mg/L) Pesticides/PCBs						
Alachlor	(0.004)	0.002	ND	ND	ND	
Atrazine	0.003	0.003	ND	ND	ND	ND
Bentazon	NS	0.018	ND	ND	NR	NR
Carbofuran	0.04	0.018	ND	ND	ND	ND
Chlordane	(0.000003)	0.0001	ND	ND	ND	ND
"2,4-D"	(0.07)	0.07	ND	ND	NR	NR
Dalapon	(0.79)	0.2	ND	ND	NR	NR
Dibromochloropropane (DBCP)	0	0.0002	ND	ND	ND	ND
Dinoseb	(0.014)	0.007	ND	ND	NR	NR
Diquat	0.02	0.02	ND	ND	ND	ND
Endothall	(0.58)	0.1	ND	ND	ND	ND
Endrin	0.002	0.002	ND	ND	ND	ND
Ethylene Dibromide (EDB)	0	0.00005	ND	ND	ND	ND
Glyphosate	(1)	0.7	ND	ND	ND	ND
Heptachlor	0	0.00001	ND	ND	ND	ND
Heptachlor Epoxide	0	0.00001	ND	ND	ND	ND
Lindane	0.0002	0.0002	ND	ND	ND	ND
Methoxychlor	0.04	0.04	ND	ND	ND	ND
Molinate	NS	0.02	ND	ND	ND	ND
Oxamyl	(0.05)	0.2	ND	ND	ND	ND
Pentachlorophenol	(0.0004)	0.001	ND	ND	NR	NR
Picloram	(0.5)	0.5	ND	ND	NR	NR
Polychlorinated Biphenyls (PCBs)	0	0.0005	ND	ND	ND	ND
Simazine	0.004	0.004	ND	ND	ND-0.0002	ND
"2,4,5-TP (Silvex)"	0.05	0.05	ND	ND	NR	NR
Thiobencarb	NS	0.07 (#0.001)	ND	ND	ND	ND
Toxaphene	0	0.003	ND	ND	ND	ND
SEMI-VOLATILE ORGANIC COMPOUNDS						
Benzo(a)pyrene	(0.000004)	0.0002	ND	ND	ND	ND
Di (2-ethylhexyl) adipate	0.4	0.4	ND	ND	ND	ND
Di (2-ethylhexyl) phthalate	(0.012)	0.004	ND	ND	ND	ND
Hexachlorobenzene	0	0.001	ND	ND	ND	ND
Hexachlorocyclopentadiene	0.05	0.05	ND	ND	ND	ND
"2,3,7,8-TCDD (Dioxin)"	0	0.00000003	ND	ND	ND	ND
VOLATILE ORGANIC COMPOUNDS						
Benzene	0	0.001	ND	ND	ND	ND
Carbon Tetrachloride	0	0.0005	ND	ND	ND	ND
"1,2-Dichlorobenzene"	(0.6)	0.6	ND	ND	ND	
"1,4-Dichlorobenzene"	(0.006)	0.005	ND	ND	ND	
"1,1-Dichloroethane"	NS	0.005	ND	ND	ND	
"1,2-Dichloroethane"	0	0.0005	ND	ND	ND	ND
"1,1-Dichloroethylene"	0.007	0.006	ND	ND	ND	ND
"cis-1,2-Dichloroethylene"	0.07	0.006	ND	ND	ND	ND
"trans-1,2-Dichloroethylene"	0.1	0.01	ND	ND	ND	ND
Dichloromethane (methylene chloride)	0	0.005	ND	ND	ND	ND
"1,2-Dichloropropane"	0	0.005	ND	ND	ND	ND
"1,3-Dichloropropene"	NS	0.0005	ND	ND	ND	ND
Ethylbenzene	(0.3)	0.7	ND	ND	ND	ND
Monochlorobenzene	0.1	0.07	ND	ND	ND	ND
Styrene	0.1	0.1	ND	ND	ND	ND
"1,1,2,2-Tetrachloroethane"	NS	0.001	ND	ND	ND	ND
Tetrachloroethylene (PCE)	0	0.005	ND	ND	ND	ND
Toluene	NS	0.15	ND	ND	ND	ND
"1,2,4-Trichlorobenzene"	(0.005)	0.07	ND	ND	ND	ND
"1,1,1-Trichloroethane"	0.2	0.2	ND	ND	ND	ND
"1,1,2-Trichloroethane"	0.003	0.005	ND	ND	ND	ND
Trichloroethylene (TCE)	0	0.005	ND	ND	ND	ND
Trichlorofluoromethane	(0.7)	0.15	ND	ND	ND-0.0013	ND
"1,1,2-Trichloro-1,2,2-trifluoroethane"	(4)	1.2	ND	ND	ND	ND
Vinyl Chloride	0	0.0005	ND	ND	ND	ND
Xylenes	(1.8)	1.75	ND	ND	ND	ND
TURBIDITY (NTU)	NS	0.5 (b)	0.05-0.08	0.07	0.04-0.09	0.05

Total Trihalomethanes	NS	0.1	Distribution System:	Range ND-0.058 Average 0.013
MICROBIOLOGICAL (Presence/Absence) (c)	0%	5%	Distribution System:	Range ND-0.81% Average 0.06%

About your new waste services provider...

Waste Management of Orange.

We believe you'll be extremely happy with Waste Management of Orange's new automated service, expanded recycling collection program and flat rate structure.

If you have any further questions, please call the City of Orange at (714) 532-6480 or Waste Management of Orange's Customer Service Center at (714) 637-3010.

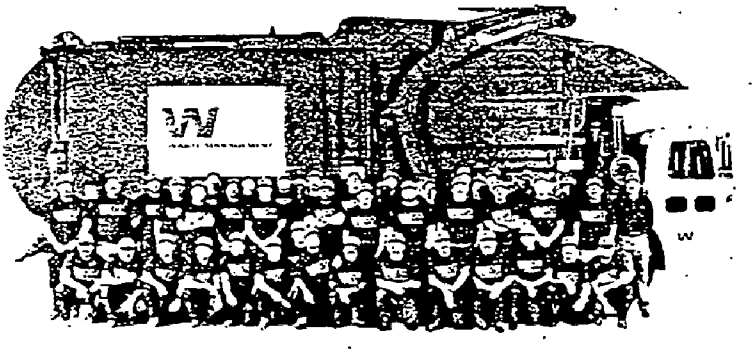

WASTE MANAGEMENT of ORANGE

Printed on recycled paper

ABOUT YOUR NEW WASTE COLLECTION SERVICE

On April 27, 1999, the City of Orange terminated its contract with Orange Disposal Service and hired Waste Management of Orange to be its new trash collection service provider. Since that time, the City has received numerous questions from residents who are concerned about how this changeover will affect them. You may have had some questions yourself.

To help ease any worries you may have about how trash service will be conducted under Waste Management of Orange, here are the answers to the questions we receive most often:

REMEMBER TO RECYCLE

Aluminum Cans
Glass Food and Beverage Containers
Steel/ Tin Cans
Plastic Food and Beverage Containers
Detergent Containers (#1 & #2 Plastics)
Newspaper
Mixed Papers
Junk Mail
Magazines, Catalogs and Phone Books
Corrugated Cardboard Boxes

QUESTIONS?

Waste Management
Customer Service Center
(714) 637-3010

Scavenging
(714) 532-6480

Bulky Item Pickup
(714) 637-3010

WASTE MANAGEMENT of ORANGE

ORANGE RECYCLES!

Your Starter Kit Enclosed

ADDITIONAL SERVICES

BULKY ITEM COLLECTION

Each Orange Resident with curbside refuse collection is entitled to two free bulky item pick-ups each year, with up to four large items or 20 plastic bags of refuse permitted per pick-up. Bulky items include large, hard-to-handle items such as furniture, major appliances, and other household items that require two individuals to move. Call the Waste Management Customer Service Center at (714) 637-3010 to schedule your free bulky item pick-up.

HOUSEHOLD HAZARDOUS WASTE

The County of Orange operates free regional household hazardous waste collection centers for homeowners to take and dispose of their paint, automotive products, pesticides, cleaners, solvents, etc. The two closest centers for Orange residents are conveniently located in Anaheim at 1071 N. Blue Gum St. and in Irvine at 6411 Oak Canyon. For more information, call the County's Information Hotline at (714) 834-6752.

DISPOSAL OF USED MOTOR OIL

Orange residents can safely & easily dispose of used motor oil right here in Orange. Please refer to the Used Motor Oil Reference Card inclosed in the Starter Kit or contact the California Environmental Hotline at 1-800-CLEANUP to locate a State Certified Used Oil Collection Center near you.

CHRISTMAS TREE RECYCLING

We will collect and recycle Christmas trees for the first two weeks following Christmas on your regular trash day. Trees longer than six feet must be cut in half. Please remove all tinsel, metal ornaments and metal stands from trees. Flocked trees will be collected but not recycled.

HOLIDAY SCHEDULE

Waste collection does not occur on the following holidays:

New Year's Day	Labor Day
Memorial Day	Thanksgiving Day
4th of July	Christmas Day

When any of these holidays are observed on a weekday, refuse and recycling collections for the remainder of the week will be delayed one day. PLEASE NOTE: During holiday weeks when your refuse collection falls on a street sweeping day, place your carts on the curb or in your driveway, NOT IN THE STREET.

LARGE BIN SERVICE

For large household and yard projects, special bin rental service is available. Please call the Waste Management Customer Service Center at (714) 637-3010 for rates and information.

HOME COMPOSTING WORKSHOPS

available FREE to all residents of the City of Orange

SATURDAYS at 10:00 am

Under the Ash Tree

February 19 () April 8 () June 17

reservations not required

Plan to attend one of these 90 minute workshops. Learn how to naturally recycling your yard waste. Hands-on demonstrations about composting, mulching, "grasscycling", and more. Workshop participants will receive a voucher to purchase a compost bin for only $15.

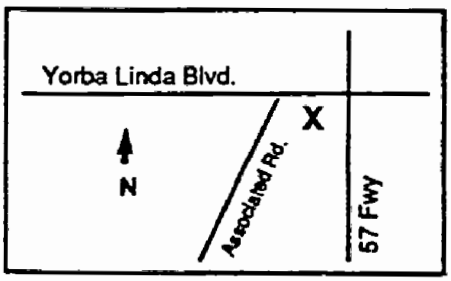

All workshops are held at the

Fullerton Arboretum

Located at 1900 Associated Road, west of the 57 Freeway, off Yorba Linda Blvd.

The Community Compost Education Program is sponsored by the Fullerton Arboretum and various cities including Orange. All entry fees, donations, and balance due for backyard composting unit are paid for by the City of Orange. Any donation made individually by Orange residents to the Arboretum will help to further Arboretum programs.

For more information on other recycling programs for the City of Orange, call (714) 744-5563.

Groundwater Replenishment System

Providing High-quality Water for 200,000 Orange County Families

The Need for a Stable, Independent Water Supply

Orange County and much of the southwestern portion of the United States are short of water and dependent on increasingly less-reliable imported water supplies. Finding new sources of imported water holds little promise, in fact, federal watershed policy and court actions will probably lead to decreases in future imports. As Orange County experiences increased population growth, the supply of existing water will out distance the demand. One innovative approach to providing future high-quality water is the Groundwater Replenishment System.

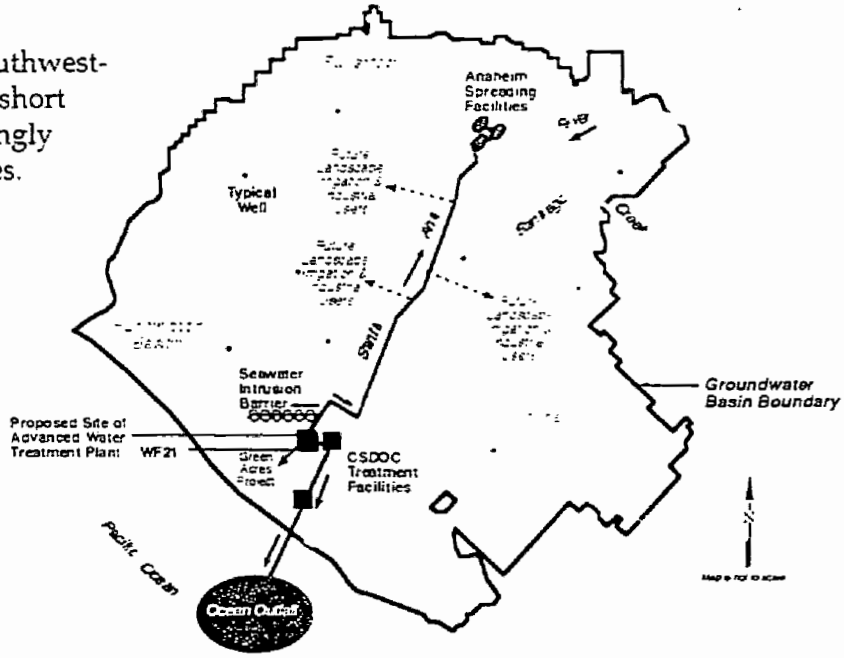

The Groundwater Replenishment System

The Groundwater Replenishment System will take highly treated wastewater now sent to the ocean and treat it through highly advanced microfiltration and reverse osmosis processes to standards that will surpass all drinking water requirements. Reverse Osmosis is the same process used by many bottled water companies. Some of the purified water will then be naturally percolated into Orange County's large underground water basin where it will actually improve the overall quality of our groundwater. The remainder of the water will be used for irrigation, industrial use, and for protecting the groundwater basin from seawater intrusion.

Reverse Osmosis (RO) is the process in which water is forced through a membrane to filter out contaminants. The RO membrane is like a microscopic strainer that allows only the water molecules (H_2O) to pass through. Visualize the water molecules as the size of tennis balls, then relatively speaking, metal and inorganic compounds screened out would be the size of softballs; organic compounds soccer balls; viruses the size of a tractor-trailer truck; bacteria the size of a large office building; and a protozoa would be the relative size of a mountain.

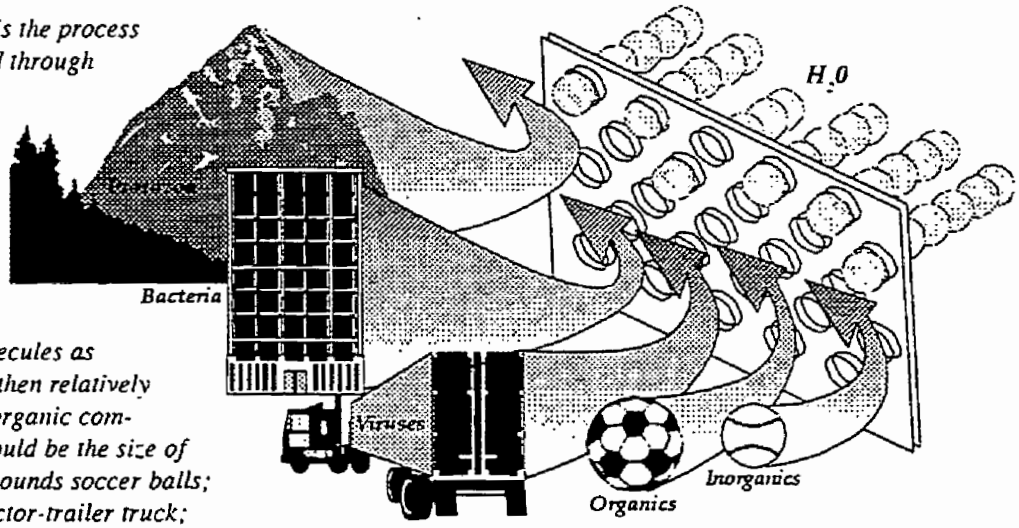

Additional information on the Groundwater Replenishment System

Besides providing 100,000 acre-feet of new water, enough for 200,000 families, here is what the Groundwater Replenishment System will do: provide water for multiple uses including household, landscaping, industrial and prevention of seawater intrusion; make the County less dependent on more expensive, less-reliable imported water; free up water which can be used by agriculture and the environment; produce "drought-proof" water, easing the hardships of the next drought; improve the overall quality of our groundwater by adding this purified water; provide increased wastewater storm treatment capability; decrease the amount of discharge into the ocean; provide water that is more energy efficient and environmentally friendly than current sources; and provide water at a cost lower than or comparable to imported water. This proposed solution to the growing need for more local water comes from over 8 years of study by the joint project sponsors - The Orange County Water District (OCWD) and the County Sanitation Districts of Orange County (CSDOC). The people who will be operating the Replenishment System, recently won the California Water and Environment Association's Santa Ana River Basin "1997 Plant of the Year Award" recognizing their ability to run a safe, well-operated water production facility. Because the new System will be built on the property of the two agencies and use the Santa Ana River right-of-way for moving the water from Fountain Valley to the Anaheim percolation basins, there will be minimal impact on the community. Health and safety will be primary concerns with the new System – the water, treated beyond drinking water standards, will constantly be monitored by the producers as well as outside health and regulatory agencies. The water will actually be purified twice, the last time by natural groundwater absorption, the same process that purifies rainwater. This System actually improves on existing, similar water Systems already operating successfully in cities in Virginia, Texas and California.

Water Quality - Total Dissolved Solids (Salts)

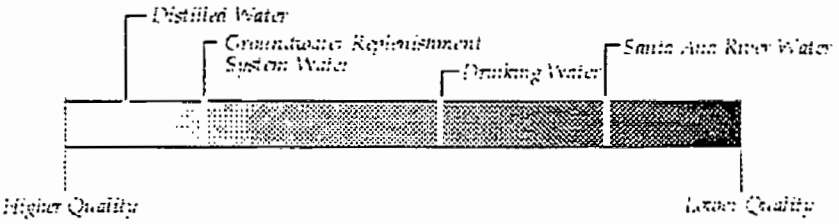

Feedback on the Groundwater Replenishment System

We would like to hear from you concerning the Groundwater Replenishment System. If you have any ideas, thoughts or opinions on this new proposed System, please write the Orange County Water District (Attn: Tom Dawes) 10500 Ellis Ave., P.O. Box 8300, Fountain Valley, CA 92728 or contact us through our Internet homepage: www.ocwd.com, or call 714- 378-3351.

REPRESENTATIVE PUBLIC EDUCATION MATERIALS

CITY OF SAN CLEMENTE

TRANSPORTATION AND HANDLING

- A maximum of 15 gallons or 125 pounds may be transported per vehicle, per trip (Department of Transportation regulation).
- Materials should be in original containers (except motor oil, fuels and antifreeze).
- All containers must have lids, be sturdy, non-leaking, and protected from breakage.
- Do not combine types of waste.
- Do not mix oil-base paint with latex paint.
- Dry out empty paint cans and discard in regular trash.
- If you wish to have a container returned (i.e. oil containers and boxes/crates used to transport materials), please notify the attendant in advance. Some containers may not be returnable.

WHY SHOP [illegible] YOU DROP?

VISIT THE STOP & SWAP!

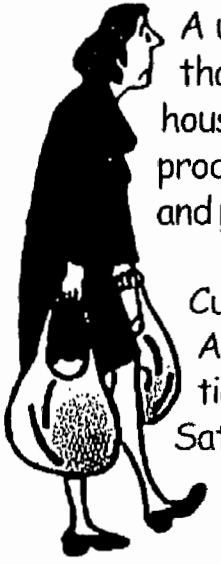

A unique and FREE program that allows you to drop off household, yard, and car care products you no longer need and pick up others you can use.

Currently available at the Anaheim and Irvine locations only. (Tuesday through Saturday, 9 a.m. to 1 p.m.)

FOR MORE INFORMATION ABOUT THE HOUSEHOLD HAZARDOUS WASTE COLLECTION PROGRAM AND THE STOP & SWAP CALL:

(714) 834-6752

Or see our webiste: www.oc.ca.gov/iwmd

Orange County Recycles!

Printed on recycled paper.

Integrated Waste Management Department

007634

DISPOSAL OF HOUSEHOLD HAZARDOUS WASTE

Household Hazardous Waste Collection Program

DID YOU KNOW?

- Most home, car, and yard care products can't be thrown in the trash?
- Paint, used motor oil, and most cleaning products are considered to be "hazardous waste"?
- If these products are put in the landfill they can contaminate our groundwater?

SO WHAT CAN YOU DO?

EASY AS 1-2-3!

1. Pack unwanted home, yard, and car care products in your car.
2. Drive to the Household Hazardous Waste Center closest to you.
3. Sit in your car and fill out a simple form while an attendant removes the unwanted products.

AND AWAY YOU GO!

LOCATIONS

Tuesday through Saturday
9 a.m. to 1 p.m.
except for rainy days and major holidays: Independence, Thanksgiving, Christmas and New Years Days)

STOP & SWAP*

ANAHEIM
1071 N. Blue Gum Street
(Located between the 91 and 57 Freeways on the corner of La Palma and Blue Gum)

HUNTINGTON BEACH
17121 Nichols Street
(Between Beach Blvd. and Gothard St. off Warner Ave. at Rainbow Recycling and Disposal. Use Gate 6.)

STOP & SWAP*

IRVINE
6411 Oak Canyon
(Off Sand Canyon between the 5 and 405 Freeways. Next to the City Corporate Yard and Animal Shelter.)

SAN JUAN CAPISTRANO
Prima Deseche Landfill
(From the 5 Freeway exit Ortega Highway, go east to La Pata and turn right)

MATERIALS ACCEPTED

- Automotive products (antifreeze, motor oil, fluids)
- Batteries (home and car)
- Cosmetics
- Herbicides
- Hobby supplies
- Household cleaners
- Fuels
- Medicines
- Paints (latex and oil)
- Paint products
- Personal care products
- Pesticides
- Polishes and waxes
- Pool and spa chemicals
- Propane tanks from barbecues
- Unused road flares
- Wood preservatives

WASTE NOT ACCEPTED

Ammunition
Asbestos
Biological
Business-generated
Explosives
Radioactive
Compressed gas cylinders

* See reverse for Stop & Swap info!

Honey, before you go shopping, please check the Stop & Swap for:

- ✔ Latex Paint
- ✔ Bug Spray
- ✔ Chlorine
- ✔ Cleaning products

Thanks!

COUNTY OF ORANGE

HOUSEHOLD HAZARDOUS WASTE PROGRAM

For free disposal of old paints, pesticides, and other household toxic products, call:

(714) 834-6752

County of Orange Stop and Swaps are funded by a Grant from the California Integrated Waste Management Board.

Printed on recycled paper.

Integrated Waste Management Department

Before you shop...

Stop! Drop! and Swap!

Household Hazardous Waste Collection Progr

The County of Orange Integrated Waste Management Department introduces a **FREE** program that will **SAVE** you time and money...

Stop & Swap

What is Stop & Swap?
A unique program that allows you to drop off household and car maintenance products you no longer need and pick up other products you can use in your home and yard.

How does it work?
It's simple, just

Stop

Drop &

Swap!

Stop

It's convenient!
Just stop at one of three Regional Household Hazardous Waste Collection Centers, Tuesday through Saturday, 9 a.m. to 1 p.m. (except rainy days and major holidays).

Drop

It's quick!
Drive through and drop off the household and car maintenance products you no longer need but can't throw in the trash.* While you wait in your car, an attendant removes the unwanted materials. These products will either be added to the Stop & Swap for someone else to use or be treated and disposed of in an environmentally friendly way.

* This includes cleaning products, old paint, used motor oil, pesticides, pool and hobby chemicals, and much more! Call our hotline: 714-834-6752 for more details.

Swap

It's easy!
Park your car and visit the Stop & Swap area. Select products you can use at home, complete a simple form telling us what you are taking, and away you go!

How much does it cost?
It's FREE! Not only is it free, you actually **SAVE** money when you take these products home instead of buying new ones!

Where is the nearest Stop & Swap?
Stop & Swaps are found at the following Household Hazardous Waste Collection Centers:

IRVINE
6411 Oak Canyon
(Next to the City of Irvine Corporate Yard. Off Sand Canyon between the 5 and 405 Freeways.)

ANAHEIM
COMING IN 1999!

HUNTINGTON BEACH
COMING IN 1999!

Although the San Juan Capistrano Center accepts household hazardous waste, it does not currently have a Stop & Swap.

Orange County Recycles!

REPRESENTATIVE PUBLIC EDUCATION MATERIALS

CITY OF SAN JUAN CAPISTRANO

SAN JUAN CAPISTRANO RECYCLING PROGRAM

007639

TRASH | RECYCLABLE | YARD WASTE

RECYCLABLE PAPER

DO'S

- Corrugated Cardboard
- Junk Mail
- Magazines
- Phonebooks
- Chipboard (Cereal/cracker boxes)
- Newspaper
- Computer Paper
- Any White Paper
- Mixed Paper

DON'TS

- No Mixed Products (i.e. metal/paper combination)
- Waxed Milk Cartons
- Waxed Paper
- No Coated Materials

RECYCLABLE METAL

DO'S

- Empty Aerosol Cans
- Metal Coat Hangers
- Aluminum Cans
- Tin Cans
- Food and Juice Cans
- Empty Paint Cans (dry paint is O.K.)
- Metal Foil
- Lawn Furniture

DON'TS

- No Mixed Products (i.e. metal/paper combination)
- Automotive/Plumbing Parts

RECYCLABLE GLASS

DO'S

- Food/Beverage Bottles
- Glass Jars and Bottles
- House Windows
- Liquor, Soda Juice Bottles

DON'TS

- No Ceramic/Pyrex
- No Mirrors
- Fluorescent Tubes
- No Light Bulbs
- No Safety Glass

RECYCLABLE PLASTICS

DO'S

- **PET:** (soft drink bottles, photo film)
- **HDPE:** (detergent containers, plastic water and milk containers, pails, T-shirt bags)
- **PVC:** (sprinkler pipe)
- **LDPE:** (trash can liners, shrink wrap, grocery bags)
- **PP:** (yogurt containers, luggage, drinking straws)
- **PS:** (plastic plates, cups, egg cartons, food trays)
- **Other:** (Tupperware and mixed plastic containers)

DON'TS

- No Plastic Container Lids
- No Mixed products (i.e. plastic/metal combination)
- Plastic Toys
- Flower/Plant Containers

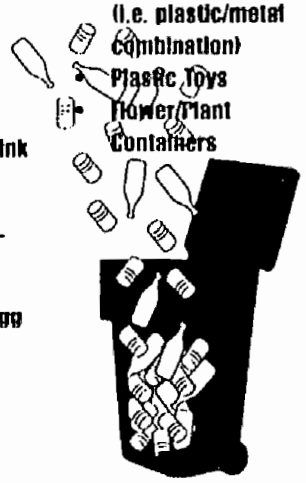

Note: Please remove liquids, lids and food residue from all recyclables before placing them in the "brown / blue" container.

YARD WASTE

DO'S

- Grass Clippings
- Green Plants
- Dry Leaves
- Wood Chips
- Garden Trimmings
- Weeds
- Wood Scraps

DON'TS

- Animal Waste
- Palm Branches
- Diseased Plants
- Meat/Fish/Bones
- Dairy Products
- Sod/Dirt

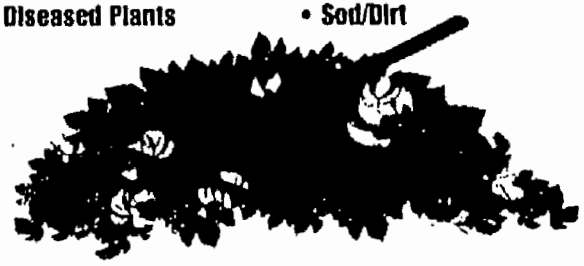

Household HAZARDOUS WASTE?

It is illegal to dispose of Household Hazardous Waste (HHW) through the automated residential program. HHW must be disposed of at a certified collection center. The nearest collection center is located at the Prima Deshecha Landfill (see map below). Household Hazardous Waste includes but is not limited to:

- Used Motor Oil
- Solvents
- Batteries
- Cleaning Products
- Wood Preservative
- Old Paint
- Pesticides
- Pool Chemicals
- Printer Cartridges
- Unused Road Flares

Call the office of the Orange County Integrated Waste Management Department or SOLAG Disposal for the collection centers' hours of operation. A maximum of 15 gallons or 125 lbs. of hazardous materials may be brought to the collection center per vehicle, per visit. You must have a valid Drivers License Number.

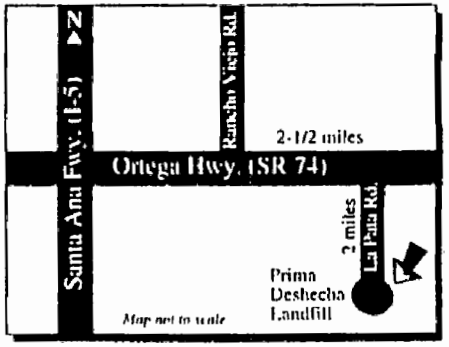

CHRISTMAS TREE RECYCLING

Free curbside collection of your Christmas trees will take place on your normal collection day, the two weeks following New Years. Your trees need to be unflocked, free of any ornaments, nails or stands to be recycled. The trees should then be placed at the curb where they will be recycled.

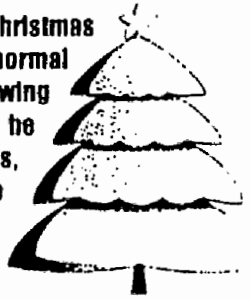

BLACK CONTAINER # _____ BROWN / BLUE CONTAINER

GREEN CONTAINER # _____

SAN JUAN CAPISTRANO RECYCLING PROGRAM

ABOUT THE AUTOMATED SYSTEM

The reason for this new automated collection program is to meet the requirements of the California Integrated Waste Management Act of 1989, better known as AB 939. One of the main objectives of AB 939 is to get Californians to manage their solid waste stream and reduce production of solid waste on an individual basis (i.e. source reduction). This law requires that each city divert 50% of their waste stream away from the landfill by the year 2000.

Subscribers may select a set of three specially designed automated containers with an attached lid and wheels. A black container will be for regular trash, a brown or blue container for recyclable material and a green container for yard waste. You may choose a set of 35 or 67-gallon containers.

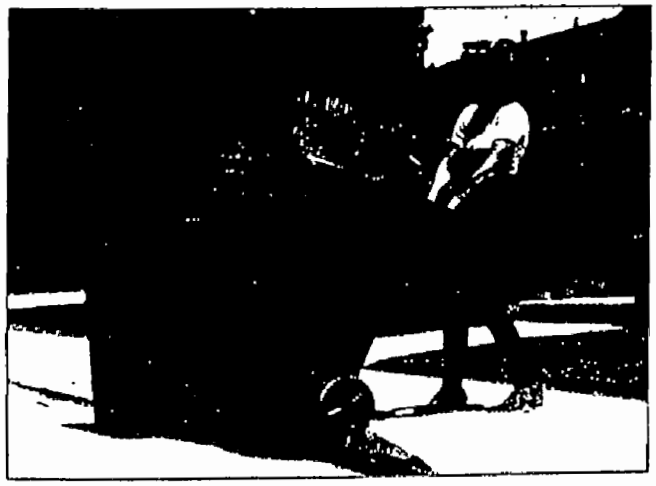

Approximately 70 percent of the residential waste stream is recyclable material. A list of the materials that can be recycled are provided on the back of this flyer. From time to time as markets are developed new recyclable may be added. If you are unsure as to whether or not an item is recyclable, please call a customer service representative to assist you.

TIPS FOR COLLECTION DAY

The automated solid waste and recycling collection program is an efficient means of collecting refuse, yard waste and recyclables, and offers long-term price stability to the consumer. The program requires the use of automated collection vehicles equipped with a robotic arm. The driver will use the robotic arm to pick-up and dump the contents of the container into the truck. Because of this, it is important that all materials are placed inside of, not around or on top of the automated containers.

HOW THE AUTOMATED SYSTEM WORKS

In order to improve efficiency, stabilize prices and ensure regular collection of the automated containers, SOLAG Disposal recommends that you remember the following on collection day:

1. The containers should be placed at curbside no later than 6:30 am on collection day.
2. The containers must be placed side-by-side approximately 1' foot apart and at least 3' from any obstruction. (i.e. fire hydrants, trees)
3. The containers should be placed with the handles & wheels facing towards your home.
4. Containers should be removed from curbside within 12 hours after service.
5. Items placed outside of the containers will not be collected.

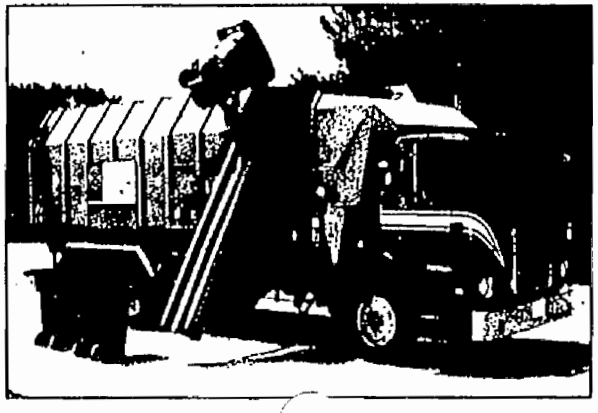

BULKY ITEMS

SCHEDULE A BULKY-ITEM PICK-UP

Each residential customer is entitled to two (2) bulky-item pick-ups free-of-charge per calendar year from SOLAG Disposal. Please call a customer service representative to arrange for a pick-up of the bulky-items on your regular trash collection day. Additional bulky-item pick-up may be arranged for a nominal charge per collection.

WHAT ARE BULKY-ITEMS?

Items that cannot fit in your "black," "brown / blue," or "green" automated containers, such as a chair or a couch, are considered "bulky-items." The bulky-item is an object that can be handled by a two-person crew, and may include washers, dryers, refrigerators or other large materials.

NON-PROFIT ORGANIZATIONS

Before you put out large items to be landfilled, consider donating these items to a non-profit organization. If you would like more information about bulky-item pickups or the phone number of a non-profit organization willing to pick-up your reusable items, please contact a customer service representative at (714) 240-0446.

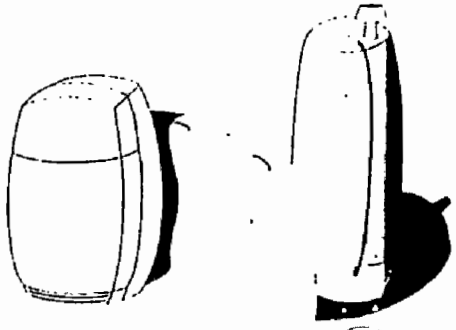

PROGRAMA DE RECICLAJE DE LA COMUNIDAD

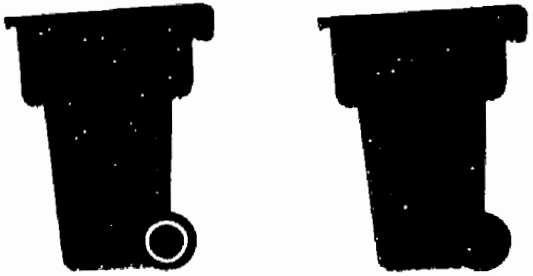

BASURA RECICLABLE

PAPEL RECICLABLE

SI:

- Cartón corrugado
- Publicidad
- Revistas
- Directorios telefónicos
- Cartón para envases (cajas de galletas/cereales)
- Papel periódico
- Papel de computadora
- Papel blanco
- Papel mezclado

NO:

- Productos mixtos (metal y papel combinados)
- Envases encerados de leche
- Papel encerado
- Materiales de recubrimiento

METAL RECICLABLE

SI:

- Aerosoles vacíos
- Ganchos de alambre para ropa
- Latas de aluminio
- Hoja lata
- Latas de alimentos/jugos
- Latas vacías de pintura (se aceptan con pintura seca)
- Papel de estaño

NO:

- Productos mixtos (metal y papel combinados)
- Refacciones automotrices/ de plomería

VIDRIO RECICLABLE

SI:

- Botellas de alimentos/bebidas
- Jarros y frascos de vidrio
- Ventanas de la casa
- Botellas de licor, soda y jugo

NO:

- Cerámica/Pyrex
- Espejos
- Tubos fluorescentes
- Focos
- Vidrio de seguridad

PLASTICOS RECICLABLES

SI:

PET: (botellas de sodas, película fotográfica)

HDPE: (contenedores para detergente, contenedores de plástico para agua y leche, charolas, bolsas para camisetas)

PVC: (tubería para aspersores)

LDPE: (bolsas para botes de basura, celofán, bolsas de abarrotes)

PP: (recipientes para yogurt, maletas, popotes)

PS: (platos, tazas, contenedores para huevos y bandejas para comida de plástico)

OTROS: (contenedores de plástico mixtos y Tupperware®)

NO:

- Tapaderas de recipientes de plástico
- Productos mixtos (metal y plástico)
- Juguetes de plástico
- Macetas para flores/plantas

Nota: Por favor remueva líquidos, tapaderas y residuos alimenticios de todos los productos para reciclar antes de depositarlos en el contenedor "café/azul".

DESECHOS DE PATIO:

SI:

- Pasto cortado
- Plantas verdes
- Hojas secas
- Hojuelas de madera
- Recortes del jardín
- Yerbas
- Sobrantes de madera

NO:

- Desechos animales
- Ramas de palmas
- Plantas enfermas
- Carne/pescado/huesos
- Productos lácteos
- Zacate/tierra

DESECHOS DEL PATIO

Los residentes de San Juan Capistrano deben usar el contenedor automatizado verde.

Los residentes de la Ciudad de Dana Point pueden usar sus propios contenedores (hasta 35 galones), bolsas o pueden atar los desechos de jardín.

¿Desechos PELIGROSOS EN EL HOGAR?

Es ilegal deshacerse de Desechos Peligrosos en el Hogar (DPH) por medio del programa residencial automatizado. Los DPH deben depositarse en un centro de recolección certificado. El centro de recolección se encuentra en Prima Desecha Landfill (veáse mapa más adelante). Los Desechos Peligrosos en el Hogar incluyen, aunque sin limitarse:

- Aceite usado de automóvil
- Solventes
- Baterías
- Productos de limpieza
- Preservantes para madera
- Pintura vieja
- Pesticidas
- Productos químicos para alberca
- Cartuchos de impresoras
- Luces de bengala sin usar

Llame a la oficina del Departamento de Desechos Integrados del Condado de Orange o SOLAG para los horarios de operación de los centros de recolección. Se pueden depositar en el centro de recolección un máximo de 15 galones o 125 libras de materiales peligrosos por vehículo y por visita. Usted debe ser residente del Condado de Orange y tener licencia de manejo o tarjeta de identificación válidas para usar las instalaciones.

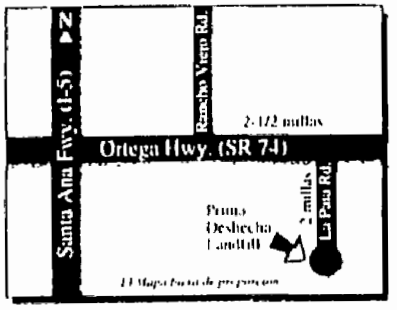

RECICLAJE DE ARBOLES DE NAVIDAD

La recolección en la banqueta de árboles de navidad se llevará a cabo en el día usual de recolección, durante las dos semanas después del año nuevo. Para poder ser reciclados los árboles no deben tener nieve artificial, esteras, clavos o bases. Se deben colocar en la banqueta de donde serán recogidos para ser reciclados.

PROGRAMA DE RECICLAJE DE LA COMUNIDAD

ACERCA DEL SISTEMA AUTOMATIZADO

La razón de este nuevo programa de recolección automatizada es el cumplimiento del Acta de Manejo Integrado de los Desechos de 1989, más conocida como AB 939. Uno de los principales objetivos del AB 939 es lograr que los californianos manejen los desechos sólidos y reduzcan la generación de desechos sólidos individual (por ejemplo, reducción del origen). Esta ley requiere que las ciudades canalizen 50% de sus desechos a otros lugares que no sean los basureros para el año 2000.

Los subscriptores en las Ciudades de Dana Point, San Clemente y San Juan Capistrano pueden seleccionar un juego de tres contenedores especialmente diseñados con tapas y ruedas. El contenedor negro será para los desechos comunes y el café o azul será para materiales reciclables. Los residentes de San Juan Capistrano pueden obtener un verde adicional para desechos del jardín. Usted puede escojer el juego de 35 o 67 galones.

Aproximadamente 70% del flujo de desechos residenciales consiste de materiales reciclables. Una lista de los materiales que pueden ser reciclados aparece al reverso de este volante. De vez en cuando , nuevos materiales reciclables se pueden añadir. Si no está seguro si un artículo es o no es reciclable, llame a un representante para ser auxiliado.

IDEAS PARA EL DIA DE RECOLECCION

El sistema de desechos sólidos y de reciclados es el modo mejor de recolectar basura y materiales reciclables y ofrece, estabilidad en el precio, a largo plazo para el consumidor.

Es importante para los residentes de la Ciudad de Dana Point que reciben servicio del vehículo de recolección de desechos del jardín que opera manualmente asegurarse que los desechos de jardín estén en bolsas o estén atados apropiadamente.

El programa requiere el uso de vehículos automatizados de recolección equipados con un brazo robotizado. El conductor usará el brazo robotizado para recoger y vaciar el contenido del contenedor en el camión. Debido a esto, es importante que todos los materiales se depositen dentro del contenedor automatizado y no fuera o encima del mismo.

COMO FUNCIONA EL SISTEMA AUTOMATIZADO

Para mejorar la eficiencia, estabilizar los precios y asegurar la recolección habitual de los contenedores automatizados, SOLAG Disposal recomienda que recuerde lo siguiente el día de recolección:

1. Los contenedores deben de colocarse en la orilla de la banqueta antes de las 6:30 a.m. el día de recolección.
2. Los contenedores deben de colocarse un lado a otro, con un pie de separación y 3 pies de obstrucción, (por ejemplo: hidrantes, árboles).
3. Los contenedores deben de colocarse con las asas y ruedas apuntando a su casa.
4. Los contenedores deben de removerse de la banqueta entre 12 horas después del servicio.
5. Los artículos colocados a fuera de los contenedores no serán recogidos.

ARTICULOS VOLUMINOSOS

PROGRAME LA RECOLECCION DE ARTICULOS VOLUMINOSOS

Cada cliente residencial tiene derecho a dos (2) recolecciones de artículos voluminosos sin costo al año por parte de SOLAG Disposal. Por favor llame a un representante para hacer arreglos de artículos voluminosos en el día usual de recolección de basura. Se pueden hacer arreglos para recoger artículos voluminosos con un pago nominal por cada recolección.

¿QUE SON ARTICULOS VOLUMINOSOS?

Los artículos que no caben en sus contenedores automatizados negro (basura), café/azul (reciclables) o verde (jardín) tal como una silla o un couch, se consideran "artículos voluminosos". El artículo voluminoso es un objeto que no puede ser manejado con un equipo de dos personas, pudiendo ser lavadoras, secadoras, refrigeradores o cualquier otro objeto grande.

ORGANIZACIONES NO LUCRATIVAS

Antes de que usted saque los artículos voluminoso para ser desechados, considere donarlos a una organización no lucrativa. Si desea más información sobre la recolección de artículos voluminosos o el número telefónico de alguna organización no lucrativa que esté dispuesta a recoger artículos usados, comuníquese con un representante (714) 240-0446.

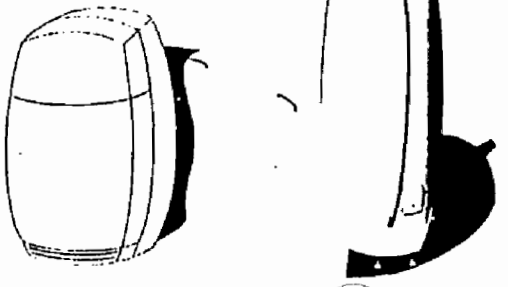

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Recycle Now There's A Future In It!

Recycling News

July 1, 1999 Volume VII, No 3

IMPORTANT NOTICE

NO DELAY IN TRASH COLLECTION THIS JULY 4TH

This year the Fourth of July falls on a Sunday. Currently the County landfills operate Monday through Saturday so you will not experience delay in trash service. On your normal collection day, please place your trash/recyclables out at the curb for collection.

PROPER DISPOSAL OF THE AMERICAN FLAG

As we celebrate America's Independence this Fourth of July we may notice that the flags we display have become torn or tattered beyond repair. This past year the editors of Recycling News received a letter from a World War II Veteran regarding proper disposal of an American Flag.

The Orange County Veterans will forward the flags to the American Legion Post where they will be Disposed of in conformance with tradition and local laws. Please mail your old American Flags to:

ORANGE COUNTY VETERANS
SERVICE CENTER OFFICE
1300 South Grand Avenue, building B
Santa Ana, CA 92705

TIPS TO REMEMBER WHEN YOU'RE AT THE BEACH OR PARK

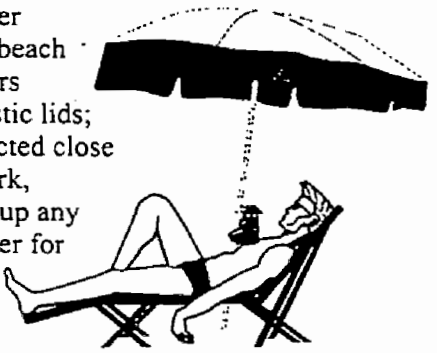

Did you know that our oceans provide most of the planet's oxygen, moisture and weather patterns? Every year, the Center of Marine Conservation sponsors a nationwide 3-hour beach clean-up, which has proven to be extremely effective. In 1987, in Texas alone, volunteers collected: 31,773 plastic bags; 30,295 plastic bottles; 15,631 six pack rings; 28,450 plastic lids; and 1,914 disposable diapers. And around the nation, the volunteer clean-up crew collected close to 2 million pounds of debris in just 3 hours. So next time you go to the beach or the park, remember to bring a trash bag and before you leave try to spend a few minutes picking up any litter you find. If you are interested in beach clean-up activities, please contact the Center for Marine Conservation at (202) 429-5609 or the Surfrider Foundation at (800) 743-7873.

IMPORTANT Y2K INFORMATION

By December 31, 2000 your city will need to be in compliance with the regulations set forth by state law AB 939. As you are already aware, AB 939 is the state-mandated requirement for each City throughout California to divert 50% of their waste stream away from the landfill by the Year 2000. Over the past several years the Editors of *Recycling News* have been discussing the 50% goal and the importance of reducing your waste, recycling and buying recycled products. Over the next year, your city will evaluating the programs currently in place and will review new ideas to promote the goals or the state law. Keep up the good work!!!!

Holiday Collection Schedule

We will not pick-up on these holidays:
- New Years Day - Memorial Day - Independence Day - Labor Day - Thanksgiving Day - Christmas Day
However, trash collection will resume one day later.

Unwanted Computer Parts - Help Your Community Recycle

Recently there has been a lot of talk about the year 2000 (Y2K) and the potential of imbedded computer chips disabling thousands of appliances, electronic products, etc. While the editors of ***Recycling News*** can neither confirm nor deny these reports, we would like to request our customers' help to try and locate alternatives to disposing of these items in the landfill. If you or someone you know can direct us to a non-profit organization willing to accept these items or a remanufacturer that would be interested in securing this material, please contact our office in writing.

Some locations that may take old computers (via the internet)
CALMAX - http://www.ciwmb.ca.gov/calmax
Detwiler Foundation - http:/www.detwiler.org
Goodwill Industries of Orange County -
http:/ocgoodwill.org/computer_donations.html

More Trash Friendly Websites

Solag Disposal, Inc. - www.solag.com
County of Orange - www.oc.ca.gov./iwmd/
Laguna Hills - www.ci.laguna-hills.ca.us

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Recycling News

October 1, 1999 Volume VII, No. 4

KEEP RECYCLING WORKING - AMERICA RECYCLES

On November 13, California cities will have the opportunity to participate in the second annual America Recycles Day - a national campaign designed specifically to reinforce public support of recycling. Your City, the County of Orange and SOLAG Disposal would like to "Keep Recycling Working." You can help by remembering to reduce, reuse, recycle and compost your waste, but most importantly... purchase products that contain recycled materials. By working together we can preserve our planet, promote a healthier environment and secure the future of recycling.

SPECIAL GIVEAWAY

To celebrate America Recycles Day, on Saturday, November 13 from 8:00 a.m. to 12:00 p.m. Tierra Verde Industries, a green waste recycling facility located in San Juan Capistrano, has offered to donate compost for use in your yard. Bring a shovel and a large container/bag to Federal Doc Loading, located on Alicia Parkway between Avila and Aliso Creek Road in the City of Laguna Niguel to collect the free compost material.

FIND A NEW USE FOR AN OLD ITEM

Have an old bike that needs fixing or a chair that is missing a leg? Or how about some other large item that needs some minor repairs? Before you throw that item away, why not give it to someone who could put it to good use? There are many organization such as Goodwill Industries, Children's Hospital of Orange County (CHOC) and the Salvation Army that make it their business to bring new life to older, reusable items. In the spirit of goodwill and less waste, SOLAG Disposal, Inc. together with your City encourage you to contact these organizations before you throw a reusable item in the trash. For telephone numbers to these or other non-profit organizations, please look in the yellow pages under "Thrift Shops," or you may contact Solag Disposal for more information. Also remember that your contribution may be tax deductible.

ENVIRONMENTAL AWARDS

The Cities of Dana Point, Laguna Niguel, San Clemente, San Juan Capistrano and the County of Orange would like to recognize the following businesses for their outstanding efforts to reduce waste and recycle in their community:

Doubletree Guest Suites, Dana Point • Flex Foot, Inc. • Trade Winds Motel
Unichem Industries, Inc. • Tall Mouse Arts & Crafts, Inc. • Auto Care
Launderland • Mission Yamaha, Inc. • Saturn of San Juan Capistrano

Each of these businesses are being recognized by their respective cities for their dedication to help keep our environment clean and their commitment to recycling and source reduction.

TRASH FRIENDLY WEBSITES

Solag Disposal - www.solag.com
www.choose2reuse.org - This website will give you valuable information and on-line resources to help in your efforts to re-use everyday items.

Dana Point - www.ci.dana-point.ca.us
Laguna Niguel - www.ci.laguna-niguel.ca.us
San Juan Capistrano - www.sanjuancapistrano.org
San Clemente - www.cty.org/san-clemente/
County of Orange - www.oc.ca.gov/iwmd/

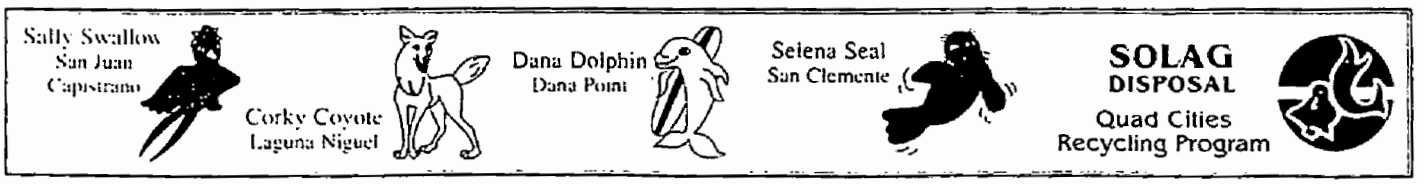

IS YOUR TRASH WEIGHING YOU DOWN?

Items that are too large to fit in your container are considered bulky-items. As a customer of SOLAG Disposal you are entitled to two bulky-item pick-ups per calendar year, at no extra charge. Almost anything that can be managed by a two-person crew will be picked up as a bulky-item. This includes old furniture, appliances, carpet, mattresses, water heaters, etc. Loose items need to be bagged or bundled, and no liquids or drums of any kind will be accepted. Before you put out large items to be landfilled, consider donating these items to a non-profit organization. If you would like more information about bulky-item pick-ups or non-profit organizations willing to pick-up your reusable items, please contact one of the customer service representatives at (949) 240-0446, Ext. 1.

Recycle Now
There's A Future In It!

Recycling News

January 1, 1999 Volume VII, No 1

RECYCLING YOUR CHRISTMAS TREE IS AS EASY AS 1-2-3....

Can you believe that the Holiday Season is already behind us? Well it's time again to recycle your Christmas Trees. Depending on where you live, collection of your trees will take place on your normal collection day during a two week period shortly after Christmas or after the New Year. Just follow these three simple steps:

FIRST, please review the front of your bill for the dates of the curbside collection of your Christmas trees.

SECOND, Remove all decorations, tinsel and stands (wood or metal) from the tree before collection. If your tree is over 8-feet in height, please cut the tree in half.

THIRD, Place your tree at the curb next to your container on collection day. On trash day a separate collection vehicle will pick up your Christmas tree.

NOTE: Flocked trees or trees with nails, stands or ornaments cannot be recycled, but will be picked up and disposed of at the landfill. Please do your part to help recycle your trees.

ITS NEVER TOO LATE TO RECYCLE OLD CHRISTMAS CARDS

For the past 20 years St. Jude's Ranch for Children has recycled holiday, birthday, get well and all other occasion cards. St. Jude's Ranch is a non-profit home for abused and homeless children located in Boulder City, Nevada. People from across the United States and around the world send used cards to the Ranch. In 1992 nearly one and a half million cards were collected. If you would like to recycle your Christmas cards, please send them to:

St. Jude's Ranch for Children
P.O. Box 60100
Boulder City, NV 89006

If sending by United Parcel Service, send to:
St. Jude's Ranch for Children
100 St. Jude Street
Boulder City, NV 89005

TRASH FRIENDLY WEBSITES

Each quarter the editor of *Recycling News* will be reviewing website and e-mail addresses on the Internet that may be of interest to our readers. The sites examine: ways to reduce waste, avenues to reuse unwanted materials (such as donations to non-profit organizations), types of recyclable material and directions to backyard composting.

http://www.epa.gov This website is an excellent source for businesses and individuals that have questions about waste prevention, water & air quality information & regulations.

http://www.mastercomposter.com Want to know the secret to a successful home composting system? Check out this site for complete & easy do-it-yourself instructions.

http://www.recycle.net This location is a worldwide trading site for information related to secondary or recyclable commodities, by-products, used materials and surplus items.

There will be no collection on the following holidays:

New Years Day	Independence Day	Memorial Day
Thanksgiving Day	Christmas Day	Labor Day

Trash collection will be delayed one day after the holiday.

SOLAG DISPOSAL

CLOSE THE RECYCLING LOOP.

comic books

plastic bottles

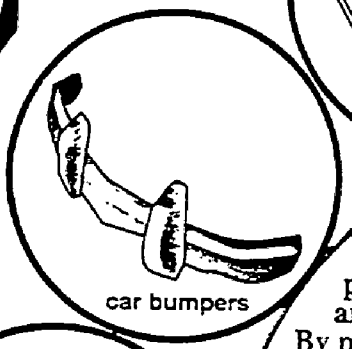
car bumpers

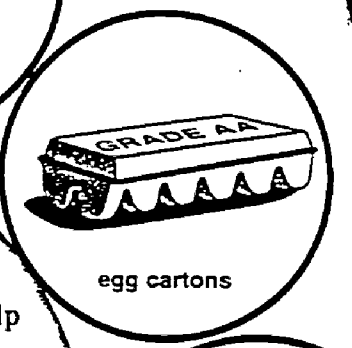

egg cartons

Many products are collected through community recycling programs. These materials are cleaned and processed to produce new products. By purchasing recycled products you can help "Close The Loop"

Why buy recycled products:

1. Buying Recycled reduces waste and pollution.
2. Buying Recycled conserves resources.
3. Buying Recycled conserves energy.

Some myths about recycled products:

1. Recycled products are hard to find.
2. Recycled products cost more.
3. Recycled products are inferior in quality.

"Look for these symbols when purchasing everyday products."

CA Redemption Value

Recyclable

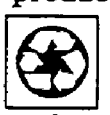
Contains Recycled Material

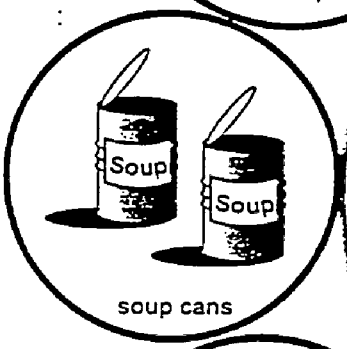

soup cans

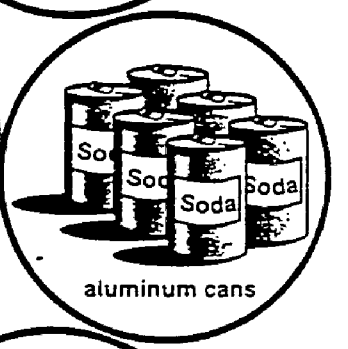

aluminum cans

newspapers

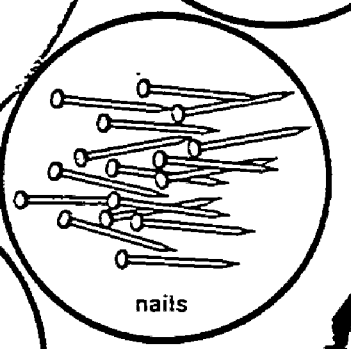
nails

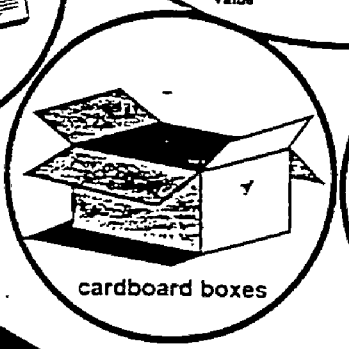
cardboard boxes

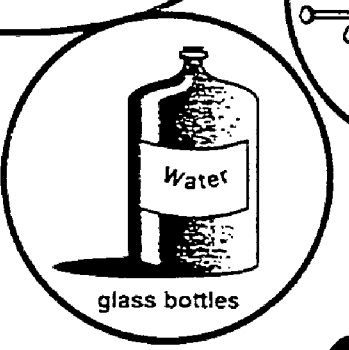

glass bottles

BUY RECYCLED PRODUCTS.

Recycle Now
There's A Future In It!

Recycling News

April 1, 1999 Volume VII, No 2

IS YOUR TRASH WEIGHING YOU DOWN?

Items that are too large to fit in your container are considered bulky-items. As a customer of SOLAG Disposal you are entitled to two bulky-item pick-ups per calendar year, at no extra charge. Almost anything that can be managed by a two-person crew will be picked up as a bulky-item. This includes old furniture, appliances, carpet, mattresses, water heaters, etc. Loose items need to be bagged or bundled, and no liquids or drums of any kind will be accepted. Before you put out large items to be landfilled, consider donating these items to a non-profit organization. If you would like more information about bulky-item pickups or non-profit organizations willing to pick-up your reusable items, please contact one of the customer service representatives at (949) 240-0446, Ext. 1.

HOUSEHOLD HAZARDOUS WASTE (Roundup Available Year-round)

To make proper disposal of "household hazardous material" convenient, the County of Orange operates four household hazardous waste (HHW) collection centers throughout the County. The closest facilities are located in San Juan Capistrano and in the City of Irvine. Each facility will accept your hazardous waste at no charge, upon proof of Orange County residency. Some common household hazardous materials are:

- Road Flares
- Toilet Bowl Cleaners
- Wood Preservatives
- Batteries
- Weed Killers
- Fertilizers
- Antifreeze
- Medicines
- Pool Chemicals
- Oil
- Bleach
- Paint

For proper disposal of these materials, we recommend that all items are in their original containers, are clearly marked as to their content, or are marked as "unknown material". A maximum of 15 gallons or 125 lbs. of hazardous materials may be brought to the collection center per vehicle, per visit.

The **Household Hazardous Waste Collection Facility** in San Juan Capistrano is located at the Prima Deshecha landfill off of Ortega Highway at the l of La Pata Avenue. Or the Irvine facility is located at 6411 Oak Canyon between the 5 and 405 off the Sand Canyon exit. Hours of operation are esday through Saturday, 9:00 a.m. - 1:00 p.m. They are closed Sundays, Mondays, major holidays and rainy days. ***For more information on the Stop, Drop & Swap Program at the Irvine Facility (which allows residents to select free products that can be used at home) call (714) 834-6752 or visit their website at: www.oc.ca.gov/iwmd/***

MORE DISPOSAL TIPS: Save a trip to the HHW Facility by using the hazardous materials completely. And remember products such as paint, stain or weed killers may be useful to friends or neighbors. For additional information please call the County of Orange trash and recycling hotline @ (714) 834-6752.

Prima Deshecha Landfill

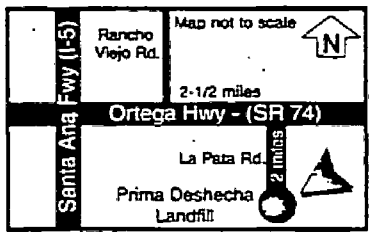

6411 Oak Canyon

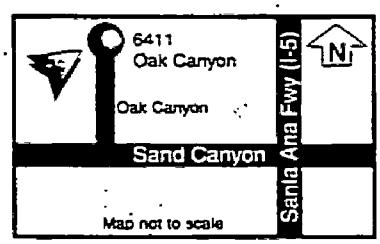

TRASH FRIENDLY WEBSITES

http://www.obviously.com/recycle/
The Internet Consumer Recycling Guide shows ways to stop unwanted mail and other reuse and recycling tips.

http://www.ergroup.com
The Environmental Recycling Group helps to promote the use of environmentally friendly products and the use of recycled building materials. They have an extensive data base of recycled building materials for homeowners and contractors.

Along with the many website offerings we bring you each quarter, your local cities also have sites that are both informative and interesting. And this quarter, SOLAG Disposal is excited to introduce their new website at **solag.com**. If you have any suggestions to help make our webpage more informative, please contact our office with your ideas.

aguna Niguel www.ci.laguna-niguel.ca.us
n Clemente www.cty.org/san-clemente/
Dana Point www.ci.dana-point.ca.us
San Juan Capistrano www.sanjuancapistrano.org

SOLAG DISPOSAL
Quad Cities Recycling Program

REPRESENTATIVE PUBLIC EDUCATION MATERIALS

CITY OF SANTA ANA

Santa Ana State Certified Used Motor Oil Collection Centers*

All Phase Environmental
1367 Santiago
(714) 731-5995

Archie's Tire & Towing
(Accepts oil filters too!)
(¡Aceptam Filtros!)
(Chúng tôi cũng thu hồi đồ lọc dầu cũ)
4518 Westminster Ave.
(714) 636-4518

AutoZone
430 W. 17th Street
(714) 547-7003

AutoZone
1101 S. Bristol
(714) 241-0335

Big O Tires
1211 W. Warner Ave.
(714) 540-8646

Firestone
(Accepts oil filters too!)
(¡Aceptam Filtros!)
(Chúng tôi cũng thu hồi đồ lọc dầu cũ)
3733 S. Bristol
(714) 549-4015

Firestone
2005 N. Tustin Ave.
Suite A
(714) 541-7977

Jiffy Lube
(Accepts oil filters too!)
(¡Aceptam Filtros!)
(Chúng tôi cũng thu hồi đồ lọc dầu cũ)
2025 N. Tustin Ave.
(714) 834-0470

John's Mobil
1465 S. Main St.
(714) 835-3266

Kragen Auto Parts
1302 E. 17th St.
(714) 953-6061

Kragen Auto Parts
1400 W Edinger Ave.
(714) 754-1432

Kragen Auto Parts
521 W. 17th St.
(714) 543-4492

Kragen Auto Parts
2337 S. Bristol Ave.
(714) 557-0787

Pep Boys
(Accepts oil filters too!)
(¡Aceptam Filtros!)
(Chúng tôi cũng thu hồi đồ lọc dầu cũ)
120 E. 1st St.
(714) 547-7477

Pep Boys
1107 S. Harbor Blvd.
(714) 775-0828

Purrfect Auto Service
2519 S. Main St.
(714) 549-7900

Saturn of Santa Ana
(Accepts oil filters too!)
(¡Aceptam Filtros!)
(Chúng tôi cũng thu hồi đồ lọc dầu cũ)
1350 Auto Mall Dr.
(714) 648-2444

Scher Tire
(Accepts oil filters too!)
(¡Aceptam Filtros!)
(Chúng tôi cũng thu hồi đồ lọc dầu cũ)
1805 N. Grand Ave.
(714) 558-8644

Tire Station
101 S. Main St.
(714) 542-8857

*Note: It is advisable to call before taking oil to any of the State Certified Used Oil Collection Centers listed. Centers will pay you $.04 for each quart you recycle. If you have additional questions about used motor oil recycling, please contact the California Environmental Hotline at **1-800-CLEANUP** or **www.1800CLEANUP.org**. You can take other hazardous household wastes, such as paint, pesticides, cleaners, solvents, etc., to a nearby County of Orange Collection Center: 1071 N. Blue Gum Street, Anaheim or 6411 Oak Canyon, Irvine. Please call (714) 834-6752 for more information.

*Por favor llame por teléfono al centro antes de visitarlo. Los centros le pagarán $.04 por cada cuarto de aceite que Ud recicle. Si tiene otras preguntas acerca del reciclaje de aceite usado de motor, por favor llame al California Environmental Hotline al teléfono **1-800-CLEANUP** o **www.1800CLEANUP.org**. Ud. puede llevar materiales domésticos peligrosos como ser pintura, pesticidas, limpiadores solventes, etc., a uno de los centros de colección del Condado de Orange: 1071 N. Blue Gum Street, Anaheim or 6411 Oak Canyon, Irvine. Por favor llame al teléfono (714) 834-6752 para obtener más información.

* Ghi chú: Quý vị nên gọi trước khi đem dầu đến bất cứ trung tâm Thu Hồi Dầu Cũ nào được liệt kê trong danh sách. Trung tâm sẽ trả $.04 cho mỗi quart dầu thu hồi. Nếu có thêm thắc mắc nào về việc thu hồi dầu cũ, xin liên lạc Đường Dây Nóng Môi Trường California tại số **1-800-CLEANUP** hay đến mạng lưới **www.1800CLEANUP.org**. Quý vị có thể đem đồ phế thải gia dụng nguy hại như sơn, thuốc trừ sâu bọ, chất liệu lau chùi, dung môi, vân vân. đến Trung Tâm Thu Hồi gần nhà trong Quận Cam: 1071 N. Blue Gum Street, Anaheim hay 6411 Oak Canyon, Irvine. Xin gọi số (714) 834-6752 để biết thêm chi tiết.

097651

Santa Ana RECYCLES USED OIL!

IT'S EASY! IT'S FREE!

Did you know that you can dispose of your used motor oil safely and easily right here in Santa Ana? When you change your vehicle's oil, drain the used motor oil into a clean container, seal the container well with a lid, and bring it to one of the conveniently located State Certified Used Oil Collection Centers in Santa Ana. And...State Certified Used Oil Collection Centers will pay you $.04 for each quart you recycle.

Santa Ana recycles

You make the difference!

RECYCLE USED OIL

This program is brought to you by the City of Santa Ana and made possible by a grant from the California Integrated Waste Management Board.

007652

Santa Ana RECICLA ACEITE USADO DE MOTOR

¡Es Fácil! ¡Es Gratis!

¿Sabe que Ud. puede deshacerse del aceite usado de motor aquí en Santa Ana? Cuando Ud. cambia el aceite de su motor, vacíelo en un recipiente, selle el recipiente con una tapa bien segura, y tráigalo a uno de los Centros Certificados de Recolección de Aceite Usado de Motor en Santa Ana. Estos Centros Certificados le pagarán $.04 por cada cuarto de aceite usado que usted recicle si así lo desea.

RECICLE ACEITE USADO

Este programa es traído a usted por la Ciudad de Santa Ana y es hecho posible con fondos del California Integrated Waste Management Board.

THU HỒI DẦU CŨ TẠI SANTA ANA!

RẤT DỄ DÀNG! MIỄN PHÍ!

Quý vị có biết là quý vị có thể bỏ dầu xe cũ của mình một cách an toàn và dễ dàng tại Santa Ana không? Khi thay dầu xe, đổ dầu xe cũ vào một thùng sạch, đóng kín nắp thùng lại, và đem dầu đến một trong các trung tâm Thu Hồi Dầu Cũ được tiểu bang chấp thuận tiện lợi trong Santa Ana. Và... các trung tâm Thu Hồi Dầu Cũ được tiểu bang chấp thuận sẽ trả $.04 cho mỗi quart dầu thu hồi.

TÁI CHẾ DẦU CŨ

Đây là một chương trình do Thành Phố Santa Ana cống hiến và được Hội Đồng Quản Lý Rác California tài trợ.

RECYCLE USED OIL

It's Easy! It's Free!

Santa Ana residents with curbside refuse service are eligible to have their used motor oil collected free of charge. Call (714) 558-7761 to have a used motor oil container delivered to your home. When you fill the container with used motor oil, call Great Western Reclamation and schedule a pickup for your next regularly scheduled refuse collection day. An empty container will be left for your next oil change.

RECICLE ACEITE USADO DE MOTOR

¡Es Fácil! ¡Es Gratis!

Los residentes de la Ciudad de Santa Ana que reciben servicio de recolección de basura al borde de la vereda/banqueta pueden reciclar el aceite de motor usado sin cargo! Llamen al telefono (714) 558-7761 para pedir que le envien un recipiente para recojer el aceite a su domicilio. Una vez que el recipiente este lleno, llamen a Great Western Reclamation y pidan que lo recojan la próxima vez que le recojen la basura. Al recojer el recipiente lleno le dejarán uno vacío para usar la próxima vez.

TÁI CHẾ BIẾN DẦU MÁY ĐÃ DÙNG RỒI

Vừa dễ dàng! Vừa miễn phí!

Cư dân của thành phố Santa Ana đang sử dụng dịch vụ để rác trước cửa nhà cho xe lấy đồ hàng tuần còn được hưởng dịch vụ miễn phí thu hồi dầu, nhớt máy đã dùng rồi. Xin gọi số (714) 558-7761 để có được thùng chứa dầu giao đến tận nhà. Sau khi thùng chứa dầu cũ đã đầy, xin gọi cơ quan Great Western Reclamation ở số điện thoại trên để sắp xếp giờ cho xe đến thâu hồi thùng dầu. Quý vị sẽ được cung cấp một thùng chứa dầu mới để tiếp tục sử dụng.

Great Western Reclamation Customer Service Center (714) 558-7761
Mon - Fri 8:00 am - 5:00 pm Sat 8:00 am - 12:00 pm

Great Western Reclamation Trung Tâm Phục Vụ Khách Hàng (Customer Service Center)
714-558-7761 Thứ Hai - Thứ Sáu: 8 giờ sáng - 5 giờ chiều Thứ Bảy: 8 giờ sáng - 12 giờ trưa

The Recycle Used Oil program is brought to you by the City of Santa Ana and made possible by a grant from the California Integrated Waste Management Board
Este programa es traido a usted por la ciudad de Santa Ana y es hecho posible con fondos del California Integrated Waste Management Board
Chương trình tái chế biến dầu máy được bảo trợ bởi thành phố Santa Ana và tài trợ bởi cơ quan California Integrated Waste Management Board

RECYCLE USED OIL

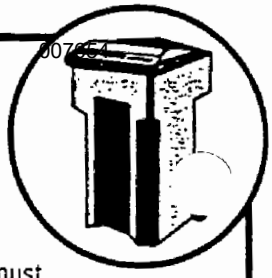

SPECIAL NOTICE!

As a reminder, the Santa Ana Municipal Code requires that all carts be placed at the curb no earlier than 4:00 p.m. the day prior to collection and must be removed and placed in a location out of public view before 12:00 a.m. (midnight) the day of collection. (Please note that a fine of $50 to $150 may be assessed if carts are not placed out of public view.) Your assistance in making Santa Ana a better place to live is greatly appreciated. (If you would like to report carts left in public view, please call Community Preservation at (714) 667-2780.)

¡NOTICIA ESPECIAL!

Por favor recuerden que el Código Municipal de la Ciudad de Santa Ana requiere que todos los recipientes sean ubicados en el cordón de la vereda despues de las 4:00 de la tarde del día anterior a la recolección, y se los debe guardar antes de las 12:00 de la medianoche del día de recolección. (Por favor tenga en cuenta que se les puede dar una multa de $50.00 a $150.00 si los recipientes no están fuera de la vista del público). Se les agradece con anticipación su esfuerzos para ayudar a mantener a Santa Ana a ser un lugar mejor para vivir. (Si Ud. quiere informar acerca de recipientes que no han sido guardados, por favor llame a Community Preservation al telefono (714) 667-2780.)

LƯU Ý ĐẶC BIỆT!

Xin lưu ý quý vị rằng luật thành phố chỉ cho phép để thùng rác ra lề đường sớm nhất là sau 4 giờ chiều ngày hôm trước, và thùng phải được cất kỹ khỏi tầm nhìn của công chúng trước nửa đêm ngày hôm sau (tức ngày đổ rác). Nếu vi phạm, quý vị có thể bị phạt từ $50 đô-la đến $150 đô-la. Xin cám ơn sự hợp tác của quý vị trong lãnh vực này. Trong trường hợp có những thùng rác không ai cất và bỏ ngoài lề đường quá hạn, xin quý vị thông báo về cơ quan Community Preservation ở số (714) 667-2780.

Santa Ana recycles

You make the difference!

RECYCLE USED OIL! IT'S EASY! IT'S FREE!

Did you know that you can dispose of your used motor oil safely and easily right here in Santa Ana? When you change your oil, drain your used motor oil into a container, seal the container well with a lid, and bring it to one of the conveniently located State Certified Used Oil Collection Centers in Santa Ana. And, State Certified Used Oil Collection Centers will pay you $.04 for each quart you recycle.

WHY RECYCLE USED MOTOR OIL?

Because it never wears out! Your used motor oil can be recycled and used again. And that means you can be conserving a natural resource. Motor oil which is poured into the ground can pollute the soil, groundwater, streams, and rivers... your environment. When you take your used motor oil to a certified center for recycling, you are protecting the environment and conserving a valuable resource. And, State Certified Used Oil Collection Centers will pay you $.04 for each quart you recycle.

USED OIL RECYCLING TIPS

- When draining used oil, use a clean plastic oil pan and a container with a tight lid.
- Never pour or drain oil in the gutter or storm drains. City storm drains empty to the ocean.
- Reuse your used oil container, and store it safely, away from children and pets.
- Don't mix used oil with chemicals, gasoline, water or other substances.
- Use a reusable 5-gallon or smaller size container.
- Call your nearest State Certified Used Oil Collection Center for hours of operation and amounts accepted.

¡ES FACIL! ¡ES GRATIS!

¿Sabe que Ud. puede deshacerse del aceite usado de motor aquí en Santa Ana? Cuando Ud. cambia el aceite de su motor, vacíelo en un recipiente, selle el recipiente con una tapa bien segura, y tráigalo a uno de los Centros Certificados de Recolección de Aceite Usado de Motor en Santa Ana. Estos Centros Certificados le pagarán $.04 por cada cuarto de aceite usado que Ud. recicle si usted así lo desea.

¿PORQUE RECILAR ACEITE USADO DE MOTOR?

¡Porque nunca se gasta! El aceite usado de motor puede ser usado nuevamente si se le limpian las impurezas. Haciendo ésto, conservamos nuestros recursos naturales. Si uno se deshace del aceite usado de motor tirándolo en un agujero en el jardín, se puede contaminar las tablas de agua bebible, los lagos y los ríos. Cuando Ud. lleva su aceite de motor usado a un Centro Certificado de reciclaje, Ud. está protegiendo al medio ambiente y conservando recursos naturales. Y los Centros Certificados de Recolección de Aceite Usado de Motor le pagarán $.04 por cada cuarto de aceite usado si Ud. así lo desea.

SUGERENCIAS ACERCA DEL ACEITE USADO DE MOTOR

- Cuando cambie el aceite de su motor use un recipiente que tenga una tapa segura y que esté limpio.
- Nunca tire el aceite usado de motor en la alcantarilla. Los desagües de la Ciudad de Santa Ana se desagotan en el océano.
- Vuelva a usar el recipiente original y guárdelo en un lugar fuera del alcance de los niños y animales.
- Nunca mezcle el aceite de motor con productos químicos, gasolina, agua, u otras sustancias.
- Use un recipiente con una capacidad de 5 galones y que se pueda volver a usar.
- Llame al Centro Certificado de Reciclaje de Aceite Usado de Motor más cerca a su domicilio para averiguar horas de operación y cantidad aceptada.

State Certified Used Oil Collection Centers*

For additional recycling locations, please call the Integrated Waste Management Board Recycling Hotline at **1-800-CLEANUP.**

Para otras localidades por favor llame al Integrated Waste Management Board al teléfono **1-800-CLEANUP.**

Please telephone these centers before taking in your used oil. *Por favor llame por teléfono al centro antes de visitarlo.*

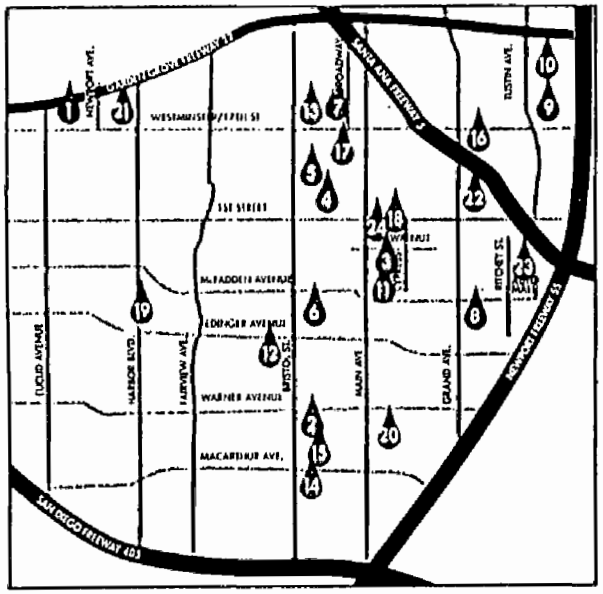

1. **Archie's Tire and Towing Inc.**
   4518 Westminster Ave
   Santa Ana, CA 92703
   (714) 636-4518
2. **Big O Tires**
   1211 West Warner Ave
   Santa Ana, CA 92707
   (714) 540-8646
3. **Car-Tune Complete Auto Services**
   112A East Walnut St
   Santa Ana, CA 92701
   (714) 835-4455
4. **Car-Tune Complete Auto Services**
   1135 West 1st St
   Santa Ana, CA 92703
   (714) 547-1497
5. **Car-Tune Complete Auto Services**
   509 N. Bristol
   Santa Ana, CA 92703
   (714) 835-4433
6. **Chief Auto Parts Inc.**
   1101 So. Bristol
   Santa Ana, CA 92704
   (714) 241-0335
7. **Ed Dickens Unocal**
   1702 N. Broadway
   Santa Ana, CA 92706
   (714) 541-6688
8. **Edinger Unocal**
   1502 E. Edinger Ave
   Santa Ana, CA 92705
   (714) 667-0207
9. **Firestone Store**
   3733 S. Bristol
   Santa Ana, CA 92704
   (714) 549-4015
10. **Firestone Store**
    2005 N. Tustin Ave
    Santa Ana, CA 92705
    (714) 541-7977
11. **Jiffy Lube**
    2025 N. Tustin Ave
    Santa Ana, CA 92705
    (714) 834-0470
12. **John's Mobil**
    1465 S. Main St
    Santa Ana, CA 92707
    (714) 835-3266
13. **Kragen Auto Parts**
    1400 W. Edinger Ave
    Santa Ana, CA 92704
    (714) 754-1432
14. **Kragen Auto Parts**
    521 W. 17th St
    Santa Ana, CA 92706
    (714) 543-4492
15. **Kragen Auto Parts**
    2337 S. Bristol Ave
    Santa Ana, CA 92704
    (714) 557-0787
16. **Kragen Auto Parts**
    1302 E. 17th St
    Santa Ana, CA 92705
    (714) 953-6061
17. **Parts USA**
    430 W 17th St
    Santa Ana, CA 92706
    (714) 835-9555
18. **Pep Boys**
    120 East 1st St
    Santa Ana, CA 92701
    (714) 547-7477
19. **Pep Boys**
    1107 S. Harbor Blvd.
    Santa Ana, CA 92704
    (714) 775-0828
20. **Purrfect Auto Service**
    2519 S. Main St
    Santa Ana, CA 92707
    (714) 549-7900
21. **Quaker State Minit-Lube Inc.**
    3822 W. Westminster
    Santa Ana, CA 92703
    (714) 554-0610
22. **Saturn of Santa Ana**
    1350 Auto Mall Dr
    Santa Ana, CA 92705
    (714) 648-2444
23. **Scher Tire**
    1805 N. Grand Ave
    Santa Ana, CA 92705
    (714) 558-8644
24. **Tire Station**
    101 S. Main St
    Santa Ana, CA 92701
    (714) 542-8857

This program is brought to you by the City of Santa Ana and made possible by a grant from the California Integrated Waste Management Board.

Este programa es traído a usted por la Ciudad de Santa Ana y es hecho posible con fondos del California Integrated Waste Management Board.

Printed on Recycled Paper

007656

RECYCLE USED OIL

It's Easy! It's Free!

RECICLE ACEITE USADO DE MOTOR

¡Es Fácil! ¡Es Gratis!

Santa Ana recycles

You make the difference!

LA RECOLECCION DE ACEITE Y FILTROS USADOS DE MOTOR GRATIS YA ESTA AQUI

007657

¡Es Fácil! ¡Es Gratis!

CUANDO SE RECICLA EL ACEITE USADO DE MOTOR SE RECUPERAN RECURSOS NATURALES MUY VALIOSOS

¡Great Western Reclamation vendrá a su casa a recoger el aceite y los filtros usados de motor sin cargo alguno!

¡Así es! Los residentes de la Ciudad de Santa Ana que tienen servicio de recolección de basura al cordón de la vereda pueden gozar de este servicio totalmente gratis.

Llame al teléfono (714) 558-7761 y pida que le envien a su casa un recipiente para el aceite y una bolsa para el filtro. Cuando tenga el recipiente lleno de aceite usado de motor y el filtro dentro de la bolsa de plástico, llame a Great Western Reclamation para hacer una cita para que se lo recojan.

Recicle El Aceite y Los Filtros Usados

El aceite y el filtro usado de motor serán recogidos el próximo día que le recojan la basura, y al mismo tiempo le dejarán un recipiente y una bolsa de plástico limpios para que Ud. use la próxima vez que tenga que cambiar el aceite del motor a su vehículo. ¡Llame hoy mismo al teléfono (714) 558-7761 y haga una cita para que le envien un recipiente para el aceite y una bolsa de plástico para el filtro!

TIENE UD. MATERIALES TÓXICOS?

El Condado de Orange opera centros de recolección para materiales tóxicos donde residentes pueden llevar pinturas, pesticidas, solventes, etc. Los residentes de la Cuidad de Santa Ana pueden utilizar dos centros: 6411 Oak Canyon Road en la Ciudad de Irvine, y/o 1071 Blue Gum Street en la Ciudad de Anaheim. Para más informacion, por favor llame al teléfono (714) 834-6752.

RECYCLE USED OIL

Este programa es traido a usted por la Ciudad de Santa Ana y es hecho possible con fondos del California Integrated Waste Management Board.

Santa Ana recycles
You make the difference!

Tại Đây Có Thu Hồi Dầu và Đồ Lọc Dầu Cũ Miễn Phí

Rất Dễ Dàng! Miễn Phí!

Thu hồi dầu xe hơi đã dùng bảo vệ một tài nguyên đáng giá.

Great Western Reclamation sẽ đến tận nhà và thu hồi dầu xe hơi và đồ lọc dầu cũ... miễn phí!

Đúng vậy, cư dân tại Santa Clara có dịch vụ hốt rác bên lề nhà hội đủ điều kiện để được thu hồi dầu xe hơi và đồ lọc dầu cũ miễn phí!

Chỉ cần gọi số (714) 558-7761 để được gởi đến tận nhà một thùng đựng dầu và bịt đựng đồ lọc dầu. Khi đã đổ dầu xe hơi cũ vào thùng, và bỏ đồ lọc dầu vào bịt, hãy gọi Great Western Reclamation để sắp xếp thời biểu thu hồi.

Santa Ana recycles
You make the difference!

Thu hồi dầu và đồ lọc dầu

Dầu xe hơi và đồ lọc dầu cũ sẽ được thu hồi vào ngày hốt rác thông thường sắp đến, và họ sẽ để lại một thùng không và một bịt khác đựng đồ lọc dầu cho lần thay dầu kỳ tới! Hãy gọi số (714) 558-7761 để sắp xếp thời biểu nhận thùng đựng dầu và bịt đựng đồ lọc dầu miễn phí ngay hôm nay!

Quý vị có muốn phế thải gia vật nguy hại không?

Quận Orange điều hành các trung tâm thu hồi phế thải gia vật nguy hại trong vùng cho gia chủ đem bỏ sơn, thuốc trừ sâu bọ, vật liệu lau chùi, dung môi, vân vân. Hai trung tâm tiện lợi cho cư dân tại Santa Clara nằm tại 6411 Oak Canyon Road, Irvine và 1071 Blue Gum Street, Anaheim. Để biết thêm chi tiết, xin gọi số (714) 834-6752.

RECYCLE USED OIL

Chương trình này do Thành Phố SanTa Ana cống hiến và được Hội Đồng Tổng Hợp Quản Lý Rác California tài trợ.

FREE USED OIL AND OIL FILTER COLLECTION IS HERE

It's Easy! It's Free!

RECYCLING USED MOTOR OIL PRESERVES A VALUABLE RESOURCE.

Great Western Reclamation will come to your home and collect your used motor oil and oil filters...for free!

That's right. Santa Ana residents with curbside refuse collection are eligible to have their used motor oil and oil filters collected for free.

Simply call (714) 558-7761 to have an oil container and an oil filter bag delivered to your home. When you fill the container with used motor oil, and place your used oil filter into the plastic bag, call Great Western Reclamation to schedule a pickup.

Recycle Your Oil and Oil Filters

Your used motor oil and oil filter will be picked up on your next regularly scheduled refuse collection day and an empty container and oil filter bag will be left for your next oil change! Call (714) 558-7761 to schedule a FREE oil container and oil filter bag drop-off today!

DO YOU HAVE HOUSEHOLD HAZARDOUS WASTE?

The County of Orange operates regional household hazardous waste collection centers for homeowners to take and dispose of their paint, pesticides, cleaners, solvents, etc. Two centers convenient for Santa Ana residents are 6411 Oak Canyon Road, Irvine and 1071 Blue Gum Street, Anaheim. For more information, please call (714) 834-6752.

RECYCLE USED OIL

This program is brought to you by the City of Santa Ana and made possible by a grant from the California Integrated Waste Management Board.

Santa Ana recycle
You make the difference

Santa Ana
Making A
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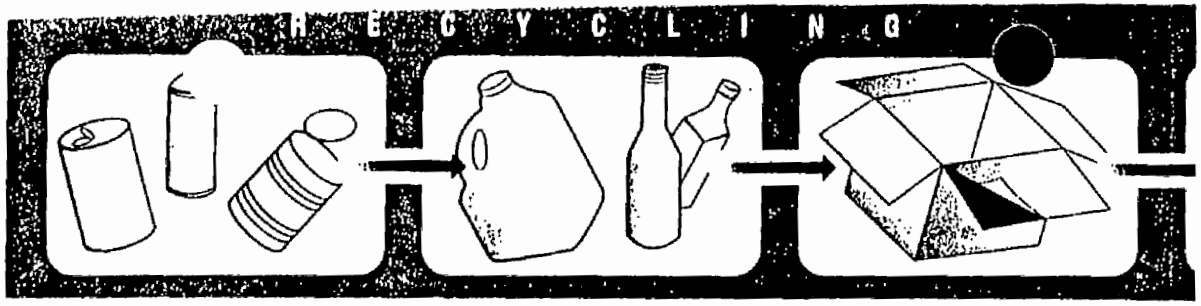

WE ARE ALMOST THERE!

The City of Santa Ana is moving toward the 50% recycling goal set by the State of California for the year 2000. Approximately 40% of the waste generated at each home is now being recycled. Even with this success, the City continues to need your support and participation. So please review the points outlined below so that we may continue to increase the amount of clean recyclables collected and reach our 50% goal by the year 2000.

RECYCLING REMINDERS

- Place only recyclable materials in the recycling (gray) cart.
- Please refer to the decal on the cart lid for acceptable materials.
- When in doubt, please place materials in the refuse (burgundy) cart.
- Do not place any liquid or food waste in the recycling (gray) cart.
- Do not place recyclable materials in plastic bags.

GREEN WASTE REMINDERS

- Place all yard trimmings in the green waste (green) cart.
- Refer to the decal on the cart lid for acceptable materials.
- Do not place green waste in plastics bags.
- Only green waste can be placed in the green waste (green) cart. When in doubt, please place materials in the refuse (burgundy) cart.
- Animal waste cannot be placed in the green waste (green) cart. Place it in a plastic bag and in the refuse (burgundy) cart.

Bulky Item Pickup Service

Each resident with curbside refuse service is entitled to 2 free bulky item pickups eact year (not to exceed 4 items per pickup). Bulky items include large, hard-to-handl items such as sofas, furniture and appliances which can be lifted by two men.
Call Great Western Reclamation at (714) 558-7761 to schedule a pickup.

Holiday Schedule

When New Year's Day, Labor Day, Independence Day (July 5th), Memorial Day, Th Christmas Day is observed on a weekday, collections for the remainder of the week will l

VERY IMPORTANT! To maximize street sweeping services, when your refuse collc a street sweeping day, your carts should be placed on the curb or on your driveway with the handles facing your home!

Servicio para los Artículos Grandes y Pesados

Cada residente con servicio de recolección de basura en el cordón de la vereda tien se le recojan artículos grandes y pesados dos veces por año, gratis (no más de 4 a Los artículos grandes y pesados incluyen sofás, muebles, y artículos del hogar que p tados por dos personas. **Llame a Great Western Reclamation al telefono (714) 558 una cita y usar el servicio.**

Horarios de Días Feriados

Cuando Año Nuevo, Día del Trabajo, Día de la Independencia (5 de julio), Día de Acción de (es observado en un día de semana, la recolección por el resto de la semana va a ser un d

MUY IMPORTANTE! Para utilizar al máximo el servicio de la barredora de la calle, s día de recolección de basura coincide con el de la barrida de las calles, Ud. pong en la vereda o en su entrada al garage, no en la calle, con las manijas mirando hac

Dịch vụ thu lượm vật dụng lớn và nặng

Những quý vị hiện đang dùng dịch vụ để rác trước cửa nhà cho xe đến lấy đồ được hưởng thêm dịch vụ thu lượm vật dụng lớn và nặng. Đây là một dịch miễn phí, mỗi năm 2 lần, nhằm thâu nhật vật dụng lớn và nặng thí dụ như bàn cũ, tủ lạnh cũ v.v. Xin lưu ý mỗi lần không được quá 4 món đồ khác nhau. X Great Western Reclamation ở số (714) 558-7761 để hẹn giữ xe đến nhà quý

Thời khoá biểu ngày lễ

Sau đây là danh sách các ngày lễ chính: Tết Dương Lịch, Lễ Lao Động, Lễ Độc Lễ Chiến Sĩ Trận Vong, Lễ Tạ Ơn và Lễ Giáng Sinh. Nếu những ngày lễ này rơi v tuần thì thời khóa biểu đổ rác cho những ngày còn lại của tuần sẽ bị chậm đi m

Xin lưu ý! Để tránh gây cản trở cho dịch vụ quét đường, nếu ngày đổ rác củ với ngày quét đường, xin để thùng rác trên vỉa hè thay vì trên mặt đường, và cửa của thùng rác phải quay vào hướng nhà quý vị.

REPRESENTATIVE PUBLIC EDUCATION MATERIALS

CITY OF TUSTIN

Green Waste Recycling

Green waste is one of the largest components of Tustin's waste. The City of Tustin encourages all homeowners, homeowner associations, businesses and property management firms who contract for landscape maintenance services to ask your contractor to recycle all green waste. Green waste should not be disposed of in a landfill, if possible. The Sunset Environmental Material Recovery Facility in Irvine is one location that accepts green waste for a fee. These efforts will save landfill space and put a valuable resource to better use.

Backyard composting is another way to recycle your green waste and its also great for your garden. Local retailers such as Tustin Home Depot sell home inexpensive home composting units. Backyard composting is easy and an effective way to keep green waste out of the landfill.

For more information on how you or your landscape contractor can recycle green waste, please contact Sunset Environmental at (949) 451-2600.

Holiday Schedule 1999 - 2000

New Year's Day	Independence Day *
Labor Day	Thanksgiving Day
Memorial Day	Christmas Day

When one of these holidays is observed on a weekday, collections for the remainder of the week will be delayed one day. *Independence Day (4th of July) will be observed on Monday July 5, 1999.

Important Telephone Numbers

City of Tustin	
General Information	(714) 573-3000
Public Works	(714) 573-3150
Police Dept. Waste Scavenging	(714) 573-3225
Graffiti Hotline	(714) 573-1111
Sunset Environmental	(949) 451-2600
Used Oil Recycling Centers	(800) CLEANUP
County of Orange	
Landfills	(714) 834-6752
Household Hazardous Waste Disposal	(714) 834-6752
Waste Alert - Illegal Dumping	(800) 698-6942
California Shopping Cart Retrieval Corp.	(800) 252-4613

WASTE MANAGEMENT

Customer Service Center
1800 South Grand Avenue
Santa Ana, CA 92705
(714) 558-7761

City of Tustin Refuse and Recycling Program Information

What services does Great Western Reclamation provide to Tustin residents?

The following basic services are provided to all residents at no additional charge:

- ✓ Curbside refuse collection
- ✓ Bulky item collection
- ✓ Christmas tree recycling
- ✓ Customer Service Center Assistance

What do I do with my recyclables?

It is not necessary to separate your recyclables at home to participate in Tustin's residential recycling program. All refuse and recycling is collected together at the curb and then taken to Sunset Environmental, where the refuse is sorted and recyclables are removed.

What size containers can I use?

- ✓ No larger than 35 gallons in capacity
- ✓ No heavier than 50 pounds

Containers should be constructed of solid weather resistant materials. Great Western Reclamation will collect up to five containers on a weekly basis.

When do I place my trash out for collection?

- ✓ Prior to 6:0[illegible]n. on your collection day or the night before.

Bulky Item Collection

Great Western Reclamation provides for free bulky item pickups to each household. If you need to dispose of large, hard-to-handle furniture or appliances, contact our Customer Service Center at (714) 558-7761 to schedule a pickup.

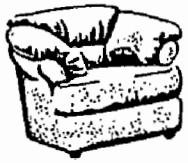

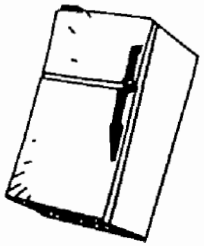

Source Reduction

Source Reduction means reducing waste at its source and preventing garbage from being created in the first place. This includes reducing unnecessary packaging of items, purchasing reusable and repairable items instead of disposable goods, purchasing in bulk, and making a conscious choice to create less garbage. Please join us in our efforts to reduce, reuse and recycle!

Waste Disposal Center

Sunset Environmental, located at 16122 Construction Circle West in Irvine, is a transfer facility.

Rather than going to the landfill, come to Sunset Environmental! For hours of operation, please call (949) 451-2600.

Household Hazardous Waste

007662

What is HHW? HHW consists of materials which cannot be safely sent to the landfill. Some hazardous materials are paint, household cleaners, pesticide: pool chemicals, and automotiv products such as batteries, mote oil and antifreeze.

The County of Orange has permanent Househol Hazardous Waste Collection Centers. The neare center is located at 6411 Oak Canyon in Irvin (take the Sand Canyon exit off the 5 freeway an go west). For more information call th Household Hazardous Waste Hotline at (714) 834 6752.

Used motor oil is accepted by many servic stations. If you need to locate a state-certified use oil collection center in the Tustin area, call (800 CLEANUP.

RECYCLE
USED OIL

Printed on Recycled Paper

Do You Know Where The Water In Your Storm Drain Goes?

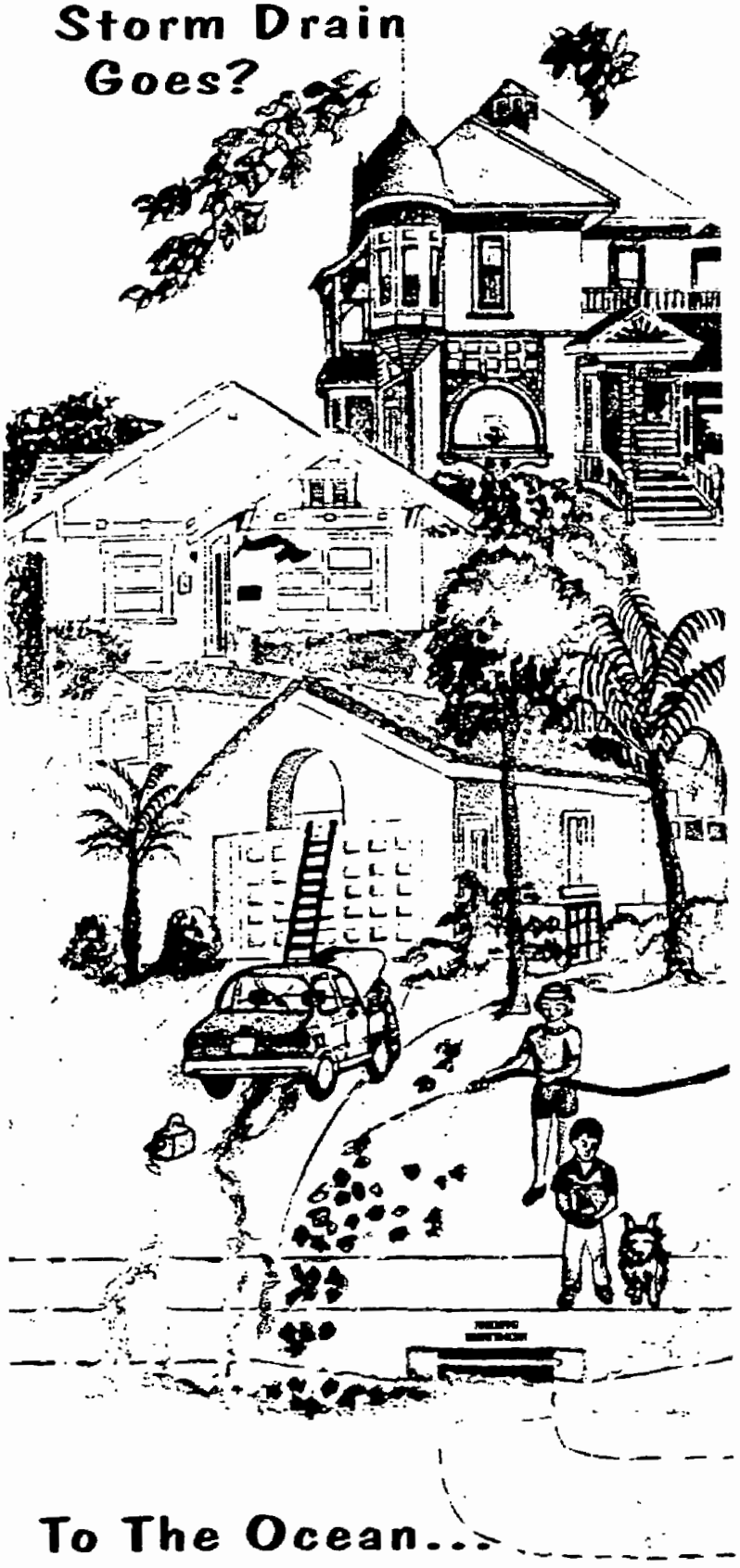

To The Ocean...

The Ocean begins at your front door!

Storm Water & Urban Runoff Pollution (SWURP)
And What You Can Do To Stop It!

To locate the nearest

Certified Used Oil Collection

Center. please call

1-800-CLEANUP

or you may visit the website at

www.1800CLEANUP.org.

RECYCLE
USED OIL

This program is brought to you by the City of Tustin and made possible by a grant from the California Integrated Waste Management Board.

TUSTIN RECYCLES USED MOTOR OIL!

IT'S EASY! IT'S FREE!

RECYCLING USED MOTOR OIL PRESERVES A VALUABLE NATURAL RESOURCE AND PROTECTS THE ENVIRONMENT!

Recycling Used Oil is Easy!

It's easy to recycle your used motor oil safely right here in Tustin. When you change your vehicle's oil, drain the used motor oil into a clean container, seal the container well with a lid, and bring it to one of the conveniently located State Certified Collection Centers. Be sure that your motor oil is not mixed with other substances, such as antifreeze, solvents, gasoline or water.

Why Recycle Used Motor Oil?

Because it never wears out! Your used motor oil can be recycled, cleaned and used again. That means you can help conserve a valuable natural resource, and help protect the environment. Used oil can contain such contaminants as lead, magnesium, copper, zinc, chromium, arsenic, chlorides, cadmium and chlorinated compounds. Oil poured down storm drains or on the ground can work its way into our ground and surface waters and cause serious pollution. One gallon of used oil can pollute one million gallons of drinking water!

When you take your used motor oil to a State Certified Used Oil Collection Center for recycling, you are protecting our planet and our future. So don't pour good oil down the drain!

How To Recycle Used Oil?

Tustin has 6 State Certified Used Oil Collection Centers standing by to help you recycle your used motor oil. Recycling oil is easy! When you do an oil change, just drain your vehicle's old oil into a clean container, seal the container well with a lid, and bring it to one of the 6 conveniently located State Certified Used Oil Collection Centers in Tustin. So don't throw good oil down the drain. Recycle now!

Used Oil Recycling Tips

007666

- When draining used oil, use a clean plastic oil pan or container with a tight lid.
- Use a reusable 5-gallon or smaller size container.
- Reuse your used oil container, and store it safely away from children and pets.
- Don't mix used oil with chemicals, gasoline, water or other substances.
- State Certified Used Oil Collection Centers will take up to 5 gallons per day, per person.
- You can take other hazardous household wastes, such as paint, pesticides, cleaners, solvents, etc., to a nearby County of Orange Collection Center: 32250 La Pata Ave., San Juan Capistrano or 6411 Oak Canyon, Irvine. Please call (714) 834-6752 for more information.

TUSTIN STATE CERTIFIED USED MOTOR OIL COLLECTION CENTERS*

AUTO ZONE
14460 Newport Ave.
(714) 544-1820

BIG O TIRES
131 E. 1st Street
(714) 544-9431

BOB NEIL'S UNOCAL
17280 E. 17th Street
(714) 544-3704

JIFFY LUBE
(Accepts oil filters too!)
3087 Edinger Ave.
(949) 651-8814

KRAGEN AUTO PARTS
502 B E. 1st Street
(714) 544-9249

SCHER TIRE, INC.
14511 Red Hill Ave.
(714) 832-6011

*Note: It is advisable to call before taking oil to any of the State Certified Used Oil Collection Centers listed. Centers will pay you $.04 for each quart you recycle.

Printed on Recycled Paper

REPRESENTATIVE PUBLIC EDUCATION MATERIALS

CITY OF WESTMINSTER

14451 CEDARWOOD AVENUE
WESTMINSTER, CALIFORNIA 92683
893-3553

MIDWAY CITY SANITARY DISTRICT AND THE ENVIRONMENT
(KEEP FOR FUTURE REFERENCE)

This information is provided to assist you, our valued customer, in protecting the Environment and by doing so, help us keep your service fees the lowest in Orange County. We have accomplished this through cost efficient service and an aggressive trash recycling program. Here's how you can help.

RECYCLABLES: Plastics, styrofoam, glass bottles and jars, phone books, newspapers, magazines, junk mail, cardboard and most other paper products (dry only), tin and aluminum cans.

NON-RECYCLABLES: Wet paper, diapers, animal waste and kitty litter, food waste, grease, coffee grounds, old clothes. shoes, window glass, mirrors, yard waste (grass and tree trimmings).

BULKY ITEMS: (Call District office 893-3553 to arrange pick up on trash day). Two items per month including washers, dryers, hot water heaters, refrigerators and other appliances, furniture, and mattresses.

HOUSEHOLD HAZARDOUS WASTES: (DO NOT put in trash, take to Orange County Collection Centers at 17121 Nichols, in Huntington Beach or 1131 Blue Gum Ave. in Anaheim). Antifreeze batteries. pesticides, herbicides, clear solvents, motor oil and filters, paints, paint thinner are accepted at the center. Biological and radioactive waste, ammunition, explosives and asbestos are not accepted. Call County at 834-6752 for information.

SEWERS: Do not pour cooking oil, grease or coffee grounds down the sink. They plug up sewer lines, and increase service costs. They should be disposed of in closed containers and placed in the trash.

MOTOR OIL DISPOSAL: In addition to the County disposal sites, Westminster residents may telephone the City of Westminster for free pick service at the home (telephone 1 800 576-0041). Small quantities of used motor oil in covered containers may be taken to the District at 14451 Cedarwood Avenue in Westminster.

CHRISTMAS TREES: Strip off ornamentation and set out with trash on collection day. Do not place in barrels. They will be picked up by special trucks for two or three weeks after Christmas and recycled.

WHAT GOES WHERE?

007669

Periodically, we update the list of what is and is not recyclable. We are pleased to say that the list of recyclable items keeps growing! Here is a complete list of items that are and are not recyclable. The list can be clipped out of the newsletter for posting in your home. ■

Your Blue Container

RECYCLABLE

Aerosol cans (must be completely empty)
Aluminum cans (please do not crush)
Aluminum foil
Beverage cans
Bottle caps
Brochures
Cardboard
Cardboard 12-pack soda container boxes
Cereal boxes (remove the inner paper lining)
Computer paper
Coupons
Drink boxes
Egg cartons (cardboard and foam)
Foam cups and plates
Food cans
Glass bottles and jars
Glass cosmetic bottles (remove caps and lids)
Juice cartons
Junk mail
Laundry bottles
Ledger paper
Lids and container closures
Magazines
Metal coat hangers
Milk/half & half/cream cartons
Newspapers
Paper
Paper tubes
Phone books
Pizza boxes
All recyclable plastics
Plastic bags
Plastic bottles (small mouthed)
Plastic containers
Plastic cups/plates/utensils
Plastic milk jugs
Styrofoam
Tin cans
Tissue boxes
Used envelopes (including those with plastic windows)
Wrapping paper
Yogurt containers

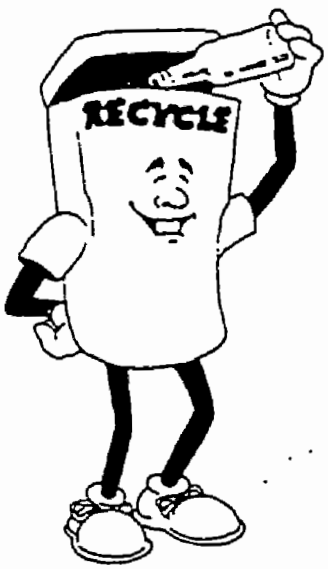

Your Black Container

NON-RECYCLABLE

Bathroom wastes
Carbon paper
Cigarette butts
Drinking glasses
Electronic equipment
Flooring
Food waste
Freezer/refrigerator food boxes
Furniture
Glass and ceramic plates and cups
Liquid waste
Mirrors
Needles
Old clothes/shoes
Plastic toys
Rags
Sponges
Toothpaste tubes/pumps
Soiled paper plates
Waxed paper
Window glass
Yard waste (can be composted)
Animal Waste*
Cat litter*
Disposable diapers*
***Bagged, tied, and placed in black container**

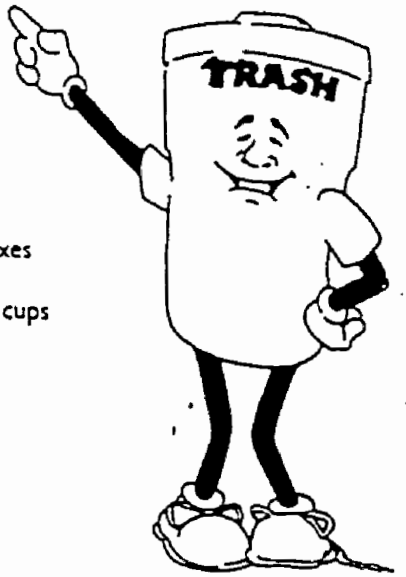

HOUSEHOLD HAZARDOUS WASTE

FOR DISPOSAL AT THE ORANGE COUNTY HOUSEHOLD HAZARDOUS WASTE COLLECTION CENTER

Antifreeze
Aerosol can (full or partially full)
Household cleaners
Motor oil
Paints (latex or oil-based)
Paint thinner

HAZARDOUS MATERIALS HOTLINE

714 834-6752

District Holiday Schedule - New Year's Day, Memorial Day, Fourth of July, Labor Day, Thanksgiving and Christmas Day.

Need Additional Information? Please telephone the District Office at (714) 893-3553 for details on the Recycle Midway City Sanitary District Program. Please note that all provided containers are property of the Midway City Sanitary District. Your cooperation in protecting containers from abuse or negligence will be appreciated. Remember, containers must be left behind if you move away.

As a reminder, if your street sweeping is scheduled the same day as refuse collection, please do not place your container in the street. Place the container on the sidewalk or parkway area with the wheels facing your home. If you do not have street sweeping on the same day, place the container at the curb. The new automated truck can service your container from those areas.

MIDWAY CITY SANITARY DISTRICT

NEWSLETTER - WINTER 1999

14451 CEDARWOOD AVE. • WESTMINSTER, CA 92683

(714) 893-3553

"GIVING EXCELLENT SERVICE AT THE LOWEST RATE IN ORANGE COUNTY"

Board of Directors

Grace P. Epperson
James V. Evans
Joy L. Neugebauer
Russell C. Paris
Margie L. Rice

General Manager

Del Boyer

MIDWAY CITY SANITARY DISTRICT EXCEEDS STATE RECYCLING REQUIREMENT!

The residents and businesses within the Midway City Sanitary District now recycle more than 50% percent of their waste. By recycling 53.9% percent of their waste, pending State approval, the District will exceed the Year 2000 State-mandated 50 percent recycling requirement. Congratulations and keep up the good work!

WE'RE IN THE MOVIES

We are shooting moving pictures (television pictures that is) of the inside of our sewer to determine their condition. Up to now we have televised approximately 25 miles of our 168-mile system and found broken sewers that will cost $775,000 to fix.

Fortunately for us, the Orange County Sanitation District established their Cooperative Services Program. Through this program, the Sanitation District gives matching funds for the repair of sewers. Our District applied for and received $347,500 in matching funds, which means we have to pay the remaining $427,500. The Midway City Sanitary District is paying their matching fund amount out of reserve funds that have been saved for this purpose. We project our televising and repair program for the whole District will take eight years.

YOUR SEWER NEEDS CARE

House grease should never be dumped into your drains. The grease builds up on the side of your sewer and can plug it. Save a plumber's service fee, put excess grease in a container and dispose of it in your black container.

YOUR RATES - LOWEST IN THE COUNTY

As a result of your efforts, the Midway City Sanitary District is proud to currently have the lowest rate for customer service in the County of Orange. The District is an independent special district providing refuse and sewer service in Westminster and Midway City.

GRASSCYCLING?

Grasscycling is the natural recycling of grass. Grass clippings left on the lawns after you mow decompose quickly and release valuable nutrients back into the soil. Grasscycling saves time (no more bagging), valuable landfill space, and money.

Grasscycling can be practiced with almost any mower. Just remove the collection bag and allow clippings to drop on the lawn. Retrofit kits can be purchased to convert lawnmowers that do not have a safety flap covering the opening where the bag fits into the chute.

You can also buy a special mower to recycle grass. Several lawnmower manufacturers have developed mulching or recycling mowers that cut grass into small pieces and force them into the soil. In fact, some are rechargeable, electric mowers that improve air quality while cutting your lawn. If you choose to grasscycle, always follow the "1/3 rule"; a lawn should be mowed so that no more than 1/3 of the length of the grass blade is cut in any one mowing. If a lawn is not cut frequently, the clippings will be too large to fall back to the soil and it will produce a "hay-like" look that can be unsightly.

05243291 8919 Americlean Environmental SRVS 740 LOCC 5-12-99 Log# 351 Miki (2) show

Announcing

City of Westminster

RESIDENTIAL

Used Oil Collection

The City of Westminster provides FREE used motor oil collection at your home or apartment. To schedule an appointment call:

1-800-576-0041

Westminster residents only

Funded by a grant from the California Integrated Waste Management Board

AMERICLEAN
ENVIRONMENTAL TECHLOCC 2-25 sharoon1
Air Control pro

WANTED

USED MOTOR OIL

CITY OF WESTMINSTER
FREE PICKUP AND COLLECTION!
¡COLLECTION GRATIS!

The City of Westminster Now Provides Collection of Used Motor Oil at the Resident's Home or Apartment. To Schedule This Free Service, Please Call the Number Below:

La Cuidad de Westminster le ayuda a reciclar aceite usado de motor. Este servicio es para los residentes de Westminster solamente. Por favor, llame numero abajo y un representativo le puede hacer una cita, para recojer su aceite usado.

RECYCLE USED OIL

CITY OF WESTMINSTER RESIDENTS ONLY!

CALL 1-800-576-0041

FUNDED BY A GRANT FROM THE CALIFORNIA INTEGRATED WASTE MANAGEMENT BOARD

APPENDIX 3.2

ENVIRONMENTAL PERFORMANCE REPORT - SIGNIFICANT ISSUES ACTION PLANS & UPDATES

ENVIRONMENTAL PERFORMANCE REPORT - SIGNIFICANT ISSUES ACTION PLANS & UPDATES
COUNTY OF ORANGE

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: County of Orange

Facility: Laguna Niguel Park

Prepared By: John Robinson

Date: 6-12-00

Significant Issue	ACTION 1	ACTION 2	START DATE	END DATE	Action Plan Completed?
Materials Storage - Paint	Reconstruct a portion of the containment berm	Construct berm	1/1/98	6/30/98	Yes / No
If action plan is not completed, note progress made: Revised end date 12/15/98					

FORM 2

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: County of Orange

Facility: Laguna Niguel Park

☑ No More Significant Issues

Significant Issue (From Form 1):

Objective and Target Date:

Action Items

Actions To Be Taken	Responsible Party	Projected Start Date	Projected Completion Date	Comments

FORM 2

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: County of Orange

Facility: Health Care Complex

Prepared By: Patti Henschel

Date: 8-15-00

Significant Issue	ACTION 1	ACTION 2	START DATE	END DATE	Action Plan Completed?
Waste Storage - Biohazards	Train employees	Put up signs	2/1/98	6/30/98	Yes / No
If action plan is not completed, note progress made: Revised end date 12/98					

FORM 2

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: County of Orange

Facility: Health Care Complex

☑ No More Significant Issues

Significant Issue (From Form 1):

Objective and Target Date:

Action Items

Actions To Be Taken	Responsible Party	Projected Start Date	Projected Completion Date	Comments
Put up signs			Completed	Signs were up when I began my assignment as Building Mgr in March 1999.

Rcvd: 8/15/00 11:01AM; 7148348741 -> OC PFRD ENV RESOURCES ; Page 3
8-15-00 11:01am From-HCA BLDG 50 7148348741 T-881 P.03/03 F-378

FORM 2

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: County of Orange

Facility: Katella Yard

Prepared By: TAMARA KILLINGSWORTH

Date: 8/11/00

Significant Issue	ACTION 1	ACTION 2	START DATE	END DATE	Action Plan Completed?
Fuel Spills - Small **If action plan is not completed, note progress made:**	Place pan underneath vehicles	Conduct degreasing on wash pad	12/1/98	On going	Yes / No
Vehicle & Equipment Washing **If action plan is not completed, note progress made:**	Train employees		12/1/98	On going	Yes / No
Waste Storage **If action plan is not completed, note progress made:**	Train employees	Conduct inspections	12/1/98	On going	Yes / No

FORM 2

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: County of Orange

Facility: Katella Yard

☐ No More Significant Issues

Significant Issue (From Form 1):

Objective and Target Date:
NONE

Action Items

Actions To Be Taken	Responsible Party	Projected Start Date	Projected Completion Date	Comments

FORM 2

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: County of Orange

Facility: Sheriff - Coroner Civic Center

Prepared By: Lucille Freer

Date: 7/17/00

Significant Issue	ACTION 1	ACTION 2	START DATE	END DATE	Action Plan Completed?
Vehicle Washing	Discontinue Runoff		7/1/98	12/30/99	(Yes) / No
If action plan is not completed, note progress made: Revised end date 12/99					

FORM 2

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: County of Orange

Facility: Sheriff - Coroner Civic Center

☒ No More Significant Issues

Significant Issue (From Form 1):

Objective and Target Date:

Action Items

Actions To Be Taken	Responsible Party	Projected Start Date	Projected Completion Date	Comments

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: County of Orange

Facility. Central Utility Facility

Prepared By: [illegible]

Date: 5/31/00

Significant Issue	ACTION 1	ACTION 2	START DATE	END DATE	Action Plan Completed?
Materials Storage - Chemicals	Construct a new berm		2/15/98	~~4/30/98~~ 10/30/98	Yes / No
If action plan is not completed, note progress made: Revised end date 12/98					

FORM 2

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: County of Orange

Facility: Central Utility Facility

☒ No More Significant Issues

Significant Issue (From Form 1):

Objective and Target Date:

Action Items

Actions To Be Taken	Responsible Party	Projected Start Date	Projected Completion Date	Comments

ENVIRONMENTAL PERFORMANCE REPORT - SIGNIFICANT ISSUES ACTION PLANS & UPDATES

CITY OF ANAHEIM

FORM 2

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Anaheim

Facility: Streets & Sanitation #28

Prepared By: ROD HALLOCK

Date: 7/20/00

Significant Issue	ACTION 1	ACTION 2	START DATE	END DATE	Action Plan Completed?
Material Storage - Asphalt/Dirt	Install a clarifier/Construct asphalt berm		11/24/97	12/31/97	Yes / No
If action plan is not completed, note progress made:				Revised 12/99	
General Stormwater Runoff	Install a clarifier		11/24/97	6/30/99	Yes / No
If action plan is not completed, note progress made: None noted					

FORM 2

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Anaheim

Facility: Streets & Sanitation #28

☐ No More Significant Issues

Significant Issue (From Form 1): GENERAL STORMWATER RUNOFF – INSTALL CLARIFIER

Objective and Target Date:
INSTALL DRAIN INLET FILTERS 6/30/01

Action Items

Actions To Be Taken	Responsible Party	Projected Start Date	Projected Completion Date	Comments
ISSUE A BLANKET PURCHASE ORDER TO A	ROD HALLOCK	11/24/97	6/30/01	*
CONTRACTOR TO INSTALL AND SERVICE				
FOUR STORMWATER INLET FILTERS				

* THE PREVIOUS PLAN WAS TO INSTALL ONE LARGE CLARIFIER AND INSTALL NEW DRAIN LINES TO DIRECT RUN OFF TO THE CLARIFIER. WE DECIDED WE COULD CAPTURE AND FILTER A GREATER AMOUNT OF RUNOFF BY INSTALLING FILTERS IN ALL EXISTING STORM DRAIN INLETS. WE WERE IN CONTRACT NEGOTIATIONS WITH ONE DRAIN FILTER CONTRACTOR BUT THE CONTRACTOR COULD NOT DELIVER THE DEBRIS DISPOSAL SERVICE WE REQUESTED. WE ARE CURRENTLY PREPARING A SERVICE CONTRACT WITH A NEW DRAIN FILTER SERVICE CONTRACTOR.

FORM 2

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Anaheim

Facility: Streets & Sanitation #28

☐ No More Significant Issues

Significant Issue (From Form 1): MATERIAL STORAGE - ASPHALT/DIRT - INSTALL CLARIFIER AND ASPHALT BERM

Objective and Target Date:
CONSTRUCT METAL ROOFING TO COVER BUNKERS 6/30/01

Action Items

Actions To Be Taken	Responsible Party	Projected Start Date	Projected Completion Date	Comments
CONSTRUCT METAL ROOFING TO COVER BUNKERS	HECTOR CRUZ	11/24/97	6/30/01	*

* WE HAVE DECIDED TO CONSTRUCT METAL ROOFING OVER THE MATERIALS BUNKERS TO PREVENT RUNOFF DURING STORMS. THIS PROJECT WAS DELAYED DURING 99/00 BECAUSE OTHER MODIFICATIONS TO OUR METAL BUILDINGS WERE IDENTIFIED AND WE WANT TO AWARD ALL THE NEW METAL STRUCTURE WORK ON ONE CONTRACT. WE STILL COVER OUR MATERIALS BUNKERS WITH TARPS DURING RAIN STORMS TO PREVENT RUN OFF UNTIL THE METAL ROOFING IS CONSTRUCTED. WE WILL STILL INSTALL STORM DRAIN INLET FILTERS (INSTEAD OF A CLARIFIER) IN ADDITION TO THE METAL ROOFING (WE WILL DO BOTH).

C: LOUIE VECCHIONE

FORM 2

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Anaheim

Facility: Dad Miller Golf Course

Prepared By:

Date:

Significant Issue	ACTION 1	ACTION 2	START DATE	END DATE	Action Plan Completed?
Material Storage	Purchase tarps		11/15/97	On going	Yes / No
If action plan is not completed, note progress made: Need to purchase tarps					

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Anaheim

Facility: Dad Miller Golf Course

☐ No More Significant Issues

Significant Issue (From Form 1):

Objective and Target Date:

Action Items

Actions To Be Taken	Responsible Party	Projected Start Date	Projected Completion Date	Comments

FORM 2

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Anaheim

Facility: Anaheim Hills Yard

Prepared By:

Date:

Significant Issue	ACTION 1	ACTION 2	START DATE	END DATE	Action Plan Completed?
Material Storage	Purchase tarps		11/15/97	On going	Yes / No
If action plan is not completed, note progress made: Need to purchase tarps					

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Anaheim

Facility: Anaheim Hills Yard

☒ No More Significant Issues

Significant Issue (From Form 1):

Objective and Target Date:

Action Items

Actions To Be Taken	Responsible Party	Projected Start Date	Projected Completion Date	Comments

FORM 2

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Anaheim

Facility: Fire Station One

Prepared By: Roger Smith

Date: 7/5/00

Significant Issue	ACTION 1	ACTION 2	START DATE	END DATE	Action Plan Completed?
Vehicle Washing	Relocate wash area		3/1/98	3/1/99	Yes / No
If action plan is not completed, note progress made: None noted					

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Anaheim

Facility: Fire Station One

☒ No More Significant Issues

Significant Issue (From Form 1):

Objective and Target Date:

Action Items

Actions To Be Taken	Responsible Party	Projected Start Date	Projected Completion Date	Comments

FORM 2

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Anaheim

Facility: Fire Station Two

Prepared By: Roger Smith

Date: 7/5/00

Significant Issue	ACTION 1	ACTION 2	START DATE	END DATE	Action Plan Completed?
Vehicle Washing	Relocate wash area		3/1/98	3/1/99	Yes / No
If action plan is not completed, note progress made: None noted					

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Anaheim

Facility: Fire Station Two

☒ No More Significant Issues

Significant Issue (From Form 1):

Objective and Target Date:

Action Items

Actions To Be Taken	Responsible Party	Projected Start Date	Projected Completion Date	Comments

FORM 2

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Anaheim

Facility: Fire Station Four

Prepared By: Roger Smith

Date: 7/5/00

Significant Issue	ACTION 1	ACTION 2	START DATE	END DATE	Action Plan Completed?
Vehicle Washing	Relocate wash area		3/1/98	3/1/99	Yes / No
If action plan is not completed, note progress made: None noted					

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Anaheim

Facility: Fire Station Four

☒ No More Significant Issues

Significant Issue (From Form 1):

Objective and Target Date:

Action Items

Actions To Be Taken	Responsible Party	Projected Start Date	Projected Completion Date	Comments

FORM 2

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Anaheim

Facility: Fire Station Five

Prepared By: Roger Smith

Date: 7/5/00

Significant Issue	ACTION 1	ACTION 2	START DATE	END DATE	Action Plan Completed?
Vehicle Washing	Relocate wash area		3/1/98	3/1/99	Yes / No
If action plan is not completed, note progress made: None noted					

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Anaheim

Facility: Fire Station Five

☒ No More Significant Issues

Significant Issue (From Form 1):

Objective and Target Date:

Action Items

Actions To Be Taken	Responsible Party	Projected Start Date	Projected Completion Date	Comments

FORM 2

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Anaheim

Facility: Fire Station Six

Prepared By: Roger Smith

Date: 7/5/00

Significant Issue	ACTION 1	ACTION 2	START DATE	END DATE	Action Plan Completed?
Vehicle Washing	Relocate wash area		3/1/98	3/1/99	Yes / No
If action plan is not completed, note progress made: None noted					

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Anaheim

Facility: Fire Station Six

☒ No More Significant Issues

Significant Issue (From Form 1):

Objective and Target Date:

Action Items

Actions To Be Taken	Responsible Party	Projected Start Date	Projected Completion Date	Comments

FORM 2

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Anaheim

Facility: Fire Station Seven

Prepared By: Roger Smith

Date: 7/5/00

Significant Issue	ACTION 1	ACTION 2	START DATE	END DATE	Action Plan Completed?
Vehicle Washing	Relocate wash area		3/1/98	3/1/99	Yes / No
If action plan is not completed, note progress made: None noted					

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Anaheim

Facility: Fire Station Seven

☒ No More Significant Issues

Significant Issue (From Form 1):

Objective and Target Date:

Action Items

Actions To Be Taken	Responsible Party	Projected Start Date	Projected Completion Date	Comments

FORM 2

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Anaheim

Facility: Fire Station Eight

Prepared By: Roger Smith

Date: 7/5/00

Significant Issue	ACTION 1	ACTION 2	START DATE	END DATE	Action Plan Completed?
Vehicle Washing	Relocate wash area		3/1/98	3/1/99	Yes No
If action plan is not completed, note progress made: None noted					

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Anaheim

Facility: Fire Station Eight

☒ No More Significant Issues

Significant Issue (From Form 1):

Objective and Target Date:

Action Items

Actions To Be Taken	Responsible Party	Projected Start Date	Projected Completion Date	Comments

FORM 2

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Anaheim

Facility. Fire Station Nine

Prepared By: Roger Smith

Date: 7/5/00

Significant Issue	ACTION 1	ACTION 2	START DATE	END DATE	Action Plan Completed?
Vehicle Washing	Relocate wash area		3/1/98	3/1/99	Yes / No
If action plan is not completed, note progress made: None noted					

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Anaheim

Facility: Fire Station Nine

☒ No More Significant Issues

Significant Issue (From Form 1):

Objective and Target Date:

Action Items

Actions To Be Taken	Responsible Party	Projected Start Date	Projected Completion Date	Comments

FORM 2

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Anaheim

Facility: Fire Station Ten

Prepared By: Roger Smith

Date: 7/5/00

Significant Issue	ACTION 1	ACTION 2	START DATE	END DATE	Action Plan Completed?
Vehicle Washing	Relocate wash area		3/1/98	3/1/99	Yes / No
If action plan is not completed, note progress made: None noted					

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Anaheim

Facility: Fire Station Ten

☒ No More Significant Issues

Significant Issue (From Form 1):

Objective and Target Date:

Action Items

Actions To Be Taken	Responsible Party	Projected Start Date	Projected Completion Date	Comments

FORM 2

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Anaheim

Facility Convention Center

Prepared By:

Date:

Significant Issue	ACTION 1	ACTION 2	START DATE	END DATE	Action Plan Completed?
Material Storage - Chemical Coolant	Install containment system		2/1/98	7/31/98	Yes / No
If action plan is not completed, note progress made: None stated					
Transfer Area	Install curbs, drains and clarifier		6/1/98	10/31/98	Yes / No
If action plan is not completed, note progress made: None stated					

FORM 2

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Anaheim

Facility Convention Center

☒ No More Significant Issues

Significant Issue (From Form 1):

Objective and Target Date:

Action Items

Actions To Be Taken	Responsible Party	Projected Start Date	Projected Completion Date	Comments

ENVIRONMENTAL PERFORMANCE REPORT - SIGNIFICANT ISSUES ACTION PLANS & UPDATES

CITY OF BREA

007714

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Brea

Facility: Service Center

Prepared By: Beatrice Ramirez/Jerry Mesa

Date: 7/20/00

Significant Issue	ACTION 1	ACTION 2	START DATE	END DATE	Action Plan Completed?
Vehicle/Equipment Wash Water If action plan is not completed, note progress made:	Construct new wash facility with water recycling		05/01/1997	03/01/1999	Yes / No
Steam Cleaning If action plan is not completed, note progress made:	Provide new location (move to newly contstructed facility)		05/01/1997	03/01/1999	Yes / No
Sweeper Transfer Area If action plan is not completed, note progress made:	Capture and treat runoff from dump pile		05/01/1997	03/01/1999	Yes / No

ENVIRONMENTAL PERFORMANCE REPORT - SIGNIFICANT ISSUES ACTION PLANS & UPDATES

CITY OF BUENA PARK

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Buena Park

Facility: Vehicle Maintenance Yard

Prepared By: Paul DePietro

Date: July 17, 2000

Significant Issue	ACTION 1	ACTION 2	START DATE	END DATE	Action Plan Completed?
Fuel Spills - Small and Large	Placed spill cleanup materials.	Inspect daily and sweep	11/1/97	On going	Yes / No
Hazardous Materials Storage	Purchased secondary containment pallets.	Conduct daily inspections	11/1/97	On going	Yes / No
Material Storage - Oil Drums	Purchased secondary containment pallets.	Conduct daily inspections	11/1/97	On going	Yes / No
Material Storage - Paint	Purchased secondary containment pallets.	Conduct daily inspections	11/1/97	On going	Yes / No
Material Storage - Garage	Purchased secondary containment pallets.	Conduct daily inspections	11/1/97	On going	Yes / No

If action plan is not completed, note progress made:

FORM 2

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Buena Park

Facility: Vehicle Maintenance Yard

☐ No More Significant Issues

Significant Issue (From Form 1):

Objective and Target Date:	Removed, replaced and retrofitted underground storage tanks to meet secondary containment standards. This project was completed in November 1999.

Action Items

Actions To Be Taken	Responsible Party	Projected Start Date	Projected Completion Date	Comments
Removed, replaced and retrofitted	Paul DePietro	December-98	November-99	
underground storage tanks at City				
Yard, Fire Stations and Police Dept.				

ENVIRONMENTAL PERFORMANCE REPORT - SIGNIFICANT ISSUES ACTION PLANS & UPDATES

CITY OF COSTA MESA

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Costa Mesa

Facility: New Corporation Yard

Prepared By: Bruce Covey

Date: 7-27-00

Significant Issue	ACTION 1	ACTION 2	START DATE	END DATE	Action Plan Completed?
Sweeper Transfer Area	New sweeper dump area to be constructed		December 2000	February 2000	Yes / No X
If action plan is not completed, note progress made: Budget 12/15/00					

FORM 2

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Costa Mesa

Facility: New Corporation Yard

☐ No More Significant Issues

Significant Issue (From Form 1): Prevent sweeper debris liquid from entering storm drain system.

Objective and Target Date: Relocate debris site and use approved sewer clarifier and drain.

Action Items

Actions To Be Taken	Responsible Party	Projected Start Date	Projected Completion Date	Comments
Budget in FY 1999-2000	Bruce Covey	December 2000	February 2000	on schedule

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Costa Mesa

Facility: Old Corporation Yard

Prepared By: Bruce Covey

Date: 7-27-00

Significant Issue	ACTION 1	ACTION 2	START DATE	END DATE	Action Plan Completed?
Large & Small Spills	Install waterproof cover on existing frame work		September 2000	October 2000	Yes / No X
If action plan is not completed, note progress made: Budget 6/30/99					

FORM 2

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Costa Mesa

Facility: Old Corporation Yard

☐ No More Significant Issues

Significant Issue (From Form 1): Large and small spills

Objective and Target Date: Construct a roof for paint cleaning area

Action Items

Actions To Be Taken	Responsible Party	Projected Start Date	Projected Completion Date	Comments
Budget or use end-of-year funds to construct a roof	Bruce Covey	September 2000	October 2000	on schedule

ENVIRONMENTAL PERFORMANCE REPORT - SIGNIFICANT ISSUES ACTION PLANS & UPDATES

CITY OF CYPRESS

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Cypress

Facility: Corporation Yard

Prepared By: Gonzalo Vazquez/Bill Raymond

Date: July 28,2000

Significant Issue	ACTION 1	ACTION 2	START DATE	END DATE	Action Plan Completed?
Waste Storage - Paint	Provide covered storage area		11/1/00	1/1/01	Yes / No
If action plan is not completed, note progress made: Revised end date 1/1/01 - Funded as capital project in fiscal year 2000-2001					
Fluid Transfer Area	Construct berm around perimeter		11/1/00	1/1/01	Yes / No
If action plan is not completed, note progress made: Revised end date 1/1/01 - Funded as capital project in fiscal year 2000-2001					
Fluid Transfer Area	Utilize effective housekeeping techniques		2/1/98	2/1/99	Yes / No
If action plan is not completed, note progress made: 2/1/99					
Spills - Small	Tarp landscape equipment to cover		2/1/98	8/1/00	Yes / No
If action plan is not completed, note progress made: 8/1/00					
Material Storage	Install roof over storage area	Temporarily cover bins	9/1/98	1/1/01	Yes / No
If action plan is not completed, note progress made: Revised end date 1/1/01 - Funded as capital project in fi					
Vehicle/Equipment Wash Water	Inspect wash rack drainage system regularily		1/1/98	2/1/99	Yes / No
If action plan is not completed, note progress made: 2/1/99					

FORM 2

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Cypress

Facility: Corporation Yard

☐ No More Significant Issues

Significant Issue (From Form 1):

Fluid storage inside of building and ongoing equipment and vehicle maintenance

Objective and Target Date:

To install a berm around automotive fluids stored inside of garage to prevent any potential spill flows outside of building and performance of regularly scheduled maintenance of equipment so to remove any exposed grease and prevent any potential runoff

Action Items

Actions To Be Taken	Responsible Party	Projected Start Date	Projected Completion Date	Comments
Install berm around fluid drums inside of garage	Maintenance Division	9/1/00	9/30/00	
Increase frequency of vehicle maintenance	Maintenance Division	9/1/00	Ongoing	Will be ongoing program

ENVIRONMENTAL PERFORMANCE REPORT - SIGNIFICANT ISSUES ACTION PLANS & UPDATES

CITY OF DANA POINT

007727

FORM 2

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Dana Point

Facility: Del Obispo Community Center

Prepared By: Cindy Asher

Date: July 27, 2000

[X] No Significant Issues *

* This municipal facility **does not** have any of the following operations that could contribute to storm-water pollution.

- Hazardous materials stored on-site.
- Waste stored or handled on-site.
-Vehicle and equipment maintenance activiites.

Significant Issue (From Form 1):

Objective and Target Date:

Action Items

Actions To Be Taken	Responsible Party	Projected Start Date	Projected Completion Date	Comments

FORM 2

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Dana Point

Facility: City Plaza - Dana Point City Hall

Prepared By: Cindy Asher

Date: July 27, 2000

[X] No Significant Issues*

* This municipal facility does not have any of the follow operations that could contribute to stormwater pollutio

- Hazardous materials stored or handled on-site.
- Waste stored or handled on-site.
- Vehicle and equipment maintenance activities.

Significant Issue (From Form 1):

Objective and Target Date:

Action Items

Actions To Be Taken	Responsible Party	Projected Start Date	Projected Completion Date	Comments

ENVIRONMENTAL PERFORMANCE REPORT - SIGNIFICANT ISSUES ACTION PLANS & UPDATES

CITY OF FOUNTAIN VALLEY

ENVIRONMENTAL PERFORMANCE REPORT - SIGNIFICANT ISSUES ACTION PLANS & UPDATES

CITY OF FULLERTON

ENVIRONMENTAL PERFORMANCE REPORT - SIGNIFICANT ISSUES ACTION PLANS & UPDATES

CITY OF GARDEN GROVE

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Garden Grove

Facility: Municipal Service Center

Prepared By: Maria Stipe

Date: 7/28/00

Significant Issue	ACTION 1	ACTION 2	START DATE	END DATE	Action Plan Completed?
Hazardous Materials Storage	Training of personnel		12/1/98	Ongoing	(Yes) / No
If action plan is not completed, note progress made: Annual training completed 4/00					

FORM 2

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Garden Grove

Facility: Municipal Service Center

[X] No More Significant Issues

Significant Issue (From Form 1):

Objective and Target Date:

Action Items

Actions To Be Taken	Responsible Party	Projected Start Date	Projected Completion Date	Comments

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Garden Grove

Facility: Fire Station #2

Prepared By: Maria Stipe

Date: 7/28/00

Significant Issue	ACTION 1	ACTION 2	START DATE	END DATE	Action Plan Completed?
Hazardous Materials Storage	Training of personnel		12/1/98	Ongoing	Yes / No
If action plan is not completed, note progress made: Annual training completed 4/00					

FORM 2

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Garden Grove

Facility: Fire Station #2

[X] No More Significant Issues

Significant Issue (From Form 1):

Objective and Target Date:

Action Items

Actions To Be Taken	Responsible Party	Projected Start Date	Projected Completion Date	Comments

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Garden Grove

Facility: Fire Station #3

Prepared By: Maria Stipe

Date: 7/28/00

Significant Issue	ACTION 1	ACTION 2	START DATE	END DATE	Action Plan Completed?
Hazardous Materials Storage	Training of personnel		12/1/98	Ongoing	(Yes) / No
If action plan is not completed, note progress made: Annual training completed 4/00					

FORM 2

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Garden Grove

Facility: Fire Station #3

[X] No More Significant Issues

Significant Issue (From Form 1):

Objective and Target Date:

Action Items

Actions To Be Taken	Responsible Party	Projected Start Date	Projected Completion Date	Comments

007738

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Garden Grove

Facility: Fire Station #4

Prepared By: Maria Stipe

Date: 7/28/2000

Significant Issue	ACTION 1	ACTION 2	START DATE	END DATE	Action Plan Completed?
Hazardous Materials Storage	Training of personnel		12/1/98	Ongoing	Yes / No
If action plan is not completed, note progress made: Annual training completed 4/00					

FORM 2

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Garden Grove

Facility: Fire Station #4

[X] No More Significant Issues

Significant Issue (From Form 1):

Objective and Target Date:

Action Items

Actions To Be Taken	Responsible Party	Projected Start Date	Projected Completion Date	Comments

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Garden Grove

Facility: Fire Station #5

Prepared By: Maria Stipe

Date: 7/28/2000

Significant Issue	ACTION 1	ACTION 2	START DATE	END DATE	Action Plan Completed?
Hazardous Materials Storage	Training of personnel		12/1/98	Ongoing	(Yes) / No
If action plan is not completed, note progress made: Annual training completed 4/00					

FORM 2

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Garden Grove

Facility: Fire Station #5

[X] No More Significant Issues

Significant Issue (From Form 1):

Objective and Target Date:

Action Items

Actions To Be Taken	Responsible Party	Projected Start Date	Projected Completion Date	Comments

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Garden Grove

Facility: Fire Station #6

Prepared By: Maria Stipe

Date: 7/28/00

Significant Issue	ACTION 1	ACTION 2	START DATE	END DATE	Action Plan Completed?
Hazardous Materials Storage	Training of personnel		12/1/98	Ongoing	Yes / No
If action plan is not completed, note progress made: Annual training completed 4/00					

FORM 2

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Garden Grove

Facility: Fire Station #6

[X] No More Significant Issues

Significant Issue (From Form 1):

Objective and Target Date:

Action Items

Actions To Be Taken	Responsible Party	Projected Start Date	Projected Completion Date	Comments

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Garden Grove

Facility: Fire Station #7

Prepared By: Maria Stipe

Date:7/28/00

Significant Issue	ACTION 1	ACTION 2	START DATE	END DATE	Action Plan Completed?
Hazardous Materials Storage	Training of personnel		12/1/98	Ongoing	Yes / No
If action plan is not completed, note progress made: Annual training completed 4/00					

FORM 2

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Garden Grove

Facility: Fire Station #7

[X] No More Significant Issues

Significant Issue (From Form 1):

Objective and Target Date:

Action Items

Actions To Be Taken	Responsible Party	Projected Start Date	Projected Completion Date	Comments

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Garden Grove

Facility: City Hall

Prepared By: Maria Stipe

Date: 7/28/00

Significant Issue	ACTION 1	ACTION 2	START DATE	END DATE	Action Plan Completed?
Materials Storage	Replace generator		TBD	12/29/99	Yes / No
If action plan is not completed, note progress made:		Revised end date: 2005. The action plan was not completed due to funding contraints. However, the integrety of the existing emergency generator remains good and is inspected on a regular basis. **Should funding become available sooner than 2005, the end date will be accelerated.*			

FORM 2

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Garden Grove

Facility: City Hall

☐ No More Significant Issues

Significant Issue (From Form 1):

Objective and Target Date:

Action Items

Actions To Be Taken	Responsible Party	Projected Start Date	Projected Completion Date	Comments

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Garden Grove

Facility: Police & Fire Station

Prepared By: Maria Stipe

Date: 7/28/00

Significant Issue	ACTION 1	ACTION 2	START DATE	END DATE	Action Plan Completed?
Hazardous Materials Storage	Training of personnel		12/1/98	On going	Yes / No
If action plan is not completed, note progress made: Annual training completed 4/00					

FORM 2

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Garden Grove

Facility: Police & Fire Station

[X] No More Significant Issues

Significant Issue (From Form 1):

Objective and Target Date:

Action Items

Actions To Be Taken	Responsible Party	Projected Start Date	Projected Completion Date	Comments

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Garden Grove

Facility: Willowick Golf Course

Prepared By: Maria Stipe

Date: 7/28/00

Significant Issue	ACTION 1	ACTION 2	START DATE	END DATE	Action Plan Completed?
Waste Storage	Build berm	Train personnel	11/1/98	12/1/98	Yes / No
If action plan is not completed, note progress made:		*Willowick Golf Course was incorrectly identified as a municipal facility and should not be included in this report. Donovan Golf Courses Management, Inc. leases this property from the City and operates the business. There are no municipal employees.*			
Vehicle & Equipment Washing	Install a clarifier		12/1/98	6/1/99	Yes / No
If action plan is not completed, note progress made:		*See a note above.*			

FORM 2

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Garden Grove

Facility: Willowick Golf Course

[X] No More Significant Issues

Significant Issue (From Form 1):

Objective and Target Date:

Action Items

Actions To Be Taken	Responsible Party	Projected Start Date	Projected Completion Date	Comments

ENVIRONMENTAL PERFORMANCE REPORT - SIGNIFICANT ISSUES ACTION PLANS & UPDATES

CITY OF HUNTINGTON BEACH

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Huntington Beach

Facility: Beach Maintenance Yard

Prepared By: Edward Magyar

Date: 14-Jul-00

Significant Issue	ACTION 1	ACTION 2	START DATE	END DATE	Action Plan Completed?
Material Storage - Oil	Construct berm		10/1/98	10/1/99	Yes
If action plan is not completed, note progress made: In Design 07/14/00					
Fuel Spills	Construct berm		10/1/98	10/1/99	Yes
If action plan is not completed, note progress made: In Design 07/14/00					
Underground Storage Tank	Remove underground storage tanks		12/1/98 (no longer used)	12/1/99 (removed) Removed	Yes
If action plan is not completed, note progress made: In Pogress 12/1/98					

FORM 2

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Huntington Beach

Facility: Beach Maintenance Yard

☒ No More Significant Issues

Significant Issue (From Form 1):

Objective and Target Date:

Action Items

Actions To Be Taken	Responsible Party	Projected Start Date	Projected Completion Date	Comments

007755

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Huntington Beach

Facility: Park Maintenance Facility

Prepared By: Edward Magyar

Date: 14-Jul-00

Significant Issue	ACTION 1	ACTION 2	START DATE	END DATE	Action Plan Completed?
Material Storage/Trash Bin	Construct berm		11/15/97	On going	No
If action plan is not completed, note progress made: In Design					
Fuel Spills - Large	Construct roof		11/15/97	On going	No
If action plan is not completed, note progress made: Under Construction					

FORM 2

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Huntington Beach

Facility: Park Maintenance Facility

☒ No More Significant Issues

Significant Issue (From Form 1):

Objective and Target Date:

Action Items

Actions To Be Taken	Responsible Party	Projected Start Date	Projected Completion Date	Comments

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Huntington Beach

Facility: Gothard Fire Station

Prepared By: Edward Magyar

Date: 14-Jul-00

Significant Issue	ACTION 1	ACTION 2	START DATE	END DATE	Action Plan Completed?
Underground Storage Tank	Remove tanks			~~12/30/00~~	Yes
If action plan is not completed, note progress made: Complete 04-04-99					

FORM 2

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Huntington Beach

Facility: Gothard Fire Station

☒ No More Significant Issues

Significant Issue (From Form 1):

Objective and Target Date:

Action Items

Actions To Be Taken	Responsible Party	Projected Start Date	Projected Completion Date	Comments

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Huntington Beach

Facility: Joint Powers Training Center

Prepared By: Edward Magyar

Date: 14-Jul-00

Significant Issue	ACTION 1	ACTION 2	START DATE	END DATE	Action Plan Completed?
Trash Bin	Construct roof		12/1/98	On-going	No
If action plan is not completed, note progress made: Revised end date 12/1/99					
Trash Bin	Provide spill clean up materials		11/15/97	On going	No
If action plan is not completed, note progress made: Not Stated					

FORM 2

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Huntington Beach

Facility: Joint Powers Training Center

☒ No More Significant Issues

Significant Issue (From Form 1):

Objective and Target Date:

Action Items

Actions To Be Taken	Responsible Party	Projected Start Date	Projected Completion Date	Comments

Form 2

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Huntington Beach

Facility: Civic Center

Prepared By: Edward Magyar

Form 2

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Huntington Beach

Facility: Warner Fire Station

Prepared By: Edward Magyar

Date: 14-Jul-00

Significant Issue	ACTION 1	ACTION 2	START DATE	END DATE	Action Plan Completed?
Underground Storage Tank	Remove tanks			4/1/99	Yes
If action plan is not completed, note progress made: In Progress 12/28/98					

FORM 2

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Huntington Beach

Facility: Warner Fire Station

☒ No More Significant Issues

Significant Issue (From Form 1):

FORM 2

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Huntington Beach

Facility: Civic Center

☒ No More Significant Issues

Significant Issue (From Form 1):

Objective and Target Date:

Action Items

Actions To Be Taken	Responsible Party	Projected Start Date	Projected Completion Date	Comments

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Huntington Beach

Facility: 19001 Huntington Street

Prepared By: Edward Magyar

Date: 14-Jul-00

Significant Issue	ACTION 1	ACTION 2	START DATE	END DATE	Action Plan Completed?
Fluoride Bulk Storage	Construct Roof For Area		1/1/98	12/1/1998 (Pending funding)	No
If action plan is not completed, note progress made: In Design 12/1/98					
Fuel Spill - Small	Replace fuel system		11/15/97	Complete 4-1-99	Yes
If action plan is not completed, note progress made: In Design 1/30/99					
Material Storage	Relocate and construct covered storage area		1/1/00	12/1/2001 (Funding needed)	Yes
If action plan is not completed, note progress made: In design					

FORM 2

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Huntington Beach

Facility: 19001 Huntington Street

☒ No More Significant Issues

Significant Issue (From Form 1):

Objective and Target Date:

Action Items

Actions To Be Taken	Responsible Party	Projected Start Date	Projected Completion Date	Comments

07765

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Huntington Beach

Facility: Corporate Yard

Prepared By: Edward Magyar

Date: 14-Jul-00

Significant Issue	ACTION 1	ACTION 2	START DATE	END DATE	Action Plan Completed?
Fuel Spills	Construct berm		12/1/98	1/1/99	Yes
If action plan is not completed, note progress made: In Progrss 1/1/99					

FORM 2

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Huntington Beach

Facility: Corporate Yard

☒ No More Significant Issues

Significant Issue (From Form 1):

Objective and Target Date:

Action Items

Actions To Be Taken	Responsible Party	Projected Start Date	Projected Completion Date	Comments

ENVIRONMENTAL PERFORMANCE REPORT - SIGNIFICANT ISSUES ACTION PLANS & UPDATES

CITY OF IRVINE

ENVIRONMENTAL PERFORMANCE REPORT - SIGNIFICANT ISSUES ACTION PLANS & UPDATES

CITY OF LA HABRA

Received: 8/14/00 1:04PM; 5629059643 -> OC PFRD ENV RESOURCES ; Page 2
08/14/2000 12:04 FAX 5629059643 COMMUNITY DEV 02

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: La Habra

Facility: Public Works Yard

Prepared By: Alan Leung

Date: 8/10/2000

Significant Issue	ACTION 1	ACTION 2	START DATE	END DATE	Action Plan Completed?
Vehicle/Equipment Wash Water	Install clarifier		7/1/2001	6/30/02 (Pending funding)	Yes / (No)
If action plan is not completed, note progress made: Rebudget for clarifier 7/1/01					
Trash Bin	Construct a containment berm		7/1/2001	6/30/02 (Pending funding)	Yes / (No)
If action plan is not completed, note progress made: Design containment cover 7/1/01					
Material Storage - Chemicals	Cosntruct new chemical shed		7/1/1998	1999	(Yes) / No
If action plan is not completed, note progress made: Completed					

007770

FORM 2

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: La Habra

Facility: Public Works Yard

☒ No More Significant Issues

Significant Issue (From Form 1):

Objective and Target Date:

Action Items

Actions To Be Taken	Responsible Party	Projected Start Date	Projected Completion Date	Comments
SAME AS ABOVE				

ENVIRONMENTAL PERFORMANCE REPORT - SIGNIFICANT ISSUES ACTION PLANS & UPDATES

CITY OF LA PALMA

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: LA PALMA

[X] No Significant Issues

Facility: PUBLIC WORKS DEPARTMENT

Prepared By: ISMILE H. NOORBAKSH

Date: 8-8-00

Significant Issue (From Form 1): NONE

Objective and Target Date: N/ A

Action Items

Actions To Be Taken	Responsible Party	Projected Start Date	Projected Completion Date	Comments
N/ A				

ENVIRONMENTAL PERFORMANCE REPORT - SIGNIFICANT ISSUES ACTION PLANS & UPDATES

CITY OF LAGUNA BEACH

ENVIRONMENTAL PERFORMANCE REPORT - SIGNIFICANT ISSUES ACTION PLANS & UPDATES

CITY OF LAGUNA HILLS

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Laguna Hills

[X] No Significant Issues

Facility:

Prepared By: Kenneth H. Rosenfield, City Engineer

Date: July 27, 2000

Significant Issue (From Form 1): None

Objective and Target Date:

Action Items

Actions To Be Taken	Responsible Party	Projected Start Date	Projected Completion Date	Comments

ENVIRONMENTAL PERFORMANCE REPORT - SIGNIFICANT ISSUES ACTION PLANS & UPDATES

CITY OF LAGUNA NIGUEL

ENVIRONMENTAL PERFORMANCE REPORT - SIGNIFICANT ISSUES ACTION PLANS & UPDATES

CITY OF LAKE FOREST

007778

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

[X] No Significant Issues

City of:Lake Forest

Facility:

Prepared By:

Date:

Significant Issue (From Form 1):

Objective and Target Date:

Action Items

Actions To Be Taken	Responsible Party	Projected Start Date	Projected Completion Date	Comments

ENVIRONMENTAL PERFORMANCE REPORT - SIGNIFICANT ISSUES ACTION PLANS & UPDATES

CITY OF LOS ALAMITOS

ENVIRONMENTAL PERFORMANCE REPORT - SIGNIFICANT ISSUES ACTION PLANS & UPDATES

CITY OF MISSION VIEJO

ENVIRONMENTAL PERFORMANCE REPORT - SIGNIFICANT ISSUES ACTION PLANS & UPDATES

CITY OF NEWPORT BEACH

ENVIRONMENTAL PERFORMANCE REPORT - SIGNIFICANT ISSUES ACTION PLANS & UPDATES

CITY OF ORANGE

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Orange

☒ No Significant Issues

Facility: ALL (includes City Hall, CoRP[1] and Water Yards)

Prepared By: James Bisetti - Administrative Analyst II

Date: June 15, 2000

Significant Issue (From Form 1): NONE

Objective and Target Date: ALL issues previously identified in last year's report and now COMPLETED. No new issues.

Action Items

Actions To Be Taken	Responsible Party	Projected Start Date	Projected Completion Date	Comments

1-City's maintenance facility at 637 W. Stuck

ENVIRONMENTAL PERFORMANCE REPORT - SIGNIFICANT ISSUES ACTION PLANS & UPDATES

CITY OF PLACENTIA

ENVIRONMENTAL PERFORMANCE REPORT - SIGNIFICANT ISSUES ACTION PLANS & UPDATES

CITY OF SAN CLEMENTE

ENVIRONMENTAL PERFORMANCE REPORT - SIGNIFICANT ISSUES ACTION PLANS & UPDATES

CITY OF SAN JUAN CAPISTRANO

ENVIRONMENTAL PERFORMANCE REPORT - SIGNIFICANT ISSUES ACTION PLANS & UPDATES

CITY OF SANTA ANA

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Santa Ana

10-1-99

Facility: Corporation Yard

☐ No More Significant Issues

Significant Issue (From Form 1): Leakage from Fluid Transfer Area: Material transfer Area S/E Yard.
* Same as spillage of waste

Objective and Target Date:
Move Drums to Covered Area, add containment Berms. 7-2000

Action Items

Actions To Be Taken	Responsible Party	Projected Start Date	Projected Completion Date	Comments
SC 5 - Berm Area	Corp/Yard Mgr.	1/2000	7/2000	*
SC 14 - Employee training	Supervisors	1/2000	7/2000	* *

	Action 1	Action 2	Action Plan Completed
7-17-00	* SC5 Berm Area		No
	**	SC 14 Training	Yes

* Berm Completion date 10-2000.

FORM 2

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Santa Ana

Facility: Corporation Yard

☐ No More Significant Issues

Significant Issue (From Form 1): Small / Large Spills ; Street Sweeping Run-Off

Objective and Target Date:
Eliminate Street Sweeping Run-Off From reaching Storm Drain

Action Items

Actions To Be Taken	Responsible Party	Projected Start Date	Projected Completion Date	Comments
SC 5 Berm Area or	Corp/Yard Mgr	7-2000	12-2000	*
Contain Liquid.				
SC 14 Employee Training	Supervisors	7-2000	12-2000	* *

		Action 1	Action 2	Action Plan Completed
	*	Berm Area or Contain Liquid		No
7-17-00	* *		SC14 Emp. Training	Yes

* Install Storm Drain Filtration System 1-2001

FORM 2

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Santa Ana

Facility: Corporation Yard

Prepared By:

Date:

Significant Issue	ACTION 1	ACTION 2	START DATE	END DATE	Action Plan Completed?
Material Storage - (Out Door) Chemicals	Construct a roof & containment berm	Train employees	1/5/98	7/1/98	Yes / No
If action plan is not completed, note progress made: In Progress					

See attached!

FORM 2

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Santa Ana

Facility: Corporation Yard

Prepared By: Terrill Price

Date: 7-1-99

Significant Issue	ACTION 1	ACTION 2	START DATE	END DATE	Action Plan Completed?
Material Storage - (Out Door) Chemicals	Construct a roof & containment berm	Train employees	1/5/98	7/1/98	Yes / No
If action plan is not completed, note progress made: In Progress					

Note: Chemical storage tank no longer in use!

ENVIRONMENTAL PERFORMANCE REPORT - SIGNIFICANT ISSUES ACTION PLANS & UPDATES

CITY OF SEAL BEACH

ENVIRONMENTAL PERFORMANCE REPORT - SIGNIFICANT ISSUES ACTION PLANS & UPDATES

CITY OF STANTON

FORM 2

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Stanton

Facility: 10652 Bell Street

Prepared By: Craig Stubbe and Pin Chan

Date: July 20, 2000

Enclosed storage pad with block on three sides, placed concrete on 1/2 of storage floor.

Significant Issue	ACTION 1	ACTION 2	START DATE	END DATE	Action Plan Completed?
Materials Storage **If action plan is not completed, note progress made: In progress**	Increase inspections of storage area	Train employees	11/15/97	On Going	Yes / No X

FORM 2

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Stanton

Facility: 10652 Bell Street

[X] No More Significant Issues

Significant Issue (From Form 1):

Objective and Target Date:

Action Items

Actions To Be Taken	Responsible Party	Projected Start Date	Projected Completion Date	Comments

ENVIRONMENTAL PERFORMANCE REPORT - SIGNIFICANT ISSUES ACTION PLANS & UPDATES

CITY OF TUSTIN

007797

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Tustin

Facility Corporate Yard

Prepared By Thomas Lo (URS)

Date 8/1/2000

Significant Issue	ACTION 1	ACTION 2	START DATE	END DATE	Action Plan Completed?
Sweeper Transfer Area	Temporary sand bag containment berms are in place preventing runoff from entering the storm drain system. Sump water is removed by the waste hauler and the sump pump is disabled to avoid accidental discharge into the storm drain system. **(Completed prior to 1999)**	**(2A)** Design and installation of canopy over sweeper transfer area.	N/A	N/A	**Yes (Action 1) / No (Action 2A)**
		(2B) Obtain wastewater discharge permit from the Orange County Sanitation District for wash rack discharge to the sanitary sewer.			**No (Action 2B)**
If action plan is not completed, note progress made:		Design of Canopy complete. Construction anticipated in October 2000. Wastewater discharge permit application complete. Being submitted to OCSD for issuance.			
If action plan is not completed, note progress made:			N/A	N/A	**Yes**
If action plan is not completed, note progress made:			N/A	N/A	**Yes**

FORM 2

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Tustin

Facility Corporate Yard

☐ No More Significant Issues

Significant Issue (From Form 1):

Objective and Target Date:

Action Items

Actions To Be Taken	Responsible Party	Projected Start Date	Projected Completion Date	Comments

ENVIRONMENTAL PERFORMANCE REPORT - SIGNIFICANT ISSUES ACTION PLANS & UPDATES

CITY OF VILLA PARK

ENVIRONMENTAL PERFORMANCE REPORT - SIGNIFICANT ISSUES ACTION PLANS & UPDATES

CITY OF WESTMINSTER

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Westminster

Facility: Corporation Yard

Prepared By:

Date:

Significant Issue	ACTION 1	ACTION 2	START DATE	END DATE	Action Plan Completed?
Paint Drying Area	Construct a canopy	removed drying area	1/1/98	5/1/98	Yes
If action plan is not completed, note progress made: **we store drying paint in drums that aew pumped out when full.**					

FORM 2

ORANGE COUNTY STORM WATER MANAGEMENT PROGRAM

Significant Issues Action Plan and Updates

City of: Westminster

Facility: Corporation Yard

[X] No More Significant Issues

Significant Issue (From Form 1):

Objective and Target Date:

Action Items

Actions To Be Taken	Responsible Party	Projected Start Date	Projected Completion Date	Comments

ENVIRONMENTAL PERFORMANCE REPORT - SIGNIFICANT ISSUES ACTION PLANS & UPDATES

CITY OF YORBA LINDA

APPENDIX 3.3

BMP GUIDELINES

Vicki L. Wilson, Director

COUNTY OF ORANGE

PUBLIC FACILITIES & RESOURCES DEPARTMENT

Environmental Resources
10852 Douglass Road
Anaheim, CA 92806

Telephone: (714) 567-6363
Fax: (714) 567-6220

April 03, 2000

To: Automotive Service Managers

Subject: Automotive Service Center Maintenance - Control of Wash Water Runoff

Dear Sir or Madam:

This letter is being sent to automotive service businesses to draw the attention of service managers to the need to eliminate the discharge of pollutants in wash water runoff to the street and storm drain and to explain why these discharges are of concern to municipalities in Orange County.

In 1990, pursuant to the federal Water Quality Act, Orange County's municipalities received National Pollutant Discharge Elimination System (NPDES) permits. These NPDES permits require the municipalities to eliminate non-stormwater discharges to their storm drain systems and reduce the discharge of pollutants in stormwater runoff to the maximum extent practicable. As a consequence of these requirements, Orange County's municipalities must address the routine disposal of automotive service center wash water runoff to the street and storm drain.

Pressure washing or steam cleaning of areas used for automotive servicing results in runoff containing detergents, caustic cleaning agents, oils and grease, and heavy metals. Consequently, eliminating the discharge of these pollutants to the street or storm drain will make a significant contribution towards protecting the creeks, rives, streams and sensitive receiving waters that ultimately receive all runoff from the municipal storm drain system.

The proper management of this waste stream can also help ensure that regulatory intervention to protect sensitive receiving waters and the municipal storm drain system is avoided. The State Fish and Game Code, State Water Code and local Water Quality Ordinances enforced by this Department and the cities of Orange County all include provision that prohibit unpermitted disposal of wastes to the municipal storm drain system and surface waters.

A number of automotive service centers already use "zero discharge" cleaning services or have arranged with sewering agencies for the direct disposal of waste to the sanitary sewer. If you have not previously considered arranging for the safe disposal of facility wash water, the

attached guidelines prepared by this Department in collaboration with the Regional Water Quality Control Board (Santa Ana Region), should be helpful to you.

Please direct any questions regarding this letter to Karen Ashby at (714) 567-6297.

Very truly yours,

Chris Crompton, Manager
Environmental Resources

Distribution

Attachment: Guidelines for Automotive Service Center Maintenance - Control of Wash Water Runoff

cc: Mark Smythe, Regional Water Quality Control Board - Region 8
Deborah Jayne, Regional Water Quality Control Board, Region 9
Dan Meer, USEPA Region IX
Co-Permittee Cities

GUIDELINES FOR CLEANING AUTOMOTIVE SERVICE FACILITIES

Steam/Pressure Washing of Vehicle Maintenance Areas & Fuel Dispensing Areas

- Block the storm drain and collect water/waste for disposal to the sanitary sewer (with the prior approval of the local sanitation district).

Pressure Washing Sidewalks, Parking Lots, Common Areas

- If soap or any other cleaning agent is used, block the storm drain and collect water/waste and discharge to the sanitary sewer (with the approval of the local sanitation district).

- If only tap water with no cleaning agent is used, then the following Best Management Practices (BMPs) must be implemented before pressure washing:

  - Prior to washing, clean and/or sweep all large debris from the area, and

  - Clean any oil/auto fluid spills with an appropriate dry method, such as kitty litter or other absorbent, and dispose of appropriately,

  - To the extent practicable, the wash water must be directed to vegetative or unpaved areas where it would percolate,

  - If visual observation of the wash water indicates contamination (cloudy, colored, presence of suspended solids), additional Best Management Practices such as temporary retention of wash water (sandbags around storm drain inlets) or filtration methods must be implemented prior to discharge.

For further information, please contact:

Karen Ashby, County of Orange, PFRD/Stormwater Section. Tel. (714) 567-6297
Mark Smythe, Regional Water Quality Control Board - Santa Ana Region. Tel. (909) 782-4998

GUIDELINES FOR CLEANING AUTOMOTIVE SERVICE FACILITIES

Steam/Pressure Washing of Vehicle Maintenance Areas & Fuel Dispensing Areas

- Block the storm drain and collect water/waste for disposal to the sanitary sewer (with the prior approval of the local sanitation district).

Pressure Washing Sidewalks, Parking Lots, Common Areas

- If soap or any other cleaning agent is used, block the storm drain and collect water/waste and discharge to the sanitary sewer (with the approval of the local sanitation district).

- If only tap water with no cleaning agents is used, then the following Best Management Practices (BMPs) must be implemented before pressure washing:

  - Prior to washing, clean and/ or sweep all large debris from the area, and

  - Clean any oil/auto fluid spills with an appropriate dry method, such as kitty litter or other absorbent, and dispose of appropriately,

  - To the extent practicable, the wash water must be directed to vegetative or unpaved areas where it would percolate,

  - If visual observation of the wash water indicates contamination (cloudy, colored, presence of suspended solids), additional best management practices such as temporary retention of wash water (sand bags around storm drain inlets) or filtration methods must be implemented prior to discharge.

For further information, please contact:

Richard Boon, County of Orange, PFRD/Stormwater Section. Tel. (714)567-6371
Laurie Taul, Regional Water Quality Control Board - Santa Ana Region Tel. (909)782-4906

County of Orange

Public Facilities & Resources Department

John W. Sibley, Director

June 10, 1998

To: Automotive Service Managers

Subject: Automotive Service Center Maintenance - Control of Wash Water Runoff

Dear Sir or Madam:

This letter is being sent to automotive service businesses to draw the attention of service managers to the need to eliminate the discharge of pollutants in wash water runoff to the street and storm drain and to explain why these discharges are of concern to municipalities in Orange County.

In 1990, pursuant to the federal Water Quality Act, Orange County's municipalities received National Pollutant Discharge Elimination System (NPDES) permits. These NPDES permits require the municipalities to eliminate non-stormwater discharges to their storm drain systems and reduce the discharge of pollutants in stormwater runoff to the maximum extent practicable. As a consequence of these requirements, the routine use of the street and storm drain for the disposal of automotive service center wash water runoff must be addressed by Orange County's municipalities.

The pressure washing or steam cleaning of areas that are used for automotive servicing generally means that any runoff will contain detergents, caustic cleaning agents, oils and grease, and heavy metals. Consequently, eliminating the discharge of these pollutants to the street or storm drain will make a significant contribution towards protecting the creeks, rivers, streams and sensitive receiving waters that ultimately receive all runoff from the municipal storm drain system.

The proper management of this waste stream can also help ensure that regulatory intervention to protect sensitive receiving waters and the municipal storm drain system is avoided. The State Fish and Game Code, State Water Code and local Water Quality Ordinances enforced by this Department and the cities of Orange County all include provisions that prohibit the unpermitted disposal of wastes to the municipal storm drain system and surface waters.

A number of automotive service centers already use "zero discharge" cleaning services or have arranged with sewering agencies for the direct disposal of waste to the sanitary sewer. If you have not previously considered arranging for the safe disposal of facility wash water, the attached guidelines, which have been prepared by this Department in collaboration with the Regional Water Quality Control Board (Santa Ana Region), should be helpful to you.

LOCATION:
300 N. FLOWER ST
SANTA ANA, CALIFORNIA

MAILING ADDRESS:
P.O. BOX 4048
SANTA ANA, CA 92702-4048

TELEPHONE:
(714) 834-2300
FAX # 834-5188

Please direct any questions regarding this letter to Richard Boon at (714)567-6371.

Very truly yours,

Chris Crompton
Manager
Environmental Resources

Attachment: Guidelines

CC: Laurie Taul, Regional Water Quality Control Board - Region 8
Deborah Jayne, Regional Water Quality Control Board - Region 9
Dan Meer, USEPA Region IX
City Representatives

For More Information...

Questions regarding this notice may be directed to:

The Orange County Public Facilities and Resources Department's Stormwater Section at (714)567-6363

Or

Pavlova Vitale of the Santa Ana Regional Water Quality Control Board at (909) 782-4130

ORANGE COUNTY • STORMWATER • PROGRAM

Orange County Stormwater Program
10852 Douglass Rd.
Anaheim, CA 92806

007811

MOBILE DETAILING AND THE WATER QUALITY ACT

This flyer has been prepared at the request of the mobile detailing industry to provide direction with regard to compliance with the federal Water Quality Act of 1987.

THE WATER QUALITY ACT: Controlling Storm Drain Pollution

Under the federal Water Quality Act of 1987, the County and cities of Orange County are obligated to control the discharge of pollutants into storm drain systems. Specifically, National Pollutant Discharge Elimination System (NPDES) Permits issued by the state in 1990 pursuant to the Act prohibit the public agencies of Orange County from accepting, with few exceptions, non-stormwater discharges into these systems.

According to EPA, exceptions to local regulation include water line flushing, landscape irrigation water, water from potable water sources, foundation drains, air conditioning condensation, irrigation water, water from crawl space pumps, footing drains, lawn watering, individual residential car washing, dechlorinated swimming pool discharges, street wash runoff and fire fighting runoff.

The County's NPDES Permits prohibit, with few exceptions, non-stormwater discharges into the storm drain system.

Mobile Detailing Procedures

Since commercial vehicle washing, including mobile detailing, is not exempted, the following procedures should be adopted by individuals performing this service:

1. When cleaning engines and/or vehicles using chemical additives such as soaps, solvents or degreasers.

   a. Service must be performed at a facility that has the equipment to properly process the contaminated wastewater runoff, or

   b. Service must be performed using a leak-proof ground cover device that will catch and contain all contaminated wastewater runoff for later disposal in a manner that complies with all city, county, state and federal codes.

2. When engine cleaning is not involved, the service may be performed using only deionized water, purified water, and/or tap water with no additives for wash and rinse purposes. This water may then be discharged to the storm drain systems provided there is no visible evidence of chemical contamination such as foams, odors, discoloration, etc.

   When chemical products must be used to perform this type of service, they must be used on a spot basis, and wiped off prior to rinsing.

3. Equipment, such as ground cover devices, shall be regularly inspected and maintained to ensure proper and effective functioning.

Before you allow anything to go into the gutter or storm drain, stop to think!

Storm drains run directly into channels and creeks, through wetlands and to the ocean.

For More Information...

Questions regarding this brochure may be directed to:

The Orange County Public Facilities and Resources Department's Stormwater Section at (714) 567-6363

ORANGE COUNTY • STORMWATER • PROGRAM

Orange County Stormwater Program
10852 Douglass Road
Anaheim, CA 92806

007813

Pool Maintenance and the Water Quality Act

July 2000

This brochure has been prepared to inform the public of the guidelines that have been established regarding the discharge of pool water in Orange County in order to protect storm drains, channels, creeks and bays.

Pool Maintenance and the Water Quality Act

This brochure is presented to you to explain the regulatory issues regarding the discharge of pool water and the two methods by which it may be discharged.

Many pools are plumbed to allow the discharge to go directly to the sanitary sewer. This is an acceptable and preferred method of disposal.

Where the discharge of pool water to the sanitary sewer is not feasible, federal law allows the release of dechlorinated swimming pool water. In Orange County the guidlines for such releases requires pool owners to ensure that all the following criteria are met:

- The residential chlorine does not exceed 0.1 mg/l (parts per million);
- The pH is between 6.5 and 8.5;
- The water is free of any unusual coloration;
- There is no discharge of filter media;
- There is no discharge of acid cleaning wastes; and
- Any pipe connection to the stormdrain system has permits from the city or county having jurisdiction.

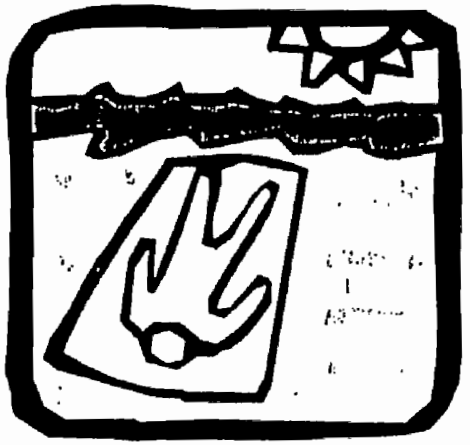

Compliance with this guidance can be verified using a pool testing kit. Excess chlorine can be removed by removing the chlorine tablets for a couple of days prior to discharge or by purchasing dechlorinating chemicals from local pool supply companies.

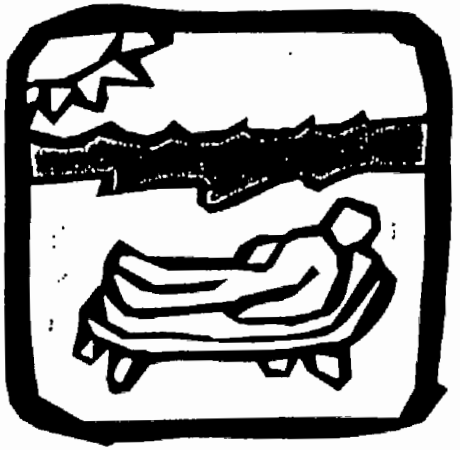

By ensuring compliance with these criteria, you will make a significant contribution toward keeping pollutants out of Orange County's creeks, streams and receiving waters and help to protect organisms that are sensitive to pool chemicals.

Before you allow anything to go into the gutter or storm drain, stop to think.

Storm drains run directly into channels and creeks, through wetlands and to the ocean.

Remember the ocean begins at your front door.

GUIDELINES FOR RESTAURANT CLEANING OPERATIONS

General Cleaning Operations

- Clean floormats, filters and garbage cans in a mop sink, floor drain or contained area outside.
- Pour all washwater into a janitorial or mop sink.
- Keep dumpster area clean and closed, clean area following the guidelines listed below.

Steam/Pressure Washing of Dumpster Areas, Sidewalks and Common Areas

- Block the storm drain and collect all water/waste for disposal to the sanitary sewer (with the prior approval of the local sanitation district).

Hose Washing of Dumpster Areas, Sidewalks, Common Areas

- If hot water, soap or any other cleaning agent is used, block the storm drain and collect water/waste and discharge to the sanitary sewer (with the approval of the local sanitation district).
- If only cold tap water with no cleaning agent is used, then the following Best Management Practices (BMPs) must be implemented before washing:
  - Prior to washing, clean and/or sweep all large debris from the area, and
  - Clean any fluid spills with an appropriate dry method, such as kitty litter or other absorbent, and dispose of appropriately,
  - To the extent practicable, the wash water must be directed to vegetative or unpaved areas where it would percolate,
  - If visual observation of the wash water indicates contamination (cloudy, colored, presence of suspended solids), additional Best Management Practices such as temporary retention of wash water (sandbags around storm drain inlets) or filtration methods must be implemented prior to discharge.

For further information, please contact:

Karen Ashby, County of Orange, PFRD/Stormwater Section (714) 567-6297
Angela Duzich, City of Dana Point/Code Enforcement (949) 248-3565

Appendix 4.1:
Field Screening Data

Field Sc ing Data

007817

STN #	STATION CODE	DATE		TIME	Qw (cfs)		pH	COND (µmhos)	TEMP (C)	DO (mg/l)	Total Cl2 (mg/l)	Diss. Cu (µg/l)	Diss. Cr^{6+} (µg/l)	Diss. Zn (µg/l)	Free CN (mg/l)	Total CN (mg/l)	NO3 (mg/l)	Phenol (mg/l)	COD (mg/l)	Hard-ness (mg/l)	Analyzed by Flame Atomic Absorption Cr (µg/l)	Cu (µg/l)	Cd (µg/l)	Pb (µg/l)	Zn (µg/l)
1	CYTA01	07/14/94		1045	1.6	M	7.5	1367	28.5	11.4	0.06	<5.0	10	30	<0.014		7.4	ND	<25	548					
				1500	1.6	M	7.7	1331	31.6	10.5	0.06	<5.0	<10	30	<0.014		7.5	ND	<25	490					
		01/23/95	S	1140	37.5	E	8.3	212	14.1	8.8					<0.014		<1	ND	55	65	<5	<5		<5	<20
		06/20/96		900	1.0	E	7.9	350	24.3	15.2	<0.05	<5.0	<10	50	0.031v		8.8	ND	<25	397					
				1300	1.5	E	8.5	463	33.1	>19.99	<0.05	<5.0	10	<30	0.021v		10.6	ND	<25	496					
		10/30/96	S	1530	1.5	E	7.8	520	15.3	12.4					<0.014		<1	ND	<75	124					
		05/13/97		815	0.9	E	7.0	1300	21.4	10.9	0.03	<5.0	10	<30	<0.014		10.70	ND	17.0	530					
				1245	0.9	E	7.3	1400	31.0	>19.99	0.07	<5.0	<10	<30	<0.014		11.20	ND	35.0	506					
2	CCCA01	10/05/94	S	1215	450	E	7.5	738	22.2	6.0					<0.014		1.6	0.1	550	160	<5	<5		<5	35
		04/13/95		1120	6.9	M	8.1	1760	22.1	17.6	<0.05	<5.0	<10	<30	0.015v		<1	ND	<25	551					
				1520	7.8	M	8.3	1740	27.7	18.3	<0.05	<5.0	10	<30	<0.014		1.4	ND	<25	496					
		09/06/95		920	5.5	E	8.6	1480	23.1	>20	<0.05	<5.0	10	30	<0.014		<1	ND	34	380					
				1320	4.8	E	9.2	1400	32.9	>20	<0.05	<5.0	<10	50	<0.014		<1	ND	36	356					
		03/12/96	S	1510	1418	E	8.5	392	16.1	8.0					<0.014		<1	ND	136	80	<5	<5		<5	<10
		01/15/97	S	1510	413	E	8.1	165	12.3	11.0							<1	ND	52	53					
		06/03/97		815	2.4	E	7.7	1550	20.4	12.4	0.08	2.0	20	<30	<0.014		1.7	ND	41	438					
				1215	3.1	E	8.4	1435	28.3	15.4	0.13	6.8	10	<30	<0.014		2.1	ND	66	408					
3	BCWA02	10/05/94	S	1345	60	E	7.7	980	24.2	4.6					<0.014			ND	300	264	<5	<5		<5	<20
		04/13/95		1000	6.8	M	8.0	1980	18.5	14.7	<0.05	5.1	<10	<30	<0.014		<1	ND	<25	496					
				1400	6.8	M	8.2	1850	25.9	18.1	<0.05	5.6	<10	<30	<0.014		<1	ND	<25	540					
		09/06/95		830	4.3	E	8.2	1630	22.1	16.4	<0.05	<5.0	20	40	<0.014		<1.0	ND	27	492					
		09/07/95		1305	3.7	E	8.9	1550	32.1	>20.0	<0.05	<5.0	<10	<30	<0.014		<1.0	ND	26	380					
		03/12/96	S	1435	960	E	8.2	745	16.8	7.9					<0.014		<1.0	ND	143	143	<5	5		<2	<20
		01/15/97	S	1430	270	E	8.2	155	12.2	10.3					<0.014		<1.0	ND	45	40					
		06/03/97		DRY																					
4	FULA03	10/05/94	S	1130	27	M	7.3	771	22.5	3.9					<0.014		1.5	0.3	475	108	<5	14		5	170
		05/24/95		735	1.8	M	7.8	1710	16.9	9.5	<0.05	<5.0	40	50	<0.014		<1	ND	30	408					
				1135	1.8	M	8.6	1510	17.8	>20	0.05	<5.0	20	60	<0.014		1.2	ND	37	580					
		09/06/95		1010	3.7	E	8.8	1450	26.8	>20	0.05	<5.0	10	<30	<0.014		<1	ND	56	524					
				1410	3.3	E	9.8	1320	32.8	>20	<0.05	<5.0	<10	<30	<0.014		<1	ND	68	236					
		03/12/96	S	1540	450	E	7.9	275	17.0	8.0					<0.014		11	ND	195	61	<5	13		<5	71
		01/15/97	S	1600	350	E	8.0	130	12.4	11.0					<0.000		<1	ND	52	32					
		06/03/97		915	1.4	E	8.3	1540	22.0	13.0	0.08	8.0	0.02	<30	<0.014		1.3	ND	56	412					
				1315	1.1	E	8.7	1452	32.4	>19.99	0.24	1.50	0.02	<30	<0.014		<1	ND	63	324					

Field Screening Data

007818

STN #	STATION CODE	DATE		TIME	Qw (cfs)		pH	COND (µmhos)	TEMP (C)	DO (mg/l)	Total Cl2 (mg/l)	Diss. Cu (µg/l)	Diss. Cr^{6+} (µg/l)	Diss. Zn (µg/l)	Free CN (mg/l)	Total CN (mg/l)	NO3 (mg/l)	Phenol (mg/l)	COD (mg/l)	Hard-ness (mg/l)	Analyzed by Flame Atomic Absorption Cr (µg/l)	Cu (µg/l)	Cd (µg/l)	Pb (µg/l)	Zn (µg/l)
5	BCCA04	01/23/95	S	1055	15.0	E	7.6	100	13.0	9.0					<0.014		<1	ND	69	242	<5	21		<5	<20
		04/27/95		1030	5.7	M	8.3	1900	16.8	13.7	<0.05	<5.0	20	<30	<0.014		<1	ND	<25	660					
				1430	5.3	M	8.4	1800	24.5	19.6	0.06	<5.0	10	<30	<0.014		<1	ND	<25	560					
		06/20/96		1000	3.0	E	8.0	1375	25.2	12.0	<0.05	<5.0	<10	<30	0.034v		<1	ND	<25	550					
				1400	3.0	E	8.3	1333	32.9	12.8	0.05	<5.0	<10	<30	<0.014		<1	ND	<25	314					
		05/13/97		1000	7.5	E	7.1	1710	22.1	12.5	0.03	1.8	<10	<30	<0.014		20.9	ND	23	584					
				1400	7.5	E	7.7	1650	30.5	>19.99	0.08	0.8	<10	<30	<0.014		<1	ND	15	540					
6	LDCA06	07/12/94		1030	0.4	M	7.9	1430	22.3	9.9	0.05	<5.0	10	30	<0.014		1.0	ND	26	450					
				1445	0.3	M	8.3	1440	27.0	10.5	0.11	<5.0	<10	<30	<0.014		1.9	ND	<25	476					
		01/23/95	S	915	37	E	6.7	871	13.8	7.9					<0.014		1.6	ND	83	270	<5	7		<5	46
		08/24/95		1120	0.1		8.3	1310	25.3	10.3	<0.05	<5.0	10	<30	<0.014		1.2	0	<25	396					
				1520	0.02		8.3	1480	29.9	8.4	0.05	<5.0	10	<30	<0.014		1.9	0	<25	424					
		10/30/96	S	1402	6	E	8.3	500	15.3	12.3				<30	<0.014		<1	ND	<143	122					
		05/28/97		1015	0.94	E	8.0	1420	22.9	10.7	<0.05	<5.0	10	<30	<0.014		2.6	ND	<23	476					
				1415	0.57	E	8.2	1370	27.8	10.7	0.06	<5.0	<10	<30	<0.014		3.3	ND	<14	416					
		05/01/91		845	0.2		7.4	1300	16.0	7.9	0.08	90	<10		<0.014			<0.01	<58						
				1430	0.2		8.5	1400	24.0	>15.0	0.21	<30	<10		<0.014			<0.01	<58						
		01/03/92	S	1310	6.0		7.0	205	13.1	11.2			10		<0.014			<0.01	135	65					
		07/29/92		950	<0.1		8.1	1310	23.1	1.9	<0.05	<30	<10		<0.014			<0.01	130	392					
				1400	<0.1		8.1	1360	30.5	1.8	0.06	<30	<10		<0.014			<0.01	196	396					
		02/18/93	S	1600			7.2	50	15.0	9.8					<0.014			ND	<25	9	<10	<10	<10		<20
		07/27/93		930	0.2		8.1	1350	21.1	1.5	<0.05	UTD	40	<30	<0.014		0.2n	ND	181	360					
				1345	0.2		9.5	2130	32.2	6.8	0.12	UTD	20	<30	<0.014		1.6n	ND	535	392					
		02/04/94	S	1330	12		7.2	251	15.2	9.3					<0.014		4.0	ND	82	39	<5	7		<5	59
7	IMPA07	07/19/94		1020	0.1	M	8.4	1327	23.1	8.4	<0.05	<5.0	10	160	<0.014		<1	0.1	194	300					
				1430	0.02	M	9.8	719	30.0	12.5	<0.05	<5.0	20	30	<0.014		<1	ND	274	230					
				1435			9.5	742	32.2	11.9	0.05	5.3	20	70	<0.014		<1	ND	230	74					
		01/23/95	S	1015	4.5	M	7.7	154	13.0	9.5					<0.014		<1	ND	50	30	<5	<5		<5	27
		06/20/96		755	0.5	E	8.2	681	20.9	8.9	<0.05	<5.0	20	30	<0.014		1.3	ND	44	270					
				1215	0.5	E	9.3	679	33.2	12.5	0.07	6.1	10	50	<0.014		<1	ND	84	230					
		10/30/96		1440	1.0	E	7.9	600	14.6	12.0					<0.014		<4	ND	125	145					
		05/28/97		1125	0.3	E	9.5	656	27.1	11.6	0.04	29.1	30	50	<0.014		<1	ND	121	240					
				1530	0.3	E	10.1	723	31.9	8.3		65.7	10	<30	<0.014		<1	ND	106	216					
8	LMDA08	07/19/94		845	0.02	M	7.5	366	19.3	6.1	<0.05	5.2	20	30	<0.014		3.0	ND	<25	1540					
				1245	0.01	M	8.0	361	21.4	9.8	<0.05	<5.0	10	30	<0.014		2.9	ND	26	1466					
		01/23/95	S	1500	4.5	E	8.0	2650	13.1	8.8					<0.014		<1	ND	41	1108	<5	<5		<5	<20
		06/20/96		DRY																					
		05/13/97		DRY																					

STN #	STATION CODE	DATE		TIME	Qw (cfs)		pH	COND (µmhos)	TEMP (C)	DO (mg/l)	Total Cl2 (mg/l)	Diss. Cu (µg/l)	Diss. Cr^{6+} (µg/l)	Diss. Zn (µg/l)	Free CN (mg/l)	Total CN (mg/l)	NO3 (mg/l)	Phenol (mg/l)	COD (mg/l)	Hard-ness (mg/l)	Analyzed by Flame Atomic Absorption Cr (µg/l)	Cu (µg/l)	Cd (µg/l)	Pb (µg/l)	Zn (µg/l)
9	TCCA09	07/12/94		DRY																					
		01/23/95	S	1600	6	E	8.2	1940	12.8	8.3					<0.014		4.6	ND	28	630	<5	<5		<5	<20
		04/27/95		900	2.2	M	8.3	2060	15.1	8.6	0.20	<5.0	10	<30	<0.014		<1	ND	<25	660					
				1300	2.1	M	8.4	2040	16.5	9.4	<0.05	<5.0	10	<30	<0.014		<1	ND	<25	572					
		08/24/95		1010	0.01	E	7.9	2340	20.7	7.8	<0.05	<5.0	20	<30	<0.014		1.4	ND	30	960					
				1410	0.01	E	8.0	3190	23.5	7.6	<0.05	<5.0	10	<30	<0.014		1	ND	29	892					
		05/28/97		900	0.2	E	7.9	3860	19.9	16.6	<0.06	<5.0	20	<30	<0.014		<1	ND	41	992					
				1315	0.2	E	7.8	3540	23.0	11.3	0.05	<5.0	10	<30	<0.014		<1	ND	45	972					
10	CCCB01	11/10/94	S	1045	108	E	8.2	150	13.2	7.6					<0.014		<1	ND	218	47	<5	7		6	<20
		06/01/95		1115	5.0	M	8.3	1800	19.7	15.9	0.05	<5.0	20	70	<0.014		<1	ND	91	416					
				1515	4.1	M	8.6	1760	20.8	20.0	<0.05	<5.0	10	60	<0.014		<1	ND	<58	365					
		08/23/95		1025	0.7	E	8.3	1940	23.1	9.2	<0.05	<5.0	<10	60	<0.014		<1	ND	<25	375					
				1510	0.56	E	9.2	1920	33.0	>19.9	0.06	<5.0	<10	<30	<0.014		<1	ND	36	62					
		05/27/97		1000	2	E	7.5	1650	27.7	15.1	<0.05	10.8	10	<30	<0.014		<6	ND	27	398					
				1405	11.2	E	8.5	1590	33.6	>19.9	0.05	<5.0	<10	<30	<0.014		<1	ND	51	298					
11	CCPB01	02/14/95	S	845	51.0	E	7.0	93	14.9	8.7					<0.014		<1	ND	38	<25	<5	6.0		<5	<20
		06/01/95		1000	86.4	M	8.2	1030	19.5	9.8	<0.05	<5.0	20	50	<0.014		<1	ND	<25	300					
				1400	35	M	8.5	1040	19.5	10.0	<0.05	<5.0	10	50	<0.014		<1	ND	<25	294					
		10/04/95		1050	1.9	E	8.3	1010	23.1	15.1	<0.05	<5.0	<10	40	<0.014		<1	ND	<25	292					
				1450	1.4	E	8.8	1070	28.6	>20	<0.05	<5.0	<10	30	<0.014		<1	ND	<25	244					
		10/30/96	S	1240	180	E	8.2	210	15.3	13.3					<0.014		<1	ND	99	45					
		06/10/97		815	1	E	8.1	1090	20.4	7.8	0.03	<5.0	30	30	<0.014		1.5	ND	44	308					
				1335	1	E	9.5	1120	31.9	19.3	0.04	<5.0	10	<30	<0.014		1.2	ND	37	290					
12	CCEB01	02/14/95	S	800	150.0	E	6.6	54	14.9	9.4					<0.014		<1	ND	57	14	<5	<5		<5	<20
		08/13/97		1000	DRY																				
13	CCBB01	02/14/95	S	1135	50.0	E	7.4	50	15.6	9.6					<0.014		<1	ND	57	24	<5	5		15	47
		05/24/95		940	0.6	M	7.8	1600	17.5	5.9	<0.05	<5.0	10	40	<0.014		<1	ND	<25	428					
				1340	0.6	E	8.3	1630	19.0	14.2	<0.05	<5.0	10	40	0.016v		<1	ND	<25	460					
		06/27/96		830	2.0	E	8.3	1370	20.0	11.1	<0.05	<5.0	10	<30	<0.014		13.2	ND	<25	422					
				1307	2.0	E	8.7	1460	25.2	14.3	0.05	<5.0	<10	<30	<0.014		7.7	ND	25	376					
		06/25/97		815	8.5	E	7.1	1540	22.0	7.8	<0.05	<5.0	10	30	<0.014		6.5	ND	32	466					
				1220	3.8	E	7.8	1260	25.8	11.8	0.08	<5.0	10	<30	<0.014		5.4	ND	46	358					

Field Screening Data

STN #	STATION CODE	DATE		TIME	Qw (cfs)		pH	COND (µmhos)	TEMP (C)	DO (mg/l)	Total Cl2 (mg/l)	Diss. Cu (µg/l)	Diss. Cr^{6+} (µg/l)	Diss. Zn (µg/l)	Free CN (mg/l)	Total CN (mg/l)	NO3 (mg/l)	Phenol (mg/l)	COD (mg/l)	Hard-ness (mg/l)	Analyzed by Flame Atomic Absorption Cr (µg/l)	Cu (µg/l)	Cd (µg/l)	Pb (µg/l)	Zn (µg/l)
14	PBS1S3	02/14/95	S	915	40.0	E	7.1	193	15.2	9.4					<0.014		<1	ND	55	36	<5	<5		<5	29
		04/25/95		730	0.4	M	7.8	1140	15.3	5.5	<0.05	5.6	30	80	<0.014		<1	ND	52	340					
				1245	0.3	M	9.4	1030	23.7	17.0	0.05	<5.0	10	30	<0.014		<1	ND	33	332					
		06/27/96		730	0.9	E	8.2	1490	17.9	6.1	<0.05	<5.0	40	30	<0.014		<1	ND	41	406					
				1236	0.9	E	9.1	1550	21.1	17.2	<0.05	<5.0	20	40	<0.014		2	ND	60	388					
		10/30/96	S	1115	75	E	8.3	180	15.2	8.8					<0.014		<1	ND	111	42					
		06/10/97		915	0.2	E	8.3	955	21.1	9.3	<0.05	<5.0	50	<30	<0.014		<1	ND	53	334					
				1430	0.20	E	9.5	956	28.9	10.1	<0.05	<5.0	10	<30	<0.014		<1	ND	68	334					
15	MCCB02	11/10/94	S	1245	13.0	M	7.8	340	16.0	8.6					<0.014		<1	ND	58	41	<5	6		<5	66
		05/24/95		840	2.5	M	8.1	2940	16.3	9.6	<0.05	<5.0	30	80	<0.014		4.1	ND	28	404					
				1240	2.5	M	8.7	2520	19	>20	<0.05	<5.0	10	50	<0.014		<1	ND	<25	350					
		08/23/95		910	0.4	E	8.2	2790	22.5	9.2	<0.05	<5.0	40	<30	<0.014		<1	ND	42	355					
				1410	0.4	E	9.7	2420	29.3	>20	0.06	<5.0	<10	<30	<0.014		<1	ND	61	208					
		01/15/97	S	1655	34.5	E	8.0	90	12.8	9.4					<0.014		<1	ND	38	18					
		06/03/97		1015	0.4	E	8.0	1770	23.0	12.8	0.19	18.8	20	30	<0.014		2.5	ND	51	310					
				1415	0.4	E	8.3	2100	33.3	>20	0.11	<5.0	10	30	<0.014		2	ND	54	192					
16	LACC01	11/10/94	S	940	7.9	E	8.0	850	13.8	4.8					<0.014		<1	ND	123	140	<5	9		<5	64
		06/01/95		1245	0.7	M	7.9	5120	19.9	12.0	<0.05	<5.0	<10	50	<0.014		<1	ND	83	865					
		06/02/95		800	2.6	M	7.5	4760	18.1	4.0	<0.05	<5.0	20	<30	<0.014		<1	ND	99	830					
		01/09/96		1030	1.00	E	7.7	5400	14.8	9.8	<0.05	<5.0	N/A	<30	<0.014		<1	ND	35	920					
				1435	1.00	E	8.1	5350	18.0	>20	<0.05	<5.0	10	<30	<0.014		<1	ND	<25	920					
		08/19/97		800	5.00	E	7.5	5280	23.5	1.8	0.06	<5.0	<10	<30	<0.014		<1	ND	<0	830					
				1205	5.00	E	7.9	5300	30.0	13.1	0.09	<5.0	<10	<30	<0.014		<1	ND	<8	840					
17	LABC01	03/11/95	S	1130			8.4	275	16.8	7.1					<0.014		1	ND	49	65	<5	5		<5	<20
18	BCC02	11/08/94	S	810	2.46	M	8.0	2500	14.6	0.6					<0.014		<1	ND	103	516	<5	8		<5	28
		05/31/95		835	1.9	M	7.6	2830	19.7	6.1	<0.05	<5.0	10	<30	<0.014		<1	ND	29	504					
				1250	0.9	E	8.3	2840	24.4	18.9	0.06	<5.0	10	<30	<0.014		<1	ND	35	480					
		08/22/95		915	3.7	M	8.0	257	23.7	18.3	<0.05	<5.0	10	<30	<0.014		<1	ND	31	400					
				1315	3.7	M	8.5	259	30.0	>20	0.05	<5.0	10	50	<0.014		1.7	ND	34	352					
		12/09/96	S	1634	600	E	8.0	105	14.6	>08					<0.014		<1	ND	73	26					
		09/12/96		750	60		8.0	2130	20.0	>01	<0.05	<5.0	20	30	<0.014		<1	ND	24	294					
				1224	42		8.8	2060	27.2	>20	0.06	<5.0	<10	30	<0.014		<1	ND	39	260					

Field Sampling Data

STN #	STATION CODE	DATE		TIME	Qw (cfs)		pH	COND (µmhos)	TEMP (C)	DO (mg/l)	Total Cl2 (mg/l)	Diss. Cu (µg/l)	Diss. Cr^{6+} (µg/l)	Diss. Zn (µg/l)	Free CN (mg/l)	Total CN (mg/l)	NO3 (mg/l)	Phenol (mg/l)	COD (mg/l)	Hard-ness (mg/l)	Analyzed by Flame Atomic Absorption Cr (µg/l)	Cu (µg/l)	Cd (µg/l)	Pb (µg/l)	Zn (µg/l)
19	SSC2S1	11/08/94	S	1000	5.5	M	7.6	890	15.3	7.4					<0.014		<1	0.2	379	196	<5	23		<5	370
		05/26/95		840	2.6	M	8.2	2300			<0.05	<5.0	70	30	<0.014		<1	ND	77	670					
				1245	2.6	M	9.9	1750	29.5	>20	0.05	<5.0	10	60	<0.014		1.0	ND	66	270					
		09/13/95		1015	0.2	M	8.5	1600	26.2	>20	0.05	<5.0	<10	80	<0.014		<1	ND	53	324					
				1420	0.08	M	9.3	1740	29.8	>20	0.06	<5.0	20	<30	<0.014		1	ND	64	256					
		12/09/96	S	1442	27.0	E	8.3	65	15.0	9.5					<0.014		<1	ND	75	18					
		05/27/97		800	3.0	E	7.1	1440	23.3	7.5	UTD	<5.0	30	<30	<0.014		<1	ND	210	316					
				1200	1.3	E	8.8	1290	30.8	>20	<0.05	<5.0	10	<30	<0.014		2.9	ND	24	270					
20	JSC2S3	11/08/94	S	1040	1.3	M	7.9	800	16.7	9.4					<0.014		<1	0.1	234	194	5	21		<5	160
		05/26/95		935	0.5	M					<0.05	<5.0	10	40	<0.014		<1	ND	<25	624					
				1335	0.2	M	8.7	2330	30.1	>20	0.05	<5.0	<10	40	<0.014		<1	ND	27	396					
		01/09/96		920	0.3	E	8.2	2360	14.2	18.4	<0.05	<5.0	N/A	<30	<0.014		<1	ND	38	504					
				1340	0.3	E	8.5	2390	16.8	>20	<0.05	<5.0	<10	<30	<0.014		<1	ND	<25	432					
		12/09/96	S	1410	48.0	E	8.4	69	15.1	>09					<0.014		<1	ND	<52	13					
		05/27/97		900	0.3	E	7.0	2350	25.5	14.5	0.08	15.8	<10	30	<0.014		3.5	ND	15	560					
				1310	1.0	E	8.2	2210	30.1	>20	0.05	<5.0	<10	30	<0.014		3.7	ND	<26	360					
21	ABCC03	10/04/94	S	1530	11.1		7.3	830	22.1	5.8					<0.014		<1	0.6	900	245	10	73		16	970
				1550	88.6													0.3	500	165	5	23		9	340
		05/31/95		950	1.3	E	8.5	1520	19.8	18.4	<0.05	<5.0	20	30			<1	ND	26	400					
				1400	1.3	E	9.1	1420	25.9	>20	<0.05	<5.0	20	50	<0.014		<1	ND	45	260					
		08/22/95		1010	122.9	M	8.4	1750	25.9	>20	0.05	<5.0	10	80	<0.014		<1	ND	49	388					
				1410	137.9	M	9.4	1430	31.6	>20	<0.05	6.3	10	<30	<0.014		<1	ND	64	224					
		12/09/96	S	1605	200.0	E	8.0	58	14.7	9.6					<0.014		<1	ND	62	17					
		09/12/96		855	109.3	M	8.1	1710	19.5	12.0	0.09	<5.0	20	40	<0.014		<1	ND	52	480					
				1300	91.4	M	8.8	1640	30.7	20.0	0.06	<5.0	10	40	<0.014		<1	ND	54	342					
22	HSC3S2	11/08/94	S	910	0.2	M	7.4	600	15.2	3.8					<0.014		UTD	ND	363	150	<5	26		8	230
		05/31/95		1100	0.04	E	8.7	1580	20.6	14.5	<0.05	<5.0	80	30	<0.014		<1	ND	132	250					
				1500	0.05	E	9.2	2130	24.3	16.0	0.05	<5.0	50	40	<0.014		<1	ND	79	212					
		04/30/96		910	0.03	E	8.6	1280	22.0	7.5	<0.05	<5.0	30	<30	<0.014		<1	ND	188	200					
				1445	0.03	E	9.1	1270	29.2	11.5	<0.05	9.3	10	30	<0.014		<1	ND	161	190					
		12/09/96	S	1520	24.0	E	8.1	60	14.7	9.5					<0.014		<1	ND	77	23					
		09/12/96		950	0.3	E	8.5	930	21.1	4.0	<0.05	<5.0	30	30	<0.014		9.1	ND	124	318					
				1350	0.3	E	9.2	840	24.9	12.5	0.05	<5.0	30	30	<0.014		<1	ND	137	252					

Field Screening Data

STN #	STATION CODE	DATE		TIME	Qw (cfs)		pH	COND (µmhos)	TEMP (C)	DO (mg/l)	Total Cl2 (mg/l)	Diss. Cu (µg/l)	Diss. Cr^{6+} (µg/l)	Diss. Zn (µg/l)	Free CN (mg/l)	Total CN (mg/l)	NO3 (mg/l)	Phenol (mg/l)	COD (mg/l)	Hard-ness (mg/l)	Analyzed by Flame Atomic Absorption Cr (µg/l)	Cu (µg/l)	Cd (µg/l)	Pb (µg/l)	Zn (µg/l)
23	WMCC04	10/04/94	S	1330	0.4	M	7.6	1110	21.5	4.4					<0.014		<1	ND	800	220	7	30		10	500
		06/02/95		920	2.4	M	8.0	1900	18.3	8.9	<0.05	<5.0	10	40	<0.014		<1	ND	<25	522					
				1350	1.5	M	8.2	1870	24.0	>20	0.25	<5.0	10	30	<0.014		<1	ND	31	484					
		09/05/95		950	5.1	E	7.9	1790	22.9	11.6	<0.05	<5.0	10	<30	<0.014		<1	ND	25	490					
				1350	5.2	E	8.2	1770	31.7	>20	<0.05	<5.0	<10	<30	<0.014		<1	ND	27	440					
		12/09/96	S	1725	262.5	E	8.3	61	14.4	9.0					<0.014		<1	ND	60	17					
		09/12/96		1045	1.1	E	8.2	1460	24.1	15.6	<0.05	<5.0	<10	80	<0.014				22						
				1445	1.1	E	8.5	1510	31.2	>20	0.05	<5.0	<10	<30	<0.014				24						
24	EGWC05	10/04/94	S	1430	15.5	M	7.9	1450	21.5	4.8					<0.014		<1	ND	275	322	<5	18		<5	33
		06/02/95		1020			8.0	1810	18.9	6.2	<0.05	<5.0	10	40	<0.014		<1	ND	26	516					
				1440			8.4	1760	23.6	>20	<0.05	<5.0	10	40	<0.014		<1	ND	30	480					
		09/05/95		840	10	E	7.7	1410	21.9	0.8	<0.05	<5.0	10	<30	<0.014		<1	ND	54	310					
				1240	10	E	8.7	1360	27.1	>20	0.05	<5.0	<10	50	<0.014		<1	ND	141	296					
		12/09/96	S	1800	700	E	8.3	75	14.4	8.0					<0.014		<1	ND	83	19					
		05/02/97		900	0.9	M	8.0	1720	20.3	4.4	0.07	<5.0	10	<30	<0.014			ND	36	440					
				1300	0.9	M	8.5	1610	25.9	12.3	0.09	<5.0	10	<30	<0.014		<1	ND	35	398					
25	WSC5B1	03/11/95	S	1230	1.0	E	7.9	165	16.6	1.8					<0.014		<1	ND	34	26	<5	<5		<5	<20
26	HBC5B2	05/31/94		1345	0.2		10.1	1170	23.0	8.9	0.05	<70	10	50	<0.014		4.6	ND	42	306	<5	9		<5	<20
		06/01/94		930	0.2		9.1	1100	20.1	11.7	<0.05	<70	20	40	<0.014		0.6	ND	47	302	<5	19		<5	37
		03/11/95	S	1310	2.0	E	7.9	48	15.2	8.4					<0.014		<1	ND	37	16	<5	<5		<5	<20
27	OVCC06	11/10/94	S	840	24.0	E	8.4	320	14.3	6.5					<0.014		<1	ND	361	154	<5	<5		<5	<20
		06/06/95		800	2.0	M	7.8	1770	17.8	2.5	<0.05	<5.0	10	70	<0.014		<1	ND	25	460					
				1235	2.2	M	8.0	1840	22.6	10.1	<0.05	<5.0	10	40	<0.014		<1	ND	29	500					
		04/30/96		1110	2.6	E	8.3	1800	22.6	7.6	<0.05	<5.0	10	60	<0.014		1.1	ND	<25	480					
				1540	2.6	E	8.5	1780	28.2	>20	0.05	5.4	<10	<30	<0.014		1.7	ND	<25	430					
		05/21/97		1010	1.5	E	8.1	1830	21.0	7.4	0.05	<5.0	10	<30	<0.014		<1	ND	40	444					
				1410	1.4	E	8.3	1770	27.0	18.0	0.01	<5.0	10	<30	<0.014		<1	ND	38	430					
28	GBSD03	02/13/95	S	1630	10.0	E	7.5	712	17.4	6.0					<0.014		<1	ND	134	130	<5	45		<5	38
		06/06/95		915	1.3	M	8.1	1350	21.1	7.7	0.06	<5.0	10	<30	<0.014		<1	ND	<58	408					
				1330	1.5	M	8.5	1310	28.0	>20	0.07	<5.0		<30	<0.014		<1	ND	<58	368					
		06/14/96		800	1.3	E	8.3	1120	22.3	8.0	0.05	<5.0	30	<30	<0.014		<1	ND	30	280					
		06/17/96		1220	0.8	E	8.8	1040	31.8	>20	0.06	<5.0	10	<30	<0.014		<2	ND	25	220					
		06/24/97		1020	0.02	E	8.4	1610	24.0	12.33	0.05	<5.0	10	<30	<0.014		<2	ND	33	498					
				1430	0.02	E	8.3	1800	31.9	16.75	0.09	<5.0	<10	<30	<0.014		<2	ND	32	288					

Field Sc ing Data

STN #	STATION CODE	DATE		TIME	Qw (cfs)		pH	COND (µmhos)	TEMP (C)	DO (mg/l)	Total Cl2 (mg/l)	Diss. Cu (µg/l)	Diss. Cr^{6+} (µg/l)	Diss. Zn (µg/l)	Free CN (mg/l)	Total CN (mg/l)	NO3 (mg/l)	Phenol (mg/l)	COD (mg/l)	Hard-ness (mg/l)	Cr (µg/l)	Cu (µg/l)	Cd (µg/l)	Pb (µg/l)	Zn (µg/l)
																					Analyzed by Flame Atomic Absorption				
29	GBHD03	02/14/95	S	1430	12600	E	7.7	650	16.2	9.7					<0.014		<1	ND	68	143	<5	6		<5	<20
30	FCCD04	02/13/95	S	1530	4.0	E	8.2	640	16.6	5.8					<0.014		2.3	0.1	308	104	<5	31		18	190
		04/26/95		845	0.04	M	8.5	1240	18.5	0.8	<0.05	<5.0	30	140	<0.014		<1	ND	40	340					
				1245	0.07	M	8.8	1310	22.7	8.2	<0.05	<5.0	40	80	<0.014		<1	ND	48	278					
		05/01/96		850	0.4	E	8.9	1420	21.0	2.2	0.05	<5.0	30	60	<0.014		<1	ND	57	320					
				1440	0.4	E	9.1	1410	27.9	12.4	0.06	6.7	10	40	<0.014		<1	ND	61	340					
		06/24/97		930	0.1	E	8.9	970	24.4	11.0	0.05	5.1	30	<30	<0.014		<1	ND	54	172					
				1330	0.1	E	9.4	1110	30.5	10.9	0.07	9.7	20	<30	<0.014		<0	ND	110	178					
31	FVCD05	02/13/95	S	1430	5	E	8.0	1750	16.4	13.9					<0.014		<1	ND	69	340	<5	15		<5	<20
		04/26/95		1000	1.3	M	8.0	2330	20.3	17.3	<0.05	<5.0	10	<30	<0.014		<1	ND	28	722					
				1400	0.9	M	8.6	1830	28.9	>20	0.06	<5.0	10	30	<0.014		3.5	ND	<25	392					
		05/01/96		940	0.8	E	8.5	1030	24.0	20.0	0.05	<5.0	10	80	<0.014		<1	ND	<25	220					
				1540	4.4	E	9.0	1170	29.5	20.0	0.05	<5.0	<10	40	<0.014		1.9	ND	<25						
		06/24/97		830	0.6	E	9	1920	21.5	12.6	0.05	<5.0	10	<30	<0.014		2.5	ND	<53	304					
				1230	0.6	E	9	1890	31.4	17.4	0.07	<5.0	<10	<30	<0.014		2.3	ND	<61	274					
32	CCDE03	02/14/95	S	715	60.0	E	5.7	233	14.7	9.1					<0.014		<1	ND	57	20	<5	<5		<5	<20
		04/25/95		DRY																					
		08/31/95		DRY																					
		01/11/96		1120	<0.1	E		2150	17.4	7.3	<0.05	<5.0	10	<30	<0.014		1.7	ND	<25	380					
				1505	<0.1	E		2090	21	11	<0.05	7	10	<30	<0.014		1.5	ND	27	348					
		03/13/96	S	910	1.3	E	8	197	13.5	7.9					<0.014		<1	ND	71	67	<5	9		<5	<20
		10/30/96	S	1035	180.0	E	8	160	14.4	8.3					0		<1.0	ND	120	38					
		06/10/97		DRY																					
33	MBE2B1																								
34	CCCE03	02/14/95	S	1000	99.0	E	8.0	820	14.7	9.1					<0.014		<1	ND	46	235	<5	6		7	<20
		04/25/95		900	4.6	M	8.5	2880	14.1	10.0	<0.05	<5.0	20	<30	<0.014		<1	ND	<25	960					
				1345	5.6	M	8.6	2750	23.7	11.7	0.05	<5.0	10	<30	0.019v		<1	ND	<25	998					
		08/31/95		1030	0.07	M	8.5	1080	25.5	18.6	<0.05	<5.0	20	<30	<0.014		<1	ND	27	234					
				1500	0.04	M	8.9	1200	33.0	20.0	0.06	<5.0	10	<30	<0.014		<1	ND	36	256					
		03/13/96	S	800	14.0	E	8.3	1070	13.4	8.6					<0.014		<1	ND	56	377	<5	3		9	<20
		08/13/97		900	0.2	E	7.8	1190	20.6	5.8	0.05	<5.0	20	<30	<0.014		<1.00	ND	39	370					
				1400	0.1	E	8.5	1260	32.8	10.5	<0.05	<5.0	10	<30	<0.014		<1.30	ND	18	340					

Field Screening Data

STN #	STATION CODE	DATE		TIME	Qw (cfs)		pH	COND (µmhos)	TEMP (C)	DO (mg/l)	Total Cl2 (mg/l)	Diss. Cu (µg/l)	Diss. Cr^{6+} (µg/l)	Diss. Zn (µg/l)	Free CN (mg/l)	Total CN (mg/l)	NO3 (mg/l)	Phenol (mg/l)	COD (mg/l)	Hard-ness (mg/l)	Analyzed by Flame Atomic Absorption Cr (µg/l)	Cu (µg/l)	Cd (µg/l)	Pb (µg/l)	Zn (µg/l)
35	RFCE05	02/14/95	S	1025	5.0	E	6.9	235	15.8	9.8					<0.014		<1	ND	58	62	<5	<5		<5	46
		06/29/95		720	0.8	M	8.1	1720	20.0	5.7	<0.05	5.8	10	30	<0.014		<1	ND	30	520					
				1300	0.8	M	8.2	1760	28.0	>20	0.06	15.6	<10	<30	<0.014		8.1	ND	55	408					
		08/15/95		1115	3.6	E	9.1	1490	30.7	>20	0.08	<5	10	<30	<0.014		3.8	ND	33	420					
				1515	0.2	E	10.0	1530	32.5	>20	0.08	7	<10	<30	<0.014		3.1	ND	49	360					
		03/13/96	S	830	3.0	E	8.4	561	14.1	9.7					<0.014		1.9	ND	45	130	<5	5		<5	<20
		08/13/97		820	2.1	E	7.9	1590	20.4	10.8	<0.05	<5	10	<30	<0.014		2.1		22	498					
				1300	1.2	E	8.3	1390	35.0	12.6	<0.05	<5	<10	<30	<0.014		1.2		29	375					
36	ECEE06	02/14/95	S	1050	35.0	E	8.0	982	15.4	8.0					<0.014		<1	ND	46	301	<5	<5		10	<20
		06/09/95		850	2.0	E	7.9	3070	16.7	9.0	<0.05	<5.0	10	<30	<0.014		<1	ND	26	1174					
				1350	2.0	E	8.2	3120	28.0	7.2	<0.05	65	<10	<30	<0.014		<1	ND	31	1230					
		05/03/96		1000	1.5	E					<0.05	20.3	<10	<30	<0.014		<1	ND	<25	1190					
				1415	1.3	E	8.9	3530	26.3	5.2	<0.05	<5.0	<10	30	<0.014		<1	ND	33	1244					
		08/13/97		730																					
				1215	1.8	E	7.3	1003	18.2	8.4	<0.05	<5.0	<10	<30	<0.014		<4.1	ND	14	1162					
					1.5	E	8.0	1030	25.6	11.4	<0.05	<5.0	<10	40	<0.014		<1.2	ND	13	1108					
37	CLSE07	01/03/95	S	815	25.0	E	7.0	224	11.7	10.2					<0.014		<1	ND	75	66	<5	22		<5	82
		04/12/95		DRY																					
		08/16/95		DRY																					
		01/16/96	S	1728	112.5	E	8.1	900	16.6	5.1					<0.014		2.1	ND	439	238	<5	45		7	34
		10/30/96	S	750	300.0	E	8.6	190	14.3	8.8					<0.014		<1.0	ND	129	47					
38	SANE08	11/10/94	S	1345	0.5	E	7.9	230	8.4	15.5					<0.014		<1	ND	62	58	<5	8		<5	<20
		04/12/95		DRY																					
		08/16/95		DRY																					
		01/16/96	S	1850	5.3	E	7.6	156	16.1	7.8					<0.014		1.1	ND	143	27	<5	24		<5	73
39	SOSE08	03/07/95	S	1015	700.0	M	8.1	710	15.5	12.2					<0.014		<1	ND	<25	241	<5	<5		<5	<20
40	GCCE09	03/23/95	S	800	1.8	E	7.3	840	12.9	9.4					<0.014		<1	ND	53	230	<5	5		<5	<20
41	BCSE11	04/12/95		810	<0.01	M	7.0	910	15.9	8.4	<0.05	<5.0	10	<30	<0.014		<1	ND	<25	254					
				1430	0.05	M	9.7	971	25.5	>20	<0.05	6.5	<10	<30	<0.014		<1	ND	38	250					
		08/16/95		1015	0.1	E	8.7	753	22.3	N/A	<0.05	<5.0	90	30	<0.014		<1	ND	52	296					
				1415	0.1	E	9.3	774	29.5	N/A	0.05	<5.0	10	<30	<0.014		<1	ND	61	292					
		01/16/96	S	1610	90	E	8.1	278	16.4	7.3					<0.014		1.90	ND	326	71	<5	25		<5	21
		10/30/96	S	840	120	E	8.3	180	14.2	8.3					<0.014		<1	ND	153	49					
		06/25/97		1000	0.07	E	7.3	1300	10.6	11.3	0.05	<5.0	10	60	<0.014		1.00	ND	82	300					
				1400	0.07	E	7.9	1100	23.1	16.2	0.05	<5.0	10	30	<0.014		1.00	ND	102	312					

Field Sc ing Data

STN #	STATION CODE	DATE		TIME	Qw (cfs)		pH	COND (µmhos)	TEMP (C)	DO (mg/l)	Total Cl2 (mg/l)	Diss. Cu (µg/l)	Diss. Cr^{6+} (µg/l)	Diss. Zn (µg/l)	Free CN (mg/l)	Total CN (mg/l)	NO3 (mg/l)	Phenol (mg/l)	COD (mg/l)	Hard-ness (mg/l)	Analyzed by Flame Atomic Absorption Cr (µg/l)	Cu (µg/l)	Cd (µg/l)	Pb (µg/l)	Zn (µg/l)
42	SACE12	01/03/95	S	920	75.0	E	7.3	105	12.6	8.7					<0.014		<1	ND	76	21	<5	11		<5	130
		04/12/95		935	0.4	M	8.3	1220	17.2	10.6	<0.05	<5.0	20	40	<0.014		<1	ND	25	420					
				1545	0.4	M	8.5	1100	20.1	10.2	<0.05	5.1	10	120	<0.014		<1	ND	29	438					
		08/16/95		1300	0.5	E	7.6	1005	25.7	N/A	<0.05	<5.0	10	<30	<0.014		<1	ND	31	372					
		08/17/95		800	0.4	M	8.1	980	21.3	3.3	<0.05	<5.0	60	<30	<0.014		<1	ND	39	360					
		01/16/96	S	1730	150.0	E	7.7	116	15.9	7.8					<0.014		<1	ND	73	30	<5	16		<5	89
		10/30/96	S	915	300.0	E	7.8	150	14.4	9.9					<0.014		<1	ND	136	37					
		08/19/97		830	2.0	E	7.9	1340	23.9	2.0	<0.05	<5.0	10	50	<0.014		1.5	ND	87	392					
				1300	3.0	E	8.1	1370	26.1	2.7	<0.05	<5.0	10	<30	<0.014		<1	ND	139	376					
43	SOBF01	10/05/95		CONSTRUCTION																					
		06/14/96		900	3.80	E	8.0	2610	21.4	9.5	0.12	<5	<10	<30	<0.014		1.8	ND	<25	980					
		06/17/96		1340	5.00	E	8.1	2150	26.6	10.7	0.45	<5	<10	<30	<0.014		2.5	ND	30	680					
		06/09/97		750	5.00	E	6.7	2190	21.3	8.0	0.05	<5	10	30	<0.014		1.8	ND	24	730					
				1215	5.00	E	7.2	2340	26.4	11.8	0.06	<5	<10	<30	<0.014		1.4	ND	41	800					
44	SASF01	01/07/95	S	1400	150.0	E	8.1	85	14.0	10.4					<0.014		2.2	ND	30	22	<5	8		<5	<20
		05/02/95		900	2.7	M	7.9	3130	20.7	10.0	<0.05	<5.0	10	<30	<0.014		<1	ND	25	1075					
				1300	2.4	M	8.0	3170	23.2	11.5	<0.05	<5.0	10	<30	<0.014		<1	ND	<25	1150					
		06/12/96		1105	4.0	E	7.8	3210	24.3	10.9	<0.05	<5.0	<10	<30	<0.014		1.6	ND	<25	1264					
		06/17/96		1510	1.1	E	8.1	2850	29.9	18.0	<0.05	<5.0	<10	<30	0.04v		1.3	ND	<25	930					
		07/30/97		1030	6.0	E	7.7	1560	20.1	8.9	<0.05	<5.0	<10	30	<0.014		3.1	ND	<44	504					
				1430	4.5	E	7.7	1730	25.1	7.9	<0.05	<5.0	<10	40	<0.014		3.0	ND	<8	578					
45	SADF01	01/07/95	S	750	37	M									<0.014		<1	ND	32	190	<5	16		<5	<20
		06/06/95		1100			8.2	2500	25.3	>20	<0.05	<5.0	10	30	<0.014		1.2	ND	<58	816					
				1500			8.2	2560	29.2	>20	<0.05	<5.0	<10	<30	<0.014		<1	ND	64	744					
		01/31/96	S	1805	32	M	8.0	225	15.5	7.7					<0.014		1.6	ND	89	80	<5	7		<5	<20
		06/12/96		830	10.3	M	7.4	2450	21.3	9.0	<0.05	<5.0	10	<30	<0.014		2.1	ND	<25	884					
				1235	10.3	M	7.7	2320	28.2	>20	0.05	<5.0	<10	<30	<0.014		2.5	ND	<25	888					
		07/30/97		915	8.5	E	7.6	1880	21.1	9.0	0.08	<5.0	<10	30	<0.014		7.0	ND	<16	609					
					9.0	E	8.3	1810	27.4	>20	0.07	<5.0	<10	40	<0.014		3.8	ND	<20	584					
46	SAGF02	01/07/95	S	1345	150.0	E	8.1	78	13.8	11.1					<0.014		<1	ND	33	22	<5	6		<5	<20
		05/02/95		1015	1.1	M	8.1	3470	22.8	>20	<0.05	<5.0	10	<30	<0.014		<1	ND	37	1300					
				1415	2.1	M	8.2	3360	30.0	>20	0.06	<5.0	10	<30	<0.014		<1	ND	39	1195					
		10/05/95		1030	5.0	E	7.4	2590	22.4		<0.05	<5.0	10	<30	<0.014		<1	ND	39	1012					
				1445	5.0	E	7.9	1870	30.3	5.9	<0.05	<5.0	<10	<30	<0.014		<1	ND	<25	916					

Field Screening Data

STN #	STATION CODE	DATE		TIME	Qw (cfs)		pH	COND (µmhos)	TEMP (C)	DO (mg/l)	Total Cl2 (mg/l)	Diss. Cu (µg/l)	Diss. Cr^{6+} (µg/l)	Diss. Zn (µg/l)	Free CN (mg/l)	Total CN (mg/l)	NO3 (mg/l)	Phenol (mg/l)	COD (mg/l)	Hard-ness (mg/l)	Analyzed by Flame Atomic Absorption Cr (µg/l)	Cu (µg/l)	Cd (µg/l)	Pb (µg/l)	Zn (µg/l)
47	PACF03	01/07/95	S	1300	18.0	E	7.7	98	15.0	8.8					<0.014		8.5	ND	27	31	<5	7		<5	<20
		06/06/95		DRY																					
		10/05/95		DRY																					
		06/12/96		DRY																					
		06/09/97		830	<0.1	E	6.6	2450	21.8	3.0	<0.05	<5.0	30		<0.014		<1	ND	92	386					
				DRY																					
48	BCF04	01/07/95	S	1120	8.0	E	7.0	1313							<0.014		<1	ND	39	324	<5	13		<5	<20
		06/29/95		900	0.6	M	8.1	3550	19.2	8.5	0.06	<5.0	10	<30	<0.014		<1	ND	44	1020					
				1430	0.5	M	8.3	3980	24.6	9.7	0.05	<5.0	20	<30	<0.014		<1	ND	29	1020					
		01/31/96	S	1720	160.0	E	8.3	797	16.4	7.6					<0.014		<1	ND	86	100	<5	8		<5	<20
		06/27/96		945	2.0	E	8.3	3100	17.8	11.1	0.09	<5.0	10	<30	<0.014		<1	ND	32	850					
				1420	2.0	E	8.5	3150	21.9	7.8	0.07	<5.0	10	50	<0.014		1.3	ND	46	680					
		11/21/96	S	1450	195.0	E	7.5	699	18.0	8.5					<0.014		<1	ND	59	168					
		06/23/97		805	3.0	E	7.4	3500	19.9	7.3	0.07	<5.0	<10	30	<0.014		<1	ND	35	884					
				1205	3.0	E	7.8	3570	21.2	8.1	0.07	<5.0	<10	<30	<0.014		<1	ND	20	902					
49	SDMF05	01/07/95	S	1005	410	M	7.8	2170	13.0	10.2					<0.014		<1	ND	<25	568	<5	7		<5	<20
		06/07/95		900	34.3	M	7.7	3290	18.0	7.9	<0.05	<5.0	<10	<30	<0.014		<1	ND	<58	785					
				1300	8.6	M	8.2	3310	20.9	16.2	<0.05	<5.0	<10	<30	<0.014		<1	ND	<58	835					
		01/31/96	S	1945	1234	M	8.2	460	15.0	8.0					<0.014		1.4	ND	204	70	<5	8		<5	<20
		06/12/96		910	3.3	M	7.8	3230	21.5	10.3	<0.05	<5.0	<10	<30	<0.014		8.1	ND	<25	858					
				1310	3.3	M	7.3	3230	28.7	>20	<0.05	<5.0	<10	50	<0.014		14.8	ND	<25	800					
		06/23/97		855	24.0	E	7.6	3310	21.4	9.0	0.06	<5.0	<10	<30	<0.014		11.0	ND	<20	852					
				1255	2.4	E	7.8	3280	29.7	6.1	0.32p	<5.0	10	<30	<0.014		1.8	ND	<37	850					
50	BARSED	01/04/95	S	1250	1993.0	M	7.7	181	11.7	15.0					<0.014		<1	ND	58	16	<5	5		<5	<20
		06/08/95		955			8.2	2560	21.6	16.1	<0.05	<5.0	10	<30	<0.014		3.7	ND	<25	772					
				1355			8.4	2500	25.5	18.6	<0.05	<5.0	20	<30	<0.014		2.4	ND	<25	704					
		03/04/96	S	1320	63.2	M	8.2	922	12.7	9.6					<0.014		7.8	ND	64	528	<5	8		9	<20
		06/11/96		845	4.0	M	8.3	3250	21.2	14.5	<0.05	6.5	10	30	<0.014		18.2	ND	<25	958					
				1255	4.4	M	8.8	3470	29.3	20.0	0.14	<5.0	<10	<30	<0.014		18.8	ND	29	945					
		06/04/97		845	1.5	M	7.8	2340	23.4	11.3	0.18	<5.0	<10	<30	<0.014		1.3	ND	30	890					
				1250	1.5	M	8.3	2400	29.6	11.3	0.08	<5.0	<10	<30	<0.014		11.3	ND	19	850					
51	MICF07	01/04/95	S	930			7.3	168	12.5	15					<0.014		3.1	ND	61	28	<5	7		<5	<20
		04/28/95		1000			8.4	2050	18.8	>20	<0.05	<5.0	10	<30	<0.014		<1	ND	<25	626					
				1420			8.6	1980	21.3	>20	0.06	<5.0	10	<30	<0.014		4.7	ND	<25	518					
		08/17/95		1000	2.5	M	8.6	1570	23.7	>20	<0.05	<5.0	20	<30	<0.014		<1	ND	26	448					
				1415	2.5	M	8.8	1830	31.0	>20	0.06	<5.0	10	<30	<0.014		5.9	ND	30	412					
		01/31/96	S	1340	26.8	M	8.0	178	15.3	8.7					<0.014		<1	ND	81	48	<5	10		<5	<20
		05/19/97		1010	1.8	E	7.4	1790	31.2	15.3	<0.05	<5.0	20	30	<0.014		6.7	ND	33	500					
				1410	2.5	E	8.4	1300	28.3	16.4	0.05	<5.0	10	30	<0.014		7.4	ND	25	312					

Field Sc ing Data

STN #	STATION CODE	DATE		TIME	Qw (cfs)		pH	COND (µmhos)	TEMP (C)	DO (mg/l)	Total Cl2 (mg/l)	Diss. Cu (µg/l)	Diss. Cr^{6+} (µg/l)	Diss. Zn (µg/l)	Free CN (mg/l)	Total CN (mg/l)	NO3 (mg/l)	Phenol (mg/l)	COD (mg/l)	Hard-ness (mg/l)	Analyzed by Flame Atomic Absorption Cr (µg/l)	Cu (µg/l)	Cd (µg/l)	Pb (µg/l)	Zn (µg/l)
52	LANF08	01/04/95	S	1500	105.0	E	7.1	140	11.7	15.8					<0.014		1.4	ND	<25	45	<5	7		<5	<20
		08/04/95		1115	3.2	M	8.6	10600	26.8	>20	0.05	<5.0	<10	<30	<0.014		<1	ND	80	1514					
		08/05/95		745	3.4	M	7.8	10400	22.1	3.3	<0.05	<5.0	10		<0.014		<1	ND	85	1578					
		03/04/96	S	1410	56.0	E	7.9	1000	16.9	9.2					<0.014		1	ND	116	266	<5	20		8	31
		06/10/96		900	3.3	E	7.9	10900	23.4	16.8	<0.05	<5.0	10	<30	<0.014		5.6	ND	41	1585					
				1300	3.4	E	8.5	11100	31.4	>20	<0.05	7	<10	<30	<0.014		6.9	ND	42	1610					
		11/21/96	S	1100	285	E	7.6	285	18.7	7.5					<0.014		<1	ND	111	102					
		06/11/97		735	5.5		7.2	5520	21.8	2.8	<0.05	<5.0	10	UTD	<0.014		<1	ND	60	1260					
				1135	5.1		8.0	5370	23.9	13.3	0.05	<5.0	10	UTD	<0.014		3	ND	0	1535					
53	ASCF08	01/04/95	S	1400	45.0	E	7.0	131	11.5	16.3					<0.014		1.1	ND	39	12	<5	11		<5	58
		05/09/95		1000	0.4	M	7.6	5770	21.0	8.0	<0.05	<5.0	20	<30	<0.014		<1	ND	31	1370					
				1400	1.2	M	8.1	4960	29.8	7.2	0.06	<5.0	<10	<30	<0.014		<1	ND	<25	1400					
		03/04/96	S	1450	27.2	E	8.8	781	16.9	6.6					<0.014		<1	ND	100	216	<5	11		15	48
		06/10/96		1400	1.1	E	8.7	5980	32.9	>20	0.05	<5.0	<10	<30	<0.014		<1	ND	41	1315					
		06/11/96		1015	1.1	E	8.5	1360	24.0	14.5	0.08	8.9	<10	<30	<0.014		4.1	ND	<25	1280					
		06/11/97		820	0.2	E	7.6	4560	21.2	2.7	<0.05	11.1	10	UTD	<0.014		<1	ND	<23	1160					
				1220	0.2	E	8.5	3870	25.8	11.0	0.09	<5.0	10	<30	<0.014		<1	ND	<40	1000					
54	BC2F09	01/04/95	S	1530	5.0	E	7.4	240	11.0	16.8					<0.014		1.5	ND	47	69	<5	<5		<5	<20
		06/28/95		1500	0.6	M	8.6	5170	29.4	16.9	0.07	<5.0	<10	<30	<0.014		<1	ND		1126					
		06/29/95		1100	0.9	M	8.2	5240	26.3	14.3	0.09	<5.0	<10	<30	<0.014		<1	ND							
		06/10/96		1045	1.5	E	8.5	3870	27.3	20.0	<0.05	<5.0	10	<30	<0.014		1.6	ND	37	948					
				1500	1.8	E	9.1	3940	32.6	20.0	0.06	<5.0	<10	<30	<0.014		2.1	ND	39	908					
		11/21/96	S	1140	9.4	E	7.6	257	18.7	6.8					<0.014		<1	ND	94	156					
		06/77/97		900	0.5	E	8.3	4680	21.3	3.0	<0.05	UTD	20	UTD	<0.014		1.2	ND	40	1100					
				1300	0.7	E	8.5	4540	25.4		<0.05	<5.0	10	<30	<0.014		<1	ND	37	1040					
55	SSFF10	01/04/95	S	1615			7.8	64	11.0	9.9					<0.014		<1	ND	25	22	<5	<5		<5	<20
		06/08/95		855	1.9	M	7.0	1970	19.1	2.5	<0.05	<5.0	10	<30	<0.014		<1	ND	<25	1720					
				1255	1.8	M	7.2	2060	19.7	4.8	<0.05	<5.0	<10	<30	<0.014		<1	ND	35	10750					
		01/31/96	S	1410	40.0	E	7.7	140	15.5	9.2					<0.014		<1	ND	79	29	<5	8		<5	<20
		05/30/96		1100	1.3	M	7.6	2130	21.4	5.2	<0.05	5.3	<10	<30	<0.014		7.3	ND	<25	930					
				1500	2	M	7.2	2160	21.7	10.5	<0.05	<5.0	<10	<30	<0.014		10.8	ND	44	900					
		06/04/97		1045	1	E	7.3	1630	23.4	5.2	<0.05	12.3	<10	30	<0.014		9.6	ND	66	880					
				1445	1	E	8.3	1650	23.4	5.2	<0.05	<5.0	10	20	<0.014		12.7	ND	11	880					

Field Screening Data

STN #	STATION CODE	DATE		TIME	Qw (cfs)		pH	COND (µmhos)	TEMP (C)	DO (mg/l)	Total Cl2 (mg/l)	Diss. Cu (µg/l)	Diss. Cr^{6+} (µg/l)	Diss. Zn (µg/l)	Free CN (mg/l)	Total CN (mg/l)	NO3 (mg/l)	Phenol (mg/l)	COD (mg/l)	Hard-ness (mg/l)	Analyzed by Flame Atomic Absorption Cr (µg/l)	Cu (µg/l)	Cd (µg/l)	Pb (µg/l)	Zn (µg/l)
56	SWTF11	01/04/95	S	810	3.6	E	6.5	105	12.6	13.0					<0.014		<1	ND	131	25	<5	10		<5	95
		05/04/95		1015	0.02	M	9.0	1460	18.8	>20	<0.05	7.3	60	40	<0.014		<1	ND	91	210					
				1430	0.01	E	10.2	2810	29.8	>20	0.17	11.8	60	<30	<0.014		<1	ND	123	220					
		01/31/96	S	1450	25.00	E	7.6	121	15.5	8.5					<0.014		<1	ND	71	13	<5	8		<5	30
		05/30/96		1000	0.1	M	9.8	616	20.5	15.6	<0.05	6.3	20	50	<0.014		<1	ND	73	175					
				1415	0.04	E	10.2	260	28.0	10.8	<0.05	18.6	10	<30	<0.014		<1	ND	74	117					
		06/04/97		945	0.20	E	9.0	716	23.7	13.0	<0.05	<5.0	40	<30	<0.014		<1	ND	37	220					
				1350	0.20	E	9.3	890	33.2	13.3	0.08	<5.0	30	30	<0.014		<1	ND	96	240					
57	NTCF12	01/04/95	S	820	8	E	7.0	128	12.4	10.0					<0.014		1.3	ND	75	35	<5	11		<5	65
		04/28/95		DRY																					
		08/17/95		DRY																					
		01/31/96	S	900	5	E	7.7	121	13.8	9.00					<0.014		<1	ND	38	28	<5	8		<5	<20
58	RHCF13	01/04/95	S	930	18.0	E	7.6	190	12.0	9.6					<0.014		<1	ND	58	40	<5	7		<5	31
		05/04/95		915	0.9	M	8.7	2000	17.8	19.8	<0.05	<5.0	20	30	<0.014		<1	ND	<25	684					
				1325	1.0	M	9.1	2050	23.6	>20	<0.05	<5.0	<10	<30	<0.014		<1	ND	25	630					
		08/17/95		913	0.3	M	8.5	1800	22.0	11.9	0.07	<5.0	30	<30	<0.014		<1	ND	36	560					
				1335	0.3	M	8.8	1860	32.0	15.5	0.09	7	10	<30	<0.014		<1	ND	36	608					
		01/31/96	S	945	10.0	E	7.8	196	14.6	7.8					<0.014		<1	ND	64	37	<5	12		<5	<20
		05/15/97		830	1.5	E	7.9	1750	21.3	9.3	<0.05	<5.0	20	<30	<0.014		<1	ND	24	631					
				1230	1.5	E	8.4	1660	32.4	10.3	0.07	<5.0	10	<30	<0.014		<1	ND	26	520					
59	SJQF14	01/07/95	S	930	20.0	E	7.2	1402	14.0	10.2					<0.014		<1	ND	58	366	<5	6		<5	<20
		06/08/95		1055	1.8	M	8.0	2360	18.9	14.0	<0.05	<5.0	10	<30	<0.014		<1	ND	<25	670					
				1455	2.8	M	8.6	2210	23.4	>20	<0.05	<5.0	10	<30	<0.014		<1	ND	<25	590					
		06/11/96		1415	1.3	E	8.6	1900	29.5	20.0	<0.05	<5.0	<10	40	<0.014		7.6	ND	<25	460					
		06/12/96		1015	3.0	E	7.8	1880	23.4	10.0	<0.05	<5.0	10	<30	<0.014		7.6	ND	<25	564					
		06/23/97		1025	1.4	E	7.7	1870	24.1	9.0	0.05	8.4	10	<30	<0.014		5.2	ND	<41	456					
				1425	1.4	E	8.1	1980	29.9	15.0	0.05	<5.0	<10	<30	<0.014		7.0	ND	<38	490					
60	SCCF15	01/12/95	S	1050	56.0	E	7.7	939	14.2	8.5					<0.014			ND	46	143					
		04/11/95		1100	1.1	M	8.3	2180	15.9	9.7	<0.05	<5.0	10	<30	<0.014		<1	ND	<25	622					
				1500	1.0	M	8.4	2250	19.4	10.2	0.07	<5.0	20	70	<0.014		<1	ND	<25	630					
		06/05/96		1120	0.12	M	7.9	2290	20.5	6.7	<0.05	<5.0	10	90	<0.014		<1	ND	41	606					
		06/06/96		1520	27.0	M	7.9	2000	24.2	5.4	<0.05	<5.0	10	<30	<0.014		<1	ND	58	510					
		06/23/97		945	0.6	E	7.5	2090	20.7	4.8	0.25	<5.0	10	30	<0.014		<1	ND	40	277					
				1345	0.3	E	8.1	2070	24.6	11.9	<0.05	<5.0	<10	30	<0.014		1.2	ND	34	284					

Field Sc. .ing Data

STN #	STATION CODE	DATE		TIME	Qw (cfs)		pH	COND (µmhos)	TEMP (C)	DO (mg/l)	Total Cl2 (mg/l)	Diss. Cu (µg/l)	Diss. Cr^{6+} (µg/l)	Diss. Zn (µg/l)	Free CN (mg/l)	Total CN (mg/l)	NO3 (mg/l)	Phenol (mg/l)	COD (mg/l)	Hard-ness (mg/l)	Analyzed by Flame Atomic Absorption Cr (µg/l)	Cu (µg/l)	Cd (µg/l)	Pb (µg/l)	Zn (µg/l)
61	BEEF17	02/14/95	S	1515	360.0	E	8.8	183	15.7	9.8					<0.014		<1	ND	126	15	<5	7		<5	93
		06/28/95		1410	0.1	E	8.3	1070	24.7	7.2	0.05	<5.0	30	30	<0.014		<1	ND	80	300					
		06/29/95		1010	0.1	E	8.4	1570	20.5	8.0	0.05	<5.0	40	30	<0.014		1.5	ND	38	272					
		06/05/96		850	0.10	M	8.4	1480	19.8	11.0	<0.05	<5.0	30	30	<0.014		<1	ND	52	372					
				1315	0.03	E	8.9	1410	27.1	17.7	0.12	6.1	10	<30	<0.014		<1	ND	51	366					
		06/18/97		805	1.00	E	6.0	1010	20.9	5.8	0.11	<5.0	10	30	<0.014		<2	ND	20	302					
				1210	0.03	E	7.8	1420	25.0	9.4	0.12	<5.0	20	<30	<0.014		1	ND	127	392					
62	ACWF18	01/25/95	S	1140	0.4	E	8.2	190	14.2	9.9					<0.014		1.2	ND	54	50	<5	<5		<5	<20
		06/05/96		DRY																					
		06/18/97		DRY																					
63	SERF19	01/24/95	S	1900	27	E	7.8	240	14.0	10.0					<0.014		<1	ND	50	76	<5	<5		<5	<20
		01/25/95	S	1300	1200	E	7.9	225	14.5	10.1					<0.014		<1	ND	97	64	<5	6		<5	<20
		05/11/95		945	1.1	M	8.4	1240	20.5	10.7	0.10	<5.0	10	<30	0.07v		2.1	ND	30	390					
				1345	0.5	M	8.7	1660	24.2	11.2	0.17	<5.0	30	30	<0.014		2.6	ND	47	525					
		06/05/96		950	0.1	M	9.4	1270	19.3	18.4	<0.05	<5.0	20	<30	<0.014		7	ND	55	356					
				1440	0.1	M	10.0	2990	26.2	13.3	0.05	<5.0	<10	30	0.023v		<1	ND	65	688					
		06/18/97		900	1.0	E	8.1	1230	20.1	8.4	<0.05	<5.0	20	<30	<0.014		<2	ND	55	340					
				1300	0.1	E	9.8	1240	29.7	6.4	<0.05	<5.0	10	<30	<0.014		<1	ND	64	310					
64	BORF20	01/24/95	S	1830	8	E	7.7	299	13.0	10.2					<0.014		<1	ND	141	89	<5	8		<5	<20
		06/20/95		DRY																					
		06/05/96		DRY																					
		06/18/97		DRY	1000																				
65	CANF23	01/25/95	S	1045	160	E	7.9	670	13.6	8.9					<0.014		<1	ND	37	126	<5	7		<5	<20
		05/11/95		1050	0.8	M	7.7	1540	21.5	9.3	<0.05	<5.0	30	<30	0.034v		<1	ND	29	410					
				1450	1.1	M	8.1	1500	25.5	14.9	0.07	<5.0	30	<30	0.016v		<1	ND	29	375					
		06/26/96		810	0.5	E	7.5	1880	21.3	1.0	<0.05	<5.0	30	270	<0.014		<1	ND	59	494					
				1220	0.5	E	7.7	1960	22.2	5.1	<0.05	<5.0	10	<30	<0.014		<1	ND	64	496					
		06/18/97		1010	1.0	E	7.5	1720	23.1	6.9	<0.05	6.7	10	30	<0.014		<1	ND	50	466					
				1410	1.2	E	8.1	1600	25.6	7.6	0.05	<5.0	<10	<30	<0.014		<1	ND	44	432					
66	CICF25	01/04/95	S	1030	29.0	E	6.9	432	11.7	15.8					<0.014		6.9	ND	86	151	<5	9		<5	<20
		05/05/95		1100	1.2	M	8.1	2060	17.5	9.1	0.12	<5.0	60	<30	<0.014		24.0	ND	54	608					
				1500	1.8	M	8.1	2070	21.3	9.1	0.11	<5.0	40	<30	<0.014		33.1	ND	34	608					
		01/10/96		930	0.25	E	8.1	1490	12.4	8.9	<0.05	<5.0	50	<30	<0.014		15.2	ND	68	560					
				1345	0.25	E	8.8	1450	18.6	9.7	0.08	<5.0	30	<30	<0.014		37.4	ND	69	508					
		01/31/96	S	1245	50.0	E	7.9	590	15.0	9.0					<0.014		7.3	ND	85	162	<5	11		<5	<20
		09/10/96		930	3.0	E	8.3	1990	23.8	10.2	0.03	<5.0	10	30	<0.014		14.3	ND	34	582					
				1330	6.0	E	8.6	1980	34.0	11.5	0.05	6.1	10	70	<0.014		23.1	ND	46	700					

Field Screening Data

STN #	STATION CODE	DATE		TIME	Qw (cfs)		pH	COND (µmhos)	TEMP (C)	DO (mg/l)	Total Cl2 (mg/l)	Diss. Cu (µg/l)	Diss. Cr^{6+} (µg/l)	Diss. Zn (µg/l)	Free CN (mg/l)	Total CN (mg/l)	NO3 (mg/l)	Phenol (mg/l)	COD (mg/l)	Hard-ness (mg/l)	Analyzed by Flame Atomic Absorption Cr (µg/l)	Cu (µg/l)	Cd (µg/l)	Pb (µg/l)	Zn (µg/l)
67	RCWF26	01/04/95	S	1100	18.0	E	7.4	220	12.0	10.5					<0.014		3.9	ND	73	62	<5	<5		<5	27
		06/08/95		DRY																					
		01/10/96		DRY																					
		01/31/96	S	1210	20.0	E	7.9	340	15.1	7.9					<0.014		1.9	ND	104	60	<5	9		<5	<10
		05/19/97		1100	1.5	E	7.9	1150	25.1	8.0	<0.05	<5.0	20	<30	<0.014		14.8	ND	25	296					
				1500	0.1	E	8.5	1240	23.4	8.5	<0.05	8.2	20	30	<0.014		7.2	ND	25	334					
68	HCWF27	01/25/95	S	1400	30.0	E	7.9	245	14.5	10.4					<0.014		2.0	ND	98	60	<5	5		<5	<20
		06/08/95		CONSTRUCTION																					
		01/10/96		840	0.1	E	7.6	1330	11.1	10.4	<0.05	<5.0	40	<30	<0.014		1.6	ND	67	364					
				1300	0.1	E	7.9	1190	15.5	9.6	<0.05	<5.0	20	<30	<0.014		1.1	ND	48	336					
		01/31/96	S	1025	3.0	E	7.6	617	14.2	8.0					<0.014		10.3	ND	108	210	<5	9		<5	<20
		05/15/97		1045	0.1	E	7.6	1230	23.4	6.9	0.06	<5.0	40	<30	<0.014		30.0	ND	50	342					
				1510	0.1	E	7.8	1016	28.3	5.8	0.08	<5.0	30	<30	<0.014		15.5	ND	53	248					
69	CMCG02	01/07/95	S	850	6	E	7.6	550							<0.014		<1	ND	110	168	<5	19		<5	88
		05/03/95		1015	0.02	E	9.2	1770	20.4	>20	<0.05	6.4	<10	50			<1	ND	37	378					
				1415	0.04	E	9.9	1910	26.5	14.0	<0.05	8.9	<10	<30	<0.014		<1	ND	80	296					
		01/31/96	S	1830	2.5	E	7.6	180	15.1	8.2					<0.014		<1	ND	60	45	<5	9		<5	25
		05/08/96		900	0.5	E	8.8	1240	19.8	12.9	<0.05	<5.0	30	<30	<0.014		<1	ND	<25	290					
				1505	0.5	E	9.4	1080	28.1	11.7	<0.05	13.7	<10	30	<0.014		<1	ND	72	204					
		11/21/96	S	1300	135.0	E	7.5	76	18.3	9.0					<0.014		<1	ND	119	22					
		07/29/97		935	0.4	E	8.4	950	20.0	9.4	<0.05	<5.0	20	<30	<0.014		<1	ND	40	284					
				1335	0.4	E	9.6	1220	23.9	10.4	<0.05	<5.0	10	<30	<0.014		<2	ND	76	312					
70	SICG03	02/13/95	S	1715	2.5	E	7.7	1480	16.9	5.8					<0.014		1.5	ND	39	270	<5	5		12	<20
		05/03/95		1115	0.8	M	8.2	2150	19.5	16.9	<0.05	<5.0	10	<30	<0.014		<1	ND	<25	534					
				1415	0.8	E	8.0	2780	21.8	15.0	<0.05	<5.0	10	<30	<0.014		<1	ND	<25	470					
		05/08/96		1000	3.0	E	7.9	2920	20.5	11.9	<0.05	<5.0	<10	<30	<0.014		2.4	ND	<25	510					
		05/09/96		1430	2.0	E	8.0	2840	22.8	13.2	<0.05	<5.0	<10	40	<0.014		3.4	ND	<25	400					
		11/21/96	S	1335	270.0	E	7.5	198	17.8	9.0					<0.014		<1	ND	<69	116					
		07/30/97		815	2.5	E	7.1	2750	20.8	5.6	<0.05	<5.0	10	30	<0.014		2.5	ND	<11	534					
				1220	4.9	E	7.8	2700	22.4	7.9	<0.05	<5.0	10	<30	<0.014		4.9	ND	<1	458					
71	BCWG04	02/14/95	S	1430	36.0	E	7.6	1920	15.7	6.8					<0.014		<1	ND	42	500	<5	8		<5	<20
		06/07/95		1030	1.0	E	7.8	5550	16.3	7.3	<0.05	<5.0	10	<30	<0.014		<1	ND	25	1725					
				1430	1.0	E	7.9	5570	17.8	7.7	<0.05	<5.0	10	<30	<0.014		<1	ND	<25	1625					
		06/26/96		1030	3.0	E	8.0	5450	18.3	6.4	0.05	<5.0	20	<30	<0.014		<1	ND	26	1700					
				1510	3	E	8.0	5458	19.5	5.1	<0.05	<5.0	10	<30	<0.014		<1	ND	30	1664					
		07/28/97		1030	3	E	7.8	5440	18.4	7.4	0.06	<5.0	<10	<30	<0.014		2.2	ND	24	1506					
				1430	3	E	8.0	5400	20.4	6.5	0.06	<5.0	10	<30	<0.014		1.6	ND	26	1610					

Field Sc. ning Data

STN #	STATION CODE	DATE		TIME	Qw (cfs)		pH	COND (µmhos)	TEMP (C)	DO (mg/l)	Total Cl2 (mg/l)	Diss. Cu (µg/l)	Diss. Cr^{6+} (µg/l)	Diss. Zn (µg/l)	Free CN (mg/l)	Total CN (mg/l)	NO3 (mg/l)	Phenol (mg/l)	COD (mg/l)	Hard-ness (mg/l)	Analyzed by Flame Atomic Absorption Cr (µg/l)	Cu (µg/l)	Cd (µg/l)	Pb (µg/l)	Zn (µg/l)
72	LCWI02	01/24/95	S	1640	2.2	M	7.2	378	13.5	10.4					<0.014		<1	ND	229	62	<5	<5		<5	<20
		06/05/95		900			8.3	1670	17.9	10.4	<0.05	<5.0	20	<30	<0.014		<1	ND	<25	455					
				1320			8.4	1600	18.6	16.9	<0.05	<5.0	10	30	<0.014		<1	ND	<25	465					
		06/25/96		1015	0.5	E	7.9	1651	22.2	10.0	<0.05	<5.0	<10	<30	<0.014		<1	ND	54	560					
				1510	0.5	E	8.5	1780	26.3	10.4	<0.05	<5.0	<10	<30	0.024v		<1	ND	58	480					
		09/17/96		1100	8.6	M	8.5	1910	21.7	13.0	<0.05	<5.0	10	30	<0.014		<1	ND	21	548					
				1500	8.1	M	8.7	1830	27.2	16.6	<0.05	<5.0	<10	<30	<0.014		<1	ND	29	464					
73	ACCJ01	03/05/95	S	1715	3280	E	7.4	420	16.0	9.4					<0.014		<1	ND	98	105	<5	6		<5	<20
		06/15/95		815	4.6	M	8.1	2440	18.3	9.4	<0.05	<5.0	10	<30	<0.014		<1	ND	<25	846					
				1220	2.0	M	8.2	2800	22.9	12.6	<0.05	<5.0	10	60	<0.014		<1	ND	26	660					
		06/17/96		920	4.9	E	7.9	3380	20.9	8.5	0.08	<5.0	10	<30	<0.014		<1	ND	<25	1670					
		06/18/96		1420	14	E	8.4	3050	28.1	>20.0	<0.05	<5.0	<10	<30	<0.014		<1	ND	<25	980					
		08/06/97		955	6.0	E	7.8	2610	24.5	11.5	<0.05	<5.0	10	<30	<0.014		<1	ND	<16	816					
				1355	6	E	7.8	2600	29.9	>20.0	0.05	<5.0	<10	<30	0.044v		1.2	ND	<18	736					
74	ABJ01	01/10/95	S	1600	700.0	E	8.2	305	13.7	8.4					<0.014		<1	ND	134	116	<5	6		<5	<20
		06/05/95		1000	12.6	M	8.2	3220	18.5	8.7	<0.05	<5.0	<10	<30	<0.014		<1	ND	<58	1035					
				1405	11.4	M	8.2	3270	20.7	8.6	0.08	<5.0	10	<30	<0.014		<1	ND	60	995					
		06/25/96		915	6.0	E	7.9	3260	22.5	8.9	<0.05	<5.0	<10	<30	0.014v		<1	ND	57	1005					
				1315	5.5	E	8.4	3170	30.2	8.9	<0.05	<5.0	<10	<30	<0.014		<1	ND	26	940					
		09/17/97		1000	8.0	E	8.3	3160	21.7	12.0	0.05	<5.0	<10	30	<0.014		<1	ND	28	1024					
				1400	8.0	E	8.6	2630	27.9	12.4	<0.05	<5.0	<10	40	<0.014		<1	ND	27	1086					
75	SCBJ03	01/10/95	S	1700	900.0	E	7.0	310	13.6	11.6					<0.014		1.0	ND	256	111	<5	7		<5	<20
		05/25/95		945	1.3	M	7.8	2470	20.4	8.7	<0.05	5.3	10	<30	<0.014		<1	ND	<25	824					
				1420	1.8	M	8.3	2450	22.9	10.4	0.11	9.7	<10	40	<0.014		<1	ND	30	812					
		06/15/95		1030	3.0	M	8.0	2770	22.8	8.2	0.12	<5.0	10	<30	<0.014		<1	ND	34	906					
				1430	1.7	M	8.2	2770	23.2	9.2	0.11	10.2	10	<30	<0.014		<1	ND	35	908					
		06/18/96		930	1.3	E	7.6	2750	26.0	5.7	0.07	<5.0	<10	50	<0.014		<1	ND	<25	880					
				1330	2.0	E	8.1	2770	30.3	6.6	0.05	<5.0	<10	<30	<0.014		<1	ND	29	850					
		08/06/97		800	2.0	E	7.1	3420	26.2	5.6	0.08	<5.0	10	<30	0.046v		<1	ND	20	1260					
				1210	2.0	E	7.7	3420	29.9	8.3	<0.05	<5.0	10	<30	<0.014		<1	ND	29	1080					
76	NARJ04	01/10/95	S	1730	45.0	E	8.0	400	13.7	8.4					<0.014		<1	ND	36	116	<5	7		<5	<20
		05/25/95		845	1.5	E	6.8	4080	18.3	6.2	<0.05	<5.0	10	300	<0.014		<1	ND	35	1610					
				1400	1.5	E	7.9	4890	20.5	12.7	0.10	<5.0	10	30	<0.014		4.3	ND	46	1748					
		06/15/95		915	18.0	M	7.5	4180	19.4	5.0	<0.05	<5.0	20	<30	<0.014		1.3	ND	35	1436					
				1315	18.0	M	7.8	4280	20.7	10.3	<0.05	<5.0	10	<30	<0.014		<1	ND	35	1540					
		06/18/96		815	7.5	E	6.8	3210	20.1	7.4	<0.05	<5.0	10	<30	<0.014		1.5	ND	<25	1060					
				1220	15.0	E	8.0	3360	25.0	>20	<0.05	<5.0	<10	<30	<0.014		1.5	ND	27	1100					
		08/06/97		900	1.3	E	7.3	3400	24.3	7.2	<0.05	<5.0	10	<30	<0.014		2.0	ND	32	1096					
				1300	1.3	E	7.8	3430	27.6	10.0	<0.05	<5.0	<10	<30	<0.014		1.7	ND	36	1136					

Field Screening Data

STN #	STATION CODE	DATE		TIME	Qw (cfs)		pH	COND (µmhos)	TEMP (C)	DO (mg/l)	Total Cl2 (mg/l)	Diss. Cu (µg/l)	Diss. Cr^{6+} (µg/l)	Diss. Zn (µg/l)	Free CN (mg/l)	Total CN (mg/l)	NO3 (mg/l)	Phenol (mg/l)	COD (mg/l)	Hard-ness (mg/l)	Analyzed by Flame Atomic Absorption Cr (µg/l)	Cu (µg/l)	Cd (µg/l)	Pb (µg/l)	Zn (µg/l)
77	ECCJ07	03/05/95	S	1845	500.0	E	7.9	250	15.0	9.0					<0.014		<1	ND	84	51	<5	<5		11	<20
		06/20/95		1015	0.5	M	7.5	2210	19.2	7.6	<0.05	<5.0	10	<30	<0.014		<1	ND	<25	598					
				1440	0.5	E	7.9	2190	24.0	8.0	<0.05	<5.0	<10	<30	<0.014		<1	ND	<25	786					
		06/07/96		940	3.0	E	7.8	2070	19.9	5.2	<0.05	<5.0	<10	80	<0.014		<1	ND	33	680					
				1345	3.0	E	8.1	2150	25.0	5.3	<0.05	<5.0	<10	<30	<0.014		<1	ND	25	740					
		08/12/97		1105	4.0	E	7.6	2140	20.8	9.6	<0.05	<5.0	10	<30	<0.014		<1	ND	21	830					
				1515	4.0	E	7.9	2150	24.3	6.0	<0.05	<5.0	<10	<30	<0.014		1.5	ND	20	898					
78	SCCK01	03/03/95	S	900	3.0	E	8.6	2500	16.2	9.0					<0.014		<1	ND	92	736	<5	10		<5	<20
		06/12/95		1010	2.7	M	7.7	4120	18.8	8.7	<0.05	<5.0	10	<30	<0.014		<1	ND	25	950					
				1505	4.9	M	7.8	4050	20.9	9.3	<0.05	<5.0	20	<30	<0.014		<1	ND	34	1224					
		06/25/96		800	2.5	E	7.2	3610	19.0	8.8	<0.05	<5.0	10	<30	<0.014		1.6	ND	36	975					
				1230	2.5	E	8.0	3510	20.7	9.2	0.14	<5.0	30	<30	<0.014		2.1	ND	126	920					
		09/17/96		920	7.0	E	7.8	3430	19.3	8.3	<0.05	<5.0	20	50	<0.014		1.0	ND	36	1014					
				1320	7.0	E	7.8	3590	21.0	8.4	0.05	<5.0	<10	<30	<0.014		1.0	ND	44	1078					
79	SJCL01	01/10/95	S	1500	560.0	E	8.0	398	13.9	8.4					<0.014		<1	ND	84	112	<5	<5		<5	<20
		06/12/95		855	41.4	M	8.1	1440	20.7	10.3	<0.05	<5.0	10	40	<0.014		<1	ND	<25	436					
				1345	31.0	M	8.6	1470	27.9	12.9	<0.05	<5.0	10	30	<0.014		<1	ND	<25	425					
		06/24/96		815	5.0	E	7.5	2590	20.7	7.4	<0.05	<5.0	<10	<30	<0.014		1.8	ND	<25	920					
				1220	4.7	E	8.1	2480	26.4	13.6	<0.05	<5.0	<10	<30	<0.014		1.7	ND	<25	800					
		09/17/96		820	8.0	E	8.1	3010	19.6	10.2	0.10	<5.0	10	<30	<0.014		1.0	ND	<24	992					
				1230	6.0	E	8.1	3820	24.7	12.5	0.05	<5.0	<10	<30	<0.014		1.0	ND	<12	1070					
80	SJOL01	07/20/94		DRY																					
		03/05/95	S	1200	975	E	7.2	140	15.0	8.9					<0.014		<1	ND	90	25	<5	<5		6.0	<20
		04/14/95		1035	43	E	8.1	490	15.3	9.2	<0.05	<5.0	<10	<30	<0.014		<1	ND	<25	111					
				1430	40.8	E	8.2	490	17.6	9.1	<0.05	<5.0	<10	<30	<0.014		<1	ND	<25	117					
		06/20/96		DRY																					
81	TRCL02	01/10/95	S	1240	121.0	M	7.0	398	14.1	10.1					<0.014		1.2	ND	36	135	<5	5		<5	<20
		04/11/95		930			8.3	908	13.1	10.3	<0.05	<5.0	10	<30	<0.014		<1	ND	<25	279					
				1330			8.6	891	18.2	10.3	<0.05	<5.0	<10	<30	<0.014		<1	ND	<25	275					
		06/26/96		910	0.5	E	8.6	970	21.4	12.0	<0.05	<5.0	<10	<30	<0.014		<1	ND	<25	380					
				1310	0.5	E	8.5	960	24.0	12.6	<0.05	<5.0	<10	40	<0.014		<1	ND	<25	324					
		08/05/97		900	4.0	E	7.8	1002	23.4	7.5	<0.05	<5.0	10	90	<0.014		<1	ND	<12	360					
				1300	4.0	E	8.1	992	27.4	10.1	<0.05		10	<30	<0.014		<1	ND	<5	278					
82	TCCL02	03/11/95		800	500.0	E	8.2	450	12.9	8.9					<0.014		1.1	ND	35	132	<5	<5		<5	<20
		06/20/95		1235	8.8	E	8.1	720	23.3	9.7	<0.05	<5.0	<10	<30	<0.014		<1	ND	<25	218					
		06/21/95		835	1.7	M	7.5	780	15.6	7.1	<0.05	<5.0	<10	<30	<0.014		<1	ND	<25	248					
		06/07/96		DRY																					

STN #	STATION CODE	DATE		TIME	Qw (cfs)		pH	COND (µmhos)	TEMP (C)	DO (mg/l)	Total Cl2 (mg/l)	Diss. Cu (µg/l)	Diss. Cr^{6+} (µg/l)	Diss. Zn (µg/l)	Free CN (mg/l)	Total CN (mg/l)	NO3 (mg/l)	Phenol (mg/l)	COD (mg/l)	Hard-ness (mg/l)	Analyzed by Flame Atomic Absorption Cr (µg/l)	Cu (µg/l)	Cd (µg/l)	Pb (µg/l)	Zn (µg/l)
83	OSOL03	01/12/95	S	1020	168.0	E	7.6	780	13.9	9.2					<0.014			ND	39	220					
		06/28/95		845	4.5	M	8.1	3130	22.1	10.5	<0.05	<5.0	10	<30	<0.014		<1	ND	37	980					
				1310			8.2	3190	28.5	>20	0.30	<5.0	<10	<30	<0.014		<1	ND	34	1420					
		06/18/96		1040	2.7	E	8.0	3100	28.5	14.4	<0.05	5.8	<10	<30	<0.014		<1	ND	40	1110					
		06/26/96		1418	2.7	E	8.5	3270	25.3	11.4	<0.05	<5.0	<10	<30	<0.014		<1	ND	36	1184					
		08/05/97		750	4.0	E	7.1	3290	22.6	2.5	<0.05	<5.0	10	<30	<0.014		<1	ND	38	1140					
				1150	4.0	E	7.6	3150	31.4	>20	0.08		10	<30	<0.014		<1	ND	45	1148					
84	OSAL03	03/11/95	S	955	7.0	E	8.1	1110	14.9	9.1					<0.014		<1	ND	43	409	<5	8		<5	<20
		06/20/95		1130	0.8	M	7.7	3300	22.9	10.5	<0.05	<5.0	<10	<30	<0.014		<1	ND	30	1158					
		06/21/95		730	0.9	M	7.3	2890	18.5	8.2	<0.05	<5.0	20	30	<0.014		<1	ND	30	1080					
		06/07/96		820	3.0	E	7.8	2340	21.5	11.1	<0.05	397	10	50	<0.014		<1	ND	51	812					
				1220	3.0	E	8.5	2380	30.1	11.1	<0.05	225	<10	<30	<0.014		<1	ND	62	952					
		08/12/97		1000	3.0	E	7.5	2320	22.0	9.0	<0.05	<5.0	<10	<30	<0.014		3.9	ND	45	848					
				1415	9.0	E	7.8	2560	27.6	8.3	0.06	<5.0	<10	<30	<0.014		2.6	ND	52	928					
85	LPCL04	01/10/95	S	1130	135.0	E	7.5	1230	14.5	10.3					<0.014		<1	ND	47	423	<5	7		<5	<20
		06/28/95		750	4.6	M	7.0	3090	21.5	7.3	<0.05	<5.0	10	<30	<0.014		<1	ND	30	1040					
				1200	4.0	M	8.2	3000	23.7	10.3	<0.05	<5.0	<10	<30	<0.014		<1	ND	28	1130					
		06/07/96		1030	5.0	E	8.0	2970	21.1	9.4	<0.05	<5.0	10	<30	<0.014		<1	ND	<25	1088					
		06/12/96		1415	5.0	E	8.2	2880	23.9	11.7	<0.05	<5.0	10	<30	<0.014		<1	ND	<25	1008					
		08/05/97		945	1.0	E	7.3	3080	22.4	6.2	<0.05		10	<30	0.019v		1.4	ND	<26	1126					
				1345	1.0	E	7.6	3200	27.0	10.1	0.08		<10	<30	0.020v		<1	ND	<25	1172					
86	ESM0S1	01/10/95	S	1410	15.0	E	7.1	312	13.9	11.8					<0.014		<1	ND	45	254	<5	7		<5	<20
		04/06/95		1130	0.7	M	7.9	23800	17.2	17.0	<0.05	<5.0	30	UTD	<0.014		1.3	ND	62	>2000					
		04/14/95		730	0.6	M	7.5	22000	13.8	8.9	<0.05	<5.0	30	UTD	<0.014		<1	ND	73	>2000					
		06/24/96		915	0.7	E	6.8	6770	19.0	7.3	<0.05	10.0	30	<30	<0.014		<1	ND	35	1945					
				1315	0.7	E	7.5	6990	23.4	7.3	<0.05	17.0	10	<30	<0.014		<1	ND	42	1985					
		09/11/96		1005	19.3	E	7.2	9400	19.3	8.6	0.24	<5.0	30	<30	<0.014		<1	ND	51	1730					
				1405	23.3	E	8.3	10200	23.3	6.8	0.11	7.0	10	<30	<0.014		<1	ND	34	1550					
87	MSM0S7	01/10/95	S	1330	30	E	7.4	75	14.2	10.3					<0.014		<1	ND	41	32	<5	9		<5	<20
		04/14/95		845	0.02	M	7.6	15300	15.3	9.0	<0.05	<5.0	30	UTD	<0.014		4.9	ND	110	>2000					
				1245	0.06	M	7.6	16300	16.5	10.2	<0.05	6.9	20	UTD	<0.014		<1	ND	158	>2000					
		06/24/96		1030	0.15	E	6.8	10800	18.0	7.5	<0.05	<5.0	40	<30	<0.014		<1	ND	603	2675					
				1430	0.15	E	7.3	11750	18.3	7.6	<0.05	<5.0	30	330	<0.014		<1	ND	361	2465					
		09/11/96		815	2.00	E	8.0	5560	19.2	6.5	0.06	<5.0	50	UTD	<0.014		2.4	ND	201	1360					49
				1215	1.00	E	7.7	12500	22.7	6.2	<0.05	<5.0	90	UTD	<0.014		<1	ND	198	2170					43

Field Screening Data

STN #	STATION CODE	DATE		TIME	Qw (cfs)		pH	COND (µmhos)	TEMP (C)	DO (mg/l)	Total Cl2 (mg/l)	Diss. Cu (µg/l)	Diss. Cr^{6+} (µg/l)	Diss. Zn (µg/l)	Free CN (mg/l)	Total CN (mg/l)	NO3 (mg/l)	Phenol (mg/l)	COD (mg/l)	Hard-ness (mg/l)	*Analyzed by Flame Atomic Absorption* Cr (µg/l)	Cu (µg/l)	Cd (µg/l)	Pb (µg/l)	Zn (µg/l)
88	PDCM01	01/12/95	S	1000	90.0	E	7.5	1600	15.2	9.8					<0.014			ND	64	511					
		04/06/95		1035	1.9	M	7.9	17400	16.3	9.5	<0.05	<5.0	10	UTD	<0.014		<1	ND	44	>2000					
				1430	1.1	M	8.3	18700	18.1	12.7	<0.05	<5.0	20	UTD	<0.014		<1	ND	44						
		05/29/96		922	1.8	E	8.0	12800	18.2	16.1	0.05	<5.0	20		<0.014		3.1	ND	56	2590					
				1345	1.3	E	8.2	16300	21.2	>20	0.05	<5.0	20		<0.014		2.9	ND	56	2800					
		09/11/96		1040	1.2	E	8.0	10100	11.6	8.6	0.06	<5.0	30	UTD	<0.014		1.2	ND	45	1790					26
				1770	1.2	E	8.3	13000	22.7	12.5	0.07	<5.0	30	UTD	<0.014		1.0	ND	58	2200					<20
89	SDCM02	01/12/95	S	950	67.0	E	7.5	1230	14.4	9.2					<0.014			ND	46	354					
		04/06/95		905	1.7	M	8.3	15600	15.7	13.6	<0.05	<5.0	20	61p	<0.014		<1	ND	50	>2000					
				1305	2.3	M	8.8	19200	18.8	>20	<0.05	<5.0	<10	<30	<0.014		<1	ND	58						
		05/29/96		800	1.4	E	8.0	32100	18.6	17.9	0.06	<5.0	20	180	<0.014		<1	ND	808	2350					
				1240	0.7	E	9.0	43900	28.0	>20	0.06	<5.0	10	910	<0.014		<1	ND	901	3550					
		09/11/96		920	1.4	E	8.6	4560	19.6	11.2	0.08	<5.0	30	UTD	<0.014		<1	ND	41	930					<20
				1320	1.4	E	8.9	33300	27.9	>19.99	0.10	<5.0	10	UTD	<0.014		<1	ND	18	2600					61

p = precipitate formed when sample was mixed with colorimetric reagent; may be false positive

v = no visual color change detected, possible false positive

UTD = Unable to determine because of sample matrix interferences

ND = not detected; below the detection limit of the method

n = No Nitrate standard run

M = Measured

E = Estimated

[ ] = Exceeded the RWQCB Basin Plan Objective

[ ] = Exceeded the acute toxicity objective for hexavalent chromium from the California Toxics Rule (CTR)

Appendix 4.2:
Data from Channels Monitored with Automatic Samplers

HUNTINGTON WATERSHED - STORM AND DRY WEATHER MONITORING

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
TGUC05	08/28/97		DT	1	43000	3	8.2	<0.2	<0.1	1.1	0.6		98	36	<1	<10	<4	<2	<4	<1	40	
	09/25/97	10:48	ST	5	23000	7.7	8.1	1.4	<0.1	1.7	0.5	<0.5	46	21	100	<5	23	<2	6	<1	320	2380
	09/25/97	11:48	SF												<1	<5	13	<2	<4	<1	19	
	09/25/97	13:48	ST	7	3700	52	7.2	4.1	0.72	5.3	1.4	<0.5	57	27	3	<10	28	14	15	<1	200	450
	09/26/97	7:48	SF												2	<10	25	16	14	<1	180	
	09/26/97	9:48	ST	9	41000	5.2	7.7	0.8	0.54	2.0	0.93	<0.5	91	41	<1	<5	12	<2	<4	<1	43	3620
	09/27/97	7:48	SF												<1	<5	11	<2	<4	<1	54	
	10/03/97		DT	1	41000	7.1	8.2	<0.2	0.48	2.3	1.4	<5	120	45	<1	<10	6	<2	<4	<1	18	
	10/03/97		DT												<1	<10	5	<2	<4	<1	13	
	11/05/97	9:05	DT	1	31000	5.0	8.3	<0.2	<0.1	1.4	0.5	<50	53	16	1	<4	10	2	8	<1	14	
			SF												<1	1	11	2	9	<1	16	
	11/10/97	16:07	SF	5				0.80				<50			<10	<40	22	<20	10	<100	29	>2000
	11/10/97	17:07																				
	11/10/97	19:07	ST	7	29000	50	7.7	5.6	0.52	4.1	1.4	<30	150	41	1	7	34	13	14	<1	85	2320
	11/11/97	11:07	SF												3	6	26	7	14	2	47	
	11/11/97	21:07	ST	9	12000	40	7.7	6.6	1.30	6.0	1.6	<0.5	90	30	2	8	39	10	16	<1	77	2110
	11/12/97	13:07	SF												2	5	27	3	15	<1	46	
	11/13/97	7:07	ST	14	9700	100	7.3	3.4	1.40	5.9	2.7	<0.5	240	61	2.0	12	39	23	12	<1	120	1440
	11/14/97	9:07	SF												2	<1	6	64	19	4	8	
	11/26/97	10:09	ST	6	41000	180	8.0	1.7	0.22	3.2	2.4	<50	640	450	2	<4	21	<2	11	<1	64	
	11/26/97	11:09	SF												1	13	54	62	18	<1	140	
	11/26/97	13:09	ST	12	6200	180	7.6	5.0	0.61	4.9	2.8	<0.5	300	260	3	16	56	56	13	<1	230	626
	11/27/97	11:09	SF												2	4	10	2	4	<1	26	
	11/27/97	21:09	ST	22	34000	19	7.4	1.1	0.49	1.4	0.90	<50	300	250	1	<4	24	6.0	9	<1	48	3620
	11/30/97	7:09	SF												<1	<4	19	3	11	<1	60	
	12/18/97	14:05	ST	5	18000	300	7.8	5.4	0.57	3.4	2.9	<20	1300	200	<10	<40	58	54	17	<10	196	2082
	12/18/97	15:05	SF												<10	<40	31	<20	<10	<10	<100	
	12/18/97	17:05	ST	9	16000	280	7.6	2.3	0.62	3.8	3.1	<20	1100	150	<10	<40	69	67	17	<10	268	1270
	12/19/97	9:05	SF												<10	<40	18	<20	<10	<10	<100	
	12/19/97	11:05	ST	37	30000	63	7.6	12	<0.5	<0.5	1.2		310	48	<10	<40	41	<20	<10	<10	<100	2740
	12/22/97	13:05	SF												<10	<40	<10	<20	<10	<10	<100	
	01/03/98	10:01	ST	5	39000	59	7.8	2.1	<0.5	1.5	1.2	<0.5	210	36	<10	<40	37	<20	11	<10	<100	>2000
	01/03/98	11:01	SF												<10	<40	25	<20	<10	<10	<100	
	01/03/98	13:01	ST	10	40000	24	7.7	2.5	1.70	2.9	2.5	<20	180	37	<10	<40	32	<20	17	<10	<100	>2000
	01/04/98	7:01	SF												<10	<40	24	<20	15	<10	<100	
	01/04/98	9:01	ST	36	35000	35	7.7	1.0	0.95	2.0	2.0	<0.5	170	22	<1	<4	18	6	8	<1	18	>2000
	01/07/98	7:01	SF												<1	<4	9	<2	5	<1	<10	
	01/09/98	12:30	ST	5	32000	22	7.7	0.8	2.60	5.9	5.7	<0.5	230	50	<10	<40	21	<20	13	<10	<100	
	01/09/98	13:30	SF												<10	<10	12	<2	18	<1	68	
	01/09/98	15:30	ST	11	11000	180	7.5	1.4	0.95	4.3	3.3	<20	390	58	<1	12	39	82	19	<1	12	1182
	01/10/98	11:30	SF												<1	<10	21	22	20	<1	<10	

HUNTINGTON WATERSHED - STORM AND DRY WEATHER MONITORING

STATION	DATE	TIME	SAMPLES Type	#	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
SPDPMP	11/5/97	10:05	DT	1	95000	50	8.4	<0.2	0	6.8	2	<50	230	80	<1	2	40	2.0	26	<1	64	
			SF												<1	<1	34	<1	19	<1	48	
	11/26/97	10:20	ST	1											<1	<10	39	28	11	<1	200	110
	11/26/97		SF												<1	<10	11	<2	<4	<1	55	
	1/29/98	9:04	ST	5	270	21	7.4	3	<0.5	1.9	1.3	<0.5	72	27	<1	<10	29	11	8	<1	72	52
	1/29/98	10:04	SF												<1	<10	10	<2	10	<1	<10	
	1/29/98	12:04	ST	11	5800	25	7.5	7	<0.5	2.9	2		33	16	<1	<10	24	7	6	<1	31	690
	1/30/98	8:04	SF												11	<10	21	4	5	<1	33	
	2/19/98	20:03	ST	5	910	31	7.4	4.0	1	1	2				<1.00	6	18	10	5	1	46	108
	2/19/98	21:03	SF												<1.00	4	10	<1.00	2	<1.00	12	
	2/19/98	23:03	ST	5	2100	58	7.6	8.0	<0.5	2	2				<1.00	6	95	10	8	<1.00	55	336
	2/20/98	7:03	SF												<1.00	3	17	1	5	<1.00	25	
	2/21/98	22:59	ST	2											<1.00	4	11	3	3	<1.00	25	
	2/22/98	0:59	SF												<1.00	2	9.63	<1.00	4	<1.00	23	
	2/23/98	17:04	ST	10		31	7.7	5	<0.5	2	8				<1.00	6	51	5.30	5	<1.00	32	44
	2/24/98	11:04	SF												<1.00	3	21	2	3	<1.00	18	

HUNTINGTON WATERSHED - STORM AND DRY WEATHER MONITORING

STATION	DATE	TIME	SAMPLES Type	#	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
SPDC05	9/25/97	9:16	ST	5	2000	22	7.4	1.0	0.49	2.8	0.53	0.75	25	16	2	<10	15	7	10	<1	220	190
	9/25/97	10:16	SF												<1	<10	17	3	7	<1	70	
	9/25/97	12:16	ST	9	400	200	7.0	5.6	0.53	8.0	3.60	<5	430	94	2	10	87	84	21	<1	440	230
	9/26/97	8:16	ST												<1	<10	25	21	14	<1	200	
	9/26/97	10:16	ST	9	420	18	7.1	5.4	0.50	3.00	1.40	<0.5	12	12	<1	30	20	6	7.0	<1	78	74
	9/27/97	6:16	SF												<1	<10	17	3	10	<1	59	
	11/5/97	10:25	DT	1	8700	6.9	8.1	<0.2	0.10	1.80	0.38	<0.5	18	<6	2	4	7	4	7	<1	17	
			SF												2	6	5.0	2	7	<1	12	
	11/10/97	8:38	SF	5				<0.8				<30			<10	<40	14	<20	<10	<100	23	1902
	11/10/97	9:38																				
	11/10/97	11:38	ST	9	3600	43	7.5	15.0	0.70	6.40	1.20	<0.5	30	20	<1	<10	<4	9	15	<1	120	452
	11/11/97	5:38	SF												<1	<10	29	7.0	15	<1	130	
	11/11/97	7:38	ST	23	3200	38	7.5	6.7	1.40	6.30	1.60	<0.5	52	24	<1	<10	37	14	13	<1	120	354
	11/13/97	5:38	SF														22	<2	14	<1	77	
	11/13/97	9:38	ST	12	340	420	7.6	4.6	1.2	18.00	9.40	<0.5	1600	330	4	54	250	220	44	<1	1400	88
	11/14/97	7:38	SF												<1	<10	5	3	5	<1	41	
	11/26/97	10:01	ST	5	5500	2600	7.7	1.5	1.4	59.00	34.00		4900	3700	15	100	810	880	180	3		640
	11/26/97	11:01	SF												<1	<10	4	<2	<4	<1	26	
	11/26/97	13:01	ST	13	270	210	7.4	4.6	0.6	6.60	4.20	0.83	210	140	2	22	76	100	21	2	510	60
	11/27/97	13:01	SF												<1	<10	8	<2	<4	<1	42	
	11/27/97	15:01	ST	30	18000	39	7.6	1.9	0.80	2.90	1.60	<50	130	110	2	6	22	15	8	<1	73	2006
	11/30/97	7:01	SF												4	<4	10	<2	6.0	<1	26	
	12/18/97	13:52	ST	5	400	240	7.9	5.5	<0.5	3.50	3.40	<0.5	860	96	<1	21	54	52	18	<1	270	96
	12/18/97	14:52	SF												<1	<10	10	<2	<4	<1	<10	
	12/18/97	16:52	ST	8	150	120	7.6	3.2	<0.5	1.70	1.40	0.70	380	85	<1	12	33	23	9	<1	120	32
	12/19/97	6:52	SF												<1	<10	12	<2	<4	<1	<10	
	12/19/97	8:52	ST	38	26000	25	7.6	5.1	0.58	1.60	0.69		120	38	<10	<40	26	<20	<10	<10	<100	2618
	12/22/97	12:52	SF												<10	<40	<10	<20	<10	<10	<100	
	1/3/98	9:41	ST	5	32000	18	8.1	3.9	<0.5	1.20	0.48	<20	85	24	<10	<40	28	<20	<10	<10	<100	>2000
	1/3/98	10:41	SF												<10	<40	24	<20	<10	<10	<100	
	1/3/98	12:41	ST	9	25000	11	7.9	5.2	<0.5	2.00	0.53	<20	50	22	<10	<40	30	<20	<10	<10	<100	>2000
	1/4/98	6:41	SF												<10	<40	26	<20	<10	<10	<100	
	1/4/98	8:41	ST	37	17000	200	7.5	1.7	0.39	3.30	2.20	<0.5	320	69	<1	5	37	36	10	<1	160	1440
	1/7/98	8:41	SF												<1	<4	9	<2	2	<1	<10	
	1/9/98	15:39	ST	5	4800	300	7.8	7.0	0.57	6.90	5.80	<0.5	1100	150	<10	<40	74	300	24	<10	450	650
	1/9/98	16:39	SF												<10	<10	9	6	5	<1	66	
	1/9/98	18:39	ST	10	2100	190	7.6	1.5	0.56	5.20	5.30	<0.5	880	120	<1	23	81	100	46	<1	23	396
	1/10/98	12:39	SF												<1	<10	8	<2	6	<1	<10	
	1/10/98	14:39	ST	32	11000	29	7.6	2.4	<0.5	2.60	1.20	<20	100	25	<10	<40	<10	<20	<10	<10	<10	1125
	1/13/98	14:39	SF												<10	<40	97	<20	<10	<10	<10	
	1/29/98	7:24	ST	5	17000	19	7.9	5.1	0.57	1.70	0.41	<20	65	21	<1	3	21	11	5	2	27	1900
	1/29/98	8:24	SF												<10	<10	11	<10	<10	<10	<50	
	2/14/98	10:57	ST	5	260	70	7.2	6.6	<0.5	1.80	2.30		380	42	<1.00	20	41	52	15	<1.00	107	70
	2/14/98	11:57	SF												<1.00	2	10	2	4	<1.00	20	
	2/14/98	13:57	ST	7	140	52	7.4	4.0	<0.5	0.97	2.20		450	41	<1.00	13	38	43	11	<1.00	92	60
	2/15/98	1:57	SF												<1.00	2	12	2	5	<1.00	38	
	2/15/98	3:57	ST	14	750	33	7.9	12.0	<0.5	1.60	8.60		44	12	<1.00	4	24	8	83	<1.00	26.0	196
	2/16/98	15:57	SF												<1.00	2	11	<1	2	<1.00	10	
	2/16/98	21:57	ST	9	170	35	7.5	4.0	<0.5	1.40	11.30		86	21	<1.00	16	28	19	5	<1.00	72	44
	2/17/98	13:57	SF												<1.00	3	10	2	2	<1.00	14	
	2/17/98	15:57	ST	10	540	43	7.7	8.4	<0.5	1.30	10.10		43	14	<1.00	49.0	24	12	19	<1.00	41.0	146
	2/18/98	9:57	SF												<1.00	2	18	1	3	<1.00	14	

HUNTINGTON WATERSHED - STORM AND DRY WEATHER MONITORING

STATION	DATE	TIME	SAMPLES Type	#	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
SLTGRM	9/25/97	9:47	SF												<1	<5	7	<2	<4	<1	<10	
	9/26/97	9:45	ST	1											<1	<10	30	12	11	<1	210	180
			SF												<1	<10	18	5	7	<1	110	
	11/5/97	9:35	DT	1	4800	26	8.2	<0.2	<0.1	2.4	1.0	<0.5	21	<6	2	5	17	4	7	<1	47	
			SF												2	6	12	2	6	<1	6	
	11/26/97	9:21	ST	5	1200	320	6.8	2	1	4.8	2		300	230	<1	17	54	48	16	<1		150
	11/26/97	10:21	SF												<1	<10	13	<2	<4	<1	35	
	11/26/97	12:21	ST	13	270	60	7.2	4	0	2.3	1	1	32	<20	<1	<10	27	17	4	<1	120	48
	11/27/97	12:21	SF												<1	<10	10	<2	<4	<1	55	
	11/27/97	14:21	ST	33	340	31	7.7	4	0	1.8	1	<0.5	28	<20	<1	<10	27	11	5	<1	95	58
	11/30/97	6:21	SF												<1	<10	17	<2	<4	<1	71	
	12/18/97	12:31	ST	5	2400	81	7.8	9	1	3.0	1	<0.5	150	32	<1	<10	45	10	8	<1	77	460
	12/18/97	13:31	SF												<1	<10	28	<2	7	<1	23	
	12/18/97	15:31	ST	9	160	54	7.4	3	<0.5	0.98	1	1	67	14	<1	<10	31	13	5	<1	69	38
	12/19/97	7:31	SF												<1	<10	19	<2	<4	<1	29	
	12/19/97	9:31	ST	38	560	40	7.7	5	<0.5	1.4	1		37	10	<10	<10	20	7	<4	<1	38	128
	12/22/97	11:31	SF												<10	<10	22	<2	<4	<1	47	
	1/3/98	0:40	ST	5	2500	12	7.7	6	1	2.1	1	<0.5	<6	<6	<1	<10	22	3	5	<1	44	456
	1/3/98	1:40	SF												<1	<10	16	<2	5	<1	23	
	1/3/98	3:40	ST	15	1200	15	7.5	6	1	2.5	1	<0.5	<6	<6	<1	<10	23	5	6	<1	39	250
	1/4/98	7:40	SF												<1	<10	14	<2	<4	<1	29	
	1/4/98	9:40	ST	32	1400	10	7.5	4.0	1	2.0	1	<0.5	10	8	<1	<10	21	3	6	<1	22	250
	1/6/98	23:40	SF												<1	<10	18	<2	6	<1	34	
	1/9/98	15:45	ST	5	1000	21	7.6	4	<0.5	2.4	1	<0.5	51	<6	<10	<10	23	13	8	<1	440	150
	1/9/98	16:45	SF												<10	<10	11	<2	6	<1	89	
	1/9/98	18:45	ST	10	200	39	7.2	2.0	<0.5	2.2	1	0.685	44	14	<1	<10	24	13	6	<1	<10	44
	1/10/98	12:45	SF												<1	<10	13	<2	<4	<1	<10	
	1/10/98	14:45	ST	37	450	21	7.6	3	<0.5	1.5	1	<0.5	13	8	<1	<10	18	5	<4	<1	110	94
	1/13/98	14:45	SF												<1	<10	15	<2	<4	<1	<10	

HUNTINGTON WATERSHED - STORM AND DRY WEATHER MONITORING

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
BCC02	8/5/91	10:50		25	2100	1.0	8.3	1.1	0.32	6.51	2.00		21	<5								
	8/6/91	10:50																				
	9/11/91	8:30		26	1800	4.0	8.5	0.9	0.20	2.30	1.40		140	23								
	9/12/91	9:30																				
	10/26/91	22:15	ST	4	1500	20.0	7.6	28.0	1.00	10.00	4.60		530	90	<7	<10	90	40	40	<2	420	370
	10/27/91	1:15																				
	11/6/91	9:55		24	1600	2.0	8.4	29.0	0.10	1.10	0.40		<5	<5								
	11/7/91	8:55																				
	12/4/91	10:30		24	2100	1.4	8.4	32.0	0.10	0.50	0.50		17	6								
	12/5/91	9:30																				
	12/10/91	14:10	ST	4	740	6.0	7.9	20.0	0.60	0.50	67.00		<5	<5	<20	<30	20	5	<40	<10	50	164
	12/10/91	17:10																				
	12/10/91	18:10	ST	4	940	17.0	7.9	18.0	0.80	3.00	85.00		<5	<5	<20	<30	20	11	<40	<10	50	278
	12/10/91	21:10																				
	1/5/92	8:00	ST	4	400	22.0	7.9	7.4	0.40	1.90	35.00		420	49	<20	<30	40	51	<40	<10	170	
	1/5/92	11:00																				
	1/5/92	11:30	ST	6	200	210.0	8.3	3.3	0.10	0.50	0.20		880	77	<20	<30	30	57	<40	<10	180	41
	1/6/92	16:30																				
	2/5/92	20:30	ST	4	820	390.0	7.5	21.0	1.90	2.10	52.00		770	100	<20	<30	60	110	<40	<10	330	
	2/5/92	22:30																				
	2/5/92	23:00	ST	20	380	240.0	7.6	10.0	1.40	1.90	46.00		610	58	<20	<30	40	92	<40	<10	250	86
	2/6/92	20:30																				
	5/21/92	11:22		24	2400	1.4	8.8	19.0	0.40	1.90	0.10		8	5	<2	<6	19	<2	<10	<2	20	365
	5/22/92	10:22																				
	8/12/92	13:20		1	2100	3.5	9.1	0.5	0.10	0.70	0.10		40	15	<20	<30	<20	6	<40	<10	<10	
	9/30/92	8:30			2300	2.1	8.3	0.2	0.30	1.10	0.10		<5	<5								
	11/25/92	11:00			2200	5.6	8.6	19.0	0.10	1.40	0.30		9	7								
	12/7/92	9:50	ST	1	260	340.0	8.6	3.1	0.38	1.60	3.20		640	47	<20	<30	20	32	<40	<10	150	
	1/15/93	14:30	ST	17	200	140.0	8.0	2.9	0.20	0.69	2.00		290	24	<7	15	<30	27	12	<4	110	58
	1/16/93	22:30																				
	1/17/93	4:30	ST	5	610	38.0	7.9	10.0	0.25	0.69	0.10		140	8	<7	<10	<30	10	<3	<4	37	134
	1/17/93	12:30																				
	1/17/93	11:58	ST	3	530	63.0	8.0	8.5	0.22	1.00	1.10		100	15	<7	<10	<30	11	4	<4	58	1150
	1/17/93	15:58																				
	1/17/93	17:58	ST	9	180	260.0	8.0	2.3	0.15	1.10	2.40		510	38	<7	19	<30	20	13	<4	140	45
	1/18/93	9:58																				
	1/18/93	11:58	ST	9	240	140.0	8.2	3.7	0.18	0.89	1.50		200	21	<7	11	<30	12	6	<4	130	52
	1/19/93	3:58																				
	2/7/93	22:00	ST	7	230	380.0	8.2	3.2	0.22	0.79	2.30		450	40	<20	<30	<20	24	<40	<10	74	58
	2/8/93	10:00																				
	2/8/93	12:00	ST	9	340	200.0	8.0	4.9	0.18	0.91	1.60		180	24	<20	<30	20	22	<40	<10	87	82
	2/9/93	4:00																				
	2/9/93	6:00	ST	4	830	24.0	8.1	9.9	0.18	1.20	1.40		22	9	<20	<30	<20	6	<40	<10	48	184
	2/9/93	11:45																				
	2/9/93	12:00	ST	13	1500	16.0	8.4	22.0	0.16	0.93	2.90		13	7	<7	<10	<30	5	<3	<4	<20	336
	2/10/93	15:00																				
	2/10/93	17:15	ST	11	2200	10.0	8.4	42.0	0.18	0.97	1.20		11	7	<7	<10	<30	4	<3	<4	<20	504
	2/11/93	15:45																				
	2/18/93	12:16	ST	1											<7	<10	<30	14	3	<4	50	500
	2/18/93	14:15	ST	9	220	95.0	7.9	3.7	0.20	0.72	1.00		200	22	<7	<10	<30	23	<3	<4	70	140
	2/19/93	6:15																				
	2/19/93	8:15	ST	14	200	580.0	8.5	2.6	0.13	0.74	3.40		960	34	<7	20	<30	31	12	<4	130	74
	2/20/93	10:15																				

HUNTINGTON WATERSHED - STORM AND DRY WEATHER MONITORING

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
BCC02	2/20/93	10:16	ST	6	360	60.0	8.1	4.0	0.11	0.84	0.77		69	21	<7	<10	<30	13	6	<4	32	140
	2/20/93	20:36																				
	2/20/93	22:40	ST	18	1500	11.0	8.3	21.0	0.12	1.40	0.94		10	<5	<7	<10	<30	3	<3	<4	<20	340
	2/22/93	8:26																				
	4/26/93	14:24		24	3000	5.7	8.3	47.0	0.10	1.30	0.10		16	6								
	4/27/93	13:30																				
	5/26/93	12:10		24	2900	27.0	8.6	43.0	0.10	2.30	0.40		110	7								
	5/27/93	12:55																				
	6/23/93	12:46		24	2900	7.9	8.5	1.5	0.10	2.30	0.50		19	7								
	6/24/93	11:46																				
	7/28/93	10:00		24	2700	60.0	8.2	28.0	0.18	1.90	0.38		22	11								
	7/29/93	9:00																				
	8/25/93	8:45		24	2800	22.0	8.6	14.0	0.27	2.20	0.47		40	13								
	8/26/93	7:45																				
	9/20/93	11:15		24	2500	1.9	8.2	13.0	0.45	1.80	0.82		150	20								
	9/21/93	12:15																				
	10/19/93	10:23		24	2200	56.0	8.4	12.0	0.45	3.40	1.20		160	<5								
	10/20/93	9:23																				
	11/11/93	3:00	ST	2											<5	<10	55	53	<40	<10	630	224
	11/11/93	5:00																				
	11/11/93	7:00	ST	9	500	190.0	7.4	13.0	0.75	4.10	2.70		280	48	<5	<10	35	30	<40	<10	220	112
	11/11/93	23:00																				
	11/12/93	1:00	ST	7	930	51.0	7.6	14.0	0.56	3.50	1.60		76	24	<5	<10	<20	9.9	<40	<10	100	204
	11/12/93	13:00																				
	11/12/93	15:00	ST	10	1300	17.0	6.8	12.0	0.83	3.00	1.30		39	<5	<5	<10	29	2.6	<40	<10	52	304
	11/13/93	11:00																				
	11/13/93	13:00	ST	12	1900	27.0	7.9	21.0	0.67	2.80	0.95		37	7	<5	<10	23	<2	<40	<10	44	413
	11/14/93	11:00																				
	11/14/93	13:00	ST	7	2400	16.0	8.3	36.0	0.50	2.30	0.36		42	15	<5	<10	<20	3.8	<40	<10	36	546
	11/15/93	1:00																				
	11/23/93	2:56	ST	4	2200	28.0	7.8	24.0	0.50	3.80	1.90		75	7	<5	<10	25	<2	<40	<10	44	430
	11/23/93	8:56																				
	11/23/93	10:56	ST	6	1400	22.0	7.6	29.0	0.58	4.40	1.40		50	<5	<5	<10	27	3.3	<40	<10	110	300
	11/23/93	20:56																				
	11/23/93	22:56	ST	5	1200	42.0	7.5	14.0	0.67	4.30	1.80		62	<5	<5	<10	44	5.8	<40	<10	120	290
	11/24/93	6:56																				
	11/24/93	10:56	ST	12	1500	130.0	7.9	11.0	0.53	4.00	0.20		220	<5	<5	<10	31	10	<40	<10	160	132
	11/25/93	8:56																				
	11/25/93	10:56	ST	12	2000	100.0	8.2	24.0	0.26	2.90	1.40		200	<5	<5	<10	27	7.8	<40	<10	71	412
	11/26/93	8:34																				
	11/26/93	10:56	ST	8	2400	100.0	8.3	23.0	0.23	3.00	1.40		230	<5	<5	<10	<20	85	<40	<10	57	448
	11/27/93	0:56																				
	11/30/93	2:52	ST	4	900	280.0	7.8	13.0	0.35	5.60	4.40		690	7	<5	<10	35	41	<40	<10	210	170
	11/30/93	13:00																				
	11/30/93	15:00	ST	9	800	80.0	7.8	12.0	0.41	2.70	1.90		10	13	<5	<10	<20	13	<40	<10	87	182
	12/1/93	7:07																				
	12/1/93	9:07	ST	13	1400	34.0	8.1	14.0	0.39	1.90	0.92		54	14	<5	<10	<20	3.9	<40	<10	38	300
	12/2/93	9:07																				
	12/2/93	11:07	ST	20	2100	32.0	8.3	34.0	0.28	1.90	1.10		160	19	<5	<10	24	14	<40	<10	52	319
	12/4/93	1:07																				
	12/30/93	9:45		1	2300	7.3	8.2	21.0	0.14	1.00	0.18		15	<5								
	1/31/94	10:00		1	2700	27.0	8.0	18.0	38.00	79.00	1.20		53	13								
	2/7/94	16:00	ST	1	130	150.0	7.9	3.7	0.51	2.40	2.40		300	40	<5	<10	<20	25	<40	<10	220	32

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STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
BCC02	2/17/94	5:00	ST	3	1100	400.0	8.1	21.0	0.40	3.70	4.80		930	46	<5	48	72	53	41	<10	300	220
	2/17/94	9:00																				
	2/17/94	11:00	ST	13	430	160.0	8.1	8.9	0.41	1.50	2.70		330	16	<5	25	29	18	<40	<10	100	100
	2/18/94	11:00																				
	2/18/94	13:00	ST	12	750	44.0	7.9	13.0	0.36	1.70	1.30		67	<5	<5	<10	<20	9.6	<40	<10	48	220
	2/19/94	11:00																				
	2/19/94	13:00	ST	9	850	62.0	8.0	15.0	0.14	1.50	1.10		100	<5	<5	<10	<20	8.5	<40	<10	57	170
	2/20/94	5:00																				
	2/20/94	7:00	ST	7	150	150.0	8.4	0.2	0.10	0.56	2.00		360	8	<5	21	23	22	<40	<10	99	38
	2/20/94	21:00																				
	4/11/94	14:00		24	2400	6.7	8.2	24.0	0.10	1.60	0.52		18	16								
	4/12/94	13:00																				
	5/18/94	10:50		24	840	0.1	7.2	1.0	1.80	2.50	1.60		<5	<5								
	5/19/94	9:50																				
	6/14/94	9:51		24	2800	46.0	8.2	17.0	0.35	2.40	2.90		110	8								
	6/15/94	8:51																				
	7/14/94	10:15			2700	15.0	8.3	10.0	0.51	2.30	0.52		37	<5								
	10/4/94	11:18	ST	4	2200	320.0	7.6	11.0	4.00	18.00	4.30		650	24	1.7	17	63	31	<40	2	260	308
	10/4/94	15:18																				
	10/5/94	13:18	ST	10	1400	270.0	7.5	7.2	6.50	18.00	5.80		870	28	2.1	30	<20	42	44	7.3	320	288
	10/6/94	7:18																				
	10/13/94	10:00		24	2400	8.5	8.3	11.0	0.38	2.20	0.55		88	8								
	10/14/94	9:00																				
	11/10/94	8:35	ST	2	460	740.0	6.5	8.8	0.79	6.30	7.30		1800	120	2.8	61	150	100	52	0.49	620	100
	11/10/94	10:35																				
	11/10/94	12:35	ST	4	610	130.0	6.5	14.0	0.59	3.10	2.10		230	31	<1	11	41	21	<40	<0.3	150	170
	11/10/94	18:35																				
	3/2/95	14:05	ST	3	2000	34.0	8.0	40.0	0.34	3.40	0.82		82	15	<1	<10	23	7.4	<40	1.6	57	342
	3/2/95	18:05																				
	3/2/95	20:05	ST	20	1300	19.0	7.9	19.0	0.42	2.80	0.75		21	8	<1	<10	23	5.9	<40	1.3	62	264
	3/4/95	10:05																				
	3/4/95	12:05	ST	7	1900	17.0	8.2	20.0	0.14	1.90	0.47		38	12	<1	<10	19	3.4	<40	1	26	436
	3/5/95	0:05																				
	3/5/95	2:05	ST	17	290	78.0	7.7	3.3	0.20	1.30	1.30		140	18	<1	<10	22	13	<40	<1	70	66
	3/6/95	10:05																				
	3/10/95	21:52	ST	3	710	200.0	7.8	9.5	0.16	2.20	2.70		340	43	<1	25	42	35	56	<1	180	114
	3/11/95	1:52																				
	3/11/95	3:52	ST	15	530	70.0	7.7	5.5	0.10	1.60	1.60		96	19	<1	10	20	14	<40	<1	75	110
	3/12/95	7:52																				
	3/12/95	9:52	ST	30	2100	11.0	8.0	19.0	0.17	1.70	1.20		19	8	<1	<10	14	3.7	<40	<1	28	396
	3/14/95	19:52																				
	5/8/95	10:34		24	3100	5.0	8.4	22.0	0.10	2.10	0.20		19	19								
	5/9/95	9:34																				
	6/7/95	9:53		24	2900	5.1	8.4	26.0	0.18	2.00	0.20		<6	<6								
	6/8/95	8:53																				
	7/10/95	13:12		24	3000	14.0	8.3	18.0	0.10	5.70	0.37		42	10								
	7/11/95	12:12																				
	8/9/95	10:30		24	2400	9.1	8.5	9.1	0.10	1.10	0.25		23	14								
	8/10/95	9:30																				
	9/5/95	10:50		24	2500	3.9	8.4	2.7	0.86	1.30	0.21		<6	<6								
	9/6/95	9:50																				
	10/10/95	13:51		24	2600	5.8	8.5	11.0	0.27	2.00	0.20		18	<6								
	10/11/95	12:51																				

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STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
BCC02	11/6/95	13:02		15	1200	2.4	8.5	6.7	0.10	0.79	0.20		<6	<6								
	11/7/95	3:02																				
	12/6/95	12:58		24	1800	3.3	8.7	18.0	0.21	1.00	0.38		7	7								
	12/7/95	11:58																				
	12/12/95	20:38	ST	5	1700	10.0	8.0	24.0	0.88	4.00	1.70		17	8	<1	<10	34	5	<40	<1	51	92
	12/12/95	21:38																				
	12/12/95	23:38	ST	18	500	100.0	7.6	13.0	0.70	3.90	2.10		160	29	<1	10	40	18	<40	<1	160	302
	12/14/95	9:38																				
	12/14/95	11:38	ST	29	1500	17.0	8.2	15.0	0.77	2.60	0.67		24	<6	<1	<10	20	2	<40	<1	64	396
	12/16/95	19:38																				
	1/10/96	9:16		24	2400	7.6	8.6	32.0	0.10	1.70	0.33		37	11								
	1/11/96	8:16																				
	1/19/96	6:37	ST	5	1300	140.0	8.1	24.0	0.82	3.90	1.60		410	65	<1	50	35	18	10	<1	140	276
	1/19/96	7:37																				
	1/19/96	9:37	ST	5	400	35.0	7.9	11.0	1.10	3.00	0.92		66	16	<1	<10	25	8	8	<1	92	88
	1/19/96	17:37																				
	1/19/96	17:37	ST	22	1200	11.0	8.0	10.0	0.10	2.50	0.58		32	8	<1	<10	23	3	10	<1	41	274
	1/21/96	13:37																				
	1/21/96	17:37	ST	9	330	80.0	7.6		0.12	0.50	1.40		120	24	<1	<10	39	18	11	<1	140	106
	1/22/96	7:37																				
	1/22/96	11:37	ST	10	1000	20.0	8.0	8.8	0.41	1.50	0.71		24	12	<1	<10	18	4	5	1	42	236
	1/23/96	5:37																				
	1/31/96	2:56	ST	5	1500	90.0	7.8	21.0	0.24	2.60	1.30		200	28	<1	<10	35	13	10	<1	92	278
	1/31/96	3:56																				
	1/31/96	5:56	ST	13	330	110.0	7.7	6.6	0.48	2.20	1.70		170	27	<1	17	34	27	12	<1	170	70
	2/1/96	7:56																				
	2/1/96	9:56	ST	24	1100	16.0	8.3	13.0	0.24	3.00	0.55		17	11	<1	<10	20	5	4	3	40	244
	2/3/96	7:56																				
	2/3/96	9:56	ST	9	520	29.0	7.6	6.7	0.41	2.10	0.97		53	14	<1	<10	29	13	7	2	60	102
	2/4/96	1:56																				
	3/4/96	13:22	ST	5	990	160.0	8.1	18.0	0.81	3.20	1.70		360	32	<1	10	33	30	12	<1	160	168
	3/4/96	14:22																				
	3/4/96	16:22	ST	10	190	78.0	7.9	2.7	0.38	1.30	0.99		110	15	<1	<10	19	15	8	<1	110	42
	3/5/96	10:22																				
	3/5/96	12:22	ST	35	1600	5.8	8.4	20.0	0.10	1.50	0.47		8	<6	<1	<5	14	<2	6	<1	32	382
	3/8/96	8:22																				
	3/27/96	9:30			2800	2.5	8.0	37.0	0.10	1.40	0.20		7	<6	<1	<10	4	<2	15	<1	35	620
	4/30/96	12:00			2400	2.8	8.4	16.0	0.14	2.00	0.20		11	9								
	5/28/96	10:00			2400	3.1	8.3	20.0	0.13	1.70	0.20		9	<6								
	6/17/96	10:00			2100	3.6	8.1	12.0	0.10	0.50	0.20		31	14								
	7/15/96	10:12		24	2100	1.6	8.4	3.5	<0.1	1.30	0.30		14	7								
	7/16/96	9:12																				
	8/7/96	10:14		24	2100	1.4	8.6	1.6	0.24	1.40	0.24		<6	<6								
	8/8/96	9:14																				
	9/4/96	10:10		24	2100	1.2	8.6	<0.2	0.38	1.50	0.39		9	7								
	9/5/96	9:10																				
	10/1/96	15:13		24	2200	2.5	8.3	3.9	0.24	1.50	0.49		<6	<6								
	10/2/96	14:13																				
	10/30/96	5:24	ST	5	1600	370.0	7.6	22.0	1.50	12.00	3.60		710	160	1	22	70	49	31	1	400	270
	10/30/96	6:24	SF												<1	<10	21	<2	14	<1	100	
	10/30/96	8:24	ST	6	300	140.0	7.2	11.0	0.94	4.10	2.10		170	38	<1	<10	48	31	17	<1	290	76
	10/30/96	18:24																				
	10/30/96	20:24	ST	42	1300	25.0	8.2	17.0	2.60	2.90	0.81		30	10	<1	<10	19	4	8	<1	80	348

HUNTINGTON WATERSHED - STORM AND DRY WEATHER MONITORING

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
BCC02	11/3/96	6:24																				
	11/14/96	10:35			2200	6.0	8.4	27.0	0.38	1.60	0.34		15	7								
	11/21/96	8:00	ST	5	340	130.0	7.5	9.9	1.10	6.50	3.30		220	26	1	<10	90	29	16	<1	260	60
	11/21/96	9:00																				
	11/21/96	11:00	ST	10	180	100.0	7.5	4.7	0.46	2.20	1.80		210	22	<1	<10	61	33	11	<1	200	32
	11/22/96	5:00																				
	11/22/96	7:00	ST	33	1100	1.3	8.3	15.0	0.36	1.90	0.87		20	8	2	<10	17	3	9	<1	110	258
	11/25/96	6:00																				
	12/9/96	13:10	ST	5	1300	150.0	8.0	18.0	0.31	3.10	1.40		320	37	<1	<10	34	26	10	<1	150	294
	12/9/96	14:10																				
	12/9/96	18:10	ST	4	160	96.0	7.9	3.6	0.13	0.95	1.50		150	18	<1	<10	25	21	7	<1	120	40
	12/10/96	0:10																				
	12/10/96	2:10	ST	11	620	24.0	7.9	10.0	0.19	1.20	0.95		24	<6	11	<10	14	5	<4	<1	37	134
	12/10/96	22:10																				
	12/11/96	0:10	ST	12	240	59.0	7.8	3.9	0.10	1.00	1.30		120	17	<1	<10	22	18	5	<1	75	54
	12/11/96	22:10																				
	12/11/96	0:10	ST	18	810	18.0	8.0	11.0	0.23	1.70	0.21		20	10	<1	<10	15	5	6	<1	110	196
	12/13/96	10:10																				
	12/27/96	11:51	ST	5	1900	180.0	8.1	40.0	0.64	3.40	1.80		250	40	<1	<10	24	31	9	<1	180	264
	12/27/96	12:51																				
	12/27/96	14:51	ST	9	240	78.0	7.6	4.4	0.47	1.20	0.98		120	16	<1	<10	26	15	<4	<1	160	72
	12/28/96	6:51																				
	12/28/96	8:51	ST	36	1600	5.1	8.3	21.0	0.16	1.70	0.48		25	10	<1	<10	13	3	<4	<1	62	382
	12/31/96	10:34																				
	1/23/97	7:45	ST		170	32.0	7.8	2.6	<0.1	0.76	0.65		30	7	<1	<10	8	3	<4	<1	83	50
	1/25/97	9:20	ST		2100	10.0	8.1	26.0	0.30	1.90	0.71		23	7	<1	<10	8	<2	<1	<1	160	490
	1/26/97	8:10	ST		160	76.0	8.0	2.4	0.33	0.75	0.85		98	14	<1	<10	14	12	7	<1	180	38
	2/24/97	12:20			2900	6.1	8.0	36.0	0.39	1.90	1.00		28	8								
	3/24/97	10:20			2700	3.7	8.1	29.0	0.54	2.00	0.46		10	<6								
	4/28/97	13:17		24	2600	6.7	8.6	19.0	<0.1	1.50	<0.2		24	10								
	4/29/97	12:17																				
	5/28/97	11:00		24	2500	9.1	8.3	14.0	0.26	2.20	0.31		26	13								
	5/29/97	10:00																				
	7/2/97	14:30	DT	23	2000	4	8.4	8.6	<0.1	1.6	<0.2		17	26								
	7/3/97	12:30																				
	8/7/97	13:30	DT	1	2100	2	8.6	2.0	<0.1	1.6	0.20		10	<6								
	9/17/97	14:10	DT	1	2100	5.9	8.3	0.7	2	6.6	1.00		9	8								
	9/25/97	8:22	ST	5	1500	81	7.1	15.0	2	9.9	2.00	<0.5	100	31	<1	<10	30	11	28	<1	210	210
	9/25/97	9:22	SF												1	<10	25	7	19	<1	320	
	9/25/97	11:22	ST	7	580	150	7.0	10.0	1	5.5	2.50	<0.5	270	51	<1	14	35	26	18	<1	220	130
	9/25/97	23:22	SF												<1	<10	17	4	10	<1	70	
	9/26/97	9:22	ST	24	1500	41	7.8	7.7	1	3.1	1.00	<0.5	80	24	<1	<10	20	6	<4	<1	55	370
	9/28/97	7:22	SF												<1	<10	12	<2	<4	<1	45	
	9/28/97	9:22	ST	12	2100	98	8.0	14.0	0	3.3	1.20	<0.5	210	29	<1	<10	35	14	11	<1	58	478
	9/29/97	7:22	SF												<1	<10	14	<2	4	<1	<10	
	11/5/97	8:30	DT	1	2300	7.2	7.9	18.0	0	1.8	<0.2	<0.5	<6	<6	2	6	13	4.0	6	0	77	
			SF												1	6	6	2.7	5	<1	59	
	11/10/97	17:42	SF	5				42.0				<0.5			<1	<10	32	5	16	<1	160	404
	11/10/97	18:42																				
	11/10/97	20:42	ST	7	780	82	7.2	9.4	2	8.9	1.70	<0.5	70	23	<1	<10	53	6	27	<1	320	212
	11/11/97	8:42	SF												<1	<10	44	4	25	<1	220	
	11/11/97	10:42	ST	23	1400	17	8.2	8.3	0.80	4.0	0.64	<0.5	26	10	<1	<10	30	4	14	<1	95	448
	11/13/97	6:42	SF												<1	<10	23	<2	6	<1	87	

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STATION	DATE	TIME	SAMPLES Type	#	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
BCC02	11/13/97	8:42	ST	8	490	150	7.3	11.0	1	4.5	2.20	<0.5	370	66	<1	13	35	28	9	<1	330	102
	11/13/97	22:42	SF												<1	<10	13	7	11	<1	88	
	12/16/97	12:15	OT	1	2700	4.9	8.1	27.0	<0.1	1.1	0.81		25	<6	<1	<10	4	0	<4	<1	16	560
	1/29/98	9:16	ST	5	390	61	7.6	11.0	1	4.2	2.2	<0.5	490	45	3	18	44	40	22	<1	250	88
	1/29/98	10:16	SF												<1	<10	30	15	13	<1	72	
	1/29/98	11:16	ST	8	310	100	6.6	3.8	<0.5	6.7	2		140	33	7	<10	31	18	7	<1	160	70
	1/30/98	1:16	SF												<1	<10	33	12	7	<1	110	
	1/30/98	1:16	ST	39	1200	13	7.5	12.8	<0.5	1.8	0.49		16	13	<1	<10	23	3	14	<1	22	275
	2/2/98	7:16	SF												<1	<10	16	<2	<4	<1	<10	
	5/13/98	2:36	ST	14	525	36	7.8	7.0	0.07	1.1	0.77		110	36	<0.5	7	24	10	5	<2	72	108
	5/13/98	18:36	SF												<0.5	9	15	<2	<4	<2	20	
	5/13/98	20:36	ST	32	2180	2.4	8.3	26.0	0.05	1.2	<0.05		32	16	<0.5	<4	15	<2	<4	<2	21	445
	5/16/98	12:36	SF												<0.5	<4	13	<2	<4	<2	16	
	6/22/98	10:43	DT	24	2680	18	8.3	20.0	<0.05	2.2	0.34		94	12								
	6/23/98	9:43																				
	7/15/98	9:00	D	6	1790	18	8.3	8.4	0.08	3.8	<0.061		120	38								
	7/15/98	15:00																				
	8/4/98	8:20	D	13	2650	6	8.2	3.6	<0.05	2.8	0.06		14	10								
	8/4/98	21:20																				
	9/8/98	10:30	D	24	1920	8	8.0	6.6	<0.05	1.9	<0.061		72	27								
	9/9/98	9:30																				
	10/20/98	9:49	D	24	2470	16	8.2	23.0	0.39	2.5	0.18		49	15								
	10/21/98	8:49																				
	11/2/98	9:18	D	24	2380	33	8.3	20.8	0.14	1.5	0.55		140	28								
	11/3/98	8:18																				
	11/8/98	3:27	ST	5	1520	145	7.8	21.0	0.75	11.6	4.28		660	200	<1	18	92	36	20	<2	313	275
	11/8/98	4:27	SF												<1	<8	38	8	12	<2	92	
	11/8/98	6:27	ST	9	470	27	7.6	12.0	0.37	2.7	2.29		120	80	<1	10	44	12	10	<2	121	70
	11/8/98	22:27	SF												<1	<8	27	<2	6	<2	39	
	11/9/98	0:27	ST	38	1780	10	8.1	24.0	0.47	1.1	0.67		34	18	<1	<8	20	13	5	<2	62	430
	11/12/98	2:27	SF												<1	<8	16	<2	5	<2	31	
	12/8/98	8:41	D	24	2330	5	8.3		0.06	<0.2	0.28		14	8								
	12/9/98	7:41																				
	1/4/99	8:46	D	24	2560	22	8.2	35.0	<0.05	1.4	0.18		120	66								
	1/5/99	7:46																				
	1/25/99	4:05	ST	5											<1	<8	32	11	7	<2	88	368
	1/25/99	5:05	SF												<1	<8	15	<2	5	<2	16	
	1/25/99	7:05	ST	13	510	19	7.9	6.9	0.37	1.3	0.70		44	18	<1	<8	26	6	5	<2	62	244
	1/26/99	7:05	SF												<1	<8	17	<2	4	<2	35	
	1/26/99	9:05	ST	15	360	32	7.7	5.2	0.34	1.6	0.83		78	22	<1	<8	34	14	6	<2	107	60
	1/27/99	13:05	SF												<1	<8	16	<2	<4	<2	23	
	1/27/99	15:05	ST	19	1480	6	8.1	19.4	0.26	1.6	0.43		14	6	<1	<8	22	<2	<4	<2	28	280
	1/29/99	3:05	SF												<1	<8	17	<2	<4	<2	18	
	2/2/99	12:50	D	24	2320	05	8.4	37.0	0.15	1.2	0.31		23	10								
	2/3/99	11:50																				
	3/1/99	9:55	D	24	2500	8	8.3	29.6	0.06	1.0	0.12		40	9								
	3/2/99	8:55																				
	3/11/99	10:45	ST	5	1670	13	8.4	19.4	0.25	2.1	0.40		34	12	<1	<8	35	4	5	<2	56	445
	3/11/99	11:45	SF												<1	<8	25	<2	6	<2	25	
	3/11/99	13:45	ST	6	735	14	8.0	13.0	0.49	2.5	0.21		28	18	<1	<8	38	5	7	<2	72	195
	3/11/99	23:45	SF												<1	<8	29	<2	6	<2	44	
	3/13/99	1:45	ST	37	1890	4	8.3	21.1	0.16	1.3	0.15		18	16	<1	<8	28	<2	5	<2	32	442
	3/15/99	5:30	SF												<1	<8	21	<2	6	<2	24	

HUNTINGTON WATERSHED - STORM AND DRY WEATHER MONITORING

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
BCC02	3/15/99	9:44	ST	5	220	78	7.8	5.0	0.41	3.9	1.25		590	130	1	17	59	38	12	<2	283	50
	3/15/99	10:44	SF												12	16	<2	7	<2	15		
	3/15/99	12:44	ST	3	160	25	7.7	4.4	0.36	1.5	0.55		50	16	<1	8	45	13	5	<2	88	40
	3/15/99	16:44	SF												<1	<8	27	<2	4	<2	26	
	3/15/99	18:44	ST	44	1640	6	8.2	23.2	0.15	1.4	0.25		16	5	<1	<8	27	2	4	<2	32	420
	3/19/99	9:44	SF												<1	<8	21	<2	4	<2	25	
	3/25/99	12:03	ST	5	1680	31	8.2	17.7	0.17	2.2	0.61		130	80	<1	<8	32	9	7	<2	81	318
	3/25/99	13:03	SF												<1	<8	23	4	5	<2	36	
	3/25/99	15:03	ST	9	295	21	7.6	4.6	0.18	1.3	0.64		50	14	<1	<8	22	8	5	<2	104	62
	3/26/99	7:03	SF												<1	<8	14	<2	<4	<2	56	
	3/26/99	9:03	ST	38	1880	3	8.3	19.7	0.08	0.7	0.12		15	8	<1	<8	15	<2	<4	<2	21	396
	3/29/99	11:03	SF												<1	<8	13	<2	<4	<2	15	
	4/27/99	9:17	D	24	2510	5	8.4	23.7	0.05	1.8	0.09		12	4								
	4/28/99	8:17																				
	5/4/99	8:20	D	24	2440	4	8.4	26.0	<0.05	0.7	<0.061		7	6								
	5/5/99	7:20																				
	6/1/99	10:10		24	1490	32	8.0	10.7	0.36	1.8	0.49		50	20								
	6/2/99	9:10																				

HUNTINGTON WATERSHED - STORM AND DRY WEATHER MONITORING

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
ABCC03	10/4/94	12:00	ST	4	560	330.0	7.1	0.7	2.20	16.00	8.80		1200	81	6.8	63	380	25	66	1.1	1600	188
	10/4/94	18:00																				
	10/5/94	12:00	ST	3	400	100.0	6.9	6.4	0.45	7.40	3.60		440	43	3.6	24	250	100	45	1.5	840	128
	10/5/94	16:00																				
	11/16/94	5:33	ST	5	1100	16.0	7.8	10.0	0.53	4.70	1.20		36	9	<1	<10	58	11	<40	<0.3	120	180
	11/16/94	19:53																				
	3/10/95	21:55	ST	2	650	36.0	7.8	5.9	0.15	1.40	0.84		110	26	<1	<10	31	17	<40	<1	100	84
	3/10/95	23:55																				
	3/11/95	1:55	ST	16	630	34.0	7.8	5.7	0.10	0.94	0.77		61	17	<1	<10	21	13	<40	<1	85	90
	3/12/95	7:55																				
	3/12/95	9:55	ST	30	2500	1.9	8.3	19.0	0.10	1.20	0.42		<6	6	<1	34	15	2.3	<40	<1	36	236
	3/14/95	19:55																				
	12/12/95	21:12	ST	5	750	780.0	7.3	19.0	2.80	47.00	27.00		2100	420	6	63	310	180	62	<1	1500	154
	12/12/95	22:12																				
	12/13/95	0:12	ST	15	400	54.0	7.2	10.0	0.63	4.70	2.20		74	35	<1	11	120	40	<40	<1	410	80
	12/14/95	4:12																				
	12/14/95	10:12	ST	30	1900	2.6	8.5	21.0	0.28	1.20	0.40		<6	<6	<1	<10	29	<2	<40	<1	67	364
	12/16/95	20:12																				
	1/16/96	17:04	ST	5	960	11.0	7.9	14.0	0.91	9.60	4.40		470	110	4	13	87	41	19	2	340	290
	1/16/96	18:04																				
	1/16/96	20:04	ST	5	230	34.0	7.3	7.5	1.60	5.10	1.90		110	33	10	<10	56	21	12	1	230	58
	1/17/96	4:04																				
	1/19/96	4:37	ST	5	2000	4.3	8.4	26.0	0.10	2.30	0.41		12	8	<1	91	46	3	3	<1	94	346
	1/19/96	5:37																				
	1/19/96	7:37	ST	3	210	15.0	7.9	12.0	0.92	3.20	0.82		33	19	<1	<10	49	9	7	<1	140	66
	1/19/96	11:37																				
	1/21/96	14:57	ST	5	330	170.0	7.6	3.5	0.16	4.00	2.80		360	84	3	16	61	53	16	<1	290	74
	1/21/96	15:57																				
	1/21/96	17:57	ST	9	610	19.0	7.6	6.5	0.10	1.60	0.86		46	22	<1	<10	36	14	<20	<1	140	140
	1/22/96	9:57																				
	1/25/96	13:45	ST		860	29.0	8.4	12.0	0.50	3.80	1.70		42	27	<1	<10	36	12	10	<1	190	260
	1/22/96	11:57	ST	38	1600	2.2	8.4	11.0	0.10	1.20	0.30		<6	<6	<1	<10	22	<2	4	<1	56	320
	1/25/96	13:45																				
	1/31/96	1:57	ST	5	630	140.0	7.9	8.1	0.27	3.30	1.60		180	19	<1	20	49	17	12	1	170	134
	1/31/96	2:57																				
	1/31/96	4:57	ST	10	210	58.0	7.7	3.9	0.33	2.70	1.40		65	21	<1	<10	48	<2	9	<1	240	60
	1/31/96	22:57																				
	2/1/96	14:57	ST	21	1700	5.4	8.5	19.0	0.10	1.00	0.42		13	9	<1	<10	26	3	4	2	70	326
	2/3/96	6:57																				
	2/3/96	8:57	ST	9	870	14.0	7.9	11.0	0.33	2.20	0.71		17	16	<1	<10	40	10	7	3	77	154
	2/4/96	0:57																				
	3/4/96	11:56	ST	5	980	78.0	8.5	11.0	0.54	3.50	1.00		70	23	<1	<10	41	19	9	1	170	132
	3/4/96	12:56																				
	3/4/96	14:56	ST	11	190	23.0	7.7	2.5	0.47	1.30	0.77		43	12	<1	<10	28	14	6	3	120	36
	3/5/96	10:56																				
	3/5/96	12:56	ST	35	2000	2.6	8.5	21.0	0.10	1.40	0.29		<6	<6	<1	<5	19	5	4	<1	78	348
	3/8/96	8:56																				
	10/30/96	4:43	ST	5	1700	1400.0	7.6	22.0	3.20	37.00	19.00		2900	530	6	50	310	130	52	2	1300	250
	10/30/96	5:43	F												<1	<10	29	4	22	<1	110	
	10/30/96	7:43	ST	7	220	62.0	7.0	5.9	0.87	2.90	1.80		83	24	<1	<10	47	49	12	<1	330	56
	10/30/96	19:43																				
	10/30/96	21:43	ST	10	1200	11.0	8.1	18.0	0.14	1.40	0.83		13	9	<1	<10	30	5	7	<1	180	225
	10/31/96	15:43																				

HUNTINGTON WATERSHED - STORM AND DRY WEATHER MONITORING

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
ABCC03	11/21/96	7:34	ST	5	140	44.0	7.0	6.4	0.84	4.00	1.80		58	36	<1	<10	210	22	15	<1	300	38
	11/21/96	8:34																				
	11/21/96	10:34	ST	12	100	32.0	7.2	3.1	0.35	1.40	0.90		34	12	<1	<10	39	16	12	<1	140	32
	11/22/96	8:34																				
	11/22/96	10:34	ST	31	1000	20.0	8.6	13.0	0.12	1.50	0.63		23	8	<1	<10	24	4	5	<1	84	226
	11/25/96	6:34																				
	12/9/96	13:08	ST	3	250	200.0	7.3	5.9	0.45	2.90	2.00		250	50	<1	13	39	36	11	<1	270	58
	12/9/96	13:38																				
	12/9/96	16:08	ST	5	120	30.0	7.2	1.9	0.21	0.81	0.43		32	10	<1	<10	25	11	4	<1	95	30
	12/10/96	0:08																				
	12/10/96	2:08	ST	10	750	10.0	8.7	8.6	<0.1	0.88	0.69		<6	<6	<1	<10	25	3	<4	<1	47	198
	12/10/96	20:08																				
	12/10/96	22:08	ST	13	130	25.0	7.4	2.2	0.14	0.88	0.71		9	10	<1	<10	17	8	<4	<1	82	40
	12/11/96	22:08																				
	12/12/96	0:08	ST	18	550	58.0	8.1	7.7	0.15	1.40	<0.2		42	11	<1	<10	22	9	<4	<1	170	140
	12/13/96	14:08																				
	1/1/97	21:08	ST	5	1100	36.0	8.0	9.9	0.34	2.40	0.70		22	12	<1	<10	22	6	43	<1	82	190
	1/1/97	22:08																				
	1/2/97	0:08	ST	8	320	28.0	7.6	5.0	0.60	1.40	0.60		20	11	<1	<10	24	7	6	<1	100	78
	1/2/97	14:08																				
	1/2/97	16:08	ST	40	850	11.0	8.3	7.0	0.28	0.78	0.32		10	8	<1	<10	30	4	12	<1	72	862
	1/5/97	22:08																				
	1/21/97	19:02	ST	4	600	48.0	8.0	6.7	0.25	1.70	0.77		45	14	<1	<10	27	4	<4	<1	120	114
	1/22/97	1:02																				
	1/22/97	14:17	ST	6	800	24.0	8.0	9.5	0.27	1.70	0.61		35	6	<1	<10	34	10	5	<1	59	139
	1/22/97	23:02																				
	1/23/97	1:02	ST	9	260	38.0	7.7	2.5	<0.1	0.93	0.58		50	19	<1	<10	28	12	<4	<1	24	55
	1/23/97	17:02																				
	1/23/97	19:02	ST	22	1900	20.0	8.4	20.0	<0.1	1.60	0.43		23	10	<1	<10	25	<2	<4	<1	140	322
	1/25/97	13:02																				
	1/25/97	15:02	ST	2				12.0	0.27	2.40	0.73				<1	<10	46	13	4	<1	200	140
	1/25/97	17:02																				
	1/26/97	8:25	ST		58	21.0	7.5	1.2	0.29	0.79	0.50		27	15	<1	<10	11	10	<4	<1	200	14
	9/25/97	8:41	ST	1											9	69	480	180	23	<1	2500	>4000
	9/25/97	11:41	ST	8	390	120	6.8	7.0	0.3	4.7	2	<0.5	200	52	1	11	78	44	20	<1	350	
	9/26/97	1:41	SF												<1	<10	43	11	13	<1	300	
	9/26/97	9:41	ST	24	1300	11	8.1	11.0	0.1	1.7	0.44	<0.5	10	11	<1	<10	29	2	5	<1	52	298
	9/28/97	7:41	SF												<1	<10	26	<2	4	<1	64	
	9/28/97	9:41	ST	12	1600	2.4	8.2	9.2	<0.1	2.5	0.2	<0.5	17	<6	<1	<10	27	<2	7.0	<1	11	328
	9/29/97	7:41	SF												<1	<10	20	<2	<4	<1	16	
	11/10/97	12:15	SF	5				5.7				<0.5			<1	<10	33	9	13	<1	170	224
	11/10/97	13:15																				
	11/10/97	15:15	ST	8	460	150	6.9	10.0	1.5	9.2	3.70	<0.5	220	78	1.0	16	110	19	29	<1	680	132
	11/11/97	5:15	SF												<1	<10	47	6	20	<1	310	
	11/11/97	7:15	ST	25	1400	10	8.3	18.0	0.3	2.7	0.57	<0.5	<6	<6	<1	<10	<4	3	7	<1	110	282
	11/13/97	7:15	SF												<1	<10	25	<2	8	<1	93	
	11/13/97	9:15	ST	11	340	41	7.4	7.1	0.7	6.6	2.20	<0.5	140	39	<1	90	37	24	4	<1	280	68
	11/14/97	5:15	SF												<1	<10	25	7	6	<1	160	
	12/18/97	12:13	ST	5	650	440	7.5	9.9	0.6	4.1	2.50	<0.5	700	110	<1	18	48	42	18	<1	260	116
	12/18/97	13:13	SF												<1	<10	19	<2	7	<1	25	
	12/18/97	15:13	ST	7	200	63	7.5	4.2	0.6	1.7	0.81	<0.5	64	16	<1	20	30	14	6	<1	130	50
	12/19/97	3:13	SF												<1	<10	20	<2	5	<1	34	
	1/29/98	5:21	ST	5	860	14	7.6	14.0	1.2	4.6	1.00	<0.5	98	30	2	<10	43	14	9	<1	440	158

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STATION	DATE	TIME	SAMPLES Type	#	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
ABCC03	1/29/98	6:21	SF												<1	<10	34	6	7	<1	120	
	1/29/98	8:21	ST	18	820	140	7.8	10	<0.5	1.4	0.63		110	24	<1	<10	27	12	9	<1	79	166
	1/30/98	18:21	SF												9	<10	18	4	8	1	26	
	1/30/98	20:21	ST	29	1300	11	8.2	16	<0.5	1.7	0.34		13	9	<1	<10	22	4	8	<1	26	262
	2/2/98	4:21	SF												18	<10	19	<2	<4	<1	<10	
	5/12/98	14:40	ST	5	1050	136	7.9	10	<0.05	8.7	2		490	110	1	18	52	42	14	<2	370	210
	5/12/98	15:40	SF												<0.5	6	22	<2	6	<2	66	
	5/12/98	17:40	ST	13	195	44	7.5	3.1	0.18	<1.0	2.33		88	40	<0.5	9	25	13	5	<2	91	56
	5/13/98	17:40	SF												<0.5	5	13	<2	<4	<2	26	
	5/13/98	19:40	ST	33	1780	28	8.4	24.0	<0.05	1.1	<0.05		68	28	<0.5	6	19	4	<4	<2	37	350
	5/16/98	11:40	SF												<0.5	4	15	<2	<4	<2	17	
	11/8/98	3:03	ST	5	1010	190	7.3	22.0	1.61	39.6	11.0		600	333	4	29	132	87	36	<2	888	190
	11/8/98	4:03	SF												<1	<8	20	3	21	<2	100	
	11/8/98	6:03	ST	9	460	23	7.5	9.7	0.18	2.6	1.2		80	50	<1	9	40	11	8	<2	149	115
	11/8/98	22:03	SF												<1	<8	22	<2	6	<2	70	
	11/9/98	0:03	ST	38	1370	9	8.2	17.0	<0.05	1.2	0.4		16	8	<1	<8	20	2	<4	<2	50	295
	11/12/98	2:03	SF												<1	<8	18	<2	<4	<2	40	
	11/11/98	10:03	ST	6											<1	<8	41	14	9	<2	187	160
	11/11/98	20:03	SF												<1	<8	31	<2	9	<2	103	
	3/11/99	10:49	ST	5	670	88	7.7	9.9	0.51	8.8	0.6		210	110	2	15	71	39	16	<2	401	160
	3/11/99	11:49	SF												<1	<8	24	<2	9	<2	83	
	3/11/99	13:49	ST	2	375	64	7.5	7.2	0.53	5.7	1.6		220	98	1	13	70	33	15	<2	414	100
	3/11/99	15:49																				
	3/20/99	6:25	ST	5	755	18	7.5	9.6	0.46	3.9	1.7		210	62	<1	9	40	14	10	<2	210	184
	3/20/99	7:25	SF												<1	<8	22	<2	8	<2	109	
	3/20/99	9:25	ST	4	405	12	7.2	7.2	0.26	2.9	0.8		50	24	<1	<8	38	8	8	<2	135	112
	3/20/99	15:25	SF												<1	<8	33	13	8	<2	81	
	3/21/99	9:25	ST	35	1460	2	8.7	11.4	<0.05	1.4	0.1		7	3	<1	<8	32	<2	<4	<2	28	292
	3/24/99	7:25	SF												<1	<8	28	<2	4	<2	22	
	3/25/99	11:44	ST	5	565	26	7.9	4.8	0.31	4.4	1.6		220	166	<1	<8	33	22	8	<2	193	126
	3/25/99	12:44	SF												<1	<8	19	<2	4	<2	26	
	3/25/99	14:44	ST	9	380	18	7.7	5.5	0.13	1.3	0.4		42	14	<1	<8	24	8	5	<2	101	86
	3/26/99	6:44	SF												<1	<8	18	<2	<4	<2	55	
	3/26/99	8:44	ST	38	1270	2	8.6	10.2	0.05	1.3	0.1		9	6	<1	<8	23	<2	<4	<2	40	282
	3/29/99	10:44	SF												<1	<8	17	<2	<4	<2	25	

HUNTINGTON WATERSHED - STORM AND DRY WEATHER MONITORING

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
WMCC04	11/10/94	6:50	ST	3	500	130.0	6.4	5.8	1.30	6.40	4.40		340	63	1.1	<10	210	55	<40	0.93	350	100
	11/10/94	10:50																				
	11/10/94	12:50	ST	5	490	29.0	6.7	9.6	0.52	2.50	1.50		37	23	<1	<10	35	9.5	<40	<0.3	97	105
	11/10/94	20:50																				
	11/16/94	5:41	ST	4	1100	20.0	7.8	13.0	0.43	4.60	1.50		28	20	<1	<10	80	8.4	<40	0.95	140	205
	11/16/94	11:41																				
	3/10/95	21:29	ST	3	700	70.0	8.0	8.9	0.10	1.40	1.10		180	29	<1	<10	28	33	<40	<1	110	164
	3/11/95	1:29																				
	3/11/95	3:29	ST	15	450	39.0	7.7	6.4	0.10	0.99	0.86		52	16	<1	<10	22	12	<40	<1	57	112
	3/12/95	7:29																				
	3/12/95	9:29	ST	30	1700	2.3	8.2	21.0	0.10	0.98	0.32		<6	<6	<1	<10	15	<2	<40	<1	19	440
	3/14/95	19:29																				
	9/27/95	9:00		6	1800	0.7	8.3	21.0	0.10	2.30	0.40		10	12	<1	<10	18	<2	<40	<1	14	
	9/27/95	14:00																				
	9/27/95	15:00		18	1900	0.9	8.3	17.0	0.10	1.30	0.20		7	<6	<1	<10	21	<2	<40	<1	17	
	9/28/95	8:00																				
	12/12/95	21:19	ST	4	740	590.0	7.3	25.0	2.90	26.00	13.00		2100	380	3	32	480	140	55	1	1100	185
	12/12/95	22:19																				
	12/13/95	0:19	ST	10	400	51.0	6.9	9.0	0.58	3.40	2.00		84	26	<1	<10	51	26	<40	<1	230	92
	12/13/95	18:19																				
	12/14/95	10:19	ST	30	1800	2.1	8.3	22.0	0.29	0.89	0.45		<6	<6	<1	<10	40	<2	<40	<1	33	540
	12/16/95	8:19																				
	1/16/96	16:36	ST	5	1100	45.0	7.7	27.0	1.30	10.00	2.40		160	59	10	<10	84	24	15	3	280	304
	1/16/96	17:36																				
	1/16/96	19:36	ST	7	440	180.0	7.5	9.1	0.88	5.20	2.90		230	53	<1	15	58	24	13	4	200	350
	1/17/96	7:36																				
	1/19/96	5:07	ST	5	910	25.0	8.0	25.0	0.82	4.30	0.90		56	29	<1	<10	39	9	6	<1	140	258
	1/19/96	6:07																				
	1/19/96	8:07	ST	5	480	55.0	8.1	14.0	0.38	3.30	1.00		76	22	<1	<10	32	10	8	<1	100	124
	1/19/96	16:07																				
	1/19/96	18:07	ST	23	1600	3.9	8.3	15.0	0.12	1.90	0.30		7	6	<1	<10	23	<2	11	<1	37	452
	1/21/96	16:07																				
	1/21/96	22:07	ST	6	540	120.0	7.9	6.2	0.16	2.90	2.50		260	45	1	14	84	48	16	<1	330	132
	1/22/96	6:07																				
	1/22/96	10:07	ST	10	1400	6.9	8.4	15.0	0.10	0.83	0.45		18	6	<1	<10	24	<2	4	2	42	404
	1/23/96	4:07																				
	1/31/96	1:46	ST	5	930	12.0	8.0	14.0	0.33	2.30	0.77		38	16	<1	13	41	10	7	<1	110	258
	1/31/96	2:46																				
	1/31/96	4:46	ST	8	210	140.0	7.4	3.8	0.47	3.00	1.90		180	36	1	16	59	50	25	<1	360	46
	1/31/96	18:46																				
	1/31/96	20:46	ST	30	1100	19.0	8.4	14.0	0.10	1.10	0.49		26	11	<1	<10	27	8	10	<1	79	318
	2/3/96	6:46																				
	2/3/96	8:46	ST	8	660	21.0	7.9	7.9	0.28	2.20	0.87		46	19	<1	<10	41	13	10	4	80	172
	2/4/96	0:46																				
	3/4/96	11:35	ST	5	1100	56.0	8.2	14.0	0.46	2.00	0.78		67	23	<1	<10	34	14	24	<1	130	258
	3/4/96	12:35																				
	3/4/96	16:35	ST	10	190	82.0	8.0	3.0	0.35	1.40	1.40		160	20	<1	<10	33	19	5	<1	120	56
	3/5/96	10:35																				
	3/5/96	12:35	ST	35	1400	2.2	8.4	15.0	0.10	0.71	0.29		12	<6	<1	<5	15	3	<4	<1	36	880
	3/8/96	10:35																				
	10/30/96	5:00	ST	5	550	270.0	7.1	13.0	1.50	8.20	4.00		520	110	2	21	83	50	31	<1	530	170
	10/30/96	13:00	SF												<1	<10	23	<2	14	<1	150	
	10/30/96	15:00	ST	7	620	62.0	7.9	10.0	0.42	1.60	1.30		60	13	<1	11	31	11	8	<1	130	180

HUNTINGTON WATERSHED - STORM AND DRY WEATHER MONITORING

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
WMCC04	10/31/96	3:00																				
	10/31/96	5:00	ST	36	1400	1.8	8.4	17.0	0.15	0.50	0.31		<6	<6	<1	<10	19	<2	<4	<1	48	478
	11/3/96	3:00																				
	11/21/96	7:04	ST	5	250	160.0	7.4	6.2	0.59	4.80	2.40		260	42	1	18	83	41	14	<1	290	94
	11/21/96	8:04																				
	11/21/96	10:04	ST	12	140	98.0	7.5	3.8	0.33	1.90	1.70		180	26	<1	10	47	32	<20	<1	170	58
	11/22/96	8:04																				
	11/23/96	8:44	ST	24	1200	14.0	8.4	16.0	0.18	1.20	0.47		<6	<6	<1	<10	13	<2	6	<1	69	404
	11/25/96	6:04																				
	12/9/96	14:00	ST	5											2	35	85	88	30	1	420	68
	12/9/96	15:00																				
	12/9/96	17:00	ST	6	230	120.0	7.8	4.0	0.21	1.10	1.00		130	16	<1	<10	23	18	5	<1	85	68
	12/10/96	3:00																				
	12/10/96	5:00	ST	10	980	14.0	8.3	12.0	<0.1	0.83	0.61		37	8	<1	<10	17	4	<4	<1	20	306
	12/10/96	23:00																				
	12/11/96	1:00	ST	7	210	34.0	7.5	3.4	0.22	1.00	0.92		51	15	<1	<10	20	12	12	<1	76	52
	12/12/96	1:00																				
	12/12/96	3:00	ST	17	910	4.9	8.1	11.0	0.15	0.98	<0.2		<6	<6	<1	<10	15	2	<4	<1	74	295
	12/13/96	11:00																				
	12/27/96	10:00	ST	5	960	140.0	7.9	15.0	0.27	2.40	0.61		58	15	<1	<10	23	8	5	1	130	320
	12/27/96	11:00																				
	12/27/96	13:00	ST	10	230	330.0	7.8	3.4	0.43	2.20	2.60		670	50	<1	19	41	39	16	<1	240	82
	12/28/96	7:00																				
	12/28/96	9:05	ST	36	1400	5.4	8.3	16.0	<0.1	1.10	0.23		10	<6	<1	<10	11	<2	<4	<1	75	426
	12/31/96	9:05																				
	1/21/97	20:00	ST	3	230	130.0	7.5	3.6	0.27	1.80	0.91		210	31	<1	<10	31	12	6	<1	170	66
	1/22/97	0:00																				
	1/22/97	2:00	ST	11	990	11.0	7.9	13.0	<0.1	0.91	0.40		8	<6	<1	<10	19	3	5	<1	<10	305
	1/22/97	22:00																				
	1/23/97	0:00	ST	4	310	67.0	7.8	5.4	0.21	1.40	0.83		14	6	<1	<10	31	20	5	<1	22	95
	1/23/97	6:00																				
	1/23/97	8:00	ST	28	1300	15.0	8.1	19.0	<0.1	0.74	0.32		20	10	<1	<10	26	4	<4	<1	100	410
	1/25/97	14:00																				
	1/25/97	16:00	ST	3	340	64.0	8.0	6.0	0.38	1.40	1.90		130	26	2	<10	38	160	16	<1	530	102
	1/25/97	20:00																				
	1/26/97	8:55	ST		120	66.0	7.6	1.9	0.26	0.56	0.62		75	13	<1	<10	14	15	5	<1	190	36
	9/25/97	9:32	ST	5	930	240	7.0	9.5	3	21.0	5	<0.5	510	120	2	16	89	44	29	2	720	330
	9/25/97	10:32	SF												<1	<10	32	5	37	<1	340	
	9/25/97	12:32	ST	6	360	100	7.2	6.8	0.5	5.1	2	<0.5	170	52	<1	<10	89	27	18	<1	210	104
	9/26/97	0:32	ST	14	1400	3.9	8.5	14.0	0.2	1.8	0.58	<0.5	14	12	<1	<10	18	<2	<4	<1	56	364
	9/26/97	22:32	SF												<1	<10	49	17	14	<1	140	
	9/27/97	2:32	SF												<1	<10	17	<2	6	<1	45	
	11/10/97	11:24	SF	5				25.0				<0.5			<1	<10	56	17	20	<1	410	240
	11/10/97	12:24	SF																			
	11/10/97	14:24	ST	5	490	140	7.0	7.9	1.5	9.2	2.7	<0.5	170	61	<1	<10	80	16	18	<1	390	350
	11/10/97	22:24	SF												<1	<10	62	7	21	<1	310	
	11/11/97	8:24	ST	12	1200	5.3	8.2	14.0	0.2	1.7	0.5	<0.5	<6	7	<1	<10	30	2	<4	<1	63	446
	11/12/97	6:24	SF												<1	<10	23	<2	<4	<1	47	
	11/13/97	8:43	ST	11	470	45	7.9	6.9	0.8	3.3	1.5	<0.5	170	44	<1	<10	41	21	4	<1	220	136
	11/14/97	4:43	SF												<1	<10	17	4	6.0	<1	87	
	12/18/97	12:25	ST	5	510	130	7.7	8.5	0.6	3.1	1.7	<0.5	640	170	<1	20	39	59	10	<1	270	134
	12/18/97	13:25	SF												<1	<10	16	<2	<4	<1	22	
	12/18/97	15:25	ST	9	480	31	7.5	7.6	<0.5	1.2	0.8	<0.5	140	27	<1	<10	16	12	<4	<1	49	142

HUNTINGTON WATERSHED - STORM AND DRY WEATHER MONITORING

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
WMCC04	12/19/97	7:25	SF												<1	<10	16	<2	<4	<1	<10	
	12/19/97	9:25	ST	38	1200	9.2	8.2	19.0	<0.5	1.2	0.3		16	12	<10	<10	20	3	<4	<1	37	376
	12/22/97	11:25	SF												<10	<10	19	<2	<4	<1	33	
	1/29/98	7:04	ST	5	390	10	7.4	12.0	1.2	5.0	1.3	<0.5	98	43	<1	<10	46	13	9	<1	150	114
	1/29/98	8:04	SF												<1	<10	28	<2	7	<1	22	
	5/12/98	12:25	ST	5	1660	3.1	8.3	20.0	<0.05	3.2	0		68	36	<1	<4	17	<2	<4	<2	35	440
	5/12/98	13:25	SF												1	5	15	<2	<4	<2	31	
	5/12/98	15:25	ST	13	290	22	7.8	4.8	0.1	1.1	1		60	36	<1	7	56	16	4	<2	88	86
	5/13/98	15:25	SF												<1	5	16	<2	<4	<2	23	
	5/13/98	17:25	ST	34	1670	1.4	8.2	28.0	<0.05	1.1	<0.05		32	24	<1	<4	17	<2	<4	<2	18	510
	5/16/98	11:25	SF												<1	<4	15	<2	<4	<2	15	
	3/11/99	10:28	ST	5	1130	23	8.3	19.6	0.7	3.7	0.5		80	40	<1	<8	76	17	8	<2	210	328
	3/11/99	11:28	SF												<1	<8	42	4	5	<2	98	
	3/20/99	6:14	ST	5	1010	5	7.7	14.9	0.3	2.2	0.6		22	15	<1	<8	36	4	5	<2	87	300
	3/20/99	7:14	SF												<1	<8	31	<2	7	<2	67	
	3/20/99	9:14	ST	8	645	6	7.8	9.9	0.1	1.7	0.3		14	12	<1	<8	31	3	6	<2	57	208
	3/20/99	23:14	SF												<1	<8	29	<2	5	<2	51	
	3/21/99	1:14	ST	40	1630	1	8.4	19.0	<0.05	0.7	0.1		<4	<1	<1	<8	23	<2	<4	<2	21	422
	3/24/99	7:14	SF												<1	<8	19	<2	4	<2	18	
	3/25/99	11:45	ST	5	525	23	7.7	6.5	0.4	3.9	1.4		170	62	<1	9	50	25	9	<2	227	140
	3/25/99	12:45	SF												<1	<8	19	<2	<4	<2	32	
	3/25/99	14:45	ST	9	510	21	7.9	7.4	0.2	1.3	0.9		130	24	<1	8	31	14	5	<2	132	140
	3/26/99	6:45	SF												<1	<8	19	<2	<4	<2	38	
	3/26/99	8:45	ST	38	1530	2	8.4	18.2	<0.05	0.6	0.1		<4	<1	<1	<8	18	<2	<4	<2	23	500
	3/29/99	10:45	SF												<1	<8	15	<2	<4	<2	19	

HUNTINGTON WATERSHED - STORM AND DRY WEATHER MONITORING

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
EGWC05	6/14/94	10:36		24	1500	28.0	8.3	0.3	0.13	1.60	0.27		80	8								
	6/14/94	9:36																				
	7/13/94	10:46		24	1600	34.0	8.6	0.3	0.20	1.60	0.59		58	22								
	7/14/94	9:46																				
	10/4/94	12:30	ST	4	1400	120.0	7.1	4.0	1.50	7.80	3.00		240	12	1.2	<10	39	24	140	1.8	170	344
	10/4/94	16:30																				
	10/4/94	18:30	ST	9	740	94.0	7.1	5.6	2.00	9.70	2.60		220	28	1.2	11	41	32	59	1.7	240	184
	10/5/94	10:30																				
	10/5/94	12:30	ST	11	840	76.0	7.4	5.9	0.94	5.60	1.70		120	15	<1	<10	31	17	76	1.9	160	228
	10/8/94	8:30																				
	10/6/94	12:30	ST	23	910	160.0	7.8	2.6	1.30	47.00	2.60		230	39	<1	<10	66	26	<40	1.1	130	200
	10/8/94	8:30																				
	10/13/94	10:30		24	1200	95.0	8.2	2.6	0.82	3.30	1.90		170	28								
	10/14/94	9:30																				
	11/8/94	4:00	ST	5	1800	60.0	7.9	7.1	0.34	2.10	0.50		84	16	<1	<10	42	11	<40	2.1	120	455
	11/8/94	12:00																				
	11/8/94	14:00	ST	19	1300	58.0	7.5	9.8	1.00	4.90	1.10		67	10	<1	<10	25	8	54	0.58	95	345
	11/10/94	2:00																				
	11/10/94	6:00	ST	1									200		<1	<10	78	66	<40	<0.3	300	165
	11/10/94	22:00	ST	13	580	160.0	6.7	5.4	0.44	5.10	2.90		380	36	1.3	10	100	49	<40	<0.3	260	155
	11/12/94	4:00																				
	3/2/95	12:00	ST	4	1900	12.0	8.3	19.0	0.24	2.30	0.41		23	10	<1	<10	20	3.3	<40	<1	44	460
	3/2/95	18:00																				
	3/2/95	20:00	ST	20	670	27.0	7.9	10.0	0.46	2.30	0.91		61	16	<1	<10	23	11	<40	1.2	63	174
	3/4/95	10:00																				
	3/4/95	12:00	ST	6	660	6.2	7.9	6.4	0.15	1.80	0.82		14	7	<1	<10	32	3.5	<40	1.1	32	170
	3/4/95	22:00																				
	3/5/95	0:00	ST	18	170	37.0	7.4	1.3	0.15	1.10	0.94		67	11	<1	<10	39	15	<40	<1	65	46
	3/6/95	10:00																				
	3/10/95	21:57	ST	3	250	92.0	7.5	3.3	0.10	1.20	1.20		180	31	<1	15	36	24	<40	<1	110	56
	3/11/95	1:57																				
	3/11/95	3:57	ST	15	250	40.0	7.4	3.3	0.11	1.10	1.20		62	16	<1	<10	27	11	<40	<1	70	64
	3/12/95	7:57																				
	3/12/95	9:57	ST	30	870	9.8	8.0	12.0	0.17	0.85	0.77		12	6	<1	<10	16	3.4	<40	<1	27	240
	3/14/95	19:57																				
	5/8/95	11:10		24	1700	4.1	8.4	5.9	0.19	1.50	0.20		<6	<6								
	5/9/95	10:10																				
	6/7/95	10:27		24	1600	26.0	8.4	6.6	0.11	2.40	0.65		71	34								
	6/8/95	9:27																				
	7/10/95	13:35		24	1600	100.0	8.1	1.3	0.17	5.70	1.90		190	54								
	7/11/95	12:35																				
	8/9/95	10:49		24	1700	94.0	8.5	1.1	0.17	2.90	1.80		160	47								
	8/10/95	9:49																				
	9/5/95	9:29		24	1500	61.0	8.2	0.2	0.19	3.50	1.40		120	36								
	9/6/95	8:29																				
	10/10/95	13:20		24	1600	25.0	8.4	1.8	0.47	3.00	0.48		43	17								
	10/11/95	12:20																				
	11/6/95	13:45		24	1500	66.0	8.4	4.5	0.39	2.80	0.81		130	23								
	11/7/95	12:45																				
	12/6/95	13:19		17	1600	140.0	8.5	8.1	0.25	3.30	1.20		210	53								
	12/7/95	5:19																				
	12/12/95	20:35	ST	5	1200	180.0	7.9	14.0	0.61	8.40	2.40		300	61	<1	10	70	29	<40	<1	310	304
	12/12/95	21:35																				

HUNTINGTON WATERSHED - STORM AND DRY WEATHER MONITORING

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
EGWC05	12/12/95	23:35	ST	11	460	110.0	7.5	12.0	0.71	5.50	2.60		170	28	<1	12	42	23	<40	<1	200	104
	12/14/95	3:00																				
	12/14/95	9:35	ST	30	780	8.6	8.1	11.0	0.69	2.40	0.77		15	<6	<1	22	25	3	<40	<1	71	296
	12/16/95	19:35																				
	1/10/96	8:47		24	1700	5.3	8.6	14.0	0.10	1.90	0.36		10	<6								
	1/11/96	7:47																				
	1/16/96	17:17	ST	5	1000	78.0	7.6	14.0	0.40	7.50	2.10		210	58	1	<10	59	24	19	3	200	262
	1/16/96	18:17																				
	1/16/96	20:17	ST	10	280	63.0	7.5	7.4	0.74	3.70	1.60		100	27	<1	<10	42	18	15	3	120	88
	1/17/96	14:17																				
	1/17/96	16:17	ST	19	640	61.0	8.1	9.1	0.34	3.60	1.00		110	30	<1	70	37	13	20	<1	98	198
	1/19/96	4:17																				
	1/19/96	6:17	ST	5	450	64.0	7.9	13.0	0.91	4.30	1.10		110	31	<1	<10	40	17	18	<1	130	130
	1/19/96	14:17																				
	1/19/96	16:17	ST	24	490	21.0	7.5	6.4	0.10	1.90	1.20		36	13	<1	<10	28	5	12	<1	60	146
	1/21/96	14:17																				
	1/21/96	16:17	ST	8				2.7	0.78	3.60	3.10				1	16	40	87	<20	<1	330	60
	1/22/96	18:17																				
	3/4/96	12:07	ST	5	1100	66.0	7.2	9.3	0.28	3.30	1.00		76	26	<1	<10	36	10	13	2	130	254
	3/4/96	13:07																				
	3/4/96	15:07	ST	11	120	52.0	8.4	2.0	0.34	1.20	0.87		77	19	<1	<10	34	10	5	<1	100	44
	3/5/96	11:07																				
	3/5/96	13:07	ST	35	400	6.0	8.0	4.9	0.21	1.30	0.64		16	6	<1	<5	17	4	8	<1	50	112
	3/8/96	9:07																				
	3/27/96	9:45			1700	3.2	8.1	12.0	0.13	2.00	0.20		8	<6	<1	<10	5	<2	8	<1	38	770
	4/29/96	13:34		24	1500	4.4	8.1	1.1	0.13	1.70	0.27		30	15								
	4/30/96	12:34																				
	5/28/96	10:30			1600	7.4	8.1	0.7	0.15	2.20	0.32		15	7								
	6/17/96	10:30			1500	6.9	8.1	0.7	0.14	0.50	0.20		20	6								
	7/15/96	10:57		24	1500	33.0	8.2	0.3	<0.1	2.90	0.54		47	20								
	7/16/96	9:57																				
	8/7/96	10:51		24	1400	27.0	8.4	0.8	0.16	0.60	0.36		73	25								
	8/8/96	9:51																				
	9/4/96	10:44		24	1400	17.0	8.6	<0.2	0.35	2.00	0.48		62	20								
	9/5/96	9:44																				
	10/2/96	15:36		9	1500	6.5	8.4	0.6	0.23	3.00	0.51		56	32								
	10/2/96	23:36																				
	10/30/96	11:45	ST	6	220	130.0	7.1	6.5	0.82	3.00	1.90		150	28	<1	<10	41	22	13	<1	200	45
	10/30/96	21:45																				
	10/31/96	7:45	ST	32	690	92.0	8.0	7.9	2.20	2.60	1.20		94	17	<1	<10	27	8	11	<1	100	216
	11/3/96	9:45																				
	11/14/96	10:50			1500	44.0	8.4	3.9	0.29	1.40	0.38		73	19								
	11/21/96	7:25	ST	5	620	580.0	7.5	12.0	<0.1	5.70	1.80		93	22	<1	<10	52	3	20	<1	150	160
	11/21/96	8:25																				
	11/21/96	10:25	ST	14	200	350.0	7.7	4.0	<0.1	2.80	2.30		310	38	<1	18	53	30	17	<1	190	70
	11/22/96	2:25																				
	11/22/96	4:25	ST	34	670	12.0	8.2	5.9	0.19	1.30	0.82		23	7	<1	<10	21	4	9	<1	120	198
	11/25/96	6:25																				
	12/9/96	12:39	ST	5	900	180.0	7.9	6.9	0.12	2.50	1.10		110	26	<1	<10	32	13	9	<1	120	164
	12/9/96	13:39																				
	12/9/96	15:39	ST	7	150	110.0	7.5	2.3	0.24	1.50	1.30		130	23	<1	<10	30	36	9	<1	130	43
	12/10/96	3:39																				
	12/10/96	5:39	ST	10	300	32.0	7.6	3.5	<0.1	1.20	0.87		61	13	<1	<10	27	7	11	<1	50	88

HUNTINGTON WATERSHED - STORM AND DRY WEATHER MONITORING

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
EGWC05	12/10/96	23:39																				
	12/11/96	1:39	ST	14	130	34.0	7.3	1.9	<0.1	0.85	1.00		57	13	<1	<10	21	10	<4	<1	51	42
	12/12/96	3:39																				
	12/12/96	5:39	ST	15	490	14.0	7.8	5.5	0.15	1.00	0.72		18	10	<1	<10	15	3	4	<1	120	145
	12/13/96	9:39																				
	12/27/96	10:05	ST	5	1500	32.0	8.2	14.0	0.19	1.70	0.50		31	7	<1	<10	27	5	23	<1	97	470
	12/27/96	11:05																				
	12/27/96	13:05	ST	10	370	37.0	7.7	4.1	0.31	1.50	0.76		65	17	<1	<10	23	12	<4	<1	120	106
	12/28/96	7:05																				
	12/28/96	9:05	ST	37	970	9.5	8.2	7.8	0.12	1.40	0.46		11	<6	<1	<10	16	<2	4	<1	79	384
	12/31/96	9:05																				
	1/21/97	20:03	ST	5	560	90.0	7.9	13.0	0.20	2.20	1.10		190	46	<1	<10	28	11	44	<1	190	144
	1/21/97	21:03																				
	1/21/97	23:03	ST	5	160	43.0	7.6	2.9	0.13	1.30	0.73		48	13	<1	<10	23	6	5	<1	100	52
	1/22/97	7:03																				
	1/22/97	9:03	ST	13	450	23.0	7.8	5.6	<0.1	0.88	0.54		25	7	<1	<10	18	4	11	<1	<10	114
	1/22/97	23:03																				
	1/23/97	1:03	ST	11	200	30.0	7.4	2.4	<0.1	0.76	0.67		39	13	<1	<10	28	7	7	<1	<10	59
	1/23/97	21:03																				
	1/23/97	23:03	ST	20	570	11.0	7.4	6.3	0.28	0.80	0.58		10	9	<1	<10	19	3	<4	<1	120	184
	1/25/97	13:03																				
	1/25/97	15:03	ST	4	280	50.0	7.9	3.2	0.29	0.93	0.73		72	26	<1	<10	33	12	<4	<1	180	94
	1/25/97	21:03																				
	1/26/97	8:40	ST		79	45.0	7.4	1.3	0.22	0.84	1.00		67	18	<1	<10	16	9	8	<1	180	30
	2/24/97	11:55			1800	3.0	8.0	14.0	0.31	1.70	0.79		23	10								
	3/24/97	10:50			1700	3.5	8.1	5.5	<0.5	1.60	0.48		12	8								
	4/28/97	13:47		24	1700	4.8	8.2	1.8	<0.1	1.40	0.28		10	9								
	4/29/97	12:47																				
	5/29/97	10:30			1500	5.1	8.6	0.9	0.25	1.70	0.23		8	6								
	7/2/97	14:00	DT	24	6000	6.1	8.2	<0.2	<0.1	2.0	<0.2		11	10								
	7/3/97	13:00																				
	8/7/97	13:00	DT	1	1500	8	8.1	1	<0.1	1.7	1		17	<6								
	9/17/97	13:30	DT	1	1600	14	7.9	<0.4	1	7.3	1		27	16								
	9/25/97	9:08	ST	5	360	680	7.5	6	1	12.0	5	<0.5	860	180	8	24	110	110	30	1	930	320
	9/25/97	10:08	SF												1	<10	13	4	12	<1	340	
	11/5/97	10:50	DT	1	1600	7.3	7.9	1	1	2.1	0	<0.5	<6	<6	1	~~3.0~~	5	3.0	6.0	<1	49	
			SF												2	4	4	3	6	<1	49	
	11/10/97	11:45	SF	5				11				<0.5			<1	<10	43	7	12	<1	160	420
	11/10/97	12:45																				
	11/10/97	14:45	ST	9	550	100	7.2	11	2	7.9	2	<0.5	99	47	<1	<10	50	13	24	<1	380	174
	11/11/97	6:45	SF												<1	<10	28	7	18	<1	220	
	11/11/97	8:45	ST	22	850	40	7.9	5	0.90	4.5	1	<0.5	45	13	<1	<10	16	7	10	<1	86	244
	11/13/97	2:45	SF												<1	<10	25	2.0	11	<1	66	
	11/13/97	4:45	ST	15	340	46	7.7	6	1	4.0	2	<0.5	230	51	<1	<10	38	25	5.0	<1	210	98
	11/14/97	8:45	SF												<1	<10	19	10	6	<1	100	
	11/26/97	9:18	ST	5	570	390	8.6	5	1	7.3	5		880	720	2	<10	50	66	12	<1		140
	11/26/97	10:18	SF												<1	<10	8	<2	<4	<1	39	
	11/26/97	12:18	ST	16	240	68	7.0	5	0	2.58	1	1	20	<20	<1	11	29	25	6	<1	150	64
	11/27/97	18:18	SF												<1	<10	15	<2	<4	<1	98	
	11/27/97	20:18	ST	30	910	16	7.6	7	0	1.5	0.50	<0.5	17	11	~~<1~~	<10	20	4.0	5	<1	62	258
	11/30/97	6:18	SF												~~<1~~	<10	17	<2	6	<1	~~67~~	
	12/16/97	12:00	DT	1	1500	16	7.9	22	0	1.3	1.0		20	<6	<1	<10	7	3	5	<1	46	492
	12/18/97	12:55	ST	5	460	220	7.4	8	<0.5	3.6	2	<0.5	460	72	<1	15	48	45	17	<1	270	124

HUNTINGTON WATERSHED - STORM AND DRY WEATHER MONITORING

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
EGWC05	12/18/97	13:55	SF												<1	<10	16	<2	4	<1	35	
	12/18/97	15:55	ST	9	220	75	7.4	4	<0.5	1.6	1	1	93	23	<1	<10	25	15	5	<1	110	60
	12/19/97	7:55	SF												<1	<10	13	<2	<4	<1	20	
	12/19/97	9:55	ST	38	470	38	7.4	9	1	1.8	0.90		29	13	<10	<10	23	8	<4	<1	61	148
	12/22/97	11:55	SF												<10	<10	17	<2	<4	<1	91	
	1/3/98	0:54	ST	5	1100	67	7.6	13	<0.5	2.9	1	<0.5	78	23	<1	<10	27	14	6	<1	93	280
	1/3/98	1:54	SF												<1	<10	14	<2	<4	<1	30	
	1/3/98	3:54	ST	14	500	50	7.4	9	<0.5	1.9	1	<0.5	48	16	<1	<10	27	8	7	<1	130	140
	1/4/98	5:54	SF												<1	<10	23	<2	5	<1	34	
	1/4/98	7:54	ST	33	660	40	7.7	6	0.2	1.5	1	<0.5	46	16	<1	<10	23	7	4	<1	41	200
	1/8/98	23:54	SF												<1	<10	18	<2	5	<1	<10	
	1/9/98	9:44	ST	5	1500	35	8.0	16	<0.5	3.0	1	<0.5	64	23	10	<10	34	11	22	<1	140	420
	1/9/98	10:44	SF												<10	<10	21	<2	7	<1	100	
	1/9/98	12:44	ST	13	180	68	7.3	3	<0.5	1.8	1.0	0.665	130	28	<1	<10	43	19	16	<1	<10	70
	1/10/98	12:44	SF												<1	<10	71	<10	<20	<1	<10	
	1/10/98	14:44	ST	34	440	26	7.7	1	<0.5	1.4	1	<0.5	31	14	<1	<10	20	6	<4	19	140	128
	1/13/98	8:44	SF												<1	<10	18	3.0	<4	<1	140	
	1/29/98	6:23	ST	5	1100	22	7.8	13	<0.5	3.0	0.73	<0.5	96	30	<1	<10	34	12	11	<1	64	300
	1/29/98	7:23	SF												<1	<10	24	2	7.0	<1	<10	
	1/29/98	9:23	ST	12	270	38	7.4	4	<0.5	1.3	1.0		130	27	<1	<10	36	22	8	<1	110	76
	1/30/98	7:23	SF												<1	<10	22	6	6	<1	19	
	1/30/98	9:23	ST	35	520	17	7.7	8.0	<0.5	1.3	0.5		24	12	<1	<10	23	6	9	<1	<10	152
	2/2/98	5:23	SF												<1	<10	16	<2	<4	<1	<10	
	2/14/98	8:53	ST	5	910	64	7.7	16	<0.5	2.6	1.0		180	39	<1	7.7	36	19	9	<1.00	87	240
	2/14/98	9:53	SF												<1	4	20	7	5	<1.00	42	
	2/14/98	11:53	ST	8	110	53	7.5	3	<0.5	0.88	0.9		120	19	<1	8	22	18	6	2	58	80
	2/15/98	1:53	SF												<1	2	22	1	7	<1.00	18	
	2/15/98	3:53	ST	21	1100	21	7.8	32	<0.5	1.6	11.0		24	9	<1	4	20	4	3	<1.00	30	288
	2/16/98	19:53	SF												<1	2	14	1	8	1	29	
	2/16/98	21:53	ST	14	630	38	7.6	11	<0.5	1.4	9.2		41	14	<1	4	20	9	4	1.10	35	170
	2/18/98	7:53	SF												<1	37	29	1.30	14	<1.00	13	
	5/12/98	14:29	ST	5	1310	12	8.2	22	<0.05	2.8	0		60	32	<0.5	6	32	6	<4	<2	57	376
	5/12/98	15:29	SF												<0.5	5	26	<2	<4	<2	32	
	5/12/98	17:29	ST	7	310	62	7.7	2	<0.05	1.6	1.4		240	48	1	12	41	46	9	<2	168	50
	5/13/98	11:29	SF												<0.5	5	11	<2	<4	<2	11	
	6/22/98	11:03	DT	24	1620	4.2	8.4	14	0.20	1.7	0.2		18	6								
	6/23/98	10:03																				
	7/15/98	9:30	D	6	1220	18	8.4	6.6	0.1		<0.061											
	7/15/98	15:30																				
	8/4/98	8:40	D	24	1640	7	7.9	4.1	<0.05	3.5	0.2		15	17								
	8/5/98	7:40																				
	9/8/98	11:30	D	24	1650	9	8.1	3.4	0.1	2.6	0.1		54	19								
	9/9/98	10:30																				
	10/20/98	10:20	D	24	1640	7	8.3	5.7	0.2	1.9	0.1		210	8								
	10/21/98	9:20																				
	11/2/98	9:50	D	24	1690	6	8.3	6.7	0.2	1.5	0.3		32	18								
	11/3/98	8:50																				
	11/8/98	3:00	ST	5	1400	22	7.9	11.0	0.4	4.4	0.9		120	80	<1	11	34	8	9	<2	176	385
	11/8/98	4:00	SF												<1	<8	19	<2	8	<2	105	
	11/8/98	6:00	ST	2	255	105	7.7	4.8	0.5	6.9	6.1		540	240	2	24	85	92	19	<2	436	65
	11/8/98	8:00	SF												<1	<8	7	<2	6	<2	29	
	11/9/98	8:36	ST	36	695	12	7.7	9.7	0.4	43	0.7		40	18	<1	9	21	8	6	<2	92	

HUNTINGTON WATERSHED - STORM AND DRY WEATHER MONITORING

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
EGWC05	11/12/98	6:36	SF												<1	<8	13	4	5	<2	60	
	12/8/98	9:15	D	24	1080	22	8.0	10.5	0.1	0.8	0.5		40	10								
	12/9/98	8:15																				
	1/4/99	9:31	D	24	1670	9	8.2	14.0	<0.05	1.4	0.2		56	24								
	1/5/99	9:31																				
	2/2/99	13:12	D	24	650	6	8.0	7.5	0.1	0.6	0.3		24	7								
	2/3/99	12:12																				
	3/1/99	10:20	D	24	1610	4	8.3	7.4	<0.05	0.9	0.1		10	8								
	3/2/99	9:20																				
	3/11/99	10:41	ST	5	1180	11	8.1	9.6	0.1	1.8	1.5		26	24	<1	<8	28	6	6	<2	88	365
	3/11/99	11:41	SF												<1	<8	22	<2	5	<2	57	
	3/11/99	13:41	ST	10	685	10	7.8	12.8	0.5	1.9	0.1		22	12	<1	<8	32	4	9	<2	67	240
	3/12/99	7:41	SF												<1	<8	23	<2	9	<2	52	
	3/12/99	9:41	ST	33	1180	3	8.2	5.5	<0.05	1.5	0.1		10	4	<1	<8	22	<2	6	<2	38	340
	3/15/99	6:11	SF												<1	<8	20	<2	7	<2	30	
	3/15/99	10:09	ST	5	205	35	7.5	4.8	0.5	4.3	1.0		390	140	1	16	65	60	13	<2	368	112
	3/15/99	11:09	SF												<1	<8	7	<2	<4	<2	20	
	3/15/99	13:09	ST	4	155	18	7.5	4.3	0.5	1.8	0.6		56	26	<1	<8	24	11	5	<2	77	86
	3/15/99	19:09	SF												<1	<8	13	<2	4	<2	28	
	3/15/99	21:09	ST	43	785	4	8.2	7.2	0.1	1.3	0.3		17	7	<1	<8	21	3	8	<2	36	260
	3/19/99	9:47	SF												<1	<8	18	<2	5	<2	27	
	3/20/99	7:06	ST	5	1250	5	7.9	8.0	<0.05	1.6	0.2		4	<1	<1	<8	32	4	5	<2	60	366
	3/20/99	8:06	SF												1	<8	29	3	7	<2	55	
	3/20/99	10:06	ST	10	735	6	7.7	8.2	0.2	2.2	0.4		20	10	<1	<8	28	3	6	<2	55	242
	3/21/99	4:06	SF												<1	<8	22	<2	8	<2	39	
	3/21/99	6:06	ST	38	1190	7	8.3	4.2	0.1	1.5	0.2		10	6	<1	<8	33	2	6	<2	38	340
	3/24/99	8:06	SF												<1	<8	22	<2	6	<2	24	
	3/25/99	11:33	ST	5	955	23	7.8	4.7	<0.05	2.4	0.5		78	30	<1	<8	27	10	8	<2	105	316
	3/25/99	12:33	SF												<1	<8	17	<2	5	<2	36	
	3/25/99	14:33	ST	9	215	19	7.5	3.3	0.2	1.6	0.8		76	28	<1	<8	27	12	5	<2	97	72
	3/26/99	6:33	SF												<1	<8	15	<2	<4	<2	28	
	3/26/99	8:33	ST	38	730	4	8.1	4.4	0.1	1.3	0.2		11	8	<1	<8	19	2	<4	<2	31	186
	3/29/99	10:33	SF												<1	<8	16	<2	<4	<2	21	
	4/27/99	8:31	D	24	1530	02	8.4	2.9	0.1	0.8	<0.061		4	2								
	4/28/99	7:31																				
	5/4/99	7:51	D	24	1160	5	8.3	9.4	<0.05	1.2	<0.061		14	10								
	5/5/99	6:51																				
	6/7/99	9:15	D	1																		

SOUTH COUNTY WATERSHED - STORM AND DRY WEATHER MONITORING

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd ug/L	Cr ug/L	Cu ug/L	Pb ug/L	Ni ug/L	Ag ug/L	Zn ug/L	Hardness mg/L
ACJ01	6/23/94	11:45	DT	1	4300	1.9	8.7	2.0	0.11	0.61	0.64		14	<5								
	7/19/94	9:48	DT	24	3400	1.5	8.4	2.2	0.3	0.49	0.67		6	6	2.5	<6	23	<3	10	0.45	18	
	7/20/94	8:48																				
	10/26/94	9:22	DT	24	11000	2.1	8.4	2.0	0.36	1.5	0.22		39	25	<1	<10	23	<2	<40	<0.3	28	1005
	10/27/94	8:22																				
	11/7/94	8:37	DT	24	3800	1.8	8.3	3.2	<0.2	1.3	0.6		26	<5	2.1	<10	31	3.8	<40	<0.3	32	
	11/8/94	7:37																				
	5/25/95	10:15	DT	1	3000	2.5	8.4	4.6	0.22	0.59	0.28		10	7	4.2	<10	38	3	<40	2	50	1110
	5/25/95	10:20																				
	6/21/95	10:34	DT	24	3100	3.0	8.1	2.3	<0.1	0.62	0.33		<6	<6								
	6/22/95	9:34																				
	7/25/95	10:30	DT	8	3200	24.0	8.4	0.3	0.26	1.30	<0.20		51	18								
	7/26/95	9:30																				
	8/28/95	9:22	DT	24	3300	2.7	8.4	1.5	0.26	0.79	0.52		9	<6								
	8/29/95	8:22																				
	9/11/95	11:45	DT	24	3200	3.3	8.4	1.7	0.10	1.40	0.45		12	8								
	9/12/95	10:45																				
	10/18/95	9:48	DT	24	3500	10.0	8.3	2.7	<0.10	0.98	0.84		7	6								
	10/19/95	8:48																				
	11/20/95	10:26	DT	24	3400	22.0	8.3	5.2	0.27	1.50	0.90		<6	<6								
	11/21/95	9:26																				
	12/13/95	0:00	ST	3	2000	190.0	7.7	18.0	1.80	7.60	3.40		320	49	10	14	46	<10	59	<1	120	602
	12/13/95	4:00																				
	12/13/95	6:00	ST	11	1500	170.0	7.7	6.3	0.84	3.60	3.10		280	42	5	22	42	<10	42	<1	120	474
	12/14/95	2:00																				
	12/14/95	12:18	ST	29	3100	14.0	8.3	5.3	0.39	1.60	0.86		26	<6	2	<10	14	<2	<40	<1	25	1055
	12/16/95	22:00																				
	12/20/95	8:30	DT	1	3700	5.8	8.0	7.0	0.29	1.30	0.57		7	10								
	1/31/96	4:00	ST	3	2400	86.0	8.0	6.9	0.30	4.60	1.30		130	25	8	12	27	4	47	<1	67	804
	1/31/96	6:00																				
	1/31/96	7:00	ST	7	940	190.0	7.9	6.8	<0.10	3.90	1.60		200	36	3	26	31	9	20	1	65	276
	1/31/96	15:00																				
	2/15/96	11:15	DT	1	3400	1.6	8.1	4.8	0.36	0.60	0.33		22	7	4	11	3	<2	48	2	27	1280
	3/27/96	13:45	DT	1	3300	2.2	8.4	5.7	<0.10	1.00	<0.20		10	<6	6	<10	3	<2	58	<1	24	1240
	4/16/96	10:11	ST	24	3000	15.0	8.2	0.2	0.12	1.40	0.28		18	10	3	<10	29	<2	25	<1	48	1018
	4/17/96	9:11																				
	4/18/96	1:30	ST	2	2000	52.0	7.8	0.5	0.40	3.00	1.20		120	24	7	<10	19	2	39	<1	60	708
	4/18/96	3:30																				
	4/18/96	9:30	ST	4	1300	100.0	7.9	0.2	0.24	2.10	3.30		230	40	6	14	42	6	28	<1	98	410
	4/18/96	13:30																				
	4/18/96	19:30	ST	37	2500	4.1	8.1	0.2	<0.10	1.20	0.62		15	7	2	<10	11	<2	27	<1	23	900
	4/21/96	21:30																				
	5/28/96	14:00	DT	1	2900	1.6	8.3	0.5	<0.10	1.00	0.49		19	6	2	<10	<2	<2	25	<1	<10	
	6/19/96	11:00	DT	1	2800	4.9	8.2	2.2	0.16	0.80	0.39		51	37	1	<10	3	<2	25	<1	<10	1120
	7/24/96	12:20	DT	24	2900	9.1	8.3	0.2	<0.1	1.10	0.54		17	11	2	<10	31	<2	27	<1	62	1018
	7/25/96	11:20																				
	8/27/96	12:00	DT	23	2900	5.7	8.1	3.6	0.22	1.30	0.85		16	10	2	<10	23	<2	30	<1	41	1142
	8/28/96	10:00																				
	9/24/96	10:45	DT	23	3100	7.7	8.0	4.1	<0.1	0.93	<0.2		15	9	2	<10	14	<2	22	<1	32	1146
	9/25/96	8:45																				
	11/6/96	15:50	DT	1	3100	3.0	8.1	5.8	0.20	1.10	0.86		10	<6								
	11/21/96	12:58	ST	5	2000	60.0	7.5	15.0	0.82	4.10	1.70		130	20	3	11	27	2	51	<1	71	760
	11/21/96	13:58	SF												6	<10	14	<2	39	<1	17	

SOUTH COUNTY WATERSHED - STORM AND DRY WEATHER MONITORING

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd ug/L	Cr ug/L	Cu ug/L	Pb ug/L	Ni ug/L	Ag ug/L	Zn ug/L	Hardness mg/L
ACJ01	12/4/96	15:35	DT	1	2900	6.5	8.2	5.8	0.33	0.85	0.63		14	<6	6	<10	<4	<2	53	<1	26	1222
	1/29/97	11:45	DT	1	2300	9.6	7.9	5.7	0.33	0.93	0.63		22	13	6	<10	4	<2	50	<1	52	980
	2/26/97	14:05	DT	1	3400	2.7	8.2	5.7	<0.1	1.10	0.32		11	<6	7	<10	7	<2	45	<1	17	1230
	3/18/97	14:45	DT	24	3200	5.9	8.2	5.3	<0.5	1.40	0.45		14	8	5	<10	6	<4	38	<1	150	1170
	3/19/97	13:45																				
	4/8/97	11:45	DT	24	3300	6.0	8.1	3.4	<0.5	1.30	0.43		12	<6	2	<10	16	<2	23	<1	<10	1086
	4/9/97	10:45																				
	5/6/97	14:00	DT	22	3300	7.2	8.3	2.8	<0.1	1.60	0.52		20	9	8	<10	59	2	28	1	190	1054
	5/7/97	11:00																				
	6/5/97	10:40	DT	1	3300	1.2	7.7	2.7	0.56	0.85	0.55		6	6								
	7/2/97	10:50	DT	1	3500	1.1	7.9	2	<0.1	1.1	0.4		10	7								
	8/7/97	10:10	DT	1	3400	1.7	7.6	2	<0.1	1.1	0.7		7	8								
	9/17/97	11:00	DT	1	3200	2.1	7.5	5	0	1.8	0.9		6	6								
	10/9/97	15:00	DT	1	3400	2.0	8.2	7	<0.1	1.2	0.8		13	<6								
	6/19/98	13:40	DT	1	3250	7.6	8.0	6.0	0	1.4	0.6		28	7.0								
	7/20/98	12:00	D	1																		
	8/11/98	11:23	D	1																		
	9/2/98	8:37	D	1	3220	0	7.8	4.2	0.2	1.3	0		13	05								
	10/1/98	8:35	D	1	3060	4	7.6	5.2	0.1	1.4	<0.061		19	6								
	11/8/98	4:59	ST	5											8	22	20	4	41	<2	153	880
	11/8/98	5:59	SF												<1	<8	7	<2	20	<2	36	
	11/8/98	7:59	ST	4											8	25	35	15	31	<2	209	285
	11/8/98	13:59	SF												3	12	16	5	18	<2	93	
	12/7/98	10:15	D	1	2250	9	7.9	5.3	0.1	1.1	0.7		26	9								
	1/13/99	10:45	D	1	3260	2	7.9	7.3	0.2	0.7	0.3		9	6								
	1/25/99	4:50	ST	10	2550	75	8.1	6.6	0.1	2.6	1.5		270	100	8	15	30	4	43	<2	86	940
	1/25/99	5:44	SF												2	<8	14	<2	24	<2	17	
	1/25/99	7:44	ST	13	1350	40	7.9	4.3	0.1	1.6	1.0		150	60	3	9	27	4	21	<2	71	480
	1/26/99	7:44	SF												1	<8	13	<2	13	<2	15	
	1/26/99	9:44	ST	15	1020	230	7.9	3.9	0.2	2.2	2.5		570	110	5	23	35	10	28	<2	116	280
	1/27/99	13:44	SF												<1	<8	9	<2	9	<2	<10	
	1/27/99	15:44	ST	13	2230	12	7.8	5.2	0.1	0.9	0.6		30	16	3	<8	17	<2	27	<2	32	720
	1/29/99	4:18	SF												2	<8	12	<2	25	<2	18	
	2/8/99	9:46	D	1	3200	3	8.0	6.6	0.1	1.2	0.5		22	10								
	2/9/99	18:18	ST	4	2520	36	8.3	7.0	0.1	1.7	1.1		110	18	5	11	24	3	42	<2	55	882
	2/9/99	19:18	SF												3	<8	14	<2	32	<2	16	
	2/9/99	21:18	ST	7	1040	72	8.1	4.4	0.1	1.9	1.0		170	36	2	9	31	5	17	<2	65	312
	2/10/99	9:18	SF												<1	<8	13	<2	12	<2	12	
	2/10/99	11:18	ST	18	2410	8	8.1	5.9	<0.05	0.7	0.5		40	12	3	<8	29	<2	33	<2	38	738
	2/12/99	21:18	SF												3	<8	23	<2	32	<2	49	
	3/1/99	10:24	D	1	3140	2	8.0	5.6	0.1	0.8	0.3		12	10								
	3/11/99		ST	1	2630	21	8.3	6.1	0.1	1.0	0.4		64	20	4	<8	27	<2	35	<2	40	970
	3/11/99		SF												3	<8	19	<2	28	<2	22	
	3/25/99	13:27	ST	5	1840	136	7.8	159.0	0.2	3.1	2.7		380	40	11	32	47	8	58	<2	166	786
	3/25/99	14:27	SF												1	<8	11	<2	23	<2	12	
	3/25/99	16:27	ST	8	1210	72	7.8	3.3	0.1	1.0	1.4		130	26	2	<8	27	5	15	<2	60	346
	3/26/99	6:27	SF												<1	<8	15	<2	9	<2	14	
	3/26/99	8:27	ST	39	2540	3	8.2	4.7	<0.05	0.6	0.4		11	6	2	<8	12	<2	22	<2	31	824
	3/29/99	12:27	SF												2	<8	11	<2	22	<2	14	
	4/29/99	8:30	D	1	3080	02	8.0	4.7	<0.05	1.0	0.4		11	7								
	5/20/99	10:25	DT	1	3150	2	8.0	5.8	0.1	0.7	0.5		56	20	4	<8	6	<2	24	<2	16	
	5/20/99	10:25	DF												4	8	6	<2	22	<2	14	
	6/9/99	9:52	D	1	2880	02	8.1	3.6	0.1	0.9	0.5		7	4								

SOUTH COUNTY WATERSHED - STORM AND DRY WEATHER MONITORING

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd ug/L	Cr ug/L	Cu ug/L	Pb ug/L	Ni ug/L	Ag ug/L	Zn ug/L	Hardness mg/L
LCWI02	3/10/95	22:30	ST	2	530	3500	7.7	4	0.12	14	21		10000	780	5.9	230	110	150	120	<1	520	180
	3/11/95	0:30																				
	3/11/95	8:30	ST	11	550	630	7.9	2.5	0.12	3.2	4.7		1000	120	<1	50	34	35	<40	<1	110	144
	3/12/95	9:30																				
	3/12/95	11:26	ST	11	960	320	8.2	3.5	0.15	0.77	2.2		320	37	<1	23	19	10	<40	<1	47	262
	3/13/95	13:26																				
	12/12/95	21:41	ST	5	970	800.0	7.4	19.0	2.00	32.00	21.00		2400	330	9	62	290	490	75	2	1300	195
	12/12/95	22:41																				
	12/13/95	0:41	ST	14	1100	140.0	7.8	8.2	0.35	4.30	3.80		310	48	<1	12	43	41	<40	<1	130	312
	12/14/95	2:41																				
	12/14/95	10:41	ST	30	1700	3.4	8.6	3.8	0.31	0.70	0.64		10	8	<1	<10	24	<2	<40	<1	11	500
	12/16/95	20:41																				
	1/19/96	6:02	ST	5	530	65.0	7.8	6.2	0.31	2.50	1.30		85	16	<1	17	33	14	6	<1	94	150
	1/19/96	7:02																				
	1/19/96	9:02	ST	8	1300	11.0	8.4	4.7	0.14	0.95	0.56		6	<6	<1	<10	12	<2	<2	<1	18	368
	1/19/96	23:02																				
	1/20/96	1:02	ST	19	1500	1.7	8.5	1.7	<0.10	0.59	0.34		6	10	<1	<10	26	<2	5	<1	36	486
	1/21/96	13:02																				
	1/21/96	15:02	ST	9	710	740.0	8.1	3.2	<0.10	3.20	4.00		1500	130	4	69	82	33	180	<1	190	204
	1/22/96	7:02																				
	1/22/96	9:02	ST	11	1000	140.0	8.1	1.9	0.16	1.10	1.30		150	25	<1	11	26	5	9	1	33	284
	1/23/96	5:02																				
	2/20/96	2:21	ST	5	720	170.0	7.6	3.0	0.20	3.20	1.80		210	42	<1	13	33	19	11	<1	110	196
	2/20/96	3:21																				
	2/20/96	5:21	ST	13	530	1300.0	8.0	4.5	0.14	3.50	6.60		2700	200	3	74	65	<2	<2	<1	250	175
	2/21/96	21:21																				
	2/22/96	5:21	ST	23	1200	69.0	8.5	4.5	0.17	0.89	1.20		150	23	<1	<10	22	3	7	<1	12	350
	2/24/96	1:21																				
	10/30/96	5:51	ST	5	1500	1300.0	7.3	24.0	3.40	25.00	15.00		2900	520	10	60	490	780	86	1	1600	448
	10/30/96	6:51	SF												<1	<10	32	13	19	<1	130	
	10/30/96	9:06	ST	5	630	720.0	7.3	8.2	0.98	5.20	5.00		1200	130	2	80	23	42	46	<1	220	174
	10/30/96	17:06																				
	10/30/96	19:06	ST	24	1100	48.0	8.2	6.7	0.26	1.80	1.50		52	13	<1	<10	15	<2	<4	<1	55	330
	11/1/96	17:06																				
	11/21/96	11:07	ST	5	510	170.0	7.4	6.2	0.72	5.20	3.30		300	76	<1	17	100	28	17	<1	330	162
	11/21/96	12:07																				
	11/21/96	14:07	ST	9	490	1000.0	7.7	5.2	0.37	4.40	6.00		1900	140	1	97	72	37	73	<1	220	156
	11/22/96	6:07																				
	11/22/96	8:07	ST	26	970	120.0	8.3		0.24	<0.5	1.30		110	16	<1	<10	18	3	6	<1	120	268
	11/25/96	16:07																				
	12/9/96	13:21	ST	5	530	420.0	7.5	5.4	0.23	3.10	2.10		280	59	<1	18	45	33	15	<1	190	150
	12/9/96	14:21																				
	12/9/96	16:21	ST	10	630	410.0	7.9	3.2	<0.1	1.70	2.00		390	34	<1	17	25	13	12	<1	94	176
	12/10/96	10:21																				
	12/10/96	12:21	ST	8	820	190.0	8.3	2.9	<0.1	1.20	1.10		290	23	<1	17	18	4	17	<1	45	250
	12/11/96	2:21																				
	12/11/96	4:21	ST	16	580	570.0	8.1	3.7	0.18	1.80	2.30		940	56	<1	28	28	11	25	<1	85	170
	12/12/96	10:21																				
	12/12/96	12:21	ST	13	1100	25.0	8.3	3.1	<0.1	0.83	0.45		31	15	<1	<10	8	<2	<4	<1	50	345
	12/13/96	12:21																				

SOUTH COUNTY WATERSHED - STORM AND DRY WEATHER MONITORING

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd ug/L	Cr ug/L	Cu ug/L	Pb ug/L	Ni ug/L	Ag ug/L	Zn ug/L	Hardness mg/L
LCWI02	3/11/99	13:19	ST	5	980	230	8.6	4.1	0.1	2.3	0.4		170	26	1	50	54	31	35	<2	153	320
	3/11/99	14:19	SF												<1	<8	16	<2	<4	<2	<10	
	3/11/99	16:19	ST	6	1270	15	8.4	3.3	<0.05	0.9	1.3		66	20	<1	<8	25	5	<4	<2	27	390
	3/12/99	2:19	SF												<1	<8	15	<2	<4	<2	15	
	3/12/99	4:19	ST	39	1530	1	8.5	5.5	<0.05	0.5	0.3		12	5	<1	<8	18	<2	<4	<2	18	486
	3/15/99	10:05	ST	5	600	170	8.1	4.7	0.2	2.2	1.1		680	90	<1	42	56	23	31	<2	130	185
	3/15/99	10:19	SF												<1	<8	15	<2	<4	<2	<10	
	3/15/99	11:05	SF												<1	<8	19	<2	4	<2	<10	
	3/15/99	13:05	S	3	820	58	8.2	3.0	0.1	2.8	1.2		420	100								
	3/15/99	17:05	S																			
	3/15/99	19:05	ST	35	1290	2	8.5	4.4	<0.05	0.6	0.4		8	3	<1	<8	16	<2	<4	<2	15	424
	3/19/99	7:32	SF												<1	<8	14	<2	<4	<2	11	

SOUTH COUNTY WATERSHED - STORM AND DRY WEATHER MONITORING

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd ug/L	Cr ug/L	Cu ug/L	Pb ug/L	Ni ug/L	Ag ug/L	Zn ug/L	Hardness mg/L
OSOL02	11/16/94	6:00	ST	3	2400	56	7.8	6.1	0.2	2.9	1.4		120	26	2.7	<10	28	7.3	<40	<0.3	72	975
	11/16/94	10:00																				
	3/2/95	19:30	ST	3	2900	54	8.0	8.5	<0.1	3.2	1.2		130	30	5	<10	6	6.5	<40	1.5	64	1008
	3/2/95	23:30																				
	3/3/95	1:30	ST	16	1300	130	7.8	4.2	0.24	2.1	1.7		210	32	4.8	<10	25	8.5	<40	3.6	69	378
	3/4/95	7:30																				
	3/4/95	9:30	ST	8	1300	42	7.6	2.6	<0.1	1.1	0.94		65	14	<1	<10	26	3.5	<40	1.2	28	346
	3/4/95	23:30																				
	3/5/95	1:30	ST	16	690	240	7.6	1.9	0.23	2.3	4.2		880	82	4.5	30	31	11	<40	<1	110	214
	3/6/95	7:30																				
	3/10/95	22:54	ST	18	1300	230	7.9	3.3	0.25	3.0	3.3		680	79	3.7	27	41	11	63	<1	120	402
	3/12/95	8:54																				
	3/12/95	10:54	ST	9	2500	16	8.0	5.6	<0.1	0.74	0.85		28	<5	7.4	<10	29	<2	59	<1	41	875
	3/13/95	2:54																				
	1/19/96	9:08	ST	5	1900	65.0	8.1	9.0	0.49	3.10	1.10		100	22	3	<10	22	4	19	<1	58	712
	1/19/96	10:08																				
	1/19/96	12:08	ST	4	2300	48.0	8.3	9.0	0.27	2.60	1.20		76	18	2	16	19	5	18	<1	51	872
	1/19/96	18:08																				
	1/19/96	20:08	ST	23	2500	30.0	8.1	7.7	<0.10	1.20	0.73		49	7	2	<10	29	2	24	<1	43	988
	1/21/96	20:08																				
	1/21/96	22:08	ST	3	680	630.0	7.7	3.0	0.67	4.80	6.20		1500	190	26	59	140	35	82	<1	400	210
	1/22/96	2:08																				
	1/22/96	10:08	ST	12	1200	46.0	7.7	3.8	0.43	1.50	1.40		57	15	4	<10	19	3	17	<1	59	364
	1/23/96	8:08																				
	1/31/96	2:58	ST	5	2100	64.0	8.1	3.3	<0.10	4.20	1.20		92	16	3	<10	30	8	23	1	120	736
	1/31/96	3:58																				
	1/31/96	5:58	ST	12	560	230.0	7.8	5.9	0.38	5.20	3.10		470	58	7	28	46	16	27	2	150	162
	2/1/96	3:58																				
	2/1/96	5:58	ST	18	1100	50.0	8.0	5.7	0.30	1.70	1.70		67	18	2	<10	26	3	13	6	46	458
	2/2/96	11:58																				
	2/20/96	2:12	ST	5	2400	29.0	7.7	3.1	<0.10	2.80	0.90		84	<20	2	<10	21	3	13	<1	57	846
	2/20/96	3:12																				
	2/20/96	5:12	ST	7	510	310.0	7.7	3.7	0.17	2.80	3.20		710	78	6	31	41	<2	<2	<1	160	160
	2/20/96	17:12																				
	2/20/96	19:12	ST	20	710	140.0	7.8	15.0	0.27	1.90	2.70		380	38	4	19	29	<2	<2	<1	98	208
	2/22/96	9:21																				
	2/22/96	11:21	ST	21	2300	21.0	8.1	6.3	0.23	1.60	1.40		27	9	<1	<10	21	<2	24	<1	<10	732
	2/24/96	3:21																				
	10/30/96	6:46	ST	5	1700	170.0	7.3	15.0	1.60	6.70	3.20		290	68	6	15	62	7	30	<1	510	604
	10/30/96	7:46	F												<1	<10	14	<2	18	<1	190	
	10/30/96	10:01	ST	5	760	380.0	7.4	6.8	1.00	6.60	5.00		910	140	15	36	43	21	37	1	280	244
	10/30/96	18:01																				
	10/30/96	20:01	ST	43	2100	29.0	8.2	6.4	0.54	1.10	1.20		48	11	2	<10	17	6	13	<1	56	814
	11/3/96	8:01																				
	12/9/96	13:21	ST	5	1800	51.0	8.0	5.8	0.18	1.80	0.94		72	19	2	<10	22	6	13	<1	110	700
	12/9/96	14:21																				
	12/9/96	16:21	ST	7	590	210.0	7.6	4.1	0.22	2.10	2.40		380	44	3	17	32	11	17	<1	110	158
	12/10/96	4:21																				
	12/10/96	6:21	ST	9	1000	120.0	7.9	5.4	0.21	1.60	0.93		105	18	1	<10	15	<2	11	<1	44	335
	12/10/96	22:21																				
	12/11/96	0:21	ST	13	670	150.0	7.8	3.7	0.19	1.70	1.60		240	28	2	<10	21	4	15	<1	61	230
	12/12/96	0:21																				

SOL ... Y WATERSHED - STORM AND DRY WEATHER MONITORING

STATION	DATE	TIME	SAMPLES Type	#	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd ug/L	Cr ug/L	Cu ug/L	Pb ug/L	Ni ug/L	Ag ug/L	Zn ug/L	Hardness mg/L
OSOL02	12/12/96	2:21	ST	17	1800	23.0	8.1	5.8	0.23	1.90	<0.2		37	7	3	<10	15	<2	21	<1	98	700
	12/13/96	10:21																				
	3/25/98	6:00	ST	5	2760	20	7.65	8	0	1.8	<0.1		33	19								1080
	3/25/98	7:00	SF												2	3	14	2	26	<1.00	54	
	11/8/98	5:45	ST	5	2250	200	7.6	8.4	0.4	6.8	6.1		960	180	10	40	59	47	33	<2	288	755
	11/8/98	6:45	SF												<1	<8	9	<2	10	<2	21	
	11/8/98	8:45	ST	8	745	44	7.6	7.0	0.3	2.2	2.9		200	120	9	14	25	6	21	<2	96	240
	11/8/98	22:45	SF												4	9	16	3	14	<2	55	
	11/9/98	0:45	ST	39	1960	9	8.0	6.6	0.2	1.2	0.6		38	14	1	<8	13	<2	8	<2	24	685
	11/12/98	4:45	SF												1	<8	11	<2	8	<2	20	
	1/25/99	4:30	ST	5	1680	130	7.7	5.5	0.2	4.0	2.7		730	150	8	19	35	20	28	<2	136	620
	1/25/99	5:30	SF												<1	<8	8	<2	12	<2	11	
	1/25/99	7:30	ST	11	785	26	7.7	4.6	0.1	1.3	0.9		100	30	3	<8	17	3	10	<2	34	280
	1/26/99	3:30	SF												1	<8	10	<2	9	<2	13	
	1/26/99	5:30	ST	15	700	60	7.7	4.1	0.2	1.3	1.5		200	60	4	9	26	6	29	<2	66	210
	1/27/99	9:30	SF												<1	<8	12	<2	6	<2	14	
	1/27/99	11:30	ST	21	1300	26	7.6	5.1	0.1	1.0	1.1		58	34	2	<8	19	3	12	<2	32	404
	1/29/99	3:30	SF												1	<8	12	<2	6	<2	14	
	3/11/99	11:56	ST	5	2710	28	8.4	3.5	<0.05	1.0	0.5		98	20	3	<8	23	4	16	<2	49	1046
	3/11/99	12:56	SF												2	<8	17	<2	13	<2	17	
	3/11/99	14:56	ST	5	2430	68	8.3	5.3	<0.05	1.7	0.8		270	36	6	12	29	8	21	<2	81	974
	3/11/99	22:56	SF												1	<8	13	<2	12	<2	13	
	3/15/99	9:07	ST	5	2240	80	8.1	2.8	0.1	2.1	0.5		300	40	6	12	29	8	15	<2	110	1300
	3/15/99	10:07	SF												1	<8	14	<2	7	<2	18	
	3/15/99	12:07	ST	3	920	76	7.8	5.8	0.1	2.3	0.7		260	44	7	13	38	9	22	<2	118	436
	3/15/99	16:07	SF												1	<8	18	<2	12	<2	13	
	3/15/99	18:07	ST	44	2020	12	8.2	4.3	<0.05	0.9	0.4		40	11	3	<8	22	2	15	<2	39	750
	3/19/99	10:45	SF												2	<8	25	<2	15	<2	29	
	5/20/99	14:00	DT	1	3020	5	8.4	1.8	0.1	0.9	0.4		39	9	1	9	10	<2	9	<2	12	
	5/20/99	14:00	DF												<1	9	9	<2	8	<2	16	

SOUTH COUNTY WATERSHED - STORM AND DRY WEATHER MONITORING

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd ug/L	Cr ug/L	Cu ug/L	Pb ug/L	Ni ug/L	Ag ug/L	Zn ug/L	Hardness mg/L
PDCM01	6/23/94	10:20	DT	1	13000	1.1	8	17	0.23	0.91	0.5		16	<5								
	7/19/94	10:31	DT	24	7400	0.5	8.3	15	0.12	0.69	0.81		28	20								
	7/20/94	9:31																				
	10/26/94	10:19	DT	24	3900	1.7	8.2	4.1	0.27	1.1	0.37		10	<5								
	10/27/94	9:19																				
	11/7/94	9:34	DT	24	10000	62	8.4	15	0.3	3.2	1.6		230	23								
	11/8/94	8:34																				
	11/10/94	7:23	ST	3	1000	440	6.4	8.3	1.3	9.4	12		1800	100	24	87	170	60	160	0.5	830	470
	11/10/94	11:23																				
	11/10/94	13:23	ST	14	8100	63	6.8	13	0.3	2.8	2		500	33	11	<10	33	2.4	93	<0.3	110	1695
	11/11/94	15:23																				
	5/25/95	14:45	DT	1	10000	9.8	8.3	15	0.49	1.1	0.81		46	22								
	6/21/95	12:29	DT	24	11000	60	8.2	15	<0.1	3.4	1.6		220	76								
	6/22/95	11:29																				
	7/25/95	13:10	DT	24	8900	110.0	8.4	5.8	<0.10	4.20	0.21		260	58								
	7/26/95	12:10																				
	8/28/95	11:15	DT	24	1000	160.0	8.3	12.0	0.30	5.40	5.00		450	75								
	8/29/95	10:15																				
	9/11/95	14:45	DT	24	7900	150.0	8.4	14.0	0.11	3.60	1.80		280	60								
	9/12/95	13:45																				
	10/18/95	13:00	DT	24	11000	100.0	8.4	18.0	0.40	6.70	3.80		490	120								
	10/19/95	12:00																				
	11/20/95	11:38	DT	24	9900	390.0	8.3	17.0	0.15	6.20	3.90		640	69								
	11/21/95	10:38																				
	12/20/95	9:20	DT	1	13000	14.0	8.2	24.0	0.24	2.60	0.87		51	18								
	2/15/96	10:20			12000	9.4	8.1	21.0	0.25	1.20	0.76		57	23	34	<10	23	<2	280	3	150	4360
	2/20/96	3:24	ST	2	720	370.0	7.6	2.5	0.50	3.00	2.10		850	110	8	40	43	20	50	1	290	185
	2/20/96	3:33																				
	2/20/96	5:33	ST	28	2600	1000.0	7.7	9.1	0.53	5.40	8.50		2800	190	17	90	86	24	220	<1	280	864
	2/22/96	11:33																				
	2/22/96	13:33	ST	19	7600	46.0	8.2	19.0	0.38	1.40	0.86		110	20	38	<10	17	<2	190	<1	140	2850
	2/24/96	1:33																				
	3/12/96	15:42	ST	3	4800	160.0	8.1	8.2	0.33	1.70	1.10		320	34	18	22	31	6	120	<1	140	1450
	3/12/96	19:42																				
	3/12/96	21:42	ST	6	4600	150.0	7.7	9.0	0.98	2.80	1.80		310	41	20	18	81	6	140	1	240	1568
	3/13/96	11:42																				
	3/13/96	13:42	ST	38	6600	76.0	8.2	12.0	<0.10	0.88	0.76		160	28	26	<5	20	4	170	<1	130	3012
	3/16/96	13:42																				
	4/17/96	14:15	ST	1	10000	260.0	8.1	0.9	0.70	7.70	5.80		840	160	67	31	230	14	350	3	850	3215
	4/17/96	23:43	ST	5	800	93.0	7.5	0.6	0.80	2.80	2.10		420	52	8	18	38	10	34	2	200	224
	4/18/96	0:43																				
	4/18/96	2:43	ST	5	4000	420.0	8.0	0.4	0.27	3.90	2.80		670	86	12	47	76	6	97	<1	200	1276
	4/18/96	10:43																				
	4/18/96	12:43	ST	41	9900	57.0	8.3	1.7	0.25	3.10	1.40		140	46	41	<10	25	<2	390	1	230	3746
	4/21/96	22:43																				
	5/28/96	14:50	DT	1	8500	30.0	8.4	13.0	0.27	6.20	2.80		150	67	23	<10	14	<2	<4	<1	100	
	6/19/96	13:30			8200	14.0	8.5	16.0	1.20	3.10	1.20		85	<6	17	<10	9	<2	130	<1	61	2870
	7/24/96	14:40	DT	24	7200	240.0	8.3	4.8	0.17	5.60	3.90		620	94	27	21	55	9	210	1	340	2400
	7/25/96	13:40																				
	8/27/96	12:30	DT	24	6700	73.0	8.2	15.0	0.94	11.00	3.70		190	34	21	<10	28	2	130	<1	160	2425
	8/28/96	11:30																				
	9/24/96	13:15	DT	23	7600	170.0	8.1	16.0	0.34	3.50	2.00		440	70	34	<10	29	5	160	1	250	2828
	9/25/96	11:15																				

...TY WATERSHED - STORM AND DRY WEATHER MONITORING

...ION	DATE	TIME	SAMPLES Type	#	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd ug/L	Cr ug/L	Cu ug/L	Pb ug/L	Ni ug/L	Ag ug/L	Zn ug/L	Hardness mg/L
...CM01	10/30/96	7:17	ST	5	1800	1400.0	7.1	30.0	4.90	21.00	19.00		5800	580	120	250	80	49	630	3	2100	550
	10/30/96	8:17	SF												2	<10	17	<2	93	<1	72	
	10/30/96	10:32	ST	4	1500	370.0	7.3	9.0	0.85	4.60	4.10		700	94	12	44	49	13	64	<1	320	470
	10/30/96	16:32																				
	10/30/96	18:32	ST	35	5500	45.0	8.3	13.0	0.45	1.60	1.30		100	20	15	7	25	2	114	<0.1	81	2094
	11/3/96	8:32																				
	11/6/96	13:05	DT	1	8900	13.0	8.2	17.0	<0.1	1.60	0.75		30	11								
	11/21/96	13:52	ST	5	350	200.0	7.2	3.2	0.44	2.80	2.70		570	56	3	32	43	16	32	<1	180	118
	11/21/96	14:52																				
	11/21/96	16:52	ST	9	1500	2000.0	7.5	7.3	0.44	5.90	14.00		5500	320	12	210	160	18	170	<1	570	620
	11/22/96	8:52																				
	11/22/96	10:52	ST	37	5400	62.0	8.2	7.3	0.19	2.10	1.40		120	21	8	17	30	3	81	<0.1	66	1920
	11/25/96	14:52																				
	12/4/96	14:00	DT	1	11000	9.4	8.5	25.0	0.23	1.20	0.87		52	14	49	<10	12	<2	300	<1	110	4380
	1/29/97	12:35	DT	1	4500	28.0	8.0	6.9	0.25	0.80	0.48		28	10	19	<10	6	<2	150	<1	130	1690
	2/26/97	13:50	DT	1	11000	38.0	8.3	21.0	<0.1	2.50	1.20		100	35	35	<2	12	1	240	0	120	4040
	3/18/97	13:27	DT	24	9600	79.0	8.1	22.0	<0.5	5.30	2.40		230	47	50	<10	29	5	290	<1	390	3560
	3/19/97	12:27																				
	4/8/97	9:25	DT	24	9600	46.0	8.1	18.0	<0.5	2.20	1.10		120	42	31	<10	19	<2	210	<1	85	2750
	4/9/97	8:25																				
	5/6/97	13:30	DT	22	7500	45.0	8.2	15.0	<0.1	2.50	1.30		130	30	26	<10	33	<2	150	<1	170	2120
	5/7/97	10:30																				
	6/5/97	8:50	DT	1	6000	190.0	7.6	29.0	2.40	12.00	3.20		350	67								
	7/2/97	9:10	DT	1	6300	4.1	8.0	11	0.4	2.6	1		56	23								
	8/7/97	8:45	DT	1	5700	61	7.9	10	0.3	3.1	2		200	38								
	9/17/97	10:30	DT	1	6900	7.9	8.0	12	<0.1	2.1	2		49	26								
	10/9/97	13:00	DT	1	8500	72	8.3	17	<0.1	3.0	2		120	39								
	1/9/98	19:59	ST	1											50	<10	35	<2	240	<1	210	>2000
	1/9/98	22:59	ST	11	2500	680	7.7	8	<0.5	4.7	5	<0.5	1300	140	6	50	48	11	83	<1	50	390
	1/10/98	20:59	SF												3	<10	20	<2	28	<1	<10	
	1/29/98	13:24	ST	11	5300	130	7.8	43	<0.5	2.2	1		570	65	9	25	26	4	110	<1	110	1736
	1/30/98	9:24	SF												<1	14	31	3	97	<1	110	
	1/30/98	11:24	ST	35	7000	36	8.0	20	1	2.9	4		160	25	17	<10	21	<2	160	<1	93	2200
	2/2/98	7:24	SF												4	<10	16	<2	180	<1	34	
	2/14/98	9:36	ST	5	940	200	7.2	7.1	<0.5	2.2	2		730	69	5	30	40	15	43	<1.00	89	200
	2/14/98	10:36	SF												1	3	11	1	19	<1.00	15	
	2/14/98	12:36	ST	11	2700	1300	7.5	8.4	0.7	6	10		7000	750	22	256	110	20	254	<10	582	988
	2/15/98	6:36	SF												2	3	14	<1.00	60	<1.00	7	
	2/15/98	8:36	ST	11	7400	100	7.8	16.4	<0.5	2	10		360	57	39.0	18	7	<2	354	<5.00	176	>2000
	2/16/98	6:36	SF												27	3	17	<1.00	275	<1.00	44	
	2/16/98	8:36	ST	26	5800	850	7.7	13.7	<0.5	3	10		2400	290	38	85	102	21	336	<10	467	1910
	2/18/98	10:36	SF												17	3	23	<1.00	195	<1.00	32	
	3/25/98	6:14	ST	5	943	180	7.38	8.9	0.2	2.2	<0.1		7430	46	7	27	31	12.0	48	<1.00	110	290
	3/25/98	7:14	SF												2	3	15.0	2	26	<1.00	58.0	
	3/25/98	9:14	ST	6	1520	2900	7.43	<0.4	0.3	4.6	0.3		122	461	18	165	82	23	173	<10	535	590
	3/25/98	19:14	SF												<1.00	3	8	<1.00	23	<1.00	30	
	3/25/98	21:14	ST	27	5370	650	7.93	16.8	0.9	1.6	0.6		2230	172	26	85	45	17	241	<5.00	257	1608
	3/27/98	1:14	SF												13	3	22	4	173	<1.00	48.0	
	3/28/98	3:14	ST	15	3400	1660	7.75	3.5	0.6	6.7	0.3		4340	255	22	158	89	25	234	<5.00	485	1065
	3/29/98	7:14	SF												4	2	8.40	1	68.0	<1.00	17	
	6/22/98	10:00	DT	1	9180	22	7.9	19.0	0.1	2.8	1.3		110	30								
	8/11/98	12:59	D	1	9920	280	7.7	22.0	2	30	6.1		860	190								
	9/2/98	10:19	D	1	6840	1000	7.9	13.0	<0.05	6	1.8		1280	260								

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STATION	DATE	TIME	SAMPLES Type	#	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd ug/L	Cr ug/L	Cu ug/L	Pb ug/L	Ni ug/L	Ag ug/L	Zn ug/L	Hardness mg/L
PDCM01	10/1/98	10:40	D	1	7500	10	8.0	14.4	<0.05	1	<0.061		80	22								
	11/8/98	5:51	ST	5	435	95	7.3	4.2	0.4	2	3.4		470	90	6	28	32	10	32	<2	195	110
	11/8/98	6:51	SF												<1	<8	10	<2	11	<2	24	
	11/8/98	8:51	ST	10	4090	580	7.7	14.0	0.6	7	8.6		2580	320	16	98	66	20	90	<2	492	1235
	11/9/98	2:51	SF												5	37	31	5	52	<2	140	
	11/9/98	10:51	ST	37	8280	58	8.1	14.0	0.2	3	1.4		340	60	23	16	34	5	117	<2	182	2912
	11/12/98	4:51	SF												17	<8	22	<2	113	<2	54	
	11/28/98	5:08	ST	5											6	31	37	12	35	<2	209	160
	11/28/98	6:08	SF												<1	<8	10	<2	10	<2	19	
	11/28/98	8:08	ST	13	3390	900	7.8	9.7	0.4	1.1	9.1		1900	720	14	108	72	20	92	<2	481	1030
	11/28/98	8:08	SF												2	<8	13	<2	38	<2	14	
	11/29/98	10:08	ST	28	7970	152	8.2	12.0	<0.05	2.8	2.3		700	110	25	26	37	5	128	<2	184	2750
	12/1/98	16:08	SF												16	<8	20	<2	129	<2	34	
	12/1/98	18:08	ST	8	3490	3360	7.9	7.9	0.5	6.2	6.2		1910	750	12	66	48	11	82	<2	286	1155
	12/2/98	8:08	SF												4	<8	12	<2	56	<2	15	
	12/7/98	11:15	D	1	6570	120	8.1	12.6	0.3	3.3	1.2		580	100								
	1/13/99	10:10	D	1	9640	6	8.1	22.3	<0.05	1.2	0.8		41	13								
	2/9/99	17:32	ST	5	850	190	7.4	3.2	0.3	4.6	2.9		150	18	10	39	52	20	56	<2	329	264
	2/9/99	18:32	SF												<1	<8	6	<2	14	<2	20	
	2/9/99	20:32	ST	6	5110	72	8.0	13.6	0.3	2.8	1.4		260	28	11	14	22	4	90	<2	100	1610
	2/10/99	6:32	SF												8	<8	14	<2	84	<2	40	
	2/10/99	8:32	ST	41	10400	14	8.1	20.6	<0.05	1.2	0.5		200	18	26	<8	28	<2	204	<2	109	3228
	2/13/99	16:32	SF												24	<8	25	<2	207	<2	100	
	2/18/99	11:40	D	1	12000	14	8.2	22.4	<0.05	1.1	0.4		58	15								
	3/1/99	11:16	D	1	10300	13	8.4	19.4	<0.05	1.6	0.5		48	11								
	3/11/99	11:27	ST	5	1520	130	7.7	6.1	0.7	1.9	1.9		100	30	21	26	70	18	81	<2	433	464
	3/11/99	12:27	SF												1	<8	15	<2	28	<2	31	
	3/11/99	14:27	ST	5	7120	13	8.2	16.1	0.1	0.9	0.3		78	20	18	8	26	<2	129	<2	105	2460
	3/11/99	22:27	SF												17	<8	22	<2	128	<2	67	
	3/12/99	0:27	ST	8	8670	9	8.3	19.4	<0.05	1.3	0.4		48	11	21	<8	30	<2	148	<2	88	2618
	3/12/99	14:27	SF												18	<8	27	<2	140	<2	58	
	3/25/99	11:59	ST	5	1490	112	7.4	6.1	0.7	6.5	4.1		510	420	14	26	90	19	70	<2	444	394
	3/25/99	12:59	SF												3	<8	23	<2	30	<2	35	
	3/25/99	14:59	ST	9	4380	54	8.0	9.7	0.1	1.4	1.0		180	24	9	<8	30	2	70	<2	89	1268
	3/26/99	6:59	SF												8	<8	25	<2	64	<2	46	
	3/26/99	8:59	ST	38	9920	15	8.2	20.0	0.1	1.5	0.6		74	15	29	<8	30	<2	207	<2	117	3046
	3/29/99	10:59	SF												26	<8	25	<2	199	<2	67	
	4/7/99	2:16	ST	5	3350	194	7.9	6.1	0.3	1.9	0.9		500	110	9	21	30	6	67	<2	165	952
	4/7/99	3:16																				
	4/7/99	5:16	ST	6	3380	323	8.1	8.1	0.3	2.5	1.8		390	44	9	29	37	5	73	<2	162	1052
	4/7/99	15:16	SF												4	<8	13	<2	49	<2	23	
	4/7/99	17:16	ST	39	10400	15	8.2	21.5	<0.05	1.4	0.7		47	14	30	<8	31	<2	218	<2	132	3325
	4/11/99	1:59	SF												26	<8	27	<2	206	<2	84	
	4/29/99	10:30	D	1	8970	4	8.3	18.2	<0.05	1.9	0.6		18	5								
	5/20/99	12:00	D	1	9050	24	8.3	12.0	<0.05	1.0	0.9		130	18								
	6/9/99	12:00	D	1	9100	6	8.4	19.0	<0.05	<0.2	0.7		46	11								

SOUTH COUNTY WATERSHED - STORM AND DRY WEATHER MONITORING

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd ug/L	Cr ug/L	Cu ug/L	Pb ug/L	Ni ug/L	Ag ug/L	Zn ug/L	Hardness mg/L
SDCM02	6/23/94	10:05	DT	1	4900	2.8	9.5	0.27	<0.1	0.8	0.48		13	<5								
	7/19/94	10:48	DT	24	13000	2.3	8.4	3.4	0.18	0.95	1.3		77	11								
	7/20/94	9:48																				
	10/26/94	10:09	DT	24	8600	23	8.3	11	0.5	2.5	2.1		440	17								
	10/27/94	9:09																				
	11/7/94	9:26	DT	24	9900	2.2	8.4	1.4	<0.2	1.4	0.46		37	14								
	11/8/94	8:26																				
	11/10/94	15:06	ST	4	940	310	6.1	5.1	0.48	3.3	2.8		760	70	7.8	30	65	19	<40	<0.3	250	565
	11/10/94	21:06																				
	5/25/95	14:15	DT	1	11000	1.6	8.3	2.4	<0.1	0.77	0.21		24	13								
	6/21/95	12:09	DT	24	11000	2.7	8.2	<0.2	0.1	1.2	0.28		18	11								
	6/22/95	11:09																				
	7/25/95	12:45	DT	24	980	4.7	8.4	<0.2	<0.10	1.00	<0.20		18	13								
	7/26/95	11:45																				
	8/28/95	10:50	DT	24	1200	5.1	8.4	1.4	0.47	1.70	0.47		32	15								
	8/29/95	9:50																				
	9/11/95	14:31	DT	24	12000	7.0	8.5	1.5	0.18	2.30	0.67		35	16	4	<10	31	<2	59	<1	63	
	9/12/95	13:31																				
	10/18/95	12:00	DT	24	12000	9.7	8.4	2.1	0.11	1.80	0.65		36	14								
	10/19/95	11:00																				
	11/20/95	11:24	DT	24	11000	6.7	8.4	5.3	0.20	2.20	1.00		43	29								
	11/21/95	10:24																				
	12/20/95	9:40	DT	1	25000	6.9	8.1	7.0	0.69	2.00	0.75		49	23								
	1/19/96	6:13	ST	5	2700	100.0	7.7	11.0	0.86	4.00	2.70		140	37	5	<10	38	46	34	<1	250	652
	1/19/96	7:13																				
	1/19/96	9:13	ST	5	8500	24.0	8.7	6.1	<0.10	1.50	0.66		42	12	2	<10	17	2	22	<1	44	1266
	1/19/96	17:13																				
	1/19/96	19:13	ST	23	6500	5.5	8.4	3.2	<0.10	1.10	0.46		19	9	5	<10	17	<2	77	<1	43	1908
	1/21/96	15:13																				
	1/21/96	17:13	ST	11	2300	74.0	7.6	3.3	<0.10	1.30	1.10		100	20	3	<10	23	11	26	<1	110	520
	1/22/96	13:13																				
	1/22/96	15:13	ST	8	5100	5.2	8.2	4.0	<0.10	1.10	0.46		13	9	4	<5	14	<2	36	2	63	1140
	1/23/96	5:13																				
	1/31/96	3:17	ST	5	1200	140.0	7.5	3.6	0.36	6.00	2.20		280	48	4	27	46	24	30	<1	250	278
	1/31/96	4:17																				
	1/31/96	6:17	ST	6	1900	92.0	7.9	3.3	<0.10	1.70	2.00		230	36	2	18	30	15	26	<1	140	62
	1/31/96	16:17																				
	2/15/96	10:00	DT	1	13000	2.6	7.9	2.4	0.25	1.00	<0.20		28	15	8	15	52	<2	78	3	26	14044
	2/20/96	2:50	ST	5	1500	360.0	7.1	3.9	0.38	5.20	2.70		540	84	8	22	77	44	37	1	380	415
	2/20/96	3:50																				
	2/20/96	5:50	ST	24	1600	350.0	7.7	4.1	0.24	2.70	3.00		700	62	7	40	40	13	41	<1	190	395
	2/22/96	3:50																				
	2/22/96	11:50	ST	3	5600	24.0	8.8	6.1	0.24	1.80	1.70		47	15	5	16	21	<2	50	<1	23	1610
	2/22/96	15:50																				
	3/12/96	14:14	ST	5	3400	340.0	7.9	4.0	0.39	5.30	2.50		530	75	<1	27	48	24	61	<1	320	682
	3/12/96	15:14																				
	3/12/96	17:14	ST	11	2300	240.0	8.0	3.2	0.20	2.10	1.90		470	64	<1	29	36	8	36	<1	120	396
	3/13/96	15:14																				
	3/13/96	17:14	ST	35	11000	2.1	8.4	1.9	0.15	<0.50	0.26		23	9	4	<5	26	<2	75	<1	46	2500
	3/16/96	13:14																				
	4/17/96	13:35	DT	1	9300	100.0	8.0	0.5	0.70	9.60	3.80		770	130	15	18	150	24	83	2	360	1770
	5/28/96	14:40	DT	1	23000	2.6	9.6	<0.2	0.11	1.10	0.32		55	20	<1	<10	17	<2	30	<1	43	
	6/19/96	13:00	DT	1	8440	3.3	9.6	<0.2	0.23	1.50	0.46		36	<6	<1	<10	12	<2	26	<1	23	1816

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STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd ug/L	Cr ug/L	Cu ug/L	Pb ug/L	Ni ug/L	Ag ug/L	Zn ug/L	Hardness mg/L
SDCM02	7/24/96	14:25	DT	23	12000	130.0	8.4	<0.2	0.27	6.30	3.40		350	84	12	<10	52	19	98	<1	62	1965
	7/25/96	13:25																				
	8/27/96	12:45	DT	24	7100	54.0	8.4	1.8	0.26	2.60	1.40		150	1962	10	<10	41	9	53	<1	190	56
	8/28/96	11:45																				
	9/24/96	13:00	DT	23	10000	47.0	8.3	1.2	<0.1	2.30	0.74		140	25	8	<10	32	5	44	<1	180	2356
	9/25/96	11:00																				
	11/6/96	12:50	DT	1	6800	3.2	9.0	4.0	0.20	1.90	1.10		19	6								
	11/21/96	12:37	ST	5	2200	350.0	7.5	9.8	1.30	9.70	5.20		660	140	7	26	110	80	58	<1	700	440
	11/21/96	13:37																				
	11/21/96	15:37	ST	10	970	830.0	7.8	4.4	0.18	3.40	5.80		1800	120	5	81	90	17	80	<1	290	292
	11/22/96	9:37																				
	11/22/96	11:37	ST	36	5700	40.0	8.2	20.0	0.28	2.10	0.89		78	15	28	15	29	1	228	<0.1	125	1792
	11/25/96	13:05																				
	12/4/96	13:45	DT	1	29000	15.0	8.2	2.3	0.25	0.89	0.27		83	23	6	<10	12	<2	72	<1	52	5780
	1/29/97	12:25	DT	1	17000	7.3	8.6	7.8	<0.1	2.00	0.72		60	28	11	<10	10	<2	150	<1	78	3470
	2/26/97	13:35	DT	1	27000	4.4	8.8	0.9	<0.1	1.90	0.27		54	12	2	<2	12	1	42	<0.1	25	4220
	3/18/97	13:11	DT	22	14000	140.0	8.2	2.5	<0.5	6.80	2.20		660	260	18	<10	37	15	110	1	350	3300
	3/19/97	12:11																				
	4/8/97	9:00	DT	24	14000	5.1	8.1	5.9	<0.5	1.80	0.69		37	17	6	<10	42	<2	75	<1	<10	2650
	4/9/97	8:00																				
	5/6/97	13:00	DT	22	14000	3.7	8.3	1.2	<0.1	1.50	0.38		33	15	5	<10	53	<2	52	<1	54	2700
	5/7/97	10:00																				
	6/5/97	8:20	DT		15000	4.1	8.2	1.2	0.44	1.80	0.89		59	22								
	7/2/97	8:50	DT	1	8600	3.2	8.4	1.9	0	4.6	1		46	24								
	8/7/97	8:15	DT	1	19000	5.3	7.9	2.9	0	2.0	1		48	20								
	9/17/97	10:10	DT	1	20000	8.9	8.5	3.8	0	2.6	2		70	32								
	10/9/97	12:45	DT	1	14000	4.0	9.9	1.7	<0.1	1.8	1		35	12								
	1/9/98	5:18	ST	6	5500	110	7.8	9.7	1	4.0	3	<0.5	400	72	<10	10	43	22	62	<1	480	1320
	1/9/98	6:19	SF												<10	<10	14	<2	37	<1	93	
	1/9/98	6:19	ST	19	1900	240	7.6	3.7	<0.5	2.4	2	1	630	63	1.0	14	32	8	30	<1	14	710
	1/10/98	18:19	SF												<1	10	25	4	19	<1	<10	
	1/10/98	20:19	ST	18	5400	8.3	8.1	5.8	<0.5	2.0	0.90	<0.5	17	10	3	<10	18	<2	67	<1	110	1430
	1/12/98	6:19	SF												3	<10	16	<2	59	<1	89	
	2/14/98	9:38	ST	6	1300	130	7.5	8.4	1	3.0	2		370	72	4	14	40	25	30	<1.00	131	230
	2/14/98	10:39	SF												1	7.70	14	1	17	1	32	
	2/14/98	12:39	ST	14	1800	510	7.8	7.1	<0.5	2	10		1500	200	5	50	54	13	63.0	<1.00	91	544
	2/15/98	14:39	SF												1.10	3	16	<2	32	<1.00	9	
	2/16/98	20:39	ST	12	1500	440	7.7	5.8	<0.5	4	10				4	46	39	14	49	<1.00	119	300
	2/17/98	18:39	SF												<1.00	7	19	<1.00	28	<1.00	13	
	3/25/98	6:12	ST	5	2860	140	7.38	12.8	0.2	5.5	<0.1		2620	81	17	10.0	36	19	105	<1.00	175	865
	3/25/98	7:12	SF												3.40	3	28	2	59.0	<1.00	53.0	
	3/25/98	9:12	ST	6	718	1900	7.60	7.1	0.3	3.5	0.9		968	211	8	78	58	28	69	1.30	191	240
	3/25/98	19:12	SF												<1.00	3	19	2	12	<1.00	23	
	3/25/98	21:12	ST	18	26700	600	7.89	7.5	0.5	3.7	1.2		1260	103	6	58	44	22	73	2.10	143	684
	3/27/98	19:12	SF												2	2	19	1	41	<1.00	30	
	3/27/98	21:12	ST	18	2050	610	7.97	1.8	0.3	3.1	0.9		1400	106	8	46	51	18	80	<1.00	158	655
	3/29/98	7:12	SF												2	2	10	2	39	<1.00	13	
	6/22/98	9:40	DT	1	25600	4.7	8.0	<1.3	<0.05	2.0	0.2		48	30								
	7/20/98	12:40	D	1	10200	3	8.7	1.4	<0.05	2.5	0.1		100	26								
	8/11/98	12:44	D	1	5830	9	8.9	02	0.1	3.5	0.6		44	15								
	9/2/98	10:04	D	1	14400	5	8.4	3.1	0.3	2.7	1.2		64	22								
	10/1/98	10:15	D	1	11000	3	8.5	1.3	<0.05	1.6	0.3		50	12								
	11/8/98	4:26	ST	1											46	45	178	205	143	<2	1530	921

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STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd ug/L	Cr ug/L	Cu ug/L	Pb ug/L	Ni ug/L	Ag ug/L	Zn ug/L	Hardness mg/L
SDCM02	12/7/98	11:00	D	1	38300	38	8.0	8.7	<0.05	1.8	0.9		260	34								
	1/13/99	10:00	D	1	7450	4	8.5	10.0	<0.05	1.4	0.4		25	6								
	2/9/99	16:29	ST	5	5130	80	8.1	11.0	0.1	4.7	2.0		260	48	6	14	37	11	55	<2	169	1352
	2/9/99	17:29	SF												1	<8	10	<2	22	<2	18	
	2/18/99	12:00	D	1	18100	6	8.6	3.8	0.1	0.8	0.3		61	16								
	3/1/99	11:41	D	1	23700	8	8.6	3.3	<0.05	1.9	0.5		85	20								
	3/11/99	10:58	ST	5	3740	68	8.5	5.0	0.3	2.3	1.5		250	60	10	12	71	24	60	<2	360	1080
	3/11/99	11:58	SF												2	<8	34	<2	30	<2	42	
	3/11/99	13:58	ST	6	2290	72	8.1	5.2	0.1	1.4	0.4		160	32	4	10	33	4	38	<2	94	618
	3/11/99	23:58	SF												2	<8	21	<2	31	<2	24	
	3/12/99	1:58	ST	39	7170	4	8.4	5.2	0.1	1.5	0.2		28	10	4	<8	34	2	54	<2	42	1908
	3/15/99	5:58	SF												3	<8	31	<2	51	<2	29	
	3/15/99	8:26	ST	5	2040	76	7.7	5.5	0.6	3.0	1.0		360	130	6	11	47	22	36	<2	285	688
	3/15/99	9:26	SF												2	<8	22	4	23	<2	79	
	3/15/99	11:26	ST	2	900	124	7.7	3.4	0.2	2.3	1.0		510	130	7	17	38	9	30	<2	193	232
	3/15/99	13:26																				
	4/6/99	13:41	ST	5	3080	122	7.9	4.8	0.6	6.1	1.4		280	130	6	10	52	19	44	<2	264	800
	4/6/99	14:41	SF												<1	<8	29	<2	19	<2	29	
	4/6/99	16:41	ST	15	1760	161	8.1	3.8	0.2	1.2	1.5		230	30	2	9	26	3	23	<2	82	440
	4/7/99	20:22	SF												<1	<8	15	<2	15	<2	16	
	4/7/99	22:41	ST	8	5060	47	8.3	7.5	0.4	1.3	0.9		86	14	3	<8	27	<2	39	<2	53	1400
	4/8/99	20:41	SF												2	<8	18	<2	35	<2	22	
	4/8/99	22:41	ST	2	3460	38	8.0	6.6	0.3	2.1	0.8		60	17	3	<8	25	4	37	<2	93	855
	4/9/99	0:41	SF												2	<8	20	<2	33	<2	47	
	4/9/99	2:41	ST	17	6130	4	8.3	4.8	0.1	1.2	0.2		21	6	4	<8	21	<2	65	<2	41	1658
	4/10/99	13:44	SF												4	<8	20	<2	63	<2	23	
	4/29/99	10:15	D	1	7760	6	8.8	<0.44	<0.05	1.6	0.3		53	15								
	6/9/99	12:15	D	1	5370	2	10	0.9	<0.05	2.1	0.3		22	13								

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STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd ug/L	Cr ug/L	Cu ug/L	Pb ug/L	Ni ug/L	Ag ug/L	Zn ug/L	Hardness mg/L
SCDAM	3/12/96	15:42	ST	5	1800	9.1	8.4	2.0	<0.10	1.40	0.87		23	9	3	<10	22	2	28	<1	27	574
	3/12/96	16:42																				
	3/12/96	18:42	ST	8	180	7.1	8.3	2.1	<0.10	1.60	0.91		21	12	2	<10	21	<2	33	<1	63	570
	3/13/96	8:42																				
	3/13/96	10:42	ST	39	1700	3.4	8.3	19.0	<0.10	0.84	0.55		12	9	1	<10	25	<2	27	<1	13	600
	3/16/96	14:42																				
	4/18/96	0:33	ST	5	2100	4.7	9.0	<0.2	0.57	1.10	1.30		25	13	2	<10	14	<2	23	<1	28	686
	4/18/96	1:33																				
	4/18/96	3:33	ST	4	2100	13.0	9.3	<0.2	0.11	1.90	1.60		42	19	1	<10	33	<2	25	<1	33	750
	4/18/96	9:33																				
	4/18/96	11:33	ST	40	2100	4.8	8.8	<0.2	<0.10	1.60	1.50		25	13	1	<10	15	3	20	<1	17	706
	4/21/96	17:33																				

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STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd ug/L	Cr ug/L	Cu ug/L	Pb ug/L	Ni ug/L	Ag ug/L	Zn ug/L	Hardness mg/L
SJNL01	6/23/94	11:20	DT	1	1800	0.71	8.8	0.79	0.11	<0.2	0.43		9	<5								
	5/25/95	11:45	DT	1	720	1.2	8.3	0.9	<0.1	<0.2	<0.2		<6	<6								
	6/21/95	11:06	DT	24	720	1.3	8.3	<0.2	<0.1	0.23	0.28		<6	<6								
	6/22/95	10:06																				
	7/25/95	12:30	DT	24	940	24.0	8.4	<0.2	0.21	1.00	<0.20		45	18								
	7/26/95	11:30																				
	8/28/95	9:50	DT	24	1100	13.0	8.3	<0.2	0.18	0.48	<0.20		39	8								
	8/29/95	8:50																				
	9/11/95	12:40	DT	24	1100	1.0	8.5	<0.2	0.19	0.54	<0.20		<6	<6								
	9/12/95	11:40																				
	10/18/95	10:45	DT	24	1200	9.9	8.4	<0.2	<0.10	0.52	0.23		18	8								
	10/19/95	9:45																				
	11/20/95	10:57	DT	24	1100	0.4	8.3	1.0	<0.10	<0.50	<0.20		<6	<6								
	11/21/95	9:57																				
	12/20/95	9:00	DT	1	1200	1.0	8.0	4.2	<0.10	0.62	<0.20		<6	<6								
	2/14/96	12:30	DT	1	1100	2.5	8.5	2.0	0.14	0.56	<0.20		<6	<6	3	27	3	<2	<2	2	20	340
	3/12/96	14:22	ST	5	530	260.0	7.6	2.2	0.34	1.70	1.20		360	46	<1	19	43	31	15	<1	300	180
	3/12/96	15:22																				
	3/12/96	15:22	ST	13	630	230.0	7.9	3.7	0.20	1.10	1.60		430	60	<1	<10	32	18	8	<1	120	226
	3/13/96	19:22																				
	3/13/96	21:22	ST	33	6100	31.0	8.3	12.0	0.14	1.10	0.57		78	25	24	<10	26	<2	180	<1	110	2200
	3/16/96	13:22																				
	3/27/96	14:10	DT	1	940	5.2	8.0	<0.2	0.10	0.72	0.25		20	9	<1	<10	4	<2	4	<1	39	350
	4/2/96	3:13	ST	5	1000	5.8	7.6	0.6	0.14	<0.50	0.27		13	<6	<1	<10	40	11	7	<1	22	340
	4/2/96	4:13																				
	4/2/96	6:13	ST	47	870	14.0	8.0	1.4	0.17	<0.50	0.25		32	11	<1	<10	15	<2	5	<1	17	314
	4/6/96	2:13																				
	4/17/96	11:30			910	5.6	8.3	<0.2	0.10	<0.50	<0.20		25	9	<1	<10	15	<2	6	<1	19	290
	4/18/96	1:02	ST	5	810	9.1	8.0	0.3	0.18	0.78	0.37		37	9	<1	<10	16	<2	7	<1	18	280
	4/18/96	2:02																				
	4/18/96	4:02	ST	5	830	160.0	8.1	<0.2	<0.10	1.70	1.10		270	46	<1	<10	19	7	4	<1	44	260
	4/18/96	12:02																				
	4/18/96	14:02	ST	41	900	7.2	8.4	<0.2	0.10	0.58	0.24		20	8	<1	<10	11	3	<2	<1	11	290
	4/22/96	0:02																				
	5/28/96	15:15	DT	1	1100	0.9	8.4	0.8	<0.10	<0.50	<0.20		<6	<6	<1	<10	<2	<2	6	<1	17	
	6/19/96	12:00	DT	1	1000	2.8	8.2	<0.2	0.11	<0.50	<0.20		21	12	<1	<10	<2	<2	5	<1	12	230
	11/6/96	15:35	DT	1	1400	0.9	8.1	<0.2	0.23	0.85	<0.2		<6	<6								
	12/4/96	14:20	DT	1	1200	1.6	8.7	5.0	0.23	<0.5	<0.2		<6	<6	<1	<10	<4	<2	<4	<1	<10	395
	1/29/97	12:00	DT	1	480	25.0	7.9	1.4	<0.1	<0.5	0.39		69	10	<1	<10	4	<2	<4	2	53	160
	2/26/97	13:20	DT	1	760	3.1	8.4	1.2	0.11	0.54	0.23		<6	<6	1	<10	<4	<2	<4	<1	94	240
	3/18/97	13:45	DT	1	760	0.9	9.0	1.1	<0.5	<0.5	<0.2		<6	<6	<1	<10	<4	<2	<4	<1	20	225
	4/8/97	9:50	DT	1	940	<0.5	8.3	<0.2	<0.5	<0.5	<0.2		<6	<6	<1	<10	<4	<2	<4	<1	<10	300
	5/6/97	9:45	DT	1	1100	0.7	8.0	<0.2	<0.1	<0.5	<0.2		<6	<6	<1	<10	12	<2	23	<1	15	370
	6/5/97	9:15	DT	1	1200	0.5	8.2	0.2	0.10	0.50	0.20		6	6								
	7/2/97	9:35	DT	1	1400	<0.5	8.2	<0.2	<0.1	<0.5	<0.2		<6	7								
	6/30/98	13:00	DT	1	605	1.4	9.1	<1.3	<0.05	<1.0	0		7	5								
	7/20/98	13:40	D	1																		
	8/11/98	11:51	D	1	830	3.3	8.7	<1.3	<0.05	1.0	<0.061		37	14								
	9/2/98	9:10	D	1	1140	0.2	8.4	<1.3	<0.05	1.0	<0.061		27	9								
	10/1/98	9:15	D	1	1050	0.3	8.0	<1.3	<0.05	0.4	<0.061		<4	<1								
	12/7/98	12:00	D	1	930	14.0	8.4	7.1	<0.05	0.5	1		20	7								
	1/13/99	9:35	D	1	1170	4.4	8.3	4.4	<0.05	0.5	0		17	8								
	2/18/99	13:00	D	1	975	1.3	8.7	1.9	<0.05	0.4	<0.061		9	6								

SOUTH COUNTY WATERSHED - STORM AND DRY WEATHER MONITORING

STATION	DATE	TIME	SAMPLES Type	#	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd ug/L	Cr ug/L	Cu ug/L	Pb ug/L	Ni ug/L	Ag ug/L	Zn ug/L	Hardness mg/L
SJNL01	3/1/99	13:25	D	1	930	0.4	8.9	<0.44	<0.05	0.5	<0.061		<4	<1								
	4/29/99	10:00	D	1	1070	0.8	8.3	<0.44	<0.05	0.3	0.1		<4	<1								
	5/20/99	13:13	DT	1	1280	0.3	8.3	<0.44	<0.05	0.4	0.1		4	<1	<1	8	<2	<2	<4	<2	<10	
	5/20/99	13:13	DF												<1	11	<2	<2	<4	<2	<10	
	6/9/99	11:15	D	1	1150	0.5	8.4	1	<0.05	0.4	0.1		6	4								

SOUTH COUNTY WATERSHED - STORM AND DRY WEATHER MONITORING

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd ug/L	Cr ug/L	Cu ug/L	Pb ug/L	Ni ug/L	Ag ug/L	Zn ug/L	Hardness mg/L
SJOL01	6/23/94	10:55	DT	1	1100	0.98	7.9	0.67	0.15	<0.2	0.8		22	8								
	5/25/95	13:30			400	0.7	8.1	<0.2	<0.1	<0.2	<0.2		<6	<6								
	6/21/95	11:42	DT	24	490	1	8.1	<0.2	<0.1	<0.2	<0.2		<6	<6								
	6/22/95	10:42																				
	7/25/95	11:30	DT	24	470	20.0	8.2	<0.2	0.21	0.88	<0.20		42	24								
	7/26/95	10:30																				
	8/28/95	10:30	DT	24	530	32.0	8.3	<0.2	0.21	0.29	0.27		65	24								
	8/29/95	9:30																				
	9/11/95	14:03	DT	24	980	3.4	8.4	<0.2	<0.10	0.76	<0.20		<6	<6								
	9/12/95	13:03																				
	2/14/96	13:00	ST	1	490	1.4	8.3	<0.2	0.32	<0.50	<0.20		15	10	<1	13	3	<2	<2	<1	20	135
	3/12/96	15:18	ST	5	440	1.1	7.9	0.6	<0.10	<0.50	<0.20		<6	<6	<1	<10	12	<2	5	<1	17	142
	3/12/96	16:18																				
	3/12/96	18:18	ST	11	370	32.0	7.9	0.2	<0.10	<0.50	0.41		40	12	<1	<10	15	3	3	<1	20	198
	3/13/96	14:18																				
	3/13/96	16:18	ST	36	360	3.6	8.0	0.2	<0.10	<0.50	<0.20		<6	<6	<1	<10	16	<2	<4	<1	110	128
	3/16/96	14:18																				
	3/27/96	14:35	DT	1	440	1.4	7.8	1.0	<0.10	<0.50	<0.20		<6	<6	<1	<10	3	<2	<2	<1	37	320
	4/17/96	13:00	DT	1	450	0.3	7.6	<0.2	0.10	<0.50	<0.20		<6	<6	<1	<10	<2	<2	<4	<1	23	115
	5/28/96	15:45	DT	1	450	0.6	7.6	<0.2	<0.10	<0.50	<0.20		<6	<6	<1	<10	<2	<2	7	<1	23	
	1/29/97	14:15	DT	1	260	4.0	7.8	1.1	<0.1	<0.5	<0.2		<6	<6	<1	<10	<4	<2	<4	<1	28	70
	2/26/97	12:50	DT	1	390	0.9	7.7	0.8	<0.1	<0.5	<0.2		<6	<6	<1	<10	<4	<2	<4	<1	<10	140
	3/18/97	14:20	DT	1	410	<0.5	7.7	0.6	<0.5	<0.5	<0.2		<6	47	<1	<10	<4	<2	<4	<1	16	135
	4/8/97	10:20	DT	1	400	<0.5	7.5	<0.2	<0.5	<0.5	<0.2		<6	<6	<1	<10	<4	<2	<4	<1	<10	140
	5/6/97	10:15	DT	1	430	<0.5	7.6	<0.2	<0.1	<0.5	<0.2		<6	<6	<1	<10	4	<2	5	<1	21	134
	6/5/97	9:55	DT	1	450	0.5	7.2	0.2	0.10	0.50	0.20		6	6								
	6/30/98	13:30	DT	1	390	0.40	7.8	<1.3	<0.05	<1.0	0.06		4	2								
	7/20/98	14:00	D	1	400	0.3	7.8	<1.3	<0.05	1	<0.061		<4	<1								
	8/11/98	12:14	D	1	430	0.9	7.6	<1.3	<0.05	<1	<0.061		10	6								
	9/2/98	9:37	D	1	410	0.2	7.7	<1.3	<0.05	<1	0.09		<4	<1								
	10/1/98	9:45	D	1	435	0.3	7.5	<1.3	<0.05	<0.2	<0.061		<4	<1								
	12/7/98	12:40	D	1	425	0.2	7.9	<1.3	<0.05	0.3	0.061		<4	<1								
	1/13/99	9:15	D	1	460	0.1	7.6	0.5	<0.05	<0.2	<0.061		<4	5								
	2/18/99	12:20	D	1	460	0.2	7.8	<0.44	<0.05	0	0.06		<4	<1								
	3/1/99	13:15	D	1	445	0.2	7.7	<0.44	<0.05	<0.2	<0.061		<4	<1								
	4/29/99	9:30	D	1	430	0.2	7.6	<0.44	<0.05	<0.2	<0.061		<4	<1								
	5/20/99	12:35	DT	1	455	0.2	7.7	<0.44	<0.05	0.4	<0.061		<4	<1	<1	<8	<2	4	<4	<2	<10	
	5/20/99	12:35	DF												4	<8	3	<2	<4	<2	13	
	6/9/99	10:45	D	1	405	0.2	7.7	0.8	<0.05	1.5	0.1		<4	<1								

SOUTH COUNTY WATERSHED - STORM AND DRY WEATHER MONITORING

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd ug/L	Cr ug/L	Cu ug/L	Pb ug/L	Ni ug/L	Ag ug/L	Zn ug/L	Hardness mg/L
TCOL02	1/21/96	18:56	ST	33	490	1200.0	7.9	2.6	0.15	5.10	4.60		2000	210	3	72	84	39	76	<1	380	330
	1/21/96	23:56																				
	2/20/96	13:22	ST	15	370	700.0	7.9	3.3	<0.10	2.20	3.10		1400	100	1	50	54	<2	<2	<1	180	120
	2/21/96	17:22																				
	11/21/96	14:30	ST	1	500	240.0	8.9	3.0	0.56	2.50	1.80		430	68	1	28	55	57	18	<1	380	160
	11/21/96	16:30	ST	3	480	770.0	8.3	4.0	0.16	3.20	3.50		1200	110	11	47	72	24	24	<1	240	208
	11/21/96	20:30																				
	5/20/99	11:00	DT	1	1040	0.7	8.3	<0.44	<0.05	0.6	0.1		7	3	<1	8	2	<2	<4	<2	<10	
	5/20/99	11:00	DF												<1	8	2	<2	<4	<2	<10	

SOUTH COUNTY WATERSHED - STORM AND DRY WEATHER MONITORING

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd ug/L	Cr ug/L	Cu ug/L	Pb ug/L	Ni ug/L	Ag ug/L	Zn ug/L	Hardness mg/L
SCBJ03	11/21/95	11:30			3500	5.8	8.5	1.4	<0.10	1.30	2.00		<6	<6	<10	<10	<20	<2	<40	<1	18	
	3/13/96	8:00	ST	8	990	24.0	8.0	2.8	<0.10	1.10	0.97		56	14	2	<10	21	4	18	<1	68	342
	3/13/96	15:00																				
	3/13/96	17:00	ST	28	3300	14.0	8.4	5.0	<0.10	0.66	0.58		34	8	3	<10	20	<2	33	<1	37	1180
	3/16/96	13:00																				
	4/18/96	0:08	ST	5	2300	110.0	8.0	0.2	0.43	7.10	2.70		320	68	8	11	33	7	35	<1	120	765
	4/18/96	1:08																				
	4/18/96	3:08	ST	4	790	48.0	8.0	<0.2	0.14	1.70	1.40		98	21	2	<10	29	5	15	<1	64	246
	4/18/96	9:08																				
	4/18/96	11:08	ST	40	2800	4.7	8.5	<0.2	0.13	1.60	0.98		29	12	2	<10	13	<2	21	<1	33	1036
	4/21/96	19:08																				
	5/20/99	10:30	DT	1	2650	0.9	8.0	2.4	<0.05	0.5	0.8		22	8	2	9	6	<2	22	<2	12	
	5/20/99	10:30	DF												2	9	6	<2	20	<2	<10	

SOUTH COUNTY WATERSHED - STORM AND DRY WEATHER MONITORING

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd ug/L	Cr ug/L	Cu ug/L	Pb ug/L	Ni ug/L	Ag ug/L	Zn ug/L	Hardness mg/L
SILE17	3/4/96	14:15	S	3	1100	4.2	8.4	0.7	0.23	<0.50	<0.20	20	11	<1	<10	9	<2	8	<1	39	512	
	3/4/96	18:15																				
	3/5/96	14:15	S	36	800	2.8	8.4	1.2	<0.10	<0.50	<0.20	6	<6	<1	<5	16	8	5	<1	34	420	
	3/8/96	12:15																				
	5/24/99	11:00	DT	1	1050	0	8	<0.44	<0.05	<0.2	<0.081		6	5	<1	8	<2	<2	<4	<2	13	
	5/26/99	11:00	DF												<1	<8	<2	<2	<4	<2	11	
SARIMP	5/24/99		DT	1	1010	64.0	8.4	19.8	0.057	0.79	4.07		120	26	<10	10	7.23	2.44	<1	<2	18.2	
	5/24/99		DF	1											1.03	9.49	6.86	<2	<1	<2	34.2	

UPPER NEWPORT BAY WATERSHED - STORM AND DRY WEATHER MONITORING

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
WYLSED	6/30/94	10:25			2200	1.7	8.3	89.0	0.40	0.80	0.50		9	<5								
	10/4/94	17:00	ST	9	2100	16.0	7.8	10.0	0.52	6.10	1.10		74	6	<1	<10	23	2.2	<40	0.97	84	544
	10/5/94	9:00																				
	10/5/94	11:00	ST	5	1200	350.0	7.5	13.0	0.50	13.00	4.90		950	56	4.1	32	56	29	<40	0.77	260	300
	10/5/94	19:00																				
	10/25/94	12:40	DT	23	3400	17.0	8.0	58.0	0.25	1.20	0.53		130	8								
	10/26/94	8:40																				
	11/10/94	8:01	ST	1											3.7	11	46	22	<40	<0.3	360	620
	11/30/94	10:30			2700	1.5	8.3	59.0	0.11	1.30	0.76		<5	<5								
	3/3/95	8:58	ST	3	970	240.0	8.0	15.0	0.10	4.60	4.30		1100	65	1.7	31	45	24	<40	1	160	240
	3/3/95	12:58																				
	3/3/95	14:58	ST	10	940	210.0	8.0	23.0	0.11	2.60	2.40		320	48	<1	10	3.6	9.2	<40	1.4	64	248
	3/4/95	8:58																				
	3/23/95	8:00	ST	8	630	280.0	8.1	8.4	0.25	2.40	6.80		1300	150	4	30	38	20	<40	1.5	140	104
	3/24/95	0:00																				
	3/24/95	0:00	ST	40	1600	68.0	8.4	28.0	0.20	1.40	1.60		120	16	<1	10	17	4	<40	<1	27	416
	3/27/95	8:00																				
	5/16/95	14:30	DT	24	1900	380.0	8.4	46.0	0.10	1.10	2.60		550	70								
	5/17/95	13:30																				
	6/13/95	11:00	DT	24	2200	4.6	8.3	72.0	0.11	0.99	0.60		18	7								
	6/14/95	10:00																				
	7/26/95	12:25	DT		2400	1700.0	8.5	56.0	0.10	4.10	9.80		2500	280								
	8/29/95	11:00	DT	24	2300	120.0	8.3	82.0	0.11	0.84	1.10		220	30								
	8/30/95	10:00																				
	9/20/95	11:30	DT	1	2200	24.0	8.3	91.0	0.12	1.00	0.25		33	10	<1	<10	20	4	<40	<1	45	
	10/24/95	13:40	DT	6	2300	54.0	8.4	110.0	0.10	1.60	0.64		78	6								
	10/25/95	18:40																				
	11/15/95	9:40	DT	1	2600	130.0	8.1	130.0	0.14	0.82	0.80		180	43								
	12/6/95	9:30	DT	1	2400	34.0	8.2	130.0	0.60	0.89	1.10		140	21								
	12/13/95	0:00	ST	4	1200	800.0	7.3	45.0	1.50	9.20	6.10		940	120	3	32	68	27	40	<1	290	340
	12/13/95	6:00																				
	1/19/96	5:51	ST	5	1000	87.0	7.9	43.0	0.47	3.30	1.60		140	22	<1	11	32	7	8	<1	70	314
	1/19/96	13:51																				
	1/19/96	15:51	ST	22	1600	29.0	8.0	53.0	0.17	1.10	0.60		52	12	<1	<10	22	3	9	<1	30	494
	1/21/96	14:51																				
	1/21/96	16:51	ST	4	620	950.0	7.8	21.0	0.31	2.80	5.60		1800	240	3	50	<20	26	34	<1	300	220
	1/22/96	8:51																				
	1/22/96	10:51	ST	10	1000	230.0	8.0	23.0	0.23	1.70	2.00		360	41	<1	13	24	8	11	2	77	236
	1/23/96	4:51																				
	1/31/96	3:05	ST	4	1200	210.0	8.0	35.0	0.28	5.30	2.10		320	53	1	26	41	9	11	2	110	254
	1/31/96	9:05																				
	1/31/96	11:05	ST	21	660	840.0	7.5	16.0	0.52	4.60	8.60		1200	160	<1	<10	64	24	32	2	210	196
	2/2/96	3:05																				
	2/2/96	5:05	ST	15	1400	57.0	8.1	36.0	0.10	1.50	1.80		94	17	<1	<10	18	<2	8	<1	41	366
	2/3/96	9:05																				
	2/3/96	11:05	ST	8	750	230.0	7.7	18.0	0.26	3.10	2.70		330	52	<1	<10	36	11	12	9	72	208
	2/4/96	1:05																				

UPPER NEWPORT BAY WATERSHED - STORM AND DRY WEATHER MONITORING

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
WYLSED	2/13/96	9:40	DT	24	2000	1.6	7.9	59.0	0.10	1.20	0.54		10	10								
	2/14/96	8:40																				
	2/20/96	10:10	ST	22	440	1100.0	7.9	8.1	0.48	4.50	8.80		3400	330	6	78	69	<2	<2	<1	320	110
	2/22/96	8:10																				
	3/4/96	16:40	ST	5	1500	50.0	8.4	41.0	0.17	2.00	0.75		64	16	<1	<10	19	<2	7	<1	35	402
	3/4/96	17:40																				
	3/4/96	19:40	ST	9	460	730.0	8.0	8.9	0.47	4.30	6.20		2500	200	4	69	56	27	37	<1	310	58
	3/5/96	11:40																				
	3/5/96	13:40	ST	36	1300	43.0	8.3	43.0	0.10	0.94	1.20		340	42	<1	8	32	10	<4	<1	72	207
	3/8/96	11:40																				
	3/27/96	12:00	DT	1	1900	1.1	8.6	74.0	0.10	0.84	0.20		<6	<6								
	4/24/96	12:15	DT	1	2000	1.2	8.7	78.0	0.10	0.92	0.20		<6	<6								
	5/29/96	12:00	DT	24	2200	2.3	8.4	97.0	0.10	1.00	0.26		17	8								
	5/30/96	11:00																				
	6/20/96	9:15	DT	1	2100	3.0	8.0	110.0	0.20	0.95	0.20		18	12								
	7/24/96	11:00	DT	24	2300	10.0	8.5	62.0	<0.1	1.10	<0.2		25	12								
	7/25/96	10:00																				
	8/27/96	10:45	DT	23	2100	7.2	8.3	120.0	0.26	1.20	0.46		13	8								
	8/28/96	8:45																				
	9/24/96	10:30	DT	24	2100	16.0	8.2	110.0	0.29	1.30	<0.2		90	21								
	9/25/96	9:30																				
	10/30/96	7:59	ST	5	1400	160.0	7.2	78.0	2.20	11.00	3.20		340	90	1	<10	41	3	24	<1	340	400
	10/30/96	8:59	SF												<1	<10	20	<2	17	<1	180	
	10/30/96	11:14	ST	5	610	690.0	7.3	23.0	0.96	8.40	6.60		1700	260	4	50	30	34	39	1	380	195
	10/30/96	19:14																				
	10/30/96	21:14	ST	17	1500	160.0	8.0	39.0	0.43	2.30	2.00		220	37	<1	12	24	5	8	<1	100	1650
	11/1/96	4:14																				
	11/5/96	12:05	DT	1	2000	4.4	8.4	120.0	0.51	1.10	0.69		9	<6								
	11/21/96	10:12	ST	5	1200	76.0	7.6	32.0	0.77	5.10	2.30		130	27	<1	<10	58	5	13	<1	81	344
	11/21/96	11:12																				
	11/21/96	13:12	ST	13	480	1000.0	7.8	10.0	0.53	4.90	7.00		2100	190	4	50	68	31	36	<1	270	188
	11/22/96	13:12																				
	11/22/96	15:12	ST	15	940	210.0	8.1	16.0	0.10	2.00	1.80		270	37	<1	11	26	7	10	<1	120	274
	11/24/96	1:12																				
	12/4/96	12:45	DT	1	1900	2.2	8.9	62.0	0.25	0.80	0.45		7	<6								
	12/9/96	13:18	ST	5	1400	30.0	8.1	52.0	<0.1	1.50	0.56		13	9	<1	<10	24	<2	4	<1	48	440
	12/9/96	14:18																				
	12/9/96	16:18	ST	11	500	580.0	7.8	11.0	0.16	3.00	4.40		1200	110	2	33	42	21	24	<1	180	148
	12/10/96	12:18																				
	12/10/96	14:18	ST	12	620	450.0	7.9	12.0	0.19	2.20	2.90		980	86	1	24	26	12	16	<1	140	150
	12/11/96	12:18																				
	12/11/96	14:18	ST	11	550	410.0	7.8	8.9	0.19	2.10	2.70		760	74	2	20	25	10	16	<1	100	165
	12/12/96	10:18																				
	12/12/96	12:18	ST	12	1100	22.0	8.1	19.0	0.16	1.50	0.96		57	10	<1	<10	22	2	4	<1	77	310
	12/13/96	10:18																				

UPPER NEWPORT BAY WATERSHED - STORM AND DRY WEATHER MONITORING

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
WYLSED	1/22/97	0:18	ST	5	1100	360.0	7.8	16.0	0.18	2.50	2.40		580	86	1	15	27	12	12	<1	48	295
	1/22/97	1:18																				
	1/22/97	3:18	ST	11	1100	140.0	7.8	27.0	0.28	1.80	1.40		200	34	<1	<10	21	5	7	<1	<10	321
	1/22/97	23:18																				
	1/23/97	1:18	ST	8	550	770.0	7.7	11.0	0.35	3.10	4.40		1400	180	3	27	40	19	210	<1	120	170
	1/23/97	15:18																				
	1/23/97	17:18	ST	23	1100	75.0	8.0	31.0	0.26	1.10	0.94		82	19	<1	<10	21	<2	5	<1	120	370
	1/25/97	13:18																				
	1/25/97	15:18	ST	6	690	780.0	8.0	20.0	0.43	3.30	4.20		1300	160	2	29	41	19	28	<1	260	230
	1/26/97	1:18																				
	1/29/97	10:50	DT	1	1400	66.0	8.3	36.0	<0.1	0.86	1.00		54	11								
	2/11/97	1:55	ST	5	1300	31.0	7.8	38.0	<0.1	2.30	0.64		54	30	<1	<10	21	<2	6	<1	37	474
	2/11/97	2:55																				
	2/27/97	14:20	DT	1	<10	<0.5	8.1	6.3	0.47	2.40	3.30		9	6								
	3/12/97	9:35	DT	1	1800	2.9	8.6	46.0	0.36	1.50	1.20		110	<6								
	4/16/97	11:35	DT	1	2200	0.8	8.4	93.0	<0.5	0.87	0.41		<6	<6								
	5/20/97	10:10	DT	1	2400	5.1	8.1	110.0	0.25	0.71	0.43		14	8								
	6/10/97	10:05	DT	1	2300	5.8	8.3	100.0	<0.1	0.67	0.31		17	8								
	7/8/97	11:00	DT	1	2100	2	8.7	57	<0.1	1.3	1		12	8								
	8/15/97	11:35	DT	1	2300	5.1	8.1	78	0.2	1.5	1		6	8								
	9/24/97	10:15	DT	1	2400	5.5	8.1	93	<0.1	1.1	1		30	19								
	10/29/97	10:45	DT	1	2000	4.2	8.5	76	<0.1	1.1	1		8	<6								
	11/10/97	9:46	SF	5				85				<0.5			<1	<10	28	2	7	<1	120	496
	11/10/97	10:46																				
	11/10/97	12:46	ST	10	1200	170	7.5	39	1	6.1	3	<0.5	200	47	1	<10	41	4	12	<1	160	332
	11/11/97	6:46	SF												<1	<10	29	<2	11	<1	110	
	11/11/97	8:46	ST	22	1300	37	7.9	36	0.2	2.8	1	<0.5	51	15	<1	<10	27	3	6	<1	85	512
	11/13/97	2:46	SF												<1	<10	17	<2	<4	<1	73	
	11/13/97	4:46	ST	14	570	490	7.7	19	1	4.7	5	<0.5	910	23	2	25	41	15	14	<1	240	178
	11/14/97	8:00	SF												<1	11	28	7	9.0	<1	88	
	11/19/97	13:21	DT	10	1700	6.1	8.3	44	<0.1	1.4	1	<0.5	15	6								
	11/19/97	22:21	DT		1200	9.1	8.6	42	<0.1	1.2	1	<0.5	23	<6								
	11/26/97	9:40	ST	5	740	250	8.1	30	0.4	3.9	3		540	460	<1	16	65	36	16	<1		190
	11/26/97	10:40	SF												<1	<10	16	<2	<4	<1	34	
	11/26/97	12:40	ST	16	660	1000	7.6	12	0.4	5.3	6	0.90	1000	880	4	39	60	31	35	<1	280	140
	11/27/97	18:40	SF												<1	<10	11	<2	<4	<1	33	
	11/27/97	20:40	ST	29	1700	19	8.1	49	<0.1	1.4	1	<0.5	25	19	<1	<10	13	<2	5	<1	40	472
	11/30/97	6:36	SF												<1	<10	13	<2	<4	<1	67	
	1/3/98	10:33	ST	14	390	16	5.6	3	<0.5	1.6	2.0	<0.5	10	8	<1	<10	32	6.0	<4	<1	53	80
	1/4/98	7:33	SF												<1	<10	28	<2	<4	<1	51	
	1/4/98	9:33	ST	36	1300	130	7.7	19	0.2	1.4	1	<0.5	180	30	<1	<10	19	4	6	<1	43	390
	1/7/98	7:33	SF												<1	<10	14	<2	4	<1	<10	
	1/9/98	17:30	ST	2				17	0.50	4.9	5				<10	33	59	24	29	<1	330	260
	1/9/98	18:30	SF												<10	<10	17	<2	5	<1	90	
	1/9/98	20:30	ST	9	330	1400	7.9	6	<0.5	6.0	40	1	3900	360	5	71	73	37	57	<1	71	66
	1/10/98	12:30	SF												<1	<10	8	<2	<4	<1	<10	
	1/20/98		DT	24	1400	14	8.1	44	0.1	1.6	1	<0.5	18	9								

UPPER NEWPORT BAY WATERSHED - STORM AND DRY WEATHER MONITORING

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
WYLSED	2/14/98	9:13	ST	5	690	120	7.8	22	<0.5	2.4	2		500	46	<1.00	11	27	7	13	<1.00	64	190
	2/14/98	10:13	SF												<1.00	2	12	<1.00	12	<1.00	9	
	2/14/98	11:13	ST	7	290	1600	8.0	8	<0.5	3.2	9		3600	330	4.70	53	61	36	36.0	<1.00	122	90
	2/15/98	0:13	SF												<10	<10	<10	<10	<10	<10	<50	
	2/15/98	2:13	ST	22	710	330	7.9	12	<0.5	2.5	11		650	96	1.10	17	35	9	14	<1.00	72	188
	2/16/98	20:13	SF												<1.00	1	14	<1.00	3	<1.00	6.30	
	2/16/98	22:13	ST	10	410	700	7.9	7	<0.5	3.4	8.0				4	39	38	35	29	<1.00	121	100
	2/17/98	16:13	SF												<1.00	2	21	1	2	<1.00	21	
	2/17/98	18:13	ST	8	680	190	8.0	11	<0.5	1.6	5				1	13	30	8	9	1	54	185
	2/18/98	8:13	SF												<1.00	3	13	1	4	2	10	
	2/19/98	12:54	ST	5	870	140	7.9	16	0.5	2.3	5				<1.00	10	26	6	8	<1.00	39	232
	2/19/98	13:54	SF												<1.00	8	18	1	7	<1.00	29	
	2/19/98	21:54	ST	6	390	710	7.6	6	<0.5	4.6	7.0				<5.00	50	46	31	34	<5.00	174	135
	2/20/98	7:54	SF												<1.00	3	10	2	3	<1.00	11	
	2/20/98	9:54	ST	16	870	150	7.7	13	<0.5	1.8	8				<1.00	11	18	13	10	<1.00	36	240
	2/21/98	15:54	SF												<1.00	3	12	6	5	<1.00	9	
	2/22/98	11:54	ST	14		1200	7.7	5	0.7	2.7	10				3	28	17.0	18	20	2	68	94
	2/23/98	13:54	SF												<1.00	4	13	12	5	<1.00	48	
	3/25/98	6:29	ST	5	1410	30	7.62	52	0.2	<1.0	1		525	11	<1.00	4	20	2.80	7	<1.00	55	450
	3/25/98	7:29	SF												<1.00	3	18	1	8	<1.00	62	
	3/25/98	21:29	ST	21	1100	220	8.16	3	0.3	1.0	1		365	36	1	16	39	40	15	<1.00	76	302
	3/28/98	1:29	SF												<1.00	4	18	4	7	<1.00	51.0	
	3/28/98	1:29	ST	15	812	113	8.10	13	0.1	2.0	1		444	30	2	16.0	31	11	16	<1.00	84	280
	3/29/98	7:29	SF												1	27	22	<1.00	7	<1.00	44	
	4/20/98	13:25	DT	2	1900	4.2	8.68	56	0.2	<1.0	1		6	5								
	4/21/98	14:25																				
	6/23/98		DT	1	2300	2.5	8.3	106	<0.05	<1.0	0		4	<1.0								
	7/15/98	8:55	D	24	2380	6	8.2	145	<0.05	<1	<0.061		21	9								
	7/16/98	7:55																				
	8/17/98	8:21	D	16	2360	96	8.2	97	<0.05	4.4	1		380	60								
	8/17/98	23:21																				
	9/4/98	13:44	ST	4	1290	475	7.5	36	0.8	8.2	2		1050	190	3	24	27	17	17	<2	494	400
	9/4/98	14:29	SF												1	13	19	5	11	<2	301	
	9/4/98	16:29	ST	5	1310	152	7.6	33	0.5	6.3	2		460	110	2	18	24	10	12	<2	149	378
	9/5/98	0:29	SF												1	12	21	5	10	<2	145	
	9/8/98	12:38	D	21																		
	9/9/98	9:38																				
	10/13/98	9:05	D	24	1900	220	8.3	39	0.1	7.0	3		680	110								
	10/14/98	8:05																				
	11/3/98	11:19	D	10	1960	56	8.3	54	<0.05	1.1	1		200	30								
	11/3/98	20:19																				
	12/9/98	8:00	D	24	1660	150	8.0	41	<0.05	1.2	2		310	52								
	12/10/98	7:00																				
	1/5/99	9:27	D	24	2180	36	8.3	63	<0.05	0.8	1		90	20								
	1/6/99	8:27																				

UPPER NEWPORT BAY WATERSHED - STORM AND DRY WEATHER MONITORING

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
WYLSED	1/25/99	6:16	ST	5											8	88	276	47	75	<2	484	180
	1/25/99	7:16	SF												<1	<8	13	<2	7	<2	<10	
	1/25/99	9:16	ST	9	720	350	7.9	22	0.3	4.2	5		290	42	4	63	108	29	45	<2	260	216
	1/26/99	3:16	SF												3	41	68	19	30	<2	176	
	2/2/99	10:01	D	24	2560	18	8.3	84	0.2	<0.2	1		44	13								
	2/3/99	9:01																				
	2/4/99	21:26	ST	6	540	650	7.9	11	0.3	4.1	6		1730	370	4	49	71	28	36	<2	256	164
	2/4/99	22:41	SF												<1	<8	10	<2	<4	<2	11	
	2/5/99	0:41	ST	6	740	190	7.9	30	0.3	2.4	3		780	310	1	19	33	10	13	<2	84	220
	2/5/99	10:41	SF												<1	<8	12	<2	<4	<2	<10	
	2/5/99	12:41	ST	41	1610	30	8.3	62	0.1	1.3	1		74	28	<1	<8	18	<2	6	<2	19	430
	2/6/99	20:41	SF												<1	<8	13	<2	5	<2	<10	
	3/1/99	12:50	D	24	1930	5	8.3	62	<0.05	0.9	0.2		28	18								
	3/2/99	11:50																				
	3/11/99	11:14	ST	5	1270	60	8.2	38	0.5	2.7	1		160	28	<1	8	43	6	8	<2	100	460
	3/11/99	12:14	SF												<1	<8	21	<2	5	<2	19	
	3/11/99	14:14	ST	6	1070	260	8.1	30	0.2	3.1	2		860	150	3	22	87	21	78	<2	314	360
	3/12/99	0:14	SF												<1	<8	16	<2	5	<2	10	
	3/12/99	2:14	ST	39	1720	25	8.3	67	<0.05	1.0	0.4		79	16	<1	<8	20	<2	<4	<2	26	494
	3/15/99	8:14	SF												<1	<8	13	<2	<4	<2	10	
	3/15/99	9:12	ST	5	910	76	7.7	31	0.3	2.8	1		440	110	1	14	35	8	10	<2	122	264
	3/15/99	10:12	SF												<1	<8	12	<2	5	<2	15	
	4/27/99	11:40	D	24	1920	279	8.4	63	<0.05	1.3	2		370	224								
	4/28/99	10:40																				
	5/4/99	10:33	D	24	1880	18	8.5	71	<0.05	0.5	0.4		25	7								
	5/5/99	9:33																				
	6/17/99	15:45	D	1	1830	5	8.8	81	<0.05	0.5	0.1		15	2								

UPPER NEWPORT BAY WATERSHED - STORM AND DRY WEATHER MONITORING

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
BARSED	10/25/94	12:30	DT	23	2600	32.0	8.4	46.0	0.16	1.30	0.69		140	18								
	10/26/94	8:30																				
	11/8/94	9:00	ST	5	2000	90.0	7.6	40.0	0.67	3.80	1.10		150	23	<1	10	33	7.2	<40	<0.3	88	460
	11/8/94	17:00																				
	11/9/94	9:00	ST	13	2500	75.0	8.3	48.0	0.10	1.10	0.72		58	9	<1	<10	20	7.6	<40	<0.3	62	605
	11/10/94	7:00																				
	11/30/94	10:20			2700	3.0	8.3	51.0	0.13	1.10	0.47		11	<5								
	12/5/94	4:00	ST	3	1500	12.0	7.8	18.0	0.40	3.10	1.40		68	20	2.3	<10	30	5.1	<40	0.54	62	350
	12/5/94	8:00																				
	3/2/95	17:43	ST	3	2700	63.0	7.9	55.0	0.20	3.30	1.40		140	26	<1	<10	5.4	4.3	<40	<1	47	720
	3/2/95	21:43																				
	3/2/95	23:43	ST	17	2100	100.0	7.9	39.0	0.35	2.70	1.50		200	36	<1	<10	30	14	<40	1.1	95	534
	3/4/95	7:43																				
	3/21/95	7:45	ST	2	1600	240.0	7.8	42.0	0.31	2.80	2.20		300	59	<1	<10	30	9.4	<40	1	53	402
	3/21/95	9:45																				
	3/21/95	11:45	ST	20	4100	9.4	8.2	47.0	0.14	1.10	1.20		160	23	<1	<10	15	3.5	<40	1	<10	1230
	3/22/95	5:45																				
	3/23/95	7:45	ST	9	2000	88.0	8.1	31.0	0.15	1.50	2.30		220	32	<1	<10	23	9.5	<40	1	39	436
	3/23/95	23:45																				
	5/16/95	14:15	DT	23	3100	20.0	8.4	71.0	0.55	0.83	0.52		34	6								
	5/17/95	13:15																				
	6/13/95	10:45	DT	24	2900	22.0	8.2	74.0	0.11	1.60	1.30		250	29								
	6/14/95	9:45																				
	7/25/95	9:00	DT	6	2800	2.4	8.6	42.0	0.10	0.74	0.51		25	6								
	7/25/95	14:00																				
	8/29/95	10:00	DT	24	2400	61.0	8.5	49.0	0.10	1.10	0.55		76	16								
	8/30/95	9:00																				
	9/19/95	10:40	DT	24	2400	86.0	8.5	78.0	0.10	1.60	0.99		130	30	1	<10	21	7	<40	<1	57	
	9/20/95	9:40																				
	10/24/95	13:20	DT	20	2400	48.0	8.4	57.0	0.10	1.50	0.84		40	18								
	10/25/95	8:20																				
	11/14/95	11:15	DT	23	2600	27.0	8.3	76.0	0.32	1.20	0.46		53	40								
	11/15/95	9:45																				
	12/5/95	9:00	DT	24	2400	8.5	8.2	86.0	0.23	1.60	0.96		95	22								
	12/6/95	8:00																				
	12/12/95	22:48	ST	5	1800	1100.0	7.4	42.0	1.80	20.00	10.00		1300	200	7	58	150	60	63	<1	640	430
	12/12/95	23:48																				
	12/13/95	1:48	ST	13	1300	140.0	7.7	35.0	1.20	5.70	2.20		190	38	<1	15	49	<10	<40	2	140	344
	12/14/95	1:48																				
	12/14/95	11:48	ST	27	2400	6.4	8.3	60.0	0.27	0.62	0.42		15	<6	<1	<10	22	<2	<40	<1	13	732
	12/16/95	21:48																				
	1/19/96	6:18	ST	5	1300	220.0	7.8	48.0	0.58	4.50	2.30		380	69	1	16	46	13	13	<1	140	366
	1/19/96	7:18																				
	1/19/96	9:18	ST	4	1000	51.0	7.9	43.0	0.54	2.50	0.91		66	14	<1	13	25	5	6	<1	42	330
	1/19/96	15:18																				
	1/19/96	17:18	ST	20	2200	10.0	8.2	51.0	0.10	0.74	0.44		20	<6	<1	<10	22	<2	4	<1	56	652
	1/21/96	13:18																				
	1/21/96	15:18	ST	1											<1	<10	28.00	<2	<20	<1	140	348

UPPER NEWPORT BAY WATERSHED - STORM AND DRY WEATHER MONITORING

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
BARSED	1/31/96	3:51	ST	5	1300	360.0	8.1	33.0	0.20	6.90	2.60		470	71	1	25	49	16	17	2	130	354
	1/31/96	4:51																				
	1/31/96	6:51	ST	8	400	800.0	8.1	18.0	0.10	7.80	6.40		1500	190	7	60	68	36	37	3	310	125
	1/31/96	20:51																				
	1/31/96	22:51	ST	30	2100	110.0	7.8	49.0	0.13	1.60	1.20		140	24	1	<10	25	7	6	3	96	630
	2/3/96	8:51																				
	2/3/96	10:51	ST	10	1600	66.0	7.8	36.0	0.29	2.10	1.10		83	21	1	<10	32	6	8	2	40	476
	2/4/96	4:51																				
	2/13/96	9:25	DT	24	2700	5.3	7.6	67.0	0.18	0.89	0.24		9	6								
	2/14/96	8:25																				
	2/19/96	20:47	ST	5	2000	130.0	7.8	65.0	0.72	5.00	1.60		210	16	<1	<10	26	6	8	<1	91	536
	2/19/96	21:47																				
	2/19/96	23:47	ST	25	590	500.0	7.8	23.0	0.53	3.70	3.50		800	84	2	38	51	<2	<2	<1	200	192
	2/22/96	1:47																				
	2/22/96	3:47	ST	21	3800	24.0	8.4	230.0	0.16	0.50	0.36		31	7	<1	14	<2	<2	<2	<1	<10	1490
	2/23/96	19:47																				
	3/27/96	11:50	DT	1	2900	4.4	8.5	94.0	0.11	0.92	0.44		19	7								
	4/23/96	12:05	DT	24	2800	30.0	8.6	90.0	0.40	1.30	0.58		57	20								
	4/24/96	11:05																				
	5/29/96	11:50	DT	24	3200	15.0	8.7	120.0	0.13	1.20	1.10		75	17								
	5/30/96	10:50																				
	6/20/96	9:00	DT	1	2100	50.0	8.0	100.0	1.00	2.50	2.40		150	30								
	7/24/96	10:30	DT	24	2400	43.0	8.6	42.0	<0.1	1.40	0.81		8	23								
	7/25/96	9:30																				
	8/27/96	10:30	DT	24	2500	33.0	8.4	82.0	0.28	1.30	0.89		77	20								
	8/28/96	9:30																				
	9/25/96	9:50	DT	1	2000	38.0	8.3	59.0	0.14	1.40	0.50		90	13								
	10/30/96	9:55	ST	6											6	68	170	58	63	2	690	380
	10/30/96	11:10	SF												<1	<10	14	2	9	<1	48	
	10/30/96	13:10	ST	7	1100	420.0	7.4	22.0	0.95	4.50	3.90		730	100	2	27	46	23	24	1	240	240
	10/31/96	1:10																				
	10/31/96	3:10	ST	36	2100	65.0	8.5	46.0	0.20	0.85	1.10		92	17	<1	<10	26	4	5	<1	66	722
	11/3/96	1:10																				
	11/5/96	12:20	DT	1	2800	66.0	8.3	71.0	0.12	0.65	0.77		90	11								
	11/21/96	9:59	ST	5	540	530.0	7.6	19.0	1.10	5.80	3.90		970	95	1	38	76	23	27	<1	240	200
	11/21/96	10:59																				
	11/21/96	12:59	ST	10	360	770.0	8.0	11.0	0.42	3.90	5.70		1600	140	2	47	76	35	34	<1	270	122
	11/22/96	6:59																				
	11/22/96	8:59	ST	9	2600	34.0	8.2	120.0	0.17	1.20	0.92		60	17	<1	<10	19	<2	<4	<1	79	1134
	11/23/96	0:59																				
	11/23/96	10:59	ST	23	3300	22.0	8.3	210.0	0.15	0.96	0.86		51	14	2	<10	11	<2	<4	<1	96	1424
	11/25/96	4:59																				

UPPER NEWPORT BAY WATERSHED - STORM AND DRY WEATHER MONITORING

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
BARSED	12/4/96	12:35	DT	1	3100	8.9	8.5	110.0	0.32	0.63	0.51		17	<6								
	12/9/96	14:43	ST	4	700	1100.0	7.6	19.0	0.33	5.70	5.90		1800	180	5	55	71	46	41	<1	400	206
	12/9/96	15:28																				
	12/9/96	17:28	ST	6	610	600.0	7.7	15.0	0.15	2.00	2.70		540	56	<1	18	29	18	15	<1	120	184
	12/10/96	3:28																				
	12/10/96	5:28	ST	11	1900	73.0	8.1	48.0	<0.1	1.70	1.10		77	16	<1	<10	15	4	5	<1	43	664
	12/11/96	1:28																				
	12/11/96	3:28	ST	11	430	270.0	7.9	13.0	0.62	1.30	1.70		380	39	<1	16	23	10	12	<1	93	120
	12/11/96	23:28																				
	12/12/96	1:28	ST	20	3300	11.0	8.1	42.0	0.22	1.10	0.60		18	<6	<1	<10	14	<2	6	<1	110	1015
	12/13/96	15:28																				
	1/29/97	10:40	DT	1	4700	15.0	8.0	130.0	<0.1	0.76	0.28		25	9								
	2/11/97	0:54	ST	5	2000	1000.0	8.0	74.0	0.65	9.80	4.70				4	30	83	17	32	1	190	490
	2/11/97	1:54																				
	2/27/97	14:10	DT	1	1800	56.0	8.1	77.0	2.90	7.50	0.75		58	17								
	3/12/97	9:20			2900	82.0	8.4	140.0	1.90	3.40	2.00											
	4/15/97	11:00	DT	24	2900	72.0	8.3	96.0	<0.5	1.30	1.40		87	14								
	4/16/97	10:00																				
	5/20/97	10:06	DT	24	2900	34.0	8.3	100.0	0.46	1.60	1.70		87	20								
	5/21/97	9:06																				
	6/10/97	10:02	DT	24	2900	29.0	8.3	94.0	<0.1	1.70	0.87		67	16								
	6/11/97	9:02																				
	7/8/97	10:35	DT	1	3000	7.8	8.6	79	<0.1	7.2	3		64	22								
	8/15/97	11:15	DT	1	2800	29	8.3	92	0.1	1.4	1		46	16								
	9/24/97	10:05	DT	1	2500	46	8.2	65	<0.1	1.8	2		79	24								
	10/29/97	10:30	DT	1	2400	64	8.4	53	0.3	2.0	2		83	10								
	11/10/97	9:25	SF	5				50				<0.5			<1	<10	48	20	15	<1	280	550
	11/10/97	10:25																				
	11/10/97	12:25	ST	8	1200	300	7.4	29	1.1	6.6	3	<0.5	390	84	1	14	44	11	37	<1	290	324
	11/11/97	2:25	SF												<1	<10	29	5	12	<1	170	
	11/11/97	4:25	ST	24	2300	78	8.1	55	<0.1	2.8	2	<0.5	98	20	<1	<10	34	6	6	<1	100	720
	11/13/97	2:25	SF												<1	<10	28	4	4	<1	79	
	11/13/97	4:25	ST	13	750	270	7.6	24	0.6	3.5	3	<0.5	490	72	<1	15	34	12	9	<1	200	210
	11/14/97	5:45	SF												<1	<10	15	<2	<4	<1	42	
	11/20/97	11:25	DT	1	1200	53	7.9	16	0.2	1.5	1	<0.5	64	8								
	11/26/97	9:30	ST	5	1500	1000	7.9	39	0.3	6.1	6.0	<0.5	1600	1300	3	53	96	50	39	<1	550	314
	11/26/97	10:30	SF												<1	<10	8	<2	<4	<1	43	
	11/26/97	12:30	ST	13	970	620	7.6	30	0.3	4.4	6	1	620	530	3	30	61	27	27	<1	210	274
	11/27/97	18:30	SF												<1	<10	16	<2	<4	<1	36	
	11/27/97	20:30	ST	21	2700	15	8.2	68	<0.1	1.2	1	<0.5	23	20	<1	<10	21	<2	13	<1	37	818
	11/30/97	6:30	SF												<1	<10	18	<2	<4	<1	58	
	12/6/97	3:37	ST	5	240	760	7.9	5	0.4	4.7	6	<0.5	1200	1000	3	44	67	38	35	<1	440	50
	12/6/97	4:37	SF												<1	<10	7	<2	<4	<1	39	
	12/6/97	6:37	ST	6	300	3700	7.9	8	0.4	11	29	1	4400	4000	13	160	150	100	110	<1	850	200
	12/6/97	16:37	SF												<1	<10	9	<2	<4	<1	34	
	12/6/97	18:37	ST	8	430	880	7.8	8	0.3	3.8	6.0	1.0	1300	1200	4	44	51	33	39	<1	270	150
	12/7/97	8:37	SF												<1	<10	10	<2	<4	<1	48	
	12/7/97	14:37	ST	6	600	46	7.8	24	<0.1	1.1	1	<0.5	78	19	<1	<10	25	3	<4	<1	34	200
	12/8/97	0:37	SF												<1	<10	17	<2	<4	<1	18	

UPPER NEWPORT BAY WATERSHED - STORM AND DRY WEATHER MONITORING

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
BARSED	12/18/97	14:58	ST	5	490	940	7.5	13	0.6	5.3	5	<0.5	1700	190	3	42	93	43	35	<1	380	144
	12/18/97	15:58	SF												<1	<10	16	<2	<4	<1	<10	
	12/18/97	17:58	ST	6	730	1400	7.7	27	0.70	4.1	6	1	1500	170	4	49	80	28	32	<1	240	230
	12/19/97	9:58	SF												<1	<10	19	<2	<4	<1	<10	
	12/19/97	11:58	ST	33	3900	21	8.2	9	<0.5	0.90	1		25	12	<10	<10	17	<2	<4	<1	25	1208
	12/22/97	13:58	SF												<10	<10	15	<2	<4	<1	53	
	1/9/98	13:38	ST	5	1700	140	8.0	19	<0.5	2.8	1	<0.5	210	44	<10	<10	44	11	9.0	<1	280	500
	1/9/98	14:38	SF												<10	<10	13	<2	<4	<1	220	
	1/9/98	16:38	ST	19	560	760	7.8	18	<0.5	3.3	6	1	1100	140	3	32	48	26	23	<1	32	145
	1/11/98	4:38	SF												1	19	34	15	12	<1	19	
	1/11/98	4:38	ST	28	2500	23	8.1	70	<0.5	1.3	1	<0.5	48	12	<1	<10	22	2	<4	<1	120	756
	1/13/98	12:38	SF												<1	<10	22	<2	<4	<1	160	
	2/14/98	9:36	ST	5	2000	300	8.0	53	<0.5	2.3	2		620	87	1	20	50	18	15	<1.00	86	440
	2/14/98	10:36	SF												<1.00	3	20	2	8	<1.00	7	
	2/14/98	12:36	ST	7	280	1500	8.1	11	<0.5	2.2	6		2600	270	5	55	70	46	33	<1.00	126	60
	2/15/98	0:36	SF												<1.00	3	14	1	2	<1.00	9	
	3/25/98	9:22	ST	5	442	470	7.79	16	0.2	3.3	1		1390	104	3	26	76	37	22.0	4.60	178	140
	3/25/98	10:22	SF												<1.00	4	36	1	4.50	<1.00	39	
	3/25/98	12:22	ST	6	438	790	7.62	21	0.5	4.1	1		43	125	4	33	52	31	24	<1.00	140	100
	3/25/98	22:22	SF												<1.00	3	15	4.00	4	<1.00	29	
	3/26/98	12:22	ST	20	2930	40	8.41	72	0.1	<1.0	1		28	2	<1.00	4	23	3.80	5	<1.00	37	904
	3/28/98	2:22	SF												<1.00	3	12	1.30	6	<1.00	24	
	3/28/98	4:22	ST	16	1620	81	8.31	34	0.2	1.5	2		112	7	<1.00	7.10	15	5	6.10	<1.00	35	478
	3/29/98	10:22	SF												<1.00	3	11	<1.00	7	<1.00	25.0	
	4/20/98	13:40	DT	23	2470	6.1	8.28	76	0.2	1.1	1		9	1								
	4/21/98	11:40																				
	6/23/98	13:10	DT	1	2460	4.4	8.8	92	0.1	1.3	1		16	2								
	7/15/98	9:15	D	24	2810	12	8.5	110	<0.05	2	0		40	10								
	7/16/98	8:15																				
	8/17/98	8:55	D	24	2690	19	8.2	66	0.1	2.5	1		52	12								
	8/18/98	7:55																				
	9/8/98	12:05	D	15	3020	21	8.3	66	0.2	0.4	1		70	28								
	9/9/98	3:05																				
	10/13/98	8:33	D	24	2250	34	8.4	68	0.3	2.2	2		98	13								
	10/14/98	7:33																				

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STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
BARSED	11/3/98	11:22	D	24	2400	22	8.3	53	0.1	1.2	1		78	18								
	11/4/98	10:22																				
	11/8/98	3:23	ST	5	1120	200	7.5	25	0.4	9.6	6		880	260	2	27	57	32	20	<2	280	290
	11/8/98	4:23	SF												1	14	30	13	11	<2	123	
	11/8/98	6:23	ST	11	1410	170	7.6	38	0.6	4.1	6		700	200	2	21	37	16	14	<2	162	380
	11/9/98	2:23	SF												<1	<8	13	<2	4	<2	12	
	11/9/98	4:23	ST	36	2240	27	8.4	46	0.2	1.4	1		76	22	<1	<8	16	3	<4	<2	32	740
	11/12/98	2:23	SF												<1	<8	12	<2	<4	<2	10	
	11/28/98	5:30	ST	5	605	260	7.9	10	0.1	3.7	6		1020	170	3	29	63	53	21	<2	386	182
	11/28/98	6:30	SF												<1	<8	12	<2	<4	<2	11	
	11/28/98	8:30	ST	13	1270	185	7.7	43	0.2	4.0	5		710	110	3	21	34	19	15	<2	164	376
	11/29/98	8:30	SF												<1	<8	12	<2	<4	<2	15	
	11/29/98	10:30	ST	26	2750	18	8.3	67	<0.05	1.8	2		50	12	6	9	29	9	9	<2	94	935
	12/1/98	12:30	SF												<1	<8	18	<2	<4	<2	<10	
	12/1/98	14:30	ST	10											3	26	45	33	19	<2	249	235
	12/2/98	8:30	SF												<1	<8	13	<2	9	<2	<10	
	12/8/98	10:11	D	24	3170	17	8.4	121	0.1	0.7	1		34	2								
	12/9/98	9:11																				
	1/5/99	9:27	D	24	2730	5	8.7	87	0.3	1.2	1		32	22								
	1/6/99	8:27																				
	1/25/99	4:00	S	5	1010	140	8.0	34	0.1	3.6	3		390	50								
	1/25/99	5:00	S																			
	1/25/99	7:00	S	12	1290	90	7.9	43	0.2	2.3	2		380	110								
	1/26/99	5:00	S																			
	1/26/99	19:00	S	8	3530	120	8.2	92	0.1	1.2	1		250	32								
	1/27/99	7:00																				
	1/27/99	9:16	S	10	4360	26	8.1	135	0.1	0.7	1		70	18								
	1/29/99	3:16																				
	2/2/99	9:35	D	24	1590	21	8.2	62	0.1	0.8	1		53	10								
	2/3/99	8:35																				
	2/9/99	17:04	ST	5	1260	240	8.0	38	0.1	3.6	2		390	132	1	16	42	29	14	<2	183	470
	2/9/99	18:04	SF												<1	<8	12	<2	4	<2	17	
	2/9/99	20:04	ST	9	1870	300	8.0	41	0.1	6.4	6		460	150	4	32	73	45	26	<2	353	282
	2/10/99	12:04	SF												<1	<8	19	2	6	<2	28	
	2/10/99	14:04	ST	38	2770	38	8.1	77	0.6	1.9	1		130	26	<1	9	25	8	7	<2	80	850
	2/13/99	16:04	SF												<1	<8	16	<2	7	<2	26	
	3/1/99	12:39	D	24	2880	9	8.5	116	2.5	3.5	1		58	24								
	3/2/99	11:39																				
	3/11/99	10:02	ST	5	1590	340	8.2	29	0.1	6.2	4		720	200	3	32	89	55	25	<2	481	444
	3/11/99	11:02	SF												<1	<8	19	<2	<4	<2	15	
	3/11/99	13:02	ST	6	2110	76	8.1	69	1.4	4.2	1		190	34	<1	<8	40	6	6	<2	74	706
	3/11/99	23:02	SF												<1	<8	17	<2	<4	<2	17	
	3/12/99	2:02	ST	40	2900	12	8.3	98	0.6	1.4	2		43	11	<1	<8	24	<2	<4	<2	32	900
	3/15/99	4:01	SF												<1	<8	18	<2	<4	<2	14	

UPPER NEWPORT BAY WATERSHED - STORM AND DRY WEATHER MONITORING

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
BARSED	3/15/99	10:36	ST	5	630	350	7.7	25	1.2	9.9	3		1410	220	4	37	79	36	25	<2	374	205
	3/15/99	11:36	SF												<1	8	16	4	5	<2	69	
	3/15/99	13:36	S	2				37	1.3	4.5	2											
	3/15/99	15:36																				
	3/15/99	17:36	ST	45	2330	16	8.3	79	0.3	1.0	1		23	9	<1	<8	18	<2	<4	<2	20	768
	3/19/99	10:36	SF												<1	<8	14	<2	<4	<2	15	
	4/27/99	11:29	D	24	2320	8	9.1	103	0.4	2.2	1		34	20								
	4/28/99	10:29																				
	5/4/99	10:50	D	24	2560	9	8.5	82	0.3	1.9	1		26	10								
	5/5/99	9:50																				
	6/17/99	15:15	D	1	1910	4	9.1	55	0.1	1.2	0		17	8								
		0:00																				

UPPER NEWPORT BAY WATERSHED - STORM AND DRY WEATHER MONITORING

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
CMCG02	3/3/95	6:59	ST	3	310	25.0	6.9	4.3	0.10	3.0	2.50		50	26	<1	<10	11	14	<40	1.8	150	49
	3/3/95	10:59																				
	3/3/95	12:59	ST	18	830	16.0	8.6	1.3	0.13	1.7	0.90		10	9	<1	<10	41	6.4	<40	2.1	90	166
	3/4/95	22:59																				
	3/5/95	0:59	ST	11	81	11.0	7.2	0.4	0.11	0.9	0.77		22	7	<1	<10	27	6.3	<40	<1	69	23
	3/6/95	0:59																				
	3/10/95	22:01	ST	3	160	32.0	6.9	2.5	0.10	2.1	1.40		50	27	<1	<10	37	18	<40	<1	180	28
	3/11/95	2:01																				
	3/11/95	4:01	ST	15	730	12.0	7.6	3.3	0.12	2.3	1.30		17	11	<1	<10	24	6.7	<40	<1	100	134
	3/12/95	8:01																				
	3/12/95	10:01	ST	25	2400	2.1	8.5	10.0	0.18	1.4	0.63		<6	<6	<1	<10	12	<2	<40	<1	71	490
	3/14/95	20:20																				
	3/21/95	5:57	ST	3	250	92.0	6.9	4.5	0.43	2.9	1.80		91	39	<1	<10	40	26	<40	1	220	110
	3/21/95	9:57																				
	3/21/95	11:57	ST	22	1800	4.0	8.5	7.2	0.10	0.7	0.62		<6	<6	<1	<10	16	<2	<40	<1	15	375
	3/22/95	5:57																				
	3/23/95	7:57	ST	6	430	15.0	8.0	1.7	0.10	1.0	1.20		24	10	<1	<10	27	4	<40	1	53	64
	3/23/95	17:57																				
	3/23/95	19:57	ST	17	2300	2.4	8.4	10.0	0.10	1.0	1.60		7	6	<1	<10	15	<2	<40	1	17	446
	3/25/95	3:57																				
	12/12/95	21:13	ST	5	580	300.0	6.7	29.0	4.00	23.0	13.00		700	250	5	36	300	150	82	<1	1900	164
	12/12/95	22:13																				
	12/13/95	0:13	ST	8	190	78.0	6.8	6.8	0.64	3.3	2.20		89	31	<1	<10	50	24	<40	<1	310	52
	12/13/95	14:13																				
	12/14/95	12:13	ST	29	1000	9.7	8.4	4.4	0.56	2.1	1.90		9	7	<1	<10	70	3	<40	<1	87	240
	12/16/95	20:13																				
	1/19/96	4:39	ST	5	150	20.0	7.5	7.3	0.84	3.6	1.10		51	28	<1	10	34	15	9	<1	210	42
	1/19/96	5:39																				
	1/19/96	7:39	ST	3	170	11.0	7.4	3.5	0.22	1.9	0.82		15	15	<1	<10	34	4	5	<1	130	44
	1/19/96	11:39																				
	1/21/96	15:03	ST	5											1	<10	49	33	34	<1	230	36
	1/21/96	16:35																				
	1/31/96	2:29	ST	5	100	61.0	7.1	2.7	0.48	3.2	1.40		50	25	2	12	34	<2	11	<1	210	30
	1/31/96	3:29																				
	1/31/96	5:29	ST	10	130	45.0	7.2	2.2	0.24	1.8	1.20		29	17	1	16	39	15	10	<1	110	40
	1/31/96	23:29																				
	2/1/96	1:29	ST	29	830	13.0	8.8	2.3	1.10	3.2	1.20		8	12	<1	<10	31	3	11	1	100	198
	2/2/96	9:33																				
	2/3/96	11:29	ST	8	430	19.0	7.3	2.6	0.16	5.6	1.60		12	11	<1	<10	44	9	7	3	100	90
	2/4/96	1:29																				
	2/19/96	20:00	ST	4	340	170.0	7.1	4.6	0.95	9.5	5.20		200	130	2	<10	100	36	19	2	730	116
	2/20/96	2:00																				
	2/20/96	4:00	ST	28	210	24.0	7.7	1.9	0.18	1.5	1.40		56	20	<1	<10	34	<2	<2	<1	140	50
	2/22/96	10:00																				
	2/22/96	12:00	ST	16	1100	11.0	9.1	1.7	0.22	3.3	2.20		7	10	<1	<10	27	2	10	<1	160	240
	2/23/96	18:00																				

UPPER NEWPORT BAY WATERSHED - STORM AND DRY WEATHER MONITORING

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
CMCG02	10/30/96	5:45	ST	2											15	110	410	500	130	24	5800	330
	10/30/96	6:00																				
	10/30/96	8:45	ST	6	270	62.0	6.9	6.2	0.16	3.3	2.40		94	32	2	<10	70	25	19	<1	320	60
	10/30/96	20:45																				
	10/30/96	22:45	ST	41	1100	8.2	8.3	1.0	0.60	1.6	1.60		<6	<6	<1	<10	26	4	6	<1	98	320
	11/3/96	6:45																				
	11/21/96	8:05	ST	5	170	42.0	6.7	9.6	0.64	3.8	1.90		39	23	<1	<10	79	18	16	<1	280	50
	11/21/96	9:05																				
	11/21/96	11:05	ST	9	130	28.0	7.0	3.7	0.19	1.9	1.60		36	15	<1	<10	46	16	7	<1	180	54
	11/22/96	3:05																				
	12/9/96	12:24	ST	5	350	72.0	6.7	5.8	0.37	3.6	2.00		89	41	<1	<10	64	34	12	<1	320	90
	12/9/96	13:24																				
	12/9/96	15:24	ST	5	270	82.0	7.3	2.9	0.14	1.3	1.40		29	16	<1	<10	25	9	7	<1	120	76
	12/10/96	3:24																				
	12/10/96	5:24	ST	10	720	17.0	8.2	2.4	0.11	2.8	1.30		44	10	2	<10	34	9	6	<1	130	194
	12/10/96	23:24																				
	12/12/96	13:24	ST	11	1000	9.3	8.9	3.3	0.26	4.2	<0.2		8	6	<1	<10	19	5	4	<1	120	265
	12/13/96	9:24																				
	1/1/97	15:21	ST	5	410	140.0	7.0	0.7	0.99	3.6	2.00		100	51	<1	11	49	31	15	<1	480	90
	1/1/97	16:21																				
	1/1/97	18:21	ST	6	420	44.0	7.3	2.1	0.30	1.6	0.92		20	11	<1	<10	34	8	11	<1	190	112
	1/2/97	4:21																				
	1/2/97	6:21	ST	16	610	20.0	8.5	1.3	0.34	1.2	0.73		15	8	<1	<10	34	7	8	<1	120	597
	1/3/97	14:21																				
	1/21/97	20:49	ST	5	320	68.0	7.3	2.1	0.66	<0.5	0.21		130	49	<1	<10	31	28	6	<1	140	144
	1/21/97	21:49																				
	1/21/97	23:49	ST	13	580	17.0	8.3	3.8	0.30	2.1	1.40		10	<6	<1	<10	28	5	<4	<1	40	140
	1/22/97	23:49																				
	1/23/97	1:49	ST	5	220	6.4	7.6	1.6	0.31	0.8	0.68		<6	<6	<1	<10	28	3	<4	<1	<10	60
	1/23/97	9:49																				
	1/23/97	11:49	ST	26	1300	9.8	8.8	2.2	0.28	2.1	0.66		<6	<6	<1	<10	28	<2	<4	<1	160	340
	1/25/97	13:49																				
	1/25/97	15:49	ST	4	150	64.0	8.8	1.2	0.38	1.1	0.81		82	45	<1	<10	37	20	4	<1	260	40
	1/25/97	21:49																				
	9/4/97	13:36	DT	15	1400	4.3	8.0	0.6	0.2	2.7	2.10	1	10	8								
	9/5/97	3:36																				
	9/5/97	4:36	DT	9	1300	3.9	8.2	0.4	<0.1	2.4	2.70	2	16	19								
	9/5/97	12:36																				
	9/25/97	11:56	ST	5	110	60.0	6.9	7.4	0.2	2.6	1.80	<0.5	74	40	1	10	44	25	8	<1	270	50
	9/25/97	12:56	SF												2	<10	34	53	6	<1	400	
	11/10/97	8:58	SF	5				34.0				<0.5			<1	<10	49	7	23	<1	320	406
	11/10/97	9:58																				
	11/10/97	11:58	ST	9	700	130.0	6.8	8.2	1.7	15.0	5.90	<0.5	140	100	<1	<10	100	14	28	<1	560	174
	11/11/97	3:58	SF												<1	<10	67	5	23	<1	340	
	11/11/97	5:58	ST	24	740	14.0	8.1	1.8	0.3	3.0	2.00	<0.5	8	<6	<1	<10	<4	5	11	<1	120	162
	11/13/97	3:58	SF												<1	<10	34	2	12	<1	94	
	11/13/97	5:58	ST	14	300	37.0	7.6	4.6	0.4	2.0	1.40	<0.5	78	27	<1	<10	28	18	<4	<1	210	96
	11/14/97	7:58	SF												<1	<10	19	7	8	<1	120	
	11/19/97	9:24	DT	12	780	4.8	9.2	1.0	<0.1	1.6	0.48	<0.5	18	6								
	11/19/97	20:24																				

UPPER NEWPORT BAY WATERSHED - STORM AND DRY WEATHER MONITORING

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
CMCG02	12/6/97	12:10	ST	9	350	21.0	7.4	3.8	0.1	2.9	~~1.70~~	3	24	<20	<1	<10	31	8	4	<1	93	75
	12/7/97	8:10	SF												<1	<10	24	3	<4	<1	93	
	12/7/97	10:10	ST	31	1100	11.0	7.8	3.8	<0.1	2.9	0.90	<0.5	<6	<6	<1	<10	22	3	<4	<1	65	234
	12/10/97	22:10	SF												<1	<10	16	<2	4	<1	62	
	12/18/97	12:06	ST	5	290	100.0	6.8	6.1	0.60	4.8	2.20	1	140	61	<1	10	75	31	11	<1	310	64
	12/18/97	13:06	SF												<1	<10	30	2	6	<1	130	
	12/18/97	15:06	ST	10	500	18.0	7.6	3.6	<0.5	1.3	1.00	1	9	9	<1	<10	24	6	<4	<1	77	134
	12/19/97	9:06	SF												<1	<10	19	<2	<4	<1	66	
	12/19/97	11:06	ST	23	1300	3.2	8.4	2.5	<0.5	0.7	1.30		<6	<6	<10	<10	22	<2	<4	<1	61	336
	12/22/97	11:06	SF												<10	<10	19	<2	<4	<1	100	
	12/23/97	8:47	DT	13	1400	3.6	8.9	1.4	0.2	1.9	2.00		<6	<6								
	12/23/97	19:47																				
	12/23/97	20:47	DT	11	1500	1.5	8.4	1.8	<0.1	1.0	1.80		<6	<6								
	12/24/97	7:47																				
	1/3/98	3:41	ST	5	190	40.0	6.3	7.8	0.7	3.8	1.90	<0.5	57	32	<1	<10	53	14	7	<1	170	60
	1/3/98	4:41	SF												<1	<10	39	2	7	<1	100	
	1/3/98	6:41	ST	14	1300	160.0	7.7	29	<0.5	2.2	1.40	<0.5	170	29	<1	<10	21	3	5	<1	30	360
	1/4/98	8:41	SF												<1	<10	19	<2	7	<1	<10	
	1/4/98	10:41	ST	34	750	9.0	8.4	2.8	0.7	1.1	0.73	<0.5	6	6	<1	<10	20	2	<4	<1	44	104
	1/7/98	2:41	SF												<1	<10	18	<2	<4	<1	32	
	1/20/98		DT	24	1300	6.0	9.0	0.9	0.1	2.2	0.74	<0.5	<6	<6								
	1/21/98																					
	2/6/98	9:56	ST	5	350	22.0	6.8	4.4	<0.5	2.4	0.98		65	31	<1	5	35	15	6	<1	90	68
	2/6/98	10:56	SF												<1	5	24	6	5	<1	55	
	2/6/98	12:56	ST	11	300	19.0	7.5	3.5	<0.5	2.3	1.30		23	10	<1	4	22	9	<4	<1	47	74
	2/7/98	8:56	SF												6	2	21	3	<4	<1	27	
	2/7/98	18:56	ST	10	390	11.0	7.3	4.4	<0.5	2.1	1.50		11	7	<1.00	3	17	7	2	<1.00	40	65
	2/8/98	12:56	SF												<1.00	2	19	1	2	<1.00	32	
	2/8/98	18:56	ST	5	220	8.6	7.2	2.6	<0.5	1.8	1.40		<6	<6	<1.00	2	23	5	1	<1.00	37	50
	2/9/98	2:56	SF												<1.00	2	16	1	3	4	32	
	2/14/98	8:47	ST	5	200	22.0	7.0	5.3	<0.5	1.3	0.82		49	21	<1.00	5	30	19	5	<1.00	90	50
	2/14/98	9:47	SF												<1.00	2	31	1	2	<1.00	26.0	
	2/14/98	11:47	ST	7	240	12.0	7.6	4.9	<0.5	0.8	1.10		17	8	<1.00	3	21	8	1.70	<1.00	36	50
	2/14/98	23:47	SF												<1.00	6	13	20	3	<1.00	97	
	2/15/98	1:47	ST	21	1900	4.4	8.2	12	<0.5	1.6	11.00		7	7	<1.00	2	12	1.80	5	<1.00	26	384
	2/16/98	17:47	SF												<1.00	2	19	<1.00	3	<1.00	31	
	2/16/98	19:47	ST	10	450	11.0	8.0	4.0	<0.5	1.2	9.80				<1.00	13.0	18	6	3	14	71	80
	2/17/98	13:47	SF												<1.00	3	25	1	2	<1.00	33	
	2/17/98	15:47	ST	9	2000	4.9	8.2	13	<0.5	1.1	10.40				<1.00	4	48	4	14	<1.00	65	580
	2/18/98	7:47	SF												<1.00	17	13	<1.00	8.20	1	30	
	3/25/98	4:54	ST	5	532	52.0	7.5	11	0.2	2.5	0.90		109	40	2	9	67	25	12	<1.00	256	90
	3/25/98	5:54	SF												<1.00	3	31	3	9	<1.00	123	
	3/25/98	7:54	ST	7	161	15.0	7.6	2.6	<0.1	1.0	0.60		11	2	<1.00	4	31	11	3	<1.00	80	40
	3/25/98	19:54	SF												<1.00	3	35	3	4	7	64	
	3/25/98	21:54	ST	27	1500	5.1	8.6	12	0.4	1.0	0.90		3	<1	<1.00	3	35.0	6	5	<1.00	52	344
	3/28/98	1:54	SF												<1.00	2	31	2	3.20	<1.00	38.0	
	3/28/98	3:54	ST	13	1170	3.7	8.5	4.0	0.1	1.0	0.30		5	1	<1.00	2	18	4	4	<1.00	48	276
	3/29/98	3:54	SF												18	3	16	1	5	<1.00	39	
	4/20/98	11:45	DT	23	1730	17.0	8.5	6.6	0.2	4.3	1.50		136	40								
	4/21/98	9:45																				

UPPER NEWPORT BAY WATERSHED - STORM AND DRY WEATHER MONITORING

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
CMCG02	6/22/98	11:40	DT	1	1310	2.4	9.3	<1.3	<0.05	1.7	1.10		6.0	8.0								
	7/15/98	10:00	D	24	1370	3.3	8.9	<1.3	<0.05	2.9	0.44		26	18								
	7/16/98	9:00																				
	8/17/98	10:14	D	24	1370	3.7	8.6	<1.3	<0.05	3.6	0.70		22	10								
	8/18/98	9:14																				
	9/4/98	8:58	ST	5	885	16.0	7.0	15	1	22.0	4.59		240	130	2	13	116	25	32	<2	584	250
	9/4/98	9:58	SF												<1	12	63	10	31	<2	513	
	9/4/98	11:58	ST	7	1290	5.9	7.5	4.8	0.3	4.8	1.96		35	20	<1	11	37	7	15	<2	159	260
	9/4/98	23:58	SF												<1	13	31	4	15	<2	167	
	9/5/98	1:58	ST	12	1000	3.1	8.1	<1.3	0.2	2.6	1.04		11	7	<1	<8	26	<2	5	<2	60	236
	9/5/98	23:58	SF												<1	<8	20	<2	5	<2	50	
	9/6/98	7:58	ST	23	1210	3.7	8.4	<1.3	0.1	2.2	1.04		11	8	<1	<8	24	<2	5	<2	49	284
	9/8/98	3:58	SF												<1	<8	18	<2	4	<2	35	
	9/8/98	9:11	D	24	1200	3.7	8.8	<1.3	<0.05	2.8	1.35		26	14								
	9/9/98	8:11																				
	9/14/98	8:45	D	24	1250	43.0	8.9	1.5	0.1	8.1	2.20		150	68								
	9/15/98	7:45																				
	9/21/98	9:18	D	24	1090	15.0	8.2	2.2	0.2		1.74											
	9/22/98	8:18																				
	9/28/98	12:00	D	24	960	3.6	8.2	1.9	<0.05	2.0	0.77		12	6								
	9/29/98	11:00																				
	10/6/98	10:30	D	24																		
	10/7/98	9:30																				
	10/13/98	12:15	D	24	1080	3.4	8.8	1.4	0.2	2.5	1.62		24	<1								
	10/14/98	11:15																				
	10/20/98	11:55	D	24	1210	5.3	7.8	6.2	1	7.5	2.54		14	7								
	10/21/98	10:55																				
	10/26/98	10:04	D	24	1480	9.8	7.9	11	2	7.1	6.12		40	20								
	10/27/98	9:04																				
	11/2/98	10:30	D	24	1050	4.4	8.7	<1.3	0.1	1.9	1.53		26	16								
	11/3/98	9:30	D																			
	11/7/98	22:47	ST	5	1340	14.0	7.9	<1.3	0.1	4.5	5.81		80	40	<1	<8	29	5	6	<2	327	295
	11/7/98	23:47	SF												<1	<8	18	<2	4	<2	211	
	11/8/98	1:47	ST	12	630	6.4	7.7	5.7	0.1	2.6	2.36		40	20	<1	<8	32	11	5	<2	118	165
	11/8/98	23:47	SF												<1	<8	27	2	6	<2	89	
	11/9/98	1:47	ST	35	3010	6.2	8.3	6.2	1	4.2	1.53		16	12	<1	<8	42	5	6	<2	98	222
	11/11/98	21:47	SF												<1	<8	32	3	6	<2	69	
	11/18/98	11:34	D	24	1060	2.3	8.9	<1.3	0.1	1.4	1.29		24	14								
	11/19/98	10:34																				
	11/28/98	4:49	ST	5	205	22.0	6.9	4.8	0.1	4.8	1.87		180	82	1	11	76	37	12	<2	362	60
	11/28/98	5:49	SF												<1	<8	28	<2	7	<2	91	
	11/28/98	7:49	ST	13	350	16.0	7.4	4.0	0.1	2.5	2.42		30	18	<1	<8	40	8	7	<2	123	88
	11/29/98	7:49	SF												<1	<8	32	3	6	<2	79	
	11/29/98	9:49	ST	26	875	2.6	8.5	<1.3	<0.05	1.5	1.87		12	8	<1	<8	27	2	<4	<2	47	208
	12/1/98	11:49	SF												<1	<8	24	<2	<4	<2	39	
	12/1/98	13:49	ST	10	310	17.0	7.8	3.2	0.1	1.3	1.44		24	18	<1	<8	30	7	<4	<2	<10	84
	12/2/98	7:49	SF												<1	<8	<10	4	<4	75	<10	
	12/7/98	10:03	D	24	745	290.0	8.2	1.4	<0.05	1.9	1.77		140	30								
	12/8/98	9:03																				

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
CMCG02	12/23/98	10:15	D	23	965	3.9	8.6	2.4	<0.05	0.8	0.73		50	6								
	12/24/98	8:15																				
	12/28/98	8:11	D	24	1010	5.9	8.8	1.0	0.1	0.9	0.83		23	12								
	12/29/98	7:11																				
	1/4/99	9:24	D	24	4450	2.8	8.4	4.6	<0.05	2.2	2.82		24	12								
	1/5/99	8:24																				
	1/13/99	12:05	D	24	1050	2.9	8.5	4.3	0.2	1.2	0.67		4	2								
	1/14/99	11:05																				
	1/19/99	8:53	DT	24	975	7.7	8.8	0.7	<0.05	2.3	1.74		40	24	5	28	5	5	24	4	27	
	1/20/99	7:53																				
	1/25/99	3:34	ST	5	160	19.0	6.8	3.4	1	3.6	2.75		140	74	<1	9	70	19	10	<2	240	60
	1/25/99	4:34	SF												<1	<8	30	<2	7	<2	76	
	1/25/99	6:34	ST	13	325	17.0	7.6	3.3	0.1	1.8	1.22		20	16	<1	<8	33	7	5	<2	96	120
	1/26/99	6:34	SF												<1	<8	23	<2	6	<2	65	
	1/26/99	8:35	ST	15	260	17.0	7.5	2.4	0.1	1.3	1.13		46	24	<1	<8	26	9	<4	<2	89	34
	1/27/99	12:35	SF												<1	<8	17	<2	<4	<2	38	
	1/27/99	14:35	ST	19	825	3.4	8.3	3.9	0.1	1.3	1.04		7	4	<1	<8	20	<2	<4	<2	34	216
	1/29/99	2:35	SF												<1	<8	18	<2	<4	<2	26	
	2/2/99	8:20	D	24	855	4.0	9.3	2.0	0.1	2.6	0.70		11	6								
	2/3/99	7:20																				
	2/4/99	18:07	ST	5	250	32.0	7.4	7.5	1	3.6	1.59		72	26	<1	10	50	14	9	<2	228	75
	2/4/99	19:07	SF												<1	<8	38	2	7	<2	128	
	2/4/99	21:07	ST	13	235	15.0	7.6	4.8	0.2	1.5	0.98		18	13	<1	<8	35	5	<4	<2	121	40
	2/5/99	21:07	SF												<1	<8	30	<2	<4	<2	208	
	2/5/99	23:07	ST	34	905	4.2	9.0	3.7	0.1	1.2	0.92		10	6	<1	<8	25	<2	<4	<2	38	195
	2/8/99	17:07	SF												<1	<8	21	<2	<4	<2	23	
	2/9/99	16:04	ST	5	260	24.0	7.4	5.7	0.3	4.5	1.71		100	48	<1	9	87	22	14	<2	327	86
	2/9/99	17:04																				
	2/9/99	19:04	ST	6	235	15.0	7.8	2.7	0.1	1.6	0.77		20	12	<1	<8	37	6	4	<2	99	88
	2/10/99	5:04	SF												<1	<8	28	<2	5	<2	65	
	2/10/99	7:04	ST	8	835	3.9	8.5	3.2	<0.05	0.9	0.92		10	6	<1	<8	23	<2	<4	<2	38	234
	2/10/99	21:04	SF												<1	<8	22	2	<4	<2	122	
	2/18/99	10:24	D	24	965	2.9	8.7	3.0	0.1	1.1	1.04		9	6								
	2/19/99	9:24																				
	2/22/99	11:44	D	24	1200	3.6	8.6	<0.44	<0.05	3.1	2.17		18	14								
	2/23/99	10:44																				
	3/1/99	11:15	D	24	1050	17.0	8.8	1.5	0.3	3.5	3.58		78	38								
	3/2/99	10:15																				
	3/8/99	10:18	D	24	1030	7.6	8.5	0.7	1	3.3	5.36		16	4								
	3/9/99	9:18																				
	3/11/99	11:18	ST	5	410	27.0	7.4	5.0	1	5.0	0.58		78	48	1	11	87	18	14	<2	294	110
	3/11/99	12:18																				
	3/11/99	14:18	ST	6	160	16.0	7.7	3.2	0.1	1.4	1.38		16	12	<1	8	50	8	5	<2	87	40
	3/12/99	0:18																				
	3/12/99	2:18	ST	37	1090	4.1	8.8	1.9	0.1	1.6	0.95		6	4	<1	<8	31	2	4	<2	48	276
	3/15/99	2:18	SF												<1	<8	24	<2	5	<2	27	

UPPER NEWPORT BAY WATERSHED - STORM AND DRY WEATHER MONITORING

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
CMCG02	3/22/99	11:39	D	24	1150	4.6	9.0	1.7	0.4	5.6	1.13		8	6								
	3/23/99	10:39																				
	3/25/99	11:26	ST	5	185	30.0	6.6	2.7	0.4	4.0	1.99		200	36	<1	9	62	22	12	<2	368	48
	3/25/99	12:26	SF												<1	<8	25	<2	7	<2	134	
	3/25/99	14:26	ST	9	270	8.5	7.7	2.2	0.1	0.8	0.77		8	6	<1	<8	22	4	<4	<2	82	78
	3/26/99	6:26	SF												1	<8	18	<2	<4	<2	69	
	3/31/99	9:03	D	24	1330	9.7	8.7	<0.44	<0.05	1.2	2.97		14	10								
	4/1/99	8:03																				
	4/27/99	9:55	D	24	980	14.0	9.0	1.6	0.2	3.2	0.98		52	34								
	4/28/99	8:55																				
	5/4/99	9:06	D	24	1260	86.0	9.0	<0.44	<0.05	8.0	2.80		270	190								
	5/5/99	8:06																				
	5/26/99	9:17	D	24	990	5.9	8.8	<0.44	0.1	2.0	0.86		24	16								
	5/26/99	9:17	DT	24											<1	9	36	4	6	<2	184	330
	5/27/99	8:17																				
	5/27/99	8:17	DF												2	9	28	2	5	<2	124	
	6/1/99	12:20	DT	24											<2	<8	30	16	5	<2	53	310
	6/2/99	11:20																				
	6/2/99	12:20	DT	24	750	4.3	9.1	<0.44	0.1	1.9	1.84		150	42	<2	<8	36	9	5	<2	81	200
	6/3/99	11:20																				
	6/7/99	9:18	DT	24	1160	25.0	8.9	4.1	<0.05	4.4	2.08		27	16	<2	<8	59	16	<4	<2	89	260
	6/7/99	9:18	D	24																		
	6/8/99	8:18	DF												<2	<8	33	6	4	<2	31	
	6/8/99	8:18																				
	6/16/99	10:25	DT	24	1180	12.0	8.9	0.8	1.9	3.0	1.99		40	30	<1	<8	36	3	5	<2	47	360
	6/17/99	9:25	DF												<1	<8	31	<2	4	<2	32	
	6/23/99	15:00	DT	24	965	15.0	9.0	<0.44	0.2	5.0	0.90		16	10	<2	<8	30	<2	5	<2	32	352
	6/24/99	14:00	DF												<2	<8	24	<2	5	<2	22	

DANA POINT HARBOR

STATION	DATE	TIME	Depth feet	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L
DAPTEB	8/29/91	11:20		51000	0.7	8.0	0.30	<0.10	<0.10	<0.10	180	130							
	6/24/92	11:30		49000	0.8	8.0	<0.20	<0.10	0.90	<0.10	27	17							
	11/24/92	11:30		51000	2.5	8.1	<0.20	<0.10	0.23	0.17	120	38							
	2/18/93	13:00 S		41000	14.0	8.1	0.45	0.51	0.70	<0.10	74	7	<7	<10	<30	<2	<3	<4	59
	2/18/93	S	10	47000	82.0	8.1	<0.2	0.55	1.30	0.31	260	37	<7	18	84	13.0	<3	<4	140
	2/20/93	9:30 S		44000	6.1	8.2	0.55	0.28	1.00	0.14	78	26	<7	<10	<30	<2	<3	<4	29
	2/20/93	S	11	47000	7.8	8.1	0.36	0.10	0.32	0.17	83	25	<7	<10	<30	3.4	<3	<4	<20
	2/22/93	12:30 S		47000	4.2	8.1	0.97	0.16	0.52	<0.03	94	26	9	<10	<30	<2	<3	<4	61
	2/22/93	S	10	49000	5.2	8.1	0.40	0.12	0.28	<0.10	63	30	<7	<10	<30	<2	<3	<4	27
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)												**<7**	**>6**	**>28**	**>5.5**	**<3**	**<4**	**>55.7**
	6/5/93	12:44 S		41000	5.6	8.1	0.60	0.22	0.83	0.56	67	20	<20	<30	<20	<2	<40	<10	17
	6/5/93	S	11	48000	3.6	8.1	<0.20	0.20	0.70	0.28	62	20	<20	<30	23	<2	<40	40	48
	6/7/93	13:45 S		50000	1.0	8.1	<0.20	<0.10	0.57	0.22	110	28	<20	<30	61	<2	<40	42	51
	6/7/93	S	13	50000	7.5	8.0	<0.20	<0.10	0.60	0.32	150	38	<20	<30	57	<2	<40	35	48
	6/9/93	13:00 S		50000	1.1	8.1	<0.20	<0.10	1.20	0.23	90	23	<20	<30	31	3.4	<40	18	150
	6/9/93	S	12	50000	5.3	8.0	<0.20	<0.10	0.66	0.21	90	22	<20	<30	24	<2	<40	27	35
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)												**<20**	**<30**	**34**	**<2**	**<40**	**34**	**44**
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)												**<1**	**<10**	**<20**	**<20**	**<40**	**<10**	**31.3**
	2/21/96	10:20 S		34000	10.0	8.1	0.60	0.15	0.76	0.66	90	25	<1	<5	15	<4	17	<1	38
	2/21/96	10:25 S	12										<1	<5	19	<2	16	<1	30
	2/23/96	10:30 S		43000	1.2	8.1	0.30	0.19	<0.50	<0.20	83	24	<1	14	10	<8	<8	<5	27
	2/23/96	10:35 S	7										<1	<5	<8	<8	<8	<5	35
	2/25/96	9:30 S		40000	6.6	2.1	0.40	0.29	0.75	0.40	80	26	<1	<5	<8	<8	<8	<5	37
	2/25/96	9:35 S	16										<1	<5	<8	<8	11	<5	36
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)												**<1**	**<5**	**>6.3**	**<8**	**>9**	**<5**	**33.7**
	10/16/96	13:35		43000	2.3	8.1	<0.2	0.36	<0.5	<0.2	98	19							
	1/15/97	17:05 S		25000	22.0	8.0	0.4	<0.1	0.82	0.62	96	24	<0.1	<1	5	1	<5	<0.1	17
	1/15/97	17:05 S	7										0.3	4	7	2	<5	<0.1	22
	1/17/97	11:35 S		30000	1.9	7.9	<0.4	<0.1	<0.5	<0.2	180	34	0.9	3	7	<0.1	<5	<0.1	21
	1/17/97	11:35 S	8										0.3	3	5	0.7	<5	<0.1	18
	1/19/97	9:50 S		32000	5.8	8.0	0.3	<0.1	0.72	0.43	99	29	1	3	4	0.6	<5	<0.1	10
	1/19/97	9:50 S	10										0.3	3	7	0.5	<5	<0.1	14
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)												**0.3**	**3.3**	**6.3**	**1.1**	**<5**	**<0.1**	**18**
	4/30/97	10:25		48000	5.0	7.9	<0.8	0.23	<0.5	0.22	110	38							
	10/17/97	8:30 M		49000	5.7	8.0	<0.2	0.19	0.5	0.47	120	40	<1	7.2	7.6	<2	23	<1	56
	10/28/98	9:40 D	8.1	51400	5.1	7.9	<1.3	0.5	<0.05	0.09	170	27							
	6/23/99	9:00 D	9.3	47000	3.9	8.1	<0.44	<0.2	<0.05	0.06	63	9							

UPPER NEWPORT BAY WATERSHED - STORM AND DRY WEATHER MONITORING

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
SJQF14	10/26/94	8:50	DT	1	2600	3.7	7.9	53	0.57	1.40	1.40		25	11								
	5/17/95	9:00	DT	1	2700	2.3	7.8	56	0.12	0.94	1.10		<8	<6								
	7/25/95	10:45	DT	1	2100	3.5	8.2	28	0.25	1.40	1.40		14	6								
	10/25/95	11:20	DT	1	2200	8.4	8.2	46	0.25	1.40	1.40		14	6								
	1/3/96	8:50	DT	1					0.10	1.40	1.20		13	<6								
	4/23/96	10:00	DT	1	2000	4.6	7.8	45	0.10	1.00	0.88		7	<6								
	7/24/96	9:20	DT	1	1800	14.0	7.8	15	<0.1	1.40	1.30		19	8								
	11/5/96	10:35	DT	1	1900	3.7	8.2	39	0.22	1.20	1.20		9	<6								
	1/29/97	9:20	DT	1	2500	4.9	7.9	48	0.16	0.67	0.68		9	9								
	4/15/97	9:45	DT	1	2000	3.2	7.9	49	<0.5	1.20	1.10		<6	<6								
	7/8/97	9:30	DT	1	1800	5.3	8.0	42	0	2.4	4		13	7								
	10/29/97	9:30	DT	1	1300	33	8.1	16	0	2.0	2		34	7								
	4/21/98	9:25	DT	1	2040	7.9	8.13	68	<0.1	<1.0	1		4	1								

UPPER NEWPORT BAY WATERSHED - STORM AND DRY WEATHER MONITORING

STATION	FIXED DATE	FIXED TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
SCCF15	10/26/94	9:00	DT	1	2200	8	7.9	6.1	0.23	1.2	1.3		40	<5								
	11/30/94	9:20	DT	1	2300	2	7.8	3.9	0.12	1.2	1.3		5	<5								
	5/17/95	8:30	DT	1	2800	7.1	8.2	2.9	<0.1	0.77	1		14	6								
	6/13/95	10:11	DT	24	2600	4.8	8.2	4.6	0.12	0.74	1.1		12	6								
	6/14/95	9:11																				
	7/25/95	9:50	DT	18	2300	5.7	8.5	2.4	<0.10	0.78	1.00		21	8								
	7/26/95	2:00																				
	8/30/95	8:35	DT		2300	23.0	8.2	3.8	0.18	0.83	1.50		35	6								
	9/19/95	10:15	DT	24	2200	13.0	8.4	5.5	0.13	1.00	1.60		24	9	2	<10	8	<2	<40	<1	39	
	9/20/95	9:15																				
	10/24/95	11:30	DT	15	2500	40.0	8.5	11.0	<0.10	1.40	1.60		49	<6								
	10/25/95	10:30																				
	11/14/95	9:45	DT	23	2700	8.2	8.4	8.5	<0.10	0.95	0.72		25	14								
	11/15/95	7:45																				
	12/6/95	8:35	DT	1	2400	7.8	8.3	11.0	0.19	0.81	1.00		50	<6								
	1/19/96	4:37	ST	5	850	15.0	7.3	7.8	1.20	3.40	1.20		28	14	<1	<10	28	5	7	<1	130	216
	1/19/96	5:37																				
	1/19/96	7:37	ST	8	860	6.9	7.6	4.6	0.12	2.50	1.40		9	6	<1	<10	22	<2	7	<1	28	228
	1/19/96	21:37																				
	1/21/96	5:37	ST	9	750	110.0	7.4	3.1	0.24	1.60	2.00		110	23	<1	<10	33	6	9	<1	86	170
	1/22/96	7:37																				
	1/22/96	13:37	ST	8	970	17.0	7.5	1.8	0.30	1.10	1.60		7	<6	<1	<10	19	<2	4	1	35	228
	1/23/96	3:37																				
	1/31/96	2:27	ST	5	660	21.0	7.4	2.1	0.34	1.70	0.86		38	18	<1	<10	24	6	9	1	120	148
	1/31/96	3:27																				
	1/31/96	5:27	ST	10	640	57.0	7.7	2.9	0.20	1.40	1.80		47	13	<1	<10	28	4	15	3	70	134
	1/31/96	23:27																				
	2/1/96	1:27	ST	28	1500	13.0	8.1	2.3	<0.10	2.20	1.40		<6	<6	<1	<10	21	2	61	2	31	376
	2/3/96	7:27																				
	2/3/96	9:27	ST	10	1400	8.4	7.8	1.3	<0.10	1.20	1.40		8	<6	<1	<10	15	<2	6	2	15	348
	2/4/96	3:27																				
	2/13/96	8:45	DT	24	2000	7.5	7.3	1.8	0.21	1.00	0.77		23	13								
	2/14/96	7:45																				
	2/20/96	10:18	ST	24	790	86.0	7.7	3.9	0.20	1.40	2.20		72	20	<1	<10	19	<2	8	<1	46	170
	2/22/96	8:18																				
	2/22/96	10:18	ST	23	2000	4.6	8.4	3.0	0.13	0.75	1.10		8	7	<1	<10	13	<2	9	<1	<10	546
	2/24/96	8:18																				
	3/27/96	10:50			2100	5.3	8.2	2.3	<0.10	0.74	0.61		9	6								
	4/23/96	10:30	ST	24	2300	3.0	8.3	4.1	<0.10	1.50	0.99		<6	<6								
	4/24/96	9:30																				
	5/29/96	10:30	ST	24	2200	8.7	8.4	1.0	0.27	1.80	1.50		74	19								
	5/30/96	9:30																				
	6/6/96	15:20	DT	1	1900	2.8	7.8	3.5	<0.10	<0.50	<0.20		16	10	<1	<5	4	<2	7	<1	<10	
	6/20/96	8:20	DT	1	2000	14.0	8.0	7.0	0.22	1.80	1.50		36	<6								
	7/24/96	9:30	DT	24	2000	12.0	8.5	1.9	<0.1	0.91	0.98		19	7								
	7/25/96	8:30																				

UPPER NEWPORT BAY WATERSHED - STORM AND DRY WEATHER MONITORING

STATION	FIXED DATE	FIXED TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
SCCF15	8/27/96	9:10	DT	24	1900	25.0	8.3	5.8	0.26	1.10	1.20		33	11								
	8/28/96	8:10																				
	9/25/96	9:05	DT	1	2000	110.0	8.3	7.9	0.37	2.70	2.00		210	46								
	11/5/96	10:50	DT	1	2300	13.0	8.3	5.4	<0.1	0.55	1.00		95	7								
	12/4/96	11:15	DT	1	2500	2.5	8.2	3.9	0.31	0.53	0.60		7	<6								
	1/29/97	9:30	DT	1	960	170.0	8.0	3.5	0.19	1.50	1.10		74	18								
	2/27/97	11:00	DT	1	2700	35.0	8.0	1.5	0.33	1.20	0.81		38	11								
	3/12/97	8:35	DT	1	2600	15.0	8.1	2.9	<0.1	0.87	1.40		21	<6								
	4/15/97	10:00	DT	22	2700	31.0	8.2	2.6	<0.5	1.40	1.10		37	11								
	4/16/97	7:00																				
	5/20/97	8:50	DT	1	2100	3.7	7.7	<0.2	0.3	3.50	0.84		8	8								
	6/10/97	9:20	DT	1	1800	8.5	7.8	0.96	<0.1	0.61	1.0		28	17								
	7/8/97	9:40	DT	1	1900	3.7	7.9	2	<0.1	1.3	1.0		16	6								
	8/15/97	10:30	DT	1	1900	12	7.8	10	0	1.3	2.1		21	7								
	9/24/97	9:10	DT	1	2000	23	7.6	9	<0.1	1.9	2.0		33	9								
	10/29/97	9:45	DT	1	2400	7.1	8.1	8	<0.1	1.4	1.6		14	7								
	4/21/98	9:15	DT	1	2670	3.5	8.04	5	<0.1	1.2	1.2		10	2								
	6/24/98	8:45	DT	1	2490	1.7	8.0	7.0	<0.05	1.0	0.6		6	2								
	7/14/98	11:51	D	1	2250	4	8.2	4.4	<0.05	3.2	1.0		15	5								
	8/12/98	8:08	D	1	2430	8	7.7	2.6	0.1	1.2	0.6		86	14								
	9/9/98	10:03	S	1	2070	9.4	8.3	6.2	<0.05	2.5	0.49		56	21								
	10/20/98	11:45	D	1	2350	115	8.1	<1.3	1.2	34.0	23.9		640	190								
	11/30/98	10:15	D	1	1620	15	7.8	5.3	0.2	4.2	2.3		70	22								
	12/14/98	9:40	D	1	2550	8	8.1	8.5	<0.05	1.2	1.1		30	18								
	1/14/99	9:50	D	1	2570	3	8.2	6.7	<0.05	1.3	0.4		19	8								
	2/8/99	10:15	D	1	2710	14	8.2	5.3	<0.05	1.3	0.7		84	26								
	3/2/99	12:25	D	1	2600	1	8.2	3.3	<0.05	0.7	0.3		8	6								
	4/1/99	9:30	D	1	2750	9	8.2	1.6	<0.05	0.7	0.6		26	12								
	5/26/99	9:45	D	1	2010	6	8.1	<0.44	0.1	1.2	1.1		30	16								
	6/18/99	11:00	D	1	1950	15	8.1	1.6	0.1	1.0	2.6		58	17								

UPPER NEWPORT BAY WATERSHED - STORM AND DRY WEATHER MONITORING

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
BEEF17	5/17/95	13:00	DT	1	1300	27	8.2	22	2	1.8	0.43		44	8	<1	<10	6	<2	<40	<1	<10	292
	6/14/95	11:15	DT	1	1100	12	8.4	7.7	0.13	0.57	0.84		58	12								
	7/26/95	12:30	DT	1	1300	4.2	9.3	7.5	<0.10	1.90	2.80		32	13								
	8/30/95	10:30	DT	1	1400	39.0	8.4	11.0	0.30	1.20	3.00		64	12								
	9/20/95	12:00	DT	1	1500	120.0	8.1	18.0	6.50	11.00	7.10		210	37	1	<10	21	7	<40	<1	130	
	10/24/95	14:00	DT	1	880	42.0	7.9	20.0	2.10	2.40	0.84		88	20								
	11/15/95	10:05	DT	1	1500	35.0	8.2	10.0	0.47	2.20	1.80		28	13								
	12/6/95	10:00	DT	1	1600	6.5	8.2	17.0	0.23	1.70	2.80		92	17								
	3/12/96	14:16	ST	5	200	300.0	7.2	4.5	1.20	4.00	2.00		620	96	1	21	64	34	18	<1	350	54
	3/12/96	15:16																				
	3/12/96	17:16	ST	9	460	480.0	7.8	4.1	0.38	2.50	3.10		900	120	3	27	50	22	22	<1	160	120
	3/13/96	23:16																				
	3/13/96	1:16	ST	31	1100	16.0	8.0	2.7	<0.10	0.69	0.62		17	7	<1	<10	45	4	13	<1	33	320
	3/16/96	13:16																				
	3/27/96	12:20	DT	1	1500	3.8	8.4	28.0	3.30	6.00	4.60		12	8								
	4/1/96	17:52	ST	4				40.0	4.30	16.00	3.10				<1	<10	110	10	35	<1	1100	180
	4/1/96	18:37																				
	4/24/96	13:00	DT	1	1400	7.0	8.9	17.0	0.10	3.60	4.50		120	23								
	5/30/96	12:30	DT	1	1600	8.8	9.2	9.6	0.24	1.00	2.10		37	11								
	6/20/96	9:40	DT	1	950	5.6	8.1	6.4	0.16	1.00	1.20		8	8								
	7/24/96	11:20	DT	1	1200	4.6	8.6	2.0	<0.1	0.85	0.69		9	<6								
	8/27/96	11:00	DT	1	900	11.0	8.6	6.5	0.34	1.50	2.00		32	9								
	9/24/96	10:50	DT	1	1300	4.9	8.5	19.0	0.16	2.10	3.70		16	7								
	11/5/96	13:35	DT	1	1700	62.0	8.4	120.0	0.57	3.50	3.00		130	20								
	12/4/96	13:00	DT	1	860	4.3	8.6	1.1	0.28	<0.5	0.21		10	<6								
	1/29/97	11:05	DT	1	770	34.0	8.3	1.8	<0.1	0.86	1.30		39	10								
	2/27/97	14:30	DT	1	460	16.0	8.0	8.7	0.64	1.90	1.20		6	<6								
	3/12/97	10:20	DT	1	1300	3.8	8.3	20.0	2.80	5.40	2.90		11	15								
	5/20/97	10:40	DT	1	1400	5.4	8.9	12.0	0.3	1.40	2.40		9	<6								
	6/10/97	9:00	DT	1	1100	4.7	8.4	7.6	<0.1	1.90	1.50		10	6								
	7/8/97	12:30	DT	1	1400	5.1	9.0	4	0	2.7	3		76	21								
	8/15/97	13:00	DT	1	1200	6.2	8.6	14	<0.1	2.5	2		6	<6								
	9/24/97	11:45	DT	1	1200	7.3	8.5	7	<0.1	1.6	6		21	10								
	10/29/97	12:25	DT	1	1400	67	8.8	21	0	2.0	4		140	23								
	4/21/98	8:55	DT	1	1110	1.6	8.35	3	0	<1.0	<0.1		2	1								
	6/24/98	9:20	DT	1	870	3.9	8.5	7.0	<0.05	1.1	2		4	2								
	7/14/98	12:16	D	1	715	6	8.5	0.5	0.2	<1	0.4		36	10								
	8/12/98	8:57	D	1	1190	4	8.3	9.7	0.1	1.8	2.5		10	6								
	9/14/98	11:04	D	1																		
	10/8/98	11:50	D	1	1290	9	8.2	7.8	0.2	1.7	1.8		17	7								
	11/30/98	11:50	D	1	1380	8	8.5	5.7	<0.05	<0.2	1		17	11								
	12/14/98	9:30	D	1	775	30	7.1	25.9	2.4	8.9	2.9		130	60								
	1/14/99	9:38	D	1	1120	3	8.4	7.3	0.1	0.9	1.0		8	5								
	2/3/99	9:55	D	1	2040	125	8.4	17.2	<0.05	1.7	0.9		250	36								
	3/2/99	11:00	D	1	1110	5	8.3	14.0	0.1	5.4	3.2		23	15								
	4/15/99		D	1	1160	5	7.6	19.1	0.1	1.4	4.0		10	7								
	5/26/99	11:00	D	1	1210	19	8.6	13.6	0.2	1.6	2.8		28	12								
	6/18/99	12:15	D	1	1360	37	8.4	32.9	0.1	1.3	4.7		93	19								

UPPER NEWPORT BAY WATERSHED - STORM AND DRY WEATHER MONITORING

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
ACWF18	11/15/95	10:20	DT	1	1300	550.0	8.9	4.7	2.10	4.20	4.2		770	150								
	3/12/96	14:30	ST	5	500	1300.0	5.1	16.0	0.79	7.20	11.0		3000	280	7	99	79	47	57	<1	440	254
	3/13/96	2:30																				
	3/13/96	9:30	ST	6	720	120.0	7.5	19.0	0.52	4.20	4.7		160	38	1	12	73	17	21	<1	760	248
	3/14/96	13:30																				
	3/14/96	15:30	ST	23	1100	11.0	7.8	9.4	0.33	1.60	6.2		18	15	<1	<10	45	8	15	<1	130	418
	3/16/96	12:00																				
	3/27/96	12:35	DT	1	1600	37.0	7.5	13.0	0.83	5.80	9.5		26	18								
	4/1/96	17:32	ST	5	890	380.0	6.3	27.0	6.60	25.00	8.3		600	150	2	34	440	33	62	1	850	300
	4/1/96	18:32																				
	4/1/96	20:32	ST	23	1700	34.0	7.4	58.0	1.50	7.10	13.0		45	23	1	<10	150	6	27	<1	110	520
	4/3/96	6:32																				
	4/3/96	10:32	ST	21	1800	88.0	7.4	52.0	2.10	6.40	11.0		120	26	2	<10	74	4	19	<1	81	540
	4/5/96	16:00																				
	4/17/96	20:26	ST	5	2000	870.0	7.5	2.1	0.68	8.50	23.0		1400	170	7	50	77	27	43	2	440	710
	4/17/96	21:26																				
	4/17/96	23:26	ST	3	990	410.0	6.7	5.1	1.10	12.00	12.0		1000	140	4	33	110	30	48	1	530	314
	4/18/96	3:26																				
	4/18/96	5:26	ST	35	1700	51.0	7.6	2.2	0.79	5.60	11.0		92	21	1	<10	50	5	25	<1	94	524
	4/21/96	19:26																				
	4/23/96	13:04	ST	24	1600	98.0	7.7	16.0	0.33	5.40	23.0		180	57								
	7/24/96	11:30	DT	1	1200	18.0	7.7	<0.2	0.58	2.40	3.5		49	16								
	8/27/96	11:20	DT	1	1100	4.7	7.5	1.4	0.87	2.00	1.9		13	8								
	9/24/96	11:05	DT	1	1200	150.0	7.6	5.3	1.40	4.90	5.4		390	170								
	11/5/96	13:50	DT	1	3600	22.0	6.2	4.5	97	240	560		23	10	5	28	9600	10	32	<1	470	
	12/4/96	13:15	DT	1	1400	29.0	7.8	7.2	5.50	6.80	2.9		58	15								
	9/24/97	11:25	DT	1	960	72	7.3	2.2	0.6	2.6	1.1		62	24								
	10/29/97	12:35	DT	1	1200	51	7.3	1.0	0.6	2.5	2.2		71	13								
	4/21/98	8:45	DT	1	1120	34	7.71	6	0.7	4.6	0.9		29	20								
	6/24/98	10:00	DT	1	1230	9.6	7.5	<1.3	0.4	~~2.7~~	2.0		22	10								
	7/14/98	12:33	D	1	890	18	7.4	<1.3	0.1	3.6	4.0		32	17								
	12/14/98	9:15	D	1	1160	7	7.1	<1.3	0.2	2.2	3.1		28	20								
	1/14/99	9:25	D	1	1510	23	7.3	7.0	0.6	4.5	6.4		30	21								
	2/3/99	9:40	D	1	940	5	7.4	0.6	0.1	1.9	26.0		14	8								
	3/2/99	10:41	D	1	1310	18	7.6	2.6	0.4	3.5	5.3		16	13								
	4/15/99		D	1	1270	24	7.0	0.5	0.5	4.7	11.4		41	11								
	6/18/99	12:00	D	1	930	27	7.6	<0.44	0.4	2.2	7.5		100	45								

UPPER NEWPORT BAY WATERSHED - STORM AND DRY WEATHER MONITORING

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
SERF19	10/25/94	15:00	DT	22	1800	9.8	8.8	9	2.0	2.8	1		72	<5								
	10/26/94	9:00																				
	11/30/94	11:25	DT	1	1800	9.6	8.4	14	1.5	3.8	1.5		25	18								
	5/16/95	15:30	DT	24	1700	53	8.8	9.5	<0.1	1.6	5.5		120	12								
	5/17/95	14:30																				
	6/14/95	11:35	DT	1	1300	3	9.8	11	0.93	3	0.82		<6	<6								
	7/25/95	9:00	DT	24	1600	4.0	11.0	<0.2	<0.10	2.00	0.60		<6	11								
	7/26/95	8:00																				
	8/29/95	11:15	DT	24	1400	7.2	8.9	3.5	0.31	1.20	0.78		15	8								
	8/30/95	10:15																				
	9/19/95	11:00	DT	24	1500	6.5	8.9	2.4	0.26	2.60	1.10		14	12	<1	<10	25	3	<40	<1	28	
	9/20/95	10:00																				
	10/25/95	10:00	DT	1	1700	25.0	8.6	8.8	<0.10	2.70	5.50		11	<6								
	11/14/95	11:20	DT	23	1700	21.0	8.6	13.0	0.29	2.70	1.90		<6	<6								
	11/15/95	9:20																				
	12/6/95	10:30	DT	1	1600	4.6	8.8	19.0	0.46	2.80	2.20		56	21								
	1/21/96	15:25	ST	5	170	120.0	7.2	2.8	0.53	2.20	3.20		340	56	1	12	180	17	13	<1	260	48
	1/21/96	23:25																				
	1/31/96	15:47	ST	4	350	740.0	8.1	15.0	0.65	7.60	11.00		3100	350	4	53	44	31	41	2	260	155
	1/31/96	21:47																				
	2/14/96	12:00	DT	1	1500	1.3	8.4	5.2	0.16	1.00	0.84		10	7								
	3/27/96	15:15	DT	1	1400	2.1	10.0	<0.2	<0.10	2.00	0.21		7	<6								
	4/24/96	13:25	DT	1	1100	2.1	9.5	0.9	0.26	1.40	0.50		11	<6								
	5/30/96	13:15	DT	1	920	5.2	8.8	2.4	<0.10	1.10	0.88		38	10								
	6/20/96	9:55	DT	1	1200	4.0	8.9	9.1	0.24	2.30	0.60		6	7								
	7/24/96	15:15	DT	1	950	19.0	10.0	<0.2	<0.1	1.50	0.55		25	14								
	8/27/96	14:30	DT	1	1300	4.6	11.0	<0.2	0.25	1.80	0.73		110	8								
	9/24/96	14:15	DT	1	1400	3.9	11.0	<0.2	0.18	2.60	1.50		6	9								
	11/5/96	14:05	DT	1	1400	5.5	8.9	4.1	0.16	1.40	1.20		28	12								
	12/4/96	16:05	DT	1	1400	2.6	8.6	6.2	0.29	0.77	0.89		17	7								
	1/29/97	14:50	DT	1	1600	8.8	8.6	7.4	<0.1	1.30	1.00		13	8								
	2/27/97	15:15	DT	1	530	460.0	7.9	20.0	1.30	6.70	3.50		590	60								
	3/12/97	10:45	DT	1	1200	3.6	9.2	0.9	0.36	1.50	1.50		7	7								
	4/15/97	12:45	DT	1	1200	2.1	9.5	<0.4	0.64	2.00	0.84		<6	<6								
	5/20/97	11:05	DT	1	970	8.2	9.2	0.72	0.62	2.20	1.4		17	12								
	6/10/97	8:40	DT	1	990	10.0	9.0	1.2	0.54	2.40	1.2		17	9								
	8/15/97	13:30	DT	1	1300	5.2	10.0	1.8	0.4	3.2	1.0		23	20								
	9/24/97	11:00	DT	1	1500	25	9.7	19	0.4	2.7	1.0		60	28								
	10/29/97	12:50	DT	1	1600	22	8.8	11	0.4	5.3	1.4		45	12								

UPPER NEWPORT BAY WATERSHED - STORM AND DRY WEATHER MONITORING

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
SERF19	4/21/98	8:30	DT	1	1350	1.8	8.18	2.2	0.3	1.7	0.6		<1	<1								
	6/24/98	10:15	DT	1	850	26	9.5	4.0	0.1	1.6	0.4		56	22								
	7/14/98	13:15	D	1																		
	8/12/98	9:20	D	1	1150	3	8.8	9.2	1.4	3.4	0.8		36	26								
	9/14/98	12:09	D	1	945	390	9.4	3.5	0.1	3.5	1.4		630	60								
	10/8/98	12:15	D	1	1070	4	9.4	11.2	0.1	1.9	0.6		17	9								
	11/30/98	11:18	D	1	1240	2	8.6	5.7	<0.05	1.2	1.0		7	5								
	12/14/98	8:45	D	1	410	68	6.6	13.2	1.8	4.9	3.5		280	110								
	1/14/99	9:10	D	1	1300	23	8.2	13.0	5.5	6.08	0.6		52	12								
	2/3/99	9:20	D	1	1470	5	8.3	10.6	<0.05	1.96	0.4		15	6								
	3/2/99	10:15	D	1	1190	11	8.6	7.1	<0.05	0.79	0.5		39	13								
	4/15/99	12:06	D	1	1490	02	8.7	44.0	0.6	1.45	0.6		47	26								
	5/26/99	11:30	D	1	1280	05	9.0	10.5	1.0	2.51	0.4		28	14								
	6/18/99	12:30	D	1	1040	6	9.3	19.5	0.6	2.40	0.5		15	9								

UPPER NEWPORT BAY WATERSHED - STORM AND DRY WEATER MONITORING

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
CICF25	10/26/94	11:30	DT	1	2600	1.3	7.5	230	4.90	7.50	5.50		10	5								
	5/17/95	14:00	DT	1	2400	54.0	8.2	460	26.00	30.00	5.20		71	12								
	7/26/95	13:15	DT	1	2000	14.0	9.0	390	10.00	15.00	4.90		17	10								
	10/24/95	15:00	DT	1	1100	280.0	8.3	70	2.60	4.80	4.00		280	20								
	4/24/96	13:50	DT	1	2000	8.9	8.7	440	16.00	12.00	5.90		13	9								
	7/24/96	15:40	DT	1	2000	11.0	9.1	170	4.60	8.10	2.30		15	12								
	11/5/96	14:25	DT	1	1700	11.0	9.0	160	2.90	4.10	2.70		24	7								
	1/29/97	13:25	DT	1	1900	21.0	8.4	65	<0.1	1.30	0.79		22	<6								
	4/15/97	13:10	DT	1	1800	23.0	8.5	270	1.40	2.80	6.50		20	9								
	7/8/97	13:20	DT	1	2100	18	9.2	140	0.3	3.2	3.4		59	15								
	10/29/97	11:30	DT	1	1800	60	8.2	76	3.2	5.1	4.5		63	15								
	4/21/98	8:15	DT	1	1570	104	7.38	314	13.0	14.0	4.6		115	23								
	5/19/99		D	1				306														
	6/2/99	10:00	D	1				<0.44														
	6/7/99	10:48	D	1				44														
	6/16/99	8:30	D	1				220														
	6/21/99	11:00	D	1				12	2.5	4.3	6.9											

UPPER NEWPORT BAY WATERSHED - STORM AND DRY WEATHER MONITORING

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
RCWF26	10/26/94	12:00	DT	1	1100	1.7	8.2	18	0.21	0.65	0.36		46	7								
	11/30/94	12:00	DT	1	1200	26	8.3	3.2	<0.1	0.82	1		64	16								
	7/26/95	13:45	DT	1	1200	18.0	9.3	26.0	0.60	1.60	2.00		90	15								
	3/12/96	21:23	ST	5	180	510.0	7.7	6.9	0.55	3.60	4.30		1300	130	4	40	63	50	32	<1	310	56
	3/12/96	22:23																				
	3/13/96	0:23	ST	5	320	3700.0	7.5	27.0	0.94	12.00	14.00		5800	720	10	96	160	300	110	2	450	350
	3/13/96	20:23																				
	4/1/96	13:42	ST	5	1800	62.0	7.8	120.0	1.80	5.10	5.10		100	19	2	<10	32	6	8	<1	42	480
	4/1/96	17:42																				
	4/1/96	18:42	ST	5	900	270.0	7.1	58.0	2.00	9.80	4.40		480	78	3	16	260	23	27	1	170	324
	4/1/96	22:42																				
	4/3/96	8:24	ST	11	1500	76.0	7.8	69.0	9.00	9.90	9.50		135	29	<1	<10	42	5	7	<1	40	592
	4/4/96	16:24																				
	4/17/96	20:54	DT	1				10.0	28.00	98.00	44.00		43	1	200							
	4/23/96	14:15	DT	8	1200	140.0	8.3	130.0	0.96	2.50	2.50		320	60	2	12	50	7	3	<1	71	420
	4/24/96	10:15																				
	5/29/96	12:30	DT	12	1300	140.0	8.6	68.0	0.17	1.60	6.10		190	30	2	<10	30	4	11	<1	55	356
	5/30/96	8:30																				
	6/20/96	10:30	DT	1	1100	9.8	8.4	110.0	0.20	1.80	4.20		17	10	<1	<10	5	<2	10	<1	43	
	7/24/96	16:00	DT	23	1400	20.0	8.1	75.0	7.20	7.80	2.50		27	10	<1	<10	21	<2	8	<1	26	406
	7/25/96	14:00																				
	8/27/96	14:30	DT	18	1100	11.0	8.4	28.0	0.21	1.10	1.40		14	5	<1	<10	10	<2	<4	<1	56	265
	8/28/96	8:30																				
	9/24/96	13:30	DT	4	1000	20.0	8.9	29.0	0.19	1.60	1.10		26	8	<1	<10	29	<2	<4	<1	29	425
	9/24/96	16:30																				
	11/21/96	10:38	ST	5	700	150.0	7.3	61.0	0.47	3.80	2.90		230	38	<1	<10	60	12	13	<1	140	262
	11/21/96	11:38																				
	11/22/96	3:38	ST	7	610	1900.0	7.9	32.0	0.45	4.40	8.00		3000	230	6	79	110	47	49	<1	390	570
	11/22/96	19:38																				
	2/27/97	11:30	DT	1	780	180.0	7.5	6.5	7.00	13.00	2.30		190	48								
	3/12/97	11:05	DT	1	1700	330.0	7.9	300.0	25.00	2.60	19.00		370	55	2	<10	24	8	14	<1	29	514
	4/16/97	13:30	DT	1	1300	450.0	8.3	130.0	0.51	3.50	5.70		480	74	4	20	24	10	14	2	110	458
	5/20/97	13:10	DT	5				110.0	2.70	5.50	6.70				1	11	24	54	11	<1	120	
	5/20/97	17:10																				
	6/10/97	8:02	DT	21	1500	25.0	8.0	160.0	3.40	4.30	3.20		<6	<6	<1	<10	18	2	5	<1	35	
	6/11/97	4:02																				
	7/8/97	13:45	DT	1	980	5.5	8.6	7	<0.1	<0.5	0.3		42	<6	<1	<10	5	<2	<4	<1	25	
	8/15/97	14:15	DT	1	1100	150	8	85	2.30	5.6	5.6		220	46	4	<10	17	5	8	<1	54	
	9/24/97	10:45	DT	1	1300	230	8.1	90	4.80	6.2	5.7		320	49								
	6/24/98	10:40	DT	1	990	1100	8.1	4.0	0.19	7.0	21		370	140								
	7/14/98	13:36	D	1	995	240	8.6	5.0	0.09	3.4	2.3											
	9/14/98	13:30	D	1	760	31	7.8	3.8	0.2	3.1	3.3		72	26								
	10/8/98	13:00	D	1	1010	38	7.9	5.6	0.2	1.4	1.7		240	29								
	5/19/99		D	1				1.7														

UPPER NEWPORT BAY WATERSHED - STORM AND DRY WEATHER MONITORING

STATION	DATE	TIME	SAMPLES Type	#	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
HCWF27	10/26/94	11:45	DT	1	2900	1.4	7.5	110	16	32	21		210	46								
	11/30/94	11:45	DT	1	1500	2.9	7.7	19	0.12	2.1	3.9		22	7								
	5/17/95	14:15	DT	1	8000	7	7.7	7.9	0.40	0.74	3.8		14	<6								
	7/26/95	13:30	DT	1	1500	27.0	7.6	160.0	8.50	9.70	4.50		73	11								
	8/30/95	12:00	DT	1	1400	81.0	8.1	100.0	0.32	2.30	5.90		160	23								
	9/20/95	13:25	DT	1	1900	9.1	7.6	320.0	0.54	5.20	3.40		12	6	<1	<10	17	2	<40	<1	35	
	11/15/95	10:55	DT	1	1300	9.0	8.0	3.6	<0.10	1.20	3.30		<6	<6								
	12/6/95	11:00	DT	1	1100	9.3	8.2	4.9	0.15	1.30	3.60		20	<6								
	2/14/96	12:20	DT	1	1300	3.9	8.0	64.0	2.60	8.90	4.00		13	7								
	4/24/96	14:00	DT	1	1100	8.3	8.8	0.5	0.12	1.70	2.50		81	18								
	5/30/96	13:30	DT	1	1000	17.0	9.1	<0.2	0.16	2.70	3.80		100	23								
	6/20/96	10:15	DT	1	1200	2.0	9.6	7.3	0.25	13.00	2.40		13	10								
	7/24/96	15:50	DT	1	1800	8.5	8.0	180.0	33.00	26.00	4.90		10	<6								
	8/27/96	14:50	DT	1	1400	3.8	8.3	120.0	0.27	2.20	3.00		12	7								
	9/24/96	14:25	DT	1	980	18.0	8.5	31.0	0.20	1.70	3.60		55	20								
	1/29/97	15:15	DT	1	930	12.0	7.8	67.0	0.50	2.70	2.70		<6	<6								
	2/27/97	11:20	DT	1	1600	15.0	7.5	240.0	28.00	22.00	1.80		<6	<6								
	3/12/97	10:55	DT	1	1900	55.0	7.7	460.0	42.00	38.00	24.00		51	14								
	4/15/97	13:20	DT	1	1400	39.0	7.7	150.0	0.64	2.00	6.00		48	12								
	5/20/97	11:20	DT	1	1400	44.0	7.3	190.0	20.00	19.00	11.00		42	<6								
	6/10/97	8:30	DT	1	1700	16.0	7.4	240.0	18.00	16.00	4.40		13	7								
	7/8/97	13:35	DT	1	970	11	8.1	21	<0.1	2.2	5		80	19								
	8/15/97	14:00	DT	1	840	56	7.8	36	1	4.4	6		77	18								
	9/24/97	10:30	DT	1	920	8.4	7.9	2	<0.1	1.3	2		7	<6								
	10/29/97	12:05	DT	1	1100	15	7.7	1.0	0.20	1.7	4.0		22	9								
	6/24/98	11:00	DT	1	700	7.9	7.7	2.0	0	1.6	6		24	10								
	7/14/98	14:00	D	1	670	4	8.0	<1.3	<0.05	<1.0	4		14	5								
	8/12/98	9:45	D	1	635	3	7.8	2	<0.05	1.4	4.0		48	24								
	10/8/98	12:45	D	1	1070	4	7.1	<1.3	<0.05	1.6	6.7		52	20								
	11/30/98	12:15	D	1	975	7	7.6	6	<0.05	1.5	3.5		43	7								
	12/14/98	8:25	D	1	1190	4	7.1	<1.3	<0.05	1.3	4.6		18	12								
	1/14/99	8:25	D	1	1620	90	7.2	308	31	26.7	5.2		140	26								
	2/3/99	9:00	D	1	625	13	7.6	8.4	0.1	1.1	3.7		18	8								
	3/2/99	9:50	D	1	1220	7	7.8	2.1	0.3	6.3	1.4		39	16								
	4/15/99	12:24	D	1	750	8	7.8	0.5	<0.05	1.2	2.9		27	8								
	5/26/99	12:00	D	1	665	5	9.2	<0.44	<0.05	1.0	3.2		24	14								
	6/18/99	13:05	D	1	1020	90	8.9	88	0	1.8	3.7		220	30								

UPPER NEWPORT BAY WATERSHED - STORM AND DRY WEATHER MONITORING

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
HINF28	10/26/94	11:10	DT	1	2500	65.0	7.8	300	8.7	10.0	9.8		160	20								
	5/17/95	13:50	DT	1	2400	52.0	8.0	460	24.0	27.0	4.7		60	12								
	10/24/95	14:50	DT	1	1000	1200.0	8.0	77	4.0	11.0	11.0		1300	88								
	4/24/96	13:35	DT	1	2300	26.0	7.8	580	40.0	31.0	6.7		24	12								
	7/24/96	15:25	DT	1	1800	28.0	7.8	140	7.8	7.8	5.2		30	12								
	11/5/96	14:20	DT	1	1600	62.0	8.1	210	4.3	5.4	5.3		57	10								
	12/4/96	16:20	DT	1	1100	47.0	8.3	79	1.0	2.1	2.9		46	10								
	4/15/97	13:05	DT	1	2000	250.0	7.2	260	11.0	12.0	13.0		310	53								
	7/8/97	13:00	DT	1	2200	20	9.0	85	0.3	3.1	3.9		74	16								
	10/29/97	11:45	DT	1	2200	390	8.0	210	12.0	14.0	14.0		550	62								
	4/21/98	8:05	DT	1	1520	26	7.51	346	13.2	13.2	3.1		31	13								

UPPER NEWPORT BAY WATERSHED - STORM AND DRY WEATHER MONITORING

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
LANF08	10/4/94	14:39	ST	11	5900	6.8	8.2	11.0	0.60	2.8	0.37		39	9	<1	<10	25	<2	<40	0.58	50	1160
	10/5/94	8:39																				
	10/5/94	10:39	ST	13	4500	28	7.6	13.0	1.00	7.8	1.1		120	21	1.4	<10	41	11	<40	1	250	800
	10/6/94	10:39																				
	10/6/94	12:39	ST	24	5700	3.9	6.1	10.0	0.62	4.8	0.44		8	<5	<1	<10	19	<2	<40	0.82	40	860
	10/8/94	10:20																				
	10/25/94	12:09	DT	23											<1	<10	23	2.4	<40	<0.3	26	940
	10/26/94	8:09																				
	11/8/94	11:06	ST	3	2900	40	7.0	28.0	2.5	11	2.3		54	21	<1	<10	54	8.7	<40	<0.3	450	610
	11/8/94	15:06																				
	11/9/94	9:06	ST	9	7500	14	8.2	19.0	0.41	2.4	0.7		38	10	<1	<10	25	<2	<40	<0.3	80	1405
	11/10/94	5:06																				
	11/10/94	9:00	ST	4	2200	60	6.4	15.0	0.57	3.1	1.4		120	11	1.1	<10	44	11	<40	<0.3	180	105
	11/10/94	11:00																				
	11/10/94	7:06	ST	4	560	230	6.1	8.3	0.67	4.7	3.2		660	53	4.3	28	150	56	<40	<0.3	580	85
	11/10/94	13:06																				
	11/30/94	9:50	DT												1.5	<10	19	<2	<40	3	53	
	12/5/94	2:00	ST	3	3400	33	7.6	18.0	0.74	3.7	1.2		160	40	2.1	<10	47	18	<40	0.39	170	746
	12/5/94	6:00																				
	5/16/95	13:45	DT	24	7800	5.7	8.4	28.0	<0.1	0.74	0.31		21	8	<1	<10	21	<2	<40	<1	<10	1585
	5/17/95	12:45																				
	6/14/95	10:00	DT	1											<1	<10	8.8	<2	<40	5	36	1720
	7/25/95	9:00	DT	24											1	<10	20	3	<40	<1		58
	7/26/95	8:00																				
	8/29/95	10:20	DT	24											<1	<10	21	2	<40	<1	52	1348
	8/30/95	9:20																				
	9/19/95	10:30	DT	24											1	<10	28	<2	<40	<1	50	
	9/20/95	9:30																				
	10/24/95	12:30	DT	23											<1	<10	31	2	<40	<1	340	
	10/25/95	10:30																				
	11/14/95	10:00	DT	23											4	<10	29	3	<40	<1	55	1737
	11/15/95	8:00																				
	12/5/95	8:30	DT	24											3	<10	64	3	<40	<1	35	1844
	12/6/95	7:30																				
	12/12/95	21:00	ST	5	3700	350	7.3	52.0	3.70	14	4.60		690	100	3	27	180	39	<40	<1	1100	790
	12/12/95	22:00																				
	12/13/95	2:00	ST	7	890	74	7.3	14.0	0.82	4.1	1.70		120	26	1	11	83	33	<40	<1	350	155
	12/13/95	14:00																				
	12/14/95	12:50	ST	29	7000	12	8.2	30.0	0.48	1.6	0.74		41	10	<1	<10	21	<2	<40	<1	94	1440
	12/16/95	20:50																				
	1/21/96	15:34	ST	14	1500	220	7.7	8.8	0.13	3.4	2.50		480	71	3	20	95	35	17	<1	320	334
	1/22/96	10:34																				
	1/22/96	12:34	ST	36	5600	16	8.2	21.0	0.11	0.79	0.42		24	11	1	<10	27	<2	8	<1	50	1570
	1/25/96	14:34																				
	1/25/96	15:30	ST	1	4300	39	8.1	27.0	0.36	2.0	0.59		39	13	<1	<10	35	4	9	<1	120	1350
	1/31/96	2:55	ST	4	20000	290	7.9	15.0	0.85	8.3	2.60		650	93	4	34	90	60	32	1	450	412
	1/31/96	3:40																				
	1/31/96	5:55	ST	8	390	150	7.8	3.9	0.45	2.5	4.10		350	67	5	27	70	5	20	1	340	70
	1/31/96	21:55																				
	1/31/96	23:55	ST	10	1800	35	7.7	12.0	0.37	2.0	0.83		35	13	<1	<10	40	7	9	2	120	384
	2/2/96	17:55																				

UPPER NEWPORT BAY WATERSHED - STORM AND DRY WEATHER MONITORING

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
LANF08	2/2/96	19:55	ST	19	4900	18	8.4	21.0	0.19	2.2	0.68		8	7	<1	<10	29	2	10	1	110	1092
	2/3/96	7:55																				
	2/13/96	9:15	DT	24											<1	<10	35	<2	5	2	74	1840
	2/14/96	8:15																				
	2/19/96	19:06	ST	5	4400	74	7.5	41.0	0.72	5.5	1.40		90	34	<1	<10	71	7	14	2	230	1210
	2/19/96	20:06																				
	2/19/96	22:06	ST	22	780	170	7.4	7.0	0.33	2.6	2.80		440	50	15	60	100	<2	<2	1	700	182
	2/22/96	2:03																				
	2/22/96	4:03	ST	20	4000	8	8.4	28.0	0.19	0.81	0.70		24	14	1	<10	22	<2	8	<1	30	1025
	2/23/96	18:06																				
	3/27/96	11:40	DT	1											<1	<5	9	<2	7	<1	39	2110
	4/23/96	11:30	DT	24											<1	<10	63	2	5	1	50	1758
	4/24/96	10:30																				
	5/29/96	11:30	DT	8											<1	<10	28	<2	7	<1	31	
	5/30/96	18:30																				
	6/20/96	8:50	DT												<1	<10	5	<2	10	<1	42	
	7/24/96	10:20	DT	24											<1	<10	21	<2	15	<1	27	1390
	7/25/96	9:20																				
	8/27/96	10:15	DT	23											<1	<10	21	<2	6	<1	60	1566
	8/28/96	8:15																				
	9/24/96	10:00	DT	23											<1	<10	23	4	6	<1	120	2015
	9/25/96	8:00																				
	11/5/96	12:25	DT	1											<1	21	58	<2	<4	<1	110	
	11/21/96	9:23	ST	4	410	110	7.1	6.0	0.68	3.4	1.40		130	28	2	<10	78	32	19	<1	260	112
	11/21/96	10:23																				
	11/21/96	12:23	ST	9	230	140	7.8	2.8	0.27	1.7	1.40		270	34	2	15	42	31	12	<1	230	82
	11/22/96	4:23																				
	12/4/96	12:15	DT	1											<1	<10	7	2	4	<1	55	1680
	12/9/96	12:55	ST	5	1800	180	7.6	16.0	0.30	3.9	1.80		320	51	1	12	48	21	10	<1	300	474
	12/9/96	13:52																				
	12/9/96	14:22	ST	7	810	150	7.5	6.0	0.19	1.8	1.30		220	30	1	11	42	25	11	<1	210	182
	12/10/96	2:22																				
	12/10/96	4:22	ST	10	2900	18	8.0	19.0	0.23	1.2	<0.2		43	9	<1	<10	17	<2	7	<1	71	745
	12/10/96	22:22																				
	12/11/96	0:22	ST	13	460	69	7.7	3.8	0.27	0.91	<0.2		100	14	<1	<10	25	10	11	<1	100	110
	12/12/96	0:22																				
	12/12/96	0:22	ST	15	3200	12	8.1	100.0	0.20	1.1	<0.2		19	8	<1	<10	12	<2	5	<1	89	1240
	12/13/96	6:22																				
	1/1/97	22:12	ST	5	1900	64	7.6	14.0	0.39	1.9	0.51		81	20	<1	<10	38	7	6	<1	120	504
	1/1/97	23:12																				
	1/2/97	1:12	ST	5	880	52	7.5	6.3	0.40	0.98	0.41		26	9	<1	<10	25	5	6	<1	71	200
	1/2/97	9:12																				
	1/2/97	11:12	ST	42	3300	11	8.0	20.0	0.23	1.1	0.47		20	6	1.8	<10	25	2.5	12	<1	70	3950
	1/5/97	23:12																				

UPPER NEWPORT BAY WATERSHED - STORM AND DRY WEATHER MONITORING

STATION	DATE	TIME	SAMPLES Type	#	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
LANF08	1/21/97	20:42	ST	2				48.0	<0.1	1.1	0.66				1.2	<10	33	3.9	5.9	<1	<10	1850
	1/21/97	21:42																				
	1/22/97	1:42	ST	12	3600	11	7.8	19.0	0.36	1.1	0.52		24	6	6.7	<10	25	2.6	11	<1	<10	790
	1/22/97	23:42																				
	1/23/97	1:42	ST	3	630	150	7.5	6.8	0.23	1.2	0.50		89	11	1.2	<10	26	9.1	7.6	<1	10	170
	1/23/97	5:42																				
	1/23/97	11:42	ST	4	4700	11	8.1	38.0	0.25	0.86	0.31		29	22	2.2	<10	34	<2	20	<1	120	1304
	1/24/97	23:42																				
	1/29/97	10:15	DT	1											1.2	<10	19	<2	8.1	<1	82	1760
	2/11/97	0:41	ST	5	3000	98	7.8	37.0	1.0	4.3	1.0		120	32	1.2	<10	40	5.1	9.8	1.0	170	940
	2/11/97	1:41																				
	2/27/97	10:00	DT	1											<1	<10	8.4	<2	4.3	<1	17	
	3/12/97	8:45	DT	1											<1	<10	14	<2	4.1	<1	50	1460
	4/15/97	10:45	DT	24											<1	<10	49	11	7.7	<1	70	1590
	4/16/97	9:45																				
	5/20/97	9:50	DT	1											<1	<10	6.4	<2	<4	<1	39	1300
	6/10/97	10:50	DT	1											<1	<10	6.2	<2	4.0	<1	30	1436
	7/8/97	10:00	DT	1											2	<10	5	<2	<4	<1	26	
	8/15/97	10:50	DT	1											<1	<10	<4	<2	4	<1	20	
	9/24/97	9:45	DT	1											<1	<10	7	<2	5	<1	<10	
	10/29/97	10:05	DT	1											<1	<10	8	<2	12	<1	160	
	11/10/97	8:47	SF	4				40.0				<30			<1	<10	73	4	18	<1	250	1350
	11/10/97	9:32																				
	11/10/97	10:02	SF	8				13.0				<0.5			<1	<10	49	15	20	<1	280	195
	11/11/97	0:02																				
	11/11/97	2:02	ST	25	3900	33	7.7	23.0	1	3.1	1	<0.5	31	11	<1	<10	33	6	15	<1	150	894
	11/13/97	2:02	SF												<1	20	20	4	11	<1	120	
	11/13/97	4:02	ST	9	470	55	7.2	6.7	1	2.5	1.0	<0.5	150	36	<1	11	25	17	6	<1	240	72
	11/14/97	21:27	SF												<1	<10	20	9	11	<1	160	
	11/19/97	11:25	DT	10								<0.5			<1	<10	23	<2	13	<1	87	1640
	11/19/97	20:25	SF												<1	<10	34	<2	6	<1	56	
	11/26/97	9:36	ST	5	1400	630	8.2	8.7	0	5.0	4	<0.5	1100	910	3	38	150	100	43	<1	640	304
	11/26/97	10:36	SF												<1	<10	14	<2	<4	<1	42	
	11/26/97	14:36	ST	13	1400	66	7.6	8.2	0.50	2.1	1	<0.5	72	52	<1	<10	35	15	12	2	150	262
	11/27/97	14:36	SF												<1	<10	16	<2	6	<1	98	
	11/27/97	16:36	ST	32	5900	11	8.0	33.0	0	0.97	0.40	<50	33	33	<1	<10	19	<2	7	<1	68	1416
	11/30/97	6:36	SF												<1	<10	13	<2	5	<1	84	
	12/6/97	3:59	ST	5	460	200	7.7	4.2	0	2.8	2	<0.5	310	260	1	10	5	35	16	3	260	90
	12/6/97	4:59	SF												<1	<10	6	<2	<4	<1	45	
	12/6/97	5:59	ST	6	200	210	7.8	1.7	0	0.93	1	<0.5	210	170	<1	12	31	18	11	<1	470	40
	12/6/97	15:59	SF												<1	<10	6	<2	<4	<1	41	
	12/6/97	17:59	ST	8	980	150	7.6	7.2	0	1.4	1	<0.5	200	180	<1	11	24	15	10.0	<1	430	250
	12/7/97	7:59	SF												<1	<10	8	<2	<4	<1	74	
	12/7/97	9:59	ST	34	3900	16	7.9	28.0	<0.1	0.91	0	<0.5	31	8	1.0	<10	18	<2	6	<1	60	950
	12/10/97	3:59	SF												<1	<10	12	<2	4	<1	42	
	12/18/97	13:43	ST	5	1400	360	7.4	14.0	0.70	5.6	3	<0.5	660	100	3	29	94	44	22	<1	420	328
	12/18/97	14:43	SF												<1	<10	20	<2	4.0	<1	36	
	12/18/97	16:43	ST	7	1500	120	7.6	7.2	<0.5	2.1	1	<0.5	210	31	<1	<10	43	19	12	<1	160	280
	12/19/97	4:43	SF												<1	<10	33	9	6	<1	84	
	12/19/97	10:43	ST	38	5800	7.7	8.0	23.0	<0.5	0.92	0.30		12	10	<10	<10	14	<2	<4	<1	61	1580
	12/22/97	12:43	SF												<10	<10	11	<2	<4	<1	58	

UPPER NEWPORT BAY WATERSHED - STORM AND DRY WEATHER MONITORING

STATION	DATE	TIME	SAMPLES Type	#	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
LANF08	1/9/98	17:37	ST	5	320	250	7.7	2.0	0.50	3.2	2	<0.5	800	110	<10	28	80	59	25	<1	470	70
	1/9/98	18:37	SF												<10	<10	10	<2	5	<1	84	
	1/9/98	20:37	ST	9	450	54	7.4	2.9	<0.5	1.2	0	1	94	17	<1	<10	31	11	9	<1	<10	108
	1/10/98	12:37	SF												<1	<10	13	<2	<4	<1	<10	
	1/10/98	14:37	ST	38	400	11	8.0	27.0	<0.5	1.3	0.40	<0.5	21	8	1.0	<10	26	2	5	<1	140	980
	1/13/98	16:37	SF												<1	<10	15	<2	6	<1	100	
	1/20/98		DT	24											<1	<10	14	<2	<4	<1	<10	
	1/21/98														<1	<10	14	<2	<4	<1	<10	
	2/14/98	9:09	ST	5	2000	50	7.7	20.4	<0.5	1.9	1		180	32	1	10	38	17	9	1.40	91	420
	2/14/98	10:09	SF												<1.00	4	15	2	5	<1.00	24	
	2/14/98	12:09	ST	7	570	62	7.7	4.9	<0.5	0.8	1		160	22	<1.00	11	27	14	8.40	<1.00	56	100
	2/15/98	0:09	SF												<1.00	5	10	<1.00	2	<1.00	9	
	2/15/98	2:09	ST	20	4300	5.9	8.1	28.8	<0.5	1	8		21	8	1	4	48	3	6	<1.00	30.6	1334
	2/16/98	16:09	SF												1.10	5	15	<1.00	67	1	19	
	2/16/98	18:09	ST	10	1900	34	7.9	15.9	<0.5	1	10		74	18	<1.00	5	22	7	5	<1.00	38	430
	2/17/98	12:09	SF												<1.00	4	18	2	4.00	<1.00	20	
	2/17/98	14:09	ST	11	4200	8.1	8.0	4.0	<0.5	1	10		15	8	<1.00	60	30	3	19	<1.00	79	1060
	2/18/98	10:09	SF												<1.00	52	23	1	20.0	<1.00	38	
	2/19/98	12:30	ST	5	4800	2.1	8.1	34.6	<0.5	<1	10				<1.00	4	17	4	5	<1.00	30	>1500
	2/19/98	13:30	SF												<1.00	4	15	2	6.40	<1.00	22	
	2/19/98	21:30	ST	7	1100	510	7.7	11.5	<0.5	2.0	12				<1.00	9	26	11	9	<1.00	60	320
	2/20/98	9:30	SF												<1.00	3	15	1	3	<1.00	20.0	
	2/20/98	11:30	ST	18	4800	3.4	8.0	33.2	<0.5	1.0	11.0				<1.00	4	125	3	7	<1.00	36.0	1200
	2/21/98	21:30	SF												<1.00	3	103	1	7	<1.00	32	
	2/21/98	23:30	ST	8		41	7.8	12.0	0.8	<1	12				<1.00	9	33	13	7	<1.00	45	224
	2/22/98	13:30	SF												<1.00	2	19.0	1	4	<1.00	17	
	2/22/98	15:30	ST	11		12	8.0	15.9	<0.5	1.1	12				<1.00	4	22	5	5.60	<1.00	43	428
	2/23/98	11:30	SF												<1.00	4.00	18	1	6	<1.00	54	
	3/25/98	5:44	ST	5	2940	42	7.6	30.6	0.5	1.5	<0.1		143	34	1	17	70	15	9	<1.00	157	775
	3/25/98	6:44	SF												<1.00	15	59	2	8.80	<1.00	119	
	3/25/98	8:44	ST	6	315	100	7.8	5	<0.1	<1.0	<0.1		51	23	6	12	54.0	22	11	<1.00	132	80
	3/25/98	18:44	SF												<1.00	4	17.0	2	3	<1.00	103	
	3/25/98	20:44	ST	28	4430	12	8.2	33.2	0.3	<1.0	0		9	1	1	28	34	6	6	<1.00	53	1110
	3/28/98	2:44	SF												<1.00	25	17	<1.00	6	<1.00	39	
	3/28/98	4:44	ST	13	2600	17	8.1	10.2	0.2	<1.0	<0.1		11	2	1	29	34	32	7	<1.00	71	606
	3/29/98	4:44	SF												1	27.0	22	<1.00	7	<1.00	44	
	4/20/98	12:31	DT	23											<1.00	30	19	2	4	<1.00	23	1450
	4/21/98	10:31																				
	6/22/98	13:00	DT	1											<0.50	28	10	<2	<4	<2	22	
	7/15/98	9:30	DT	24											<1	16	27	<4	11	<4	45	
	7/16/98	8:30	DF												<1	17	20	<4	10	<4	35	
	8/17/98	8:26	DT	13											<1	9	30	<2	<8	<2	36	1260
	8/17/98	20:26	DF												<1	<8	22	<2	<8	<2	20	
	9/8/98	11:24	DT	22											<1	11	28	<2	7	<2	47	1190
	9/9/98	9:24	DF												<1	10	21	<2	6	<2	26	
	10/13/98	12:20	DT	24											<1	<8	25	<2	<4	<2	40	1430
	10/14/98	11:20	DF												<1	<8	21	<2	<4	<2	35	

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
LANF08	11/3/98	11:02	DT	24											<1	<8	19	<2	<4	<2	122	
	11/4/98	10:02	DF												<1	<8	14	<2	<4	<2	76	
	11/8/98	2:50	ST	3	1940	150	7.3	19.0	1.0	16.6	5.8		700	260	3	33	119	42	28	<2	698	435
	11/8/98	3:20	SF												<1	<8	22	<2	14	<2	95	
	11/8/98	5:50	ST	10	1630	24	7.6	13.0	0.2	2.5	1.0		140	100	<1	9	33	6	18	<2	91	395
	11/8/98	23:50	SF												<1	<8	24	3	16	<2	67	
	11/9/98	1:50	ST	37	3330	17	7.9	25.0	0.2	2.2	0.6		50	16	1	<8	22	3	13	<2	71	825
	11/12/98	1:50	SF												1	<8	22	2	13	<2	68	
	11/28/98	4:50	ST	5											2	21	77	29	20	<2	406	434
	11/28/98	5:50	SF												2	<8	25	<2	9	<2	73	
	11/28/98	7:50	ST	13											5	10	43	6	20	<2	109	332
	11/29/98	7:50	SF												4	<8	31	<2	18	<2	67	
	11/29/98	9:50	ST	27	3730	21	8.1	28.0	<0.05	1.5	0.6		66	14	2	<8	23	3	11	<2	53	1120
	12/1/98	13:50	SF												1	<8	18	<2	10	<2	35	
	12/1/98	15:50	ST	9	730	60	8.5	7.0	0.1	2.4	1.4		210	42	6	20	58	31	18	<2	222	195
	12/2/98	7:50	SF												<1	8	19	<2	7	<2	15	
	12/8/98	9:33	DT	24											<1	4	<10	18	<4	<2	41	1540
	12/9/98	8:33																				
	1/5/99	8:52	DT	24											<1	<8	16	<2	6	<2	30	1246
	1/6/99	7:52	DF												<1	<8	13	<2	6	<2	23	
	1/25/99	3:23	ST	5											2	11	62	15	9	27	199	280
	1/25/99	4:23	SF												<1	<8	21	<2	4	<2	40	
	1/25/99	6:23	ST	13											1	8	43	9	12	<2	104	860
	1/26/99	6:23	SF												<1	<8	18	<2	9	<2	32	
	1/26/99	8:23	ST	15	815	35	7.7	6.3	0.3	1.6	0.9		160	34	2	13	53	19	13	<2	151	175
	1/27/99	12:23	SF												<1	<8	15	<2	6	<2	25	
	1/27/99	14:23	ST	19	3700	18	7.8	40.2	0.2	1.4	1.4		17	10	<1	10	26	5	8	<2	53	1048
	1/29/99	2:23	SF												<1	<8	21	2	6	<2	39	
	2/2/99	10:50	D	24	4630	3	8.1	52.8	0.1	0.7	0.3		16	7								
	2/3/99	9:50																				
	2/4/99	18:24	ST	5	3630	28	8.1	17.2	0.2	2.4	0.4		70	12	1	9	32	6	<4	<2	110	1020
	2/4/99	19:24	SF												<1	<8	18	2K	<4	<2	55	
	2/4/99	21:24	ST	14	1190	27	7.7	10.1	0.4	1.9	0.6		60	52	2	9	43	9	11	<2	140	276
	2/5/99	23:24	SF												1	<8	28	<2	9	<2	242	
	2/6/99	1:24	ST	33	4600	5	8.2	48.4	0.1	1.0	0.3		30	14	1	<8	26	<2	10	<2	49	1300
	2/8/99	17:24	SF												1	<8	22	<2	11	<2	37	
	2/9/99	17:09	ST	5	1490	26	7.5	14.5	0.2	3.3	0.7		230	100	1	12	106	19	11	<2	316	470
	2/9/99	18:09	SF												<1	<8	19	2	6	<2	76	
	2/9/99	20:09	ST	7	1110	27	7.8	7.0	0.2	1.1	0.6		64	20	2	9	50	13	12	<2	149	238
	2/10/99	8:09	SF												1	<8	26	2	10	<2	55	
	2/10/99	10:09	ST	40	4580	5	8.2	49.3	<0.05	0.9	0.2		9	6	1	<8	27	3	11	<2	51	1320
	2/13/99	16:09	SF												<1	<8	22	<2	12	<2	50	
	2/18/99	9:10	DT	1											<1	<8	11	<2	9	<2	36	1030
	2/18/99	9:10	DF												<1	<8	12	<2	8	<2	28	
	3/1/99	12:20	DT	24											<1	<8	31	<2	10	<2	32	1490
	3/2/99	11:20	DF												<1	<8	27	<2	10	<2	27	

UPPER NEWPORT BAY WATERSHED - STORM AND DRY WEATHER MONITORING

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
LANF08	3/11/99	10:40	ST	5				25.6	0.7	3.3	0.9				1	10	77	12	10	<2	220	752
	3/11/99	11:40																				
	3/11/99	13:40	ST	6	2000	24	7.9	11.0	0.6	3.0	0.7		46	24	1	<8	90	20	21	<2	148	404
	3/11/99	23:40																				
	3/12/99	1:40	ST	40	5170	4	8.2	41.4	0.2	0.8	0.5		28	7	<1	<8	32	2	<4	<2	56	1414
	3/15/99	7:40	SF												<1	<8	32	<2	7	<2	42	
	3/15/99	9:35	ST	5	1380	68	7.5	18.3	0.4	3.7	0.7		280	90	2	20	64	31	10	<2	264	430
	3/15/99	10:35	SF												<1	<8	15	<2	<4	<2	48	
	3/15/99	12:35	S	2	325	29	7.3	5.5	0.4	2.2	0.6		76	26								
	3/15/99	14:35																				
	3/15/99	16:35	ST	46	4600	8	8.1	35.4	0.2	1.2	0.3		22	9	<1	<8	35	3	8	<2	62	1204
	3/19/99	10:35	SF												<1	<8	26	<2	8	<2	43	
	3/25/99	12:09	ST	5	2070	68	7.5	24.9	0.5	4.5	1.3		380	92	2	18	72	30	17	<2	370	476
	3/25/99	13:09	SF												<1	<8	14	<2	6	<2	33	
	3/25/99	15:09	ST	9	1300	23	7.7	5.8	0.3	1.0	0.6		60	10	<1	<8	45	9	8	<2	351	222
	3/26/99	7:09	SF												<1	<8	21	<2	7	<2	90	
	4/27/99	10:14	DT	24											2	<8	35	<2	<4	<2	239	958
	4/28/99	9:14	DF												2	<8	30	<2	<4	<2	130	
	5/4/99	10:10	DT	24											<1	<8	26	<2	<4	<2	35	850
	5/5/99	9:10	DF												<1	<8	24	9	<4	<2	31	
	6/17/99	15:00	DT	1											<1	<8	18	<2	<4	<2	27	1600
	6/17/99	15:00	DF												<1	<8	16	<2	<4	<2	27	

UPPER NEWPORT BAY WATERSHED - STORM AND DRY WEATHER MONITORING

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
BC2F09	10/25/94	12:00	DT	23											<1	<10	19	6.5	<40	<0.3	47	1060
	10/26/94	8:00																				
	11/30/94	9:35	DT	1											<1	<10	21	<2	<40	22	43	
	5/16/95	10:44	DT	24											<1	<10	26	2.6	<40	<1	<10	
	5/17/95	9:44																				
	6/14/95	9:30	DT	1											<1	<10	3.8	2	<40	<1	28	1146
	7/26/95	11:10	DT	1											<1	<10	6	<2	<40	<1	41	
	8/29/95	10:00	DT	23											<1	<10	24	5	<40	<1	64	1040
	8/30/95	8:00																				
	9/19/95	10:25	DT	24											1	<10	70	4	<40	<1	63	959
	9/20/95	9:25																				
	10/24/95	11:50	DT	21											<1	<10	32	5	<40	<1	64	
	10/25/95	7:00																				
	11/14/95	9:09	DT	24											<1	<10	33	5	<40	<1	72	1486
	11/15/95	8:09																				
	12/5/95	8:15	DT	24											3	17	49	7	<40	<1	140	1200
	12/6/95	7:15																				
	12/12/95	22:05	ST	5	3000	350.0	7.3	45.0	2.50	11.00	4.20		580	86	2	32	120	28	49	<1	920	595
	12/12/95	23:05																				
	12/13/95	1:05	ST	17	1500	95.0	7.3	13.0	0.67	4.60	2.40		120	25	<1	<10	70	10	<40	<1	220	306
	12/14/95	9:05																				
	12/14/95	11:05	ST	30	4200	29.0	7.9	6.6	3.10	4.90	10.00		45	8	<1	<10	22	<2	<40	<1	72	956
	12/16/95	21:05																				
	1/19/96	5:33	ST	5	3100	72.0	7.9	15.0	0.70	3.50	1.10		120	25	<1	<10	36	6	9	<1	130	684
	1/19/96	6:33																				
	1/19/96	8:33	ST	5	910	51.0	7.8	16.0	0.59	3.10	0.73		48	13	<1	<10	30	4	5	<1	76	218
	1/19/96	16:33																				
	1/19/96	18:33	ST	17	3400	34.0	8.0	3.5	0.43	1.60	0.75		33	7	<1	<10	25	3	<20	<1	46	646
	1/21/96	14:33																				
	1/21/96	16:33	ST	5	720	230.0	7.6	2.3	0.57	1.90	2.10		340	46	<1	11	44	21	<20	<1	200	154
	1/22/96	0:33																				
	1/31/96	3:07	ST	5	3100	120.0	8.1	13.0	0.30	2.90	1.00		190	32	<1	<10	44	10	16	<1	150	662
	1/31/96	4:07																				
	1/31/96	6:07	ST	20	890	71.0	8.0	5.8	0.12	1.30	0.65		82	13	<1	<10	34	8	5	7	100	190
	2/1/96	20:07																				
	2/1/96	22:07	ST	18	2800	25.0	8.1	7.5	0.21	1.40	0.42		17	13	<1	<10	23	3	5	3	53	484
	2/3/96	8:07																				
	2/3/96	10:07	ST	10	1300	29.0	7.7	4.5	0.33	1.70	0.59		29	<6	<1	<10	34	3	4	1	36	344
	2/4/96	4:07																				
	2/13/96	9:00	DT	24											2	<10	43	2	6	2	100	1300
	2/14/96	8:00																				

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STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
BC2F09	2/19/96	20:18	ST	5	4300	98.0	8.2	33.0	0.42	2.90	0.62		92	22	<1	<10	31	5	<4	<1	100	1186
	2/19/96	21:18																				
	2/19/96	23:18	ST	28	780	160.0	7.5	5.3	0.18	1.40	0.84		210	28	<1	<10	28	<2	<2	<1	120	174
	2/22/96	9:18																				
	2/22/96	11:18	ST	16	3100	15.0	8.4	11.0	0.26	0.65	0.93		18	11	<1	<10	21	<2	10	<1	<10	820
	2/23/96	17:18																				
	3/27/96	11:15	DT	1											<1	<5	8	<2	4	<1	17	1770
	4/23/96	10:45	DT	24											<1	<10	83	<2	<2	1	58	1446
	4/24/96	9:45																				
	5/29/96	12:00	DT	24											<1	<10	29	<2	7	<1	27	1240
	5/30/96	11:00																				
	6/20/96	8:45	DT	1											<1	<10	12	<2	8	<1	12	
	7/24/96	10:00	DT	19											<1	<10	28	<2	3	<1	35	975
	7/25/96	9:00																				
	8/27/96	10:00	DT	24											<1	<10	35	6	9	<1	100	1055
	8/28/96	9:00																				
	9/25/96	9:20	DT	1											<1	<10	15	<2	<4	<1	37	945
	11/5/96	12:35	DT	1											<1	<10	14	<2	5	<1	110	
	12/4/96	12:00	DT	1											<1	<10	6	<2	<4	<1	24	1280
	1/29/97	10:30	DT	1											<1	<10	7	<2	<4	<1	60	2160
	2/27/97	10:15	DT	1											<1	<10	8	<2	<4	<1	<10	
	3/11/97	9:20	DT	24											<1	<10	48	10	13	1	210	1565
	3/12/97	8:20																				
	4/15/97	10:20	DT	24											<1	<10	13	<2	<4	<1	29	1500
	4/16/97	9:20																				
	5/20/97	9:30	DT	1											<1	<10	6.7	<2	23	<1	47	1400
	6/10/97	10:40	DT	1											<1	<10	16	2.7	15	<1	35	1012
	7/8/97	10:20	DT	1											<1	<10	4	<2	<4	<1	30	
	8/15/97	10:40	DT	1											<1	<10	4	<2	4	<1	24	
	9/24/97	9:30	DT	1											<1	<10	7	3	7	<1	<10	
	10/29/97	10:20	DT	1											<1	<10	5	<2	8	<1	65	
	6/24/98	9:00	DT	1											<0.50	9	9	<2.00	<4.00	<2.00	21	1350
	6/24/98		DF												<0.50	21	8	<2.00	<4.00	<2.00	17	
	7/14/98	13:00	DT	1											<1	10	<10	<4	<8	<4	22	1340
	7/14/98	13:00	DF												<1	10	<10	<4	<8	<4	17	

UPPER NEWPORT BAY WATERSHED - STORM AND DRY WEATHER MONITORING

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
BC2F09	8/12/98	8:23	DT	1											<1	<8	9	<2	<8	<2	21	1050
	8/12/98	8:23	DF												<1	<8	9	2	<8	<2	21	
	9/9/98	9:00	DT	1											<1	<8	13	<2	4	<2	25	930
	9/9/98	9:00	DF												<1	8	9	<2	5	<2	15	
	10/20/98	12:00	DT	1											<1	<8	8	<2	<4	<2	17	1070
	10/20/98	12:00	DF												<1	<8	8	<2	<4	<2	16	
	11/30/98	0:00	DT												<1	<8	3	<2	<4	<2	<10	
	11/30/98	10:00	DF	1											<1	<8	12	<2	5	<2	32	880
	12/14/98	10:20	DT	1											<1	<8	10	2	<4	<2	44	1040
	12/14/98	10:20																				
	1/14/99	10:20	DT	1											<1	<8	9	<2	<4	<2	21	1100
	1/14/99	10:20	DF												<1	<8	8	<2	<4	<2	18	
	2/8/99	10:30	DT	1											<1	<8	11	<2	<4	<2	24	1296
	2/8/99	10:30	DF												<1	<8	12	<2	<4	<2	20	
	3/2/99	12:00	DT	1											<1	20	6	<2	6	<2	10	670
	3/2/99	12:00	DF												<1	<8	7	3	7	<2	<10	
	4/1/99	10:50	DT	1											<1	<8	11	<2	<4	<2	12	
	4/1/99	10:50	D												<1	<8	10	<2	<4	<2	12	
	5/26/99	10:00	DT	1											<1	<8	13	<2	<4	<2	21	
	5/26/99	10:00	DF												<1	<8	14	<2	<4	<2	20	
	6/18/99	11:30	DT	1											<1	<8	8	<2	<4	<2	17	620
	6/18/99	11:30	DF	1											<1	<8	6	<2	<4	<2	19	

UPPER NEWPORT BAY WATERSHED - STORM AND DRY WEATHER MONITORING

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
SDMF05	10/25/94	11:30	DT	23	2900	2.9	8.4	130	0.34	<0.2	<0.2		11	19								
	10/26/94	7:30																				
	11/30/94	8:40	DT	1	3700	3.9	7.8	70	0.18	1.1	0.66		22	12								
	3/23/95	12:30	SF	1	430	40	8.2	7.8	0.29	3.3	11		2500	270	5	51	45	33	41	1.7	230	
	5/16/95	11:30	DT	24	3100	18	8.4	55	0.25	1.0	0.78		29	7								
	5/17/95	10:30																				
	6/13/95	10:00	DT	24	3300	6.8	8.3	59	0.24	1.8	0.75		100	21								
	6/14/95	9:00																				
	7/25/95	9:00	DT	24	3200	6.3	8.6	36.0	<0.10	0.53	0.37		62	15								
	7/26/95	8:00																				
	8/29/95	9:00	DT	24	3000	19.0	8.4	41.0	0.16	1.40	0.55		54	12								
	8/30/95	8:00																				
	9/20/95	9:35	DT	1	3100	61.0	8.0	55.0	0.56	2.00	1.50		140	28	<1	<10	14	3	<40	<1	60	
	10/24/95	11:00	DT	24	3300	56.0	8.5	71.0	<0.10	1.30	1.10		110	27								
	10/25/95	10:00																				
	11/15/95	8:10	DT	1	3400	28.0	8.1	81.0	0.42	0.97	0.69		44	24								
	12/6/95	8:25	DT	1	3400	10.0	8.0	86.0	0.30	0.82	0.75		52	6								
	1/21/96	10:00	SF	1	330	1100	6.8	8.3	0.32	2.40	4.20		1100	88	4	34	32	22	30	<1	180	170
	1/21/96	12:00	SF	1	390	750.0	7.0	9.5	0.35	2.20	3.10		680	32	2	22	31	21	18	<1	150	160
	1/31/96	20:30	SF	1	390	1800	8.1	12.0	0.84	8.60	12.00		3100	420	18	110	100	56	<2	32	640	70
	2/14/96	9:30	DT	1	3100	7.2	6.9	74.0	0.36	0.88	0.28		29	14								
	3/27/96	10:40	DT	1	3100	4.6	8.4	78.0	0.13	0.93	0.31		15	<6								
	4/24/96	9:45	DT	1	3100	3.6	8.3	81.0	<0.10	1.20	0.48		70	19								
	5/30/96	10:30	DT	1	3100	3.5	8.6	79.0	<0.10	1.20	0.67		13	7								
	6/20/96	8:05	DT	1	3000	4.0	8.0	84.0	0.43	1.30	0.88		21	7								
	7/24/96	9:10	DT	1	2700	17.0	8.1	13.0	<0.1	0.80	0.40		37	12								
	8/27/96	9:15	DT	1	3200	16.0	8.1	65.0	0.24	0.80	0.66		42	17								
	9/24/96	8:45	DT	1	2700	16.0	8.0	56.0	0.15	1.20	0.77		29	10								
	11/5/96	10:05	DT	1	3100	54.0	8.0	28.0	1.60	3.80	2.50		88	11								
	12/4/96	11:05	DT	1	2800	6.7	8.4	74.0	0.29	1.00	0.59		18	<6								
	1/14/97	10:00	SF	14	2500	100.0	7.8	40.0	<0.1	1.60	1.10		140	22	<1	<10	9	3	<4	<1	48	578
	1/15/97	12:00																				
	1/15/97	16:00	SF	3	660	2500	7.8	5.5	0.47	7.70	13.00		4900	480	10	75	100	70	73	<1	320	180
	1/15/97	20:00																				
	1/16/97	11:23	SF	7	2600	180.0	8.3	36.0	0.10	1.80	1.70		270	37	2	1K	14	6	5K	<0.1	32	530
	1/16/97	23:23																				
	1/29/97	9:05	DT	1	16000	80.0	8.2	51.0	0.16	0.80	0.82		66	17								
	2/27/97	10:30	DT	1	3100	6.0	8.0	79.0	2.00	2.90	1.10		16	<6								
	3/11/97	8:45	DT	23	2800	5.7	8.3	16.0	1.20	1.80	1.50		11	<6								
	3/12/97	6:45																				
	4/15/97	9:30	DT	24	3100	8.7	8.3	80.0	<0.5	1.10	0.57		15	9								
	4/16/97	8:30																				
	5/20/97	8:50	DT	24	3200	5.2	8.2	78.0	0.35	1.30	1.00		11	11								
	5/21/97	7:50																				
	6/10/97	9:54	DT	24	3100	6.1	8.4	64.0	<0.1	1.40	0.38		19	11								
	6/11/97	0:54																				
	7/8/97	9:10	DT	1	3100	6.6	8.3	59	0	1.5	0		20	8								
	8/15/97	10:00	DT	1	2900	17	7.8	55	<0.1	0.8	1		42	19								
	9/24/97	8:55	DT	1	2900	14	8.0	37	<0.1	2.4	1		50	28								

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
SDMF05	9/25/97	10:53	ST	5	2500	120	7.6	35	<0.1	5.1	3	<0.5	290	75	2	<10	24	8	12	<1	180	632
	9/25/97	11:53	SF												1	<10	16	3	6	<1	110	
	9/25/97	13:53	ST	3	800	300	7.3	13	0	4.2	2	<0.5	420	77	2.0	13	35	20	20	<1	220	260
	9/25/97	17:53	SF												<1	<10	11	<2	7	<1	78	
	9/26/97	9:48	ST	24	1500	21	8.0	25	0	2.6	1	<0.5	35	<6	<1	<10	21	3	7	<1	46	348
	9/28/97	7:48	SF												<1	<10	15	2	5	<1	49	
	9/28/97	10:13	ST	12	1900	26	7.8	28	0	2.5	1	<0.5	33	<6	<1	<10	21	<2	5	<1	19	550
	9/29/97	8:13	SF												<1	<10	15	<2	6	<1	16	
	10/29/97	9:20	DT	1	3100	28	8.3	50	0	1.8	2		57	9								
	11/10/97	10:30	SF	1				35				<0.5			<1	<10	17	3.0	8	<1	110	400
	11/11/97	8:30	ST	24	2000	50	7.7	29	1	3.7	1	<0.5	66	19	<1	<10	20	3	7	<1	56	508
	11/13/97	4:30	SF												<1	<10	11	<2	4.0	<1	62	
	11/13/97	10:39	ST	5	450	480	7.9	16.0	1	4	3.6		720	98	1	26	32	15	14	<1	230	228
	11/13/97	18:39	SF												<1	<10	5	<2	6	<1	48	
	11/19/97	10:29	DT	12	2700	29	8.2	43	0	1.5	1	<0.5	71	10	<1	<10	27	2	6	<1	99	725
	11/19/97	21:29	SF												<1	<10	20	<2	7	<1	150	
	11/26/97	11:23	ST	5	670	1600	8.1	11	1	9.4	8		2200	1900	8	72	150	97	46	<1	850	122
	11/26/97	12:23	SF												<1	<10	6	<2	<4	<1	44	
	11/26/97	14:23	ST	15	590	500	7.6	15	0	4.1	4	1	440	370	2	21	38	20	19	<1	170	166
	11/27/97	18:23	SF												<1	<10	9	<2	<4	<1	30	
	11/27/97	20:23	ST	28	2100	55	8.0	32	<0.1	1.8	1	<0.5	77	68	<1	<10	16	3.0	7	<1	56	520
	11/30/97	7:01	SF												<1	<10	9	<2	<4	<1	42	
	12/6/97	4:25	ST	5	280	1200	7.8	4	0	6.1	7	1	2000	1800	5	75	98	63	66	<1	510	85
	12/6/97	5:25	SF												<1	<10	14	6	5	<1	72	
	12/6/97	7:25	ST	5	320	2600	8.1	6.0	1	8.9	18	1	2600	2400	13	150	110	91	98	1	670	160
	12/6/97	15:25	SF												2	29	24	15	20	<1	150	
	12/6/97	17:25	ST	8	470	1500	7.9	8	0	4.4	8.0	2	1700	1500	6	74	61	39	60	<1	350	155
	12/7/97	7:25	SF												<1	<10	15	4	7	<1	82	
	12/7/97	9:25	ST	28	1200	21	7.9	22	<0.1	2.1	2	<0.5	400	52	<1	13	18	5	9.0	<1	63	360
	12/10/97	3:25	SF												<1	<10	9.0	<2	<4	<1	14	
	12/18/97	15:04	ST	5	1600	240	7.9	41	<0.5	2.2	2.0	<0.5	430	51	<1	<10	27	13	14	<1	110	460
	12/18/97	16:04	SF												<1	<10	11	<2	<4	<1	25	
	12/18/97	18:04	ST	8	610	850	7.7	16	<0.5	3.2	4	1	1100	130	2	20	37	18	22	<1	140	176
	12/19/97	8:04	SF												<1	<10	11	<2	<4	<1	11	
	12/19/97	10:04	ST	30	1600	100	8.0	19	<0.5	1.6	1		90	17	<10	<10	16	3	<4	<1	21	420
	12/22/97	10:15	SF												<10	<10	11	<2	<4	<1	34	
	1/3/98	6:46	ST	5	3000	18	8.2	81	<0.5	1.0	0	<0.5	26	9	<1	<10	18	3	<4	<1	15	694
	1/3/98	7:46	SF												<1	<10	16	<2	<4	<1	<10	
	1/3/98	9:46	ST	12	1800	28	7.8	21	<0.5	2.1	1	<0.5	28	11	<1	<10	22	<2	4.0	<1	<10	420
	1/4/98	7:46	SF												<1	<10	18	<2	<4	<1	<10	
	1/4/98	13:46	ST	30	1500	95	7.6	16	0	1.5	1.0	<0.5	110	22	<1	11	23	3	5	<1	22	496
	1/6/98	23:46	SF												<1	<10	16	<2	5	<1	11	
	1/9/98	15:31	ST	5	3100	15	8.4	570	<0.5	1.2	0	<0.5	28	11	<10	<10	18	1	4	<1	52	800
	1/9/98	16:31	SF												<10	<10	13	<2	<4	<1	64	
	1/9/98	17:31	ST	21	730	740	7.9	17	<0.5	4.2	5	0.590	1400	160	2	28	210	120	130	<1	28	186
	1/11/98	5:31	SF												<1	<10	14	<2	<4	<1	<10	
	1/11/98	7:31	ST	29	1700	34	8.0	33	<0.5	1.5	1	<0.5	54	15	<1	<10	17	<2	<4	<1	45	464
	1/13/98	15:31	SF												<1	<10	14	<2	<4	<1	94	
	1/20/98		DT	24	1800	22	8.2	41	0.10	1.4	1	<0.5	30	8								
	1/21/98																					

UPPER NEWPORT BAY WATERSHED - STORM AND DRY WEATHER MONITORING

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
SDMF05	2/3/98	8:34	ST	5												41	58	29	40	<1	170	
	2/3/98	9:34													4							
	2/3/98	11:34	ST	12	15000	680	1.8	12	<0.5	3.0	5		1500	<6	1	25	43	18	23	<1	120	
	2/4/98	9:34	SF													<10	18	3	8	<1	<10	
	2/4/98	11:34	ST	23	1200	95	8.0	22	<0.5	2.0	2		190	22		<10	46	5	11	<1	42	
	2/6/98	7:34													<1							
	2/6/98	13:31	ST	11	500	1300	7.7	14	<0.5	5.2	9		3200	290		80	80	45	62	<1	292	215
	2/7/98	9:31													7							
	2/7/98	21:31	ST	3				8.0	<0.5	3.4	9					58	70	47	<20	<1	265	130
	2/8/98	1:31																				
	2/8/98	3:31	ST	8				9	<0.5	3	7											
	2/8/98	17:31																				
	2/8/98	19:31	ST	20	920	300	7.8	16	0		3		540	72								
	2/10/98	9:31	SF																			
	2/14/98	10:12	ST	5	2000	160	8.0	53	<0.5	1.6	2		370	42	<1.00	12	25	11	9	<1.00	77	510
	2/14/98	11:12	SF												<1.00	2	12	1	6	<1.00	14	
	2/14/98	13:12	ST	7	320	1200	8.2	8	<0.5	2.8	8		2900	270	<5.00	82	53	38	51	<1.00	225	80
	2/15/98	1:12	SF												<1.00	2	9	<1.00	1	<1.00	5	
	2/15/98	1:12	ST	9	1100	230	7.9	17	1	2	10		380	64	<1.00	13	27	6	9	<1.00	52	288
	2/15/98	19:12	SF												<1.00	2	15	<1.00	3	<1.00	5	
	2/19/98	20:46	ST	5	2200	59	8.0	53	<0.5	1.0	2				<1.00	8	16	6	6	<1.00	23	640
	2/19/98	21:46	SF												<1.00	2	11.0	2	3	<1.00	9	
	2/19/98	23:46	ST	4	330	540	7.9	7	<0.5	4	9				3	43	32	34	27	<1.00	108	85
	2/20/98	5:46	SF												<1.00	2	7	1	3	<1.00	11	
	2/20/98	9:46	ST	20	1800	93	7.9	44	<0.5	2	6				<1.00	8	24	4	8	<1.00	27	505
	2/21/98	23:46	SF												<1.00	2	13.0	<1.00	4	<1.00	9	
	2/22/98	1:46	ST	11		580	7.9	16	<0.5	4	10				3.00	37	39	25	26	~~<1.00~~	104	235
	2/22/98	21:46	SF												<1.00	2	10	<1.00	3	~~<1.00~~	12	
	2/22/98	23:46	ST	10		460	7.6	10	0.7	3.4	~~11.0~~				2	27.0	176	17	18	~~<1.00~~	84	80
	2/23/98	17:46	SF												<1.00	2	11	<1.00	3.40	~~<1.00~~	13	
	2/23/98	19:46	ST	9		1500	7.8	5	0.5	3.3	9.8				7	72	59	40	53	<5.00	234	88
	2/24/98	11:46	SF												<1.00	6	11	2	9	<1.00	13	
	3/25/98	8:02	ST	5	2460	21	7.84	41	<0.1	<1.0	0.3		3090	21	<1.00	6	29	4	5	4	57	590
	3/25/98	9:02	SF												<1.00	4	28	2	5	1	75.0	
	3/25/98	11:02	ST	5	377	1500	8.08	14	0.1	3.2	0.9		92	275	6	64	46	52	44	2	220	120
	3/25/98	19:02	SF												<1.00	3	18	3	4	<1.00	55	
	3/25/98	21:02	ST	29	1480	120	8.25	28	<0.1	1.3	1.2		148	13	<1.00	10	22	9	9	2	89	394
	3/28/98	5:02	SF												<1.00	3	18	2	6	<1.00	75	
	3/28/98	7:02	ST	13	978	181	8.12	17	0.2	1.8	1.2		307	38	1	14	27	10	13	<1.00	92.0	276
	3/29/98	7:02	SF												<1.00	3	19	<1.00	6	<1.00	16	
	4/20/98	12:56	DT	8	2880	4.6	8.48	65	<0.1	1.1	0.9		13	2								
	4/21/98	19:56																				
	5/12/98	15:25	ST	5	1690	39	8.1	37	<0.05	~~2.7~~	~~1.2~~		200	40	<0.50	12	24	5	4	<2.00	45	460
	5/12/98	16:25	SF												<0.50	7	15	<2.00	<4.00	<2.00	14	
	5/12/98	18:25	ST	15	500	600	7.8	17	<0.05	2.7	2.7		1600	60	4	42	48	32	27	<2.00	230	190
	5/13/98	22:25	SF												<0.50	7	14	<2.00	<4.00	<2.00	<10	
	5/14/98	0:25	ST	31	2120	70	8.2	37	<0.05	1.2	1.1		200	32	<0.50	9	15	3	5	<2.00	32	560
	5/16/98	11:40	SF												<0.50	5	10	<2.00	<4.00	<2.00	<10	
	6/22/98	12:40	DT	24	3090	20	8.4	57	<0.05	1.3	0.6		56	8								
	6/23/98	11:40																				

UPPER NEWPORT BAY WATERSHED - STORM AND DRY WEATHER MONITORING

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
SDMF05	7/15/98	9:45	D	24	3060	32	8.5	79	<0.05	2.4	0.1		130	32								
	7/16/98	8:45																				
	8/17/98	9:48	D	13	2980	37	8.4	35	0.1	4.6	0.6		140	42								
	8/17/98	21:48																				
	9/8/98	13:01	D	24																		
	9/9/98	12:01																				
	10/13/98	10:43	D	24	2620	28	8.5	43.6	0.1	1.8	1.0		62	24								
	10/14/98	9:43																				
	11/3/98	12:59	D	7	2630	26	8.3	42.4	0.2	1.6	0.9		84	30								
	11/3/98	18:59																				
	11/8/98	4:59	ST	5	2220	48	8.1	44.0	0.5	2.8	1.5		150	70	<1	11	20	5	8	<2	55	600
	11/8/98	5:59	SF												<1	<8	10	<2	6	<2	15	
	11/8/98	7:59	ST	9	695	500	7.7	26.0	0.5	4.9	8.6		1620	210	6	42	47	33	27	<2	472	210
	11/8/98	23:59	SF												<1	10	14	3	7	<2	38	
	11/9/98	1:59	ST	38	1880	29	7.7	37.0	0.5	2.1	1.3		54	14	<1	<8	21	4	5	<2	30	550
	11/12/98	4:00	SF												<1	<8	18	<2	5	<2	20	
	11/28/98	6:12	ST	5											<1	9	20	4	6	<2	47	820
	11/28/98	7:12	SF												<1	<8	14	<2	5	<2	23	
	11/28/98	9:12	ST	12											4	30	34	20	21	<2	224	236
	11/29/98	7:12	SF												<1	<8	10	<2	4	<2	<10	
	11/29/98	9:12	ST	29	1430	24	8.1	26.0	<0.05	2.1	1.3		62	18	<1	<8	25	<2	6	<2	28	160
	12/1/98	19:50	SF												<1	<8	20	<2	5	<2	14	
	12/1/98	21:50	ST	5	450	540	7.9	8.8	0.1	4.1	7.3		1140	140	5	43	44	31	30	<2	248	410
	12/2/98	7:50	SF												<1	<8	9	<2	<4	<2	<10	
	12/9/98	8:30	D	24	2320	26	8.3	44.0	<0.05	0.9	0.7		76	28								
	12/10/98	7:30																				
	1/5/99	10:07	D	24	2450	23	8.5	47.0	<0.05	1.8	0.3		64	24								
	1/6/99	9:07																				
	1/19/99	10:04	D	24	2640	15	8.3	134.0	0.1	0.9	0.4		32	18								
	1/20/99	9:04																				
	1/25/99	5:15	ST	5	2520	21	8.3	58.1	0.2	1.4	1.0		80	20	<1	<8	29	3	4	<2	26	700
	1/25/99	6:15	SF												<1	<8	19	<2	5	<2	11	
	1/25/99	8:15	ST	12	720	160	7.9	22.7	0.3	2.4	2.4		360	42	1	17	36	8	13	<2	82	192
	1/26/99	6:15	SF												<1	<8	14	<2	4	<2	21	
	1/26/99	10:15	ST	19	585	500	7.8	15.0	0.3	3.1	4.2		1040	160	2	31	39	21	22	<2	151	115
	1/27/99	22:15	SF												<1	<8	9	<2	<4	<2	<10	
	1/28/99	0:15	ST	14	1450	33	8.0	33.3	0.1	1.4	1.2		68	13	<1	<8	19	<2	<4	<2	20	384
	1/29/99	2:15	SF												<1	<8	15	<2	<4	<2	10	
	2/2/99	10:30	D	24	1820	24	8.2	44.0	<0.05	1.6	0.7		62	19								
	2/3/99	9:30																				
	2/4/99	20:31	ST	5	2490	16	8.3	48.4	<0.05	1.6	0.7		43	13	<1	<8	20	<2	<4	<2	17	700
	2/4/99	21:31	SF												<1	<8	14	<2	<4	<2	11	

UPPER NEWPORT BAY WATERSHED - STORM AND DRY WEATHER MONITORING

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
SDMF05	2/4/99	23:31	ST	5	1420	72	8.1	37.0	0.7	2.6	1.2		150	88	<1	11	27	5	6	<2	49	360
	2/5/99	7:31	SF												<1	10	25	5	6	<2	47	
	2/5/99	9:31	ST	40	1730	28	8.3	37.0	0.3	1.8	0.9		64	24	<1	<8	20	2	5	<2	30	458
	2/8/99	19:31	SF												<1	<8	13	<2	4	<2	17	
	2/9/99	19:16	ST	5	2460	23	8.5	48.4	<0.05	2.0	0.5		64	22	<1	<8	23	<2	6	<2	30	686
	2/9/99	20:16	SF																			
	2/9/99	22:16	ST	8	1070	88	8.0	22.9	0.1	2.2	1.1		170	55	<1	<8	31	5	8	<2	58	284
	2/10/99	12:16	SF												<1	<8	16	<2	4	<2	15	
	2/10/99	14:16	ST	32	1580	34	8.3	28.7	0.1	1.9	0.9		92	28	<1	<8	27	3	7	<2	37	402
	2/13/99	4:16	SF												<1	<8	16	<2	6	<2	24	
	2/18/99	9:39	D	24	2670	17	8.4	56.3	0.1	1.3	0.3		62	32								
	2/19/99	8:39																				
	2/22/99	10:50	D	24	2640	16	8.5	77.0	0.6	2.2	0.5		70	30								
	2/23/99	9:50																				
	3/1/99	12:11	D	24	2780	13	8.6	71.3	0.4	1.5	0.4		52	20								
	3/2/99	11:11																				
	3/8/99	10:45	D	24	2640	12	8.3	51.5	0.2	2.0	0.4		37	25								
	3/9/99	9:45																				
	3/11/99	13:09	ST	5	2560	14	8.4	56.8	0.1	1.3	0.2		36	12	<1	<8	35	2	<4	<2	31	660
	3/11/99	14:09	SF												<1	<8	27	<2	<4	<2	17	
	3/11/99	16:09	ST	8	1970	16	8.3	44.4	0.3	1.9	0.2		38	18	<1	<8	31	<2	<4	<2	37	565
	3/12/99	6:09	SF												<1	<8	25	<2	<4	<2	19	
	3/12/99	8:09	ST	13	1560	18	8.0	41.4	0.6	1.9	0.7		38	12	<1	<8	30	<2	5	<2	52	386
	3/13/99	8:09																				
	3/15/99	10:10	ST	5	2380	13	8.2	65.6	0.3	1.5	0.4		44	16	<1	10	27	3	<4	<2	39	1875
	3/15/99	11:10	SF												<1	<8	11	<2	<4	<2	12	
	3/15/99	13:10	ST	8	635	105	7.7	26.0	0.7	2.7	1.1		210	60	<1	14	23	7	9	<2	59	188
	3/16/99	1:10	SF												<1	9	11	<2	4	<2	12	
	3/16/99	3:10	ST	41	1700	21	8.2	54.6	0.5	1.4	0.8		41	10	<1	<8	21	3	5	<2	25	420
	3/19/99	11:10	SF												<1	<8	17	<2	4	<2	15	
	3/22/99	12:11	D	24	2210	17	8.4	66.9	0.4	1.9	1.0		48	14								
	3/23/99	11:11																				
	3/25/99	13:19	ST	5	2200	88	8.2	46.2	0.2	2.6	1.4		280	46	<1	13	29	10	12	<2	99	440
	3/25/99	14:19	SF												<1	<8	8	<2	<4	<2	<10	
	3/25/99	16:19	ST	8	545	250	7.6	21.3	0.4	3.2	3.6		780	110	3	27	47	19	24	<2	185	142
	3/26/99	6:19	SF												<1	<8	11	<2	4	<2	14	
	3/26/99	8:19	ST	39	2040	19	8.3	54.1	0.3	1.3	0.8		49	13	<1	<8	26	<2	4	<2	26	566
	3/29/99	12:19	SF												<1	<8	22	<2	<4	<2	13	
	3/31/99	9:30	D	12	2960	31	8.5	53.7	<0.05	1.3	0.1		63	18								
	4/1/99	8:30																				
	4/6/99	15:07	ST	5	2810	27	8.5	48.0	0.1	1.5	0.3		45	15	<1	<8	23	2	<4	<2	40	746
	4/6/99	16:07																				
	4/6/99	18:07	ST	6	800	201	7.5	14.9	0.3	2.6	1.3		230	38	1	13	31	6	11	<2	74	254
	4/7/99	6:07	SF												<1	<8	18	<2	7	<2	14	
	4/27/99	10:55	D	24	2710	20	8.7	55.9	0.1	1.5	0.5		44	18								
	4/28/99	9:55																				
	5/4/99	9:33	D	24	2680	20	8.7	56.8	0.2	1.5	0.6		38	16								
	5/5/99	8:33																				

UPPER NEWPORT BAY WATERSHED - STORM AND DRY WEATHER MONITORING

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
SDMF05	5/26/99	10:07	D	24	2490	8	8.2	35.6	0.5	1.6	0.8		36	12								
	5/27/99	9:07																				
	6/2/99	14:30	D	1	990	29	7.0	20.7	1.3	3.8	1.2		34	16								
	6/7/99	9:35	D	24	2750	11	8.4	34.1	0.1	2.0	0.5		18	11								
	6/8/99	8:35																				
	6/17/99	14:30	D	1	2580	18	8.5	35.8	0.1	0.9	0.3		42	12								
	6/24/99	15:00	D		2590	28	8.6	27.3	0.2	1.0	0.7		53	18								

UPPER NEWPORT BAY WATERSHED - STORM AMD DRY WEATHER MONITORING

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
BCF04	11/10/94	9:00	ST	4	990	620	6.6	5.1	0.34	4.2	5.2		1200	45	1.9	98	120	32	65	<0.3	250	205
	11/10/94	15:00																				
	11/10/94	17:00	ST	13	1400	12	6.8	2.2	0.13	0.63	0.85		32	<5	<1	<10	21	<2	<40	<0.3	28	290
	11/11/94	17:00																				
	11/12/94	9:04	ST	24	1500	0.55	8.3	0.26	<0.1	0.36	<0.2		<5	<5	<1	<10	6.3	<2	<40	<2	26	580
	11/14/94	7:04																				
	11/30/94	8:00	DT	1											<1	<10	26	5.5	<40	0.7	36	
	3/3/95	10:00	ST	3	2200	360	7.9	8.5	0.15	2.8	1.93		490	31	<1	56	40	9.1	<40	<1	96	464
	3/3/95	14:00																				
	3/3/95	16:00	ST	18	3400	120	8.2	10.0	<0.1	1.5	0.96		180	22	<1	<10	16	<2	<40	1.5	12	738
	3/5/95	0:00																				
	3/5/95	2:00	ST	13	490	2000	7.8	2.7	0.51	4.2	11		4600	99	6.8	310	210	84	270	<1	540	155
	3/6/95	8:00																				
	3/6/95	10:00	ST	12	1000	300	8.0	5.7	<0.1	2.3	2.2		360	31	<1	40	31	6.5	51	<1	65	
	3/7/95	8:00																				
	3/10/95	22:30	ST	3	1200	4200	8.0	4.2	<0.1	11	16		7500	750	10	520	270	110	420	<1	760	280
	3/11/95	2:30																				
	3/11/95	4:30	ST	14	550	2100	7.8	3.3	<0.1	4.6	7.2		2800	280	4.7	240	110	37	190	<1	320	158
	3/12/95	6:30																				
	3/12/95	8:30	ST	8	1000	150	8.0	6.1	0.14	1.6	1.4		200	24	<1	24	24	4.9	<40	<1	41	236
	3/12/95	22:30																				
	5/16/95	11:45	DT	24											<1	<10	13	<2	<40	<1	<10	850
	5/17/95	10:45																				
	7/25/95	9:00	DT	24											<1	<10	8	<2	<40	<1	19	
	7/26/95	8:00																				
	9/19/95	10:00	DT	24											<1	<10	19	3	<40	1	28	745
	9/20/95	9:00																				
	1/21/96	15:36	ST	5	1200	370.0	7.2	2.8	0.37	2.60	2.60		250	68	1	40	48	22	28	<1	160	298
	1/21/96	16:36																				
	1/21/96	18:36	ST	10	970	160.0	7.6	3.0	<0.10	1.30	1.20		130	18	<1	14	32	6	<20	<1	42	224
	1/22/96	12:36																				
	1/22/96	14:36	ST	31	2100	15.0	8.3	2.8	0.18	0.68	0.33		15	6	<1	<10	31	<2	6	<1	17	
	1/25/96	14:36																				
	1/31/96	3:43	ST	5	650	50.0	7.4	2.7	<0.10	1.40	1.00		69	15	<1	14	33	5	9	<1	77	138
	1/31/96	4:43																				
	1/31/96	6:43	ST	20	1000	170.0	8.2	4.9	0.11	1.60	1.60		184	24	<1	20	32	5	24	11	150	238
	2/1/96	20:43																				
	2/1/96	22:43	ST	12	2000	32.0	8.3	6.3	<0.10	2.50	0.81		37	6	<1	10	19	<2	9	3	26	490
	2/2/96	20:43																				
	2/3/96	10:43	ST	10	1300	86.0	7.9	4.2	0.12	1.50	1.00		61	15	<1	<10	39	4	10	8	23	260
	2/4/96	4:43																				
	2/20/96	2:18	ST	5	2300	26.0	7.8	3.4	<0.10	2.50	0.68		48	20	<1	<10	29	2	19	<1	45	576
	2/20/96	3:18																				
	2/20/96	5:18	ST	27	690	340.0	7.7	7.9	0.21	1.00	1.60		330	48	<1	35	34	<2	<2	<1	68	160
	2/22/96	9:18																				
	2/22/96	11:18	ST	20	1400	110.0	8.1	9.0	0.22	1.70	1.10		88	13	<1	13	26	<2	16	<1	<10	345
	2/24/96	1:18																				
	3/27/96	10:25	DT	1											<1	<10	4	2	5	<1	35	850
	7/24/96	8:45	DT	1											<1	<10	6	<2	7	<1	14	790

UPPER NEWPORT BAY WATERSHED - STORM AMD DRY WEATHER MONITORING

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
BCF04	9/24/96	8:35	DT	1											<1	<10	4	<2	5	<1	34	710
	1/29/97	8:55	DT	1											<1	16	12	4	18	<1	100	800
	4/16/97	8:55	DT	1											<1	<10	11	4	10	<1	28	900
	5/20/97	8:30	DT	1											<1	<10	4.1	<2	<6	<1	48	780
	7/8/97	8:55	DT	1											<1	<10	<4	<2	6	<1	24	
	9/24/97	8:45	DT	1											<1	<10	6	<2	7	<1	<10	
	9/25/97	10:15	ST	5	2400	190	7.3	10.0	0	4.5	2.5	<0.5	280	72	<1	15	43	8	23	<1	110	590
	9/25/97	11:15	SF												<1	<10	30	3	14	<1	76	
	9/25/97	13:15	ST	11	2000	59	7.5	5.1	<0.1	2.1	1.1	<0.5	79	31	<1	<10	18	<2	12	<1	51	500
	9/26/97	9:15	SF												<1	<10	16	2	8	<1	35	
	9/26/97	11:15	ST	23	2500	24	8.4	2.8	0	1.4	0.6	<0.5	34	17	<1	<10	20	<2	<4	<1	36	648
	9/28/97	7:15	SF												<1	<10	21	<2	6	<1	39	
	9/28/97	9:15	ST	13	2900	23	8.0	4.7	<0.1	1.6	0.5	<0.5	31	<6	<1	<10	20	<2	5	<1	29	800
	9/29/97	9:15	SF												1.0	<10	21	<2	7	<1	15	
	11/19/97	11:00	DT	12	3000	22	8.1	5.4	0.2	1.8	0.4	<0.5	58	6	<1	<10	24	<2	5	<1	80	790
	11/19/97	22:00	DF												<1	<10	15	<2	4	<1	110	
	12/6/97	1:46	ST	5											<1	18	49	9	12	<1	110	265
	12/6/97	2:46	SF												<1	<10	150	<2	<4	<1	38	
	12/6/97	4:46	ST	16	520	1700	7.4	5.0	0.3	3.8	5.0	0.50	1800	1600	1	190	110	25	120	<1	370	150
	12/7/97	10:46	SF												<1	<10	15	<2	4.0	<1	38	
	1/20/98		DT	24											<1	<10	9	<2	<4	<1	<10	
	1/21/98		DF												<1	<10	10	<2	4.0	<1	<10	
	2/14/98	9:01	ST	5									330		<1.00	24	34	6	18	<1.00	43.0	410
	2/14/98	10:01	SF												<1.00	2	18	<1.00	5	<1.00	8	
	2/14/98	12:01	ST	4									2500		<5.00	265	87	32	158	<1.00	323	70
	2/14/98	18:01	SF												<1.00	3	93	4	19	<1.00	42	
	2/15/98	10:01	ST	18	1300	210	8.2	6.6	<0.5	1.7	11.0		280	42	<1.00	28	29	5	22	2	51	328
	2/16/98	20:01	SF												<1.00	4	15	<2	10	<1.00	27	
	2/16/98	22:01	ST	11	490	1100	7.9	6.2	<0.5	1.6	10.7				<1.00	77	41	17	50	<1.00	84	116
	2/17/98	18:01	SF												<1.00	7	138	6	8	<1.00	47	
	2/17/98	20:01	ST	7	800	180	8.0	4.9	<0.5	2.6	9.8				<1.00	29	55	5.60	21	2	45	208
	2/18/98	8:01	SF												<1.00	3	21	1	5	<1.00	19	
	2/19/98	22:20	ST	5	520	310	7.8	4.9	<0.5	1.6	1.5				<1.00	33	21	11	20	<1.00	55	124
	2/19/98	23:20	SF												<1.00	3	16	<1.00	3	<1.00	5.60	
	2/20/98	1:20	ST	8	520	750	7.8	4.4	0.5	2.6	9.5				<1.00	74	38	14	47	<1.00	84	125
	2/20/98	15:20	SF												<1.00	3	13	<1.00	6	<1.00	22	
	2/20/98	17:20	ST	16	1400	89	8.1	6.2	<0.5	2.1	9.5				<1.00	13.0	12	3	11	<1.00	17	340
	2/21/98	23:20	SF												<1.00	3	11	<1.00	5	<1.00	9	
	2/22/98	1:20	ST	8		1300	8.0	6.6	0.6	2.9	9				<1.00	120	69	20	78	<5.00	175	141
	2/22/98	15:20	SF												<1.00	3.90	14	2	5	<1.00	9	
	2/22/98	19:20	ST	11		460	7.9	4.0	<0.5	2.4	11.0				<1.00	51.0	38	14	32.0	<1.00	138	135
	2/23/98	15:20	SF												<1.00	3.80	27	3	6	<1.00	11	
	2/23/98	17:20	ST	10		3000	7.7	5.3	0.8	3.9	9.5				<5.00	239	110	29	161	<5.00	242	85
	2/24/98	11:20	SF												<1.00	4	17	1	4	<1.00	11	
	3/25/98	8:56	ST	5	490	2900	8.21	13.7	0.7	3.6	0.3		4720	353	<20	345	184	67	235	<20	659	330
	3/25/98	9:56	SF												1	4	9	<1.00	5	<1.00	14	
	3/25/98	11:56	ST	5	328	1500	8.19	3.1	<0.1	2.8	0.6		2060	162	<5.00	215	82	36	141	<5.00	274	70
	3/25/98	21:56	SF												2	2	3	2	12	<1.00	40	

UPPER NEWPORT BAY WATERSHED - STORM AMD DRY WEATHER MONITORING

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
BCF04	3/25/98	23:56	ST	26	1340	240	8.50	9.3	<0.1	<1.0	0.9		267	10	<1.00	39	34.0	8	30	<1.00	76	336
	3/28/98	1:56	SF												1	4	13	44	6	<1.00	20.0	
	3/28/98	3:56	ST	16	1580	80	8.48	4.4	0.1	1.2	0.6		103	13	<1.00	17	19	4	17	<1.00	43.0	390
	3/29/98	9:56	SF												<1.00	1.90	7	<1.00	7	<1.00	9	
	11/8/98	6:40	ST	5	805	320	7.6	5.3	0.2	4.9	5.2		920	160	2	70	55	18	47	<2	172	190
	11/8/98	7:40	SF												<1	34	28	7	23	<2	76	
	11/8/98	9:40	ST	9	1170	58	7.8	6.6	0.1	4.3	1.4		220	120	<1	22	28	3	17	<2	40	320
	11/9/98	1:40	SF												<1	<8	14	<2	6	<2	12	
	11/9/98	3:40	ST	14	2350	6	8.3	3.7	<0.05	1.1	0.3		18	10	<1	<8	17	<2	5	<2	19	640
	11/10/98	15:40	SF												<1	<8	15	2	5	<2	13	
	11/28/98	6:27	ST	5	1030	320	7.7	5.7	0.1	4.6	4.0		850	130	2	47	41	16	32	<2	164	248
	11/28/98	7:27	SF												<1	<8	9	<2	5	2	<10	
	11/28/98	9:27	ST	12	1310	27	8.1	4.8	<0.05	1.8	0.6		290	80	<1	11	19	<2	10	<2	22	334
	11/29/98	7:27	SF												<1	<8	14	<2	6	<2	<10	
	11/29/98	9:27	ST	27	2110	8	8.3	2.9	<0.05	0.9	0.2		40	20	<1	<8	13	<2	6	<2	14	605
	12/1/98	13:27	SF												<1	<8	12	<2	5	<2	<10	
	12/1/98	15:27	ST	9	705	152	8.0	2.7	<0.05	1.8	1.9		300	240	<1	30	29	6	20	<2	64	185
	12/2/98	7:27	SF												<1	<8	10	<2	<4	<2	<10	
	1/25/99	9:31	ST	5	650	116	8.0	4.6	0.1	1.6	1.9		300	100	<1	21	32	6	17	<2	67	168
	1/25/99	10:31	SF												<1	<8	12	<2	5	<2	18	
	1/25/99	12:31	ST	11	1070	30	8.1	4.4	<0.05	1.0	0.7		62	18	<1	<8	14	<2	5	<2	16	300
	1/26/99	8:31	SF												<1	<8	10	<2	5	<2	<10	
	1/26/99	10:31	ST	14	645	350	8.0	3.1	0.1	1.8	2.8		670	90	<1	51	35	13	33	<2	120	115
	1/27/99	12:31	SF												<1	<8	63	9	<4	<2	82	
	1/27/99	14:31	ST	22	1860	750	8.2	4.1	0.1	0.9	4.3		430	100	<1	51	29	14	31	<2	106	552
	1/29/99	8:31	SF												<1	<8	9	<2	<4	<2	<10	
	4/6/99	13:09	ST	5	1470	436	8.0	3.9	0.3	3.1	2.5		580	120	<1	41	43	11	29	<2	118	250
	4/6/99	14:09	SF												<1	<8	17	<2	<4	<2	<10	
	4/6/99	16:09	ST	14	985	154	8.2	1.5	0.1	0.8	0.9		200	30	<1	17	25	4	12	<2	46	250
	4/7/99	18:09	SF												<1	<8	14	<2	<4	<2	<10	
	4/7/99	20:09	ST	13	1710	25	8.4	1.0	<0.05	0.6	0.3		56	18	<1	<8	12	<2	<4	<2	13	450
	4/8/99	20:09	SF												<1	<8	11	<2	<4	<2	<10	
	4/8/99	22:09	ST	3	1630	107	8.4	1.3	0.1	0.7	0.6		140	20	<1	14	23	3	9	<2	33	448
	4/9/99	2:09																				
	4/9/99	4:09	ST	17	1850	8	8.4	1.1	<0.05	0.4	0.2		18	6	<1	<8	11	<2	5	<2	<10	522
	4/10/99	12:09	SF												<1	<8	10	<2	4	<2	<10	

UPPER NEWPORT BAY WATERSHED - STORM AND DRY WEATHER MONITORING

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
SADF01	10/4/94	12:07	ST	1	1400	120.0	6.8	15.0	7.70	30.00	3.70		140	14	26	21	310	54	130	0.5	2200	400
	10/4/94	14:07	ST	10	2000	21.0	7.5	14.0	0.69	6.30	0.70		45	<5	2.8	<10	46	16	<40	0.67	290	555
	10/5/94	8:07																				
	10/5/94	10:07	ST	12	1700	52.0	7.6	9.2	0.89	6.50	0.99		110	19	1.4	<10	38	16	<40	3.8	190	450
	10/6/94	8:07																				
	10/6/94	12:39	ST	24	1700	28.0	7.7	4.5	0.37	0.51	1.10		91	31	1	<10	27	8.5	<40	9.8	120	440
	10/8/94	10:39																				
	10/26/94	8:15	DT		3000	7.6	7.8	18.0	0.22	1.10	0.20		41	<5	<1	<10	4.4	2.6	<40	<0.3	14	
	11/8/94	4:35	ST	3	1100	120.0	7.1	13.0	2.20	7.00	2.10		240	48	3.9	12	410	51	<40	0.53	67	275
	11/8/94	8:35																				
	11/8/94	10:35	ST	3	1400	64.0	7.2	15.0	0.86	4.70	1.10		87	18	<1	<10	120	13	<40	<0.3	190	365
	11/8/94	14:35																				
	11/8/94	16:35	ST	14	2300	34.0	7.6	13.0	0.70	3.60	0.70		30	11	<1	<10	45	5.7	<40	<0.3	120	650
	11/10/94	2:35																				
	11/10/94	4:35	ST	3	550	600.0	6.3	4.7	0.80	7.50	7.10		1300	95	5.2	51	240	160	<40	0.45	720	160
	11/10/94	8:35																				
	11/10/94	10:35	ST	5	360	360.0	6.2	8.2	0.55	4.60	4.40		840	50	2.2	36	100	83	<40	<0.3	360	80
	11/10/94	18:35																				
	11/10/94	20:35	ST	15	640	72.0	6.2	10.0	0.44	2.60	1.40		160	16	<1	<10	26	15	<40	<0.3	92	135
	11/12/94	0:35																				
	12/5/94	2:00	ST	3	1400	12.0	7.4	11.0	0.97	5.10	2.20		240	48	1.4	<10	56	21	<40	0.52	230	402
	12/5/94	6:00																				
	3/21/95	6:37	ST	3	680	144.0	7.6	6.8	0.10	2.40	1.90		260	45	<1	<10	30	19	<40	1.2	95	172
	3/21/95	12:37																				
	3/21/95	14:37	ST	16	1600	12.0	8.2	9.7	0.10	0.96	0.78		35	11	<1	<10	15	4.9	<40	<1	<10	440
	3/23/95	6:37																				
	3/23/95	8:37	ST	8	580	33.0	8.0	3.8	0.10	1.20	1.40		160	32	<1	<10	32	9.8	<40	1.8	80	150
	3/23/95	22:37																				
	3/24/95	0:37	ST	15	1900	13.0	8.0	12.0	0.10	0.82	0.58		17	6	<1	<10	16	2.5	<40	1	<10	542
	3/25/95	4:37																				
	5/16/95	12:15	DT	24	2300	190.0	8.0	4.4	0.35	1.30	1.40		240	30	<1	<10	33	17	<40	<1	31	720
	5/17/95	11:15																				
	7/25/95	9:00	DT	24	2300	30.0	8.4	6.6	0.23	0.99	0.38		160	34								
	7/26/95	8:00																				
	10/24/95	9:47	DT	24	2800	53.0	8.4	16.0	0.10	1.80	0.99		86	23	<1	71	270	29	<40	<1	370	
	10/25/95	8:47																				
	12/12/95	22:14	ST	5	680	550.0	7.1	24.0	2.30	13.00	7.60		1100	120	6	55	220	340	64	<1	910	156
	12/12/95	23:14																				
	12/13/95	1:14	ST	7	380	290.0	7.2	10.0	1.10	9.40	4.30		580	61	2	27	120	110	<40	<1	500	138
	12/13/95	13:14																				
	1/21/96	15:07	ST	3											6	18	110	92	96	<1	390	78
	1/21/96	15:37																				
	1/31/96	2:36	ST	5	420	190.0	7.6	5.4	0.73	2.70	1.40		200	38	1	18	66	45	24	<1	250	112
	1/31/96	3:36																				
	1/31/96	5:36	ST	5	220	160.0	7.5	3.0	0.13	2.40	1.90		240	46	1	<10	55	49	16	<1	250	105
	1/31/96	13:36																				

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STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
SADF01	2/1/96	11:09	ST	24	1400	34.0	8.0	11.0	0.22	1.60	0.67		29	10	<1	<10	30	12	5	5	93	478
	2/3/96	9:09																				
	2/19/96	23:08	ST	5	2200	310.0	7.6	16.0	0.53	7.40	2.40		460	56	2	15	60	28	13	1	220	880
	2/20/96	0:08																				
	2/20/96	2:08	ST	17	370	180.0	7.5	6.8	0.38	2.50	4.70		380	60	8	31	88	<2	<2	<1	510	110
	2/22/96	6:08																				
	2/22/96	8:08	ST	20	2000	80.0	8.3	28.0	0.29	1.60	0.70		87	15	<1	30	23	6	8	1	27	680
	2/23/96	22:08																				
	3/4/96	12:10	ST	5	1000	110.0	7.5	11.0	1.00	3.70	1.00		110	29	1	<10	44	19	10	<1	210	304
	3/4/96	13:10																				
	3/4/96	15:10	ST	10	350	150.0	7.6	3.4	0.48	1.90	1.30		200	33	<1	11	32	34	10	<1	190	104
	3/5/96	11:10																				
	3/5/96	13:10	ST	36	1400	3.0	8.4	9.6	0.28	0.50	0.24		7	<6	<1	<5	15	<2	<4	<1	50	608
	3/8/96	11:10																				
	4/23/96	9:15	DT	24	2500	14.0	8.2	22.0	0.47	2.10	0.38		49	16	<1	<10	49	<2	3	<1	34	1010
	4/24/96	8:15																				
	7/24/96	8:21	DT	24	2200	73.0	8.1	4.7	<0.1	1.80	0.65		100	24	<1	<10	27	6	10	<1	54	820
	7/25/96	7:21																				
	10/30/96	7:40	ST	5	770	1200.0	7.0	18.0	2.00	15.00	9.20		2100	260	5	83	130	190	73	1	1300	270
	10/30/96	8:40	SF												<1	<10	11	<2	19	<1	130	
	10/30/96	10:40	ST	5	280	350.0	7.1	7.8	0.88	4.50	3.30		580	78	2	23	49	58	26	<1	440	90
	10/30/96	18:40																				
	10/30/96	20:40	ST	43	1500	30.0	8.1	13.0	0.35	1.90	0.60		37	10	<1	<10	18	4	5	<1	76	556
	11/3/96	8:40																				
	11/5/96	9:20	DT	1	2400	3.4	8.0	14.0	0.50	0.88	0.50		9	<6								
	11/21/96	8:35	ST	5	530	360.0	7.3	8.8	1.10	6.80	3.80		670	78	<1	30	97	11	20	<1	360	194
	11/21/96	9:35																				
	11/21/96	11:35	ST	9	230	170.0	7.5	6.4	0.45	3.00	2.20		350	46	<1	20	57	46	15	<1	270	84
	11/22/96	3:35																				
	11/22/96	5:35	ST	34	1600	12.0	8.2	16.0	0.28	1.00	0.54		16	8	<1	<10	21	3	5	<1	110	594
	11/25/96	8:07																				
	12/9/96	16:30	ST	5	130	300.0	7.5	2.1	0.11	1.90	1.90		210	24	<1	19	48	54	13	<1	280	50
	12/9/96	17:30																				
	12/9/96	19:30	ST	7	390	100.0	7.5	6.0	<0.1	1.20	0.77		95	16	<1	<10	25	22	5	<1	97	156
	12/10/96	7:30																				
	12/10/96	9:30	ST	7	1100	14.0	8.1	13.0	<0.1	1.60	0.67		14	8	<1	<10	20	3	<4	<1	42	394
	12/10/96	21:30																				
	12/10/96	23:30	ST	15	320	92.0	7.7	5.1	<0.1	1.90	0.98		120	18	<1	<10	24	18	6	<1	91	92
	12/12/96	3:30																				
	12/12/96	5:30	ST	17	1600	8.8	8.1	13.0	0.40	1.70	0.38		9	6	<1	<10	17	6	<4	<1	83	700
	12/13/96	13:30																				
	1/1/97	11:00	ST	5	740	98.0	7.5	5.8	0.50	1.60	0.69		140	45	1	<10	45	38	18	<1	240	224
	1/1/97	12:00																				
	1/1/97	14:00	ST	9	840	60.0	7.6	6.2	0.28	1.20	0.65		51	15	<1	<10	23	10	8	<1	89	256
	1/2/97	6:00																				
	1/29/97	8:35	DT	1	3100	4.4	7.9	26.0	0.23	0.73	0.20		<6	<6	<1	<10	22	<2	4	<1	57	1200
	4/15/97	8:30	DT	24	2000	<0.5	5.6	33.0	0.68	3.30	3.50		<6	<6	24	95	23	21	110	22	110	940
	4/16/97	7:30																				
	7/8/97	8:30	DT	1	2100	1.9	8.0	15	0.1	0.8	0.2		14	6	<1	<10	6	2	<4	<1	31	
	9/25/97	11:33	ST	5	500	1500	7.3	3	1.1	18.0	9.4	<0.5	2100	330	<1	54	310	260	67	<1	1400	160

UPPER NEWPORT BAY WATERSHED - STORM AND DRY WEATHER MONITORING

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
SADF01	9/25/97	12:33	SF												2	<10	56	45	23	<1	260	
	9/25/97	14:33	ST	11	840	200	7.3	8	0.3	4.0	2.0	<0.5	270	51	4	<10	65	52	23	<1	300	270
	9/26/97	10:33	SF												1	<10	40	20	14	<1	170	
	9/26/97	12:33	ST	23	2000	5.2	8.2	10	0.2	1.5	0.6	<0.5	15	12	<1	<10	24	<2	5	<1	50	624
	9/28/97	8:33	SF												<1	<10	20	<2	<4	<1	65	
	9/28/97	10:33	ST	13	2100	2.1	7.9	9	<0.1	1.2	0.5	<0.5	7	<6	<1	<10	20	<2	4.0	<1	13	704
	9/29/97	10:33	SF												<1	<10	18	<2	<4	<1	48	
	10/29/97	8:40	DT	1	2600	12	7.8	16	<0.1	1.6	0.5		28	<6	<1	<10	12	3	5	<1	66	
	11/10/97	8:17	SF	5				45				<0.5			2	<10	74	19	27	<1	440	610
	11/10/97	9:17																				
	11/10/97	11:17	SF	5				20				<0.5			<1	<10	52	23	19	<1	290	440
	11/10/97	19:17																				
	11/10/97	21:17	ST	29	1600	35	7.6	19	<0.1	3.2	1.1	<0.5	34	15	<1	<10	33	9	11	<1	130	460
	11/13/97	3:17	SF												<1	<10	28	5	9	<1	100	
	11/13/97	5:17	ST	14	450	130	7.4	7	0.5	3.4	1.6	<0.5	180	46	<1	13	54	33	11	<1	280	142
	11/14/97	7:17	SF												<1	<10	25	19	8	<1	130	
	11/19/97	8:46	DT	12	2600	5.1	8.1	24	0.4	1.2	0.4	<0.5	18	<6	<1	<10	26	<2	<4	<1	76	1064
	11/19/97	19:46	SF												20	<10	21	<2	5	<1	98	
	11/26/97	9:39	ST	5	270	730	8.5	6	1.1	7.3	4.8		1100	910	3	53	180	230	38	<1		70
	11/26/97	10:39	SF												<1	<10	11	<2	<4	<1	37	
	11/26/97	12:39	ST	16	500	90	7.4	7	0.20	3.1	1.3	<0.5	110	70	<1	<10	42	31	8	<1	180	134
	11/26/97	18:39	SF												<1	<10	18	<2	<4	<1	50	
	11/27/97	20:39	ST	30	2300	7	8.1	25	<0.1	0.88	0.3	<0.5	17	12	<1	<10	20	2	<4	<1	65	776
	11/30/97	5:00	SF												<1	<10	16	<2	<4	<1	62	
	12/6/97	4:06	ST	5	110	250	8.1	2	0.3	2.4	2	<0.5	410	360	<1	12	42	43	15	<1	240	35
	12/6/97	5:06	SF												<1	<10	13	9.0	<4	<1	70	
	12/6/97	7:06	ST	5	160	170	7.7	3	0.2	2.0	2	<0.5	250	200	<1	<10	43	34	9	<1	190	50
	12/6/97	15:06	SF												<1	<10	22	11	<4	<1	91	
	12/6/97	17:06	ST	8	370	84	7.7	5	0.2	1.8	1	<0.5	120	110	<1	<10	38	24	7	<1	140	96
	12/7/97	7:08	SF												<1	<10	17	<2	<4	<1	65	
	12/7/97	9:08	ST	34	1500	22	7.9	19	0.3	1.4	0.5	<0.5	27	13	<1	<10	19	5	4	<1	56	504
	12/10/97	3:06	SF												<1	<10	13	<2	<4	<1	32	
	1/3/98	3:18	ST	5				11	1.3	4.7	1.0		57		<1	<10	75	18	10	<1	180	256
	1/3/98	4:18	SF												<1	<10	53	6	8	<1	110	
	1/3/98	6:18	ST	14	970	34	7.2	9	<0.5	2.8	0.8	<0.5	28	18	<1	<10	37	6	6	<1	84	288
	1/4/98	8:18	SF												<1	<10	29	<2	5	<1	46	
	1/4/98	10:18	ST	34	1800	15	7.9	14	0.2	1.3	0.40	<0.5	21	9	<1	<10	25	4	<4	<1	34	594
	1/7/98	4:18	SF												<1	<10	22	<2	<4	<1	97	
	1/9/98	5:19	ST	5				18	<0.5	0.85	<0.2				<10	<10	25	<2	13	<1	83	870
	1/9/98	6:19	SF												<10	<10	23	<2	8.0	<1	140	
	1/9/98	7:33	ST	13	570	100	7.6	4	<0.5	1.8	1	<0.5	170	36	<1	<10	40	29	8	<1	<10	164
	1/10/98	12:09	SF												<1	<10	20	8	13	<1	<10	
	1/10/98	14:09	ST	33	1900	6.6	8.1	15	<0.5	1.6	0	<0.5	10	8	<1	<10	120	14	29	<1	94	694
	1/13/98	6:09	SF												<1	<10	18	<2	<4	<1	140	
	1/20/98		DT	24	2500	1.9	8.1	17	0.1	1.2	<0.2	<0.5	<6	<6	<1	<10	12	<2	<4	<1	<10	
	1/21/98														<1	<10	14	<2	<4	<1	<10	
	2/14/98	8:58	ST	5	500	85	7.4	8.4	<0.5		8.6		190	33	<1.00	12	38	22	7	<1.00	195	110
	2/14/98	9:58	SF												<1.00	2	18	2	4	<1.00	297	
	2/14/98	11:58	ST	7	210	75	7.6	4.4	<0.5		9.5		140	23	<1.00	8	33	19	9	<1.00	229	70
	2/14/98	23:58	SF												<1.00	2	14	2	2	1.40	15	

UPPER NEWPORT BAY WATERSHED - STORM AND DRY WEATHER MONITORING

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
SADF01	2/19/98	20:07	ST	5	670	75	7.7	11.5	<0.5	3.3	0.9				<1.00	16	37	35	10	<1.00	145	176
	2/19/98	21:07	SF												<1.00	3	15	5.20	3	<1.00	31	
	2/19/98	23:07	ST	5	390	60	7.6	6.2	<0.5	1.5	14.1				<1.00	5	26	14	5	<1.00	57	150
	2/20/98	7:07	SF												<1.00	2	11	<1.00	2	<1.00	19	
	2/20/98	9:07	ST	20	2400	11	8.0	26.6	0.5	1.2	8.9				<1.00	2	19.0	3	5	<1.00	44	850
	2/21/98	23:07	SF												<1.00	2	27	3	6	<1.00	23	
	2/22/98	1:07	ST	7		27	7.8	8.4	<0.5	1.4	9				<1.00	4	23	13	4	<1.00	48	234
	2/22/98	13:07	SF												<1.00	2	15	2	2	<1.00	20	
	2/22/98	15:07	ST	13		18	7.9	13.3	<0.5	1.1	10				<1.00	5	23	7	6	<1.00	49	298
	2/23/98	15:07	SF												<1.00	2	17	1	4	<1.00	20.0	
	2/23/98	17:07	ST	10		64	7.1	4.4	<0.5	2.1	11.9				<1.00	7	26.0	19.0	6	<1.00	71	64
	2/24/98	11:07	SF												<1.00	2.10	12	1	2.00	<1.00	10	
	3/25/98	5:27	ST	8	264	78	7.53	6.2	0.1	<1.0	<0.1		542	21	<1.00	7	42	26	7	<1.00	133	100
	3/25/98	19:13	SF												<1.00	3	17	2	3	<1.00	60	
	3/25/98	21:13	ST	28	2340	6.9	8.26	26.1	<0.1	<1.0	0.9		4	<1	<1.00	2	36	4.00	5	<1.00	47	850
	3/28/98	3:13	SF												<1.00	3	32	2	5	<1.00	50	
	3/28/98	9:13	ST	14	1500	10	8.16	10.2	<0.1	1.3	0.3		3	<1	<1.00	3	57	6	5.70	<1.00	57	512
	3/29/98	11:13	SF												<1.00	2	15	3	9	<1.00	57	
	4/20/98	13:11	DT	20	3050	2.1	8.10	19.9	<0.1	<1.0	<0.1		2	1								
	4/21/98	8:11																				
	11/8/98	2:41	ST	5	835	80	7.0	9.2	1.7	12.2	4.6		500	240	3	16	99	48	21	<2	850	230
	11/8/98	3:41	SF												<1	<8	24	4	13	<2	326	
	11/8/98	5:41	ST	10	755	28	7.5	11.0	0.3	2.2	2.8		140	100	<1	<8	28	13	7	<2	117	245
	11/8/98	23:41	SF												<1	<8	18	4	4	<2	61	
	11/9/98	1:41	ST	37	2060	6	7.9	17.0	0.2	1.3	0.3		14	10	<1	<8	18	3	<4	<2	64	705
	11/12/98	1:41	SF												<1	<8	13	<2	<4	<2	43	
	2/4/99	19:13	ST	5	1810	15	7.9	16.7	0.5	2.3	0.5		29	19	<1	<8	23	6	<4	<2	117	600
	2/4/99	20:13	SF												<1	<8	17	4	<4	<2	90	
	2/4/99	22:13	ST	14	560	24	7.5	6.2	0.3	1.4	0.6		52	44	<1	<8	23	12	6	<2	193	208
	2/6/99	0:13	SF												<1	<8	14	<2	4	<2	222	
	2/6/99	2:13	ST	33	2360	2	8.1	18.9	0.1	1.0	0.3		6	3	<1	<8	16	<2	6	<2	28	668
	2/8/99	18:13	SF												<1	<8	13	<2	7	<2	29	
	2/9/99	17:00	ST	4	1050	28	7.8	10.6	0.3	2.6	0.6		120	40	<1	<8	39	25	8	<2	223	340
	2/9/99	17:45	SF												<1	<8	17	<2	5	<2	81	
	2/9/99	20:00	ST	9	985	24	7.7	11.4	0.1	1.9	0.8		66	42	<1	<8	31	15	8	<2	108	308
	2/10/99	12:00	SF												<1	<8	18	<2	8	<2	53	
	2/10/99	14:00	ST	38	2370	2	8.1	19.4	<0.05	0.9	0.3		<4	<1	<1	<8	21	<2	6	<2	64	872
	2/13/99	16:00	SF												<1	<8	19	<2	7	<2	64	
	3/15/99	8:32	ST	5	780	28	7.5	9.2	0.8	3.5	0.6		130	46	1	10	56	24	7	<2	299	220
	3/15/99	9:32	SF												<1	<8	27	<2	<4	<2	120	
	3/15/99	11:32	S	3	325	92	7.5	5.7	0.5	4.2	1.2		270	110								
	3/15/99	15:32	S																			
	3/15/99	17:32	ST	41	1810	3	8.2	16.4	<0.05	0.9	0.2		05	2	<1	<8	21	<2	<4	<2	33	724
	3/19/99	8:32	SF												<1	<8	17	<2	<4	<2	30	
	3/25/99	12:02	ST	5	595	26	7.3	6.6	0.7	3.8	0.7		120	14	1	<8	59	21	10	<2	375	195
	3/25/99	13:02	SF												<1	<8	25	3	7	<2	163	
	3/25/99	15:02	ST	9	505	23	7.6	6.9	0.1	1.1	0.7		52	18	<1	<8	36	15	4	<2	115	158
	3/26/99	7:02	SF												<1	<8	22	<2	<4	<2	49	
	3/26/99	9:02	ST	38	1800	4	8.3	17.7	0.1	0.6	0.2		11	7	<1	<8	27	2	<4	<2	43	666
	3/29/99	11:02	SF												<1	<8	16	<2	<4	<2	30	

UPPER NEWPORT BAY WATERSHED - STORM AND DRY WEATHER MONITORING

STATION	DATE	TIME	SAMPLES Type	SAMPLES #	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	o-PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg/L
SADF01	4/6/99	13:07	ST	5	1050	62	7.5	11.9	1.1	7.4	0.5		110	50	1	<8	68	14	8	<2	384	372
	4/6/99	14:07																				
	4/6/99	16:07	ST	12	405	98	7.6	4.1	0.2	2.5	1.1		140	46	1	8	46	26	7	<2	185	168
	4/7/99	20:07	SF												<1	<8	20	<2	<4	<2	54	
	4/7/99	22:07	ST	12	1430	13	8.3	13.8	<0.05	0.8	0.3		16	10	<1	<8	21	3	<4	<2	41	480
	4/8/99	20:07	SF												<1	<8	18	<2	<4	<2	30	
	4/8/99	22:07	ST	3	900	38	8.0	7.1	0.4	2.1	0.6		44	24								300
	4/9/99	2:07																				
	4/9/99	4:04	ST	17	1850	4	8.1	15.0	<0.05	1.1	0.5		6	4	<1	<8	17	<2	4	<2	35	730
	4/10/99	13:44	SF												<1	<8	19	<2	5	<2	31	

Appendix 4.3:
Watershed Maps for Channels Monitored with Automatic Samplers

AGUA CHINON WASH

Location :	At Irvine Center Dr. and Pacifica Lat. 33-39-09 Long. 117-44-56
Channel :	F18
Storet Code :	ACWF18
Watershed Area :	approx. 7.2 sq.mi. (18.7 sq.km.)
Cities in Watershed :	Irvine, Lake Forest
Raingage :	Lambert Reservoir Alert #217

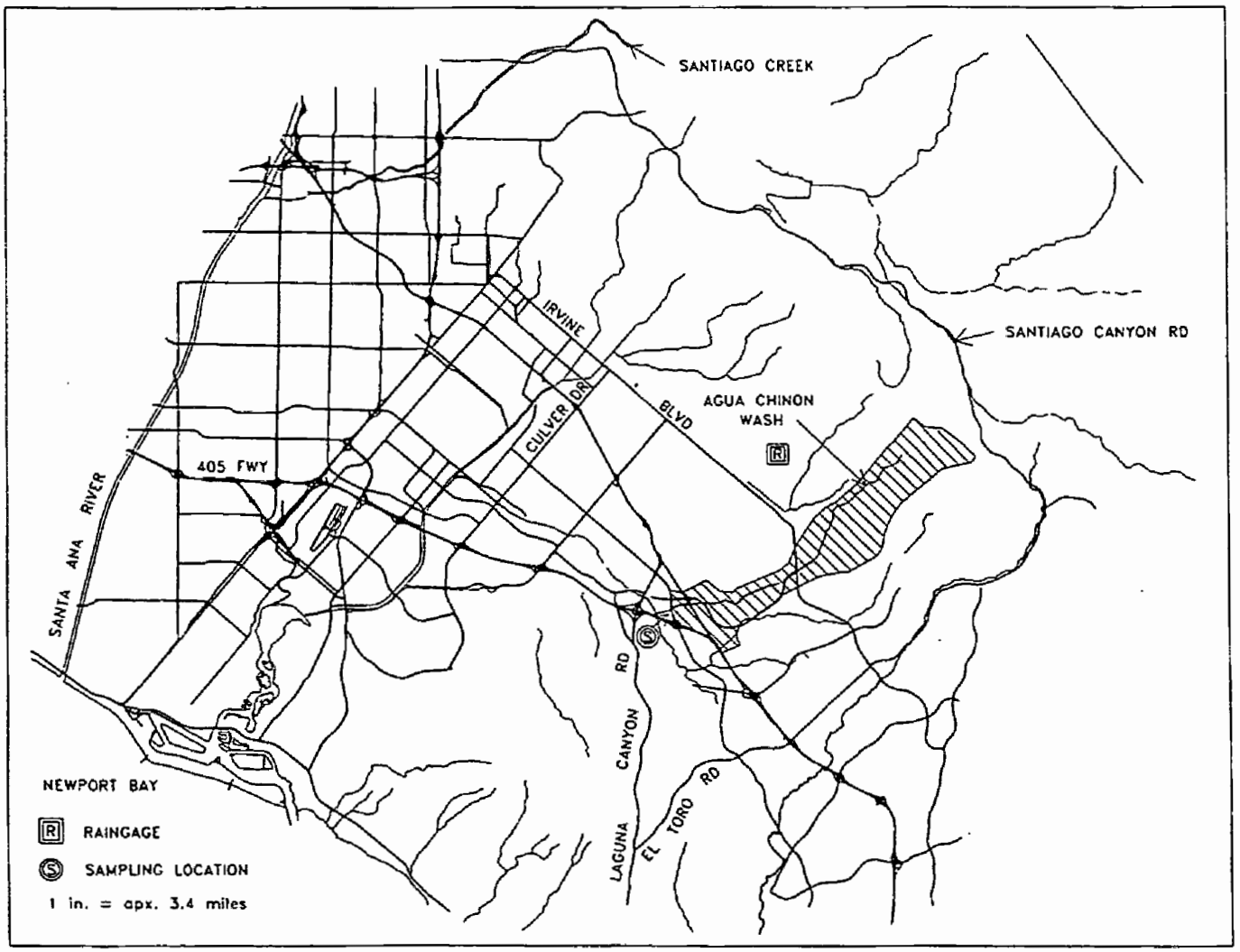

ALISO CREEK

Location :	At Pacific Coast Highway Lat. 33-31-10 Long 117-45-07
Channel :	JO1
Storet Code :	ABJ01
Watershed Area :	29.7 sq.mi. (76.9 sq.km.)
Cities in Watershed :	El Toro, Laguna Beach,Laguna Hills, Laguna Niguel, Lake Forest Mission Viejo
Raingage :	El Toro Alert #207, El Toro #176

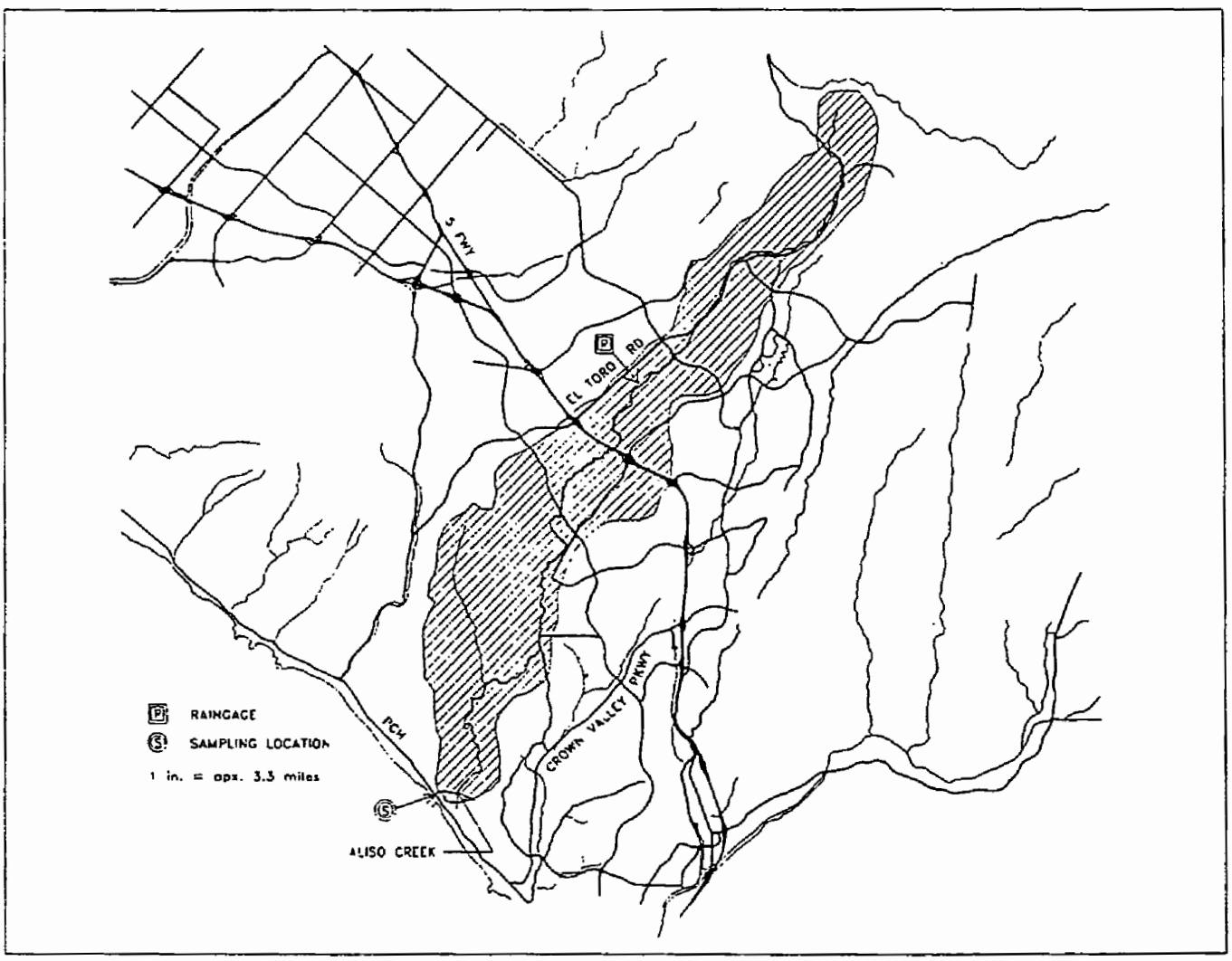

ANAHEIM BARBER CITY CHANNEL

Location :	Downstream U.S. Gov. Railroad Bridge at Rancho Road Lat. 33-45-16 Long. 118-02-04
Channel :	CO3
Storet Code :	ABCC03
Watershed Area :	14.9 sq. mi. (38.6 sq. km.)
Cities in Watershed :	Anaheim, Garden Grove, Huntington Beach, Stanton, Westminster
Raingage :	Garden Grove Alert #1175, Garden Grove Fire Station #229
Gaging Station :	#232
Equipment :	Stevens A-71 Water-Stage Recorder with Nitrogen Bubbler and Mercury Manometer Alert Water Level Sensor and Rain Gage

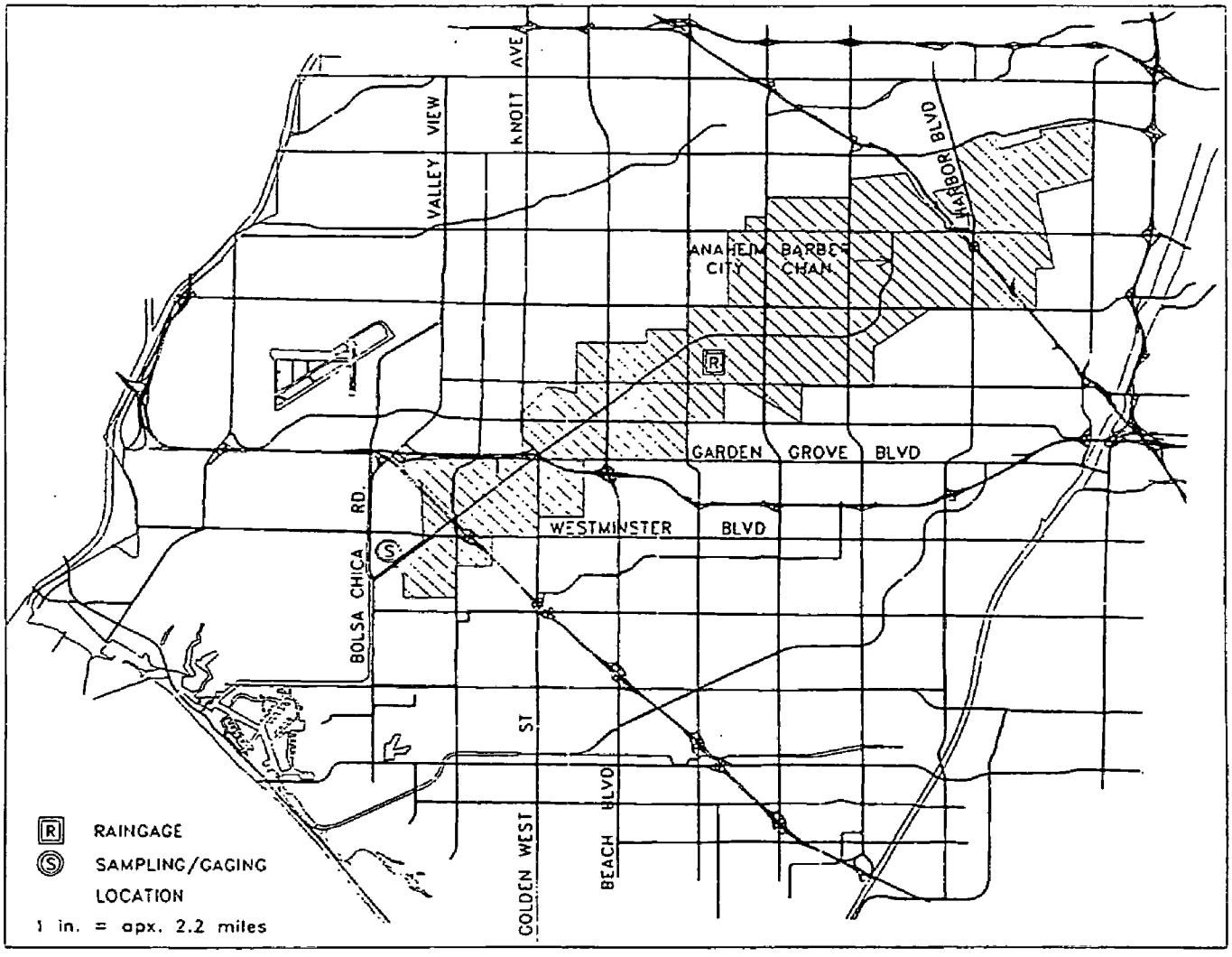

BARRANCA CHANNEL

Location :	At Main St. Lat. 33-40-45 Long. 117-50-07
Channel :	FO9
Storet Code :	BC2FO9
Watershed Area :	approx. 2.7 sq.mi. (7.0 sq.km.)
Cities in Watershed :	Irvine, Santa Ana, Tustin
Raingage :	Santa Ana Engineering Alert #219, Santa Ana #121

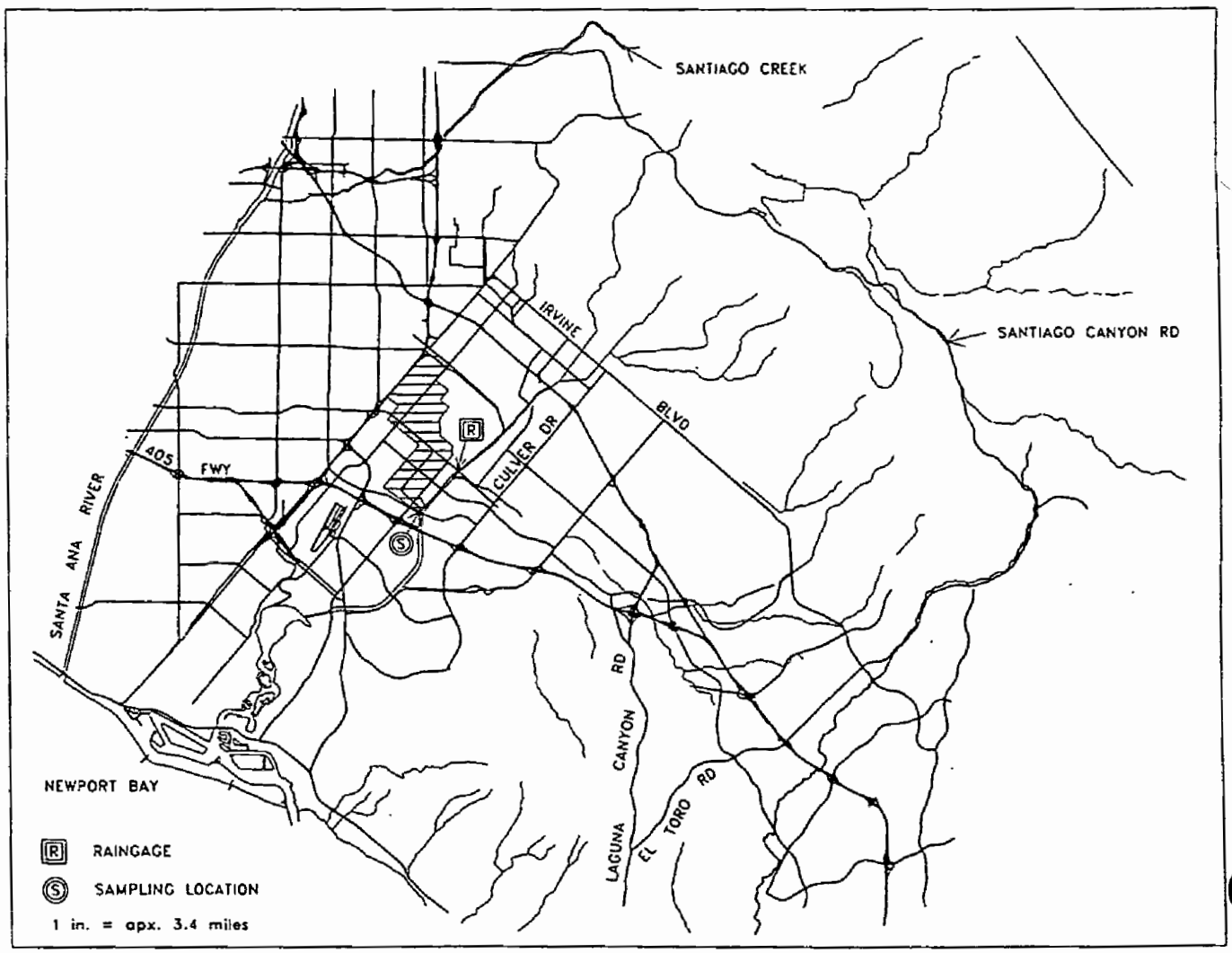

BEE CANYON CHANNEL

Location :	At Alton and Pacifica Lat. 33-39-22 Long. 117-45-22
Channel :	F17
Storet Code :	BEEF17
Watershed Area :	11.2 sq.mi. (29.1 sq.km.)
Cities in Watershed :	Irvine
Raingage :	Lambert Reservoir Alert #217

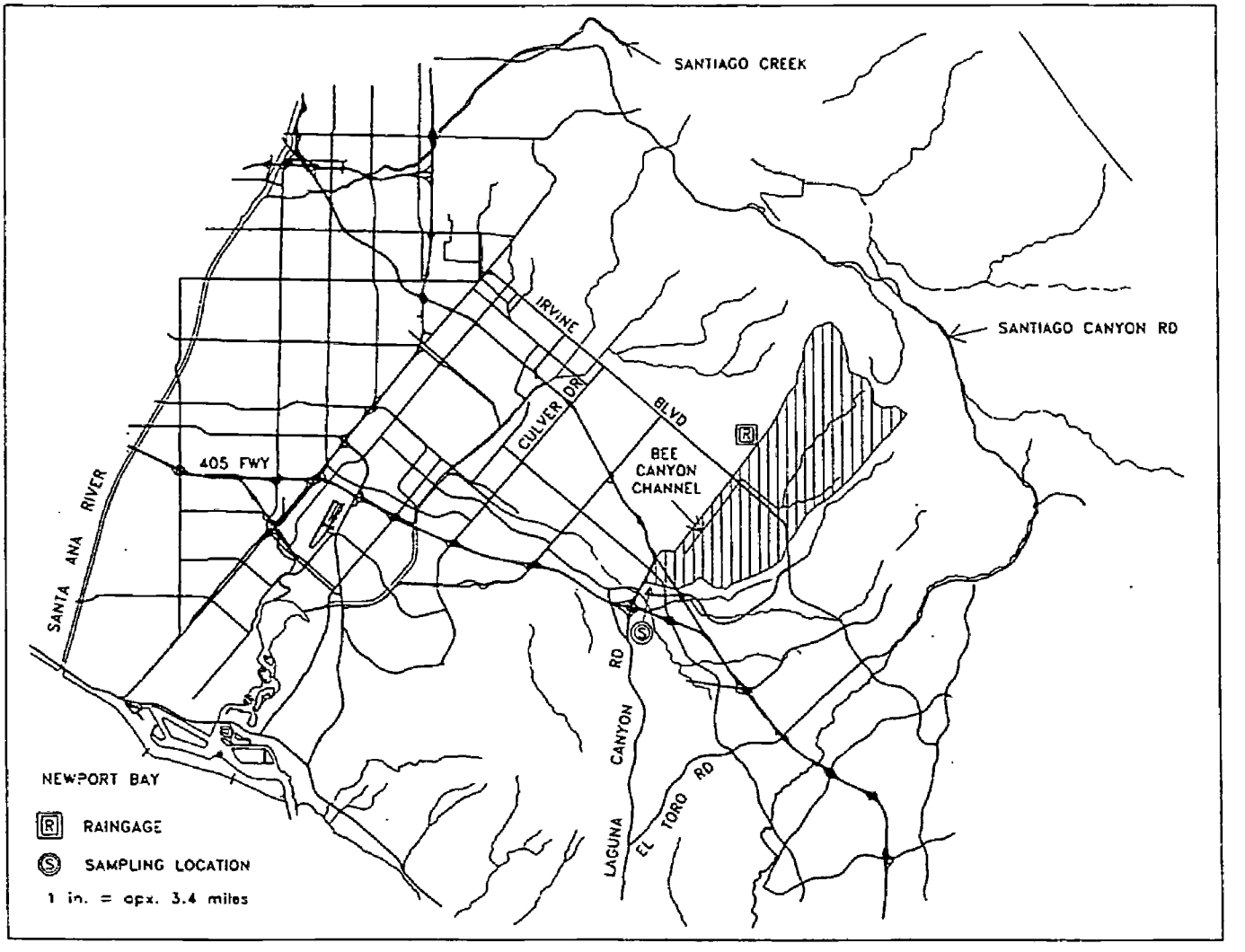

BOLSA CHICA CHANNEL

Location :	At Bolsa Chica Road and Westminster Ave. Lat. 33-45-33 Long. 118-02-30
Channel :	CO2
Storet Code :	BCC02
Watershed Area :	10.0 sq. mi. (26.0 sq. km.)
Cities in Watershed :	Anaheim, Buena Park, Cypress, Garden Grove, Los Alamitos, Seal Beach, Stanton, Westminster
Raingage :	Garden Grove Alert #1175, Garden Grove Fire Station #229
Gaging Station :	#225
Equipment :	Stevens A-71 Water-Stage Recorder with Float Alert Water Level Sensor

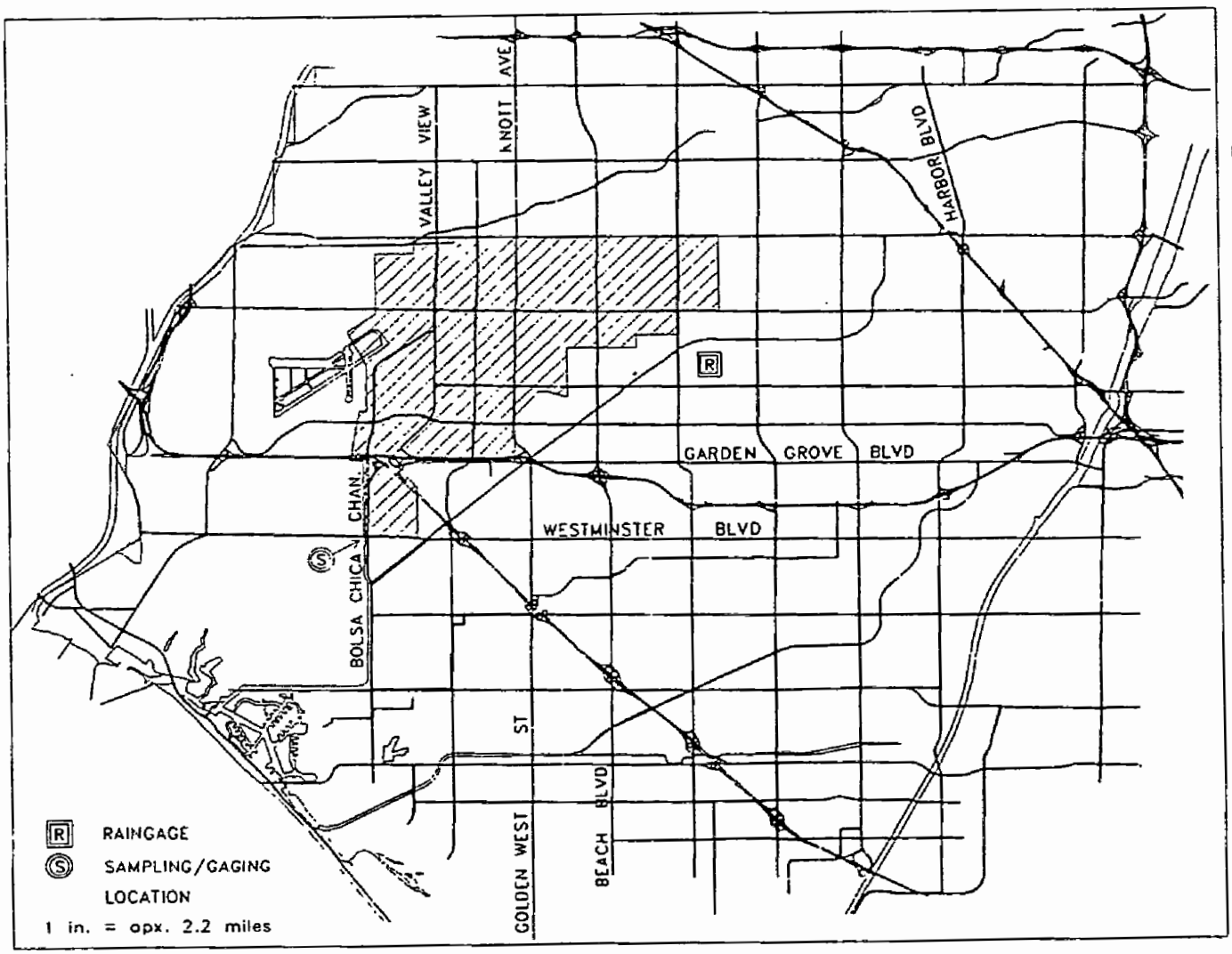

BONITA CANYON CHANNEL

Location :	At San Diego Creek Confluence Lat. 33-39-05 Long. 117-51-38
Channel :	FO4
Storet Code :	BCFO4
Watershed Area :	approx. 5.0 sq.mi. (13.0 sq.km.)
Cities in Watershed :	Irvine, Newport Beach
Raingage :	San Diego Creek Alert #1125

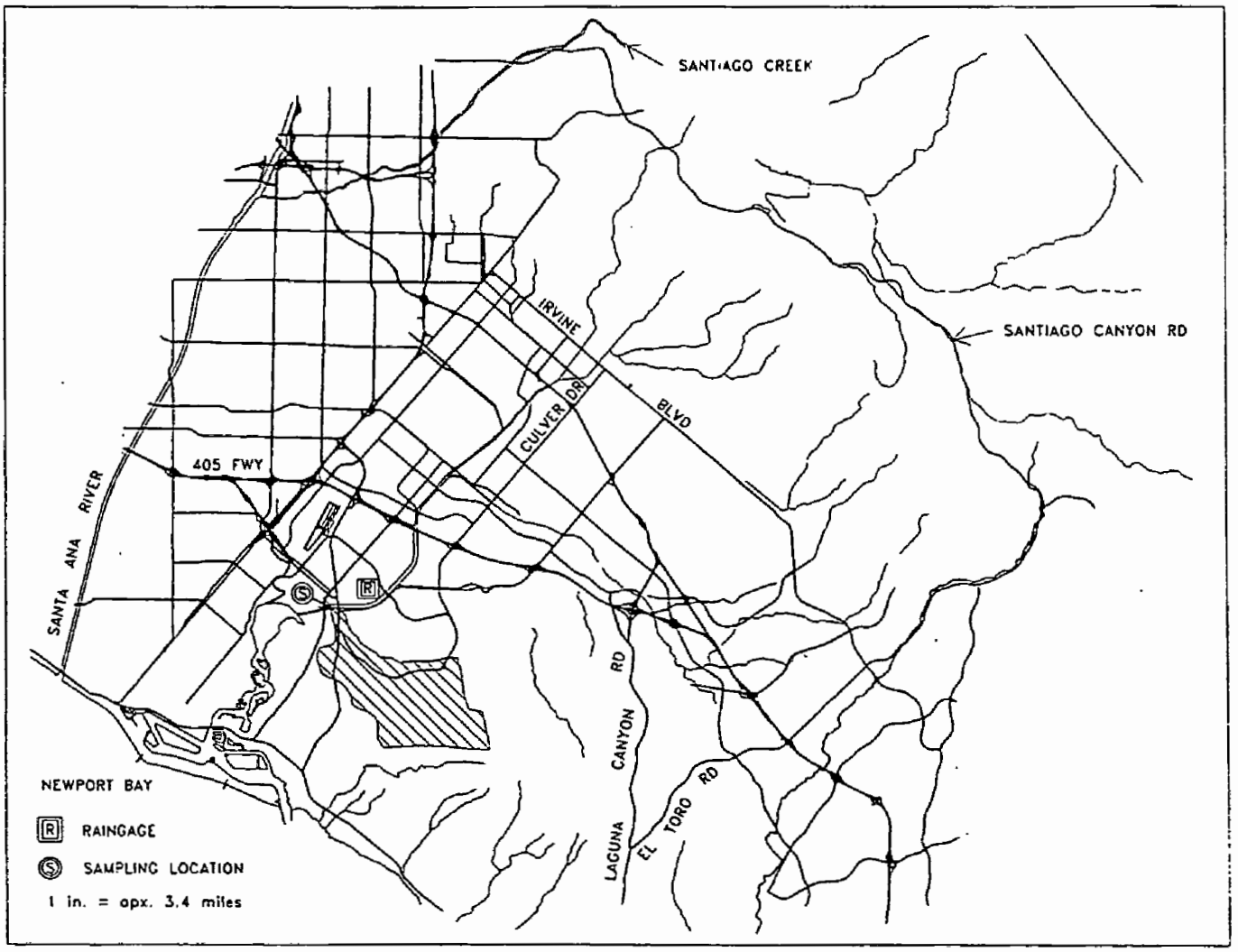

COSTA MESA CHANNEL

Location :	At Westcliff Drive Lat. 33-37-23 Long. 117-53-57
Channel :	GO2
Storet Code :	CMCGO2
Watershed Area :	approx. 1.0 sq.mi. (2.6 sq.km.)
Cities in Watershed :	Costa Mesa, Newport Beach
Raingage :	Santa Ana Delhi Alert #1111, Newport Harbor Master #88

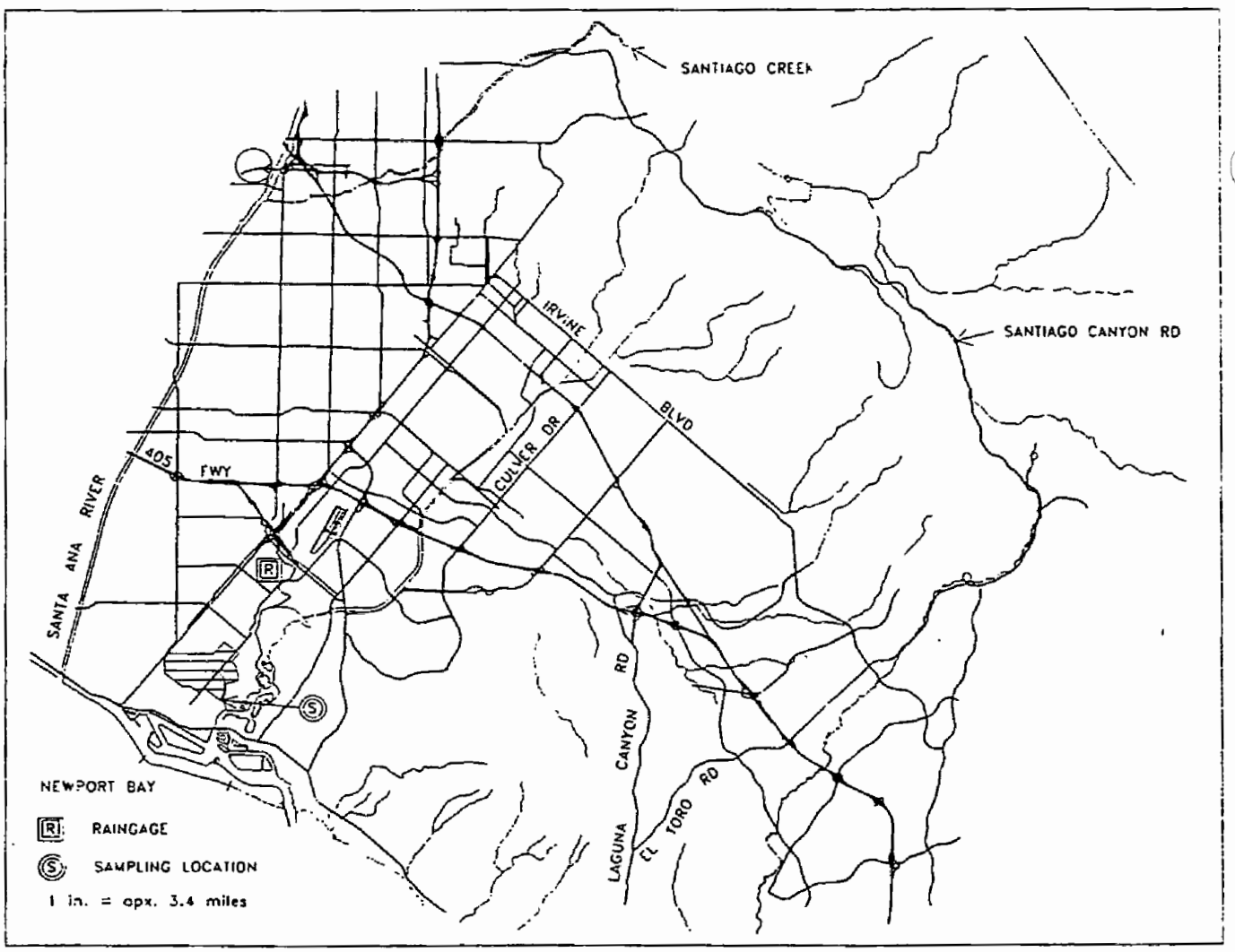

EAST GARDEN GROVE WINTERSBURG

Location :	At Gothard St. Lat. 33-42-58 Long. 117-59-57
Channel :	CO5
Storet Code :	EGWC05
Watershed Area :	20.8 sq. mi. (53.8 sq. km.)
Cities in Watershed :	Anaheim, Fountain Valley, Garden Grove, Huntington Beach, Orange Santa Ana, Westminster
Raingage :	Katella Yard Alert #223
Gaging Station :	#217
Equipment :	Stevens A-71 Water-Stage Recorder with Float Alert Water Level Sensor and Rain Gage

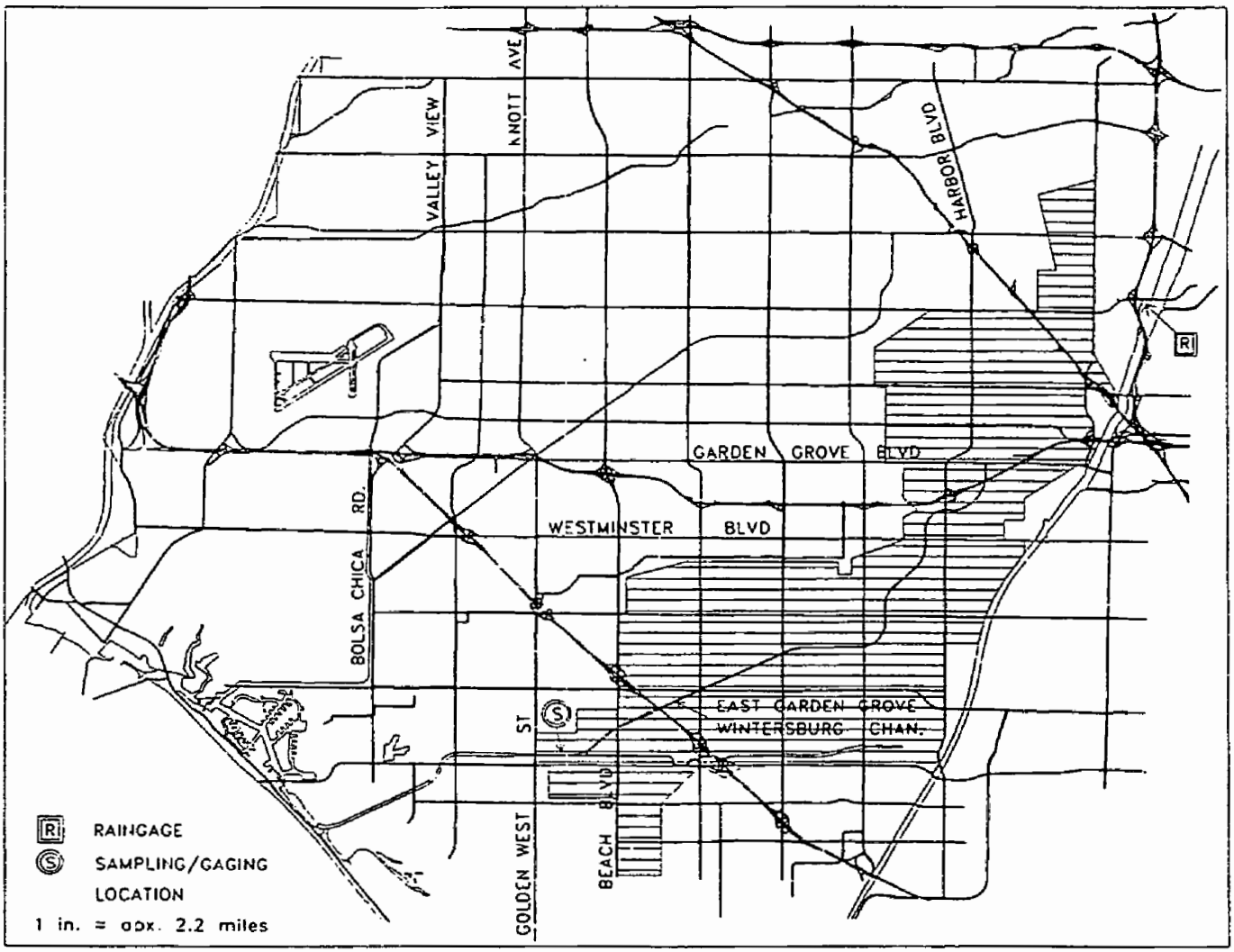

HICKS CANYON WASH

Location :	At Culver Blvd. Lat. 33-43-27 Long. 117-46-01
Channel :	F27
Storet Code :	HCWF27
Watershed Area :	approx. 7.5 sq.mi. (19.4 sq.km.)
Cities in Watershed :	Irvine
Raingage :	Lambert Reservoir Alert #217

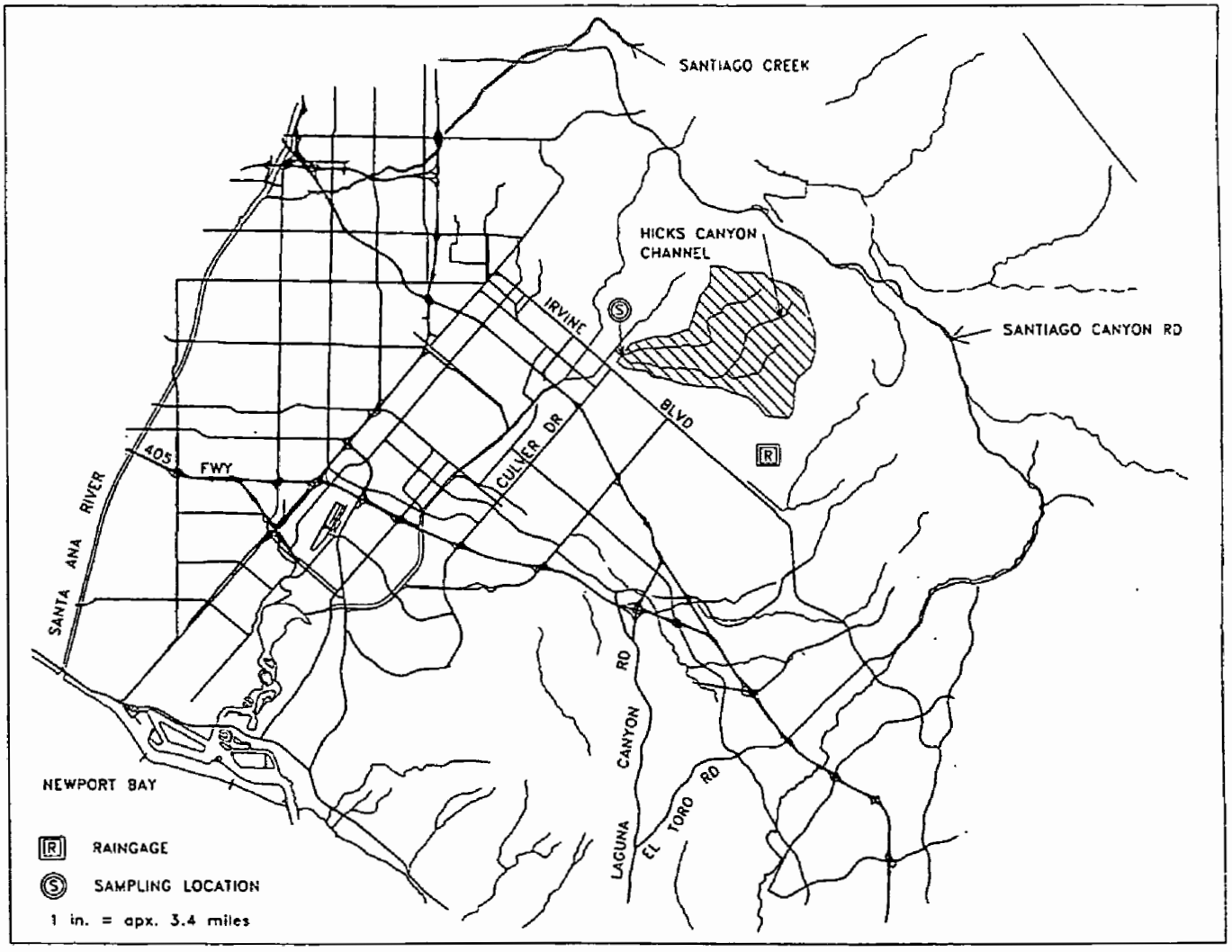

LAGUNA CANYON CHANNEL

Location :	At Woodland Ave. Lat. 33-33-18 Long 117-46-33
Channel :	IO2
Storet Code :	LCWI02
Watershed Area :	8.3 sq.mi. (21.4 sq.km.)
Cities in Watershed :	Laguna Beach
Raingage :	Laguna Canyon Alert #1120
Gaging Staion :	#222
Equipment :	Stevens A-71 Water-Stage Recorder with Float Alert Rain Gage and Water Level Sensor

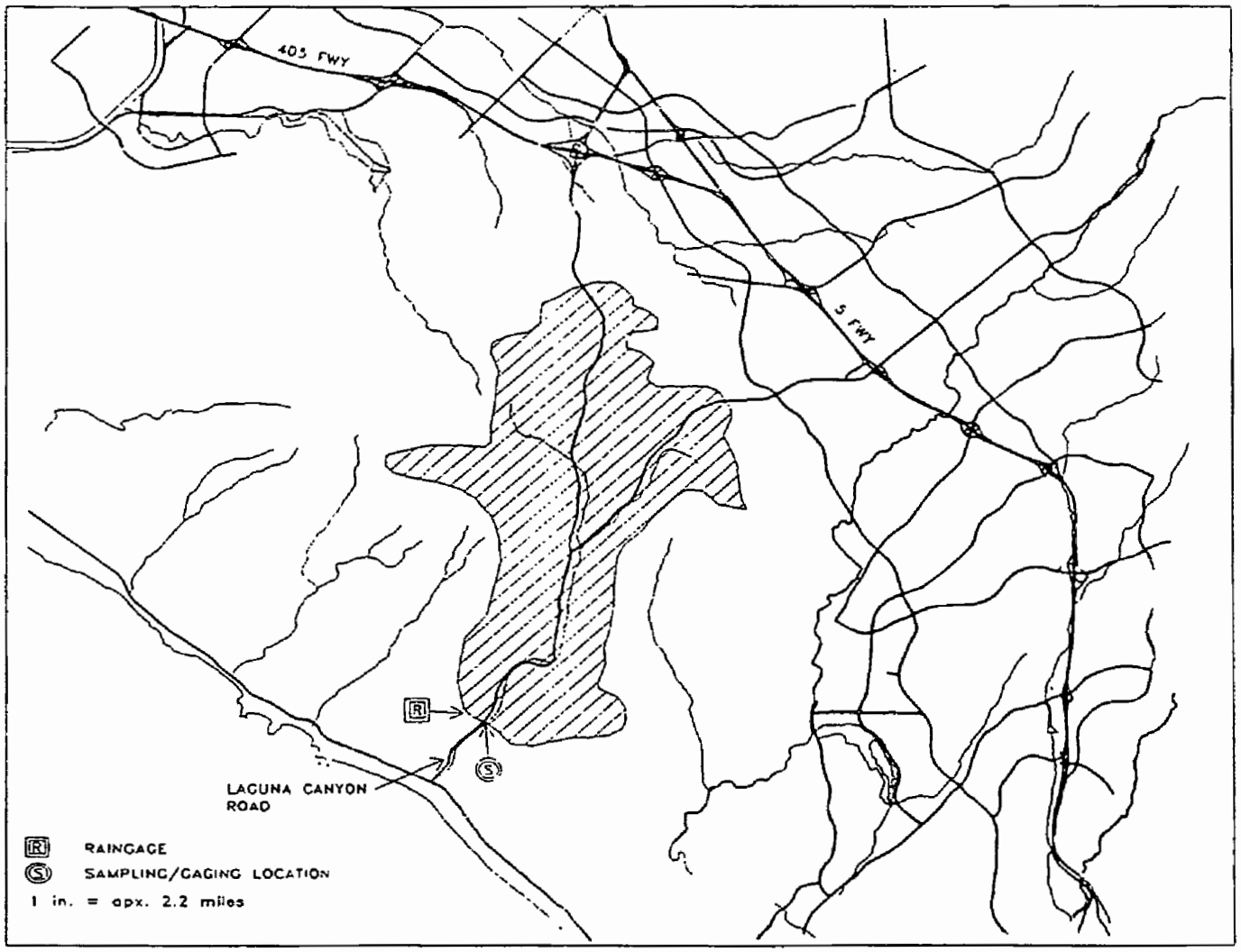

LANE CHANNEL

Location :	At McCabe Way, upstream FO8/FO5 confluence Lat. 33-40-41 Long. 117-50-34
Channel :	FO8
Storet Code :	LANFO8
Watershed Area :	approx. 4.6 sq.mi. (11.9 sq.km.)
Cities in Watershed :	Irvine, Santa Ana
Raingage :	Santa Ana Engineering Alert #219, Santa Ana #121

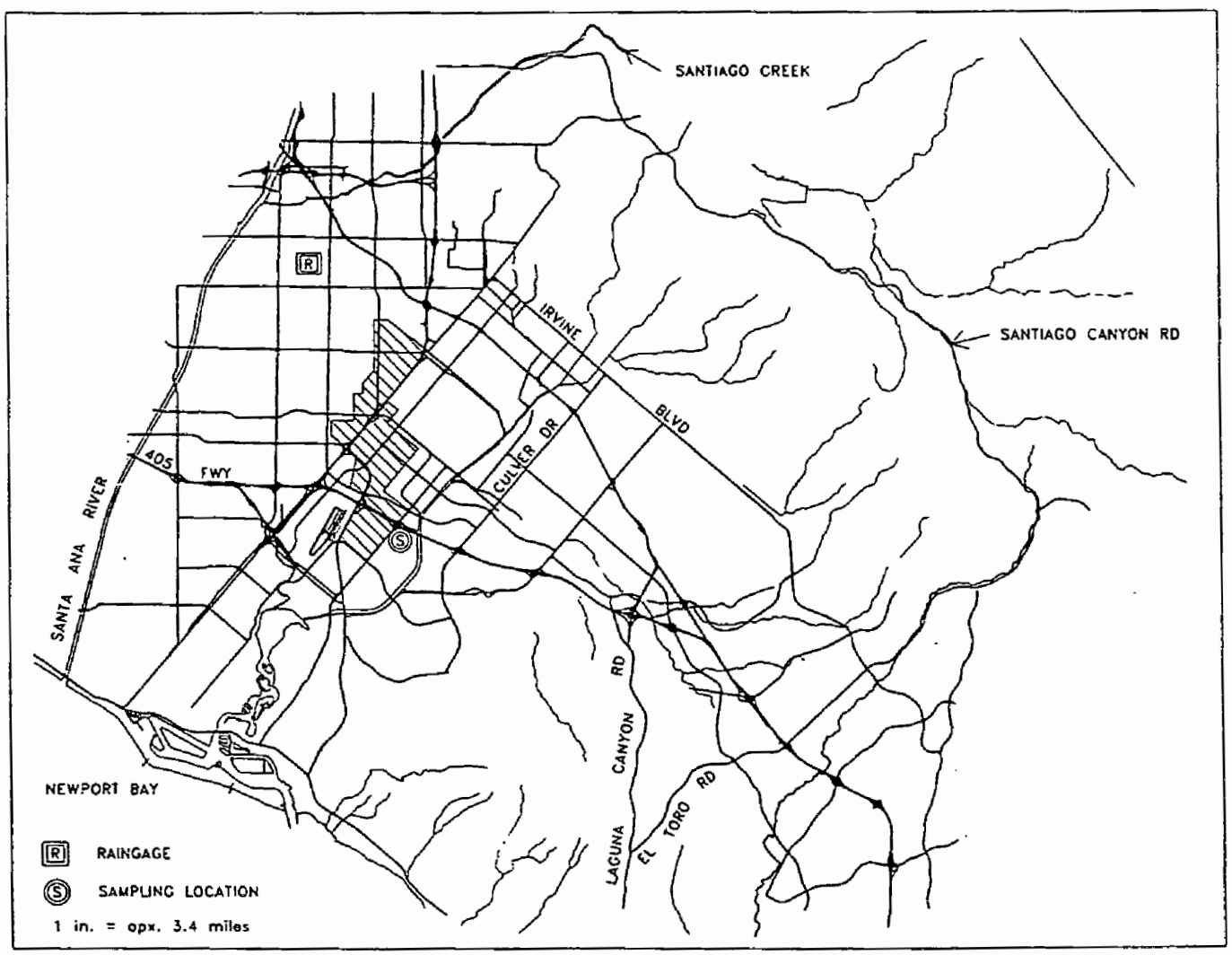

OSO CREEK

Location :	At Crown Valley Parkway Lat. 33-33-29 Long 117-40-33
Storet Code :	OSOL03
Watershed Area :	14.0 sq.mi. (36.2 sq.km.)
Cities in Watershed :	Laguna Hills, Laguna Niguel, Mission Viejo
Raingage :	Upper Oso Creek Alert #297, Trabuco Canyon #133
Gaging Station :	#218
Equipment :	Stevens A-71 Water-Stage Recorder with Float Alert Raingage and Water Level Sensor

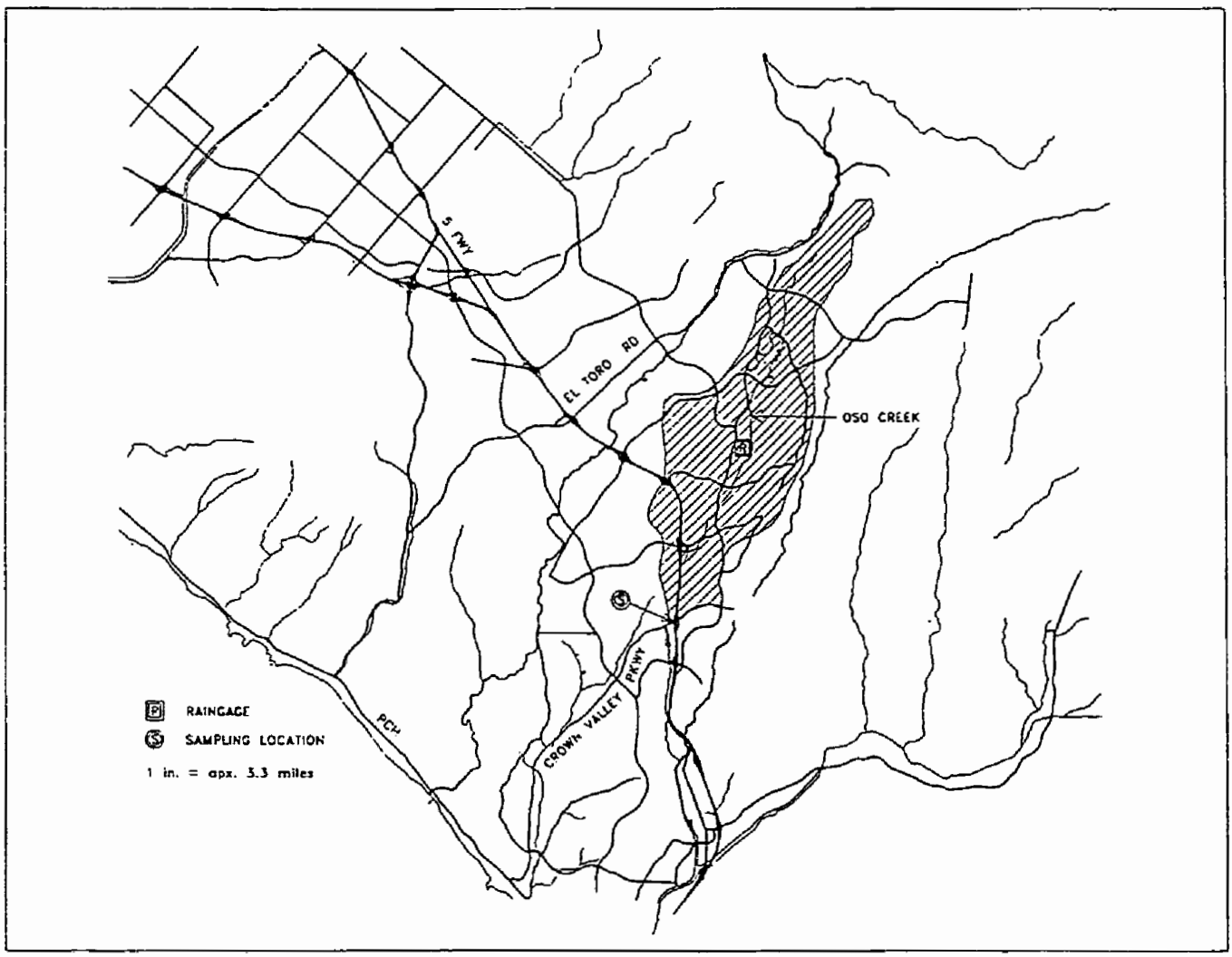

PRIMA DESHECHA CHANNEL

Location :	At Calle Grande Vista Lat. 33-25-57 Long. 117-37-53
Channel :	MO1
Storet Code :	PDCMO1
Watershed Area :	7.0 sq.mi. (18.1 sq.km.)
Cities in Watershed :	San Clemente, San Juan Capistrano
Raingage :	San Juan Capistrano Alert #215

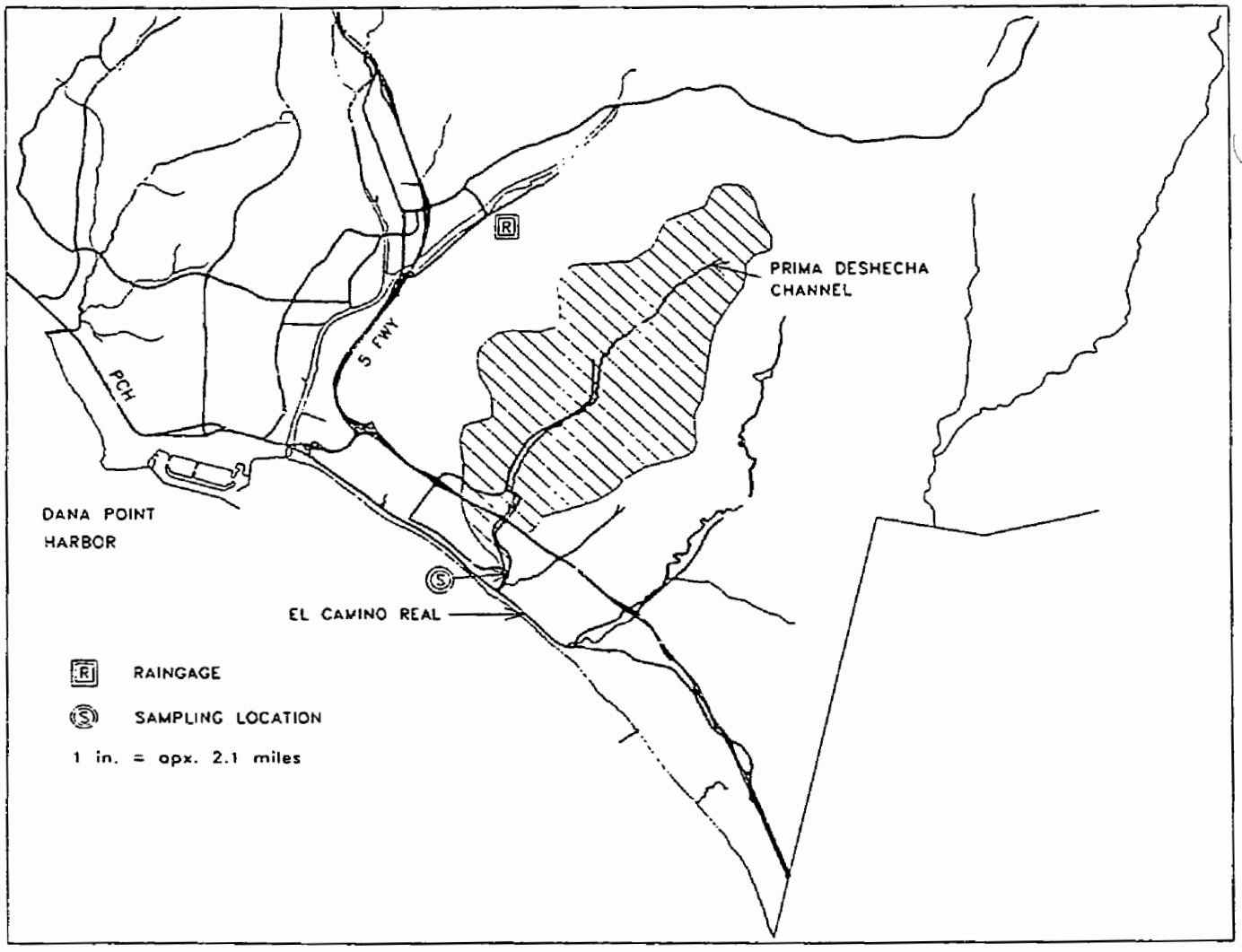

RATTLESNAKE CANYON WASH

Location :	At Bryan Ave. Lat. 33-42-30 Long. 117-45-00
Channel :	F26
Storet Code :	RCWF26
Watershed Area :	approx. 3.5 sq.mi. (9.1 sq.km.)
Cities in Watershed :	Irvine, Tustin
Raingage :	Lambert Reservoir Alert #217

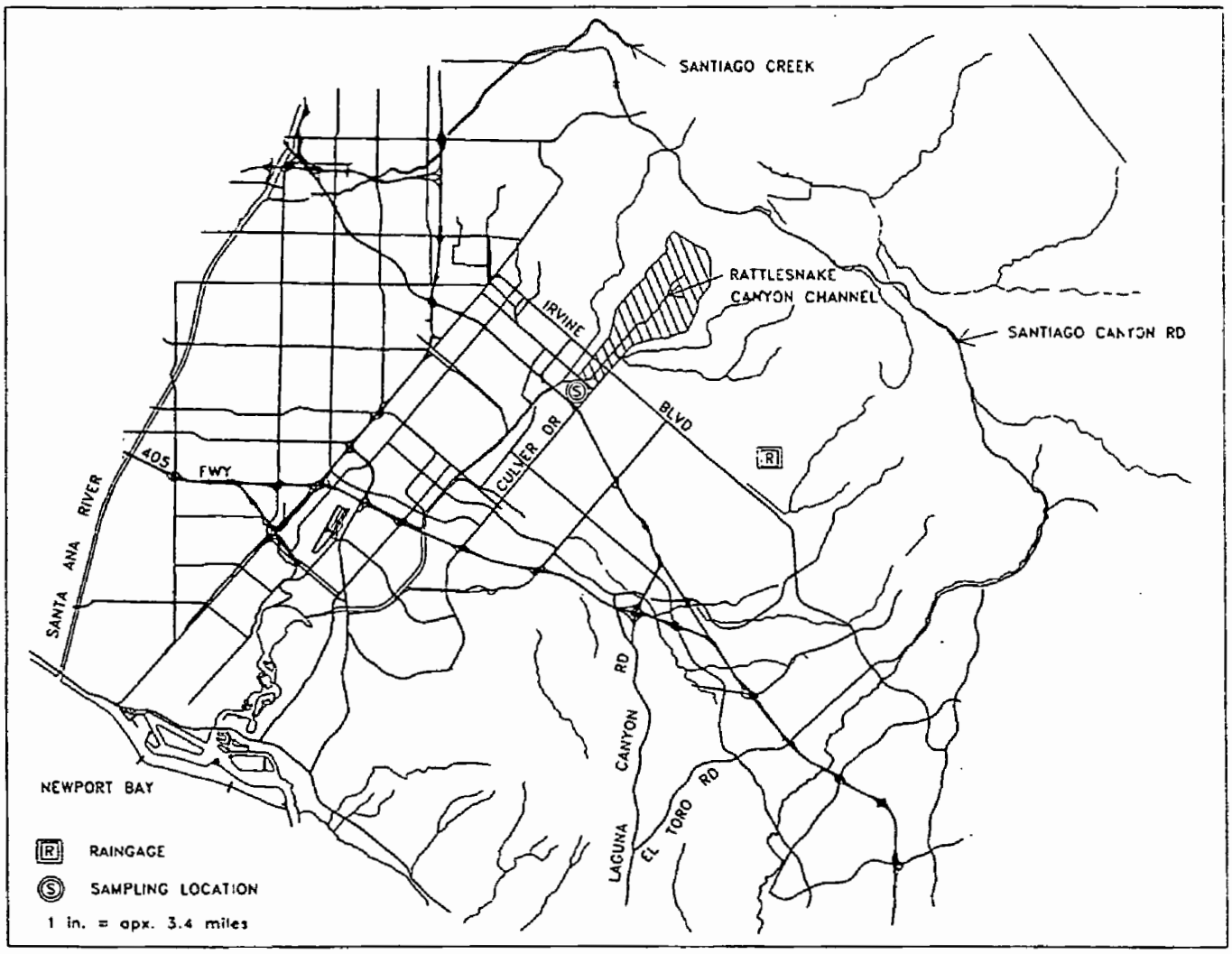

PETERS CANYON CHANNEL

Location :	At Barranca Road Lat. 33-41-30 Long. 117-49-23
Channel :	FO6
Storet Code :	BARSED
Watershed Area :	45.2 sq.mi. (117.1 sq.km.)
Cities in Watershed :	Irvine, Santa Ana
Raingage :	Santa Ana Engineering Alert #219, Santa Ana #121
Gaging Station :	#230
Equipment :	Stevens A-71 Water-Stage Recorder with Float Alert Rain Gage and Water Level Float

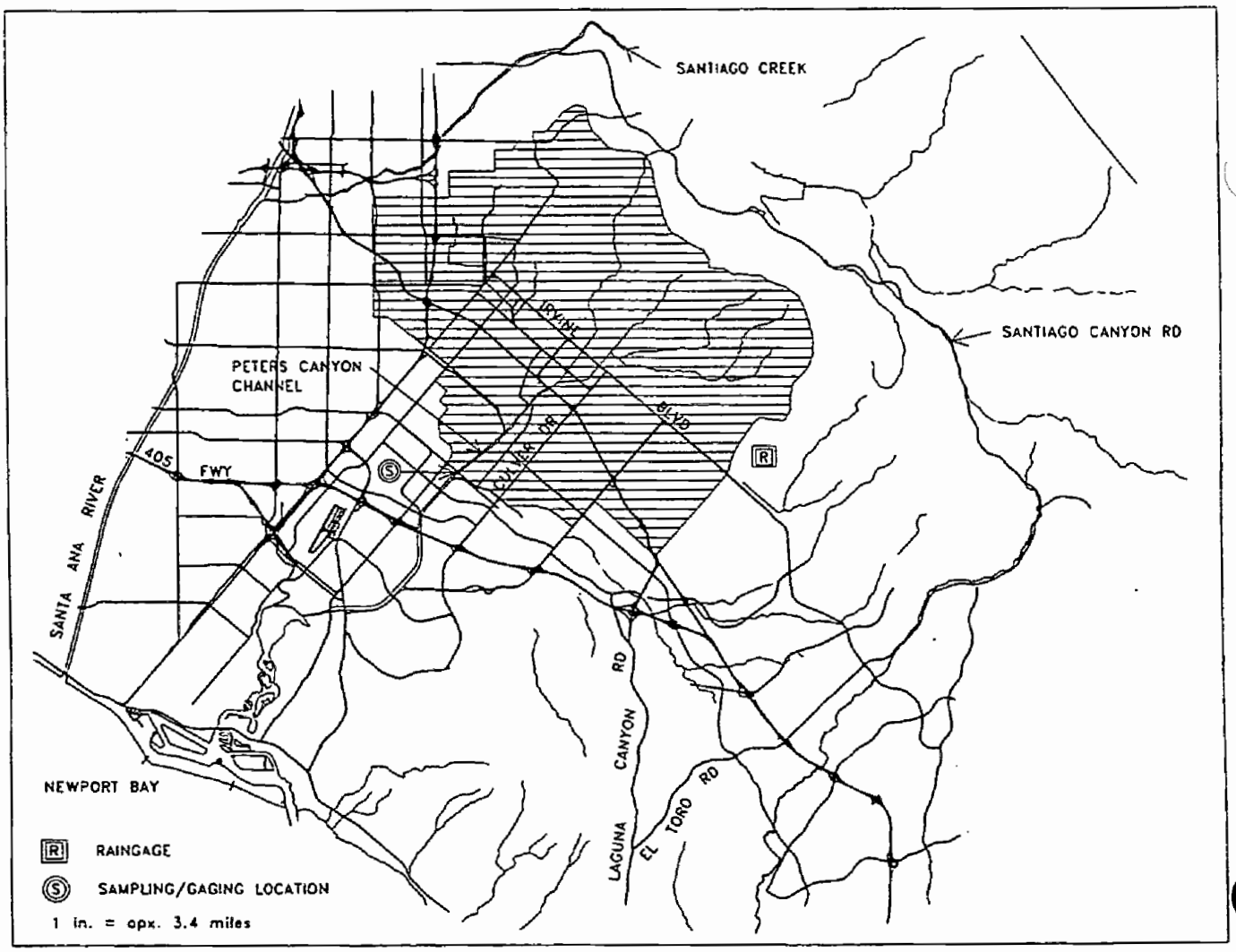

SAN DIEGO CREEK AT CAMPUS

Location :	At Campus Dr. Lat. 33-39-20 Long. 117-50-41
Channel :	FO5
Storet Code :	SDMFO5
Watershed Area :	111.0 sq.mi. (287.5 sq.km.)
Cities in Watershed :	Irvine, Lake Forest, Orange, Santa Ana, Tustin
Raingage :	Lambert Reservoir Alert #217
Gaging Station :	#226
Equipment :	Stevens A-71 Water-Stage Recorder with Nitrogen Bubbler and Mercury Manometer Alert Rain Gage and Water Level Sensor

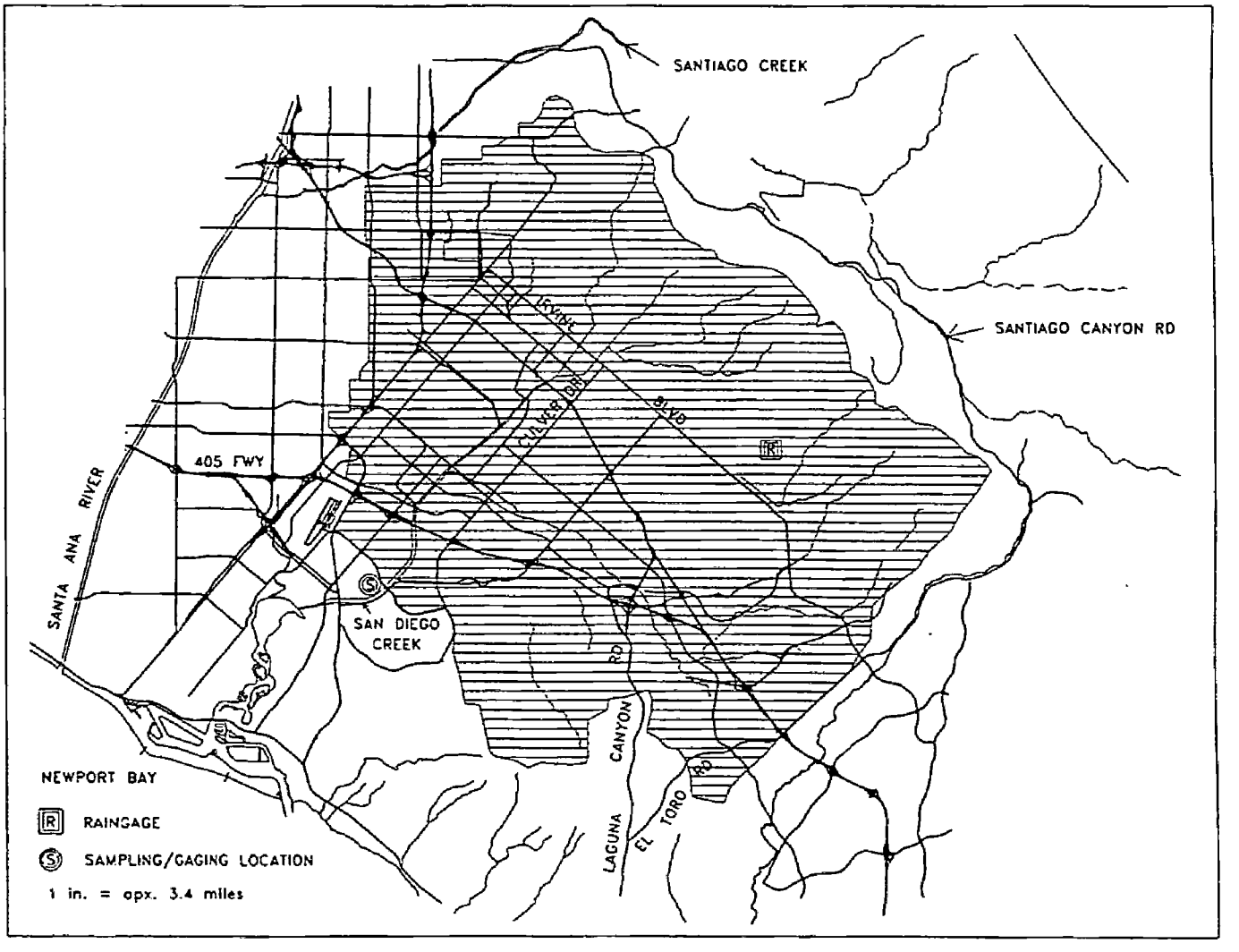

SAN DIEGO CREEK AT CULVER

Location :	At Culver Lat. 33-40-54 Long. 117-48-31
Channel :	FO5
Storet Code :	WYLSED
Watershed Area :	41.8 sq.mi. (108.3 sq.km.)
Cities in Watershed :	Irvine, Lake Forest
Raingage :	Lambert Reservoir Alert #217
Gaging Station :	#231
Equipment :	Stevens A-71 Water-Stage Recorder with Nitrogen Bubbler and Mercury Manometer

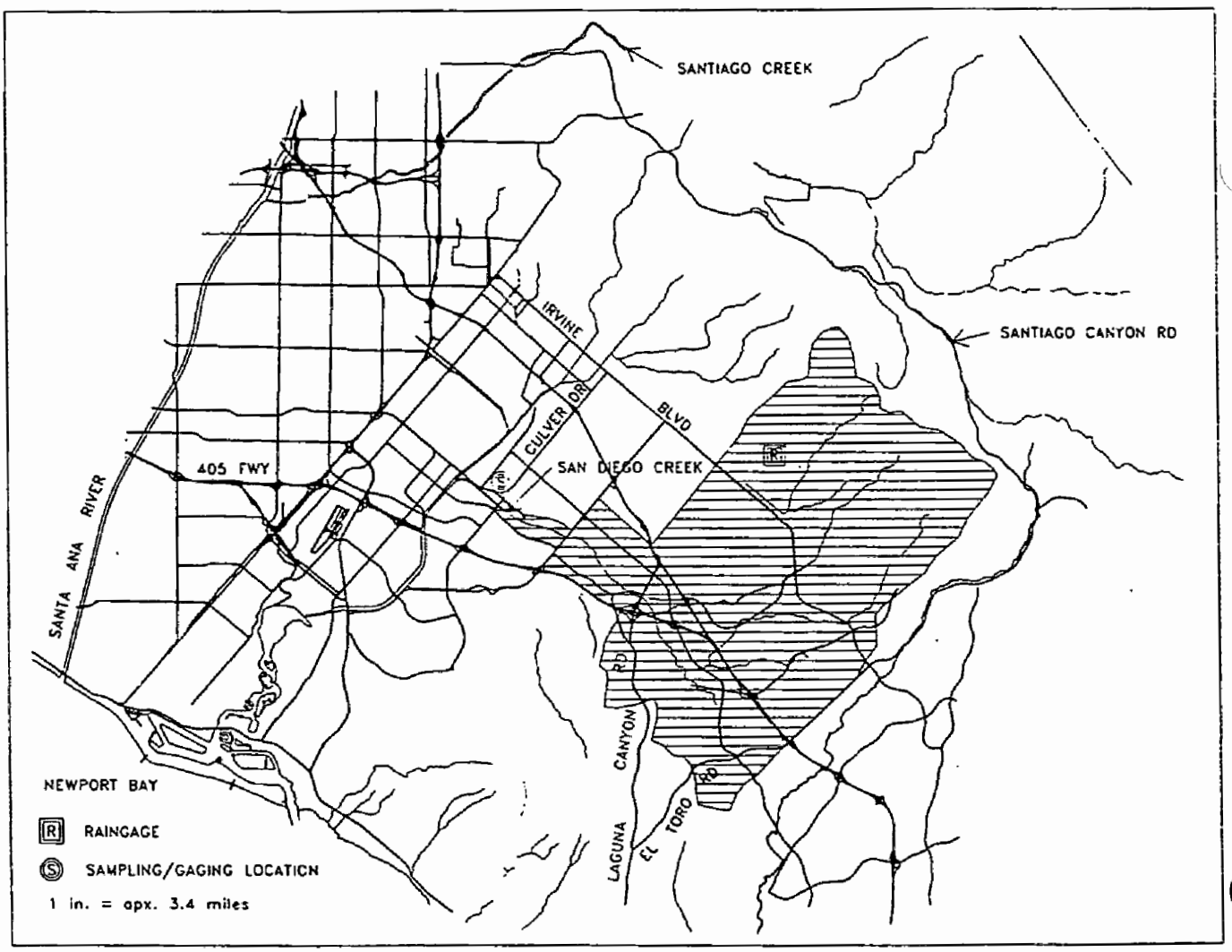

SAND CANYON CHANNEL

Location :	At Culver and University Lat. 33-39-30 Long. 117-49-40
Channel :	F15
Storet Code :	SCCF15
Watershed Area :	approx. 9.6 sq.mi. (24.8 sq.km.)
Cities in Watershed :	Irvine
Raingage :	San Diego Creek Alert #1125

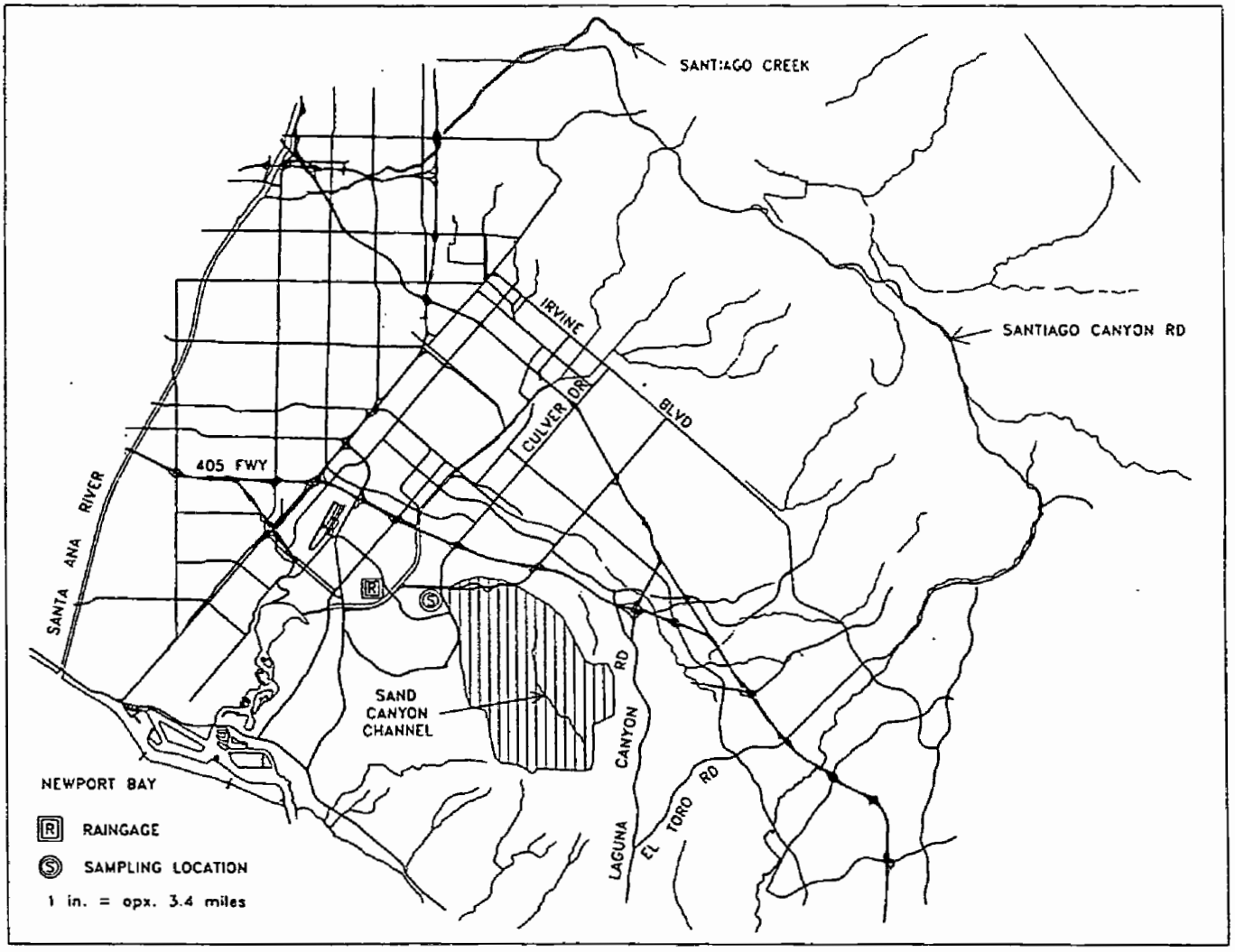

SANTA ANA DELHI CHANNEL

Location :	Upstream Irvine Ave. Lat. 33-39-36 Long. 117-52-50
Channel :	FO1
Storet Code :	SADFO1
Watershed Area :	17.6 sq.mi. (45.6 sq.km.)
Cities in Watershed :	Costa Mesa, Irvine, Newport Beach, Santa Ana
Raingage :	Costa Mesa Alert #1150, Costa Mesa #165
Gaging Station :	#220
Equipment :	Stevens A-71 Water-Stage Recorder with Float Alert Rain Gage and Water Level Sensor

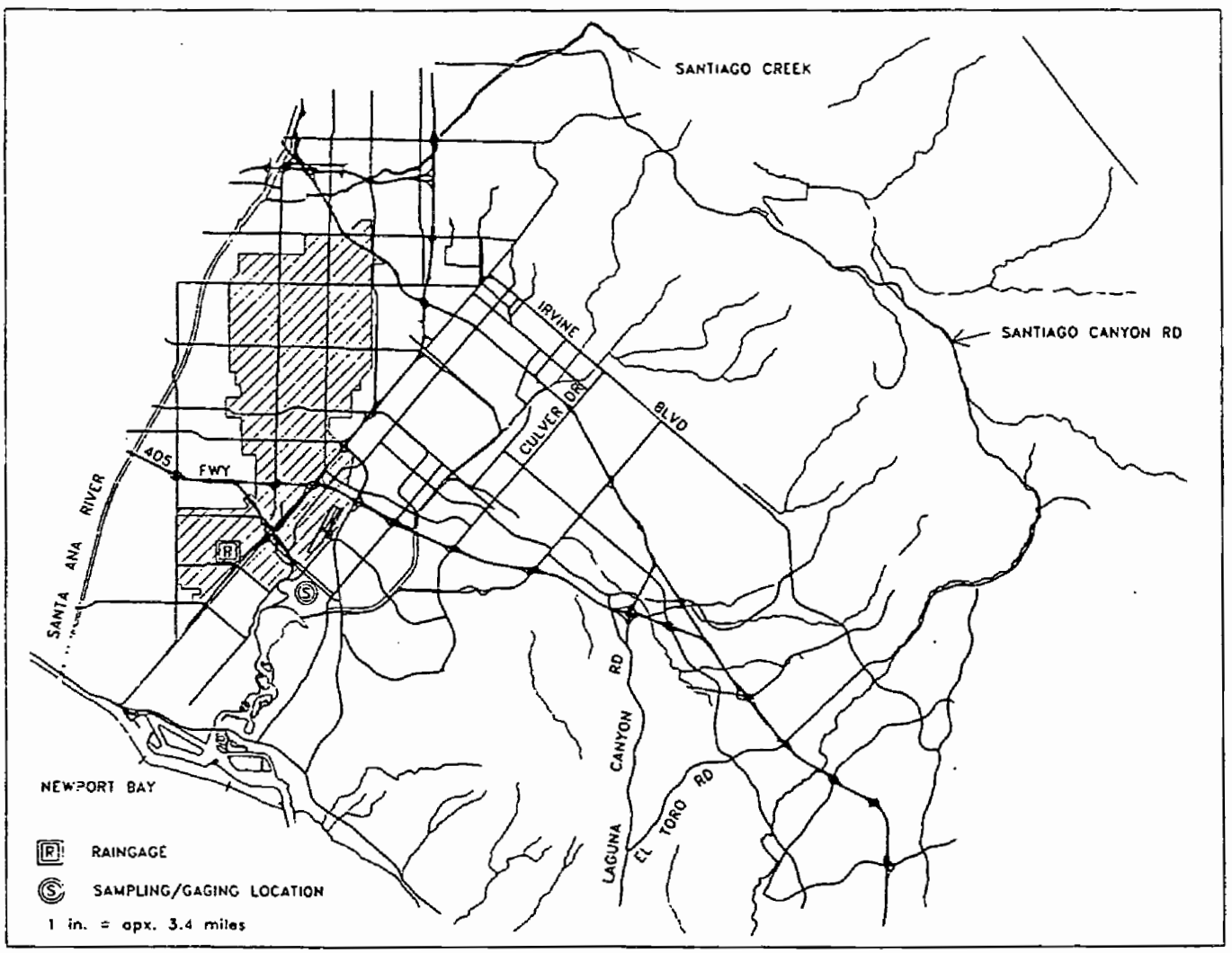

SEGUNDA DESHECHA CANNEL

Location :	At El Camino Real Lat. 33-25-58 Long. 117-37-51
Channel :	MO2
Storet Code :	SDCMO2
Watershed Area :	8.9 sq.mi. (23.1 sq.km.)
Cities in Watershed :	San Clemente
Raingage :	San Juan Capistrano Alert #215

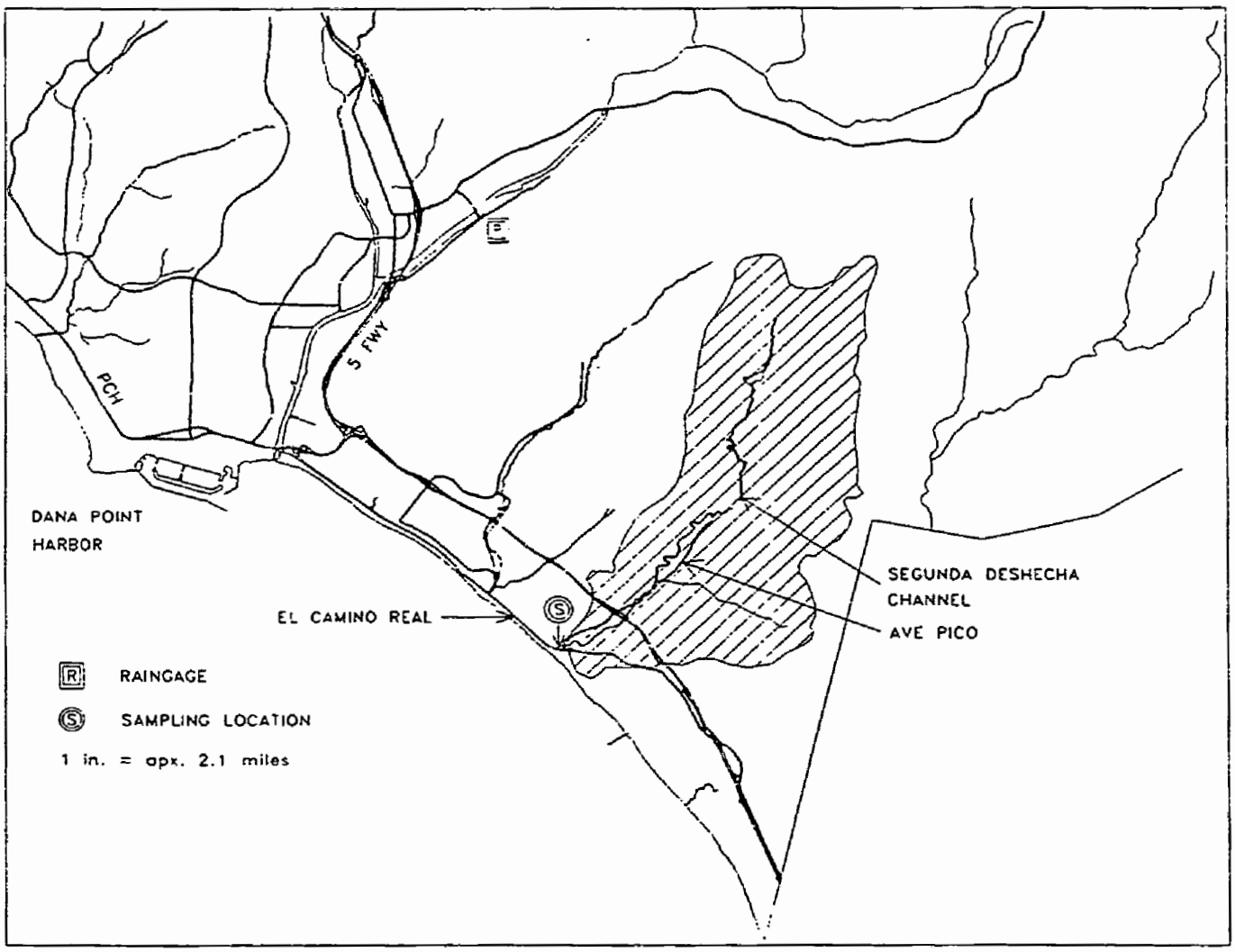

SERRANO CREEK

Location :	At Alton and Muirlands Lat. 33-39-00 Long. 117-42-21
Channel :	F19
Storet Code :	SERF19
Watershed Area :	approx. 6.9 sq.mi. (17.9 sq.km.)
Cities in Watershed :	Irvine, Lake Forest
Raingage :	Lambert Reservoir Alert #217

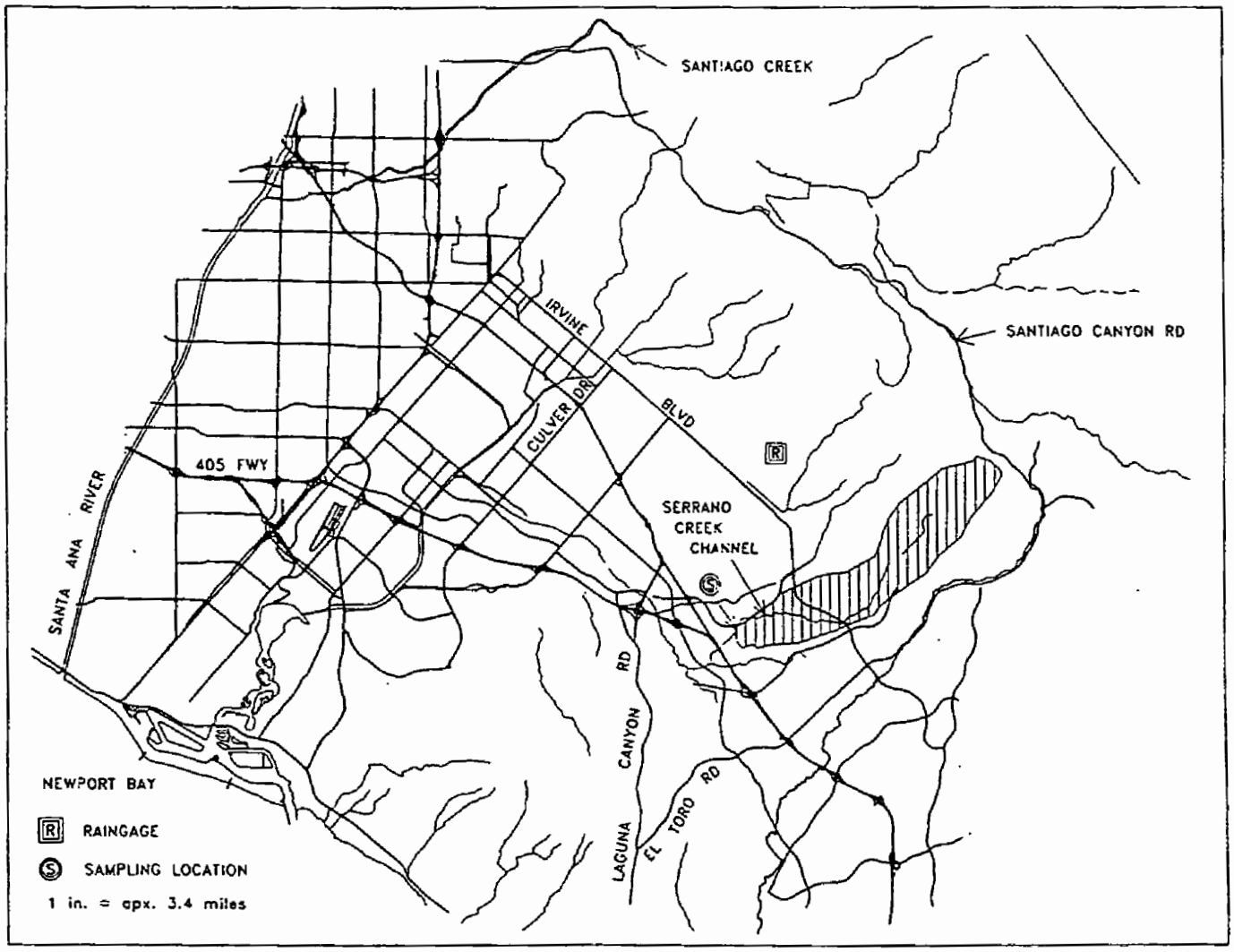

WESTMINSTER CHANNEL

Location :	At Hazard Downstream Beach Blvd. Lat. 33-45-07 Long. 117-59-26
Channel :	CO4
Storet Code :	WMCC04
Watershed Area :	6.7 sq. mi. (17.3 sq. km.)
Cities in Watershed :	Garden Grove, Westminster
Raingage :	Garden Grove Alert #1175, Garden Grove Fire Station #229
Gaging Station :	#207
Equipment :	Stevens A-71 Water-Stage Recorder with Float Alert Water Level Sensor and Rain Gage

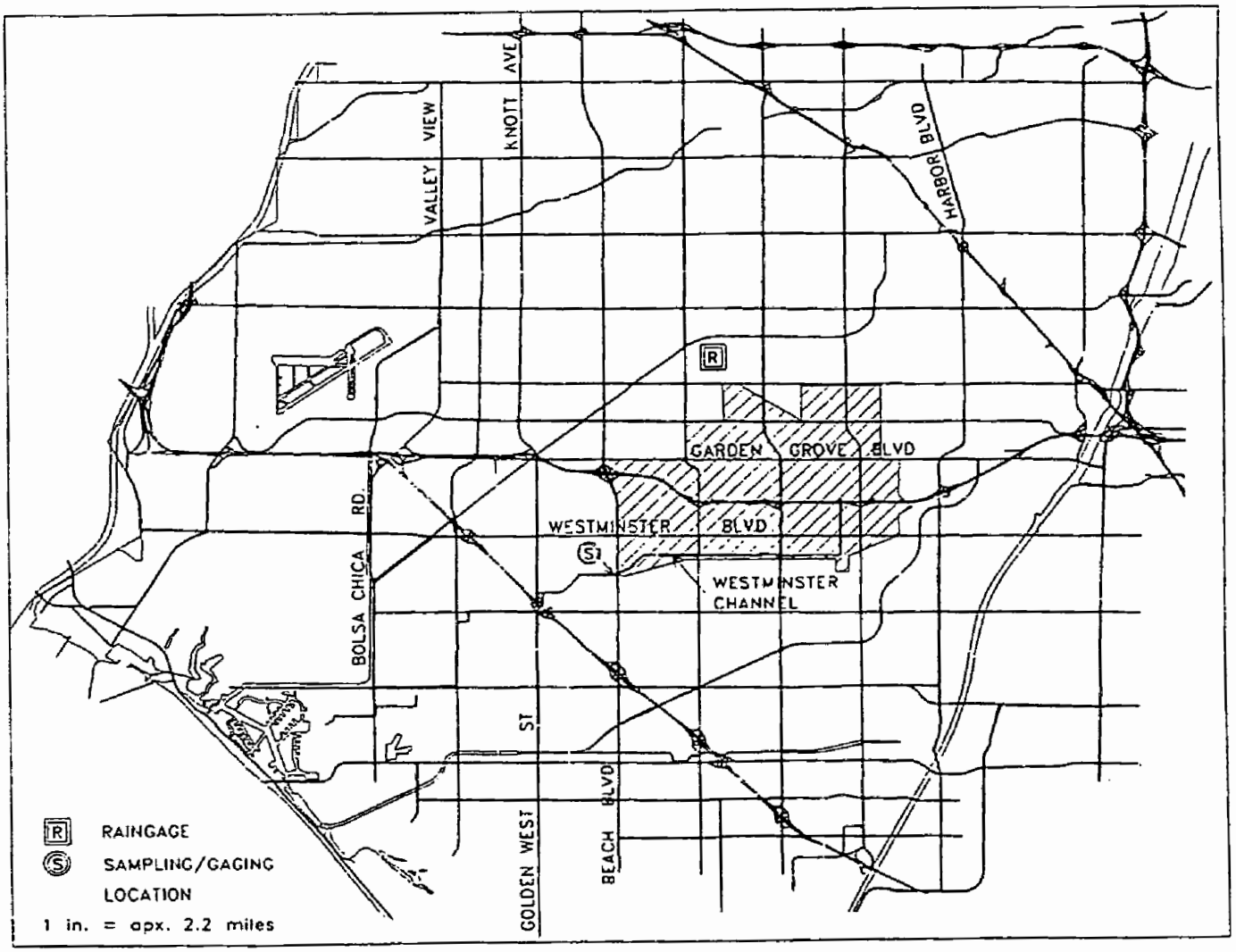

Appendix 4.4:
Harbor/Bay Monitoring Data

STATION	DATE	TIME		Depth feet	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L
LNBTUB	3/5/95	13:50	S		47000	3.5	8.0	1.10	0.17	0.71	0.32	68	32	<1	<10	5	<2	<40	<1	29
	3/5/95	13:55	S	20										<1	<10	4	<2	<40	1.7	25
	3/7/95	11:00	S		14000	5.5	7.9	4.00	0.24	1.10	0.91	14	10	<1	<10	6	<2	<40	<1	<10
	3/7/95	11:05	S	22										<1	<10	<4	<2	60	<1	18
	3/9/95	10:00	S		28000	1.3	8.0	3.40	0.41	0.96	0.61	29	13	<1	<10	7	<2	<40	<1	23
	3/9/95	10:05	S	20										<1	<10	<20	<2	50	<1	20
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													**<1**	**<10**	**>1**	**<2**	**>37**	**>0.56**	**21.6**
	3/23/95	13:45	S		47000	1.1	8.1	3.10	0.35	0.68	0.58	56	23	<1	<10	5	<2	67	1.3	36
	3/23/95	13:50	S	20										<1	<10	11	4	55	<1	54
	3/25/95	10:45	S		50000	1.1	8.1	1.60	0.19	0.20	0.21	66	21	<1	<10	<4	<2	<40	<1	<10
	3/25/95	10:50	S	19										<1	<10	8	<2	<40	<1	<10
	3/27/95	12:30	S		51000	1.0	8.1	1.10	0.21	0.82	0.37	58	22	<1	<10	6	<2	50	<1	25
	3/27/95	12:35	S	18										<1	<10	22	6	50	<1	54
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													**<1**	**<10**	**13.7**	**>3**	**>35**	**<1**	**>36**
	2/1/96	12:30	S		38000	1.7	8.1	2.20	0.10	2.70	0.32	36	24	2	<5	7	<2	<2	<1	35
	2/1/96	12:35	S	18										5	<5	2	<2	<2	<1	14
	2/3/96	10:40	S		33000	1.2	8.2	2.70	0.10	2.00	0.35	41	12	<1	<5	<8	<2	<20	<1	49
	2/3/96	10:45	S	23										<1	<5	3	<2	<20	<1	19
	2/5/96	12:20	S		40000	1.4	8.1	1.10	0.14	0.96	0.23	57	18	<1	<5	5	<2	<2	4	14
	2/5/96	12:25	S	22										<1	<5	11	<2	22	<2	13
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													**>1.7**	**<5**	**5.3**	**<2**	**>7.3**	**<2**	**15.3**
	2/20/96	11:45	S		27000	12.0	7.9	0.50	0.10	0.75	0.40	67	18	<1	<5	12	<2	5	<1	55
	2/20/96	11:50	S	24										<1	<5	4	<2	5	<1	28
	2/22/96	11:50	S		25000	5.3	8.0	4.00	0.13	0.70	0.58	34	14	<1	<5	<4	<2	<4	<1	35
	2/22/96	11:55	S	22										<1	<5	2	<2	<8	<1	74
	2/24/96	9:30	S		33000	1.4	8.1	2.10	0.35	0.82	0.63	66	18	<1	<5	<8	<8	<8	<5	52
	2/24/96	9:35	S	16										<1	<5	6	<2	<8	<5	24
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													**<1**	**<5**	**4**	**<2**	**>1.7**	**<5**	**42**
	11/22/96	11:45	S		14000	9.2	7.9	5.4	0.53	1.20	0.77	37	7	0.2	5	6	3	<10	<0.1	16
	11/22/96	11:45	S	20										0.3	7	13	7	<10	<0.1	22
	11/24/96	10:20	S		21000	0.9	7.8	3.1	0.51	0.96	0.68	50	9	<0.1	6	9	<0.1	<10	<0.1	20
	11/24/96	10:20	S	26										<0.1	9	8	4	<10	<0.1	16
	11/26/96	10:35	S		29000	1.0	7.9	1.7	0.39	0.69	0.41	36	11	<0.1	13	8	<0.2	<10	<0.1	21
	11/26/96	10:35	S	23										<0.1	16	7	2	13	<0.1	18
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													**<0.1**	**10.6**	**9.3**	**4.3**	**>4.3**	**<0.1**	**18.6**

NEWPORT BAY

STATION	DATE	TIME		Depth feet	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L
LNBTUB	1/27/99	11:45	ST		33700	3.3	7.8	4.6	0.61	0.22	0.28	61	8	<1	<8	12	<2	4	<2	24
	1/27/99		SF	10										<1	<8	11	<2	7	<2	27
	1/29/99	13:35	ST		42300	0.7	7.9	2.4	0.45	0.16	0.15	58	5	<1	<8	13	<2	8	<2	26
	1/29/99		SF	18										<1	<8	13	<2	8	<2	25
	4/12/99	13:00	ST		30400	5.1	8.0	1.7	0.51	0.09	0.23	63	10	<1	<8	12	<2	11	<2	24
	4/12/99		SF	19										<1	<8	11	<2	11	<2	22
	4/14/99	13:00	ST		42800	1.1	8.0	1.7	0.49	<0.05	0.15	73	7	<1	<8	11	<2	15	<2	<10
	4/14/99		SF	20										<1	<8	11	<2	12	<2	10
	4/16/99	14:10	ST		49500	1.6	8.0	3.4	0.47	<0.05	0.12	150	14	<1	<1	11	<2	<4	<2	<10
	4/16/99		SF	20										<1	<8	11	<2	<4	<2	<10
									4-day average [dissolved metals]					<1	<1	11	<2	>8.3	<2	>10.6

STATION	DATE	TIME		Depth feet	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L
LNBRIN	12/1/94	12:00												1.1	<10	7.8	<2	<40	<0.3	38
	3/5/95	14:20	S		40000	3.7	8.1	1.2	0.17	0.61	0.28	62	22	<1	<10	13	<2	<40	<1	42
	3/5/95	14:25	S	14										<1	<10	17	<2	<40	<1	33
	3/7/95	11:20	S		13000	6.1	7.9	3.5	0.23	1.2	0.92	12	<6	<1	<10	8	<2	<40	<1	<10
	3/7/95	11:25	S	12										<1	<10	14	<2	51	<1	28
	3/9/95	10:30	S		28000	1.9	8.0	3.2	0.2	0.92	0.69	28	12	<1	<10	8	<2	<40	<1	23
	3/9/95	10:35	S	10										<1	<10	16	<2	<40	<1	46
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													**<1**	**<10**	**>16**	**<2**	**>17**	**<1**	**36**
	3/23/95	14:00	S		48000	0.6	8.1	2.3	0.19	0.68	0.57	50	24	<1	<10	6	<2	62	1.8	37
	3/23/95	14:05	S	11										<1	<10	9	<2	53	<1	31
	3/25/95	11:10	S		43000	1.8	8.1	2.9	0.24	0.25	0.38	46	18	<1	<10	5	<2	<40	<1	<10
	3/25/95	11:15	S	11										<1	<10	4	<2	<40	<1	20
	3/27/95	13:00	S		51000	1.0	8.1	1	0.25	0.81	0.37	59	22	<1	<10	10	<2	<40	<1	26
	3/27/95	13:05	S	13										<1	<10	53	5	54	<1	52
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													**<1**	**<10**	**22**	**>2**	**>36**	**<1**	**34.3**
	5/18/95	10:15												<1	<10	9	<2	<40	<1	<10
	10/31/95	9:50												<1	<10	11	<2	<40	<1	80
	2/1/96	12:55	S		31000	4.5	8.1	4	<0.1	1	0	49	30	<1	<5	5	<2	7	<1	21
	2/1/96	13:00	S	12										<1	<5	26	<2	3	<1	31
	2/3/96	11:15	S		34000	0.9	8.2	3	<0.1	2	0	27	11	<1	<5	<2	<2	<20	<1	85
	2/3/96	11:20	S	13										<1	<5	14	<2	<20	<1	40
	2/5/96	13:45	S		40000	0.6	8.1	2	<0.1	1	0	62	13	<1	<5	31	<2	<2	7	20
	2/5/96	12:45	S	14										<1	<5	6	<2	<4	<2	22
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													**<1**	**<5**	**15**	**<2**	**>1**	**<2**	**31**
	2/20/96	12:00	S		36000	2.2	8.0	<0.2	<0.1	1	0	62	18	1	<5	33	<2	8	<1	58
	2/20/96	12:05	S	16										<1	<5	30	<2	6	<1	42
	2/22/96	12:10	S		24000	4.0	8.0	5	0	1	1	44	15	<1	<5	6	<2	<4	<1	31
	2/22/96	12:15	S	13										1	<5	15	<2	<8	<1	80
	2/24/96	9:50	S		31000	1.8	8.1	2	0	1	1	66	20	<1	9	11	<8	<8	<5	35
	2/24/96	9:55	S	13										<1	<5	13	<2	19	<5	40
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													**>0.3**	**<5**	**19**	**<2**	**>8.3**	**<5**	**54**
	4/25/96	10:45												<1	<5	9	<2	<2	<1	30

NEWPORT BAY

STATION	DATE	TIME		Depth feet	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L
LNBRIN	11/7/96	11:20												0.20	6	24	<0.1	4	<0.1	28
	11/22/96	13:35	S		13000	9.4	7.9	5.7	0.42	1.20	0.74	37	9	<0.1	<3	<5	1	<10	<0.1	9
	11/22/96	13:35	S	10										0.20	6	9	1	<10	<0.1	16
	11/24/96	10:45	S		20000	1.7	7.8	3.6	0.57	0.98	0.73	43	11	0.30	6	15	<0.1	<10	<0.1	25
	11/24/96	10:45	S	15										0.20	9	7	0.3	<10	<0.1	16
	11/26/96	10:50	S		28000	0.8	7.9	1.8	0.36	0.66	0.44	38	11	0.30	14	6	<0.2	<10	<0.1	29
	11/26/96	10:50	S	15										0.30	19	75	15	15	<0.1	44
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													**0.23**	**11.3**	**30.3**	**5.4**	**>5**	**<0.1**	**25.3**
	4/17/97	11:35												0.10	3	8	0	<5	<0.1	18
	10/30/97	12:15	M											<1	6	15	<2	<4	4	89
	3/25/98		S	22										<1	<8	29	3	<4	<2	30
	3/26/98		S/F	22										<1	<8	17	<2	<4	<2	14
	3/28/98		S	22										<1	<8	17	<2	<4	<2	11
	3/28/98		S/F	22										<1	<8	16	<2	<4	<2	<10
	3/30/98	13:00	S	22										<1	<8	15	<2	<4	<2	<10
	3/30/98	13:00	S/F	22										2	<8	14	<2	<4	<2	11
										4-day average [dissolved metals]				**>0.66**	**<8**	**12**	**<2**	**<4**	**<2**	**>8.3**
	11/4/98	11:30	D	14																
	1/25/99	15:50	ST		45100	0.8	8.0	1.7	0.45	0.09	0.12	73	6	<1	<8	17	<2	<4	<2	27
	1/25/99		SF	14										<1	<8	17	<2	<4	<2	26
	1/27/99	11:00	ST		34600	3.4	7.8	5.0	1.23	0.21	0.28	60	11	<1	<8	17	<2	6	<2	38
	1/27/99		SF	11										<1	<8	14	<2	5	<2	35
	1/29/99	13:20	ST		43600	0.7	7.9	2.7	0.63	0.16	0.18	54	8	<1	<8	21	<2	9	<2	32
	1/29/99		SF	7										<1	<8	17	<2	10	<2	30
										4-day average [dissolved metals]				**<1**	**<8**	**16**	**<2**	**>5**	**<2**	**30.3**
	4/12/99	12:00	ST		35100	4.3	8.1	3.0	0.35	0.06	0.24	30	17	<1	<8	14	<2	12	<2	23
	4/12/99		SF	11										<1	<8	13	<2	11	<2	21
	4/14/99	11:45	ST		40000	0.7	8.0	2.0	0.32	<0.05	0.19	65	7	<1	<8	14	<2	11	<2	20
	4/14/99		SF	13										<1	<8	14	<2	11	<2	19
	4/16/99	13:40	ST		49200	0.7	8.0	1.0	0.51	<0.05	0.15	150	14	<1	<8	20	<2	7	<2	17
	4/16/99		SF	13										<1	<8	20	<2	7	<2	14
										4-day average [dissolved metals]				<1	<8	**16**	<2	**9.6**	<2	18

STATION	DATE	TIME		Depth feet	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L
LNBHIR	12/1/95	12:10			50000	1.7	8.1	0.89	0.21	0.57	0.27	110	27							
	3/5/95	14:45	S		23000	68.0	8.1	4.20	0.23	0.94	0.96	91	17	<1	<10	7	<2	<40	<1	23
	3/5/95	14:50	S	20										<1	<10	7	<2	<40	<1	28
	3/7/95	12:40	S		13000	12.0	7.9	3.30	0.24	1.30	1.10	10	<6	<1	<10	7	<2	<40	<1	<10
	3/7/95	12:45	S	18										<1	<10	<4	<2	44	<1	19
	3/9/95	11:30	S		27000	7.3	8.0	6.10	0.26	1.10	0.80	42	19	<1	<10	<20	<2	<40	<1	14
	3/9/95	11:35	S	16										<1	<10	<20	<2	47	<1	32
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													**<1**	**<10**	**>2**	**<2**	**>30.3**	**<1**	**26**
	3/23/95	14:30	S		46000	2.1	8.1	2.80	0.25	0.80	0.64	51	23	<1	<10	<4	<2	61	<1	29
	3/23/95	14:35	S	15										1	19	17	6	<40	1.1	85
	3/25/95	11:40	S		42000	5.4	8.1	3.10	0.24	0.95	0.90	55	20	<1	<10	<4	<2	<40	<1	<10
	3/25/95	11:45	S	15										<1	<10	<4	<2	<40	<1	<10
	3/27/95	14:15	S		50000	4.5	8.0	1.50	0.25	0.86	0.49	69	25	<1	<10	<4	<2	<40	<1	22
	3/27/95	14:20	S	14										<1	<10	6	<2	<40	<1	30
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													**>0.67**	**<19**	**>8**	**>2**	**<40**	**>0.36**	**42**
	5/18/95	11:30			52000	3.2	7.9	0.85	0.58	0.58	0.22	71	20							
	10/31/95	9:30			49000	3.1	8.2	0.50	0.18	<0.50	<0.20	80	27							
	2/1/96	14:00	S		20000	16.0	8.1	7.10	0.13	2.40	0.83	37	15	<1	<5	8	<2	<2	<1	13
	2/1/96	14:05	S	18										<1	<5	3	<2	<2	<1	23
	2/3/96	12:20	S		38000	2.3	8.3	2.00	<0.10	1.70	0.38	45	23	<1	<5	3	<2	<20	<1	23
	2/3/96	12:25	S	13										<1	<5	2	<2	<20	<1	24
	2/5/96	13:45	S		39000	3.8	8.1	1.50	0.14	0.74	0.31	56	21	<1	<5	2	<2	11	<2	<10
	2/5/96	13:50	S	14										<1	<5	6	<2	<4	<2	19
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													**<1**	**<5**	**3.7**	**<2**	**<20**	**<2**	**22**
	2/20/96	12:50	S		26000	130.0	8.0	4.60	0.35	1.30	1.30	190	32	<1	8	10	<2	10	3	61
	2/20/96	12:55	S	13										<1	8	11	2	11	4	62
	2/22/96	13:20	S		23000	4.6	8.1	4.50	0.11	0.74	0.64	43	13	<1	<5	<4	<2	<4	<1	16
	2/22/96	13:25	S	16										<1	<5	<2	<2	<8	<1	31
	2/24/96	10:20	S		34000	3.0	8.1	1.90	0.32	0.79	0.56	66	18	<1	<5	<8	<8	<8	<5	14
	2/24/96	10:25	S	16										<1	<5	28	<2	100	<5	24
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													**<1**	**>2.7**	**>13**	**>0.7**	**>37**	**>1.3**	**39**

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STATION	DATE	TIME		Depth feet	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L
LNBHIR	4/25/96	11:20			38000	2.4	8.4	1.70	0.23	0.68	<0.20	86	11							
	11/7/96	11:45			32000	0.7	8.0	1.1	0.18	0.70	0.31	85	28							
	11/22/96	14:05	S		8500	21.0	7.8	6.1	0.44	0.94	0.91	37	7	<0.1	<3	<5	2	<10	<0.1	16
	11/22/96	14:05	S	15.6										0.2	6	<5	0.7	<10	<0.1	10
	11/24/96	11:05	S		24000	8.5	8.0	1.9	0.39	0.69	0.61	66	12	<0.1	7	<5	0	<10	<0.1	9
	11/24/96	11:05	S	18.8										<0.1	9	<5	0.4	<10	<0.1	9
	11/26/96	11:25	S		29000	2.5	8.0	1.4	0.25	0.67	0.42	79	16	<0.1	13	<5	<0.2	<10	<0.1	8
	11/26/96	11:25	S	16										<0.1	16	6	<0.2	13	<0.1	10
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													**>0.07**	**10.3**	**>2**	**>0.36**	**>4.3**	**<0.1**	**9.6**
	4/17/97	12:45			47000	4.0	8.0	<0.8	<0.50	0.73	0.45	83	19							
	10/30/97	12:45	M		50000	2.5	8.1	0	0	0.9	<0.2	84	15							
	2/7/98	11:05	S		16000	75	7.9	5.3	<0.5	1.0	1.3	170	21							
	2/7/98	11:05	S	9.8	47000	63	7.8	3.1	<0.5	0.7	0.6	190	28							
	3/28/98		S		41800	10	8.0	0.9	<0.1	1.0	0.3	2.0	<1	<10	<10	<10	<10	<10	<10	<50
	3/28/98		S	19.7										<1	<8	13	<2	<4	<2	27
	3/28/98		S/F	19.7										<1	<8	13	<2	<4	<2	19
	3/30/98	13:15	S		45700	3.0	8.1	1.3	0.3	1.0	0.3	13	7							
	3/30/98	13:15	S	19.0										<1	<8	13	<2	<4	<2	<10
	3/30/98	13:15	S/F	19.0										<1	<8	14	<2	<4	<2	<10
	6/23/98	14:10	M		49200	5.8	7.8	<1.3	<0.05	<1.0	0.2	190	17							
	11/4/98	12:10	D	18.6	49000	1.9	8.0	2.2	0.6	<0.05	0.18	100	18							
	1/25/99	16:25	ST		46100	1.6	8.0	1.9	0.3	0.1	0.12	72	10	<1	<8	14	<2	<4	<2	54
	1/25/99		SF	18.0										<1	<8	14	<2	<4	<2	22
	1/27/99	10:45	ST		31500	22.0	7.9	4.6	0.6	0.2	0.43	160	22	<1	<8	9	<2	6	<2	23
	1/27/99		SF	19.4										<1	<8	8	<2	5	<2	16
	1/29/99	12:50	ST		39600	12.0	7.9	3.0	1.0	0.2	0.28	82	13	<1	14	19	6	11	<2	36
	1/29/99	12:50	SF	18.7										<1	<8	8	<2	7	<2	<10
									4-day average [dissolved metals]					**<1**	**<8**	**10**	**<2**	**>4.0**	**<2**	**>9.0**
	4/12/99	11:35	ST		26600	8.9	8.0	6.1	0.4	0.2	0.39	54	11	<1	<8	11	<2	12	<2	16
	4/12/99		SF	13.1										<1	<8	10	<2	11	<2	13
	4/14/99	11:20	ST		40800	1.0	8.0	2.0	<0.2	<0.05	0.17	66	5	<1	<8	11	<2	11	<2	13
	4/14/99		SF	20.3										<1	<8	11	<2	11	<2	11
	4/16/99	12:30	ST		48200	1.7	8.0	0.9	0.5	<0.05	0.12	150	17	<1	<8	16	<2	7	<2	<10
	4/16/99		SF	19.7										<1	<8	17	<2	<4	<2	<10
									4-day average [dissolved metals]					**<1**	**<8**	**12.6**	**<2**	**>7.3**	**<2**	**>7.6**
	5/27/99	11:45	D		47200	1.8	8.1	<0.44	<0.2	<0.05	0.12	79	7							

STATION	DATE	TIME	Depth feet	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L
LNBHAR	3/5/95	15:15	S	32000	11.0	8.1	3.30	0.17	0.83	0.45	44	17	<1	<10	4	<2	<40	<1	18
	3/7/95	13:15	S	17000	6.0	8.0	3.00	0.20	1.20	0.94	22	11	<1	<10	<4	<2	<40	<1	<10
	3/9/95	12:15	S	39000	1.2	8.2	2.00	0.13	0.98	0.47	41	19	<1	<10	14	<2	<40	<1	20
	3/23/95	15:00	S	48000	1.8	8.1	2.30	0.15	0.87	0.56	63	23	<1	<10	<4	<2	57	<1	22
	3/25/95	12:00	S	50000	1.9	8.1	1.30	0.16	0.79	0.49	58	20	<1	<10	<4	<2	<40	<1	<10
	3/27/95	15:00	S	52000	3.5	8.1	0.75	0.30	0.82	0.47	69	26	<1	<10	<4	<2	<40	<1	21
	2/1/96	14:40	S	36000	4.9	8.1	2.60	<0.10	2.70	0.41	71	29	<1	<5	2	<2	2	<1	<10
	2/3/96	12:45	S	40000	1.4	8.3	1.40	<0.10	1.80	0.35	31	14	<1	<5	2	<2	<20	<1	45
	2/5/96	14:15	S	42000	1.5	8.2	0.90	<0.10	0.65	0.23	71	13	<1	<5	<2	<2	<2	<2	<10
	2/20/96	13:30	S	39000	7.5	8.1	1.80	<0.10	0.75	0.39	68	20	<1	48	<2	<2	7	<1	28
	2/22/96	13:50	S	26000	5.2	8.1	3.80	0.18	0.72	0.62	35	8	<1	<5	<4	<2	<4	<1	33
	2/24/96	10:50	S	40000	1.5	8.1	0.60	0.20	0.53	0.24	85	23	<1	5	<8	<8	<8	<5	18
	11/22/96	14:30	S	15000	11.0	7.9	4.4	0.47	1.00	0.78	33	6	<0.1	<3	<5	0.4	<10	<0.1	7
	11/24/96	11:25	S	25000	1.3	8.0	1.7	0.31	0.61	0.53	79	20	<0.1	8	<5	<0.1	<10	<0.1	8
	11/26/96	12:05	S	30000	1.4	8.0	0.9	0.19	<0.50	0.33	59	14	<0.1	13	<5	<0.2	<10	<0.1	8
	2/7/98	11:45	M	17000	22.0	7.8	4.4	<0.5	0.75	1	62	16							

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STATION	DATE	TIME	Depth feet	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L
UNBJAM	12/1/94	10:25		44000	2.7	7.9	6.00	0.44	0.93	0.38	83	28							
	3/5/95	11:55 S		390	680.0	7.4	7.20	0.26	3.30	5.30	1300	180	2	40	36	8	<40	<1	160
	3/5/95	12:00 S	4										3	49	39	15	40	<1	190
	3/23/95	12:00 S		510	190.0	7.8	6.10	0.25	2.40	5.90	1500	150	3	53	46	32	<40	2.3	220
	3/23/95	12:05 S	3										4	29	62	45	<40	2.6	110
	3/25/95	8:45 S		30000	6.6	7.6	11.00	0.23	1.10	1.20	65	14	<1	<10	<4	<2	<40	<1	<10
	3/25/95	8:50 S	1										<1	<10	6	<2	<40	<1	52
	3/27/95	10:00 S		35000	6.6	8.0	14.00	0.26	0.85	0.89	49	18	<1	<10	<4	<2	<40	<1	16
	3/27/95	10:05 S	2										<1	<10	<4	<2	<40	<1	40
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)												**>1**	**>10**	**>23**	**15**	**<40**	**>0.86**	**67**
	5/18/95	12:15		45000	10.0	7.8	4.40	0.74	0.95	0.48	53	17							
	6/15/95	11:15		44000	19.0	7.7	3.10	0.37	0.96	0.52	110	33							
	7/28/95	10:45		44000	7.8	8.2	1.60	0.26	0.59	0.39	85	29							
	8/31/95	11:25		44000	4.5	8.6	1.00	0.55	0.66	0.21	67	35							
	9/21/95	11:00		26000	10.0	8.2	15.00	0.17	1.40	0.54	56	23							
	10/31/95	11:30		41000	5.2	8.1	10.00	0.50	0.86	0.44	66	31							
	11/16/95	11:00		40000	4.0	8.1	9.30	0.53	1.00	0.52	180	32							
	12/7/95	11:00		38000	4.7	8.0	14.00	0.31	0.98	0.42	130	38							
	1/4/96	12:00		41000	3.0	8.0	5.10	0.18	1.00	0.36	77	19							
	2/1/96	10:00 S		870	140.0	7.8	15.00	1.00	2.20	2.00	110	22	<1	5	9	4	8	5	37
	2/1/96	10:05 S	3										4	12	130	4	13	6	34
	2/3/96	8:45 S		18000	14.0	7.9	11.00	0.38	2.30	0.86	50	19	<1	<5	<2	<2	<20	<1	35
	2/3/96	8:50 S	2										<1	6	52	21	<20	2	33
	2/5/96	10:30 S		21000	14.0	7.8	21.00	0.18	1.20	0.85	55	13	1	<5	180	<2	4	<2	<10
	2/5/96	10:35 S	3										<1	<5	8	<2	8	<2	17
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)												**>1.3**	**>6.0**	**63**	**>8.3**	**>7.0**	**>2.7**	**28**
	2/20/96	9:30 S		330	530.0	6.7	10.00	0.45	2.90	3.80	690	94	2	27	29	19	16	16	140
	2/20/96	9:35 S	6										6	33	65	46	42	30	480
	2/22/96	11:10 S		3000	70.0	7.7	7.40	0.19	1.20	1.20	40	11	6	<5	6	3	<4	<1	35
	2/22/96	11:15 S	1										<1	<5	5	2	<4	<1	39
	2/24/96	12:20 S		21000	7.7	7.8	14.00	0.35	0.97	0.84	42	14	<1	<5	<8	<8	<8	<5	22
	2/24/96	12:25 S	5										<1	<5	<8	<2	<8	<5	46
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)												**>2.0**	**>11.0**	**>23.3**	**>16.0**	**>14.0**	**>10.0**	**188**

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STATION	DATE	TIME		Depth feet	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L
UNBJAM	5/31/96	9:00			36000	5.1	8.3	6.50	0.16	0.85	0.48	90	29							
	7/30/96	10:57			38000	2.1	8.0	<0.2	0.26	0.67	0.47	96	28							
	8/29/96	10:45			34000	3.1	8.0	1.6	0.35	0.96	0.62	76	40							
	9/26/96	8:35			33000	3.3	7.9	2.0	0.45	0.88	0.35	88	23							
	11/7/96	9:35			19000	14.0	7.8	13.0	1.80	2.20	1.50	53	16							
	11/22/96	9:35	S		550	200.0	8.0	8.8	0.62	1.70	2.50	200	17	0.8	<3	7	3	<10	<0.1	30
	11/22/96	9:35	S	1.5										0.7	<3	8	4	<10	<0.1	25
	11/24/96	8:20	S		11000	17.0	7.9	12.0	0.59	1.60	1.20	39	9	<0.1	6	5	0.6	<10	<0.1	11
	11/24/96	8:20	S	5										0.3	9	6	1	<10	<0.1	18
	11/26/96	8:50	S		19000	12.0	7.7	19.0	0.59	1.10	0.96	54	14	<0.1	15	<5	<0.2	<10	<0.1	10
	11/26/96	8:50	S	1.5										0.3	15	17	0.7	<10	<0.1	24
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													**0.43**	**>8**	**10.3**	**1.9**	**<10**	**<0.1**	**22.3**
	3/13/97	9:05			41000	3.6	8.3	7.9	<0.5	1.20	0.47	130	39							
	4/17/97	8:45			31000	4.8	7.9	22.0	0.53	1.40	0.69	67	20							
	5/22/97	10:30			40000	13.0	7.9	5.5	0.59	1.10	0.69	98	18							
	6/12/97	14:05			36000	7.4	8.3	8.3	<0.1	0.90	0.60	61	13							
	7/10/97	13:25	M		44000	3	8.3	3	0	0.5	<0.2	140	75							
	8/14/97	14:00	M		37000	5	8.2	6.0	<0.5	1.5	0.8	68	20							
	10/30/97	9:45	M		38000	6	8.0	8	0	1.1	0.6	85	21							
	11/21/97	13:00	M		23000	10	7.7	10	0.90	1.6	0.7	180	72							
	12/6/97	9:50	S		290	2500	8.4	5	1	9.0	15.0	3000	270	10	180	110	67	100	<1	560
	12/6/97	9:50	S/F											<1	<10	5	<2	<4	<1	33
	12/6/97	9:50	S	7.9										12	220	110	77	110	<1	710
	12/6/97	9:50	S/F	7.9										<1	<10	<4	<2	4.0	<1	53
	12/10/97	7:25	S		19000	15	7.8	13	0.4	0.7	0.7	44	16	<1	<4	24	3	7	<1	23
	12/10/97	7:25	S/F											<1	<4	15	<2	5	<1	<10
	12/10/97	7:25	S	2.6										<1	<4	15	<2	5	<1	66
	12/10/97	7:25	S/F	2.6										<1	<4	15	<2	5	<1	48
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													**>4**	**>73.3**	**>41.7**	**>25.7**	**>38.4**	**<1**	**>259**
	1/21/98	8:30	M		17000	10	7.9	19	<0.5	1.3	0.5	28	10							
	2/7/98	8:50	M		590	100	7.8	9.7	<0.5	1.6	1.7	86	15							
	3/26/98	9:50	S		1100	78	7.7	104.7	0.6	1.1	1.2	29	5							
	3/26/98	9:50	S	2.6										<1	16	11	6	7	<2	46
	3/26/98	9:50	S/F	2.6										<1	<8	5	<2	<4	<2	12
	3/28/98	10:30	S		1140	320	7.8	7.5	0.3	1.7	0.9	367	21	<10	26	<10	11	17	<10	146
	3/28/98	10:30	S	3.3										1	19	16	9	10	<2	89
	3/28/98	10:30	S/F	3.3										<1	<8	6	<2	<4	<2	11
	3/30/98	9:45	S		30400	3.4	8.0	4.4	0.2	1.0	0.6	4	2							
	3/30/98	9:45	S	3.6										<10	<10	<10	<10	<10	<10	<50
	3/30/98	9:45	S/F	3.6										<1	<8	11	<2	<4	<2	<10
													4-day average [dissolved metals]	**<1**	**<8**	**>7.3**	**<2**	**<4**	**<2**	**>7.6**

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STATION	DATE	TIME		Depth feet	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L
UNBJAM	4/21/98	9:55	M		18100	4.6	8.3	37	0.3	1.3	0.3	10	7							
	6/23/98	11:10	M		41800	7.6	8.0	4.0	<0.05	2.0	0.6	160	42							
	7/16/98	11:30	D	4.0																
	8/13/98	10:00	D	1.6	39000	18.0	7.7	4.0	<1	0.36	0.428	120	16							
	10/15/98	9:30	D		30900	8.2	7.8	11.3	1.20	0.38	0.490	31	8							
	11/4/98	9:30	D	13.3	41800	6.5	7.8	5.2	1.08	0.22	0.398	170	38							
	12/15/98	9:15	D	15.1	35700	5.6	7.8	7.4	0.72	0.29	0.306	78	16							
	1/7/99	9:20	D	14.3	41200	7.5	7.9	11.0	0.77	0.20	0.153	74	10							
	1/25/99	12:25	ST		7700	75.0	7.9	15.1	1.44	0.42	1.070	120	20	<1	<8	7	<2	5	<2	21
	1/25/99		SF	13.1										<1	<8	5	<2	4	<2	11
	1/27/99	13:30	ST		4590	25.0	7.7	8.9	1.08	0.31	1.040	78	40	<1	<8	5	2	5	<2	18
	1/27/99		SF	14.1										<1	<8	3	<2	5	<2	19
	1/29/99	10:23	ST		18300	16.0	7.9	11.6	0.75	0.28	0.551	54	8	<1	<8	6	<2	5	<2	12
	1/29/99	10:23	SF	16.4										<1	<8	7	<2	6	<2	14
									4-day average [dissolved metals]					**<1**	**<8**	**5**	**<2**	**5**	**<2**	**14.7**
	3/3/99	9:00	D	16.4	38500	5.9	8.0	11.9	0.52	0.29	0.184	73	10							
	4/12/99	10:45	ST		8760	45.0	7.9	13.7	0.78	0.36	1.010	70	15	<1	<8	6	<2	8	<2	<10
	4/12/99		SF	13.1										2.6	<8	6	<2	9	<2	12
	4/14/99	8:35	ST		25800	11.0	7.8	9.3	0.73	0.27	0.535	55	9	<1	<8	7	<2	10	<2	<10
	4/14/99		SF	14.1										<1	<8	8	<2	10	<2	28
	4/16/99	10:05	ST		28900	7.2	8.0	22.4	0.74	0.15	0.428	93	13	<1	<8	14	<2	7	<2	12
	4/16/99		SF	12.1										<1	<8	13	<2	7	<2	10
									4-day average [dissolved metals]					**<1**	**<8**	**9**	**<2**	**8.7**	**<2**	**13.3**
	5/27/99	10:00	D	3.1	27300	4.2	8.1	11.6	0.91	0.21	0.337	50	9							
	6/30/99	12:15	D	2.5	37100	6.2	8.4	1.6	0.54	0.07	0.254	60	16							

STATION	DATE	TIME	Depth feet	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L
UNBSDC	10/28/94	10:00		35000	2.0	8.4	10.00	0.44	0.95	0.30	74	8							
	12/1/95	10:45		47000	3.3	8.0	2.90	0.34	0.89	0.12	87	25							
	3/5/95	12:10 S		710	470.0	8.0	5.60	0.31	1.50	4.10	600	80	1	23	26	4	<40	<1	96
	3/5/95	12:15 S	13										1	30	32	14	<40	<1	120
	3/7/95	9:20 S		2100	40.0	7.7	11.00	0.37	1.80	1.60	24	6	<1	<10	7	<2	<40	<1	14
	3/7/95	9:25 S	9										<1	18	15	5	<40	<1	71
	3/9/95	8:40 S		6800	9.9	8.0	28.00	0.32	1.80	1.10	17	7	<1	<10	4	<2	<40	<1	<10
	3/9/95	8:45 S	7										<1	<10	20	<2	<40	<1	46
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)												**>0.3**	**>16**	**22.3**	**>6**	**<40**	**<1**	**79**
	3/23/95	12:30 S		150	40.0	7.8	10.00	0.29	1.60	2.70	440	56	<1	22	18	11	<40	2.3	74
	3/23/95	12:35 S	9										2	39	35	24	<40	1.2	160
	3/25/95	9:10 S		13000	9.1	7.9	14.00	0.29	0.91	1.30	24	10	<1	<10	5	<2	<40	1.6	<10
	3/25/95	9:15 S	10										<1	<10	5	<2	<40	<1	19
	3/27/95	10:30 S		32000	6.5	8.0	17.00	0.25	0.90	0.88	48	19	<1	<10	<4	<2	<40	<1	<10
	3/27/95	10:35 S	9										1	22	25	8	<40	<1	92
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)												**>1**	**>20**	**22**	**>10.6**	**<40**	**>0.4**	**90.3**
	7/28/95	11:00		45000	6.8	8.2	1.30	0.10	0.53	0.28	110	39							
	8/31/95	11:45		48000	3.4	8.5	<0.20	0.71	0.64	<0.20	67	32							
	9/21/95	11:20		41000	3.1	8.4	3.90	<0.10	1.10	0.32	75	33							
	10/31/95	11:15		38000	5.4	8.2	12.00	0.39	1.00	0.48	62	29							
	11/16/95	11:20		39000	3.7	8.2	11.00	0.47	0.92	0.38	180	38							
	12/7/95	11:15		43000	3.5	7.9	8.30	0.29	0.93	0.82	88	23							
	1/4/96	12:20		42000	3.2	8.1	3.50	0.14	1.10	0.36	69	19							
	2/1/96	10:30 S		1100	140.0	7.8	15.00	0.45	1.80	2.00	100	16	<1	7	8	5	8	5	27
	2/1/96	10:35 S	9										1	7	13	<2	6	4	38
	2/3/96	9:00 S		24000	6.5	8.1	7.40	0.37	2.30	0.79	53	19	<1	<5	<2	<2	<20	<1	28
	2/3/96	9:05 S	10										<1	<5	6	<2	<20	1	20
	2/5/96	10:45 S		32000	7.3	8.0	8.20	0.23	1.30	0.65	52	18	3	<5	77	<2	3	2	<10
	2/5/96	10:45 S	13										<1	<5	9	<2	8	4	29
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)												**>0.3**	**>2.3**	**9.3**	**<2**	**>4.7**	**3.0**	**29.0**
	2/15/96	11:10		36000	5.9	6.5	5.00	0.44	0.70	0.57	75	21							
	2/20/96	9:45 S		650	530.0	6.8	10.00	0.45	3.20	3.40	660	70	2	24	27	17	17	14	140
	2/20/96	9:50 S	3										4	21	35	13	23	15	210
	2/22/96	10:45 S		3900	82.0	7.8	8.10	0.25	1.60	1.30	48	17	<1	5	6	3	<4	<1	34
	2/22/96	10:50 S	4										<1	<5	4	<2	<4	<1	29
	2/24/96	12:00 S		29000	8.2	8.0	7.60	0.41	0.85	0.75	61	19	<1	<5	<8	<8	<8	<5	26
	2/24/96	12:05 S	7										<1	<5	8	<2	<8	<5	39
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)												**>1.3**	**>7.0**	**15.7**	**>4.3**	**>7.7**	**>5.0**	**92.7**

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STATION	DATE	TIME		Depth feet	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L
UNBSDC	3/28/96	9:30			31000	6.9	8.5	12.00	0.31	0.88	0.26	84	25							
	4/25/96	11:30			28000	9.6	8.4	11.00	0.35	1.10	0.39	84	22							
	5/31/96	9:15			33000	8.2	8.3	7.10	0.15	1.00	0.48	100	43							
	6/21/96	10:20			27000	4.0	8.6	6.20	0.21	0.73	0.45	260	96							
	7/30/96	11:11			37000	2.6	8.0	<0.2	0.27	0.66	0.46	110	35							
	8/29/96	11:00			34000	3.1	8.0	1.1	0.34	0.76	0.50	83	27							
	9/26/96	8:50			36000	5.4	8.0	0.3	0.24	0.74	0.28	82	22							
	11/7/96	9:50			26000	7.9	7.7	6.3	0.99	1.90	1.10	55	15							
	11/22/96	9:50	S		1100	180.0	7.9	8.0	0.45	1.60	2.10	200	16	1	<3	7	4	<10	<0.1	22
	11/22/96	9:50	S	10										1	<3	13	9	<10	<0.1	47
	11/24/96	8:35	S		15000	9.1	7.8	7.5	0.61	1.30	1.00	52	10	<0.1	7	<5	0	<10	<0.1	8
	11/24/96	8:35	S	7										0.3	9	<5	2	<10	<0.1	13
	11/26/96	9:05	S		22000	4.6	7.8	11.0	0.61	1.00	0.74	45	15	<0.1	15	<5	<0.2	<10	<0.1	9
	11/26/96	9:05	S	3										<0.1	16	5	0.7	<10	<0.1	20
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													**0.43**	**>8.3**	**>6**	**3.9**	**>10**	**<0.1**	**26.6**
	12/5/96	13:35			30000	5.2	8.2	7.3	0.20	0.81	0.42	100	29							
	1/31/97	11:35			28000	8.1	8.0	16.0	0.15	1.00	0.52	60	18							
	3/13/97	9:25			41000	7.4	8.1	7.5	0.57	1.00	0.40	91	24							
	4/17/97	9:05			35000	3.0	7.9	12.0	0.53	1.30	0.58	68	21							
	5/22/97	10:45			43000	12.0	7.9	4.9	0.43	0.82	0.49	84	29							
	6/12/97	13:50			43000	8.1	8.2	3.6	0.21	0.82	0.50	140	38							
	7/10/97	13:10	M		47000	2	8.3	1.4	0.2	0.5	<0.2	160	89							
	8/14/97	14:20	M		41000	4	8.3	6.0	<0.5	1.1	0.6	81	27							
	10/30/97	10:05	M		43000	4.0	8.0	3.8	0.3	1.1	0.5	85	21							
	11/21/97	13:25	M		28000	9	7.8	7.6	0.8	1.4	0.5	120	50							
	12/6/97	10:30	S		360	2200	8.5	4.2	0.6	7.2	12	1600	1400	8	170	100	75	94	<1	620
	12/6/97	10:30	S/F											<1	<10	<4	<2	<4	<1	15
	12/6/97	10:30	S	9.8										10	180	110	80	110	<1	600
	12/6/97	10:30	S/F	9.8										<1	<10	5	<2	<4	<1	24
	12/10/97	7:45	S		27000	10	7.9	6.2	0.2	0.6	0.6	60	20	<1	<4	21	<2	7	<1	32
	12/10/97	7:45	S/F																	
	12/10/97	7:45	S	7.2										<1	<4	18	<2	6	<1	21
	12/10/97	7:45	S/F	7.2										<1	<4	14	<2	7	<1	29
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													**>3.2**	**>60**	**>42.7**	**>26.7**	**>38.7**	**<1**	**>207**

STATION	DATE	TIME		Depth feet	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L
UNBSDC	1/21/98	8:50	M		17000	7.2	8.0	18	<0.5	1.1	1	36	19							
	2/7/98	9:15	M		640	130	7.8	6.6	<0.5	1.3	2	120	18							
	3/26/98	10:15	S		7390	44	7.6	11	0.7	1.2	10	42	7							
	3/26/98	10:15	S	8.9										<1	9	7	<2	4	<2	22
	3/26/98	10:15	S/F	8.9										<1	<8	5	<2	<4	<2	<10
	3/26/98	10:15	S	6.6	17700	100	7.9	8.8	0.6	1.0	11	116	16							
	3/28/98	10:45	S		3690	220	8.0	7.0	0.4	2.0	0.9	13	3	<10	17	<10	<10	<10	<10	<50
	3/28/98	10:45	S	6.6										2	27	23	17	16	<2	127
	3/28/98	10:45	S/F	6.6										<1	<8	5	<2	<4	<2	10
	3/28/98	10:45	S		25900	120	8.1	4.4	0.3	1.0	0.6	176	11	<10	12	<10	<10	<10	<10	<50
	3/30/98	10:15	S		31700	1.7	8.2	4.0	0.2	1.0	0.6	3	1							
	3/30/98	10:15	S	9.8										<1	<8	13	<2	<4	<2	<10
	3/30/98	10:15	S/F	9.8										<1	<8	11	<2	<4	<2	12
									4-day average [dissolved metals]					<1	<8	7	<2	<4	<2	>7.3
	4/21/98	10:08	M		21400	3.4	8.4	25	<0.1	1.0	0.6	13	2							
	6/23/98	11:30	M		42700	8.4	8.0	3.0	<0.05	1.5	0.5	190	52							
	7/16/98	11:00	D	3.1																
	8/13/98	9:30	D	11.8	43100	13.0	7.7	2.7	1.10	0.30	0.40	120	14							
	10/15/98	9:45	D		39200	3.8	7.8	6.4	1.15	0.28	0.37	29	7							
	11/4/98	10:30	D	15.5	45200	5.2	7.9	2.2	0.87	0.15	0.28	190	24							
	12/15/98	9:45	D	14.3	36600	8.0	7.8	6.3	0.75	0.30	0.28	72	12							
	1/7/99	8:55	D	13.6	38400	4.4	7.8	8.0	0.45	0.19	0.15	75	10							
	1/25/99	13:45	ST		10700	22.0	7.8	8.8	1.52	0.42	0.64	56	14	<1	<8	10	4	<4	<2	29
	1/25/99		SF	13.8										<1	<8	5	<2	<4	<2	17
	1/27/99	14:30	ST		6310	19.0	7.7	7.7	1.03	0.32	0.77	52	16	<1	<8	8	4	7	<2	31
	1/27/99		SF	7.5										<1	<8	3	<2	<4	<2	23
	1/29/99	9:15	ST		34600	11.0	7.8	3.6	0.77	0.18	0.31	89	9	<1	<8	8	<2	6	<2	14
	1/29/99	9:15	SF	13.1										<1	<8	6	<2	5	<2	<10
									4-day average [dissolved metals]					<1	<8	5	<2	>1.6	<2	>13.3
	3/3/99	9:50	D	15.5	42800	4.2	8.0	5.2	<0.2	0.22	0.18	76	10							
	4/12/99	10:30	ST		7220	18.0	7.8	7.0	0.78	0.27	0.63	33	9	<1	<8	14	<2	8	<2	15
	4/12/99		SF	13.1										<1	<8	6	<2	8	<2	<10
	4/14/99	8:50	ST		32100	3.4	7.9	5.2	0.72	0.14	0.35	56	8	<1	<8	10	<2	11	<2	13
	4/14/99		SF	6.6										<1	<8	9	<2	10	<2	<10
	4/16/99	10:25	ST		27200	6.6	8.0	17.7	0.63	0.18	0.43	84	12	<1	<8	16	<2	8	<2	28
	4/16/99		SF	4.3										<1	<8	13	<2	7	<2	12
									4-day average [dissolved metals]					<1	<8	9.3	<2	8.3	<2	>4.0
	5/27/99	10:30	D	13.6	36000	3.4	8.1	7.1	0.68	0.08	0.25	64	9							
	6/30/99	11:55	D	9.3	42000	5.3	8.2	<0.44	0.44	0.09	0.22	78	14							

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STATION	DATE	TIME	Depth feet	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L
UNBBCW	10/28/94	10:10		41000	1.7	8.4	1.30	0.27	0.76	0.52	65	12							
	12/1/94	11:00		49000	1.3	8.0	1.70	0.30	0.95	0.35	97	22							
	3/5/95	12:35 S		1400	270.0	8.0	5.60	0.29	1.80	2.80	280	48	<1	19	19	<2	<40	<1	66
	3/5/95	12:40 S	2										<1	25	24	11	<40	<1	93
	3/7/95	9:40 S		2200	44.0	7.7	9.30	0.30	1.80	1.60	32	10	<1	<10	8	<2	<40	<1	15
	3/7/95	9:45 S	1										<1	15	15	6	<40	<1	53
	3/9/95	8:50 S		8400	10.0	8.0	22.00	0.23	1.60	1.10	42	10	<1	<10	6	<2	<40	<1	<10
	3/9/95	8:55 S	12										<1	<10	<20	<2	61	<1	25
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)												**<1**	**>13**	**>13**	**>5.6**	**>17**	**<1**	**57**
	3/23/95	12:45 S		7100	12.0	7.9	22.00	0.29	1.10	1.30	58	11	<1	<10	7	<2	<40	1.6	21
	3/23/95	12:50 S	9										<1	<10	11	<2	46	<1	48
	3/25/95	9:25 S		14000	10.0	8.0	12.00	0.33	0.96	1.40	24	9	<1	<10	5	<2	<40	<1	<10
	3/25/95	9:30 S	1										<1	<10	6	<2	<40	<1	19
	3/27/95	10:45 S		38000	5.7	8.0	11.00	0.20	0.86	0.76	55	22	<1	<10	<4	<2	<40	<1	14
	3/27/95	10:50 S	3										1	11	23	6	<40	<1	81
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)												>0.3	>3.6	13	>2	>15	<1	49
	5/18/95	9:00		46000	9.7	7.9	4.90	0.37	0.49	0.32	72	21							
	6/15/95	11:40		49000	9.1	8.0	0.43	0.13	0.63	<0.20	85	24							
	7/28/95	11:10		48000	6.3	8.6	<0.20	<0.10	0.60	0.36	110	45							
	8/31/95	12:05		49000	3.8	8.4	<0.20	<0.10	0.53	<0.20	68	34							
	9/21/95	11:45		43000	2.9	8.4	3.20	<0.10	1.00	0.33	63	27							
	10/31/95	11:00		40000	8.1	8.2	9.90	0.34	0.78	0.42	54	23							
	11/16/95	11:45		39000	3.8	8.3	10.00	0.39	0.80	0.34	59	24							
	12/7/95	11:30		48000	4.6	8.1	1.70	0.18	0.81	0.53	81	21							
	1/4/96	12:45		43000	2.1	8.1	3.20	<0.10	1.00	0.32	81	19							
	2/1/96	10:55 S		9300	47.0	7.7	9.30	0.18	1.40	1.20	38	14	<1	<5	5	<2	12	3	22
	2/1/96	11:00 S	0										<1	<5	26	<2	4	3	<10
	2/3/96	9:15 S		34000	4.6	8.2	3.00	0.10	1.90	0.43	61	20	<1	<5	<2	<2	<20	<1	28
	2/3/96	9:20 S	3										<1	<5	3	<2	<20	2	50
	2/5/96	11:05 S		35000	6.2	8.0	3.90	0.19	1.20	0.48	55	8	<1	<5	2	<2	<2	6	26
	2/5/96	11:10 S	2										<1	<5	2	<2	5	<2	13
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)												**<1**	**<5**	**10.3**	**<2**	**>3.0**	**>1.7**	**>21.0**
	2/15/96	11:30		37000	7.9	7.2	4.50	0.47	0.60	0.67	93	27							

NEWPORT BAY

STATION	DATE	TIME		Depth feet	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L
UNBBCW	2/20/96	10:15	S		5500	150.0	6.9	10.00	0.47	1.60	1.40	150	23	1	9	12	3	8	4	42
	2/20/96	10:20	S	17										<1	8	16	<2	8	5	73
	2/22/96	10:15	S		9100	42.0	7.7	6.80	0.26	0.98	0.94	31	7	<1	<5	<4	<2	<4	<1	23
	2/22/96	10:20	S	2										<1	<5	<4	<2	<4	<1	31
	2/24/96	11:45	S		27000	6.0	8.1	6.30	0.37	0.78	0.81	54	17	4	<5	<8	<8	<8	<5	23
	2/24/96	11:50	S	10										<1	<5	13	<2	<8	<5	41
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													**<1**	**>2.7**	**>9.7**	**<2**	**>2.7**	**>1.7**	**48**
	3/28/96	9:45			31000	4.6	8.5	12.00	0.31	0.94	0.29	90	24							
	4/25/96	12:00			29000	5.4	8.4	9.50	0.34	1.00	0.31	73	21							
	5/31/96	9:30			39000	4.3	8.3	<0.20	<0.10	0.85	0.24	140	59							
	6/21/96	9:50			30000	3.3	8.6	5.00	0.25	0.70	0.44	290	110							
	7/30/96	11:27			37000	1.7	8.1	<0.2	0.15	<0.50	0.26	120	38							
	8/29/96	11:15			33000	3.0	8.1	<0.2	0.21	0.60	0.25	86	31							
	9/26/96	9:15			35000	5.2	8.1	<0.2	0.29	0.65	0.36	99	29							
	11/7/96	10:05			30000	6.6	7.7	2.4	0.77	1.50	0.92	69	23							
	11/22/96	10:20	S		1100	200.0	7.9	7.0	0.48	1.60	2.10	250	24	1	<3	8	5	<10	<0.1	25
	11/22/96	10:20	S	11.6										2	6	23	16	<10	<0.1	102
	11/24/96	8:50	S		22000	5.3	7.9	2.8	0.40	0.91	0.76	61	11	<0.1	8	<5	<0.1	<10	<0.1	8
	11/24/96	8:50	S	9.2										0.2	7	<5	0.6	<10	<0.1	11
	11/26/96	9:25	S		30000	4.3	7.9	1.6	0.27	0.68	0.43	48	12	<0.1	12	<5	<0.2	<10	<0.1	9
	11/26/96	9:40	S	7										0.3	15	6	0.9	10	<0.1	18
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													**0.83**	**9.3**	**>9.6**	**5.8**	**>3.3**	**<0.1**	**43.6**
	12/5/96	13:55			31000	3.8	8.2	6.2	0.47	0.68	0.34	86	22							
	1/31/97	11:50			28000	6.8	8.1	16.0	0.23	1.20	0.52	65	17							
	3/13/97	9:35			44000	5.1	8.1	4.8	0.58	0.97	0.47	110	36							
	4/17/97	9:25			40000	3.1	7.9	6.9	<0.50	1.30	0.55	82	26							
	5/22/97	11:00			47000	8.0	8.0	0.9	0.31	0.62	0.56	120	33							
	6/12/97	13:35			45000	10.0	8.2	2.4	<0.10	0.81	0.45	170	40							

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STATION	DATE	TIME		Depth feet	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L
UNBBCW	7/10/97	12:55	M		45000	1.7	8.3	1.7	<0.1	0.5	<0.2	190	110							
	8/14/97	14:45	M		40000	4.6	8.3	1.3	<0.5	1.1	0.5	83	26							
	10/30/97	10:20	M		49000	3.2	8.0	0.5	0.2	0.7	0.3	95	22							
	11/21/97	13:50	M		35000	5.8	7.8	4.3	0.6	1.1	0.3	180	73							
	12/6/97	10:50	S		1200	2000	8.2	3.6	0.5	4.4	6.3	1100	970	4	110	66	37	59	<1	310
	12/6/97	10:50	S/F											<1	<10	<4	<2	<4	<1	34
	12/6/97	10:50	S	3.9										5	120	7.7	43	68	<1	320
	12/6/97	10:50	S/F	3.9										<1	<10	4.0	<2	<4	<1	25
	12/10/97	8:05	S		37000	19	7.9	3	0	0.6	0.6	120	29	1	4	23	<2	8	<1	52
	12/10/97	8:05	S/F											<1	<4	6	<2	7	<1	27
	12/10/97	8:05	S	3.9										<1	<4	22	<2	7	<1	17
	12/10/97	8:05	S/F	3.9										<1	<4	20	<2	6	<1	22
								4-day average [dissolved metals]						**<1**	**<6**	**10**	**<2**	**>4.3**	**<1**	**25**
	1/21/98	9:05	M		22000	5.9	8.0	12	<0.5	1.2	0.4	46	17							
	2/7/98	9:40	S		2400	100	7.8	7.9	<0.5	1.5	2.0	310	31							
	3/26/98	10:30	S		9810	55	7.9	9.2	0.6	1.1	1.2	43	8							
	3/26/98	10:30	S	3.3										<1	11	10	4	6	<2	36
	3/26/98	10:30	S/F	3.3										<1	<8	6	<2	<4	<2	<10
	3/28/98	11:00	S		1780	45	8.0	6.6	0.1	1.0	0.9	45	7	<10	<10	<10	<10	<10	<10	<50
	3/28/98	11:00	S	3.3										<10	<10	<10	<10	<10	<10	<50
	3/28/98	11:00	S/F	3.3										<1	<8	7	<2	<4	<2	22
	3/30/98	10:45	S		41000	1.9	8.1	1.8	0.2	1.0	<0.1	2	<1							
	3/30/98	10:45	S	7.9										<1	<8	20	<2	<4	<2	<10
	3/30/98	10:45	S/F	7.9										<1	<8	13	<2	<4	<2	<10
								4-day average [dissolved metals]						**<1**	**<8**	**8.7**	**<2**	**<4**	**<2**	**>12.0**
	4/21/98	10:24	M		24900	3.2	8.5	22.44	0.10	1.60	0.100	6	1							
	6/23/98	12:10	M		47200	14	7.8	1.3	0.10	<1	0.280	110	26							
	7/16/98	10:45	D	6.2	41600	7.7	8.1	1.7	2.60	0.15	0.092	200	44							
	8/13/98	9:00	D	5.6	43600	7.6	7.7	2.4	1.00	0.35	0.337	110	12							
	10/15/98	10:10	D		42600	4.4	7.9	3.1	1.11	0.22	0.337	37	8							
	11/4/98	10:50	D	4.0	48500	5.8	7.9	1.3	0.79	0.10	0.275	190	28							
	12/15/98	10:00	D	9.3	40300	5.4	7.8	3.56	0.30	0.20	0.245	78	17							
	1/7/99	8:35	D	13.6	47800	13.0	7.9	3.8	0.36	0.15	0.153	110	14							
	1/25/99	12:00	ST		17500	19.0	7.9	14.0	1.38	0.46	0.581	72	11	<1	<8	9	2	<4	<2	21
	1/25/99		SF	14.4										<1	<8	6	<2	<4	<2	15
	1/27/99	15:00	ST		6290	15.0	7.6	7.0	1.0	0.31	0.734	54	14	<1	<8	5	<2	4	<2	19
	1/27/99		SF	13.5										<1	<8	3	<2	4	<2	11
	1/29/99	11:06	ST		29500	12.0	7.8	6.4	0.6	0.28	0.428	69	9	<1	<8	9	<2	5	<2	20
	1/29/99	11:06	SF	14.8										<1	<8	8	<2	6	<2	13
									4-day average [dissolved metals]					<1	<8	5.7	<2	>3.3	<2	13

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STATION	DATE	TIME		Depth feet	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L
UNBBCW	3/3/99	10:15	D	14.0	47400	2.5	8.1	1.5	0.4	0.06	0.092	69	10							
	4/12/99	11:00	ST		10300	22.0	7.9	9.2	0.8	0.30	0.673	52	13	<1	<8	10	<2	9	<2	14
	4/12/99		SF	15.1										2	<8	9	<2	9	<2	15
	4/14/99	9:30	ST		38500	1.7	8.0	2.9	0.7	0.05	0.226	26	5	<1	<8	10	<2	10	<2	11
	4/14/99		SF	18.4										<1	<8	9	<2	10	<2	11
	4/16/99	10:50	ST		46100	3.3	8.0	1.1	0.6	0.05	0.153	150	13	<1	<8	15	<2	7	<2	12
	4/16/99		SF	12.8										<1	<8	14	<2	7	<2	<10
									4-day average [dissolved metals]					**<1**	**<8**	**10**	**<2**	**8.7**	**<2**	**>8.7**
	5/27/99	10:45	D	15.5	41000	2.3	8.0	3.3	0.5	0.09	0.214	70	8							
	6/30/99	11:40	D	9.9	47500	2.3	8.2	0.4	0.2	<0.05	0.101	81	16							

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STATION	DATE	TIME	Depth feet	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L
UNBNSB	10/28/94	10:20		49000	1.4	8.3	1.00	0.21	0.74	0.21	79	13							
	12/1/95	11:10		49000	1.2	8.1	1.40	0.26	0.85	0.28	99	33							
	3/5/95	12:55 S		3000	310.0	7.9	5.30	0.33	1.80	3.20	410	54	<1	14	20	3	<40	<1	70
	3/5/95	13:00 S	6										6	95	76	39	62	<1	410
	3/7/95	10:00 S		2800	50.0	7.7	7.10	0.29	1.90	1.60	29	8	1	<10	8	<2	<40	<1	25
	3/7/95	10:05 S	3										<1	<10	7	<2	<40	<1	31
	3/9/95	9:10 S		9600	9.4	8.0	17.00	0.24	1.60	1.10	21	<6	<1	<10	6	<2	<40	<1	<10
	3/9/95	9:15 S	8										<1	<10	<20	<2	<40	<1	18
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)												**>2**	**>32**	**>28**	**>13**	**>21**	**<1**	**153**
	3/23/95	13:00 S		13000	8.0	7.9	13.00	0.29	0.96	1.10	40	11	<1	<10	8	<2	<40	1.8	25
	3/23/95	13:05 S	3										<1	<10	6	<2	<40	1.7	28
	3/25/95	9:45 S		18000	9.2	7.9	9.70	0.25	0.85	1.20	30	12	<1	<10	5	<2	<40	<1	<10
	3/25/95	9:50 S	8										<1	<10	4	<2	<40	<1	<10
	3/27/95	11:00 S		43000	7.3	8.1	6.20	0.20	0.86	0.66	50	14	<1	<10	5	<2	<40	<1	19
	3/27/95	11:05 S	5										<1	10	16	3	<40	<1	55
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)												**<1**	**>3**	**>8**	**>1**	**<40**	**<1**	**>27**
	5/18/95	9:10		48000	6.5	8.0	3.20	0.60	0.50	0.24	64	20							
	6/15/95	11:55		49000	7.4	8.0	0.32	0.11	0.71	<0.20	65	23							
	7/28/95	11:25		50000	3.6	8.2	<0.20	<0.10	0.54	0.21	94	35							
	8/31/95	12:20		50000	3.6	8.3	<0.20	<0.10	0.53	<0.20	57	27							
	9/21/95	12:10		46000	3.5	8.3	1.50	<0.10	0.77	0.23	79	30							
	10/31/95	10:40		47000	3.4	8.2	4.00	0.25	0.77	0.36	90	38							
	11/16/95	12:00		42000	3.0	8.3	8.20	0.37	0.78	0.24	71	33							
	12/7/95	11:45		48000	5.0	8.1	1.60	0.20	0.70	0.33	80	23							
	1/4/96	12:55		43000	1.7	8.1	2.70	<0.10	0.94	0.31	97	27							
	2/1/96	11:15 S		8900	76.0	7.9	11.00	0.26	3.20	1.40	47	13	<1	<5	8	<2	8	3	<10
	2/1/96	11:20 S	12										3	6	26	3	8	5	45
	2/3/96	9:30 S		35000	3.4	8.2	2.90	<0.10	1.90	0.45	87	30	<1	<5	2	<2	<20	<1	22
	2/3/96	9:35 S	7										<1	6	9	<2	<20	1	90
	2/5/96	11:20 S		36000	6.1	8.0	2.80	0.16	1.20	0.49	74	16	<1	<5	2	<2	<2	2	<10
	2/5/96	11:25 S	13										<1	<5	4	<2	<4	5	21
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)												**>1**	**>4**	**13**	**>1**	**>2.7**	**3.7**	**52**
	2/15/96	11:45		38000	6.4	7.4	4.30	0.37	<0.50	0.42	95	24							

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STATION	DATE	TIME		Depth feet	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L
UNBNSB	2/20/96	10:35	S		13000	72.0	7.4	7.90	0.44	1.20	0.91	84	17	<1	<5	13	<2	5	1	30
	2/20/96	10:40	S	16										<1	6	12	<2	10	3	75
	2/22/96	10:00	S		10000	17.0	7.8	6.70	0.17	0.98	0.88	29	10	<1	6	<4	<2	<4	<1	21
	2/22/96	10:05	S	3										<1	<5	4	<2	10	<1	34
	2/24/96	11:30	S		26000	4.3	8.0	5.50	0.51	0.98	0.70	55	14	<1	<5	<8	<8	<8	<5	41
	2/24/96	11:35	S	10										<1	<5	8	<2	<8	<5	65
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													**<1**	**>2**	**8**	**<2**	**>7**	**>1**	**55**
	3/28/96	10:00			30000	4.7	8.5	11.00	0.31	0.75	0.21	91	25							
	4/25/96	9:15			29000	4.5	8.4	9.30	0.31	1.00	0.30	78	23							
	5/31/96	9:40			39000	2.6	8.3	0.70	<0.10	0.50	0.23	130	53							
	6/21/96	9:30			31000	3.5	8.6	4.80	0.19	0.80	0.42	250	91							
	7/30/96	11:42			37000	1.4	8.1	<0.2	0.10	<0.50	0.24	120	41							
	8/29/96	11:45			32000	2.3	8.1	<0.2	<0.10	0.58	<0.20	72	35							
	9/26/96	9:35			35000	3.5	8.0	<0.2	0.28	0.63	0.30	110	28							
	11/7/96	10:20			31000	5.4	7.8	1.8	<0.10	1.30	0.66	110	27							
	11/22/96	10:45	S		3200	250.0	7.9	7.2	0.49	1.80	2.40	380	33	1	<3	9	7	<10	<0.1	32
	11/22/96	10:45	S	12.4										3	7	26	22	<10	<0.1	122
	11/24/96	9:15	S		25000	4.5	8.0	2.3	0.39	0.82	0.72	71	14	<0.1	8	<5	<0.1	<10	<0.1	8
	11/24/96	9:15	S	13										0.3	9	<5	1	<10	<0.1	15
	11/26/96	9:40	S		29000	2.0	7.9	1.6	0.24	0.70	0.43	66	14	<0.1	13	<5	<0.2	<10	<0.1	11
	11/26/96	9:40	S	15.4										<0.1	14	<5	<0.2	11	<0.1	11
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													**>1.1**	**10**	**>8.6**	**>7.3**	**>3.6**	**<0.1**	**49.3**
	12/5/96	14:15			33000	2.9	8.1	4.3	0.37	0.63	0.20	94	26							
	1/31/97	12:05			33000	3.9	8.0	8.4	0.19	0.77	0.53	67	17							
	3/13/97	9:50			45000	5.5	8.0	3.0	<0.50	0.81	0.31	110	32							
	4/17/97	10:05			45000	4.4	7.9	0.9	<0.50	1.00	0.49	100	23							
	5/22/97	11:15			48000	12.0	8.1	0.7	0.26	0.60	0.28	90	31							
	6/12/97	13:20			46000	9.1	8.2	1.3	<0.1	0.69	0.41	180	39							
	7/10/97	12:40	M		49000	1.7	8.1	0.3	<0.1	0.5	<0.2	190	100							
	8/14/97	15:00	M		46000	4.5	8.2	0.2	<0.5	0.6	0.4	100	30							
	10/30/97	10:35	M		48000	3.9	8.0	0.5	0.2	0.8	0.3	50	17							
	11/21/97	14:05	M		40000	4.0	7.9	3.5	0.6	0.9	0.2	160	65							

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STATION	DATE	TIME		Depth feet	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L
JUNBNSB	12/6/97	11:15	S		380	2300	8.6	4.5	0.6	7.4	13	2800	2600	8	160	98	68	83	<1	520
	12/6/97	11:15	S/F											<1	<10	<4	<2	<4	<1	29
	12/6/97	11:15	S	17.7										8	180	110	74	90	<1	570
	12/6/97	11:15	S/F	17.7										<1	<10	<4	<2	<4	<1	22
	12/8/97	12:20	S		4800	37	7.6	13.0	<0.5	1.3	1.3	57	44	<10	<40	14	<20	<10	<10	<100
	12/8/97	12:20	S/F											<10	<40	33	<20	<10	<10	<100
	12/8/97	12:20	S	6.6										<10	<40	16	<20	<10	<10	<100
	12/8/97	12:20	S/F	6.6										<10	<40	17	<20	<10	<10	<100
	12/10/97	8:20	S		37000	20	7.9	3.5	0.2	1.1	0.7	110	29	<1	<4	21	<2	7	<1	16
	12/10/97	8:20	S/F											<1	<4	350	<2	6	<1	12
	12/10/97	8:20	S	14.8										<1	<4	39	<2	7	<1	18
	12/10/97	8:20	S/F	14.8										<1	<4	20	<2	7	<1	17
														<4	**<12**	**>12.3**	**>8.0**	**>2.3**	**<3**	**22**
	1/21/98	9:25	M		25000	5	8.0	11	<0.5	0.9	0.5	57	23							
	2/7/98	10:05	S		4000	110	7.8	7.5	<0.5	1.4	2.0	290	30							
	2/7/98	10:05	S	9.8	11000	450	7.7	7.5	<0.5	2.1	3.6	880	61							
	3/26/98	11:00	S		12600	58	7.9	9	0.5	1.1	1.2	57	6							
	3/26/98	11:00	S	3.3										<1	12	12	3	6	<2	29
	3/26/98	11:00	S/F	3.3										<1	<8	7	<2	<4	<2	<10
	3/26/98	11:00	S	3.3	22700	250	8.0	7.5	0.6	1.3	0.9	341	29							
	3/28/98	11:45	S		28300	11	8.0	4.0	<0.1	1.0	0.9	5	<1	<10	<10	<10	<10	<10	<10	<50
	3/28/98	11:45	S	3.3										<1	10	14	4	5	<2	44
	3/28/98	11:45	S/F	3.3										<1	<8	9	<2	<4	<2	20
	3/30/98	11:00	S		43400	2.1	8.7	1.8	0	1.0	<0.1	5	3							
	3/30/98	11:00	S	16.7										<1	<8	13	<2	<4	<2	<10
	3/30/98	11:00	S/F	16.7										6	<8	13	<2	<4	<2	<10
									4-day average [dissolved metals]					**<1**	**<8**	**9.7**	**<2**	**<4**	**<2**	**>6.7**
	4/21/98	10:35	M		29300	2.6	8.5	16	<0.1	1.0	<0.1	15	4							
	6/23/98	12:40	M		48900	8.5	7.8	<1.3	<0.05	<1.0	0.210	220	42							
	7/16/98	10:30	D	12.4	44300	7.30	8.10	<1.3	<0.05	1.6	0.092	180	36							
	8/13/98	8:45	D	10.9	47700	7.3	7.8	<1.3	<1	0.21	0.245	120	14							
	10/15/98	10:25	D		46600	5.4	7.8	<1.3	1.0	0.13	0.214	51	9							
	11/4/98	11:15	D	9.3	48600	5.5	7.9	1.7	0.9	0.09	0.245	260	30							
	12/15/98	10:20	D	13.3	41700	7.3	7.8	3.1	0.5	0.15	0.214	140	25							
	1/7/99	8:20	D	14.3	48900	6.0	7.9	3.1	0.3	0.12	0.092	98	11							

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STATION	DATE	TIME		Depth feet	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L
UNBNSB	1/25/99	11:05	ST		20100	17.0	7.9	6.4	1.5	0.39	0.551	67	13	<1	<8	10	<2	<4	<2	23
	1/25/99		SF	13.1										<1	<8	8	<2	<4	<2	23
	1/27/99	15:33	ST		13900	15.0	7.7	7.5	1.0	0.31	0.612	62	34	<1	<8	5	<2	5	<2	13
	1/27/99		SF	8.9										<1	<8	5	<2	5	<2	12
	1/29/99	10:40	ST		36100	10.0	7.8	3.8	0.6	0.19	0.306	90	10	<1	<8	8	<2	7	<2	17
	1/29/99	10:40	SF	12.1										<1	<8	7	<2	6	<2	12
									4-day average [dissolved metals]					<1	<8	6.7	<2	>3.7	<2	15.7
	3/3/99	10:35	D	16.4	47600	02	8.1	1.1	0.3	0.05	0.092	90	11							
	4/12/99	10:00	ST		11800	17.0	7.9	10.1	0.9	0.27	0.652	49	31	<1	<8	9	<2	9	<2	19
	4/12/99		SF	11.2										<1	<8	6	<2	8	<2	13
	4/14/99	9:50	ST		41500	1.6	8.0	1.8	0.4	<0.05	0.171	57	9	<1	<8	11	<2	11	<2	11
	4/14/99		SF	15.4										<1	<8	15	<2	<4	<2	10
	4/16/99	11:10	ST		45600	2.4	8.0	1.1	0.7	<0.05	0.153	150	14	<1	<8	16	<2	8	<2	11
	4/16/99		SF	11.2										<1	<8	15	<2	7	<2	<10
														<1	<8	12.3	<2	>5.0	<2	>7.7
	5/27/99	11:15	D	12.4	46300	1.5	8.1	1.1	0.3	<0.05	0.153	78	9							
	6/30/99	11:30	D	13.0	47700	2.8	8.1	<0.44	0.2	<0.05	0.101	75	14							
									4-day average [dissolved metals]											

NEWPORT BAY

STATION	DATE	TIME	Depth feet	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L
UNBNDB	10/28/94	10:30		50000	0.8	8.5	1.00	0.18	0.80	<0.20	90	18							
	3/5/95	13:10 S		6000	80.0	7.8	5.30	0.27	1.10	1.40	71	10	<1	<10	8	<2	<40	<1	21
	3/5/95	13:15 S	5										<1	25	30	13	<40	<1	97
	3/7/95	10:15 S		3500	16.0	7.7	4.10	0.34	1.40	1.10	12	<6	<1	<10	<4	<2	<40	<1	<10
	3/7/95	10:20 S	1										<1	<10	6	<2	<40	<1	20
	3/9/95	9:20 S		13000	9.1	7.9	5.50	0.24	1.40	1.00	19	11	<1	<10	6	<2	<40	<1	<10
	3/9/95	9:25 S	1										<1	<10	12	<2	<40	<1	12
				4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)									**<1**	**>8**	**16**	**>4**	**<40**	**<1**	**43**
	3/23/95	13:15 S		16000	8.5	7.9	9.40	0.30	1.20	1.10	35	11	<1	<10	5	<2	<40	1.3	20
	3/23/95	13:20 S	2										<1	<10	5	<2	<40	1.2	24
	3/25/95	10:00 S		17000	5.1	8.1	9.10	0.20	0.76	0.96	22	9	<1	<10	6	<2	<40	<1	19
	3/25/95	10:05 S	4										<1	<10	6	<2	<40	<1	14
	3/27/95	11:30 S		42000	8.6	8.1	3.90	0.22	0.88	0.65	63	21	<1	<10	5	<2	<40	<1	23
	3/27/95	11:35 S	4										2	24	37	12	51	<1	120
				4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)									**>0.6**	**>8**	**16**	**>4**	**>17**	**>0.4**	**53**
	5/18/95	9:20		49000	7.9	8.0	2.60	0.49	0.65	0.29	79	21							
	6/15/95	12:10		48000	6.8	8.0	0.89	0.14	0.60	<0.20	79	25							
	7/28/95	11:35		48000	2.9	8.3	<0.20	0.26	0.60	0.29	110	40							
	8/31/95	12:30		49000	2.4	8.4	<0.20	0.67	0.54	<0.20	68	32							
	9/21/95	12:30		46000	1.8	8.4	1.20	<0.10	0.70	<0.20	78	42							
	10/31/95	12:15		48000	3.1	8.2	2.90	0.32	0.93	0.29	75	27							
	11/16/95	12:20		45000	1.4	8.3	4.50	0.32	0.67	<0.20	100	41							
	12/7/95	12:00		48000	3.3	8.1	2.20	0.22	0.78	0.64	76	23							
	1/4/96	13:10		46000	2.7	8.2	0.60	<0.10	1.50	0.25	71	7							
	2/1/96	11:40 S		9600	18.0	7.8	9.00	0.20	1.40	0.76	29	20	<1	<5	6	<2	6	1	16
	2/1/96	22:45 S	4										<1	<5	7	<2	5	3	28
	2/3/96	9:40 S		35000	2.9	8.2	3.10	0.12	2.00	0.47	38	18	<1	<5	<2	<2	<20	<1	24
	2/3/96	9:45 S	10										<1	7	9	<2	<20	2	34
	2/5/96	11:35 S		33000	2.8	8.1	3.70	0.38	0.86	0.45	58	21	<1	<5	2	<2	<2	<2	<10
	2/5/96	11:40 S	4										<1	<5	5	<2	<4	4	26
				4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)									**<1**	**>2.3**	**7**	**<2**	**>1.7**	**3**	**29**
	2/15/96	12:00		40000	2.9	7.6	1.80	0.39	<0.50	0.24	68	26							

STATION	DATE	TIME		Depth feet	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L
UNBNDB	2/20/96	11:00	S		29000	22.0	7.7	4.30	0.26	0.92	0.65	69	19	<1	<5	11	<2	5	<1	27
	2/20/96	11:05	S	6										<1	<5	8	<2	8	3	51
	2/22/96	9:45	S		8300	15.0	7.8	7.00	0.23	1.40	0.93	18	12	<1	<5	<4	<2	<4	<1	61
	2/22/96	9:50	S	7										<1	<5	2	<2	<8	<1	69
	2/24/96	8:15	S		17000	4.2	8.0	5.50	0.36	0.93	0.96	37	14	<1	<5	<8	<8	<8	<5	37
	2/24/96	8:20	S	23										<1	<5	12	<2	<8	<5	54
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													**<1**	**<5**	**7.3**	**<2**	**>2.7**	**>1.0**	**58**
	3/28/96	10:10			35000	1.6	8.4	4.10	0.13	0.59	<0.20	99	27							
	4/25/96	9:30			36000	3.7	8.4	<0.20	0.30	0.86	<0.20	88	22							
	5/31/96	9:50			38000	2.7	8.4	1.80	<0.10	0.62	0.31	140	61							
	6/21/96	9:15			35000	2.1	8.5	2.80	0.25	0.73	0.35	220	74							
	7/30/96	12:00			36000	1.8	8.1	<0.2	0.10	0.56	0.30	120	40							
	8/29/96	12:00			32000	1.7	8.1	0.6	<0.10	0.72	0.32	95	35							
	9/26/96	10:05			33000	1.7	8.1	0.6	0.27	0.77	0.39	91	27							
	11/7/96	10:35			31000	1.4	7.9	1.9	0.48	1.20	0.57	78	27							
	11/22/96	11:05	S		2300	38.0	7.7	7.4	0.58	1.50	1.00	19	<6	<0.1	<3	<5	1	<10	<0.1	11
	11/22/96	11:05	S	3										0.9	<3	14	10	<10	<0.1	53
	11/24/96	9:25	S		19000	3.6	7.8	3.9	0.47	0.98	0.85	48	9	<0.1	7	<5	<0.1	<10	<0.1	8
	11/24/96	9:25	S	6.6										<0.1	8	<5	0.3	<10	<0.1	9
	11/26/96	9:55	S		30000	2.2	7.9	1.9	0.34	<0.50	0.25	76	18	<0.1	14	6	<0.2	<10	<0.1	10
	11/26/96	9:55	S	3										<0.1	16	6	0.7	11	<0.1	16
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													**>0.3**	**>8.0**	**>6.6**	**3.6**	**>3.6**	**<0.1**	**26**
	12/5/96	14:35			34000	4.0	8.1	2.8	0.47	0.60	<0.20	100	27							
	1/31/97	12:15			34000	1.7	8.1	3.3	<0.10	0.84	0.44	69	19							
	3/13/97	10:00			44000	3.5	8.0	4.3	<0.50	0.79	0.30	120	39							
	4/17/97	10:35			46000	3.6	8.2	<0.8	<0.50	0.87	0.42	110	27							
	5/22/97	11:30			46000	4.7	8.0	2.4	0.26	0.73	0.34	93	34							
	6/12/97	12:45			46000	5.5	8.3	1.1	<0.10	0.90	1.40	160	38							

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STATION	DATE	TIME		Depth feet	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L
UNBNDB	7/10/97	12:20	M		49000	1.9	8.4	0.4	<0.1	0.5	<0.2	180	100							
	8/14/97	13:30	M		45000	3.1	8.2	0.4	<0.5	0.8	0.4	85	31							
	10/30/97	10:55	M		48000	2.8	8.0	1.0	0.3	1.0	0.3	78	14							
	11/21/97	14:30	M		40000	2.8	7.9	3.8	<0.5	0.9	<0.2	150	38							
	12/6/97	11:45	S		2000	400	8.2	4.2	0.4	2.0	2.8	560	480	<1	15	11	5	7	<1	45
	12/6/97	11:45	S/F											<1	<10	<4	4	<4	<1	17
	12/6/97	11:45	S	5.6										10	210	130	100	110	<1	700
	12/6/97	11:45	S/F	5.6										<1	<10	<4	<2	<4	<1	14
	12/8/97	13:40	S		4300	29	7.7	4.3	<0.5	1.1	1.0	47	34	<10	<40	14	<20	<10	<10	<100
	12/8/97	13:40	S/F											<10	<40	11	<20	<10	<10	<100
	12/8/97	13:40	S	6.6										<10	<40	14	<20	<10	<10	<100
	12/8/97	13:40	S/F	6.6										<10	<40	15	<20	<10	<10	<100
	12/10/97	8:40	S		35000	6.0	7.8	2.3	0.2	0.8	0.6	82	24	<1	<4	21	<2	7	<1	20
	12/10/97	8:40	S/F											<1	<4	18	<2	6	<1	15
	12/10/97	8:40	S	10.8										<1	<4	19	<2	7	<1	25
	12/10/97	8:40	S/F	10.8										<1	<4	18	<2	6	<1	16
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													>3.3	>70	54	>33.3	>38.9	<4	>242
	1/21/98	10:20	M		36000	1.6	8.0	7.2	<0.5	0.8	0.3	43	17							
	2/7/98	10:25	S		2400	27	7.8	4.4	<0.5	0.9	0.9	20	8							
	2/7/98	10:25	S	3.3	1900	48	7.8	4.4	<0.5	0.9	1.0	70	17							
	3/26/98	11:30	S		6970	16	7.7	8.8	0.1	1.0	1.2	2	<1							
	3/26/98	11:30	S	7.9										<1	9	9	<2	<4	<2	20
	3/26/98	11:30	S/F	7.9										<1	<8	7	<2	4	<2	11
	3/26/98	11:30	S	7.9	16400	16	7.8	7.5	0.7	1.1	0.6	6	4							
	3/28/98		S		32900	15	8.1	2.2	<0.1	1.0	0.3	6	1	<10	<10	<10	<10	<10	<10	<50
	3/28/98		S	7.9										<1	10	16	4	5	<2	48
	3/28/98		S/F	7.9										<1	<8	11	<2	<4	<2	23
	3/30/98	11:15	S		35600	7.0	8.1	2.6	0	1.0	0.6	10	5							
	3/30/98	11:15	S	7.9										<1	<8	14	<2	<4	<2	12
	3/30/98	11:15	S/F	7.9										3	<8	12	<2	<4	<2	11
									4-day average [dissolved metals]					**>1**	**<8**	**10**	**<2**	**>1.6**	**<2**	**15**
	4/21/98	10:50	M		37500	3.2	8.4	15	<0.1	1.0	<0.1	26	4							
	6/23/98	9:55	M		46500	3.1	7.9	1.3	<0.05	<1.0	0.090	140	23							
	7/16/98	9:15	D		46000	2.8	8.0	<1.3	<1	0.07	0.122	110	18							
	8/13/98	8:30	D	7.1	47300	5.1	7.8	<1.3	<1	0.20	0.214	110	14							
	10/15/98	10:35	D		46100	2.4	8.0	<1.3	0.85	0.11	0.214	52	7							
	11/4/98	9:00	D	9.3	47500	0.9	7.9	2.8	0.69	0.13	0.275	67	10							
	12/15/98	8:30	D	11.5	43100	3.7	7.8	2.2	<0.2	0.12	0.184	90	17							
	1/7/99	8:00	D	9.3	49700	1.9	7.9	1.9	0.45	0.10	0.092	69	10							

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STATION	DATE	TIME	Depth feet	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L
UNBNDB	1/25/99	10:45 ST		35200	5.8	7.8	5.3	1.07	0.28	0.245	70	9	<1	<8	11	<2	<4	<2	23
	1/25/99	SF	6.60										<1	<8	11.1	<2	<4	<2	23.6
	1/27/99	9:40 ST		16000	14.0	7.7	7.3	0.98	0.30	0.551	70	18	<1	<8	5	<2	<4	<2	18
	1/27/99	SF	4.6										<1	<8	5	<2	4.22	<2	16
	1/29/99	8:31 ST		30800	2.4	7.8	5.0	0.61	0.24	0.337	51	8	<1	<8	8	<2	4.78	<2	16
	1/29/99	8:31 SF	9.8										<1	<8	8	<2	4.37	<2	18
								4-day average [dissolved metals]					<1	<8	8.0	<2	2.8	<2	19.3
	3/3/99	8:30 D	10.5	47200	1.8	8.1	2.2	0.36	0.10	0.122	82	12							
	4/12/99	9:40 ST		18200	11.0	8.0	5.4	0.62	0.16	0.407	50	27	<1	<8	9	<2	10.60	<2	17
	4/12/99	SF	15.7										<1	<8	10	<2	10.30	<2	24
	4/14/99	8:15 ST		34400	1.7	8.0	4.2	0.47	0.11	0.282	58	7	<1	<8	10	<2	10.60	<2	12
	4/14/99	SF	7.5										<1	<8	10	<2	10.50	<2	11
	4/16/99	9:20 ST		39800	1.7	7.9	2.7	1.74	0.12	0.184	130	14	<1	<8	14	<2	8.29	<2	12
	4/16/99	SF	7.2										<1	<8	15	<2	7.24	<2	14
								4-day average [dissolved metals]					<1	<8	11.7	<2	9.3	<2	16.3
	5/27/99	9:15 D	7.8	43800	1.1	8.1	2.0	0.40	0.05	0.153	74	8							
	6/30/99	11:15 D	4.3	46200	2.0	8.2	<0.44	<0.2	<0.05	0.162	70	10							

NEWPORT BAY

STATION	DATE	TIME		Depth feet	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L
UNBCHB	4/24/91	12:30												<2	<6	<4	<2	<10	<2	<10
	6/20/91	12:40												33	<10	<30	<20	<10	<2	<10
	7/24/91	14:30			50000	2.4	8.1	0.50	0.70	1.10	4.30	30	16	<1	<5	<5	<10	<40	<3	<20
	3/21/92	12:15	S		7400	22.0	7.7	5.60	0.20	0.90	0.90	16	7	<2	<6	<4	<2	<10	<2	40
	3/21/92	12:15	S											<2	<6	<4	<2	<10	<2	20
	3/23/92	12:05	S		9200	9.0	7.7	5.00	0.10	0.40	0.80	6	7	4	<6	5	<2	<10	<2	20
	3/23/92	12:05	S	15										2	<6	8	4.0	<10	<2	<10
	3/25/92	13:15	S		19000	6.9	7.7	4.40	0.10	<0.10	1.10	7	9	<20	<30	<20	<2	<40	<10	10
	3/25/92	13:15	S	13										<20	<30	<20	<2	<40	<10	20
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													**>0.6**	**<14**	**>2**	**>1**	**<20**	**<4**	**>13**
	4/23/92	10:45			47000	1.2	8.2	3.70	<0.10	0.10	<0.10	86	22	<20	<30	<20	<2	<40	<10	20
	10/29/92	11:45			50000	2.1	8.0	0.20	0.15	0.40	0.18	89	41	<20	<30	<20	<2	<40	15	25
	1/7/93	11:25	S		9500	660.0	7.8	1.80	0.23	0.58	4.80	1000	120	<20	<30	<20	13	<40	<10	67
	1/7/93	11:30	S	16	8800	930.0	7.9	3.90	0.23	2.10	4.80	1200	140	<20	<30	<20	18	<40	<10	72
	1/9/93	11:05	S		33000	11.0	8.0	2.70	0.32	0.45	5.00	47	17	<20	<30	<20	<2	<40	12	27
	1/9/93	11:10	S	18	40000	29.0	8.1	1.40	0.28	0.50	6.80	150	37	<20	<30	<20	<2	<40	<10	19
	1/11/93	15:10	S		35000	16.0	8.0	3.60	0.41	0.96	0.82	91	20	<20	<30	<20	<2	<40	13	17
	1/11/93	15:15	S	16	37000	18.0	8.1	3.20	0.40	0.92	0.56	120	23	<20	<30	<20	<2	<40	12	17
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													**<20**	**<30**	**<20**	**>6**	**<40**	**>4**	**36**
	2/19/93	11:00	S		22000	180.0	8.0	4.60	0.24	0.74	2.00	290	33	<7	<10	<30	7.2	<3	<4	<20
	2/19/93	11:00	S	N/A	23000	220.0	8.0	5.10	0.21	0.80	1.60	360	39	<7	<12	<30	7.7	<3	<4	50
	2/21/93	10:40	S		20000	9.4	8.0	3.30	0.21	0.41	0.75	43	17	<7	<10	<30	<2	<3	<4	<20
	2/21/93	10:40	S	13	34000	330.0	8.1	1.70	0.23	0.40	0.76	770	66	<7	16	<30	13.0	<3	<4	71
	2/23/93	10:45	S		40000	4.1	8.2	2.20	0.16	0.48	<0.10	72	14	<7	<10	<30	<2	<3	<4	<20
	2/23/93	10:45	S	20	44000	4.8	8.2	1.10	0.15	0.33	<0.10	66	14	<7	<10	<30	<2	<3	<4	<20
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													**<7**	**>5.3**	**<30**	**>7**	**<3**	**<4**	**>40**
	3/18/93	10:30			46000	15.0	8.4	1.40	0.12	0.56	0.30	96	22							
	10/27/93	11:00			47000	5.0	7.9	0.32	0.38	1.20	0.25	76	25	<5	<10	<20	<2	<40	15	20

STATION	DATE	TIME		Depth feet	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L
UNBCHB	1/25/94	12:50	S		36000	13.0	7.9	5.30	0.47	1.10	0.42	150	13	<5	<10	<20	<2	<40	11	29
	1/25/94	12:55	S	14										<5	<10	<20	<2	<40	17	48
	1/27/94	12:30	S		40000	23.0	8.0	3.10	0.35	0.50	<0.10	130	30	<5	<10	<20	<2	<40	11	26
	1/27/94	12:35	S	N/A										<5	<10	<20	<2	<40	11	37
	1/29/94	11:00	S		46000	1.0	8.0	0.94	0.39	0.81	<0.10	160	15	<5	<10	<20	<2	<40	16	35
	1/29/94	11:05	S	13										<5	<10	<20	<2	<40	14	22
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													**<5**	**<10**	**<20**	**<2**	**<40**	**14**	**36**
	2/7/94	11:50	S		34000	31.0	7.8	5.20	0.64	0.84	0.79	150	24	<5	<10	<20	3.4	<40	10	77
	2/7/94	11:55	S	10										<5	<10	<20	6.4	<40	12	56
	2/9/94	11:45	S		35000	24.0	7.9	2.80	0.13	0.15	0.43	150	23	<5	<10	<20	<2	<40	<10	20
	2/9/94	11:50	S	12										<5	<10	<20	<2	<40	<10	20
	2/11/94	11:30	S		48000	8.2	8.1	1.20	0.13	0.43	0.15	220	34	<5	<10	<20	<2	<40	10	15
	2/11/94	11:35	S	N/A										<5	<10	<20	<2	<40	11	23
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													**<5**	**<10**	**<20**	**>2**	**<40**	**>8**	**33**
	4/21/94	11:00			48000	3.0	8.3	1.60	0.24	1.10	0.34	82	<5							
	3/5/95	13:25	S		9900	100.0	8.0	5.10	0.27	1.10	1.60	130	20	<1	<10	11	3	<40	<1	28
	3/5/95	13:30	S	N/A										<1	<10	14	5	<40	1.1	60
	3/7/95	10:30	S		5900	26.0	7.8	5.10	0.25	1.60	1.30	32	10	<1	<10	6	<2	<40	<1	<10
	3/7/95	10:35	S	13										<1	<10	<4	<2	49	<1	30
	3/9/95	9:40	S		17000	11.0	8.0	11.00	0.27	1.20	1.00	36	14	<1	<10	<4	<2	<40	<1	<10
	3/9/95	9:45	S	14										<1	<10	16	<2	<40	<1	15
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													**<1**	**<10**	**>10**	**>1**	**>16**	**>0.36**	**35**
	3/23/95	13:30	S		21000	4.2	8.0	9.10	0.29	0.92	1.10	34	13	<1	<10	5	<2	<40	1.5	16
	3/23/95	13:35	S	13										<1	<10	<4	<2	51	<1	42
	3/25/95	10:25	S		25000	6.8	8.0	7.00	0.29	0.81	1.00	41	16	<1	<10	<4	<2	<40	<1	<10
	3/25/95	10:30	S	9										<1	<10	7	<2	<40	<1	<10
	3/27/95	12:00	S		46000	10.0	8.1	3.70	0.21	0.81	0.65	69	21	<1	<10	<4	<2	<40	<1	20
	3/27/95	12:05	S	13										<1	<10	7	<2	<40	<1	46
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													**<1**	**<10**	**>4**	**<2**	**>17**	**<1**	**>29**

NEWPORT BAY

STATION	DATE	TIME		Depth feet	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L
UNBCHB	2/1/96	12:05	S		18000	36.0	7.8	7.70	0.33	1.60	0.97	47	18	8	<5	6	<2	5	2	<10
	2/1/96	12:10	S	8										2	<5	6	2	9	2	16
	2/3/96	10:15	S		37000	2.1	8.3	2.10	0.10	1.80	0.38	32	12	<1	<5	<2	<2	<20	<1	39
	2/3/96	10:20	S	20										<1	<5	2	<2	<20	<1	21
	2/5/96	11:50	S		41000	4.8	8.1	1.40	<0.10	0.64	0.30	95	27	<1	<5	3	<2	<2	<2	<10
	2/5/96	11:55	S	13										<1	<5	22	<2	<10	4	29
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													**>0.7**	**<5**	**10**	**>0.7**	**>3.0**	**>2.0**	**22**
	2/20/96	11:15	S		28000	20.0	7.7	4.60	0.25	1.00	0.51	97	25	<1	<5	5	<2	6	2	30
	2/20/96	11:20	S	13										<1	<5	<2	<2	6	2	<10
	2/22/96	11:25	S		21000	6.1	7.9	4.80	0.16	0.88	0.67	28	6	<1	<5	<4	<2	<4	<1	20
	2/22/96	11:30	S	18										<1	<5	<2	<2	<8	<1	73
	2/24/96	8:30	S		25000	5.6	8.1	6.50	0.42	0.92	0.80	62	17	<1	<5	<8	<8	<8	<5	23
	2/24/96	8:35	S	13										<1	<5	<2	<2	<8	<2	33
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													**<1**	**<5**	**<2**	**<2**	**>2.0**	**>0.7**	**>35.3**
	11/22/96	11:25	S		5400	200.0	8.0	6.8	0.41	1.70	2.00	290	25	1	<3	8	5	<10	<0.1	36
	11/22/96	11:25	S	14.2										1	8	16	11	<10	<0.1	47
	11/24/96	9:45	S		23000	3.1	7.9	2.3	0.37	0.76	0.64	60	11	<0.1	7	<5	<0.1	<10	<0.1	7
	11/24/96	9:45	S	16										<0.1	9	<5	0.5	<10	<0.1	9
	11/26/96	10:05	S		31000	2.2	8.0	1.5	0.27	0.70	0.49	70	15	0	13	<5	<0.2	<10	<0.1	9
	11/26/96	10:05	S	16										<0.1	16	5	0.6	11	<0.1	18
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													**>0.3**	**11**	**>7.0**	**4.0**	**>3.6**	**<0.1**	**25**
	12/6/97	12:00	S		950	1800	8.4	4.7	0.6	7.6	12	3000	2700	9	170	110	78	84	<1	560
	12/6/97	12:00	S/F											<1	<10	<4	<2	<4	<1	18
	12/6/97	12:00	S	20.7										8	170	110	76	91	<1	530
	12/6/97	12:00	S/F	20.7										<1	<10	<4	<2	<4	<1	16
	12/8/97	12:40	S					8.4	<0.5	1.6	1.1			<10	<40	18	<20	<10	<10	<100
	12/8/97	12:40	S/F											<10	<40	17	<20	<10	<10	<100
	12/8/97	12:40	S	22.6										<10	<40	14	<20	<10	<10	<100
	12/8/97	12:40	S/F	22.6										<10	<40	16	<20	<10	<10	<100
	12/10/97	9:00	S		41000	40	8.0	1.7	0.1	0.7	0.6	170	37	<1	<4	23	<2	8.0	<1	23
	12/10/97	9:00	S/F											<1	<4	18	<2	7	<1	12
	12/10/97	9:00	S	16.4										<1	<4	59	<2	8	<1	20
	12/10/97	9:00	S/F	16.4										<1	<4	29	<2	7	<1	16
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													>2.8	>56.7	61	>25.3	>32.9	<4	>183

STATION	DATE	TIME		Depth feet	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L
UNBCHB	1/21/98	10:00	M		37000	5.2	8.0	4.9	<0.5	0.8	0.3	53	22							
	2/7/98	10:40	S		7900	140	7.8	6.6	<0.5	1.3	1.9	350	35							
	2/7/98	10:40	S	13.1	28000	330	7.9	7.0	<0.5	1.9	2.8	860	80							
	3/26/98	11:45	S		21300	93	7.9	7.9	0.5	1.2	0.6	97	7							
	3/26/98	11:45	S	16.4										<1	14	16	5	7	<2	41
	3/26/98	11:45	S/F	16.4										<1	<8	9.0	<2	<4	<2	<10
	3/28/98		S		33700	14	8.1	2.2	0.2	1.0	0.6	18	4	<10	<10	<10	<10	<10	<10	<50
	3/28/98		S	16.4										2	33	31	21	18	<2	148
	3/28/98		S/F	16.4										<1	<8	11	<2	5	<2	15
	3/30/98	11:45	S		45800	4.1	8.1	0.9	0.3	1.0	0.3	8	4							
	3/30/98	11:45	S	12.1										<1	<8	13	<2	<4	<2	<10
	3/30/98	11:45	S/F	12.1										2	<8	13	<2	<4	<2	<10
									4-day average [dissolved metals]					**>0.7**	**<8**	**14.3**	**<2**	**>1.7**	**<2**	**>5**
	4/21/98	11:08	M		40800	4.3	8.3	3.1	<0.1	1.0	<0.1	23	2							
	1/25/99	15:15	ST		36700	4.0	7.9	5.0	0.99	0.32	0.245	54	10	<1	<8	12	<2	<4	<2	20
	1/25/99		SF	16.1										<1	<8	12	<2	<4	<2	25
	1/27/99	9:50	ST		15700	26.0	7.7	7.5	0.85	0.30	0.673	98	14	<1	<8	5	<2	4	<2	11
	1/27/99		SF	16.4										<1	<8	5	<2	4	<2	12
	1/29/99	12:30	ST		37800	11.0	7.8	3.5	0.60	0.18	0.306	81	8	<1	<8	9	<2	6	<2	17
	1/29/99	12:30	SF	13.1										<1	<8	8	<2	8	<2	<10
									4-day average [dissolved metals]					**<1**	**<8**	**8.3**	**<2**	**>4.0**	**<2**	**<12**
	4/12/99	11:00	ST		17600	15.0	8.0	8.8	0.76	0.25	0.551	59	12	<1	<8	8	<2	11	<2	12
	4/12/99		SF	13.1										<1	<8	8	<2	10	<2	11
	4/14/99	11:00	ST		40400	1.1	8.0	2.1	0.33	0.06	0.205	62	7	<1	<8	10	<2	11	<2	11
	4/14/99		SF	18.0										<1	<8	10	<2	12	<2	<10
	4/16/99	12:10	ST		49500	2.3	8.0	1.3	0.53	<0.05	0.153	150	13	<1	<8	17	<2	7	<2	12
	4/16/99		SF	4.3										<1	<8	16	<2	7	<2	10
									4-day average [dissolved metals]					**<1**	**<8**	**11.3**	**<2**	**9.7**	**<2**	**>7.0**

DANA POINT HARBOR

STATION	DATE	TIME		Depth feet	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L
DAPTHE	11/9/95	11:15			54000	0.6	8.2	<0.20	<0.20	0.41	<0.20	86	8							
	5/31/95	11:30			48000	3.1	8.2	1.70	<0.10	0.38	<0.20	81	32							
	10/23/95	13:55			54000	0.9	8.1	<0.20	<0.10	<0.50	<0.20	61	10							
	12/23/95	11:35	S		48000	3.4	8.2	<0.20	<0.10	0.76	<0.20	130	43	<1	<10	<20	<2	<40	<10	21
	12/25/95	0:00	S		48000	0.9	8.3	<0.20	0.22	0.51	<0.20	130	41	<1	<10	<20	<20	<40	<10	<10
	12/27/95	11:25	S		48000	1.1	8.1	<0.20	<0.10	0.52	<0.20	100	27	<1	<10	<20	<20	<40	<10	<10
	2/21/96	11:10	S		37000	5.8	8.2	<0.20	<0.10	0.52	0.39	89	29	<1	<5	9	<4	11	<1	17
	2/23/96	11:20	S		42000	1.1	8.2	0.20	0.16	<0.50	<0.20	69	20	4	<5	<8	<8	<8	<5	22
	2/25/96	10:15	S		47000	1.5	2.1	<0.20	0.17	0.54	0.21	94	26	<1	<5	<8	<8	8	<5	17
	10/16/96	13:05			43000	0.9	8.2	<0.2	0.41	0.71	0.20	100	20							
	1/15/97	14:50	S		27000	9.1	8.1	0.3	<0.1	<0.5	0.25	77	26	<0.1	3	<3	<0.1	<5	<0.1	<2
	1/17/97	12:35	S		31000	3.4	8.0	<0.4	<0.1	<0.5	0.22	120	34	<0.1	3	<3	<0.1	<5	<0.1	13
	1/19/97	10:50	S		31000	3.1	8.1	<0.2	<0.1	0.62	<0.2	110	20	<0.1	3	<3	<0.1	<5	<0.1	<2
	4/30/97	9:20			48000	1.4	8.1	<0.8	0.22	<0.5	<0.2	82	30							
	10/17/97	9:30	M		49000	0.8	8.2	<0.2	<0.1	0.5	0.22	130	34	<1	<5	<4	<2	11	<1	65
	10/28/98	9:40	D	8.1	51400	5.1	7.9	<1.3	0.5	<0.05	0.09	170	27							
	6/23/99	9:00	D	9.3	47000	3.9	8.1	<0.44	<0.2	<0.05	0.06	63	9							

DANA POINT HARBOR

STATION	DATE	TIME	Depth feet	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L
DAPTEB	8/29/91	11:20		51000	0.7	8.0	0.30	<0.10	<0.10	<0.10	180	130							
	6/24/92	11:30		49000	0.8	8.0	<0.20	<0.10	0.90	<0.10	27	17							
	11/24/92	11:30		51000	2.5	8.1	<0.20	<0.10	0.23	0.17	120	38							
	2/18/93	13:00 S		41000	14.0	8.1	0.45	0.51	0.70	<0.10	74	7	<7	<10	<30	<2	<3	<4	59
	2/18/93	S	10	47000	82.0	8.1	<0.2	0.55	1.30	0.31	260	37	<7	18	84	13.0	<3	<4	140
	2/20/93	9:30 S		44000	6.1	8.2	0.55	0.28	1.00	0.14	78	26	<7	<10	<30	<2	<3	<4	29
	2/20/93	S	11	47000	7.8	8.1	0.36	0.10	0.32	0.17	83	25	<7	<10	<30	3.4	<3	<4	<20
	2/22/93	12:30 S		47000	4.2	8.1	0.97	0.16	0.52	<0.03	94	26	9	<10	<30	<2	<3	<4	61
	2/22/93	S	10	49000	5.2	8.1	0.40	0.12	0.28	<0.10	63	30	<7	<10	<30	<2	<3	<4	27
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)												**<7**	**>6**	**>28**	**>5.5**	**<3**	**<4**	**>55.7**
	6/5/93	12:44 S		41000	5.6	8.1	0.60	0.22	0.83	0.56	67	20	<20	<30	<20	<2	<40	<10	17
	6/5/93	S	11	48000	3.6	8.1	<0.20	0.20	0.70	0.28	62	20	<20	<30	23	<2	<40	40	48
	6/7/93	13:45 S		50000	1.0	8.1	<0.20	<0.10	0.57	0.22	110	28	<20	<30	61	<2	<40	42	51
	6/7/93	S	13	50000	7.5	8.0	<0.20	<0.10	0.60	0.32	150	38	<20	<30	57	<2	<40	35	48
	6/9/93	13:00 S		50000	1.1	8.1	<0.20	<0.10	1.20	0.23	90	23	<20	<30	31	3.4	<40	18	150
	6/9/93	S	12	50000	5.3	8.0	<0.20	<0.10	0.66	0.21	90	22	<20	<30	24	<2	<40	27	35
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)												**<20**	**<30**	**34**	**<2**	**<40**	**34**	**44**
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)												**<1**	**<10**	**<20**	**<20**	**<40**	**<10**	**31.3**
	2/21/96	10:20 S		34000	10.0	8.1	0.60	0.15	0.76	0.66	90	25	<1	<5	15	<4	17	<1	38
	2/21/96	10:25 S	12										<1	<5	19	<2	16	<1	30
	2/23/96	10:30 S		43000	1.2	8.1	0.30	0.19	<0.50	<0.20	83	24	<1	14	10	<8	<8	<5	27
	2/23/96	10:35 S	7										<1	<5	<8	<8	<8	<5	35
	2/25/96	9:30 S		40000	6.6	2.1	0.40	0.29	0.75	0.40	80	26	<1	<5	<8	<8	<8	<5	37
	2/25/96	9:35 S	16										<1	<5	<8	<8	11	<5	36
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)												**<1**	**<5**	**>6.3**	**<8**	**>9**	**<5**	**33.7**
	10/16/96	13:35		43000	2.3	8.1	<0.2	0.36	<0.5	<0.2	98	19							
	1/15/97	17:05 S		25000	22.0	8.0	0.4	<0.1	0.82	0.62	96	24	<0.1	<1	5	1	<5	<0.1	17
	1/15/97	17:05 S	7										0.3	4	7	2	<5	<0.1	22
	1/17/97	11:35 S		30000	1.9	7.9	<0.4	<0.1	<0.5	<0.2	180	34	0.9	3	7	<0.1	<5	<0.1	21
	1/17/97	11:35 S	8										0.3	3	5	0.7	<5	<0.1	18
	1/19/97	9:50 S		32000	5.8	8.0	0.3	<0.1	0.72	0.43	99	29	1	3	4	0.6	<5	<0.1	10
	1/19/97	9:50 S	10										0.3	3	7	0.5	<5	<0.1	14
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)												**0.3**	**3.3**	**6.3**	**1.1**	**<5**	**<0.1**	**18**
	4/30/97	10:25		48000	5.0	7.9	<0.8	0.23	<0.5	0.22	110	38							
	10/17/97	8:30 M		49000	5.7	8.0	<0.2	0.19	0.5	0.47	120	40	<1	7.2	7.6	<2	23	<1	56
	10/28/98	9:40 D	8.1	51400	5.1	7.9	<1.3	0.5	<0.05	0.09	170	27							
	6/23/99	9:00 D	9.3	47000	3.9	8.1	<0.44	<0.2	<0.05	0.06	63	9							

DANA POINT HARBOR

STATION	DATE	TIME	Depth feet	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L
DAPTWB	11/9/95	10:10		56000	0.4	8.2	<0.20	<0.20	0.45	<0.20	85	<5							
	5/31/95	11:00		48000	2.0	8.1	<0.20	<0.10	0.42	0.22	82	38							
	10/23/95	13:30		52000	2.1	8.0	<0.20	<0.10	0.57	0.20	78	12							
	12/23/95	11:00 S		45000	4.4	8.2	<0.20	0.18	1.00	0.26	110	40	<1	<10	<20	<2	<40	<10	19
	12/23/95	11:05 S	11.2	47000									<1	<10	<20	<20	<40	<10	22
	12/25/95	7:40 S		48000	1.2	8.2	<0.20	0.25	<0.50	<0.20	170	69	<1	<10	<20	<20	<40	<10	100
	12/25/95	7:45 S	4.6	46000									<1	<10	<20	<20	<40	<10	26
	12/27/95	11:00 S		47000	0.9	8.1	<0.20	<0.10	0.53	<0.20	89	24	<1	<10	<20	<20	<40	<10	13
	12/27/95	11:05 S	10.8	48000									<1	<10	<20	<20	<40	<10	64
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)												**<1**	**<10**	**<20**	**<20**	**<40**	**<10**	**37.3**
	2/21/96	10:45 S		34000	8.9	8.2	0.40	<0.10	0.66	0.52	82	27	2	<5	12	<4	15	<1	25
	2/21/96	11:15 S	3.8										<1	<5	8	2	16	<1	22
	2/23/96	10:50 S		42000	1.0	8.2	<0.20	0.16	<0.5	<0.20	71	28	<1	<5	97	<8	<8	<5	28
	2/23/96	10:55 S	7.8										<1	8	11	<8	<8	<5	34
	2/25/96	9:50 S		41000	5.3	2.1	0.50	0.23	0.62	0.43	73	25	<1	<5	<8	<8	<8	<5	46
	2/25/96	9:55 S	15.6										<1	<5	<8	<8	8	<5	20
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)												**<1**	**>2.7**	**>6.3**	**>0.7**	**>8.0**	**<5**	**25.3**
	10/16/96	12:35		42000	1.2	8.2	<0.2	0.40	0.60	<0.2	100	21							
	1/15/97	16:05 S		26000	36.0	8.0	<0.2	<0.1	0.59	0.47	170	40	0.2	4	9	6	<5	<0.1	39
	1/15/97	16:05 S	10										0.2	4	14	4	<5	<0.1	32
	1/17/97	12:05 S		30000	1.8	8.0	<0.4	0.27	<0.5	0.30	130	31	<0.1	3	5	<0.1	<5	<0.1	13
	1/17/97	12:05 S	7.6										<0.1	3	10	0.5	<5	<0.1	14
	1/19/97	10:20 S		32000	1.6	8.1	<0.2	<0.1	<0.5	0.25	96	25	<0.1	3	5	0.3	7	<0.1	16
	1/19/97	10:20 S	9.2										<0.1	3	4	0.3	<5	<0.1	8
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)												**<0.06**	**3.3**	**9.3**	**1.6**	**<5**	**<0.1**	**18**
	4/30/97	10:10		49000	2.1	8.0	<0.8	0.18	<0.5	<0.2	100	38							
	10/17/97	9:00 M		48000	3.9	8.2	<0.2	<0.1	0.6	0.37	140	40	<1	<5	9.3	<2	<4	3.3	76
	10/28/98	10:00 D	7.8	51800	2.6	8	<1.3	0.43	<0.05	0.15	160	24							
	6/23/99	9:30 D	9.3	47300	4.7	8.1	<0.44	<0.2	<0.05	0.08	82	13							

DANA POINT HARBOR

STATION	DATE	TIME		Depth feet	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L
DAPTLB	8/29/91	13:25			51000	3.00	8.00	<0.20	<0.10	<0.10	<0.10	93	59							
	6/24/92	13:30			50000	2.20	8.00	<0.20	<0.10	0.60	<0.10	150	47							
	11/24/92	12:45			51000	2.90	8.20	<0.20	<0.10	0.27	0.30	49	20							
	2/18/93	14:15	S		44000	16.00	8.10	<0.20	0.57	1.30	0.21	120	25	15	16	32	2.3	<3	22	74
	2/18/93		S	9	48000	15.00	8.10	<0.20	0.59	0.74	0.29	140	29	<7	<10	<30	<2	<3	<4	56
	2/20/93	10:45	S		43000	9.10	8.10	0.56	0.11	0.31	0.36	85	26	<7	<10	<30	<2	<3	<4	<20
	2/20/93		S	13	47000	15.00	8.10	0.40	0.10	0.26	0.57	110	29	<7	<10	<30	2.2	<3	<4	<20
	2/22/93	14:00	S		49000	4.20	8.10	0.39	0.13	0.28	<0.10	76	23	<7	<10	<30	<2	<3	<4	<20
	2/22/93		S	9	49000	5.30	8.10	0.37	0.12	0.26	<0.10	88	28	<7	<10	<30	<2	<3	<4	21
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													**<7**	**<10**	**<30**	**>0.7**	**<3**	**<4**	**>25.7**
	6/5/93	14:45	S		48000	5.50	8.00	<0.20	0.13	0.75	0.32	91	25	<20	<30	<20	<2	<40	<10	26
	6/5/93		S	10	49000	7.50	8.00	<0.20	0.11	0.71	0.43	81	21	<20	<30	50	<2	<40	48	43
	6/7/93	15:50	S		50000	3.30	8.10	<0.20	0.10	1.80	0.19	60	18	<20	<30	44	<2	<40	15	23
	6/7/93		S	12	50000	4.30	8.00	<0.20	0.10	0.59	0.22	84	25	<20	<30	39	<2	<40	<10	23
	6/9/93	14:30	S		50000	2.80	8.00	<0.20	0.12	0.38	0.12	87	16	<20	<30	<20	<2	<40	20	34
	6/9/93		S	13	50000	5.20	8.10	<0.20	0.11	0.33	0.12	100	24	<20	<30	<20	<2	<40	19	19
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													**<20**	**<30**	**>30**	**<2**	**<40**	**>22**	**28**
	10/27/93	11:30	S	11	47000	3.80	8.00	<0.20	0.33	0.46	<0.10	100	31							
	4/26/94	12:25	S		51000	3.10	8.00	0.59	0.16	0.45	<0.20	41	10	<5	<10	<20	<2	<40	15	21
	4/26/94		S	11										<5	<10	<20	<2	<40	11	25
	4/28/94	11:45	S		48000	1.80	8.00	0.33	0.17	0.53	0.52	77	32	<5	<10	<20	<2	<40	<10	14
	4/28/94		S	15										<5	<10	<20	<2	<40	<10	16
	4/30/94	10:00	S		52000	1.80	8.00	<0.20	0.18	0.66	0.44	57	25	<5	<10	<20	<2	<40	<10	<10
	4/30/94		S	11										<5	<10	<20	<2	<40	<10	16
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													**<5**	**<10**	**<20**	**<2**	**<40**	**>3.7**	**19**
	5/5/94	14:30		8	48000	1.80	8.20	<0.20	0.25	0.7	0.33	75	13							
	11/9/94	11:00			55000	0.42	8.20	<0.20	0.22	0.54	<0.20	110	21							
	5/31/95	12:15			55000	2.20	8.10	0.21	<0.10	0.32	0.37	42	20							

DANA POINT HARBOR

STATION	DATE	TIME	Depth feet	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L
DAPTLB	10/23/95	14:25		54000	0.60	8.10	<0.20	0.13	0.52	0.20	57	10							
	12/23/95	11:55 S		47000	3.70	8.20	<0.20	0.17	0.52	<0.20	110	27	<1	<10	<20	<20	<40	<10	16
	12/23/95	12:00 S	12.6	47000									<1	<10	<20	<20	<40	<10	55
	12/25/95	8:20 S		48000	1.30	8.20	<0.20	0.13	0.57	<0.20	180	62	<1	<10	<20	<20	<40	<10	23
	12/25/95	8:25 S	12.6	46000									<1	<10	<20	<20	<40	<10	28
	12/27/95	11:45 S		48000	1.00	8.10	<0.20	0.19	0.53	<0.20	89	44	<1	<10	<20	<20	<40	<10	10
	12/27/95	11:50 S	12.2	48000									<1	<10	5	<2	<40	<10	<10
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)												**<1**	**<10**	**>1.7**	**<20**	**<40**	**<10**	**>27.7**
	2/21/96	11:40 S		36000	2.10	7.90	0.30	<0.10	<0.50	0.30	49	11	<1	<5	11	<4	14	<1	26
	2/21/96	11:45 S	12										<1	<5	8	<2	14	<1	20
	2/23/96	11:50 S		43000	1.50	8.20	<0.20	0.20	<0.50	0.24	91	34	<1	<5	12	<8	<8	<5	24
	2/23/96	11:55 S	8.4										<1	7	<8	<8	<8	<5	26
	2/25/96	10:40 S		45000	2.10	2.10	0.20	0.22	<0.50	<0.20	84	27	<1	<10	<8	<8	<8	<5	16
	2/25/96	10:45 S	16										<1	8	22	<8	11	<5	41
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)												**<1**	**>5**	**>10**	**<8**	**>8.3**	**<5**	**29**
	10/16/96	14:05		40000	1.0	8.2	<0.2	0.34	<0.5	0.65	110	20							
	1/15/97	18:05 S		27000	3.4	8.1	<0.2	<0.1	<0.5	<0.2	90	26	<0.1	3	<3	0.5	<5	<0.1	9
	1/15/97	18:05 S	9.6										<0.1	3	<3	0.8	<5	<0.1	9
	1/17/97	13:05 S		31000	2.0	8.0	<0.4	<0.1	<0.5	<0.2	120	26	<0.1	3	<3	<0.1	<5	<0.1	10
	1/17/97	13:05 S	8.4										<0.1	3	4	0.6	<5	<0.1	10
	1/19/97	11:10 S		32000	1.9	8.1	<0.2	<0.1	<0.5	<0.2	120	32	<0.1	3	<3	<0.1	<5	<0.1	6
	1/19/97	11:10 S	9.6										<0.1	3	<3	0.4	<5	<0.1	7
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)												**<0.1**	**3**	**<3**	**0.6**	**<5**	**<0.1**	**8.6**
	4/30/97	10:55		49000	2.2	8.0	<0.8	0.38	<0.5	0.20	78	28							
	10/17/97	10:15 M		48000	2.6	8.1	<0.2	<0.1	0.5	0.24	99	30	<1	<5	5.2	<2	21	<1	46
	10/28/98	9:00 D	9.3	52200	3	8	<1.3	0.42	<0.05	0.153	150	22							
	6/23/99	8:45 D	12.4	47600	5.2	8	<0.44	<0.2	0.056	<0.061	84	10							

DANA POINT HARBOR

STATION	DATE	TIME		Depth feet	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L
DAPTLR	6/24/92	13:05			50000	1.8	8.0	0.20	<0.10	0.80	0.30	81	29							
	11/24/92	12:30			50000	1.6	8.1	<0.20	<0.10	0.21	0.29	99	36							
	2/18/93	14:00	ST		47000	9.8	8.1	<0.20	0.58	1.60	<0.10	78	19	<7	<10	68	2.7	<3	<4	46
	2/18/93		S	16	48000	14.0	8.1	0.34	0.56	1.00	0.15	120	73	<7	<10	<30	<2	<3	<4	39
	2/20/93	10:30	ST		43000	15.0	8.1	0.54	0.17	0.30	0.30	81	24	<7	<10	<30	<2	<3	<4	<20
	2/20/93		S	15	47000	25.0	8.1	0.38	0.12	0.41	0.37	110	30	<7	<10	<30	<2	<3	<4	<20
	2/22/93	13:30	ST		49000	3.6	8.1	0.39	0.14	0.32	0.23	83	23	<7	<10	<30	<2	<3	<4	<20
	2/22/93		S	13	48000	7.8	8.1	0.38	0.10	0.21	<0.3	94	28	<7	<10	<30	<2	<3	<4	<20
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													**<7**	**<10**	**<30**	**<2**	**<3**	**<4**	**>13**
	6/5/93	14:45	S		46000	5.3	8.1	0.25	0.16	0.73	0.36	49	16	<20	<30	<20	<2	<40	<10	24
	6/5/93		S	13	49000	7.2	8.0	<0.20	0.11	0.61	0.35	140	37	<2	<30	<20	<2	<40	<10	24
	6/7/93	15:30	S		50000	2.4	8.1	<0.20	0.12	0.57	0.14	78	23	<20	<30	46	<2	<40	22	19
	6/7/93		S	13	50000	6.2	8.1	<0.20	0.11	0.59	0.19	100	26	<20	<30	52	<2	<40	<10	31
	6/9/93	14:15	S		50000	2.3	8.1	<0.20	0.11	0.44	<0.10	94	19	<20	<30	52	<2	<40	20	18
	6/9/93		S	13	50000	6.2	8.1	<0.20	0.13	0.66	0.14	97	20	<20	<30	<20	<2	<40	25	22
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													**<20**	**<30**	**>17**	**<2**	**<40**	**>8**	**>18**
	10/27/93	11:10	S	16	48000	5.1	7.9	<0.20	0.23	0.71	<0.10	89	22							
	4/26/94	12:00	S		52000	2.2	8.0	0.74	0.16	0.69	<0.20	52	16	<5	<10	<20	<2	<40	11	18
	4/26/94		S	13										<5	<10	22	<2	<40	<10	24
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													**<5**	**<10**	**>7.3**	**<2**	**<40**	**<10**	**17.3**
	11/9/95	10:45			55000	0.6	8.2	<0.20	<0.20	0.84	<0.20	74	14							
	5/31/95	12:00			48000	3.1	8.1	0.29	0.13	0.56	0.52	39	21							
	10/23/95	14:10			54000		8.1	<0.20	<0.10	0.5	<0.20	71	12							
	12/23/95	11:45	S		48000	4.0	8.2	<0.20	0.16	0.85	<0.20	120	26	<1	<10	<20	<20	<40	<10	15
	12/23/95		S	16	47000									<1	<10	<20	<20	<40	<10	31
	12/25/95	8:10	S		47000	0.9	8.2	<0.20	<0.10	<0.50	<0.20	120	33	<1	<10	<20	<20	<40	<10	33
	12/25/95		S	16	46000									<1	<10	<20	<20	<40	<10	27
	12/27/95	11:35	S		48000	1.9	8.2	<0.20	<0.10	<0.50	<0.20	88	22	<1	<10	<20	<20	<40	<10	16
	12/27/95		S	12.6	47000									<1	<10	<20	<20	<40	<10	13
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													**<1**	**<10**	**<20**	**<20**	**<40**	**<10**	**23.7**

DANA POINT HARBOR

STATION	DATE	TIME		Depth feet	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L
DAPTLR	2/21/96	11:30	S		35000	3.2	8.1	0.30	<0.10	0.52	0.25	76	27	28	<5	11	<4	21	<1	25
	2/21/96		S	15										<1	<5	9	<2	9	<1	26
	2/23/96	11:40	S		43000	1.3	8.1	0.20	0.15	<0.50	<0.20	72	23	<1	<5	<8	<8	<8	13	24
	2/23/96		S	7										<1	8	10	<8	<8	<5	19
	2/25/96	10:30	S		44000	2.6	2.0	0.30	0.23	<0.50	0.24	73	21	<1	<5	56	<8	8	<5	31
	2/25/96		S	18										<1	<5	78	9	<8	<5	20
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													**<1**	**>2.7**	**32.3**	**>3**	**>3**	**<5**	**21.7**
	10/16/96	13:50			41000	5.6	8.2	<0.2	0.51	<0.5	0.28	83	17							
	1/15/97	17:50	S		26000	8.2	8.0	<0.2	<0.1	<0.5	0.20	110	28	0.2	3	20	1	<5	<0.1	12
	1/15/97		S	12.8										<0.1	3	8	0.7	<5	<0.1	11
	1/17/97	12:50	S		30000	2.0	8.0	<0.4	<0.1	0.55	<0.2	72	22	<0.1	3	<3	<0.1	<5	<0.1	8
	1/17/97		S	13										<0.1	3	<3	0.3	<5	<0.1	9
	1/19/97	11:05	S		32000	3.0	8.1	<0.2	<0.1	<0.5	<0.2	110	26	<0.1	3	<3	<0.1	<5	<0.1	8
	1/19/97		S	14.2										<0.1	3	4	0.3	<5	<0.1	8
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													**<0.1**	**3**	**>4**	**0.43**	**<5**	**<0.1**	**9.3**
	4/30/97	10:40			49000	2.4	8.0	<0.8	<0.1	<0.5	<0.2	86	29							
	10/28/98	9:40	D	8.1	51400	5.1	7.9	<1.3	0.5	<0.05	0.09	170	27							
	6/23/99	9:00	D	9.3	47000	3.9	8.1	<0.44	<0.2	<0.05	0.06	63	9							

HUNTINGTON HARBOUR

STATION	DATE	TIME	Depth feet	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L
TGDC05	1/29/98	11:35	S	8400	25	7.8	4.6	0.66	2.0	0.49	58	21	<10	<10	12	14	<10	<10	85.5
	1/29/98	11:35	S/F										<10	<10	<10	<10	<10	<10	<50
	1/31/98	10:45	S	43000	4.6	8.0	<0.2	0.26	0.7	0.29	72	25	<10	<10	12.3	<10	<10	<10	<50
	1/31/98	10:45	S/F										<10	<10	<10	<10	<10	<10	<50
	2/2/98		S	42000	2.3	7.9	<0.2	<0.5	0.7	0.25	68	20	<10	<10	11	<10	<10	<10	<50
	2/2/98		S/F										<10	<10	<10	<10	<10	<10	<50
							4-day average [dissolved metals]						**<10**	**<10**	**<10**	**<10**	**<10**	**<10**	**<50**
	5/13/98	11:56	S	285	27	8.2	1.8	<0.05	1.6	0.83	72	28	<2	5.34	8.49	14.4	<10	<2	47
	5/13/98	11:56	S/F										<2	<10	2.33	<2	<10	<2	<10
	5/15/98		S	39400	1.3	8.4	<0.5	0.06	1.2	0.31	260	24							
	5/15/98		S/F										<2	<10	14.7	<2	<10	<2	<10
	5/17/98	12:00	S	42800	1.7	8.3	<0.5	<0.05	1.0	0.06	340	36	<2	<10	14.9	<2	<10	<2	23.5
	5/17/98	12:00	S/F										<2	<10	12.7	<2	<10	<2	11.6
							4-day average [dissolved metals]						**<2**	**<10**	**9.9**	**<2**	**<10**	**<2**	**>3.9**
	6/25/98		M	48300	1.8	7.9	<1.3	0.08	1.4	0.18	25	9							
	6/25/98		M	49800	8.9	8.0	<1.3	0.09	1.2	0.34	120	22							
	10/26/98	9:45	D	S 47700	0.6	8.1	<1.3	0.98	0.06	0.245	18	12							
	3/25/99		ST	S 8220	21	8.2	2.02	2.0	0.2	0.337	84	28	<1	<8	12.1	7.35	8.42	<2	82.4
	3/25/99		SF	S									<1	<8	5.02	<2	6.89	<2	16.7
	3/27/99	11:40	ST	S 28600	6.4	8.0	1.06	0.84	0.18	0.306	63	51	<1	<8	10.9	<2	10.1	<2	18.0
	3/27/99		SF	S									<1	<8	9.24	<2	17.6	<2	10.9
	3/29/99	13:25	ST	S 34900	5.2	8.2	<0.44	0.6	0.11	0.245	68	13	<1	<8	12.4	2.45	<4	<2	16.1
	3/29/99		SF	S									<1	<8	10.7	<2	<4	<2	<10
							4-day average [dissolved metals]						**<1**	**<8**	**8.3**	**<2**	**>8.2**	**<2**	**>9.2**
	6/24/99	15:35	D	S 50200	7.6	8.2	<0.44	0.68	<0.05	0.343	130	34							

HUNTINGTON HARBOUR

STATION	DATE	TIME	Depth feet	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L
HUNHAR	11/10/94	13:15	S	53000	3.0	8.2	<0.20	<0.10	0.60	<0.20	70	14	<1	<10	3	<2	<40	<0.3	20
	11/12/94	10:00	S	51000	1.4	6.9	<0.20	<0.10	0.77	0.28	69	19	<1	<10	<10	<2	<40	<0.3	26
	11/14/94	12:45	S	52000	1.4	8.2	<0.20	0.16	0.60	0.27	86	10	<1	<10	9	<2	<40	<2	17
	3/11/95	9:45	S	20000	16.0	8.0	1.30	0.12	0.78	0.45	34	11	<1	<10	5	<2	<40	<1	20
	3/13/95	11:15	S	39000	2.4	8.1	0.40	<0.10	0.34	0.25	59	19	<1	<10	<4	<2	<40	<1	16
	3/15/95	10:30	S	50000	1.9	8.2	<0.20	0.29	0.58	0.25	80	40	<1	<10	<4	<2	<40	<1	13
	12/13/95	9:35	S	40000	12.0	7.7	3.80	0.51	1.90	0.78	66	23	<1	<10	<4	<4	<2	<40	<1
	12/15/95	8:45	S	44000	1.9	8.0	0.40	0.44	0.74	0.27	97	26	<1	<10	6	<2	<40	<1	11
	12/17/95	9:45	S	48000	2.6	8.1	<0.20	0.35	0.76	<0.20	100	26	<1	<10	<5	<2	<40	<1	<10
	3/5/96	9:55	S	44000	3.7	8.2	0.80	0.29	0.58	0.25	89	24	<1	<5	<2	8	<4	<1	24
	3/7/96	10:30	S	39000	1.4	8.2	0.40	0.17	0.62	<0.20	100	24	<1	7	12	2	6	<1	38
	3/9/96	9:10	S	41000	1.1	8.2	0.20	<0.10	<0.50	<0.20	100	24	<1	<5	<2	6	4	<1	22
	10/30/96	11:15	S	61000	2.7	8.2	<0.2	0.33	0.57	<0.20	120	30	<0.1	5	<3	0.3	<4	<0.9	<2
	11/1/96	9:20	S	35000	2.5	8.0	1.0	0.33	0.86	<0.20	59	22	<0.1	<2	<3	0.5	<4	<0.1	9
	11/3/96	10:20	S	36000	1.7	8.0	0.5	0.12	<0.50	0.29	100	31	<0.1	5	<3	<0.1	<4	<0.1	6
	1/23/97	10:35	S	41000	6.6	8.1	0.3	0.13	0.69	0.30	110	37	<0.1	<3	<3	0.6	7	<0.1	<2
	1/25/97	9:55	S	44000	1.7	8.1	<0.2	<0.10	0.66	0.20	87	23	<0.1	<3	<3	0.2	8	<0.1	<2
	1/27/97	11:05	S	41000	4.7	8.1	<0.8	<0.10	0.60	0.26	56	59	<0.1	<3	<3	0.5	8	<0.1	<2

HUNTINGTON HARBOUR

STATION	DATE	TIME		Depth feet	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L
HUNWAR	11/8/94	11:30			51000	0.5	8.1	<0.20	<0.10	0.63	0.54	100	25							
	11/10/94	12:00	S		21000	48.0	7.9	5.00	0.59	1.80	0.58	89	22	<1	<10	8.1	8.2	<40	<0.3	40
	11/10/94	12:05	S	13.8										<1	<10	9.2	4	<40	<0.3	60
	11/12/94	8:30	S		34000	2.4	7.3	3.40	0.27	1.60	0.44	75	<5	<1	<10	35	<2	<40	<0.3	54
	11/12/94	8:35	S	13.8										<1	<10	28	9.1	<40	<0.3	82
	11/14/94	11:00	S		47000	0.5	7.8	0.81	0.33	0.97	0.33	<5	<5	<1	<10	8.6	<2	<40	<2	62
	11/14/94	11:05	S	12.6										<1	<10	3	<2	<40	<2	110
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLE)													**<1**	**<10**	**13.3**	**>1.3**	**<40**	**<0.86**	**84**
	3/11/95	9:00	S		9700	40.0	7.9	1.50	0.15	0.99	1.00	68	16	<1	<10	12	8	<40	<1	40
	3/11/95	9:05	S	13.1										<1	<10	7.7	2.2	55	<1	41
	3/13/95	9:30	S		21000	7.0	7.8	1.30	0.16	0.79	0.51	36	17	<1	<10	5.9	<2	<40	<1	37
	3/13/95	9:35	S	11.5										<1	<10	<4	<2	45	<1	36
	3/15/95	11:45	S		41000	3.3	8.2	1.10	0.31	0.89	0.46	56	34	<1	<10	5.5	<2	46	<1	16
	3/15/95	11:50	S	10.8										<1	<10	<4	<2	<40	<1	36
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLE)													**<1**	**<10**	**>2.6**	**>0.67**	**>33.3**	**<1**	**38**
	5/10/95	10:00			52000	1.6	7.8	<0.20	0.49	0.78	0.26	60	29							
	10/11/95	10:45						<0.20	0.21	1.1	0.28									
	12/13/95	10:00	S		14000	27.0	7.2	6.90	1.50	2.50	1.10	59	21	<1	<10	6	5	<40	<1	47
	12/13/95	10:05	S	7.0	41000									<1	<10	8	<2	<40	<1	49
	12/15/95	9:30	S		37000	2.8	7.3	1.40	0.70	1.40	0.48	52	16	<1	<10	8	<2	<40	<1	28
	12/15/95	9:35	S	13.0	40000									<1	<10	8	<2	<40	<1	20
	12/17/95	8:45	S		43000	1.5	7.8	0.70	0.62	1.10	0.39	86	27	<1	<10	<5	<2	<40	<1	110
	12/17/95	8:50	S	13.4	44000									<1	<10	<5	<2	<40	<1	23
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLE)													**<1**	**<10**	**>5.3**	**<2**	**<40**	**<1**	**30.7**
	3/5/96	8:45	S		21000	15.0	8.1	1.90	0.33	0.84	0.46	37	11	<1	<5	4	<2	<4	1.5	37
	3/5/96	8:50	S	13.0										<1	<5	8	<2	<4	<1	46
	3/7/96	9:00	S		27000	1.5	8.1	1.40	1.20	0.62	0.32	44	13	<1	18	21	3	5	<1	72
	3/7/96	9:05	S	10.0										<1	5	10	10	9	<1	71
	3/9/96	10:00	S		36000	1.3	8.1	0.50	0.39	0.57	0.30	95	25	<1	6	3	<4	<4	<1	26
	3/9/96	10:05	S	9.2										<1	<5	3	5	5	<1	27
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLE)													**<1**	**>1.7**	**7**	**>3.0**	**>4.7**	**<1**	**48**
	5/1/96	9:45			40000	1.7	8.1	<0.20	0.11	0.51	0.21	100	31							
	10/9/96	10:50			41000	2.6	7.9	<0.2	0.44	<0.50	0.28	96	28							
	10/30/96	10:25	S		35000	3.4	8.1	1.0	0.48	0.97	<0.20	79	26	0.2	5	3	1	<4	<0.9	29
	10/30/96	10:25	S	15.2										<0.1	5	<3	0.6	<4	<0.9	11
	11/1/96	9:50	S		24000	10.0	7.0	4.5	<0.10	2.00	<0.20	44	18	0.3	<2	10	2	5	<0.1	46
	11/1/96	9:50	S	14.2										0.3	5	<3	1	<4	<0.1	23
	11/3/96	11:05	S		34000	1.2	7.9	0.9	0.22	0.56	0.48	81	24	<0.1	4	<3	0.4	<4	<0.1	13
	11/3/96	11:05	S	12.8										<0.1	6	<3	0.7	<4	<0.1	12
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLE)													**<0.1**	**5**	**<3**	**<0.6**	**<4**	**<0.1**	**15.3**

HUNTINGTON HARBOUR

STATION	DATE	TIME		Depth feet	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L
HUNWAR	1/23/97	8:50	S		17000	21.0	8.1	1.2	0.28	0.70	0.41	43	11	<0.1	<3	<3	2	<5	<0.1	17
	1/23/97	8:50	S	15.8										<0.1	<3	<3	1	<5	<0.1	9
	1/25/97	10:35	S		32000	1.6	7.9	0.9	0.29	0.73	0.46	110	36	<0.1	<3	8	0.3	6	<0.1	22
	1/25/97	10:35	S	15.2										<0.1	<3	<3	0.9	<5	<0.1	7
	1/27/97	12:15	S		22000	3.9	7.9	1.3	0.27	0.87	0.49	82	31	<0.1	<3	7	0.7	<5	<0.1	20
	1/27/97	12:15	S	10.8										<0.1	<3	<3	0.7	6	<0.1	10
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLE)													**<0.1**	**<3**	**<3**	**0.9**	**>2.6**	**<0.1**	**8.7**
	4/29/97	9:05			46000	3.1	7.9	<0.8	<0.50	0.74	0.50	100	29							
	10/2/97	13:45	M		50000	3.2	7.9	<0.2	0.26	0.9	0.40	100	28							
	1/29/98	12:25	S		31000	10	7.8	1.7	0.42	1.2	0.39	68	28							
	1/29/98	12:25	S	12.1										<10	<10	13.8	<10	<10	<10	<50
	1/29/98	12:25	S/F	12.1										<10	<10	<10	<10	<10	<10	<50
	1/31/98	9:00	S		39000	2.5	7.8	0.43	0.29	0.6	0.27	85	29							
	1/31/98	9:00	S	14.1										<10	<10	<10	<10	<10	<10	<50
	1/31/98	9:00	S/F	14.1										<10	<10	<10	<10	<10	<10	<50
	2/2/98		S		43000	2.8	7.8	<0.2	<0.5	0.7	0.32	53	24							
	2/2/98		S	12.5										<10	<10	12.6	<10	<10	<10	<50
	2/2/98		S/F	12.5										<10	<10	<10	<10	<10	<10	<50
	4-day average [dissolved metals]													**<10**	**<10**	**<10**	**<10**	**<10**	**<10**	**<50**
	5/13/98	9:56	S		12800	29	7.9	1.8	0.15	1.0	0.7	200	36							
	5/13/98	9:56	S	11.2										<2	<10	19.4	11.6	<10	<2	56.5
	5/13/98	9:56	S/F	11.2										<2	<10	12.8	<2	<10	<2	14.4
	5/15/98		S		26900	1.7	7.0	<0.5	0.07	1.0	0.15	170	32							
	5/15/98		S	7.9										<2	<10	15.3	<2	<10	<2	17.4
	5/15/98		S/F	7.9										<2	<10	15.5	<2	<10	<2	13
	5/17/98	9:30	S		41200	2.2	8.0	<0.5	<0.05	<1.0	0.12	280	44							
	5/17/98	9:30	S	10.5										<2	<10	14.8	2.32	<10	<2	41.4
	5/17/98	9:30	S/F	10.5										<2	<10	13.7	<2	<10	<2	25.5
	4-day average [dissolved metals]													**<2**	**<10**	**14.0**	**<2**	**<10**	**<2**	**17.6**
	6/25/98		M		49200	1.8	7.9	<1.3	<0.05	<1.0	0.12	26	5							
	10/21/98	9:30	D	12.4																
	3/25/99	14:50	ST	9.3	46200	1.8	8.1	0.44	0.61	<0.05	0.061	70	12	<1	<8	20.3	5.96	12.2	<2	39.0
	3/25/99		SF	9.8										<1	<8	11.8	<2	10.5	<2	13.4
	3/27/99	9:40	ST	9.3	44600	0.9	8.0	<0.44	0.38	0.09	0.092	59	9	<1	<8	14.1	<2	12.1	<2	20.7
	3/27/99		SF	9.8										<1	<8	13.3	<2	12.6	<2	15.1
	3/29/99	10:45	ST	8.1	45600	1.0	8.1	<0.44	0.29	<0.05	0.122	82	12	<1	<8	14.7	<2	<4	<2	15.2
	3/29/99		SF	8.5										<1	<8	12.2	<2	<4	<2	10.2
	4-day average [dissolved metals]													**<1**	**<8**	**12.4**	**<2**	**>7.7**	**<2**	**12.9**
	6/24/99	14:10	D	6.2	47100	2.7	8.1	<0.44	0.45	<0.05	0.184	73	8							

HUNTINGTON HARBOUR

STATION	DATE	TIME	Depth feet	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L
BBOLR	11/8/94	14:00		51000	1.6	8.3	<0.20	<0.20	1.00	0.32	76	14							
	11/10/94	14:00	S	39000	14.0	8.0	1.90	0.14	0.89	0.42	78	11	<1	17	3	4	45	<0.3	<10
	11/10/94	14:05	S 1.8										<1	<10	4	<2	<40	<0.3	18
	11/12/94	11:00	S	44000	1.7	7.0	0.60	<0.10	1.20	0.43	31	<5	<1	<10	<10	<2	<40	<0.3	24
	11/12/94	11:05	S 1.8										<1	<10	<10	<2	<40	<0.3	26
	11/14/94	13:45	S	46000	1.7	8.1	<0.20	0.15	0.95	0.39	79	10	<1	<10	5	<2	<40	<2	23
	11/14/94	13:50	S 1.5										<1	<10	<2	<2	<40	<2	26
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLE)												**<1**	**<10**	**>1.3**	**<2**	**<40**	**<0.86**	**23**
	3/11/95	10:45	S	14000	18.0	8.2	1.30	0.25	1.00	0.63	31	11	<1	<10	6	2	<40	<1	20
	3/11/95	10:50	S 2.3										<1	<10	4	<2	48	<1	20
	3/13/95	12:15	S	26000	2.6	8.7	<0.20	<0.10	0.89	0.44	47	18	<1	<10	<4	<2	<40	<1	<10
	3/13/95	12:20	S 2.3										<1	<10	<4	<2	<40	<1	16
	3/15/95	13:45	S	32000	2.6	8.8	<0.20	0.16	0.99	0.57	39	20	<1	<10	<4	<2	<40	<1	11
	3/15/95	13:50	S 1.0										<1	<10	<4	<2	<40	<1	15
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLE)												**<1**	**<10**	**>1.3**	**<2**	**>16**	**<1**	**17**
	5/10/95	11:45		52000	3.0	8.5	<0.20	0.42	0.69	0.55	69	26							
	10/11/95	13:15		51000	1.9	8.2	<0.20	0.16	0.73	0.27	94	34							
	12/13/95	12:00	S	19000	25.0	7.4	8.40	1.20	3.00	0.98	62	20	<1	<10	6	<2	<40	<1	63
	12/13/95	12:05	S 1.2	35000									<1	<10	9	<2	<40	<1	56
	12/15/95	11:00	S	39000	3.8	8.0	0.40	0.38	1.00	0.48	67	18	<1	<10	6	<2	<40	<1	<10
	12/15/95	11:05	S 1.4	39000									<1	<10	8	<2	<40	<1	<10
	12/17/95	11:00	S	40000	2.2	8.2	<0.20	0.48	1.60	0.43	83	22	<1	<10	<5	<2	<40	<1	<10
	12/17/95	11:05	S 1.4	39000									<1	<10	<5	<2	<40	<1	14
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLE)												**<1**	**<10**	**>5.7**	**<2**	**<40**	**<1**	**>23**
	3/5/96	11:00	S	34000	7.7	8.4	0.80	0.31	0.68	1.70	77	22	<1	<5	3	21	20	<1	31
	3/5/96	11:05	S 2.1										<1	<5	5	<2	5	<1	30
	3/7/96	11:00	S	30000	1.9	8.7	0.20	0.31	1.00	0.33	82	20	<1	<5	19	<2	3	<1	37
	3/7/96	11:05	S 2.1										<1	<5	28	25	8	<1	54
	3/9/96	12:00	S	34000	1.7	8.7	<0.20	<0.10	0.57	0.31	94	21	<1	<5	<2	<4	<4	<1	<10
	3/9/96	12:05	S 1.2										<1	5	<2	5	4	<1	28
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLE)												**<1**	**>1.7**	**>11**	**>10**	**5.7**	**<1**	**37.3**
	5/1/96	12:10		40000	1.9	8.4	<0.20	0.11	0.90	0.45	110	33							
	10/9/96	12:55		39000	2.8	8.2	<0.2	0.14	1.40	0.63	83	24							

HUNTINGTON HARBOUR

STATION	DATE	TIME		Depth feet	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L
BBOLR	11/1/96	11:50	S		33000	3.7	7.9	1.3	0.33	1.10	0.73	66	22	0.4	4	<3	1	<4	<0.1	25
	11/1/96	11:50	S	1.8										0.5	6	<3	1	<4	<0.1	33
	11/3/96	13:00	S		34000	1.8	8.3	0.4	0.16	0.60	0.57	72	24	<0.1	5	<3	0.4	<4	<0.1	8
	11/3/96	13:00	S	2.4										<0.1	6	<3	0.4	<4	<0.1	8
	2-DAY AVERAGE (DEPTH INTEGRATED SAMPLE)													**>0.3**	**6**	**<3**	**0.7**	**<4**	**<0.1**	**20.5**
	1/23/97	11:10	S		19000	21.0	8.1	1.4	0.17	0.74	0.51	62	19	<0.1	<3	5	3	<5	<0.1	20
	1/23/97	11:10	S	2.7										<0.1	<3	<3	2	<5	<0.1	10
	1/25/97	11:20	S		37000	3.2	8.2	<0.8	0.27	0.85	0.40	82	19	<0.1	<3	<3	0.8	6	<0.1	11
	1/25/97	11:20	S	2.1										<0.1	<3	<3	1	8	<0.1	8
	1/27/97	10:05	S		27000	5.3	8.1	<0.8	0.26	0.94	0.48	75	34	<0.1	<3	<3	1	6	<0.1	7
	1/27/97	10:05	S	1.5										<0.1	<3	<3	1	7	<0.1	7
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLE)													**<0.1**	**<3**	**<3**	**1.3**	**>5**	**<0.1**	**8.3**
	4/29/97	11:25			44000	2.7	8.0	<0.8	<0.50	0.96	0.55	110	29							
	10/2/97	15:20	M		49000	2.3	8.2	<0.2	<0.1	1.4	0.74	130	32							
	1/29/98	11:20	S		46000	2.4	7.9	0.2	0.52	0.9	0.24	86	31	<10	<10	12.6	<10	<10	<10	<50
	1/29/98	11:20	S/F											<10	<10	12.4	<10	<10	<10	<50
	1/31/98	10:15	S		45000	4.1	8.1	<0.2	0.22	0.8	0.24	72	29	<10	<10	10.9	<10	<10	<10	<50
	1/31/98	10:15	S/F											<10	<10	10.9	<10	<10	<10	<50
	2/2/98		S		43000	2.4	8.0	<0.2	<0.5	0.8	0.26	89	25	<10	<10	<10	<10	<10	<10	<50
	2/2/98		S/F											<10	<10	<10	<10	<10	<10	<50
	4-day average [dissolved metals]													**<10**	**<10**	**>7.9**	**<10**	**<10**	**<10**	**<50**
	5/13/98	12:05	S		25800	13	8.3	<0.5	<0.05	1.2	0.37	190	28	<2	<10	13.2	4.52	<10	<2	30.6
	5/13/98	12:05	S/F											<2	<10	9.57	<2	<10	<2	<10
	5/15/98		S		41900	0.75	8.9	<0.5	<0.05	1.3	0.34	310	36							
	5/15/98		S/F											<2	<10	17.1	<2	10.9	<2	<10
	5/17/98	11:45	S		42000	0.7	9.0	<0.5	<0.05	1.1	0.12	340	40	<2	<10	13.2	<2	<10	<2	17
	5/17/98	11:45	S/F											<2	<10	12.9	<2	<10	<2	10.8
	4-day average [dissolved metals]													**<2**	**<10**	**13.2**	**<2**	**>3.6**	**<2**	**>3.6**
	6/25/98	13:00	M		50500	2.2	8.0	<1.3	<0.05	1.4	0.24	32	10							
	10/21/98	11:45	D		50500	21.0	8.5	<1.3	2.93	0.07	1.22	330	52							
	3/25/99		ST		47800	1.7	8.6	<0.44	0.89	<0.05	0.092	81	12	<1	<8	13.3	<2	11.9	<2	<10
	3/25/99		SF											<1	<8	12.8	<2	12.5	<2	<10
	3/27/99	11:20	ST		43400	1.6	8.4	<0.44	0.51	<0.05	0.122	62	6	<1	<8	12.7	<2	12.8	<2	<10
	3/27/99		SF											<1	<8	12.9	<2	12.1	<2	<10
	3/29/99	13:00	ST		43300	1.7	8.7	<0.44	0.34	<0.05	0.122	74	10	<1	<8	12.2	<2	<4	<2	<10
	3/29/99		SF											<1	<8	10.8	<2	<4	<2	<10
	4-day average [dissolved metals]													**<1**	**<8**	**12.2**	**<2**	**>8.5**	**<2**	**<10**
	6/24/99	15:30	D		51100	27	8.5	<0.44	0.75	<0.05	0.263	140	55							

HUNTINGTON HARBOUR

STATION	DATE	TIME		Depth feet	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L
HUNBCC	11/8/94	12:30			52000	0.7	8.2	<0.20	0.26	0.36	<0.20	87	9							
	11/10/94	11:30	S		390	120.0	7.6	5.60	0.80	1.30	1.40	260	33	<1	14	28	31	<40	0.4	180
	11/10/94	11:35	S	15.0										<1	11	57	17	<40	<0.3	220
	11/12/94	9:15	S		33000	4.4	6.3	3.20	0.36	1.70	0.61	49	9	<1	<10	<10	<2	<40	<0.3	39
	11/12/94	9:20	S	15.2										<1	<10	61	14	<40	<0.3	160
	11/14/94	12:00	S		45000	1.8	7.8	1.10	0.39	1.20	0.40	78	8	<1	<10	6	<2	<40	<2	31
	11/14/94	12:05	S	13.0										<1	<10	<2	<2	<40	<2	51
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLE)													**<1**	**>3.6**	**>39.3**	**>10.3**	**<40**	**<2**	**147**
	3/11/95	8:15	S		950	80.0	8.3	1.40	<0.10	0.90	1.00	110	20	<1	<10	14	9	<40	<1	55
	3/11/95	8:20	S	12.1										<1	<10	9	<2	50	<1	48
	3/13/95	10:30	S		17000	7.1	7.8	2.70	0.12	0.71	0.48	27	10	<1	<10	6	<2	<40	<1	34
	3/13/95	10:35	S	10.5										<1	<10	<4	<2	<40	<1	27
	3/15/95	11:15	S		34000	2.4	8.1	5.10	0.31	0.78	0.45	44	22	<1	<10	13	<2	<40	<1	25
	3/15/95	11:20	S	9.5										<1	<10	<4	<2	<40	<1	19
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLE)													**<1**	**<10**	**>3**	**<2**	**>16.6**	**<1**	**31**
	5/10/95	11:00			38000	4.4	8.1	1.70	0.29	0.79	<0.20	53	21							
	10/11/95	12:00			51000	1.8	8.0	<0.20	0.24	0.81	0.22	93	29							
	12/13/95	10:50	S		4500	74.0	7.5	6.50	0.54	2.40	1.70	97	20	3	<10	13	8	<40	<1	86
	12/13/95	10:55	S	15.0	40000									<1	<10	8	<2	<40	<1	47
	12/15/95	9:10	S		24000	11.0	7.7	4.20	0.60	2.10	0.62	45	17	<1	<10	8	<2	<40	<1	46
	12/15/95	9:15	S	10.0	42000									<1	<10	7	<2	<40	<1	15
	12/17/95	9:30	S		38000	4.4	7.8	1.40	0.78	1.90	0.46	120	29	<1	<10	54	<2	<40	<1	47
	12/17/95	9:35	S	9.6	44000									<1	<10	13	<2	<40	<1	32
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLE)													**<1**	**<10**	**9.3**	**<2**	**<40**	**<1**	**31.3**
	3/5/96	8:15	S		32000	120.0	8.6	1.60	0.35	0.89	0.65	68	10	<1	7	9	11	9	<1	79
	3/5/96	8:20	S	13.4										<1	<5	15	<2	4	<1	73
	3/7/96	9:50	S		36000	2.4	8.2	0.60	0.16	0.69	0.22	95	22	<1	9	21	3	8	<1	82
	3/7/96	9:55	S	8.8										<1	52	24	8	5	<1	48
	3/9/96	10:50	S		38000	1.2	8.2	0.60	0.10	<0.50	0.27	87	21	<1	<5	3	<4	16	<1	78
	3/9/96	10:55	S	8.0										<1	9	2	9	<4	<1	19
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLE)													**<1**	**>20.3**	**41**	**>5.7**	**>3.0**	**<1**	**46.7**
	5/1/96	10:50			39000	1.8	8.1	<0.10	0.11	0.55	0.20	110	33							
	10/9/96	11:55			49000	3.8	8.0	<0.2	0.12	0.70	0.34	120	31							

HUNTINGTON HARBOUR

STATION	DATE	TIME		Depth feet	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L
HUNBCC	10/30/96	9:35	S		6000	150.0	7.7	21.0	2.30	8.80	1.80	160	32	0.9	4	18	14	13	<0.9	142
	10/30/96	9:35	S	12.8										0.3	<2	4	4	<4	<0.9	38
	11/1/96	10:45	S		29000	7.4	7.7	2.4	0.47	1.40	<0.20	65	24	<0.1	4	4	2	<4	<0.1	27
	11/1/96	10:50	S	12.2										<0.1	5	5	5	<4	<0.1	28
	11/3/96	12:05	S		30000	1.2	7.7	2.0	0.59	0.87	0.61	69	21	0.2	5	8	0.3	<4	<0.1	24
	11/3/96	12:05	S	10.8										<0.1	6	<3	0.4	<4	<0.1	14
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLE)													**>0.1**	**>3.7**	**>3**	**3.1**	**<4**	**<0.4**	**26.7**
	1/23/97	8:25	S		1300	65.0	8.5	1.0	0.21	0.72	0.50	62	11	<0.1	<3	4	5	<5	<0.1	23
	1/23/97	8:25	S	13.8										<0.1	<3	<3	2	<5	<0.1	8
	1/25/97	11:05	S		35000	2.6	8.0	1.2	0.30	0.58	0.40	77	20	<0.1	<3	<3	0.4	8	<0.1	8
	1/25/97	11:05	S	12.2										<0.1	<3	<3	0.7	8	<0.1	5
	1/27/97	13:05	S		24000	4.4	7.9	1.3	0.25	0.72	0.44	89	32	<0.1	<3	6	0.8	<5	<0.1	17
	1/27/97	13:05	S	12.8										<0.1	<3	<3	0.8	8	<0.1	11
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLE)													**<0.1**	**<3**	**<3**	**1.2**	**>5.3**	**<0.1**	**8**
	4/29/97	10:35			38000	5.7	8.0	<0.8	<0.50	0.74	0.27	87	26							
	10/2/97	13:10	M		50000	4.2	7.9	<0.2	0.17	0.8	0.32	120	33							
	1/29/98	11:45	S		490	53	8.9	1.9	0.36	1.3	0.99	220	34							
	1/29/98	11:45	S	12.5										<10	10.6	14.1	23.7	<10	<10	75.9
	1/29/98	11:45	S/F	12.5										<10	<10	16.5	19.8	46.1	<10	92.1
	1/31/98	8:40	S		41000	2.4	8.0	0.23	0.2	0.6	0.21	66	21							
	1/31/98	8:40	S	13.4										<10	<10	14.1	<10	<10	<10	<50
	1/31/98	8:40	S/F	13.4										<10	<10	12.8	<10	<10	<10	<50
	2/2/98		S		40000	2.3	7.7	1.4	<0.5	0.8	0.24	80	28							
	2/2/98		S	12.5										<10	<10	10.3	<10	<10	<10	<50
	2/2/98		S/F	12.5										<10	<10	<10	<10	<10	<10	<50
	4-day average [dissolved metals]													**<10**	**>3.5**	**13.1**	**>6.6**	**>15.4**	**<10**	**>30.7**
	5/13/98	9:12	S		1280	120	8.4	2.6	0.12	1.6	1.2	360	48							
	5/13/98	9:12	S	9.5										<2	22.6	43.1	33.6	18.2	<2	209
	5/13/98	9:12	S/F	9.5										<2	<10	9.87	<2	<10	<2	14.6
	5/15/98		S		23600	3.5	8.0	3.5	0.1	1.3	0.09	180	32							
	5/15/98		S	7.5										<2	<10	15.9	<2	<10	<2	16.7
	5/15/98		S/F	7.5										<2	<10	16.3	<2	11.4	<2	20.6
	5/17/98	10:30	S		34900	2.4	8.6	<0.5	<0.05	1.1	<0.05	290	32							
	5/17/98	10:30	S	9.2										<2	<10	14.7	<2	11.3	<2	23
	5/17/98	10:30	S/F	9.2										<2	<10	13.2	<2	<10	<2	14.4
	4-day average [dissolved metals]													**<2**	**<10**	**13.1**	**<2**	**>3.8**	**<2**	**16.5**

HUNTINGTON HARBOUR

STATION	DATE	TIME		Depth feet	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L
HUNBCC	6/25/98	10:25	M		50100	1.9	7.8	<1.3	0.07	<1.0	0.12	32	6							
	10/21/98	9:00	D	12.4																
	3/25/99	15:30	ST	9.3	15800	21.0	8.0	4.53	1.24	0.31	0.428	100	28	<1	<8	17.4	2.64	11.7	<2	29.7
	3/25/99		SF	9.8										<1	<8	11.5	<2	11.4	<2	15.0
	3/27/99	10:20	ST	9.3	37300	2.9	7.9	1.23	0.54	0.2	0.245	53	6	<1	<8	12.2	<2	11.5	<2	13.3
	3/27/99		SF	7.5										<1	<8	11.9	<2	11.7	<2	11.6
	3/29/99	11:45	S	9.9	40300	2.2	8.0	1.23	0.48	0.11	0.153	64	12	<1	<8	12.8	<2	<4	<2	<10
	3/29/99		ST	10.5										<1	<8	11.3	<2	<4	<2	<10
									4-day average [dissolved metals]					<1	<8	11.2	<2	>7.4	<2	>8.9
	6/24/99	13:30	D	7.4	45400	2.3	8.1	<0.44	0.35	<0.05	0.07	74	12							

HUNTINGTON HARBOUR

STATION	DATE	TIME		Depth feet	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L
HUNCRB	11/8/94	12:00			53000	0.5	8.1	<0.20	0.33	0.40	0.25	99	20							
	11/10/94	12:30	S		29000	16.0	7.9	3.80	0.46	1.40	0.59	50	5	<1	<10	18	4	<40	<0.3	84
	11/10/94	12:35	S	13.8										<1	<10	22	6	<40	<0.3	68
	11/12/94	9:00	S		35000	2.4	6.9	2.90	0.27	1.50	0.45	22	<5	<1	<10	13	<2	<40	<0.3	45
	11/12/94	9:05	S	13.0										<1	<10	27	11	<40	<0.3	77
	11/14/94	11:30	S		46000	0.5	7.9	0.90	0.34	0.84	0.31	66	10	<1	<10	10	<2	<40	<2	42
	11/14/94	11:35	S	12.2										<1	<10	2	<2	<40	<2	50
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLE)													**<1**	**<10**	**17**	**>5.6**	**<40**	**<0.86**	**65**
	3/11/95	8:30	S		8600	48.0	8.0	2.20	0.13	1.00	1.10	57	9	<1	<10	15	3	<40	<1	29
	3/11/95	8:35	S	13.8										<1	<10	15	7	65	<1	57
	3/13/95	10:00	S		16000	6.4	8.0	1.70	<0.10	0.72	0.59	18	9	<1	<10	7	<2	<40	<1	36
	3/13/95	10:05	S	13.1										<1	<10	9	3	<40	<1	64
	3/15/95	12:15	S		33000	1.2	8.0	1.90	0.29	0.86	0.52	22	12	<1	<10	4	<2	<40	<1	22
	3/15/95	12:20	S	11.5										<1	<10	<4	<2	<40	<1	25
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLE)													**<1**	**<10**	**>8**	**>3.3**	**>21.6**	**<1**	**49**
	5/10/95	10:30			46000	1.4	8.0	<0.20	0.39	0.41	<0.20	62	26							
	10/11/95	11:20						<0.20	0.22	1.9	0.53									
	12/13/95	10:30	S		29000	16.0	7.5	5.80	0.71	2.30	0.86	49	17	<1	<10	10	<2	<40	<1	65
	12/13/95	10:35	S	15.0	40000									<1	<10	14	<2	<40	<1	76
	12/15/95	9:45	S		38000	2.2	7.8	1.70	0.56	1.70	0.48	68	17	<1	<10	12	<2	<40	<1	33
	12/15/95	9:45	S	12.0	41000									<1	<10	10	<2	<40	<1	27
	12/17/95	9:00	S		43000	1.0	7.8	0.60	0.58	6.10	1.10	84	21	<1	<10	8	<2	<40	<1	27
	12/17/95	9:05	S	13.0	43000									<1	<10	20	12	<40	<1	45
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLE)													**<1**	**<10**	**14.7**	**>4**	**<40**	**<1**	**49.3**
	3/5/96	9:00	S		23000	12.0	8.2	1.80	0.36	0.75	0.45	60	14	<1	<5	5	<2	17	<1	46
	3/5/96	9:05	S	16.4										<1	<5	10	<2	<4	<1	38
	3/7/96	9:15	S		30000	1.6	8.1	1.70	0.28	0.91	0.53	76	18	<1	<5	22	6	8	<1	69
	3/7/96	9:20	S	13.0										<1	<5	27	4	9	<1	45
	3/9/96	10:30	S		35000	0.7	8.1	0.90	0.13	0.57	0.35	85	22	<1	<5	4	<4	<4	<1	43
	3/9/96	10:35	S	12.0										<1	<5	2	5	<4	<1	61
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLE)													**<1**	**<5**	**13**	**>3**	**>3**	**<1**	**48**

STATION	DATE	TIME		Depth feet	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L
HUNCRB	5/1/96	10:20			39000	1.2	8.2	<0.20	<0.10	<0.50	<0.20	110	35							
	10/9/96	11:20			40000	3.2	8.0	0.2	0.23	0.54	0.33	77	25							
	10/30/96	10:05	S		24000	28.0	8.1	4.9	0.84	2.20	0.56	83	22	0.4	4	15	6	5	<0.9	76
	10/30/96	10:05	S	15.6										<0.1	6	<3	2	<4	<0.9	20
	11/1/96	10:20	S		30000	8.4	7.6	2.8	0.47	1.60	<0.20	16	16	<0.1	<2	6	2	<4	<0.1	30
	11/1/96	10:20	S	15.0										0.2	5	<3	2	<4	<0.1	22
	11/3/96	11:35	S		31000	1.6	7.8	1.6	0.38	0.84	0.51	69	24	<0.1	5	5	0.3	<4	<0.1	24
	11/3/96	11:35	S	13.4										<0.1	6	<3	3	<4	<0.1	17
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLE)													**>0.06**	**5.7**	**<3**	**2.3**	**<4**	**<0.4**	**19.6**
	1/23/97	9:20	S		20000	15.0	8.0	1.3	0.27	0.75	0.44	50	17	<0.1	<3	5	1	<5	<0.1	19
	1/23/97	9:20	S	16.0										<0.1	<3	5	6	7	<0.1	15
	1/25/97	10:50	S		35000	1.6	8.0	0.6	0.32	0.76	0.35	87	26	<0.1	<3	<3	0.4	<5	<0.1	12
	1/25/97	10:50	S	15.4										<0.1	<3	<3	1	7	<0.1	9
	1/27/97	12:35	S		18000	8.1	7.9	2.2	0.24	0.81	0.57	66	24	<0.1	<3	10	1	<5	<0.1	32
	1/27/97	12:35	S	14.6										<0.1	<3	<3	0.7	8	<0.1	11
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLE)													**<0.1**	**<3**	**>1.67**	**2.6**	**7.3**	**<0.1**	**11.7**
	4/29/97	10:05			49000	1.7	8.0	<0.8	<0.50	0.52	0.30	110	32							
	10/2/97	14:10	M		48000	3.4	8.1	<0.2	<0.1	1.0	0.38	91	27							
	1/29/98	12:50	S		25000	7.9	8.0	1.9	0.38	1.2	0.46	59	27							
	1/29/98	12:50	S	13.8										<10	<10	14.4	<10	<10	<10	<50
	1/29/98	12:50	S/F	13.8										<10	<10	10	<10	<10	<10	<50
	1/31/98	9:20	S		41000	2.9	8.0	0.27	0.23	0.6	0.24	49	16							
	1/31/98	9:20	S	14.8										<10	<10	<10	<10	40.4	<10	<50
	1/31/98	9:20	S/F	14.8										<10	<10	14.2	13.2	<10	<10	<50
	2/2/98		S		43000	1.1	7.9	0.91	<0.5	0.7	0.22	76	22							
	2/2/98		S	13.1										<10	<10	<10	<10	<10	<10	<50
	2/2/98		S/F	13.1										<10	<10	<10	<10	<10	<10	<50
									4-day average [dissolved metals]					**<10**	**<10**	**>8.1**	**>4.1**	**<10**	**<10**	**<50**
	5/13/98	9:35	S		18600	18	7.9	<0.5	0.08	1.0	0.4	160	24							
	5/13/98	9:35	S	14.1										<2	<10	19.9	2.29	<10	<2	26.9
	5/13/98	9:35	S/F	14.1										<2	<10	18.9	<2	<10	<2	19.1
	5/15/98		S		27100	2.5	8.0	1.3	0.07	1.3	0.52	200	36							
	5/15/98		S	11.5										<2	<10	17	<2	10.7	<2	19.2
	5/15/98		S/F	11.5										<2	<10	17	<2	11.2	<2	15.7
	5/17/98	10:00	S		38900	0.7	8.4	<0.5	<0.05	<1.0	<0.05	330	40							
	5/17/98	10:00	S	9.8										<2	<10	14.8	<2	<10	<2	25.4
	5/17/98	10:00	S/F	9.8										<2	<10	13.5	<2	11.4	<2	21.3
									4-day average [dissolved metals]					**<2**	**<10**	**16.5**	**<2**	**>7.8**	**<2**	**18.7**

HUNTINGTON HARBOUR

STATION	DATE	TIME		Depth feet	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L
HUNCRB	6/25/98		M		49800	1.0	8.0	<1.3	<0.05	<1.0	0.12	33	8							
	10/21/98	10:15	D	12.7	50200	2.9	7.9	<1.3	0.88	0.09	<0.061	140	15							
	3/25/99	15:10	ST	12.4	21500	14.0	8.1	14	1.07	0.24	0.367	84	20	<1	<8	17.2	3.01	12.9	<2	28.8
	3/25/99		SF	13.1										<1	<8	15.2	<2	13.9	<2	21.2
	3/27/99	10:00	ST	11.2	35700	1.6	8.0	0.84	0.58	0.12	0.153	58	9	<1	<8	15.8	<2	11.7	<2	18.2
	3/27/99		SF	11.8										<1	<8	14.1	<2	12.5	<2	17.5
	3/29/99	11:15	ST	11.2	44300	0.5	8.1	<0.44	0.34	<0.05	0.092	68	12	<1	<8	13.4	<2	<4	<2	37.6
	3/29/99		SF	11.8										<1	<8	13.4	<2	<4	<2	34.9
									4-day average [dissolved metals]					<1	<8	14.2	<2	>8.8	<2	24.8
	6/24/99	13:55	D	11.2	47200	2.2	8.1	<0.44	<0.2	<0.05	<0.061	84	10							

HUNTINGTON HARBOUR

STATION	DATE	TIME		Depth feet	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L
HUNSUN	11/8/94	13:00			54000	1.4	8.2	<0.20	<0.20	2.50	0.25	82	12							
	11/10/94	13:00	S		22000	48.0	8.0	4.10	0.49	1.20	0.54	83	18	<1	<10	9.2	5.5	<40	0.4	40
	11/10/94	13:05	S	12.2										<1	<10	6.3	<2	<40	<0.3	28
	11/12/94	9:30	S		50000	2.3	6.8	<0.20	<0.10	0.79	0.39	69	5	<1	<10	<10	<2	<40	<0.3	19
	11/12/94	9:35	S	10.0										<1	<10	<10	<2	<40	<0.3	30
	11/14/94	12:30	S		51000	2.4	8.1	<0.20	0.12	0.78	0.26	89	11	<1	<10	5	<2	<40	2	31
	11/14/94	12:35	S	7.0										<1	<10	<2	<2	<40	<2	26
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLE)													**<1**	**<10**	**>2**	**<2**	**<40**	**>0.67**	**28**
	3/11/95	9:30	S		12000	43.0	8.0	1.30	0.13	0.77	0.64	54	9	<1	<10	8	3.6	<40	<1	23
	3/11/95	9:35	S	10.2										<1	<10	6.2	<2	63	<1	33
	3/13/95	11:00	S		31000	3.3	7.9	0.88	0.11	0.45	0.35	46	16	<1	<10	<4	<2	<40	<1	32
	3/13/95	11:05	S	8.2										<1	<10	<4	<2	<40	<1	73
	3/15/95	10:00	S		50000	4.5	8.2	<0.20	0.24	0.58	0.24	73	31	<1	<10	<4	<2	<40	<1	17
	3/15/95	10:05	S	10.8										<1	<10	<4	<2	<40	<1	23
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLE)													**<1**	**<10**	**>2**	**<2**	**>21**	**<1**	**43**
	5/10/95	9:30			55000	1.9	7.8	<0.20	0.55	0.63	0.28	68	36							
	10/11/95	12:20			51000	3.0	8.1	<0.20	0.16	0.53	<0.20	95	31							
	12/13/95	9:15	S		25000	33.0	7.8	6.70	0.93	2.20	1.00	75	24	1	<10	5	<2	<40	<1	110
	12/13/95	9:20	S	1.8	42000									10	<10	11	<2	<40	<1	42
	12/15/95	8:35	S		41000	2.7	7.9	1.00	0.58	1.20	0.39	64	21	<1	<10	10	<2	<40	<1	21
	12/15/95	8:40	S	4.2	43000									<1	<10	8	<2	<40	<1	10
	12/17/95	10:00	S		46000	5.2	7.9	<0.20	0.35	1.10	0.25	95	25	<1	<10	<5	<2	<40	<1	<10
	12/17/95	10:05	S	4.2	46000									<1	<10	7	<2	<40	<1	16
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLE)													**>3.3**	**<10**	**8.7**	**<2**	**<40**	**<1**	**68**
	3/5/96	9:35	S		33000	15.0	8.2	1.20	0.30	0.59	0.37	73	18	<1	<5	18	<2	<4	<1	35
	3/5/96	9:40	S	13.0										<1	<5	3	<2	3	<1	29
	3/7/96	10:10	S		40000	3.5	8.2	0.20	0.19	0.75	<0.20	100	25	<1	<5	17	<2	3	<1	53
	3/7/96	10:15	S	7.6										<1	7	20	<2	<2	<1	46
	3/9/96	9:35	S		40000	1.3	8.1	<0.20	<0.10	<0.50	<0.20	110	28	<1	<5	<2	6	<4	<1	60
	3/9/96	9:40	S	9.2										<1	<5	<2	<4	<4	<1	11
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLE)													**<1**	**>2.3**	**>7.7**	**<4**	**>1.0**	**<1**	**28.7**

HUNTINGTON HARBOUR

STATION	DATE	TIME		Depth feet	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L
HUNSUN	5/1/96	11:15			40000	3.4	8.2	<0.20	0.14	<0.50	<0.20	130	33							
	10/9/96	12:20			39000	5.6	8.0	<0.2	0.21	0.74	0.29	120	31							
	10/30/96	10:55	S		24000	39.0	7.9	9.5	1.20	3.70	0.72	67	18	0.4	3	9	5	4	<0.9	62
	10/30/96	10:55	S	13.0										<0.1	5	<3	0.7	<4	<0.9	8
	11/1/96	9:05	S		29000	7.3	7.6	2.3	0.50	1.00	0.74	55	21	0.4	4	4	2	<4	<0.1	43
	11/1/96	9:05	S	11.6										0.6	4	<3	0.9	<4	<0.1	21
	11/3/96	9:50	S		35000	2.8	7.9	1.0	0.27	<0.50	0.46	98	28	<0.1	5	<3	0.3	<4	<0.1	55
	11/3/96	9:50	S	10.0										0.2	6	<3	0.6	<4	<0.1	15
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLE)													**>0.26**	**5**	**<3**	**0.73**	**<4**	**<0.1**	**14.6**
	1/23/97	10:05	S		23000	22.0	8.2	0.9	0.11	0.64	0.39	57	19	<0.1	<3	5	2	<5	<0.1	13
	1/23/97	10:05	S	15.2										<0.1	<3	<3	4	<5	<0.1	7
	1/25/97	10:15	S		48000	2.1	8.1	<0.2	<0.10	0.65	<0.20	110	22	<0.1	<3	<3	0.3	6	<0.1	<2
	1/25/97	10:15	S	13.0										<0.1	<3	<3	0.8	6	<0.1	5
	1/27/97	11:35	S		30000	4.9	8.1	0.9	0.23	0.72	0.37	110	38	<0.1	<3	<3	0.7	6	<0.1	10
	1/27/97	11:35	S	12.6										<0.1	<3	<3	0.6	9	<0.1	5
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLE)													**<0.1**	**<3**	**<3**	**1.8**	**>5**	**<0.1**	**5.6**
	4/29/97	11:05			49000	3.8	7.9	<0.8	<0.50	0.78	0.35	110	31							
	10/2/97	12:45	M		50000	5.1	7.9	<0.2	0.22	0.7	0.29	100	31							
	1/29/98	13:15	S		41000	8.5	8.0	0.67	0.16	0.8	0.35	110	34							
	1/29/98	13:15	S	9.8										<10	<10	10.4	<10	<10	<10	<50
	1/29/98	13:15	S/F	9.8										<10	<10	<10	<10	<10	<10	<50
	1/31/98	8:25	S		47000	4.9	8.1	<0.2	0.15	0.5	<0.2	66	22							
	1/31/98	8:27	S	11.8										<10	<10	18.7	<10	<10	<10	<50
	1/31/98	8:29	S/F	11.8										<10	<10	<10	<10	<10	<10	<50
	2/2/98		S		47000	2.5	8.0	<0.2	<0.5	0.5	<0.2	130	39							
	2/2/98		S	9.8										<10	<10	12.5	<10	<10	<10	<50
	2/2/98		S/F	9.8										<10	<10	<10	13.1	<10	<10	<50
	4-DAY AVERAGE (DEPTH INTEGRATED SAMPLES)													**<10**	**<10**	**<10**	**>4**	**<10**	**<10**	**<50**

HUNTINGTON HARBOUR

STATION	DATE	TIME		Depth feet	EC umhos	Turb NTU	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L
HUNSUN	5/13/98	10:25	S		27500	19	8.0	<0.5	0.07	1.0	0.37	230	32							
	5/13/98	10:25	S	10.8										<2	<10	18.9	<2	<10	<2	20.3
	5/13/98	10:25	S/F	10.8										<2	<10	16.3	<2	<10	<2	10
	5/15/98		S		45300	2.3	8.2	<0.5	<0.05	1.0	<0.05	270	36							
	5/15/98		S	9.2										<2	<10	17.2	<2	<10	<2	<10
	5/15/98		S/F	9.2										<2	<10	18.3	<2	11.5	<2	15.4
	5/17/98	11:00	S		47100	1.9	8.2	<0.5	<0.05	<1.0	<0.05	350	48							
	5/17/98	11:00	S	6.6										<2	<10	13.2	<2	<10	<2	17.3
	5/17/98	11:00	S/F	6.6										<2	<10	13.5	<2	<10	<2	17.9
									4-day average [dissolved metals]					**<2**	**<10**	**16.0**	**<2**	**3.8**	**<2**	**14.4**
	6/25/98	10:10	M		51300	2.1	7.9	<1.3	<0.05	<1.0	0.15	34	10							
	10/21/98	10:45	D	14.4																
	3/25/99	15:50	ST	10.2	49000	1.6	8.0	<0.44	<0.2	<0.05	0.061	210	34	<1	<8	19.9	<2	12.9	<2	12.2
	3/25/99		SF	10.8										<1	<8	13.4	<2	14.5	<2	<10
	3/27/99	10:35	ST	9	46300	2.2	8.0	<0.44	0.32	<0.05	0.122	78	6	<1	<8	13.6	<2	12.3	<2	<10
	3/27/99		SF	9.5										<1	<8	13	<2	13.1	<2	<10
	3/29/99	12:15	ST	7.4	46300	1.9	8.2	<0.44	1.11	<0.05	0.092	79	8	<1	<8	12.5	<2	<4	<2	<10
	3/29/99		SF	7.8										<1	<8	13.9	<2	<4	<2	<10
									4-day average [dissolved metals]					**<1**	**<8**	**13.4**	**<2**	**>9.2**	**<2**	**<10**
	6/24/99	13:15	D	8.4	48100	2.8	8.0	<0.44	<0.2	<0.05	0.073	94	10							

Appendix 4.5:
Sediment Quality Data

STATION	DATE	TIME	Cd mg/kg	Cr mg/kg	Cu mg/kg	Pb mg/kg	Ni mg/kg	Ag mg/kg	Zn mg/kg	Fe mg/kg	Clay %	Silt+ Clay %	Tot PO_4 as P mg/Kg	DDD µg/kg	DDE µg/kg	DDT µg/kg	gamma BHC µg/kg	2,4-D µg/kg	2,4,5-TP Silvex µg/kg	Benzo(b) µg/kg	Benzo(k) µg/kg	Chrysene µg/kg	Flranth µg/kg	Pyrene µg/kg	Mthxy µg/kg	Dznon µg/kg	Endo I µg/kg	Aroclor 1254 µg/kg	Aroclor 1260 µg/kg
NEWPORT BAY WATERSHED																													
BCF04	11/30/94	8:00	<1.2	26	19	<0.9	35	<2	79					1.2	4.0	1.2	<0.7	<40	<20	<400	<400	<400	<400	<400	<2	<50	<1.2		
	5/17/95	0:00	<1.0	18	9.2	<10	19	<2	29					<18	<8	<18	<8.0	-	-	-	-	-	-	-	-	-	-		
	10/24/95	0:00	<0.6	14	11	7.1	19	<1	38					4.3	3.4	<0.8	<0.5	<30	<10	<300	<300	<300	<300	<300	1.0	<40	<0.8		
	4/23/96	9:30	<2.0	27	16	9.8	21	<2	48					3.6	6.4	5.0	<0.7	<71	<38	<360	<360	<360	<360	<360	<2	<54	<1.7		
	11/5/96	9:40	<1.0	21	12	<7	16	<1	46					<1.5	3.2	2.2	<0.6	<29	<15	<290	<290	<290	<290	<290	<1	<44	<1.5	<44	<44
	4/15/97	8:50	<0.7	20	11	<7	16	<1	37					<0.9	2.1	1.5	<0.5	<27	<13	<270	<270	<270	<270	<270	<1	<40	<0.9	<40	<40
	10/29/97	9:05	<2.0	36	30	13	36	<2	81	23000	33.2	79.1		<2	3.0	<2	<0.9	<40	<20	-	-	-	-	-	<2	<60	<2	<60	<60
	6/23/98	12:30	<1	23.3	15.5	4.8	18.6	<0.5	47.1	12710	6.4	15.1		<4	<3	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	6/18/99	10:30	0.46	19.1	<0.22	2.2	11.9	<0.5	29.9	13760	25.3	71.0	346	<4	<3	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	5/9/00	9:00	2.16	40.3	14.7	4.5	22.6	<0.5	19.6	28300				<4	<3	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
SDMF05	11/30/94	8:40	<0.7	5.2	7.8	<7	<6	<1	27					3.5	6.8	5.2	<0.5	<30	<10	<300	<300	<300	<300	<300	<1	<40	<1		
	5/17/95	0:00	<0.7	1.8	<3	<7	<5	<1	6.2					<5	<3	<5	<3	-	-	-	-	-	-	-	-	-	-		
	10/24/95	10:50	<0.6	2.3	<3	<6	<5	<1	23.0					<0.8	<2	<0.8	<0.5	<30	<10	<300	<300	<300	<300	<300	<1	<40	<0.8		
	4/23/96	0:00	<1.0	4.4	4.7	<6	<5	<1	18.0					<0.9	3.4	1.6	<0.5	<52	<26	<260	<260	<260	<260	<260	<1	<39	<0.9		
	11/5/96	10:00	<1.0	4.7	4.4	<6	<5	<1	27.0					<0.9	2.9	1.3	<0.5	<26	<13	<260	<260	<260	<260	<260	<1	<38	<0.9	<38	<38
	4/15/97	9:30	<0.6	2.4	<3	<6	<5	<1	13.0					<0.9	1.9	<0.9	<0.5	<25	<13	<250	<250	<250	<250	<250	<1	<38	<0.9	<38	<38
	10/29/97	9:20	<2.0	10	18	11	9.1	<2.0	67.0	13000	12.3	30.2		4.7	13	2.1	<0.7	<40	<20	-	-	-	-	-	<2	<50	<1	<50	<50
	6/23/98	12:10	<0.2	2.3	4.7	3.7	3.5	<0.5	16.4	4570	1.2	3.0		<4	<3	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	10/27/98	10:40	<0.2	3.3	1.3	2.3	2.6	<0.5	13.5	3310	1.3	3.7		<4	7.0	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	6/17/99	14:30	0.33	2.4	<0.22	1.5	0.9	<0.5	16.9	2540	0.5	1.3	157	<4	<3	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	10/14/99	11:15	0.23	1.7	0.75	1.6	<0.7	<0.5	7.5	1980				<4	<3	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	5/9/00	10:00	1.68	12.8	13.80	2.0	7.7	0.2	62.1	10600				<4	<7	<11	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
LANF08	11/30/94	9:50	<1.1	15	10	7.1	6.2	<1	54					<0.9	2	<0.9	<0.5	<30	<10	<300	<300	<300	<300	<300	<1	<40	<0.9		
	5/17/95	11:45	<0.6	3.5	<3	7	<5	<1	25					<8	7	<8	<0.5	-	-	-	-	-	-	-	-	-	-		
	10/24/95	11:15	<0.6	1.6	4	83	<5	<1	28					<0.8	<0.8	<0.8	<0.4	<20	<10	<200	<200	<200	<200	<200	<1	<40	<0.8		
	4/23/96	11:00	<2.0	32	25	63	21	<2	110					320	160	<35	<19.0	<35	<18	<350	<350	<350	<350	<350	<35	<53	<35		
	11/5/96		<1.0	9	10	11	7	<1	59					<0.9	2	<0.9	<0.5	<25	<12	<250	<250	<250	<250	<250	<1	<37	<0.9	<37	<37
	4/15/97	10:45	<0.6	5	6	6	5	<1	26					1.3	2.0	1.3	<0.5	<24	<12	<240	<240	<240	<240	<240	<1	<35	<0.8	<35	<35
	10/28/97	10:05	1.4	6.2	16	<5.0	1	<1	49	6000	0.0	0.3		<0.9	<0.9	<0.9	<0.5	<50	<30	<3000	<3000	<3000	<3000	<3000	<1	<40	<0.9	<40	<40
	6/22/98	13:00	<1.0	15.7	24.2	8.8	15.6	<0.5	61	23640	37.9	78.2		<4	<3	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	10/27/98	11:45	0.9	8.9	8.1	14.7	4.6	<0.5	35	5530	1.1	3.4		<4	<3	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	6/17/99	15:00	0.6	7.5	5.7	20.5	3.7	<0.5	35	10040	0.5	1.1	181	<4	<3	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25

All organic compounds unless otherwise noted were below the detection limits of the laboratory.

Benzo (b) - Benzo(b) flouranthene Flranth - Flouranthene Dznon - Diazinon

Benzo(k) - Benzo(k)flouranthene Mthxy - Methoxychlor Endo I - Endosulfan I

ND - Not Detected (below detection limit of laboratory).

STATION	DATE	TIME	Cd mg/kg	Cr mg/kg	Cu mg/kg	Pb mg/kg	Ni mg/kg	Ag mg/kg	Zn mg/kg	Fe mg/kg	Clay %	Silt+ Clay %	Tot PO_4 as P mg/Kg	DDD µg/kg	DDE µg/kg	DDT µg/kg	gamma BHC µg/kg	2,4-D µg/kg	2,4,5-TP Silvex µg/kg	Benzo(b) µg/kg	Benzo(k) µg/kg	Chrysene µg/kg	Flranth µg/kg	Pyrene µg/kg	Mthxy µg/kg	Oznon µg/kg	Endo I µg/kg	Aroclor 1254 µg/kg	Aroclor 1260 µg/kg
BC2F09	5/17/95	10:45	2	21	21	16	18	<2	130					<19	26.0	<19	<9	-	-	-	-	-	-	-	-	-	-		
	10/24/95	11:50	<0.9	10	38	12	11	<2	180					<1.7	<1.7	<1.7	<0.7	<40	<20	<400	<400	<400	<400	<400	<2	<50	<1.7		
	11/5/96	12:30	<2.0	15	20	13	12	<2	110					<1.5	2.1	<1.5	<0.6	<30	<15	<300	<300	<300	<300	<300	<2	<30	<1.5	<45	<45
	10/29/97	10:20	<2.0	20	47	16	21	<2	200	21000	17.1	33.3		<2	<2	<2	<0.9	<40	<20	-	-	-	-	-	<2	<70	<2	<70	<70
	6/24/98	9:00	<0.3	23.6	7.1	7.1	22.3	<0.5	43.1	5410	7.1	25.7		<4	<3	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	10/20/98	12:00	0.5	8.4	12.8	5.6	6.9	-	65.4	6570				<4	<3	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
SCCF15	11/30/94	9:20	<0.7	4.9	<3	<7	<6	<1	18					<6	<3	<6	<3	<30	<10	<300	<300	<300	<300	<300	<7	<40	<6		
	5/17/95	0:00	1	19	7.9	<7	14.0	<1	32					<15	<5	<15	<0.5	-	-	-	-	-	-	-	-	-	-		
	10/24/95	11:30	<0.7	7.8	8.4	11	8.4	<1	<45					<0.9	1.4	<0.9	<0.5	<30	<10	<300	<300	<300	<300	<300	<1	<40	<0.9		
	4/23/96	10:30	<1.0	15	7.5	10	11	<1	31					<0.9	1.2	<0.9	<0.5	<53	<27	<270	<270	<270	<270	<270	<1	<40	<0.9		
	11/5/96	10:45	<1.0	10	5.1	<6	8	<1	23					<0.9	<0.9	<0.9	<0.5	<25	<12	<250	<250	<250	<250	<250	<1	<37	<0.9	<37	<37
	4/15/97	10:00	<0.7	22	14.0	8.1	18.0	<1	46					<1.0	1.2	<1.0	<0.6	<28	<14	<280	<280	<280	<280	<280	<1	<42	<1.0	<42	<42
	10/29/97	9:45	<2	6.5	7.3	10	6.0	<2	32	5400	0.0	0.0		<6	<6	<6	<3	<30	<20	-	-	-	-	-	<8	<50	<6	<300	<300
	6/24/98	8:45	ND	2.3	0.6	2.3	2.1	<0.5	7	2250	0.9	1.8		<4	<3	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	10/20/98	11:45	0.3	5.4	2.8	6.5	3.2	<0.5	19.4	3820	2.2	5.0		<4	<3	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	6/18/99	11:00	0.4	6.5	10.0	6.3	4.8	<0.5	65.8	4470	17.0	35.9	388	<4	<3	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
BEEF17	6/24/98	9:20	ND	1.1	0.5	1.3	1.1	<0.5	10.1	2030	0.0	0.2		<4	<3	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	10/20/98	12:30	0.6	6.7	7.9	4.2	4.3	-	47.8	6040	4.1	12.4		<4	<3	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
ACWF18	5/17/95	13:15	3.7	22	16	17.0	17.0	<2	95					30	210	62	<18	-	-	-	-	-	-	-	-	-	-		
	10/24/95	14:10	<0.7	5.6	6.9	6.7	6.7	<1	32					5	31	8	<2	<30	<10	<300	<300	<300	<300	<300	<3	<40	<3		
	4/23/96	13:15	<1.0	4.2	12	6.5	<5	<1	22					3.1	18	6.2	<2	<51	<26	<260	<260	<260	<260	<260	<3	<38	<3		
	11/5/96	13:45	<1.0	14.0	16	7.1	11	<1	48					<5	53	16.0	<3	<27	<14	<270	<270	<270	<270	<270	<7	<41	<5	<270	<270
	4/15/97		<0.6	8.4	9	<6	6.2	<1	30					<2	28	7.5	<1	<25	<12	<250	<250	<250	<250	<250	<2	<37	<25	<74	<74
	10/29/97	12:35	<1.0	7.1	12	9	<6	<1	44	8800	4.1	12.1		<1	9	<1	<0.6	<30	<10	-	-	-	-	-	<1	<40	<1	<40	<40
	6/24/98	10:00	<3.7	4.3	5.3	3.4	4.2	<0.5	27	4490	5.2	15.4		<4	<1	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	6/18/99	12:00	0.3	19.0	33.5	10.3	6.8	<0.5	139		17.1	43.8	457	<4	<3	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	5/9/00	12:00	-	-	-	-	-	-	-	-				<4	<3	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25

STATION	DATE	TIME	Cd mg/kg	Cr mg/kg	Cu mg/kg	Pb mg/kg	Ni mg/kg	Ag mg/kg	Zn mg/kg	Fe mg/kg	Clay %	Silt+ Clay %	Tot PO_4 as P mg/Kg	DDD µg/kg	DDE µg/kg	DDT µg/kg	gamma BHC µg/kg	2,4-D µg/kg	2,4,5-TP Silvex µg/kg	Benzo(b) µg/kg	Benzo(k) µg/kg	Chrysene µg/kg	Flranth µg/kg	Pyrene µg/kg	Mthxy µg/kg	Dznon µg/kg	Endo I µg/kg	Aroclor 1254 µg/kg	Aroclor 1260 µg/kg
SERF19	11/30/94	11:25	<0.7	3.9	10.0	<7	<6	<1	67					<6	<3	<6	<3	<30	<10	<300	<300	<300	<300	<300	<7	49	<6		
	5/17/95	13:30	<0.6	<1	<2	<6	<5	<1	<1					<0.8	<0.4	<0.8	<0.4	-	-	-	-	-	-	-	-	-	-		
	10/24/95	14:15	<0.6	<1	<3	<6	<5	<1	9.5					<0.9	<0.9	<0.9	<0.5	<30	<10	<300	<300	<300	<300	<300	<1	<40	<0.9		
	4/23/96	13:25	<1.0	2.0	<3	<6	<5	<1	6.8					<0.9	<0.9	<0.9	<0.5	<51	<25	<250	<250	<250	<250	<250	<1	<38	<0.9		
	11/5/96	14:00	<1.0	2.8	<2	<6	<5	<1	8.5					<0.9	<0.9	<0.9	<0.5	<25	<12	<250	<250	<250	<250	<250	<1	<37	<0.9	<37.0	<37.0
	4/15/97	12:40	<0.6	<1	<2	<6	<5	<1	7.8					<0.8	<0.8	<0.8	<0.5	<23	<12	<230	<230	<230	<230	<230	<1	<35	<23.0	<35.0	<35.0
	10/29/97	12:50	<1	<1	<3	<6	<5	<1	7.1	900	10.6	19.7		<0.9	<0.9	<0.9	<0.5	<30	<10	-	-	-	-	-	<1	<40	<0.9	<40	<40
	6/24/98	10:15	<1	-	-	<1	<1	<0.5	5.7	940	0.0	0.1		<4	<3	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	10/20/98	13:00	0.4	1.7	3.6	0.9	1.1	<0.5	8.1		0.0	0.5		<4	<3	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	6/18/99	12:30	<0.2	0.8	<0.2	0.8	<0.7	<0.5	6.0	914	0.0	0.2	159	<4	<3	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
RCWF26	11/30/94	12:00	<0.7	<3.1	<3	<7	<6	<1	8.2					<1	<0.5	<1	<0.5	<30	<10	<300	<300	<300	<300	<300	<1	40	<1.0		
	5/17/95	14:20	<0.6	<1	<3	<6	<5	<1	6.8					<5	<3	<5	<3	-	-	-	-	-	-	-	-	-	-		
	10/24/95	15:15	<0.6	<1	<3	<6	<5	<1	7.0					<0.8	2	<0.8	<0.5	<30	<10	<300	<300	<300	<300	<300	<1	<40	<0.8		
	4/23/96	14:15	<1	2.9	<3	<6	23	<5	<1					<0.9	1.3	<0.9	<0.5	<130	<65	<260	<260	<260	<260	<260	<1	<39	<0.9		
	11/5/96		<1	3.5	3.1	6.5	<5	<1	20					<2.0	15.0	3.2	<1.0	<25	<12	<250	<250	<250	<250	<250	<2	<37	<2.0	<74	<74
	4/15/97		<0.6	1.8	<2	<6	<5	<1	11					<0.8	2.5	<0.8	<0.5	<24	<12	<240	<240	<240	<240	<240	<1	<35	<0.8	<35	<35
	10/29/97	11:55	2.4	17.0	15.0	<8	15.0	<2	75.0	30000	10.3	29.1		<1	1.5	<1	<0.6	<30	<20	-	-	-	-	-	<2	<50	<1	<50	<50
	6/24/98	10:40	0.3	4.5	2.3	10	4.1	<0.5	20.7	4650	2.2	4.8		<4	<1	<1	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	10/20/98	13:30	0.8	1.9	2.9	1.2	<0.2	<0.5	11.9	1980.0	2	3.6		<4	<3	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4		
HCWF27	11/30/94	11:45	<0.7	1.8	3.4	<7	<5	<1	15					1.9	7.5	<0.9	<0.5	<30	<10	<300	<300	<300	<300	<300	<1	<40	<0.9		
	5/17/95	14:00	1.8	8.8	14	<8	11	<1	41					<5	3.2	6.5	<3	-	-	-	-	-	-	-	-	-	-		
	10/24/95	15:10	<0.7	4.7	12	<7	6	<1	51					<5	95	22	<3	<30	<10	<300	<300	<300	<300	<300	<7	<40	<5		
	4/23/96	14:00	<2	14	14	13	13	<2	59					<16	29	<16	<7	<68	<34	<340	<340	<340	<340	<340	<17	<51	<16		
	11/5/96		<1	4	5	<6	<5	<1	26					3.6	<3	5	<2	<26	<13	<260	<260	<260	<260	<260	<3	<38	<3	<77	<77
	4/15/97	13:15	<0.7	6	10	<7	<6	<1	44					<6	64	13	<3	<28	<14	<280	<280	<280	<280	<280	<7	<42	<28	<280	<280
	10/29/97	12:05	<1	4.1	7.9	<7	<6	<1	34	7000	2.0	4.0		5	12	<1	<0.6	<30	<10	-	-	-	-	-	<1	<40	<1	<40	<40
	6/24/98	11:00	<0.2	3.0	4.4	2.3	2.1	<0.5	20	3010	1.7	3.9		<4	<3	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	6/18/99	13:05	0.9	9.1	10.1	5.0	5.2	<0.5	54	10030	8.3	30.6	571	<4	<39	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	5/9/00	11:30	-	-	-	-	-	-	-	-				21	93	66	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25

STATION	DATE	TIME	Cd mg/kg	Cr mg/kg	Cu mg/kg	Pb mg/kg	Ni mg/kg	Ag mg/kg	Zn mg/kg	Fe mg/kg	Clay %	Silt+ Clay %	Tot PO_4 as P mg/Kg	DDD µg/kg	DDE µg/kg	DDT µg/kg	gamma BHC µg/kg	2,4-D µg/kg	2,4,5-TP Silvex µg/kg	Benzo(b) µg/kg	Benzo(k) µg/kg	Chrysene µg/kg	Firanth µg/kg	Pyrene µg/kg	Mthxy µg/kg	Dznon µg/kg	Endo I µg/kg	Aroclor 1254 µg/kg	Aroclor 1260 µg/kg
BARSED	11/30/94	10:20	1	2.3	3	7.7	<6	<1	10					<0.9	3	2.3	<0.5	<30	<10	<300	<300	<300	<300	<300	<1	<40	<0.9		
	5/17/95	12:15	<0.6	<1	<2	<6	<5	<1	3.9					<5	4	<5	<2	-	-	-	-	-	-	-	-	-	-		
	10/24/95	13:15	<0.6	<1	<3	<6	<5	<1	13					1	3.5	1.6	<0.5	<30	<10	<300	<300	<300	<300	<300	<1	<40	<0.8		
	4/23/96	12:15	<1	2.7	2.7	<6	<5	<1	12					2.6	7.6	3.6	<1.5	<130	<64	<260	<260	<260	<260	<260	<3	<38	<3		
	11/5/96		<1	1.9	<3	<6	<5	<1	12					1.9	5.6	2.9	<0.5	<25	<13	<250	<250	<250	<250	<260	<1	<38	<0.9	<38	<38
	4/15/97	11:00	<0.6	2.5	2.7	<6	<5	<1	11					1.9	4.3	2.3	<0.5	<25	<12	<250	<250	<250	<250	<250	<1	<37	<25.0	<37	<37
	10/29/97	10:30	2.4	10	22	<10.0	8.7	<2	67	13000	29.4	53.2		<2	4.3	<2	<0.9	<40	<20	-	-	-	-	-	<2	<70	<2.0	<70	<70
	6/23/98	13:10	<1	1.7	1.9	1.7	1.8	<0.5	5.8	1500	0.0	1.2		<4	<4	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	10/27/98	9:45	0.7	11.1	7.6	5.2	8.1	<0.5	35.2	11780	9.4	18.5		<4	6	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	6/17/99	15:15	0.3	3.7	1.9	2.3	2.7	<8.3	19.8	3300	0.9	2.4	123	<4	<3	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
WYLSED	11/30/94	10:30	<0.7	<1	<3	<7	<6	<1	7.1					<0.9	1.1	<0.9	<0.5	<30	<10	<300	<300	<300	<300	<300	<1	<40	<0.9		
	5/17/95	12:30	<0.7	1.9	<3	<7	<5	<1	7.5					<5	<3	<5	<3	-	-	-	-	-	-	-	-	-	-		
	10/24/95	13:45	<0.6	<1.0	<2.0	<6	<5	<1	6.5					<0.8	1.4	<0.8	<0.4	<20	<10	<200	<200	<200	<200	<200	<1	<40	<0.8		
	4/23/96	12:15	<1.0	3.3	<3.0	<7	<5	<5	13					1.8	<0.9	<0.9	<0.5	<130	<66	<260	<260	<260	<260	<260	<1	<39	<0.9		
	10/29/97	10:45	<2	3	5	<8	<6	<2	18	3900	0.9	4.5		<4	<3	<3	<11	<800	<110	-	-	-	-	-	<2	<50	<1	50	50
	10/27/98	10:00	0.3	6.5	2.8	3.0	5.1	<2	26	7200	6.9	34.2		<4	6	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	6/17/99	15:45	0.4	3.5	1.0	1.5	1.5	<0.5	10	3300	0.8	1.2	185	<4	<3	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	10/14/00	11:00	0.2	2.4	6.1	1.6	2.1	<0.5	10	2390				<4	<3	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	5/9/00	10:30	0.5	2.8	3.5	2.0	1.9	<0.5	15	2860				<4	<3	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25

STATION	DATE	TIME	Cd mg/kg	Cr mg/kg	Cu mg/kg	Pb mg/kg	Ni mg/kg	Ag mg/kg	Zn mg/kg	Fe mg/kg	Clay %	Silt+ Clay %	Tot PO_4 as P mg/Kg	DDD µg/kg	DDE µg/kg	DDT µg/kg	gamma BHC µg/kg	2,4-D µg/kg	2,4,5-TP Silvox µg/kg	Benzo(b) µg/kg	Benzo(k) µg/kg	Chrysene µg/kg	Flranth µg/kg	Pyrene µg/kg	Mthxy µg/kg	Dznon µg/kg	Endo I µg/kg	Aroclor 1254 µg/kg	Aroclor 1260 µg/kg
NEWPORT BAY																													
LNBRIN	12/1/94	12:45	<1.6	52	420	110	21	<3	280					<6	52	<6	<3.2	<60	<30	<600	<600	<600	<600	<600	<6	<100	<6		
	5/18/95	10:00	<0.9	21	330	65	11	<2	150					<7	28	<7	<4	-	-	-	-	-	-	-	-	-	-		
	10/31/95	9:50	<1.7	46	410	130	24	<2	270					<2.2	2	<2.2	<0.9	<50	<20	<500	<500	<500	<500	<500	<2	<70	<2.2		
	4/25/96	10:45	<2.0	23	29	26	18	<2	100					6.4	60	<5	<2.4	<480	<240	<480	<480	<480	<480	<480	<5	<71	<5.0	400	
	11/7/96	11:15	<3.0	60	490	110	31	<3	340					<2.4	37	<2.4	<1.6	<57	<29	<570	<570	<570	<570	<570	<3	<86	<2.4	120	<86
	4/17/97	11:30	<21	25	430	110	17	<3	240					6.0	40	<2.4	<1.6	<57	<29	<570	<570	<570	<570	<570	<3	<86	<2.4	150	<86
	10/30/97	12:15	<3.0	36	530	120	23	<3	280	39000	46.2	56.9		2.6	47	<2	<1	<60	<30	<600	<600	<600	<600	<600	<600	<80	<2	<80	<80
	6/23/98	13:45	<1	14.2	193	40.2	7.3	<0.5	99	12290	67.8	66.9		6	22	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	11/4/98	11:30	2.6	13.3	159	36.3	5.7	<0.5	91	11100	23.9	55.7		<4	19	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	5/27/99	12:15	<0.20	15.1	167	30.9	6.7	<0.5	93	11580	68.8	85.3	297	10	26	13	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	10/12/99	13:25	<0.20	16.3	180	28.0	7.3	<0.5	113	12200				<4	21	11	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	6/2/00	12:10	<0.20	17.0	169	33.3	7.6	<0.5	101					<4	16	8	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
LNBHIR	12/1/94	13:00	<1.3	38	33	22	20	<3	120					<5	55	<5	<2.0	<50	<30	<500	<500	<500	<500	<500	<5	<80	<5		
	5/18/95	11:30	2.8	28	31	17	24	<3	120					<24	47	<24	<16	-	-	-	-	-	-	-	-	-	-		
	10/31/95	9:30	<0.9	28	32	28	19	<2	110					4.7	23	2	<0.7	<40	<20	<400	<400	<400	<400	<400	<2	<60	<1.8		
	4/25/96	11:20	<2.0	36	30	28	47	<2	110					7.2	42	4	<2.0	<380	<190	<380	<380	<380	<380	<380	<4	<57	<4.0		
	11/7/96	11:40	<1.0	3.0	5.0	6.5	<5	<1	18					<0.9	1.4	<0.9	<0.5	<130	<63	<250	<250	<250	<250	<250	<1	<38	<0.9	<38	<38
	4/17/97	12:40	7.9	8.6	37.0	19.0	7.4	<2	75					4.4	25	<1.7	<0.7	<35	<18	<350	<350	<350	<350	<350	<2	<53	<1.7	<53	<53
	10/30/97	12:45	<2.0	29.0	49.0	31.0	22.0	<2	130	33000	39.1	70.6		<1	29	<1	<0.8	<40	<20	-	-	-	-	-	<2	<60	<1	<60	<60
	6/23/98	14:10	<1	12.6	14.4	7.9	10.2	<0.5	48	13760	29.2	59.5		<4	29	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	11/4/98	12:10	0.8	11.6	6.3	6.3	7.5	<0.5	43	11060	53.7	78.1		<4	28	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	5/27/99	11:45	<0.2	15.1	11.5	13.5	8.0	<0.5	49		62.7	79.9		<4	26	12	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	10/12/99	12:25	<0.2	16.6	22.5	8.2	8.2	<0.5	70	14000				<4	21	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	6/2/00	13:00	0.255	17.7	23.2	14.8	10.0	<0.5	61	16100				<7	26	6	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
LNBTUB	10/12/99	13:55	<0.2	18.9	30.5	21.1	10.4	<0.5	72	15300				<4	17	9	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	6/2/00	12:30	<0.2	16.0	25.8	17.2	8.0	<0.5	55.7					<16	41	7	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25

STATION	DATE	TIME	Cd mg/kg	Cr mg/kg	Cu mg/kg	Pb mg/kg	Ni mg/kg	Ag mg/kg	Zn mg/kg	Fe mg/kg	Clay %	Silt+ Clay %	Tot PO_4 as P mg/Kg	DDD µg/kg	DDE µg/kg	DDT µg/kg	gamma BHC µg/kg	2,4-D µg/kg	2,4,5-TP Silvex µg/kg	Benzo(b) µg/kg	Benzo(k) µg/kg	Chrysene µg/kg	Flranth µg/kg	Pyrene µg/kg	Mthxy µg/kg	Dznon µg/kg	Endo I µg/kg	Aroclor 1254 µg/kg	Aroclor 1260 µg/kg
UNBJAM	12/1/94	10:25	<0.9	10	12	<9.0	7.7	<2	58					<1.3	12	<1.3	<0.7	<40	<20	<400	<400	<400	<400	<400	<2	60	<1.3		
	5/18/95	12:15	<0.6	<1	<3	<6	<5	<1	4					<9	4.8	<9	<5	-	-	-	-	-	-	-	-	-	-		
	10/31/95	11:30	<0.7	5	5	7	<6	<1	24					<0.9	3.2	<0.9	<0.5	<30	<10	<300	<300	<300	<300	<300	<1	<40	<0.9		
	4/25/96	11:30	<2.0	42	38	47	29	<2	170					<20	69	<20	<9.0	<890	<440	<440	<440	<440	<440	<440	<22	<67	<20.0		
	11/7/96	9:30	<2.0	17	18	15	9.3	<2	84					<1.7	18	<1.7	<0.7	<36	<18	<360	<360	<360	<360	<360	<2	<360	<1.7	<54	<54
	4/17/97	8:40	<6.2	6	12	9	6.8	<1	45					1.4	8.0	<1.5	<0.6	<29	<14	<290	<290	<290	<290	<290	<1	<43	<1.5	<43	<43
	10/30/97	9:45	<2.0	7	12	<9.0	<7.0	<2	41	9100	25.7	38.3		2.9	15	<1.0	<0.7	<40	<20	-	-	-	-	-	<2	<50	<1.0	<50	<50
	6/24/98	11:10	<1	9.2	10.6	6.8	6.6	<0.5	41.6	11210	7.1	16.7		<4	27	<3	<11	<800	<110	-	-	-	-	-	<2	<50	<1	50	50
	11/4/98	9:30	1.0	10.3	6.5	5.6	6.4	<0.5	38.5	10490	33.1	67.6		<4	10	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	5/27/99	10:00	0.6	23.6	7.5	4.1	13.9	<0.5	31.0	15010	40.1	77.4	287	<4	7	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	10/12/99	11:05	0.2	11.6	4.4	3.3	4.1	<0.5	26.8	7010			346	<4	<3	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	6/2/00	9:30	0.6	14.0	11.6	17.2	8.8	<0.5	54.8	13300				4	18	7	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
UNBSDC	12/1/94	10:45	<0.8	15	15	13	8.0	<2	68					<1.1	19	<1.1	<0.6	<30	<20	<300	<300	<300	<300	<300	<25	50	<1.1		
	5/18/95	0:00	2.8	25	20	18	21	<3	95					<22	33	<22	<15	-	-	-	-	-	-	-	-	-	-		
	10/31/95	11:15	<1.5	19	19	16	14	<2	81					2.7	11	1.9	<0.8	<40	<20	<400	<400	<400	<400	<400	<2	<60	<1.9		
	4/25/96	11:30	<2.0	42	38	47	29	<2	170					<20	69	<20	<9.0	<890	<440	<440	<440	<440	<440	<440	<22	<67	<20.0		
	11/7/96	9:45	<3.0	30	45	33	18	<3	210					4.3	43	<2	<1.5	<50	<25	<500	<500	<500	<500	<500	<3	<75	<2.2	<75	<75
	4/17/97	9:00	11.0	9.4	30	26	11	<2	110					5.4	28	2.8	<0.8	<40	<20	<400	<400	<400	<400	<400	<2	<60	<1.9	<60	<60
	10/30/97	10:05	<2.0	15.0	19	14	11	<2	75	16000	18.5	35.9		4.4	16	<1	<0.7	<30	<20	-	-	-	-	-	<2	<50	<1.0	<50	<50
	6/23/98	11:30	1.1	15.5	16.6	10.9	10.7	<0.5	57.5	14110	44.1	94.6		<4	<21	<3	<11	<800	<110	-	-	-	-	-	<0.025	<0.4	<0.004		
	11/4/98	10:30	0.6	12.7	6.9	11.4	8.0	<0.5	49.9	11130	17.5	42.3		<4	24	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	5/27/99	10:30	0.8	21.0	10.8	42.5	11.6	<0.5	70.4	17500	55.1	64.7	388	<4	150	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	10/12/99	10:45	0.9	23.7	14.1	9.7	16.4	<0.5	68.7	18100			624	<7	38	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	6/2/00	10:05	0.6	12.5	15.6	10.9	7.8	<0.5	60.3	10400				5	17	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25

STATION	DATE	TIME	Cd mg/kg	Cr mg/kg	Cu mg/kg	Pb mg/kg	Ni mg/kg	Ag mg/kg	Zn mg/kg	Fe mg/kg	Clay %	Silt+ Clay %	Tot PO_4 as P mg/Kg	DDD µg/kg	DDE µg/kg	DDT µg/kg	gamma BHC µg/kg	2,4-D µg/kg	2,4,5-TP Silvex µg/kg	Benzo(b) µg/kg	Benzo(k) µg/kg	Chrysene µg/kg	Flranth µg/kg	Pyrene µg/kg	Mthxy µg/kg	Dznon µg/kg	Endo I µg/kg	Aroclor 1254 µg/kg	Aroclor 1260 µg/kg
UNBBCW	12/1/94	11:00	<0.9	23	28	18	11	<2	100					<1.3	28	<1.3	<0.7	<40	<20	<400	<400	<400	<400	<400	<2	<60	<1.3		
	5/18/95	0:00	2.3	19	14	14	14	<2	66					<18	23	<18	<8	-	-	-	-	-	-	-	-	-	-		
	10/31/95	11:00	<0.7	18	28	19	13	<2	90					1.5	11	<1.5	<0.5	<30	<10	<300	<300	<300	<300	<300	<1	<40	<1.5		
	4/25/96	12:00	<2.0	2.5	<3	<8	<6	<2	8					7.0	38	<6.0	<3.0	<31	<16	<310	<310	<310	<310	<310	<8	<47	<6.0		
	11/7/96	10:00	<2.0	16	22	15	8.6	<2	83					<1.7	15.	<1.7	<0.7	<34	<17	<340	<340	<340	<340	<340	<2	<340	<1.7	<52.0	<52.0
	4/17/97		12	11	24	17	<11	<2	85					4.1	27	3.2	<0.7	<34	<17	<340	<340	<340	<340	<340	<2	<51	<1.6		
	10/30/97	10:20	<2.0	22.0	25.0	17.0	17.0	2.0	98.0	25000	24.3	58.2		2	27	2	<0.9	<50	<1	-	-	-	-	-	<2	<70	<2	<70	<70
	6/23/98	12:10	<1	14.8	190	7.2	7.5	<0.5	99.6	12810	20.7	52.1		<4	<18	<3	<11	<800	<110	-	-	-	-	-	<0.025	<0.4	<0.004		
	11/4/98	10:50	0.3	8.9	5	5.2	4.8	<0.5	34.0	7860	21.9	54.4		<4	19	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	5/27/99	10:45	0.3	11.9	9	8.2	6.1	<0.5	47.6	10110	42.6	76.0	416	<4	21	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
UNBNDB	12/1/94	11:35	1.5	43	51	32	25.0	<3	180					<5	73	<5	7	<50	<30	<500	<500	<500	<500	<500	<5	<80	<5		
	5/18/95	0:00	3.5	29	25	20	23.0	<2	100					<19	48	<19	<8	-	-	-	-	-	-	-	-	-	-		
	10/31/95	12:15	<0.8	16	16	14	11.0	<2	60					2	9.2	<1.6	<0.6	<30	<20	<300	<300	<300	<300	<300	<2	<50	<1.6		
	4/25/96	0:00	<3.0	47	53	38	32.0	<3	160					6.8	38	<6	<2.8	<290	<150	<590	<590	<590	<590	<590	<6	<88	<6	530	
	11/7/96	10:30	<2.0	35	48	31	23.0	<2	150					<8	23	<8	<4.0	<38	<19	<380	<380	<380	<380	<380	<10	<380	<8	<380	<380
	4/17/97	10:30	9.8	8.6	34	19	9.8	<2	79					4.8	29	2.6	<0.7	<34	<17	<340	<340	<340	<340	<340	<2	<34	<17	<52	<52
	10/30/97	10:55	<3.0	39	87	39	29.0	<3	200	48000	62.7	98.2		7.7	35	<2	<1	<70	<30	-	-	-	-	-	<3	<100	<2	<100	<100
	6/23/98	9:55	<1.1	17.0	17.3	7.8	10.9	<0.5	50	15680	50.1	92.6		<4	24	<3	<11	<800	<110	-	-	-	-	-	ND	ND	ND		
	11/4/98	9:00	1.1	12.6	11.8	7.8	6.0	<0.5	53	11160	44.0	92.1		<4	34	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	5/27/99	9:15	0.3	18.4	19.6	11.7	9.3	<0.5	66	15600	54.5	95.1	402	<4	40	13	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25

STATION	DATE	TIME	Cd mg/kg	Cr mg/kg	Cu mg/kg	Pb mg/kg	Ni mg/kg	Ag mg/kg	Zn mg/kg	Fe mg/kg	Clay %	Silt+ Clay %	Tot PO_4 as P mg/Kg	DDD µg/kg	DDE µg/kg	DDT µg/kg	gamma BHC µg/kg	2,4-D µg/kg	2,4,5-TP Silvex µg/kg	Benzo(b) µg/kg	Benzo(k) µg/kg	Chrysene µg/kg	Flranth µg/kg	Pyrene µg/kg	Mthxy µg/kg	Dznon µg/kg	Endo I µg/kg	Aroclor 1254 µg/kg	Aroclor 1260 µg/kg
HUNTINGTON HARBOUR																													
HUNWAR	11/8/94	11:30	2.0	28	49	70	18	<2	260					<15	<9	<15	<9	<40	<20	<400	<400	<400	<400	<400	<20	<60	<15		
	5/10/95	10:00	4.1	20	46	61	20	<2	190					<16	<7	<16	<7	-	-	-	-	-	-	-	-	-	-		
	10/11/95	10:45	1.0	15	32	41	15	<2	130					5.8	29	<2	<1	<40	<20	-	<400	-	-	<400	<2	<50	-		
	5/2/96	0:00	<2	26	62	76	16	<2	300					12.0	46	11	<4	<40	<20	<400	<400	<400	<400	<400	<8	<60	<6		
	10/9/96	10:45	<2	26	68	85	23	<2	340					<43	<43	<43	<21	<43	<21	<430	<430	<430	<430	<430	<64	<64	<43	<1700	<1700
	4/29/97	9:00	<0.9	23	58	64	18	<2	260					6.4	32	5.3	<1	<38	<19	<380	<380	<380	<380	<380	<2	<57	<1.8	<57	<57
	10/2/97	13:45	<2	23	70	67	19	<2	260		18.7	45.2		5.6	37	<5	<2	<50	<20	-	-	-	-	-	<5	<70	<5	<100	<100
	6/25/98		<1	11.4	23.7	35	8.1	<0.5	133	8930	16.1	33.4		<4	17	<3	<11	<800	<110	-	-	-	-	-	<24	<400	<4	<11	<25
	10/21/98	9:30	<1	13.7	24.4	30	10.6	<0.5	126	12990	15.0	44.2		<4	11	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	6/24/99	14:10	0.65	14.1	27.4	28.6	8.35	<0.50	131	12870	16.2	38.3	439	<20	34	<15	<55	<800	<110	-	-	-	-	-	<125	<2000	<20	<50	<125
	10/27/99	10:30	0.38	11.7	20.7	20.9	7.52	<0.51	93	10700				<4	14	<2	<54	<800	<110	-	-	-	-	-	<125	<2000	<20	<50	<125
	6/28/00	10:50	<0.20	12.0	33.9	27.3	8.40	<0.50	146	9620				<4	<3	<3	<55	<800	<110	-	-	-	-	-	<125	<2000	<20	<50	<125
HUNCRB	11/8/94	12:00	1.7	48	83	150	28	<2	240					<1.5	22	<1.5	<0.8	<40	<20	<400	<400	<400	<400	<400	<2	<70	<1.5		
	5/10/95	10:30	5.2	30	60	100	26	<2	210					19	<4	<7	<4	-	-	-	-	-	-	-	-	-	-		
	10/11/95	11:20	<1.6	53	100	180	35	<2	280					<2.1	23	<2.1	<1	<50	<20	-	<500	-	-	<500	<2	<70	-		
	5/2/96	10:20	<2.0	35	92	130	23	3.1	230					<11	52	<6	<4	<42	<21	<420	<420	<420	<420	<420	<8	<62	<6		
	10/9/96	11:15	<2.0	26	85	130	22	<2	240					<20	35	<20	<9	<43	<22	<430	<430	<430	<430	<430	<22	<65	<20	<650	<650
	4/29/97	10:00	<1.5	32.0	120	120	26	<2	230					<9	28	<9	<4	<43	<21	<430	<430	<430	<430	<430	<9	<64	<9	<430	<430
	10/2/97	14:10	<2.0	30	84	120	23	<2	200		46.1	89.3		8	44	<5	<2	<50	<20	-	-	-	-	-	<5	<70	<5	<100	<100
	6/25/98		<0.8	17.3	34	46.6	11.8	<0.5	103	15400	43.8	90.3		<4	16	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	10/21/98	10:15	<0.5	17.6	33	52.1	12.8	<0.5	106	17020	43.4	92.5		<4	20	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	6/24/99	13:55	0.259	19.6	29.3	47.6	11.1	<0.5	99	17700	47.4	94.9	503	<20	131	24	<55	<800	<110	-	-	-	-	-	<125	<2000	<20	<50	<125
	10/27/99	10:50	<0.20	20.8	37.1	48.4	12.2	<0.6	108	18800				<4	37	3	<56	<800	<110	-	-	-	-	-	<125	<2000	<20	<50	<125
	6/28/00	11:40	<0.20	18.0	36.0	51.6	11.7	<0.5	107	14800				<4	36	6	-	<800	<110	-	-	-	-	-	<125	<2000	<20	<50	<125
HUNBCC	11/8/94	12:30	<1.1	19	25	25	13	<2	100					7.0	20	<6	<3	<30	<20	<300	<300	<300	<300	<300	<8	<50	<6		
	5/10/95	10:45	1.1	4.9		11	<5.0	<1	27					13.0	<3	<4	<3	-	-	-	-	-	-	-	-	-	-		
	10/11/95	12:00	<0.7	13	25	19	9.6	<1	60					3.8	7.2	8.6	<0.5	<30	<10	-	<300	-	-	<300	<1	<50	<6		
	5/2/96	10:50	<2.0	22	52	44	22	2.1	235					4.3	34	24	<2.0	<39	<20	<410	<410	<410	<410	<410	<2	<61	<1.9		
	10/9/96	11:50	<2.0	28	56	44	24	<2	240					46.0	<19	72	<8.0	<40	<20	<400	<400	<400	<400	<400	<20	<60	<19	<600	<600
	4/29/97	10:30	<1.5	28	60	44	21	<2	210					9.6	35	<1.9	<0.8	<42	<21	<420	<420	<420	<420	<420	<2	<62	<1.9	<62	<62
	10/2/97	13:10	<2	20	44	36	18	<2	180		16.0	44.2		8.6	26	4	<2	<200	<100	-	-	-	-	-	<4	<60	<4	<100	<100
	6/25/98		<1	16.6	26.7	21.7	10.9	<0.5	119	14000	17.6	54.4		<4	15	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	10/21/98	9:00	<1	15.8	20.2	20.9	10.7	<0.5	122	13820	12.9	47.0		<4	<3	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	6/24/99	13:30	<0.2	16.9	24.4	18.9	10.3	<0.5	123	15020	30.9	71.8	430	<20	36	<15	<55	<800	<110	-	-	-	-	-	<125	<2000	<20	<50	<125
	10/27/99	9:50	<0.5	14.2	25.5	17.2	8.1	<0.5	117	12700				<4	15	<3	<56	<800	<110	-	-	-	-	-	<125	<2000	<20	<50	<125
	6/25/00	9:39	0.33	16.8	30.5	27.2	11.5	<0.5	130	13500				17	31	11	<55	<800	<110	-	-	-	-	-	<125	<2000	<20	<50	<125

STATION	DATE	TIME	Cd mg/kg	Cr mg/kg	Cu mg/kg	Pb mg/kg	Ni mg/kg	Ag mg/kg	Zn mg/kg	Fe mg/kg	Clay %	Silt+ Clay %	Tot PO_4 as P mg/Kg	DDD µg/kg	DDE µg/kg	DDT µg/kg	gamma BHC µg/kg	2,4-D µg/kg	2,4,5-TP Silvex µg/kg	Benzo(b) µg/kg	Benzo(k) µg/kg	Chrysene µg/kg	Flranth µg/kg	Pyrene µg/kg	Mthxy µg/kg	Dznon µg/kg	Endo I µg/kg	Aroclor 1254 µg/kg	Aroclor 1260 µg/kg
BBOLR	8/14/91	0:00	<0.4	4.7	6.7	24	<0.8	<0.2	30					<1	<1	<1	<10	<5000	<2000	-	<200	-	-	<400	-	-	-		
	5/10/95	11:45	2.5	12	29	44	12	2	98					<18	<8	<18	<8	-	-	-	-	-	-	-	-	-	-		
	10/11/95	13:15	1.5	22	28	120	18	2	140					<1.9	6	<1.9	<0.8	<40	<20	-	<400	-	-	<400	-	<60	-		
	5/2/96	12:10	2.0	8	14	28	<7	2	71					<1.7	7.2	<1.7	<0.7	<34	<17	<340	<340	<340	<340	<340	<2	<52	<1.7		
	10/9/96	12:50	<1	8	11	24	8.8	<1	88					<30	<30	<30	<15.0	<30	<15	<300	<300	<300	<300	<300	<45	<45	<30	<1200	<1200
	4/29/97	11:20	<1.5	10	19	35	9.4	<2	90					<1.9	4.2	<1.9	<0.8	<42	<21	<420	<420	<420	<420	<420	<2	<62	<1.9	<62	<62
	10/2/97	15:20	<2.0	6.7	9.3	16	<7	<2	41		4.8	7.3		<2	<2	<2	<0.7	<30	<20	-	-	-	-	-	<2	<50	<2	<50	<50
	6/25/98		<0.5	7.3	8.9	15.3	4.4	<0.5	49	6820	17.1	28.0		<4	15	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	10/21/98	11:45	<0.15	8.2	5.1	15.8	5.0	<0.5	47	8590	2.0	6.8		<4	<3	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	6/24/99	15:30	<0.2	11.2	3.57	11.7	5.52	<0.5	34.5	7960	6.4	14.4	434	<20	<15	<15	<55	<800	<110	-	-	-	-	-	<125	<2000	<20	<50	<125
	10/27/99	12:20	<0.2	8.9	1.89	8.5	3.10	<0.6	15.5	5890				<4	<3	<3	<54	<800	<110	-	-	-	-	-	<125	<2000	<20	<50	<125
	6/28/00	12:45	<0.2	8.2	10.60	18.3	5.51	<0.5	57.4	7140				<4	<3	<3	<55	<800	<110	-	-	-	-	-	<125	<2000	<20	<50	<125
TGDC05	10/3/97	0:00	<2.0	6.7	8.2	11	6.2	<2	30		0.1	32.3		<2.0	5.5	<2	<0.6	<30	<20	-	-	-	-	-	<2	<50	<2	<50	<50
	6/25/98	0:00									4.2	14.6																	
	10/26/98	9:45	<0.3	11.6	16.8	35.8	6.64	<.5	85	10270	11.4	43.6		<4	20	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	6/24/99	15:35	<0.2	15	6	36	8.8	<0.5	54	8250	3.0	9.2	284	<20	32	<15	<55	<800	<110	-	-	-	-	-	<125	<2000	<20	<50	<125
TGUCO5	10/3/97	0:00	<2	14	26	41	14	<2	160					<3.7	<18	<2	<0.7	<40	<20	-	-	-	-	-	<2	<60	<2	<60	<60
	6/25/98	0:00	<0.3	10.5	8.4	18	6.7	<0.5	63	10300	8.6	32.8		<4	<3	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	10/26/98	9:30	<0.6	5.25	7.55	11.80	6.31	<0.5	50	4830	7.0	19.8		<4	8	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	6/24/99	15:40	<0.2	10.3	3.18	17.4	6.68	<0.5	57	10860	4.1	18.9	499	<20	16	<15	<55	<800	<110	-	-	-	-	-	<125	<2000	<20	<50	<125

STATION	DATE	TIME	Cd mg/kg	Cr mg/kg	Cu mg/kg	Pb mg/kg	Ni mg/kg	Ag mg/kg	Zn mg/kg	Fe mg/kg	Clay %	Silt+ Clay %	Tot PO_4 as P mg/Kg	DDD µg/kg	DDE µg/kg	DDT µg/kg	gamma BHC µg/kg	2,4-D µg/kg	2,4,5-TP Silvex µg/kg	Benzo(b) µg/kg	Benzo(k) µg/kg	Chrysene µg/kg	Flranth µg/kg	Pyrene µg/kg	Mthxy µg/kg	Dznon µg/kg	Endo I µg/kg	Aroclor 1254 µg/kg	Aroclor 1260 µg/kg
SANTA ANA RIVER WATERSHED																													
SARIMP	11/7/94	13:00	<0.8	8.0	7.3	7.1	<5.0	<1	34					<0.8	0.5	<0.8	<0.5	30	<10	<300	<300	<300	<300	<300	<1	<40			
	5/9/95	0:00	<0.7	4.5	2.9	<7.0	<5.0	<1	19					-	-	-	-	-	-	-	-	-	-	-	-	-	-		
	10/12/95	14:15	<0.6	5.1	4.8	<6.0	<5.0	<1	20					<0.8	<0.8	<0.8	<0.4	<20	<10	-	<200	-	-	<200	<1	<40	-		
	6/30/98	12:00	ND	2.3	1.8	1.9	1.8	<0.5	11.2	3010	12.2	42.8		<4	<3	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	10/27/98	11:45	0.6	13.5	11.7	7.6	10.9	<0.5	46.7	11300	11.0	28.6		<4	5	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
											20.4	58.0																	
SANEO8	5/9/95	0:00	<0.6	3.5	7.1	<6.0	4.9	<1	27					-	-	-	-	-	-	-	-	-	-	-	-	-	-		
	10/12/95	14:40	<0.6	6.5	20.0	96	9.6	<1	120					<0.8	4.2	<0.8	<0.5	<100	<60	-	<500	-	-	<500	<1	<40	-		
SILE17	5/9/95	0:00	1.8	5.1	24.0	<7.0	18.0	<1	150					-	-	-	-	-	-	-	-	-	-	-	-	-	-		
	6/30/98	12:30	1.7	10.6	32.4	141	15.9	<0.5	193	23360	0.0	0.4		<4	<3	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	10/27/99	9:30	<0.6	0.7	4.6	2	2.7	<0.5	29	2310	0.6	3.0		<4	<3	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
											0.5	2.1																	

STATION	DATE	TIME	Cd mg/kg	Cr mg/kg	Cu mg/kg	Pb mg/kg	Ni mg/kg	Ag mg/kg	Zn mg/kg	Fe mg/kg	Clay %	Silt+ Clay %	Tot PO_4 as P mg/Kg	DDD µg/kg	DDE µg/kg	DDT µg/kg	gamma BHC µg/kg	2,4-D µg/kg	2,4,5-TP Silvex µg/kg	Benzo(b) µg/kg	Benzo(k) µg/kg	Chrysene µg/kg	Flranth µg/kg	Pyreno µg/kg	Mthxy µg/kg	Dznon µg/kg	Endo I µg/kg	Aroclor 1254 µg/kg	Aroclor 1260 µg/kg
SOUTH COUNTY WATERSHED																													
ACJ01	11/8/94	9:00	0.9	3.2	3.1	<6	5.9	<1	11					<0.8	<0.5	<0.8	<0.5	30	<10	<300	<300	<300	<300	<300	<1	<40	<0.8		
	5/25/95	10:15	<0.6	<1	<3	<6	<5	<1	2.7					<5	<3	<5	<3	-	-	-	-	-	-	-	-	-	-		
	10/19/95	12:30	<0.7	3	3.6	<7	6.6	<1	36					<0.9	<0.9	<0.9	<0.5	<30	<10	-	<300	-	-	<300	<1	<40	-		
	4/17/96	0:00	<1.0	6	<3	<7	8.5	<1	15					<0.9	<0.9	<0.9	<0.5	<27	<14	<270	<270	<270	<270	<270	<1	<41	<0.9		
	11/6/96	15:45	<1.0	6	2.6	<6	7.4	<1	12					<0.8	<0.8	<0.8	<0.5	<36	<24	<240	<240	<240	<240	<240	<1	<36	<24	<36	<36
	4/8/94		3.8	5.2	<3	<6	7.1	<1	16					<0.9	<0.9	<0.9	<0.5	<25	<13	<250	<250	<250	<250	<250	<1	<38	<1	<38	<38
	10/9/97	15:00	<1	20.0	11.0	<6	23.0	<1	21	8100	8.0	17.8		<0.9	<0.9	<0.9	<0.5	<30	<10	-	-	-	-	-	<1	<40	<0.9	<40	<40
	6/19/98	13:40	<1.7	10.2	3.0	<2	8.7	<0.5	22.2	4260	2.4	5.7		<4	<3	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	10/19/98	10:00	0.6	3.5	0.9	0.9	3.4	<0.5	8.2	2650	0.2	0.6		<4	<3	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	5/20/99	12:35	0.6	6.9	2.2	<10.0	3.5	<0.5	7.2	2340	0.0	0.0		<4	<3	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	10/27/99	12:05	0.5	5.7	1.1	0.74	6.2	<0.5	10.2	2280				<4	<3	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	5/31/00	13:45	0.3	5.2	1.8	1.9	4.4	<0.5	21.0	3800				<4	<3	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
SCDAM	11/8/94	9:30	2.0	15	15	<7	16	<1	39					<0.9	<0.5	<0.9	<0.5	30	<10	<300	<300	<300	<300	<300	<1	<40	<0.9		
	5/25/95	0:00	4.4	7.5	13	<7	40	<1	53					<30	<16	<30	<16	-	-	-	-	-	-	-	-	-	-		
	10/19/95	13:15	14.0	12	130	<15.0	78	<2	150					<9	<9	<9	<4	<40	<20	-	<400	-	-	<400	<15	<70	-		
	4/17/95	10:20	3.8	29	18	12	38	<2	67					<1.7	<1.7	<1.7	<0.7	<36	<18	<360	<360	<360	<360	<360	<2	<55	<1.7		
	11/6/96	15:30	4.1	11	16	8	25	<2	71					<1.6	<1.6	<1.6	<0.6	<32	<16	<320	<320	<320	<320	<320	<2	<48	<1.6	<48	<48
	4/8/97		24.0	14	13	12	14	<1	43					<1.5	<1.5	<1.5	<0.6	<29	<14	<290	<290	<290	<290	<290	<1	<43	<1.5	<43	<43
	10/9/97	14:30	2.7	2.8	6.5	<7	28	<1	28	2600	0.1	0.3		<4	<3	<3	<0.5	<100	<70	-	-	-	-	-	<1	<40	<1	<40	<40
	10/27/99	11:10	9.1	5.0	30.3	2.3	38	<0.5	76	3220																			
	5/31/00	13:00	9.8	8.0	13.6	<3	69	<0.5	80	5300																			
OHBL01	4/17/96	13:00	<1.0	12.0	10.0	9.4	8.3	<1.0	24.0					<1	<0.9	<0.9	<0.5	<26	<13	<260	<260	<260	<260	<260	<1	<38	<0.9		
SJNL01	5/25/95	11:45	<0.6	2.2	<3	<6	<5	<1	14					<5	<3	<5	<3	-	-	-	-	-	-	-	-	-	-		
	10/19/95	14:15	<0.7	5.3	4.1	7.1	<5	<1	33					<0.9	<0.9	<0.9	<0.5	<30	<10	-	<300	-	-	<300	<1	<40	-		
	4/17/96	11:30	2.0	6.5	6.1	9.8	46.0	<7	24					<1.7	<1.7	<1.7	<0.7	<37	<19	<370	<370	<370	<370	<370	<2	<56	<1.7		
	11/6/96	14:00	1.0	3.4	2.6	<6	<5	<1	12					<0.9	<0.9	<0.9	<0.5	<24	<12	<240	<240	<240	<240	<240	<1	<37	<0.9	<37	<37
	4/8/97		4.8	4.0	2.7	<6	<5	<1	15					<0.9	<0.9	<0.9	<0.5	<25	<12	<250	<250	<250	<250	<250	<1	<37	<0.9	<37	<37
	10/9/97	11:35	<1	2.6	<2	<5	<4	<1	5.5	26000	0.0	0.2		<0.7	<0.7	<0.7	<0.4	<20	<10	-	-	-	-	-	<1	<30	<0.7	<30	<30
	6/30/98	13:00	0.3	1.7	1.0	1.6	1.2	<0.5	9	2580	1.7	4.9		<4	<3	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	10/19/98	12:18	0.5	4.2	1.3	1.1	2.3	<0.5	9	4000	0.9	3.1		<4	<3	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	5/20/99	13:13	0.4	6.3	2.4	<10.0	1.3	<0.5	10	3840	0.0	0.2		<4	<3	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	5/31/00	11:00	<0.3	3.0	1.5	1.7	1.3	<0.5	18	3460				<4	<3	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25

STATION	DATE	TIME	Cd mg/kg	Cr mg/kg	Cu mg/kg	Pb mg/kg	Ni mg/kg	Ag mg/kg	Zn mg/kg	Fe mg/kg	Clay %	Silt+ Clay %	Tot PO_4 as P mg/Kg	DDD µg/kg	DDE µg/kg	DDT µg/kg	gamma BHC µg/kg	2,4-D µg/kg	2,4,5-TP Silvex µg/kg	Benzo(b) µg/kg	Benzo(k) µg/kg	Chrysene µg/kg	Flranth µg/kg	Pyrene µg/kg	Mthxy µg/kg	Dznon µg/kg	Endo I µg/kg	Aroclor 1254 µg/kg	Aroclor 1260 µg/kg
TCOL02	11/8/94	10:30	0.96	5.8	12.0	<9	<7	<2	40					<7	<4	<7	<4	40	<20	<400	<400	<400	<400	<400	<9	<50	<7		
	5/25/95	11:15	<0.7	5.4	8.2	<7	7.3	<1	31					<6	3.0	<6	<3	-	-	-	-	-	-	-	-	-	-		
	10/19/95	13:45	<0.9	21	21	<14	18	<2	94					2.1	4.0	<2	<0.7	40	<20	-	<400	-	-	<400	<2	<60	-		
	4/17/96	10:55	<1.0	17	20	<23	17	<1	74					<1.5	<1.5	<1.5	<0.6	<29	<14	<290	<290	<290	<290	<290	<1	<43	<1.5	46	
	11/6/96	14:45	<1.0	11	8.8	7.1	7	<1	41					<0.9	<0.9	<0.9	<0.5	<24	<12	<240	<240	<240	<240	<240	<1	<37	<0.9	<37	<37
	4/8/97		12.0	6.4	8.7	9.8	12	<1	40					<0.8	<0.8	<0.8	<0.5	<24	<12	<240	<240	<240	<240	<240	<1	<36	<0.8	<36	<36
	10/9/97	13:50	<2.0	6.5	9.1	<10	<9	<2	28	6700	3.7	18.3		<2	<2	<2	<0.9	<200	<100	-	-	-	-	-	<2	<70	<2	<70	<70
	6/19/98	14:50	0.4	11.3	9.6	5.4	8.2	<0.5	47.3	12790	3.1	24.9		<4	<3	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
OSOL03	11/8/94	10:00	<0.7	2.6	3.5	<7	<5	<1	13					<5	<3	<5	<3	30	<10	<300	<300	<300	<300	<300	<7	<40	<5		
	5/25/95	10:45	<0.7	<1.0	<3	<7	<5	<1	8.9					<5	<3	<5	<3	-	-	-	-	-	-	-	-	-	-		
	10/19/95	13:30	<0.7	2.5	3.5	<7	<6	<1	34					<1.5	<1.5	<1.5	<0.5	<30	<10	-	<300	-	-	<300	<1	<40	-		
	4/17/96	10:35	<1.0	4.6	5.8	<7	<5	<1	21					<0.9	<0.9	<0.9	<0.5	<26	<13	<260	<260	<260	<260	<260	<1	<39	<0.9		
	11/6/96	15:00	<1.0	4.1	2.6	<6	<5	<1	13					<0.8	<0.8	<0.8	<0.5	<34	<12	<240	<240	<240	<240	<240	<1	<35	<0.8	<35	<35
	4/8/97		4.0	1.7	<3	<6	7.9	<1	26					<0.9	<0.9	<0.9	<0.5	<26	<13		<260	<260	<260	<260	<1	<38	<0.9	<38	<38
	10/9/97	14:10	<2	2.5	4.3	<8	<6	<2	16	3400	0.0	0.2		<1	<1	<1	<0.6	<30	<20	-	-	-	-	-	<2	<50	<1	<50	<50
	6/30/98	12:50	0.4	13.0	5.3	2	<5	<0.5	25.5	8010	28.4	58.6		<4	<3	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	10/19/98	10:40	2.8	4.3	2.5	1.8	2.1	<0.5	12.7	2620	3.3	10.3		<4	<3	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	5/20/99	14:00	4.3	10.1	13.0	<10	8.9	<0.5	51.3	7100	2.7	12.1		<4	<3	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
SCBJ03	6/19/98	14:10	10.2	4.8	10.7	2.2	68.2	<0.5	78.1	3350				<4	<3	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	5/20/99	10:30	0.5	12.4	5.8	<10	8.0	<0.5	21.6	8460				<4	<3	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
SJOL01	5/25/95	13:30	<0.7	5.0	5.3	<7	<6	<1	21					<6	<3	<6	<3	-	-	-	-	-	-	-	-	-	-		
	4/8/97		17	20.0	6.5	<6	<5	<1	26					<0.9	<0.9	<0.9	<0.5	<25	<12	250	<250	<250	<250	<250	<1	<37	<0.9	<37	<37
	10/9/97	11:15	<1	4.1	4.1	<5	<4	<1	9.5	4900	0.0	0.1		<0.7	<0.7	<0.7	<0.4	<20	<10	-	-	-	-	-	<1	<30	<0.7	<30	<30
	6/30/98	13:30	<0.15	2.4	2.7	1.5	0.7	<0.5	8.3	3120				<4	<3	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	10/19/98	13:15	0.4	8.7	3.3	2.8	3.5	<0.5	16.4	9640	13.9	22.1		<4	<3	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	5/20/99	12:35	<0.5	7.9	4.0	<10	2.7	<0.5	17.4	7610	0.0	0.3		<4	<3	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	5/31/00	10:20	<0.3	6.4	3.4	3.42	2.6	<0.5	20.6	8290				<4	<3	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
PDCM01	10/19/95	15:15	44.0	20	68	<27	110	<2	410					<50	<50	<50	<24	200	<170	-	<500	-	-	<500	<50	51	-		
	5/20/99	12:00	1.0	22	15	<10	15	<0.5	51					<4	<3	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25

STATION	DATE	TIME	Cd mg/kg	Cr mg/kg	Cu mg/kg	Pb mg/kg	Ni mg/kg	Ag mg/kg	Zn mg/kg	Fe mg/kg	Clay %	Silt+ Clay %	Tot PO_4 as P mg/Kg	DDD µg/kg	DDE µg/kg	DDT µg/kg	gamma BHC µg/kg	2,4-D µg/kg	2,4,5-TP Silvex µg/kg	Benzo(b) µg/kg	Benzo(k) µg/kg	Chrysene µg/kg	Flranth µg/kg	Pyrene µg/kg	Mthxy µg/kg	Dznon µg/kg	Endo I µg/kg	Aroclor 1254 µg/kg	Aroclor 1260 µg/kg
DANA POINT HARBOR																													
DAPTEB	11/9/94	10:00	4.0	23	160	44	18	<2	260					<9	<5	<9	<5	<50	20	<500	<500	<500	<500	<500	<12	<70	<9		
	5/31/95	10:30	3.0	18	120	50	26	<2	240					<6	<4	<6	4	-	-	-	-	-	-	-	-	-	-		
	10/23/95	13:10	<1.5	33	200	57	24	<2	350					<9	<9	<9	<4	<40	<20	-	<900	-	-	<900	<15	<70	22		
	5/22/96	10:20	3.7	20	150	31	16	<2	290					<8	<8	<8	<4	<41	<20	<410	<410	<410	<410	<410	<4	<410	<8		
	11/14/96		3.5	29	190	41	20	<2	310					<1.9	11	<1.9	<0.8	<41	<20	<410	<410	<410	<410	<410	<2	<410	<1.9	63	<61
	4/30/97	10:20	3.3	19	170	37	14	<2	310					<1.8	7	<1.8	<0.8	<38	<19	<380	<380	<380	<380	<380	<2	<58	<1.8	58	<58
	10/17/97	8:30	5.6	44	240	59	22	<2	440	32000	32.9	54.9		<1	13	<1	<1	<200	<100	<2000	<2000	<2000	<2000	<2000	<2	<50	<1	<70	<70
	7/28/98	12:30	1.5	18	87	20	9	<0.5	143		33.2	60.7		<4	<3	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	10/28/98	9:40	2.2	6.9	56.8	11.3	8.1	<0.5	86	5340	36.2	63.9		<4	<3	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	6/23/99	9:00	3.2	14	96	16	9	<0.5	143	9310	25.5	49.7		<4	<3	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	10/28/99	10:55	1.7	15	83	14	7	<0.5	127	9650				<4	<15	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	6/7/00	11:05	1.4	11	44	18	8	<0.5	98	6420				<4	<3	<3	<11	<800	<110	-	-	78	173	177	<25	<400	<4	<11	<25
DAPTWB	11/9/94	10:10	1.4	23	130	32	12	<3	160					<1.8	<1	<1.8	<1	<50	<30	<500	<500	<500	<500	<500	<3	<80	<1.8		
	5/31/95	11:00	<1.5	17	98	34	15	<2	120					<1.9	12	<1.9	<0.8	-	-	-	<400	-	-	<400	19	-	-		
	10/23/95	13:30	<0.8	22	110	37	11	<2	130					<1.6	5.5	<1.6	<0.6	<30	<20	370	<300	330	560	920	<2	<50	<1.6		
	5/22/96	10:45	<2.0	24	130	32	12	<2	130					<1.6	6.1	2.5	<0.7	<34	<17	<340	<340	<340	<340	<340	<2	<51	<1.6		3500
	11/14/96		<2.0	18	93	33	14	<2	120					<1.6	6.4	<1.6	<0.7	<160	<82	<330	<330	<330	<330	<330	<2	<49	<1.6	<49	<49
	4/30/97	10:05	<0.9	16	120	26	10	<2	120					3.9	7.8	<1.7	<0.7	<37	<19	<370	<370	<370	<370	<370	<2	<56	<37.0	<56	<56
	10/17/97	9:00	<3	48	250	55	18	<3	280	35000	39.9	63.2		<1	<1	<1	<1	<300	100	<500	<500	<500	<500	<500	<3	<80	<1	<80	<80
	7/28/98	13:00	0.39	22.8	109	16	10	<0.5	98		22.6	50.4		<4	<3	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	10/28/98	10:00	<0.15	13.2	68.1	14.1	6.6	<0.5	66.5	8180	31.1	63.4		<4	<3	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	6/23/99	9:30	0.3	14.7	81.2	19.0	7.6	<0.5	90	10210	21.0	41.8		<4	<3	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	10/28/99	11:20	<0.2	15.5	81.5	11.5	5.0	<0.5	92	8860				<4	<3	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	6/7/00	11:35	<0.2	14.7	37.1	18.4	7.3	<0.5	60	8330				5	6	8	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25

STATION	DATE	TIME	Cd mg/kg	Cr mg/kg	Cu mg/kg	Pb mg/kg	Ni mg/kg	Ag mg/kg	Zn mg/kg	Fe mg/kg	Clay %	Silt+ Clay %	Tot PO_4 as P mg/Kg	DDD µg/kg	DDE µg/kg	DDT µg/kg	gamma BHC µg/kg	2,4-D µg/kg	2,4,5-TP Silvex µg/kg	Benzo(b) µg/kg	Benzo(k) µg/kg	Chrysene µg/kg	Flranth µg/kg	Pyrene µg/kg	Mthxy µg/kg	Dznon µg/kg	Endo I µg/kg	Aroclor 1254 µg/kg	Aroclor 1260 µg/kg
DAPTLB	11/9/94	11:00	4.3	40	150	36	19	<2	200					<1.6	<0.9	<1.6	<0.9	<50	<20	<500	<500	<500	<500	<500	<2	<70	<1.6		
	5/31/95	12:15	1.7	23	160	30	18	<2	170					<1.9	7	<1.9	<0.8	-	-	-	-	-	-	-	-	-	-		
	10/23/95	14:25	<1.6	36	160	34	19	<2	230					<2	7	<2	<0.9	<50	<20	<500	<500	<500	<500	<500	<2	<70	<2		
	5/22/96	11:40	<3.0	31	200	38	19	<3	210					<2	2	<2		<51	<26	<510	<510	<510	<510	<510	<3	<77	<2		
	10/16/96	14:00	<2.0	24	180	36	17	<2	220					<95	<95	<95	<48.0	<48	<24	<480	<480	<480	<480	<480	<120	<71	<95	<4800	<4800
	4/30/97	10:50	<1.4	24	180	36	15	<2	180					<2.1	8.1	<2.1	<1.0	<48	<24	<480	<480	<480	<480	<480	<2	<71	<48	<71	<71
	10/17/97	10:20	<3	54	200	46	18	<3	230	43000	36.9	83.3		<1	<1	<1	<1	<50	<30	<500	<500	<500	<500	<500	<3	<80	<1	<80	<80
	7/28/98	14:00	<0.15	22.4	81.0	10.8	9.3	<0.5	88		39.7	80.3		<4	<3	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	10/28/98	9:00	<0.15	14.7	76.8	13.0	7.8	<0.5	84	11750	33.8	77.1		<4	<3	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	6/23/99	8:45	<0.15	17.4	80.7	13.5	7.6	<0.5	84	11690	42.0	78.3		<4	<3	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	10/28/99	11:48	0.3	18.2	74.2	12.4	6.7	6.7	81	12400				<4	<3	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	6/7/00	12:00	<0.20	12.5	79.6	12.8	6.6	<0.5	95	9760				<4	6	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
DAPTLR	11/9/94	10:45	1.5	40	130	24	11	<2	140					<1.6	<0.9	<1.6	<0.9	<50	<20	<500	<500	<500	<500	<500	<2	<70	3.3		
	5/31/95	12:45	2.1	22	150	20	20	<2	150					<2	2.6	<2	<0.8		-	-	-	-	-	-	-	-	-		
	10/23/95	14:10	<1.6	29	150	31	58	<2	150					<2	5.2	<2	<0.9	<50	<20	<500	<500	<500	<500	<500	<2	<70	<2.1		
	5/22/96	11:40	<2.0	27	140	27	17	<2	140					<2	<2	<2	<0.8	<42	<21	<420	<420	<420	<420	<420	<2	<62	<1.9		
	11/14/96		<2.0	16	81	14	13	<2	75					<1.6	3.2	<1.6	<0.6	<32	<16	<320	<320	<320	<320	<320	<2	<48	<1.6	<48.0	<48.0
	4/30/97	10:35	<1.6	29	220	29	19	<2	180					<2.0	7.1	<2.0	<0.9	<44	<22	<440	<440	<440	<440	<440	<2	<67	<2.0	<67.0	<67.0
	10/17/97	9:45	<2	36	120	28	14	2	140	32000	25.0	39.3		<1	<1	<1	<0.8	<200	<100	<400	<400	<400	<400	<400	<2	<60	<1	<60	<60
	7/28/98	13:30	<0.3	21	108	11	9	<0.5	93		38.7	82.2		<4	<3	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	10/28/98	9:15	<0.2	10.6	63.1	9.3	6.8	<0.5	54		36.9	79.7		<4	<3	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	6/23/99	10:00	2	15.4	117.0	10.3	9.4	<0.5	65	11120	45.7	86.4		<4	<3	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	10/24/99	10:05	0.18	18.3	63.7	9.3	7.7	<0.5	96	14200				<4	<3	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25
	6/7/00	12:15	<0.2	17.9	61.5	10.9	8.3	<0.5	78	13500				<4	5	<3	<11	<800	<110	-	-	-	-	-	<25	<400	<4	<11	<25

Appendix 4.6:
Stage Hydrographs with Composite Sampling Periods during Storms

Stormwater Sampling in Santa Ana Delhi Channel

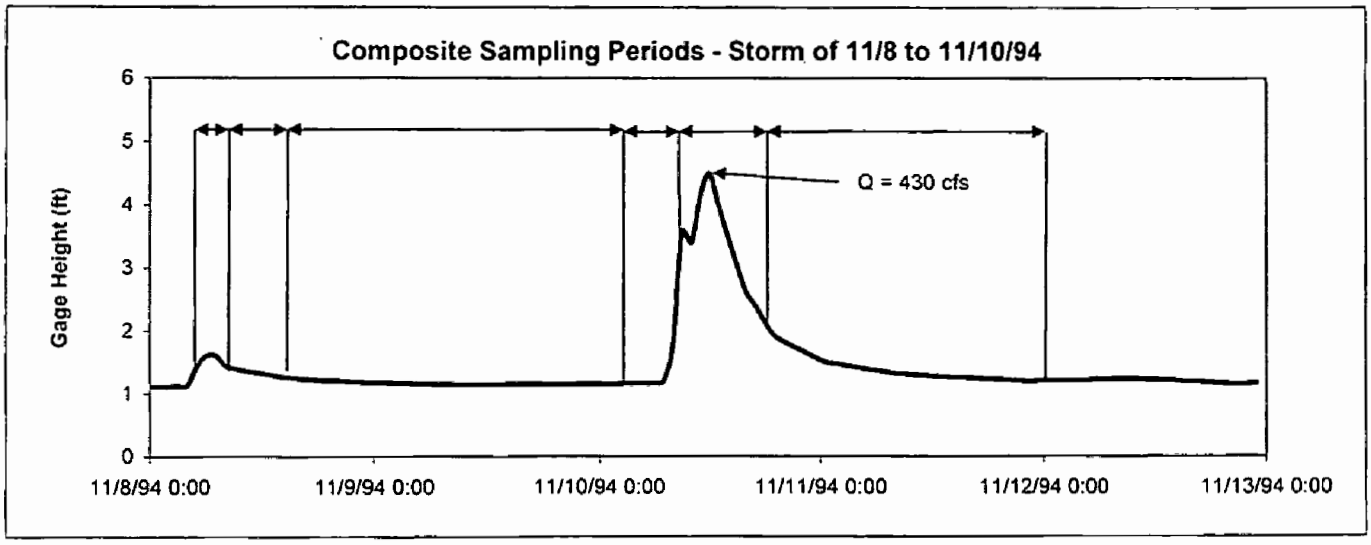

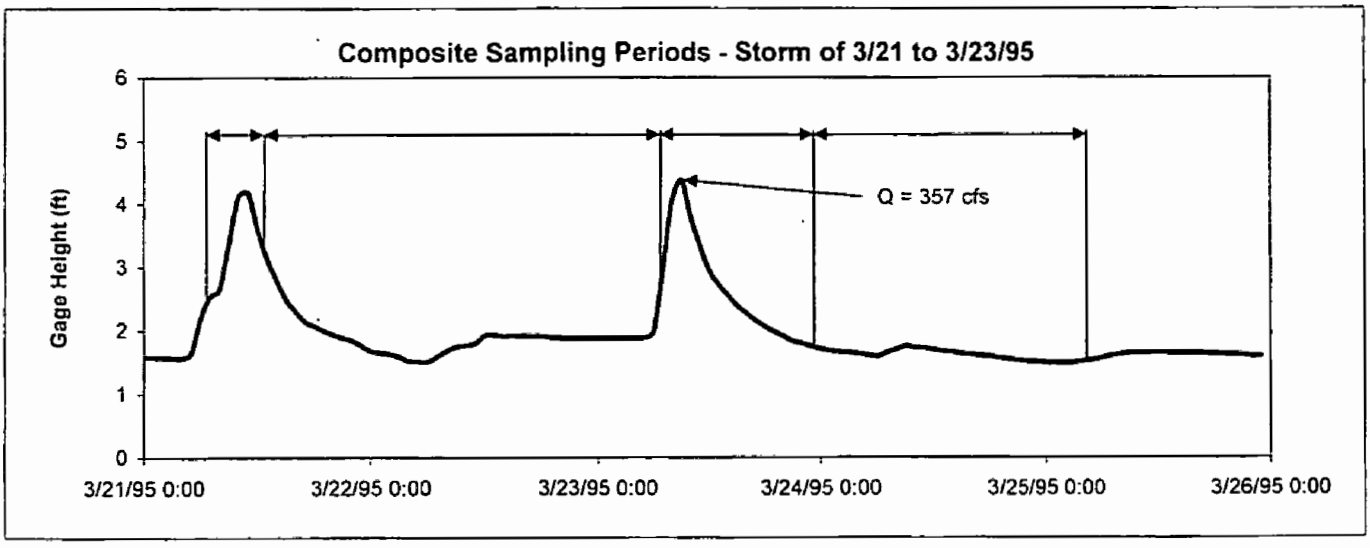

Storm Sampling @ Santa Ana Delhi Channel

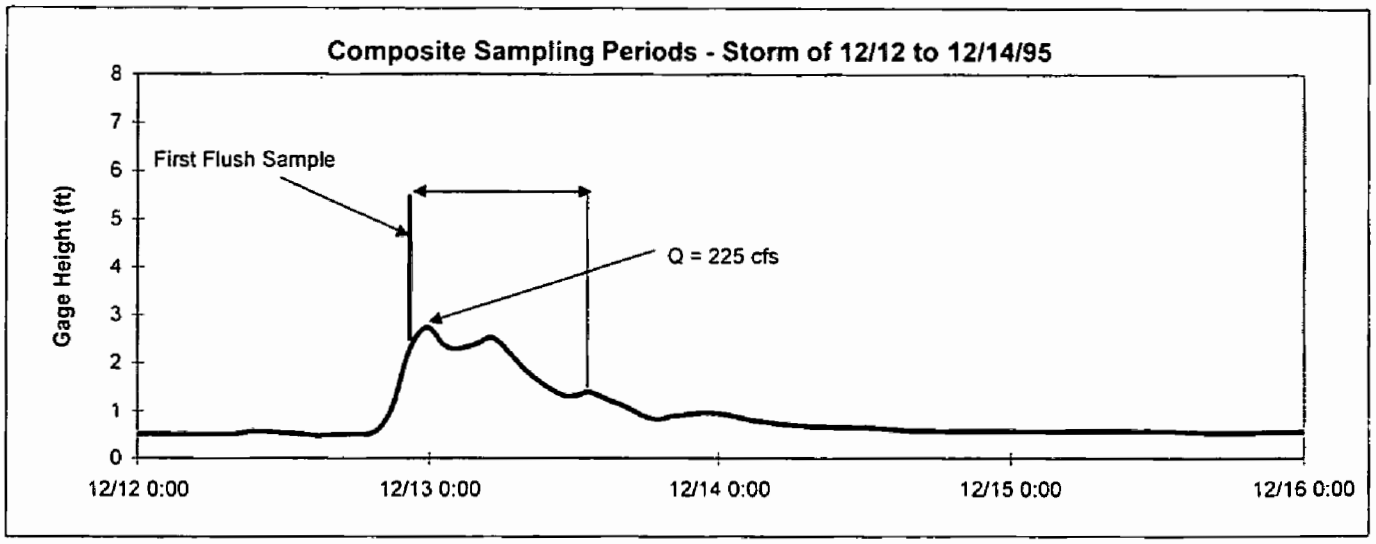

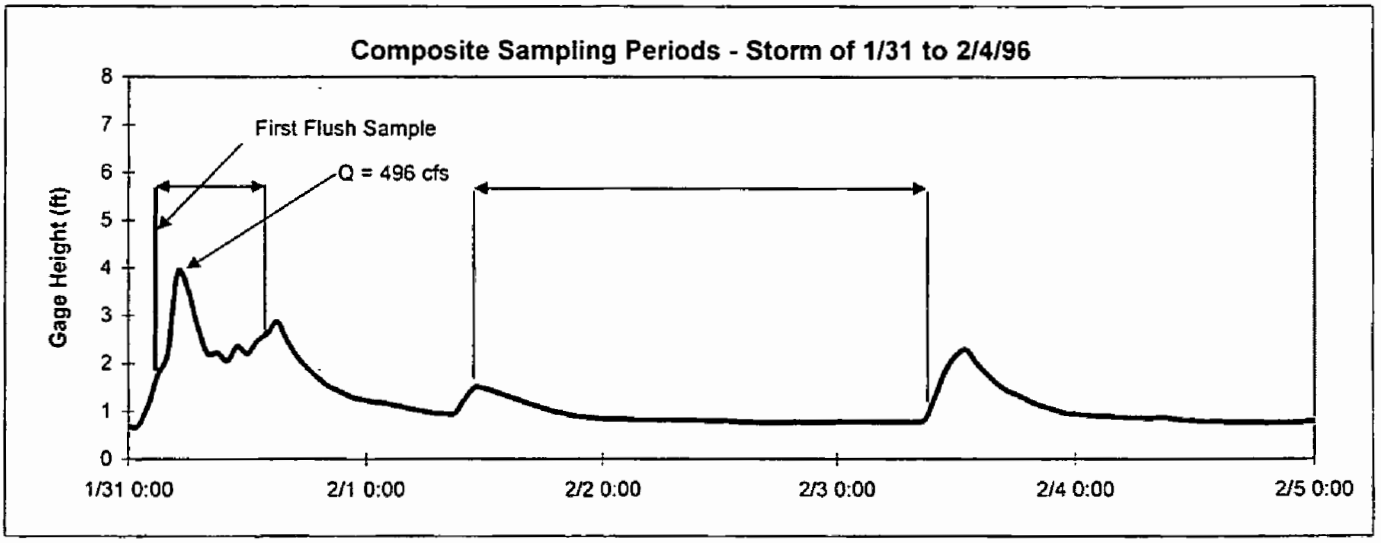

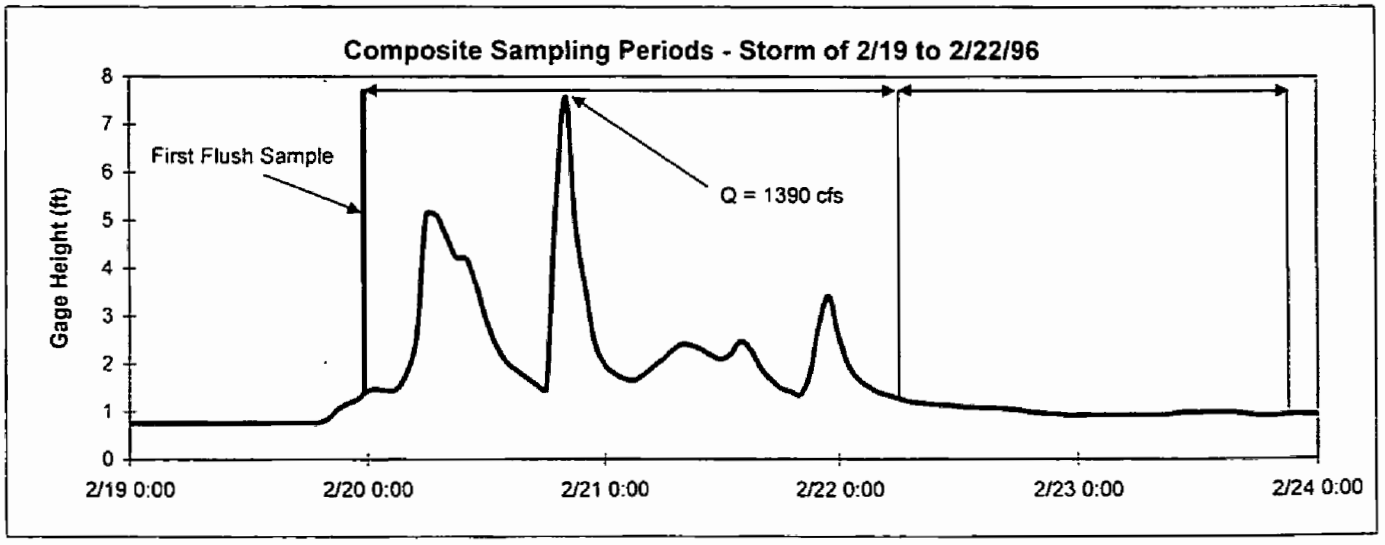

Storm Sampling @ Santa Ana Del

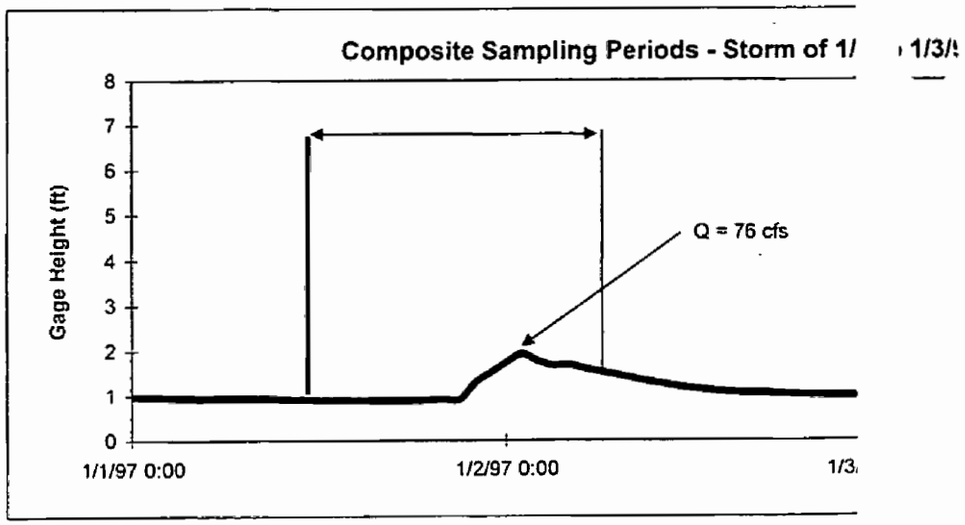

Storm Sampling @ Santa Ana Delhi Channel

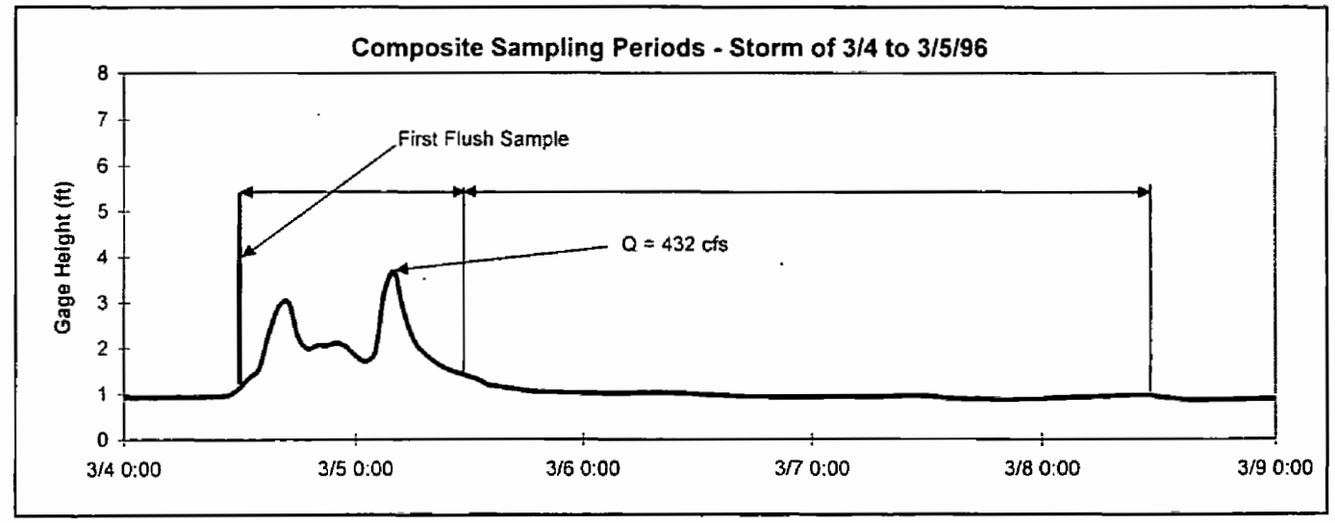

Appendix 4.6

Storm Sampling @ Santa Ana De

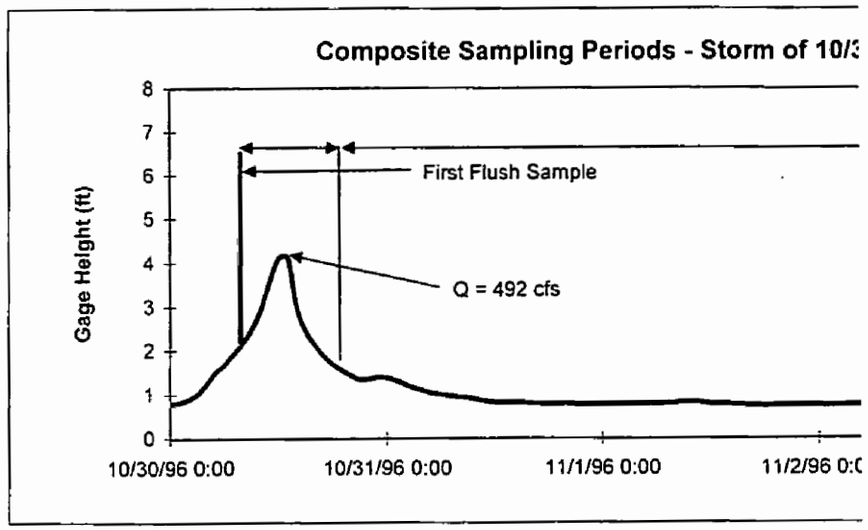

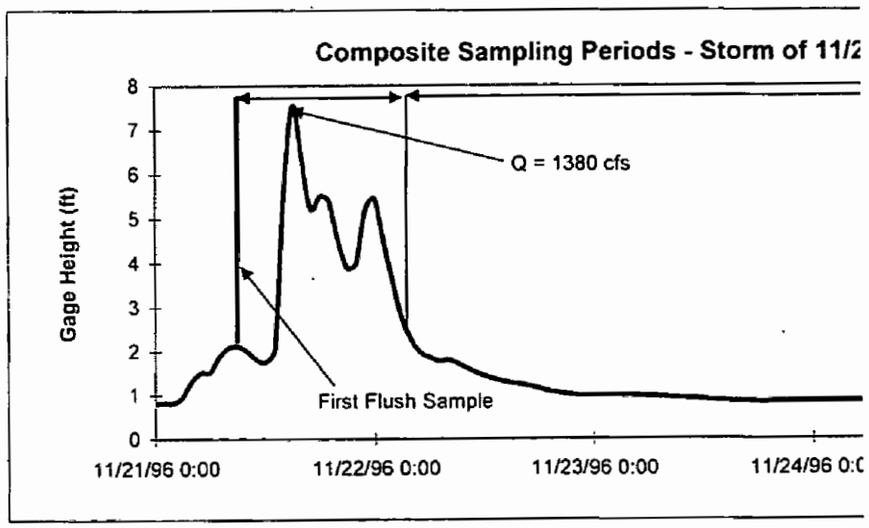

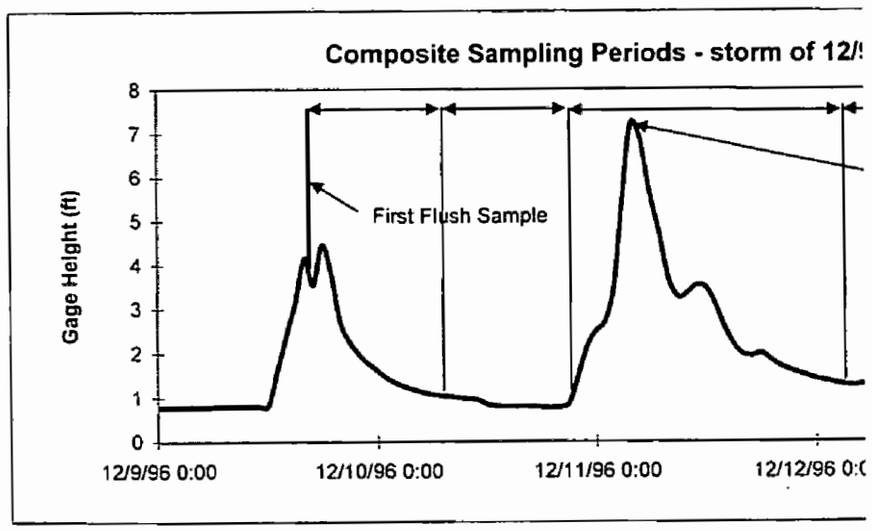

Stormwater Sampling in Santa Ana Delhi Channel

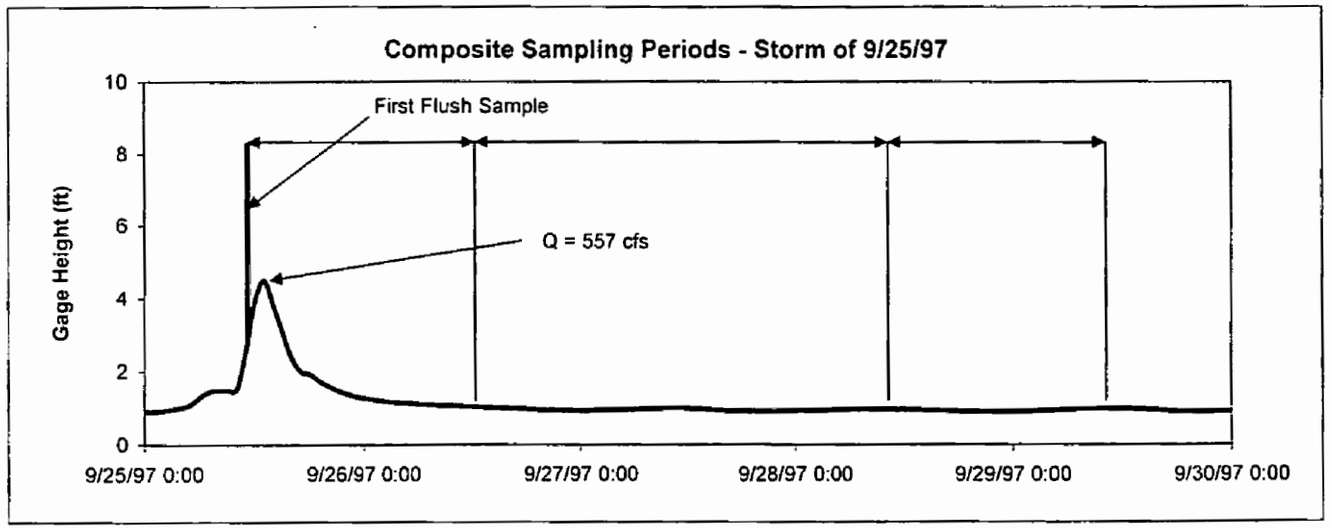

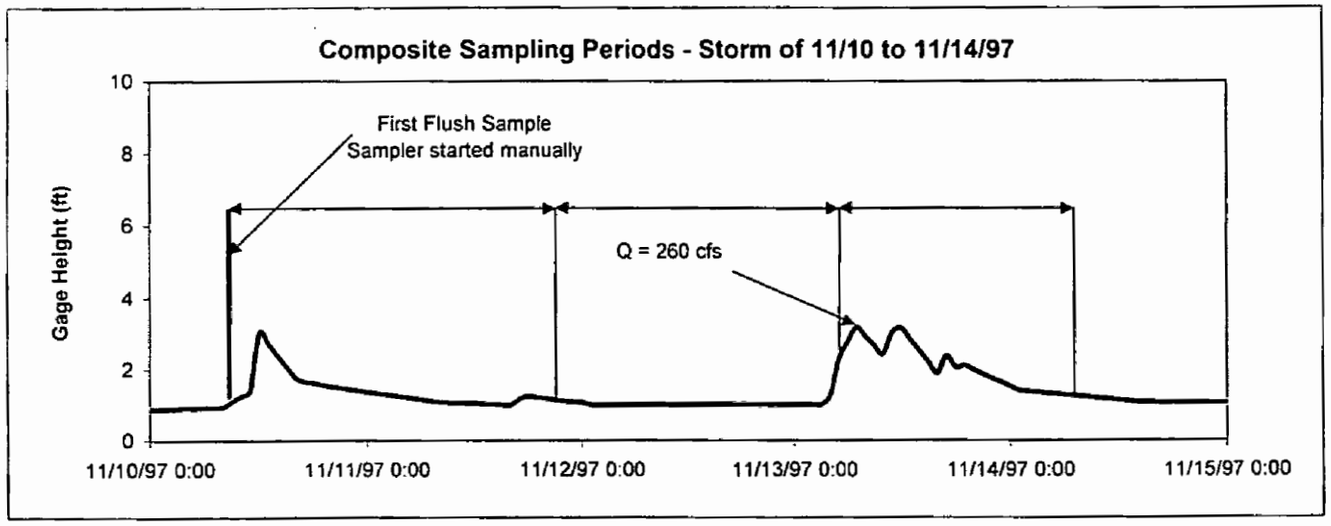

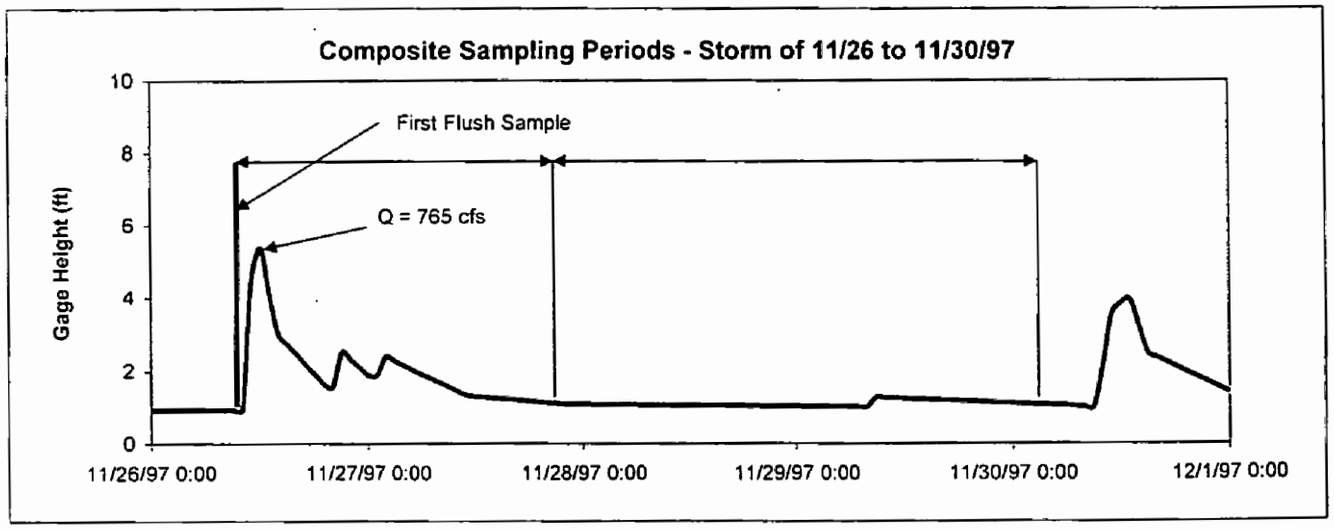

Stormwater Sampling in Santa Ana Delhi Channel

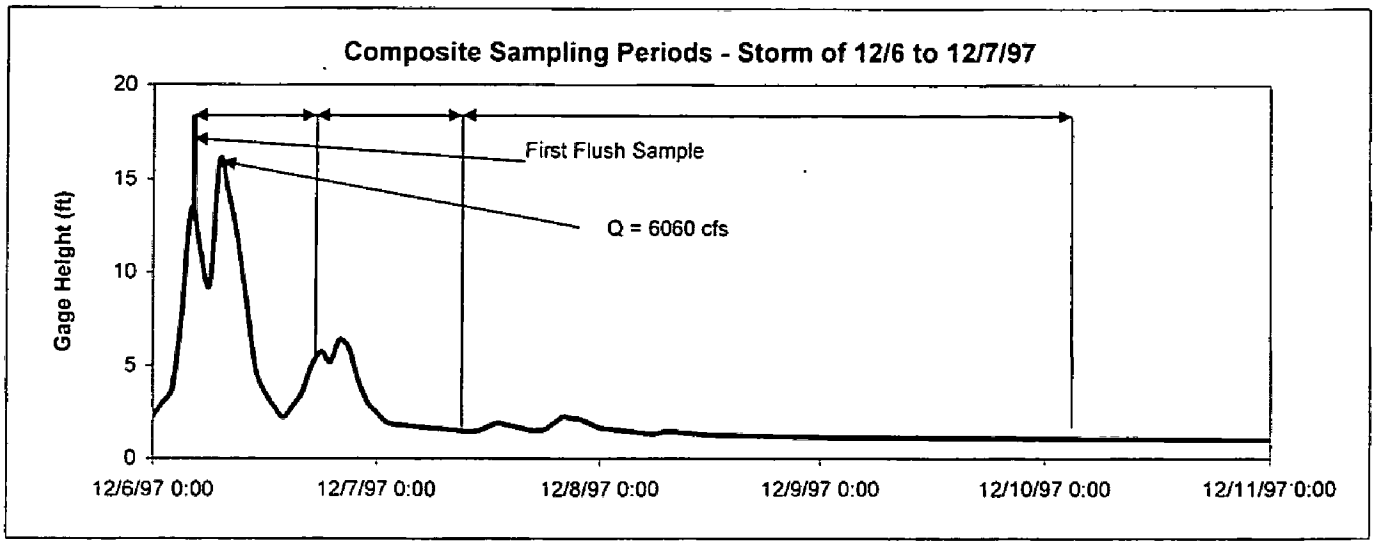

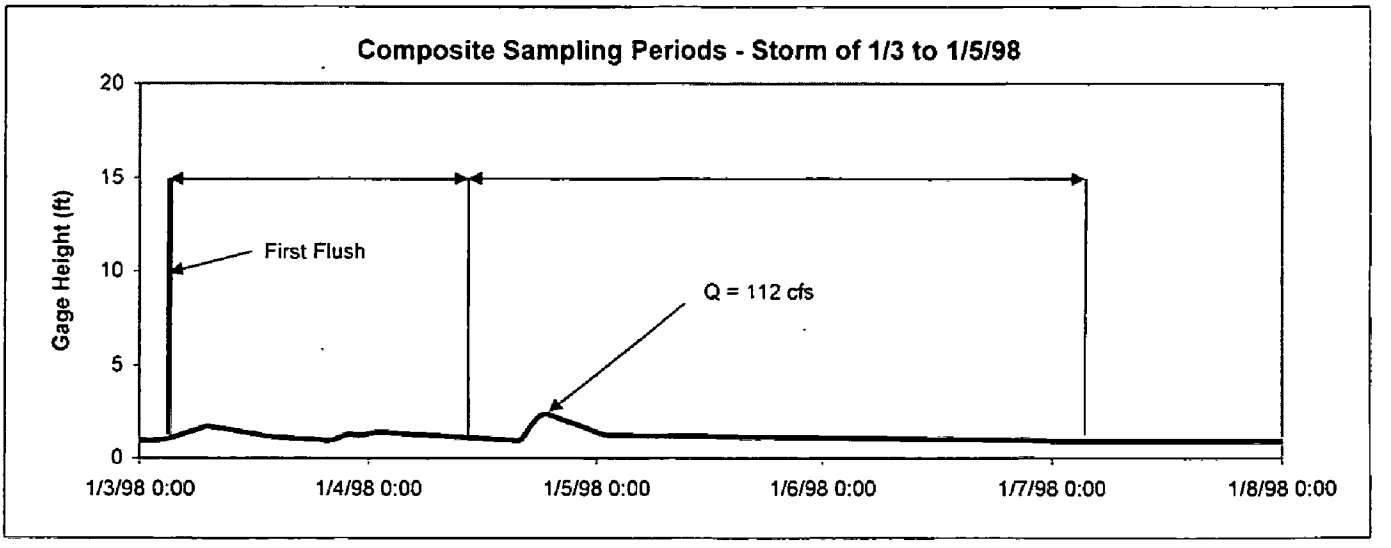

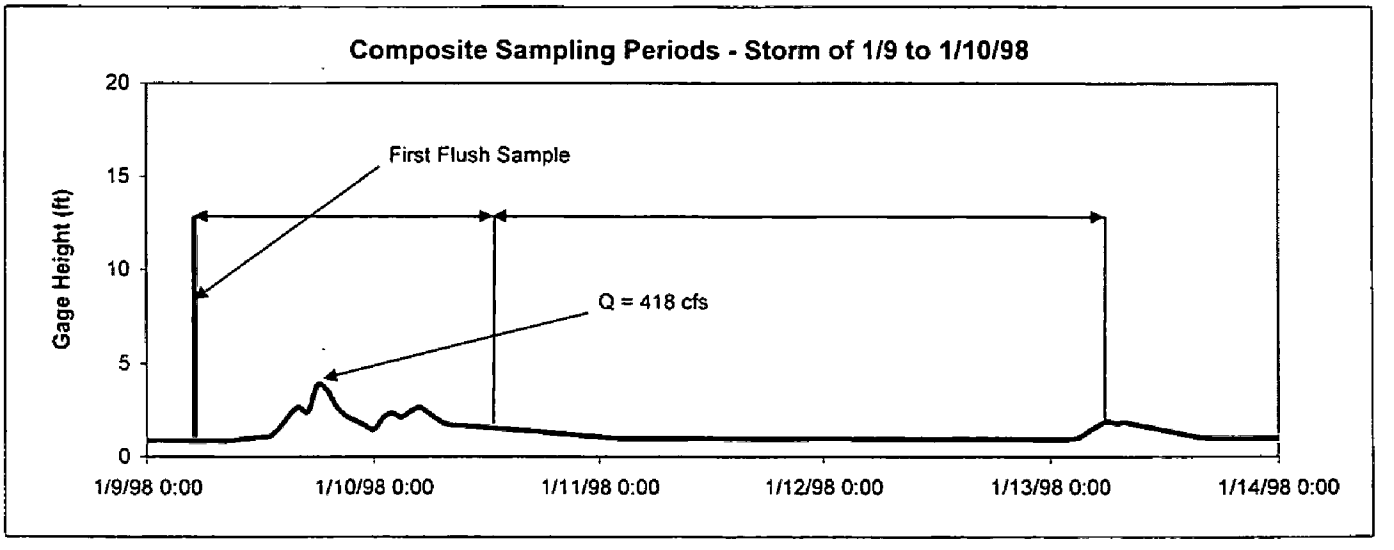

Stormwater Sampling in Santa Ana Delhi Channel

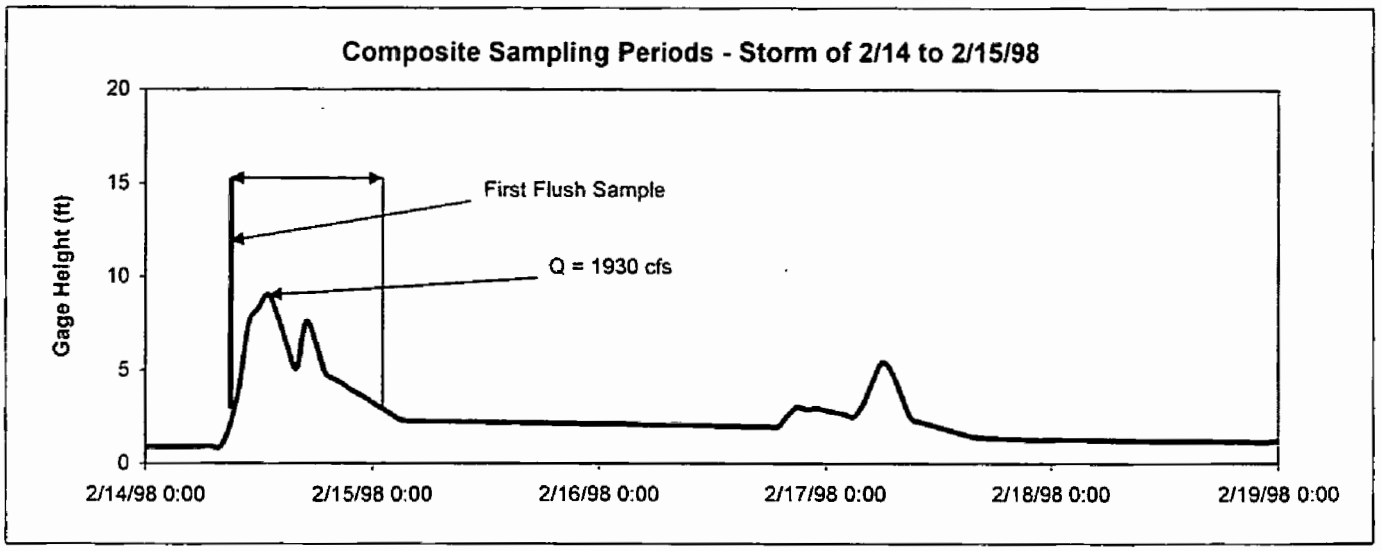

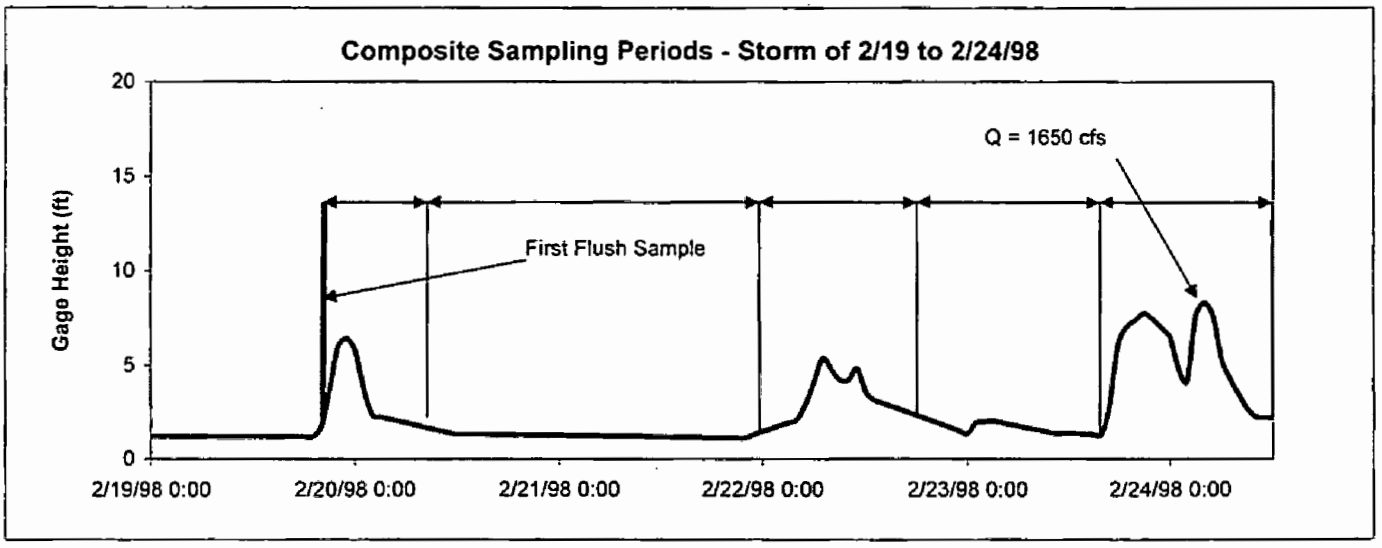

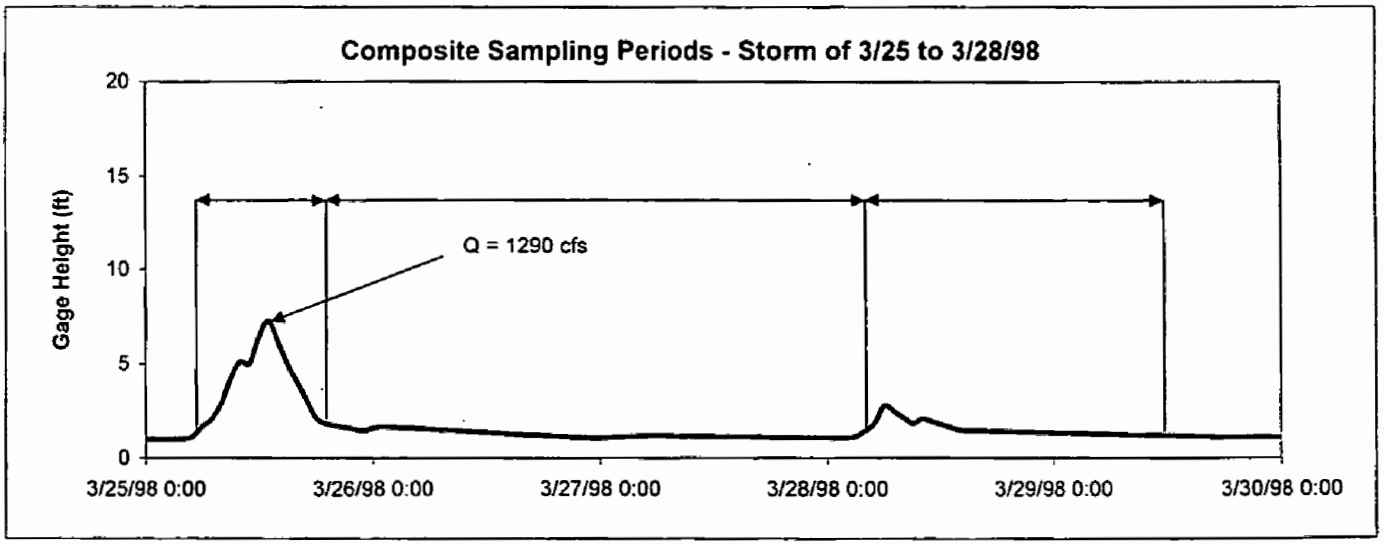

Stormwater Sampling in Santa Ana Delhi Channel

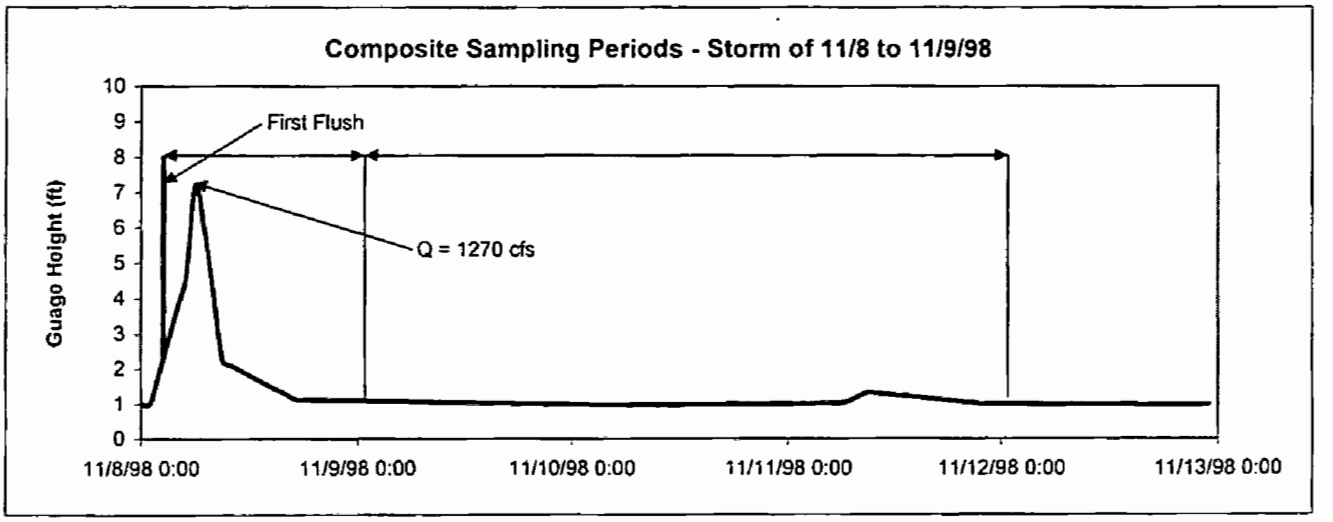

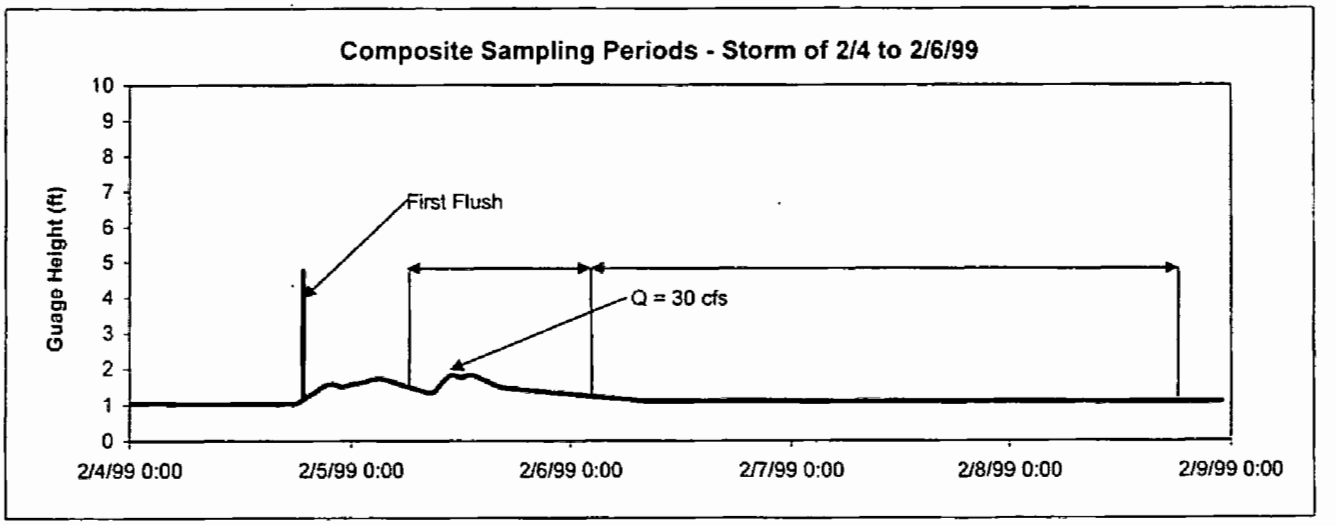

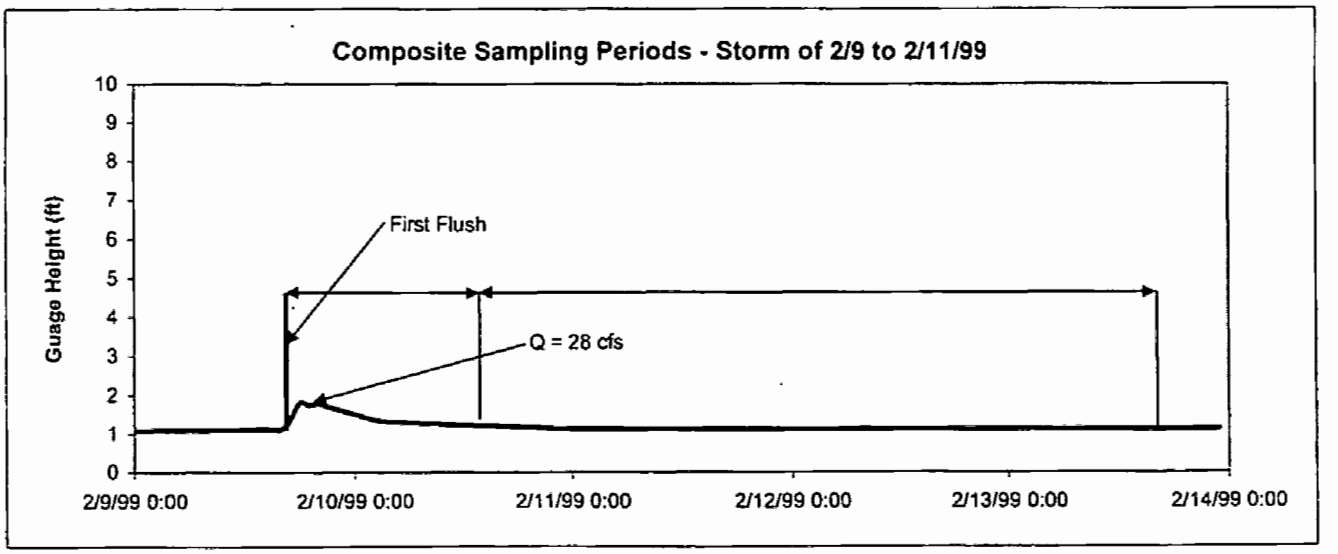

Stormwater Sampling in Santa Ana Delhi Channel

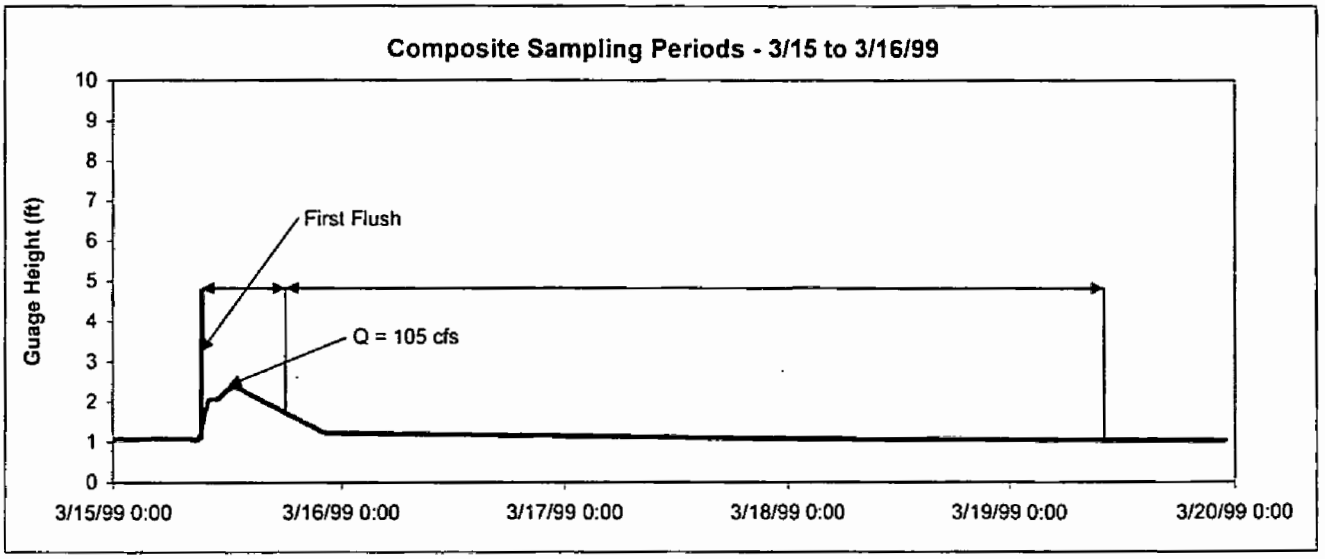

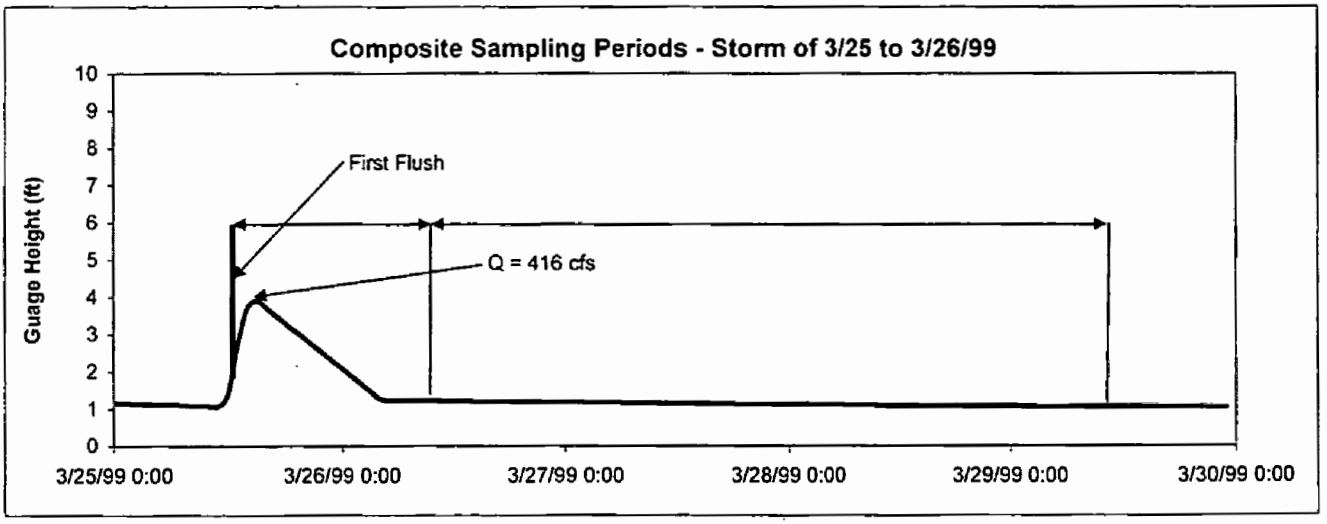

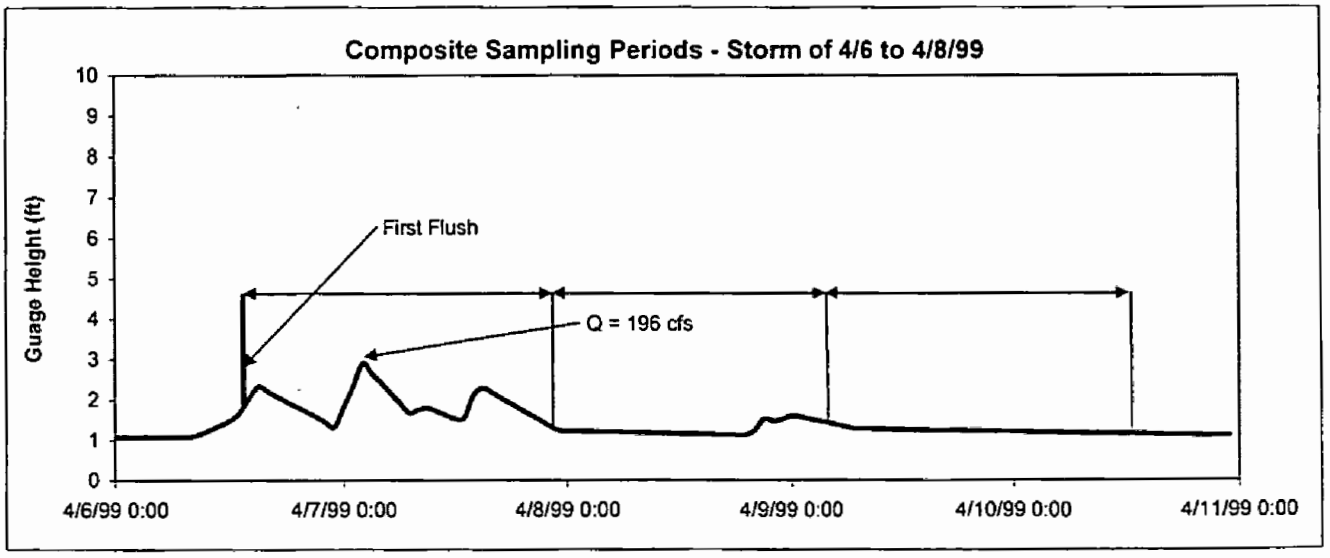

Storm Sampling @ Lane Channel

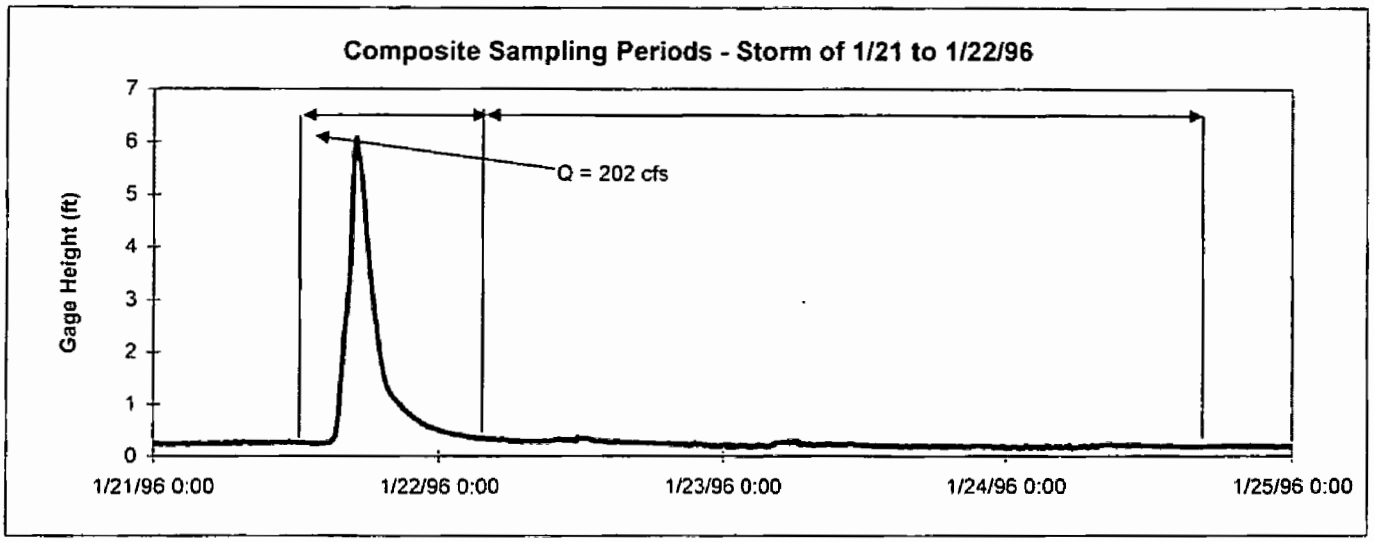

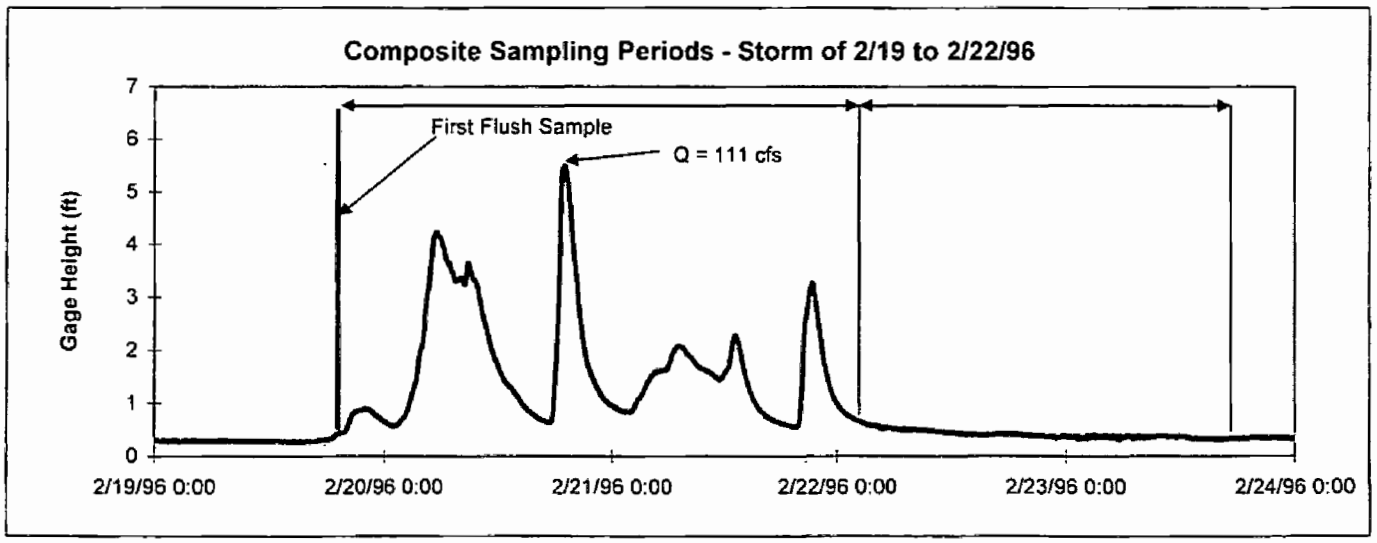

Storm Sampling @ Lane Channel

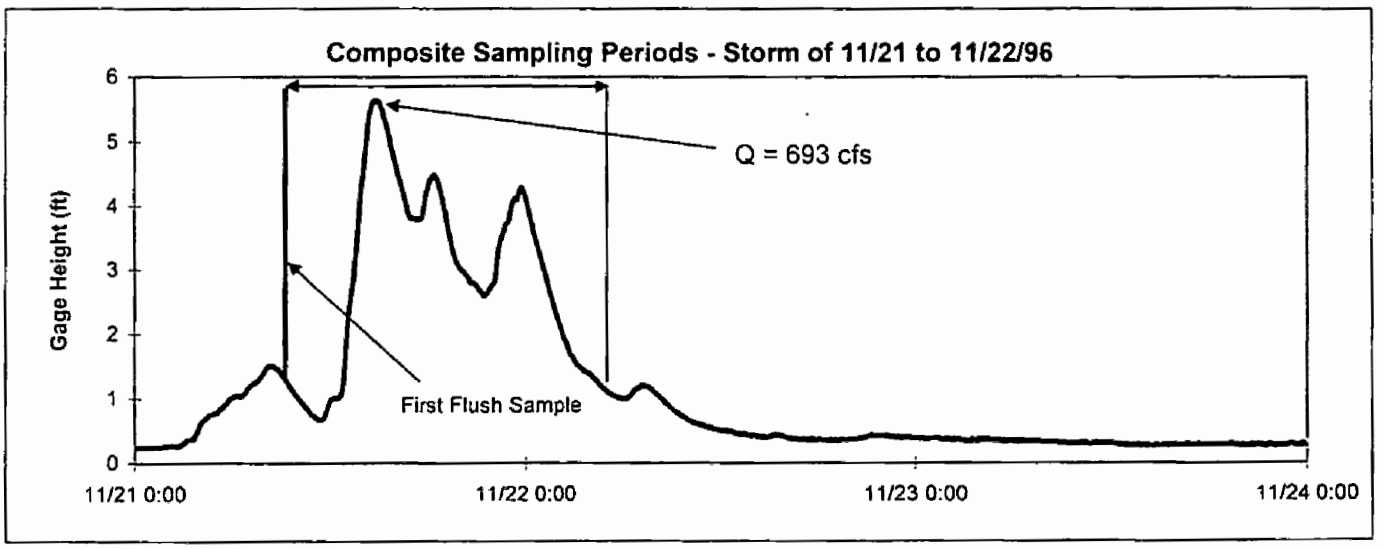

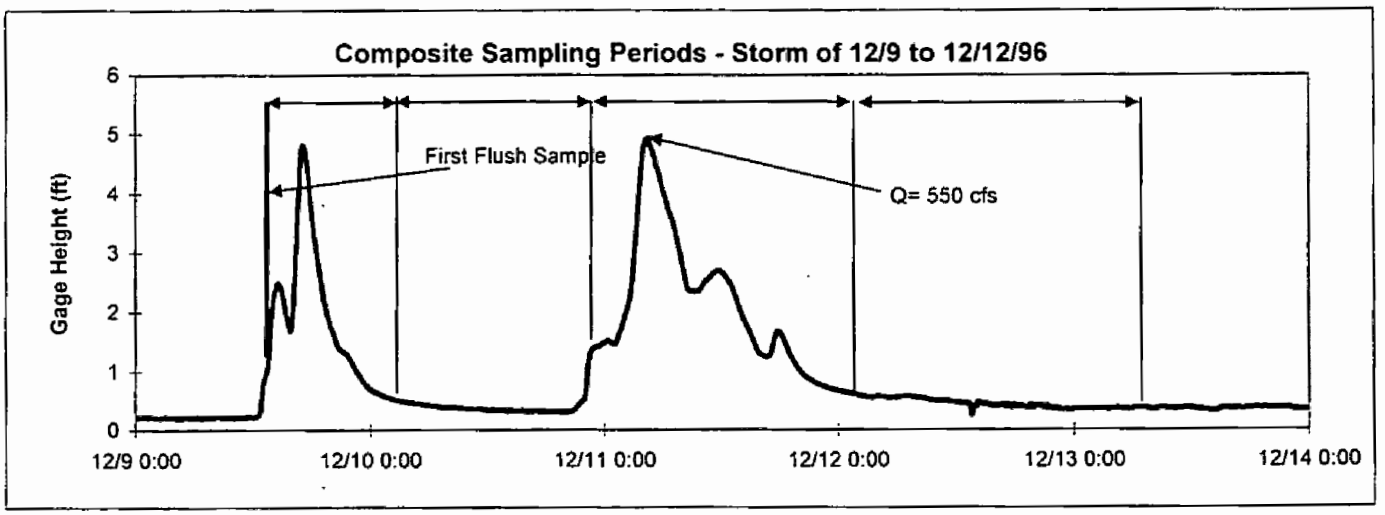

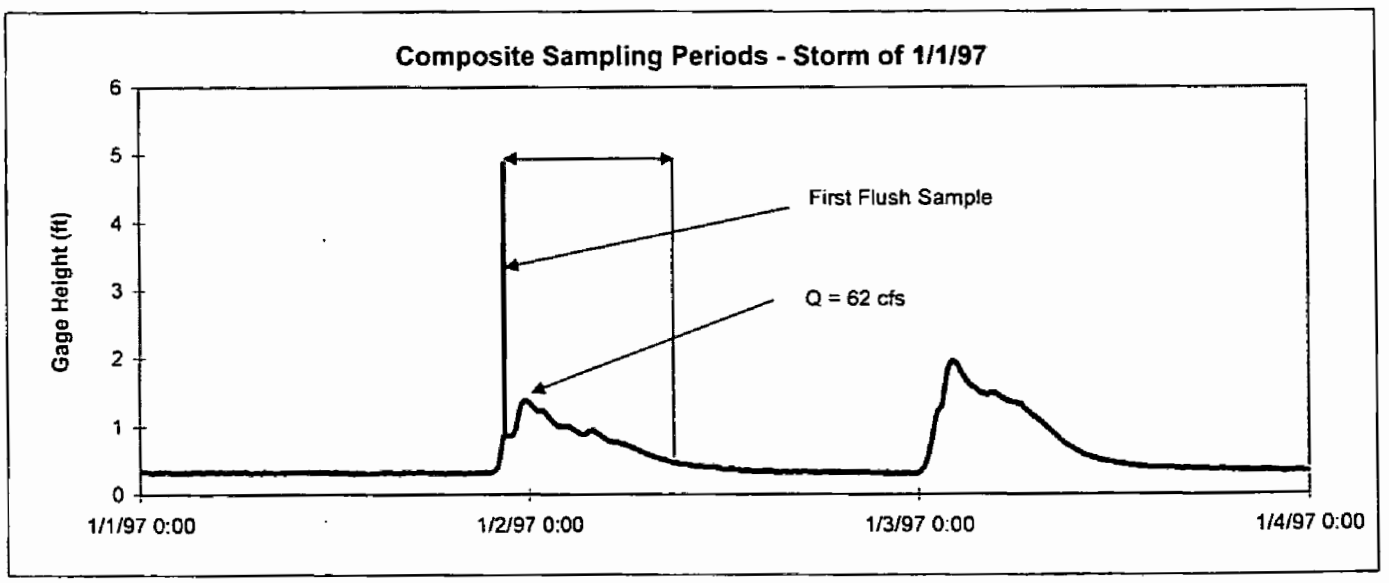

Stormwater Sampling in Lane Channel

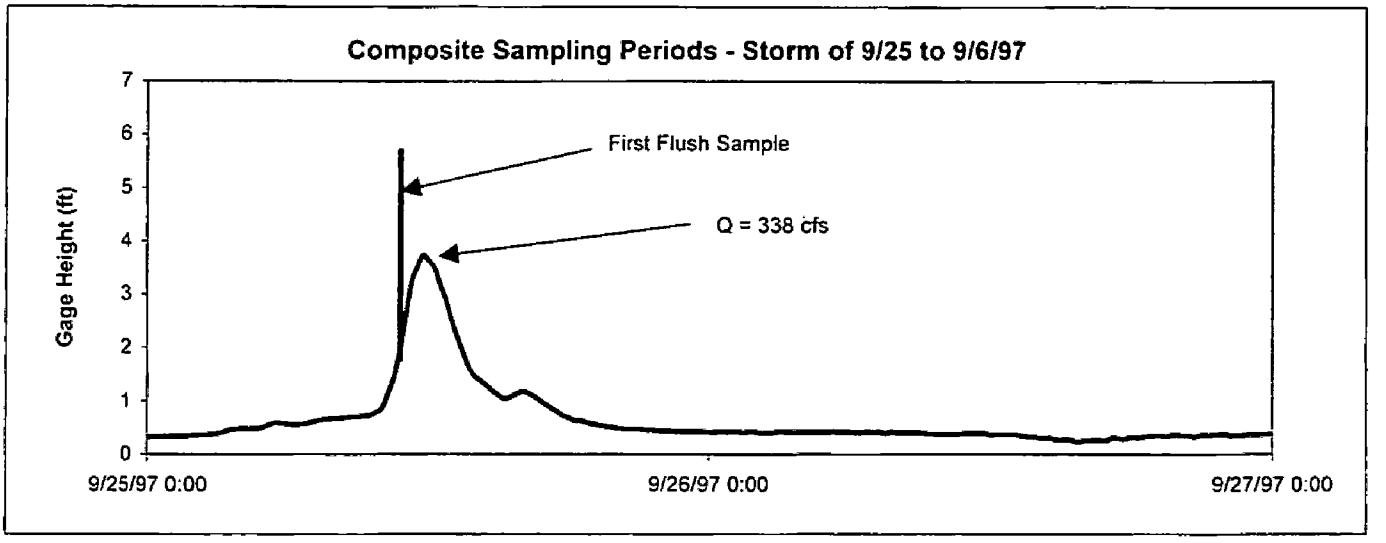

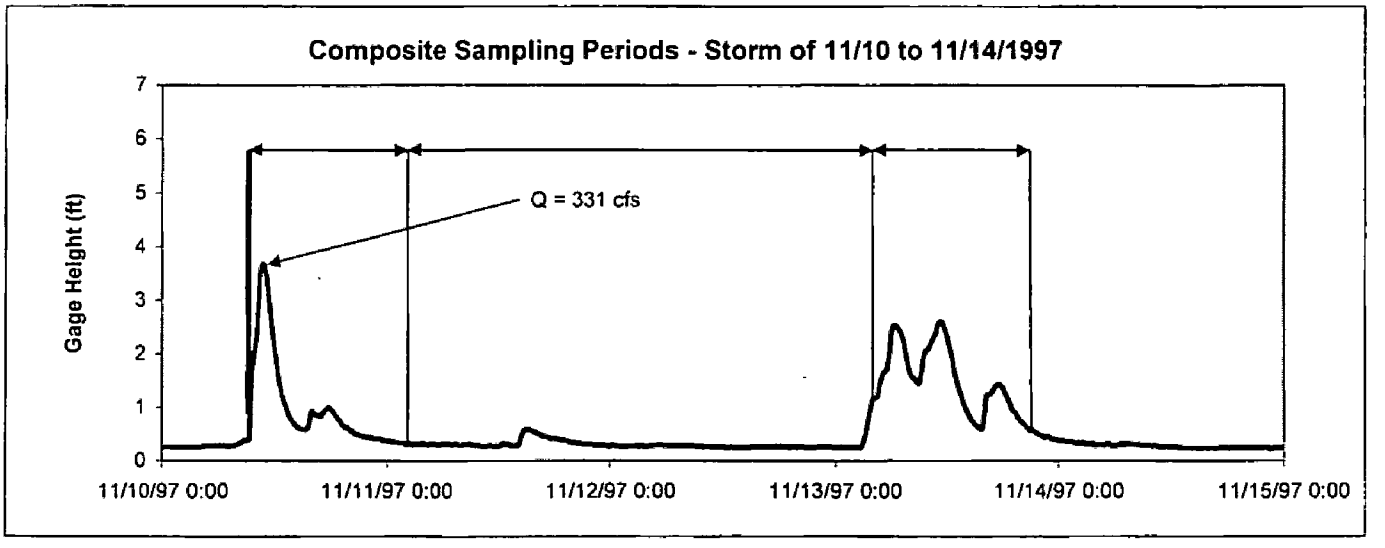

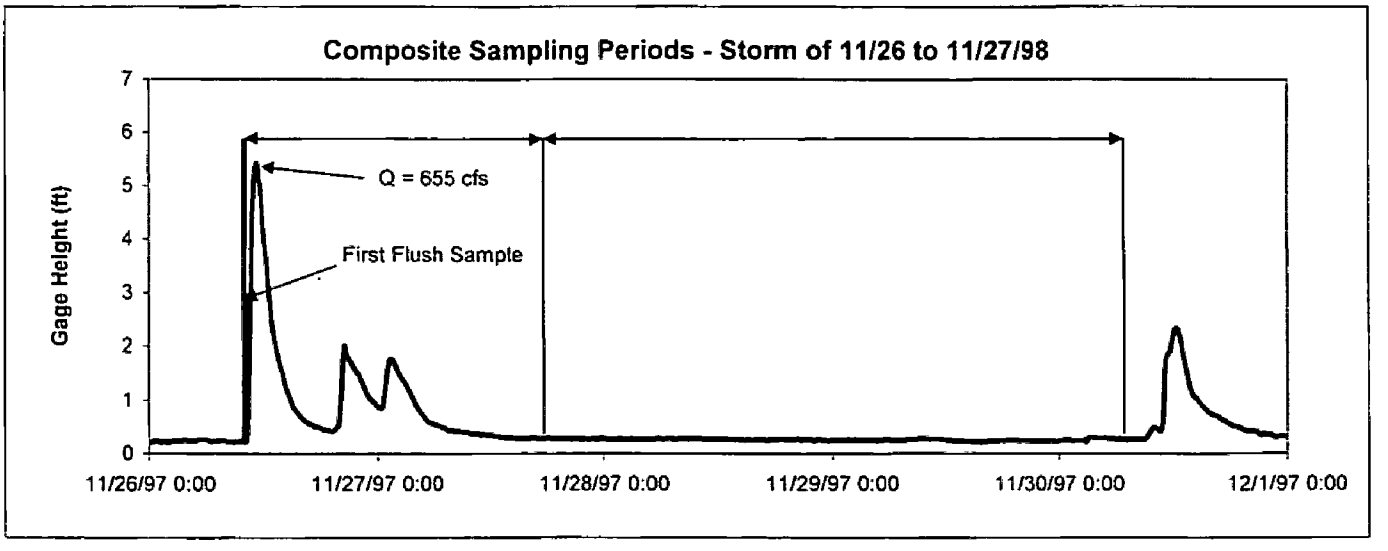

Stormwater Sampling in Lane Channel

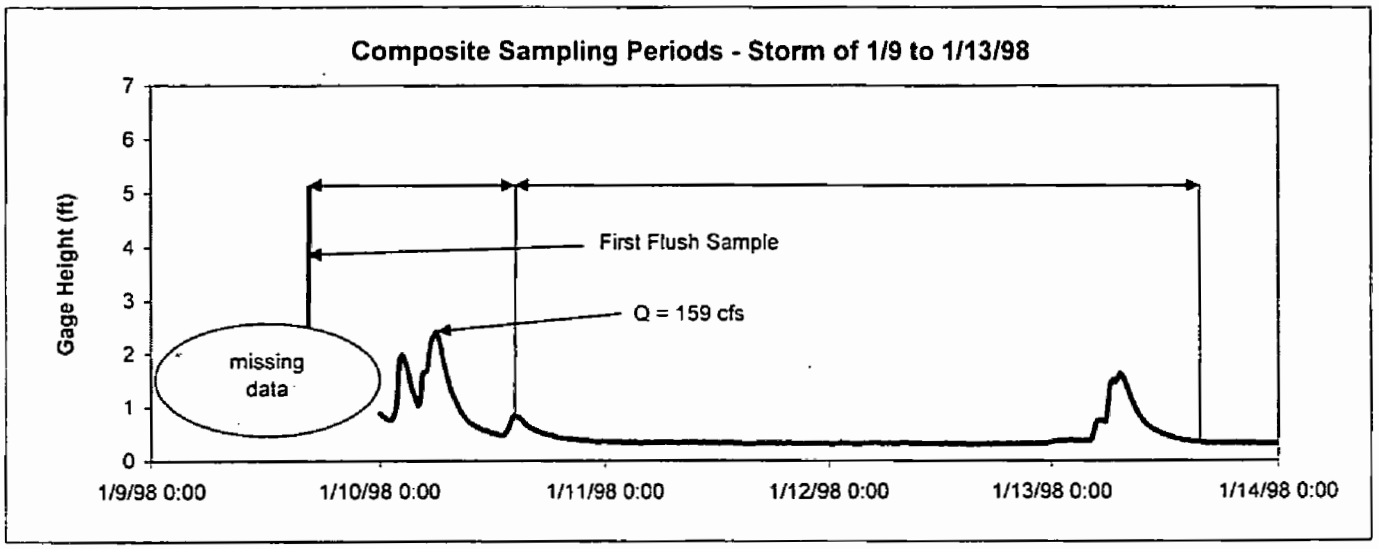

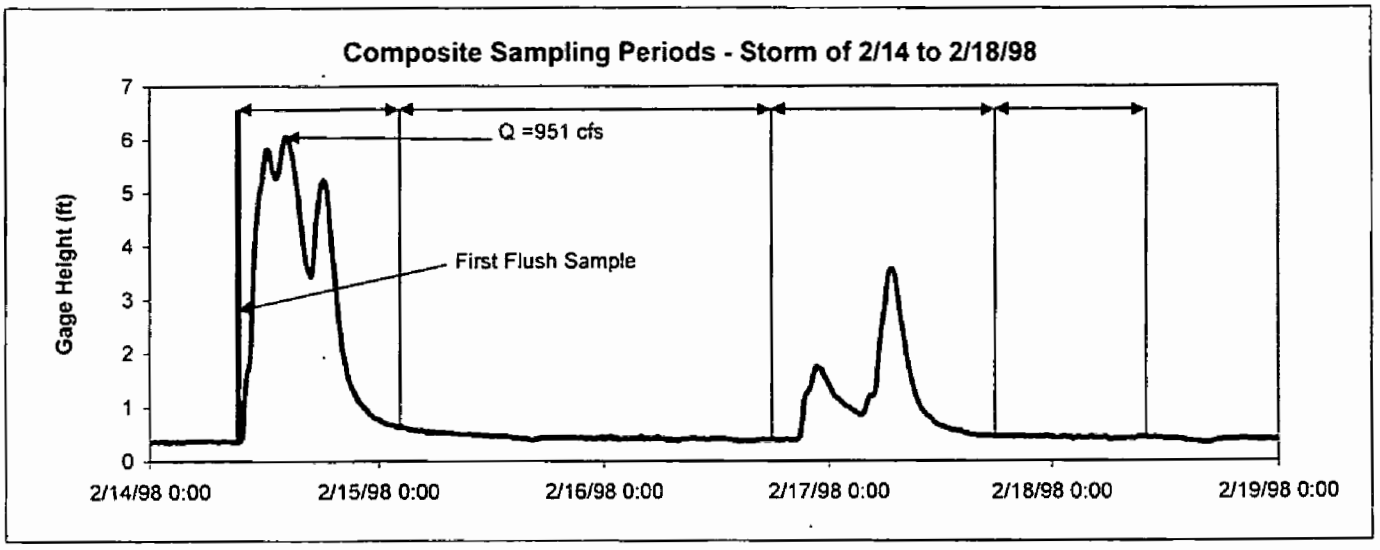

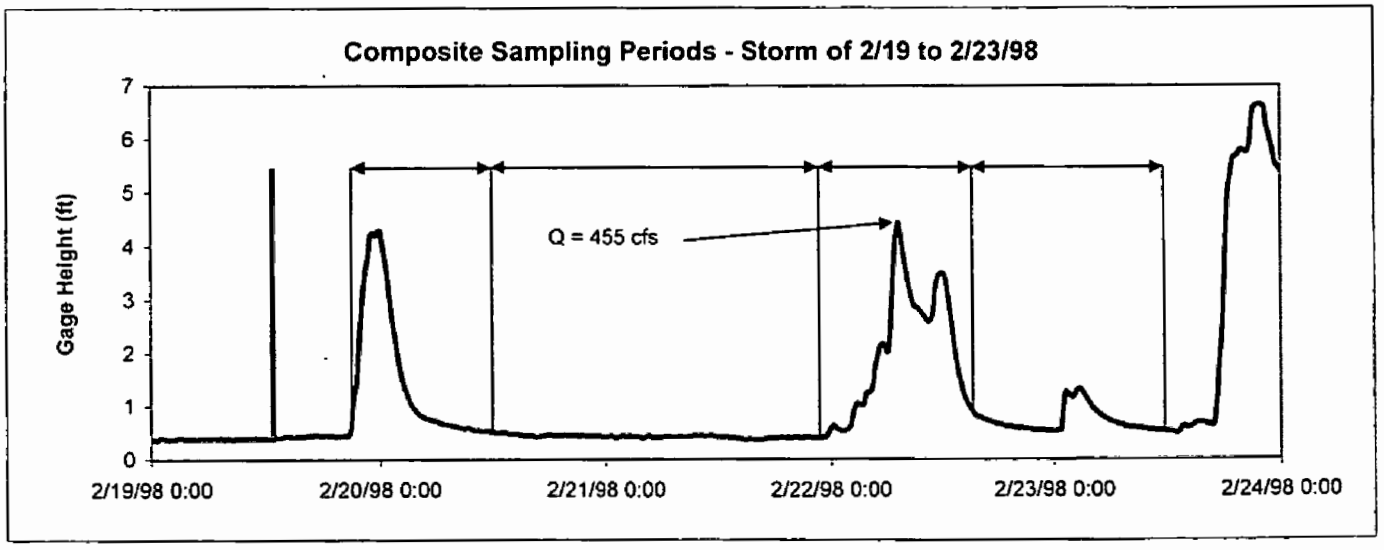

Stormwater Sampling @ Lane Channel

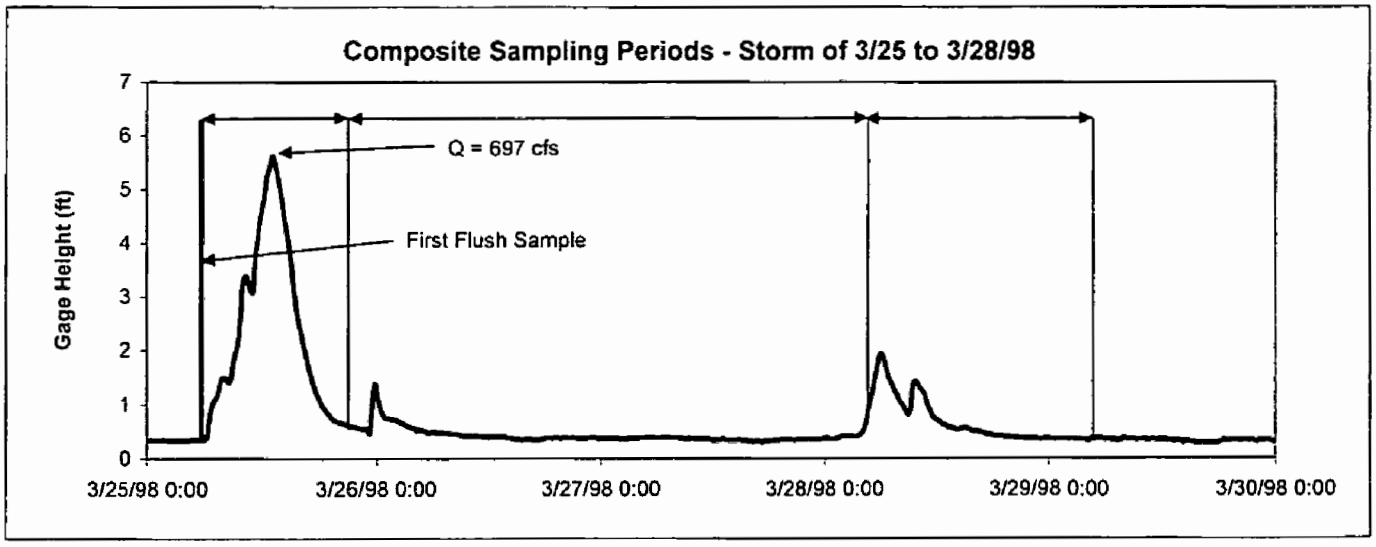

Stormwater Sampling in Lane Channel

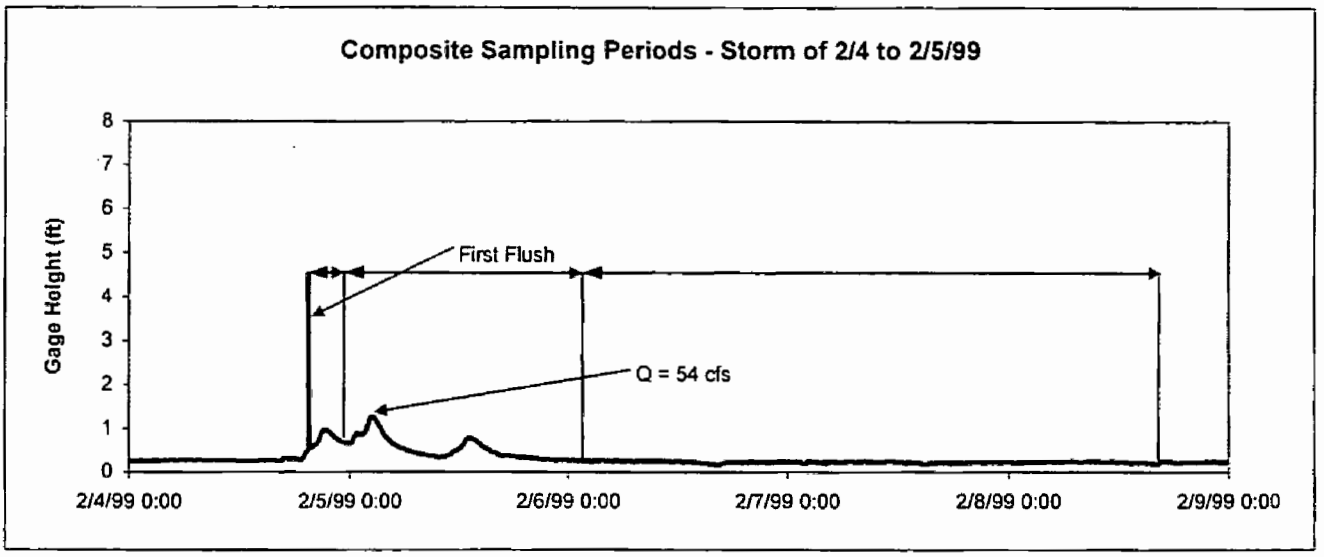

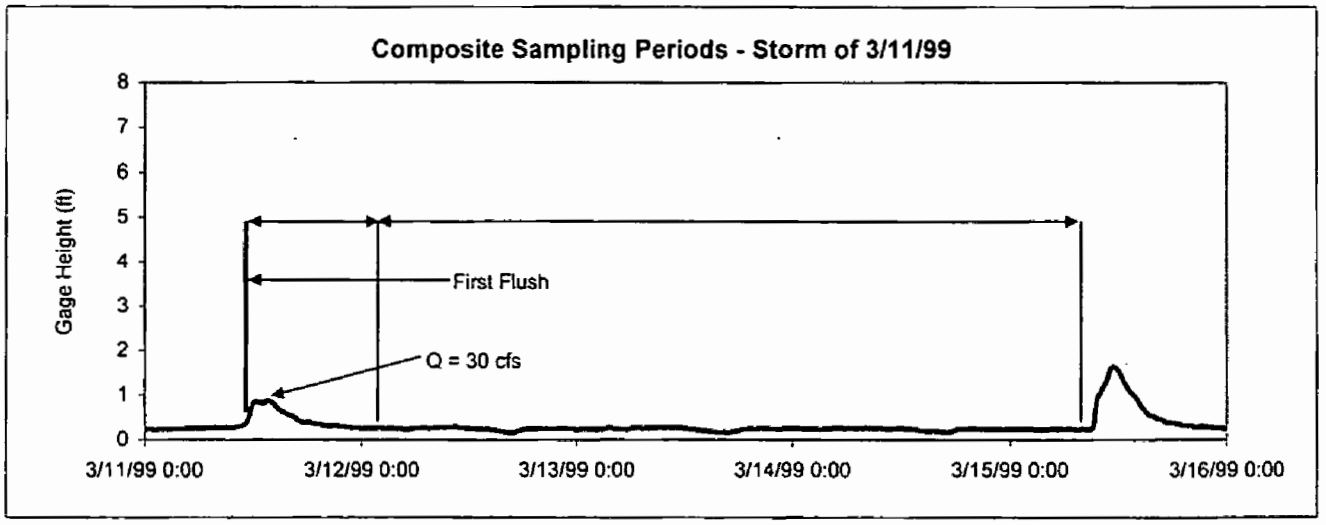

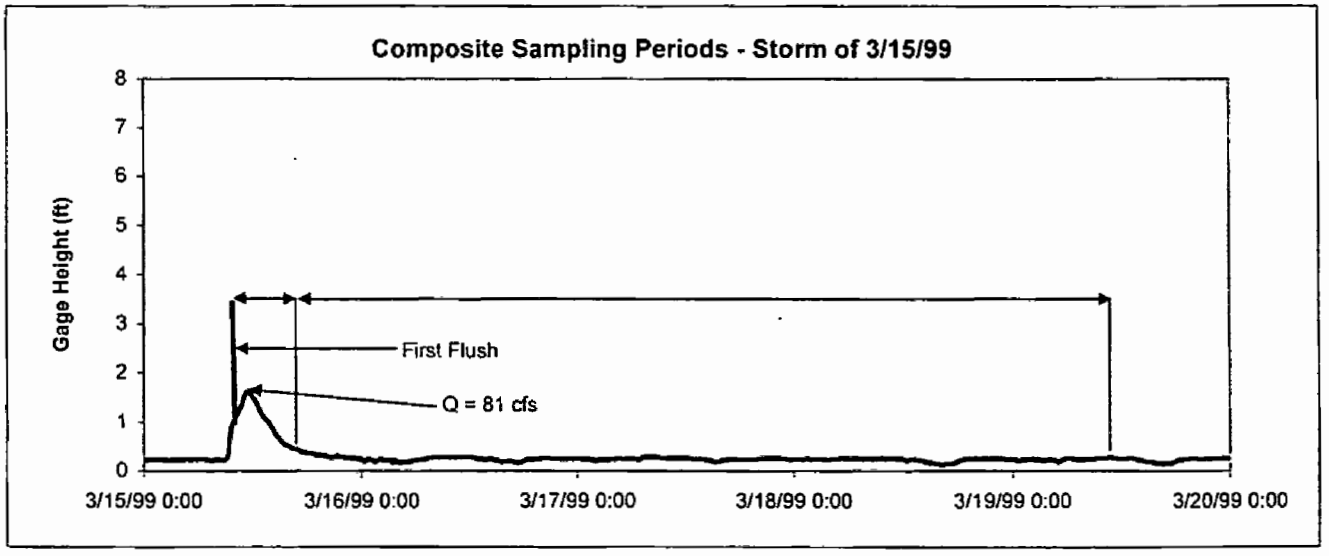

Stormwater Sampling in Lane Channel

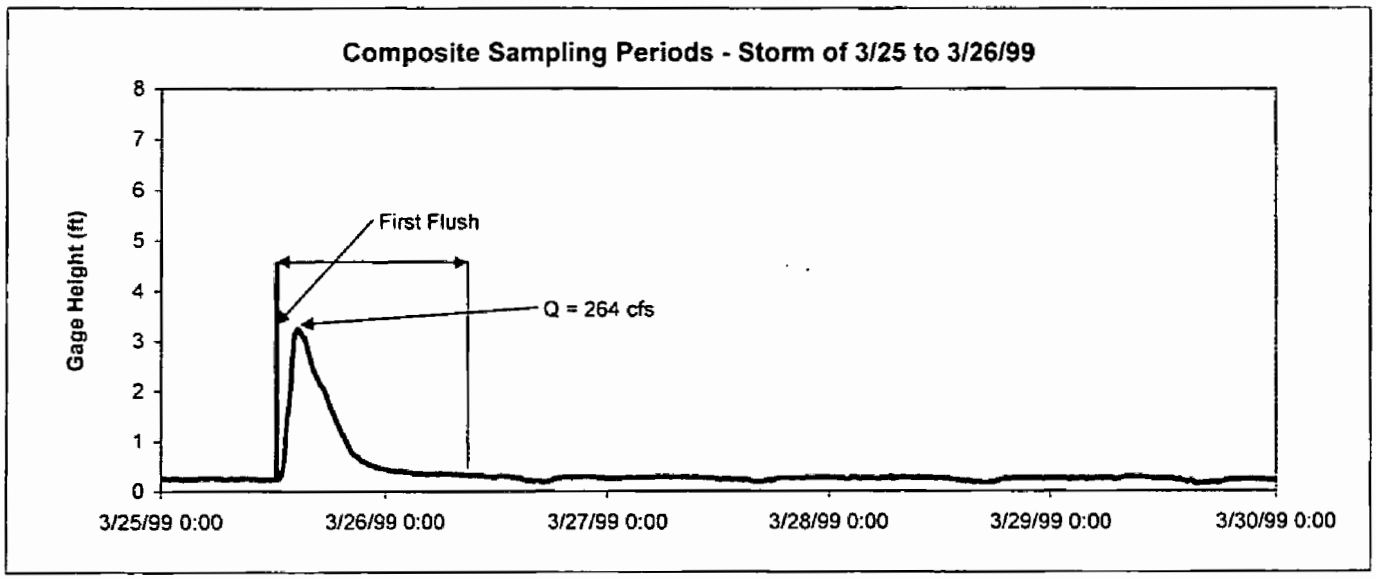

Stormwater Sampling in Lane Channel

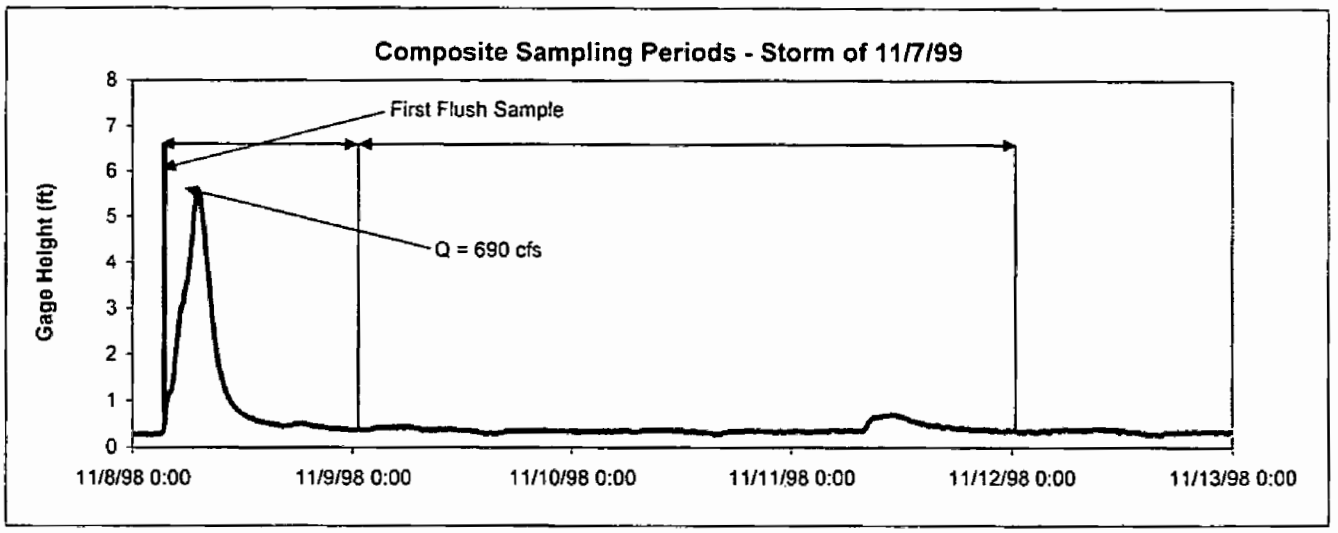

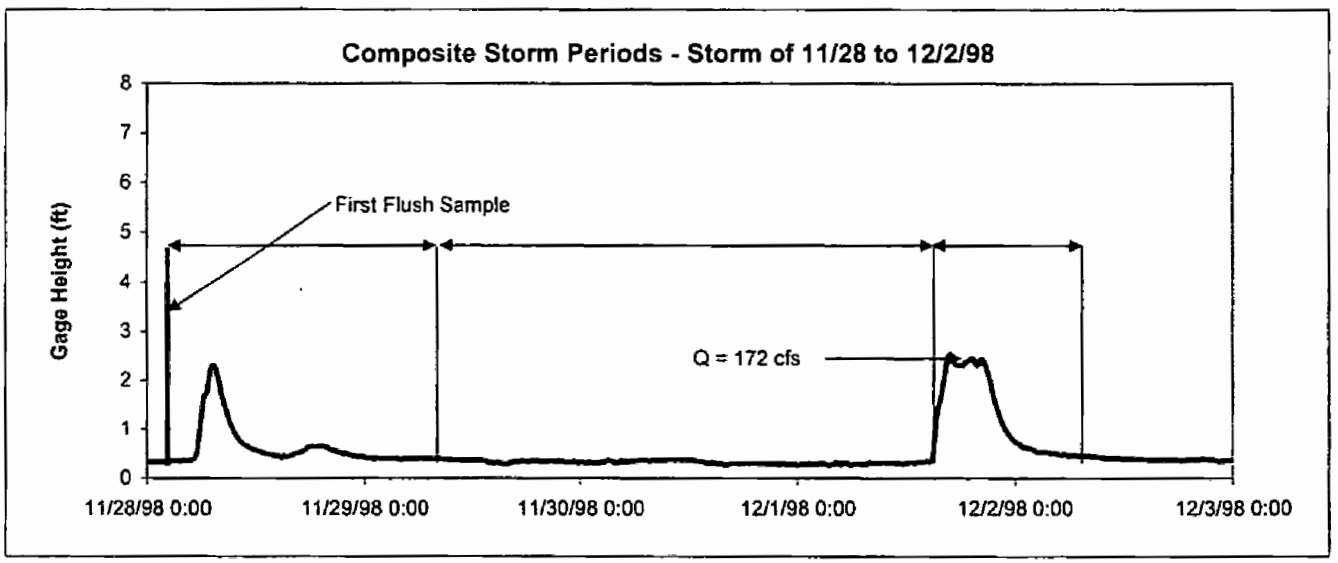

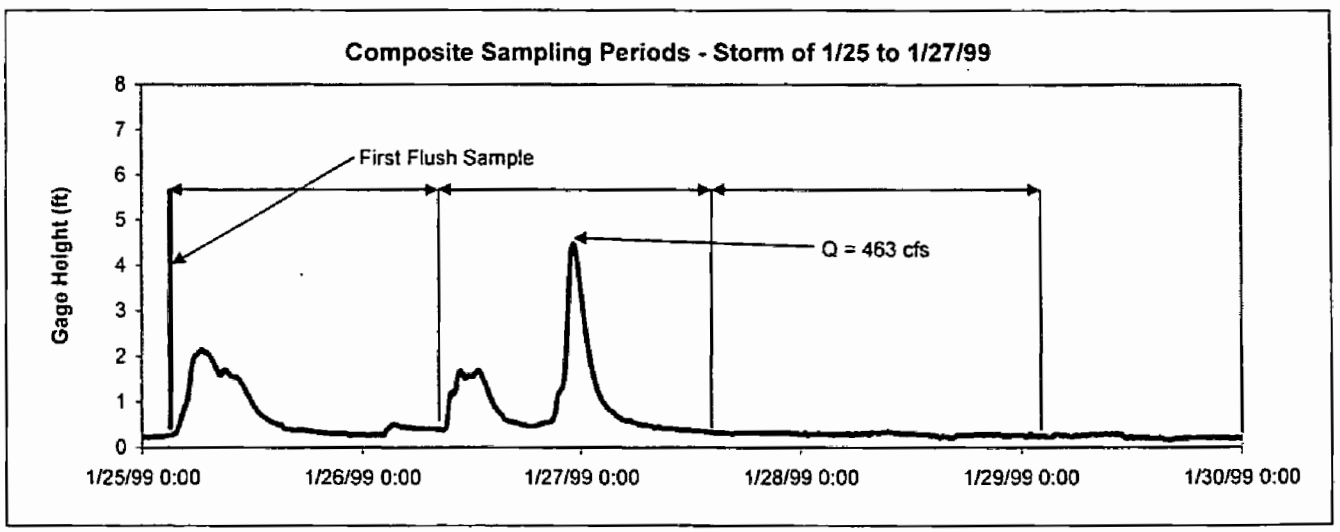

Stormwater Sampling in San Diego Creek @ Campus Drive

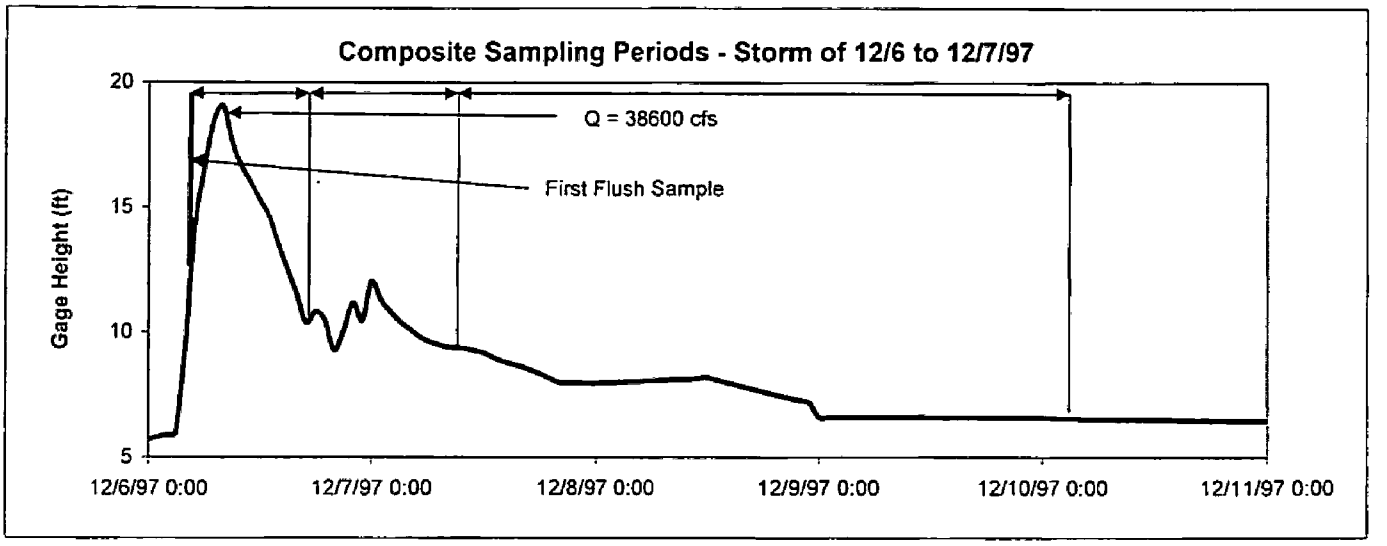

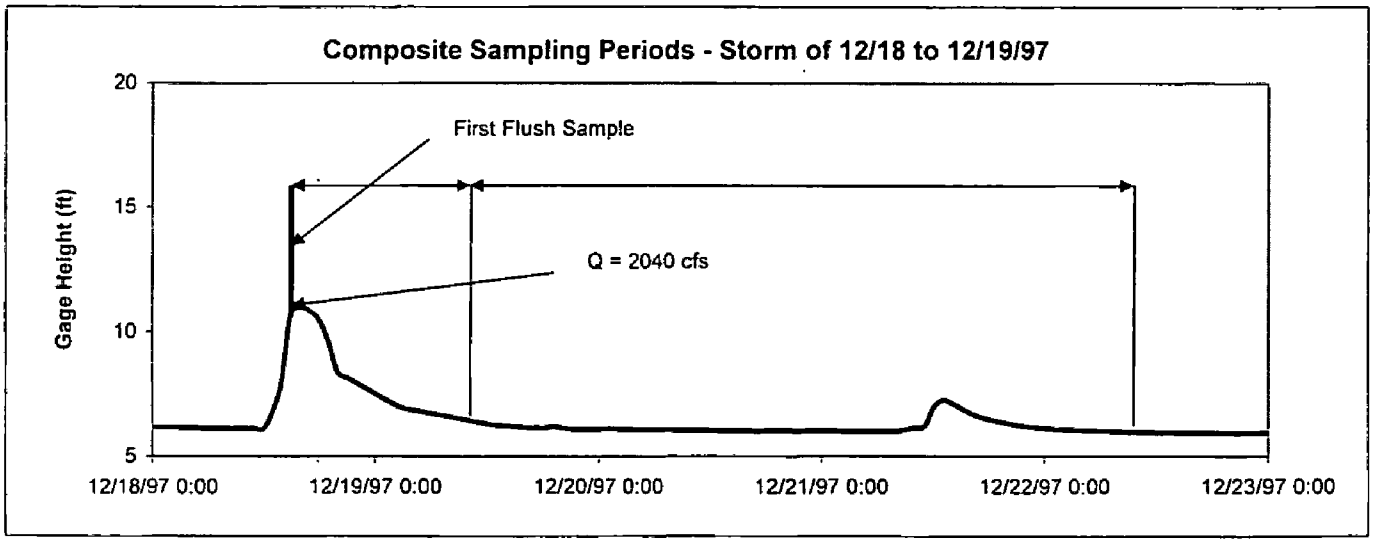

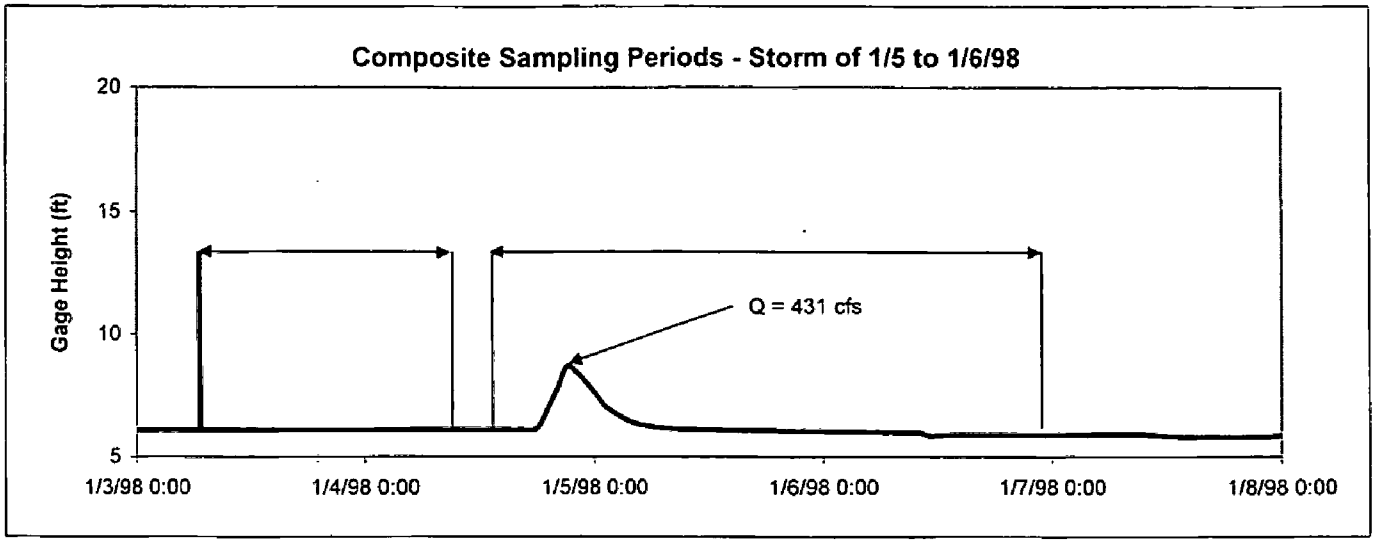

Stormwater Sampling in San Diego Creek @ Campus Drive

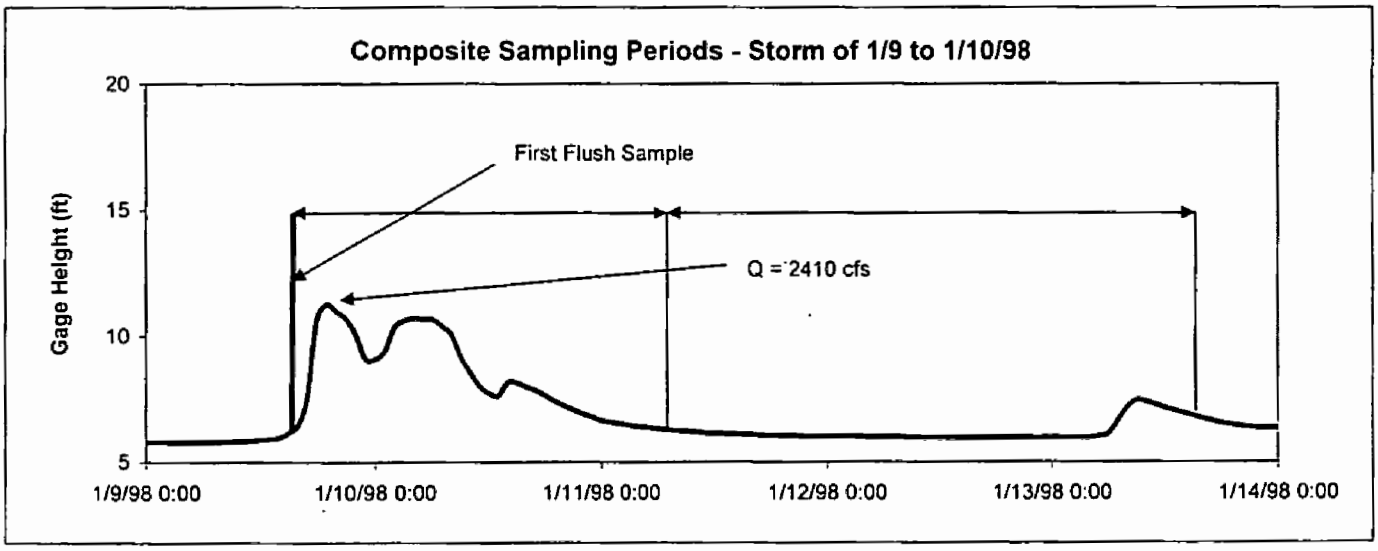

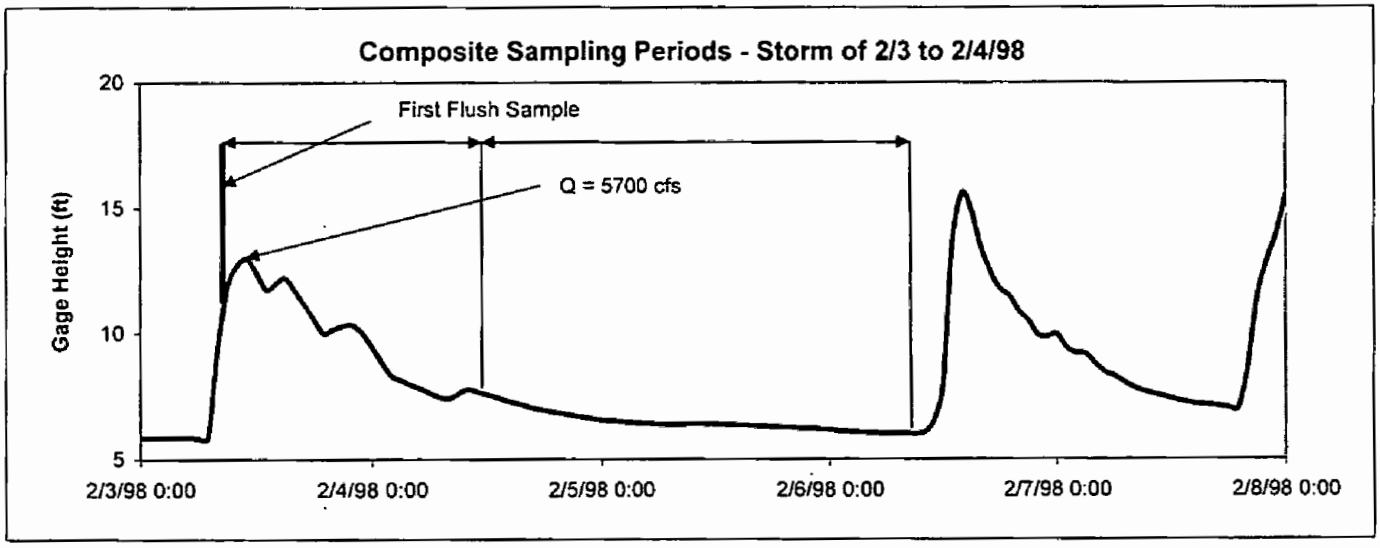

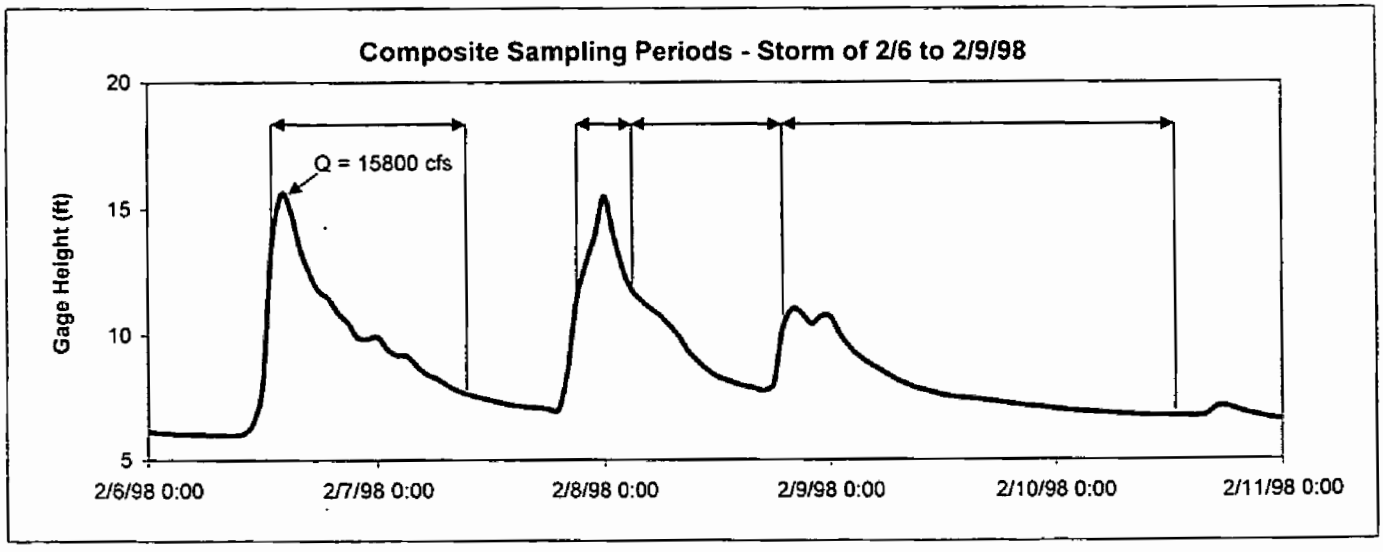

Stormwater Sampling in San Diego Creek @ Campus Drive

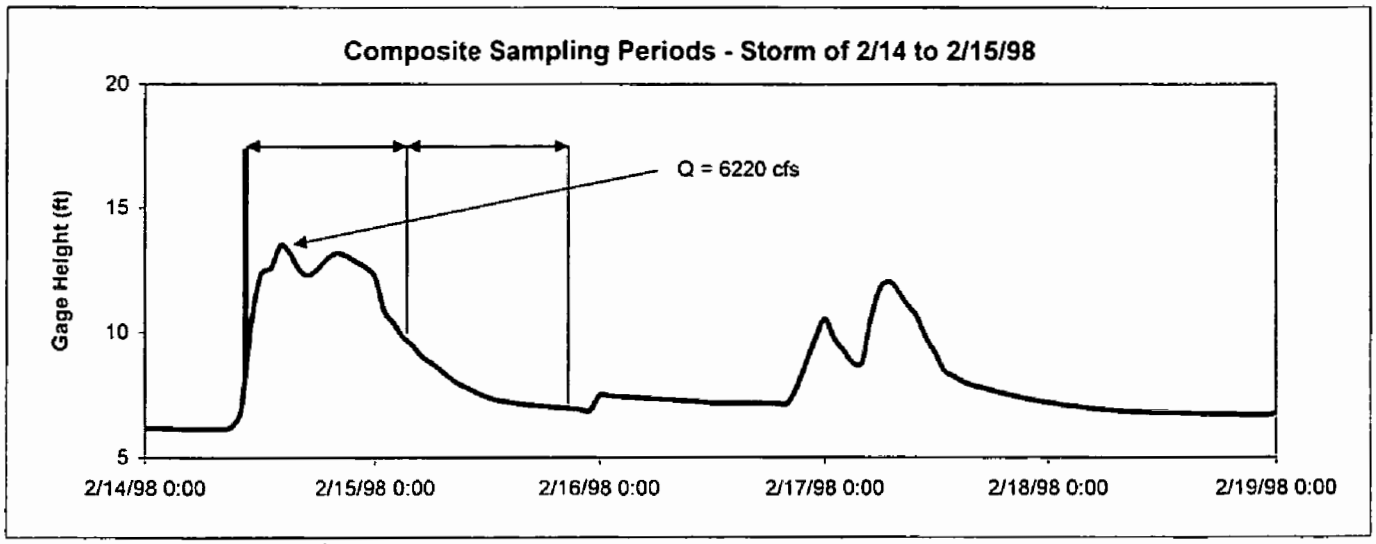

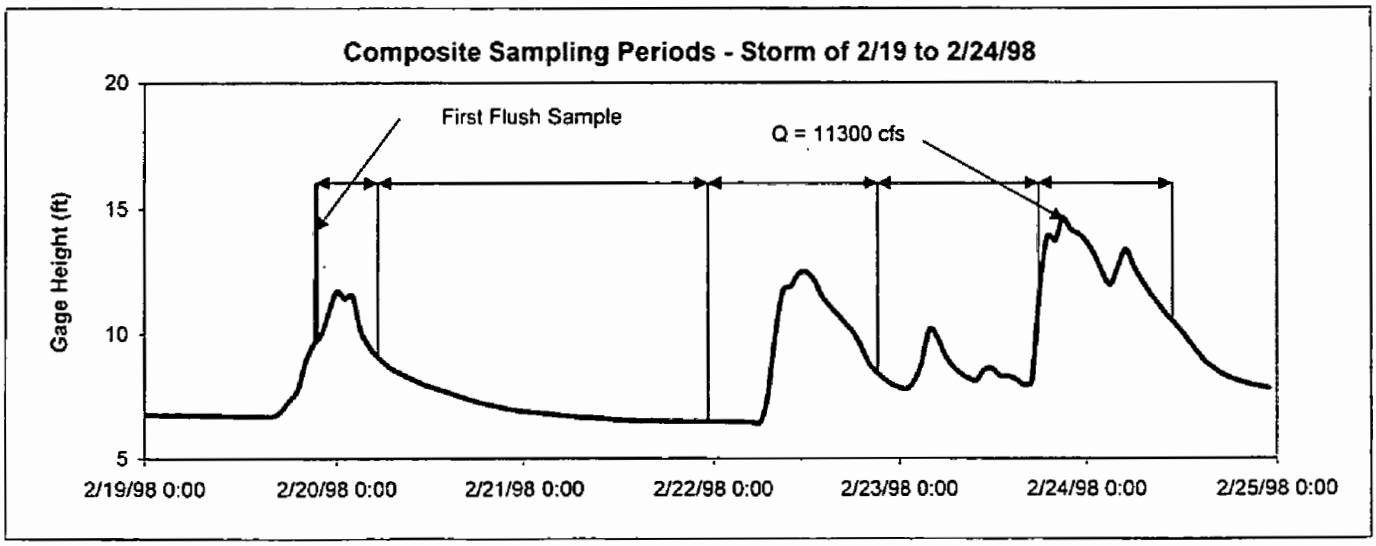

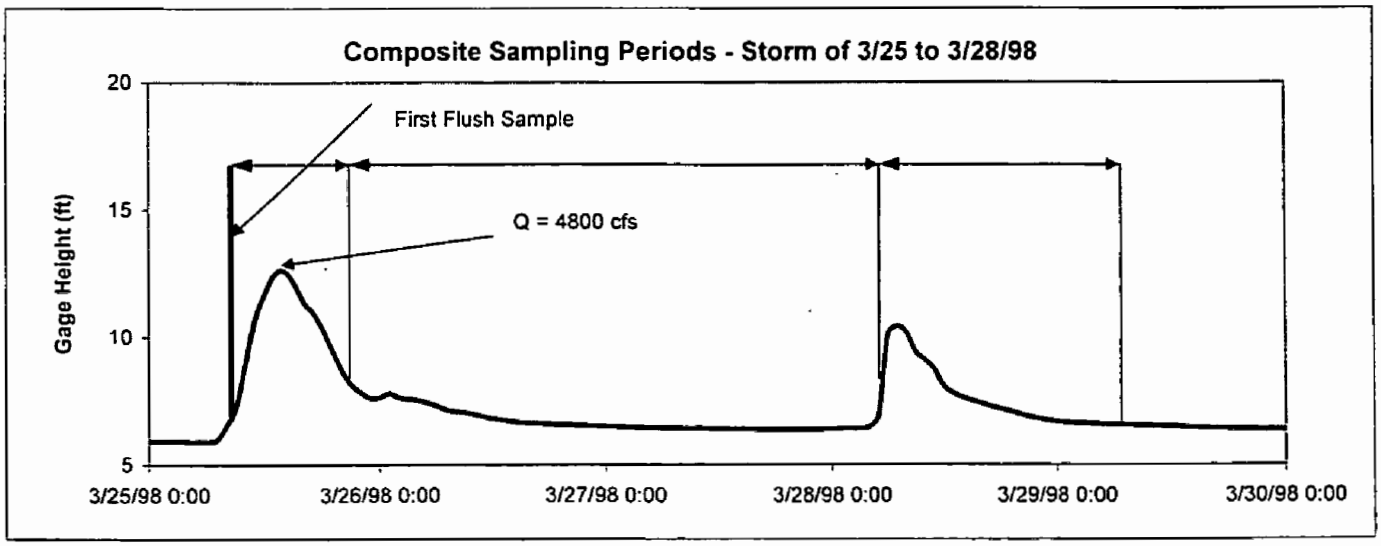

Stormwater Sampling in San Diego Creek @ Campus Drive

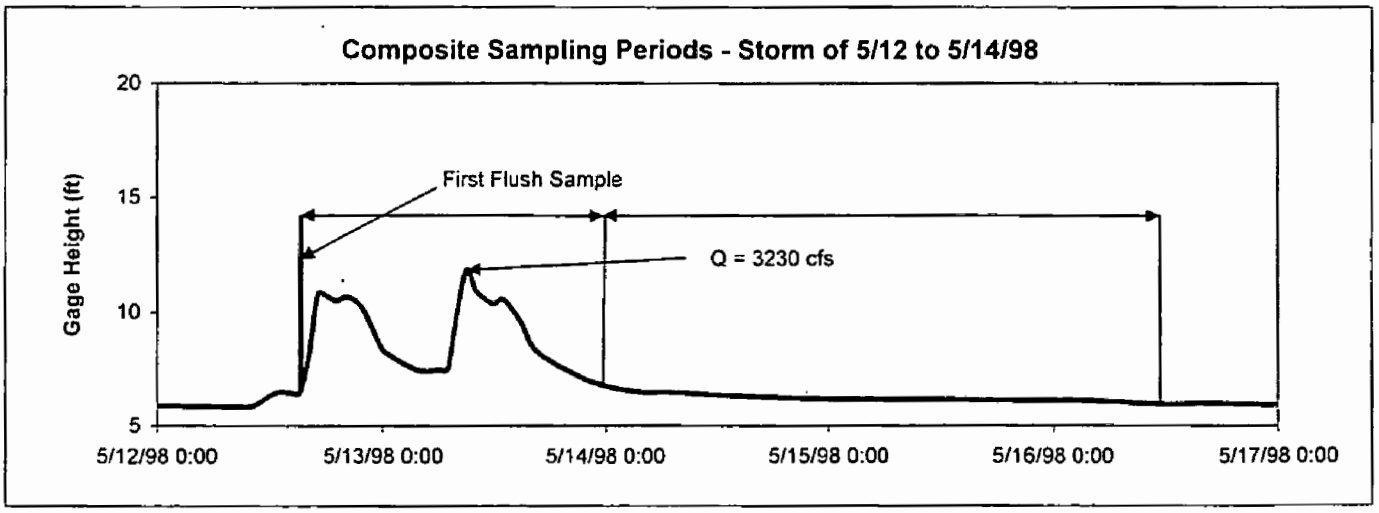

Stormwater Sampling in San Diego Creek @ Campus Drive

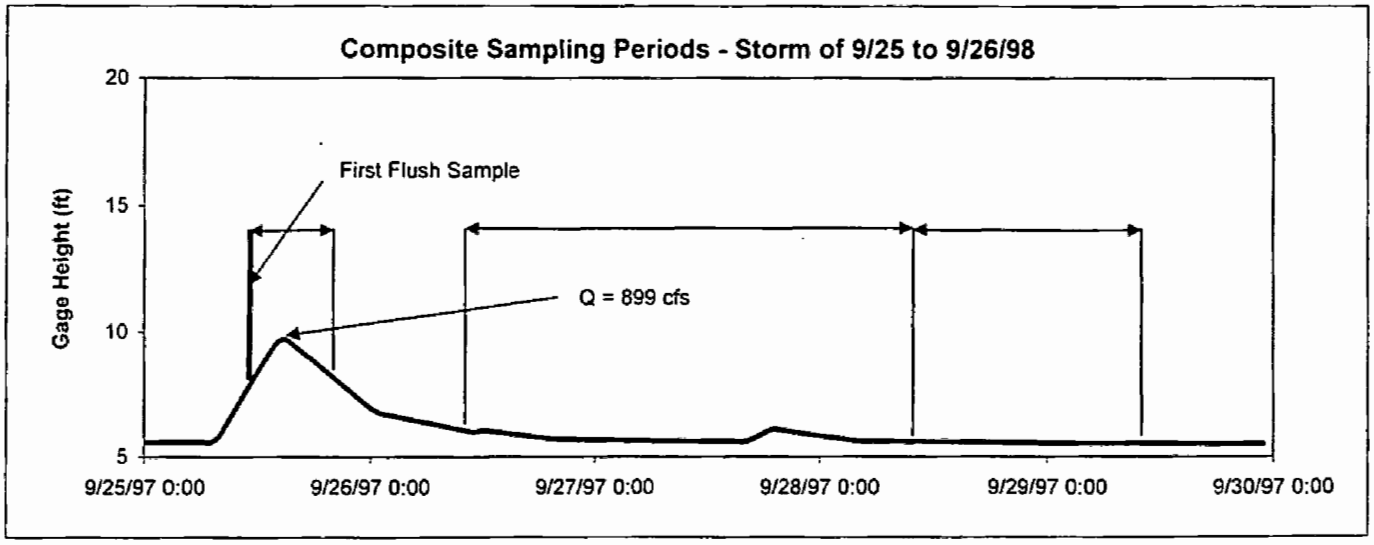

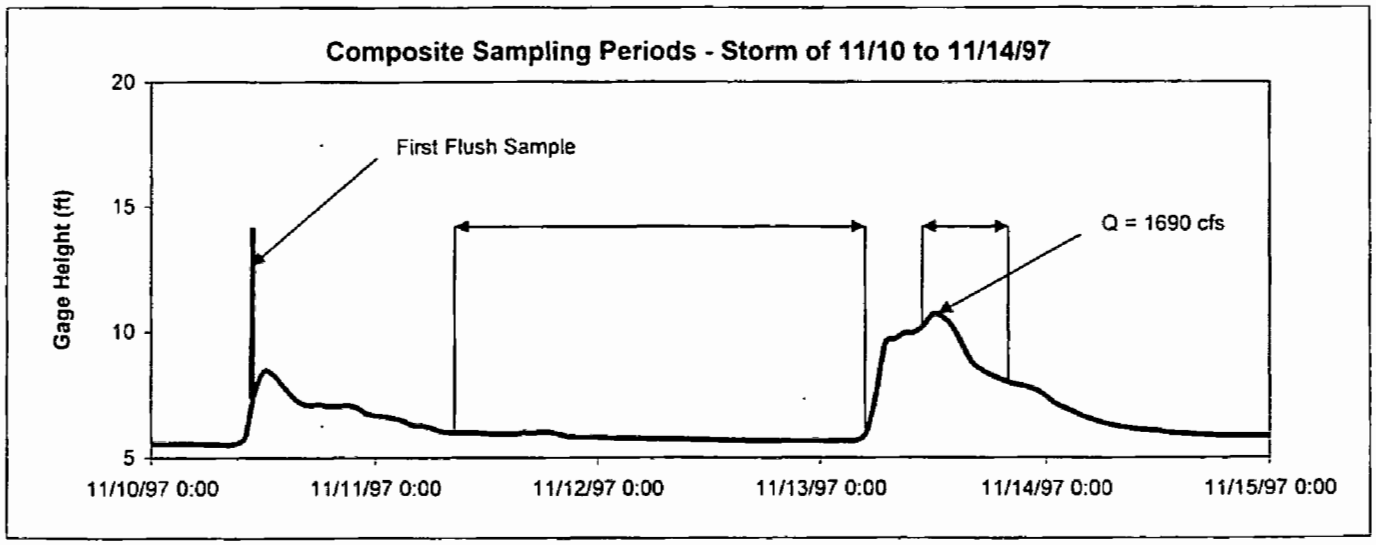

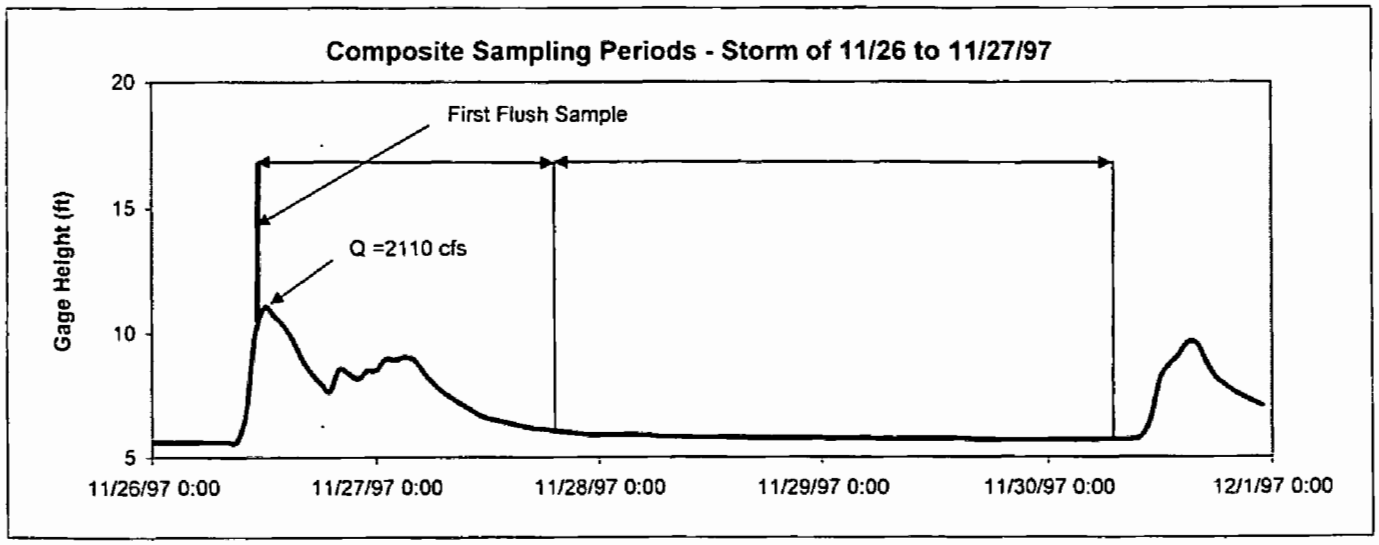

Stormwater Sampling in San Diego Creek @ Campus Drive

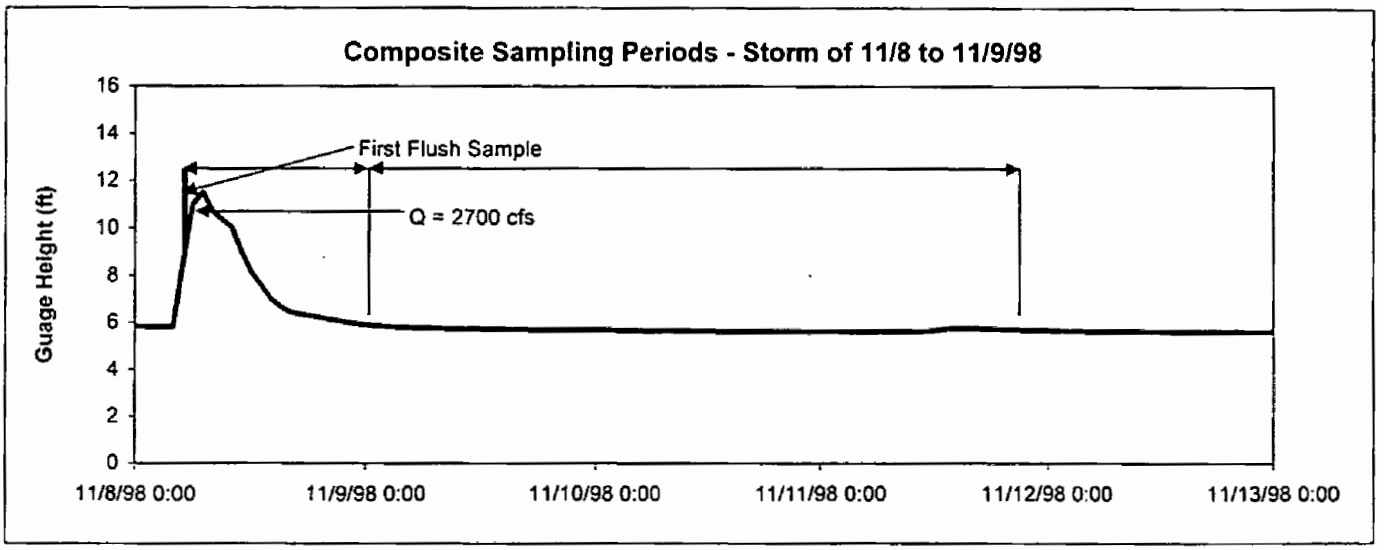

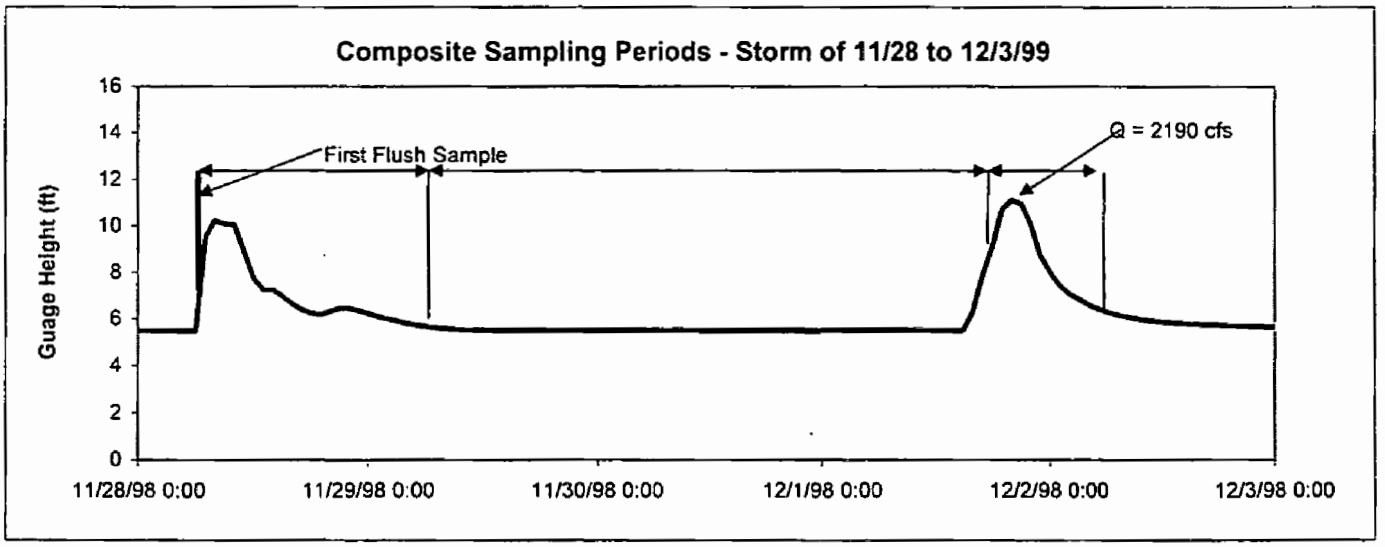

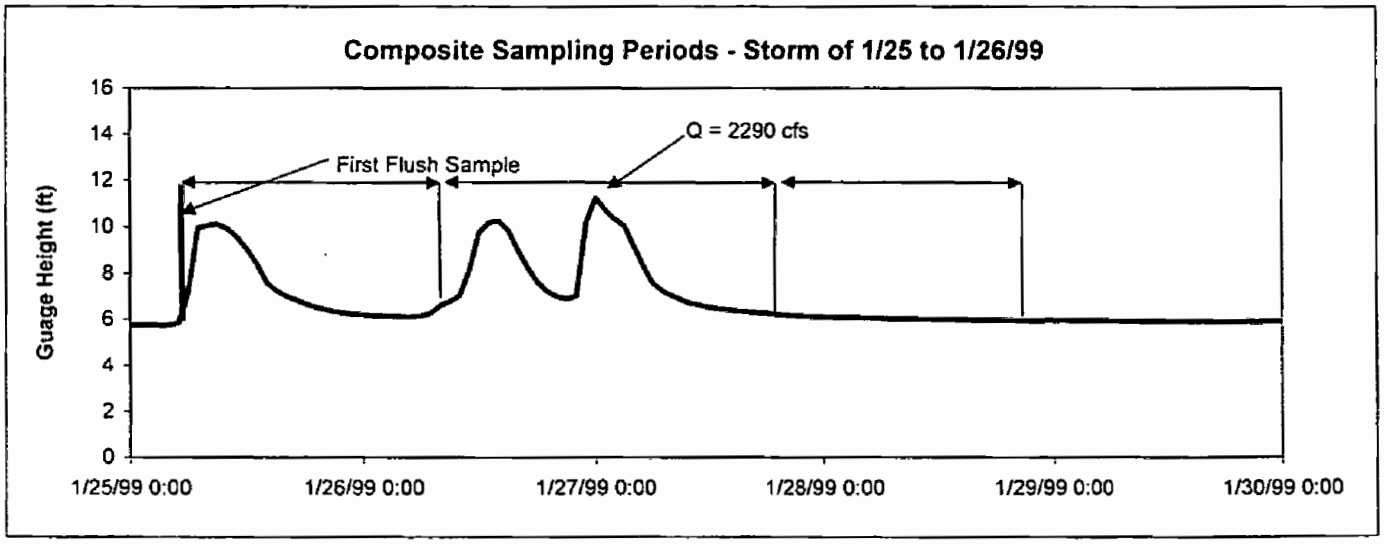

Stormwater Sampling in San Diego Creek @ Campus Drive

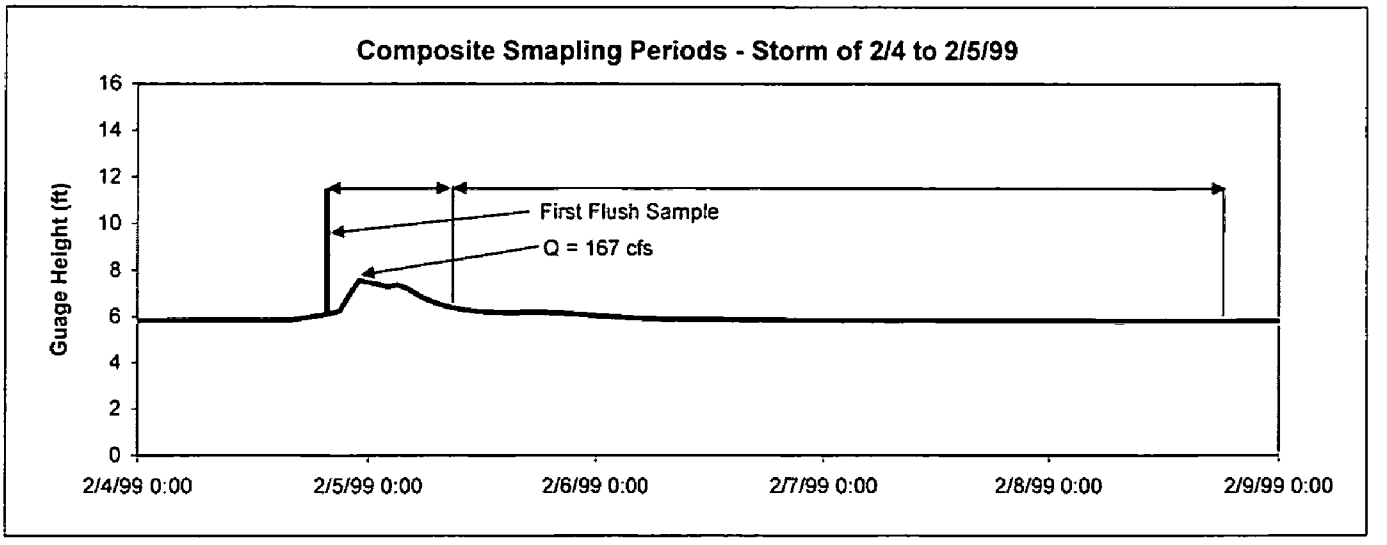

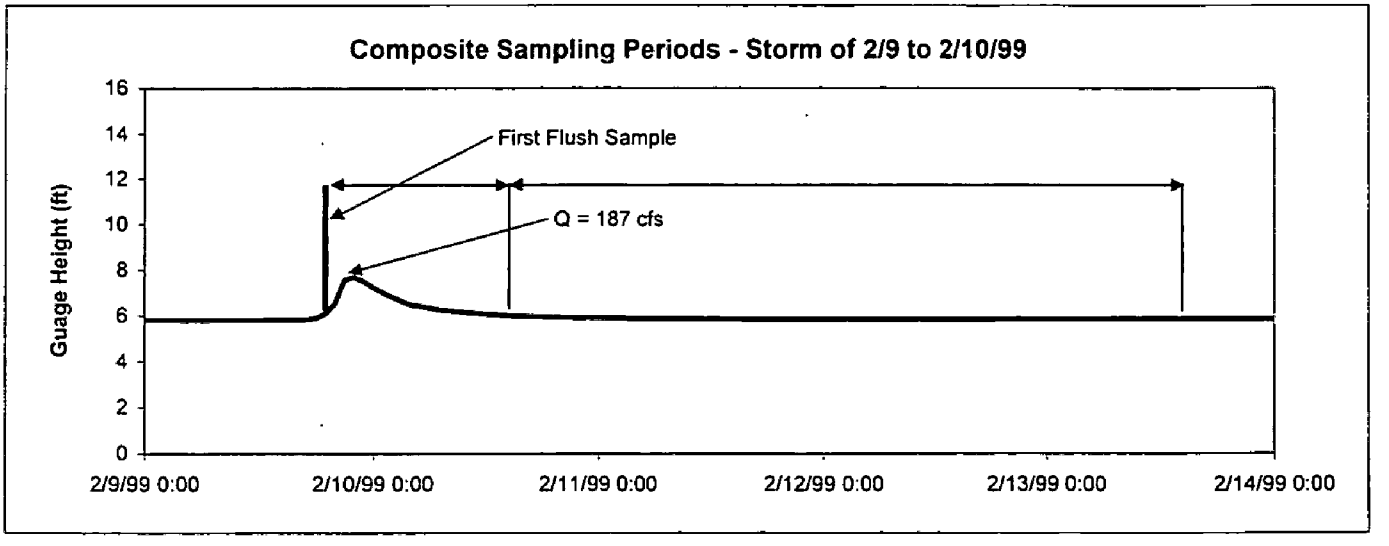

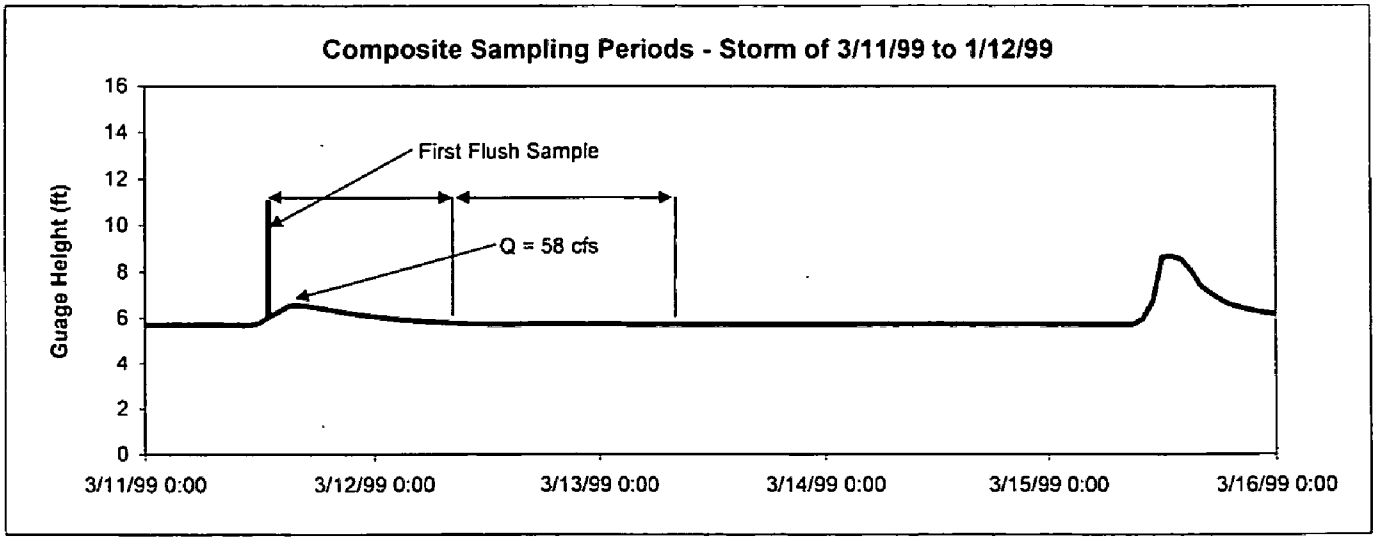

Stormwater Sampling in San Diego Creek @ Campus Drive

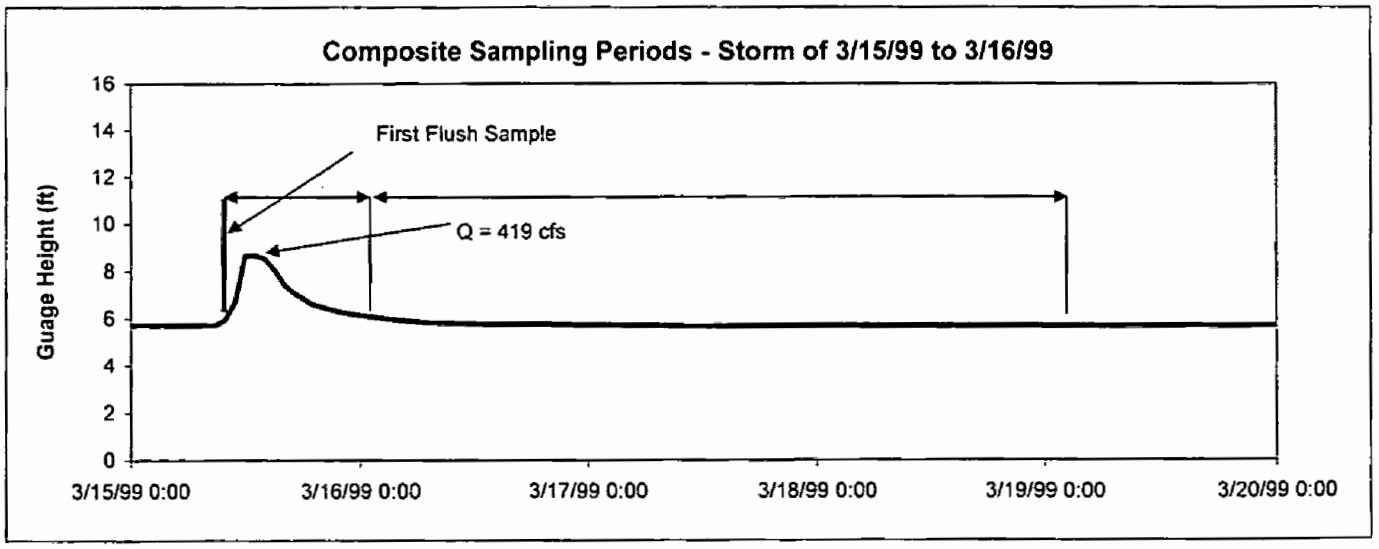

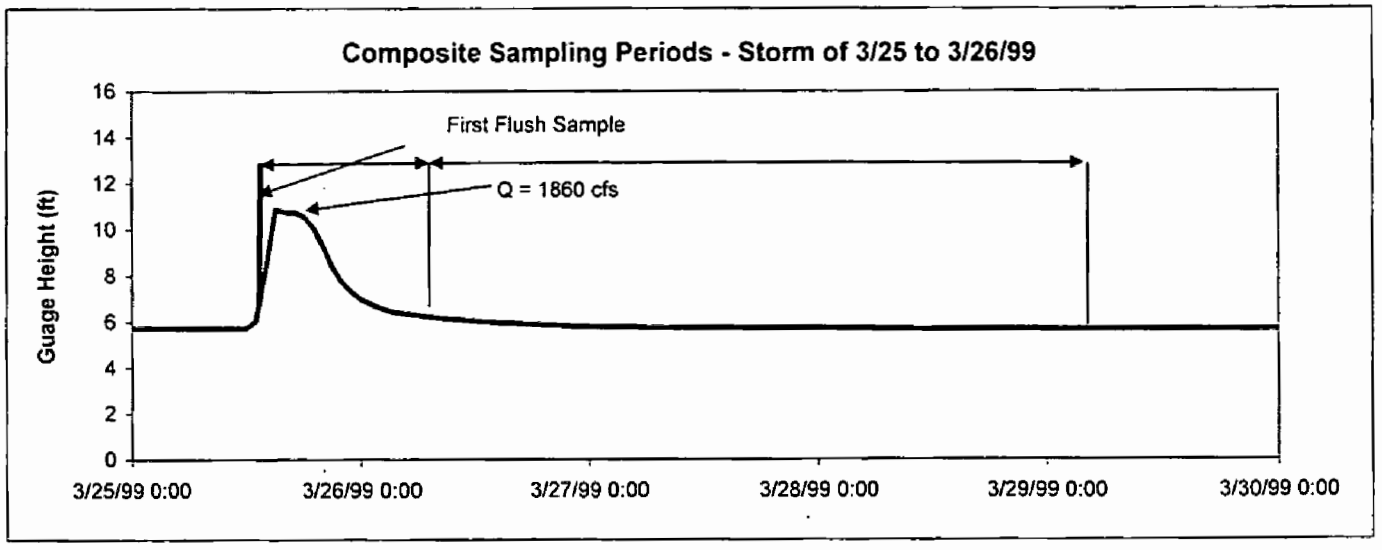

Storm Sampling of San Diego Creek @ Harvard Ave.

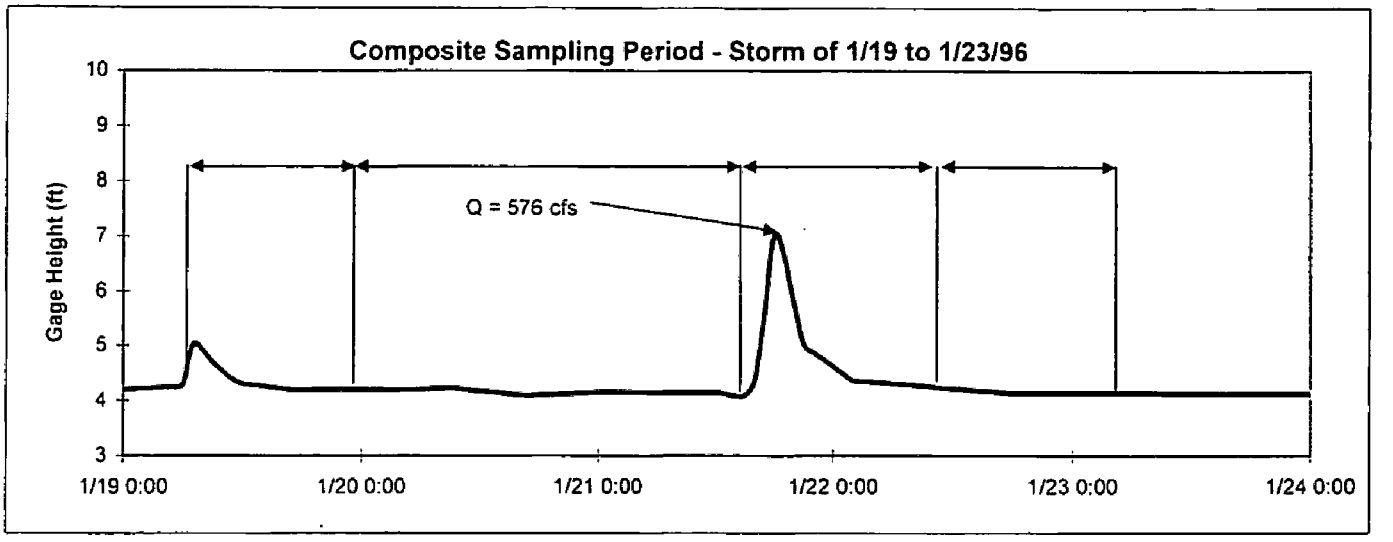

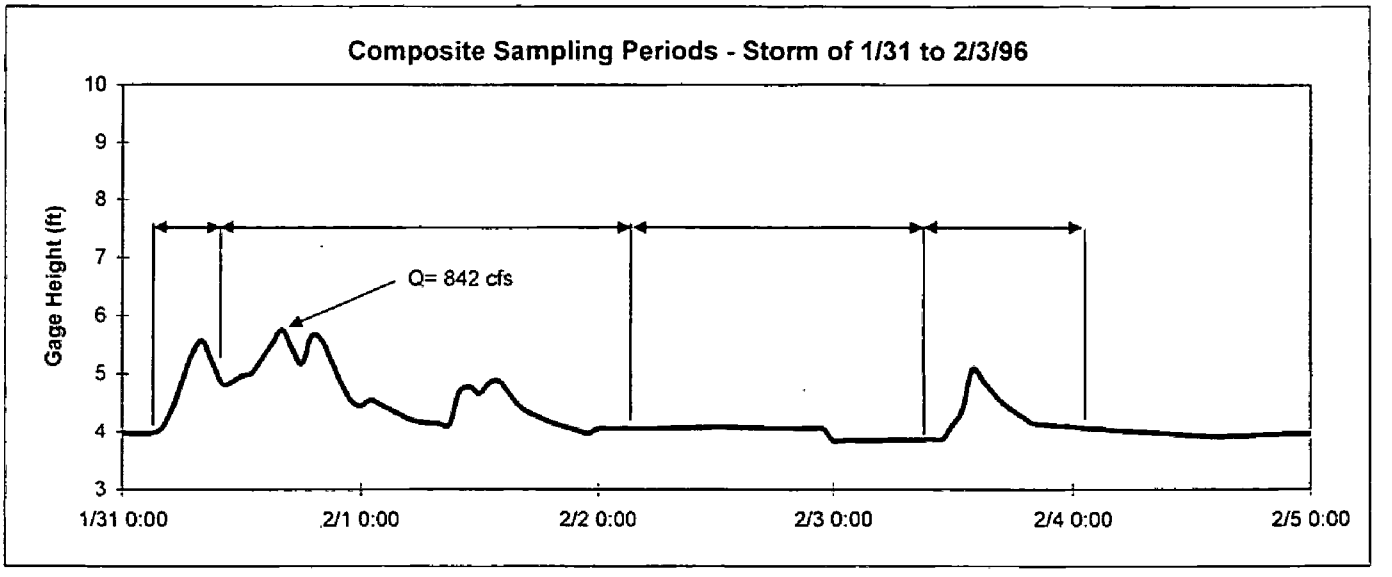

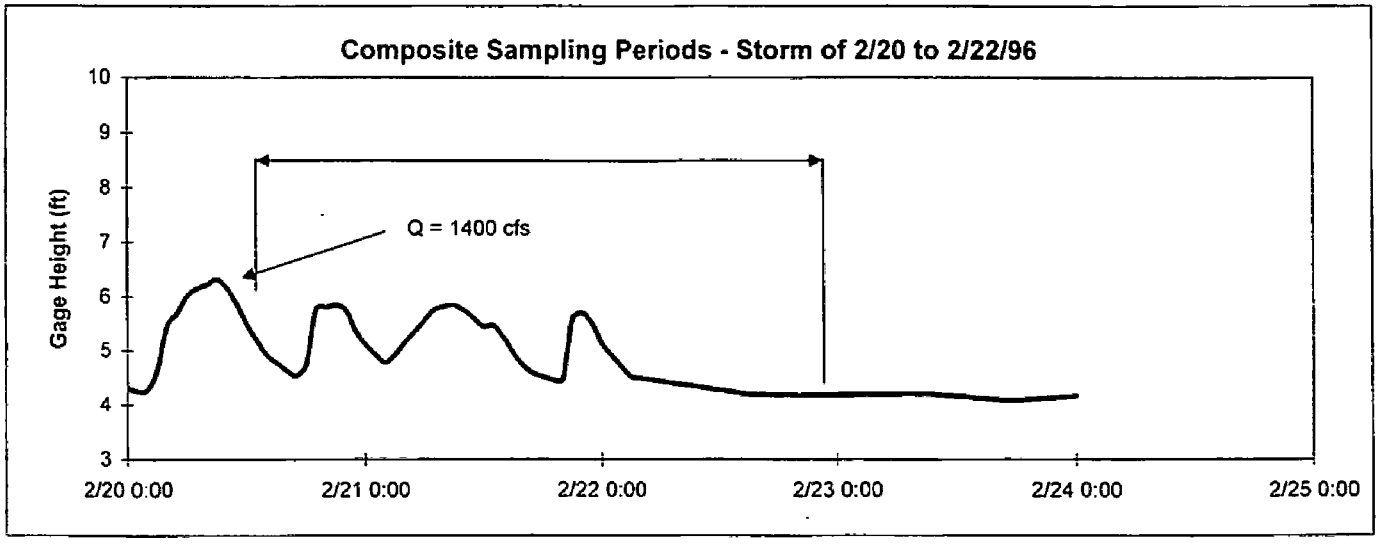

Storm Sampling in San Diego Creek @ Harvard Avenue

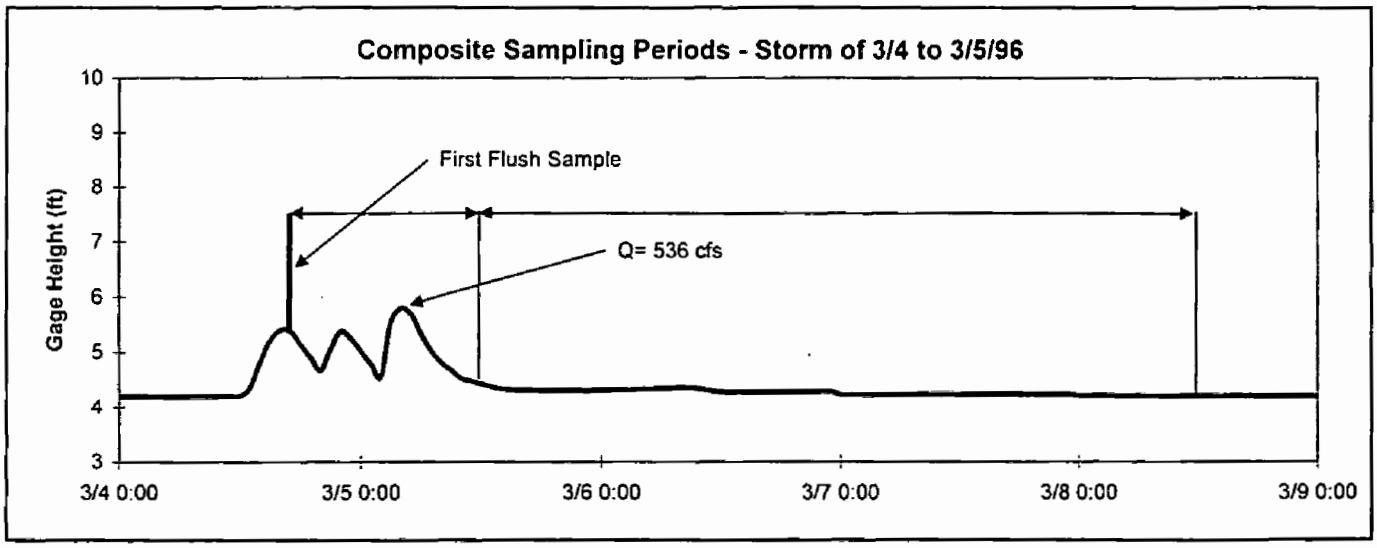

Storm Sampling - San Diego Creek @ Harvard

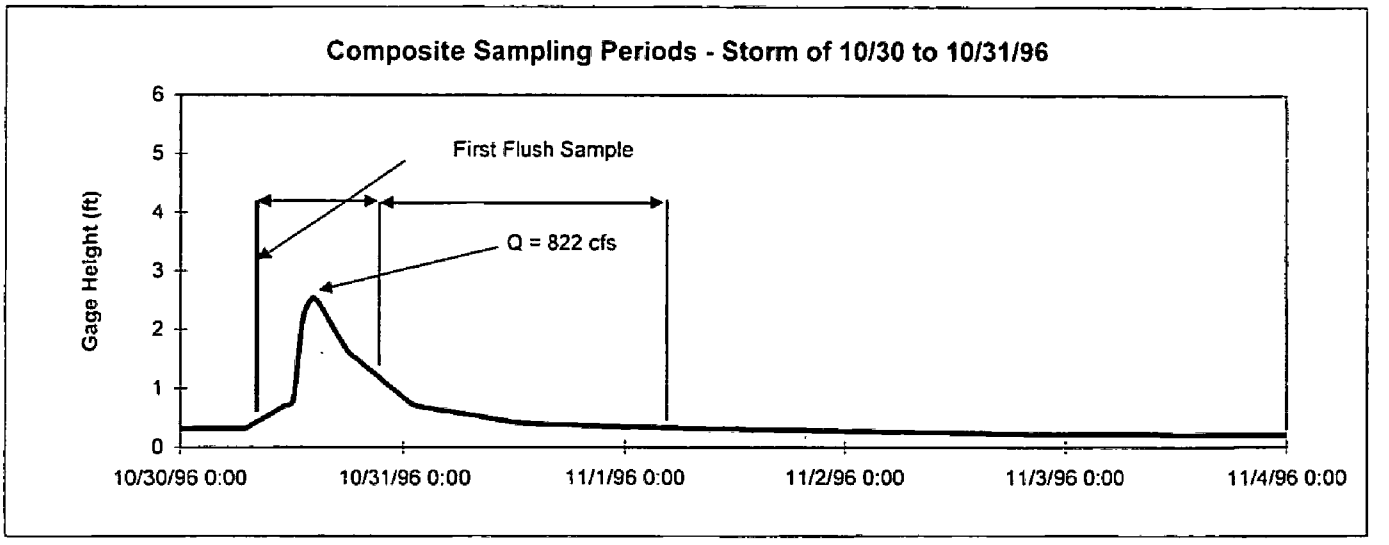

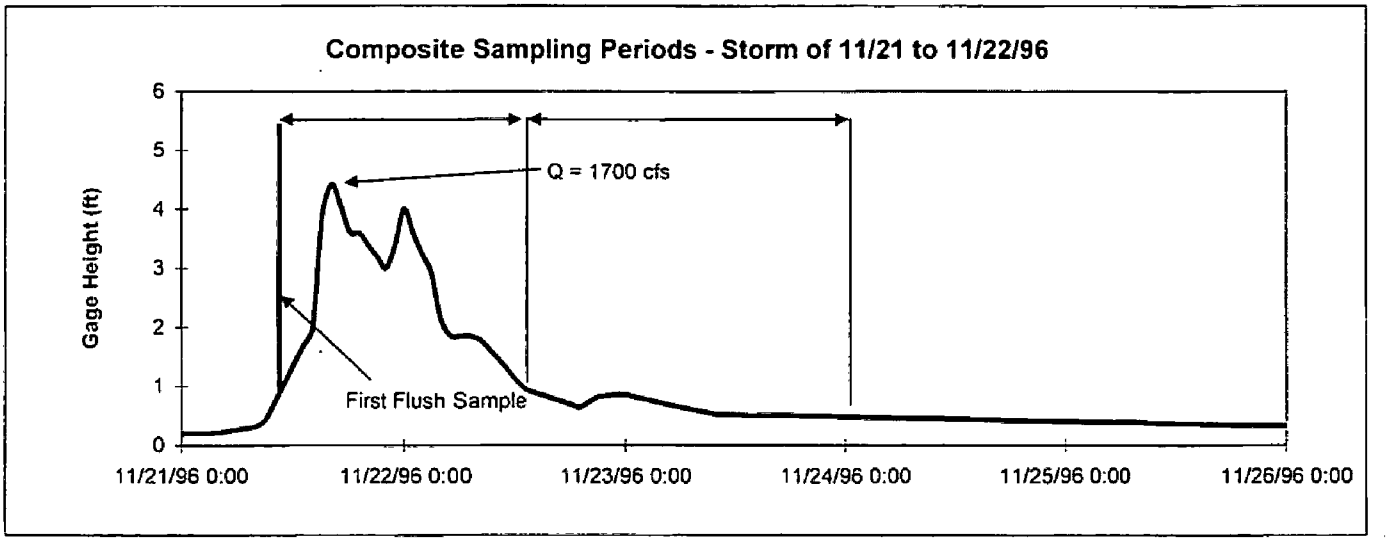

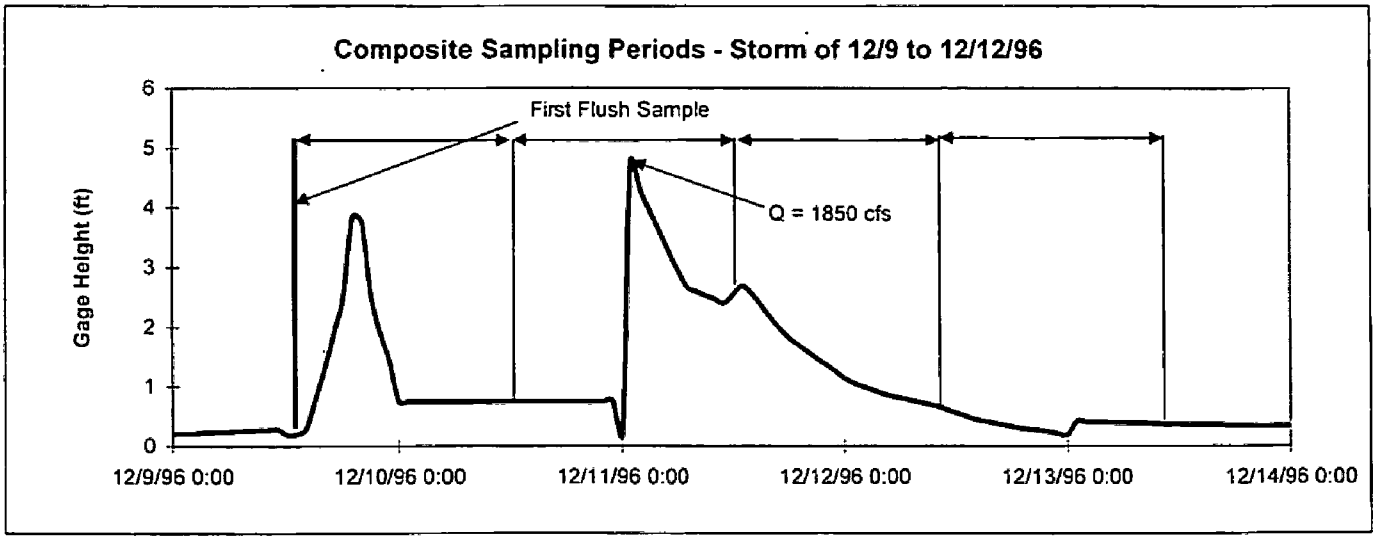

Streamgage u/s @ Culver Drive
Appendix 4.6

Storm Sampling - San Diego Creek @ Harvard

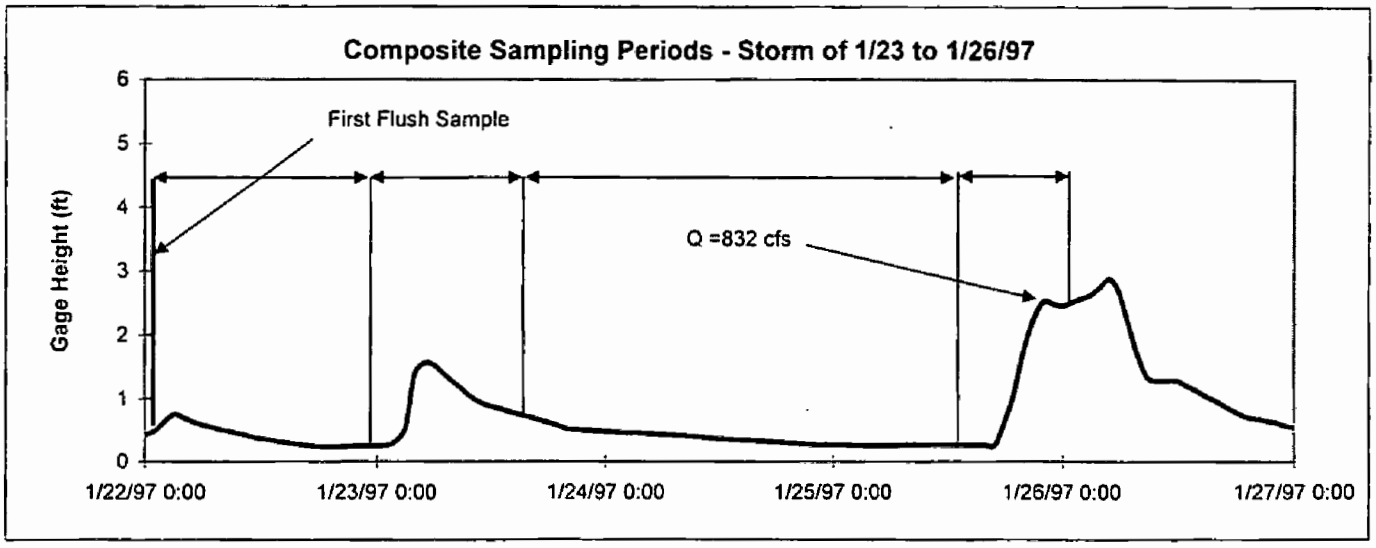

Stormwater Sampling in San Diego Creek @ Harvard Ave.

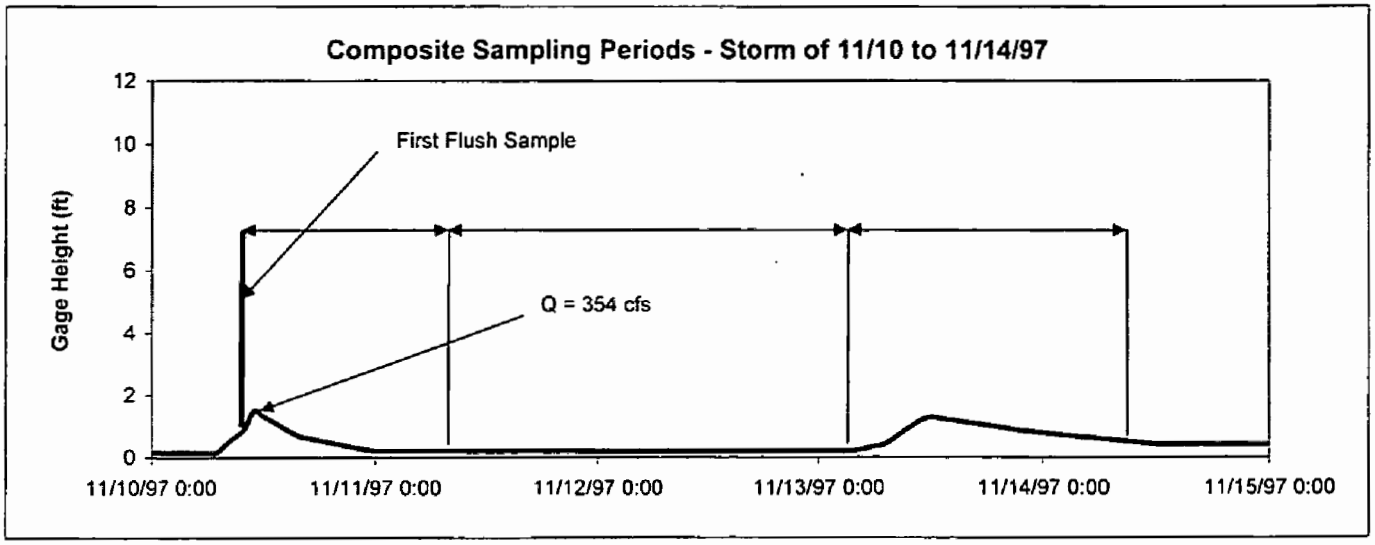

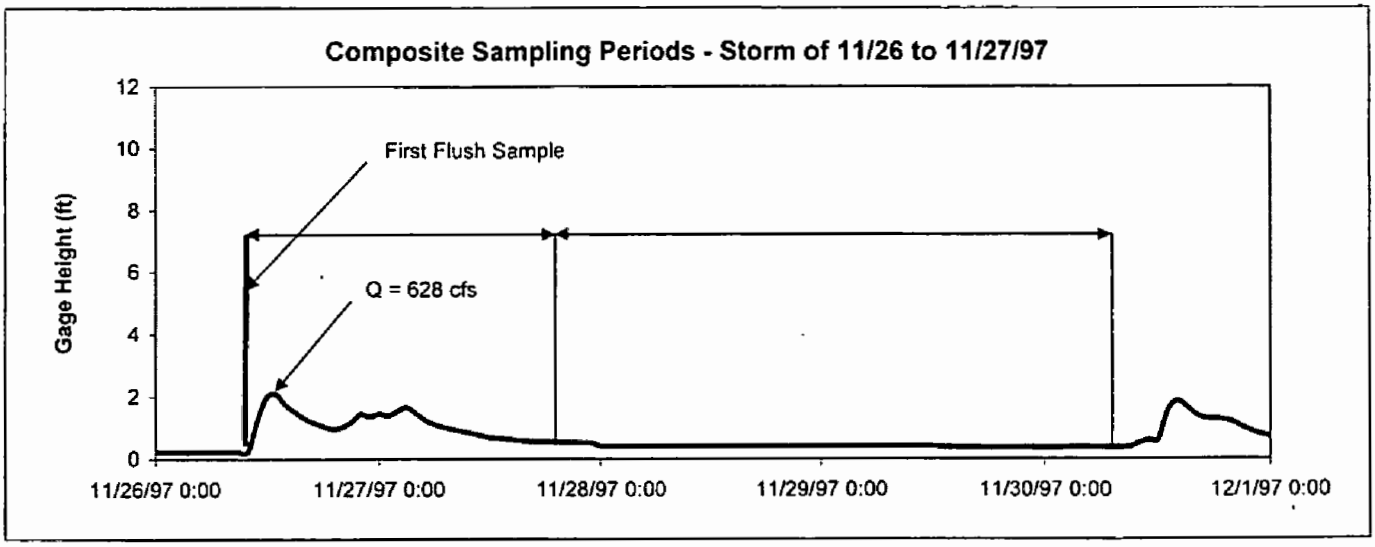

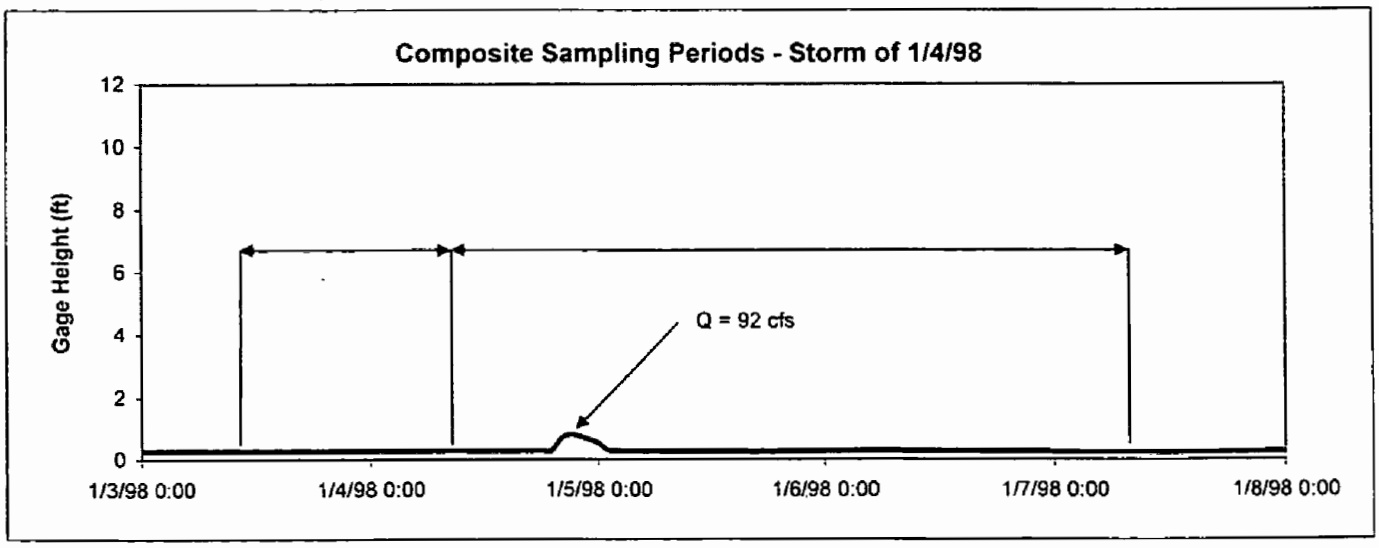

Streamgage located upstream at Culver Drive

Stormwater Sampling in San Diego Creek @ Harvard Ave.

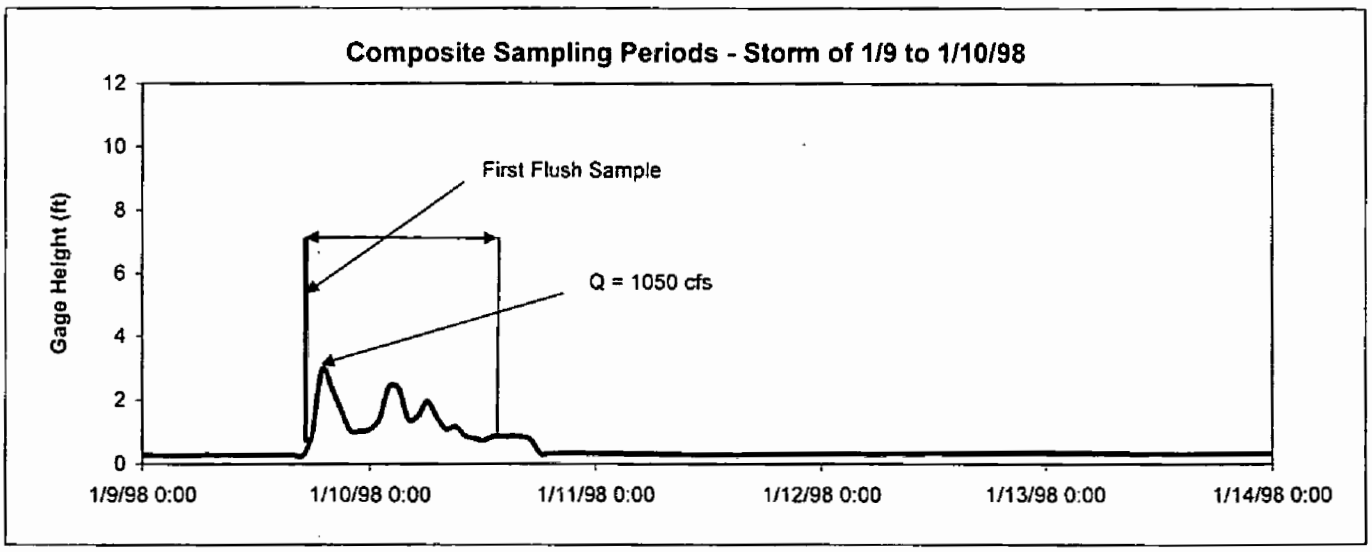

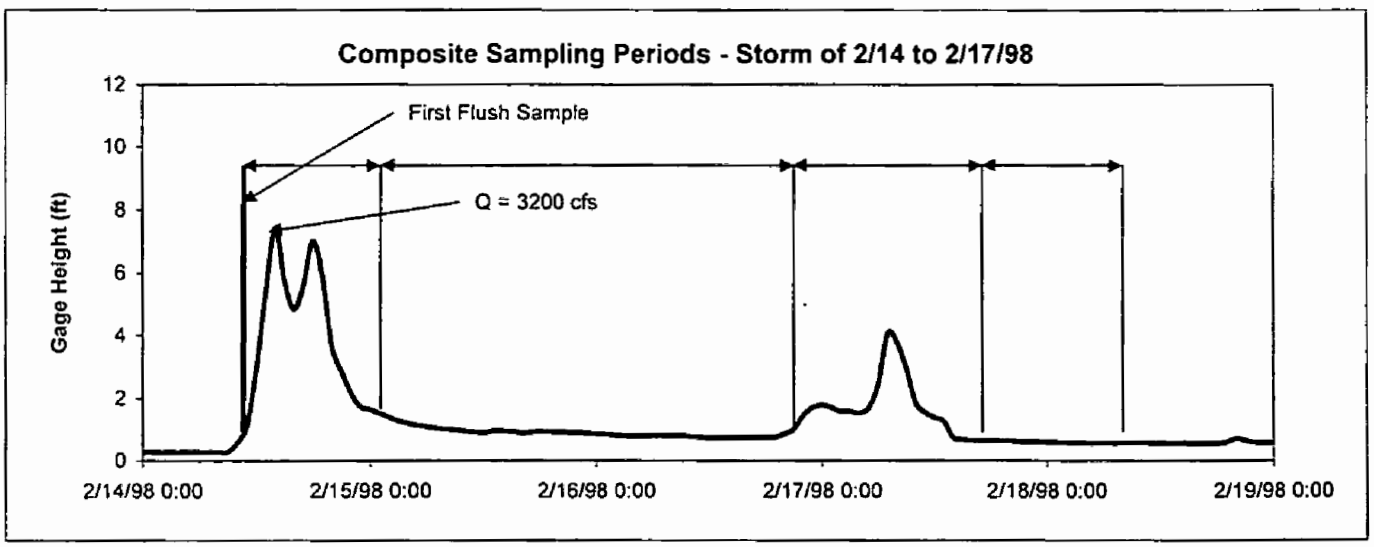

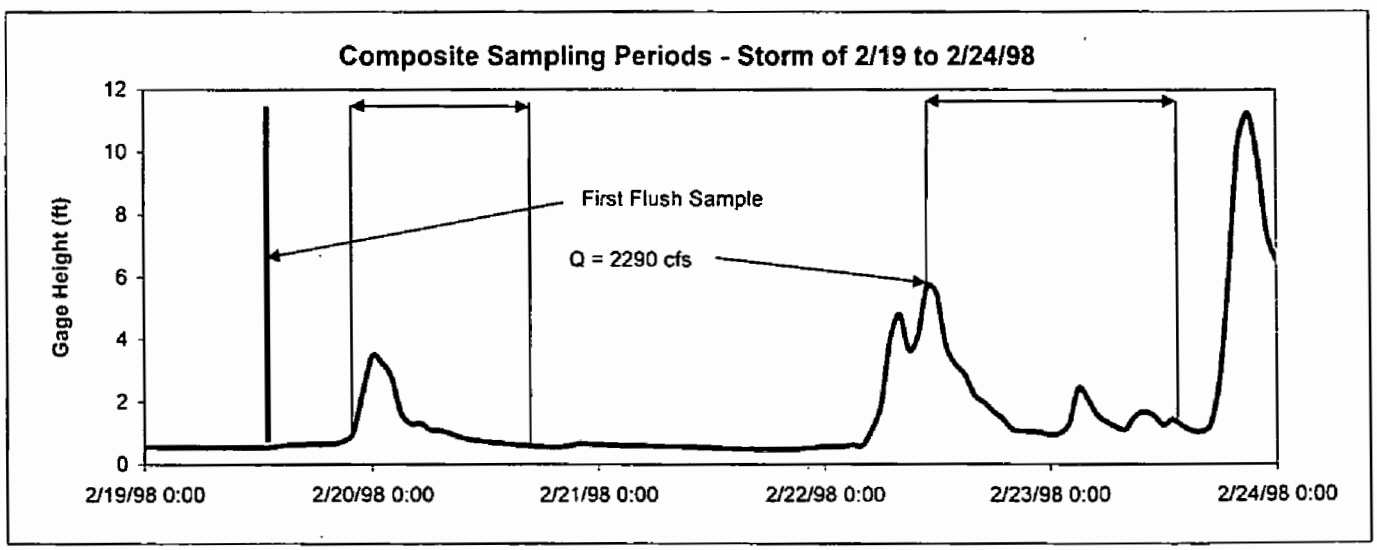

Streamgage located upstream at Culver Drive

Appendix 4.6

Stormwater Sampling in San Diego Creek @ Harvard Ave.

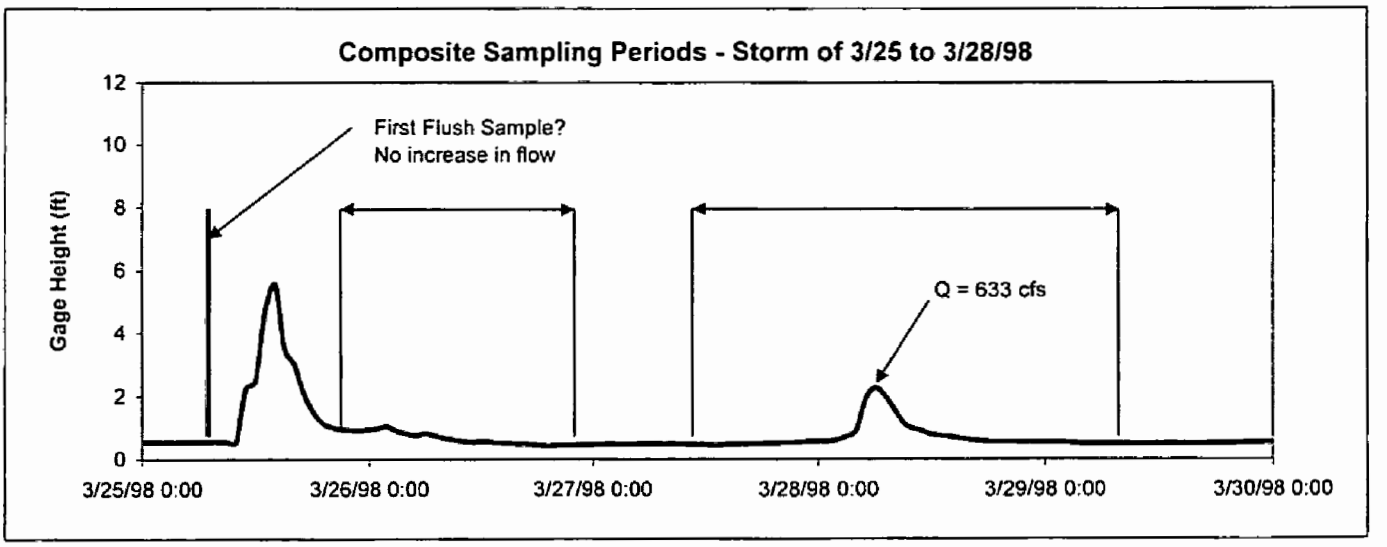

Streamgage located upstream at Culver Drive

Stormwater Sampling in San Diego Creek @ Harvard Ave.

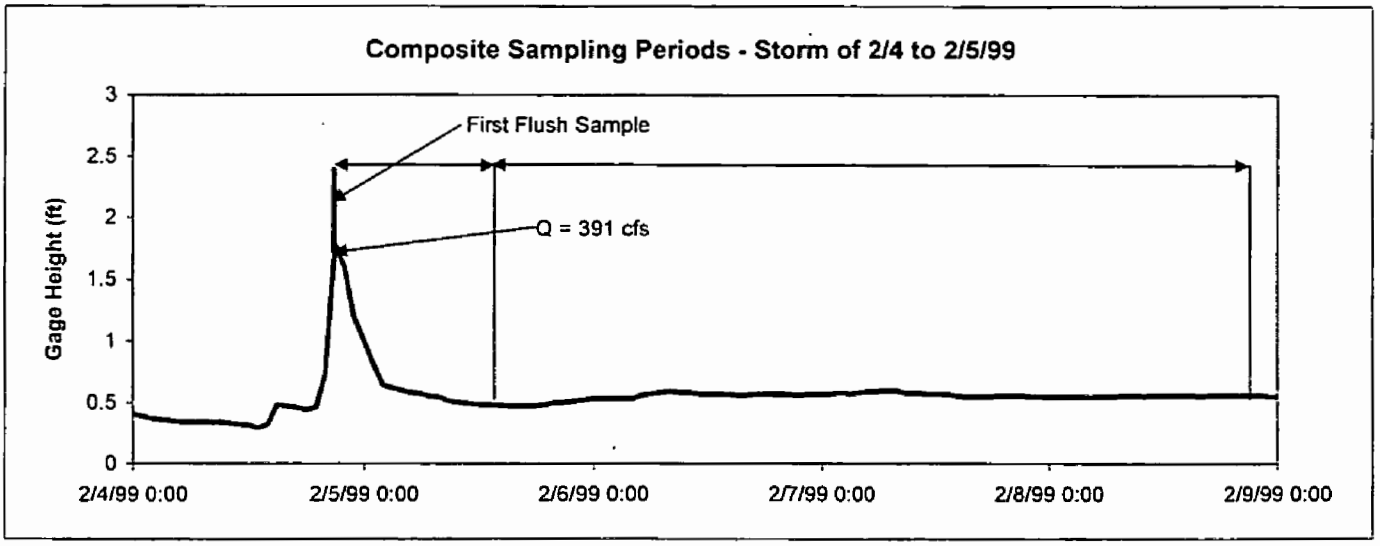

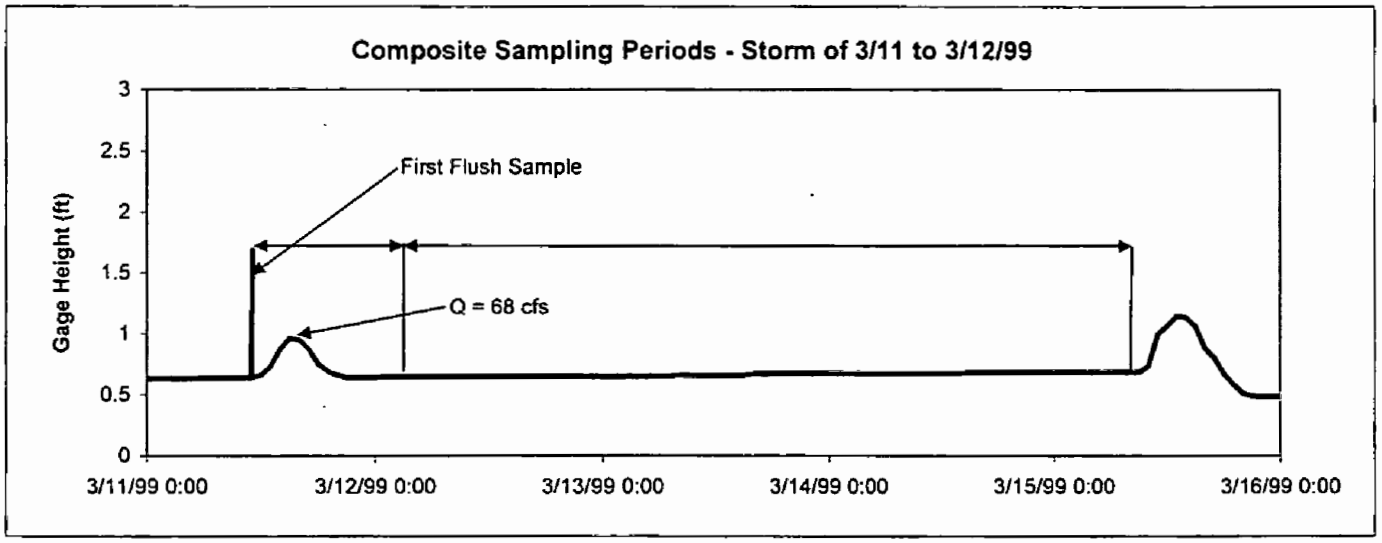

Storm Sampling @ Costa Mesa Channel

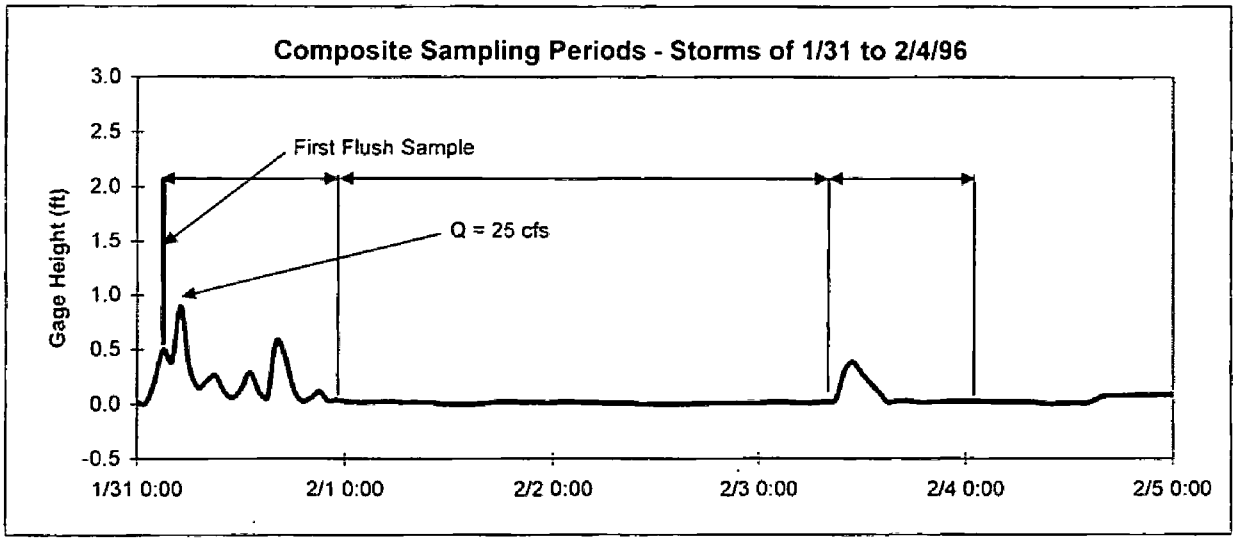

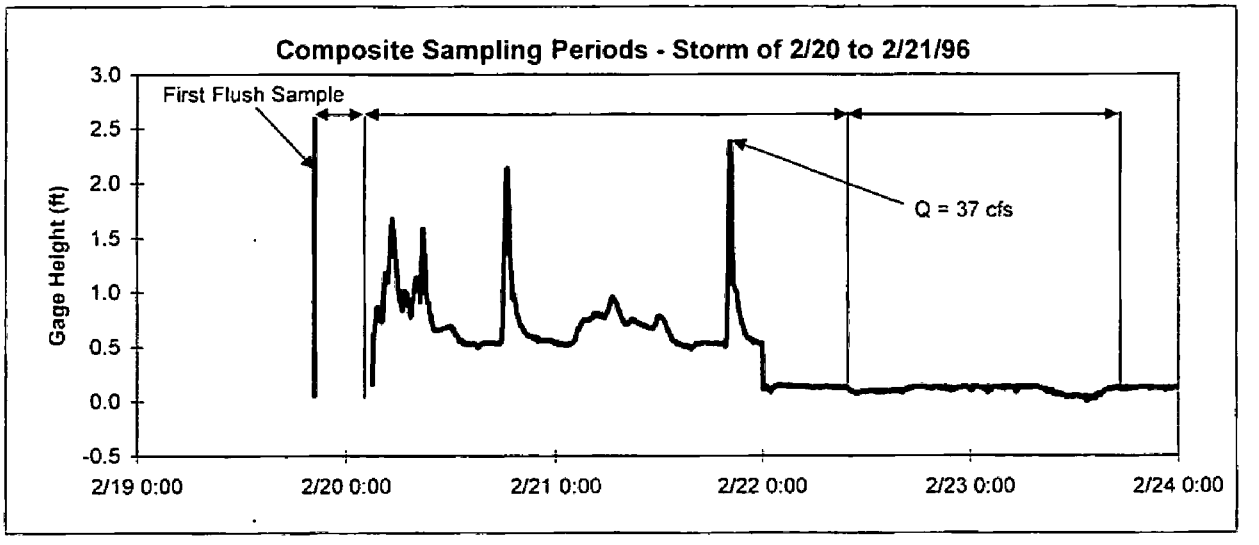

Storm Sampling @ Costa Mesa Channel

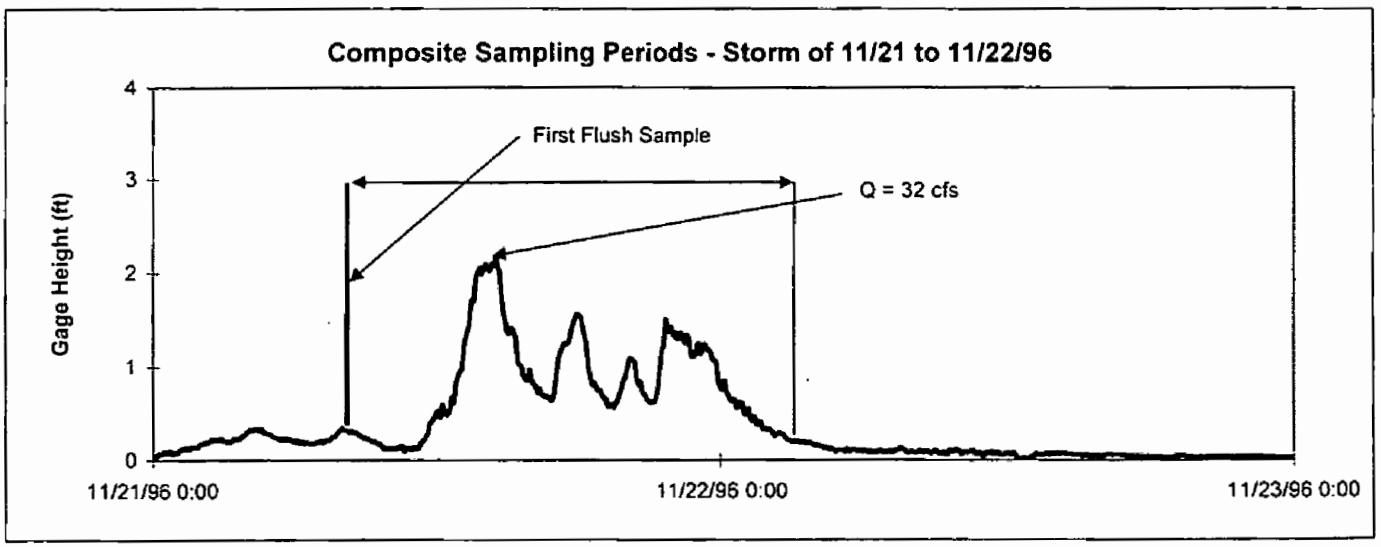

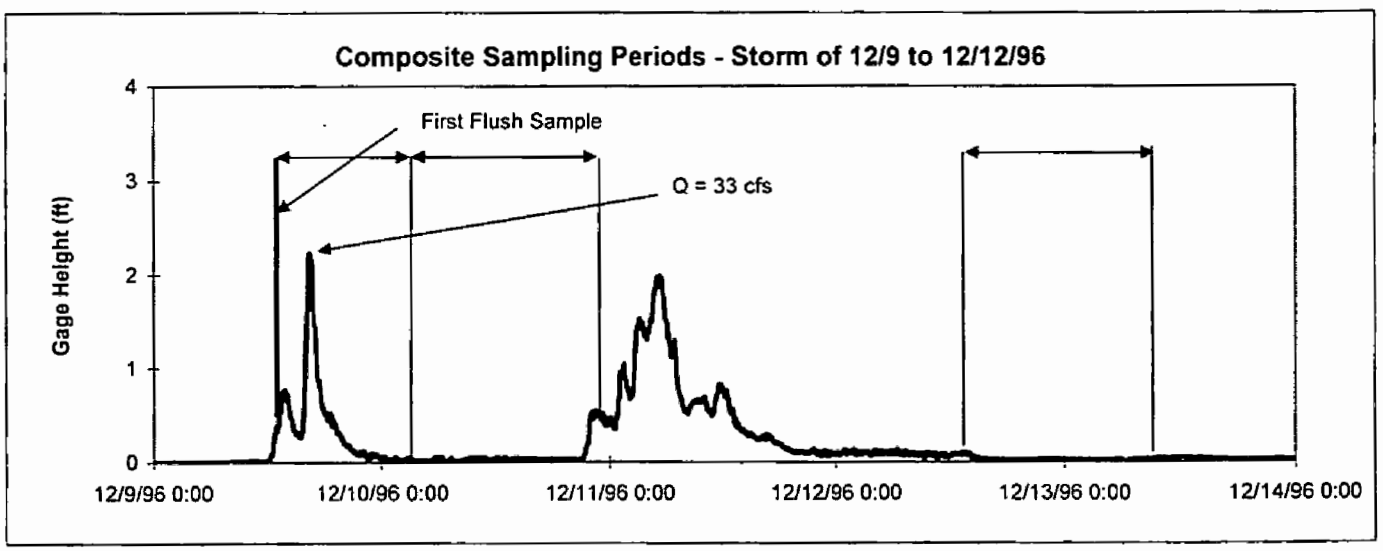

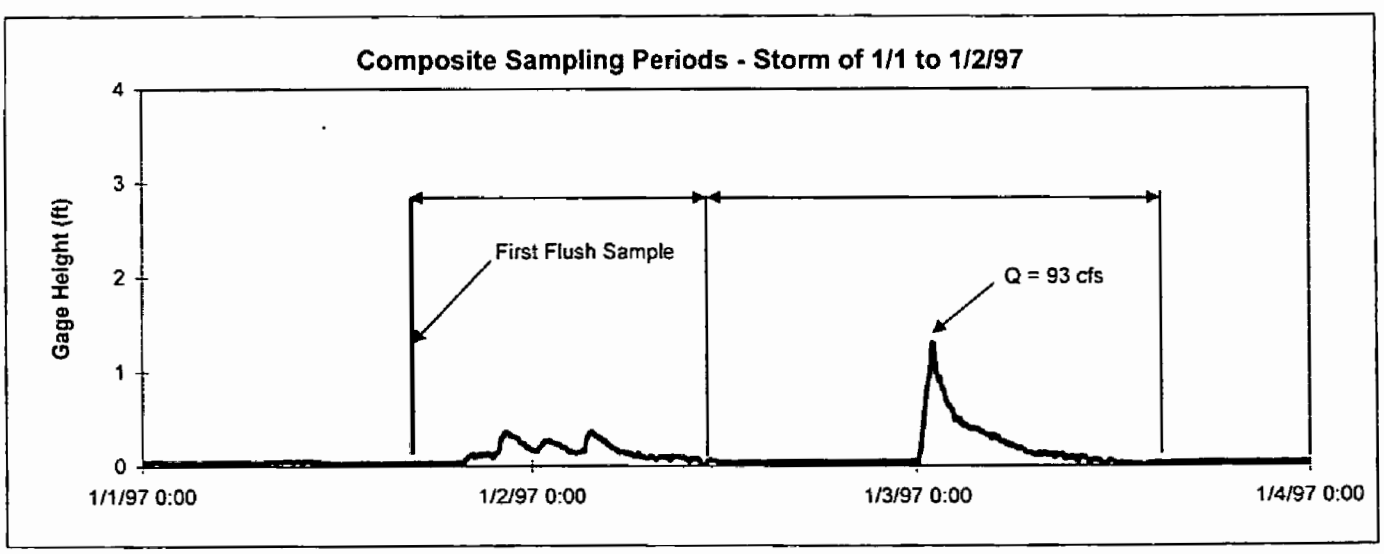

Storm Sampling @ Costa Mesa Channel

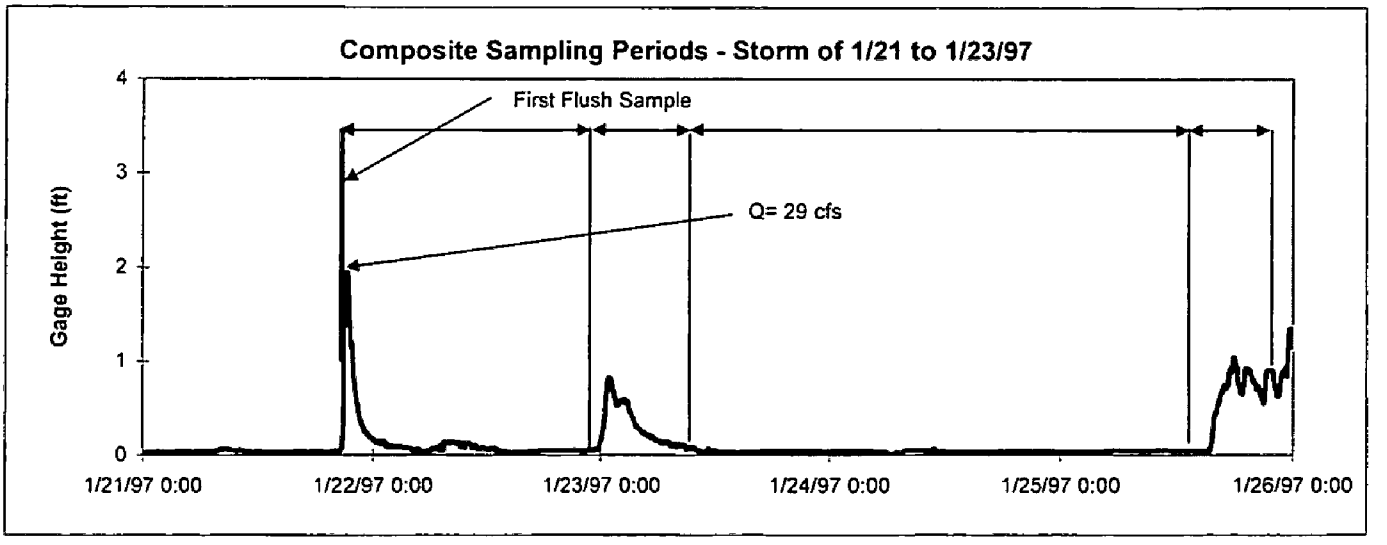

Stormwater Sampling in Costa Mesa Channel

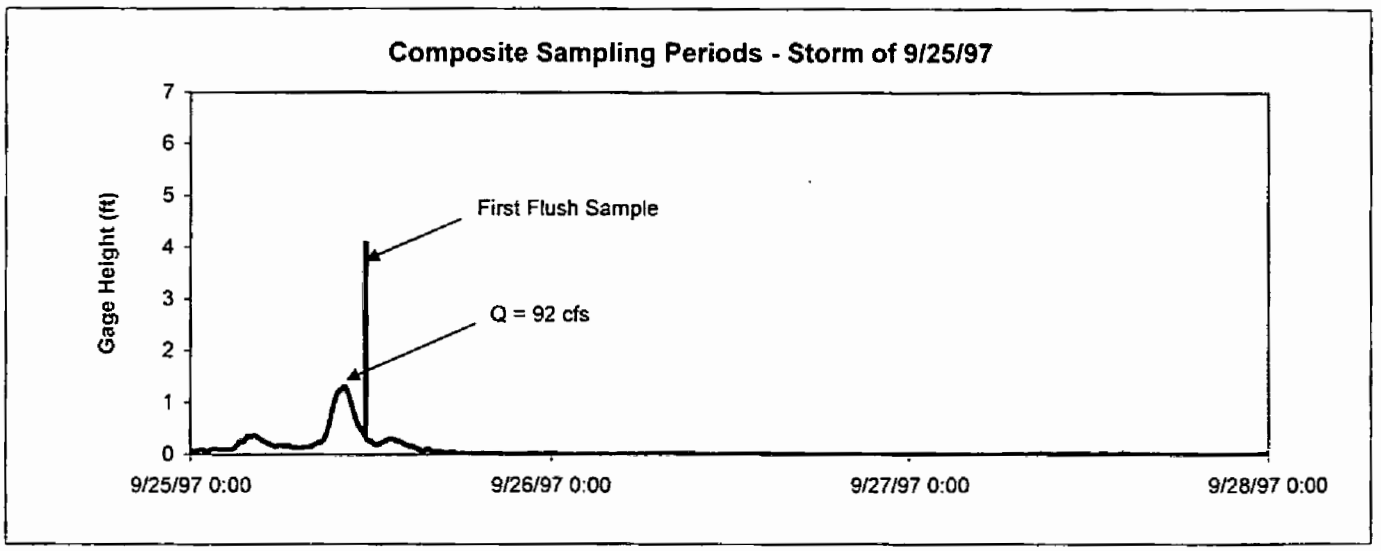

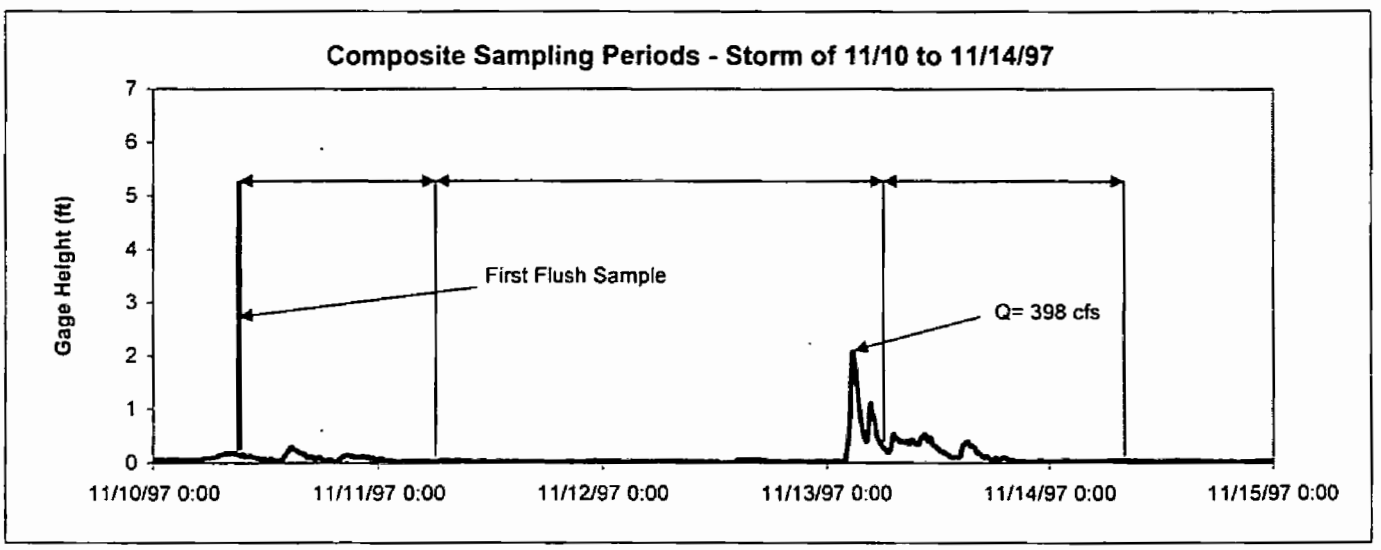

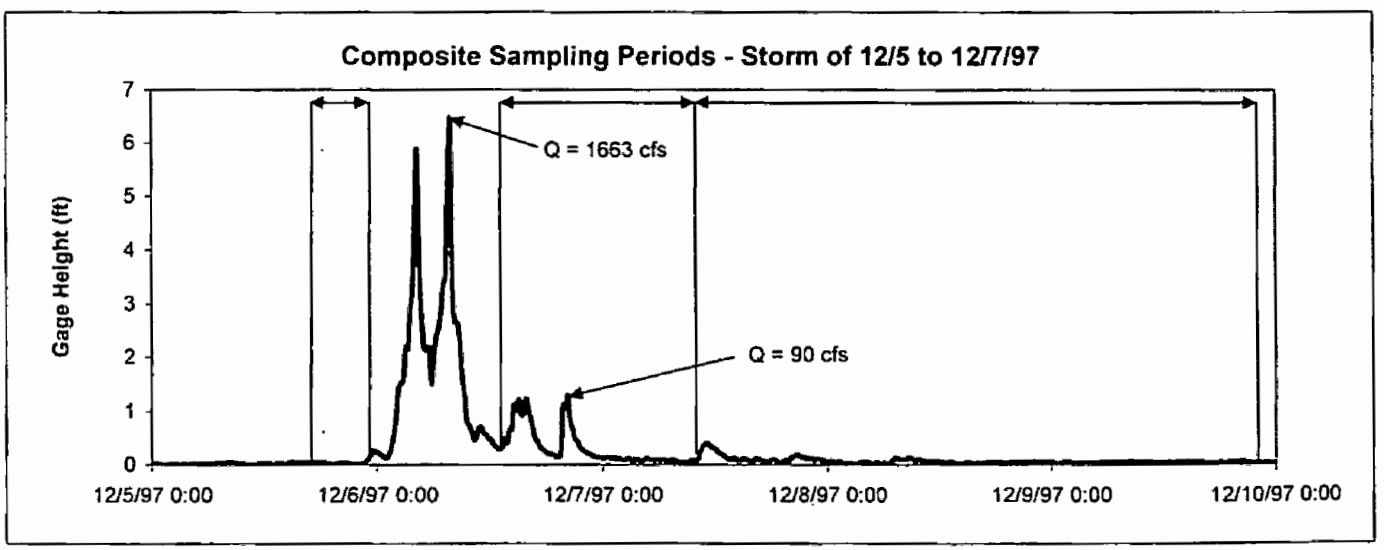

Stormwater Sampling in Costa Mesa Channel

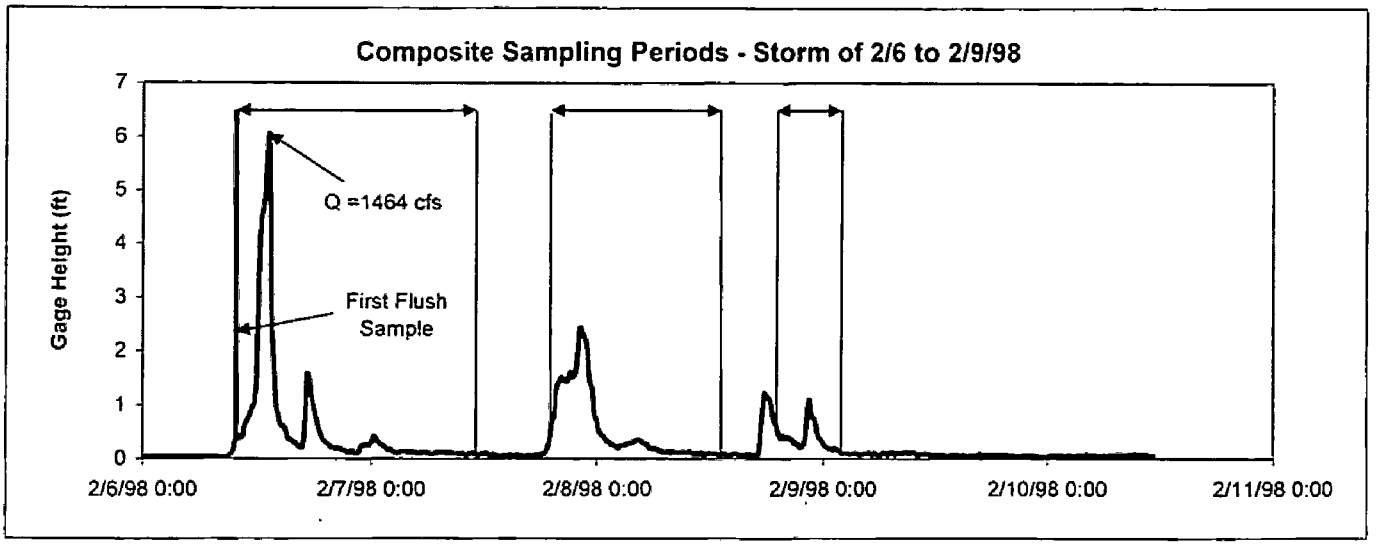

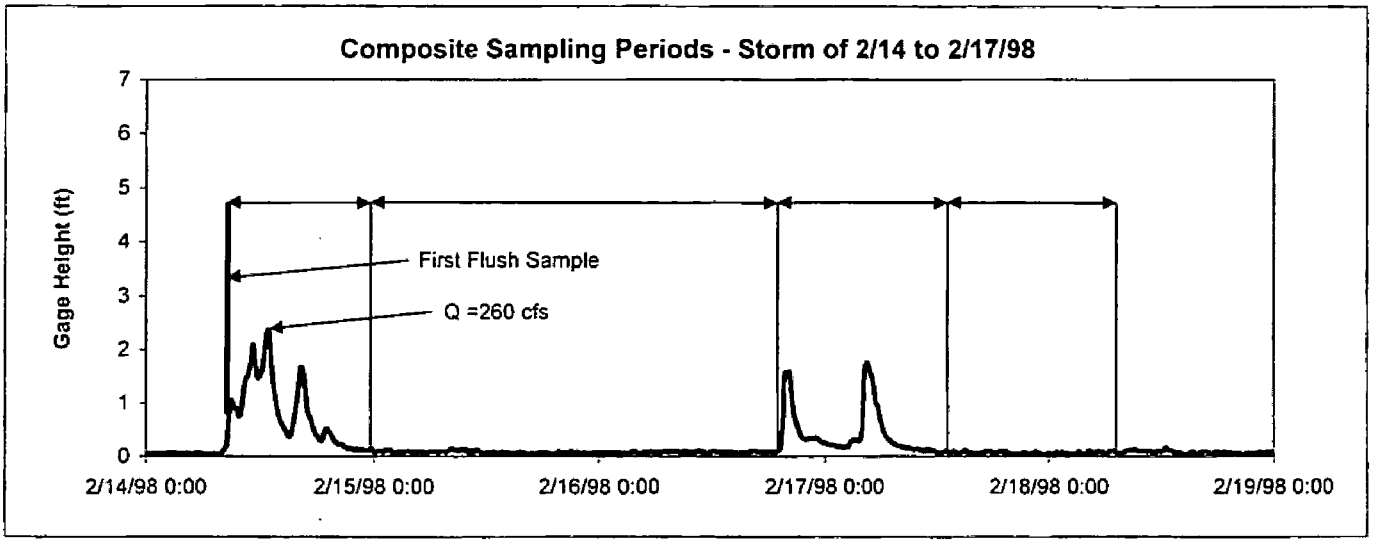

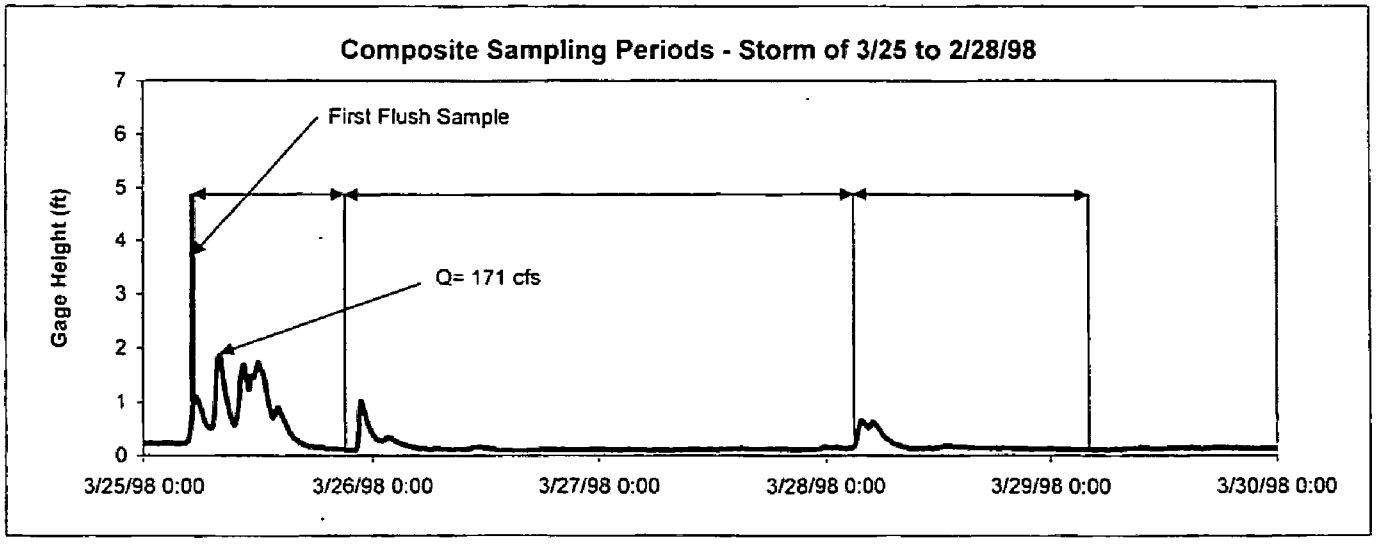

Stormwater Sampling in Costa Mesa Channel

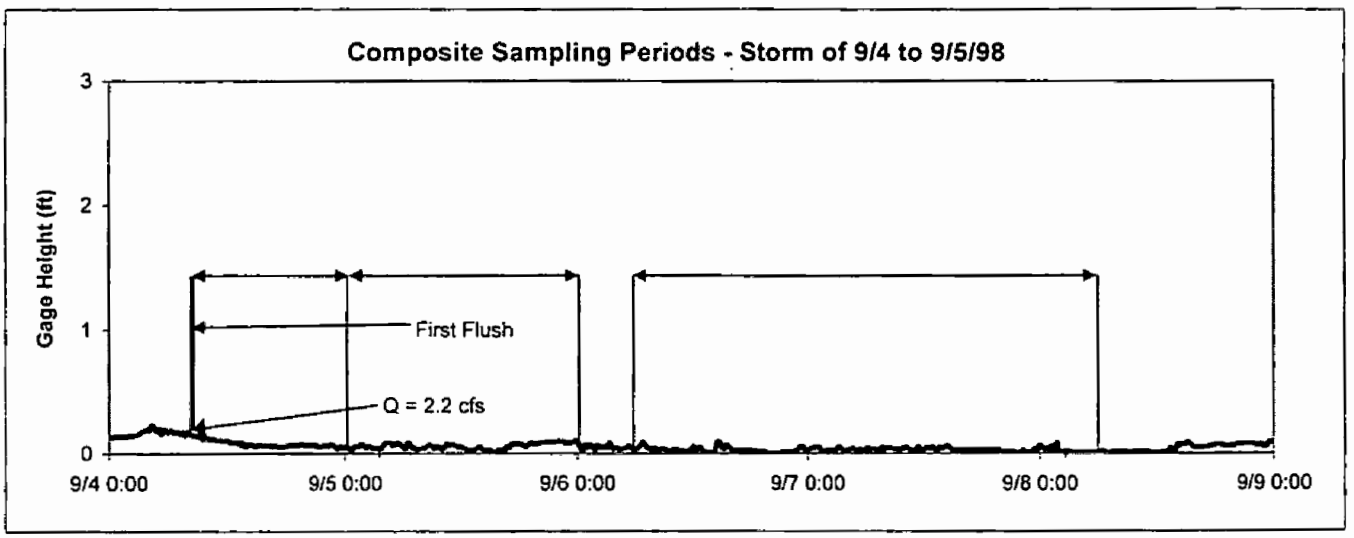

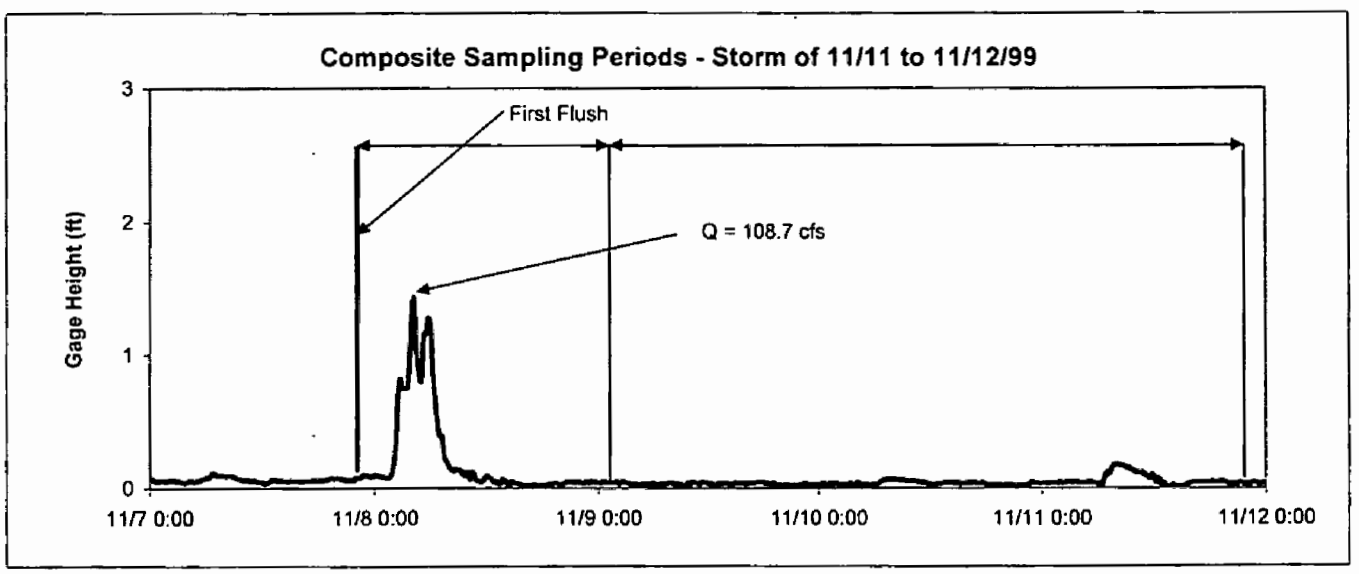

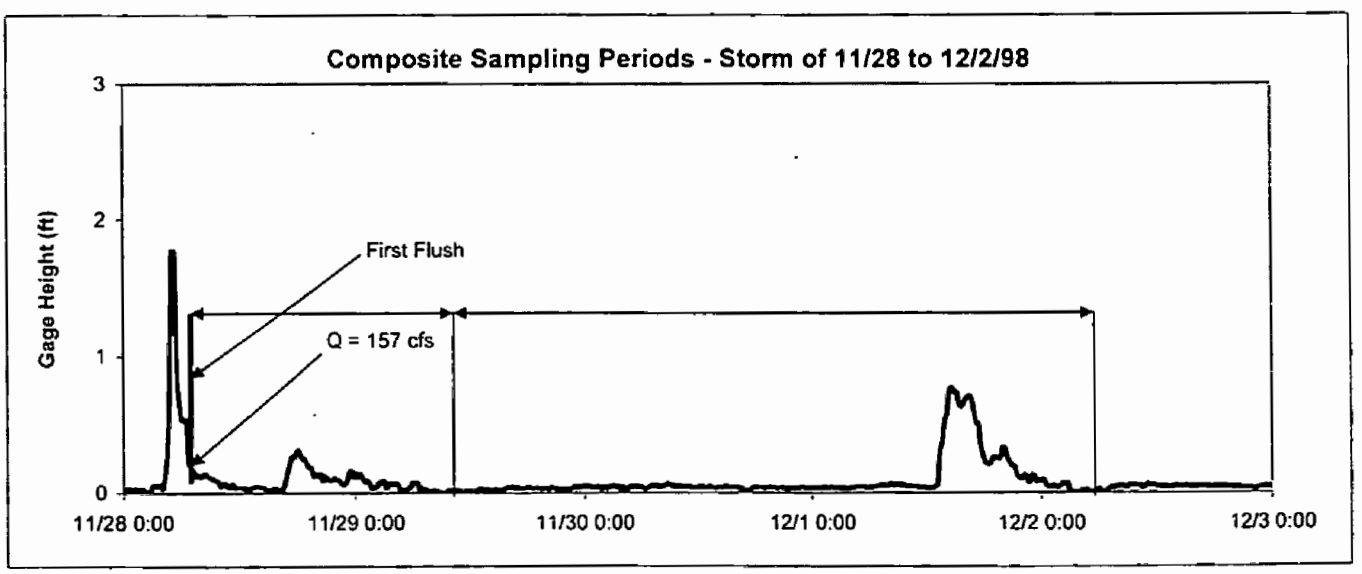

Stormwater Sampling in Costa Mesa Channel

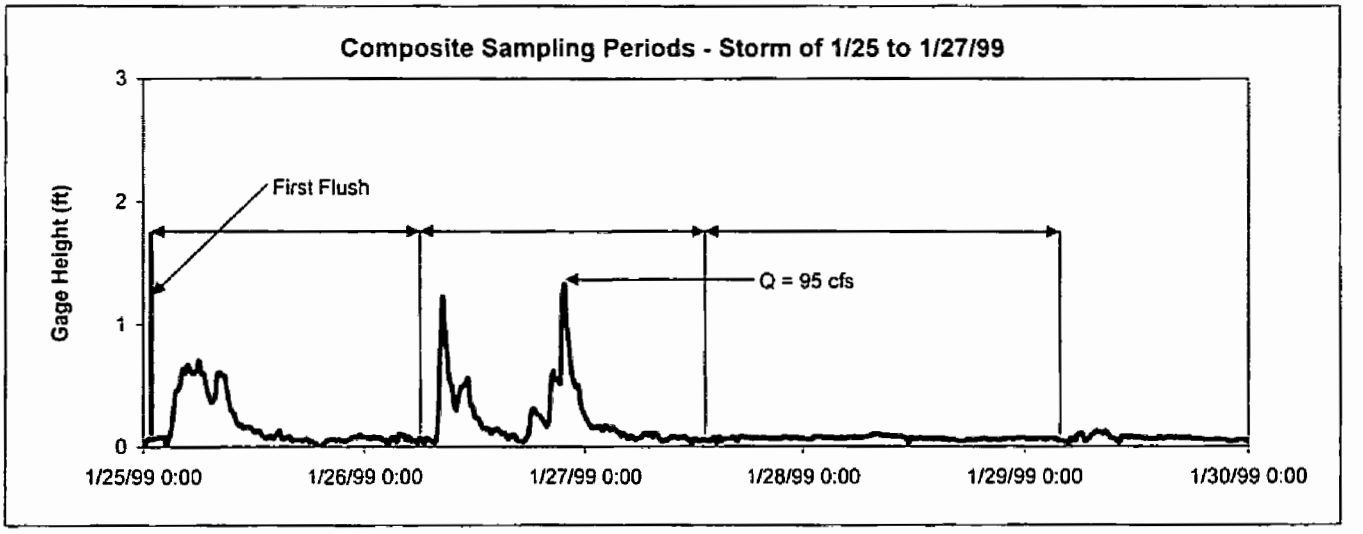

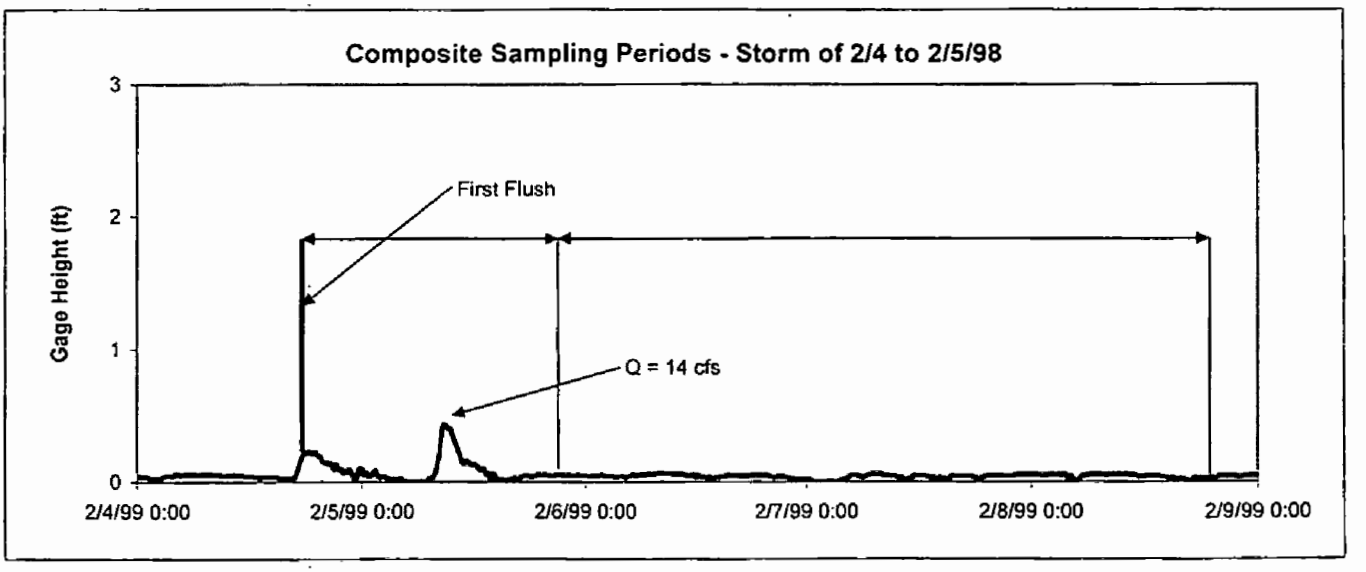

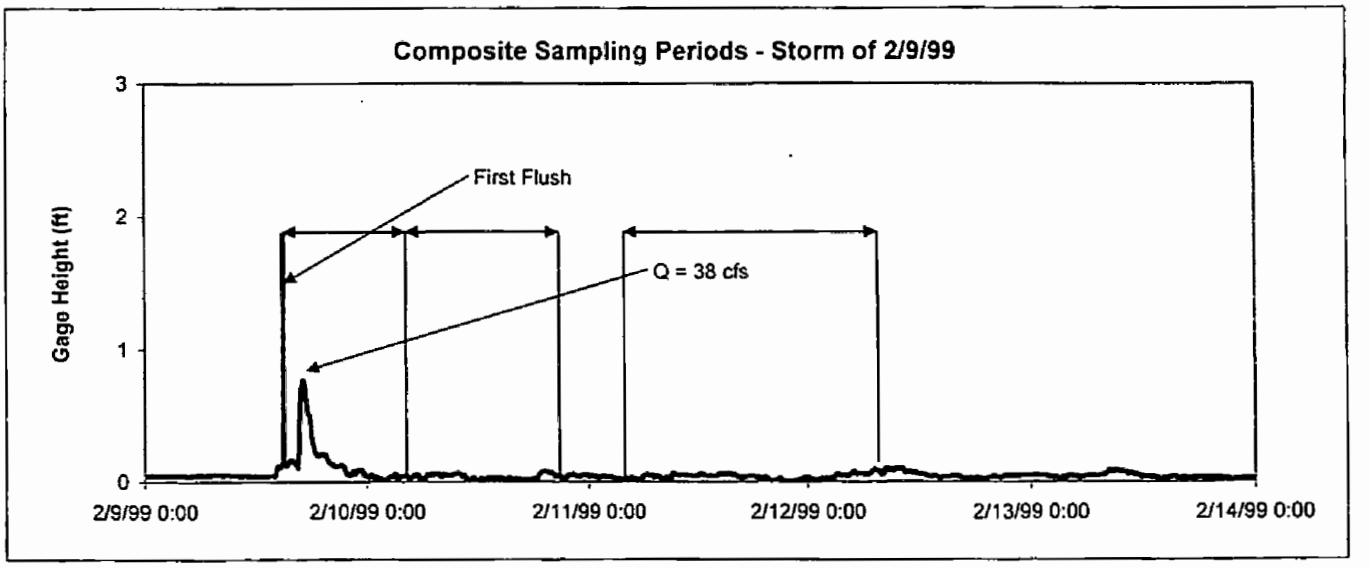

Stormwater Sampling in Costa Mesa Channel

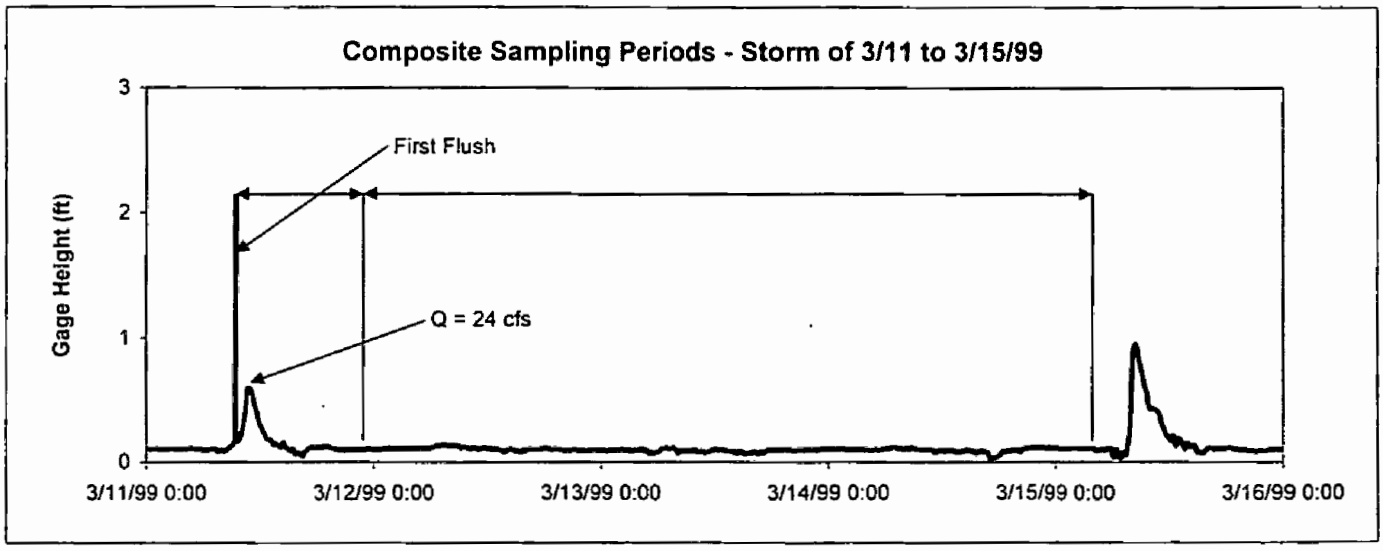

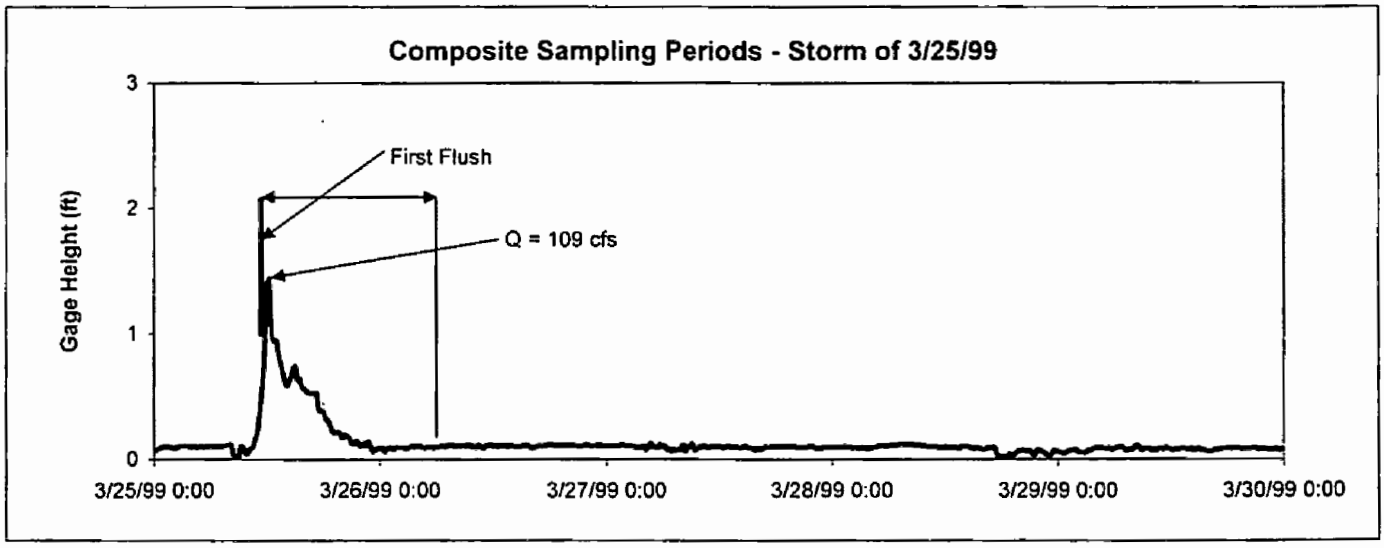

Stormwater Sampling in Peters Canyon Wash

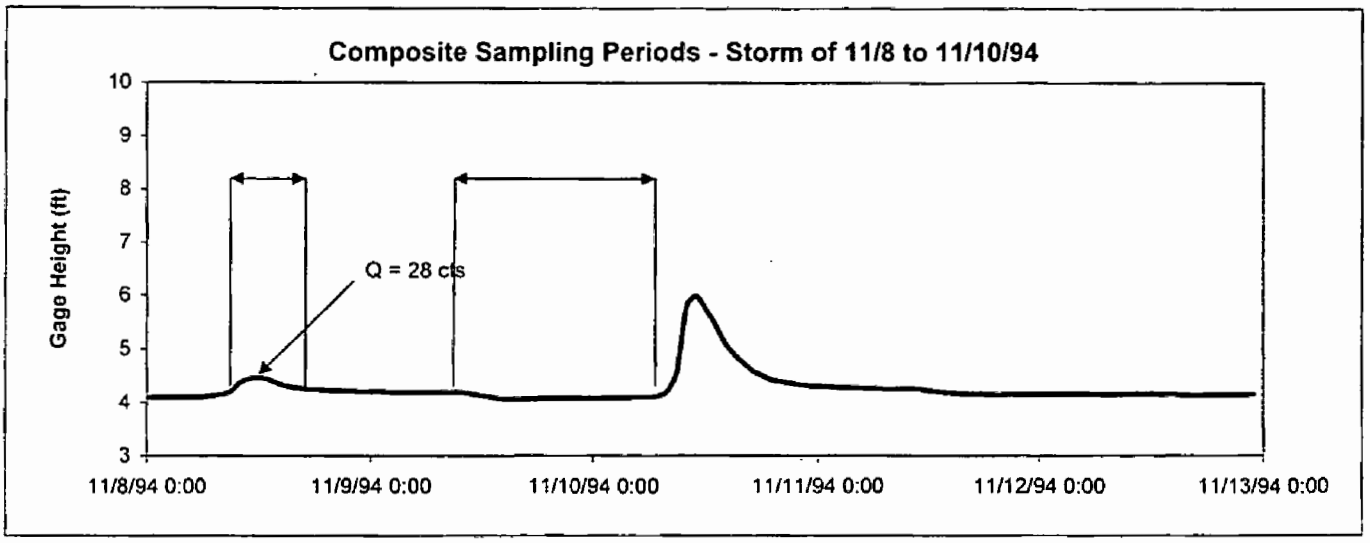

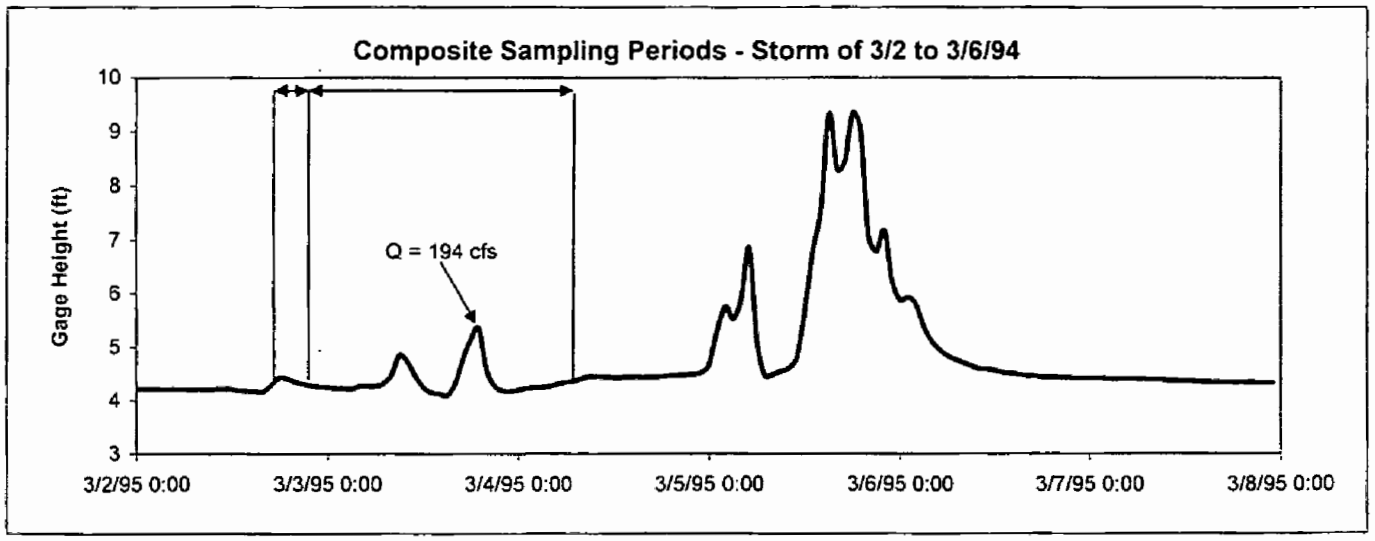

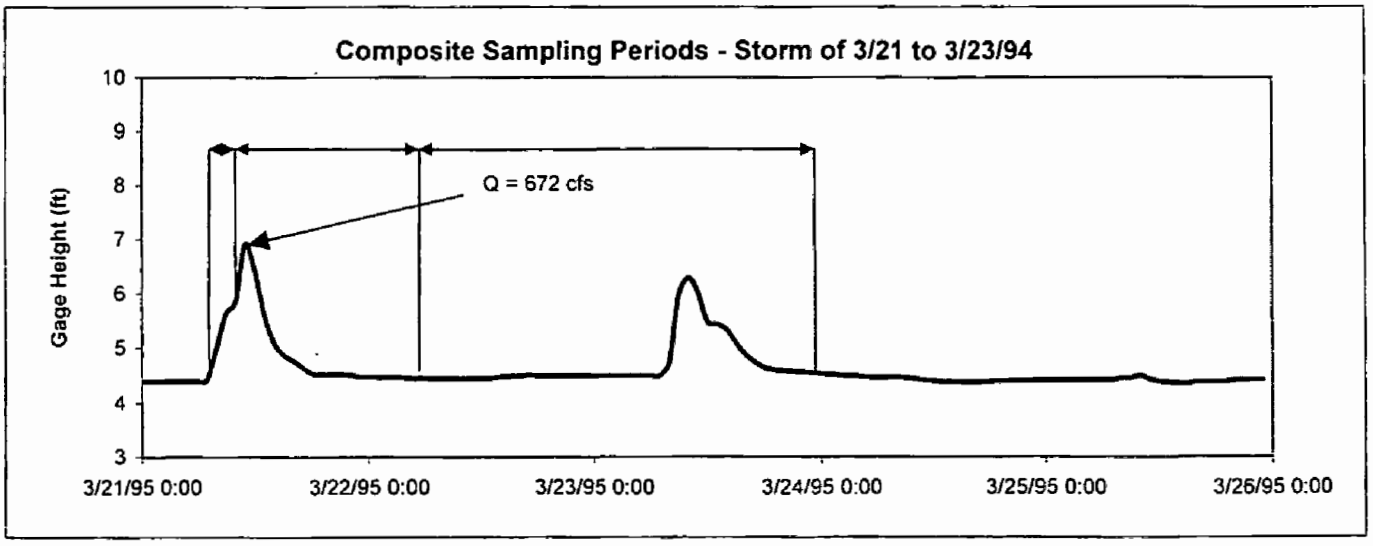

Storm Sampling @ Peters Canyon Wash

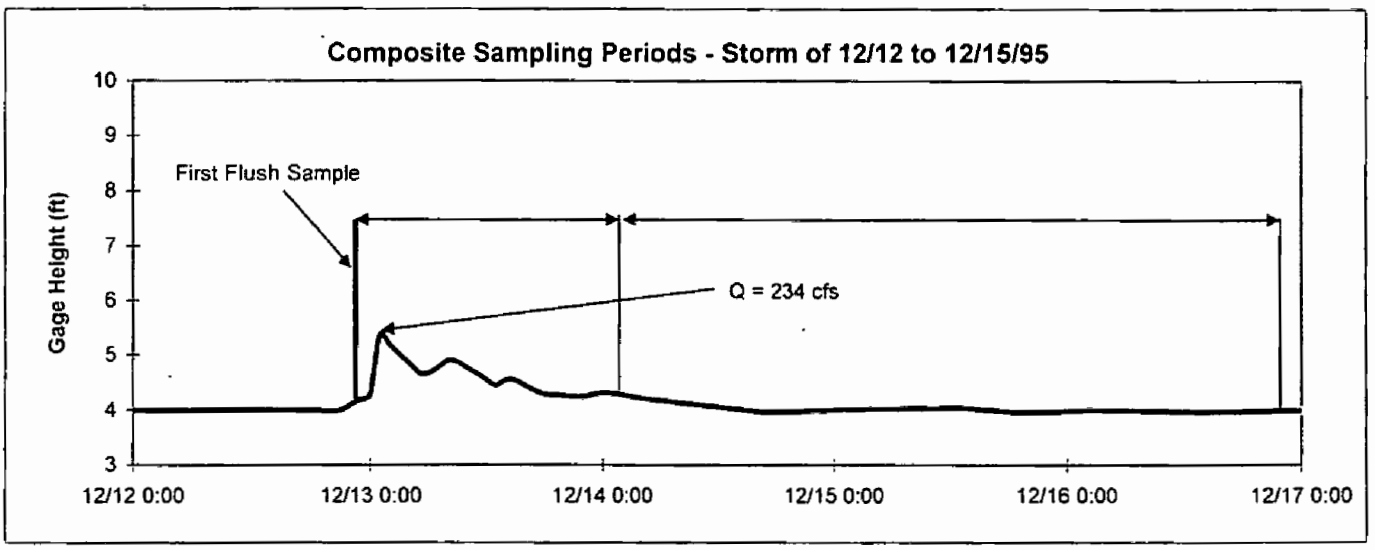

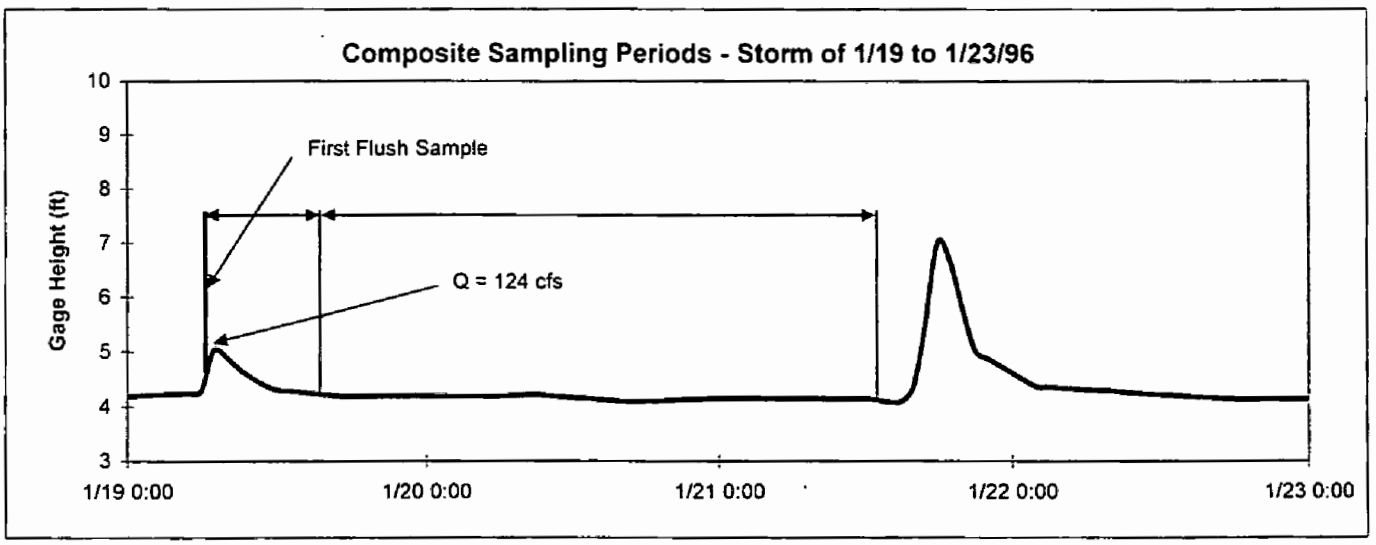

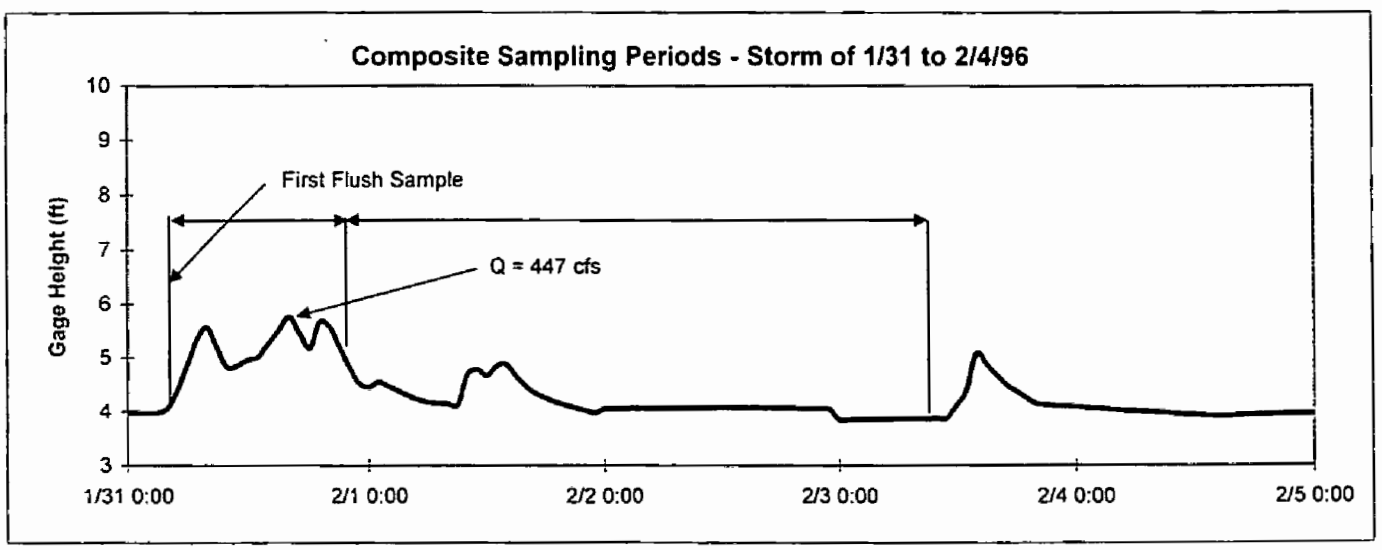

Storm Sampling @ Peters Canyon Wash

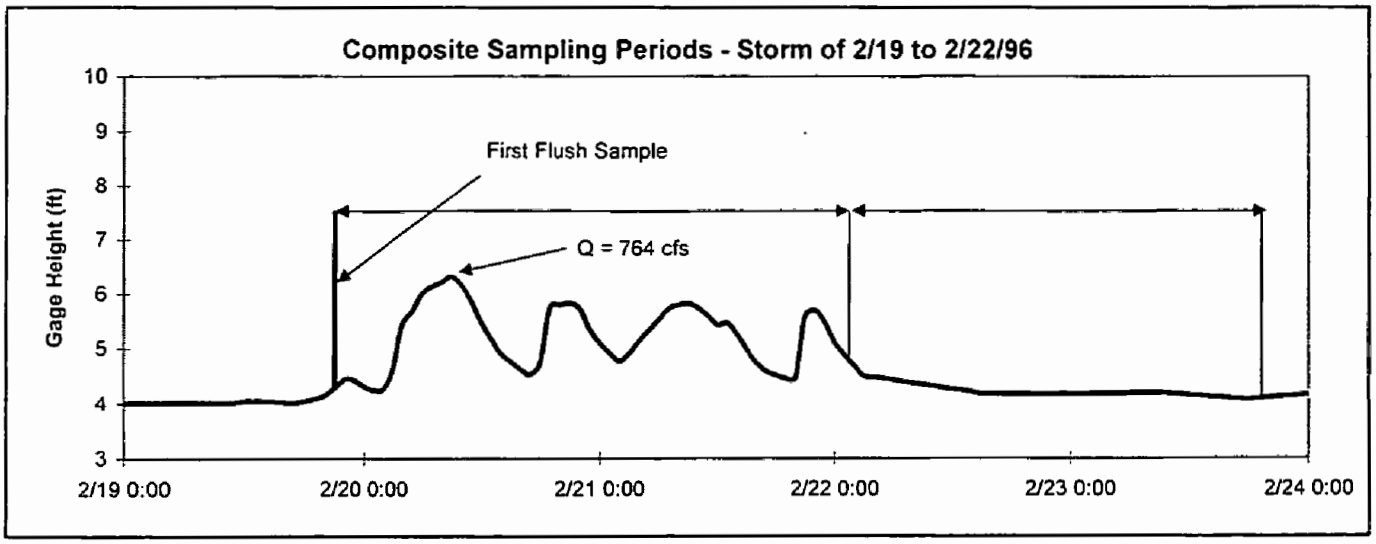

Storm Sampling @ Peters Canyon Channel

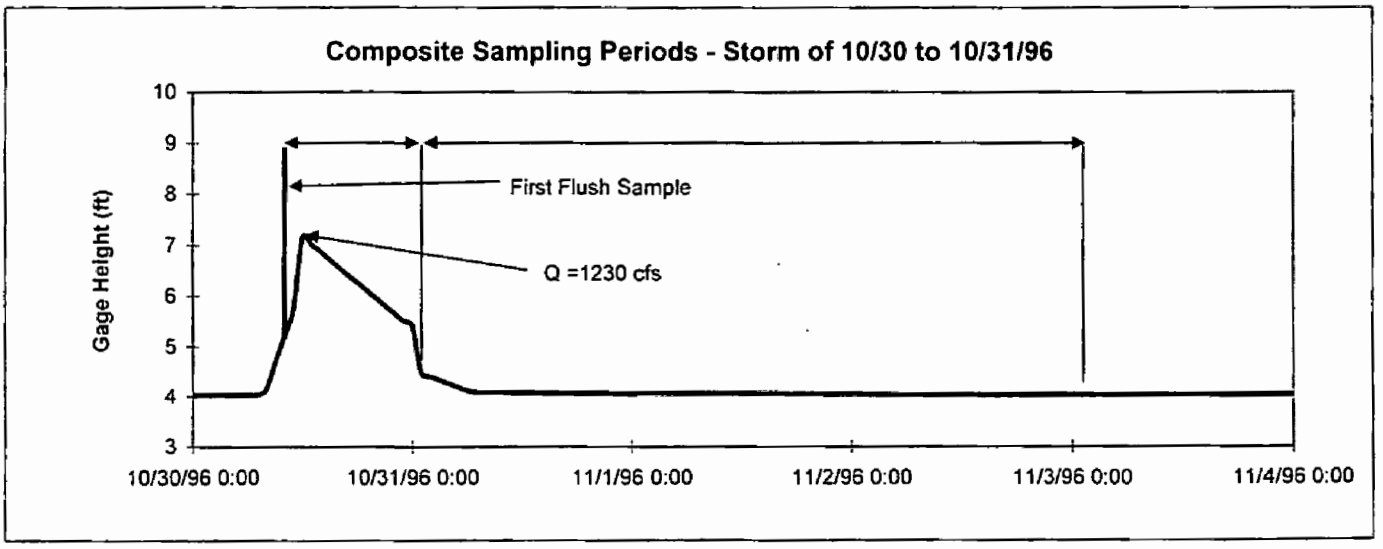

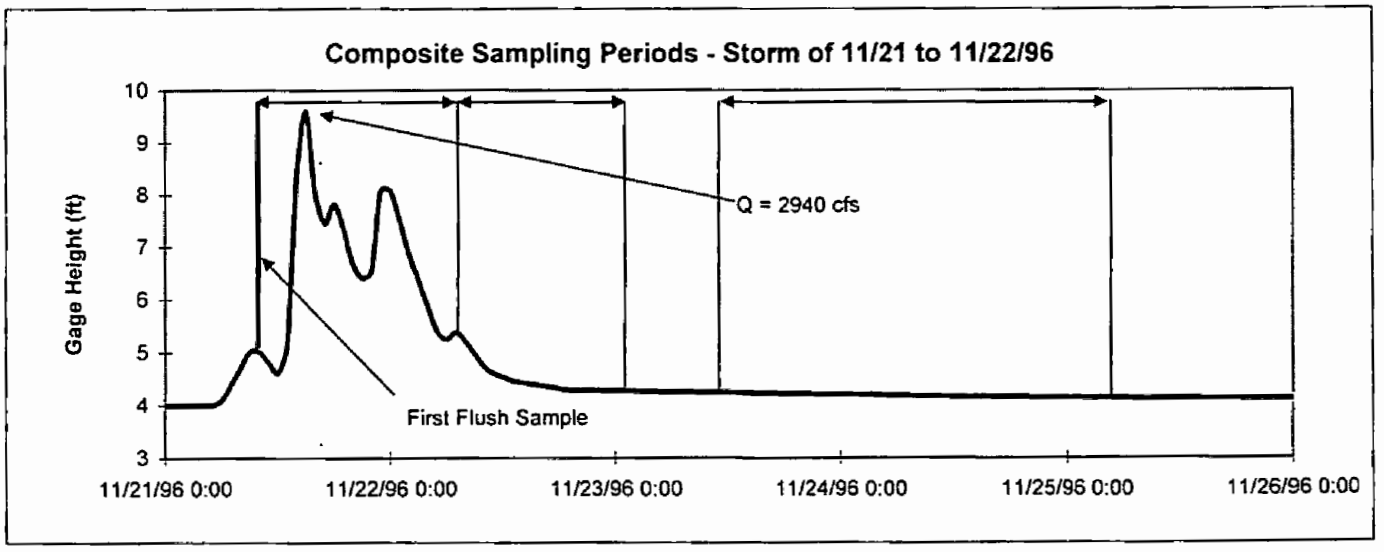

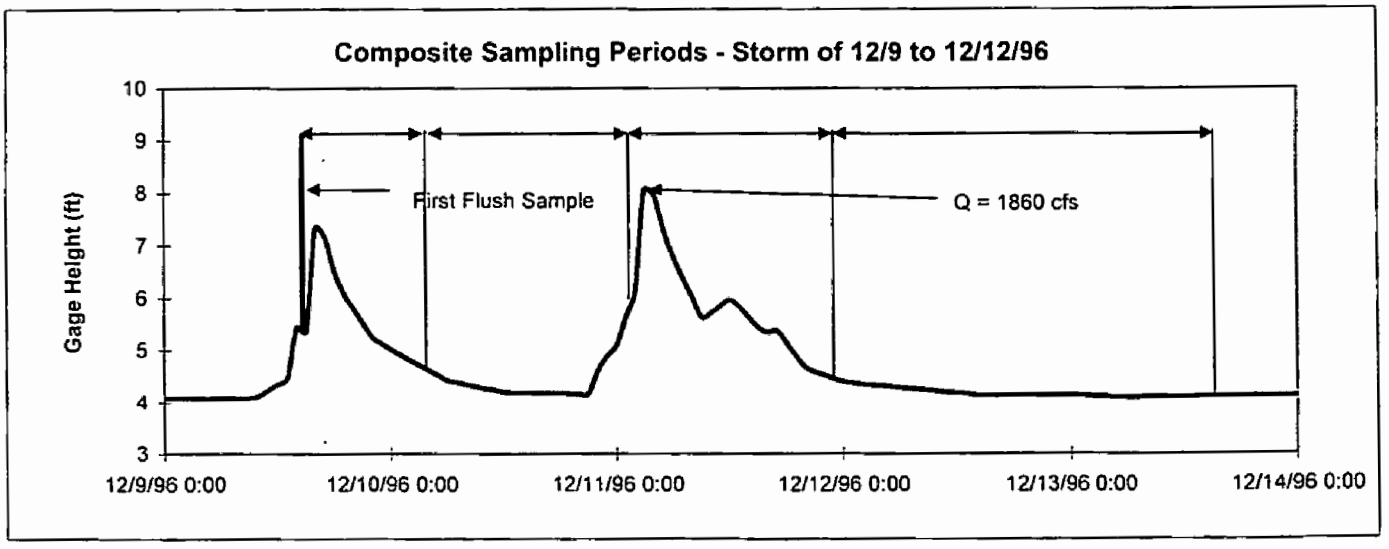

Storm Sampling @ Peters Canyon Channel

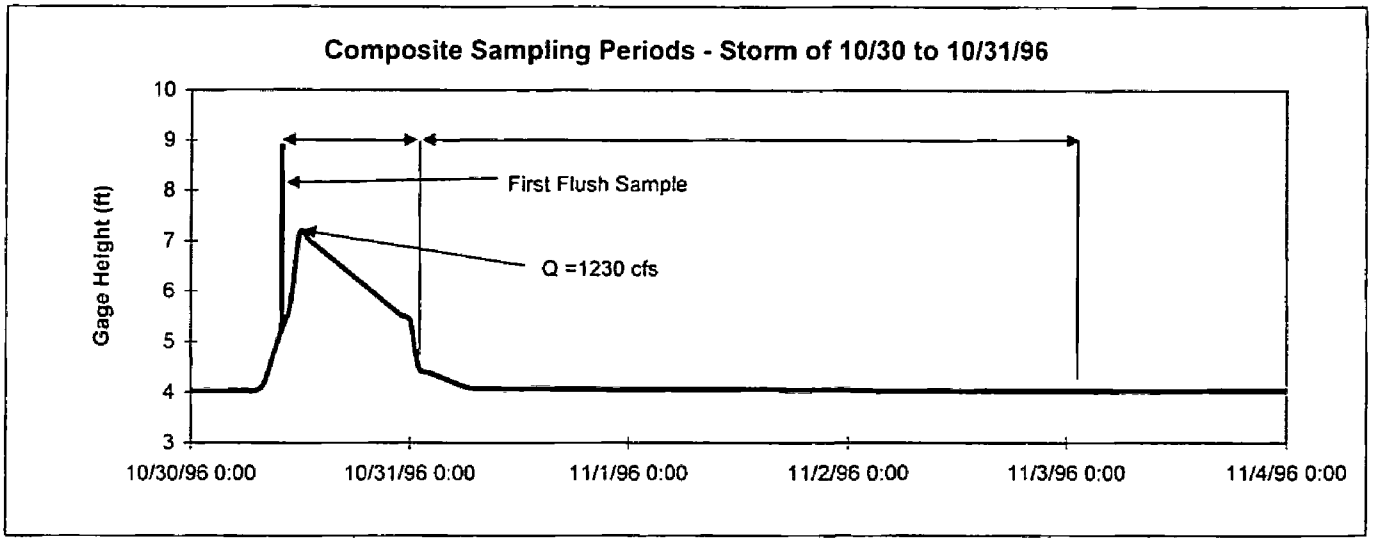

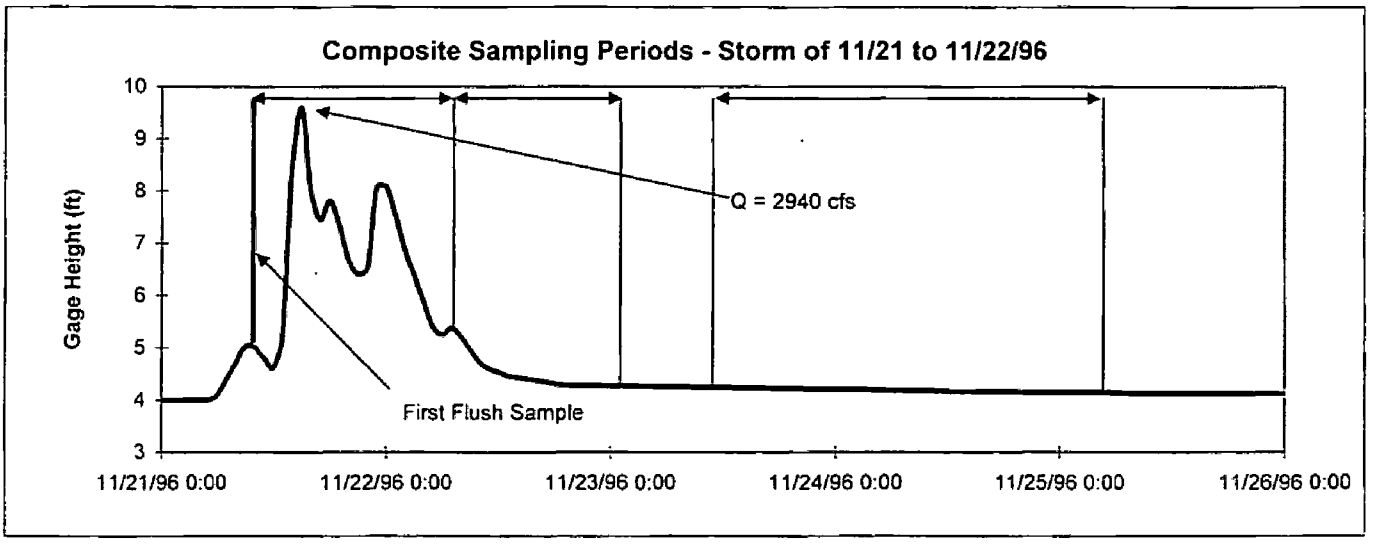

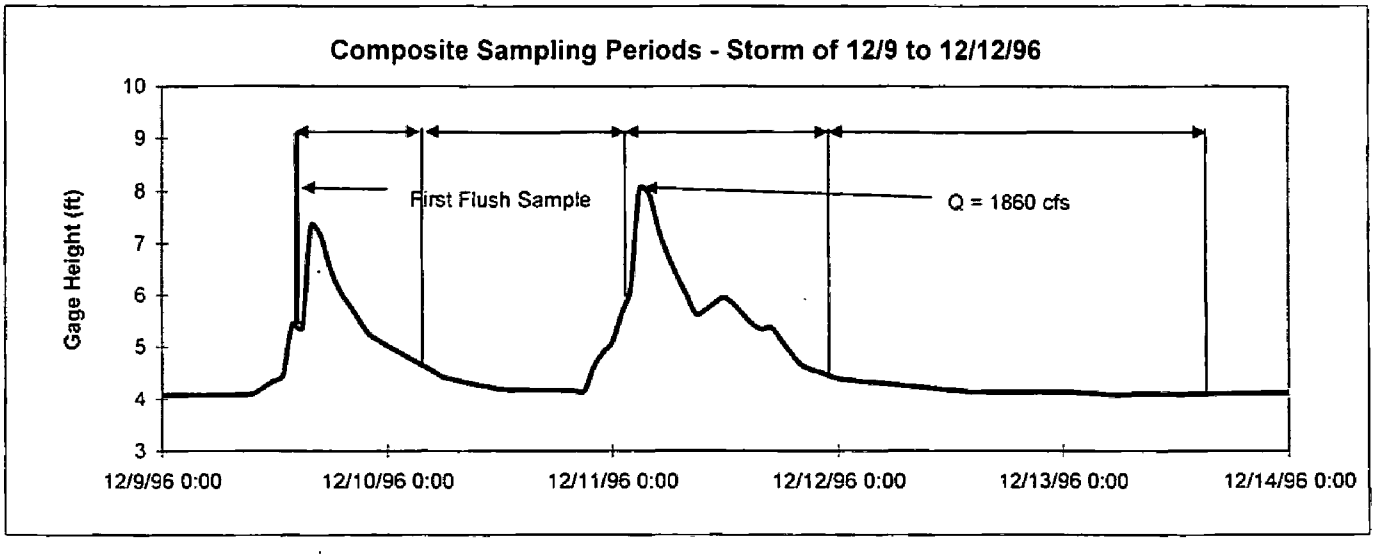

Stormwater Sampling in Peters Canyon Wash @ Barranca Parkway

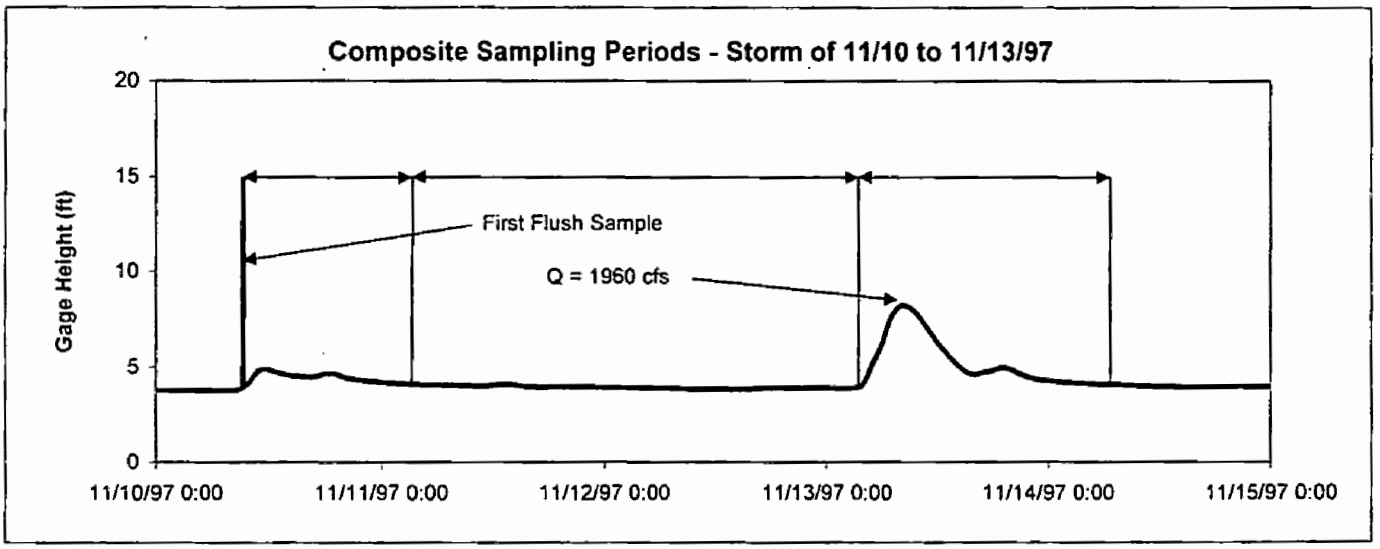

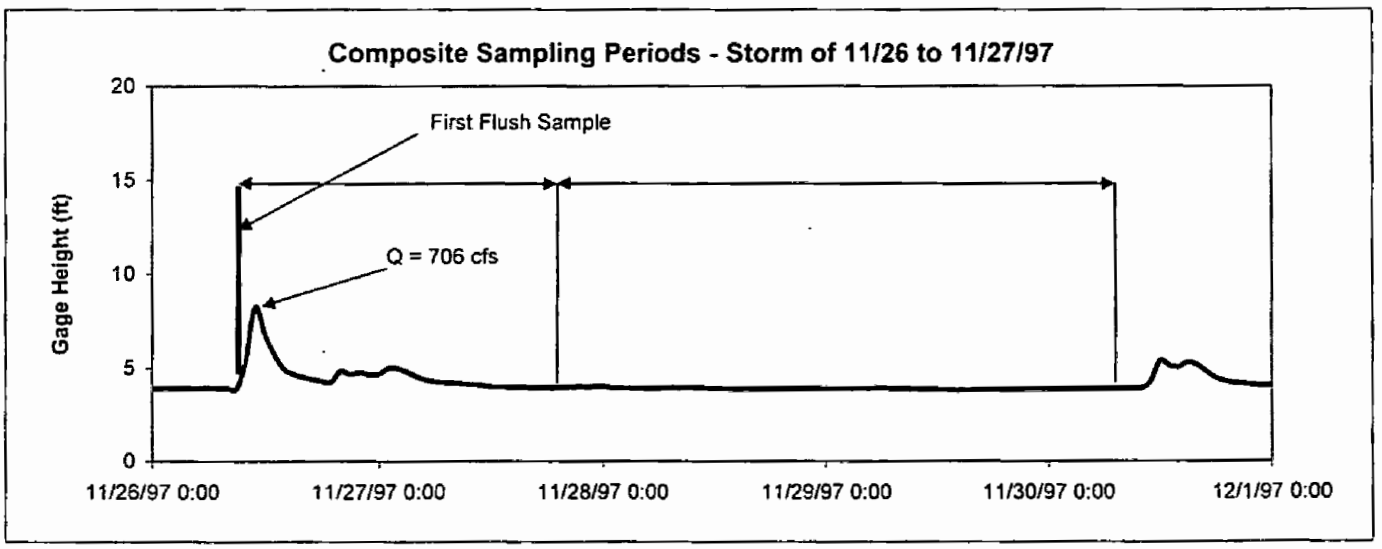

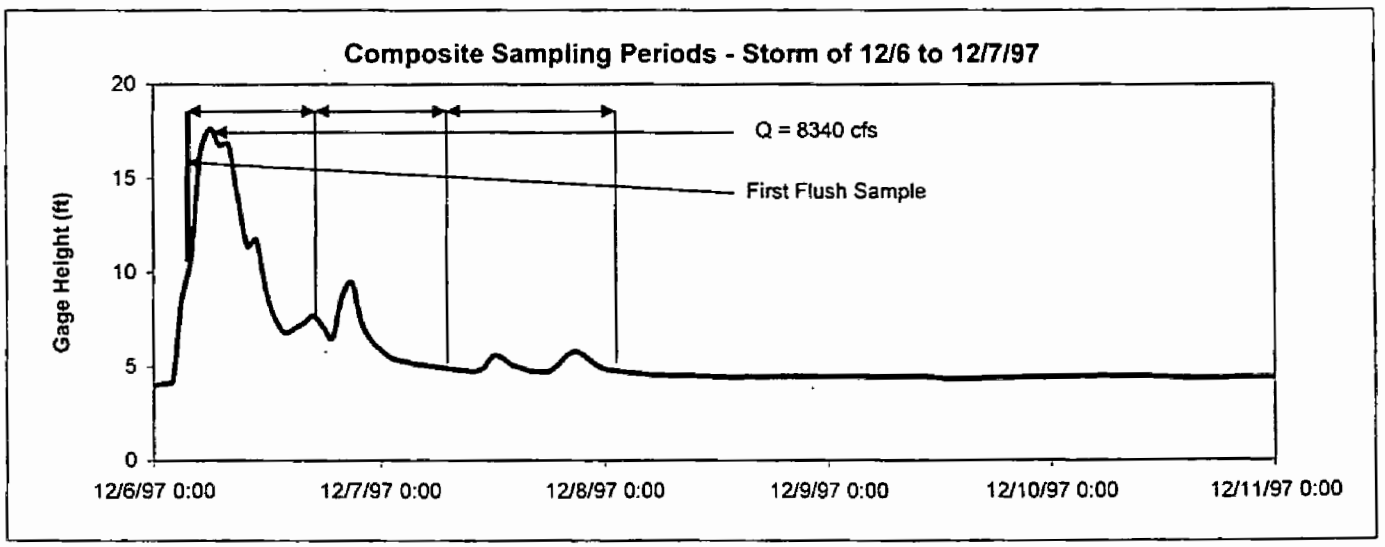

Stormwater Sampling in Peters Canyon Wash @ Barranca Parkway

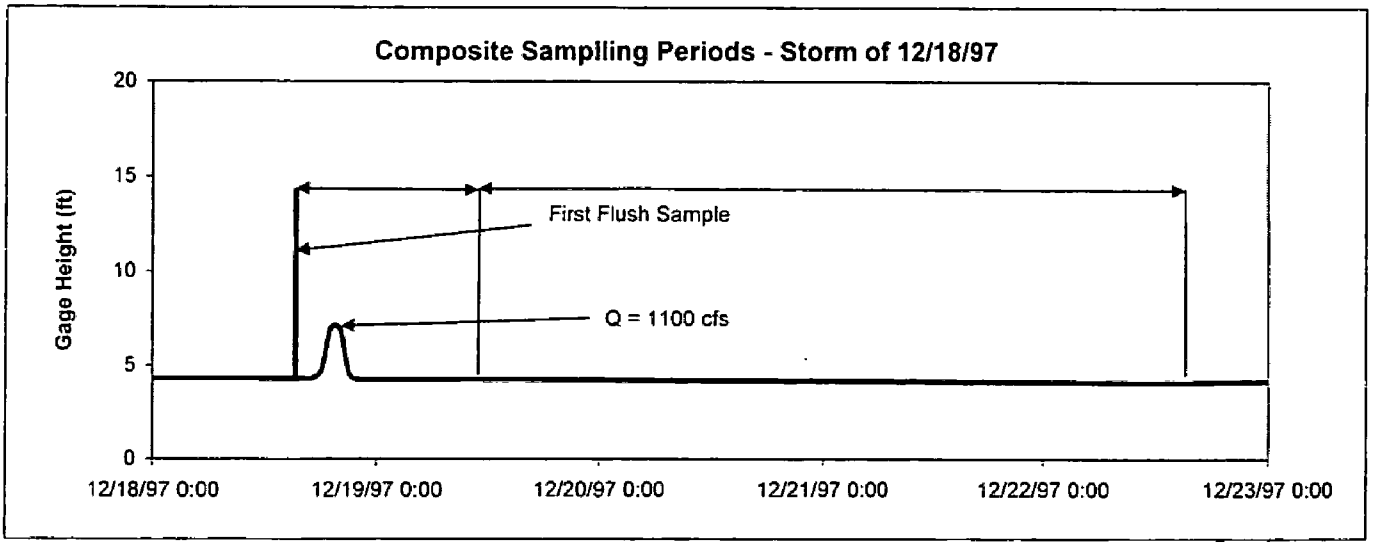

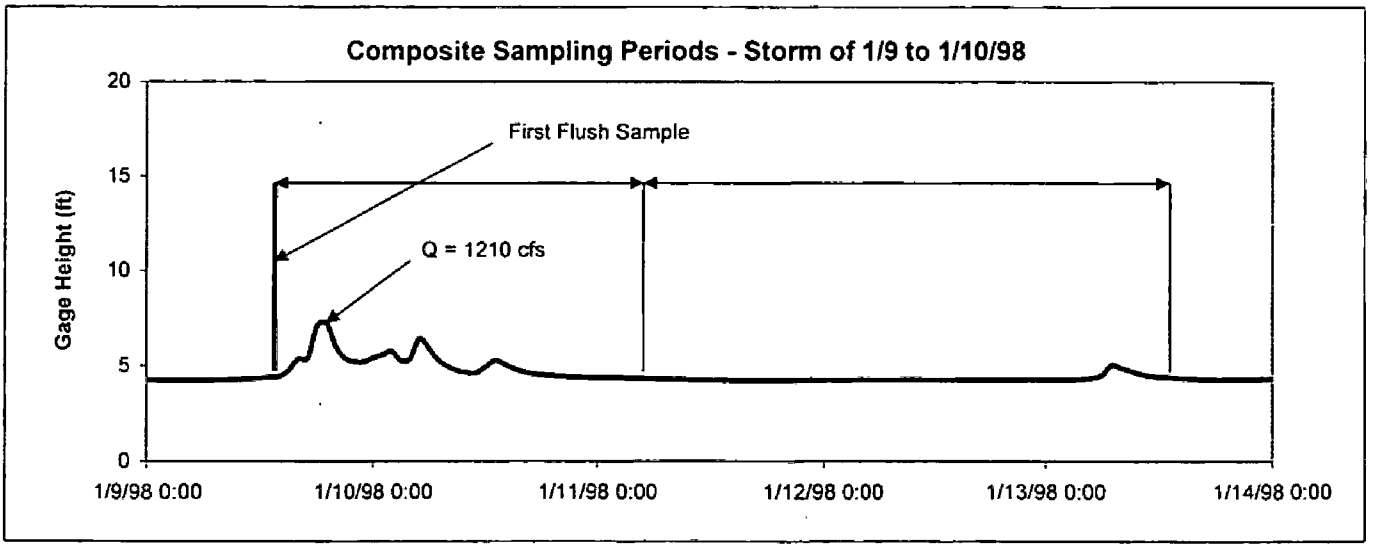

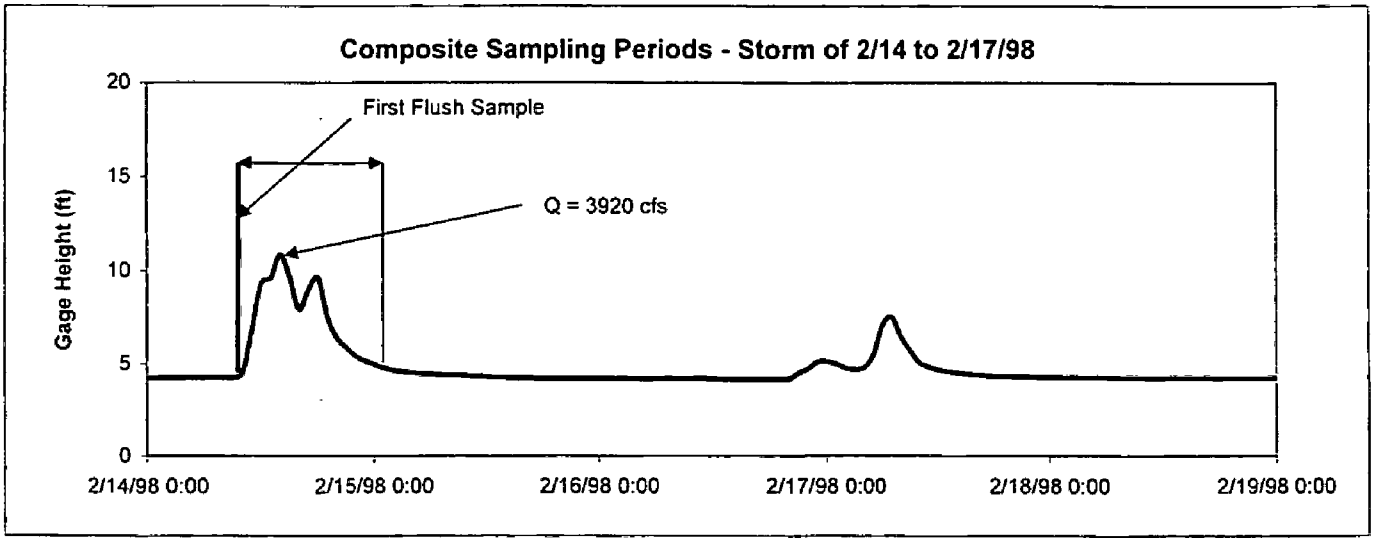

Stormwater Sampling in Peters Canyon Wash @ Barranca Parkway

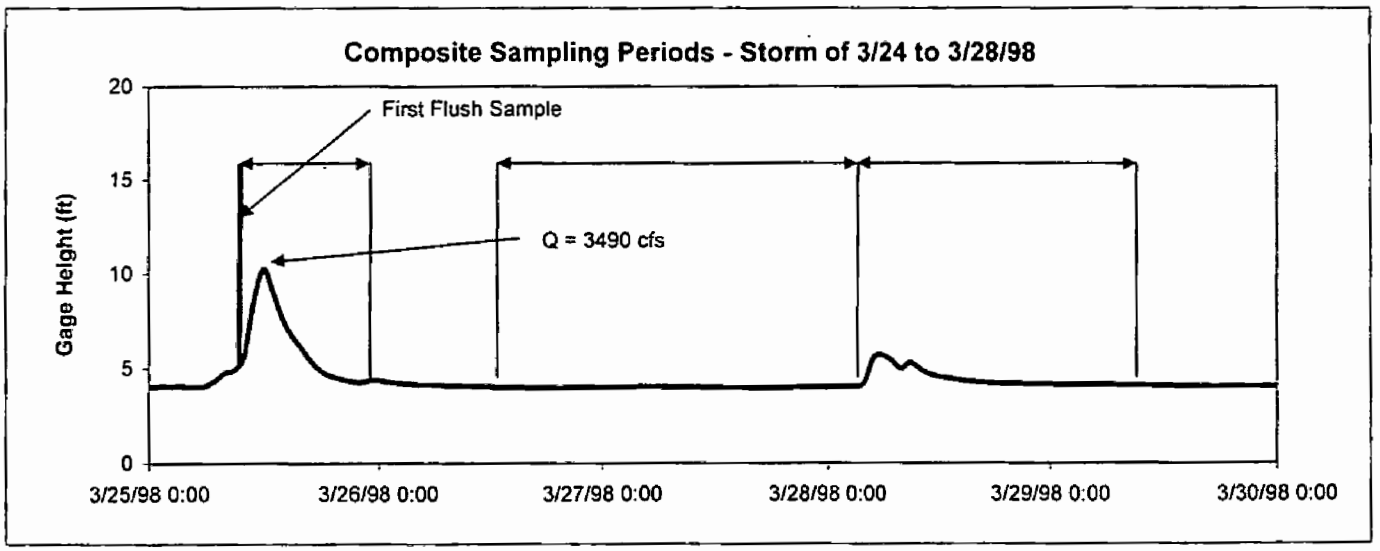

Stormwater Sampling in Peters Canyon Wash @ Barranca Parkway

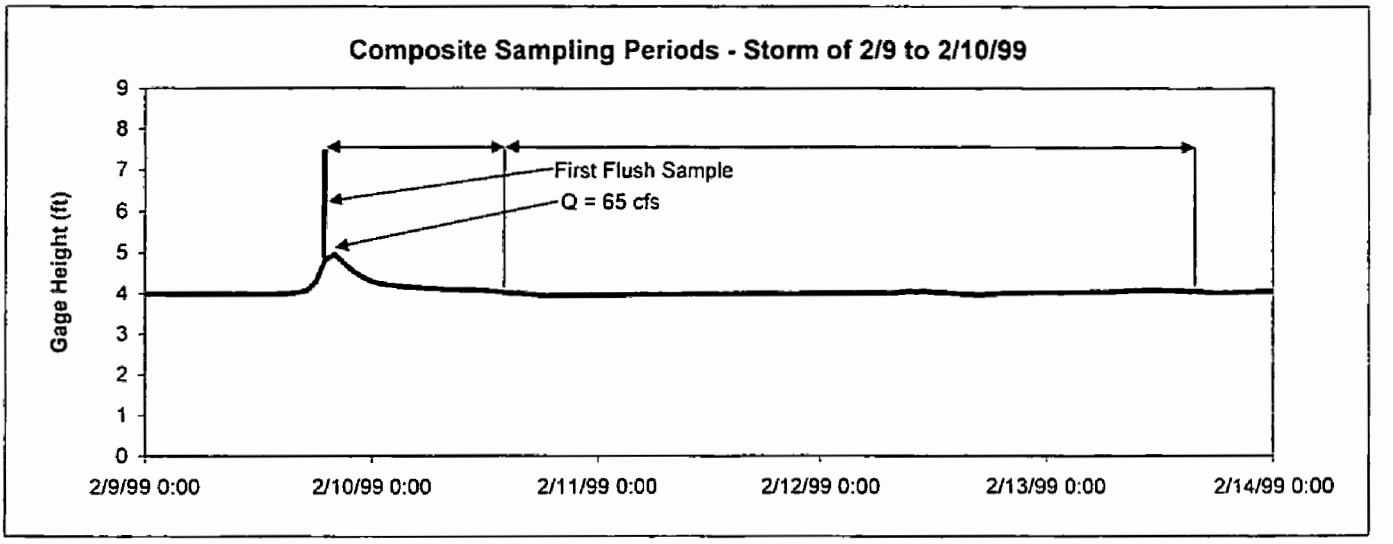

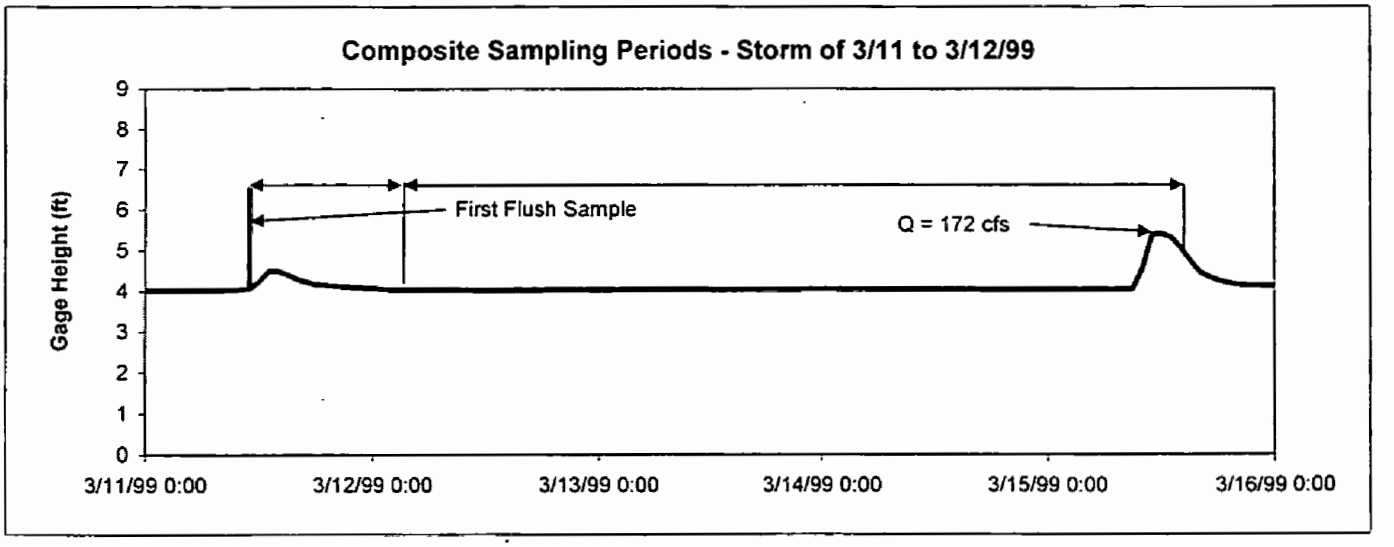

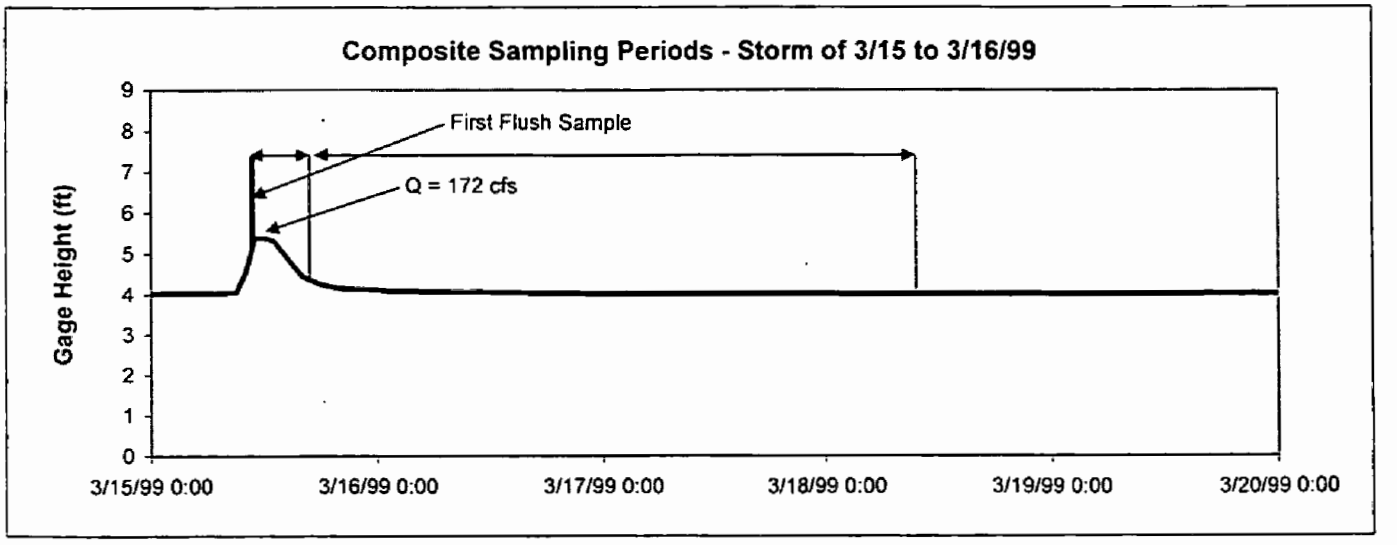

Stormwater Sampling in Peters Canyon Wash @ Barranca Parkway

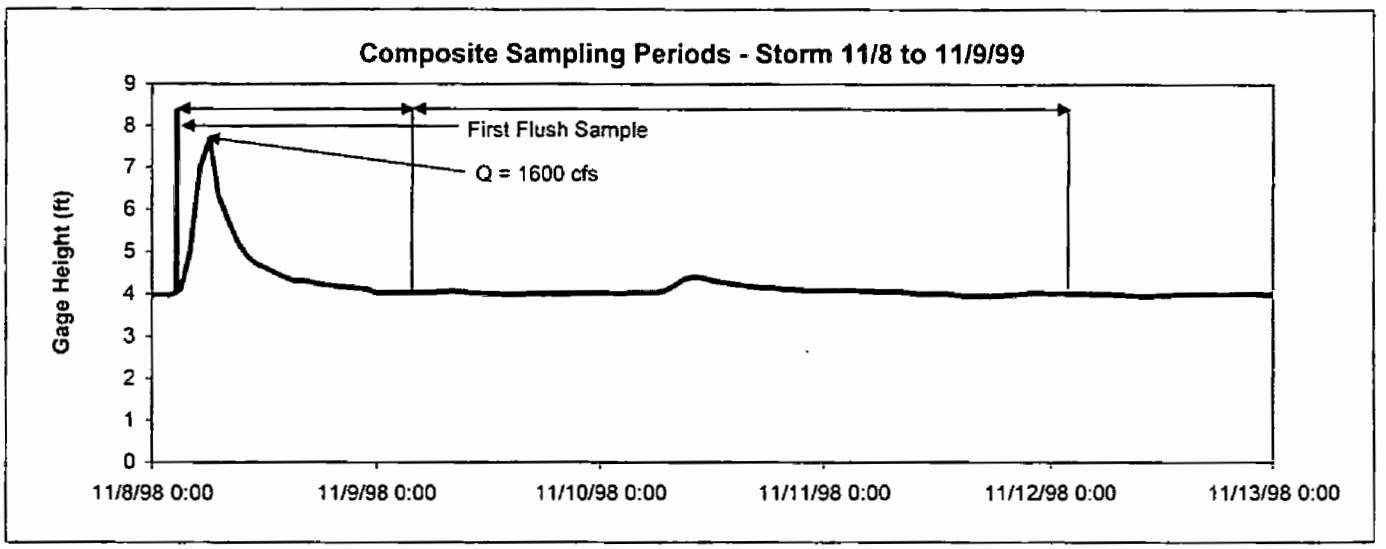

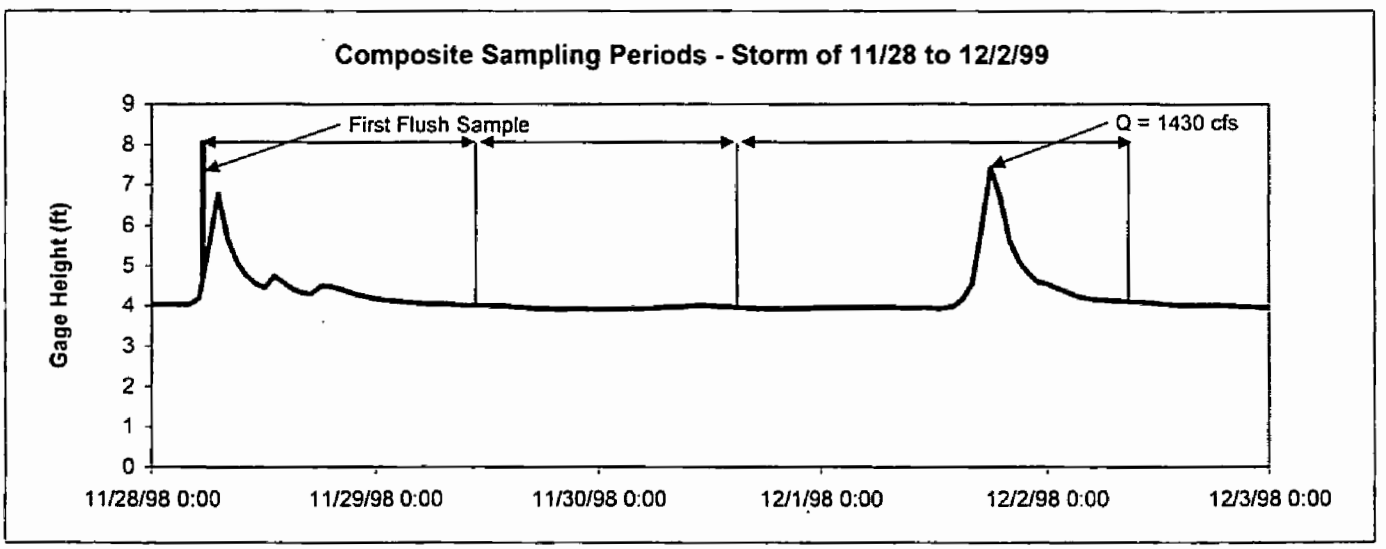

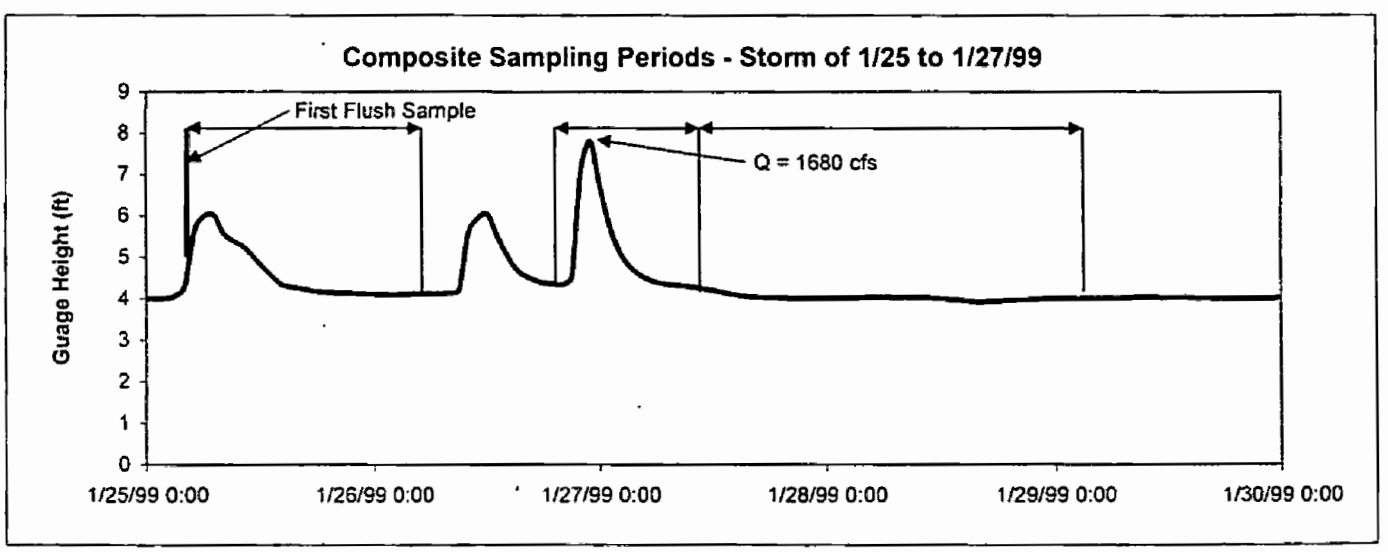

Stormwater Sampling in Bolsa Chica Channel

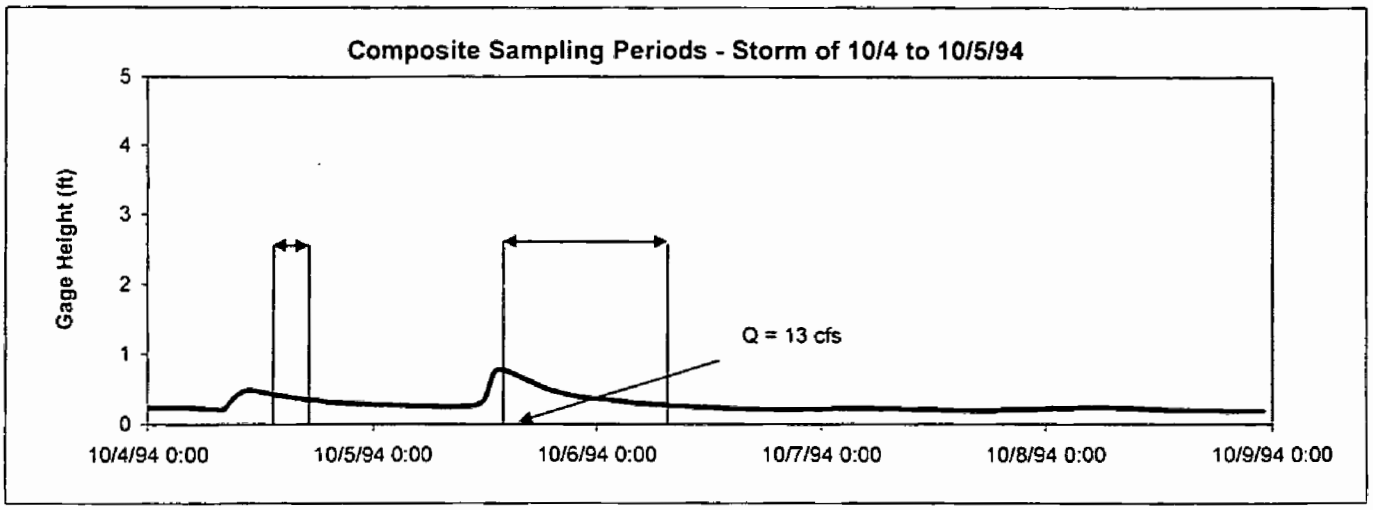

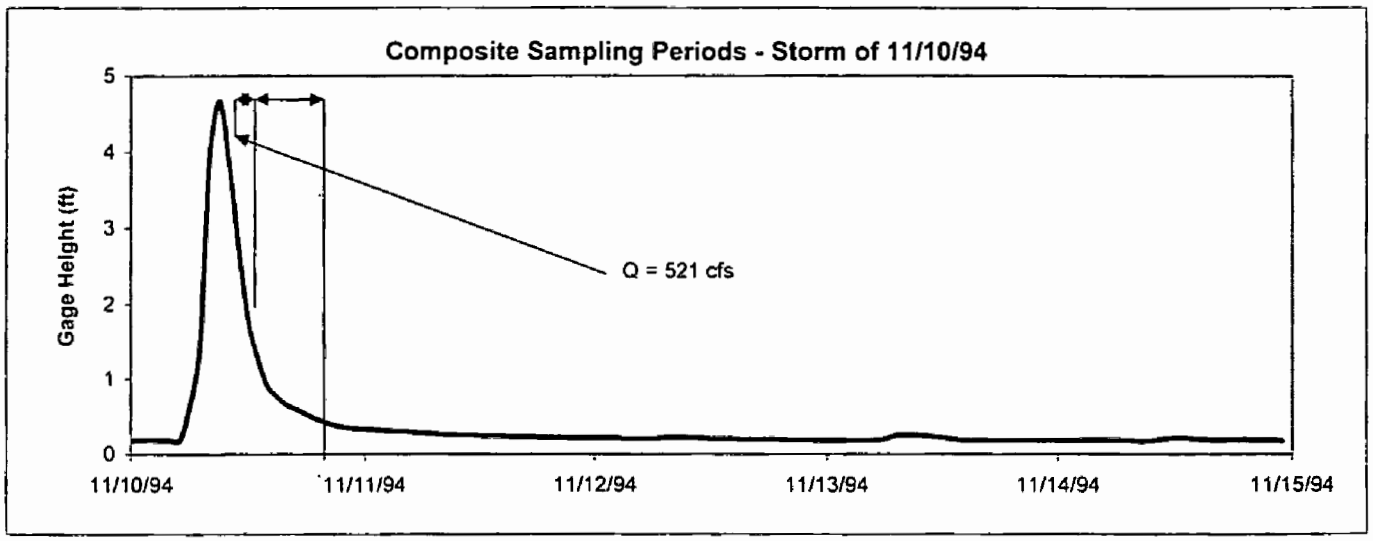

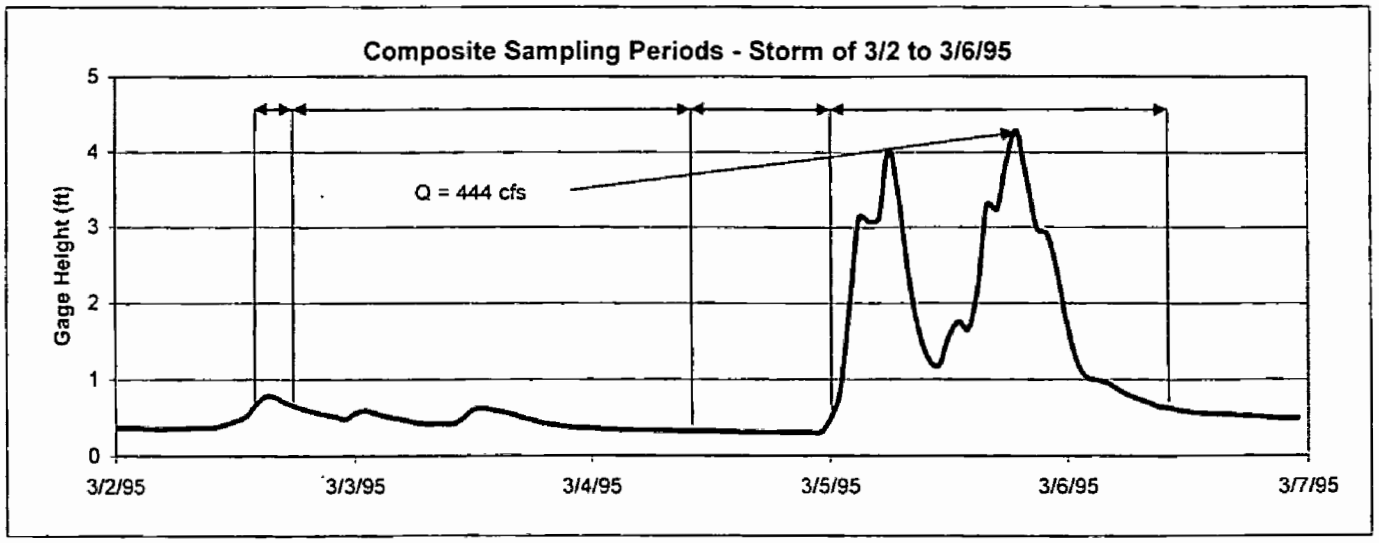

Stormwater Sampling in Bolsa Chica Channel

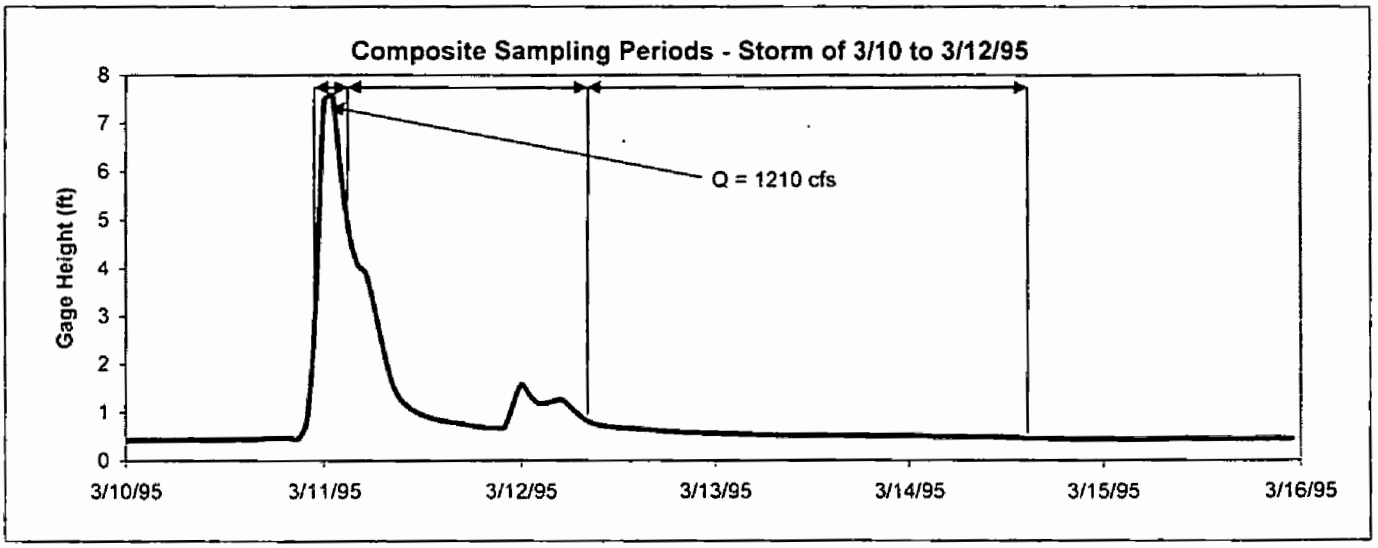

Storm Sampling @ Bolsa Chica Channel

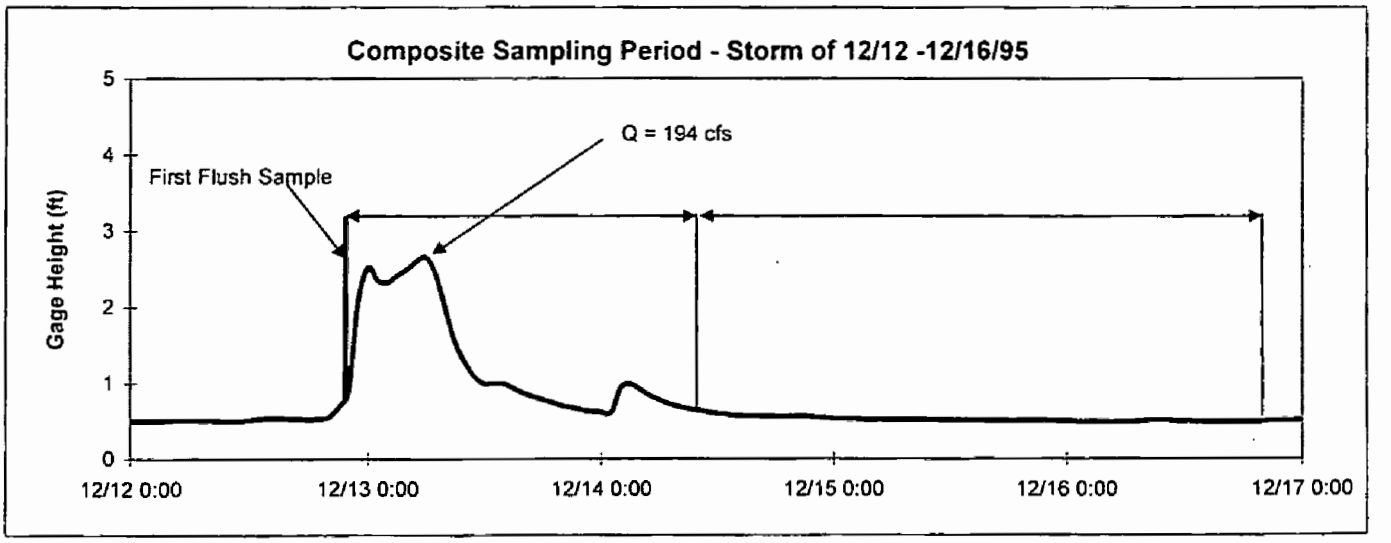

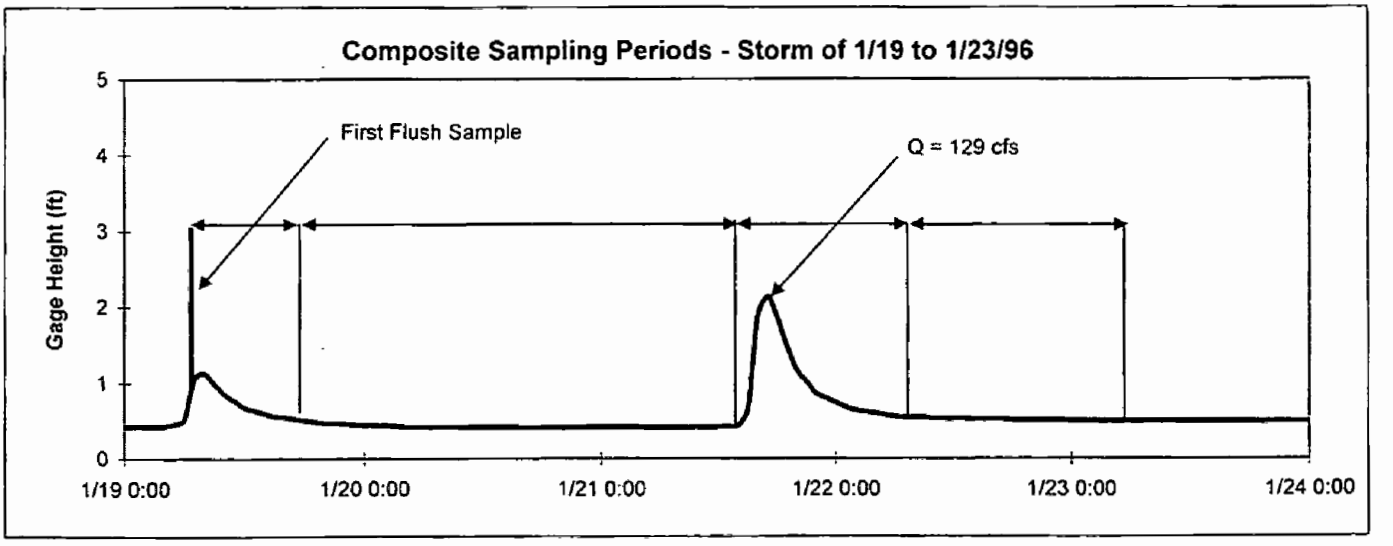

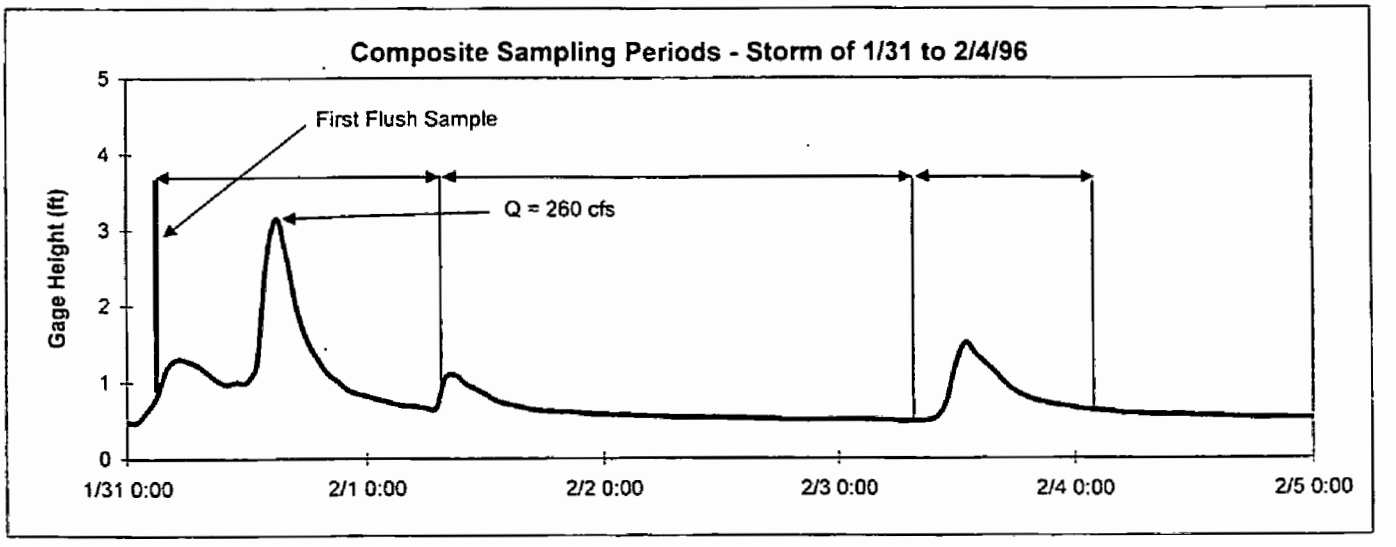

Storm Sampling @ Bolsa Chica Channel

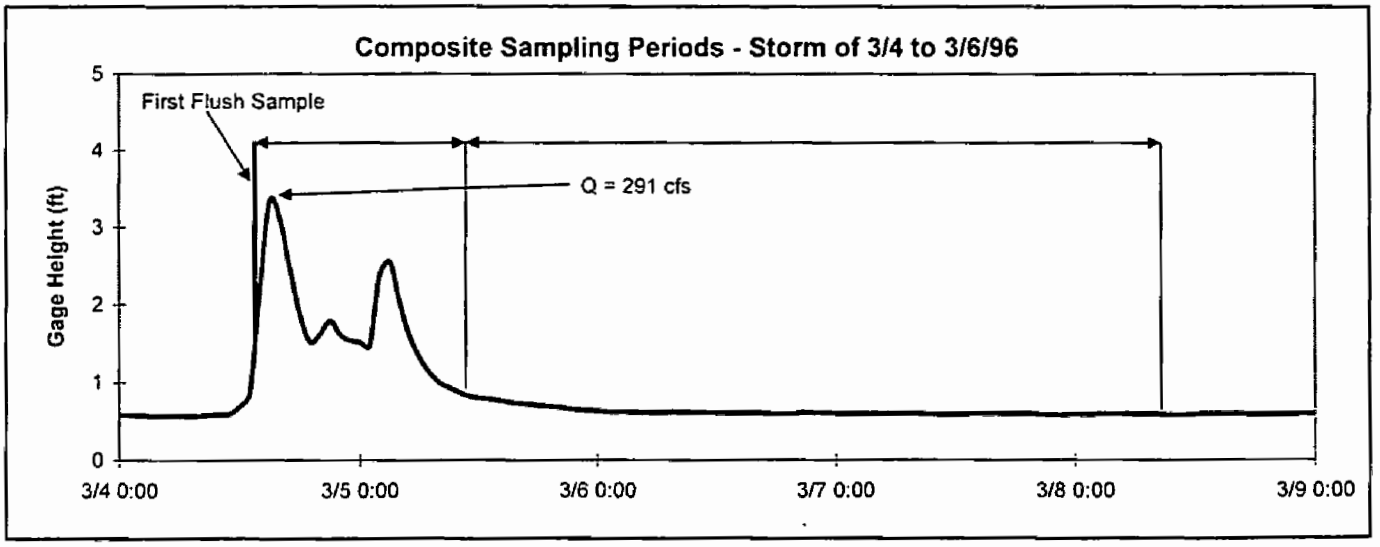

Storm Sampling @ Bolsa Chica Channel

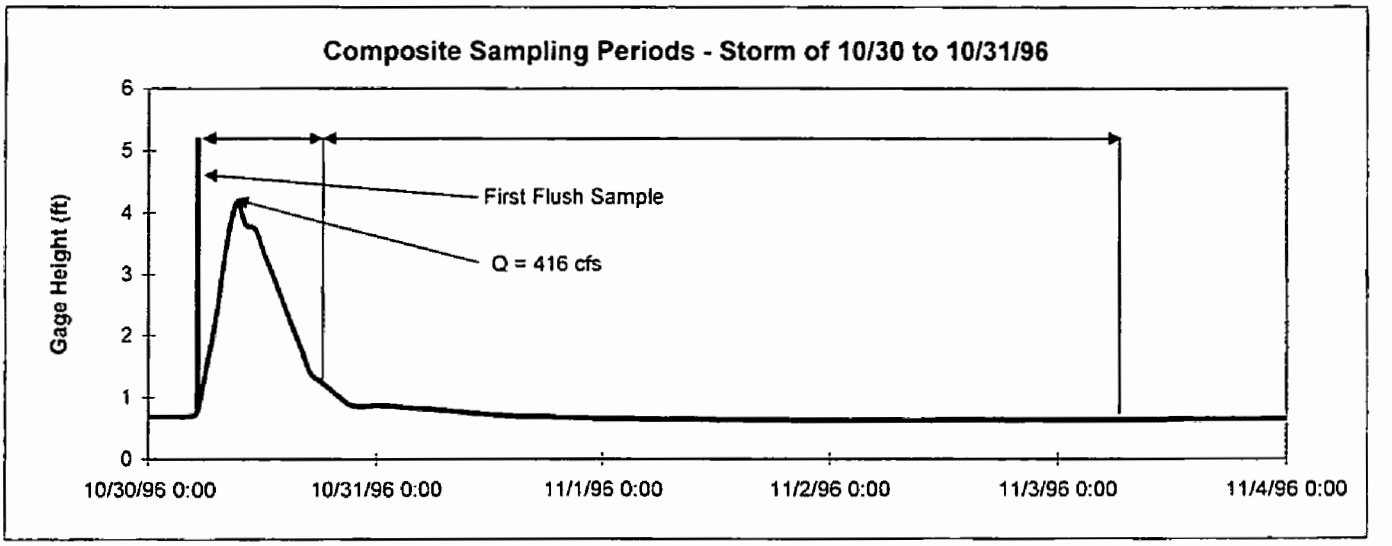

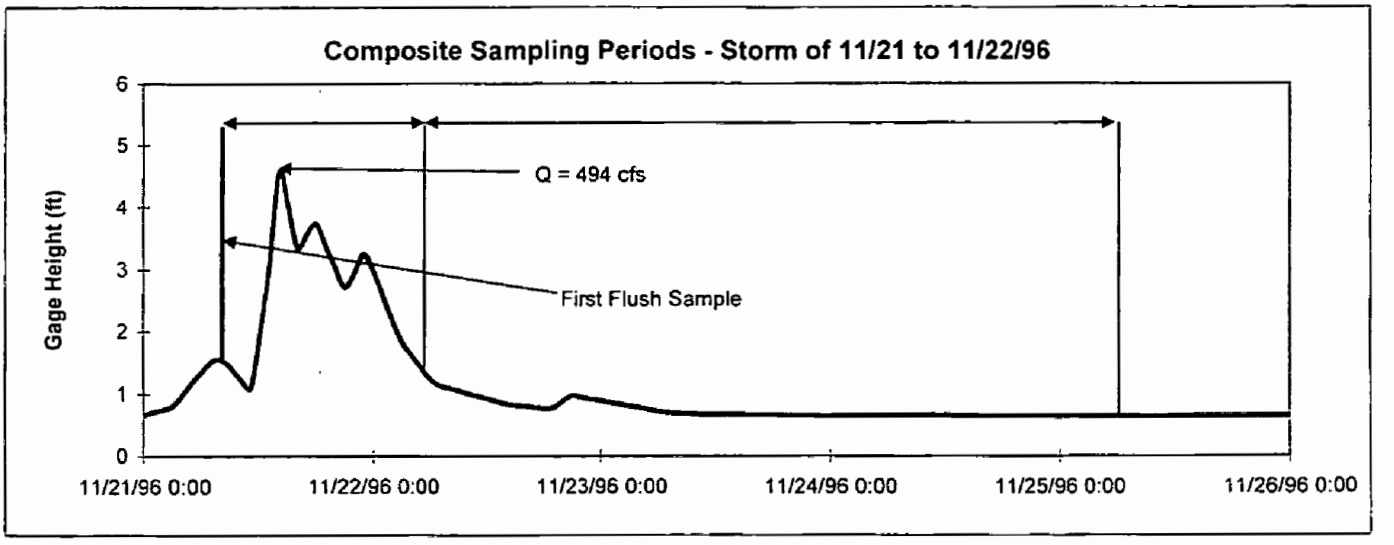

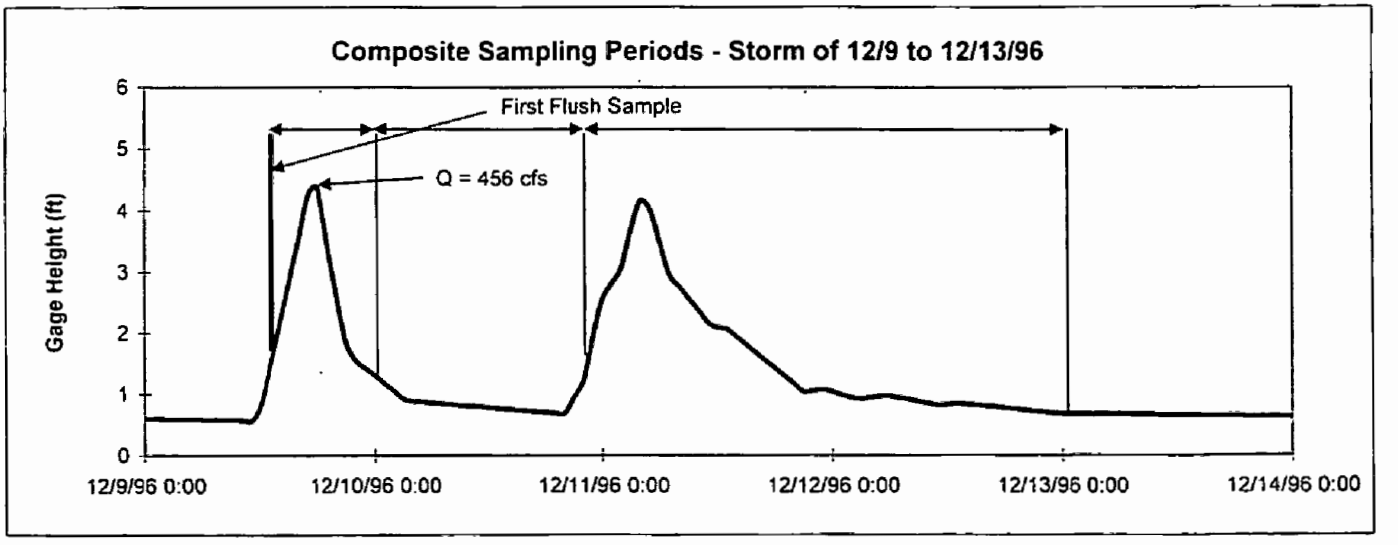

Storm Sampling @ Bolsa Chica Channel

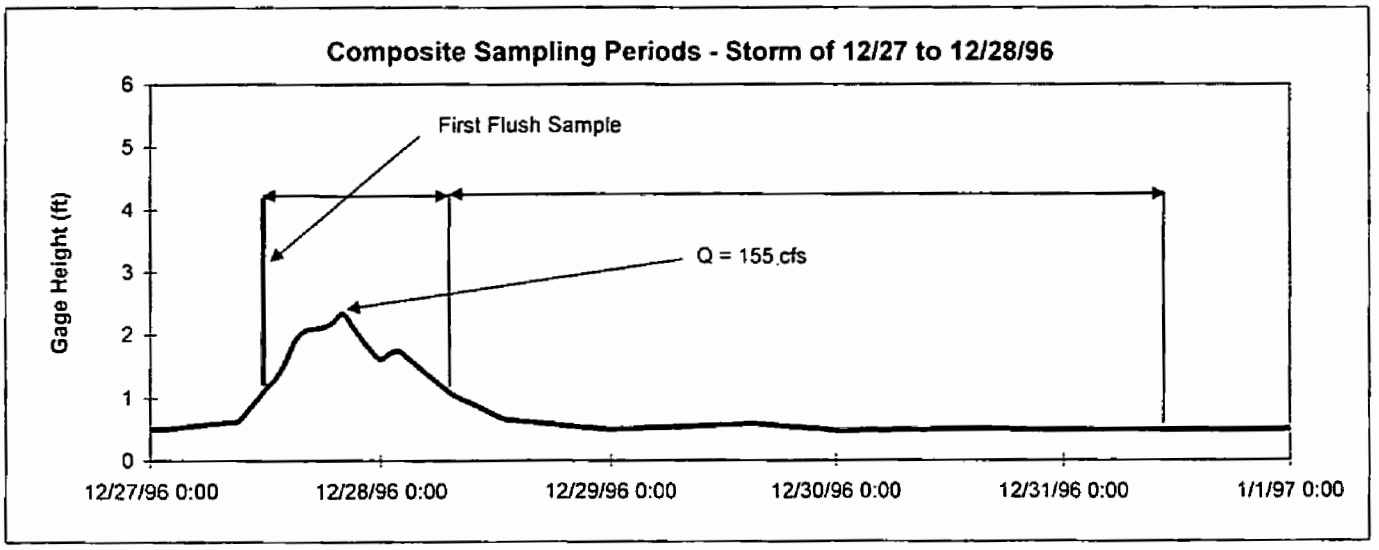

Stormwater Sampling in Bolsa Chica Channel

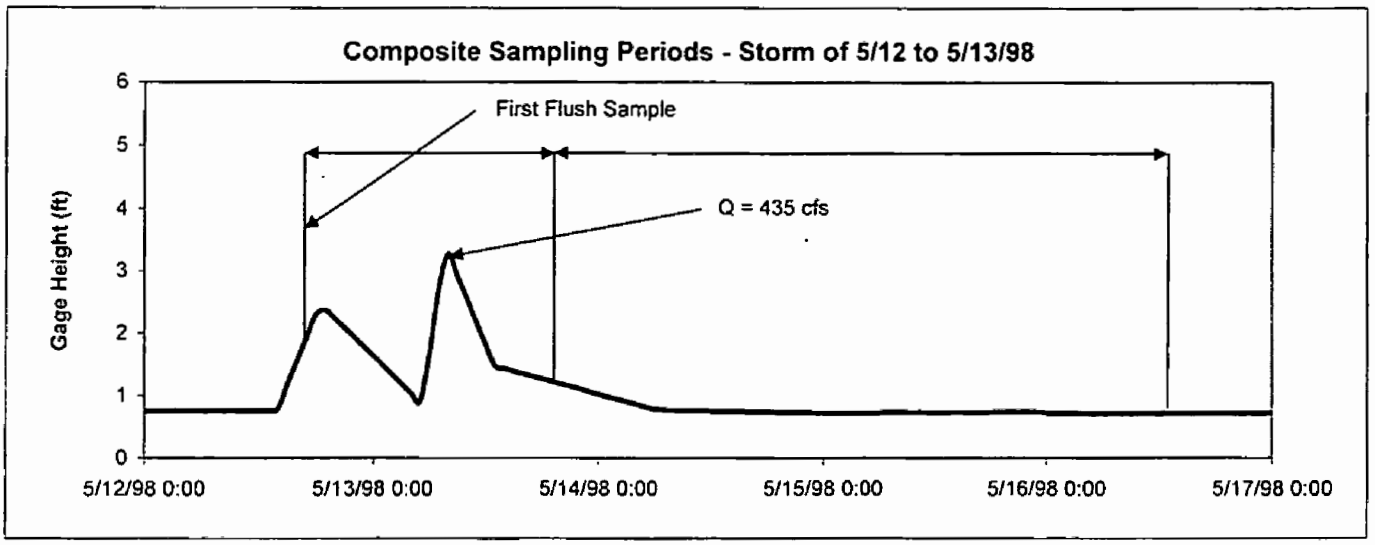

Stormwater Sampling in Bolsa Chica Channel

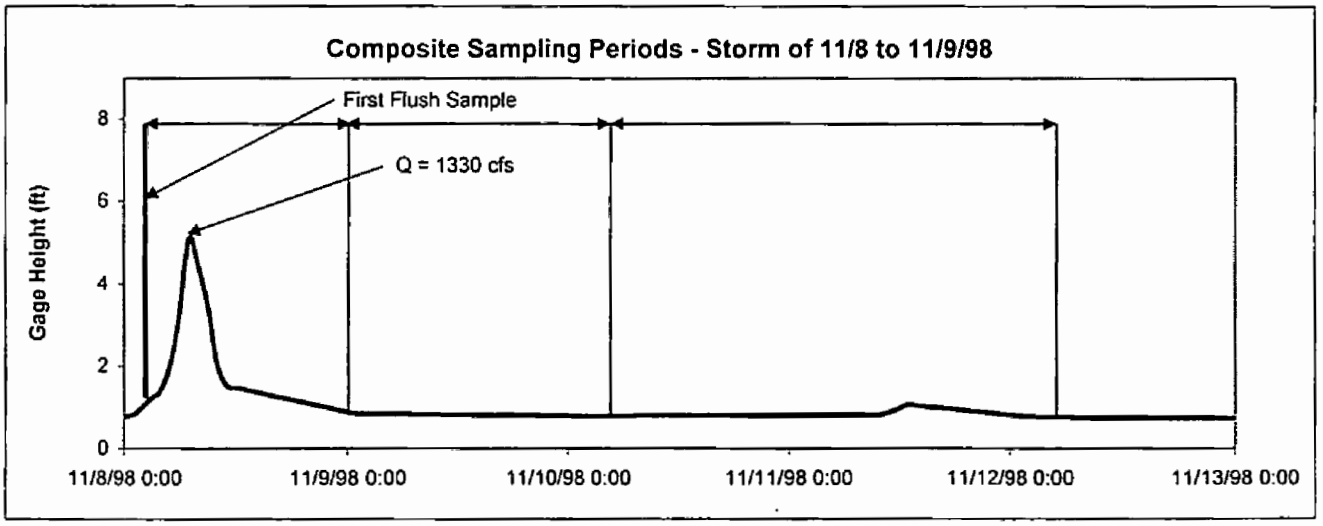

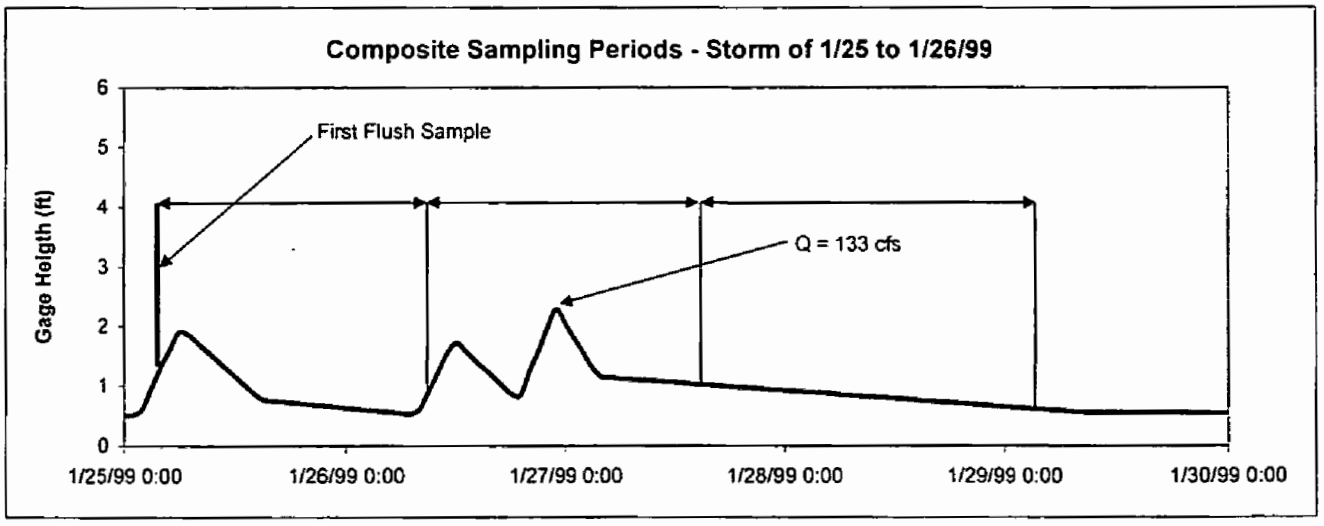

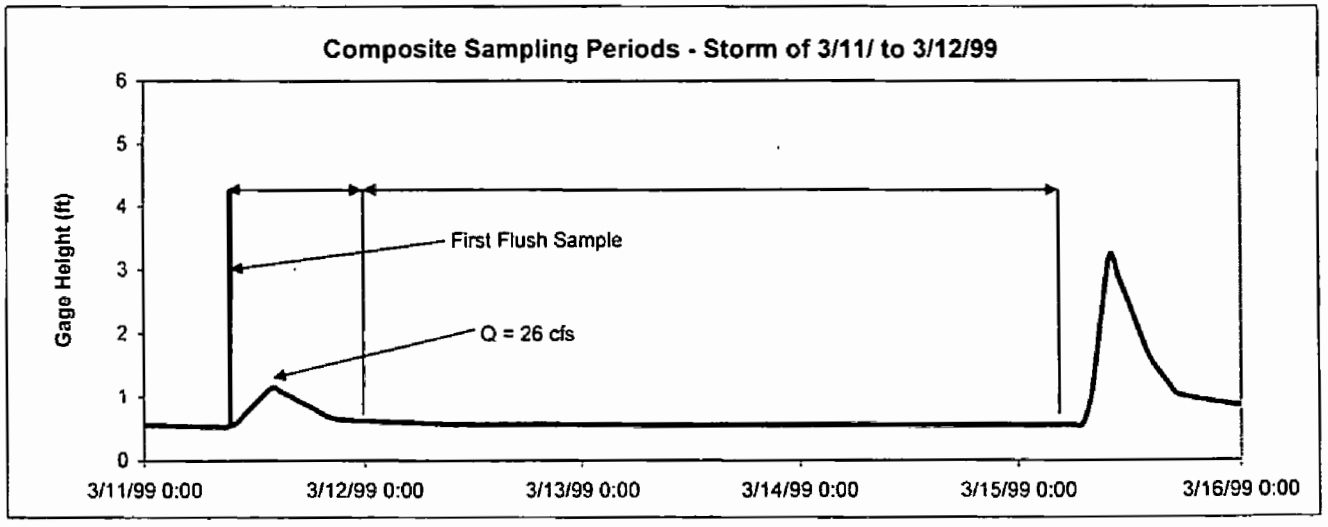

Stormwater Sampling in Bolsa Chica Channel

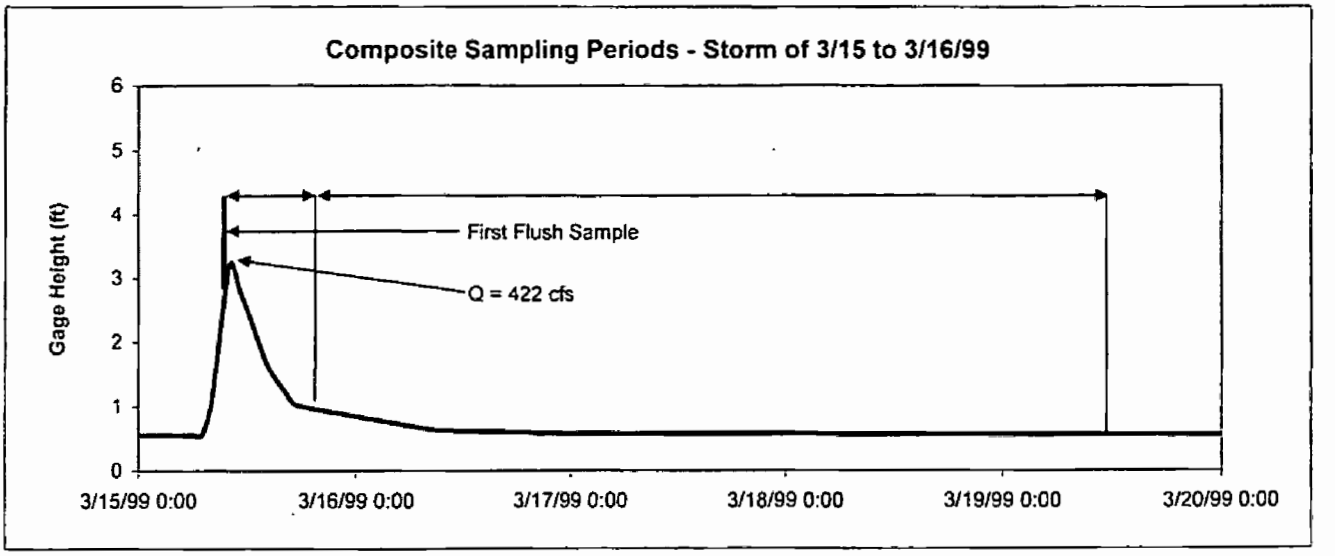

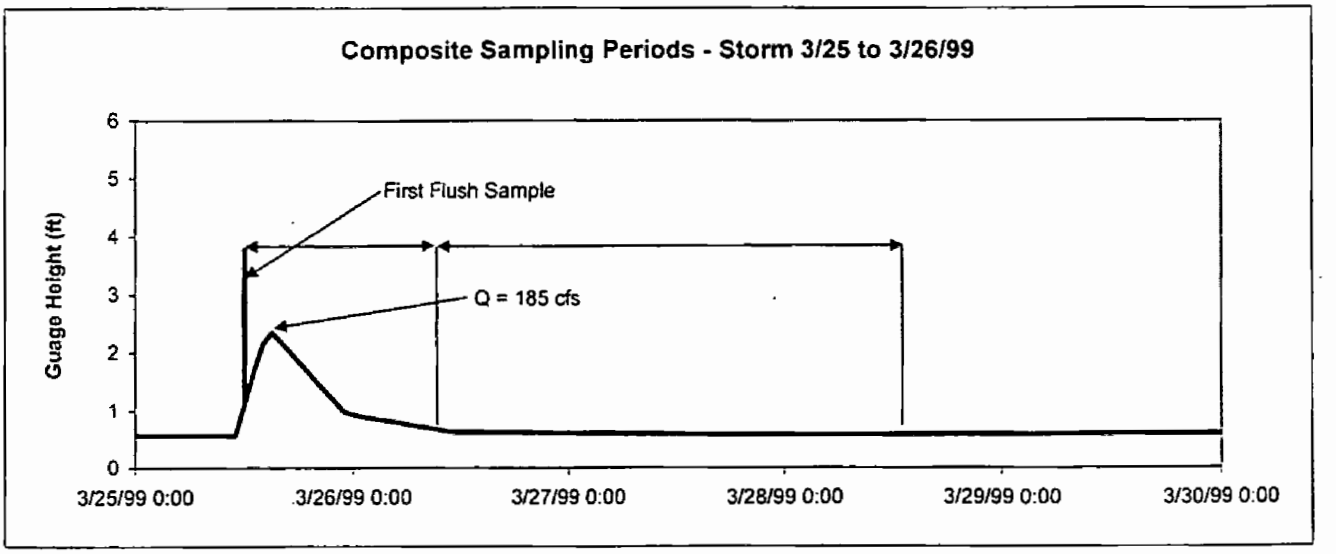

Stormwater Sampling in Bolsa Chica Channel

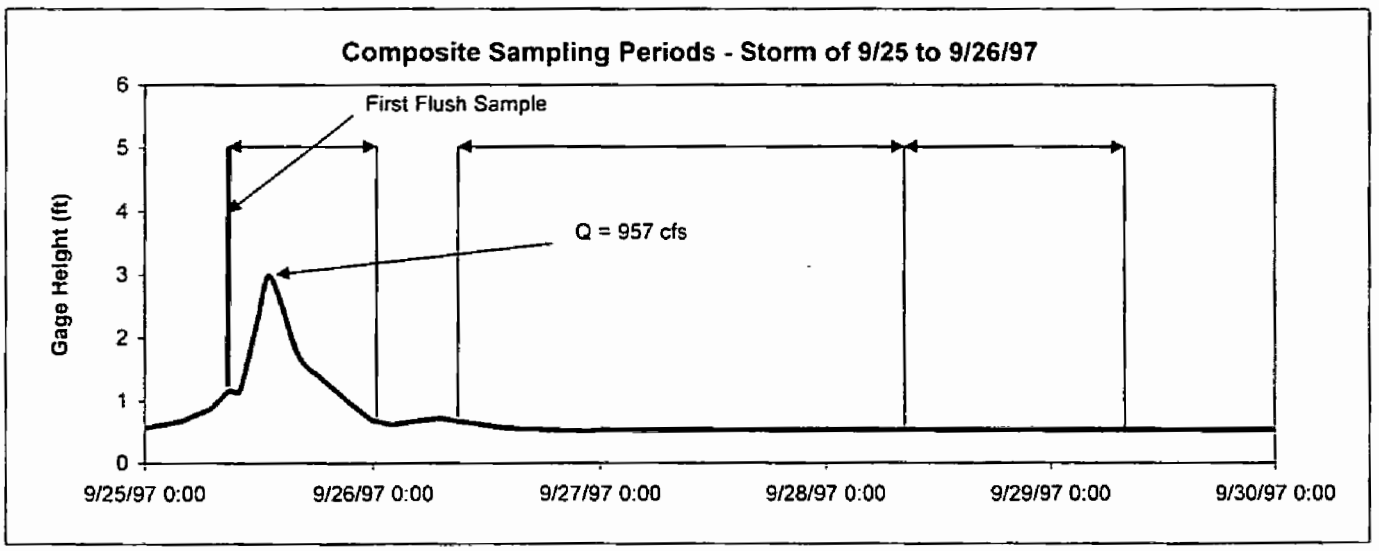

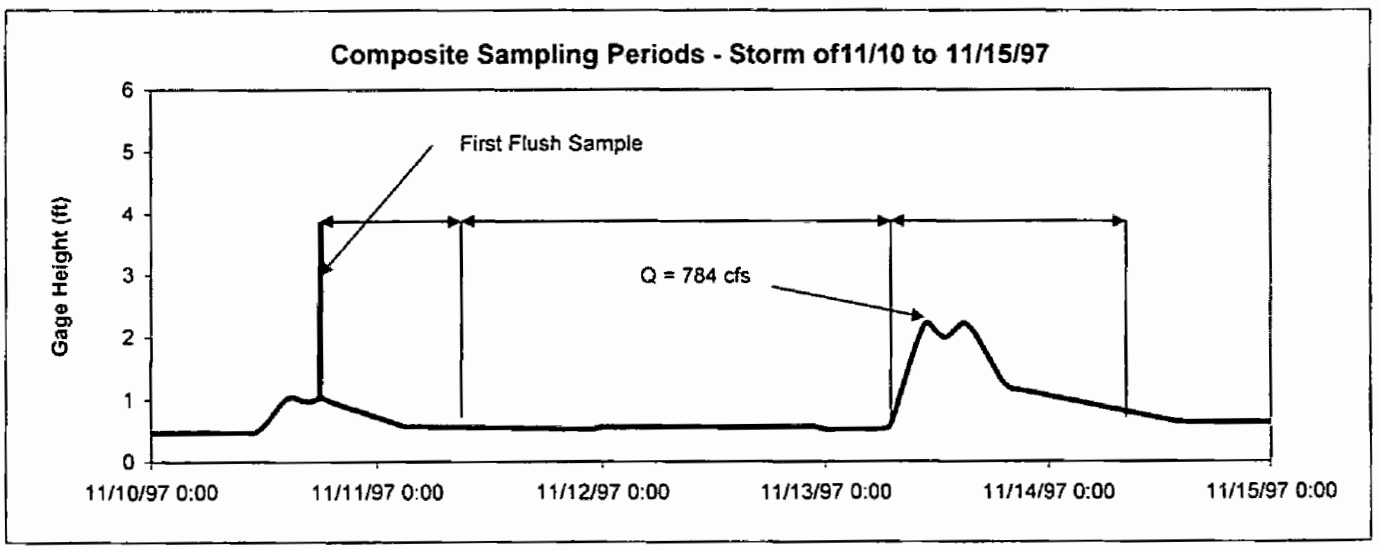

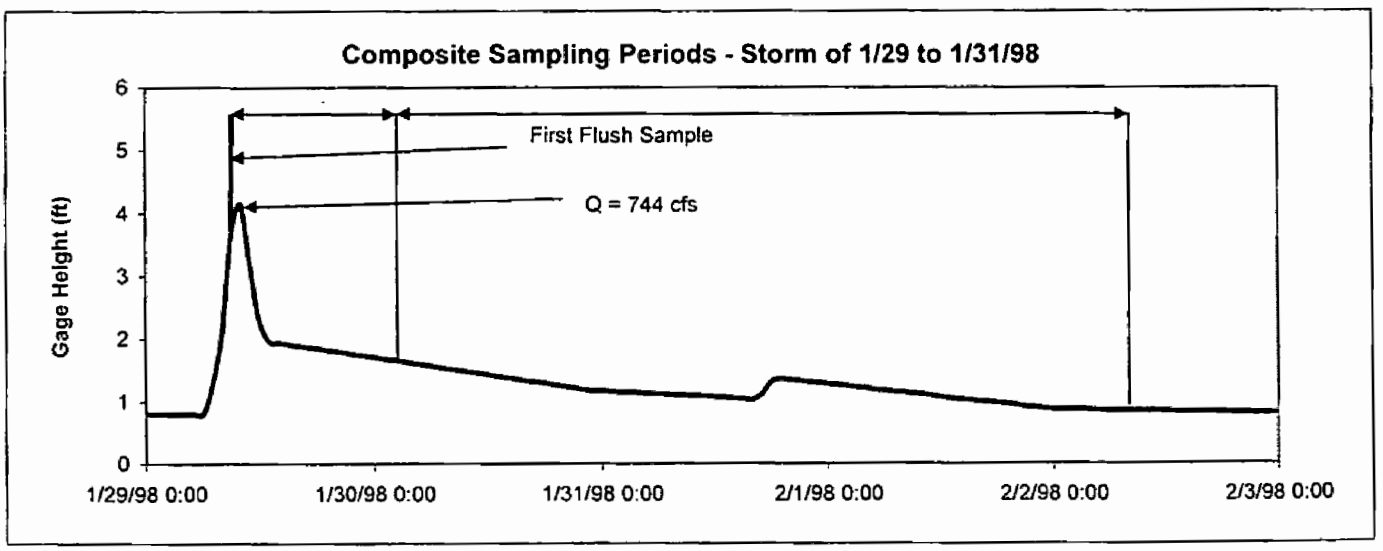

Stormwater Sampling in Westminster Channel

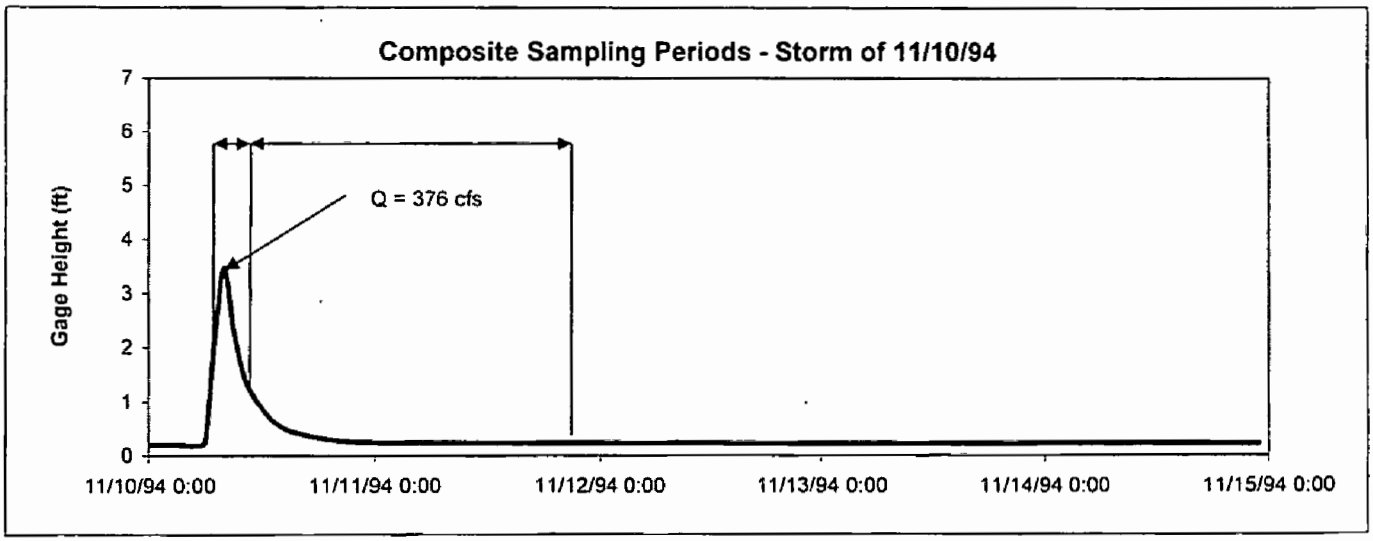

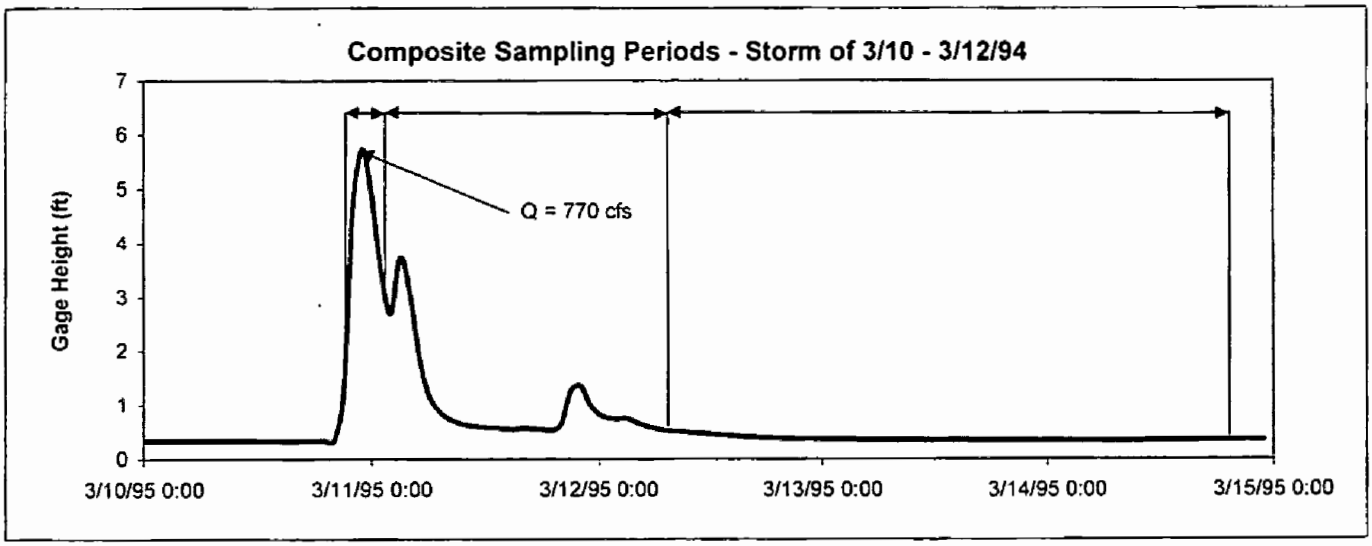

Storm Sampling @ Westminster Channel

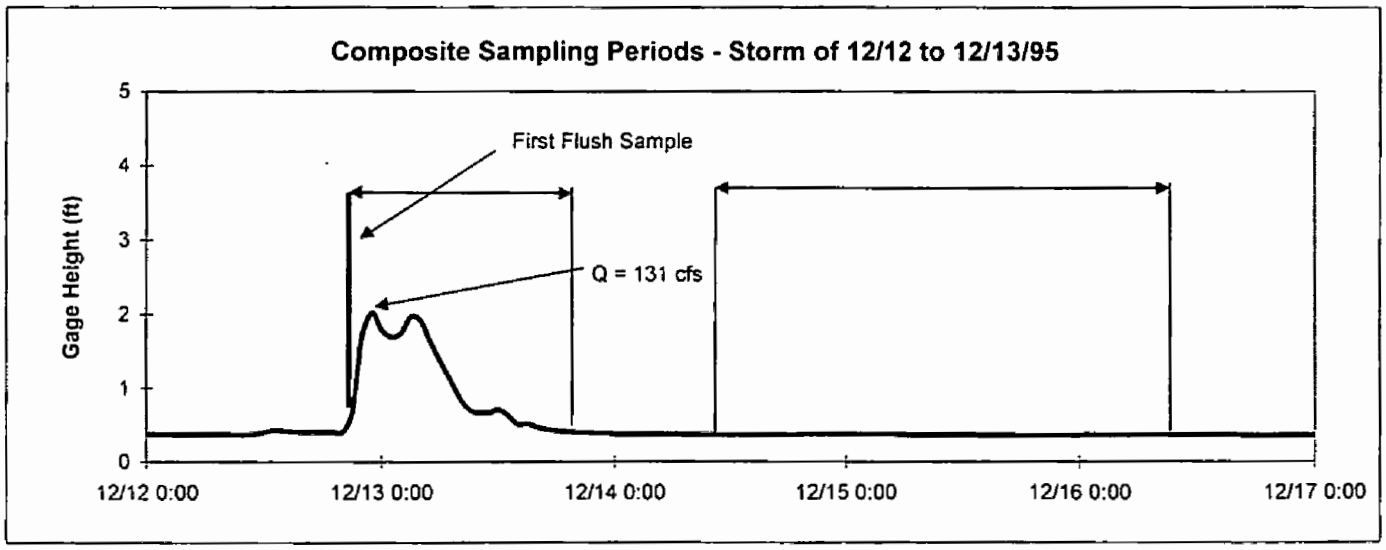

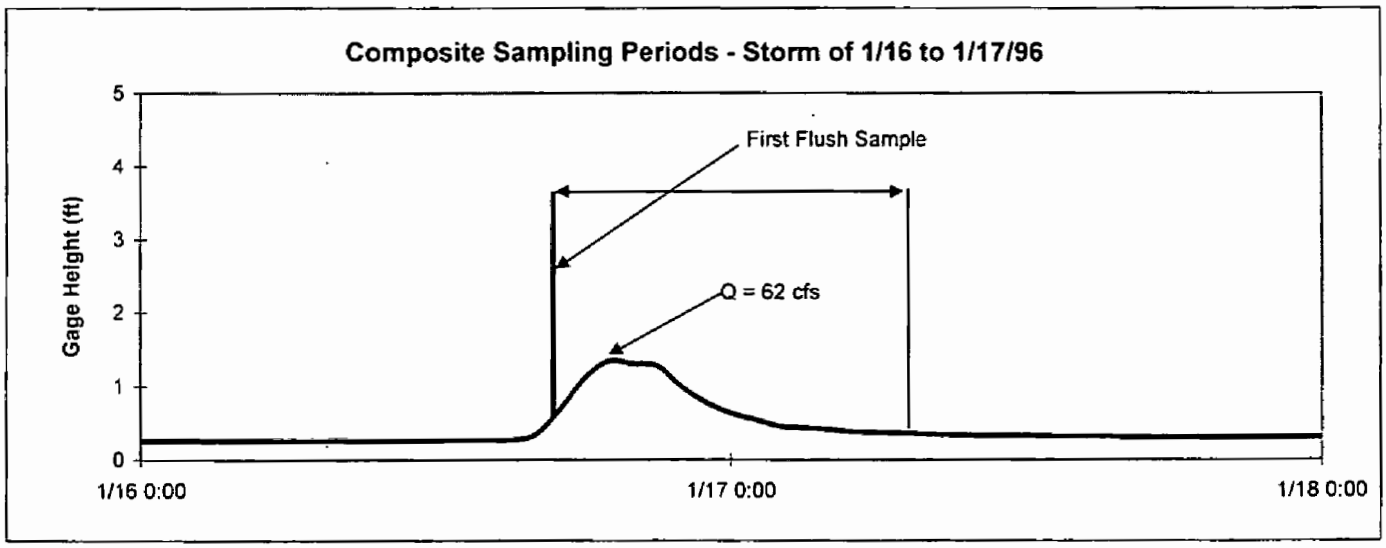

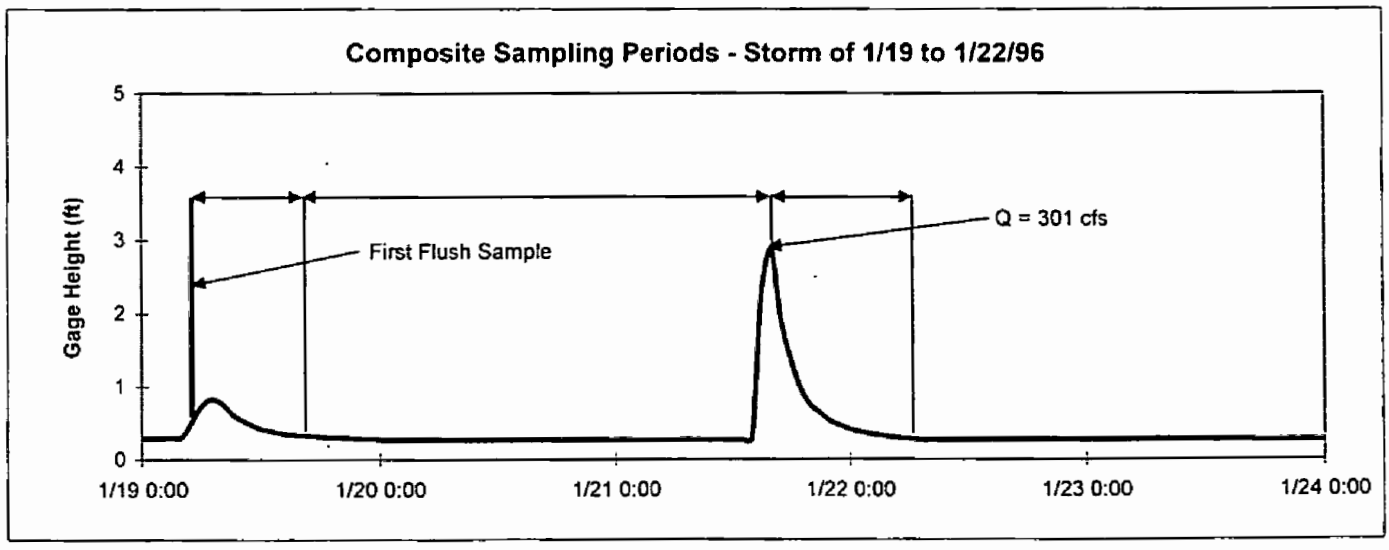

Storm Sampling @ Westminster Channel

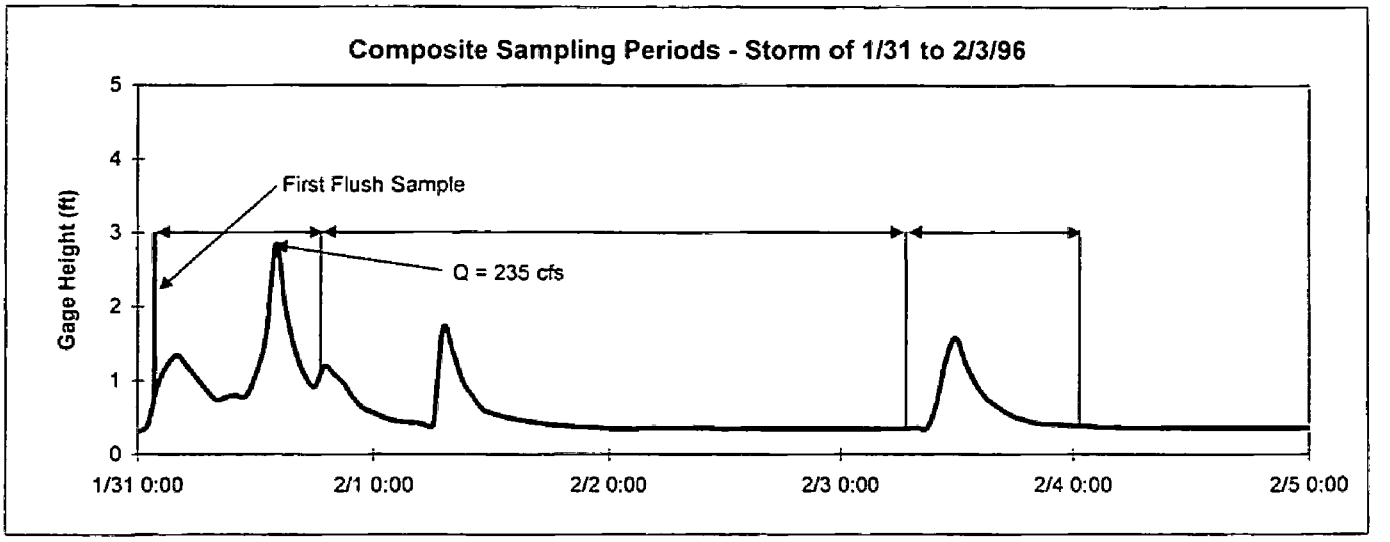

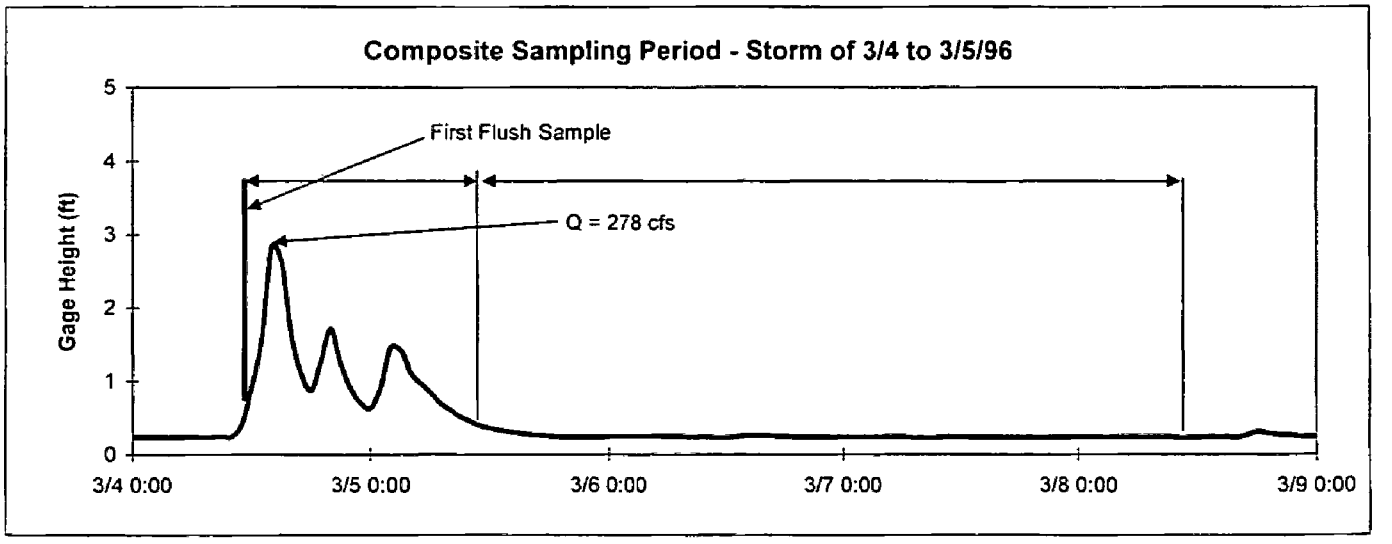

Storm Sampling @ Westminster Channel

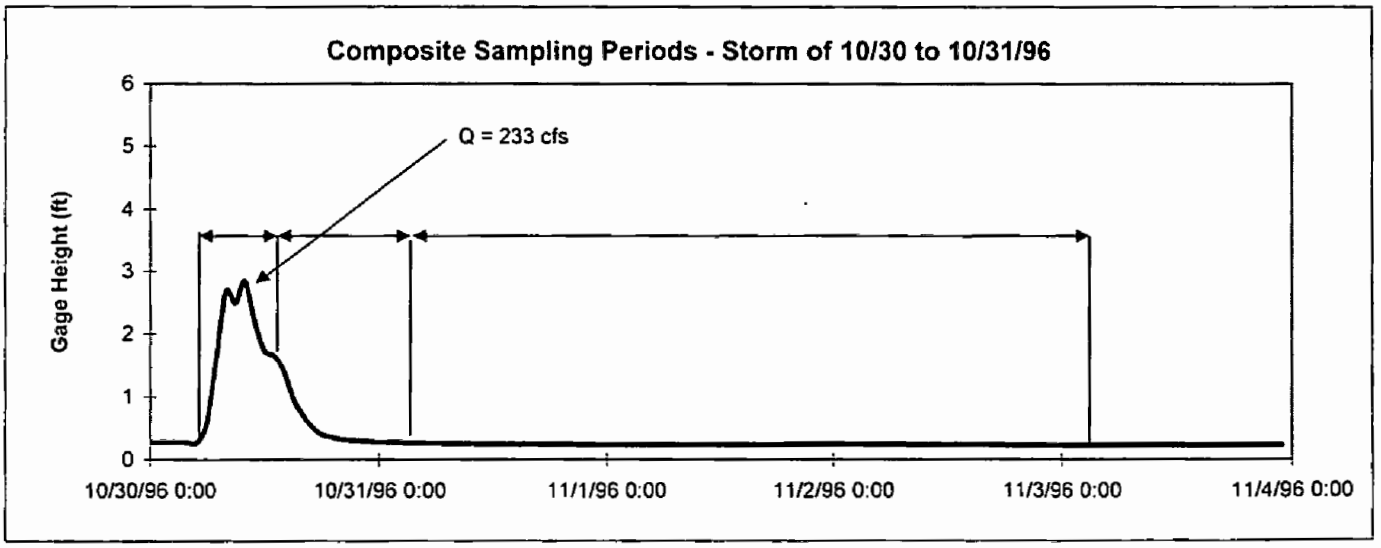

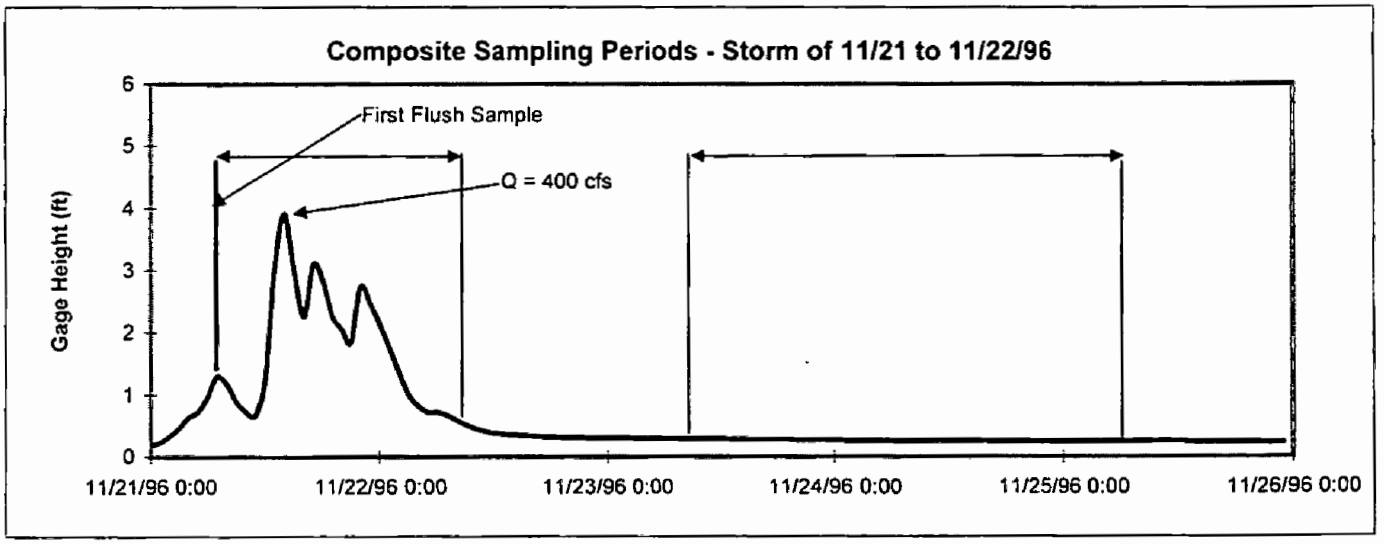

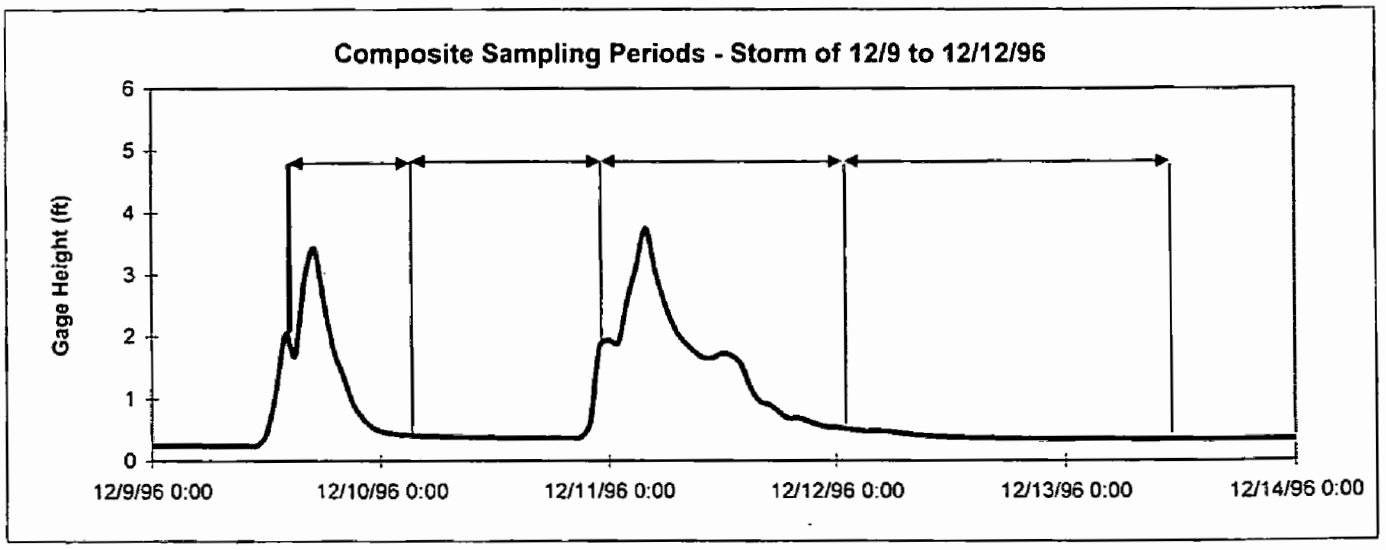

Storm Sampling @ Westminster Channel

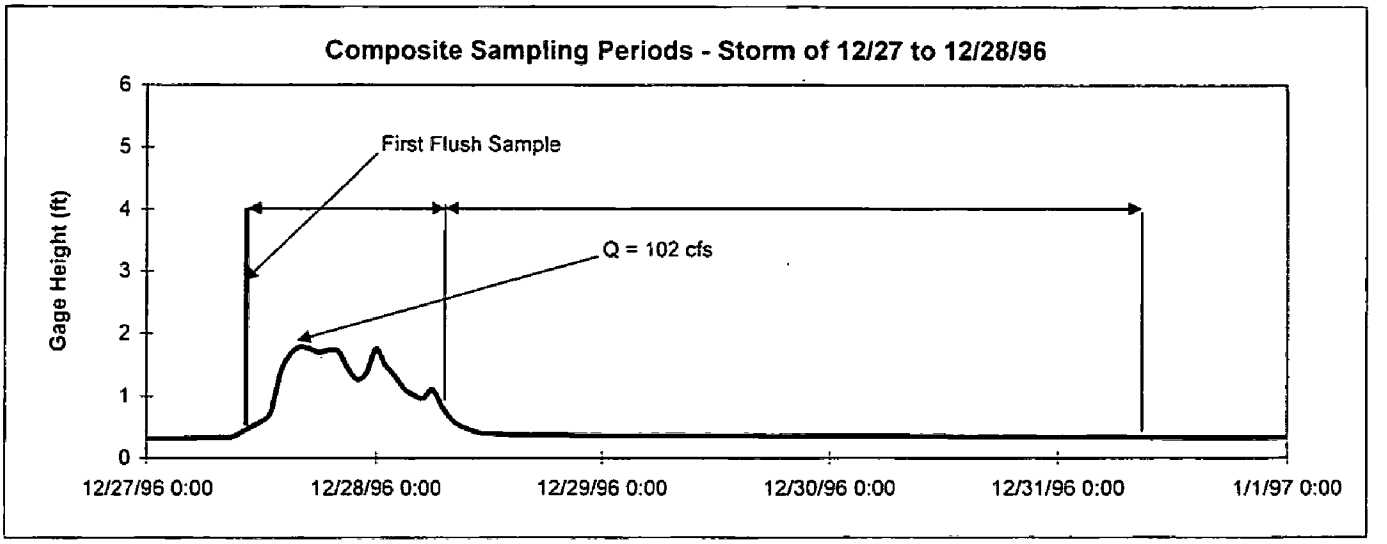

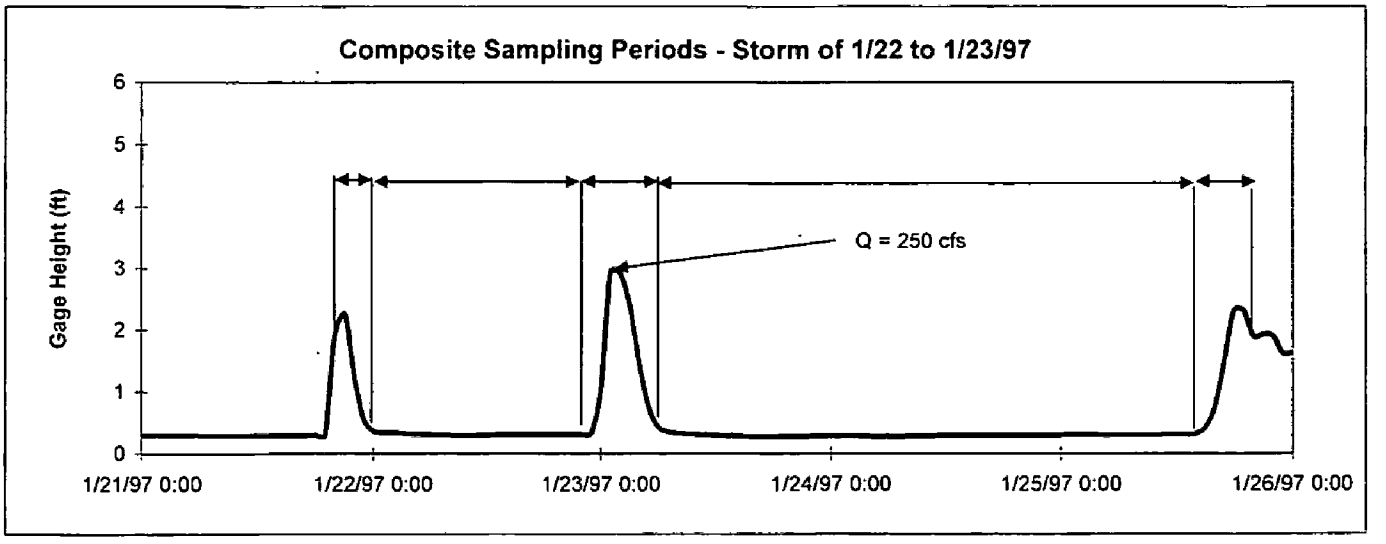

Stormwater Sampling in Westminster Channel

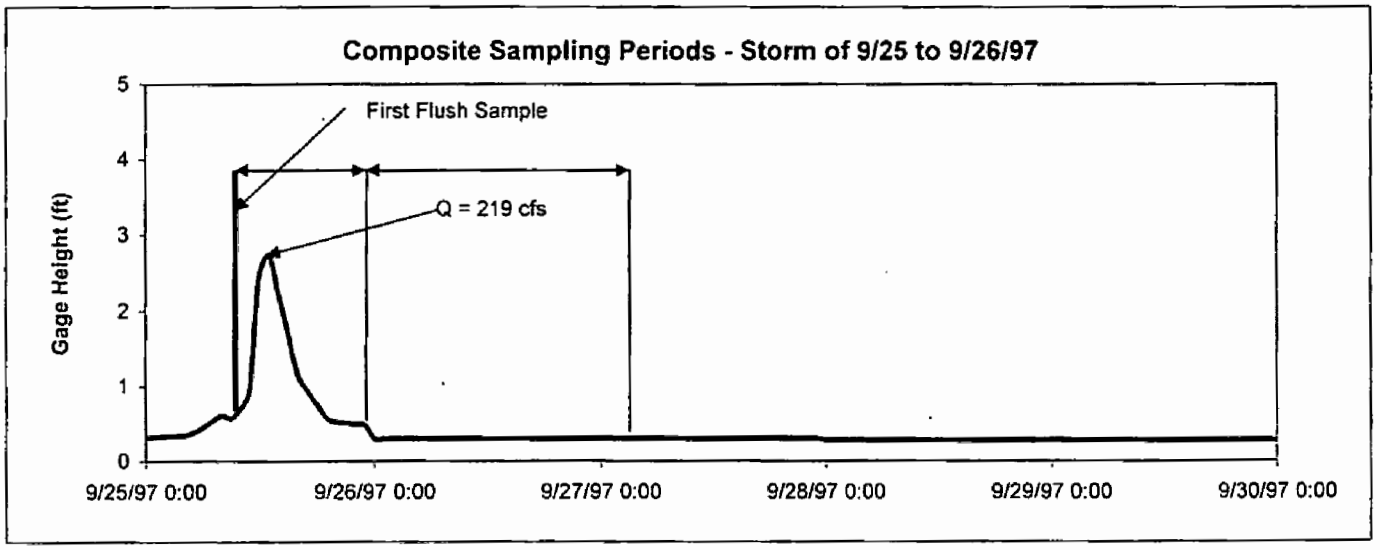

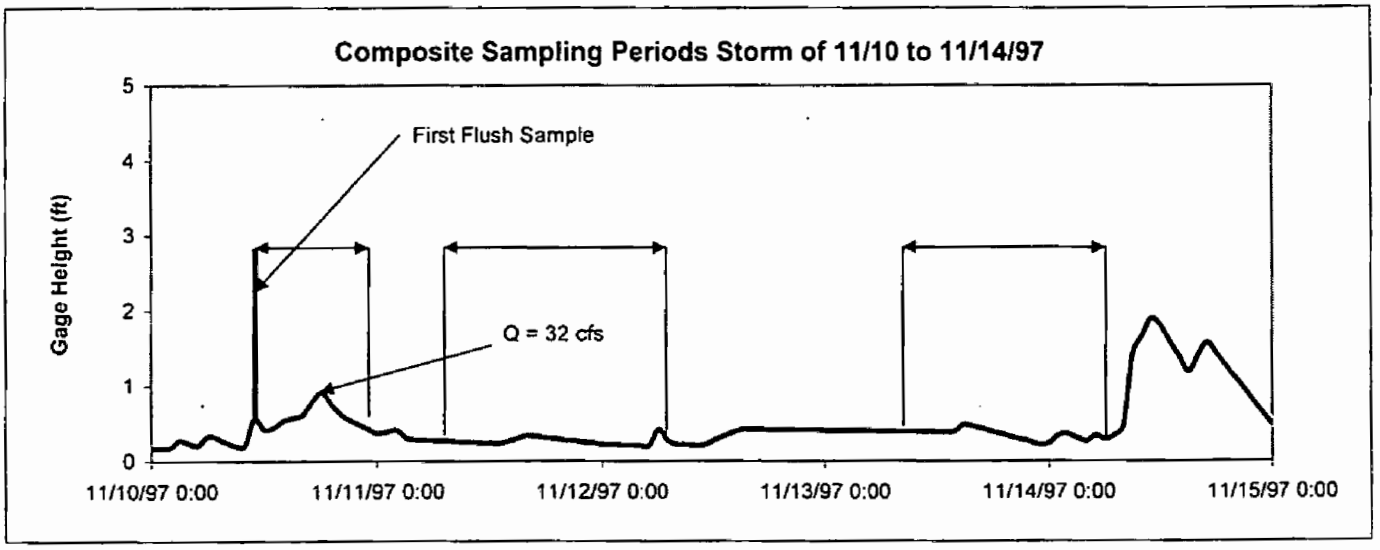

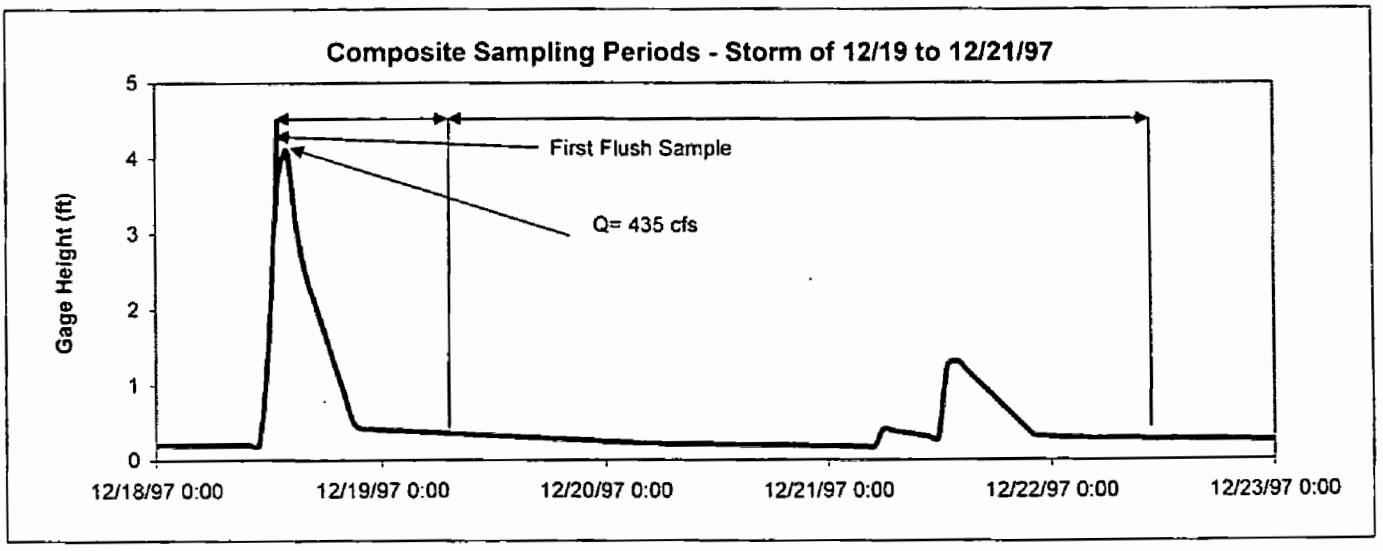

Stormwater Sampling in Westminster Channel

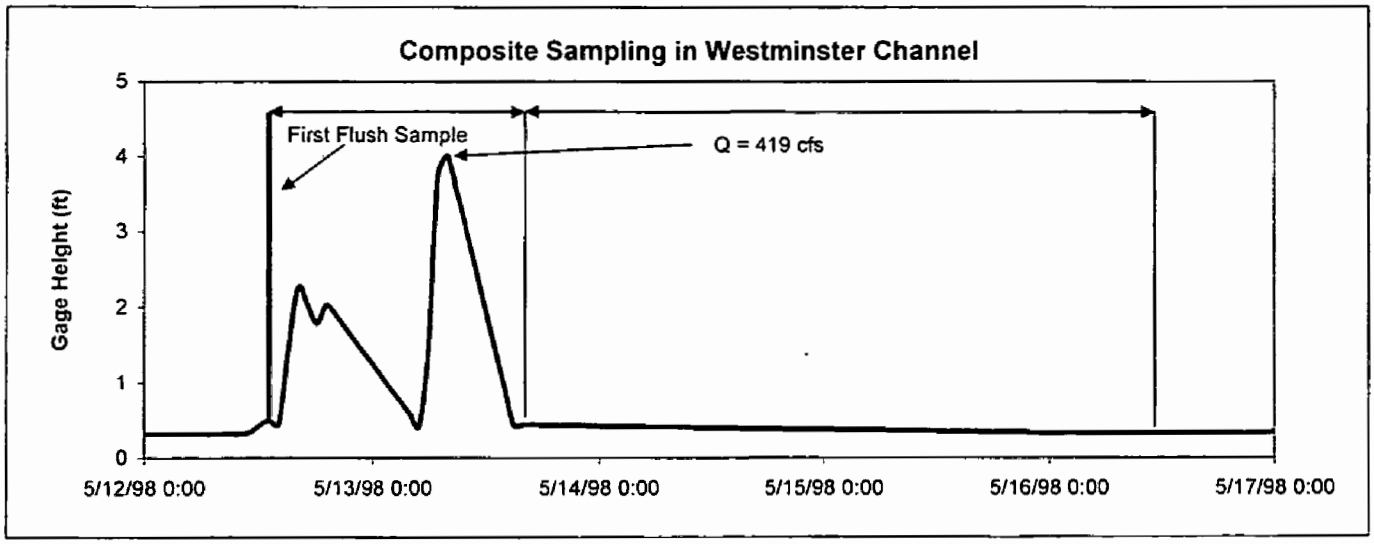

Stormwater Sampling in Westminster Channel

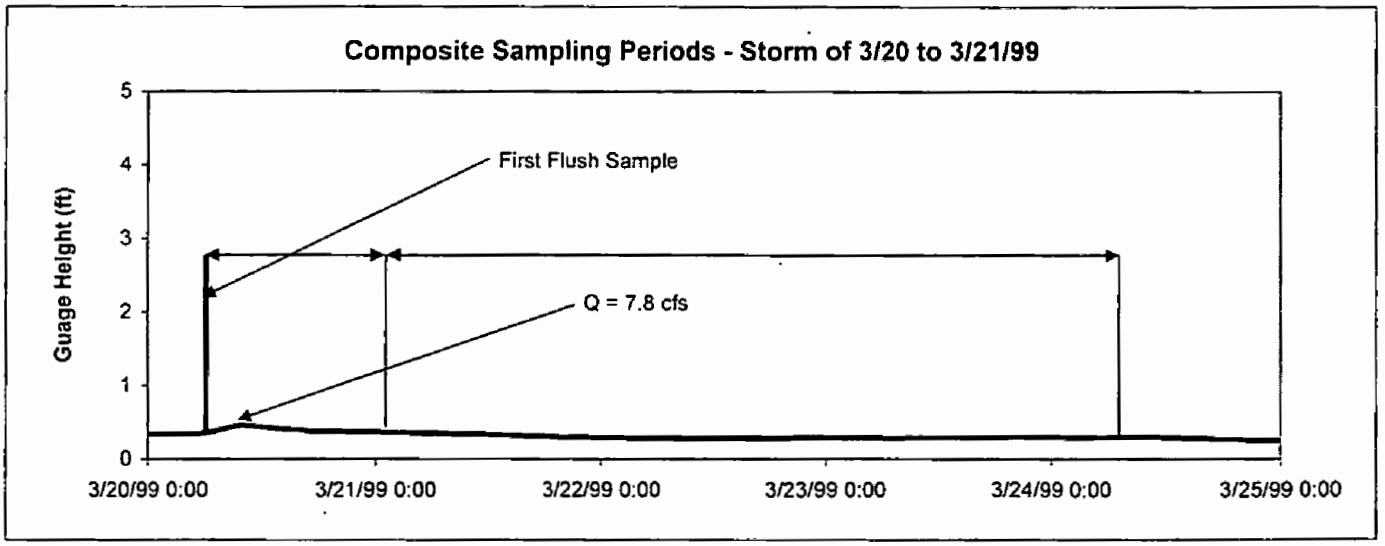

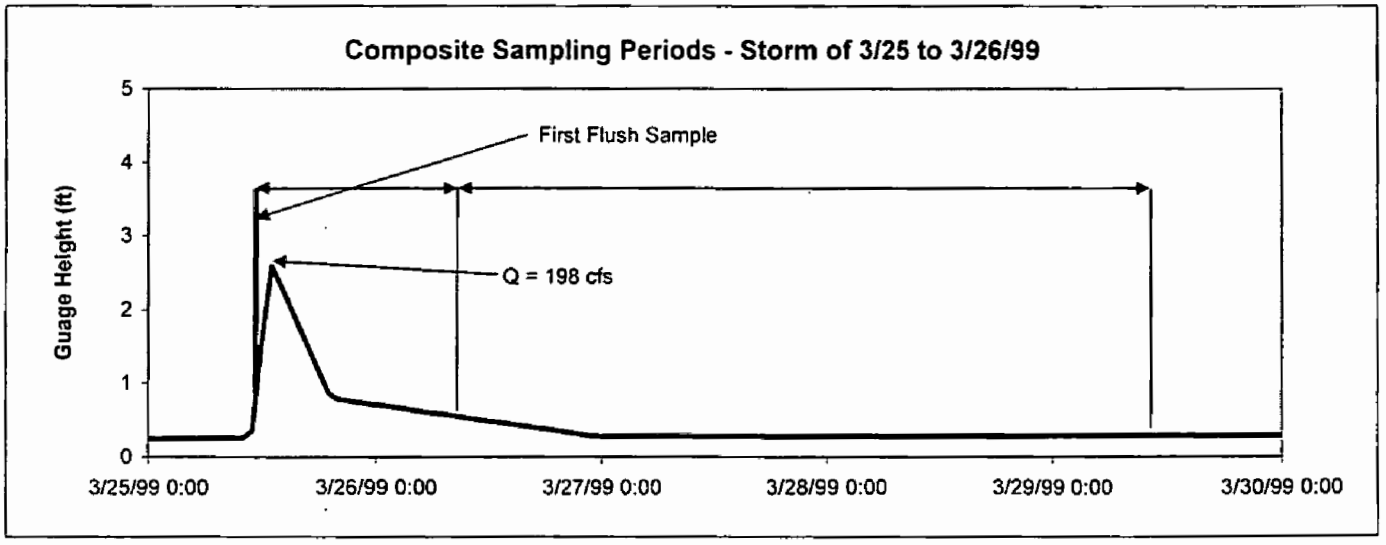

Stormwater Sampling in East Garden Grove Wintersburg Channel

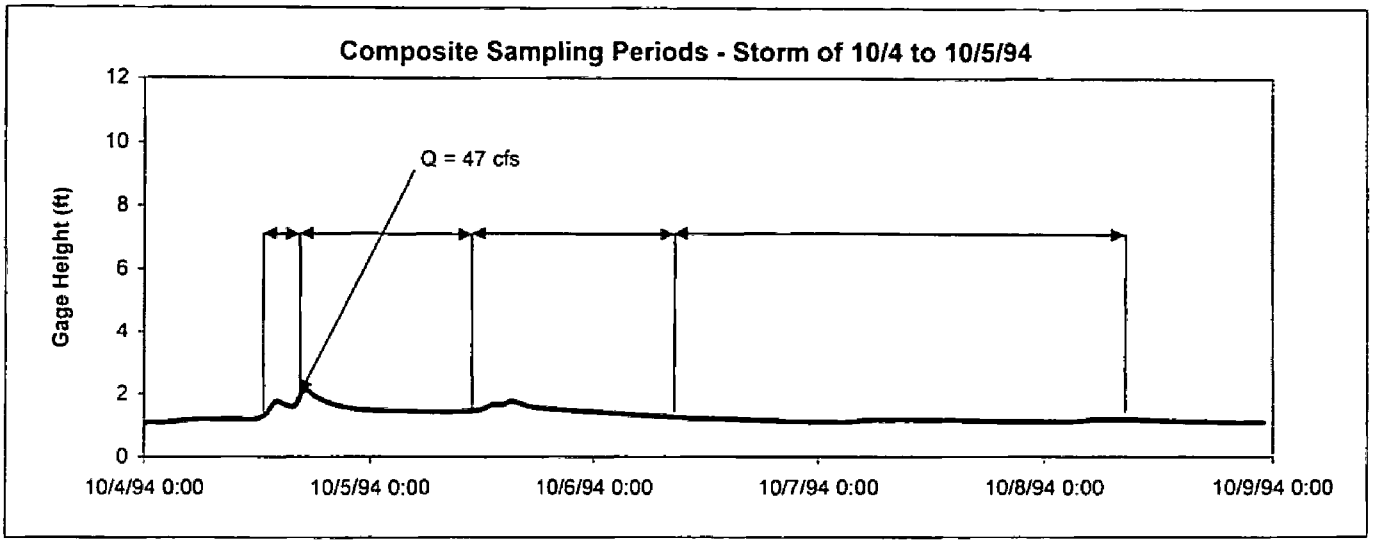

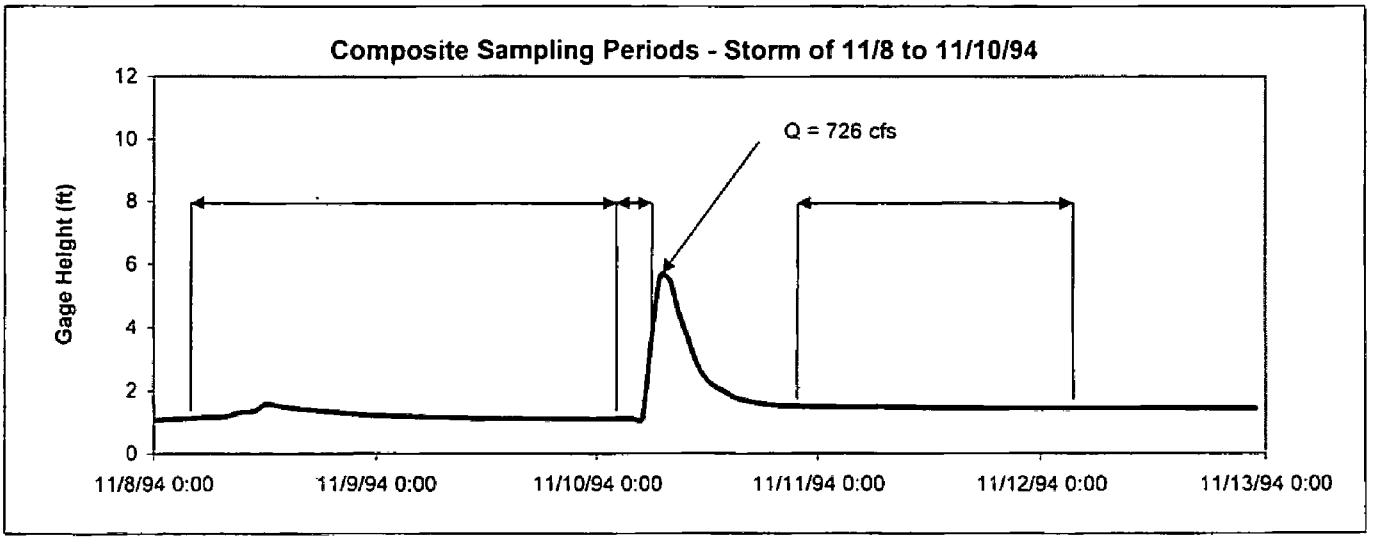

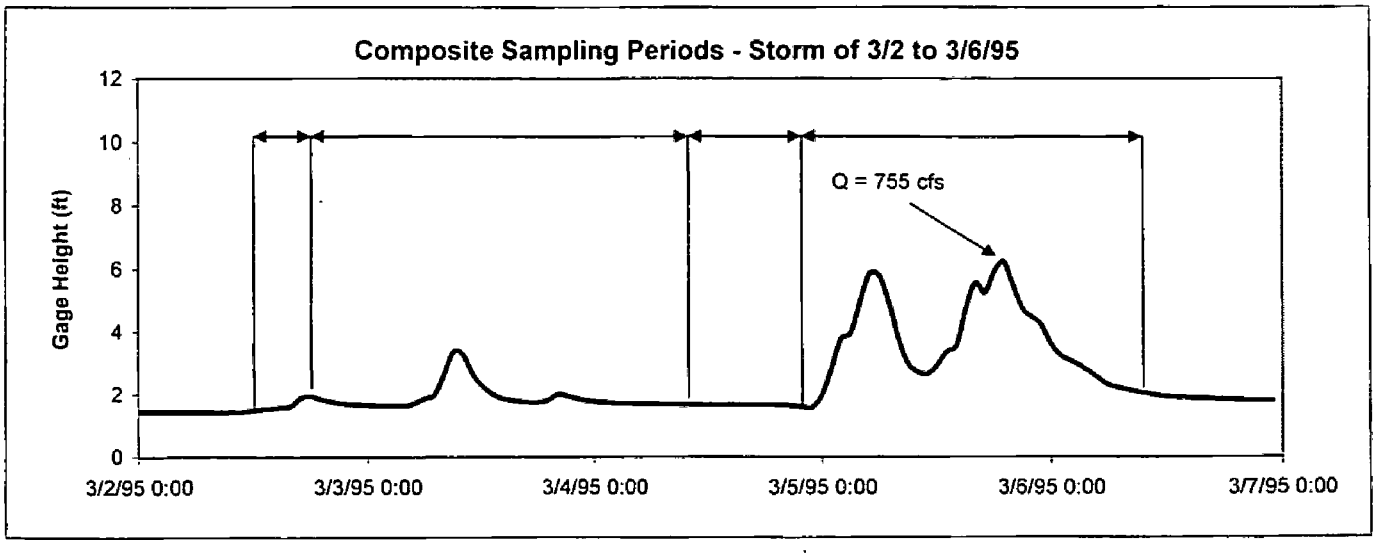

Stormwater Sampling in East Garden Grove Wintersburg Channel

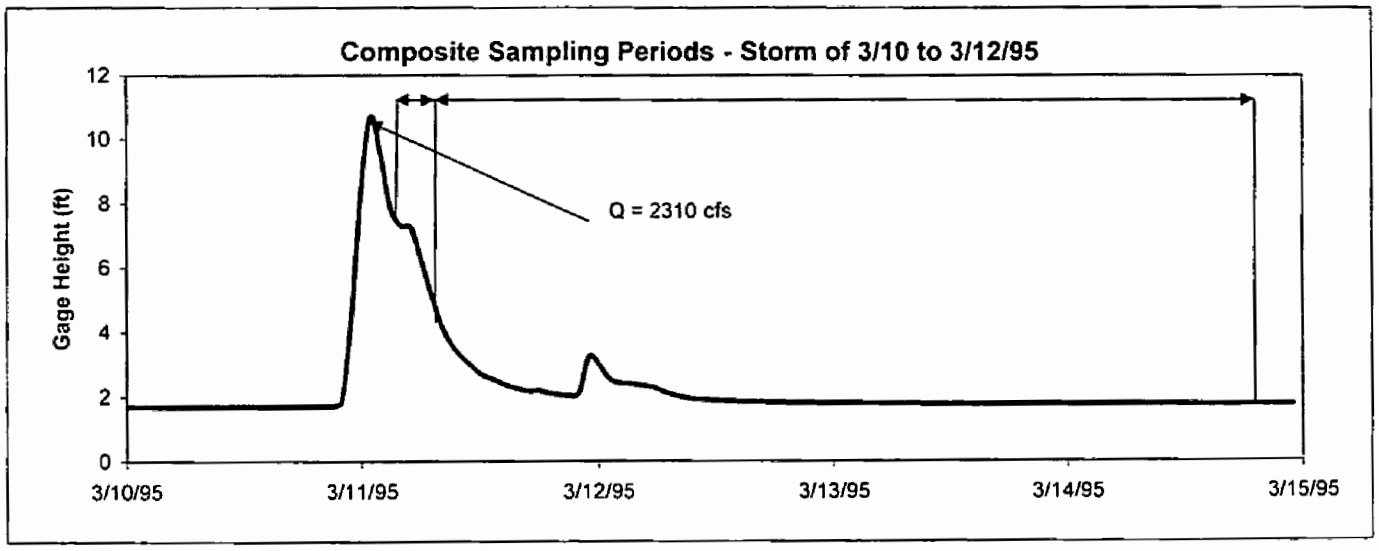

Storm Sampling @ East Garden Grove Wintersburg Channel

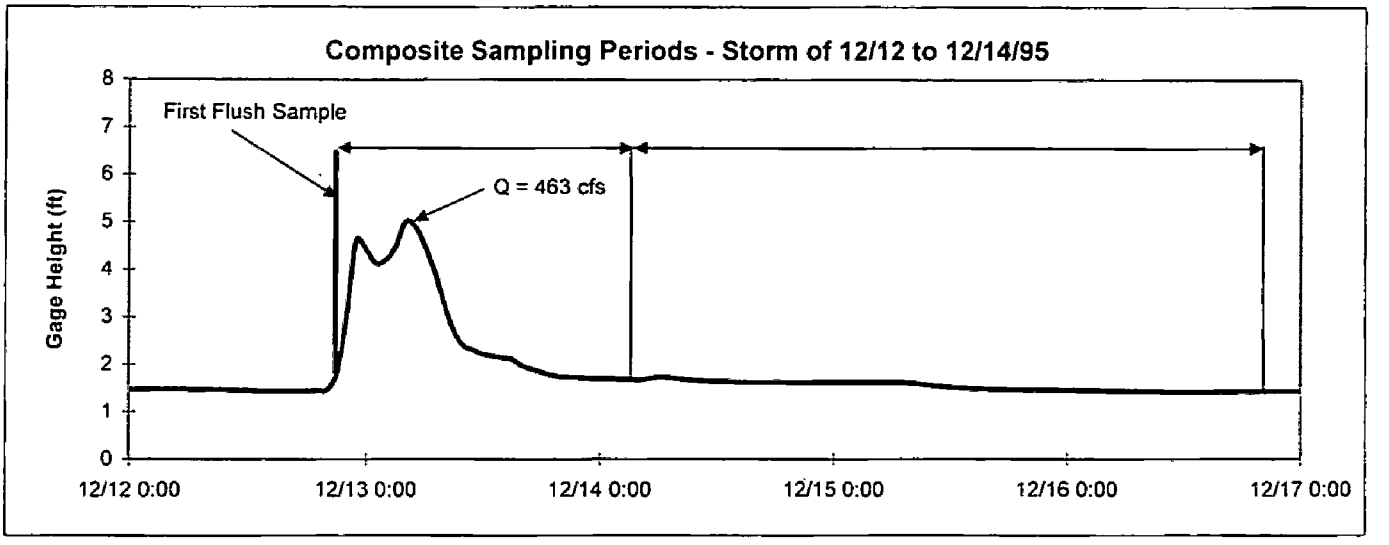

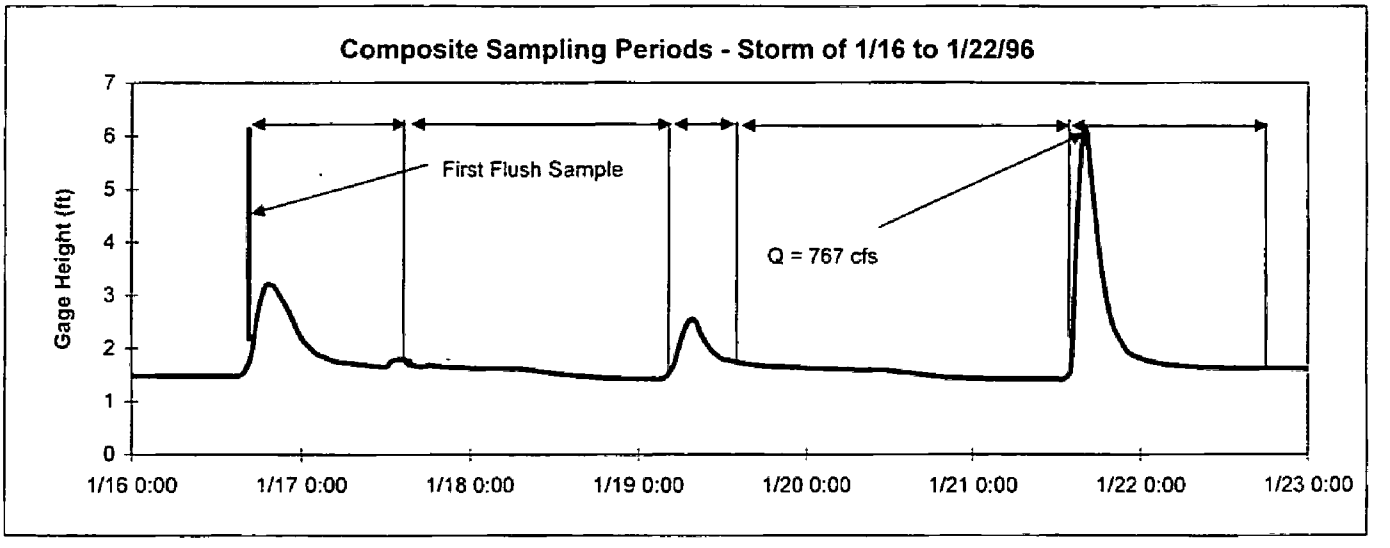

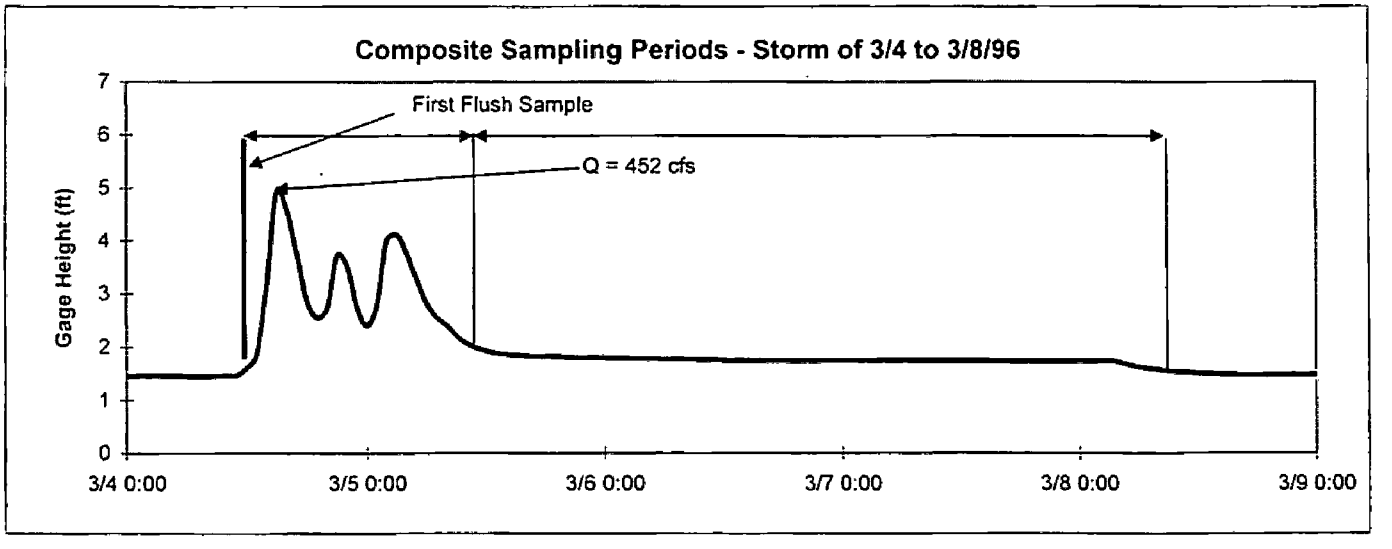

Storm Sampling @ East Garden Grove Wintersburg Channel

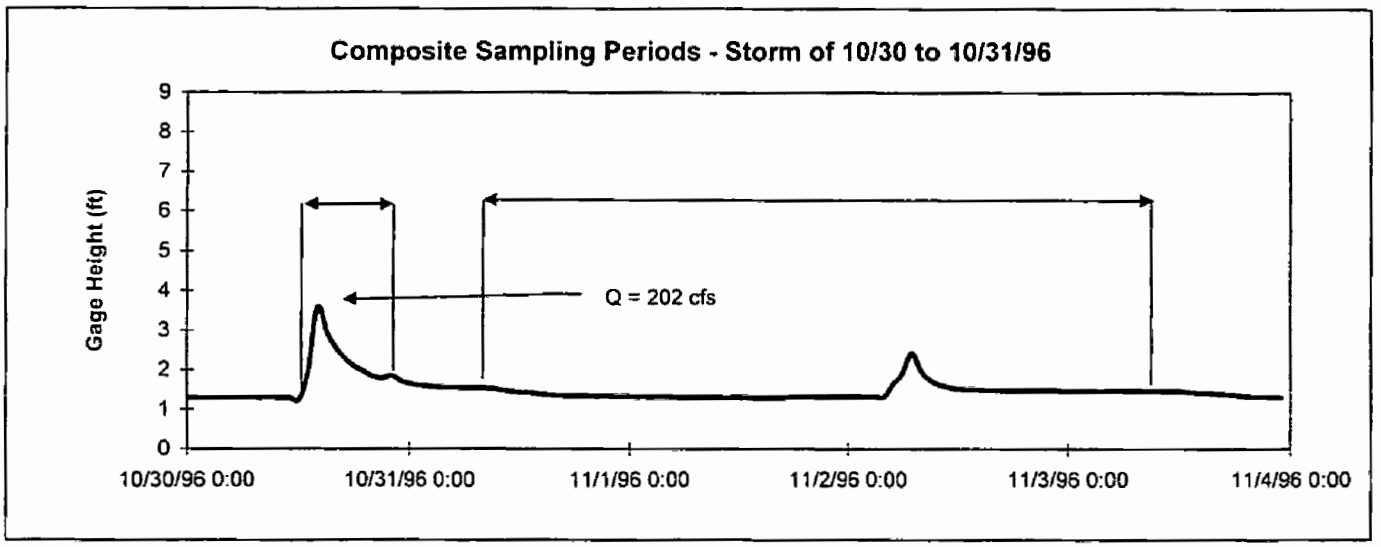

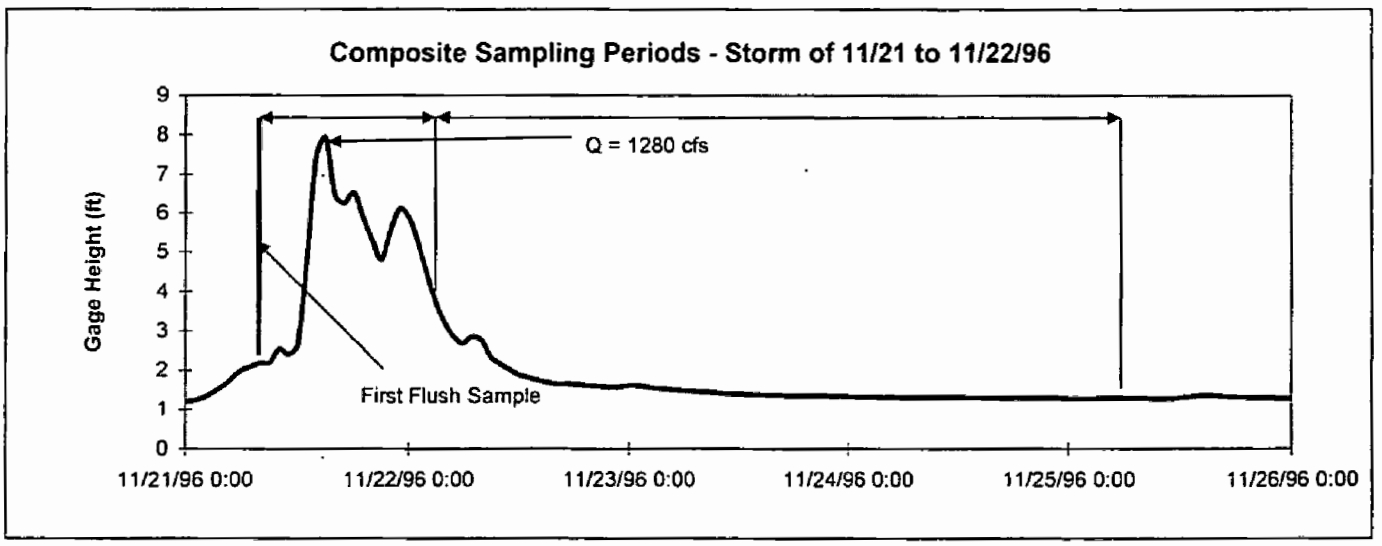

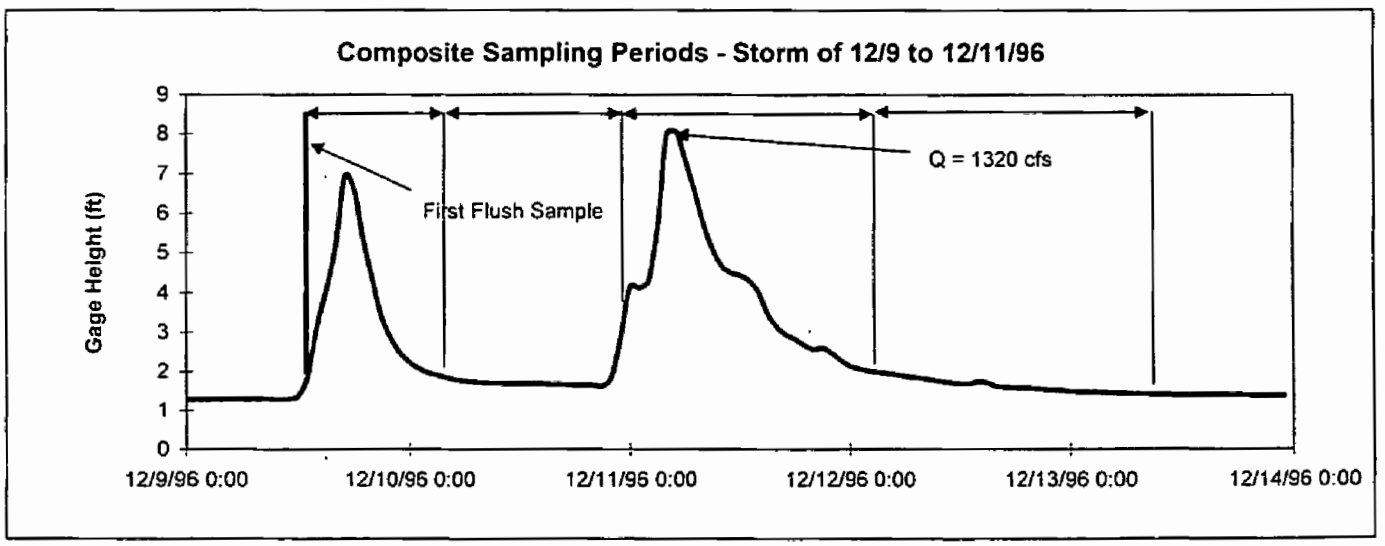

Storm Sampling @ East Garden Grove Wintersburg Channel

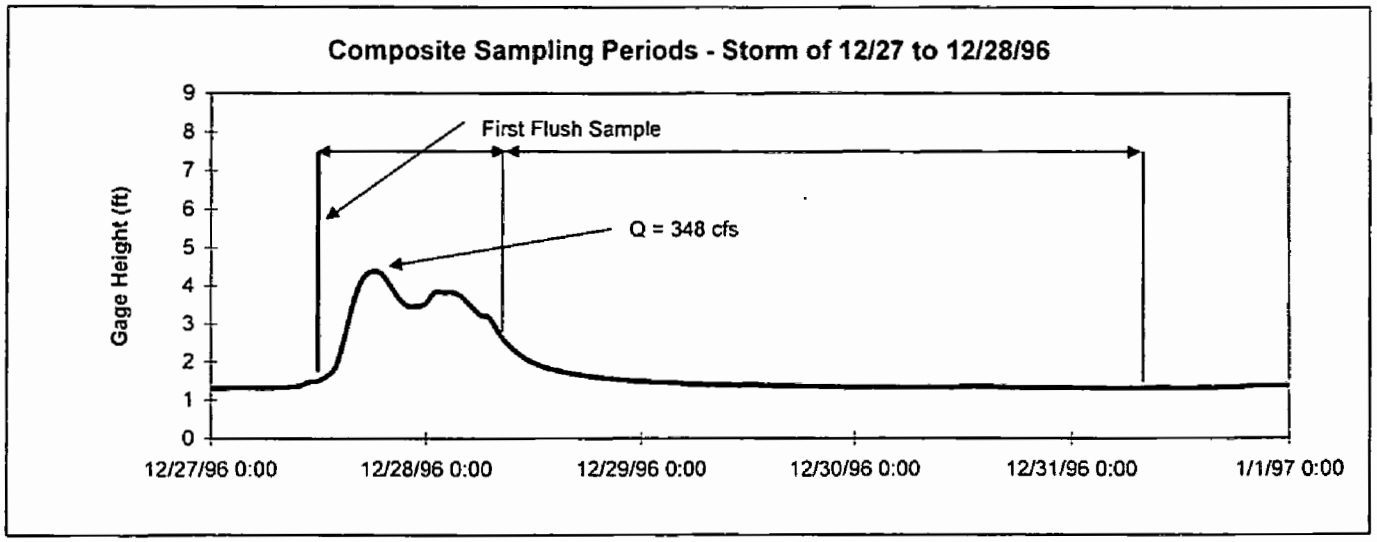

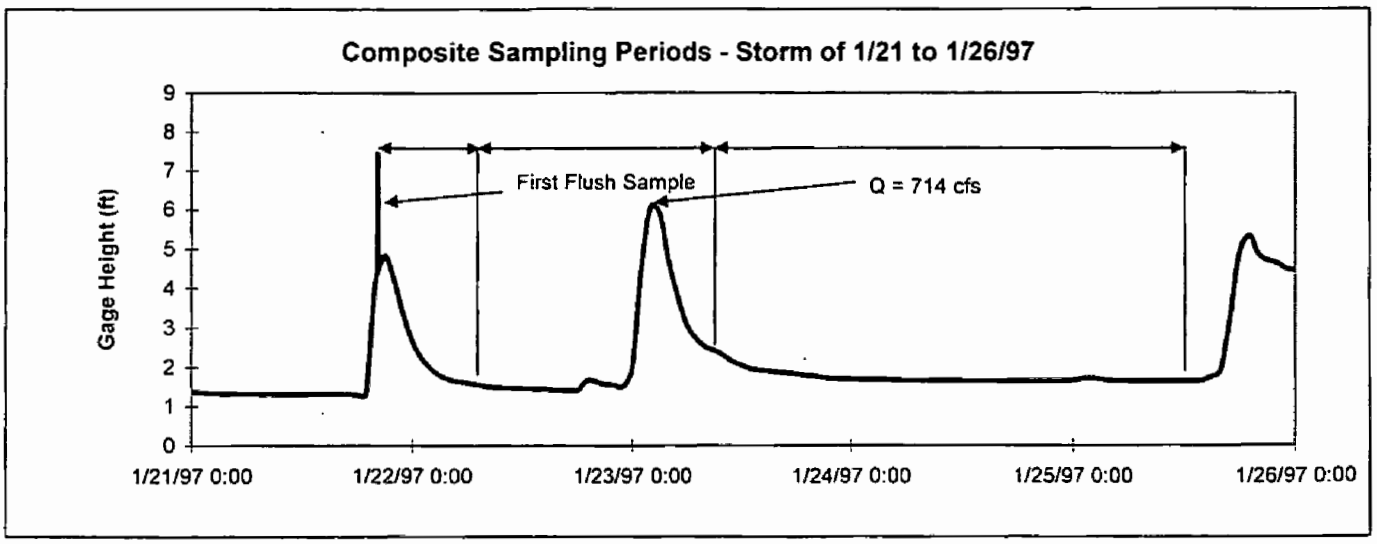

Stormwater Sampling in East Garden Grove Wintersburg Channel

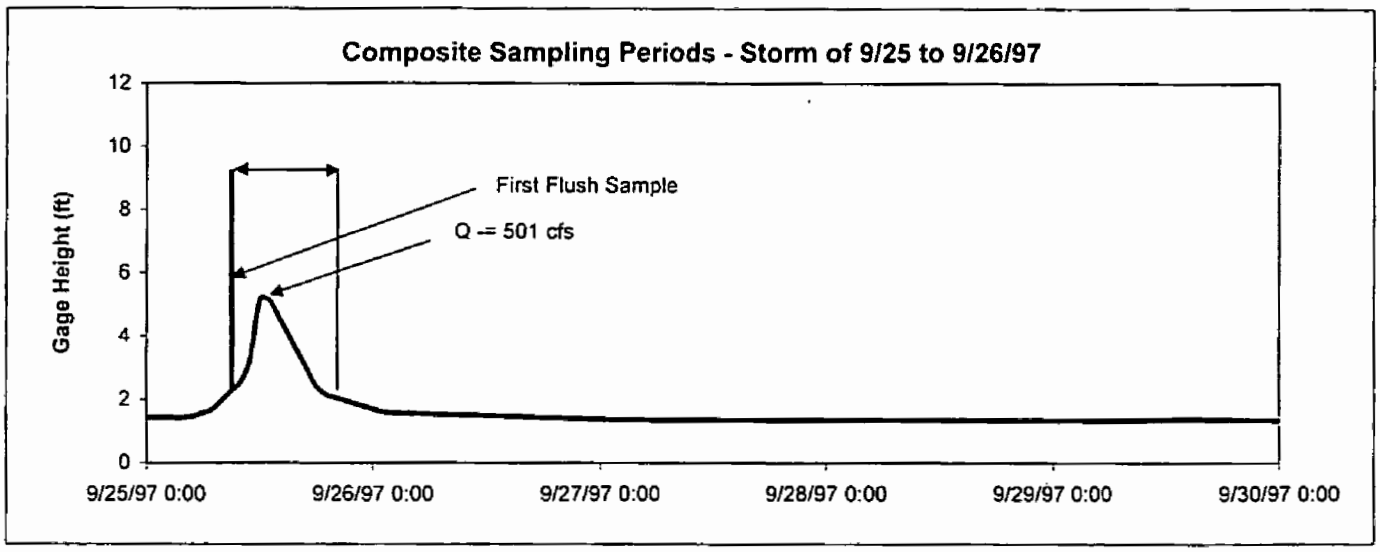

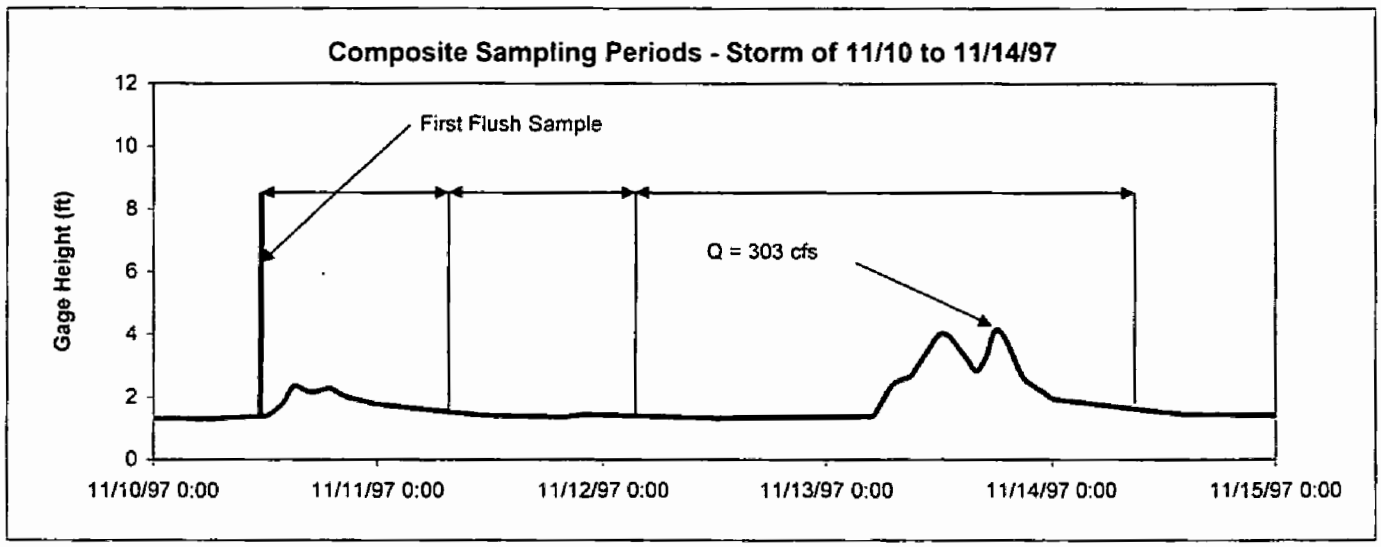

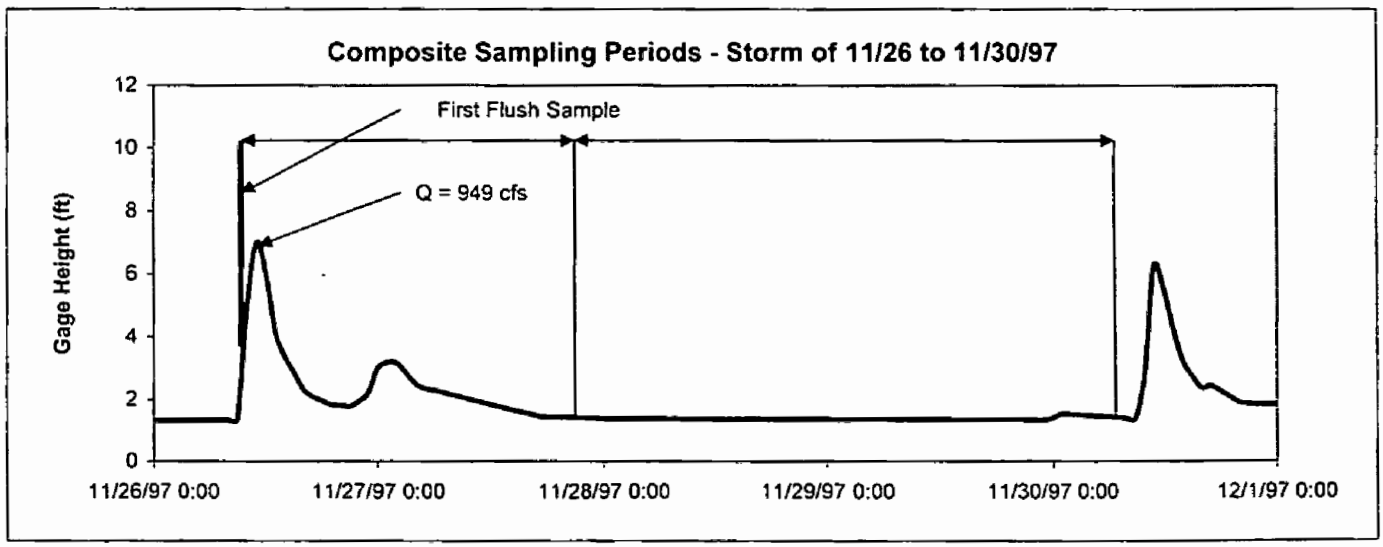

Stormwater Sampling in East Garden Grove Wintersburg Channel

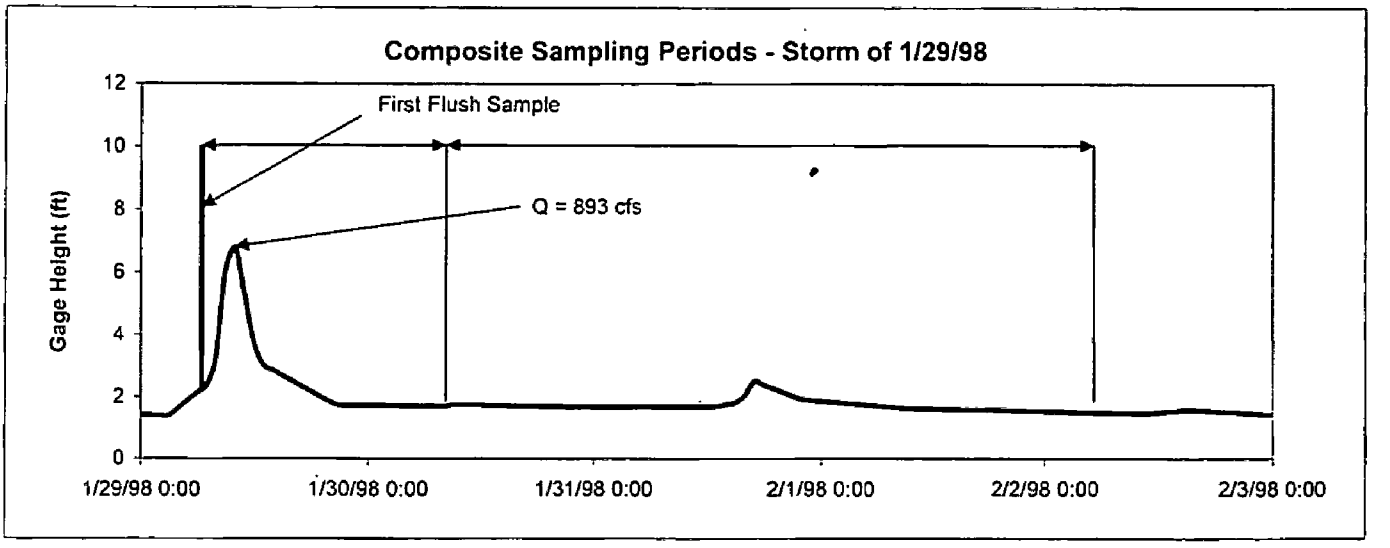

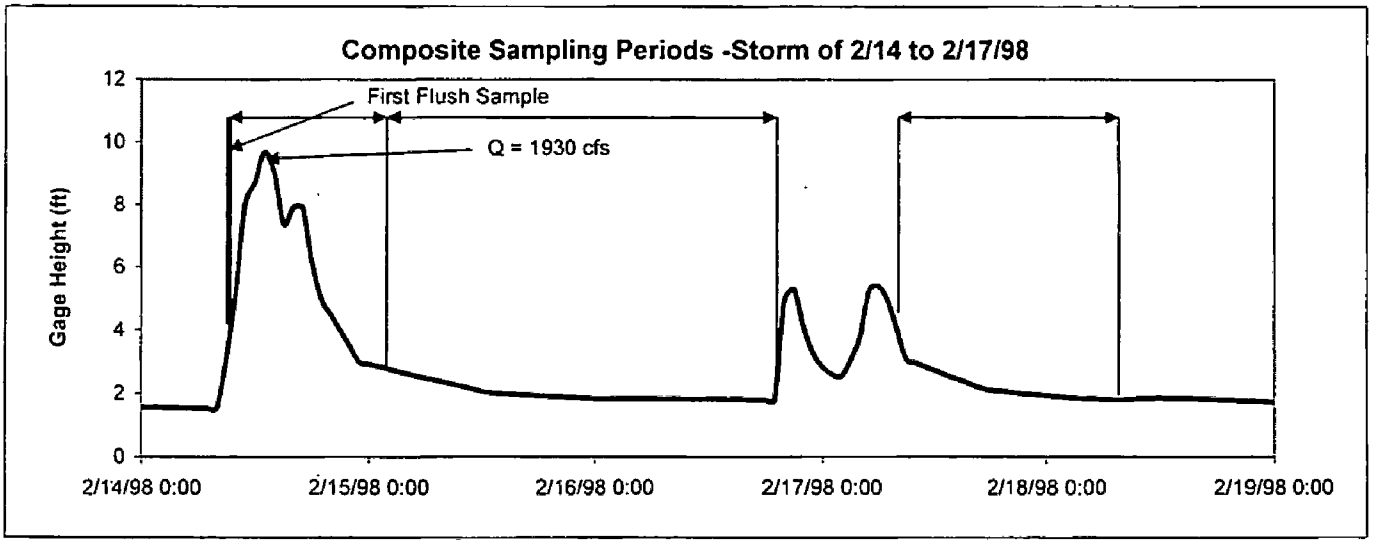

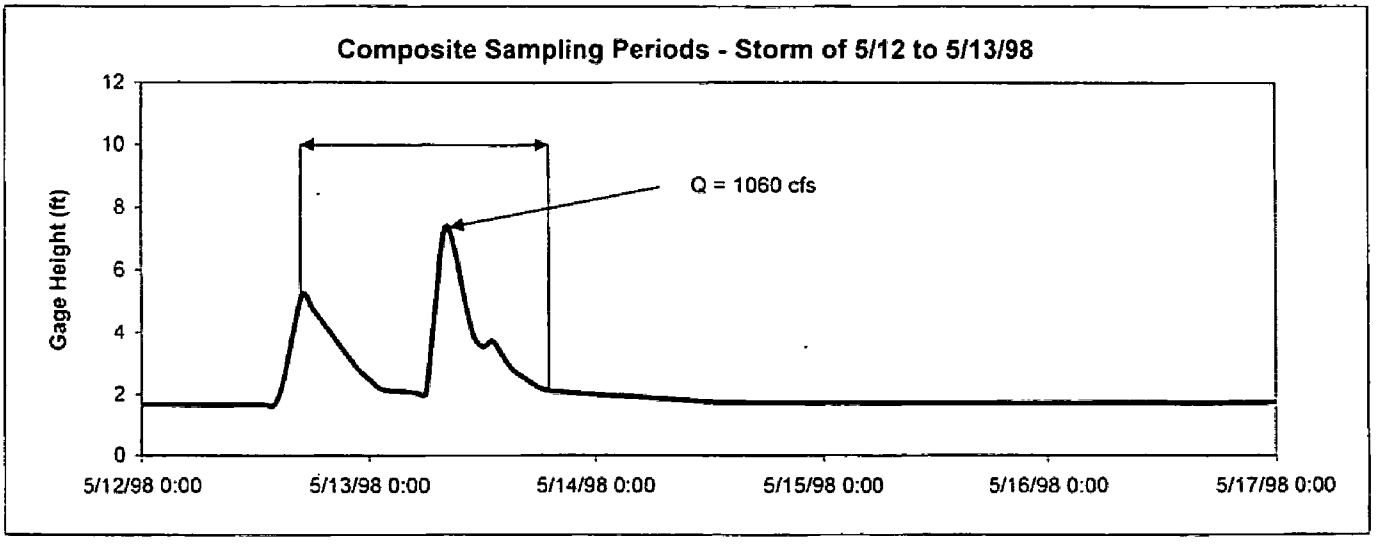

Stormwater Sampling in East Garden Grove Wintersburg Channel

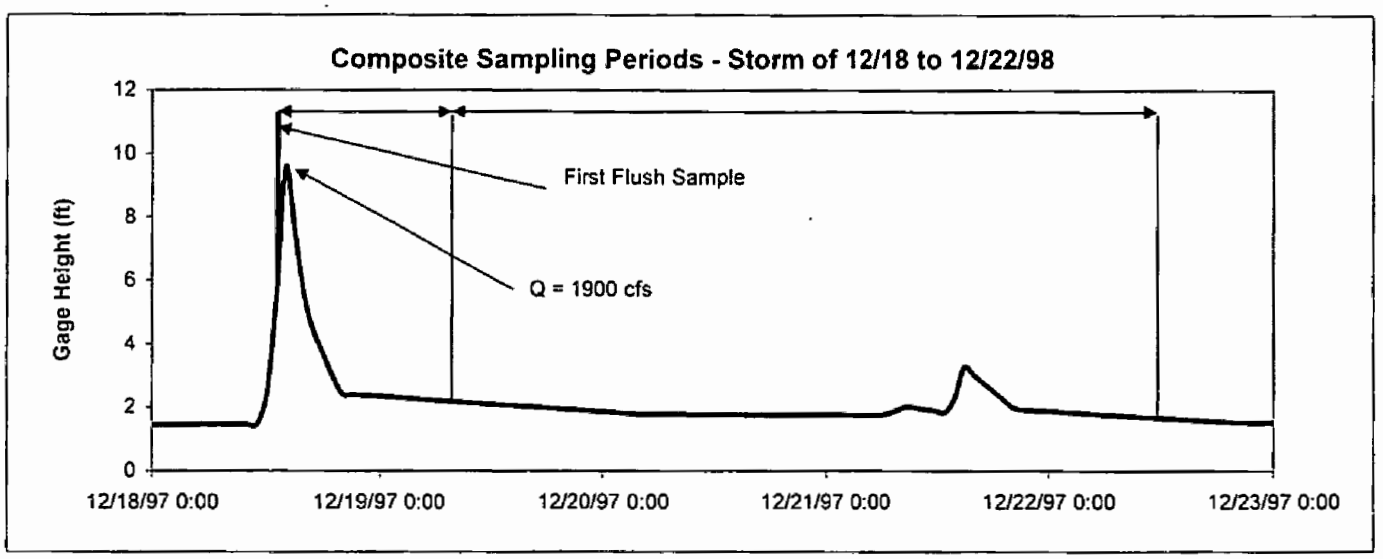

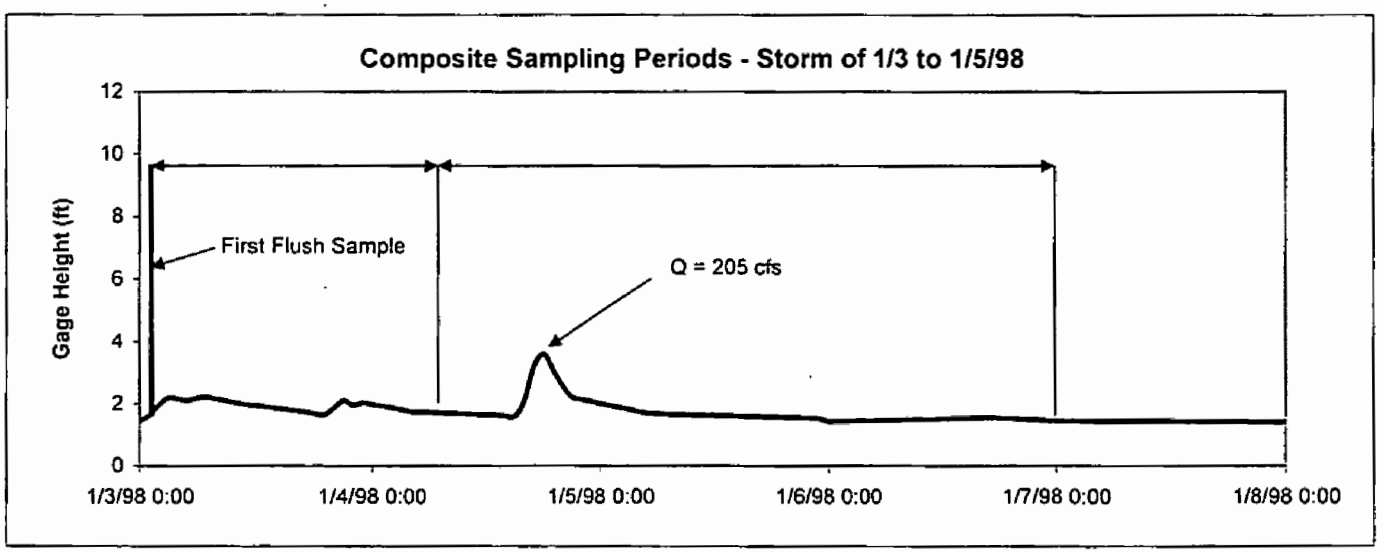

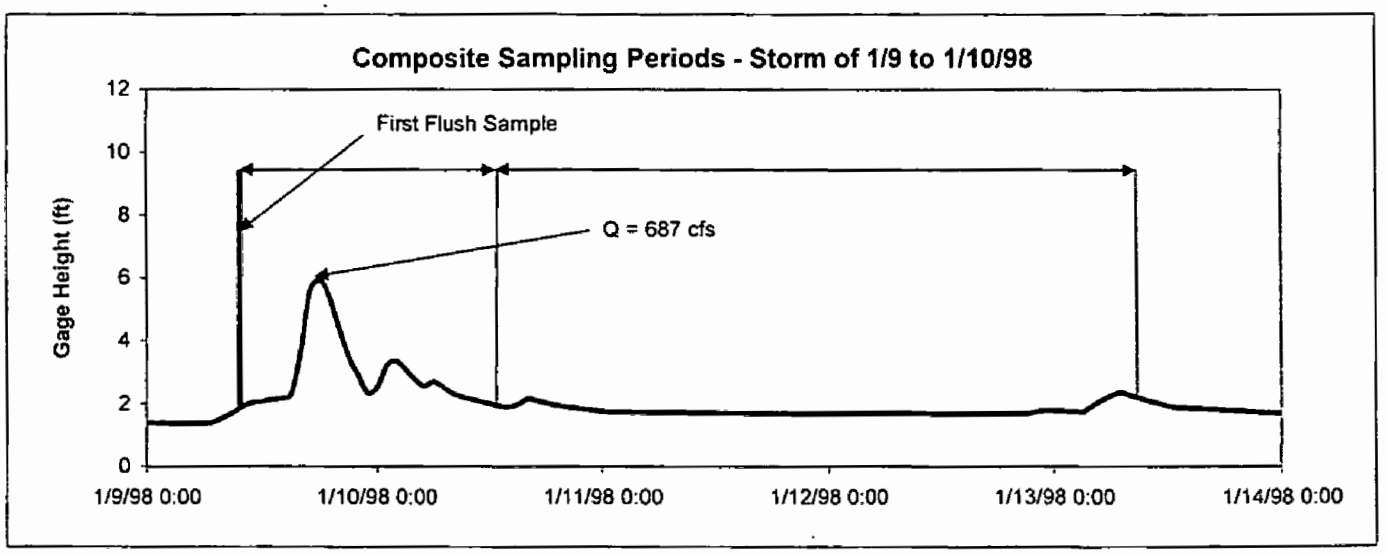

Stormwater Sampling in East Garden Grove Wintersburg Channel

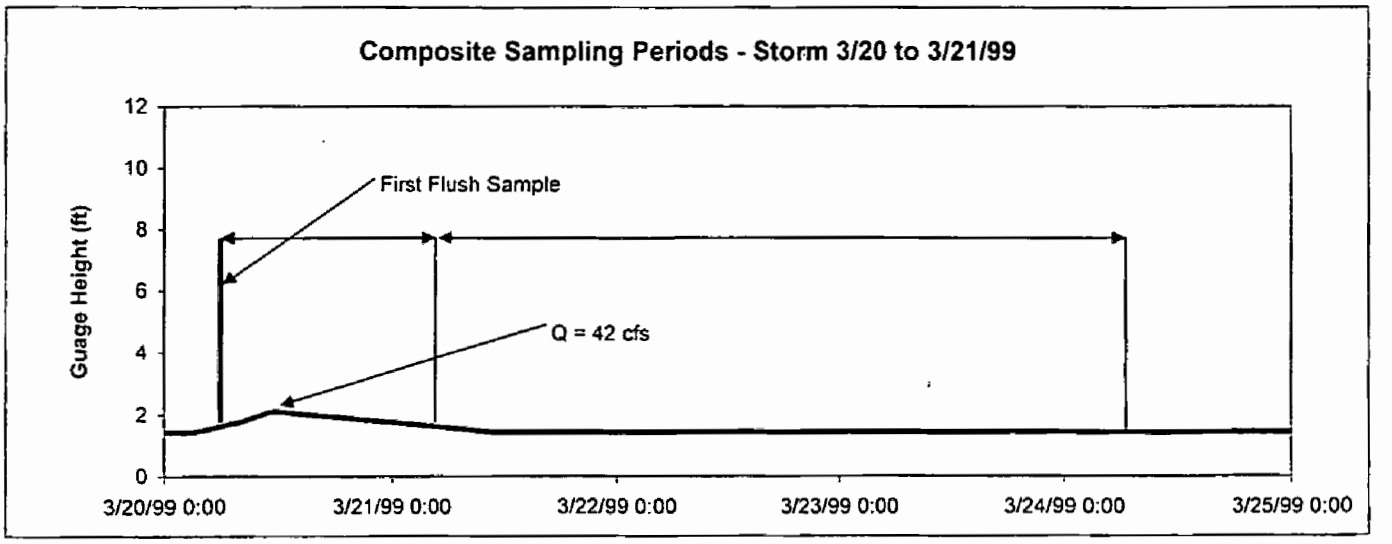

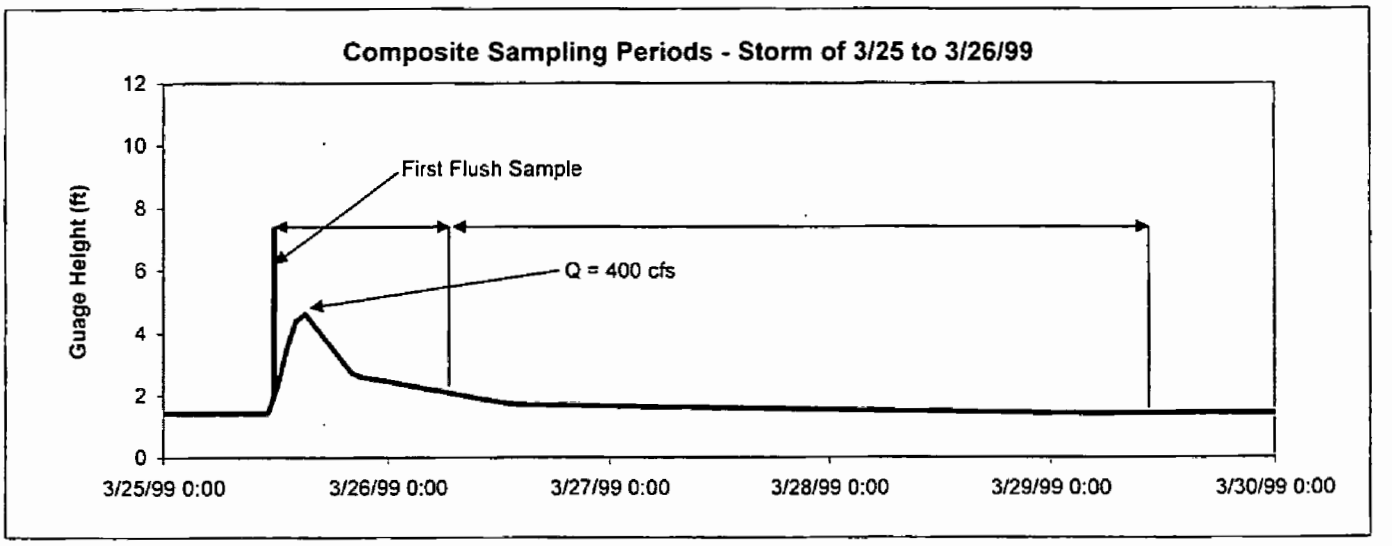

Stormwater Sampling in East Garden Grove Wintersburg Channel

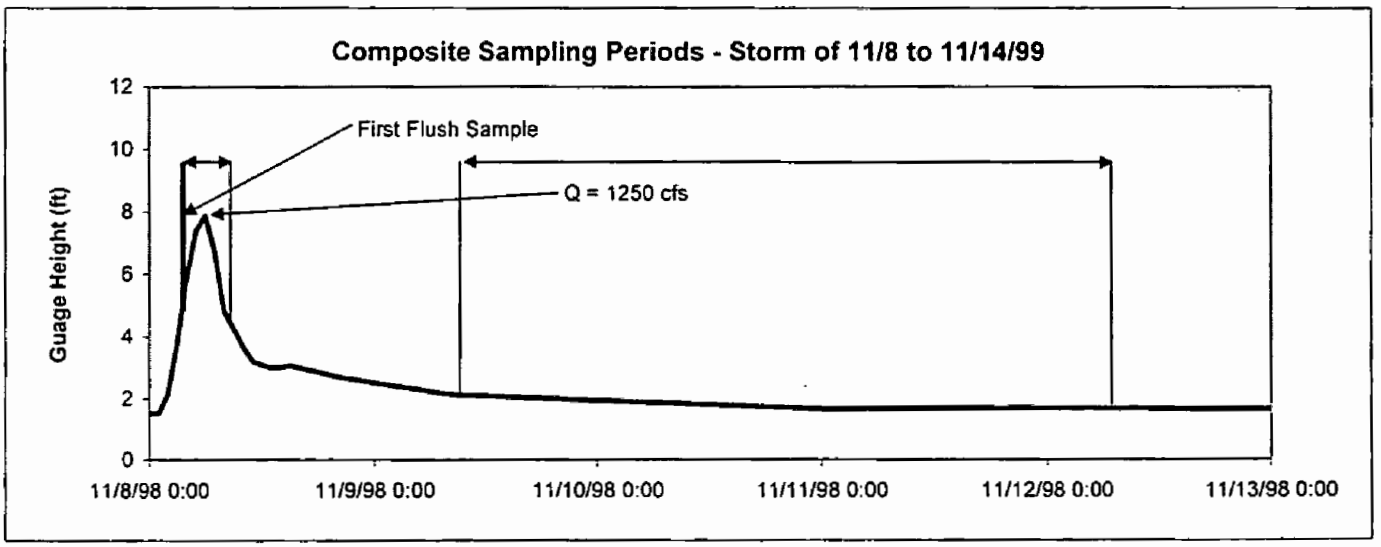

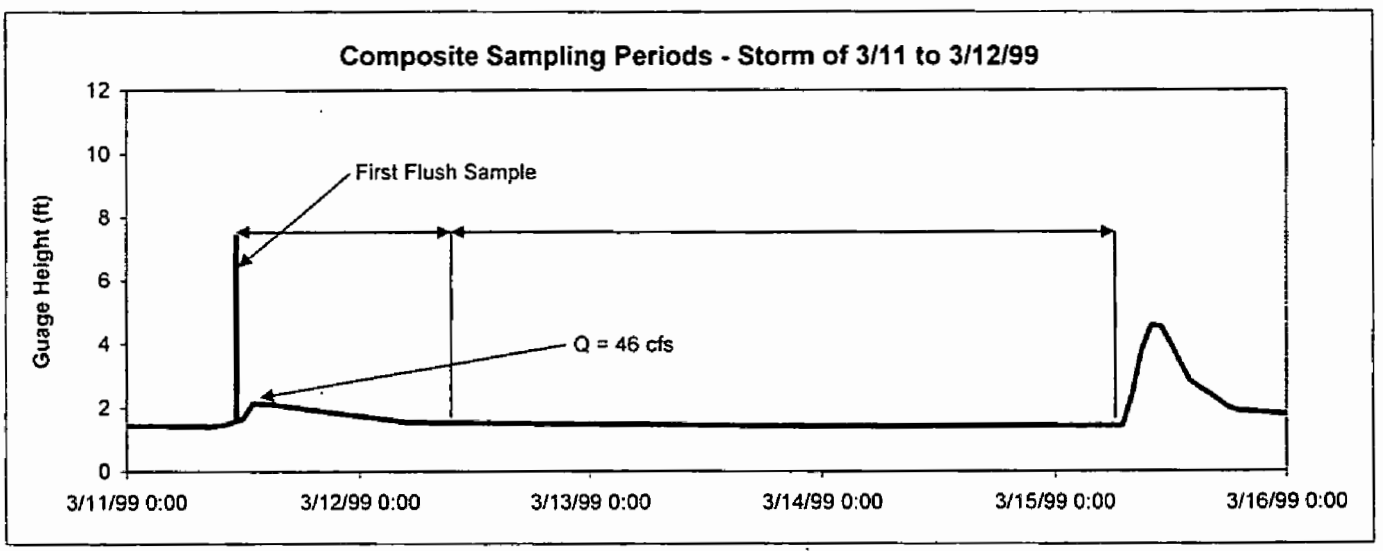

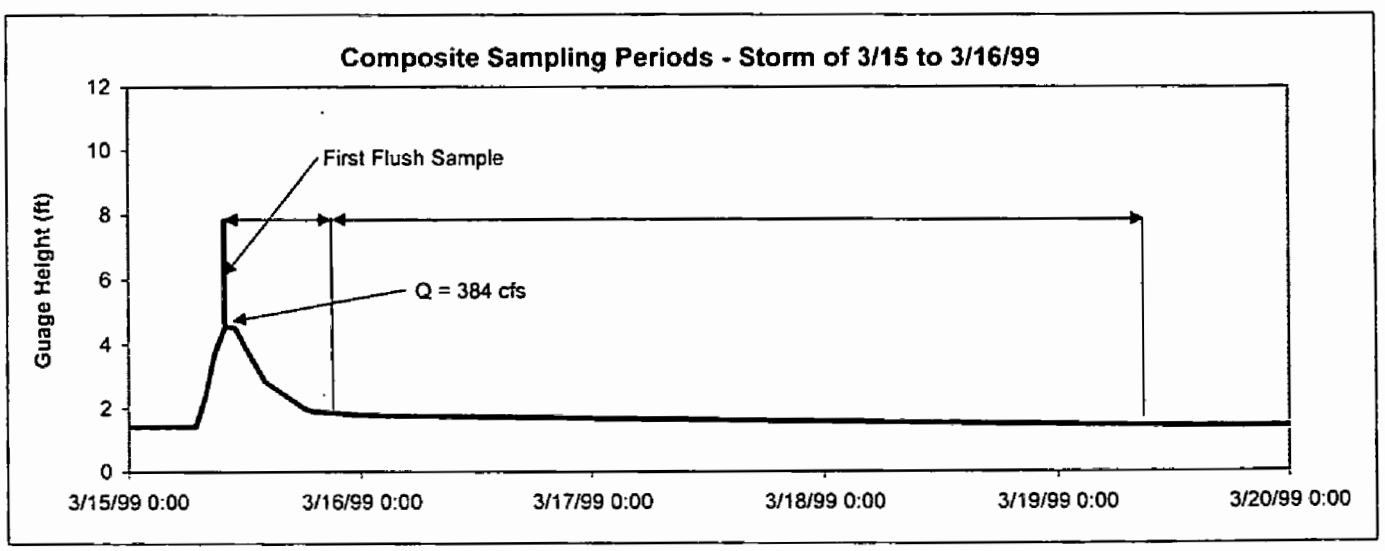

Stormwater Sampling in Anaheim Barber City Channel

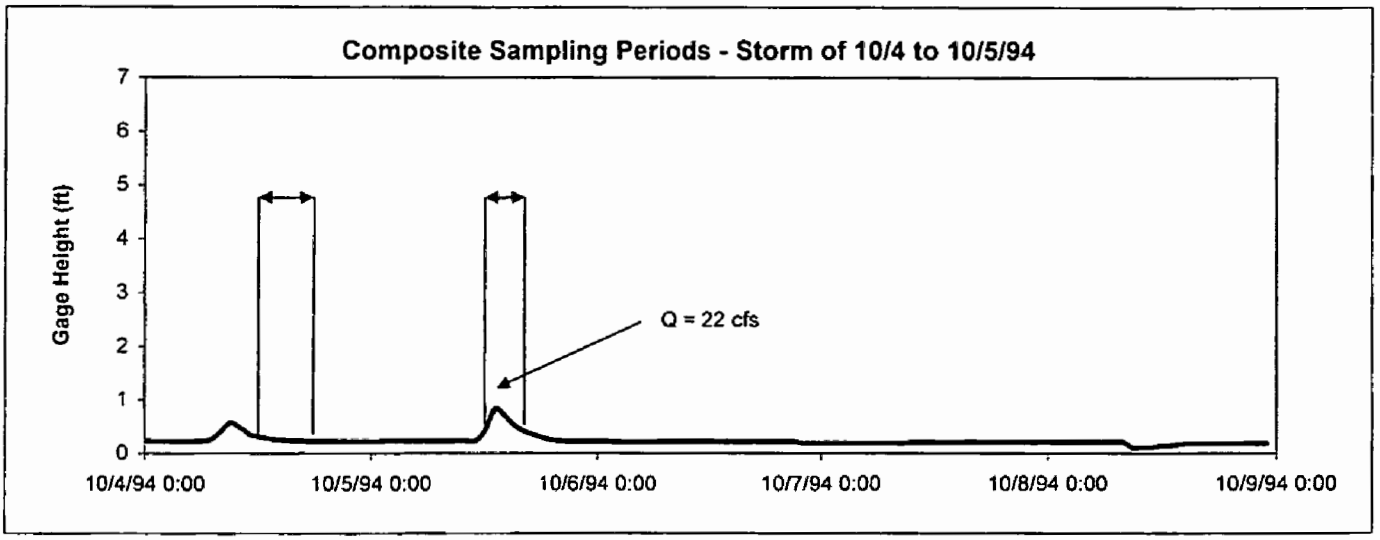

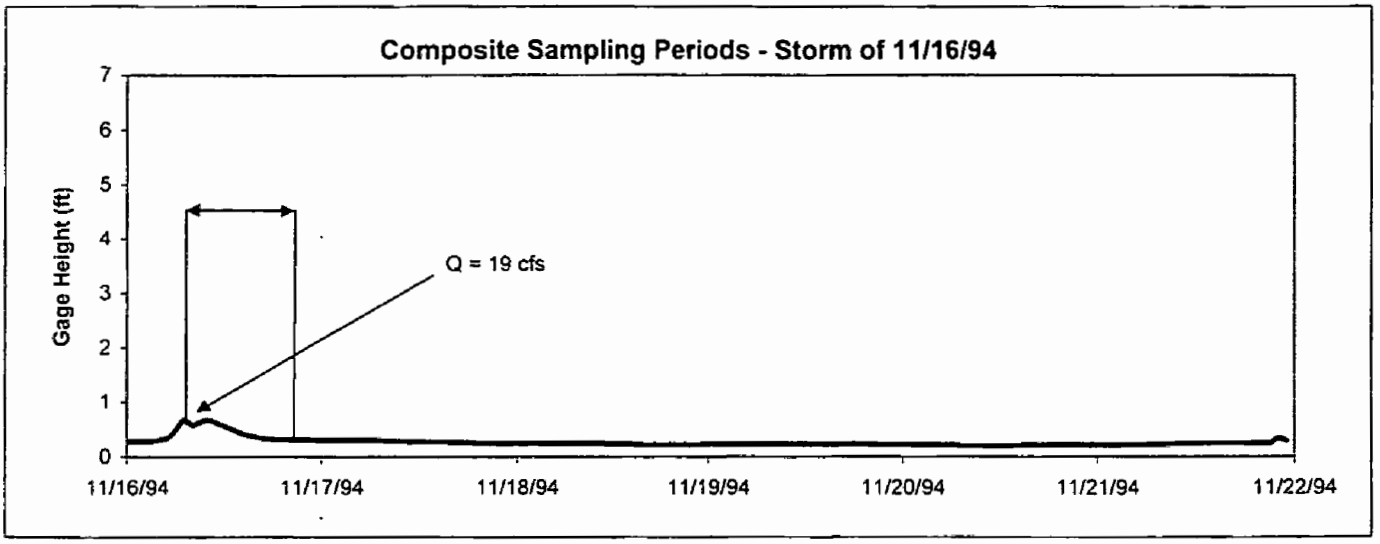

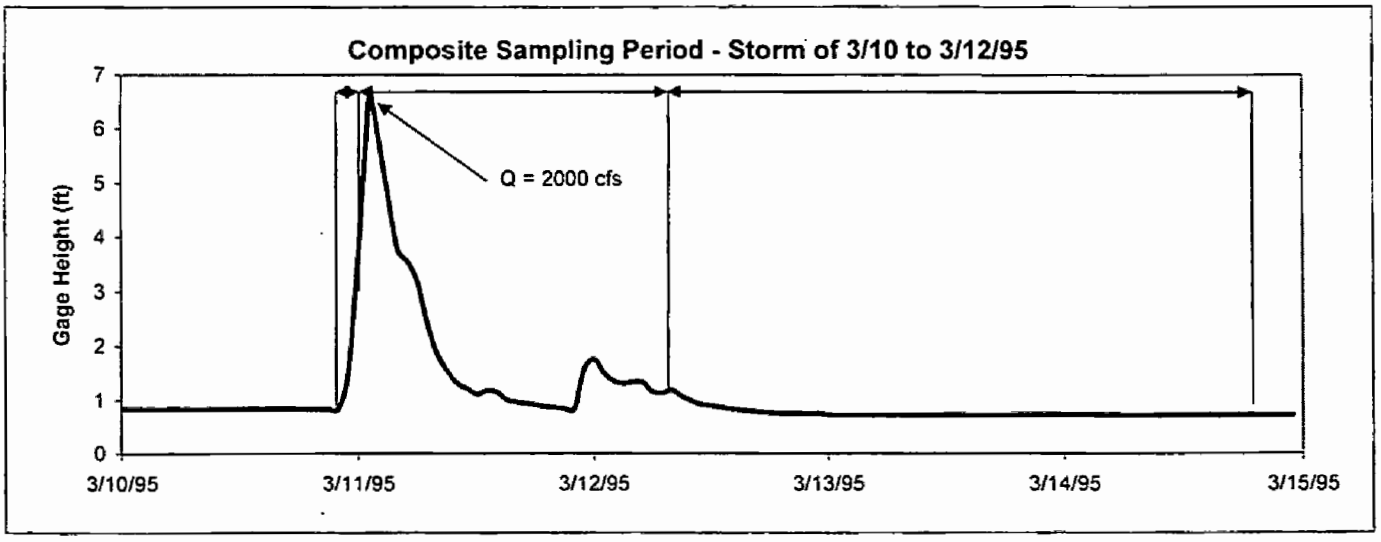

Storm Sampling @ Anaheim Barber City Channel

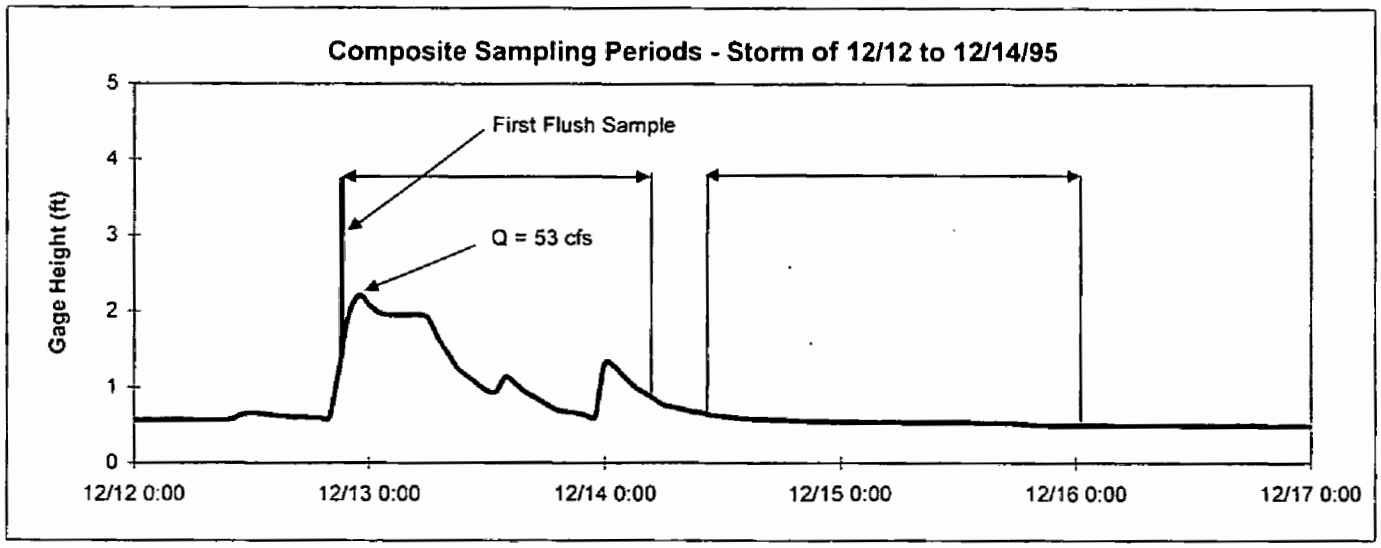

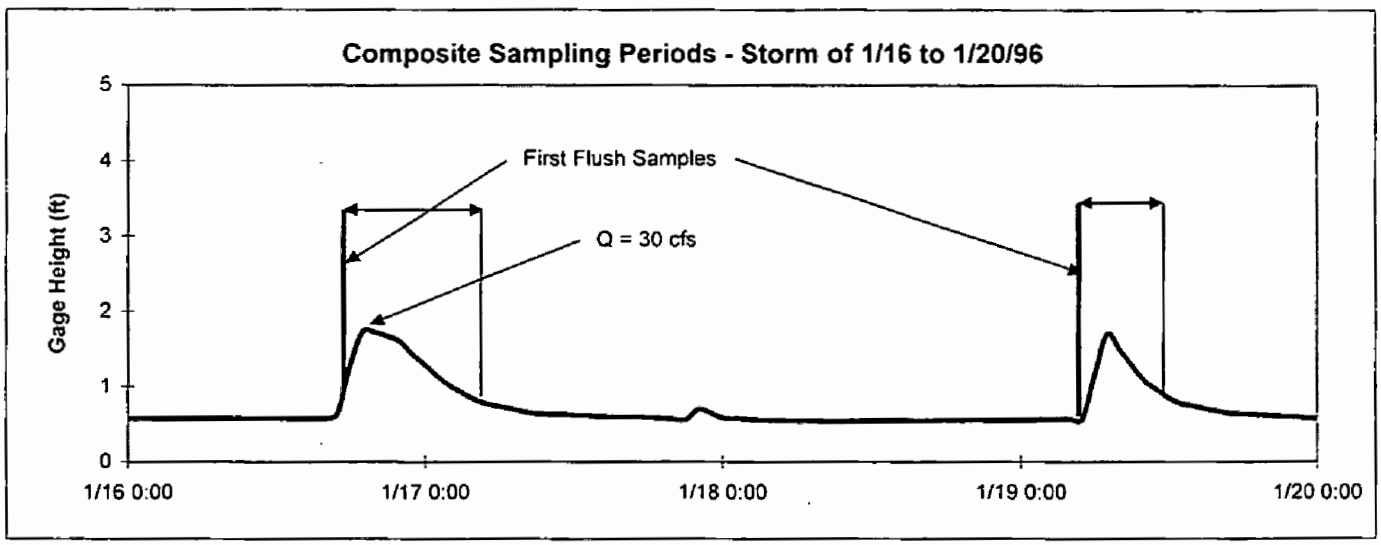

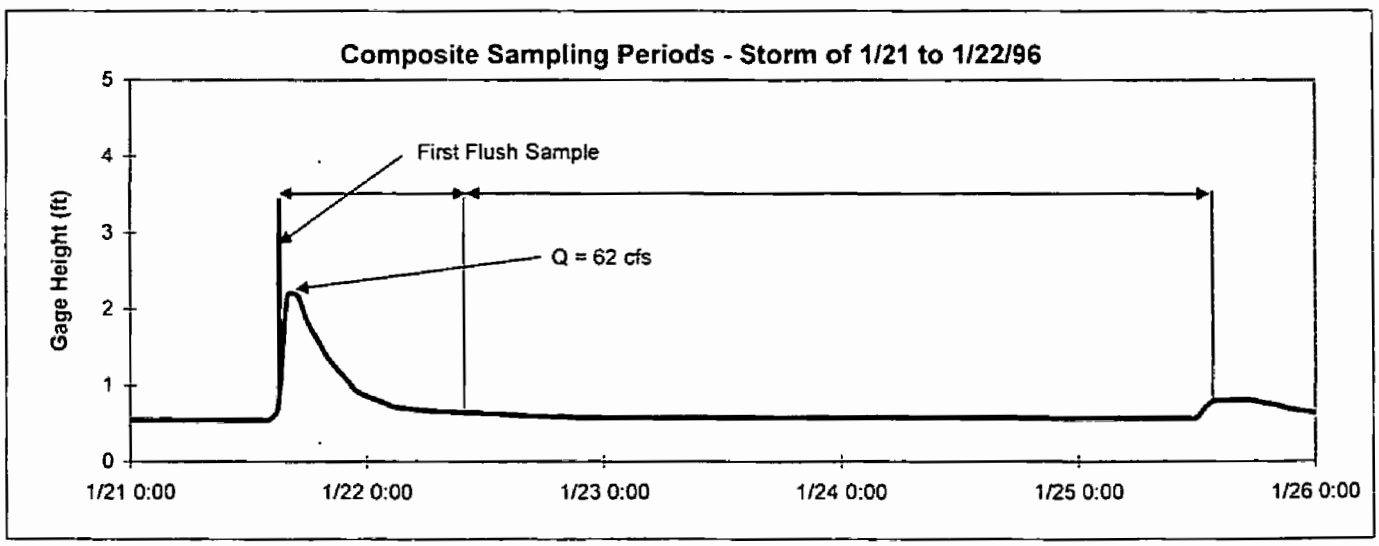

Storm Sampling @ Anaheim Barber City Channel

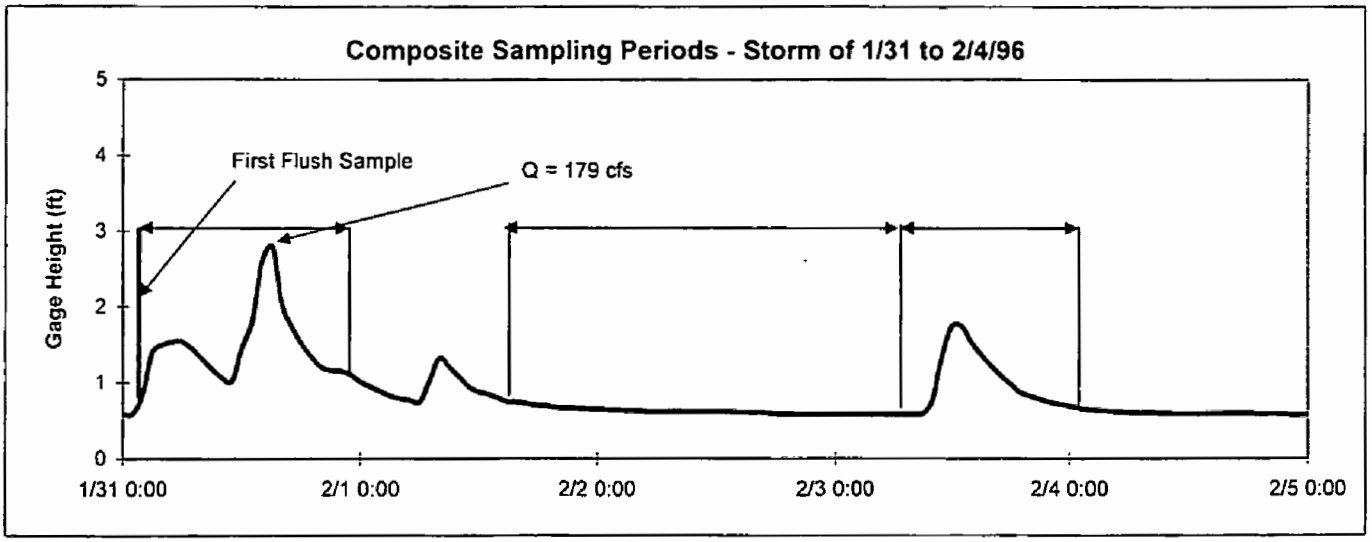

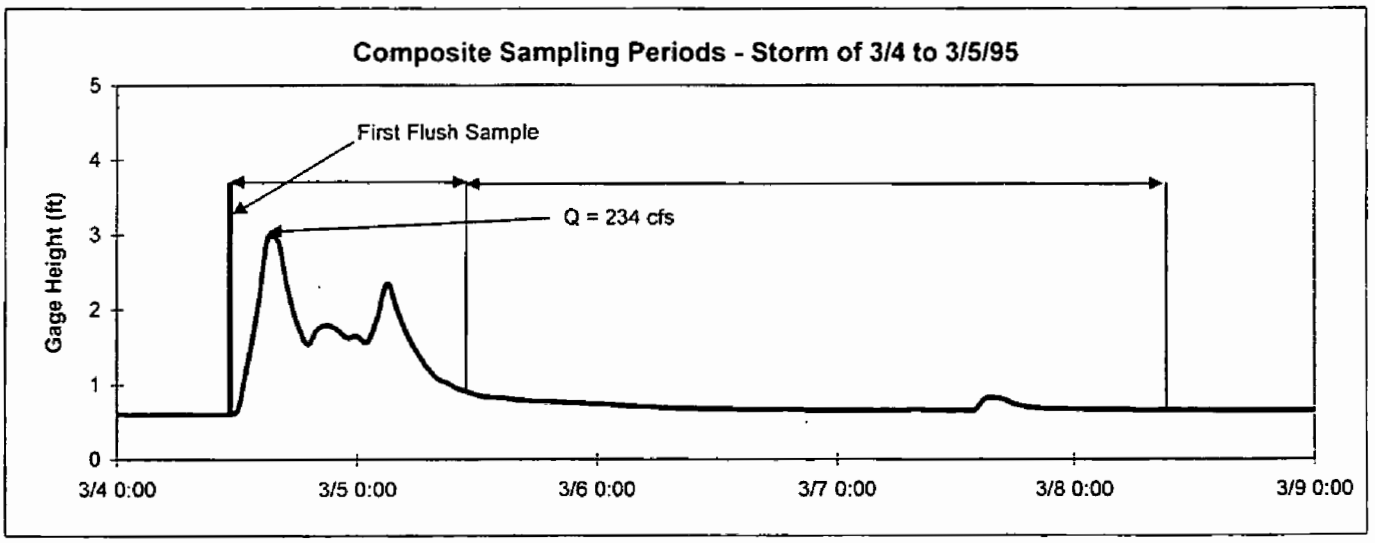

Storm Sampling @ Anaheim Barber City Channel

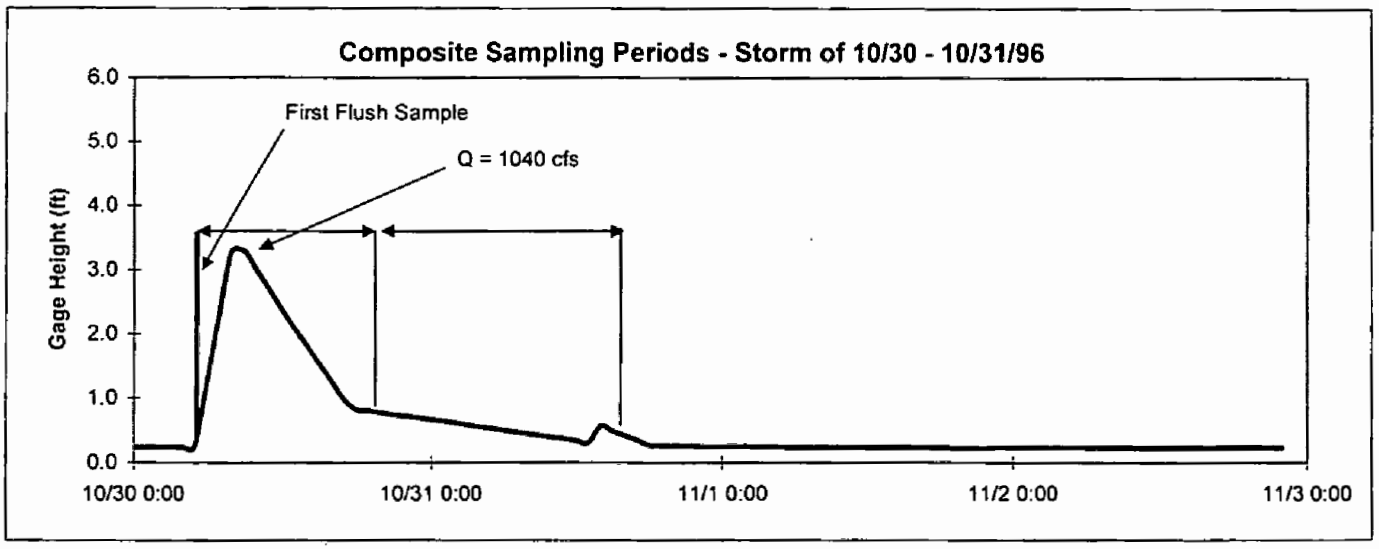

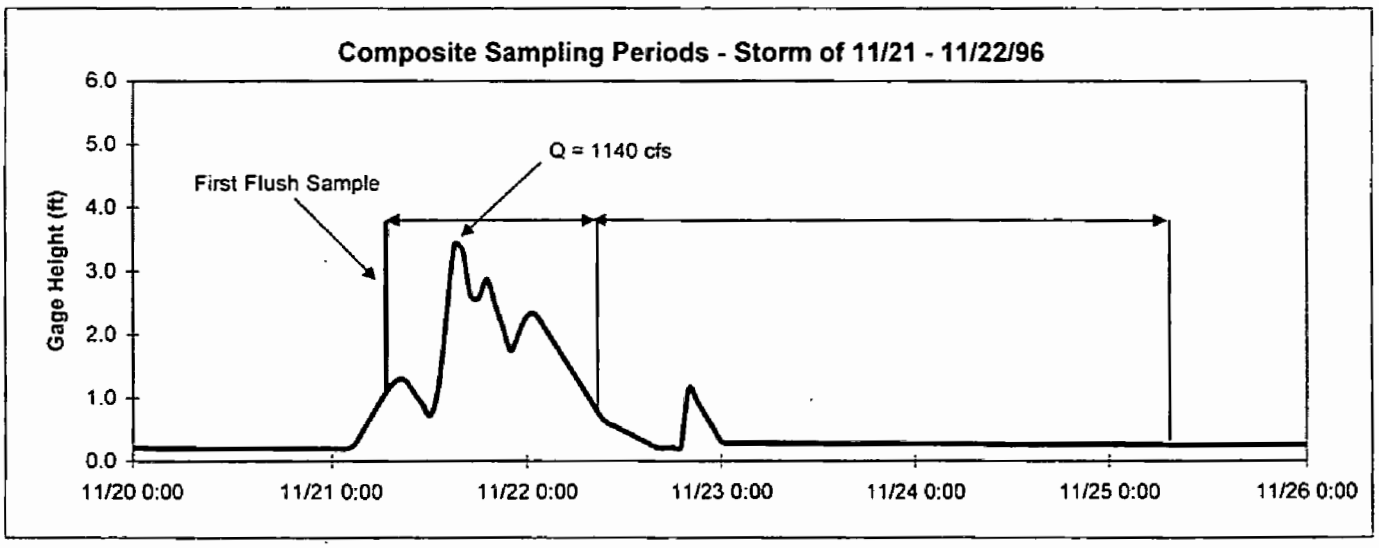

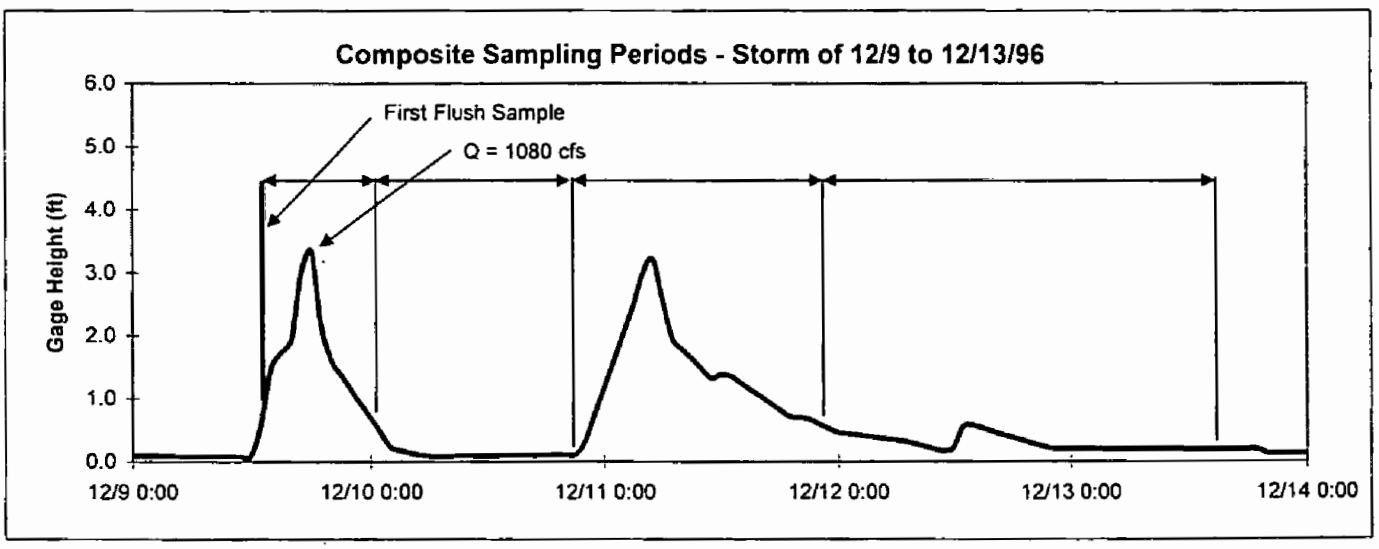

Storm Sampling @ Anaheim Barber City Channel

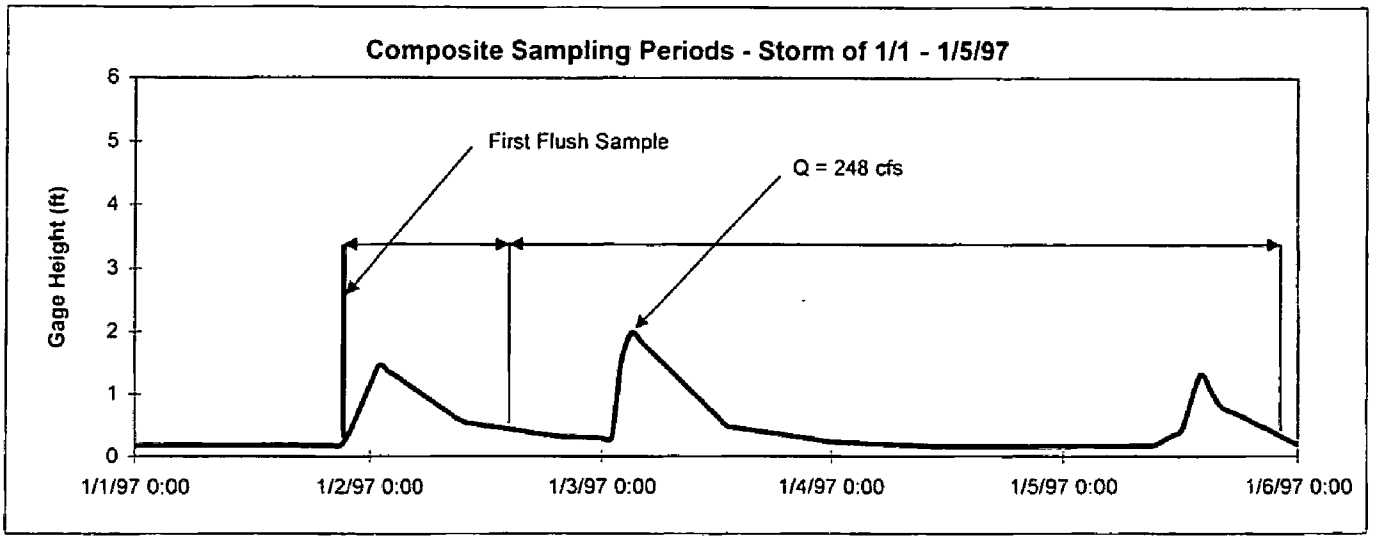

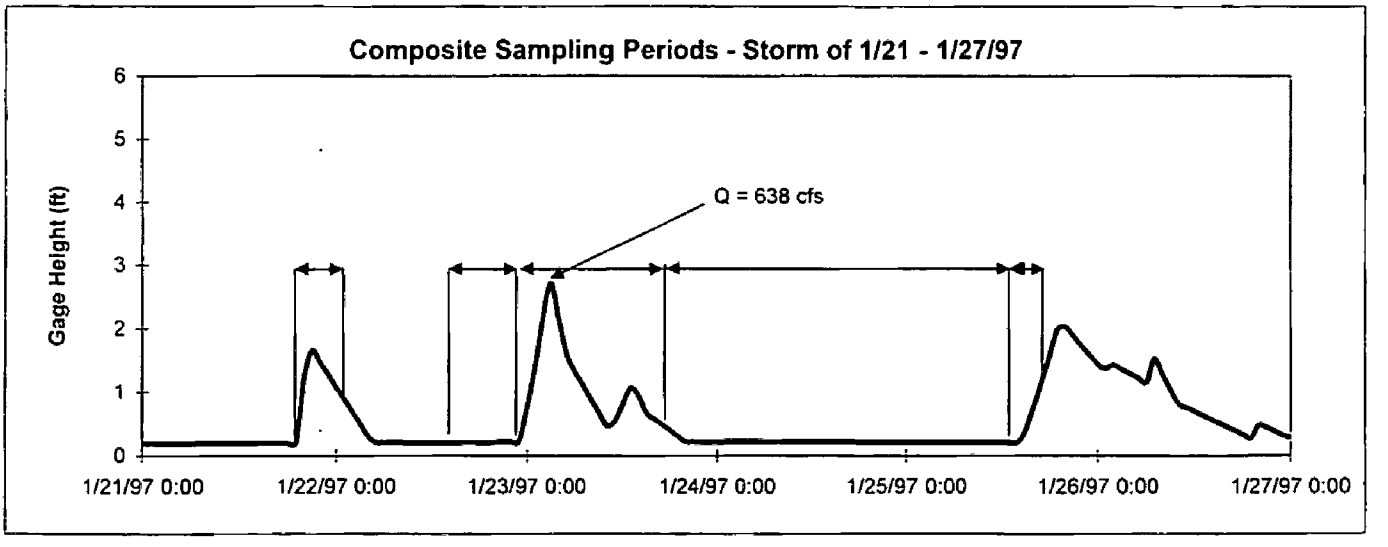

Stormwater Sampling in Anaheim Barber City Channel

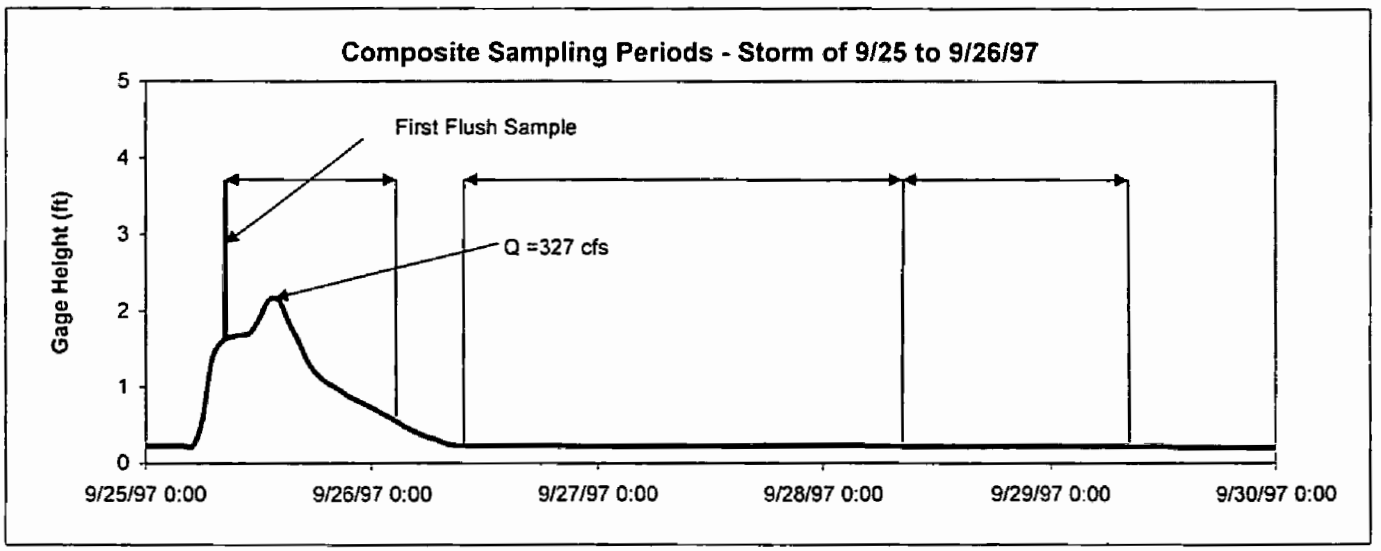

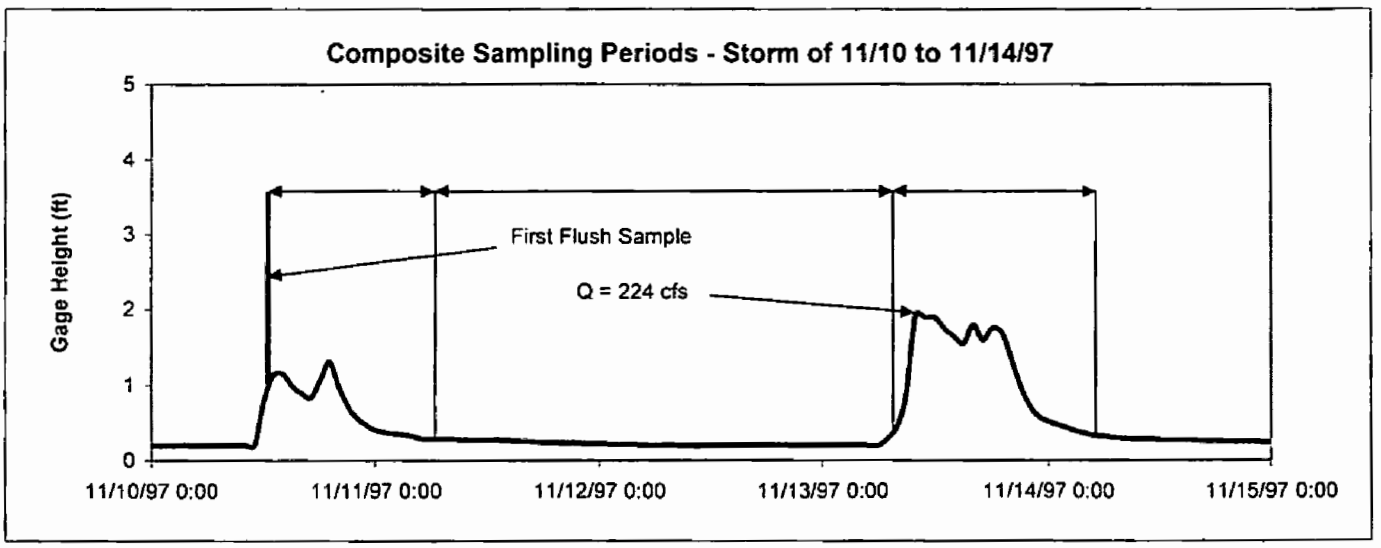

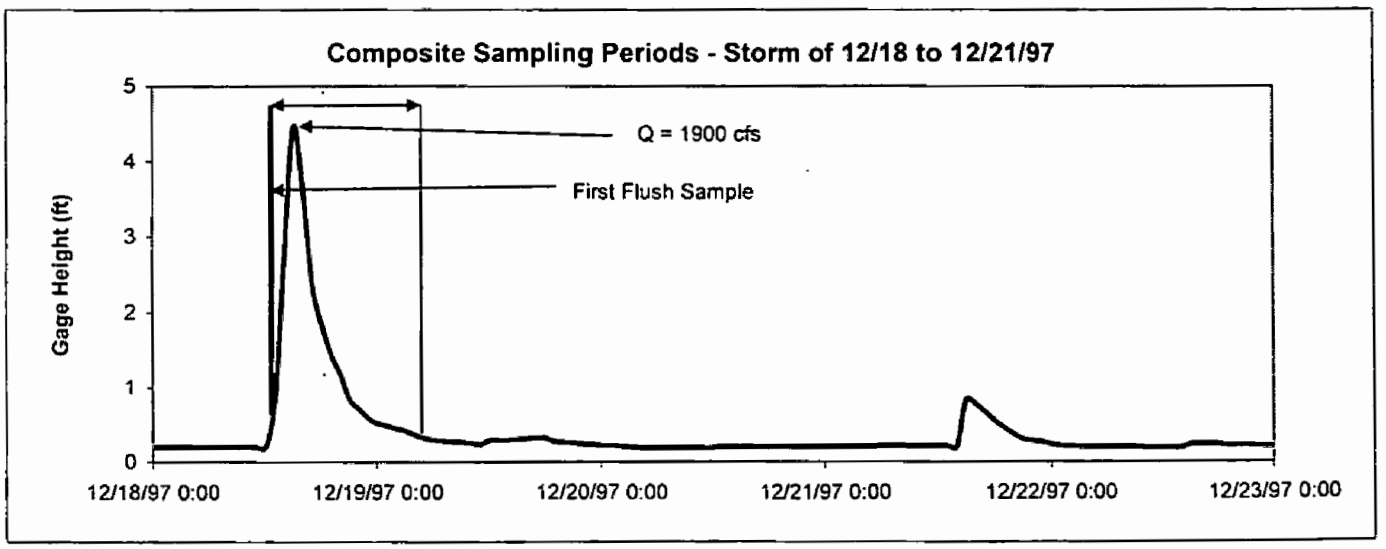

Stormwater Sampling in Anaheim Barber City Channel

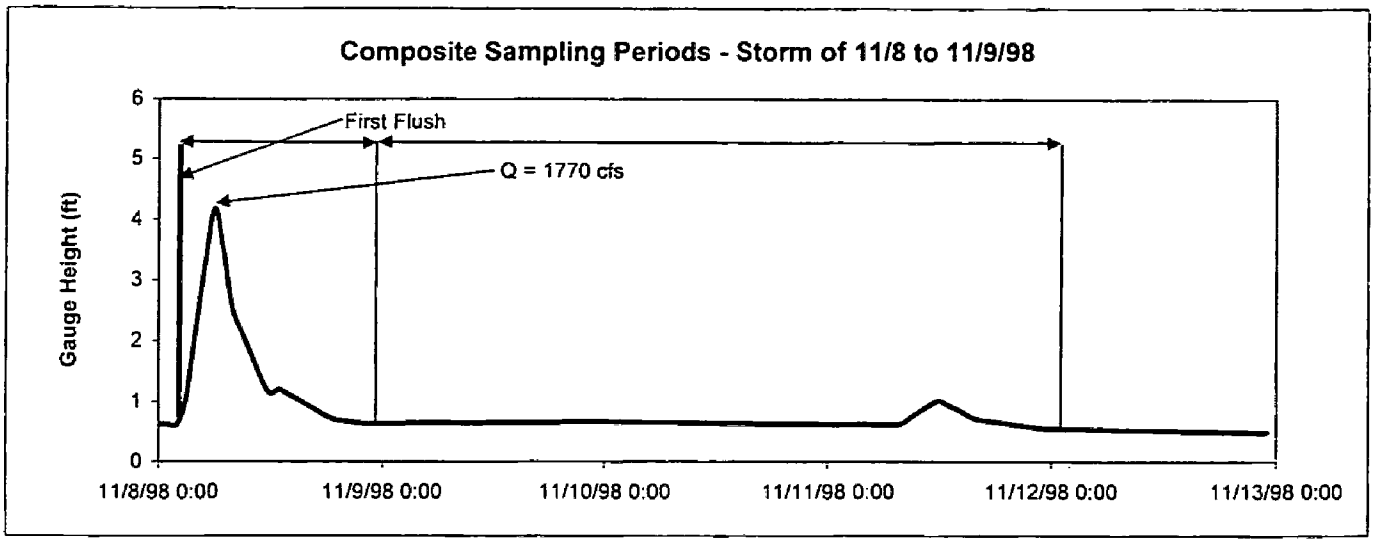

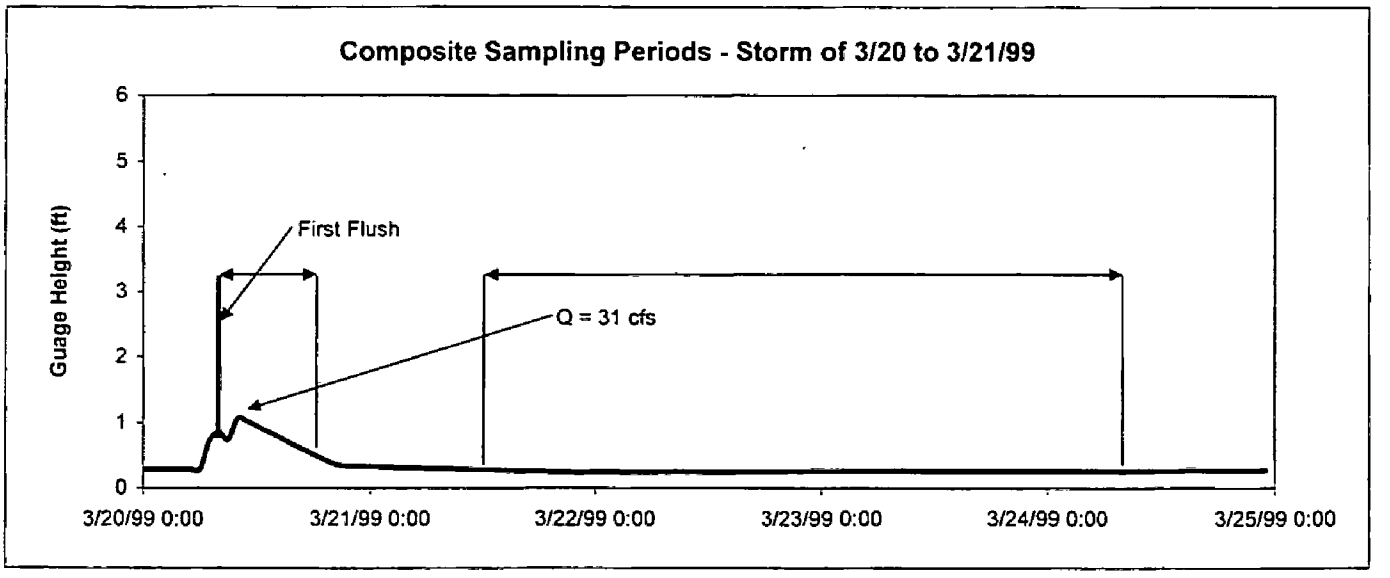

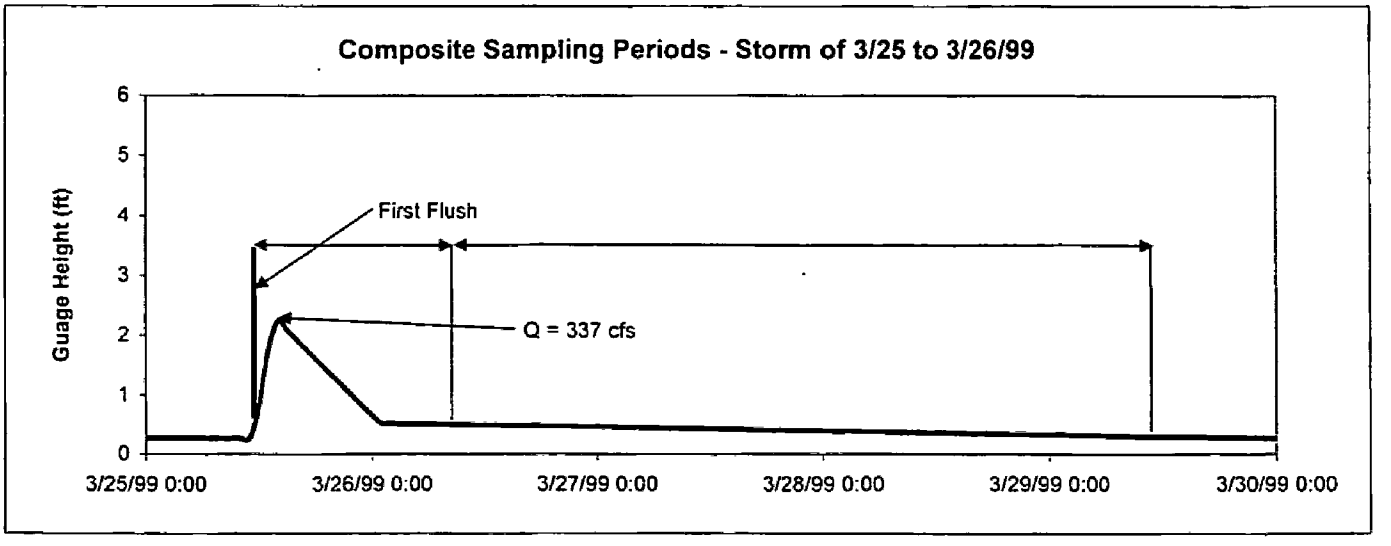

Stormwater Sampling in Segunda Deschecha Channel

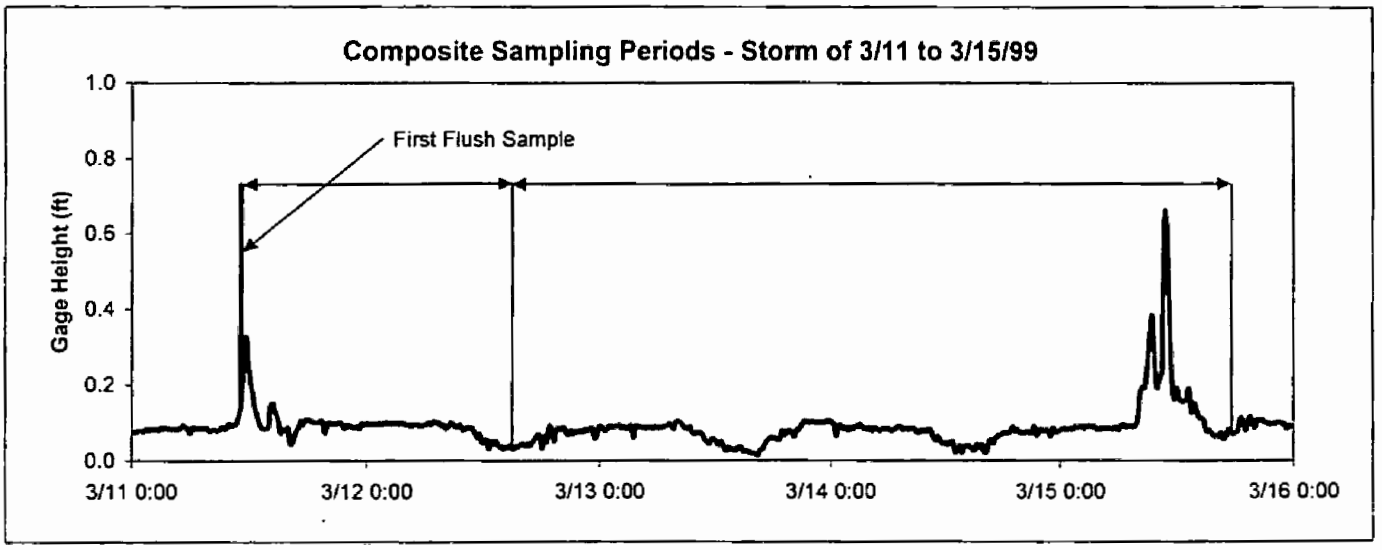

Stormwater Sampling in Prima Deschecha Channel

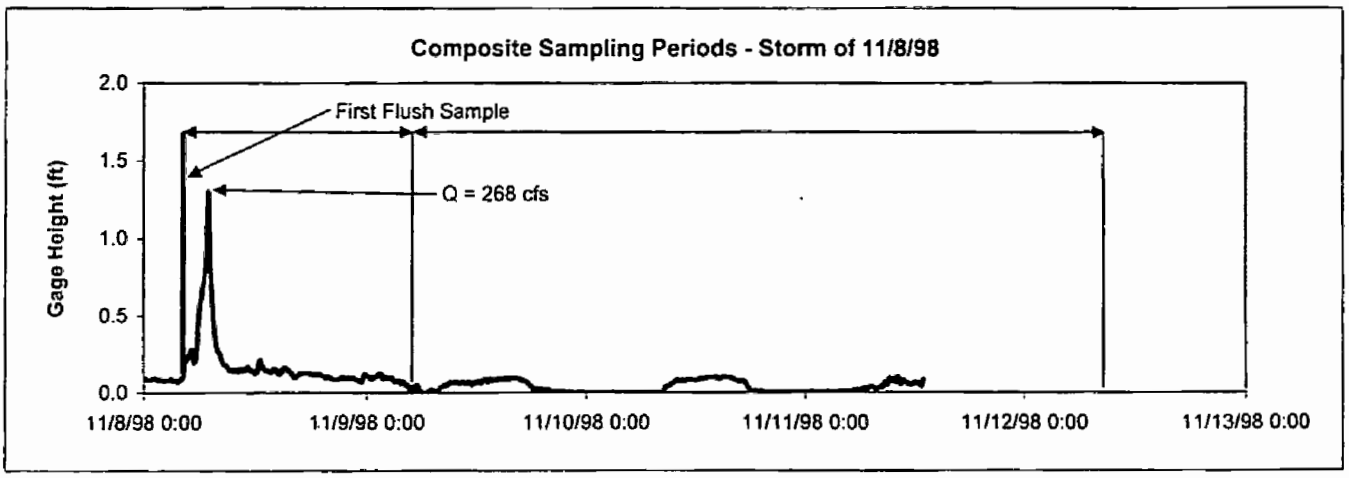

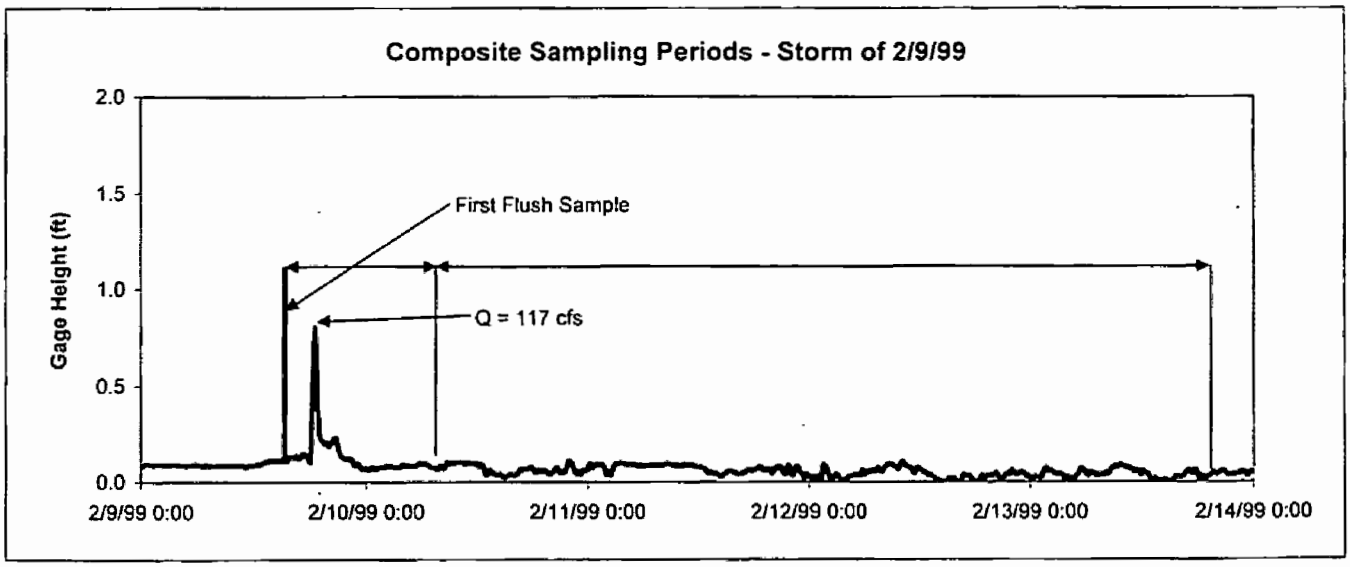

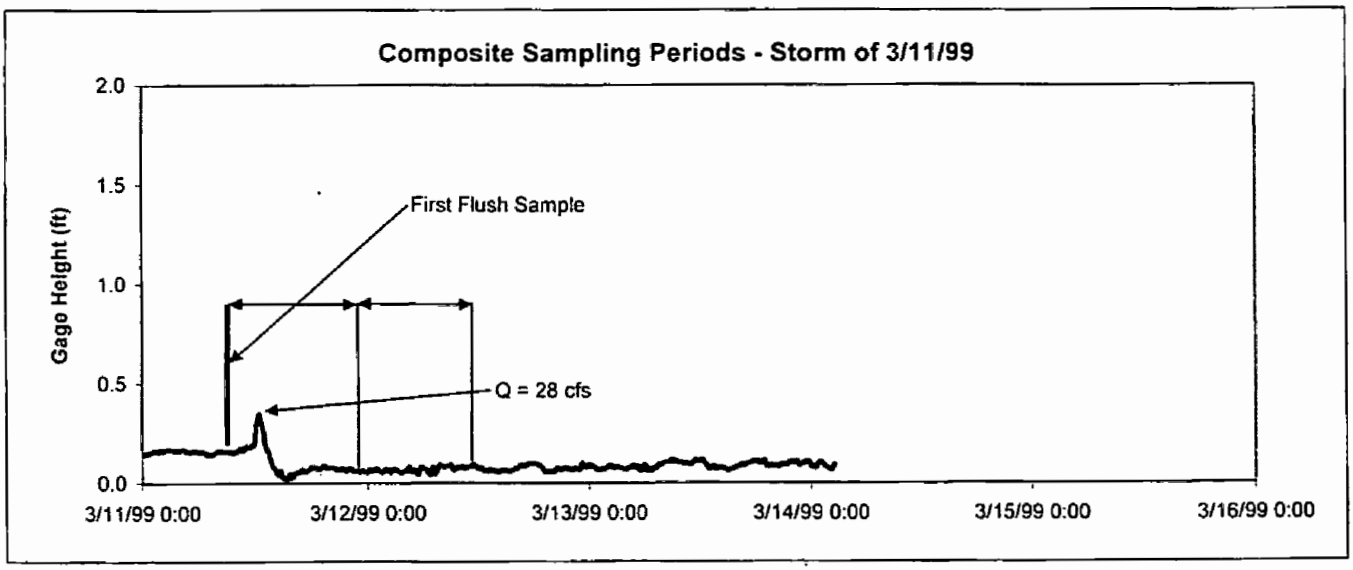

Stormwater Sampling in Prima Deschecha Channel

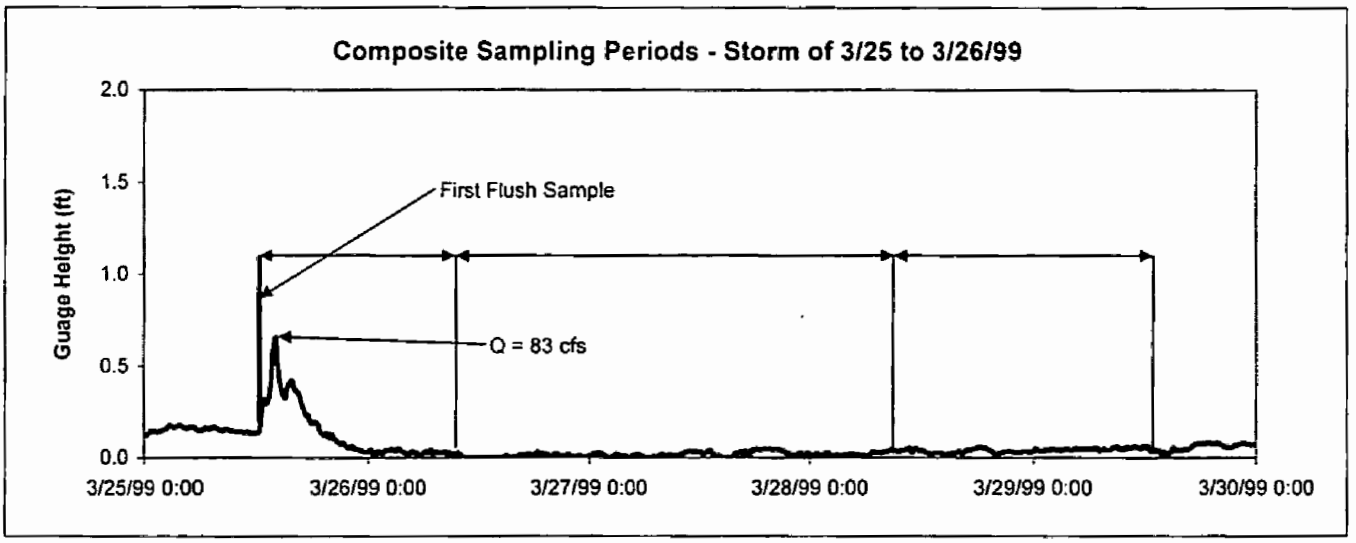

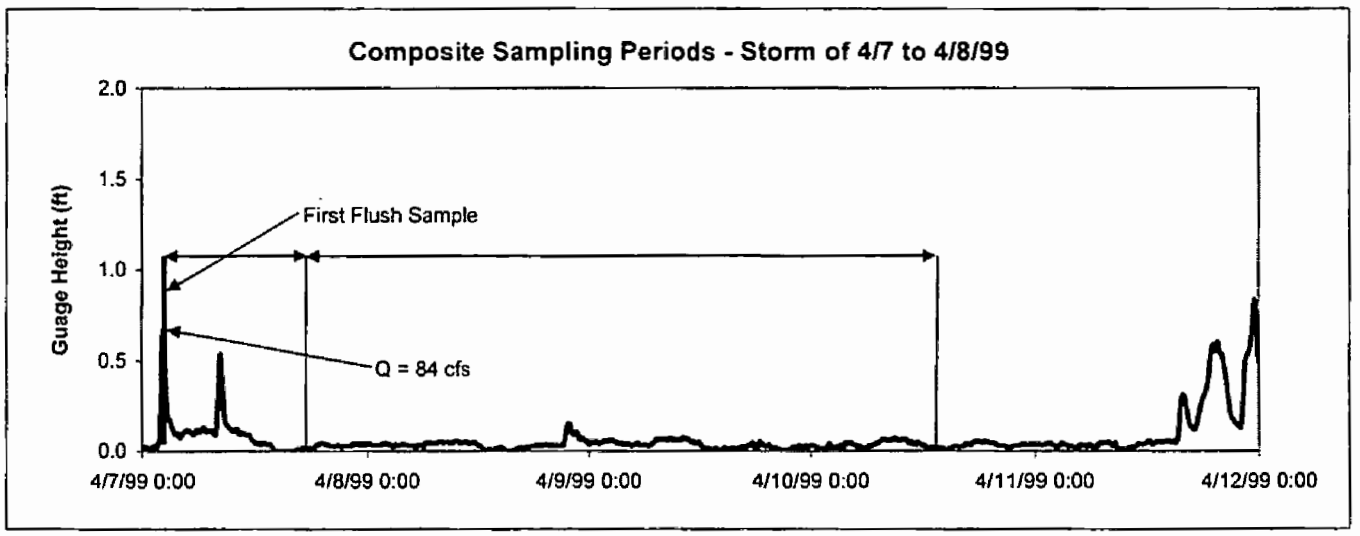

Stormwater Sampling in Oso Creek Channel

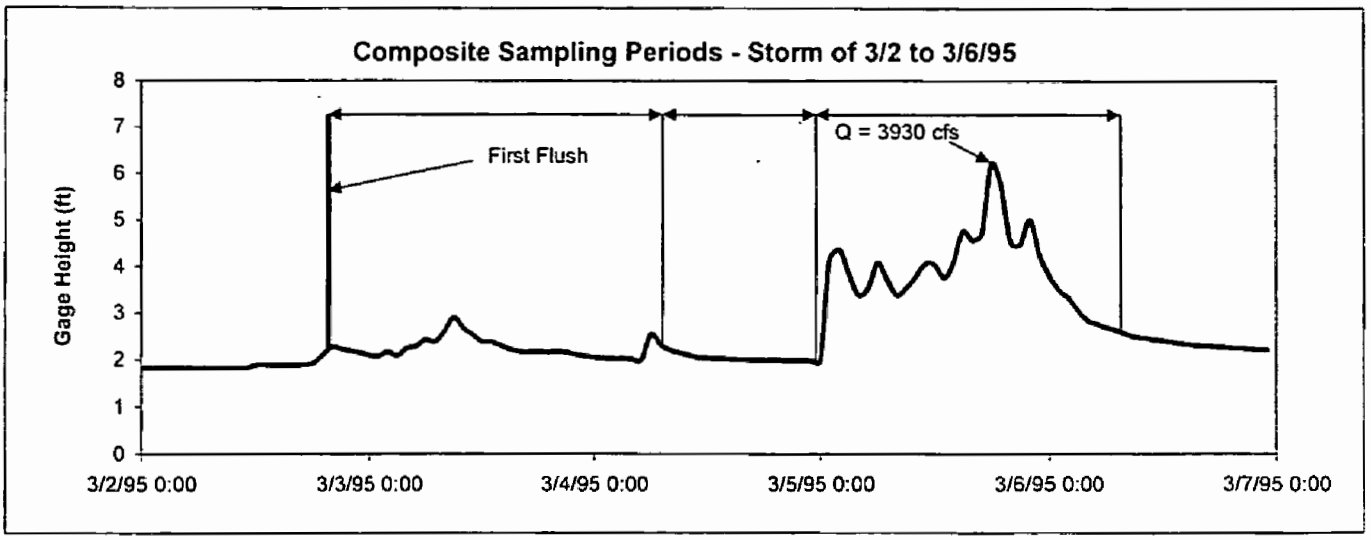

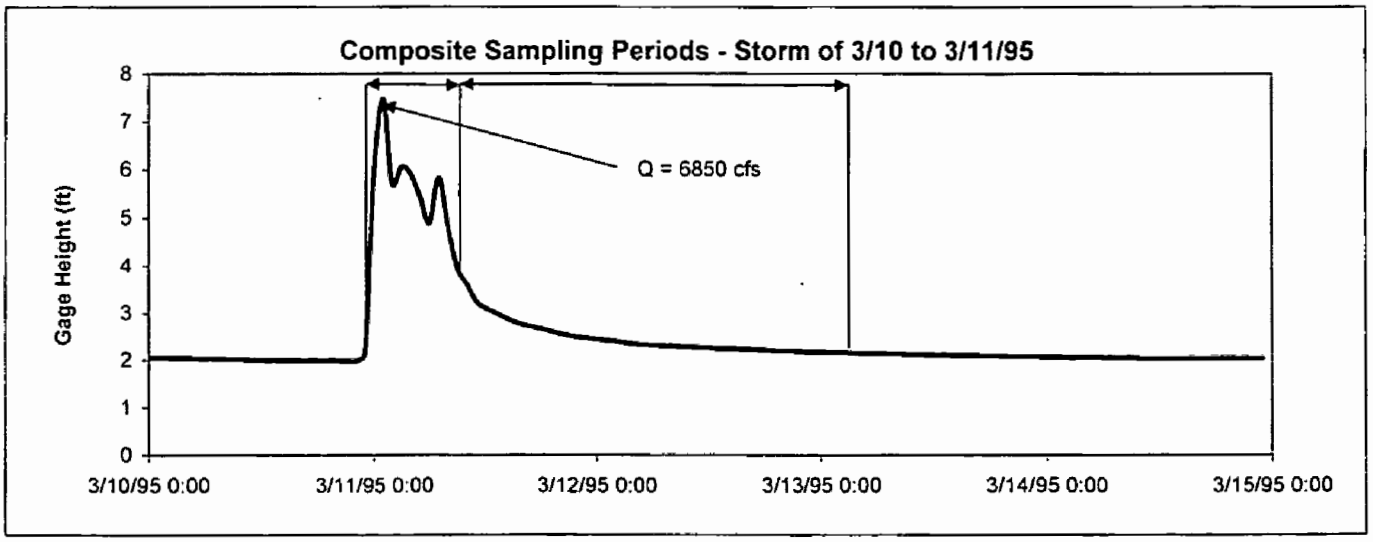

Storm Sampling @ Oso Creek

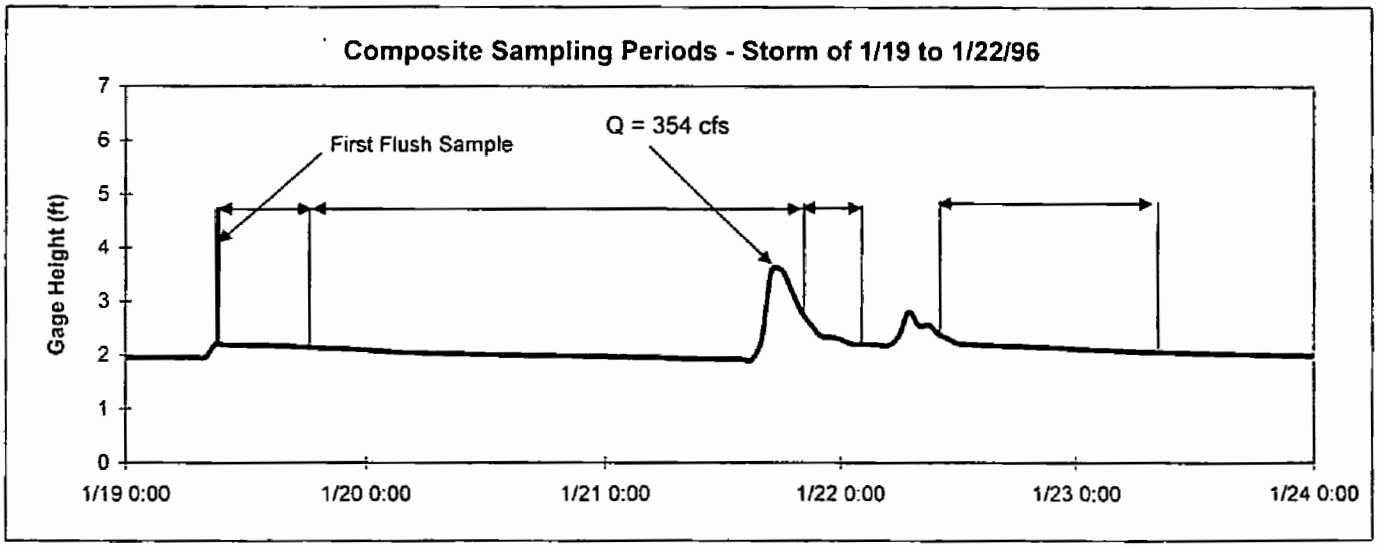

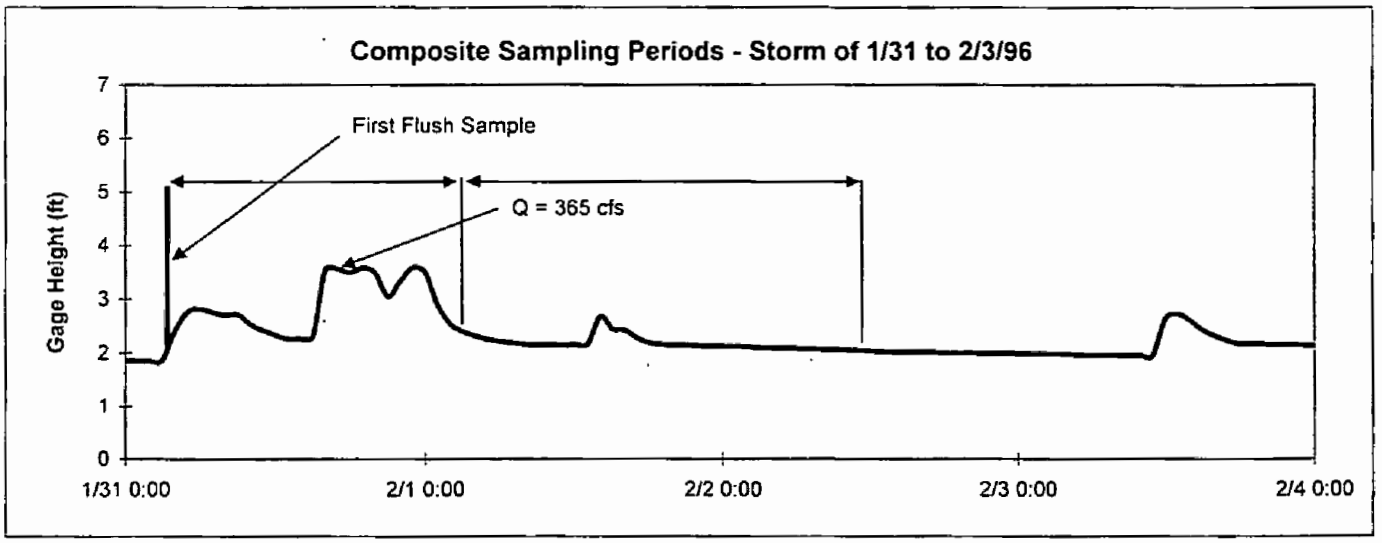

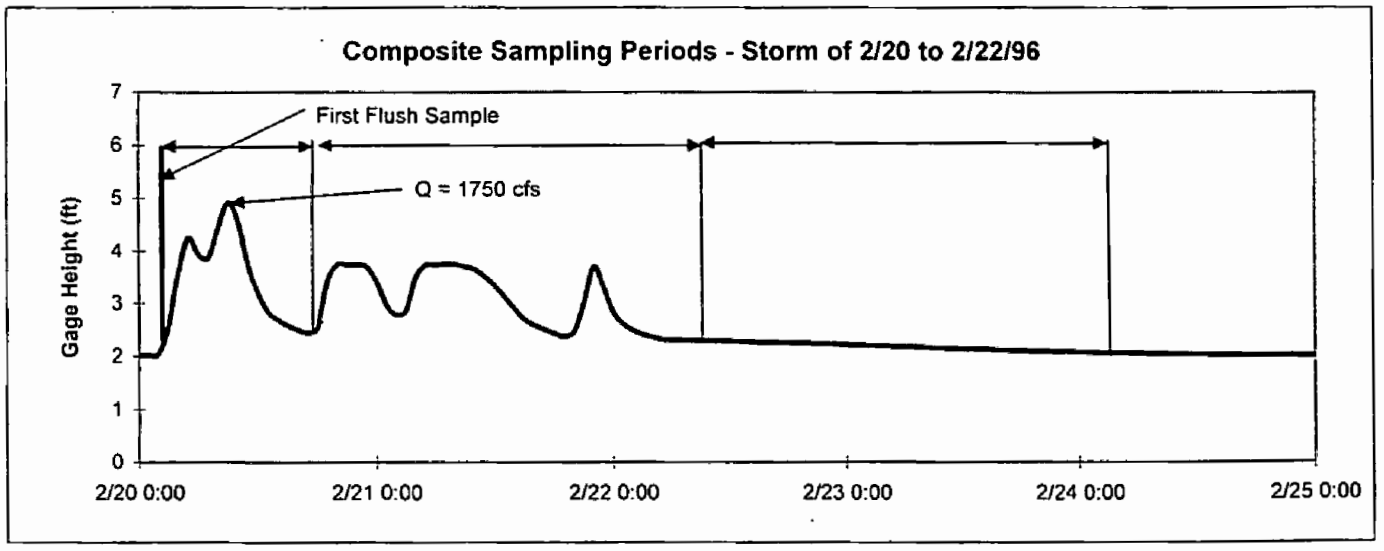

Storm Sampling @ Oso Creek

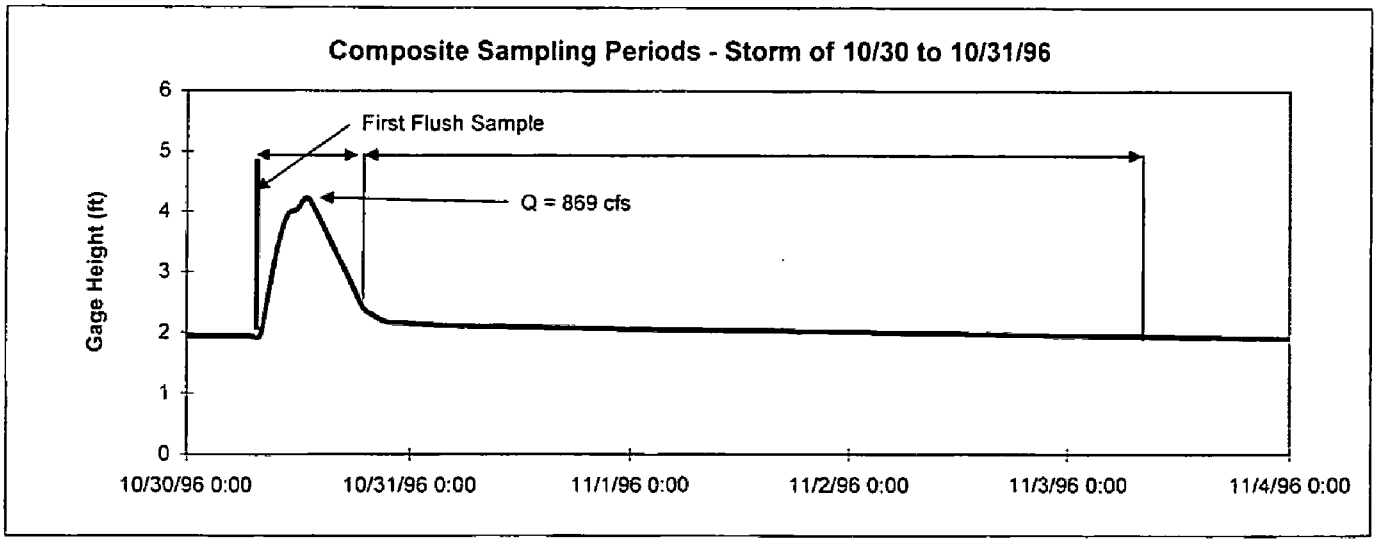

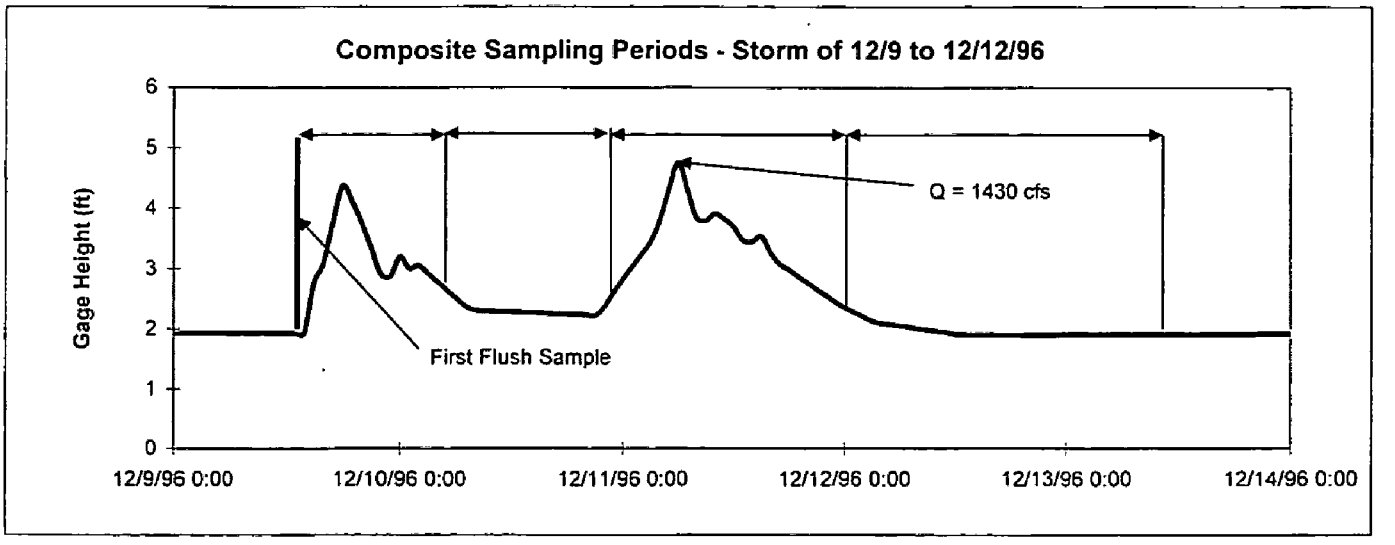

Stormwater Sampling in Laguna Canyon Channel

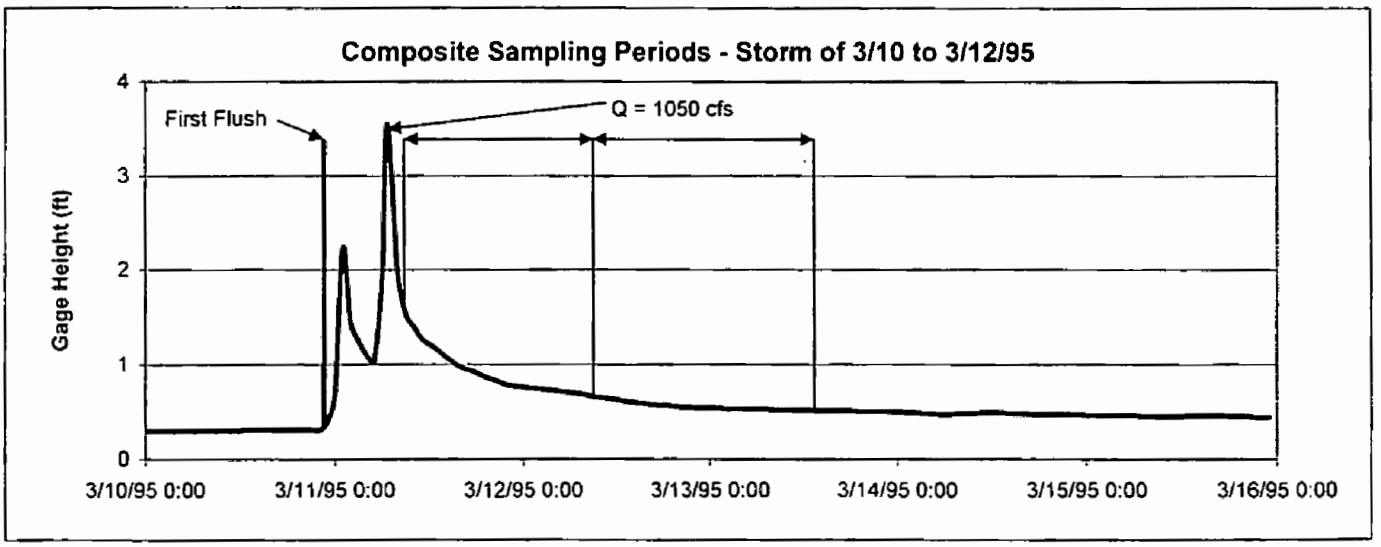

Storm Sampling @ Laguna Canyon Channel

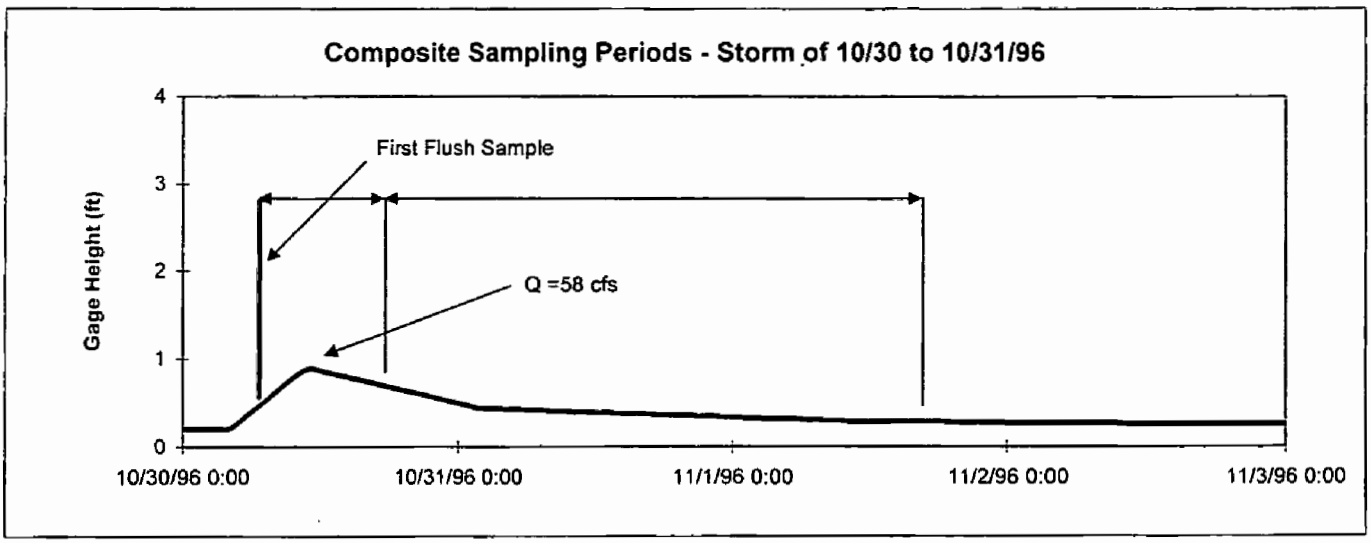

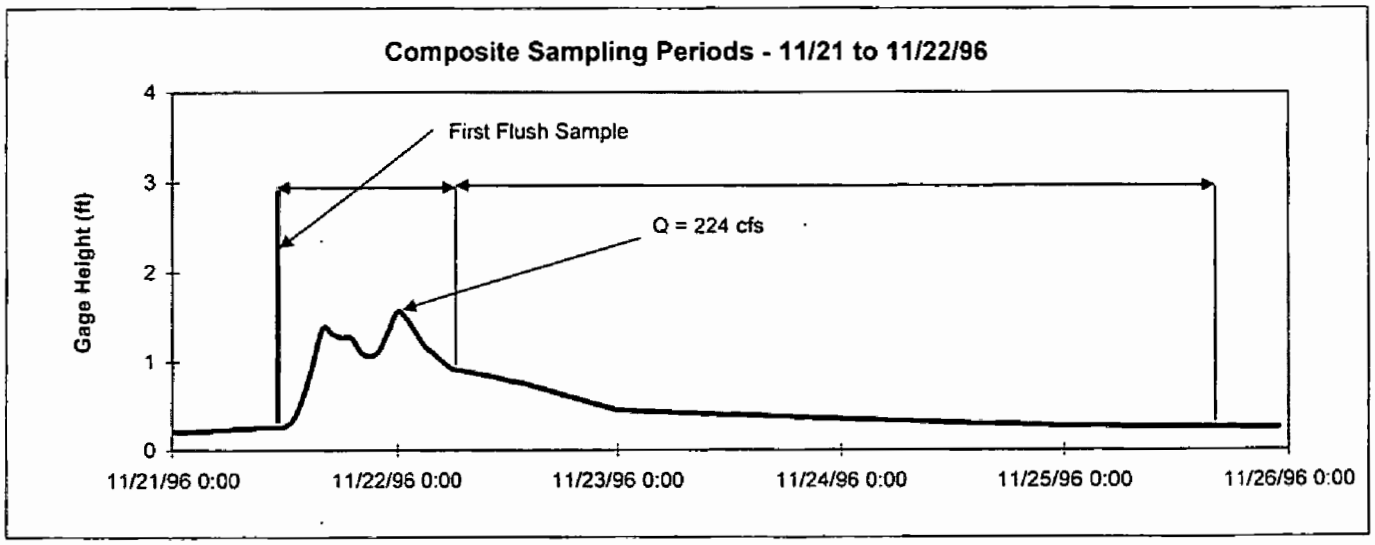

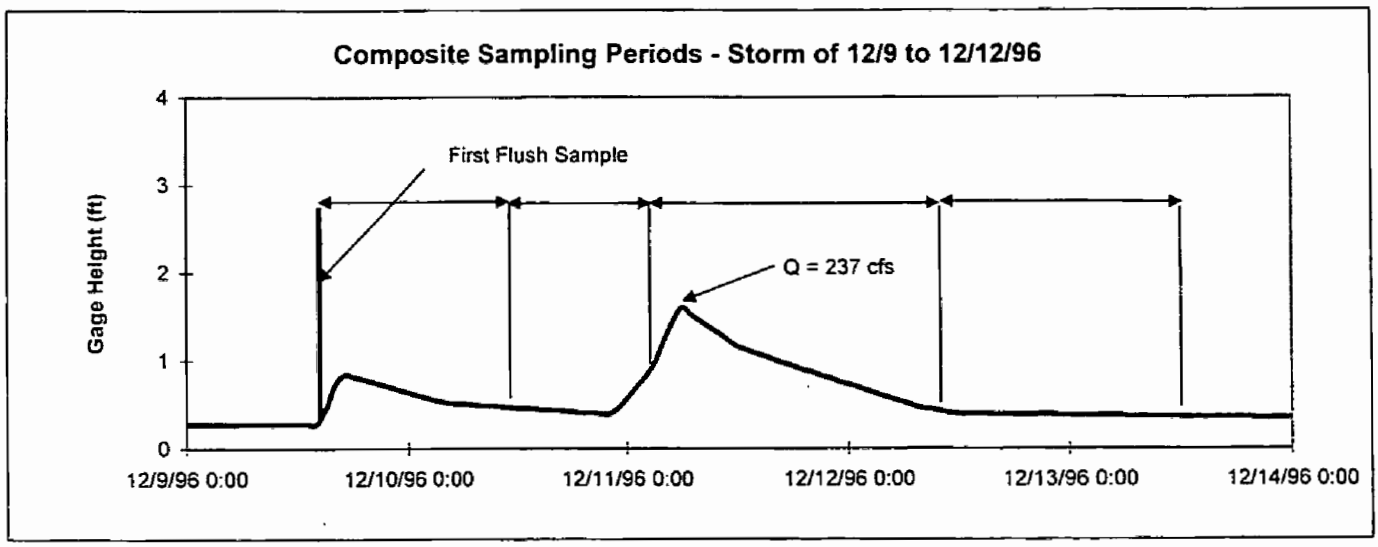

Appendix 4.7:
Mass Loads from Sampled Storms (1994-99)

Mass Load at Automatic Sampling / Streamgaging Locations

Channel Sampled Period	Storm Vol. ac-ft	Vol. Sampled ac-ft	NO3 tons	NH3 tons	TKN tons	PO4 tons	TSS tons	VSS tons	Cd lbs	Cr lbs	Cu lbs	Pb lbs	Ni lbs	Ag lbs	Zn lbs
Anaheim Barber City															
Oct 4-5,1994	11	7	0.05	0.01	0.09	0.04	5.61	0.47	0.09	0.60	5.07	1.48	0.90	0.03	18.45
Nov 16,1994	11	10	0.14	0.01	0.07	0.02	0.50	0.13	0.01	0.14	1.61	0.31	0.56	0.00	3.34
Mar 10-14,1995	528	510	4.12	0.05	0.71	0.54	47.03	12.65	0.69	7.60	31.17	18.64	27.69	0.53	119.89
Dec 12-14, 1995	275	294	4.77	0.27	2.34	1.16	57.38	18.19	0.57	9.72	91.21	31.82	17.28	0.40	321.84
Jan 16-17,1996	73	67	0.70	0.14	0.48	0.18	11.15	3.25	1.78	0.96	10.37	3.94	2.22	0.24	42.48
Jan 19,1996	37	31	0.52	0.04	0.13	0.03	1.36	0.78	0.04	0.62	4.10	0.74	0.58	0.04	11.61
Jan 21-25, 1996	100	169	1.86	0.01	0.36	0.17	9.80	3.98	0.28	2.51	14.58	4.90	3.66	0.23	52.50
Jan 31-Feb 4, 1996	332	330	3.18	0.13	1.09	0.52	22.20	8.18	0.45	7.71	38.15	2.66	8.93	0.86	165.07
Mar 4-8,1996	412	470	3.81	0.25	0.85	0.44	22.77	6.62	0.64	5.79	33.68	15.76	7.20	3.23	143.50
Oct 30 - Oct 31, 1996	431	430	3.72	0.49	1.69	1.05	49.35	14.12	0.59	5.92	54.62	55.49	13.87	0.59	380.69
Nov 21 - Nov 25, 1996	652	658	3.11	0.31	1.27	0.80	30.15	10.73	0.89	8.93	70.69	27.87	21.02	0.89	248.33
Dec 9 - Dec 13, 1996	621	621	1.88	0.14	0.74	0.50	16.97	8.63	0.84	8.51	34.43	15.77	4.80	0.84	151.50
Jan 1 - Jan 5, 1997	136	140	1.24	0.07	0.18	0.07	2.36	1.66	0.19	1.90	10.83	1.79	4.04	0.19	29.88
Jan 21 - Jan 25, 1997	342	159	0.82	0.01	0.23	0.13	10.00	3.79	0.22	2.16	12.43	4.97	0.92	0.22	16.56
Sep 25 - Sep 29, 1997	169	161	1.48	0.05	0.92	0.44	38.17	10.00	0.64	6.24	43.80	21.77	8.40	0.22	203.53
Nov 10 - Nov 14, 1997	170	177	1.89	0.18	1.61	0.55	34.27	10.10	0.27	36.25	21.62	10.68	3.70	0.24	155.48
Dec 18 - Dec 19, 1997	383	383	2.19	0.32	0.89	0.42	33.96	8.42	0.52	20.78	31.22	14.61	6.06	0.52	135.41
Jan 29 - Feb 2, 1998	191	196	2.72	0.07	0.38	0.16	27.98	6.20	0.27	2.66	14.31	6.19	4.51	0.27	40.93
May 12 - May 16, 1998	265	223	1.50	0.05	0.38	0.66	36.95	13.76	0.21	6.02	16.53	9.00	3.26	0.61	68.19
Nov 8 - Nov 12, 1998	467	553	8.06	0.95	0.14	2.36	62.15	38.09	0.84	13.28	59.09	17.26	12.33	1.50	228.27
Mar 11, 1999	19	11	0.11	0.02	0.01	0.09	3.14	1.44	0.04	0.39	2.02	0.97	0.43	0.03	11.84
Mar 20 - Mar 24, 1999	20	38	0.50	0.02	0.01	0.11	1.59	0.69	0.05	0.43	3.60	0.43	0.46	0.10	7.93
Mar 25 - Mar 29, 1999	137	169	1.48	0.09	0.03	0.30	8.77	3.42	0.46	1.83	10.85	3.07	1.92	0.46	41.27
Bolsa Chica															
Oct 4-6,1994	12	9	0.09	0.07	0.21	0.06	9.74	0.32	0.05	0.65	0.36	0.94	0.93	0.15	7.26
Nov 10, 1994	143	135	1.72	0.14	1.08	1.22	295.95	20.06	0.99	20.20	50.25	33.23	17.67	0.17	206.88
Mar 2-6,1995	431	425	2.46	0.12	0.79	0.74	78.16	10.18	0.58	5.77	25.41	14.63	23.07	0.62	80.06
Mar 10-14,1995	491	492	5.63	0.08	1.30	1.47	153.25	21.34	0.67	24.30	42.85	33.82	53.78	0.87	175.97
Dec 12-16, 1995	162	169	3.01	0.16	0.88	0.47	35.34	6.39	0.23	4.49	9.20	7.94	9.18	0.23	71.48
Jan 19-23,1996	48	54	0.75	0.02	0.07	0.09	8.48	1.70	0.07	1.00	5.18	2.24	1.51	0.08	18.18
Jan 31-Feb 4, 1996	141	144	1.44	0.09	0.44	0.29	26.74	4.57	0.20	5.39	12.48	8.80	4.07	0.40	54.32
Mar 4-8, 1996	179	183	1.08	0.10	0.35	0.25	28.91	3.77	0.25	2.54	9.64	7.43	4.02	0.25	53.75
Oct 30 - Nov 3, 1996	227	229	3.59	0.32	1.30	0.64	53.45	12.01	0.32	3.30	29.16	18.59	10.44	0.32	174.77
Nov 21 - Nov 25, 1996	395	383	2.79	0.24	1.16	0.92	103.73	11.06	0.62	5.21	61.26	32.52	11.40	0.52	203.89
Dec 9 - Dec 13, 1996	562	561	3.49	0.09	0.81	0.99	95.05	12.81	1.32	7.62	34.38	27.47	8.66	0.76	139.36
Dec 27 - Dec 31, 1996	150	153	1.38	0.09	0.27	0.20	23.53	3.29	0.21	2.07	10.26	5.88	0.88	0.21	62.67
Sep 25 - Sep 29, 1997	473	473	6.47	0.43	3.55	1.58	169.09	32.16	1.29	17.78	44.51	32.52	23.00	0.64	277.79
Nov 10 - Nov 13, 1997	669	601	9.19	0.82	3.75	1.76	290.30	52.07	0.82	20.64	58.00	44.08	16.39	0.82	534.02
Jan 29 - Feb 2, 1998	310	280	3.19	0.16	1.72	0.61	68.37	11.10	2.97	6.07	23.85	13.82	9.62	0.38	103.01
May 13 - May 16, 1998	271	273	3.17	0.03	0.41	0.26	38.35	12.72	0.19	5.21	17.04	6.82	3.60	0.74	49.84
Nov 8 - Nov 12, 1998	308	325	5.64	0.98	0.17	1.19	53.28	34.32	0.44	8.39	38.24	10.84	8.67	0.88	105.66
Jan 25 - Jan 29, 1999	182	181	1.78	0.18	0.08	0.37	14.65	4.54	0.25	1.96	14.87	5.21	2.52	0.49	41.92
Mar 11 - Mar 15, 1999	10	14	0.30	0.00	0.01	0.04	0.48	0.33	0.50	0.15	1.35	0.14	0.24	0.04	2.29
Mar 15 - Mar 19, 1999	124	109	1.10	0.10	0.05	0.32	29.56	6.96	0.21	2.92	13.68	5.39	1.97	0.30	40.12
Mar 25 - Mar 29, 1999	95	103	0.93	0.08	0.02	0.18	6.91	2.23	0.14	1.12	6.13	2.09	1.29	0.28	26.36

Mass Load at Automatic Sampling / Streamgaging Locations

Channel Sampled Period	Storm Vol. ac-ft	Vol. Sampled ac-ft	NO3 tons	NH3 tons	TKN tons	PO4 tons	TSS tons	VSS tons	Cd lbs	Cr lbs	Cu lbs	Pb lbs	Ni lbs	Ag lbs	Zn lbs
						Westminster									
Nov 10, 1994	71	71	0.59	0.12	0.58	0.40	30.09	5.71	0.18	0.96	37.38	9.81	3.85	0.16	62.97
Nov 16, 1994	0.3	0.5	0.01	0.00	0.00	0.00	0.02	0.01	0.00	0.01	0.11	0.01	0.03	0.00	0.19
Mar 10-14,1994	330	330	3.84	0.02	0.56	0.44	57.65	10.50	0.45	4.48	22.73	21.91	17.90	0.45	78.80
Dec 12-16, 1995	94	108	1.74	0.10	0.61	0.34	26.02	6.01	0.28	2.80	28.42	8.39	10.07	0.36	77.67
Jan 16-17, 1996	31	30	0.41	0.04	0.22	0.12	9.08	2.15	0.09	1.16	4.79	1.93	1.06	0.30	16.47
Jan 19-23, 1996	70	78	0.94	0.01	0.14	0.03	1.51	0.63	1.06	10.62	27.15	2.40	5.21	1.77	48.70
Jan 31-Feb 4, 1996	165	162	1.76	0.07	0.49	0.27	22.90	5.42	0.33	4.60	18.05	12.29	6.86	0.50	89.14
Mar 4-8, 1996	111	115	0.61	0.05	0.21	0.21	23.30	2.98	0.16	1.51	9.97	5.61	1.64	0.16	35.99
Oct 30 - Nov 3, 1996	102	108	1.84	0.17	0.92	0.47	57.00	12.09	0.46	5.25	19.90	11.32	7.12	0.15	121.46
Nov 21 - Nov 25, 1996	260	253	1.41	0.11	0.67	0.58	61.11	8.87	0.35	6.90	32.28	21.67	6.87	0.34	116.93
Dec 9 - Dec 13, 1996	345	341	1.88	0.09	0.46	0.40	31.51	6.55	0.50	5.42	20.71	13.96	9.21	0.48	79.85
Dec 27 - Dec 31, 1996	113	134	1.09	0.06	0.36	0.41	97.06	7.33	0.18	5.86	12.67	11.34	4.77	0.18	74.94
Jan 21 - Jan 25, 1997	253	158	1.38	0.06	0.30	0.24	9.00	1.79	0.42	2.14	13.95	26.43	3.63	0.21	91.09
Sep 25 - Sep 27, 1997	73	74	0.75	0.05	0.52	0.21	16.48	5.03	0.11	1.05	16.68	5.06	3.39	0.11	41.76
Nov 10 - Nov 14, 1997	18	23	0.27	0.03	0.20	0.06	4.62	1.52	0.03	0.31	3.92	1.00	0.77	0.03	19.08
Dec 18 - Dec 22, 1997	133	166	2.26	0.07	0.34	0.18	42.98	10.27	0.63	3.27	9.14	7.80	1.44	0.23	36.01
May 12 - May 16, 1998	251	277	2.66	0.03	0.42	0.35	21.56	13.10	0.19	5.23	39.14	10.99	2.91	0.75	60.97
Mar 20 - Mar 24, 1999	10	31	0.71	0.01	0.00	0.04	0.22	0.15	0.04	0.34	2.14	0.18	0.25	0.09	2.61
Mar 25 - Mar 29, 1999	94	102	1.28	0.11	0.02	0.20	15.26	3.21	0.14	2.05	8.50	3.48	1.38	0.28	33.44
						E. Garden Grove Wintersburg									
Oct 4-8, 1994	51	50	0.34	0.10	1.00	0.16	13.16	1.58	0.10	0.96	5.71	3.39	9.70	0.23	25.06
Nov 8-12, 1994	243	170	0.34	0.03	0.24	0.11	49.49	1.37	0.26	2.63	35.56	27.19	10.13	0.10	128.29
Mar 2-6, 1995	959	932	4.53	0.21	1.60	1.11	76.91	13.75	1.26	12.64	92.15	33.75	50.57	1.31	156.62
Mar 10-14, 1995	1,176	1,171	6.58	0.14	1.78	1.84	176.24	34.75	1.59	30.37	95.49	51.33	63.59	1.59	267.22
Dec 12-16, 1995	375	418	6.78	0.40	3.03	1.41	91.77	15.27	1.13	14.26	46.72	24.82	45.39	1.13	219.18
Jan 16-22, 1996	404	357	2.41	0.31	1.57	1.00	19.49	5.47	0.87	11.36	34.41	45.70	15.34	1.42	52.48
Mar 4-8, 1996	428	423	1.65	0.17	0.71	0.46	34.10	8.77	0.57	4.92	33.43	9.50	3.39	0.75	98.45
Oct 30 - Nov 3, 1996	113	103	1.01	0.21	0.39	0.21	16.87	3.11	0.14	1.40	9.41	4.11	3.34	0.14	41.33
Nov 21 - Nov 25, 1996	953	957	5.57	0.09	3.41	2.74	353.62	44.11	1.30	42.29	127.08	68.97	41.56	1.30	470.19
Dec 9 - Dec 13, 1996	1,253	1,231	3.65	0.17	1.74	1.78	125.27	25.96	1.67	16.68	77.88	54.67	13.96	1.67	245.04
Dec 27 - Dec 31, 1996	365	392	2.59	0.14	0.79	0.37	28.79	7.54	0.53	5.32	22.99	10.41	2.59	0.53	118.91
Jan 21 - Jan 25, 1997	976	609	3.00	0.12	0.79	0.58	44.74	14.57	0.83	8.27	45.72	13.15	11.88	0.83	134.03
Sep 25, 1997	222	193	0.05	0.01	0.10	0.04	7.12	1.49	0.13	0.40	1.82	1.82	0.50	0.02	15.40
Nov 10 - Nov 14, 1997	285	315	3.00	0.53	1.97	0.74	84.14	20.35	0.43	4.28	31.38	18.69	7.03	0.43	193.76
Nov 26 - Nov 30, 1997	331	362	2.63	0.15	1.36	0.75	33.96	24.98	0.57	9.97	28.95	25.12	6.01	0.49	130.78
Dec 18 - Dec 22, 1997	661	663	5.73	0.35	1.74	1.09	108.03	23.51	3.69	11.41	49.34	29.65	10.22	0.90	206.33
Jan 3 - Jan 6, 1998	169	207	1.97	0.08	0.47	0.19	13.20	4.51	0.28	2.81	13.76	4.28	2.87	0.28	41.54
Jan 9 - Jan 13, 1998	394	480	1.52	0.16	1.11	0.59	67.21	15.79	0.73	6.52	47.96	20.07	16.02	7.10	10.57
Jan 29 - Feb 2, 1998	331	391	2.67	0.13	0.70	0.44	52.19	12.02	0.53	5.32	34.16	18.15	9.15	0.53	83.27
Feb 14 - Feb 18, 1998	1,489	1,375	13.05	0.47	1.93	5.27	192.36	33.21	1.87	27.73	81.33	57.06	21.48	5.72	199.93
May 12 - May 13, 1998	586	506	1.69	0.02	1.11	0.92	163.56	32.89	1.06	16.28	56.12	62.88	12.06	1.38	229.25
Nov 8 - Nov 12, 1998	688	723	5.93	4.74	0.47	5.36	415.93	186.19	3.10	40.36	138.14	140.43	31.66	1.96	701.67
Mar 11 - Mar 15, 1999	39	94	1.13	0.02	0.03	0.22	1.99	1.00	0.13	1.02	6.66	0.60	1.86	0.25	13.13
Mar 15 - Mar 19, 1999	169	224	1.76	0.15	0.09	0.59	26.64	10.35	0.40	3.57	17.25	8.77	4.57	0.61	61.60
Mar 20 - Mar 24, 1999	46	102	0.85	0.04	0.02	0.25	2.02	1.08	0.14	1.10	8.49	0.76	1.68	0.28	12.91
Mar 25 - Mar 29, 1999	239	306	1.53	0.27	0.07	0.64	24.23	9.39	0.42	3.33	20.63	7.55	3.54	0.83	65.90

Mass Load at Automatic Sampling / Streamgaging Locations

Channel Sampled Period	Storm Vol. ac-ft	Vol. Sampled ac-ft	NO3 tons	NH3 tons	TKN tons	PO4 tons	TSS tons	VSS tons	Cd lbs	Cr lbs	Cu lbs	Pb lbs	Ni lbs	Ag lbs	Zn lbs
Santa Ana Delhi															
Oct 4-8, 1994	27	23	0.23	0.02	0.10	0.03	2.81	0.73	0.08	0.31	2.04	0.76	1.26	0.42	10.45
Nov 8-12, 1994	211	204	2.34	0.17	1.30	1.13	208.73	13.46	1.16	17.68	61.65	43.36	11.06	0.11	192.44
Dec 5, 1994	13	5	0.08	0.01	0.04	0.02	1.73	0.35	0.01	0.07	0.81	0.30	0.29	0.01	3.32
Mar 21-25, 1995	419	399	3.70	0.03	0.80	0.72	79.78	15.47	0.54	5.41	27.96	11.81	21.64	1.33	64.61
Dec 12-13, 1995	150	130	2.00	0.21	1.72	0.82	111.25	11.77	0.84	10.49	45.77	46.73	8.57	0.18	190.5
Jan 31, 1996	328	158	0.66	0.03	0.52	0.40	51.23	9.82	0.43	2.31	23.74	20.97	6.97	0.21	107.3
Feb 19-23, 1996	882	879	8.51	0.45	2.98	5.54	448.81	70.84	18.81	73.89	207.71	2.71	2.70	1.22	1199.4
Mar 4-8, 1996	246	258	1.49	0.16	0.60	0.41	60.99	10.17	0.35	6.90	20.90	20.72	6.27	0.35	120.3
Oct 30 - Nov 3, 1996	239	241	2.95	0.28	1.48	1.02	181.69	24.41	1.23	14.76	31.01	35.86	16.09	0.35	273.11
Nov 21 - Nov 25, 1996	918	933	9.40	0.56	3.58	2.59	403.15	53.65	1.27	46.96	135.88	104.46	35.49	1.27	644.15
Dec 9 - Dec 13, 1996	963	859	6.34	0.07	2.15	1.17	141.39	21.30	1.20	13.30	59.98	47.44	14.52	1.20	237.44
Jan 1 - Jan 2, 1997	138	35	0.30	0.01	0.06	0.03	2.47	0.73	0.05	0.48	2.22	0.98	0.77	0.05	8.62
Sep 25 - Sep 29, 1997	174	180	1.76	0.11	1.50	0.81	147.71	24.84	1.48	7.05	53.37	43.31	14.77	0.24	241.06
Nov 10 - Nov 14, 1997	274	283	3.82	0.16	1.05	0.49	52.70	13.61	0.39	8.46	40.34	22.82	9.65	0.38	210.35
Nov 26 - Nov 30, 1997	280	294	3.25	0.08	1.21	0.52	46.51	30.55	0.42	4.42	33.91	25.41	6.50	0.40	137.66
Dec 6 - Dec 10, 1997	2,804	2,465	12.48	0.68	6.66	5.13	792.86	654.29	3.35	38.80	275.87	215.85	61.92	3.35	1219.42
Jan 3 - Jan 7, 1998	84	90	1.54	0.03	0.22	0.07	2.87	1.43	0.12	1.23	7.12	1.21	0.77	0.12	12.32
Jan 9 - Jan 13, 1998	225	245	1.82	0.08	0.59	0.23	49.81	10.79	0.33	3.32	33.23	18.02	7.01	0.33	2.93
Feb 14, 1998	1,328	1,176	7.14	0.40	0.00	15.15	224.99	37.01	1.60	24.71	105.71	60.87	27.87	1.60	729.90
Feb 19 - Feb 24, 1998	2,329	2,248	19.51	0.78	5.57	35.00	0.00	0.00	3.05	38.28	153.64	99.92	33.62	3.05	389.45
Mar 25 - Mar 29, 1998	711	725	8.70	0.11	0.62	0.16	429.19	17.55	0.98	12.50	99.43	45.71	18.47	0.98	217.24
Nov 8 - Nov 12, 1998	299	331	4.97	1.25	0.16	1.18	69.18	46.92	0.56	4.12	28.29	12.53	6.42	0.90	135.16
Feb 4 - Feb 8, 1999	32	37	0.43	0.03	0.01	0.07	2.20	1.84	0.05	0.40	2.22	1.01	0.57	0.10	16.44
Feb 9 - Feb 13, 1999	17	23	0.45	0.02	0.00	0.05	1.40	0.85	0.03	0.25	1.73	0.64	0.46	0.06	6.01
Mar 15 - Mar 19, 1999	56	78	1.15	0.07	0.03	0.28	15.05	6.13	0.05	0.42	2.21	0.14	0.21	0.10	3.82
Mar 25 - Mar 29, 1999	242	263	2.76	0.23	0.05	0.41	17.95	6.10	0.37	2.86	25.80	9.77	3.14	0.72	82.10
Apr 6 - Apr 10, 1999	181	183	1.51	0.24	0.05	0.59	28.56	9.65	0.58	3.56	19.94	10.20	3.04	0.48	78.50
Costa Mesa Channel															
Mar 10-14, 1995	75	76	0.31	0.01	0.22	0.14	4.20	2.32	0.10	1.03	6.82	3.06	4.13	0.10	32.55
Jan 31-Feb 4, 1996	16	16	0.05	0.01	0.06	0.03	0.63	0.38	0.05	0.61	1.76	0.55	0.43	0.04	5.35
Feb 19-23, 1996	137	142	0.37	0.04	0.30	0.28	10.59	3.82	0.19	1.94	13.09	0.40	0.48	0.19	54.40
Nov 21 - Nov 22, 1996	81	80	0.40	0.02	0.21	0.17	3.93	1.64	0.11	1.09	10.04	3.49	1.53	0.11	39.27
Dec 9 - Dec 13, 1996	99	29	0.11	0.01	0.06	0.05	1.25	0.63	0.05	0.39	2.10	0.76	0.55	0.04	9.88
Jan 1 - Jan 2, 1996	3	4	0.01	0.00	0.01	0.01	0.11	0.06	0.01	0.06	0.40	0.09	0.12	0.01	2.08
Jan 21 - Jan 25, 1997	51	42	0.10	0.02	0.06	0.04	3.86	1.83	0.06	0.57	3.68	1.87	0.43	0.06	17.81
Nov 10 - Nov 14, 1997	27	29	0.15	0.02	0.13	0.08	1.88	0.84	0.08	0.59	1.68	0.89	0.65	0.04	15.03
Feb 6 - Feb 9, 1998	214	206	1.04	0.07	0.62	0.38	5.41	2.55	0.28	1.87	11.63	4.47	1.11	0.28	25.27
Feb 14 - Feb 18, 1998	102	106	0.70	0.04	0.14	0.60	1.83	0.86	0.73	5.39	54.25	6.03	15.07	1.86	78.84
Mar 25 - Mar 29, 1998	77	206	1.46	0.04	0.15	0.19	2.67	0.54	0.29	2.05	17.72	5.27	2.05	0.28	40.81
Sep 4 - Sep 8, 1998	3	3	0.01	0.01	0.00	0.02	0.12	0.07	0.00	0.05	0.26	0.03	0.07	0.01	0.93
Nov 7 - Nov 11, 1998	23	25	0.19	0.08	0.01	0.09	1.28	0.65	0.03	0.27	2.18	0.71	0.35	0.07	7.87
Nov 28 - Dec 2, 1998	25	26	0.13	0.06	0.00	0.09	2.64	1.35	0.05	0.45	3.26	1.20	0.44	0.07	10.15
Jan 25 - Jan 29, 1999	1	1	0.00	0.00	0.00	0.00	0.06	0.03	0.00	0.01	0.09	0.02	0.01	0.00	0.28
Feb 4 - Feb 8, 1999	4	5	0.03	0.01	0.00	0.01	0.14	0.09	0.01	0.06	0.49	0.07	0.04	0.01	1.52
Feb 9 - Feb 10, 1999	4	5	0.02	0.01	0.00	0.01	0.19	0.10	0.01	0.06	0.53	0.10	0.07	0.01	1.58
Mar 11 - Mar 15, 1999	4	10	0.04	0.01	0.00	0.03	0.22	0.15	0.02	0.15	1.15	0.15	0.15	0.03	2.33
Mar 25 - Mar 26, 1999	21	22	0.07	0.03	0.01	0.05	1.75	0.41	0.03	0.32	1.91	0.51	0.27	0.06	9.33

Mass Load at Automatic Sampling / Streamgaging Locations

Channel Sampled Period	Storm Vol. ac-ft	Vol. Sampled ac-ft	NO3 tons	NH3 tons	TKN tons	PO4 tons	TSS tons	VSS tons	Cd lbs	Cr lbs	Cu lbs	Pb lbs	Ni lbs	Ag lbs	Zn lbs
San Diego Creek @ Campus															
Sep 25 - Sep 29, 1997	566.25	423.02	9.27	0.20	2.29	1.19	203	38	2.07	13.2	37.1	19.1	20.1	0.57	218
Nov 26 - Nov 30, 1997	1191.49	1127.27	23.17	0.62	7.36	6.67	1,058	902	8	85.9	165.5	94.8	69.2	1.5	821
Dec 6 - Dec 10, 1997	20429.51	20298.31	193.72	12.5	219.4	433.0	65,152	59406	621	7275	5479	4404	4852	54.3	32942
Dec 18 - Dec 22, 1997	970.59	948.29	26.74	0.32	3.52	4.34	1,028	123	6.46	37.8	80.8	36.7	43.5	1.29	290
Jan 3 - Jan 6, 1998	352.41	319.54	7.51	0.08	0.69	0.42	42	8.7	0.43	8.64	19.8	2.53	4.46	0.43	17
Jan 9 - Jan 13, 1998	2333.18	2338.01	61.69	0.79	12.62	16.01	4,091	470	14.30	166	1232	699	758	3.18	164
Feb 3 - Feb 6, 1998	3953.80	3915.01	64.81	1.24	14.60	25.60	7,039	21	13.02	264	470	191	249	5.32	1261
Feb 6 - Feb 10, 1998	11741.92	11581.10	188.38	4.11	57.31	118.3	23,490	2,176	0.00	1638	1745	1050	1046	11.47	6455
Feb 14 - Feb 15, 1998	6444.64	6409.41	83.90	4.33	23.56	70.39	23,020	2,167	40.00	1303	877	607	810	8.71	3616
Feb 19 - Feb 24, 1998	13881.28	13265.39	164.52	7.75	61.0	173.5			187.79	2084	2082	1225	1505	63.0	6536
Mar 25 - Mar 29, 1998	3193.76	3190.55	73.52	0.49	11.43	4.34	647	820	37.46	400	337	320	279	15.1	1518
May 12 - May 16, 1998	2316.87	2379.72	60.69	0.08	8.34	8.24	4,773	186	24.13	250	293	191	162	6.47	1374
Nov 8 - Nov 12, 1998	895.17	940.31	36.18	9.55	0.65	5.84	1,775.60	236.63	12.5	93.4	109.3	72.7	60.3	2.6	1,039.6
Nov 28 - Dec 2, 1998	1,221.10	1,236.86	15.43	5.29	0.10	3.51	779.57	99.57	10.8	97.0	119.8	66.4	70.5	3.4	627.8
Jan 25 - Jan 29, 1999	1,730.25	1,914.97	46.41	9.28	0.79	7.39	2,115.74	315.42	10.8	136.9	197.4	87.8	99.6	5.2	661.8
Feb 4 - Feb 8, 1999	147.42	224.61	11.34	0.31	0.13	0.66	30.92	15.82	0.3	4.2	14.0	2.0	3.2	0.6	23.3
Feb 9 - Feb 13, 1999	118.53	184.89	6.52	0.25	0.03	0.51	33.57	10.67	0.3	2.0	14.7	2.1	3.6	0.5	24.1
Mar 11 - Mar 13, 1999	45.48	70.96	4.22	0.04	0.04	0.18	3.66	1.52	0.1	0.8	5.9	0.2	0.6	0.2	8.1
Mar 15 - Mar 19, 1999	183.09	250.52	11.88	0.34	0.23	0.78	53.92	15.25	0.3	7.4	15.4	3.7	5.4	0.7	33.1
Mar 25 - Mar 29, 1999	846.54	896.79	29.97	4.02	0.46	3.73	862.09	122.37	6.0	60.3	109.2	41.7	53.3	2.4	413.4
Apr 6 - Apr 7, 1999	447.05	215.64	4.91	0.38	0.09	0.73	64.37	10.76	0.8	7.2	17.6	3.6	6.2	0.6	42.2
Peters Canyon Wash															
Nov 8-10, 1994	47	32	1.93	0.02	0.11	0.04	4.55	0.71	0.04	0.44	2.34	0.66	1.76	0.01	6.61
Dec 5, 1994	4	4	0.10	0.00	0.02	0.01	0.39	0.11	0.02	0.06	0.34	0.06	0.23	0.01	0.71
Mar 2-4, 1995	97	69	3.85	0.03	0.26	0.14	18.22	3.29	0.09	0.94	5.13	2.43	3.77	0.19	16.89
Mar 21-23, 1995	500	483	26.07	0.11	0.99	1.18	134.39	20.97	0.66	6.55	26.82	9.40	26.21	1.36	33.94
Dec 12-16, 1995	125	144	7.72	0.20	0.97	0.38	33.33	6.55	0.38	5.69	16.96	1.90	7.99	0.74	48.02
Jan 19-21, 1996	334	71	4.54	0.02	0.15	0.07	6.00	1.12	0.10	1.63	4.79	0.62	1.05	0.10	11.42
Jan 31-Feb 4, 1996	369	386	12.33	0.03	2.95	2.40	546.33	69.98	6.06	54.78	86.11	33.11	35.58	4.67	282.09
Feb 19-23, 1996	1,112	1,131	52.22	0.79	5.41	5.12	1165.94	122.71	5.90	112.77	148.56	3.10	3.11	1.54	582.72
Oct 30 - Nov 3, 1996	712	747	23.78	0.91	4.31	3.76	696.39	95.68	3.90	52.31	91.85	44.53	46.59	1.97	468.48
Nov 21 - Nov 25, 1996	1,815	1,834	40.81	1.03	9.47	13.75	3839.42	337.03	9.78	226.30	367.60	167.95	163.40	2.49	1310.90
Dec 9 - Dec 13, 1996	1,268	1,256	27.21	0.75	2.65	3.37	708.83	73.64	1.82	55.00	83.82	41.47	43.16	1.71	346.75
Nov 10 - Nov 14, 1997	924	935	31.98	0.71	4.58	3.52	601.10	90.02	1.34	37.20	87.51	29.95	26.42	1.27	510.59
Nov 26 - Nov 30, 1997	222	251	11.88	0.10	1.43	1.77	215.28	182.23	1.70	19.82	40.48	17.70	18.00	0.34	148.45
Dec 6 - Dec 8, 1997	6,040	6,007	68.37	3.08	76.50	136.92	30067.18	27325.68	178.25	2178.98	2089.87	1381.48	1523.25	8.16	11760.40
Dec 18 - Dec 22, 1997	219	311	9.63	0.25	1.42	1.97	489.23	56.34	3.26	32.74	55.28	18.41	21.16	0.52	161.08
Jan 9 - Jan 13, 1998	526	574	18.88	0.19	2.39	3.35	757.82	97.04	4.22	44.76	70.01	36.07	31.90	0.78	45.09
Feb 14 - Feb 15, 1998	2,135	2,111	30.68	0.72	6.31	17.75	7443.86	773.16	26.97	315.60	401.26	263.49	186.76	2.87	722.21
Mar 25 - Mar 29, 1998	1,141	1,207	41.18	0.71	5.84	2.11	127.15	168.71	10.28	90.57	147.94	86.60	66.59	1.82	393.04
Nov 8 - Nov 12, 1998	180	410	21.67	2.97	0.32	2.10	340.24	97.32	1.86	20.61	37.88	16.11	14.11	1.11	161.40
Nov 28 - Dec 2, 1998	253	495	12.09	1.36	0.05	1.07	193.01	30.54	4.34	31.30	56.21	37.57	22.78	1.34	297.66
Jan 25 - Jan 29, 1999	653	671	73.45	1.07	0.13	1.32	252.21	45.93	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Feb 9 - Feb 13, 1999	22	76	6.46	0.31	0.04	0.38	27.10	7.83	0.42	3.76	9.07	4.67	2.98	0.21	38.91
Mar 11 - Mar 15, 1999	15	78	9.60	0.24	0.08	0.22	8.68	1.90	0.11	0.91	5.96	0.57	0.64	0.21	9.70
Mar 15 - Mar 19, 1999	64	120	9.83	0.22	0.11	0.49	26.52	4.66	0.23	2.04	6.14	1.45	1.26	0.23	16.64

Mass Load at Automatic Sampling / Streamgaging Locations

Channel Sampled Period	Storm Vol. ac-ft	Vol. Sampled ac-ft	NO3 tons	NH3 tons	TKN tons	PO4 tons	TSS tons	VSS tons	Cd lbs	Cr lbs	Cu lbs	Pb lbs	Ni lbs	Ag lbs	Zn lbs
San Diego Creek @ Harvard															
Jan 19-23, 1996	361	335	12.14	0.15	1.30	2.33	721.87	96.27	2.44	41.00	13.02	21.52	28.44	0.58	246.21
Jan 31-Feb 4, 1996	783	777	18.90	0.49	4.68	7.81	1083.21	146.16	1.13	13.57	123.67	44.66	59.07	4.94	391.09
Feb 20-22, 1996	2,411	1,983	21.82	1.29	12.12	23.70	9157.98	888.86	32.32	420.19	371.71	5.39	5.39	2.69	1723.86
Mar 4-8, 1996	487	484	8.69	0.27	2.55	3.66	1461.80	118.16	4.68	80.52	69.47	32.55	42.89	0.66	367.48
Oct 30 - Nov 5, 1996	449	449	16.30	0.51	4.28	3.38	830.04	127.43	3.90	50.37	34.95	33.37	38.93	1.08	385.54
Nov 21 - Nov 24, 1996	1,902	1,903	26.91	1.32	12.29	17.36	5164.36	469.09	19.68	247.17	340.31	153.34	178.74	2.59	1352.00
Dec 9 - Dec 13, 1996	2,272	2,272	34.02	0.56	7.31	9.90	3005.79	273.07	9.22	154.99	183.16	84.32	110.51	3.09	861.14
Jan 22 - Jan 26, 1997	1,417	641	15.88	0.34	2.63	3.41	1043.33	131.42	3.73	44.66	66.90	29.86	143.55	0.87	339.10
Nov 10 - Nov 14, 1997	367	365	13.88	0.30	2.38	1.87	327.51	13.94	1.74	18.18	39.80	11.19	12.88	0.50	208.36
Nov 26 - Nov 30, 1997	581	613	12.03	0.33	4.20	4.80	779.53	685.82	5.81	61.24	94.82	48.36	55.05	0.83	440.09
Jan 9 - Jan 10, 1998	655	610	5.65	0.22	4.93	7.91	3075.61	283.90	8.45	114.64	119.88	60.29	92.23	0.83	138.51
Feb 14 - Feb 18, 1998	3,021	3,024	33.20	1.03	12.95	35.77	9116.81	856.08	32.41	361.78	419.75	261.65	254.90	4.14	941.19
Jan 25 - Jan 26, 1999	689	178	4.81	1.20	0.05	0.91	63.45	9.19	2.17	31.54	60.25	14.92	23.11	0.48	136.55
Feb 4 - Feb 8, 1999	87	88	4.03	0.37	0.02	0.32	107.41	28.19	0.46	6.02	10.08	3.31	4.62	0.24	30.38
Mar 11 - Mar 15, 1999	27	168	13.53	0.15	0.01	0.32	52.12	9.61	0.42	3.45	14.81	2.18	7.34	0.46	36.81
Lane Channel															
Jan 21-25, 1996	130	142	2.52	0.03	0.64	0.45	83.74	12.70	1.11	7.29	35.23	12.15	6.55	0.21	117.04
Feb 19-23, 1996	497	498	5.54	0.22	1.70	1.82	282.52	32.54	19.27	77.16	129.72	1.37	1.89	1.70	898.50
Nov 21 - Nov 22, 1996	449.51	407.33	1.6	0.15	0.95	0.77	148.8	18.8	2.21	16.51	46.8	34.32	13.34	0.55	254.83
Dec 9 - Dec 13, 1996	490.09	489.93	6.0	0.16	0.80	0.30	86.5	12.2	0.85	8.93	38.8	18.11	14.16	0.67	173.96
Jan 1 - Jan 2, 1996	29.33	27.26	0.3	0.01	0.04	0.02	1.1	0.4	0.04	0.37	1.9	0.38	0.44	0.04	5.55
Nov 10 - Nov 14, 1997	186.35	179.06	3.0	0.12	0.46	0.18	25.0	6.1	0.24	4.39	16.7	7.01	4.75	0.24	116.91
Nov 26 - Nov 30, 1997	149.65	171.34	2.6	0.11	0.47	0.21	18.7	14.1	0.25	2.52	16.1	6.73	5.48	0.72	68.29
Feb 14 - Feb 18, 1998	552.38	594.57	6.7	0.20	0.73	2.63	107.0	16.3	0.86	17.51	44.3	19.17	12.74	0.82	84.38
Feb 19 - Feb 23, 1998	315.44	380.52	7.2	0.27	0.56	6.16	0.0	0.0	0.52	7.95	37.0	10.93	7.83	0.52	50.49
Mar 25 - Mar 29, 1998	312	343	4.47	0.05	0.24	0.04	18.96	8.13	4.11	15.29	45.53	19.62	9.36	0.47	106.20
Nov 9 - Nov 12, 1998		208	4.42	0.26	0.06	0.69	34.07	23.01	0.37	4.47	17.30	3.10	9.37	0.56	49.11
Feb 4 - Feb 8, 1999		54	1.64	0.04	0.02	0.12	3.71	2.90	0.28	1.12	5.50	0.99	1.59	0.15	16.22
Feb 9 - Feb 13, 1999		39	1.55	0.02	0.01	0.06	2.11	0.78	0.17	0.72	4.20	0.83	1.25	0.11	10.96
Mar 11 - Mar 15, 1999		35	1.44	0.03	0.02	0.08	1.60	0.61	0.08	0.39	5.05	0.80	0.83	0.09	8.65
Mar 15 - Mar 19, 1999		49	1.54	0.03	0.02	0.11	3.82	1.34	0.05	0.45	3.15	0.47	0.67	0.08	6.66
Mar 25 - Mar 26, 1999		86	0.69	0.07	0.03	0.12	7.25	1.23	0.12	0.96	10.56	2.13	1.92	0.23	82.08

Mass Load at Automatic Sampling / Streamgaging Locations

Channel Sampled Period	Storm Vol. ac-ft	Vol. Sampled ac-ft	NO3 tons	NH3 tons	TKN tons	PO4 tons	TSS tons	VSS tons	Cd lbs	Cr lbs	Cu lbs	Pb lbs	Ni lbs	Ag lbs	Zn lbs
Laguna Canyon															
Mar 10-13, 1995	381	238	0.92	0.04	1.41	2.14	695.88	64.62	0.81	46.03	27.45	30.67	21.91	0.32	102.18
Dec 12-16, 1995	14	15	0.11	0.01	0.05	0.04	2.77	0.51	0.02	0.33	1.35	0.77	0.84	0.02	2.58
Jan 19-23, 1996	25	26	0.11	0.00	0.08	0.10	33.72	3.05	0.19	3.23	4.18	1.52	7.98	0.05	9.09
Feb 20-24, 1996	191	180	1.10	0.03	0.81	1.52	616.62	45.89	1.38	33.83	30.33	0.57	0.70	0.24	114.17
Oct 30 - Nov 1, 1996	50	57	0.60	0.05	0.31	0.28	57.20	6.61	0.23	7.50	3.83	5.11	4.34	0.08	25.71
Nov 21 - Nov 25, 1996	226	236	1.20	0.11	1.04	1.50	448.09	33.73	0.55	45.64	36.46	17.61	34.75	0.32	123.01
Dec 9 - Dec 13, 1996	262	272	1.32	0.06	0.63	0.78	293.14	18.31	0.37	18.45	19.39	7.76	16.16	0.37	61.06
Oso Creek															
Nov 16, 1994	22	10	0.09	0.00	0.04	0.02	1.69	0.37	0.08	0.14	0.79	0.20	0.56	0.00	2.03
Mar 2-6, 1995	2,107	2,081	5.58	0.65	6.47	11.63	2423.31	226.90	28.14	165.00	173.79	61.63	112.98	3.29	613.00
Mar 10-13, 1995	2,285	2,271	10.22	0.77	9.19	10.11	2080.86	241.73	22.95	165.42	252.17	67.35	388.12	2.90	736.07
Jan 19-23, 1996	154	134	1.24	0.03	0.30	0.25	34.75	4.78	1.67	3.90	13.77	1.99	10.32	0.18	29.10
Jan 31-Feb 2, 1996	342	310	2.48	0.16	2.04	1.24	180.28	22.68	5.46	21.57	37.02	12.35	21.54	1.73	117.39
Feb 20-24, 1996	1,250	1,247	13.09	0.27	3.82	2.72	290.07	32.44	8.00	32.78	80.19	6.52	38.07	1.69	203.52
Oct 30 - Nov 3, 1996	344	381	3.50	0.49	3.07	2.35	416.51	64.32	13.89	33.35	41.26	19.84	35.28	1.06	261.86
Dec 9 - Dec 13, 1996	1,067	1,073	6.80	0.30	2.58	2.18	311.23	40.28	5.31	24.91	62.02	13.35	40.01	1.46	197.35
Nov 8 - Nov 12, 1998	118	144	1.45	0.69	0.06	0.70	84.60	23.22	3.09	8.21	13.41	7.53	8.70	0.39	58.00
Jan 25 - Jan 29, 1999	327	330	1.95	0.65	0.08	0.68	94.92	26.46	3.38	7.62	22.00	5.65	21.28	0.90	55.78
Mar 11 - Mar 15, 1999	3	15	0.10	0.02	0.00	0.03	5.31	0.75	0.25	0.46	1.16	0.32	0.84	0.04	3.19
Mar 15 - Mar 19, 1999	50	84	0.54	0.06	0.01	0.18	16.66	2.99	1.11	1.87	6.57	1.18	4.07	0.23	17.28

Appendix 4.8:
EMCs from Sampled Storms (1994-99)

Event Mean Concentrations at Automatic Sampling / Streamgaging Locations

Channel Sampled Period	Vol. Storm ac-ft	Vol. Sampled ac-ft	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L
Anaheim Barber City															
Oct 4-5,1994	7	11	5.03	0.87	9.46	4.84	621.80	52.08	4.72	33.33	281.03	82.00	50.01	1.40	1021.65
Nov 16,1994	10	11	10.00	0.53	4.70	1.20	35.98	9.00	0.50	5.00	57.98	11.00	19.99	0.15	119.95
Mar 10-14,1995	510	528	5.95	0.07	1.02	0.78	67.92	18.26	0.50	5.48	22.51	13.46	19.99	0.38	86.57
Dec 12-14, 1995	275	294	11.96	0.67	5.87	2.92	143.91	45.61	0.72	12.19	114.39	39.91	21.68	0.50	403.62
Jan 16-17,1996	73	67	7.74	1.58	5.26	1.99	122.89	35.76	9.79	5.29	57.14	21.73	12.26	1.32	234.08
Jan 19,1996	37	31	12.40	0.90	3.18	0.81	32.43	18.70	0.50	7.43	48.95	8.84	6.89	0.50	138.80
Jan 21-25, 1996	100	169	8.10	0.05	1.55	0.73	42.61	17.32	0.60	5.46	31.71	10.66	7.96	0.50	114.19
Jan 31-Feb 4, 1996	332	330	7.09	0.30	2.43	1.15	49.55	18.26	0.50	8.60	42.58	2.97	9.97	0.96	184.27
Mar 4-8,1996	412	470	5.98	0.39	1.33	0.68	35.70	10.38	0.50	4.54	26.40	12.36	5.64	2.53	112.48
Oct 30 - Oct 31, 1996	431	430	6.37	0.85	2.90	1.79	84.56	24.20	0.51	5.07	46.79	47.54	11.88	0.50	326.15
Nov 21 - Nov 25, 1996	652	658	3.49	0.34	1.42	0.90	33.78	12.02	0.50	5.00	39.59	15.61	11.77	0.50	139.08
Dec 9 - Dec 13, 1996	621	621	2.23	0.17	0.87	0.60	20.14	10.24	0.50	5.05	20.43	9.36	2.85	0.50	89.90
Jan 1 - Jan 5, 1997	136	140	6.53	0.36	0.93	0.39	12.45	8.74	0.50	5.00	28.56	4.73	10.67	0.50	78.81
Jan 21 - Jan 25, 1997	342	159	3.79	0.06	1.04	0.58	46.32	17.55	0.50	5.00	28.81	11.51	2.13	0.50	38.38
Sep 25 - Sep 29, 1997	169	161	6.79	0.22	4.22	2.03	174.77	45.79	1.48	14.29	100.27	49.83	19.23	0.50	465.94
Nov 10 - Nov 14, 1997	170	177	7.88	0.75	6.69	2.30	142.77	42.06	0.57	75.50	45.02	22.25	7.70	0.50	323.85
Dec 18 - Dec 19, 1997	383	383	4.22	0.62	1.71	0.81	65.39	16.21	0.50	20.01	30.06	14.07	5.83	0.50	130.37
Jan 29 - Feb 2, 1998	191	196	10.22	0.26	1.44	0.62	105.22	23.33	0.51	5.00	26.90	11.65	8.48	0.50	76.95
May 12 - May 16, 1998	265	223	4.96	0.16	1.25	2.19	122.05	45.44	0.35	9.94	27.30	14.87	5.38	1.00	112.60
Nov 8 - Nov 12, 1998	467	553	10.74	1.26	0.19	3.15	82.81	50.75	0.56	8.85	39.37	11.50	8.21	1.00	152.08
Mar 11, 1999	19	11	7.71	1.61	0.53	6.28	218.21	100.41	1.48	13.52	70.24	33.89	14.88	1.00	411.76
Mar 20 - Mar 24, 1999	20	38	9.66	0.41	0.13	2.08	30.61	13.28	0.50	4.17	34.73	4.13	4.48	1.00	76.54
Mar 25 - Mar 29, 1999	137	169	6.48	0.37	0.12	1.32	38.31	14.94	1.00	4.00	23.68	6.69	4.19	1.00	90.09
Bolsa Chica															
Oct 4-6,1994	9	12	7.89	6.04	17.99	5.52	829.63	27.26	2.00	27.62	15.54	39.98	39.62	6.33	308.96
Nov 10, 1994	135	143	9.40	0.77	5.93	6.69	1617.36	109.64	2.71	55.18	137.31	90.81	48.27	0.46	565.30
Mar 2-6,1995	425	431	4.25	0.21	1.37	1.27	135.44	17.65	0.50	5.00	22.02	12.68	19.99	0.54	69.37
Mar 10-14,1995	492	491	8.42	0.12	1.94	2.20	229.37	31.94	0.50	18.18	32.07	25.31	40.24	0.65	131.69
Dec 12-16, 1995	162	169	13.12	0.70	3.85	2.04	154.07	27.88	0.50	9.79	20.05	17.31	20.01	0.50	155.83
Jan 19-23,1996	48	54	10.21	0.28	0.94	1.27	115.32	23.13	0.50	6.81	35.21	15.21	10.28	0.53	123.63
Jan 31-Feb 4, 1996	141	144	7.38	0.44	2.26	1.47	136.65	23.37	0.50	13.76	31.89	22.48	10.41	1.02	138.81
Mar 4-8, 1996	179	183	4.36	0.38	1.40	1.00	116.46	15.17	0.50	5.11	19.41	14.97	8.09	0.50	108.25
Oct 30 - Nov 3, 1996	227	229	11.52	1.04	4.17	2.06	171.66	38.57	0.51	5.29	46.83	29.86	16.76	0.51	280.63
Nov 21 - Nov 25, 1996	395	383	5.36	0.46	2.24	1.77	199.37	21.26	0.59	5.00	58.86	31.25	10.95	0.50	195.93
Dec 9 - Dec 13, 1996	562	561	4.59	0.12	1.06	1.30	124.79	16.82	0.87	5.00	22.57	18.03	5.69	0.50	91.48
Dec 27 - Dec 31, 1996	150	153	6.65	0.44	1.29	0.95	113.58	15.90	0.50	5.00	24.75	14.18	2.13	0.50	151.23
Sep 25 - Sep 29, 1997	473	473	10.07	0.68	5.53	2.46	263.29	50.08	1.00	13.85	34.65	25.32	17.91	0.50	216.27
Nov 10 - Nov 13, 1997	669	601	11.26	1.01	4.59	2.16	355.67	63.79	0.50	12.64	35.53	27.00	10.04	0.50	327.13
Jan 29 - Feb 2, 1998	310	280	8.41	0.42	4.52	1.60	180.01	29.23	3.91	8.00	31.39	18.19	12.66	0.50	135.60
May 13 - May 16, 1998	271	273	8.58	0.07	1.11	0.71	103.63	34.37	0.25	7.04	23.03	9.22	4.87	1.00	67.34
Nov 8 - Nov 12, 1998	308	325	12.78	2.22	0.38	2.69	120.71	77.77	0.50	9.50	43.32	12.28	9.82	1.00	119.70
Jan 25 - Jan 29, 1999	182	181	7.25	0.73	0.33	1.50	59.72	18.50	0.50	4.00	30.30	10.62	5.14	1.00	85.44
Mar 11 - Mar 15, 1999	10	14	15.67	0.20	0.38	2.11	25.09	17.25	12.97	4.00	35.09	3.53	6.27	1.00	59.30
Mar 15 - Mar 19, 1999	124	109	7.43	0.70	0.34	2.15	199.35	46.95	0.70	9.83	46.12	18.17	6.64	1.00	135.28
Mar 25 - Mar 29, 1999	95	103	6.67	0.59	0.17	1.26	49.55	15.99	0.50	4.00	21.96	7.49	4.62	1.00	94.49

Event Mean Concentrations at Automatic Sampling / Streamgaging Locations

Channel Sampled Period	Vol. Storm ac-ft	Vol. Sampled ac-ft	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L
						Westminster									
Nov 10, 1994	71	71	6.14	1.23	6.05	4.14	312.94	59.42	0.96	5.00	194.37	50.98	19.99	0.83	327.38
Nov 16, 1994	0.5	0.3	12.99	0.43	4.60	1.50	27.99	19.99	0.50	5.00	79.97	8.00	19.99	0.50	139.94
Mar 10-14,1994	330	330	8.57	0.05	1.24	0.98	128.77	23.44	0.50	5.00	25.39	24.47	19.99	0.50	88.00
Dec 12-16, 1995	94	108	11.91	0.66	4.21	2.34	178.27	41.17	0.95	9.59	97.34	28.75	34.51	1.24	266.06
Jan 16-17, 1996	31	30	10.16	0.91	5.49	2.87	226.04	53.39	1.06	14.42	59.57	24.02	13.13	3.68	204.86
Jan 19-23, 1996	70	78	8.92	0.11	1.30	0.28	14.34	6.02	5.04	50.43	128.96	11.39	24.73	8.41	231.30
Jan 31-Feb 4, 1996	165	162	7.99	0.30	2.24	1.24	103.85	24.57	0.74	10.42	40.91	27.85	15.56	1.13	202.08
Mar 4-8, 1996	111	115	3.92	0.34	1.38	1.33	149.75	19.14	0.50	4.86	32.05	18.01	5.27	0.50	115.64
Oct 30 - Nov 3, 1996	102	108	12.54	1.19	6.31	3.20	389.12	82.51	1.58	17.91	67.93	38.64	24.29	0.50	414.55
Nov 21 - Nov 25, 1996	260	253	4.10	0.33	1.94	1.69	178.06	25.86	0.51	10.06	47.03	31.57	10.00	0.50	170.35
Dec 9 - Dec 13, 1996	345	341	4.06	0.20	0.99	0.87	67.98	14.13	0.54	5.85	22.34	15.06	9.93	0.52	86.15
Dec 27 - Dec 31, 1996	113	134	5.99	0.35	1.98	2.27	534.70	40.41	0.50	16.13	34.90	31.23	13.14	0.50	206.43
Jan 21 - Jan 25, 1997	253	158	6.42	0.26	1.41	1.14	42.00	8.37	0.98	5.00	32.55	61.68	8.47	0.50	212.59
Sep 25 - Sep 27, 1997	73	74	7.48	0.54	5.16	2.13	164.03	50.07	0.53	5.24	83.00	25.16	16.88	0.53	207.83
Nov 10 - Nov 14, 1997	18	23	8.70	1.11	6.41	2.04	147.29	48.52	0.50	5.00	62.37	15.96	12.22	0.50	303.75
Dec 18 - Dec 22, 1997	133	166	10.00	0.31	1.49	0.82	190.63	45.53	1.39	7.26	20.26	17.31	3.20	0.50	79.87
May 12 - May 16, 1998	251	277	7.07	0.08	1.11	0.94	57.38	34.88	0.25	6.95	52.08	14.62	3.87	1.00	81.14
Mar 20 - Mar 24, 1999	10	31	16.77	0.12	0.05	0.99	5.13	3.45	0.50	4.00	25.14	2.16	2.97	1.00	30.75
Mar 25 - Mar 29, 1999	94	102	9.26	0.83	0.18	1.42	110.35	23.22	0.50	7.42	30.72	12.56	5.01	1.00	120.88
						E. Garden Grove Wintersburg									
Oct 4-8, 1994	50	51	4.91	1.45	14.57	2.37	192.41	23.07	0.75	7.02	41.77	24.76	70.93	1.68	183.25
Nov 8-12, 1994	170	243	1.48	0.13	1.05	0.48	214.76	5.96	0.57	5.70	77.15	59.01	21.99	0.22	278.37
Mar 2-6, 1995	932	959	3.58	0.16	1.27	0.87	60.81	10.87	0.50	5.00	36.43	13.34	19.99	0.52	61.92
Mar 10-14, 1995	1,171	1,176	4.14	0.09	1.12	1.16	110.82	21.85	0.50	9.55	30.02	16.14	19.99	0.50	84.01
Dec 12-16, 1995	375	418	11.96	0.71	5.34	2.49	161.86	26.93	1.00	12.58	41.20	21.89	40.03	1.00	193.28
Jan 16-22, 1996	404	357	4.99	0.64	3.23	2.06	40.25	11.29	0.89	11.73	35.53	47.19	15.84	1.46	54.19
Mar 4-8, 1996	428	423	2.87	0.30	1.24	0.80	59.38	15.28	0.50	4.28	29.11	8.27	2.95	0.65	85.71
Oct 30 - Nov 3, 1996	113	103	7.23	1.54	2.79	1.54	121.03	22.31	0.50	5.00	33.76	14.75	11.97	0.50	148.21
Nov 21 - Nov 25, 1996	953	957	4.29	0.07	2.62	2.11	272.10	33.94	0.50	16.27	48.89	26.53	15.99	0.50	180.90
Dec 9 - Dec 13, 1996	1,253	1,231	2.19	0.10	1.04	1.07	74.96	15.53	0.50	4.99	23.30	16.36	4.18	0.50	73.31
Dec 27 - Dec 31, 1996	365	392	4.86	0.27	1.48	0.70	54.14	14.18	0.50	5.00	21.62	9.79	2.44	0.50	111.81
Jan 21 - Jan 25, 1997	976	609	3.63	0.15	0.96	0.71	54.15	17.63	0.50	5.00	27.67	7.96	7.19	0.50	81.11
Sep 25, 1997	222	193	0.19	0.03	0.38	0.17	27.24	5.70	0.26	0.76	3.48	3.48	0.95	0.04	29.46
Nov 10 - Nov 14, 1997	285	315	7.02	1.24	4.62	1.72	196.87	47.62	0.50	5.00	36.71	21.87	8.22	0.50	226.67
Nov 26 - Nov 30, 1997	331	362	5.34	0.31	2.76	1.52	69.10	50.83	0.58	10.15	29.45	25.56	6.12	0.50	133.03
Dec 18 - Dec 22, 1997	661	663	6.36	0.39	1.94	1.21	119.96	26.11	2.05	6.34	27.39	16.46	5.68	0.50	114.55
Jan 3 - Jan 6, 1998	169	207	7.01	0.30	1.66	0.67	47.03	16.07	0.50	5.00	24.51	7.63	5.12	0.50	74.03
Jan 9 - Jan 13, 1998	394	480	2.34	0.25	1.70	0.91	103.22	24.25	0.56	5.00	36.82	15.41	12.30	5.45	8.12
Jan 29 - Feb 2, 1998	331	391	5.03	0.25	1.32	0.83	98.27	22.62	0.50	5.00	32.15	17.08	8.61	0.50	78.38
Feb 14 - Feb 18, 1998	1,489	1,375	6.99	0.25	1.03	2.82	103.02	17.79	0.50	7.42	21.78	15.28	5.75	1.53	53.54
May 12 - May 13, 1998	586	506	2.45	0.03	1.62	1.34	237.89	47.83	0.77	11.84	40.81	45.73	8.77	1.00	166.71
Nov 8 - Nov 12, 1998	688	723	6.05	4.83	0.48	5.46	423.99	189.80	1.58	20.57	70.41	71.58	16.14	1.00	357.63
Mar 11 - Mar 15, 1999	39	94	8.89	0.12	0.24	1.71	15.66	7.87	0.50	4.00	26.21	2.38	7.30	1.00	51.63
Mar 15 - Mar 19, 1999	169	224	5.79	0.51	0.30	1.95	87.65	34.03	0.65	5.87	28.38	14.42	7.51	1.00	101.31
Mar 20 - Mar 24, 1999	46	102	6.16	0.29	0.14	1.83	14.65	7.81	0.50	4.00	30.78	2.76	6.08	1.00	46.84
Mar 25 - Mar 29, 1999	239	306	3.67	0.64	0.16	1.53	58.24	22.57	0.50	4.00	24.79	9.08	4.26	1.00	79.20

Event Mean Concentrations at Automatic Sampling / Streamgaging Locations

Channel Sampled Period	Vol. Storm ac-ft	Vol. Sampled ac-ft	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L
Santa Ana Delhi															
Oct 4-8, 1994	23	27	7.29	0.57	3.10	1.01	89.29	23.21	1.31	5.00	32.45	12.05	19.99	6.70	165.87
Nov 8-12, 1994	204	211	8.48	0.61	4.70	4.09	754.89	48.68	2.10	31.96	111.49	78.41	19.99	0.19	347.99
Dec 5, 1994	5	13	11.00	0.97	5.10	2.20	239.90	47.98	1.00	5.00	55.98	20.99	19.99	0.50	229.90
Mar 21-25, 1995	399	419	6.84	0.05	1.47	1.33	147.42	28.58	0.50	5.00	25.84	10.91	19.99	1.23	59.69
Dec 12-13, 1995	150	130	11.38	1.22	9.76	4.63	631.31	66.82	2.39	29.76	129.87	132.59	24.32	0.50	540.48
Jan 31, 1996	328	158	3.07	0.15	2.41	1.89	238.97	45.79	1.00	5.39	55.37	48.91	16.25	0.50	250.18
Feb 19-23, 1996	882	879	7.13	0.38	2.50	4.64	376.23	59.38	7.88	30.97	87.06	1.14	1.13	0.51	502.72
Mar 4-8, 1996	246	258	4.26	0.46	1.73	1.16	174.25	29.06	0.50	9.86	29.86	29.60	8.96	0.50	171.85
Oct 30 - Nov 3, 1996	239	241	9.01	0.84	4.51	3.11	555.18	74.57	1.89	22.55	47.37	54.79	24.59	0.54	417.25
Nov 21 - Nov 25, 1996	918	933	7.42	0.44	2.83	2.04	318.41	42.37	0.50	18.54	53.66	41.25	14.02	0.50	254.37
Dec 9 - Dec 13, 1996	963	859	5.43	0.06	1.85	1.00	121.22	18.26	0.52	5.70	25.71	20.34	6.23	0.52	101.79
Jan 1 - Jan 2, 1997	138	35	6.20	0.28	1.20	0.65	51.70	15.23	0.50	5.00	23.18	10.21	8.08	0.50	90.18
Sep 25 - Sep 29, 1997	174	180	7.21	0.43	6.13	3.32	604.51	101.64	3.02	14.42	109.21	88.62	30.22	0.50	493.28
Nov 10 - Nov 14, 1997	274	283	9.92	0.41	2.74	1.26	137.04	35.39	0.50	11.01	52.45	29.68	12.55	0.50	273.50
Nov 26 - Nov 30, 1997	280	294	8.14	0.20	3.04	1.29	116.61	76.60	0.53	5.54	42.50	31.86	8.14	0.50	172.56
Dec 6 - Dec 10, 1997	2,804	2,465	3.73	0.20	1.99	1.53	236.96	195.54	0.50	5.80	41.22	32.26	9.25	0.50	182.22
Jan 3 - Jan 7, 1998	84	90	12.53	0.23	1.78	0.54	23.38	11.68	0.50	5.00	29.00	4.95	3.15	0.50	50.19
Jan 9 - Jan 13, 1998	225	245	5.48	0.25	1.78	0.69	150.00	32.50	0.50	5.00	50.04	27.13	10.55	0.50	4.42
Feb 14, 1998	1,328	1,176	4.47	0.25	0.00	9.49	140.93	23.18	0.50	7.74	33.11	19.06	8.73	0.50	228.60
Feb 19 - Feb 24, 1998	2,329	2,248	6.39	0.25	1.82	11.47	0.00	0.00	0.50	6.27	25.17	16.37	5.51	0.50	63.80
Mar 25 - Mar 29, 1998	711	725	8.84	0.11	0.63	0.16	436.21	17.83	0.50	6.35	50.53	23.23	9.39	0.50	110.40
Nov 8 - Nov 12, 1998	299	331	11.07	2.78	0.36	2.64	154.18	104.57	0.62	4.59	31.53	13.96	7.16	1.00	150.61
Feb 4 - Feb 8, 1999	32	37	8.52	0.56	0.24	1.33	43.67	36.54	0.50	4.00	22.06	10.00	5.61	1.00	163.10
Feb 9 - Feb 13, 1999	17	23	14.23	0.59	0.07	1.56	44.87	27.20	0.50	4.00	27.69	10.20	7.40	1.00	95.91
Mar 15 - Mar 19, 1999	56	78	10.84	0.70	0.29	2.62	142.39	57.95	0.25	1.98	10.44	0.64	1.00	0.49	18.06
Mar 25 - Mar 29, 1999	242	263	7.72	0.64	0.14	1.15	50.19	17.05	0.52	4.00	36.06	13.66	4.40	1.00	114.77
Apr 6 - Apr 10, 1999	181	183	6.07	0.95	0.18	2.37	114.82	38.79	1.16	7.15	40.08	20.50	6.12	0.96	157.78
Costa Mesa Channel															
Mar 10-14, 1995	76	75	3.01	0.07	2.11	1.34	40.69	22.43	0.50	5.00	33.03	14.82	19.99	0.50	157.64
Jan 31-Feb 4, 1996	16	16	2.33	0.26	2.62	1.29	28.28	16.84	1.02	13.58	39.24	12.30	9.62	0.85	119.50
Feb 19-23, 1996	137	142	1.90	0.18	1.55	1.42	54.75	19.75	0.50	5.00	33.84	1.03	1.24	0.50	140.63
Nov 21 - Nov 22, 1996	81	80	3.71	0.19	1.90	1.60	36.03	15.02	0.50	5.00	46.05	16.01	7.01	0.50	180.19
Dec 9 - Dec 13, 1996	99	29	2.95	0.15	1.54	1.40	32.06	16.12	0.64	5.00	26.98	9.72	7.04	0.50	127.04
Jan 1 - Jan 2, 1996	3	4	1.91	0.31	1.52	0.88	19.17	10.47	0.50	5.03	34.08	7.86	10.33	0.50	175.11
Jan 21 - Jan 25, 1997	51	42	1.79	0.42	0.98	0.71	68.12	32.26	0.50	5.00	32.49	16.48	3.81	0.50	157.28
Nov 10 - Nov 14, 1997	27	29	3.70	0.43	3.31	1.97	47.47	21.34	0.96	7.43	21.18	11.30	8.22	0.50	189.93
Feb 6 - Feb 9, 1998	214	206	3.72	0.25	2.22	1.36	19.30	9.10	0.50	3.34	20.75	7.98	1.98	0.50	45.10
Feb 14 - Feb 18, 1998	102	106	4.83	0.25	0.98	4.14	12.66	5.96	2.53	18.68	187.92	20.91	52.20	6.43	273.13
Mar 25 - Mar 29, 1998	77	206	5.21	0.15	0.52	0.67	9.52	1.92	0.51	3.65	31.64	9.41	3.65	0.50	72.84
Sep 4 - Sep 8, 1998	3	3	2.78	1.53	0.28	4.32	31.75	18.41	0.58	6.65	33.92	4.20	9.43	1.00	118.90
Nov 7 - Nov 11, 1998	23	25	5.72	2.31	0.16	2.76	38.24	19.45	0.50	4.00	32.51	10.57	5.26	1.00	117.25
Nov 28 - Dec 2, 1998	25	26	3.77	1.78	0.08	2.68	75.18	38.34	0.70	6.33	46.40	17.06	6.27	1.00	144.35
Jan 25 - Jan 29, 1999	1	1	2.95	1.20	0.14	1.53	34.85	19.95	0.50	4.19	28.78	7.39	3.11	1.00	87.00
Feb 4 - Feb 8, 1999	4	5	4.70	1.01	0.25	1.57	19.45	11.80	0.50	4.40	33.22	4.61	2.48	1.00	103.26
Feb 9 - Feb 10, 1999	4	5	3.18	0.92	0.12	1.99	31.18	16.92	0.50	4.76	43.29	8.12	5.50	1.00	128.57
Mar 11 - Mar 15, 1999	4	10	2.48	0.98	0.18	1.93	15.63	10.20	0.56	5.42	40.28	5.11	5.29	1.00	81.91
Mar 25 - Mar 26, 1999	21	22	2.30	1.10	0.18	1.67	59.92	14.12	0.50	5.47	32.70	8.72	4.60	1.00	159.68

Event Mean Concentrations at Automatic Sampling / Streamgaging Locations

Channel Sampled Period	Vol. Storm ac-ft	Vol. Sampled ac-ft	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L
San Diego Creek @ Campus															
Sep 25 - Sep 29, 1997	566.25	423.02	16.13	0.34	4.00	2.08	353.23	65.48	1.80	11.52	32.26	16.65	17.53	0.50	189.90
Nov 26 - Nov 30, 1997	1191.49	1127.27	15.14	0.40	4.81	4.36	691.53	589.24	2.71	28.06	54.06	30.96	22.61	0.50	268.31
Dec 6 - Dec 10, 1997	20429.51	20298.31	7.03	0.45	7.96	15.71	2364.20	2155.67	11.28	131.98	99.41	79.90	88.03	0.98	597.69
Dec 18 - Dec 22, 1997	970.59	948.29	20.77	0.25	2.73	3.37	798.37	95.58	2.51	14.68	31.40	14.26	16.91	0.50	112.68
Jan 3 - Jan 6, 1998	352.41	319.54	17.30	0.18	1.60	0.96	95.74	20.08	0.50	9.96	22.81	2.91	5.15	0.50	19.95
Jan 9 - Jan 13, 1998	2333.18	2338.01	19.43	0.25	3.98	5.04	1288.75	148.02	2.25	26.10	194.06	110.17	119.43	0.50	25.79
Feb 3 - Feb 6, 1998	3953.80	3915.01	12.19	0.23	2.75	4.82	1324.24	3.95	1.23	24.85	44.19	17.97	23.40	0.50	118.63
Feb 6 - Feb 10, 1998	11741.92	11581.10	11.98	0.26	3.65	7.53	1494.01	138.42	0.00	52.08	55.50	33.39	33.26	0.36	205.26
Feb 14 - Feb 15, 1998	6444.64	6409.41	9.64	0.50	2.71	8.09	2645.50	249.03	2.30	74.89	50.37	34.85	46.52	0.50	207.75
Feb 19 - Feb 24, 1998	13881.28	13265.39	9.14	0.43	3.39	9.63	0.00	0.00	5.21	57.84	57.79	34.02	41.78	1.75	181.46
Mar 25 - Mar 29, 1998	3193.76	3190.55	16.97	0.11	2.64	1.00	149.38	189.22	4.32	46.17	38.89	36.96	32.26	1.75	175.24
May 12 - May 16, 1998	2316.87	2379.72	18.78	0.03	2.58	2.55	1477.19	57.64	3.73	38.65	45.36	29.51	25.08	1.00	212.71
Nov 8 - Nov 12, 1998	895.17	940.31	28.34	7.48	0.51	4.57	1390.88	185.36	4.88	36.57	42.81	28.46	23.61	1.00	407.16
Nov 28 - Dec 2, 1998	1,221.10	1,236.86	9.19	3.15	0.06	2.09	464.25	59.29	3.22	28.89	35.68	19.78	20.98	1.00	186.94
Jan 25 - Jan 29, 1999	1,730.25	1,914.97	17.85	3.57	0.31	2.84	813.79	121.32	2.08	26.33	37.97	16.89	19.16	1.00	127.27
Feb 4 - Feb 8, 1999	147.42	224.61	37.18	1.00	0.44	2.16	101.41	51.89	0.50	6.89	22.87	3.27	5.24	1.00	38.19
Feb 9 - Feb 13, 1999	118.53	184.89	25.97	1.00	0.13	2.03	133.73	42.52	0.50	4.00	29.28	4.28	7.17	1.00	48.02
Mar 11 - Mar 13, 1999	45.48	70.96	43.85	0.40	0.40	1.87	37.96	15.74	0.50	4.00	30.56	1.04	3.10	1.00	42.22
Mar 15 - Mar 19, 1999	183.09	250.52	34.92	1.01	0.67	2.30	158.54	44.85	0.50	10.90	22.71	5.39	7.92	1.00	48.60
Mar 25 - Mar 29, 1999	846.54	896.79	24.62	3.30	0.37	3.06	708.07	100.51	2.46	24.78	44.85	17.11	21.90	1.00	169.78
Apr 6 - Apr 7, 1999	447.05	215.64	16.75	1.28	0.31	2.50	219.86	36.75	1.41	12.22	30.11	6.19	10.51	1.00	72.14
Peters Canyon Wash															
Nov 8-10, 1994	32	47	43.95	0.36	2.46	0.91	103.34	16.05	0.50	5.00	26.54	7.49	19.99	0.15	75.07
Dec 5, 1994	4	4	17.99	0.40	3.10	1.40	67.97	19.99	2.00	5.00	29.99	5.00	19.99	0.50	61.97
Mar 2-4, 1995	69	97	40.79	0.33	2.77	1.49	193.15	34.86	0.50	5.00	27.17	12.87	19.99	1.03	89.55
Mar 21-23, 1995	483	500	39.77	0.17	1.51	1.79	205.02	31.99	0.50	5.00	20.46	7.17	19.99	1.04	25.89
Dec 12-16, 1995	125	144	39.48	1.04	4.96	1.97	170.47	33.50	0.97	14.56	43.38	4.85	20.44	1.89	122.80
Jan 19-21, 1996	334	71	47.27	0.25	1.59	0.73	62.42	11.63	0.54	8.47	24.95	3.23	5.46	0.50	59.43
Jan 31-Feb 4, 1996	369	386	23.54	0.06	5.64	4.59	1043.22	133.63	5.78	52.30	82.21	31.62	33.97	4.45	269.32
Feb 19-23, 1996	1,112	1,131	34.00	0.51	3.52	3.33	759.07	79.89	1.92	36.71	48.36	1.01	1.01	0.50	189.68
Oct 30 - Nov 3, 1996	712	747	23.45	0.90	4.25	3.71	686.72	94.35	1.92	25.79	45.28	21.95	22.97	0.97	230.98
Nov 21 - Nov 25, 1996	1,815	1,834	16.39	0.41	3.80	5.52	1541.64	135.33	1.96	45.43	73.80	33.72	32.80	0.50	263.18
Dec 9 - Dec 13, 1996	1,268	1,256	15.95	0.44	1.55	1.97	415.55	43.17	0.53	16.12	24.57	12.16	12.65	0.50	101.64
Nov 10 - Nov 14, 1997	924	935	25.20	0.56	3.61	2.78	473.62	70.93	0.53	14.66	34.48	11.80	10.41	0.50	201.15
Nov 26 - Nov 30, 1997	222	251	34.89	0.29	4.19	5.19	632.03	535.00	2.50	29.09	59.41	25.98	26.43	0.50	217.90
Dec 6 - Dec 8, 1997	6,040	6,007	8.38	0.38	9.38	16.79	3686.53	3350.40	10.93	133.58	128.12	84.69	93.38	0.50	720.96
Dec 18 - Dec 22, 1997	219	311	22.78	0.59	3.36	4.67	1157.70	133.33	3.85	38.74	65.41	21.78	25.03	0.62	190.59
Jan 9 - Jan 13, 1998	526	574	24.23	0.25	3.06	4.29	972.44	124.52	2.71	28.72	44.92	23.14	20.47	0.50	28.93
Feb 14 - Feb 15, 1998	2,135	2,111	10.70	0.25	2.20	6.20	2597.41	269.78	4.71	55.06	70.00	45.97	32.58	0.50	126.00
Mar 25 - Mar 29, 1998	1,141	1,207	25.13	0.43	3.56	1.29	77.61	102.97	3.14	27.64	45.15	26.43	20.32	0.55	119.95
Nov 8 - Nov 12, 1998	180	410	38.97	5.35	0.57	3.78	611.85	175.02	1.67	18.53	34.06	14.49	12.69	1.00	145.12
Nov 28 - Dec 2, 1998	253	495	18.00	2.03	0.08	1.60	287.32	45.46	3.23	23.29	41.84	27.96	16.95	1.00	221.54
Jan 25 - Jan 29, 1999	653	671	80.58	1.17	0.14	1.45	276.71	50.39	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Feb 9 - Feb 13, 1999	22	76	62.51	3.01	0.36	3.68	262.00	75.68	2.05	18.18	43.87	22.58	14.41	1.00	188.12
Mar 11 - Mar 15, 1999	15	78	90.85	2.24	0.76	2.08	82.11	18.02	0.53	4.31	28.21	2.67	3.03	1.00	45.87
Mar 15 - Mar 19, 1999	64	120	60.43	1.33	0.69	3.00	163.09	28.64	0.70	6.28	18.86	4.45	3.87	0.70	51.16

Event Mean Concentrations at Automatic Sampling / Streamgaging Locations

Channel Sampled Period	Vol. Storm ac-ft	Vol. Sampled ac-ft	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L
San Diego Creek @ Harvard															
Jan 19-23, 1996	361	335	26.70	0.33	2.85	5.12	1588.01	211.78	2.69	45.10	14.32	23.67	31.28	0.64	270.81
Jan 31-Feb 4, 1996	783	777	17.90	0.47	4.43	7.40	1026.34	138.49	0.53	6.43	58.59	21.16	27.99	2.34	185.28
Feb 20-22, 1996	2,411	1,983	8.11	0.48	4.50	8.81	3402.48	330.24	6.00	78.06	69.05	1.00	1.00	0.50	320.23
Mar 4-8, 1996	487	484	13.23	0.42	3.89	5.56	2223.94	179.76	3.56	61.25	52.85	24.76	32.62	0.50	279.53
Oct 30 - Nov 5, 1996	449	449	26.73	0.84	7.01	5.55	1360.96	208.94	3.20	41.29	28.65	27.35	31.91	0.89	316.07
Nov 21 - Nov 24, 1996	1,902	1,903	10.42	0.51	4.76	6.72	1998.98	181.57	3.81	47.84	65.86	29.68	34.59	0.50	261.66
Dec 9 - Dec 13, 1996	2,272	2,272	11.03	0.18	2.37	3.21	974.51	88.53	1.49	25.12	29.69	13.67	17.91	0.50	139.59
Jan 22 - Jan 26, 1997	1,417	641	18.25	0.39	3.02	3.92	1198.72	151.00	2.14	25.66	38.43	17.15	82.46	0.50	194.80
Nov 10 - Nov 14, 1997	367	365	27.98	0.61	4.80	3.77	660.27	28.09	1.75	18.33	40.12	11.27	12.99	0.50	210.03
Nov 26 - Nov 30, 1997	581	613	14.45	0.40	5.05	5.76	936.45	823.87	3.49	36.78	56.95	29.05	33.07	0.50	264.33
Jan 9 - Jan 10, 1998	655	610	6.82	0.26	5.95	9.55	3713.60	342.79	5.10	69.21	72.37	36.40	55.68	0.50	83.62
Feb 14 - Feb 18, 1998	3,021	3,024	8.09	0.25	3.15	8.71	2220.60	208.52	3.95	44.06	51.12	31.86	31.04	0.50	114.62
Jan 25 - Jan 26, 1999	689	178	19.88	4.95	0.23	3.75	262.03	37.95	4.48	65.12	124.40	30.80	47.73	1.00	281.96
Feb 4 - Feb 8, 1999	87	88	33.83	3.11	0.21	2.68	902.21	236.74	1.92	25.30	42.35	13.91	19.41	1.00	127.58
Mar 11 - Mar 15, 1999	27	168	59.39	0.67	0.06	1.42	228.81	42.18	0.93	7.57	32.50	4.78	16.11	1.00	80.80
Lane Channel															
Jan 21-25, 1996	130	142	13.04	0.17	3.32	2.33	433.19	65.67	2.88	18.85	91.12	31.41	16.95	0.55	302.71
Feb 19-23, 1996	497	498	8.18	0.32	2.51	2.69	417.49	48.08	14.24	57.01	95.85	1.01	1.40	1.26	663.87
Nov 21 - Nov 22, 1996	449.51	407.33	2.83	0.27	1.71	1.40	269.08	33.98	2.00	14.93	42.32	31.03	12.06	0.50	230.40
Dec 9 - Dec 13, 1996	490.09	489.93	8.96	0.24	1.20	0.44	130.03	18.34	0.64	6.71	29.13	13.61	10.65	0.50	130.77
Jan 1 - Jan 2, 1996	29.33	27.26	6.93	0.40	1.05	0.42	30.46	9.89	0.50	5.00	26.07	5.17	6.00	0.50	75.01
Nov 10 - Nov 14, 1997	186.35	179.06	12.52	0.51	1.91	0.74	102.88	24.95	0.50	9.03	34.42	14.41	9.77	0.50	240.45
Nov 26 - Nov 30, 1997	149.65	171.34	11.04	0.46	2.01	0.88	80.29	60.46	0.54	5.41	34.62	14.46	11.77	1.55	146.80
Feb 14 - Feb 18, 1998	552.38	594.57	8.28	0.25	0.90	3.26	132.54	20.15	0.53	10.85	27.46	11.87	7.89	0.51	52.26
Feb 19 - Feb 23, 1998	315.44	380.52	13.86	0.52	1.09	11.93	0.00	0.00	0.50	7.69	35.77	10.58	7.58	0.50	48.86
Mar 25 - Mar 29, 1998	312	343	9.59	0.10	0.50	0.08	40.67	17.43	4.41	16.40	48.83	21.04	10.04	0.50	113.90
Nov 9 - Nov 12, 1998		208	15.68	0.92	0.20	2.44	120.89	81.64	0.66	7.94	30.70	5.49	16.63	1.00	87.13
Feb 4 - Feb 8, 1999		54	22.40	0.52	0.33	1.62	50.57	39.50	1.90	7.61	37.49	6.72	10.82	1.00	110.66
Feb 9 - Feb 13, 1999		39	28.87	0.42	0.13	1.03	39.46	14.57	1.61	6.70	39.16	7.74	11.68	1.00	102.30
Mar 11 - Mar 15, 1999		35	30.43	0.55	0.33	1.61	33.86	12.87	0.80	4.11	53.47	8.50	8.82	1.00	91.50
Mar 15 - Mar 19, 1999		49	23.11	0.42	0.28	1.69	57.41	20.14	0.40	3.39	23.62	3.50	5.05	0.62	49.99
Mar 25 - Mar 26, 1999		86	5.89	0.59	0.29	1.02	62.11	10.54	0.51	4.09	45.21	9.12	8.20	1.00	351.37

Event Mean Concentrations at Automatic Sampling / Streamgaging Locations

Channel Sampled Period	Vol. Storm ac-ft	Vol. Sampled ac-ft	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd µg/L	Cr µg/L	Cu µg/L	Pb µg/L	Ni µg/L	Ag µg/L	Zn µg/L
Laguna Canyon															
Mar 10-13, 1995	238	381	2.85	0.12	4.35	6.60	2149.51	199.59	1.25	71.08	42.39	47.37	33.84	0.50	157.81
Dec 12-16, 1995	14	15	5.50	0.34	2.21	1.92	134.46	24.62	0.56	7.92	32.65	18.71	20.37	0.51	62.60
Jan 19-23, 1996	25	26	2.98	0.08	2.34	2.81	950.38	85.92	2.64	45.47	58.95	21.49	112.45	0.67	128.14
Feb 20-24, 1996	191	180	4.50	0.14	3.32	6.22	2521.70	187.65	2.83	69.18	62.02	1.16	1.43	0.50	233.45
Oct 30 - Nov 1, 1996	50	57	7.76	0.71	4.01	3.66	741.64	85.68	1.47	48.61	24.84	33.11	28.15	0.51	166.69
Nov 21 - Nov 25, 1996	226	236	3.75	0.33	3.25	4.69	1401.01	105.46	0.86	71.35	56.99	27.53	54.33	0.50	192.30
Dec 9 - Dec 13, 1996	262	272	3.57	0.15	1.72	2.12	795.03	49.67	0.50	25.02	26.29	10.52	21.91	0.50	82.80
Oso Creek															
Nov 16, 1994	10	22	6.10	0.20	2.90	1.40	119.95	25.99	3.00	5.00	27.99	7.00	19.99	0.15	71.97
Mar 2-6, 1995	2,081	2,107	1.98	0.23	2.29	4.11	857.64	80.30	4.98	29.20	30.75	10.91	19.99	0.58	108.47
Mar 10-13, 1995	2,271	2,285	3.32	0.25	2.98	3.28	674.94	78.41	3.72	26.83	40.90	10.92	62.94	0.47	119.37
Jan 19-23, 1996	154	134	6.81	0.17	1.67	1.37	190.67	26.23	4.57	10.71	37.78	5.45	28.31	0.50	79.83
Jan 31-Feb 2, 1996	342	310	5.88	0.37	4.84	2.95	427.83	53.81	6.48	25.59	43.93	14.65	25.56	2.06	139.28
Feb 20-24, 1996	1,250	1,247	7.74	0.16	2.26	1.60	171.39	19.17	2.36	9.68	23.69	1.92	11.25	0.50	60.12
Oct 30 - Nov 3, 1996	344	381	6.76	0.94	5.93	4.54	804.85	124.28	13.42	32.22	39.87	19.17	34.09	1.03	253.00
Dec 9 - Dec 13, 1996	1,067	1,073	4.67	0.21	1.77	1.49	213.65	27.65	1.82	8.55	21.29	4.58	13.73	0.50	67.74
Nov 8 - Nov 12, 1998	118	144	7.41	3.56	0.30	3.59	433.54	119.01	7.93	21.04	34.36	19.29	22.30	1.00	148.62
Jan 25 - Jan 29, 1999	327	330	4.35	1.45	0.18	1.51	212.09	59.11	3.78	8.51	24.57	6.32	23.78	1.00	62.32
Mar 11 - Mar 15, 1999	3	15	5.23	0.76	0.03	1.65	265.37	37.52	6.29	11.40	28.94	7.96	20.97	1.00	79.78
Mar 15 - Mar 19, 1999	50	84	4.79	0.55	0.08	1.55	146.70	26.38	4.91	8.26	28.95	5.22	17.91	1.00	76.08

Appendix 4.9:
Time of Field Screening Relative to Rainfall

Time of Field Screening Relative to Rainfall

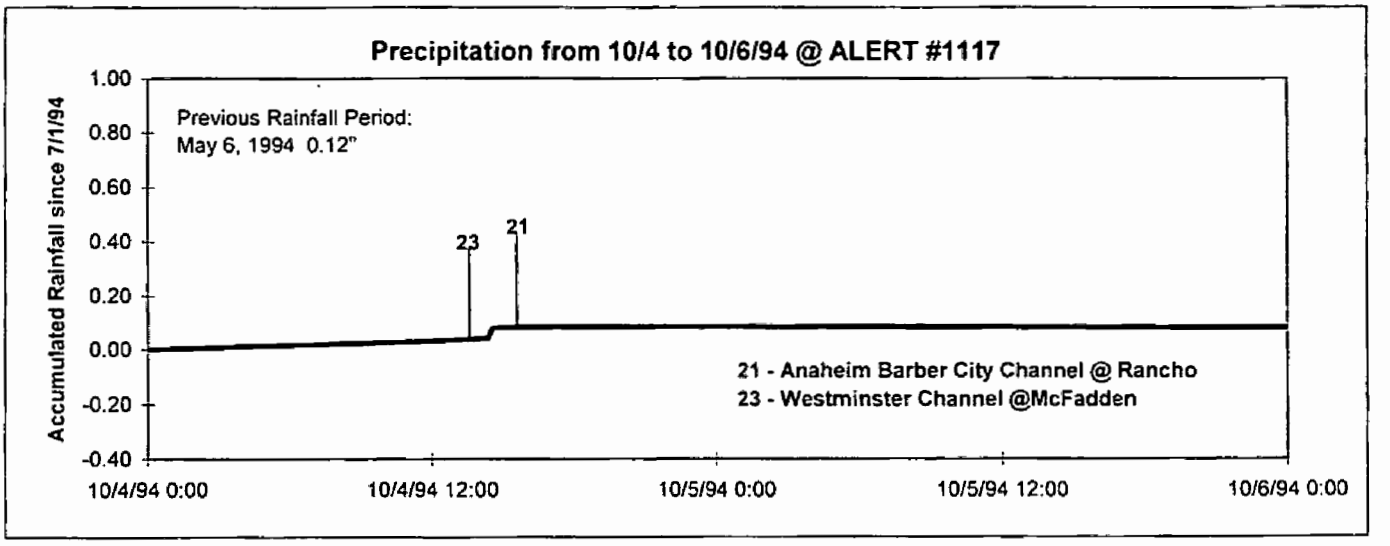

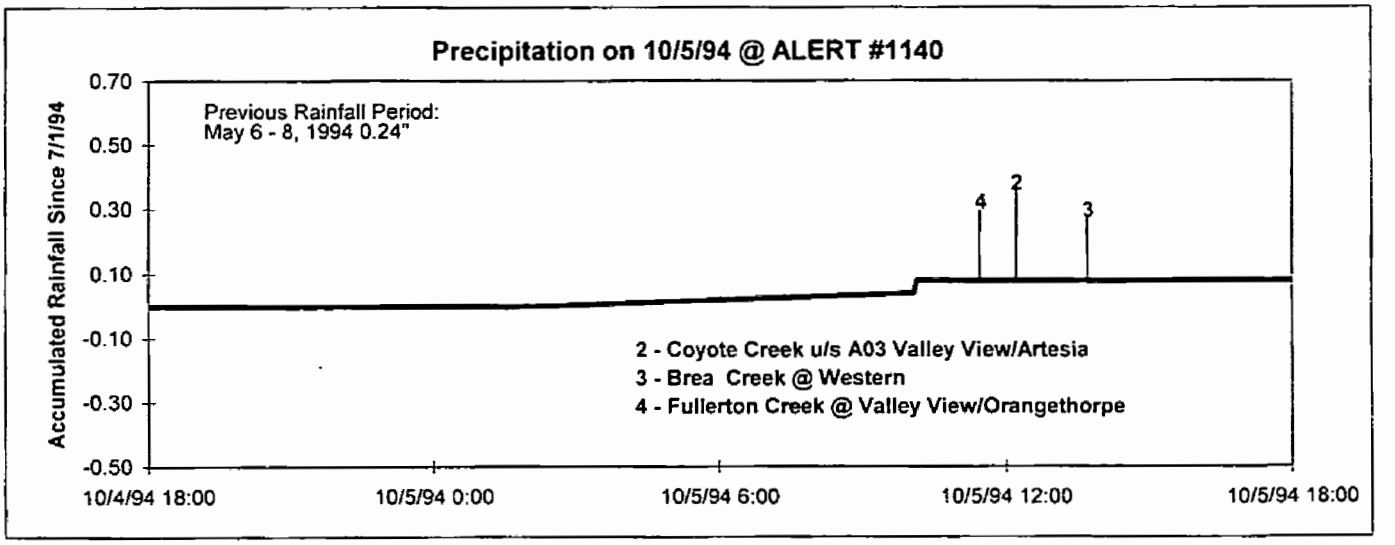

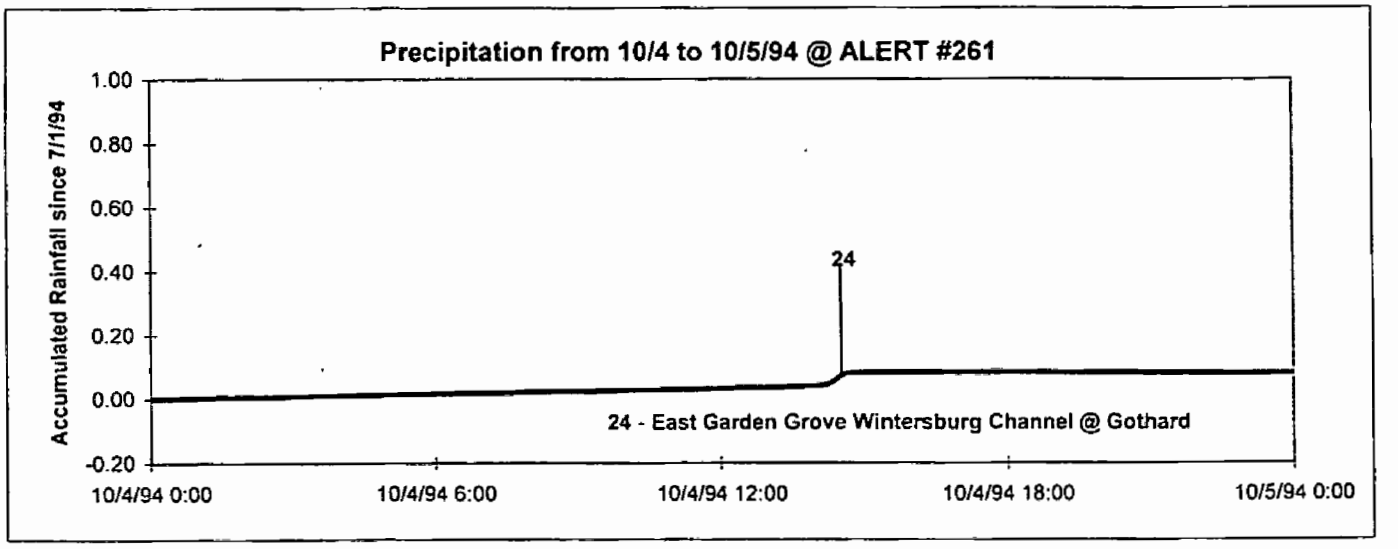

Time of Field Screening Relative to Rainfall

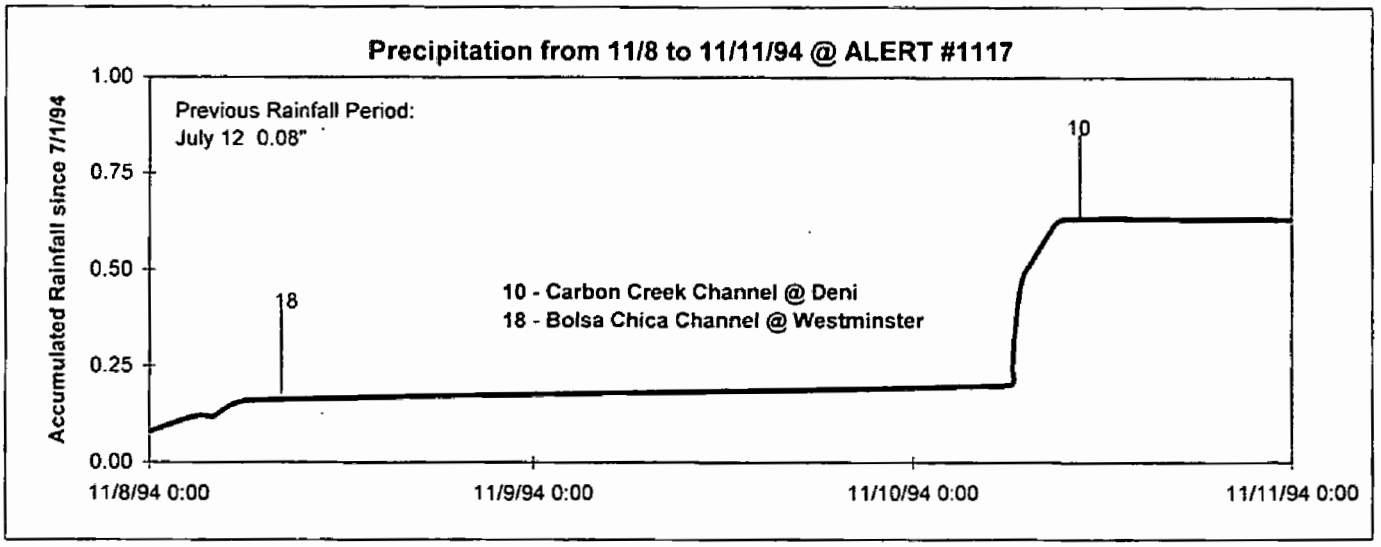

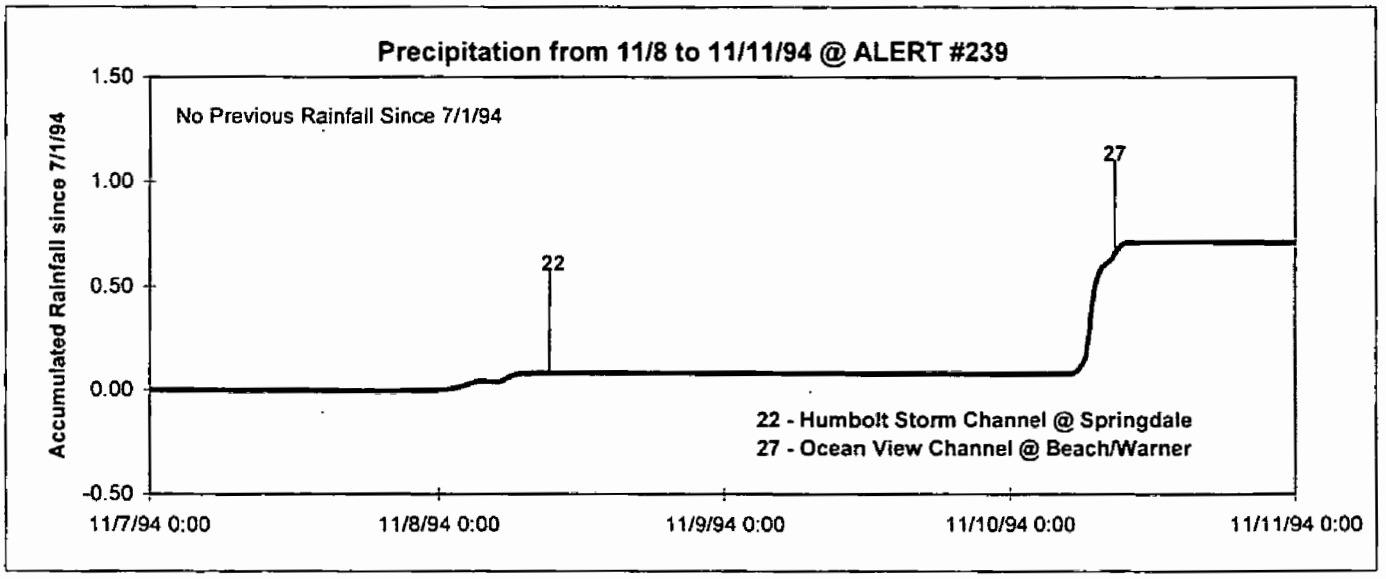

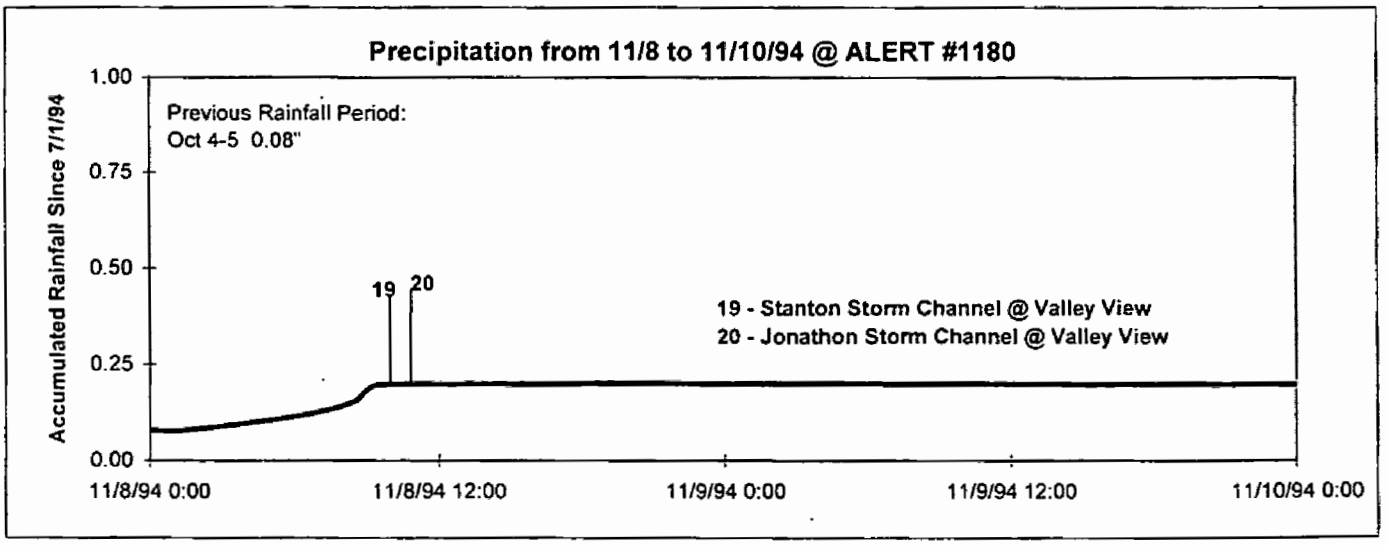

Time of Field Screening Relative to Rainfall

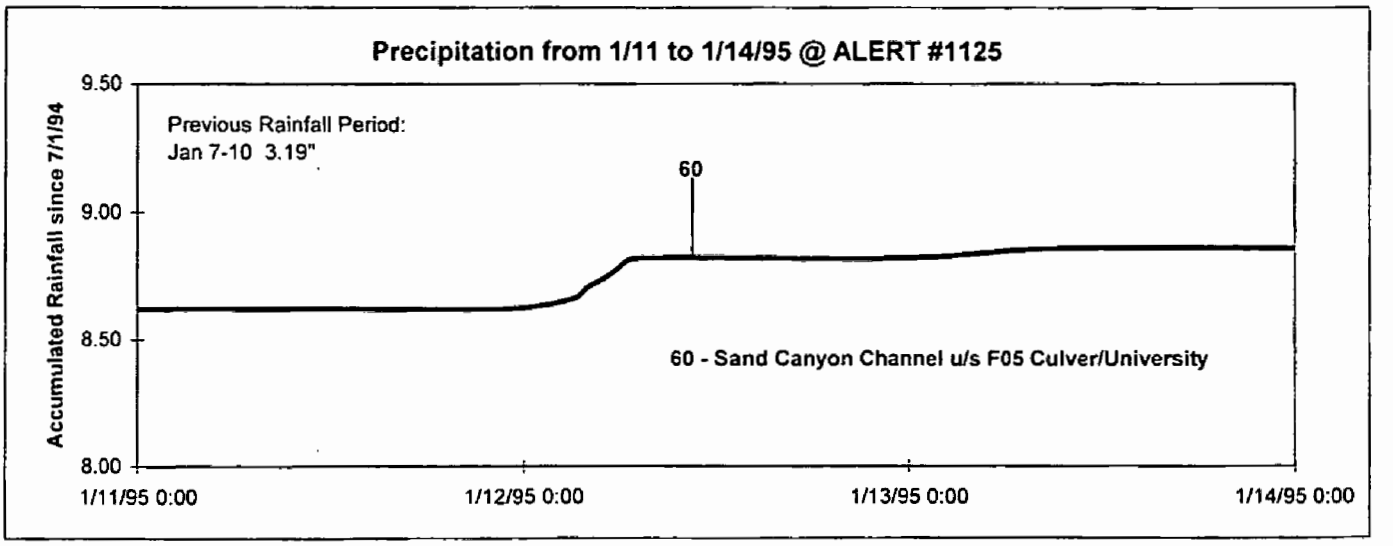

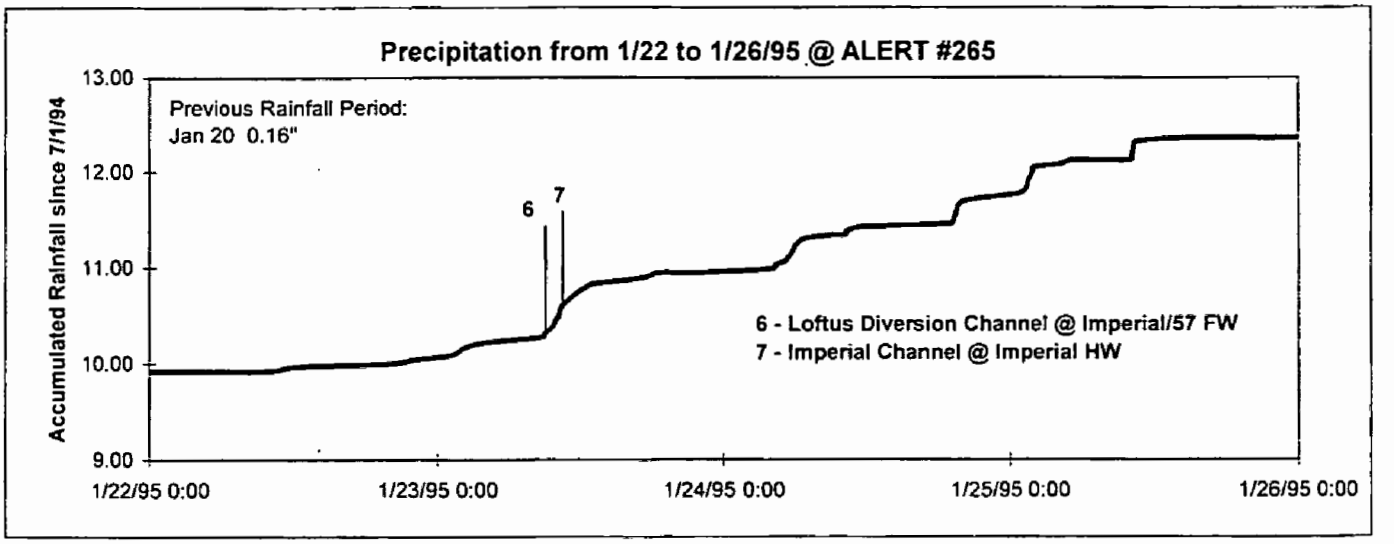

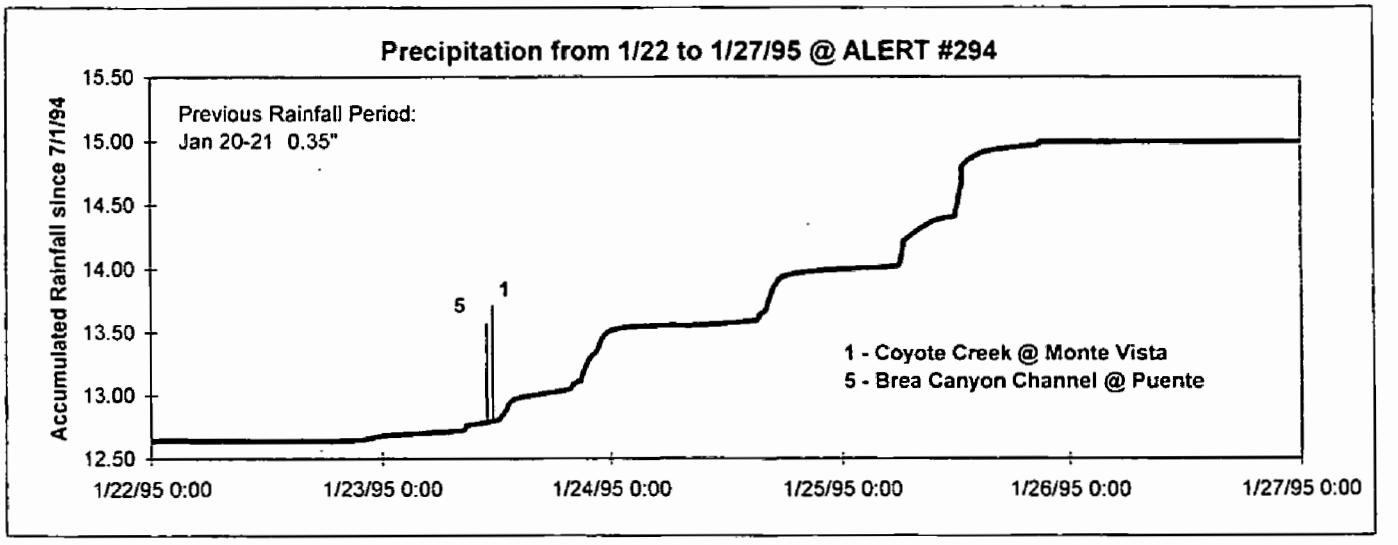

Time of Field Screening Relative to Rainfall

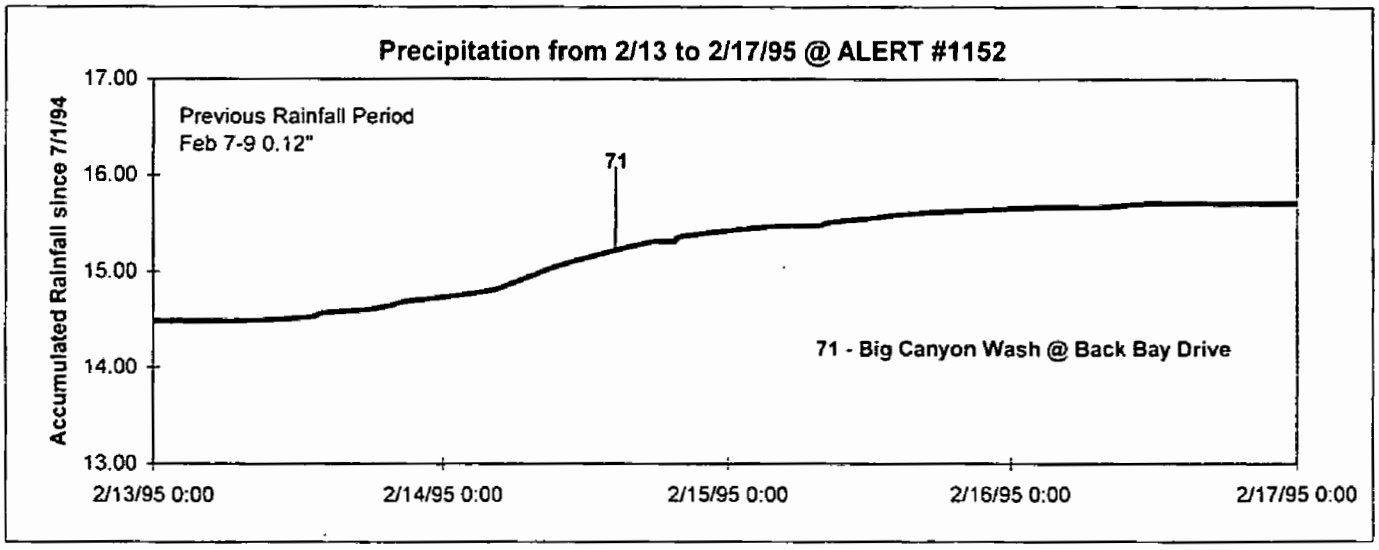

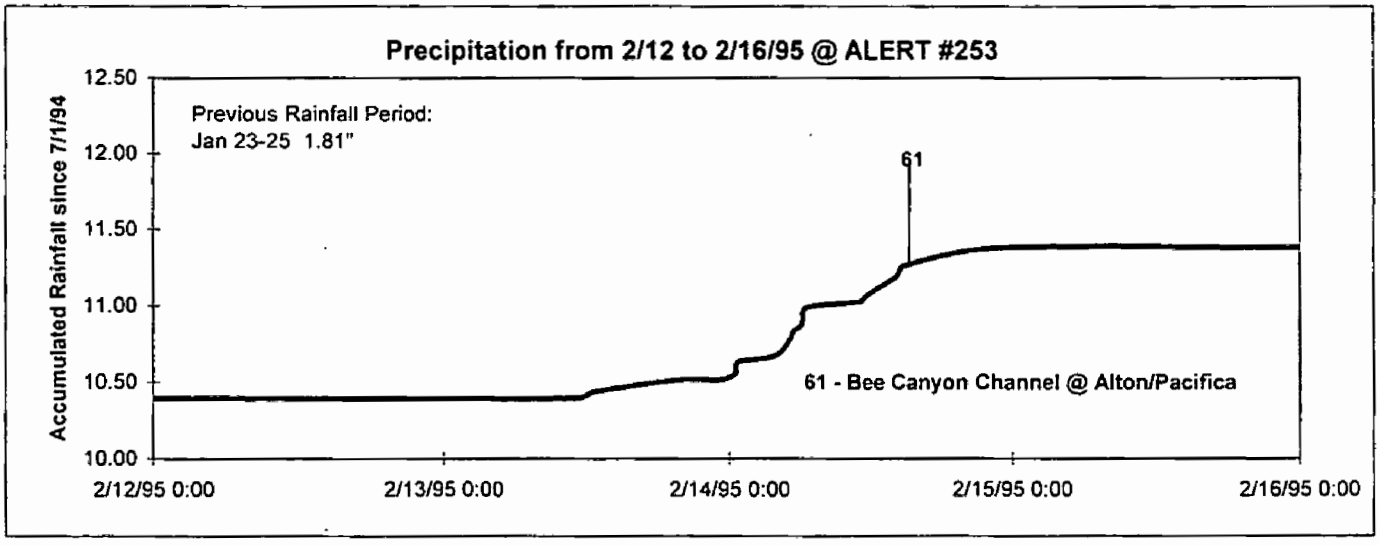

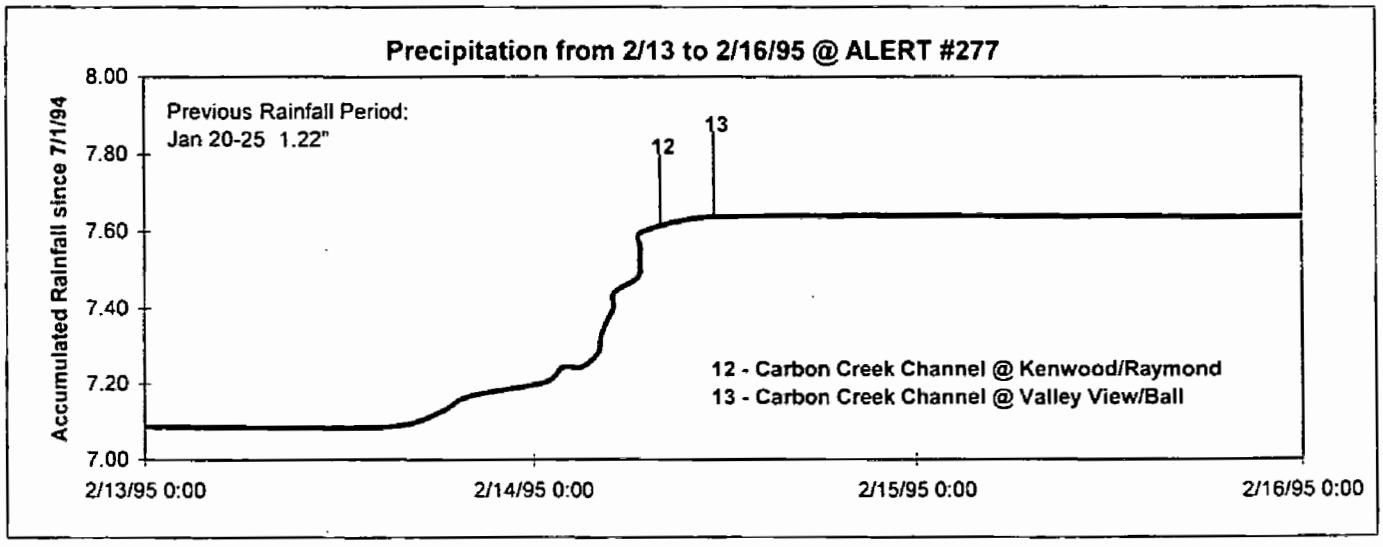

Time of Field Screening Relative to Rainfall

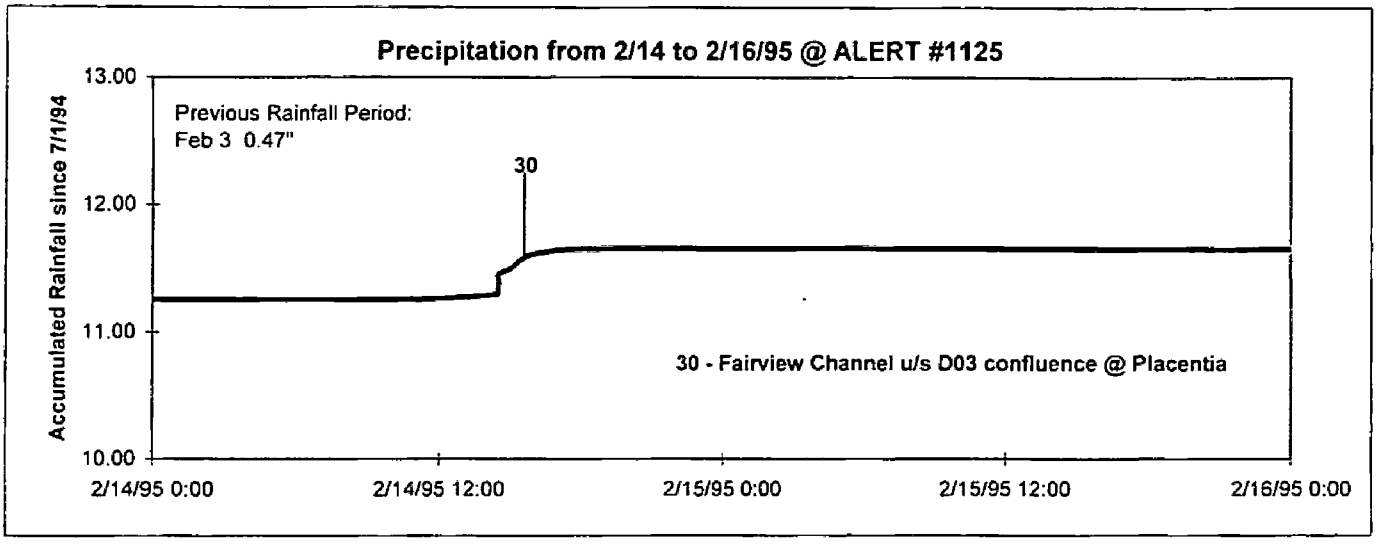

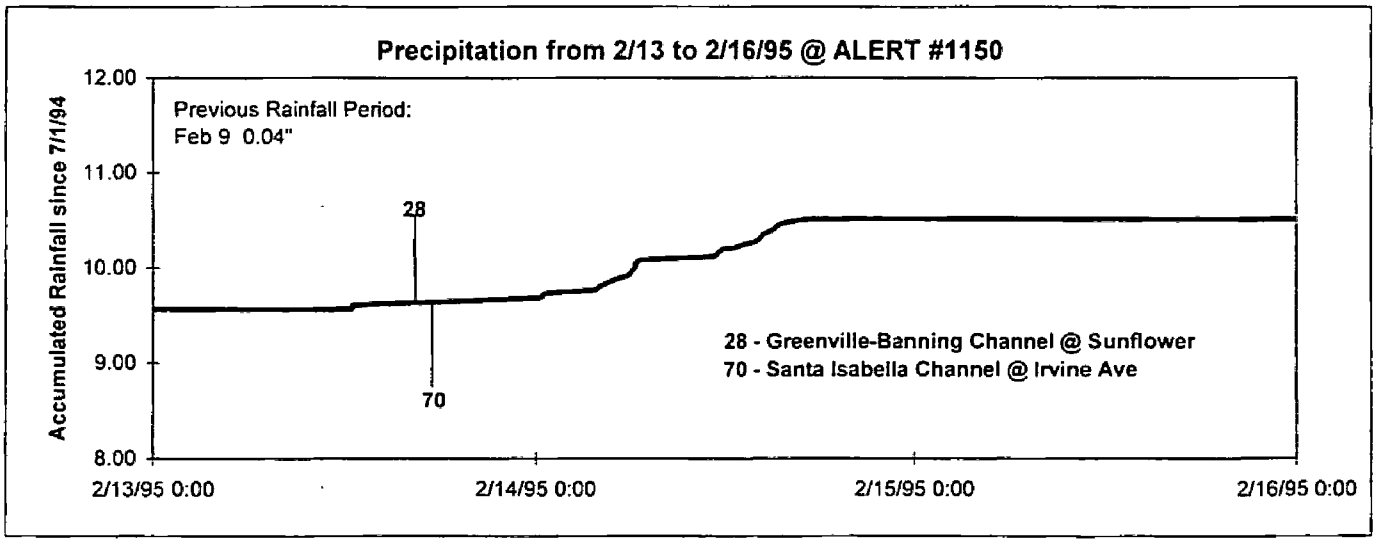

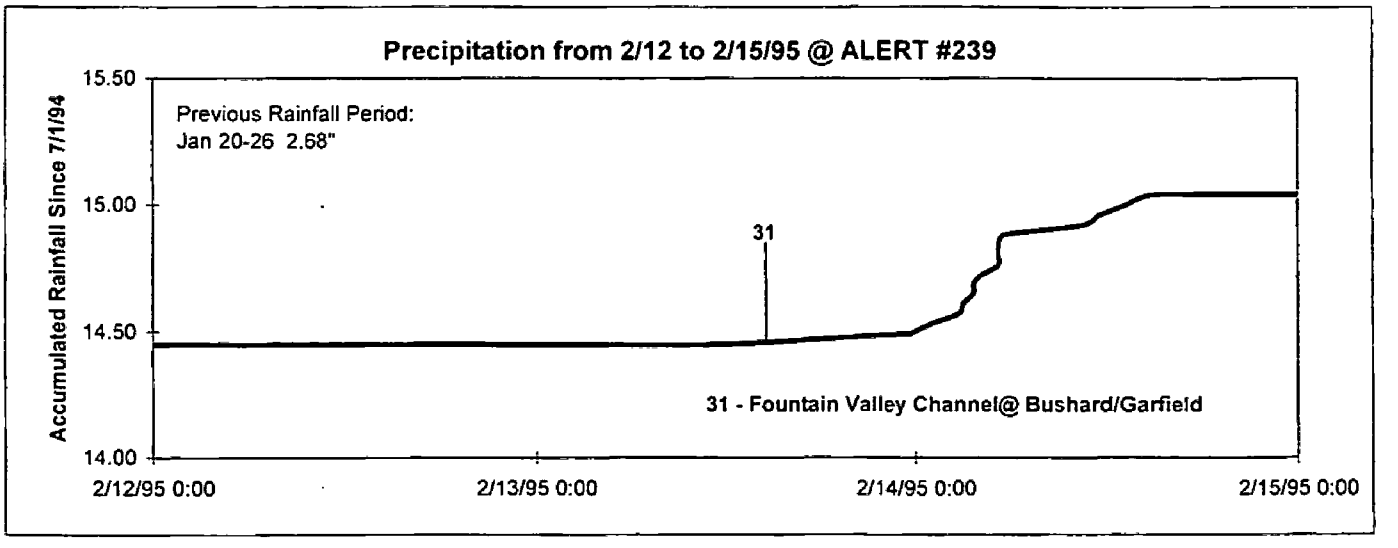

Time of Field Screening Relative to Rainfall

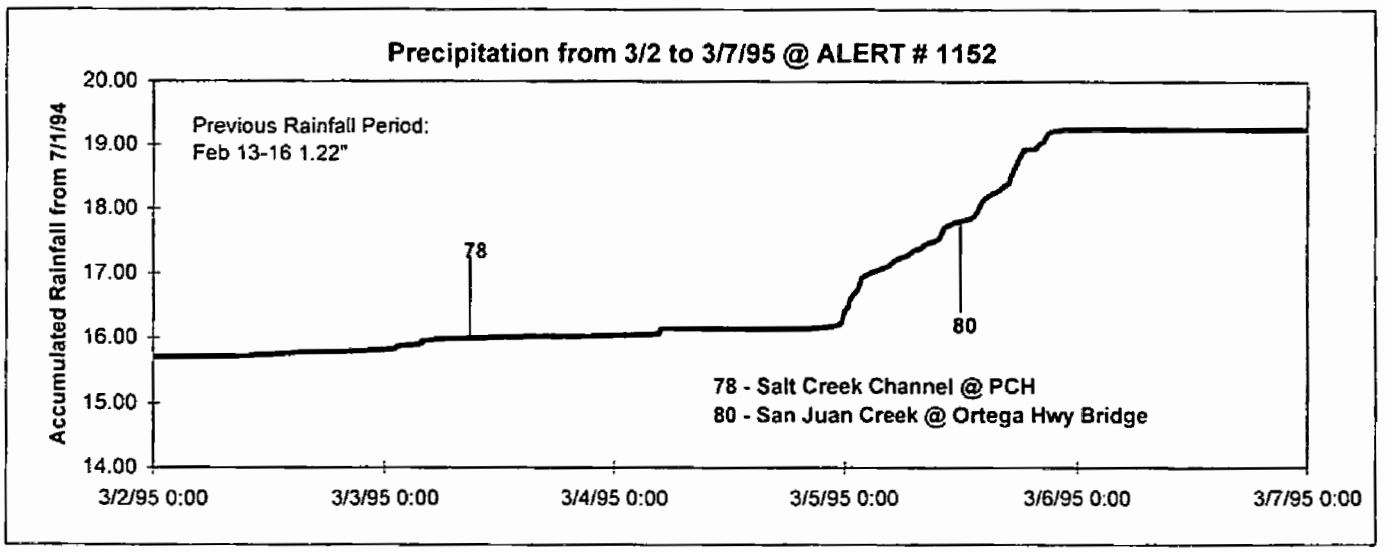

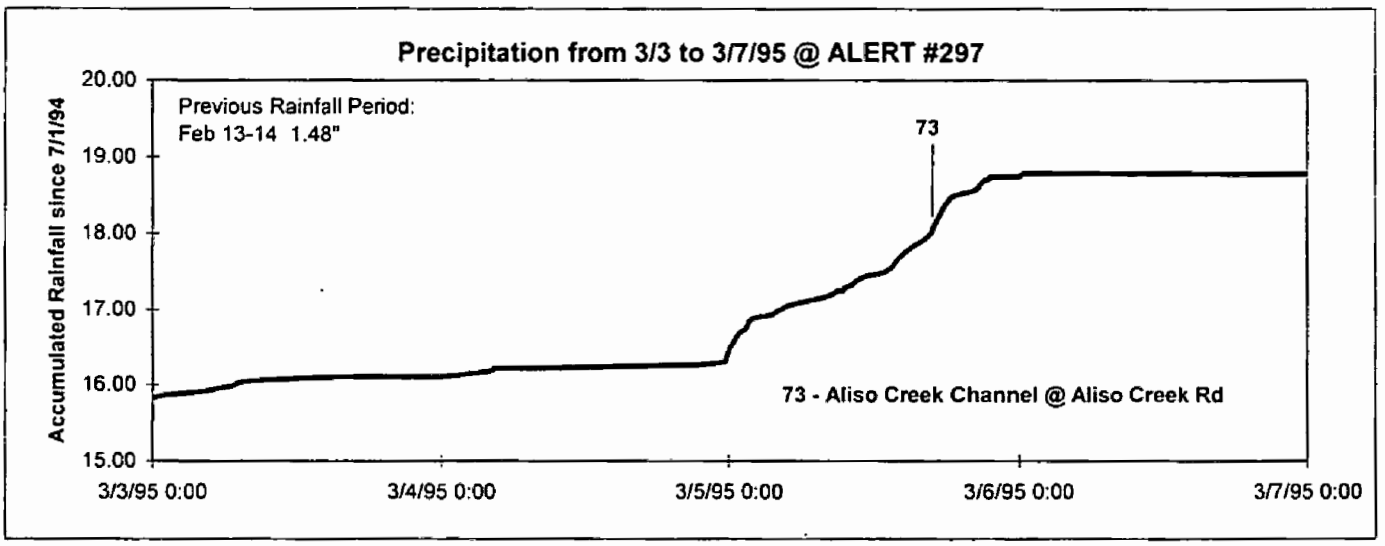

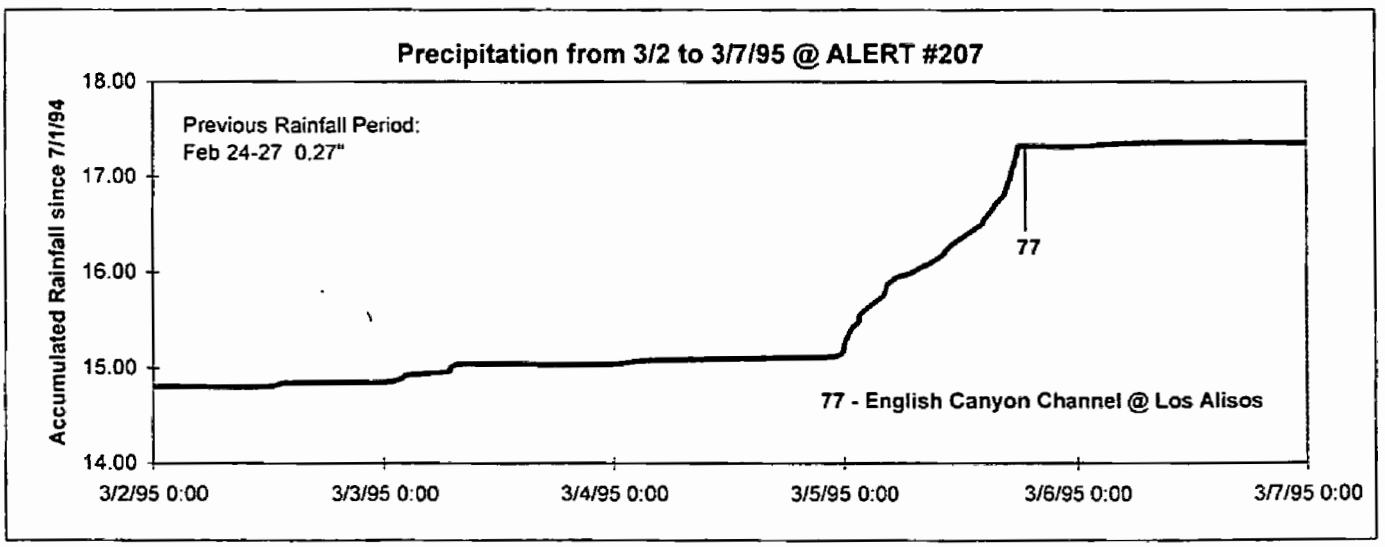

Time of Field Screening Relative to Rainfall

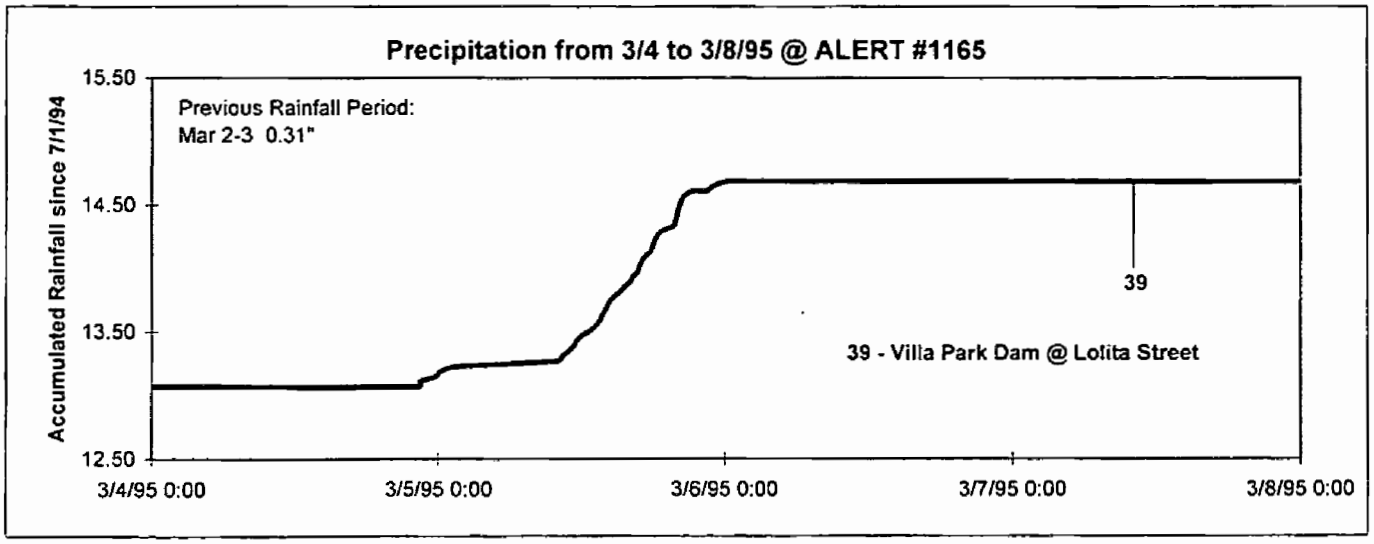

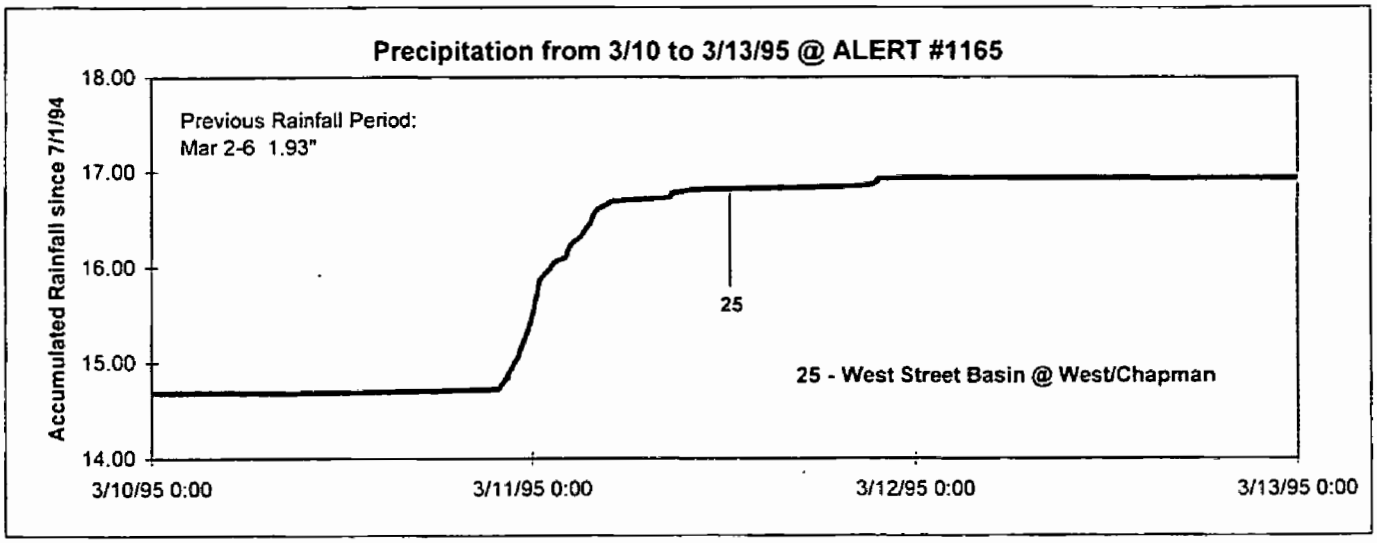

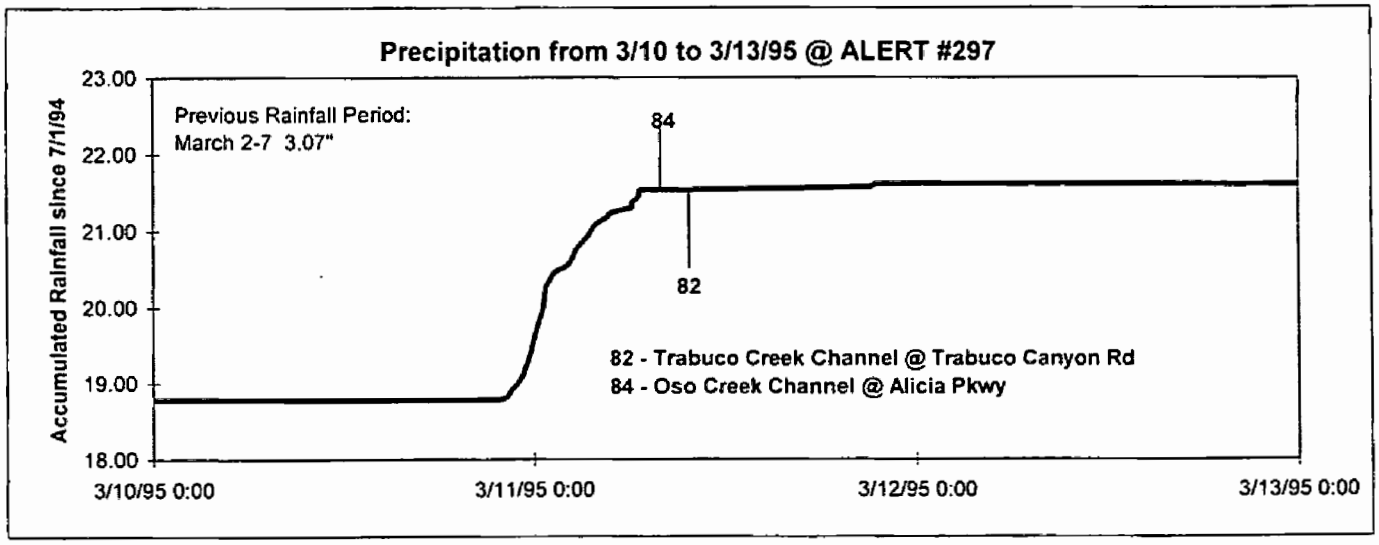

Time of Field Screening Relative to Rainfall

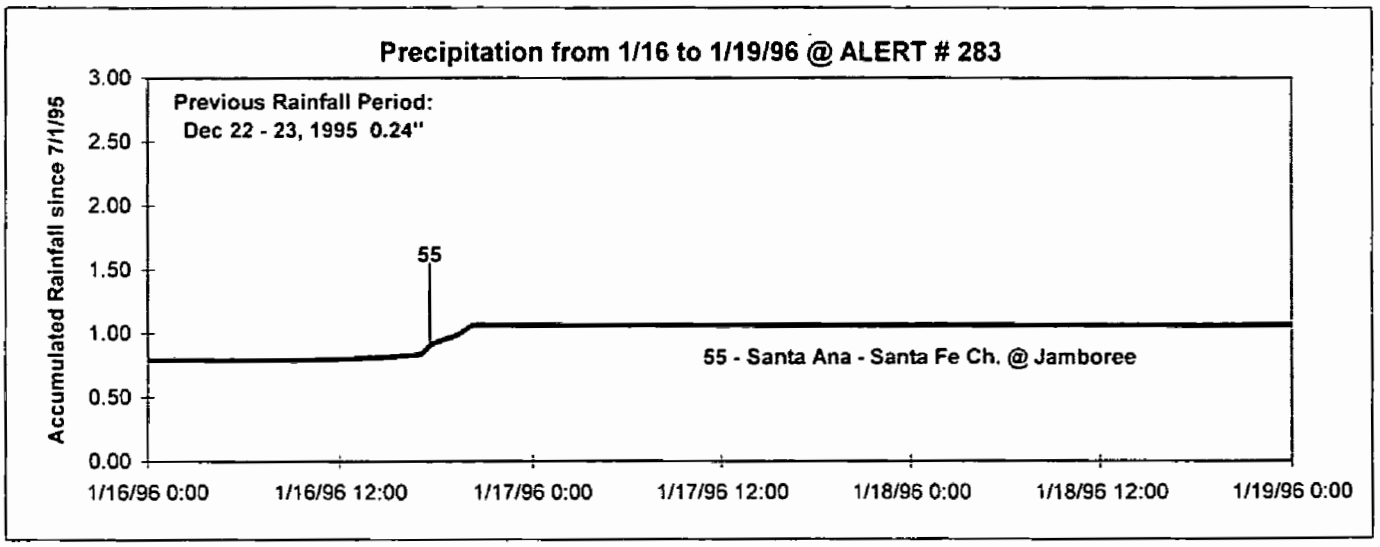

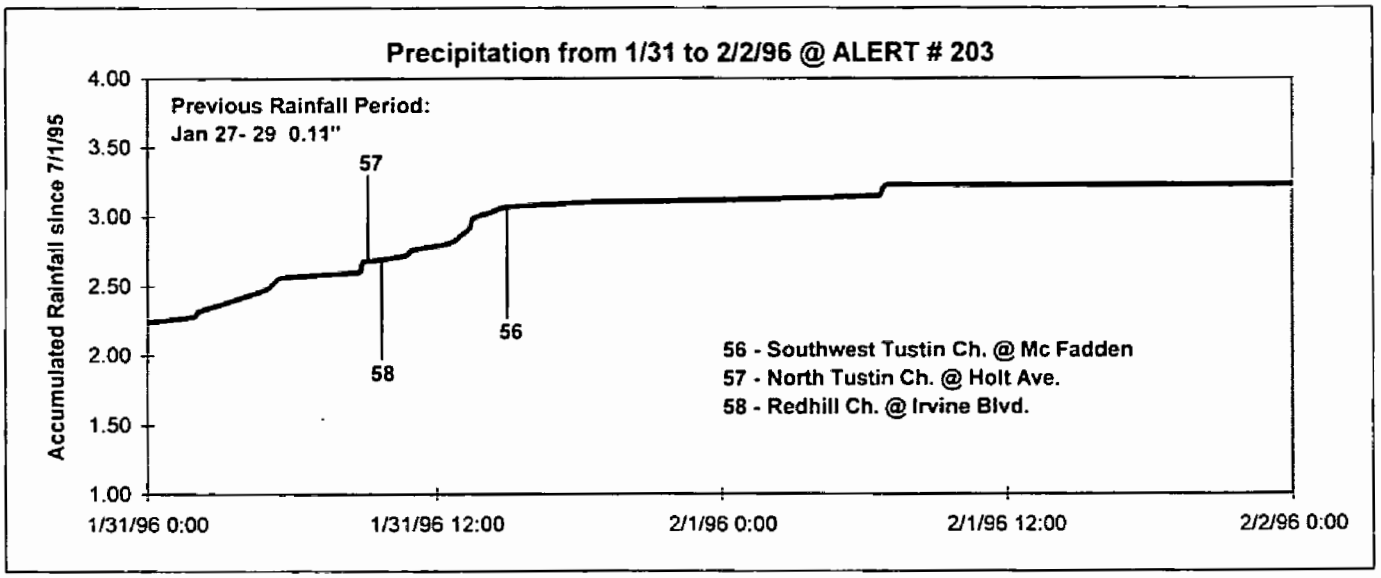

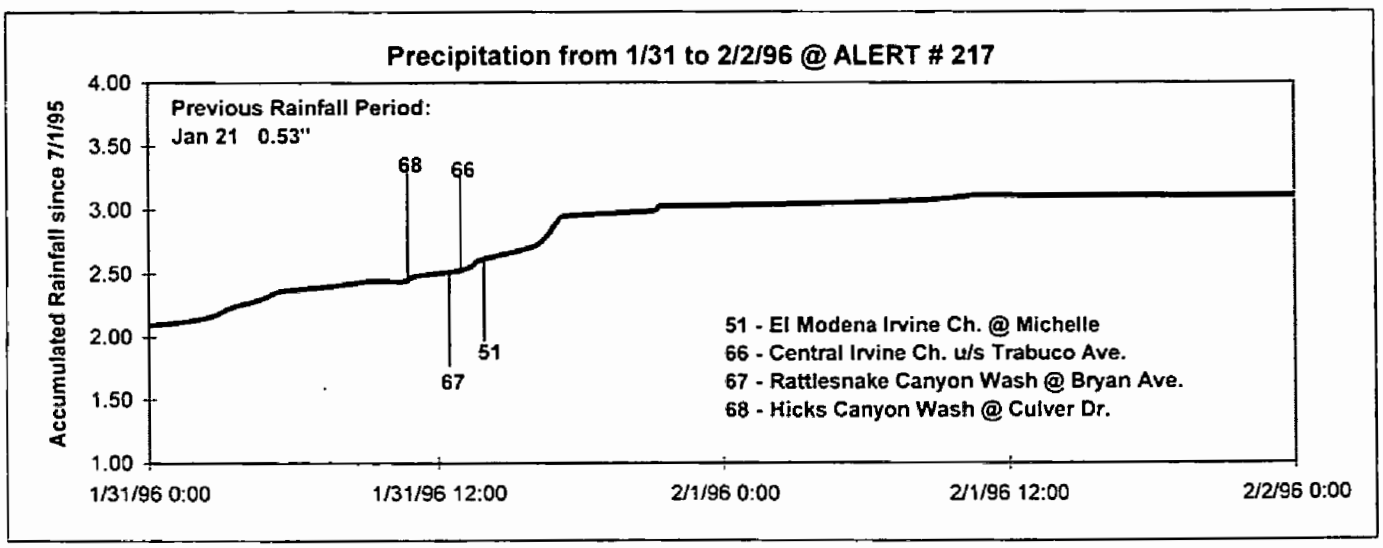

Time of Field Screening Relative to Rainfall

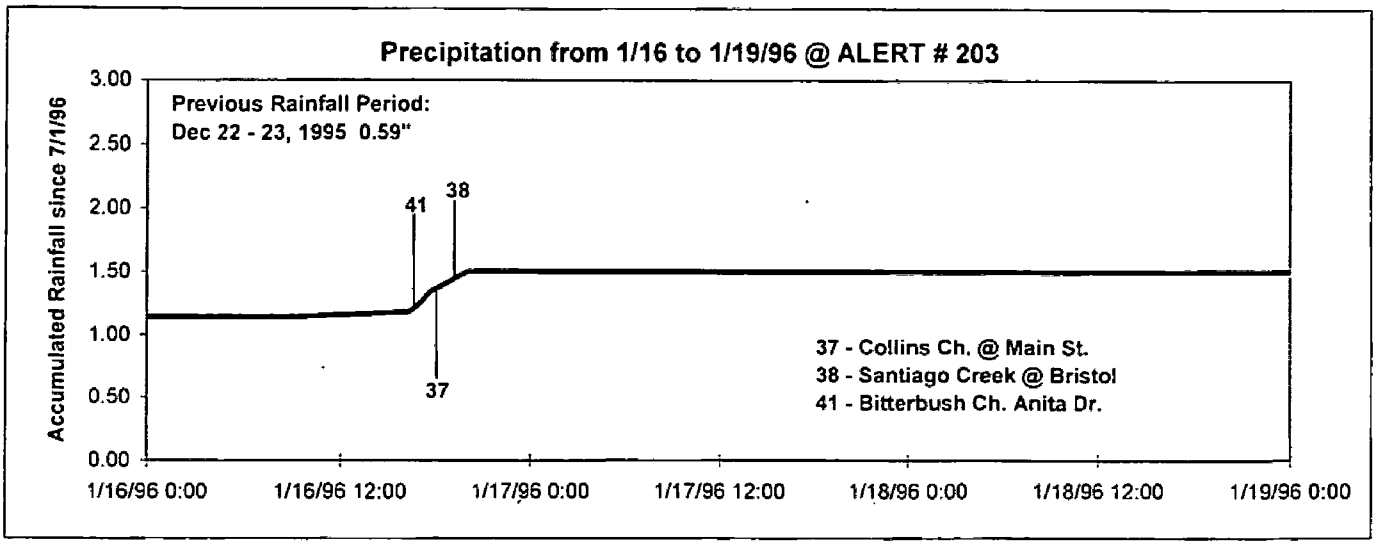

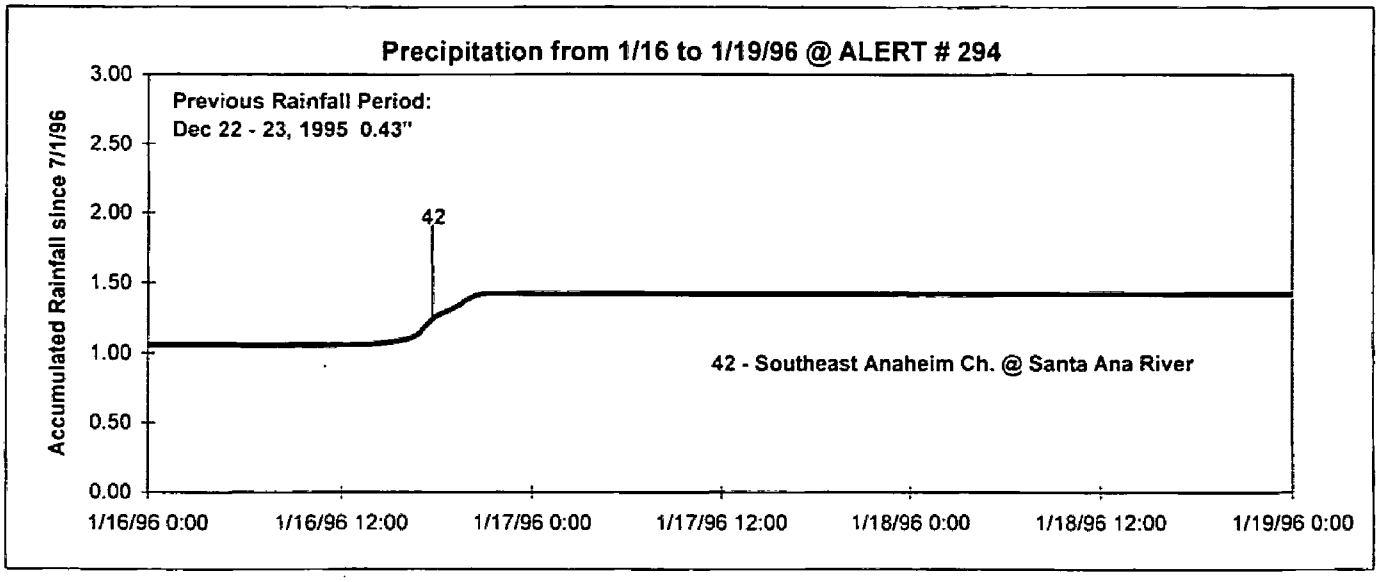

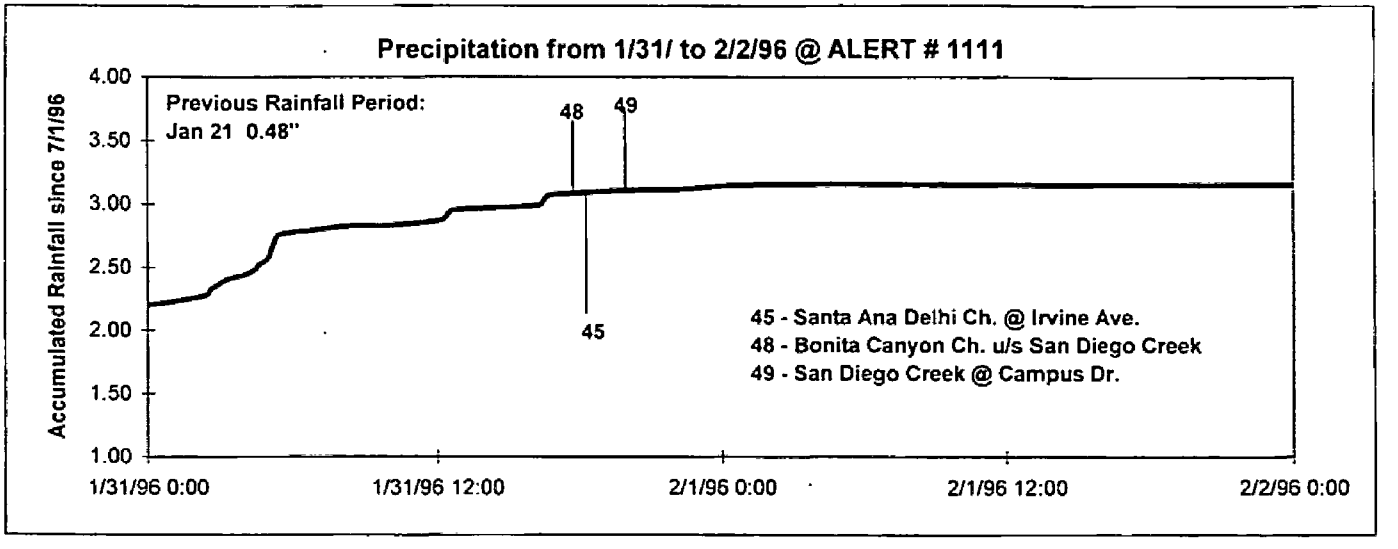

Time of Field Screening Relative to Rainfall

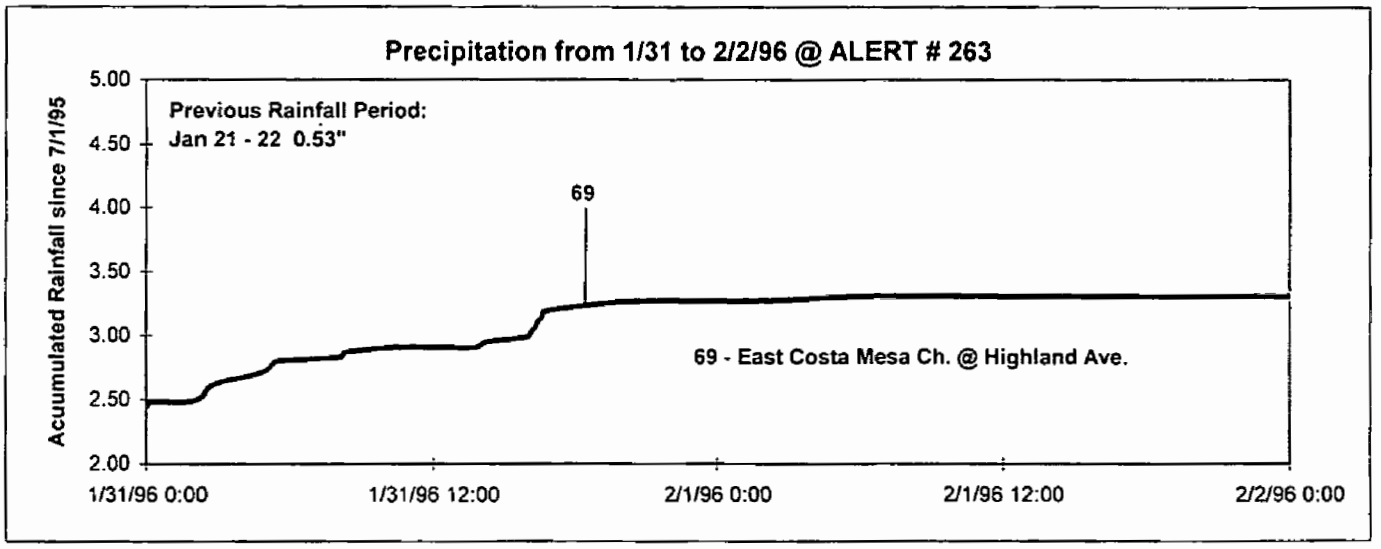

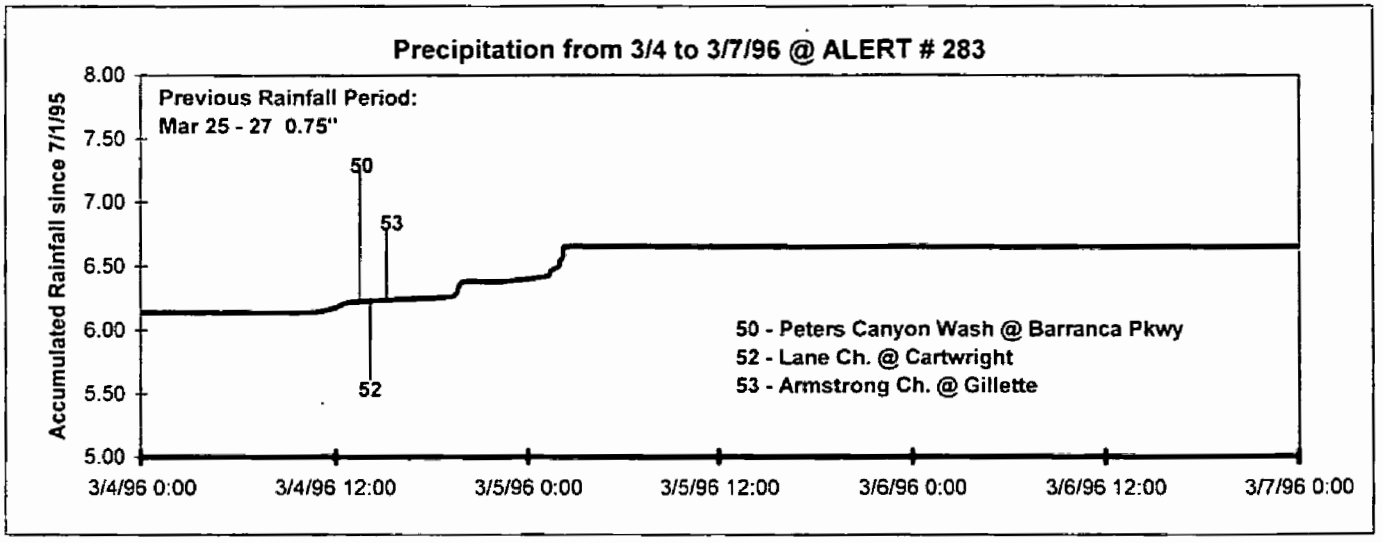

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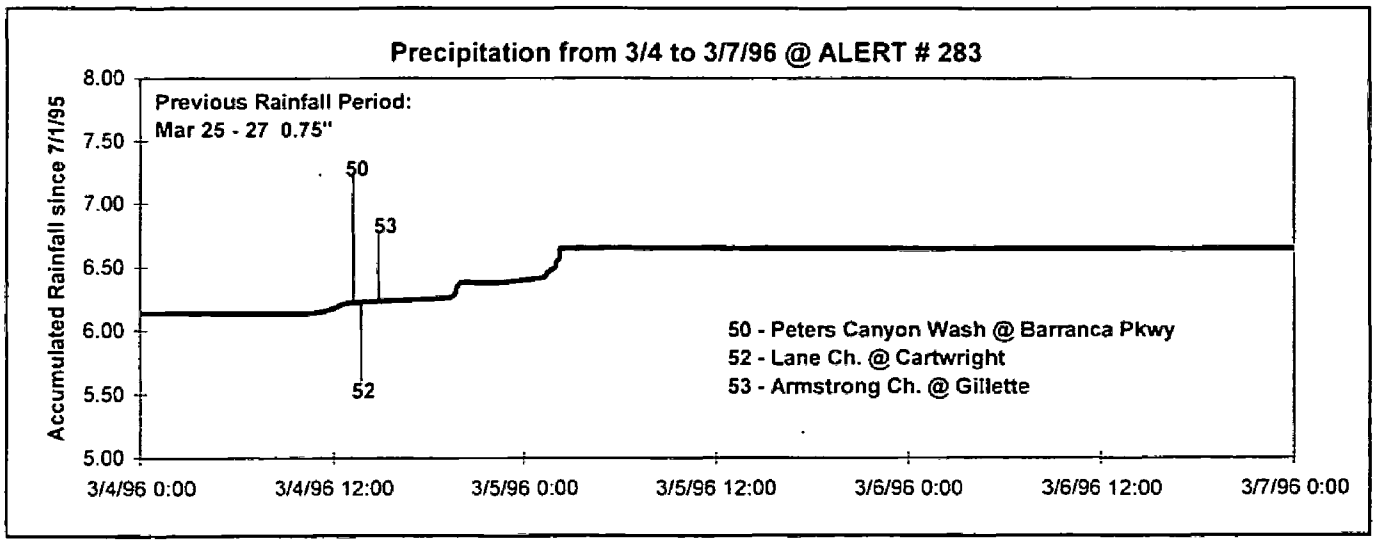

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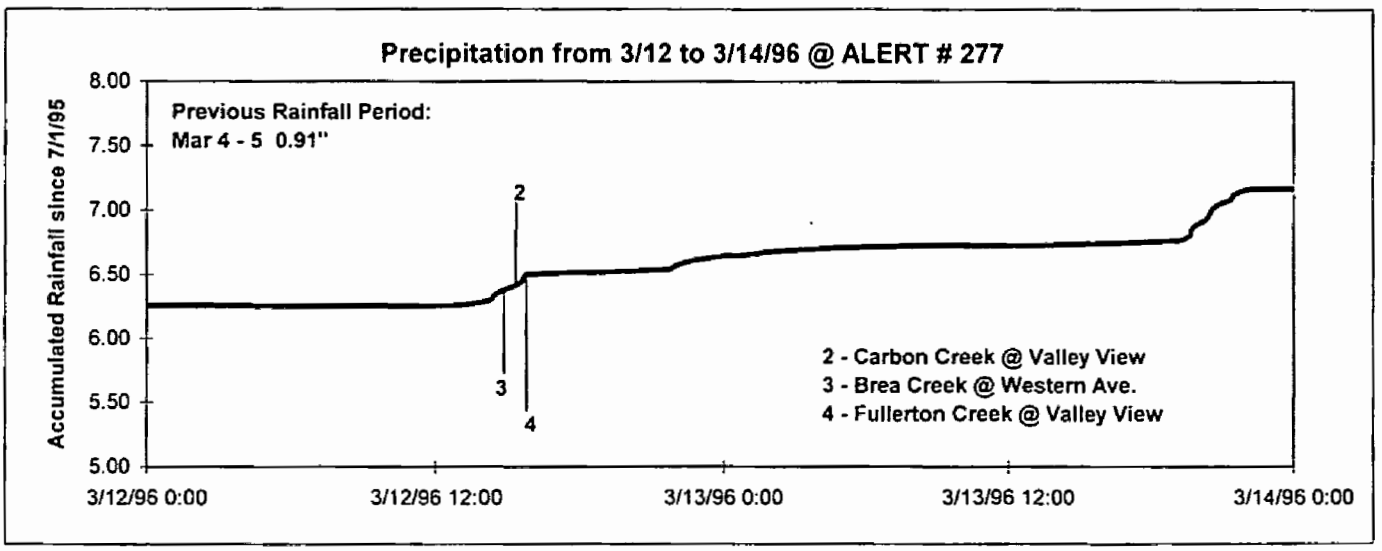

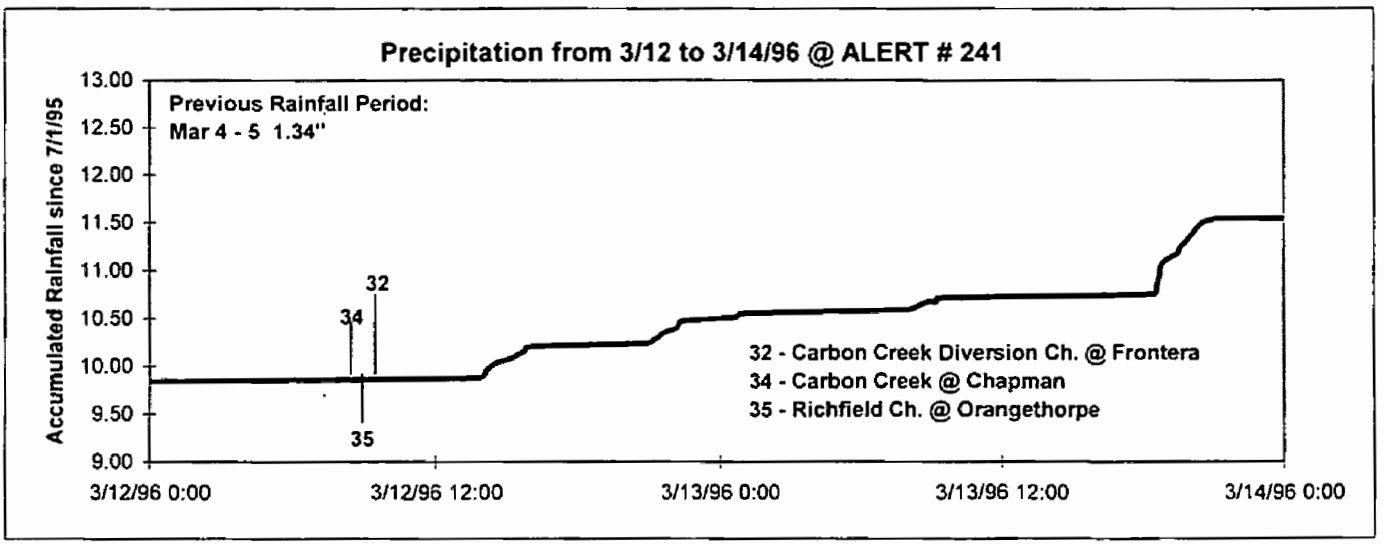

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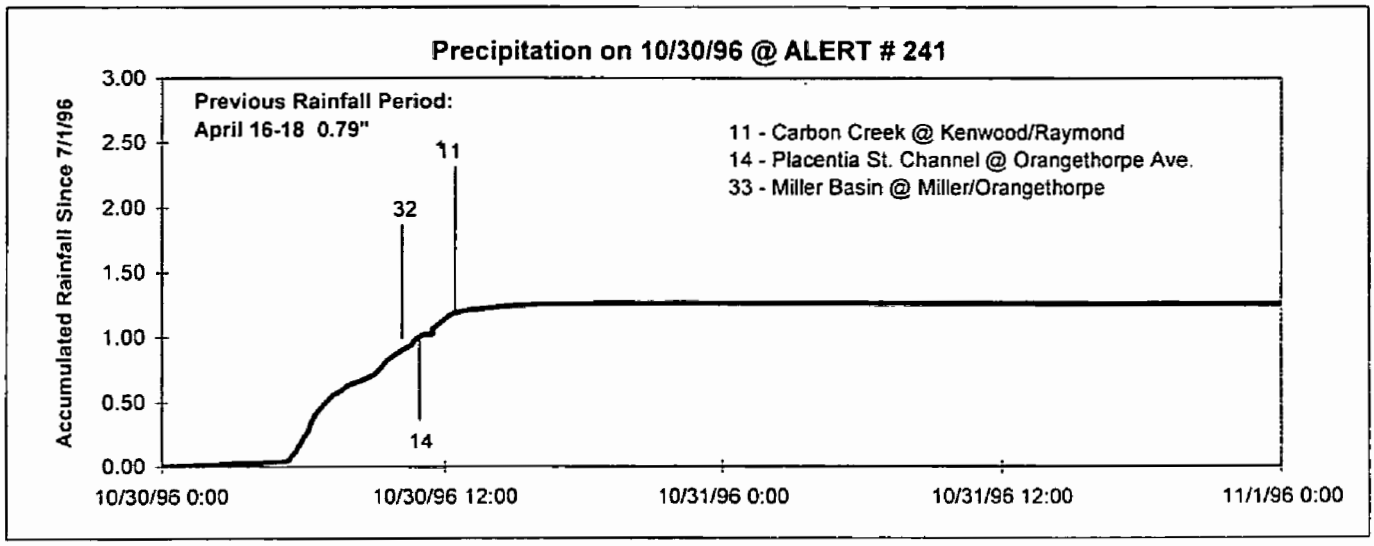

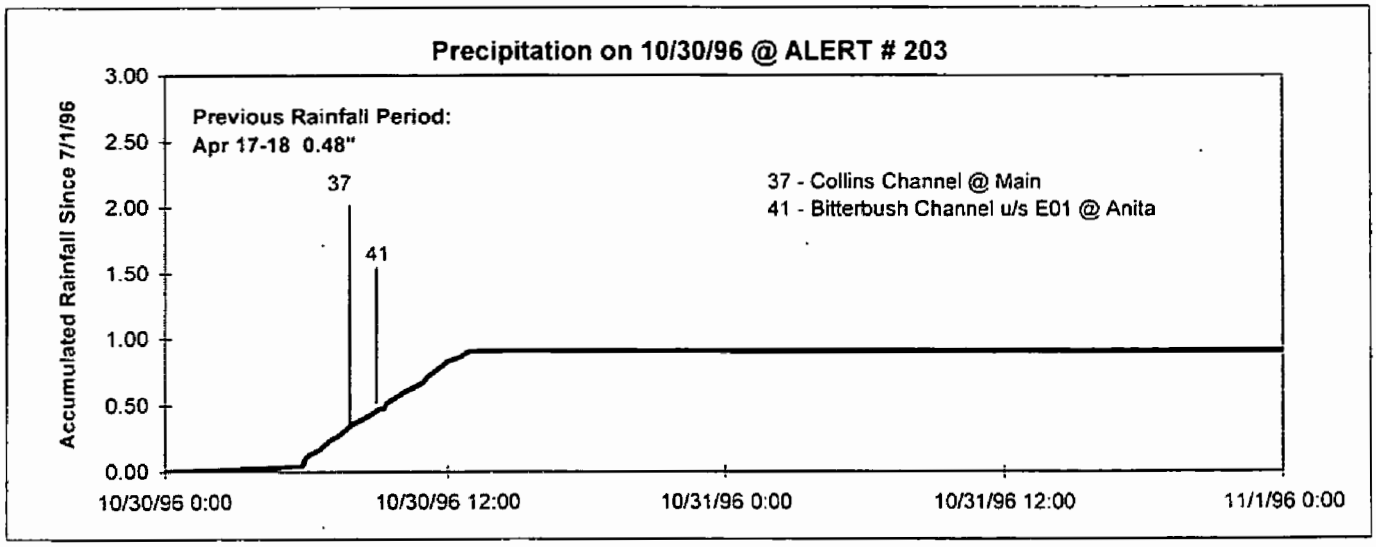

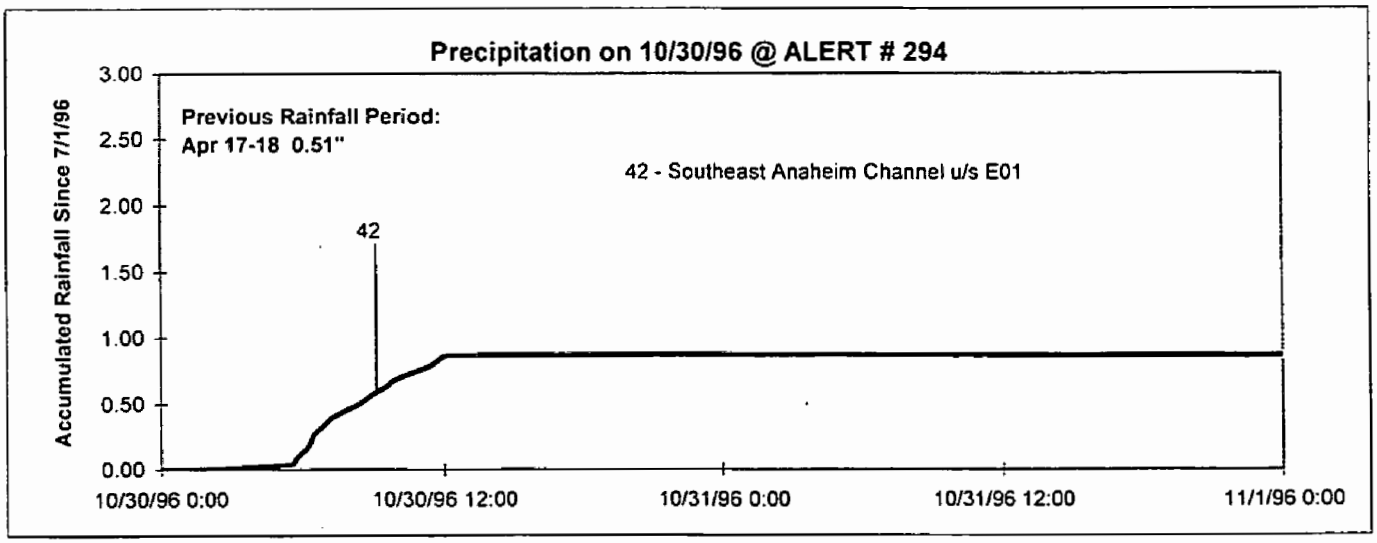

Time of Field Screening Relative to Rainfall

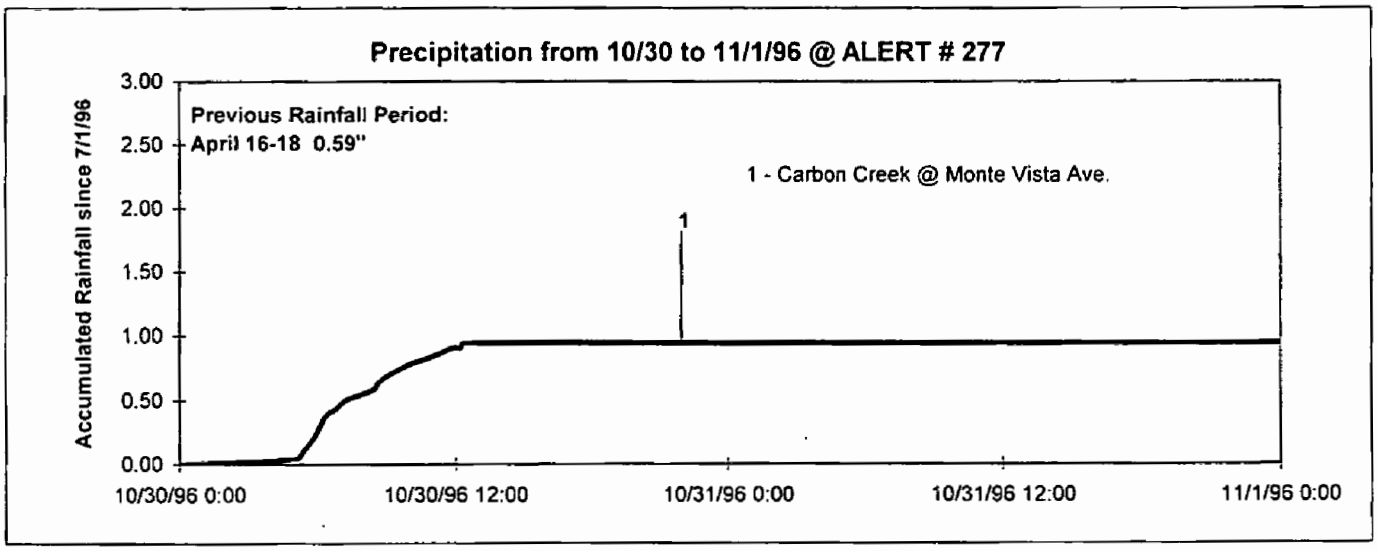

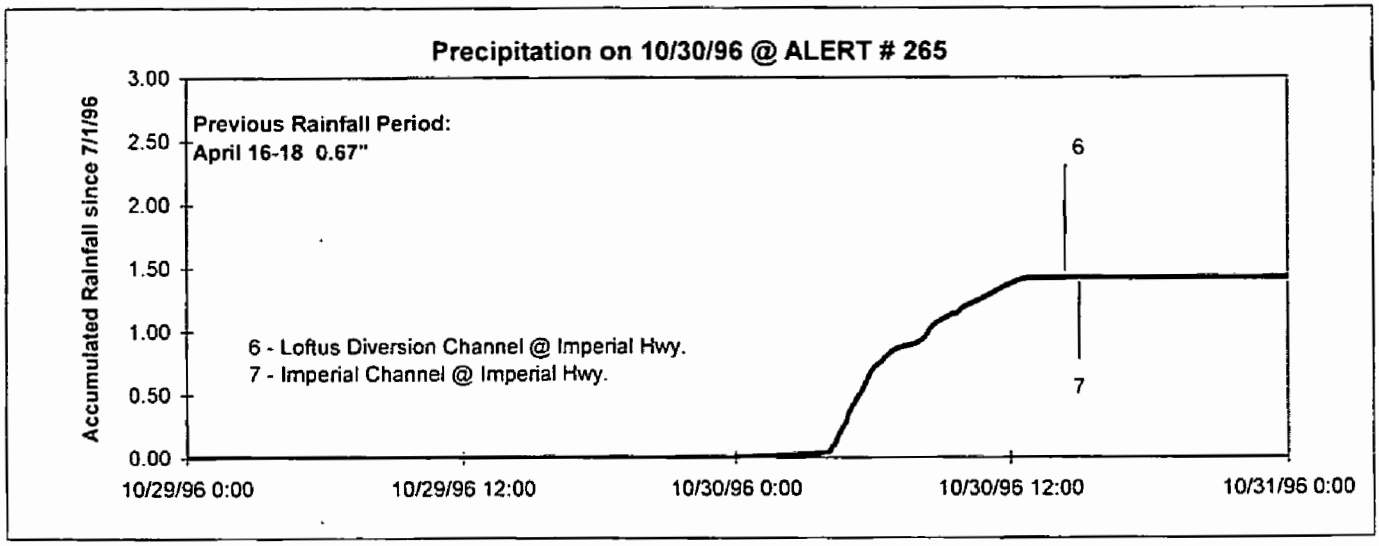

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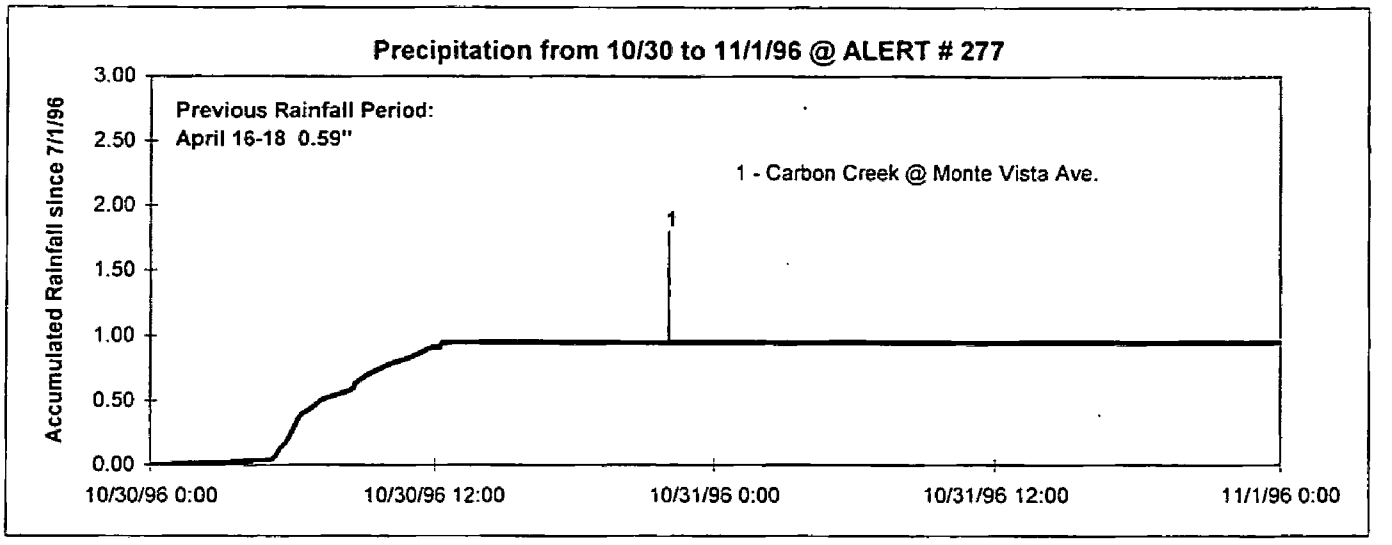

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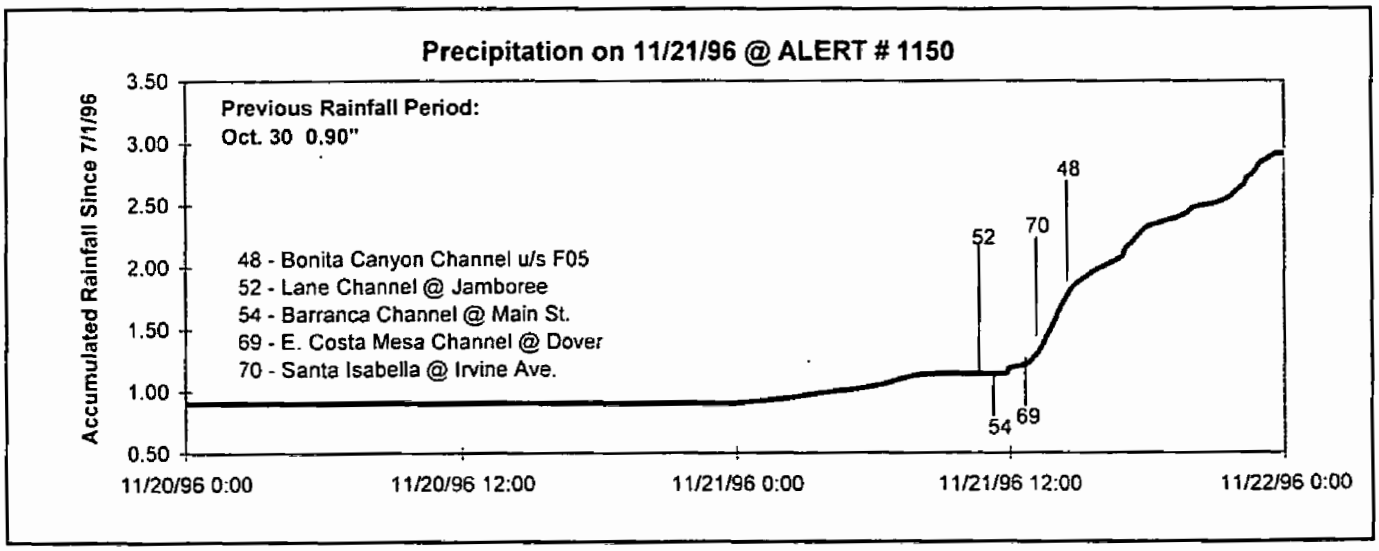

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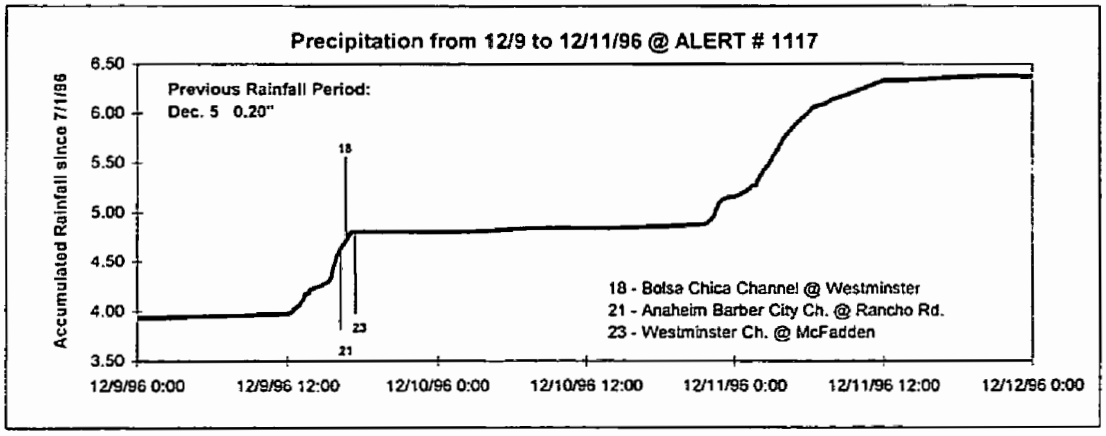

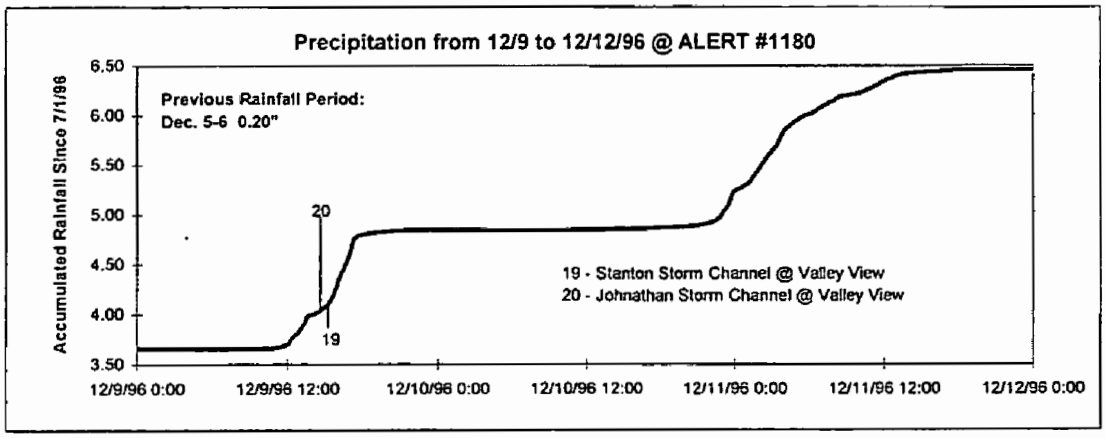

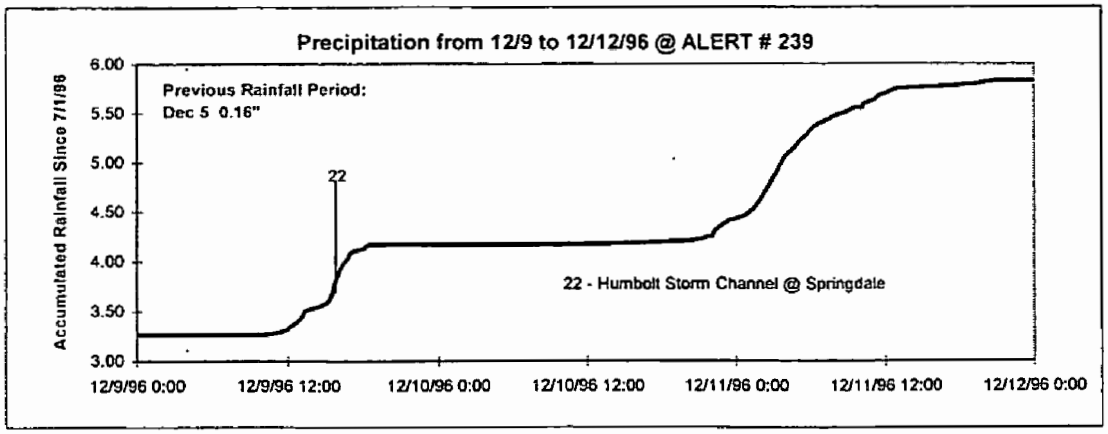

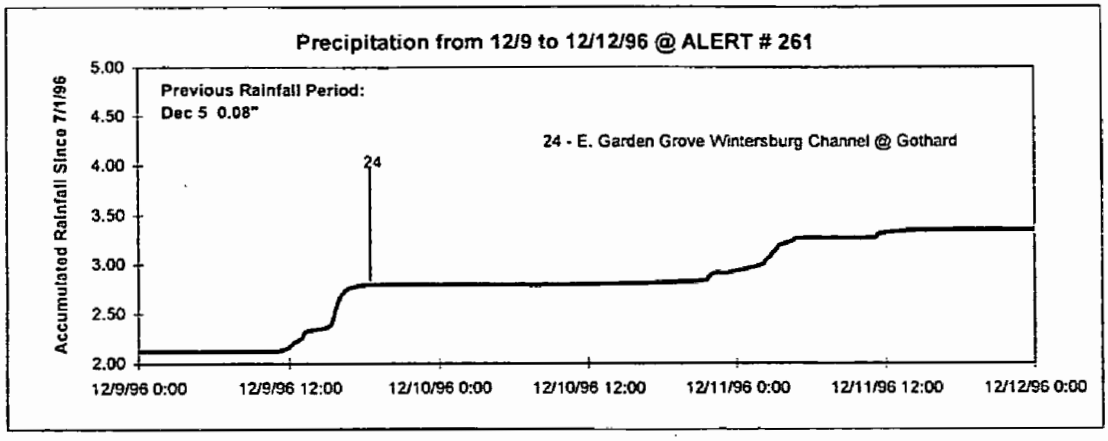

Time of Field Screening Relative to Rainfall

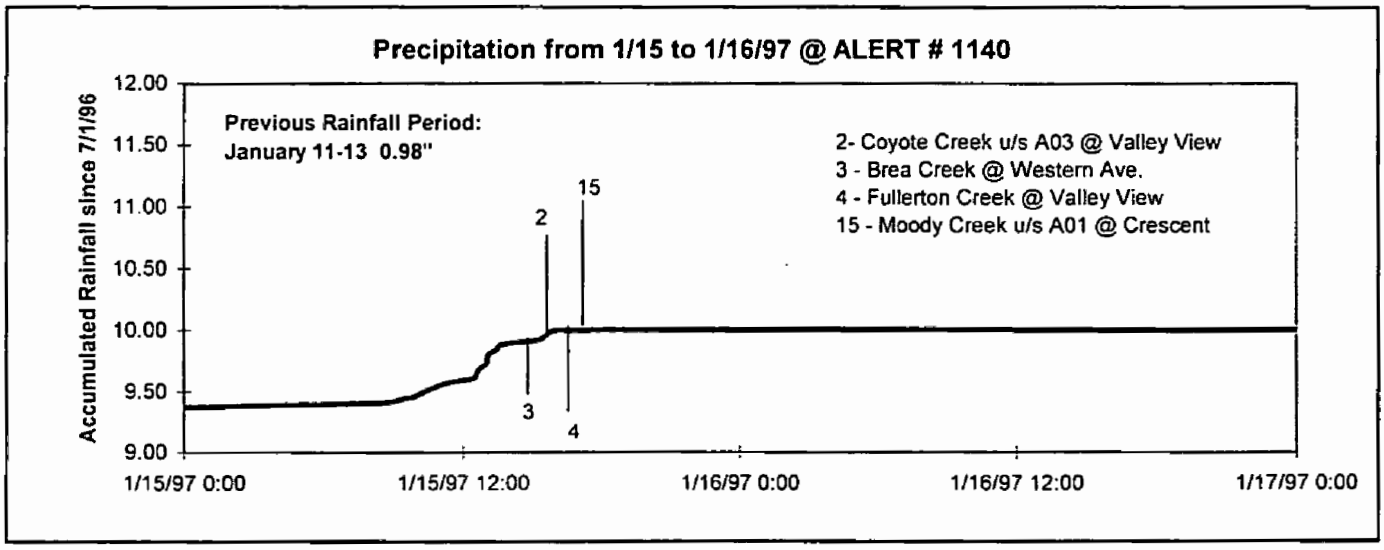

Appendix 4.10:
Annual Measured and Estimated Mass Loads

Annual Measured and Estimated Stormwater Loads

					NO3 tons	PO4 tons	TSS tons	Cu lbs	Pb lbs	Zn lbs
	Bolsa Chica Channel									
Total Sampled Load		1,061			9.9	3.5	538	119.0	82.7	471
Annual Stormwater Volume	**94-95**	5,062	0.21	Site Mean EMC	**8.8**	**2.7**	**478.4**	**35.2**	**31.1**	**178.7**
Calc. Unsampled Load		4,001			47.8	14.6	2598	382.6	337.7	1941
Sampled+Unsampled Load					57.7	18.1	3136	501.7	420.4	2412
Total Sampled Load		530			6.3	1.1	99	36.5	26.4	198
Annual Stormwater Volume	**95-96**	1,171	0.45	Site Mean EMC	**8.8**	**2.3**	**367.2**	**32.6**	**26.9**	**164.1**
Calc. Unsampled Load		641			7.7	2.0	320	56.8	46.9	286
Sampled+Unsampled Load					13.9	3.1	419	93.2	73.3	484
Total Sampled Load		1,326			11.2	2.7	276	135.1	84.5	581
Annual Stormwater Volume	**96-97**	2,872	0.46	Site Mean EMC	**8.4**	**2.1**	**311.6**	**33.9**	**26.1**	**167.9**
Calc. Unsampled Load		1,546			17.6	4.5	655	142.7	109.7	706
Sampled+Unsampled Load					28.9	7.2	931	277.7	194.1	1286
Total Sampled Load		1,627			22.0	4.2	566	143.4	97.2	965
Annual Stormwater Volume	**97-98**	10,907	0.15	Site Mean EMC	**8.6**	**2.1**	**247.7**	**33.4**	**25.0**	**171.7**
Calc. Unsampled Load		9,281			108.6	26.1	3124	843.4	630.6	4330
Sampled+Unsampled Load					130.6	30.3	3690	986.8	727.8	5295
Total Sampled Load		732			9.8	2.1	105	74.3	23.7	216
Annual Stormwater Volume	**98-99**	1,599	0.46	Site Mean EMC	**8.6**	**2.0**	**226.6**	**33.8**	**23.0**	**161.2**
Calc. Unsampled Load		867			10.2	2.4	267	79.6	54.2	380
Sampled+Unsampled Load					19.9	4.5	372	153.9	77.9	596

Annual Measured and Estimated Stormwater Loads

Anaheim Barber City Channel

					NO3 tons	PO4 tons	TSS tons	Cu lbs	Pb lbs	Zn lbs
Total Sampled Load		532			4.2	0.6	53	37.0	20.3	140
Annual Stormwater Volume	94-95	6,473	0.08	Site Mean EMC	**6.0**	**1.2**	**58.5**	**29.6**	**19.2**	**129.9**
Calc. Unsampled Load		5,941			48.5	9.3	472	478.0	310.2	2096
Sampled+Unsampled Load					52.7	9.9	525	515.0	330.5	2236
Total Sampled Load		1,230			14.8	2.5	125	192.1	59.8	737
Annual Stormwater Volume	95-96	2,691	0.46	Site Mean EMC	**7.4**	**1.3**	**66.8**	**42.1**	**18.3**	**169.3**
Calc. Unsampled Load		1,461			14.7	2.6	133	167.1	72.6	672
Sampled+Unsampled Load					29.5	5.1	257	359.2	132.4	1409
Total Sampled Load		2,007			10.8	2.5	109	183.0	105.9	827
Annual Stormwater Volume	96-97	2,998	0.67	Site Mean EMC	**6.6**	**1.2**	**59.0**	**39.8**	**18.8**	**165.7**
Calc. Unsampled Load		991			9.0	1.6	80	107.1	50.5	446
Sampled+Unsampled Load					19.7	4.2	188	290.1	156.4	1273
Total Sampled Load		1,139			9.8	2.2	171	127.5	62.3	604
Annual Stormwater Volume	97-98	7,523	0.15	Site Mean EMC	**6.7**	**1.3**	**74.7**	**41.1**	**19.7**	**179.0**
Calc. Unsampled Load		6,384			58.0	11.3	649	712.7	342.6	3106
Sampled+Unsampled Load					67.8	13.6	820	840.2	404.9	3710
Total Sampled Load		770			10.2	2.9	76	75.6	21.7	289
Annual Stormwater Volume	98-99	2,172	0.35	Site Mean EMC	**6.9**	**1.4**	**75.1**	**41.0**	**19.3**	**177.6**
Calc. Unsampled Load		1,402			13.1	2.7	143	156.2	73.5	677
Sampled+Unsampled Load					23.3	5.5	219	231.7	95.2	966

Annual Measured and Estimated Stormwater Loads

Westminster Channel

					NO3 tons	PO4 tons	TSS tons	Cu lbs	Pb lbs	Zn lbs
Total Sampled Load		401			4.4	0.8	88	60.3	31.8	142
Annual Stormwater Volume	**94-95**	3,073	0.13	Site Mean EMC	**6.6**	**2.8**	**177.2**	**24.9**	**34.0**	**138.8**
Calc. Unsampled Load		2,672			24.0	10.2	642.7	180.4	246.3	1,007.0
Sampled+Unsampled Load					28.5	11.0	730.5	240.7	278.0	1,149.1
Total Sampled Load		471			5.5	1.0	83	88.4	30.6	268
Annual Stormwater Volume	**95-96**	1,184	0.40	Site Mean EMC	**6.9**	**2.3**	**154.4**	**46.9**	**31.1**	**156.0**
Calc. Unsampled Load		713			6.7	2.2	150	91.0	60.3	302
Sampled+Unsampled Load					12.2	3.2	232	179.4	90.9	570
Total Sampled Load		996			7.6	2.1	256	99.5	84.7	484
Annual Stormwater Volume	**96-97**	1,422	0.70	Site Mean EMC	**6.9**	**1.7**	**184.9**	**46.1**	**31.0**	**170.3**
Calc. Unsampled Load		428			4.0	1.0	108	53.7	36.1	198
Sampled+Unsampled Load					11.6	3.1	363	153.2	120.8	682
Total Sampled Load		540			5.9	0.8	86	68.9	24.8	158
Annual Stormwater Volume	**97-98**	4,368	0.12	Site Mean EMC	**7.1**	**1.6**	**176.7**	**47.9**	**28.3**	**170.0**
Calc. Unsampled Load		3,828			37.1	8.5	919	498.8	294.2	1768.
Sampled+Unsampled Load					43.0	9.3	1005	567.7	319.1	1926
Total Sampled Load		136			2.1	0.3	16	11.1	3.8	37
Annual Stormwater Volume	**98-99**	1,137	0.12	Site Mean EMC	**7.2**	**1.6**	**176.7**	**47.1**	**27.5**	**167.6**
Calc. Unsampled Load		1,001			9.8	2.2	240	128.1	74.7	456
Sampled+Unsampled Load					11.9	2.5	256	139.2	78.5	493

Annual Measured and Estimated Stormwater Loads

East Garden Grove Wintersburg Channel

					NO3 tons	PO4 tons	TSS tons	Cu lbs	Pb lbs	Zn lbs
Total Sampled Load		2,323			11.8	3.2	316	229.2	115.8	578
Annual Stormwater Volume	94-95	10,630	0.22	Site Mean EMC	**4.0**	**1.4**	**93.5**	**30.3**	**20.6**	**122.7**
Calc. Unsampled Load		8,307			45.4	16.2	1054	682.5	464.0	2767
Sampled+Unsampled Load					57.2	19.4	1370	911.7	579.8	3345
Total Sampled Load		1,208			10.8	2.9	145	114.6	80.0	370
Annual Stormwater Volume	95-96	3,824	0.32	Site Mean EMC	**4.7**	**1.5**	**91.7**	**31.6**	**22.0**	**119.7**
Calc. Unsampled Load		2,617			16.7	5.5	326	224.8	156.6	851
Sampled+Unsampled Load					27.5	8.3	472	339.4	236.6	1221
Total Sampled Load		3,291			15.8	5.7	569	283.1	151.3	1009
Annual Stormwater Volume	96-97	5,251	0.63	Site Mean EMC	**4.7**	**1.5**	**102.0**	**31.7**	**20.6**	**123.4**
Calc. Unsampled Load		1,960			12.5	4.0	272	168.7	109.5	657
Sampled+Unsampled Load					28.3	9.6	841	451.8	260.8	1667
Total Sampled Load		4,492			32.3	10.0	722	344.8	237.7	1111
Annual Stormwater Volume	97-98	15,015	0.30	Site Mean EMC	**4.7**	**1.4**	**108.2**	**30.3**	**21.0**	**113.2**
Calc. Unsampled Load		10,523			67.5	20.7	1548	866.7	600.1	3237
Sampled+Unsampled Load					99.8	30.7	2270	1211.5	837.9	4348
Total Sampled Load		1,448			11.2	1.7	471	191.2	158.1	855
Annual Stormwater Volume	98-99	3,473	0.42	Site Mean EMC	**4.8**	**1.4**	**108.2**	**32.0**	**23.0**	**131.9**
Calc. Unsampled Load		2,025			13.2	4.0	298	176.4	126.9	726
Sampled+Unsampled Load					24.3	5.7	769	367.5	285.0	1581

Annual Measured and Estimated Stormwater Loads

Santa Ana Delhi Channel

					NO3 tons	PO4 tons	TSS tons	Cu lbs	Pb lbs	Zn lbs
Total Sampled Load		639			6.4	1.9	293	92.6	56.3	271
Annual Stormwater Volume	**94-95**	9,150	0.07	Site Mean EMC	**6.2**	**1.7**	**243.1**	**36.7**	**42.7**	**157.3**
Calc. Unsampled Load		8,511			72.0	20.1	2808	847.7	987.7	3635
Sampled+Unsampled Load					78.4	22.0	3102	940.3	1044.0	3906
Total Sampled Load		1,605			12.7	7.2	672	298.1	91.1	1617
Annual Stormwater Volume	**95-96**	2,804	0.57	Site Mean EMC	**6.6**	**2.2**	**243.1**	**47.9**	**55.3**	**218.6**
Calc. Unsampled Load		1,198			10.7	3.5	396	156.1	180.1	712
Sampled+Unsampled Load					23.4	10.7	1068	454.3	271.2	2329
Total Sampled Load		2,068			19.0	4.8	729	229.1	188.7	1163
Annual Stormwater Volume	**96-97**	4,512	0.46	Site Mean EMC	**7.1**	**2.1**	**283.8**	**46.7**	**51.5**	**218.6**
Calc. Unsampled Load		2,444			23.6	7.1	943	310.4	342.1	1452
Sampled+Unsampled Load					42.5	11.9	1671	539.5	530.8	2615
Total Sampled Load		7,705			60.0	57.6	1747	802.6	533.1	3160
Annual Stormwater Volume	**97-98**	14,259	0.54	Site Mean EMC	**7.2**	**2.6**	**281.4**	**47.2**	**42.9**	**217.3**
Calc. Unsampled Load		6,554			64.2	23.0	3397	840.8	763.9	3871
Sampled+Unsampled Load					124.2	80.5	5144	1643.4	1297.0	7031
Total Sampled Load		915			11.3	2.6	134	80.2	34.3	322
Annual Stormwater Volume	**98-99**	1,763	0.52	Site Mean EMC	**7.4**	**2.5**	**258.4**	**45.3**	**38.8**	**209.5**
Calc. Unsampled Load		848			8.5	2.9	298	104.3	89.5	483
Sampled+Unsampled Load					19.7	5.5	432	184.5	123.8	805

Annual Measured and Estimated Stormwater Loads

Peters Canyon Channel

						NO3 tons	PO4 tons	TSS tons	Cu lbs	Pb lbs	Zn lbs
Total Sampled Load		588				32.0	1.4	158	34.7	12.6	58
Annual Stormwater Volume	94-95	15,920	0.04	Site Mean EMC		**22.8**	**1.7**	**228.6**	**21.7**	**9.0**	**62.3**
Calc. Unsampled Load		15,332				474.5	36.3	4759	905.2	374.0	2591
Sampled+Unsampled Load						506.5	37.7	4917	939.9	386.6	2650
Total Sampled Load		1,940			1732	76.8	8.0	1752	256.4	38.7	924
Annual Stormwater Volume	95-96	4,284	0.45	Site Mean EMC		**26.9**	**2.4**	**412.0**	**37.2**	**10.5**	**118.5**
Calc. Unsampled Load		2,344				85.6	7.7	1312	237.2	66.8	755
Sampled+Unsampled Load						162.4	15.7	3064	493.6	105.5	1679
Total Sampled Load		3,838				91.8	20.9	5245	543.3	254.0	2126
Annual Stormwater Volume	96-97	7,398	0.52	Site Mean EMC		**24.4**	**2.8**	**552.3**	**40.4**	**14.1**	**142.4**
Calc. Unsampled Load		3,561				117.9	13.6	2672	391.0	136.5	1379
Sampled+Unsampled Load						209.7	34.4	7917	934.3	390.5	3505
Total Sampled Load		11,396				212.6	167.4	39702	2892.3	1833.7	13741
Annual Stormwater Volume	97-98	27,648	0.41	Site Mean EMC		**23.3**	**3.2**	**900.8**	**49.1**	**24.7**	**177.3**
Calc. Unsampled Load		16,251				513.6	70.3	19896	2167.0	1089.8	7834
Sampled+Unsampled Load						726.2	237.7	59597	5059.3	2923.5	21575
Total Sampled Load		1,850				133.1	5.6	848	115.3	60.4	524
Annual Stormwater Volume	98-99	2,819	0.66	Site Mean EMC		**26.4**	**3.1**	**849.9**	**49.1**	**24.7**	**177.3**
Calc. Unsampled Load		969				34.8	4.0	1119	216.2	108.8	782
Sampled+Unsampled Load						167.9	9.6	1967	331.5	169.1	1306

Annual Measured and Estimated Stormwater Loads

					NO3 tons	PO4 tons	TSS tons	Cu lbs	Pb lbs	Zn lbs
San Diego Creek @ Harvard										
Total Sampled Load		4,042		3579	61.5	37.5	12425	577.9	104.1	2729
Annual Stormwater Volume	**95-96**	5,654	0.71	Site Mean EMC	**16.4**	**6.8**	**1611.0**	**48.3**	**19.7**	**237.5**
Calc. Unsampled Load		1,612			35.8	14.8	3529	211.4	86.3	1041
Sampled+Unsampled Load					97.4	52.3	15954	789.3	190.4	3769
Total Sampled Load		5,265			93.1	34.0	10044	625.3	300.9	2938
Annual Stormwater Volume	**96-97**	9,226	0.57	Site Mean EMC	**16.2**	**6.2**	**1554.7**	**45.9**	**21.0**	**237.9**
Calc. Unsampled Load		3,961			87.4	33.6	8369	494.6	225.8	2561
Sampled+Unsampled Load					180.6	67.6	18412	1119.9	526.6	5499
Total Sampled Load		4,613			64.8	50.4	13299	674.3	381.5	1728
Annual Stormwater Volume	**97-98**	33,624	0.14	Site Mean EMC	**15.7**	**6.5**	**1,647.5**	**48.8**	**22.9**	**216.4**
Calc. Unsampled Load		29,011			617.1	254.4	64959	3844.3	1802.6	17062
Sampled+Unsampled Load					681.9	304.7	78259	4518.6	2184.1	18790
Total Sampled Load		434			22.4	1.6	223	85.1	20.4	204
Annual Stormwater Volume	**98-99**	2,848	0.15	Site Mean EMC	**16.9**	**6.2**	**1647.5**	**48.3**	**22.2**	**210.0**
Calc. Unsampled Load		2,414			55.6	20.3	5406	316.9	145.8	1378
Sampled+Unsampled Load					78.0	21.8	5629	402.1	166.2	1582
San Diego Creek @ Campus										
Total Sampled Load		66,196			957.9	862.0	130543	12817.3	8840.0	55213
Annual Stormwater Volume	**97-98**	79,825	0.83	Site Mean EMC	**14.4**	**5.7**	**1,231.3**	**61.3**	**41.7**	**210.8**
Calc. Unsampled Load		13,629			266.4	106.1	46036	2270.1	1544.5	7808
Sampled+Unsampled Load					1224.3	968.1	176578	15087.4	10384.5	63021
Total Sampled Load		5,936			166.8	23.3	5719	603.4	280.2	2873
Annual Stormwater Volume	**98-99**	7,714	0.77	Site Mean EMC	**15.9**	**5.1**	**1,120.4**	**47.0**	**35.0**	**188.4**
Calc. Unsampled Load		1,778			38.4	12.3	2708	227.3	169.2	911
Sampled+Unsampled Load					205.2	35.7	8427	830.7	449.5	3784

Annual Measured and Estimated Stormwater Loads

					NO3 tons	PO4 tons	TSS tons	Cu lbs	Pb lbs	Zn lbs
Oso Creek										
Total Sampled Load		4,362			15.9	21.8	4511	427.2	129.3	1353
Annual Stormwater Volume	94-95	15,207	0.29	Site Mean EMC	**3.9**	**3.0**	**490.4**	**18.9**	**5.8**	**70.5**
Calc. Unsampled Load		10,845			57.3	44.1	7219	557.2	170.1	2076
Sampled+Unsampled Load					73.2	65.9	11731	984.5	299.5	3429
Total Sampled Load		1,746		1691	16.8	4.2	505	131.0	20.8	350
Annual Stormwater Volume	95-96	2,899	0.60	Site Mean EMC	**4.5**	**2.8**	**441.6**	**22.6**	**6.1**	**75.3**
Calc. Unsampled Load		1,154			7.1	4.4	692	70.8	19.2	236
Sampled+Unsampled Load					23.9	8.6	1197	201.8	40.0	586
Total Sampled Load		1,454			10.3	4.5	728	103.3	33.2	459
Annual Stormwater Volume	96-97	5,490	0.26	Site Mean EMC	**4.7**	**2.8**	**450.0**	**23.7**	**6.9**	**87.6**
Calc. Unsampled Load		4,036			25.6	15.6	2468	259.8	76.0	961
Sampled+Unsampled Load					35.9	20.1	3196	363.1	109.2	1421
Total Sampled Load										
Annual Stormwater Volume	97-98			Site Mean EMC	**4.7**	**2.8**	**450.0**	**23.7**	**6.9**	**87.6**
Calc. Unsampled Load										
Sampled+Unsampled Load										
Total Sampled Load		572			4.0	1.6	201	43.1	14.7	134
Annual Stormwater Volume	98-99	1,724	0.33	Site Mean EMC	**4.6**	**2.7**	**435.9**	**23.8**	**6.9**	**85.9**
Calc. Unsampled Load		1,152			7.3	4.3	682	74.4	21.6	269
Sampled+Unsampled Load					11.3	5.9	884	117.5	36.3	403

Annual Measured and Estimated Stormwater Loads

Laguna Canyon Channel

						NO3 tons	PO4 tons	TSS tons	Cu lbs	Pb lbs	Zn lbs
Total Sampled Load		238				0.9	2.1	697	27.5	30.7	102
Annual Stormwater Volume	94-95	3,794	0.06	Site Mean EMC		**3.3**	**4.8**	**1,328.1**	**26.1**	**53.5**	**110.4**
Calc. Unsampled Load		3,556				15.8	23.0	6412	251.7	516.4	1066
Sampled+Unsampled Load						16.7	25.1	7109	279.1	547.1	1168
Total Sampled Load		231			221	1.3	1.7	653	35.9	2.9	126
Annual Stormwater Volume	95-96	591	0.39	Site Mean EMC		**3.7**	**4.3**	**1,273.2**	**36.8**	**41.6**	**123.6**
Calc. Unsampled Load		361				1.8	2.1	624	36.1	40.8	121
Sampled+Unsampled Load						3.1	3.8	1277	71.9	43.7	247
Total Sampled Load		564				3.1	2.6	798	59.7	30.5	210
Annual Stormwater Volume	96-97	1,374	0.41	Site Mean EMC		**4.1**	**4.0**	**1,184.5**	**36.6**	**36.6**	**130.6**
Calc. Unsampled Load		810				4.5	4.5	1305	80.5	80.7	288
Sampled+Unsampled Load						7.6	7.0	2103	140.2	111.2	497

Appendix 4.11:
Annual Loads of Nitrate, Phosphate, TSS, Copper, Lead, and Zinc

Total Stormwater Discharge from Automatic Sampling Sites

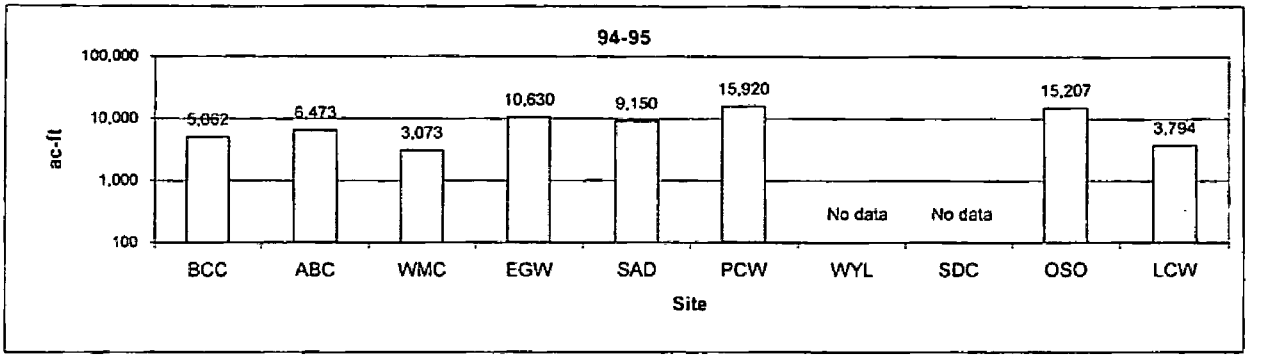

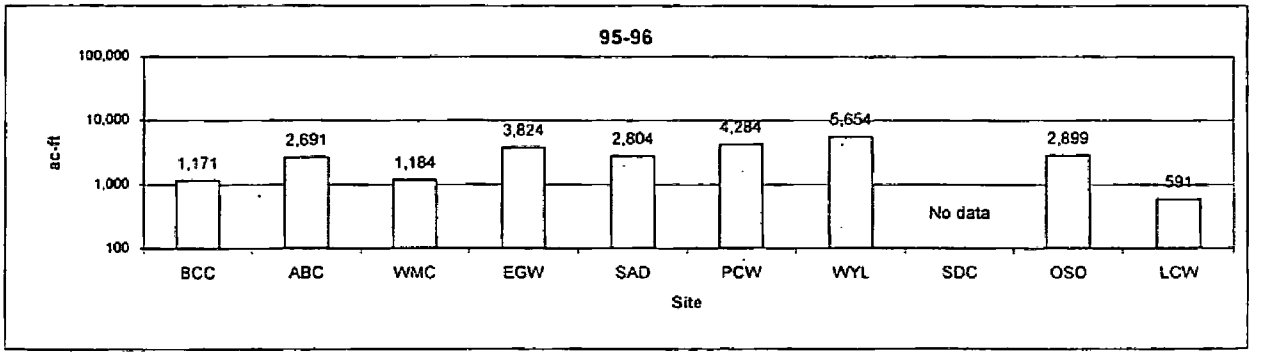

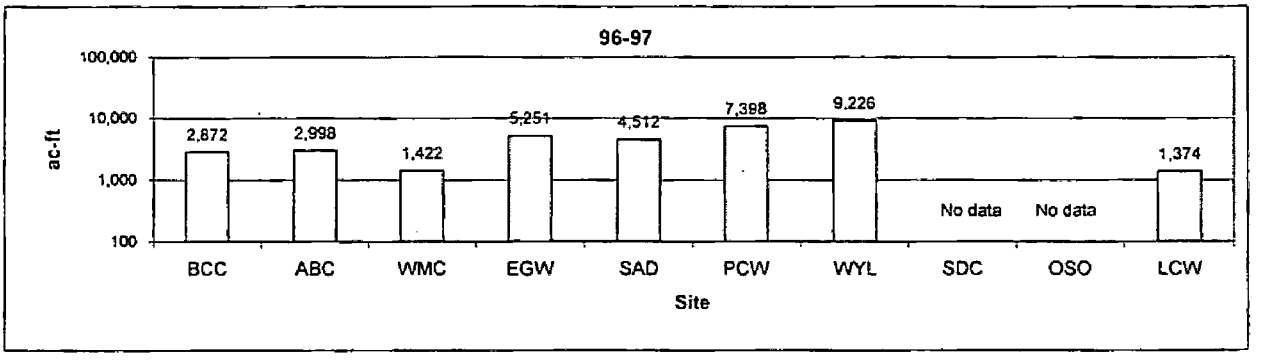

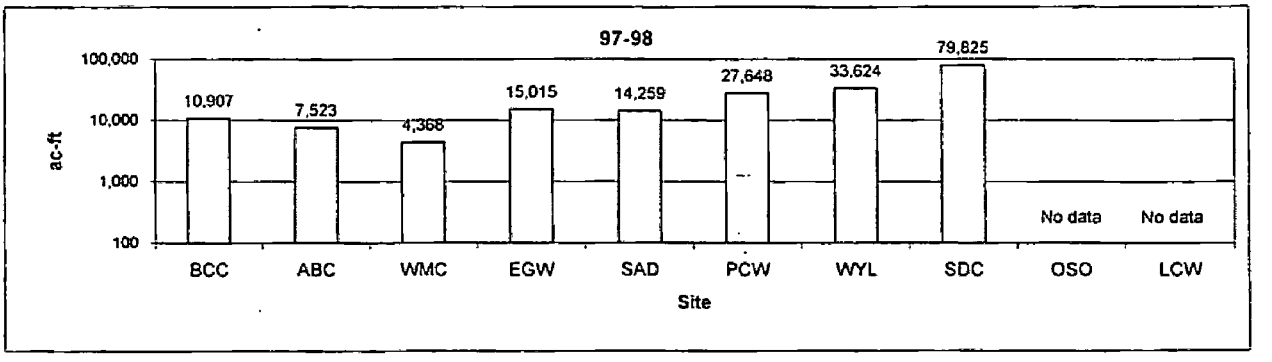

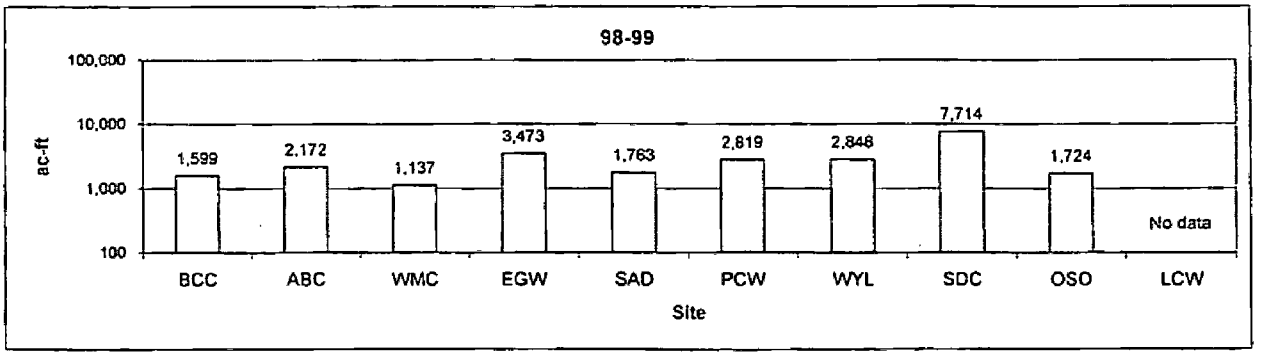

Total Stormwater Nitrate Load from Automatic Sampling Sites

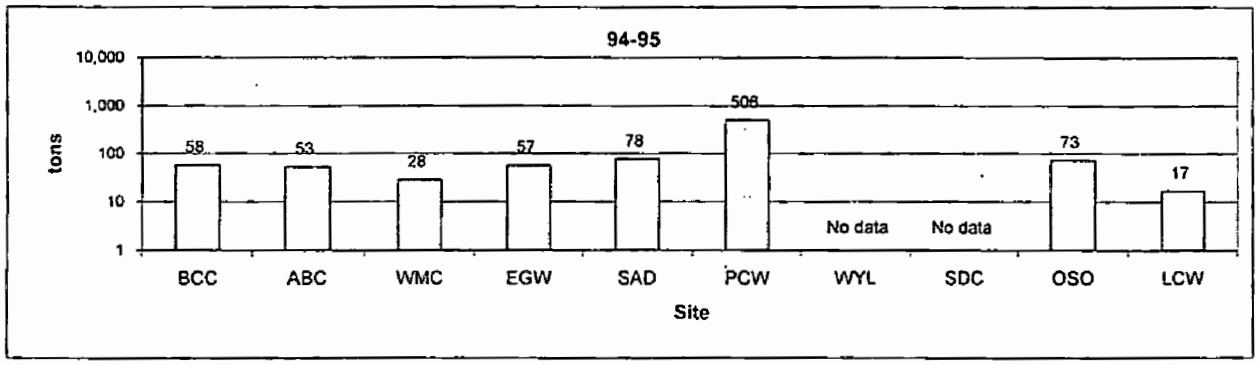

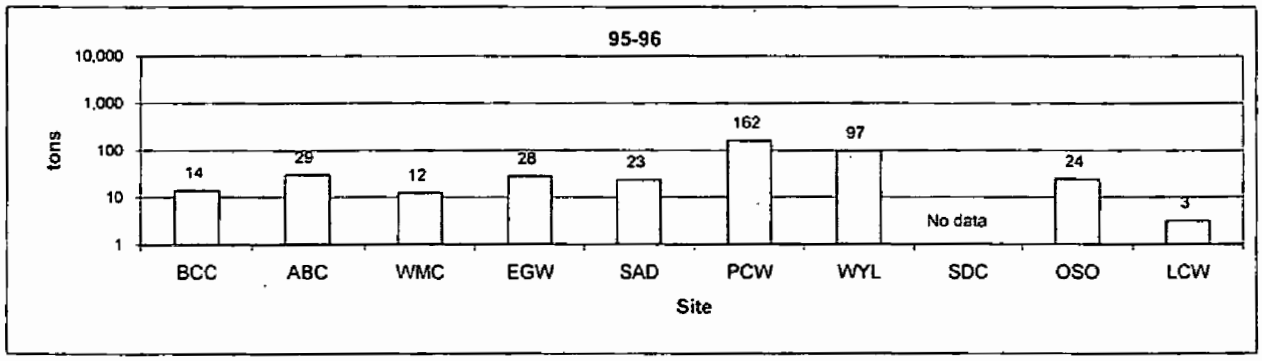

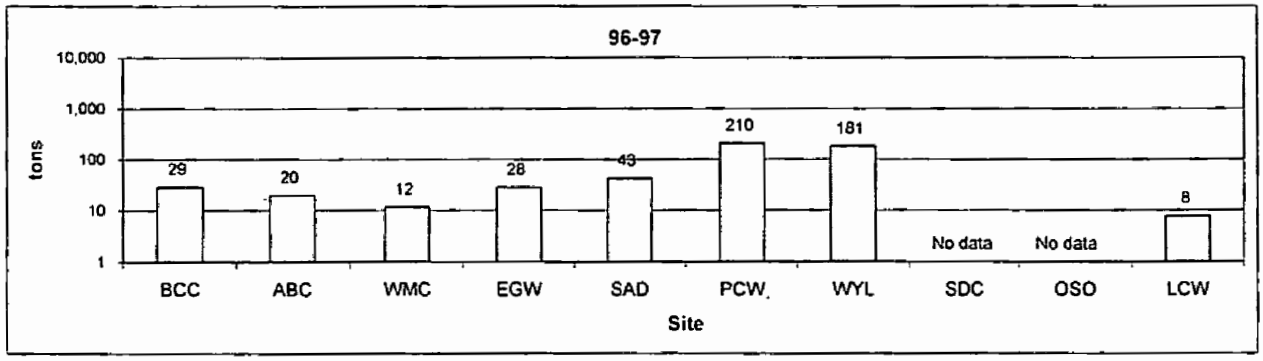

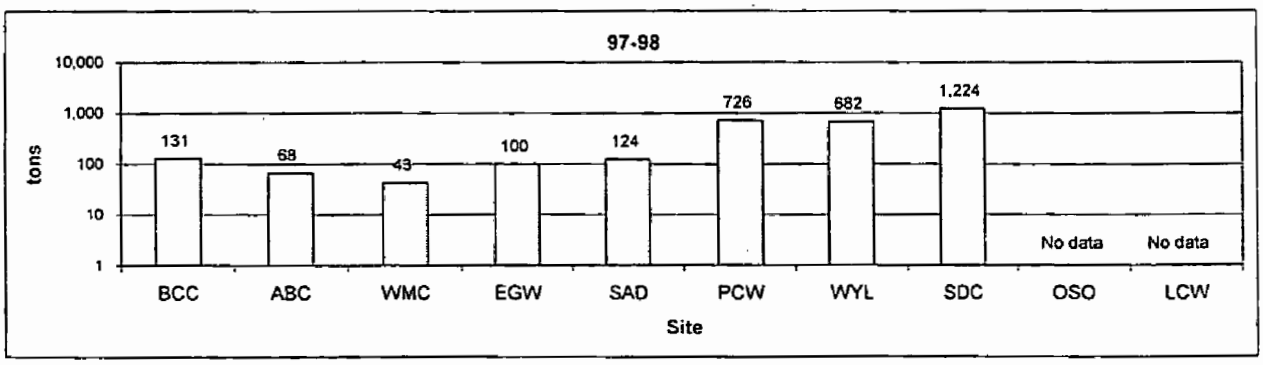

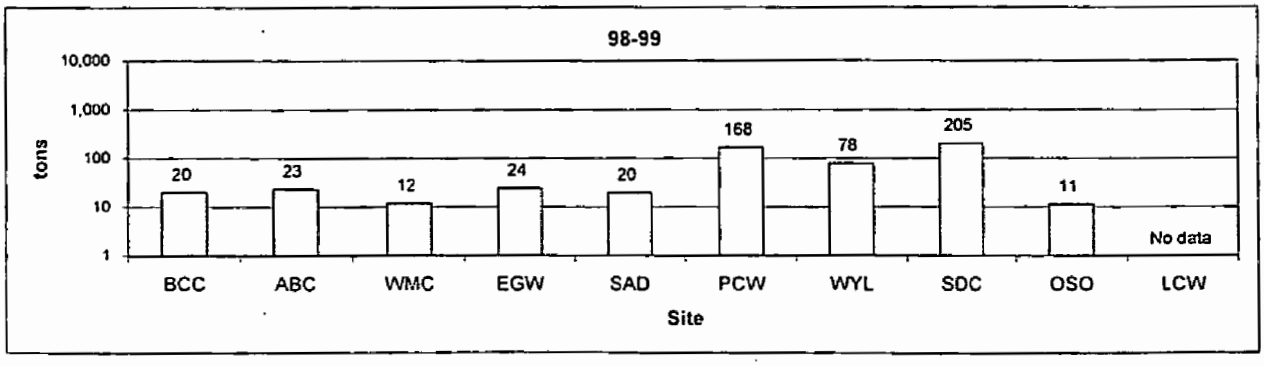

Total Stormwater Phosphate Load from Automatic Sampling Sites

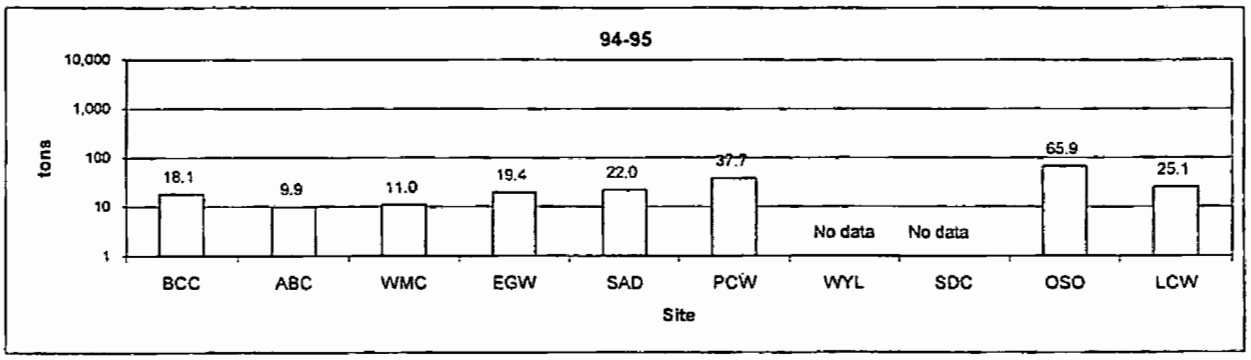

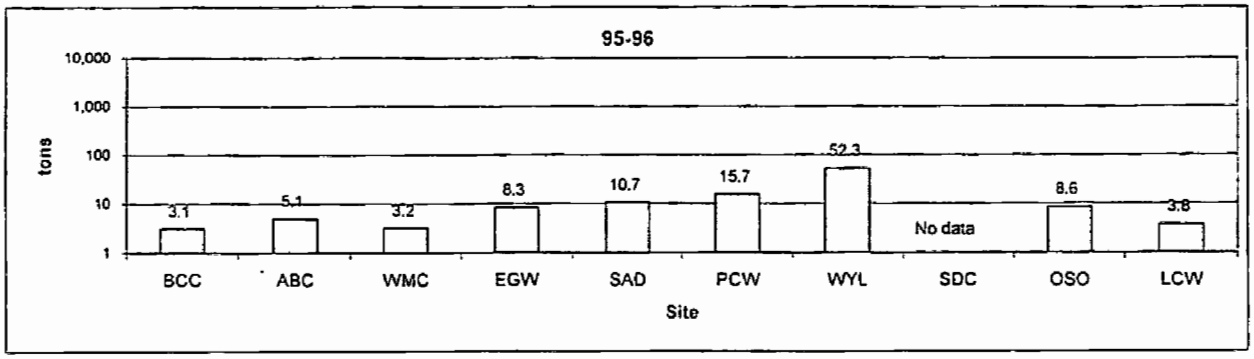

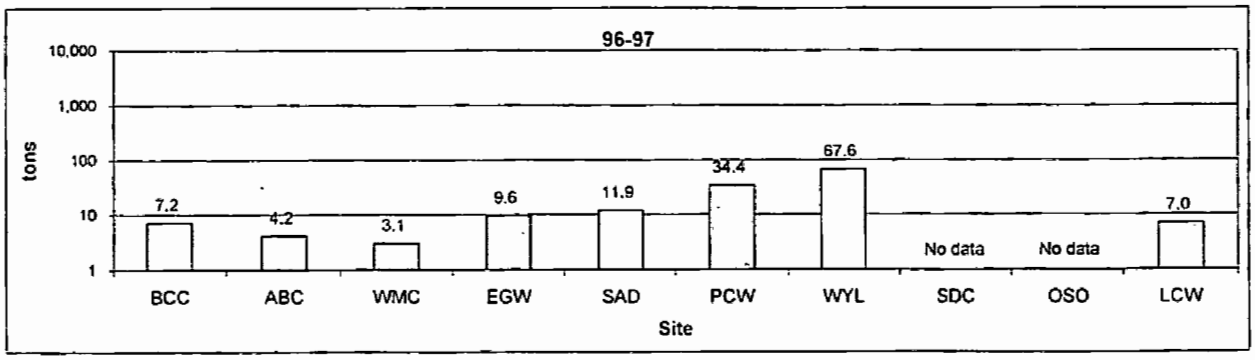

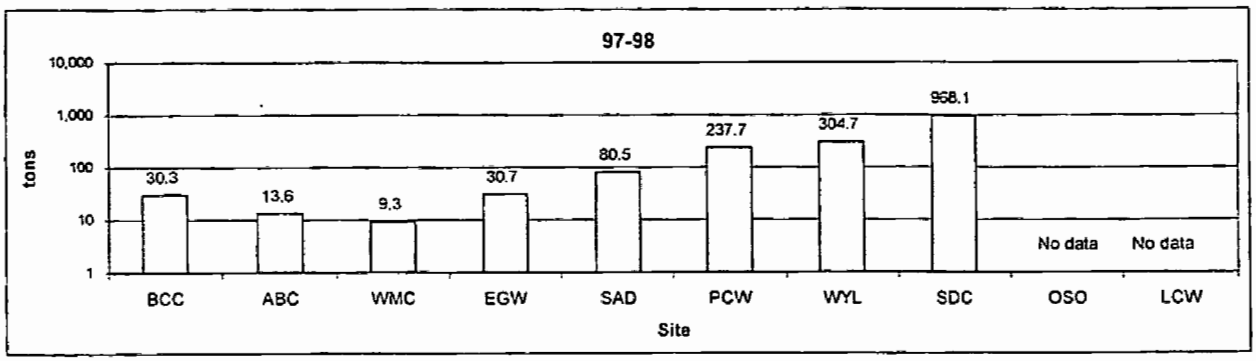

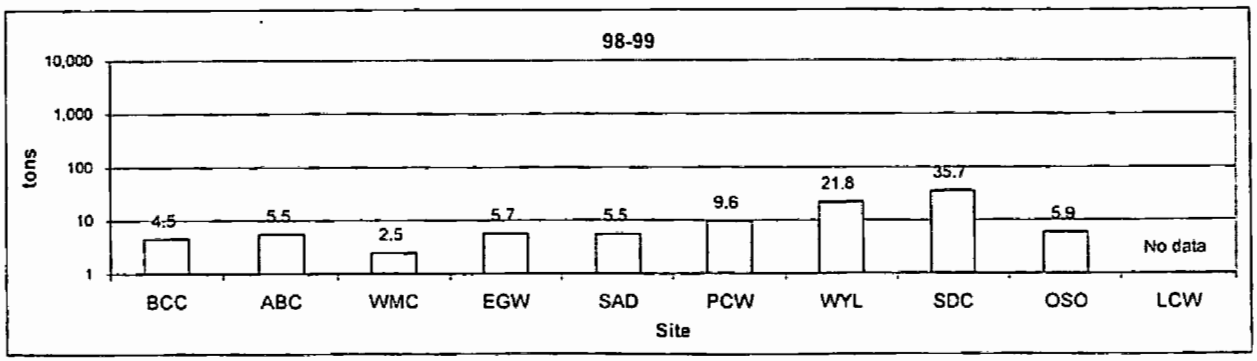

Total Stormwater TSS Load from Automatic Sampling Sites

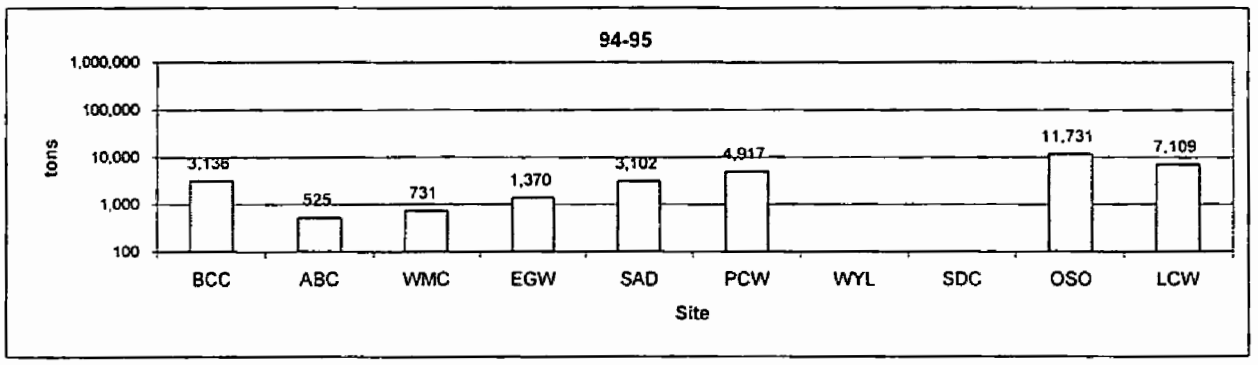

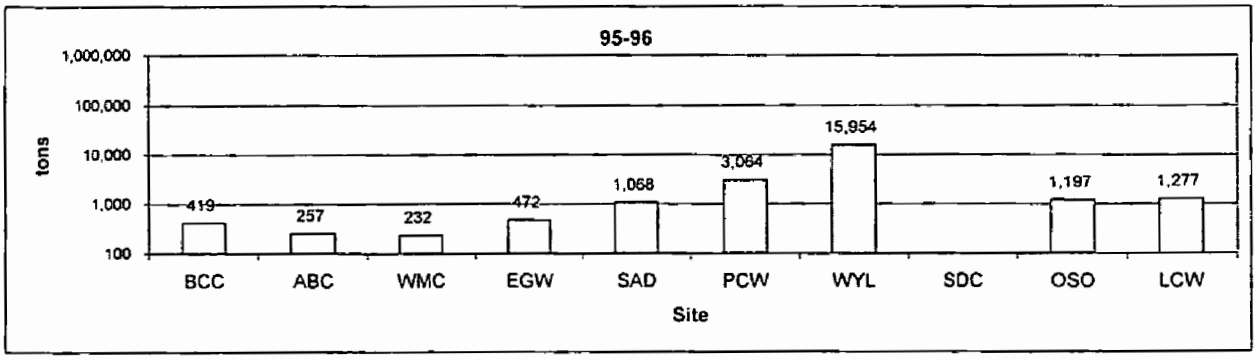

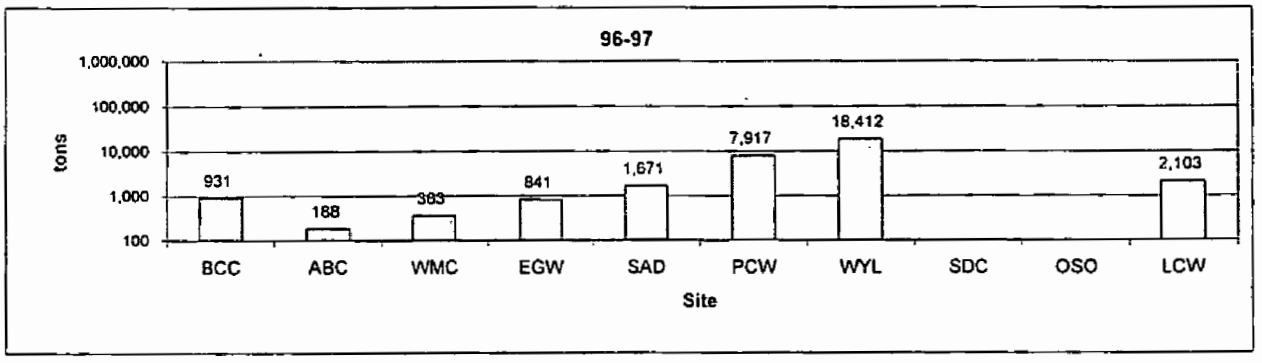

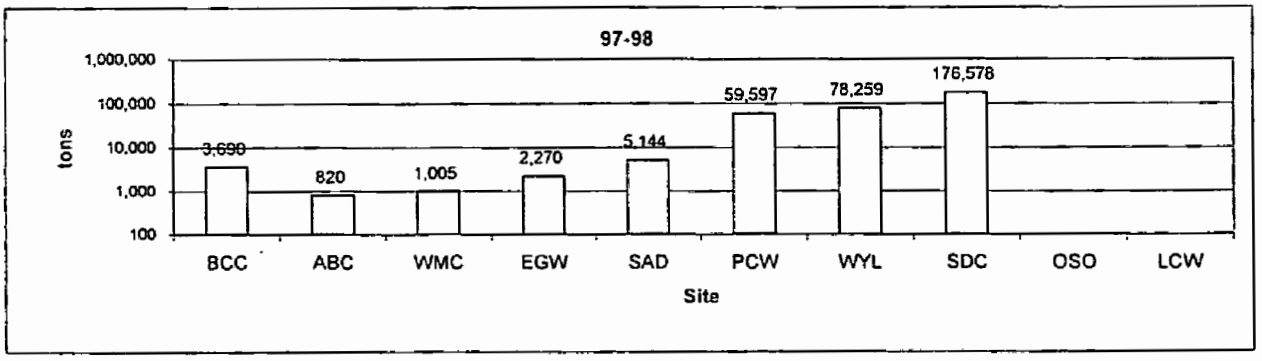

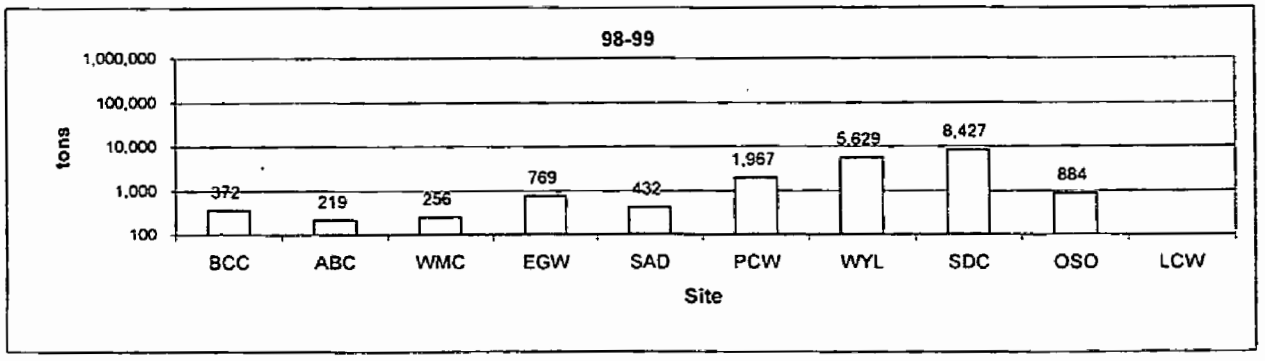

Total Stormwater Copper Load from Automatic Sampling Sites

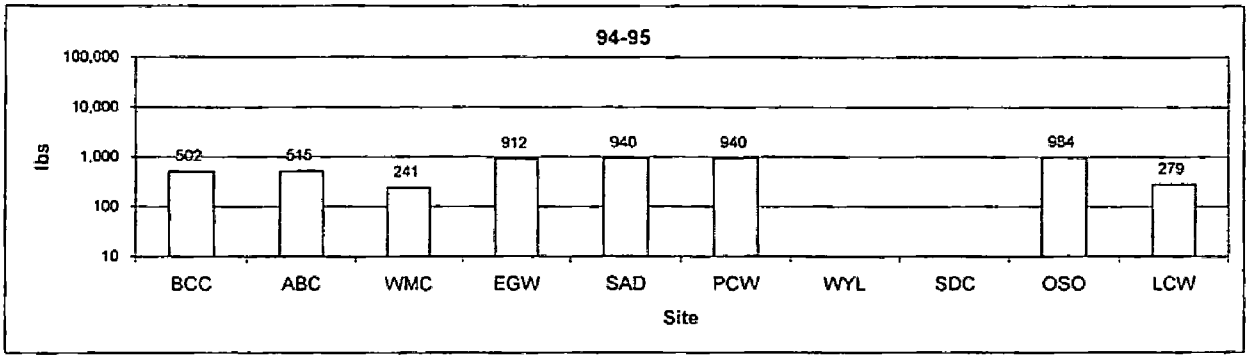

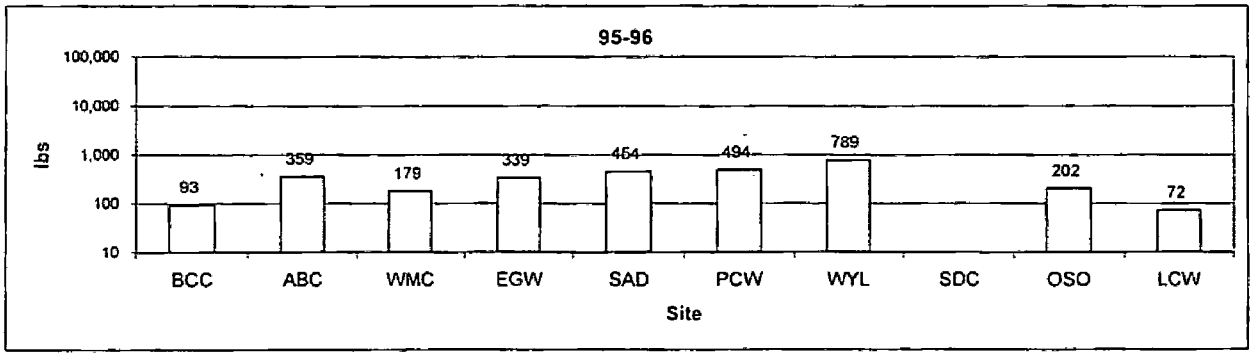

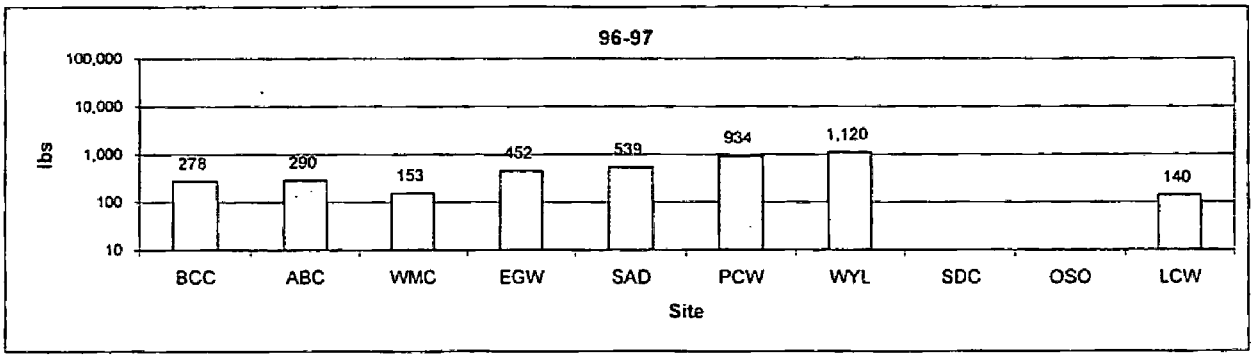

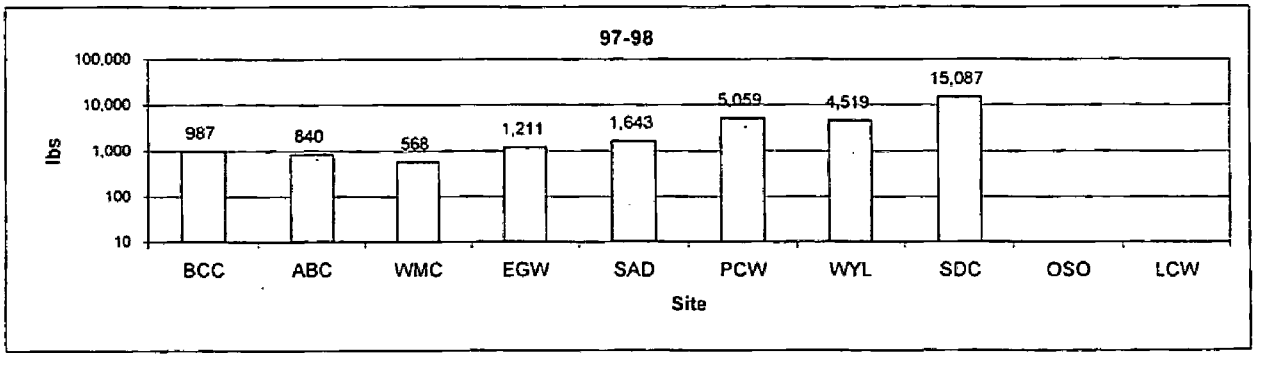

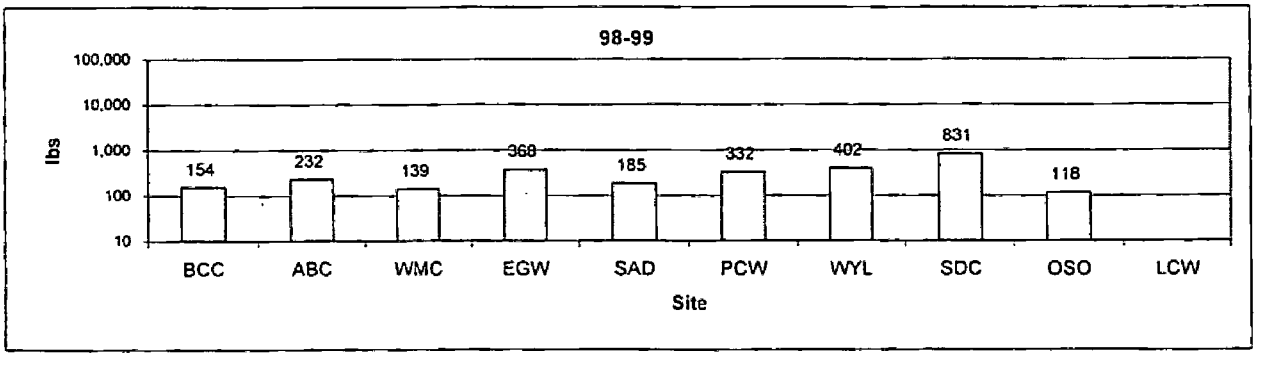

Total Stormwater Lead Load from Automatic Sampling Sites

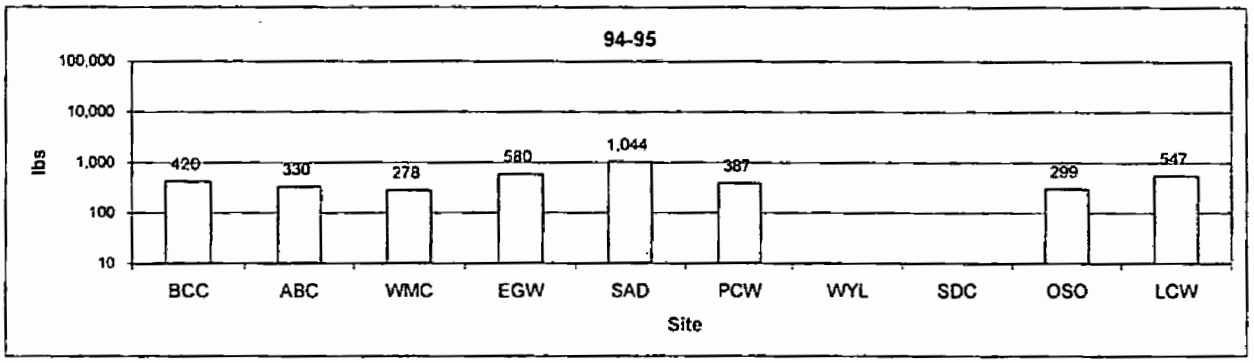

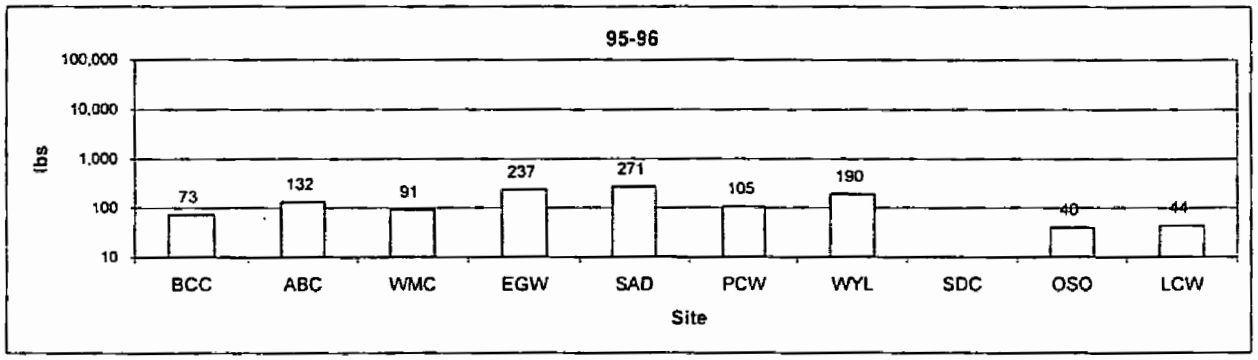

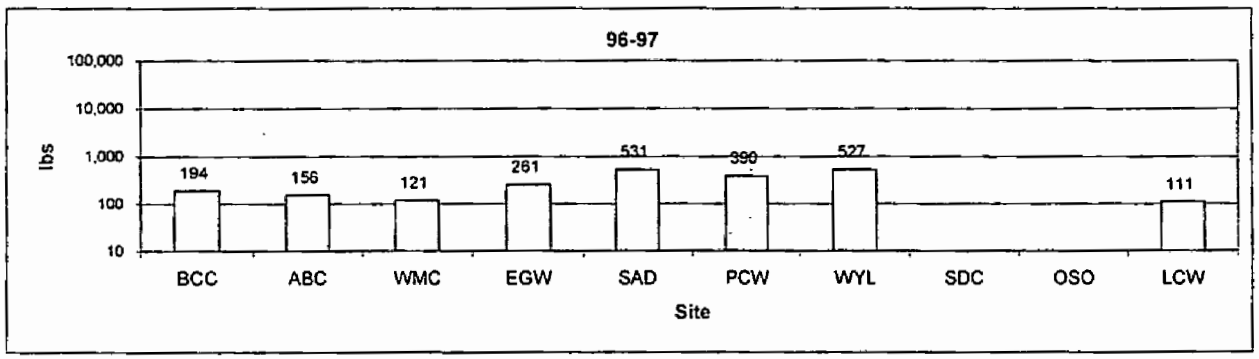

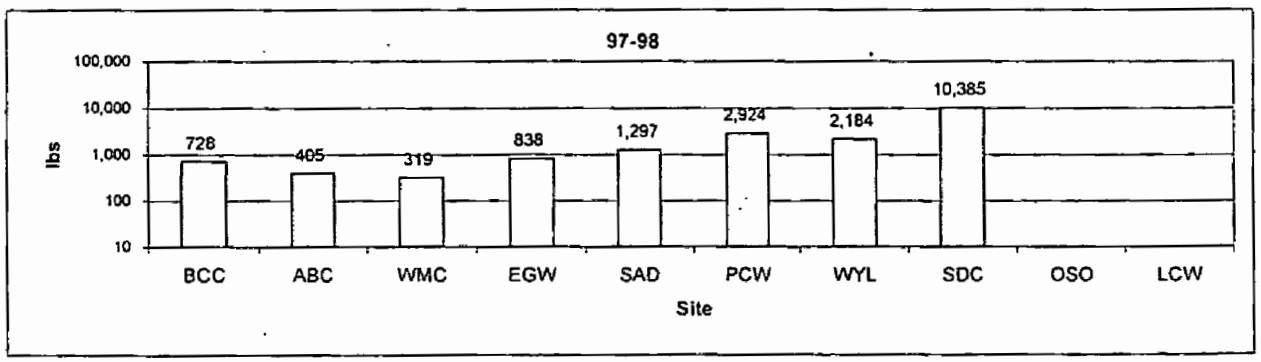

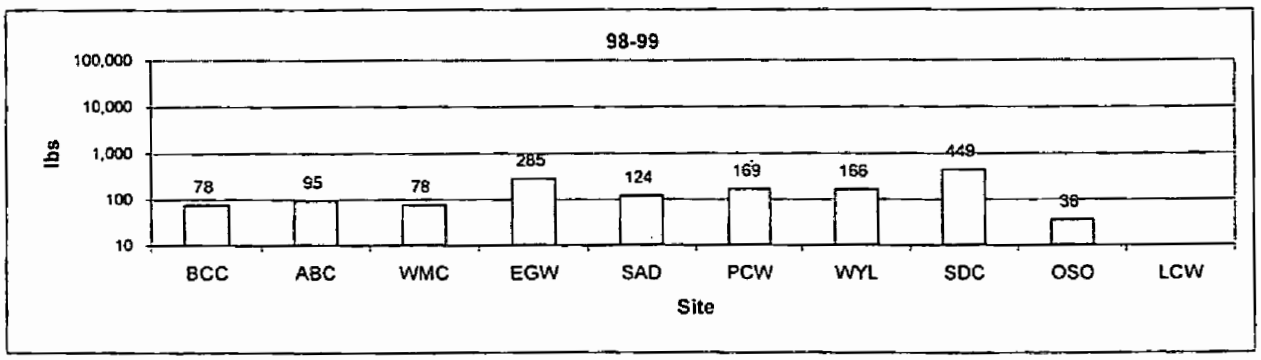

Total Stormwater Zinc Load from Automatic Sampling Sites

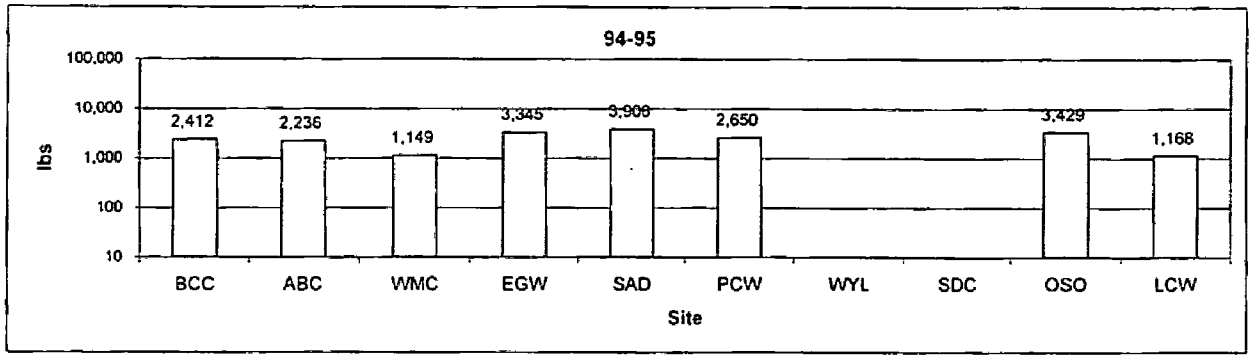

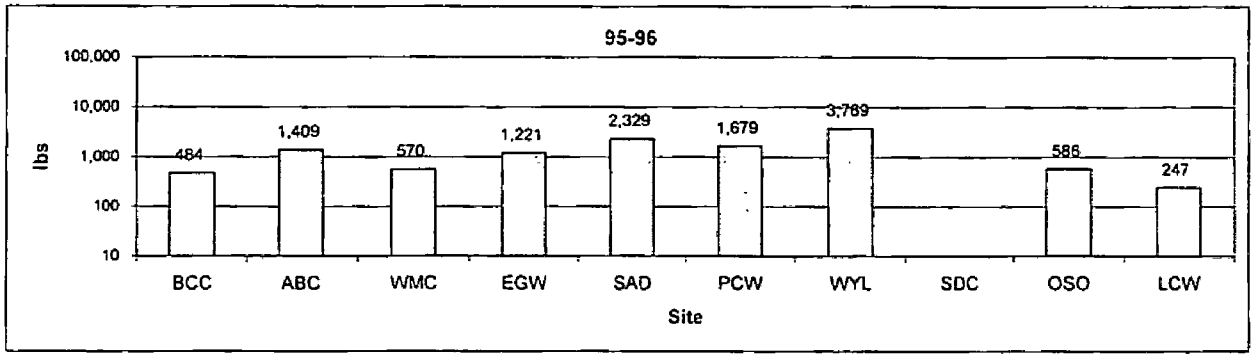

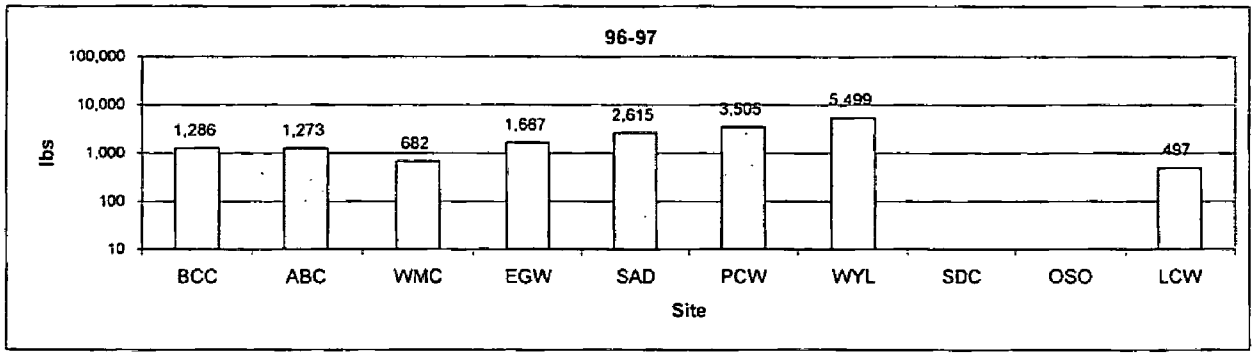

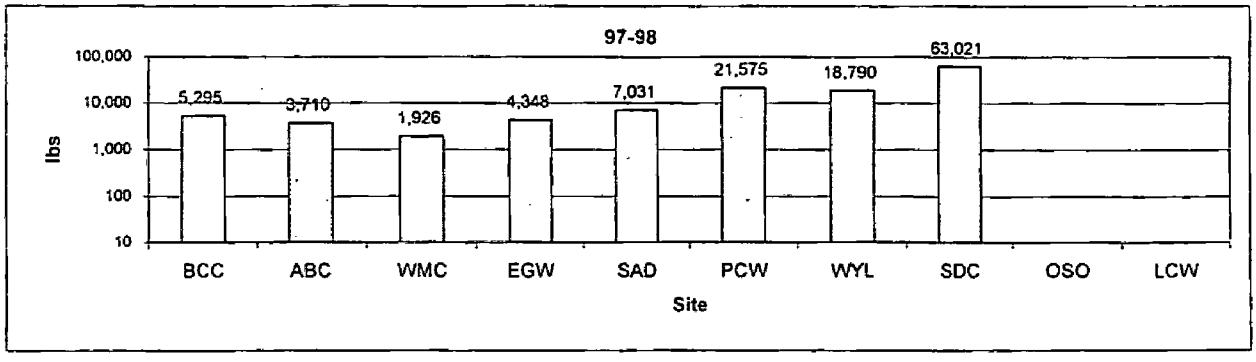

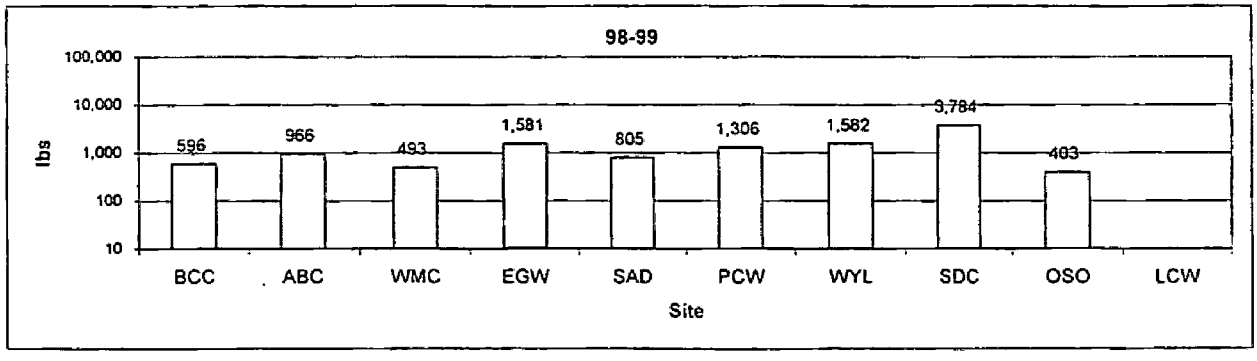

Appendix 4.12
First Flush Data

First Flush Data

	PERIOD		Vol. ac-ft	No. samp	EC	Turb	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd ug/L	Cr ug/L	Cu ug/L	Pb ug/L	Ni ug/L	Ag ug/L	Zn ug/L	Hardness mg/L
ABCC03	12/12/95	21:12	**11.61**	5	750	780.0	7.3	19.0	2.80	47.00	27.00	2100	420	6	63	310	180	62	<1	1500	154
	12/12/95	22:12																			
	1/16/96	17:04	**2.38**	5	960	11.0	7.9	14.0	0.91	9.60	4.40	470	110	4	13	87	41	19	1.8	340	290
	1/16/96	18:04																			
	1/19/96	04:37	**0.87**	5	2000	4.3	8.4	26.0	0.10	2.30	0.41	12	8	<1	91	46	3	3	<1	94	346
	1/19/96	05:37																			
	1/21/96	14:57	**7.02**	5	330	170.0	7.6	3.5	0.16	4.00	2.80	360	84	3	16	61	53	16	<1	290	74
	1/21/96	15:57																			
	1/31/96	01:57	**2.91**	5	630	140.0	7.9	8.1	0.27	3.30	1.60	180	19	<1	20	49	17	12	1.2	170	134
	1/31/96	02:57																			
	3/4/96	11:56	**1.89**	5	980	78.0	8.5	11.0	0.54	3.50	1.00	70	23	<1	<10	41	19	9	1	170	132
	3/4/96	12:56																			
	10/30/96	4:43	**0.62**	5	1700	1400.0	7.6	22.0	3.20	37.00	19.00	2900	530	6	50	310	130	52	2	1300	250
	10/30/96	5:43	**F**											<1	<10	29	4	22	<1	110	
	11/21/96	7:34	**4.28**	5	140	44.0	7.0	6.4	0.84	4.00	1.80	58	36	<1	<10	210	22	15	<1	300	38
	11/21/96	8:34																			
	12/9/96	13:08	**3.61**	3	250	200.0	7.3	5.9	0.45	2.90	2.00	250	50	<1	13	39	36	11	<1	270	58
	12/9/96	13:38																			
	1/1/97	21:08	**0.44**	5	1100	36.0	8.0	9.9	0.34	2.40	0.70	22	12	<1	<10	22	6	43	<1	82	190
	1/1/97	22:08																			
	9/25/97	8:41	**10.22**	1										9	69	480	180	23	<1	2500	>4000
	11/10/97	12:15	**2.26**	5				5.7						<1	<10	33	9	13	<1	170	224
	11/10/97	13:15																			
	12/18/97	12:13	**0.81**	5	650	440	7.5	9.9	0.6	4.1	2.50	700	110	<1	18	48	42	18	<1	260	116
	12/18/97	13:13	**SF**											<1	<10	19	<2	7	<1	25	

First Flush Data

	PERIOD		Vol. ac-ft	No. samp	EC	Turb	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd ug/L	Cr ug/L	Cu ug/L	Pb ug/L	Ni ug/L	Ag ug/L	Zn ug/L	Hardness mg/L
ABCC03	1/29/98	5:21	**1.59**	5	860	14	7.6	14.0	1.2	4.6	1.00	98	30	2	<10	43	14	9	<1	~~140~~	158
	1/29/98	6:21	**SF**											<1	<10	34	6	7	<1	~~120~~	
	5/12/98	14:40	**19.50**	5	1050	136	7.9	10	<0.05	~~8.7~~	~~2~~	490	110	1	18	52	42	14	<2	370	210
	5/12/98	15:40	**SF**											<0.5	6	22	<2	6	<2	66	
	11/8/98	3:03	**10.36**	5	1010	190	7.3	22.0	1.61	39.6	11.0	600	333	4	29	132	87	36	<2	888	190
	11/8/98	4:03	**SF**											<1	<8	20	3	21	<2	100	
	3/11/99	10:49	**2.07**	5	670	88	7.7	9.9	0.51	8.8	0.6	210	110	2	15	71	39	16	<2	401	160
	3/11/99	11:49	**SF**											<1	<8	24	<2	9	<2	83	
	3/20/99	6:25	**1.19**	5	755	18	7.5	9.6	0.48	3.9	1.7	210	62	<1	9	40	14	10	<2	210	184
	3/20/99	7:25	**SF**											<1	<8	22	<2	8	<2	109	
	3/25/99	11:44	**2.84**	5	565	26	7.9	4.8	0.31	4.4	1.6	220	166	<1	<8	33	22	8	<2	193	126
	3/25/99	12:44	**SF**											<1	<8	19	<2	4	<2	26	

First Flush Data

	PERIOD		Vol. ac-ft	No. samp	EC	Turb	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd ug/L	Cr ug/L	Cu ug/L	Pb ug/L	Ni ug/L	Ag ug/L	Zn ug/L	Hardness mg/L
BCC02	12/12/95	20:38	**0.42**	5	1700	10.0	8.0	24.0	0.88	4.00	1.70	17	8	<1	<10	34	5	<40	<1	51	92
	12/12/95	21:38																			
	1/19/96	06:37	**2.18**	5	1300	140.0	8.1	24.0	0.82	3.90	1.60	410	65	<1	50	35	18	10	<1	140	276
	1/19/96	07:37																			
	1/31/96	02:56	**1.54**	5	1500	90.0	7.8	21.0	0.24	2.60	1.30	200	28	<1	<10	35	13	10	<1	92	278
	1/31/96	03:56																			
	3/4/96	13:22	**8.68**	5	990	160.0	8.1	18.0	0.81	3.20	1.70	360	32	<1	10	33	30	12	<1	160	168
	3/4/96	14:22																			
	10/30/96	5:24	**3.89**	5	1600	370.0	7.6	22.0	1.50	12.00	3.60	710	160	1	22	70	49	31	1	400	270
	10/30/96	6:24	**SF**											<1	<10	21	<2	14	<1	100	
	11/21/96	8:00	**4.56**	5	340	130.0	7.5	9.9	1.10	6.50	3.30	220	26	1	<10	90	29	16	<1	280	60
	11/21/96	9:00																			
	12/9/96	13:10	**8.72**	5	1300	150.0	8.0	18.0	0.31	3.10	1.40	320	37	<1	<10	34	26	10	<1	150	294
	12/9/96	14:10																			
	12/27/96	11:51	**2.89**	5	1900	180.0	8.1	40.0	0.54	3.40	1.80	250	40	<1	<10	24	31	9	<1	180	264
	12/27/96	12:51																			
	9/25/97	8:22	**8.74**	5	1500	81	7.1	15.0	2	9.9	2.00	100	31	<1	<10	30	11	28	<1	210	210
	9/25/97	9:22	**SF**											1	<10	25	7	19	<1	320	
	11/10/97	17:42	**6.07**	5				42.0						<1	<10	32	5	16	<1	160	404
	11/10/97	18:42																			
	1/29/98	9:16	**64.33**	5	390	61	7.6	11.0	1	4.2	2.2	490	45	3	18	44	40	22	<1	~~250~~	88
	1/29/98	10:16	**SF**											<1	<10	30	15	13	<1	~~72~~	
	11/8/98	3:27	**3.31**	5	1520	145	7.8	21.0	0.75	11.6	4.28	660	200	<1	18	92	36	20	<2	313	275
	11/8/98	4:27	**SF**											<1	<8	38	8	12	<2	92	

First Flush Data

	PERIOD		Vol. ac-ft	No. samp	EC	Turb	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd ug/L	Cr ug/L	Cu ug/L	Pb ug/L	Ni ug/L	Ag ug/L	Zn ug/L	Hardness mg/L
BCC02	1/25/99	4:05	**4.26**	5										<1	<8	32	11	7	<2	88	368
	1/25/99	5:05	**SF**											<1	<8	15	<2	5	<2	16	
	3/11/99	10:45	**0.35**	5	1670	13	8.4	19.4	0.25	2.1	0.40	34	12	<1	<8	35	4	5	<2	56	445
	3/11/99	11:45	**SF**											<1	<8	25	<2	6	<2	25	
	3/15/99	9:44	**31.23**	5	220	78	7.8	5.0	0.41	3.9	1.25	590	130	1	17	59	38	12	<2	283	50
	3/15/99	10:44	**SF**											12	16	<2	7	<2	15		
	3/25/99	12:03	**4.05**	5	1680	31	8.2	17.7	0.17	2.2	0.61	130	80	<1	<8	32	9	7	<2	81	318
	3/25/99	13:03	**SF**											<1	<8	23	4	5	<2	36	

First Flush Data

	PERIOD		Vol. ac-ft	No. samp	EC	Turb	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd ug/L	Cr ug/L	Cu ug/L	Pb ug/L	Ni ug/L	Ag ug/L	Zn ug/L	Hardness mg/L
EGWC05	12/12/95	20:35	**2.35**	5	1200	180.0	7.9	14.0	0.61	8.40	2.40	300	61	<1	10	70	29	<40	<1	310	304
	12/12/95	21:35																			
	1/16/96	17:17	**6.08**	5	1000	78.0	7.6	14.0	0.40	7.50	2.10	210	58	1	<10	59	24	19	3.2	200	262
	1/16/96	18:17																			
	3/4/96	12:07	**1.75**	5	450	64.0	7.9	9.3	0.28	3.30	1.00	76	26	<1	<10	36	10	13	1.5	130	254
	3/4/96	13:07																			
	11/21/96	7:25	**4.34**	5	620	580.0	7.5	12.0	<0.1	5.70	1.80	93	22	<1	<10	52	3	20	<1	150	160
	11/21/96	8:25																			
	12/9/96	12:39	**3.66**	5	900	180.0	7.9	6.9	0.12	2.50	1.10	110	26	<1	<10	32	13	9	<1	120	164
	12/9/96	13:39																			
	12/27/96	10:05	**0.67**	5	1500	32.0	8.2	14.0	0.19	1.70	0.50	31	7	<1	<10	27	5	23	<1	97	470
	12/27/96	11:05																			
	1/21/97	20:03	**33.29**	5	560	90.0	7.9	13.0	0.20	2.20	1.10	190	46	<1	<10	28	11	44	<1	190	144
	1/21/97	21:03																			
	9/25/97	9:08	**6.10**	5	360	680	7.5	6	1	12.0	5	860	180	8	24	110	110	30	1	930	320
	9/25/97	10:08	**SF**											1	<10	13	4	12	<1	340	
	11/10/97	11:45	**0.62**	5				11						<1	<10	43	7	12	<1	160	420
	11/10/97	12:45																			
	11/26/97	9:18	**20.76**	5	570	390	8.6	5	1	7.3	5	880	720	2	<10	50	66	12	<1		140
	11/26/97	10:18	**SF**											<1	<10	8	<2	<4	<1	39	
	12/18/97	12:55	**88.30**	5	460	220	7.4	8	<0.5	3.6	2	460	72	<1	15	48	45	17	<1	270	124
	12/18/97	13:55	**SF**											<1	<10	16	<2	4	<1	35	
	1/3/98	0:54	**1.70**	5	1100	67	7.6	13	<0.5	2.9	1	78	23	<1	<10	27	14	6	<1	93	280
	1/3/98	1:54	**SF**											<1	<10	14	<2	<4	<1	30	
	1/9/98	9:44	**2.90**	5	1500	35	8.0	16	<0.5	3.0	1	64	23	10	<10	34	11	22	<1	~~440~~	420
	1/9/98	10:44	**SF**											<10	<10	21	<2	7	<1	~~400~~	
	1/29/98	6:23	**5.41**	5	1100	22	7.8	13	<0.5	3.0	0.73	96	30	<1	<10	34	12	11	<1	~~64~~	300
	1/29/98	7:23	**SF**											<1	<10	24	2	7.0	<1	~~<10~~	

First Flush Data

	PERIOD		Vol. ac-ft	No. samp	EC	Turb	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd ug/L	Cr ug/L	Cu ug/L	Pb ug/L	Ni ug/L	Ag ug/L	Zn ug/L	Hardness mg/L
EGWC05	2/14/98	8:53	**20.61**	5	910	64	7.7	16	<0.5	2.6	1.0	180	39	<1	7.7	36	19	9	<1	87	240
	2/14/98	9:53	**SF**											<1	4	20	7	5	<1	42	
	5/12/98	14:29	**6.43**	5	1310	12	8.2	22	<0.05	2.8	0	60	32	<0.5	6	32	6	<4	<2	57	376
	5/12/98	15:29	**SF**											<0.5	5	26	<2	<4	<2	32	
	11/8/98	3:00	**35.56**	5	1400	22	7.9	11.0	0.4	4.4	0.9	120	80	<1	11	34	8	9	<2	176	385
	11/8/98	4:00	**SF**											<1	<8	19	<2	8	<2	105	
	3/11/99	10:41	**0.94**	5	1180	11	8.1	9.6	0.1	1.8	1.5	26	24	<1	<8	28	6	6	<2	88	365
	3/11/99	11:41	**SF**											<1	<8	22	<2	5	<2	57	
	3/15/99	10:09	**33.93**	5	205	35	7.5	4.8	0.5	4.3	1.0	390	140	1	16	65	60	13	<2	368	112
	3/15/99	11:09	**SF**											<1	<8	7	<2	<4	<2	20	
	3/20/99	7:06	**1.67**	5	1250	5	7.9	8.0	<0.05	1.6	0.2	4	<1	<1	<8	32	4	5	<2	60	366
	3/20/99	8:06	**SF**											1	<8	29	3	7	<2	55	
	3/25/99	11:33	**5.82**	5	955	23	7.8	4.7	<0.05	2.4	0.5	78	30	<1	<8	27	10	8	<2	105	316
	3/25/99	12:33	**SF**											<1	<8	17	<2	5	<2	36	

First Flush Data

	PERIOD		Vol. ac-ft	No. samp	EC	Turb	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd ug/L	Cr ug/L	Cu ug/L	Pb ug/L	Ni ug/L	Ag ug/L	Zn ug/L	Hardness mg/L
WMCC04	12/12/95	21:19	**5.70**	4	740	590.0	7.3	25.0	2.90	26.00	13.00	2100	380	3	32	480	140	55	1	1100	185
	12/12/95	22:19																			
	1/16/96	16:36	**1.74**	5	1100	45.0	7.7	27.0	1.30	10.00	2.40	160	59	10	<10	84	24	15	3.4	280	304
	1/16/96	17:36																			
	1/19/96	05:07	**1.36**	5	910	25.0	8.0	25.0	0.82	4.30	0.90	56	29	<1	<10	39	9	6	<1	140	258
	1/19/96	06:07																			
	1/31/96	01:46	**2.83**	5	930	12.0	8.0	14.0	0.33	2.30	0.77	38	16	<1	13	41	10	7	<1	110	258
	1/31/96	02:46																			
	3/4/96	11:35	**2.63**	5	1100	56.0	8.2	14.0	0.46	2.00	0.78	67	23	<1	<10	34	14	24	<1	130	258
	3/4/96	12:35																			
	10/30/96	5:00	**77.83**	5	550	270.0	7.1	13.0	1.50	8.20	4.00	520	110	2	21	83	50	31	<1	530	170
	10/30/96	13:00	**SF**											<1	<10	23	<2	14	<1	150	
	11/21/96	7:04	**4.80**	5	250	160.0	7.4	6.2	0.59	4.80	2.40	260	42	1	18	83	41	14	<1	290	94
	11/21/96	8:04																			
	12/9/96	14:00	**9.64**	5										2	35	85	88	30	1	420	66
	12/9/96	15:00																			
	12/27/96	10:00	**0.64**	5	960	140.0	7.9	15.0	0.27	2.40	0.61	58	15	<1	<10	23	8	5	1.1	130	320
	12/27/96	11:00																			
	9/25/97	9:32	**1.57**	5	930	240	7.0	9.5	3	21.0	5	510	120	2	16	89	44	29	2	720	330
	9/25/97	10:32	**SF**											<1	<10	32	5	37	<1	340	
	11/10/97	11:24	**0.54**	5				25.0						<1	<10	56	17	20	<1	410	240
	11/10/97	12:24	**SF**																		
	12/18/97	12:25	**24.94**	5	510	130	7.7	8.5	0.6	3.1	1.7	640	170	<1	20	39	59	10	<1	270	134
	12/18/97	13:25	**SF**											<1	<10	16	<2	<4	<1	22	

First Flush Data

	PERIOD		Vol. ac-ft	No. samp	EC	Turb	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd ug/L	Cr ug/L	Cu ug/L	Pb ug/L	Ni ug/L	Ag ug/L	Zn ug/L	Hardness mg/L
WMCC04	1/29/98	7:04	**15.66**	5	390	10	7.4	12.0	1.2	5.0	1.3	98	43	<1	<10	46	13	9	<1	~~150~~	114
	1/29/98	8:04	**SF**											<1	<10	28	<2	7	<1	~~22~~	
	5/12/98	12:25	**0.76**	5	1660	3.1	8.3	20.0	<0.05	~~3.2~~	0	68	36	<1	<4	17	<2	<4	<2	35	440
	5/12/98	13:25	**SF**											1	5	15	<2	<4	<2	31	
	3/11/99	10:28	**2.42**	5	1130	23	8.3	19.6	0.7	3.7	0.5	80	40	<1	<8	76	17	8	<2	210	328
	3/11/99	11:28	**SF**											<1	<8	42	4	5	<2	98	
	3/20/99	6:14	**0.38**	5	1010	5	7.7	14.9	0.3	2.2	0.6	22	15	<1	<8	36	4	5	<2	87	300
	3/20/99	7:14	**SF**											<1	<8	31	<2	7	<2	67	
	3/25/99	11:45	**9.38**	5	525	23	7.7	6.5	0.4	3.9	1.4	170	62	<1	9	50	25	9	<2	227	140
	3/25/99	12:45	**SF**											<1	<8	19	<2	<4	<2	32	

First Flush Data

	PERIOD		Vol. ac-ft	No. samp	EC	Turb	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd ug/L	Cr ug/L	Cu ug/L	Pb ug/L	Ni ug/L	Ag ug/L	Zn ug/L	Hardness mg/L
SADF01	10/30/96	7:40	**9.32**	5	770	1200.0	7.0	18.0	2.00	15.00	9.20	2100	260	5	83	130	190	73	1	1300	270
	10/30/96	8:40	**SF**											<1	<10	11	<2	19	<1	130	
	11/21/96	8:35	**8.32**	5	530	360.0	7.3	8.8	1.10	6.80	3.80	670	78	<1	30	97	11	20	<1	360	194
	11/21/96	9:35																			
	12/9/96	16:30	**33.47**	5	130	300.0	7.5	2.1	0.11	1.90	1.90	210	24	<1	19	48	54	13	<1	280	50
	12/9/96	17:30																			
	1/1/97	11:00	**0.26**	5	740	98.0	7.5	5.8	0.50	1.60	0.69	140	45	1	<10	45	38	18	<1	240	224
	1/1/97	12:00																			
	9/25/97	11:33	**34.55**	5	500	1500	7.3	3	1.1	16.0	9.4	2100	330	<1	54	310	260	67	<1	1400	160
	9/25/97	12:33	**SF**											1.5	<10	56	45	23	<1	260	
	11/10/97	8:17	**0.25**	5				45						2	<10	74	19	27	<1	440	610
	11/10/97	9:17																			
	11/26/97	9:39	**3.27**	5	270	730	8.5	6	1.1	7.3	4.8	1100	910	3	53	180	230	38	<1		70
	11/26/97	10:39	**SF**											<1	<10	11	<2	<4	<1	37	
	12/6/97	4:06	**279.27**	5	110	250	8.1	2	0.3	2.4	~~2~~	410	360	<1	12	42	43	15	<1	~~240~~	35
	12/6/97	5:06	**SF**											<1	<10	13	9.0	<4	<1	~~70~~	
	1/3/98	3:18	**0.60**	5				11	1.3	4.7	1.0	57		<1	<10	75	18	10	<1	180	256
	1/3/98	4:18	**SF**											<1	<10	53	6	8	<1	110	
	1/9/98	5:19	**0.12**	5				18	<0.5	0.85	<0.2			<10	<10	25	<2	13	<1	~~83~~	870
	1/9/98	6:19	**SF**											<10	<10	23	<2	8.0	<1	~~110~~	
	2/14/98	8:58	**19.50**	5	500	85	7.4	8.4	<0.5		8.6	190	33	<1	12	38	22	7	<1	195	110
	2/14/98	9:58	**SF**											<1	2	18	2	4	<1	297	
	2/19/98	20:07	**16.64**	5	670	75	7.7	11.5	<0.5	3.3	0.9			<1	16	37	35	10	<1	145	176
	2/19/98	21:07	**SF**											<1	3	15	5.20	3	<1	31	
	11/8/98	2:41	**15.67**	5	835	80	7.0	9.2	1.7	12.2	4.6	500	240	3	16	99	48	21	<2	850	230
	11/8/98	3:41	**SF**											<1	<8	24	4	13	<2	326	
	2/4/99	19:13	**0.30**	5	1810	15	7.9	16.7	0.5	2.3	0.5	29	19	<1	<8	23	6	<4	<2	117	600
	2/4/99	20:13	**SF**											<1	<8	17	4	<4	<2	90	

First Flush Data

	PERIOD		Vol. ac-ft	No. samp	EC	Turb	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd ug/L	Cr ug/L	Cu ug/L	Pb ug/L	Ni ug/L	Ag ug/L	Zn ug/L	Hardness mg/L
SADF01	2/9/99	17:00	**0.69**	4	1050	28	7.8	10.6	0.3	2.6	0.6	120	40	<1	<8	38.8	25	8.44	<2	223	340
	2/9/99	17:45	**SF**											<1	<8	17	<2	5.4	<2	81.2	
	3/15/99	8:32	**0.54**	5	780	28	7.5	9.2	0.8	3.5	0.6	130	46	1	10	56	24	7	<2	299	220
	3/15/99	9:32	**SF**											<1	<8	27	<2	<4	<2	120	
	3/25/99	12:02	**5.48**	5	595	26	7.3	6.6	0.7	3.8	0.7	120	14	1	<8	59	21	10	<2	375	195
	3/25/99	13:02	**SF**											<1	<8	25	3	7	<2	163	
	4/6/99	13:07	**3.55**	5	1050	62	7.5	11.9	1.1	7.4	0.5	110	50	1	<8	68	14	8	<2	384	372
	4/6/99	14:07																			

First Flush Data

	PERIOD		Vol. ac-ft	No. samp	EC	Turb	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd ug/L	Cr ug/L	Cu ug/L	Pb ug/L	Ni ug/L	Ag ug/L	Zn ug/L	Hardness mg/L
BCF04	9/25/97	10:15	ST	5	2400	190	7.3	10.0	0	4.5	2.5	280	72	<1	15	43	8	23	<1	110	590
	9/25/97	11:15	SF											<1	<10	30	3	14	<1	76	
	12/6/97	1:46	ST	5										<1	18	49	9	12	<1	~~110~~	265
	12/6/97	2:46	SF											<1	<10	150	<2	<4	<1	~~38~~	
	2/14/98	9:01	ST	5								330		<1	24	34	6	18	<1	43.0	410
	2/14/98	10:01	SF											<1	2	18	<1	5	<1	8	
	2/19/98	22:20	ST	5	520	310	7.8	4.9	<0.5	1.6	1.5			<1	33	21	11	20	<1	55	124
	2/19/98	23:20	SF											<1	3	16	<1	3	<1	5.60	
	3/25/98	8:56	ST	5	490	2900	8.21	13.7	0.7	3.6	0.3	4720	353	<20	345	184	67	235	<20	659	330
	3/25/98	9:56	SF											1	4	9	<1	5	<1	14	
	11/8/98	6:40	ST	5	805	320	7.6	5.3	0.2	4.9	5.2	920	160	2	70	55	18	47	<2	172	190
	11/8/98	7:40	SF											<1	34	28	7	23	<2	76	
	11/28/98	6:27	ST	5	1030	320	7.7	5.7	0.1	4.6	4.0	850	130	2	47	41	16	32	<2	164	248
	11/28/98	7:27	SF											<1	<8	9	<2	5	2	<10	
	1/25/99	9:31	ST	5	650	116	8.0	4.6	0.1	1.6	1.9	300	100	<1	21	32	6	17	<2	67	168
	1/25/99	10:31	SF											<1	<8	12	<2	5	<2	18	
	4/6/99	13:09	ST	5	1470	436	8.0	3.9	0.3	3.1	2.5	580	120	<1	41	43	11	29	<2	118	250
	4/6/99	14:09	SF											<1	<8	17	<2	<4	<2	<10	

First Flush Data

	PERIOD		Vol. ac-ft	No. samp	EC	Turb	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd ug/L	Cr ug/L	Cu ug/L	Pb ug/L	Ni ug/L	Ag ug/L	Zn ug/L	Hardness mg/L
SDMF05	9/25/97	10:53	**21.94**	5	2500	120	7.6	35	<0.1	5.1	3	290	75	2	<10	24	8	12	<1	180	632
	9/25/97	11:53	**SF**											1	<10	16	3	6	<1	110	
	11/26/97	11:23	**170.80**	5	670	1600	8.1	11	1	9.4	8	2200	1900	8	72	150	97	46	<1	850	122
	11/26/97	12:23	**SF**											<1	<10	6	<2	<4	<1	44	
	12/6/97	4:25	**680.23**	5	280	1200	7.8	4	0	6.1	~~7~~	2000	1800	5	75	98	63	66	<1	~~510~~	85
	12/6/97	5:25	**SF**											<1	<10	14	6	5	<1	~~72~~	
	12/18/97	15:04	**159.02**	5	1600	240	7.9	41	<0.5	2.2	2.0	430	51	<1	<10	27	13	14	<1	110	460
	12/18/97	16:04	**SF**											<1	<10	11	<2	<4	<1	25	
	1/3/98	6:46	**2.23**	5	3000	18	8.2	81	<0.5	1.0	0	26	9	<1	<10	18	3	<4	<1	15	694
	1/3/98	7:46	**SF**											<1	<10	16	<2	<4	<1	<10	
	1/9/98	15:31	**4.73**	5	3100	15	8.4	570	<0.5	1.2	0	28	11	<10	<10	18	1	4	<1	~~52~~	800
	1/9/98	16:31	**SF**											<10	<10	13	<2	<4	<1	~~64~~	
	2/3/98	8:34	**254.82**	5										4	41	58	29	40	<1	170	
	2/3/98	9:34																			
	2/14/98	10:12	**58.73**	5	2000	160	8.0	53	<0.5	1.6	2	370	42	<1	12	25	11	9	<1	77	510
	2/14/98	11:12	**SF**											<1	2	12	1	6	<1	14	
	2/19/98	20:46	**72.67**	5	2200	59	8.0	53	<0.5	1.0	2			<1	8	16	6	6	<1	23	640
	2/19/98	21:46	**SF**											<1	2	11.0	2	3	<1	9	
	3/25/98	8:02	**7.22**	5	2460	21	7.84	41	<0.1	<1.0	0.3	3090	21	<1	6	29	4	5	4	57	590
	3/25/98	9:02	**SF**											<1	4	28	2	5	1	75.0	
	5/12/98	15:25	**21.32**	5	1690	39	8.1	37	<0.05	~~2.7~~	~~1.2~~	200	40	<0.50	12	24	5	4	<2	45	460
	5/12/98	16:25	**SF**											<0.50	7	15	<2.00	<4.00	<2	14	
	11/8/98	4:59	**86.18**	5	2220	48	8.1	44.0	0.5	2.8	1.5	150	70	<1	11	20	5	8	<2	55	600
	11/8/98	5:59	**SF**											<1	<8	10	<2	6	<2	15	

First Flush Data

	PERIOD		Vol. ac-ft	No. samp	EC	Turb	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd ug/L	Cr ug/L	Cu ug/L	Pb ug/L	Ni ug/L	Ag ug/L	Zn ug/L	Hardness mg/L
SDMF05	11/28/98	6:12	**25.53**	5										<1	9	20	4	6	<2	47	820
	11/28/98	7:12	**SF**											<1	<8	14	<2	5	<2	23	
	1/25/99	5:15	**5.76**	5	2520	21	8.3	58.1	0.2	1.4	1.0	80	20	<1	<8	29	3	4	<2	26	700
	1/25/99	6:15	**SF**											<1	<8	19	<2	5	<2	11	
	2/4/99	20:31	**3.06**	5	2490	16	8.3	48.4	<0.05	1.6	0.7	43	13	<1	<8	20	<2	<4	<2	17	700
	2/4/99	21:31	**SF**											<1	<8	14	<2	<4	<2	11	
	2/9/99	19:16	**3.62**	5	2460	23	8.5	48.4	<0.05	2.0	0.5	64	22	<1	<8	23	<2	6	<2	30	686
	2/9/99	20:16	**SF**																		
	3/11/99	13:09	**2.53**	5	2560	14	8.4	56.8	0.1	1.3	0.2	36	12	<1	<8	35	2	<4	<2	31	660
	3/11/99	14:09	**SF**											<1	<8	27	<2	<4	<2	17	
	3/15/99	10:10	**3.67**	5	2380	13	8.2	65.6	0.3	1.5	0.4	44	16	<1	10	27	3	<4	<2	39	1875
	3/15/99	11:10	**SF**											<1	<8	11	<2	<4	<2	12	
	4/6/99	15:07	**12.00**	5	2810	27	8.5	48.0	0.1	1.5	0.3	45	15	<1	<8	23	2	<4	<2	40	746
	4/6/99	16:07																			

First Flush Data

	PERIOD		Vol. ac-ft	No. samp	EC	Turb	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd ug/L	Cr ug/L	Cu ug/L	Pb ug/L	Ni ug/L	Ag ug/L	Zn ug/L	Hardness mg/L
LANF08	11/21/96	9:23	**3.26**	4	410	110	7.1	6.0	0.68	3.4	1.40	130	28	2	<10	78	32	19	<1	260	112
	11/21/96	10:23																			
	12/9/96	12:55	**4.15**	5	1800	180	7.6	16.0	0.30	3.9	1.80	320	51	1	12	48	21	10	<1	300	474
	12/9/96	13:52																			
	1/1/97	22:12	**2.20**	5	1900	64	7.6	14.0	0.39	1.9	0.51	81	20	<1	<10	38	7	6	<1	120	504
	1/1/97	23:12																			
	1/21/97	20:42	**ST**	2				48.0	<0.1	1.1	0.66			1.2	<10	33	3.9	5.9	<1	<10	1850
	1/21/97	21:42																			
	2/11/97	0:41	**ST**	5	3000	98	7.8	37.0	1.0	4.3	1.0	120	32	1.2	<10	40	5.1	9.8	1.0	170	940
	2/11/97	1:41																			
	11/10/97	8:47	**19.85**	4				40.0													1350
	11/10/97	9:32												<1	<10	73	4	18	<1	250	
	11/26/97	9:36	**2.11**	5	1400	630	8.2	8.7	0	5.0	4	1100	910	3	38	150	100	43	<1	640	304
	11/26/97	10:36	**SF**											<1	<10	14	<2	<4	<1	42	
	12/6/97	3:59	**ST**	5	460	200	7.7	4.2	0	2.8	2	310	260	1	10	5	35	16	3	260	90
	12/6/97	4:59	**SF**											<1	<10	6	<2	<4	<1	45	
	12/18/97	13:43	**ST**	5	1400	360	7.4	14.0	0.70	5.6	3	660	100	3	29	94	44	22	<1	420	328
	12/18/97	14:43	**SF**											<1	<10	20	<2	4.0	<1	36	
	1/9/98	17:37	**ST**	5	320	250	7.7	2.0	0.50	3.2	2	800	110	<10	28	80	59	25	<1	470	70
	1/9/98	18:37	**SF**											<10	<10	10	<2	5	<1	84	
	2/14/98	9:09	**3.32**	5	2000	50	7.7	20.4	<0.5	1.9	1	180	32	1	10	38	17	9	1.40	91	420
	2/14/98	10:09	**SF**											<1	4	15	2	5	<1	24	
	2/19/98	12:30	**0.66**	5	4800	2.1	8.1	34.6	<0.5	<1	10			<1	4	17	4	5	<1	30	>1500
	2/19/98	13:30	**SF**											<1	4	15	2	6.40	<1	22	
	3/25/98	5:44	**1.37**	5	2940	42	7.6	30.6	0.5	1.5	<0.1	143	34	1	17	70	15	9	<1	157	775
	3/25/98	6:44	**SF**											<1	15	59	2	8.80	<1	119	

First Flush Data

	PERIOD		Vol. ac-ft	No. samp	EC	Turb	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd ug/L	Cr ug/L	Cu ug/L	Pb ug/L	Ni ug/L	Ag ug/L	Zn ug/L	Hardness mg/L
LANF08	11/8/98	2:50	**0.29**	3	1940	150	7.3	19.0	1.0	16.6	5.8	700	260	3	33	119	42	28	<2	698	435
	11/8/98	3:20	**SF**											<1	<8	22	<2	14	<2	95	
	11/28/98	4:50	**1.19**	5										2	21	77	29	20	<2	406	434
	11/28/98	5:50	**SF**											2	<8	25	<2	9	<2	73	
	1/25/99	3:23	**0.73**	5										2	11	62	15	9	27	199	280
	1/25/99	4:23	**SF**											<1	<8	21	<2	4	<2	40	
	2/4/99	18:24	**0.55**	5	3630	28	8.1	17.2	0.2	2.4	0.4	70	12	1	9	32	6	<4	<2	110	1020
	2/4/99	19:24	**SF**											<1	<8	18	<2	<4	<2	55	
	2/9/99	17:09	**0.86**	5	1490	26	7.5	14.5	0.2	3.3	0.7	230	100	1	12	106	19	11	<2	316	470
	2/9/99	18:09	**SF**											<1	<8	19	2	6	<2	76	
	3/11/99	10:40	**0.63**	5				25.6	0.7	3.3	0.9			1	10	77	12	10	<2	220	752
	3/11/99	11:40																			
	3/15/99	9:35	**2.84**	5	1380	68	7.5	18.3	0.4	3.7	0.7	280	90	2	20	64	31	10	<2	264	430
	3/15/99	10:35	**SF**											<1	<8	15	<2	<4	<2	48	
	3/25/99	12:09	**0.55**	5	2070	68	7.5	24.9	0.5	4.5	1.3	380	92	2	18	72	30	17	<2	370	476
	3/25/99	13:09	**SF**											<1	<8	14	<2	6	<2	33	

First Flush Data

	PERIOD		Vol. ac-ft	No. samp	EC	Turb	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd ug/L	Cr ug/L	Cu ug/L	Pb ug/L	Ni ug/L	Ag ug/L	Zn ug/L	Hardness mg/L
CMCG02	1/31/96	02:29	**1.85**	5	100	61.0	7.1	2.7	0.48	3.20	1.40	50	25	2	12	34	<2	11	<1	210	30
	1/31/96	03:29																			
	10/30/96	5:45	**ST**	2										15	110	410	500	130	24	5800	330
	10/30/96	6:00																			
	11/21/96	8:05	**0.05**	5	170	42.0	6.7	9.6	0.64	3.8	1.90	39	23	<1	<10	79	18	16	<1	280	50
	11/21/96	9:05																			
	12/9/96	12:24	**0.86**	5	350	72.0	6.7	5.8	0.37	3.6	2.00	89	41	<1	<10	64	34	12	<1	320	90
	12/9/96	13:24																			
	1/1/97	15:21	**0.02**	5	410	140.0	7.0	0.7	0.99	3.6	2.00	100	51	<1	11	49	31	15	<1	480	90
	1/1/97	16:21																			
	1/21/97	20:49	**9.60**	5	320	68.0	7.3	2.1	0.66	<0.5	0.21	130	49	<1	<10	31	28	6	<1	140	144
	1/21/97	21:49																			
	9/25/97	11:56	**ST**	5	110	60.0	6.9	7.4	0.2	2.6	1.80	74	40	1	10	44	25	8	<1	270	50
	9/25/97	12:56	**SF**											2	<10	34	53	6	<1	400	
	11/10/97	8:58	**0.22**	5				34.0													406
	11/10/97	9:58	**SF**											<1	<10	49	7	23	<1	320	
	12/18/97	12:06	**ST**	5	290	100.0	6.8	6.1	0.60	4.8	2.20	140	61	<1	10	75	31	11	<1	310	64
	12/18/97	13:06	**SF**											<1	<10	30	2	6	<1	130	
	1/3/98	3:41	**ST**	5	190	40.0	6.3	7.8	0.7	3.8	1.90	57	32	<1	<10	53	14	7	<1	170	60
	1/3/98	4:41	**SF**											<1	<10	39	2	7	<1	100	
	2/6/98	9:56	**2.04**	5	350	22.0	6.8	4.4	<0.5	2.4	0.98	65	31	<1	5	35	15	6	<1	90	68
	2/6/98	10:56	**SF**											<1	5	24	6	5	<1	55	
	2/14/98	8:47	**4.84**	5	200	22.0	7.0	5.3	<0.5	1.3	0.82	49	21	<1	5	30	19	5	<1	90	50
	2/14/98	9:47	**SF**											<1	2	31	1	2	<1	26.0	
	3/25/98	4:54	**2.04**	5	532	52.0	7.5	11	0.2	2.5	0.90	109	40	2	9	67	25	12	<1	256	90
	3/25/98	5:54	**SF**											<1	3	31	3	9	<1	123	
	9/4/98	8:58	**0.17**	5	885	16.0	7.0	15	1	22.0	4.59	240	130	2	13	116	25	32	<2	584	250
	9/4/98	9:58	**SF**											<1	12	63	10	31	<2	513	

First Flush Data

	PERIOD		Vol. ac-ft	No. samp	EC	Turb	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd ug/L	Cr ug/L	Cu ug/L	Pb ug/L	Ni ug/L	Ag ug/L	Zn ug/L	Hardness mg/L
CMCG02	11/7/98	22:47	**0.10**	5	1340	14.0	7.9	<1.3	0.1	4.5	5.81	80	40	<1	<8	29	5	6	<2	327	295
	11/7/98	23:47	**SF**											<1	<8	18	<2	4	<2	211	
	11/28/98	4:49	**8.38**	5	205	22.0	6.9	4.8	0.1	4.8	1.87	180	82	1	11	76	37	12	<2	362	60
	11/28/98	5:49	**SF**											<1	<8	28	<2	7	<2	91	
	1/25/99	3:34	**0.04**	5	160	19.0	6.8	3.4	1	3.6	2.75	140	74	<1	9	70	19	10	<2	240	60
	1/25/99	4:34	**SF**											<1	<8	30	<2	7	<2	76	
	2/4/99	18:07	**0.39**	5	250	32.0	7.4	7.5	1	3.6	1.59	72	26	<1	10	50	14	9	<2	228	75
	2/4/99	19:07	**SF**											<1	<8	38	2	7	<2	128	
	2/9/99	16:04	**0.67**	5	260	24.0	7.4	5.7	0.3	4.5	1.71	100	48	<1	9	87	22	14	<2	327	86
	2/9/99	17:04																			
	3/11/99	11:18	**1.16**	5	410	27.0	7.4	5.0	1	5.0	0.58	78	48	1	11	87	18	14	<2	294	110
	3/11/99	12:18																			
	3/25/99	11:26	**5.81**	5	185	30.0	6.6	2.7	0.4	4.0	1.99	200	36	<1	9	62	22	12	<2	368	48
	3/25/99	12:26	**SF**											<1	<8	25	<2	7	<2	134	

First Flush Data

	PERIOD		Vol. ac-ft	No. samp	EC	Turb	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd ug/L	Cr ug/L	Cu ug/L	Pb ug/L	Ni ug/L	Ag ug/L	Zn ug/L	Hardness mg/L
BARSED	12/12/95	22:48	**1.43**	5	1800	1100.0	7.4	42.0	1.80	20.00	10	1300	200	7.1	58	150	60	63	<1	640	130
	12/12/95	23:48																			
	1/19/96	06:18	**5.44**	5	1300	220.0	7.8	48.0	0.58	4.50	2.30	380	69	1	16	46	13	13	<1	140	366
	1/19/96	07:18																			
	1/31/96	03:51	**1.02**	5	1300	360.0	8.1	33.0	0.20	6.90	2.60	470	71	1	25	49	16	17	1.6	130	354
	1/31/96	04:51																			
	2/19/96	20:47	**1.87**	5	2000	130.0	7.8	65.0	0.72	5.00	1.60	210	16	<1	<10	26	6	8	<1	91	536
	2/19/96	21:47																			
	10/30/96	9:55	**3.17**	6										6	68	170	58	63	2	690	380
	10/30/96	11:10	**SF**											<1	<10	14	2	9	<1	48	
	11/21/96	9:59	**4.37**	5	540	530.0	7.6	19.0	1.10	5.80	3.90	970	95	1	38	76	23	27	<1	240	200
	11/21/96	10:59																			
	12/9/96	14:43	**9.17**	4	700	1100.0	7.6	19.0	0.33	5.70	5.90	1800	180	5	55	71	46	41	<1	400	206
	12/9/96	15:28																			
	2/11/97	0:54	**ST**	5	2000	1000.0	8.0	74.0	0.85	9.80	4.70			4	30	83	17	32	1	190	490
	2/11/97	1:54																			
	11/10/97	9:25	**1.07**	5				50													550
	11/10/97	10:25	**SF**											<1	<10	48	20	15	<1	280	
	11/26/97	9:30	**19.68**	5	1500	1000	7.9	39	0.3	6.1	6.0	1600	1300	3	53	96	50	39	<1	550	314
	11/26/97	10:30	**SF**											<1	<10	8	<2	<4	<1	43	
	12/6/97	3:37	**175.08**	5	240	760	7.9	5	0.4	4.7	6	1200	1000	3	44	67	38	35	<1	410	50
	12/6/97	4:37	**SF**											<1	<10	7	<2	<4	<1	39	
	12/18/97	14:58	**1.32**	5	490	940	7.5	13	0.6	5.3	5	1700	190	3	42	93	43	35	<1	380	144
	12/18/97	15:58	**SF**											<1	<10	16	<2	<4	<1	<10	
	1/9/98	13:38	**1.69**	5	1700	140	8.0	19	<0.5	2.8	1	210	44	<10	<10	44	11	9.0	<1	280	500
	1/9/98	14:38	**SF**											<10	<10	13	<2	<4	<1	220	
	2/14/98	9:36	**4.79**	5	2000	300	8.0	53	<0.5	2.3	2	620	87	1	20	50	18	15	<1	86	440
	2/14/98	10:36	**SF**											<1.00	3	20	2	8	<1	7	

First Flush Data

	PERIOD		Vol. ac-ft	No. samp	EC	Turb	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd ug/L	Cr ug/L	Cu ug/L	Pb ug/L	Ni ug/L	Ag ug/L	Zn ug/L	Hardness mg/L
BARSED	3/25/98	9:22	**23.73**	5	442	470	7.79	16	0.2	3.3	1	1390	104	3	26	76	37	22.0	4.60	178	140
	3/25/98	10:22	**SF**											<1.00	4	36	1	4.50	<1	39	
	11/8/98	3:23	**7.68**	5	1120	200	7.5	25	0.4	9.6	6	880	260	2	27	57	32	20	<2	280	290
	11/8/98	4:23	**SF**											1	14	30	13	11	<2	123	
	11/28/98	5:30	**29.15**	5	605	260	7.9	10	0.1	3.7	6	1020	170	3	29	63	53	21	<2	386	182
	11/28/98	6:30	**SF**											<1	<8	12	<2	<4	<2	11	
	1/25/99	4:00	**11.62**	5	1010	140	8.0	34	0.1	3.6	3	390	50								
	1/25/99	5:00	**S**																		
	2/9/99	17:04	**0.84**	5	1260	240	8.0	38	0.1	3.6	2	390	132	1	16	42	29	14	<2	183	470
	2/9/99	18:04	**SF**											<1	<8	12	<2	4	<2	17	
	3/11/99	10:02	**0.84**	5	1590	340	8.2	29	0.1	6.2	4	720	200	3	32	89	55	25	<2	481	444
	3/11/99	11:02	**SF**											<1	<8	19	<2	<4	<2	15	
	3/15/99	10:36	**12.69**	5	630	350	7.7	25	1.2	9.9	3	1410	220	4	37	79	36	25	<2	374	205
	3/15/99	11:36	**SF**											<1	8	16	4	5	<2	69	

First Flush Data

	PERIOD		Vol. ac-ft	No. samp	EC	Turb	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd ug/L	Cr ug/L	Cu ug/L	Pb ug/L	Ni ug/L	Ag ug/L	Zn ug/L	Hardness mg/L
WYLSED	3/4/96	16:40	**5.17**	5	1500	50.0	8.4	41.0	0.17	2.00	0.75	64	16	<1	<10	19	<2	7	<1	35	402
	3/4/96	17:40																			
	10/30/96	7:59	**0.35**	5	1400	160.0	7.2	78.0	2.20	11.00	3.20	340	90	1	<10	41	3	24	<1	340	400
	10/30/96	8:59	**SF**											<1	<10	20	<2	17	<1	180	
	11/21/96	10:12	**0.35**	5	1200	78.0	7.6	32.0	0.77	5.10	2.30	130	27	<1	<10	58	5	13	<1	81	344
	11/21/96	11:12																			
	12/9/96	13:18	**0.12**	5	1400	30.0	8.1	52.0	<0.1	1.50	0.56	13	9	<1	<10	24	<2	4	<1	48	440
	12/9/96	14:18																			
	1/22/97	0:18	**1.10**	5	1100	360.0	7.8	16.0	0.18	2.50	2.40	580	86	1	15	27	12	12	<1	48	295
	1/22/97	1:18																			
	2/11/97	1:55	**ST**	5	1300	31.0	7.8	38.0	<0.1	2.30	0.64	54	30	<1	<10	21	<2	6	<1	37	474
	2/11/97	2:55																			
	11/10/97	9:46	**18.46**	5				85													496
	11/10/97	10:46	**SF**											<1	<10	28	2	7	<1	120	
	11/26/97	9:40	**0.17**	5	740	250	8.1	30	0.4	3.9	3	540	460	<1	16	65	36	16	<1		190
	11/26/97	10:40	**SF**											<1	<10	16	<2	<4	<1	34	
	1/9/98	17:30	**29.58**	2				17	0.50	4.9	4.6			<10	33	59	24	29	<1	330	260
	1/9/98	18:30	**SF**											<10	<10	17	<2	5.4	<1	90	
	2/14/98	9:13	**1.20**	5	690	120	7.8	22	<0.5	2.4	2	500	46	<1	11	27	7	13	<1	64	190
	2/14/98	10:13	**SF**											<1	2	12	<1.00	12	<1	9	
	2/19/98	12:54	**1.80**	5	870	140	7.9	16	0.5	2.3	5			<1	10	26	6	8	<1	39	232
	2/19/98	13:54	**SF**											<1	8	18	1	7	<1	29	
	3/25/98	6:29	**0.55**	5	1410	30	7.62	52	0.2	<1.0	1	525	11	<1	4	20	2.80	7	<1	55	450
	3/25/98	7:29	**SF**											<1	3	18	1	8	<1	62	
	9/4/98	13:44	**0.17**	4	1290	475	7.5	36	0.8	8.2	2	1050	190	3	24	27	17	17	<2	494	400
	9/4/98	14:29	**SF**											1	13	19	5	11	<2	301	

First Flush Data

	PERIOD		Vol. ac-ft	No. samp	EC	Turb	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd ug/L	Cr ug/L	Cu ug/L	Pb ug/L	Ni ug/L	Ag ug/L	Zn ug/L	Hardness mg/L
WYLSED	1/25/99	6:16	**17.32**	5										8	88	276	47	75	<2	484	180
	1/25/99	7:16	**SF**											<1	<8	13	<2	7	<2	<10	
	2/4/99	21:26	**33.48**	6	540	650	7.9	11.4	0.3	4.1	5.51	1730	370	3.62	48.8	70.6	28.2	36.1	<2	256	164
	2/4/99	22:41	**SF**											<1	<8	10.1	<2	<4	<2	10.8	
	3/11/99	11:14	**1.07**	5	1270	60	8.2	38	0.5	2.7	1	160	28	<1	8	43	6	8	<2	100	460
	3/11/99	12:14	**SF**											<1	<8	21	<2	5	<2	19	
	3/15/99	9:12	**2.52**	5	910	78	7.7	31	0.3	2.8	1	440	110	1	14	35	8	10	<2	122	264
	3/15/99	10:12	**SF**											<1	<8	12	<2	5	<2	15	
	11/21/96	12:58	**ST**	5	2000	60.0	7.5	15.0	0.82	4.10	1.70	130	20	3	11	27	2	51	<1	71	760
	11/21/96	13:58	**SF**											6	<10	14	<2	39	<1	17	

First Flush Data

	PERIOD		Vol. ac-ft	No. samp	EC	Turb	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd ug/L	Cr ug/L	Cu ug/L	Pb ug/L	Ni ug/L	Ag ug/L	Zn ug/L	Hardness mg/L
ACJ01	11/8/98	4:59	ST	5										8	22	20	4	41	<2	153	880
	11/8/98	5:59	SF											<1	<8	7	<2	20	<2	36	
	2/9/99	18:18	ST	4	2520	36	8.3	7.0	0.1	1.7	1.1	110	18	5	11	24	3	42	<2	55	882
	2/9/99	19:18	SF											3	<8	14	<2	32	<2	16	
	3/25/99	13:27	ST	5	1840	136	7.8	159.0	0.2	3.1	2.7	380	40	11	32	47	8	58	<2	166	786
	3/25/99	14:27	SF											1	<8	11	<2	23	<2	12	
OSOL03	1/19/96	09:08	**0.83**	5	1900	65.0	8.1	9.0	0.49	3.10	1.10	100	22	3	<10	22	4	19	<1	58	712
	1/19/96	10:08																			
	1/31/96	02:58	**0.67**	5	2100	64.0	8.1	3.3	<0.10	4.20	1.20	92	16	3	<10	30	8	23	1.2	120	736
	1/31/96	03:58																			
	2/20/96	02:12	**2.13**	5	2400	29.0	7.7	3.1	<0.10	2.80	0.90	84	<20	2	<10	21	3	13	<1	57	846
	2/20/96	03:12																			
	10/30/96	6:46	**0.29**	5	1700	170.0	7.3	15.0	1.60	6.70	3.20	290	68	6	15	62	7	30	<1	510	604
	10/30/96	7:46	F											<1	<10	14	<2	18	<1	190	
	12/9/96	13:21	**0.27**	5	1800	51.0	8.0	5.8	0.18	1.80	0.94	72	19	2	<10	22	6	13	<1	110	700
	12/9/96	14:21																			
	3/25/98	6:00	ST	5	2760	20	7.65	8	0	1.8	<0.1	33	19								1080
	3/25/98	7:00	SF											2	3	14	2	26	<1	54	
	11/8/98	5:45	**50.52**	5	2250	200	7.6	8.4	0.4	6.8	6.1	960	180	10	40	59	47	33	<2	288	755
	11/8/98	6:45	SF											<1	<8	9	<2	10	<2	21	
	1/25/99	4:30	**26.05**	5	1680	130	7.7	5.5	0.2	4.0	2.7	730	150	8	19	35	20	28	<2	136	620
	1/25/99	5:30	SF											<1	<8	8	<2	12	<2	11	
	3/11/99	11:56	**0.41**	5	2710	28	8.4	3.5	<0.05	1.0	0.5	98	20	3	<8	23	4	16	<2	49	1048
	3/11/99	12:56	SF											2	<8	17	<2	13	<2	17	
	3/15/99	9:07	**5.28**	5	2240	80	8.1	2.8	0.1	2.1	0.5	300	40	6	12	29	8	15	<2	110	1300
	3/15/99	10:07	SF											1	<8	14	<2	7	<2	18	

First Flush Data

	PERIOD		Vol. ac-ft	No. samp	EC	Turb	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd ug/L	Cr ug/L	Cu ug/L	Pb ug/L	Ni ug/L	Ag ug/L	Zn ug/L	Hardness mg/L
LCWI02	12/12/95	21:41	**0.10**	5	970	800.0	7.4	19.0	2.00	32.00	21.00	2400	330	9	62	290	490	75	1.6	1300	195
	12/12/95	22:41																			
	1/19/96	06:02	**0.16**	5	530	65.0	7.8	6.2	0.31	2.50	1.30	85	16	<1	17	33	14	6	<1	94	150
	1/19/96	07:02																			
	2/20/96	02:21	**0.19**	5	720	170.0	7.6	3.0	0.20	3.20	1.80	210	42	<1	13	33	19	11	<1	110	196
	2/20/96	03:21																			
	10/30/96	5:51	**0.63**	5	1500	1300.0	7.3	24.0	3.40	25.00	15.00	2900	520	10	60	490	780	86	1	1600	448
	10/30/96	6:51	**SF**											<1	<10	32	13	19	<1	130	
	11/21/96	11:07	**0.11**	5	510	170.0	7.4	6.2	0.72	5.20	3.30	300	76	<1	17	100	28	17	<1	330	162
	11/21/96	12:07																			
	12/9/96	13:21	**0.14**	5	530	420.0	7.5	5.4	0.23	3.10	2.10	280	59	<1	18	45	33	15	<1	190	150
	12/9/96	14:21																			
	3/11/99	13:19	**0.04**	5	980	230	8.6	4.1	0.1	2.3	0.4	170	26	1	50	54	31	35	<2	153	320
	3/11/99	14:19	**SF**											<1	<8	16	<2	<4	<2	<10	
	3/15/99	10:05	**0.04**	5	600	170	8.1	4.7	0.2	2.2	1.1	680	90	<1	42	56	23	31	<2	130	185
	3/15/99	10:19	**SF**											<1	<8	15	<2	<4	<2	<10	

First Flush Data

	PERIOD		Vol. ac-ft	No. samp	EC	Turb	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd ug/L	Cr ug/L	Cu ug/L	Pb ug/L	Ni ug/L	Ag ug/L	Zn ug/L	Hardness mg/L
PDCM01	10/30/96	7:17	ST	5	1800	1400.0	7.1	30.0	4.90	21.00	19.00	5800	580	120	250	80	49	630	3	2100	550
	10/30/96	8:17	SF											2	<10	17	<2	93	<1	72	
	11/21/96	13:52	ST	5	350	200.0	7.2	3.2	0.44	2.80	2.70	570	56	3	32	43	16	32	<1	180	118
	11/21/96	14:52																			
	2/14/98	9:36	ST	5	940	200	7.2	7.1	<0.5	2.2	2	730	69	5	30	40	15	43	<1	89	200
	2/14/98	10:36	SF											1	3	11	1	19	<1	15	
	3/25/98	6:14	ST	5	943	180	7.38	8.9	0.2	2.2	<0.1	7430	46	7	27	31	12.0	48	<1	110	290
	3/25/98	7:14	SF											2	3	15.0	2	26	<1	58.0	
	11/8/98	5:51	ST	5	435	95	7.3	4.2	0.4	2	3.4	470	90	6	28	32	10	32	<2	195	110
	11/8/98	6:51	SF											<1	<8	10	<2	11	<2	24	
	11/28/98	5:08	ST	5										6	31	37	12	35	<2	209	160
	11/28/98	6:08	SF											<1	<8	10	<2	10	<2	19	
	2/9/99	17:32	ST	5	850	190	7.4	3.2	0.3	4.6	2.9	150	18	10	39	52	20	56	<2	329	264
	2/9/99	18:32	SF											<1	<8	6	<2	14	<2	20	
	3/11/99	11:27	ST	5	1520	130	7.7	6.1	0.7	1.9	1.9	100	30	21	26	70	18	81	<2	433	464
	3/11/99	12:27	SF											1	<8	15	<2	28	<2	31	
	3/25/99	11:59	ST	5	1490	112	7.4	6.1	0.7	6.5	4.1	510	420	14	26	90	19	70	<2	444	394
	3/25/99	12:59	SF											3	<8	23	<2	30	<2	35	
	4/7/99	2:16	ST	5	3350	194	7.9	6.1	0.3	1.9	0.9	500	110	9	21	30	6	67	<2	165	952
	4/7/99	3:16																			

First Flush Data

	PERIOD		Vol. ac-ft	No. samp	EC	Turb	pH	NO3 mg/L	NH3 mg/L	TKN mg/L	PO4 mg/L	TSS mg/L	VSS mg/L	Cd ug/L	Cr ug/L	Cu ug/L	Pb ug/L	Ni ug/L	Ag ug/L	Zn ug/L	Hardness mg/L
SDCM02	11/21/96	12:37	ST	5	2200	350.0	7.5	9.8	1.30	9.70	5.20	660	140	7	26	110	80	58	<1	700	440
	11/21/96	13:37																			
	3/25/98	6:12	ST	5	2860	140	7.38	12.8	0.2	5.5	<0.1	2620	81	17	10.0	36	19	105	<1	175	865
	3/25/98	7:12	SF											3.40	3	28	2	59.0	<1	53.0	
	3/11/99	10:58	ST	5	3740	68	8.5	5.0	0.3	2.3	1.5	250	60	10	12	71	24	60	<2	360	1080
	3/11/99	11:58	SF											2	<8	34	<2	30	<2	42	
	3/15/99	8:26	ST	5	2040	76	7.7	5.5	0.6	3.0	1.0	360	130	6	11	47	22	36	<2	285	688
	3/15/99	9:26	SF											2	<8	22	4	23	<2	79	
	4/6/99	13:41	ST	5	3080	122	7.9	4.8	0.6	6.1	1.4	280	130	6	10	52	19	44	<2	264	800
	4/6/99	14:41	SF											<1	<8	29	<2	19	<2	29	
	4/18/96	0:33	ST	5	2100	4.7	9.0	<0.2	0.57	1.10	1.30	25	13	2	<10	14	<2	23	<1	28	686
	4/18/96	1:33																			

Appendix 4.13:
Precipitation, Runoff and Tides during Harbors/Bays Sampling

Newport Bay Sampling during a March 1995 Storm

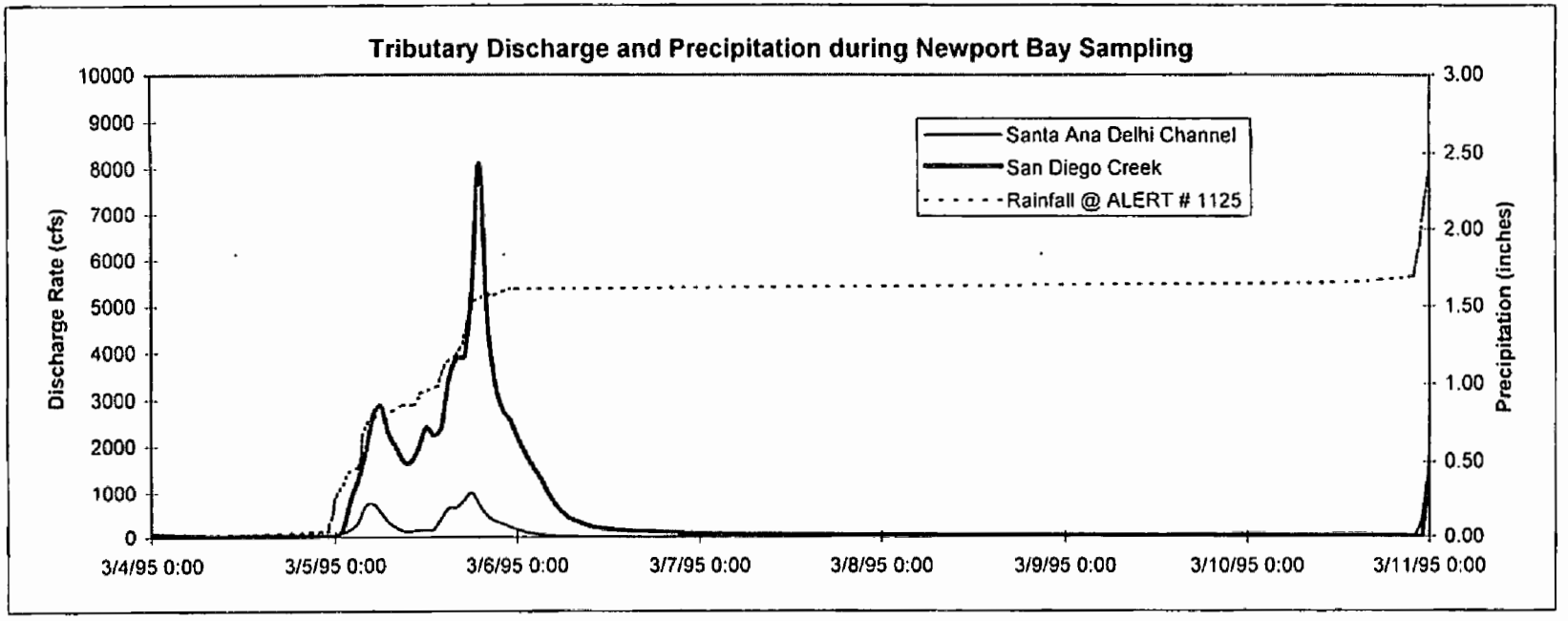

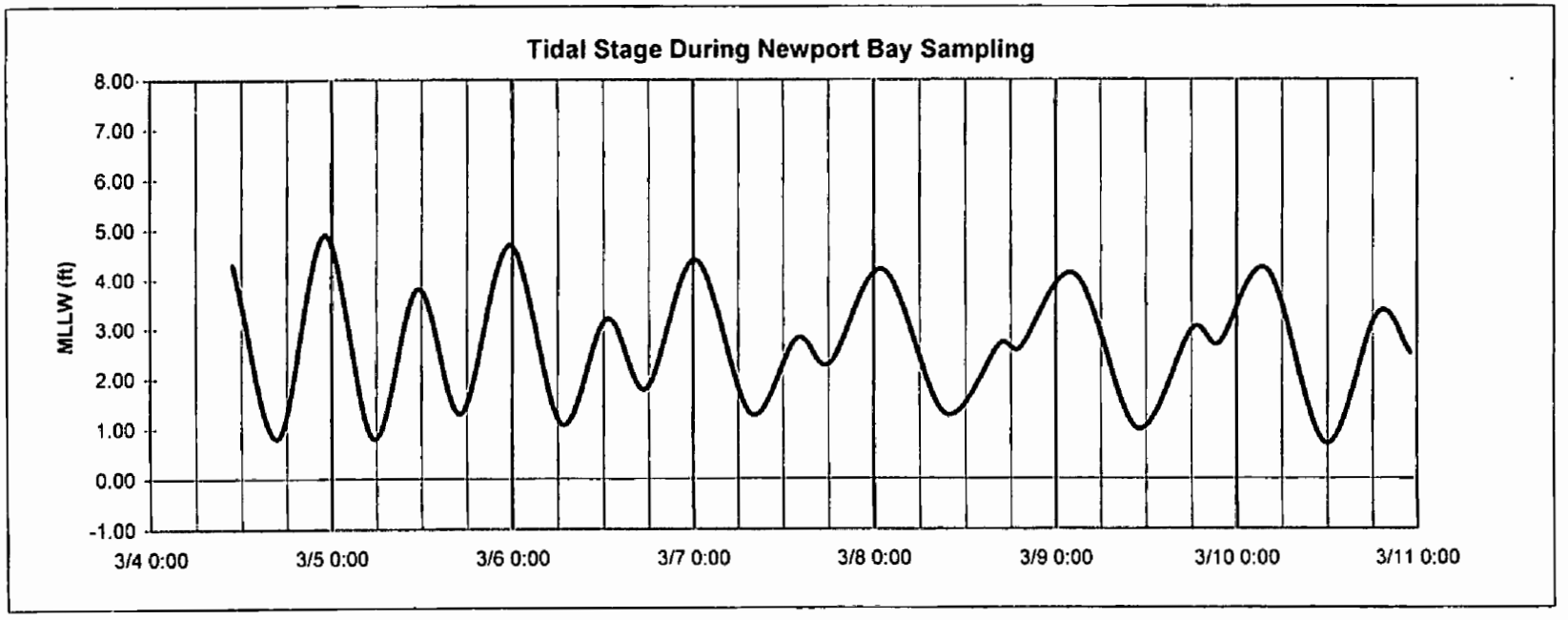

Newport Bay Sampling During a March 1995 Storm

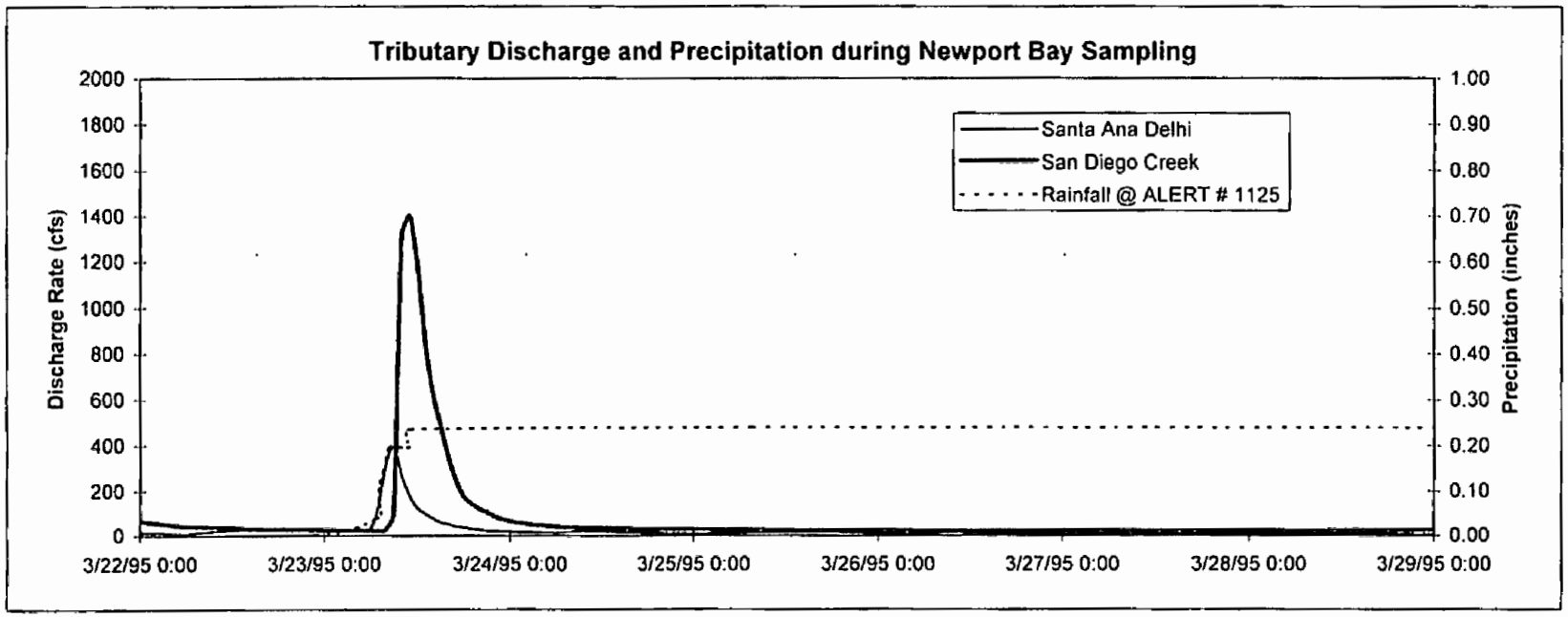

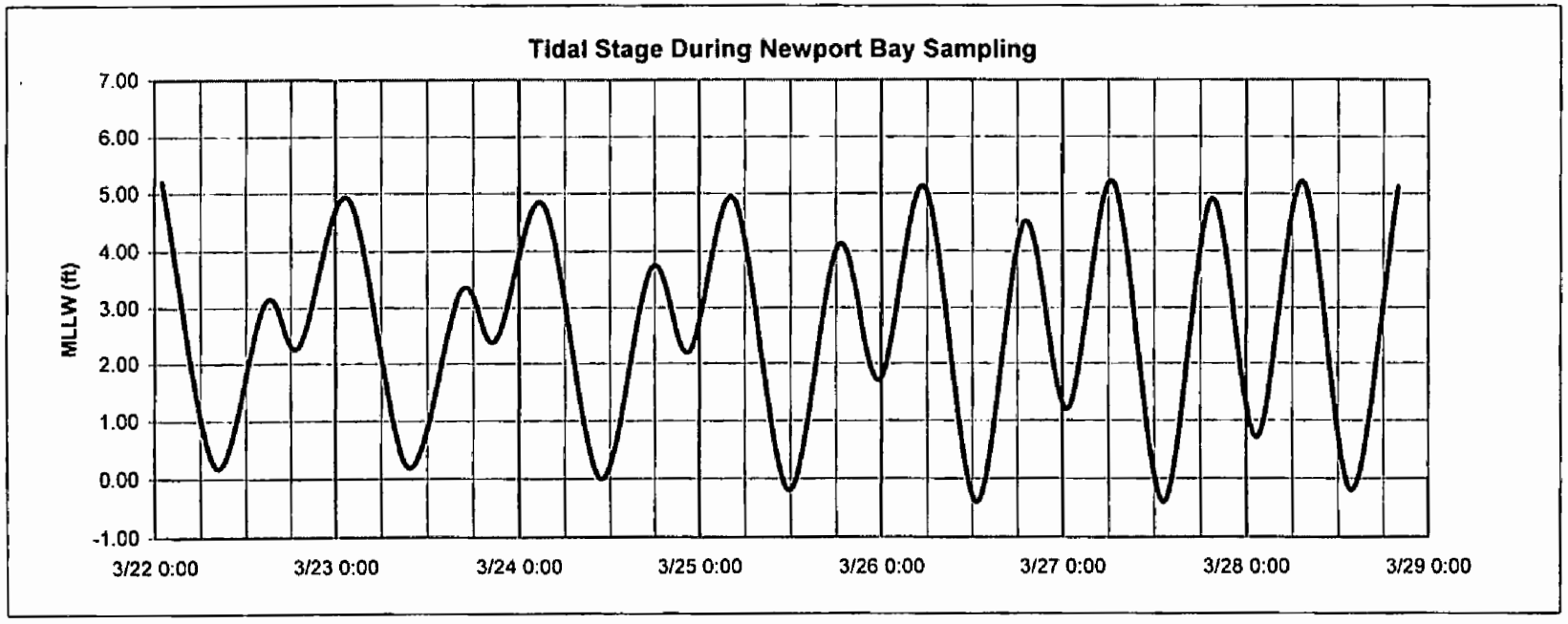

Newport Bay Samping during a January-February 1996 Storm

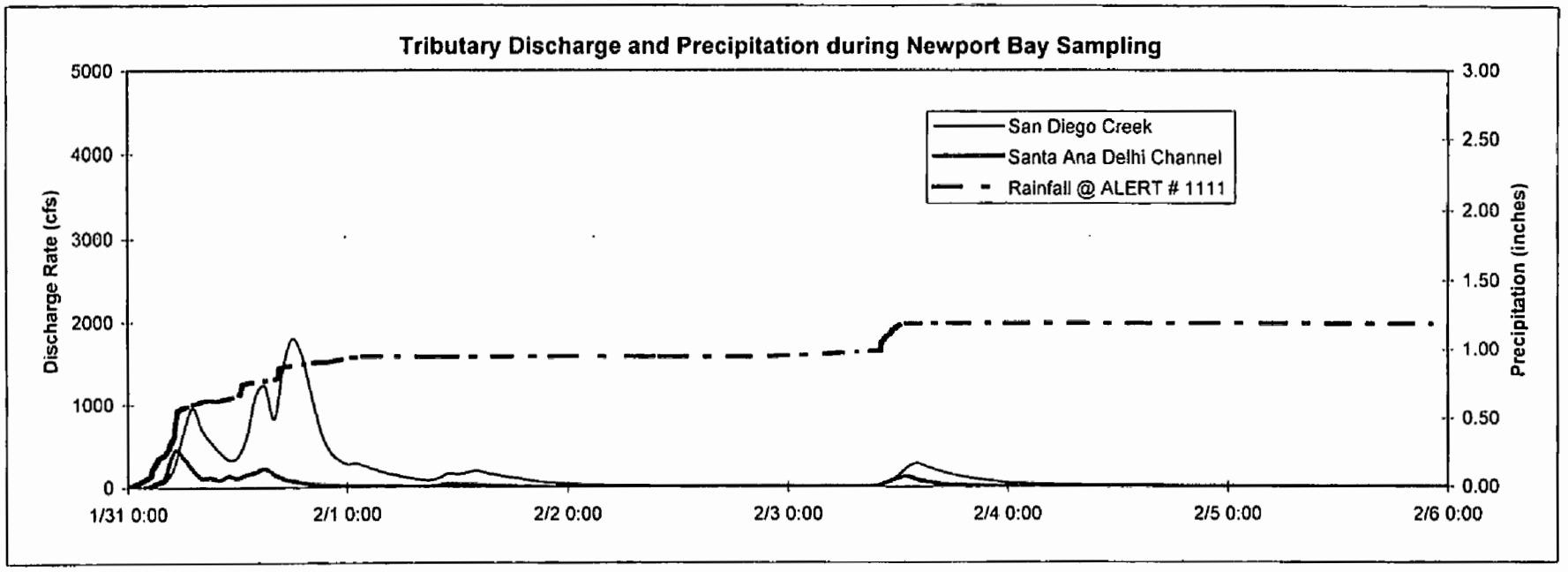

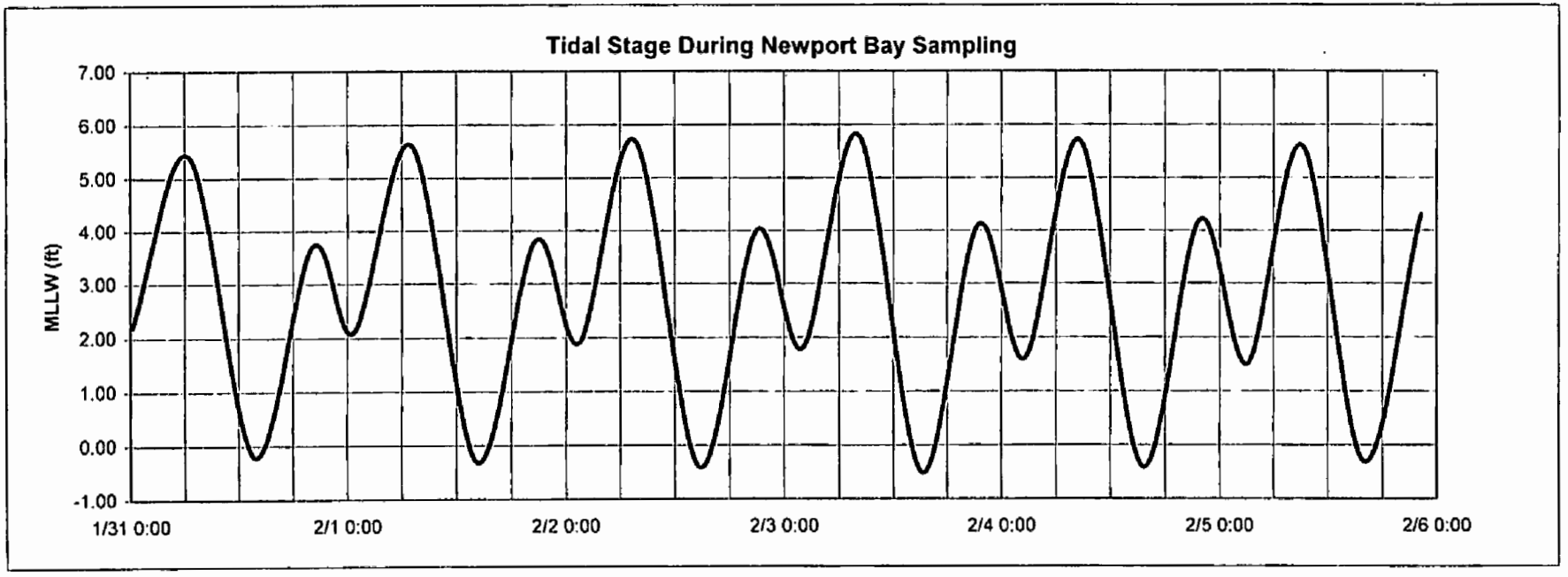

Newport Bay Sampling during a February 1996 Storm

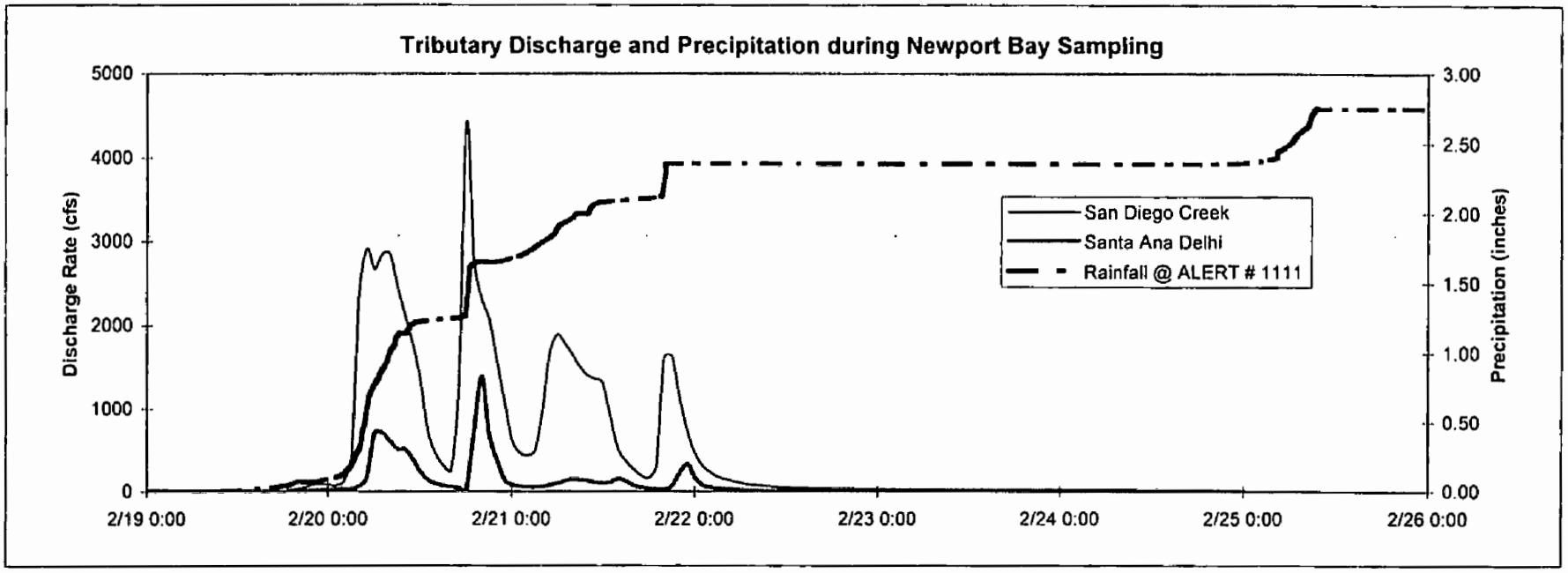

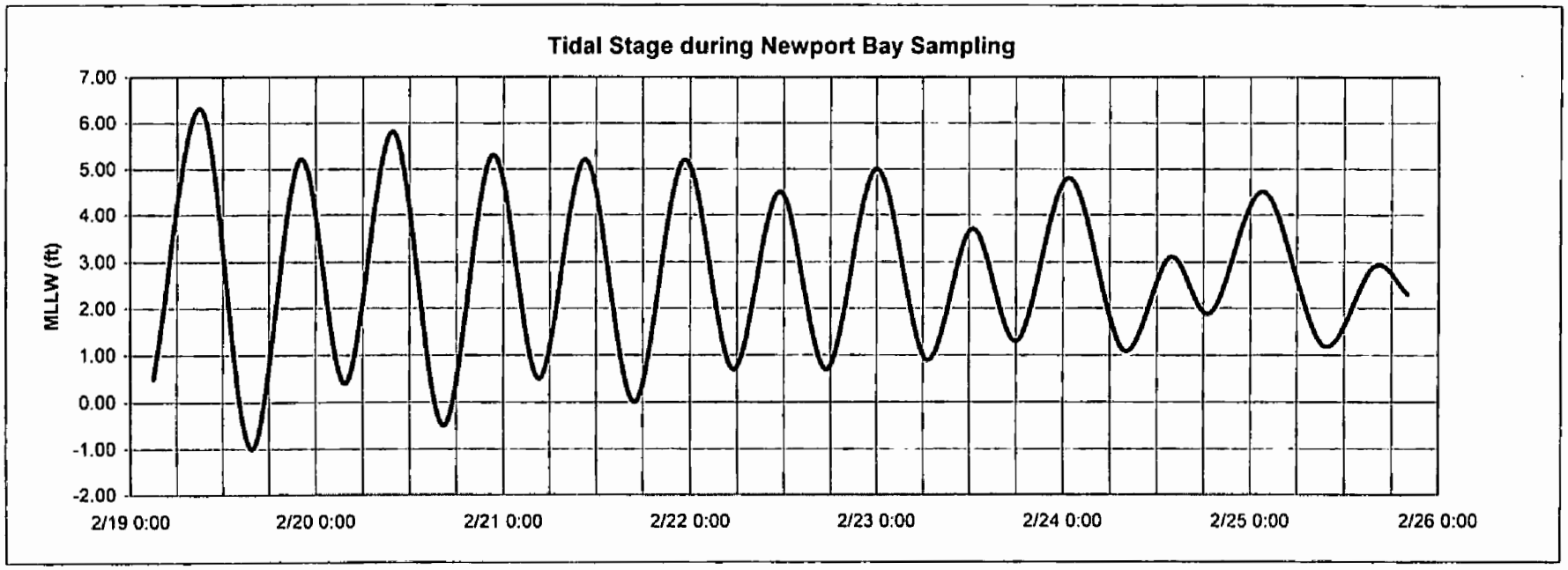

Newport Bay Sampling during a November 1996 Storm

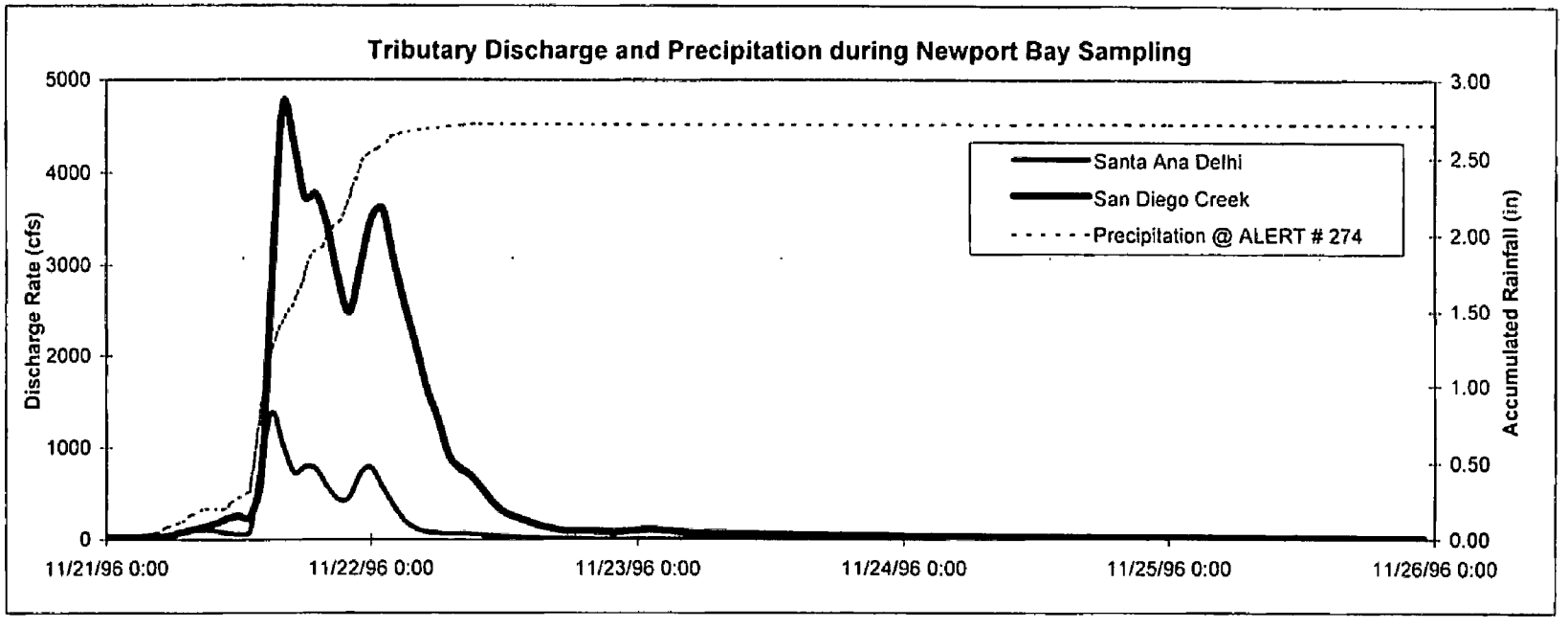

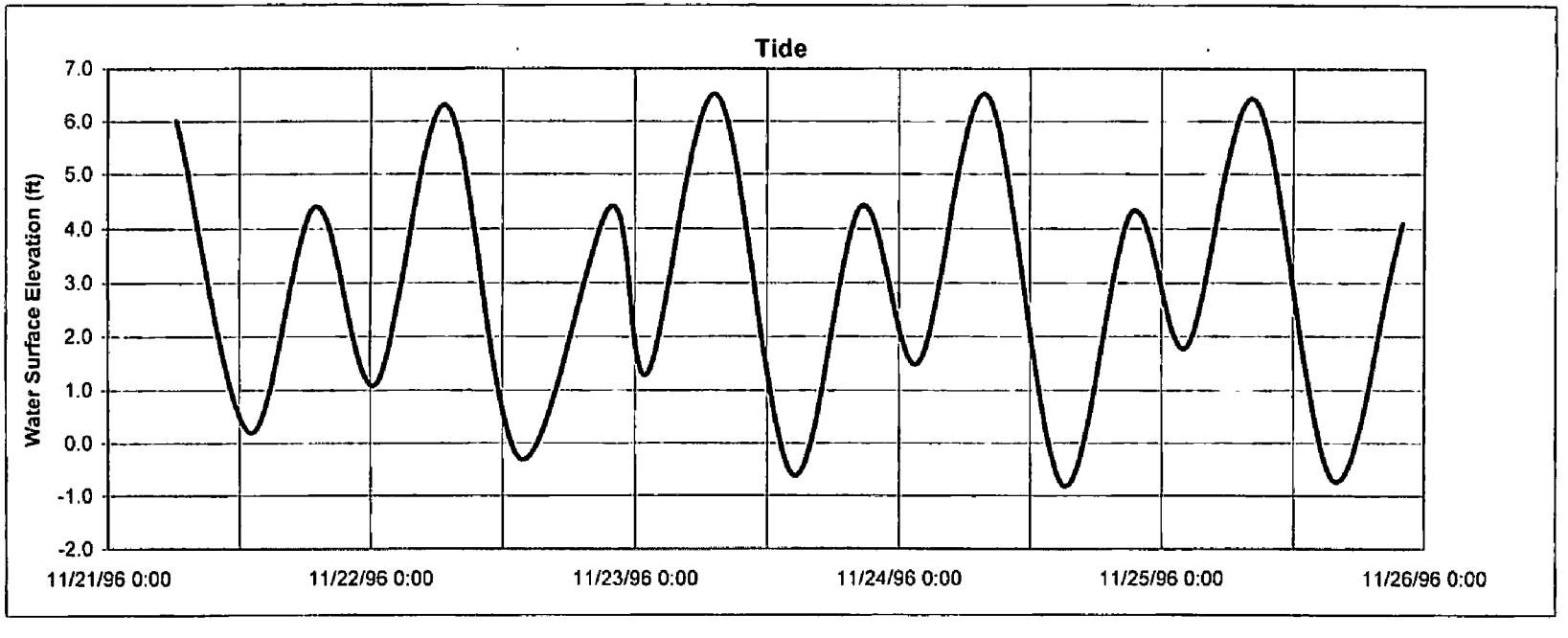

Newport Bay Sampling during a December 1997 Storm

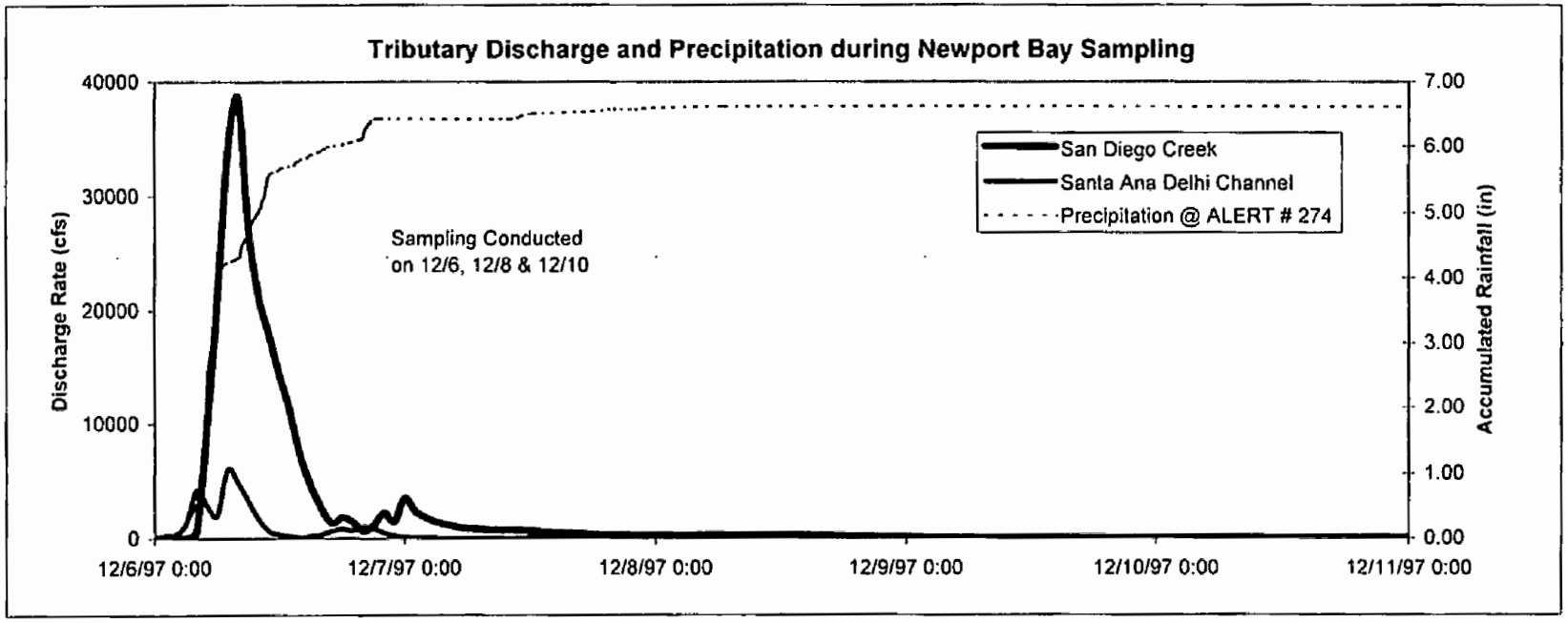

Note : Scales on primary and secondary y axes are different than for other Newport Bay samplings

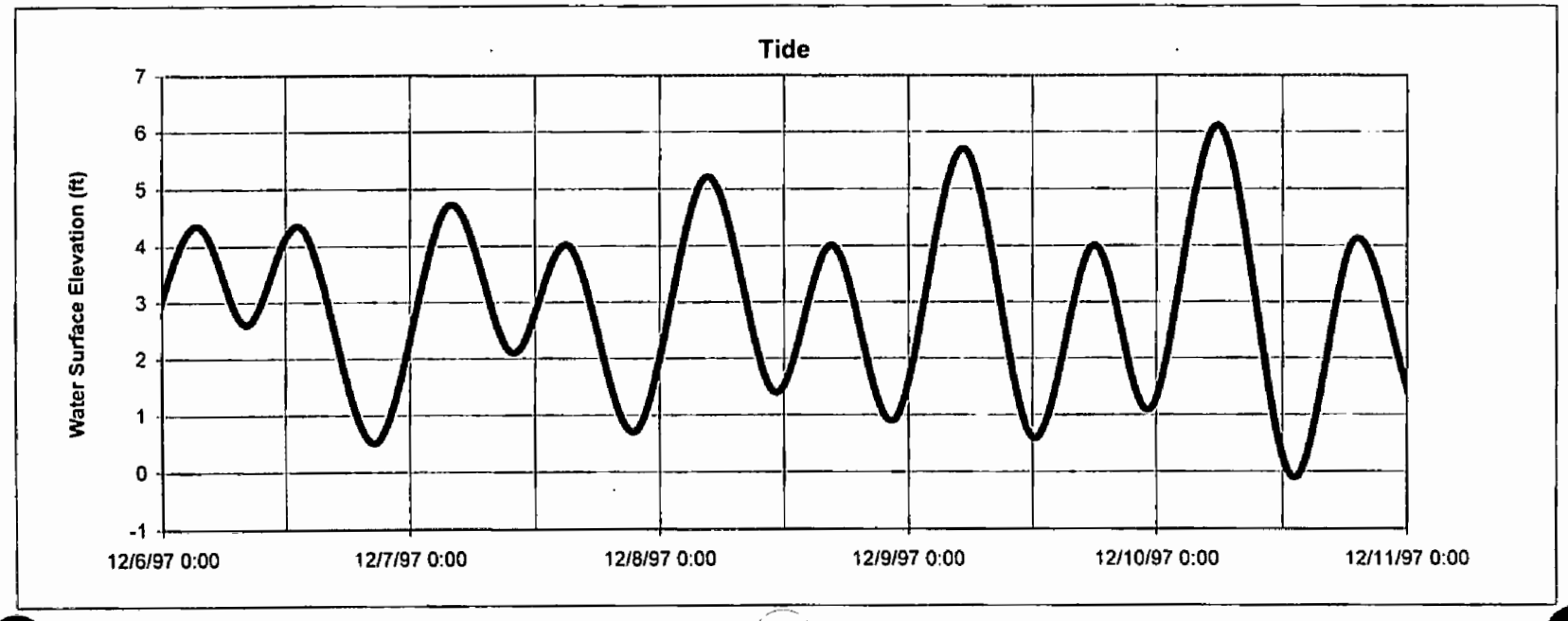

Newport Bay Sampling during a February 1998 Storm

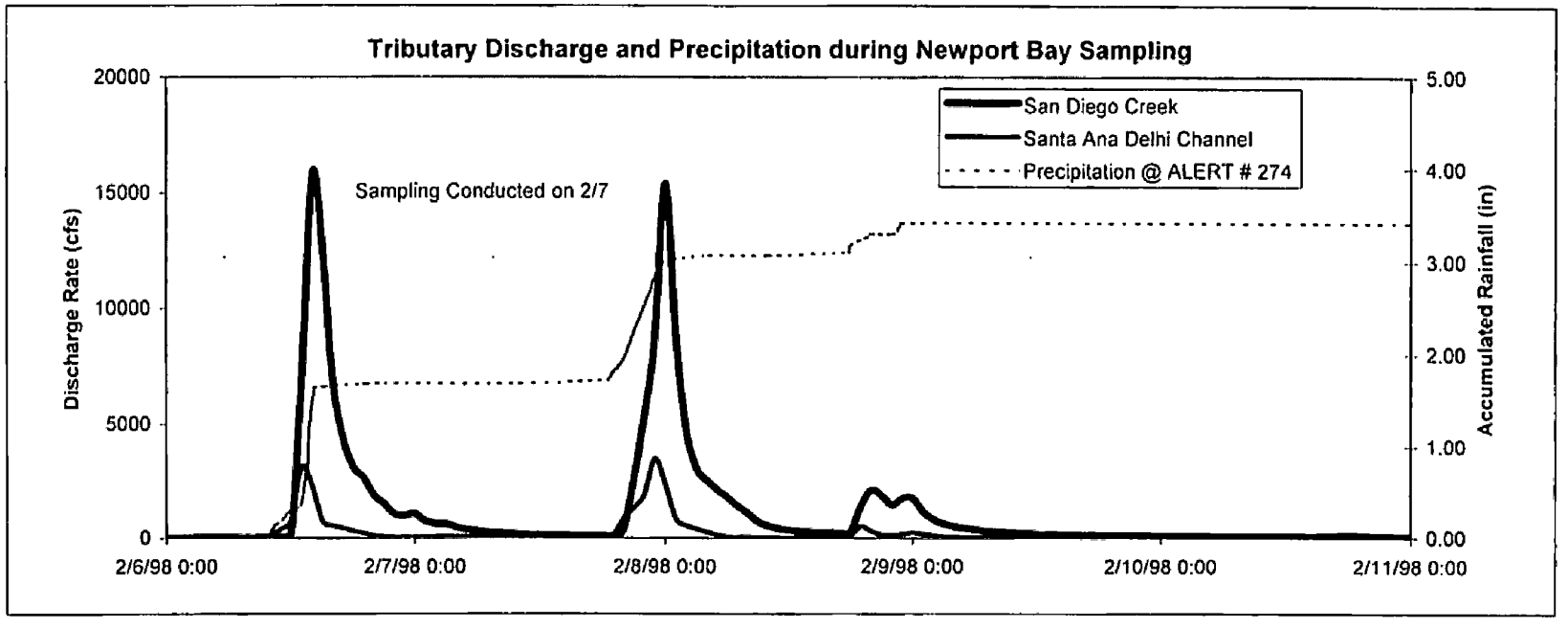

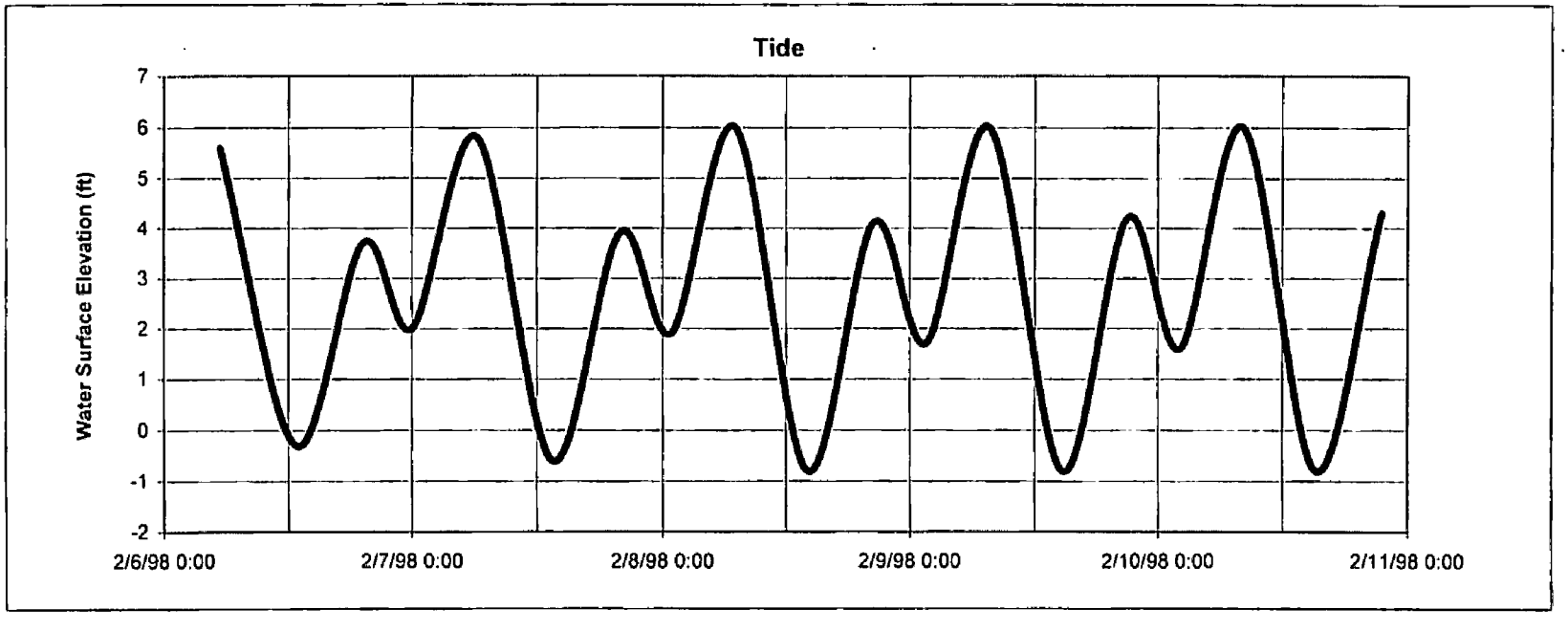

Newport Bay Sampling during a March 1998 Storm

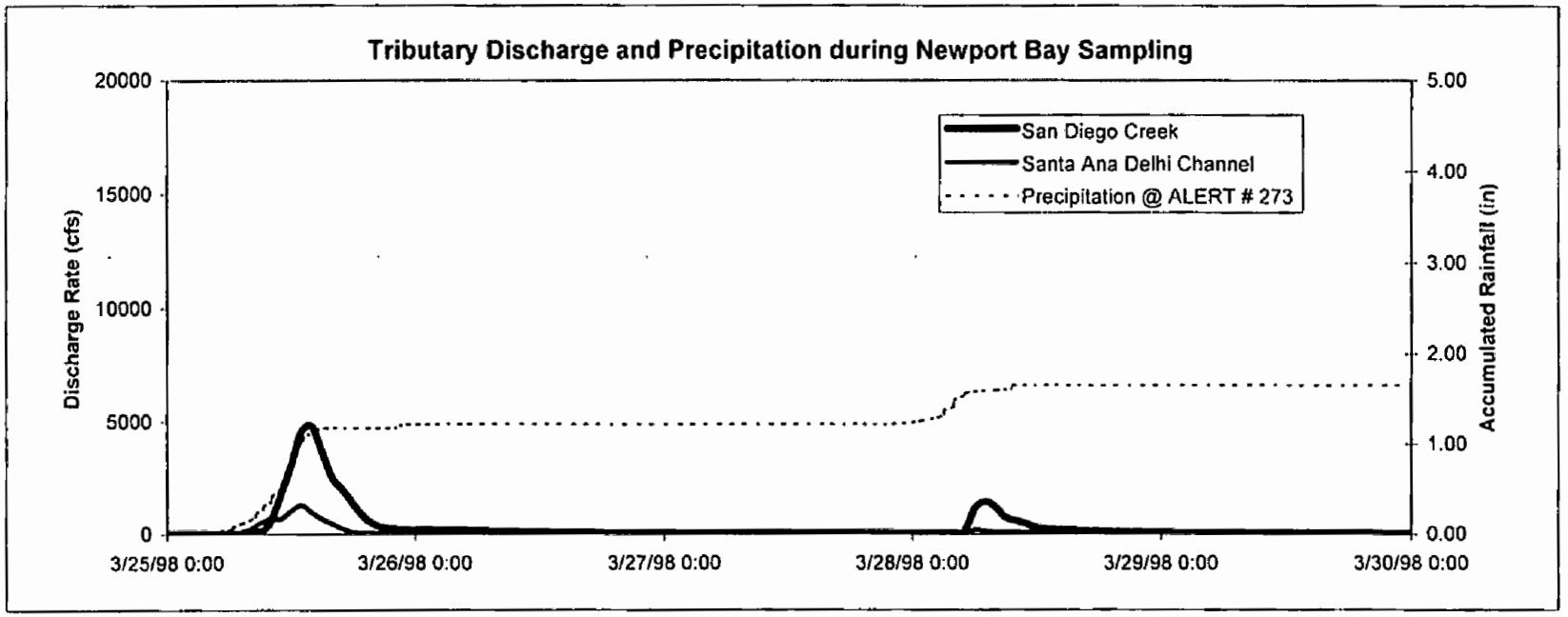

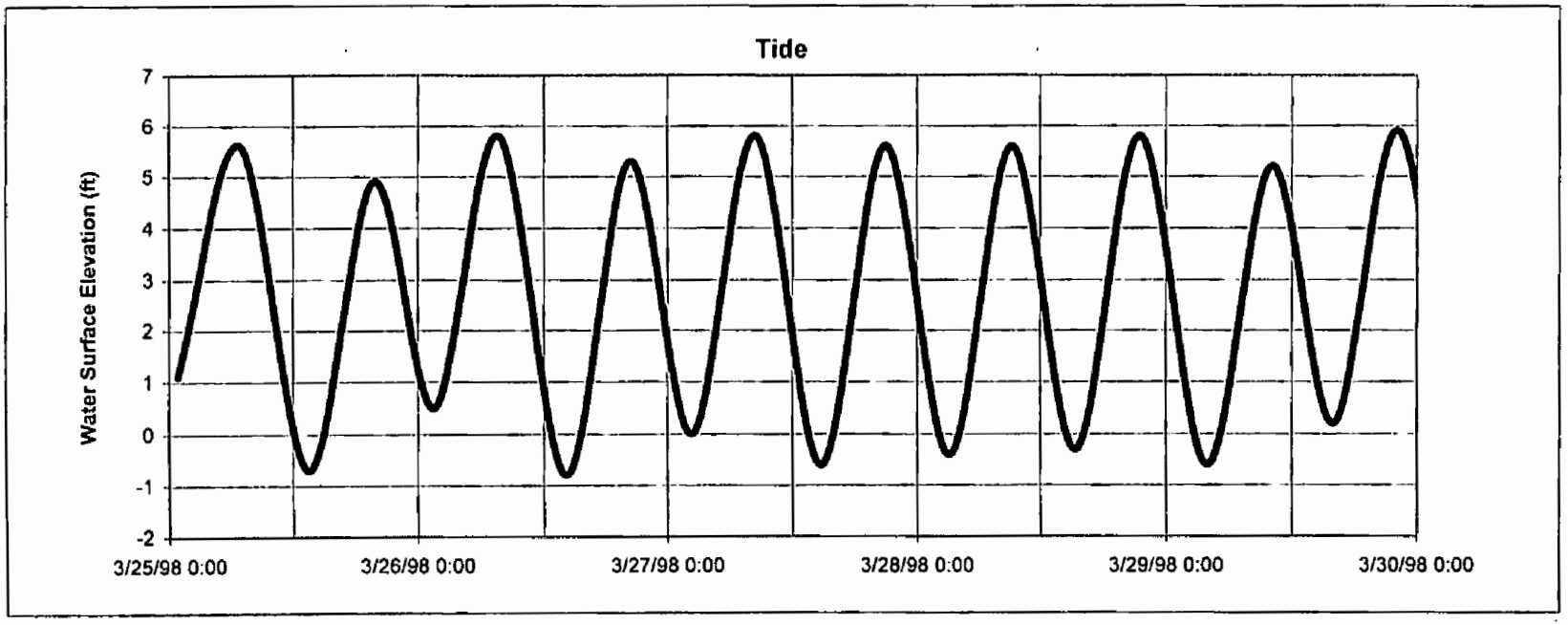

Newport Bay Sampling during a January 1999 Storm

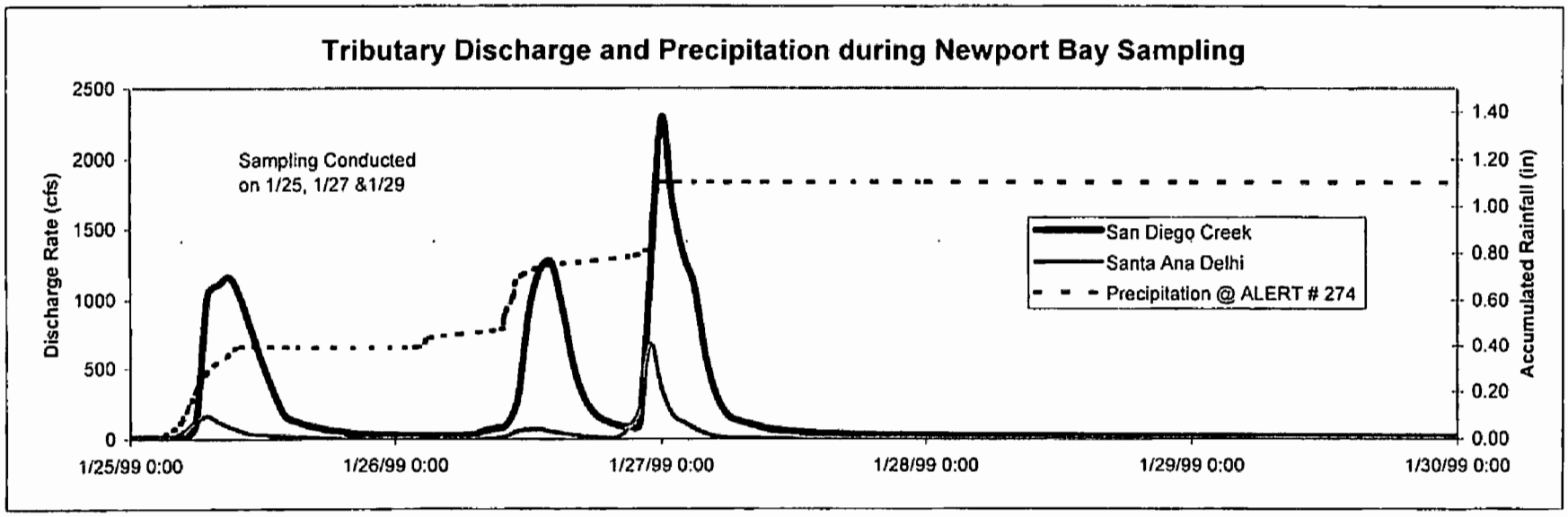

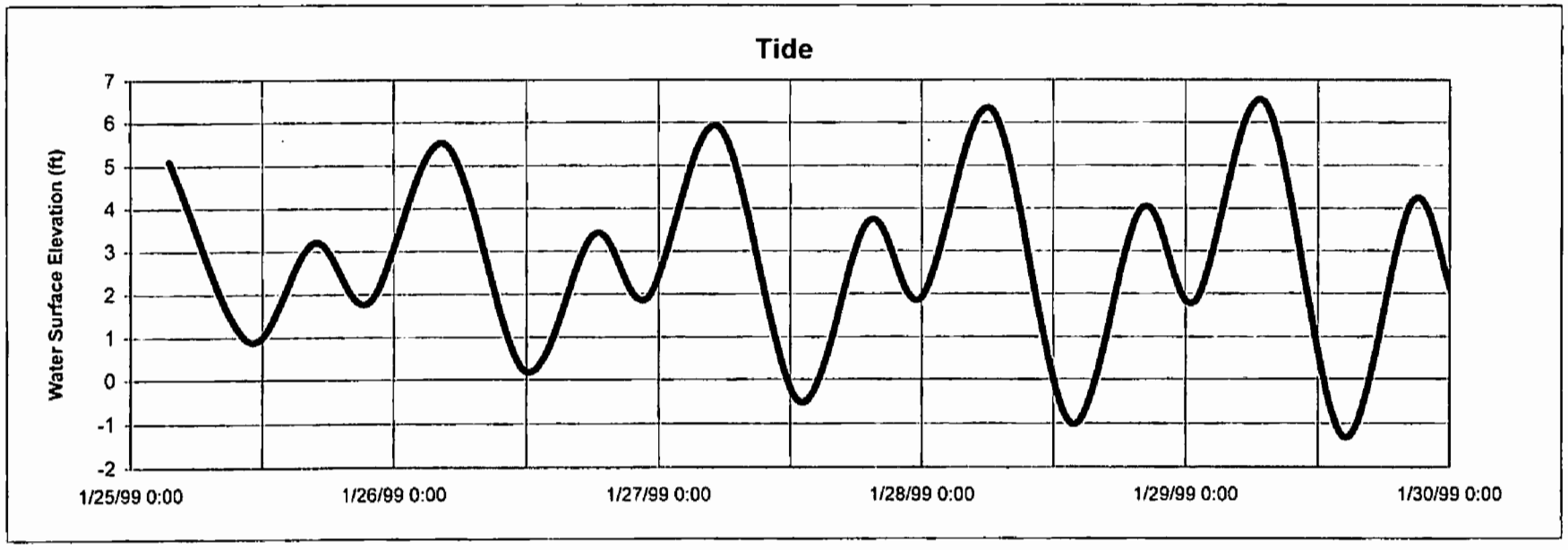

Newport Bay Sampling during an April 1999 Storm

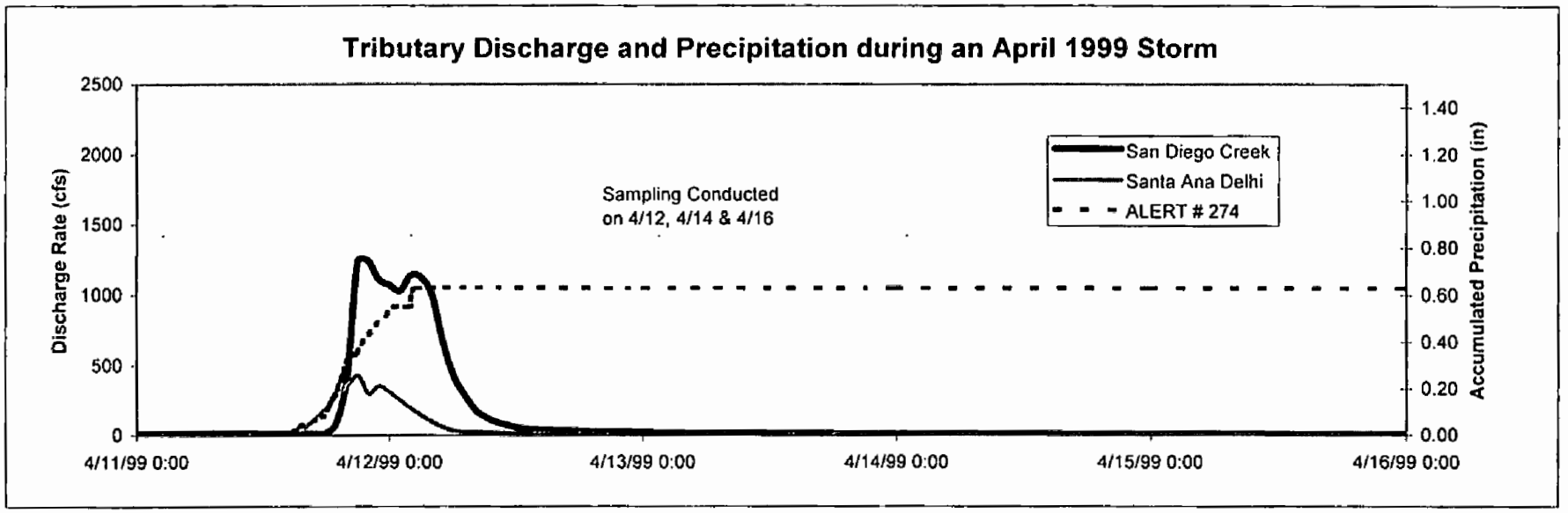

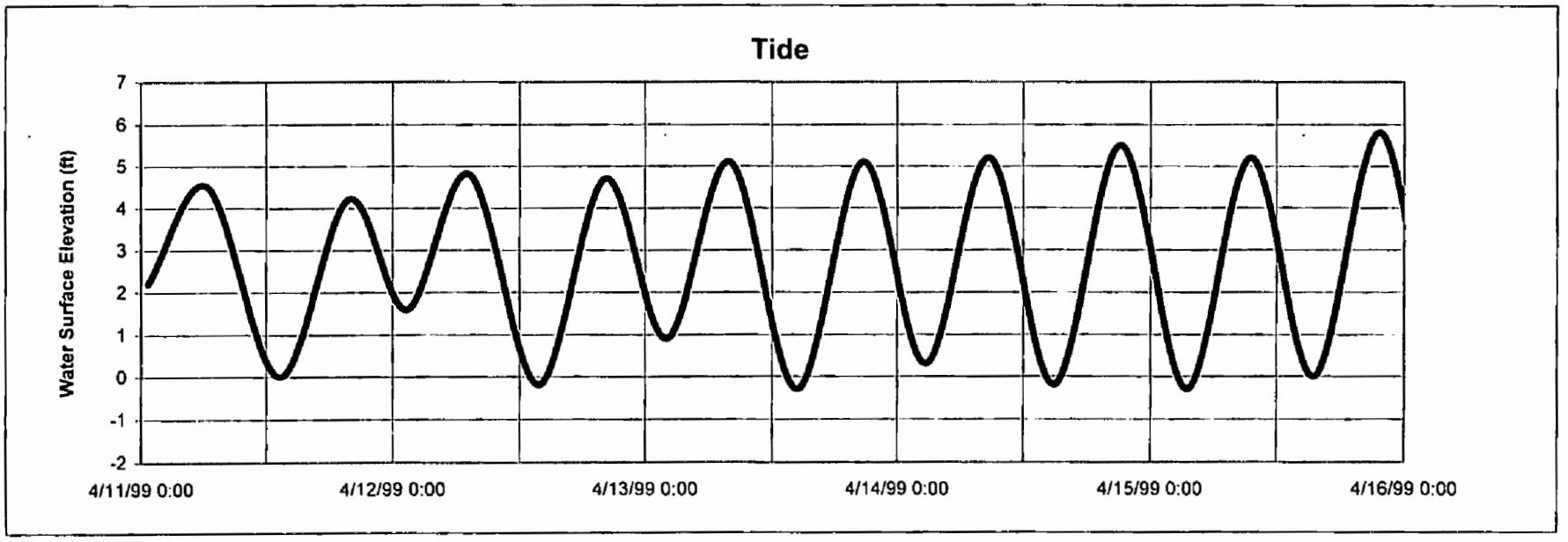

Huntington Harbour Sampling during a November 1994 Storm

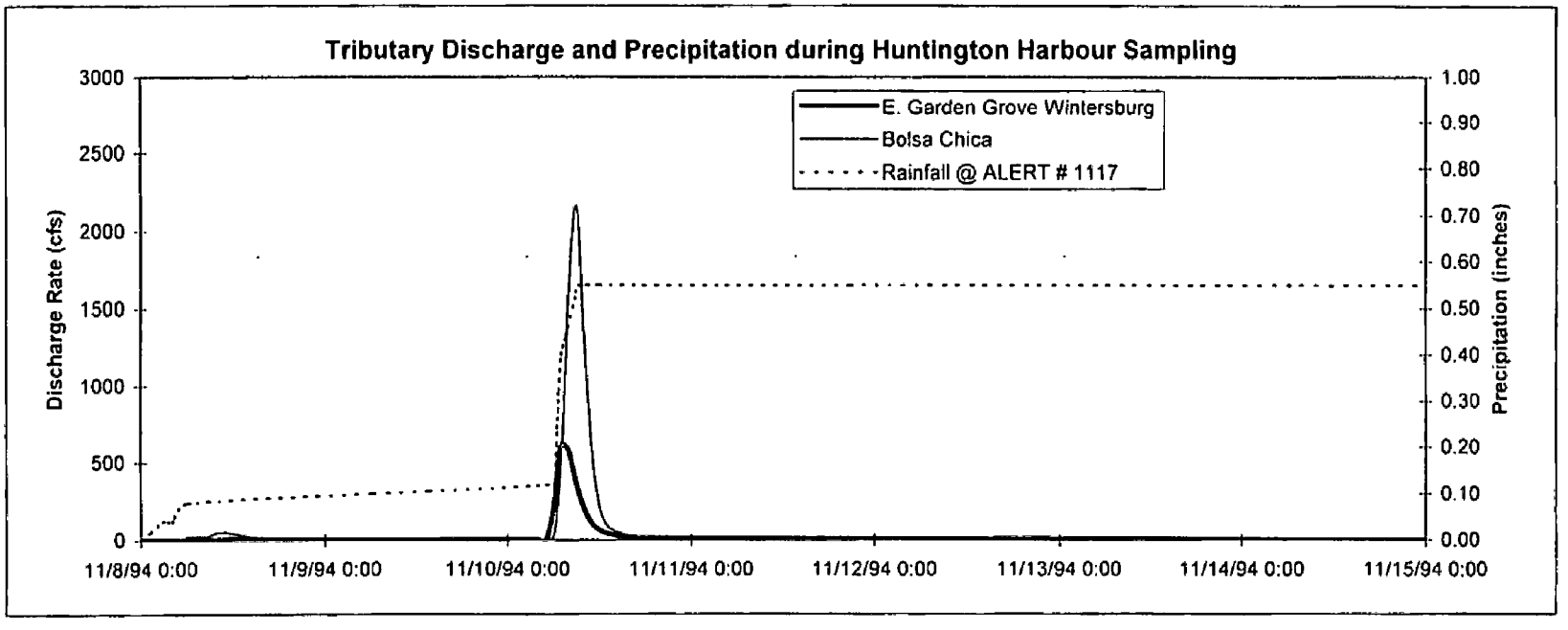

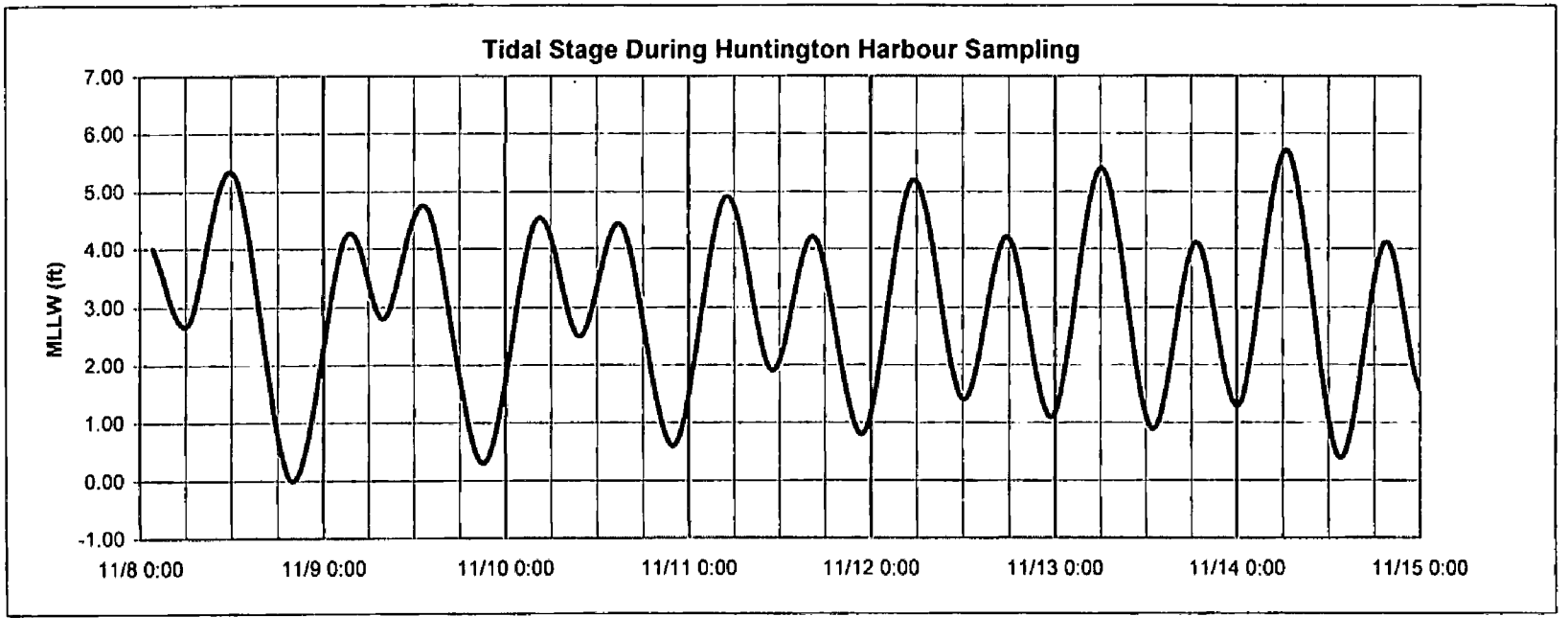

Bolsa Chica Discharge includes Anaheim Barber City and Westminster Channels

Huntington Harbour Sampling during a March 1995 Storm

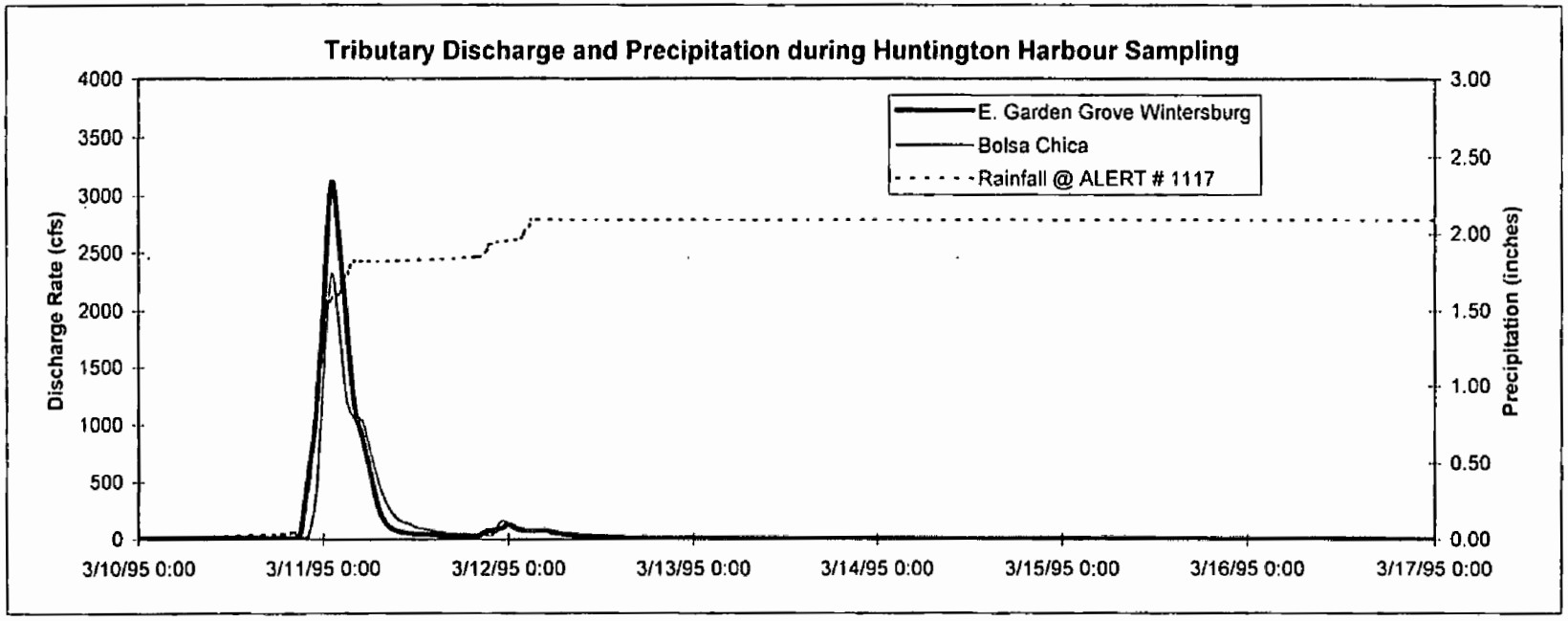

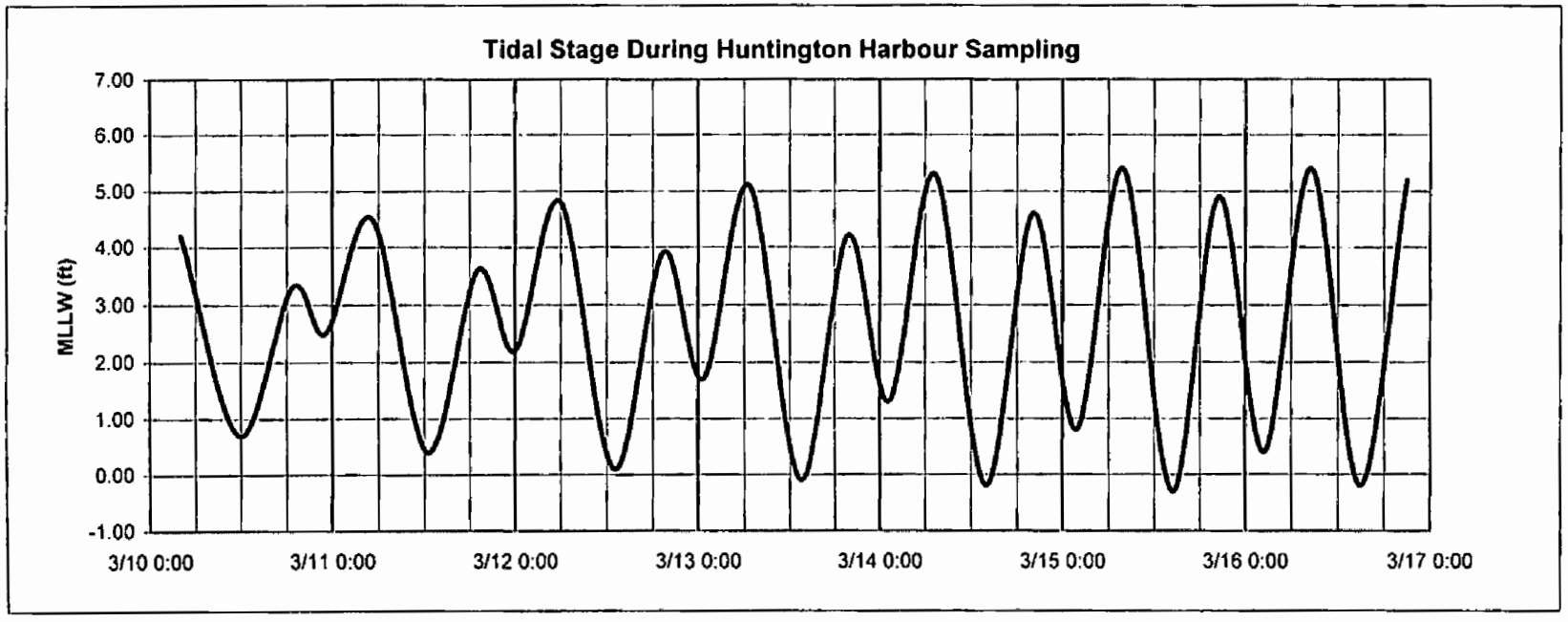

Bolsa Chica Discharge includes Anah Jarber City and Westminster Channels

Huntington Harbour Sampling during a December 1995 Storm

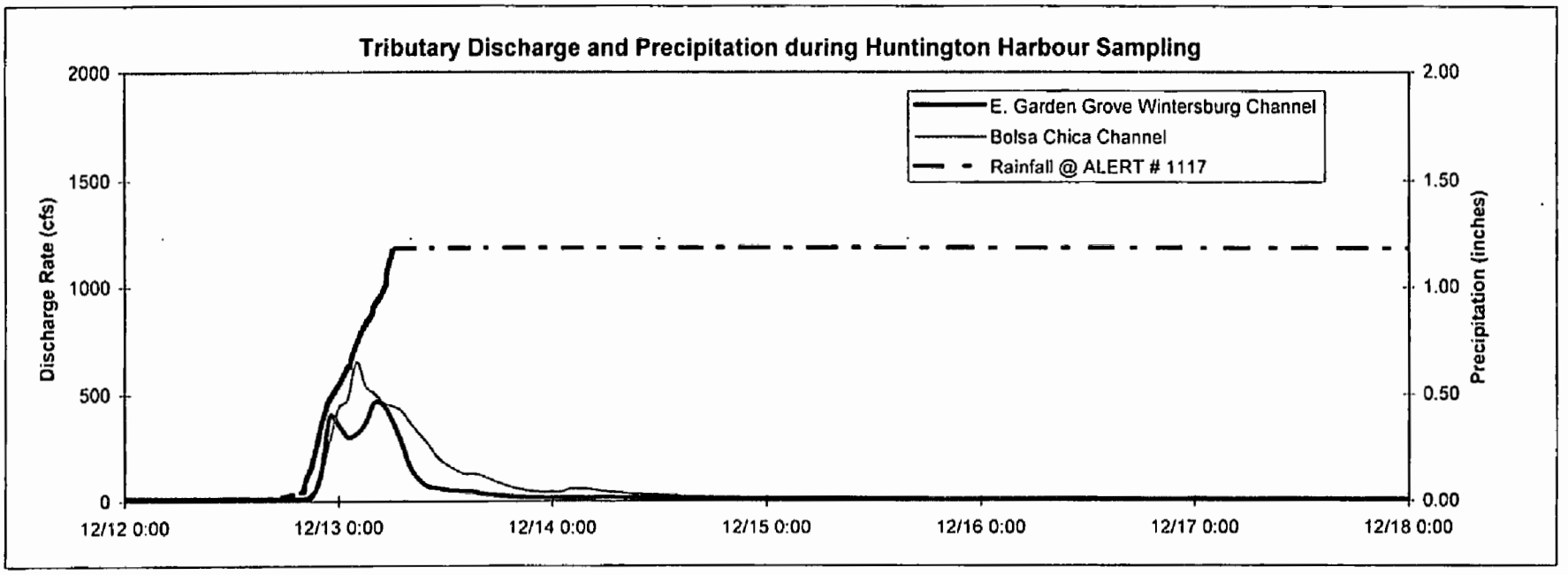

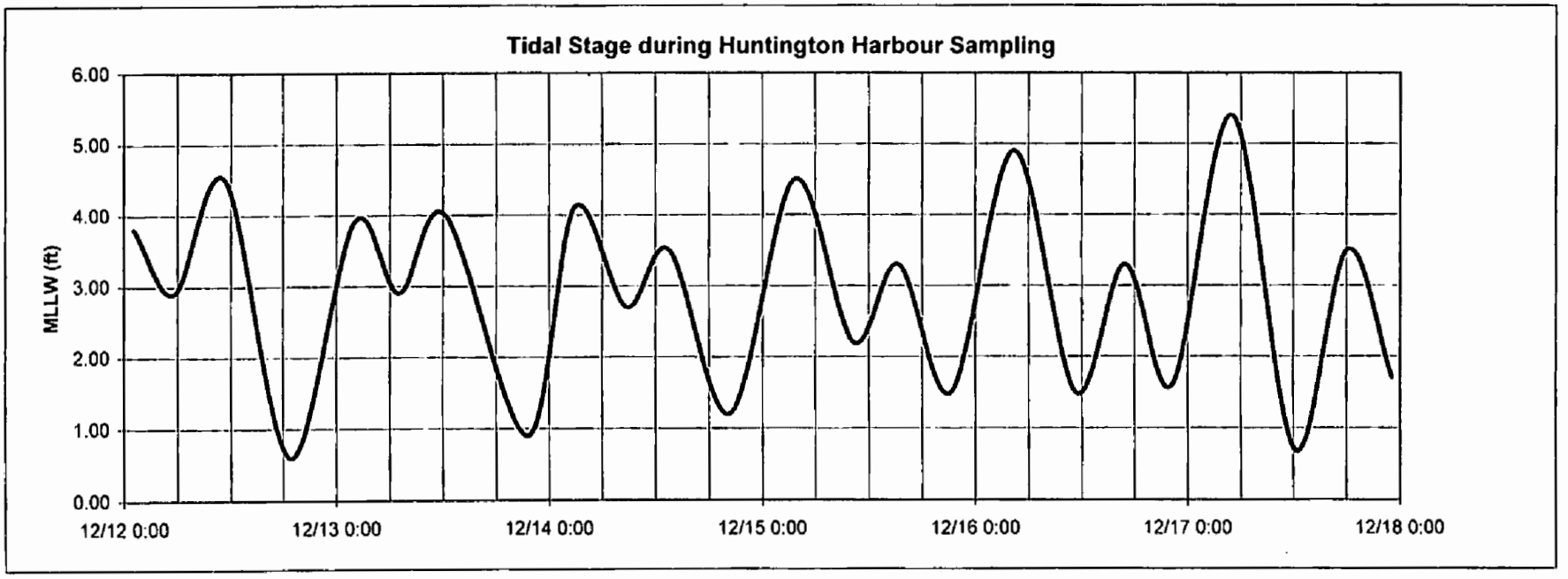

Bolsa Chica Discharge includes Anaheim Barber City and Westminster Channels

Huntington Harbour Sampling during a March 1996 Storm

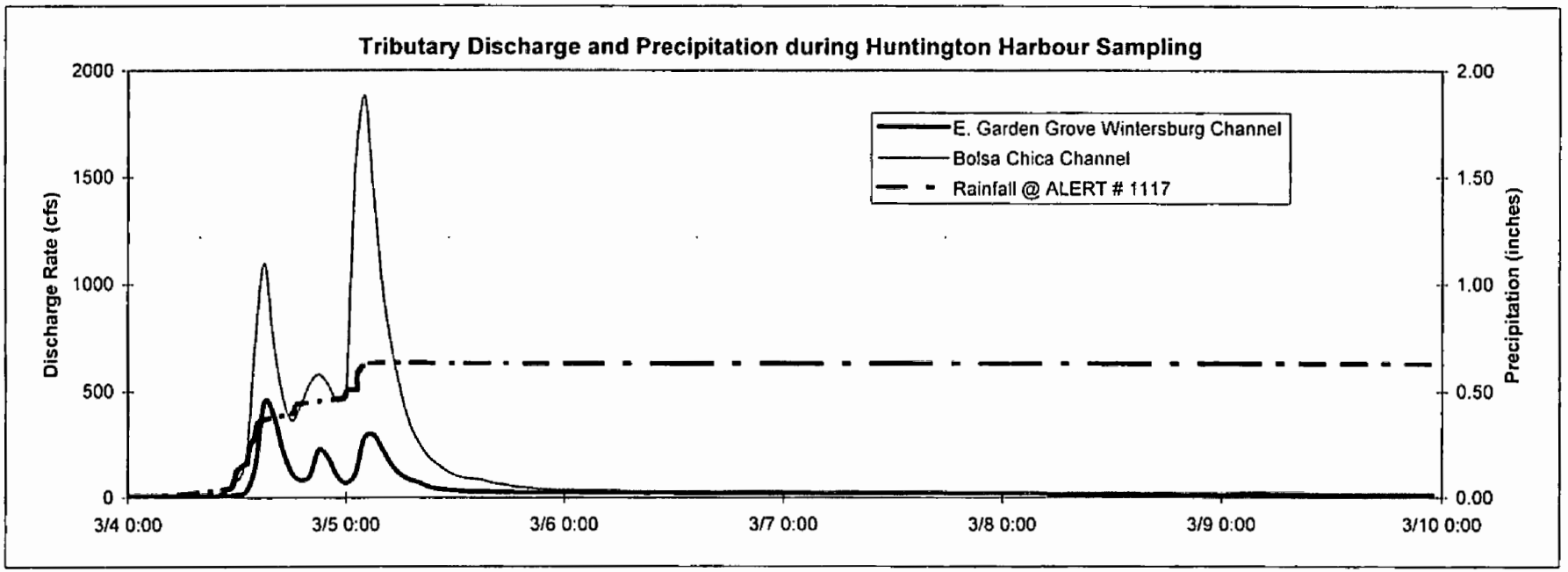

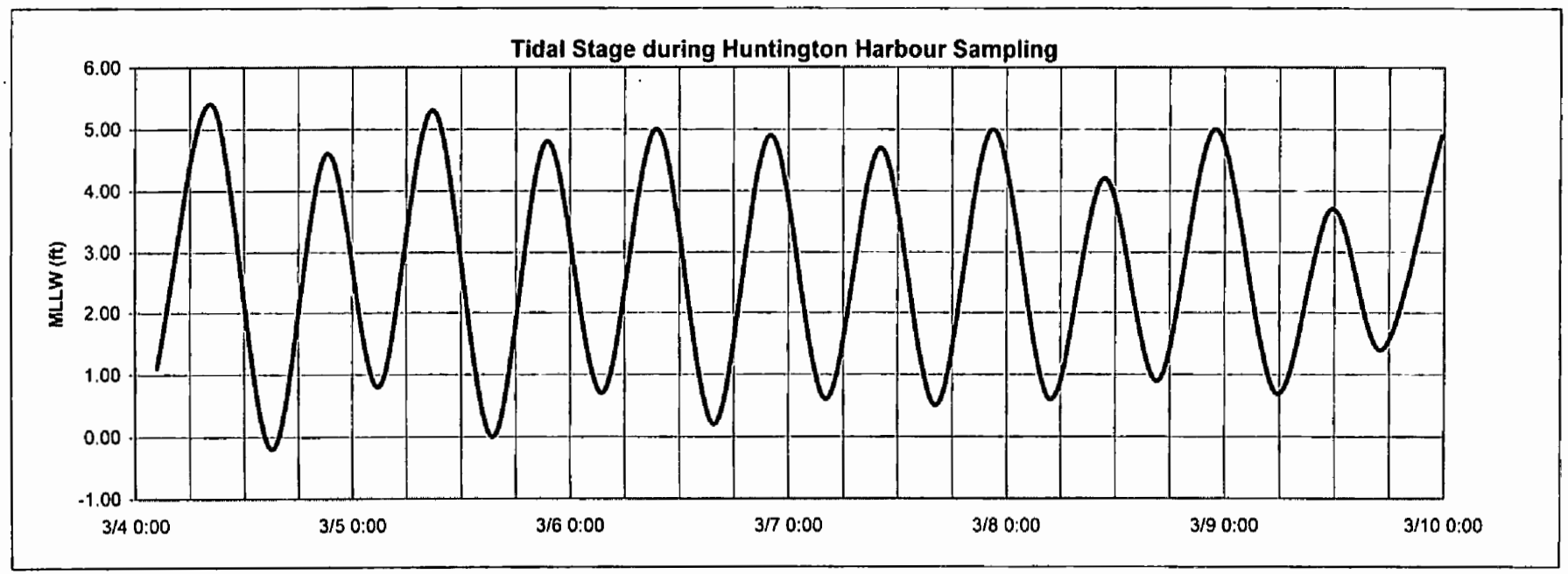

Bolsa Chica Discharge includes Anal Barber City and Westminster Channel

Huntington Harbour Sampling during a November 1996 Storm

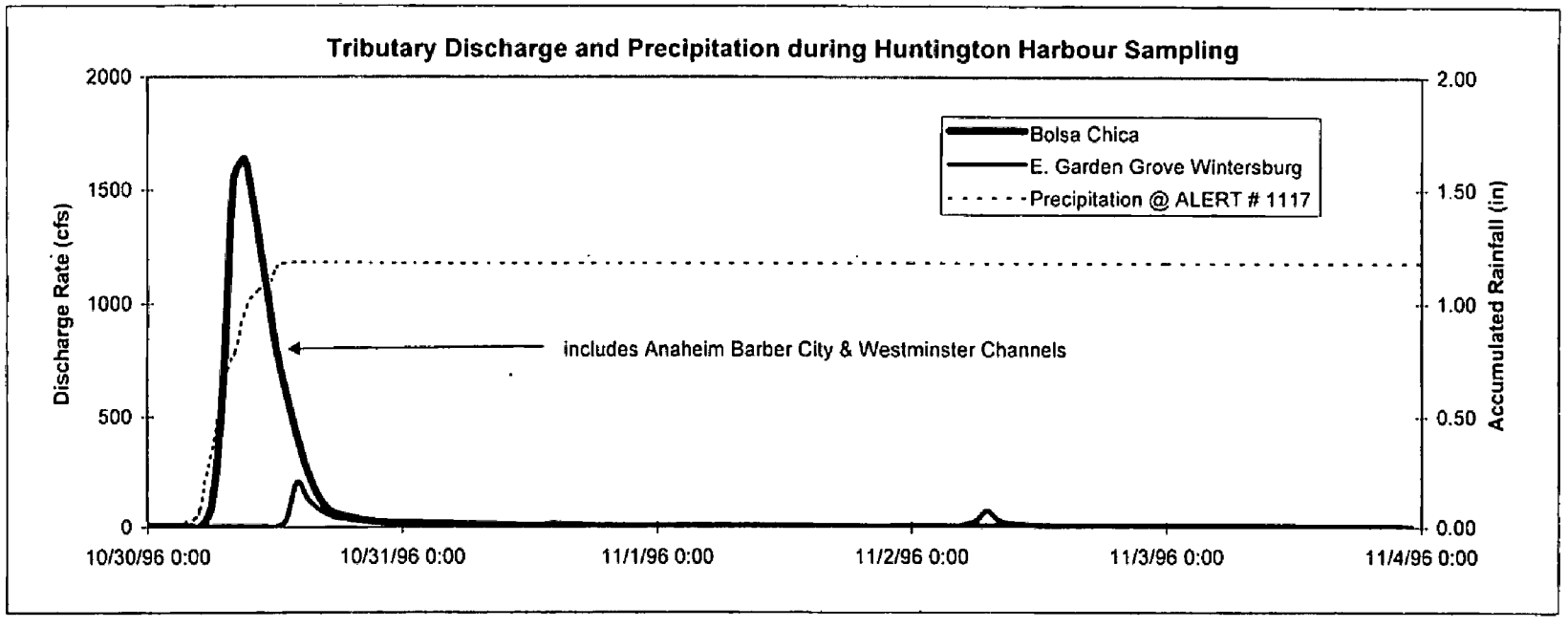

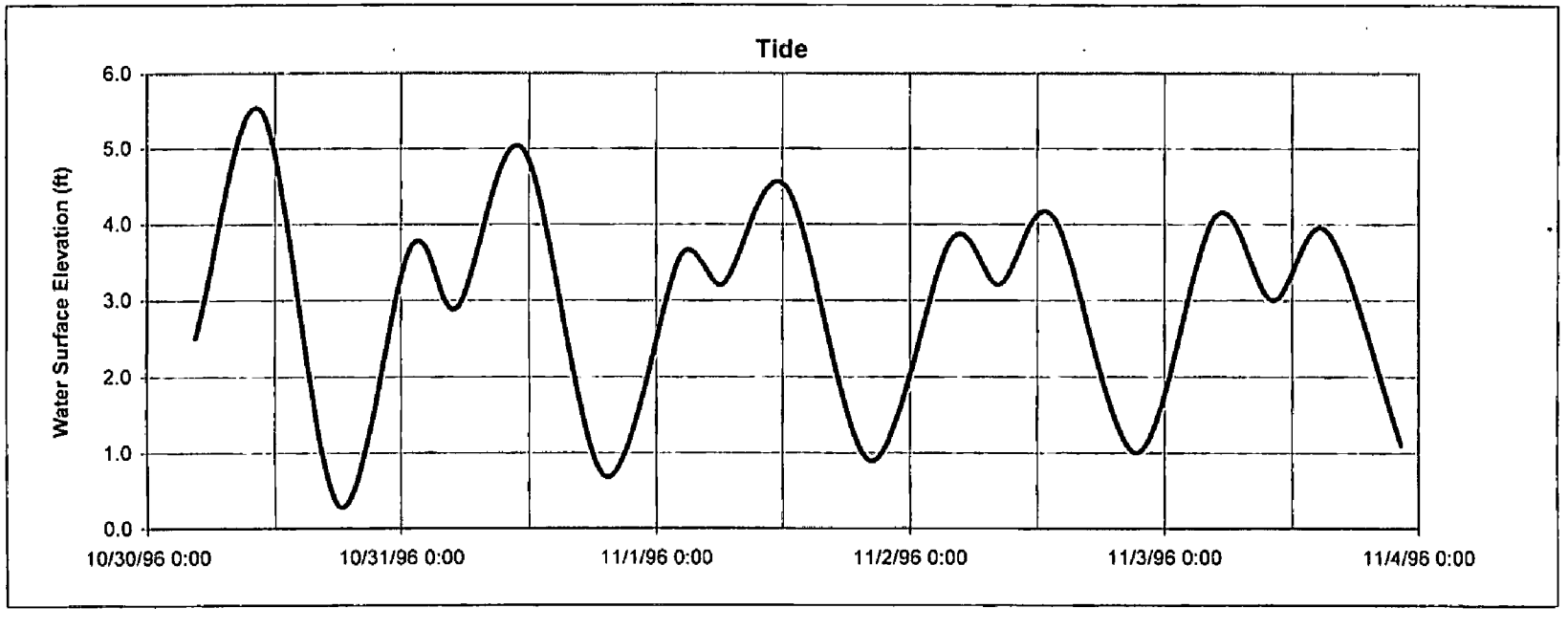

Huntington Harbour Sampling during a January 1997 Storm

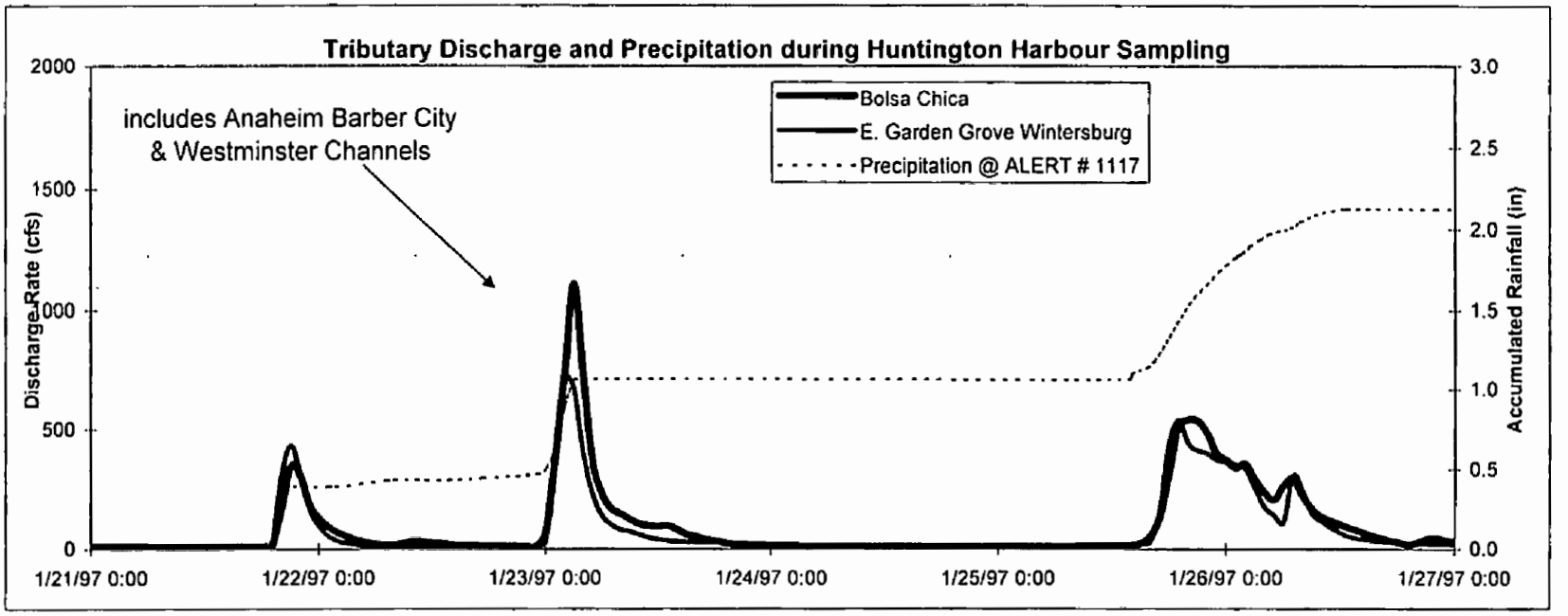

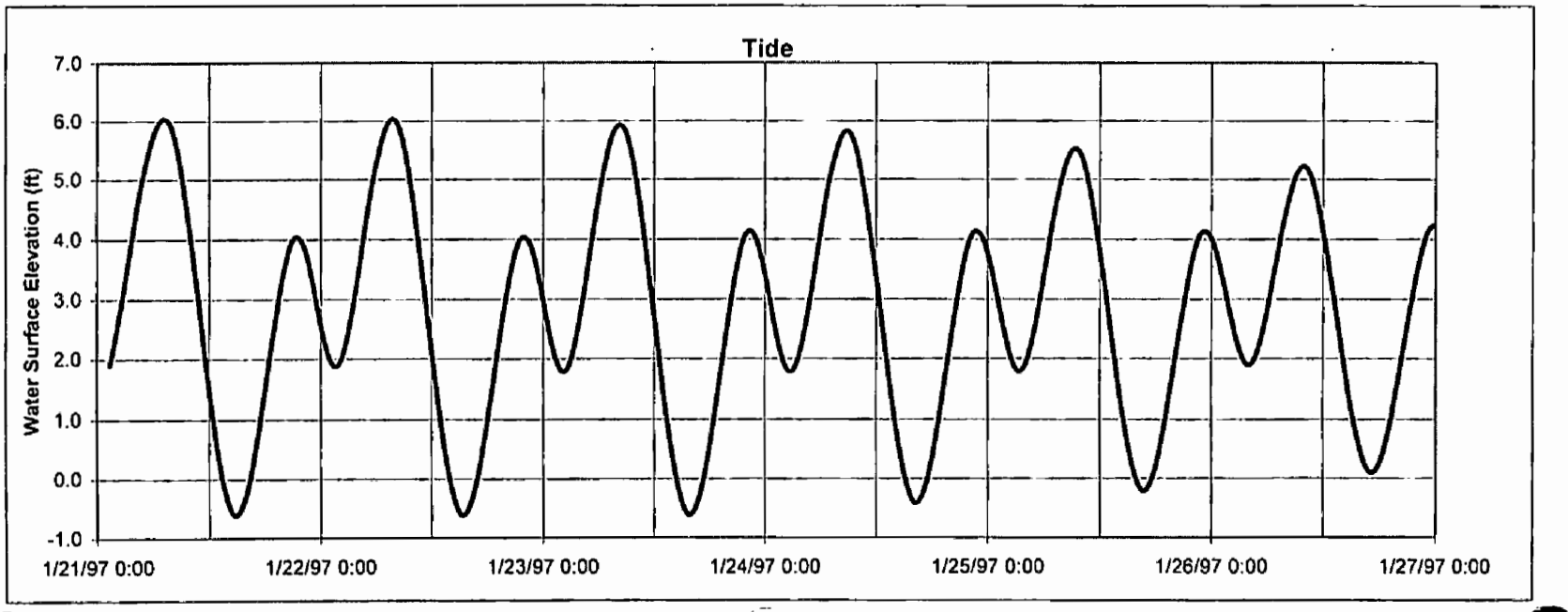

Huntington Harbour Sampling during a January 1998 Storm

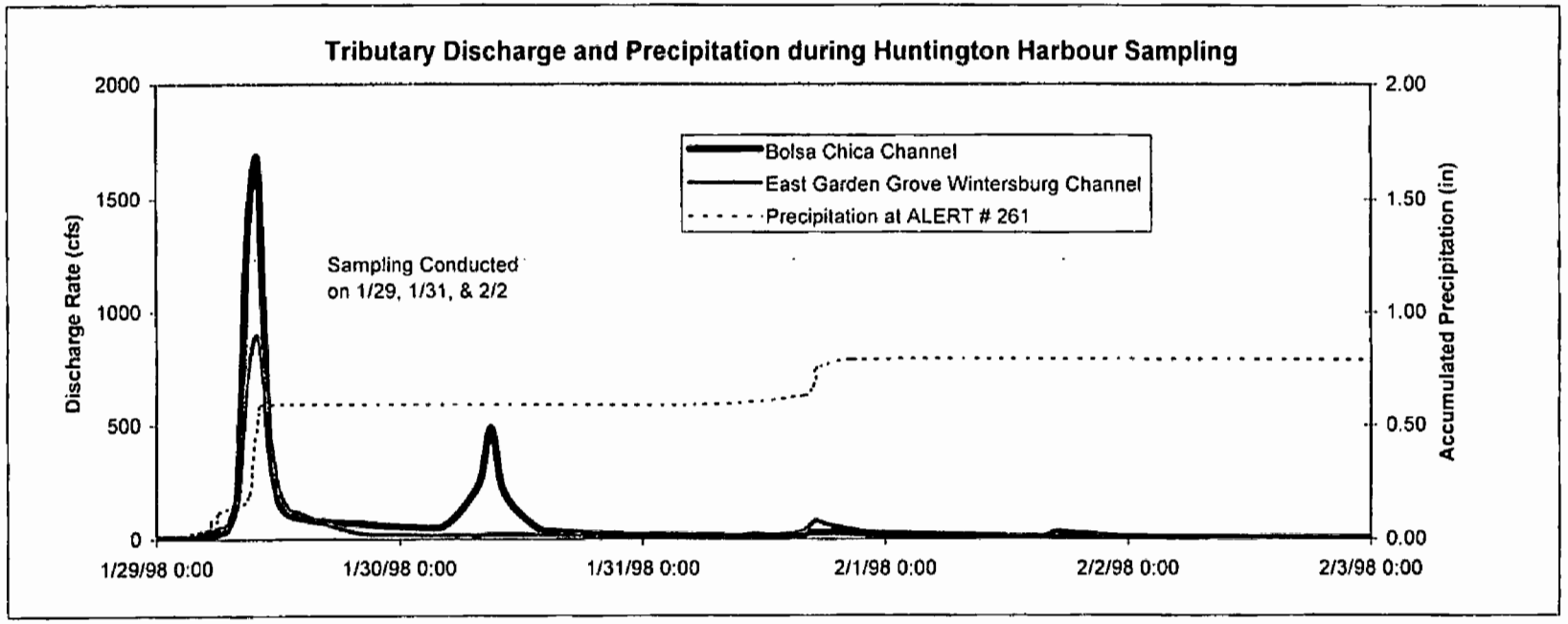

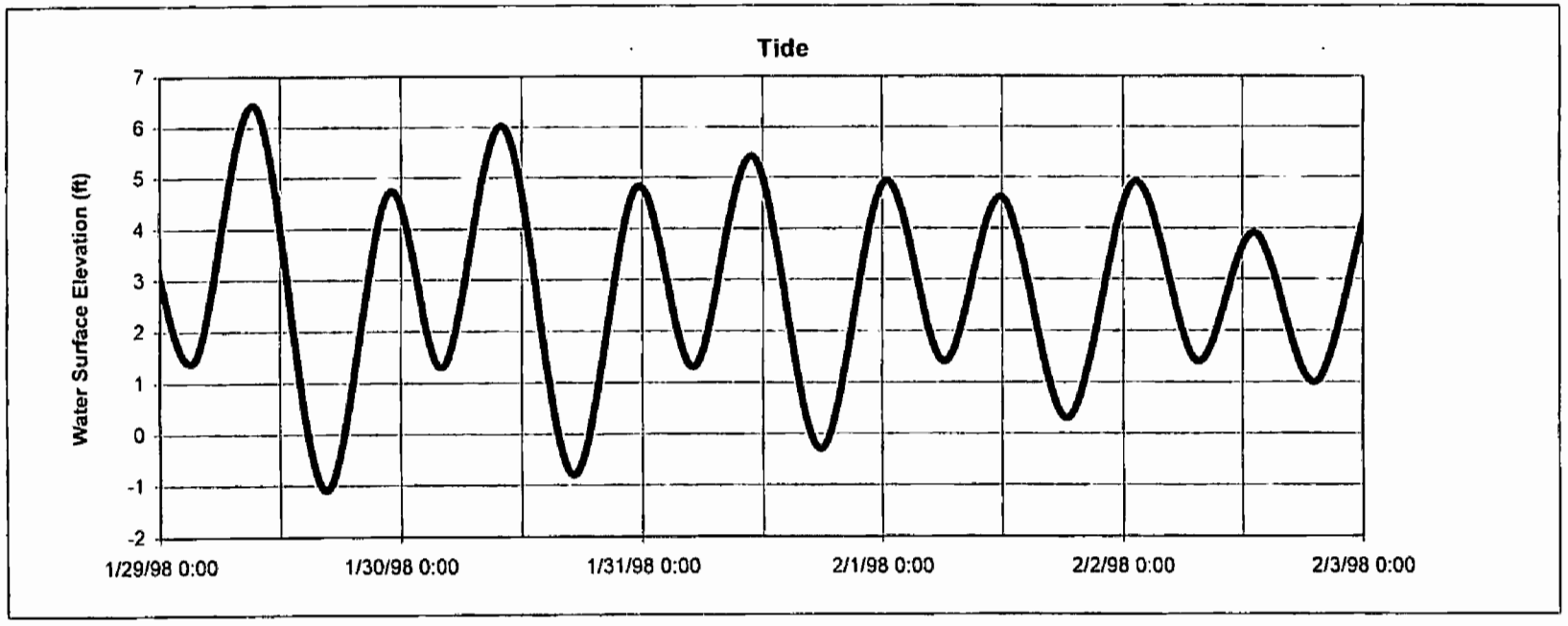

Bolsa Chica discharge includes Anaheim Barber City and Westminster Channels

Huntington Harbour Sampling during a May 1998 Storm

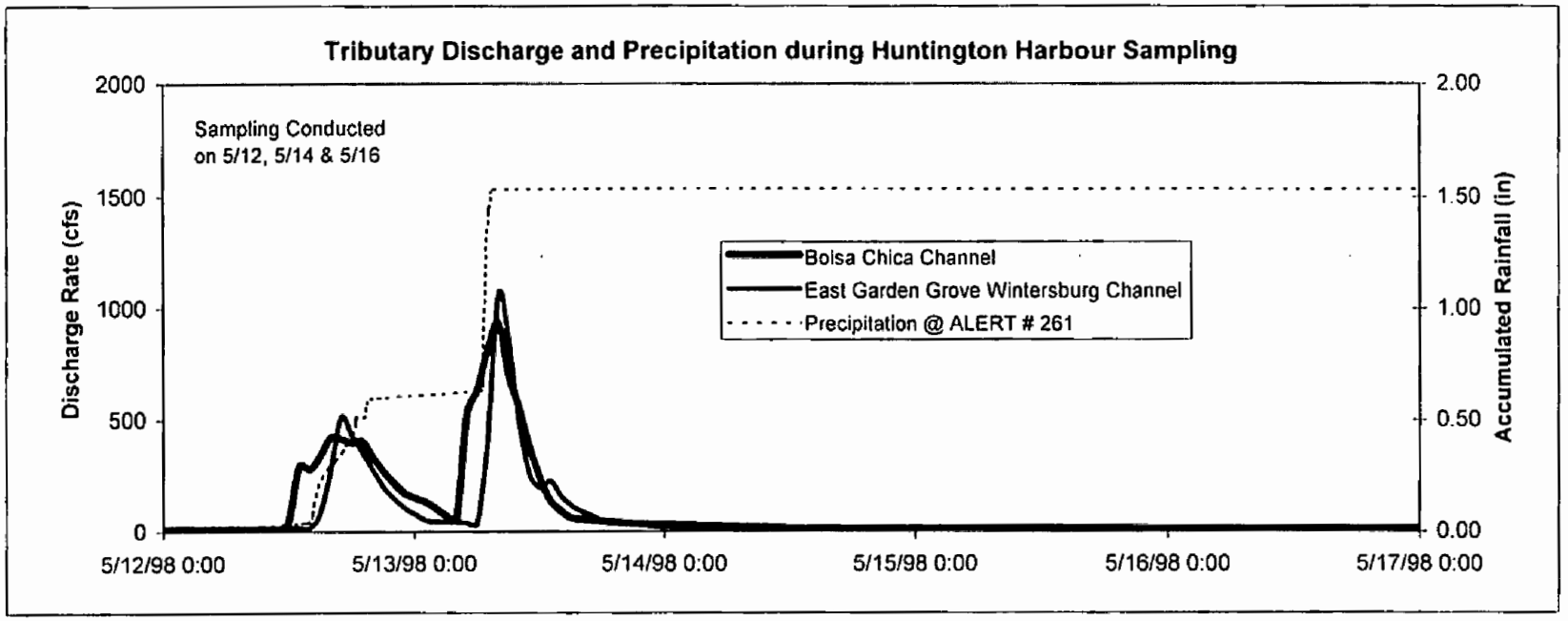

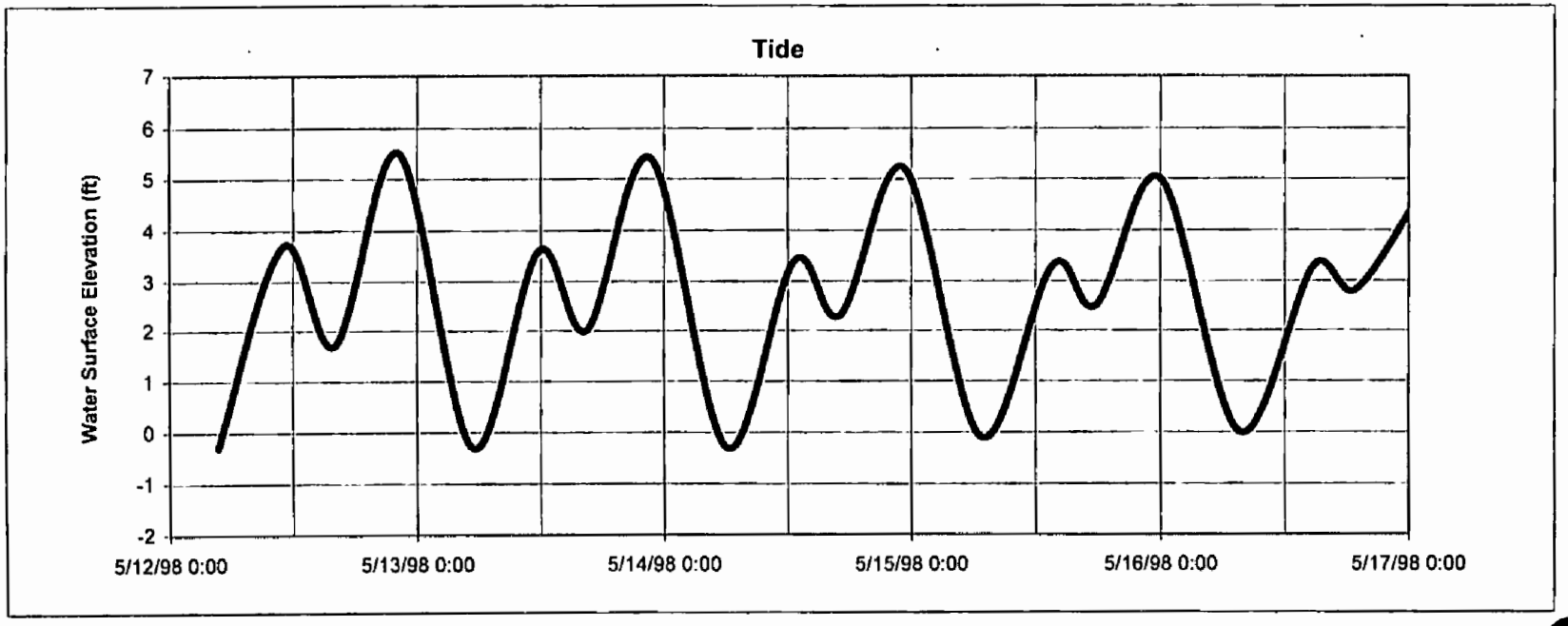

Bolsa Chica Discharge includes Anah Barber City and Westminster Channels

Huntington Harbour Sampling during a March 1999 Storm

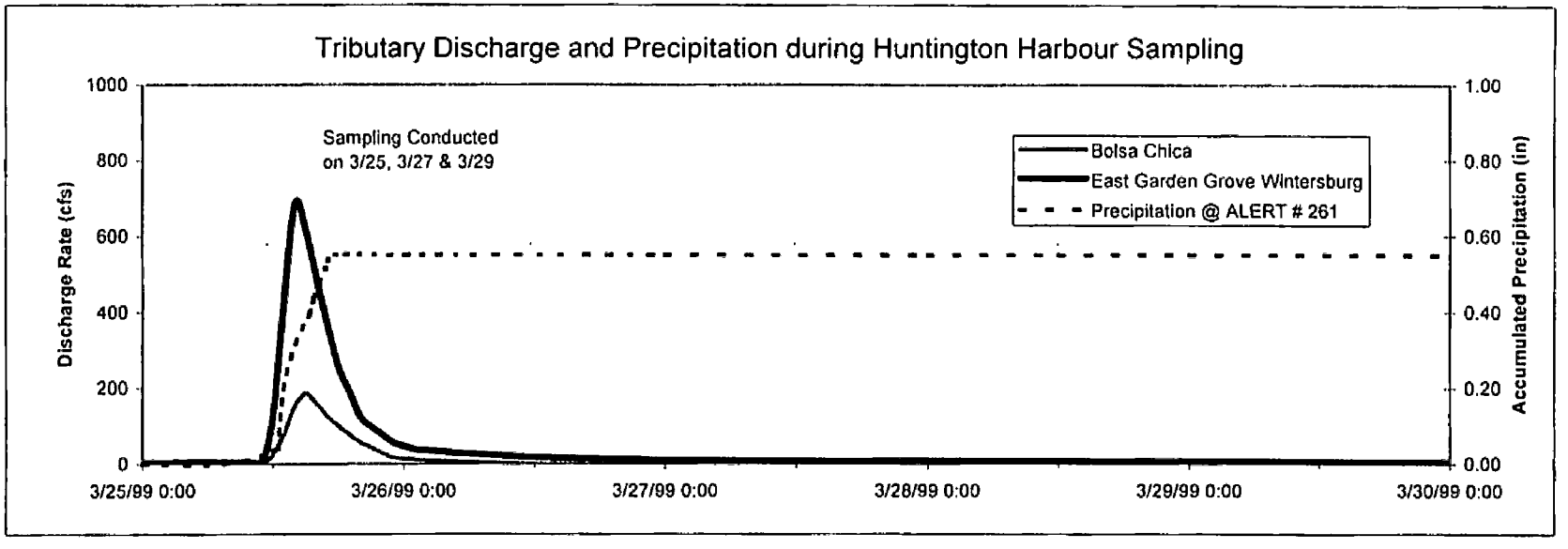

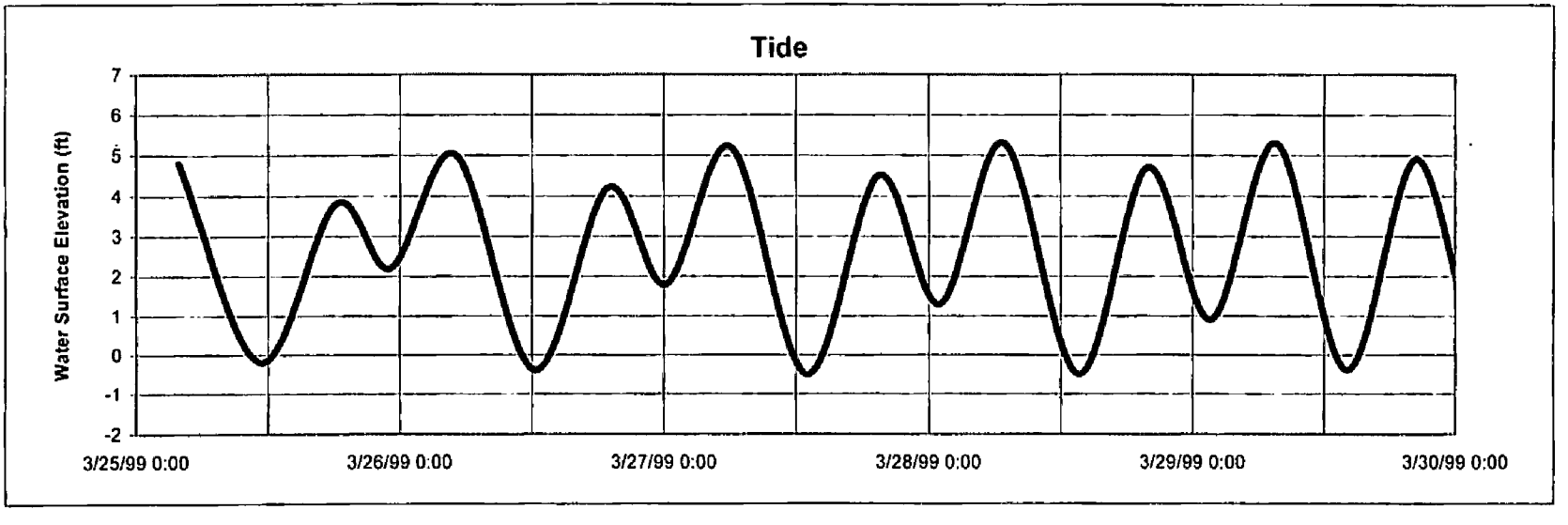

Bolsa Chica discharge includes Anaheim Barber City and Westminster Channels

Appendix 4.14:
Studies Conducted by Other Agencies

Chemistry, Toxicity and Benthic Community Conditions of Selected Southern California Bays and Estuaries

Figure 1
Sampling Locations in Newport Bay for NOAA/ SWRCB/ EPA Study

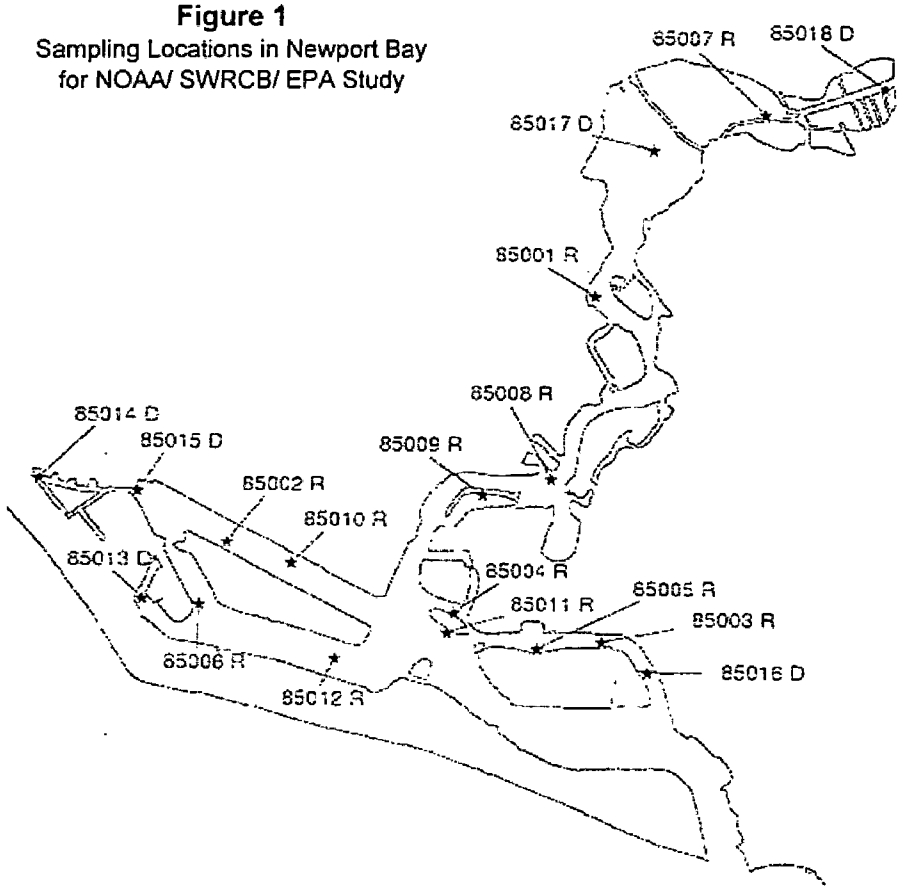

Station No.	Station Name	Sampling Design
85001	NEWPORT BAY (523)	RANDOM
85002	NEWPORT BAY (616)	RANDOM
85003	NEWPORT BAY (791)	RANDOM
85004	NEWPORT BAY (877)	RANDOM
85005	NEWPORT BAY (949)	RANDOM
85006	NEWPORT BAY (1009)	RANDOM
85007	NEWPORT BAY (431)	RANDOM
85008	NEWPORT BAY (670)	RANDOM
85009	NEWPORT BAY (705)	RANDOM
85010	NEWPORT BAY (819)	RANDOM
85011	NEWPORT BAY (905)	RANDOM
85012	NEWPORT BAY (1064)	RANDOM
85013	NEWPORT BAY (RHINE CHANNEL)	DIRECTED
85014	NEWPORT BAY (NEWPORT ISLAND)	DIRECTED
85015	NEWPORT BAY (ARCHES STORM DRAIN)	DIRECTED
85016	NEWPORT BAY (YACHTMANS COVE)	DIRECTED
85017	NEWPORT BAY (UNIT II BASIN)	DIRECTED
85018	NEWPORT BAY (UNIT I BASIN)	DIRECTED

R = Sampling sites selected using EPA's EMAP stratified random sampling design intended to assess the spatial extent of toxicity.
D = Sampling sites selected using a directed point sampling design intended to investigate potential toxic hotspots.

Chemistry, Toxicity and Benthic Community Conditions at Selected Southern California Bays and Estuaries

Figure 2
Sampling Locations in Dana Point Harbor
for NOAA/ SWRCB/ EPA Study

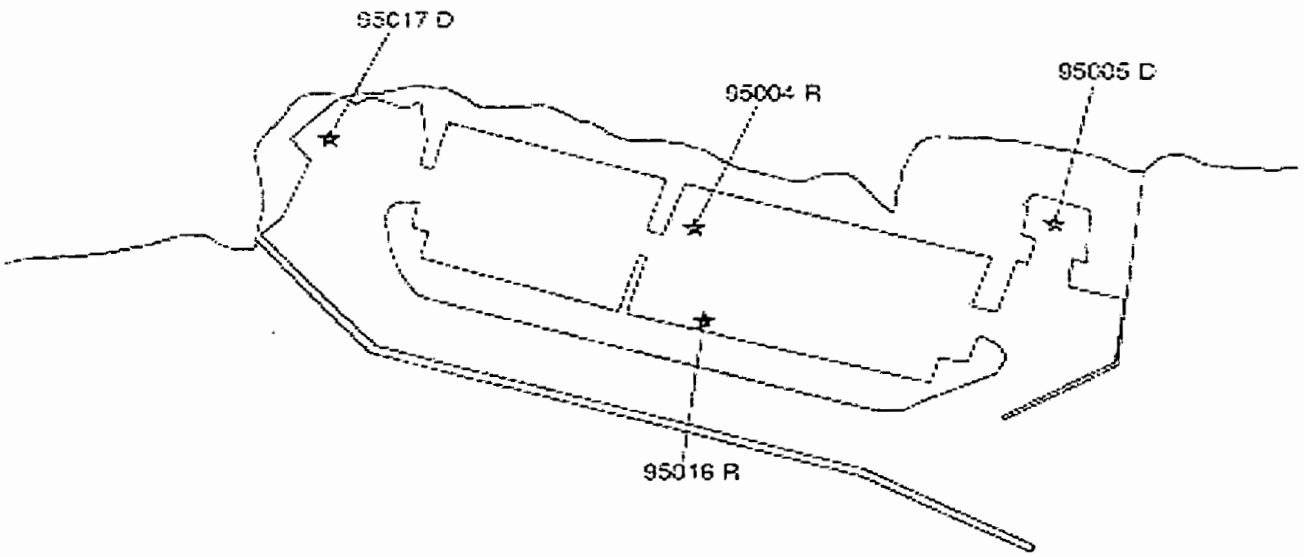

Station No.	Station Name	Sampling Design
95004	DANA POINT HARBOR (386)	RANDOM
95005	DANA POINT HARBOR (COMMERCIAL BASIN)	DIRECTED
95016	DANA POINT HARBOR (396)	RANDOM
95017	DANA POINT HARBOR (STORM DRAIN)	DIRECTED

R = Sampling sites selected using EPA's EMAP stratified random sampling design intended to assess the spatial extent of toxicity.
D = Sampling sites selected using a directed point sampling design intended to investigate potential toxic hotspots.

Chemistry, Toxicity and Benthic Community Conditions of Selected Southern California Bays and Estuaries

Figure 3
Total Chlordane Concentrations in Newport Bay
Sediment Samples for NOAA/ SWRCB/ EPA Study

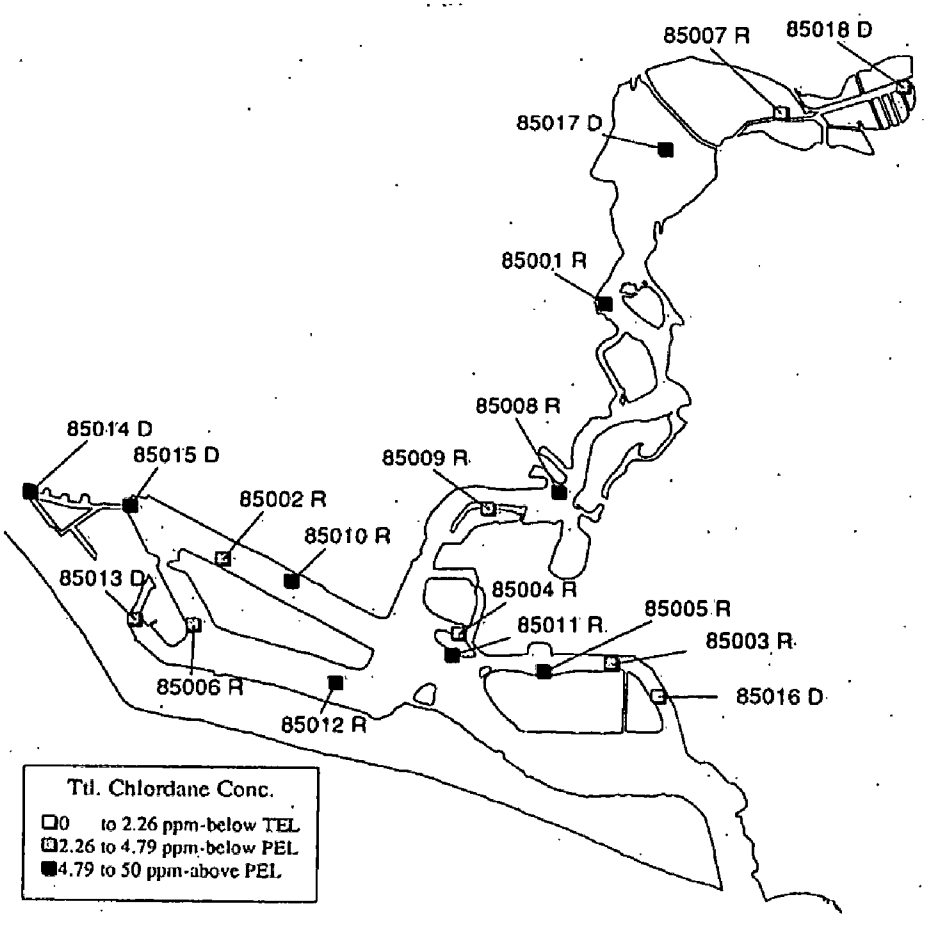

Figure 4
Total PAH Concentrations in Newport Bay
Sediment Samples for NOAA/ SWRCB/ EPA Study

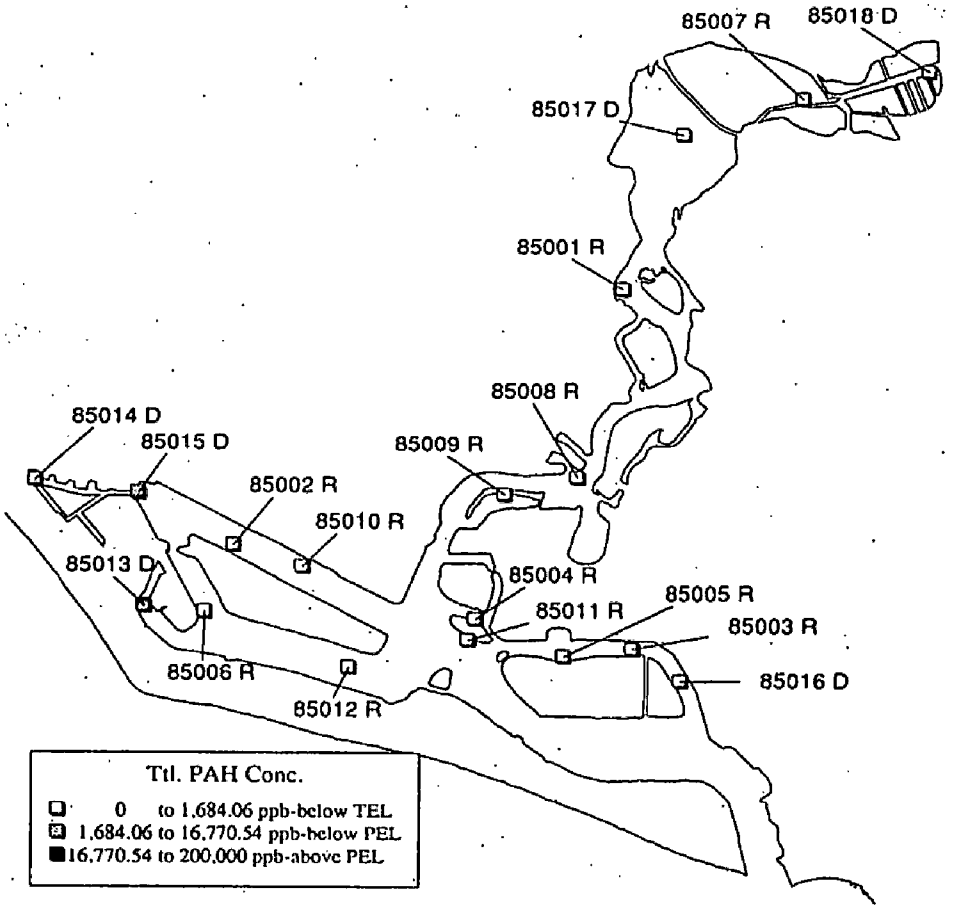

TEL = Threshold Effects Level = The geometric mean of the 50th percentile of the "No Effects" data and the 15th percentile of the "Effects" data.
PEL = Probable Effects Level = The geometric mean of the 85th percentile of the "No Effects" data and the 50th percentile of the "Effects" data.

Chemistry, Toxicity and Benthic Community Conditions of Selected Bays and Estuaries

Figure 5
p,p'-DDE Concentrations in Newport Bay
Sediment Samples for NOAA/ SWRCB/ EPA Study

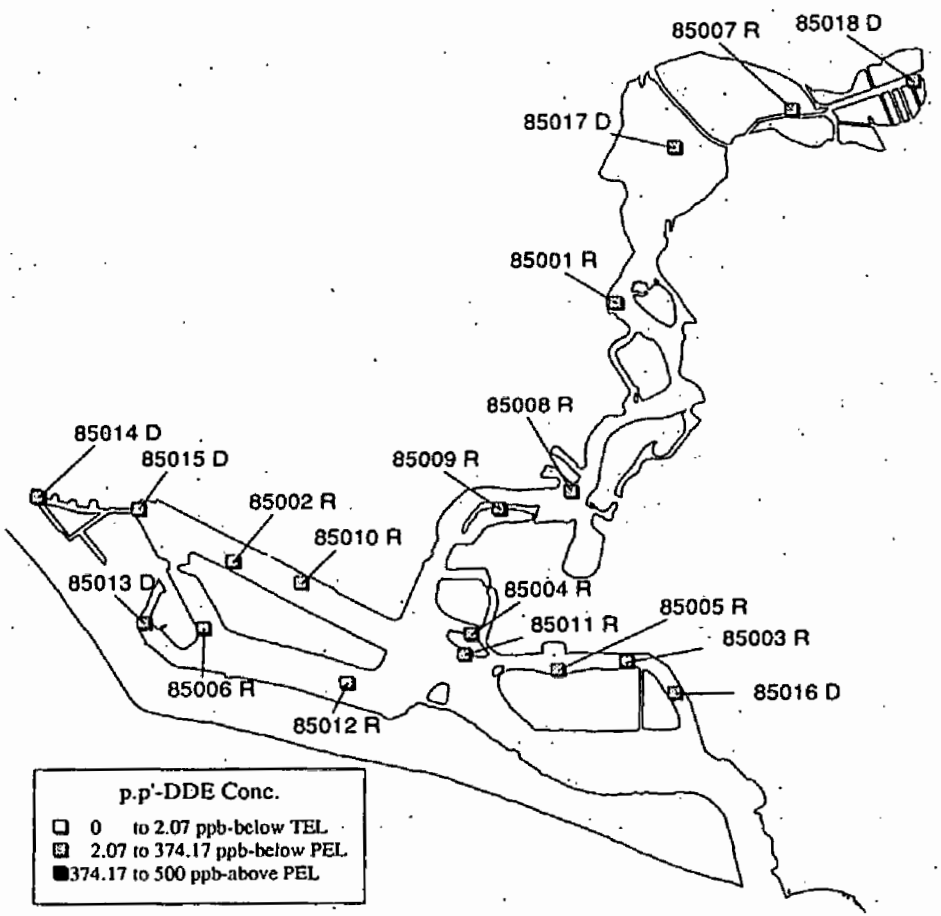

Figure 6
Total DDT Concentrations in Newport Bay
Sediment Samples for NOAA/ SWRCB/ EPA Study

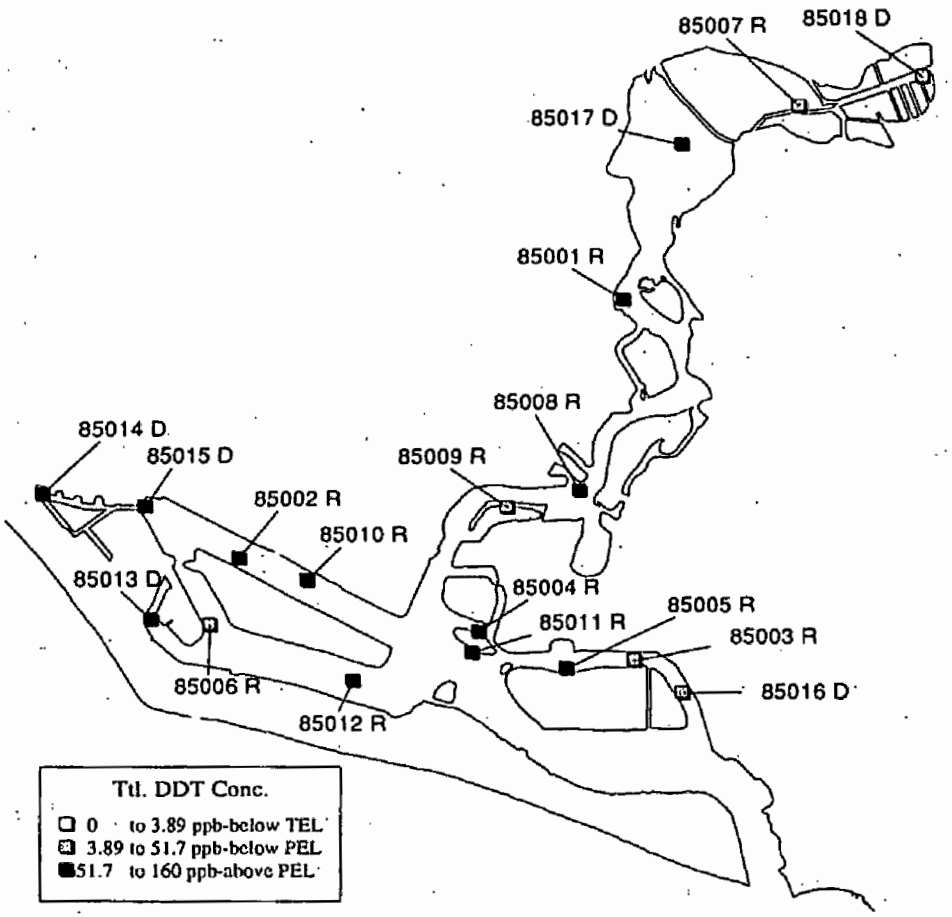

TEL = Threshold Effects Level = The geometric mean of the 50th percentile of the "No Effects" data and the 15th percentile of the "Effects" data.
PEL = Probable Effects Level = The geometric mean of the 85th percentile of the "No Effects" data and the 50th percentile of the "Effects" data.

Chemistry, Toxicity and Benthic Community Conditions of Selected Southern California Bays and Estuaries

Figure 7
Copper Concentrations in Newport Bay
Sediment Samples for NOAA/ SWRCB/ EPA Study

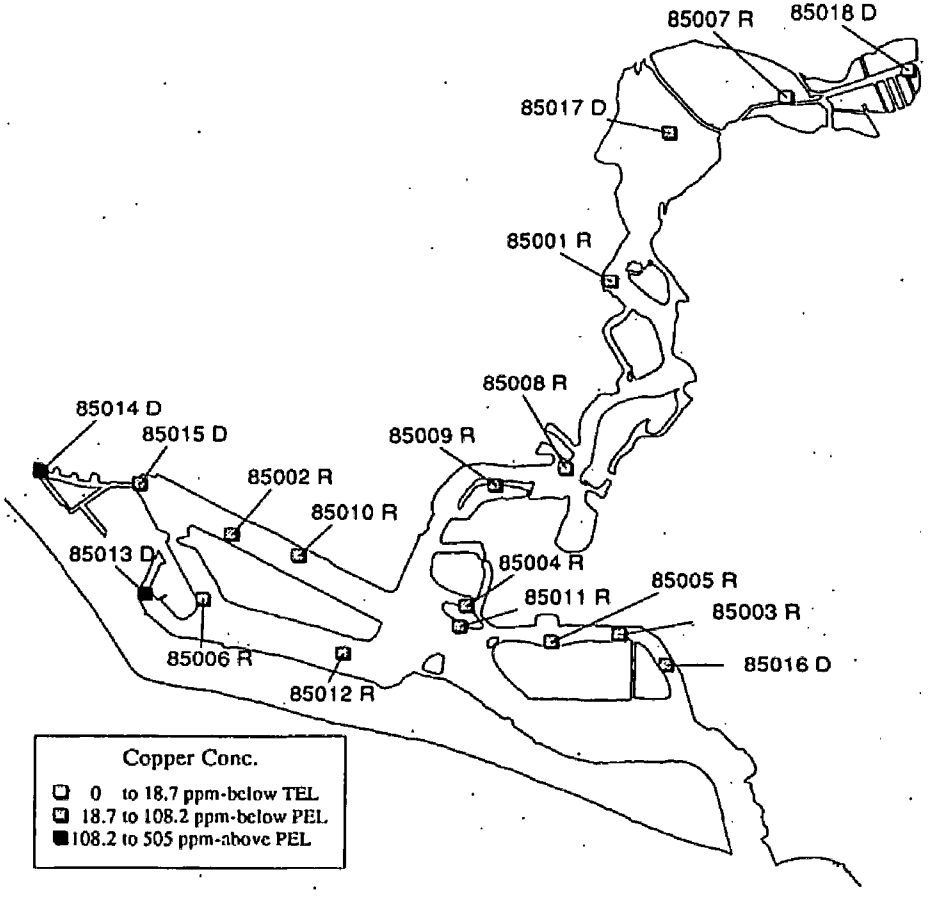

Figure 8
Mercury Concentrations in Newport Bay
Sediment Samples for NOAA/ SWRCB/ EPA Study

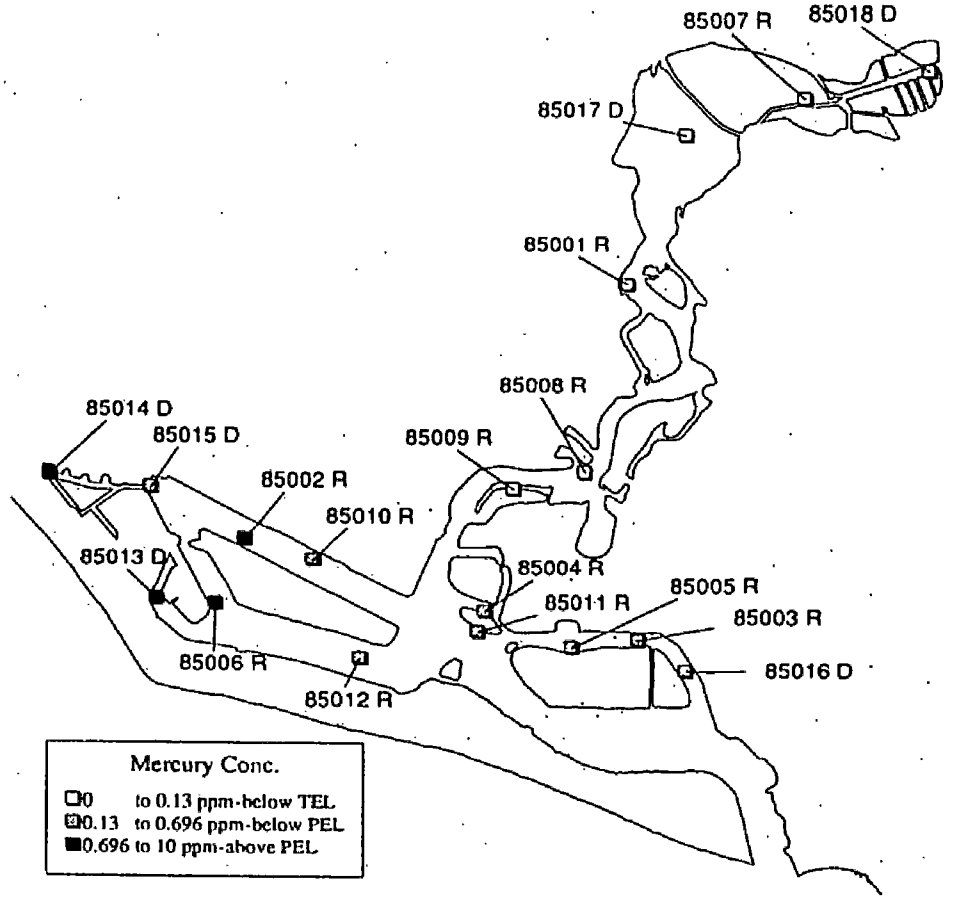

TEL = Threshold Effects Level = The geometric mean of the 50th percentile of the "No Effects" data and the 15th percentile of the "Effects" data.
PEL = Probable Effects Level = The geometric mean of the 85th percentile of the "No Effects" data and the 50th percentile of the "Effects" data.

Chemistry, Toxicity and Benthic Community Conditions of Selected Southern California Bays and Estuaries

Figure 9
Toxicity of Sediment Interstitial Water Samples in Newport Bay to Sea Urchin Fertilization for NOAA/ SWRCB/ EPA Study.

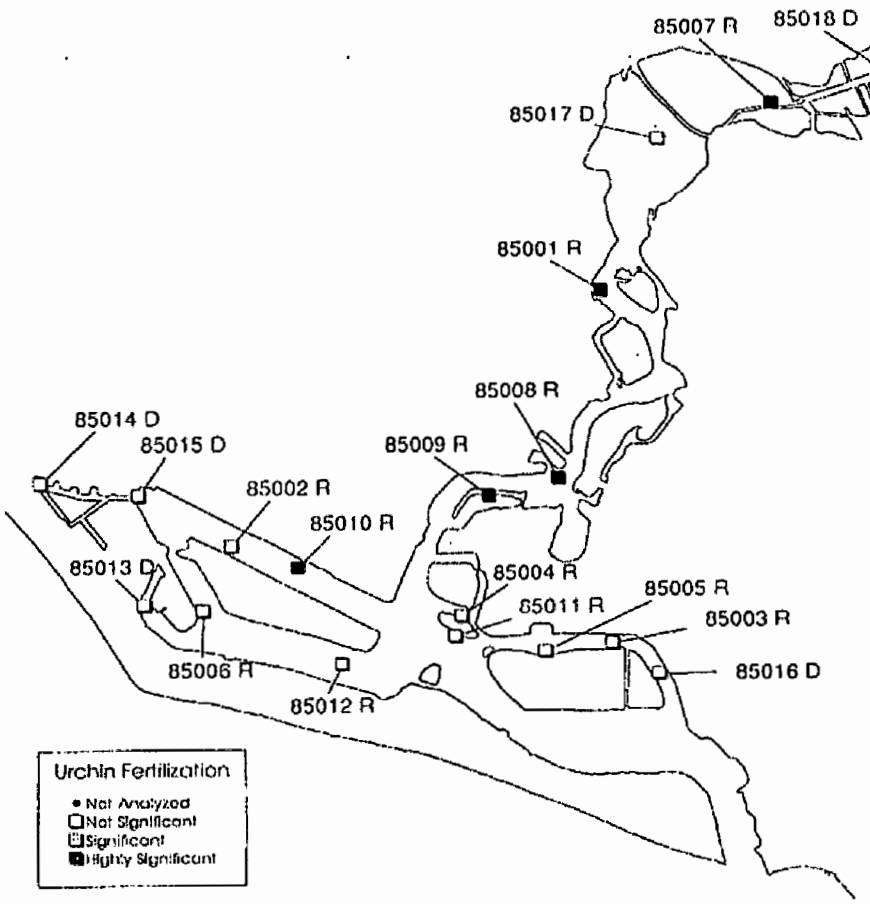

Figure 10
Benthic Community Degradation in Newport Bay Samples for NOAA/ SWRCB/ EPA Study

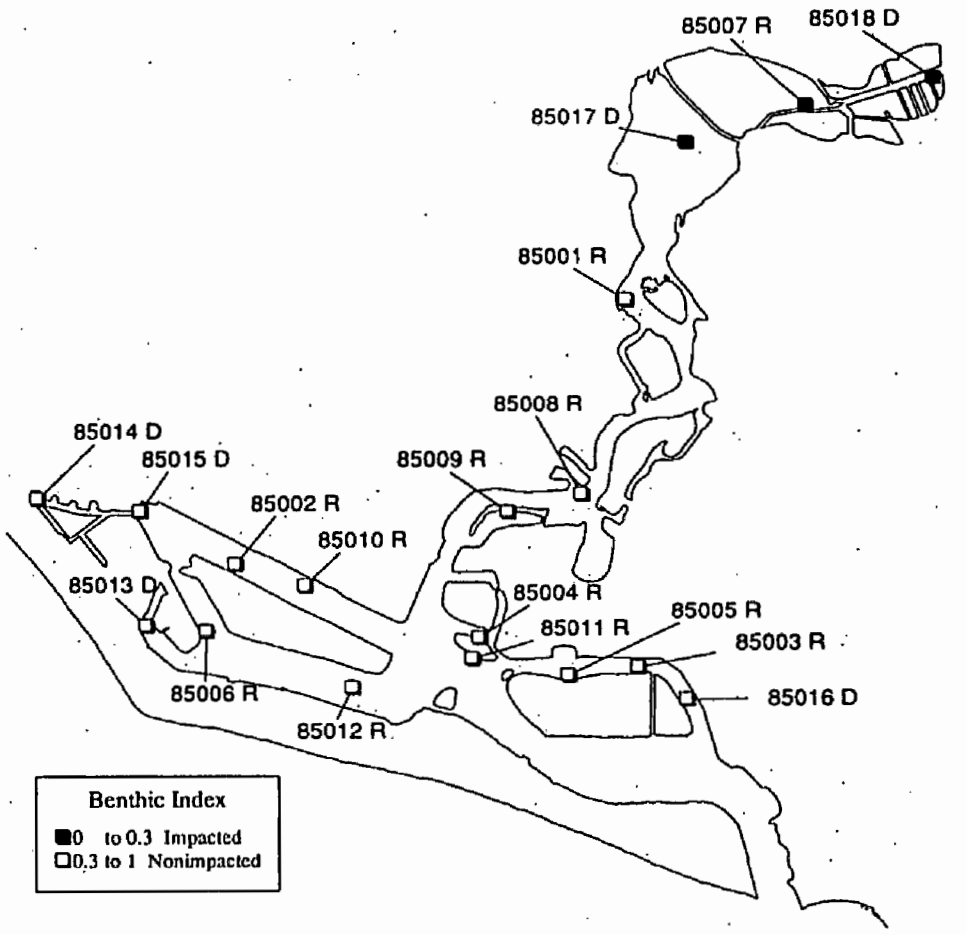

Benthic community degradation is assessed using a Benthic Index, calculated based on measures of the Total Number of Fauna, Number of Crustacean Species, and Numbers of Positive and Negative Indicator Species.

Chemistry, Toxicity and Benthic Community Conditions of Selected Southern California Bays and Estuaries

Figure 11
Total Chlordane Concentrations in Dana Point Harbor Sediment Samples for NOAA/ SWRCB/ EPA Study.

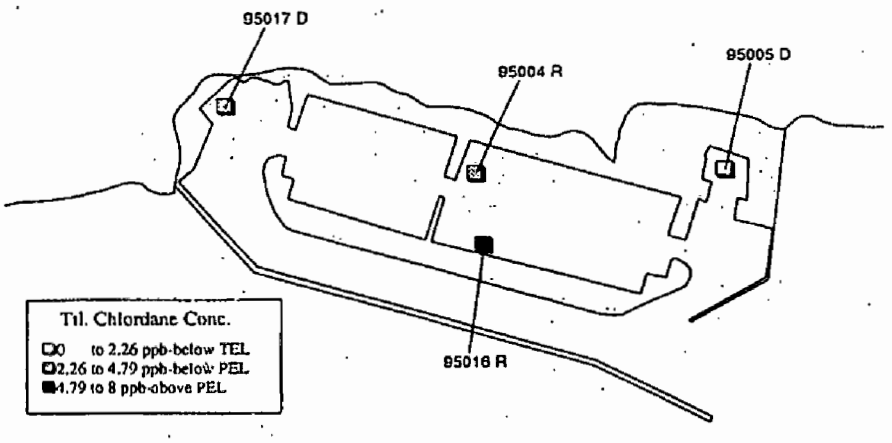

Figure 12
Copper Concentrations in Dana Point Harbor Sediment Samples for NOAA/ SWRCB/ EPA Study.

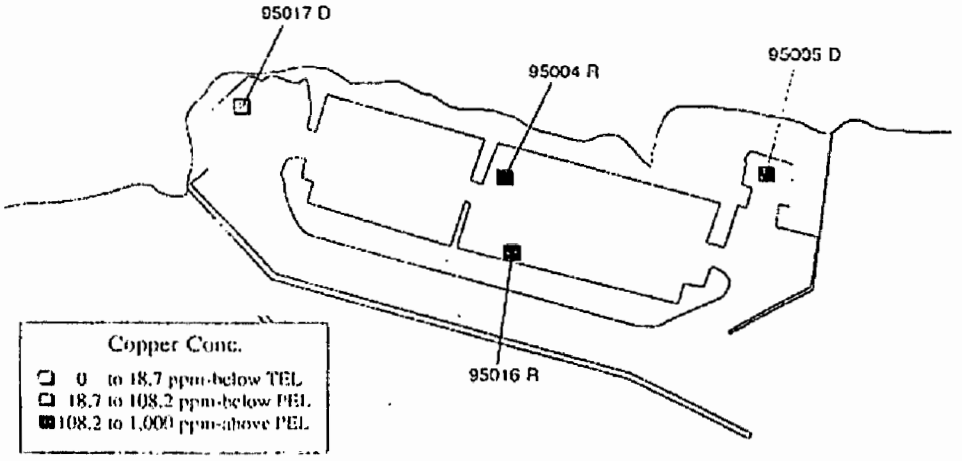

TEL = Threshold Effects Level = The geometric mean of the 50th percentile of the "No Effects" data and the 15th percentile of the "Effects" data.
PEL = Probable Effects Level = The geometric mean of the 85th percentile of the "No Effects" data and the 50th percentile of the "Effects" data.

Cheimistry, Toxicity and Benthic Community Conditions of Selected Southern California Bays and Estuaries

Figure 13
Toxicity of Sediment Interstitial Water Samples in Dana Point Harbor to Sea Urchin Fertilization for NOAA/ SWRCB/ EPA Study.

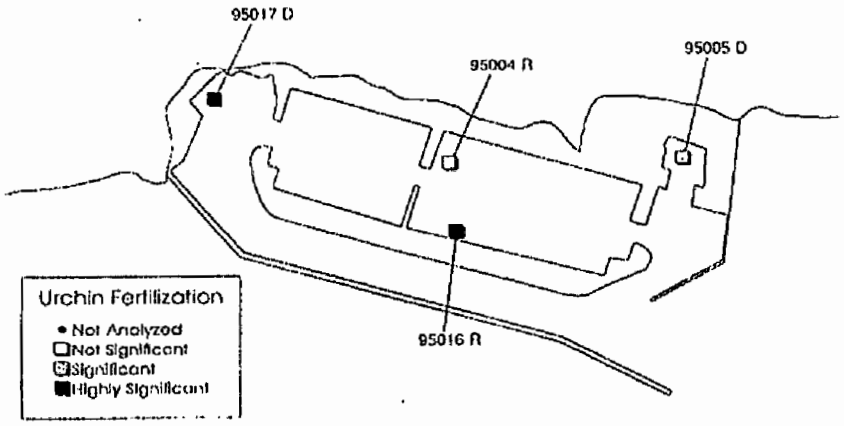

Figure 14
Benthic Community Degradation in Dana Point Harbor Samples for NOAA/ SWRCB/ EPA Study.

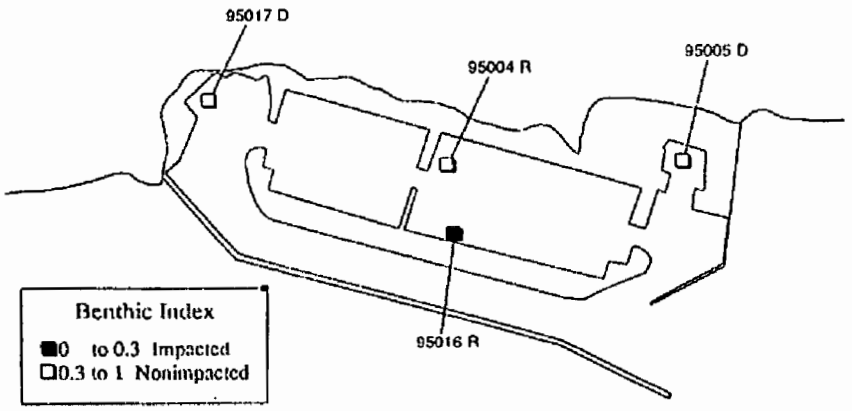

Benthic community degradation is assessed using a Benthic Index, calculated based on measures of the Total Number of Fauna, Number of Crustacean Species, and Numbers of Positive and Negative Indicator Species.

Table 1
SWRCB Mussel Watch Program 1991-1995
Organic Chemicals Exceeding Selected Criteria
(ppb, wet weight)

Station Name	Sample Date	Chlor-pyrifos	Dacthal	Hepta-chlor-epoxide	Oxa-diazon	Toxa-phene	Total Chlor-dane	Total DDT	Dieldrin	Total PCB	Diaz-inon	Dichloro-benzo-phenone	Dicofol	Total PAH
Anaheim Bay/Navy Harbor	12/22/91						8.8+	103.6+	1.8+	53.0+				
Anaheim Bay/Navy Marsh	12/22/91						9.9+	103.5+	1.8+	51.0+				
Anaheim Bay/Navy Marsh 2	12/22/91		0.7*				7.5+	80.8+	0.9+	40.0+				
Huntington Harbour/Edinger Street	12/22/91	ND	0.5	ND	2.1*	ND	12.0+	68.6+	1.9+	52.0+				
	2/7/94	1.3*	2.2*	ND	ND	ND	8.9+	36.2+	1.5+	11.8+				
	1/30/95	0.9*	ND	0.2*	0.9	15.1*+	13.1+	63.5+	2.7+	15.5+				
Huntington Harbour/Warner Ave Brdg	12/22/91	ND		ND	1.1*	ND	14.3+	51.3+	2.0+	44.0+				NA
	1/6/93	2.6**		ND	1.1*	26.0*+	16.1+	54.2+	2.4+	49.0+				53.0+
	2/7/94	1.3*		ND	1.5*	ND	16.7+	52.8+	1.7+	17.1+				NA
	1/30/95	1.1*		0.2	0.7	20.7*+	17.9+	70.6+	2.8+	32.4+				NA
Huntington Harbour/Harbor Lane	12/22/91				1.4*		16.3+	135.9+	4.6+	460.0**+				
Newport Bay/Bay Island	12/22/91				2.8**		14.8+	141.1+	2.3+	66.0+				
Newport Bay/Turning Basin	12/22/91	ND			1.1*	ND	10.2+	57.2+	1.8+	58.0+				
	1/30/95	0.7*			1.6*	15.6*+	6.3+	25.2	1.7+	8.6+				
Newport Bay/Highway 1 Bridge	12/22/91	ND	ND	ND	2.3*	ND	15.8+	162.5*+	2.4+	70.0+				NA
	1/5/93	9.1**	0.6	ND	1.8*	42.0*+	11.6+	80.7+	2.7+	24.0+				24.3+
	2/7/94	1.4*	ND	ND	ND	ND	10.4+	72.9+	1.6+	11.5+				NA
	1/30/95	2.9**	1.2*	0.2*	4.0**	43.4*+	17.0+	119.2+	1.9+	16.9+				NA
Newport Bay/Crows Nest	12/22/91	0.8*			2.3*	ND	16.2+	139.8+	4.8+	460.0**+				NA
	1/5/93	1.4**			ND	ND	10.4+	53.0+	4.1+	160.0+				12.1+
	2/7/94	0.6*			ND	ND	8.1+	53.2+	1.5+	75.7+				NA
	1/30/95	0.3			0.8	10.8*+	6.3+	36.6+	2.1+	44.1+				NA
Newport Bay/Rhine Channel/End	12/22/91	ND			3.8**	ND	22.9*+	165.8*+	5.2+	630.0**+				NA
	1/5/93	1.2*			ND	ND	13.9+	47.3+	1.8+	40.0+				80.4+
	2/7/94	1.6**			0.5	ND	6.6+	36.3+	2.1+	62.3+				NA
	1/30/95	0.7*			1.9*	22.1*+	9.6+	40.9+	1.9+	45.2+				NA
Dana Point Harbor/Boat Yard	12/21/91						2.3+			19.0+				
	1/5/93						NA			NA				
Garden Grove/Wintersburg Channel	1/23/91				28.4*		13.3+++	28.2	5.3+++	29.4+++	22.5*			NA
	3/17/93				22.0		18.9+++	95.8+++	4.4+++	61.0+++	NA			210.2+++
Upper Newport Bay/MacArthur	1/23/91	7.5			60.0*	ND	15.5+++	88.2+++	1.6+++	22.5+++				NA
	3/17/93	42.0*			62.0**	110.0+++	11.1+++	76.0+++	2.8+++	27.0+++				72.9+++
Upper Newport Bay/Drain 4	1/23/91	27.4				ND	12.1+++	60.3+++	1.0+++	9.4+++		4.1*	273.6**	NA
	3/17/93	56.0*				140.0+++	11.5+++	93.1+++	3.8+++	21.0+++		ND	NA	164.1+++
Corona Del Mar	11/29/91	0.8**					0.9++	16.3++	0.5++	11.0++				

ND Not Detected
NA Not Analyzed

* Equals or exceeds EDL 85
** Equals or exceeds EDL 95

\+ Exceeds MTRLs in Enclosed Bays and Estuaries
++ Exceeds MTRLs in Ocean Waters
+++ Exceeds MTRLs in Inland Surface Waters

Table 2
SWRCB Mussel Watch Program 1991-1995
Trace Elements Exceeding Selected Criteria
(ppm, wet weight)

Station Name	Sample Date	Aluminum	Arsenic	Cadmium	Chromium	Copper	Lead	Manganese	Mercury	Selenium	Silver	Zinc
Anaheim Bay/Navy Harbor	12/22/91	150.0*		1.0+								
Anaheim Bay/Navy Marsh	12/22/91	130.0*										
Anaheim Bay/Navy Marsh 2	12/22/91	160.0*		1.0+								
Huntington Harbour/Edinger Street	12/22/91	140.0*	NA	1.5+	0.24			4.20		NA		
	2/7/94	190.0*	1.6+	1.3+	0.28			4.20		0.40+		
	1/30/95	250.0**	NA	1.5+	18.00**+			6.20**		NA		
Huntington Harbour/Warner Ave Brdg	12/22/91	120.0	NA	1.3+	0.26		1.60*	4.80*		NA		40.0
	1/6/93	170.0*	NA	1.3+	0.72*		1.50	4.10		NA		55.0*
	2/7/94	190.0*	1.5+	1.4+	0.33		1.70*	5.90*		0.37+		63.0*
	1/30/95	200.0*	NA	1.2+	15.00**+		1.50	5.90*		NA		55.0*
Huntington Harbour/Harbor Lane	12/22/91			1.0+		5.00*	2.60*+					54.0*
Newport Bay/Bay Island	12/22/91			1.2+								
Newport Bay/Turning Basin	12/22/91			1.4+	0.16							64.0*
	1/30/95			1.7*+	1.90**+							55.0*
Newport Bay/Highway 1 Bridge	12/22/91	73.0	NA	1.4+		2.60		3.20	0.02			42.0
	1/5/93	230.0**	NA	1.9*+		2.10		7.81*	0.03			46.0
	2/7/94	150.0*	1.5+	1.4+		2.70		7.50**	0.04			46.0
	1/30/95	110.0	NA	1.4+		7.00*		6.90**	0.06*			75.0*+
Newport Bay/Crows Nest	12/22/91	61.0	NA	1.4+	0.18	3.70	2.10*+	2.90	0.06*	NA		74.0**+
	1/5/93	52.0	NA	1.5+	2.30**+	8.30*	0.95	3.80	0.05	NA		76.0**+
	2/7/94	110.0	1.5+	1.7*+	0.29	21.00**+	1.00	4.80*	0.09**	0.31+		81.0**+
	1/30/95	280.0**	NA	1.2+	2.50**+	2.10	0.49	4.50	0.03	NA		42.0
Newport Bay/Rhine Channel/End	12/22/91		NA	1.1+	0.24	4.10	2.60*+	4.40*	0.07*			70.0*+
	1/5/93		NA	2.7**+	1.40**+	11.00*	0.94	6.81*	0.06*			98.0**+
	2/7/94		1.4+	1.5+	0.45	26.00**+	0.92	12.00**	0.07*			88.0**+
	1/30/95		NA	1.6*+	0.57	11.00*	0.58	6.10**	0.06*			72.0*+
Dana Point Harbor/Boat Yard	12/21/91	110.0		0.9		12.00**						59.0*
	1/5/93	200.0*		2.4**+		15.00**						110.0**+
Garden Grove/Wintersburg Channel	1/23/91					6.20	0.41**	2.70	0.07**		<0.002	25.0*
	3/17/93					19.00**	0.24*	10.00*	0.05**		0.04**	26.0**
Upper Newport Bay/MacArthur	1/23/91			8.4**+#								
	3/17/93			0.1								
Upper Newport Bay/Drain 4	1/23/91					5.20			0.02			
	3/17/93					9.70*			0.05*			

NA Not Analyzed
< Below Indicated Detection Limit

* Equals or exceeds EDL 85
** Equals or exceeds EDL 95

\+ Exceeds MIS
\# Exceeds MTRLs in Inland Surface Waters

Table 3
SWRCB Toxic Substances Monitoring Program 1991-1995
Trace Elements Exceeding Selected Criteria
(ppm, wet weight)

Station Name	Species Code	Tissue Analyzed	Sample Date	Cadmium	Chromium	Lead	Nickel	Selenium	Zinc
San Diego Creek/Michelson Drive	PRS	W	5/16/91	0.06				1.60*	39.00
	PRS	W	5/16/91	0.06				1.60*	33.00
	PRS	W	6/6/92	0.07				1.40*	37.00
	PRS	W	5/19/93	0.12*				1.30	34.00
	PRS	W	6/2/94	0.07				1.60*	49.00**
	PRS	W	6/17/95	0.13*				1.10	25.00
	PRS	W	6/17/95	0.12*				1.10	29.00
San Diego Creek/Barranca Parkway	PRS	W	5/16/91	0.08*				1.60*	40.00*
	PRS	W	6/6/92	0.11*				1.40*	40.00*
El Modena Chan/Upstr Walnut Ave Bridge	PRS	W	5/16/91	0.31**					
Peters Canyon Channel	PRS	W	5/16/91	0.15**					38.00
	PRS	W	6/7/92	0.24**					43.00*
	PRS	W	5/19/93	0.14*					39.00
	PRS	W	6/2/94	0.13*					46.00*
	PRS	W	6/2/94	0.13*					44.00*
	PRS	W	6/17/95	0.14*					38.00
Aliso Creek	PRS	W	7/29/95	0.50**					48.00*
	PRS	W	7/29/95	0.43**					47.00*
Santa Ana River/Imperial Hwy Bridge	SAKR	W	5/18/93		0.26*				
San Juan Creek/Doheny State Park	PRS	W	6/17/93	0.15**			<0.10	1.40*	
	PRS	W	7/29/95	0.72**			0.16	1.90**	
	PRS	W	7/29/95	0.79**			0.21*	1.90**	
Huntington Harbour/Anaheim Bay	WCK	L	11/21/91		<0.02		0.20**		
	WCK	F	11/21/91		NA		NA		
	BP	F	6/7/92		NA		NA		
	BP	L	6/7/92		<0.02		<0.10		
	BSP	F	6/18/93		NA		<0.10		
	BSP	L	6/18/93		0.06**		NA		
Newport Bay	SSB	F	6/20/91			NA			
	SSB	L	6/20/91			0.10			
	BP	L	6/8/92			5.00**			
	BP	F	6/8/92			NA			

Species codes are listed in Table 3-A
< - Below Indicated Detection Limit

Tissues Analyzed: W - Whole Body
F - Filet
L - Liver

* - Equals or exceeds EDL 85
** - Equals or exceeds EDL 95
NA - Not Analyzed

Table 4
SWRCB Toxic Substances Monitoring Program 1991-1995
Organic Chemicals Exceeding Selected Criteria
(ppb, wet weight)

Station Name	Species Code	Tissue Analyzed	Sample Date	Chlor-pyrifos	Dacthal	Oxa-diazon	Hexa-chloro-benzene	Toxa-phene	gamma-HCH (Lindane)	Total Chlor-dane	Total DDT	Total PCB	Diaz-inon	Chem. Group A
San Diego Creek/Michelson Drive	PRS	W	5/16/91	<10.0	120.0*	240.0		130.0#					180.0**	190.4#
	PRS	W	5/16/91	<10.0	120.0*	240.0		160.0#					260.0**	220.1#
	PRS	W	6/6/92	<10.0	5.1	200.0		150.0#					<50.0	203.0#
	PRS	W	5/19/93	15.0	9.0	130.0		180.0#					<50.0	215.5#
	PRS	W	6/2/94	<10.0	6.9	70.0		120.0#					440.0**	151.5#
	PRS	W	6/17/95	55.0*	140.0*	420.0*		<100.0					<50.0	48.1
	PRS	W	6/17/95	59.0*	130.0*	360.0*		320.0#					87.0**	365.6#
San Diego Creek/Barranca Parkway	PRS	W	5/16/91			350.0*		180.0#			754.0			222.3#
	PRS	W	6/6/92			310.0		140.0#			1054.0#			193.9#
	PRS	W	5/19/93			170.0		130.0#			386.0			144.6#
El Modena Chan/Upstr Walnut Ave Brg	PRS	W	5/16/91		550.0**		8.2*	500.0#		157.0#	3986.0#			677.6#
Peters Canyon Channel	PRS	W	5/16/91	16.0	670.0**	330.0		550.0#		109.0#	2179.0#		180.0**	677.0#
	PRS	W	6/7/92	<10.0	12.0	480.0*		330.0#		65.8	1617.2#		120.0**	405.4#
	PRS	W	5/19/93	15.0	7.9	200.0		393.0#		74.2	1512.0#		<50.0	477.1#
	PRS	W	6/2/94	<10.0	9.0	77.0		300.0#		45.4	918.0		<50.0	350.8#
	PRS	W	6/2/94	<10.0	5.6	120.0		390.0#		54.1	930.0		<50.0	452.5#
	PRS	W	6/17/95	40.0*	16.0	79.0		540.0#		27.9	707.0		74.0**	574.9#
Santa Ana River/Imperial Hwy Bridge	SAKR	W	5/18/93						2.7	<5.0				
	CP	F	7/25/95						3.3+	6.0+				
San Juan Creek/Doheny State Park	PRS	W	6/17/93			320.0*								
	PRS	W	7/29/95			340.0*								
	PRS	W	7/29/95			310.0*								
San Juan Creek/La Novia Avenue	LMB	F	6/12/94			56.0**								
Huntington Harbour/Anaheim Bay	WCK	F	11/21/91							42.8**	368.0**	260.0*		42.8**
	BP	F	6/7/92							5.3+	100.0+	<50.0		5.3
	BSP	F	6/18/93							<5.0	61.0+	<50.0		ND
Anaheim Bay/Sunset Boatworks	YFC	F	6/17/95							28.5+	243.0+	70.0+		
Newport Bay	SSB	F	6/20/91								110.0+	135.0*		
	BP	F	6/8/92								48.0+	<50.0		
	BCK	F	6/18/95								66.0+	<50.0		

Species codes are listed in Table 3-A
Chemicals in Group A are listed in Table 4-A
Tissues Analyzed: W - Whole Body
F - Filet

* Equals or exceeds EDL 85
** Equals or exceeds EDL 95
\+ Exceeds MTRLs in Inland Surface Waters, Enclosed Bays and Estuaries or Ocean Waters

\# Equals or exceeds NAS recommended guideline
< Below indicated detection limit
ND Not Detected

Table 5
NOAA NST Mussel Watch Project 1990-1993
Trace Elements and Organic Chemicals Exceeding Selected Criteria
(dry weight)

Station Name	Species Tissue Analyzed	Number of Years Sampled Since 1990	Lead (Pb)	Total DDT	Total Chlordane	Total Dieldrin	Total PCB
"High" Concentration Criteria Level			4.0 ppm	120 ppb	31 ppb	15 ppb	470 ppb
Newport Beach Wedge Jetty	Mytilus californianus	3	2*+	2*			
Anaheim Bay West Jetty	Mytilus californianus	4	2*+	4*	4*	1*	1*

* Number of years since 1990 in which the concentration of the chemical was equal to or exceeded the indicated "High" Concentration Criteria Level. "High" is defined as the mean plus one standard deviation of the lognormal distribution of concentrations among sites using 1990 data.

+ Number of years since 1990 when concentration exceeded the U.S. Federal Drug Administration human consumption guidelines.

Table 3-A
SWRCB Toxic Substances Monitoring Program 1991-1995
Freshwater and Marine Fish Species Code List

Species Code	Type	Common Name	Species Name	Family Name
PRS	Freshwater	Red Shiner	Cyprinella lutrensis	Cyprinidae
SAKR	Freshwater	Santa Ana Sucker	Catostomus santaanae	Catostomidae
CP	Freshwater	Carp	Cyprinus carpio	Cyprinidae
LMB	Freshwater	Largemouth Bass	Micropterus salmoides	Centrarchidae
WCK	Marine	White Croaker	Genyonemus lineatus	Sciaenidae
BP	Marine	Black Perch	Embiotoca jacksoni	Embiotocidae
BSP	Marine	Barred Surfperch	Amphistichus argenteus	Embiotocidae
SSB	Marine	Spotted Sand Bass	Paralabrax maculatofasciatus	Serranidae
YFC	Marine	Yellowfin Croaker	Umbrina roncador	Sciaenidae
BCK	Marine	Black Croaker	Cheilotrema saturnum	Sciaenidae

Table 4-A
SWRCB Toxic Substances Monitoring Program 1991-1995
NAS Chemical Group A*

Chemical Name
aldrin
dieldrin
endrin
heptachlor
heptachlor epoxide
chlordane (total)
hexachlorocyclohexane (total)
endosulfan (total)
toxaphene

* Under National Academy of Sciences (NAS) Guidelines, chemicals in this group (individually or in combination), are referred to as Chemical Group A.

Table 3-A
SWRCB Toxic Substances Monitoring Program 1991-1995
Freshwater and Marine Fish Species Code List

Species Code	Type	Common Name	Species Name	Family Name
PRS	Freshwater	Red Shiner	Cyprinella lutrensis	Cyprinidae
SAKR	Freshwater	Santa Ana Sucker	Catostomus santaanae	Catostomidae
CP	Freshwater	Carp	Cyprinus carpio	Cyprinidae
LMB	Freshwater	Largemouth Bass	Micropterus salmoides	Centrarchidae
WCK	Marine	White Croaker	Genyonemus lineatus	Sciaenidae
BP	Marine	Black Perch	Embiotoca jacksoni	Embiotocidae
BSP	Marine	Barred Surfperch	Amphistichus argenteus	Embiotocidae
SSB	Marine	Spotted Sand Bass	Paralabrax maculatofasciatus	Serranidae
YFC	Marine	Yellowfin Croaker	Umbrina roncador	Sciaenidae
BCK	Marine	Black Croaker	Cheilotrema saturnum	Sciaenidae

STATE OF CALIFORNIA
STATE WATER RESOURCES CONTROL BOARD

ORDER: WQ 2000 - 11

In the Matter of the Petitions of
THE CITIES OF BELLFLOWER, ET AL., THE CITY OF ARCADIA, AND WESTERN STATES PETROLEUM ASSOCIATION
Review of January 26, 2000 Action of the Regional Board
and
Actions and Failures to Act
by both the
California Regional Water Quality Control Board,
Los Angeles Region and Its Executive Officer
Pursuant to Order No. 96-054,
Permit for Municipal Storm Water and Urban Run-Off Discharges Within
Los Angeles County
[NPDES NO. CAS614001]

SWRCB/OCC FILES A-1280, A-1280(a) and A-1280(b)

BY THE BOARD:

On July 15, 1996, the Los Angeles Regional Water Quality Control Board (Regional Water Board) issued a revised national pollutant discharge elimination system (NPDES) permit in Order No. 96-054 (permit) to the 85 incorporated cities and the county within Los Angeles County (the County).[1] The permit covers storm water discharges from municipal separate storm sewer systems throughout the County.[2]

[1] This was the second storm water permit adopted for Los Angeles County and its cities. The first permit was the subject of an earlier Order. (In the Matter of Natural Resources Defense Council, Inc., Order WQ 91-04). In this permit, the County is designated as the Principal Permittee, and each city is designated as a permittee. The County is required to submit various documents on behalf of all of the permittees.
[2] The Regional Water Board has since issued a separate permit for one city, Long Beach. The relevant provisions of the Long Beach permit are similar to those in Order No. 96-054.

The permit contains provisions for the regulation of storm water discharges from development planning and construction.[3] Pursuant to these provisions, the County was required to submit Standard Urban Storm Water Mitigation Plans (SUSMPs).[4] The SUSMPs are plans that designate best management practices (BMPs) that must be used in specified categories of development projects. The County submitted SUSMPs, but the Regional Water Board approved the SUSMPs only after making revisions. The Executive Officer issued the revised SUSMPs on March 8, 2000.[5]

On February 25, 2000, the State Water Resources Control Board (State Water Board or Board) received a petition for review of the actions and failures to act regarding the SUSMPs from a number of cities, the Building Industry Association of Southern California and the Building Industry Legal Defense Foundation (jointly referred to as Cities). A second petition was received from the City of Arcadia. And a third petition was received from the Western States Petroleum Association (WSPA). On April 7, 2000, the petitioners filed amendments to their petitions, concerning the March 8, 2000 issuance of the SUSMPs. The Cities' amendment also revised the list of cities included in the petition. The Cities' petition now includes 32 cities. The petitions are legally and factually related, and have therefore been consolidated for purposes of review.[6] The petitioners also requested a stay of the SUSMPs. This request was denied by letter, dated May 11, 2000.

[3] Permit, Part 2.III. These provisions focus more on post-construction impacts of development than on discharges from construction activities.
[4] Permit, Part 2.III.A.1.c.
[5] These are referred to herein as the Final SUSMPs. The Final SUSMPs also apply to Long Beach, even though it is subject to a separate permit.
[6] Cal. Code of Regs., tit. 23, section 2054.

On June 7 and 8, 2000, the Board held a hearing in Torrance. Several entities, including the petitioners, the Regional Water Board, and several environmental groups[7], were designated parties. The evidence from that hearing has been included in the record before the Board. The record for comments on the petition was kept open until the end of the hearing. The parties were allowed to submit post-hearing briefs.[8]

I. BACKGROUND

In prior Orders[9] this Board has explained the need for the municipal storm water programs and the emphasis on BMPs in lieu of numeric effluent limitations. The emphasis for preventing pollution from storm water discharges is still on the development and implementation of effective BMPs, but with the expectation that the level of effort will increase over time. In its Interim Permitting Approach[10], the United States Environmental Protection Agency (U.S. EPA) stated that first-round permits should include BMPs, and expanded or better-tailored BMPs in subsequent permits where necessary to attain water quality standards. Dischargers, consultants, and academic institutions in California and nationwide have conducted numerous studies on the effectiveness of BMPs and appropriate design standards. While many questions are still

[7] The environmental groups are Natural Resources Defense Council, Inc., Santa Monica BayKeeper, and Heal the Bay.

[8] There are several documents that were not timely received and, therefore, are not made a part of the record before the Board. The hearing notice specified that all evidence from parties must be received by May 31, 2000. The Regional Water Board submitted documents on June 6, 2000. The hearing notice specified that policy statements were due by the close of the hearing. Several comment letters were received June 12, 13, and 19, 2000. None of these submittals are a part of the record. The post-hearing briefs were subject to a 10-page limit. The environmental groups submitted objections to the post-hearing brief submitted by the Cities. First, the environmental groups challenge the length of the brief. All briefs were subject to a 10-page limit. The Cities submitted a 10-page brief, with a 22-page attachment showing extensive proposed revisions to the SUSMPs. This submittal violates the page limit, and only the brief is considered part of the record. Second, the environmental groups claim that an e-mail message referred to by the petitioners is subject to attorney-client privilege and should not have been used in this hearing. This e-mail message, from the Regional Water Board's counsel to one of its engineers, was placed in the Regional Water Board's administrative record and submitted to the State Water Board. Any privilege that may have attached to the message has been waived and no longer exists. Finally, the post-hearing brief from the City of Arcadia was received late and will not be considered. Documents submitted late for interim deadlines (such as the deadline for submitting responses to the petitions), have been included in the record.

[9] See, especially Orders WQ 91-03 (In the Matter of Citizens for a Better Environment et al.) and WQ 91-04.

[10] Interim Permitting Approach for Water Quality-Based Effluent Limitations in Storm Water Permits. (61 Federal Register 57425.)

outstanding, more is expected of municipal dischargers, and many are implementing more effective programs.

While storm water management plans are improving, our knowledge of the impacts is also growing. Urban runoff has been determined to be a significant contributor of impairment to waters throughout the state. In Los Angeles specifically, beach closures are sometimes associated with urban runoff. In adopting the SUSMPs, the Regional Water Board took note of the urgent need for preventing further pollution from urban runoff and storm water discharges.

It is important to emphasize the role of the SUSMPs within the totality of regulating storm water discharges, and the purpose of these particular control measures. The requirement to prepare SUSMPS was part of the development controls in the permit. In addition to development controls, the permit requires education, public outreach, programs to restrict illicit connections and discharges, and controls on public facilities. In the context of the entire effort required by the permit, the development controls can be seen as preventing the existing situation from becoming worse.

The Final SUSMPs include a list of mandatory BMPs for nine categories of development. There are provisions that are applicable to all categories and lists of BMPs for individual categories. Requirements applicable to all categories include provisions to limit erosion from new development and redevelopment, requirements to conserve natural areas, protection of slopes and channels, and storm drain stenciling. Examples of BMPs specific to categories of discharge include design of loading docks for commercial projects and design of fueling areas for retail gasoline outlets. In most respects, the Final SUSMPs were similar to those proposed by the County. The significant departures were the inclusion of a numeric design standard for structural or treatment control BMPs, and the inclusion of certain types of projects that were not

covered in the County's proposal. The design standard creates objective and measurable criteria for the amount of runoff that must be treated or infiltrated by BMPs.

The record indicates that the purpose of the development controls, including the SUSMPs, is not simply to prevent pollution associated with construction runoff. As the petitioners point out, construction discharges are already subject to this Board's Statewide Construction Permit. The development controls in the SUSMPs, on the other hand, focus on post-construction runoff. They are aimed at limiting not just the pollutants in runoff from the new development, but also the volume of runoff that enters the municipal storm sewer system. By limiting runoff from new development, the SUSMPs prevent increased impacts from urban runoff generally. There is adequate technical information in the record to show that by controlling the volume of runoff from new development, BMPs can be effective in reducing the discharge of pollutants in storm water runoff.

The Procedure for Adopting the SUSMPs

The permit requires a program for controls on Development Planning and Construction. It involved a number of submissions by the County in consultation with the Cities. The first step was submission of a checklist for determining priority projects and exempt projects. The checklist was due on January 30, 1998. A list of recommended BMPs for development projects was also due on that date. The SUSMPs were due within six months of approval of the BMP list, and were to incorporate BMPs for certain categories of development. Following approval of the SUSMPs, the cities and County were to implement development programs for priority projects, consistent with the BMP list and the SUSMPs.

The BMP list was not approved until April 22, 1999. Thereafter, the County submitted proposed SUSMPs on July 22, 1999. The Regional Water Board held a public workshop on

August 10, 1999. Following the workshop, the County submitted revisions to the SUSMPs on August 12, 1999. On August 16, 1999, the Regional water Board gave notice that it would discuss the SUSMPs in a public meeting on September 16, 1999. There was significant discussion at that meeting regarding the intent of the Executive Officer to approve the SUSMPs, but with revisions including a numeric design standard. At the conclusion of the meeting, the Regional Water Board members asked the Executive Officer to revise the SUSMPs and bring them back to another meeting. On December 7, 1999, the Executive Officer circulated revised SUSMPs for public review. This document incorporated a numeric design standard and made other revisions to the permittees' proposal. The Regional Water Board held a hearing on the SUSMPs on January 26, 2000. At that meeting, the Regional Water Board endorsed the SUSMPs revised by the Executive Officer, but directed him to make further changes. The Executive Officer issued the Final SUSMPs on March 8, 2000.

The Contents of the Final SUSMPs

The permit provides that the SUSMPs must incorporate the appropriate elements of the BMP list and, at a minimum, apply to seven development categories: 100-plus home subdivisions; 10-plus home subdivisions; 100,000-plus square foot commercial developments; automotive repair shops; retail gasoline outlets; restaurants; and hillside single-family dwellings.

The SUSMPs proposed by the County applied to these seven categories. Various BMPs applied to the different categories, and the SUSMPs contained narrative mitigation requirements for source control and treatment. The July proposals stated:

> "The development must be designed so as to mitigate (infiltrate and/or treat) the site runoff generated from impervious directly connected areas that may contribute pollutants of concern to the storm water conveyance system."

There were no numeric design criteria for mitigation. According to various participants, earlier County drafts had included design standards to mitigate flows from 0.6-inch storm events. But any numeric criteria had been removed from the version that was submitted.

In its revised SUSMPs, submitted on August 12, the County explained in its cover letter that the mitigation language did not mean that all runoff must be mitigated. Rather, the County's intent was to omit a numerical standard from the SUSMPs. The revised SUSMPs no longer referred to mitigation at all. Instead, the following language replaced the mitigation requirement:

> "The development must be designed so as to minimize, to the maximum extent practicable (MEP), the introduction of pollutants of concern that may result in significant impacts, generated from site runoff of directly connected impervious areas (DCIA), to the storm water conveyance system as approved by the building official."

The Final SUSMPs, as approved by the Executive Officer and the Regional Water Board, included several revisions from the County's submittal. The revision that is of greatest concern to the petitioners is the addition of Design Standards for Structural or Treatment Control BMPs.[11] The design standards require that developments subject to the SUSMPs shall be designed to mitigate storm water runoff (by treatment or infiltration) from one of the following:

> "1. The 85th percentile 24-hour runoff event determined as the maximized capture storm water volume for the area…, or
> 2. The volume of annual runoff based on unit basin storage water quality volume, to achieve 80 percent or more volume treatment…, or
> 3. The volume of runoff produced from a 0.75 inch storm event, prior to its discharge to a storm water conveyance system, or
> 4. The volume of runoff produced from a historical-record based reference 24-hour rainfall criterion for "treatment" (0.75 inch average for the Los Angeles County area) that achieves approximately the same reduction in pollutant loads achieved by the 85th percentile 24-hour runoff event."

[11] The Final SUSMPs also include the narrative language quoted from the County's August 22, 1999 proposal.

The Final SUSMPs also applied to two additional categories of development: parking lots over 5,000 square feet or with 25 or more spaces and exposed to storm water, and to developments in environmentally-sensitive areas. Other revisions included application to all projects in the categories instead of discretionary projects only and the definition of redevelopment.

II. CONTENTIONS AND FINDINGS[12]

Contention: The petitioners contend that the Regional Water Board erred in not complying with the Administrative Review Process within the permit, and acted arbitrarily and capriciously and in violation of the Clean Water Act and state law.

Finding: The permit required the County, in consultation with the cities subject to the permit, to submit SUSMPs. The permit includes some general minimum requirements for the SUSMPs.[13] The Executive Officer is granted authority to approve the SUSMPs.[14]

The permit also contains an administrative review process.[15] The permit states that the administrative review process "formalizes the procedure for review and acceptance of reports and documents" and "provides a method to resolve any differences in compliance expectations between the Regional Board and Permittees, prior to initiating enforcement action."[16] Following this introductory statement, the permit includes two procedures. The first is for review and approval or disapproval of reports and documents. The second is the dispute resolution section that must be followed prior to enforcement action.

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[12] This Order does not address all of the issues raised by the petitioners. The Board finds that the issues that are not addressed are insubstantial and not appropriate for State Water Board review. (See *People v. Barry* (1987) 194 Cal.App.3d 158, [239 Cal.Rptr. 349], Cal. Code Regs., tit. 3, § 052.)
[13] Permit, Part 2, III.A.1.c.
[14] Permit, Part 2, III.A.2.
[15] Permit, Part 2, I.G.
[16] *Id.*

The process for review of documents that are subject to the Executive Officer's approval is that the Executive Officer will notify the permittees of the results of the review and approval or disapproval within 120 days. If the Executive Officer does not do so, the permittees must notify the Regional Water Board of their intent to implement the documents without approval. The Executive Officer then has 10 days to respond, or the permittees may implement the program and the Executive Officer may not make modifications.

The dispute resolution procedure is to be used when the Executive Officer determines that a permittee's storm water program is insufficient to meet the permit's provisions. The Executive Officer must send a "Notice of Intent to Meet and Confer" with the permittee. A meet and confer period then ensues, resulting in a written "Storm Water Program Compliance Amendment (SWPCA)." The permittee is provided time to comply with the SWPCA. The Executive Officer is not allowed to take enforcement action against a permittee until the Executive Officer notifies the permittee in writing that the administrative review process has been exhausted and that a violation exists warranting enforcement.

The petitioners contend that the Executive Officer failed to notify the permittees that their SUSMPs were inadequate within 120 days of its submittal. The petitioners also argue that, by revising the SUSMPs without pursuing the dispute resolution process, the Regional Water Board "violated" the terms of the permit.

The provision for review of documents, which clearly includes the SUSMPs, requires that the Executive Officer notify the permittees of the results of the review and approval or disapproval within 120 days. The County submitted the revised SUSMPs on August 12, 1999. Within 120 days, the Regional Water Board held a workshop where staff expressed their concerns with the SUSMPs. Also within 120 days the Regional Water Board itself held a public

meeting where there was extensive discussion and concern by board members that the SUSMPs did not include a numeric standard. And, prior to any notification by the permittees that they would proceed with implementing their SUSMPs, the Regional Water Board held a hearing January 26, 2000, where it directed the Executive Officer to issue the SUSMPs with revisions. The Executive Officer did so on March 8, 2000.

It is clear from the record that the Executive Officer, and the Regional Water Board itself, did inform the permittees that the SUSMPs were inadequate. There was no requirement for a specific form for expressing disapproval of documents. The extensive discussion and meetings on the need for revisions to the SUSMPs, and the Executive Officer's approval of revised SUSMPs, plainly refutes the allegation that the Regional Water Board never notified the permittees of its disapproval of the County's proposed SUSMPs.

The permittees also claim that the Regional Water Board "violated" the permit by failing to institute the meet and confer process.[17] The dispute resolution process, which includes meet and confer, did not apply to the decision to disapprove the proposed SUSMPs. That process is only required when the Regional Water Board ultimately takes an enforcement action against a permittee. It is separate from the process for review and approval or disapproval of documents, and does not even appear to relate to possible enforcement actions for submission of inadequate documents. This is illustrated by the fact that the provision regarding documents refers to submittals from both the Principal Permittee and the individual permittees, while the dispute resolution provision refers only to the permittees. This distinction is relevant because the County is charged with submitting the documents, while the individual permittees are responsible for compliance. A fair reading of the entire section on the administrative review process is that the

[17] We note that permits are issued to permittees to allow discharges to waters of the state. It is only permittees, and not Regional Water Boards, who can be charged with violating permits.

review and approval or disapproval of documents applies to submission of documents by the County on behalf of the cities, while the dispute resolution process applies to enforcement actions against any permittees for failing to implement adequate programs.

Contention: The petitioners contend that the Regional Water Board was not authorized to revise the SUSMPs to add more stringent requirements.

Finding: The petitioners contend that the mitigation standards in the SUSMPs are more stringent than the requirement in the permit to reduce pollutants in storm water runoff to the maximum extent practicable (MEP)[18]. The issue of what level of protection constitutes MEP will be discussed *Infra*, in the discussion of the reasonableness of the numeric standards. But the petitioners also make certain procedural claims on this point. They argue that in approving the BMP list, the Regional Water Board determined that those BMPs constituted MEP and that the Board could not add additional BMPs in the SUSMPs. They also contend the Regional Water Board itself had no authority to "usurp" the Executive Officer's role in reviewing the SUSMPs.[19] Finally, the petitioners contend that the Regional Water Board was not authorized to mandate a program for the permittees without amending the permit.

The permit requires the County to submit a list of BMPs for approval. The Regional Water Board approved this list. Following approval of the list, the County was required to submit the SUSMPs, which must "incorporate the appropriate elements of the recommended BMPs list."[20] The petitioners contend that by approving the list, the Regional Water Board determined that those BMPs constituted MEP, and that under the terms of the permit the Regional Water Board could not require additional BMPs.

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[18] The technology-based standard for controls under municipal storm water permits is MEP. For a fuller discussion of this standard, see Order WQ 91-03.
[19] It is undisputed that, at its January 26, 2000 meeting, the Board directed the Executive Officer to make additional revisions to the SUSMPs.
[20] Permit, Part 2, III.A.1.c.

In addressing this contention, we face what appears to be a fundamental misunderstanding of the numeric design standards on the part of the petitioners. The design standards are objective criteria that developers must achieve in designing their BMPs. The design standards are not separate BMPs. The standards tell what magnitude of storm event the BMPs must be designed to treat or infiltrate. They do not specify the BMPs that must be employed.

The SUSMPs as submitted by the County specify BMPs for various categories of development. Many of these BMPs are designed to minimize the pollutants in storm water runoff, by reducing flow through infiltration or by treatment. Examples of BMPs proposed by the County include infiltration basins and trenches, oil/water separators, and media filtration. The County's proposed SUSMPs also included language requiring minimizing the introduction of pollutants to the storm water conveyance system. That language remains unchanged in the Final SUSMPs. The only significant difference between the two versions of the SUSMPs was that the Regional Water Board established numeric criteria for designing the BMPs.

In adopting the Final SUSMPs, the Regional Water Board based its decision on the MEP standard.[21] The Regional Water Board did not significantly revise the BMP list or specify further the actions that developers must take to comply with the SUSMPs. Thus, we find that the Regional Water Board did not inappropriately revise its determination of what constituted MEP.

The Regional Water Board is the political body responsible for water quality control in the Los Angeles region.[22] While the Regional Water Board may delegate specified powers and duties to its Executive Officer,[23] it can at any time act on its own behalf. The fact that the Board authorized its Executive Officer to approve the SUSMPs in the permit did not mean that the Board thereby denied itself the opportunity to provide direction to the Executive Officer in his

[21] Resolution R-00-02.
[22] Water Code sections 13200 and 13225.
[23] Water Code section 13223.

approval. Such an interpretation of its delegation authority would result in an improper failure of the Board to assume responsibility for water quality in the region.

We also find that the Regional Water Board was authorized to revise the SUSMPs to achieve compliance with the permit's requirements. The SUSMPs are a part of implementation of the permit. Because the permit regulates storm water discharges throughout the entire Los Angeles region and it is implemented by 85 cities and the County, it is obvious that the permit could not spell out every detail of the program for the five-year term of the permit. Instead, the implementation is through the submission, review and approval, and implementation of various programs, including the SUSMPs.[24] Where it receives a submission that it finds is not consistent with the requirements of the permit, it is reasonable for the Regional Water Board to be able to require revisions. The Regional Water Board is not required to amend the permit each time it approves a submittal or approves a submittal with revisions. On the other hand, if the Regional Water Board's action in requiring revisions is inconsistent with the terms of the permit, then the Board should not act without first amending the permit. While the Regional Water Board could have required the County to make the revisions rather than making them itself, we see no harm in the Regional Water Board's approach.

As will be discussed below, in most respects the Final SUSMPs are consistent with the permit. But there are some portions of the SUSMPs that are not consistent, and in those cases the SUSMPs provisions are further revised in this Order.

Contention: The petitioners make various procedural claims, including that they were denied due process, and that the Regional Water Board violated the Administrative Procedure

[24] A fuller discussion of the use of storm water management plans to incorporate a developing program is found in Order No. WQ 91-03.

Act, the California Environmental Quality Act (CEQA), and the California Constitution, Article XIII B, section 6 (regarding state mandates).

Finding: The petitioners point out that at the January 26, 2000 Regional Water Board hearing, there was some confusion over late changes to the SUSMPs and they contend they were not provided adequate opportunity to comment. There was significant discussion of the SUSMPs over several months. We do not agree with the petitioners that a program of this magnitude must necessarily take years to develop. But we are concerned that at the January 26, 2000 hearing, interested persons and permittees were not given adequate time to review late revisions or to comment on them. Given the intense interest in this issue, the Regional Water Board should have diverged from its strict rule limiting individual speakers to three minutes and conducted a more formal process. Such a process should provide adequate time for comment, including continuances where appropriate.[25] But to the extent the Regional Water Board's process caused any harm, this Board cured those harms. We held a two-day hearing in Los Angeles County, where all parties were allowed significant time to present their positions and testimony. In addition, we allowed the introduction of new evidence that had not been presented to the Regional Water Board. At this point, all parties have been afforded a full opportunity to review the Final SUSMPs, to present their positions and evidence, and to engage in cross-examination. The petitioners' due process rights have been protected.

The Board has already addressed the contentions regarding compliance with other laws in prior decisions. The Administrative Procedure Act exempts the adoption of permits from its requirements.[26] While the SUSMPs are not a permit, they are implementing documents for a

[25] For future adjudicative proceedings that are highly controversial or involve complex factual or legal issues, we encourage regional water boards to follow the procedures for formal hearings set forth in Cal. Code of Regs., tit. 23, section 648 et seq.

[26] Government Code section 11352; See, Order No. 95-4 (In the Matter of the City and County of San Francisco).

permit, and are therefore subject to the exemption. Moreover, they are relevant only to this permit, and are not a general rule of application. The constitutional provisions regarding state mandates also do not apply to NPDES permits.[27] As will be explained below, the SUSMPs as revised herein, are consistent with MEP and therefore are federally mandated. The provisions of CEQA requiring adoption of environmental documents also do not apply to NPDES permits.[28] Again, as an implementing document for the permit, there is no requirement for a separate CEQA analysis.[29]

Contention: The petitioners contend that the SUSMPs do not properly apply the maximum extent practicable standard.

Finding: The permit, consistent with Clean Water Act section 402(p)(3)(B)(iii), requires controls to reduce the discharge of pollutants to the maximum extent practicable, or MEP.[30] In approving the Final SUSMPs, the Regional Water Board acknowledged that one of the primary objectives of the municipal storm water program is the requirement to reduce the discharge of pollutants from storm water conveyance systems to the MEP.[31] While all parties appear to agree that the standard for the SUSMPs is MEP, they disagree about what level of effort is necessary to comply with that standard.

The petitioners approach this issue from two angles. First, they contend that the SUSMPs will not provide water quality benefits that reflect MEP. Second, they contend that there could be adverse impacts on groundwater quality that have not been adequately evaluated.

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[27] See, Order No. WQ 90-3 (In the Matter of San Diego Unified Port District).
[28] Water Code section 13389.
[29] We do note with interest the environmental groups' comment that if the permittees believed it was necessary to comply with the APA and CEQA prior to adoption of the SUSMPs, then they themselves would have violated those acts in their submissions of the proposed SUSMPs.
[30] Permit, Finding 13.
[31] Final SUSMPs, at page 2; Resolution No. R-00-02, at page 3.

Storm Water Design Standards as MEP

In adopting the Final SUSMPs, the Regional Water Board found that many rivers and streams in Los Angeles County are impaired for pollutants found in storm water and urban runoff, and that storm water runoff carries pollutants from nearly all types of developed properties.[32] Pollutant loading from the aggregate of development in the basin results in impairments from sediments, metals, complex organic compounds, oil and grease, nutrients, and pesticides.[33] The Final SUSMPs reflect two goals: to reduce the amounts of these pollutants in runoff and to reduce the ability of runoff to act as a conveyance system to deliver more pollutants to receiving waters. The Final SUSMPs, which include lists of BMPs and design standards requiring treatment or infiltration, address these two goals.

Clean Water Act section 402(p)(3)(B)(iii), which sets forth the requirements for establishing MEP in municipal storm water permits, provides that such permits "shall require controls to reduce the discharge of pollutants to the maximum extent practicable, including management practices, control techniques and system, design and engineering methods, and such other provisions as the Administrator or the State determines appropriate for the control of such pollutants." The United States Environmental Protection Agency (U.S. EPA), in a guidance document, explains that BMPs should be used in first-round storm water permits, and "expanded or better-tailored BMPs in subsequent permits, where necessary, to provide for the attainment of water quality standards."[34] The Clean Water Act, as interpreted by U.S. EPA, does require that, in a second-round permit,[35] expanded BMPs may be appropriate. In light of the number of water

[32] Resolution No. R-00-02.
[33] *Id*.
[34] Interim Permitting Approach for Water Quality-Based Effluent Limitations in Storm Water Permits, 61 Federal Register 57425 (1996).
[35] The original permit was issued in 1990. The 1996 permit is a second-round permit.

bodies impaired by runoff in Los Angeles County, it was appropriate to expand the scope of BMPs during the permit term.

The regulations implementing section 402(p) specifically require municipalities to have controls to reduce the discharge of pollutants from their storm sewer systems that "receive discharges from areas of new development and significant redevelopment," including post-construction discharges.[36] Clearly, it was appropriate for the Regional Water Board to require BMPs for new development and significant redevelopment. The permittees, who submitted their own version of SUSMPs with listed BMPs for categories of development, appear to have no real quarrel with this general mandate.

This Board has already endorsed requirements to limit the flow of the "first flush" of storm water, which may contain more significant pollutants.[37] The permittees' own version of the SUSMPs required mitigation of storm water runoff by treatment or infiltration, thus conceding the propriety of these two approaches to lessening the impact of storm water discharges. The crux of the disagreement is that the Regional Water Board added numeric design standards to establish the amount of runoff that must be treated or infiltrated, and required the mandatory application of these standards to categories of development.

The addition of measurable standards for designing the BMPs provides additional guidance to developers and establishes a clear target for the development of the BMPs. The U.S. EPA guidance manual suggests the use of design criteria and performance standards for post-construction BMPs.[38] The numeric criteria the Regional Water Board adopted essentially

[36] 40 CFR section 122.26(d)(2)(iv)(A)(2).
[37] In the Matter of National Steel and Shipbuilding Company, et al., Order WQ 98-07, at slip opinion 7.
[38] Guidance Manual for the Preparation of Part 2 of the NPDES Permit Applications for Discharges from Municipal Separate Strom Sewer Systems, at page 6-4 (November 1992).

requires that 85 percent of the runoff from the development be infiltrated or treated.[39] In adopting these standards, the Regional Water Board based its decision on a research review of standards in other states and a statistical analysis of the rainfall in the area. The standard was set to gain the maximum benefit in mitigation while imposing the least burden on developers.[40] In light of the evidence of the use of this or more stringent standards in other states, the expert testimony supporting this standard, the endorsement by U.S. EPA in its comments, and the cost-effectiveness of its implementation (discussed below), the Regional Water Board acted appropriately in determining that the standards reflect MEP.[41]

We also find that the Regional Water Board appropriately applied these standards to seven of the categories listed in the SUSMPs: single-family hillside residences, 100,000 square foot commercial developments, automotive repair shops, restaurants, home subdivisions with 10 to 99 housing units, home subdivisions with 100 or more housing units, and parking lots with 5,000 square feet or more or with 25 or more parking spaces and potentially exposed to storm water runoff.[42] These categories, except for parking lots, were already targeted for special treatment in the permit. The evidence shows that each listed category can be a significant source of pollutants and/or runoff following development. It is appropriate that the design standards apply so that BMPs for these categories of development result in the infiltration or treatment of a significant about of the runoff.

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[39] Four different methods of calculation are permitted, so the percentage of capture may vary slightly.

[40] At the hearing in this matter, Regional Water Board staff explained that the standard was set at the bottom of the "knee" of the curve where the benefits of the mitigation requirements decrease and the cost increases. Other states have set the standard higher along this curve, requiring 90 to 95 percent mitigation.

[41] This conclusion in no way departs from our acceptance of BMPs in lieu of numeric effluent limitations in storm water permits. (See, e.g., Order WQ 91-03 and Order WQ 91-04.) The numeric standard is a design standard for BMPs. It does not quantify or limit the pollutants in the effluent. It also does not specify which of the listed BMPs must be employed.

[42] As discussed below, this Board is revising the SUSMPs to delete the application of the design standards to retail gasoline outlets and to locations within or directly adjacent to or discharging directly to environmentally-sensitive areas.

Potential Impacts on Ground Water

The petitioners contend that infiltration of runoff may lead to ground water pollution, and that the Regional Water Board did not properly consider such potential impacts. The mitigation standards provide for a waiver where there is a risk of ground water contamination because a known unconfined aquifer lies beneath the land surface or an existing or potential underground source of drinking water is less than ten feet from the soil surface.[43] The Final SUSMPs also include a discussion on how to use infiltration so that the risk of contamination of groundwater is reduced, and where infiltration is not appropriate.[44]

The Regional Water Board did consider the potential impacts to groundwater from infiltration, and included appropriate limitations and guidance on its use as a BMP. These provisions will ensure adequate protection of groundwater from any adverse impacts due to infiltration.

Contention: The petitioners contend the Regional Water Board failed to show that the SUSMPs as adopted are cost-effective and that the benefits to be obtained outweigh the costs.

Finding: The petitioners refer to the Preamble to the Phase II storm water regulations[45] as the basis for their economic argument. The quoted language, however, does not wholly support the petitioners' contention. The Preamble states that President Clinton's Clean Water Initiative clarifies "that the maximum extent practicable standard should be applied in a site-specific, flexible manner, taking into account cost considerations as well as water quality effects."[46] It is clear that cost should be considered in determining MEP; this does not mean that

[43] Final SUSMP, page 14.
[44] *Id*., at page 15.
[45] 64 Federal Register 68722 and following. These regulations do not apply to the permit, but the general language on MEP is relevant to EPA's interpretation of the standard.
[46] 64 Federal Register 68722, 68732 (December 8, 1999).

the Regional Water Board must demonstrate that the water quality benefits outweigh the economic costs.

While the standard of MEP is not defined in the storm water regulations or the Clean Water Act, the term has been defined in other federal rules. Probably the most comparable law that uses the term is the Superfund legislation, or CERCLA, at section 121(b). The legislative history of CERCLA indicates that the relevant factors, to determine whether MEP is met in choosing solutions and treatment technologies, include technical feasibility, cost, and state and public acceptance.[47] Another example of a definition of MEP is found in a regulation adopted by the Department of Transportation for onshore oil pipelines. MEP is defined as to "the limits of available technology and the practical and technical limits on a pipeline operator . . . ."[48]

These definitions focus mostly on technical feasibility, but cost is also a relevant factor. There must be a serious attempt to comply, and practical solutions may not be lightly rejected. If, from the list of BMPs, a permittee chooses only a few of the least expensive methods, it is likely that MEP has not been met. On the other hand, if a permittee employs all applicable BMPs except those where it can show that they are not technically feasible in the locality, or whose cost would exceed any benefit to be derived, it would have met the standard. MEP requires permittees to choose effective BMPs, and to reject applicable BMPs only where other effective BMPs will serve the same purpose, the BMPs would not be technically feasible, or the cost would be prohibitive. Thus while cost is a factor, the Regional Water Board is not required to perform a cost-benefit analysis.

In reviewing the record, it is apparent that the Regional Water Board did evaluate the cost of the SUSMPs. While the petitioners claim there is no evidence in the record to show the

[47] 132 Cong. Rec. H 9561 (Oct. 8, 1986).
[48] 49 CFR section 194.5.

SUSMPs are necessary and cost effective, the opposite is true. The record is replete with documentation of costs of pilot mitigation projects, studies from similar programs in other states, and research studies. The Regional Water Board complied with the requirement to consider cost.

The Regional Water Board found that the cost to include BMPs that will meet the mitigation criteria will be one to two percent of the total development cost. This amount appears reasonable, especially in light of the amount of impervious surface already in Los Angeles County and the impacts on impaired water bodies. In considering the cost of compliance, it is also important to consider the costs of impairment. The beach closures in the Los Angeles region, well documented in the evidence, have reached critical proportions. These beach closures clearly have a financial impact on the area, and should be positively affected by the SUSMPs.

We do note that there could be further cost savings for developers if the permittees develop a regional solution for the problem. We recommend that the cities and the County, along with other interested agencies, work to develop regional solutions so that individual dischargers are not forced to create numerous small-scale projects. While the SUSMPs are an appropriate means of requiring mitigation of storm water discharges, we also encourage innovative regional approaches.[49]

Contention: The petitioners have raised contentions regarding details of the SUSMPs, including the amount of time allowed for inclusion of SUSMPs in local ordinances, and their application to both "discretionary" and "non-discretionary" projects. In addition, during the hearing certain ambiguities in the wording of the Final SUSMPs became apparent, including the provisions regarding redevelopment and environmentally-sensitive areas. In this portion of the

[49] We note that the SUSMPs as written do not in any way preclude the development of regional solutions approved by the Regional Water Board as a means to comply with the BMP and design standard requirements.

Order we address these issues and also the application of the design standards to retail gasoline outlets (RGOs) and the waiver funding requirements.

Finding: The testimony at the hearing in this matter revealed that there are specific provisions of the SUSMPs that create confusion as to the types of development projects subject to the mitigation design standards. The petitioners also contend that application of the standards to specific types of development either is unreasonable or is inconsistent with the terms of the permit. The specific requirements are discussed below.

Retail Gasoline Outlets

Petitioner WSPA contends that RGOs should be excluded from the SUSMPs. Its petition raised the same general contentions as the other petitioners, but at the hearing WSPA presented evidence specific to RGOs. In particular, WSPA raised questions about the propriety of applying the design standards for BMPs to RGOs. In considering this issue, we conclude that construction of RGOs is already heavily regulated and that owners may be limited in their ability to construct infiltration facilities. Moreover, in light of the small size of many RGOs and the proximity to underground tanks, treatment may not always be feasible, or safe. The mandatory BMPs that are included in the SUSMPs may be adequate to achieve MEP at RGOs, but the Regional Water Board should add additional mandatory BMPs, such as use of dry cleanup methods (e.g. sweeping) for removal of litter and debris, use of rags and absorbents for leaks and spills, restricting the practice of washing down hard surfaces unless the wash water is collected and disposed of properly, annual training of employees on proper spill cleanup and waste disposal methods, and the inclusion of BMPs to address trash receptacle areas and air/water supply

areas.[50] We conclude that because RGOs are already heavily regulated and may be limited in their ability to construct infiltration facilities or to perform treatment, they should not be subject to the BMP design standards at this time, and recommend that the Regional Water Board undertake further consideration of a threshold relative to size of the RGO, number of fueling nozzles, or some other relevant factor. This Order should not be construed to preclude inclusion of RGOs in the SUSMP design standards, with proper justification, when the permit is reissued.

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Redevelopment Projects

The SUSMPs were written to apply to new development and to some types of redevelopment in nine categories of projects. The definition of "redevelopment" reflected the intent of the Regional Water Board to define the scope of redevelopment projects subject to the requirements. That definition[51], however, was somewhat confusing, and it was apparent from testimony at the hearing that the parties had different understandings of the scope of redevelopment subject to the SUSMPs. In their post-hearing briefs, the various parties appeared to agree on the actual intent of the Regional Water Board in including redevelopment in the SUSMPs. This intent was to include redevelopment that adds or creates at least 5,000 square feet of impervious surface to the original development and, where the addition constitutes less than 50 percent of the original development, to limit the application of the BMP design standards to the addition.

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[50] These BMPs are from a list of BMPs in a publication of the California Storm Water Quality Task Force. (Best Management Practice Guide – Retail Gasoline Outlets. March 1997.) This publication includes BMPs in addition to those listed in the SUSMPs. All BMPs recommended in this publication should be mandated.

[51] The SUSMPs state: "Redevelopment" means, on an already developed site, the creation or addition of at least 5,000 square feet of impervious surfaces or the creation or addition of fifty percent or more of impervious surfaces or the making of improvements to fifty percent or more of the existing structure. Redevelopment includes, but is not limited to: the expansion of a building footprint or addition or replacement of a structure; structural development including an increase in gross floor area and/or exterior construction or remodeling; replacement of impervious surface that is not part of a routine maintenance activity; and land disturbing activities related with structural or impervious surfaces.

While some parties requested further requirements for development, it appears that the Regional Water Board's original intent was relatively simple to apply and results in a fair and appropriate application of the SUSMPs' requirements to redevelopment. Therefore, we will revise the definition in the SUSMPs accordingly.

Environmentally-Sensitive Areas

The permit required that the SUSMPs address at least seven development categories.[52] The final SUSMPs added two more categories: parking lots of 5,000 square feet or more or with 25 or more parking spaces and potentially exposed to storm water runoff; and location within or directly adjacent to an environmentally-sensitive area (ESA). The petitioners contend that the addition of ESAs was inappropriate because the permit refers only to "development categories"[53] and ESA is a location category.

Whether or not the Regional Water Board went beyond the permit's terms in including this category, we find a fundamental problem with the language of the SUSMPs regarding ESAs. All of the other categories are relatively simple to apply because they describe the types of development that fall within the category. For instance, the threshold for a commercial development is 100,000 square feet. If the development is smaller, it is not subject to the SUSMPs. But for developments within ESAs, the SUSMPs contain no threshold. This absence led to speculation by the petitioners that something as small as a new patio on a home in an ESA would make the SUSMPs applicable. The Regional Water Board, at the hearing and in its post-hearing brief, conceded that there should be some threshold. While the Regional Water Board

[52] The categories listed in the permit are: single-family hill residences, 100,000 square-foot commercial developments, automotive repair shops, retail gasoline outlets, restaurants, home subdivisions with 10 to 99 housing units, and home subdivisions with 100 or more housing units. Permit, Part 2, III.A.1.c.
[53] *Id*.

did recommend a specific threshold, we believe that it is inappropriate for this Board to add a threshold that has not been fully discussed by all interested persons.

While it may be appropriate to include more stringent controls for developments in ESAs, we also note that such developments are already subject to extensive regulation under other regulatory programs. Moreover, in light of the permit language limiting the SUSMPs to development categories, ESAs are not an appropriate category within the SUSMPs. The Regional Water Board may choose to consider the issue further when it reissues the permit.

Discretionary and Non-Discretionary, or Ministerial, Projects

The petitioners contend that the SUSMPs should apply only to projects that are considered "discretionary" within the meaning of California Environmental Quality Act (CEQA).[54] They argue that the inclusion of non-discretionary, or ministerial, projects is inconsistent with the terms of the permit.

The permit provisions on development projects do refer to "discretionary" projects in several places. The permittees are directed to develop a checklist for determining priority and exempt projects.[55] Priority projects are defined as development and redevelopment projects requiring discretionary approval, which may have a potential significant effect on storm water quality.[56] The permittees are also required to develop a BMP list.[57] In developing the SUSMPs, the permittees are required to incorporate appropriate elements of the BMP list.[58] Next, the permittees must develop a program on planning control measures for priority projects (which are limited to projects requiring discretionary approval), consistent with the list of BMPs and the

[54] Public Resources Code section 21000 *et seq*.
[55] Permit, Part 2, III.A.1.a.
[56] *Id*.
[57] Permit, Part 2, III.A.1.b.
[58] Permit, Part 2, III.A.1.c.

SUSMPs.[59] The permit further states that, in order to assure compliance with these requirements, the permittees must develop guidelines on preparing CEQA documents that link mitigation conditions to "local discretionary project approvals."[60]

Taken as a whole, the provisions of the permit appear to link the development requirements for SUSMPs to developments that receive discretionary approval by local governments, as defined in CEQA. The SUSMPs are an implementation tool for the permit and must be consistent with the permit. While the limitation of the SUSMPs to discretionary projects may not be sufficiently broad for an effective storm water control program, the Regional Water Board acted inappropriately in expanding the SUSMPs to include non-discretionary projects. The Regional Water Board may consider expanding the development controls beyond CEQA discretionary projects when it reissues the permit. But at this time, the SUSMPs must be revised so that they are limited to development projects requiring discretionary approval within the meaning of CEQA.[61]

Waiver Funding Requirement

Where a waiver is granted from the design standard requirements, the Final SUSMPs provide that the permittee must require the project proponent to transfer the cost savings to a storm water mitigation fund. The fund is to be operated by a public agency or a non-profit entity, to promote regional or alternative solutions for storm water pollution in the same storm watershed. The petitioners contend that the funding requirement will create an additional administrative burden.

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[59] Permit, Part 2, III.a.2.
[60] Permit, Part 2, III.a.3.b.
[61] We note that the Final SUSMPs already include a definition of "discretionary project" consistent with the definition in the CEQA guidelines. Final SUSMPs at page 4 of 25; Title 14, California Code of Regulations, section 15357. Apparently this definition was inadvertently retained after the Regional Water Board decided to expand the SUSMPs beyond discretionary projects.

The concept of a mitigation fund or "bank" is a positive idea for obtaining regional solutions to storm water runoff. As a long-term strategy, municipal storm water dischargers should work to establish regional mitigation facilities, which may be more cost-effective and more technically effective than mitigation structures at individual developments. But at this point there are not sufficient resources in place to require all permittees to establish such funds or to find appropriate non-profit organizations. Before mandating funding, preliminary questions should be answered, including who will manage the fund, what types of projects it will be used for, what entities can legally operate such funds, and how permittees will determine the amount of the assessments. It would be appropriate for the County to consider developing a program with the appropriate flood control agency, or as a model for the separate cities to develop. There may be suitable agencies to administer such funds, but the development of programs may take some time. The Regional Water Board should consider adopting such a program when it reissues the permit, after consultation with the appropriate local agencies.

III. CONCLUSIONS

Based on the discussion above, the Board concludes that:

1. The Regional Water Board complied with the procedural requirements of the permit, including the Administrative Review Process, in approving the Final SUSMPs.
2. The Regional Water Board was authorized to revise the SUSMPs by including more stringent requirements than the permittees had proposed.
3. The Regional Water Board complied with did not violate the Administrative Procedure Act, CEQA, or the Constitutional provisions on state mandates. The petitioners' due process rights have been protected
4. The Regional Water Board considered the costs of the SUSMPs, and acted reasonably in requiring these controls in light of the expected benefits to water quality.

5. The Final SUSMPs reflect a reasonable interpretation of development controls that achieve reduction of pollutants in storm water discharges to the maximum extent practicable.
6. The SUSMPs include adequate protections of groundwater quality from any impacts from infiltration.
7. The SUSMPs will be revised to clarify the intent of the Regional Water Board and to make them consistent with the permit. Specifically, retail gasoline outlets should not be subject to the BMP design standards because they are already heavily regulated and may be limited in their ability to construct infiltration facilities or to perform treatment. Redevelopment projects should be subject to the SUSMPs only if they result in creation or addition of 5,000 square feet of impervious surfaces. Environmentally-sensitive areas should not be listed as a category in the SUSMPs. The SUSMPs should only apply to discretionary projects. The requirement for funding by project proponents who receive waivers should be deleted. The SUSMPs will be amended as shown in the attachment to this Order.
8. In light of the revisions of the SUSMPs made by this Order, and to allow the permittees adequate time to adopt implementing ordinances, the deadline for adopting ordinances will be revised to January 15, 2001, and the effective date of the Final SUSMPs will be revised to February 15, 2001.

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IV. ORDER

IT IS HEREBY ORDERED that the Standard Urban Storm Water Mitigation Plans for Los Angeles County and Cities in Los Angeles County is revised consistent with the amendments attached hereto. In all other respects the petitions are dismissed.

CERTIFICATION

The undersigned, Administrative Assistant to the Board, does hereby certify that the foregoing is a full, true, and correct copy of an order duly and regularly adopted at a meeting of the State Water Resources Control Board held on October 5, 2000.

AYE: Arthur G. Baggett, Jr.
Mary Jane Forster
John W. Brown

NO: None

ABSENT: Peter S. Silva

ABSTAIN: None

/s/
Maureen Marché
Administrative Assistant to the Board

AMENDMENTS TO SUSMPS

[These amendments are to the Final SUSMP, as published March 8, 2000]

Page 3 of 25

First full paragraph:

All **discretionary development and redevelopment** projects that fall into one of ~~seven~~ **the following** categories are ~~identified in the Los Angeles County MS4 Permit as requiring~~ **subject to these** SUSMPs. These categories are:

- Single-family Hillside Residences
- 100,000 Square Foot Commercial Developments
- Automotive Repair Shops
- Retail Gasoline Outlets
- Restaurants
- Home Subdivisions with 10 to 99 housing units
- Home Subdivisions with 100 or more housing units
- **Parking lots 5,000 square feet or more or with 25 or more parking spaces and potentially exposed to storm water runoff**

Second full paragraph:

~~The Regional Board Executive Officer has designated two additional categories subject to SUSMP requirements for the Los Angeles County MS4 Permit. These categories are:~~

- ~~Location within or directly adjacent to or discharging directly to an environmentally sensitive area, and~~
- ~~Parking lots 5,000 square feet or more or with 25 or more parking spaces and potentially exposed to storm water runoff~~

Fourth full paragraph:

Permittees shall amend codes, if necessary, not later than ~~September 8, 2000~~ **January 15, 2001**, to give legal effect to the SUSMP requirements. The SUSMP requirements for projects identified herein shall take effect not later than ~~October 8, 2000~~ **February 15, 2001**.

Page 4 of 25

Delete definition of “Environmentally Sensitive Area”

Revise Definition of “Redevelopment”:

"Redevelopment" means, on an already developed site, the creation or addition of at least 5,000 square feet of impervious surfaces ~~or the creation or addition of fifty percent or more of impervious surfaces or the making of improvements to fifty percent or more of the existing structure~~. Redevelopment includes, but is not limited to: the expansion of a building footprint or addition or replacement of a structure; structural development including an increase in gross floor area and/or exterior construction or remodeling; replacement of impervious surface that is not part of a routing maintenance activity; and land disturbing activities related with structural or impervious surfaces. **Where redevelopment results in an increase of less than fifty percent of the impervious surfaces of a previously existing development, and the existing development was not subject to these SUSMPs, the Design Standards apply only to the addition, and not to the entire development.**

Page 10 of 25

Add to "Limited Exclusion": Retail Gasoline Outlets

Page 15 of 25

Delete the first full paragraph (storm water mitigation funding)

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United States
Environmental Protection
Agency

Office of Water
(4204)

EPA 833-R-00-002
March 2000

Storm Water Phase II Compliance Assistance Guide

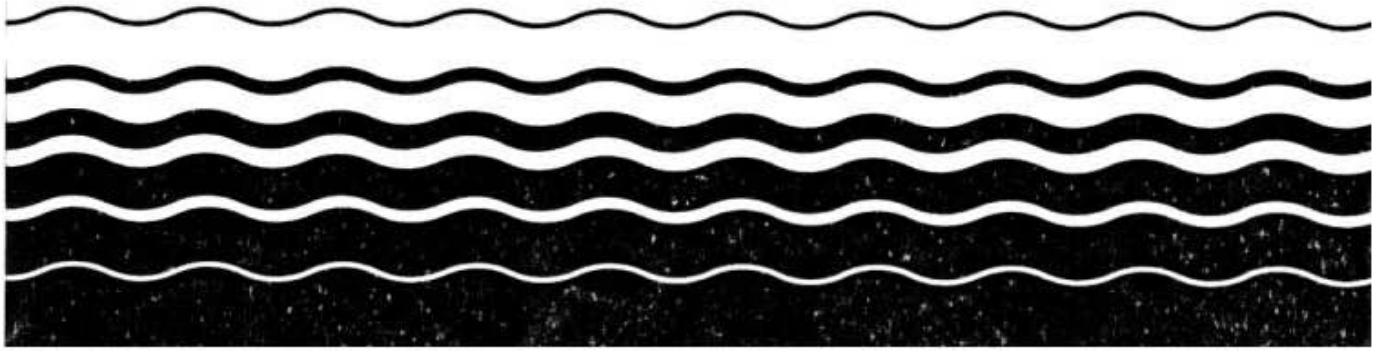

Compliance Guide Notice

The statements in this document are intended solely as guidance to aid regulated entities in complying with the Storm Water Phase II final rule. The guidance is not a substitute for reading the regulation and understanding all its requirements as it applies to your facility. This guidance does not constitute rulemaking by the EPA and may not be relied on to create a substantive or procedural right or benefit enforceable, at law or in equity, by any person. EPA may decide to update this guide without public notice to reflect changes in EPA's approach to implementing Storm Water Phase II or to clarify and update text. To determine whether EPA has revised this document and/or to obtain copies, go to EPA's web site at www.epa.gov/owm/sw/phase2.

1.0 INTRODUCTION

After reading this introduction, you should know whether you need to use this guide, what the guide covers, and where to get the latest information on the regulation.

The U.S. Environmental Protection Agency (EPA) published the regulation entitled "National Pollutant Discharge Elimination System - Regulations for Revision of the Water Pollution Control Program Addressing Storm Water Discharges" (*Federal Register*, Volume 64, Number 235, pages 68722-68852) on December 8, 1999 as required by Section 402(p) of the Clean Water Act (CWA). This guide explains how to tell if you are subject to the regulation and what to do if you are required to comply.

1.1 Who should use this guide?

This new rule regulates storm water discharges from two categories:

First, the rule covers storm water discharges to certain ***municipal separate storm sewer systems*** (MS4s). Public entities which operate these MS4s, such as cities, counties, States, and the Federal government, could be regulated under this rule. MS4 operators should read section 4 for more information.

Second, the rule also covers storm water discharges from ***construction activity*** generally disturbing between 1 and 5 acres. A construction operator could include the site owner, developer, contractor, or subcontractor. Construction site operators should read section 5 for more information.

The storm water Phase II final rule also provide regulatory relief for certain ***industrial facilities*** (currently permitted under EPA's storm water regulations) where storm water runoff is not exposed to industrial activities. Operators of industrial facilities interested in the no exposure exclusion should read section 6.

1.2 What Does this Guide Cover?

The purpose of this guide is to help the regulated community comply with the Storm Water Phase II Rule. This guide answers the following basic questions:

- Why is the Storm Water Phase II Rule important?
- Am I subject to the Storm Water Phase II Rule?
- What must I do to comply with the Storm Water Phase II Rule?

1.3 How Do I Use this Guide?

This guide is organized into seven major sections plus three appendices.

Section 1.0 Introduces you to this guide and the Storm Water Phase II Rule. Describes basic types of entities regulated so you can determine if you are affected by the rule.

Section 2.0 Provides background on why the Storm Water Phase II Rule is needed. Topics such as the environmental impacts of storm water and why storm water should be controlled are discussed. The history of the NPDES Storm Water program is briefly described.

Section 3.0 Delivers an overview of the Storm Water Phase II requirements. The basic components of the program are described and schedules and timelines are highlighted.

Section 4.0 Gives step-by-step procedures for operators of small MS4s to determine if they are subject to the regulation and provides information on how to demonstrate compliance.

Section 5.0 Gives step-by-step procedures for operators of small construction activities to determine if they are subject to the regulation and provides information on how to demonstrate compliance.

Section 6.0 Provides a discussion of how the Rule affects industrial facilities, including which industrial facilities are covered, and an explanation of the No Exposure exclusion and how to determine if you qualify.

Section 7.0 Documents the Compliance Assurance Process - Discusses how EPA will determine compliance, what happens if you or EPA discovers noncompliance, and the legal status of the guide.

Appendices Provides additional references and where to go for more information on storm water.

1.4 Where Can I Get More Information on the Storm Water Phase II Rule?

Additional information on the NPDES storm water Phase II rule, including a series of fact sheets and a full copy of the final rule, can be found on EPA's web pages at http://www.epa.gov/owm/sw/phase2.

Compliance assistance will be covered in Section 7 of the guide. One source for compliance assistance and information on the rule is the Local Government Environmental Assistance Network (LGEAN). LGEAN is one of EPA's compliance

assistance centers and can be found on the web at www.lgean.org or contacted by phone at 1-877-TO-LGEAN.

2.0 BACKGROUND

After reading section 2, you should understand the environmental impacts of storm water and the history of the storm water program, including existing regulations to control storm water (Phase I).

2.1 What are the Environmental Impacts from Storm Water Discharges?

Storm water runoff from lands modified by human activities can harm surface water and, in turn, cause or contribute to an exceedance of water quality standards by changing natural hydrologic patterns, accelerating natural stream flows, destroying aquatic habitat, and elevating pollutant concentrations and loadings. Such runoff may contain high levels of contaminants, such as sediment, suspended solids, nutrients (phosphorus and nitrogen), heavy metals, pathogens, toxins, oxygen-demanding substances (organic material), and floatables (U.S. EPA. 1992. *Environmental Impacts of Storm Water Discharges: A National Profile*. EPA 841-R-92-001. Office of Water. Washington, DC). After a rain, storm water runoff carries these pollutants into nearby streams, rivers, lakes, estuaries, wetlands, and oceans. Individually and combined, these pollutants impair water quality, threatening designated beneficial uses and causing habitat alteration and destruction.

The 1996 305(b) Report (U.S. EPA. 1998. The National Water Quality Inventory, 1996 Report to Congress. EPA 841-R-97-008. Office of Water. Washington, DC), provides a national assessment of water quality based on biennial reports submitted by the States as required under CWA section 305(b) of the CWA. In the CWA 305(b) reports, States, Tribes, and Territories assess their individual water quality control programs by examining the attainment or

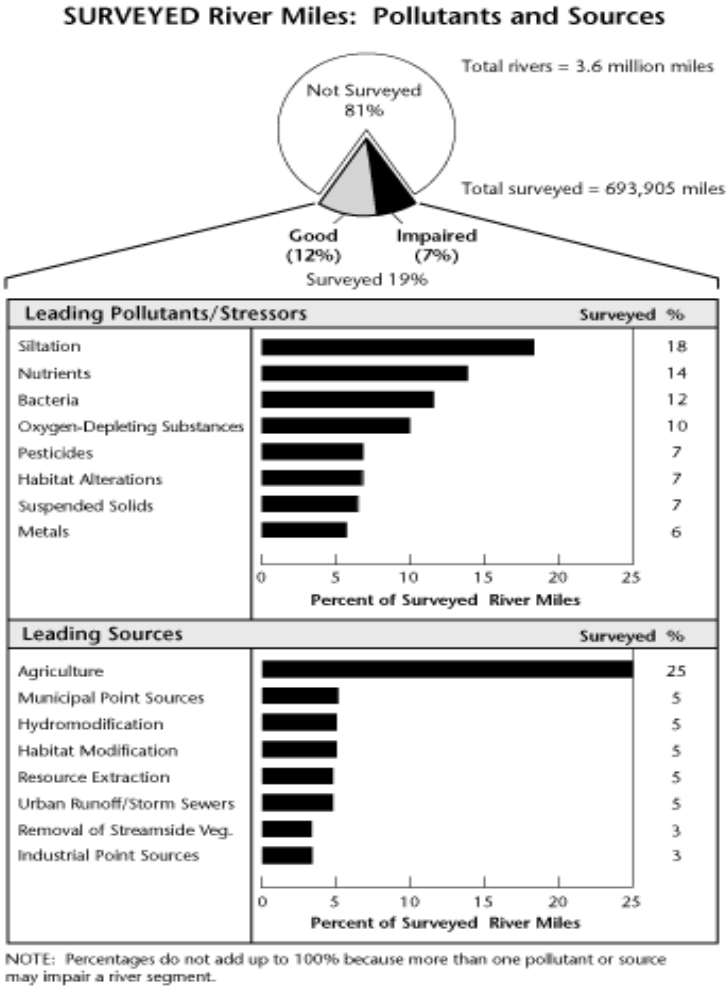

Figure 2-1. Pollutants and Sources in Surveyed River Miles (EPA, 1998)

nonattainment of the designated uses assigned to their rivers, lakes, estuaries, wetlands, and ocean shores. The 1996 Inventory indicated that approximately 40 percent of the Nation's assessed rivers, lakes, and estuaries are impaired.

The 1996 Inventory also found urban runoff/discharges from storm sewers to be a major source of water quality impairment nationwide. Urban runoff/storm sewers were found to be a source of pollution in 13 percent of impaired rivers; 21 percent of impaired lakes, ponds, and reservoirs; and 45 percent of impaired estuaries (second only to industrial discharges). See Figures 2-1 and 2-2 for an illustration of the pollutants and sources of pollution for both rivers and estuaries. In addition to these waterbodies, urban runoff was found to be the leading cause of ocean impairment for those ocean miles surveyed.

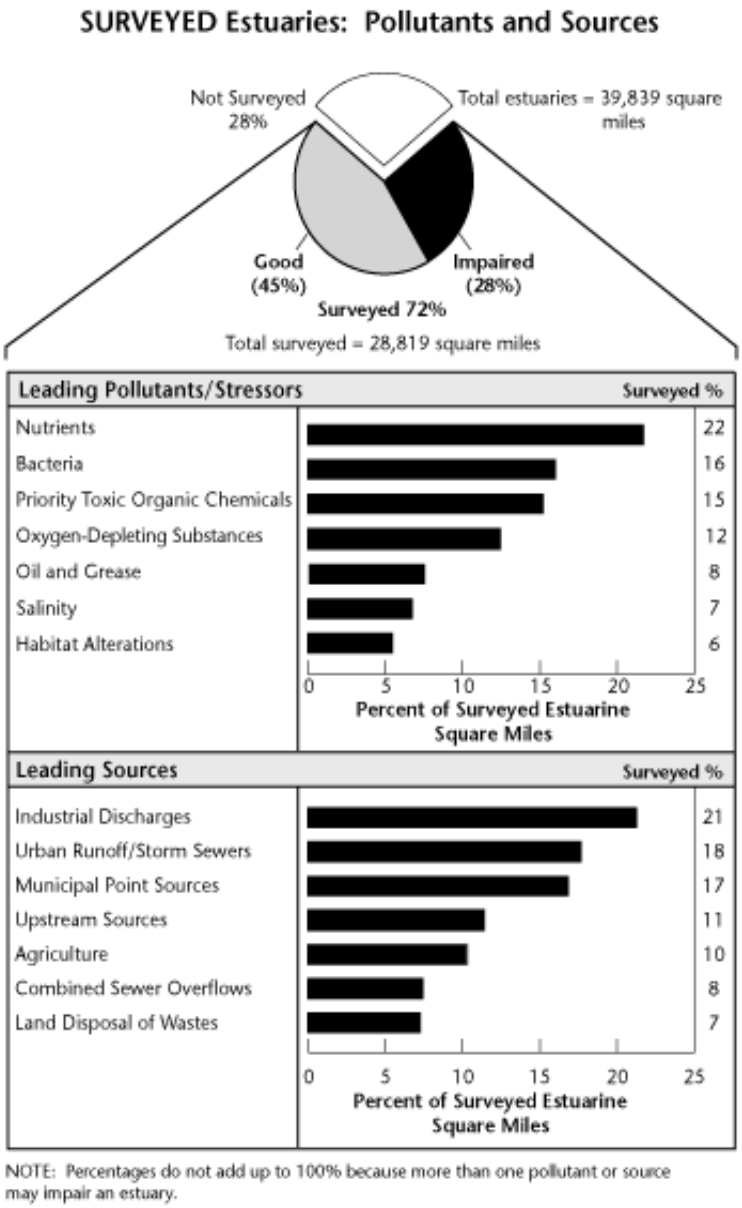

Figure 2-2. Pollutants and Sources in surveyed Estuaries (EPA, 1998)

Urbanization alters the natural infiltration capability of the land and generates a host of pollutants that are associated with the activities of dense populations, thus causing an increase in storm water runoff volumes and pollutant loadings in storm water discharged to receiving waterbodies (U.S. EPA, 1992). Urban development increases the amount of impervious surface in a watershed as farmland, forests, and meadowlands are converted into buildings with rooftops, driveways, sidewalks, roads, and parking lots with virtually no ability to absorb storm water. Storm water and snow-melt runoff wash over these impervious areas, picking up pollutants along the way while gaining speed and volume because of their inability to disperse and filter into the ground (see Figure 2-3 which illustrates the increased runoff resulting from increased impervious area). The resulting storm water flows are higher in volume, pollutants, and temperature than the flows in less impervious areas, which have more natural vegetation and soil to filter the runoff (U.S. EPA, 1997. *Urbanization and Streams: Studies of Hydrologic Impacts*.

EPA 841-R-97-009. Office of Water. Washington, DC).

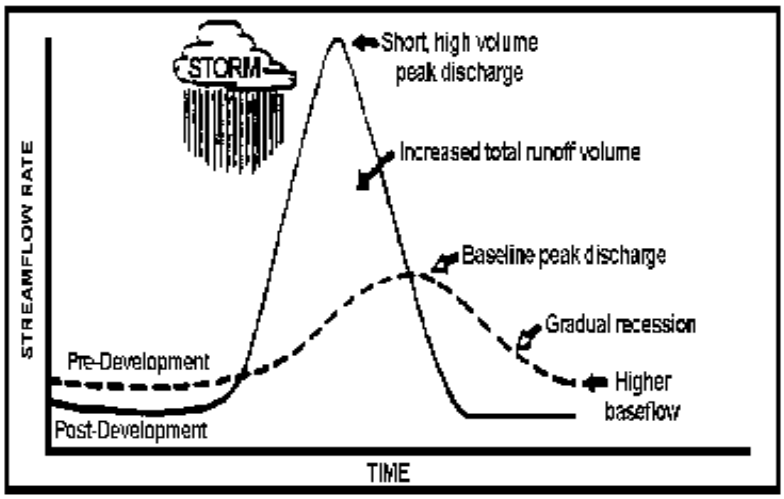

Figure 1. Impacts of urbanization on stream flow (Schueler, 1987).

In addition to the pollutants picked up by storm water runoff before it enters a storm drain, studies have shown that discharges from a storm drain system often include wastes and wastewater from non-storm water sources, referred to as illicit discharges. These discharges are 'illicit' because municipal storm sewer systems are not designed to accept, process, or discharge such wastes. Sources of illicit discharges can include sanitary wastewater illegally connected to the storm drain system; effluent from septic tanks; car wash, laundry, and other industrial wastewaters; improper disposal of auto and household toxics, such as used motor oil and pesticides; and spills from roadways.

Illicit discharges enter the system through either direct connections (e.g., wastewater piping either mistakenly or deliberately connected to the storm drains) or indirect connections (e.g., infiltration into the MS4 from cracked sanitary systems, spills collected by drain outlets, and paint or used oil dumped directly into a drain). The result is untreated discharges that contribute high levels of pollutants, including heavy metals, toxics, oil and grease, solvents, nutrients, viruses and bacteria into receiving waterbodies.

2.2 Summary of EPA's Storm Water Program

In 1972, Congress amended the Federal Water Pollution Control Act (commonly referred to as the Clean Water Act (CWA)) to prohibit the discharge of any pollutant to waters of the United States from a point source unless the discharge is authorized by an NPDES permit. The NPDES program is designed to track point sources and require the implementation of the controls necessary to minimize the discharge of pollutants. Initial efforts to improve water quality under the NPDES program primarily focused on reducing pollutants in industrial process wastewater and municipal sewage. These discharge sources were easily identified as responsible for poor water quality.

As pollution control measures for industrial process wastewater and municipal sewage were implemented and refined, it became increasingly evident that more diffuse sources of water pollution were also significant causes of water quality impairment. Specifically, storm water runoff was found to be a major cause of water quality impairment.

In 1987, Congress amended the CWA to require implementation, in two phases, of a comprehensive national program for addressing storm water discharges. The first phase of the program, commonly referred to as “Phase I,” was promulgated on November 16, 1990 (55 FR 47990). Phase I requires NPDES permits for storm water discharge from a large number of priority sources including medium and large municipal separate storm sewer systems (“MS4s”) generally serving populations of 100,000 or more and several categories of industrial activity, including construction activity that disturbs five or more acres of land.

The Phase I permits for municipal separate storm sewer systems mostly covere larger cities, and require them to develop a storm water management program, track and oversee industrial facilities regulated under the NPDES storm water program, conduct some monitoring, and submit periodic reports.

The operators of construction activities disturbing greater than 5 acres have been required to obtain NPDES permit coverage since 1992. General permits for large construction activity require construction operators to develop and implement a storm water pollution prevention plan to control erosion, sediment and other wastes on the site.

The Phase I industrial storm water program also regulates the following industrial sectors:

- facilities subject to EPA storm water effluent guidelines, new source performance standards, or toxic pollutant effluent standards
- heavy manufacturing facilities
- mining/oil and gas
- hazardous waste faciliites
- landfills
- recycling facilities
- steam electric power
- transportation facilities
- sewage treatment plants
- construction activity (described above), and
- light manufacturing facilities.

The second phase of the storm water program, which this guide addresses, requires permits for storm water discharges from certain small municipal separate storm sewer systems and construction activity generally disturbing between 1 and 5 acres. See Figure 2-4 for a summary of the federal storm water permit requirements under Phases I and II.

Figure 2-4. Summary of Federal Permit Requirements Under the NPDES Storm Water Program

	Municipal Separate Storm Sewer Systems (MS4s)	Construction Activity	Industrial Activity
Requirements in Effect Now (Phase I)	**Medium and Large MS4s** (§ 122.26(d)) • Storm Water Management Program: - Public education and outreach - Public participation efforts - Illicit discharge detection and elimination program - Construction and post-construction runoff control program for all construction activity (no size threshold) - BMPs to reduce pollutants from industrial, commercial, and residential areas • Track/oversee industrial facilities regulated under the NPDES storm water program • Conduct analytical and visual monitoring of MS4 discharges • Submit periodic program assessment reports	**Category (x) Construction Activity (5+ Acres)*** CGP: • Storm Water Pollution Prevention Plan (SWPPP) - Site description - Description of BMPs for erosion and sediment, post-construction storm water management, and other controls - Self-evaluation and reporting **Category (x) is one of the categories of "storm water discharges associated with industrial activity." Temporarily excluded from permitting: Category (x) construction activity operated by a municipality of <100,000 (ISTEA moratorium).*	**Ten Categories of Industrial Activity (Categories (i)-(ix),(xi))*** MSGP: • SWPPP - Site evaluation -Description of appropriate storm water management BMPs - Self-evaluation, monitoring, and reporting • If discharging into a medium or large MS4, notify the MS4 operator **Temporarily excluded from permitting: Industrial activity operated by a municipality of <100,000, except for power plants, airports, and uncontrolled sanitary landfills (ISTEA moratorium).*
Requirements that Will Be in Effect by 2003 (Phase II)	**Regulated Small MS4s** (§ 122.34 outlined here, but may choose permit coverage under § 122.26(d) instead) • Storm Water Management Program: - Public education and outreach - Public participation efforts - Illicit discharge detection and elimination program - Construction runoff control program for construction activity disturbing 1 acre or greater - Post-construction runoff control program for construction activity disturbing 1 acre or greater - Good housekeeping/pollution prevention for municipal operations • Conduct assessment of identified BMPs and measurable goals for each minimum control measure • Submit annual program assessment reports	**Small Construction Activity (≤1 and <5 Acres)** • Expected to be similar to Category (x) Construction Activity requirements above **Category (x) Construction Activity Operated by a Municipality of < 100,000** • Same requirements as for Category (x) Construction Activity above	**Industrial Activity Operated by a Municipality of <100,000*** • Same requirements as for Ten Categories of Industrial Activity above **Does not include: Power plants, airports, and uncontrolled sanitary landfills*

3.0 REGULATION REQUIREMENTS

After reading section 3.0, you should understand the basic components and requirements of the Storm Water Phase II Rule and the rule's compliance schedule/timeline. This information is meant to serve as a basis for understanding the details of the Rule as discussed in further sections of this guidance.

3.1 What Does The Storm Water Phase II Rule Require?

This regulation can be divided into three main components, each with distinct requirements, affecting three types of entities. These components and the requirements for each are summarized below.

Regulated Small MS4s (see section 4.0)

A certain subset of operators of small MS4s (primarily those located in urbanized areas) are required to implement programs and practices to control polluted storm water runoff from the jurisdiction serviced by the MS4. The operator must design its storm water management program to satisfy applicable CWA water quality requirements and technology standards. The program must include the development and implementation of best management practices (BMPs) and measurable goals for the following six minimum measures, and include evaluation and reporting efforts:

- Public education and outreach,
- Public participation/involvement,
- Illicit discharge detection and elimination,
- Construction site runoff control,
- Post-construction runoff control, and
- Pollution prevention/good housekeeping for municipal operations.

Two waivers from coverage are available for small MS4s brought into the program by the Phase II regulation.

Small Construction Activity (see section 5.0)

All construction operators disturbing more than 1 acre and less than 5 acres are required to apply for an NPDES storm water permit for small construction activity. EPA already regulates construction activity disturbing more than 5 acres. A construction operator is usually the developer or landowner, but can also be the contractor or another party responsible for the operational control of erosion and sediment control practices on site.

Unlike the requirements for regulated small MS4s, the requirements for small construction activity (primarily activity disturbing between 1 and 5 acres of land) are not detailed in the Phase II regulation. Rather, the requirements are left to the discretion of the NPDES permitting authority when it develops the small construction activity permit. EPA expects the permit for small construction activity to be similar to the existing storm water general permits for large construction activity regulated under the Phase I program. EPA's existing Construction General Permit includes requirements to:

- Submit a Notice of Intent (NOI);
- Develop and implement a Storm Water Pollution Prevention Plan (SWPPP). The SWPPP includes erosion and sediment controls, controls on waste at the site, self-inspection/monitoring, and reporting efforts; and
- Submit a Notice of Termination (NOT) when permit coverage is no longer necessary.

Two waivers from coverage are available for small construction activity.

Industrial Activity (see section 6.0)

Eleven categories of industrial activity are regulated under Phase I of the NPDES Storm Water Program. Under the Phase II Rule, no new categories of industrial activity are designated into the storm water program. The Rule does, however, include a revised no exposure exclusion that is available to all regulated categories of industrial activity (except category (x) - large construction activity) if the facility operator can certify that storm water runoff is not exposed to industrial activities.

Also, this regulation further extends the deadline to obtain permit coverage for those industrial activities operated by municipalities with populations of less than 100,000 that were temporarily exempted from permitting under the Intermodal Surface Transportation Enforcement Act (ISTEA) of 1991.

3.2 What Is the Phase II Rule's Compliance Schedule/Timeline?

The Phase II Final Rule was published in the *Federal Register* on December 8, 1999 (64 *FR* 68722). The following table lists milestones for EPA, the NPDES permitting authorities, and the regulated community under this program.

Storm Water Phase II Program Compliance Timeline

ACTIVITY	DEADLINE
Conditional No Exposure Exclusion option available in States where EPA is the NPDES permitting authority	February 7, 2000
Submission of No Exposure Certification	Every 5 years
EPA issues a menu of BMPs for small MS4 programs	October 2000
EPA issues a model general permit for small MS4s	October 2000
EPA issues guidance on measurable goals for small MS4 programs	October 2001
NPDES permitting authority determines designation of small MS4s located outside of an urbanized area that serve a jurisdiction with a population of 10,000 and population density of 1,000	By December 9, 2002; or by December 8, 2004 if apply designation criteria on a watershed basis under a comprehensive watershed plan
NPDES permitting authority determines waivers for regulated small MS4s in urbanized areas	By December 9, 2002
NPDES permitting authority issues general permits for regulated small MS4s and small construction activity	By December 9, 2002
Operators of regulated small MS4s and small construction activity designated by the rule must obtain permit coverage	By March 10, 2003
Operators of regulated small MS4s and small construction activity designated by NPDES permitting authority must obtain permit coverage	Within 180 days of notice
Temporarily exempted municipal operators of industrial activity must obtain permit coverage (ISTEA moratorium)	By March 10, 2003
The NPDES permitting authority may phase in coverage for small MS4s serving jurisdictions with a populations less than 10,000 on a schedule consistent with a State watershed permitting approach	Completion of phase-in by March 8, 2007
The regulated small MS4s must fully implement their storm water management programs	By the end of the first permit term – typically a 5-year period
Re-evaluation of the Phase II small MS4 regulations by EPA	By December 2012
NPDES permitting authority determination on a petition for designation of a non-regulated storm water discharger	Within 180 days of receipt

4.0 REGULATED SMALL MS4S

After reading section 4.0, you should understand what an MS4 is, which operators of MS4s are subject to the Phase II small MS4 regulations (including who may be waived from coverage), the small MS4 permit options, and the permit requirements for a small MS4 storm water management program. The discussion of these elements concludes with a step-by-step review of the process for compliance with the small MS4 program and possible funding options. Special concerns regarding Federal and State-operated small MS4s are also addressed.

4.1 MS4 DEFINITIONS

EPA's National Pollutant Discharge Elimination System (NPDES) storm water permitting program labels municipal separate storm sewer systems (MS4s) as either "small," " medium," or "large" for the purposes of regulation. The definitions of each are included herein. The Phase I storm water program covers medium and large MS4s. The Phase II storm water regulation covers a certain subset of small MS4s, known as "regulated small" MS4s. Regulated small MS4 coverage under the rule is discussed in section 4.2.

4.1.1 What is an "MS4"?

What constitutes a municipal separate storm sewer system (MS4) is often misinterpreted and misunderstood. The term MS4 does not solely refer to municipally-owned storm sewer systems, but rather is a term of art with a much broader application that can include, in addition to local jurisdictions, State departments of transportation, universities, local sewer districts, hospitals, military bases, and prisons. An MS4 also is not always just a system of underground pipes – it can include roads with drainage systems, gutters, and ditches. The regulatory definition of an MS4 is provided in the text box below.

According to 40 CFR 122.26(b)(8), "***municipal separate storm sewer*** means a conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, or storm drains):

(i) Owned or operated by a State, city, town, borough, county, parish, district, association, or other public body (created by or pursuant to State law)...including special districts under State law such as a sewer district, flood control district or drainage district, or similar entity, or an Indian tribe or an authorized Indian tribal organization, or a designated and approved management agency under section 208 of the Clean Water Act that discharges into waters of the United States.

(ii) Designed or used for collecting or conveying storm water;

(iii) Which is not a combined sewer; and

(iv) Which is not part of a Publicly Owned Treatment Works (POTW) as defined at 40 CFR 122.2."

4.1.2 What is a "large" MS4?

A ***large* MS4** is any MS4 located in an incorporated place or county with a population of 250,000 or greater as of the 1990 Census. The Phase II Final Rule revised the original large MS4 definition (found in the 1990 Phase I regulations) by freezing it as of the 1990 Census so that no new large MS4s could be automatically designated based on the 2000 Census, or any subsequent Census. Listings of incorporated places and counties with populations of 250,000 or greater as of the 1990 Census are included in the revised Appendices F and H to Part 122, found in the Phase II Final Rule.

4.1.3 What is a "medium" MS4?

A ***medium* MS4** is any MS4 located in an incorporated place or county with a population between 100,000 - 249,999 as of the 1990 Census. The Phase II Final Rule revised the original medium MS4 definition (found in the 1990 Phase I regulations) by freezing it as of the 1990 Census so that no new medium MS4s could be automatically designated based on the 2000 Census, or any subsequent Census. Listings of incorporated places and counties with populations between 100,000 - 249,999 as of the 1990 Census are included in the revised Appendices G and I to Part 122, found in the Phase II Final Rule.

Important Note: Many MS4s in areas below 100,000 in population have been individually brought into the Phase I program by NPDES permitting authorities. Such already regulated MS4s are considered Phase I MS4s and are not required to develop a Phase II program.

4.1.4 What is a "small" MS4?

A ***small* MS4** is any MS4 that is not already regulated under the Phase I storm water program. Unlike the definitions of medium and large MS4s, the definition of a small MS4: 1) is not dependant on a population threshold, and 2) includes Federally-owned systems, such as military bases and veterans hospitals.

4.2 COVERAGE: Who Is Subject to the Phase II Final Rule?

4.2.1 Are All Small MS4s Covered by the Phase II Final Rule?

No. The universe of small MS4s is quite large since it includes every MS4 except for the approximately 900 medium and large MS4s already regulated under the Phase I storm water program. Only a select sub-set of small MS4s, referred to as ***regulated* small MS4s**, are covered by the Phase II Final Rule, either through automatic nationwide designation by the rule or designation on a case-by-case basis by the NPDES permitting authority.

4.2.2 How Is A Small MS4 Designated as a Regulated Small MS4 under Phase II?

A *small* MS4 can be designated as a *regulated small* MS4, and thereby be subject to the Phase II rule, in any one of the three ways explained in the following subsections.

4.2.2.1 Automatic Nationwide Designation by the Rule

The Phase II Final Rule requires "automatic" nationwide coverage of all operators of small MS4s that are located within the boundaries of a Bureau of the Census-delineated “urbanized area” (UA) based on the latest decennial Census. This doesn't just include municipal operators of small MS4s, but also universities, highway departments, and any other operator of a storm sewer system that is located fully or partially within the UA. **Refer to section 4.3 for more information on how to determine if a particular small MS4 is located within a UA.**

> **Important Note:** Only the portion of the small MS4 that is located within the UA boundaries is regulated under Phase II. For example, if a county operates a small MS4 that serves the whole county but only half of the MS4 falls within the UA boundary, then the county must obtain permit coverage (and implement a storm water management program) only for the half of the MS4 in the UA.

Once a small MS4 is designated into the program based on the UA boundaries, it cannot be waived from the program if in a subsequent UA calculation the small MS4 is no longer within the UA boundaries. An automatically designated small MS4 remains regulated unless, or until, it meets the criteria for a waiver. See section 4.4 for more information on waivers from coverage for regulated small MS4s in urbanized areas.

An operator of a small MS4 located outside of a UA boundary may be designated as a regulated small MS4 if the NPDES permitting authority determines that the small MS4's discharges cause, or have the potential to cause, an adverse impact on water quality. See sections 4.2.2.2 and 4.2.2.3 below for more information on designations by the permitting authority.

Preamble of the Phase II Final Rule: Appendix 6

A listing of governmental entities that are located either fully or partially within a UA according to the 1990 Census can be found in Appendix 6 to the Preamble of the Phase II Final Rule. The list is a general geographic reference intended to help operators of small MS4s determine whether or not they are located in a UA and, consequently, required to comply with the regulation; it is not a list of all Phase II regulated MS4s and it may contain errors. For example, the list does not include small MS4 operators such as colleges and universities, Federal prison complexes, and State highway departments located within a UA.

4.2.2.2 Potential Designation by the NPDES Permitting Authority — Required Evaluation of 10,000/1,000 Areas

The Phase II Final Rule requires the NPDES permitting authority to develop a set of designation criteria and apply them, *at a minimum*, to all small MS4s located outside of a UA that serve a jurisdiction with a population of at least 10,000 and a population density of at least 1,000 people/square mile. The permitting authority is required to *evaluate* such small MS4s but is not required to *designate* them into the program unless they meet the designation criteria.

Recommended Designation Criteria

EPA recommends in the Phase II regulations that the NPDES permitting authority use a balanced consideration of the following designation criteria on a watershed or other local basis:

- ✔ Discharge to sensitive waters;
- ✔ High population density;
- ✔ High growth or growth potential;
- ✔ Contiguity to a UA;
- ✔ Significant contributor of pollutants to waters of the United States; and
- ✔ Ineffective protection of water quality concerns by other programs.

Preamble of the Phase II Final Rule: Appendix 7

A listing of governmental entities located outside of a UA that have a population of at least 10,000 and a population density of at least 1,000 people per square mile, can be found in Appendix 7 to the Preamble of the Phase II Final Rule. Similar to Appendix 6, the list is a geographic reference only – it is not a list of regulated entities and it may contain errors. Operators of small MS4s located within a listed area could be examined by their NPDES permitting authority for potential designation into the Phase II

program. Furthermore, the NPDES permitting authority reserves the right to designate for regulation any small MS4 that is contributing pollutants to waters of the United States, whether or not its jurisdiction is found in Appendix 7.

Deadline for Designation

The NPDES permitting authority is required to designate small MS4s meeting the designation criteria by December 9, 2002, or by December 8, 2004 if a comprehensive State watershed plan is in place and the criteria are being applied on a watershed basis.

4.2.2.3 Potential Designation by the NPDES Permitting Authority — Physically Interconnected

The Phase II Final Rule requires the NPDES permitting authority to designate any small MS4 located outside of a UA that contributes substantially to the pollutant loadings of a *physically interconnected* MS4 that is permitted by the NPDES storm water program. This means the other MS4 could be a large, medium, or regulated small MS4.

Small MS4s located right outside the boundary of an urbanized area are the ones most likely to meet this criterion for designation and, therefore, should make an effort to become aware of whether they discharge pollutants directly into a regulated MS4. The sooner a small MS4 operator is prepared for potential designation and implementation of the Phase II program, the better.

> ***Physically interconnected*** means that one MS4 is connected to a second MS4 in such a way that it allows for *direct* discharges into the second system.

Deadline for Designation

The final rule does not set a deadline for designation of small MS4s meeting this criterion.

4.3 URBANIZED AREAS: What Are They and How Does a Small MS4 Operator Determine If It Is Located in One?

As discussed in section 4.2, the Phase II Final Rule covers all small municipal separate storm sewer systems (MS4s) located within an “urbanized area” (UA). Based on the 1990 Census, there are 405 UAs in the United States that cover 2 percent of total U.S. land area and contain approximately 63 percent of the Nation’s population. These numbers include Puerto Rico — the only U.S. Territory with UAs.

UAs constitute the largest and most dense areas of settlement. UA calculations delineate boundaries around these dense areas of settlement and, in doing so, identify the areas of concentrated development. UA designations are used for several

purposes in both the public and private sectors. For example, the Federal Government has used UAs to calculate allocations for transportation funding, and some planning agencies and development firms use UA boundaries to help ascertain current, and predict future, growth areas.

4.3.1. What Is the Definition of an Urbanized Area (UA)?

The Bureau of the Census determines UAs by applying a detailed set of published UA criteria (see 55 *FR* 42592, October 22, 1990) to the latest decennial census data. Although the full UA definition is complex, the Bureau of the Census' general definition of a UA, based on population and population density, is provided below.

> An ***urbanized area*** (**UA**) is a land area comprising one or more places – central place(s) – and the adjacent densely settled surrounding area – urban fringe – that together have a residential population of at least 50,000 and an overall population density of at least 1,000 people per square mile. It is a calculation used by the Bureau of the Census to determine the geographic boundaries of the most heavily developed and dense urban areas.

UA Facts:

- The basic unit for delineating the UA boundary is the census block. Census blocks are based on visible physical boundaries, such as the city block, when possible, or on invisible political boundaries, when not. An urbanized area can comprise places, counties, Federal Indian Reservations, and minor civil divisions (MCDs - towns and townships).

- A UA can include governmental entities of every population size: 200; 7,000; 15,000; 30,000, 200,000; or 3 million! Entities with small populations are commonly found in the urban fringe of the UA.

- Before the time of permit issuance (by December 9, 2002), new UA calculations based on the 2000 Census should be published. The regulated small MS4 universe then will be based on these new calculations.

4.3.2. What Does A UA Look Like?

The drawing below (see Figure 4-1) is a simplified UA illustration that demonstrates the concept of UAs in relation to the Phase II Final Rule. This "urbanized area" includes within its boundaries incorporated places, a portion of a Federal Indian reservation, an entire MCD, a portion of another MCD, and portions of two counties. Any and all operators of small MS4s located within the boundaries of the UA are covered under the Phase II Final Rule, regardless of political boundaries. Operators of small MS4s located outside of the UA are subject to potential designation into the Phase II MS4 program by the NPDES permitting authority, as explained in section 4.2.

Figure 4-1

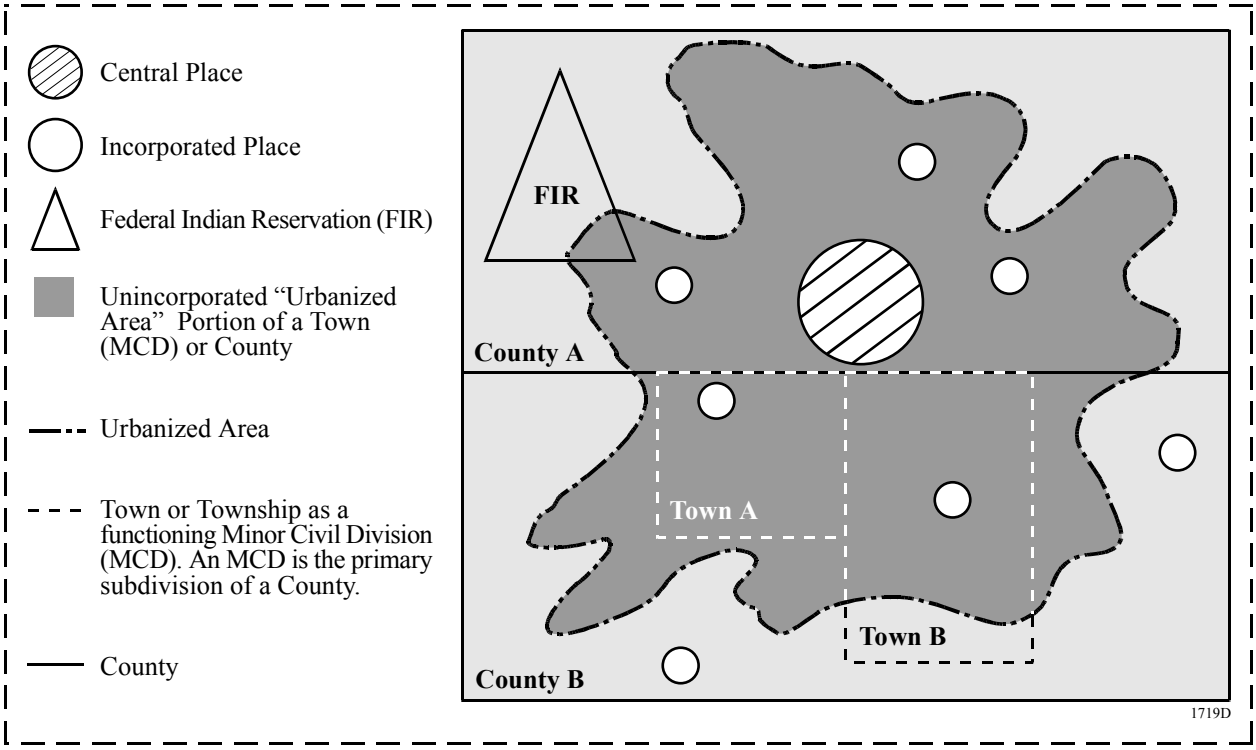

4.3.3 How Can An Operator of a Regulated Small MS4 Determine If It Is Located Within a UA?

Operators of small MS4s can determine if they are located within a UA, and therefore covered under the Phase II storm water program, through the following two steps:

— STEP 1 —

Refer to a listing of incorporated places, MCDs, and counties that are located entirely or partially within a UA. Such a listing, based on the 1990 Census and including only those entities not regulated under Phase I, can be found in Appendix 6 to the Preamble of the Phase II Final Rule. If a small MS4 is located in a listed incorporated place, MCD, or county, then the operator of the small MS4 should follow step (2) below. It is important to note that Appendix 6 is general guidance only and may contain errors. For this reason, even if a particular small MS4 isn't located in a listed area, EPA recommends that the small MS4 operator follow Step 2.

— STEP 2 —

Some operators of small MS4s may find that they are located within an

entity listed in Appendix 6 but not know if their systems are within the urbanized portion of the listed entity, or they are not on the list but want to confirm their status as recommended above. In such cases, they should contact one or more of the following institutions for more detailed information on the location of UA boundaries:

- **The State or NPDES Permitting Authority**

***Storm Water Coordinators*:** The NPDES permitting authority may be the State or the U.S. EPA Region. The Storm Water Coordinators for each U.S. EPA Region are listed in Section 8. These regional contacts can assist with UA information and provide the names of State storm water contacts.

***State Data Centers*:** Each State's Data Center receives listings of all entities that are located in UAs, as well as detailed maps and electronic files of UA boundaries. The Bureau of the Census web site includes a list of contact names and phone numbers for the Data Center in each State at www.census.gov/sdc/www.

***State Planning/Economic/Transportation Agencies*:** These agencies typically use UAs to assess current development and forecast future growth trends and, therefore, should have detailed UA information readily available to help determine the UA boundaries in any given area.

- **County or Regional Planning Commissions/ Boards**

As with State agencies, these entities are likely to have detailed UA data and maps to help determine UA boundaries.

- **The Bureau of the Census**

***Urbanized Areas Staff*:** 301 457-1099

***Web Site*:** www.census.gov
The site provides information on purchasing UA maps and electronic files for use with computerized mapping systems. Obtain free UA cartographic boundary files (Arc/Info export format) for Geographical Information System (GIS) use at: www.census.gov:80/geo/www/cob/ua.html.

***UA Maps*:** Detailed UA maps are available for purchase with a $25 minimum order ($5 per map sheet). Each map sheet measures 36 by 42 inches. For prices and a listing of UAs, visit www.census.gov/mp/www/geo/msgeo12.html. Order from the Department of Commerce, Bureau of the Census (MS 1921), P.O. Box 277943, Atlanta, GA 30384-7943 (Phone: 301 457-4100; Toll-free fax: 1-888-249-7295).

- **U.S. EPA**

EPA is currently modifying a web-based geographic program called *Enviromapper* for use in determining UA boundaries. This program will allow users to enter a location (by name, zip code, or street address) and see a map that will show if the location is within a UA boundary. EPA is committed to using Enviromapper to create a tool that, someday, will be the only tool necessary to determine the location of UA boundaries. Information about *Enviromapper* will be available at www.epa.gov/owm/phase2.

4.3.4 How Will the Year 2000 Census Affect the Determination of Status as a Regulated Small MS4?

The listing of incorporated places, MCDs, and counties located within UAs in the United States and Puerto Rico, found in Appendix 6, is based on the 1990 Census. New listings for UAs based on the 2000 Census are scheduled to be available by August of 2001. Once the official 2000 Census listings are published by the Bureau of the Census, operators of small MS4s located within the revised boundaries of former 1990 UAs, or in any newly defined 2000 UAs, become regulated small MS4s and must develop a storm water management program.

Any additional automatic designations of small MS4s based on subsequent census years is governed by the Bureau of the Census' definition of a UA in effect for that year and the UA boundaries determined as a result of the definition.

Once a small MS4 is designated into the Phase II storm water program based on the UA boundaries, it can not be waived from the program if in a subsequent UA calculation the small MS4 is no longer within the UA boundaries. An automatically designated small MS4 will remain regulated unless, or until, it meets the criteria for a waiver.

4.4 WAIVERS: Which Regulated Small MS4s May Obtain a Waiver From Coverage?

Two waiver options are available to operators of regulated small MS4s in urbanized areas if the NPDES permitting authority determines that their discharges do not cause, or have the potential to cause, water quality impairment.

> **Important Note:** The waivers are granted by the NPDES permitting authority, the operator of the regulated small MS4 can not determine for itself that it meets the waiver criteria. If the permitting authority is not proactive in assessing small MS4s for potential waivers, an operator may petition for a waiver assessment.

If a permitting authority decides to grant waivers, it is required to do so by December 9, 2002 to coincide with the expected date of the small MS4 permit issuance. The

permitting authority is also required to periodically review any waivers granted to small MS4 operators to determine whether any information required for granting the waiver has changed. Minimally, such a review needs to be conducted once every five years. The waiver options are described in the following two subsections.

Deadline for Waivers

The NPDES permitting authorities are required to make their waiver determinations by March 9, 2002 to coincide with the expected issuance of their small MS4 general permit. If the permit authority chooses to phase in permit coverage based on a comprehensive watershed plan (see section 4.5.2.2), then regulated small MS4s may be waived on the same schedule. The phase-in of permit coverage and waivers is to be completed no later than March 8, 2007.

4.4.1 Option 1: Less than 1,000 Population in a UA

The first waiver option applies where:

(1) the jurisdiction served by the system is less than 1,000 people;

(2) the system is not contributing substantially to the pollutant loadings of a physically interconnected regulated MS4; and

(3) if the small MS4 discharges any pollutants identified as a cause of impairment of any water body to which it discharges, storm water controls are not needed based on wasteload allocations that are part of an EPA approved or established "total maximum daily load" (TMDL) that addresses the pollutant(s) of concern.

> ***TMDLs*** are water quality assessments that determine the source or sources of pollutants of concern for a particular waterbody, consider the maximum amount of pollutants the waterbody can assimilate, and then allocate to each source a set level of pollutants that it is allowed to discharge (i.e., a "wasteload allocation"). Small MS4s that are not given a wasteload allocation would meet the third criterion above.

The third criterion of this waiver option <u>need only be met if</u> the small MS4 is discharging into a impaired water body and the discharge contains a pollutant or pollutants that are the cause of the impairment (i.e., the "pollutants of concern").

4.4.2 Option 2: Less than 10,000 Population in a UA

The second waiver option applies where:

(1) the jurisdiction served by the system is less than 10,000 people;

(2) an evaluation of all waters of the U.S. that receive a discharge from the system shows that storm water controls are not needed based on wasteload allocations that are part of an EPA approved or established TMDL that addresses the pollutant(s) of concern or an equivalent analysis; and

(3) it is determined that future discharges from the small MS4 do not have the potential to result in exceedances of water quality standards.

> ***Pollutants of Concern*** include biochemical oxygen demand (BOD), sediment or a parameter that addresses sediment (such as total suspended solids, turbidity or siltation), pathogens, oil and grease, and any pollutant that has been identified as a cause of impairment in any water body to which the MS4 discharges.

This waiver option differs from the first option in that: 1) it applies to a larger jurisdiction size (up to 10,000 rather than 1,000), 2) it requires a determination that the discharges are not affecting the receiving water body, whether the water body is impaired or not (in the first option an assessment is only necessary if the water body is impaired and the MS4 is discharging a pollutant of concern), 3) the determination must be based on a TMDL <u>or</u> an equivalent analysis (the first option does not allow for an equivalent analysis), and 4) an assessment of the impacts of future discharges must be performed (no such assessment is necessary under the first option).

4.5 PERMITTING OPTIONS: What Permitting Choices are Available?

The Storm Water Phase II Final Rule requires operators of a particular subset of small MS4s in urbanized areas to obtain National Pollutant Discharge Elimination System (NPDES) permit coverage because their storm water discharges are considered “point sources” of pollution. All point source discharges, unlike nonpoint sources such as agricultural runoff, are required under the Clean Water Act (CWA) to be covered by federally enforceable NPDES permits. Those MS4s already permitted under the NPDES Phase I storm water program, even MS4s serving less than 100,000 people, are not required to be permitted under the Phase II storm water program.

NPDES storm water permits are issued by an NPDES permitting authority, which may be an NPDES-authorized State or a U.S. EPA Region in non-authorized States. Once a permit application is submitted by the operator of a regulated small MS4 and a permit is obtained, the conditions of the permit must be satisfied (i.e., development and implementation of a storm water management program) and periodic reports must be submitted on the status and effectiveness of the program. This section addresses the flexible permit options the Phase II regulations allow for the regulated small MS4 operator, as well as for the permitting authority. The permit requirements are discussed in section 4.6.

4.5.1 For Regulated Small MS4 Operators

4.5.1.1 The Types of Permit Coverage Available

Unlike the Phase I program that requires individual permits for medium and large MS4s, the Phase II approach allows operators of regulated small MS4s to choose from as many as three permitting options as listed below. Each NPDES permitting authority reserves the authority to determine, however, which options are available to the regulated small MS4s in their jurisdiction.

1) General Permits

General permits are strongly encouraged by EPA. The Phase II program has been designed specifically to accommodate a general permit approach.

General permits prescribe one set of requirements for all applicable permittees. General permits are drafted by the NPDES permitting authority, then published for public comment before being finalized and issued.

A Notice of Intent (NOI) serves as the application for the general permit. The regulated small MS4 operator complies with the permit application requirements by submitting an NOI to the NPDES permitting authority that describes the storm water management plan, including best management practices (BMPs) and measurable goals. The operator has the flexibility to develop an individualized storm water program that addresses the particular characteristics and needs of its system, provided the requirements of the general permit are satisfied.

For general permit coverage, the regulated small MS4 operator must follow the Phase II permit application requirements (see section 4.6.2).

2) Individual Permits

Individual permits are required for Phase I medium and large MS4s, but not recommended by EPA for Phase II program implementation.

Individual permits prescribe a particular set of requirements for a particular permittee or a group of co-permittees. Individual permits require the submission of a more comprehensive permit application than an NOI that is submitted under a general permit. Once the permit application is received, an individual permit is drafted by the NPDES permitting authority, then published for public comment before being finalized and issued.

The Phase II rule allows a regulated small MS4 to submit an individual application for coverage under either the:

- Phase II MS4 regulation (see § 122.34 of the Phase II rule), or
- Phase I MS4 regulation (see 40 CFR §122.26(d)).

3) Modification of an Existing Phase I Individual Permit – A Co-Permittee Option with Medium and Large MS4s

The operator of a regulated small MS4 could participate as a limited co-permittee in a neighboring Phase I MS4's storm water management program by seeking a modification of the existing Phase I individual permit. As a limited co-permittee the small MS4 operator would be responsible for compliance with the permit's conditions applicable to its jurisdiction.

Note: A list of Phase I medium and large MS4s can be obtained from the EPA Office of Wastewater Management (OWM) or downloaded from the OWM web site.

The permittee must comply with the applicable terms of the modified Phase I individual permit rather than the minimum control measures in the Phase II Final Rule.

4.5.1.2 Co-permittee with Another Operator of a Regulated Small MS4

Section 4.5.1.1 explained the permitting option of a modification of an existing Phase I individual permit in order to be a co-permittee with a medium or large MS4. Regulated small MS4 operators may also choose to share responsibilities for meeting the Phase II program requirements with another regulated small MS4 operator under a general or individual permit. Those operators choosing to do so may submit jointly an NOI or individual permit application that identifies who will implement which minimum measures within the area served by the MS4s.

4.5.1.3 Relying on Another Entity to Satisfy One or More of the Minimum Control Measures

Under either a general or individual permit, the Phase II small MS4 permittee has the option of relying on other entities that are already performing one or more of the minimum control measures to implement the measure(s) on the permittee's behalf. This is only allowable where the existing control measure, or component thereof, is at least as stringent as the Phase II rule requirements (under § 122.34(b)) and the other entity has agreed to the arrangement.

For example, a county may already have an illicit discharge detection and elimination program in place and may allow an operator of a regulated small MS4 within the county's jurisdiction to rely on the county program instead of formulating and implementing a new program. In such a case, the permittee would not need to

implement the particular measure, but would still be ultimately responsible for its effective implementation. For this reason, EPA recommends that the permittee enter into a legally binding agreement with the other entity. If the permittee chooses to rely on another entity, they must note this in their permit application and subsequent reports.

> **Note:** Also, the other entity does not necessarily need to be a governmental entity. For example, a permittee could rely on a non-profit organization that is performing public education efforts on environmental issues to satisfy the public education and outreach minimum measure.

A Phase II permittee also has the option to rely on another entity to satisfy all of the permittee's small MS4 permit obligations – but only if the other entity is a governmental entity permitted under the NPDES storm water program. Should this option be chosen, the permittee must note this in its NOI, but does not need to file the otherwise required periodic reports on the status of the program. Again, it is important to note that the permittee would remain ultimately liable under the small MS4 permit. This option is particularly beneficial for operators that serve a low population, have limited resources or legal authority, or are surrounded by an NPDES regulated municipality. For example, let's assume a college campus or a veteran's hospital are operators of small MS4s and they are located in the middle of a Phase II regulated city. Negotiating with the city to implement the storm water management program for them in their jurisdictions could be a cost-effective and less burdensome option than for each to implement their own programs.

4.5.2 For the NPDES Permitting Authority

4.5.2.1 Alternative Options for Writing Permit Requirements

Two permitting options tailored to minimize duplication of effort by the regulated small MS4 permittee can be incorporated into the general or individual permit by the NPDES permitting authority:

1) Recognizing Another Governmental Entity's Program

The permitting authority can recognize in a small MS4 permit that another governmental entity is responsible under an NPDES permit for implementing any or all of the minimum control measures. In such a case, responsibility for implementation of the measure(s) would rest with the other governmental entity, thereby relieving the small MS4 permittee of its responsibility to implement that particular measure(s). See Table 4-1 for examples of both this option and the following option.

STORM WATER PHASE II RULE SMALL MS4 FLEXIBLE PERMITTING OPTIONS

	Referencing a QUALIFYING LOCAL PROGRAM (QLP)	RECOGNIZING an NPDES-Regulated Entity	RELYING on Another Entity	CO-PERMITTEE with an NPDES-Regulated Entity
NPDES PERMITTING AUTHORITY Responsibilities	• PA assesses local, State, and Tribal NPDES and non-NPDES programs to determine if their requirements are equivalent to one or more Phase II minimum measures for regulated small MS4s • PA chooses whether to reference a QLP in small MS4 permit. Requires permittee to follow requirements of QLP rather than new permit requirements. • PA does not need to notify the administrator of the QLP or obtain permission since referencing the QLP has no bearing/no affect on the administrator.	• PA assesses entities that are, or will be, performing the equivalent of 1 or more of the small MS4 minimum measures under an NPDES permit. • PA chooses whether to recognize such an entity in a small MS4 permit.	N/A	N/A
SMALL MS4 OPERATOR Responsibilities	• The operator should already be complying with any QLP referenced in the permit. • Compliance with the QLP is considered compliance with the NPDES permit; therefore operator held liable if doesn't comply with the QLP.	• Operator has no responsibility to perform the measure(s) that is being done by the recognized entity. • Not held liable if the other entity fails to perform the measure effectively; however, PA may then require the operator to implement the measure itself.	• Operator chooses, under its own permit, whether to rely on another entity to implement 1 or more minimum measure on its behalf – can be a non-NPDES regulated entity. • Operator notes in NOI or indiv. permit application that it is relying on another entity to implement a measure. • Remain liable if other entity fails to perform the measure effectively.	• Operator chooses whether to be a co-permittee with another regulated MS4 and submits a single NOI or individual permit application • The operators determine who will do what and include this information in the permit application
EXAMPLES	The QLP in the small MS4 permit could be a State program that requires MS4 operators to detect & eliminate illicit discharges into their systems.	A county doing educational outreach for the whole county under a Phase I NPDES permit could be recognized, thereby relieving all small MS4s in the county from having to have their own educational outreach programs.	1. An environmental group is doing educational outreach on the impacts of storm water runoff. 2. A county is already implementing a construction runoff control program under a Phase I NPDES permit.	

2) Referencing a Qualifying Local Program

The NPDES permitting authority can include conditions in a small MS4 permit that direct a permittee to follow the requirements of an existing qualifying local program rather than the requirements of particular minimum control measure(s). A qualifying local program is defined as a local, State or Tribal municipal storm water program that imposes requirements that are equivalent to those of the Phase II MS4 minimum measures (as found in § 122.34(b) of the rule). Unlike in Option 1 above, under this option the permittee remains responsible for the implementation of the minimum measure through its compliance with the qualifying local program.

4.5.2.2. Alternative Option for Permit Coverage: Phase-in Coverage for Regulated Small MS4s with Populations under 10,000

Permitting authorities may phase-in permit coverage for regulated small MS4s serving jurisdictions with a population under 10,000 on a schedule consistent with a State watershed permitting approach. Under this alternative option, the permitting authority must develop and implement a schedule to phase-in permit coverage for approximately 20 percent annually of all regulated small MS4s that qualify, completing the phase-in schedule in no more than five years. In such a case, the regulated small MS4 operators would be notified by the permitting authority concerning the operator's deadlines for permit coverage.

Deadlines for Phase-In

- Permitting authorities are required to have their phase-in schedule approved by the USEPA Regional Administrator no later than December 10, 2001.
- Under the phase-in option, all regulated small MS4s are required to have coverage under an NPDES permit no later than March 8, 2007.

4.6 REQUIREMENTS: What Requirements Are Regulated Small MS4s Subject To?

A regulated small MS4 operator is required to submit a permit application and obtain coverage under a NPDES storm water permit. Under the permit, the operator will be required to develop and implement a storm water management program that includes six minimum control measures, evaluation/assessment and reporting efforts, and recordkeeping, as described herein. This section begins by highlighting the standards an operator must meet to ensure compliance with the Phase II regulations.

4.6.1 Applicable Standards

A Phase II small MS4 operator must design a storm water management program so that it:

❑ Reduces the discharge of pollutants to the “maximum extent practicable”

(MEP);

- ❑ Protects water quality; and
- ❑ Satisfies the appropriate water quality requirements of the Clean Water Act.

The standard of MEP is the same standard applied to Phase I medium and large MS4 programs. There is no regulatory definition of MEP in order to allow the permitting authority and regulated MS4s maximum flexibility in their interpretation of it as appropriate.

Compliance with the technical standard of MEP requires the successful implementation of approved BMPs. The Phase II Final Rule considers narrative effluent limitations that require the implementation of BMPs and the achievement of measurable goals as the most appropriate form of effluent limitations to achieve the protection of water quality, rather than requiring that storm water discharges meet numeric effluent limitations.

EPA intends to issue Phase II NPDES permits consistent with its August 1, 1996, Interim Permitting Approach policy, which calls for BMPs in first-round storm water permits and expanded or better tailored BMPs in subsequent permits, where necessary, to provide for the attainment of water quality standards. In cases where information exists to develop more specific conditions or limitations to meet water quality standards, these conditions or limitations should be incorporated into the storm water permit. Monitoring is not required under the Phase II Rule, but the NPDES permitting authority has the discretion to require monitoring if deemed necessary.

4.6.2 Permit Application Requirements

The permit application requirements differ depending on the type of permit chosen. The following subsections describe the applicable requirements for each type of permit option allowable under the Phase II regulation.

Deadline for Submission of Permit Application

The deadline for submission of each type of permit application is the same – it must be done no later than March 10, 2003 unless the NPDES permitting authority chooses to phase-in permit coverage on a watershed basis and establishes other deadlines (see section 4.5.2.2).

4.6.2.1 General Permit Under Phase II Regulations

Operators of regulated small MS4s are required to submit in their NOI the following information:

- ❑ Best management practices (BMPs) for each of the six minimum control measures:

  ❶ Public education and outreach on storm water impacts
  ❷ Public participation/involvement
  ❸ Illicit discharge detection and elimination
  ❹ Construction site storm water runoff control
  Post-construction storm water management in new development/ redevelopment
  ❻ Pollution prevention/good housekeeping for municipal operations

- ❑ Measurable goals for each minimum control measure (i.e, narrative or numeric standards used to gauge program effectiveness);

- ❑ Estimated months and years in which actions to implement each measure will be undertaken, including interim milestones and frequency; and

- ❑ The person or persons responsible for implementing or coordinating the storm water program.

The operator of a regulated small MS4 has the flexibility to determine the BMPs and measurable goals, for each minimum control measure, that are most appropriate for the system. The chosen BMPs and measurable goals, submitted in the permit application, become the required storm water management program; however, the NPDES permitting authority can require changes in the mix of chosen BMPs and measurable goals if all or some of them are found to be inconsistent with the provisions of the Phase II Final Rule. Likewise, the permittee can change its mix of BMPs if it determines that the program is not as effective as it could be. Section 4.6.2 fully describes the minimum control measures, including sample BMPs and measurable goals for each, while section 4.6.3 describes the permit requirements concerning evaluation/assessment and recordkeeping activities.

4.6.2.2 Individual Permit Under the Phase II Regulation

For individual permit coverage under Phase II, the regulated small MS4 operator must follow the requirements of 40 CFR § 122.21(f) and the Phase II permit application requirements as described in section 4.6.2.1 above. The operator must also provide an estimate of the square mileage served by the system and any additional information requested by the NPDES permitting authority. A storm sewer map that satisfies the requirements of § 122.34(b)(3)(i) of the Phase II rule will satisfy the map requirements of § 122.21(f)(7).

4.6.2.3 Individual Permit Under the Phase I Regulation

For individual permit coverage under Phase I, the regulated small MS4 operator must follow the permit application requirements detailed at 40 CFR § 122.26(d). The operator must submit both Part 1 and Part 2 of the application requirements in §§ 122.26(d)(1) and (2) by March 10, 2003. The operator would not need to submit the information required by §§ 122.26(d)(1)(ii) and (d)(2) regarding legal authority unless it wanted the permitting authority to take that information into account when developing the individual permit.

4.6.2.4 Modification of an Existing Phase I Individual Permit

Under this permit option, the operator of a regulated small MS4 must follow Phase I permit application requirements in § 122.26(d), with some exclusions, rather than Phase II permit application requirements. The operator would not need to follow the application requirements of §§ 122.26(d)(1)(iii) and (iv) and (d)(2)(iii) – *discharge characterization*. The operator may satisfy the requirements in §§ 122.26(d)(1)(v) and (d)(2)(iv) – *identification of a management program* – by referring to the Phase I MS4's storm water management program.

EPA Recommendations

In referencing a Phase I's MS4's storm water management program, the operator should briefly describe how the existing plan will address discharges from the small MS4 or would need to be supplemented in order to adequately address the small MS4 discharges. The small MS4 operator should explain their role in coordinating storm water pollutant control activities in their MS4 service area and detail the resources available to accomplish the plan.

If a small MS4 is considering this option, it should find out when the Phase I MS4's permit is scheduled for renewal and become thoroughly familiar with the Phase I MS4's permit conditions. This co-permitting approach will be most successful if both MS4s have had thorough discussions of their storm water programs and if the small MS4 submits it’s application at the time that the Phase I MS4 is submitting its reapplication.

4.6.2 Program Requirements: The Six Minimum Control Measures

If coverage is obtained under a general permit or an individual permit under the Phase II regulations, the operator of a regulated small MS4 is required to implement a storm water management program that includes, at a minimum, the six minimum control measures described in the following subsections. As you read these subsections, keep in mind that the operator has a great deal of flexibility in determining the best management practices they will use to accomplish each measure. The rule allows the operators to chose the BMPs and measurable goals for each measure as appropriate for their particular MS4 service area – as long as the chosen BMPs and measurable goals result in effective control of pollutants in storm water runoff. Otherwise, the permitting authority may require changes in the chosen mix of BMPs and measurable goals to result in a more effective program.

4.6.2.1 Public Education and Outreach on Storm Water Impacts

Why Is Public Education and Outreach Necessary?

An informed and knowledgeable community is crucial to the success of a storm water management program since it helps to ensure the following:

Greater support for the program as the public gains a greater understanding of the reasons why it is necessary and important. Public support is particularly beneficial when operators of small MS4s attempt to institute new funding initiatives for the program or seek volunteers to help implement the program; and

Greater compliance with the program as the public becomes aware of the personal responsibilities expected of them and others in the community, including the individual actions they can take to protect or improve the quality of area waters.

What Is Required?

To satisfy this minimum control measure, the operator of a regulated small MS4 must:

- ❑ Implement a public education program to distribute educational materials to the community, or conduct equivalent outreach activities about the impacts of storm water discharges on local waterbodies and the steps that can be taken to reduce storm water pollution; and

- ❑ Determine the appropriate best management practices (BMPs) and measurable goals for this minimum control measure. Some program implementation approaches, BMPs (i.e., the program actions/activities), and measurable goals are suggested below.

What Are Some Guidelines for Developing and Implementing This Measure?

Three main action areas are important for successful implementation of a public education and outreach program:

❶ ***Forming Partnerships***
Operators of regulated small MS4s are encouraged to enter into partnerships with other governmental entities to fulfill this minimum control measure's requirements. It is generally more cost-effective to use an existing program, or to develop a new regional or state-wide education program, than to have numerous operators developing their own local programs. Operators also are encouraged to seek assistance from non-governmental organizations (e.g., environmental, civic, and industrial organizations), since many already have educational materials and perform outreach activities.

❷ ***Using Educational Materials and Strategies***

Operators of regulated small MS4s may use storm water educational information provided by their State, Tribe, EPA Region, or environmental, public interest, or trade organizations instead of developing their own materials. Operators should strive to make their materials and activities relevant to local situations and issues, and incorporate a variety of strategies to ensure maximum coverage. Some examples include:

Brochures or fact sheets for general public and specific audiences;

Recreational guides to educate groups such as golfers, hikers, paddlers, climbers, fishermen, and campers;

Alternative information sources, such as web sites, bumper stickers, refrigerator magnets, posters for bus and subway stops, and restaurant placemats;

A library of educational materials for community and school groups;

Volunteer citizen educators to staff a ***public education task force;***

Event participation with educational displays at home shows and community festivals;

Educational programs for school-age children;

Storm drain stenciling of storm drains with messages such as “Do Not Dump - Drains Directly to Lake;”

Storm water hotlines for information and for citizen reporting of polluters;

Economic incentives to citizens and businesses (e.g., rebates to homeowners purchasing mulching lawnmowers or biodegradable lawn products);and

Tributary signage to increase public awareness of local water resources.

❸ ***Reaching Diverse Audiences***

The public education program should use a mix of appropriate local strategies to address the viewpoints and concerns of a variety of audiences and communities, including minority and disadvantaged communities, as well as children. Printing posters and brochures in more than one language or posting large warning signs (e.g., cautioning against fishing or swimming) near storm sewer outfalls are methods that can be used to reach audiences less likely to read standard materials. Directing materials or outreach programs toward specific groups of commercial, industrial, and institutional entities likely to have significant storm water impacts is also recommended. For example, information could be provided to restaurants on the effects of grease clogging storm drains and to auto garages on the effects of dumping used oil into storm drains.

What Are Appropriate Measurable Goals?

Measurable goals, which are required for each minimum control measure, are intended to gauge permit compliance and program effectiveness. The measurable goals, as well as the BMPs, should reflect the needs and characteristics of the operator and the area served by its small MS4. Furthermore, they should be chosen using an integrated approach that fully addresses the requirements and intent of the minimum control measure. An integrated approach for this minimum measure could include the following measurable goals:

Target Date	Activity
1 year.....	Brochures developed (bilingual, if appropriate) and distributed in water utility bills; a storm water hotline in place; volunteer educators trained.
2 years.....	A web site created school curricula developed; storm drains stenciled.
3 years.....	A certain percentage of restaurants no longer dumping grease and other pollutants down storm sewer drains.
4 years.....	A certain percentage reduction in litter or animal waste detected in discharges.

4.6.2.2 Public Participation/Involvement

Why Is Public Participation and Involvement Necessary?

EPA believes that the public can provide valuable input and assistance to a regulated small MS4's municipal storm water management program and, therefore, suggests that the public be given opportunities to play an active role in both the development and implementation of the program. An active and involved community is crucial to the success of a storm water management program because it allows for:

Broader public support since citizens who participate in the development and decision making process are partially responsible for the program and, therefore, may be less likely to raise legal challenges to the program and more likely to take an active role in its implementation;

Shorter implementation schedules due to fewer obstacles in the form of public and legal challenges and increased sources in the form of citizen volunteers;

A broader base of expertise and ***economic benefits*** since the community can be a valuable, and free, intellectual resource; and

A conduit to other programs as citizens involved in the storm water program development process provide important cross-connections and relationships with other community and government programs. This benefit is particularly valuable when trying to implement a storm water program on a watershed basis, as encouraged by EPA.

What Is Required?

To satisfy this minimum control measure, the operator of a regulated small MS4 must:

- ❑ Comply with applicable State, Tribal, and local public notice requirements; and
- ❑ Determine the appropriate best management practices (BMPs) and measurable goals for this minimum control measure. Possible implementation approaches, BMPs (i.e., the program actions and activities), and measurable goals are described below.

What Are Some Guidelines for Developing and Implementing This Measure?

Operators of regulated small MS4s should include the public in developing, implementing, and reviewing their storm water management programs. The public participation process should make every effort to reach out and engage all economic and ethnic groups. EPA recognizes that there are challenges associated with public involvement. Nevertheless, EPA strongly believes that these challenges can be addressed through an aggressive and inclusive program. Challenges and example practices that can help ensure successful participation are discussed below.

Implementation Challenges

The best way to handle common notification and recruitment challenges is to know the audience and think creatively about how to gain its attention and interest. Traditional methods of soliciting public input are not always successful in generating interest, and subsequent involvement, in all sectors of the community. For example, municipalities often rely solely on advertising in local newspapers to announce public meetings and other opportunities for public involvement. Since there may be large sectors of the population who do not read the local press, the audience reached may be limited. Therefore, alternative advertising methods should be used whenever possible, including radio or television spots, postings at bus or subway stops, announcements in neighborhood newsletters, announcements at civic organization meetings, distribution of flyers, mass mailings, door-to-door visits, telephone notifications, and multilingual announcements. These efforts, of course, are tied closely to the efforts for the public education and outreach minimum control measure.

In addition, advertising and soliciting for help could and should be targeted at specific population sectors, including ethnic, minority, and low-income communities; academia and educational institutions; neighborhood and community groups; outdoor recreation groups; and business and industry. The goal is to involve a diverse cross-section of people who could offer a multitude of concerns, ideas, and connections during the program development process.

Possible Practices (BMPs)

There are a variety of practices that could be incorporated into a public participation and involvement program, such as:

Public meetings/citizen panels allow citizens to discuss various viewpoints and provide input concerning appropriate storm water management policies and BMPs;

Volunteer water quality monitoring gives citizens first-hand knowledge of the quality of local water bodies and provides a cost-effective means of collecting water quality data;

Volunteer educators/speakers who can conduct workshops, encourage public participation, and staff special events;

Storm drain stenciling is an important and simple activity that concerned citizens, especially students, can do;

Community clean-ups along local waterways, beaches, and around storm drains;

Citizen watch groups can aid local enforcement authorities in the identification of polluters; and

"Adopt A Storm Drain" programs encourage individuals or groups to keep storm drains free of debris and to monitor what is entering local waterways through storm drains.

What Are Appropriate Measurable Goals?

Measurable goals, which are required for each minimum control measure, are intended to gauge permit compliance and program effectiveness. The measurable goals, as well as the BMPs, would greatly depend on the needs and characteristics of the operator and the area served by its small MS4. Furthermore, they should be chosen using an integrated approach that fully addresses the requirements and intent of the minimum control measure. An integrated approach for this minimum measure could include the following measurable goals:

Target Date	Activity
1 year.....	Notice of a public meeting in several different print media and bilingual flyers; citizen panel established; volunteers organized to locate outfalls/illicit discharges and stencil drains.
2 years.....	Final recommendations of the citizen panel; radio spots promoting program and participation.
3 years.....	A certain percentage of the community participating in community clean-ups.
4 years.....	Citizen watch groups established in a certain percentage of neighborhoods; outreach to every different population sector completed.

4.6.2.3 Illicit Discharge Detection and Elimination

What Is An "Illicit Discharge"?

Federal regulations define an illicit discharge as "...any discharge to an MS4 that is not composed entirely of storm water..." with some exceptions. These exceptions include discharges from NPDES-permitted industrial sources and discharges from fire-fighting activities. Illicit discharges (see Table 4-2) are considered "illicit" because MS4s are not designed to accept, process, or discharge such non-storm water wastes. It is important to note that "illicit" does not mean "illegal." Not every illicit discharge is necessarily a prohibited illegal discharge.

Why Are Illicit Discharge Detection and Elimination Efforts Necessary?

Discharges from MS4s often include wastes and wastewater from non-storm water sources. A study conducted in 1987 in Sacramento, California, found that almost one-half of the water discharged from a local MS4 was not directly attributable to precipitation runoff. A significant portion of these dry weather flows were from illicit and/or inappropriate discharges and connections to the MS4.

Table 4-2

Sources of Illicit Discharges
Sanitary wastewater
Effluent from septic tanks
Car wash wastewaters
Improper oil disposal
Radiator flushing disposal
Laundry wastewaters
Spills from roadway accidents
Improper disposal of auto and household toxics

Illicit discharges enter the system through either direct connections (e.g., wastewater piping either mistakenly or deliberately connected to the storm drains) or indirect connections (e.g., infiltration into the MS4 from cracked sanitary systems, spills collected by drain outlets, or paint or used oil dumped directly into a drain). The result is untreated discharges that contribute high levels of pollutants, including heavy metals, toxics, oil and grease, solvents, nutrients, viruses, and bacteria to receiving waterbodies. Pollutant levels from these illicit discharges have been shown in EPA studies to be high enough to significantly degrade receiving water quality and threaten aquatic, wildlife, and human health.

What Is Required?

Recognizing the adverse effects illicit discharges can have on receiving waters, the final rule requires an operator of a regulated small MS4 to develop and implement an illicit discharge detection and elimination program. This program must include the following:

- ❑ A storm sewer system map, showing the location of all outfalls and the names and location of all waters of the United States that receive discharges from those outfalls;

- ❑ Through an ordinance, or other regulatory mechanism, a prohibition (to the extent allowable under State, Tribal, or local law) on non-storm water discharges into the MS4, and appropriate enforcement procedures and actions;

- ❑ A plan to detect and address non-storm water discharges, including illegal dumping, into the MS4;

- ❑ The education of public employees, businesses, and the general public about the hazards associated with illegal discharges and improper disposal of waste; and

- ❑ The determination of appropriate best management practices (BMPs) and measurable goals for this minimum control measure. Some program implementation approaches, BMPs (i.e., the program actions/activities), and measurable goals are suggested below.

Does This Measure Need to Address All Illicit Discharges?

No. The illicit discharge detection and elimination program does not need to address the following categories of non-storm water discharges or flows unless the operator of the regulated small MS4 identifies them as significant contributors of pollutants to its MS4:

- ❑ Water line flushing
- ❑ Landscape irrigation
- ❑ Diverted stream flows
- ❑ Rising ground waters
- ❑ Uncontaminated ground water infiltration
- ❑ Uncontaminated pumped ground water
- ❑ Discharges from potable water sources
- ❑ Foundation drains
- ❑ Air conditioning condensation
- ❑ Irrigation water
- ❑ Springs
- ❑ Water from crawl space pumps
- ❑ Footing drains
- ❑ Lawn watering
- ❑ Individual residential car washing
- ❑ Flows from riparian habitats and wetlands
- ❑ Dechlorinated swimming pool discharges
- ❑ Street wash water.

What Are Some Guidelines for Developing and Implementing This Measure?

The objective of the illicit discharge detection and elimination minimum control measure is to have regulated small MS4 operators gain a thorough awareness of their systems. This awareness allows them to determine the types and sources of illicit discharges entering their system, and establish the legal, technical, and educational means needed to eliminate these discharges. Permittees could meet these objectives

in a variety of ways depending on their individual needs and abilities, but some general guidance for each requirement is provided below.

The Map

The storm sewer system map is meant to demonstrate a basic awareness of the intake and discharge areas of the system. It is needed to help determine the extent of discharged dry weather flows, the possible sources of the dry weather flows, and the particular waterbodies these flows may be affecting. An existing map, such as a topographical map, on which the location of major pipes and outfalls can be clearly presented would demonstrate such an awareness.

EPA recommends collecting all existing information on outfall locations (e.g., review city records, drainage maps, storm drain maps), and then conducting field surveys to verify locations. It probably will be necessary to walk (i.e., wade through small receiving waters or use a boat for larger waters) the streambanks and shorelines for visual observation. More than one trip may be needed to locate all outfalls.

Legal Prohibition and Enforcement

EPA recognizes that some permittees may have limited authority under State, Tribal or local law to establish and enforce an ordinance, or other regulatory mechanism, prohibiting illicit discharges. In such a case, the permittee is encouraged to obtain the necessary authority, if at all possible. Otherwise, the NPDES permitting authority assumes responsibility for implementation of this component of the minimum measure, yet the permittee would remain ultimately responsible for the quality of its MS4 discharge. Model ordinances, including examples of amendments to local codes or existing ordinances, will be provided in the Phase II storm water guidance for regulated small MS4s, which is part of EPA's planned implementation "tool box" for the rule.

The Plan

The plan to detect and address illicit discharges is the central component of this minimum control measure. The plan is dependant upon several factors, including the permittee's available resources, size of staff, and degree and character of its illicit discharges. EPA envisions a plan similar to the one recommended for use in meeting Michigan's general storm water NPDES permit for small MS4s. As guidance only, the four steps of a recommended plan are outlined below:

❶ **Locate Problem Areas**
EPA recommends that priority areas be identified for detailed screening of the system based on the likelihood of illicit connections (e.g., areas with older sanitary sewer lines). Some methods that could be used to locate problem areas include: public complaints; visual screening; water sampling from manholes and outfalls during dry weather; and use of infrared and thermal photography.

❷ **Find the Source**
Once a problem area or discharge is found, additional efforts usually would be

necessary to determine the source of the problem. Some methods that could be used to find the source of the illicit discharge include: dye-testing buildings in problem areas; dye- or smoke-testing buildings at the time of sale; tracing the discharge upstream in the storm sewer; employing a certification program that shows that buildings have been checked for illicit connections; implementing an inspection program of existing septic systems; and using video to inspect the storm sewers.

❸ **Remove/Correct Illicit Connections**
Once the source is identified, the offending discharger should be notified and directed to correct the problem. Education efforts and working with the discharger can be effective in resolving the problem before taking legal action.

❹ **Document Actions Taken**
As a final step, all actions taken under the plan should be documented. Doing so would illustrate that progress is being made to eliminate illicit connections and discharges. Documented actions should be included in the required annual reports and include information such as: the number of outfalls screened; any complaints received and corrected; the number of discharges and quantities of flow eliminated; and the number of dye or smoke tests conducted.

Educational Outreach

Outreach to public employees, businesses, property owners, the general community, and elected officials regarding ways to detect and eliminate illicit discharges is an integral part of this minimum measure that will help gain support for the permittee's storm water program. Suggested educational outreach efforts include:

- Developing ***informative brochures, and guidances*** for specific audiences (e.g., carpet cleaning businesses) and school curricula;
- Designing a program to ***publicize and facilitate public reporting*** of illicit discharges;
- ***Coordinating volunteers*** for locating, and visually inspecting, outfalls or to stencil storm drains; and
- Initiating ***recycling programs*** for commonly dumped wastes, such as motor oil, antifreeze, and pesticides.

What Are Appropriate Measurable Goals?

Measurable goals, which are required for each minimum control measure, are intended to gauge permit compliance and program effectiveness. The measurable goals, as well as the BMPs, should reflect the needs and characteristics of the operator and the area served by its small MS4. Furthermore, they should be chosen using an integrated approach that would fully address the requirements and intent of the minimum control measure. An integrated approach for this minimum measure could

include the following measurable goals:

Target Date	Activity
1 year.....	Sewer system map completed; recycling program for household hazardous waste in place.
2 years.....	Ordinance in place; training for public employees completed; a certain percentage of sources of illicit discharges determined.
3 years.....	A certain percentage of: illicit discharges detected; illicit discharges eliminated; and households participating in quarterly household hazardous waste special collection days.
4 years.....	Most illicit discharge sources detected and eliminated.

The educational outreach measurable goals for this minimum control measure could be combined with the measurable goals for the Public Education and Outreach minimum control measure.

4.6.2.4 Construction Site Storm Water Runoff Control

Why Is The Control of Construction Site Runoff Necessary?

Polluted storm water runoff from construction sites often flows to MS4s and ultimately is discharged into local rivers and streams. Of the pollutants listed in Table 4-3, sediment is usually the main pollutant of concern. Sediment runoff rates from construction sites are typically 10 to 20 times greater than those of agricultural lands, and 1,000 to 2,000 times greater than those of forest lands. During a short period of time, construction sites can contribute more sediment to streams than can be deposited naturally during several decades. The resulting siltation, and the contribution of other pollutants from construction sites, can cause physical, chemical, and biological harm to our nation's waters. For example, excess sediment can quickly fill rivers and lakes, requiring dredging and destroying aquatic habitats.

Table 4-3

Pollutants Commonly Discharged From Construction Sites
Sediment
Solid and sanitary wastes
Phosphorous (fertilizer)
Nitrogen (fertilizer)
Pesticides
Oil and grease
Concrete truck washout
Construction chemicals
Construction debris

What Is Required?

The Phase II Final Rule requires an operator of a regulated small MS4 to develop, implement, and enforce a program to reduce pollutants in storm water runoff to their MS4 from construction activities that result in a land disturbance of greater than or equal to one acre. The small MS4 operator is required to:

- ❑ Have an ordinance or other regulatory mechanism requiring the implementation of proper erosion and sediment controls, and controls for other wastes, on applicable construction sites;

- ❑ Have procedures for site plan review of construction plans that consider potential water quality impacts;
- ❑ Have procedures for site inspection and enforcement of control measures;
- ❑ Have sanctions to ensure compliance (established in the ordinance or other regulatory mechanism);
- ❑ Establish procedures for the receipt and consideration of information submitted by the public; and
- ❑ Determine the appropriate best management practices (BMPs) and measurable goals for this minimum control measure. Suggested BMPs (i.e., the program actions/activities) and measurable goals are presented below.

What Are Some Guidelines for Developing and Implementing This Measure?

Further explanation and guidance for each component of a regulated small MS4's construction program is provided below.

Regulatory Mechanism

Through the development of an ordinance or other regulatory mechanism, the small MS4 operator needs to establish a construction program that requires controls for polluted runoff from construction sites with a land disturbance of greater than or equal to one acre. Because there may be limitations on regulatory legal authority, the small MS4 operator is required to satisfy this minimum control measure only to the maximum extent practicable and allowable under State, Tribal, or local law. If an operator is unable to establish an enforceable construction program due to a lack of legal authority, and is unsuccessful in trying to obtain the necessary authority, the NPDES permitting authority would then assume responsibility.

EPA intends to develop a model ordinance that a small MS4 operator could use as a basis for its construction program. Alternatively, amendments to existing erosion and sediment control programs, or other ordinances, can also provide the basis for the program.

Site Plan Review

The small MS4 operator is required to include in its construction program requirements for the implementation of appropriate BMPs on construction sites to control erosion and sediment, as well as waste at the site. To determine if a construction site is in compliance with such provisions, the small MS4 operator should review the site plans submitted by the construction site operator before ground is broken.

Site plan review aids in compliance and enforcement efforts since it alerts the small MS4 operator early in the process to the planned use or non-use of proper BMPs and provides a way to track new construction activities. The tracking of sites is useful not only for the small MS4 operator's recordkeeping and reporting purposes, which will be required activities under their NPDES storm water permit (see Fact Sheet 2.9), but also for members of the public interested in ensuring that the sites are in compliance.

Inspections and Penalties

Once construction commences, the BMPs should be in place and the small MS4 operator's enforcement activities should begin. To ensure that the BMPs are properly installed, the small MS4 operator is required to develop procedures for site inspection and enforcement of control measures to deter infractions. Procedures could include steps to identify priority sites for inspection and enforcement based on the nature and extent of the construction activity, topography, and the characteristics of soils and receiving water quality. Inspections give the MS4 operator an opportunity to provide additional guidance and education, issue warnings, or assess penalties. To conserve staff resources, one possible option for small MS4 operators could be to have these inspections performed by the same inspector that visits the sites to check compliance with health and safety building codes.

Information Submitted by the Public

A final requirement of the small MS4 program for construction activity is the development of procedures for the receipt and consideration of public inquiries, concerns, and information submitted regarding local construction activities. This provision is intended to further reinforce the public participation component of the regulated small MS4 storm water program and to recognize the crucial role that the public can play in identifying instances of noncompliance.

The small MS4 operator is required only to *consider* the information submitted, and may not need to follow-up and respond to every complaint or concern. Although some form of enforcement action or reply is not required, the small MS4 operator is required to demonstrate acknowledgment and consideration of the information submitted. A simple tracking process in which submitted public information, both written and verbal, is recorded and then given to the construction site inspector for possible follow-up would suffice.

What Are Appropriate Measurable Goals?

Measurable goals, which are required for each minimum control measure, are intended to gauge permit compliance and program effectiveness. The measurable goals, as well as the BMPs, should reflect the needs and characteristics of the operator and the area served by its small MS4. Furthermore, they should be chosen using an integrated approach that fully addresses the requirements and intent of the minimum control measure. An integrated approach for this minimum measure could include the following measurable goals:

Target Date	Activity
1 year.....	Ordinance or other regulatory mechanism in place; procedures for information submitted by the public in place.
2 years.....	Procedures for site inspections implemented; a certain percentage rate of compliance achieved by construction operators.
3 years.....	Maximum compliance with ordinance; improved clarity and reduced sedimentation of local waterbodies.
4 years.....	Increased numbers of sensitive aquatic organisms in local waterbodies.

Am I Correct in Thinking that Construction Sites Are Already Covered Under the NPDES Storm Water Program?

Yes. EPA's Phase I NPDES storm water program requires operators of construction activities that disturb five or more acres to obtain a NPDES construction storm water permit. General permit requirements include the submission of a Notice of Intent and the development of a storm water pollution prevention plan (SWPPP). The SWPPP must include a site description and measures and controls to prevent or minimize pollutants in storm water discharges. The Phase II Final Rule similarly regulates discharges from smaller construction sites disturbing equal to or greater than one acre and less than five acres.

Even though all construction sites that disturb more than one acre are covered nationally by an NPDES storm water permit, the construction site runoff control minimum measure for the small MS4 program is needed to induce more localized site regulation and enforcement efforts, and to enable operators of regulated small MS4s to more effectively control construction site discharges into their MS4s.

To aid operators of regulated construction sites in their efforts to comply with both local requirements and their NPDES permit, the Phase II Final Rule includes a provision that allows the NPDES permitting authority to reference a "qualifying State, Tribal or local program" in the NPDES general permit for construction. This means that if a construction site is located in an area covered by a qualifying local program, then the construction site operator's compliance with the local program would constitute compliance with their NPDES permit. A regulated small MS4's storm water program for construction could be a "qualifying program" if the MS4 operator requires a SWPPP, in addition to the requirements summarized in this fact sheet.

The ability to reference other programs in the NPDES permit is intended to reduce confusion between overlapping and similar requirements, while still providing for both local and national regulatory coverage of the construction site. The provision allowing NPDES permitting authorities to reference other programs has no impact on, or direct relation to, the small MS4 operator's responsibilities under the construction site runoff control minimum measure profiled in this fact sheet.

Is a Small MS4 Operator Required to Regulate Construction Sites that the Permitting Authority has Waived from the NPDES Construction Program?

No. If the NPDES permitting authority waives requirements for storm water discharges associated with small construction activity (see § 122.26(b)(15) of the Phase II rule), the small MS4 operator is not required to develop, implement, and/or enforce a program to reduce pollutant discharges from such sites.

4.6.2.5 Post-construction Storm Water Management in New Development/ Redevelopment

Why Is The Control of Post-Construction Runoff Necessary?

Post-construction storm water management in areas undergoing new development or redevelopment is necessary because runoff from these areas has been shown to significantly effect receiving waterbodies. Many studies indicate that prior planning and design for the minimization of pollutants in post-construction storm water discharges is the most cost-effective approach to storm water quality management.

There are generally two forms of substantial impacts of post-construction runoff. The first is caused by an increase in the type and quantity of pollutants in storm water runoff. As runoff flows over areas altered by development, it picks up harmful sediment and chemicals such as oil and grease, pesticides, heavy metals, and nutrients (e.g., nitrogen and phosphorus). These pollutants often become suspended in runoff and are carried to receiving waters, such as lakes, ponds, and streams. Once deposited, these pollutants can enter the food chain through small aquatic life, eventually entering the tissues of fish and humans. The second kind of post-construction runoff impact occurs by increasing the quantity of water delivered to the waterbody during storms. Increased impervious surfaces interrupt the natural cycle of gradual percolation of water through vegetation and soil. Instead, water is collected from surfaces such as asphalt and concrete and routed to drainage systems where large volumes of runoff quickly flow to the nearest receiving water. The effects of this process include streambank scouring and downstream flooding, which often lead to a loss of aquatic life and damage to property.

What Is Required?

The Phase II Final Rule requires an operator of a regulated small MS4 to develop, implement, and enforce a program to reduce pollutants in post-construction runoff to their MS4 from new development and redevelopment projects that result in the land disturbance of greater than or equal to 1 acre. The small MS4 operator is required to:

- ❑ Develop and implement strategies which include a combination of structural and/or non-structural best management practices (BMPs);

- ❑ Have an ordinance or other regulatory mechanism requiring the implementation of post-construction runoff controls to the extent allowable under State, Tribal or local law;

- ❑ Ensure adequate long-term operation and maintenance of controls;

- ❑ Determine the appropriate best management practices (BMPs) and measurable goals for this minimum control measure.

What Is Considered a "Redevelopment" Project?

The term "redevelopment" refers to alterations of a property that change the "footprint" of a site or building in such a way that the disturbance of equal to or greater than 1 acre of land results. The term does not include such activities as exterior remodeling. Because redevelopment projects may have site constraints not found on new development sites, the rule provides flexibility for implementing post-construction controls on redevelopment sites that consider these constraints.

What Are Some Guidelines for Developing and Implementing This Measure?

This section includes some sample non-structural and structural BMPs that could be used to satisfy the requirements of the post-construction runoff control minimum measure. It is important to recognize that many BMPs are climate-specific, and not all BMPs are appropriate in every geographic area. Because the requirements of this measure are closely tied to the requirements of the construction site runoff control minimum measure (see Fact Sheet 2.6), EPA recommends that small MS4 operators develop and implement these two measures in tandem. Sample BMPs follow.

❑ **Non-Structural BMPs**

- **Planning and Procedures**. Runoff problems can be addressed efficiently with sound planning procedures. Master Plans, Comprehensive Plans, and zoning ordinances can promote improved water quality by guiding the growth of a community away from sensitive areas and by restricting certain types of growth (industrial, for example) to areas that can support it without compromising water quality.

- **Site-Based Local Controls**. These controls can include buffer strip and riparian zone preservation, minimization of disturbance and imperviousness, and maximization of open space.

❑ **Structural BMPs**

- **Storage Practices**. Storage or detention BMPs control storm water by gathering runoff in wet ponds, dry basins, or multichamber catch basins and slowly

releasing it to receiving waters or drainage systems. These practices both control storm water volume and settle out particulates for pollutant removal.

- **Infiltration Practices**. Infiltration BMPs are designed to facilitate the percolation of runoff through the soil to ground water, and, thereby, result in reduced storm water quantity and reduced mobilization of pollutants. Examples include infiltration basins/trenches, dry wells, and porous pavement.

- **Vegetative Practices**. Vegetative BMPs are landscaping features that, with optimal design and good soil conditions, enhance pollutant removal, maintain/improve natural site hydrology, promote healthier habitats, and increase aesthetic appeal. Examples include grassy swales, filter strips, artificial wetlands, and rain gardens.

What Are Appropriate Measurable Goals?

Measurable goals, which are required for each minimum control measure, are intended to gauge permit compliance and program effectiveness. The measurable goals, as well as the BMPs, should reflect needs and characteristics of the operator and the area served by its small MS4. Furthermore, the measurable goals should be chosen using an integrated approach that fully addresses the requirements and intent of the minimum control measure. An integrated approach for this minimum measure could include the following goals:

Target Date	Activity
1 year.....	Strategies developed that include structural and/or non-structural BMPs.
2 years.....	Strategies codified by use of ordinance or other regulatory mechanism.
3 years.....	Reduced percent of new impervious surfaces associated with new development projects.
4 years.....	Improved clarity and reduced sedimentation of local waterbodies.

4.6.2.6 Pollution Prevention/Good Housekeeping for Municipal Operations

Why Is Pollution Prevention/Good Housekeeping Necessary?

The Pollution Prevention/Good Housekeeping for municipal operations minimum control measure is a key element of the small MS4 storm water management program. This measure requires the small MS4 operator to examine and subsequently alter own actions to help ensure a reduction in the amount and type of pollution that (1) collects on streets, parking lots, open spaces, and storage and vehicle maintenance areas and is discharged into local waterways; and (2) results from actions such as environmentally damaging land development and flood management practices or poor maintenance of storm sewer systems.

While this measure is meant primarily to accomplish the goal of improving or protecting the quality of receiving waters by altering the performance of municipal or facility operations, it also can result in a cost savings for the small MS4 operator, since proper and timely maintenance of storm sewer systems can help avoid repair costs from damage caused by age and neglect.

What Is Required?

Recognizing the benefits of pollution prevention practices, the rule requires an operator of a regulated small MS4 to:

- ❑ Develop and implement an operation and maintenance program with the ultimate goal of preventing or reducing pollutant runoff from municipal operations into the storm sewer system;

- ❑ Include employee training on how to incorporate pollution prevention/good housekeeping techniques into municipal operations such as park and open space maintenance, fleet and building maintenance, new construction and land disturbances, and storm water system maintenance. To minimize duplication of effort and conserve resources, the MS4 operator could use training materials that are available from EPA, their State or Tribe, or relevant organizations;

- ❑ Determine the appropriate best management practices (BMPs) and measurable goals for this minimum control measure. Some program implementation approaches, BMPs (i.e., the program actions/activities), and measurable goals are suggested below.

What Are Some Guidelines for Developing and Implementing This Measure?

The intent of this control measure is to ensure that existing municipal, State or Federal operations are performed in ways that will minimize contamination of storm water discharges. EPA encourages the small MS4 operator to consider the following components when developing their program for this measure:

Maintenance activities, maintenance schedules, and long-term inspection procedures for structural and non-structural controls to reduce floatables and other pollutants discharged from the separate storm sewers;

Controls for reducing or eliminating the discharge of pollutants from areas such as roads and parking lots, maintenance and storage yards (including salt/sand storage and snow disposal areas), and waste transfer stations. These controls could include programs that promote recycling (to reduce litter), minimize pesticide use, and ensure the proper disposal of animal waste;

Procedures for the proper disposal of waste removed from the separate

storm sewer systems and the areas listed in the bullet above, including dredge spoil, accumulated sediments, floatables, and other debris; and

Ways to ensure that new flood management projects assess the impacts on water quality and examine existing projects for incorporation of additional water quality protection devices or practices. EPA encourages coordination with flood control managers for the purpose of identifying and addressing environmental impacts from such projects.

The effective performance of this control measure hinges on the proper maintenance of the BMPs used, particularly for the first two bullets above. For example, structural controls, such as grates on outfalls to capture floatables, typically need regular cleaning, while non-structural controls, such as training materials and recycling programs, need periodic updating.

What Are Appropriate Measurable Goals?

Measurable goals, which are required for each minimum control measure, are meant to gauge permit compliance and program effectiveness. The measurable goals, as well as the BMPs, should consider the needs and characteristics of the operator and the area served by its small MS4. The measurable goals should be chosen using an integrated approach that fully addresses the requirements and intent of the minimum control measure. An integrated approach for this minimum measure could include the following measurable goals:

Target Date	Activity
1 year.....	Pollution prevention plan (the new BMPs and revised procedures) completed; employee training materials gathered or developed; procedures in place for catch basin cleaning after each storm and regular street sweeping.
2 years.....	Training for appropriate employees completed; recycling program fully implemented.
3 years.....	Some pollution prevention BMPs incorporated into master plan; a certain percentage reduction in pesticide and sand/salt use; maintenance schedule for BMPs established.
4 years.....	A certain percentage reduction in floatables discharged; a certain compliance rate with maintenance schedules for BMPs; controls in place for all areas of concern.

4.6.3 Program Requirements: Evaluation/Assessment & Reporting

If coverage is obtained under a general permit or an individual permit under the Phase II regulations, the operator of a regulated small MS4 is required to comply with the evaluation/assessment and reporting requirements summarized in this section.

Frequency of Reports

Reports must be submitted annually during the first permit term – permit terms are typically a 5-year period. For subsequent permit terms, reports must be submitted in years 2 and 4 only, unless the NPDES permitting authority requests more frequent reports. Reports do not need to be submitted if the operator of the regulated small MS4 is relying on another entity to satisfy all permit obligations (see section 4.5.1.3)

Required Report Content

The reports must include the following:

- ❑ The status of compliance with permit conditions, including an assessment of the appropriateness of the selected BMPs and progress toward achieving the selected measurable goals for each minimum measure;
- ❑ Results of any information collected and analyzed, including monitoring data, if any;
- ❑ A summary of the storm water activities planned for the next reporting cycle;
- ❑ A change in any identified best management practices or measurable goals for any minimum measure; and
- ❑ Notice of relying on another governmental entity to satisfy some of the permit obligations (if applicable – see section 4.5.1.3).

A Change in Selected BMPs

If, upon evaluation of the program, improved controls are identified as necessary, permittees should revise their mix of BMPs to provide for a more effective program. Such a change, and an explanation of the change, must be noted in a report to the NPDES permitting authority.

Recordkeeping Requirements

Records required by the NPDES permitting authority must be kept for at least 3 years and made accessible to the public at reasonable times during regular business hours. Records need not be submitted to the NPDES permitting authority unless the permittee is requested to do so.

4.7 SMALL MS4 PROGRAM COMPLIANCE PROCESS: What Do I Need to Do To Comply?

Sections 4.1 through 4.6 of this guidance have provided a details on who's covered and what's required under the Phase II regulations for regulated small MS4s. Now that you are familiar with the Phase II program, this section walks you through the process, from beginning to end, that an operator of a regulated small should take to comply with the regulation. This step-by-step "walk-through" references the appropriate sections of the

guidance along the way as a means for understanding how the information in sections 4.1 through 4.6 fits together.

The last page of this section includes a permitting decision tree to help operators of MS4s determine if they need an NPDES storm water permit. By starting in the upper left hand corner, an operator can follow the decision tree to determine if they fall under Phase I or Phase II, and if they are eligible for a waiver.

Step 1: Determine if you are an operator of an MS4 (see section 4.1.1).

Step 2: As an operator of an MS4, determine if you are an operator of a small MS4 (see section 4.1.4).

Step 3: As an operator of a small MS4, determine if you are an operator of a regulated small MS4 (see section 4.2). You need to find out if you are:

A. Automatically designated by the rule

- First, determine if your system is located partially or fully within an urbanized area (See section 4.3),
- Second, determine if you may qualify for a waiver (waivers are at the discretion of the permitting authority). If you qualify for a waiver, stop here. (See section 4.4)

B. Potentially designated by the NPDES permitting authority

- Determine if your system, located outside of a UA, may fit the criteria for potential designation. Since designations are at the discretion of the permitting authority, a final determination is made by the permitting authority and not the small MS4 operator. If designated, continue with Step 4.

Step 4: Read Phase II Rule and guidance materials to get a sense of the permitting options (see section 4.5) and program requirements (see section 4.6).

Step 5: Determine which neighbors are regulated as Phase I MS4s (refer to list on the EPA web site) or Phase II MS4s (refer to Appendix 6 and maps of your UA). This information will be used to base your decision as to whether to:

- Be a co-permittee with another regulated MS4. (See section 4.5.1.2)
- Rely on another regulated MS4 for partial or full implementation of the minimum measures on your behalf. (See section 4.5.1.3)

Step 6: Determine if programs similar to one or more of the minimum measures is already being performed by another entity. This information will be used to decide whether you wish to rely on another entity for partial implementation of the minimum measures on your behalf. (See section 4.5.1.3)

Step 7: Determine which permit option to choose (depends on which are made available by the your NPDES permitting authority) (See section 4.5.1)

- General permit under the Phase II regulation
- Individual permit under the Phase I or Phase II regulation
- Modification of a Phase I individual permit (Co-permittee with a large or medium MS4)

In determine which option to choose, think about...

— If you wish to be a co-permittee and share responsibilities based on information from Step 5

— If, instead of the co-permittee option, you wish to have own permit but rely on another entity for implementing a measure or measures based on information from Steps 5 & 6.

Step 8: Begin planning and development of your storm water management program

- Use menu of BMPs as a guide (provided by EPA or the permitting authority). The EPA web site will also have references and links to helpful guidance on every facet of a storm water management program for MS4s.

- Meet with staff who will be responsible for implementing the storm water management program (may be a multi-departmental team). Task them with:
  — Assessing the storm water management characteristics and needs of the area served by the regulated small MS4.
  — Determining appropriate BMPs and measurable goals
  — Determining who will be responsible for what under the program

- Form a citizen advisory panel to help develop the program and give them similar tasks as those given to the staff.

- Meet with local Phase I and Phase II MS4 operators to discuss co-permittee status or sharing of resources, such as: hiring one enforcement inspector for multiple areas, co-sponsoring household hazardous waste collection events, or sharing a street sweeper, recycling truck, illicit discharge detection cameras, or any other equipment. (Note: Nothing listed here is required by the Phase II rule -- they are only examples)

- Meet with other entities that you may rely on to implement one or more of the minimum measures to discuss the arrangement and any legal agreements.

Step 9: **A. Under a General Permit:**

1) Once a general permit is issued, read it carefully. You may not be

required to implement every minimum measure due to the permitting authority recognizing or referencing other similar programs (see section 4.5.2.1). For this reason, before the permit is issued (which is expected to be no later than December 9, 2002) follow Step 8 but only do a preliminary storm water management program until the final permit requirements are know. Once the permit is issued, if you have chosen this option you will need to make final decisions on the following issues and complete the development of your storm water management plan:

- Do you want to be a co-permittee with another regulated small MS4?
- Do you want to rely on another entity for some or all of the permit requirements?
- Which BMPs and measurable goals will you use for each minimum measure you will be implementing?

2) Fill out an NOI in accordance with the Phase II regulation. (See section 4.6.2.1)

B. Under an Individual Permit (new or modified):

If you have chosen one of the individual permit options (i.e., under Phase II, under Phase I, or modified existing Phase I), you will need to continue efforts in Step 8, as applicable, and complete development of your permit application in accordance with the Phase II regulation. (See sections 4.6.2.2 through 4.6.2.4)

Step 10: Submit your NOI under a general permit or your individual permit application to the NPDES permitting authority <u>by March 10, 2003</u>; unless your NPDES permitting authority phases-in permit coverage and establishes alternative deadlines (see section 4.5.2.2).

Step 11: Implement your storm water management program in accordance with applicable standards (see section 4.6.1). The Phase II rule allows you up to five years to fully implement your program, although the exact timeframe is at the discretion of the your NPDES permitting authority.

Step 12: Write annual reports in your first permit term assessing the effectiveness of BMPs and if measurable goals were met, and submit the reports to your NPDES permitting authority. You may change the mix of BMPs originally selected if you find that such a change is necessary to ensure a more effective program. This step, as required in the Phase II regulations at § 122.34(g) and described in section 4.6.3, is not applicable if you sought coverage under an individual permit under the Phase I regulations or under a modification of an existing Phase I MS4 permit.

Step 13: Be aware that you may need to take over implementation of a minimum control measure if you are relying on another entity for its implementation and the other entity fails to perform it effectively. This is why EPA encourages a legally-binding agreement when choosing to rely on another entity. Also, the permitting authority may chose to change your mix of BMPs and measurable goals as submitted in you permit application if it determines that your program is not effectively controlling pollutant discharges.

4.8 FEDERAL AND STATE-OPERATED REGULATED SMALL MS4S: Unique Program Implementation Issues

In addition to local government jurisdictions, small MS4s include certain Federal and State-operated MS4s. Federal facilities were not designated for regulation by the NPDES Phase I storm water program for MS4s. The Phase II Final Rule, however, includes the "United States" in the definition of a small MS4, thereby including Federal MS4 operators in the NPDES Phase II storm water program. Federal and State-operated small MS4s can include universities, prisons, hospitals, roads (i.e., departments of transportation), military bases (e.g., State Army National Guard barracks), parks, and office buildings/complexes.

The small MS4 program, largely designed with municipally-operated small MS4s in mind, raises a number of implementation issues for Federal and State operators of regulated small MS4s who must obtain an NPDES permit that requires the development and implementation of a storm water management program that includes the six minimum control measures. This section highlights potential implementation issues related to the minimum control measures, and then discusses the implementation options included in the rule that may help resolve these issues.

4.8.1 What Are Some Implementation Concerns?

This section profiles the three most common implementation issues raised in the public comments submitted regarding Federal/State implementation of the small MS4 program.

How Does the Final Rule Account for Unique Characteristics?

Federal and State small MS4s possess a number of characteristics that set them apart from their municipal counterparts. For example, whereas municipally-operated MS4s largely serve resident populations, many Federal or State-operated MS4s, such as medical clinics and departments of transportation (DOTs), do not. Other types of Federal and State MS4s, such as military bases, prisons, and State universities, serve populations that are different from a typical municipal population. Their unique characteristics might lead Federal or State MS4 operators to question either the need to implement the entire suite of minimum control measures or their ability to comply fully with their Phase II storm water permit. The flexibility within the minimum measures allows Federal and State MS4s to develop a storm water program that comprises the

minimum measures in a way that makes sense for their circumstances.

What If the Operator Lacks Legal Authority?

Three of the minimum control measures (illicit discharge detection and elimination, and the two construction-related measures) require enforceable controls on third party activities to ensure successful implementation of the measure. Some Federal and State operators, however, may not have the necessary legal regulatory authority to adopt these enforceable controls in the same manner as do local governments.

For example, a State DOT that is responsible for the portions of its roads running through urbanized areas may not have the legal authority to impose restrictions on, and penalties against, illicit (i.e., non-storm water) discharges into its MS4 if the source of the discharge is outside the DOT's right-of-way or jurisdiction. As in the case of local governments that lack such authority, State and Federal MS4s are expected to utilize the authority they do possess and to seek cooperative arrangements.

How Can the Program Be Implemented in Areas Where There Are Multiple Regulated Entities?

Since the final rule provides automatic coverage of all small MS4s within an urbanized area, regardless of political boundaries, coverage of multiple governments and agencies in a single area is likely. For example, a city government that operates a small MS4 within an urbanized area must obtain permit coverage alongside the county, State, and Federal DOTs if they all operate a portion of the roads (i.e., MS4s) in the city. All four entities are responsible for developing a storm water management program for their MS4s (or portions thereof) within the urbanized area. EPA encourages State and Federal small MS4 operators to establish cooperative agreements with cities and counties in implementing their storm water programs.

4.8.2 Are There Implementation Strategies that Help Facilitate Program Implementation?

This section offers two hypothetical strategies for resolving the implementation issues raised above. The best solution may include a creative combination of strategies.

STRATEGY #1
A Focus on Choosing Appropriate BMPs

The final rule requires the permittee to choose *appropriate* best management practices (BMPs) for each minimum control measure. In other words, EPA expects Phase II permittees to tailor their storm water management plans and their BMPs to fit the particular characteristics and needs of the permittee and the area served by its MS4. Therefore, the Federal or State operator of a regulated storm sewer system can take advantage of the flexibility provided by the rule to utilize the most suitable minimum control measures for its MS4. Below is an example of tailored activities and BMPs that

Federal or State operators can implement for each measure:

- ❑ **Public Education and Outreach**. Distribute brochures and post fliers to educate employees of a Federal hospital about the problems associated with storm water runoff and the steps they can take to reduce pollutants in storm water discharges. For example, employees could be advised against carelessly discarding trash on the ground or allowing their cars to leak oil/fluids in the parking lot.

- ❑ **Public Participation/Involvement**. Provide notice of storm water management plan development and hold meetings at which employees of a Federal office complex are encouraged to voice their ideas and opinions about the effort. Request volunteers to help develop the plan.

- ❑ **Illicit Discharge Detection and Elimination**. Develop a map of the storm sewer system on a military base. Perform visual dry weather monitoring of any outfalls to determine whether the storm sewer system is receiving any non-storm water discharges from the base. If a dry weather flow is found, trace it back to the source and stop the discharge. Should a Federal military base identify an illicit discharge, the source of which is traced to the boundary of its system, the Federal operator should refer the discharge to the adjoining regulated MS4 for further action.

- ❑ **Construction Site Runoff Control**. Require the implementation of erosion and sediment controls, and control of waste, for any Federal or State DOT road construction. The DOT would review site plans for proper controls, perform inspections, and establish penalties in the construction contract if controls are not implemented. If construction is done directly by the regulated DOT instead of a private contractor, the DOT could be penalized by the NPDES permitting authority for non-compliance with its small MS4 permit in the event that controls are not properly implemented.

- ❑ **Post-Construction Runoff Control**. Require the implementation of post-construction storm water controls for any new construction on the grounds of a prison. This can be required as part of a construction contract, instituted as internal policy, and considered during site plan review.

- ❑ **Pollution Prevention/Good Housekeeping for Municipal Operations**. Train maintenance staff at a State university to employ pollution prevention techniques whenever possible. For example, routinely pick up trash/litter from the university grounds, use less salt on the parking lots and access roads in the winter, perform any maintenance of university vehicles under shelter only, limit pesticide use to the minimum needed, use vegetative buffer strips in the parking lots to filter runoff, and keep dumpster lids closed.

STRATEGY #2
Working with Other Entities

There may be instances when the Federal or State permittee has limited capabilities to satisfy one or more of the minimum control measures. As discussed above, the permittee may lack the proper legal authority to enforce controls (although it should try to obtain the necessary legal authority if at all possible).

In the case of limited capabilities, the permittee can work with neighboring operators of regulated small MS4s, preferably on a watershed basis, to form a shared storm water management program in which each permittee is responsible for activities that are within individual legal authorities and abilities. The final rule allows the permittee to rely on other entities, with their permission, to implement those minimum measures that the permittee is otherwise unable to implement. Three examples are:

- ❑ A State DOT with limited regulatory legal authority can reference a local sewer district's illicit detection and elimination program in its permit application, provided the program sufficiently addresses illicit discharges into the DOT's storm sewer system.

- ❑ The permittee or NPDES permitting authority can reference such programs as coastal nonpoint pollution control programs, State or local watershed programs, State or local construction programs, and environmental education efforts by public or private entities.

- ❑ The permittee can become a co-permittee with a neighboring Phase I MS4 through a modification of the Phase I MS4's individual permit. This may be the most logical and preferable option for those Federal and State entities located in close proximity to Phase I MS4s.

Choosing to work with other governmental entities as a co-permittee, or referencing parts of each other's plans, can help resolve issues that may arise where multiple regulated jurisdictions exist in the same area. Permittees can avoid duplicative efforts, as well as territorial or regulatory disputes, by working together to implement the storm water program.

Suggested Steps for Working with Other Entities

(1) Identify the boundaries of the urbanized area.

(2) Identify the operators of storm sewer systems or portions of the systems within the urbanized area such as local, State, Tribal or Federal governments or other entities.

(3) In seeking permit coverage:

Identify where another entity's program may satisfy one or more minimum control measure. If a program has requirements that are equivalent to a minimum control measure's required elements, the operator of the regulated small MS4 may reference the program in its permit application, provided the other entity gives it permission to do so. While such an arrangement relieves the operator from performing the minimum measure itself, the operator remains ultimately responsible for the measure's effective implementation.

OR

Team with an operator of a Phase I MS4 and become a co-permittee on its existing Phase I individual permit.

4.9 FUNDING OPTIONS

Possibly the biggest challenge for an operator of a regulated small MS4 in implementing a storm water management program is finding funding for the program. Funding is needed to maintain the staff, equipment and materials necessary to develop and implement an effective program. Adequate funding is critical to the success of the program but attaining it can be difficult as many other important programs compete for the same limited revenues from a general fund. Therefore, the operator of a regulated small MS4 will need to consider alternative funding options. This section provides brief introductions to some of the various funding options currently in use across the country. The following information on funding options was written by the American Public Works Association (AWPA) as part of their Storm Water Phase II workshops:

Debt Financing: Typically used for capital-intensive projects, local governments can issue debt to finance storm water management programs and facilities. Revenue bonds - or bonds that rely on ongoing source of revenue may be used. Alternatively, a general obligation bond can be issued which are backed by the full faith and credit of your municipality (based on your ability to generate revenues though taxes and other fees).

Grants and Loans: Federal, State, or Regional grant or loan funds may be available for some elements of the storm water program, depending on the BMP's selected and the location. Grants and loans are usually applicable to specific projects and not on-going activities, such as operation and maintenance.

Users /Utility Fees: Utility services charges are rates billed to customers for providing storm water management services. The service charges may be flat rates, or variable rates based on classes of

customers. Utility service charges may represent a dedicated source of funding and an ongoing method of funding some or all storm water management programs.

Special Assessment: Properties can be assessed annually to fund storm water management programs. Often, special assessments are used to fund a special district or authority that can implement all or portions of a region's storm water management program.

Local Improvement Under this type of funding system, individual properties benefitted by storm water projects are assessed to fund the project. Some states require special enabling legislation to establish this type of special benefits district.

General Fund: General fund monies are used for may storm water programs. If storm water programs are funded from your General Fund, the programs are at risk in each budget cycle. In addition, in order to increase funding levels for your program, other local government services may be affected or a general tax increase may be required.

Inspection Fees: Plan review and inspection fees allows the community to recover some or all of the direct cost associated with performing design reviews for pre and post construction BMP's.

Developer Fees: The developers construct needed facilities as a condition of development and bear associated costs.

Alternative Fees: Instead of constructing on-site facilities to meet development requirements, developers may be given the option of paying a comparable fee to be used by the local government to build regional facilities that are designed to meet the same objectives as the developer-constructed on-site mitigation.

Connection Fees: A one time charge assessed at the time of development to recover a proportionate share of the cost of existing facilities and planned future facilities. The applicability depends upon legislation in each state.

Additional Resources

- Storm Water Utilities: Innovative Financing for Storm Water Management. 1992. U.S. EPA, Office of Policy, Planning, and Evaluation. Washington, D.C.
- State and Local Funding of Nonpoint Source Control Programs. 1992. U.S. EPA, Office of Water, Assessment and Watershed Protection Division. Washington, D.C.
- Storm Water Management Utility Implementation Manual. South Carolina Land Resources Commission, Columbia, S.C.

- Storm Water Maintenance and Financing Options (draft). 1987. State of Maryland, Maryland Department of Natural Resources.

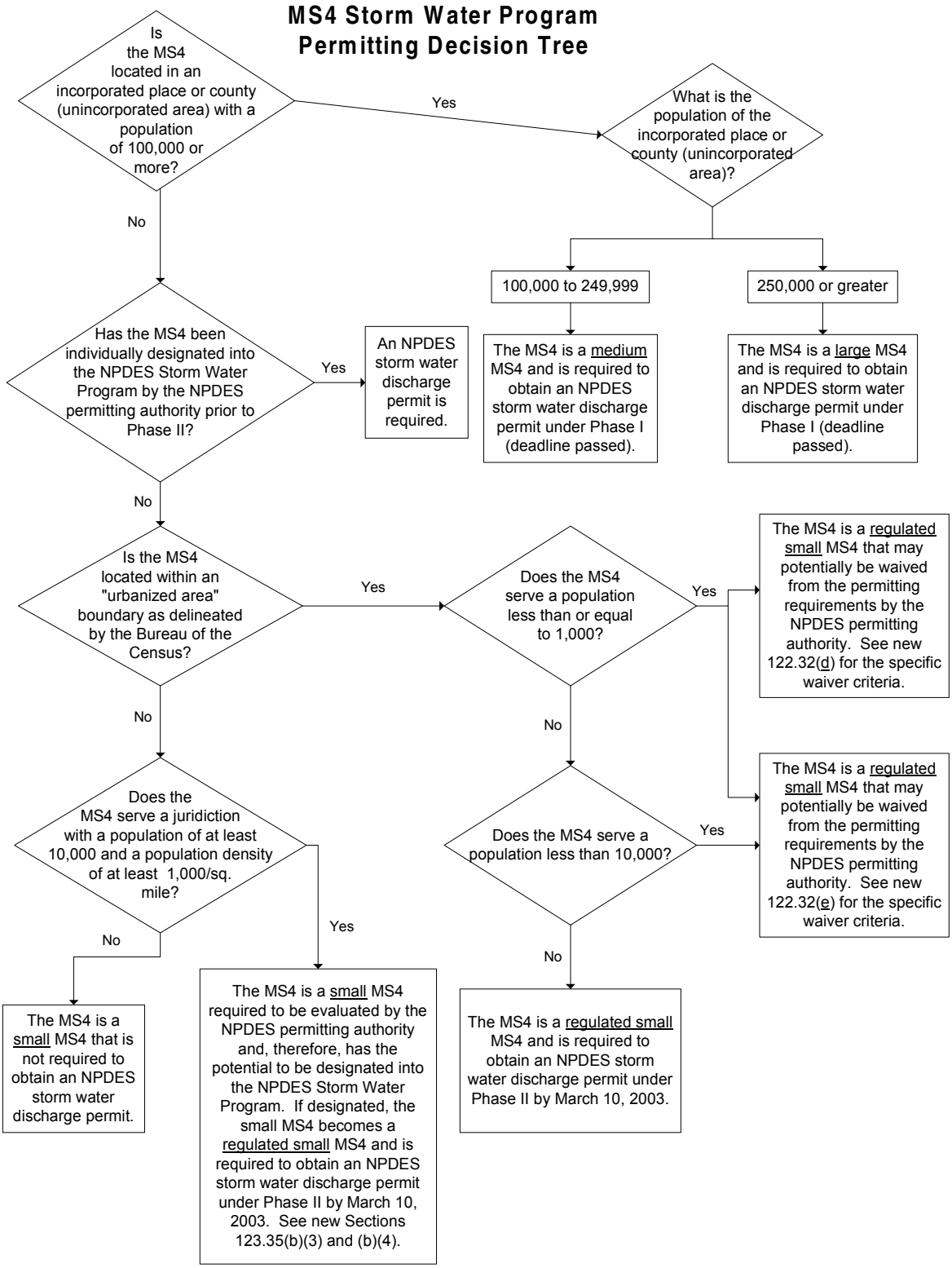

1. See Appendices F, G, H, and I to Part 122 (as revised by the Phase II Final Rule) for the list of incorporated places and counties (unincorporated areas) with a population of 100,000 or greater. If the MS4 is located in a listed entity, then the answer to this question is "Yes" and the MS4 is covered under the Phase I MS4 program as a medium or large MS4.

5.0 SMALL CONSTRUCTION ACTIVITY

After reading Section 5.0, you should understand what type of construction activity is subject to the Phase II small construction activity regulations (including who may be waived from coverage), who is considered an operator of small construction activity, the permit options and requirements for small construction activity, and the interaction of the NPDES storm water program for construction with the NPDES storm water program for regulated MS4s. The discussion of these elements concludes with a step-by-step review of the process for compliance with the Phase II regulations for small construction activity.

5.1 COVERAGE: Who Is Subject to the Phase II Rule?

The NPDES Storm Water Program defines construction activities as "small" and "large" for the purposes of regulation. The Phase I storm water program covers large construction activity. The Phase II storm water regulation covers small construction activity. To understand who is covered under the Phase II Rule, it is necessary to understand who is already covered under the Phase I Rule. Toward this end, this section provides a definition of the type of construction activity covered by Phase I and Phase II, as well as other definitions essential to understanding the construction component of the NPDES Storm Water Program.

5.1.1 What Type of Construction Activity Is Covered Under the Phase I Regulations?

The Phase I Rule identifies eleven categories of industrial activity in the definition of "storm water discharge associated with industrial activity" that must obtain an NPDES storm water discharge permit (see section 6.1). Category (x) of this definition includes construction activity (including clearing, grading and excavation) that results in ***a total land disturbance of 5 acres or greater***. Disturbances of less than 5 acres are also regulated under category (x) if they are part of a "larger common plan of development or sale" with a planned land disturbance of 5 acres or greater. Phase I construction activity is commonly referred to as "large"

Construction activities can include road building, construction of residential houses, office buildings, industrial sites, or demolition.

Land Disturbance means exposed soil due to clearing, grading, or excavation activities.

Larger common plan of development or sale describes a situation in which multiple construction activities are occurring, or will occur, on a contiguous area.

An operator is the person or persons that has either operational control of construction project plans and specifications, or day-to-day operational control of activities necessary to ensure compliance with storm water permit conditions.

construction activity. The Phase I rule requires all operators of large construction activity to obtain an NPDES storm water discharge permit before discharging storm water runoff to a municipal separate storm sewer system or waters of the United States.

5.1.2 What Type of Construction Activity Is Covered Under the Phase II Regulations?

In 1992, the Ninth Circuit court remanded for further proceedings the portion of EPA's Phase I storm water regulation related to category (x) construction activity (NRDC v. EPA, 966 F.2d at 1292). EPA responded to the court's decision by designating under Phase II storm water discharges from construction site activities that ultimately will result in a ***land disturbance of equal to or greater than 1 and less than 5 acres*** as "storm water discharges associated with *small construction* activity" (see § 122.26(b)(15)). The Phase II rule requires all operators of small construction activity to obtain an NPDES storm water discharge permit before discharging storm water runoff to a municipal separate storm sewer system or waters of the United States.

Construction activities disturbing less than 1 acre are also included in Phase II of the NPDES storm water program if they are part of a larger common plan of development or sale with a planned disturbance of equal to or greater than 1 acre and less than 5 acres, or if they are designated by the NPDES permitting authority. The NPDES permitting authority or EPA Region may designate construction activities disturbing less than 1 acre based on the potential for contribution to a violation of a water quality standard or for significant contribution of pollutants to waters of the United States.

The definition of small construction activity does not apply where the construction operator can certify to one of two waivers – see section 5.2 for more information on waiver options.

5.1.3 What is meant by the terms "land disturbance," "larger common plan of development or sale," and "operator" of a construction site?

The definitions of "land disturbance," "larger common plan of development or sale," and "operator" of a construction site are key in understanding coverage under the NPDES Storm Water Program for construction activity. These definitions originate from the NPDES storm water general permit for large construction activity.

- **Land disturbance** refers to exposed soil resulting from activities such as clearing, grading and excavating.

- **Larger common plan of development or sale** is a contiguous area where multiple separate and distinct construction activities are occurring under one plan (e.g., the operator is building on three half-acre lots in a 6-acre development). The "plan" in a common plan of development or sale is broadly defined as any announcement or piece of documentation (including a sign, public notice or hearing, sales pitch,

advertisement, drawing, permit application, zoning request, computer design, etc.) or physical demarcation (including boundary signs, lot stakes, surveyor markings, etc.) indicating that construction activities may occur on a specific plot.

- **An operator** of a construction site is the person (or persons) responsible for obtaining coverage under an NPDES storm water permit for construction activity, and complying with the permit requirements. An operator is the person or persons that meet either of the following criteria:

  - ❑ Has operational control of construction project plans and specifications, including the ability to make modifications to those plans and specifications; or

  - ❑ Has day-to-day operational control of those activities at a project which are necessary to ensure compliance with a storm water pollution prevention plan (SWPPP) for the site or other permit conditions (e.g., they are authorized to direct workers at a site to carry out activities required by the SWPPP or comply with other permit conditions).

  There may be more than one party at a site responsible for “operational control.” Depending on the project and the distinction between the parties’ (e.g., owner’s vs. developer’s) responsibilities, there can either be a single party acting as a site operator needing permit coverage or there can be two (or more) operators who may share permit responsibilities. In cases where there are two or more operators , both parties will need permit coverage if they choose to keep the responsibilities as described in the above bullets separate, or they choose to separately maintain operational control for different portions of the site, etc. In such cases both operators should obtain permit coverage as co-permittees by co-submitting separate Notice of Intent forms, and should share in meeting permit conditions (e.g., generating the storm water pollution prevention plan, performing inspections, etc.). The option to have one sole operator who is willing to assume complete responsibility / liability for all permit requirements still exists and, in many cases, may be the less overall burdensome way to comply with storm water requirements.

  There are other instances where parties conduct earth disturbing activities at a site but do not need their own permit coverage. Examples for whom this may apply include a subcontractor who is under the supervision of the operator, or an entity that is neither a subcontractor nor has operational control (e.g., a utility line installer).

  Additional information on the responsibilities of operators can be found in Part III.E of EPA's NPDES Construction General Permit, published on February 17, 1998 (63 FR 7858). Part II of the fact sheet contained in the NPDES Construction General Permit also provides answers to common questions regarding roles and responsibilities of different parties involved on a construction site.

Important note: NPDES-authorized States may use a different definition of "operator" than the one provided above.

5.2 WAIVERS: Which Small Construction Activity Sites May Obtain a Waiver From Coverage?

Under the Phase II Rule, NPDES permitting authorities have the option of providing a waiver from Phase II coverage and requirements to operators of small construction activity who certify to one of two conditions:

❶ Low predicted rainfall potential (i.e., activity occurs during a negligible rainfall period), where the rainfall erosivity factor ("R" in the Revised Universal Soil Loss Equation [RUSLE]) would be less than 5 during the period of construction activity.

❷ A determination that storm water controls are not necessary based on either:

(A) A "total maximum daily load" (TMDL) that address the pollutant(s) of concern for construction activities; **OR**

(B) For nonimpaired waters that don't require TMDLs, an equivalent analysis that determines allocations for small construction sites for the pollutants of concern or determines that such allocations are not needed to protect water quality based on consideration of instream concentrations, expected growth in pollutant concentrations from all sources, and a margin of safety.

> **Pollutants of concern** include sediment or a parameter that addresses sediment (such as total suspended solids, turbidity, or siltation) and any other pollutant that has been identified as a cause of impairment of a receiving waterbody.

The intent of these waiver provisions (see §§ 122.26(b)(15)(A) and(B)) is to waive only those sites that are highly unlikely to have a negative effect on water quality. Therefore, before applying for a waiver, operators of small construction activity are encouraged to consider the potential water quality impacts that may result from their project and to carefully examine such factors as proximity to water resources and sensitivity of receiving waters. Small construction activities disturbing less than 1 acre that are designated by the permitting authority are not eligible for these waivers.

5.2.1 Waiver 1: The Rainfall Erosivity Factor Waiver

The Rainfall Erosivity Factor waiver is based on the potential for a construction activity to occur in an area, or during a certain period of time, where there is low

predicted rainfall potential and, therefore, less likelihood of causing impacts. This waiver is time-sensitive and is dependent on when during the year a construction activity takes place, how long it lasts, and the expected rainfall and intensity during that time. It creates an incentive for construction site operators to build during the dry part of the year.

How would an operator qualify for, and certify to, this waiver?

To qualify for this waiver, the construction site operator must determine the value of the rainfall erosivity factor (R factor) in the Revised Universal Soil Loss Equation (RUSLE) and then certify to the permitting authority that the value of the factor is less than 5 during the period of construction. The RUSLE is a refinement of the Universal Soil Loss Equation (USLE), which is a method developed by the U.S. Department of Agriculture to measure soil loss from agricultural lands at various times of the year on a regional basis. The R factor varies based on location and time period during the year.

A construction site operator will need site-specific data to calculate the values for rainfall erosivity using the RUSLE. The rainfall erosivity factor is determined in accordance with Chapter 2 of *Agriculture Handbook Number 703, Predicting Soil Erosion by Water: A Guide to Conservation Planning With the Revised Universal Soil Loss Equation (RUSLE)*. This handbook is no longer in print but Chapter 2 can be obtained from EPA's web site or by contacting EPA's Water Resource Center.

5.2.1 Waiver 2: The Water Quality Waiver

The Water Quality waiver consists of: 1) a component for small construction sites that will discharge to an impaired waterbody where total maximum daily load (TMDL) assessments have been performed, and 2) a component for small construction sites that will discharge to non-impaired waters where an analysis equivalent to the TMDL assessments have been performed.

For impaired waters where technology-based controls required by NPDES permits are not achieving State water quality standards, the CWA requires implementation of the TMDL process.

> The **TMDL process** establishes the maximum amount of pollutants a waterbody can assimilate before water quality is impaired, then requires that this maximum level not be exceeded. A TMDL assessment determines the source or sources of a pollutant of concern, considers the maximum allowable level of that pollutant for the waterbody, then allocates to each source or category of sources a set level of the pollutant that it is allowed to discharge into the waterbody. Allocations to point sources are called wasteload allocations.

A TMDL is developed for each pollutant that is found to be contributing to the impairment of a waterbody or a segment of a waterbody. To allow a waiver for construction activities, a TMDL would need to address sediment, or a parameter that addresses sediment such as total suspended solids, turbidity, or siltation. Additional TMDLs addressing common pollutants from construction sites such as nitrogen, phosphorus, and oil and grease also may be necessary to ensure water quality protection and allow a waiver from the NPDES storm water program. More information on TMDLs can be found at http://www.epa.gov/owow/tmdl/.

Non-impaired waterbodies do not require TMDL assessments. However, construction site operators that discharge to non-impaired waterbodies are still eligible for this waiver. A construction site operator is eligible for a waiver if an analysis equivalent to a TMDL assessment is conducted for the pollutants of concern and it is determined through this analysis that small construction sites would not have to control their contribution of pollutants of concern to the waterbody to protect water quality. The analysis may also determine that allocations are not needed to protect water quality based on consideration of variables including existing in-stream concentrations; expected growth in pollutant contributions from all sources; and a margin of safety. In this situation, the construction site operator also qualifies for a waiver.

How would an operator qualify for, and certify to, this waiver?

EPA expects that when TMDLs, or equivalent analyses are completed, there may be a determination that certain classes of sources, such as small construction sites, would not have to control their contribution of pollutants of concern to the waterbody in order for the waterbody to be in attainment with water quality standards (i.e., these sources were not assigned wasteload allocations). In such a case, to qualify for the Water Quality waiver, the operator of the construction site would need to certify that its construction activity will take place, and the storm water discharges will occur, within the area covered either by the TMDLs or equivalent analysis. A certification form would likely be provided by the NPDES permitting authority.

5.3 PERMIT OPTIONS

The Storm Water Phase II Rule requires operators of small construction activities to obtain National Pollutant Discharge Elimination System (NPDES) permit coverage because their storm water discharges are considered “point sources” of pollution. Point source pollutant discharges, unlike nonpoint sources such as agricultural runoff, are required under the Clean Water Act (CWA) to be covered by federally enforceable NPDES permits.

NPDES storm water permits are issued by an NPDES permitting authority, which may be an NPDES-authorized State or a U.S. EPA Region in non-authorized States (see *Appendix A* for a list of U.S. EPA Regions). Once a permit application is submitted by the operator of a small construction activity, the conditions of the permit must be

satisfied (i.e., implementation of a storm water pollution prevention plan). This section addresses the permit options under the Phase II regulations for operators of small construction activity, as well as for the permitting authority. The permit requirements are discussed in Section 5.4.

5.3.1 For Operators of Small Construction Activity: What Types of Permit Coverage Are Available?

Similar to the Phase I program for large construction activity, the Phase II approach allows operators of small construction activities to choose between two permitting options. Each NPDES permitting authority has the discretion, however, to determine which options are available to operators of small construction activities in their jurisdiction.

1) General Permits

General permits are strongly encouraged by EPA for small construction activity. EPA anticipates that the existing general permit for large construction activity will serve as a model for small construction activity general permits.

General permits prescribe one set of requirements for all applicable permittees. General permits are drafted by the NPDES permitting authority, then published for public comment before being finalized and issued.

A Notice of Intent (NOI) serves as the application for the general permit. Under the Phase II Rule, NPDES permitting authorities have the discretion to not require submittal of an NOI under a general permit for small construction activity.

Small construction operators must submit an NOI and obtain coverage under a general permit by March 10, 2003 or an earlier date set by the permitting authority (if this option is available).

2) Individual Permits

NPDES permitting authorities may deny coverage under general permits and require operators to submit an individual NPDES permit application based on information such as water quality data.

In the event that an NPDES permitting authority decides to issue an individual construction permit for small construction activity, operators are subject to the individual application requirements found at 40 CFR §122.26(c)(1)(ii).

For any discharges of storm water associated with small construction activity identified in §122.26(b)(15) that are not authorized by a general permit, an individual permit application must be submitted to the permitting authority by

March 10, 2003.

5.3.2 For the NPDES Permitting Authority

5.3.2.1 Alternative Option for Writing Permit Requirements: Referencing a Qualifying State, Tribal or Local Erosion and Sediment Control Program

Under §122.44(s) of the Phase II Rule, permitting authorities have the flexibility to develop permit conditions that incorporate by reference qualifying State, Tribal, or local erosion and sediment control programs into permits for large and small construction activity.

To be considered a qualifying State, Tribal, or local program, the program must require construction site operators to:

- Implement appropriate erosion and sediment control BMPs;
- Control waste such as discarded building materials, concrete truck washout, chemicals, litter, and sanitary waste at the site that may cause adverse impacts to water quality;
- Submit a site plan for review that incorporates consideration of potential water quality impacts; and
- Develop and implement a storm water pollution prevention plan (SWPPP) containing elements similar to those required by other NPDES construction storm water permits.

In addition to these elements, a qualifying program for large construction activities must also include any additional requirements necessary to achieve the applicable technology-based standards of “Best Available Technology” (BAT) and “Best Conventional Technology” (BCT) based on the best professional judgment of the permit writer.

> **Important Note:** Not all the construction programs administered by NPDES-permitted MS4s would qualify. A primary reason for this is because NPDES-permitted MS4s are not obligated under their permit to require construction operators to develop a SWPPP.

Should a State, Tribal, or local program include one or more, but not all, of the elements listed above, the NPDES permitting authority can reference the program in the permit, provided it also lists the missing element(s) as a condition in the permit.

5.3.2.2 Permit Application: Optional Use of NOIs

Under the Phase II Rule, EPA is providing NPDES permitting authorities with the

discretion to not require NOIs under a general permit for discharges from small construction activity, if desired. EPA does, however, recommend the use of NOIs for tracking permit coverage and prioritizing inspections and enforcement. This alternative option does not apply to general permits for large construction activity.

5.4 PERMIT REQUIREMENTS

The Phase II Rule requires operators of small construction sites, nationally, to obtain an NPDES permit and implement practices to minimize pollutant runoff. The Phase II Rule directs permitting authorities to develop and issue permits for small construction activity no later than December 9, 2002. Operators of small construction activity will be required to obtain permit coverage by March 10, 2003, or an earlier date set by the permitting authority. However, operators may have to comply with local, State, or Tribal construction runoff control programs (see section 4.6.2.4 for information on the Phase II small MS4's construction program).

For the Phase II small construction program, EPA has taken an approach similar to Phase I where the program requirements are not fully defined in the rule but rather in the NPDES permit by the NPDES permitting authority. EPA recommends that the NPDES permitting authorities use their existing Phase I NPDES construction general permits as a guide to developing their Phase II construction permits. In doing so, the Phase II requirements would be similar to the Phase I requirements described in subsection 5.4.2, although the applicable standards for small construction activity are different as outlined in subsection 5.4.1.

5.4.1 Applicable Water Quality Standards

Unlike the technology-based standards of BAT and BCT that are applicable to large construction activity, an operator of small construction activity is required to design its pollutant control plan so that it:

- ❑ Protects water quality (under CWA section 402(p)(6)); and
- ❑ Satisfies the appropriate water quality requirements of the CWA.

The water quality standards for large and small construction activity are different because they were designated into the NPDES storm water program under two separate sections of the CWA with differing standards. Practically, though, the standard for small construction activity would be substantively the same as the standard for large construction activity.

5.4.2 Potential Small Construction Activity Permit Requirements

EPA currently has only one type of permit available for construction activity operators, the NPDES Construction General Permit. This permit provides coverage to

large construction activities only. EPA expects any general permit for small construction activity to be very similar to the CGP. To gain familiarity with the CGP, the three main elements of the CGP are included below.

> **Important note:** This section on the CGP requirements is included for informational purposes only in order to provide a sense of what the permit requirements for small construction activity may be – these are not the requirements for small construction activity.

5.4.2.1 Notice of Intent

A complete and accurate NOI must be submitted to the NPDES permitting authority. An NOI includes general information and a certification that the activity will not impact endangered or threatened species. This certification is unique to EPA's NOI and is not a requirement of most NPDES-delegated State's NOIs.

An NOI must be postmarked at least two days prior to commencement of any work on site (if the operator has control over plans and specifications) or two days prior to commencement of the operator's portion of the work (if the operator has only day-to-day operational control).

5.4.2.2 Storm Water Pollution Prevention Plan (SWPPP)

The most important requirement of the CGP is the construction storm water pollution prevention plan (SWPPP) that includes the appropriate BMPs to minimize the discharge of pollutants from the site. The CGP requires at least one SWPPP for each construction project or site.

The construction site operator, or operators, must develop the SWPPP prior to submitting the NOI to obtain permit coverage. Unlike the NOI and other reporting forms, the operator(s) does not submit the SWPPP to the permitting authority. Instead, the SWPPP remains onsite and made accessible according to the requirements described in the CGP.

The SWPPP comprises several elements:

- **Site description.** This will contain a description of potential pollutant sources and other information.

- **Controls (BMPs).** This part of the SWPPP must clearly describe not only the controls, but also the timing and responsible permittee for implementing the controls in the following categories:

  ✔ Erosion and Sediment Controls
  ✔ Storm Water Management Controls

✓ Other Controls

- **Inspections.** Another critical element of the SWPPP is regular inspections of disturbed areas of the site that has not been stabilized; exposed materials storage areas; structural controls; and vehicle entrances and exits.

- **Maintenance.** The SWPPP also requires that operators perform maintenance on the controls (BMPs) to ensure they are in effective operating condition.

- **Signatures.** The SWPPP must be signed by at least one of the persons responsible for submitting an NOI for the project.

- **Accessibility.** The CGP requires the operator(s) to retain a copy of the SWPPP at the construction site or other local location accessible to the permitting authority.

More information on the construction SWPPP requirements can be found in the CGP, published on February 17, 1998 (63 *FR* 7858, p. 7906). EPA has also issued a construction general permit for Regions IV and VI. Contact your EPA Regional office or State environmental agency for information on construction permits in your State. In addition, EPA published a construction SWPPP guidance in a document entitled *Storm Water Management for Construction Activities: Developing Storm Water Pollution Prevention Plans and Best Management Practices* (EPA 832-R-92-005, September 1992).

5.4.2.3 Notice of Termination (NOT)

A completed Notice of Termination (NOT) must be submitted to the NPDES permitting authority within 30 days after one or more of the following conditions have been met:

- Final stabilization has been achieved on all portions of the site for which the permittee is responsible;

- Another operator/permittee has assumed control over all areas of the site that have not been finally stabilized; or

- For residential construction only: temporary stabilization of a lot has been completed prior to transference of ownership to the homeowner, with the homeowner being made aware of the need to perform final stabilization.

5.5 INTEGRATION OF NPDES PROGRAM FOR CONSTRUCTION WITH NPDES PROGRAM FOR MS4S

There is often confusion about the interaction between the NPDES Storm Water Program for construction activity, which has been the topic of discussion in this section, and the construction runoff control program implemented by NPDES-regulated MS4s, which was the topic of discussion in section 4.6.2.4.

- These are two separate and distinct construction programs.
- A construction operator is subject to requirements under BOTH programs if it is located in an NPDES-regulated MS4's jurisdiction.

The NPDES Storm Water Program for Construction is administered by the NPDES permitting authority, either the State or an EPA Regional Office.

- This program requires the construction site operator to seek coverage under an NPDES storm water discharge permit for construction. The current permit, the Construction General Permit, requires the operator to submit an NOI, develop a SWPPP, and comply with other applicable NPDES storm water discharge permit requirements.
- The Construction General Permit (CGP) currently only applies to large construction activity disturbing greater than 5 acres. Permits for small construction activity will be issued by each NPDES permitting authority by December 9, 2002.

The NPDES Storm Water Program for MS4s: MS4 Construction Runoff Control Programs are administered by the MS4 operator. The MS4 operator's NPDES storm water discharge permit requires it to establish requirements to control storm water discharges from construction activity and new development and redevelopment.

- Regulated small MS4s must control 1 acre and above.
- Medium and large MS4s have no particular size thresholds that they must control – differs among MS4s
- The specific requirements of the construction programs will vary among MS4s. An MS4 permit typically does not specify that the MS4 operator must require a SWPPP or that a permit application be submitted.

5.6 SMALL CONSTRUCTION ACTIVITY COMPLIANCE PROCESS: What Do I Need To Do To Comply?

Sections 5.1 through 5.5 of this guidance have provided details on who's covered, who may be waived, and what may be required under the Phase II regulations for small construction activity. Now that you are familiar with the Phase II program, this section

walks you through the process, from beginning to end, that an operator of a small construction activity should take to comply with the regulation. This step-by-step "walk-through" assumes the issuance of a general permit for small construction activity that is similar to the CGP. Remember, the general permit for small construction activity may have different requirements, timeframes, and deadlines than what is noted here. Repeat the steps for each individual construction site.

The last page of this section includes a permitting decision tree to help operators of construction activity determine if they need an NPDES storm water permit. By starting in the upper left hand corner, an operator can follow the decision tree to determine if they fall under Phase I, Phase II, or are eligible for a waiver.

Step 1: Determine if your construction site will discharge storm water runoff into a MS4 (see section 4.1.1 for definition) or to waters of the United States. If so, proceed to Step 2. If not, stop here.

> ***Waters of the United States*** include interstate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds the use, degradation, or destruction of which would affect or could affect interstate or foreign commerce. (Waste treatment systems, including treatment ponds or lagoons designed to meet the requirements of CWA are not waters of the United States.) A complete definition can be found at 40 CFR 122.2.

Step 2: Determine if your construction site's storm water discharge will meet the definition of a "storm water discharge associated with small construction activity." If so, proceed to Step 3. If not, stop here. (See section 5.1.2)

Step 3: If your site meets the definition of small construction activity, determine if it qualifies for a waiver from the permit requirements. If so, stop here. If not, proceed to Step 4. (See section 5.2)

Step 4: Obtain and read the applicable storm water discharge permit for small construction activity (or the CGP until the small construction permit has been issued to get a sense of the upcoming permit requirements). The small construction permit should be issued by the NPDES permitting authority by December 9, 2002. (See section 5.4.2 for potential requirements)

Step 5: Determine which parties are considered *operators* and, therefore, are responsible for complying with the requirements described in the storm water permit for small construction activity (See section 5.1.3)

Step 6: Develop a SWPPP. (See section 5.4.2.2)

- SWPPPs must be developed prior to submitting the NOI.
- You do not need to submit the SWPPP to your NPDES permitting authority, however, it should be accessible to the public.

Step 7: Complete and submit an NOI. (See section 5.4.2.1)

- Your NPDES permitting authority may or may not require a NOI. If so, the Phase II regulation requires that you submit your NOI no later than March 10, 2003 (or 90 days after the NPDES permitting authority issues the permit, whichever comes first).
- Submit a completed NOI to your NPDES permitting authority two days prior to beginning work at the construction site.

Step 8: Implement the SWPPP.

- Includes generation of inspection reports that are to be kept on-site.

Step 9: Complete and submit an NOT. (See section 5.4.2.3)

- Submit a completed NOT to your NPDES permitting authority within 30 days after one or more of the appropriate conditions have been met.

Construction Activities Storm Water Program Permitting Decision Tree

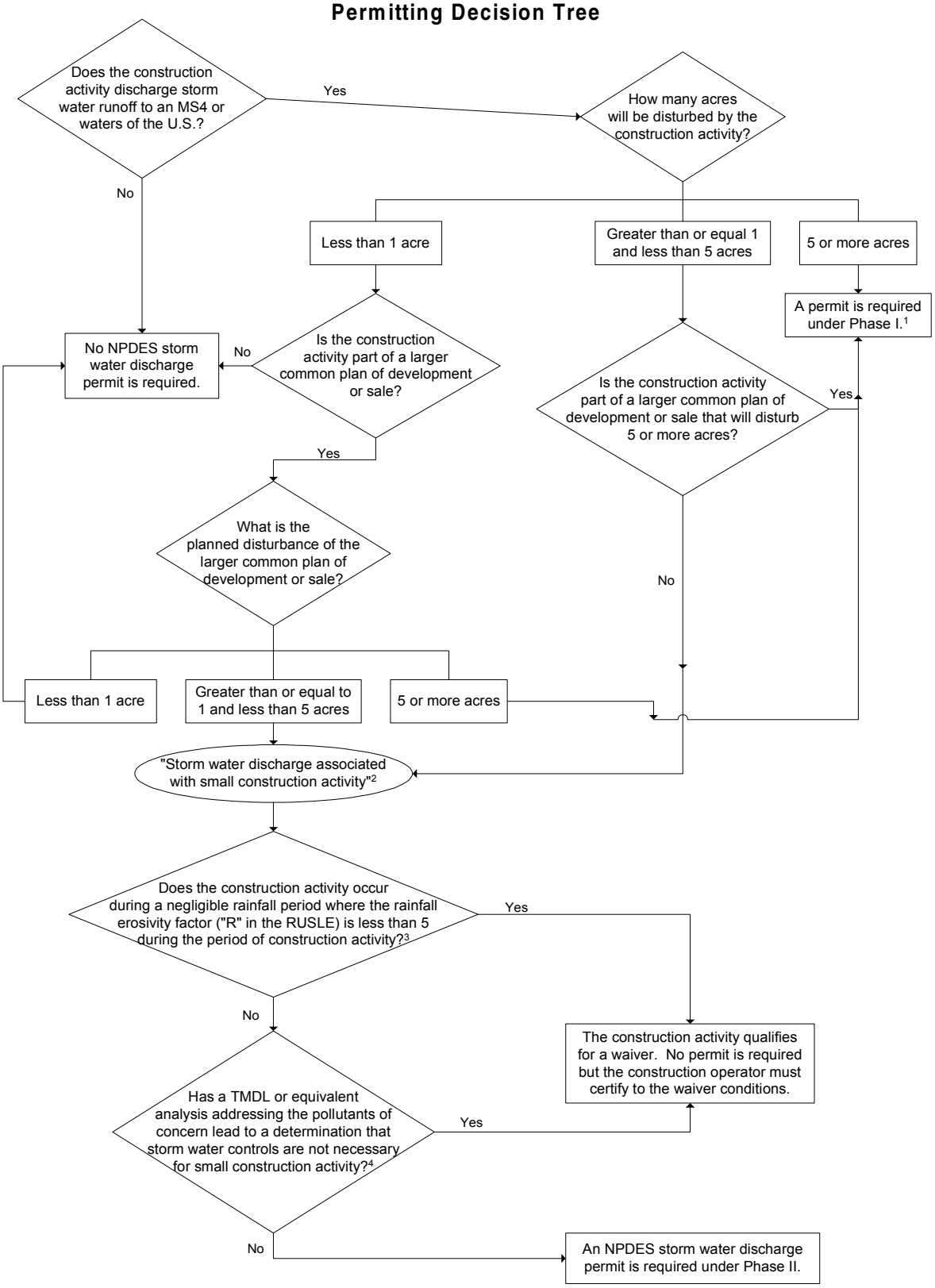

1. Construction activity disturbing, or part of a planned disturbance of, five or more acres is a "storm water discharge associated with industrial activity" under category (x). See 40 CFR 122.26(b)(14)(x).
2. See new 122.26(b)(15) for the definition of "storm water discharge associated with small construction activity."
3. See new 122.26(b)(15)(i)(A) for more details.
4. See new 122.26(b)(15)(i)(B) for more details.

6.0 INDUSTRIAL ACTIVITY

After reading section 6.0, you should understand the basic components and requirements of the Phase II regulations as they affect the categories of industrial activity covered by the Phase I regulations. Phase II revises the original Phase I industrial no exposure exemption and also sets a new deadline for permit coverage for the municipally-owned industrial activity that had been temporarily exempted from storm water permit coverage.

6.1 PHASE I INDUSTRIAL ACTIVITY: What Industrial Activities are Covered by Phase I of EPA's Storm Water Program?

The 1990 storm water regulations for Phase I of the federal storm water program identify eleven categories of industrial activities under the definition of a "storm water discharge associated with industrial activity" that must obtain a National Pollutant Discharge Elimination System (NPDES) permit. The categories contain industries listed either by reference to an industry's Standard Industrial Classification (SIC) code, or by a short narrative description of the activity found at the industrial site (see text box at right for more detailed descriptions). For facilities that match the SIC codes or description in one of the categories, only those that have a storm water discharge to a *municipal separate storm sewer system (MS4)* or *waters of the United States* are required to seek permit coverage. The NPDES permit requirements vary between individual and general permits, but in general involve the development of a storm water pollution prevention plan based upon site assessments, monitoring and reporting data on storm water discharges, and mitigating any possible effects of discharges on endangered species and national historic properties (for EPA issued permits).

Storm Water Discharge Associated with Industrial Activity (40 CFR 122.26(b)(14)(i) - (xi))

- Facilities subject to storm water effluent limitation guidelines; new source performance standards, or toxic pollutant effluent standards under 40 CFR Subchapter N.
- "Heavy" industrial facilities with SIC codes listed in 40 CFR 122.26(b)(14)(ii), (iii), and (vi)
- "Light" industrial facilities with SIC codes listed in 40 CFR 122.26(b)(14)(xi), which conduct the activities specified in that sections.
- Hazardous waste treatment, storage, or disposal facilities.
- Landfills, land application sites, and open dumps that receive or have received industrial waste.
- Steam electric power generating facilities.
- Sewage treatment works.
- Construction activity (including clearing, grading, and excavation) disturbing five or more acres of land, or less than five acres of land if it is part of a larger common plan of development or sale of five acre or greater.

Under the Phase I regulations, operators of facilities within category eleven (xi), commonly referred to as "light industry," were exempted from the definition of "storm water discharge associated with industrial activity," and the subsequent requirement to obtain an NPDES permit, provided their industrial materials or activities were not "exposed" to storm water. This Phase I no exposure exemption from permitting was limited to those facilities identified in category (xi), and did not require category (xi) facility operators to submit any information supporting their no exposure claim.

In 1992, the Ninth Circuit court remanded to EPA for further rulemaking the no exposure exemption for light industry after making a determination that the limited exemption was arbitrary and capricious. The result was a revised no exposure exemption (now an "exclusion") as part of the Phase II regulation.

6.2 PHASE II NO EXPOSURE EXCLUSION: What is the Conditional No Exposure Exclusion for Industrial Activity as Revised by this Regulation?

The intent of the no exposure provision is to provide a simplified method for complying with the Clean Water Act to all industrial facilities that are entirely indoors. This includes facilities that are located within a large office building, or at which the only items permanently exposed to precipitation are roofs, parking lots, vegetated areas, and other non-industrial areas or activities.

As revised in the Phase II regulation, if a condition of No Exposure exists at a Phase I industrial facility, then permits will not be required for storm water discharges from these facilities. All industrial facilities that have no exposure of materials to storm water, including the "light industrial" facilities, must submit a certification to the permitting authority. The facility must certify that a condition of No Exposure exists at its facility and either maintain a condition of no exposure or obtain a permit. The following subsections discuss who is eligible for the revised no exposure exclusion, the definition of no exposure, and the requirement to submit a written certification of no exposure in place of a permit application.

6.2.1 Who is Eligible to Qualify for the No Exposure Exclusion?

The Phase II Conditional No Exposure Exclusion represents a significant expansion in the scope of the original no exposure provision in terms of eligibility. Now, <u>all Phase I industrial categories</u> with a condition of no exposure, except for construction activity, <u>are eligible</u> for the no exposure exclusion. The exclusion from permitting is available on a facility-wide basis only, not for individual outfalls

6.2.2 What is the Definition of No Exposure?

The Phase II regulatory definition of no exposure is as follows:

> ***No exposure*** means all industrial materials and activities are protected

by a storm resistant shelter to prevent exposure to rain, snow, snowmelt, and/or runoff. Industrial materials or activities include, but are not limited to, material handling equipment or activities, industrial machinery, raw materials, intermediate products, by-products, final products, or waste products.

A storm resistant shelter is not required for the following industrial materials and activities:

- Drums, barrels, tanks, and similar containers that are tightly sealed, provided those containers are not deteriorated and do not leak. "Sealed" means banded or otherwise secured and without operational taps or valves;
- Adequately maintained vehicles used in materials handling;
- Final products, other than products that would be mobilized in storm water discharges (e.g., rock salt).

The term "storm-resistant shelter," as used in the no exposure definition, includes completely roofed and walled buildings or structures, as well as structures with only a top cover but no side coverings, provided material under the structure is not otherwise subject to any run-on and subsequent runoff of storm water.

While the intent of the no exposure provision is to promote a condition of permanent no exposure, certain machinery, such as trucks, may become temporarily exposed to rain and snow while passing between buildings. Adequately maintained mobile equipment (e.g., trucks, automobiles, forklifts, trailers, or other such general purpose vehicles found at the industrial site that are not industrial machinery, and that are not leaking contaminants or are not otherwise a source of industrial pollutants) also can be exposed to precipitation or runoff. Such activities alone would not prevent a facility from certifying to no exposure. Similarly, trucks or other vehicles awaiting maintenance at vehicle maintenance facilities that are not leaking contaminants or are not otherwise a source of industrial pollutants, would not be considered exposed.

EPA recognizes that there are circumstances where permanent no exposure of industrial activities or materials is not possible and, therefore, under such conditions, materials and activities could be sheltered with temporary covers (e.g., tarps) between periods of permanent enclosure. The No Exposure provision does not specify every such situation, but NPDES permitting authorities can address this issue on a case-by-case basis.

The Phase II regulation also addresses particulate matter emissions from roof stacks/vents. If regulated by, and in compliance with, other environmental protection programs (i.e., air quality control programs) and not causing storm water contamination, they are considered not exposed. Particulate matter or visible deposits of residuals from roof stacks and/or vents not otherwise regulated (i.e., under an air quality control program) and evident in storm water outflow are considered "exposed." Likewise,

visible “track out” (i.e., pollutants carried on the tires of vehicles) or windblown raw materials are considered “exposed.” Leaking pipes containing contaminants exposed to storm water are deemed “exposed,” as are past sources of storm water contamination that remain onsite. General refuse and trash, not of an industrial nature, is not considered exposed as long as the container is completely covered and nothing can drain out holes in the bottom, or is lost in loading onto a garbage truck. Industrial refuse and trash that is left uncovered, however, is considered “exposed.”

6.2.3 What Do I Need To Know About Certifying to a Condition of No Exposure?

In order to obtain the Conditional No Exposure exclusion, you will have to submit written certification that your facility meets the definition of “no exposure,” even if you are a category (xi) facility operator. The Phase II Rule included as an appendix to the preamble a four-page No Exposure Certification form to be used for this purpose in areas where EPA is the NPDES permitting authority. EPA's certification form uses a series of yes/no questions which you must answer regarding the your industrial activity. You may certify to no exposure if you can answer "no" to all of the questions.

> **Important note:** EPA's No Exposure Certification form applies <u>only</u> in areas where EPA is the NPDES permitting authority. Where a State is the NPDES permitting authority, the State will issue its own form. Since most aspects of EPA's form are also regulatory requirements as to what must be included within a written certification of no exposure, you may expect the State forms to be very similar to EPA's.

The Certification form serves two purposes: 1) as an aid to help you in determining whether you have a condition of No Exposure at your facility or site, and 2) as the necessary written certification of No Exposure, provided you are able to answer all the questions in the negative.

- ❏ If, after you have completed the form, you find that you answered "yes" to one or more of the questions about possible exposure, you must make the appropriate changes at the facility if you still wish to apply for the conditional exclusion. These changes must remove the particular material, process, or activity at the facility or site from exposure to storm water.

- ❏ If, after completing the form, you find that you were able to check "no" to every question, you qualify for the no exposure exclusion and must sign and submit the form to your NPDES permitting authority.

Certification Facts:

- The certification must be completed and submitted to your permitting authority once every 5 years, and can only be done so if the condition of no exposure continues to exist at the facility.
- The Certification must be provided for each facility qualifying for the no exposure

exclusion.

- The form is non-transferable. If a new operator takes over your facility, they must complete, sign, and submit a new form to claim the no exposure exclusion when they assume control over the operations of the facility.

6.2.4 Are There Any Concerns Related to Water Quality Standards?

Yes. An operator certifying that its facility qualifies for the conditional no exposure exclusion may, nonetheless, be required by the permitting authority to obtain permit authorization. Such a requirement would follow the permitting authority's determination that the facility's discharge is likely to have an adverse impact on water quality.

Many efforts to achieve no exposure can employ simple good housekeeping and contaminant cleanup activities such as moving materials and activities indoors into existing buildings or structures. In limited cases, however, industrial operators may make major changes at a site to achieve no exposure. These efforts may include constructing a new building or cover to eliminate exposure or constructing structures to prevent run-on and storm water contact with industrial materials and activities. Major changes undertaken to achieve no exposure, however, can increase the impervious area of the site, such as when a building is placed in a formerly vegetated area. Increased impervious area can lead to an increase in the volume and velocity of storm water runoff, which, in turn, can result in a higher concentration of pollutants in the discharge, since fewer pollutants are naturally filtered out.

The concern of increased impervious area is addressed in one of the last questions on the Certification form, which asks, "Have you paved or roofed over a formerly exposed, pervious area in order to qualify for the no exposure exclusion? If yes, please indicate approximately how much area was paved or roofed over." This question is intended to aid the NPDES permitting authority in assessing the likelihood of such actions interfering with water quality standards. Where this is a concern, the facility operator and its NPDES permitting authority should take appropriate actions to ensure that water quality standards can be achieved.

6.2.5 Industrial Program Compliance Process: What Do I Need To Do To Obtain the No Exposure Exclusion and Comply with Applicable Requirements?

Sections 6.1 through 6.2.4. of this guidance have provided information necessary to understand the conditional no exposure exclusion. Now that you are familiar with the no exposure exclusion, this section walks you through the process, from beginning to end, that an operator of industrial activity will need to take to comply with the Phase II regulation. This step-by-step "walk-through" assumes the issuance of a no exposure certification form that is similar to EPA's form. Remember, a State's certification form may have different requirements and deadlines than what is noted here. Repeat the steps for each individual facility or site.

Step 1: Determine if your industrial activity meets the definition of a "discharge associated with industrial activity." If so, proceed to Step 2. If not, stop here. (See section 6.1)

- If you are a regulated industrial operator, you need to **either** apply for a storm water permit, **or** submit a no exposure certification, in order to be in compliance with the NPDES storm water regulations. Any storm water permit you may currently hold becomes null and void once a completed conditional no exposure certification form is submitted

Step 2: Obtain the no exposure certification form from your NPDES permitting authority. Determine if your regulated industrial activity meets the definition of " no exposure" and qualifies for the exclusion from permitting. If it does, proceed to Step 3. If not, stop here and obtain industrial storm water permit coverage (probably through the multi-sector general permit or similar permit).

- The conditional no exposure exclusion option is currently available only for facilities in areas where EPA is the NPDES permitting authority. In all other areas, where the State is the NPDES permitting authority, the facility operators will need to wait until the State makes the option available.

Step 3: Submit the certification form to your NPDES permitting authority -- a new form must be submitted once every 5 years.

- Be aware that even when you certify to no exposure, your NPDES permitting authority still retains the authority to require you to apply for an individual or general permit if it has determined that your discharge is contributing to the violation of, or interfering with the attainment or maintenance of, water quality standards, including designated uses.

Step 4: Submit a copy, upon request, of the certification form to the municipality in which the facility is located.

Step 5: Allow your NPDES permitting authority or, if discharging into a municipal separate storm sewer system, the operator of the system, to (1) inspect the facility and (2) make such inspection reports publicly available upon request.

Step 6: Maintain a condition of no exposure.

- The no exposure exclusion is conditional and not an outright exemption. Therefore, if there is a change in circumstances that causes exposure of industrial activities or materials to storm water, the you are required to comply immediately with all the requirements of the NPDES Storm Water Program, including applying for and obtaining a storm water discharge permit.

- Failure to maintain the condition of no exposure or obtain coverage under an NPDES permit can lead to the unauthorized discharge of pollutants to waters of the United States, resulting in penalties under the CWA.

6.3 ISTEA MORATORIUM: How Has this Regulation Affected the Municipally-Operated Industrial Activity Subject to the Intermodal Surface Transportation Enforcement Act (ISTEA) Moratorium?

Provisions within ISTEA temporarily delayed the deadline for Phase I industrial activities operated by municipalities with populations of less than 100,000 people to obtain an NPDES storm water discharge permit. Congress delayed the permitting deadline to allow small municipalities additional time to comply with NPDES requirements. This moratorium on permitting did not apply to power plants, airports, and uncontrolled sanitary landfills operated by small municipalities.

The Phase II Rule slightly extended this temporary exemption from permitting and set a deadline of no later than March 10, 2003 for all ISTEA-exempted municipally-operated industrial activities to obtain NPDES permit coverage. Of course, like any other regulated industrial activity, these municipally-operated industrial activities are eligible to qualify for the no exposure exclusion from permitting if a condition of no exposure exists. Municipal-operators must follow the same procedures outlined in Section 6.2.4 in order to obtain an exclusion from permitting.

Many of the small municipalities that will now have to obtain permit coverage for their industrial activity will also have to obtain permit coverage for their small MS4 (see section 4.0) and small construction activity (see section 5.0). The Phase II regulation deadlines for industrial, small MS4, and small construction permit coverage are all the same – no later than March 10, 2003 – to allow the NPDES permitting authority to issue one individual permit that covers all three components if it chooses to do so.

7.0 THE COMPLIANCE ASSURANCE PROCESS

After reading section 7, you should understand how EPA will determine compliance, what happens if you or the EPA discovers noncompliance, and where to go for compliance assistance information.

7.1 How Will EPA Determine Compliance?

EPA employs several approaches to monitor compliance with its environmental regulations, including both EPA-initiated and facility-initiated methods.

1. **Inspections** – EPA may conduct periodic inspections at facilities subject to this regulation. Inspections may be initiated by disclosures to EPA, randomly selecting facilities, or a variety of targeting methods. Inspections may be used, for instance, to monitor recordkeeping requirements, visit sites where storm water controls should be in place, and/or verify that facilities have permits.

2. **Permits, Records, and Reports** – Permits are not required for small construction sites and regulated small MS4s for up to three years and 90 days from the effective date of the final rule. After general permits are issued, the NPDES permitting authorities intend to use the data in storm water permit applications, construction waiver certifications, storm water pollution prevention plans (SWPPPs), no exposure certifications, records, and reports (as required by the Phase II regulation) to set appropriate permit conditions and track discharges covered by a storm water permit. Compliance and enforcement authorities will use the information to assess the regulated entity's level of compliance.

3. **Review of No Exposure Certifications** – Operators of industrial facilities that are eligible for a no exposure exclusion from the NPDES permitting requirements may prepare, and submit for review, a no exposure certification. NPDES authorities will use the information contained in the certification in determining compliance with the no exposure provisions. This information will particularly assist in determining compliance with the no exposure certification in conjunction with complaints from the public.

4. **Self-audit and Self Disclosure** – Facilities have the primary responsibility for ensuring that they are in continuous compliance. EPA encourages the facility to take advantage of EPA's Audit Policy, Small Business Policy, or Small Community Policy (these will be discussed in more detail in section 7.2).

   In addition to this document, to aid in determining whether it is in compliance, the facility might use a document currently being developed by EPA entitled "Protocol for Conducting Environmental Compliance Audits under the Storm

Water Program." This protocol, which is a part of a set containing other statute-specific audit protocols, is a tool to assist and encourage businesses and organizations to perform environmental audits and disclose violations in accordance with EPA's Audit Policy. The protocol provides guidance on key requirements, defines regulatory terms, gives an overview of the federal laws affecting a particular environmental management area, and includes a checklist for review of the facility. EPA anticipates making the document available for public use in summer 2000. To see a sample of protocols that have been completed under other statutes (RCRA, EPCRA, CERCLA), visit the Internet site: http://es.epa.gov/oeca/ccsmd/profile.html.

7.2 If I Discover a Violation, How Can I Work With The Agency to Correct It?

EPA promotes environmental compliance by providing incentives. By participating in compliance assistance programs or voluntarily disclosing violations and promptly correcting violations, businesses may get penalty waivers or reductions. EPA has three policies that potentially apply to entities regulated by the Storm Water Phase II Rule. These policies do not apply if an enforcement action has already been initiated.

Audit Policy. The first of these policies is *"Incentives for Self-Policing: Discovery, Disclosure, Correction and Prevention of Violations"* (60 FR 66706), known as the "Audit Policy". EPA initiated this policy to provide entities of all sizes with incentives to voluntarily discover and promptly disclose and correct violations of environmental regulations. For a more detailed description of the Audit Policy, visit the Internet site at: www.epa.gov/oeca/polguid/polyguid1.html.

Small Business Policy. EPA's *"Policy on Compliance Incentives for Small Business"* was developed to help small businesses with 100 or fewer employees achieve environmental compliance by creating benefits for businesses that make a good faith effort to comply with environmental regulations before a government agency discovers a violation or otherwise takes an enforcement action. The Policy currently provides incentives, such as penalty waivers or penalty reduction, for businesses that participate in on-site compliance assistance programs or conduct environmental audits to discover, disclose, and correct violations. The Policy is presently being modified to broaden when and how a small business can take advantage of the Policy. Revisions are expected in spring of 2000. Please see www.epa.gov/oeca/polguid or contact Ginger Gotliffe (202-564-7072) for more information.

Small Community Policy. The "*Policy on Flexible State Enforcement Responses to Small Community Violations"* (November, 1995) promotes alternative strategies for communities to achieve environmental and economic goals. States are encouraged to use multimedia compliance assistance and prioritize compliance issues to address specific needs of their small communities. As long as states work within the parameters of the Policy, EPA will generally defer to their decision to waive part or all of the penalty for a small community's environmental violations. This approach allows small

communities to apply their limited resources to fixing their environmental problems, rather than to paying penalties. The policy applies to communities generally comprised of fewer than 2,500 residents. In the context of the Storm Water Phase II Rule, small MS4s that are not eligible for waivers from their regulatory requirements would be most likely to take advantage of this policy. For a more detailed description of the Small Communities Policy, visit the Internet sites: www.epa.gov/oeca/scpolcy.html or www.epa.gov/oeca/ccsmd/mun.html.

7.3 Where Can I Go for Compliance Assistance on the Storm Water Phase II Rule?

The permitting authority is the leading source for information on the Storm Water Phase II Rule. EPA is also developing a "tool box" to assist States, Tribes, municipalities, and other parties involved in the Phase II program. This tool box will facilitate implementation of the storm water program in an effective and cost-efficient manner. The tool box is available on EPA's web page at http://www.epa.gov'owm/sw/phase2 and consists of the following eight major components:

- Fact Sheets
- Guidance Documents
- Menu of BMPs
- Training and Outreach Efforts
- Information Clearinghouse
- Technical Research
- Support for Demonstration Projects
- Compliance Monitoring/Assistance Tools

In addition, EPA provides widely available compliance assistance through the establishment of national compliance assistance centers, in partnership with industry, academic institutions, and other federal and state agencies. Centers have been established that provide services for several industries that contain many small businesses. Compliance assistance centers offer a range of communications services, including Web sites, e-mail groups, fax-back systems, and telephone assistance lines. Each Center is targeted to a specific sector and explains relevant federal environmental regulations. For instance, local governments can use the services of the Local Government Environmental Assistance Network (LGEAN). LGEAN is a "first-stop shop" providing environmental management, planning, and regulatory information for local government elected and appointed officials, managers, and staff. It provides 24-hour access to regulatory and pollution prevention information, message boards, regulatory updates, grants and information, and more. It is a good source for compliance assistance information on the Storm Water Phase II Rule.

For more information on EPA's compliance assistance centers, please contact Tracy Back (202-564-7076). You can access all the centers through www.epa.gov/oeca/mcfac.html or individually at:

EPA's Compliance Assistance Centers

Center	Phone	Web Address
Local Government Environmental Assistance Network (LGEAN)	1-877-TO-LGEAN	www.lgean.org
National Metal Finishing Resource Center	1-800-AT-NMFRC	www.nmfrc.org
Printers' National Environmental Assistance Center	1-888-USPNEAC	www.pneac.org
CCAR-Greenlink (the Automotive Compliance Information Assistance Center)	1-888-GRN-LINK	www.ccar-greenlink.org
National Agriculture Compliance Assistance Center	1-888-663-2155	www.epa.gov/oeca/ag
Printed Wiring Board Resource Center	1-734-995-4911	www.pwbrc.org
ChemAlliance	1-800-672-6048	www.chemalliance.org
Transportation Environmental Resource Center	1-888-459-0656	www.transource.org
Paints and Coatings Resource Center	1-800-286-6372	www.paintcenter.org

7.4 If the Agency Discovers a Violation, What Might Be Its Response?

To maximize compliance, EPA implements a balanced program of compliance assistance, compliance incentives, and traditional law enforcement. EPA knows that small businesses which must comply with complicated new statutes or rules often want to do the right thing, but may lack the requisite knowledge, resources, or skills. Compliance assistance information and technical advice helps small businesses to understand and meet their environmental obligations. Compliance incentives, such as our Small Business Policy, encourage persons to voluntarily discover, disclose, and correct violations before they are identified by the government. EPA's strong law enforcement program protects all of us by targeting persons who neither comply nor cooperate to address their problems.

EPA uses a variety of methods to determine whether regulated entities are complying, including inspecting facilities, reviewing records and reports, and responding to citizen complaints. If we learn an entity is violating the law, EPA (or a State, if the program is delegated) may file an enforcement action seeking penalties of up to $27,500, per violation, per day. While the statutory maximum penalty is currently $27,500, it may be increased periodically based on inflation in accordance with the Debt Collection Improvement Act of 1996. The proposed penalty in a given case will depend on many factors, including the number, length, and severity of the violations, the economic benefit obtained by the violator, and its ability to pay. EPA has polices in place to ensure penalties are calculated fairly. These policies are available to the public. In addition, any company charged with a violation has the right to contest EPA's allegations and proposed penalty before an impartial judge or jury.

EPA recognizes that we can achieve the greatest possible protection by encouraging businesses and organizations to work with us to discover, disclose, and correct violations. That is why we have issued Audit, Small Business, and Small Community policies to eliminate or reduce penalties for small and large entities which cooperate with EPA to address compliance problems. To help the regulated community in understanding their requirements for compliance with the rule, EPA provides compliance assistance through its regional offices, Office of Enforcement and Compliance Assurance at Headquarters, and national compliance assistance centers partners.

ABBREVIATIONS:

BAT	Best Available Technology Economically Achievable (applies to non-conventional and toxic pollutants)
BCT	Best Conventional Pollutant Control Technology (applies to conventional pollutants)
BMP	Best Management Practice
BPJ	Best Professional Judgment
BPT	Best Practicable Control Technology Currently Available (generally applies to conventional pollutants and some metals)
CFR	Code of Federal Regulations
CGP	Construction General Permit
COD	Chemical Oxygen Demand
CSO	Combined Sewer Overflow
CWA	Clean Water Act (formerly referred to as the Federal Water Pollution Control Act or Federal Water Pollution Control Act Amendments of 1972)
CZARA	Coastal Zone Act Reauthorization Amendments
D.O.	Dissolved Oxygen
DMR	Discharge Monitoring Report
ELG	Effluent Limitations Guidelines
EPA	Environmental Protection Agency
FR	Federal Register
MEP	Maximum Extent Practicable
MS4	Municipal Separate Storm Sewer System
MSGP	Multi Sector General Permit
NOI	Notice of Intent
NOT	Notice of Termination
NOV	Notice of Violation
NPDES	National Pollutant Discharge Elimination System
NPS	Non-point Source
O&M	Operation and Maintenance
OW	Office of Water
OWM	Office of Wastewater Management
PA	Permitting Authority
POTW	Publicly Owned Treatment Works
SIC	Standard Industrial Classification
SWPPP	Storm Water Pollution Prevention Plan
TMDL	Total Maximum Daily Load
TSS	Total Suspended Solids
UA	Urbanized Area

DEFINITIONS:

Best Available Treatment(BAT)/Best Control Technology (BCT): A level of technology based on the very best (state of the art) control and treatment measures that have been developed or are capable of being developed and that are economically achievable within the appropriate industrial category.

Best Management Practices (BMPs): Activities or structural improvements that help reduce the quantity and improve the quality of storm water runoff. BMPs include treatment requirements, operating procedures, and practices to control site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage.

Category (xi) facilities: Specific facilities classified as light industry with equipment or materials exposed to storm water.

Clean Water Act (Water Quality Act): (formerly the Federal Water Pollution Control Act or Federal Water Pollution Control Act Amendments of 1972). Public law 92-500; 33 U.S.C. 1251 et seq.; legislation which provides statutory authority for the NPDES program. Also know as the Federal Water Pollution Control Act.

Conveyance: The process of water moving from one place to another.

Discharge: The volume of water (and suspended sediment if surface water) that passes a given location within a given period of time.

Erosion: When land is diminished or worn away due to wind, water, or glacial ice. Often the eroded debris (silt or sediment) becomes a pollutant via storm water runoff. Erosion occurs naturally but can be intensified by land clearing activities such as farming, development, road-building, and timber harvesting.

Excavation: The process of removing earth, stone, or other materials from land.

General Permit: A permit issued under the NPDES program to cover a certain class or category of storm water discharges. These permits reduce the administrative burden of permitting storm water discharges.

Grading: The cutting and/or filling of the land surface to a desired slope or elevation.

Illicit Connection: Any discharge to a municipal separate storm sewer that is not composed entirely of storm water and is not authorized by an NPDES permit, with some exceptions (e.g., discharges due to fire fighting activities).

Industrial Activity: Any activity which is directly related to manufacturing, processing or raw materials storage areas at an industrial plant.

Large Municipal Separate Storm Sewer System (MS4): An MS4 located in an incorporated place or county with a population of 250,000 or more, as determined by

the latest U.S. Census

Light Manufacturing Facilities: Described under Category (xi) of the definition of "storm water discharges associated with industrial activity." [40 CFR 122.26(b)(14)(xi)] Under the Phase I NPDES Storm Water Program, these facilities were eligible for exemption from storm water permitting requirements if certain areas and activities were not exposed to storm water. As a result of the Phase II Final Rule, these facilities must now certify to a condition of no exposure.

Maximum Extent Practicable (MEP): A standard for water quality that applies to all MS4 operators regulated under the NPDES Storm Water Program. Since no precise definition of MEP exists, it allows for maximum flexibility on the part of MS4 operators as they develop and implement their programs.

Medium Municipal Separate Storm Sewer System (MS4): MS4 located in an incorporated place or county with a population of 100,000 or more but less than 250,000, as determined by the latest U.S. Census.

Municipal Separate Storm Sewer System (MS4): A publically-owned conveyance or system of conveyances that discharges to waters of the U.S. and is designed or used for collecting or conveying storm water, is not a combined sewer, and is not part of a publicly-owned treatment works (POTW).

Multi-Sector General Permit (MSGP): An NPDES permit that regulates storm water discharges from eleven categories of industrial activities.

No exposure: All industrial materials or activities are protected by a storm resistant shelter to prevent exposure to rain, snow, snowmelt, and/or runoff. Industrial materials or activities include, but are not limited to, material handling equipment or activities, industrial machinery, raw materials, intermediate products, by-products, final products, or waste products. Material handling activities include the storage, loading and unloading, transportation, or conveyance of any raw material, intermediate product, final product or waste product.

Non-authorized States: any State that does not have the authority to regulate the NPDES Storm Water Program.

Non-point Source (NPS) Pollutants: Pollutants from many diffuse sources. NPS pollution is caused by rainfall or snowmelt moving over and through the ground. As the runoff moves, it picks up and carries away natural and human-made pollutants, finally depositing them into lakes, rivers, wetlands, coastal waters, and even our underground sources of drinking water.

Notice of Intent (NOI): An application to notify the permitting authority of a facility's intention to be covered by a general permit; exempts a facility from having to submit an individual or group application.

NPDES: "National Pollutant Discharge Elimination System" the name of the surface water quality program authorized by Congress as part of the 1987 Clean Water Act. This is EPA's program to control the discharge of pollutants to waters of the United States (see 40 CFR 122.2).

O&M Expenditures: The operating and maintenance costs associated with the continual workings of a project.

Outfall: The point where wastewater or drainage discharges from a sewer pipe, ditch, or other conveyance to a receiving body of water.

Permitting Authority (PA): The NPDES-authorized state agency or EPA regional office that administers the NPDES Storm Water Program. PAs issue permits, provide compliance assistance, and inspect and enforce the program.

Physically interconnected MS4: This means that one MS4 is connected to a second MS4 in such a way that it allows for direct discharges into the second system.

Point Source Pollutant: Pollutants from a single, identifiable source such as a factory or refinery.

Pollutant Loading: The total quantity of pollutants in storm water runoff.

Qualifying local program: A local, State or Tribal municipal storm water management program that imposes, at a minimum, the relevant requirements of one or more of the minimum control measures includes in 122.34(b).

Regulated MS4: Any MS4 covered by the NPDES Storm Water Program (regulated small, medium, or large MS4s).

Retrofit: The modification of storm water management systems through the construction and/or enhancement of wet ponds, wetland plantings, or other BMPs designed to improve water quality

Runoff: Drainage or flood discharge that leaves an area as surface flow or as pipeline flow. Has reached a channel or pipeline by either surface or sub-surface routes.

Sanitary Sewer: A system of underground pipes that carries sanitary waste or process wastewater to a treatment plant.

Sediment: Soil, sand, and minerals washed from land into water, usually after rain. Sediment can destroy fish-nesting areas, clog animal habitats, and cloud waters so that sunlight does not reach aquatic plants.

Sheet flow: The portion of precipitation that moves initially as overland flow in very shallow depths before eventually reaching a stream channel.

Site Plan: A graphical representation of a layout of buildings and facilities on a parcel of land.

Site Runoff: Any drainage or flood discharge that is released from a specified area.

Small Municipal Separate Storm Sewer System (MS4): Any MS4 that is not regulated under Phase I of the NPDES Storm Water Program and Federally-owned MS4s.

Stakeholder: An entity that holds a special interest in an issue or program -- such as the storm water program -- since it is or may be affected by it.

Standard Industrial Classification (SIC) Code: A four digit number which is used to identify various types of industries.

Storm Drain: A slotted opening leading to an underground pipe or an open ditch for carrying surface runoff.

Storm Water: Precipitation that accumulates in natural and/or constructed storage and storm water systems during and immediately following a storm event.

Storm Water Management: Functions associated with planning, designing, constructing, maintaining, financing, and regulating the facilities (both constructed and natural) that collect, store, control, and/or convey storm water.

Storm Water Pollution Prevention Plan (SWPPP): A plan to describe a process whereby a facility thoroughly evaluates potential pollutant sources at a site and selects and implements appropriate measures designed to prevent or control the discharge of pollutants in storm water runoff.

Surface Water: Water that remains on the surface of the ground, including rivers, lakes, reservoirs, streams, wetlands, impoundments, seas, estuaries, etc.

Total Maximum Daily Load (TMDL): The maximum amount of pollutants which can released into a water body without adversely affecting the water quality.

Tool Box: A term to describe the activities and materials that EPA plans to perform/produce to facilitate implementation of the storm water program in an effective and cost-efficient manner. The eight components include: 1)fact sheets; 2) guidance documents; 3) menu of BMPs; 4) compliance assistance; 5) information clearing house; 6) training and outreach efforts; 7) technical research; and 8) support for demonstration projects.

Urbanized Area (UA): A Bureau of the Census determination of a central place (or places) and the adjacent densely settled surrounding territory that together have a minimum residential population of 50,000 people and a minimum average density of 1,000 people/square mile. This is a simplified definition of a UA, the full definition is very complex.

Urban Runoff: Storm water from urban areas, which tends to contain heavy concentrations of pollutants from urban activities.

Watershed: That geographical area which drains to a specified point on a water course, usually a confluence of streams or rivers (also known as drainage area, catchment, or river basin).

Wet Weather Flows: Water entering storm drains during rainstorms/wet weather events.

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http://www.epa.gov/owm/sw/phase2

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STANDARD URBAN STORM WATER MITIGATION PLAN

FOR LOS ANGELES COUNTY AND CITIES IN LOS ANGELES COUNTY

Final
Approved – Regional Board Executive Officer
March 8, 2000.

LOS ANGELES COUNTY URBAN RUNOFF AND STORM WATER NPDES PERMIT

STANDARD URBAN STORM WATER MITIGATION PLAN

BACKGROUND

The municipal storm water National Pollutant Discharge Elimination System (NPDES) permit (Los Angeles County Permit) issued to Los Angeles County and 85 cities (Permittees) by the Los Angeles Regional Water Quality Control Board (Regional Board) on July 15, 1996, requires the development and implementation of a program addressing storm water pollution issues in development planning for private projects. The same requirements are applicable to the City of Long Beach under its separate municipal storm water permit (City of Long Beach MS4 Permit), which was issued on June 30, 1999.

The requirement to implement a program for development planning is based on, federal and state statutes including: Section 402 (p) of the Clean Water Act, Section 6217 of the Coastal Zone Act Reauthorization Amendments of 1990 ("CZARA"), and the California Water Code. The Clean Water Act amendments of 1987 established a framework for regulating storm water discharges from municipal, industrial, and construction activities under the NPDES program. The primary objectives of the municipal storm water program requirements are to:

1. Effectively prohibit non-storm water discharges, and
2. Reduce the discharge of pollutants from storm water conveyance systems to the Maximum Extent Practicable (MEP statutory standard).

The Standard Urban Storm Water Mitigation Plan (SUSMP) was developed as part of the municipal storm water program to address storm water pollution from new Development and Redevelopment by the private sector. This SUSMP contains a list of the minimum required Best Management Practices (BMPs) that must be used for a designated project. Additional BMPs may be required by ordinance or code adopted by the Permittee and applied generally or on a case by case basis. The Permittees are required to adopt the requirements set herein in their own SUSMP. Developers must incorporate appropriate SUSMP requirements into their project plans. Each Permittee will approve the project plan as part of the development plan approval process and prior to issuing building and grading permits for the projects covered by the SUSMP requirements.

All projects that fall into one of seven categories are identified in the Los Angeles County MS4 Permit as requiring SUSMPs. These categories are:

- Single-Family Hillside Residences
- 100,000 Square Foot Commercial Developments
- Automotive Repair Shops
- Retail Gasoline Outlets
- Restaurants
- Home Subdivisions with 10 to 99 housing units
- Home Subdivisions with 100 or more housing units

The Regional Board Executive Officer has designated two additional categories subject to SUSMP requirements for the Los Angeles County MS4 Permit. These categories are:

- Location within or directly adjacent to or discharging directly to an environmentally sensitive area, and
- Parking lots 5,000 square feet or more or with 25 or more parking spaces and potentially exposed to storm water runoff

The City of Long Beach permit requires SUSMP for the following categories only: (i) 10-99 home subdivisions; (ii) 100 or more subdivisions; (iii) 100,000 or more square foot commercial developments; and (iv) Projects located adjacent to or discharging to environmentally sensitive areas. For the remaining five categories, equivalent requirements have been included directly in or are expected to be developed shortly under the City of Long Beach Storm Water Management Plan.

Permittees shall amend codes and promulgate ordinances not later than September 8, 2000, to give legal effect to the SUSMP requirements. The SUSMP requirements for projects identified herein shall take effect not later than October 8, 2000.

DEFINITIONS

"100,000 Square Foot Commercial Development" means any commercial development that creates at least 100,000 square feet of impermeable area, including parking areas."Automotive Repair Shop" means a facility that is categorized in any one of the following Standard Industrial Classification (SIC) codes: 5013, 5014, 5541, 7532-7534, or 7536-7539.

"Best Management Practice (BMP)" means any program, technology, process, siting criteria, operational methods or measures, or engineered systems, which when implemented prevent, control, remove, or reduce pollution.

"Commercial Development" means any development on private land that is not heavy industrial or residential. The category includes, but is not limited to: hospitals, laboratories and other medical facilities, educational institutions, recreational facilities, plant nurseries, multi-apartment buildings, car wash facilities, mini-malls and other business complexes, shopping malls, hotels, office buildings, public warehouses and other light industrial complexes.

“Directly Connected Impervious Area (DCIA)” means the area covered by a building, impermeable pavement, and/ or other impervious surfaces, which drains directly into the storm drain without first flowing across permeable land area (e.g. lawns).

“Discretionary Project” means a project which requires the exercise of judgement or deliberation when the public agency or public body decides to approve or disapprove a particular activity, as distinguished from situations where the public agency or body merely has to determine whether there has been conformity with applicable statutes, ordinances, or regulations.

“Environmentally Sensitive Area” means an area designated as an Area of Special Biological Significance by the State Water Resources Control Board (*Water Quality Control Plan, Los Angeles Region: Basin Plan for the Coastal Watersheds of Los Angeles and Ventura Counties* (1994) and amendments) or an area designated as an Area of Ecological Significance by the County of Los *Angeles (Los Angeles County Significant Areas Study, Los Angeles County Department of Regional Planning (1976)* and amendments) or an area designated as a significant natural area by the California Resources Agency. Refer to Table 3 for a listing.

“Greater than (>) 9 unit home subdivision” means any subdivision being developed for 10 or more 10 single-family or multi-family dwelling units.

“Hillside” means property located in an area with known erosive soil conditions, where the development contemplates grading on any natural slope that is twenty-five percent or greater.

“Infiltration” means the downward entry of water into the surface of the soil.

“New Development” means land disturbing activities; structural development, including construction or installation of a building or structure, creation of impervious surfaces; and land subdivision.

“Parking Lot” means land area or facility for the temporary parking or storage of motor vehicles used personally, for business or for commerce with a lot size of 5,000 square feet or more, or with 25 or more parking spaces.

“Redevelopment” means, on an already developed site, the creation or addition of at least 5,000 square feet of impervious surfaces or the creation or addition of fifty percent or more of impervious surfaces or the making of improvements to fifty percent or more of the existing structure. Redevelopment includes, but is not limited to: the expansion of a building footprint or addition or replacement of a structure; structural development including an increase in gross floor area and/ or exterior construction or remodeling; replacement of impervious surface that is not part of a routine maintenance activity; and land disturbing activities related with structural or impervious surfaces.

"Restaurant" means a stand-alone facility that sells prepared foods and drinks for consumption, including stationary lunch counters and refreshment stands selling prepared foods and drinks for immediate consumption. (SIC code 5812).

"Retail Gasoline Outlet" means any facility engaged in selling gasoline and lubricating oils.

"Source Control BMP" means any schedules of activities, prohibitions of practices, maintenance procedures, managerial practices or operational practices that aim to prevent storm water pollution by reducing the potential for contamination at the source of pollution.

"Storm Event" means a rainfall event that produces more than 0.1 inch of precipitation and that, which is separated from the previous storm event by at least 72 hours of dry weather.

"Structural BMP" means any structural facility designed and constructed to mitigate the adverse impacts of storm water and urban runoff pollution (e.g. canopy, structural enclosure). The category may include both Treatment Control BMPs and Source Control BMPs.

"Treatment" means the application of engineered systems that use physical, chemical, or biological processes to remove pollutants. Such processes include, but are not limited to, filtration, gravity settling, media adsorption, biodegradation, biological uptake, chemical oxidation and UV radiation.

"Treatment Control BMP" means any engineered system designed to remove pollutants by simple gravity settling of particulate pollutants, filtration, biological uptake, media adsorption or any other physical, biological, or chemical process.

CONFLICTS WITH LOCAL PRACTICES

Where provisions of the SUSMP requirements conflict with established local codes, (e.g., specific language of signage used on storm drain stenciling), the Permittee may continue the local practice and modify the SUSMP to be consistent with the code, except that to the extent that the standards in the SUSMP are more stringent than those under local codes, such more stringent standards shall apply.

SUSMP PROVISIONS APPLICABLE TO ALL CATEGORIES

REQUIREMENTS

1. PEAK STORM WATER RUNOFF DISCHARGE RATES

Post-development peak storm water runoff discharge rates shall not exceed the estimated pre-development rate for developments where the increased peak storm water discharge rate will result in increased potential for downstream erosion.

2. CONSERVE NATURAL AREAS

If applicable, the following items are required and must be implemented in the site layout during the subdivision design and approval process, consistent with applicable General Plan and Local Area Plan policies:

- Concentrate or cluster Development on portions of a site while leaving the remaining land in a natural undisturbed condition.
- Limit clearing and grading of native vegetation at a site to the minimum amount needed to build lots, allow access, and provide fire protection.
- Maximize trees and other vegetation at each site by planting additional vegetation, clustering tree areas, and promoting the use of native and/or drought tolerant plants.
- Promote natural vegetation by using parking lot islands and other landscaped areas.
- Preserve riparian areas and wetlands.

3. MINIMIZE STORM WATER POLLUTANTS OF CONCERN

Storm water runoff from a site has the potential to contribute oil and grease, suspended solids, metals, gasoline, pesticides, and pathogens to the storm water conveyance system. The development must be designed so as to minimize, to the maximum extent practicable, the introduction of pollutants of concern that may result in significant impacts, generated from site runoff of directly connected impervious areas (DCIA), to the storm water conveyance system as approved by the building official. Pollutants of concern, consist of any pollutants that exhibit one or more of the following characteristics: current loadings or historic deposits of the pollutant are impacting the beneficial uses of a receiving water, elevated levels of the pollutant are found in sediments of a receiving water and/or have the potential to bioaccumulate in organisms therein, or the detectable inputs of the pollutant are at a concentrations or loads considered potentially toxic to humans and/or flora and fauna.

In meeting this specific requirement, “minimization of the pollutants of concern” will require the incorporation of a BMP or combination of BMPs best suited to maximize the reduction of pollutant loadings in that runoff to the Maximum Extent Practicable. Those BMPs best suited for that purpose are those listed in the *California Storm Water Best Management Practices Handbooks*; *Caltrans Storm Water Quality Handbook: Planning and Design Staff Guide*; *Manual for Storm Water Management in Washington State*;

The Maryland Stormwater Design Manual; *Florida Development Manual: A Guide to Sound Land and Water Management*; Denver *Urban Storm Drainage Criteria Manual, Volume 3 – Best Management Practices* and *Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters* , USEPA Report No. EPA-840-B-92-002, as "likely to have significant impact" beneficial to water quality for targeted pollutants that are of concern at the site in question. However, it is possible that a combination of BMPs not so designated, may in a particular circumstance, be better suited to maximize the reduction of the pollutants.

Examples of BMPs that can be used for minimizing the introduction of pollutants of concern generated from site runoff are identified in Table 2. Any BMP not specifically approved by the Regional Board in Resolution No. 99-03, "Approving Best Management Practices for Municipal Storm Water and Urban Runoff Programs in Los Angeles County", for development planning may be used if they have been recommended in one of the above references.

4. PROTECT SLOPES AND CHANNELS

Project plans must include BMPs consistent with local codes and ordinances and the SUSMP to decrease the potential of slopes and/or channels from eroding and impacting storm water runoff:

- Convey runoff safely from the tops of slopes and stabilize disturbed slopes.
- Utilize natural drainage systems to the maximum extent practicable
- Control or reduce or eliminate flow to natural drainage systems to the maximum extent practicable
- Stabilize permanent channel crossings.
- Vegetate slopes with native or drought tolerant vegetation.
- Install energy dissipaters, such as riprap, at the outlets of new storm drains, culverts, conduits, or channels that enter unlined channels in accordance with applicable specifications to minimize erosion, with the approval of all agencies with jurisdiction, e.g., the U.S. Army Corps of Engineers and the California Department of Fish and Game

5. PROVIDE STORM DRAIN SYSTEM STENCILING AND SIGNAGE

Storm drain stencils are highly visible source controls that are typically placed directly adjacent to storm drain inlets. The stencil contains a brief statement that prohibits the dumping of improper materials into the storm water conveyance system. Graphical icons, either illustrating anti-dumping symbols or images of receiving water fauna, are effective supplements to the anti-dumping message.

- All storm drain inlets and catch basins within the project area must be

stenciled with prohibitive language (such as: “NO DUMPING – DRAINS TO OCEAN”) and/or graphical icons to discourage illegal dumping.

- Signs and prohibitive language and/or graphical icons, which prohibit illegal dumping, must be posted at public access points along channels and creeks within the project area.
- Legibility of stencils and signs must be maintained.

6. PROPERLY DESIGN OUTDOOR MATERIAL STORAGE AREAS

Outdoor material storage areas refer to storage areas or storage facilities solely for the storage of materials. Improper storage of materials outdoors may provide an opportunity for toxic compounds, oil and grease, heavy metals, nutrients, suspended solids, and other pollutants to enter the storm water conveyance system. Where proposed project plans include outdoor areas for storage of materials that may contribute pollutants to the storm water conveyance system, the following Structural or Treatment BMPs are required:

- Materials with the potential to contaminate storm water must be: (1) placed in an enclosure such as, but not limited to, a cabinet, shed, or similar structure that prevents contact with runoff or spillage to the storm water conveyance system; or (2) protected by secondary containment structures such as berms, dikes, or curbs.
- The storage area must be paved and sufficiently impervious to contain leaks and spills.
- The storage area must have a roof or awning to minimize collection of storm water within the secondary containment area.

7. PROPERLY DESIGN TRASH STORAGE AREAS

A trash storage area refers to an area where a trash receptacle or receptacles are located for use as a repository for solid wastes.

Loose trash and debris can be easily transported by the forces of water or wind into nearby storm drain inlets, channels, and/or creeks. All trash container areas must meet the following Structural or Treatment Control BMP requirements (individual single family residences are exempt from these requirements):

- Trash container areas must have drainage from adjoining roofs and pavement diverted around the area(s).

- Trash container areas must be screened or walled to prevent off-site transport of trash.

8. PROVIDE PROOF OF ONGOING BMP MAINTENANCE

Improper maintenance is one of the most common reasons why water quality controls will not function as designed or which may cause the system to fail entirely. It is important to consider who will be responsible for maintenance of a permanent BMP, and what equipment is required to perform the maintenance properly. As part of project review, if a project applicant has included or is required to include, Structural or Treatment Control BMPs in project plans, the Permittee shall require that the applicant provide verification of maintenance provisions through such means as may be appropriate, including, but not limited to legal agreements, covenants, CEQA mitigation requirements and/or Conditional Use Permits.

For all properties, the verification will include the developer's signed statement, as part of the project application, accepting responsibility for all structural and treatment control BMP maintenance until the time the property is transferred and, where applicable, a signed agreement from the public entity assuming responsibility for Structural or Treatment Control BMP maintenance. The transfer of property to a private or public owner must have conditions requiring the recipient to assume responsibility for maintenance of any Structural or Treatment Control BMP to be included in the sales or lease agreement for that property, and will be the owner's responsibility. The condition of transfer shall include a provision that the property owners conduct maintenance inspection of all Structural or Treatment Control BMPs at least once a year and retain proof of inspection. For residential properties where the Structural or Treatment Control BMPs are located within a common area which will be maintained by a homeowner's association, language regarding the responsibility for maintenance must be included in the projects conditions, covenants and restrictions (CC&Rs). Printed educational materials will be required to accompany the first deed transfer to highlight the existence of the requirement and to provide information on what storm water management facilities are present, signs that maintenance is needed, how the necessary maintenance can be performed, and assistance that the Permittee can provide. The transfer of this information shall also be required with any subsequent sale of the property.

If Structural or Treatment Control BMPs are located within a public area proposed for transfer, they will be the responsibility of the developer until they are accepted for transfer by the County or other appropriate public agency. Structural or Treatment Control BMPs proposed for transfer must meet design standards adopted by the public entity for the BMP installed and should be approved by the County or other appropriate public agency prior to its installation.

9. DESIGN STANDARDS FOR STRUCTURAL OR TREATMENT CONTROL BMPs

Structural or Treatment control BMPs selected for use at any project covered by this

SUSMP shall meet the design standards of this Section unless specifically exempted.

Post-construction Structural or Treatment Control BMPs shall be designed to:

A. mitigate (infiltrate or treat) storm water runoff from either:

1. the 85th percentile 24-hour runoff event determined as the maximized capture storm water volume for the area, from the formula recommended in *Urban Runoff Quality Management, WEF Manual of Practice No. 23/ ASCE Manual of Practice No. 87, (1998*), or

2. the volume of annual runoff based on unit basin storage water quality volume, to achieve 80 percent or more volume treatment by the method recommended in *California Stormwater Best Management Practices Handbook – Industrial/ Commercial,* (1993), or

3. the volume of runoff produced from a 0.75 inch storm event, prior to its discharge to a storm water conveyance system, or

4. the volume of runoff produced from a historical-record based reference 24-hour rainfall criterion for "treatment" (0.75 inch average for the Los Angeles County area) that achieves approximately the same reduction in pollutant loads achieved by the 85th percentile 24-hour runoff event,

AND

B. control peak flow discharge to provide stream channel and over bank flood protection, based on flow design criteria selected by the local agency.

Limited Exclusion

Restaurants, where the land area for development or redevelopment is less than 5,000 square feet, are excluded from the numerical Structural or Treatment Control BMP design standard requirement only.

10. PROVISIONS APPLICABLE TO INDIVIDUAL PRIORITY PROJECT CATEGORIES

REQUIREMENTS

A. 100,000 SQUARE FOOT COMMERCIAL DEVELOPMENTS

1. PROPERLY DESIGN LOADING/UNLOADING DOCK AREAS

Loading/unloading dock areas have the potential for material spills to be quickly transported to the storm water conveyance system. To minimize this potential, the following design criteria are required:

- Cover loading dock areas or design drainage to minimize run-on and runoff of storm water.
- Direct connections to storm drains from depressed loading docks (truck wells) are prohibited.

2. PROPERLY DESIGN REPAIR/MAINTENANCE BAYS

Oil and grease, solvents, car battery acid, coolant and gasoline from the repair/maintenance bays can negatively impact storm water if allowed to come into contact with storm water runoff. Therefore, design plans for repair bays must include the following:

- Repair/maintenance bays must be indoors or designed in such a way that doesn't allow storm water runon or contact with storm water runoff.
- Design a repair/maintenance bay drainage system to capture all washwater, leaks and spills. Connect drains to a sump for collection and disposal. Direct connection of the repair/maintenance bays to the storm drain system is prohibited. If required by local jurisdiction, obtain an Industrial Waste Discharge Permit.

3. PROPERLY DESIGN VEHICLE/EQUIPMENT WASH AREAS

The activity of vehicle/equipment washing/steam cleaning has the potential to contribute metals, oil and grease, solvents, phosphates, and suspended solids to the storm water conveyance system. Include in the project plans an area for washing/steam cleaning of vehicles and equipment. The area in the site design must be:

- Self-contained and/ or covered, equipped with a clarifier, or other pretreatment facility, and properly connected to a sanitary sewer.

B. RESTAURANTS

1. PROPERLY DESIGN EQUIPMENT/ACCESSORY WASH AREAS

The activity of outdoor equipment/accessory washing/steam cleaning has the potential to contribute metals, oil and grease, solvents, phosphates, and suspended solids to the storm water conveyance system. Include in the project plans an area for the

washing/steam cleaning of equipment and accessories. This area must be:

- Self-contained, equipped with a grease trap, and properly connected to a sanitary sewer.
- If the wash area is to be located outdoors, it must be covered, paved, have secondary containment, and be connected to the sanitary sewer.

C. RETAIL GASOLINE OUTLETS

1. PROPERLY DESIGN FUELING AREA

Fueling areas have the potential to contribute oil and grease, solvents, car battery acid, coolant and gasoline to the storm water conveyance system. The project plans must include the following BMPs:

- The fuel dispensing area must be covered with an overhanging roof structure or canopy. The canopy's minimum dimensions must be equal to or greater than the area within the grade break. The canopy must not drain onto the fuel dispensing area, and the canopy downspouts must be routed to prevent drainage across the fueling area.
- The fuel dispensing area must be paved with Portland cement concrete (or equivalent smooth impervious surface), and the use of asphalt concrete shall be prohibited.
- The fuel dispensing area must have a 2% to 4% slope to prevent ponding, and must be separated from the rest of the site by a grade break that prevents run-on of storm water to the extent practicable.
- At a minimum, the concrete fuel dispensing area must extend 6.5 feet (2.0 meters) from the corner of each fuel dispenser, or the length at which the hose and nozzle assembly may be operated plus 1 foot (0.3 meter), whichever is less.

D. AUTOMOTIVE REPAIR SHOPS

1. PROPERLY DESIGN FUELING AREA

Fueling areas have the potential to contribute oil and grease, solvents, car battery acid, coolant and gasoline to the storm water conveyance system. Therefore, design plans, which include fueling areas, must contain the following:

- The fuel dispensing area should be covered with an overhanging roof structure or canopy. The cover's minimum dimensions must be equal to or greater than the area within the grade break. The cover must not drain onto the fuel dispensing area and the downspouts must be routed to prevent drainage across the fueling area.
- The fuel dispensing areas must be paved with Portland cement concrete (or equivalent smooth impervious surface), and the use of asphalt concrete shall be prohibited.
- The fuel dispensing area must have a 2% to 4% slope to prevent ponding, and must be separated from the rest of the site by a grade break that prevents run-on of storm water.
- At a minimum, the concrete fuel dispensing area must extend 6.5 feet (2.0 meters) from the corner of each fuel dispenser, or the length at which the hose and nozzle assembly may be operated plus 1 foot (0.3 meter), whichever is less.

2. PROPERLY DESIGN REPAIR/MAINTENANCE BAYS

Oil and grease, solvents, car battery acid, coolant and gasoline from the repair/maintenance bays can negatively impact storm water if allowed to come into contact with storm water runoff. Therefore, design plans for repair bays must include the following:

- Repair/maintenance bays must be indoors or designed in such a way that doesn't allow storm water run-on or contact with storm water runoff.
- Design a repair/maintenance bay drainage system to capture all wash-water, leaks and spills. Connect drains to a sump for collection and disposal. Direct connection of the repair/maintenance bays to the storm drain system is prohibited. If required by local jurisdiction, obtain an Industrial Waste Discharge Permit.

3. PROPERLY DESIGN VEHICLE/EQUIPMENT WASH AREAS

The activity of vehicle/equipment washing/steam cleaning has the potential to contribute metals, oil and grease, solvents, phosphates, and suspended solids to the storm water conveyance system. Include in the project plans an area for washing/steam cleaning of vehicles and equipment. This area must be:

- Self-contained and/or covered, equipped with a clarifier, or other pretreatment facility, and properly connected to a sanitary sewer or to a permitted disposal facility.

4. PROPERLY DESIGN LOADING/UNLOADING DOCK AREAS

Loading/unloading dock areas have the potential for material spills to be quickly transported to the storm water conveyance system. To minimize this potential, the following design criteria are required:

- Cover loading dock areas or design drainage to minimize run-on and runoff of storm water.
- Direct connections to storm drains from depressed loading docks (truck wells) are prohibited.

E. PARKING LOTS

1. PROPERLY DESIGN PARKING AREA

Parking lots contain pollutants such as heavy metals, oil and grease, and polycyclic aromatic hydrocarbons that are deposited on parking lot surfaces by motor-vehicles. These pollutants are directly transported to surface waters. To minimize the offsite transport of pollutants, the following design criteria are required:

- Reduce impervious land coverage of parking areas
- Infiltrate runoff before it reaches storm drain system.
- Treat runoff before it reaches storm drain system

2. PROPERLY DESIGN TO LIMIT OIL CONTAMINATION AND PERFORM MAINTENANCE

Parking lots may accumulate oil, grease, and water insoluble hydrocarbons from vehicle drippings and engine system leaks.

- Treat to remove oil and petroleum hydrocarbons at parking lots that are heavily used (e.g. fast food outlets, lots with 25 or more parking spaces , sports event parking lots, shopping malls, grocery stores, discount warehouse stores)
- Ensure adequate operation and maintenance of treatment systems particularly sludge and oil removal, and system fouling and plugging prevention control

11. WAIVER

A Permittee may, through adoption of an ordinance or code incorporating the treatment requirements of the SUSMP, provide for a waiver from the requirement if impracticability for a specific property can be established. A waiver of impracticability shall be granted only when all other Structural or Treatment Control BMPs have been considered and rejected as infeasible. Recognized situations of impracticability include, (i) extreme limitations of space for treatment on a redevelopment project, (ii) unfavorable or unstable soil conditions at a site to attempt infiltration, and (iii) risk of ground water contamination because a known unconfined aquifer lies beneath the land surface or an existing or potential underground source of drinking water is less than 10 feet from the soil surface. Any other justification for impracticability must be separately petitioned by the Permittee and submitted to the Regional Board for consideration. The Regional Board may consider approval of the waiver justification or may delegate the authority to approve a class of waiver justifications to the Regional Board Executive Officer. The supplementary waiver justification becomes recognized and effective only after approval by the Regional Board or the Regional Board Executive Officer. A waiver granted by a Permittee to any development or redevelopment project may be revoked by the Regional Board Executive Officer for cause and with proper notice upon petition.

If a waiver is granted for impracticability, the Permittee must require the project proponent to transfer the savings in cost, as determined by the Permittee, to a storm water mitigation fund to be used to promote regional or alternative solutions for storm water pollution in the storm watershed and operated by a public agency or a non-profit entity.

12. LIMITATION ON USE OF INFILTRATION BMPs

Three factors significantly influence the potential for storm water to contaminate ground water. They are (i) pollutant mobility, (ii) pollutant abundance in storm water, (iii) and soluble fraction of pollutant. The risk of contamination of groundwater may be reduced by pretreatment of storm water. A discussion of limitations and guidance for infiltration practices is contained in, *Potential Groundwater Contamination from Intentional and Non-Intentional Stormwater Infiltration, Report No. EPA/600/R-94/051, USEPA (1994).*

In addition, the distance of the groundwater table from the infiltration BMP may also be a factor determining the risk of contamination. A water table distance separation of ten feet depth in California presumptively poses negligible risk for storm water not associated with industrial activity or high vehicular traffic.

Infiltration BMPs are not recommended for areas of industrial activity or areas subject to high vehicular traffic (25,000 or greater average daily traffic (ADT) on main roadway or 15,000 or more ADT on any intersecting roadway) unless appropriate pretreatment is provided to ensure groundwater is protected and the infiltration BMP is not rendered ineffective by overload.

13. ALTERNATIVE CERTIFICATION FOR STORM WATER TREATMENT MITIGATION

In lieu of conducting detailed BMP review to verify Structural or Treatment Control BMPs adequacy, a Permittee may elect to accept a signed certification from a Civil Engineer or a Licensed Architect registered in the State of California, that the plan meets the criteria established herein. The Permittee is encouraged to verify that certifying person(s) have been trained on BMP design for water quality, not more than two years prior to the signature date. Training conducted by an organization with storm water BMP design expertise (e.g., a University, American Society of Civil Engineers, American Society of Landscape Architects, American Public Works Association, or the California Water Environment Association) may be considered qualifying.

14. RESOURCES AND REFERENCE

TABLE 1

SUGGESTED RESOURCES	HOW TO GET A COPY

Start at the Source (1999) by Bay Area Stormwater Management Agencies Association Detailed discussion of permeable pavements and alternative driveway designs presented.	Bay Area Stormwater Management Agencies Association 2101 Webster Street Suite 500 Oakland, CA 510-286-1255
Design of Stormwater Filtering Systems (1996) by Richard A. Claytor and Thomas R. Schuler Presents detailed engineering guidance on ten different storm water-filtering systems.	Center for Watershed Protection 8391 Main Street Ellicott City, MD 21043 410-461-8323
Better Site Design: A Handbook for Changing Development Rules in Your Community (1998) Presents guidance for different model development alternatives.	Center for Watershed Protection 8391 Main Street Ellicott City, MD 21043 410-461-8323
Design Manual for Use of Bioretention in Stormwater Management (1993) Presents guidance for designing bioretention facilities.	Prince George's County Watershed Protection Branch 9400 Peppercorn Place, Suite 600 Landover, MD 20785
Operation, Maintenance and Management of Stormwater Management (1997) Provides a thorough look at stormwater practices including, planning and design considerations, programmatic and regulatory aspects, maintenance considerations, and costs.	Watershed Management Institute, Inc. 410 White Oak Drive Crawfordville, FL 32327 850-926-5310
California Storm Water Best Management Practices Handbooks (1993) for Construction Activity, Municipal, and Industrial/Commercial Presents a description of a large variety of Structural BMPs, Treatment Control, BMPs and Source Control BMPs	Los Angeles County Department of Public Works Cashiers Office 900 S. Fremont Avenue Alhambra, CA 91803 626-458-6959

TABLE 1 (Continued)

SUGGESTED RESOURCES	HOW TO GET A COPY

Second Nature: Adapting LA's Landscape for Sustainable Living (1999) by Tree People Detailed discussion of BMP designs presented to conserve water, improve water quality, and achieve flood protection.	Tree People 12601 Mullholland Drive Beverly Hills, CA 90210 818-753-4600 (?)
Florida Development Manual: A Guide to Sound Land and Water Management (1988) Presents detailed guidance for designing BMPs	Florida Department of the Environment 2600 Blairstone Road, Mail Station 3570 Tallahassee, FL 32399 850-921-9472
Stormwater Management in Washington State (1999) Vols. 1-5 Presents detailed guidance on BMP design for new development and construction.	Department of Printing State of Washington Department of Ecology P.O. Box 798 Olympia, WA 98507-0798 360-407-7529
Maryland Stormwater Design Manual (1999) Presents guidance for designing storm water BMPs	Maryland Department of the Environment 2500 Broening Highway Baltimore, MD 21224 410-631-3000
Texas Nonpoint Source Book – Online Module (1998)www.txnpsbook.org Presents BMP design and guidance information on-line	Texas Statewide Storm Water Quality Task Force North Central Texas Council of Governments 616 Six Flags Drive Arlington, TX 76005 817-695-9150
Urban Storm Drainage, Criteria Manual – Volume 3, Best Management Practices (1999) Presents guidance for designing BMPs	Urban Drainage and Flood Control District 2480 West 26th Avenue, Suite 156-B Denver, CO 80211 303-455-6277
Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters (1993) Report No. EPA–840-B-92-002. Provides an overview of, planning and design considerations, programmatic and regulatory aspects, maintenance considerations, and costs.	National Technical Information Service U.S. Department of Commerce Springfield, VA 22161 800-553-6847
National Stormwater Best Management Practices (BMP) Database, Version 1.0 Provides data on performance and evaluation of storm water BMPs	American Society of Civil Engineers 1801 Alexander Bell Drive Reston, VA 20191 703-296-6000

SUGGESTED RESOURCES	HOW TO GET A COPY
Caltrans Storm Water Quality Handbook: Planning and Design Staff Guide (Best Management Practices Handbooks (1998) Presents guidance for design of storm water BMPs	California Department of Transportation P.O. Box 942874 Sacramento, CA 94274-0001 916-653-2975

TABLE 2

EXAMPLE BEST MANAGEMENT PRACTICES (BMPs)

The following are examples of BMPs that can be used for minimizing the introduction of pollutants of concern that may result in significant impacts, generated from site runoff to the storm water conveyance system. (See Table 1: Suggested Resources for additional sources of information):

- Provide reduced width sidewalks and incorporate landscaped buffer areas between sidewalks and streets. However, sidewalk widths must still comply with regulations for the Americans with Disabilities Act and other life safety requirements.
- Design residential streets for the minimum required pavement widths needed to comply with all zoning and applicable ordinances to support travel lanes; on-street parking; emergency, maintenance, and service vehicle access; sidewalks; and vegetated open channels.
- Comply with all zoning and applicable ordinances to minimize the number of residential street cul-de-sacs and incorporate landscaped areas to reduce their impervious cover. The radius of cul-de-sacs should be the minimum required to accommodate emergency and maintenance vehicles. Alternative turnarounds should be considered.
- Use permeable materials for private sidewalks, driveways, parking lots, or interior roadway surfaces (examples: hybrid lots, parking groves, permeable overflow parking, etc.).
- Use open space development that incorporates smaller lot sizes.
- Reduce building density.
- Comply with all zoning and applicable ordinances to reduce overall lot imperviousness by promoting alternative driveway surfaces and shared driveways that connect two or more homes together.
- Comply with all zoning and applicable ordinances to reduce the overall imperviousness associated with parking lots by providing compact car spaces, minimizing stall dimensions, incorporating efficient parking lanes, and using pervious materials in spillover parking areas.
- Direct rooftop runoff to pervious areas such as yards, open channels, or vegetated areas, and avoid routing rooftop runoff to the roadway or the storm water conveyance system.
- Vegetated swales and strips
- Extended/dry detention basins
- Infiltration basin
- Infiltration trenches
- Wet ponds
- Constructed wetlands
- Oil/Water separators
- Catch basin inserts
- Continuous flow deflection/ separation systems
- Storm drain inserts
- Media filtration
- Bioretention facility
- Dry-wells
- Cisterns
- Foundation planting
- Catch basin screens
- Normal flow storage/ separation systems
- Clarifiers
- Filtration systems
- Primary waste water treatment systems

TABLE 3

HABITAT PROTECTION IN THE LOS ANGELES COUNTY AREA

Agency:
State Water Resources Control Board

Designation:
Areas of Significant Biological Significance (ASBS)

Definition:
Areas designated by the State Water Resources Control Board as requiring protection of species or biological communities to the extent that alteration of natural water quality is undesirable.

Affected Area:
(See Table 1 & Figure 2)

Agency:
Los Angeles County Department of Regional Planning

Designation:
Significant Ecological Areas (SEA)

Definitions:
Significant Ecological Areas (SEAs) are areas that have been identified by the Los Angeles County General Plan as containing unique or unusual species assemblages, or areas of habitat that are rapidly declining in the Los Angeles County. The SEAs were established to protect a special or sometimes unique collection of habitats and species from loss due to encroachment and human disturbances. However, SEAs are not intended to function as isolated preservation areas.

Affected Areas:
(See Table A & Figure 1)

Agency:
California Department of Fish & Game

Designation:
Natural Communities Conservation Plan Region (NCCP)

Definition:
Identifies and provides for the regional or area wide protection and perpetuation of natural wildlife diversity, while allowing compatible and appropriate development and growth. The goal of the program is to protect sufficient resources in regional preserves to assure the survival of the ecosystem and, at the same time, permit compatible uses of less sensitive land.

Affected Area:
(See Table 1 & Figure 3)

TABLE 3 A

HABITAT PROTECTION IN LOS ANGELES COUNTY AREA1

Figure 1	AFFECTED AREA	DESIGNATION	DESIGNATING AGENCY
1.	Malibu Coastline	SEA	LACDRP
2.	Point Dume	SEA	LACDRP
3.	Zuma Canyon	SEA	LACDRP
4.	Upper La Sierra Canyon	SEA	LACDRP
5.	Malibu Canyon and Lagoon	SEA	LACDRP
5.	Malibu Creek State Park Buffer Area	SEA	LACDRP
6.	Las Virgenes	SEA	LACDRP
7.	Hepatic Gulch	SEA	LACDRP
9.	Cold Creek	SEA	LACDRP
10.	Tuna Canyon	SEA	LACDRP
11.	Temescal-Rustic-Sullivan Canyons	SEA	LACDRP
12.	Palo Comado Canyon	SEA	LACDRP
13.	Chatsworth Reservior	SEA	LACDRP
14.	Simi Hills	SEA	LACDRP
15.	Tonner Canyon/Chino Hills	SEA	LACDRP
16.	Buzzard Peak/ San Jose Hills	SEA	LACDRP
17.	Powder Canyon/Punte Hills	SEA	LACDRP
18.	Way Hills	SEA	LACDRP
19.	San Francisquito Canyon	SEA	LACDRP
20.	Santa Susana Mountains	SEA	LACDRP
21.	Santa Susana Pass	SEA	LACDRP
22.	Santa Fe Dam Floodplain	SEA	LACDRP
23.	Santa Clara River	SEA	LACDRP
24.	Tujunga Valley/Hansen Dam	SEA	LACDRP
25.	San Dimas Canyon	SEA	LACDRP
26.	San Antonio Canyon Mouth	SEA	LACDRP
27.	Portuguese Bend Landslide	SEA	LACDRP
28.	El Segundo Dunes	SEA	LACDRP
29.	Ballona Creek	SEA	LACDRP
30.	Alamitos Bay	SEA	LACDRP
31.	Rolling Hills Canyons	SEA	LACDRP
32.	Agua Amarga Canyon	SEA	LACDRP
33.	Terminal Island	SEA	LACDRP
34.	Palos Verdes Peninsula Coastline	SEA	LACDRP
35.	Harbor Lake Regional Park	SEA	LACDRP
36.	Madrona Marsh	SEA	LACDRP
37.	Griffith Park	SEA	LACDRP
39.	Encino Reservoir	SEA	LACDRP
40.	Verdugo Mountains	SEA	LACDRP

1 This list is a compilation of data from the Department of Fish & Game, State Water Resources Control Board, and the Los Angeles County Department of Regional Planning as of February 29, 2000. Areas in this may changes, as area are added or deleted by the designating agencies.

	AFFECTED AREA	DESIGNATION	DESIGNATING AGENCY
42.	Whittier Narrows Dam County Recreation Area	SEA	LACDRP
43.	Rio Hondo College Wildlife Santuary	SEA	LACDRP
44.	Sycamore and Turnbull Canyons	SEA	LACDRP
45.	Dudleya Densiflora Population	SEA	LACDRP
62.	Galium Grande Population	SEA	LACDRP
63.	Lyon Canyon	SEA	LACDRP
64.	Valley Oaks Savannah, Newhall	SEA	LACDRP
Fig.2	Point Dume to Latigo Point	ASBS	SWRCB
Fig.3	Palos Verdes Peninsula	NCCP	DFG

FIGURE 1

SIGNIFICANT ECOLOGICAL AREAS IN LOS ANGELES COUNTY

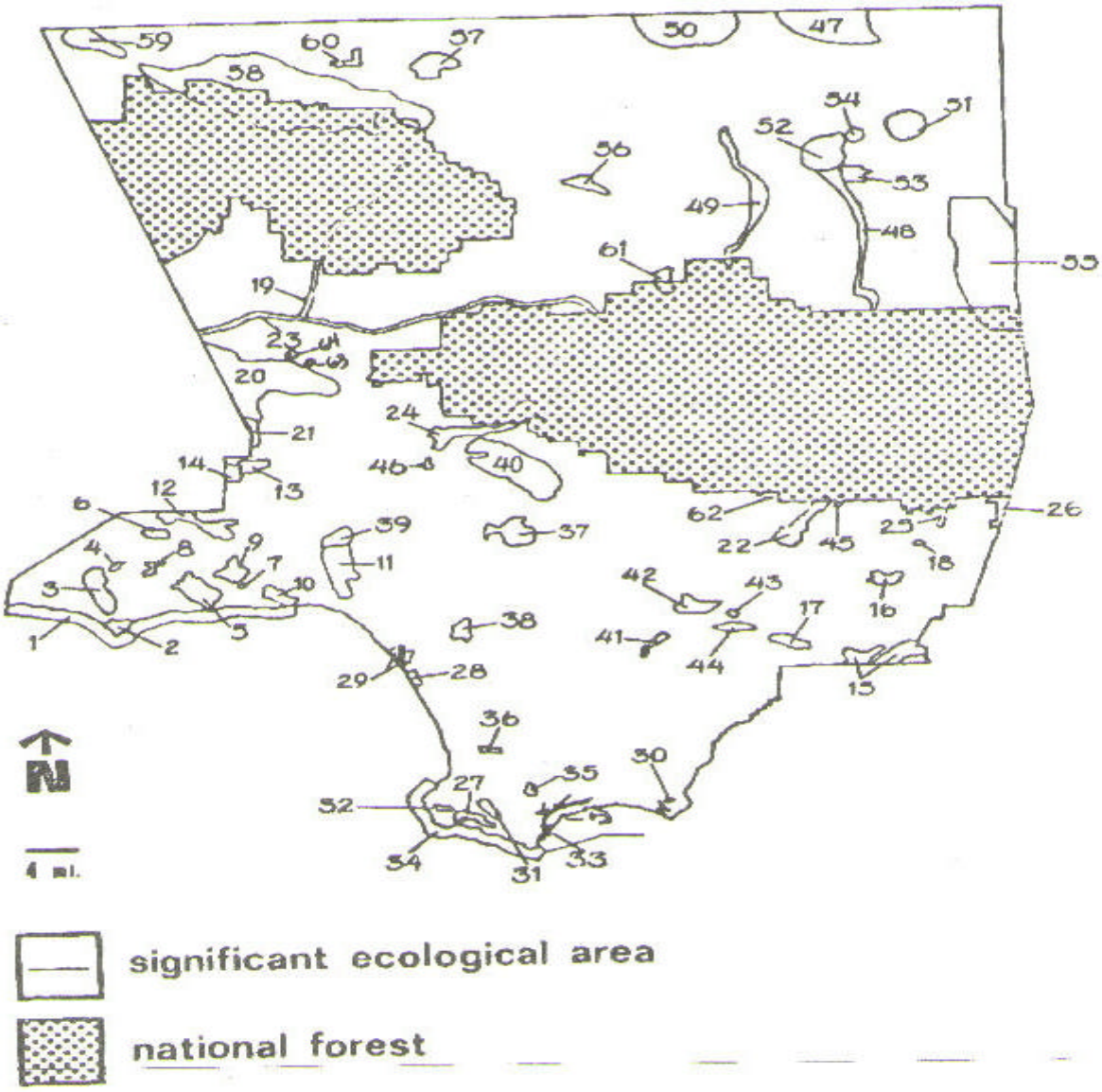

FIGURE 2

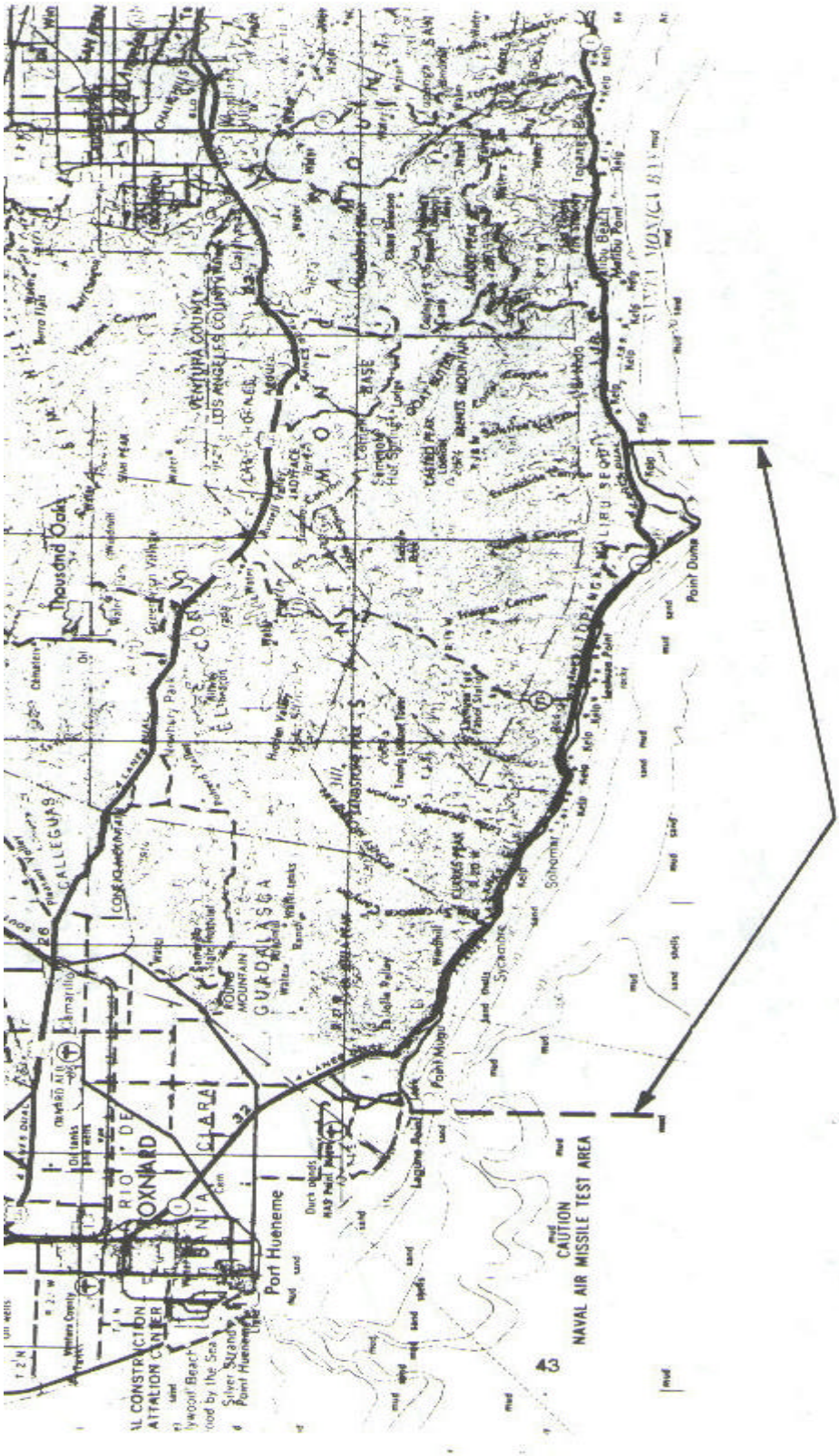

FIGURE 24
POINT MUGU TO LATIGO POINT
AREA OF SPECIAL BIOLOGICAL SIGNIFICANCE
Ref. Maps: USGS Point Mugu, CA
Point Dume, CA
Scale: 1 inch = 4 miles
Seaward boundary is 100-foot isobath or 1000 feet offshore, whichever is more distant.

(For enlarged delineation of boundary lines, SEE FIGURES 24a and 24b)

FIGURE 3

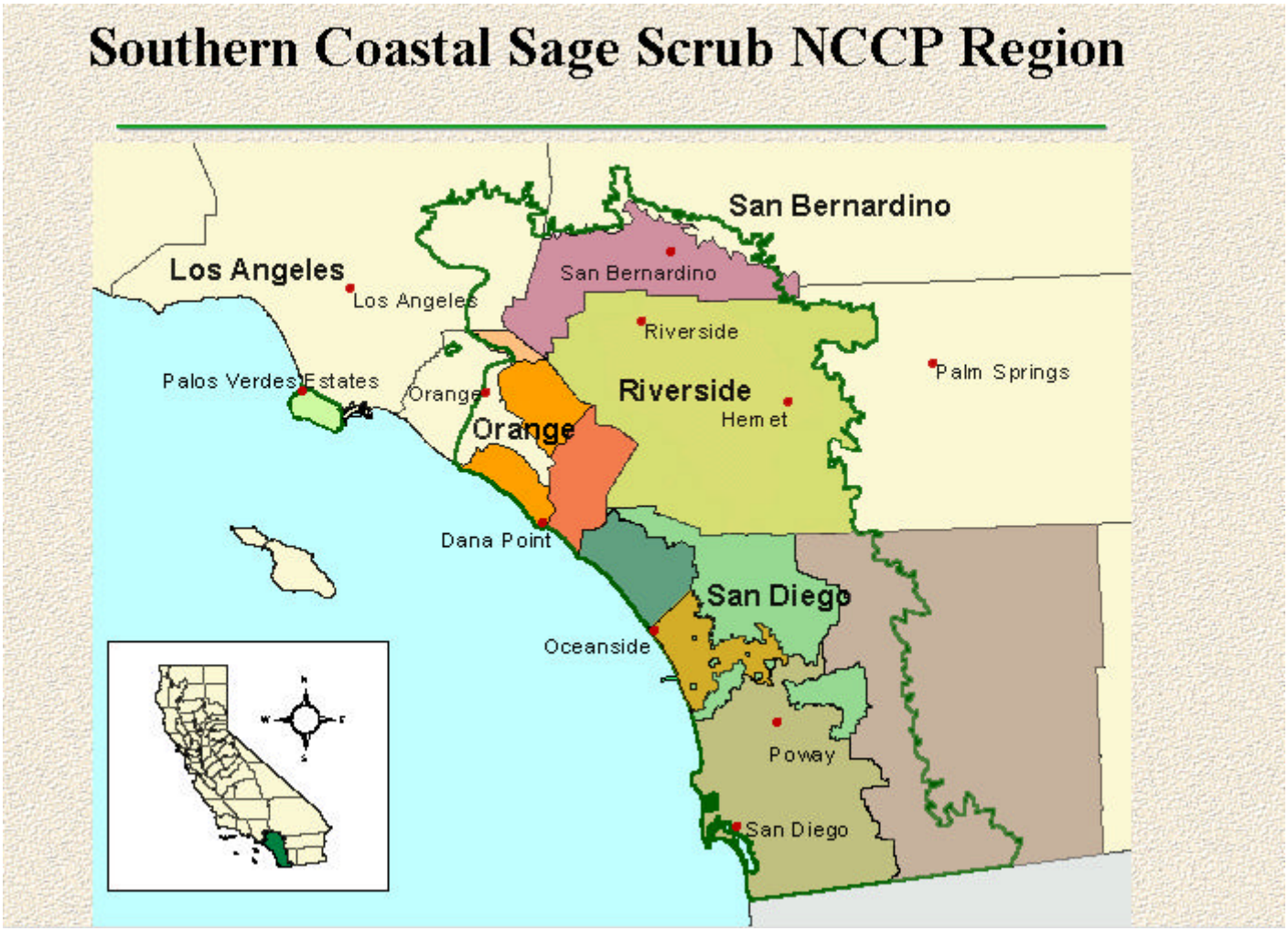
Southern Coastal Sage Scrub NCCP Region
San Bernardino
Los Angeles
Los Angeles
San Bernardino
Riverside
Palm Springs
Palos Verdes Estates
Orange
Riverside
Hemet
Orange
Dana Point
San Diego
Oceanside
Poway
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WHAT: Free public briefings (approximately 3 hours) to present:

1. The regulatory process, with a focus on the Federal Register system and the public's role in the development regulations.
2. The relationship between the Federal Register and Code of Federal Regulations.
3. The important elements of typical Federal Register documents.
4. An introduction to the finding aids of the FR/CFR system.

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WASHINGTON, DC

WHEN: May 23, 2000 at 9:00 am.

WHERE: Office of the Federal Register
Conference Room, Suite 700
800 North Capitol Street, NW.
Washington, DC
(3 blocks north of Union Station Metro)

RESERVATIONS: 202–523–4538

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Rules and Regulations

Federal Register
Vol. 65, No. 97
Thursday, May 18, 2000

This section of the FEDERAL REGISTER contains regulatory documents having general applicability and legal effect, most of which are keyed to and codified in the Code of Federal Regulations, which is published under 50 titles pursuant to 44 U.S.C. 1510.

The Code of Federal Regulations is sold by the Superintendent of Documents. Prices of new books are listed in the first FEDERAL REGISTER issue of each week.

DEPARTMENT OF AGRICULTURE

Food and Nutrition Service

7 CFR Part 245

Determining Eligibility for Free and Reduced Price Meals and Free Milk in Schools

CFR Correction

In Title 7 of the Code of Federal Regulations, parts 210 to 299, revised as of January 1, 2000, page 285, § 245.6a is corrected by revising the fourth sentence of paragraph (a)(2)(v), and revising the last sentence in paragraph (a)(5) to read as follows:

§ 245.6a Verification requirements.

(a) * * *

(2) * * *

(v) * * * Selected households must also be informed that, in lieu of any information that would otherwise be required, they can submit proof of current food stamp, FDPIR or TANF certification as described in paragraph (a)(3) of this section to verify the free meal eligibility of a child who is a member of a food stamp, FDPIR or TANF household. * * *

* * * * *

(5) * * * Verification of eligibility is not required of households when the determination of eligibility was based on documentation provided by the State or local agency responsible for the administration of the Food Stamp Program, FDPIR or TANF Program, as described in § 245.6(b).

* * * * *

[FR Doc. 00–55508 Filed 5–17–00; 8:45 am]

BILLING CODE 1505–01–D

DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Part 97

[Docket No. 30043; Amdt. No. 1992]

Standard Instrument Approach Procedures; Miscellaneous Amendments

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Final rule.

SUMMARY: This amendment establishes, amends, suspends, or revokes Standard Instrument Approach Procedures (SIAPs) for operations at certain airports. These regulatory actions are needed because of changes occurring in the National Airspace System, such as the commissioning of new navigational facilities, addition of new obstacles, or changes in air traffic requirements. These changes are designed to provide safe and efficient use of the navigable airspace and to promote safe flight operations under instrument flight rules at the affected airports.

DATES: An effective date for each SIAP is specified in the amendatory provisions.

Incorporation by reference-approved by the Director of the Federal Register on December 31, 1980, and reapproved as of January 1, 1982.

ADDRESSES: Availability of matter incorporated by reference in the amendment is as follows:

For Examination—

1. FAA Rules Docket, FAA Headquarters Building, 800 Independence Avenue, SW., Washington, DC 20591;
2. The FAA Regional Office of the region in which affected airport is located; or
3. The Flight Inspection Area Office which originated the SIAP.

For Purchase—Individual SIAP copies may be obtained from:

1. FAA Public Inquiry Center (APA–200), FAA Headquarters Building, 800 Independence Avenue, SW., Washington, DC 20591; or
2. The FAA Regional Office of the region in which the affected airport is located.

By Subscription—Copies of all SIAPs, mailed once every 2 weeks, are for sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402.

FOR FURTHER INFORMATION CONTACT: Donald P. Pate, Flight Procedure Standards Branch (AMCAFS–420), Flight Technologies and Programs Division, Flight Standards Service, Federal Aviation Administration, Mike Monroney Aeronautical Center, 6500 South McArthur Blvd. Oklahoma City, OK 73169 (Mail Address: P.O. Box 25082 Oklahoma City, OK 73125) telephone: (405) 954–4164.

SUPPLEMENTARY INFORMATION: This amendment to part 97 of the Federal Aviation Regulations (14 CFR part 97) establishes, amends, suspends, or revokes Standard Instrument Approach Procedures (SIAPs). The complete regulatory description on each SIAP is contained in the appropriate FAA Form 8260 and the National Flight Data Center (FDC)/Permanent (P) Notices to Airmen (NOTAM) which are incorporated by reference in the amendment under 5 U.S.C. 552(a), 1 CFR part 51, and § 97.20 of the Federal Aviation's Regulations (FAR). Materials incorporated by reference are available for examination or purchase as stated above.

The large number of SIAPs, their complex nature, and the need for a special format make their verbatim publication in the **Federal Register** expensive and impractical. Further, airmen do not use the regulatory text of the SIAPs, but refer to their graphic depiction of charts printed by publishers of aeronautical materials. Thus, the advantages of incorporation by reference are realized and publication of the complete description of each SIAP contained in FAA form documents is unnecessary. The provisions of this amendment state the affected CFR (and FAR) sections, with the types and effective dates of the SIAPs. This amendment also identifies the airport, its location, the procedure identification and the amendment number.

The Rule

This amendment to part 97 of the Federal Aviation Regulations (14 CFR 97) establishes, amends, suspends, or revokes SIAPs. For safety and timeliness of change considerations, this amendment incorporates only specific changes contained in the content of the following FDC/P NOTAMs for each

008390

SIAP. The SIAP information in some previously designated FDC/Temporary (FDC/T) NOTAMs is of such duration as to be permanent. With conversion to FDC/P NOTAMs, the respective FDC/T NOTAMs have been canceled.

The FDC/P NOTAMs for the SIAPs contained in this amendment are based on the criteria contained in the U.S. Standard for Terminal Instrument Procedures (TERPS). In developing these chart changes to SIAPs by FDC/P NOTAMs, the TERPS criteria were applied to only these specific conditions existing at the affected airports. All SIAP amendments in this rule have been previously issued by the FAA in a National Flight Data Center (FDC) Notice to Airmen (NOTAM) as an emergency action of immediate flight safety relating directly to published aeronautical charts. The circumstances which created the need for all these SIAP amendments requires making them effective in less than 30 days.

Further, the SIAPs contained in this amendment are based on the criteria contained in the TERPS. Because of the close and immediate relationship between these SIAPs and safety in air commerce, I find that notice and public procedure before adopting these SIAPs are impracticable and contrary to the public interest and, where applicable, that good cause exists for making these SIAPs effective in less than 30 days.

Conclusion

The FAA has determined that this regulation only involves an established body of technical regulations for which frequent and routine amendments are necessary to keep them operationally current. It, therefore—(1) is not a ''significant regulatory action'' under DOT Regulatory Policies and Procedures (44 FR 11034; February 26, 1979); and (3) does not warrant preparation of a regulatory evaluation as the anticipated impact is so minimal. For the same reason, the FAA certifies that this amendment will not have a significant economic impact on a substantial number of small entities under the criteria of the Regulatory Flexibility Act.

List of Subjects in 14 CFR Part 97

Air traffic control, Airports, Navigation (air).

Issued in Washington, DC on May 12, 2000.

L. Nicholas Lacey,

Director, Flight Standards Service.

Adoption of the Amendment

Accordingly, pursuant to the authority delegated to me, part 97 of the Federal Aviation Regulations (14 CFR part 97) is amended by establishing, amending, suspending, or revoking Standard Instrument Approach Procedures, effective at 0901 UTC on the dates specified, as follows:

PART 97—STANDARD INSTRUMENT APPROACH PROCEDURES

1. The authority citation for part 97 is revised to read as follows:

Authority: 49 U.S.C. 40103, 40113, 40120, 44701; 49 U.S.C. 106(g); and 14 CFR 11.49(b)(2).

2. Part 97 is amended to read as follows:

§§ 97.23, 97.25, 97.27, 97.29, 97.31, 97.33, 97.35 [Amended]

By amending: § 97.23 VOR, VOR/DME, VOR or TACAN, and VOR/DME or TACAN; § 97.25 LOC, LOC/DME, LDA, LDA/DME, SDF, SDF/DME; § 97.27 NDB, NDB/DME; § 97.29 ILS, ILS/DME, ISMLS, MLS, MLS/DME, MLS/RNAV; § 97.31 RADAR SIAPs; § 97.33 RNAV SIAPs; and § 97.35 COPTER SIAPs, identified as follows:

* * * effective upon publication.

FDC date	State	City	Airport	FDC number	SIAP
04/25/00	CA	Burbank	Burbank-Glendale-Pasadena	FDC 0/4208	LOC RWY 8 AMDT 2A This corrects TL00–11.
4/25/00	CA	Burbank	Burbank-Glendale-Pasadena	FDC 0/4209	ILS RWY 8 AMDT 35A This corrects TL00–11.
04/26/00	GA	Marietta	Cobb County-Mc Collum Field	FDC 0/4266	GPS RWY 9 ORIG–A.
04/26/00	GA	Marietta	Cobb County-Mc Collum Field	FDC 0/4268	VOR/DME RWY 9 ORIG–D.
04/26/00	GA	Marietta	Cobb County-Mc Collum Field	FDC 0/4278	ILS RWY 27 ORIG–D.
04/27/00	GA	Marietta	Cobb County-Mc Collum Field	FDC 0/4324	GPS RWY 27 ORIG–B.
04/27/00	IL	Moline	Quad City	FDC 0/4367	NDB OR GPS RWY 9, AMDT 27B.
04/27/00	MA	Bedford	Laurence G. Hanscon Field	FDC 0/4355	VOR RWY 23 AMDT 8C.
04/27/00	MI	Bellaire	Antrim County	FDC 0/4334	GPS RWY 2 ORIG-A.
04/27/00	MO	Kansas City	Kansas City Intl	FDC 0/4361	NDB RWY 9, AMDT 8.
04/27/00	NC	North Wilkesboro	Wilkes County	FDC 0/4315	NDB RWY 1, AMDT 2A.
04/27/00	NC	North Wilkesboro	Wilkes County	FDC 0/4316	ILS RWY 1, ORIG-A.
04/27/00	NE	Grand Island	Central Nebraska Regional	FDC 0/4365	ILS RWY 35, AMDT 9A.
04/27/00.	OH	Akron	Akron-Canton Regional	FDC 0/4339	VOR OR GPS RWY 23 AMDT 9.
04/27/00	OH	Columbus	Port Columbus Intl	FDC 0/4352	NDB OR GPS RWY 10L, AMDT 8.
04/27/00	OH	Springfield	Springfield-Beckly Muni	FDC 0/4335	VOR OR GPS RWY 6 AMDT 10A.
04/27/00	OH	Springfield	Springfield-Beckley Muni	FDC 0/4336	VOR RWY 24 AMDT 10.
04/27/00	OR	John Day	Grant Co. Rgnl/Ogilvie Field	FDC 0/4359	GPS RWY 9, ORIG.
04/27/00	SD	Aberdeen	Aberdeen Regional	FDC 0/4337	VOR/DME OR GPS RWY 13 AMDT 12.
04/27/00	SD	Pierre	Pierre Regional	FDC 0/4340	VOR/DME OR TACAN OR GPS RWY 25 AMDT 16.
04/27/00	WI	Appleton	Outagamie County Regional	FDC 0/4345	VOR/DME RWY 3 AMDT 8B.
04/27/00	WI	Appleton	Outagamie County Regional	FDC 0/4346	LOC BC RWY 11 AMDT 1A.
04/27/00	WI	Rhinelander	Rhinelander-Onieda	FDC 0/4341	VOR/DME OR GPS RWY 27 ORIG-C.
04/28/00	DE	Georgetown	Sussex County	FDC 0/4421	RNAV RWY 4, ORIG-A.
04/28/00	DE	Georgetown	Sussex County	FDC 0/4422	RNAV RWY 22, ORIG-A.
04/28/00	IL	Macomb	Macomb Muni	FDC 0/4386	LOC RWY 27, AMDT 2A.

FDC date	State	City	Airport	FDC number	SIAP
04/28/00	MD	Ocean City	Ocean City Muni	FDC 0/4405	RNAV RWY 14, ORIG-A.
04/28/00	MO	Kansas City	Kansas City Intl	FDC 0/4402	VOR/DME OR TACAN RWY 1L, ORIG.
04/28/00	MO	Kansas City	Kansas City Intl	FDC 0/4403	VOR/DME OR TACAN RWY 19R, ORIG.
04/28/00	NY	Farmingdale	Republic	FDC 0/4395	ILS RWY 14, AMDT 7A.
04/28/00.	SD	Aberdeen	Aberdeen Regional	FDC 0/4388	VOR OR GPS RWY 31, AMDT 20.
04/28/00	UT	Salt Lake City	Salt Lake City Intl	FDC 0/4408	ILS RWY 34R (CAT I,II,III), ORIG.
04/28/00	UT	Salt Lake City	Salt Lake City Intl	FDC 0/4411	GPS RWY 16L, ORIG.
04/28/00	UT	Salt Lake City	Salt Lake City Intl	FDC 0/4412	GPS RWY 17, ORIG.
04/28/00	UT	Salt Lake City	Salt lake City Intl	FDC 0/4414	ILS/DME RWY 16R (CAT I, II, III), AMDT 3.
04/28/00	UT	Salt Lake City	Salt Lake City Intl	FDC 04/4416	VOR/DME OR TACAN OR GPS RWY 34R, AMDT 7.
04/28/00	UT	Salt Lake City	Salt Lake City Intl	FDC 0/4420	ILS/DME RWY 34L, AMDT 1.
05/01/00	FL	West Palm Beach	North Palm Beach County General Aviation.	FDC 0/4476	VOR RWY 85 AMDT 1.
05/01/00	IA	Marshalltown	Marshalltown Muni	FDC 0/4499	GPS RWY 12, ORIG-A.
05/01/00	KS	Garden City	Garden City Regional	FDC 0/4495	VOR/DME OR GPS RWY 35, AMDT 1.
05/01/00	KS	Garden City	Garden City Regional	FDC 0/4496	VOR/DME OR GPS RWY 30, ORIG.
05/01/00	KS	Goodland	Renner Field (Goodland Muni)	FDC 0/4493	VOR/DME RWY 30, AMDT 6.
05/01/00	KS	Hays	Hays Regional	FDC 0/4494	VOR/DME RWY 34, AMDT 2A.
05/01/00	KS	Hays	Hays Regional	FDC 0/4501	LOC RWY 34, AMDT 2A.
05/01/00	KS	Ottawa	Ottawa Muni	FDC 0/4474	GPS RWY 17, ORIG.
05/01/00	MO	Jefferson City	Jefferson City Memorial	FDC 0/4497	LOC BC RWY 12, AMDT 6C.
05/01/00	MO	Jefferson City	Jefferson City Memorial	FDC 0/4498	NDB RWY 12, AMDT 2A.
05/01/00	MO	Kansas City	Kansas City Intl	FDC 0/4500	NDB OR GPS RWY 1L, AMDT 15.
05/01/00	ND	Jamestown	Jamestown Muni	FDC 0/4490	LOC/DME BC RWY 13, AMDT 7C.
05/01/00	NE	Grand Island	Central Nebraska Regional	FDC 0/4472	LOC/DME BC RWY 17, AMDT 9A.
05/01/00	NE	Omaha	Eppley Airfield	FDC 0/4491	VOR RWY 32L, AMDT 10A.
05/01/00	SD	Rapid City	Rapid City Regional	FDC 0/4489	VOR OR TACAN OR GPS RWY 14, ORIG.
05/01/00	SD	Watertown	Watertown Muni	FDC 0/4487	VOR OR TACAN OR GPS RWY 17, AMDT 16.
05/01/00		Watertown	Watertown Muni	FDC 0/4488	VOR/DME OR TACAN RWY 35, AMDT 11.
05/01/00	SD	Williston	Sloulin Field Intl	FDC 0/4492	VOR/DME OR GPS RWY 29, AMDT 3A.
05/01/00	UT	Salt Lake City	Salt Lake City Intl	FDC 0/4477	ILS/DME RWY 16L (CAT I, II, III), AMDT 12.
05/02/00	CA	Monterey	Monterey Peninsula	FDC 0/4543	ILS RWY 10R AMDT 26.
05/03/00	ID	Boise	Boise Air Terminal (Gowen Field).	FDC 0/4599	GPS RWY 28L, AMDT 1A.
05/03/00	MA	Nantucket	Nantucket Memorial	FDC 0/4598	LOC BC RWY 6 AMDT 10.
05/03/00	MID	Sand Island	Henderson Field	FDC 0/4564	AY ATOLL, MQ. GPS RWY 6 ORIG.
05/03/00	WY	Guernesey	Camp Guernsey	FDC 0/4567	NDB RWY 32, ORIG.
05/04/00	GA	Mc Rae	Telfair-Wheeler	FDC 0/4638	NDB OR GPS RWY 20 AMDT 8.
05/04/00	KS	Garden City	Garden City Regional	FDC 0/4633	NDB RWY 35, ORIG.
05/04/00	KS	Garden City	Garden City Regional	FDC 0/4637	VOR/DME RWY 17, AMDT.
05/04/00	MI	Detroit	Detroit Metropolitan Wayne County.	FDC 0/4689	ILS RWY 3R (CAT I, II, III), AMDT 13.
05/04/00	MO	Fort Leonard Wood	Waynesville Regional Arpt at Forney Field.	FDC 0/4639	LOC RWY 14, ORIG.
05/04/00	MO	Fort Leonard Wood	Waynesville Regional Arpt at Forney Field.	FDC 0/4640	NDB/DME RWY 14 AMDT 1.
05/04/00	MO	Fort Leonard Wood	Waynesville Regional Arpt at Forney Field.	FDC 0/4641	VOR RWY 32, ORIG.
05/04/00	MO	Fort Leonard Wood	Waynesville Regional Arpt at Forney Field.	FDC 0/4642	NDB RWY 32, ORIG.
05/04/00	MO	Fort Leonard Wood	Waynesville Regional Arpt at Forney Field.	FDC 0/4649	GPS RWY 14, ORIG.
05/04/00	TX	Houston	George Bush Intercontinental Airport/Houston.	FDC 0/4631	GPS RWY 8, ORIG. This Replaces FDC 0/4261.

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FDC date	State	City	Airport	FDC number	SIAP
05/04/00	TX	Houston	George Bush Intercontinental Airport/Houston.	FDC 0/4632	ILS RWY 8, AMDT 18G. This Replaces FDC 0/4292.
05/05/00	ID	Driggs	Driggs-Reed Memorial	FDC 0/4702	GPS-A, ORIG-A.
05/05/00	IN	Evansville	Evansville Regional	FDC 0/4678	NDB OR GPS RWY 22, AMDT 12.
05/05/00	MO	Fort Leonard Wood	Waynesville Regional Arpt at Forney Field.	FDC 0/4721	GPS RWY 32, ORIG.
05/05/00	OH	Middletown	Hook Field Muni	FDC 0/4746	LOC RWY 23, AMDT 7D.
05/08/00	IN	Evansville	Evansville Regional	FDC 0/4786	VOR OR GPS RWY 4, AMDT 5.
05/09/00	GUA	Agana	Guam Intl	FDC 0/4825	GPS RWY 24R ORIG.
05/09/00	IL	Freeport	Albertus	FDC 0/4819	NDB RWY 6, ORIG-A.
05/09/00	IL	Freeport	Albertus	FDC 0/4820	LOC RWY 24, ORIG-A.
05/09/00	IL	Freeport	Albertus	FDC 0/4821	VOR OR GPS RWY 24, AMDT 6A.
05/09/00	MO	Fredericktown	Fredericktown Regional	FDC 0/4809	RNAV RWY 19, ORIG. This replaces FDC 0/4021.
05/09/00	MO	Fredericktown	Fredericktown Regional	FDC 0/4810	RNAV RWY 1, ORIG. This replaces FDC 0/4054.
05/09/00	MO	Marshall	Marshall Memorial Muni	FDC 0/4833	RNAV RWY 36, ORIG-A.
05/09/00	MO	Marshall	Marshall Memorial Muni	FDC 0/4834	RNAV RWY 18, ORIG-A.
05/09/00	WI	Madison	Dane County Regional-Truax Field.	FDC 0/4827	ILS RWY 18, AMDT 7B
05/10/00	CA	Burbank	Burbank-Glendale-Pasadena	FDC 0/4849	NDB RWY 8 AMDT 2A. This replaces FDC 0/4211 IN TL00–11

[FR Doc. 00–12560 Filed 5–17–00; 8:45 am]
BILLING CODE 4910–13–M

DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

15 CFR Part 902

50 CFR Part 600

[Docket No. 980812215–0109–02; I.D. 072898D] 648–AK76

Magnuson-Stevens Act Provisions; Fishing Capacity Reduction Program

AGENCY: National Marine Fisheries Service (NMFS), National Oceanic and Atmospheric Administration (NOAA), Commerce.

ACTION: Interim final rule; request for public comments.

SUMMARY: NMFS issues interim final framework regulations specifying procedures for requesting and conducting fishing capacity reduction programs (reduction programs). A reduction program pays harvesters in a fishery with too much fishing capacity either to surrender their fishing permits for that fishery or both to surrender all their fishing permits and withdraw their fishing vessels from all fishing. Reduction costs can be paid by post-reduction harvesters, taxpayers, or others. The intent is to decrease excess harvesting capacity, increase the economic efficiency of harvesting, and facilitate the conservation and management of fishery resources in each fishery in which NMFS conducts a reduction program.

DATES: This interim final rule is effective June 19, 2000. Comments must be received on or before June 19, 2000.

ADDRESSES: Copies of the Regulatory Impact Review may be obtained from Michael L. Grable, Chief, Financial Services Division, NMFS, 1315 East-West Highway, Silver Spring, MD 20910–3282. Written comments should be sent to Michael L. Grable at the above address. Comments also may be sent, via facsimile, to (301) 713–1306. NMFS will not accept comments sent by e-mail or the Internet. Comments involving the reporting burden estimates or any other aspects of the collection of information requirements contained in this interim final rule should be sent to both Michael L. Grable and to the Office of Information and Regulatory Affairs, Office of Management and Budget (OMB), Washington, D.C. 20503 (ATTN: NOAA Desk Officer).

FOR FURTHER INFORMATION CONTACT: Michael L. Grable, (301) 713-2390.

SUPPLEMENTARY INFORMATION:

Background

Many U.S. fisheries have excess fishing capacity. Excess fishing capacity decreases earnings, complicates management, and imperils conservation. To provide for fishing capacity reduction programs, Congress amended the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) by adding section 312(b)-(e) (16 U.S.C. 1861a(b)-(e)). To finance reduction costs, Congress amended Title XI of the Merchant Marine Act, 1936 (Title XI), by adding new sections 1111 and 1112. The Title XI provisions involving fishing capacity reduction loans have been codified at 46 U.S.C. App. 1279f and g.

This action adds a subpart L to 50 CFR part 600 establishing framework regulations for requesting and conducting fishing capacity reduction programs. These framework regulations were published as a proposed rule on February 11, 1999 (64 FR 6854–6869), with a public comment period that ended on April 12, 1999.

While NMFS received numerous comments on the proposed rule (addressed in more detail below), it believes further comment on the revised capacity reduction referenda provisions would be useful.

Comments on Proposed Rule and Responses

NMFS received comments from 24 entities. Most of the comments are from organizations that represent the views of many parties. All but one of the comments supported fishing capacity reduction, although many comments disagreed with some aspects of the proposed rule. The following summarizes the comments and gives NMFS' responses.

Comment Issue 1: Five comments addressed interest rates for loans financing capacity reduction costs.

Three comments said that a reduction loan interest rate 2 percent higher than the interest cost for borrowing loan capital from the U.S. Treasury is unnecessary, burdensome, and counterproductive.

One comment said that the interim final rule should state whether the reduction loan interest rate is fixed or adjustable and that the interest rate projected for reduction planning purposes can change before reduction implementation.

One comment said that there should be no interest prepayment penalties.

Response: A reduction loan interest rate 2 percent higher than NMFS' interest cost is required by the statute (46 U.S.C. App. 1279g).

Reduction loan interest rates depend on prevailing yields on comparable maturity Treasury obligations at the time the U.S. Treasury Department establishes the interest rate NMFS must pay on loan capital borrowed from the U.S. Treasury. The actual interest rate NMFS charges for a specific reduction loan could be higher or lower than the interest rates projected for reduction planning purposes. The projection of an interest rate could occur many months before the disbursement of reduction loan funds. The interim final rule revises the proposed rule to more fully address this issue (see § 600.1012(b) and (c) and the definition of ''Treasury percentage'' in § 600.1000).

All reduction loan interest rates are fixed rather than adjustable. There is no prepayment penalty.

Comment Issue 2: Ten comments involved the reduction program process.

Six comments said that referenda about industry fee systems should occur earlier in the reduction process. Most believed that, until referenda first demonstrate the fishing industry's willingness to pay for financed reduction programs, fishery management councils (FMCs) will be reluctant to process fishery management plan (FMP) amendments complementing reduction programs and industry will be reluctant to submit reduction bids. Some also believed that industry will be reluctant to prepare business plans until after successful referenda.

Three comments said that the reduction process would be shorter if all its components were concurrent.

One comment said that the process for reduction loans should be kept as simple as possible, or the fishing industry will seek subsidized reduction programs rather than financed ones.

Two comments said that pre-bidding referenda should involve ranges of projected reduction results, with a minimum acceptable level.

Response: NMFS based the proposed rule's process for financed reduction programs on two concepts. First, industry reduction proponents and an FMC should demonstrate their commitment to a reduction program by establishing, at the time of making a reduction program request, everything necessary for prompt and reliable reduction program completion. Second, reduction bidding results need to be known before a referendum asks post-reduction harvesters to commit themselves to repaying a reduction loan.

NMFS acknowledges that FMCs may be reluctant to invest the time and resources necessary to prepare and process FMP reduction amendments, and industry may be reluctant to submit reduction bids, unless referenda have first demonstrated the industry's willingness to pay for financed reduction programs. The interim final rule revises the proposed rule in many places to better address these concerns (see, particularly, § 600.1010).

The interim final rule provides for pre-bidding referenda and, if necessary, a post-bidding referendum as well. The necessary pre-bidding referendum can occur at any time after an FMC requests a reduction program and before NMFS proposes a plan and regulations to implement the program. Each pre-bidding referendum is based on a reduction loan amount not greater than the maximum specified in the business plan being sufficient to reduce at least the minimum amount of fishing capacity specified in the business plan. A post-bidding referendum occurs only if the maximum reduction loan amount is insufficient to reduce at least the minimum amount of fishing capacity.

If an initial pre-bidding referendum occurs before the FMC adopts any FMP reduction amendment necessary, the referendum is based on the FMP reduction amendment that the business plan specifies. If afterwards, the referendum is based on the FMP reduction amendment that the FMC adopts.

If the initial pre-bidding referendum is successful, the reduction process proceeds. If the referendum precedes any FMP reduction amendment necessary, a second pre-bidding referendum is required if, in NMFS' judgment, the adopted FMP reduction amendment differs materially from the FMP reduction amendment that the business plan specifies. A material difference would, for example, be a post-reduction harvesting allocation for the harvesters who must repay a reduction loan that is less than the allocation specified in the business plan. The second pre-bidding referendum is to determine whether the referendum voters approve an industry fee system despite any such material difference.

If the initial pre-bidding referendum is unsuccessful, the reduction process then either ceases or is suspended pending an appropriate amendment of the business plan.

The interim final rule requires the business plan to specify the maximum amount of a reduction loan and the minimum amount of fishing capacity this must be sufficient to reduce. The interim final rule also requires the business plan to provide guidance about when pre-bidding referenda should occur.

Under the interim final rule, a reduction request from an FMC based on a business plan serves as the FMC's endorsement, in principle, of all aspects of the business plan that depend on the FMC's action (see § 600.1003(g)). Endorsement in principle does not, however, mean that the FMC will eventually vote to recommend implementing the business plan's concept of an FMP reduction amendment. Implementing any FMP reduction amendment necessary remains subject to all the requirements applicable to all other FMP amendments. Endorsement in principle merely means that the FMC has taken whatever action the FMC deems necessary to endorse the business plan (including the business plan's proposed FMP reduction amendment) by requesting NMFS to initiate a reduction program based on the business plan. Subsequent consideration, in accordance with the ordinary Magnuson-Stevens Act process, of the FMP reduction amendment may result either in no FMP amendment or one that differs from the business plan specifications.

Nevertheless, an FMC may not make a reduction request based on a business plan that the FMC does not endorse in principle. If an FMC cannot endorse the business plan in principle, the FMC should not make a reduction request.

If reduction bidding achieves, with a reduction loan not greater than the maximum amount that the business plan specifies, at least the minimum amount of fishing capacity reduction that the business plan specifies, then a post-bidding referendum does not occur. A post-bidding referendum occurs only if bidding does not achieve at least the minimum reduction for not more than the maximum reduction loan.

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Any necessary post-bidding referendum is to determine whether the referendum voters approve an industry fee system for a reduction less than the minimum.

This pre- and post-bidding approach should solve several problems. First, the approach should solve the problem of an FMC not wanting to make a large time and resource investment in an FMP reduction amendment without assurance that the industry is willing to repay a reduction loan. The business plan's survey (§ 600.1003(n)(12) in the interim final rule) of potential referendum voters should provide an FMC with enough assurance for the FMC to make a reduction request based upon that business plan. A successful pre-bidding referendum reinforces this assurance before an FMC invests time and resources in an FMP reduction amendment.

Second, allowing a second pre-bidding referendum should solve the problem of an actual FMP reduction amendment that differs materially from the FMP reduction amendment specified in the business plan.

Third, allowing a post-bidding referendum should solve the problem of reduction bidding results that do not achieve at least the minimum amount of fishing capacity reduction that the business plan specifies for a reduction loan whose principal amount is not greater than the maximum that the business plan specifies.

Finally, the approach eliminates the need for a linear processing sequence that precludes concurrent work on different parts of the reduction process. The revision allows the FMP reduction amendment process to proceed concurrently with the rest of the reduction process that occurs before NMFS proposes a plan and regulations to implement a reduction program. All other components of the reduction process, up to NMFS' publication of a plan and regulations implementing each reduction program, may now occur before an FMC prepares and processes, and NMFS approves, an FMP reduction amendment. The FMP reduction amendment must still, however, be in place before NMFS proposes the reduction plan and implementing regulations.

A completed business plan, however, remains essential both to an FMC's reduction request and the pre-bidding referendum that follows. Without a completed business plan, the FMC cannot fully know what it is endorsing in principle, NMFS does not fully know what the FMC and the industry is requesting, and referendum voters do not fully know for what they are voting.

The interim final rule requires that the business plan specify the maximum reduction cost and the minimum reduction that must be achieved for that cost. This achieves the same result as specifying ranges of projected reduction results, with a minimum acceptable level.

Comment Issue 3: Five comments involved payment and collection of the reduction loan repayment fee.

All 5 comments, to one degree or another, said that the proposed rule's fee payment and collection provisions are too costly, burdensome, or complicated.

One comment said that fish buyers in California, Washington, and Oregon collect other fees for state and industry groups, and that the interim final rule should allow the payment and collection of the reduction loan repayment fee to conform to established regional practices.

One comment said that the fee payment and collection provisions provide an incentive for ''kickbacks'' based on misreported fish deliveries, and that this could change the assumptions upon which accurate catch reporting depends.

One comment said that these provisions do not accommodate fish buyers paying for fish on a periodic, rather than a trip, basis.

One comment said that collecting the fee that repays reduction loans is not the fish buyers' business, and that the fish buyers' cost of collecting the fee could itself be considered an illegal fee under the Magnuson-Stevens Act.

One comment said that, because bank rules about interest bearing accounts vary widely from state to state, some fish buyers might be able to offset some fee collection costs by interest earnings while others might not. The comment said that this violates section 301(a)(4) of the Magnuson-Stevens Act.

One comment said that fee collection audits are unrestricted.

One comment said that fish buyers are the enforcers of fee collection, without protection against fish sellers who might sue them. If a fish buyer deducts the fee over a fish seller's protest, the fish buyer risks the fish seller's legal action. Fish buyers refusing to buy fish from fish sellers who refuse to pay the fee (the alternative to deducting the fee over the fish seller's protest) is inconsistent with the business of buying fish.

One comment said that the proposed rule's provision about state confidentiality requirements not preventing NMFS' access to fish tickets places fish buyers in an impossible position.

One comment said that many fish buyers will be unaware of their fee collection responsibilities.

Response: The proposed rule is a framework rule involving matters common to all reduction programs. Some aspects of a framework rule will apply, without exception, to all reduction programs. Other aspects of the framework rule may be inappropriate for application to some reduction programs in some reduction fisheries. Nevertheless, these aspects provide a framework against which everyone can measure the circumstances of different reduction programs in different reduction fisheries. The rule's fee collection, deposit, disbursement, accounting, record keeping, and reporting procedures are of the latter type. § 253.27(q)(10), § 253.36(f), and § 253.37(h) of the proposed rule provide sufficient opportunity for approaches in each reduction program different from the framework approach. Nevertheless, the interim final rule revises the proposed rule to require business planners to consult with fish buyers before including in their business plan any special circumstances in their reduction fishery that might require some fee provisions different from the framework provisions (see § (n)(9)). Thus, the interim final rule provides opportunity for reduction program to accommodate the circumstances of, and practices, in different fisheries as long as accommodation does not jeopardize the intent and purpose of the framework rule provisions.

There are substantial penalties for misreporting catches and otherwise failing to pay and collect the fees due. The rule's fee accounting and reporting provisions require documentation that provides ample audit opportunity, and NMFS intends to audit sufficiently to ensure compliance.

NMFS believes the time at which fish sellers deliver fee fish to fish buyers is the most appropriate time for the fish sellers to pay and the fish buyers to collect the fee. The interim final rule, however, revises the proposed rule to provide for paying and collecting fees on bonuses at the time the bonuses first become known rather than at the time the fish sellers deliver the fee fish involving the bonuses to fish buyers (see § 600.1013(c)(2)).

The Magnuson-Stevens Act requires fish buyers to collect the fee. Interest earnings on collected fee revenues might allow, depending on state banking regulations, some fish buyers to offset some of the costs of discharging this statutory obligation.

A reduction loan can involve up to $100 million repaid on a incidental

basis amortized over 20 years by many fish sellers, and collected by many fish buyers, as a small percentage of variable revenue from many fishing trips. This loan collection environment is susceptible to considerable nonperformance and fraud. Due diligence requires audit and, where necessary, enforcement.

Auditing is not, however, unrestricted. The rule restricts audits to those ''reasonably necessary...to ensure proper fee payment, collection, deposit, disbursement, record keeping, and reporting.'' The rule also restricts audits to ''reasonable times and places...'' NMFS does not intend any greater auditing burden than reasonable due diligence requires for the proper repayment of reduction loans. Audits may either be random (deterrent) or triggered by circumstances that indicate fee payment and collection activities inconsistent with this rule's requirements, but will not be more frequent or burdensome than needed to fulfill due diligence.

NMFS does not anticipate that fish sellers will violate these regulations by refusing to pay the fee. If any do, this does not excuse fish buyers from failing to comply with these regulations, either by collecting the fee over the fish seller's protest or by refusing to buy fish from fish sellers from whom fish buyers are unable to collect the fee as the Magnuson-Stevens Act requires.

The interim final rule does not contain the proposed rule's provision about fish tickets and state confidentiality requirements.

The interim final rule requires fish buyers to maintain the records and to submit the reports specified in § 600.1014(d) (or whatever alternative records and reports might be specified, under § 600.1014(j), in the implementation regulations for each reduction program). If landing records that a state requires contain some or all of the data that § 600.1014(d) requires and state confidentiality provisions do not prevent NMFS' access to the records maintained for the state, then fish buyers can use those records to meet appropriate portions of the § 600.1014(d) requirements. If, however, state confidentiality provisions make those records unavailable to NMFS, then fish buyers will be required to maintain separate records that meet the requirements of § 600.1014(d).

Where it becomes necessary to audit the reports that fish buyers submit in compliance with § 600.1014(d), trip tickets (or equivalent accounting records establishing the pounds of fee fish purchased and the price paid) are essential audit documentation. If, for any reason, any state law or regulation makes it illegal for fish buyers to keep separate records that involve some or all of the same data as the landing records that the fish buyers keep for state purposes, then a financed reduction program will not be possible unless there is a change in the state law or regulations to give NMFS access to the records necessary for administration of reduction loans. The interim final rule revises the proposed rule accordingly (see § 600.1003(n)(11)(i) and § 600.1014(f) and (g)).

Existing regulations require many fish buyers to have dealer permits, so NMFS often knows who the authorized fish buyers are. The rule also requires each business plan to include information about fish buyers who can, after reduction, reasonably be expected to have fee collection responsibilities. The rule requires NMFS to notify, both by a **Federal Register** notice and by mailed notification to fish buyers of whom NMFS is aware, all fish buyers about their fee collection responsibilities.

Comment Issue 4: Four comments involved exempting reduction requests preceding publication of the proposed rule from some aspects of the interim final rule.

All four comments generally said that various parties had expended much effort and expense on two reduction requests that substantially preceded NMFS's publishing the proposed rule. The proposed rule required the FMCs and the business planners for these two reduction requests to start at the beginning of a process of which they were unaware before NMFS published the proposed rule. Thus, these parties would have to expend additional time and money for the sole purpose of resubmitting their requests to conform with the interim final rule. This may be inequitable, because NMFS assured the parties involved that the lack of a proposed rule would not deter NMFS from processing their reduction requests as far as possible without a interim final rule. The interim final rule should ensure expeditious consideration of these two reduction requests.

Response: On November 27, 1997, the Pacific FMC submitted a request for a financed reduction program in the fishery for Pacific coast groundfish (limited entry trawl fishery). On October 10, 1997, the North Pacific FMC submitted a request for a financed reduction program in the fishery for Bering Sea and Aleutian Islands king and tanner crab. Industry proponents have since prepared business plans for each of these requests. The business planners and the FMCs have already expended considerable effort on these business plans and reduction requests. Both requests and their acceptances preceded, by many months, the publication of the proposed rule. NMFS agrees that it is counterproductive to now require the FMCs to resubmit these two reduction requests. The FMCs do not, consequently, have to resubmit these two reduction requests in accordance with the process in the interim final rule. However, the business planners and the FMCs will have to submit some additional information required by the interim final rule. After review of both plans and the interim final rule, NMFS will specify this additional information.

Comment Issue 5: Six comments concerned proposed rule provisions that allow financed reduction programs to involve only fishing permits in the reduction fishery, rather than requiring reduction programs to involve all fishing permits held by reduction program participants. These comments were evenly divided between supporting and opposing these provisions.

Three comments supported the proposed rule provisions. These comments generally said that it is impractical and unreasonable to require post-reduction harvesters in reduction fisheries to pay for the cost of reducing fishing permits in non-reduction fisheries, and otherwise agreed with the proposed rule's preamble discussion of this aspect.

Three comments opposed the proposed rule provisions. These comments generally said that reducing only the fishing permits in the reduction fishery causes reduction program fishing vessels to shift their effort from the reduction fishery to any non-reduction fisheries for which the vessels also have fishing permits. The goal of each reduction program should be removing the fishing capacity involved in a reduction program from all fishing rather than just fishing in the reduction fishery. To enable this result, one of these comments said that the interim final rule must define the term ''fishery'' differently than the Magnuson-Stevens Act does.

One comment said that the proposed rule provisions are inconsistent with the objective in section 312(b)(2) of the Magnuson-Stevens Act because the proposed rule provisions merely shift reduction costs to other fisheries in which reduction participants' vessels might also have fishing permits rather than obtaining the maximum sustained reduction in fishing capacity at the least cost.

Another comment said that all reduction programs should involve

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analysis of the reduction programs' impact on non-reduction fisheries and that it is unacceptable and contrary to the Magnuson-Stevens Act for improvements in a reduction fishery to occur at the expense of any other fishery.

Response: The Magnuson-Stevens Act authorizes conducting reduction programs, like fishery management plans, on a fishery-by-fishery basis. Each reduction program must occur within a fishery that meets the Magnuson-Stevens Act's definition of ''fishery''. This requires each reduction program to occur in ''one or more stocks of fish which can be treated as a unit for purposes of conservation and management and which are identified on the basis of geographical, scientific, technical, recreational, and economic characteristics...'' and to involve ''fishing for such stocks...'' The objective in section 312(B)(2) of the Magnuson-Stevens Act relates to each reduction program in each reduction fishery.

While section 312(b)(2)(A) of the Magnuson-Stevens Act authorizes reductions that include both fishing permit revocations and fishing vessel scrappings (or title restrictions that prevent future fishing), section 312(b)(2)(B) also authorizes reductions that are restricted to fishing permit revocations alone.

In a financed program, the post-reduction harvesters in the reduction fishery are paying for fishing capacity reduction. They are retiring excess capacity in their fishery. The Government is simply lending them the money to do this. NMFS should not require a borrower composed of post-reduction harvesters to spend any of the borrower's reduction loan proceeds on reducing fishing capacity that the borrower does not want to reduce. This includes reducing capacity in non-reduction fisheries, which benefits parties other than the borrower.

In a subsidized program, however, the taxpayers are paying the cost of reducing fishing capacity. The taxpayers can choose, through their Government, the fishing capacity reduction alternative that provides the broadest fishery conservation and management benefit. This may include withdrawing fishing vessels (either by scrapping them or imposing title restrictions that prevent their fishing) and revoking all fishing permits associated with the scrapped vessels that are not individually transferable. Individually transferable fishing permits in non-reduction fisheries could not, however, be revoked as part of such a reduction program (because these permits may be used by vessels other than the vessels whose fishing is prevented by scrapping or title restriction). Revoking individually transferable fishing permits in non-reduction fisheries would require separate reduction programs in the non-reduction fisheries involved.

A financed reduction program is, in essence, a contribution from post-reduction harvesters in a reduction fishery to fisheries conservation and management in that fishery. It is a contribution that is in the best economic interest of the post-reduction harvesters, but, nonetheless, it is their voluntary contribution. NMFS should not limit the opportunities for satisfying the statutory purposes by requiring post-reduction harvesters willing to repay the cost of buying and retiring fishing permits in their reduction fishery to also pay the cost of buying and retiring fishing permits in non-reduction fisheries. It is not in the taxpayers' interest to do so, because the net effect may be to limit most reduction programs to those whose entire cost the taxpayers bear. This is true because harvesters in reduction fisheries are generally unlikely to approve industry fee systems in reduction fisheries for repaying reduction loans that benefit harvesters in non-reduction fisheries.

In the interim final rule's revision of the proposed rule, business planners have the option of reducing only fishing permits in the reduction fishery or both doing that and withdrawing fishing vessels by scrapping or title restriction. The latter enables the revocation of all permits, except individually transferrable ones in non-reduction fisheries, associated with withdrawn vessels. Although business planners may voluntarily choose to withdraw fishing vessels, either by scrapping them or imposing title restrictions that prevent their fishing, FMCs may not require business planners to do so.

There is, however, one exception where a financed reduction program should always include the reduction of fishing permits that involve species other than those in the reduction fishery. That exception is fishing permits that merely allow the incidental catch of non-reduction species during directed fishing for reduction species. Once the directed fishing permits are bought and retired, the incidental fishing permits are of no further use. In addition to being useless, the incidental fishing permits were always a corollary of the directed fishing permits, and should be revoked along with the directed fishing permits. Accordingly, the interim final rule revises the proposed rule in this respect (see § 600.1011(d)).

The interim final rule also revises the proposed rule to require business planners and FMCs to consider the effect on non-reduction fisheries of financed reduction programs that involve only fishing permits in the reduction fishery (see § 600.1003(l) and § 600.1003(n)(9)).

NMFS notes that there may be other potential alternatives to deal with this situation. One alternative might be combining fisheries for fishery conservation and management purposes, which might then allow a financed reduction program to relate to the combined fishery rather than just to one of the fisheries. Another alternative might be conducting a separate financed (indeed, even subsidized) program in a fishery that a reduction program in another fishery affects. Both these potential alternatives would avoid one group of post-reduction harvesters paying for another group's benefit.

Comment Issue 6: Two comments concerned post-reduction fish allocations in financed reduction programs that do not involve all the harvesters in the reduction fishery. For example, say, a reduction fishery involves both longline and pot gear, but the financed reduction program in that reduction fishery involves only fishing permits for the longline gear.

One comment supported, and one comment opposed, allocations of this type and the proposed rule's treatment of this issue. The supporting comment said that allocation of the post-reduction resource protects the investment of the post-reduction harvesters who must repay a reduction loan as well as the interest as the Federal Government in ensuring the reduction loan's repayment. The opposing comment said that the allocation might damage the operators of non-reduction fishing gear who may have been less responsible for overfishing and, thus, creating the crisis in the fishery to which the financed reduction program relates.

Response: NMFS believes post-reduction allocation is essential in financed reduction programs that involve fewer than all the harvesters in a reduction fishery.

Assume that a fishery is composed of ''A'' gear fishermen and ''B'' gear fishermen, each group has a pre-reduction allocation equal to 50 percent of the fishery's total allowable catch, and the ''A'' gear fishermen encumber themselves with a 20-year debt to pay for buying and retiring 50 percent of the ''A'' gear fishing permits. Unless their post-reduction allocation stays at 50 percent of the fishery's total allowable catch, there is no economic incentive for the ''A'' gear fishermen to pay for

buying half of the pre-reduction ''A'' gear fishing permits. Similarly, neither does the government have the requisite assurance that up to 5 percent of the ''A'' gear fishermen's post-reduction trip proceeds will be sufficient to repay the reduction loan over a 20-year period. Without post-reduction allocations, there is little economic incentive either for the reduction borrowers to borrow or for the reduction lender to lend, and the taxpayers may, consequently, be called upon to pay for most reduction programs of this type.

Moreover, it is inequitable for ''A'' gear fishermen to pay for a benefit that ''B'' gear fishermen receive without payment. Business plans for, and FMPs complementing, financed reduction programs that involve only one of several gear types within a reduction fishery must adequately address this critical issue sufficiently to provide economic incentive both for reduction borrowers and the reduction lender.

Financed reduction programs cannot usefully address the possibility that allocations to gear operators who some perceive as less responsible harvesters may have impacted allocations to other gear operators who some perceive as more responsible harvesters.

Comment Issue 7: Two comments involved consultation with fishing communities and other interested parties during reduction program development. One comment pointed out, in the context of reduction programs that involve only fishing permits in a reduction fishery, that the law requires this consultation. The other comment said that, if NMFS consults with conservation organizations (and other interested parties who are, presumably, not directly involved in the reduction fishery), ''those entities must have their own substantiated fishery and economic data base [sic] to be considered a valid consulting participants [sic], or we will challenge their participation. No more rhetoric of how many people they represent, they will deal in facts and not personal agenda generalities.''

Response: The statutory reduction provisions require consultation ''as appropriate, with Councils, Federal agencies, State and regional authorities, affected fishing communities, participants in the fishery, conservation organizations, and other interested parties throughout the development and implementation of any...'' reduction program.

Comment Issue 8: One comment addressed the potential for the eventual replacement of the fishing capacity that reduction programs remove from reduction fisheries (and other comments also indirectly involved this issue). The comment expressed concern about the potential for post-reduction fishing capacity to gradually expand through the post-reduction adoption of new technology and the pre-reduction existence of latent fishing capacity. This comment said that analysis of the Fishing Capacity Reduction Demonstration Program and the Fishing Capacity Reduction Initiative in the Northeast multispecies fishery suggests that the existence of significant latent fishing capacity will result in little or no long-term reduction in the multispecies fishery's fishing capacity.

Response: The reduction programs in the Northeast multispecies fishery were authorized under the Interjurisdictional Fisheries Act rather than under the Magnuson-Stevens Act. The Interjurisdictional Fisheries Act does not address the issue involved in this comment, but the reduction provisions of the Magnuson-Stevens Act do. The reduction provisions of the Magnuson-Stevens Act require FMPs for reduction fisheries to prevent the replacement of fishing capacity removed by the program through a moratorium on new entrants, restrictions on vessel upgrades, and other effort control measures, taking into account the full potential fishing capacity of the fleet (16 U.S.C. 1861a(b)(1)(B)(i)).

The proposed rule addresses this statutory provision by requiring each reduction request (and, in the instance of financed reduction programs, each business plan) to demonstrate how the FMP complies with this statutory provision or will comply with it after an FMP reduction amendment. The interim final rule continues this requirement.

Comment 9: NMFS should evaluate the efficacy of each reduction program two years after the reduction program's implementation. The evaluation should help identify areas where capacity leaks back into the fishery and will help in designing future reduction programs. It will take a few more reduction programs to iron out the difficulties in designing efficient reduction programs, and post-program evaluation will be critical.

Response: NMFS agrees. NMFS will include post-reduction evaluations as part of the SAFE reports under 50 CFR 600.315(e).

Comment 10: Reduction is an extremely valuable tool to remove capital from fisheries in a rational and orderly fashion. Many of the proposed rule's elements will allow capacity reduction to move forward.

Response: NMFS agrees.

Comment 11: The proposed rule does not define ''capacity''. If this is intentional in order to provide flexibility in constructing reduction programs this should be stated. The proposed rule's preamble uses ''excess capacity'', but does not define the term. ''Excess capacity'' could mean either that there are more vessels than necessary for maximum economic efficiency or that the capacity exceeds the resource's ability to support the capacity. The use of ''full potential fishing capacity'' highlights this problem. Defining these terms has enormous implications for interpreting the regulations and these definitions should undergo public comment before their adoption. Alternatively, the interim final rule should state that definitions for these terms will be included in the program implementation regulations.

Response: The term ''excess capacity'' did not appear in the proposed rule (the term appeared only once in the proposed rule's preamble).

The statutory term ''full potential fishing capacity'' appeared once in the proposed rule (in the definition of the term ''non-replacement requirement'') and once in the proposed rule's preamble.

The appropriate context in which to make distinctions between concepts like ''more vessels in a fishery than are necessary for maximum economic efficiency'' and ''capacity in the fishery...[exceeding] what the resources can support'' is implementation of the Magnuson-Stevens Act's provision that authorizes a reduction program only if the reduction program ''is necessary to prevent or end overfishing, rebuild stocks of fish, or achieve measurable and significant improvements in the conservation and management of the fishery.'' Each reduction program must meet one of these criteria. For the sake of flexibility, NMFS does not qualify these criteria further. Each reduction request must make its best case on the merits of the request's own particulars.

Comment 12: ''Reduction fishery'' traditionally refers to fisheries that convert fish to meal and/or oil. Substitute ''buyback fishery'' for ''reduction fishery''.

Response: ''Fishing capacity reduction'' is the operative statutory term. NMFS chose, for brevity's sake, to define a fishery in which reduction is proposed or occurs as a ''reduction fishery'' rather than a ''fishing capacity reduction fishery''. The interim final rule defines the term ''reduction fishery'' sufficiently to distinguish this term from a fishery involving the production of fish meal and oil.

Comment 13: The interim final rule should ''include criteria that will be used to determine...'' a reduction loan's

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repayment period. A repayment period can be longer than the maximum 5 percent repayment fee might otherwise indicate.

Response: The amount annually required to service debt is a function of principal, interest, and the repayment term. Business planners must propose an annual reduction loan debt service burden that post-reduction harvesters are likely to be willing to undertake in return for a finite reduction in fishing capacity. Harvester referenda must subsequently approve this. Subject to the statutory constraints (maximum 5 percent fee and maximum 20-year repayment period), NMFS will accommodate each business plan's debt service proposal unless the circumstances of the reduction program involved clearly warrant doing otherwise.

Comment 14: Failure to address how in-kind compensation (e.g., dock space, ice) affects the delivery value used to calculate the reduction loan repayment fee could result in ''creative reimbursement arrangements to avoid fees.'' The interim final rule should avoid this result by addressing this issue.

Response: The fee rate required to repay reduction loans is applied to ''delivery value''. The proposed rule's definition of ''delivery value'' excludes in-kind compensation because ''delivery value'', as defined in the proposed rule, is the ''full, fair market value...in an arm's length transaction...'' Full, fair market value in an arm's length transaction cannot, by definition, include in-kind compensation. In-kind compensation cannot, consequently, be used to avoid the fee. Nevertheless, the interim final rule revises the proposed rule's definition of ''delivery value'' to clarify that the term includes ''the value of in kind compensation or all other goods or services exchanged in lieu of cash.'' (see the definition of ''delivery value'' in § 600.1000).

Comment 15: The proposed rule's definition of ''fee fish'' requires fishing vessels in a post-reduction fishery to pay the reduction loan repayment fee on fish harvested incidentally to the targeted reduction species. The definition of this term should allow each reduction program to define the ''fee fish'' that will be used to calculate the fee. Some fisheries may have an incidental catch of ''fee fish'', and the interim final rule should ''clearly state that incidental catches in non reduction program fisheries are not subject to the fee unless those fisheries are included in the referendum for a financed reduction program.''

Response: The term ''fee fish'', as defined in the interim final rule, means all fish harvested from the reduction fishery. The term fee fish excludes fish harvested incidentally while fishing for fish not included in the reduction fishery. The term ''reduction fishery'', as defined in the interim final rule, means the fishery or portion of a fishery to which a program applies. The reduction fishery must specify each included species, as well as any limitations by gear type, size of fishing vessel, geographic area, and any other relevant factor. Except in extraordinary instances, the interim final rule's intent is to limit fee fish to those that are directly rather than incidentally harvested.

Comment 16: The proposed rule requires a reduction request to list all parties who are authorized to fish in the proposed reduction fishery and to specify the catch allocated to those parties for the past five years. The proposed rule also requires a business plan to analyze the proposed reduction loan's cost effectiveness based on the best historical fishing revenue and expense date available in the reduction fishery. NMFS is a likely source for this information, but these data are considered confidential at the individual fishing vessel level required by the regulations. The regulations in 50 CFR 600 Subpart E state that this type of information can only be released to NMFS employees or contractors, state employees, and Council staff or contractors. Thus, business planners will not have access to this information. The interim final rule should address this by requiring NMFS to provide, in an aggregate form, the data business planners need.

Response: The proposed rule intends catch allocation data to be aggregate data for all parties authorized to fish in the reduction fishery rather than individual data for each such party. The interim final rule revises the proposed rule to make this intent clearer (see § 600.1003(j) and § 600.1005(f)).

Section 253.27(q)(5)(1) of the proposed rule merely requires that business plans include the ''Best historical fishing revenue and expense data (and any other relevant productivity measures) available in the reduction fishery.'' This neither requires these data to be provided at the individual fishing vessel or fishing permit level nor requires those data to be identified with specific fishing vessels or fishing permits. The interim final rule revises this aspect of the proposed rule to clarify that NMFS seeks the ''best and most representative historical...data... available...'' (see § 600.1003(n)(5)(l)).

NMFS does not know, in every fishery that may become the subject of a reduction request (which includes fisheries managed by states), who may have the best available data. NMFS may have these data for some fisheries, but may not have them for others. The fishing industry itself generally is the source of these data, and, if adequate data have not been elsewhere gathered, business planners must arrange to make available sufficiently representative data from the industry in order to make the business planners' case.

This aspect of the rule does not require NMFS to violate data confidentiality, and NMFS intends, upon request, to make available to business planners, in a way that does not violate data confidentiality, whatever useful data NMFS has.

Comment 17: The proposed rule requires the FMCs to provide the names and addresses of fishing permit holders authorized to fish in a reduction fishery, but NMFS (as the permitting authority) has the most current information and should supply the information itself.

Response: NMFS has these data for fishing permits in Federal fisheries. Nevertheless, the referenda aspect of the statutory reduction provisions requires NMFS, ''in consultation with the FMC...'' to ''identify, to the extent practicable, and notify all permit or vessel owners who would be affected by the...'' (16 U.S.C. App. 1861a) reduction. The proposed rule was premised on the assumption that an FMC would ask NMFS for the data needed to complete this aspect of a reduction request, examine the data NMFS provided, and, where necessary, consult with NMFS about any aspect of the data before confirming the data by including them in a reduction request to NMFS. NMFS continues to believe this is the most appropriate approach. Moreover, reduction programs can involve state, as well as Federal, fisheries, and NMFS may not have these data for fishing permits in state fisheries.

The interim final rule revises the proposed rule to clarify that NMFS is a source of Federal fishing permit data (see § 600.1003(i) and § 600.1005(e)).

Comment 18: The proposed rule requires the FMCs to provide the names and addresses of likely post-reduction fish buyers, but NMFS has this information in NMFS' dealer permit database and should, consequently, remove this requirement.

Response: The proposed rule requires business planners, not FMCs, to provide this information (although FMCs must include business plans with reduction

requests). NMFS may not always have these data even for all Federal fisheries, let alone state fisheries. Where NMFS has these data, however, NMFS will be pleased to supply the data to business planners for their review, (where appropriate) revision, and inclusion in their business plans. Where NMFS does not have these data, business planners must produce the data for inclusion in their business plans.

Comment 19: Business planners must be able to gauge the amount of time NMFS will take to implement reduction. The regulations should specify a maximum time for the agency to do this.

Response: NMFS will process reduction requests as quickly as NMFS can, but cannot specify time limits for doing so.

Comment 20: Reduction amendments to FMPs may not always be necessary to accommodate reduction because ''some Councils may be able to adjust management plans through a framework adjustment rather than a full plan amendment.'' The interim final rule should change ''reduction amendment'' to ''reduction amendment or framework adjustment.''

Response: The interim final rule revises the proposed rule's definition of the term ''reduction amendment'' to include framework adjustments (see the definition of this term in § 600.1000).

Comment 21: In some cases, latent fishing permits may be held by parties who do not own fishing vessels. The basis of the referendum voter lists should be explained (''in particular, whether it is based on vessels or permits''). The proposed rule ''does not state if a reduction program could apportion voting rights based on landings, permit categories, days-at-sea usage, or other criteria.'' Referenda results ''may require as much as one-third of the industry to fund a program they oppose.'' This could both be unfair and make designing successful reductions difficult. In a fishery where the few catch most of the fish, the many who catch few of the fish could force the former into a reduction they oppose. (The example given is a 100 permit fishery where 20 percent of the fishing permit holders catch 80 percent of the fish). ''The interim final rule should clearly state how voting rights are apportioned...[and should allow apportionment] based on relative criteria determined by the designers of the program.'' The proposed rule does not specify what happens if an eligible voter is inadvertently omitted. The interim final rule should provide for an appeal process prior to referendum ballot distribution.

Response: Referenda voters under the statutory reduction provisions are ''permit or vessel owners who would be affected by the program...'' The rule mirrors the statutory language by including either fishing vessel owners or fishing permit owners as potential referenda voters. Nevertheless, because reduction programs can occur only in limited access fisheries, NMFS believes referenda voters will always be those who hold fishing permits at the time of the referenda.

The proposed rule requires each reduction implementation plan to include the names and addresses of all parties eligible to vote in a referendum. The interim final rule, however, revises the proposed rule to allow referenda before reduction implementation plans. This requires public comment about voter eligibility to occur earlier in the reduction process. Consequently, the interim final rule also revises the proposed rule to make the names and addresses of eligible voters subject to public comment by including them in the **Federal Register** notice that NMFS publishes when NMFS accepts a request for a financed reduction program (see § 600.1003(i) and § 600.1004(a)).

During the proposed rule's formulation, NMFS considered the possibility of apportioning referenda votes according to various criteria. NMFS believed, however, that the most equitable approach in the greatest number of cases is a one fishing permit/one vote rule. NMFS still believes this. NMFS believes that the concern in this comment might be better addressed by an FMC. This Council, by refusing to request a reduction program (based on a business plan that allows the many who catch little to force a reduction of their fishing permits on the few who catch much) unless it appears to be in the best conservation and management interest of the reduction fishery and in the best economic interest of all post-reduction harvesters in the reduction fishery. However, NMFS does not, for a variety of reasons, anticipate that this hypothetical situation will often occur. Initiating a financed reduction program requires NMFS, for example, to determine that post-reduction harvesters will be able to repay the reduction loan. If, prospectively, the cost of buying 80 percent of the fishing permits that produce 20 percent of the fish were so high that the remaining 20 percent of fishing permit holders could not, with 20 percent more fish to harvest, reasonably afford to repay that cost over 20 years at a maximum fee limited to 5 percent of ex-vessel landings, then NMFS could decide not to initiate the reduction program.

Comment 22: The interim final rule should address the impact of fishing vessels or fishing permits being sold, bankruptcies, and corporate dissolutions during the interim between bid acceptance and actual fishing capacity reduction.

Response: Bids are irrevocable offers. NMFS' acceptance of bids creates reduction contracts that entitle NMFS to specific performance of the contract obligations. This is as far as NMFS can reasonably go to ensure that reduction contracts culminate in the reduction results upon which referenda are based. NMFS will, as a matter of course, take whatever legal action may be available to NMFS to enforce specific performance of reduction contracts, but cannot predict the outcome of hypothetical future events. NMFS realizes that some circumstances (e.g., bankruptcy) could conceivably delay or prevent NMFS' enforcing specific performance, but NMFS will have to deal with these circumstances as they present themselves during the conduct of each reduction program. Nevertheless, the interim final rule revises the proposed rule to more specifically address the impact of these potential occurrences (see § 600.1011, particularly § 600.1011(f) and (g)).

Comment 23: ''There may be a long period between bidding and actual implementation of the program. While at some point the bidders must commit to participation...they should...[be able to] withdraw up to the point...referendum ballots are prepared.''

Response: The proposed rule requires NMFS immediately after bid closing to accept bids, notify bidders, and conduct a referendum.

The proposed rule also requires NMFS to tally all ballots and notify all referendum voters, within seven business days after the last day for receipt of ballots, of the referendum results.

Additionally, in response to other comments about the proposed rule, the interim final rule revises the proposed rule to restrict post-bidding referenda to situations in which bidding results are insufficient for the maximum reduction loan amount specified in the business plan to reduce the minimum amount of fishing capacity specified in the business plan (see § 600.1010(c)).

NMFS will do everything possible to keep the elapsed time between bid closing and actual reduction as short as possible. NMFS fully realizes the commercial necessity of doing so.

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NMFS' reduction experience in the Northeast multispecies fishery demonstrates that irrevocable bids are essential to effective reduction. Irrevocability will limit bidding to fishing permit or fishing vessel owners who are serious about reduction. This will also prevent the situation in which bid results that initially conformed with a business plan's capacity reduction specifications become nonconforming because of subsequent bid withdrawals.

Comment 24: Invitations to bid ''should include projections of the benefits of capacity reduction on the management plan for the subject species, notice of possible capital gains tax liabilities, and other limitations such as to CCF contributions. This information may not be readily apparent to permit holders.''

Response: The reduction plan that NMFS publishes in the **Federal Register** will, for each financed reduction program, ''describe in detail all relevant aspects of implementing...'' each reduction program. NMFS believes the reduction plan may be the better place to discuss, if appropriate, any matters like those involved in this comment. Invitations to bid are contractual in nature, and NMFS believes they should focus only on contractual matters.

Comment 25: The interim final rule ''should specify that NMFS will follow established standards for conducting referenda.'' The proposed rule does not specify that voting would be conducted by secret ballot, but the interim final rule should.

Response: NMFS does not know to what standards this comment refers. The interim final rule revises the proposed rule to clarify ballot confidentiality (see § 600.1010(d)(10)).

Comment 26: Where reduction programs involve withdrawing fishing vessels from fishing, the proposed rule requires state registered fishing vessels to always be scrapped (rather than either being scrapped or having their titles restricted). This complicates reduction programs involving both Federally registered and state registered fishing vessels, and may increase reduction cost or put owners of state-registered fishing vessels at a disadvantage. Some states may have the ability to impose title restrictions that will prevent the future use of state-registered fishing vessels in other fisheries. Fishing vessels not required to be scrapped should not be allowed to be sold to other countries if they exacerbate overcapacity in (presumably) any other fishery in the world. ''Vessels should also not be allowed to be sold to foreigners and then enter a fishery in U.S. waters that may not be subject to U.S. jurisdiction.''

Response: Although some states may have this title-restriction ability, NMFS has no way of ensuring that these states will enforce such title restrictions for as long as the fishing vessels exist. Moreover, little may prevent a fishing vessel owner whose fishing vessel title has been restricted in one State from re-registering the vessel in another state that cannot or will not similarly restrict the vessel's title. Federal title restrictions for Federally-documented fishing vessels are effective for reduction purposes, but state title restrictions for state-registered fishing vessels may not always be effective.

For the reasons stated in the preamble to the proposed rule, NMFS does not believe it should, for fishing vessels involved in financed reduction programs, impose any non-statutory use restrictions. No foreign country need allow these fishing vessels to be registered under the country's national flag or harvest fisheries resources under the country's national jurisdiction if the country believes that this registration is inconsistent with: the country's economic interests, the country's fisheries conservation and management responsibilities, the country's obligations under treaties or international law, or any other aspect of the country's sovereign affairs. Finally, all vessels fishing in U.S. waters are subject to U.S. jurisdiction.

Comment 27: The interim final rule should state that reduction loan repayment is the only basis for post-reduction fee increases. The interim final rule should ''describe the criteria NMFS will use to increase the fee amount rather than extend the period of the payback... This should include a determination that the increased fee will not result in a significant impact on ...[post-reduction fishermen or communities].''

Response: The only statutory authority NMFS has for any reduction fee (including the subsequent increase of an initial fee) is repayment of a reduction loan. Absent specific circumstances that clearly warrant the contrary, NMFS has no particular preference, in the instance of a reduction loan whose initial maturity was shorter than the statutory maximum, for either fee increases or longer repayment periods. NMFS will certainly attempt to avoid significantly adverse effects on post-reduction harvesters and fishing communities, but, where actual gross revenue experience in a reduction fishery clearly indicates the projected need for a fee increase in order to repay a reduction loan within the maximum maturity, NMFS is obliged to increase the fee up to and including the maximum fee.

Comment 28: Harvesters base their referenda votes on the fee rate projected to be necessary to repay the reduction loan. Additional fees during the time that post-reduction harvesters are paying the reduction loan repayment fee may become an economic burden. The interim final rule should prohibit the adoption of additional fees (e.g., for observer programs, for research or enforcement costs) during the period the industry is paying back reduction loan.

Response: Neither the reduction framework rule nor reduction regulations implementing any reduction program can control matters not pertinent to fishing capacity reduction. Fees involving matters other than the repayment of reduction loans may become necessary or advisable at some time during the 20 years during which reduction loans are repayable. While NMFS will always attempt to avoid fees that have significant adverse impacts, neither the reduction framework rule nor reduction program implementation regulation can prohibit whatever non-reduction fees may become necessary or advisable in the future. Furthermore, a reduction program should make the fishery economical and paying reduction fees should not be overly burdensome.

Comment 29: The proposed rule's requirement that the fishing industry submit business plans and the FMCs make certain other submissions places an enormous burden on the industry and the Councils—or, for state requests, on the states—to prepare capacity reduction programs. This shifts the burden of preparation from the Secretary to the Council and the industry. This is a shift that has not been accompanied by an increase in Council resources. Business plans should not always be required. The interim final rule should allow flexibility in determining the lead authority for the preparation of a financed reduction program or, alternatively, NMFS should immediately identify resources that will be made available to Councils to meet the requirements imposed by the regulation.

Response: For the reasons stated in the preamble to the proposed rule, NMFS believes that the business plan requirements appropriately place, on a reduction's industry proponents, the burden of developing proposals for financed reduction programs. NMFS realizes that business plans require industry to undertake a large effort. This is, however, no different from planning

for other business investments. NMFS views financed reduction programs as post-reduction harvesters making business investments in their economic future by retiring some of their competition, thereby increasing their harvests of finite natural resources. NMFS can lend post-reduction harvesters the money required to make this investment. As a lender, however, it is not appropriate for NMFS to do the business planning that may determine whether the investment succeeds or fails. Moreover, no one is more qualified to do this business planning than the harvesters affected by the plan and who will be required to mortgage, in effect, up to 5 percent of their future gross revenue over as much as 20 years to repaying the reduction investment's cost. Reduction planning is expensive, but so is most business planning. Reduction planning may, however, from time-to-time be eligible for grants. The Saltonstall-Kennedy Fisheries Research and Development Program's fiscal year 2000 grant cycle includes reduction planning.

Although FMCs have the lesser burden of reviewing, rather than preparing, business plans, the burden is one that cannot reasonably be avoided. It is the FMCs' responsibility to manage and conserve the national fisheries. Determining if a reduction program will assist in this is integral to an FMC's mandate. The reduction framework rule is not the proper venue for addressing FMC personnel or resource matters.

Comment 30: ''By failing to list the four possible funding sources included in the statute, the proposed rule sends a strong message that reduction programs must be industry funded. The interim final rule should clearly identify possible funding sources and ...emphasize that industry funding is only one way to finance a reduction program.''

Response: Financed reduction programs, in which the direct beneficiaries of a reduction program repay the programs' cost, are the preferred way of funding most reduction programs. The proposed rule, however, also equally addressed subsidized reduction programs, in which the taxpayers or other contributors fund reduction program costs. These are the only two basic methods of funding reduction program costs. Under the proposed rule, if any portion of a reduction program's cost is funded by a reduction loan, the reduction program is a financed reduction program. All other reduction programs are subsidized reduction programs, even though three different statutory funding sources are included in this category: (1) appropriations under the reduction provisions of the Magnuson-Stevens Act, (2) appropriations under the Saltonstall-Kennedy Act, and (3) contributions from States or other public or private sources. In the first 2 funding sources for subsidized reduction programs, Federal taxpayers provide the subsidy; in the third, State taxpayers or other public or private entities provide the subsidy. There appears to be no functional reason for the reduction framework rule to separately address the 3 different sources of subsidized funding.

Comment 31: Different industry groups may present competing business plans to the FMCs. The proposed rule does not provide criteria for deciding what industry groups have standing. ''Do the FMCs decide which proposals are forwarded to the Secretary for review? How will specific reduction proposals be compared and how will the choice be made between them?'' The interim final rule should allow the FMCs to decide what reduction request to forward to NMFS, but should clearly explain the criteria the FMCs should consider in making this decision.

Response: NMFS believes it is best to leave this to the FMCs' discretion. NMFS cannot, in a fishery subject to an FMC's jurisdiction, undertake a reduction program unless the FMC first requests NMFS to do so. Consequently, the FMCs have discretion to entertain reduction proposals from whatever industry reduction proponents the FMCs deem appropriate. The FMCs may reject proposals, merge or consolidate proposals, or accept proposals as submitted. If the industry proponents of a financed reduction program and the appropriate FMC cannot come to agreement about a prospective reduction program, it makes little sense for the FMC to request a financed reduction program. In financed reduction programs, NMFS believes the FMCs should defer to representative business planners who make a strong case for increasing the economic efficiency of post-reduction harvesters in the reduction fishery and, most particularly, for the widespread industry support that successful referenda require. Proposals for financed reduction programs that do not potentially enjoy widespread industry support will fail and waste much time, effort, and resources.

Comment 32: Reduction ''is important for the preservation of natural resources and the economic stability of American fisheries.''

Response: NMFS agrees.

Comment 33: The requirement that a proposed reduction be lawful at the time of reduction must be made clear. No person or government body can guarantee what will be lawful in the future. Future judicial interpretation is always an unknown. As long as a proposed reduction is not known to be unlawful at the time it is requested, all such requirements should be deemed satisfied.

Response: All reduction programs will be lawful at the time of their occurrence, and NMFS agrees that no one can guarantee what will be lawful in the future.

Comment 34: The proposed rule is sufficient for fisheries under Federal jurisdiction. For state-managed fisheries, however, it would be useful to have a sample request and business plan accessible at NMFS' web site.

Response: The proposed rule outlined the required contents of reduction requests and business plans for both Federal and state fisheries. NMFS does not have any samples that NMFS could post at NMFS' web site. NMFS is, however, willing to advise all parties about reduction in any appropriate way NMFS can.

Comment 35: The proposed rule ''has been thoughtfully and thoroughly developed...'' and ''has great merit and practical application ...'' to the salmon driftnet and purse seine fishery in Bristol Bay, Alaska.

Response: NMFS notes this comment.

Comment 36: ''In some cases...industry-funded license reductions may represent the only viable alternative to achieving needed reductions of capacity. In complex fisheries, overcapacity and inadequate management in any major fishery can lead to adverse consequences for other fisheries.''

Response: NMFS agrees.

Comment 37: Where fishing permit reductions involve Bristol Bay and Chignic, the number of fishing permits bought back from local residents must be proportional with the number of fishing permits bought back from parties who do not reside in Alaska. 1,325 Bristol Bay salmon fishing permits were initially issued to residents of the Bristol Bay and Chignic watershed region. Today, only about 900 of these remain owned by local residents. Each fishing permit sold to non-residents of the local area results in the loss of 2 crewmen jobs from the local economy. This devastates the local economy.

Response: A framework rule involving matters common to all reduction programs is not the appropriate place to address this matter.

Comment 38: The ''technical requirements for information ...[should not be] implemented in a way that the available databases and their managers

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cannot accommodate. Flexibility to meet the data variability and personnel constraints should be clearly provided.''

Response: It is not clear to what ''technical requirements for information'' this comment related. Requiring unavailable data is nonfunctional. The interim final rule is a framework rule common to all reduction programs, and NMFS will accommodate specific data or technical information circumstances that do not reasonably allow individual requests for reduction programs to comply with the framework rule. The interim final rule revises the proposed rule to provide flexibility in this and other respects (see § 600.1001(f)).

Comment 39: Reduction planners (either industry business planners or Government reduction planners) will be unqualified to fully understand fisheries complexity and to ''comprehensively formulate a feasible...plan.'' Theoretical reduction plans might not achieve the intended purpose, and might have unplanned impacts on ''the permit holder, vessel owner, financiers, and buyers (fish fee collectors)...'' Experience demonstrates that ''decisions are reached to appease political agendas, therefore, constituents of the fisheries will not take a plan or program at face value.'' Industry members will incur substantial expense in analyzing reduction plans. Reduction plans will involve a major economic impact on small fishery businesses. The ''massive economic data that will be required...'' may be nonexistent.

Response: Financed reduction programs are based on business plans that the fishing industry itself develops. When FMCs request financed reduction programs, they must base their requests on those business plans. If NMFS undertakes financed reduction programs, NMFS must, to the greatest extent possible, base these programs on those business plans. Moreover, all fishing permit holders or fishing vessel owners affected have the opportunity, through a referendum, to approve or reject the business plans upon which financed reduction programs are based. A financed reduction program is not possible unless at least two-thirds of those voting in a referendum approve the fee necessary to repay a reduction loan.

Subsidized reduction programs are based on implementation plans that NMFS develops from general FMC recommendations. The rule provides ample opportunity for the views of all affected parties to be heard and duly considered.

Whether to offer one's fishing capacity for reduction in either a financed or subsidized reduction program is the voluntary decision of each fishing permit holder and/or fishing vessel owner.

Comment 40: A business plan should be subjected to a referendum of fishing permit holders and fishing vessel owners. Additionally, the fish buyers that are responsible for collecting the fee that repays a reduction loan should vote in a referendum about (presumably) the ''fee collection, disbursement, and accounting...'' aspects of the reduction. Moreover, a referendum committee of fishing vessel and fishing permit owners and fish buyers should review the results of all referenda involving financed reduction programs ''to alleviate [sic] any questions by the fishery as to the valid tally of support or non-support...'' A subsidized reduction program should also be subjected to a referendum of fishing permit and fishing vessel owners.

Response: The Magnuson-Stevens Act reduction provisions authorize referenda only for fee payers (fish sellers), not fee collectors (fish buyers). Fish buyers pay no fee, and cannot vote in referenda about fee payment. The statutory reduction provisions do not authorize referenda for subsidized reduction programs, where no one either pays or collects a fee. Those provisions do, however, require NMFS to consult with fish sellers, fish buyers, and all other affected parties through the development and implementation of subsidized reduction programs.

NMFS is the referendum authority under the statutory reduction provisions, and NMFS believes it can competently exercise this authority. NMFS does not, consequently, perceive a need for fish-seller and fish-buyer committees that will review referenda results. Moreover, the fact that referenda may sometimes follow irrevocable bidding precludes any referenda review or collaboration that lengthens the time between the submission of irrevocable bids and completing the reduction programs to which the bids relate.

Comment 41: It is good ''that industry is expected to pay for...[reduction] in the long run.'', but landing taxes are already high (''nearly 10 percent off the top for salmon in

Alaska...'') This, combined with the high cost of business and depressed markets, threatens the survival of many family fishing businesses. Further landing taxes should be minimal. As an alternative, consider putting ''a large tax [25 percent or more] on the sales of permits.''

Response: In financed reduction programs, the industry's business plans project the amount by which fishing capacity is reduced and the prospective fee rate necessary to pay for that reduction. Fee rates are based on post-reduction gross revenue that can only be projected over the life of the reduction loans, but all business is planned on the basis of future income that can only be projected. For a financed reduction loan to be possible, affected fishing vessel or fishing permit owners must vote in a referendum to approve the fee necessary to repay a reduction loan of a certain maximum amount whose disbursement in the form of reduction payments will reduce fishing capacity by a certain minimum amount. Business planners are unlikely to suggest a fee higher than post-reduction producers are reasonably likely to be able to pay, and, in the event they do, referenda voters are unlikely to approve a higher fee. Post-reduction fee rates may increase if post-reduction gross revenue proves to be lower than projected at the time of reduction, but may never exceed 5 percent of gross revenue. NMFS has no authority to consider the alternative this comment suggested.

Comment 42: The proposed rule is a ''very well done plan on how to implement. It is believable, do-able, and very much needed in the fishing industry.''

Response: NMFS notes this comment.

Comment 43: The comment applauds this avenue to reduce overcapitalization, return economic viability to fishing, and resolve many concerns (including bycatch and habitat) that the race for fish creates. Reductions reduces fishermen's pressure by eliminating ''derby fisheries.''

Response: NMFS agrees that fishing capacity reduction can help improve fisheries economics and fisheries conservation and management.

Comment 44: The fee for fish processed at sea cannot equitably be calculated in the same way as the fee for raw fish delivered ashore. Using appropriate recovery rates, NMFS should convert processed fish to the fish's round weight equivalent and calculate the fee based on the ex-vessel price for raw fish. If there is an ex-vessel price for raw fish delivered at sea, NMFS should use this. If not, NMFS should use the ex-vessel price for raw fish delivered ashore. Where all fish in a reduction fishery are processed and delivered at sea, NMFS must devise an appropriate proxy for a raw-fish, ex-vessel price. The fee should, in all cases, be based on the ex-vessel price for raw fish, rather than on the value that at-sea processing adds.

Response: NMFS considered this issue during the proposed rule's formulation, but elected in the proposed

rule to define ''delivery value'' and associated terms in a way that required payment of the reduction loan repayment fee based on fish in whatever form the fish existed at the time that the party who harvested the fish first delivered the fish for value to an unrelated fish buyer. This resulted, for fish harvested and processed at sea by the same party, in applying the fee rate to a higher delivery value than for fish delivered unprocessed and subsequently processed ashore by an unrelated fish buyer. There are good arguments for and against this approach, but, on balance, the more equitable way to resolve this issue is, as this comment suggests, to apply the fee to unprocessed fish. Doing so, however, creates considerable problems of its own.

One primary problem is a formula for accurately and efficiently converting the weight of processed fish to the weight of unprocessed fish. Another is a common value for unprocessed fish (prices may vary from time to time and from fish buyer to fish buyer). Nevertheless, the interim final rule revises the proposed rule to make the fee payable on the basis of the value of unprocessed fish. The interim final rule requires each business plan, for fisheries in which related parties both catch and process fish at sea, to formulate an accurate and efficient means of converting processed weight to unprocessed weight and of commonly valuing unprocessed fish (see, in § 600.1000, the definition of the terms ''delivery value'', ''processed fish'', and ''unprocessed fish'' and, in § 600.1003(n)(11), the new business plan requirement in this respect).

Comment 45: The framework rule represents an ''excellent job of distilling common sense answers from some very difficult and complex issues.''

Response: NMFS notes the comment.

Comment 46: The reduction loan repayment fee is the delivery value of fee fish times the fee rate. The definition of ''delivery value'', however, excludes ''any deductions whatsoever'' from the price that a fish buyer pays a fish seller when the fish seller first delivers fish to the fish buyer. This excludes ''weighbacks'' (small, unmarketable fish that the fish buyer deducts from the weight of delivered fish upon which the fish buyer calculates the delivery value). To comply with the statute's restriction of the fee to no more than 5 percent of ex-vessel value, the fee rate must be applied to the net weight of delivered fish (landed fish minus ''weighbacks'').

Response: Representative fish tickets provided with this comment deduct the weight of weighbacks from the gross weight of fee fish delivered before applying the purchase price per pound to the resulting net weight. Under these circumstances, the fee is not, as the proposed rule defined the relevant term, applied to the weighbacks because the fish buyer did not pay any ''delivery value'' for the weighbacks because they were deducted from the total weight of delivered fish before calculating the ''delivery value'' on the net weight of delivered fish. The rule bases the fee on whatever value fish buyers pay fish sellers for fish subject to the fee (see the definition of the term ''delivery value'' in § 600.1000).

Comment 47: This comment supported fishing capacity reduction, but is frustrated that ''the system'' moves so slowly.

Response: NMFS will expedite the process as much as it possibly can, but fishing capacity reduction is a complex undertaking. The FMP amendment required to complement each reduction program may become a major source of delay in implementing each reduction program.

Comment 48: The reduction concept is ''totally objectionable and immoral.'' Allowing ''two thirds of the fishermen in a fishery...'' to authorize the fee system required to repay a loan forces the other one third to repay a loan they do not want. The commenter objects to ''forced loans.'' The commenter does not ''believe in borrowing...'', and ''objects] to being forced to pay back a loan to stay fishing.'' Government should not be in the business of making loans. Reduction programs will not increase the price of post-reduction fish. The reduction concept ''has the potential to force out small boat owners.''

Response: NMFS notes the comment. The Magnuson-Stevens Act authorizes reduction programs and specifies the way in which they must be conducted. This rule implements the Act.

The reduction concept has the potential to reduce fishing capacity of every size, but decisions about whether to offer any fishing capacity for reduction are always the voluntary decisions of individual fishing permit and/or fishing vessel owners.

Comment 49: Reduction might have the collateral effect of putting some shoreline processors out of business, because fewer fishing vessels could result in the need for fewer shoreline processors.

Response: Absent concurrent reductions in total allowable catches, post-reduction harvests will require the same fish processing capacity as pre-reduction harvests. NMFS hopes that fewer harvesters catching the same amount of fish will not always mean a need for fewer processors, but it sometimes unavoidably may. Nevertheless, the statutory objective of the reduction provisions of the Magnuson-Stevens Act is to reduce fishing capacity.

Comment 50: ''Congress made it very clear in the Sustainable Fisheries Act of 1996 that all capacity reduction plans must achieve measurable and significant improvements in the conservation and management of the fishery in question...''

Response: The rule reflects this aspect of the statutory reduction provisions.

Summary of Revisions

The proposed rule was Subpart D of 50 CFR Part 253. The interim final rule, however, is subpart L of 50 CFR Part 600.

The following sections of the interim final rule revise the proposed rule:

(1) *§ 600.1000*. This section is revised to add some terms, delete some terms, rename some terms, and amend the definition of some terms. Added terms include: ''address of record'', ''bid'', ''business week'', ''fair market value'', ''fishing capacity reduction specifications'', ''net delivery value'', ''post-bidding referendum'', ''pre-bidding referendum'', ''processed fish'', ''reduction amendment specifications'', ''request'', ''treasury percentage'', ''unprocessed fish'', and ''vote''. Deleted terms include: ''consistency requirement'', ''control requirement'', ''Council'', ''necessity requirement'', and ''nonreplacement requirement''. Renamed terms include: ''program plan'', which becomes ''implementation plan''; ''program regulations'', which becomes ''implementation regulations''; and ''management plan'', which becomes ''controlling fishery management plan or program (CFMP)''. Amended definitions include ''borrower'', ''delivery value'', ''fee fish'', ''fish buyer'', ''fish delivery'', ''fish seller'', ''reduction amendment'', ''reduction fishery'', and ''reduction payment''.

(2) *§ 600.1001(f)*. This section is added to provide for waivers of framework rule provisions in order to accommodate special circumstances in particular reduction fisheries.

(3) *§ 600.1002*. This section is new. It encompasses four general requirements, three of which were, in the proposed rule, terms defined in § 253.25. This new section required conforming revisions of various other sections of the proposed rule.

(4) *§ 600.1003*. Paragraph (g) of this section is revised to require each request for a financed reduction program to include the FMC's endorsement in principle of any reduction amendment

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to the FMP that the business plan proposes. Paragraph (i) of this section is revised to clarify that NMFS is a source for the fishing permit data that this section requires in requests for financed reduction programs. Paragraph (j) of this section is revised to clarify that financed reduction program requests require aggregate, rather than individual, catch data. Paragraph (n)(11) of this section is revised to require the business plan included in each financed reduction request to evaluate the need for fee payment and collection provisions in each reduction fishery's implementation regulations different from the fee collection provisions in the framework rule.

(5) *§ 600.1005*. Paragraph (e) of this section is revised to clarify that NMFS is a source for the fishing permit data that this section requires in requests for subsidized reduction programs. Paragraph (f) of this section is revised to clarify that financed reduction program requests require aggregate, rather than individual, catch data.

(6) *§ 600.1010*. This section is revised extensively to provide for referenda preceding reduction amendments to FMPs as well as other referenda that may be required by no longer limiting referenda to those following reduction bidding. This also required appropriately revising other sections of the proposed rule that referenced referenda. Paragraph (d)(10) of this section is revised to establish the confidentiality of referenda ballots.

(7) *§ 600.1011*. This section, particularly paragraphs (f) and (g), is revised to clarify the effect of reduction payments that NMFS is unable to make because of reduction contract non-performance.

(8) *§ 600.1012*. This section is new. Paragraphs (b) and (c) of this section pertain to reduction loan interest rates, including the effect of any difference between prospective and actual reduction loan interest rates. The balance of this new section pertains to the reduction loan obligation, including principal amount, repayment term, and penalties for non-payment or non-collection.

(9) *§ 600.1013(c)(2)*. This paragraph is revised to clarify that the fee applicable to post-delivery fish bonuses is paid and collected when the bonuses first become known rather than when fish sellers first deliver fish to fish buyers.

(10) *§ 600.1015*. This section is new. This provision is necessary to ensure prompt payment.

(11) *§ 600.1016*. This section is new. This provision is necessary to ensure compliance.

The interim final rule further revises the proposed rule to make the rule briefer, clearer, and more internally consistent.

NOAA codifies its OMB control numbers for information collection at 15 CFR part 902. Part 902 collects and displays the control numbers OMB assigned to NOAA's information collection requirements pursuant to the Paperwork Reduction Act (PRA). This interim final rule codifies OMB control number 0648–0376 and OMB control number 0648–0413 for Part 600 Subpart L—Fishing Vessel Capacity Reduction.

Classification

The Assistant Administrator for Fisheries, NMFS, determined that this interim final rule is consistent with the Magnuson-Stevens Act and other applicable laws.

This interim final rule has been determined to be significant for purposes of E.O. 12866, and a Regulatory Impact Review has been prepared by NMFS (see **ADDRESSES**).

The Chief Counsel for Regulation of the Department of Commerce certified to the Chief Counsel for Advocacy of the Small Business Administration when this rule was proposed that, if adopted as proposed, it would not have a significant economic impact on a substantial number of small entities. NMFS received no comments about this certification. Because this interim final rule only establishes a framework for implementing future reduction programs in specific reduction fisheries, each future reduction program will require its own implementation regulations and analysis of effects on small entities. As a result, a regulatory flexibility analysis was not prepared.

Notwithstanding any other provision of law, no person is required to respond to, nor shall any person be subject to a penalty for failure to comply with, a collection of information subject to the requirements of the PRA unless that collection of information displays a currently valid OMB control number.

This interim final rule contains new collection of information requirements subject to the PRA that have been approved by OMB, under OMB Control No. 0648–0376. The estimates of the public reporting burden for these requirements are: 6,634 hours for developing a business plan, 4 hours per voter for a referendum, four hours to make a bid, 10 minutes per fishing trip to maintain records on transactions, 2 hours for a buyer's monthly report, 4 hours for a buyer's annual report, 2 hours for a buyer/seller report (where either a buyer refuses to a fee or the seller refuses to pay the fee to the buyer), and 270 hours for state approval of a business plan and amendments to a state fishery management plan.

Emergency clearance has also been obtained under OMB Control Number 0648-0413 to conduct, in accordance with the interim final rule's revised referenda procedures, more than one referendum for each reduction program if the circumstances of a reduction program require multiple referenda. The response time per voter for these referenda is 4 hours. NMFS intends to ask OMB for a three-year extension of the clearance for these requirements, which are currently only approved on an emergency basis.

The response time estimates above include the time needed for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and revising the collection of information.

Send comments regarding the extension of the emergency clearance or any other aspect of the collection of information requirements contained in this rule, including the burden hour estimates, and suggestions for reducing the burdens to NMFS (see **ADDRESSES**) and to OMB (see **ADDRESSES**).

List of Subjects

15 CFR Part 902

Reporting and recordkeeping requirements.

50 CFR Part 600

Fishing capacity reduction, Fisheries, Fishing permits, Fishing vessels, Intergovernmental relations, Loan programs-business, Reporting and recordkeeping requirements.

Dated: May 8, 2000.

Penelope D. Dalton,

Assistant Administrator for Fisheries, National Marine Fisheries Services.

For the reasons set out in the preamble, 15 CFR part 902, chapter IX, is amended and 50 CFR part 600 is amended as follows:

15 CFR Chapter IX

PART 902—NOAA INFORMATION COLLECTION REQUIREMENTS UNDER THE PAPERWORK REDUCTION ACT; OMB CONTROL NUMBERS

1. The authority citation for part 902 continues to read as follows:

Authority: 44 U.S.C. 3501 *et seq.*

2. In § 902.1, the table in paragraph (b) is amended by adding under 50 CFR the following entries in numerical order:

§ 902.1 OMB control numbers assigned pursuant to the Paperwork Reduction Act.

* * * * *

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(b) * * *

CFR part or section where the information collection requirement is located	Current OMB control number (All numbers begin with 0648–)
* * * * * * *	
50 CFR	
* * * * * * *	
600.1001	- 0376
600.1003	- 0376
600.1005	- 0376
600.1006	- 0376
600.1009	- 0376
600.1010	- 0376 and–0413
600.1011	- 0376
600.1012	- 0376
600.1013	- 0376
600.1014	- 0376
* * * * * * *	

3. The authority citation for 50 CFR part 600 continues to read as follows:

Authority: 5 U.S.C. 561 and 16 U.S.C. 1801 *et seq.*

4. In § 600.5, a paragraph (c) is added to read as follows:

§ 600.5 Purpose and scope.

* * * * *

(c) This part also governs fishing capacity reduction programs under the Magnuson-Stevens Act.

5. A subpart L is added to read as follows:

50 CFR Chapter VI

PART 600 MAGNUSON-STEVENS ACT PROVISIONS

Subpart L—Fishing Capacity Reduction

Sec.

600.1000 Definitions.
600.1001 Requests.
600.1002 General requirements.
600.1003 Content of a request for a financed program.
600.1004 Accepting a request for, and determinations about initiating, a financed program.
600.1005 Content of a request for a subsidized program.
600.1006 Accepting a request for, and determinations about conducting, a subsidized program.
600.1007 Reduction amendments.
600.1008 Implementation plan and implementation regulations.
600.1009 Bids.
600.1010 Referenda.
600.1011 Reduction methods and other conditions.
600.1012 Reduction loan.
600.1013 Fee payment and collection.
600.1014 Fee collection deposits, disbursements, records, and reports.
600.1015 Late charges.
600.1016 Enforcement.
600.1017 Prohibitions and penalties.
600.1018 Implementation regulations for each program. [Reserved]

Subpart L—Fishing Capacity Reduction

Authority: 16 U.S.C. 1861a(b)–(e).

§ 600.1000 Definitions.

In addition to the definitions in the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) and in § 600.10 of this title, the terms used in this subpart have the following meanings:

Address of Record means the business address of a person, partnership, or corporation. Addresses listed on permits or other NMFS records are presumed to be business addresses, unless clearly indicated otherwise.

Bid means the price a vessel owner or reduction fishery permit holder requests for reduction of his/her fishing capacity. It is an irrevocable offer in response to the invitation to bid in § 600.1009.

Borrower means, individually and collectively, each post-reduction fishing permit holder and/or fishing vessel owner fishing in the reduction fishery.

Business plan means the document containing the information specified in § 600.1003(n) and required to be submitted with a request for a financed program.

Business week means a 7-day period, Saturday through Friday.

Controlling fishery management plan or program (CFMP) means either any fishery management plan or any state fishery management plan or program, including amendments to the plan or program, pursuant to which a fishery is managed.

Delivery value means:

(1) For unprocessed fish, all compensation that a fish buyer pays to a fish seller in exchange for fee fish; and

(2) For processed fish, all compensation that a fish buyer would have paid to a fish seller in exchange for fee fish if the fee fish had been unprocessed fish instead of processed fish.

Delivery value encompasses fair market value, as defined herein, and includes the value of all in-kind compensation or all other goods or services exchanged in lieu of cash. It is synonymous with the statutory term ''ex-vessel value'' as used in section 312 of the Magnuson Act.

Deposit principal means all collected fee revenue that a fish buyer deposits in a segregated account maintained at a federally insured financial institution for the sole purpose of aggregating collected fee revenue before sending the fee revenue to NMFS for repaying a reduction loan.

Fair market value means the amount that a buyer pays a seller in an arm's length transaction or, alternatively, would pay a seller if the transaction were at arm's length.

Fee means the amount that fish buyers deduct from the delivery value under a financed reduction program. The fee is the delivery value times the reduction fishery's applicable fee rate under section 600.1013.

Fee fish means all fish harvested from a reduction fishery involving a financed program during the period in which any amount of the reduction loan remains unpaid. The term fee fish excludes fish harvested incidentally while fishing for fish not included in the reduction fishery.

Final development plan means the document NMFS prepares, under § 600.1006(b) and based on the preliminary development plan the requester submits, for a subsidized program.

Financed means funded, in any part, by a reduction loan.

Fish buyer means the first ex-vessel party who:

(1) in an arm's—length transaction, purchases fee fish from a fish seller;

(2) takes fish on consignment from a fish seller; or

(3) otherwise receives fish from a fish seller in a non arm's-length transaction.

Fish delivery means the point at which a fish buyer first purchases fee fish or takes possession of fee fish from a fish seller.

Fishing capacity reduction specifications means the minimum amount of fishing capacity reduction and the maximum amount of reduction loan principal specified in a business plan.

Fish seller means the party who harvests and first sells or otherwise delivers fee fish to a fish buyer.

Fishery Management Plan (FMP) means any Federal fishery management plan, including amendments to the plan, that the Secretary of Commerce approves or adopts pursuant to section 303 of the Magnuson-Stevens Act.

Fund means the Fishing Capacity Reduction Fund, and each subaccount for each program, established in the U.S. Treasury for the deposit into, and disbursement from, all funds, including all reduction loan capital and all fee revenue, involving each program.

Implementation plan means the plan in § 600.1008 for carrying out each program.

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Implementation regulations mean the regulations in § 600.1008 for carrying out each program.

Net delivery value means the delivery value minus the fee.

Post-bidding referendum means a referendum that follows bidding under § 600.1009.

Post-reduction means after a program reduces fishing capacity in a reduction fishery.

Pre-bidding referendum means a referendum that occurs at any time after a request for a financed program but before a proposal under § 600.1008 of a implementation plan and implementation regulations.

Preliminary development plan means the document specified in § 600.1005(g) and required to be submitted with a request for a subsidized program.

Processed fish means fish in any form different from the form in which the fish existed at the time the fish was first harvested, unless any such difference in form represents, in the reduction fishery involved, the standard ex-vessel form upon which fish sellers and fish buyers characteristically base the delivery value of unprocessed fish.

Program means each instance of reduction under this subpart, in each reduction fishery—starting with a request and ending, for a financed program, with full reduction loan repayment.

Reduction means the act of reducing fishing capacity under any program.

Reduction amendment means any amendment, or, where appropriate, framework adjustment, to a CFMP that may be necessary for a program to meet the requirements of this subpart.

Reduction amendment specifications mean the reduction amendment to a CFMP specified in a business plan.

Reduction contract means the invitation to bid under § 600.1009, together with each bidder's irrevocable offer and NMFS' conditional or non-conditional acceptance of each such bid under § 600.1009.

Reduction cost means the total dollar amount of all reduction payments to fishing permit owners, fishing vessel owners, or both, in a reduction fishery.

Reduction fishery means the fishery or portion of a fishery to which a program applies. The reduction fishery must specify each included species, as well as any limitations by gear type, fishing vessel size, geographic area, and any other relevant factor(s).

Reduction loan means a loan, under section 1111 and section 1112 of Title XI of the Merchant Marine Act, 1936, as amended (46 U.S.C. 1279f and g App.), for financing any portion, or all, of a financed program's reduction cost and repayable by a fee under, and in accordance with, § 600.1012, § 600.1013, and § 600.1014.

Reduction payment means the Federal Government's fishing capacity reduction payment to a fishing permit owner, fishing vessel owner, or both, under a reduction contract. Additionally, it is payment for reduction to each bidder whose bid NMFS accepts under § 600.1009. In a financed program each reduction payment constitutes a disbursement of a reduction loan's proceeds and is for either revoking a fishing permit or both revoking a fishing permit and withdrawing a vessel from fishing either by scrapping or title restriction.

Reduction permit means any fishing permit revoked in a program in exchange for a reduction payment under a reduction contract.

Reduction vessel means any fishing vessel withdrawn from fishing either by scrapping or title restriction in exchange for a reduction payment under a reduction contract.

Referendum means the voting process under § 600.1010 for approving the fee system for repaying a reduction loan.

Request means a request, under § 600.1001, for a program.

Requester means a Council for a fishery identified in § 600.1001(c), a state governor for a fishery identified in § 600.1001(d), or the Secretary for a fishery identified in § 600.1001(e).

Scrap means to completely and permanently reduce a fishing vessel's hull, superstructures, and other fixed structural components to fragments having value, if any, only as raw materials for reprocessing or for other non-fisheries use.

Subsidized means wholly funded by anything other than a reduction loan.

Treasury percentage means the annual percentage rate at which NMFS must pay interest to the U.S. Treasury on any principal amount that NMFS borrows from the U.S. Treasury in order to generate the funds with which to later disburse a reduction loan's principal amount.

Unprocessed fish means fish in the same form as the fish existed at the time the fish was harvested, unless any difference in form represents, in the reduction fishery involved, the standard ex-vessel form upon which fish sellers and fish buyers characteristically base the delivery value of unprocessed fish.

Vote means a vote in a referendum.

§ 600.1001 Requests.

(a) A Council or the Governor of a State under whose authority a proposed reduction fishery is subject may request that NMFS conduct a program in that fishery. Each request shall be in writing and shall be submitted to the Director, Office of Sustainable Fisheries, NMFS. Each request shall satisfy the requirements of § 600.1003 or § 600.1005, as applicable, and enable NMFS to make the determinations required by § 600.1004 or § 600.1006, as applicable.

(b) NMFS cannot conduct a program in any fishery subject to the jurisdiction of a Council or a state unless NMFS first receives a request from the Council or the governor to whose jurisdiction the fishery is subject.

(c) For a fishery subject to the jurisdiction of a Council, only that Council can or must make the request. If the fishery is subject to the jurisdiction of two or more Councils, those Councils must make a joint request. No Council may make a request, or join in making a request, until after the Council conducts a public hearing about the request.

(d) For a fishery subject to the jurisdiction of a State, only the Governor of that State can make the request. If the fishery is subject to the jurisdiction of two or more states, the Governors of those States shall make a joint request. No Governor of a State may make a request, or join in making a request, until the State conducts a public hearing about the request.

(e) For a fishery under the direct management authority of the Secretary, NMFS may conduct a program on NMFS' own motion by fulfilling the requirements of this subpart that reasonably apply to a program not initiated by a request.

(f) Where necessary to accommodate special circumstances in a particular fishery, NMFS may waive, as NMFS deems necessary and appropriate, compliance with any specific requirements under this subpart not required by statute.

§ 600.1002 General requirements.

(a) Each program must be: (1) Necessary to prevent or end overfishing, rebuild stocks of fish, or achieve measurable and significant improvements in the conservation and management of the reduction fishery;

(2) Accompanied by the appropriate environmental, economic and/or socioeconomic analyses, in accordance with applicable statutes, regulations, or other authorities; and

(3) Consistent with the CFMP, including any reduction amendment, for the reduction fishery.

(b) Each CFMP for a reduction fishery must: (1) Prevent the replacement of fishing capacity removed by the program through a moratorium on new

entrants, restrictions on vessel upgrades, and other effort control measures, taking into account the full potential fishing capacity of the fleet;

(2) Establish a specified or target total allowable catch or other measures that trigger closure of the fishery or adjustments to reduce catch; and

(3) Include, for a financed program in a reduction fishery involving only a portion of a fishery, appropriate provisions for the post-reduction allocation of fish between the reduction fishery and the rest of the fishery that both protect the borrower's reduction investment in the program and support the borrower's ability to repay the reduction loan.

§ 600.1003 Content of a request for a financed program.

A request for a financed program shall:

(a) Specify the reduction fishery.

(b) Project the amount of the reduction and specify what a reduction of that amount achieves in the reduction fishery.

(c) Specify whether the program is to be wholly or partially financed and, if the latter, specify the amount and describe the availability of all funding from sources other than a reduction loan.

(d) Project the availability of all Federal appropriation authority or other funding, if any, that the financed program requires, including the time at which funding from each source will be available and how that relates to the time at which elements of the reduction process are projected to occur.

(e) Demonstrate how the program meets, or will meet after an appropriate reduction amendment, the requirements in § 600.1002(a).

(f) Demonstrate how the CFMP meets, or will meet after an appropriate reduction amendment, the requirements in § 600.1002(b).

(g) If a reduction amendment is necessary, include an actual reduction amendment or the requester's endorsement in principle of the reduction amendment specifications in the business plan. Endorsement in principle is non-binding.

(h) Request that NMFS conduct, at the appropriate time, a referendum under § 600.1010 of this subpart.

(i) List the names and addresses of record of all fishing permit or fishing vessel owners who are currently authorized to harvest fish from the reduction fishery, excluding those whose authority is limited to incidentally harvesting fish from the reduction fishery during directed fishing for fish not in the reduction fishery. The list shall be based on the best information available to the requester. The list shall take into account any limitation by type of fishing gear operated, size of fishing vessel operated, geographic area of operation, or other factor that the proposed program involves. The list may include any relevant information that NMFS may supply to the requester.

(j) Specify the aggregate total allowable catch in the reduction fishery during each of the preceding 5 years and the aggregate portion of such catch harvested by the parties listed under paragraph (i) of this section.

(k) Specify the criteria for determining the types and number of fishing permits or fishing permits and fishing vessels that are eligible for reduction under the program. The criteria shall take into account:

(1) The characteristics of the fishery;

(2) Whether the program is limited to a particular gear type within the reduction fishery or is otherwise limited by size of fishing vessel operated, geographic area of operation, or other factor;

(3) Whether the program is limited to fishing permits or involves both fishing permits and fishing vessels;

(4) The reduction amendment required;

(5) The needs of fishing communities;

(6) Minimizing the program's reduction cost; and

(7) All other relevant factors.

(l) Include the requester's assessment of the program's potential impact on fisheries other than the reduction fishery, including an evaluation of the likely increase in participation or effort in such other fisheries, the general economic impact on such other fisheries, and recommendations that could mitigate, or enable such other fisheries to mitigate, any undesirable impacts.

(m) Include any other information or guidance that would assist NMFS in developing an implementation plan and implementation regulations.

(n) Include a business plan, prepared by, or on behalf of, knowledgeable and concerned harvesters in the reduction fishery, that:

(1) Specifies a detailed reduction methodology that accomplishes the maximum sustained reduction in the reduction fishery's fishing capacity at the least reduction cost and in the minimum period of time, and otherwise achieves the program result that the requester specifies under paragraph (b) of this section. The methodology shall:

(i) Establish the appropriate point for NMFS to conduct a pre-bidding referendum and be sufficiently detailed to enable NMFS to readily:

(A) Design, propose, and adopt a timely and reliable implementation plan,

(B) Propose and issue timely and reliable implementation regulations,

(C) Invite bids,

(D) Accept or reject bids, and

(E) Complete a program in accordance with this subpart, and

(ii) Address, consistently with this subpart:

(A) The contents and terms of invitations to bid,

(B) Bidder eligibility,

(C) The type of information that bidders shall supply,

(D) The criteria for accepting or rejecting bids,

(E) The terms of bid acceptances,

(F) Any referendum procedures in addition to, but consistent with, those in § 600.1010, and

(G) All other technical matters necessary to conduct a program;

(2) Projects and supports the reduction fishery's annual delivery value during the reduction loan's repayment period based on documented analysis of actual representative experience for a reasonable number of past years in the reduction fishery;

(3) Includes the fishing capacity reduction specifications upon which both the pre-bidding referendum and the bidding under § 600.1009 will be based. The reduction loan's maximum principal amount cannot, at the interest rate projected to prevail at the time of reduction, exceed the principal amount that can be amortized in 20 years by 5 percent of the projected delivery value;

(4) States the reduction loan's repayment term and the fee rate, or range of fee rates, prospectively necessary to amortize the reduction loan over its repayment term;

(5) Analyzes and demonstrates the ability to repay the reduction loan at the minimum reduction level and at various reduction-level increments reasonably greater than the minimum one, based on the:

(i) Best and most representative historical fishing revenue and expense data and any other relevant productivity measures available in the reduction fishery, and

(ii) Projected effect of the program on the post-reduction operating economics of typical harvesters in the reduction fishery, with particular emphasis on the extent to which the reduction increases the ratio of delivery value to fixed cost and improves harvesting's other relevant productivity measures;

(6) Demonstrates how the business plan's proposed program meets, or will

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meet after an appropriate reduction amendment, the requirements in § 600.1002(a);

(7) Demonstrates how the CFMP meets, or will meet after an appropriate reduction amendment, the requirements in § 600.1002(b);

(8) Includes, if a reduction amendment is necessary, the reduction amendment specifications upon which the pre-bidding referendum will be based;

(9) Includes an assessment of the program's potential impact on fisheries other than the reduction fishery, including an evaluation of the likely increase in participation or effort in such other fisheries, the general economic impact on such other fisheries, and recommendations that could mitigate, or enable such other fisheries to mitigate, any undesirable impacts;

(10) Specifies the names and addresses of record of all fish buyers who can, after reduction, reasonably be expected to receive deliveries of fee fish. This shall be based on the best information available, including any information that NMFS may be able to supply to the business planners;

(11) Specifies, after full consultation with fish buyers, any special circumstances in the reduction fishery that may require the implementing regulations to contain provisions in addition to, or different from, those contained in § 600.1013 and/or § 600.1014 in order to accommodate the circumstances of, and practices in, the reduction fishery while still fulfilling the intent and purpose of § 600.1013 and/or § 600.1014—including, but not limited to:

(i) In the case of reduction fisheries in which state data confidentiality laws or other impediments may negatively affect the efficient and effective conduct of the same, specification of who needs to take what action to resolve any such impediments, and

(ii) In the case of reduction fisheries in which some fish sellers sell unprocessed, and other fish sellers sell processed fish to fish buyers, specification of an accurate and efficient method of establishing the delivery value of processed fish; and

(12) Demonstrates by a survey of potential voters, or by any other convincing means, a substantial degree of potential voter support for the business plan and confidence in its feasibility.

(o) Include the requester's statement of belief that the business plan, the CFMP, the reduction amendment specifications, and all other request aspects constitute a complete, realistic, and practical prospect for successfully completing a program in accordance with this subpart.

§ 600.1004 Accepting a request for, and determinations about initiating, a financed program.

(a) *Accepting a request.* Once it receives a request, NMFS will review any request for a financed program to determine whether the request conforms with the requirements of § 600.1003. If the request does not conform, NMFS will return the request with guidance on how to make the request conform. If the request conforms, NMFS shall accept it and publish a notice in the **Federal Register** requesting public comments on the request. Such notice shall state the name and address of record of each eligible voter, as well as the basis for having determined the eligibility of those voters. This shall constitute notice and opportunity to respond about adding eligible voters, deleting ineligible voters, and/or correcting any voter's name and address of record. If, in NMFS' discretion, the comments received in response to such notice warrants it, or other good cause warrants it, NMFS may modify such list by publishing another notice in the **Federal Register**.

(b) *Determination about initiating a financed program.* After receipt of a conforming request for a financed program, NMFS will, after reviewing and responding to any public comments received in response to the notice published in the **Federal Register** under paragraph (a) of this section, initiate the program if NMFS determines that: (1) The program meets, or will meet after an appropriate reduction amendment, the requirements in § 600.1002(a);

(2) The CFMP meets, or will meet after an appropriate reduction amendment, the requirements in § 600.1002(b);

(3) The program, if successfully implemented, is cost effective;

(4) The reduction requested constitutes a realistic and practical prospect for successfully completing a program in accordance with this subpart and the borrower is capable of repaying the reduction loan. This includes enabling NMFS to readily design, propose, and adopt a timely and reliable implementation plan as well as propose and issue timely and reliable implementation regulations and otherwise complete the program in accordance with this subpart; and

(5) The program accords with all other applicable law;

§ 600.1005 Content of a request for a subsidized program.

A request for a subsidized program shall:

(a) Specify the reduction fishery.

(b) Project the amount of the reduction and specify what a reduction of that amount achieves in the reduction fishery.

(c) Project the reduction cost, the amount of reduction cost to be funded by Federal appropriations, and the amount, if any, to be funded by other sources.

(d) Project the availability of Federal appropriations or other funding, if any, that completion of the program requires, including the time at which funding from each source will be available and how that relates to the time at which elements of the reduction process are projected to occur.

(e) List the names and addresses of record of all fishing permit or fishing vessel owners who are currently authorized to harvest fish from the reduction fishery, excluding those whose authority is limited to incidentally harvesting fish from the reduction fishery during directed fishing for fish not in the reduction fishery. The list shall be based on the best information available to the requester, including any information that NMFS may supply to the requester, and take into account any limitation by type of fishing gear operated, size of fishing vessel operated, geographic area of operation, or other factor that the proposed program involves.

(f) Specify the aggregate total allowable catch in the reduction fishery during each of the preceding 5 years and the aggregate portion of such catch harvested by the parties listed under paragraph (e) of this section.

(g) Include a preliminary development plan that: (1) Specifies a detailed reduction methodology that accomplishes the maximum sustained reduction in the reduction fishery's fishing capacity at the least cost and in a minimum period of time, and otherwise achieves the program result that the requester specifies under paragraph (b) of this section. The methodology shall:

(i) Be sufficiently detailed to enable NMFS to prepare a final development plan to serve as the basis for NMFS to readily design, propose, and adopt a timely and reliable implementation plan and propose and issue timely and reliable implementation regulations, and

(ii) Include:

(A) The contents and terms of invitations to bid,

(B) Eligible bidders,

(C) The type of information that bidders shall supply,

(D) The criteria for accepting or rejecting bids, and

(E) The terms of bid acceptances;

(2) Specifies the criteria for determining the types and numbers of fishing permits or fishing permits and fishing vessels that are eligible for reduction under the program. The criteria shall take into account:

(i) The characteristics of the fishery,

(ii) Whether the program is limited to a particular gear type within the reduction fishery, or is otherwise limited by size of fishing vessel operated, geographic area of operation, or other factor,

(iii) Whether the program is limited to fishing permits or involves both fishing permits and fishing vessels,

(iv) The reduction amendment required,

(v) The needs of fishing communities, and

(vi) The need to minimize the program's reduction cost; and

(3) Demonstrates the program's cost effectiveness.

(h) Demonstrate how the program meets, or will meet after an appropriate reduction amendment, the requirements in § 600.1002(a).

(i) Demonstrate how the CFMP meets, or will meet after an appropriate reduction amendment, the requirements in § 600.1002(b)(1) and (2).

(j) Specify any other information or guidance that assists NMFS in preparing a final development plan and a proposed implementation plan and proposed implementation regulations.

(k) Include the requester's statement of belief that the program constitutes a reasonably realistic and practical prospect for successfully completing a program in accordance with this subpart.

§ 600.1006 Accepting a request for, and determinations about conducting, a subsidized program.

(a) *Accepting a request.* NMFS will review any request for a subsidized program submitted to NMFS to determine whether the request conforms with the requirements of § 600.1005. If the request does not conform, NMFS will return it with guidance on how to make the request conform. If the request conforms, NMFS shall accept it and publish a notice in the **Federal Register** requesting public comments about the request.

(b) *Final development plan.* After receipt of a conforming request, NMFS will prepare a final development plan if NMFS determines that the reduction requested constitutes a realistic and practical prospect for successfully completing a program in accordance with this subpart. This includes enabling NMFS to readily design, propose, and adopt a timely and reliable implementation plan as well as propose and issue timely and reliable implementation regulations and otherwise complete the program in accordance with this subpart. NMFS will, as far as possible, base the final development plan on the requester's preliminary development plan. Before completing the final development plan, NMFS will consult, as NMFS deems necessary, with the requester, Federal agencies, state and regional authorities, affected fishing communities, participants in the reduction fishery, conservation organizations, and other interested parties in preparing the final development plan.

(c) *Reaffirmation of the request.* After completing the final development plan, NMFS will submit the plan to the requester for the requester's reaffirmation of the request. Based on the final development plan, the reaffirmation shall: (1) Certify that the final development plan meets, or will meet after an appropriate reduction amendment, the requirements in § 600.1002(a);

(2) Certify that the CFMP meets, or will meet after an appropriate reduction amendment, the requirements in § 600.1002(b)(1) and (2); and

(3) Project the date on which the requester will forward any necessary reduction amendment and, if the requester is a Council, proposed regulations to implement the reduction amendment. The requester shall base any necessary reduction amendment on the final development plan.

(d) *Determinations about conducting a subsidized program.* After NMFS' receipt of the requester's reaffirmation, any required reduction amendment, and any proposed regulations required to implement the amendment, NMFS will initiate the program if NMFS determines that: (1) The program meets, or will meet after an appropriate reduction amendment, the requirements in § 600.1002(a);

(2) The CFMP meets, or will meet after an appropriate reduction amendment, the requirements in § 600.1002(b)(1) and (2); and

(3) The program is reasonably capable of being successfully implemented;

(4) The program, if successfully implemented, will be cost effective; and

(5) The program is in accord with all other applicable provisions of the Magnuson-Stevens Act and this subpart.

§ 600.1007 Reduction amendments.

(a) Each reduction amendment may contain provisions that are either dependent upon or independent of a program. Each provision of a reduction amendment is a dependent provision unless the amendment expressly designates the provision as independent.

(b) Independent provisions are effective without regard to any subsequent program actions.

(c) Dependent provisions are initially effective for the sole limited purpose of enabling initiation and completion of the pre-reduction processing stage of a program.

(d) All dependent provisions of a reduction amendment for a financed program are fully in force and effect for all other purposes only when NMFS either: (1) For bidding results that conform to the fishing capacity reduction specifications and are not subject to any other condition, notifies bidders, under § 600.1009(e)(3), that reduction contracts then exist between the bidders and the United States; or

(2) For bidding results that do not conform to the fishing capacity reduction specifications or are subject to any other condition, notifies bidders whose bids NMFS had conditionally accepted, under § 600.1010 (d)(8)(iii), that the condition pertaining to the reduction contracts between them and the United States is fulfilled.

(e) If NMFS does not, in accordance with this subpart and any special provisions in the implementation regulations, subsequently make all reduction payments that circumstances, in NMFS' judgment, reasonably permit NMFS to make and, thus, complete a program, no dependent provisions shall then have any further force or effect for any purpose and all final regulations involving such dependent provisions shall then be repealed.

§ 600.1008 Implementation plan and implementation regulations.

(a) As soon as practicable after deciding to initiate a program, NMFS will prepare and publish, for a 60-day public comment period, a proposed implementation plan and implementation regulations. During the public comment period, NMFS will conduct a public hearing of the proposed implementation plan and implementation regulations in each state that the program affects.

(b) To the greatest extent practicable, NMFS will base the implementation plan and implementation regulations for a financed program on the business plan. The implementation plan for a financed program will describe in detail

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all relevant aspects of implementing the program, including:

(1) The reduction fishery;

(2) The reduction methodology;

(3) The maximum reduction cost;

(4) The maximum reduction loan amount, if different from the maximum reduction cost;

(5) The reduction cost funding, if any, other than a reduction loan;

(6) The minimum acceptable reduction level;

(7) The potential amount of the fee;

(8) The criteria for determining the types and number of fishing permits or fishing permits and fishing vessels eligible to participate in the program;

(9) The invitation to bid and bidding procedures;

(10) The criteria for determining bid acceptance;

(11) The referendum procedures; and

(12) Any relevant post-referendum reduction procedures other than those in the implementation regulations or this subpart.

(c) NMFS will base each implementation plan and implementation regulations for a subsidized program on the final development plan. The implementation plan will describe in detail all relevant aspects of implementing the program, including: (1) The reduction fishery;

(2) The reduction methodology;

(3) The maximum reduction cost;

(4) The reduction-cost funding, if any, other than Federal appropriations;

(5) The criteria for determining the types and number of fishing permits or fishing permits and fishing vessels eligible to participate in the program;

(6) The invitation to bid and bidding procedures;

(7) The criteria for determining bid acceptance; and

(8) Any relevant post-bidding program procedures other than those in the implementation regulations or this subpart.

(d) The implementation regulations will:

(1) Specify, for invitations to bid, bids, and reduction contracts under § 600.1009:

(i) Bidder eligibility,

(ii) Bid submission requirements and procedures,

(iii) A bid opening date, before which a bidder may not bid, and a bid closing date, after which a bidder may not bid,

(iv) A bid expiration date after which the irrevocable offer contained in each bid expires unless NMFS, before that date, accepts the bid by mailing a written acceptance notice to the bidder at the bidder's address of record,

(v) The manner of bid submission and the information each bidder shall supply for NMFS to deem a bid responsive,

(vi) The conditions under which NMFS will accept or reject a bid,

(vii) The manner in which NMFS will accept or reject a bid, and

(viii) The manner in which NMFS will notify each bidder of bid acceptance or rejection;

(2) Specify any other special referendum procedures or criteria; and

(3) Specify such other provisions, in addition to and consistent with those in this subpart, necessary to regulate the individual terms and conditions of each program and reduction loan. This includes, but is not limited to:

(i) Provisions for the payment of costs and penalties for non-payment, non-collection, non-deposit, and/or non-disbursement of the fee in accordance with § 600.1013 and § 600.1014,

(ii) Prospective fee rate determinations, and

(iii) Any other aspect of fee payment, collection, deposit, disbursement, accounting, record keeping, and/or reporting.

(e) NMFS will issue final implementation regulations and adopt a final implementation plan within 45 days of the close of the public-comment period.

(f) NMFS may repeal the final implementation regulations for any program if: (1) For a financed program, the bidding results do not conform to the fishing capacity reduction specifications or a post-bidding referendum does not subsequently approve an industry fee system based on the bidding results;

(2) For a subsidized program, NMFS does not accept bids; and

(3) For either a financed program or a subsidized program, if NMFS is unable to make all reduction payments due to a material adverse change.

§ 600.1009 Bids.

(a) Each invitation to bid, bid, bid acceptance, reduction contract, and bidder—or any other party in any way affected by any of the foregoing—under this subpart is subject to the terms and conditions in this section: (1) Each invitation to bid constitutes the entire terms and conditions of a reduction contract under which:

(i) Each bidder makes an irrevocable offer to the United States of fishing capacity for reduction, and

(ii) NMFS accepts or rejects, on behalf of the United States, each bidder's offer;

(2) NMFS may, at any time before the bid expiration date, accept or reject any or all bids;

(3) For a financed program in which bidding results do not conform to the fishing capacity reduction specifications, NMFS' acceptance of any bid is subject to the condition that the industry fee system necessary to repay the reduction loan is subsequently approved by a successful post-bidding referendum conducted under § 600.1010. Approval or disapproval of the industry fee system by post-bidding referendum is an event that neither the United States nor the bidders can control. Disapproval of the industry fee system by an unsuccessful post-bidding referendum fully excuses both parties from any performance and fully discharges all duties under any reduction contract;

(4) For a financed program in one reduction fishery that is being conducted under appropriate implementation regulations simultaneously with another financed program in another reduction fishery, where the acceptance of bids for each financed program is conditional upon successful post-bidding referenda approving industry fee systems for both financed programs, NMFS' acceptance of all bids is, in addition to any condition under paragraph (a)(3) of this section, also subject to the additional conditions that both referenda approve the industry fee systems required for both financed programs—-all as otherwise provided in paragraph (a)(3) of this section;

(5) Upon NMFS' acceptance of the bid and tender of a reduction payment, the bidder consents to:

(i) The revocation, by NMFS, of any reduction permit, and

(ii) Where the program also involves the withdrawal of reduction vessels from fishing:

(A) Title restrictions imposed by the U.S. Coast Guard on any reduction vessel that is federally documented to forever prohibit and effectively prevent any future use of the reduction vessel for fishing in any area subject to the jurisdiction of the United States or any state, territory, commonwealth, or possession of the United States, or

(B) Where reduction vessel scrapping is involved and the reduction vessel's owner does not comply with the owner's obligation under the reduction contract to scrap the reduction vessel, take such measures as necessary to cause the reduction vessel's prompt scrapping. The scrapping will be at the reduction vessel owner's risk and expense. Upon completion of scrapping, NMFS will take such action as may be necessary to recover from the reduction vessel owner any cost or expense NMFS incurred in causing the reduction vessel to be scrapped and any other damages NMFS may have incurred and such

owner shall be liable to the United States for such cost, expenses, and damages;

(6) Money damages not being an adequate remedy for a bidder's breach of a reduction contract, the United States is, in all particulars, entitled to specific performance of each reduction contract. This includes, but is not limited to, the scrapping of a reduction vessel;

(7) Any reduction payment is available, upon timely and adequately documented notice to NMFS, to satisfy liens, as allowed by law, against any reduction permit/and or reduction vessel; provided, however, that:

(i) No reduction payment to any bidder either relieves the bidder of responsibility to discharge the obligation which gives rise to any lien or relieves any lien holder of responsibility to protect the lien holder's interest,

(ii) No reduction payment in any way gives rise to any

liability of the United States for the obligation underlying any lien,

(iii) No lien holder has any right or standing, not otherwise provided by law, against the United States in connection with the revocation of any reduction permit or the title restriction or scrapping of any reduction vessel under this subpart, and

(iv) This subpart does not provide any lien holder with any right or standing to seek to set aside any revocation of any reduction permit or the title restriction or scrapping of any reduction vessel for which the United States made, or has agreed to make, any reduction payment. A lien holder is limited to recovery against the holder of the reduction permit or the owner of the reduction vessel as otherwise provided by law; and

(8) Each invitation to bid may specify such other terms and conditions as NMFS believes necessary to enforce specific performance of each reduction contract or otherwise to ensure completing each program. This includes, but is not limited to, each bidder's certification, subject to the penalties in § 600.1017, of the bidder's full authority to submit each bid and to dispose of the property involved in the bid in the manner contemplated by each invitation to bid.

(b) NMFS will not invite bids for any program until NMFS determines that: (1) Any necessary reduction amendment is fully and finally approved and all provisions except those dependent on the completion of reduction are implemented;

(2) The final implementation plan is adopted and the final implementation regulations are issued;

(3) All required program funding is approved and in place, including all Federal appropriation and apportionment authority;

(4) Any reduction loan involved is fully approved;

(5) Any non-Federal funding involved is fully available at the required time for NMFS disbursement as reduction payments; and

(6) All other actions necessary to disburse reduction payments, except for matters involving bidding and post-bidding referenda, are completed.

(c) After making the affirmative determinations required under paragraph (b) of this section, NMFS will publish a **Federal Register** notice inviting eligible bidders to offer to the United States, under this subpart, fishing capacity for reduction.

(d) NMFS may extend a bid closing date and/or a bid expiration date for a reasonable period. NMFS may also issue serial invitations to bid if the result of previous bidding, in NMFS' judgment, warrant this.

(e) After the bid expiration date, NMFS will: (1) Analyze responsive bids;

(2) Determine which bids, if any, NMFS accepts; and

(3) Notify, by U.S. mail at each bidder's address of

record, those bidders whose bids NMFS accepts that a reduction contract now exists between them and the United States—subject, where appropriate, to the conditions provided for elsewhere in this subpart.

(f) NMFS will keep confidential the identity of all bidders whose bids NMFS does not accept. In financed programs where bidding results do not conform to the fishing capacity reduction specifications, NMFS also will keep confidential the identity of all bidders whose bids NMFS does accept until after completing a successful post-bidding referendum under § 600.1010.

§ 600.1010 Referenda.

(a) *Referendum success.* A referendum is successful if at least two-thirds of the ballots that qualify to be counted as referendum votes under subparagraph (d)(6) of this section are cast in favor of an industry fee system.

(b) *Pre-bidding referendum*—(1) *Initial referendum.* An initial pre-bidding referendum shall be conducted for each financed program. The business plan shall, subject to this subpart, determine the chronological relationship of the initial pre-bidding referendum to other pre-bidding aspects of the reduction process sequence. The initial pre-bidding referendum shall be based on the fishing capacity reduction specifications. If the initial pre-bidding referendum precedes the adoption of any necessary reduction amendment, the initial pre-bidding referendum shall also be based on the reduction amendment specifications. If the initial pre-bidding referendum follows the adoption of any necessary reduction amendment, the initial pre-bidding referendum shall also be based on the adopted reduction amendment;

(2) *Successful initial pre-bidding referendum.* If the initial pre-bidding referendum is successful, the reduction process will proceed as follows:

(i) If the initial pre-bidding referendum follows reduction amendment adoption, no second pre-bidding referendum shall be conducted,

(ii) If the initial pre-bidding referendum precedes reduction amendment adoption, a second pre-bidding referendum shall be conducted if, in NMFS' judgment, the reduction amendment subsequently adopted differs, in any respect materially affecting the borrower's reduction investment in the program and the borrower's ability to repay the reduction loan, from the reduction amendment specifications upon which the initial pre-bidding referendum successfully occurred. The sole purpose of any second pre-bidding referendum shall be to determine whether the voters authorize an industry fee system despite any such difference between the reduction amendment specifications and a subsequently adopted reduction amendment.

(3) *Unsuccessful initial pre-bidding referendum.* If the initial pre-bidding referendum is unsuccessful, the reduction process will either cease or NMFS may suspend the process pending an appropriate amendment of the business plan and the request.

(c) *Post-bidding referendum.* A post-bidding referendum shall occur only if, in NMFS' judgment, the result of bidding under § 600.1009 does not conform, in any material respect, to the fishing capacity reduction specifications and such result justifies, in NMFS' judgment, conducting a post-bidding referendum. Bidding that results in reducing fishing capacity in any amount not less than the minimum fishing capacity reduction amount for any reduction loan amount not more than the maximum reduction loan amount, and otherwise achieves all material requirements of the fishing capacity reduction specifications, shall conform to the fishing capacity reduction specifications. The sole purpose of any post-bidding referendum shall be to determine whether voters authorize an industry fee system for bidding that results in reducing fishing capacity in

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any amount materially less than the minimum amount in the fishing capacity reduction specifications.

(d) NMFS will conduct referenda in accordance with the following: (1) *Eligible voters*. The parties eligible to vote in each referendum are the parties whose names are listed as being eligible to vote in the notice published in the **Federal Register** under § 600.1004(a);

(2) *Ballot issuance*. NMFS will mail, by U.S. certified mail, return receipt requested, a ballot to each eligible voter. Each ballot will bear a randomly derived, 5-digit number assigned to each eligible voter. Each ballot will contain a place for the voter to vote for or against the proposed industry fee system and a place, adjacent to the 5-digit number, for the signature of the fishing permit or fishing vessel owner to whom the ballot is addressed or, if the fishing permit or fishing vessel owner is an organization, the person having authority to vote and cast the ballot on the organization's behalf. Each ballot will contain a place for the person signing the ballot to print his or her name. NMFS will enclose with each ballot a specially-marked, postage-paid, pre-addressed envelope that each voter shall use to return the ballot to NMFS;

(3) *Voter certification*. Each ballot will contain a certification, subject to the penalties set forth in § 600.1017, that the person signing the ballot is the fishing permit or fishing vessel owner to whom the ballot is addressed or, if the fishing permit or fishing vessel owner is an organization, the person having authority to vote and cast the ballot on the organization's behalf;

(4) *Information included on a ballot*. Each ballot mailing will:

(i) Summarize the referendum's nature and purpose,

(ii) Specify the date by which NMFS must receive a ballot in order for the ballot to be counted as a qualified vote,

(iii) Identify the place on the ballot for the voter to vote for or against the proposed industry fee system, the place on the ballot where the voter shall sign the ballot, and the purpose of the return envelope,

(iv) For each pre-bidding referendum, state:

(A) The fishing capacity reduction specifications,

(B) The reduction loan's repayment term, and

(C) The fee rate, or range of fee rates, prospectively necessary to amortize the reduction loan over the loan's term,

(v) For each initial pre-bidding referendum that precedes reduction amendment adoption, state the reduction amendment specifications,

(vi) For each initial pre-bidding referendum that follows reduction amendment adoption, summarize the material aspects of the reduction amendment adopted,

(vii) For each second pre-bidding referendum, summarize how the adopted reduction amendment materially differs from the reduction amendment specifications upon which a successful initial pre-bidding referendum occurred and how this material difference affects the borrower's reduction investment in the program and the borrower's ability to repay the reduction loan,

(viii) For each post-bidding referendum, specify the actual bidding results that do not conform to the fishing capacity reduction specifications, and

(ix) State or include whatever else NMFS deems appropriate;

(5) *Enclosures to accompany a ballot*. Each ballot mailing will include:

(i) A specially-marked, postage-paid, and pre-addressed envelope that a voter must use to return the original of a ballot to NMFS by whatever means of delivery the voter chooses, and

(ii) Such other materials as NMFS deems appropriate;

(6) *Vote qualification*. A completed ballot qualifies to be counted as a vote if the ballot:

(i) Is physically received by NMFS on or before the last day NMFS specifies for receipt of the ballot,

(ii) Is cast for or against the proposed industry fee system,

(iii) Is signed by the voter,

(iv) Is the original ballot NMFS sent to the voter bearing the same 5-digit number that NMFS assigned to the voter, and

(v) Was returned to NMFS in the specially-marked envelope that NMFS provided for the ballot's return;

(6) *Vote tally and notification*. NMFS will:

(i) Tally all ballots qualified to be counted as referendum votes,

(ii) Notify, by U.S. mail at the address of record, all eligible voters who received ballots of:

(A) The number of potential voters,

(B) The number of actual voters who returned a ballot,

(C) The number of returned ballots that qualified to be counted as referendum votes,

(D) The number of votes for and the number of votes against the industry fee system, and

(E) Whether the referendum was successful and approved the industry fee system or unsuccessful and disapproved the industry fee system, and

(iii) If a successful referendum is a post-bidding referendum, NMFS will, at the same time and in the same manner, also notify the bidders whose bids were conditionally accepted that the condition pertaining to the reduction contracts between them and the United States is fulfilled;

(7) *Conclusiveness of referendum determinations*. NMFS' determinations about ballot qualifications and about all other referendum matters, including, but not limited to, eligible voters and their addresses of record, are conclusive and final as of the date NMFS makes such determinations. No matter respecting such determinations shall impair, invalidate, avoid, or otherwise render unenforceable any referendum, reduction contract, reduction loan, or fee payment and collection obligation under § 600.1013 and § 600.1014 necessary to repay any reduction loan;

(8) *Ballot confidentiality*. NMFS will not voluntarily release the name of any party who voted. NMFS will restrict the availability of all voter information to the maximum extent allowed by law; and

(9) *Conclusive authorization of industry fee system*. Each successful referendum conclusively authorizes NMFS' imposition of an industry fee system—including the fee payment, collection, and other provisions regarding fee payment and collection under § 600.1013 and § 600.1014—to repay the reduction loan for each financed program that NMFS conducts under this subpart.

§ 600.1011 Reduction methods and other conditions.

(a) *Reduction permits or reduction permits and reduction vessels*. Each program may involve either the surrender and revocation of reduction permits or both the surrender and revocation of reduction permits and the withdrawal from fishing either by title restriction or by scrapping of reduction vessels. No financed program may, however, require such title restriction or scrapping of reduction vessels unless the business plan voluntarily includes the same.

(b) *Reduction permit revocation and surrender*. Each reduction permit is, upon NMFS' tender of the reduction payment for the reduction permit, forever revoked. Each reduction permit holder shall, upon NMFS' tender of the reduction payment, surrender the original reduction permit to NMFS. The reduction permit holder, upon NMFS' tender of the reduction payment, forever relinquishes any claim associated with the reduction permit and with the fishing vessel that was used to harvest

fishery resources under the reduction permit that could qualify the reduction permit holder or the fishing vessel owner for any present or future limited access system fishing permit in the reduction fishery.

(c) *Reduction vessel title restriction or scrapping.* For each program that involves reduction vessel title restriction or scrapping: (1) Each reduction vessel that is subject to title restriction only and is thus not required to be scrapped, is, upon NMFS' tender of the reduction payment, forever prohibited from any future use for fishing in any area subject to the jurisdiction of the United States or any State, territory, possession, or commonwealth of the United States. NMFS will request that the U.S. Coast Guard permanently restrict each such reduction vessel's title to exclude the reduction vessel's future use for fishing in any such area;

(2) Each reduction vessel owner whose reduction vessel is required to be scrapped shall, upon NMFS' tender of the reduction payment, immediately cease all further use of the reduction vessel and arrange, without delay and at the reduction vessel owner's expense, to scrap the reduction vessel to NMFS' satisfaction, including adequate provision for NMFS to document the physical act of scrapping; and

(3) Each reduction vessel owner, upon NMFS' tender of the reduction payment, forever relinquishes any claim associated with the reduction vessel and with the reduction permit that could qualify the reduction vessel owner or the reduction permit holder for any present or future limited access system fishing permit in the reduction fishery.

(d) *Fishing permits in a non-reduction fishery.* A financed program that does not involve the withdrawal from fishing or scrapping of reduction vessels may not require any holder of a reduction permit in a reduction fishery to surrender any fishing permit in any non-reduction fishery or restrict or revoke any fishing permit other than a reduction permit in the reduction fishery, except those fishing permits authorizing the incidental harvesting of species in any non-reduction fishery during, and as a consequence of, directed fishing for species in the reduction fishery.

(e) *Reduction vessels disposition.* Where a business plan requires the withdrawal from fishing of reduction vessels as well as the revocation of reduction permits: (1) Each reduction vessel that is not documented under Federal law must in every case always be scrapped, without regard to whether a program is a financed program or a subsidized program;

(2) No financed program may require any disposition of a reduction vessel documented under Federal law other than the title restriction in paragraph (b) of this section unless the business plan volunteers to do otherwise; and

(3) Any subsidized program may require the scrapping of reduction vessels documented under Federal law.

(f) *Reduction payments.* NMFS will disburse all reduction payments in the amount and in the manner prescribed in reduction contracts, except reduction payments that a bidder's reduction-contract nonperformance prevents NMFS from disbursing. In financed programs, the reduction loan's principal amount is the total amount of all reduction payments that NMFS disburses from the proceeds of a reduction loan. Any reduction payment that NMFS, because of a bidder's reduction-contract nonperformance, disburses but subsequently recovers, shall reduce the principal amount of the reduction loan accordingly.

(g) *Effect of reduction-contract nonperformance.* No referendum, no reduction contract, no reduction loan, and no fee payment and collection obligation under § 600.1013 and § 600.1014 necessary to repay any reduction loan, shall be impaired, invalidated, avoided, or otherwise rendered unenforceable by virtue of any reduction contract's nonperformance. This is without regard to the cause of, or reason for, nonperformance. NMFS shall endeavor to enforce the specific performance of all reduction contracts, but NMFS' inability, for any reason, to enforce specific performance for any portion of such reduction contracts shall not relieve fish sellers of their obligation to pay, and fish buyers of their obligation to collect, the fee necessary to fully repay the full reduction loan balance that results from all reduction payments that NMFS actually makes and does not recover.

(h) *Program completion.* Other than the payment and collection of the fee that repays a reduction loan and any other residual matters regarding reduction payments and the disposition of reduction permits and reduction vessels, a program shall be completed when NMFS tenders or makes all reduction payments under all reduction contracts that circumstances, in NMFS' judgment, reasonably permit NMFS to make.

§ 600.1012 Reduction loan.

(a) *Obligation.* The borrower shall be obligated to repay a reduction loan. The borrower's obligation to repay a reduction loan shall be discharged by fish sellers paying a fee in accordance with § 600.1013. Fish buyers shall be obligated to collect the fee in accordance with § 600.1013 and to deposit and disburse the fee revenue in accordance with § 600.1014.

(b) *Principal amount, interest rate, repayment term, and penalties for non-payment or non-collection.* The reduction loan shall be: (1) In a principal amount that shall be determined by subsequent program events under this subpart, but which shall not exceed the maximum principal amount in the fishing capacity reduction specifications;

(2) At an annual rate, that shall be determined by subsequent events, of simple interest on the reduction loan's principal balance that shall equal 2 percent plus the Treasury percentage; (3) Repayable over the repayment term specified in the business plan or otherwise determined by subsequent events; and

(4) Subject to such provisions as implementation regulations shall specify for the payment of costs and penalties for non-payment, non-collection, non-deposit, and/or non-disbursement in accordance with § 600.1013 and § 600.1014.

(c) *Effect of prospective interest rate.* Any difference between a prospective interest rate projected, for the purpose of any aspect of reduction planning or processing under this subpart, before the U.S. Treasury determines the Treasury percentage and an interest rate first known after the U.S. Treasury determines the Treasury percentage shall not void, invalidate, or otherwise impair any reduction contract, any reduction loan repayment obligation, or any other aspect of the reduction process under this subpart. Should any such difference result in a reduction loan that cannot, at the maximum fee rate allowed by law, be repaid, as previously projected, within the maximum maturity, any amount of the reduction loan remaining unpaid at maturity shall be repaid after maturity by continuing fee payment and collection under this subpart at such maximum fee rate until the reduction loan's unpaid principal balance and accrued interest is fully repaid. The above notwithstanding, at the discretion of the Secretary, the reduction contract can be voided if a material adverse change affects the reduction contract, reduction loan obligation, or any other aspect of the reduction process under this subpart.

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§ 600.1013 Fee payment and collection.

(a) *Amount.* The fee amount is the delivery value times the fee rate.

(b) *Rate.* NMFS will establish the fee rate. The fee rate may not exceed 5 percent of the delivery value. NMFS will establish the initial fee rate by calculating the fee revenue annually required to amortize a reduction loan over the reduction loan's term, projecting the annual delivery value, and expressing such fee revenue as a percentage of such delivery value. Before each anniversary of the initial fee rate determination, NMFS will recalculate the fee rate reasonably required to ensure reduction loan repayment. This will include any changed delivery value projections and any adjustment required to correct for previous delivery values higher or lower than projected.

(c) *Payment and collection.* (1) The full fee is due and payable at the time of fish delivery. Each fish buyer shall collect the fee at the time of fish delivery by deducting the fee from the delivery value before paying, or promising to pay, the net delivery value. Each fish seller shall pay the fee at the time of fish delivery by receiving from the fish buyer the net delivery value, or the fish buyer's promise to pay the net delivery value, rather than the delivery value. Regardless of when the fish buyer pays the net delivery value, the fish buyer shall collect the fee at the time of fish delivery;

(2) In the event of any post-delivery payment for fee fish— including, but not limited to bonuses—whose amount depends on conditions that cannot be known until after fish delivery, that either first determines the delivery value or later increases the previous delivery value, the fish seller shall pay, and the fish buyer shall collect, at the time the amount of such post-delivery payment first becomes known, the fee that would otherwise have been due and payable as if the amount of the post-delivery payment had been known, and as if the post-delivery payment had consequently occurred, at the time of initial fish delivery;

(3)(i) Each fish seller shall be deemed to be, for the purpose of the fee collection, deposit, disbursement, and accounting requirements of this subpart, both the fish seller and the fish buyer, and shall be responsible for all requirements and liable for any penalties under this subpart applicable to fish sellers and/or fish buyers, each time that a fish seller sells fee fish to:

(A) Any party whose place of business is not located in the United States, who does not take delivery or possession of the fee fish in the United States, who is not otherwise subject to this subpart, or to whom or against whom NMFS cannot otherwise apply or enforce this subpart,

(B) Any party who is a general food-service wholesaler or supplier, a restaurant, a retailer, a consumer, some other type of end-user, or some other party not engaged in the business of buying fish from fish sellers for the purpose of reselling the fish, either with or without processing the fish, or

(C) Any other party who the fish seller has good reason to believe is a party not subject to this subpart or to whom or against whom NMFS cannot otherwise apply or enforce this subpart,

(ii) In each such case the fish seller shall, with respect to the fee fish involved in each such case, discharge, in addition to the fee payment requirements of this subpart, all the fee collection, deposit, disbursement, accounting, record keeping, and reporting requirements that this subpart otherwise imposes on the fish buyer, and the fish seller shall be subject to all the penalties this subpart provides for a fish buyer's failure to discharge such requirements;

(4) Fee payment begins on the date NMFS specifies under the notification procedures of paragraph (d) of this section and continues without interruption at the fee rates NMFS specifies in accordance this subpart until NMFS determines that the reduction loan is fully repaid. If a reduction loan is, for any reason, not fully repaid at the maturity of the reduction loan's original amortization period, fee payment and collection shall continue until the reduction loan is fully repaid, notwithstanding that the time required to fully repay the reduction loan exceeds the reduction loan's initially permissible maturity.

(d) *Notification.* (1) At least 30 days before the effective date of any fee or of any fee rate change, NMFS will publish a **Federal Register** notice establishing the date from and after which the fee or fee rate change is effective. NMFS will then also send, by U.S. mail, an appropriate notification to each affected fish seller and fish buyer of whom NMFS has notice;

(2) When NMFS determines that a reduction loan is fully repaid, NMFS will publish a **Federal Register** notice that the fee is no longer in effect and should no longer be either paid or collected. NMFS will then also send, by U.S. mail, notification to each affected fish seller and fish buyer of whom NMFS has knowledge;

(3) If NMFS fails to notify a fish seller or a fish buyer by U.S. mail, or if the fish seller or fish buyer otherwise does not receive the notice, of the date fee payments start or of the fee rate in effect, each fish seller is, nevertheless, obligated to pay the fee at the fee rate in effect and each fish buyer is, nevertheless, obligated to collect the fee at the fee rate in effect.

(e) *Failure to pay or collect.* (1) If a fish buyer refuses to collect the fee in the amount and manner that this subpart requires, the fish seller shall then advise the fish buyer of the fish seller's fee payment obligation and of the fish buyer's fee collection obligation. If the fish buyer still refuses to properly collect the fee, the fish seller, within the next 7 calendar days, shall forward the fee to NMFS. The fish seller at the same time shall also advise NMFS in writing of the full particulars, including:

(i) The fish buyer's and fish seller's name, address, and telephone number,

(ii) The name of the fishing vessel from which the fish seller made fish delivery and the date of doing so,

(iii) The quantity and delivery value of each species of fee fish that the fish seller delivered, and

(iv) The fish buyer's reason, if known, for refusing to collect the fee in accordance with this subpart;

(2) If a fish seller refuses to pay the fee in the amount and manner that this subpart requires, the fish buyer shall then advise the fish seller of the fish buyer's collection obligation and of the fish seller's payment obligation. If the fish seller still refuses to pay the fee, the fish buyer shall then either deduct the fee from the delivery value over the fish seller's protest or refuse to buy the fee fish. The fish buyer shall also, within the next 7 calendar days, advise NMFS in writing of the full particulars, including:

(i) The fish buyer's and fish seller's name, address, and telephone number,

(ii) The name of the fishing vessel from which the fish seller made or attempted to make fish delivery and the date of doing so,

(iii) The quantity and delivery value of each species of fee fish the fish seller delivered or attempted to deliver,

(iv) Whether the fish buyer deducted the fee over the fish seller's protest or refused to buy the fee fish, and

(v) The fish seller's reason, if known, for refusing to pay the fee in accordance with this subpart.

(f) *Implementation regulations at variance with this section.* If any special circumstances in a reduction fishery require, in NMFS's judgment, fee payment and/or collection provisions in addition to, or different from, those in this section in order to accommodate the circumstances of, and practices in, a reduction fishery while still fulfilling the intent and purpose of this section,

NMFS may, notwithstanding this section, include such provisions in the implementation regulations for such reduction fishery.

§ 600.1014 Fee collection deposits, disbursements, records, and reports.

(a) *Deposit accounts*. Each fish buyer that this subpart requires to collect a fee shall maintain a segregated account at a federally insured financial institution for the sole purpose of depositing collected fee revenue and disbursing the fee revenue directly to NMFS in accordance with paragraph (c) of this section.

(b) *Fee collection deposits*. Each fish buyer, no less frequently than at the end of each business week, shall deposit, in the deposit account established under paragraph (a) of this section, all fee revenue, not previously deposited, that the fish buyer collects through a date not more than two calendar days before the date of deposit. Neither the deposit account nor the principal amount of deposits in the account may be pledged, assigned, or used for any purpose other than aggregating collected fee revenue for disbursement to the Fund in accordance with paragraph (c) of this section. The fish buyer is entitled, at any time, to withdraw deposit interest, if any, but never deposit principal, from the deposit account for the fish buyer's own use and purposes.

(c) *Deposit principal disbursement*. On the last business day of each month, or more frequently if the amount in the account exceeds the account limit for insurance purposes, the fish buyer shall disburse to NMFS the full amount of deposit principal then in the deposit account. The fish buyer shall do this by check made payable to the Fund subaccount to which the deposit principal relates. The fish buyer shall mail each such check to the Fund subaccount lockbox that NMFS establishes for the receipt of the disbursements for each program. Each disbursement shall be accompanied by the fish buyer's settlement sheet completed in the manner and form that NMFS specifies. NMFS will specify the Fund subaccount lockbox and the manner and form of settlement sheet by means of the notification in § 600.1013(d).

(d) *Records maintenance*. Each fish buyer shall maintain, in a secure and orderly manner for a period of at least 3 years from the date of each transaction involved, at least the following information: (1) For all deliveries of fee fish that the fish buyer buys from each fish seller:

(i) The date of delivery,

(ii) The seller's identity,

(iii) The weight, number, or volume of each species of fee fish delivered,

(iv) The identity of the fishing vessel that delivered the fee fish,

(v) The delivery value of each species of fee fish,

(vi) The net delivery value,

(vii) The identity of the party to whom the net delivery value is paid, if other than the fish seller,

(viii) The date the net delivery value was paid, and

(ix) The total fee amount collected;

(2) For all fee collection deposits to and disbursements from the deposit account:

(i) The dates and amounts of deposits,

(ii) The dates and amounts of disbursements to the Fund's lockbox account, and

(iii) The dates and amounts of disbursements to the fish buyer or other parties of interest earned on deposits.

(e) *Annual report*. In each year, on the date to be specified in each implementation regulation, succeeding the year during which NMFS first implemented a fee, each fish buyer shall submit to NMFS a report, on or in the form NMFS specifies, containing the following information for the preceding year, or whatever longer period may be involved in the first annual report, for all fee fish each fish buyer purchases from fish sellers: (1) Total weight, number, or volume bought;

(2) Total delivery value paid;

(3) Total fee amounts collected;

(4) Total fee collection amounts deposited by month;

(5) Dates and amounts of monthly disbursements to each Fund lockbox account;

(6) Total amount of interest earned on deposits; and

(7) Depository account balance at year-end.

(f) *State records*. If landing records that a state requires from fish sellers contain some or all of the data that this section requires and state confidentiality laws or regulations do not prevent NMFS' access to the records maintained for the state, then fish buyers can use such records to meet appropriate portions of this section's recordkeeping requirements. If, however, state confidentiality laws or regulations make such records unavailable to NMFS, then fish buyers shall maintain separate records for NMFS that meet the requirements of this section. If any state law or regulation prohibits fish buyers, or fish sellers where appropriate, from keeping, for the purpose of complying with any requirement of this section, separate records that involve some or all of the same data elements as the landing records that the fish buyers also keep, for state purposes and under state law or regulation, then a financed reduction program will not be possible.

(g) *Audits*. NMFS or its agents may audit, in whatever manner NMFS believes reasonably necessary for the duly diligent administration of reduction loans, the financial records of fish buyers and fish sellers in each reduction fishery in order to ensure proper fee payment, collection, deposit, disbursement, accounting, record keeping, and reporting. Fish buyers and fish sellers shall make all records of all program transactions involving post-reduction fish harvests, fish deliveries, and fee payments, collections, deposits, disbursements, accounting, record keeping, and reporting available to NMFS or NMFS' agents at reasonable times and places and promptly provide all requested information reasonably related to these records that such fish sellers and fish buyers may otherwise lawfully provide. Trip tickets (or similar accounting records establishing the pounds of fee fish that each fish buyer buys from each fish seller each time that each fish buyer does so and each price that each fish buyer then pays to each fish seller for the fee fish) are essential audit documentation.

(h) *Confidentiality of records*. NMFS and NMFS' auditing agents shall maintain the confidentiality of all data to which NMFS has access under this section and shall neither release the data nor allow the data's use for any purpose other than the purpose of this subpart; provided, however, that NMFS may aggregate such data so as to preclude their identification with any fish buyer or any fish seller and use them in the aggregate for other purposes).

(i) *Refunds*. When NMFS determines that a reduction loan is fully repaid, NMFS will refund any excess fee receipts, on a last-in/first-out basis, to the fish buyers. Fish buyers shall return the refunds, on a last-in/first-out basis, to the fish sellers who paid the amounts refunded.

(j) *Implementation regulations at variance with this section*. If any special circumstances in a reduction fishery require, in NMFS's judgment, fee collection deposit, disbursement, or records provisions in addition to, or different from, those in this section in order to accommodate the circumstances of, and practices in, a reduction fishery while still fulfilling the intent and purpose of this section, NMFS may, notwithstanding this section, include such provisions in the implementation regulations for such reduction fishery.

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§ 600.1015 Late charges.

The late charge to fish buyers for fee payment, collection, deposit, and/or disbursement shall be one and one-half (1.5) percent per month, or the maximum rate permitted by state law, for the total amount of the fee not paid, collected, deposited, and/or disbursed when due to be paid, collected, deposited, and/or disbursed. The full late charge shall apply to the fee for each month or portion of a month that the fee remains unpaid, uncollected, undeposited, and/or undisbursed.

§ 600.1016 Enforcement.

In accordance with applicable law or other authority, NMFS may take appropriate action against each fish seller and/or fish buyer responsible for non-payment, non-collection, non-deposit, and/or non-disbursement of the fee in accordance with this subpart to enforce the collection from such fish seller and/or fish buyer of any fee (including penalties and all costs of collection) due and owing the United States on account of the loan that such fish seller and/or fish buyer should have, but did not, pay, collect, deposit, and/or disburse in accordance with this subpart. All such loan recoveries shall be applied to reduce the unpaid balance of the loan.

§ 600.1017 Prohibitions and penalties.

(a) The following activities are prohibited, and it is unlawful for any party to: (1) Vote in any referendum under this subpart if the party is ineligible to do so;

(2) Vote more than once in any referendum under this subpart;

(3) Sign or otherwise cast a ballot on behalf of a voter in any referendum under this subpart unless the voter has fully authorized the party to do so and doing so otherwise comports with this subpart;

(4) Interfere with or attempt to hinder, delay, buy, or otherwise unduly or unlawfully influence any eligible voter's vote in any referendum under this subpart;

(5) Submit a fraudulent, unauthorized, incomplete, misleading, unenforceable by specific performance, or inaccurate bid in response to an invitation to bid under this subpart or, in any other way, interfere with or attempt to interfere with, hinder, or delay, any invitation to bid, any bid submitted under any invitation to bid, any reduction contract, or any other reduction process in connection with any invitation to bid;

(6) Revoke or attempt to revoke any bid under this subpart;

(7) Fail to comply with the terms and conditions of any invitation to bid, bid, or reduction contract under this subpart, including NMFS' right under such reduction contracts to specific performance;

(8) Fail to fully and properly pay and collect any fee due payable, and collectible under this subpart or otherwise avoid, decrease, interfere with, hinder, or delay any such payment and collection,

(9) Convert, or otherwise use for any purpose other than the purpose this subpart intends, any paid or collected fee;

(10) Fail to fully and properly deposit on time the full amount of all fee revenue collected under this subpart into a deposit account and disburse the full amount of all deposit principal to the Fund's lockbox account—all as this subpart requires;

(11) Fail to maintain full, timely, and proper fee payment, collection, deposit, and/or disbursement records or make full, timely, and proper reports of such information to NMFS—all as this subpart requires;

(12) Fail to advise NMFS of any fish seller's refusal to pay, or of any fish buyer's refusal to collect, any fee due and payable under this subpart;

(13) Refuse to allow NMFS or agents that NMFS designates to review and audit at reasonable times all books and records reasonably pertinent to fee payment, collection, deposit, disbursement, and accounting under this subpart or otherwise interfere with, hinder, or delay NMFS or it agents in the course of their activities under this subpart;

(14) Make false statements to NMFS, any of the NMFS' employees, or any of NMFS' agents about any of the matters in this subpart;

(15) Obstruct, prevent, or unreasonably delay or attempt to obstruct, prevent, or unreasonably delay any audit or investigation NMFS or its agents conduct, or attempt to conduct, in connection with any of the matters in this subpart; and/or

(16) Otherwise materially interfere with the efficient and effective conduct of reduction and the repayment of reduction loans under this subpart.

(b) Any party who violates one or more of the prohibitions of paragraph (a) of this section is subject to the full range of penalties the Magnuson-Stevens Act and 15 CFR part 904 provide—including, but not limited to: civil penalties, sanctions, forfeitures, and punishment for criminal offenses—and to the full penalties and punishments otherwise provided by any other applicable law of the United States.

(c) Additionally, NMFS may take any and all appropriate actions, including the communication of action at law, against each party responsible for the non-payment, non-collection, non-deposit, and/or non-disbursement in accordance with § 600.1013 and/or § 600.1014 to enforce the United States' receipt from such party of any fee—including penalties and all costs of collection—due and owing the United States on account of the reduction loan that such party should have, but did not, pay, collect, deposit, and/or disburse in accordance with § 600.1013 and/or § 600.1014. All such reduction loan recoveries shall be applied to reduce the unpaid balances of reduction loans.

§ 600.1018 Implementation regulations for each program. [Reserved]

[FR Doc. 00–12159 Filed 5–17–00; 8:45 am]

BILLING CODE 3510–22–F

DEPARTMENT OF HEALTH AND HUMAN SERVICES

Food and Drug Administration

21 CFR Part 884

[Docket No. 99N–1309]

Obstetrical and Gynecological Devices; Classification of Female Condoms

AGENCY: Food and Drug Administration, HHS.

ACTION: Final rule.

SUMMARY: The Food and Drug Administration (FDA) is classifying the preamendments female condom intended for contraceptive and prophylactic purposes. Under this rule, the preamendments female condom is being classified into class III (premarket approval). This action is being taken under the Federal Food, Drug, and Cosmetic Act (the act), as amended by the Medical Device Amendments of 1976, the Safe Medical Devices Act of 1990, and the FDA Modernization Act of 1997.

DATES: This rule is effective June 19, 2000.

FOR FURTHER INFORMATION CONTACT: Colin M. Pollard, Center for Devices and Radiological Health (HFZ–470), Food and Drug Administration, 9200 Corporate Blvd., Rockville, MD 20850, 301–594–1180.

SUPPLEMENTARY INFORMATION:

I. Background

In a proposal published in the **Federal Register** of June 10, 1999 (64 FR 31164)

(hereinafter referred to as the June 10, 1999, proposal), FDA solicited comments regarding the proposed classification of female condoms. The June 10, 1999, proposal provided the regulatory history of female condoms, as well as the recommendation of the Obstetrical and Gynecological Device Classification Panel (the Panel) that this particular device be classified into class III. Specifically, the Panel recommended that this device be classified into class III because no published laboratory or clinical study data could be found that demonstrate its safety and effectiveness. Also, the Panel believed that general controls and special controls would not provide reasonable assurance of the safety and effectiveness of the device and the device is purported or represented to be for a use in supporting or sustaining human life or for a use which is of substantial importance in preventing impairment of human health, or presents a potential unreasonable risk of illness or injury. FDA agreed with the Panel's recommended classification.

The Panel also recommended that the device be identified as an intravaginal pouch because it is a sheath-like device that lines the vaginal wall and is inserted into the vagina prior to the initiation of coitus. FDA proposed to change the name of the generic type of the device to female condom.

The 90-day comment period ended September 8, 1999, and FDA stated that upon consideration of public comment it would issue a final rule classifying this device. FDA received one comment endorsing the June 10, 1999, proposal.

II. Conclusion

FDA has concluded that the female condom be classified into class III because general controls and special controls do not provide reasonable assurance of the safety and effectiveness of the device, and the device is purported or represented to be for a use in supporting or sustaining human life or for a use which is of substantial importance in preventing impairment of human health, or presents a potential unreasonable risk of illness or injury. FDA has further concluded that the generic type of this device be identified as ''female condom.'' FDA intends to issue a call for premarket approval applications (PMA's) for these devices.

III. Environmental Impact

The agency has determined under 21 CFR 25.34(b) that this action is of a type that does not individually or cumulatively have a significant effect on the human environment. Therefore, neither an environmental assessment nor an environmental impact statement is required.

IV. Analysis of Impacts

FDA has examined the impacts of the rule under Executive Order 12866, Executive Order 13132, the Regulatory Flexibility Act (5 U.S.C. 601–612) (as amended by subtitle D of the Small Business Regulatory Fairness Act of 1996 (Public Law 104–121)), and the Unfunded Mandates Reform Act of 1995 (Public Law 104–4). Executive Order 12866 directs agencies to assess all costs and benefits of available regulatory alternatives and, when regulation is necessary, to select regulatory approaches that maximize net benefits (including potential economic, environmental, public health and safety, and other advantages; distributive impacts; and equity). The agency believes that this final rule is consistent with the regulatory philosophy and principles identified in the Executive Order. In addition, the final rule is not a significant regulatory action as defined by the Executive Order and so it is not subject to review under the Executive Order.

FDA has analyzed this final rule in accordance with the principles set forth in Executive Order 13132. FDA has determined that the rule does not contain policies that have substantial direct effects on the States, on the relationship between the National Government and the States, or on the distribution of power and responsibilities among the various levels of government. Accordingly, the agency has concluded that the rule does not contain policies that have federalism implications as defined in the order and, consequently, a federalism summary impact statement is not required.

The Regulatory Flexibility Act requires agencies to analyze regulatory options that would minimize any significant impact of a rule on small entities. FDA believes that there is no interest at this time in marketing the device to be classified by this rule. FDA is taking this action because it has determined that premarket approval is necessary to provide reasonable assurance of the safety and effectiveness of the device, if there is any interest in marketing one in the future. Without this rule (and a subsequent requirement for PMA's), a person could market a device by claiming substantial equivalence to the Gee Bee Ring. All premarket submissions for ''female condom'' type devices that FDA has received to date have been for devices that have been found to be not substantially equivalent to the Gee Bee Ring and, therefore, those devices are not preamendments devices and are not to be classified by this rule. Under section 501(f)(2)(B) of the act (21 U.S.C. 351(f)(2)(B)), a rule requiring PMA's for this device could not take effect any sooner than 30 months after the effective date of a final rule classifying the device or 90 days after publication of the final rule requiring the PMA's, whichever is later.

The agency therefore certifies that this rule will not have a significant economic impact on a substantial number of small entities. In addition, this rule will not impose costs of $100 million or more on either the private sector or State, local, and tribal governments in the aggregate, and, therefore, a summary statement or analysis under section 202(a) of the Unfunded Mandates Reform Act of 1995 is not required.

V. Paperwork Reduction Act of 1995

FDA tentatively concludes that this rule requires no collection of information. Therefore, clearance by the Office of Management and Budget under the Paperwork Reduction Act of 1995 is not required.

List of Subjects in 21 CFR Part 884

Medical devices.

Therefore, under the Federal Food, Drug, and Cosmetic Act, and under authority delegated to the Commissioner of Food and Drugs, 21 CFR part 884 is amended as follows:

PART 884—OBSTETRICAL AND GYNECOLOGICAL DEVICES

1. The authority citation for 21 CFR part 884 continues to read as follows:

Authority: 21 U.S.C. 351, 360, 360c, 360e, 360j, 371.

2. Section 884.5330 is added to subpart F to read as follows:

§ 884.5330 Female condom.

(a) *Identification*. A female condom is a sheath-like device that lines the vaginal wall and is inserted into the vagina prior to the initiation of coitus. It is indicated for contraceptive and prophylactic (preventing the transmission of sexually transmitted diseases) purposes.

(b) *Classification*. Class III (premarket approval).

(c) *Date premarket approval application (PMA) or notice of completion of a product development protocol (PDP) is required*. No effective date has been established of the requirement for premarket approval for the devices described in paragraph (b) of this section. See § 884.3 for effective

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dates of requirement for premarket approval.

Dated: May 9, 2000.

Linda S. Kahan,

Deputy Director for Regulations Policy, Center for Devices and Radiological Health.

[FR Doc. 00–12526 Filed 5–17–00; 8:45 am]

BILLING CODE 4160–01–F

DEPARTMENT OF DEFENSE

Department of the Navy

32 CFR Part 701

Department of the Navy Privacy Act Program

AGENCY: Department of the Navy.

ACTION: Final rule.

SUMMARY: On September 14, 1999, at 64 FR 49850, the Department of the Navy unintentionally deleted subparts F and G to 32 CFR part 701. These subparts provide the policies and procedures for the Department of the Navy Privacy Program and are still current and relevant to the Navy's Privacy Program. Therefore, this final rule adds subparts F and G to 32 CFR part 701.

EFFECTIVE DATE: September 14, 1999.

FOR FURTHER INFORMATION CONTACT: Mrs. Doris Lama at (202) 685-6545.

SUPPLEMENTARY INFORMATION:

Executive Order 12866, 'Regulatory Planning and Review'

It has been determined that 32 CFR part 701, subparts F and G are not significant regulatory action. The rule does not:

(1) Have an annual effect to the economy of $100 million or more; or adversely affect in a material way the economy; a section of the economy; productivity; competition; jobs; the environment; public health or safety; or state, local, or tribal governments or communities;

(2) Create a serious inconsistency or otherwise interfere with an action taken or planned by another Agency;

(3) Materially alter the budgetary impact of entitlements, grants, user fees, or loan programs or the rights and obligations of recipients thereof;

(4) Raise novel legal or policy issues arising out of legal mandates, the President's priorities, or the principles set forth in this Executive Order.

Public Law 96–354, 'Regulatory Flexibility Act' (5 U.S.C. 601)

It has been certified that this rule is not subject to the Regulatory Flexibility Act (5 U.S.C. 601) because it would not, if promulgated, have a significant economic impact on a substantial number of small entities.

Public Law 96–511, 'Paperwork Reduction Act' (44 U.S.C. Chapter 35)

It has been certified that this part does not impose any reporting or record keeping requirements under the Paperwork Reduction Act of 1995.

List of Subjects in 32 CFR Part 701

Privacy.

Accordingly, Chapter I, 32 CFR part 701, is amended by adding subparts F and G to read as follows:

Subpart F—Department of the Navy Privacy Act Program

Sec.
701.100 Purpose.
701.101 Applicability.
701.102 Definitions.
701.103 Policy.
701.104 Responsibility and authority.
701.105 Systems of records.
701.106 Safeguarding records in systems of records.
701.107 Criteria for creating, altering, amending and deleting Privacy Act systems of records.
701.108 Collecting information about individuals.
701.109 Access to records.
701.110 Amendment of records.
701.111 Privacy Act appeals.
701.112 Disclosure of records.
701.113 Exemptions.
701.114 Enforcement actions.
701.115 Computer matching program.

Subpart G—Privacy Act Exemptions

701.116 Purpose.
701.117 Exemption for classified records.
701.118 Exemptions for specific Navy record systems.
701.119 Exemptions for specific Marine Corps records systems.

Subpart F—Department of the Navy Privacy Act Program

Authority: Pub. L. 93–579, 88 Stat 1896 (5 U.S.C. 552a).

§ 701.100 Purpose.

Subparts F and G of this part implement the Privacy Act (5 U.S.C. 552a), and DoD Directive 5400.11,[1] and DoD 5400.11–R,[2] (32 CFR part 310) and provides Department of the Navy policies and procedures for:

(a) Governing the collection, safeguarding, maintenance, use, access, amendment, and dissemination of personal information kept by Department of the Navy in systems of records;

(b) Notifying individuals if any systems of records contain a record pertaining to them;

(c) Verifying the identity of individuals who request their records before the records are made available to them;

(d) Notifying the public of the existence and character of each system of records.

(e) Exempting systems of records from certain requirements of the Privacy Act; and

(f) Governing the Privacy Act rules of conduct for Department of the Navy personnel, who will be subject to criminal penalties for noncompliance with 5 U.S.C. 552a, as amended by the Computer Matching Act of 1988.

§ 701.101 Applicability.

This subpart and subpart G of this part apply throughout the Department of the Navy. It is also applicable to contractors by contract or other legally binding action, whenever a Department of the Navy contract provides for the operation of a system of records or portion of a system of records to accomplish a Department of the Navy function. For the purposes of any criminal liabilities adjudged, any contractor or any employee of such contractor is considered to be an employee of Department of the Navy. In case of a conflict, this subpart and subpart G of this part take precedence over any existing Department of the Navy directive that deals with the personal privacy and rights of individuals regarding their personal records, except for disclosure of personal information required by 5 U.S.C. 552 (1988) as amended by the Freedom of Information Reform Act and implemented by Secretary of the Navy Instruction 5720.42F,[3] 'Department of the Navy Freedom of Information Act Program.'

§ 701.102 Definitions.

For the purposes of this subpart and subpart G of this part, the following meanings apply.

Access. The review or copying of a record or parts thereof contained in a system of records by any individual.

Agency. For the purposes of disclosing records subject to the Privacy Act between or among Department of Defense (DoD) components, the Department of Defense is considered a single agency. For all other purposes, Department of the Navy is considered an agency within the meaning of Privacy Act.

[1] Copies may be obtained: http://www.whs.osd.mil/corres.htm.

[2] See footnote 1 to § 701.100.

[3] Copies may be obtained: Chief of Naval Operations, 2000 Navy Pentagon, Washington, DC 20350–2000.

Confidential source. A person or organization who has furnished information to the Federal Government either under an express promise that the person's or the organization's identity will be held in confidence or under an implied promise of such confidentiality if this implied promise was made before September 27, 1975.

Defense Data Integrity Board. Consists of members of the Defense Privacy Board, as outlined in DoD Directive 5400.11 and, in addition, the DoD Inspector General or the designee, when convened to oversee, coordinate and approve or disapprove all DoD component computer matching covered by the Privacy Act.

Disclosure. The transfer of any personal information from a system of records by any means of communication (such as oral, written, electronic, mechanical, or actual review), to any person, private entity, or government agency, other than the subject of the record, the subject's designated agent or the subject's legal guardian.

Federal personnel. Officers and employees of the Government of the United States, members of the uniformed services (including members of the Reserve Components), individuals or survivors thereof, entitled to receive immediate or deferred retirement benefits under any retirement program of the Government of the United States (including survivor benefits).

Individual. A living citizen of the United States or alien lawfully admitted to the U.S. for permanent residence. The legal guardian of an individual has the same rights as the individual and may act on his or her behalf. No rights are vested in the representative of a deceased person under this instruction and the term ''individual'' does not embrace an individual acting in a non-personal capacity (for example, sole proprietorship or partnership).

Individual access. Access to information pertaining to the individual by the individual or his or her designated agent or legal guardian.

Maintain. Includes maintain, collect, use, or disseminate.

Member of the public. Any individual or party acting in a private capacity.

Minor. Under this subpart and subpart G of this part, a minor is an individual under 18 years of age, who is not a member of the U.S. Navy or Marine Corps, nor married.

Official use. Under this subpart and subpart G of this part, this term is used when Department of the Navy officials and employees have a demonstrated need for the use of any record or the information contained therein in the performance of their official duties.

Personal information. Information about an individual that is intimate or private to the individual, as distinguished from information related solely to the individual's official functions or public life.

Privacy Act (PA) request. A request from an individual for notification as to the existence of, access to, or amendment of records pertaining to that individual. These records must be maintained in a system of records.

Record. Any item, collection, or grouping of information about an individual that is maintained by a naval activity including, but not limited to, the individual's education, financial transactions, and medical, criminal, or employment history, and that contains the individual's name or other identifying particulars assigned to the individual, such as a finger or voice print or a photograph.

Review authority. An official charged with the responsibility to rule on administrative appeals of initial denials of requests for notification, access, or amendment of records. The Secretary of the Navy has delegated his review authority to the Assistant Secretary of the Navy (Manpower and Reserve Affairs (ASN(MRA)), the General Counsel (OGC), and the Judge Advocate General (NJAG). Additionally, the Office of Personnel Management (OPM) is the review authority for civilian official personnel folders or records contained in any other OPM record.

Risk assessment. An analysis which considers information sensitivity, vulnerability, and cost to a computer facility or word processing center in safeguarding personal information processed or stored in the facility or center.

Routine use. Disclosure of a record outside the Department of Defense for a purpose that is compatible with the purpose for which the record was collected and maintained by the Department of Defense. The routine use must have been included in the notice for the system of records published in the **Federal Register**.

Statistical record. A record maintained only for statistical research, or reporting purposes, and not used in whole or in part in making any determination about a specific individual.

System manager. An official who has overall responsibility for a system of records. He or she may serve at any level in Department of the Navy. Systems managers are indicated in the published record systems notices. If more than one official is indicated as a system manager, initial responsibility resides with the manager at the appropriate level (i.e., for local records, at the local activity).

System of records. A group of records under the control of a Department of the Navy activity from which information is retrieved by the individual's name or by some identifying number, symbol, or other identifying particular assigned to the individual. System notices for all Privacy Act systems of records must be published in the **Federal Register** and are also published in periodic Chief of Naval Operations Notes (OPNAVNOTEs) 5211.[4]

Word processing equipment. Any combination of electronic hardware and computer software integrated in a variety of forms (firmware, programmable software, hard wiring, or similar equipment) that permits the processing of textual data. Generally, the equipment contains a device to receive information, a computer-like processor with various capabilities to manipulate the information, a storage medium, and an output device.

Word processing system. A combination of equipment employing automated technology, systematic procedures, and trained personnel for the primary purpose of manipulating human thoughts and verbal or written communications into a form suitable to the originator. The results are written or graphic presentations intended to communicate verbally or visually with another individual.

Working day. All days excluding Saturday, Sunday, and legal holidays.

§ 701.103 Policy.

It is the policy of Department of the Navy to:

(a) Ensure that all its personnel comply fully with 5 U.S.C. 552a, DoD Directive 5400.11 and DoD 5400.11–R, to protect individuals from unwarranted invasions of privacy. Individuals covered by this protection are living citizens of the U.S. or aliens lawfully admitted for permanent residence. A legal guardian of an individual or parent of a minor when acting on the individual's or minor's behalf, has the same rights as the individual or minor. (A member of the Armed Forces is not a minor for the purposes of this subpart and subpart G of this part).

(b) Collect, maintain, and use only that personal information needed to support a Navy function or program as authorized by law or E.O., and disclose this information only as authorized by 5 U.S.C. 552a and this subpart and subpart G of this part. In assessing need, consideration shall be given to alternatives, such as use of information

[4] See footnote 3 to § 701.101.

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not individually identifiable or use of sampling of certain data for certain individuals only. Additionally, consideration is to be given to the length of time information is needed, and the cost of maintaining the information compared to the risks and adverse consequences of not maintaining the information.

(c) Keep only personal information that is timely, accurate, complete, and relevant to the purpose for which it was collected.

(d) Let individuals have access to, and obtain copies of, all or portions of their records, subject to exemption procedures authorized by law and this subpart and subpart G of this part.

(e) Let individuals request amendment of their records when discrepancies proven to be erroneous, untimely, incomplete, or irrelevant are noted.

(f) Let individuals request an administrative review of decisions that deny them access, or refuse to amend their records.

(g) Ensure that adequate safeguards are enforced to prevent misuse, unauthorized disclosure, alteration, or destruction of personal information in records.

(h) Maintain no records describing how an individual exercises his or her rights guaranteed by the First Amendment (freedom of religion, political beliefs, speech, and press; peaceful assemblage; and petition for redress of grievances), unless they are:

(1) Expressly authorized by statute;

(2) Authorized by the individual;

(3) Within the scope of an authorized law enforcement activity; or

(4) For the maintenance of certain items of information relating to religious affiliation for members of the naval service who are chaplains. This should not be construed, however, as restricting or excluding solicitation of information which the individual is willing to have in his or her record concerning religious preference, particularly that required in emergency situations.

(5) Maintain only systems of records which have been published in the **Federal Register**, in accordance with periodic Chief of Naval Operations Notes (OPNAVNOTEs) 5211 and § 701.105. These OPNAVNOTEs 5211 provide a listing of all Department of the Navy Privacy Act systems of records and identify the Office of Personnel Management (OPM) government-wide systems containing information on Department of the Navy civilian employees, even though technically, Department of the Navy does not have cognizance over them. A Privacy Act systems notice outlines what kinds of information may be collected and maintained by naval activities. When collecting/maintaining information in a Privacy Act system of records, review the systems notice to ensure activity compliance is within the scope of the system. If you determine the systems notice does not meet your needs, contact the systems manager or Chief of Naval Operations (N09B30) with your concerns so that amendment of the system may be considered.

§ 701.104 Responsibility and authority.

(a) *Chief of Naval Operations (CNO).* CNO is designated as the official responsible for administering and supervising the execution of 5 U.S.C. 552a, DoD Directive 5400.11, and DoD 5400.11–R. CNO has designated the Assistant Vice Chief of Naval Operations (N09B30) as principal Privacy Act Coordinator for the Department of the Navy to:

(1) Set Department of the Navy policy on the provisions of the Privacy Act.

(2) Serve as principal advisor on all Privacy Act matters.

(3) Oversee the administration of the Privacy Act program, which includes preparing the Department of the Navy Privacy Act report for submission to Congress.

(4) Develop Navy-wide Privacy Act training program and serve as training-oversight manager.

(5) Conduct staff assistance visits within Department of the Navy to review compliance with 5 U.S.C. 552a and this subpart and subpart G of this part.

(6) Coordinate and prepare responses for Privacy Act requests received for Office of the Secretary of the Navy records.

(b) *Commandant of the Marine Corps (CMC).* CMC is responsible for administering and supervising the execution of this subpart and subpart G of this part within the Marine Corps. The Commandant has designated the Director, Manpower Management Information Systems Division (HQMC (Code ARAD)) as the Privacy Act coordinator for Headquarters, U.S. Marine Corps.

(c) *Privacy Act Coordinator.* Each addressee is responsible for implementing and administering a Privacy Act program under this subpart and subpart G of this part. Each addressee shall designate a Privacy Act Coordinator to:

(1) Serve as principal point of contact on Privacy Act matters.

(2) Provide training for activity/command personnel on the provisions of 5 U.S.C. 552a and this subpart and subpart G of this part.

(3) Issue implementing instruction which designates the activity's Privacy Act Coordinator, Privacy Act records disposition, Privacy Act processing procedures, identification of Privacy Act systems of records under their cognizance, and training aids for those personnel involved with systems of records.

(4) Review internal directives, practices, and procedures, including those having Privacy Act implications and where Privacy Act Statements (PASs) are needed.

(5) Compile input and submit consolidated Privacy Act report to Echelon 2 Privacy Act Coordinator, who, in turn, will provide consolidated report to CNO (N09B30).

(6) Maintain liaison with records management officials (i.e., maintenance and disposal procedures and standards, forms, and reports), as appropriate.

(7) Provide guidance on handling Privacy Act requests and scope of Privacy Act exemptions.

(8) Conduct staff assistance visits within command and lower echelon commands to ensure compliance with the Privacy Act.

(9) Echelon 2 Privacy Act Coordinators shall provide CNO (N09B30) with a complete listing of all Privacy Act Coordinators under their jurisdiction. Such information should include activity name and address, office code, name of Privacy Act Coordinator, commercial and DSN telephone number, and FAX number, if applicable.

(d) *Release authority.* Officials having cognizance over the requested subject matter are authorized to respond to requests for notification, access, and/or amendment of records. These officials could also be systems managers (see § 701.104(g)).

(e) *Denial authority.* Within the Department of the Navy, the following chief officials, their respective vice commanders, deputies, principal assistants, and those officials specifically designated by the chief official are authorized to deny requests, either in whole or in part, for notification, access and amendment, made under this subpart and subpart G of this part, when the records relate to matters within their respective areas of responsibility or chain of command:

(1) Department of the Navy. Civilian Executive Assistants; CNO; CMC; Chief of Naval Personnel; Commanders of the Naval Systems Commands, Office of Naval Intelligence, Naval Security Group Command, Naval Imaging Command, and Naval Computer and Telecommunications Command; Chief, Bureau of Medicine and Surgery;

Auditor General of the Navy; Naval Inspector General; Director, Office of Civilian Personnel Management; Chief of Naval Education and Training; Commander, Naval Reserve Force; Chief of Naval Research; Commander, Naval Oceanography Command; heads of Department of the Navy Staff Offices, Boards, and Councils; Flag Officers and General Officers. NJAG and his Deputy, and OGC and his Deputies are excluded from this grant of authorization. While NJAG and OGC are not denial authorities, they are authorized to further delegate the authority conferred here to other senior officers/officials within NJAG and OGC.

(2) For the shore establishment.(i) All officers authorized under Article 22, Uniform Code of Military Justice (UCMJ) or designated in section 0120, Manual of the Judge Advocate General (JAGINST 5800.7C),[5] to convene general courts-martial.

(ii) Commander, Naval Investigative Service Command.

(iii) Deputy Commander, Naval Legal Service Command.

(3) In the Operating Forces. All officers authorized by Article 22, Uniform Code of Military Justice (UCMJ), or designated in section 0120, Manual of the Judge Advocate General (JAGINST 5800.7C), to convene general courts-martial.

(f) *Review authority.* (1) The Assistant Secretary of the Navy (Manpower and Reserve Affairs), is the Secretary's designee, and shall act upon requests for administrative review of initial denials of requests for amendment of records related to fitness reports and performance evaluations of military personnel (see § 701.111(c)(3)).

(2) The Judge Advocate General and General Counsel, as the Secretary's designees, shall act upon requests for administrative review of initial denials of records for notification, access, or amendment of records, as set forth in § 701.111(c)(2) and (4).

(3) The authority of the Secretary of the Navy (SECNAV), as the head of an agency, to request records subject to the Privacy Act from an agency external to the Department of Defense for civil or criminal law enforcement purposes, under subsection (b)(7) of 5 U.S.C. 552a, is delegated to the Commandant of the Marine Corps, the Director of Naval Intelligence, the Judge Advocate General, and the General Counsel.

(g) *Systems manager.* Systems managers, as designated in Department of the Navy's compilation of systems notices (periodic Chief of Naval Operations Notes (OPNAVNOTEs) 5211,[6] ''Current Privacy Act Issuances'') shall:

(1) Ensure the system has been published in the **Federal Register** and that any additions or significant changes are submitted to CNO (N09B30) for approval and publication. The systems of records should be maintained in accordance with the systems notices as published in the periodic Chief of Naval Operations Notes (OPNAVNOTEs) 5211, ''Current Privacy Act Issuances.''

(2) Maintain accountability records of disclosures.

(h) *Department of the Navy employees.* Each employee of the Department of the Navy has certain responsibilities for safeguarding the rights of others. These include:

(1) Not disclosing any information contained in a system of records by any means of communication to any person or agency, except as authorized by this subpart and subpart G of this part.

(2) Not maintaining unpublished official files which would fall under the provisions of 5 U.S.C. 552a.

(3) Safeguarding the privacy of individuals and confidentiality of personal information contained in a system of records.

§ 701.105 Systems of records.

To be subject to this subpart and subpart G of this part, a ''system of records'' must consist of ''records'' that are retrieved by the name, or some other personal identifier, of an individual and be under the control of Department of the Navy.

(a) *Retrieval practices.* (1) Records in a group of records that are not retrieved by personal identifiers are not covered by this subpart and subpart G of this part, even if the records contain information about individuals and are under the control of Department of the Navy. The records must be retrieved by personal identifiers to become a system of records.

(2) If records previously not retrieved by personal identifiers are rearranged so they are retrieved by personal identifiers, a new system notice must be submitted in accordance with § 701.107.

(3) If records in a system of records are rearranged so retrieval is no longer by personal identifiers, the records are no longer subject to this subpart and subpart G of this part and the records system notice should be deleted in accordance with § 701.107.

(b) *Recordkeeping standards.* A record maintained in a system of records subject to this subpart and subpart G of this part must meet the following criteria:

(1) Be accurate. All information in the record must be factually correct.

(2) Be relevant. All information contained in the record must be related to the individual who is the record subject and also must be related to a lawful purpose or mission of the Department of the Navy activity maintaining the record.

(3) Be timely. All information in the record must be reviewed periodically to ensure that it has not changed due to time or later events.

(4) Be complete. It must be able to stand alone in accomplishing the purpose for which it is maintained.

(5) Be necessary. All information in the record must be needed to accomplish a Department of the Navy mission or purpose established by Federal Law or E.O. of the President.

(c) *Authority to establish systems of records.* Identify the specific Federal statute or E.O. of the President that authorizes maintaining each system of records. When a naval activity uses its ''internal housekeeping'' statute, i.e., 5 U.S.C. 301, Departmental Regulations, the naval instruction that implements the statute should also be identified. A statute or E.O. authorizing a system of records does not negate the responsibility to ensure the information in the system of records is relevant and necessary.

(d) *Exercise of First Amendment rights.* (1) Do not maintain any records describing how an individual exercises rights guaranteed by the First Amendment of the U.S. Constitution unless expressly authorized by Federal law; the individual; or pertinent to and within the scope of an authorized law enforcement activity.

(2) First amendment rights include, but are not limited to, freedom of religion, freedom of political beliefs, freedom of speech, freedom of the press, the right to assemble, and the right to petition.

(e) *System manager's evaluations and reviews.* (1) Evaluate each new system of records. Before establishing a system of records, evaluate the information to be included and consider the following:

(i) The relationship of each item of information to be collected and retained to the purpose for which the system is maintained (all information must be relevant to the purpose);

(ii) The specific impact on the purpose or mission if each category of information is not collected (all information must be necessary to accomplish a lawful purpose or mission.);

[5] Copies may be obtained: Judge Advocate General, Navy Department, 1322 Patterson Avenue, SE, Suite 3000, Washington Navy Yard, Washington, DC 20374-5066.

[6] See footnote 3 to § 701.101.

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(iii) The ability to meet the informational needs without using personal identifiers (will anonymous statistical records meet the needs?);

(iv) The length of time each item of information must be kept;

(v) The methods of disposal;

(vi) The cost of maintaining the information; and

(vii) Whether a system already exists that serves the purpose of the new system.

(2) Evaluate and review all existing systems of records.

(i) When an alteration or amendment of an existing system is prepared pursuant to § 701.107(b) and (c), do the evaluation described in paragraph (e) of this section.

(ii) Conduct the following reviews annually and be prepared to report, in accordance with § 701.104(c)(8), the results and corrective actions taken to resolve problems uncovered.

(A) Training practices to ensure all personnel are familiar with the requirements of 5 U.S.C. 552a, and DoD Directive 5400.11, ''DoD Privacy Program'', this subpart and subpart G of this part, and any special needs their specific jobs entail.

(B) Recordkeeping and disposal practices to ensure compliance with this subpart and subpart G of this part.

(C) Ongoing computer matching programs in which records from the system have been matched with non-DoD records to ensure that the requirements of § 701.115 have been met.

(D) Actions of Department of the Navy personnel that resulted in either Department of the Navy being found civilly liable or a person being found criminally liable under 5 U.S.C. 552a, to determine the extent of the problem and find the most effective way of preventing the problem from occurring in the future.

(E) Each system of records notice to ensure it accurately describes the system. Where major changes are needed, alter the system notice in accordance with § 701.107(b). If minor changes are needed, amend the system notice pursuant to § 701.107(c).

(iii) Every even-numbered year, review a random sample of Department of the Navy contracts that provide for the operation of a system of records to accomplish a Department of the Navy function, to ensure the wording of each contract complies with the provisions of 5 U.S.C. 552a and paragraph (h) of this section.

(iv) Every three years, beginning in 1992, review the routine use disclosures associated with each system of records to ensure the recipient's use of the records continues to be compatible with the purpose for which the information was originally collected.

(v) Every three years, beginning in 1993, review each system of records for which exemption rules have been established to determine whether each exemption is still needed.

(vi) When directed, send the reports through proper channels to the CNO (N09B30).

(f) *Discontinued information requirements.* (1) Immediately stop collecting any category or item of information about individuals that is no longer justified, and when feasible, remove the information from existing records.

(2) Do not destroy records that must be kept in accordance with retention and disposal requirements established under SECNAVINST 5212.5,[7] ''Disposal of Navy and Marine Corps Records.''

(g) *Review records before disclosing outside the Federal government.* Before disclosing a record from a system of records to anyone outside the Federal government, take reasonable steps to ensure the record which is being disclosed is accurate, relevant, timely, and complete for the purposes it is being maintained.

(h) *Federal government contractors.*—(1) *Applicability to Federal government contractors.* (i) When a naval activity contracts for the operation of a system of records to accomplish its function, the activity must ensure compliance with this subpart and subpart G of this part and 5 U.S.C. 552a. For the purposes of the criminal penalties described in 5 U.S.C. 552a, the contractor and its employees shall be considered employees of the agency during the performance of the contract.

(ii) Consistent with parts 24 and 52 of the Federal Acquisition Regulation (FAR), contracts for the operation of a system of records shall identify specifically the record system and the work to be performed, and shall include in the solicitations and resulting contract the terms as prescribed by the FAR.

(iii) If the contractor must use records that are subject to this subpart and subpart G of this part to perform any part of a contract, the contractor activities are subject to this subpart and subpart G of this part.

(iv) This subpart and subpart G of this part do not apply to records of a contractor that are:

(A) Established and maintained solely to assist the contractor in making internal contractor management decisions, such as records maintained by the contractor for use in managing the contract;

(B) Maintained as internal contractor employee records, even when used in conjunction with providing goods or services to the naval activity;

(C) Maintained as training records by an educational organization contracted by a naval activity to provide training when the records of the contract students are similar to and commingled with training records of other students, such as admission forms, transcripts, and academic counseling and similar records; or

(D) Maintained by a consumer reporting agency to which records have been disclosed under contract in accordance with 31 U.S.C. 952d.

(v) For contracting that is subject to this subpart and subpart G of this part, naval activities shall publish instructions that:

(A) Furnish Privacy Act guidance to personnel who solicit, award, or administer Government contracts;

(B) Inform prospective contractors of their responsibilities under this subpart and subpart G of this part and the Department of the Navy Privacy Program;

(C) Establish an internal system for reviewing contractor's performance for compliance with the Privacy Act; and

(D) Provide for the biennial review of a random sample of contracts that are subject to this subpart and subpart G of this part.

(2) *Contracting procedures.* The Defense Acquisition Regulatory (DAR) Council, which oversees the implementation of the FAR within the Department of Defense, is responsible for developing the specific policies and procedures for soliciting, awarding, and administering contracts that are subject to this subpart and subpart G of this part and 5 U.S.C. 552a.

(3) *Contractor compliance.* Naval activities shall establish contract surveillance programs to ensure contractors comply with the procedures established by the DAR Council under the preceding subparagraph.

(4) *Disclosing records to contractors.* Disclosing records to a contractor for use in performing a contract let by a naval activity is considered a disclosure within Department of the Navy. The contractor is considered the agent of Department of the Navy when receiving and maintaining the records for that activity.

§ 701.106 Safeguarding records in systems of records.

Establish appropriate administrative, technical, and physical safeguards to

[7] Copies may be obtained: OPNAV/SECNAV Directives Control Office, Washington Navy Yard, Building 200, Washington, DC 20350–2000.

ensure the records in every system of records are protected from unauthorized alteration, destruction, or disclosure. Protect the records from reasonably anticipated threats or hazards that could result in substantial harm, embarrassment, inconvenience, or unfairness to any individual on whom information is maintained.

(a) *Minimum standards.* (1) Conduct risk analysis and management planning for each system of records. Consider sensitivity and use of the records, present and projected threats and vulnerabilities, and present and projected cost-effectiveness of safeguards. The risk analysis may vary from an informal review of a small, relatively insensitive system to a formal, fully quantified risk analysis of a large, complex, and highly sensitive system.

(2) Train all personnel operating a system of records or using records from a system of records in proper record security procedures.

(3) Label information exempt from disclosure under this subpart and subpart G of this part to reflect their sensitivity, such as ''FOR OFFICIAL USE ONLY,'' ''PRIVACY ACT SENSITIVE: DISCLOSE ON A NEED-TO-KNOW BASIS ONLY,'' or some other statement that alerts individuals of the sensitivity to the records.

(4) Administer special administrative, physical, and technical safeguards to protect records processed or stored in an automated data processing or word processing system to protect them from threats unique to those environments.

(b) *Records disposal.* (1) Dispose of records from systems of records so as to prevent inadvertent disclosure. Disposal methods are considered adequate if the records are rendered unrecognizable or beyond reconstruction (*i.e.,* such as tearing, burning, melting, chemical decomposition, burying, pulping, pulverizing, shredding, or mutilation). Magnetic media may be cleared by completely erasing, overwriting, or degaussing the tape.

(2) The transfer of large volumes of records (*e.g.,* printouts and computer cards) in bulk to a disposal activity such as a Defense Reutilization and Marketing Office for authorized disposal is not a disclosure of records, if the volume of records, coding of the information, or some other factor render it impossible to recognize any personal information about a specific individual.

(3) When disposing or destroying large quantities of records from a system of records, care must be taken to ensure that the bulk of the records is maintained to prevent easy identification of specific records. If such bulk is maintained, no special procedures are required. If bulk is not maintained, or if the form of the records makes individually identifiable information easily discernable, dispose of the records in accordance with paragraph (b)(1) of this section.

§ 701.107 Criteria for creating, altering, amending and deleting Privacy Act systems of records.

(a) *Criteria for a new system of records.* A new system of records is one for which no existing system notice has been published in the **Federal Register**. If a notice for a system of records has been canceled or deleted, and it is determined that it should be reinstated or reused, a new system notice must be published in the **Federal Register**. Advance public notice must be given before a naval activity may begin to collect information for or use a new system of records. The following procedures apply:

(1) Describe in the record system notice the contents of the record system and the purposes and routine uses for which the information will be used and disclosed.

(2) The public shall be given 30 days to comment on any proposed routine uses before the routine uses are implemented.

(3) The notice shall contain the date the system of records will become effective.

(b) *Criteria for an alteration to a system of records notice.* A system is considered altered when any one of the following actions occur or is proposed:

(1) A significant increase or change in the number or types of individuals about whom records are maintained. For example, a decision to expand a system of records that originally covered personnel assigned to only one naval activity to cover personnel at several installations would constitute an altered system. An increase or decrease in the number of individuals covered due to normal growth or decrease is not an alteration.

(2) A change that expands the types or categories of information maintained. For example, a personnel file that has been expanded to include medical records would be an alteration.

(3) A change that alters the purpose for which the information is used. In order to be an alteration, the change must be one that is not reasonably inferred from any of the existing purposes.

(4) A change to equipment configuration (either hardware or software) that creates substantially greater use of records in the system. For example, placing interactive computer terminals at regional offices when the system was formerly used only at the headquarters would be an alteration.

(5) A change in the manner in which records are organized or in the method by which records are retrieved.

(6) Combining record systems due to a reorganization within Department of the Navy.

(7) Retrieving by Social Security Numbers (SSNs), records that previously were retrieved only by names would be an alteration if the present notice failed to indicate retrieval by SSNs. An altered system of records must be published in the **Federal Register**. Submission for an alteration must contain a narrative statement, the specific changes altering the system, and the system of records notice.

(c) *Criteria for amending a systems of records notice.* Minor changes to published system of records notices are considered amendments. All amendments should be forwarded to CNO (N09B30) for publication in the **Federal Register**. When submitting an amendment to a system of records notice, the naval activity must include a description of the specific changes proposed and the system of records notice.

(d) *Criteria for deleting a system of records notice.* When a system of records is discontinued, incorporated into another system, or determined to be no longer subject to this subpart and subpart G of this part, a deletion notice must be published in the *Federal Register.* The deletion notice shall include the system identification number, system name, and the reason for deleting it. If a system is deleted through incorporation into or merger with another system, identify the successor system in the deletion notice.

§ 701.108 Collecting information about individuals.

(a) *Collecting directly from the individual.* To the greatest extent practicable, collect information for systems of records directly from the individual to whom the record pertains if the record may be used to make an adverse determination about the individual's rights, benefits, or privileges under the Federal programs.

(b) *Collecting information about individuals from third persons.* It might not always be practical to collect all information about an individual directly from that person, such as verifying information through other sources for security or employment suitability determinations; seeking other opinions, such as a supervisor's comments on past performance or other evaluations; obtaining the necessary information directly from the individual would be

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exceptionally difficult or would result in unreasonable costs or delays; or, the individual requests or consents to contacting another person to obtain the information.

(c) *Soliciting the social security number (SSN).* (1) It is unlawful for any Federal, State, or local government agency to deny an individual a right, benefit, or privilege provided by law because the individual refuses to provide his or her SSN. However, this prohibition does not apply if a Federal law requires that the SSN be provided, or the SSN is required by a law or regulation adopted before January 1, 1975, to verify the individual's identity for a system of records established and in use before that date.

(2) Before requesting an individual to provide the SSN, the individual must be advised whether providing the SSN is mandatory or voluntary; by what law or other authority the SSN is solicited; and what uses will be made of the SSN.

(3) The preceding advice relates only to the SSN. If other information about the individual is solicited for a system of records, a Privacy Act statement (PAS) also must be provided to him/her.

(4) The notice published in the **Federal Register** for each system of records containing SSNs solicited from individuals must indicate the authority for soliciting the SSNs and whether it is mandatory for the individuals to provide their SSNs. E.O. 9397 requires federal agencies to use SSNs as numerical identifiers for individuals in most federal records systems, however, it does not make it mandatory for individuals to provide their SSNs.

(5) When entering military service or civilian employment with the Department of the Navy, individuals must provide their SSNs. This is then the individual's numerical identifier and is used to establish personnel, financial, medical, and other official records (as authorized by E.O. 9397). The individuals must be given the notification described above. Once the individual has provided his or her SSN to establish the records, a notification is not required when the SSN is requested only for identification or to locate the records.

(6) The Federal Personnel Manual [8] must be consulted when soliciting SSNs for use in systems of records maintained by the Office of Personnel Management.

(7) A Department of the Navy activity may request an individual's SSN even though it is not required by Federal statute, or is not for a system of records in existence and operating prior to January 1, 1975. However, the separate Privacy Act Statement for the SSN, alone, or a merged Privacy Act Statement covering both the SSN and other items of personal information, must make clear that disclosure of the number is voluntary. If the individual refuses to disclose his or her SSN, the activity must be prepared to identify the individual by alternate means.

(d) *Contents of Privacy Act Statement.* (1) When an individual is requested to furnish information about himself/herself for a system of records, a Privacy Act Statement must be provided to the individual, regardless of the method used to collect the information (*i.e.,* forms, personal or telephonic interview, etc). If the information requested will not be included in a system of records, a Privacy Act Statement is not required.

(2) The Privacy Act Statement shall include the following:

(i) The Federal law or E.O. that authorizes collecting the information (*i.e.,* E.O. 9397 authorizes collection of SSNs);

(ii) Whether or not it is mandatory for the individual to provide the requested information (It is only mandatory when a Federal law or E.O. of the President specifically imposes a requirement to furnish the information and provides a penalty for failure to do so. If furnishing information is a condition for granting a benefit or privilege voluntarily sought by the individual, it is voluntary for the individual to give the information.);

(iii) The principle purposes for collecting the information;

(iv) The routine uses that will be made of the information (*i.e.,* to whom and why it will be disclosed outside the Department of Defense); and

(v) The possible effects on the individual if the requested information is not provided.

(3) The Privacy Act Statement must appear on the form used to collect the information or on a separate form that can be retained by the individual collecting the information. If the information is collected by means other than a form completed by the individual, *i.e.,* solicited over the telephone, the Privacy Act Statement should be read to the individual and if requested by the individual, a copy sent to him/her. There is no requirement that the individual sign the Privacy Act Statement.

(e) *Format for Privacy Act Statement.* When forms are used to collect information about individuals for a system of records, the Privacy Act Statement shall appear as follows (listed in the order of preference):

(1) Immediately below the title of the form,

(2) Elsewhere on the front page of the form (clearly indicating it is the Privacy Act Statement),

(3) On the back of the form with a notation of its location below the title of the form, or

(4) On a separate form which the individual may keep.

§ 701.109 Access to records.

(a) *Individual access to records.* (1) *Right of access.* Only individuals who are subjects of records maintained in systems of records and by whose personal identifiers the records are retrieved have the right of individual access under this subpart and subpart G of this part, unless they provide written authorization for their representative to act on their behalf. Legal guardians or parents acting on behalf of a minor child also have the right of individual access under this subpart and subpart G of this part.

(2) *Notification of record's existence.* Each naval activity shall establish procedures for notifying an individual, in response to his or her request, if a system of records identified by him/her contains a record pertaining to the individual.

(3) *Individual request for access.* Individuals shall address requests for access to records in systems of records to the system manager or the office designated in the Department of the Navy compilation of system notices (periodic Chief of Naval Operations Notes (OPNAVNOTEs) 5211, ''Current Privacy Act Issuances'').

(4) *Verifying identity.* (i) An individual shall provide reasonable verification of identity before obtaining access to records.

(ii) When requesting records in writing, naval activities may not insist that a requester submit a notarized signature. The courts have ruled that an alternative method of verifying identity must be established for individuals who do not have access to notary services. This alternative permits requesters to provide an unsworn declaration that states ''I declare under perjury or penalty under the laws of the United States of America that the foregoing is true and correct.''

(iii) When an individual seeks access in person, identification can be verified by documents normally carried by the individual (*i.e.,* identification card, driver's license, or other license, permit or pass normally used for identification purposes).

(iv) When access is requested other than in writing, identity may be verified by the individual's providing minimum identifying data such as full name, date and place of birth, or other information

[8] Copies may be obtained: Office of Personnel Management, 1900 E Street, Washington, DC 20415.

necessary to locate the record sought. If the information sought is sensitive, additional identifying data may be required. Telephonic requests should not be honored.

(v) Allow an individual to be accompanied by a person of his or her choice when viewing the record; however, require the individual to provide written authorization to have the record discussed in front of the other person.

(vi) Do not deny access to an individual who is the subject of the record solely for refusing to divulge his or her SSN, unless it is the only means of retrieving the record or verifying identity.

(vii) Do not require the individual to explain why he or she is seeking access to a record under this subpart and subpart G of this part.

(viii) Only a designated denial authority may deny access. The denial must be in writing and contain the information required by paragraph (d) of this section.

(5) *Blanket requests not honored.* Do not honor requests from individuals for notification and/or access concerning all Department of the Navy systems of records. In these instances, notify the individual that requests for notification and/or access must be directed to the appropriate system manager for the particular record system being requested, as indicated in the periodic Chief of Naval Operations Notes (OPNAVNOTEs) 5211, ''Current Privacy Act Issuances''; and the request must either designate the particular system of records to be searched, or provide sufficient information for the system manager to identify the appropriate system. Also, provide the individual with any other information needed for obtaining consideration of his or her request.

(6) *Granting individual access to records.* (i) Grant the individual access to the original record (or exact copy) without any changes or deletions, other than those made in accordance with § 701.113.

(ii) Grant the individual's request for an exact copy of the record, upon the signed authorization of the individual, and provide a copy to anyone designated by the individual. In either case, the copying fees may be assessed to the individual pursuant to § 701.109(b).

(iii) If requested, explain any record or portion of a record that is not understood, as well as any changes or deletions.

(7) *Illegible or incomplete records.* Do not deny an individual access solely because the physical condition or format of the record does not make it readily available (*i.e.,* when the record is in a deteriorated state or on magnetic tape). Either prepare an extract or recopy the document exactly.

(8) *Access by parents and legal guardians.* (i) The parent of any minor, or the legal guardian of any individual declared by a court of competent jurisdiction to be incompetent due to physical or mental incapacity or age, may obtain access to the record of the minor or incompetent individual if the parent or legal guardian is acting on behalf or for the benefit of the minor or incompetent. However, with respect to access by parents and legal guardians to medical records and medical determinations about minors, use the following procedures:

(A) In the United States, the laws of the state where the records are located might afford special protection to certain medical records (*i.e.,* drug and alcohol abuse treatment, and psychiatric records). The state statutes might apply even if the records are maintained by a naval medical facility.

(B) For installations located outside the U.S., the parent or legal guardian of a minor shall be denied access if all four of the following conditions are met:

(1) The minor at the time of the treatment or consultation was 15, 16, or 17 years old;

(2) The treatment or consultation was within a program authorized by law or regulation to provide confidentiality to the minor;

(3) The minor indicated a desire that the treatment or consultation record be handled in confidence and not disclosed to a parent or guardian; and

(4) The parent or legal guardian does not have the written authorization of the minor or a valid court order granting access.

(ii) A minor or incompetent has the same right of access as any other individual under this subpart and subpart G of this part. The right of access of the parent or legal guardian is in addition to that of the minor or incompetent.

(9) *Access to information compiled in reasonable anticipation of a civil proceeding.* (i) An individual is not entitled under this subpart and subpart G of this part to access information compiled in reasonable anticipation of a civil action or proceeding.

(ii) The term ''civil action or proceeding'' includes quasi-judicial and pre-trial judicial proceedings, as well as formal litigation.

(iii) Paragraphs (a)(9)(i) and (ii) of this section do not prohibit access to records compiled or used for purposes other than litigation, nor prohibit access to systems of records solely because they are frequently subject to litigation. The information must have been compiled for the primary purpose of litigation.

(10) *Personal notes or records not under the control of the Department of the Navy.* (i) Certain documents under the control of a Department of the Navy employee and used to assist him/her in performing official functions are not considered Department of the Navy records within the meaning of this subpart and subpart G of this part. These documents are not systems of records that are subject to this subpart and subpart G of this part, if they are:

(A) Maintained and discarded solely at the discretion of the author;

(B) Created only for the author's personal convenience;

(C) Not the result of official direction or encouragement, whether oral or written; and

(D) Not shown to other persons for any reason or filed in agency files.

(11) *Relationship between the Privacy Act and FOIA.* In some instances, individuals requesting access to records pertaining to themselves may not know which Act to cite as the appropriate statutory authority. The following guidelines are to ensure that the individuals receive the greatest degree of access under both Acts:

(i) Access requests that specifically state or reasonably imply that they are made under 5 U.S.C. 552 (1988) as amended by the Freedom of Information Reform Act of 1986, are processed under Secretary of the Navy Instruction 5720.42F, ''Department of the Navy Freedom of Information Act Program.''

(ii) Access requests that specifically state or reasonably imply that they are made under 5 U.S.C. 552a are processed under this subpart and subpart G of this part.

(iii) Access requests that cite both 5 U.S.C. 552a, as amended by the Computer Matching Act of 1988 and 5 U.S.C. 552 (1988) as amended by the Freedom of Information Reform Act are processed under the Act that provides the greater degree of access. Inform the requester which instruction was used in granting or denying access.

(iv) Do not penalize the individual access to his or her records otherwise releasable under 5 U.S.C. 552a and periodic Chief of Naval Operations Notes (OPNAVNOTEs) 5211, ''Current Privacy Act Issuances'', simply because he or she failed to cite the appropriate statute or instruction.

(12) *Time limits.* Acknowledge requests for access made under Privacy Act or this subpart and subpart G of this part within 10 working days after receipt, and advise the requester of your

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decision to grant/deny access within 30 working days.

(b) *Reproduction fees.* Normally, only one copy of any record or document will be provided. Checks or money orders for fees should be made payable to the Treasurer of the United States and deposited to the miscellaneous receipts of the treasury account maintained at the finance office servicing the activity.

(1) Fee schedules shall include only the direct cost of reproduction and shall not include costs of:

(i) Time or effort devoted to searching for or reviewing the record by naval personnel;

(ii) Fees not associated with the actual cost of reproduction;

(iii) Producing a copy when it must be provided to the individual without cost under another regulation, directive, or law;

(iv) Normal postage;

(v) Transportation of records or personnel; or

(vi) Producing a copy when the individual has requested only to review the record and has not requested a copy to keep, and the only means of allowing review is to make a copy (*e.g.,* the record is stored in a computer and a copy must be printed to provide individual access, or the naval activity does not wish to surrender temporarily the original record for the individual to review).

(2) Fee schedules.

(i) Office copy (per page).....$.10

(ii) Microfiche (per fiche).....$.25

(3) Fee waivers. Waive fees automatically if the direct cost of reproduction is less than $15, unless the individual is seeking an obvious extension or duplication of a previous request for which he or she was granted a waiver. Decisions to waive or reduce fees that exceed $15 are made on a case-by-case basis.

(c) *Denying individual access.* (1) Deny the record subject access to requested record only if it was compiled in reasonable anticipation of a civil action or proceeding or is in a system of records that has been exempt from the access provisions of § 701.113.

(2) Deny the individual access only to those portions of the record for which the denial will serve a legitimate government purpose. An individual may be refused access for failure to comply with established procedural requirements, but must be told the specific reason for the refusal and the proper access procedures.

(3) Deny the individual access to his or her medical and psychological records if it is determined that access could have an adverse affect on the mental or physical health of the individual. This determination normally should be made in consultation with a medical practitioner. If it is medically indicated that access could have an adverse mental or physical effect on the individual, provide the record to a medical practitioner named by the individual, along with an explanation of why access without medical supervision could be harmful to the individual. In any case, do not require the named medical practitioner to request the record for the individual. If, however, the individual refuses or fails to designate a medical practitioner, access shall be refused. The refusal is not considered a denial for reporting purposes under the Privacy Act.

(d) Notifying the individual. Written denial of access must be given to the individual. The denial letter shall include:

(1) The name, title, and signature of a designated denial authority;

(2) The date of the denial;

(3) The specific reason for the denial, citing the appropriate subsections of 5 U.S.C. 552a or this subpart and subpart G of this part authorizing the denial;

(4) The individual's right to appeal the denial within 60 calendar days of the date the notice is mailed; and

(5) The title and address of the review authority.

§ 701.110 Amendment of records.

(a) *Individual review and amendment.* Encourage individuals to review periodically, the information maintained about them in systems of records, and to avail themselves of the amendment procedures established by this subpart and subpart G of this part.

(1) *Right to amend.* An individual may request to amend any record retrieved by his or her personal identifier from a system of records, unless the system has been exempt from the amendment procedures under this subpart. Amendments under this subpart and subpart G of this part are limited to correcting factual matters, not matters of opinion (*i.e.,* information contained in evaluations of promotion potential or performance appraisals). When records sought to be amended are covered by another issuance, the administrative procedures under that issuance must be exhausted before using the Privacy Act. In other words, the Privacy Act may not be used to avoid the administrative procedures required by the issuance actually covering the records in question.

(2) *In writing.* Amendment requests shall be in writing, except for routine administrative changes, such as change of address.

(3) *Content of amendment request.* An amendment request must include a description of the information to be amended; the reason for the amendment; the type of amendment action sought (*i.e.,* deletion, correction, or addition); and copies of available documentary evidence supporting the request.

(b) *Burden of proof.* The individual must provide adequate support for the request.

(c) *Verifying identity.* The individual may be required to provide identification to prevent the inadvertent or intentional amendment of another's record. Use the verification guidelines provided in § 701.109(a)(4).

(d) *Limits on amending judicial and quasi-judicial evidence and findings.* This subpart and subpart G of this part do not permit the alteration of evidence presented in the course of judicial or quasi-judicial proceedings. Amendments to such records must be made in accordance with procedures established for such proceedings. This subpart and subpart G of this part do not permit a collateral attack on a judicial or quasi-judicial finding; however, this subpart and subpart G of this part may be used to challenge the accuracy of recording the finding in a system of records.

(e) *Standards for amendment request determinations.* The record which the individual requests to be amended must meet the recordkeeping standards established in § 701.105. The record must be accurate, relevant, timely, complete, and necessary. If the record in its present state does not meet each of the criteria, grant the amendment request to the extent necessary to meet them.

(f) *Time limits.* Within 10 working days of receiving an amendment request, the systems manager shall provide the individual a written acknowledgement of the request. If action on the amendment request is completed within the 10 working days and the individual is so informed, no separate acknowledgment is necessary. The acknowledgment must clearly identify the request and advise the individual when to expect notification of the completed action. Only under exceptional circumstances should more than 30 working days be required to complete the action on an amendment request.

(g) *Granting an amendment request in whole or in part.*—(1) *Notify the requester.* To the extent the amendment request is granted, the systems manager shall notify the individual and make the appropriate amendment.

(2) *Notify previous recipients.* Notify all previous recipients of the information (as reflected in the disclosure accounting record) that the amendment has been made and provide each a copy of the amended record. Recipients who are known to be no longer retaining the record need not be advised of the amendment. If it is known that other naval activities, DoD components, or Federal agencies have been provided the information that now requires amendment, or if the individual requests that these agencies be notified, provide the notification of amendment even if those activities or agencies are not listed on the disclosure accounting form.

(h) *Denying an amendment request in whole or in part.* If the amendment request is denied in whole or in part, promptly notify the individual in writing. Include in the notification to the individual the following:

(1) Those sections of 5 U.S.C. 552a or this subpart and subpart G of this part upon which the denial is based;

(2) His or her right to appeal to the head of the activity for an independent review of the initial denial;

(3) The procedures for requesting an appeal, including the title and address of the official to whom the appeal should be sent; and

(4) Where the individual can receive assistance in filing the appeal.

(i) *Requests for amending OPM records.* The records in an OPM government-wide system of records are only temporarily in the custody of naval activities. Requests for amendment of these records must be processed in accordance with OPM Regulations and the Federal Personnel Manual. The denial authority may deny a request, but all denials are subject to review by the Assistant Director for Workforce Information, Personnel Systems Oversight Group, Office of Personnel Management, 1900 E Street, NW, Washington, DC 20415.

(j) *Individual's statement of disagreement.* (1) If the review authority refuses to amend the record as requested, the individual may submit a concise statement of disagreement listing the reasons for disagreeing with the refusal to amend.

(2) If possible, incorporate the statement of disagreement into the record. If that is not possible, annotate the record to reflect that the statement was filed and maintain the statement so that it can be readily obtained when the disputed information is used or disclosed.

(3) Furnish copies of the statement of disagreement to all individuals listed on the disclosure accounting form (except those known to be no longer retaining the record), as well as to all other known holders of copies of the record.

(4) Whenever the disputed information is disclosed for any purpose, ensure that the statement of disagreement also is used or disclosed.

(k) *Department of the Navy statement of reasons.* (1) If the individual files a statement of disagreement, the naval activity may file a statement of reasons containing a concise summary of the activity's reasons for denying the amendment request.

(2) The statement of reasons shall contain only those reasons given to the individual by the appellate official and shall not contain any comments on the individual's statement of disagreement.

(3) At the discretion of the naval activity, the statement of reasons may be disclosed to those individuals, activities, and agencies that receive the statement of disagreement.

§ 701.111 Privacy Act appeals.

(a) *How to file an appeal.* The following guidelines shall be followed by individuals wishing to appeal a denial of notification, access, or amendment of records.

(1) The appeal must be received by the cognizant review authority (*i.e.,* ASN (MRA), NJAG, OGC, or OPM) within 60 calendar days of the date of the response.

(2) The appeal must be in writing and requesters should provide a copy of the denial letter and a statement of their reasons for seeking review.

(b) *Time of receipt.* The time limits for responding to an appeal commence when the appeal reaches the office of the review authority having jurisdiction over the record. Misdirected appeals should be referred expeditiously to the proper review authority.

(c) *Review authorities.* ASN (MRA), NJAG, and OGC are authorized to adjudicate appeals made to SECNAV. NJAG and OGC are further authorized to delegate this authority to a designated Assistant NJAG and the Principal Deputy General or Deputy General Counsel, respectively, under such terms and conditions as they deem appropriate.

(1) If the record is from a civilian Official Personnel Folder or is contained on any other OPM forms, send the appeal to the Assistant Director for Workforce Information, Personnel Systems and Oversight Group, Office of Personnel Management, 1900 E Street, NW, Washington, DC 20415. Records in all systems of records maintained in accordance with the OPM government-wide systems notices are only in the temporary custody of the Department of the Navy.

(2) If the record pertains to the employment of a present or former Navy and Marine Corps civilian employee, such as Navy or Marine Corps civilian personnel records or an employee's grievance or appeal file, to the General Counsel, Navy Department, 720 Kennon Street, SE, Washington Navy Yard, Building 36, Washington, DC 20374–5012.

(3) If the record pertains to a present or former military member's fitness reports or performance evaluations to the Assistant Secretary of the Navy (Manpower and Reserve Affairs), Navy Department, Washington, DC 20350–1000.

(4) All other records dealing with present or former military members to the Judge Advocate General, Navy Department, 1322 Patterson Avenue, SE, Suite 3000, Washington Navy Yard, Washington, DC 20374–5066.

(d) *Appeal procedures.* (1) If the appeal is granted, the review authority shall advise the individual that his or her appeal has been granted and provide access to the record being sought.

(2) If the appeal is denied totally or in part, the appellate authority shall advise the reason(s) for denying the appeal, citing the appropriate subsections of 5 U.S.C. 552a or this subpart and subpart G of this part that apply; the date of the appeal determination; the name, title, and signature of the appellate authority; and a statement informing the requester of his or her right to seek judicial relief in the Federal District Court.

(e) *Final action, time limits and documentation.* (1) The written appeal notification granting or denying access is the final naval activity action on the initial request for access.

(2) All appeals shall be processed within 30 working days of receipt, unless the appellate authority finds that an adequate review cannot be completed within that period. If additional time is needed, notify the applicant in writing, explaining the reason for the delay and when the appeal will be completed.

(f) *Denial of appeal by activity's failure to act.* An individual may consider his or her appeal denied if the appellate authority fails to:

(1) Take final action on the appeal within 30 working days of receipt when no extension of time notice was given; or

(2) Take final action within the period established by the notice to the appellate authority of the need for an extension of time to complete action on the appeal.

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§ 701.112 Disclosure of records.

(a) *Conditions of disclosure.* (1) 5 U.S.C. 552a prohibits an agency from disclosing any record contained in a system of records to any person or agency, except when the record subject gives written consent for the disclosure or when one of the 12 conditions listed below in this subsection applies.

(2) Except for disclosures made under 5 U.S.C. 552 (1988) as amended by the Freedom of Information Reform Act of 1986 and Secretary of the Navy Instruction 5720.42F, ''Department of the Navy Freedom of Information Act Program,'' before disclosing any record from a system of records to any recipient other than a Federal agency, make reasonable efforts to ensure the record is accurate, relevant, timely, and complete for Department of the Navy purposes. Records discovered to have been improperly filed in the system of records should be removed before disclosure.

(i) If validation cannot be obtained from the record itself, the naval activity may contact the record subject (if reasonably available) to verify the accuracy, timeliness, completeness, and relevancy of the information.

(ii) If validation cannot be obtained from the record and the record subject is not reasonably available, advise the recipient that the information is believed to be valid as of a specific date and reveal any factors bearing on the validity of the information.

(b) *Nonconsensual disclosures.* 5 U.S.C. 552a provides 12 instances when a record in a system of records may be disclosed without the written consent of the record subject:

(1) *Disclosures within the Department of Defense.* For purposes of disclosing records, the Department of Defense is considered a single agency; hence, a record may be disclosed to any officer or employee in the Department of Defense (including private contractor personnel who are engaged to perform services needed in connection with the operation of a system of records for a DoD component), who have a need for the record in the performance of their duties, provided this use is compatible with the purpose for which the record is maintained. This provision is based on the ''need to know'' concept.

(i) For example, this may include disclosure to personnel managers, review boards, discipline officers, courts-martial personnel, medical officers, investigating officers, and representatives of the Judge Advocate General, Auditor General, Naval Inspector General, or the Naval Investigative Service, who require the information in order to discharge their official duties. Examples of personnel outside the Department of the Navy who may be included are: Personnel of the Joint Staff, Armed Forces Entrance and Examining Stations, Defense Investigative Service, or the other military departments, who require the information in order to discharge an official duty.

(ii) It may also include the transfer of records between naval components and non-DoD agencies in connection with the Personnel Exchange Program (PEP) and interagency support agreements. Disclosure accountings are not required for intra-agency disclosure and disclosures made in connection with interagency support agreements or the PEP. Although some disclosures authorized by this paragraph might also meet the criteria for disclosure under other exceptions specified in the following paragraphs of this section, they should be treated under this paragraph for disclosure accounting purposes.

(2) *Disclosures required by the FOIA.* (i) A record must be disclosed if required by 5 U.S.C. 552 (1988) as amended by the Freedom of Information Reform Act of 1986, which is implemented by Secretary of the Navy Instruction 5720.42F, ''Department of the Navy Freedom of Information Act Program.''

(ii) 5 U.S.C. 552 (1988) as amended by the Freedom of Information Reform Act of 1986 and Secretary of the Navy Instruction 5720.42F, ''Department of the Navy Freedom of Information Act Program'' require that records be made available to any person requesting them in writing, unless the record is exempt from disclosure under one of the nine FOIA exemptions. Therefore, if a record is not exempt from disclosure, it must be provided to the requester.

(iii) Certain records, such as personnel, medical, and similar files, are exempt from disclosure under exemption (b)(6) of 5 U.S.C. 552 (1988) as amended by the Freedom of Information Act Reform Act of 1986. Under that exemption, disclosure of information pertaining to an individual can be denied only when the disclosure would be a clearly unwarranted invasion of personal privacy. The first step is to determine whether a viable personal privacy interest exists in these records involving an identifiable living person. The second step is to consider how disclosure would benefit the general public in light of the content and context of the information in question. The third step is to determine whether the identified public interests qualify for consideration. The fourth step is to balance the personal privacy interests against the qualifying public interest. Numerous factors must be considered such as: The nature of the information to be disclosed (*i.e.,* Do individuals normally have an expectation of privacy in the type of information to be disclosed?); importance of the public interest served by the disclosure and probability of further disclosure which may result in an unwarranted invasion of privacy; relationship of the requester to the public interest being served; newsworthiness of the individual to whom the information pertains (*i.e.,* high ranking officer, public figure); degree of sensitivity of the information from the standpoint of the individual or the individual's family, and its potential for being misused to the harm, embarrassment, or inconvenience of the individual or the individual's family; the passage of time since the event which is the topic of the record (*i.e.,* to disclose that an individual has been arrested and is being held for trial by court-martial is normally permitted, while to disclose an arrest which did not result in conviction might not be permitted after the passage of time); and the degree to which the information is already in the public domain or is already known by the particular requester.

(iv) Records or information from investigatory records, including personnel security investigatory records, are exempt from disclosure under the broader standard of ''an unwarranted invasion of personal privacy'' found in exemption (b)(7)(C) of 5 U.S.C. 552. This broader standard applies only to records or information compiled for law enforcement purposes.

(v) A disclosure under 5 U.S.C. 552 about military members must be in accordance with Secretary of the Navy Instruction 5720.42F, ''Department of the Navy Freedom of Information Act Program'', but the following information normally may be disclosed from military personnel records (except for those personnel assigned to sensitive or routinely deployable units, or located in a foreign territory), without a clearly unwarranted invasion of personal privacy: Full name, rank, date of rank, base pay, past duty stations, present duty station and future duty station (if finalized), unless the stations have been determined by the Department of the Navy to be sensitive, routinely deployable, or located in a foreign territory, office or duty telephone number, source of commission, promotion sequence number, awards and decorations, attendance at professional military schools, and duty status at any given time.

(vi) The following information normally may be disclosed from civilian employee records about CONUS employees: Full name, present and past position titles and occupational series, present and past grades, present and past annual salary rates (including performance awards or bonuses, incentive awards, merit pay amount, Meritorious and Distinguished Executive Ranks, and allowances and differentials), past duty stations, present duty station and future duty station (if finalized), including room numbers, shop designations, or other identifying information regarding buildings or places of employment, unless the duty stations have been determined by the Department of the Navy to be sensitive, routinely deployable, or located in a foreign territory, position descriptions, identification of job elements, and those performance standards (but not actual performance appraisals) that the disclosure of which would not interfere with law enforcement programs or severely inhibit Department of the Navy effectiveness.

(viii) Disclosure of home addresses and home telephone numbers normally is considered a clearly unwarranted invasion of personal privacy and is prohibited. However, they may be disclosed if the individual has consented to the disclosure; the disclosure is required by the FOIA; the disclosure is required by another law, such as 42 U.S.C. 653, which provides assistance to states in locating parents who have defaulted on child support payments, or the collection of alimony, and to state and local tax authorities for the purpose of enforcing tax laws. However, care must be taken prior to release to ensure that a written record is prepared to document the reasons for the release determination.

(A) When compiling home addresses and telephone numbers, the individual may be offered the option of authorizing disclosure of the information without further consent for specific purposes, such as locator services. In that case, the information may be disclosed for the stated purpose without further consent. If the information is to be disclosed for any other purpose, a signed consent permitting the additional disclosure must be obtained from the individual.

(B) Before listing home addresses and telephone numbers in Department of the Navy telephone directories, give the individual the opportunity to refuse such a listing. If the individual requests that the home address or telephone number not be listed in the directory, do not assess any additional fee associated with maintaining an unlisted number for government-owned telephone services.

(C) The sale or rental of lists of names and addresses is prohibited unless such action is specifically authorized by Federal law. This does not prohibit the disclosure of names and addresses made under Secretary of the Navy Instruction 5720.42F, ''Department of the Navy Freedom of Information Act Program.''

(D) In response to FOIA requests, information concerning special and general courts-martial results (*e.g.,* records of trial) are releasable. However, information regarding summary courts-martial and non-judicial punishment are generally not releasable. The balancing of interests must be done. It is possible that in a particular case, information regarding non-judicial punishment should be disclosed pursuant to a FOIA request (*i.e.,* the facts leading to a nonjudicial punishment are particularly newsworthy or the case involves a senior official abusing the public trust through office-related misconduct, such as embezzlement). Announcement of nonjudicial punishment dispositions under JAGMAN, subsection 0107, is a proper exercise of command authority and not a release of information under FOIA or this subpart and subpart G of this part. Exceptions to this policy must be coordinated with CNO (N09B30) or CMC (ARAD) prior to responding to requesters, including all requests for this type of information from members of Congress.

(3) *Disclosures for established routine uses.* (i) Records may be disclosed outside the Department of the Navy if the disclosure is for an established routine use.

(ii) A routine use shall:

(A) Be compatible with and related to the purpose for which the record was created;

(B) Identify the persons or organizations to whom the record may be disclosed;

(C) Identify specifically the uses for which the information may be employed by the receiving person or organization; and

(D) Have been published previously in the **Federal Register**.

(iii) A routine use shall be established for each user of the information outside the Department of the Navy who needs the information for an official purpose.

(iv) Routine uses may be established, discontinued, or amended without the consent of the individuals to whom the records pertain. However, new and amended routine uses must be published in the **Federal Register** at least 30 days before the information may be disclosed under their provisions.

(v) In addition to the routine uses established by the Department of the Navy for each system of records, common ''Blanket Routine Uses,'' applicable to all record systems maintained with the Department of the Navy, have been established. These ''Blanket Routine Uses'' are published at the beginning of the Department of the Navy's **Federal Register** compilation of record systems notices rather than at each system notice and are also reflected in periodic Chief of Naval Operations Notes (OPNAVNOTEs) 5211, ''Current Privacy Act Issuances.'' Unless a system notice specifically excludes a system of records from a ''Blanket Routine Use,'' all ''Blanket Routine Uses'' apply to that system.

(vi) If the recipient has not been identified in the **Federal Register** or if the recipient, though identified, intends to employ the information for a purpose not published in the **Federal Register,** the written consent of the individual is required before the disclosure can be made.

(4) *Disclosures to the Bureau of the Census.* Records may be disclosed to the Bureau of the Census for purposes of planning or carrying out a census, survey, or related activities authorized by 13 U.S.C. 8.

(5) *Disclosures for statistical research or reporting.* Records may be disclosed to a recipient for statistical research or reporting if:

(i) Prior to the disclosure, the recipient has provided adequate written assurance that the records shall be used solely for statistical research or reporting; and

(ii) The records are transferred in a form that does not identify individuals.

(6) *Disclosures to the National Archives and Records Administration.* (i) Records may be disclosed to the National Archives and Records Administration for evaluation to determine whether the records have sufficient historical or other value to warrant preservation by the Federal government. If preservation is warranted, the records will be retained by the National Archives and Record Administration, which becomes the official owner of the records.

(ii) Records may be disclosed to the National Archives and Records Administration to carry out records management inspections required by Federal law.

(iii) Records transferred to a Federal Records Center operated by the National Archives and Records Administration for storage are not within this category. Those records continue to be maintained and controlled by the transferring naval activity. The Federal

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Records Center is considered the agent of Department of the Navy and the disclosure is made under paragraph (b)(1) of this section.

(7) *Disclosures when requested for law enforcement purposes.* (i) A record may be disclosed to another agency or an instrumentality of any governmental jurisdiction within or under the control of the U.S. for a civil or criminal law enforcement activity if:

(A) The civil or criminal law enforcement activity is authorized by law (federal, state or local); and

(B) The head of the agency (or his or her designee) has made a written request to the naval activity specifying the particular record or portion desired and the law enforcement purpose for which it is sought.

(ii) Blanket requests for any and all records pertaining to an individual shall not be honored. The requesting agency must specify each record or portion desired and how each relates to the authorized law enforcement activity.

(iii) If a naval activity discloses a record outside the Department of Defense for law enforcement purposes without the individual's consent and without an adequate written request, the disclosure must be under an established routine use, such as the ''Blanket Routine Use'' for law enforcement.

(iv) Disclosure to foreign law enforcement agencies is not governed by the provisions of 5 U.S.C. 552a and this paragraph, but may be made only under established ''Blanket Routine Uses,'' routine uses published in the individual record system notice, or to other governing authority.

(8) *Disclosure to protect the health or safety of an individual.* Disclosure may be made under emergency conditions involving circumstances affecting the health and safety of an individual (*i.e.,* when the time required to obtain the consent of the individual to whom the records pertain might result in a delay which could impair the health or safety of a person) provided notification of the disclosure is sent to the record subject. Sending the notification to the last known address is sufficient. In instances where information is requested by telephone, an attempt will be made to verify the inquirer's and medical facility's identities and the caller's telephone number. The requested information, if then considered appropriate and of an emergency nature, may be provided by return call.

(9) *Disclosures to Congress.* (i) A record may be disclosed to either House of Congress at the request of either the Senate or House of Representatives as a whole.

(ii) A record also may be disclosed to any committee, subcommittee, or joint committee of Congress if the disclosure pertains to a matter within the legislative or investigative jurisdiction of the committee, subcommittee, or joint committee.

(iii) Disclosure may not be made to a Member of Congress requesting in his or her individual capacity. However, for Members of Congress making inquiries on behalf of individuals who are subjects of records, a ''Blanket Routine Use'' has been established to permit disclosures to individual Members of Congress.

(A) When responding to a congressional inquiry made on behalf of a constituent by whose identifier the record is retrieved, there is no need to verify that the individual has authorized the disclosure to the Member of Congress.

(B) The oral or written statement of a Congressional staff member is sufficient to establish that a request has been received from the individual to whom the record pertains.

(C) If the constituent inquiry is made on behalf of an individual other than the record subject, provide the Member of Congress only that information releasable under 5 U.S.C. 552. Advise the Member of Congress that the written consent of the record subject is required before additional information may be disclosed. Do not contact the record subject to obtain consent for the disclosure to the Member of Congress unless the Congressional office specifically requests it be done.

(10) *Disclosures to the Comptroller General for the General Accounting Office (GAO).* Records may be disclosed to the Comptroller General of the U.S., or authorized representative, in the course of the performance of the duties of the GAO.

(11) *Disclosures under court orders.* (i) Records may be disclosed under the order of a court of competent jurisdiction.

(ii) When a record is disclosed under this provision and the compulsory legal process becomes a matter of public record, make reasonable efforts to notify the individual to whom the record pertains. Notification sent to the last known address of the individual is sufficient. If the order has not yet become a matter of public record, seek to be advised as to when it will become public. Neither the identity or the party to whom the disclosure was made nor the purpose of the disclosure shall be made available to the record subject unless the court order has become a matter of public record.

(iii) The court order must bear the signature of a federal, state, or local judge. Orders signed by court clerks or attorneys are not deemed to be orders of a court of competent jurisdiction. A photocopy of the order, regular on its face, will be sufficient evidence of the court's exercise of its authority of the minimal requirements of SECNAVINST 5820.8A,[9] ''Release of Official Information for Litigation Purposes and Testimony by Department of the Navy Personnel.''

(12) *Disclosures to consumer reporting agencies.* Certain information may be disclosed to consumer reporting agencies (i.e., credit reference companies such as TRW and Equifax, etc.) as defined by the Federal Claims Collection Act of 1966 (31 U.S.C. 952d). Under the provisions of that Act, the following information may be disclosed to a consumer reporting agency:

(i) Name, address, taxpayer identification number (SSN), and other information necessary to establish the identity of the individual;

(ii) The amount, status, and history of the claim; and

(iii) The agency or program under which the claim arose. 31 U.S.C. 952d specifically requires that the **Federal Register** notice for the system of records from which the information will be disclosed indicate that the information may be disclosed to a consumer reporting agency.

(c) *Disclosures to commercial enterprises.* Records may be disclosed to commercial enterprises only under the criteria established by Secretary of the Navy Instruction 5720.42F and 42 U.S.C. 653, Parent Locator Service for Enforcement of Child Support.

(1) Any information required to be disclosed by Secretary of the Navy Instruction 5720.42F and 42 U.S.C. 653, Parent Locator Service for Enforcement of Child Support may be disclosed to a requesting commercial enterprise.

(2) Commercial enterprises may present a consent statement signed by the individual indicating specific conditions for disclosing information from a record. Statements such as the following, if signed by the individual, are considered sufficient to authorize the disclosure: I hereby authorize the Department of the Navy to verify my SSN or other identifying information and to disclose my home address and telephone number to authorized representatives of (name of commercial enterprise) to be used in connection

[9] Copies may be obtained: Judge Advocate General, Navy Department, (Code 34), 1322 Patterson Avenue, SE, Suite 3000, Washington Navy Yard, Washington, DC 20374–5066.

with my commercial dealings with that enterprise. All information furnished will be used in connection with my financial relationship with (name of commercial enterprise).

(3) When a consent statement as described in the preceding subsection is presented, provide the information to the commercial enterprise, unless the disclosure is prohibited by another regulation or Federal law.

(4) Blanket consent statements that do not identify the Department of Defense or Department of the Navy, or that do not specify exactly the information to be disclosed, may be honored if it is clear that the individual, in signing the consent statement, was seeking a personal benefit (i.e., loan for a house or automobile) and was aware of the type of information necessary to obtain the benefit sought.

(5) Do not honor requests from commercial enterprises for official evaluations of personal characteristics such as personal financial habits.

(d) *Disclosure of health care records to the public.* This paragraph applies to disclosure of information to the news media and the public concerning individuals treated or hospitalized in Department of the Navy medical facilities and, when the cost of care is paid by the Department of the Navy, in non-Federal facilities.

(1) *Disclosures without the individual's consent.* Normally, the following information may be disclosed without the individual's consent:

(i) Information required to be released by Secretary of the Navy Instruction 5720.42F and OPM Regulations and the Federal Personnel Manual, as well as the information listed in paragraphs (b)(2)(v) (for military personnel) and (b)(2) of this section.

(ii) For civilian employees; and

(iii) General information concerning medical conditions, i.e., date of admission or disposition; present medical assessment of the individual's condition if the medical practitioner has volunteered the information, i.e., the individual's condition presently is (stable) (good) (fair) (serious) (critical), and the patient is (conscious) (semi-conscious) (unconscious).

(2) *Disclosures with the individual's consent.* With the individual's informed consent, any information about the individual may be disclosed. If the individual is a minor or has been declared incompetent by a court of competent jurisdiction, the parent of the minor or appointed legal guardian of the incompetent may give consent on behalf of the individual.

(e) Disclosure of Personal Information on Group/Bulk Orders. Do not use personal information including complete SSNs, home addresses and phone numbers, dates of birth, etc., on group/bulk orders. This personal information should not be posted on lists that everyone listed on the orders sees. Such a disclosure of personal information violates the Privacy Act and this subpart and subpart G of this part.

(f) *Disclosure accounting.* Keep an accurate record of all disclosures made from a record (including those made with the consent of the individual) except those made to DoD personnel for use in performing their official duties; and those made under the FOIA. Disclosure accounting is to permit the individual to determine what agencies or persons have been provided information from the record, enable Department of the Navy activities to advise prior recipients of the record of any subsequent amendments or statements of dispute concerning the record, and provide an audit trial of Department of the Navy's compliance with 5 U.S.C. 552a.

(1) Disclosure accountings shall contain the date of the disclosure; a description of the information disclosed; the purpose of the disclosure; and the name and address of the person or agency to whom the disclosure was made.

(2) The record subject has the right of access to the disclosure accounting except when the disclosure was made at the request of a civil or criminal law enforcement agency under paragraph (b)(7) of this section; or when the system of records has been exempted from the requirement to provide access to the disclosure accounting.

(g) *Methods of disclosure accounting.* Since the characteristics of various records maintained within the Department of the Navy vary widely, no uniform method for keeping disclosure accountings is prescribed. The primary criteria are that the selected method be one which will:

(1) Enable an individual to ascertain what persons or agencies have received disclosures pertaining to him/her;

(2) Provide a basis for informing recipients of subsequent amendments or statements of dispute concerning the record; and

(3) Provide a means to prove, if necessary that the activity has complied with the requirements of 5 U.S.C. 552a and this subpart and subpart G of this part.

(h) *Retention of disclosure accounting.* Maintain a disclosure accounting of the life of the record to which the disclosure pertains, or 5 years after the date of the disclosure, whichever is longer. Disclosure accounting records are normally maintained with the record, as this will ensure compliance with paragraph (f) of this section.

§ 701.113 Exemptions.

(a) *Using exemptions.* No system of records is automatically exempt from all provisions of 5 U.S.C. 552a. A system of records is exempt from only those provisions of 5 U.S.C. 552a that are identified specifically in the exemption rule for the system. Subpart G of this part contains the systems designated as exempt, the types of exemptions claimed, the authority and reasons for invoking the exemptions and the provisions of 5 U.S.C. 552a from which each system has been exempt. Exemptions are discretionary on the part of Department of the Navy and are not effective until published as a final rule in the **Federal Register**. The naval activity maintaining the system of records shall make a determination that the system is one for which an exemption may be established and then propose an exemption rule for the system. Submit the proposal to CNO (N09B30) for approval and publication in the **Federal Register**.

(b) *Types of exemptions.* There are two types of exemptions permitted by 5 U.S.C. 552a.

(1) *General exemptions.* Those that authorize the exemption of a system of records from all but specifically identified provisions of 5 U.S.C. 552a.

(2) *Specific exemptions.* Those that allow a system of records to be exempt from only a few designated provisions of 5 U.S.C. 552a.

(c) *Establishing exemptions.* (1) 5 U.S.C. 552a authorizes the Secretary of the Navy to adopt rules designating eligible systems of records as exempt from certain requirements. The Secretary of the Navy has delegated the CNO (N09B30) to make a determination that the system is one for which an exemption may be established and then propose and establish an exemption rule for the system. No system of records within Department of the Navy shall be considered exempt until the CNO (N09B30) has approved the exemption and an exemption rule has been published as a final rule in the **Federal Register**. A system of records is exempt from only those provisions of 5 U.S.C. 552a that are identified specifically in the Department of the Navy exemption rule for the system.

(2) No exemption may be established for a system of records until the system itself has been established by publishing a notice in the **Federal Register**, at least 30 days prior to the effective date, describing the system. This allows

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interested persons an opportunity to comment. An exemption may not be used to deny an individual access to information that he or she can obtain under Secretary of the Navy Instruction 5720.42F, ''Department of the Navy Freedom of Information Act Program.''

(d) *Exemption for classified material.* All systems of records maintained by the Department of the Navy shall be exempt under section (k)(1) of 5 U.S.C. 552a, to the extent that the systems contains any information properly classified under E.O. 12958 and that is required by that E.O. to be kept secret in the interest of national defense or foreign policy. This exemption is applicable to parts of all systems of records including those not otherwise specifically designated for exemptions herein which contain isolated items of properly classified information.

Note: Department of the Navy Privacy Act systems of records which contain classified information automatically qualify for a (k)(1) exemption, without establishing an exemption rule.

(e) *Exempt records in nonexempt systems.* (1) An exemption rule applies to the system of records for which it was established. If a record from an exempt system is incorporated intentionally into a system that has not been exempt, the published notice and rules for the nonexempt system will apply to the record and it will not be exempt from any provisions of 5 U.S.C. 552a.

(2) A record from one component's (i.e., Department of the Navy) exempted system that is temporarily in the possession of another component (i.e., Army) remains subject to the published system notice and rules of the originating component's (i.e., Department of the Navy). However, if the non-originating component incorporates the record into its own system of records, the published notice and rules for the system into which it is incorporated shall apply. If that system of records has not been exempted, the record shall not be exempt from any provisions of 5 U.S.C. 552a.

(3) A record accidentally misfiled into a system of records is governed by the published notice and rules for the system of records in which it actually should have been filed.

(f) *General exemptions.* (1)*Central Intelligence Agency (CIA).* The Department of the Navy is not authorized to establish an exemption for records maintained by the CIA under subsection (j)(1) of 5 U.S.C. 552a.

(2) *Law enforcement.* (i) The general exemption provided by subsection (j)(2) of 5 U.S.C. 552a may be established to protect criminal law enforcement records maintained by Department of the Navy.

(ii) To be eligible for the (j)(2) exemption, the system of records must be maintained by an element that performs, as one of its principal functions, the enforcement of criminal laws. The Naval Investigative Service, Naval Inspector General, and military police activities qualify for this exemption.

(iii) Criminal law enforcement includes police efforts to detect, prevent, control, or reduce crime, or to apprehend criminals, and the activities of prosecution, court, correctional, probation, pardon, or parole authorities.

(iv) Information that may be protected under the (j)(2) exemption includes:

(A) Information compiled for the purpose of identifying criminal offenders and alleged criminal offenders consisting of only identifying data and notations of arrests; the nature and disposition of criminal charges; and sentencing, confinement, release, parole, and probation status;

(B) Information compiled for the purpose of a criminal investigation, including reports of informants and investigators, and associated with an identifiable individual; and

(C) Reports identifiable to an individual, compiled at any stage of the enforcement process, from arrest, apprehension, indictment, or preferral of charges through final release from the supervision that resulted from the commission of a crime.

(v) The (j)(2) exemption does not apply to:

(A) Investigative records maintained by a naval activity having no criminal law enforcement duties as one of its principle functions, or

(B) Investigative records compiled by any element concerning individual's suitability, eligibility, or qualification for duty, employment, or access to classified information, regardless of the principle functions of the naval activity that compiled them.

(vi) The (j)(2) exemption established for a system of records maintained by a criminal law enforcement activity cannot protect law enforcement records incorporated into a nonexempt system of records or any system of records maintained by an activity not principally tasked with enforcing criminal laws. All system managers, therefore, are cautioned to comply strictly with Department of the Navy regulations or instructions prohibiting or limiting the incorporation of criminal law enforcement records into systems other than those maintained by criminal law enforcement activities.

(g) *Specific exemptions.* Specific exemptions permit certain categories of records to be exempted from specific provisions of 5 U.S.C. 552a. Subsections (k)(1)–(k)(7) of 5 U.S.C. 552a allow exemptions for seven categories of records. To be eligible for a specific exemption, the record must meet the corresponding criteria.

Note: Department of the Navy Privacy Act systems of records which contain classified information automatically qualify for a (k)(1) exemption, without an established exemption rule.

(1) *(k)(1) exemption:* Information properly classified under Secretary of the Navy Instruction 5720.42F, ''Department of the Navy Freedom of Information Act Program'' and E.O. 12958, in the interest of national defense or foreign policy.

(2) *(k)(2) exemption:* Investigatory information (other than that information within the scope of paragraph (f)(2) of this section) compiled for law enforcement purposes. If maintaining the information causes an individual to be ineligible for or denied any right, benefit, or privilege that he or she would otherwise be eligible for or entitled to under Federal law, then he or she shall be given access to the information, except for the information that would identify a confidential source (see paragraph (h) of this section, ''confidential source''). The (k)(2) exemption, when established, allows limited protection on investigative records maintained for use in personnel and administrative actions.

(3) *(k)(3) exemption:* Records maintained in connection with providing protective services to the President of the United States and other individuals under 18 U.S.C. 3056.

(4) *(k)(4) exemption:* Records required by Federal law to be maintained and used solely as statistical records that are not used to make any determination about an identifiable individual, except as provided by 13 U.S.C. 8.

(5) *(k)(5) exemption:* Investigatory material compiled solely for the purpose of determining suitability, eligibility, or qualifications for Federal civilian employment, military service, Federal contracts, or access to classified information, but only to the extent such material would reveal the identity of a confidential source (see paragraph (h) of this section, ''confidential source''). This exemption allows protection of confidential sources in background investigations, employment inquiries, and similar inquiries used in personnel screening to determine suitability, eligibility, or qualifications.

(6) *(k)(6) exemption:* Testing or examination material used solely to

determine individual qualifications for appointment or promotion in the Federal or military service if the disclosure would compromise the objectivity or fairness of the testing or examination process.

(7) *(k)(7) exemption:* Evaluation material used to determine potential for promotion in the military services, but only to the extent that disclosure would reveal the identity of a confidential source (see paragraph (h) of this section, ''confidential source''.)

(h) *Confidential source.* Promises of confidentiality are to be given on a limited basis and only when essential to obtain the information sought. Establish appropriate procedures for granting confidentiality and designate those categories of individuals authorized to make such promises.

§ 701.114 Enforcement actions.

(a) *Administrative remedies.* An individual who alleges he or she has been affected adversely by a naval activity's violation of 5 U.S.C. 552a or this subpart and subpart G of this part shall be permitted to seek relief from SECNAV through proper administrative channels.

(b) *Civil court actions.* After exhausting all administrative remedies, an individual may file suit in Federal court against a naval activity for any of the following acts:

(1) *Denial of an amendment request.* The activity head, or his or her designee wrongfully refuses the individual's request for review of the initial denial of an amendment or, after review, wrongfully refuses to amend the record;

(2) *Denial of access.* The activity wrongfully refuses to allow the individual to review the record or wrongfully denies his or her request for a copy of the record;

(3) *Failure to meet recordkeeping standards.* The activity fails to maintain an individual's record with the accuracy, relevance, timeliness, and completeness necessary to assure fairness in any determination about the individual's rights, benefits, or privileges and, in fact, makes an adverse determination based on the record; or

(4) *Failure to comply with Privacy Act.* The activity fails to comply with any other provision of 5 U.S.C. 552a or any rule or regulation promulgated under 5 U.S.C. 552a and thereby causes the individual to be adversely affected.

(c) *Criminal penalties.* Subsection (i)(1) of 5 U.S.C. 552a authorizes three criminal penalties against individuals for violations of its provisions. All three are misdemeanors punishable by fines of $5,000.

(1) *Wrongful disclosure.* Any member or employee of Department of the Navy who, by virtue of his or her employment or position, has possession of or access to records and willfully makes a disclosure knowing that disclosure is in violation of 5 U.S.C. 552a or this subpart and subpart G of this part.

(2) *Maintaining unauthorized records.* Any member or employee of Department of the Navy who willfully maintains a system of records for which a notice has not been published under periodic Chief of Naval Operations Notes (OPNAVNOTEs) 5211, ''Current Privacy Act Issuances.''

(3) *Wrongful requesting or obtaining records.* Any person who knowingly and willfully requests or obtains information concerning an individual under false pretenses.

§ 701.115 Computer matching program.

(a) *General.* 5 U.S.C. 552a and this subpart and subpart G of this part are applicable to certain types of computer matching, i.e., the computer comparison of automated systems of records. There are two specific kinds of matching programs that are fully governed by 5 U.S.C. 552a and this subpart and subpart G of this part:

(1) Matches using records from Federal personnel or payroll systems of records;

(2) Matches involving Federal benefit programs to accomplish one or more of the following purposes:

(i) To determine eligibility for a Federal benefit.

(ii) To comply with benefit program requirements.

(iii) To effect recovery of improper payments or delinquent debts from current or former beneficiaries.

(b) *The record comparison must be a computerized one.* Manual comparisons are not covered, involving records from two or more automated systems of records (i.e., systems of records maintained by Federal agencies that are subject to 5 U.S.C. 552a); or a Department of the Navy automated systems of records and automated records maintained by a non-Federal agency (i.e., State or local government or agent thereof). A covered computer matching program entails not only the actual computerized comparison, but also preparing and executing a written agreement between the participants, securing approval of the Defense Data Integrity Board, publishing a matching notice in the **Federal Register** before the match begins, ensuring that investigation and due process are completed, and taking ultimate action, if any.

Subpart G—Privacy Act Exemptions

Authority: Pub. L. 93–579, 88 Stat 1896 (5 U.S.C. 552a).

§ 701.116 Purpose.

Subparts F and G of this part contain rules promulgated by the Secretary of the Navy, pursuant to 5 U.S.C. 552a (j) and (k), and subpart F, § 701.113, to exempt certain systems of Department of the Navy records from specified provisions of 5 U.S.C. 552a.

§ 701.117 Exemption for classified records.

All systems of records maintained by the Department of the Navy shall be exempt from the requirements of the access provision of the Privacy Act (5 U.S.C. 552a(d)) under the (k)(1) exemption, to the extent that the system contains information properly classified under E.O. 12958 and that is required by that E.O. to be kept secret in the interest of national defense or foreign policy. This exemption is applicable to parts of all systems of records including those not otherwise specifically designated for exemptions herein which contain isolated items of properly classified information.

§ 701.118 Exemptions for specific Navy record systems.

(a) *System identifier and name:*

(1) *N01070–9, White House Support Program.*

(2) *Exemption:* (i) Information specifically authorized to be classified under E.O. 12958, as implemented by DoD 5200.1–R, may be exempt pursuant to 5 U.S.C. 552a(k)(1).

(ii) Investigatory material compiled for law enforcement purposes may be exempt pursuant to 5 U.S.C. 552a(k)(2). However, if an individual is denied any right, privilege, or benefit for which he would otherwise be entitled by Federal law or for which he would otherwise be eligible, as a result of the maintenance of such information, the individual will be provided access to such information except to the extent that disclosure would reveal the identity of a confidential source.

(iii) Records maintained in connection with providing protective services to the President and other individuals under 18 U.S.C. 3506, may be exempt pursuant to 5 U.S.C. 552a(k)(3).

(iv) Investigatory material compiled solely for the purpose of determining suitability, eligibility, or qualifications for federal civilian employment, military service, federal contracts, or access to classified information may be exempt pursuant to 5 U.S.C. 552a(k)(5),

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but only to the extent that such material would reveal the identity of a confidential source.

(v) Portions of this system of records are exempt from the following subsections of the Privacy Act: (c)(3), (d), (e)(1), (e)(4) (G) through (I), and (f).

(3) *Authority:* 5 U.S.C. 552a(k)(1), (k)(2), (k)(3), and (k)(5).

(4) *Reasons:* (i) Exempted portions of this system contain information which has been properly classified under E.O. 12958, and which is required to be kept secret in the interest of national defense or foreign policy. Exempted portions of this system may also contain information considered relevant and necessary to make a determination as to qualifications, eligibility, or suitability for access to classified information, and which was obtained by providing an express or implied promise to the source that his or her identity would not be revealed to the subject of the record. Exempted portions of this system may also contain information collected and maintained in connection with providing protective services to the President and other individuals protected pursuant to 18 U.S.C. 3056. Exempted portions of this system may also contain investigative records compiled for law enforcement purposes, the disclosure of which could reveal the identity of sources who provide information under an express or implied promise of confidentiality, compromise investigative techniques and procedures, jeopardize the life or physical safety of law-enforcement personnel, or otherwise interfere with enforcement proceedings or adjudications.

(b) *System identifier and name:*

(1) *N01131–1, Officer Selection and Appointment System.*

(2) *Exemption:* (i) Information specifically authorized to be classified under E.O. 12958, as implemented by DoD 5200.1–R, may be exempt pursuant to 5 U.S.C. 552a(k)(1).

(ii) Investigatory material compiled solely for the purpose of determining suitability, eligibility, or qualifications for federal civilian employment, military service, federal contracts, or access to classified information may be exempt pursuant to 5 U.S.C. 552a(k)(5), but only to the extent that such material would reveal the identity of a confidential source.

(iii) Testing or examination material used solely to determine individual qualifications for appointment or promotion in the Federal service may be exempt pursuant to 5 U.S.C. 552a(k)(6), if the disclosure would compromise the objectivity or fairness of the test or examination process.

(iv) Evaluation material used to determine potential for promotion in the Military Services may be exempt pursuant to 5 U.S.C. 552a(k)(7), but only to the extent that the disclosure of such material would reveal the identity of a confidential source.

(v) Portions of this system of records are exempt from the following subsections of the Privacy Act: (c)(3), (d), (e)(1), (e)(4)(G) through (I), and (f).

(3) *Authority:* 5 U.S.C. 552a(k)(1), (k)(5), (k)(6), and (k)(7).

(4) *Reasons:* (i) Granting individuals access to portions of this system of records could result in the disclosure of classified material, or the identification of sources who provided information to the government under an express or implied promise of confidentiality. Material will be screened to permit access to unclassified material and to information that does not disclose the identity of a confidential source.

(c) *System identifier and name:*

(1) *N01133–2, Recruiting Enlisted Selection System.*

(2) *Exemption:* (i) Information specifically authorized to be classified under E.O. 12958, as implemented by DoD 5200.1–R, may be exempt pursuant to 5 U.S.C. 552a(k)(1).

(ii) Investigatory material compiled solely for the purpose of determining suitability, eligibility, or qualifications for federal civilian employment, military service, federal contracts, or access to classified information may be exempt pursuant to 5 U.S.C. 552a(k)(5), but only to the extent that such material would reveal the identity of a confidential source.

(iii) Testing or examination material used solely to determine individual qualifications for appointment or promotion in the Federal service may be exempt pursuant to 5 U.S.C. 552a(k)(6), if the disclosure would compromise the objectivity or fairness of the test or examination process.

(iv) Evaluation material used to determine potential for promotion in the Military Services may be exempt pursuant to 5 U.S.C. 552a(k)(7), but only to the extent that the disclosure of such material would reveal the identity of a confidential source.

(v) Portions of this system of records are exempt from the following subsections of the Privacy Act: (c)(3), (d), (e)(1), (e)(4)(G) through (I), and (f).

(3) *Authority:* 5 U.S.C. 552a(k)(1), (k)(5), (k)(6), and (k)(7).

(4) *Reasons:* Granting individuals access to portions of this system of records could result in the disclosure of classified material, or the identification of sources who provided information to the government under an express or implied promise of confidentiality. Material will be screened to permit access to unclassified material and to information that does not disclose the identity of a confidential source.

(d) *System identifier and name:*

(1) *N01640–1, Individual Correctional Records.*

(2) *Exemption:* (i) Parts of this system may be exempt pursuant to 5 U.S.C. 552a(j)(2) if the information is compiled and maintained by a component of the agency which performs as its principle function any activity pertaining to the enforcement of criminal laws.

(ii) Portions of this system of records are exempt from the following subsections of the Privacy Act: (c)(3), (c)(4), (d), (e)(2), (e)(3), (e)(4)(G) through (I), (e)(5), (e)(8), (f), and (g).

(3) *Authority:* 5 U.S.C. 552a(j)(2).

(4) *Reason:* (i) Granting individuals access to portions of these records pertaining to or consisting of, but not limited to, disciplinary reports, criminal investigations, and related statements of witnesses, and such other related matter in conjunction with the enforcement of criminal laws, could interfere with the orderly investigations, with the orderly administration of justice, and possibly enable suspects to avoid detection or apprehension. Disclosure of this information could result in the concealment, destruction, or fabrication of evidence, and jeopardize the safety and well-being of informants, witnesses and their families, and law enforcement personnel and their families. Disclosure of this information could also reveal and render ineffectual investigative techniques, sources, and methods used by these components and could result in the invasion of the privacy of individuals only incidentally related to an investigation. The exemption of the individual's right of access to portions of these records, and the reasons therefor, necessitate the exemption of this system of records from the requirement of the other cited provisions.

(e) *System identifier and name:*

(1) *N01754–3, Navy Child Development Services Program.*

(2) *Exemption:* (i) Investigatory material compiled for law enforcement purposes may be exempt pursuant to 5 U.S.C. 552a(k)(2). However, if an individual is denied any right, privilege, or benefit for which he would otherwise be entitled by Federal law or for which he would otherwise be eligible, as a result of the maintenance of such information, the individual will be provided access to such information except to the extent that disclosure would reveal the identity of a confidential source.

(ii) Portions of this system of records are exempt from the following subsections of the Privacy Act: (c)(3) and (d).

(3) *Authority:* 5 U.S.C. 552a(k)(2).

(4) *Reasons:* (i) Exemption is needed in order to encourage persons having knowledge of abusive or neglectful acts toward children to report such information, and to protect such sources from embarrassment or recrimination, as well as to protect their right to privacy. It is essential that the identities of all individuals who furnish information under an express promise of confidentiality be protected. Additionally, granting individuals access to information relating to criminal and civil law enforcement, as well as the release of certain disclosure accountings, could interfere with ongoing investigations and the orderly administration of justice, in that it could result in the concealment, alteration, destruction, or fabrication of information; could hamper the identification of offenders and the disposition of charges; and could jeopardize the safety and well being of parents and their children.

(f) *System identifier and name:*

(1) *N03834–1, Special Intelligence Personnel Access File.*

(2) *Exemption:* (i) Information specifically authorized to be classified under E.O. 12958, as implemented by DoD 5200.1–R, may be exempt pursuant to 5 U.S.C. 552a(k)(1).

(ii) Investigatory material compiled solely for the purpose of determining suitability, eligibility, or qualifications for federal civilian employment, military service, federal contracts, or access to classified information may be exempt pursuant to 5 U.S.C. 552a(k)(5), but only to the extent that such material would reveal the identity of a confidential source.

(iii) Portions of this system of records are exempt from the following subsections of the Privacy Act: (c)(3), (d), (e)(1), (e)(4) (G) through (I), and (f).

(3) *Authority:* 5 U.S.C. 552a(k)(1) and (k)(5).

(4) *Reasons:* (i) Exempted portions of this system contain information that has been properly classified under E.O. 12356, and that is required to be kept secret in the interest of national defense or foreign policy.

(ii) Exempted portions of this system also contain information considered relevant and necessary to make a determination as to qualifications, eligibility, or suitability for access to classified information and was obtained by providing an express or implied assurance to the source that his or her identity would not be revealed to the subject of the record.

(g) *System identifier and name:*

(1) *N04060–1, Navy and Marine Corps Exchange Security Files.*

(2) *Exemption:* (i) Investigatory material compiled for law enforcement purposes may be exempt pursuant to 5 U.S.C. 552a(k)(2). However, if an individual is denied any right, privilege, or benefit for which he would otherwise be entitled by Federal law or for which he would otherwise be eligible, as a result of the maintenance of such information, the individual will be provided access to such information except to the extent that disclosure would reveal the identity of a confidential source.

(ii) Portions of this system of records are exempt from the following subsections of the Privacy Act: (c)(3), (d), (e)(4) (G) through (I), and (f).

(3) *Authority:* 5 U.S.C. 552a(k)(2).

(4) *Reasons:* (i) Granting individuals access to information collected and maintained by these activities relating to the enforcement of criminal laws could interfere with orderly investigations, with orderly administration of justice, and possibly enable suspects to avoid detection or apprehension. Disclosure of this information could result in the concealment, destruction, or fabrication of evidence, and could also reveal and render ineffectual investigative techniques, sources, and methods used by these activities.

(h) [Reserved]

(i) *System identifier and name:*

(1) *N05041–1, Inspector General (IG) Records.*

(2) *Exemption:* (i) Information specifically authorized to be classified under E.O. 12958, as implemented by DoD 5200.1–R, may be exempt pursuant to 5 U.S.C. 552a(k)(1).

(ii) Investigatory material compiled for law enforcement purposes may be exempt pursuant to 5 U.S.C. 552a(k)(2). However, if an individual is denied any right, privilege, or benefit for which he would otherwise be entitled by Federal law or for which he would otherwise be eligible, as a result of the maintenance of such information, the individual will be provided access to such information except to the extent that disclosure would reveal the identity of a confidential source.

(iii) Portions of this system of records may be exempt from the provisions of 5 U.S.C. 552a(c)(3); (d); (e)(1); (e)(4)(G), (H), and (I); and (f).

(3) *Authority:* 5 U.S.C. 552a(k)(1) and (k)(2).

(4) *Reasons:* (i) From subsection (c)(3) because the release of the disclosure accounting would permit individuals to obtain valuable information concerning the nature of the investigation and would present a serious impediment to the orderly conduct of any investigative activities. Such accounting could result in the release of properly classified information which would compromise the national defense or disrupt foreign policy.

(ii) From subsections (d) and (f) because access to the records would inform individuals of the existence and nature of the investigation; provide information that might result in the concealment, destruction, or fabrication of evidence; possibly jeopardize the safety and well-being of informants, witnesses and their families; likely reveal and render ineffectual investigatory techniques and methods and sources of information; and possibly result in the invasion of the personal privacy of third parties. Access could result in the release of properly classified information which could compromise the national defense or disrupt foreign policy. Amendment of the records would interfere with the ongoing investigation and impose an impossible administrative burden by requiring investigations to be continually reinvestigated.

(iii) From subsection (e)(1) because in the course of the investigation it is not always possible, at least in the early stages of the inquiry, to determine relevance and or necessity as such determinations may only occur after the information has been evaluated. Information may be obtained concerning the actual or potential violation of laws or regulations other than those relating to the ongoing investigation. Such information should be retained as it can aid in establishing patterns of improper activity and can provide valuable leads in the conduct of other investigations.

(iv) From subsection (e)(4)(G) and (H) because this system of records is exempt from individual access pursuant to subsections (k)(1) and (k)(2) of the Privacy Act of 1974.

(v) From subsection (e)(4)(I) because it is necessary to protect the confidentiality of sources and to protect the privacy and physical safety of witnesses. Although the system is exempt from this requirement, the Department of the Navy has published a notice in broad, generic terms in the belief that this is all that subsection (e)(4)(I) of the Act requires.

(j) *System identifier and name:*

(1) *N05300–3, Faculty Professional Files.*

(2) *Exemption:* Investigatory material compiled solely for the purpose of determining suitability, eligibility, or qualifications for federal civilian

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employment, military service, federal contracts, or access to classified information may be exempt pursuant to 5 U.S.C. 552a(k)(5), but only to the extent that such material would reveal the identity of a confidential source.

(ii) Portions of this system of records are exempt from the following subsections of the Privacy Act: (c)(3), (d), (e)(4) (G) and (H), and (f).

(3) *Authority:* 5 U.S.C. 552a(k)(5).

(4) *Reasons:* Exempted portions of this system contain information considered relevant and necessary to make a release determination as to qualifications, eligibility, or suitability for Federal employment, and was obtained by providing an express or implied promise to the source that his or her identity would not be revealed to the subject of the record.

(k) *System identifier and name:*

(1) *N05354–1, Equal Opportunity Information Management System.*

(2) *Exemption:* (i) Information specifically authorized to be classified under E.O. 12958, as implemented by DoD 5200.1–R, may be exempt pursuant to 5 U.S.C. 552a(k)(1).

(ii) Investigatory material compiled solely for the purpose of determining suitability, eligibility, or qualifications for federal civilian employment, military service, federal contracts, or access to classified information may be exempt pursuant to 5 U.S.C. 552a(k)(5), but only to the extent that such material would reveal the identity of a confidential source.

(iii) Portions of this system of records are exempt from the following subsections of the Privacy Act: (c)(3), (d), (e)(4)(G) through (I), and (f).

(3) *Authority:* 5 U.S.C. 552a(k)(1) and (k)(5).

(4) *Reasons:* Granting access to information in this system of records could result in the disclosure of classified material, or reveal the identity of a source who furnished information to the Government under an express or implied promise of confidentiality. Material will be screened to permit access to unclassified material and to information that will not disclose the identity of a confidential source.

(l) *System identifier and name:*

(1) *N05520–1, Personnel Security Eligibility Information System.*

(2) *Exemption:* (i) Information specifically authorized to be classified under E.O. 12958, as implemented by DoD 5200.1–R, may be exempt pursuant to 5 U.S.C. 552a(k)(1).

(ii) Investigatory material compiled for law enforcement purposes may be exempt pursuant to 5 U.S.C. 552a(k)(2). However, if an individual is denied any right, privilege, or benefit for which he would otherwise be entitled by Federal law or for which he would otherwise be eligible, as a result of the maintenance of such information, the individual will be provided access to such information except to the extent that disclosure would reveal the identity of a confidential source.

(iii) Investigatory material compiled solely for the purpose of determining suitability, eligibility, or qualifications for federal civilian employment, military service, federal contracts, or access to classified information may be exempt pursuant to 5 U.S.C. 552a(k)(5), but only to the extent that such material would reveal the identity of a confidential source.

(iv) Evaluation material used to determine potential for promotion in the Military Services may be exempt pursuant to 5 U.S.C. 552a(k)(7), but only to the extent that the disclosure of such material would reveal the identity of a confidential source.

(v) Portions of this system of records are exempt from the following subsections of the Privacy Act: (c)(3), (d), (e)(4)(G) and (I), and (f).

(3) *Authority:* 5 U.S.C. 552a(k)(1), (k)(2), (k)(5), and (k)(7).

(4) *Reasons:* Granting individuals access to information collected and maintained in this system of records could interfere with orderly investigations; result in the disclosure of classified material; jeopardize the safety of informants, witnesses, and their families; disclose investigative techniques; and result in the invasion of privacy of individuals only incidentally related to an investigation. Material will be screened to permit access to unclassified information that will not disclose the identity of sources who provide the information to the government under an express or implied promise of confidentiality.

(m) *System identifier and name:*

(1) *N05520–4, NCIS Investigative Files System.*

(2) *Exemption:* (i) Parts of this system may be exempt pursuant to 5 U.S.C. 552a(j)(2) if the information is compiled and maintained by a component of the agency which performs as its principle function any activity pertaining to the enforcement of criminal laws.

(ii) Portions of this system of records are exempt from the following subsections of the Privacy Act: (c)(3), (c)(4), (d), (e)(2), (e)(3), (e)(4)(G) through (I), (e)(5), (e)(8), (f), and (g).

(3) *Authority:* 5 U.S.C. 552a(j)(2).

(4) *Reason:*

(i) Granting individuals access to information collected and maintained by this activity relating to the enforcement of criminal laws could interfere with the orderly investigations, with the orderly administration of justice, and possibly enable suspects to avoid detection or apprehension. Disclosure of this information could result in the concealment, destruction, or fabrication of evidence, and jeopardize the safety and well-being of informants, witnesses and their families, and law enforcement personnel and their families. Disclosure of this information could also reveal and render ineffectual investigative techniques, sources, and methods used by these components and could result in the invasion of the privacy of individuals only incidentally related to an investigation. The exemption of the individual's right of access to portions of these records, and the reasons therefor, necessitate the exemption of this system of records from the requirement of the other cited provisions.

(5) *Exemption:*

(i) Information specifically authorized to be classified under E.O. 12958, as implemented by DoD 5200.1–R, may be exempt pursuant to 5 U.S.C. 552a(k)(1).

(ii) Records maintained in connection with providing protective services to the President and other individuals under 18 U.S.C. 3506, may be exempt pursuant to 5 U.S.C. 552a(k)(3).

(iii) Records maintained solely for statistical research or program evaluation purposes and which are not used to make decisions on the rights, benefits, or entitlement of an individual except for census records which may be disclosed under 13 U.S.C. 8, may be exempt pursuant to 5 U.S.C. 552a(k)(4).

(iv) Investigatory material compiled solely for the purpose of determining suitability, eligibility, or qualifications for federal civilian employment, military service, federal contracts, or access to classified information may be exempt pursuant to 5 U.S.C. 552a(k)(5), but only to the extent that such material would reveal the identity of a confidential source.

(v) Testing or examination material used solely to determine individual qualifications for appointment or promotion in the Federal service may be exempt pursuant to 5 U.S.C. 552a(k)(6), if the disclosure would compromise the objectivity or fairness of the test or examination process.

(vi) Portions of this system of records are exempt from the following subsections of the Privacy Act: (c)(3), (d), (e)(1), (e)(4)(G) through (I), and (f).

(6) *Authority:* 5 U.S.C. 552a(k)(1), (k)(3), (k)(4), (k)(5) and (k)(6).

(7) *Reason:*

(i) The release of disclosure accountings would permit the subject of

an investigation to obtain valuable information concerning the nature of that investigation, and the information contained, or the identity of witnesses or informants, would therefor present a serious impediment to law enforcement. In addition, disclosure of the accounting would amount to notice to the individual of the existence of a record.

(ii) Access to the records contained in this system would inform the subject of the existence of material compiled for law enforcement purposes, the premature release of which could prevent the successful completion of investigation, and lead to the improper influencing of witnesses, the destruction of records, or the fabrication of testimony. Exempt portions of this system also contain information that has been properly classified under E.O. 12958, and that is required to be kept secret in the interest of national defense or foreign policy.

(iii) Exempt portions of this system also contain information considered relevant and necessary to make a determination as to qualifications, eligibility, or suitability for Federal civilian employment, military service, Federal contracts, or access to classified information, and was obtained by providing an express or implied assurance to the source that his or her identity would not be revealed to the subject of the record.

(iv) The notice of this system of records published in the **Federal Register** sets forth the basic statutory or related authority for maintenance of the system.

(v) The categories of sources of records in this system have been published in the **Federal Register** in broad generic terms. The identity of specific sources, however, must be withheld in order to protect the confidentiality of the source, of criminal and other law enforcement information. This exemption is further necessary to protect the privacy and physical safety of witnesses and informants.

(vi) This system of records is exempted from procedures for notice to an individual as to the existence of records pertaining to him/her dealing with an actual or potential civil or regulatory investigation, because such notice to an individual would be detrimental to the successful conduct and/or completion of an investigation, pending or future. Mere notice of the fact of an investigation could inform the subject or others that their activities are under, or may become the subject of, an investigation. This could enable the subjects to avoid detection, to influence witnesses improperly, to destroy records, or to fabricate testimony.

(vii) Exempt portions of this system containing screening board reports.

(viii) Screening board reports set forth the results of oral examination of applicants for a position as a special agent with the Naval Investigation Service Command. Disclosure of these records would reveal the areas pursued in the course of the examination and thus adversely affect the result of the selection process. Equally important, the records contain the candid views of the members composing the board. Release of the records could affect the willingness of the members to provide candid opinions and thus diminish the effectiveness of a program which is essential to maintaining the high standard of the Special Agent Corps., *i.e.,* those records constituting examination material used solely to determine individual qualifications for appointment in the Federal service.

(n) *System identifier and name:*

(1) *N05520–5, Personnel Security Program Management Records System.*

(2) *Exemption:*

(i) Information specifically authorized to be classified under E.O. 12958, as implemented by DoD 5200.1–R, may be exempt pursuant to 5 U.S.C. 552a(k)(1).

(ii) Investigatory material compiled solely for the purpose of determining suitability, eligibility, or qualifications for federal civilian employment, military service, federal contracts, or access to classified information may be exempt pursuant to 5 U.S.C. 552a(k)(5), but only to the extent that such material would reveal the identity of a confidential source.

(iii) Portions of this system of records are exempt from the following subsections of 5 U.S.C. 552a: (d)(1–5).

(3) *Authority:* 5 U.S.C. 552a(k)(1) and (k)(5).

(4) *Reasons:*

(i) Granting individuals access to information collected and maintained in this system of records could result in the disclosure of classified material; and jeopardize the safety of informants, and their families. Further, the integrity of the system must be ensured so that complete and accurate records of all adjudications are maintained. Amendment could cause alteration of the record of adjudication.

(o) *System identifier and name:*

(1) *N05527–1, Security Incident System.*

(2) *Exemption:*

(i) Parts of this system may be exempt pursuant to 5 U.S.C. 552a(j)(2) if the information is compiled and maintained by a component of the agency which performs as its principle function any activity pertaining to the enforcement of criminal laws.

(ii) Portions of this system of records are exempt from the following subsections of the Privacy Act: (c)(3), (c)(4), (d), (e)(2), and (e)(4)(G) through (I), (e)(5), (e)(8), (f) and (g).

(3) *Authority:* 5 U.S.C. 552a(j)(2).

(4) *Reasons:*

(i) Granting individuals access to information collected and maintained by this component relating to the enforcement of criminal laws could interfere with orderly administration of justice, and possibly enable suspects to avoid detection or apprehension. Disclosure of this information could result in concealment, destruction, or fabrication of evidence, and jeopardize the safety and well being of informants, witnesses and their families, and of law enforcement personnel and their families. Disclosure of this information could also reveal and render ineffectual investigative techniques, sources, and methods used by this component, and could result in the invasion of privacy of individuals only incidentally related to an investigation.The exemption of the individual's right of access to his or her records, and the reason therefore, necessitate the exemption of this system of records from the requirements of other cited provisions.

(p) *System identifier and name:*

(1) *N05527–4, Naval Security Group Personnel Security/Access Files.*

(2) *Exemption:*

(i) Information specifically authorized to be classified under E.O. 12958, as implemented by DoD 5200.1–R, may be exempt pursuant to 5 U.S.C. 552a(k)(1).

(ii) Investigatory material compiled for law enforcement purposes may be exempt pursuant to 5 U.S.C. 552a(k)(2). However, if an individual is denied any right, privilege, or benefit for which he would otherwise be entitled by Federal law or for which he would otherwise be eligible, as a result of the maintenance of such information, the individual will be provided access to such information except to the extent that disclosure would reveal the identity of a confidential source.

(iii) Records maintained in connection with providing protective services to the President and other individuals under 18 U.S.C. 3506, may be exempt pursuant to 5 U.S.C. 552a(k)(3).

(iv) Records maintained solely for statistical research or program evaluation purposes and which are not used to make decisions on the rights, benefits, or entitlement of an individual except for census records which may be disclosed under 13 U.S.C. 8, may be exempt pursuant to 5 U.S.C. 552a(k)(4).

(v) Investigatory material compiled solely for the purpose of determining

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suitability, eligibility, or qualifications for federal civilian employment, military service, federal contracts, or access to classified information may be exempt pursuant to 5 U.S.C. 552a(k)(5), but only to the extent that such material would reveal the identity of a confidential source.

(vi) Portions of this system of records are exempt from the following subsections of the Privacy Act: (c)(3), (d), (e)(1), (e)(4)(G) through (I), and (f).

(3) *Authority:* 5 U.S.C. 552a(k)(1) through (k)(5).

(4) *Reasons:*

(i) Exempt portions of this system contain information that has been properly classified under E.O. 12958, and that is required to be kept secret in the interest of national defense or foreign policy.

(ii) Exempt portions of this system also contain information considered relevant and necessary to make a determination as to qualification, eligibility or suitability for access to classified special intelligence information, and that was obtained by providing an express or implied promise to the source that his or her identity would not be revealed to the subject of the record.

(q) *System identifier and name:*

(1) *N05800–1, Legal Office Litigation/ Correspondence Files.*

(2) *Exemption:*

(i) Information specifically authorized to be classified under E.O. 12958, as implemented by DoD 5200.1–R, may be exempt pursuant to 5 U.S.C. 552a(k)(1).

(ii) Investigatory material compiled for law enforcement purposes may be exempt pursuant to 5 U.S.C. 552a(k)(2). However, if an individual is denied any right, privilege, or benefit for which he would otherwise be entitled by Federal law or for which he would otherwise be eligible, as a result of the maintenance of such information, the individual will be provided access to such information except to the extent that disclosure would reveal the identity of a confidential source.

(iii) Investigatory material compiled solely for the purpose of determining suitability, eligibility, or qualifications for federal civilian employment, military service, federal contracts, or access to classified information may be exempt pursuant to 5 U.S.C. 552a(k)(5), but only to the extent that such material would reveal the identity of a confidential source.

(iv) Testing or examination material used solely to determine individual qualifications for appointment or promotion in the Federal service may be exempt pursuant to 5 U.S.C. 552a(k)(6), if the disclosure would compromise the objectivity or fairness of the test or examination process.

(v) Evaluation material used to determine potential for promotion in the Military Services may be exempt pursuant to 5 U.S.C. 552a(k)(7), but only to the extent that the disclosure of such material would reveal the identity of a confidential source.

(vi) Portions of this system of records are exempt from the following subsections of the Privacy Act: (d), (e)(1), and (f)(2), (3), and (4).

(3) *Authority:* 5 U.S.C. 552a(k)(1), (k)(2), (k)(5), (k)(6), and (k)(7).

(4) *Reasons:*

(i) Subsection (d) because granting individuals access to information relating to the preparation and conduct of litigation would impair the development and implementation of legal strategy. Accordingly, such records are exempt under the attorney-client privilege. Disclosure might also compromise on-going investigations and reveal confidential informants. Additionally, granting access to the record subject would seriously impair the Navy's ability to negotiate settlements or pursue other civil remedies. Amendment is inappropriate because the litigation files contain official records including transcripts, court orders, investigatory materials, evidentiary materials such as exhibits, decisional memorandum and other case-related papers. Administrative due process could not be achieved by the ''exparte'' correction of such materials.

(ii) Subsection (e)(1) because it is not possible in all instances to determine relevancy or necessity of specific information in the early stages of case development. What appeared relevant and necessary when collected, ultimately may be deemed unnecessary upon assessment in the context of devising legal strategy. Information collected during civil litigation investigations which is not used during subject case is often retained to provide leads in other cases or to establish patterns of activity.

(iii) Subsections (f)(2), (3), and (4) because this record system is exempt from the individual access provisions of subsection (d).

(r) *System identifier and name:*

(1) *N01000–5, Naval Clemency and Parole Board Files.*

(2) *Exemption:*

(i) Parts of this system may be exempt pursuant to 5 U.S.C. 552a(j)(2) if the information is compiled and maintained by a component of the agency which performs as its principle function any activity pertaining to the enforcement of criminal laws.

(ii) Portions of this system of records are exempt from the following subsections of the Privacy Act: (c)(4), (d), (e)(4)(G), and (f).

(3) *Authority:* 5 U.S.C. 552a(j)(2).

(4) *Reasons:*

(i) Granting individuals access to records maintained by this Board could interfere with internal processes by which Board personnel are able to formulate decisions and policies with regard to clemency and parole in cases involving naval prisoners and other persons under the jurisdiction of the Board. Material will be screened to permit access to all material except such records or documents as reflecting items of opinion, conclusion, or recommendation expressed by individual board members or by the board as a whole.

(ii) The exemption of the individual's right to access to portions of these records, and the reasons therefore, necessitate the partial exemption of this system of records from the requirements of the other cited provisions.

(s) *System identifier and name:*

(1) *N06320–2, Family Advocacy Program System.*

(2) *Exemption:*

(i) Investigatory material compiled for law enforcement purposes may be exempt pursuant to 5 U.S.C. 552a(k)(2). However, if an individual is denied any right, privilege, or benefit for which he would otherwise be entitled by Federal law or for which he would otherwise be eligible, as a result of the maintenance of such information, the individual will be provided access to such information except to the extent that disclosure would reveal the identity of a confidential source.

(ii) Investigatory material compiled solely for the purpose of determining suitability, eligibility, or qualifications for federal civilian employment, military service, federal contracts, or access to classified information may be exempt pursuant to 5 U.S.C. 552a(k)(5), but only to the extent that such material would reveal the identity of a confidential source.

(iii) Portions of this system of records are exempt from the following subsections of the Privacy Act: (c)(3) and (d).

(3) *Authority:* 5 U.S.C. 552a(k)(2) and (k)(5).

(4) *Reasons:*

(i) Exemption is needed in order to encourage persons having knowledge of abusive or neglectful acts toward children to report such information, and to protect such sources from embarrassment or recriminations, as well as to protect their right to privacy. It is essential that the identities of all

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individuals who furnish information under an express promise of confidentiality be protected. Additionally, granting individuals access to information relating to criminal and civil law enforcement, as well as the release of certain disclosure accounting, could interfere with ongoing investigations and the orderly administration of justice, in that it could result in the concealment, alteration, destruction, or fabrication of information; could hamper the identification of offenders or alleged offenders and the disposition of charges; and could jeopardize the safety and well being of parents and their children.

(ii) Exempted portions of this system also contain information considered relevant and necessary to make a determination as to qualifications, eligibility, or suitability for Federal employment and Federal contracts, and that was obtained by providing an express or implied promise to the source that his or her identity would not be revealed to the subject of the record.

(t) *System identifier and name:*

(1) *N12930–1, Human Resources Group Personnel Records.*

(2) *Exemption:*

(i) Investigatory material compiled solely for the purpose of determining suitability, eligibility, or qualifications for federal civilian employment, military service, federal contracts, or access to classified information may be exempt pursuant to 5 U.S.C. 552a(k)(5), but only to the extent that such material would reveal the identity of a confidential source.

(ii) Testing or examination material used solely to determine individual qualifications for appointment or promotion in the Federal service may be exempt pursuant to 5 U.S.C. 552a(k)(6), if the disclosure would compromise the objectivity or fairness of the test or examination process.

(iii) Portions of this system of records are exempt from the following subsections of the Privacy Act: (d), (e)(4)(G) and (H), and (f).

(3) *Authority:* 5 U.S.C. 552a(k)(5) and (k)(6).

(4) *Reasons:*

(i) Exempted portions of this system contain information considered relevant and necessary to make a determination as to qualifications, eligibility, or suitability for Federal employment, and was obtained by providing express or implied promise to the source that his or her identity would not be revealed to the subject of the record.

(ii) Exempted portions of this system also contain test or examination material used solely to determine individual qualifications for appointment or promotion in the Federal service, the disclosure of which would comprise the objectivity or fairness of the testing or examination process.

§ 701.119 Exemptions for specific Marine Corps record systems.

(a) *System identifier and name:*

(1) *MMN00018, Base Security Incident Reporting System.*

(2) *Exemption:*

(i) Parts of this system may be exempt pursuant to 5 U.S.C. 552a(j)(2) if the information is compiled and maintained by a component of the agency which performs as its principle function any activity pertaining to the enforcement of criminal laws.

(ii) Portions of this system of records are exempt from the following subsections of the Privacy Act: (c)(3), (c)(4), (d), (e) (2) and (3), (e)(4)(G) through (I), (e)(5), (e)(8), (f), and (g).

(3) *Authority:* 5 U.S.C. 552a(j)(2).

(4) *Reasons:*

(i) Granting individuals access to information collected and maintained by these activities relating to the enforcement of criminal laws could interfere with orderly investigations, with the orderly administration of justice, and might enable suspects to avoid detection or apprehension. Disclosure of this information could result in the concealment, destruction, or fabrication of evidence, and jeopardize the safety and well being of informants, witnesses and their families, and law enforcement personnel and their families. Disclosure of this information could also reveal and render ineffectual investigative techniques, sources, and methods used by this component, and could result in the invasion of the privacy of individuals only incidentally related to an investigation. The exemption of the individual's right of access to his or her records, and the reasons therefore, necessitate the exemption of this system of records from the requirements of other cited provisions.

(b) *System identifier and name:*

(1) *MIN00001, Personnel and Security Eligibility and Access Information System.*

(2) *Exemption:*

(i) Investigatory material compiled for law enforcement purposes may be exempt pursuant to 5 U.S.C. 552a(k)(2). However, if an individual is denied any right, privilege, or benefit for which he would otherwise be entitled by Federal law or for which he would otherwise be eligible, as a result of the maintenance of such information, the individual will be provided access to such information except to the extent that disclosure would reveal the identity of a confidential source.

(ii) Records maintained in connection with providing protective services to the President and other individuals under 18 U.S.C. 3506, may be exempt pursuant to 5 U.S.C. 552a(k)(3).

(iii) Investigatory material compiled solely for the purpose of determining suitability, eligibility, or qualifications for federal civilian employment, military service, federal contracts, or access to classified information may be exempt pursuant to 5 U.S.C. 552a(k)(5), but only to the extent that such material would reveal the identity of a confidential source.

(iv) Portions of this system of records are exempt for the following subsections of the Privacy Act: (c)(3), (d), (e)(1), (e)(4)(G) through (I), and (f).

(3) *Authority: 5 U.S.C. 552a(k)(2), (k)(3), and (k)(5), as applicable.*

(4) *Reasons:*

(i) Exempt portions of this system contain information that has been properly classified under E.O. 12958, and that is required to be kept secret in the interest of national defense or foreign policy.

(ii) Exempt portions of this system also contain information considered relevant and necessary to make a determination as to qualifications, eligibility, or suitability for Federal civilian employment, military service, Federal contracts, or access to classified, compartmented, or otherwise sensitive information, and was obtained by providing an expressed or implied assurance to the source that his or her identity would not be revealed to the subject of the record.

(iii) Exempt portions of this system further contain information that identifies sources whose confidentiality must be protected to ensure that the privacy and physical safety of these witnesses and informants are protected.

Dated: May 12, 2000.

L.M. Bynum,

Alternate OSD Federal Register Liaison Officer, Department of Defense.

[FR Doc. 00–12465 Filed 5–17–00; 8:45 am]

BILLING CODE 5001–10–F

008440

DEPARTMENT OF TRANSPORTATION

Coast Guard

33 CFR Part 117

(CGD08–00–011)

RIN 2115–AE47

Drawbridge Operating Regulation; Massalina Bayou, Florida

AGENCY: Coast Guard, DOT.

ACTION: Temporary final rule.

SUMMARY: The Commander, Eighth Coast Guard District has temporarily changed the regulation governing the operation of the Tarpon Dock bascule span drawbridge across Massalina Bayou, mile 0.0, at Panama City, Bay County, Florida. The draw of the bridge may remain closed to navigation from 9 p.m. until 11 p.m. on July 4, 2000. This temporary rule is issued to facilitate movement of vehicular traffic associated with a fireworks display. Presently the draw opens on signal at all times.

DATES: This rule is effective from 9 p.m. to 11 p.m. on July 4, 2000.

ADDRESSES: Material received from the public, as well as documents indicated in this preamble as being available in the docket, are part of docket CGD08–00–011 and are available for inspection or copying at the Bridge Administration Branch, Eighth Coast Guard District, 501 Magazine Street, Room 1313, New Orleans, Louisiana, 70130–3396 between 7 a.m. and 3 p.m., Monday through Friday, except Federal holidays.

FOR FURTHER INFORMATION CONTACT: David Frank, Bridge Administration Branch, at the address given above. Telephone (504) 589–2965.

SUPPLEMENTARY INFORMATION:

Regulatory Information

We did not publish a notice of proposed rulemaking (NPRM) for this regulation. Under 5 U.S.C. 553(b)(B), the Coast Guard finds good cause exists for not publishing an NPRM. This temporary bridge closure has become an annual event in conjunction with the 4th of July fireworks celebration. The closure is for two hours and does not significantly affect marine traffic.

Background and Purpose

The City of Panama City, Florida requested a temporary rule, changing the operation of the Tarpon Dock bascule span drawbridge. The rule is needed to accommodate the additional volume of vehicular traffic that the fireworks display is expected to generate. The Tarpon Dock bascule span drawbridge across Massalina Bayou has a vertical clearance of 7 feet above mean high water in the closed-to-navigation position and unlimited in the open-to-navigation position. Navigation on the waterway consists primarily of commercial fishing vessels, sailing vessels and other recreational craft.

Regulatory Evaluation

This temporary rule is not a ''significant regulatory action'' under section 3(f) of Executive Order 12866 and does not require an assessment of potential costs and benefits under section 6(a)(3) of that Order. The Office of Management and Budget has not reviewed it under that Order. It is not significant under the regulatory policies and procedures of the Department of Transportation (DOT)(44 FR 11040, February 26, 1979).

We expect the economic impact of this temporary rule to be so minimal that a full Regulatory Evaluation under paragraph 10e of the regulatory policies and procedures of DOT is unnecessary.

This is because the number of vessels impaired by the closed-to-navigation period is minimal. All commercial vessels still have ample opportunity to transit this waterway before and after the two-hour closure on July 4, 2000.

Small Entities

Under the Regulatory Flexibility Act (5 U.S.C. 601 *et seq.*), the Coast Guard must consider whether this temporary rule will have a significant economic impact on a substantial number of small entities. The term ''small entities'' comprises small businesses, not-for-profit organizations that are independently owned and operated and are not dominant in their fields, and governmental jurisdictions with populations of less than 50,000.

The Coast Guard certifies under 5 U.S.C. 605(b) that this temporary rule will not have a significant economic impact on a substantial number of small entities.

This rule will affect the following entities, some of which may be small entities: the owners or operators of vessels intending to transit through the Tarpon dock bridge across Massalina Bayou from 9 p.m. to 11 p.m. on July 4, 2000.

Assistance for Small Entities

Under section 213(a) of the Small Business Regulatory Enforcement Fairness Act of 1996 (Pub. L. 104–121), we want to assist small entities in understanding the temporary rule so that they can better evaluate its effects on them and participate in the rulemaking process. If the rule would affect your small business, organization, or governmental jurisdiction and you have questions concerning its provisions or options for compliance, please contact the Bridge Administration Branch, Eighth Coast Guard District at the address above.

Collection of Information

This temporary rule would call for no new collection of information under the Paperwork Reduction Act of 1995 (44 U.S.C. 3501–3520.).

Federalism

We have analyzed this temporary rule under E.O. 13132 and have determined that this rule does not have implications for federalism under that Order.

Unfunded Mandates Reform Act

The Unfunded Mandates Reform Act of 1995 (2 U.S.C. 1531–1538) governs the issuance of Federal regulations that require unfunded mandates. An unfunded mandate is a regulation that requires a State, local, or tribal government or the private sector to incur direct costs without the Federal Government's having first provided the funds to pay those costs. This temporary rule would not impose an unfunded mandate.

Taking of Private Property

This temporary rule would not effect a taking of private property or otherwise have taking implications under E.O. 12630, Governmental Actions and Interference with Constitutionally Protected Property Rights.

Civil Justice Reform

This temporary rule meets applicable standards in sections 3(a) and 3(b)(2) of E.O. 12988, Civil Justice Reform, to minimize litigation, eliminate ambiguity, and reduce burden.

Protection of Children

We have analyzed this rule under E.O. 13045, Protection of Children from Environmental Health Risks and Safety Risks. This temporary rule is not an economically significant rule and does not concern an environmental risk to health or risk to safety that may disproportionately affect children.

Environmental

The Coast Guard considered the environmental impact of this temporary rule and concluded that under Figure 2–1, paragraph 32(e) of Commandant Instruction M16475.1C, this temporary rule is categorically excluded from further environmental documentation. Bridge Administration Program actions that can be categorically excluded include promulgation of operating

regulations or procedures for drawbridges. A ''Categorical Exclusion Determination'' is available in the docket for inspection or copying where indicated under **ADDRESSES**.

List of Subjects in 33 CFR Part 117

Bridges.

For the reasons set out in the preamble, the Coast Guard is amending Part 117 of Title 33, Code of Federal Regulations, as follows:

PART 117—DRAWBRIDGE OPERATION REGULATIONS

1. The authority citation for Part 117 continues to read as follows:

Authority: 33 U.S.C. 499; 49 CFR 1.46; 33 CFR 1.05–1(g); section 117.255 also issued under the authority of Pub. L. 102–587, 106 Stat. 5039.

2. From 9 p.m. until 11 p.m. on July 4, 2000, a new temporary § 117.T301 is added to read as follows:

§ 117.T301 Massalina Bayou.

The draw of the Tarpon Dock bascule span bridge, Massalina Bayou, mile 0.0 at Panama City, shall open on signal; except that from 9 p.m. until 11 p.m. on July 4, 2000, the draw need not open for the passage of vessels.

Dated: May 5, 2000.

K.J. Eldridge,

Captain, U.S. Coast Guard, Acting Commander, 8th Coast Guard Dist.

[FR Doc. 00–12571 Filed 5–17–00; 8:45 am]

BILLING CODE 4910–15–U

DEPARTMENT OF TRANSPORTATION

Coast Guard

33 CFR Part 165

[COTP Western Alaska 00–003]

RIN 2115–AA97

Safety Zone; Port Graham, Cook Inlet, Alaska

AGENCY: Coast Guard, DOT.

ACTION: Temporary final rule.

SUMMARY: The Coast Guard is establishing a temporary 250-yard radius safety zone on the navigable waters located in Port Graham, Cook Inlet, Alaska. The Derrick Barge LOS ANGELES will anchor in this position and assemble the Exploratory Drilling Structure ''OSPREY''. This safety zone is implemented to ensure the safe and timely anchoring of the Derrick Barge LOS ANGELES and the safe assembly of the Drilling Structure OSPREY in Port Graham, Cook Inlet, Alaska. This safety zone is necessary because the operation requires the LOS ANGELES to remain in the anchoring position until the assembly of the OSPREY is complete. Vessels or personnel not engaged in the anchoring and assembly operation, and operating within the 250-yard radius may place themselves at risk to injury.

DATES: This temporary final rule is effective from 12:01 a.m. on June 16, 2000, until 11:59 p.m. on July 10, 2000.

FOR FURTHER INFORMATION CONTACT: Lieutenant Commander Rick Rodriguez, Chief of Port Operations, USCG Marine Safety Office, Anchorage, at (907) 271–6724.

SUPPLEMENTARY INFORMATION:

Regulatory History

We did not publish a notice of proposed rulemaking (NPRM) for this regulation. Under 5 U.S.C. 553(b)(B), the Coast Guard finds that good cause exists for not publishing an NPRM. Publishing an NPRM and delaying the effective date would be contrary to national safety interests since immediate action is needed to minimize potential danger to the public. The OSPREY platform is a large structure that is difficult to maneuver, and will be towed in the strong currents of Cook Inlet, Alaska and vessels or personnel not engaged in the towing or setting down operation operating within the 600-yard radius may place themselves at risk of injury. The event is scheduled for June 16, 2000 and the permit request was only recently received.

Background and Purpose

The Coast Guard is establishing a temporary 250-yard radius safety zone on the navigable waters of the United States around the position Latitude 59–21.40 N, Longitude 151–49.50 W. The Derrick Barge LOS ANGELES will anchor in this position and assemble the tower to the tower legs of the Exploratory Drilling Structure ''OSPREY'' in Port Graham, Cook Inlet, Alaska. The safety zone is designed to permit the safe and timely anchoring and assembly of this structure in the narrow timeframe in which this can be safely done. The safety zone's 250-yard standoff also aids the safety of these evolutions by minimizing conflicts and hazards that might otherwise occur with other transiting vessels. The limited size of the zone is designed to minimize impact on other mariners transiting through the area.

Regulatory Evaluation

This rule is not a significant regulatory action under section 3(f) of Executive Order 12866 and does not require an assessment of potential cost and benefits under section 6(a)(3) of that order. It has not been reviewed by the Office of Management and Budget under that order. It is not significant under the regulatory policies and procedures of the Department of Transportation (DOT) (44 FR 11040; February 26, 1979). The Coast Guard expects the economic impact of this proposal to be so minimal that a full Regulatory Evaluation under paragraph 10(e) of the regulatory policies and procedures of DOT is unnecessary.

Small Entities

Under the Regulatory Flexibility Act (5 U.S.C. 601 *et seq.*), the Coast Guard considers whether this rule will have significant economic impacts on a substantial number of small entities. ''Small entities'' include small businesses, not-for-profit organizations that are independently owned and operated and are not dominant in their fields, and governmental jurisdictions with populations less than 50,000. Because this safety zone is very small, will only be in effect for twenty five days, and does not impede access to other maritime facilities in the area, the Coast Guard believes there will be no impact to small entities. Therefore, the Coast Guard certifies under 5 U.S.C. 605(b) that this rule will not have a significant economic impact on a substantial number of small entities.

Collection of Information

This rule does not provide for a collection of information under the Paperwork Reduction Act of 1995 (44 U.S.C. 3501 *et seq.*).

Federalism

The Coast Guard has analyzed this rule under the principles and criteria contained in Executive Order 12612 and has determined that this rule does not have sufficient federalism implications to warrant the preparation of a Federalism Assessment.

Environment

The Coast Guard considered the environmental impact of this rule and concluded that, under Figure 2–1, paragraph 34(g) of Commandant Instruction M16475.1C, this rule is categorically excluded from further environmental documentation because it establishes a safety zone

Unfunded Mandates

The Unfunded Mandates Reform Act of 1995 (2 U.S.C. 1531–1538) and E.O. 12875, Enhancing the Intergovernmental Partnership, (58 FR 58093; October 28, 1993) govern the issuance of Federal

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regulations that require unfunded mandates. An unfunded mandate is a regulation that requires a State, local, or tribal government or the private sector to incur direct costs without the Federal Government's having first provided the funds to pay those costs. This rule will not impose an unfunded mandate.

List of Subjects in 33 CFR Part 165

Harbors, Marine safety, Navigation (water), Reporting and record keeping requirements, Security measures, Waterways.

Temporary Final Regulation

For the reasons discussed in the preamble, the Coast Guard amends 33 CFR Part 165 as follows:

PART 165—[AMENDED]

1. The authority citation for Part 165 continues to read as follows:

Authority: 33 U.S.C. 1231; 50 U.S.C. 191; 33 CFR 1.05–1(g), 6.04–1, 6.04–6, and 160.5; 49 CFR 1.46.

2. From 12:01 a.m. on June 16, 2000, until 11:59 p.m. on July 10, 2000, § 165.T17–003 is temporarily added to read as follows:

§ 165.T17–003 Safety Zone; Port Graham, Cook Inlet, Alaska.

(a) *Description.* The following area is a Safety Zone: All navigable waters within a 250-yard radius of the Derrick Barge LOS ANGELES, located in Port Graham, Cook Inlet, Alaska.

(b) *Effective Dates.* This section is effective from 12:01 a.m. on June 16, 2000, until 11:59 p.m. on July 10, 2000.

(c) *Regulations.*

(1) The Captain of the Port means the Captain of the Port, Western Alaska. The Captain of the Port may authorize or designate any Coast Guard commissioned, warrant, or petty officer to act on his behalf as his representative.

(2) The general regulations governing safety zones contained in Title 33 Code of Federal Regulations, part 165.23 apply. No person or vessel may enter, transit through, anchor or remain in this safety zone, with the exception of attending vessels, without first obtaining permission from the Captain of the Port, Western Alaska, or his representative. The Captain of the Port or his representative may be contacted in the vicinity of the SWAN via marine VHF channel 16. The Captain of the Port's representative can also be contacted by telephone at (907) 271–6700.

Dated: April 14, 2000.

W. J. Hutmacher,

Captain, U.S. Coast Guard Captain of the Port, Western Alaska.

[FR Doc. 00–12461 Filed 5–17–00; 8:45 am]

BILLING CODE 4910–15–P

ENVIRONMENTAL PROTECTION AGENCY

40 CFR Part 52

[MO 096–1096b; FRL–6701–6]

Approval and Promulgation of Implementation Plans: State of Missouri

AGENCY: Environmental Protection Agency (EPA).

ACTION: Final rule.

SUMMARY: In this final rule, we (EPA) are announcing approval of a revision to Missouri's State Implementation Plan (SIP) for air pollution control. This action approves the inspection and maintenance (I/M) program which is applicable to the St. Louis nonattainment area as a revision to the SIP. The state program requires the implementation of a motor vehicle I/M program containing many of the features of an enhanced I/M program in Jefferson, St. Louis, and St. Charles counties and St. Louis City. We proposed approval of this program in the **Federal Register** on February 17, 2000. This final action is being published to meet our statutory obligation under the Clean Air Act (CAA or the Act).

DATES: This rule is effective on June 19, 2000.

ADDRESSES: A copy of the state submittal is available at the following address for inspection during normal business hours: EPA, Region 7, Air Planning and Development Branch, 901 North 5th Street, Kansas City, Kansas 66101.

FOR FURTHER INFORMATION CONTACT: Leland Daniels at (913) 551–7651.

SUPPLEMENTARY INFORMATION: This section provides additional information by addressing the following questions:

What Is a SIP?

Section 110 of the Clean Air Act (CAA) requires states to develop air pollution regulations and control strategies to ensure that state air quality meets the national ambient air quality standards that we established. These ambient standards are established under section 109 of the CAA, and they currently address six criteria pollutants. These pollutants are: carbon monoxide, nitrogen dioxide, ozone, lead, particulate matter, and sulfur dioxide. Each state must submit these regulations and control strategies to us for approval and incorporation into the Federally enforceable SIP. Each Federally approved SIP protects air quality primarily by addressing air pollution at its point of origin. These SIPs can be extensive, containing state regulations or other enforceable documents and supporting information such as emission inventories, monitoring networks, and modeling demonstrations.

What Is the Federal Approval Process for a SIP?

In order for state regulations to be incorporated into the Federally enforceable SIP, states must formally adopt the regulations and control strategies consistent with state and Federal requirements. This process generally includes a public notice, public hearing, public comment period, and a formal adoption by a state-authorized rulemaking body.

Once a state rule, regulation, or control strategy is adopted, the state submits it to us for inclusion into the SIP. We must provide public notice and seek additional public comment regarding our proposed action on the state submission. If adverse comments are received, we must address them prior to taking any final action.

All state regulations and supporting information that we approve under section 110 of the CAA are incorporated into the Federally approved SIP. The record of such SIP approvals is maintained in the Code of Federal Regulations (CFR) at Title 40, Part 52, entitled ''Approval and Promulgation of Implementation Plans.'' The actual state regulations which are approved are not reproduced in their entirety in the CFR but are ''incorporated by reference,'' which means that EPA has approved a given state regulation with a specific effective date.

What Does Federal Approval of a State Regulation Mean?

Enforcement of the state regulation before and after it is incorporated into the Federally approved SIP is primarily a state responsibility. However, after the regulation is Federally approved, we are authorized to take an enforcement action to return a violator to compliance. Citizens are also offered legal recourse to address violations as described in section 304 the CAA.

What Is Being Addressed in This Document?

In a letter of November 10, 1999 to Dennis Grams, Regional Administrator, Stephen Mahfood, Director, Missouri Department of Natural Resources (MDNR), submitted a revised I/M program as an amendment to the SIP. The submittal included the SIP revision and a number of attachments including the adopted state statute and regulation, the signed I/M contract, a memorandum of understanding with the Missouri Highway Patrol, an interagency agreement with the Missouri Department of Revenue (MDOR), the I/M budget, modeling input and output files, sample calculations, a table showing the number of vehicles in the I/M program, procedures and specifications, a list of zip codes for the I/M program, the public education program, and an example of the MDOR contract with fee offices. The Missouri rule being approved is 10 CSR 10–5.380, Motor Vehicle Emissions Inspection, with a state effective date of December 30, 1999.

On February 17, 2000 we proposed to approve this SIP revision. The proposal stated that the state I/M regulations established pass/fail exhaust standards for hydrocarbons, carbon monoxide, carbon dioxide, and oxides of nitrogen. Missouri neither passes nor fails vehicles based on carbon dioxide readings, nor do we require states to base compliance on carbon dioxide measurements, anywhere. Carbon dioxide is measured but only as a quality control process.

The public comment period was open through March 20, 2000. No comments were received. In the February 17, 2000, proposal, we noted that comments had been received on a prior proposal (64 FR 9460 on February 26, 1999) on a previous submission of the I/M program. The comments asserted deficiencies in the previous state submission. We also noted that the submission on which the February 17 proposal was based contained substantial revisions to the prior submittal, and encouraged comments relevant to the revised submittal. No comments were forthcoming, and we have determined that the prior comments are not relevant to the state's November 1999 submittal and our February 17, 2000 proposal.

On April 5, 2000 MDNR began implementation of the I/M program in the St. Louis nonattainment area.

This **Federal Register** notice takes final action to fully approve the I/M program, including the state's I/M rule, as it relates to the Missouri portion of the St. Louis nonattainment area.

Have the Requirements for Approval of a SIP Revision Been Met?

The state submittal has met the public notice requirements for SIP submissions in accordance with 40 CFR section 51.102. The submittal also satisfied the completeness criteria of 40 CFR part 51, appendix V. In addition, as explained above and in more detail in our proposal published February 17, 2000, the revision meets the substantive SIP requirements of the CAA, including section 110, Part D of Title I, and implementing regulations in 40 CFR part 51, subpart S (the ''I/M rule''). In the February 17 proposal, we discussed in detail how the state's submittal meets each of the relevant requirements of the I/M rule and EPA's rationale for approval. The reader is referred to that discussion for the rationale for this final action.

What Action Is EPA Taking?

Section 182(b) of the Act requires states with moderate ozone nonattainment areas to implement a ''basic'' I/M program. The state's plan relies on the I/M program and other specific control measures to achieve the necessary emission reductions so that the National Ambient Air Quality Standards are met. The I/M rule strengthens the SIP by obtaining needed emission reductions. Today's final action incorporates the St. Louis I/M program into the SIP.

Administrative Requirements

Under Executive Order 12866 (58 FR 51735, October 4, 1993), this action is not a ''significant regulatory action'' and therefore is not subject to review by the Office of Management and Budget. This action merely approves state law as meeting Federal requirements and imposes no additional requirements beyond those imposed by state law. Accordingly, the Administrator certifies that this rule will not have a significant economic impact on a substantial number of small entities under the Regulatory Flexibility Act (5 U.S.C. 601 *et seq.*). Because this rule approves preexisting requirements under state law and does not impose any additional enforceable duty beyond that required by state law, it does not contain any unfunded mandate or significantly or uniquely affect small governments, as described in the Unfunded Mandates Reform Act of 1995 (Public Law 104–4). For the same reason, this rule also does not significantly or uniquely affect the communities of tribal governments, as specified by Executive Order 13084 (63 FR 27655, May 10, 1998). This rule will not have substantial direct effects on the states, on the relationship between the national government and the states, or on the distribution of power and responsibilities among the various levels of government, as specified in Executive Order 13132 (64 FR 43255, August 10, 1999), because it merely approves a state rule implementing a Federal standard, and does not alter the relationship or the distribution of power and responsibilities established in the CAA. This rule also is not subject to Executive Order 13045 (62 FR 19885, April 23, 1997), because it is not economically significant.

In reviewing SIP submissions, EPA's role is to approve state choices, provided that they meet the criteria of the CAA. In this context, in the absence of a prior existing requirement for the state to use voluntary consensus standards (VCS), EPA has no authority to disapprove a SIP submission for failure to use VCS. It would thus be inconsistent with applicable law for EPA, when it reviews a SIP submission, to use VCS in place of a SIP submission that otherwise satisfies the provisions of the CAA. Thus, the requirements of section 12(d) of the National Technology Transfer and Advancement Act of 1995 (15 U.S.C. 272 note) do not apply. As required by section 3 of Executive Order 12988 (61 FR 4729, February 7, 1996), in issuing this rule, EPA has taken the necessary steps to eliminate drafting errors and ambiguity, minimize potential litigation, and provide a clear legal standard for affected conduct. EPA has complied with Executive Order 12630 (53 FR 8859, March 15, 1988) by examining the takings implications of the rule in accordance with the ''Attorney General's Supplemental Guidelines for the Evaluation of Risk and Avoidance of Unanticipated Takings'' issued under the Executive Order. This rule does not impose an information collection burden under the provisions of the Paperwork Reduction Act of 1995 (44 U.S.C. 3501 *et seq.*).

The Congressional Review Act, 5 U.S.C. section 801 *et seq.*, as added by the Small Business Regulatory Enforcement Fairness Act of 1996, generally provides that before a rule may take effect, the agency promulgating the rule must submit a rule report, which includes a copy of the rule, to each House of the Congress and to the Comptroller General of the United States. EPA will submit a report containing this rule and other required information to the United States Senate, the United States House of Representatives, and the Comptroller

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General of the United States prior to publication of the rule in the **Federal Register**. A major rule cannot take effect until 60 days after it is published in the **Federal Register**. This action is not a ''major rule'' as defined by 5 U.S.C. section 804(2).

Under section 307(b)(1) of the CAA, petitions for judicial review of this action must be filed in the United States Court of Appeals for the appropriate circuit by July 17, 2000. Filing a petition for reconsideration by the Administrator of this final rule does not affect the finality of this rule for the purposes of judicial review nor does it extend the time within which a petition for judicial review may be filed, and shall not postpone the effectiveness of such rule or action. This action may not be challenged later in proceedings to enforce its requirements. (See section 307(b)(2).)

List of Subjects 40 CFR Part 52

Environmental protection, Air pollution control, Carbon monoxide, Hydrocarbons, Incorporation by reference, Intergovernmental relations, Lead, Nitrogen dioxide, Ozone, Particulate matter, Reporting and recordkeeping requirements, Sulfur oxides.

Dated: May 8, 2000.

Dennis Grams,

Regional Administrator, Region 7.

Chapter I, title 40 of the Code of Federal Regulations is amended as follows:

PART 52—[AMENDED]

1. The authority citation for part 52 continues to read as follows:

Authority: 42 U.S.C. 7401 *et seq.*

Subpart AA—Missouri

2. In § 52.1320 the table in paragraph (c) is amended by revising the entry for 10–5.380, under Chapter 5, to read as follows:

§ 52.1320 Identification of plan.

* * * * *

(c) * * *

EPA-APPROVED MISSOURI REGULATIONS

Missouri citation	Title	State effective date	EPA approval date	Explanation
Missouri Department of Natural Resources				
*	*	*	*	*
Chapter 5—Air Quality Standards and Air Pollution Control Regulations for the St. Louis Metropolitan Area				
*	*	*	*	*
10–5.380	Motor vehicle emissions inspection.	12/30/99	[insert FR cite] May 18, 2000.	
*	*	*	*	*

3. In § 52.1320 the table in paragraph (e) is amended by adding an entry at the end of the table in the Nonregulatory SIP Provisions for the inspection/maintenance program, to read as follows:

* * * * *

(e) * * *

EPA-APPROVED MISSOURI NONREGULATIONS SIP PROVISIONS

Name of nonregulatory SIP Provision	Applicable geographic or nonattainment area	State submittal date	EPA approval date	Comments
*	*	*	*	*
Implementation plan for the Missouri inspection/. maintenance program	St. Louis	11/12/99	[insert FR cite] May 18, 2000.	

[FR Doc. 00–12395 Filed 5–17–00; 8:45 am]

BILLING CODE 6560–50–P

ENVIRONMENTAL PROTECTION AGENCY

40 CFR Part 52

[Region 7 Tracking No. MO 102–1102; FRL–6701–5]

Approval and Promulgation of Implementation Plans; State of Missouri

AGENCY: Environmental Protection Agency (EPA).

ACTION: Final rule.

SUMMARY: EPA is taking final action to approve a nitrogen oxides (NO_X) reasonably available control technology (RACT) rule which is applicable to the St. Louis, Missouri, ozone nonattainment area. This rule reduces NO_X emissions in the St. Louis area by requiring major sources to install or comply with RACT as required by the Clean Air Act (CAA).

DATES: This rule is effective on June 19, 2000.

ADDRESSES: Copies of the state submittal are available at the following address for inspection during normal business hours: Environmental Protection Agency, Air Planning and Development Branch, 901 North 5th Street, Kansas City, Kansas 66101.

FOR FURTHER INFORMATION CONTACT: Kim Johnson at (913) 551–7975.

SUPPLEMENTARY INFORMATION: Throughout this document whenever ''we, us, or our'' is used, we mean EPA. This section provides additional information by addressing the following questions:

What is a SIP?

What is the Federal approval process for a SIP?

What does Federal approval of a state regulation mean to me?
What is being addressed in this action?
Have the requirements for approval of a SIP revision been met?
What action is EPA taking?

What is a SIP?

Section 110 of the CAA requires states to develop air pollution regulations and control strategies to ensure that state air quality meets the national ambient air quality standards established by EPA. These ambient standards are established under section 109 of the CAA, and they currently address six criteria pollutants. These pollutants are: carbon monoxide, nitrogen dioxide, ozone, lead, particulate matter, and sulfur dioxide.

Each state must submit these regulations and control strategies to EPA for approval and incorporation into the Federally enforceable SIP.

Each Federally approved SIP protects air quality primarily by addressing air pollution at its point of origin. These SIPs can be extensive, containing state regulations or other enforceable documents and supporting information such as emission inventories, monitoring networks, and modeling demonstrations.

What is the Federal approval process for a SIP?

In order for state regulations to be incorporated into the Federally enforceable SIP, states must formally adopt the regulations and control strategies consistent with state and Federal requirements. This process generally includes a public notice, public hearing, public comment period, and a formal adoption by a state-authorized rulemaking body.

Once a state rule, regulation, or control strategy is adopted, the state submits it to us for inclusion into the SIP. We must provide public notice and seek additional public comment regarding the proposed Federal action on the state submission. If adverse comments are received, they must be addressed prior to any final Federal action by us.

All state regulations and supporting information approved by EPA under section 110 of the CAA are incorporated into the Federally approved SIP. Records of such SIP actions are maintained in the Code of Federal Regulations (CFR) at Title 40, Part 52, entitled ''Approval and Promulgation of Implementation Plans.'' The actual state regulations which are approved are not reproduced in their entirety in the CFR outright but are ''incorporated by reference,'' which means that we have approved a given state regulation with a specific effective date.

What does Federal approval of a state regulation mean to me?

Enforcement of the state regulation before and after it is incorporated into the Federally approved SIP is primarily a state responsibility. However, after the regulation is Federally approved, we are authorized to take enforcement action against violators. Citizens are also offered legal recourse to address violations as described in section 304 of the CAA.

What is being addressed in this document?

NO_X emissions combine with volatile organic compound emissions on hot, sunny days to form ground level ozone, commonly known as smog. The purpose of the following rule is to establish RACT requirements in Missouri for major sources of NO_X emissions. These requirements will result in reductions of NO_X emissions which will help achieve reductions in ozone levels in the St. Louis ozone nonattainment area. The St. Louis ozone nonattainment area includes Franklin, Jefferson, St. Charles, and St. Louis counties, and St. Louis City in Missouri and Madison, St. Clair and Monroe counties in Illinois.

We are taking final action to approve as an amendment to the Missouri SIP, rule 10 CSR 10–5.510, ''Control of Emissions of Nitrogen Oxides,'' submitted to us on November 12, 1999. This NO_X RACT rule is applicable to all sources with the potential to emit 100 tons per year or more of nitrogen oxides in the Missouri portion of the St. Louis nonattainment area. The rule establishes emission limits, work practices, monitoring, testing, and recordkeeping and reporting requirements for boilers, stationary internal combustion (IC) turbines, stationary IC engines, incinerators, regenerative container melting glass furnaces, and portland cement kilns.

The rule also requires any other stationary source, which has the potential to emit NO_X in amounts greater than the major stationary source threshold, to undertake a ''case-by-case'' RACT study to evaluate controls to minimize NO_X emissions. This ''case-by-case'' analysis establishes a procedure for identifying all available control technologies and selecting the technology that provides the most effective, cost reasonable reduction technique.

For those units subject to a NO_X emission limitation, the final compliance deadline is May 1, 2002. An extension of the compliance deadline may be granted by the director, if the affected installation submits a plan no later than January 1, 2001. This plan, which is subject to approval by the Missouri Department of Natural Resources, must include a detailed analysis of the air quality benefit that will occur if the compliance date is extended, a detailed explanation of why the compliance date should be extended, and a proposed schedule for meeting compliance.

As required by 40 CFR 51.261(a)(2), no extension of the compliance date can be approved if it extends final compliance beyond the attainment date in the approved SIP.

We have reviewed the NO_X controls and averaging provisions in this rule and have determined that they are consistent with relevant EPA guidance and with NO_X controls approved as RACT for other states.

No comments were received in response to the public comment period regarding this rule action.

For more background information, the reader is referred to the proposal for this rulemaking published on February 17, 2000, at 65 FR 8092.

Have the requirements for approval of a SIP revision been met?

The state submittal has met the public notice requirements for SIP submissions in accordance with 40 CFR 51.102. The submittal also satisfied the completeness criteria of 40 CFR Part 51, Appendix V. In addition, as explained above and in more detail in the technical support document which is part of this document, the revision meets the substantive SIP requirements of the CAA, including section 110 and implementing regulations and part D of Title I of the CAA.

What action is EPA taking?

We are taking final action to approve as an amendment to the Missouri SIP rule 10 CSR 10–5.510, ''Control of Emissions of Nitrogen Oxides,'' as meeting the requirement for NO_X RACT which is applicable to the Missouri portions of the St. Louis ozone nonattainment area.

Administrative Requirements

Under Executive Order 12866 (58 FR 51735, October 4, 1993), this action is not a ''significant regulatory action'' and therefore is not subject to review by the Office of Management and Budget. This action merely approves state law as meeting Federal requirements and imposes no additional requirements beyond those imposed by state law. Accordingly, the Administrator certifies that this rule will not have a significant

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economic impact on a substantial number of small entities under the Regulatory Flexibility Act (5 U.S.C. 601 *et seq.*). Because this rule approves preexisting requirements under state law and does not impose any additional enforceable duty beyond that required by state law, it does not contain any unfunded mandate or significantly or uniquely affect small governments, as described in the Unfunded Mandates Reform Act of 1995 (Public Law 104–4). For the same reason, this rule also does not significantly or uniquely affect the communities of tribal governments, as specified by Executive Order 13084 (63 FR 27655, May 10, 1998). This rule will not have substantial direct effects on the states, on the relationship between the national government and the states, or on the distribution of power and responsibilities among the various levels of government, as specified in Executive Order 13132 (64 FR 43255, August 10, 1999), because it merely approves a state rule implementing a Federal standard, and does not alter the relationship or the distribution of power and responsibilities established in the CAA. This rule also is not subject to Executive Order 13045 (62 FR 19885, April 23, 1997), because it is not economically significant.

In reviewing SIP submissions, our role is to approve state choices, provided that they meet the criteria of the CAA. In this context, in the absence of a prior existing requirement for the state to use voluntary consensus standards (VCS), we have no authority to disapprove a SIP submission for failure to use VCS. It would thus be inconsistent with applicable law for EPA, when it reviews a SIP submission, to use VCS in place of a SIP submission that otherwise satisfies the provisions of the CAA. Thus, the requirements of section 12(d) of the National Technology Transfer and Advancement Act of 1995 (15 U.S.C. 272 note) do not apply. As required by section 3 of Executive Order 12988 (61 FR 4729, February 7, 1996), in issuing this rule, we have taken the necessary steps to eliminate drafting errors and ambiguity, minimize potential litigation, and provide a clear legal standard for affected conduct. EPA has complied with Executive Order 12630 (53 FR 8859, March 15, 1988) by examining the takings implications of the rule in accordance with the ''Attorney General's Supplemental Guidelines for the Evaluation of Risk and Avoidance of Unanticipated Takings' issued under the Executive Order. This rule does not impose an information collection burden under the provisions of the Paperwork Reduction Act of 1995 (44 U.S.C. 3501 *et seq.*).

The Congressional Review Act, 5 U.S.C. section 801 *et seq.*, as added by the Small Business Regulatory Enforcement Fairness Act of 1996, generally provides that before a rule may take effect, the agency promulgating the rule must submit a rule report, which includes a copy of the rule, to each House of the Congress and to the Comptroller General of the United States. We will submit a report containing this rule and other required information to the United States Senate, the United States House of Representatives, and the Comptroller General of the United States prior to publication of the rule in the **Federal Register**. A major rule cannot take effect until 60 days after it is published in the **Federal Register**. This action is not a ''major rule'' as defined by 5 U.S.C. section 804(2).

Under section 307(b)(1) of the CAA, petitions for judicial review of this action must be filed in the United States Court of Appeals for the appropriate circuit by July 17, 2000. Filing a petition for reconsideration by the Administrator of this final rule does not affect the finality of this rule for the purposes of judicial review nor does it extend the time within which a petition for judicial review may be filed, and shall not postpone the effectiveness of such rule or action. This action may not be challenged later in proceedings to enforce its requirements. (See section 307(b)(2).)

List of Subjects in 40 CFR Part 52

Environmental protection, Air pollution control, Carbon monoxide, Hydrocarbons, Incorporation by reference, Intergovernmental relations, Lead, Nitrogen dioxide, Ozone, Particulate matter, Reporting and recordkeeping requirements, Sulfur oxides.

Dated: May 4, 2000

Dennis Grams,

Regional Administrator, Region 7.

Chapter I, title 40 of the Code of Federal Regulations is amended as follows:

PART 52—[AMENDED]

1. The authority citation for part 52 continues to read as follows:

Authority: 42 U.S.C. 7401 *et seq.*

Subpart AA—Missouri

2. § 52.1320 is amended by:

a. In the table to paragraph (c), Chapter 5, adding in numerical order entry ''10–5.510.''

The addition reads as follows:

§ 52.1320 Identification of plan.

* * * * *

(c) * * *

EPA—APPROVED MISSOURI REGULATIONS

Missouri citation	Title	State effective date	EPA approval date	Explanation
Missouri Department of Natural Resources				
*	*	*	*	*
Chapter 5—Air Quality Standards and Air Pollution Control Regulations for the St. Louis Metropolitan Area				
*	*	*	*	*
10–5.510	Control of Emissions of Nitrogen Oxides.	February 29, 2000	[insert FR cite and May 18, 2000].	
*	*	*	*	*

[FR Doc. 00–12387 Filed 5–17–00; 8:45 am]
BILLING CODE 6560–50–P

ENVIRONMENTAL PROTECTION AGENCY

40 CFR Part 52

[MO 103–1103; FRL–6701–3]

Approval and Promulgation of Implementation Plans; State of Missouri

AGENCY: Environmental Protection Agency (EPA).

ACTION: Final rule.

SUMMARY: EPA is approving Missouri's 15% Rate-of-Progress Plan (ROPP), and Missouri rule 10–CSR 10–5.300, ''Control of Emissions From Solvent Metal Cleaning.'' This Plan is intended to fulfill the requirements of section 182(b)(1)(A) of the Clean Air Act (CAA or Act).

DATES: This rule is effective on June 19, 2000.

ADDRESSES: Copies of the state submittals are available at the following address for inspection during normal business hours: Environmental Protection Agency, Air Planning and Development Branch, 901 North 5th Street, Kansas City, Kansas 66101.

FOR FURTHER INFORMATION CONTACT: Royan Teter at (913) 551–7609.

SUPPLEMENTARY INFORMATION:

Throughout this document whenever ''we, us, or our'' is used, we mean EPA. This section provides additional information by addressing the following questions:

What is a State Implementation Plan (SIP)?
What is the Federal approval process for a SIP?
What does Federal approval of a state regulation mean to me?
What is being addressed in this action?
Have the requirements for approval of a SIP revision been met?
What action is EPA taking?

What Is a SIP?

Section 110 of the CAA requires states to develop air pollution regulations and control strategies to ensure that state air quality meets the national ambient air quality standards established by EPA. These ambient standards are established under section 109 of the CAA, and they currently address six criteria pollutants. These pollutants are: Carbon monoxide, nitrogen dioxide, ozone, lead, particulate matter, and sulfur dioxide.

Each state must submit these regulations and control strategies to EPA for approval and incorporation into the Federally enforceable SIP.

Each Federally approved SIP protects air quality primarily by addressing air pollution at its point of origin. These SIPs can be extensive, containing state regulations or other enforceable documents and supporting information such as emission inventories, monitoring networks, and modeling demonstrations.

What Is the Federal Approval Process for a SIP?

In order for state regulations to be incorporated into the Federally enforceable SIP, states must formally adopt the regulations and control strategies consistent with state and Federal requirements. This process generally includes a public notice, public hearing, public comment period, and a formal adoption by a state-authorized rulemaking body.

Once a state rule, regulation, or control strategy is adopted, the state submits it to us for inclusion into the SIP. We must provide public notice and seek additional public comment regarding the proposed Federal action on the state submission. If adverse comments are received, they must be addressed prior to any final Federal action by us.

All state regulations and supporting information approved by EPA under section 110 of the CAA are incorporated into the Federally approved SIP. Records of such SIP actions are maintained in the Code of Federal Regulations (CFR) at Title 40, Part 52, entitled ''Approval and Promulgation of Implementation Plans.'' The actual state regulations which are approved are not reproduced in their entirety in the CFR outright but are ''incorporated by reference,'' which means that we have approved a given state regulation with a specific effective date.

What Does Federal Approval of a State Regulation Mean to Me?

Enforcement of the state regulation before and after it is incorporated into the Federally approved SIP is primarily a state responsibility. However, after the regulation is Federally approved, we are authorized to take enforcement action against violators. Citizens are also offered legal recourse to address violations as described in section 304 of the CAA.

What Is Being Addressed in This Document?

On November 12, 1999, Missouri submitted a revised ROPP. The plan established the 1996 target level of volatile organic compound (VOC) emissions for the Missouri portion of the St. Louis ozone nonattainment area. Missouri achieves the required reductions through a combination of 19 state and 9 Federal measures.

On February 17, 2000, (65 FR 8083) EPA proposed to approve Missouri's ROPP and VOC rule 10 CSR 10–10.300. The public provided comments on the proposed action. We are responding to those comments below.

Have the Requirements for Approval of a SIP Revision Been Met?

The state submittal has met the public notice requirements for SIP submissions in accordance with 40 CFR 51.102. The submittal also satisfied the completeness criteria of 40 CFR part 51, Appendix V. In addition, as explained above and in more detail in the technical support document which was part of the proposed action, the revision meets the substantive SIP requirements of the CAA, including section 110 and implementing regulations.

Response to Comments

The Missouri Coalition for the Environment and the Sierra Club submitted jointly written comments regarding our February 17, 2000 proposal (65 FR 8083) to approve Missouri's 15% ROPP, and Missouri rule 10–CSR 10–5.300, ''Control of Emissions From Solvent Metal Cleaning.'' Their paraphrased comments and EPA's responses follow.

1. Comments Relating to the Statutory Requirements for Review of the ROPP

Comment: The commenters stated that the ROPP should be disapproved because it fails to show reasonable further progress ''as a matter of law.'' The commenters argue that the St. Louis nonattainment area is currently classified as ''serious'' under section 181 of the Act, and is therefore subject to the reasonable further progress (RFP) requirements of section 182(c) rather than 182(b).

In addition, they argue section 182(b) is no longer relevant for purposes of determining RFP because it governs RFP toward the goal of attainment by 1996 whereas it is now 2000. They contend the plan should be disapproved based on the premise that section 182(c) is the applicable CAA requirement and their conclusion that Missouri's plan does not purport to satisfy the RFP requirements of section 182(c).

Response: The St. Louis area is classified under section 181(a) of the Act as a moderate ozone nonattainment area, and has not been reclassified under section 181(b) as suggested by the commenters. In any event, the RFP requirements of section 182(b)(1) are applicable to all areas classified as

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moderate or higher, and must be met regardless of an area's classification and attainment date.

The RFP requirements of the CAA are structured in an additive fashion. For example, section 182(c) states that serious areas must meet the requirements of both subsections (b) and (c). As stated in the proposal on Missouri's submission, the scope of this rulemaking is limited to determining whether the submission meets the RFP requirements in section 182(b)(1). Whether it also meets additional requirements of the Act, even if such requirements were relevant, is beyond the scope of the rulemaking.

2. Comments on the Adequacy of EPA's Notice of Its Statutory Authority for the Rule

Comment: The commenters argue that EPA failed to give notice of its statutory authority to approve a 15% Plan which relies on reductions in VOC emissions achieved after November 15, 1996 (the date specified in section 182(b)(1)(A)(i) for achieving the reductions). The commenters state that EPA has not met the notice requirements of section 307(d)(3)(C) of the Act, or section 553 of the Administrative Procedure Act (APA).

Response: As a preliminary matter, EPA notes that section 307(d) is not applicable to this rulemaking. Section 307(d)(1) lists the actions to which section 307(d) applies, and the list does not include approval of SIP submissions. *See, e.g., Missouri Limestone Producers* v. *Browner,* 165 F. 3d 619, 621 (8th Cir. 1999). Therefore, the rulemaking is governed by the provisions of section 553 of the APA, which requires, in relevant part, that a notice of proposed rulemaking include ''reference to the legal authority'' for the proposed rule, and ''a description of the subjects and issues involved'' in the proposed rule. APA, section 553(b). In general, the notice must be sufficient to allow for ''informed public comment.'' *Id.* at 623.

EPA believes that the notice criteria in section 553(b) were met in the notice of proposed rulemaking on the ROPP. The notice contained a description of the statutory requirements in section 182(b)(1) of the Act against which submission was evaluated and a description of how the submission meets those requirements. The notice contains a description of the issues involving the November 15, 1996 deadline, and a discussion of the rationale for approving a ROPP extending beyond that date. See 65 FR 8089–8091.

EPA notes that the commenters submitted extensive comments which took issue with EPA's stated legal basis for proposing to approve the ROPP. Therefore, EPA believes that the notice of proposed rulemaking provided sufficient notice to allow for ''informed public comment'' and to satisfy the requirements of the APA. The fact that the commenters disagree with EPA's basis for approval, to which EPA is responding below, does not mean that EPA failed to provide adequate notice of the basis for the proposed approval.

3. Comments Relating to the ROPP's Sufficiency With Respect to the Statutory Requirements

Comment: In general, the commenters assert that since section 182(b)(1) requires that the plan include a 15% decrease in baseline emissions by November 15, 1996, EPA cannot approve a plan which includes reductions occurring after 1996.

Response: This assertion is contrary to relevant case law and would provide a disincentive for states to continue to achieve emission reductions in an area once a statutory date is missed, thus defeating the purpose of section 182(b)(1). As EPA explained in the proposal, even after the November 15, 1996 deadline for demonstrating the 15% VOC reduction has passed, the requirement to achieve the emission reduction remains, and the reduction must be demonstrated as soon as practicable. This is based on the ruling in *Delaney* v. *EPA,* 898 F. 2d 687, 691 (9th Cir. 1990), stating that once a statutory deadline has passed and has not been replaced by a later one, the deadline then becomes as soon as possible, which EPA has interpreted to be as soon as practicable. The Missouri submission indicates, and EPA agrees, that this date is 2003, when the full reductions from the second phase of Missouri's motor vehicle inspection and maintenance program will be realized. As indicated in EPA's proposal, neither Missouri nor EPA has been able to identify any practicable measures which are not included in the plan and which could accelerate this demonstration date.

EPA also notes that the commenters do not take issue with the analysis of other measures, but only with the determination that a plan with a demonstration date after 1996 can be approved. For the reasons stated above and in the proposal, EPA believes that the Missouri submission can be approved even though the demonstration date is after 1996.

EPA also notes that, under the commenters' view that a 15% ROPP with a post-1996 demonstration date cannot be approved, there would be a disincentive for a state to adopt and implement a plan for achieving the 15% ROPP reductions, since EPA would be required to disapprove any post-1996 plan submitted by a state. In addition, EPA would be unable to promulgate a Federal plan after 1996, since it would also be unable to achieve emission reductions by 1996. EPA's approach keeps the requirement for emission reductions in place after 1996, and ensures that the reductions will be achieved as soon as practicable after that date.

Comment: Referring to language in section 182(b)(1)(A) of the CAA the commenters assert that Missouri's ROPP falls short of achieving the required VOC emissions reductions. They note that Missouri's plan only accounts for emissions growth between 1990 and 1996 and contend that the plan should also account for growth that occurred between 1996 and the time the state's plan was submitted. They further contend that Missouri's use of 1996 emissions projections (developed by applying economic growth factors to emissions estimates from previous years), is arbitrary and capricious for two reasons: (1) Their belief that there is no basis for relying on emissions projections at this late date, asserting that 1996 actual emissions should be inventories instead; and (2) the ROPP does not account for growth after 1996.

Response: Section 182(b)(1)(A)(i) reads, ''By no later than 3 years after the date of enactment of the Clean Air Act Amendments of 1990, the state shall submit a revision to the applicable implementation plan to provide for volatile organic compound emission reductions within 6 years after the enactment of the Clean Air Act Amendments of 1990, of at least 15 percent from baseline emissions accounting for any growth in emissions after the year in which the Clean Air Act Amendments are enacted.'' As acknowledged by the commenters, the statute clearly contemplated that states would submit their ROPP by 1993 and implement them by 1996. The growth for which they must account is clearly tied to 1996.

The 1993 due date leads to a reasonable conclusion that Congress intended for the states to determine the required level of emissions reductions based on *projected* as opposed to actual emissions. Such an approach provides for equitable treatment of the states. It ensures there is no advantage gained from delayed implementation of emission control measures until after the compliance date has passed and

actual emissions can be estimated, rather than risk implementing a control plan designed around emission projections that are too high.

Though not directly relevant to this rulemaking, but nonetheless important to achieving the air quality standards, EPA notes that neither Missouri nor EPA intends to ignore post-1996 changes in the area's emissions inventory. Appropriate consideration of such changes is paramount to ensuring that ozone levels in the St. Louis area are reduced to acceptable levels. Missouri has accounted for such changes in its attainment demonstration upon which EPA proposed action on April 17, 2000 (65 FR 20404).

Comment: The commenters stated that, even if a plan could be submitted after the statutory deadline for achieving the 15% reductions, most of the reductions included in the Missouri submission are not creditable because they did not occur prior to November 15, 1996.

Response: As stated previously, once the statutory deadline for demonstrating the 15% ROPP reductions has passed, the requirement remains in effect, and the new deadline is a date which is as expeditious as practicable. Similarly, ROPP reductions are creditable if the state shows that the reduction will occur by the new ROPP demonstration date. Because Missouri has shown that the remaining reductions will occur by the 2003 demonstration date, EPA believes that the reductions are creditable under section 182(b)(1).

4. Comments Relating to the Absence of Contingency Measures in the 15% Plan

Comment: The commenters argue that Missouri's submission should not be approved because it does not include ''any specific contingency measures,'' and EPA's proposal makes no reference to the contingency measures to be approved as part of the 15% ROPP. The commenters assert that section 172(c)(9) of the Act requires that contingency measures meeting the requirements of that section must be included in any ROPP, and that failure to do so must result in disapproval of the plan. The commenters argue that this view linking the requirements of section 172(c)(9) with the requirements for ROPP was announced as an EPA interpretation of section 172(c)(9) in the April 16, 1992, General Preamble (57 FR 13,498).

Response: EPA does not agree that the contingency measure requirement in section 172(c)(9) must be met in order to meet the requirements for an approvable 15% ROPP. The Act requires contingency measures as part of the overall SIP and not as feature of each component of that plan, such as the 15% ROPP. Contrary to the commenters' contention, our position is supported by the plain language of section 172(c)(9). While the other subsections in section 172(c) begin with ''such plan provisions shall * * * ,'' section 172(c)(9) begins with ''such plan shall * * *.'' ''Such plan'' refers to the overall nonattainment plan rather than an individual element or provision of it. The difference in language between the contingency measures requirement and the other requirement in section 172(c) emphasizes that the contingency measures serve to backstop the entire nonattainment plan and not just particular elements of it.

This interpretation is consistent with the statement in the General Preamble cited by the commenters which, contrary to their characterization, did not state that contingency measures must be included in the ROPP. In the General Preamble, EPA stated the Act's requirements for nonattainment plan submittals for moderate nonattainment areas. these included the requirement for a 15% ROPP (discussed in section III.A.3.(a)), an attainment demonstration (discussed in section III.A.3.(b)), and contingency measures (discussed in section III.A.3.(c)), see 57 FR 13,498, 13507–13,512, as well as other requirements for moderate areas.

EPA stated that it expected the contingency measures would be submitted at the same time as these other plan elements, but did not state that the 15% ROPP or any other specific submittals were required to include contingency measures. Logically, had EPA intended to assert that contingency measures are required in 15% Plans, it would have said so in the General Preamble discussion of the requirements for 15% ROPP (section III.A.3.(a)), which contained a lengthy discussion of the contents of 15% Plans.

The commenters correctly note that EPA's proposal did not address the issue of whether the various VOC rule submittals, including rule 10 CSR 10–5.300 (which EPA proposed to approve into the SIP in the February 17, 2000, proposed rulemaking), were adequate to meet the contingency measure requirements of section 172(c)(9). The issue was not addressed because the proposal related only to whether Missouri met the 15% ROPP requirements in section 182(b)(1).

In the proposal (65 FR 8083, 8088), EPA noted that rule 10–5.300 had been submitted as part of the state's 1998 contingency measure SIP, and that a small fraction of the VOC reductions (0.64 tons per day out of an approximate total of 9 tons per day) was included in the state's 15% Plan demonstration. EPA has not determined whether the 1998 submittal meets the requirements of section 172(c)(9), and, as explained above, can approve Missouri's ROPP demonstration without making that determination. EPA will address the SIP's adequacy with respect to contingency measures in a separate rulemaking.

5. Comments Relating to EPA's Authority to Engage in Retroactive Rulemaking

Comment: Finally, the commenters object to EPA's proposed action as ''retroactive'' rulemaking which is not authorized under the Act. This comment is based on their assertion that EPA is proposing ''to give legal effect as of 1996 to events potentially occurring in 2000 and beyond.''

Response: This comment is based on an incorrect characterization of EPA's proposal. Although not stated, this comment appears to be based on the commenters' view, addressed above, that EPA cannot approve a 15% ROPP which relies on reductions occurring after 1996, and that to approve such a plan we are making it ''retroactive'' to 1996. However, this is not what EPA has done. Rather, EPA has explained the legal and policy basis for approving a ROPP demonstration which extends beyond 1966.

In addition, EPA's approval of the state plan does not take effect until the future effective date specified in this notice, and EPA's approval of the plan does not alter the effective dates (which were established by Missouri during its rulemaking process) of the rules on which the plan relies. For these reasons, EPA is not engaged in ''retroactive'' rulemaking and is authorized under the Act to take this final action.

What Action Is EPA Taking?

We are taking final action to approve Missouri's 15% ROPP for the St. Louis area and VOC rule 10 CSR 10–5.300. In separate actions published in today's **Federal Register**, we are approving several other VOC regulations which are elements of the ROPP.

Administrative Requirements

Under Executive Order 12866 (58 FR 51735, October 4, 1993), this action is not a ''significant regulatory action'' and therefore is not subject to review by the Office of Management and Budget. This action merely approves state law as meeting Federal requirements and imposes no additional requirements beyond those imposed by state law. Accordingly, the Administrator certifies that this rule will not have a significant

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economic impact on a substantial number of small entities under the Regulatory Flexibility Act (5 U.S.C. 601 *et seq.*).

Because this rule approves preexisting requirements under state law and does not impose any additional enforceable duty beyond that required by state law, it does not contain any unfunded mandate or significantly or uniquely affect small governments, as described in the Unfunded Mandates Reform Act of 1995 (Public Law 104–4).

For the same reason, this rule also does not significantly or uniquely affect the communities of tribal governments, as specified by Executive Order 13084 (63 FR 27655, May 10, 1998).

This rule will not have substantial direct effects on the states, on the relationship between the national government and the states, or on the distribution of power and responsibilities among the various levels of government, as specified in Executive Order 13132 (64 FR 43255, August 10, 1999), because it merely approves a state rule implementing a Federal standard, and does not alter the relationship or the distribution of power and responsibilities established in the CAA.

This rule also is not subject to Executive Order 13045 (62 FR 19885, April 23, 1997), because it is not economically significant.

In reviewing SIP submissions, our role is to approve state choices, provided that they meet the criteria of the CAA. In this context, in the absence of a prior existing requirement for the state to use voluntary consensus standards (VCS), we have no authority to disapprove a SIP submission for failure to use VCS. It would thus be inconsistent with applicable law for EPA, when it reviews a SIP submission, to use VCS in place of a SIP submission that otherwise satisfies the provisions of the CAA. Thus, the requirement of section 12(d) of the National Technology Transfer and Advancement Act of 1995 (15 U.S.C. 272 note) do not apply.

As required by section 3 of Executive Order 12988 (61 FR 4729, February 7, 1996), in issuing this rule, we have taken the necessary steps to eliminate drafting errors and ambiguity, minimize potential litigation, and provide a clear legal standard for affected conduct. EPA has complied with Executive Order 12630 (53 FR 8859), March 15, 1988) by examining the takings implications of the rule in accordance with the ''Attorney General's Supplemental Guidelines for the Evaluation of Risk and Avoidance of Unanticipated Takings'' issued under the Executive Order. This rule does not impose an information collection burden under the provisions of the Paperwork Reduction Act of 1995 (44 U.S.C. 3501 *et. seq.*).

The Congressional Review Act, 5 U.S.C. section 801 *et seq.*, as added by the Small Business Regulatory Enforcement Fairness Act of 1996, generally provides that before a rule may take effect, the agency promulgating the rule must submit a rule report, which includes a copy of the rule, to each House of the Congress and to the Comptroller General of the United States. We will submit a report containing this rule and other required information to the United States Senate, the United States House of Representatives, and the Comptroller General of the United States prior to publication of the rule in the **Federal Register**. A major rule cannot take effect until 60 days after it is published in the **Federal Register**. This action is not a ''major rule'' as defined by 5 U.S.C. section 804(2).

Under section 307(b)(1) of the CAA, petitions for judicial review of this section must be filed in the United States Court of Appeals for the appropriate circuit by July 17, 2000. Filing a petition for reconsideration by the Administrator of this final rule does not affect the finality of this rule for the purposes of judicial review nor does it extend the time within which a petition for judicial review may be filed, and shall not postpone the effectiveness of such rule or action. This action may not be challenged later in proceedings to enforce its requirements. (See section 307(b)(2).)

List of Subjects 40 CFR Part 52

Environmental protection, Air pollution control, Carbon monoxide, Hydrocarbons, Incorporation by reference, Intergovernmental relations, Lead, Nitrogen dioxide, Ozone, Particulate matter, Reporting and recordkeeping requirements, Sulfur oxides.

Dated: May 8, 2000.

Dennis Grams,

Regional Administrator, Region 7.

Chapter I, title 40 of the code of Federal Regulations is amended as follows:

PART 52—[AMENDED]

1. The authority citation for part 52 continues to read as follows:

Authority: 42 U.S.C. 7401 *et seq.*

Subpart AA—Missouri

2. In § 52.1320, the table in paragraph (c) is amended by revising the entry for 10–5.300, under Chapter 5, to read as follows:

§ 52.1320 Identification of plan.

* * * * *

(c) * * *

EPA–APPROVED MISSOURI REGULATIONS

Missouri citation	Title	State effective date	DPA approval date	Explanation
	Missouri Department of Natural Resources			
*	*	*	*	*
	Chapter 5—Air Quality Standards and Pollution Control Regulations for the St. Louis Metropolitan Area			
*	*	*	*	*
10–5.300	Control of Emissions From Solvent Metal Cleaning.	May 30, 1998	May 18, 2000.	
*	*	*	*	*

3. In § 52.1320, the table in paragraph (e) is amended by adding the following entry at the end of the table: ''15% Rate-of-Progress Plan.''

§ 52.1320 Identification of plan.

* * * * *

(e) * * *

EPA–APPROVED MISSOURI NONREGULATORY SIP PROVISIONS

Name of nonregulatory SIP provision	Applicable geographic or nonattainment area	State Submittal date	EPA approval date	Explanation
*	*	*	*	*
15% Rate-of-Progress Plan.	St. Louis	11/12/99	May 18, 2000	

[FR Doc. 00–12385 Filed 5–17–00; 8:45 am]

BILLING CODE 6560–50–D

ENVIRONMENTAL PROTECTION AGENCY

40 CFR Part 52

[Region 7 Tracking No. MO 101–1101; FRL–6701–4]

Approval and Promulgation of Implementation Plans; State of Missouri

AGENCY: Environmental Protection Agency (EPA).

ACTION: Final rule.

SUMMARY: EPA is taking final action to approve a set of volatile organic compound (VOC) rules for the St. Louis, Missouri, nonattainment area. These rules are intended to satisfy the reasonably available control technology (RACT) requirements of section 182(b)(2) of the Clean Air Act (Act) Amendments of 1990. The VOC reductions achieved by the implementation of these rules will be accounted for in the 15% Rate-of-Progress Plan (ROPP) and the attainment demonstration for the St. Louis nonattainment area as required in section 182(b)(1)(A) of the Act. EPA is addressing the reductions as part of the 15% ROPP and the attainment demonstration in separate rulemaking actions.

DATES: This rule is effective on June 19, 2000.

ADDRESSES: Copies of the state submittals are available at the following address for inspection during normal business hours: Environmental Protection Agency, Air Planning and Development Branch, 901 North 5th Street, Kansas City, Kansas 66101.

FOR FURTHER INFORMATION CONTACT: Kim Johnson at (913) 551–7975.

SUPPLEMENTARY INFORMATION: Throughout this document whenever ''we, us, or our'' is used, we mean EPA. This section provides additional information by addressing the following questions:

What is a SIP?
What is the Federal approval process for a SIP?
What does Federal approval of a state regulation mean to me?
What is being addressed in this action?
Have the requirements for approval of a SIP revision been met?
What action is EPA taking?

What Is a SIP?

Section 110 of the Clean Air Act (CAA) requires states to develop air pollution regulations and control strategies to ensure that state air quality meets the national ambient air quality standards established by EPA. These ambient standards are established under section 109 of the CAA, and they currently address six criteria pollutants. These pollutants are: carbon monoxide, nitrogen dioxide, ozone, lead, particulate matter, and sulfur dioxide.

Each state must submit these regulations and control strategies to EPA for approval and incorporation into the Federally enforceable SIP.

Each Federally approved SIP protects air quality primarily by addressing air pollution at its point of origin. These SIPs can be extensive, containing state regulations or other enforceable documents and supporting information such as emission inventories, monitoring networks, and modeling demonstrations.

What Is the Federal Approval Process for a SIP?

In order for state regulations to be incorporated into the Federally enforceable SIP, states must formally adopt the regulations and control strategies consistent with state and Federal requirements. This process generally includes a public notice, public hearing, public comment period, and a formal adoption by a state-authorized rulemaking body.

Once a state rule, regulation, or control strategy is adopted, the state submits it to us for inclusion into the SIP. We must provide public notice and seek additional public comment regarding the proposed Federal action on the state submission. If adverse comments are received, they must be addressed prior to any final Federal action by us.

All state regulations and supporting information approved by EPA under section 110 of the CAA are incorporated into the Federally approved SIP. Records of such SIP actions are maintained in the Code of Federal Regulations (CFR) at Title 40, Part 52, entitled ''Approval and Promulgation of Implementation Plans.'' The actual state regulations which are approved are not reproduced in their entirety in the CFR outright but are ''incorporated by reference,'' which means that we have approved a given state regulation with a specific effective date.

What Does Federal Approval of a State Regulation Mean to me?

Enforcement of the state regulation before and after it is incorporated into the Federally approved SIP is primarily a state responsibility. However, after the regulation is Federally approved, we are authorized to take enforcement action against violators. Citizens are also offered legal recourse to address violations as described in section 304 of the CAA.

What Is Being Addressed in This Document?

VOC emissions combine with nitrogen oxide emissions on hot, sunny days to form ground level ozone, commonly known as smog. The purpose of the following rules is to establish RACT requirements for major sources of VOC emissions to help reduce ozone concentrations in the St. Louis ozone nonattainment area. The St. Louis ozone nonattainment area includes Franklin, Jefferson, St. Charles, and St. Louis counties, and St. Louis City in Missouri.

We are taking final action to approve as an amendment to the Missouri SIP the following rules:

10 CSR 10–5.220 Control of Petroleum Liquid Storage, Loading, and Transfer

Missouri has updated its existing rule 10 CSR 10–5.220 to improve the clarity of the regulation and generally strengthen the SIP. This rule restricts VOC emissions from the handling of petroleum liquids in five specific areas.

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These areas include petroleum storage tanks with a capacity greater than 40,000 gallons, the loading of gasoline into delivery vessels, the transfer of gasoline from delivery vessels into storage containers, gasoline delivery vessels, and the fueling of motor vehicles from storage containers.

10 CSR 10–5.295 Control of Emissions From Aerospace Manufacture and Rework Facilities

This new rule requires all aerospace manufacture and rework facilities in the St. Louis nonattainment area, which emit greater than 25 tons per year, to use low VOC coatings and cleaning solvents.

10 CSR 10–5.500 Control of Emissions From Volatile Organic Liquid Storage

This rule limits the VOC emissions from installations storing large volumes of volatile organic liquids. The control requirements apply to all 40,000 gallon or larger volatile organic liquid storage containers storing liquid with a maximum true vapor pressure of one-half pound per square inch or greater.

10 CSR 10–5.520 Control of Volatile Organic Compound Emissions From Existing Major Sources

This new rule requires major facilities that are not regulated by current category-specific RACT regulations to conduct a RACT study and implement the RACT level controls defined by the study as approved by Missouri. Major facilities are defined as having the potential to emit 100 tons per year or more of VOCs.

10 CSR 10–5.530 Control of Volatile Organic Compound Emissions From Wood Furniture Manufacturing Operations

This rule limits the VOC emissions from wood furniture manufacturing operations that have the potential to emit equal to or greater than 25 tons per year of VOC emissions.

10 CSR 10–5.540 Control of Emissions From Batch Process Operations

This rule establishes RACT controls to limit the VOC emissions from batch process operations. The control requirements apply to batch operation sources that have the potential to emit equal to or greater than 100 tons per year of VOC emissions and that are identified by one of seven different four digit standard industrial classification codes under the chemical manufacturing category.

10 CSR 10–5.550 Control of Volatile Organic Compound Emissions From Reactor Processes and Distillation Operations Processes in the Synthetic Organic Chemical Manufacturing Industry

This new rule implements RACT control of VOC emissions from the synthetic organic chemical manufacturing industry. Specifically, this rule requires RACT for control of VOC emissions from any vent stream originating from a process unit in which a reactor process or distillation operation is located.

Summary

These new VOC RACT rules are consistent with Federal regulations and are consistent with the appropriate EPA control techniques guidelines or alternative control techniques documents. The rules contain enforceable emission limits, appropriate compliance methods, require recordkeeping to determine compliance, and meet all applicable enforceability requirements.

No comments were received in response to the public comment period regarding this rule action.

For more background information and a more detailed description of EPA's rationale for approval, the reader is referred to the proposal for this rulemaking published on February 17, 2000, at 65 FR 8094.

Have the Requirements for Approval of a SIP Revision Been Met?

The state submittal has met the public notice requirements for SIP submissions in accordance with 40 CFR 51.102. The submittal also satisfied the completeness criteria of 40 CFR part 51, Appendix V. In addition, as explained above and in more detail in the technical support document which is part of this document, the revision meets the substantive SIP requirements of the CAA, including section 110 and implementing regulations and Part D of Title I of the Act.

What Action Is EPA Taking?

We are taking final action to approve as an amendment to the Missouri SIP the following rules applicable to the St. Louis nonattainment area:

10 CSR 10–5.220 Control of Petroleum Liquid Storage, Loading, and Transfer
10 CSR 10–5.295 Control of Emissions From Aerospace Manufacture and Rework Facilities
10 CSR 10–5.500 Control of Emissions from Volatile Organic Liquid Storage
10 CSR 10–5.520 Control of Volatile Organic Compound Emissions From Existing Major Sources
10 CSR 10–5.530 Control of Volatile Organic Compound Emissions From Wood Furniture Manufacturing Operations
10 CSR 10–5.540 Control of Emissions from Batch Process Operations
10 CSR 10–5.550 Control of Volatile Organic Compound Emissions From Reactor Processes and Distillation Operations Processes in the Synthetic Organic Chemical Manufacturing Industry

These rules will reduce VOC emissions in the St. Louis area and meet the RACT requirements of section 182(b)(2) of the Act as amended in 1990.

Administrative Requirements

Under Executive Order 12866 (58 FR 51735, October 4, 1993), this action is not a ''significant regulatory action'' and therefore is not subject to review by the Office of Management and Budget. This action merely approves state law as meeting Federal requirements and imposes no additional requirements beyond those imposed by state law. Accordingly, the Administrator certifies that this rule will not have a significant economic impact on a substantial number of small entities under the Regulatory Flexibility Act (5 U.S.C. 601 *et seq.*). Because this rule approves preexisting requirements under state law and does not impose any additional enforceable duty beyond that required by state law, it does not contain any unfunded mandate or significantly or uniquely affect small governments, as described in the Unfunded Mandates Reform Act of 1995 (Public Law 104–4). For the same reason, this rule also does not significantly or uniquely affect the communities of tribal governments, as specified by Executive Order 13084 (63 FR 27655, May 10, 1998). This rule will not have substantial direct effects on the states, on the relationship between the national government and the states, or on the distribution of power and responsibilities among the various levels of government, as specified in Executive Order 13132 (64 FR 43255, August 10, 1999), because it merely approves a state rule implementing a Federal standard, and does not alter the relationship or the distribution of power and responsibilities established in the CAA. This rule also is not subject to Executive Order 13045 (62 FR 19885, April 23, 1997), because it is not economically significant.

In reviewing SIP submissions, our role is to approve state choices, provided that they meet the criteria of the CAA. In this context, in the absence of a prior existing requirement for the state to use voluntary consensus standards (VCS), we have no authority

to disapprove a SIP submission for failure to use VCS. It would thus be inconsistent with applicable law for EPA, when it reviews a SIP submission, to use VCS in place of a SIP submission that otherwise satisfies the provisions of the CAA. Thus, the requirements of section 12(d) of the National Technology Transfer and Advancement Act of 1995 (15 U.S.C. 272 note) do not apply. As required by section 3 of Executive Order 12988 (61 FR 4729, February 7, 1996), in issuing this rule, we have taken the necessary steps to eliminate drafting errors and ambiguity, minimize potential litigation, and provide a clear legal standard for affected conduct. EPA has complied with Executive Order 12630 (53 FR 8859, March 15, 1988) by examining the takings implications of the rule in accordance with the ''Attorney General's Supplemental Guidelines for the Evaluation of Risk and Avoidance of Unanticipated Takings' issued under the Executive Order. This rule does not impose an information collection burden under the provisions of the Paperwork Reduction Act of 1995 (44 U.S.C. 3501 *et seq.*).

The Congressional Review Act, 5 U.S.C. section 801 *et seq.*, as added by the Small Business Regulatory Enforcement Fairness Act of 1996, generally provides that before a rule may take effect, the agency promulgating the rule must submit a rule report, which includes a copy of the rule, to each House of the Congress and to the Comptroller General of the United States. We will submit a report containing this rule and other required information to the United States Senate, the United States House of Representatives, and the Comptroller General of the United States prior to publication of the rule in the **Federal Register**. A major rule cannot take effect until 60 days after it is published in the **Federal Register**. This action is not a ''major rule'' as defined by 5 U.S.C. section 804(2).

Under section 307(b)(1) of the CAA, petitions for judicial review of this action must be filed in the United States Court of Appeals for the appropriate circuit by July 17, 2000. Filing a petition for reconsideration by the Administrator of this final rule does not affect the finality of this rule for the purposes of judicial review nor does it extend the time within which a petition for judicial review may be filed, and shall not postpone the effectiveness of such rule or action. This action may not be challenged later in proceedings to enforce its requirements. (See section 307(b)(2).)

List of Subjects 40 CFR Part 52

Environmental protection, Air pollution control, Carbon monoxide, Hydrocarbons, Incorporation by reference, Intergovernmental relations, Lead, Nitrogen dioxide, Ozone, Particulate matter, Reporting and recordkeeping requirements, Sulfur oxides.

Dated: May 2, 2000

Dennis Grams,

Regional Administrator, Region 7.

Chapter I, title 40 of the Code of Federal Regulations is amended as follows:

PART 52—[AMENDED]

1. The authority citation for part 52 continues to read as follows:

Authority: 42 U.S.C. 7401 *et seq.*

Subpart AA—Missouri

2. § 52.1320 is amended by:

a. In the table to paragraph (c), Chapter 5, revising the entry for ''10–5.220'';

b. In the table to paragraph (c), Chapter 5, adding in numerical order entries ''10–5.295,'' ''10–5.500,'' ''10–5.520,'' ''10–5.530,'' ''10–5.540,'' and ''10–5.550.''

The revision and additions read as follows:

§ 52.1320 Identification of plan.

* * * * *

(c) * * *

EPA-APPROVED MISSOURI REGULATIONS

Missouri citation	Title	State effective date	EPA approval date	Explanation
	Missouri Department of Natural Resources			
*	*	*	*	*
	Chapter 5—Air Quality Standards and Air Pollution Control Regulations for the St. Louis Metropolitan Area			
*	*	*	*	*
10–5.220	Control of Petroleum Liquid Storage, Loading, and Transfer.	August 30, 1999	May 18, 2000.	
*	*	*	*	*
10–5.295	Control of Emissions From Aerospace Manufacturing and Rework Facilities.	February 29, 2000	May 18, 2000.	
*	*	*	*	*
10–5.500	Control of Emissions From Volatile Organic Liquid Storage.	February 29, 2000	May 18, 2000.	
10–5.520	Control of Volatile Organic Compound Emissions From Existing Major Sources.	February 29, 2000	May 18, 2000.	
10–5.530	Control of Volatile Organic Compound Emissions From Wood Furniture Manufacturing Operations.	February 29, 2000	May 18, 2000.	
10–5.540	Control of Emissions From Batch Process Operations.	February 29, 2000	May 18, 2000.	
10–5.550	Control of Volatile Organic Compound Emissions From Reactor Processes and Distillation Operations Processes in the Synthetic Organic Chemical Manufacturing Industry.	February 29, 2000	May 18, 2000.	

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EPA-APPROVED MISSOURI REGULATIONS—Continued

Missouri citation	Title	State effective date	EPA approval date	Explanation
* *	* *	*	*	*

[FR Doc. 00–12384 Filed 5–17–00; 8:45am]

BILLING CODE 6560–50–P

ENVIRONMENTAL PROTECTION AGENCY

40 CFR Part 228

[FRL–6702–1]

Ocean Dumping: Designation of Site

AGENCY: Environmental Protection Agency.

ACTION: Final rule.

SUMMARY: The Environmental Protection Agency (EPA) designates an existing dredged material disposal site located in the Gulf of Mexico at the mouth of Atchafalaya Bay for the continued disposal of dredged material removed from the bar channel of the Atchafalaya River and Bayous Chene, Boeuf, and Black, Louisiana. This action is necessary to provide an acceptable ocean dumping site for current and future disposal of this material. This final site designation is for an indefinite period and is subject to monitoring to insure that unacceptable adverse environmental impacts do not occur.

DATES: This rule is effective on June 19, 2000.

ADDRESSES: Monica Young (6WQ–EM), EPA Region 6, 1445 Ross Avenue, Dallas, TX 75202–2733.

Information supporting this designation is available for review at the following location: EPA, Region 6, 1445 Ross Ave, 9th floor file room, Dallas, TX 75202.

FOR FURTHER INFORMATION CONTACT: Monica Young 214–665–7349.

SUPPLEMENTARY INFORMATION:

Background

Section 102(c) of the Marine Protection, Research, and Sanctuaries Act of 1972 (MPRSA), as amended, (33 U.S.C. 1401 *et seq.*), gives the Administrator of EPA the authority to designate sites where ocean dumping may be permitted. On December 23, 1986, the Administrator delegated the authority to designate ocean dumping sites to the Regional Administrator of the Region in which the site is located. This site designation is being made pursuant to that authority.

EPA's Ocean Dumping Regulations (40 CFR Chapter I, Subchapter H, Section 228.4) state that ocean dumping sites will be designated by promulgation in Part 228. A list of ''Approved Interim and Final Ocean Dumping Sites'' was published on January 11, 1977 (42 FR 2461 *et seq.*). That list established the Atchafalaya River Bar Channel ocean dredged material disposal site (ODMDS) on an interim basis.

The interim designation of the Atchafalaya River Bar Channel ODMDS was extended indefinitely in January 1980. However, Section 506 of the Water Resources Development Act (WRDA) of 1992, amended MPRSA such that beginning January 1, 1997, open water offshore disposal could only be into ODMDSs either designated by EPA under § 102(c) of the Act or selected by the Corps of Engineers (COE) under § 103(b) as an alternative site. Since EPA had not ruled on final designation by January 1, 1997, the Atchafalaya River Bar Channel ODMDS was selected by the New Orleans District COE as a § 103(b) alternative to accommodate annual channel maintenance dredging beyond 1996. Recognizing a five (5) year extension of the COE's § 103(b) selection allowed the continued use of the Atchafalaya River Bar Channel ODMDS through the year 2006, EPA was to designate the Atchafalaya River Bar Channel ODMDS site pursuant to § 102(c) of MPRSA, or to find that the site is inappropriate for final designation. This site designation is being published as final rulemaking in accordance with § 228.4(e) of the Ocean Dumping Regulations, which permits the designation of ocean disposal sites for dredged material.

Regulated Entities

Entities potentially regulated by this action are persons, organizations, or government bodies seeking to dispose of dredged material in ocean waters at the Atchafalaya River Bar Channel ODMDS, under the MPRSA, 33 U.S.C. 1401 *et seq.* The Rule would be primarily of relevance to parties in the Morgan City area seeking permits from the COE to transport dredged material for the purpose of disposal into ocean waters at the Atchafalaya River Bar Channel ODMDS, as well as the COE itself (when proposing to dispose of dredged material at the ODMDS). Potentially regulated categories and entities seeking to use the ODMDS and thus subject to this Rule include:

Category	Examples of regulated entities
Federal Government	U.S. Army Corps of Engineers Civil Works Projects. Other Federal Agencies, including the Department of Defense.
Industry and General Public	Port Authorities. Marinas and Harbors. Shipyards and Marine Repair Facilities. Berth Owners.
State, local and tribal governments	Governments owning and/or responsible for ports, harbors, and/or berths. Government agencies requiring disposal of dredged material associated with public works projects.

This table lists the types of entities that EPA is now aware could potentially be regulated. EPA notes, however, that nothing in this final ruling alters in any way, the jurisdiction of EPA, or the types of entities regulated under the MPRSA. To determine if you or your organization is potentially regulated by this action, you should carefully consider whether you expect to propose ocean disposal of dredged material, in accordance with the Purpose and Scope provisions of 40 CFR 220.1, and if you wish to use the Atchafalaya River Bar Channel ODMDS. If you have questions regarding the applicability of this action to a particular entity, consult the person listed in the preceding **FOR FURTHER INFORMATION CONTACT** section. Since ODMDS use is restricted to dredged material removed from the bar channel of the Atchafalaya River, EPA anticipates that the COE will be the only user of the ODMDS.

EIS Development

Section 102 (2)(c) of the National Environmental Policy Act of 1969 (NEPA), as amended (Pub. L. 91–190, 42 U.S.C. 4321 *et seq.*), requires that

Federal agencies prepare Environmental Impact Statements (EISs) on proposals for legislation and other major Federal actions significantly affecting the quality of the human environment. NEPA does not apply to ODMDS designations, however EPA voluntarily prepared an EIS in connection with this designation action.

EPA prepared a Draft EIS on the designation of the Atchafalaya River Bar Channel ODMDS in November, 1983. Six comment letters were received on the Draft EIS. Based on the comments received, EPA determined that a Supplemental Draft EIS was appropriate to correct information deficiencies and include more recent data in response to the commenting agencies. EPA and the COE jointly prepared the Supplemental Draft EIS, which was distributed to interested agencies, environmental groups and individuals for review in December, 1990. Five comments letters were received on the Supplemental Draft EIS. Responses to these comments were included in EPA's Final EIS, which was completed and distributed to interested agencies, environmental groups and individuals in November, 1998. The 30-day comment period on EPA's Final EIS closed on January 11, 1999.

Only one comment letter, from the State of Louisiana, Department of Culture, Recreation and Tourism, Office of Cultural Development, was received on the Final EIS. The Louisiana Office of Cultural Development found the document to be thorough and well written, and concurred with the evaluation that there would be no effect on significant cultural resources, and as such, had no objections to the proposal.

EPA's NEPA review included coordination with the State of Louisiana under requirements of the Coastal Zone Management Act. The State of Louisiana concurred with EPA's determination that final designation of the Atchafalaya River Bar Channel ODMDS is consistent, to the maximum extent practicable, with the Louisiana Coastal Resources Program.

This final rulemaking document fills the same role as the Record of Decision required under regulations promulgated by the Council on Environmental Quality for agencies subject to NEPA.

Site Designation

EPA's proposal to designate the Atchafalaya River Bar Channel ODMDS was published in the **Federal Register** on February 6, 1991 (pages 4777–4781). The public comment period on this proposed rule closed on March 25, 1991. One comment letter was received on the proposed rule from the U.S. Department of the Interior (DOI), Office of the Secretary, in Washington, D.C. The DOI recommended: (1) That dredged material be used for beneficial purposes (e.g., to rebuild eroded shoreline and increase marsh habitats); (2) that the final rule include a requirement for dredged material to be used to build bird islands and avoid shell reefs, in consultation with the U.S. Fish and Wildlife Service and the Louisiana Department of Wildlife and Fisheries; and (3) that the final rule require, prior to each dredging event, an interagency evaluation of the feasibility of using the dredged material to create marsh, reduce shoreline erosion, or build bird nesting/roosting islands.

In response to DOI's comments on the proposed rule (and similar comments received on the Supplemental Draft EIS), the Final EIS evaluated these recommendations, and other reasonable, beneficial use alternatives. EPA's action [*i.e.,* site designation under § 102(c) of MPRSA] does not authorize the placement of dredged materials or require interagency evaluation of beneficial use alternatives. However, beneficial use alternatives and other options for the placement of dredged material are evaluated through annual COE dredging conferences.

The Atchafalaya River Bar Channel ODMDS is located east of, and parallel to, the Atchafalaya River bar channel and is approximately 18.5 miles long. The center of the ODMDS is approximately 16 miles from the mouth of the Atchafalaya River. North Point of Point au Fer Island is about 2 miles east of the northern end of the site. The average water depth at the site is approximately 16 feet. Boundary coordinates of the rectangular shaped site are as follows: 29E20′59.92″N, 91E 23′33.23″W; 29E20′43.94″N, 91E23′09.73″W; 29E08′15.46″N, 91E34′51.02″W; and 29E07′59.43″N, 91E34′27.51″W.

Ocean Dumping Site Designation Criteria

Five general criteria are used in the selection and approval of ocean disposal sites for continuing use. Sites are selected so as to minimize interference with other marine activities, to keep any temporary perturbations from the disposal from causing impacts outside the disposal site, and to permit effective monitoring to detect any adverse impacts at an early stage. Where feasible, locations off the Continental Shelf are chosen. If at any time disposal operations at a site cause unacceptable adverse impacts, further use of the site may be terminated or limitations placed on the use of the site to reduce the impacts to acceptable levels.

The five general criteria are given in 40 CFR 228.5 of the Ocean Dumping Regulations. EPA has determined, based on the information and analyses in the Draft EIS, Supplemental Draft EIS, and Final EIS, that the site is acceptable under the five general criteria. The Continental Shelf location is not feasible and no environmental benefit would be obtained by selecting such a site. Historical use of the site has not resulted in substantial adverse impacts to living resources of the ocean or to other uses of the marine environment.

Section 228.6 of the Ocean Dumping Regulations lists eleven specific factors to be used in evaluating a proposed disposal site to assure that the general criteria are met. The characteristics of the site are reviewed below in terms of these eleven specific factors.

1. *Geographical position, depth of water, bottom topography, and distance from coast* (40 CFR 228.6(a)(1)).

Geographical position and average water depth are given above. The Atchafalaya River Bar Channel ODMDS is located in the near shore area of the Gulf of Mexico (*i.e.,* to a depth of about 75 feet). The ODMDS gently slopes from a depth of about 5 feet at its near shore end to about 22 feet at its seaward end. Except for being located adjacent to the dredged channel, the area occupied by the ODMDS is similar in depth and bottom topography to the overall lower Atchafalaya River area.

2. *Location in relation to breeding, spawning, nursery, feeding, or passage areas of living resources in adult or juvenile phases* (40 CFR 228.6(a)(2)).

The northwestern Gulf of Mexico is a breeding, spawning, nursery, and feeding area for shrimp, menhaden, and bottomfish. To complete their life cycles, many of the species migrate seasonally between the coastal estuaries and the Gulf. Because the timing varies by species, some migration can occur at almost any time of the year. The ODMDS is located in a region dominated by species that are estuary-related. The ODMDS represents a small area (9.14 square miles) of the total range of the white and brown shrimp and their related communities; however, the nearby Atchafalaya River estuarine area is one of the region's major nursery areas.

Disposal of material at the ODMDS would have negligible effects on Federally listed endangered and threatened species. Endangered whale species which may be found in the vicinity of the ODMDS are the sei, fin, humpback, right, and sperm. However, occurrences of whales off Louisiana are

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considered rare, and because the animals generally inhabit waters far deeper than those in the ODMDS, it is unlikely that disposal operations would have any impact on whale species.

Three species of sea turtles (hawksbill, Kemp's ridley, and leatherback) classified as endangered and two species of sea turtles (green and loggerhead) classified as threatened could potentially inhabit the ODMDS. Hopper dredging has been identified as a source of mortality (incidental take) to sea turtles in inshore waters. However, disposal of maintenance material dredged from the Atchafalaya River Bar Channel is by hydraulic cutter head pipeline dredge, which has not been identified as a source of sea turtle mortality.

3. *Location in relation to beaches and other amenity areas* (40 CFR 228.6(a)(3)).

The nearest point of land is North Point of Point au Fer Island, about 2 miles from the northeast end of the ODMDS. While it may be possible to observe the disposal plume, the plume is expected to dissipate quickly after completion of the disposal operations. Except for minor affects of these limited observations, there should be no effects on the aesthetics of the area. There are no known recreational parks, beaches, or other amenity areas in proximity to the ODMDS.

4. *Types and quantities of wastes proposed to be disposed of, and proposed methods of release, including methods of packing the waste, if any* (40 CFR 228.6(a)(4)).

Material dredged from the upper one-third of the bar channel generally is comprised of 26% sand, 30% silt, and 44% clay, and material from the lower two-thirds of the bar channel generally is comprised of 7% sand, 44% silt, and 49% clay. An estimated 9 to 11 million cubic yards of material is removed annually from the Atchafalaya River Bar Channel using a hydraulic cutter head pipeline dredge and released within the ODMDS as an un-cohesive slurry. Future disposal operations will follow the past disposal pattern with respect to types, quantities, and methods of release. Any material disposed of at the site is required to comply with the criteria of the Ocean Dumping Regulations. None of the material will be packaged in any way. The COE will likely be the only user of the site.

5. *Feasibility of surveillance and monitoring* (40 CFR 228.6(a)(5)).

The ODMDS is shallow and close to shore, which facilitates surveillance and monitoring of the site. Operational observations can be made using shore-based radar, aircraft, ship riders, and day-use boats. Monitoring would be facilitated by the database that has been established for the ODMDS. A monitoring program has been developed by EPA in cooperation with the COE for the ODMDS, as part of the ''Atchafalaya ODMDS Site Management Plan.''

6. *Dispersal, horizontal transport and vertical mixing characteristics of the area, including prevailing current direction and velocity, if any* (40 CFR 228.6(a)(6)).

Water currents in the vicinity of the ODMDS are very complex. Although tides, loop current intrusions, and river flow may affect the local currents, the currents are influenced predominantly by winds. Thus, the direction and velocity of currents vary throughout the year.

Water currents in the area can reach velocities sufficient to resuspend the disposed dredged material. The resuspended material would be transported in the direction of the current causing the resuspension. During these periods, constant mixing of the dredged material and sediments originally in the area takes place. The mixed dredged material and background sediments settle as the velocity decreases, and become resuspended when some event again raises the current velocity.

Sediment transport at the ODMDS is both to the northwest and to the southeast. The prevailing northwest currents are relatively weak and generally transport silt-sized and clay-sized particles. In the winter, however, stronger currents to the southeast, which are driven by the passage of cold-air outbreaks (northers), transport the latter particle sizes plus sand-sized particles. Gale-force winds for a duration of 20 to 30 hours are common during the passage of one of the cold-air outbreaks, which occur from 15 to 30 times each year.

7. *Existence and effects of current and previous discharges dumping in the area (including cumulative effects*) (40 CFR 228.6(a)(7)).

Sediment physical and chemical characteristics are generally similar within and adjacent to the ODMDS. Identified effects of dredged material disposal on sediments within the ODMDS include a few relatively high concentrations for sedimentary constituents (alpha chlordane, some chlorinated biphenols, para-para-DDD, iron, aluminum, perylene, zinc, oil, and grease). However, the area is influenced by shallow water depths, frequent resuspension of bottom sediments by winds and waves, and input of large quantities of fine sediments from riverine sources. Furthermore, dredged materials released at the ODMDS are similar to background sediments in the vicinity and are widely distributed by natural processes after deposition. Since the effects of disposal area temporary, there are no cumulative effects.

8. *Interference with shipping, fishing, recreation, mineral extraction, desalination, fish and shellfish culture, areas of special scientific importance and other legitimate uses of the ocean* (40 CFR 228.6(a)(8)).

The ODMDS is outside the navigation channel and, thus, not in the path of ocean-going vessels. Some smaller boats may pass over the site; however, since any mounds are expected to be short-lived, there should be no interference. All dredging and disposal operations are closely coordinated among the dredging operators and the shipping interests to avoid interference with ship traffic. Without dredging, the channel would be impassible to most shipping.

There is periodic, short-term, interference with recreational activities at the ODMDS during disposal operations. The plumes of dredged material have a minor impact on targeted fish stocks, temporarily affecting recreational fishing in the area. This interference is temporary and restricted to the relatively small area of the ODMDS being used for disposal at the particular time. Past experience with use of the site for disposal of dredged material has not indicated interference with oil and gas exploration or production. No other types of mineral extraction are taking place either within the site or in the general vicinity of the site.

The nearest oyster leases are located about 4 miles to the east of the ODMDS, near Point au Fer. Because the transport of suspended materials from the ODMDS is mainly parallel to the coastline, adverse effects of disposal operations on these oyster beds should be minimal. In addition, the oyster beds are naturally subjected to periodic episodes of high, suspended-solid concentrations from the waters of the Atchafalaya River. There have been no impacts to oyster leases from past use, and no impact is expected to result from future use of the ODMDS.

The Atchafalaya Delta Wildlife Management Area is located about 8 miles to the north of the ODMDS. Shell Keys National Wildlife Refuge and Russell Sage—Marsh Island State Wildlife Refuge are located about 29 miles to the west of the ODMDS. There has been no impact to the refuges from past use, and none is expected to result from future use of the ODMDS.

Periodically, scientific studies are carried out in the area. Use of the site

is not expected to interfere with any such studies. It is not expected that use of the site for disposal of dredged material would interfere with any other legitimate uses of the ocean.

9. *The existing water quality and ecology of the site as determined by available data or by trend assessment of baseline surveys* (40 CFR 228.6(a)(9)).

The water quality and ecology of the ODMDS generally reflect that of the near shore region off the Louisiana coast affected by discharges from the Atchafalaya River. The variations in water quality depend on the amount and mixing of freshwater runoff, which are highly variable.

In the summer, calm winds, freshwater input, and intrusions of offshore waters may restrict vertical mixing in the near shore waters. Under these conditions, bottom waters can be depleted of oxygen. This hypoxic condition (dissolved-oxygen content of less than 2 ppm) may be an annual phenomenon, but the event is patchy and ephemeral and has been shown to affect shelf waters from the Mississippi Delta to the upper Texas coast.

With the following exceptions, concentrations of trace metals in waters from the Atchafalaya River Bar Channel were below detection limits: concentrations of barium, iron, and manganese from the channel sample were greater, by a factor of 4, 2, and 3, respectively. There are no EPA marine acute or chronic criteria for these elements, however, and copper was less than the detection limit.

None of the water-column parameters measured during site surveys indicated that dredged material after disposal has a permanent or measurable effect on water quality in the area of the ODMDS. Waters off southeastern Louisiana are generally turbid because of shallow depths and riverine influences, and the levels of most parameters in the ODMDS appear to be typical of the region.

A site survey of macrofaunal distribution and abundance found 40 taxa, with very little difference in average taxa richness or overall average abundance. The general pattern of percent taxa and abundance group was approximately similar to those identified in other near-coastal and estuarine waters of the northern Gulf of Mexico.

The ODMDS benthic assemblage is dominated by species that live for about 1 year and undergo rapid population expansions. Results of site surveys indicated that most macrofaunal species were distributed in patches throughout the study area and several are considered opportunistic. Endemic species have considerable ability to adapt to a range of natural disturbances in their habitat. Thus, if dredged-material disposal had affected the density of these organisms, these effects could not be discerned.

Fish collected during site surveys are characteristic of the area. Furthermore, relative numbers of dominant organisms collected, such as large numbers of sciaenids (drums and croakers), are similar to results of other baseline studies conducted in the area.

10. *Potentiality for the development or recruitment of nuisance species in the disposal site* (40 CFR 228.6(a)(10)).

Past disposal of dredged material at the existing ODMDS has not resulted in the development or recruitment of nuisance species. Considering the similarity of the dredged material with the existing sediments, it is expected that continued disposal of dredged material will not result in the development or recruitment of such species.

11. *Existence at or in close proximity to the site of any significant natural or cultural features of historical importance* (40 CFR 228.6(a)(11)).

Studies, which involved literature search and coordination with the Louisiana State Historic Preservation Officer, did not demonstrate any known features of historical importance within the ODMDS. However, results from the literature review indicate shipwrecks may be found near the Point Au Fer Shell Reef and at the mouth of the Atchafalaya River. Hence, the northernmost portion of the ODMDS is considered to have the greatest potential to contain submerged cultural resources.

Future dredging and disposal operations at the ODMDS will consider the results of the submerged cultural resources survey. Plans and specifications for dredging contracts would be reviewed by COE cultural resources specialists to ensure that significant cultural resources are not impacted by any proposed action. In addition, future disposal into the ODMDS area will be reviewed by the COE in compliance of Section 106 of the National Historic Preservation Act of 1966 (as amended), Final Rule for Operation and Maintenance Of Army Corps of Engineers Civil Works Projects Involving the Discharge of Dredged Material Into Waters of the U.S. or Ocean Waters (33 CFR parts 209, 335, 336, 337, and 338), and requirements of the Louisiana SHPO.

Action

The action evaluated through this EPA rulemaking and completed NEPA/EIS processes is designation under § 102(c) of MPRSA of the existing COE § 103(b) alternative ODMDS for dredged material removed from the Atchafalaya River Bar Channel. The purpose of the designation is to provide an environmentally acceptable location for ocean disposal of dredged materials removed from the Atchafalaya River Bar Channel. The evaluative processes provide a thorough and objective evaluation of reasonable alternatives, including no action, and the information needed to evaluate the suitability of an ocean disposal area for final site designation. EPA's final site designation is being conducted in accordance with the MPRSA, the Ocean Dumping Regulations, and other applicable Federal environmental legislation. Once designated, the appropriateness of ocean disposal is determined on a case-by-case basis.

EPA emphasizes that ocean disposal site designation does not constitute or imply EPA Region VI's or the COE's approval of ocean disposal of dredged material from any project. Before disposal of any dredged material at the Atchafalaya River Bar Channel ODMDS may occur, EPA Region VI and the COE must evaluate the proposed project according to the Ocean Dumping Criteria (40 CFR part 227) adopted pursuant to the MPRSA. EPA Region VI or the COE will not allow ocean disposal of dredged material if either agency determines that the Ocean Dumping Criteria are not met. In addition, the COE is required to evaluate all proposed dredging projects associated with the Atchafalaya River in accordance with the Coastal Zone Management Act, the Magnuson-Stevens Fishery Conservation and Management Act, and the Endangered Species Act.

Administrative Requirements

1. Executive Order 12875

Under Executive Order 12875, EPA may not issue a regulation that is not required by statute and that creates a mandate upon a State, local, or tribal government, unless the Federal government provides the funds necessary to pay the direct compliance costs incurred by those governments, or EPA consults with those governments. If EPA complies by consulting, Executive Order 12875 requires EPA to provide to the OMB a description of the extent of EPA's prior consultation with representatives of affected State, local, and tribal governments, and a statement supporting the need to issue the regulation. In addition, Executive Order 12875 requires EPA to develop an effective process permitting elected officials and other representatives of

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State, local, and tribal governments to provide meaningful and timely input in the development of regulatory proposals containing significant unfunded mandates.

Today's final Rule does not create a mandate on State, local, or tribal governments. As described elsewhere in this preamble, today's final Rule would only have the effect of designating an existing ocean disposal site pursuant to section 102(c) of MPRSA. This final Rule does not impose any enforceable duties on these entities. Accordingly, the requirements of section 1(a) of Executive Order 12875 do not apply to this Rule.

2. Executive Order 13084

Under Executive Order 13084, EPA may not issue a regulation that is not required by statute, that significantly or uniquely affects the communities of Indian tribal governments, and that imposes substantial direct compliance costs on those communities, unless the Federal government provides the funds necessary to pay the direct compliance costs incurred by the tribal governments, or EPA consults with those governments. If EPA complies by consulting, Executive Order 13084 requires EPA to provide to the OMB, in a separately identified section of the preamble to the rule, a description of the extent of EPA's prior consultation with representatives of affected tribal governments, a summary of the nature of their concerns, and a statement supporting the need to issue the regulation. In addition, Executive Order 13084 requires EPA to develop an effective process permitting elected officials and other representatives of Indian tribal governments to provide meaningful and timely input in the development of regulatory policies on matters that significantly or uniquely affect their communities.

Today's final Rule does not significantly or uniquely affect the communities of Indian tribal governments. As described elsewhere in this preamble, today's final Rule would only have the effect of designating an existing ocean disposal site pursuant to section 102(c) of MPRSA. Accordingly, the requirements of section 3(b) of Executive Order 13084 do not apply to this rule.

3. Executive Order 12866

Under Executive Order 12866, (58 FR51735, October 4, 1993), EPA must determine whether the regulatory action is ''significant'' and therefore subject to OMB review and other requirements of the Executive Order. The Order defines ''significant regulatory action'' as one that is likely to lead to a rule that may:

(a) Have an annual effect on the economy of $100 million or more, or adversely affect in a material way the economy, productivity, competition, jobs, the environment, public health or safety, or State, local or tribal governments or communities;

(b) Create a serious inconsistency or otherwise interfere with an action taken or planned by another agency

(c) Materially alter the budgetary impact of entitlements, grants, user fees, or loan programs or the rights and obligations of recipients thereof; or

(d) Raise novel legal or policy issues arising out of legal mandates, the President's priorities, or the principals set forth in the Executive Order.

This final Rule should have minimal impact on permittees. As described elsewhere in this preamble, today's final Rule would only have the effect of designating an existing ocean disposal site pursuant to section 102(c) of MPRSA. Consequently, EPA has determined that this Rule is not a ''significant regulatory action'' under the terms of Executive Order 12866 and is therefore not subject to OMB review.

4. Executive Order 13045

Executive Order 13045, Protection of Children from Environmental Health Risks and Safety Risks (62 FR 19885, April 23, 1997) applies to any rule that: (1) Is determined to be ''economically significant'' as defined under Executive Order 12866, and (2) concerns an environmental health or safety risk that EPA has reason to believe may have a disproportionate effect on children. If the regulatory action meets both criteria, EPA must evaluate the environmental health or safety effects of the planned rule on children, and explain why the planned regulation is preferable to other potentially effective and reasonably feasible alternatives considered by EPA.

This final Rule is not subject to the Executive Order because it is not economically significant as defined in Executive Order 12866, and because EPA does not have any reason to believe the environmental health or safety risks addressed by this action present a disproportionate risk to children. As described elsewhere in this preamble, today's final Rule would only have the effect of designating an existing ocean disposal site pursuant to section 102(c) of MPRSA.

5. Executive Order 13132

Executive Order 13132, entitled ''Federalism'' (64 FR 43255, August 10, 1999), requires EPA to develop an accountable process to ensure ''meaningful and timely input by State and local officials in the development of regulatory policies that have federalism implications.'' ''Policies that have federalism implications'' is defined in the Executive Order to include regulations that have ''substantial direct effects on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government.'' Under Executive Order 13132, EPA may not issue a regulation that has federalism implications, that imposes substantial direct compliance costs, and that is no required by statute, unless the Federal government provides the funds necessary to pay the direct compliance costs incurred by State and local governments, or EPA consults with State and local officials early in the process of developing the proposed regulation. EPA also may not issue a regulation that has federalism implications and that preempts State law unless the Agency consults with State and local officials early in the process of developing the proposed regulation.

If EPA complies by consulting, Executive Order 13132 requires EPA to provide to the Office of Management and Budget (OMB), in a separately identified section of the preamble to the rule, a federalism summary impact statement (FSIS). The FSIS must include a description of the extent of EPA's prior consultation with State and local officials, a summary of the nature of their concerns and the Agency's position supporting the need to issue the regulation, and a statement of the extent to which the concerns of State and local officials have been met. Also, when EPA transmits a draft final rule with federalism implications to OMB for review pursuant to Executive Order 12866, EPA must include a certification from the agency's Federalism Official stating that EPA has met the requirements of Executive Order 13132 in a meaningful and timely manner.

This final rule will not have substantial direct effects on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government, as specified in Executive Order 13132 because it only has the effect of designating an existing ocean disposal site and does not alter the relationship or the distribution of power and responsibilities among the levels of government. Thus, the requirements of section 6 of the Executive Order do not apply to this rule.

6. Regulatory Flexibility Act, as Amended by the Small Businesses Regulatory Enforcement Fairness Act of 1996

The Regulatory Flexibility Act (RFA) provides that whenever an agency promulgates a final rule under 5 U.S.C. 553, the agency must prepare a regulatory flexibility analysis (RFA) unless the head of the agency certifies that the final Rule will not have a significant economic impact on a substantial number of small entities (5 U.S.C. 604 and 605). Today's final Rule would only have the effect of designating an existing ocean disposal site pursuant to section 102(c) of MPRSA. Consequently, EPA's final Rule will not impose any additional economic burden on small entities. For this reason, the Regional Administrator certifies, pursuant to section 605(b) of the RFA, that the final Rule will not have a significant economic impact on a substantial number of small entities.

7. Paperwork Reduction Act

The Paperwork Reduction Act, 44 U.S.C. 3501 *et seq.*, is intended to minimize the reporting and record-keeping burden on the regulated community, as well as to minimize the cost of Federal information collection and dissemination. In general, the Act requires that information requests and record-keeping requirements affecting ten or more non-Federal respondents be approved by OMB. Since the final Rule would not establish or modify any information or record-keeping requirements, but only finalizes existing requirements, it is not subject to the provisions of the Paperwork Reduction Act.

8. The Unfunded Mandates Reform Act

Title II of the Unfunded Mandates Reform Act of 1995 (UMRA), Public Law 104–4, establishes requirements for Federal agencies to assess the effects of their regulatory actions on State, local, and tribal governments and the private sector. Under section 202 of the UMRA, EPA generally must prepare a written statement, including a cost-benefit analysis, for proposed and final rules with ''Federal mandates'' that may result in expenditures to State, local, and tribal governments, in the aggregate, or to the private sector, of $100 million or more in any one year.

This final rule contains no Federal mandates (under the regulatory provisions of Title II of the UMRA) for State, local, or tribal governments or the private sector. As described elsewhere in this preamble, today's final Rule would only have the effect of designating an existing ocean disposal site pursuant to section 102(c) of MPRSA. Consequently, it imposes no new enforceable duty on any State, local, or tribal governments or the private sector. Similarly, EPA has also determined that this Rule contains no regulatory requirements that might significantly or uniquely affect small government entities. Thus, the requirements of section 203 of the UMRA do not apply to this Rule.

9. National Technology Transfer and Advancement Act

The National Technology Transfer and Advancement Act of 1995 (NTTAA), Public Law No. 104–113, section 12 (d) (15 U.S.C. 272 note) directs EPA to use voluntary consensus standards in its regulatory activities unless to do so would be inconsistent with applicable law or otherwise impractical. Voluntary consensus standards are technical standards (e.g. materials specifications, test methods, sampling procedures, and business practices) that are developed or adopted by voluntary consensus standards bodies. The NTTAA directs EPA to provide Congress, through OMB, explanations when the Agency decides not to use available and applicable voluntary consensus standards. This Rule does not involve technical standards. Therefore, EPA did not consider the use of any voluntary consensus standards.

10. Congressional Review Act

The Congressional Review Act, 5 U.S.C. 801 *et seq.*, as added by the Small Business Regulatory Enforcement Fairness Act of 1996, generally provides that before a rule may take effect, the agency promulgating the rule must submit a rule report, which includes a copy of the rule, to each House of the Congress and to the Comptroller General of the United States. EPA will submit a report containing this rule and other required information to the U.S. Senate, the U.S. House of Representatives, and the Comptroller General of the United States prior to publication of the rule in the **Federal Register**. A Major rule cannot take effect until 60 days after it is published in the **Federal Register**. This action is not a ''major rule'' as defined by 5 U.S.C. 804(2). This rule will be effective June 19, 2000.

11. Endangered Species Act

Pursuant to section 7(a) of the Endangered Species Act, federal agencies must insure that their actions are unlikely to jeopardize the continued existence of listed threatened or endangered species or result in adverse modification or destruction of designated critical habitat. Continuing to dispose of dredged material at the designated site will not materially change the status quo and there is no designated critical habitat in the area. Moreover, the COE will continue to consult with the National Marine Fisheries Service (NMFS) on its own project-specific use of the site and on any project for which it proposes to issue a permit authorizing disposal of dredged material at the site. EPA accordingly found today's designation action was unlikely to adversely affect any listed species or critical habitat. NMFS concurred in that finding by letter dated September 9, 1999.

12. Magnuson-Stevens Fishery Conservation and Management Act

Under section 305(b)(2) of the Magnuson-Stevens Fishery Conservation and Management Act, federal agencies must consult with the NMFS and appropriate fisheries councils before undertaking actions that may adversely affect designated essential fish habitat. NMFS has designated most of the Gulf of Mexico, including the area in which the designated disposal site is located, as essential fish habitat. It is unlikely that today's designation action will adversely affect essential fish habitat because it will not materially change the status quo. Because potentially adverse effects might be associated with its future use in the context of a specific project, the COE will continue to consult NMFS on a case-by-case basis. See 50 CFR 605.920(2).

List of Subjects in 40 CFR Part 228

Environmental protection, Water pollution control.

Dated: January 25, 2000.

Jerry Clifford,

Acting Regional Administrator of Region 6.

In consideration of the foregoing, EPA amends subchapter H of chapter I of title 40 of the Code of Federal Regulations as set forth below.

PART 228—CRITERIA FOR THE MANAGEMENT OF DISPOSAL SITES FOR OCEAN DUMPING

1. The authority citation for part 228 continues to read as follows:

Authority: 33 U.S.C. 1412 and 1418.

§ 228.14 [Amended]

2. Amend § 228.14 by removing and reserving paragraph (j)(5).

3. Amend § 228.15 by adding a new paragraph (j)(21) to read as follows:

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§ 228.15 Dumping sites designated on a final basis.

* * * * *

(j) * * *

(21) Atchafalaya River and Bayous Chene, Boeuf, and Black, LA

(i) *Location:* 29E20′59.92″ N, 91E 23′ 33.23″ W; 29E20′43.94″ N, 91E23′09.73″ W; 29E08′15.46″ N, 91E34′51.02″ W; and 29E07′59.43″ N, 91E34′27.51″ W.

(ii) *Size:* 9.14 square miles.

(iii) *Depth:* Average water depth of 16 feet.

(iv) *Primary Use:* Dredge material.

(v) *Period of Use:* Indefinite period of time.

(vi) *Restriction:* Disposal shall be limited to dredged material from the bar channel of the Atchafalaya River and Bayous Chene, Boeuf, and Black, Louisiana.

* * * * *

[FR Doc. 00–12388 Filed 5–17–00; 8:45 am]

BILLING CODE 6560–50–P

FEDERAL COMMUNICATIONS COMMISSION

47 CFR Part 73

[DA 00–322; MM Docket No. 98–112; RM–9027; RM–9268; RM–9384]

Radio Broadcasting Services; Anniston and Ashland, AL, and College Park, GA

AGENCY: Federal Communications Commission.

ACTION: Final rule.

SUMMARY: At the request of WNNX License Investment Company this document substitutes Channel 263C3 for Channel 263C at Anniston, Alabama, reallots Channel 263C3 to College Park, Georgia, and modifies the license of Station WHMA to specify operation on Channel 263C3 at College Park. In addition, this document allots Channel 261C3 to Anniston, Alabama, and Channel 264A to Ashland, Alabama. *See* 63 FR 38787, published July 20, 1998. The reference coordinates for Channel 263C3 at College Park, Georgia, are 33–45–32 and 84–30–10. The reference coordinates for Channel 261C3 at Anniston, Alabama, are 33–40–51 and 85–48–56. The reference coordinates for Channel 264A at Ashland, Alabama, are 33–13–15 and 85–49–35. With this action, the proceeding is terminated.

DATES: Effective June 14, 2000.

FOR FURTHER INFORMATION CONTACT: Robert Hayne, Mass Media Bureau (202) 418–2177.

SUPPLEMENTARY INFORMATION: This is a synopsis of the Commission's *Report and Order* in MM Docket No. 98–112, adopted April 24, 2000, and released April 28, 2000. The full text of this decision is available for inspection and copying during normal business hours in the FCC's Reference Information Center at Portals II, CY-A257, 445 12th Street, SW, Washington, D.C. The complete text of this decision may also be purchased from the Commission's copy contractor, International Transcription Service, Inc., (202) 857–3800, 1231 20th Street, NW, Washington, DC 20036.

List of Subjects in 47 CFR Part 73

Radio broadcasting.

Part 73 of title 47 of the Code of Federal Regulations is amended as follows:

PART 73—[AMENDED]

1. The authority citation for part 73 continues to read as follows:

Authority: 47 U.S.C. 154, 303, 334, 336.

§ 73.202 [Amended]

2. Section 73.202(b), the Table of FM Allotments under Alabama, is amended by removing Channel 263C and adding Channel 261C3 at Anniston.

3. Section 73.202(b), the Table of FM Allotments under Alabama, is amended by adding Channel 264A, at Ashland.

4. Section 73.202(b), the Table of FM Allotments under Georgia, is amended by adding College Park, Channel 263C3.

Federal Communications Commission.

John A. Karousos,

Chief, Allocations Branch, Policy and Rules Division, Mass Media Bureau.

[FR Doc. 00–12256 Filed 5–17–00; 8:45 am]

BILLING CODE 6712–01–P

ENVIRONMENTAL PROTECTION AGENCY

48 CFR Parts 1516 and 1552

[FRL–6606–6]

RIN 2030–AA74

Acquisition Regulation: Award Fee

AGENCY: Environmental Protection Agency (EPA).

ACTION: Direct final rule.

SUMMARY: EPA is taking direct final action on amending the EPA Acquisition Regulation (EPAAR) to comport with changes made to the Federal Acquisition Regulation (FAR) in Federal Acquisition Circular (FAC) 97–15 dated December 27, 1999 (FAR Case 98–017). The changes to the FAR were made to implement the rulings of the United States Court of Appeals and the United States Court of Federal Claims that the Contracts Disputes Act applies to all disputes arising under Government contracts, unless a more specific statute provides for other remedies.

DATES: This rule is effective on August 16, 2000, without further notice, unless EPA receives adverse comments by June 19, 2000. If we receive adverse comments, we will, before the rule's effective date, publish a timely withdrawal in the **Federal Register** informing the public that this rule will not take effect.

ADDRESSES: Written comments should be submitted to the contact listed below at the following address: U.S. Environmental Protection Agency, Office of Acquisition Management (3802R), Ariel Rios Building, 1200 Pennsylvania Avenue, NW, Washington, D.C. 20460. Comments and data may also be submitted electronically by sending electronic mail (e-mail) to: rellins.jean@epa.gov. Electronic comments must be submitted as an ASCII file avoiding the use of special characters and any form of encryption. Comments and data will also be accepted on disks in Corel WordPerfect format or ASCII file format. No confidential business information (CBI) should be submitted through e-mail. Electronic comments on this rule may be filed on-line at many Federal Depository Libraries.

FOR FURTHER INFORMATION CONTACT: Jean Rellins, U.S. EPA, Office of Acquisition Management, (3802R), Ariel Rios Building, 1200 Pennsylvania Avenue, NW, Washington, DC 20460, Telephone: (202) 564–4434.

SUPPLEMENTARY INFORMATION:

A. Background

Why is EPA utilizing a direct final rule to revise an EPAAR clause? Federal Acquisition Circular 97–15 amended the FAR to implement the rulings of the United States Court of Appeals and the United States Court of Federal Claims (Burnside-Ott case) that the Contract Disputes Act applies to all disputes arising under Government contracts, unless a more specific statute provides for other remedies. This direct final rule is being published without prior proposal because we view this as a non-controversial change to the EPAAR intended to make the EPAAR consistent with the FAR. We do not anticipate any adverse comments. This rule will be effective on August 16, 2000, without further notice unless we receive adverse comments by June 19, 2000. If EPA receives adverse comments, we will,

before the rule's effective date, publish a timely withdrawal in the **Federal Register** informing the public that the rule will not take effect. We also will publish a notice of proposed rulemaking in a future edition of the **Federal Register**. We will address the comments on the direct final rule as part of that proposed rulemaking.

B. Executive Order 12866

This direct final rule is not a significant regulatory action for the purposes of Executive Order 12866; therefore, no review is required by the Office of Information and Regulatory Affairs within the Office of Management and Budget (OMB).

C. Paperwork Reduction Act

The Paperwork Reduction Act does not apply because this direct final rule does not contain information collection requirements that require the approval of OMB under the Paperwork Reduction Act of 1980 (44 U.S.C. 3501 *et seq.*).

D. Regulatory Flexibility Act

The EPA certifies that this direct final rule does not exert a significant economic impact on a substantial number of small entities. The requirements to contractors under the rule impose no reporting, record keeping, or any compliance costs.

E. Unfunded Mandates

Title II of the Unfunded Mandates Reform Act of 1995 (UMRA), Public Law 104–4, establishes requirements for Federal agencies to assess their regulatory actions on State, local, and Tribal governments, and the private sector. This direct final rule does not contain a Federal mandate that may result in expenditures of $100 million or more for State, local, and Tribal governments, in the aggregate, or the private sector in one year. Any private sector costs for this action relate to paperwork requirements and associated expenditures that are far below the level established for UMRA applicability. Thus, the rule is not subject to the requirements of sections 202 and 205 of the UMRA.

F. Executive Order 13045

Executive Order 13045, Protection of Children from Environmental Health Risks and Safety Risks (62 FR 19885, April 23, 1997), applies to any rule that: (1) Is determined to be economically significant as defined under Executive Order 12866, and (2) concerns an environmental health or safety risk that EPA has reason to believe may have a disproportionate effect on children. If the regulatory action meets both criteria, the Agency must evaluate the environmental health or safety effects of the planned rule on children, and explain why the planned regulation is preferable to other potentially effective and reasonably feasible alternatives considered by the Agency.

This rule is not subject to E.O. 13045 because it is not an economically significant rule as defined by E.O. 12866, and because it does not involve decisions on environmental health or safety risks.

G. Executive Order 13132

Executive Order 13132 entitled ''Federalism'' (64 FR 43255, August 10, 1999), requires EPA to develop an accountable process to ensure ''meaningful and timely input by State and local officials in the development of regulatory policies that have federalism implications.'' ''Policies that have federalism implications'' is defined in the Executive Order to include regulations that have ''substantial direct effects on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government.''

Under Section 6 of Executive Order 13132, EPA may not issue a regulation that has federalism implications, that imposes substantial direct compliance costs, and that is not required by statute, unless the Federal government provides the funds necessary to pay the direct compliance costs incurred by State and local governments, or EPA consults with State and local officials early in the process of developing the proposed regulation. EPA also may not issue a regulation that has federalism implications and that preempts State law, unless the Agency consults with State and local officials early in the process of developing the proposed regulation.

This direct final rule does not have federalism implications. It will not have substantial direct effects on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government, as specified in Executive Order 13132. This direct final rule merely changes the EPAAR to be consistent with the FAR. Thus, the requirements of section 6 of the Executive Order do not apply to this rule.

H. Executive Order 13084

Under E.O. 13084, EPA may not issue a regulation that is not required by statute, that significantly or uniquely affects the communities of Indian Tribal governments, and that imposes substantial direct compliance costs on those communities, unless the Federal government provides the funds necessary to pay the direct compliance costs incurred by Tribal governments, or EPA consults with those governments. If EPA complies by consulting, E.O. 13084 requires EPA to provide to the OMB, in a separately identified section of the preamble to the rule, a description of the extent of EPA's prior consultation with representatives of affected Tribal governments, a summary of the nature of their concerns, and a statement supporting the need to issue the regulation. In addition, E.O. 13084 requires EPA to develop an effective process permitting elected and other representatives of Indian Tribal government ''to provide meaningful and timely input in the development of regulatory policies on matters that significantly or uniquely affect their communities.''

Today's rule does not significantly or uniquely affect the communities of Indian Tribal governments. Accordingly, the requirements of section 3(b) of E.O. 13084 do not apply to this rule.

I. National Technology Transfer and Advancement Act of 1995

Section 12(d) of the National Technology Transfer and Advancement Act of 1995 (NTTAA), Public Law 104–113, section 12(d) (15 U.S.C. 272 note) directs EPA to use voluntary consensus standards in its regulatory activities unless to do so would be inconsistent with applicable law or otherwise impracticable. Voluntary consensus standards are technical standards (e.g., materials specifications, test methods, sampling procedures and business practices) that are developed or adopted by voluntary consensus standards bodies. The NTTAA directs EPA to provide Congress, through OMB, explanations when the Agency decides not to use available and applicable voluntary consensus standards.

This rule does not involve technical standards. Therefore, EPA did not consider the use of any voluntary consensus standards.

J. Submission to Congress and the General Accounting Office

The Congressional Review Act, 5 U.S.C. 801 *et seq.*, as added by the Small Business Regulatory Enforcement Fairness Act of 1996, generally provides that before a rule may take effect, the agency promulgating the rule must submit a rules report, which includes a copy of the rule, to each House of the Congress and to the Comptroller General

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of the United States. EPA will submit a report containing this rule and other required information to the U.S. Senate, the U.S. House of Representatives, and the Comptroller General of the United States prior to publication of the rule in the **Federal Register**. A major rule cannot take effect until 60 days after it is published in the **Federal Register**. This action is not a ''major rule'' as defined by 5 U.S.C. 804(2).

Accordingly, under the authority of 5 U.S.C. 301; Sec. 205(c), 63 Stat. 390, as amended, 40 U.S.C. 486(c), 48 CFR Chapter 15 is amended as follows:

List of Subjects in 48 CFR Part 1516 and 1552

Government procurement.

1. The authority citation for part 1516 continues to read as follows:

Authority: Sec. 205(c), 63 Stat. 390, as amended, 40 U.S.C. 486(c).

2. Section 1516.405 is amended by revising paragraph (a) as follows:

1516.405 Contract clauses.

(a) The Contracting Officer shall insert the clause at 1552.216–70, Award fee (May 2000), in solicitations and contracts where a cost-plus-award-fee contract is contemplated.

* * * * *

3. The authority citation for part 1552 continues to read as follows:

Authority: Sec. 205(c), 63 Stat. 390, as amended, 40 U.S.C. 486(c).

4. Section 1552.216–70 is amended by revising the prescription date from (SEPT 1995) to (May 2000), and revising paragraph (b) to read as follows:

1552.216–70 Award fee.

* * * * *

(b) Award fee determinations made by the Government under this contract are unilaterally determined by the Fee Determination Official (FDO). The amount of the award fee to be paid is determined by the Government's judgmental evaluation of the contractor's performance in terms of the criteria stated in the contract. This determination and the methodology for determining the award fee are unilateral decisions made solely at the discretion of the Government.

* * * * *

Dated: April 28, 2000.

Betty L. Bailey,

Director, Office of Acquisition Management.

[FR Doc. 00–12022 Filed 5–17–00; 8:45 am]

BILLING CODE 6560–50–U

DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

50 CFR Parts 222 and 223

[Docket No. 000511138–0138–01; I.D. 051100B]

RIN 0648–A019

Sea Turtle Conservation; Restrictions to Fishing Activities

AGENCY: National Marine Fisheries Service (NMFS), National Oceanic and Atmospheric Administration (NOAA), Commerce.

ACTION: Temporary rule; request for comments.

SUMMARY: NMFS is closing an area along eastern North Carolina and Virginia to fishing with large-mesh gillnets with a stretched mesh size of 6 inches (15.24 cm) or greater for a 30-day period. The closed area includes all Atlantic Ocean waters between Cape Hatteras and 38° N. latitude (near the Virginia-Maryland border), west of 75° W. longitude, and a specified part of Chesapeake Bay. NMFS is taking this action because of its determination that gillnet fishing with large-mesh gillnets is the most likely cause of significant increases in the stranding of sea turtles listed as threatened or endangered under the Endangered Species Act (ESA) along the eastern coast of North Carolina. This action is necessary to protect threatened and endangered turtles from being taken by large-mesh gillnets along the North Carolina and Virginia coasts during their northern migration.

DATES: This action is effective from May 12, 2000 through June 12, 2000. Comments on this action are requested, and must be received at the appropriate address or fax number (**ADDRESSES**) by no later than 5 p.m., eastern daylight time, on June 12, 2000.

ADDRESSES: Written comments on this action should be addressed to the Chief, Endangered Species Division, Office of Protected Resources, NMFS, 1315 East-West Highway, Silver Spring, MD 20910. Comments may also be sent via fax to 301–713–0376. Comments will not be accepted if submitted via e-mail or the Internet.

FOR FURTHER INFORMATION CONTACT: Charles A. Oravetz (ph. 727–570–5312, fax 727–570–5517, e-mail Chuck.Oravetz@noaa.gov), or Barbara A. Schroeder (ph. 301–713–1401, fax 301–713–0376, e-mail Barbara.Schroeder@noaa.gov).

SUPPLEMENTARY INFORMATION:

Background

All sea turtles that occur in U.S. waters are listed as either endangered or threatened under the Endangered Species Act of 1973 (ESA). The Kemp's ridley (*Lepidochelys kempii*), leatherback (*Dermochelys coriacea*), and hawksbill (*Eretmochelys imbricata*) are listed as endangered. Loggerhead (*Caretta caretta*) and green (*Chelonia mydas*) turtles are listed as threatened, except for populations of green turtles in Florida and on the Pacific coast of Mexico, which are listed as endangered.

Under the ESA and its implementing regulations, taking sea turtles—even incidentally—is prohibited, with exceptions identified in 50 CFR 223.206. The incidental take of endangered species may only legally be authorized by an incidental take statement or an incidental take permit issued pursuant to section 7 or 10 of the ESA. Existing sea turtle conservation regulations specify procedures that NMFS may use to determine that unauthorized takings of sea turtles are occurring during fishing activities, and to impose additional restrictions to conserve listed sea turtles and to prevent unauthorized takings (50 CFR 223.206(d)(4)). Restrictions may be effective for a period of up to 30 days and may be renewed for additional periods of up to 30 days each.

Recent Events

The Sea Turtle Salvage and Stranding Network has documented a high level of sea turtle strandings in North Carolina this spring. There have been two stranding events involving unprecedented numbers of turtles, along the Outer Banks in Dare and Hyde counties.

During the first stranding event, a total of 71 turtles (69 loggerheads and 2 Kemp's ridleys) washed ashore on the ocean-facing beaches between Rodanthe and Ocracoke from April 14–17, 2000. There were no externally obvious signs of death on the turtles. Necropsies revealed that the turtles had excellent fat stores and were probably in good health prior to their deaths. A few of the turtles had been feeding on nearshore, benthic species, but most had empty guts, suggesting that they were in a migratory, rather than foraging, mode. The uniform state of decomposition of the turtles indicated that they had likely all died suddenly within a short period of time, probably no more than a few days before stranding on the beach. Large amounts of sargassum weed blew ashore, coincident with the turtle strandings, and indicative of the

movement of warm Gulf Stream waters close to shore.

NMFS began investigating possible causes of the sea turtle mortality event immediately. The absence of other species in the die-off was inconsistent with a toxic algae bloom. Also, there were no major traumatic injuries such as might be caused by dredging or blasting. None of the turtles had ingested any fishing hooks. NMFS, therefore, turned attention to activities that could drown large numbers of turtles, such as net fishing. There was no trawl fishing activity in the area at the time, and gillnetting was reportedly light, although there was some activity for dogfish nearshore. Monkfish gillnetting was reported to be over in the area, but NMFS subsequently learned that gillnetters continued landing monkfish in North Carolina through the end of April. Gillnetting therefore was the most likely cause of this stranding event. Sea turtles are vulnerable to entanglement in gillnets and can drown in under an hour of forced submergence.

Oceanographic conditions probably played a role in concentrating the sea turtles off the Outer Banks. Loggerhead and Kemp's ridley turtles are known to use summer foraging grounds along the mid-Atlantic and northeast seaboard. For many turtles, their spring migrations to these feeding grounds from wintering areas along the southeastern U.S. or from warm offshore waters will bring them near Cape Hatteras. The warm Gulf Stream flows southwest to northeast past Cape Hatteras. The exact position of the Gulf Stream in this area can be highly variable week-to-week, and its position, along with local winds and counterclockwise warm-water currents from the Gulf Stream can strongly affect the coastal waters. This spring, the Gulf Stream has come quite close to Cape Hatteras: only 10 to 15 nautical miles. As usual, the coastal water inshore of the Gulf Stream has been strongly affected by eddies off the Gulf Stream. Around the time of this first stranding event, warm eddies brought water up to 20 °C (68 °F) ashore along Ocracoke and Hatteras Islands, while coastal waters farther to the north were still cold (less than 14 °C), deterring turtles from proceeding northward up the coast. The warm eddy allowed turtles to move inshore where they were vulnerable to coastal fisheries and where they were more likely to strand. Onshore winds that began on April 14 likely pushed the carcasses ashore. Immediately after this stranding event, cold water pushed in from the north around Cape Hatteras, replacing the warm eddy waters. Sea turtles were forced back offshore to find warmer water. While cold water prevailed along the coast, the strandings were greatly diminished.

A second stranding event began on May 3. From May 3–8, approximately 209 additional sea turtles (3 Kemp's ridleys, the rest loggerheads) were found dead on ocean beaches between Oregon Inlet and Hatteras Inlet. Virtually all were severely decomposed, suggesting that they had been dead at sea for at least several days before stranding. The sheer numbers and the advanced decomposition of these animals preclude meaningful necropsies. Those carcasses that have been scanned with a magnetometer have not contained any hooks. Four of the carcasses were entangled in fishing gear: Three loggerheads carried pieces of gillnet with a mesh size of 12 inches (30.48 cm) stretched, and one loggerhead was carrying gillnet with a mesh size of 10 inches (25.4 cm) stretched.

Oceanographic conditions were again a factor in this wave of strandings. Cold water lay along the North Carolina coast all the way to Cape Lookout through the end of April. Sea turtles can tolerate water temperatures down to about 10 °C, but with warm water (greater than 20 °C) only 15 to 20 nm offshore, they likely would have remained in or near the 20 °C thermal front. Satellite imagery showed a small tongue of warm water curling back towards the coast from the Gulf Stream, about 15 nautical miles east of Avon, on April 30. This tongue of warm water slowly grew and extended westward until it hit the North Carolina coast between Avon and Rodanthe on May 3, the day the turtle carcasses washed ashore. Because the satellite imagery so clearly shows a distinct water mass moving in from offshore at the exact place and time that the strandings started, it is clear that the turtles also died offshore, perhaps as much as a week before they stranded, and were then brought ashore by that water mass. Three fisheries were active in offshore waters the week prior to the strandings: hook-and-line fishing for mackerel, bluefish gillnetting, and monkfish gillnetting. The mesh sizes of the gear recovered with the stranded turtles are only consistent with gillnets for monkfish. Again, there was no evidence that the turtles had been hooked.

Analysis of Other Factors

Examination of the strandings on the Outer Banks indicates that the most likely source of sea turtle mortality is large-mesh gillnetting for monkfish and possibly dogfish. Other possible causes are not consistent with the nature of the strandings. Satellite sea surface temperature information has allowed NMFS to reconstruct the likely times and locations of the sea turtle mortality. Gillnetting for dogfish and monkfish have been the active fisheries in those times and places. These fisheries deploy thousands of yards/meters of gillnets and have very long soak times, ranging from overnight to several days. Large-mesh gillnets are known to be highly effective at catching turtles and in fact were the gear of choice during the historical sea turtle fishery. Bluefish gillnetting was also active in offshore waters at the time of the second mortality event. The bluefish fishery, however, uses smaller-mesh nets (5½ inches/13.97 cm), much less net per boat, and much shorter soak times (less than an hour to several hours) than the large-mesh gillnet fisheries. While bluefish gillnets can catch and drown turtles, these fishing characteristics make bluefish gillnetting a smaller threat to sea turtles.

Impacts on Sea Turtles

The number of dead turtles in these two stranding events is unprecedented. The 10-year stranding average (1989–98) for the entire state of North Carolina for loggerheads is 219 per year; in contrast, approximately 290 have stranded in just these two events. Springtime strandings in Dare and Hyde counties, North Carolina, however, are not unusual. Historically, there has been a small spike in turtle strandings in statistical zone 35, which generally corresponds to those two counties, as the north-migrating turtles encountered coastal fisheries. In recent years, the number of stranded turtles, particularly loggerheads, has grown. In 1997 and 1998, a total of 34 and 26 loggerheads stranded in Zone 35 in May and the first 2 weeks of June. The strandings increased dramatically in 1999, to a total of 86 loggerheads for that same period. That stranding level was itself a record. NMFS believes that these increases in mortality are the result of increased fishing effort, a shift of fishing effort later into the season, fishing methods that are more lethal to sea turtles, and, this year, oceanographic conditions that likely concentrated sea turtles off Cape Hatteras.

Strandings are a minimum indicator of at-sea mortality as winds and currents will carry many carcasses offshore. The turtles involved in the second stranding event likely were killed 10–20 nm offshore and only reached shore because a warm eddy broke off. Other turtles that may have died before the eddy formed likely were swept out to sea by the Gulf Stream.

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This extreme increase in loggerhead mortality may pose a serious threat to the species' recovery, especially as the mortality has occurred at a choke point in these turtles' migration to their summer foraging grounds. Most loggerheads in U.S. waters come from one of two genetically distinct nesting populations. The population that nests in south Florida is much larger and has shown increases in nesting. The northern population that nests from northeast Florida through North Carolina is much smaller and nesting numbers are stable or declining. Previous studies suggest that up to half of the turtles stranded in North Carolina would be from the smaller, northern population. The overwhelming number of stranded turtles has precluded a full analysis of the sizes of the affected animals, but preliminary data suggest that they had a representative distribution, ranging from immatures to adults.

Continued Threat to Sea Turtles

Historical data show that increases in sea turtle strandings move south-to-north up the mid-Atlantic coast in May and June, as the migratory turtles arrive. Virginia has shown seasonal pulses in sea turtle strandings which could be magnified if the stranding trend in North Carolina continues northward. Strandings in Virginia are always the highest in the month of June, and the stranding reports for zone 36 (36-37° N. latitude) and zone 37 (37–38° N. latitude [approximately the Virginia-Maryland border]) combined have shown a definite increase in strandings in the past several years. For example, strandings in June of 1994 were recorded to be 62 animals in zones 36 and 37 combined, 81 were found in 1995, 64 in 1996, 145 in 1997, 161 in 1998, and 157 in 1999. A total of 230 dead sea turtles stranded in Virginia in 1999, including 200 loggerheads, 18 Kemp's ridleys, 6 leatherbacks and 6 unidentified turtles. Most of the strandings in Virginia have been documented from the ocean beaches south of Cape Henry and the inshore beaches in southern Chesapeake Bay. Relatively few strandings are reported from the remote and sparsely populated barrier islands of the Eastern Shore.

Based on past data, NMFS anticipates an increase in strandings in Virginia during late May and June with the migration of turtles up the Atlantic coast. Given the unusually high level of strandings in North Carolina this year and the increasing trend in strandings in recent years in Virginia, it is critical that action be implemented to reduce the likelihood that interactions with fishing gear will result in additional mortalities of sea turtles. Several large-mesh gillnet fisheries–monkfish, smooth dogfish, and black drum–are currently operating in Atlantic waters off Virginia and in Chesapeake Bay.

The coastal waters north of Cape Hatteras have warmed rapidly since May 3, and sea turtles are now moving northward toward Virginia. In fact, an aerial survey flown May 6 between the Virginia border and Cape Hatteras, approximately 5 nm offshore, sighted 30 turtles that are already north of Oregon Inlet. South of Oregon Inlet, where the strandings have been occurring, only 3 turtles were sighted. The waters to the north and farther offshore have not been surveyed, but it is clear that turtles are already entering waters off Virginia. No major stranding event has occurred in Virginia yet, but as the turtles continue their northward migration, they will continue to be vulnerable to coastal and offshore large-mesh gillnet fisheries. The turtles will likely still be concentrated on their migratory routes over the next weeks, until they disperse over their foraging grounds. Gillnet fisheries in the path of the migration can capture and kill large numbers of turtles and possibly disrupt other turtles from reaching important feeding areas. Further mortality, added to the already record-setting number of strandings, along with the undetected at-sea mortality, could be extremely damaging to loggerheads, particularly the non-recovering northern population.

Closure of Large-Mesh Gillnet Fishing

Pursuant to 50 CFR 223.206(d)(4), the exemption for incidental taking of sea turtles in 50 CFR 223.206(d)(1) does not authorize incidental takings during fishing activities if the takings may be likely to jeopardize the continued existence of a species listed under the ESA. Regulations at 50 CFR 223.206(d)(4) provide that the Assistant Administrator for Fisheries, NOAA, (AA) may issue a determination that incidental takings in the course of fishing activities are unauthorized, and specify procedures that the AA may use to impose additional restrictions to conserve listed sea turtles and prevent such takings. The level of mortality suffered by loggerhead turtles this spring off eastern North Carolina is already unprecedented and is severely impacting the northern nesting population of loggerheads. Continued mortality caused by incidental capture in large-mesh gillnets during loggerhead migrations along the mid-Atlantic coast could significantly affect this population and its ability to recover and may be likely to jeopardize the species. Therefore, the AA issues this determination that takings of threatened or endangered sea turtles by large-mesh gillnetters in mid-Atlantic waters along eastern North Carolina and Virginia are unauthorized and issues this additional restriction on fishing activities to conserve threatened and endangered sea turtles, particularly loggerhead turtles. Specifically, the AA closes the Atlantic Ocean waters of North Carolina and Virginia and in the mouth of the Chesapeake Bay to all fishing with gillnets with a stretched mesh size of 6 inches (15.24 cm) or greater. The closed area includes all offshore waters bounded by 35°13′ N. latitude on the south (approximately Cape Hatteras), 38° N. latitude on the north (just south of the Maryland-Virginia border), 75° W. longitude on the east, and the North Carolina and Virginia coasts on the west. At inlets, the western boundary of the closed area is the COLREGS demarcation line, except in Chesapeake Bay, where the closed area includes the waters contained in the regulated navigation area for Chesapeake Bay entrance and Hampton Roads, Va. and adjacent waters (as defined at 33 CFR 165.501(a)) that are east of the southeastern span of the Hampton Roads Bridge-Tunnel and the line connecting Old Point Comfort Light and Fort Wool Light. This closure is effective from May 12, 2000 through 11:59 p.m. (local time) June 12, 2000. For the duration of this closure, no gillnet with a stretched mesh size measuring 6 inches (15.24 cm) or greater may be set in the closed area. All such gillnets that are currently set must be retrieved by 11:59 p.m on May 15, 2000.

This restriction has been announced on the NOAA weather channel, in newspapers, and other media.

Additional Conservation Measures

The AA may withdraw or modify any additional restriction on fishing activities if the AA determines that such action is warranted. Notification of any additional sea turtle conservation measures, including any extension of this 30-day action, will be published in the **Federal Register** pursuant to 50 CFR 223.206(d)(4).

NMFS will continue to monitor sea turtle strandings to gauge the effectiveness of these conservation measures.

Classification

This action has been determined to be not significant for purposes of Executive Order 12866.

The AA has determined that this action is necessary to respond to an emergency situation to provide adequate protection for endangered and

threatened sea turtles, primarily the loggerhead sea turtle, pursuant to the ESA and other applicable law.

Pursuant to 5 U.S.C. 553(b)(B), the AA finds that there is good cause to waive prior notice and opportunity to comment on this action. It would be contrary to the public interest to provide prior notice and opportunity for comment because providing notice and comment would prevent the agency from implementing this action in a timely manner to protect the listed sea turtles. Notification of and opportunity to comment on the procedures allowing the implementation of temporary measures to protect sea turtles was provided through the proposed rule which established these actions (57 FR 18446, April 30, 1992). For the same reasons, the AA finds good cause also under 5 U.S.C. 553(d)(3) not to delay the effective date of this rule for 30 days. NMFS is making the rule effective May 12, 2000 through June 12, 2000. Immediately, no gillnets with a stretched mesh size measuring 6″ (15.24cm) or greater may be set in the closed area. The rule provides sufficient time—over one day—to retrieve all nets set previously. As stated earlier, this restriction has been announced on the NOAA weather radio, in newspapers, and other media.

As prior notice and an opportunity for public comment are not required to be provided for this notification by 5 U.S.C. 553, or by any other law, the analytical requirements of 5 U.S.C. 601 *et seq.*, are inapplicable.

The AA prepared an Environmental Assessment (EA) for the final rule (57 FR 57348, December 4, 1992) requiring turtle excluder device use in shrimp trawls and creating the regulatory framework for the issuance of notices such as this. Copies of the EA are available (see **ADDRESSES**).

Authority: 16 U.S.C. 1531.

Dated: May 12, 2000.

Andrew A. Rosenberg,

Deputy Assistant Administrator for Fisheries, National Marine Fisheries Service.

[FR Doc. 00–12396 Filed 5–12–00; 4:44 pm]

BILLING CODE 3510–22–F

008466

Proposed Rules

Federal Register
Vol. 65, No. 97
Thursday May 18, 2000

This section of the FEDERAL REGISTER contains notices to the public of the proposed issuance of rules and regulations. The purpose of these notices is to give interested persons an opportunity to participate in the rule making prior to the adoption of the final rules.

DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Part 71

[Airspace Docket No. 00–AEA–01]

Proposed Cancellation of Federal Airway: V–162 HAR–MRB

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Notice of proposed rulemaking

SUMMARY: This notice proposes to cancel Federal Airway 162 (V–162) between Harrisburg, PA (HAR) and Martinsburg, WV (MRB). The FAA is proposing this action due to restrictions on the HAR VOR. The airway would be deleted from aeronautical charts.

DATES: Comments must be received on or before June 19, 2000.

ADDRESSES: Send comments on the proposal in triplicate to: Manager, Airspace Branch, AEA–520, Docket NO. 00–AEA–01, F.A.A. Eastern Region, Federal Building #111, John F. Kennedy Int'l Airport, Jamaica, NY 11430.

The official docket may be examined in the Office of the Regional Counsel, AEA–7, F.A.A. Eastern Region, Federal Building #111, John F. Kennedy International Airport, Jamaica, New York 11430.

An informal docket may also be examined during normal business hours in the Airspace Branch, AEA–520, F.A.A. Eastern Region, Federal Building #111 John F. Kennedy International Airport, Jamaica, NY 11430.

FOR FURTHER INFORMATION CONTACT: Mr. Francis T. Jordan, Jr., Airspace Specialist, Airspace Branch, AEA–520 F.A.A. Eastern Region, Federal Building #111, John F. Kennedy International Airport, Jamaica, New York 11430; telephone: (718) 553–4521.

SUPPLEMENTARY INFORMATION:

Comments Invited

Interested parties are invited to participate in this proposed rulemaking by submitting such written data, views, or arguments as they may desire. Comments that provide the factual basis supporting the views and suggestions presented are particularly helpful in developing reasoned regulatory decisions on the proposal. Comments are specifically invited on the overall regulatory, economic, environmental, and energy-related aspects of the proposal. Communications should identify the airspace docket number and be submitted in triplicate to the address listed above. Commenters wishing the FAA to acknowledge receipt of their comments on this notice must submit with those comments a self-addressed, stamped postcard on which the following state is made: ''Comments to Airspace Docket No. 00–AEA–01.'' The postcard will be date/time stamped and returned to the commenter. All communications received on or before the closing date for comments will be considered before taking action on the proposed rule. The proposal contained in this notice may be changed in light of comments received. All comments submitted will be available for examination in the Rules Docket both before and after the closing date for comments. A report summarizing each substantive public contact with the FAA personnel concerned with this rulemaking will be filed in the docket.

Availability of NPRMs

Any person may obtain a copy of this Notice of Proposed Rulemaking (NPRM) by submitting a request to the Office of the Regional Counsel, AEA–7, F.A.A. Eastern Region, Federal Building #111, John F. Kennedy International Airport, Jamaica, NY 11430. Communications must identify the notice number of this NPRM. Persons interested in being placed on a mailing list for future NPRMs should also request a copy of Advisory Circular No. 11–2A, which describes the application procedure.

The Proposal

The FAA is considering an amendment to Part 71 of the Federal Aviation Regulations (14 CFR Part 71) to cancel V–162 between HAR VOR, PA and MRB VOR, WV. The FAA is proposing this action due to restrictions on the HAR VOR resulting from a flight check. The FAA is proposing this action to enhance the safety of air traffic operations. Domestic VOR airways are published in Paragraph 6010(a) of FAA Order 7400.9G, dated September 1, 1999, and Effective September 16, 1999, which is incorporated by reference in 14 CFR 71.1. The FAA has determined that this proposed regulation only involves an established body of technical regulations for which frequent and routine amendments are necessary to keep them operationally current. Therefore, this proposed regulation—(1) is not a ''significant regulatory action'' under Executive Order 12866; (2) is not a ''significant rule'' under DOT Regulatory Policies and Procedures (44 FR 11034; February 26, 1979); and (3) does not warrant preparation of a regulatory evaluation as the anticipated impact is so minimal. Since this is a routine matter that would only affect air traffic procedures and air navigation, it is certified that this proposed action would not have significant economic impact on a substantial number of small entities under the criteria of the Regulatory Flexibility Act.

List of Subjects in 14 CFR Part 71

Airspace Incorporation by reference, Navigation (air).

The Proposed Amendment

In consideration of the foregoing, the Federal Aviation Administration proposes to amend 14 CFR part 71 as follows:

PART 71—[AMENDED]

1. The authority citation for part 71 continues to read as follows:

Authority: 49 U.S.C. 106(g), 40103, 40113, 40120; E.O. 10854; 24 FR 9565, 3 CFR, 1959–1963 Comp., p. 389.

§ 71.1 [Amended]

2. The incorporation by reference in 14 CFR 71.1 of Federal Aviation Administration Order 7400.9G, Airspace Designations and Reporting Points dated September 1, 1999, and effective September 16, 1999, is proposed to be amended as follows:

* * * * *

Paragraph 6011 VOR Federal; Airways

V–162 cancelled between Harrisburg, PA (HAR) and Martinsburg, WV (MRB)

* * * * *

Issued in Jamaica, New York, on April 19, 2000.

Franklin D. Hatfield,

Manager, Air Traffic Division, Eastern Region.

[FR Doc. 00–11491 Filed 5–17–00; 8:45 am]

BILLING CODE 4910–15–M

DEPARTMENT OF DEFENSE

Department of the Navy,

32 CFR Part 701

[Secretary of the Navy Instruction 5211.5]

Privacy Act; Implementation

AGENCY: Department of the Navy, DOD.

ACTION: Proposed rule.

SUMMARY: The Department of the Navy is proposing to add an exemption rule for a Privacy Act system of records. The exemption is intended to increase the value of the system of records for law enforcement purposes, to comply with prohibitions against the disclosure of certain kinds of information, and to protect the privacy of individuals identified in the system of records.

DATES: Comments must be received on or before July 17, 2000 to be considered by this agency.

FOR FURTHER INFORMATION CONTACT: Mrs. Doris Lama at (202) 685–6545 or DSN 325–6545.

SUPPLEMENTARY INFORMATION:

Executive Order 12866

It has been determined that this Privacy Act rule for the Department of Defense does not constitute 'significant regulatory action'. Analysis of the rule indicates that it does not have an annual effect on the economy of $100 million or more; does not create a serious inconsistency or otherwise interfere with an action taken or planned by another agency; does not materially alter the budgetary impact of entitlements, grants, user fees, or loan programs or the rights and obligations of recipients thereof; does not raise novel legal or policy issues arising out of legal mandates, the President's priorities, or the principles set forth in Executive Order 12866 (1993).

Regulatory Flexibility Act

It has been determined that this Privacy Act rule for the Department of Defense does not have significant economic impact on a substantial number of small entities because it is concerned only with the administration of Privacy Act systems of records within the Department of Defense.

Paperwork Reduction Act

It has been determined that this Privacy Act rule for the Department of Defense imposes no information requirements beyond the Department of Defense and that the information collected within the Department of Defense is necessary and consistent with 5 U.S.C. 552a, known as the Privacy Act of 1974.

List of Subjects in 32 CFR Part 701

Privacy.

1. The authority citation for 32 CFR part 701, Subpart G continues to read as follows:

Authority: Pub. L. 93–579, 88 Stat. 1896 (5 U.S.C. 552a).

2. Section 701.118, is amended by adding paragraph (u) as follows:

§ 701.118 Exemptions for specific Navy record systems.

(u) *System identifier and name:* (1) N05813–4, Trial/Government Counsel Files.

(i) *Exemption.* Parts of this system may be exempt pursuant to 5 U.S.C. 552a(j)(2) if the information is compiled and maintained by a component of the agency which performs as its principle function any activity pertaining to the enforcement of criminal laws. Portions of this system of records that may be exempt pursuant to subsection 5 U.S.C. 552a(j)(2) are (c)(3), (c)(4), (d), (e)(1), (e)(2), (e)(3), (e)(5), (e)(4)(G), (H), and (I), (e)(8), (f), and (g).

(ii) *Exemption.* Information specifically authorized to be classified under E.O. 12958, as implemented by DoD 5200.1–R, may be exempt pursuant to 5 U.S.C. 552a(k)(1).

(iii) *Exemption.* Investigatory material compiled for law enforcement purposes may be exempt pursuant to 5 U.S.C. 552a(k)(2). However, if an individual is denied any right, privilege, or benefit for which he would otherwise be entitled by Federal law or for which he would otherwise be eligible, as a result of the maintenance of such information, the individual will be provided access to such information except to the extent that disclosure would reveal the identity of a confidential source. Portions of this system of records that may be exempt pursuant to subsections 5 U.S.C. 552a(k)(1) and (k)(2) are (c)(3), (d), (e)(1), (e)(4)(G), (H), and (I), and (f).

(iv) *Authority:* 5 U.S.C. 552a(j)(2), (k)(1), and (k)(2).

(v) *Reason:* (1) From subsection (c)(3) because release of accounting of disclosure could place the subject of an investigation on notice that he/she is under investigation and provide him/her with significant information concerning the nature of the investigation, resulting in a serious impediment to law enforcement investigations.

(2) From subsections (c)(4), (d), (e)(4)(G), and (e)(4)(H) because granting individuals access to information collected and maintained for purposes relating to the enforcement of laws could interfere with proper investigations and orderly administration of justice. Granting individuals access to information relating to the preparation and conduct of criminal prosecution would impair the development and implementation of legal strategy. Amendment is inappropriate because the trial/government counsel files contain official records including transcripts, court orders, and investigatory materials such as exhibits, decisional memorandum and other case-related papers. Disclosure of this information could result in the concealment, alteration or destruction of evidence, the identification of offenders or alleged offenders, nature and disposition of charges; and jeopardize the safety and well-being of informants, witnesses and their families, and law enforcement personnel and their families. Disclosure of this information could also reveal and render ineffective investigation techniques, sources, and methods used by law enforcement personnel, and could result in the invasion of privacy of individuals only incidentally related to an investigation.

(3) From subsection (e)(1) because it is not always possible in all instances to determine relevancy or necessity of specific information in the early stages of case development. Information collected during criminal investigations and prosecutions and not used during the subject case is often retained to provide leads in other cases.

(4) From subsection (e)(2) because in criminal or other law enforcement investigations, the requirement that information be collected to the greatest extent practicable from the subject individual would alert the subject as to the nature or existence of an investigation, presenting a serious impediment to law enforcement investigations.

(5) From subsection (e)(3) because compliance would constitute a serious impediment to law enforcement in that it could compromise the existence of a confidential investigation or reveal the identity of witnesses or confidential informants.

(6) From subsection (e)(4)(I) because the identity of specific sources must be withheld in order to protect the confidentiality of the sources of

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criminal and other law enforcement information. This exemption is further necessary to protect the privacy and physical safety of witnesses and informants.

(7) From subsection (e)(5) because in the collection of information for law enforcement purposes it is impossible to determine in advance what information is accurate, relevant, timely, and complete. With the passage of time, seemingly irrelevant or untimely information may acquire new significance as further investigation brings new details to light and the accuracy of such information can only be determined in a court of law. The restrictions of subsection (e)(5) would restrict the ability of trained investigators and intelligence analysts to exercise their judgment in reporting on investigations and impede the development of intelligence necessary for effective law enforcement.

(8) From subsection (e)(8) because compliance would provide an impediment to law enforcement by interfering with the ability to issue warrants or subpoenas and by revealing investigative techniques, procedures, or evidence.

(9) From subsections (f) and (g) because this record system is exempt from the individual access provisions of subsection (d).

(10) Consistent with the legislative purpose of the Privacy Act of 1974, the Department of the Navy will grant access to nonexempt material in the records being maintained. Disclosure will be governed by the Department of the Navy's Privacy Regulation, but will be limited to the extent that the identity of confidential sources will not be compromised; subjects of an investigation of an actual or potential criminal violation will not be alerted to the investigation; the physical safety of witnesses, informants and law enforcement personnel will not be endangered, the privacy of third parties will not be violated; and that the disclosure would not otherwise impede effective law enforcement. Whenever possible, information of the above nature will be deleted from the requested documents and the balance made available. The controlling principle behind this limited access is to allow disclosures except those indicated above. The decisions to release information from these systems will be made on a case-by-case basis.

* * * * *

Dated: March 29, 2000.

L.M. Bynum,

Alternate OSD Federal Register Liaison Officer, Department of Defense.

[FR Doc. 00–10053 Filed 5–17–00; 8:45 am]

BILLING CODE 5001–10–F

POSTAL SERVICE

39 CFR Part 111

Line-of-Travel Sequencing for Basic Carrier Route Periodicals

ACTION: Proposed rule.

SUMMARY: The Postal Service is soliciting comments on a proposed change to the Domestic Mail Manual that would require mailers to prepare basic rate carrier route Periodicals mail in line-of-travel sequence.

DATES: Comments must be received on or before June 19, 2000.

ADDRESSES: Comments must be sent to the Manager, Mail Preparation and Standards, 475 L'Enfant Plaza SW, Room 6800, Washington, DC 20260–2405. Fax: 202–268–4336. Comments will be available for public viewing from 9 a.m. to 4 p.m. in the Postal Service Library, 475 L'Enfant Plaza, 11th Floor, Washington, DC. Copies of comments also may be requested via fax or email.

FOR FURTHER INFORMATION CONTACT: Anne Emmerth, 202–268–2363, aemmerth@email.usps.gov.

SUPPLEMENTARY INFORMATION: In 1996, the Postal Service began requiring line-of-travel sequencing for all basic Enhanced Carrier Route Standard Mail (A). LOT sequencing generally approximates carriers' actual sequence of delivery. A cost study shows that this preparation has resulted in significant savings due to a reduction in time spent by carriers casing mail. Analysis indicates that implementing a line-of-travel requirement for packages of basic rate carrier route Periodicals could produce significant savings.

The Postal Service and representatives from the Periodicals industry are concerned about recent upward trends in mail processing costs for Periodicals and have been studying ways to lower costs. Out of these discussions came several ideas for further examination. One of these ideas is to require Periodicals mail qualifying for basic carrier route rates to be prepared in line-of-travel (LOT) sequence. A Postal Service cost study indicates that requiring LOT sequencing for basic rate carrier route Periodicals will result in reduced costs.

Accordingly, the Postal Service is proposing to require that Periodicals mailers prepare basic rate carrier route mail in line-of-travel sequence. Mailers would be required to sort their mail using the current USPS line-of-travel product within 90 days before the date of mailing. As an alternative, mailers may opt to prepare mail in actual walk sequence to qualify for basic carrier route rates.

The line-of-travel product contains a list of each ZIP+4 code that a route serves. The ZIP+4 codes are numbered in sequence according to their first occurrence on the route as served by the carrier. Each ZIP+4 is appended with either an ''A'' (for ascending) or a ''D'' (for descending) to specify the order in which the addresses in that ZIP+4 must be arranged. For Periodicals, all basic rate carrier route pieces would be sequenced in ascending ZIP+4 code line-of-travel order. As an alternative, mailers could prepare basic rate carrier route mail in actual walk sequence.

The proposed effective date of this change is September 9, 2000.

Although exempt from the notice and comment requirements of the Administrative Procedure Act (5 U.S.C. 553(b), (c)) regarding proposed rulemaking by 39 U.S.C. 410(a), the Postal Service invites comments on the following proposed revisions to the Domestic Mail Manual, incorporated by reference in the Code of Federal Regulations. See 39 CFR part 111.

List of Subjects in 39 CFR Part 111

Administrative practice and procedure, Postal Service.

PART 111—[AMENDED]

1. The authority citation for 39 CFR Part 111 continues to read as follows:

Authority: 5 U.S.C. 552(a); 39 U.S.C. 101, 401, 403, 404, 414, 3001–3011, 3201–3219, 3403–3406, 3621, 3626, 5001.

2. Revise the following sections of the Domestic Mail Manual (DMM) as set forth below:

E Eligibility

* * * * *

E200 Periodicals

* * * * *

E230 Nonautomation Rates

* * * * *

2.0 CARRIER ROUTE RATES

* * * * *

[Amend 2.2 by revising the heading and item a, renumbering item b as item c, and adding new item b to read as follows:]

2.2 Sequencing

Preparation to qualify eligible pieces for carrier route rates is optional and is subject to M200. Carrier route sort need not be done for all carrier routes in a 5-digit area. Specific rate eligibility is subject to these standards:

a. The carrier route rates apply to copies in carrier route packages of six or more letter-size pieces each that are sorted to carrier routes, 5-digit carrier routes, or 3-digit carrier routes trays; and six or more flat-size pieces or irregular parcel-size pieces each that are sorted to carrier route, 5-digit, or 5-digit scheme carrier routes sacks. (Preparation of 5-digit scheme carrier routes sacks is optional, but, if performed, must be done for all 5-digit scheme destinations.) The applicable sequencing requirements in M050 and in 2.2b or 2.2c also must be met.

b. Basic carrier route rate mail must be prepared either in carrier walk sequence or in line-of-travel (LOT) sequence according to LOT schemes prescribed by the USPS (M050).

c. The high density and saturation rates apply to pieces that are eligible for carrier route rates under 2.2a, are prepared in carrier walk sequence, and meet the applicable density standards in 6.0 for the rate claimed.

* * * * *

M Mail Preparation and Sortation

M000 General Preparation Standards

* * * * *

M050 Delivery Sequence

* * * * *

3.0 DELIVERY SEQUENCE INFORMATION

* * * * *

3.4 Line-of-Travel Sequence

[Revise the first sentence to read as follows:]

Unless the mail is prepared in carrier walk sequence, LOT sequence is required for mailings at Enhanced Carrier Route basic Standard Mail (A) rates and carrier route basic Periodicals rates.* * *

4.0 DOCUMENTATION

4.1 General

[Revise the fourth sentence to read as follows:]

* * * For Periodicals, the postage statement must be annotated in the ''Sequencing Date'' block on each of the lines where basic, high density, and saturation per piece rate postage is reported. * * *

* * * * *

M200 Periodicals (Nonautomation)

1.0 BASIC STANDARDS

* * * * *

1.3 Carrier Route and Walk Sequence

[Revise the second sentence of 1.3 to read as follows:]

* * * Periodicals for which a carrier route discount is claimed must be prepared as a carrier route mailing under this section and either the walk sequencing standard or the line-of-travel sequencing standard in M050; pieces prepared with a simplified address must also meet the standards in A040.

* * * * *

An appropriate amendment to 39 CFR part 111 to reflect these changes will be published if the proposal is adopted.

Stanley F. Mires,

Chief Counsel, Legislative.

[FR Doc. 00–12443 Filed 5–17–00; 8:45 am]

BILLING CODE 7710–12–P

ENVIRONMENTAL PROTECTION AGENCY

40 CFR Part 52

[PA 112–4084; FRL–6702–7]

Approval and Promulgation of Air Quality Implementation Plans; Pennsylvania; Withdrawal of Proposed Rule

AGENCY: Environmental Protection Agency (EPA).

ACTION: Withdrawal of notice of proposed rulemaking.

SUMMARY: On February 2, 1999 (64 FR 5015), EPA proposed to approve the Commonwealth of Pennsylvania's regulations for Nitrogen Oxides (NO_X) Allowance Requirements (commonly referred to as the NO_X Budget Rule) as a revision to the State Implementation Plan (SIP). Prior to our taking any final rulemaking, the Commonwealth informed us that it was revising the rule. On December 27, 1999, the Commonwealth submitted a new SIP revision request to EPA which consists of the revised version of its NO_X Budget Rule. Because the Commonwealth of Pennsylvania has now submitted the revised version of its NO_X Budget Rule as a SIP revision, we are withdrawing our February 2, 1999 proposed rule on the old version. EPA will initiate a new and separate rulemaking on the Commonwealth's December 27, 1999 SIP revision submittal.

FOR FURTHER INFORMATION CONTACT: Cristina Fernandez, (215) 814–2178, or by e-mail at fernandez.cristina@epa.gov.

Dated: March 19, 2000.

Bradley M. Campbell,

Regional Administrator, Region III.

[FR Doc. 00–12519 Filed 5–17–00; 8:45 am]

BILLING CODE 6560–50–U

DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

50 CFR Part 622

[Docket No. 000211038–0038–01; I.D. 101499D]

RIN 0648–AM93

Fisheries of the Caribbean, Gulf of Mexico, and South Atlantic; Snapper-Grouper Fishery off the Southern Atlantic States; Greater Amberjack Trip Limit; Resubmission of Disapproved Measure in Amendment 9

AGENCY: National Marine Fisheries Service (NMFS), National Oceanic and Atmospheric Administration (NOAA), Commerce.

ACTION: Proposed rule; request for comments.

SUMMARY: NMFS proposes a rule that would implement a previously disapproved 1,000–lb (454–kg) commercial trip limit for greater amberjack as originally contained in Amendment 9 to the Fishery Management Plan for the Snapper-Grouper Fishery of the South Atlantic Region (FMP). The intended effect of the trip limit is to prevent overfishing and conserve and manage greater amberjack.

DATES: Comments on this proposed rule must be received at the appropriate address or fax number, (see **ADDRESSES**), no later than 5:00 p.m., eastern standard time, on June 19, 2000.

ADDRESSES: Copies of documents supporting the proposed commercial trip limit for greater amberjack may be obtained upon request from the South Atlantic Fishery Management Council, One Southpark Circle, Suite 306, Charleston, SC 29407-4699; telephone: 843-571-4366; fax: 843-769-4520.

Copies of the economic analyses of the proposed commercial trip limit for greater amberjack may be obtained upon request from the Southeast Regional Office, NMFS, 9721 Executive Center Drive N., St. Petersburg, FL 33702; telephone: 727–570–5305; fax: 727–570–5583.

Written comments on this proposed rule may be submitted to the Southeast Regional Office, NMFS, 9721 Executive Center Drive N., St. Petersburg, FL 33702. Comments also may be sent via

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fax to 727–570–5583. Comments will not be accepted if submitted via e-mail or Internet.

FOR FURTHER INFORMATION CONTACT: Peter J. Eldridge, telephone: 727–570–5305, fax: 727–570–5583, e-mail: Peter.Eldridge@noaa.gov.

SUPPLEMENTARY INFORMATION: The snapper-grouper fishery off the southern Atlantic states is managed under the FMP. The FMP was prepared by the South Atlantic Fishery Management Council (Council) and approved and implemented by NMFS under the authority of the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) through regulations at 50 CFR part 622.

NMFS determined that the status of the greater amberjack stock relative to the FMP's current overfishing definition is unknown in the *Report to Congress: Status of Fisheries of the United States, NMFS, October 1999*. Current data show declines in average size and landings of greater amberjack. Accordingly, in Amendment 9 to the FMP the Council proposed precautionary measures to ensure that greater amberjack did not approach an overfished condition. Specifically, Amendment 9 to the FMP proposed to: (1) Reduce the recreational bag limit from 3 to 1 greater amberjack per person per day; (2) prohibit harvest and possession in excess of the bag limit during April throughout the EEZ; (3) establish a 1000–lb (454–kg) commercial trip limit with no more than one trip allowed per day; (4) establish a commercial quota of 1,169,931 lb (530,672 kg) (63 percent of 1995 landings); (5) begin the fishing year May 1; (6) prohibit the sale of greater amberjack harvested under the bag limit when the season is closed; and (7) prohibit coring (removal of the head from the carcass).

On September 8, 1998, NMFS announced the availability of Amendment 9 to the FMP and requested public comments on it (63 FR 47461). On November 12, 1998, NMFS published a proposed rule to implement the measures in Amendment 9 to the FMP and requested comments on this rule (63 FR 63276). On December 9, 1998, after considering the comments received on the amendment and the proposed rule, NMFS partially approved Amendment 9 to the FMP. NMFS disapproved the proposed 1,000–lb (454–kg) commercial trip limit for greater amberjack because information at that time indicated that the benefits of the trip limit did not exceed costs. Subsequently, NMFS conducted another economic analysis of the expected effects of this measure, based on more recent information, that indicates that the benefits of the trip limit may exceed costs (net benefits), especially if a ''derby'' fishery is prevented. Based on the conclusions of the supplemental economic analysis, the Council resubmitted the proposed commercial trip limit for greater amberjack, as contained in Amendment 9 to the FMP, to NMFS for review, approval, and implementation. On January 26, 2000, NMFS approved the amberjack trip limit measure.

Classification

This proposed rule has been determined to be significant for purposes of Executive Order 12866.

The Council prepared a final supplemental environmental impact statement for Amendment 9 to the FMP that assessed the environmental impacts of its greater amberjack trip limit. A notice of its availability was published on October 9, 1998 (63 FR 54476).

The Chief Counsel for Regulation of the Department of Commerce has certified to the Chief Counsel for Advocacy of the Small Business Administration that this proposed rule, if adopted, would not have a significant economic impact on a substantial number of small entities. The factual basis for the certification is based on NMFS' analyses and is summarized as follows:

Determination of Nature and Size of Economic Impacts on Small Entities: This determination and discussion is based on a series of analyses conducted by NMFS following the original disapproval decision by the Secretary of Commerce and the subsequent resubmittal of the action. One part of the determination is to decide if a substantial number of the population will be affected by the proposed Federal action and defining the population is key to the determination of substantial number. For the purposes of this determination, a narrow definition of the population that might be impacted by the action will be used. Although there are about 2,000 vessels permitted to legally harvest greater amberjack, the population is defined as being limited to those vessels that actually landed greater amberjack in the most recent fishing year for which data are available. It is further determined that all of these fishing vessels represent small entities as defined by the Small Business Administration. During the 1996–97 fishing year a total of 553 commercial fishing craft landed greater amberjack and took 3685 trips on which landings of greater amberjack were reported. Of the 553 fishing craft that could be potentially impacted, 73 reported a total of 290 trips that resulted in landing over 1,000 pounds of greater amberjack on at least one trip during the 1996–97 fishing season. In terms of the population as defined, 13 percent of the population had one or more trips on which 1,000 pounds of greater amberjack were landed and this represents 8 percent of all greater amberjack trips.

The fishing craft (small entities) expected to be directly impacted by the action are engaged in commercial fishing activities that result in the landing and sale of a variety of snapper grouper species as well as other species. In other words, these fishing businesses are not totally dependent on their ability to harvest greater amberjack. For those 73 entities reporting at least one trip on which 1,000 pounds of greater amberjack were reported, they had average gross revenues from fishing of $41,342 for the 1996–97 fishing year and $12,274, or about 30 percent of that average gross revenue, was attributed to landings of greater amberjack. Assuming no changes in fishing behavior if the trip limit is implemented, the amount of greater amberjack revenue in excess of the 1,000 pound trip limit during the 1996–97 fishing season could be interpreted as ''lost'' revenue for those trips that resulted in greater amberjack catches in excess of 1,000 pounds. However, it is known from empirical observations in other fisheries where a trip limit was introduced that fishing behavior indeed changes. The behavior can be of two different general types. When trip limits are introduced and the vessel cannot generate enough gross revenue from the trip to cover costs, the entity will either forego fishing for the species in question or will attempt to switch target species if that avenue is available. The other straightforward behavior change is to take additional trips of the original target species if the expected gross revenue will more than cover the costs of the trip. Because the data existed for this fishery, an extension of the analysis was conducted to investigate the probable change in fishing behavior and this analysis indicated that the fishermen would tend to take additional trips for greater amberjack rather than ceasing fishing or switching to an alternate species. The analysis resulted in an expectation that those vessels directly impacted by the trip limit would take an average of about 4 extra trips targeting greater amberjack if the trip limit is implemented. The analysis further indicated that the overall outcome of the trip limit would be a loss of about 3 percent of net operating revenue (gross revenue less trip costs) for the 73 vessels directly

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impacted or about four tenths of a percent loss in net operating revenue for the entire population of 553 vessels that land greater amberjack. Recalling that species other than greater amberjack are also harvested by these vessels, the 4 extra trips would also result in additional revenues derived from landing other species in association with greater amberjack. However, the landings and revenue associated with the 4 extra trips per vessel were not specifically calculated and are thus not considered in the analysis except to note that the impact would be lessened if these additional landings were to be considered. The trip limit is not expected to result in any of the affected small entities being forced to cease business operations if the trip limit goes into effect. This result is based on the analysis of vessel behavior following the imposition of a trip limit and the analysis indicated that a trip limit of 1,000 pounds would allow for the full recovery of the trip costs and additional trips would be taken instead of the small entity ceasing business operations.

There are no capital, operating, reporting or other compliance costs associated with the action and due to the lack of such costs there are no differential impacts for small versus large entities. Similarly, since there are no capital costs of compliance, there is no issue related to the total amount of capital available to the small entities that may be affected by the action.

Overall Conclusion: These results indicate that a substantial number of small entities will not be impacted to a significant degree by the action to implement a 1,000 pound trip limit for commercial fishermen operating in the snapper grouper fishery of the South Atlantic.

Copies of NMFS' economic analysis are available (see **ADDRESSES**).

List of Subjects in 50 CFR Part 622

Fisheries, Fishing, Puerto Rico, Reporting and recordkeeping requirements, Virgin Islands.

Dated: May 12, 2000.

Andrew A. Rosenberg,

Deputy Assistant Administrator for Fisheries, National Marine Fisheries Service.

For the reasons set out in the preamble, 50 CFR part 622 is proposed to be amended as follows:

PART 622—FISHERIES OF THE CARIBBEAN, GULF, AND SOUTH ATLANTIC

1. The authority citation for part 622 continues to read as follows:

Authority: 16 U.S.C. 1801 *et seq.*

2. In § 622.44, paragraph (c)(4) is added to read as follows:

§ 622.44 Commercial trip limits.

* * * * *

(c) * * *

(4) *Greater amberjack.* Until the fishing year quota specified in § 622.42(e)(3) is reached, 1,000 lb (454 kg). No more than one trip may be made per day. See § 622.43(a)(5)(i) for the limitations regarding greater amberjack after the fishing year quota is reached.

* * * * *

[FR Doc. 00–12577 Filed 5–17–00; 8:45 am]

BILLING CODE 3510–22–F

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Notices

Federal Register

Vol. 65, No. 97

Thursday, May 18, 2000

This section of the FEDERAL REGISTER contains documents other than rules or proposed rules that are applicable to the public. Notices of hearings and investigations, committee meetings, agency decisions and rulings, delegations of authority, filing of petitions and applications and agency statements of organization and functions are examples of documents appearing in this section.

DEPARTMENT OF AGRICULTURE

Forest Service

Newspapers To Be Used for Publication of Legal Notice of Appealable Decisions and Publication of Notice of Proposed Actions for Southern Region; Alabama, Kentucky, Georgia, Tennessee, Florida, Louisiana, Mississippi, Virginia, West Virginia, Arkansas, Oklahoma, North Carolina, South Carolina, Texas, Puerto Rico

AGENCY: Forest Service, USDA.

ACTION: Notice.

SUMMARY: Deciding Officers in the Southern Region will publish notice of decisions subject to administrative appeal under 36 CFR parts 215 and 217 in the legal notice section of the newspapers listed in the **SUPPLEMENTARY INFORMATION SECTION** of this notice. As provided in 36 CFR part 215.5(a) and 36 CFR part 217.5(d), the public shall be advised through **Federal Register** notice, of the principal newspaper to be utilized for publishing legal notices of decisions. Newspaper publication of notice of decisions is in addition to direct notice of decisions to those who have requested notice in writing and to those known to be interested in or affected by a specific decision. In addition, the Responsible Official in the Southern Region will also publish notice of proposed actions under 36 CFR 215 in the newspapers that are listed in the Supplementary Information section of this notice. As provided in 36 CFR part 215(a), the public shall be advised, through **Federal Register** notice, of the principal newspapers to be utilized for publishing notices on proposed actions.

DATES: Use of these newspapers for purposes of publishing legal notice of decisions subject to appeal under 36 CFR parts 215 and 217, and notices of proposed actions under 36 CFR part 215 shall begin on or after May 18, 2000.

FOR FURTHER INFORMATION CONTACT: Jean Paul Kruglewicz, Regional Appeals Coordinator, Southern Region, Planning, 1720 Peachtree Road, NW, Atlanta, Georgia 30309, Phone: 404–347–4867.

SUPPLEMENTARY INFORMATION: Deciding Officers in the Southern Region will give legal notice of decisions subject to appeal under 36 CFR part 217 and the Responsible Officials in the Southern Region will give notice of decisions subject to appeal under 36 CFR 215 in the following newspapers which are listed by Forest Service administrative unit. Responsible Officials in the Southern Region will also give notice of proposed actions under 36 CFR part 215 in the following principal newspapers which are listed by Forest Service administrative unit. The timeframe for comment on a proposed action shall be based on the date of publication of the notice of the proposed action in the principal newspaper. The timeframe for appeal shall be based on the date of publication of the legal notice of the decision in the principal newspaper for both 36 CFR parts 215 and 217.

Where more than one newspaper is listed for any unit, the first newspaper listed is the principal newspaper that will be utilized for publishing the legal notices of decisions. Additional newspapers listed for a particular unit are those newspapers the Deciding Officer expects to use for purposes of providing additional notice. The timeframe for appeal shall be based on the date of publication of the legal notice of the decision in the principal newspaper.

The following newspapers will be used to provide notice.

Southern Region

Regional Forester Decisions

Affecting National Forest System lands in more than one state of the 13 states of the Southern Region and the Commonwealth of Puerto Rico. *Atlanta Journal*, published daily in Atlanta, GA.

Affecting National Forest System lands in only one state of the 13 states of the Southern Region and the Commonwealth of Puerto Rico or only one Ranger District will appear in the principal newspaper elected by the National Forest of that state or Ranger District.

National Forests in Alabama, Alabama

Forest Supervisor Decisions

Montgomery Advertiser, published daily in Montgomery, AL

District Ranger Decisions

Bankhead Ranger District: Northwest Alabamian, published weekly (Monday & Thursday) in Haleyville, AL

Conecuh Ranger District: The Andalusia Star News, published daily (Tuesday through Saturday) in Andalusia, AL

Oakmulgee Ranger District: The Tuscaloosa News, published daily in Tuscaloosa, AL

Shoal Creek Ranger District: The Anniston Star, published daily in Anniston, AL

Talladega Ranger District: The Daily Home, published daily in Talladega, AL

Tuskegee Ranger District: Tuskegee News published weekly (Thursday) in Tuskegee, AL

Caribbean National Forest, Puerto Rico

Forest Supervisor Decisions

El Nuevo Dia, published daily in Spanish in San Juan, PR;

San Juan Star,: published daily in English in San Juan, PR

Chattahoochee-Oconee National Forest, Georgia

Forest Supervisor Decisions

The Times: published daily in Gainesville, GA

District Ranger Decisions

Armuchee Ranger District: Walker County Messenger, published bi-weekly (Wednesday & Friday) in LaFayette, GA

Toccoa Ranger District: The News Observer, published weekly (Wednesday) in Blue Ridge, GA

Brasstown Ranger District: North Georgia News, published weekly (Wednesday) in Blairsville, GA

Tallulah Ranger District: Clayton Tribune, published weekly (Thursday) in Clayton, GA

Chattooga Ranger District: Northeast Georgian, published twice weekly (Tuesday & Friday) in Cornelia, GA

Chieftain & Toccoa Record, published twice weekly (Tuesday & Friday) in Toccoa, GA

White County News Telegraph: published weekly (Thursday) in Cleveland, GA

The Dahlonega Nuggett, published weekly (Thursday) in Dahlonega, GA

Cohutta Ranger District: Chatsworth Times, published weekly (Wednesday) in Chatsworth, GA

Oconee Ranger District: Monticello News, published weekly (Thursday) in Monticello, GA

Cherokee National Forest, Tennessee

Forest Supervisor Decisions

Knoxville News Sentinel: published daily in Knoxville, TN (covering McMinn, Monroe, and Polk Counties)

Johnson City Press,: published daily in Johnson City, TN (covering Carter, Cocke, Green, Johnson, Sullivan, Unicoi and Washington Counties)

District Ranger Decisions

Ocoee-Hiwassee Ranger District: Polk County News, published weekly (Wednesday) in Benton, TN

Tellico-Hiwassee Ranger District: Monroe County Advocate, published weekly (Thursday) in Sweetwater, TN

Nolichucky-Unaka Ranger District: Johnson City Press, published daily in Johnson City, TN

Watauga Ranger District: Johnson City Press, published daily in Johnson City, TN.

Daniel Boone National Forest, Kentucky

Forest Supervisor Decisions

Lexington Herald-Leader, published daily in Lexington, KY

District Ranger Decisions

Morehead Ranger District: Morehead News, published bi-weekly (Tuesday and Friday) in Morehead, KY

Stanton Ranger District: The Clay City Times, published weekly (Thursday) in Stanton, KY

London Ranger District: The Sentinel-Echo, published tri-weekly (Monday, Wednesday, and Friday) in London, KY

Somerset Ranger District: Commonwealth-Journal, published daily (Sunday through Friday) in Somerset, KY

Stearns Ranger District: McCreary County Record, published weekly (Tuesday) in Whitley City, KY

Redbird Ranger District: Manchester Enterprise, published weekly (Thursday) in Manchester, KY

National Forests in Florida, Florida

Forest Supervisor Decisions

The Tallahassee Democrat, published daily in Tallahassee, FL

District Ranger Decisions

Apalachicola Ranger District: The Liberty Journal, published weekly (Wednesday) in Bristol, FL

Lake George Ranger District: The Ocala Star Banner, published daily in Ocala, FL

Osceola Ranger District: The Lake City Reporter, published daily (Monday–Saturday) in Lake City, FL

Seminole Ranger District: The Daily Commercial, published daily in Leesburg, FL

Wakulla Ranger District: The Tallahassee Democrat, published daily in Tallahassee, FL

Francis Marion & Sumter National Forest, South Carolina

Forest Supervisor Decisions

The State, published daily in Columbia, SC.

District Ranger Decisions

Enoree Ranger District: Newberry Observer, published tri-weekly (Monday, Wednesday, and Friday) Newberry, SC.

Andrew Pickens Ranger District: The Daily Journal, published daily in Seneca, SC.

Long Cane Ranger District: The Augusta Chronicle, published daily in Augusta, GA.

Wambaw Ranger District: Post and Courier, published daily in Charleston, SC.

Witherbee Ranger District: Post and Courier, published daily in Charleston, SC.

George Washington and Jefferson National Forests, Virginia

Forest Supervisor Decisions

Roanoke Times, published daily in Roanoke, VA

District Ranger Decisions

Lee Ranger District: Shenandoah Valley Herald, published weekly (Wednesday) in Woodstock, VA

Warm Springs Ranger District: The Recorder, published weekly (Thursday) in Monterey, VA

Pedlar Ranger District: Roanoke Times, published daily in Roanoke, VA

James River Ranger District: Virginian Review, published daily (except Sunday) in Covington, VA

Deerfield Ranger District: Daily News Leader, published daily in Staunton, VA

Dry River Ranger District: Daily News Record, published daily (except Sunday) in Harrisonburg, VA

Blacksburg Ranger District: Roanoke Times, published daily in Roanoke, VA

Monroe Watchman, published weekly (Thursday) in Union, WV (only for those decisions in West VA—notice will be published in the *Roanoke Time and Monroe Watchman.)*

Glenwood Ranger District: Roanoke Times, published daily in Roanoke, VA

New Castle Ranger District: Roanoke Times, published daily in Roanoke, VA

Mount Rogers National Recreation Area: Bristol Herald Courier, published daily in Bristol, VA

Clinch Ranger District: Kingsport-Times News, published daily in Kingsport, TN

Wythe Ranger District: Southwest Virginia Enterprise, published by-weekly (Wednesday and Saturday) in Wytheville, VA

Kisatchie National Forest, Louisiana

Forest Supervisor Decisions

The Town Talk published daily in Alexandria, LA

District Ranger Decisions

Caney Ranger District: Minden Press Herald, published daily in Minden, LA

Homer Guardian Journal, published weekly (Wednesday) in Homer, LA

Catahoula Ranger District: The Town Talk, published daily in Alexandria, LA

Calcasieu Ranger District: The Town Talk, published daily in Alexandria, LA

Kisatchie Ranger District: Natchitoches Times, published daily (Tuesday–Friday and on Sunday) in Natchitoches, LA

Winn Ranger District: Winn Parish Enterprise published weekly (Wednesday) in Winnfield, LA

Land Between the Lakes National Recreation Area, Kentucky and Tennessee

The Paducah Sun published daily in Paducah, KY

National Forests in Mississippi, Mississippi

Forest Supervisor Decisions

Clarion-Ledger published daily in Jackson, MS

District Ranger Decisions

Bienville Ranger District: Clarion-Ledger, published daily in Jackson, MS

Chickasawhay Ranger District: Clarion-Ledger, published daily in Jackson, MS

Delta Ranger District: Clarion-Ledger, published daily in Jackson, MS

De Soto Ranger District: Clarion-Ledger, published daily in Jackson, MS

Holly Springs Ranger District: Clarion-Ledger, published daily in Jackson, MS

Homochitto Ranger District: Clarion-Ledger, published daily in Jackson, MS

Tombigbee Ranger District: Clarion-Ledger, published daily in Jackson, MS

National Forests in North Carolina, North Carolina

Forest Supervisor Decisions

The Asheville Citizen-Times, published daily in Asheville, NC

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District Ranger Decisions

Appalachian Ranger District: The Asheville Citizen-Times published daily in Asheville, NC

Cheoah Ranger District: Graham Star, published weekly (Thursday) in Robbinsville, NC

Croatan Ranger District: The Sun Journal, published weekly (Sunday through Friday) in New Bern, NC

Grandfather Ranger District: McDowell News, published daily in Marion, NC

Highlands Ranger District: The Highlander, published weekly (mid May-mid Nov Tues & Fri; mid Nov-mid May Tues only) in Highlands, NC

Pisgah Ranger District: The Asheville Citizen-Times published daily in Asheville, NC

Tusquitee Ranger District: Cherokee Scout, published weekly (Wednesday) in Murphy, NC

Uwharrie Ranger District: Montgomery Herald, published weekly (Wednesday) in Troy, NC

Wayah Ranger District: The Franklin Press, published by-weekly (Wednesday and Friday) in Franklin, NC

Ouachita National Forest, Arkansas, Oklahoma

Forest Supervisor Decisions

Arkansas Democrat-Gazette, published daily in Little Rock, AR

District Ranger Decisions

Caddo Ranger District: Arkansas Democrat-Gazette, published daily in Little Rock AR

Cold Springs Ranger District: Arkansas Democrat-Gazette, published daily in Little Rock, AR

Fourche Ranger District: Arkansas Democrat-Gazette, published daily in Little Rock, AR

Jessieville Ranger District: Arkansas Democrat-Gazette, published daily in Little Rock, AR

Mena Ranger District: Arkansas Democrat-Gazette, published daily in Little Rock, AR

Oden Ranger District: Arkansas Democrat-Gazette, published daily in Little Rock, AR

Poteau Ranger District: Arkansas Democrat-Gazette, published daily in Little Rock, AR

Winona Ranger District: Arkansas Democrat-Gazette, published daily in Little Rock, AR

Womble Ranger District: Arkansas Democrat-Gazette, published daily in Little Rock, AR

Choctaw Ranger District: Tulsa World, published daily in Tulsa, OK

Kiamichi Ranger District: Tulsa World, published daily in Tulsa, OK

Tiak Ranger District: Tulsa World, published daily in Tulsa, OK

Ozark-St. Francis National Forest: Arkansas

Forest Supervisor Decisions

The Courier, published daily (Tuesday through Sunday) in Russellville, AR

District Ranger Decisions

Sylamore Ranger District: Stone County Leader, published weekly (Tuesday) in Mountain View, AR

Buffalo Ranger District: Newton County Times, published weekly in Jasper, AR

Bayou Ranger District: The Courier, published daily (Tuesday through Sunday) in Russellville, AR

Pleasant Hill Ranger District: Johnson County Graphic, published weekly (Wednesday) in Clarksville, AR

Boston Mountain Ranger District: Southwest Times Record, published daily in Fort Smith, AR

Magazine Ranger District: Southwest Times Record, published daily in Fort Smith, AR

St. Francis Ranger District: The Daily World, published daily (Sunday through Friday) in Helena, AR

National Forests and Grasslands in Texas, Texas

Forest Supervisor Decisions

The Lufkin Daily News, published daily in Lufkin, TX

District Ranger Decisions

Angelina National Forest: The Lufkin Daily News, published daily in Lufkin, TX

Davy Crockett National Forest: The Lufkin Daily News, published daily in Lufkin, TX

Sabine National Forest: The Lufkin Daily News, published daily in Lufkin, TX

Sam Houston National Forest: The Courier, published daily in Conroe, TX

Caddo & LBJ National Grasslands: Denton Record-Chronicle, published daily in Denton, TX

Dated: May 12, 2000.

David G. Holland,

Deputy Regional Forester for Natural Resources.

[FR Doc. 00–12491 Filed 5–17–00; 8:45 am]

BILLING CODE 3410–11–M

DEPARTMENT OF AGRICULTURE

Forest Service

Booger Placer Claim, Suction Dredging Nez Perce National Forest, Idaho County, Idaho

AGENCY: Forest Service, USDA.

ACTION: Notice; intent to prepare environmental impact statement.

SUMMARY: The Forest Service will prepare an environmental impact statement (EIS) to analyze and disclose the environmental effects of dredging on the Booger placer claim on Little Elk Creek. The claimant has proposed using one eight-inch suction dredge to remove possible gold deposits from the gravel and at bedrock in the stream channel of Little Elk Creek. The operation is proposed for five years, to operate when water and weather conditions allow. The Booger placer claim is located in Section 33, T30N, R8E, BPM.

DATES: Written comments and suggestions should be received on or before June 19, 2000, to receive timely consideration in the preparation of the draft EIS.

ADDRESSES: Send written comments and suggestions on the proposed action or requests for a map of the proposed action or to be placed on the project mailing list to Kevin Martin, District Ranger, Red River Ranger District, P.O. Box 416, Elk City, Idaho 83525.

FOR FURTHER INFORMATION CONTACT: Jo Ellis, District Geologist, Red River Ranger District, P.O. Box 416, Elk City, Idaho 83525, phone (208) 842–2245.

SUPPLEMENTARY INFORMATION: The proposed action is proposed pursuant to the 1872 Mining Law, the Organic Administration Act of 1897 and Forest Service mining regulations, Title 36 Code of Federal Regulation (CFR), Part 228, Subpart A. The United States mining laws at 30 U.S.C. 21–54 Confer a statutory right to enter upon the public land to search for and remove certain minerals. The Forest Service has the responsibility to make sure that the activities are conducted so as to minimize adverse environmental impacts to National Forest System lands, 36 CFR, Part 228, Subpart A.

The proposal involves processing streambed gravel to bedrock over the entire 4,020 foot length of the claim. Deeps of the gravel are between three and six feet deep. The stream channel, between high water marks, varies from six to ten feet in width. This work would take place over five years of more whenever water and weather conditions allow operations.

The process involves utilizing high-pressure water pumps driven by gasoline-powered motors, which create suction in a flexible intake pipe. A mixture of streambed sediment and water is vacuumed into the intake pipe and passed over a sluice box mounted on a floating barge. Dense particles (including gold) are trapped in the sluice box. The remainder of the entrained material is discharged into the stream as tailings or spoils. A hole is created in the gravel so bedrock is exposed. Cracks in the bedrock are then cleared with the suction. Cable attached to a winch move large boulders or rootwads.

The Forest Service will consider a range of alternatives to the proposed action. One of these will be the ''no action'' alternative, in which the Plan of Operations would not be approved. Additional alternatives will examine varying intensity and duration of the proposed activities, including restrictions on the size of equipment and length of seasonal operation, as well as respond to the issues and other resource values.

Public participation is an important part of the project, commencing with the initial scoping process (40 CFR 1501.7), which starts with publication of this notice and continues for the next 30 days. In addition, the public is encouraged to visit with Forest Service officials at any time during the analysis and prior to the decision. The Forest Service will be seeking information, comments, and assistance from Federal, State, and local agencies, the Nez Perce Tribe, and other individuals or organizations that may be interested in or affected by the proposed action.

Comments from the public and other agencies will be used in preparation of the draft EIS. The scoping process will be used to:

1. Identify potential issues;
2. Identify major issues to be analyzed in depth;
3. Eliminate minor issues or those that have been covered by a relevant previous environmental analysis, such as the Nez Perce National Forest Plan EIS;
4. Identify alternatives to the proposed action;
5. Identify potential environmental effects of the proposed action and alternatives (i.e., direct, indirect, and cumulative effects).

While public participation in this analysis is welcome at any time, comments received within 30 days of the publication of this notice will be especially useful in the preparation of the draft EIS, which is expected to be filed with the Environmental Protection Agency and available for public review in July 2000. A 45-day comment period will follow publication of a Notice of Availability of the draft EIS in the **Federal Register**. The comments received will be analyzed and considered in preparation of a final EIS, which is expected to be filed in October 2000. A Record of Decision will be issued not less than 30 days after publication of a Notice of Availability of the final EIS in the **Federal Register**.

The Forest Service believes it is important at this early stage to give reviewers notice of several court rulings related to public participation in the environmental review process. First, reviewers of draft EISs must structure their participation in the environmental review of the proposal in such a way that it is meaningful and alerts an agency to the reviewer's position and contentions. Vermont Yankee Nuclear Power Corp. v. NRDC, 435 U.S. 519, 513 (1978). Also, environmental objections that could be raised at the draft EIS stage but that are not raised until after completion of the final EIS may be waived or dismissed by the courts. City of Angoon v. Hodel, 803 F.2d 1016, 1022 (9th Cir, 1986), and Wisconsin Heritages Inc. v. Harris, 490 F.Supp. 1334, 1338 (E.D. Wis., 1980). Because of these court rulings, it is very important that those interested in this proposed action participate by the close of the 45-day comment period in order that substantive comments and objections are available to the Forest Service at a time when it can meaningfully consider them and respond to them in the final EIS. To assist the Forest Service in identifying and considering issues and concerns on the proposed action, comments should be as specific as possible. Reviewers may wish to refer to the Council on Environmental Quality Regulations for implementing the procedural provisions of the National Environmental Policy Act at 40 CFR 1503.3 in addressing these points.

Kevin Martin is the responsible official for this environmental impact statement.

Dated: May 5, 2000.

Kevin Martin,

District Ranger, Red River Ranger District, Nez Perce National Forest.

[FR Doc. 00–12476 Filed 5–17–00; 8:45 am]

BILLING CODE 3410–11–M

COMMISSION ON CIVIL RIGHTS

Agenda and Notice of Public Meeting of the Illinois Advisory Committee

Notice is hereby given, pursuant to the provisions of the rules and regulations of the U.S. Commission on Civil Rights, that a meeting of the Illinois Advisory Committee to the Commission will convene at 10:00 a.m. and adjourn at 4:00 p.m. on Tuesday, June 13, 2000, at the 55 West Monroe Street, Suite 525, Chicago, Illinois 60603. The purpose of the meeting is to discuss civil rights issues of interest and plan future activities.

Persons desiring additional information, or planning a presentation to the Committee, should contact Committee Chairperson James E. Scales, 618–453–1045, or Constance M. Davis, Director of the Midwestern Regional Office, 312–353–8311 (TDD 312–353–8362). Hearing-impaired persons who will attend the meeting and require the services of a sign language interpreter should contact the Regional Office at least ten (10) working days before the scheduled date of the meeting.

The meeting will be conducted pursuant to the provisions of the rules and regulations of the Commission.

Dated at Washington, DC, May 12, 2000.

Lisa M. Kelly,

Special Assistant to the Staff Director, Regional Programs Coordination Unit.

[FR Doc. 00–12501 Filed 5–17–00; 8:45 am]

BILLING CODE 6335–01–P

COMMISSION ON CIVIL RIGHTS

Agenda and Notice of Public Meeting of the Wisconsin Advisory Committee

Notice is hereby given, pursuant to the provisions of the rules and regulations of the U.S. Commission on Civil Rights, that a meeting of the Wisconsin Advisory Committee to the Commission will convene at 12:00 p.m. and adjourn at 4:00 p.m. on Wednesday, June 7, 2000, at the Milwaukee Hilton, 509 West Wisconsin Avenue, Milwaukee, Wisconsin 53202. The purpose of the meeting is to discuss civil rights issues and plan future activities.

Persons desiring additional information, or planning a presentation to the Committee, should contact Committee Chairperson Geraldine McFadden, 414–444–1952, or Constance M. Davis, Director of the Midwestern Regional Office, 312–353–8311 (TDD 312–353–8362). Hearing-impaired persons who will attend the meeting and require the services of a sign

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language interpreter should contact the Regional Office at least ten (10) working days before the scheduled date of the meeting.

The meeting will be conducted pursuant to the provisions of the rules and regulations of the Commission.

Dated at Washington, DC, May 12, 2000.

Lisa M. Kelly,

Special Assistant to the Staff Director, Regional Programs Coordination Unit.

[FR Doc. 00–12500 Filed 5–17–00; 8:45 am]

BILLING CODE 6335–01–P

DEPARTMENT OF COMMERCE

International Trade Administration

[A–570–828]

Silicomanganese From the People's Republic of China: Notice of Final Results of Antidumping Duty Administrative Review

AGENCY: Import Administration, International Trade Administration, Department of Commerce .

ACTION: Notice of Final Results of Antidumping Duty Administrative Review.

SUMMARY: On November 8, 1999, the Department of Commerce (''the Department'') published the preliminary results of administrative review of the antidumping duty order on silicomanganese from the People's Republic of China (''PRC''). This review covers two manufacturers/exporters, Guangxi Bayi Ferroalloy Works (''Bayi''), and Sichuan Emei Ferroalloy Import and Export Co., Ltd. (''Emei''). The period of review (''POR'') is December 1, 1997 through November 30, 1998.

The final weighted-average dumping margins for the reviewed firms are listed below in the section entitled ''*Final Results of Review.*'' The final margins differ from those published in the preliminary results due to changes that we made since the preliminary results. For details regarding these changes, see the section of the notice entitled ''*Changes Since the Preliminary Results.*''

EFFECTIVE DATE: May 18, 2000.

FOR FURTHER INFORMATION CONTACT: Timothy Finn or Howard Smith, AD/CVD Enforcement Group II, Office IV, Import Administration, International Trade Administration, U.S. Department of Commerce, 14th Street and Constitution Avenue, NW, Washington, DC 20230; telephone (202) 482–0065 or (202) 482–5193 respectively.

SUPPLEMENTARY INFORMATION:

Applicable Statute

Unless otherwise indicated, all citations to the statute are references to the provisions effective January 1, 1995, the effective date of the amendments made to the Tariff Act of 1930 (''the Act'') by the Uruguay Rounds Agreements Act (''URAA''). In addition, unless otherwise indicated, all citations to the Department's regulations are to the current regulations at 19 CFR part 351 (1999).

Background

Since the publication of the preliminary results, the following events have occurred. On November 29, 1999 the respondents and the petitioner (Eramet Marietta Inc. (''Eramet'')) submitted publicly available information and comments regarding factor valuation. On December 8, 1999 the respondents filed rebuttal comments regarding the petitioner's November 29, 1999 factor value submission. The Department issued supplemental questionnaires to the respondents on December 16, 1999, and received responses to those questionnaires on January 7, 2000. On January 11, 2000, the Department published in the **Federal Register** a notice extending the due date for the final results until May 6, 2000 (65 FR 1597). In January 2000, the Department conducted verifications of Bayi and Emei. Public versions of our verification reports, dated March 1, 2000, are on file in the Central Records Unit (''CRU''), room B–099 of the main Department of Commerce building, under the appropriate case number. In response to the Department's invitation to comment on the preliminary results of review, the petitioner and the respondents filed case and rebuttal briefs in March 2000. The Department held a public hearing regarding this review on April 3, 2000.

The Department has conducted this administrative review in accordance with section 751 of the Act.

Scope of the Review

The merchandise covered by this order is silicomanganese. Silicomanganese, which is sometimes called ferrosilicon manganese, is a ferroalloy composed principally of manganese, silicon, and iron, and normally containing much smaller proportions of minor elements, such as carbon, phosphorous and sulfur. Silicomanganese generally contains by weight not less than 4 percent iron, more than 30 percent manganese, more than 8 percent silicon and not more than 3 percent phosphorous. All compositions, forms and sizes of silicomanganese are included within the scope of this investigation, including silicomanganese slag, fines and briquettes. Silicomanganese is used primarily in steel production as a source of both silicon and manganese. This investigation covers all silicomanganese, regardless of its tariff classification. Most silicomanganese is currently classifiable under subheading 7202.30.0000 of the Harmonized Tariff Schedule of the United States (''HTS''). Some silicomanganese may also currently be classifiable under HTS subheading 7202.99.5040. Although the HTS subheadings are provided for convenience and customs purposes, our written description of the scope is dispositive.

Analysis of Comments Received

All issues raised in the case and rebuttal briefs by parties to this administrative review are addressed in the ''Issues and Decision Memorandum'' (''Decision Memorandum'') from Holly A. Kuga, Acting Deputy Assistant Secretary, Important Administration, to Troy H. Cribb, Acting Assistant Secretary for Import Administration, dated May 8, 2000, which is hereby adopted by this notice. A list of the issues which parties have raised and to which we have responded, all of which are in the Decision Memorandum, is attached to this notice as an Appendix. Parties can find a complete discussion of all issues raised in this review and the corresponding recommendations in this public memorandum which is on file in the Central Record Unit, room B–099 of the main Department of Commerce building. In addition a complete version of the Decision Memorandum can be accessed directly on the Web at *www.ita.doc.gov/import_admin/records/frn.* The paper copy and electronic version of the Decision Memorandum are identical in content.

Use of Facts Available

For a discussion of our use of facts available, see the ''Facts Available'' section of the Decision Memorandum.

Changes Since the Preliminary Results of Review

Based on the corrections presented at verification, the Department's verification findings, and our analysis of the petitioner's and the respondents' comments, we have made certain changes to the factors of production and surrogate values used to calculate the margins in the preliminary results. We have also corrected certain clerical errors in our margin calculations. The changes and corrections are discussed

in the relevant sections of the Decision Memorandum. Further details regarding the changes and corrections can be found in the Decision Memorandum, surrogate value memorandum (*see Surrogate Values Used for the Final Results of the 1997–1998 Administrative Review of Silicomanganese From the People's Republic of China*) and company-specific analysis memoranda (*see Analysis for the Final Results of the 1997–1998 Administrative Review of Silicomanganese From the People's Republic of China: Guangxi Bayi Ferroalloy and Analysis for the Final Results of the 1997–1998 Administrative Review of Silicomanganese From the People's Republic of China: Sichuan Emei Ferroalloy Import and Export Co., Ltd.*), all of which are on file in room B–099 of the main Department of Commerce building.

Final Results of Review

We determine that the following percentage weighted-average margins exist for the period December 1, 1997 through November 30, 1998:

Manufacturer/Exporter	Margin (percent)
Guangxi Bayi Ferroalloy Works	126.22
Sichuan Emei Ferroalloy Import and Export Co., Ltd	182.97

The Department shall determine, and Customs shall assess, antidumping duties on all appropriate entries. In accordance with 19 CFR 351.212(b), we have calculated exporter/importer-specific assessment rates. We divided the total dumping margins for sales to a specific importer by the total units of subject merchandise sold to the importer in order to calculate a per-unit dollar assessment. The per-unit dollar amount will be assessed uniformly against each unit of subject merchandise that the importer entered during the POR.

Cash Deposit Requirements

The following deposit requirements will be effective upon publication of this notice of final results of administrative review for all shipments of silicomanganese from the PRC entered, or withdrawn from warehouse, for consumption on or after the date of publication, as provided by section 751(a)(1) of the Act: (1) The cash deposit rates for the reviewed companies will be the rates shown above; (2) for previously reviewed or investigated companies not listed above that have separate rates, the cash deposit rate will continue to be the company-specific rate published for the most recent period; (3) the cash deposit rate for all other PRC exporters will continue to be 150.00 percent; and (4) the cash-deposit rate for non-PRC exporters will be the rate applicable to the PRC supplier of that exporter.

These deposit requirements shall remain in effect until publication of the final results of the next administrative review.

This notice also serves as a final reminder to importers of their responsibility under 19 CFR 351.402(f) to file a certificate regarding the reimbursement of antidumping duties prior to liquidation of the relevant entries during this review period. Failure to comply with this requirement could result in the Secretary's presumption that reimbursement of antidumping duties occurred and the subsequent assessment of doubled antidumping duties.

This notice also serves as the only reminder to parties subject to administrative protective orders (''APOs'') of their responsibility concerning the return or destruction of proprietary information disclosed under an APO in accordance with 19 CFR 351.305 or conversion to judicial protective order is hereby requested. Failure to comply with the regulations and terms of an APO is a violation which is subject to sanction.

We are issuing and publishing this determination and notice in accordance with sections section 751(a)(1) and 771(i) of the Act.

Dated: May 8, 2000.

Troy H. Cribb,

Acting Assistant Secretary for Import Administration.

Appendix—Issues in Decision Memorandum

Comments and Responses

I. Factor Valuation
II. Facts Available
III. Clerical Errors
IV. Miscellaneous Issues
1. Classifying Electrode Paste as a Direct Material or Part of Overhead
2. Allocating Costs Over Production Quantities That Include Fines
3. Reducing Normal Value for Sales of Silicomanganese Slag
4. Recalculating Emei's Electricity Consumption Based on Verification Findings

[FR Doc. 00–12581 Filed 5–17–00; 8:45 am]

BILLING CODE 3510–DS–P

DEPARTMENT OF COMMERCE

International Trade Administration

[C–533–063]

Certain Iron-Metal Castings from India: Final Results of Countervailing Duty Administrative Review

AGENCY: Import Administration, International Trade Administration, Department of Commerce.

ACTION: Notice of final results of countervailing duty administrative review.

SUMMARY: On November 12, 1999, the Department of Commerce (the Department) published in the **Federal Register** its preliminary results of administrative review of the countervailing duty order on certain iron-metal castings from India for the period January 1, 1997 through December 31, 1997 (64 FR 61592). The Department has now completed this administrative review in accordance with section 751(a) of the Tariff Act of 1930, as amended (the Act).

We have not made changes in the subsidy calculations from the preliminary results. For information on the net subsidy for each reviewed company, and for all non-reviewed companies, see the *Final Results of Review* section of this notice. We will instruct the U.S. Customs Service (Customs) to assess countervailing duties as detailed in the *Final Results of Review* section of this notice.

EFFECTIVE DATE: May 18, 2000.

FOR FURTHER INFORMATION CONTACT: Robert Copyak, Import Administration, International Trade Administration, U.S. Department of Commerce, 14th Street and Constitution Avenue, N.W., Room 4012, Washington, D.C. 20230; telephone: (202) 482–2786.

SUPPLEMENTARY INFORMATION:

Applicable Statute and Regulations

Unless otherwise indicated, all citations to the statute are references to the provisions of the Tariff Act of 1930, as amended by the Uruguay Round Agreements Act (URAA) effective January 1, 1995. The Department is conducting this administrative review in accordance with section 751(a) of the Act. All citations to the Department's regulations reference 19 CFR part 351 (1998), unless otherwise indicated. Because the request for this administrative review was filed before January 1, 1999, the Department's substantive countervailing duty regulations, which were published in the **Federal Register** on November 25,

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1998 (*see* CVD Regulations, 63 FR 65348), do not govern this review.

Background

On November 12, 1999, the Department published the preliminary results of administrative review of the countervailing duty order on certain iron metal castings from India. *See Notice of Preliminary Results and Partial Recission of Countervailing Duty Administrative Review: Certain Iron-Metal Castings from India,* 64 FR 61592 (November 12, 1999) (*Preliminary Results*). Pursuant to 19 CFR 351.213(b), this review covers only those producers/exporters of the subject merchandise for which a review was specifically requested. The producers/exporters of the subject merchandise for which this review was requested are:

AGV Exports,
Agarwal Hardware,
Ambika Exports,
Bengal Export Corporation,
Bengal Iron Corporation,
Bhagyadevi Factory,
Calcutta Ferrous Ltd.,
Carnation Enterprise Pvt. Ltd.,
Carnation Industries,[1]
Commex Corporation,
Crescent Foundry Co. Pvt. Ltd.,
Delta Enterprises,
Delta Corporation Ltd.,
Dinesh Brothers Pvt. Ltd.,
Dugar International,
Edcons Castings,
Essen International,
Ganapati Suppliers,
Global Intertrade,
Hargolal & Sons,
Hindustahn Malleables & Forgings Ltd.,
J.K. Udyog,
Kajaria Iron Castings Ltd.,[2]
Kajaria Iron Castings Pvt. Ltd.,
Kauntia Exports,
Kejriwal Iron & Steel Works,
Kiswok Industries Pvt. Ltd.,[3]
Metflow Corporation Pvt. Ltd.,
Nandikeshwari Iron Foundry Pvt. Ltd.,
Orissa Metal Industries,
Overseas Iron Foundry Pvt. Ltd.,
Rangilal & Sons,
RBA Exports,
R.B. Agarwalla & Company,
R.B. Agarwalla & Company Pvt. Ltd.,
RR Enterprise,
RSI Limited,
RS Ispat Pvt. Ltd.,
Samitex Corporation,
Sammitex,
Serampore Industries Pvt. Ltd.,
Shakti Isabgel Industries,
Shree Hanuman Foundry & Engineering Co. Ltd.,
Shree Rama Enterprises,
Shree Uma Foundries Pvt. Ltd.,
Siko Exports,
Sitaram Maohogarhia & Sons Pvt. Ltd.,
Sociedad J.B. Nagar,
SSL Exports,
Super Iron Foundry,
Tara Engineering Works,
Thames Engineering,
Tirupati International Pvt. Ltd.,
Tirupati Trading Company,
Trident Industries,
Trident International,
Uma Iron & Steel, and
Victory Castings Ltd.

The following companies, for which a review was requested, certified that they either do not produce or did not export the subject merchandise to the United States during the period of review (POR): AGV Exports, Agarwal Hardware Works & Foundries Pvt. Ltd., Ambika Exports, Bengal Iron Corporation, Bhagyadevi Factory, Delta Enterprises, Edcons Castings Pvt. Ltd., Essen International, Hargolal & Sons, Hindustahn Malleables & Forgings Ltd., J.K. Udyog, Kauntia Exports, Metflow Corporation Pvt. Ltd., Orissa Metal Industries, Overseas Iron Foundry Pvt. Ltd., RBA Exports, R.B. Agarwalla & Company Pvt. Ltd., RR Enterprise, RS Ispat Pvt. Ltd., Samitex Corporation, Sammitex, Shree Hanuman Foundry & Engineering Co. Ltd., Shree Rama Enterprises, Shree Uma Foundries Pvt. Ltd., Siko Exports, Sitaram Madhogarhia & Sons Pvt. Ltd., Tara Engineering Works, Tirupati International Pvt. Ltd., and Tirupati Trading Company. In addition, the Government of India (GOI) certified that the following companies either do not exist or do not export the subject merchandise to the United States: Dugar International, Global Intertrade, Shakti Isabgel Industries, Sociedad J.B. Nagar, and Trident Industries. Therefore, in accordance with section 351.213(d)(3) of the Department's regulations, we rescinded the review with respect to these companies at the time of the preliminary results.

See Preliminary Results, 64 FR at 61592

We invited interested parties to comment on the preliminary results. On December 13, 1999, case briefs were submitted by the Engineering Export Promotion Council of India and the exporters of certain iron-metal castings from India (respondents), and the Municipal Castings Fair Trade Council and its members (petitioners). On December 20, 1999, rebuttal briefs were submitted by the respondents and petitioners. None of the interested parties requested a hearing. This review covers 29 programs.

Scope of the Review

Imports covered by this administrative review are shipments of Indian manhole covers and frames, clean-out covers and frames, and catch basin grates and frames. These articles are commonly called municipal or public works castings and are used for access or drainage for public utility, water, and sanitary systems. During the review period, such merchandise was classifiable under the *Harmonized Tariff Schedule* (HTS) item numbers 7325.10.0010 and 7325.10.0050. The HTS item numbers are provided for convenience and Customs purposes. The written description remains dispositive.

Verification

As provided in section 782(i) of the Act, we verified information submitted by the GOI and certain producers/exporters of the subject merchandise. We followed standard verification procedures, including meeting with government and company officials and examining relevant accounting and financial records and other original source documents. Our verification results, which were issued on September 9, 1999, are outlined in the verification reports, the public versions of which are on file in the Central Records Unit (CRU), Room B–099 of the Main Commerce Building.

Analysis of Comments Received

All issues raised in the case and rebuttal briefs by parties to this administrative review are addressed in the ''Issues and Decision Memorandum'' (*Decision Memorandum*) from Holly A. Kuga, Acting Deputy Assistant Secretary, Import Administration, to Troy H. Cribb, Acting Assistant Secretary for Import Administration, dated concurrent with this notice, which is hereby adopted by this notice. A list of issues which parties have raised and to which we have responded, all of which are addressed in the Decision Memorandum, is attached to this notice as Appendix I. Parties can find a complete discussion of all issues raised in this review and the corresponding recommendations in this public memorandum which is on file in the CRU. In addition, a complete version of the Decision Memorandum can be accessed directly on the web at www.ita.doc.gov/import__admin/records/frn. The paper copy and electronic version of the Decision Memorandum are identical in content.

Use of Facts Available

For a discussion of our application of facts available, see the ''Facts Available''

[1] Carnation Industries was formerly Carnation Enterprise Pvt. Ltd.

[2] Kajaria Iron Castings Ltd. was formerly Kajaria Iron Castings Pvt. Ltd.

[3] Kiswok Industries Pvt. Ltd. was formerly Kejriwal Iron & Steel Works.

section of the Decision Memorandum, which is on file in the CRU and available on the web at www.ita.doc.gov/import__admin/records/frn.

Changes Since the Preliminary Results

We have not made any changes to the subsidy rate calculations from the preliminary results.

Final Results of Review

In accordance with 19 CFR 351.221(b)(4)(i), we calculated an individual subsidy rate for each producer/exporter subject to this review. We will instruct Customs to assess countervailing duties as indicated below on all appropriate entries. For the period January 1, 1997 through December 31, 1997, we determine the net subsidy rates for the reviewed companies to be as follows:

Producers/exporters	Ad valorem rates (percentages)
Bengal Export Corporation	8.35
Calcutta Ferrous Ltd	9.28
Calcutta Iron Foundry	0.42
Carnation Industries Ltd	0.72
Commex Corporation	2.71
Crescent Foundry Co. Pvt. Ltd	0.84
Delta Corporation Ltd	27.65
Dinesh Brothers (Pvt.) Ltd	1.71
Ganapati Suppliers Pvt. Ltd	5.17
Kajaria Iron Castings Ltd	5.19
Kiswok Industries Pvt. Ltd	14.90
Nandikeshwari Iron Foundry Pvt. Ltd	13.72
Rangilal & Sons	0.00
R.B. Agarwalla & Company	3.56
RSI Limited	0.90
Seramapore Industries Pvt. Ltd	1.51
SSL Exports	27.65
Super Iron Foundry	1.08
Thames Engineering	27.65
Trident International	27.65
Uma Iron & Steel Company	2.10
Victory Castings Ltd	1.88

Revocation of CVD Order

As a result of the International Trade Commission's determination that revocation of this countervailing duty order would not likely lead to continuation or recurrence of material injury to an industry in the United States in the reasonably foreseeable future, the Department, pursuant to section 751(d)(2) of the Act, revoked the countervailing duty order on iron metal castings from India. *See Revocation of Countervailing Duty Order: Iron Metal Castings from India,* 64 FR 61602 (November 12, 1999). Pursuant to section 751(c)(6)(A)(iv) of the Act and 19 CFR 351.222(i)(2)(ii), the effective date of revocation was January 1, 2000. Accordingly, the Department instructed Customs to discontinue suspension of liquidation and collection of cash deposits on entries of the subject merchandise entered or withdrawn from warehouse on or after January 1, 2000. The Department, however, will conduct administrative reviews of subject merchandise entered prior to the effective date of revocation in response to appropriately filed requests for review.

Administrative Protective Order

This notice also serves as a final reminder to parties subject to administrative protective order (APO) of their responsibility concerning the disposition of proprietary information disclosed under APO in accordance with 19 CFR 351.305. Timely written notification of return/destruction of APO materials or conversion to judicial protective order is hereby requested. Failure to comply with the regulations and the terms of an APO is a sanctionable violation.

This administrative review and notice are in accordance with section 751(a)(1) of the Act (19 U.S.C. 1675(a)(1)).

Dated: May 10, 2000.

Troy H. Cribb,

Acting Assistant Secretary for Import Administration.

Appendix I—Issues Addressed in the Decision Memorandum

Methodology and Background Information

I. Applicable Statute and Regulations
II. Facts Available
III. Benchmark Rate

Analysis of Programs

I. *Programs Conferring Subsidies*
- A. Pre-Shipment Export Financing
- B. Post-Shipment Export Financing
- C. Exemption of Export Credit from Interest Taxes
- D. Income Tax Deductions Under Section 80 HHC
- E. Import Mechanisms (Sale of Licenses)
- F. Passbook Scheme
- G. Duty Entitlement Passbook Scheme

II. *Programs Determined To Be Not Countervailable*
- A. Long-Term Financing from ''All-India Development Banks''
- B. Long-Term Loan from the West Bengal Industrial Finance Corporation
- C. Leasing of Land from the Regional Government of West Bengal

III. *Programs Found To Be Not Used*
- A. West Bengal Incentive Scheme 1993
- 1. State Capital Investment Subsidy
- B. Market Development Assistance
- C. Rediscounting of Export Bills Abroad
- D. International Price Reimbursement Scheme
- E. Cash Compensatory Support Program
- F. Programs Operated by the Small Industries Development Bank of India
- G. Export Promotion Replenishment Scheme
- H. Export Promotion Capital Goods Scheme
- I. Benefits for Export Oriented Units and Export Processing Zones
- J. Special Imprest Licenses
- K. Special Benefits
- L. Duty Drawback on Excise Taxes
- M. Payment of Premium Against Advance Licenses
- N. Pre-Shipment Export Financing in Foreign Currency
- O. Subsidies Provided by the State of Orissa
- P. Advance Licenses

IV. *Other Program Examined*
- A. Bridge Loan

V. *Programs Found Not To Exist*
- A. State Value-Added Tax ''Set-Off'' Program
- B. Interest Rate Surcharge Exemption

VI. *Analysis of Comments*
- A. Cash Credit Benchmark Interest Rate
- B. Leasing of Land
- C. Long-Term Financing
- D. Benefit Provided Under the Passbook Scheme
- E. Section 80HHC—Tax Savings Relating to Subject Castings
- F. Double-Counting of Subsidies
- G. Overdue Penalty Interest Paid

[FR Doc. 00–12580 Filed 5–17–00; 8:45 am]

BILLING CODE 3510–DS–P

DEPARTMENT OF COMMERCE

International Trade Administration

Notice of Recruitment

AGENCY: International Trade Administration, Department of Commerce.

ACTION: Notice of Recruitment.

SUMMARY: U.S. Department of Commerce Invites Small and Medium Enterprises to Join U.S. Delegation to Asia Pacific Economic Cooperation (APEC) Small and Medium Enterprise (SME) Ministerial Meeting and Related Events.

DATES: Conference: June 19–23, 2000.

Apply for participation in the U.S. Delegation by: no later than June 2, 2000.

ADDRESSES: Conference location at International Convention Center in Bandar Seri Begawan, Brunei Darussalam.

FOR FURTHER INFORMATION CONTACT: Mrs. Brenda J. Fisher, APEC Affairs Coordinator, Room 2316, International Trade Administration, U.S. Department of Commerce at phone 202/482–5334; fax 202/482–3316; or email: Brenda(underscore)Fisher@ita.doc.gov.

SUPPLEMENTARY INFORMATION:

008480

Mission Description

Brunei, Chair of APEC 2000, will host the Small and Medium Enterprise (SME) Ministerial and related events, including a Business Forum and E-Commerce Workshop, from June 20–23, in Bandar Seri Begawan.

The Department of Commerce is the lead U.S. Government agency on SME issues in APEC. It is important that the DOC maintain the profile of SME issues within the APEC forum and make substantial, tangible progress on USG objectives, including E-Commerce. A senior Commerce Department official will lead the U.S. delegation, including interagency and private sector participation.

The Ministerial will focus on building the foundations on which SMEs can flourish in the digital economy by holding workshops and discussions that will produce recommendations on how to best exploit

- Information and communication technology
- Human resources and development
- Strategic alliances between SMEs and SMEs and larger firms
- Financing SMEs.

Participants

- Ministers from APEC Economies representing small business.
- Private Sector Delegations from all 21 APEC member economies.

Commercial Setting

The APEC SME Ministerial and related events are being held in Brunei as it is the Chair of APEC during 2000. The confluence of senior government officials and private sector delegations from the 21 APEC member economies is expected to generate frank and constructive discussions on issues of concern to all APEC member economies and business communities.

Private sector businesses will have a unique chance to shape APEC's action agenda for SMEs during the June 20–23 SME Ministerial Meeting, SME Business Forum and associated events. Continuing the tradition of past Business Forums, all 21 APEC SME Ministers have agreed to interact with delegates from the SME Business Forum, E-Commerce Workshop, and Women Leaders' Network meeting—to be held concurrently at the International Convention Center in Bandar Seri Begawan.

The Business Forum will provide a platform for frank and constructive discussions on issues of concern to all APEC economies and business communities. The E-Commerce Workshop participants are to develop a set of recommendations that will constitute a collective action plan for APEC members on improving the adoption of e-commerce by SMEs. The Women Leaders' Network meeting will bring together women from business, academia, and government from the APEC economies in a single forum to discuss the pressing issues surrounding womens' involvement in SME businesses.

The formal agendas for the meetings provide opportunities for interaction between senior Government officials and business leaders from the participating 21 APEC member economies (Australia, Brunei, Canada, Chile, Hong Kong, Indonesia, Japan, Korea, Malaysia, Mexico, New Zealand, Papua New Guinea, Peru, the Philippines, Peoples' Republic of China, Russia, Singapore, Thailand, Taiwan, United States, and Vietnam). Of course, networking can also be conducted on the margins of the official programs as well. The intent of these interactions is to develop tangible, practical and prioritized recommendations for APEC Ministers to act upon during the Ministerial Meeting on June 22–23.

The SME Business Forum recommendations and action plans from two associated APEC SME events, the E-Commerce Workshop (involving 200 government officials and private sector) and Women Leaders' Network (a meeting of 350 businesswomen), will be combined to provide a framework for practical action regarding programs and policies for SMEs. Participants will have an opportunity to shape the APEC dialogue on subjects vital to the growth and development of SMEs, including strategic alliances (between SMEs and between SMEs and larger firms); creating the best environment for e-commerce, and other information and communications technologies; financing; and developing human resources.

Mission Goals

Our policy objectives are to advance U.S. interests for SMEs in APEC and work to implement the USG theme of building the foundations on which economies, particularly SMEs, can flourish in the digital economy. We will continue to press within APEC to produce tangible outcomes for the private sector and enhance public-private dialogue. Specifically, we seek Ministerial endorsement of the U.S. SME Business Partnership Initiative, developed in cooperation with the U.S. Chamber of Commerce. The partnership works on a bilateral basis with other APEC economies to develop internet-based matchmaking systems of qualified SME companies. The Initiative demonstrates first-hand the value-added of strategic partnerships, particularly when the appropriate due diligence is conducted. This program offers an excellent example of outcomes-oriented APEC work. We also will maintain momentum on the APEC Consumer Education and Protection Initiative (CEPI), developed with the Direct Selling Association.

The U.S. delegation head will deliver general remarks during the Ministerial meetings on one theme, strategic alliances. It is hoped that our private sector delegation will represent firms who are engaged in strategic alliances in Asia, and/or can support the formation of strategic partnerships via the use of the Internet and electronic commerce. There will be several opportunities for informal interaction with both other Ministers and the private sector delegation members.

Mission Scenario

Optional Gold Key Program in Malaysia—June 19.

Women Leaders' Network Meeting in Brunei—June 17–20.

Business Forum and E-Commerce Workshop—June 20–22.

(Note: Agendas call for plenary sessions, interaction with Ministers, and working group breakout sessions to deliberate on Ministerial themes.)

SME Ministerial—June 22–23.

The Ministerial and related events will be held at the International Convention Center in Bandar Seri Begawan, Brunei Darussalam from June 20 to 23, 2000. Each private sector participant is responsible for arranging travel itinerary, hotel accommodations and paying for his/her stay in Brunei. The registration fees for the Ministerial-related events vary: Women Leaders' Network Meeting registration fee is $200.00/delegate; Business Forum registration fee is $150.00/delegate; E-Commerce Workshop registration fee for the first 5 U.S. firms accepted on U.S. delegation is waived. The registration fee for subsequent participants for the E-Commerce Workshop is $100.00/delegate.

In addition, U.S. private sector members of the delegation are being offered an optional group Gold Key program in Kuala Lumpur, Malaysia on June 19. The Commercial Service in Malaysia is responsible for organizing the optional one-day program, which will include an Embassy briefing, meeting appointments, and reception. Cost to participate in the Gold Key is $500/company.

There will be opportunities for informal interaction with both other

Ministers and private sector delegation members. The head of the U.S. delegation will also interact with U.S. private sector participants via hospitality events and other meetings.

Criteria for Participant Selection

Eligibility

Participating companies must be incorporated in the United States.

A company is eligible to participate only if the products and/or services that it will promote on the U.S. delegation are either (a) manufactured in the United States; or (b) if manufactured or produced outside the United States, are marketed under the name of a U.S. firm and have at least 51 percent U.S. content of the value of the finished product/service.

Selection Criteria

Five to ten representatives of U.S. companies will be selected on the basis of:

- Company representatives' ability to participate in discussions of relevant marketing and investment issues they face in international trade, and/or demonstration of knowledge of working with information or other high-technology means, including e-commerce, to support strategic alliances between small and medium-sized firms (defined as not more than 500 employees) and/or between SMEs and larger firms. This would reflect consistency of company's market development goals with the scope and desired outcomes of the mission as described.
- Whether the company's overall business objectives, including those of any U.S. or overseas affiliates, are fully consistent with the mission's foreign and commercial policy objectives.
- Timely receipt of signed mission application and registration materials. For those interested in the optional Gold Key program in Malaysia, timely receipt of participation agreement, marketing form, company brochures, and $500.00 fee for each participating firm.

Mission recruitment will be conducted in an open and public manner, including publication in the **Federal Register**, posting on the Internet, direct mail and broadcast fax, e-mail, notices by industry trade associations and other multiplier groups, and press releases.

Any partisan political activities (including political contributions) of an applicant are entirely irrelevant to the selection process.

Time Frame for Applications

Application deadline: The Bruneian Government has requested that all participants be identified by no later than June 10, 2000. ITA staff expect recruitment outreach to conclude on/about June 2, 2000, in order to allow for time for review and approval of applications from the private sector.

Expressions of interest to obtain application and registration materials should be submitted immediately to: Brenda J. Fisher, APEC Affairs Coordinator, Room 2316, International Trade Administration, U.S. Department of Commerce, Washington, DC 20230. Phone 202 482 5334, Fax 202 482 3316; E-mail: Brenda__Fisher@ita.doc.gov

For overall meeting agendas, list of speakers, registration fees, and other administrative/logistical details, please visit the following websites, which are being regularly updated.

For SME Ministerial: *http://apecsme2000.rba.com.bn*

For E-Commerce Workshop: *http://www.apec2000.gov.bn/ecomm*

For SME Business Forum: *http://www.bsmenet.org.bn/bizforum/index.htm*

For Women Leaders' Meeting: *http://www.apec2000.gov.bn/wln*

Dated: May 12, 2000.

Philip R. Agress,

Acting Deputy Assistant Secretary for Asia and the Pacific, ITA/USDOC.

[FR Doc. 00–12466 Filed 5–17–00; 8:45 am]

BILLING CODE 3510–FP–P

DEPARTMENT OF COMMERCE

National Institute of Standards and Technology

Visiting Committee on Advanced Technology

AGENCY: National Institute of Standards and Technology, Department of Commerce.

ACTION: Notice of partially closed meeting.

SUMMARY: Pursuant to the Federal Advisory Committee Act, 5 U.S.C. app. 2, notice is hereby given that the Visiting Committee on Advanced Technology, National Institute of Standards and Technology (NIST), will meet Tuesday, June 6, 2000 from 8:15 a.m. to 5:30 p.m. and Wednesday, June 7, 2000 from 8 a.m. to 12:15 p.m. The Visiting Committee on Advanced Technology is composed of fourteen members appointed by the Director of NIST; who are eminent in such fields as business, research, new product development, engineering, labor, education, management consulting, environment, and international relations. The purpose of this meeting is to review and make recommendations regarding general policy for the Institute, its organization, its budget, and its programs within the framework of applicable national policies as set forth by the President and the Congress. The agenda will include an update on NIST programs; a presentation by one of the Visiting Committee members on Engineering Materials for Technological Applications; an indepth review of the Information Technology Laboratory; an indepth review of the Baldridge National Quality Program; an indepth review of the Electronics and Electrical Engineering Laboratory; and a laboratory tour. Discussions scheduled to begin at 8 a.m. and to end at 12:15 p.m. on June 7, 2000, on staffing of management positions at NIST, the NIST budget, including funding levels of the Advanced Technology Program and the Manufacturing Extension Partnership, and feedback sessions will be closed.

DATES: The meeting will convene June 6, 2000 at 8:15 a.m. and will adjourn at 12:15 p.m. on June 7, 2000.

ADDRESSES: The meeting will be held in the Employees' Lounge (seating capacity, 80, includes 38 participants), Administration Building at NIST, Gaithersburg, Maryland.

FOR FURTHER INFORMATION CONTACT: Dr. Brian C. Belanger, Executive Director, Visiting Committee on Advanced Technology, National Institute of Standards and Technology, Gaithersburg, MD 20899–1004, telephone number (301) 975–4720.

SUPPLEMENTARY INFORMATION: The Assistant Secretary for Administration, with the concurrence of the General Counsel, formally determined on July 15, 1999, that portions of the meeting of the Visiting Committee on Advanced Technology which involve discussion of proposed funding of the Advanced Technology Program and the Manufacturing Extension Partnership Program may be closed in accordance with 5 U.S.C. 552b(c)(9)(B), because those portions of the meetings will divulge matters the premature disclosure of which would be likely to significantly frustrate implementation of proposed agency actions; and that portions of meetings which involve discussion of the staffing issues of management and other positions at NIST may be closed in accordance with 5 U.S.C. 552b(c)(6), because divulging information discussed in those portions of the meetings is likely to reveal information of a personal nature where disclosure would constitute a clearly unwarranted invasion of personal privacy.

008482

Dated: May 10, 2000.

Raymond G. Kammer,

Director.

[FR Doc. 00–12442 Filed 5–17–00; 8:45 am]

BILLING CODE 3510–13–M

DEPARTMENT OF COMMERCE

National Institute of Standards and Technology

Malcolm Baldrige National Quality Award Board of Overseers

AGENCY: National Institute of Standards and Technology, Department of Commerce.

ACTION: Notice of public meeting.

SUMMARY: Pursuant to the Federal Advisory Committee Act, 5 U.S.C. app. 2, notice is hereby given that there will be a meeting of the Board of Overseers of the Malcolm Baldrige National Quality Award on Thursday, June 8, 2000. The Board of Overseers is composed of eleven members prominent in the field of quality management and appointed by the Secretary of Commerce, assembled to advise the Secretary of Commerce on the conduct of the Baldrige Award. The purpose of this meeting is to discuss and review information received from the National Institute of Standards and Technology with the members of the Judges Panel of the Malcolm Baldrige National Quality Award. The agenda will include: Review Roles/Responsibilities of Judges and Overseers; Health Care and Education Update; 2000 Baldrige Criteria Changes and Future Criteria Evolution; New Marketing Documents; Discussion of Program Issues, and Key Issues from the June 7 Judges' Meeting.

DATES: The meeting will convene June 8, 2000, at 8:30 a.m. and adjourn at 3:00 p.m. on June 8, 2000.

ADDRESSES: The meeting will be held at the National Institute of Standards and Technology, Administration Building Tenth Floor Conference Room, Gaithersburg, Maryland 20899.

FOR FURTHER INFORMATION CONTACT: Dr. Harry Hertz, Director, National Quality Program, National Institute of Standards and Technology, Gaithersburg, Maryland 20899, telephone number (301) 975–2361.

Dated: May 10, 2000.

Raymond G. Kammer,

Director.

[FR Doc. 00–12441 Filed 5–17–00; 8:45 am]

BILLING CODE 3510–13–M

DEPARTMENT OF COMMERCE

National Institute of Standards and Technology

Judges Panel of the Malcolm Baldrige National Quality Award

AGENCY: National Institute of Standards and Technology, Department of Commerce.

ACTION: Notice of closed meeting.

SUMMARY: Pursuant to the Federal Advisory Committee Act, 5 U.S.C. app. 2, notice is hereby given that there will be a closed meeting of the Judges Panel of the Malcolm Baldrige National Quality Award on Wednesday, June 7, 2000. The Judges Panel is composed of nine members prominent in the field of quality management and appointed by the Secretary of Commerce. The purpose of this meeting is to Review the 2000 Baldrige Award Cycle; Discussion of Senior Examiner Training for Site Visits and Final Judging Interaction; Judges' Survey of Applicants; and Judging Process Improvement. The applications under review contain trade secrets and proprietary commercial information submitted to the Government in confidence.

DATES: The meeting will convene June 7, 2000, at 11:00 a.m. and adjourn at 4:30 p.m. on June 7, 2000. The entire meeting will be closed.

ADDRESSES: The meeting will be held at the National Institute of Standards and Technology, Chemistry Building, Room A228, Gaithersburg, Maryland 20899.

FOR FURTHER INFORMATION CONTACT: Dr. Harry Hertz, National Quality Program, National Institute of Standards and Technology, Gaithersburg, Maryland 20899, telephone number (301) 975–2361.

SUPPLEMENTARY INFORMATION: The Assistant Secretary for Administration, with the concurrence of the General Counsel, formally determined on March 31, 2000, that the meeting of the Judges Panel will be closed pursuant to section 10(d) of the Federal Advisory Committee Act, 5 U.S.C. app. 2, as amended by section 5(c) of the Government in the Sunshine Act, Pub. L. 94–409. The meeting, which involves examination of records and discussion of Award applicant data, may be closed to the public in accordance with section 552b(c)(4) of Title 5, United States Code, since the meeting is likely to disclose trade secrets and commercial or financial information obtained from a person and privileged or confidential.

Dated: May 10, 2000.

Raymond G. Kammer,

Director.

[FR Doc. 00–12582 Filed 5–17–00; 8:45 am]

BILLING CODE 3510–13–M

DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

[I.D. 041800A]

Notice of Availability of Draft Stock Assessment Reports

AGENCY: National Marine Fisheries Service (NMFS), National Oceanic and Atmospheric Administration (NOAA), Commerce.

ACTION: Notice of availability; request for comments.

SUMMARY: NMFS has revised the Alaska, Atlantic and Gulf of Mexico, and Pacific marine mammal stock assessment reports in accordance with the Marine Mammal Protection Act (MMPA). Draft revised 2000 reports are available for public review and comment.

DATES: Comments must be received by August 16, 2000.

ADDRESSES: Send requests for printed copies of the draft Reports to: Chief, Marine Mammal Division, Office of Protected Resources, National Marine Fisheries Service, 1315 East-West Highway, Silver Spring, MD 20910–3226, Attn: Stock Assessments. Copies of the regional reports may also be requested from Anita Lopez, Alaska Fisheries Science Center (F/AKC), NMFS, 7600 Sand Point Way, NE BIN 15700, Seattle, WA 98115–0070 (Alaska); Janeen Quintal, Northeast Fisheries Science Center, 166 Water St., Woods Hole, MA 02543 (Northwest Atlantic); Steven Swartz, Southeast Fisheries Science Center, 75 Virginia Beach Dr., Miami, FL 33149 (Mid-Atlantic and Gulf of Mexico); and Tim Price, Southwest Regional Office (F/SWO3), NMFS, 501 West Ocean Boulevard, Long Beach, CA 90802–4213 (Pacific). Electronic copies of the reports can be found at the following internet address: http://www.nmfs.gov/prot_res/mammals/sa_rep/sar.html. Electronic copies of the Atlantic and Gulf of Mexico Marine Mammal Stock Assessments can also be found at the following internet address: http://www.nefsc.nmfs.gov/psb/assesspdfs.htm.

FOR FURTHER INFORMATION CONTACT: Emily Hanson, Office of Protected Resources, NMFS, at (301) 713–2322, ext. 101, Anita Lopez (206) 526–4045,

regarding Alaska regional stock assessments; Janeen Quintal, (508) 495–2252 regarding Northwest Atlantic regional stock assessments; Steven Swartz, (305) 361–4487, regarding Mid-Atlantic and Gulf of Mexico regional stock assessments; or Tim Price, (562) 980–4020, regarding Pacific regional stock assessments.

SUPPLEMENTARY INFORMATION: Section 117 of the MMPA (16 U.S.C. 1361 *et seq.*) requires NMFS and the U.S. Fish and Wildlife Service (FWS) to prepare stock assessment reports (SARs) for each stock of marine mammals that occurs in waters under the jurisdiction of the United States. These reports contain information regarding the distribution and abundance of the stock, population growth rates and trends, estimates of annual human-caused mortality from all sources, descriptions of the fisheries with which the stock interacts, and the status of the stock.

The MMPA also requires NMFS and FWS to review these reports annually for strategic stocks of marine mammals and at least every three years for stocks determined to be non-strategic. NMFS, in conjunction with the Alaska, Atlantic, and Pacific Scientific Review Groups, reviewed the status of marine mammal stocks as required, and revised reports for which new information was available. Summary tables for all stocks of marine mammals in the three regions (Tables 1–3) indicate revisions to the reports. NMFS solicits public comments on these draft revised Alaska, Atlantic and Gulf of Mexico, and Pacific reports.

Alaska Stocks

NMFS, in conjunction with the Alaska Scientific Review Group, reviewed information available for all strategic stocks of Alaska marine mammals under its authority, as well as Pacific white-sided dolphins, harbor porpoise (3 stocks), Dall's porpoise, and gray whales for the 2000 Stock Assessment Reports. A total of 14 of the 32 Alaska stock assessment reports were revised for 2000. These reports are identified by a November 1, 1999, date-stamp at the beginning of each report.

Most proposed changes to the stock assessment reports incorporate new information into mortality estimates. New Potential Biological Removal level (PBR) estimates have been calculated for those stocks having new abundance estimates. The new information on abundance and mortality did not change the status (strategic or not) of any of the Alaska stocks relative to the last time the respective stock assessment report was revised.

As recommended by the Alaska Scientific Review Group (ASRG), NMFS proposes to change the recovery factor for the Cook Inlet stock of beluga whales. The proposed recovery factor for this stock would decrease from 0.5 to 0.3. The ASRG recommended a recovery factor of 0.1 be incorporated into the draft 2000 report. However, three significant pieces of information have become available. First, the Alaska Natives in the Cook Inlet area are cooperating to control the harvest, and no beluga were killed for subsistence in 1999. Second, the 1999 surveys indicate that the decline of the stock has abated. Third, the first year of observer coverage reported no beluga taken in Cook Inlet fisheries, suggesting that mortality incidental to commercial fishing does not appear to be a significant factor affecting the Cook Inlet beluga stock. Therefore, NMFS intends to use a recovery factor of 0.3 until additional information indicates that a revision is warranted.

The proposed minimum population estimate for the North Pacific stock of Pacific white-sided dolphins was reduced from 486,719 animals to 26,880 animals, which would reduce the Potential Biological Removal level (PBR) from 4,867 animals to 269 animals. The minimum population estimate of 486,719 animals was based on an abundance estimate that reflected the range-wide estimate of Pacific white-sided dolphins, rather than one that could be applied just to the North Pacific stock. The full estimate is not considered appropriate to apply to the North Pacific management stock, but the portion of the estimate derived from sightings north of 45°N in the Gulf of Alaska can be used as the population estimate for this stock, yielding the proposed minimum population estimate of 26,880 animals.

Atlantic and Gulf of Mexico Stocks

The draft 2000 Atlantic and Gulf of Mexico Stock Assessment Reports were prepared by staff of the Northeast Fisheries Science Center and Southeast Fisheries Science Center. The reports were presented at the November 1999 meeting of the Atlantic Scientific Review Group, and subsequent revisions were based on the group's advice. The 2000 Stock Assessment Reports contain updated assessments for Atlantic strategic stocks and for Atlantic and Gulf of Mexico stocks for which new information was available. These reports are identified by a December 1999 date-stamp at the beginning of each report.

A total of 28 of the 60 Atlantic and Gulf of Mexico SARs were revised for 2000. Most of the proposed changes incorporate new information into sections on population size and mortality estimates. The revised reports include 15 strategic and 13 non-strategic stocks. For the first time, individual species abundance estimates are available for the Western North Atlantic stocks of Atlantic spotted and Pantropical spotted dolphins.

Based on recent modeling that suggests that the population of the Western North Atlantic stock of Northern right whales is in decline, the maximum net productivity for this stock has been estimated as zero, and therefore PBR for this stock would be reduced to zero. This decrease would change the focus of the Atlantic Large Whale Take Reduction Team from concentrating on reducing to eliminating the incidental mortality and serious injury of right whales. Information on human interactions (fishery and ship strikes) between the right whale, humpback whale, fin whale, and minke whale stocks were reviewed and updated.

The stock definition for humpback whales is proposed to be changed from the North Atlantic Stock to the Gulf of Maine stock, based on genetic analysis and the fidelity of whales to this region for feeding. Although the stock structure was revised, the abundance estimate is based on the entire North Atlantic aggregation of humpback whales. Existing data does not allow NMFS to separately estimate abundance for the Gulf of Maine feeding stock.

The Western North Atlantic stock of long-finned pilot whales was changed to ''strategic'' based on the annual incidental mortality estimate.

Pacific Stocks

The draft 2000 Stock Assessment Reports present a complete set of revised stock assessments for Pacific marine mammal stocks under NMFS jurisdiction. New abundance estimates are available and have been included for ten Hawaiian stocks and 25 U.S. West Coast stocks. The assessments in this report include stocks studied by the Southwest Fisheries Science Center and the National Marine Mammal Laboratory. The Pacific and Alaska Scientific Review Groups reviewed and commented on earlier versions of these draft stock assessment reports.

Mortality estimates for the California drift gillnet fishery are based on data from 1997–98 because entanglement rates of marine mammals decreased after implementation of the Take Reduction Plan in 1997.

The California/Oregon/Washington stock of short-finned pilot whales is proposed to be classified as not strategic. Including driftnet mortality

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only for years after implementation of the Take Reduction Plan (1997–1998), the average annual human-caused mortality in 1997–1998 (3 animals) is estimated to be less than the PBR, and therefore they would not be classified as strategic.

The Central California stock of harbor porpoise is proposed to be classified as strategic because of increased mortality from the halibut set gillnet fishery. The average annual mortality for 1996–1998 is greater than the calculated PBR for Central California harbor porpoise. Based on the success of reducing harbor porpoise mortality in east coast fisheries, efforts are currently underway to encourage voluntary use of pingers in the central California set gillnet fishery. The observer program for this fishery is scheduled to be continued and will provide information on the success of any voluntary measures.

The Hawaii stock of false killer whales is proposed to be listed as strategic because the rate of serious injury to false killer whales within the U.S. Exclusive Economic Zone in the Hawaii longline fishery exceeds the PBR. However, the available abundance estimate, on which PBR is based, is based only on a portion of the species' range in Hawaiian waters. Additional studies of abundance, distribution, and fishery-related mortality would be required to re-evaluate this species' status in the future.

The stock assessment report for the California/Oregon/Washington stock of dwarf sperm whale (*Kogia simus*) has been discontinued. The lack of reliable sighting or stranding records off the U.S. west coast since the 1970s suggests the stock does not occur in waters under U.S. jurisdiction on a regular basis.

The stock of blue whale formerly known as the 'California/Mexico stock' has been renamed the ''Eastern North Pacific stock'' to reflect current knowledge of whale movements between the U.S. west coast and the eastern tropical Pacific (Mate et al. 1999, Stafford et al. 1999).

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Table 1--Summary table of Alaska marine mammal stocks. Marine mammal stock assessment reports that were revised relative to the 1999 reports, and that have draft 2000 Stock Assessment Reports available, are identified by an 11/1/99 date of last revision. Changes to the estimates of abundance, human-caused mortality, and other items are also indicated.

Species	Stock Area	NMFS Center	Nmin	Rmax	Fr	PBR	Total Annual Mortality	Annual Fishing Mortality	Strategic Status	Last Revision
Baird's beaked whale	Alaska	AKC	N/A	0.02	0.50	N/A	0	0	N	6/25/99
Bearded seal	Alaska	AKC	N/A	0.06	0.50	N/A	2	2	N	8/8/97
Beluga whale	Beaufort Sea	AKC	32,453	0.02	1.00	649	184	0	N	6/25/99
Beluga whale	East Chukchi Sea	AKC	3,710	0.02	1.00	74	68	0	N	6/25/99
Beluga whale	East Bering Sea	AKC	6,439	0.02	1.00	129	122	1	N	6/25/99
Beluga whale	Bristol Bay	AKC	1,316	0.02	1.00	26	20	1	N	6/25/99
Beluga whale	Cook Inlet	AKC	~~273~~ 303	0.02	~~0.50~~ 0.30	~~2.7~~ 1.8	87	0	Y	11/1/99
Bowhead whale	Western Arctic	AKC	7,738	0.02	0.50	77	49	0	Y	11/1/99
Cuvier's beaked whale	Alaska	AKC	N/A	0.02	0.50	N/A	0	0	N	6/25/99
Dall's porpoise	Alaska	AKC	76,874	0.02	1.00	1,537	42	42	N	11/1/99
Fin whale	Northeast Pacific	AKC	N/A	0.02	0.10	N/A	0	0	Y	12/30/98
Gray whale	Eastern North Pacific	AKC	~~21,597~~ 24,477	0.02	1.00	~~432~~ 490	~~47~~ 140	~~4~~ 64	N	11/1/99
Harbor porpoise	Southeast Alaska	AKC	~~8,156~~ 8,376	0.02	0.50	~~82~~ 83	~~4~~ 3	~~4*~~ 3	N	11/1/99
Harbor porpoise	Gulf of Alaska	AKC	~~7,085~~ 16,630	0.02	0.50	~~71~~ 166	~~25~~ 25	~~25~~ 25	N	11/1/99
Harbor porpoise	Bering Sea	AKC	8,549	0.02	0.50	86	2	2	N	11/1/99
Harbor seal	Southeast Alaska	AKC	35,226	0.06	1.00	2,114	1,785	36	N	12/30/98
Harbor seal	Gulf of Alaska	AKC	28,917	0.06	0.50	868	827	36	N	12/30/98

Table 1 - cont.

Species	Stock Area	NMFS Center	Nmin	Rmax	Fr	PBR	Total Annual Mortality	Annual Fishing Mortality	Strategic Status	Last Revision
Harbor seal	Bering Sea	AKC	12,648	0.06	0.50	379	192	31	N	12/30/98
Humpback whale	Western North Pacific	AKC	367	0.02	0.10	0.7	~~0.2~~ 0.4	~~0.2~~ 0.4	Y	11/1/99
Humpback whale	Central North Pacific	AKC	3,698	0.02	0.10	7.4	~~1~~ 2.8	~~1~~ 2.8	Y	11/1/99
Killer whale	Eastern North Pacific Northern Resident	AKC	717	0.02	0.50	7.2	0.8	0.8	N	12/30/98
Minke whale	Alaska	AKC	N/A	0.02	0.50	N/A	0	0	N	8/8/97
Northern right whale	North Pacific	AKC	N/A	0.02	0.10	N/A	0	0	Y	11/1/99
Northern fur seal	Eastern North Pacific	AKC	848,539	0.043	0.50	18,244	~~1,725~~ 1,724	~~17~~ 16	Y	11/1/99
Pacific white-sided dolphin	~~Central~~ North Pacific	AKC	~~486,719~~ 26,880	0.02	0.50	~~4,867~~ 269	4	4	N	11/1/99
Ribbon seal	Alaska	AKC	N/A	0.06	0.50	N/A	1	1	N	8/8/97
Ringed seal	Alaska	AKC	N/A	0.06	0.50	N/A	1	1	N	8/8/97
Sperm whale	North Pacific	AKC	N/A	0.02	0.10	N/A	0	0	Y	12/30/98
Spotted seal	Alaska	AKC	N/A	0.06	0.50	N/A	2	2	N	8/8/97
Stejner's beaked whale	Alaska	AKC	N/A	0.02	0.50	N/A	0	0	N	6/25/99
Steller sea lion	Eastern U.S.	AKC	30,403	0.06	0.75	1,368	16	16	Y	11/1/99
Steller sea lion	Western U.S.	AKC	39,031	0.06	0.10	234	442	30	Y	11/1/99

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Table 2--Summary table of Atlantic and Gulf of Mexico marine mammal stocks. Marine mammal stock assessment reports that were revised relative to the 1999 reports, and that have draft 2000 Stock Assessment Reports available, are identified by a 12/99 date of last revision. Changes to the estimates of abundance, human-caused mortality, and other items are also indicated.

Species	Stock Area	NMFS Center	Nmin	Rmax	Fr	PBR	Total Annual Mortality and Serious Injury	Annual Fishing Mortality and Serious Injury	Strategic Status	Last Revision
Harbor seal	Western North Atlantic	NEC	30,990	0.12	1.0	1,859	~~934~~ 873	~~934~~ 873	N	12/99
Gray seal	Western North Atlantic	NEC	NA	NA	NA	NA	~~70~~ 75	~~70~~ 75	N	12/99
Harp seal	Western North Atlantic	NEC	N/A	N/A	N/A	N/A	~~394~~ 402	~~394~~ 402	N	12/99
Hooded seal	Western North Atlantic	NEC	N/A	N/A	N/A	N/A	5.6	5.6	N	10/99
Harbor porpoise	Gulf of Maine/Bay of Fundy	NEC	48,289	0.04	0.5	483	~~1,895~~ 1,578	~~1,895~~ 1,578	Y	12/99
Risso's dolphin	Western North Atlantic	NEC	~~11,140~~ 22,540	0.04	0.48	~~107~~ 216	~~7.2~~ 13	~~7.2~~ 13	N	12/99
Atlantic white-sided dolphin	Western North Atlantic	NEC	19,196	0.04	0.48	184	~~291~~ 223	~~291~~ 223	Y	12/99
White-beaked dolphin	Western North Atlantic	NEC	N/A	0.04	N/A	N/A	0.00	0.00	N	8/97
Common dolphin	Western North Atlantic	NEC	~~16,060~~ 11,142	0.04	0.48	~~154~~ 107	~~780~~ 612	~~780~~ 612	Y	12/99
Atlantic spotted dolphin	Western North Atlantic	NEC	~~1,617~~[+] 23,699[2]	0.04	0.5	~~16~~ 236	~~9.9~~ 7.8[1]	~~9.9~~ 7.8[1]	N	12/99
Pantropical spotted dolphin	Western North Atlantic	NEC	~~1,617~~[+] 8,450	0.04	0.5	84	~~9.9~~ 7.8[1]	~~9.9~~ 7.8[1]	N	12/99
Striped dolphin	Western North Atlantic	NEC	~~18,220~~ 44,500	0.04	0.5	~~182~~ 445	~~11~~ 7.3	~~11~~ 7.3	N	12/99
Spinner dolphin	Western North Atlantic	NEC	N/A	N/A	N/A	N/A	0.31	0.31	N	12/98

Table 2 - cont.

Species	Stock Area	NMFS Center	Nmin	Rmax	Fr	PBR	Total Annual Mortality and Serious Injury	Annual Fishing Mortality and Serious Injury	Strategic Status	Last Revision
Bottlenose dolphin	Western North Atlantic, offshore	~~NEC~~ SEC	~~8,794~~ 20,642[2]	0.04	0.5	~~88~~ 206	~~10~~ 5.3	~~10~~ 5.3	N	12/99
Bottlenose dolphin	Western North Atlantic, coastal	SEC	2,482	0.04	0.5	25	~~29~~ 46	~~29~~ 46	Y	12/99
Dwarf sperm whale	Western North Atlantic	SEC	~~N/A~~ 373[3]	0.04	~~N/A~~ 0.5	~~N/A~~ 7.5	~~0.00~~ 0.25	~~0.00~~ 0.25	N	12/99
Pygmy sperm whale	Western North Atlantic	SEC	~~N/A~~ 373[3]	0.04	~~N/A~~ 0.5	~~N/A~~ 7.5	~~0.00~~ 0.25	~~0.00~~ 0.25	N	12/99
Killer whale	Western North Atlantic	NEC	N/A	0.04	N/A	N/A	0.00	0.00	N	7/95
Pygmy killer whale	Western North Atlantic	SEC	6	0.04	0.5	0.1	0.00	0.00	N	7/95
Northern bottlenose whale	Western North Atlantic	NEC	N/A	0.04	N/A	N/A	0.00	0.00	N	12/98
Cuvier's beaked whale	Western North Atlantic	NEC	~~895~~ 2,419 [4]	0.04	0.5	~~8.9~~ 24	~~9.7~~ 9.5	~~9.7~~ 9.5[5]	Y	12/99
Mesoplodon beaked whale	Western North Atlantic	NEC	~~895~~ 2,419 [4]	0.04	0.5	~~8.9~~ 24	~~9.7~~ 9.5	~~9.7~~ 9.5[5]	Y	12/99
Pilot whale, long-finned	Western North Atlantic	NEC	~~4,968~~ 8,148[6]	0.04	0.48	~~48~~ 78	87 146	~~87~~ 146[7]	~~N~~ Y	12/99
Pilot whale, short-finned	Western North Atlantic	~~NEC~~ SEC	~~457~~ 8,148[6]	0.04	0.48	~~4.4~~ 78	~~87~~ 146	~~87~~ 146[7]	Y	12/99
Sperm whale	~~Western~~ North Atlantic	NEC	~~1,617~~ 3,400	0.04	0.1	~~3.2~~ 6.8	0.00	0.00	Y	12/99
North Atlantic right whale	Western North Atlantic	NEC	~~295~~ 291	~~0.025~~ 0	0.1	~~0.4~~ 0.0	~~1.8~~ 1.4	~~1.0~~ 0.8[8]	Y	12/99
Humpback whale	~~Western North Atlantic~~ Gulf of Maine	NEC	10,019	0.065	0.1	32.6	~~5.4~~ 3.7	~~4.4~~ 2.7[9]	Y	12/99

Table 2 - cont.

Species	Stock Area	NMFS Center	Nmin	Rmax	Fr	PBR	Total Annual Mortality and Serious Injury	Annual Fishing Mortality and Serious Injury	Strategic Status	Last Revision
Fin whale	Western North Atlantic	NEC	1,803	0.04	0.1	3.6	~~0.5~~ 0.8	0.20 [10]	Y	12/99
Sei whale	Nova Scotia	NEC	N/A	0.04	0.1	N/A	0.00	0.00	Y	12/99
Minke whale	Canadian east coast	NEC	~~2,145~~ 3,097	0.04	0.5	~~21~~ 31	~~5.8~~ 2.7	~~4.8~~ 2.7	N	12/99
Blue whale	Western North Atlantic	NEC	~~N/A~~ 308	0.04	0.1	~~N/A~~ 0.6	0.00	0.00	Y	12/99
Bottlenose dolphin	Gulf of Mexico, outer continental shelf	SEC	43,233	0.04	0.5	432	2.8	2.8	N	7/95
Bottlenose dolphin	Gulf of Mexico, continental shelf edge and slope	SEC	4,530	0.04	0.5	45	2.8	2.8	N	7/95
Bottlenose dolphin	Western Gulf of Mexico coastal	SEC	2,938	0.04	0.5	29	13	13	N	8/97
Bottlenose dolphin	Northern Gulf of Mexico coastal	SEC	3,518	0.04	0.5	35	10	10	N	8/97
Bottlenose dolphin	Eastern Gulf of Mexico coastal	SEC	8,963	0.04	0.5	0.5	8	8	N	8/97
Bottlenose dolphin	Gulf of Mexico bay, sound, and estuarine	SEC	3,933	0.04	0.5	39.7	N/A	N/A	Y	10/99
Atlantic spotted dolphin	Northern Gulf of Mexico	SEC	2,255	0.04	0.5	23	1.5	1.5	N	6/95
Pantropical spotted dolphin	Northern Gulf of Mexico	SEC	26,510	0.04	0.5	265	1.5	1.5	N	7/95
Striped dolphin	Northern Gulf of Mexico	SEC	3,409	0.04	0.5	34	0.00	0.00	N	7/95
Spinner dolphin	Northern Gulf of Mexico	SEC	4,465	0.04	0.5	45	0.00	0.00	N	7/95
Rough-toothed dolphin	Northern Gulf of Mexico	SEC	660	0.04	0.5	6.6	0.00	0.00	N	7/95
Clymene dolphin	Northern Gulf of Mexico	SEC	4,120	0.04	0.5	41	0.00	0.00	N	7/95

Table 2 - cont.

Species	Stock Area	NMFS Center	Nmin	Rmax	Fr	PBR	Total Annual Mortality and Serious Injury	Annual Fishing Mortality and Serious Injury	Strategic Status	Last Revision
Fraser's dolphin	Northern Gulf of Mexico	SEC	66	0.04	0.5	0.7	0.00	0.00	N	7/95
Killer whale	Northern Gulf of Mexico	SEC	197	0.04	0.5	2.0	0.00	0.00	N	7/95
False killer whale	Northern Gulf of Mexico	SEC	236	0.04	0.5	2.4	0.00	0.00	N	7/95
Pygmy killer whale	Northern Gulf of Mexico	SEC	285	0.04	0.5	2.8	0.00	0.00	N	7/95
Dwarf sperm whale	Northern Gulf of Mexico	SEC	N/A	0.04	N/A	N/A	0.00	0.00	N	10/99
Pygmy sperm whale	Northern Gulf of Mexico	SEC	N/A	0.04	N/A	N/A	0.00	0.00	N	10/99
Melon-headed whale	Northern Gulf of Mexico	SEC	2,888	0.04	0.5	29	0.00	0.00	N	7/95
Risso's dolphin	Northern Gulf of Mexico	SEC	2,199	0.04	0.5	22	19	19	N	7/95
Cuvier's beaked whale	Northern Gulf of Mexico	SEC	20	0.04	0.5	0.2	0.00	0.00	N	7/95
Blainville's beaked whale	Northern Gulf of Mexico	SEC	N/A	N/A	N/A	N/A	0.00	0.00	N	7/95
Gervais' beaked whale	Northern Gulf of Mexico	SEC	N/A	N/A	N/A	N/A	0.00	0.00	N	7/95
Pilot whale, short-finned	Northern Gulf of Mexico	SEC	186	0.04	0.5	1.9	0.3	0.3	Y	7/95
Sperm whale	Northern Gulf of Mexico	SEC	411	0.04	0.1	0.8	0.00	0.00	Y	7/95
Bryde's whale	Northern Gulf of Mexico	SEC	17	0.04	0.5	0.2	0.00	0.00	N	7/95

1. Mortality data are not separated by species; therefore, species-specific estimates are not available. The mortality estimate represents both Atlantic and Pantropical spotted dolphins. Estimates may include sightings of the coastal form of Atlantic spotted dolphins.
2. Estimates may include sightings of the coastal form.
3. This estimate may include both the dwarf and pygmy sperm whales.
4. This estimate includes Cuvier's beaked whales and undifferentiated Mesoplodon spp. beaked whales.
5. The estimate does not differentiate species of beaked whales (Mesoplodon spp.) and includes an unknown number of Cuvier's beaked whales.
6. This estimate may include both long-finned and short-finned pilot whales.
7. Mortality data are not separated by species; therefore, species-specific estimates are not available. This mortality estimate represents both long-finned and short-finned pilot whales. Total mortality includes Nova Scotia 94-96 average of 9 long-finned pilot whales.
8. This is the average mortality of right whales based on 5 years of observer data (0.0) and additional fishery impact records (~~1.0~~ 0.8).
9. This is the average mortality of humpback whales based on 5 years of observer data (~~0.6~~ 0.25) and additional fishery impact records (~~3.8~~ 2.4).
10. The mortality estimate is based on a review of NMFS anecdotal records from 1994-1998, that yielded an average of 0.8 human caused mortality - 0.6 ship strikes, 0.2 fishery interactions.

Table 3--Summary table of Pacific marine mammal stocks. All of the Pacific marine mammal stocks under NMFS jurisdiction were revised relative to the 1999 reports, and have draft 2000 Stock Assessment Reports available. Changes to the estimates of abundance, human-caused mortality, and other items are also indicated.

Species	Stock Area	NMFS Center	Nmin	Rmax	Fr	PBR	Total Annual Mortality and Serious Injury	Annual Fish. Mortality and Serious Injury	Strategic Status	Last Revision
California sea lion	U.S.	SWC	~~111,339~~ 109,854	0.12	1.0	~~6,680~~ 6,591	~~974~~ 1,352	~~915~~ 1,208	N	1/3/00
Harbor Seal	California	SWC	27,962	0.12	1.0	1,678	~~243~~ ≥39	~~234~~ N/A	N	1/3/00
Harbor Seal	Oregon/ Washington Coast	AKC	~~24,733~~ 24,705	0.12	1.0	~~1,484~~ 1,482	~~19~~ ≥18	~~17~~ ≥16	N	1/3/00
Harbor Seal	Inland Washington	AKC	~~16,104~~ 15,174	0.12	1.0	~~966~~ 910	~~41~~ ≥43	~~36~~ ≥38	N	1/3/00
Northern Elephant Seal	California breeding	SWC	51,625	0.083	1.0	2,142	~~145~~ ≥33	~~145~~ ≥33	N	1/3/00
Guadalupe Fur Seal	Mexico to California	SWC	3,028	0.137	0.5	104	0.0	0.0	Y	1/3/00
Northern Fur Seal	San Miguel Island	AKC	~~6,720~~ 2,336	0.086	1.0	~~216~~ 100	0.0	0.0	N	1/3/00
Monk seal	Hawaii	SWC	~~1,423~~ 1,436	0.07	0.1	5.0	N/A	N/A	Y	1/3/00
Harbor porpoise	Central California	SWC	4,172	0.04	0.50	42	~~24~~ 63	~~24~~ 63	~~N~~ Y	1/3/00
Harbor porpoise	Northern California	SWC	~~7,640~~ 8,061	0.04	~~0.5~~ 1.0	~~76~~ 81	~~0.0~~ ≥0.2	~~0.0~~ ≥0.2	N	1/3/00
Harbor porpoise	Oregon/ Washington Coast	AKC	32,769	0.04	0.5	328	12	12	N	1/3/00
Harbor porpoise	Inland Washington	AKC	2,545	0.04	0.4	20	15	15	N	1/3/00
Dall's Porpoise	California/ Oregon/ Washington	SWC	~~34,393~~ 81,866	0.04	~~0.48~~ 0.45	~~330~~ 737	~~22~~ 12	~~22~~ 12	N	1/3/00
Pacific White-sided Dolphin	California/ Oregon/ Washington	SWC	~~82,939~~ 17,475	0.04	~~0.48~~ 0.45	~~796~~ 157	~~22.0~~ ≥6.8	~~22.0~~ ≥6.8	N	1/3/00
Risso's Dolphin	California/ Oregon/ Washington	SWC	~~22,388~~ 13,079	0.04	~~0.5~~ 0.4	~~224~~ 105	~~37~~ 5.5	~~37~~ 5.5	N	1/3/00
Bottlenose Dolphin	California coastal	SWC	~~134~~ 154	0.04	0.5	~~1.3~~ 1.5	0	0	N	1/3/00

Table 3 - cont.

Species	Stock Area	NMFS Center	Nmin	Rmax	Fr	PBR	Total Annual Mortality and Serious Injury	Annual Fish. Mortality and Serious Injury	Strategic Status	Last Revision
Bottlenose Dolphin	California/ Oregon/ Washington Offshore	SWC	~~1904~~ 850	0.04	~~0.4~~ 0.5	~~15~~ 8.5	~~4.4~~ 0	~~4.4~~ 0	N	1/3/00
Striped Dolphin	California/ Oregon/ Washington	SWC	~~19,248~~ 17,995	0.04	~~0.4~~ 0.5	~~154~~ 180	~~1.2~~ 0	~~1.2~~ 0	N	1/3/00
Common dolphin, short-beaked	California/ Oregon/ Washington	SWC	~~309,717~~ 318,795	0.04	0.5	~~3,097~~ 3,188	~~272~~ 79	~~272~~ 79	N	1/3/00
Common dolphin, long-beaked	California	SWC	~~5,504~~ 27,739	0.04	~~0.48~~ 0.45	~~53~~ 250	14	14	N	1/3/00
Northern right whale dolphin	California/ Oregon/ Washington	SWC	~~15,080~~ 10,060	0.04	~~0.5~~ 0.48	~~151~~ 97	~~47~~ 15	~~47~~ 15	N	1/3/00
Killer whale	Eastern North Pacific Transient	AKC	~~336~~ 376	0.04	0.45	~~3.0~~ 3.4	~~2.0~~ 2.6	~~2.0~~ 2.4	N	1/3/00
Killer whale	Eastern North Pacific Offshore	SWC	209	0.04	0.5	2.1	0	0	N	1/3/00
Killer whale	Eastern North Pacific Southern Resident	AKC	~~89~~ 84	0.04	0.5	~~0.9~~ 0.8	0	0	N	1/3/00
Short-finned pilot whale	California/ Oregon/ Washington	SWC	717	0.04	~~0.48~~ 0.4	~~6.9~~ 5.7	~~13~~ 3.0	~~13~~ 3.0	~~Y~~ N	1/3/00
Baird's Beaked Whale	California/ Oregon/ Washington	SWC	~~252~~ 313	0.04	~~0.4~~ 0.5	~~3.1~~ 2.0	~~1.2~~ 0	~~1.2~~ 0	N	1/3/00
Mesoplodont Beaked Whales	California/ Oregon/ Washington	SWC	~~2,840~~ 2,734	0.04	~~0.45~~ 0.5	~~26~~ 27	~~≥9.2~~ 0	~~9.2 – 13~~ 0	N	1/3/00
Cuvier's Beaked Whale	California/ Oregon/ Washington	SWC	~~6,070~~ 4,309	0.04	0.5	~~61~~ 43	~~28~~ 0	~~28~~ 0	N	1/3/00
Pygmy Sperm Whale	California/ Oregon/ Washington	SWC	~~2,059~~ 2,837	0.04	~~0.45~~ 0.5	~~19~~ 28	~~2.8~~ 0	~~2.8~~ 0	N	1/3/00
~~Dwarf Sperm Whale~~	~~California/ Oregon/ Washington~~	~~SWC~~	~~N/A~~	~~0.04~~	~~0.5~~	~~N/A~~	~~N/A~~	~~N/A~~	~~N~~	Stock Assessment Discontinued

Table 3 - cont.

Species	Stock Area	NMFS Center	Nmin	Rmax	Fr	PBR	Total Annual Mortality and Serious Injury	Annual Fish. Mortality and Serious Injury	Strategic Status	Last Revision
Sperm whale	California/ Oregon/ Washington	SWC	~~992~~ 995	0.04	0.1	2.0	~~3.0~~ 2.5	~~3.0~~ 2.5	Y	1/3/00
Humpback whale	California/ Oregon/ Washington	SWC	~~563~~ 861	0.04	0.1	~~0.5~~ 1.7	~~1.8~~ 1.4	1.2	Y	1/3/00
Blue whale	~~California/ Oregon/ Washington~~ Eastern North Pacific	SWC	~~1,463~~ 1,716	0.04	0.1	~~1.5~~ 1.7	~~0.2~~ 0.0	0	Y	1/3/00
Fin whale	California/ Oregon/ Washington	SWC	~~747~~ 1,044	0.04	0.1	~~1.5~~ 2.1	~~<1~~ 0.4	0	Y	1/3/00
Bryde's whale	California/ Oregon/ Washington	SWC	11,163	0.04	0.5	~~0.2~~ N/A	0	0	N	1/3/00
Sei whale	California/ Oregon/ Washington	SWC	N/A	0.04	0.1	N/A	0	0	Y	1/3/00
Minke whale	California/ Oregon/ Washington	SWC	440	0.04	0.45	4.0	~~3.6~~ 0	~~3.6~~ 0	N	1/3/00
Rough-Toothed Dolphin	Hawaii	SWC	~~N/A~~ 76	0.04	0.5	~~N/A~~ 0.8	N/A	N/A	N	1/3/00
Risso's Dolphin	Hawaii	SWC	N/A	0.04	0.5	N/A	N/A	N/A	N	1/3/00
Bottlenose Dolphin	Hawaii	SWC	~~N/A~~ 479	0.04	0.5	~~N/A~~ 4.8	N/A	N/A	N	1/3/00
Pantropical spotted dolphin	Hawaii	SWC	~~N/A~~ 2,040	0.04	0.5	~~N/A~~ 20	N/A	N/A	N	1/3/00
Spinner dolphin	Hawaii	SWC	~~677~~ 2,355	0.04	0.5	~~6.8~~ 24	N/A	N/A	N	1/3/00
Striped dolphin	Hawaii	SWC	~~N/A~~ 52	0.04	0.5	~~N/A~~ 0.5	N/A	N/A	N	1/3/00
Melon-headed whale	Hawaii	SWC	~~N/A~~ 81	0.04	0.5	~~N/A~~ 0.8	N/A	N/A	N	1/3/00
Pygmy killer whale	Hawaii	SWC	N/A	0.04	0.5	N/A	N/A	N/A	N	1/3/00
False killer whale	Hawaii	SWC	~~N/A~~ 83	0.04	0.5	~~N/A~~ 0.8	~~N/A~~ 9.0	~~N/A~~ 9.0	~~N~~ Y	1/3/00
Killer whale	Hawaii	SWC	N/A	0.04	0.5	N/A	N/A	N/A	N	1/3/00

Table 3 - cont.

Species	Stock Area	NMFS Center	Nmin	Rmax	Fr	PBR	Total Annual Mortality and Serious Injury	Annual Fish. Mortality and Serious Injury	Strategic Status	Last Revision
Pilot whale, short-finned	Hawaii	SWC	~~N/A~~ 1,313	0.04	0.5	~~N/A~~ 13	N/A	N/A	N	1/3/00
Blainville's beaked whale	Hawaii	SWC	~~N/A~~ 43	0.04	0.5	~~N/A~~ 0.4	N/A	N/A	N	1/3/00
Cuvier's beaked whale	Hawaii	SWC	~~N/A~~ 29	0.04	0.5	~~N/A~~ 0.3	N/A	N/A	N	1/3/00
Pygmy sperm whale	Hawaii	SWC	N/A	0.04	0.5	N/A	N/A	N/A	N	1/3/00
Dwarf sperm whale	Hawaii	SWC	N/A	0.04	0.5	N/A	N/A	N/A	N	1/3/00
Sperm whale	Hawaii	SWC	~~N/A~~ 43	0.04	0.1	~~N/A~~ 0.4	N/A	N/A	Y	1/3/00
Blue whale	Hawaii	SWC	N/A	0.04	0.1	N/A	N/A	N/A	Y	1/3/00
Fin whale	Hawaii	SWC	N/A	0.04	0.1	N/A	N/A	N/A	Y	1/3/00
Bryde's whale	Hawaii	SWC	N/A	0.04	0.5	N/A	N/A	N/A	N	1/3/00

Dated: May 15, 2000.

Art Jeffers,

Acting Director, Office of Protected Resources, National Marine Fisheries Service.

[FR Doc. 00–12579 Filed 5–17–00; 8:45 am]

BILLING CODE 3510–22–C

DEPARTMENT OF DEFENSE

Office of the Secretary

National Security Education Board Meeting

AGENCY: National Defense University, National Security Education Program, Department of the Army.

ACTION: Notice of meeting.

SUMMARY: Pursuant to Public Law 92–463, notice is hereby given of a forthcoming meeting of the National Security Education Board. The purpose of the meeting is to review and make recommendations to the Secretary of Defense concerning requirements established by the David L. Boren National Security Education Act, Title VII of Public Law 102–183, as amended.

DATES: June 13, 2000.

ADDRESSES: The Crystal City Marriott Hotel, 1999 Jefferson Davis Highway, Arlington, Virginia 22202.

FOR FURTHER INFORMATION CONTACT: Dr. Edmond J. Collier, Deputy Director for Programs, National Security Education Program, 1101 Wilson Boulevard, Suite 1210, Rosslyn, Virginia 22209–2248; (703) 696–1991. Electronic mail address: colliere@ndu.edu.

SUPPLEMENTARY INFORMATION: The Board meeting is open to the public.

Dated: May 12, 2000.

L. M. Bynum,

Alternate OSD Federal Register Liaison Officer, Department of Defense.

[FR Doc. 00–12464 Filed 5–17–00; 8:45 am]

BILLING CODE 5001–10–M

DEPARTMENT OF DEFENSE

Department of the Army

Final Environmental Assessment for BRAC 95 Disposal and Reuse of Camp Kilmer, New Jersey

AGENCY: Department of the Army, DoD.

ACTION: Notice of availability.

SUMMARY: In accordance with Public Law 101–510 (as amended), the Defense Base Closure and Realignment Act of 1990, the Defense Base Closure and Realignment Commission recommended the closure of Camp Kilmer, New Jersey.

The Final Environmental Assessment (EA) evaluates the environmental impacts of the disposal and subsequent reuse of the 49 acres. Alternatives examined in the EA include no action, unencumbered disposal of the property, encumbered disposal of the property. Encumbered disposal refers to transfer or conveyance of property having restrictions on subsequent use as a result of any Army-imposed or legal restraint. The unencumbered disposal alternative refers to the transfer of property without encumbrances such as environmental restrictions and easements. Under the no action alternative, the Army would not dispose of property but would maintain it in caretaker status for an indefinite period.

DATES: Comments must be submitted on or before June 19, 2000.

ADDRESSES: A copy of the Final EA may be obtained by writing to Mr. Carl Burgamy, Jr., U.S. Army Corps of Engineers, U.S. Army Engineer District, Mobile (CESAM–PD), 109 St. Joseph Street, Mobile, AL 36602.

FOR FURTHER INFORMATION CONTACT: Mr. Carl Burgamy, Jr. at (334) 690–2036 or telefax at (334) 690–2727.

SUPPLEMENTARY INFORMATION: While closure of Camp Kilmer is the Army's primary action, the EA also analyzes the potential environmental effects of reuse as a secondary action by means of evaluating intensity-based reuse scenarios. The Army's preferred alternative for disposal of Camp Kilmer's excess property is encumbered disposal, with encumbrances pertaining to easements, use restrictions, restrictions pertaining to asbestos-containing material, future remedial activities after transfer, utility dependencies.

A Notice of Intent (NOI) declaring the Army's intent to prepare an EA for the closure of Camp Kilmer was published in the **Federal Register** on September 22, 1995 (60 FR 49264).

The Final EA is available for review at the Main Public Library, 340 Plainfield Ave., Edison, NJ 08817. Prior to initiating action the Army will consider comments received on this EA.

Dated: May 15, 2000.

Raymond J. Fatz,

Deputy Assistant Secretary of the Army, (Environment, Safety and Occupational Health); OASA (I&E).

[FR Doc. 00–12583 Filed 5–17–00; 8:45 am]

BILLING CODE 3710–08–M

DEPARTMENT OF DEFENSE

Department of the Army

Final Environmental Impact Statement (FEIS) for Schofield Barracks Wastewater Treatment Plant Effluent Treatment and Disposal, Oahu, HI

AGENCY: Department of the Army, DoD.

ACTION: Notice of availability.

SUMMARY: This announces the availability of the FEIS, which assesses the effects of implementing a system to treat and dispose of wastewater effluent from Schofield Barracks, Wheeler Army Airfield, and adjacent military lands.

Under the lead alternative, the Army would improve its Schofield Barracks Wastewater Treatment Plant to provide a higher quality effluent that would meet new State of Hawaii guidelines for effluent reuse. Part of the effluent would be used to irrigate two Army golf courses on Schofield Barracks. The balance would then be provided for irrigation reuse to Dole Foods Corporation and possibly other agricultural interests in Central Oahu. Wet weather discharge would be into Lake Wilson, an agricultural reservoir owned by Dole Foods Corporation. The lead alternative would preclude the construction of a long pipeline to the coastline and avoid disposal into the ocean.

Other alternatives considered by the FEIS included the no action alternative, which would limit the use of the Army effluent under the State of Hawaii guidelines for effluent reuse, and a joint project with the City and County of Honolulu (CCH), which would require construction of a new 14-mile pipeline from Central Oahu to the CCH's Honouliuli Wastewater Treatment Plant at the Ewa area.

None of the alternatives considered, with the possible exception of the no action alternative, are anticipated to have significant environmental impact. The Army's lead alternative provides the most potential for effluent reuse in Central Oahu.

DATES: Written comments received within 30 days of the publication of the Environmental Protection Agency's Notice of Availability for this action will be considered by the Army during final decision making.

ADDRESSES: To obtain a copy of the FEIS, contact Mr. Edward Yamada, U.S. Army Engineer District, Honolulu, ATTN: CEPOH–ED–E, Fort Shafter, HI 96858–5440; telephone: (808) 438–5421; FAX: (808) 438–7801.

FOR FURTHER INFORMATION CONTACT: Mr. Alvin Char, 25th Infantry Division

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(Light) and U.S. Army Garrison Hawaii, ATTN: APVG–GWV, Schofield Barracks, Hawaii 96857–5013; Telephone: (808) 656–2878, ext. 1062, and Fax (808) 656–1039.

SUPPLEMENTARY INFORMATION: Public scoping meetings and public meetings were held after distribution of the DEIS. All interested individuals, private organizations, and government agencies were encouraged to provide input into the EIS review process. All comments received were addressed and included in the FEIS.

Coordination was undertaken with adjoining land owners; the U.S. Environmental Protection Agency; other Federal agencies; State of Hawaii agencies such as the Departments of Health, Land and Natural Resources, Transportation, Business and Economic Development, Offices of State Planning, and Environmental Quality Control; City and County of Honolulu agencies such as Board of Water Supply, Departments of Public Works, Land Utilization, and General Planning; and organizations such as the Mililani and Wahiawa Neighborhood Boards.

Dated: May 15, 2000.

Raymond J. Fatz,

Deputy Assistant Secretary of the Army, (Environment, Safety and Occupational Health) OASA (I&E).

[FR Doc. 00–12562 Filed 5–17–00; 8:45 am]

BILLING CODE 3710–08–M

DEPARTMENT OF DEFENSE

Department of the Army

Notice of Intent To Prepare an Environmental Impact Statement (EIS) for the Northern Training Complex With a Multi-Purpose Digital Training Range and Expanded Maneuver Areas, Drop Zones, and Landing Zones at Fort Knox, KY

AGENCY: U.S. Army Armor Center and Fort Knox, Department of the Army.

ACTION: Notice of intent.

SUMMARY: Fort Knox proposes to construct and operate a multi-purpose digital training range and a series of maneuver areas, drop zones and landing zones. These facilities would provide a multi-functional war-fighting capability to meet the Army's training needs for soldiers in urban and restricted terrain combat scenarios. These facilities would upgrade existing substandard range facilities and expand the installation's training capacity to train Armor soldiers in a realistic training environment for urban and restricted terrain combat. The current facilities do not meet modern tank gunnery standards and are inadequate to support training for regional conflicts in urban and restricted areas. The project would include the installation of fiber optics, upgrading of existing roadways and construction of utilities to the site. The proposed training complex would ensure soldiers are combat ready.

ADDRESSES: Please direct written comments concerning the scope of the Northern Training Complex to:

Al Freeland, Chief, Environmental Management Division, Directorate of Base Operations Support, U.S. Army Armor Center, ATTN: ATZK–OSE, Building 1110, Room 216, Ironsides & 6th Avenue, Fort Knox, KY 40121–5000;

or

Gail Pollock, Environmental Protection Specialist, at the same address; by fax at (502) 624–3000.

FOR FURTHER INFORMATION CONTACT: Al Freeland at (502) 624–3629 or Gail Pollock at (502) 624–6684.

SUPPLEMENTARY INFORMATION: The EIS will consider reasonable alternatives including: (1) Construct the Northern Training Complex that includes the Wilcox Multi-Purpose Digital Training Range (Wilcox MPDTR) and the Maneuver Areas, Drop Zones, and Landing Zones in Training Areas 16, 17, and 18 (Training Area Complex) (preferred alternative); (2) upgrade Yano Multi-Purpose Tank Range to a Digital Range and construct Maneuver Areas, Drop Zones, and landing Zones in Training Areas 16, 17, and 18; (3) upgrade Cedar Creek Multi-Purpose Tank Range to a Digital Range and construct Maneuver Areas, Drop Zones, and Landing Zones in Training Areas 16, 17, and 18; and (4) no action (continue operations with existing ranges and facilities). Other reasonable alternatives will also be considered.

Significant Issues: The primary issues to be analyzed in this EIS include: Noise (aircraft/range firing), impacts to wetlands and riparian areas, removal of approximately 2,500 acres of forests, soil erosion, water quality, endangered species, cultural resources, and other issues raised during public scoping.

Scoping: The Army prepared Draft Environmental Assessments for the Wilcox Multi-Purpose Digital Tank Range and the Training Area 16, 17 and 18 Maneuver/Drop Zones and Landing Zones. The Environmental Assessments resulted in a determination to prepare an EIS to encompass all areas affected within the proposed Northern Training Complex.

A mailing list has been prepared for public scoping and review throughout the process of preparation of this EIS. This list includes local, state and Federal officials having jurisdictional expertise or other interests in the project; concerned citizens; conservation groups; and local news media.

Comments concerning the scope of the EIS may also be emailed to Ms. Gail Pollock at pollockl@ftknox-emph3.army.mil.

Dated: May 15, 2000.

Raymond J. Fatz,

Deputy Assistant Secretary of the Army, (Environment, Safety and Occupational Health) OASA (I&E).

[FR Doc. 00–12584 Filed 5–17–00; 8:45 am]

BILLING CODE 3710–08–M

DEPARTMENT OF EDUCATION

Notice of Proposed Information Collection Requests

AGENCY: Department of Education.

SUMMARY: The Leader, Information Management Group, Office of the Chief Information Officer, invites comments on the proposed information collection requests as required by the Paperwork Reduction Act of 1995.

DATES: Interested persons are invited to submit comments on or before July 17, 2000.

SUPPLEMENTARY INFORMATION: Section 3506 of the Paperwork Reduction Act of 1995 (44 U.S.C. Chapter 35) requires that the Office of Management and Budget (OMB) provide interested Federal agencies and the public an early opportunity to comment on information collection requests. OMB may amend or waive the requirement for public consultation to the extent that public participation in the approval process would defeat the purpose of the information collection, violate State or Federal law, or substantially interfere with any agency's ability to perform its statutory obligations. The Leader, Information Management Group, Office of the Chief Information Officer, publishes that notice containing proposed information collection requests prior to submission of these requests to OMB. Each proposed information collection, grouped by office, contains the following: (1) Type of review requested, e.g. new, revision, extension, existing or reinstatement; (2) title; (3) summary of the collection; (4) description of the need for, and proposed use of, the information; (5) respondents and frequency of collection; and (6) reporting and/or Recordkeeping burden. OMB invites public comment.

The Department of Education is especially interested in public comment addressing the following issues: (1) Is this collection necessary to the proper functions of the Department; (2) will this information be processed and used in a timely manner; (3) is the estimate of burden accurate; (4) how might the Department enhance the quality, utility, and clarity of the information to be collected; and (5) how might the Department minimize the burden of this collection on the respondents, including through the use of information technology.

Dated: May 12, 2000.

William Burrow,

Leader, Information Management Group, Office of the Chief Information Officer.

Office of the Undersecretary

Type of Review: New collection.
Title: Annual Performance Report for the Preparing Tomorrow's Teachers to Use Technology Grant Program.
Frequency: Annually.
Affected Public: Not-for-profit institutions (primary); individuals or household; State, local, or Tribal Government; SEAs or LEAs.
Reporting and Recordkeeping Hour Burden:
Responses: 225.
Burden Hours: 2,250.
Abstract: This submission requests approval for a web-based performance report needed by the U.S. Department of Education (ED) to obtain baseline data and information on the progress and effectiveness of the Preparing Tomorrow's Teachers to use Technology (PT3) grantees. The PT3 grant program was established to assist consortia of public and private entities in developing and implementing teacher training programs that prepare prospective teachers to use technology for improved instructional practices and student learning opportunities in the classroom. The performance reports will be completed by all 225 grantees and data gathered from the reports will be used by ED to determine which activities are most successful at training preservice teachers to integrate technology and to determine the overall effectiveness of the PT3 grant program.

Requests for copies of the proposed information collection request may be accessed from http://edicsweb.ed.gov, or should be addressed to Vivian Reese, Department of Education, 400 Maryland Avenue, SW, Room 5624, Regional Office Building 3, Washington, DC 20202–4651. Requests may also be electronically mailed to the internet address OCIO__IMG__Issues@ed.gov or faxed to 202–708–9346. Please specify the complete title of the information collection when making your request.

Comments regarding burden and/or the collection activity requirements should be directed to Jackie Montague at 202–708–5359. Individuals who use a telecommunications device for the deaf (TDD) may call the Federal Information Relay Service (FIRS) at 1–800–877–8339.

[FR Doc. 00–12487 Filed 5–17–00; 8:45 am]

BILLING CODE 4000–01–P

DEPARTMENT OF EDUCATION

Submission for OMB Review; Comment Request

AGENCY: Department of Education.

SUMMARY: The Leader, Information Management Group, Office of the Chief Information Officer invites comments on the submission for OMB review as required by the Paperwork Reduction Act of 1995.

DATES: Interested persons are invited to submit comments on or before June 19, 2000. On May 11, 2000, a 60-day notice was incorrectly published in the **Federal Register** regarding this information collection. This 30-day notice should have been published since this is a discretionary grant and qualifies for the streamlined process.

ADDRESSES: Written comments should be addressed to the Office of Information and Regulatory Affairs, Attention: Danny Werfel, Desk Officer, Department of Education, Office of Management and Budget, 725 17th Street, NW, Room 10235, New Executive Office Building, Washington, DC 20503 or should be electronically mailed to the internet address DWERFEL@OMB.EOP.GOV.

SUPPLEMENTARY INFORMATION: Section 3506 of the Paperwork Reduction Act of 1995 (44 U.S.C. Chapter 35) requires that the Office of Management and Budget (OMB) provide interested Federal agencies and the public an early opportunity to comment on information collection requests. OMB may amend or waive the requirement for public consultation to the extent that public participation in the approval process would defeat the purpose of the information collection, violate State or Federal law, or substantially interfere with any agency's ability to perform its statutory obligations. The Leader, Information Management Group, Office of the Chief Information Officer, publishes that notice containing proposed information collection requests prior to submission of these requests to OMB.

Each proposed information collection, grouped by office, contains the following: (1) Type of review requested, e.g. new, revision, extension, existing or reinstatement; (2) title; (3) summary of the collection; (4) description of the need for, and proposed use of, the information; (5) respondents and frequency of collection; and (6) reporting and/or recordkeeping burden. OMB invites public comment.

Dated: May 12, 2000.

William Burrow,

Leader, Information Management Group, Office of the Chief Information Officer.

Office of Elementary and Secondary Education

Type of Review: Revision of a currently approved collection.
Title: Safe and Drug-Free Schools and Communities National Programs—Federal Activities—Grant Competition to Prevent High-Risk Drinking and Violent Behavior Among College Students (1890–0001) (KA).
Frequency: Annually.
Affected Public: State, Local, or tribal Government; SEAs or LEAs (primary); not-for-profit institutions (primary).
Reporting and Recordkeeping Hour Burden:
Responses: 50.
Burden Hours: 1,600.
Abstract: This program supports the development or enhancement, implementation, and evaluation of campus-based strategies to prevent high-risk drinking and violent behavior among college students. This collection falls under the Streamlined Discretionary Grant Process, 1890–0001.

This information collection is being submitted under the Streamlined Clearance Process for Discretionary Grant Information Collections (1890–0001). Therefore, the 30-day public comment period notice will be the only public comment notice published for this information collection.

Requests for copies of the proposed information collection request may be accessed from *http://edicsweb.ed.gov,* or should be addressed to Vivian Reese, Department of Education, 400 Maryland Avenue, SW, Room 5624, Regional Office Building 3, Washington, DC 20202–4651. Requests may also be electronically mailed to the internet address OCIO__IMG__Issues@ed.gov or faxed to 202–708–9346. Please specify the complete title of the information collection when making your request.

Comments regarding burden and/or the collection activity requirements

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should be directed to Kathy Axt at (703) 426–9692. Individuals who use a telecommunications device for the deaf (TDD) may call the Federal Information Relay Service (FIRS) at 1–800–877–8339.

[FR Doc. 00–12488 Filed 5–17–00; 8:45 am]

BILLING CODE 4000–01–P

DEPARTMENT OF EDUCATION

[CFDA No. 84.334]

Office of Postsecondary Education, Gaining Early Awareness and Readiness for Undergraduate Programs

Notice Inviting Applications for New Awards for Fiscal Year 2000; Correction

SUMMARY: On April 27, 2000 we published in the **Federal Register** (65 FR 24764) a notice inviting applications for new awards for fiscal year 2000 for the Gaining Early Awareness and Readiness for Undergraduate Program (GEAR UP). That document incorrectly listed the priority for Partnerships that establish or maintain a scholarship program as invitational. Please note that Partnerships that establish or maintain a scholarship program will receive a competitive priority, as was stated in the application package for this year's competition.

The priority therefore reads as follows:

Competitive Preference Priority

The Secretary will give preference to Partnership projects that establish or maintain financial assistance programs that award scholarships to participating students, either in accordance with section 404E of the Higher Education Act of 1965, as amended, or in accordance with GEAR UP regulations. The Secretary will award up to five (5) additional points, in addition to any points the applicant earns under the selection criteria, to applicants who meet this priority, depending on how well the application meets the priority.

Also in that same Notice we stated that applications for a Partnership or State grant that serve students in Empowerment Zones, Supplemental Empowerment Zones, or Enterprise Communities would be given a Competitive Preference Priority. The language used to explain this priority (The Secretary will select an application that meets this priority over an application of comparable merit that does not meet this priority) comes directly from the Education Department General Regulations (EDGAR) 34 CFR Part 75.105. This notice clarifies that this preference will be applied as a tie-breaker only.

Finally, that notice incorrectly listed the maximum grant amount for State grants as $5 million. The correct maximum grant amount for State grants is $2.1 million.

FOR FURTHER INFORMATION CONTACT: Rafael Ramirez, Office of Postsecondary Education, U.S. Department of Education, 1900 K Street, NW, Room 6252, Washington, DC 20006. Telephone: (202) 502–7676. If you use a telecommunications device for the deaf (TDD), you may call the Federal Information Relay Service (FIRS) at 1–800–877–8339.

Individuals with disabilities may obtain this document in an alternative format (e.g., Braille, large print, audiotape, or computer diskette) on request to the contact person listed in the preceding paragraph.

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Note: The official version of this document is the document published in the **Federal Register**. Free Internet access to the official edition of the **Federal Register** and the Code of Federal Regulations is available on GPO Access at:

http://www.access.gpo.gov/nara/index.html

(Catalog of Federal Domestic Assistance Number: 84.334 Gaining Early Awareness and Readiness for Undergraduate Program)

Dated: May 15, 2000.

A. Lee Fritschler,

Assistant Secretary, Office of Postsecondary Education.

[FR Doc. 00–12525 Filed 5–17–00; 8:45 am]

BILLING CODE 4000–01–U

DEPARTMENT OF ENERGY

National Nuclear Security Administration; Postponement of Scoping Meeting for the Proposed Relocation of the Los Alamos National Laboratory Technical Area 18 Missions

AGENCY: Department of Energy, National Nuclear Security Administration.

ACTION: Postponement of scoping meeting.

SUMMARY: On May 2, 2000, the Department of Energy (DOE) announced in the **Federal Register**, (65 FR 25472), that it would hold scoping meetings for the proposal to relocate missions at Technical Area 18 (TA–18). Due to the recent fire at the Los Alamos National Laboratory (LANL), the scoping meeting scheduled for May 17, 2000 at the Betty Ehart Senior Center, 2132 Central Avenue, Los Alamos, NM, has been postponed. DOE will provide notice of the new date, time, and location for this meeting when it becomes available. DOE regrets any inconvenience for this postponement. Any questions associated with the TA–18 Project can be asked by calling Mr. Jay Rose at 1–800–832–0885, ext. 65484.

Issued in Washington, D.C., this 15th day of May 2000.

Henry Garson,

NEPA Compliance Officer, Office of Defense Programs, Department of Energy.

[FR Doc. 00–12630 Filed 5–16–00; 1:33 pm]

BILLING CODE 6450–01–P

DEPARTMENT OF ENERGY

Federal Energy Regulatory Commission

[Docket No. IC00–500–001, FERC–500]

Information Collection Submitted for Review and Request for Comments

May 12, 2000.

AGENCY: Federal Energy Regulatory Commission, DOE.

ACTION: Notice of submission for review by the Office of Management and Budget (OMB) and request for comments.

SUMMARY: The Federal Energy Regulatory Commission (Commission) has submitted the energy information collection listed in this notice to the Office of Management and Budget (OMB) for review under the provisions of Section 3507 of the Paperwork Reduction Act of 1995 (Pub. L. No. 104–13). Any interested person may file comments on the collection of information directly with OMB and

should address a copy of those comments to the Commission, as explained below. The Commission received comments from two entities in response to an earlier **Federal Register** notice of November 9, 1999 (64 FR 62184–85) and has responded to those comments in this submission.

DATES: Comments regarding this collection are best assured of having their full effect if received on or before June 10, 2000.

ADDRESSES: Address comments to Office of Management and Budget, Office of Information and Regulatory Affairs, Attention: Federal Energy Regulatory Commission Desk Officer, 725 17th Street, NW, Washington, DC 20503. A copy of the comments should also be sent to Federal Energy Regulatory Commission, Office of the Chief Information Officer, Attention: Mr. Michael Miller, CI–1, 888 First Street, NE, Washington, DC 20426. Mr. Miller may be reached by telephone at (202)208–1415 and by e-mail at mike.miller@ferc.fed.us.

SUPPLEMENTARY INFORMATION:

Description

The energy information collection submitted to OMB for review contains:

1. *Collection of Information:* FERC–500, ''Application for License, Relicense for Water Projects with More than 5 MW Capacity.''

2. Sponsor: Federal Energy Regulatory Commisison.

3. Control No.: 1902–0058. The Commission is now requesting that OMB approve a three year extension of the expiration date, with no changes to the existing collection. This is a mandatory collection requirement.

4. Necessity of Collection of Information: Submission of the information is necessary to fulfill the requirements of Part I of the Federal Power Act (FPA) in order for the Commission to make the required finding that the proposal is economically sound, is best adopted to a comprehensive plan for improving/developing a waterway or waterways. Under Part I of the FPA (16 U.S.C. sections 79a *et seq.*), the Commission has the authority to issue licenses for hydroelectric projects on the waters over which Congress has jurisdiction. The Electric Consumers Protection Act (ECPA) (Pub. L. 99–495, 100 Stat. 1243) provides the Commission with the responsibility of issuing licenses for nonfederal hydroelectric plants. ECPA also amended the language of the EPA concerning environmental issues to ensure environmental quality. The information collected under FERC–500 is used by the Commission to determine the broad impact of a hydropower license application.

5. Respondent Description: The respondent universe currently comprises on average, 9 applicants for a hydropower license/relicense.

6. Estimated Burden: 15,276 total burden hours, 9 respondents 1 response (on occasion), 1,697 hours per response (rounded off).

7. Estimated Cost to Burden to Respondents: The estimated cost burden to respondents: 15,276÷2080 hours per year×$111,545 per year=$819,212.

Statutory Authority: Sections 4(e), 9, 10, 14 and 15 of the Federal Power Act (FPA), 16 U.S.C. Sections 791a *et seq.* and Energy Consumers Protection Act, Pub. L. 99–495, 100 Stat. 1243

Linwood A. Watson, Jr.,

Acting Secretary.

[FR Doc. 00–12470 Filed 5–17–00; 8:45 am]

BILLING CODE 6717–01–M

DEPARTMENT OF ENERGY

Federal Energy Regulatory Commission

[Docket No. RP00–275–000]

Chesapeake Panhandle Limited Partnership, Complainant, v. Natural Gas Pipeline Company of America, MidCon Gas Products Corp., MidCon Gas Services Corp., KN Energy, Inc. and Kinder Morgan, Inc., Respondents; Notice of Complaint

May 12, 2000.

Take notice that on May 10, 2000, Chesapeake Panhandle Limited Partnership (Complainant) filed with the Federal Energy Regulatory Commission a complaint against Natural Gas Pipeline Company of America (''NGPL''), MidCon Gas Products Corp. (MidCon Gas Products), MidCon Gas Services Corp. (MidCon Gas Services), KN Energy, Inc. (KN) and Kinder Morgan, Inc. (Kinder Morgan) (collectively, Respondents) pursuant to Rule 206 of the Commission's Rules of Practice and Procedure, 18 CFR 385.206. According to the Complaint, Respondents, all affiliated companies, acted in concert to circumvent the filed rate doctrine and violate NGPL's Tariff by charging rates for gathering services which NGPL performed in connection with jurisdictional transportation services and which, in sum, exceeded the rate specified in the NGPL Tariff governing the relevant service.

Complainant alleges that from March 3, 1998 until January 1, 2000, Respondents effectively charged (i) a ''gathering fee'' which in certain months exceeded the Maximum rate NGPL, a jurisdictional provider of gathering services through NGPL's West Panhandle Gathering System, was authorized to charge and (ii) a fuel retention rate for gathering service provided by NGPL, which was not included in NGPL's filed Tariff. The ''gathering fee'' and fuel retention rate were established in a Gas Sales and Purchase Agreement (GAS Sales Agreement) which MC Panhandle, Inc. (MC Panhandle), an affiliate of NGPL, had initially executed with another NGPL affiliate, MidCon Gas Services. MidCon Gas Services' interest was later transferred by assignment to MidCon Gas Products. Complainant states that, in 1998, it acquired ownership of MC Panhandle, the owner of certain gas wells in Moore and Carson Counties, Texas, subject to the terms of the Gas Sales Agreement. It avers that through this purchase it became obligated to pay, and in fact paid (through a reduced gas sales price), rates for gathering services actually performed by NGPL that were greater than the applicable rates set forth in NGPL's FERC Gas Tariff.

According to the Complainant, although the Gas Sales Agreement was nominally between MC Panhandle (later succeeded by Chesapeake Panhandle) and MidCon Gas Services (later succeeded by its affiliate MidCon Gas Products), NGPL's role in the transaction as: (1) The provider of the gathering service, (2) the affiliate of the Gas Sales Agreements's Buyers, MidCon Gas Services and MidCon Gas Products, (3) the affiliate of the Gas Sales Agreement's initial Seller, MC Panhandle, and (4) a signatory to the Gas Sales Agreement, effectively make NGPL a party to the Gas Sales Agreement and, in any event, support the inference that NGPL benefited from the actions of its affiliates in charging a rate for services which NGPL provided, but for which NGPL itself could not lawfully have charged. Thus, Complainant seeks a refund, with interest, of the amounts it was charged (by way of a gas sales price reduction) for ''gathering fees'' in excess of NGPL's authorized gathering rate and fuel retainage during the period from March 3, 1998 through December 31, 1999.

Questions concerning the Complaint may be directed to counsel for Complainant, James F. Bowe, Jr., Dewey Ballantine LLP, 1775 Pennsylvania Ave., NW, Washington, DC 20006–4605, Phone 202/429–1444, Fax 202/862–1093, e-mail *jbowe@deweyballantine.com.*

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Any person desiring to be heard or to protest this filing should file a motion to intervene or protest with the Federal Energy Regulatory Commission, 888 First Street, NE, Washington, DC 20426, in accordance with Rules 211 and 214 of the Commission's Rules of Practice and Procedure (18 CFR 385.211 and 214 of the Commission's Rules of Practice and Procedure (18 CFR 385.211 and 385.214). All such motions or protests must be filed on or before May 30, 2000. Protests will be considered by the Commission in determining the appropriate action to be taken, but will not serve to make protestants parties to the proceeding. Any person wishing to become a party must file a motion to intervene. Copies of this filing are on file with the Commission and are Available for public inspection in the Public Reference Room. This filing may also be viewed on the Internet at http://www.ferc.fed.us/online/rims.htm (call 202–2222) for assistance. Answers to the complaint shall also be due on or before May 30, 2000.

Linwood A. Watson, Jr.

Acting Secretary.

[FR Doc. 00–12474 Filed 5–17–00; 8:45 am]

BILLING CODE 6717–01–M

DEPARTMENT OF ENERGY

Federal Energy Regulatory Commission

[Docket No. RP00–233–001]

Midwestern Gas Pipeline Transmission; Notice of Compliance Filing

May 12, 2000.

Take notice on May 9, 2000, Midwestern Gas Transmission Company (Midwestern), tendered for filing as part of its FERC Gas Tariff, Second Revised Volume No. 1, the revised tariff sheets identified below, with an effective date of May 1, 2000:

Substitute Fourth Revised Sheet No. 90
Substitute Second Revised Sheet No. 98
Substitute Second Revised Sheet No. 99
Substitute Third Revised Sheet No. 100
Substitute First Revised Sheet No. 101
Seventh Revised Sheet No. 110A

Midwestern states that this filing is in compliance with the Commission's April 26, 2000 Order Accepting Tariff Sheets Subject to Conditions in the above-referenced docket (April 26 Order). Midwestern Gas Transmission Company, 91 FERC ¶ 61,099 (2000).

Midwestern further states that the April 26 Order required Midwestern to file revised tariff language that would (1) Correct the Gas Industry Standards Board version reference in its tariff; and (2) specify the requirements of the waiver set forth in 18 CFR 284.8(i) of the Commission's regulations. Midwestern requests an effective date of May 1, 2000.

Any person desiring to protest this filing should file a protest with the Federal Energy Regulatory Commission, 888 First Street, NE, Washington, DC 20426, in accordance with section 385.211 of the Commission's Rules and Regulations. All such protests must be filed as provided in section 154.210 of the Commission's Regulations. Protests will be considered by the Commission in determining the appropriate action to be taken, but will not serve to make protestants parties to the proceedings. Copies of this filing are on file with the Commission and are available for public inspection in the Public Reference Room. This filing may be viewed on the web at http://www.ferc.fed.us/online/rims.htm (call 202–208–2222 for assistance).

Linwood A. Watson, Jr.,

Acting Secretary.

[FR Doc. 00–12473 Filed 5–17–00; 8:45 am]

BILLING CODE 6717–01–M

DEPARTMENT OF ENERGY

Federal Energy Regulatory Commission

[Docket No. RP00–219–001]

Northwest Pipeline Corporation; Notice of Compliance Filing

May 12, 2000.

Take notice that on May 8, 2000, Northwest Pipeline Corporation (Northwest) tendered for filing additional information related to its March 16, 2000 filing in the above referenced docket.

Northwest states that the purpose of this filing is to comply with the Commission's Letter order issued April 26, 2000 in Docket No. RP00–219, which directed Northwest to provide additional information related to the reconciliation of 1999 lost and unaccounted for volumes and the allocation of fuel usage at the Jackson Prairie storage facility.

Northwest states that a copy of this filing has been served upon each person designated on the official service list complied by the Secretary in this proceeding.

Any person desiring to protest this filing should file a protest with the Federal Energy Regulatory Commission, 888 First Street, NE., Washington, DC 20426, in accordance with section 385.211 of the Commission's Rules and Regulations. All such protests must be filed as provided in section 154.210 of the Commission's Regulations. Protests will be considered by the Commission in determining the appropriate action to be taken, but will not serve to make protestants parties to the proceedings. Copies of this filing are on file with the Commission and are available for public inspection in the Public Reference Room. This filing may be viewed on the web at http://www.ferc.fed.us/online/rims.htm (call 202–208–2222 for assistance).

Linwood A. Watson, Jr.,

Acting Secretary.

[FR Doc. 00–12472 Filed 5–17–00; 8:45 am]

BILLING CODE 6717–01–M

DEPARTMENT OF ENERGY

Federal Energy Regulatory Commission

[Docket No. RP99–513–003]

Questar Pipeline Company; Notice of Tariff Filing

May 12, 2000.

Take notice that on May 8, 2000, Questar Pipeline Company (Questar) tendered for filing as part of its FERC Gas Tariff, First Revised Volume No. 1, Third Revised Sheet No. 7, with an effective day of May 8, 2000.

Questar states that the filing is being made to implement a negotiated-rate contract as authorized by Commission orders issued October 27, 1999, and December 14, 1999, in Docket Nos. RP99–513, *et al.* The Commission approved Questar's request to implement a negotiated-rate option for Rate Schedules T–1, NNT, T–2, PKS, FSS and ISS shippers. Questar submitted its negotiated-rate filing in accordance with the Commission's Policy Statement in Docket Nos. RM95–6–000 and RM96–7–000 (Policy Statement) issued January 31, 1996.

Questar further states that the tendered tariff sheet revises Questar's Tariff to implement a new negotiated-rate transportation service agreement between Questar and Texaco Natural Gas, Inc., executed May 1, 2000, with service commencing May 8, 2000.

Questar states that a copy of this filing has been served upon Questar's customers, the Public Service Commission of Utah and the Public Service Commission of Wyoming.

Any person desiring to be heard or to protest said filing should file a motion to intervene or a protest with the Federal Energy Regulatory Commission,

888 First Street, NE., Washington, DC 20426, in accordance with sections 385.214 or 385.211 of the Commission's Rules and Regulations. All such motions or protests must be filed in accordance with section 154.210 of the Commission's Regulations. Protests will be considered by the Commission in determining the appropriate action to be taken, but will not serve to make protestants parties to the proceedings. Any person wishing to become a party must file a motion to intervene. Copies of this filing are on file with the Commission and are available for public inspection in the Public Reference Room. This filing may be viewed on the web at http://www.ferc.fed.us/online/rims.htm (call 202–208–2222 for assistance).

Linwood A. Watson, Jr.,

Acting Secretary.

[FR Doc. 00–12471 Filed 5–17–00; 8:45 am]

BILLING CODE 6717–01–M

DEPARTMENT OF ENERGY

Federal Energy Regulatory Commission

[Docket No. RP00–229–001]

Tennessee Gas Pipeline Company; Notice of Compliance Filing

May 12, 2000.

Take notice that on May 9, 2000, Tennessee Gas Pipeline Company (Tennessee), tendered for filing the revised tariff sheets identified below for inclusion in Tennessee's FERC Gas Tariff, Fifth Revised Volume No. 1, with an effective date of May 1, 2000:

Substitute Fourth Revised Sheet No. 328
Substitute Fifth Revised Sheet No. 329
Substitute Third Revised Sheet No. 336
Substitute Third Revised Sheet No. 337A
Substitute Third Revised Sheet No. 342
Substitute Second Revised Sheet No. 342A
Substitute Fifth Revised Sheet No. 347
Tenth Revised Sheet No. 412

Tennessee states that this filing is in compliance with the Commission's April 26, 2000 Order Accepting Tariff sheets Subject to Conditions in the above-referenced docket (April 26, Order). Tennessee Gas Pipeline Company, 91 FERC ¶ 61,098 (2000).

Tennessee further states that the April 26 Order required Tennessee to file revised tariff language that would (1) correct the Gas Industry Standards Board version reference in its tariff; and (2) specify the requirements of the waiver set forth in 18 CFR 284.8(i) of the Commission's regulations.

Any person desiring to protest this filing should file a protest with the Federal Energy Regulatory Commission, 888 First Street, NE., Washington, DC 20426, in accordance with section 385.211 of the Commission's Rules and Regulations. Protests will be considered by the Commission in determining the appropriate action to be taken, but will not serve to make protestants parties to the proceedings. Copies of this filing are on file with the Commission and are available for public inspection in the Public Reference Room. This filing may be viewed on the web at http://www.ferc.fed.us/online/rims.htm (call 202–208–2222 for assistance).

Linwood A. Watson, Jr.,

Acting Secretary.

[FR Doc. 00–12549 Filed 5–17–00; 8:45 am]

BILLING CODE 6717–01–M

DEPARTMENT OF ENERGY

Federal Energy Regulatory Commission

[Docket No. CP00–362–000]

Texas Gas Transmission Corporation; Notice of Application

May 12, 2000.

Take notice that on May 5, 2000, pursuant to section 7 of the Natural Gas Act (NGA) and part 157 of the Regulations of the Federal Energy Regulatory Commission (Commission), Texas Gas Transmission Corporation (Texas Gas), P.O. Box 20008, Owensboro, Kentucky 42304, filed in Docket No. CP00–362–000 an abbreviated application for a certificate of public convenience and necessity to be issued for the abandonment of five injection/withdrawal wells and the installation and operation of one horizontal injection/withdrawal well within it's Midland Storage Field in Muhlenberg County, Kentucky, all as more fully set forth in the application on file with the Commission and open to public inspection. This filing may be viewed on the web at http://www.ferc.fed.us/online/rims.htm (call 202–208–2222 for assistance).

The name, address, and telephone number of the person to whom correspondence and communications concerning this application should be addressed is: David N. Roberts, Manager of Certificates and Tariffs, Texas Gas Transmission Corporation, PO Box 20008, Owensboro, Kentucky, 42304; Phone No. 270/688–6712.

Texas Gas avers that the well replacement will alleviate safety issues associated with the existing five wells, will restore well deliverability that has deteriorated over time, and will allow for more efficient utilization of the storage reservoir. The project's purpose is not to increase the storage capacity or deliverability of the Texas Gas Midland Storage Field, but simply to guarantee that existing levels can be maintained in a safer, more cost effective and efficient manner so that Texas Gas can continue to meet customer contact obligations.

In association with the installation of the replacement well, Texas Gas will need to construct approximately 300 feet of 8-inch diameter lateral line to connect the well to the existing 16-inch diameter field tributary line. This lateral line will be constructed pursuant to Texas Gas's blanket certificate authorized in Docket No. CP82–407–000 (20 FERC ¶ 62,417 (1982)) and the Commission's blanket certificate regulations found at 18 CFR part 157, including the environmental conditions found at 18 CFR 157.206(b).

Texas Gas has requested expedited review of the application in order to begin drilling of the horizontal replacement well by July 1, 2000. This would allow Texas Gas to complete the proposed well during a period of low field pressure and optimal drilling conditions.

Any person desiring to be heard or any person desiring to make any protest with reference to said application should on or before June 2, 2000, file with the Federal Energy Regulatory Commission, Washington, DC 20426, a motion to intervene or a protest in accordance with the requirements of the Commission's Rules of Practice and Procedure (18 CFR 385.214 or 385.211) and the Regulations under the Natural Gas Act (18 CFR 157.10). All protests filed with the Commission will be considered by it in determining the appropriate action to be taken but will not serve to make the protestants parties to the proceeding. Any person wishing to become party to a proceeding or to participate as a party in any hearing therein must file a motion to intervene in accordance with the Commission's Rules.

Take further notice that, pursuant to the authority contained in and subject to the jurisdiction conferred upon the Federal Energy Regulatory Commission by sections 7 and 15 of the Natural Gas Act and the Commission's Rules of Practice and Procedure, a hearing will be held without further notice before the Commission or its designee on this application if not motion to intervene is filed within the time required herein, if the Commission on its own review of the matter finds that a grant of the certificate is required by the public convenience and necessity. If a motion for leave to intervene is timely filed, or

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if the Commission on its own motion believes that a formal hearing is required, further notice of such hearing will be duly given.

Under the procedure herein provided for, unless otherwise advised, it will be unnecessary for Texas Gas to appear or be represented at the hearing.

Linwood A. Watson, Jr.,

Acting Secretary.

[FR Doc. 00–12475 Filed 5–17–00; 8:45 am]

BILLING CODE 6717–01–M

DEPARTMENT OF ENERGY

Federal Energy Regulatory Commission

[Docket No. EG00–140–000, et al.]

NEPA Energy LP, et al.; Electric Rate and Corporate Regulation Filings

May 10, 2000.

Take notice that the following filings have been made with the Commission:

1. NEPA Energy LP

[Docket No. EG00–140–000]

Take notice that on April 26, 2000, NEPA Energy LP (NEPA) filed with the Federal Energy Regulatory Commission (Commission) an application for determination of exempt wholesale generator status pursuant to part 365 of the Commission's regulations.

NEPA acquired a 94 MW eligible facility (Facility) located in North East Pennsylvania on March 29, 2000. NEPA is a limited partnership with NEPA Energy LLC as the general partner. NEPA Energy LLC is a wholly-owned subsidiary of Welch Food, Inc., a cooperative (Welch). NEPA states that once the Facility is operational, NEPA will be engaged directly and exclusively in the business of owning and/or operating all or part of an eligible facility (as defined in section 32(a)(1) of the Public Utility Holding Company Act), be selling electricity at wholesale and making no retail electricity sales.

Comment date: May 31, 2000, in accordance with Standard Paragraph E at the end of this notice. The Commission will limit its consideration of comments to those that concern the adequacy or accuracy of the application.

2. Indianapolis Power & Light Company

[Docket Nos. ER00–1026–002 and OA00–4–002]

Take notice that on May 1, 2000, Indianapolis Power & Light Company filed a letter in compliance with the Commission's orders issued February 24, 2000 in the above-referenced dockets, 90 FERC ¶ 61,180 (2000) and 90 FERC ¶ 61,174 (2000).

Comment date: May 22, 2000, in accordance with Standard Paragraph E at the end of this notice.

3. Jack A. Fusco

[Docket No. ID–3483–000]

Take notice that on April 28, 2000, Jack A. Fusco filed with the Federal Energy Regulatory Commission an Application for Authority to Hold Interlocking Positions pursuant to section 305(b) of the Federal Power Act.

Comment date: June 9, 2000, in accordance with Standard Paragraph E at the end of this notice.

4. W. Thaddeus Miller

[Docket No. ID–3484–000]

Take notice that on April 28, 2000, W. Thaddeus Miller filed with the Federal Energy Regulatory Commission an Application for Authority to Hold Interlocking Positions pursuant to section 305(b) of the Federal Power Act.

Comment date: June 9, 2000, in accordance with Standard Paragraph E at the end of this notice.

5. Scott B. Helm

[Docket No. ID–3485–000]

Take notice that on April 28, 2000, Scott B. Helm filed with the Federal Energy Regulatory Commission an Application for Authority to Hold Interlocking Positions pursuant to section 305(b) of the Federal Power Act.

Comment date: June 9, 2000, in accordance with Standard Paragraph E at the end of this notice.

6. E. Thomas Webb

[Docket No. ID–3494–000]

Take notice that on April 28, 2000, E. Thomas Webb filed with the Federal Energy Regulatory Commission an Application for Authority to Hold Interlocking Positions pursuant to section 305(b) of the Federal Power Act.

Comment date: June 9, 2000, in accordance with Standard Paragraph E at the end of this notice.

7. James S. Potter

[Docket No. ID–3495–000]

Take notice that on May 1, 2000 James S. Potter filed with the Federal Regulatory Energy Commission an Abbreviated Application for Authorization to Hold Interlocking Positions pursuant to section 305(b) of the Federal Power Act.

Comment date: June 9, 2000, in accordance with Standard Paragraph E at the end of this notice.

8. David B. Kinnard

[Docket No. ID–3496–000]

Take notice that on May 1, 2000, David B. Kinnard filed with the Federal Energy Regulatory Commission an Abbreviated Application for Authorization to Hold Interlocking Positions pursuant to section 305(b) of the Federal Power Act.

Comment date: June 9, 2000, in accordance with Standard Paragraph E at the end of this notice.

9. Roger L. Petersen

[Docket No. ID–3497–000]

Take notice that on May 1, 2000, Roger L. Peterson filed with the Federal Energy Regulatory Commission an Abbreviated Application to Hold Interlocking Positions pursuant to section 305(b) of the Federal Power Act.

Comment date: June 9, 2000, in accordance with Standard Paragraph E at the end of this notice.

10. Paul A. Farr

[Docket No. ID–3498–000]

Take notice that on May 1, 2000, Paul A. Farr filed with the Federal Energy Regulatory Commission an Abbreviated Application to Hold Interlocking Positions pursuant to section 305(b) of the Federal Power Act.

Comment date: June 9, 2000, in accordance with Standard Paragraph E at the end of this notice.

11. Robert W. Burke, Jr.

[Docket No. ID–3499–000]

Take notice that on May 1, 2000, Robert W. Burke, Jr. filed with the Federal Energy Regulatory Commission an Abbreviated Application to Hold Interlocking positions pursuant to section 305(b) of the Federal Power Act.

Comment date: June 9, 2000, in accordance with Standard Paragraph E at the end of this notice.

12. Lockhart Power Company

[Docket No. OA96–163–003]

Take notice that on April 28, 2000, Lockhart Power Company tendered for filing with the Federal Energy Regulatory Commission (Commission), a report in compliance with the Commission's order in Allegheny Power Service Co., *et al.,* 90 FERC ¶ 61,224 (2000).

Comment date: June 9, 2000, in accordance with Standard Paragraph E at the end of this notice.

13. PPL Electric Utilities Corporation

[Docket No. OA97–688–001]

Take notice that on May 2, 2000, PPL Electric Utilities Corporation filed with the Federal Energy Regulatory

Commission a report in compliance with the Commission's order in Allegheny Power Service Company, 90 FERC ¶ 61,224 (2000).

Comment date: June 9, 2000, in accordance with Standard Paragraph E at the end of this notice.

14. Orange and Rockland Utilities, Inc.

[Docket No. OA97–708–001]

Take notice that on May 2, 2000, Orange and Rockland Utilities, Inc. tendered for filing with the Federal Energy Regulatory Commission (Commission), a report in compliance with the Commission's order in Allegheny Power Service Co., et al., 90 FERC ¶ 61,224 (2000).

Comment date: June 9, 2000, in accordance with Standard Paragraph E at the end of this notice.

15. UtiliCorp United Inc.

[Docket No. ER00–175–001]

Take notice that on May 2, 2000, UtiliCorp United, Inc., tendered for filing supplements to its October 21, 1999, filing of rate schedules in Docket No. ER00–175–000.

Comment date: May 23, 2000, in accordance with Standard Paragraph E at the end of this notice.

16. California Independent System Operator Corporation

[Docket No. ER00–1365–001]

Take notice that on May 1, 2000, the California Independent System Operator Corporation (ISO), tendered for filing modifications to Amendment No. 26 of the ISO Tariff to comply with the Commission's order in California Independent System Operator Corp., 90 FERC ¶ 61,345 (2000). The ISO states that this filing has been served upon all parties in this proceeding.

Comment date: May 22, 2000, in accordance with Standard Paragraph E at the end of this notice.

17. Ameren Services Company

[Docket No. ER00–2362–000]

Take notice that on May 1, 2000, Ameren Services Company (Ameren), tendered for filing a revised Network Integration Transmission Service Agreement with the City of Newton, Illinois (Newton). The revised Agreement includes a Distribution Facilities Charge.

Ameren seeks an effective date of June 1, 2000, subject to conditions, or, in the alternative, an effective date of May 2, 2000. Accordingly, Ameren seeks waiver of the Commission's notice requirements.

Copies of the filing have been served on Newton and on the Illinois Commerce Commission.

Comment date: May 22, 2000, in accordance with Standard Paragraph E at the end of this notice.

18. Ameren Services Company

[Docket No. ER00–2364–000]

Take notice that on May 1, 2000, Ameren Services Company (Ameren), tendered for filing a revised unexecuted Network Integration Transmission Service Agreement (Network Transmission Agreement) and a revised Network Operating Agreement with Soyland Power Cooperative, Inc., (Soyland). The revised Network Transmission Agreement includes a Distribution Facilities Charge.

Ameren seeks an effective date of June 1, 2000, subject to conditions, or, in the alternative, an effective date of May 2, 2000 for the revised Network Transmission Agreement and a date sixty days from filing for the revised Network Operating Agreement. Accordingly, Ameren seeks waiver of the Commission's notice requirements with respect to the Network Transmission Agreement.

Copies of the filing have been served on Soyland and on the Illinois Commerce Commission.

Comment date: May 22, 2000, in accordance with Standard Paragraph E at the end of this notice.

19. Ameren Services Company

[Docket No. ER00–2365–000]

Take notice that on May 1, 2000, Ameren Services Company (Ameren), tendered for filing a revised unexecuted Network Integration Transmission Service Agreement (Network Transmission Agreement) and a revised Network Operating Agreement with Clay Electric Cooperative, Inc. (Clay). The revised Network Transmission Agreement includes a Distribution Facilities Charge.

Ameren seeks an effective date of June 1, 2000, subject to conditions, or, in the alternative, an effective date of May 2, 2000 for the revised Network Transmission Agreement and a date sixty days from filing for the revised Network Operating Agreement. Accordingly, Ameren seeks waiver of the Commission's notice requirements with respect to the Network Transmission Agreement. Copies of the filing have been served on Clay and on the Illinois Commerce Commission.

Comment date: May 22, 2000, in accordance with Standard Paragraph E at the end of this notice.

20. Ameren Services Company

[Docket No. ER00–2366–000]

Take notice that on May 1, 2000, Ameren Services Company (Ameren), tendered for filing a revised unexecuted Network Integration Transmission Service Agreement with Edgar Electric Cooperative Association (Edgar). The revised Agreement includes a Distribution Facilities Charge.

Ameren seeks an effective date of June 1, 2000, subject to conditions, or, in the alternative, an effective date of May 2, 2000. Accordingly, Ameren seeks waiver of the Commission's notice requirements.

Copies of the filing have been served on Edgar and on the Illinois Commerce Commission.

Comment date: May 22, 2000, in accordance with Standard Paragraph E at the end of this notice.

21. Ameren Services Company

[Docket No. ER00–2367–000]

Take notice that on May 1, 2000, Ameren Services Company (Ameren), tendered for filing a revised Network Integration Transmission Service Agreement with Cinergy Services, Inc., (Cinergy). The revised Agreement includes a Distribution Facilities Charge.

Ameren seeks an effective date of June 1, 2000, subject to conditions, or, in the alternative, an effective date of May 2, 2000. Accordingly, Ameren seeks waiver of the Commission's notice requirements.

Copies of the filing have been served on Cinergy and on the Illinois Commerce Commission.

Comment date: May 22, 2000, in accordance with Standard Paragraph E at the end of this notice.

22. CMS Marketing, Services and Trading Company

[Docket No. ER00–2368–000]

Take notice that on May 1, 2000, CMS Marketing, Services and Trading Company (Seller) tendered for filing an executed service agreement for wholesale power service to CMS MS&T Michigan, L.L.C. (Buyer) pursuant to Seller's Market Based.

Power Sales Tariff accepted for filing in Docket No. ER96–2350–000. The filing includes an administrative tariff amendment to facilitate acceptance of the service agreement.

The filing request has an effective date of June 1, 2000.

Copies of the filing have been served on the Michigan Public Service Commission and Buyer.

Comment date: May 22, 2000, in accordance with Standard Paragraph E at the end of this notice.

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23. PG&E Energy Services Corporation

[Docket No. ER00–2369–000]

Take notice that on May 1, 2000, PG&E Energy Services Corporation (PGES), 345 California Street, Suite 3200, San Francisco, California 94104, tendered for filing revisions to its rate schedule FERC No. 1 providing for the resale of Firm Transmission Rights (FTRs) issued by the California Independent Service Operator Corporation pursuant the Commission's November 10, 1999 order in Docket No. ER98–3594–000 and agreements between PGES and its affiliate, PG&E Energy Trading-Power, L.P., concerning the resale of FTRs.

Comment date: May 22, 2000, in accordance with Standard Paragraph E at the end of this notice.

24. Allegheny Energy Supply Company, L.L.C.

[Docket No. ER00–2370–000]

Take notice that on May 1, 2000, Allegheny Energy Supply Company tendered for filing a Power Sales Agreement under which Allegheny Energy Supply provides the power and energy needed by West Penn Power Company, doing business as Allegheny Power, necessary to meet its obligations as a provider of last resort under the retail direct access program implemented in the Commonwealth of Pennsylvania.

AE Supply request waiver of the prior notice requirements and an effective date of November 18, 1999.

Comment date: May 22, 2000, in accordance with Standard Paragraph E at the end of this notice.

25. Southwestern Public Service Company

[Docket No. ER00–2371–000]

Take notice that on May 1, 2000, New Century Services, Inc., on behalf of Southwestern Public Service Company (SPS), tendered for filing the Interconnection Agreement between West Texas Municipal Power Agency and SPS. This agreement is intended to supersede the Interconnection Agreement filed in Docket No. ER96–1969–000.

Comment date: May 22, 2000, in accordance with Standard Paragraph E at the end of this notice.

26. New England Power Pool

[Docket No. ER00–2378–000]

Take notice that on May 1, 2000, the New England Power Pool (NEPOOL) Participants Committee tendered for filing for acceptance a signature page to the New England Power Pool Agreement dated September 1, 1971, as amended, signed by Praxair, Inc. (Praxair). The NEPOOL Agreement has been designated NEPOOL FPC No. 2.

The Participants Committee states that the Commission's acceptance of Praxair's signature page would permit NEPOOL to expand its membership to include Praxair. The Participants Committee further states that the filed signature page does not change the NEPOOL Agreement in any manner, other than to make Praxair a member in NEPOOL.

The Participants Committee requests an effective date of July 1, 2000, for commencement of participation in NEPOOL by Praxair.

Comment date: May 22, 2000, in accordance with Standard Paragraph E at the end of this notice.

27. Alliant Energy Corporate Services, Inc.

[Docket No. ER00–2379–000]

Take notice that on May 1, 2000, Alliant Energy Corporate Services, Inc., tendered for filing an amendment on behalf of IES Utilities Inc. (IES), Interstate Power Company (IPC) and Wisconsin Power and Light Company (WPL), in the above Dockets. This amendment is being filed because IES and IPC will join the Mid-America Interconnected Network, Inc.

Alliant Energy Corporate Services, Inc., requests an effective date of May 1, 2000, and accordingly, requests waiver of the Commission's notice requirements to permit the requested effective date.

A copy of this filing has been served upon the Illinois Commerce Commission, the Minnesota Public Utilities Commission, the Iowa Department of Commerce, the Public Service Commission of Wisconsin, and all parties listed on the service list as compiled by the Secretary in this proceeding.

Comment date: May 22, 2000, in accordance with Standard Paragraph E at the end of this notice.

28. Florida Power Corporation

[Docket No. ER00–2380–000]

Take notice that on May 2, 2000, Florida Power Corporation (Florida Power) tendered for filing a service agreement providing for non-firm point-to-point transmission service and a service agreement providing for short term firm point-to-point transmission service by Florida Power to Cargill-Alliant, LLC pursuant to its open access transmission tariff.

Florida Power requests that the Commission waive its notice of filing requirements and allow the agreements to become effective on May 1, 2000

Comment date: May 23, 2000, in accordance with Standard Paragraph E at the end of this notice.

29. Allegheny Energy Service Corporation, on behalf of Allegheny Energy Supply Company, LLC

[Docket No. ER00–2381–000]

Take notice that on May 2, 2000, Allegheny Energy Service Corporation on behalf of Allegheny Energy Supply Company, LLC (Allegheny Energy Supply), tendered for filing Amendment No. 1 to Supplement No. 31 to the Market Rate Tariff to incorporate a Netting Agreement with Cargill-Alliant, LLC into the tariff provisions.

Allegheny Energy Supply requests a waiver of notice requirements to make the Amendment effective as of April 19, 2000 or such other date as ordered by the Commission.

Copies of the filing have been provided to the Public Utilities Commission of Ohio, the Pennsylvania Public Utility Commission, the Maryland Public Service Commission, the Virginia State Corporation Commission, the West Virginia Public Service Commission, and all parties of record.

Comment date: May 23, 2000, in accordance with Standard Paragraph E at the end of this notice.

30. Allegheny Energy Service Corporation, on behalf of Allegheny Energy Supply Company, LLC

[Docket No. ER00–2382–000]

Take notice that on May 2, 2000, Allegheny Energy Service Corporation on behalf of Allegheny Energy Supply Company, LLC (Allegheny Energy Supply), tendered for filing Supplement No. 39 to add one (1) new Customer to the Market Rate Tariff under which Allegheny Energy Supply offers generation services.

Allegheny Energy Supply requests a waiver of notice requirements to make service available as of March 28, 2000 or on a date as determined by the Commission to Florida Power & Light Company.

Copies of the filing have been provided to the Public Utilities Commission of Ohio, the Pennsylvania Public Utility Commission, the Maryland Public Service Commission, the Virginia State Corporation Commission, the West Virginia Public Service Commission, and all parties of record.

Comment date: May 23, 2000, in accordance with Standard Paragraph E at the end of this notice.

31. California Independent System Operator Corporation

[Docket No. ER00–2383–000]

Take notice that on May 2, 2000, the California Independent System Operator Corporation (ISO), tendered for filing a proposed amendment (Amendment No. 29) to the ISO Tariff. Amendment No. 29 includes proposed changes to the ISO Tariff that implement ten-minute markets to reduce uninstructed deviations, enable the submission of Adjustment Bids with inter-Scheduling Coordinator trades, provide for the automation of Dispatch instructions, expand the membership of the independent Market Surveillance Committee, and modify the standards that Scheduling Coordinators must meet to avoid the need to post financial security in connection with their trades in ISO markets.

The ISO states that this filing has been served upon the Public Utilities Commission of California, the California Energy Commission, the California Electricity Oversight Board, and all parties with effective Scheduling Coordinator Service Agreements under the ISO Tariff.

Comment date: May 23, 2000, in accordance with Standard Paragraph E at the end of this notice.

32. Alliant Energy Corporate Services, Inc.

[Docket No. ER00–2384–000]

Take notice that on April 26, 2000, Alliant Energy Corporate Services, Inc. (Alliant Energy) on behalf of Interstate Power Company (IPC), tendered for filing a Unit Participation Capacity Transaction (Agreement) between IPC and IES Utilities Inc., for the period May 1, 2000 through September 30, 2000. The Agreement was negotiated to provide service under the Alliant Energy System Coordination and Operating Agreement among IES Utilities Inc., Interstate Power Company, Wisconsin Power & Light and Alliant Energy.

Comment date: May 23, 2000, in accordance with Standard Paragraph E at the end of this notice.

33. New England Power Pool

Docket No. ER00–2385–000

Take notice that on May 2, 2000, the New England Power Pool (NEPOOL) Participants Committee and Transmission Owners submitted as a supplement to the NEPOOL Open Access Transmission Tariff (the NEPOOL Tariff) Appendix A to the implementation rule for Ancillary Service Schedule 1 (Scheduling, System Control and Dispatch Service) of the NEPOOL Tariff. Appendix A sets forth the detailed methodology, in accordance with the previously-approved implementation rule for Schedule 1, for recovery of costs associated with the ownership of certain control center facilities required to provide scheduling, system control and dispatch services.

The NEPOOL Participants Committee and Transmission Owners state that copies of these materials were sent to the NEPOOL Participants and the six New England State governors and regulatory commissions.

Comment date: May 23, 2000, in accordance with Standard Paragraph E at the end of this notice.

34. California Power Exchange Corporation

Docket No. ER00–2386–000

Take notice that on May 2, 2000, California Power Exchange Corporation (CalPX), on behalf of its CalPX Trading Services Division (CTS), tendered for filing proposed Amendment No. 3 to its CTS Rate Schedule FERC No. 1. Amendment No. 3 is designed to allow CTS to implement two new services in response to demand from CTS participants and the market: (1) A daily block forward market; and (2) a balance of the month market.

CTS requests waiver of the Commission's notice provisions to permit an effective date of June 29, 2000 for delivery on July 1, 2000. If the Commission does not grant the requested waiver, CTS requests an effective date of July 2, 2000 for delivery on the next delivery day for the applicable block.

Comment date: May 23, 2000, in accordance with Standard Paragraph E at the end of this notice.

35. California Power Exchange Corporation

Docket No. ER00–2387–000

Take notice that on May 2, 2000, the California Power Exchange Corporation (CalPX), tendered for filing proposed amendments of Schedule Nos. 3 and 4 of its FERC Electric Service Tariff No. 3. These proposed amendments collectively comprise CalPX's Tariff Amendment No. 14. The purpose of the amendments is to enable CalPX to track the changes to be implemented by Tariff No. 26 of the California Independent System Operator Corporation (CAISO). The Commission accepted CAISO Tariff Amendment No. 26 with certain conditions in an order issued in Docket No. ER00–1365–000 on March 31, 2000.

Consistent with that order, CalPX requests an effective date for its Tariff Amendment No. 14 of ten days after the software modifications of both CalPX and CAISO are complete.

Comment date: May 23, 2000, in accordance with Standard Paragraph E at the end of this notice.

36. Commonwealth Edison Company

Docket No. ER00–2388–000

Take notice that on May 2, 2000, Commonwealth Edison Company (ComEd), tendered for filing a Short-Term Firm Transmission Service Agreement (Agreement) establishing Alliant Energy Corporate Services, Inc. (Alliant), as a short-term firm customer under the terms of ComEd's OATT.

ComEd requests an effective date of July 22, 1998 to coincide with the first day of service to Alliant under this type of Service Agreement. Copies of this filing were served on Alliant.

Comment date: May 23, 2000, in accordance with Standard Paragraph E at the end of this notice.

37. Central Vermont Public Service Corporation

Docket No. ER00–2389–000

Take notice that on May 2, 2000, Central Vermont Public Service Corporation tendered for filing a Transmission Service Agreement—Amendment No. 1 between Central Vermont Public Service Corporation and Green Mountain Power Company. Central Vermont also filed a certificate of concurrence executed by Green Mountain. Central Vermont states that the Amendment modifies the terms on which the parties operate the interconnections between them.

Copies of the filing were served upon Green Mountain and the Vermont Public Service Board.

Comment date: May 23, 2000, in accordance with Standard Paragraph E at the end of this notice.

38. PPL Electric Utilities Corporation

[Docket Nos. ER00–2390–000]

Take notice that on May 2, 2000, PPL Utilities Corporation (PPL Utilities), formerly known as PP&L, Inc. filed a notice of cancellation of PPL Utilities' Open Access Transmission Tariff (Tariff), FERC Electric Tariff Volume No. 4. No customers have or are taking service under the Tariff.

PPL Utilities requests an effective date of the cancellation of July 3, 2000.

Notice of the proposed cancellation has been served upon all entities that have signed service agreements under the Tariff.

Comment date: May 23, 2000, in accordance with Standard Paragraph E at the end of this notice.

008506

39. Indianapolis Power & Light Company

[Docket No. ES00–33–000]

Take notice that on May 2, 2000, Indianapolis Power & Light Company submitted an application pursuant to Section 204 of the Federal Power Act seeking Commission authorization to issue short-term debt instruments in an amount not to exceed $500 million, from time to time, for a period commencing July 30, 2000, through July 29, 2002.

Comment date: May 31, 2000, in accordance with Standard Paragraph E at the end of this notice.

40. Doswell Limited Partnership

[Docket No. ER00–2391–000]

Take notice that on May 2, 2000, Doswell Limited Partnership (Doswell) petitioned the Commission for (1) Acceptance of Doswell Rate Schedule FERC No. 2 and Form of Service Agreement; (2) acceptance of the Power Purchase Agreement entered into on April 17, 2000, between Doswell and Virginia Electric Power Company; (3) the granting of certain blanket approvals, including the authority to sell electricity at market-based rates; and (4) the waiver of certain Commission Regulations.

Comment date: May 23, 2000, in accordance with Standard Paragraph E at the end of this notice.

Standard Paragraph

E. Any person desiring to be heard or to protest such filing should file a motion to intervene or protest with the Federal Energy Regulatory Commission, 888 First Street, NE, Washington, DC 20426, in accordance with Rules 211 and 214 of the Commission's Rules of Practice and Procedure (18 CFR 385.211 and 385.214). All such motions or protests should be filed on or before the comment date. Protests will be considered by the Commission in determining the appropriate action to be taken, but will not serve to make protestants parties to the proceeding. Any person wishing to become a party must file a motion to intervene. Copies of these filings are on file with the Commission and are available for public inspection. This filing may also be viewed on the Internet at http://www.ferc.fed.us/ online/rims.htm (call 202–208–2222 for assistance).

David P. Boergers,

Secretary.

[FR Doc. 00–12468 Filed 5–17–00; 8:45 am]

BILLING CODE 6717–01–P

DEPARTMENT OF ENERGY

Federal Energy Regulatory Commission

[Docket No. EG00–138–000, et al.]

TXU (No.5) Pty Ltd., et al.; Electric Rate and Corporate Regulation Filings

May 11, 2000.

Take notice that the following filings have been made with the Commission:

1. TXU (No.5) Pty Ltd.

[Docket No. EG00–138–000]

Take notice that on May 9, 2000, TXU (No. 5) Pty Ltd, filed a withdrawal of their Application for Commission Determination of Exempt Wholesale Generator Status that was filed with the Federal Energy Regulatory Commission (Commission) on April 27, 2000, pursuant to Rule 216 of the Rules of Practice and Procedure (18 CFR 365.216).

Comment date: May 24, 2000, in accordance with Standard Paragraph E at the end of this notice.

2. ISO New England Inc.

[Docket Nos. EL00–62–001 and ER00–2052–002]

Take notice that on May 8, 2000, ISO New England Inc. amended its March 31, 2000 filing (as corrected on April 3 and May 1, 2000) to request termination of the New England Power Pool (NEPOOL) Installed Capability market effective June 1, 2000.

Copies of said filing and a redacted version of Appendix 1 have been served upon the Secretary of the NEPOOL Participants Committee, as well as upon the utility regulatory agencies of the six New England States and the New England Conference of Public Utilities Commissioners.

Comment date: May 30, 2000, in accordance with Standard Paragraph E at the end of this notice.

3. ISO New England Inc.

[Docket Nos. EL00–62–002 and ER00–2052–003]

Take notice that on May 8, 2000, contemporaneously with ISO New England Inc.'s amendment of its March 31, 2000 filing (as corrected on April 3 and May 1, 2000) to request termination of the New England Power Pool (NEPOOL) Installed Capability market effective June 1, 2000, ISO New England also filed separately in these dockets (on a confidential basis under 18 CFR 388.112) an Appendix 1, reporting mitigation activity in the Installed Capability market, in accordance with NEPOOL Market Rule 17.

Copies of said filing and a redacted version of Appendix 1 have been served upon the Secretary of the NEPOOL Participants Committee, as well as upon the utility regulatory agencies of the six New England States and the New England Conference of Public Utilities Commissioners.

Comment date: May 30, 2000, in accordance with Standard Paragraph E at the end of this notice.

4. Paul T. Champagne

[Docket No. ID–3500–000]

Take notice that on May 4, 2000, Paul T. Champagne filed an Application for Authorization to Hold Interlocking Positions pursuant to section 305(b) of the Federal Power Act.

Comment date: June 12, 2000, in accordance with Standard Paragraph E at the end of this notice.

5. Southern Minnesota Municipal Power Agency

[Docket No. NJ00–3–001]

Take notice that on May 3, 2000, Southern Minnesota Municipal Power Agency tendered for filing a revision to schedule 4 of its non-jurisdictional tariff. That revised version of schedule 4 was proffered as a replacement for the version filed on April 25, 2000, and noticed on April 28, 2000 in the above-referenced docket number.

Comment date: May 30, 2000, in accordance with Standard Paragraph E at the end of this notice.

6. El Paso Electric Company

[Docket No. OA97–686–001]

Take notice that on May 5, 2000, El Paso Electric Company filed a report with the Federal Energy Regulatory Commission (Commission) pursuant to the Commission's order in Allegheny Power Service Co., *et al.,* 90 FERC ¶ 61,224 (2000).

Comment date: June 12, 2000, in accordance with Standard Paragraph E at the end of this notice.

7. AllEnergy Marketing Company, L.L.C., New England Power Company, Massachusetts Electric Company, Nantucket Electric Company, Granite State Electric Company and The Narragansett Electric Company

[Docket No. OA00–1–001]

Take notice that on May 4, 2000 in compliance with the Commission's April 4, 2000 order in New England Power Company, *et al.,* 91 FERC ¶ 61,013 (2000), AllEnergy Marketing Company, L.L.C., New England Power Company, Massachusetts Electric Company, Nantucket Electric Company, Granite State Electric Company and The

Narragansett Electric Company submitted for filing a revised power marketer code of conduct.

Comment date: June 12, 2000, in accordance with Standard Paragraph E at the end of this notice.

8. Arizona Public Service Company

[Docket No. ER99–2852–001]

Take notice that on May 4, 2000, Arizona Public Service Company (APS), tendered for filing a Compliance Refund Report for refunds made in accordance with the Commission's letter of approval of the Offer of Settlement dated March 30, 2000 with the Arizona Electric Power Cooperative, Inc. in Docket No. ER99–2852–0000.

Copies of this filing have been served on Arizona Electric Power Cooperative, Inc. and the Arizona Corporation Commission.

Comment date: May 25, 2000, in accordance with Standard Paragraph E at the end of this notice.

9. Southern California Edison Company

[Docket No. ER98–441–019]

Take notice that on May 3, 2000, Reliant Energy Mandalay, LLC, Reliant Energy Etiwanda, LLC, Reliant Energy Power Generation, Inc., Reliant Energy Services, Inc., Southern California Edison Company, the California Independent System Operator Corp., the California Power Exchange, Pacific Gas and Electric Company, and San Diego Gas & Electric Company tendered for filing an Offer of Settlement. The Offer of Settlement resolves all of the unresolved issues set forth in Article X, sections A.2 through A.5, of the Stipulation and Agreement filed on April 2, 1999 in this docket and approved by the Commission on May 28, 1999.

Copies of the filing were served on the parties to the service list established in the above-captioned proceeding.

Comment date: May 24, 2000, in accordance with Standard Paragraph E at the end of this notice.

10. California Independent System Operator Corporation

[Docket Nos. ER99–1971–006]

Take notice that on May 3, 2000, the California Independent System Operator Corporation (ISO), tendered for filing a Notice of Effective Date, dated May 2, 2000, which specifies that the Tariff revisions relating to the Generator Communications Project approved in Amendment No. 14 to the ISO Tariff became effective on February 7, 2000, pursuant to the Commission's May 26, 1999 order in this proceeding.

The ISO states that this filing has been served on all parties listed on the official service list in the above-referenced docket.

Comment date: May 24, 2000, in accordance with Standard Paragraph E at the end of this notice.

11. Fresno Cogeneration Partners, L.P.

[Docket No. ER00–2392–000]

Take notice that on May 3, 2000, Fresno Cogeneration Partners, L.P. (FCPLP), tendered for filing, under section 205 of the Federal Power Act and Part 35 of the Commission's Regulations, a petition for order accepting initial rate schedule, Electric Rate Schedule FERC No. 1, pertaining to the sale of energy, capacity, replacement reserves at market-based rates, and for the waiver of certain Commission regulations and blanket authorization of others. FCPLP also requests authority, as provided in the proposed rate schedule, to sell ancillary services.

FCPLP requests that this rate schedule become effective as of April 28, 2000.

Copies of the filing were served on the California Public Utilities Commission and the California Independent System Operator.

Comment date: May 24, 2000, in accordance with Standard Paragraph E at the end of this notice.

12. PacifiCorp

[Docket No. ER00–2393–000]

Take notice that on May 3, 2000, PacifiCorp tendered for filing in accordance with 18 CFR 35 of the Commission's Rules and Regulations, a Long-term Firm Point-to-Point Transmission Service Agreement with Western Area Power Administration, Rocky Mountain Region (Western) under PacifiCorp's FERC Electric Tariff, First Revised Volume No. 11 (Tariff).

Copies of this filing were supplied to the Washington Utilities and Transportation Commission and the Public Utility Commission of Oregon.

Comment date: May 24, 2000, in accordance with Standard Paragraph E at the end of this notice.

13. Allegheny Energy Service Corporation on behalf of Allegheny Energy Supply Company, LLC

[Docket No. ER00–2394–000]

Take notice that on May 3, 2000, Allegheny Energy Service Corporation on behalf of Allegheny Energy Supply Company, LLC (Allegheny Energy Supply), tendered for filing Supplement No. 40 to add one (1) new Customer to the Market Rate Tariff under which Allegheny Energy Supply offers generation services.

Allegheny Energy Supply requests a waiver of notice requirements to make service available as of April 7, 2000 to Conectiv Energy Supply, Inc.

Copies of the filing have been provided to the Public Utilities Commission of Ohio, the Pennsylvania Public Utility Commission, the Maryland Public Service Commission, the Virginia State Corporation Commission, the West Virginia Public Service Commission, and all parties of record.

Comment date: May 24, 2000, in accordance with Standard Paragraph E at the end of this notice.

14. PG&E Energy Services Corporation

[Docket No. ER00–2395–000]

Take notice that on May 3, 2000, PG&E Energy Services Corporation (PGES), 345 California Street, Suite 3200, San Francisco, California 94104, tendered for filing revisions to its market-based rate schedule and code of conduct to reflect its proposed affiliation with Portland General Electric Company.

Comment date: May 24, 2000, in accordance with Standard Paragraph E at the end of this notice.

15. Energetix, Inc.

[Docket No. ER00–2396–000]

Take notice that on May 3, 2000, Energetix, Inc., tendered for filing to amend its market-based rate tariff, FERC Electric Rate Schedule No. 1, to permit sales to its affiliate, Rochester Gas and Electric Corporation, without making a separate filing under section 205 of the Federal Power Act.

Comment date: May 24, 2000, in accordance with Standard Paragraph E at the end of this notice.

16. Consumers Energy Company

[Docket No. ER00–2397–000]

Take notice that on May 3, 2000, Consumers Energy Company (Consumers), tendered for filing a Facilities Agreement Between Consumers and Modular Power Systems, LLC, (Modular), dated April 26, 2000. Under the Facilities Agreement, Consumers is to construct, operate and maintain various interconnection facilities.

Consumers requests that the Facilities Agreement be allowed to become effective within 60 days after filing.

Copies of the filing were served upon Modular and upon the Michigan Public Service Commission.

Comment date: May 24, 2000, in accordance with Standard Paragraph E at the end of this notice.

008508

17. Baconton Power LLC

[Docket No. ER00–2398–000]

Take notice that on May 3, 2000, Baconton Power LLC, tendered for filing pursuant to section 205 of the Federal Power Act, a request for blanket approval to make sales at market-based rates from its generator located in southwestern Georgia. Baconton also requests the waivers traditionally granted to parties authorized to sell power at market-based rates.

Baconton seeks a waiver of the Commission's 60-day prior notice and filing requirements and an effective date from the Commission of May 17, 2000.

Comment date: May 24, 2000, in accordance with Standard Paragraph E at the end of this notice.

18. Louisville Gas and Electric Company/Kentucky Utilities Company

[Docket No. ER00–2399–000]

Take notice that on May 4, 2000, Louisville Gas and Electric Company (LG&E)/Kentucky Utilities (KU) (hereinafter Companies), tendered for filing executed Firm and Non-Firm Point-to-Point Transmission Service Agreements between the Companies and Cinergy Capital and Trading, Inc., under the Companies Open Access Transmission Tariff.

Comment date: May 25, 2000, in accordance with Standard Paragraph E at the end of this notice.

19. Louisville Gas and Electric Company/Kentucky Utilities Company

[Docket No. ER00–2400–000]

Take notice that on May 4, 2000, Louisville Gas and Electric Company (LG&E)/Kentucky Utilities (KU) (hereinafter Companies), tendered for filing executed Firm and Non-Firm Point-to-Point Transmission Service Agreements between the Companies and MIECO, Inc., under the Companies Open Access Transmission Tariff.

Comment date: May 25, 2000, in accordance with Standard Paragraph E at the end of this notice.

20. Pacific Gas and Electric Company

[Docket No. ER00–2401–000]

Take notice that on May 4, 2000, Pacific Gas and Electric Company (PG&E) tendered for filing an agreement entitled ''GPU Solar Service Agreement for Wholesale Distribution Service'' (Service Agreement) with GPU Solar, Inc., submitted pursuant to the PG&E Wholesale Distribution Tariff (WDT).

The Service Agreement facilitates payment of PG&E's costs of designing, constructing, procuring, testing, placing in operation, owning, operating and maintaining the customer-specific facilities requested by GPU Solar, Inc., required for service over PG&E's distribution facilities. PG&E has requested certain waivers.

Copies of this filing have been served upon GPU Solar, Inc., and the California Public Utilities Commission.

Comment date: May 25, 2000, in accordance with Standard Paragraph E at the end of this notice.

21. WPS Resources Operating Companies

[Docket No. ER00–2402–000]

Take notice that on May 4, 2000, WPS Resources Operating Companies (WPSR) tendered for filing an executed Service Agreement with Upper Peninsula Power Company, providing for transmission service under FERC Electric Tariff, Volume No. 1.

Comment date: May 25, 2000, in accordance with Standard Paragraph E at the end of this notice.

22. Wisconsin Public Service Corporation

[Docket No. ER00–2403–000]

Take notice that on May 4, 2000, Wisconsin Public Service Corporation (WPSC), tendered for filing an executed Service Agreement with Wisconsin Electric Power Supply Company, providing for transmission service under FERC Electric Tariff, Volume No. 1.

Comment date: May 25, 2000, in accordance with Standard Paragraph E at the end of this notice.

23. Allegheny Energy Service Corporation, on behalf of Allegheny Energy Supply Company, LLC

[Docket No. ER00–2404–000]

Take notice that on May 4, 2000, Allegheny Energy Service Corporation on behalf of Allegheny Energy Supply Company, LLC (Allegheny Energy Supply), tendered for filing Amendment No. 1 to Supplement No. 35 to the Market Rate Tariff to incorporate a Netting Agreement with NewEnergy, Inc. into the tariff provisions.

Allegheny Energy Supply requests a waiver of notice requirements to make the Amendment effective as of April 10, 2000 or such other date as ordered by the Commission.

Copies of the filing have been provided to the Public Utilities Commission of Ohio, the Pennsylvania Public Utility Commission, the Maryland Public Service Commission, the Virginia State Corporation Commission, the West Virginia Public Service Commission, and all parties of record.

Comment date: May 25, 2000, in accordance with Standard Paragraph E at the end of this notice.

24. Cinergy Services, Inc.

[Docket No. ER00–2405–000]

Take notice that on May 4, 2000, Cinergy Services, Inc., on behalf of The Cincinnati Gas & Electric Company (CG&E), tendered for filing for approval an Interconnection Agreement dated as of March 30, 2000 and entered into by and between the City of Lebanon, Ohio, The Cincinnati Gas & Electric Company and Cinergy Services, Inc.

The Interconnection Agreement will allow for an interconnection point at the 69 KV bus of the City of Lebanon's switching station located adjacent to CG&E's Warren 138 KV Substation.

Cinergy states that it has served a copy of its filing upon the City of Lebanon, Ohio and the Public Utilities Commission of Ohio.

Comment date: May 25, 2000, in accordance with Standard Paragraph E at the end of this notice.

25. Entergy Services, Inc.

[Docket No. ER00–2406–000]

Take notice that on May 4, 2000, Entergy Services, Inc. (Entergy Services), tendered for filing on behalf of Entergy Gulf States, Inc. (Entergy Gulf States), tendered for filing a Long-Term Market Rate Sales Agreement between Entergy Gulf States and Brazos Electric Power Cooperative, Inc., for the sale of power under Entergy Services' Rate Schedule SP.

Comment date: May 25, 2000, in accordance with Standard Paragraph E at the end of this notice.

26. PPL EnergyPlus, LLC

[Docket No. ER00–2407–000]

Take notice that on May 4, 2000, PPL EnergyPlus, LLC (PPL EnergyPlus), tendered for filing revisions to its Rate Schedule No. 4.

PPL EnergyPlus has served a copy of this filing on PPL Electric Utilities Corporation.

Comment date: May 25, 2000, in accordance with Standard Paragraph E at the end of this notice.

27. PJM Interconnection, L.L.C.

[Docket No. ER00–2408–000]

Take notice that on May 4, 2000, PJM Interconnection, L.L.C. (PJM), tendered for filing signature pages to the Reliability Assurance Agreement among Load Serving Entities in the PJM Control Area (RAA) for ECONnergy PA, Inc. (ECONnergy) and Utilimax.com, Inc. (Utilimax.com), and an amended Schedule 17 listing the parties to the RAA.

PJM states that it served a copy of its filing on all parties to the RAA, including ECONnergy and Utilimax.com, and each of the state electric regulatory commissions within the PJM Control Area.

Comment date: May 25, 2000, in accordance with Standard Paragraph E at the end of this notice.

28. Puget Sound Energy, Inc.

[Docket No. ER00–2409–000]

Take notice that on May 4, 2000, Puget Sound Energy, Inc. (PSE), tendered for filing a Notice of Cancellation of a Service Agreement for Long-Term Firm Point-To-Point Transmission Service under FERC Electric Tariff Original Volume No. 7 Open Access Transmission Tariff with the United States of America Department of Energy acting by and through the Bonneville Power Administration (Bonneville), as Transmission Customer (Service Agreement No. 104 under PSE's FERC Electric Tariff Third Revised Volume No. 7).

PSE states that a copy of the filing was served upon Bonneville.

Comment date: May 25, 2000, in accordance with Standard Paragraph E at the end of this notice.

29. PPL Electric Utilities Corporation

[Docket No. ER00–2410–000]

Take notice that on May 4, 2000, PPL Electric Utilities Corporation (PPL Utilities), tendered for filing with the Federal Energy Regulatory Commission a Service Agreement between PPL Utilities and the Borough of Lewisberry under PPL Utilities' Market-Based Rate and Resale of Transmission Rights Tariff, FERC Electric Tariff, Revised Volume No. 5.

PPL Utilities requests an effective date of May 1, 2000, for the Power Sales Agreement.

PPL Utilities states that a copy of this filing has been provided to the Borough of Lewisberry and to the Pennsylvania Public Utility Commission.

Comment date: May 25, 2000, in accordance with Standard Paragraph E at the end of this notice.

30. PPL Electric Utilities Corporation

[Docket No. ER00–2411–000]

Take notice that on May 4, 2000, PPL Electric Utilities Corporation (PPL Utilities), tendered for filing with the Federal Energy Regulatory Commission a Power Sales Agreement between PPL Utilities and the Borough of Lewisberry under PPL Utilities' Market-Based Rate and Resale of Transmission Rights Tariff, FERC Electric Tariff, Revised Volume No. 5.

PPL Utilities requests an effective date of May 1, 2000 for the Power Sales Agreement.

PPL Utilities states that a copy of this filing has been provided to the Borough of Lewisberry and to the Pennsylvania Public Utility Commission.

Comment date: May 25, 2000, in accordance with Standard Paragraph E at the end of this notice.

31. Consumers Energy Company

[Docket No. ER00–2412–000]

Take notice that on May 4, 2000 Consumers Energy Company (Consumers), tendered for filing a Notice of Cancellation, terminating Consumers Energy Company Rate Schedule FERC No. 76, a facilities agreement with Wolverine Power Supply Cooperative, Inc., (Wolverine). The termination is by fully executed agreement between the two parties. Consumers requests that the cancellation be effective May 1, 2000, as specified in the termination agreement.

Copies of the filing were served upon Wolverine and upon the Michigan Public Service Commission.

Comment date: May 25, 2000, in accordance with Standard Paragraph E at the end of this notice.

32. American Electric Power Service Corporation

[Docket No. ER00–2413–000]

Take notice that on May 4, 2000, American Electric Power Service Corporation, on behalf of the operating companies of the American Electric Power System (collectively, AEP), tendered for filing an amendment to the AEP open access transmission tariff.

AEP states that a copy of the filing has been served on all of AEP's transmission customers and on the state public service commissions of Indiana, Kentucky, Michigan, Ohio, Tennessee, Virginia and West Virginia.

Comment date: May 25, 2000, in accordance with Standard Paragraph E at the end of this notice.

33. New Century Services, Inc.

[Docket No. ER00–2414–000]

Take notice that on May 4, 2000, New Century Services, Inc. (NCS), on behalf of Public Service Company of Colorado (Public Service), tendered for filing the Master Power Purchase and Sale Agreement between Public Service and South Plains Electric Cooperative, Inc., which is an umbrella service agreement under Public Service's Rate Schedule for Market-Based Power Sales (Public Service FERC Electric Tariff, Original Volume No. 6).

NCS requests that this agreement become effective on March 8, 2000.

Comment date: May 25, 2000, in accordance with Standard Paragraph E at the end of this notice.

34. Entergy Services, Inc.

[Docket No. ER00–2415–000]

Take notice that on May 5, 2000, Entergy Services, Inc. (Entergy Services), as agent for Entergy Arkansas, Inc., Entergy Gulf States, Inc., Entergy Louisiana, Inc., Entergy Mississippi, Inc., and Entergy New Orleans, Inc. (collectively, the Entergy Operating Companies), tendered for filing its 2000 annual rate redetermination update (Update) in accordance with the Open Access Transmission Tariff filed in compliance with FERC Order No. 888 in Docket No. OA96–158–000. Entergy Services states that the Update redetermines the formula rate in accordance with the annual rate redetermination provisions of Appendix 1 to Attachment H and Appendix A to Schedule 7.

Comment date: May 26, 2000, in accordance with Standard Paragraph E at the end of this notice.

35. Reliant Energy Maryland Holdings, LLC, Reliant Energy New Jersey Holdings, LLC and Reliant Energy Pennsylvania Holdings, LLC

[Docket Nos. ER00–2417–000]

Take notice that on May 4, 2000, Reliant Energy Maryland Holdings, LLC, Reliant Energy New Jersey Holdings, LLC and Reliant Energy Pennsylvania Holdings, LLC (collectively, the Reliant Energy PJM Companies), tendered for filing pursuant to section 205 of the Federal Power Act, 16 U.S.C. 824d (1994), and Part 35 of the Commission's Regulations, 18 CFR 35, revisions to their tariffs to provide for sales of regulation service at market-based rates through the Pennsylvania-New Jersey-Maryland Interchange Energy Market (PJM PX). Each of the Reliant Energy PJM Companies has further revised its tariff to consolidate provisions regarding energy, capacity and ancillary services into one market-based tariff per company.

The Reliant Energy PJM Companies request waiver of the prior notice requirements of Section 35.3 of the Commission's regulations, 18 CFR 35.3, to permit their filing to become effective as of June 1, 2000, or the date on which the PJM Interconnection, L.L.C., implements amendment to its Open Access Transmission Tariff and Operating Agreement regarding market-based pricing for Regulation service.

Comment date: May 25, 2000, in accordance with Standard Paragraph E at the end of this notice.

008510

36. Cinergy Services, Inc.

[Docket No. ER00–2418–000]

Take notice that on May 5, 2000, Cinergy Services, Inc. (Cinergy), tendered for filing a Non-Firm Point-To-Point Service Agreement under Cinergy's Open Access Transmission Service Tariff (the Tariff) entered into between Cinergy and Cinergy Capital & Trading, Inc. (C&T).

Cinergy and C&T are requesting an effective date of April 5, 2000.

Comment date: May 26, 2000, in accordance with Standard Paragraph E at the end of this notice.

37. Allegheny Energy Service Corporation, on behalf of Allegheny Energy Supply Company, LLC

[Docket No. ER00–2419–000]

Take notice that on May 26, 2000, Allegheny Energy Service Corporation on behalf of Allegheny Energy Supply Company, LLC (Allegheny Energy Supply), tendered for filing Amendment No. 4 to Supplement No. 5 to the Market Rate Tariff to incorporate a Netting Agreement with Koch Energy Trading Inc., into the tariff provisions.

Allegheny Energy Supply requests a waiver of notice requirements to make the Amendment effective as of March 23, 2000 or such other date as ordered by the Commission.

Copies of the filing have been provided to the Public Utilities Commission of Ohio, the Pennsylvania Public Utility Commission, the Maryland Public Service Commission, the Virginia State Corporation Commission, the West Virginia Public Service Commission, and all parties of record.

Comment date: May 26, 2000, in accordance with Standard Paragraph E at the end of this notice.

38. New Century Services, Inc.

[Docket No. ER00–2420–000]

Take notice that on May 5, 2000, New Century Services, Inc., on behalf of Cheyenne Light, Fuel and Power Company, Public Service Company of Colorado, and Southwestern Public Service Company (the Companies), tendered for filing a service agreement under their Joint Open Access Transmission Service Tariff for Firm Point-to-Point Transmission Service between the Companies and PPL Montana LLC.

Comment date: May 26, 2000, in accordance with Standard Paragraph E at the end of this notice.

39. Cinergy Services, Inc.

[Docket No. ER00–2422–000]

Take notice that on May 3, 2000, Cinergy Services, Inc. (Cinergy), tendered for filing a Firm Point-To-Point Service Agreement under Cinergy's Open Access Transmission Service Tariff (the Tariff) entered into between Cinergy and Cinergy Capital & Trading, Inc., (C&T).

Cinergy and Conectiv are requesting an effective date of April 5, 2000.

Comment date: May 26, 2000, in accordance with Standard Paragraph E at the end of this notice.

40. Des Plaines Green Land Development, L.L.C.

[Docket No. ER00–2423–000]

Take notice that on May 5, 2000, Des Plaines Green Land Development, L.L.C. (Des Plaines), tendered for filing its proposed Emergency Redispatch Tariff. The tariff provides for the dispatch of the Des Plaines Generation Facility during emergencies by Commonwealth Edison Co. (ComEd), the utility with which the facility is interconnected.

Des Plaines requests that the proposed tariff become effective April 11, 2000, the requested effective date of the Interconnection Agreement between Des Plaines and ComEd, and has therefore requested that the Commission waive its notice requirements.

Des Plaines has served copies of the filing on the Illinois Commerce Commission and ComEd, the only customer under the proposed tariff.

Comment date: May 26, 2000, in accordance with Standard Paragraph E at the end of this notice.

41. New England Power Pool

[Docket No. ER00–2424–000]

Take notice that on May 5, 2000, the New England Power Pool Participants Committee submitted a Load Response Program and changes to Market Rule Appendix 20–B, and requested expedited consideration of the Program and these changes in order to have them become effective on June 1, 2000.

The NEPOOL Participants Committee states that copies of these materials were sent to the New England state governors and regulatory commissions and the Participants in the New England Power Pool.

Comment date: May 26, 2000, in accordance with Standard Paragraph E at the end of this notice.

Standard Paragraphs

E. Any person desiring to be heard or to protest such filing should file a motion to intervene or protest with the Federal Energy Regulatory Commission, 888 First Street, NE, Washington, DC 20426, in accordance with Rules 211 and 214 of the Commission's Rules of Practice and Procedure (18 CFR 385.211 and 385.214). All such motions or protests should be filed on or before the comment date. Protests will be considered by the Commission in determining the appropriate action to be taken, but will not serve to make protestants parties to the proceeding. Any person wishing to become a party must file a motion to intervene. Copies of these filings are on file with the Commission and are available for public inspection. This filing may also be viewed on the Internet at http://www.ferc.fed.us/ online/rims.htm (call 202–208–2222 for assistance).

Linwood A. Watson, Jr.,

Acting Secretary.

[FR Doc. 00–12467 Filed 5–17–00; 8:45 am]

BILLING CODE 6717–01–P

DEPARTMENT OF ENERGY

Federal Energy Regulatory Commission

[Docket No. CP00–141–000]

Northwest Pipeline Corporation; Notice of Intent To Prepare an Environmental Assessment for the Proposed White River Replacement Project and Request for Comments on Environmental Issues

May 12, 2000.

The staff of the Federal Energy Regulatory Commission (FERC or Commission) will prepare an environmental assessment (EA) that will discuss the environmental impacts of the White River Replacement Project involving construction and operation of facilities by Northwest Pipeline Corporation (Northwest) in King County, Washington.[1] These facilities would consist of about 2000 feet of pipeline. This EA will be used by the Commission in its decision-making process to determine whether the project is in the public convenience and necessity.

If you are a landowner receiving this notice, you may be contacted by a pipeline company representative about the acquisition of an easement to construct, operate, and maintain the proposed facilities. The pipeline company would seek to negotiate a mutually acceptable agreement. However, if the project is approved by the Commission, that approval conveys

[1] Northwest's application was filed with the Commission under section 7 of the Natural Gas Act and part 157 of the Commission's regulations.

with it the right of eminent domain. Therefore, if easement negotiations fail to produce an agreement, the pipeline company could initiate condemnation proceedings in accordance with state law.

A fact sheet prepared by the FERC entitled ''An Interstate Natural Gas Facility On My Land? What Do I Need To Know?'' was attached to the project notice northwest provided to landowners. This fact sheet addresses a number of typically asked questions, including the use of eminent domain and how to participate in the Commission's proceedings. It is available for viewing on the FERC Internet website (www.ferc.fed.us).

Summary of the Proposed Project

Northwest wants to ensure the long-term safety and integrity of its dual pipelines where they cross the meandering White River in King County, Washington, by replacing certain sections at a deeper depth. Northwest seeks authority to construct and operate 1900 feet each of its 26-inch-diameter and a 30-inch-diameter pipeline. Approximately 1600 feet of the abandonment and replacement would occur south of the river and 300 feet would occur north of the river. No construction activities would occur on these two pipelines in the active river as this section was previously buried at a sufficient depth. The replacement pipelines would be offset 100 feet west of the existing pipelines. Additionally, Northwest would remove a 665-foot length of 26-inch-diameter pipeline from the stream channel which was previously abandoned in-place. Northwest would construct a permanent stabilization structure on the north bank and a permanent habitat enhancement structure near the south bank.

The location of the project facilities is shown in appendix 1, figures 1–3.

Land Requirements for Construction

Replacement of the proposed facilities would require the use of 22.2 acres of land, including 6.0 acres of existing right-of-way (ROW), 10.7 acres of new ROW, 4.4 acres of industrial land located 3.3 miles to the west in the town of Auburn, and 1.1 acres of unimproved open land located 1400 feet north of the pipeline work area. The final permanent ROW would be 3.9 acres.

The EA Process

The National Environmental Policy Act (NEPA) requires the Commission to take into account the environmental impacts that could result from an action whenever it considers the issuance of a Certificate of Public Convenience and Necessity. NEPA also requires us to discover and address concerns the public may have had proposals. We call this ''scoping.'' The main goal of the scoping process is to focus the analysis in the EA on the important environmental issues. By this Notice of Intent, the Commission requests public comments on the scope of the issues it will address in the EA. All comments received are considered during the preparation of the EA. State and local government representatives are encouraged to notify their constituents of this proposed action and encourage them to comment on their areas of concern.

The EA will discuss impacts that could occur as a result of the construction and operation of the proposed project under these general headings:

- geology and soils
- water resources, fisheries, and wetlands
- vegetation and wildlife
- endangered and threatened species
- public safety
- land use
- cultural resources
- air quality and noise
- hazardous waste

We will also evaluate possible alternatives to the proposed project or portions of the project, and make recommendations on how to lessen or avoid impacts on the various resource areas.

Our independent analysis of the issues will be in the EA. Depending on the comments received during the scoping process, the EA may be published and mailed to Federal, state, and local agencies, public interest groups, interested individuals, affected landowners, newspapers, libraries, and the Commission's official service list for this proceeding. A comment period will be allotted for review if the EA is published. We will consider all comments on the EA before we make our recommendations to the Commission.

To ensure our comments are considered, please carefully follow the instructions in the public participation section beginning on page 4.

Currently Identified Environmental Issues

We have already identified several issues that we think deserve attention based on a preliminary review of the proposed facilities and the environmental information provided by Northwest. This preliminary list of issues may be changed based on your comments and our analysis.

- Construction in a stream channel used by the federally threatened Puget Sound Chinook salmon and bull trout and the candidate species Coho salmon.
- Construction of fish habitat enhancement logjams near the south bank.
- Use of temporary and permanent ROW on the Muckleshoot Indian Reservation.
- Construction of a bank stabilization structure on the north side of the White River channel.
- Clearing of a 5.8-acre area of forest and scrub-shrub vegetation; and the disturbance of a 2-acre riparian area and a 0.1 acre area of wetland.

Public Participation

You can make a difference by providing us with your specific comments or concerns about the project. By becoming a commentor, your concerns will be addressed in the EA and considered by the Commission. You should focus on the potential environmental effects of the proposal, alternatives to the proposal, and measures to avoid or lessen environmental impact. The more specific your comments, the more useful they will be. Please carefully follow these instructions to ensure that your comments are received in time and properly recorded.

- Send two copies of your letter: David P. Boergers, Secretary, Federal Energy Regulatory Commission, 888 First St., NW., Room 1A, Washington, DC 20426.
- Label one copy of the comments for the attention of Gas Group 2.
- Reference Docket No. DP00–141–000.
- Mail your comments so that they will be received in Washington, DC on or before June 12, 2000.

Becoming an Intervenor

In addition to involvement in the EA scoping process, you may want to become an official party to the proceeding known as an ''intervenor.'' Intervenors play a more formal role in the process. Among other things, intervenors have the right to receive copies of case-related Commission documents and filings by other intervenors. Likewise, each intervenor must provide 14 copies of its filings to the Secretary of Commission and must send a copy of its filings to all other parties on the Commission's service list for this proceeding. If you want to become an intervenor you must file a motion to intervene according to Rule 214 of the Commission's Rules of Practice and Procedure (18 CFR 385.214) (see appendix 2). Only intervenors have the right to seek rehearing of the Commission's decision.

008512

Affected landowners and parties with environmental concerns may be granted intervenor status upon showing good cause by stating that they have a clear and direct interest in this proceeding which would not be adequately represented by any other parties. You do not need intervenor status to have your environmental comments considered.

Additional information about the proposed project is available from Mr. Paul McKee of the Commission's Office of External Affairs at (202) 208–1088 or on the FERC website (www.ferc.fed.us) using the ''RIMS'' link to information in this docket number. Click on the ''RIMS'' link, select ''Docket #'' from the RIMS Menu, and follow the instructions. For assistance with access to RIMS, the RIMS helpline can be reached at (202) 208–2222.

Similarly, the ''CIPS'' link on the FERC Internet website provides access to the texts of formal documents issued by the Commission, such as orders, notices, and rulemakings. From the FERC Internet website, click on the ''CIPS'' link, select ''Docket #'' from the CIPS menu, and follow the instructions. For assistance with access to CIPS, the CIPS helpline can be reached at (202) 208–2474.

Linwood A. Watson, Jr.,

Acting Secretary.

[FR Doc. 00–12469 Filed 5–17–00; 8:45 am]

BILLING CODE 6717–01–M

ENVIRONMENTAL PROTECTION AGENCY

[FRL–6702–6]

Agency Information Collection Activities: Questionnaire for Nominees for the Annual National Clean Water Act Recognition Awards Program (National Wastewater Management Excellence Awards Program)

AGENCY: Environmental Protection Agency (EPA).

ACTION: Notice.

SUMMARY: In compliance with the Paperwork Reduction Act (44 U.S.C. 3501 *et seq.*), this notice announces that EPA is planning to submit the following continuing Information Collection Request (ICR) to the Office of Management and Budget (OMB): Questionnaire for the Annual National Clean Water Act Recognition Awards Program (National Wastewater Management Excellence Awards Program) EPA ICR Number 1287.05, and OMB Control Number 2040–0101, approved through December 31, 2000. Before submitting the ICR to OMB for review and approval, EPA is soliciting comments on specific aspects of the proposed information collection as described below.

DATES: Comments must be submitted on or before July 17, 2000.

ADDRESSES: Office of Water, Office of Wastewater Management, Municipal Support Division, Municipal Assistance Branch, 1200 Pennsylvania Ave., NW, Washington, DC 20460.

FOR FURTHER INFORMATION CONTACT: Maria E. Campbell, 202–260–5815/Fax Number 202–260–0116/e-mail at campbell.maria@epa.gov.

SUPPLEMENTARY INFORMATION:

Affected entities: Entities potentially affected by this action are public wastewater treatment plants, municipalities, industries, universities, manufacturing sites, and States.

Title: Questionnaire for Nominees for the Annual National Clean Water Act Recognition Awards Program (National Wastewater Management Excellence Awards Program) (OMB Control No. 2040–0101, EPA ICR No. 1287.05) expires 12/31/00.

Abstract: This ICR requests re-approval to collect data from EPA's National Clean Water Act Recognition Awards nominees. The awards are for the following program categories: Operations and Maintenance (O&M), Beneficial Use of Biosolids (Biosolids), Combined Sewer Overflow Controls (CSO), and Storm Water (SW) Management.

Note: Information collection approval for the Pretreatment awards program is included in the National Pretreatment Program ICR (OMB Control No. 2040–0009, EPA ICR No. 0003.08), approved through May 31, 2000. The National Clean Water Act Recognition Awards Program is managed by EPA's Office of Wastewater Management (OWM). The Awards Program is authorized under section 501(e) of the Clean Water Act, as amended. The Awards Program is intended to provide recognition to communities and industries which have demonstrated outstanding technological achievements, innovative processes, devices or other outstanding methods in their waste treatment and pollution abatement programs. Approximately 50 awards are presented annually. The achievements of these award winners are summarized in reports, news articles, national publications, and **Federal Register** Notice.

The information is collected from approximately 200 respondents at a total cost of $79,200 per year and 2800 burden hours, including $46,000 and 1600 burden hours for the respondents' time, and $33,200 and 1200 burden hours for the States' review time. Submission of information on behalf of the respondents is voluntary. No confidential information is requested. The Agency only collects information from award nominees under a currently valid OMB control number. The OMB control numbers for EPA's regulations are listed in 40 CFR part 9 and 48 CFR Chapter 15. Based on the data collection, national panels will evaluate the nominees' efforts and recommend finalists. The collections will be used by the respective awards programs to evaluate and determine which abatement achievements should be recognized.

As currently structured, the O&M awards program has nine categories which recognize municipal achievements. The biosolids awards program has four categories which recognize municipal biosolids operations, technology and research achievements, and public acceptance; the CSO awards program has one category which recognizes municipal programs; and the SW awards program has two categories which recognize municipal and industrial programs. All nominees are screened for environmental compliance by the States and EPA. Municipalities and institutions desiring to be considered for National awards voluntarily complete the questionnaires and provide design and operating information about their facility or programs. The award nominations are reviewed by State/Regional officials prior to forwarding them for National award consideration. At the National level, award reviews involve Federal officials and review panels comprised of representatives of EPA, State water pollution control agencies, and affiliated associations.

The EPA would like to solicit comments to:

(i) Evaluate whether the proposed collection of information is necessary for the proper performance of the functions of the agency, including whether the information will have practical utility;

(ii) Evaluate the accuracy of the agency's estimate of the burden of the proposed collection of information, including the validity of the methodology and assumptions used;

(iii) Enhance the quality, utility, and clarity of the information to be collected; and

(iv) Minimize the burden of the collection of information on those who are to respond, including through the use of appropriate automated electronic, mechanical, or other technological collection techniques or other forms of information technology, e.g., permitting electronic submission of responses.

Respondents: Officials at public wastewater treatment plants,

municipalities, industries, universities, States and manufacturing sites.

Estimated Number of Respondents: 200.

Estimated Number of Responses Per Respondent: 1.

Frequency of Collection: Once a year.

Estimated Total Annual Burden on Respondents: 2800 hours (1600 hours for the response time and 1200 hours for the States' review time).

Burden means the total time, effort, or financial resources expended to generate, maintain, retain, disclose, or provide information to EPA. This estimate includes the time needed to review instructions, collect, validate, and verify information; complete and review the collection of information; and transmit the information to EPA.

Dated: May 2, 2000.

Michael B. Cook,

Director, Office of Wastewater Management.

[FR Doc. 00–12523 Filed 5–17–00; 8:45 am]

BILLING CODE 6560–50–P

ENVIRONMENTAL PROTECTION AGENCY

[FRL–6702–2]

Agency Information Collection Activities: Submission for OMB Review; Comment Request; Performance Track Program Level One: The Environmental Achievement Track

AGENCY: Environmental Protection Agency (EPA).

ACTION: Notice.

SUMMARY: In compliance with the Paperwork Reduction Act (44 U.S.C. 3501 *et seq.*), this document announces that the following Information Collection Request (ICR) has been forwarded to the Office of Management and Budget (OMB) for review and approval: Performance Track Program Level One: The Environmental Achievement Track, ICR Number 1949.01. The ICR describes the nature of the information collection and its expected burden and cost; where appropriate, it includes the actual data collection instrument.

DATES: Comments must be submitted on or before June 19, 2000.

FOR FURTHER INFORMATION CONTACT: For a copy of the ICR contact Sandy Farmer at EPA by phone at (202) 260–2740, by E-Mail at Farmer.Sandy@epamail.epa.gov or download off the Internet at *http://www.epa.gov/icr* and refer to EPA ICR No.1949.01. For technical questions about the ICR contact Ken Munis, at 202–260–9560.

SUPPLEMENTARY INFORMATION:

Title: Performance Track Program Level One: The Environmental Achievement Track, EPA ICR No. 1949.01. This is a new collection.

Abstract: The Environmental Protection Agency is developing a national Performance Track Program. In the July, 1999 report, ''Aiming for Excellence: Actions to Encourage Stewardship and Accelerate Environmental Progress,'' the Agency committed to developing a Performance Track Program to reward and motivate top environmental performance.

The Performance Track is a two-tiered, voluntary program designed to promote leadership in environmental protection through the use of Environmental Management Systems (EMS), Pollution Prevention Programs, and public reporting. Qualifying program participants will benefit from a variety of incentives, such as public recognition, reduced monitoring and reporting, and operational flexibility. EPA will announce and begin to solicit applications for level one of the Performance Track, the Environmental Achievement Track, in June of 2000. Level two, the Environmental Stewardship Track, will be announced in May of 2001.

Participation in the Performance Track program is voluntary. To be considered for acceptance into the program, applicants for the Environmental Achievement Track will be asked to submit information documenting their EMS, history of compliance with EPA regulations, commitment to continuous environmental performance improvement, and commitment to public outreach and performance reporting. Upon acceptance to the Environmental Achievement Track, participants will be required to make environmental performance reports accessible to the public.

An agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a currently valid OMB control number. The OMB control numbers for EPA's regulations are listed in 40 CFR part 9 and 48 CFR Chapter 15. The **Federal Register** document required under 5 CFR 1320.8(d), soliciting comments on this collection of information was published on 3/02/2000 (65 FR 11305); no comments were received.

Burden Statement: The annual public reporting and record keeping burden for this collection of information is estimated to average 252 hours per response. Burden means the total time, effort, or financial resources expended by persons to generate, maintain, retain, or disclose or provide information to or for a Federal agency. This includes the time needed to review instructions; develop, acquire, install, and utilize technology and systems for the purposes of collecting, validating, and verifying information, processing and maintaining information, and disclosing and providing information; adjust the existing ways to comply with any previously applicable instructions and requirements; train personnel to be able to respond to a collection of information; search data sources; complete and review the collection of information; and transmit or otherwise disclose the information.

Respondents/Affected Entities: Various Industries

Estimated Number of Respondents: 250.

Frequency of Response: Annually .

Estimated Total Annual Hour Burden: 50,450 hours.

Estimated Total Annualized Capital, O&M Cost Burden: 0

Send comments on the Agency's need for this information, the accuracy of the provided burden estimates, and any suggested methods for minimizing respondent burden, including through the use of automated collection techniques to the following addresses. Please refer to EPA ICR No. 1949.01 in any correspondence.

Ms. Sandy Farmer, U.S. Environmental Protection Agency, Office of Environmental Information, Collection Strategies Division (2822), 1200 Pennsylvania Ave, NW, Washington, DC 20460;

and

Office of Information and Regulatory Affairs, Office of Management and Budget, Attention: Desk Officer for EPA, 725 17th Street, NW, Washington, DC 20503.

Dated: May 11, 2000.

Oscar Morales,

Director, Collection Strategies Division.

[FR Doc. 00–12518 Filed 5–17–00; 8:45 am]

BILLING CODE 6560–50–P

008514

ENVIRONMENTAL PROTECTION AGENCY

[FRL–6701–2]

National Drinking Water Advisory Council; Contaminant Candidate List and 6-Year Review of Existing Regulations Working Group; Notice of Open Meeting

AGENCY: Environmental Protection Agency.

ACTION: Notice.

Under Section 10(a)(2) of Public Law 92–423, ''The Federal Advisory Committee Act,'' notice is hereby given that a meeting of the Contaminant Candidate List (CCL) Regulatory Determination and 6-Year Review of Existing Regulations Working Group of the National Drinking Water Advisory Council established under the Safe Drinking Water Act, as amended (42 U.S.C. S300f *et seq.*), will be held June 5–6, 2000, from 8:30 a.m.–5:00 p.m. ET (approximately), at RESOLVE, 1255 23rd Street, NW, Suite 275, Washington, DC 20037. The meeting is open to the public to observe and statements will be taken from the public as time allows. Seating is limited.

This is the first of three scheduled meetings to address the 6-Year Review of Existing Regulations. The purpose of the meeting is to begin the process of developing a protocol for selecting existing National Primary Drinking Water Regulation (NWPDRs) for possible revision. As a starting point, the Working Group will review a strawman protocol developed by U.S. EPA. Final recommendations will be forwarded to the full NDWAC for further consideration.

For more information, contact April McLaughlin, Designated Federal Officer, Contaminant Candidate List and Regulatory Determination and 6-Year Review of Existing Regulations Working Group, U.S. EPA (4607), Office of Ground Water and Drinking Water, 401 M Street SW, Washington, DC 20460. The telephone number is 202–260–5524, fax 202–401–6135, and e-mail *mclaughlin.april@epa.gov.*

Dated: May 8, 2000.

Janet Pawlukiewicz,

Acting Designated Federal Officer, National Drinking Water Advisory Council.

[FR Doc. 00–12521 Filed 5–17–00; 8:45 am]

BILLING CODE 6560–50–P

FEDERAL COMMUNICATIONS COMMISSION

Notice of Public Information Collection(s) Being Reviewed by the Federal Communications Commission

May 12, 2000.

SUMMARY: The Federal Communications Commission, as part of its continuing effort to reduce paperwork burden invites the general public and other Federal agencies to take this opportunity to comment on the following information collection(s), as required by the Paperwork Reduction Act of 1995, Public Law 104–13. An agency may not conduct or sponsor a collection of information unless it displays a currently valid control number. No person shall be subject to any penalty for failing to comply with a collection of information subject to the Paperwork Reduction Act (PRA) that does not display a valid control number. Comments are requested concerning: (a) Whether the proposed collection of information is necessary for the proper performance of the functions of the Commission, including whether the information shall have practical utility; (b) the accuracy of the Commission's burden estimate; (c) ways to enhance the quality, utility, and clarity of the information collected; and (d) ways to minimize the burden of the collection of information on the respondents, including the use of automated collection techniques or other forms of information technology.

DATES: Written comments should be submitted on or before June 19, 2000. If you anticipate that you will be submitting comments, but find it difficult to do so within the period of time allowed by this notice, you should advise the contact listed below as soon as possible.

ADDRESSES: Direct all comments to Judy Boley, Federal Communications Commission, Room 1–C804, 445 12th Street, SW, DC 20554 or via the Internet to jboley@fcc.gov.

FOR FURTHER INFORMATION CONTACT: For additional information or copies of the information collection(s), contact Judy Boley at 202–418–0214 or via the Internet at jboley@fcc.gov.

SUPPLEMENTARY INFORMATION:

OMB Control No.: 3060–0410.

Title: Forecast of Investment Usage Report and Actual Usage of Investment Report.

Report No.: FCC Reports 495–A and FCC 495–B.

Type of Review: Extension of a currently approved collection.

Respondents: Business or other for-profit.

Number of Respondents: 300.

Estimated Time Per Response: 40 hours.

Frequency of Response: Annual reporting requirement.

Total Annual Burden: 12,000 hours.

Total Annual Cost: N/A.

Needs and Uses: The Forecast of Investment Usage Report and the Actual Use of Investment Report implement the FCC's *Joint Cost Order,* which requires that certain telephone plant investments used for both regulated and nonregulated purposes be allocated on the basis of forecasted regulated and nonregulated use. The detection and correction of forecasting errors requires reporting of both forecasted and actual investment usage data. Sixty incumbent local exchange carriers (ILECs) file the annual reports based on study areas. If the data were collected less frequently, the Commission would not have the data in a timely manner to perform its functions. These annual reports are designed to obtain the data that are needed to evaluate ILECs proposed annual tariffs and to ensure against cross subsidization of nonregulated operations by related operations. These regulated activities are in the interests of, and for the benefit of, the ratepayers. These data are also a part of the data necessary to support the Commission's audit and other oversight functions.

Federal Communications Commission.

Magalie Roman Salas,

Secretary.

[FR Doc. 00–12497 Filed 5–17–00; 8:45 am]

BILLING CODE 6712–01–P

FEDERAL COMMUNICATIONS COMMISSION

[Report No. 2410]

Petitions for Reconsideration of Action in Rulemaking Proceeding

May 12, 2000.

Petitions for Reconsideration have been filed in the Commission's rulemaking proceeding listed in this Public Notice and published pursuant to 47 CFR Section 1.429(e). The full text of these documents are available for viewing and copying in Room CY–A257, 445 12th Street, S.W., Washington, DC or may be purchased from the Commission's copy contractor, ITS, Inc. (202) 857–3800. Oppositions to these petitions must be filed by June 2, 2000. See Section 1.4(b)(1) of the Commission's rules (47 CFR 1.4(b)(1)). Replies to an opposition must be filed within 10 days after the time of filing oppositions has expired.

Subject: Implementation of the Satellite Home Viewer Improvement Act of 1999 (CS Docket No. 99–363).

Number of Petitions Filed: 2.

Federal Communications Commission.

Magalie Roman Salas,

Secretary.

[FR Doc. 00–12498 Filed 5–17–00; 8:45 am]

BILLING CODE 6712–01–M

FEDERAL ELECTION COMMISSION

Sunshine Act Meetings

AGENCY: Federal Election Commission.

Cancellations of Previously Announced Meetings

Tuesday, May 16, 2000, 10 a.m.

Meeting closed to the public.

Thursday, May 18, 2000, 10 a.m.

Meeting open to the public.

DATE AND TIME: Tuesday, May 23, 2000 at 10 a.m.

PLACE: 999 E Street NW, Washington, DC.

STATUS: This meeting will be closed to the public.

ITEMS TO BE DISCUSSED:

Compliance matters pursuant to 2 U.S.C. 437g.

Audits conducted pursuant to 2 U.S.C. 437g, 438a(b), and Title 26, U.S.C.

Matters concerning participation in civil actions or proceedings or arbitration.

Internal personnel rules and procedures or matters affecting a particular employee.

DATE AND TIME: Thursday, May 25, 2000 at 10 a.m.

PLACE: 999 E Street NW, Washington, DC (ninth floor).

STATUS: This meeting will be open to the public.

ITEMS TO BE DISCUSSED:

Correction and approval of Minutes

Draft Advisory Opinion 2000–06
Gerald M. Moan on behalf of the 2000 Convention Committee of the Reform Party U.S.A.

Draft Advisory Opinion 2000–07
Alcatel USA, Inc. by counsel, Jonathan B. Newton

Proposal to initiate a Notice of Proposed Rulemaking on Political Committee Definition (11 CFR 100.5)

Administrative matters.

PERSON TO CONTACT FOR INFORMATION: Ron Harris, Press Officer, telephone: (202) 694–1220.

Mary W. Dove,

Acting Secretary of the Commission.

[FR Doc. 00–12623 Filed 5–16–00; 11:39 am]

BILLING CODE 6715–01–M

FEDERAL HOUSING FINANCE BOARD

Sunshine Act Meeting

Announcing an Open Meeting of the Board

TIME AND DATE: 10 a.m., Monday, May 22, 2000.

PLACE: Board Room, Second Floor, Federal Housing Finance Board, 1777 F Street, NW, Washington, DC 20006.

STATUS: The entire meeting will be open to the public.

MATTERS TO BE CONSIDERED DURING PORTIONS OPEN TO THE PUBLIC:

- Proposed Rule: FHLBank Capital Structure.

CONTACT PERSON FOR MORE INFORMATION: Elaine L. Baker, Secretary to the Board, (202) 408–2837.

William W. Ginsberg,

Managing Director.

[FR Doc. 00–12631 Filed 5–16–00; 2:22 pm]

BILLING CODE 6725–01–P

DEPARTMENT OF HEALTH AND HUMAN SERVICES

Office of the Secretary

Office of Public Health and Science; Availability of Funds and Requests for Applications for Cooperative Agreements for the National Community Centers of Excellence (CCOE) in Women's Health Program

AGENCY: Office of the Secretary, Office of Public Health and Science, Office on Women's Health.

Purpose

To provide recognition and funding to community-based programs that unite promising approaches in women's health across five components: (1) Comprehensive health service delivery, (2) training for lay and professional health providers, (3) community-based research, (4) public education/outreach, and (5) leadership development for women as health care consumers and providers. The focus of the CCOE initiative is not to develop new programs or to fund direct service or research, but rather to integrate, coordinate, and strengthen linkages between activities that are already underway in the community in order to reduce fragmentation in women's health services and activities. Another major purpose of the CCOE program is to foster the replication of promising models and strategies that coordinate and integrate women's health activities at the community level and improve health outcomes for underserved women.

The CCOE program addresses women's health from a women-centered, holistic, multi-disciplinary, and community-based perspective (see definitions below). Women's health issues are defined in the context of women's lives, including their multiple social roles and the importance of relationships with other people to their lives. This definition of women's health encompasses both mental and physical health (including oral health) and spans the life course.

The CCOE program will operate under cooperative agreements, to allow a collaborative relationship between the CCOE and the federal agencies. The funding agencies of the Department of Health and Human Services (HHS) include the Office on Women's Health; the Office of Minority and Women's Health in the Bureau of Primary Health Care of the Health Resources and Services Administration; and the Office of Minority Health. These agencies will provide technical assistance and oversight as necessary for the implementation, conduct, and assessment of program activities.

HHS is committed to achieving the health promotion and disease prevention objectives of Healthy People 2010. Emphasis will be placed on aligning activities and programs with the Healthy People 2010: Goal 2—eliminating health disparities due to age, gender, race/ethnicity, education, income, disability, living in rural localities, or sexual orientation. More information on the Healthy People 2010 objectives may be found on the Health People 2010 web site: *http://www.health.gov/healthypeople.* Copies of the Healthy People 2010: Conference Edition Volumes I and II can be purchased by calling (301) 468–5960 (cost $22.00). The reference document entitled ''Healthy People 2010: Understanding and Improving Health'' is available for $9.00. Another reference is the Healthy People 2000 Review—1998–99. One free copy may be obtained from the National Center for Health Statistics (NCHS), 6525 Belcrest Road, Room 1064, Hyattsville, MD 20782 or telephone (301) 436–8500 (*DHHS Publication No,. (PHS) 99–1256). This document may also be downloaded from the NCHS web site: http://www.cdc.gov/nchs.

Program Goals

1. Reducing the fragmentation of services and access barriers that women encounter by providing a framework for the coordination and integration of comprehensive health services with research, training, and leadership

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activities in the community to advance women's health.

2. Creating healthier communities with a more integrated and coordinated infrastructure for women's health targeted at underserved women.

3. Empowering underserved women as health care consumers and decision-makers.

4. Increasing the women's health knowledge base with rigorous, community-based research that reflects the health needs and issues of underserved women.

5. Increasing the number of health professionals who have training in working with underserved communities, boosting the number of girls who pursue health careers, and increasing the leadership skills and opportunities for women in the community and those who provide health services to the community.

6. Spreading the successes of model women's health strategies and new innovations to communities across the country.

7. Eliminating health disparities for women who are underserved due to age, gender, race/ethnicity, education, income, disability, living in rural localities, or sexual orientation.

Background

The National Centers of Excellence in Women's Health (CoEs) have been functioning in academic health centers since 1996. The unique feature of the CoE program has been the way it has brought together the disparate set of women's health activities that take place in academic health centers: linking together women's health research, medical education, clinical services, community outreach, and leadership development for women in academic medicine to create a more dynamic and informed system of care. The primary role of the CoEs has been to unite women's health activities and programs, promote multi-disciplinary and cross-departmental collaborations, and institutionalize a more integrative approach to women's health in academic health centers. The success of the CoE model has been rooted in this integrative approach.

The intent of the National Community Centers of Excellence in Women's Health Program (CCOE) is to maintain an emphasis on the linkage, coordination, and sharing of knowledge between different activities in women's health. Like the CoE program, the CCOE program will use an integrative approach, with the funding focused on linking activities rather than on creating new ones from the ground up. The CCOE program will adopt the components of the CoE Program (women's health research, health provider training, comprehensive clinical services, community outreach, and leadership development), but will focus on the community-based organization as the nucleus for operationalizing the new model. The CCOE program will also add a technical assistance component, so that the lessons learned from this unique model can be replicated in other communities around the country.

The CCOE program will be distinct from the CoE program in two important ways:

1. Applicants must be a community hospital, community health center, or other community-based organization. One award will be reserved for a community health center funded under Section 330 of the Public Health Service Act. Applications from academic health centers or organizations that are part of academic health centers will not be accepted as the CoE model is designed for such organizations.

2. To increase the geographic range of the Center of Excellence model, applications will be accepted from organizations in all of the American States and Territories except those that currently have CoE programs including CA, CT, IL, IN, LA, MA, MI, NC, PA, PR, WA, and WI.

As noted in Healthy People 2010, which outlines the health goals for our Nation, most successful community health initiatives involve multiple disciplines and interventions, linking community strengths and resources so that the whole is indeed greater than the sum of its parts. The CCOE program will link resources across women's health activities and disciplines to increase awareness/ knowledge, and to move women's health efforts forward more efficiently.

Eligible Applicants

Applicants must be a public or private nonprofit community-based hospital, community health center, or community-based organization serving underserved women. Academic health centers or organizations that are part of academic health centers are not eligible for funds under this announcement. To increase the geographic range of the overall Center of Excellence model, applications will be accepted from organizations in all of the American States and Territories except those which already have a National Center of Excellence in Women's Health (CoE) program. Thus applications will not be accepted from programs in the following states: CA, CT, IL, IN, LA, MA, MI, NC, PA, PR, WA, WI. One award will be reserved for a community health center funded under section 330 of the Public Health Service Act.

Deadline

To receive consideration, applications must be received by June 30, 2000 at 2 p.m. (Eastern Time). Applications will be considered as meeting the deadline if they are: (1) Received on or before the deadline date, or (2) postmarked on or before the deadline date and received in time for orderly processing. A legibly dated receipt from a commercial carrier or U.S. Postal Service will be accepted in lieu of a postmark. Private metered postmarks will not be accepted as proof of timely mailing. Application submitted by facsimile transmission (FAX) or any other electronic format will not be accepted. Applications which do not meet the deadline will be considered late and will be returned to the applicant unread.

Addresses/Contacts

Applications must be prepared using Form PHS 5161–1 (Revised June 1999). Application kits and questions regarding programmatic information and/or requests for technical assistance in the preparation of grant applications should be directed in writing to Ms. Anna Kindermann, Division of Program Management, Office on Women's Health, Parklawn Building, Room 16A–55, 5600 Fishers Lane, Rockville MD 20857, email: akindermann@osophs.dhhs.gov.

Completed applications are to be submitted to: Ms. Anna Kindermann, Division of Program Management, Office on Women's Health, Parklawn Building, Room 16A–55, 5600 Fishers Lane, Rockville MD 20857.

Technical assistance on budget and business aspects of the application may be obtained from Ms. Carolyn A. Williams, Grants Management Officer, Division of Management Operations, Office of Minority Health, Office of Public Health and Science, Rockville, MD, 20852, telephone (301) 594–0758, Ext. 157.

Availability of Funds

Approximately $450,000 is available for award in FY 2000 under this announcement. It is projected that awards of up to $150,000 total costs (direct and indirect) for a 12-month period will be made to approximately 3 competing applicants.

Period of Support

The start date for the cooperative agreement is September 30, 2000. Support may be requested for a total project period not to exceed 5 years.

Noncompeting continuation awards of up to $150,000 will be made subject to satisfactory performance and availability of funds.

Use of Grant Funds

Project Requirements

The major component of a CCOE program must consist of activities aimed at developing and strengthening a framework for bringing together a comprehensive array of services for women, and connecting those with promising strategies to: train a cadre of health care providers that are capable of addressing underserved women's health needs at the community level with an emphasis on prevention or moderation of illness or injury that appear controllable through individual knowledge and behavior; conduct participatory, community-based research in women's health; enhance public education and outreach activities in women's health with an emphasis on prevention or moderation of illness or injury that appear controllable through individual knowledge and behavior; and promote leadership/career development for women in the health professions and women/girls in the community. A project may develop outreach and education materials, training programs, and leadership development activities/ materials. Award recipients must also, with input from community representatives, put into place and track a set of measurable objectives for improving health outcomes and decreasing health disparities for underserved women in the community.

Each CCOE must also demonstrate an ability to foster the transfer of lessons learned and successful strategies. These may include either process-based lessons (for example: How to bring multiple community partners together) or outcomes-based lessons (for example: How to increase diabetes screening and control through improved outreach, education, and treatment). The CCOEs must foster the replication of promising models from their sites through activities such as showcasing them at meetings and workshops; providing direct technical assistance to other communities; developing replication guides/materials; and providing technical assistance to health professionals, directly or through their professional organizations, interested in working with under-served women in the community.

Use of Funds

A majority (75%) of the funds from the CCOE award must be targeted at staffing and efforts aimed at coordinating and integrating the major components of the CCOE program. The remainder (25%) of the award funding must be targeted at staff and efforts to foster the transfer of lessons learned/ successful strategies from the CCOE program.

Funds may be used to cover costs of personnel, consultants, supplies (including screening, education, and outreach supplies), equipment, and grant related travel. Funds may not be used for construction, building alterations, medical treatment, or renovations. All budget requests must be fully justified in terms of the proposed goals and objectives and include a computational explanation of how costs were determined.

Criteria for Evaluating Applications

Review of Applications

Applications will be screened upon receipt. Those that are judged to be incomplete, non-responsive to the announcement or nonconforming will be returned without comment. Accepted application will be reviewed for technical merit in accordance with PHS policies. Applications will be evaluated by a technical review panel composed of government experts in the fields of program management, community service delivery, community outreach, health education, community research, and community leadership development. Consideration will be given to applicants that demonstrate progress toward eliminating health disparities through the integration of services, research, education, training, and leadership/career development. Preference will also be given to applicants located in rural, medically underserved areas. Applicants are advised to pay close attention to the specific program guidelines and general instructions in the application kit.

Application Requirements

Each applicant for a cooperative agreement funded under this announcement must:

1. Be a sustainable organization with an established network of partnering organizations capable of ensuring a coordinated women's health system in the community. The network of partnering organizations must have the capacity to plan and coordinate comprehensive health services (as defined below) for women and unite them with community-based women's health research, teaching/training opportunities in community women's health, leadership opportunities for women in health, and community outreach/education activities in women's health.

2. Demonstrate the ways in which the organization and the care that is coordinated through its partners are women-focused and sensitive to the importance of patient/provider communication/ relationships for medically underserved women of all ages. The care that is coordinated through this organization must be focused on health promotion, disease prevention, and treatment.

3. Detail/specify the roles and resources that each partnership organization will bring to the project and state the duration and terms of agreement, as confirmed by a signed agreement between the applicant organization and each partner. The documents must be signed by individuals with the authority to represent the organization (*e.g.,* president chief executive officer, executive director).

Application Review Criteria: The technical review of applications will consider the following factors:

Factor 1: Background—10%

Adequacy of demonstrated knowledge of systems of health care for underserved women at the local level; demonstrated need within the proposed community and target population of underserved women; demonstrated support and established linkages in order to conduct proposed National Community Center of Excellence in Women's Health model; extent and documented outcome of past efforts/ activities with underserved women.

Factor 2: Objectives—10%

Merit of the objectives outlined by the applicant to address the CCOE program goals (outlined above) in a way relevant to community needs and resources. Objectives should be measurable and attainable in the stated time frame.

Factor 3: Methodology—55%

I. Extent to which the applicant demonstrates access to medically underserved women.

II. Soundness of pre-existing community resources and linkages that can be built upon and coordinated to meet the requirements of the CCOE program.

III. Appropriateness of proposed approach and specific activities described to address each element of the National Community Center of Excellence in Women's Health program including 1.comprehensive women's health services, 2. public outreach and education, 3. training for professional and lay health care workers working

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with underserved women, 4. participatory community-based research, 5. leadership/career development for women providers, and women/girls in the community, and 6. ability to train others in lessons learned and replication of successful strategies.

IV. Soundness of evaluation objectives for measuring program effectiveness and changes in health outcomes.

Factor 4: Management Plan—15%

Applicant organization's capability to manage and evaluate the project as determined by: the qualifications of proposed staff or requirements for ''to be hired'' staff, proposed staff level of effort, management experience of the lead agency; and the experience of each partnership organization as it relates to its defined roles and to the National Center of Excellence in Women's Health model.

Factor 5: Evaluation—10%

Thoroughness, feasibility and appropriateness of the evaluation design, and data collection and analysis procedures for the establishment of a National Community Center of Excellence in Women's Health. Potential for replication of the project for similar target populations and communities.

Award Criteria

Funding decisions will be determined by the *Director, Division for Program Management, Office on Women's Health,* and will take under consideration: the recommendations and ratings of the review panel; funding preference; geographic distribution; and health problem areas having the greatest impact on women's health. Consideration will be given to projects proposed to be implemented in Empowerment Zones, Enterprise Communities; and preference to those in rural, medically underserved areas.

Definitions

For the purposes of this cooperative agreement program, the following definitions are provided:

Community-based: In which the locus of control and decision-making powers are located at the community level, representing the community or a significant segment of the community.

Community-based Organization: Public and private, non-profit organizations which are representative of communities or significant segments of communities.

Community health center: A community-based organization that provides comprehensive primary care and preventive services to medically underserved populations. This includes but is not limited to Federally Qualified health centers, Federally Qualified health center look-alike, Migrant Health Centers, Primary Care Public Housing Health Centers, Healthcare for the Homeless Centers, and other community-based health centers.

Comprehensive women's health services: Services including, but going beyond traditional reproductive health services to address the health needs of underserved women in the context of their lives, including a recognition of the importance of relationships in women's lives, and the fact that women play the role of health providers and decision-makers for the family. Services include basic primary care services; acute, chronic, and preventive services; mental and dental health services; patient education and counseling; promotion of healthy behaviors (like nutrition, smoking cessation, substance abuse services); and enabling services. Ancillary services are also provided such as laboratory tests, X-ray, environmental, and pharmacy services.

Coordinated care: The formal linkages, case management services, partnering arrangements, and patient advocate supports that rationalize women's health resources and help underserved women to navigate through the comprehensive health services they need. Community-based organizations are expected to coordinate with State and local health departments, nonprofit organizations, academic institutions, or other local organizations in the community as appropriate.

Culturally competent: Information and services provided in the language, educational, and cultural context that is most appropriate for the individuals for whom the information and services are intended.

Enabling services: Services that help women access health care, such as transportation, translation, child care, and case management.

Healthy People 2010: A set of national health objectives that outlines the prevention agenda for the Nation. Healthy People 2010 identifies the most significant preventable threats to health and establishes national goals for the next ten years. Individuals, groups, and organizations are encouraged to integrate Healthy People 2010 into current programs, special events, publications, and meetings. Businesses can use the framework, for example, to guide worksite health promotion activities as well as community-based initiatives. Schools, colleges, and civic and faith-based organizations can undertake activities to further the health of all members of their community. Health care providers can encourage their patients to pursue healthier lifestyles and to participate in community-based programs. By selecting from among the national objectives, individuals and organizations can build an agenda for community health improvement and can monitor results over time.

Holistic: Looking at women's health from the perspective of the whole person and not as a group of different body parts. It includes mental as well as physical health.

Integrated: In the CCOE context, the bringing together of the numerous spheres of activity that touch women's health, including clinical services, research, health training, public health outreach and education, and leadership development for women. The goal of this approach is to unite the strengths of each of these areas, and create a more informed and efficient system of women's health for underserved women.

Multi-disciplinary: An approach that is based on the recognition that women's health crosses many disciplines, and that women's health issues need to be addressed across multiple disciplines, such as adolescent health, geriatrics, cardiology, mental health, reproductive health, nutrition, dermatology, endocrinology, immunology, rheumatology, etc.

Participatory, community-based research: Research in which community members participate on equal footing, to maximize the potential for exchange in knowledge and implementation of research findings. Community members work with researchers to help determine research issues, shape the research process/ objectives, and bring research results back to the community. The shared goal is to maintain scientific rigor in the research methods, while also incorporating the skills, knowledge, and strengths of the participants/ beneficiaries of the research. There is an emphasis on ensuring that research results are translated into practice and communicated back to the community.

Sustainability: An organization's or program's staying power: the capacity to maintain both the financial resources and the partnerships/linkages needed to provide the services demanded by the CCOE program. It also involves the ability to survive change, incorporate needed changes, and seize opportunities provided by a changing environment.

Underserved Women: In the context of the CCOE model, women who encounter barriers to health care that result from any combination of the following characteristics: poverty,

ethnicity and culture, mental or physical state, housing status, geographic location, language, sexual orientation, age, and lack of health insurance.

Women-centered: Addressing the needs and concerns of women in an environment that is welcoming to women, fosters a commitment to women, treats women with dignity, and empowers women through respect and education. The emphasis is on working with women not for women. Women clients are considered active partners in their own health and wellness.

Reporting and Other Requirements

General Reporting Requirements

In addition to those listed above, a successful applicant will submit an annual progress report, an annual Financial Status Report, and a final Progress Report and a final Financial Status Report in the format established by the Office on Women's Health, in accordance with provisions of the general regulations which apply under ''Monitoring and Reporting Program Performance,'' 45 CFR part 74, Subpart J and Part 92

Provision of Smoke-Free Workplace and Nonuses of Tobacco Products by Recipients of PHS Grants

HHS strongly encourages all grant recipients to provide a smoke-free workplace and to promote the nonuse of all tobacco products. In addition, Public Law 103–227, the Pro-Children Act of 1994, prohibits smoking in certain facilities (or in some cases, any portion of a facility) in which regular or routine education, library, day care, health care or early childhood development services are provided to children.

Public Health System Reporting Requirements

This program is subject to the Public Health Systems Reporting Requirements. Under these requirements, a community-based non-governmental applicant must prepare and submit a Public Health System Impact Statement (PHSIS). The PHSIS is intended to provide information to State and local health officials to keep them apprised on proposed health services grant applications submitted by community-based non-governmental organizations within their jurisdictions.

Community-based, non-governmental applicants are required to submit, no later than the Federal due date for receipt of the application, the following information to the head of the appropriate state and local health agencies in the area(s) to be impacted: (a) a copy of the face page of the application (SF 424), (b) a summary of the project (PHSIS), not to exceed one page, which provides: (1) A description of the population to be served, (2) a summary of the services to be provided, (3) a description of the coordination planned with the appropriate state or local health agencies. Copies of the letters forwarding the PHSIS to these authorities must be contained in the application materials submitted to the Office on Women's Health.

State Reviews

This program is subject to the requirements of Executive Order 12372 which allows States the option of setting up a system for reviewing applications from within their States for assistance under certain Federal programs. The application kit to be made available under this notice will contain a listing of States which have chosen to set up a review system and will include a State Single Point of Contact (SPOC) in the State for review. Applicants (other than federally recognized Indian tribes) should contact their SPOCs as early as possible to alert them to the prospective applications and receive any necessary instructions on the State process. For proposed projects serving more than one State, the applicant is advised to contact the SPOC of each affected State. The due date for State process recommendations is 60 days after the application deadline. The Office on Women's Health does not guarantee that it will accommodate or explain its responses to State process recommendations received after that date. (See ''Intergovernmental Review of Federal Programs,'' Executive Order 12372, and 45 CFR Part 100 for a description of the review process and requirements.)

Authority: This program is authorized by 42 U.S.C. 300u–2(a)(1), 300u–3, and 300u–6(e).

OMB Catalog of Federal Domestic Assistance

The OMB Catalog of Federal Domestic Assistance Number is pending.

Dated: May 11, 2000.

David Satcher,

Assistant Secretary for Health and Surgeon General.

[FR Doc. 00–12462 Filed 5–17–00; 8:45 am]

BILLING CODE 4160–17–U

DEPARTMENT OF HEALTH AND HUMAN SERVICES

Administration for Children and Families

[Program Announcement No. ACF/ACYF/HS 2000–08]

FY 2000 Announcement of Financial Assistance To Expand Head Start Enrollment

AGENCY: Administration on Children, Youth and Families (ACYF), ACF, DHHS.

ACTION: FY 2000 Announcement of financial assistance to expand Head Start enrollment.

SUMMARY: The Head Start Bureau of the Administration on Children, Youth and Families announces that competing applications will be accepted to fund Head Start programs to serve Federally-recognized Indian reservations and Alaska Native villages not currently served by Head Start and areas where Head Start services are not available for the children of migrant and seasonal farm workers. It is expected that a total of approximately $3,000,000 will be awarded to support these programs.

DATES: The closing date for receipt of applications is July 21, 2000.

ADDRESSES: Applications should be submitted to: Head Start Unserved Competition, ACYF Operations Center, 1815 North Fort Myer Drive, Suite 300, Arlington, VA 22209, Phone # 1–800–351–2293.

Copies of the program announcement and necessary application forms can be downloaded from the Head Start Web site at: *www.acf.dhhs.gov/programs/hsb*

FOR FURTHER INFORMATION CONTACT: ACYF Operations Center at: 1815 N. Fort Myer Drive, Suite 300, Arlington, VA 22209 or telephone: 1–800–351–2293 or email to: ehs@lcgnet.com

SUPPLEMENTARY INFORMATION:

Part I. General Information

A. Background

Head Start is a national program providing comprehensive developmental services primarily to low-income preschool children and their families. To help enrolled children achieve their full potential, Head Start programs provide comprehensive health, nutritional, educational, social and other services. In addition, Head Start programs are required to provide for the direct participation of the parents of enrolled children in the development, conduct, and direction of local programs. Head Start currently serves approximately 835,000 children

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through a network of 1520 grantees and more than 700 delegate agencies.

While Head Start is targeted primarily towards children whose families have incomes at or below the poverty line, regulations permit up to ten percent of the Head Start children in local programs to be from families who do not meet these low-income criteria. The Head Start statute also requires that a minimum of ten percent of enrollment opportunities in each program be made available to children with disabilities. Such children are expected to be enrolled in the full range of Head Start services and activities in a mainstream setting with their non-disabled peers, and to receive needed special education and related services.

Head Start programs are locally-designed to provide services through a variety of program options, based on the needs of local families that are not being met by existing early childhood and child care programs. Program options include part-day/part-year and full-day/full year center-based programs, home-based programs, combinations of center and home-based options and locally designed options.

Head Start for Children of Migrant and Seasonal Farmworkers

For purposes of establishing eligibility for Migrant Head Start services, a migrant family is defined as follows:

A family with one or more children under the age of compulsory school attendance who changed their residence by moving from one geographic location to another, either intrastate or interstate, within the past two years, for the purpose of engaging in agricultural work.

A seasonal farmworker family is a family engaged primarily in seasonal agricultural labor who has not changed its residence to another geographic location in the preceding two years.

In addition to providing the comprehensive child development services that all Head Start programs provide, Migrant/Seasonal Head Start programs typically operate for extended hours (8 to 12 hours per day), depending on the parents' work schedules, and may serve children five to seven days per week. Migrant/Seasonal programs also typically provide child development and child care services to infants, toddlers and preschool-aged children.

Note: Recent changes to the Head Start Act allow migrant Head Start programs to serve seasonal farmworker families in addition to serving migrant families. However, seasonal farmworker families may be served only where there is an adequate level of services being provided to migrant families. This expansion is targeted on those states in which there are no migrant programs, despite the presence of significant numbers of migrant families. Any request for serving seasonal farmworker families must be fully explained by the applicant, including the reasons such a proposal is being made and why the applicant believes that an adequate level of services is being provided to migrant families.

Statutory and Regulatory Authority

The Head Start program is authorized by the Head Start Act, 42 U.S.C. 9831 *et seq.*, as amended.

The relevant regulations are:

- 45 CFR part 1301, Head Start Grants Administration.
- 45 CFR part 1302, Policies and Procedures for Selection, Initial Funding and Refunding of Head Start Grantees, and for Selection of Replacement Grantees.
- 45 CFR part 1303, Appeal procedures for Head Start grantees and current or prospective delegate agencies.
- 45 CFR part 1304, Program performance standards for the operation of Head Start programs by grantees and delegate agencies.
- 45 CFR part 1305, Eligibility, recruitment, selection, enrollment and attendance in Head Start.
- 45 CFR part 1306, Head Start staffing requirements and program options.
- 45 CFR part 1308, Head Start program performance standards on services for children with disabilities.
- 45 CFR part 1309, Head Start Facilities Purchase
- 45 CFR part 74, Uniform administrative requirements for awards and subawards to institutions of higher education, hospitals, other nonprofit organizations, and commercial organizations; and certain grants and agreements with States, local governments and Indian tribal governments
- 45 CFR part 92, Uniform administrative requirements for grants and cooperative agreements to State and local governments.

B. Purpose of Announcement

This announcement solicits applications from eligible applicants that wish to compete for Head Start grants to serve Federally-recognized Indian reservations not currently served by Head Start and areas where Head Start services are not available for the children of migrant and seasonal farm workers.

The Administration on Children, Youth and Families (ACYF) is also providing funding to expand Head Start services through two other national competitions. Head Start Bureau Program Instruction ACYF–HS–PI–00–02, issued on February 15, 2000, announced the availability of approximately $185,000,000 to increase enrollment in geographical areas currently served by Head Start grantees. In addition, an announcement published in the **Federal Register** on February 29, 2000 describes a competition for approximately $40,000,000 to expand services to children under age three and pregnant women in low-income families through funding additional Early Head Start programs.

C. Eligible Applicants

Expansion applications under this announcement should be submitted under one of the following two categories:

Category 1. Applicants that wish to serve Head Start-eligible children living on Federally-recognized Indian reservations or Alaskan Native villages where a Head Start program does not currently operate.

Eligible applicants are the Tribal governments of unserved reservations that wish to initiate a Head Start program or agencies designated by these Tribal governments.

Category 2. Applicants that wish to serve Head Start-eligible children of migrant or seasonal farm workers in the following states:

Connecticut, Iowa, Kansas, Kentucky, Louisiana, Massachusetts, Mississippi, Missouri, Montana, Oklahoma, and Puerto Rico.

Eligible applicants are local public or private non-profit or for profit agencies.

D. Available Funds

Category 1. For applicants applying to serve preschool children on unserved Indian reservations under Category 1, up to approximately $1,000,000 will be made available. No minimum enrollment level has been established for new Indian Head Start projects. Applicants should propose to serve a sufficient number of children to ensure a viable and cost-efficient program.

Category 2. For applicants applying to serve migrant and seasonal children (infants, toddlers and preschoolers) under Category 2, up to approximately $2,000,000 will be made available. While no minimum enrollment level has been established for Migrant Head Start projects, applicants should indicate a sufficient number of eligible children to ensure a viable and cost-efficient program. Factors to be addressed related to program viability should include the size of the service area proposed and a sufficient population to justify program services in ''off years'' when the population of

migrant children might be low due to crop failure, variations in the migrant stream or natural disasters such as drought or flood.

E. Recipient Share of the Project

Section 640(b) of the Head Start Act requires, with certain exceptions, that at least 20 percent of the total cost of a Head Start project come from sources other than the Federal government. Therefore, a project requesting $100,000 in Federal funds must include a match of at least $25,000 (20 percent of the total project costs). The non-Federal share may be in cash or in-kind, fairly valued, and may include facilities, equipment or volunteer services. In certain instances, as described in Section 640(b) of the Head Start Act, the requirement for a 20 percent non-federal match may be waived in part or in whole.

Expansion funds should not be used to support services that were previously provided without Federal assistance. However, expansion funds can be used to provide Head Start services, either directly or through a delegate agency, to eligible families who are enrolled in other program settings but not currently receiving comprehensive Head Start services.

Applicants may use a variety of strategies for delivering services, including:

- Combining child care, pre-kindergarten and other resources with Head Start funds and directly managing full-day, full-year services.
- Funding new delegate agencies or other appropriate arrangements which will enable local child care agencies, preschool programs or family child care providers to provide Head Start services.

Part II. Application Requirements

A. Purpose of Project Description

The project description provides a major means by which an application is evaluated and ranked to compete with other applications for available assistance. The project description should be concise and complete and should address the activity for which Federal funds are being requested. Supporting documents should be included where they can present information clearly and succinctly. Applicants are encouraged to provide information on their organizational structure, staff, related experience, and other information considered to be relevant. Awarding offices use this and other information to determine whether the applicant has the capability and resources necessary to carry out the proposed project. It is important, therefore, that this information be included in the application. However, in the narrative the applicant must distinguish between resources directly related to the proposed project from those that will not be used in support of the specified project for which funds are requested.

B. General Instructions

Cross-referencing should be used rather than repetition. ACYF is particularly interested in specific factual information and statements of measurable goals in quantitative terms. Project descriptions are evaluated on the basis of substance, not length. Extensive exhibits are not required. (Supporting information concerning activities that will not be directly funded by the grant or information that does not directly pertain to an integral part of the grant funded activity should be placed in an appendix.) Pages should be numbered and a table of contents should be included for easy reference.

The Head Start Bureau is also requesting that applicants provide a summary of the project description which includes:

- The name and address of the applicant agency.
- The category of application (Category 1 or 2).
- The total number of children to be served when the program is fully operational. For applicants applying under Category 2, include the number of infant and toddlers and the number of preschoolers proposed to be served. Also include the number of children of migrant farmworkers and the number of children, if any, of seasonal farmworkers.
- The total ongoing ACYF funds requested for a 12 month period when the project is fully operational. (Do not include one-time start-up funds here.)
- The amount of any proposed one-time start-up funding requested from ACYF.
- The amount and source of any additional funding that will help support the project (i.e., funds that are in addition to Federal Head Start funds and beyond the amounts required to meet non-federal-share requirements).

The community(ies) to be served (name of town(s), city (ies) and county(ies), or the Federally recognized Indian Reservation where children will be served.

- The type of program option(s) proposed (part-day, full-day, home-based, combination program option or locally-designed options such as family child care) and proposed hours per day and days per year that children will be served in each option.
- The target date for beginning full services to new children.

C. Objectives and Need for Assistance

Clearly identify the physical, economic, social, financial, institutional, and/or other problem(s) requiring a solution. The need for assistance must be demonstrated and the principal and subordinate objectives of the project must be clearly stated; supporting documentation, such as letters of support and testimonials from concerned interests other than the applicant, may be included. Any relevant data based on planning studies should be included or referred to. Incorporate demographic data and participant/beneficiary information, as needed.

The Head Start Bureau is particularly interested in the following:

1. A description of the need for Head Start services within the agency's service area. Provide an analysis of changes in family needs, including the implications of welfare reform and employment patterns on family needs for child care and other support services. Include data on eligible, unserved children and families. Identify any special populations of low-income children and families that have been unserved or underserved by Head Start in the past.

2. A description of the services, resources, and capacities of other local child care and early childhood programs and providers serving low-income families and how the proposed strategy for expansion of Head Start will complement and enhance the effectiveness of these other community agencies.

3. Evidence of the involvement of community agencies that serve low-income families, such as child care, early childhood education, health, welfare and other programs, in the assessment of community and family needs and the development of proposed priorities and strategies.

4. A description of the children and families to be served, the type of program option that will be operated and the geographic area in which program services will be expanded. Explain: (i) The rationale for the decisions made and how they are supported by the applicant's community assessment and consultations; (ii) how the proposed expansion will meet the needs of families for full-day, full-year services and (iii) how the proposal will help assure that all families within the service area, regardless of their cultural, linguistic or ethnic backgrounds, have

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an improved opportunity to be considered for Head Start enrollment. Describe any special efforts to reach previously unserved or underserved populations of low-income families.

D. Results or Benefits Expected

Identify the results and benefits to be derived.

The Head Start Bureau is particularly interested in the following:

1. Based on the stated program objectives, identify the specific results or benefits that could be expected for children and families participating in the program. Identify the specific community-wide results or benefits including those resulting from collaborative partnership with other child and family development staff working in a variety of community agencies.

2. Identify both qualitative and quantitative data the program will collect to measure progress towards the stated results or benefits. Identify how the program will determine the extent to which it has achieved its stated objectives.

E. Approach

Outline a plan of action that describes the scope and detail of how the proposed work will be accomplished. Account for all functions or activities identified in the application. Cite factors that might accelerate or decelerate the work and state your reason for taking the proposed approach rather than others. Describe any unusual features of the project such as design or technological innovations, reductions in cost or time, or extraordinary social and community involvement.

The Head Start Bureau is particularly interested in the following:

1. A description of how children and families will be recruited and selected for the program. Describe procedures to ensure that services will be provided to individuals who have the most serious need for Head Start services, including children with disabilities and unserved and underserved populations.

2. A description of strategies for delivering high quality services to children and family members, as defined by the Head Start Performance Standards, including the involvement of parents and other community members and organizations in the program strategy. Include, as appropriate, a discussion of all proposed collaborative relationships with other local organizations and the nature of the proposed collaboration(s). If applicable, describe any proposed modifications or improvements in current program practices, such as adaptations to encourage parent involvement by low-income working families.

3. A staffing pattern that will enable services to be provided in accordance with the Head Start Program Performance Standards in all component areas. Identify all proposed staff or staff positions, their proposed salary rates and the length of time they will be employed each year. Discuss how proposed compensation levels will attract and retain well-qualified and effective staff members.

4. A description of plans for staff training and development of newly-hired staff members and a discussion of how proposed staff will be supported by the grantee's organizational structure.

5. A discussion of start-up plans and a timetable to implement the increased enrollment in a carefully planned but timely and efficient manner. Describe how the program will obtain or upgrade classroom space and other facilities to required licensing standards, recruit and train new staff or community-based providers, arrange for adequate transportation, and recruit, select and enroll eligible children and families.

F. Organizational Capacity and Experience

Provide information on the applicant organization and cooperating partners.

The Head Start Bureau is particularly interested in the following:

1. Evidence of the applicant's experience and ability to administer a Head Start program, to successfully meet the Head Start Program Performance Standards and to manage the proposed expansion strategy. Include a discussion of any proposed changes and improvements in program management and governance.

2. From applicants who are establishing partnerships with other child care and early childhood agencies, providers or funding sources:

Letters of commitment from the child care and early childhood agencies and providers, including documentation of the additional resources that will be combined with the requested Head Start funds to create a high quality, full-day, full-year program. Explain and itemize these resources or services, and whether or not these costs are included as part of the non-Federal share.

A description of plans for managing, monitoring, and assisting the efforts of proposed new delegate agencies and other forms of collaborative arrangements to assure that the Head Start Program Performance Standards are met.

A description of the experience of the applicant and the proposed partnering agencies in collaborating to deliver high quality early childhood program services and in managing multiple sources of funding.

A description of how the applicant will track, manage and account for multiple funding streams, allocate costs to different funding sources, and make adjustments in the event of fluctuations in the availability of other funding sources.

G. Cost Effectiveness and Budget Appropriateness

Provide a narrative budget justification that describes how the proposed costs are derived. Discuss the necessity, reasonableness and allocability of the proposed costs.

The Head Start Bureau is particularly interested in the following:

1. A description of two budgets, one for ongoing operating costs for a 12-month period, the other for one-time start-up costs such as the renovation of facilities, purchases of equipment and initial training of new staff members. Identification in the budget of the required non-Federal share of the cost of the project. Include a discussion of strategies for obtaining the required non-Federal share, as described in Section I.E. of this announcement.

2. A description of how the proposed budget is reasonable, appropriate and cost-effective in view of the proposed services, strategies and anticipated outcomes.

3. A description of the extent to which the proposal includes significant other resources to complement the requested Head Start expansion funds.

Part III. Evaluation Criteria

Applications will be reviewed and evaluated on the following criteria:

1. Objectives and Need for Assistance (20 Points)

- The extent to which the application provides current data on the needs of young children, families, and communities for expanded Head Start services, including analyses of changes in poverty and family mobility, employment opportunities and welfare reform, and any special unserved or underserved populations or groups.
- The extent to which the application provides convincing evidence of the involvement and support of other organizations serving low-income families in assessing family and community needs and resources, developing proposed plans and strategies, and in active partnerships to implement the proposed expansion.

Information provided in response to Section II.C. of this announcement will

be used to evaluate applicants on the above criterion.

2. Results or Benefits Expected (10 Points)

• The extent to which the applicant identifies the results and benefits to be derived from the project and links these to the stated objectives.

• The extent to which the applicant describes the kinds of data to be collected and how they will be utilized to measure progress towards the stated results or benefits.

Information provided in response to Section II.D. of this announcement will be used to evaluate applicants on this criterion.

3. Approach (25 Points)

• The extent to which the application includes a detailed, well-organized, and credible plan of action to carry out the proposed expansion of Head Start services, including plans for recruitment and selection of children, arrangements for transportation and facilities and plans for start-up of the new services.

• The extent to which the application includes clear plans and a demonstrated commitment to implement the Head Start Program Performance Standards, including involvement of parents and families in program design and decision making.

• The extent to which the application proposes, where possible, to collaborate with other community providers to deliver a high quality, cost-effective Head Start program.

• The extent to which the application provides sound, cost-effective staffing, organizational and management strategies, including staff training and development to ensure that the expansion provides high quality and responsive services.

• The extent to which the application demonstrates a sound strategy for facilitating the transition of Head Start children from the Head Start program to the local school system by coordinating with the local education agency and the local schools who will be enrolling Head Start children.

Information provided in response to Section II.E. will be used to evaluate applicants on the above criterion.

4. Organizational Capacity & Experience (20 Points)

The extent of the demonstrated capacity of the applicant organization, key leaders and managers and, where appropriate, proposed partnering organizations in:

• Providing high quality, responsive services to young children and families, including evidence of the capability to meet the Head Start Program Performance Standards;

• Managing expansion of program services in an effective and timely manner; and

• Managing successful partnerships to serve young children and their families that involve sharing resources, staffing and facilities.

Information provided in response to Section II.F. will be used to evaluate applicants on the above criterion.

5. Cost Effectiveness and Budget Appropriateness (25 Points)

• The extent to which the proposed budget is reasonable, appropriate and cost effective in view of the proposed services, strategies and anticipated outcomes.

• The extent to which the applicant has mobilized significant additional resources to complement Head Start expansion funds.

Information provided in response to Section II.G. and the applicant's proposed budget will be used to evaluate applicants on the above criterion.

IV. The Application Process

A. Availability of Forms

Eligible agencies interested in applying for funds must submit the required forms included at the end of this announcement in Appendix A.

In order to be considered, an application must be submitted on Standard Form 424. Each application must be signed by an individual authorized to act for the applicant agency and to assume responsibility for the obligations imposed by the terms and conditions of the grant award. As required by the Head Start Program Performance Standards, any current Head Start grantee's Head Start Policy Council must approve the application. Applications must be prepared in accordance with the guidance provided in this announcement.

B. Application Submission

One signed original and two copies of the grant application, including all attachments, are required. Completed applications must be sent to: Head Start Expansion Unserved Competition, ACYF Operations Center, 1815 North Fort Myer Drive—Suite 300, Arlington, VA 22209.

In order to make the review of proposals easier, applicants should include in their proposals a Table of Contents and page numbers. Although there is no specific limit on the number of pages that applications may contain, applicants are encouraged to be as concise as possible.

C. Application Consideration

Applications will be reviewed against the evaluation criteria outlined above. The review will be conducted in the Washington, DC area by persons knowledgeable about the Head Start program and early childhood care, education and development, and may include staff of Head Start programs, parents of Head Start children, Federal staff from the ACF Regional Offices and the Head Start and Child Care Bureaus, and other experts, such as university faculty members and the staff of child care and pre-kindergarten programs and agencies.

The results of the competitive reviews will be taken into consideration by the Associate Commissioner of the Head Start Bureau who, in consultation with the Indian and Migrant Programs Branches, will recommend projects to be funded. The Commissioner of ACYF will make the final selection of the applications to be funded.

The Commissioner may elect not to fund applicants that have program, management, fiscal or other problems and situations that make it unlikely that they would be able to provide effective Head Start services. Also, the Commissioner may decide not to fund projects that would require unreasonably large initial start-up costs for facilities or equipment or which require unreasonably large on-going funding levels relative to the number of children and families proposed to be served.

Applicants which do not meet the requirement found in Section 641 of the Head Start Act of being a local agency, within the community(ies) it is proposing to serve, will not be selected for funding.

Successful applicants will be notified through a Financial Assistance Award which sets forth the amount of funds awarded, the terms and conditions of the grant supplement, and other relevant information.

D. Amount of Funds Awarded to Successful Applicants

In deciding the amount of funds to apply for, applicants should be guided by the need for services in their community, the amount needed to effectively and efficiently carry out the program of services proposed, the amount needed to provide high quality comprehensive services, and the availability of funds in the competitive area. There are no predetermined cost-per-child guidelines or limits to which applicants must conform.

After applications are selected for funding, the Commissioner will

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determine if they will be funded for all or only part of the number of children proposed. In determining the amount of funds a selected applicant will receive, the Commissioner will consider:

- The application's competitive review ranking;
- The relative need for services in a proposed service area compared to other communities in the competitive area;
- The proposed costs in Federal Head Start funds and;
- The amount of funds available in the competitive area.

For example, an applicant which is able to expand Head Start services at a relatively lower cost in Federal Head Start funds because it shares costs with a child care agency will likely be awarded funds to serve a larger portion of the children it proposed serving than another applicant. Through the determination of funding levels, we hope to achieve a distribution of funds that is equitable and which allows as many children and communities as is possible to receive the benefits of a high quality Head Start program.

E. Closing Date for Receipt of Applications

Deadline: The closing date for the receipt of applications is July 21, 2000. Applications shall be considered as meeting this deadline if they are either:

1. Received on or before the deadline date at the address specified in the program announcement, or

2. Sent on or before the deadline date and received by ACYF in time for the independent review. (Applicants are cautioned to request a legibly dated U.S. Postal Service postmark or to obtain a legibly dated receipt from a commercial carrier or U.S. Postal Service. Private metered postmarks are not acceptable as proof of timely mailing.)

Applications hand carried by applicants, applicant couriers, or by overnight/express mail couriers shall be considered as meeting an announced deadline if they are received on or before the deadline date, between the hours of 8 a.m. and 4:30 p.m. at the ACYF Operations Center, 1815 North Fort Myer Drive, Suite 300, Arlington, VA. 22209, between Monday and Friday (excluding Federal Holidays). (Applicants are cautioned that express/overnight mail services may not always deliver as agreed.)

ACYF cannot accommodate the transmission of applications by FAX or through other electronic media. Therefore, applications transmitted to ACYF electronically will not be accepted regardless of the date or time of submission and time of receipt.

Late Applications: Applications that do not meet the criteria stated above are considered late applications. ACYF will notify each late applicant that its application will not be considered.

Extension of deadlines. ACF may extend the deadline for all applicants because of acts of God such as floods, hurricanes, *etc.*, or when there is a disruption of the mails. However, if the granting agency does not extend the deadline for all applicants, it may not waive or extend the deadline for any applicants.

F. Paperwork Reduction Act of 1995

Under the Paperwork Reduction Act of 1995, (Pub.L. 104–13), the Department is required to submit to the Office of Management and Budget (OMB) for review and approval any reporting and record keeping requirements or program announcements. This Program Instruction meets all information collection requirements approved for ACF grant applications under OMB Control Number 0970–0139.

G. Executive Order 12372—Notification Process

This program is covered under Executive Order (E.O.) 12372, ''Intergovernmental Review of Federal Programs,'' and 45 CFR part 100, ''Intergovernmental Review of Department of Health and Human Services Programs and Activities.'' Under the Order, States may design their own processes for reviewing and commenting on proposed Federal assistance under covered programs. All States and territories except Alabama, Alaska, Colorado, Connecticut, Hawaii, Idaho, Kansas, Louisiana, Massachusetts, Minnesota, Montana, Nebraska, New Jersey, New York, Ohio, Oklahoma, Oregon, Pennsylvania, South Dakota, Tennessee, Vermont, Virginia, Washington, American Samoa, and Palau have elected to participate in the Executive Order process and have established Single Points of Contact (SPOCs). Applications from federally-recognized Indian Tribes are exempt from E.O. 12372.

Applicants from these thirteen jurisdictions and from federally recognized Indian tribes need take no action regarding E.O. 12372. All other applicants should contact their SPOC as soon as possible to alert them to the prospective application and to receive any necessary instructions. Applicants must submit material to the SPOC as soon as possible so that the program office can obtain and review SPOC comments as part of the award process. It is imperative that the applicant submit all required materials, if any, to the SPOC and indicate the date of this submittal (or the date of contact if no submittal is required) on the SF 424, item 16a.

Under 45 CFR 100.8(a)(2), SPOCs have 60 days from the application deadline date to comment on applications submitted under this announcement. Therefore, the comment period for State processes will end on September 22, 2000. SPOCs are encouraged to eliminate the submission of routine endorsements as official recommendations. Additionally, SPOCs are requested to clearly differentiate between mere advisory comments and those official State process recommendations which they intend to trigger the ''accommodate or explain'' rule.

Comments submitted directly to ACF should be addressed to: Head Start Bureau, Grants Officer, Room 2210, 330 C Street, SW, Washington, DC 20201.

ACF will notify the State of any application received which has no indication that the State process has had an opportunity for review.

A list of Single Points of Contact for each State and territory is included at Appendix B.

(Catalog of Federal Domestic Assistance Program Number 93.600, Project Head Start)

Dated: May 11, 2000.

James Harrell,

Deputy Commissioner, Administration on Children, Youth and Families.

BILLING CODE 4184–01–P

Appendix A—Application Forms

APPLICATION FOR FEDERAL ASSISTANCE

OMB Approval No. 0348-0043

1. TYPE OF SUBMISSION: Application ☐ Construction ☐ Non-Construction; Preapplication ☐ Construction ☐ Non-Construction	**2. DATE SUBMITTED**	Applicant Identifier
	3. DATE RECEIVED BY STATE	State Application Identifier
	4. DATE RECEIVED BY FEDERAL AGENCY	Federal Identifier

5. APPLICANT INFORMATION

Legal Name:	Organizational Unit:
Address *(give city, county, State, and zip code)*:	Name and telephone number of person to be contacted on matters involving this application *(give area code)*

6. EMPLOYER IDENTIFICATION NUMBER *(EIN)*:

☐☐ – ☐☐☐☐☐☐☐

7. TYPE OF APPLICANT: *(enter appropriate letter in box)* ☐

A. State
B. County
C. Municipal
D. Township
E. Interstate
F. Intermunicipal
G. Special District
H. Independent School Dist.
I. State Controlled Institution of Higher Learning
J. Private University
K. Indian Tribe
L. Individual
M. Profit Organization
N. Other (Specify) _____

8. TYPE OF APPLICATION:

☐ New ☐ Continuation ☐ Revision

If Revision, enter appropriate letter(s) in box(es) ☐ ☐

A. Increase Award B. Decrease Award C. Increase Duration
D. Decrease Duration Other*(specify)*:

_____

9. NAME OF FEDERAL AGENCY:

10. CATALOG OF FEDERAL DOMESTIC ASSISTANCE NUMBER:

☐☐ – ☐☐☐

TITLE:

11. DESCRIPTIVE TITLE OF APPLICANT'S PROJECT:

12. AREAS AFFECTED BY PROJECT *(Cities, Counties, States, etc.)*:

13. PROPOSED PROJECT		**14. CONGRESSIONAL DISTRICTS OF:**	
Start Date	Ending Date	a. Applicant	b. Project

15. ESTIMATED FUNDING:

a. Federal	$ .00
b. Applicant	$ .00
c. State	$ .00
d. Local	$ .00
e. Other	$ .00
f. Program Income	$ .00
g. TOTAL	$ .00

16. IS APPLICATION SUBJECT TO REVIEW BY STATE EXECUTIVE ORDER 12372 PROCESS?

a. YES. THIS PREAPPLICATION/APPLICATION WAS MADE AVAILABLE TO THE STATE EXECUTIVE ORDER 12372 PROCESS FOR REVIEW ON:

DATE _____

b. No. ☐ PROGRAM IS NOT COVERED BY E. O. 12372
☐ OR PROGRAM HAS NOT BEEN SELECTED BY STATE FOR REVIEW

17. IS THE APPLICANT DELINQUENT ON ANY FEDERAL DEBT?

☐ **Yes** **If "Yes," attach an explanation.** ☐ **No**

18. TO THE BEST OF MY KNOWLEDGE AND BELIEF, ALL DATA IN THIS APPLICATION/PREAPPLICATION ARE TRUE AND CORRECT, THE DOCUMENT HAS BEEN DULY AUTHORIZED BY THE GOVERNING BODY OF THE APPLICANT AND THE APPLICANT WILL COMPLY WITH THE ATTACHED ASSURANCES IF THE ASSISTANCE IS AWARDED.

a. Type Name of Authorized Representative	b. Title	c. Telephone Number
d. Signature of Authorized Representative		e. Date Signed

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Standard Form 424 (Rev. 7-97)
Prescribed by OMB Circular A-102

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Instructions for the SF–424

Public reporting burden for this collection of information is estimated to average 45 minutes per response, including time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding the burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to the Office of Management and Budget, Paperwork Reduction Project (0348–0043), Washington, DC 20503.

Please do not return your completed form to the Office of Management and Budget. Send it to the address provided by the sponsoring agency.

This is a standard form used by applicants as a required facesheet for preapplications and applications submitted for Federal assistance. It will be used by Federal agencies to obtain applicant certification that States which have established a review and comment procedure in response to Executive Order 12372 and have selected the program to be included in their process, have been given an opportunity to review the applicant's submission.

Item and Entry

1. Self-explanatory.

2. Date application submitted to Federal agency (or State if applicable) an applicant's control number (if applicable).

3. State use only (if applicable).

4. If this application is to continue or revise an existing award, enter present Federal identifier number. If for a new project, leave blank.

5. Legal name of applicant, name of primary organizational unit which will undertake the assistance activity, complete address of the applicant, and name and telephone number of the person to contact on matters related to this application.

6. Enter Employer Identification Number (EIN) as assigned by the Internal Revenue Service.

7. Enter the appropriate letter in the space provided.

8. Check appropriate box and enter appropriate letter(s) in the space(s) provided:

—''New'' means a new assistance award.

—''Continuation'' means an extension for an additional funding/budget period for a project with a projected completion date.

—''Revision'' means any change in the Federal Government's financial obligation or contingent liability from an existing obligation.

9. Name of Federal agency from which assistance is being requested with this application.

10. Use the Catalog of Federal Domestic Assistance number and title of the program under which assistance is requested.

11. Enter a brief descriptive title of the project. If more than one program is involved, you should append an explanation on a separate sheet. If appropriate (*e.g.,* construction or real property projects), attach a map showing project location. For preapplications, use a separate sheet to provide a summary description of this project.

12. *List only the largest political entities affected (e.g., State,* counties, cities).

13. Self-explanatory.

14. List the applicant's Congressional District and any District(s) affected by the program or project.

15. Amount requested or to be contributed during the first funding/budget period by each contributor. Value of inkind contributions should be included on appropriate lines as applicable. If the action will result in a dollar change to an existing award, indicate *only* the amount of the change. For decreases, enclose the amounts in parentheses. If both basic and supplemental amounts are included, show breakdown on an attached sheet. For multiple program funding, use totals and show breakdown using same categories as item 15.

16. Applicants should contact the State Single Point of Contact (SPOC) for Federal Executive Order 12372 to determine whether the application is subject to the State intergovernmental review process.

17. This question applies to the applicant organization, not the person who signs as the authorized representative. Categories of debt include delinquent audit disallowances, loans and taxes.

18. To be signed by the authorized representative of the applicant. A copy of the governing body's *authorization for you to sign this application as official* representative must be on file in the applicant's office (Certain Federal agencies may require that this authorization be submitted as part of the application.)

BILLING CODE 4184–01–P

BUDGET INFORMATION - Non-Construction Programs

OMB Approval No. 0348-0044

SECTION A - BUDGET SUMMARY

Grant Program Function or Activity (a)	Catalog of Federal Domestic Assistance Number (b)	Estimated Unobligated Funds		New or Revised Budget		
		Federal (c)	Non-Federal (d)	Federal (e)	Non-Federal (f)	Total (g)
1.		$	$	$	$	$
2.						
3.						
4.						
5. Totals		$	$	$	$	$

SECTION B - BUDGET CATEGORIES

6. Object Class Categories	GRANT PROGRAM, FUNCTION OR ACTIVITY				Total
	(1)	(2)	(3)	(4)	(5)
a. Personnel	$	$	$	$	$
b. Fringe Benefits					
c. Travel					
d. Equipment					
e. Supplies					
f. Contractual					
g. Construction					
h. Other					
i. Total Direct Charges *(sum of 6a-6h)*					
j. Indirect Charges					
k. TOTALS *(sum of 6i and 6j)*	$	$	$	$	$
7. Program Income	$	$	$	$	$

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Standard Form 424A (Rev. 7-97)
Prescribed by OMB Circular A-102

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SECTION C - NON-FEDERAL RESOURCES				
(a) Grant Program	(b) Applicant	(c) State	(d) Other Sources	(e) TOTALS
8.	$	$	$	$
9.				
10.				
11.				
12. TOTAL *(sum of lines 8-11)*	$	$	$	$

SECTION D - FORECASTED CASH NEEDS					
	Total for 1st Year	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
13. Federal	$	$	$	$	$
14. Non-Federal					
15. TOTAL *(sum of lines 13 and 14)*	$	$	$	$	$

SECTION E - BUDGET ESTIMATES OF FEDERAL FUNDS NEEDED FOR BALANCE OF THE PROJECT				
(a) Grant Program	FUTURE FUNDING PERIODS (Years)			
	(b) First	(c) Second	(d) Third	(e) Fourth
16.	$	$	$	$
17.				
18.				
19.				
20. TOTAL *(sum of lines 16-19)*	$	$	$	$

SECTION F - OTHER BUDGET INFORMATION	
21. Direct Charges:	22. Indirect Charges:
23. Remarks:	

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Standard Form 424A (Rev. 7-97) Page

BILLING CODE 4184–01–C

Instructions for the SF–424A

Public reporting burden for this collection of information is estimated to average 180 minutes per response, including time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding the burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to the Office of Management and Budget, Paperwork Reduction Project (0348–0044), Washington, DC 20503.

Please do not return your completed form to the Office of Management and Budget. Send it to the address provided by the sponsoring agency.

General Instructions

This form is designed so that application can be made for funds from one or more grant programs. In preparing the budget, adhere to any existing Federal grantor agency guidelines which prescribe how and whether budgeted amounts should be separately shown for different functions or activities within the program. For some programs, grantor agencies may require budgets to be separately shown by function or activity. For other programs, grantor agencies may require a breakdown by function or activity. Sections A, B, C, and D should include budget estimates for the whole project except when applying for assistance which requires Federal authorization in annual or other funding period increments. In the latter case, Sections A, B, C, and D should provide the budget for the first budget period (usually a year) and Section E should present the need for Federal assistance in the subsequent budget periods. All applications should contain a breakdown by the object class categories shown in Lines a–k of Section B.

Section A. Budget Summary Lines 1–4 Columns (a) and (b)

For applications pertaining to a single Federal grant program (Federal Domestic Assistance Catalog number) and not requiring a functional or activity breakdown, enter on Line 1 under Column (a) the Catalog program title and the Catalog number in Column (b).

For applications pertaining to a single program requiring budget amounts by multiple functions or activities, enter the name of each activity or function on each line in Column (a), and enter the Catalog number in Column (b). For applications pertaining to multiple programs where none of the programs require a breakdown by function or activity, enter the Catalog program title on each line in Column (a) and the respective Catalog number on each line in Column (b).

For applications pertaining to multiple programs where one or more programs require a breakdown by function or activity, prepare a separate sheet for each program requiring the breakdown. Additional sheets should be used when one form does not provide adequate space for all breakdown of data required. However, when more than one sheet is used, the first page should provide the summary totals by programs.

Lines 1–4, Columns (c) Through (g)

For new applications, leave Column (c) and (d) blank. For each line entry in Columns (a) and (b), enter in Columns (e), (f), and (g) the appropriate amounts of funds needed to support the project for the first funding period (usually a year).

For continuing grant program applications, submit these forms before the end of each funding period as required by the grantor agency. Enter in Columns (c) and (d) the estimated amounts of funds which will remain unobligated at the end of the grant funding period only if the Federal grantor agency instructions provide for this. Otherwise, leave these columns blank. Enter in columns (e) and (f) the amounts of funds needed for the upcoming period. The amount(s) in Column (g) should be the sum of amounts in Columns (e) and (f).

For supplemental grants and changes to existing grants, do not use Columns (c) and (d). Enter in Column (e) the amount of the increase or decrease of Federal funds and enter in Column (f) the amount of the increase or decrease of non-Federal funds. In Column (g) enter the new total budgeted amount (Federal and non-Federal) which includes the total previous authorized budgeted amounts plus or minus, as appropriate, the amounts shown in Columns (e) and (f). The amount(s) in Column (g) should not equal the sum of amounts in Columns (e) and (f).

Line 5—Show the totals for all columns used.

Section B. Budget Categories

In the columns headings (1) through (4), enter the titles of the same programs, functions, and activities shown on Lines 1–4, Column (a), Section A. When additional sheets are prepared for Section A, provide similar column headings on each sheet. For each program, function or activity, fill in the total requirements for funds (both Federal and non-Federal) by object class categories.

Line 6a–i—Show the totals of Lines 6a to 6h in each column.

Line 6j—Show the amount of indirect cost.

Line 6k—Enter the total of amounts on Lines 6i and 6j. For all applications for new grants and continuation grants the total amount in column (5), Line 6k, should be the same as the total amount shown in Section A, Column (g), Line 5. For supplemental grants and changes to grants, the total amount of the increase or decrease as shown in Columns (1)–(4), Line 6k should be the same as the sum of the amounts in Section A, Columns (e) and (f) on Line 5.

Line 7—Enter the estimated amount of income, if any, expected to be generated from this project. Do not add or subtract this amount from the total project amount. Show under the program narrative statement the nature and source of income. The estimated amount of program income may be considered by the Federal grantor agency in determining the total amount of the grant.

Section C. Non-Federal Resources

Lines 8–11—Enter amounts of non-Federal resources that will be used on the grant. If in-kind contributions are included, provide a brief explanation on a separate sheet.

Column (a)—Enter the program titles identical to Column (a), Section A. A breakdown by function or activity is not necessary.

Column (b)—Enter the contribution to be made by the applicant.

Column (c)—Enter the amount of the State's cash and in-kind contribution if the applicant is not a State or State agency. Applicants which are a State or State agencies should leave this column blank.

Column (d)—Enter the amount of cash and in-kind contributions to be made from all other sources.

Column (e)—Enter the totals of Columns (b), (c), and (d).

Line 12—Enter the total for each of Columns (b)–(e). The amount in Column (e) should be equal to the amount on Line 5, Column (f), Section A.

Section D. Forecasted Cash Needs

Line 13—Enter the amount of cash needed by quarter from the grantor agency during the first year.

Line 14—Enter the amount of cash from all other sources needed by quarter during the first year.

Line 15—Enter the totals of amounts on Lines 13 and 14.

Section E. Budget Estimates of Federal Funds Needed for Balance of the Project

Line 16–19—Enter in Column (a) the same grant program titles shown in Column (a), Section A. A breakdown by function or activity is not necessary. For new applications and continuation grant applications, enter in the proper columns amounts of Federal funds which will be needed to complete the program or project over the succeeding funding periods (usually in years). This section need not be completed for revisions (amendments, changes, or supplements) to funds for the current year of existing grants.

If more than four lines are needed to list the program titles, submit additional schedules as necessary.

Line 20—Enter the total for each of the Columns (b)–(e). When additional schedules are prepared for this Section, annotate accordingly and show the overall totals on this line.

Section F. Other Budget Information

Line 21—Use this space to explain amounts for individual direct object class cost categories that may appear to be out of the ordinary or to explain the details as required by the Federal grantor agency.

Line 22—Enter the type of indirect rate (provisional, predetermined, final or fixed) that will be in effect during the funding period, the estimated amount of the base to which the rate is applied, and the total indirect expense.

Line 23—Provide any other explanations or comments deemed necessary.

Assurances—Non-Construction Programs

Public reporting burden for this collection of information is estimated to average 15 minutes per response, including time for reviewing instructions, searching existing

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data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding the burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to the Office of Management and Budget, Paperwork Reduction Project (0348–0040), Washington, DC 20503.

Please do not return your completed form to the Office of Management and Budget. Send it to the address provided by the sponsoring agency.

Note: Certain of these assurances may not be applicable to your project or program. If you have questions, please contact the awarding agency. Further, certain Federal awarding agencies may require applicants to certify to additional assurances. If such is the case, you will be notified.

As the duly authorized representative of the applicant, I certify that the applicant:

1. Has the legal authority to apply for Federal assistance and the institutional, managerial and financial capability (including funds sufficient to pay the non-Federal share of project cost) to ensure proper planning, management and completion of the project described in this application.

2. Will give the awarding agency, the Comptroller General of the United States and, if appropriate, the State, through any authorized representative, access to and the right to examine all records, books, papers, or documents related to the award; and will establish a proper accounting system in accordance with generally accepted accounting standards or agency directives.

3. Will establish safeguards to prohibit employees from using their positions for a purpose that constitutes or presents the appearance of personal or organizational conflict of interest, or personal gain.

4. Will initiate and complete the work within the applicable time frame after receipt of approval of the awarding agency

5. Will comply with the Intergovernmental Personnel Act of 1970 (42 U.S.C. §§ 4728–4763) relating to prescribed standards for merit systems for programs funded under one of the 19 statutes or regulations specified in Appendix A of OPM's Standards for a Merit System of Personnel Administration (5 CFR 900, Subpart F).

6. Will comply with all Federal statutes relating to nondiscrimination. These include but are not limited to: (a) Title VI of the Civil Rights Act of 1964 (P.L. 88–352) which prohibits discrimination on the basis of race, color or national origin; (b) Title IX of the Education Amendments of 1972, as amended (20 U.S.C. §§ 1681–1683, and 1685–1686), which prohibits discrimination on the basis of sex; (c) Section 504 of the Rehabilitation Act of 1973, as amended (29 U.S.C. § 794), which prohibits discrimination on the basis of handicaps; (d) the Age Discrimination Act of 1975, as amended (42 U.S.C. §§ 6101–6107), which prohibits discrimination on the basis of age; (e) the Drug Abuse Office and Treatment Act of 1972 (P.L. 92–255), as amended, relating to nondiscrimination on the basis of drug abuse; (f) the Comprehensive Alcohol Abuse and Alcoholism Prevention, Treatment and Rehabilitation Act of 1970 (P.L. 91–616), as amended, relating to nondiscrimination on the basis of alcohl abuse or alcoholism; (g) §§ 523 and 527 of the Public Health Service Act of 1912 (42 U.S.C. §§ 290 dd–3 and 290 ee 3), as amended, relating to confidentiality of alcohol and drug abuse patient records; (h) Title VIII of the Civil Rights Act of 1968 (42 U.S.C. §§ 3601 et seq.), as amended, relating to nondiscrimination in the sale, rental or financing of housing; (i) any other nondiscrimination provisions in the specific statute(s) under which application for Federal assistance is being made; and, (j) the requirements of any other nondiscrimination statute(s) which apply to the application.

7. Will comply, or has already complied, with the requirements of Titles II and III of the Uniform Relocation Assistance and Real Property Acquisition Polices Act of 1970 (P.L. 91–646) which provide for fair and equitable treatment of persons displaced or whose property is acquired as a result of Federal or federally-assisted programs. These requirements apply to all interests in real property acquired for project purposes regardless of Federal participation in purchases.

8. Will comply, as applicable, with provisions of the Hatch Act (5 U.S.C. §§ 1501–1508 and 7324–7328) which limit the political activities of employees whose principal employment activities are funded in whole or in part with Federal funds.

9. Will comply, as applicable, with the provisions of the Davis-Bacon Act (40 U.S.C. §§ 276a to 276a.–7), the Copeland Act (40 U.S.C. § 276c and 18 U.S.C. § 874), and the Contract Work Hours and Safely Standards Act (40 U.S.C. §§ 327–333) labor standards for federally-assisted construction subagreements.

10. Will comply, if applicable, with flood insurance purchase requirements of Section 102(a) of the Flood Disaster Protection Act of 1973 (P.L. 93–234) which requires recipients in a special flood hazard area to participate in the program and to purchase flood insurance if the total cost of insurable construction and acquisition is $10,000 or more.

11. Will comply with environmental standards which may be prescribed pursuant to the following: (a) institution of environmental quality control measures under the National Environmental Policy Act of 1969 (P.L. 91–190) and Executive Order (EO) 11514; (b) notification of violating facilities pursuant to EO 11738; (c) protection of wetlands pursuant to EO 11990; (d) evaluation of flood hazards in floodplains in accordance with EO 11988; (e) assurance of project consistency with the approved State management program developed under the Coastal Zone Management Act of 1972 (16 U.S.C. §§ 1451 et seq.); (f) conformity of Federal actions to State (Clean Air) Implementation Plans under Section 176(c) of the Clean Air Act of 1955, as amended (42 U.S.C. §§ 7401 et seq.); (g) protection of underground sources of drinking water under the Safe Drinking Water Act of 1974, as amended (P.L. 93–523); and, (h) protection of endangered species under the Endangered Species Act of 1973, as amended (P.L. 93–205).

12. Will comply with the Wild and Scenic Rivers Act of 1968 (16 U.S.C. §§ 1271 et seq.), related to protecting components or potential components of the national wild and scenic rivers system.

13. Will assist the awarding agency in assuring compliance with Section 106 of the National Historic Preservation Act of 1966, as amended (16 U.S.C. § 470), EO 11593 (identification and protection of historic properties), and the Archaeological and Historic Preservation Act of 1974 (16 U.S.C. §§ 469a–1 et seq.).

14. Will comply with P.L. 93–348 regarding the protection of human subjects involved in research, development, and related activities supported by this award of assistance.

15. Will comply with the Laboratory Animal Welfare Act of 1966 (P.L. 89–544, as amended, 7 U.S.C. §§ 2131 et seq.) pertaining to the care, handling, and treatment of warm blooded animals held for research, teaching, or other activities supported by this award of assistance.

16. Will comply with the Lead-Based Paint Poisoning Prevention Act (42 U.S.C. §§ 4801 et seq.) which prohibits the use of lead-based paint in construction or rehabilitation of residence structures.

17. Will cause to be performed the required financial and compliance audits in accordance with the Single Audit Act Amendments of 1996 and OMB Circular No. A–133, ''Audits of States, Local Governments, and Non-Profit Organizations.''

18. Will comply with all applicable requirements of all other Federal laws, executive orders, regulations, and policies governing the program.

_____

Signature of Authorization Certifying Official

_____

Title

_____

Applicant Organization

_____

Date Submitted

Administration for Children, Youth, and Families, U.S. Department of Health and Human Services

CERTIFICATION REGARDING DRUG-FREE WORKPLACE REQUIREMENTS

This certification is required by the regulations implementing the Drug-Free Workplace Act of 1988: 45 CFR Part 76, Subpart F. Sections 76.630(c) and (d)(2) and 76.645(a)(1) and (b) provide that a Federal agency may designate a central receipt point for STATE-WIDE AND STATE AGENCY-WIDE certifications, and for notification of criminal drug convictions. For the Department of Health and Human Services, the central point is: Division of Grants Management and Oversight, Office of Management and Acquisition, Department of Health and Human Services, Room 517–D, 200 Independence Avenue, SW, Washington, DC 20201.

Certification Regarding Drug-Free Workplace Requirements (Instructions for Certification)

1. By signing and/or submitting this application or grant agreement, the grantee is providing the certification set out below.

2. The certification set out below is a material representation of fact upon which reliance is placed when the agency awards the grant. If it is later determined that the grantee knowingly rendered a false certification, or otherwise violates the requirements of the Drug-Free Workplace Act, the agency, in addition to any other remedies available to the Federal Government, may take action authorized under the Drug-Free Workplace Act.

3. For grantees other than individuals. Alternate I applies.

4. For grantees who are individuals. Alternate II applies.

5. Workplaces under grants, for grantees other than individuals, need not be identified on the certification. If known, they may be identified in the grant application. If the grantee does not identify the workplaces at the time of application, or upon award, if there is no application, the grantee must keep the identity of the workplace(s) on file in its office and make the information available for Federal inspection. Failure to identify all known workplaces constitutes a violation of the grantee's drug-free workplace requirements.

6. Workplace identifications must include the actual address of buildings (or parts of buildings) or other sites where work under the grant takes place. Categorical descriptions may be used (e.g., all vehicles of a mass transit authority or State highway department while in operation. State employees in each local unemployment office, performers in concert halls or radio studios).

7. If the workplace identified to the agency changes during the performance of the grant, the grantee shall inform the agency of the change(s), if it previously identified the workplaces in question (see paragraph five).

8. Definitions of terms in the Nonprocurement Suspension and Debarment common rule and Drug-Free Workplace common rule apply to this certification. Grantees' attention is called, in particular, to the following definitions from these rules:

Controlled substance means a controlled substance in Schedules I through V of the Controlled Substances Act (21 U.S.C. 812) and as further defined by regulation (21 CFR 1308.11 through 1308.15);

Conviction means a finding of guilt (including a plea of nolo contendere) or imposition of sentence, or both, by any judicial body charged with the responsibility to determine violations of the Federal or State criminal drug statutes;

Criminal drug statute means a Federal or non-Federal criminal statute involving the manufacture, distribution, dispensing, use, or possession of any controlled substance;

Employee means the employee of a grantee directly engaged in the performance of work under a grant including: (i) All direct charge employees; (ii) All indirect charge employees unless their impact or involvement is insignificant to the performance of the grant; and, (iii) Temporary personnel and consultants who are directly engaged in the performance of work under the grant and who are on the grantee's payroll. This definition does not include workers not on the payroll of the grantee (e.g., volunteers, even if used to meet a matching requirement, consultants or independent contractors not on the grantee's payroll; or employees of subrecipients or subcontractors in covered workplaces).

Certification Regarding Drug-Free Workplace Requirements

Alternate 1. (Grantees Other Than Individuals)

The grantee certifies that it will or will continue to provide a drug-free workplace by:

(a) Publishing a statement notifying employees that the unlawful manufacture, distribution, dispensing, possession, or use of a controlled substance is prohibited in the grantee's workplace and specifying the actions that will be taken against employees for violation of such prohibition;

(b) Establishing an ongoing drug-free awareness program to inform employees about—(1) The dangers of drug abuse in the workplace; (2) the grantee's policy of maintaining a drug-free workplace; (3) any available drug counseling, rehabilitation, and employee assistance programs; and (4) the penalties that may be imposed upon employees for drug abuse violations occurring in the workplace;

(c) Making it a requirement that each employee to be engaged in the performance of the grant be given a copy of the statement required by paragraph (a);

(d) Notifying the employee in the statement required by paragraph (a) that, as a condition of employment under the grant, the employee will—(1) Abide by the terms of the statement; and (2) Notify the employer in writing of his or her conviction for a violation of a criminal drug statute occurring in the workplace no later than five calendar days after such conviction;

(e) Notifying the agency in writing, within ten calendar days after receiving notice under paragraph (d)(2) from an employee or otherwise receiving actual notice of such conviction. Employers of convicted employees must provide notice, including position title, to every grant officer or other designee on whose grant activity the convicted employee was working, unless the Federal agency has designated a central point for the receipt of such notices. Notice shall include the identification number(s) of each affected grant;

(f) Taking one of the following actions, within 30 calendar days of receiving notice under paragraph (d)(2), with respect to any employee who is so convicted—(1) Taking appropriate personnel action against such an employee, up to and including termination, consistent with the requirements of the Rehabilitation Act of 1973, as amended; or (2) requiring such employee to participate satisfactorily in a drug abuse assistance or rehabilitation program approved for such purposes by a Federal, State, or local health, law enforcement, or other appropriate agency;

(g) Making a good faith effort to continue to maintain a drug-free workplace through implementation of paragraphs (a), (b), (c), (d), (e), and (f).

(B) The grantee may insert in the space provided below the sites(s) for the performance of work done in connection with the specific grant:

Place of Performance (Street address, city, county, state, zip code)

_____

_____

Check if there are workplaces on file that are not identified here.

Alternate II. (Grantees Who Are Individuals)

(a) The grantee certifies that, as a condition of the grant, he or she will not engage in the unlawful manufacture, distribution, dispensing, possession, or use of a controlled substance in conducting any activity with the grant.

(b) If convicted of a criminal drug offense resulting from a violation occurring during the conduct of any grant activity, he or she will report the conviction, in writing, within 10 calendar days of the conviction, to every grant officer or other designee, unless the Federal agency, designates a central point for the receipt of such notices. When notice is made to such a central point, it shall include the identification number(s) of each affected grant.

[55 FR 21690, 21702, May 25, 1990]

Administration for Children, Youth, and Families, U.S. Department of health and Human Services

CERTIFICATION REGARDING DEBARMENT, SUSPENSION, AND OTHER RESPONSIBILITY MATTERS

Certification Regarding Debarment, Suspension, and Other Responsibility Matters—Primary Covered Transactions

Instructions for Certification

1. By signing and submitting this proposal, the prospective primary participant is providing the certification set out below.

2. The inability of a person to provide the certification required below will not necessarily result in denial of participation in this covered transaction. The prospective participant shall submit an explanation of why it cannot provide the certification set out below. The certification or explanation will be considered in connection with the department or agency's determination whether to enter into this transaction. However, failure of the prospective primary participant to furnish a certification or an explanation shall disqualify such person from participation in this transaction.

3. The certification in this clause is a material representation of fact upon which reliance was placed when the department or agency determined to enter into this transaction. If it is later determined that the prospective primary participant knowingly rendered an erroneous certification, in addition to other remedies available to the Federal Government, the department or agency may terminate this transaction for cause or default.

4. The prospective primary participant shall provide immediate written notice to the department or agency to which this proposal is submitted if at any time the prospective primary participant learns that its certification was erroneous when submitted or has become erroneous by reason of changed circumstances.

5. The terms covered transaction, debarred, suspended, ineligible, lower tier covered

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transaction, participant, person, primary covered transaction, principal, proposal, and voluntarily excluded, as used in this clause, have the meanings set out in the Definitions and Coverage sections of the rules implementing Executive Order 12549. You may contact the department or agency to which this proposal is being submitted for assistance in obtaining a copy of those regulations.

6. The prospective primary participant agrees by submitting this proposal that, should the proposed covered transaction be entered into, it shall not knowingly enter into any lower tier covered transaction with a person who is proposed for debarment under 48 CFR part 9, subpart 9.4, debarred, suspended, declared ineligible, or voluntarily excluded from participation in this covered transaction, unless authorized by the department or agency entering into this transaction.

7. The prospective primary participant further agrees by submitting this proposal that it will include the clause title ''Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion-Lower Tier Covered Transaction,'' provided by the department or agency entering into this covered transaction, without modification, in all lower tier covered transactions and in all solicitations for lower tier covered transactions.

8. A participant in a covered transaction may rely upon a certification of a prospective participant in a lower tier covered transaction that it is not proposed for debarment under 48 CFR part 9, subpart 9.4, debarred, suspended, ineligible, or voluntarily excluded from the covered transaction, unless it knows that the certification is erroneous. A participant may decide the method and frequency by which it determines the eligibility of its principals. Each participant may, but is not required to, check the List of Parties Excluded from Federal Procurement and Nonprocurement Programs.

9. Nothing contained in the foregoing shall be construed to require establishment of a system of records in order to render in good faith the certification required by this clause. The knowledge and information of a participant is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.

10. Except for transactions authorized under paragraph 6 of these instructions, if a participant in a covered transaction knowingly enters into a lower tier covered transaction with a person who is proposed for debarment under 48 CFR part 9, subpart 9.4, suspended, debarred, ineligible, or voluntarily excluded from participation in this transaction, in addition to other remedies available to the Federal Government, the department or agency may terminate this transaction for cause or default.

* * * * *

Certification Regarding Debarment, Suspension, and Other Responsibility Matters—Primary Covered Transactions

(1) The prospective primary participant certifies to the best of its knowledge and belief, that it and its principals:

(a) Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded by any Federal department or agency;

(b) Have not within a three-year period preceding this proposal been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State or local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property;

(c) Are not presently indicted for or otherwise criminally or civilly charged by a governmental entity (Federal, State, or local) with commission of any of the offenses enumerated in paragraph (1)(b) of this certification; and

(d) Have not within a three-year period preceding this application/proposal had one or more public transactions (Federal, State or local) terminated for cause or default.

(2) Where the prospective primary participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal.

Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion—Lower Tier Covered Transactions

Instructions for Certification

1. By signing and submitting this proposal, the prospective lower tier participant is providing the certification set out below.

2. The certification in this clause is a material representation of fact upon which reliance was placed when this transaction was entered into. If it is later determined that the prospective lower tier participant knowingly rendered an erroneous certification, in addition to other remedies available to the Federal Government the department or agency with which this transaction originated may pursue available remedies, including suspension and/or debarment.

3. The prospective lower tier participant shall provide immediate written notice to the person to which this proposal is submitted if at any time the prospective lower tier participant learns that its certification was erroneous when submitted or had become erroneous by reason of changed circumstances.

4. The terms covered transaction, debarred, suspended, ineligible, lower tier covered transaction, participant, person, primary covered transaction, principal, proposal, and voluntarily excluded, as used in this clause, have the meaning set out in the Definitions and Coverage sections of rules implementing Executive Order 12549. You may contact the person to which this proposal is submitted for assistance in obtaining a copy of those regulations.

5. The prospective lower tier participant agrees by submitting this proposal that, should the proposed covered transaction be entered into, it shall not knowingly enter into any lower tier covered transaction with a person who is proposed for debarment under 48 CFR part 9, subpart 9.4, debarred, suspended, declared ineligible, or voluntarily excluded from participation in this covered transaction, unless authorized by the department or agency with which this transaction originated.

6. The prospective lower tier participant further agrees by submitting this proposal that it will include this clause titled ''Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion-Lower Tier Covered Transaction,'' without modification, in all lower tier covered transactions and in all solicitations for lower tier covered transactions.

7. A participant in a covered transaction may rely upon a certification of a prospective participant in a lower tier covered transaction that it is not proposed for debarment under 48 CFR part 9, subpart 9.4, debarred, suspended, ineligible, or voluntarily excluded from covered transactions, unless it knows that the certification is erroneous. A participant may decide the method and frequency by which it determines the eligibility of its principals. Each participant may, but is not required to, check the List of Parties Excluded from Federal Procurement and Nonprocurement Programs.

8. Nothing contained in the foregoing shall be construed to require establishment of a system of records in order to render in good faith the certification required by this clause. The knowledge and information of a participant is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.

9. Except for transactions authorized under paragraph 5 of these instructions, if a participant in a covered transaction knowingly enters into a lower tier covered transaction with a person who is proposed for debarment under 48 CFR part 9, subpart 9.4, suspended, debarred, ineligible, or voluntarily excluded from participation in this transaction, in addition to other remedies available to the Federal Government, the department or agency with which this transaction originated may pursue available remedies, including suspension and/or debarment.

* * * * *

Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion—Lower Tier Covered Transactions

(1) The prospective lower tier participant certifies, by submission of this proposal, that neither it nor its principals is presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participation in this transaction by any Federal department or agency.

(2) Where the prospective lower tier participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal.

Administration for Children, Youth, and Families, U.S. Department of Health and Human Services

CERTIFICATION REGARDING LOBBYING

Certification for Contracts, Grants, Loans, and Cooperative Agreements

The undersigned certifies, to the best of his or her knowledge and belief, that:

(1) No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of an agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

(2) If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL. ''Disclosure Form to Report Lobbying,'' in accordance with its instructions.

(3) The undersigned shall require that the language of this certification be included in the award documents for all subawards at all tiers (including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements) and that all subrecipients shall certify and disclose accordingly. This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by section 1352, title 31, U.S. Code. Any person who fails to file the required certification shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such failure.

Statement for Loan Guarantees and Loan Insurance

The undersigned states, to the best of his or her knowledge and belief, that:

If any funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this commitment providing for the United States to insure or guarantee a loan, the undersigned shall complete and submit Standard Form-LLL. ''Disclosure Form to Report Lobbying,'' in accordance with its instructions. Submission of this statement is a prerequisite for making or entering into this transaction imposed by section 1352, title 31, U.S. Code. Any person who fails to file the required statement shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such failure.

_____

Signature

_____

Title

_____

Organization

BILLING CODE 4184–01–P

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DISCLOSURE OF LOBBYING ACTIVITIES

Approved by OMB 0348-0046

Complete this form to disclose lobbying activities pursuant to 31 U.S.C. 1352
(See reverse for public burden disclosure.)

1. Type of Federal Action:	2. Status of Federal Action:	3. Report Type:
☐ a. contract b. grant c. cooperative agreement d. loan e. loan guarantee f. loan insurance	☐ a. bid/offer/application b. initial award c. post-award	☐ a. initial filing b. material change **For Material Change Only:** year _____ quarter _____ date of last report _____

4. Name and Address of Reporting Entity:	5. If Reporting Entity in No. 4 is a Subawardee, Enter Name and Address of Prime:
☐ Prime ☐ Subawardee Tier _____, *if known*: **Congressional District**, *if known*:	 **Congressional District**, *if known*:
6. Federal Department/Agency:	**7. Federal Program Name/Description:** CFDA Number, *if applicable*: _____
8. Federal Action Number, *if known*:	**9. Award Amount**, *if known*: $
10. a. Name and Address of Lobbying Registrant (*if individual, last name, first name, MI*):	**b. Individuals Performing Services** (*including address if different from No. 10a*) (*last name, first name, MI*):
11. Information requested through this form is authorized by title 31 U.S.C. section 1352. This disclosure of lobbying activities is a material representation of fact upon which reliance was placed by the tier above when this transaction was made or entered into. This disclosure is required pursuant to 31 U.S.C. 1352. This information will be reported to the Congress semi-annually and will be available for public inspection. Any person who fails to file the required disclosure shall be subject to a civil penalty of not less that $10,000 and not more than $100,000 for each such failure.	Signature: _____ Print Name: _____ Title: _____ Telephone No.: _____ Date: _____
Federal Use Only:	Authorized for Local Reproduction Standard Form LLL (Rev. 7-97)

BILLING CODE 4184–01–C

Instructions for Completion of SF–LLL, Disclosure of Lobbying Activities

This disclosure form shall be completed by the reporting entity, whether subawardee or prime Federal recipient, at the initiation or receipt of a covered Federal action, or a material change to a previous filing, pursuant to title 31 U.S.C. section 1352. The filing of a form is required for each payment or agreement to make payment to any lobbying entity for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with a covered Federal action. Complete all items that apply for both the initial filing and material change report. Refer to the implementing guidance published by the Office of Management and Budget for additional information.

1. Identify the type of covered Federal action for which lobbying activity is and/or has been secured to influence the outcome of a covered Federal action.

2. Identify the status of the covered Federal action.

3. Identify the appropriate classification of this report. If this is a followup report caused by a material change to the information previously reported, enter the year and quarter in which the change occurred. Enter the date of the last previously submitted report by this reporting entity for this covered Federal action.

4. Enter the full name, address, city, State and zip code of the reporting entity. Include Congressional District, if known. Check the appropriate classification of the reporting entity that designates if it is, or expects to be, a prime of subaward recipient. Identify the tier of the subawardee, *e.g.*, the first subawardee of the prime is the 1st tier. Subawards include but are not limited to subcontracts, subgrants and contract awards under grants.

5. If the organization filing the report in item 4 checks ''Subawardee,'' then enter the full name, address, city, State and zip code of the prime Federal recipient. Include Congressional District, if known.

6. Enter the name of the Federal agency making the award or loan commitment. Include at least one organizational level below agency name, if known. For example, Department of Transportation, United States Coast Guard.

7. Enter the Federal program name or description for the covered Federal action (item 1). If known, enter the full Catalog of Federal Domestic Assistance (CFDA) number

for grants, cooperative agreements, loans, and loan commitments.

8. Enter the most appropriate Federal identifying number available for the Federal action identified in item 1 (*e.g.,* Request for Proposal (RFP) number; Invitation for Bid (IFB) number; grant announcement; the contract, grant, or loan award number; the application/proposal control number assigned by the Federal agency). Include prefixes, *e.g.,* ''RFP–DE–90–001.''

9. For a covered Federal action where there has been an award or loan commitment by the Federal agency, enter the Federal amount of the award/loan commitment for the prime entity identified in items 4 or 5.

10. (a) Enter the full name, address, city, State and zip code of the lobbying registrant under the Lobbying Disclosure Act of 1995 engaged by the reporting entity identified in item 4 to influence the covered Federal action.

(b) Enter the full names of the individual(s) performing services, and include full address if different 10(a). Enter Last Name, First Name, and Middle Initial (MI).

11. The certifying official shall sign and date the form, print his/her name, title, and telephone number.

According to the Paperwork Reduction Act, as amended, no persons are required to respond to a collection of information unless it displays a valid OMB Control Number. The valid OMB control number for this information collection is OMB No. 0348–0046. Public reporting burden for this collection of information is estimated to average 10 minutes per response, including time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding the burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to the Office of Management and Budget, Paperwork Reduction Project (0348–0046), Washington, DC 20503.

BILLING CODE 4184–01–P

008536

OMB No. 0999-0020
OMB No. 0925-0418
Approved for use through 01/31/2001

Protection of Human Subjects
Assurance Identification/Certification/Declaration
(Common Federal Rule)

Policy: Research activities involving human subjects may not be conducted or supported by the Departments and Agencies adopting the Common Rule (56FR28003, June 18, 1991) unless the activities are exempt from or approved in accordance with the common rule. See section 101(b) the common rule for exemptions. Institutions submitting applications or proposals for support must submit certification or appropriate Institutional Review Board (IRB) review and approval to the Department or Agency in accordance with the common rule.

Institutions with an assurance of compliance that covers the research to be conducted on file with the Department, Agency, or the Department of Health and Human Services (HHS) should submit certification of IRB review and approval with each application or proposal unless otherwise advised by the Department or Agency. Institutions which do not have such an assurance must submit an assurance and certification of IRB review and approval within 30 days of a written request from the Department or Agency.

1. Request Type
☐ ORIGINAL
☐ FOLLOWUP
☐ EXEMPTION

2. Type of Mechanism
☐ GRANT ☐ CONTRACT ☐ FELLOWSHIP
☐ COOPERATIVE AGREEMENT
☐
OTHER:_____

3. Name of Federal Department or Agency and, if known, Application or Proposal Identification No.

4. Title of Application or Activity

5. Name of Principal Investigator,Program Director, Fellow, or Other

6. Assurance Status of this Project *(Respond to one of the following)*

☐ Services, covers this activity:
This Assurance, on file with Dartment of Health and Human Assurance identification no. M-_____IRB identification no. _____

☐ This Assurance, on file with *(agency/dept)*_____, covers this activity.

Assurance identification no._____ IRB identification no._____*(if applicable)*

☐ No assurance has been filed for this project. This institution declares that it will provide an Assurance and Certification of IRB review and approval upon request.

☐ Exemption Status: Human subjects are involved, but this activity qualifies for exemption under Section 101(b), paragraph_____.

7. Certification of IRB Review (Respond to one of the following IF you have an Assurance on file)

☐ This activity has been reviewed and approved by the IRB in accordance with the common rule and any other governing regulations or subparts on *(date)*_____ by: ☐ Full IRB Review or ☐ Expedited Review

☐ This activity contains multiple projects, some of which have not been reviewed. The IRB has granted approval on condition that all projects covered by the common rule will be reviewed and approved before they are initiated and that appropriate further certification will be submitted.

8. Comments

9. The official signing below certifies that the information provided above is correct and that, as required, future reviews will be performed and certification will be provided.

10. Name and Address of Institution

11. Phone No. *(with area code)*

12. Fax No. *(with area code)*

13. Name of Official

14. Title

15. Signature

16. Date

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OPTIONAL FORM 310 (Rev. 1/98
Sponsored by HHS/NIH

Public reporting burden for this collection of information is estimated to average less than an hour per response. An agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a currently valid OMB control number. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden to: NIH, Project Clearance Office, 6701 Rockledge Drive, MSC 7730, Bethesda, Md. 20892-7730, ATTN: PRA 0925-0418. *Do not return*

BILLING CODE 4184–01–C

Certification Regarding Environmental Tobacco Smoke

Public Law 103227, Part C Environmental Tobacco Smoke, also known as the Pro Children Act of 1994, requires that smoking not be permitted in any portion of any indoor routinely owned or leased or contracted for by an entity and used routinely or regularly for provision of health, day care, education, or library services to children under the age of 18, if the services are funded by Federal programs either directly or through State or local governments, by Federal grant, contract, loan, or loan guarantee. The law does not apply to children's services provided in private residences, facilities funded solely by Medicare or Medicaid funds, and portions of facilities used for inpatient drug or alcohol treatment. Failure to comply with the provisions of the law may result in the imposition of a civil monetary penalty of up to $1,000 per day and/or the imposition of an administrative compliance order on the responsible entity. By signing and submitting this application the applicant/grantee certifies that it will comply with the requirements of the Act.

The applicant/grantee further agrees that it will require the language of this certification be included in any subawards which contain provisions for the children's services and that all subgrantees shall certify accordingly.

Appendix B—SPOC Listing

State Single Point of Contact Listing Maintained by OMB

In accordance with Executive Order #12372, ''Intergovernmental Review of Federal Programs,'' Section 4, ''the Office of Management and Budget (OMB) shall maintain a list of official State entities designated by the States to review and coordinate proposed Federal financial assistance and direct Federal development.'' This attached listing is the OFFICIAL OMB LISTING. This listing is also published in the Catalogue of Federal Domestic Assistance biannually.

OMB State Single Point of Contact Listing*

Arizona

Joni Saad, Arizona State Clearinghouse, 3800 N. Central Avenue, Fourteenth Floor, Phoenix, Arizona 85012, Telephone: (602) 280–1315, FAX: (602) 280–8144, e-mail: jonis@ep.state.az.us

Arkansas

Mr. Tracy L. Copeland, Manager, State Clearinghouse, Office of Intergovernmental Services, Department of Finance and Administration, 1515 W. 7th St., Room 412, Little Rock, Arkansas 72203, Telephone: (501) 682–1074, FAX: (501) 682–5206

California

Grants Coordinator, Office of Planning and Research/State Clearinghouse, 1400 Tenth Street, Room 121, Sacramento, California 95814, Telephone: (916) 323–7480, FAX: (916) 323–3018

Delaware

Francine Booth, State Single Point of Contact, Executive Department, Office of the Budget, 540 S. duPont Hi., Suite 5, Dover, Delaware 19901, Telephone: (302) 739–3326, FAX: (302) 739–5661

District of Columbia

Charles Nichols, State Single Point of Contact, Office of Grants Management and Development, 717 14th Street, NW—Suite 1200, Washington, DC 20005, Telephone: (202) 727–6537, FAX: (202) 727–1617, e-mail: charlesnic@yahoo.com or cnichols-ogmd@dcgov.org

Florida

Cherie L. Trainor, Coordinator, Florida State Clearinghouse, Department of Community Affairs, 2555 Shumard Oak Boulevard, Tallahassee, Florida 32399–2100, Telephone: (850) 922–5438 or (850) 414–5495, FAX: (850) 414–0479, e-mail: cherie.trainor@dca.state.fl.us

Georgia

Debra S. Stephens, Coordinator, Georgia State Clearinghouse, 270 Washington Street, S.W.—8th Floor, Atlanta, Georgia 30334, Telephone: (404) 656–3855, FAX: (404) 656–7901, e-mail: ssda@mail.opb.state.ga.us

Illinois

Virginia Bova, State Single Point of Contact, Illinois Department of Commerce and Community Affairs, James R. Thompson Center, 100 West Randolph, Suite 3–400, Chicago, Illinois 60601, Telephone: (312) 814–6028, FAX: (312) 814–1800

Indiana

Frances Williams, State Budget Agency, 212 State House, Indianapolis, Indiana 46204–2796, Telephone: (317) 232–5619, FAX: (317) 233–3323

Iowa

Steven R. McCann, Division for Community Assistance, Iowa Department of Economic Development, 200 East Grand Avenue, Des Moines, Iowa 50309, Telephone: (515) 242–4719, FAX: (515) 242–4809

Kentucky

Kevin J. Goldsmith, Director, John-Mark Hack, Deputy Director, Sandra Brewer, Executive Secretary, Intergovernmental Affairs, Office of the Governor, 700 Capitol Avenue, Frankfort, Kentucky 40601, Telephone: (502) 564–2611, FAX: (502) 564–2849

Maine

Joyce Benson, State Planning Office, 184 State Street, 38 State House Station, Augusta, Maine 04333, Telephone: (207) 287–3261, FAX: (207) 287–6489

Maryland

Linda C. Janey, JD, Manager, Clearinghouse and Plan Review Unit, Maryland Office of Planning, 301 W. Preston Street—Room 1104, Baltimore, Maryland 21201–2305, Telephone: (410) 767–4491, FAX: (410) 767–4480, e-mail: Linda@mail.op.state.md.us

Michigan

Richard Pfaff, Southeast Michigan Council of Governments, 660 Plaza Drive—Suite 1900, Detroit, Michigan 48226, Telephone: (313) 961–4266, FAX: (313) 961–4869

Mississippi

Cathy Mallette, Clearinghouse Officer, Department of Finance and Administration, 455 North Lamar Street, Jackson, Mississippi 39202–3087, Telephone (601) 359–6762, FAX: (601) 359–6764

Missouri

Lois Pohl/Carol Meyer, Federal Assistance Clearinghouse, Office Of Administration, P.O. Box 809, Room 915, Jefferson Building, Jefferson City, Missouri 65102, Telephone: (573) 751–4834, FAX: (573) 522–4395

Nevada

Heather Elliott, Department of Administration, State Clearinghouse, Capitol Complex, Carson City, Nevada 89710, Telephone: (702) 687–6367, FAX: (702) 687–3983

New Hampshire

Jeffrey H. Taylor, Director, New Hampshire Office of State Planning, Attn: Intergovernmental Review Process, Mike Blake, Office of State Planning, 2½ Beacon Street, Concord, New Hampshire 03301, Telephone: (603) 271–2155, FAX: (603) 271–1728

New Mexico

Nick Mandell, Local Government Division, Room 201, Bataan Memorial Building, Santa Fe, New Mexico 87503, Telephone: (505) 827–4991, FAX: (505) 827–4948

New York

New York State Clearinghouse, Division of the Budget, State Capitol, Marsha Roth, Albany, New York 12224, Telephone: (518)474–1605, FAX: (518) 486–5617

North Carolina

Chrys Baggett, Director, North Carolina State Clearinghouse, Office of the Secretary of Administration, 116 West Jones Street—Suite 5106, Raleigh, North Carolina 27603–8003, Telephone: (919) 733–7232, FAX: (919) 733–9571

North Dakota

Jim Boyd, North Dakota Single Point of Contact, Office of Intergovernmental Assistance, 600 East Boulevard Avenue, Department 105, Bismarck, North Dakota 58505–0170, Telephone: (701) 328–2094, FAX: (701) 328–2308

Rhode Island

Kevin Nelson, Review Coordinator, Department of Administration, Division of Planning, One Capitol Hill, 4th Floor, Providence, Rhode Island 02908–5870, Telephone: (401) 222–2656, FAX: (401) 222–2083

South Carolina

Omegia Burgess, State Single Point of Contact, Budget and Control Board, Office of State Budget, 1122 Ladies Street—12th Floor, Columbia, South Carolina 29201,

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Telephone: (803) 734–0494, FAS: (803) 734–0645

Texas

Tom Adams, Single Point of Contact, State of Texas, Governor's Office of Budget and Planning, Director, Intergovernmental Coordination, P.O. Box 12428, Austin, Texas 78711–2428, Telephone: (512) 463–1771, FAX: (512) 936–2681, e-mail: tadams@governor.state.tx.us

Utah

Carolyn Wright, Utah State Clearinghouse, Office of Planning and Budget, Room 116 State Capitol, Salt Lake City, Utah 84114, Telephone: (801) 538–1535, FAX: (801) 538–1547

West Virginia

Judith Dryer, Chief Program Manager, West Virginia Development Office, Building #6, Room 645, State Capitol, Charleston, West Virginia 25305, Telephone: (304) 558–0350, FAX: (304) 558–0362

Wisconsin

Jeff Smith, Section Chief, State/Federal Relations, Wisconsin Department of Administration, 101 East Wilson Street—6th Floor, P.O. Box 7868, Madison, Wisconsin 53707, Telephone: (608) 266–0267, FAX: (608) 267–6931

Wyoming

Matthew Jones, State Single Point of Contact, Office of the Governor, 200 West 24th Street, State Capital, Room 124, Cheyenne, Wyoming 82002 FAX: (307) 632–3909

TERRITORIES

Guam

Mr. Giovanni T. Sgambelluri, Director, Bureau of Budget and Management Research, Office of the Governor, P.O. Box 2950, Agana, Guam 96910, Telephone: 011–671–472–2285, FAX: 011–671–472–2825

Puerto Rico

Norma Burgos/Jose E. Caro, Chairwoman/Director, Puerto Rico Planning Board, Federal Proposals Review Office, Minillas Government Center, P.O. Box 41119, San Juan, Puerto Rico 00940–1119, Telephone: (809) 727–4444 or (809) 723–6190, FAX: (809) 724–3270 or (809) 724–3103

Northern Mariana Islands

Mr. Alvaro A. Santos, Executive Officer, Office of Management and Budget, Office of the Governor, Saipan, MP 96950, Telephone: (670) 674–2256, FAX: (670) 664–2272

Please direct all questions and correspondence about intergovernmental review to: Ms. Jacoba T. Seman, Federal Programs Coordinator, Telephone: (670) 664–2289, FAX: (670) 664–2272.

Virgin Islands

Nellon Bowry, Director, Office of Management and Budget, #41 Norregade Emancipation Garden Station, Second Floor, Saint Thomas, Virgin Islands 00802

Please direct all questions and correspondence about intergovernmental review to: Daisey Millen, Telephone: (809) 774–0750, FAX: (809) 776–0069.

If you would like a copy of this list faxed to your office, please call our publications office at: (202) 395–9068.

* In accordance with Executive Order #12372, ''Intergovernmental Review of Federal Programs,'' this listing represents the designated State Single Points of Contact. The jurisdictions not listed no longer participate in the process BUT GRANT APPLICANTS ARE STILL ELIGIBLE TO APPLY FOR THE GRANT EVEN IF YOUR STATE, TERRITORY, COMMONWEALTH, ETC. DOES NOT HAVE A ''STATE SINGLE POINT OF CONTACT.'' JURISDICTIONS WITHOUT ''STATE SINGLE POINTS OF CONTACTS'' INCLUDE: Alabama; Alaska, American Samoa; Colorado; Connecticut; Kansas; Hawaii; Idaho; Louisiana; Massachusetts; Minnesota; Montana; Nebraska; New Jersey; Ohio; Oklahoma; Oregon; Palau; Pennsylvania; South Dakota; Tennessee; Vermont; Virginia; and Washington.

This list is based on the most current information provided by the States. Information on any changes or apparent errors should be provided to the Office of Management and Budget and the State in question. Changes to the list will only be made upon formal notification by the State. Also, this listing is published biannually in the Catalogue of Federal Domestic Assistance.

[FR Doc. 00–12373 Filed 5–17–00; 8:45 am]

BILLING CODE 4184–01–P

DEPARTMENT OF HEALTH AND HUMAN SERVICES

Health Care Financing Administration

[Document Identifier: HCFA–R–197]

Agency Information Collection Activities: Submission for OMB Review; Comment Request

In compliance with the requirement of section 3506(c)(2)(A) of the Paperwork Reduction Act of 1995, the Health Care Financing Administration (HCFA), Department of Health and Human Services, has submitted to the Office of Management and Budget (OMB) the following proposal for the collection of information. Interested persons are invited to send comments regarding the burden estimate or any other aspect of this collection of information, including any of the following subjects: (1) The necessity and utility of the proposed information collection for the proper performance of the agency's functions; (2) the accuracy of the estimated burden; (3) ways to enhance the quality, utility, and clarity of the information to be collected; and (4) the use of automated collection techniques or other forms of information technology to minimize the information collection burden.

Type of Information Collection Request: Revision of a currently approved collection;

Title of Information Collection: Maximizing the Effective Use of Telemedicine: A Study of the Effects, Cost Effectiveness and Utilization Patterns of Consultations via Telemedicine'';

Form No.: HCFA–R–197 (OMB# 0938–0705);

Use: This study deals with several issues of importance to HCFA regarding the recent proliferation of Telemedicine programs. The primary goal of this study is to develop policy recommendations for Medicare concerning utilization review and payment methods for Telemedicine services. The major objective is to evaluate the use of interactive video Telemedicine consultation.; Recommendations will be based on analysis of the use of Telemedicine for such medical consultation.;

Frequency: Other: periodically;

Affected Public: Individuals or households, Business or other for-profit, and Not-for-profit institutions;

Number of Respondents: 1,450;

Total Annual Responses: 84,235;

Total Annual Hours: 360.

To obtain copies of the supporting statement for the proposed paperwork collections referenced above, access HCFA's Web site address at http://www.hcfa.gov/regs/prdact95.htm, or E-mail your request, including your address and phone number, to Paperwork@hcfa.gov, or call the Reports Clearance Office on (410) 786–1326. Written comments and recommendations for the proposed information collections must be mailed within 30 days of this notice directly to the OMB Desk Officer designated at the following address: OMB Human Resources and Housing Branch, Attention: Allison Eydt, New Executive Office Building, Room 10235, Washington, DC 20503.

Dated: May 4, 2000.

John P. Burke III,

HCFA Reports Clearance Officer, HCFA, Office of Information Services, Security and Standards Group, Division of HCFA Enterprise Standards.

[FR Doc. 00–12477 Filed 5–17–00; 8:45 am]

BILLING CODE 4120–03–P

DEPARTMENT OF HEALTH AND HUMAN SERVICES

Health Resources and Services Administration

White House Initiative on Asian Americans and Pacific Islanders, President's Advisory Commission; Notice of Meeting; Correction

In **Federal Register** Document 00–11449 appearing on page 26219 in the issue for Friday, May 5, 2000, the following corrections have been made to the Notice of Meeting for the President's Advisory Commission. The room number for the meeting on May 17, 2000 has been changed from Room 800 of the Hubert H. Humphrey Building to the Stonehenge Room of the Hubert H. Humphrey Building. A time change has taken place for the meeting on May 19, 2000. The meeting will take place from 9:00 a.m.–1:00 p.m. Those are the only changes to be noted. All other information is correct as it appears.

An additional meeting has been scheduled and will take place on Thursday, May 18, 2000. This meeting will be open to the public. The meeting will be held on May 18, 2000 from 2:00 p.m.–5:00 p.m. in Room 800 of the Hubert H. Humphrey Building located at 200 Independence Avenue, SW, Washington, DC 20201.

Requests to address the Commission should be made in writing and should include the name, address, telephone number and business or professional affiliation of the interested party. Individuals or groups addressing similar issues are encouraged to combine comments and present through a single representative. The allocation of time for remarks may be adjusted to accommodate the level of expressed interest. Written requests should be faxed to (301) 443–0259. Anyone who has interest in attending any portion of the meetings or who requires additional information about the Commission should contact: Mr. Tyson Nakashima, Office of the White House Initiative on Asian Americans and Pacific Islanders, Parklawn Building, Room 10–42, 5600 Fishers Lane, Rockville, MD 20857, Telephone (301) 443–2492. Anyone who requires special assistance, such as sign language interpretation or other reasonable accommodations, should contact Mr. Nakashima no later than Tuesday, May 16, 2000.

Dated: May 11, 2000.

Jane M. Harrison,

Director, Division of Policy Review and Coordination.

[FR Doc. 00–12445 Filed 5–17–00; 8:45 am]

BILLING CODE 4160–15–P

DEPARTMENT OF HEALTH AND HUMAN SERVICES

National Institutes of Health

Government-Owned Inventions; Availability for Licensing

AGENCY: National Institutes of Health, Public Health Service, DHHS.

ACTION: Notice.

SUMMARY: The inventions listed below are owned by agencies of the U.S. Government and are available for licensing in the U.S. in accordance with 35 U.S.C. 207 to achieve expeditious commercialization of results of federally-funded research and development. Foreign patent applications are filed on selected inventions to extend market coverage for companies and may also be available for licensing.

ADDRESSES: Licensing information and copies of the U.S. patent applications listed below may be obtained by writing to the indicated licensing contact at the Office of Technology Transfer, National Institutes of Health, 6011 Executive Boulevard, Suite 325, Rockville, Maryland 20852–3804; telephone: 301/496–7057; fax: 301/402–0220. A signed Confidential Disclosure Agreement will be required to receive copies of the patent applications.

Mutant Aequorea Victoria Fluorescent Proteins Having Increased Cellular Fluorescence

George N. Pavlakis, George A. Gaitanaris, Roland H. Stauber, John N. Vournakis (NCI)

U.S. Patent 6,027,881 issued 22 February 2000

Licensing Contact: Girish C. Barua; 301/406–7056 ext. 263; e-mail: gb18t@nih.gov

The Green Fluorescent Protein (GFP) from the jellyfish Aequorea victoria is rapidly becoming an important reporter molecule for monitoring gene expression in vivo, in situ and in real time. GFP can be used to tag proteins, cellular compartments, or cells, and has found many uses in the study of biological processes. Unlike other bioluminescent reporters, GFP fluoresces in the absence of any other proteins, substrates, or cofactors. Improved signal to noise ratio is important for several applications using GFP. We have generated GFP mutants that increase the fluorescent signal by at least tenfold over the wild-type GFP in mammalian cells. These mutants emit either green or blue light, detectable when single copy genes are inserted into the cell.

Method for Refolding Recombinant Endostatin

Dong Xie, Paul Grulich, John W. Erickson (NCI)

DHHS Reference No. E–260–99/0 filed 18 Feb 2000

Licensing Contact: Richard Rodriguez; 301/496–7056 ext. 287; e-mail rr154Z@nih.gov

Endostatin is a naturally occurring collagen-derived fragment that has been the subject of intense interest due to its reported anti-tumor and anti-metastatic properties. Endostatin's exact mode of action is unknown, and a detailed analysis of this mode of action has been hampered by the inability to consistently produce large quantities of refolded recombinant endostatin. While endostatin can be recombinantly produced, the isolated protein is found in an unfolded state. Thus a need exists to produce recombinant endostatin in a biologically active form for continuing clinical development and studying specific motifs or structures associated with endostatin which may be responsible for its anti-angiogenic/metastatic properties. The current invention comprises a method of renaturing endostatin comprising contacting unfolded endostatin with an effective amount of cyclodextrin in an aqueous environment buffered at a neutral or acidic ph.

CpG Oligodeoxynucleotides Used To Improve Human Immune Responses

Dennis Klinman, Daniela Verthelyi, Kenji Ishii (FDA)

DHHS Reference No. E–078–00/0 filed 14 Jan 2000

Licensing Contact: Peter Soukas; 301–496–7056, ext. 268; e-mail: ps193c@nih.gov

This invention concerns immune-activating oligonucleotides containing CpG motifs. Although it is known that certain CpG sequences can induce responses from human immune system cells, individual subjects show considerable heterogeneity in their response to different CpG sequences. These different responses make it difficult to induce a therapeutic immune response in all members of a diverse population using a single CpG sequence, even if such a sequence is repeated in a CpG oligonucleotide. The inventors have found that a broad-based immunomodulatory response scan be generated in a wide cross-section of subjects by using a mixture of multiple different CpG motifs. The mixture of oligodeoxynucleotides of the present invention can either be mixtures of different oligodeoxynucleotides expressing different CpG motif is or a

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single oligodeoxynucleotide containing multiple different motifs. The oligodeoxynucleotides of the current invention have the capacity to stimulate humoral, cell-mediated immune responses or both humoral and cell-mediated immune responses, depending on the motifs utilized. The oligodeoxynucleotides of the present invention have uses including, but not limited to, treating allergies infectious diseases, cancer, and autoimmune disorders; furthermore, the obligodeoxynucleotides of the present invention have utility as vaccine adjutants for conventional and DNA vaccines, and as anti-sense therapeutics.

A Novel Neuropeptide Potentially Involved in Pain Regulation, Blood Pressure Control, and Other Physiological Functions

Dr. Ted. Usdin (NIMH)
DHHS Reference No. E–123–99/0 filed 15 Jun 1999
Licensing Contact: Norbert Pontzer; 301/496–7736 ext. 284; e-mail: np59n@nih.gov

A 39 amino acid peptide which activates the newly discovered parathyroid 2 (PTH2) receptor has been isolated, sequenced and cloned. The PTH2 receptor is a member of the secretin receptor family which includes receptors for secretin, vasoactive intestinal polypeptide, calcitonin, glucagon, gastric inhibitory polypeptide and CRF. Immunohistochemical mapping of the PTH2 receptor shows a distribution of PTH2 receptor in: endocrine tissue including pancreatic islet somatostatin cells; thyroid parafollincular cells and peptide secreting cells in the intestine; heart muscle, and nervous tissue including areas of the hypothalamus involve din pituitary regulation and the somatic and visceral primary sensory neuron terminals in the dorsal horn of the spinal column. This distribution suggests that the ligand or an antagonist may be used to treat pain, high blood pressure, diabetes, GI disturbances, psychiatric disease and other pathologies.

Novel Disulfide Conjugated Cell Toxins and Methods of Making and Using Them

David Fitzgerald, Michael J. Iadarola (NCI)
DHHS Reference No. E–301–99/0 filed 22 Oct 1999
Licensing Contact: Marlene Shinn; 301/496–7056 ext. 285; e-mail: ms482m@nih.gov

Efforts to find more effective treatments of chronic pain with few unwanted side effects or which do not dampen acutely painful potentially dangerous stimuli remains a continuing challenge. Current analgesic therapies often fall short of therapeutic goals and typically have unacceptable side effects. Thus the discovery of a more efficacious and safe means to control chronic pain is unpredictable and therapeutically advantageous.

The NIH announces a new technology which is an effective treatment for pain control directed at the local ablation of NK–1 receptor expressing cells. The NK–1 receptor is found on a variety of cell types, the predominant expressing cells being pain-mediating neurons. Other cell types include brain cells and neostriatum cells through the axon collaterals of spiny projection neurons to name a few. This technology is the discovery of a novel conjugate generated between TNB–derivatized Substance P (SP) and a truncated version of Pseudomonas exotoxin, termed PE35. When administered to NK–1 receptor expressing cells, SP–PE35 induced cell death, while cells that expressed NK–2 and NK–3 receptors remained unaffected. This toxin allows for the killing of a specific category of cell types and is an effective means of treating a variety of conditions, in particular chronic pain or tumors that express NK–1 receptors. The toxin can be placed in a pharmaceutically acceptable excipient and can be combined with any method of procedure currently being used clinically, making it a versatile and superior form of treatment.

Dated: April 25, 2000.

Jack Spiegel,

Director, Division of Technology Development and Transfer, National Institutes of Health.

[FR Doc. 00–12546 Filed 5–17–00; 8:45 am]

BILLING CODE 4140–01–M

DEPARTMENT OF HEALTH AND HUMAN SERVICES

National Institutes of Health

Government-Owned Inventions; Availability for Licensing

AGENCY: National Institutes of Health, Public Health Service, DHHS.

ACTION: Notice.

SUMMARY: The inventions listed below are owned by agencies of the U.S. Government and are available for licensing in the U.S. in accordance with 35 U.S.C. 207 to achieve expeditious commercialization of results of federally-funded research and development. Foreign patent applications are filed on selected inventions to extend market coverage for companies and may also be available for licensing.

ADDRESSES: Licensing information and copies of the U.S. patent applications listed below may be obtained by contacting Vasant Gandhi, J.D., Ph.D., at the Office of Technology Transfer, National Institutes of Health, 6011 Executive Boulevard, Suite 325, Rockville, Maryland 20852–3804; telephone: 301/496–7056 ext. 224; fax: 301/402–0220; e-mail: vg48q@nih.gov. A signed Confidential Disclosure Agreement will be required to receive copies of the patent applications.

Peptides That Inhibit the Binding of Human Monocyte Chemoattractant Protein-1 (MCP–1) to Its Receptor CCR2

Teizo Yoshimura (NCI)
DHHS Reference No. E–235–99/0 filed 30 Nov 1999

MCP–1 is a chemoattractant protein and is a member of a family of proinflammatory cytokines called chemokines. Chemokines are of interest because of their ability to attract and activate specific leukocyte subsets to the exclusion of others. In particular, MCP–1 is capable of attracting monocytes but not neutrophils. The inventors isolated peptides with an antibody (E11) that immunoreacts with MCP–1. One such peptide may be useful in blocking the interaction of MCP–1 and its receptor CCR2 which may disrupt the formation and/or progression of a variety of disease states. MCP–1 has been detected in lesions of atherosclerosis, rheumatoid arthritis, pulmonary fibrosis and tumors such as malignant fibrous histiocytoma, malignant glioma, meningioma or melanoma.

Inhibition of ABC Transporters by Transmembrane Domain Analogs

Nadya Tarasova, Michael M Gottesman, Christine Hrycyna,
Christopher J Michejda (NCI)
DHHS Reference No. E–019–00/0 filed 18 Nov 1999

ABC transporters contain multiple transmembrane domains and are involved in the translocation of a variety of substrates across cell membranes. Upregulation of these transporters contributes to multiple drug resistance in cancer chemotherapy. The inventors have found that the P-gp (P-glycoprotein or Multiple Drug Resistance Protein-1) can be inhibited by properly substituted peptides corresponding to one of the transmembrane domains. Such inhibition can be used to enhance the activity of cancer chemotherapy in resistant tumors.

Assay for the Detection of a Variety of Tumors in Biological Specimens

Larry W. Fisher, Neal S. Fedarko, Marian F. Young (NICHD)
DHHS Reference No. E–173–98/0 filed 09 Apr 1999

The inventors have developed methods and reagents for the detection of bone sialoprotein (BSP) in biological samples. The technology relates to the disruption of a serum complex that masks the majority of BSP from established detection systems. Furthermore, there is evidence that there may be a more acidic form of BSP secreted not by normal bone, but only by tumors. Detection of BSP in serum may be a good marker of various bone diseases and a variety of cancers including breast, prostate, lung, and thyroid.

Dated: April 25, 2000.

Jack Spiegel,

Director, Division of Technology Development and Transfer, Office of Technology Transfer, National Institutes of Health.

[FR Doc. 00–12547 Filed 5–17–00; 8:45 am]

BILLING CODE 4140–01–P

DEPARTMENT OF HEALTH AND HUMAN SERVICES

National Institutes of Health

National Center for Complementary & Alternative Medicine; Notice of Closed Meeting

Pursuant to section 10(d) of the Federal Advisory Committee Act, as amended (5 U.S.C. Appendix 2), notice is hereby given of the following meeting.

The meeting will be closed to the public in accordance with the provisions set forth in sections 552b(c)(4) and 552b(c)(6), Title 5 U.S.C., as amended. The grant applications and the discussions could disclose confidential trade secrets or commercial property such as patentable material, and personal information concerning individuals associated with the grant applications, the disclosure of which would constitute a clearly unwarranted invasion of personal privacy.

Name of Committee: National Center for Complementary and Alternative Medicine Special Emphasis Panel.

Date: June 5–7, 2000.

Time: 8:30 am to 1:00 pm.

Agenda: To review and evaluate grant applications.

Place: 6001 Executive Blvd., Room A1/A2, Rockville, MD 20852.

Contact Person: Eugene G. Hayunga, PhD, Scientific Review Administrator, National Institutes of Health, NCCAM, Building 31, Room 5B50, 9000 Rockville Pike, Bethesda, MD 20892, 301–594–2014, hayungae@od.nih.gov.

Dated: May 4, 2000.

LaVerne Y. Stringfield,

Director, Office of Federal Advisory Committee Policy.

[FR Doc. 00–12544 Filed 5–17–00; 8:45 am]

BILLING CODE 4140–01–M

DEPARTMENT OF HEALTH AND HUMAN SERVICES

National Institutes of Health

National Heart, Lung, and Blood Institute; Notice of Closed meetings.

Pursuant to section 10(d) of the Federal Advisory Committee Act, as amended (5 U.S.C. Appendix 2), notice is hereby given of the following meetings.

The meetings will be closed to the public in accordance with the provisions set forth in sections 552b(c)(4) and 552b(c)(6), Title 5 U.S.C., as amended. The grant applications and the discussions could disclose confidential trade secrets or commercial property such as patentable material, and personal information concerning individuals associated with the grant applications, the disclosure of which would constitute a clearly unwarranted invasion of personal privacy.

Name of Committee: National Heart, Lung, and Blood Institute Special Emphasis Panel.

Date: June 14, 2000.

Time: 8:30 am to 5 pm.

Agenda: To review and evaluate grant applications.

Place: Holiday Inn Chevy Chase, 5520 Wisconsin Avenue, Chevy Chase, MD 20815.

Contact Person: Louise P. Corman, PhD, Scientific Review Administrator, Review Branch, NIH, NHLBI, Rockledge Building II, 6701 Rockledge Drive, Suite 7180, Bethesda, MD 20892–7924, (301) 435–0270.

Name of Committee: National Heart, Lung, and Blood Institute Special Emphasis Panel, Clinical Trials Special Emphasis Panel.

Date: June 27, 2000.

Time: 8 am to 1 pm.

Agenda: To review and evaluate grant applications.

Place: Hyatt Regency Bethesda, One Bethesda Metro Center, Bethesda, MD 20814.

Contact Person: Joyce A. Hunter, National Heart, Lung, and Blood Inst., NIH, Rockledge Center, II, 6701 Rockledge Drive, Suite 7194, Bethesda, MD 20892–7924, 301/435–0288.

Name of Committee: National Heart, Lung, and Blood Institute Special Emphasis Panel.

Date: July 13, 2000.

Time: 9 am to 3:30 pm.

Agenda: To review and evaluate grant applications.

Place: Hilton National Airport Hotel, 2399 Jefferson Davis Highway, Arlington, VA 22202.

Contact Person: Louise P. Corman, PhD, Scientific Review Administrator, Review Branch, NIH, NHLBI, Rockledge Building II, 6701 Rockledge Drive, Suite 7180, Bethesda, MD 20892–7924, (301) 435–0270.

Name of Committee: National Heart, Lung, and Blood Institute Special Emphasis Panel.

Date: July 14, 2000.

Time: 9 am to 12:30 pm.

Agenda: To review and evaluate grant applications.

Place: Washington National Airport Hilton, 2399 Jefferson Davis Highway, Arlington, VA 22202.

Contact Person: Louise P. Corman, PhD, Scientific Review, Administrator, Review Branch, NIH, NHLBI, Rockledge Building II, 6701 Rockledge Drive, Suite 7180, Bethesda, MD 20892–7924, (301) 435–0270.

(Catalogue of Federal Domestic Assistance Program Nos. 93.233, National Center for Sleep Disorders Research; 93.837, Heart and Vascular Diseases Research; 93.838, Lung Diseases Research; 93.839, Blood Diseases and Resources Research, National Institutes of Health, HHS)

Dated: May 10, 2000.

LaVerne Y. Stringfield,

Director, Office of Fedeal Advisory Committee Policy.

[FR Doc. 00–12543 Filed 5–17–00; 8:45 am]

BILLING CODE 4140–01–M

DEPARTMENT OF HEALTH AND HUMAN SERVICES

National Institutes of Health

National Institute on Alcohol Abuse and Alcoholism; Notice of Closed Meeting

Pursuant to section 10(d) of the Federal Advisory Committee Act, as amended (5 U.S.C. Appendix 2), notice is hereby given of the following meeting.

The meeting will be closed to the public in accordance with the provisions set forth in sections 552b(c)(4) and 552b(c)(6), Title 5 U.S.C., as amended. The grant applications and the discussions could disclose confidential trade secrets or commercial property such as patentable material, and personal information concerning individuals associated with the grant applications, the disclosure of which would constitute a clearly unwarranted invasion of personal privacy.

Name of Committee: National Institute on Alcohol Abuse and Alcoholism Special Emphasis Panel.

Date: June 15, 2000.

Time: 4 p.m. to 5 p.m.

Agenda: To review and evaluate grant applications.

Place: Holiday Inn, Bethesda, MD 20814.

Contact Person: Elsie D. Taylor, Scientific Review Administrator, Extramural Project Review Branch, National Institute of Alcohol

008542

Abuse and Alcoholism National Institutes of Health, Suite 409, 6000 Executive Blvd. Bethesda, MD 20892–7003, 301–443–9787, etaylor@niaaa.nih.gov

(Catalogue of Federal Domestic Assistance Program Nos. 93.271, Alcohol Research Career Development Awards for Scientists and Clinicians; 93.272, Alcohol National Research Service Awards for Research Training; 93.273, Alcohol Research Program; 93.891, Alcohol Research Center Grants, National Institutes of Health, HHS)

Dated: May 10, 2000.

LaVerne Y. Stringfield,

Director, Office of Federal Advisory Committee Policy.

[FR Doc. 00–12532 Filed 5–17–00; 8:45 am]

BILLING CODE 4140–01–M

DEPARTMENT OF HEALTH AND HUMAN SERVICES

National Institutes of Health

National Institute on Alcohol Abuse and Alcoholism; Notice of Closed Meeting

Pursuant to section 10(d) of the Federal Advisory Committee Act, as amended (5 U.S.C. Appendix 2), notice is hereby given of the following meeting.

The meeting will be closed to the public in accordance with the provisions set forth in sections 552b(c)(4) and 552b(c)(6), Title 5 U.S.C., as amended. The grant applications and the discussions could disclose confidential trade secrets or commercial such as patentable material, and personal information concerning individuals associated with the grant applications, the disclosure of which would constitute a clearly unwarranted invasion of personal privacy.

Name of Committee: National Institute on Alcohol Abuse and Alcoholism Special Emphasis Panel.

Date: June 6, 2000.

Time: 7 am to 8 am.

Agenda: To review and evaluate grant applications.

Place: Bethesda Marriott Hotel, 5151 Pooks Hill Road, Bethesda, MD 20914.

Contact Person: Ronald Suddendorf, Phd, Scientific Review Administrator, Extramural Project Review Branch, National Institute on Alcohol Abuse and Alcoholism, National Institutes of Health, Suite 409, 6000 Executive Boulevard, Bethesda, MD 20892–7003, 301–443–2926.

This notice is being published less than 15 days prior to the meeting due to the timing limitations imposed by the review and funding cycle.

(Catalogue of Federal Domestic Assistance Program Nos. 93.271, Alcohol Research Career Development Awards for Scientists and Clinicians; 93.272, Alcohol National Research Service Awards for Research Training; 93.273, Alcohol Research Programs; 93.891, Alcohol Research Center Grants, National Institutes of Health, HHS)

Dated: May 10, 2000.

LaVerne Y. Stringfield,

Director, Office of Federal Advisory Committee Policy.

[FR Doc. 00–12533 Filed 5–17–00; 8:45 am]

BILLING CODE 4140–01–M

DEPARTMENT OF HEALTH AND HUMAN SERVICES

National Institutes of Health

National Institute of Allergy and Infectious Diseases; Notice of Closed Meeting

Pursuant to section 10(d) of the Federal Advisory Committee Act, as amended (5 U.S.C. Appendix 2), notice is hereby given of the following meeting.

The meeting will be closed to the public in accordance with the provisions set forth in sections 552b(c)(4) and 552b(c)(6), Title 5 U.S.C., as amended. The grant applications and the discussions could disclose confidential trade secrets or commercial property such as patentable material, and personal information concerning individuals associated with the grant application, the disclosure of which would constitute a clearly unwarranted invasion of personal privacy.

Name of Committee: Acquired Immunodeficiency Syndrome Research Review Committee.

Date: June 15–16, 2000.

Time: 8:30 am to 5 pm.

Agenda: To review and evaluate grant applications.

Place: The Governor's House Hotel, Cabinet Room, 1615 Rhode Island Avenue, NW, Washington, DC 20036.

Contact Person: Paula S. Strickland, Phd, Scientific Review Administrator, Scientific Review Program, Division of Extramural Activities, NIAID, NIH, Room 2156, 6700–B Rockledge Drive, MSC 7610, Bethesda, MD 20892–7610, 301–496–2550.

(Catalogue of Federal Domestic Assistance Program Nos. 93.855, Allergy, Immunology, and Transplantation Research; 93.856, Microbiology and Infectious Diseases Research, National Institutes of Health, HHS)

Dated: May 10, 2000.

LaVerne Y. Stringfield,

Director, Office of Federal Advisory Committee Policy.

[FR Doc. 00–12534 Filed 5–17–00; 8:45 am]

BILLING CODE 4140–01–M

DEPARTMENT OF HEALTH AND HUMAN SERVICES

National Institutes of Health

National Institute on Deafness and Other Communication Disorders; Notice of Closed Meeting

Pursuant to section 10(d) of the Federal Advisory Committee Act, as amended (5 U.S.C. Appendix 2), notice is hereby given of the following meeting.

The meeting will be closed to the public in accordance with the provisions set forth in sections 552b(c)(4) and 552b(c)(6), Title 5 U.S.C., as amended. The grant applications and the discussions could disclose confidential trade secrets or commercial property such as patentable material, and personal information concerning individuals associated with the grant applications, the disclosure of which would constitute a clearly unwarranted invasion of personal privacy.

Name of Committee: Communication Disorders Review Committee.

Date: June 14, 2000.

Time: 8 am to 6 pm.

Agenda: To review and evaluate grant applications.

Place: Latham Hotel, 3000 M Street, NW., Washington, DC 20007–3701.

Contact Person: Melissa Stick, PhD, MPH, Scientific Review Administrator, Scientific Review Branch, Division of Extramural Research, NIDCD/NIH, 6120 Executive Blvd., Bethesda, MD 20892, 301–496–8683.

(Catalogue of Federal Domestic Assistance Program Nos. 93.173, Biological Research Related to Deafness and Communicative Disorders, National Institutes of Health, HHS)

Dated: May 10, 2000.

LaVerne Y. Stringfield,

Director, Office of Federal Advisory Committee Policy.

[FR Doc. 00–12535 Filed 5–17–00; 8:45 am]

BILLING CODE 4140–01–M

DEPARTMENT OF HEALTH AND HUMAN SERVICES

National Institutes of Health

National Institute of General Medical Sciences; Notice of Closed Meeting

Pursuant to section 10(d) of the Federal Advisory Committee Act, as amended (5 U.S.C. Appendix 2), notice is hereby given of the following meeting.

The meeting will be closed to the public in accordance with the provisions set forth in sections

552b(c)(4) and 552b(c)(6), Title 5 U.S.C., as amended. The grant applications and the discussions could disclose confidential trade secrets or commercial property such as patentable material, and personal information concerning individuals associated with the grant applications, the disclosure of which would constitute a clearly unwarranted invasion of personal privacy.

Name of Committee: National Institute of General Medical Sciences Initial Review Group, Biomedical Research and Research Training Review Subcommittee A.
Date: June 13, 2000.
Time: 8 am to 6 pm.
Agenda: To review and evaluate grant applications.
Place: Holiday Inn Bethesda, 8120 Wisconsin Avenue, Bethesda, MD 20814.
Contact Person: Carole H. Latker, Scientific Review Administrator, Office of Scientific Review, National Institute of General Medical Sciences, National Institutes of Health, Natcher Building, Room 1AS–13, Bethesda, MD 20892, (301) 594–3663.
(Catalogue of Federal Domestic Assistance Program Nos. 93.375, Minority Biomedical Research Support; 93.821, Cell Biology and Biophysics Research; 93.859, Pharmacology, Physiology, and Biological Chemistry Research; 93.862, Genetics and Developmental Biology Research; 93.88, Minority Access to Research Careers; 93.96, Special Minority Initiatives, National Institutes of Health, HHS)

Dated: May 10, 2000.

LaVerne Y. Stringfield,

Director, Office of Federal Advisory Committee Policy.

[FR Doc. 00–12536 Filed 5–17–00; 8:45 am]

BILLING CODE 4140–01–M

DEPARTMENT OF HEALTH AND HUMAN SERVICES

National Institutes of Health

National Institute of Neurological Disorders and Stroke; Notice of Closed Meeting

Pursuant to section 10(d) of the Federal Advisory Committee Act, as amended (5 U.S.C. Appendix 2), notice is hereby given of the following meeting.

The meeting will be closed to the public in accordance with the provisions set forth in sections 552b(c)(4) and 552b(c)(6), Title 5 U.S.C., as amended. The contract proposals and the discussions could disclose confidential trade secretes or commercial property such as patentable material, and personal information concerning individuals associated with the contract proposals, the disclosure of which would constitute a clearly unwarranted invasion of personal privacy.

Name of Committee: National Institute of Neurological Disorders and Stroke Special Emphasis Panel.
Date: May 24, 2000.
Time: 8 am to 4 pm.
Agenda: To review and evaluate contract proposals.
Place: One Washington Circle, 1 Washington Circle NW, Washington, DC 20037.
Contact Person: Phillip F. Wiethorn, Scientific Review Administrator, Scientific Review Branch, NINDS/NIH/DHHS, Neuroscience Center, 6001 Executive Blvd, Suite 3208, MSC 9529, Bethesda, MD 20892–9529, 301–496–9223.
This notice is being published less than 15 days prior to the meeting due to the timing limitations imposed by the review and funding cycle.

(Catalogue of Federal Domestic Assistance Program Nos. 93.853, Clinical Research Related to Neurological Disorders; 93.854, Biological Basis Research in the Neurosciences, National Institutes of Health, HHS)

Dated: May 10, 2000.

LaVerne Y. Stringfield,

Director, Office of Federal Advisory Committee Policy.

[FR Doc. 00–12538 Filed 5–17–00; 8:45 am]

BILLING CODE 4140–01–M

DEPARTMENT OF HEALTH AND HUMAN SERVICES

National Institutes of Health

National Institute of Mental Health; Notice of Closed Meeting

Pursuant to section 10(d) of the Federal Advisory Committee Act, as amended (5 U.S.C. Appendix 2), notice is hereby given of the following meeting.

The meeting will be closed to the public in accordance with the provisions set forth in sections 552b(c)(4) and 552b(c)(6), Title 5 U.S.C., as amended. The grant applications and the discussions could disclose confidential trade secrets or commercial property such as patentable material, and personal information concerning individuals associated with the grant applications, the disclosure of which would constitute a clearly unwarranted invasion of personal privacy.

Name of Committee: National Institute of Mental Health Special Emphasis Panel.
Date: June 22, 2000.
Time: 1:30 pm to 3:30 pm.
Agenda: To review and evaluate grant applications.
Place: Neuroscience Center, National Institutes of Health, 6001 Executive Blvd., Bethesda, MD 20892 (Telephone Conference Call).
Contact Person: David I. Sommers, Scientific Review Administrator, Division of Extramural Activities, National Institute of Mental Health, NIH, Neuroscience Center, 6001 Executive Blvd., Room 6144, MSC 9606, Bethesda, MD 20892–9606, 301–443–6470.

(Catalogue of Federal Domestic Assistance Program Nos. 93.242, Mental Health Research Grants; 93.281, Scientist Development Award, Scientist Development Award for Clinicians, and Research Scientist Award; 93.282, Mental Health National Research Service Awards for Research Training, National Institutes of Health, HHS)

Dated: May 10, 2000.

LaVerne Y. Stringfield,

Director, Office of Federal Advisory Committee Policy.

[FR Doc. 00–12539 Filed 5–17–00; 8:45 am]

BILLING CODE 4140–01–M

DEPARTMENT OF HEALTH AND HUMAN SERVICES

National Institutes of Health

National Institute of General Medical Sciences; Notice of Closed Meetings

Pursuant to section 10(d) of the Federal Advisory Committee Act, as amended (5 U.S.C. Appendix 2), notice is hereby given of the following meetings.

The meetings will be closed to the public in accordance with the provisions set forth in sections 552b(c)(4) and 552b(c)(6), Title 5 U.S.C., as amended. The grant applications and the discussions could disclose confidential trade secrets or commercial property such as patentable material, and personal information concerning individuals associated with the grant applications, the disclosure of which would constitute a clearly unwarranted invasion of personal privacy.

Name of Committee: National Institute of General Medical Sciences Special Emphasis Panel Summer Research Experiences for Undergraduates.
Date: June 14, 2000.
Time: 8:30 am to 5 pm.
Agenda: To review and evaluate grant applications.
Place: Holiday Inn Bethesda, 8120 Wisconsin Avenue, Bethesda, MD 20814.
Contact Person: Laura Moen, PhD, Scientific Review Administrator, Office of Scientific Review, National Institute of General Medical Sciences, National Institutes of Health, Natcher Building, Room 1AS–13H, Bethesda, MD 20892, 301–594–3998.

Name of Committee: National Institute of General Medical Sciences Special Emphasis Panel, Protein Structure Initiative.
Date: June 27–29, 2000.
Time: 8 pm to 5 pm.

008544

Agenda: To review and evaluate grant applications.

Place: Holiday Inn Chevy Chase, 5520 Wisconsin Avenue, Chevy Chase, MD 20815.

Contact Person: Irene B. Glowinski, PhD, Assistant Chief, Office of Scientific Review, National Institutes of General Medical Sciences, National Institutes of Health, Natcher Building, Room 1AS–13, Bethesda, MD 20892–6200, (301) 594–3663, glowinsi@nigms.nih.gov.

(Catalogue of Federal Domestic Assistance Program Nos. 93.375, Minority Biomedical Research Support; 93.821, Cell Biology and Biophysics Research; 93.859, Pharmacology, Physiology, and Biological Chemistry Research; 93.862, Genetics and Developmental Biology Research; 93.88, Minority Access to Research Careers; 93.96, Special Minority Initiatives, National Institutes of Health, HHS)

Dated: May 10, 2000.

LaVerne Y. Stringfield,

Director, Office of Federal Advisory Committee Policy.

[FR Doc. 00–12541 Filed 5–17–00; 8:45 am]

BILLING CODE 4140–01–M

DEPARTMENT OF HEALTH AND HUMAN SERVICES

National Institutes of Health

National Institute of General Medical Sciences; Notice of Closed meeting

Pursuant to section 10(d) of the Federal Advisory Committee Act, as amended (5 U.S.C. Appendix 2), notice is hereby given of the following meeting.

The meeting will be closed to the public in accordance with the provisions set forth in sections 552b(c)(4) and 552b(c)(6), Title 5 U.S.C., as amended. The grant applications and the discussions could disclose confidential trade secrets or commercial property such as patentable material, and personal information concerning individuals associated with the grant applications, the disclosure of which would constitute a clearly unwarranted invasion of personal privacy.

Name of Committee: Minority Programs Review Committee MARC Review Subcommittee A.

Date: June 22–23, 2000.

Time: 8 am to 5 pm.

Agenda: To review and evaluate grant applications.

Place: Holiday Inn Bethesda, 8120 Wisconsin Avenue, Bethesda, MD 20814.

Contact Person: Richard I. Martinez, PhD, Scientific Review Administrator, Office of Scientific Review, National Institute of General Medical Sciences, National Institutes of Health, Natcher Building, Room 1AS–19G, Bethesda, MD 20892–6200, (301) 594–2849.

(Catalogue of Federal Domestic Assistance Program Nos. 93.375, Minority Biomedical Research Support; 93.821, Cell Biology and Biophysics Research; 93.859, Pharmacology, Physiology, and Biological Chemistry Research; 93.862, Genetics and Development Biology Research; 93.88, Minority Access to Research Careers; 93.96, Special Minority Initiatives, National Institutes of Health, HHS)

Dated: May 10, 2000.

LaVerne Y. Stringfield,

Director, Office of Federal Advisory Committee Policy.

[FR Doc. 00–12542 Filed 5–17–00; 8:45 am]

BILLING CODE 4140–01–M

DEPARTMENT OF HEALTH AND HUMAN SERVICES

National Institutes of Health

National Institute of Environmental Health Sciences; Notice of Closed Meeting

Pursuant to section 10(d) of the Federal Advisory Committee Act, as amended (5 U.S.C. Appendix 2), notice is hereby given of the following meeting.

The meeting will be closed to the public in accordance with the provisions set forth in sections 552b(c)(4) and 552b(c)(6), Title 5 U.S.C., as amended. The contract proposals and the discussions could disclose confidential trade secrets or commercial property such as patentable material, and personal information concerning individuals associated with the contract proposals, the disclosure of which would constitute a clearly unwarranted invasion of personal privacy.

Name of Committee: National Institute of Environmental Health Services Special Emphasis Panel, Contract NIH 00–26.

Date: June 19, 2000.

Time: 9 am to 12 pm.

Agenda: To review and evaluate contract proposals.

Place: NIEHS—East Campus, Building 4401, Conference Room 122, 79 Alexander Drive, Research Triangle Park, NC 27709 (Telephone Conference Call).

Contact Person: Linda K. Bass, PhD, Scientific Review Administrator, NIEHS, PO Box 12233 EC–30, Research Triangle Park, NC 27709, (919) 541–1307.

(Catalogue of Federal Domestic Assistance Program Nos. 93.113, Biological Response to Environmental Health Hazards; 93.114, Applied Toxicological Research and Testing; 93.115 Biometry and Risk Estimation—Health Risks from Environmental Exposures; 93.142, NIEHS Hazardous Waste Worker Health and Safety Training; 93.143, NIEHS Superfund Hazardous Substances—Basic Research and Education; 93.894, Resources and Manpower Development in the Environmental Health Sciences, National Institutes of Health, HHS)

Dated: May 4, 2000.

LaVerne Y. Stringfield,

Director, Office of Federal Advisory Committee Policy.

[FR Doc. 00–12545 Filed 5–17–00; 8:45 am]

BILLING CODE 4140–01–M

DEPARTMENT OF HEALTH AND HUMAN SERVICES

National Institutes of Health

National Library of Medicine; Notice of Meeting

Pursuant to section 10(d) of the Federal Advisory Committee Act, as amended (5 U.S.C. Appendix 2), notice is hereby given of the following meeting.

The meeting will be open to the public as indicated below, with attendance limited to space available. Individuals who plan to attend and need special assistance, such as sign language interpretation or other reasonable accommodations, should notify the Contact Person listed below in advance of the meeting.

The meeting will be closed to the public in accordance with the provisions set forth in sections 552b(c)(4) and 552b(c)(6), Title 5 U.S.C., as amended. The grant applications and the discussions could disclose confidential trade secrets or commercial property such as patentable material, and personal information concerning individuals associated with the grants applications, the disclosure of which would constitute a clearly unwarranted invasion of personal privacy.

Name of Committee: Biomedical Library Review Committee

Date: June 14–15, 2000

Closed: June 14, 2000, 8:30 am to 11:30 am

Agenda: To review and evaluate grant applications

Place: National Library of Medicine, Board Room Bldg 38, 2E–09, 8600 Rockville Pike, Bethesda, MD 20894

Open: June 14, 2000, 11:30 am to 12 pm

Agenda: Administrative Reports and Program Developments

Place: National Library of Medicine, Board Room Bldg 38, 2E–09, 8600 Rockville Pike, Bethesda, MD 20894

Closed: June 14, 2000, 12 pm to 1:30 pm.

Agenda: To review and evaluate fellowship grant applications.

Place: National Library of Medicine, Board Room Bldg 38, 2E–09, 8600 Rockville Pike, Bethesda, MD 20894.

Closed: June 14, 2000, 1:30 pm to 5:30 pm.

Agenda: To review and evaluate grant applications.

Place: National Library of Medicine, Board Room Bldg 38, 2E–09, 8600 Rockville Pike, Bethesda, MD 20894.

Open: June 15, 2000, 8:30 am to 9:00 am

Agenda: Administrative Reports and Program Development

Place: National Library of Medicine, Board Room Bldg 38, 2E–09, 8600 Rockville Pike, Bethesda, MD 20894

Closed: June 15, 2000, 9 am to 12 pm

Agenda: To review and evaluate grant applications

Place: National Library of Medicine, Board Room Bldg 38, 2E–09, 8600 Rockville Pike, Bethesda, MD 20894

Closed: June 15, 2000, 12 pm to 1:30 pm

Agenda: To review and evaluate resource grant applications

Place: National Library of Medicine, Board Room Bldg 38, 2E–09, 8600 Rockville Pike, Bethesda, MD 20894

Contact Person: Sharee Pepper, Phd, Scientific Review Administrator, Health Scientist Administrator, Office of Extramural Programs, National Library of Medicine, 6705 Rockledge Drive Suite 301, Bethesda, MD 20892, (301) 594–4933

(Catalogue of Federal Domestic Assistance Program Nos. 93.879, Medical Library Assistance, National Institutes of Health, HHS)

Dated: May 10, 2000.

LaVerne Y. Stringfield,

Director, Office of Federal Advisory Committee Policy.

[FR Doc. 00–12540 Filed 5–17–00; 8:45 am]

BILLING CODE 4140–01–M

DEPARTMENT OF HEALTH AND HUMAN SERVICES

National Institutes of Health

Center for Scientific Review; Notice of Closed Meetings

Pursuant to section 10(d) of the Federal Advisory Committee Act, as amended (5 U.S.C. Appendix 2), notice is hereby given of the following meetings.

The meetings will be closed to the public in accordance with the provisions set forth in sections 552b(c)(4) and 552b(c)(6), Title 5 U.S.C., as amended. The grant applications and the discussions could disclose confidential trade secrets or commercial property such as patentable material, and personal information concerning individuals associated with the grant applications, the disclosure of which would constitute a clearly unwarranted invasion of personal privacy.

Name of Committee: Center for Scientific Review Special Emphasis Panel.

Date: May 30, 2000.

Time: 10 am to 1 pm.

Agenda: To review and evaluate grant applications.

Place: NIH, Rockledge 2, Bethesda, MD 20892 (Telephone Conference Call).

Contact Person: Dharam S. Dhindsa, DVM, Phd, Scientific Review Administrator, Center for Scientific Review, National Institutes of Health, 6701 Rockledge Drive, Room 5126, MSC 7854, Bethesda, MD 20892, (301) 435–1174, dhindsad@csr.nih.gov.

Name of Committee: Center for Scientific Review Special Emphasis Panel.

Date: May 30–31, 2000.

Time: 6 pm to 5 pm.

Agenda: To review and evaluate grant applications.

Place: American Inn of Bethesda, 8130 Wisconsin Ave, Bethesda, MD 20814.

Contact Person: Ramesh K. Nayak, Phd, Scientific Review Administrator, Center for Scientific Review, National Institutes of Health, 6701 Rockledge Drive, Room 5146, MSC 7840, Bethesda, MD 20892, (301) 435–1026.

Name of Committee: Center for Scientific Review Special Emphasis Panel.

Date: May 31–June 1, 2000.

Time: 8:30 pm to 5 pm.

Agenda: To review and evaluate grant applications.

Place: Holiday Inn, 5520 Wisconsin Ave, Palladian West, Chevy Chase, MD 20815.

Contact person: Gamil C. Debbas, PhD, Scientific Review Adminsitrator, Center for Scientific Review, National Institutes of Health, 6701 Rockledge Drive, Room 5170, MSC 7844, Bethesda, MD 20892, (301) 435–1018.

Name of Committee: Center for Scientific Review Special Emphasis Panel.

Date: May 31, 2000.

Time: 1 pm to 4 pm.

Agenda: To review and evaluate grant applications.

Place: NIH, Rockledge 2, Bethesda, MD 20892 (Telephone Conference Call).

Contact Person: Dharam S. Dhindsa, DVM, PhD, Scientific Review Administrator, Center for Scientific Review, National Institutes of Health, 6701 Rockledge Drive, Room 5126, MSC 7854, Bethesda, MD 20892, (301) 435–1174, dhindsad@csr.nih.gov

Name of Committee: Center for Scientific Review Special Emphasis Panel.

Date: May 31, 2000.

Time: 2 pm to 4 pm.

*Agenda:*To review and evaluate grant applications and/or proposals

Place: NIH, Rockledge 2, Bethesda, MD 20892 (Telephone Conference Call).

Contact Person: Syed Amir, PhD, Scientific Review Administrator, Center for Scientific Review, National Institutes of Health, 6701 Rockledge Drive, Room 6168, MSC 7892, Bethesda, MD 20892 (301) 435–1043.

(Catalogue of Federal Domestic Assistance Program Nos. 93.306, Comparative Medicine, 93.306; 93.333, Clinical Research, 93.333, 93.337, 93.393–93.396, 93.837–93.844, 93.846–93.878, 93.892, 93.893, National Institutes of Health, HHS)

Dated: May 10, 2000.

LaVerne Y. Stringfield,

Director, Office of Federal Advisory Committee Policy.

[FR Doc. 00–12537 Filed 5–17–00; 8:45 am]

BILLING CODE 4140–01–M

DEPARTMENT OF HEALTH AND HUMAN SERVICES

National Institutes of Health

Prospective Grant of Exclusive License: Uridine Prodrug Analogues: Uses in Cancer Diagnosis and Therapy

AGENCY: National Institutes of Health, Public Health Service, DHHS.

ACTION: Notice.

SUMMARY: This is notice, in accordance with 35 U.S.C. 209(c)(1) and 37 CFR 404.7(a)(1)(i), that the National Institutes of Health, Department of Health and Human Services, is contemplating the grant of an exclusive license to practice the inventions embodied in PCT Patent Application S/N PCT/US98/23109 (23109) entitled, ''Antitumor Uridine Analogs'' which was filed on October 10, 1998 and claims priority to U.S. Patent Application S/N 60/063,587 entitled, ''Diagnosis and Treatment of Tumors with Drugs Activated by Thymidylate Synthase,'' which was filed on October 10, 1997 to Nascent Pharmaceuticals LLC of San Francisco, California. The patent rights in these inventions have been assigned to the United States of America.

The prospective exclusive license territory will be worldwide and the field of use may be limited to human therapeutics and diagnostics for the detection and treatment of breast and gastrointestinal cancers.

DATES: Only *written* comments and/or license applications which are received by the National Institutes of Health on or before July 17, 2000 will be considered.

ADDRESSES: Requests for copies of the patent, inquiries, comments and other materials relating to the contemplated exclusive license should be directed to: Richard U. Rodriguez, M.B.A., Technology Licensing Specialist, Office of Technology Transfer, National Institutes of Health, 6011 Executive Boulevard, Suite 325, Rockville, MD. 20852–3804. Telephone: (301) 496–7056, X287; Facsimile (301) 402–0220; E-mail rr154z@nih.gov.

SUPPLEMENTARY INFORMATION: The technology claimed in '23109 relates to methods, compounds and compositions for diagnosing and/or treating cancers with anti-tumor agents activated by thymidylate synthase (TS) and/or thymidine kinase (TK). In addition, the invention relates to the preparation and use of positron emitting nucleoside analogues for imaging applications.

TS is an essential enzyme for DNA synthesis, and it has been shown to be

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more abundantly expressed in tumor cells than in normal cells. Historically, scientists have tried to capitalize upon this overexpression and have attempted to inhibit TS activity with the goal of shrinking tumors and/or killing tumor cells. For example, fluorouracil and floxuridine have been used to treat breast, colon, pancreas, stomach, ovarian and head/neck carcinomas, but the effectiveness of these approaches have been limited because many tumors are inherently resistant to these treatments, and even those that are initially sensitive, develop resistance during the course of treatment. It was subsequently shown, that a strong correlation exists between resistance and high level expression of TS.

The inventors have proceeded along another route, again, attempting to capitalize upon the high levels of TS in tumor cells. Instead of trying to inhibit TS activity, they have proposed the introduction of uridine analogue prodrugs into cancer cells. These prodrugs would then be converted to more toxic thymidine analogues. This approach seems to avoid the observed problems of TS inhibition and shows great promise.

Detection and diagnostic applications for this technology are also possible. In particular, the success of this type of strategy would be contingent upon the extent of prodrug incorporation into DNA and therefore, the analysis of a tumor cell's DNA could provide diagnostic information regarding the optimal therapy for a specific tumor type. Traditionally, methods to determine growth rates have been invasive, but this technology would provide for non-invasive external imaging methods which would avoid the need for biopsies as well as providing for the capability of scanning larger areas of the body.

Thymidine is an excellent probe for monitoring growth/DNA synthesis, but it cannot be used in these situations because it is quickly degraded in the body. Analogues of thymidine would obviate this problem and could be produced upon conversion of the contemplated uridine analogue prodrugs.

The prospective exclusive license will be royalty-bearing and will comply with the terms and conditions of 35 U.S.C. 209 and 37 CFR 404.7. The prospective exclusive license may be granted unless within sixty (60) days from the date of this published notice, the NIH receives written evidence and argument that establish that the grant of the license would not be consistent with the requirements of 35 U.S.C. 209 and 37 CFR 404.7.

Applications for a license in the field of use filed in response to this notice will be treated as objections to the grant of the contemplated exclusive license. Comments and objections submitted to this notice will not be made available for public inspection and, to the extent permitted by law, will not be released under the Freedom of Information Act, 5 U.S.C. 552.

Dated: April 25, 2000.

Jack Spiegel,

Director, Division of Technology Development and Transfer, Office of Technology Transfer.

[FR Doc. 00–12548 Filed 5–17–00; 8:45 am]

BILLING CODE 4140–01–P

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT

[Docket No. FR–4570–N–02]

Office of the Assistant Secretary for Public and Indian Housing; Notice of Funding Availability for Fair Share Allocation of Incremental Voucher Funding Fiscal Year 2000; Amendments to NOFA and Reopening of Application Period

AGENCY: Office of the Assistant Secretary for Public and Indian Housing, HUD.

ACTION: Notice of Fund Availability (NOFA); Amendments and Reopening of Application Period.

SUMMARY: On March 10, 2000, HUD published its FY 2000 NOFA for Fair Share Allocation of Incremental Voucher Funding (''Fair Share NOFA''). This document amends the selection criteria of this NOFA primarily to better reflect the appropriate weight in points that should have been assigned to the ''housing needs'' selection criterion so that need is the most important basis for allocating incremental voucher funding. As discussed in more detail in the Supplementary Information section of this notice, the points of other selection criteria are also revised to better reflect their appropriate weight, and the separate criterion for portability is removed. This notice also explains that HUD will substitute the number of ''contracted units'' for ''HUD-approved budget'' the number of certificates and vouchers on the latest HUD-approved budget when the number of a PHA's contracted units is higher than the number of a PHA's budgeted units.

The application period for the Fair Share NOFA closed on April 24, 2000. This notice reopens the application period for an additional 30 day period.

DATES: Applications are due on June 19, 2000.

Applicants that already submitted applications by the April 24, 2000, application due date, need not resubmit a new application, and need not amend their applications. Applicants that already submitted applications, however, may submit new or amended applications if they so choose.

SUPPLEMENTARY INFORMATION:

Background—March 10, 2000 NOFA

If you are interested in applying for funding under the Fair Share NOFA, and did not apply earlier, please review the entire Fair Share NOFA, published on March 10, 2000 (65 FR 13222). Except for the reopening of the application period and the revisions made by this document, all other provisions of the Fair Share NOFA are unchanged and remain applicable.

The March 10, 2000 Fair Share NOFA will provide you with detailed information regarding the submission of an application, Section 8 program requirements, the application selection process to be used by HUD in selecting applications for funding, and other valuable information relative to a PHA's application submission and participation in the program covered by this NOFA. The March 10, 2000 Fair Share NOFA is also available on HUD's internet site at http://www.hud.gov under ''Funds Available.'' This **Federal Register** notice amending the March 10, 2000 Fair Share NOFA is also available at the same HUD web site.

Reopening of Application Period

Application Due Date. Your completed application (an original and two copies) or any amendment to an earlier submitted application (also an original and two copies) is due on or before June 19, 2000 at the addresses shown below.

As noted earlier, applicants that already submitted applications by the April 24, 2000, application due date, need not resubmit a new application, and need not amend their applications. Applicants that already submitted applications, however, may submit new or amended applications if they so choose.

Submission of new or amended applications should clearly identify the name of the applicant, the applicant HA code (*e.g.* CA002), and whether the information submitted is new and replaces a previously submitted application in its entirety or is an addendum to the previously submitted application.

Address for Submitting Applications. Submit your original application or your original application amendment and one copy to Michael E. Diggs, Director

of the Grants Management Center, Department of Housing and Urban Development, 501 School Street, SW, Suite 800, Washington, DC 20024.

Submit the second copy of your application or application amendment to the local HUD Field Office Hub, Attention: Director, Office of Public Housing, or to the local HUD Field Office Program Center, Attention: Program Center Coordinator.

The Grants Management Center is the official place of receipt for all applications in response to this NOFA.

Delivered Applications. If you are hand delivering your application, or application amendment, it is due on or before 5:00 pm, Eastern time, on the application due date to the Office of Public and Indian Housing's Grants Management Center (GMC) in Washington, DC. A copy is also to be submitted by the applicant to the local HUD Field Office Hub or local HUD Field Office Program Center.

This application deadline in this notice is firm as to date and hour. In the interest of fairness to all competing PHAs, HUD will not consider any application or application amendment that is received after the application deadline. Applicants should take this practice into account and make early submission of their materials to avoid any risk of loss of eligibility brought about by unanticipated delays or other delivery-related problems. HUD will not accept, at any time during the NOFA competition, application materials sent via facsimile (FAX) transmission.

Mailed Applications. Applications sent by U.S. mail will be considered timely filed if postmarked before midnight on the application due date and received within ten (10) days of that date.

Applications Sent by Overnight Delivery. Applications sent by overnight delivery will be considered timely filed if received before or on the application due date, or upon submission of documentary evidence that they were placed in transit with the overnight delivery service by no later than the specified application due date.

For Application Kit. An application kit is not available and is not necessary for submitting an application for funding under this NOFA. The March 10, 2000 Fair Share NOFA, as amended by this notice, contains all of the information necessary for the submission of an application for voucher funding in connection with this NOFA.

For Further Information and Technical Assistance. You may contact George C. Hendrickson, Housing Program Specialist, Room 4216, Office of Public and Assisted Housing Delivery, Department of Housing and Urban Development, Room 4216, 451 Seventh Street, SW, Washington, DC 20410; telephone (202) 708–1872, ext. 4064, or you may contact Ms. Sherry McCown at the Grants Management Center at (202) 358–0273. (These are not toll-free numbers.) Persons with hearing or speech impairments may access these numbers via TTY (text telephone) by calling the Federal Information Relay Service at 1–800–877–8339 (this is a toll-free number).

Amendments to Selection Criteria and Points Assigned

This document amends the selection criteria in Section IV of the March 10, 2000 Fair Share NOFA primarily to better reflect the appropriate weight in points that should have been assigned to the ''housing needs'' selection criterion so that need is the most important basis for allocating incremental voucher funding. Weights of other criteria are reduced accordingly. This document also alters or removes two selection criteria that do not assess a public housing agency's housing needs and are otherwise problematic. First, the residency preference subcategory is being altered to provide for the assignment of points to PHAs that will limit applicability of residency preferences to 15% of all new admissions to the program, as well as to those PHAs that do not have a residency preference or agree to eliminate one. This change is made in recognition that some PHAs with legally adopted residency preferences and great housing needs would have been penalized by the language provided in the March 10, 2000 Fair Share NOFA. Second, the portability selection criterion is removed because portability is adequately covered in the Area-Wide Housing Opportunities (Selection Criterion 2) and because the portability criterion would have awarded too many points for PHAs promising to absorb portable families with the new funds, relative to the March 10, 2000 Fair Share NOFA's treatment of PHAs that already are absorbing portable families. Because of the changes in the Selection Criteria, changes were required to be made to Attachment 2 to the March 10, 2000 Fair Share NOFA (Fair Share Application Checklist) and the amended checklist is included in this notice.

This document also revises the total amount of points a PHA is eligible to receive under the Fair Share NOFA. The March 10, 2000 Fair Share NOFA provided for a total of 160 points. The amendments made by this notice provide that the total number of points a PHA is eligible to receive is 100 points.

The changes made by this document are as follows:

- Selection Criterion 1: Housing Needs—the maximum number of points for this criterion is changed from 30 to 45 points, and the assignment of these points is based more specifically on the percentage of the State's housing need in the PHA's jurisdiction.
- Selection Criterion 2: Efforts of PHA to Provide Area-Wide Housing Opportunities for Families—the points for this criterion are changed from 60 to 30 points. To correspond to the reduction in the point total for this criterion, all the subcategories under Selection Criterion 2 are reduced from 10 to 5 points. In addition, the residency preference subcategory is changed as discussed above. PHAs that would have received points for this subcategory will still receive points and need submit nothing else unless they choose to amend their certification. PHAs that would not have received points but would qualify under the amended language need to submit the required certification.
- Selection Criterion 3: Local Initiatives—the points for this criterion are changed from 20 to 10 points.
- Selection Criterion 4: Disabled Families—the points for this criterion are changed from 20 to 10 points.
- Selection Criterion 5: Medicaid Home and Community Based Services Waivers under Section 1915(c) of the Social Security Act—the points for this criterion are changed from 10 to 5 points.
- Selection Criterion 6: Portability—this criterion is removed as a selection criterion for the reasons discussed above. Statements already submitted in response to this criterion will not be considered.

Substitution of ''Contracted Units'' for Budgeted Units When Number of Contracted Units Is Higher Than Number of Budgeted Units

In the March 10, 2000 Fair Share NOFA, HUD used the term ''HUD-approved budget'' in discussing the calculation of maximum funding allowed under the NOFA. For example, in Section V.(A) (''Fair Share Application Process''), HUD advises that the ''The GMC may recommend for approval the maximum funding for a PHA under this NOFA that does not exceed the lesser of 25% of the PHA vouchers and certificates on the latest HUD-approved budget or 25% of the number of vouchers available in the State, whichever is less.'' (See page 13226, first column). Reference to 25%

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of HUD-approved budget (''budgeted units'') for certificates and vouchers also appears in Section V(B) and Section VI(A) (also on page 13226).

Because the automated data on budgeted units are not optimal in all cases, through this notice, HUD provides notification that it will substitute in this calculation contracted units (*i.e.,* the number of units under an Annual Contributions Contract) for the number of certificates and vouchers on the latest HUD-approved budget when the number of a PHA's contracted units is higher than the number of a PHA's budgeted units. The determination of contracted units shall be made in accordance with Attachment 3 (Methodology for Determining Lease-Up and Budget Authority Utilization Percentage Rates) to the March 10, 2000 Fair Share NOFA (see page 13229).

Accordingly, in the FY 2000 NOFA for Fair Share Allocation of Incremental Voucher Funding, notice document 00–6027, beginning at 65 FR 13222, in the issue of Friday, March 10 2000, the following amendments are made to Section IV of the NOFA at 65 FR 13224, and Attachment 2 at 65 FR 13229:

IV. Fair Share Application Rating Process

(A) *Selection Criteria.* The GMC will use the Selection Criteria shown below for the rating of applications submitted in response to this NOFA. The maximum score under the selection criteria for fair share funding is 100 points.

(1) Selection Criterion 1: Housing Needs (45 points).

(a) Description: This criterion assesses the housing need in the primary market area specified in the PHA's application compared with the housing need for the State. Housing need is defined as the number of very low-income renter households with severe rent burden, based on 1990 Census data. Very low-income is defined as income at or below the Section 8 very low-income limits. Severe rent burden is defined as a household paying 50 percent or more of its gross income for rent.

(b) Needs Data: For the purpose of this criterion, housing needs are based on a tabulation of 1990 Census data prepared for the Department by the Bureau of the Census. Data on housing needs are available for all States, all counties (county equivalents), and places with populations of 10,000 or more as of 1990. Information will be posted on the HUD Home Page site on the Internet's world wide web (http://www.hud.gov under ''Funds Available'') indicating the proportion of each State's housing needs for primary markets.

(c) Rating and Assessment: The number of points assigned is based on the percentage of the State's housing need that is within the PHA's primary market area. The primary market area is defined as the jurisdiction (or its closest equivalent in terms of areas for which housing needs data are available) in which the PHA is authorized to operate and where the vouchers will be used, as described in its application. (See paragraph VI(C) of this NOFA regarding regional (multi-county) and State PHAs.)

(1) The GMC will assign the following points :

- 45 points (maximum). For each percentage point of the State's housing need (rounded to the nearest percentage point), the PHA will receive two points.

(2) A State, regional or multi-county PHA will receive points based on the areas it serves where the vouchers will be used, *e.g.,* the entire State or the sum of the housing needs for the counties and/or localities comprising its primary market area.

(3) A PHA with a primary market area that is a community with a population of 10,000 or less, or a PHA for which housing needs data are not available, will receive 2 points.

(2) Selection Criterion 2: Efforts of PHA to Provide Area-Wide Housing Opportunities for Families (30 points).

(a) Description: Many PHAs have undertaken voluntary efforts to provide area-wide housing opportunities for families. The efforts described in response to this selection criterion must be beyond those required by federal law or regulation such as the portability provisions of the Section 8 voucher program. The GMC will assign points to PHAs that have established cooperative agreements with other PHAs or created a consortium of PHAs in order to facilitate the transfer of families and their rental assistance between PHA jurisdictions. In addition, the GMC will assign points to PHAs that have established relationships with non-profit groups to provide families with additional counseling, or have directly provided counseling, to increase the likelihood of a successful move by the families to areas that do not have large concentrations of poverty.

(b) Rating and Assessment: The GMC will assign point values for any of the following assessments for which the PHA qualifies and add the points for all the assessments (maximum of 30 points) to determine the total points for this Selection Criterion:

- 5 Points—Assign 5 points if the PHA documents that it participates in an area-wide exchange program where all PHAs absorb portable Section 8 families.
- 5 Points—Assign 5 points if the PHA certifies that (i) its administrative plan does not include a ''residency preference'' for selection of families to participate in its voucher program, or (ii) it will eliminate immediately any ''residency preference'' currently in its administrative plan, or (iii) it will limit applicability of residency preferences to 15% of all new admissions to the voucher program.
- 5 Points—Assign 5 points if the PHA documents that it has established a contractual relationship with a non-profit agency or the local governmental entity to provide housing counseling for families that want to move to low-poverty or non-minority areas. The five PHAs approved for the FY 93 Moving to Opportunity (MTO) for Fair Housing Demonstration, PHAs participating in the Regional Opportunity Counseling (ROC) Program, and any other PHAs that receive counseling funds from HUD in connection with the demolition of public housing, public housing vacancy consolidation, or settlement of litigation involving desegregation may qualify for points under this assessment. However, these PHAs must identify all activities undertaken, other than those funded and required under the MTO Demonstration, ROC Program, or the court-ordered plans or plans for relocating public housing families, to expand housing opportunities.
- 5 Points—Assign 5 points if the PHA documents that it participates with other PHAs in using a metropolitan wide or combined waiting list for selecting participants in the program.
- 5 Points—Assign 5 points if the PHA documents that it has implemented other initiatives that have resulted in expanding housing opportunities in areas that do not have undue concentrations of poverty or minority families.
- 5 Points—Assign 5 points if the PHA has formed a consortium or joint venture with other PHAs to administer its voucher program.

(3) Selection Criterion 3: Local Initiatives (10 points).

(a) Description: The application must describe the extent to which the PHA demonstrates locally initiated efforts in support of its voucher and certificate programs or comparable tenant-based rental assistance programs. Evaluation of a locality's contribution is measured competitively by whether the locality is able to provide services, cash contributions, or tax abatements to rental property owners leasing to Section 8 families, or demonstrates its

intention to provide this kind of support in the future.

(b) Rating and Assessment: The GMC will assign one of two point-values, as follows:

• 10 points: The State or locality provides local support (e.g., financial, manpower for inspection services) to its voucher or certificate program.

• 0 points: The State or locality does not provide support to the PHA's voucher or certificate program.

(4) Selection Criterion 4: Disabled Families (10 points).

(a) Description: The GMC will assign 10 points to PHAs that indicate at least 15 percent or more of the vouchers they are requesting (or funded by HUD) under this NOFA will be used to house disabled families. The PHA's application must be specific as to the exact percentage of vouchers that will be issued solely to disabled families. Disabled families are defined as follows:

(i) *Disabled Family.* A family whose head, spouse, or sole member is a person with disabilities. The term ''disabled family'' may include two or more such persons with disabilities living together, and one or more such persons with disabilities living with one or more persons who are determined essential to the care and well-being of the person or persons with disabilities (live-in aides).

(ii) *Person with disabilities.* A person who—

a. Has a disability as defined in section 223 of the Social Security Act (42 U.S.C. 423), or

b. Is determined to have a physical, mental or emotional impairment that:

1. Is expected to be of long-continued and indefinite duration;

2. Substantially impedes his or her ability to live independently; and

3. Is of such a nature that such ability could be improved by more suitable housing conditions, or

c. Has a developmental disability as defined in section 102 of the Developmental Disabilities Assistance and Bill of Rights Act (42 U.S.C. 6001(5)).

The term ''person with disabilities'' does not exclude persons who have the disease of acquired immunodeficiency syndrome (AIDS) or any conditions arising from the etiologic agent for acquired immunodeficiency syndrome (HIV).

(Note: While the above definition of a ''person with disabilities'' is to be used for purposes of determining a family's eligibility for a Section 8 voucher designated as being for a disabled family under this NOFA, the definition of a person with disabilities contained in section 504 of the Rehabilitation Act of 1973 and its implementing regulations must be used for purposes of meeting the requirements of Fair Housing laws, including providing reasonable accommodations.)

No individual shall be considered a person with disabilities for the purpose of determining eligibility solely on the basis of any drug or alcohol dependence.

(b) Rating and Assessment: The GMC will assign one of two point values, as follows:

• 10 points: The PHA will use not less than 15 percent of the vouchers being requested (or funded by HUD) to house disabled families.

• 0 points: The PHA will use less than 15 percent of the vouchers it is requesting (or funded by HUD) to house disabled families.

(5) Selection Criterion 5: Medicaid Home and Community Based Services Waivers Under Section 1915(c) of the Social Security Act (5 points).

(a) Description: This selection criterion is for PHAs interested in the provision of Section 8 voucher assistance to families within their jurisdiction who are disabled and also covered under a waiver of Section 1915(c) of the Social Security Act. Section 1915(c) waivers are approved by the Health Care Financing Administration within the Department of Health and Human Services (HHS) for the agency within each State responsible for the administration of the medicaid program. Contacting the responsible State agency (for example, the Agency for Health Care Administration in the State of Florida) will assist the PHA in determining how many, if any, individuals are covered by a Section 1915(c) waiver in the PHA's legal area of operation. These waivers allow medicaid-eligible individuals at risk of being placed in hospitals, nursing facilities or intermediate care facilities the alternative of being cared for in their homes and communities. These individuals are thereby assisted in preserving their independence and ties to family and friends at a cost no higher than that of institutional care.

While a Section 1915(c) waiver may cover individuals other than those who are disabled, the focus of Selection Criterion 5 is on disabled families only. The definition of disabled families listed under Selection Criterion 4 will be used by PHAs for purposes of the issuance of vouchers to disabled families in connection with Selection Criterion 5; *i.e.,* only those individuals that meet the definition of a disabled family in this announcement are to be considered in connection with a PHA determining how many such disabled families are covered by a Section 1915(c) waiver in their legal area of operation and whether to try to qualify for the 5 points available under Selection Criterion 5. The PHA's application must be specific as to the percentage of vouchers that will be issued to such disabled families.

Any PHA attempting to qualify for the 5 points available under Selection Criterion 5 should also include information within its application indicating the collaborative efforts already undertaken with the responsible State agency to identify eligible families, as well as agreements reached with that agency for future referrals of such families. HUD reserves the right at some future point in time to conduct an evaluation of the success of the PHA's efforts to collaborate with the State agency and to successfully house individuals that meet the requirements of being covered by a Section 1915(c) waiver, qualify as a disabled family under this announcement, and are otherwise eligible for a Section 8 voucher.

(b) Rating and Assessment: The GMC will assign one of two point values as follows:

• 5 points: The PHA will use not less than 3 percent of the vouchers being requested (or funded by HUD) to house Section 8 eligible, disabled families covered by a waiver under Section 1915(c) of the Social Security Act.

• 0 points: The PHA will use less than 3 percent of the vouchers it is requesting (or funded by HUD) to house Section 8 eligible, disabled families covered by a waiver under Section 1915(c) of the Social Security Act.

(c) Prohibition Against Double Counting. The number (percentage) of disabled families that a PHA indicates it will issue vouchers to when qualifying for the 5 points available under Selection Criterion 5 cannot be used to also qualify for the 10 points available under Selection Criterion 4 or conversely.

Dated: May 15, 2000.

Harold Lucas,

Assistant Secretary for Public and Indian Housing.

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Attachment 2

FAIR SHARE VOUCHER APPLICATION CHECKLIST

PHA NAME:_____

CITY/STATE:_____

PHA CODE #:_____

_____ Delivered by the **due date**, or mailed and postmarked before midnight on due date, or placed in transit with overnight delivery service before due date.

_____ **Original and one copy** of application submitted to Michael E. Diggs, Director of the Grants Management Center, Department of Housing and Urban Development, 501 School St., SW, Suite 800, Washington, D.C., 20024; and **one copy** sent to local HUD Field Office Hub, Attn: Director, Office of Public Housing, or to the local HUD Field Office Program Center, Attention: Program Center Coordinator.

_____ **If applicable**, PHA designates another **housing agency, nonprofit agency, or contractor to administer new funding.**

_____ Copy of letter from local HUD Field Office requiring contract administrator.

_____ Agreement from contract agency to administer funding on behalf of applicant.

_____ Copy of PHA letter to local HUD Field Office appealing requirement for contract administrator.

_____ Copy of written response to appeal from local HUD Field Office.

_____ PHA listed on HUD Home Page Internet site as passing **90% lease-up OR 90% budget authority utilization -or-**

_____ PHA not listed as meeting 90% thresholds. PHA includes information confirming 90% lease-up or budget authority utilization for 1998 or 1999 using same methodology and data sources indicated in Attachment 3 to the Fair Share NOFA.

_____ PHA is in **compliance with all fair housing and civil rights laws** (refer to Section III. General Program Requirements).

_____ PHA has **not been debarred or otherwise disqualified** from providing assistance under the Section 8 Housing Choice Voucher Program.

_____ **Form HUD-52515**, Funding Application (January 1996 version), completed in its entirety, except Section C. (See Section VI.(A) of the NOFA and form HUD-52515 regarding information to be entered thereon.)

_____ **Letter of Intent and Narrative**

_____ Includes statement of acceptance of a reduction in the number of vouchers.

_____ Includes minimum number of vouchers PHA will accept:_____.

_____ Includes a narrative description of how the application meets, or will meet, the application selection criteria.

Housing Needs **(Criterion 1).** Areas PHA is authorized to operate in (HUD-52515).

_____ Efforts of PHA to Provide Area-Wide Housing Opportunities for Families **(Criterion 2).**

_____ Evidence of participation in area-wide exchange program where all PHA absorb portable Section 8 families.

_____ Certification that (i) the PHA's administrative plan does not include a "residency preference" for selection of families to participate in its voucher program, or (ii) PHA will eliminate immediately any "residency preference" currently in its administrative plan, or (iii) the PHA will limit applicability of residency preferences to 15% of all new admissions to the voucher program..

_____ PHA contract to provide housing counseling for families moving to low-poverty/non-minority areas.

_____ Is an approved PHA for FY 1993 Moving to Opportunity (MTO) Fair Housing Demonstration, **- or-**

_____ Is a participant in the Regional Opportunity Counseling (ROC) Program, **-or-**.

_____ Receives counseling funds related to public housing demolition, vacancy consolidation, or litigation.

_____ Describes other activities expanding housing opportunities (not MTO, ROC, or litigation efforts).

_____ Documentation of PHA's Participation With Other PHAs in Using Metropolitan-Wide/Combined Waiting List.

_____ Documentation of Other Initiatives Resulting in Expansion of Housing Opportunities.

_____ Documentation of Consortium or Joint Venture with other PHAs to administer its voucher program.

_____ Local Initiatives **(Criterion 3).** Narrative description of locally initiated efforts in support of the PHA's voucher and certificate programs.

_____Disabled Families (**Criterion 4**). Includes a narrative description indicating the PHA will use 15 percent or more of the vouchers being requested/funded to house disabled families.

_____Medicaid Home and Community Based Services Waivers Under Section 1915(c) of the Social Security Act **(Criterion 5).** Includes narrative description indicating the percentage of vouchers to be issued to disabled families covered by a Section 1915(c) waiver, and the collaborative efforts undertaken with the State agency to identify eligible families/agreements for future referrals of such families from that agency.

_____**Description of Primary Market Area**. Regional (multi-county) and State PHAs clearly identify which cities and counties they will use the vouchers in that are within their legal area of operation.

_____Statement Regarding Steps PHA Will Take To: **(Affirmatively Further Fair Housing)**

_____ Eliminate impediments to fair housing identified in local Analysis of Impediments (AI) to Fair Housing Choice,

_____ Remedy discrimination in housing, or

_____ Promote fair housing rights and fair housing choice.

_____ **Program Summary**. Provide a separate, one paragraph statement describing

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how the vouchers being applied for will address the local housing needs of eligible families in renting decent, safe, and affordable housing. Describe, where applicable, how the vouchers will be used to expand existing housing choices, and whether the PHA intends to use the vouchers to establish or expand upon its existing Family Unification Program, partnerships with local government, nonprofit agencies, or private industry groups. Also address any related notable local program activities, best practices, or accomplishments.

_____**Application Checklist.** A copy of this Checklist has been included as part of the PHA's application.

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[FR Doc. 00–12586 Filed 5–15–00; 4:58 pm]

BILLING CODE 4210–33–C

DEPARTMENT OF THE INTERIOR

Fish and Wildlife Service

Endangered and Threatened Species Permit Application

AGENCY: Fish and Wildlife Service, Interior.

ACTION: Notice of receipt of application.

The following applicant has applied for a permit to conduct certain activities with endangered species. This notice is provided pursuant to section 10(c) of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531, *et seq.*).

Permit Number TE805269–6

Applicant: Daniel A. Soluk, Illinois Natural History Survey, Champaign, Illinois.

The applicant requests a permit amendment to take Hine's Emerald Dragonfly (Somatochlora hineana) in the states of Alabama, Michigan, Missouri and Ohio. The applicant is currently authorized to conduct take in Illinois and Wisconsin. Activities are proposed for the enhancement of survival of the species in the wild.

Written data or comments should be submitted to the Regional Director, U.S. Fish and Wildlife Service, Ecological Services Operations, 1 Federal Drive, Fort Snelling, Minnesota 55111–4056, and must be received within 30 days of the date of this publication.

Documents and other information submitted with this application are available for review by any party who submits a written request for a copy of such documents to the following office within 30 days of the date of publication of this notice: U.S. Fish and Wildlife Service, Ecological Services Operations, 1 Federal Drive, Fort Snelling, Minnesota 55111–4056. Telephone: (612/713–5343); FAX: (612/713–5292).

Dated: May 12, 2000.

Charles M. Wooley,

Assistant Regional Director, Ecological Services, Region 3, Fort Snelling, Minnesota.

[FR Doc. 00–12573 Filed 5–17–00; 8:45 am]

BILLING CODE 4310–55–P

DEPARTMENT OF THE INTERIOR

Fish and Wildlife Service

Availability of a Draft Environmental Assessment and Receipt of an Application for an Incidental Take Permit for the Atlantic Coast Piping Plover in Massachusetts

AGENCY: Fish and Wildlife Service, Interior.

ACTION: Notice.

SUMMARY: The Massachusetts Division of Fisheries and Wildlife has applied to the U.S. Fish and Wildlife Service (Service) for an incidental take permit pursuant to Section 10(a)(1)(B) of the Endangered Species Act (Act). The requested permit, which is for a period of three years, would authorize the incidental take of the threatened piping plover *(Charadrius melodus)* in Massachusetts. The proposed take would occur as a result of specific actions relating to the management of recreational use of beaches where breeding piping plovers are found.

The Massachusetts Division of Fisheries and Wildlife has prepared a draft environmental assessment (EA) for the incidental take application. This notice is provided pursuant to Section 10(c) of the Act and National Environmental Policy Act regulations (40 CFR 1506.6).

DATES: Written comments on the application and draft EA should be received on or before June 19, 2000.

ADDRESSES: Written comments regarding the application and requests for copies of the draft EA and the conservation plan should be addressed to Field Supervisor, New England Field Office, 22 Bridge St., Unit 1, Concord, New Hampshire 03301–4986, telephone (603) 225–1411. Please refer to permit TE813653 when submitting comments. Comments regarding the conservation plan will be forwarded to the Massachusetts Division of Fisheries and Wildlife for review and response.

FOR FURTHER INFORMATION CONTACT: Susanna L. von Oettingen at the above address.

SUPPLEMENTARY INFORMATION:

The Atlantic Coast piping plover was listed as a threatened species on January 10, 1986. Because of its listing as threatened, the piping plover is protected by the Act's prohibitions against ''take''. However, the Service may issue permits to carry out otherwise prohibited activities involving endangered and threatened wildlife under certain circumstances. Regulations governing permits are at 50 CFR 17.22, 17.23 and 17.32. For threatened species, such permits are available for scientific purposes, incidental take, or special purposes consistent with the purposes of the Act.

The Massachusetts Division of Fisheries and Wildlife (Division) has applied to the Service for an incidental take permit pursuant to Section 10(a)(1)(B) of the Act. This permit would authorize the incidental take of piping plovers through otherwise lawful activities occurring on plover breeding beaches. Included in the application is a conservation plan prepared by the Division detailing the activities that would result in incidental take and describing measures that mitigate, minimize and monitor the amount of take. In 1996, the Division was granted a Section 10(a)(1)(B) permit for the incidental take of piping plovers. The permit expired in 1998. The conservation plan included in the current application under review is an updated document and will replace the earlier conservation plan.

The revised recovery plan for the Atlantic Coast piping plover (U.S. Fish and Wildlife Service, 1996. Piping Plover (*Charadrius melodus*), Atlantic Coast Population, Revised Recovery Plan. Hadley, MA. 258 pp) identified New England (which includes Massachusetts) as a recovery unit. Guidelines in the recovery plan state that permits for incidental take that will reduce the productivity of breeding piping plovers should only be allowed in recovery units where the subpopulation has achieved at least 70% of its portion of the recovery goal. The 1999 preliminary estimate of 634 pairs of piping plovers in the New England recovery unit indicate that the population has exceeded the recovery goal of 627 pairs specified in the recovery plan. Furthermore, under an intensive management program, the Massachusetts piping plover population has increased more than four-fold over the last ten years, from 140 pairs in 1990 to 505 pairs in 1999.

The purpose of the proposed incidental take permit is to provide increased flexibility in managing Massachusetts beaches for use by recreationists and homeowners, while assuring continued progress toward the recovery of the Massachusetts and Atlantic Coast populations of the piping plover. The additional flexibility in managing beaches will prevent a disproportionate expenditure of resources directed at the protection of a few nests or broods in areas where they may significantly disrupt beach access by large numbers of people and be highly vulnerable to disturbance and/or mortality. Management flexibility also

will create incentives for the continued participation by beach management agencies and organizations involved in protecting piping plovers.

The two alternatives presented by the Division in the conservation plan and the draft EA are limited to the proposed action and the no-action alternative (continuation of current management recommendations without increased flexibility for limited take).

The proposed action establishes strict statewide and site-specific eligibility criteria that must be met prior to the implementation of the proposed Section 10 incidental take permit. Statewide eligiblity requirements determine the level of take that will be allowed for each breeding season. Site-specific eligibility requirements determine whether a landowner may participate in permitted activities, and requires that these landowners make additional plover protection commitments, including the use of predator exclosures, prohibition of dogs, implementation of public outreach programs (for heavily-used public recreational beaches), and plover monitoring and reporting. The proposed permit would be effective during the 2000, 2001 and 2002 plover breeding seasons. Authorized take would only affect piping plovers; take of other federally-listed species is specifically excluded from the proposed action.

Incidental take likely to occur on eligible sites may result from several management activities outlined in the conservation plan. Certain activities will be automatically authorized statewide and at particular sites. Statewide activities automatically proposed to be authorized include the taking of chicks on paved or improved roads and in parking lots and take caused by fireworks located within one-half mile or more from plover nests or chicks. Additional proposed take automatically permitted at three sites includes: (1) Take from fireworks at Crane Beach, Ipswich; (2) take from unescorted essential vehicles on a specified portion of Crane's Beach; (3) take from unescorted vehicles on a specified portion of Plymouth Beach, Plymouth; and (4) take of chicks by unescorted vehicles on a specified portion of Sandy Neck, Barnstable.

Additional discretionary take may also be authorized at a limited number of sites that meet specific eligibility requirements. Landowners that choose to undertake such actions may apply to be included under the Division's proposed permit that will authorize the incidental take. Proposed authorized activities are: (1) Reduction of symbolically-fenced buffer areas around plover nests, applicable to one plover nest per site per year; (2) moving eggs from heavily-used pedestrian or vehicle access points; (3) limited use of escorted off-road vehicle caravans for recreational access during periods when unfledged chicks are present on the beach; and (4) limited use of vehicles for homeowner access after dark through areas with unfledged chicks.

Take of piping plovers primarily will occur either through direct mortality of chicks, harassment of chicks or adults, or mortality of eggs that occurs as the result of nest abandonment or inadequate incubation or nest defense. As a result of these takings, overall reproductive success will be reduced at individual sites, and adverse effects may occur to immediate habitats of individuals pairs or broods. However, the level of incidental take likely to occur will not reduce productivity enough to substantially slow progress toward recovery. Take that occurs as a result of a permit issued to the Division will not include mortality of adults, nor will actions undertaken within the scope of such a permit permanently degrade otherwise suitable habitat.

The Division has proposed to minimize and monitor the level of incidental take through a number of measures. Continued population growth over the duration of the permit should be ensured by conditioning the authorization of discretionary incidental take on maintaining average productivity of 1.5 chicks fledged per pair for the entire state, individual Management Units and individual sites. If statewide productivity falls below 1.5 chicks fledged per pair, incidental take authorized for the following year will be limited. The conservation plan encompasses a sufficiently large geographic area that should some sites experience adverse effects from environmental or demographic stochasticity, unsuccessful management, or larger incidental take than predicted, those set-backs may be balanced by more favorable conditions or results of management elsewhere in the planning unit. Finally, the proposed permit duration of three years will allow for a relatively rapid evaluation of the conservation plan in light of management results and changes in the overall status of the Massachusetts and New England plover populations that may occur in 2000, 2001 and 2002.

The 1996 Section 19(a)(1)(B) incidental take permit granted to the Division outlined eligibility requirements similar to those proposed in the current application. Due to a decrease in piping plover productivity in 1996, permit activities were not allowed to occur the following year in order to ensure the continued recovery of piping plovers in Massachusetts. Piping plover productivity also fell below the established eligibility criteria in 1997, again precluding the implementation of measures permitted in the 1996 Section 10 permit. The eligibility criteria proposed in the current Section 10(a)(1)(B) permit application provide a greater range of options than the previous permit. These options will allow greater flexibility to implement the portions of the proposed permit that will have the least impact on the recovery of the Massachusetts population of the piping plover.

Dated: May 11, 2000.

Mamie Parker,

Deputy Regional Director, Region 5.

[FR Doc. 00–12492 Filed 5–17–00; 8:45 am]

BILLING CODE 4310–55–M

DEPARTMENT OF THE INTERIOR

Fish and Wildlife Service

Letters of Authorization To Take Marine Mammals

AGENCY: U.S. Fish and Wildlife Service, Interior.

ACTION: Notice of issuance of Letters of Authorization to take marine mammals incidental to oil and gas industry activities.

SUMMARY: In accordance with section 101(a)(5)(A) of the Marine Mammal Protection Act of 1972, as amended, and the U.S. Fish and Wildlife Service implementing regulations [50 CFR 18.27(f)(3)], notice is hereby given that Letters of Authorization to take polar bears and Pacific walrus incidental to oil and gas industry exploration, development, and production activities have been issued to the following companies:

Company	Activity	Date issued
BP Exploration (Prudhoe Bay Unit)	Production	April 21, 2000.
BP Exploration (Kuparuk Unit)	Production	April 21, 2000.
Western Geophysical (Anadarko)	Exploration	April 21, 2000.

008556

Company	Activity	Date issued
BP Exploration (Northstar)	Development	May 3, 2000.
ARCO Alaska, Inc. (Meltwater North)	Exploration	May 3, 2000.
ARCO Alaska, Inc. (Spark # 1)	Exploration	May 3, 2000.
ARCO Alaska, Inc. (Rendezvous A&B)	Exploration	May 3, 2000.
ARCO Alaska, Inc. (Lookout A)	Exploration	May 3, 2000.
ARCO Alaska, Inc. (Moose's Tooth A&C)	Exploration	May 3, 2000.
ARCO Alaska, Inc. (Clover A&B)	Exploration	May 3, 2000.
ARCO Alaska, Inc. (Cairn)	Exploration	May 3, 2000.
Western Geophysical (ARCO)	Exploration	May 3, 2000.
Western Geophysical (BP Exploration)	Exploration	May 3, 2000.
Kuukpik/Fairweather Geophysical	Exploration	May 3, 2000.
BP Exploration (Point Thomson)	Exploration	May 3, 2000.

FOR FURTHER INFORMATION CONTACT: Mr. John W. Bridges at the U.S. Fish and Wildlife Service, Marine Mammals Management Office, 1011 East Tudor Road, Anchorage, Alaska 99503, (300) 362–5148 or (907) 786–3810.

SUPPLEMENTARY INFORMATION:

Letters of Authorization were issued in accordance with U.S. Fish and Wildlife Service Federal Rules and Regulations ''Marine Mammals; Incidental Take During Specified Activities (65 FR 16828; March 30, 2000).''

Dated: May 8, 2000.

Mike Boylan,

Acting Deputy Regional Director.

[FR Doc. 00–12527 Filed 5–17–00; 8:45 am]

BILLING CODE 4310–55–M

DEPARTMENT OF THE INTERIOR

Bureau of Indian Affairs

Notice of Final Agency Action To Take 90.94 Acres of Land, More or Less, Into Trust for the Lower Brule Sioux Tribe of Indians of South Dakota

AGENCY: Bureau of Indian Affairs, Interior.

ACTION: Notice of intent to take land into trust.

SUMMARY: This provides notice that a final agency determination has been made to acquire 90.94 acres of land, more or less, into trust for the Lower Brule Sioux Tribe of Indians of South Dakota. The United States will acquire title no sooner than thirty days after this notice is published. This notice is published in the exercise of authority delegated by the Secretary of the Interior to the Assistant Secretary—Indian Affairs by 209 DM 8.1 and pursuant to 25 CFR 151.12(b), 61 **Federal Register** 18082–18083, April 24, 1996.

FOR FURTHER INFORMATION CONTACT: Terrance L. Virden, Bureau of Indian Affairs, Director, Office of Trust Responsibilities, MS–4513/MIB/Code 200, 1849 C Street, NW, Washington, DC 20240; telephone (202) 208–5831.

SUPPLEMENTARY INFORMATION: On April 6, 2000, the Assistant Secretary—Indian Affairs made a final determination that the United States will accept 90.94 acres of land, more or less, in trust for the Lower Brule Sioux Tribe of Indians of South Dakota. It was determined that the acceptance of the following described land into trust, pursuant to 25 U.S.C. 465, would be in the best interest of the Lower Brule Sioux Tribe of Indians of South Dakota.

Lyman County, South Dakota

A portion of the Northeast Quarter of the Northwest Quarter (NE¼NW¼) lying North of Highway No. 16 (shown as Lot H–1 in Book 3 of Plats, Page 108) and except Lot ''A'' of Lester's Addition (a subdivision of the NE¼NW¼) of Section Twenty-Four (24) and the West Half of the Southwest Quarter (W½SW¼) of Section Thirteen (13), the Northwest Quarter of the Northwest Quarter of the Northwest Quarter (NW¼NW¼NW¼) of Section Twenty-Four (24), and the Northeast Quarter of the Northwest Quarter of the Northwest Quarter (NE¼NW¼NW¼) of Section Twenty-Four (24), Township One Hundred Four North (104N), Range Seventy-Two West (72W) of the Fifth Principal Meridian, Lyman County, South Dakota.

Subject to any valid existing easements for public roads and highways, for public utilities and for railroads and pipelines and any other rights-of-way or reservations of record.

Dated: May 12, 2000.

Kevin Gover,

Assistant Secretary—Indian Affairs.

[FR Doc. 00–12585 Filed 5–17–00; 8:45 am]

BILLING CODE 4310–02–P

DEPARTMENT OF THE INTERIOR

Bureau of Land Management

[WY090–00–1310–EJ]

Notice of Availability of Final Environmental Impact Statement for the Pinedale Anticline Natural Gas Exploration and Development Project, and Proposed Amendment to the Pinedale Resource Management Plan

AGENCY: Lead Agency—Bureau of Land Management, Interior. Cooperating Agencies—U.S. Forest Service, Department of Agriculture, Corps of Engineers, U.S. Army, State of Wyoming.

ACTION: Notice of Availability of Final Environmental Impact Statement (FEIS) for the Pinedale Anticline Natural Gas Exploration and Development Project, Sublette County, Wyoming, and Notice of 30-day protest period for proposed amendment to the Pinedale Resource Management Plan (RMP).

SUMMARY: The FEIS is an abbreviated FEIS. The FEIS and the Draft EIS (DEIS) comprise the entire document for filing purposes and for the decision making process. Please refer to the DEIS for more detailed analysis and description of the proposed action and alternatives. The FEIS contains 7 Sections. Section 1, Introduction; Section 2, Potential Management Scenario for Continued Exploration and Development; Section 3, Analysis of Revised Sales Gas Pipeline Alternatives; Section 4, Errata; Section 5, Comment Responses and Letters; Section 6, Responses to Environmental Group Notices and Alerts; and Section 7, Public Hearing Comments and Responses. BLM has identified the Resource Protection (RP) Alternative on Federal Lands and Minerals as its preferred alternative based on information contained in the DEIS, comments received during public scoping, and comments received on the DEIS. BLM considers the RP Alternative on All Lands and Minerals to be the environmentally preferred alternative.

The Pinedale Anticline EIS identifies the need for amendment, planning review, and/or maintenance of the following 1988 Pinedale RMP items: (1) The amendment of a Pinedale RMP off-road vehicle (ORV) designation; (2) the update and modification, if necessary, of visual resource management (VRM) classification; and (3) withhold unleased Federal lands and minerals and/or expired leases in the Hoback Basin, southern foothills of the Gros Ventre Range, and the Wind River Front from oil and gas leasing until the effects of leasing these lands can be addressed in a planning review of the Pinedale RMP and Bridger-Teton Leasing EIS.

DATES: Comments on the FEIS will be accepted for 30 days following the date that the Environmental Protection Agency (EPA) publishes their Notice of Availability in the **Federal Register**. The EPA notice is anticipated to be published on June 2, 2000. Protest of the proposed ORV designation amendment to the Pinedale RMP must be postmarked within 30 days following the date that the Environmental Protection Agency publishes the filing notice for the Final EIS in the **Federal Register**.

ADDRESSES: Comments on the FEIS should be sent to Bureau of Land Management, Bill McMahan (Project Coordinator), 280 Highway 191 North, Rock Springs, WY 82901, or they can be e-mailed to bill_mcmahan@blm.gov.

Protests on the proposed ORV designation amendment to the Pinedale RMP should be sent to the Director (210), Bureau of Land Management, Attention: Brenda Williams, 1849 C Street NW, Washington, DC 20240.

FOR FURTHER INFORMATION CONTACT: Bill McMahan, Project Coordinator, Bureau of Land Management, Rock Springs, Wyoming 82901, (307) 352–0224.

SUPPLEMENTARY INFORMATION: The DEIS (NOA published by EPA in the **Federal Register**, November 26, 1999; comment due date February 4, 2000, following State Director approval of a 10 day extension of time for review/comment on the DEIS) analyzed a proposal by the Pinedale Anticline Operators to drill up to 900 new wells to achieve 700 producing locations over the next 10 to 15 years on their leased acreage within the Pinedale Anticline Project Area (PAPA) (approximately 197,345 acres) in western Wyoming. Lands associated with the new drilling program are located between the town of Pinedale, Wyoming, and the Jonah Natural Gas Field (30 miles south); and between the Green River on the west and Wyoming Highway 191 on the east (between 8 and 15 miles wide). Comments were received on the DEIS from a number of groups. A total of 235 comment letters were received. BLM held a public hearing on January 12, 2000. A total of 86 people signed in at the hearing—17 gave statements. BLM responses to each comment letter and hearing comments are included in Sections 5, 6, and 7 of the FEIS.

Factors Affecting Pinedale Resource Management Plan (RMP) Completed in 1988—The Pinedale Anticline EIS addresses the need for amendment, planning review, and/or maintenance of the Pinedale RMP. The EIS identifies that (1) the RMP decision designating portions of the PAPA as ''open'' to off-road vehicle (ORV) use should be amended from ''open'' to ''limited to existing roads and trails'' to protect surface values and to be consistent with other oil/gas development areas; (2) the visual resource management (VRM) classification for the VRM classifications within the Resource Area need to be updated and the RMP modified if necessary; and (3) all Federal lands and minerals that are unleased and/or that have expired leases in the Hoback Basin, southern foothills of the Gros Ventre Range, and the Wind River Front should be withheld from oil and gas leasing until the effects of leasing these lands can be addressed in a planning review to determine any needed modification to the 1988 Pinedale RMP and to the Bridger-Teton Leasing EIS (Management Areas 21, 45, 71, and 72).

The RMP planning review for the identified areas (see Pinedale Anticline DEIS Figure 5–2) would address new issues and concerns for air quality related values, protection of scenic values of the mountain ranges, protection of the new and/or more densely populated rural subdivisions occurring on private surface underlain by Federal minerals, and other resource concerns. An analysis of these factors may affect Federal mineral leasing and other Federal authorizations on the described lands.

The Pinedale Anticline EIS proposal to amend the Pinedale RMP ORV ''open'' area designation to ''limited to existing roads and trails'' is protestable. This is the only part of the Pinedale Anticline EIS that is protestable under the BLM Planning Regulations (43 CFR 1610.5–2). Anyone disagreeing with the proposed decision to change the ORV designation within the Pinedale Anticline project area must file a written protest within the 30-day review period for the FEIS. The proposed amendment may be protested by parties who participated in the Pinedale Anticline EIS process, who have an interest which is or may be adversely affected by the proposed change, and who raised issue with ORV use during the EIS process. The protest must include the following information: (1) The name, mailing address, telephone number, and interest of the person filing the protest; (2) a statement of the issue(s) submitted during the DEIS review process by the protesting party, or an indication of the date the issue(s) were discussed for the record; (3) a statement of the part(s) of the recommendation being protested; (4) a copy of all documents addressing the issue(s) that were submitted during the DEIS review process by the protesting party, or an indication of the date the issue(s) were discussed for the record; and (5) a concise statement explaining why the proposed decision is believed to be wrong.

At the end of the 30-day protest period, the proposed change, if not protested, will become final. If a protest is received, approval of oil and gas development will be based upon the existing ORV designation until final action on the protest has been completed. Any significant change made as a result of a protest will be made available for public review and comment before it is approved.

This DEIS, in compliance with section 7(c) of the Endangered Species Act (as amended), includes the Biological Assessment for the purpose of identifying any endangered or threatened species which are likely to be affected by the proposed action.

Dated: May 12, 2000.

Alan L. Kesterke,

Associate State Director.

[FR Doc. 00–12495 Filed 5–17–00; 8:45 am]

BILLING CODE 4310–22–P

DEPARTMENT OF THE INTERIOR

Bureau of Land Management

[WY–030–2000–1310–DB]

Notice of Intent To Prepare an Environmental Impact Statement; Desolation Flats Natural Gas Development Project, Carbon and Sweetwater Counties, Wyoming, To Conduct a Planning Review of the Proposed Project Area, and if Necessary, Amend Either or Both the Great Divide and Green River Resource Management Plans

AGENCY: Bureau of Land Management, Interior.

ACTION: Notice of Intent (NOI) to prepare an Environmental Impact Statement (EIS) and to conduct scoping for the Desolation Flats Natural Gas

008558

Development Project, Carbon and Sweetwater Counties, Wyoming.

SUMMARY: Under section 102(2)(C) of the National Environmental Policy Act (NEPA) of 1969, as amended, the Bureau of Land Management (BLM), Rawlins Field Office, will direct the preparation of an EIS on the potential impacts of a proposed natural gas field development project. Approximately 385 gas wells and associated facilities could be constructed on approximately 229,781 acres of primarily Federal land (some private and State included), over a 20-year development period. The project area is located in southwestern Carbon County and southeastern Sweetwater County, Wyoming. The proposed action may be modified, as a result of comments received during scoping or anytime during the preparation of the draft EIS, to include actions that may, upon review, require a plan amendment to the Green River and Great Divide Resource Management Plans. A planning review of existing land-use decisions would be conducted. Additionally an evaluation of potential relevant and important resource values in the Desolation Flats project area portion of the Monument Valley Management Area of the Rock Springs Field Office would be done. Any needed changes in existing management or any new management actions to be prescribed for the area will be identified and, if necessary, the Green River RMP amended. In accordance with 43 CFR 3420.1–2, this notice also serves as a call for coal and other resource information to solicit indications of interest and information on coal resource development potential in the proposed project area and on other resources which may be affected by the proposed project. Affected Federal lands are administered by the BLM Rawlins and Rock Springs Field Offices. The EIS will be prepared by a third-party contractor.

DATES: Comments on the project proposal will be accepted through June 23, 2000. Public scoping meetings will be held at 7 p.m. on the following dates, at the following locations:

—June 7, 2000, in Rock Springs, Wyoming, Bureau of Land Management, Rock Springs Field Office, 280 Highway 191 North.

—June 8, 2000, in Rawlins, Wyoming, Bureau of Land Management, Rawlins Field Office, 1300 North Third Street.

ADDRESSES: Comments should be sent to Bureau of Land Management, Rawlins Field Office, John Spehar, Team Leader, 1300 North Third Street, P.O. Box 2407, Rawlins, Wyoming 82301, phone (307) 328–4200, or e-mailed to rawlins__wymail@blm.gov. Additionally, the Scoping Notice will be posted on the Wyoming BLM homepage at www.wy.blm.gov. Your response is important and will be considered in the environmental analysis process. If you do respond, we shall keep you informed of decisions resulting from the analysis. Please note that public comments submitted for this scoping review, including names, e-mail addresses, and street addresses of the respondents will be available for public review and disclosure at the above address during regular business hours (7:45 a.m. to 4:30 p.m.) Monday through Friday, except holidays. Individual respondents may request confidentially. If you wish to withhold your name, e-mail address, or street address from public review or from disclosure under the Freedom of Information Act, you must state this plainly at the beginning of your written comment. Such requests will be honored to the extent allowed by law. All submissions from organizations or businesses, and from individuals identifying themselves as representatives or officials of organizations or businesses, will be made available for public inspection in their entirety.

FOR FURTHER INFORMATION CONTACT: Bureau of Land Management, John Spehar, Project Manager, 1300 North Third Street, P.O. Box 2407, Rawlins, Wyoming 82301, phone 307–328–4264, e-mail: John_Spehar@blm.gov.

SUPPLEMENTARY INFORMATION: Marathon Oil Company (Marathon) has notified the Bureau of Land Management that Marathon and other operators propose a 20-year field development project. The proposed project area, referred to as the Desolation Flats area, is generally located in Townships 13–16 North, Ranges 94–96 West, Sixth Principal meridian, Carbon and Sweetwater Counties, Wyoming.

The project area is located approximately 14 miles west and north of Baggs, Wyoming. The project area is approximately 229,781 acres in size. The vast majority of land and mineral ownership is Federal. The Federal land surface and Federally owned minerals are managed by the Rawlins and Rock Springs BLM Field Offices.

Marathon and other operators propose to drill 385 wells on 361 locations and construct associated facilities, including roads, well pads, pipelines, and compressor stations. Drilling of exploratory or confirmation/delineation wells on existing Federal leases will be permitted on a case-by-case basis during the preparation of the EIS. A site-specific environmental assessment (EA) will be prepared for each individual drilling proposal.

The Desolation Flats project area contains lands covered by two existing natural gas development project EISs. The Mulligan Draw Unit EIS and the Dripping Rock/Cedar Breaks Area EA were approved for spacing of one well per section and for drilling in the Almond Formation. The intent of including the Mulligan Draw EIS area and the Dripping Rock/Cedar Breaks EA area within the Desolation Flats project area, as described by the operators, is to determine the feasibility and environmental impacts of a well-spacing density greater than the authorized one-well per 640-acre spacing.

This EIS will address cumulative impacts and will include consideration of affects of other oil and gas projects addressed in recently completed EISs for the Mulligan Draw Gas Field Project, the Creston/Blue Gap Natural Gas Project, the soon to be completed Continental Divide/Wamsutter II Natural Gas Project, and the recently proposed Atlantic Rim Coalbed Methane Project EA. Potential issues to be addressed in the EIS include, but are not limited to: impacts to wildlife populations and their habitats, access road development and transportation management, surface and ground water resources, impacts from additional drilling and production activities, reclamation, noxious weed control, conflicts with livestock grazing operations, protection of cultural and paleontological resources, threatened and endangered species, and cumulative impacts.

Dated: May 12, 2000.

Alan R. Pierson,

State Director.

[FR Doc. 00–12496 Filed 5–17–00; 8:45 am]

BILLING CODE 4310–22–P

DEPARTMENT OF THE INTERIOR

Bureau of Land Management

[ID–010–0777–XQ]

Notice of Meeting

AGENCY: Lower Snake River District, Bureau of Land Management, Interior.

ACTION: Meeting notice.

SUMMARY: The Lower Snake River District Resource Advisory Council will meet in Boise. Potential agenda topics are the Interior Columbia Basin Ecosystem Management Plan, the Integrated Natural Resources Management Plan for the U.S. Air Force

Enhanced Training in Idaho project, sage grouse habitat management, implementation of rangeland standards and guidelines, off-highway vehicle management and other land management issues.

DATES: June 22, 2000. The meeting will begin at 9 a.m. Public comment periods will be held at 9:30 a.m. and 4 p.m.

ADDRESSES: The meeting will be held at the Lower Snake River District Office, located at 3948 Development Avenue, Boise, Idaho.

FOR FURTHER INFORMATION CONTACT: Barry Rose, Lower Snake River District Office (208–384–3393).

Dated: May 12, 2000.

Howard Hendrick,

District Manager.

[FR Doc. 00–12490 Filed 5–17–00; 8:45 am]

BILLING CODE 4310–84–P

DEPARTMENT OF THE INTERIOR

Bureau of Land Management

[OR–958–1430–ET; GP0–0014; OR–54087]

Public Land Order No. 7446; Withdrawal of Public Lands for the Desert Springs Seed Orchard; Oregon

AGENCY: Bureau of Land Management, Interior.

ACTION: Public Land Order.

SUMMARY: This order withdraws 80 acres of public land from surface entry and mining for a period of 50 years and transfers administrative jurisdiction to the Forest Service to protect its investment in the development of a seed orchard. The land has been and will remain open to mineral leasing.

EFFECTIVE DATE: May 18, 2000.

FOR FURTHER INFORMATION CONTACT: Charles R. Roy, BLM Oregon/Washington State Office, P.O. Box 2965, Portland, Oregon 97208–2965, 503–952–6189.

By virtue of the authority vested in the Secretary of the Interior by section 204 of the Federal Land Policy and Management Act of 1976, 43 U.S.C. 1714 (1994), it is ordered as follows:

1. Subject to valid existing rights, the following described public land is hereby withdrawn from settlement, sale, location, or entry under the general land laws, including the United States mining laws (30 U.S.C. Ch. 2 (1994)), to protect the proposed investment of Federal funds and related facilities for the Forest Service's Desert Springs Seed Orchard:

Willamette Meridian

T. 33 S., R. 18 E.,
Sec. 11, E½SE¼.

The area described contains 80 acres in Lake County.

2. Administrative jurisdiction of the land described in Paragraph 2 is hereby transferred to the Forest Service.

3. The withdrawal made by this order does not alter the applicability of those public land laws governing the use of the land under lease, license, or permit, or governing the disposal of its mineral or vegetative resources other than under the mining laws.

4. This withdrawal will expire 50 years from the effective date of this order unless, as a result of a review conducted before the expiration date pursuant to Section 204(f) of the Federal Land Policy and Management Act of 1976, 43 U.S.C. 1714(f) (1994), the Secretary determines that the withdrawal shall be extended.

Dated: May 4, 2000.

Sylvia V. Baca,

Assistant Secretary of the Interior.

[FR Doc. 00–12478 Filed 5–17–00; 8:45 am]

BILLING CODE 4310–33–P

DEPARTMENT OF THE INTERIOR

Bureau of Land Management

[WY–100–1430–EU; WYW–146697]

Notice of Realty Action; Recreation and Public Purposes (R&PP) Act Classification; Wyoming

AGENCY: Bureau of Land Management, Interior.

ACTION: Notice.

SUMMARY: The following public lands located near Pinedale, Wyoming, have been examined and found suitable for classification for conveyance to Sublette County under the provisions of the Recreation and Public Purposes Act, as amended (43 U.S.C. 869 *et seq.*). Sublette County intends to use the land as a shooting sports complex.

Sixth Principal Meridian

T. 33 N., R. 109 W.,
Section 7, Lots 1 and 2.
T. 33 N., R. 110 W.
Section 12, S½NE¼NE¼, SE¼NE¼.

The land described above contains 132.67 acres.

FOR FURTHER INFORMATION CONTACT: Detailed information concerning this action is available for review at the Pinedale Field Office, Bureau of Land Management, 432 East Mill Street, P.O. Box 768, Pinedale, Wyoming 82941, or contact Bill Wadsworth at (307) 367–5341.

SUPPLEMENTARY INFORMATION: The lands are not needed for Federal purposes. Conveyance is consistent with current BLM land use planning and would be in the public interest. The conveyances, when completed, will be subject to the following terms, conditions and reservations:

1. Provisions of the Recreation and Public Purposes Act and to all applicable regulations of the Secretary of the Interior.

2. All valid existing rights documented on the official public land records at the time of patent issuance.

3. All minerals shall be reserved to the United States, together with the right to prospect for, mine, and remove the minerals.

4. A right-of-way for ditches and canals constructed by the authority of the United States. Upon publication of this notice in the **Federal Register**, the lands will be segregated from all other forms of appropriation under the public land laws, including the general mining laws, except for conveyance under the Recreation and Public Purposes Act and leasing under the mineral leasing laws.

For a period of 45 days from the date of publication of this notice in the **Federal Register,** interested parties may submit comments regarding the proposed conveyance or classification of the lands to the Field Manager, Bureau of Land Management, Pinedale Field Office, P.O. Box 768, Pinedale, Wyoming 82941.

The analysis may identify that an amendment to the Pinedale RMP is needed. If a plan amendment is needed, other notices, mailings, or media releases will announce a 30-day protest period on the proposed amendment.

Classification Comments

Interested parties may submit comments involving the suitability of the lands for a shooting sports complex. Comments on the classification should only address whether the land is physically suited for a shooting sports complex (as appropriate), whether the use will maximize the future use or uses of the land, whether the use is consistent with local planning and zoning, or if the use is consistent with State and Federal programs.

Application Comments

Interested parties may submit comments regarding the specific uses proposed in the conveyance applications and plans of development, whether the BLM followed proper administrative procedures in reaching the decisions, or any other factor not directly related to the suitability of the land for a shooting sports complex. Any adverse comments will be reviewed by the State Director. In the absence of any

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adverse comments, the classification will become effective 60 days from the date of publication of this notice in the **Federal Register.**

Dated: May 4, 2000.

Priscilla Mecham,

Field Manager.

[FR Doc. 00–12574 Filed 5–17–00; 8:45 am]

BILLING CODE 4310–84–M

DEPARTMENT OF THE INTERIOR

Bureau of Land Management

[ES–960–1910–BJ–4377; ES–50671, Group 154, Minnesota]

Notice of Filing of Plat of Survey; Minnesota

The plat of the dependent resurvey of portions of the south, east and north boundaries, portions of the subdivisional lines, the survey of the subdivision of sections 1 through 4, 6, 7, 9 through 21, 23 through 28, and 30 through 36, the reestablishment of the record meander line in sections 2, 3, 4, 11, 18, 23 and 34, and the metes-and-bounds survey in section 34, Township 143 North, Range 39 West, 5th Principal Meridian, Minnesota, will be officially filed in Eastern States, Springfield, Virginia at 7:30 a.m., on June 19, 2000.

The survey was requested by the Bureau of Indian Affairs.

All inquiries or protests concerning the technical aspects of the survey must be sent to the Chief Cadastral Surveyor, Eastern States, Bureau of Land Management, 7450 Boston Boulevard, Springfield, Virginia 22153, prior to 7:30 a.m., June 19, 2000.

Copies of the plat will be made available upon request and prepayment of the appropriate fee.

Dated: May 4, 2000.

Stephen G. Kopach,

Chief Cadastral Surveyor.

[FR Doc. 00–12479 Filed 5–17–00; 8:45 am]

BILLING CODE 4310–GJ–P

DEPARTMENT OF THE INTERIOR

Bureau of Land Management

[AZA 18465]

Notice of Proposed Withdrawal Extension and Opportunity for Public Meeting; Arizona

AGENCY: Bureau of Land Management, Interior.

ACTION: Notice.

SUMMARY: The Bureau of Prisons, Department of Justice, has filed an application to extend Public Land Order No. 6493 for a 20-year period. This order withdrew public land from surface entry and mining for sewage treatment, a water well, and a buffer zone for a Federal Correctional Institution located on adjacent land.

DATES: Comments and requests for a public meeting must be received by August 16, 2000.

ADDRESSES: Comments and meeting requests should be sent to the Facilities Manager, Federal Correctional Institution, 37900 North 45th Avenue, Phoenix, Az 85027–7003.

FOR FURTHER INFORMATION CONTACT: D.C. Henderson, Federal Correctional Institution, Phoenix, Arizona; 623–465–9757.

SUPPLEMENTARY INFORMATION: On May 2, 2000, the Bureau of Prisons filed an application to extend Public Land Order No. 6493 for a 20-year period. Public Land Order No. 6493 withdrew the following described land from settlement, sale, location, or entry under the general land laws, including the mining laws, subject to valid existing rights:

Gila and Salt River Meridian

T. 6 N., R. 2 E.,
Sec. 28, N½SW¼SW¼;
Sec. 29, E½SE¼NE¼, E½NE¼SE¼, and NE¼SE¼SE¼.

The area described contains 70 acres in Maricopa County.

All persons who wish to submit comments, suggestions, or objections in connection with the proposed withdrawal extension may present their views in writing, by the date specified above, to the Facilities Manager, Federal Correctional Institution, Phoenix, Arizona.

Notice is hereby given that an opportunity for a public meeting is afforded in connection with the proposed withdrawal extension. All interested persons who desire a public meeting for the purpose of being heard on the proposed withdrawal extension must submit a written request, by the date specified above, to the Facilities Manager, Federal Correctional Institution, Phoenix, Arizona. Upon determination by the authorized officer that a public meeting will be held, a notice of the time and place will be published in the **Federal Register** at least 30 days before the scheduled date of the meeting.

The application will be processed in accordance with the regulations set forth in 43 CFR 2300.

Dated: May 9, 2000.

Kelly Grissom,

Acting Deputy State Director, Resources Division.

[FR Doc. 00–12528 Filed 5–17–00; 8:45 am]

BILLING CODE 4410–05–P

DEPARTMENT OF THE INTERIOR

Minerals Management Service

Agency Information Collection Activities: Submitted for Office of Management and Budget Review; Comment Request

AGENCY: Minerals Management Service (MMS), Interior.

ACTION: Notice of Information Collection Request.

SUMMARY: To comply with the Paperwork Reduction Act (PRA) (44 U.S.C. 3501 *et seq.*), we are notifying you that an information collection request (ICR) has been forwarded to the Office of Management and Budget (OMB) for review and approval. We are also soliciting your comments on this ICR which describes the information collection, its expected costs and burden, and how the data will be collected.

DATES: Written comments should be received on or before June 19, 2000.

ADDRESSES: You may submit comments directly to the Office of Information and Regulatory Affairs, OMB, Attention: Desk Officer for the Interior Department (OMB Control Number 1010-NEW), 725 17th Street, NW, Washington, DC 20503. You should also send copies of these comments to us. Our mailing address for written comments regarding this information collection is David S. Guzy, Chief, Rules and Publications Staff, Minerals Management Service, Royalty Management Program, P.O. Box 25165, MS 3021, Denver, Colorado 80225. Courier or overnight delivery address is Building 85, Room A–613, Denver Federal Center, Denver, Colorado 80225. Email address is *RMP.comments@mms.gov.*

Public Comment Procedure

Your comments and copies of your comments may be submitted to the addresses listed above. Please submit Internet comments as an ASCII file avoiding the use of special characters and any form of encryption. Please also include Attn: Report of Sales and Royalty Remittance, Form MMS–2014, OMB Control Number 1010–NEW, and your name and return address in your Internet message. If you do not receive a confirmation from the system that we

have received your Internet message, contact David S. Guzy directly at (303) 231–3432.

We will post public comments after the comment period closes on the Internet at *http://www.rmp.mms.gov.* You may arrange to view paper copies of the comments by contacting David S. Guzy, Chief, Rules and Publications Staff, telephone (303) 231–3432, FAX (303) 231–3385. Our practice is to make comments, including names and addresses of respondents, available for public review on the Internet and during regular business hours at our offices in Lakewood, Colorado. Individual respondents may request that we withhold their home address from the rulemaking record, which we will honor to the extent allowable by law. There also may be circumstances in which we would withhold from the rulemaking record a respondent's identity, as allowable by law. If you wish us to withhold your name and/or address, you must state this prominently at the beginning of your comment. However, we will not consider anonymous comments. We will make all submissions from organizations or businesses, and from individuals identifying themselves as representatives or officials of organizations or businesses, available for public inspection in their entirety.

FOR FURTHER INFORMATION CONTACT: Dennis C. Jones, Rules and Publications Staff, phone (303) 231–3046, FAX (303) 231–3385, email *Dennis.C.Jones@mms.gov*.

SUPPLEMENTARY INFORMATION:

Title: Report of Sales and Royalty Remittance.

OMB Control Number: 1010–NEW.

Bureau Form Number: Form MMS–2014.

Abstract: The Secretary of the Interior is responsible for the collection of royalties from leases producing minerals from leased Federal and Indian lands. The Secretary is required by various laws to manage the production of mineral resources on Indian lands and Federal onshore and offshore leases, to collect the royalties due, and to distribute the funds in accordance with those laws. MMS is responsible for the royalty management functions assigned to the Secretary and is developing a financial accounting system which includes royalty and production reporting as a part of an overall effort to improve management of the nation's resources. This new system will be effective October 1, 2001, and will replace both the Accounting and Financial System and the Production Accounting and Auditing System. MMS's proposal for royalty reporting requirements was published in the Federal Register on February 23, 1999 (64 FR 8835).

In April 1996, RMP undertook a compliance reengineering initiative. The principal reengineering objective was to define and implement a new compliance strategy ensuring that Federal and Indian mineral lease revenues were accurately and timely paid in the most cost-effective manner possible.

The Royalty Policy Committee (RPC), which includes representatives from industry, States, Indian Tribal and allottee groups, and MMS, issued recommendations in June 1996 to streamline both royalty and production reporting. An action plan was developed to implement many of the recommendations. However, in August 1996, the Federal Oil and Gas Royalty Simplification and Fairness Act of 1996 (RSFA) was enacted into law. RSFA significantly changed many of RMP's historical operating assumptions as well as some fundamental Federal oil and gas mineral revenue financial activities. Although near-term changes in processes and systems were made to implement the law, long-term strategies, business processes, and aging systems needed to be addressed for RMP to be cost-effective and responsive to customer needs. The decision was made April 1, 1997, to expand reengineering to all RMP core business processes. This is the most comprehensive review of RMP's business processes and organization since its creation in 1982.

When a company or individual enters into a contract to develop, produce, and dispose of minerals from Federal or Indian lands, that company or individual agrees to pay the United States, Indian tribe, or allottee a share (royalty) each month of the full value received for the minerals taken from leased lands. The Report of Sales and Royalty Remsittance, Form MMS–2014, is the only document used for reporting royalties, certain rents, and other lease-related transactions to MMS.

As part of our reengineering effort, we analyzed current information collection requirements for the existing Form MMS–2014 and built upon the RPC's earlier recommendations. As a result of our analysis, we developed and incorporated revised reporting requirements for Form MMS–2014 which will reduce the volume of lines reported and processed, minimize errors and related error correction workloads, simplify reporting and lower costs for both industry and RMP. The revised Form MMS–2014 incorporates RPC's recommendations and input received from States, Indian Tribes, and other industry groups.

Industry will not begin using the revised Form MMS–2014 until October 1, 2001, when we implement our new financial accounting system. However, we are requesting approval of this revised form immediately, so that industry can begin work on the necessary systems development and reprogramming adjustments and changes that may be required as they prepare for the new reporting requirements that will be effective October 1, 2001. Please note that the existing Form MMS–2014 will continue to be used until the change over to the revised Form MMS–2014 in the fall of 2001.

Failure to collect the information provided by Form MMS–2014 would render it impossible to ensure that MMS is collecting and disbursing the full value of royalties received from production of leased lands. Collection of royalties directly impacts the amount of funds made available to the United States Treasury, to State governments, and to Indian Tribes and allottees.

The PRA provides that an agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a currently valid OMB Control Number. As required in 5 CFR 1320.8(d), MMS published a 60-day **Federal Register** Notice on February 23, 1999 (64 FR 8835), soliciting comments from the public on this revised Form MMS–2014.

Respondents/Affected Entities: Payors-companies or individuals who enter into a contract to develop, produce, and dispose of minerals from Federal or Indian lands.

Frequency of Response: Monthly.

Estimated Number of Respondents: 2,300 payors.

Estimated Annual Reporting and Recordkeeping ''Hour'' Burden: 124,500 hours.

Estimated Annual Reporting and Recordkeeping ''Non-Hour Cost'' Burden: $4.7 million.

Comments: Section 3506(c)(2)(A) of the Paperwork Reduction Act requires each agency ''* * * to provide notice * * * and otherwise consult with members of the public and affected agencies concerning each proposed collection of information * * * .'' Agencies must specifically solicit comments to: (a) Evaluate whether the proposed collection of information is necessary for the agency to perform its duties, including whether the information is useful; (b) evaluate the accuracy of the agency's estimate of the burden of the proposed collection of information; (c) enhance the quality,

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usefulness, and clarity of the information to be collected; and (d) minimize the burden on the respondents, including the use of automated collection techniques or other forms of information technology.

Send your comments directly to the offices listed under the **ADDRESSES** section of this Notice. OMB has up to 60 days to approve or disapprove the information collection but may respond after 30 days. Therefore, to ensure maximum consideration, OMB should receive public comments by June 19, 2000.

MMS Information Collection Clearance Officer: Jo Ann Lauterbach, telephone (202) 208–7744.

Dated: March 27, 2000.

Lucy Querques Denett,

Associate Director for Royalty Management.

[FR Doc. 00–12485 Filed 5–17–00; 8:45 am]

BILLING CODE 4310–MR–P

DEPARTMENT OF THE INTERIOR

Minerals Management Service

Agency Information Collection Activities: Submitted for Office of Management and Budget Review; Comment Request

AGENCY: Minerals Management Service (MMS), Interior.

ACTION: Notice of Information Collection Request (OMB Control Number 1010–NEW).

SUMMARY: Under the Paperwork Reduction Act (PRA) of 1995 (44 U.S.C. 3501 *et seq.*), we are notifying you that an information collection request (ICR) has been forwarded to the Office of Management and Budget (OMB) for review and approval. We are also soliciting your comments on this ICR which describes the information collection, its expected costs and burden, and how the data will be collected.

DATES: Submit written comments on or before June 19, 2000.

ADDRESSES: You may submit comments directly to the Office of Information and Regulatory Affairs, OMB, Attention: Desk Officer for the Interior Department (OMB Control Number 1010–NEW), 725 17th Street, NW, Washington, DC 20503; telephone (202) 395–7340. You should also send copies of these comments to us. Our mailing address for written comments regarding this information collection is David S. Guzy, Chief, Rules and Publications Staff, Minerals Management Service, Royalty Management Program, P.O. Box 25165, MS 3021, Denver, Colorado 80225. Courier or overnight delivery address is Building 85, Room A–613, Denver Federal Center, Denver, Colorado 80225.

Public Comment Procedure

If you wish to comment, you may submit your comments by any one of several methods. You may mail comments to the offices listed in the **ADDRESSES** section. You may also comment via the Internet to *RMP.comments@mms.gov.* Please submit Internet comments as an ASCII file avoiding the use of special characters and any form of encryption. Include Attn: OMB Control Number 1010–NEW, and your name and return address in your Internet message. If you do not receive a confirmation from the system that we have received your Internet message, contact David S. Guzy directly at (303) 231–3432.

We will post public comments after the comment period closes on the Internet at *http://www.rmp.mms.gov.* You may arrange to view paper copies of the comments by contacting David S. Guzy, Chief, Rules and Publications Staff, telephone (303) 231–3432, FAX (303) 231–3385. Our practice is to make comments, including names and addresses of respondents, available for public review on the Internet and during regular business hours at our offices in Lakewood, Colorado. Individual respondents may request that we withhold their home address from the rulemaking record, which we will honor to the extent allowable by law. There also may be circumstances in which we would withhold from the rulemaking record a respondent's identity, as allowable by law. If you wish us to withhold your name and/or address, you must state this prominently at the beginning of your comment. However, we will not consider anonymous comments. We will make all submissions from organizations or businesses, and from individuals identifying themselves as representatives or officials of organizations or businesses, available for public inspection in their entirety.

FOR FURTHER INFORMATION CONTACT: Dennis C. Jones, Rules and Publications Staff, phone (303) 231–3046, FAX (303) 231–3385, email *Dennis.C.Jones@mms.gov.*

SUPPLEMENTARY INFORMATION:

Title: Production Accounting and Auditing System Reports.

OMB Control Number: 1010–NEW.

Bureau Form Numbers: Forms MMS–4054, MMS–4055, MMS–4056, and MMS–4058.

Abstract: The Secretary of the Interior is responsible for the collection of royalties from lessees who produce minerals from leased Federal and Indian lands. The Secretary is authorized to manage lands, to collect royalties due, and to distribute royalty funds. MMS is responsible for the royalty management functions assigned to the Secretary and is developing a financial accounting system which includes royalty and production reporting as a part of an overall effort to improve management of the nation's resources. This new system will be effective October 1, 2001, and will replace both the Accounting and Financial System and the Production Accounting and Auditing System. MMS' proposal was published in the **Federal Register** on February 23, 1999 (64 FR 8844). We received 15 comments related to production reporting. We responded to these comments in the ICR that we submitted to OMB.

In April 1996, MMS undertook a compliance reengineering initiative. The principal reengineering objective was to define and implement a new compliance strategy ensuring that Federal and Indian mineral lease revenues were accurately and timely paid in the most cost-effective manner possible.

The Royalty Policy Committee (RPC), which includes representatives from industry, States, Indian Tribal and allottee groups, and MMS, issued recommendations in June 1996 to streamline both royalty and production reporting. An action plan was developed to implement many of the recommendations. However, in August 1996, the Federal Oil and Gas Royalty Simplification and Fairness Act (RSFA) of 1996, was enacted into law. RSFA significantly changed many of the Royalty Management Program's (RMP) historical operating assumptions as well as some fundamental Federal oil and gas mineral revenue financial activities. Although near-term changes in processes and systems were made to implement the law, long-term strategies, business processes, and aging systems needed to be addressed for RMP to be cost-effective and responsive to customer needs. The decision was made April 1, 1997, to expand reengineering to all RMP core business processes. This is the most comprehensive review of RMP's business processes and organization since its creation in 1982.

As part of our reengineering effort, we analyzed current information collection requirements for existing Forms MMS–3160, MMS–4051, MMS–4054, MMS–4055, MMS–4056, and MMS–4058 (OMB control Number 1010–0040) to confirm the presence of data needed to

support future RMP processes. As a result, RMP deleted Forms MMS–3160 and MMS–4051 and streamlined and modified required data elements on Forms MMS–4054 through MMS–4058. These revised forms will not be used until RMP implements it's new financial accounting system, currently scheduled for implementation in October 2001.

MMS proposes to use these four revised forms for gathering oil and gas production data from industry as follows:

a. Form MMS–4054, Oil and Gas Operations Report (OGOR),

b. Form MMS–4055, Gas Analysis Report (GAR),

c. Form MMS–4056, Gas Plant Operations Report (GPOR), and

d. Form MMS–4058, Production Allocation Schedule Report (PASR).

The data from these forms are matched with sales and royalty data reported to MMS. The production reports provide MMS with ongoing information on lease, agreement (property) and facility production, sales volumes, and inventories. The reports summarize all operations on a property or facility during a reporting period. They identify production by API well number and sales by product. Data collected are used as a method of cross checking reported production with reported sales.

Industry will not begin using the revised forms until October 2001 when we implement our new financial accounting system. However, we are requesting approval of these revised forms immediately, so that industry can begin work on the necessary systems development and reprogramming adjustments and changes that may be required as they prepare for the new reporting requirements that will be effective October 2001. Please note that the existing forms (Forms MMS–4054, MMS–4055, MMS–4056, and MMS–4058) will continue to be used until the change over to the revised forms in the fall of 2001.

Failure to collect all of this information will prevent MMS from ensuring that all royalties owed on lease production are paid. Additionally, the data are shared electronically with the MMS's Offshore Minerals Management program, Bureau of Land Management, Bureau of Indian Affairs, and tribal and State governments so they can perform their lease management responsibilities.

Respondents/Affected Entities: Operators of Federal or Indian leases.

Frequency of Response: Monthly.

Estimated Number of Respondents: 2,450 operators.

Estimated Total Annual Reporting and Recordkeeping ''Hour'' Burden: 89,717 hours.

Estimated Annual Reporting and Recordkeeping ''Non-Hour Cost'' Burden: $1.5 million.

Comments: Section 3506(c)(2)(A) of the PRA requires each agency ''* * * to provide notice * * * and otherwise consult with members of the public and affected agencies concerning each proposed collection of information. . . .'' Agencies must specifically solicit comments to: (a) Evaluate whether the proposed collection of information is necessary for the agency to perform its duties, including whether the information is useful; (b) evaluate the accuracy of the agency's estimate of the burden of the proposed collection of information; (c) enhance the quality, usefulness, and clarity of the information to be collected; and (d) minimize the burden on the respondents, including the use of automated collection techniques or other forms of information technology.

The PRA provides that an agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a currently valid OMB Control Number. As required in 5 CFR 1320.8(d), MMS published a 60-day **Federal Register** Notice on February 23, 1999 (64 FR 8835), soliciting comments from the public on these revised forms.

Send your comments directly to the offices listed under the **ADDRESSES** section of this notice. OMB has up to 60 days to approve or disapprove the information collection but may respond after 30 days. Therefore, to ensure maximum consideration, OMB should receive public comments by June 19, 2000.

MMS Information Collection Clearance Officer: Jo Ann Lauterbach, telephone (202) 208–7744.

Dated: May 11, 2000.

Lucy Querques Denett,

Associate Director for Royalty Management.

[FR Doc. 00–12486 Filed 4–17–00; 8:45 am]

BILLING CODE 4310–MR–P

DEPARTMENT OF THE INTERIOR

Bureau of Reclamation

Central Valley Project Improvement Act, Criteria for Evaluating Water Management Plans

AGENCY: Bureau of Reclamation, Interior.

ACTION: Notice.

SUMMARY: To meet the requirements of the Central Valley Project Improvement Act (CVPIA) of 1992 and the Reclamation Reform Act of 1982, the Bureau of Reclamation (Reclamation) developed and published the Criteria for Evaluating Water Conservation Plans, dated April 30, 1993. In September 1996 Reclamation revised the document and renamed it to Criteria for Evaluating Water Management Plans (Criteria). The Criteria have been revised again in 1999.

The City of Roseville and El Dorado Irrigation District have developed Water Management Plans (Plan) which Reclamation has evaluated and preliminarily determined to meet the requirements of the Criteria.

The 1999 Criteria were developed based on information provided during public scoping and review sessions held throughout Reclamation's Mid-Pacific (MP) Region. Reclamation uses these Criteria to evaluate the adequacy of all Plans developed by Central Valley Project contractors. The Criteria were developed and the Plans have been evaluated for the purpose of promoting the most efficient water use reasonably achievable by all MP Region contractors. Reclamation made a commitment (stated within the Criteria) to publish a notice of its draft determination of the adequacy of each contractor's Plan in the **Federal Register** to allow the public a minimum of 30 days to comment on its preliminary determinations.

DATES: All public comments must be received by June 19, 2000.

ADDRESSES: Our practice is to make comments, including names and home addresses of respondents, available for public review. Individual respondents may request that we withhold their home address from public disclosure, which we will honor to the extent allowable by law. There also may be circumstances in which we would withhold a respondent's identity from public disclosure, as allowable by law. If you wish us to withhold your name and/or address, you must state this prominently at the beginning of your comment. We will make all submissions from organizations or businesses, and from individuals identifying themselves as representatives or officials of organizations or businesses, available for public disclosure in their entirety.

Please mail comments to Lucille Billingsley, Bureau of Reclamation, 2800 Cottage Way, MP–410, Sacramento, California 95825.

FOR FURTHER INFORMATION CONTACT: To be placed on a mailing list for any subsequent information, please contact Lucille Billingsley at the address above,

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or by telephone at (916) 978–5215 (TDD 978–5608).

SUPPLEMENTARY INFORMATION: Under provision of Section 3405(e) of the CVPIA (Title 34 Pub. L. 102–575), ''The Secretary [of the Interior] shall establish and administer an office on Central Valley Project water conservation best management practices that shall * * * develop criteria for evaluating the adequacy of all water conservation plans developed by project contractors, including those plans required by section 210 of the Reclamation Reform Act of 1982.'' Also, according to Section 3405(e)(1), these criteria will be developed ''* * * with the purpose of promoting the highest level of water use efficiency reasonably achievable by project contractors using best available cost-effective technology and best management practices.''

The Criteria states that all parties (Contractors) that contract with Reclamation for water supplies (municipal and industrial contracts over 2,000 irrigable acre-feet and agricultural contracts over 2,000 irrigable acres) will prepare Plans which will be evaluated by Reclamation based on the following required information detailed in the sections listed below to develop, implement, monitor, and update their Plans. The sections are:

1. Description of the District
2. Inventory of Water Resources
3. Best Management Practices (BMPs) for Agricultural Contractors
4. BMP's for Urban Contractors
5. Plan Implementation
6. Exemption Process
7. Regional Criteria
8. 5-Year Revisions

Public comment on Reclamation's preliminary (*i.e.,* draft) determination of both the City of Roseville's and El Dorado Irrigation District's Plans are invited at this time. A copy of both Plans will be available for review at Reclamation's MP Regional Office located in Sacramento, California, and MP's Central California Area Office located in Folsom, California. If you wish to review a copy of the plan, please contact Ms. Billingsley to find the office nearest you.

Dated: May 11, 2000.

Mary Johannis,

Acting Regional Resources Manager, Mid-Pacific Region.

[FR Doc. 00–12350 Filed 5–17–00; 8:45 am]

BILLING CODE 4310–94–M

DEPARTMENT OF THE INTERIOR

Bureau of Reclamation

Refuge Water Supply Long-Term Water Service Agreements

AGENCY: Bureau of Reclamation, Interior.

ACTION: Notice of public meeting.

SUMMARY: The Bureau of Reclamation (Reclamation) has scheduled the first meeting for long-term water service contracts with the California Department of Fish and Game, Grassland Water District (representing the Grasslands Resources Conservation District), and long-term memoranda of understanding with the U.S. Fish and Wildlife Service. This first meeting will include distribution of the draft agreements, establishing each party's negotiation team, and setting the schedule for future negotiation sessions. The public is welcome to observe the meeting process.

DATES: The first meeting will be held on Thursday, May 18, 2000 from 10 a.m. to 1 p.m.

ADDRESSES: The meeting will be held at the Expo Inn, 1413 Howe Avenue, Sacramento, California.

FOR FURTHER INFORMATION CONTACT: Stan Yarborough, Reclamation, at (916) 978–5516.

SUPPLEMENTARY INFORMATION: The water service contractual agreements are to provide ''firm water supplies of suitable quality to maintain and improve wetland habitat areas on units of the National Wildlife Refuge System in the Central Valley of California; on the Gray Lodge, Los Banos, Volta, North Grasslands, and Mendota state wildlife management areas; and on the Grasslands Resources Conservation District in the Central Valley of California,'' in accordance with the requirements of section 3406(d) of the Central Valley Project Improvement Act (CVPIA). Before the enactment of the CVPIA, most of the Federal, State and local refuges identified above did not have firm water supplies to meet optimum refuge water management needs (Level 4 needs). The negotiation process that commences on May 18, 2000, is intended to yield new long-term refuge water service agreements to supply up to Level 4 needs. In some cases, these new agreements may replace existing agreements.

Dated: May 11, 2000.

Mary Johannis,

Acting Regional Resources Manager, Mid-Pacific Region.

[FR Doc. 00–12349 Filed 5–15–00; 5:09 pm]

BILLING CODE 4310–94–P

DEPARTMENT OF JUSTICE

Notice of Lodging of Consent Decree in Comprehensive Environmental Response, Compensation and Liability Act Cost Recovery Action

In accordance with the Departmental Policy, 28 CFR 50.7, notice is hereby given that a Consent Decree in *United States* v. *Cytec Industries, Inc., Ford Motor Company, and SPS Technologies, Inc.,* Civil Action No. 00–CV–2248 was lodged with the United States District Court for the Eastern District of Pennsylvania on May 2, 2000. This Consent Decree resolves certain claims of the United States against Cytec Industries, Inc., Ford Motor Company, and SPS Technologies (''Settling Defendants'') under Sections 106 and 107(a) of the Comprehensive Environmental Response, Compensation and Liability Act (''CERCLA''), 42 U.S.C. 9606 and 9607(a), for performance of Operable Unit 1 response action and for Operable Unit 1 future response costs at the Boarhead Farms Superfund Site located in Bridgeton Township, Pennsylvania. The Consent Decree requires the Settling Defendants to perform all Operable Unit 1 activities (as defined in the Decree) and to pay all Future Response Costs relating to Operable Unit 1 activities at the Boarhead Farms Superfund Site.

The Department of Justice will accept written comments on the proposed Consent Decree for thirty (30) days from the date of publication of this notice. Please address comments to the Assistant Attorney General, Environment and Natural Resources Division, Department of Justice, P.O. Box 7611, Ben Franklin Station, Washington, DC 20044 and refer to *United States* v. *Cytec Industries, Inc., Ford Motor Company, and SPS Technologies, Inc.,* DOJ #90–11–2–06036.

Copies of the proposed Consent Decree may be examined at the Office of the United States Attorney, Eastern District of Pennsylvania, 615 Chestnut Street, Philadelphia, PA 19106 and at EPA Region III, 1650 Arch Street, Philadelphia, PA 19103. A copy of the proposed Consent Decree may be obtained by mail from the U.S. Department of Justice, Consent Decree Library, P.O. Box 7611, Washington, DC

20044–7611. When requesting a copy of the proposed Consent Decree, please enclose a check to cover the twenty-five cents per page reproduction costs payable to the ''Consent Decree Library'' in the amount of $21.00 (for Decree without appendices) or $50.00 (for Decree with appendices), and please reference *United States* v. *Cytec Industries, Inc., Ford Motor Company, and SPS Technologies, Inc., DOJ No. 90–11–2–06036.*

Joel M. Gross,

Chief, Environmental Enforcement Section, Environment and Natural Resources Division, U.S. Department of Justice.

[FR Doc. 00–12482 Filed 5–17–00; 8:45 am]

BILLING CODE 4410–15–M

DEPARTMENT OF JUSTICE

Notice of Lodging of Proposed Consent Decree

In accordance with Departmental Policy, 28 CFR 50.7, notice is hereby given that a proposed consent decree in *United States* v. *Roger D. Williams*, Civil Action No. 2:00CV296 (E.D. Va.), was lodged with the United States District Court for the Eastern District of Virginia, Norfolk Division, on April 21, 2000. This proposed Consent Decree concerns a complaint filed by the United States against Roger D. Williams, pursuant to sections 309(b) and (d) of the Clean Water Act, 33 U.S.C. 1319(b) and (d), to obtain injunctive relief and impose civil penalties against Roger D. Williams for alleged violation of sections 301 and 404 of the Clean Water Act, 33 U.S.C. 1311 and 1344, by unlawfully discharging and/or controlling and directing the discharge of dredged and fill materials into waters of the United States at a 40-acre site located on Sondej Avenue immediately east of Bowers Hill Auto Parts and south of South Military Highway in the city of Chesapeake, Norfolk County, Virginia. The proposed Consent Decree requires Roger D. Williams to perform a restoration project at the site.

The Department of Justice will accept written comments relating to this proposed Consent Decree for thirty (30) days from the date of publication of this notice. Please address comments to: Yvette M. Wilkerson-Barron, U.S. Department of Justice, Environment and Natural Resources Division, Environmental Defense Section, P.O. Box 23986, Washington, DC 20026–3986, and refer to *United States* v. *Roger D. Williams*, DJ Reference No. 90–5–1–1–4518.

The proposed Consent Decree may be examined at the Clerk's Office of the United States District Court for the Eastern District of Virginia, 193 Walter E. Hoffman United States Courthouse, 600 Granby Street, Norfolk, Virginia.

Letitia J. Grishaw,

Chief Environmental Defense Section, Environment and Natural Resources Division, United States Department of Justice.

[FR Doc. 00–12481 Filed 5–17–00; 8:45 am]

BILLING CODE 4410–15–M

DEPARTMENT OF JUSTICE

Membership of the 2000 Senior Executive Service Performance Review Boards

AGENCY: Department of Justice.

ACTION: Notice of Department of Justice's 2000 Senior Executive Service Performance Review Boards.

SUMMARY: Pursuant to the requirements of 5 U.S.C. 4314(c)(4), the Department of Justice announces the membership of its Senior Executive Service (SES) Performance Review Boards (PRBs). The purpose of the PRBs is to provide fair and impartial review of SES performance appraisals and bonus and recertification recommendations. The PRBs will make recommendations regarding the final performance ratings to be assigned, SES bonuses to be awarded, and the recertification of SES career appointees.

FOR FURTHER INFORMATION CONTACT: Joanne W. Simms, Director, Personnel Staff, Justice Management Division, Department of Justice, Washington, DC 20530; (202) 514–6788.

Department of Justice, 2000 Senior Executive Service Performance Review Board Members

Community Oriented Policing Services

Dennis E. Greenhouse, Deputy Director

Office of the Solicitor General

Lawrence G. Wallace, Deputy Solicitor General

Office of Legal Counsel

Robert J. Delahunty, Special Counsel

Office of Professional Responsibility

H. Marshall Jarrett, Counsel on Professional Responsibility

Office of Intelligence Policy and Review

James A. Baker, Deputy Counsel for Intelligence Operations

Office of Policy Development

Kevin R. Jones, Deputy Assistant Attorney General

Office of Information and Privacy

Daniel J. Metcalfe, Director (Policy and Litigation)

Antitrust Division

Willie L. Hudgins, Assistant Chief, Litigation II Section
Mary Jean Moltenbrey, Deputy Director of Operations
Anthony V. Nanni, Chief, Litigation I Section
Kenneth Heyer, Chief, Competition Policy Section

Civil Division

Gary W. Allen, Director, Aviation and Admiralty Litigation, Torts Branch
Felix V. Baxter, Director, Federal Programs Branch
JoAnn J. Bordeaux, Deputy Director, Environmental Tort Litigation, Torts Branch
Vito J. Dipietro, Director, Intellectual Property Litigation, Commercial Litigation Branch
J. Patrick Glynn, Director, Environmental Tort Litigation, Torts Branch
Thomas W. Hussey, Director, Office of Immigration Litigation
J. Christopher Kohn, Director, Corporate/Financial Litigation, Commercial Litigation Branch
Neil H. Koslowe, Special Litigation Counsel, Federal Programs Branch
Sheila M. Lieber, Deputy Director, Federal Programs Branch
Mark B. Stern, Appellate Litigation Counsel, Appellate Staff

Civil Rights Division

Merrily A. Friedlander, Chief, Coordination and Review Section
Katherine A. Baldwin, Chief, Employment Litigation Section
David K. Flynn, Chief, Appellate Section
Joan A. Magagna, Chief, Housing and Civil Enforcement Section

Criminal Division

Joseph E. Gangloff, Principal Deputy Chief, Public Integrity Section
Terry R. Lord, Chief, Chief Exploitation & Obscenity Section
Maureen H. Killion, Senior Associate Director, Office of Enforcement Operations
Thomas G. Snow, Deputy Director, Office of International Affairs

Environment and Natural Resources Division

Virginia P. Butler, Chief, Land Acquisition Section
Robert L. Bruffy, Executive Officer
Walker B. Smith, Deputy Section Chief, Environmental Enforcement Section

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Pauline H. Millius, Chief, Policy, Legislation & Special Litigation Section

Justice Management Division

Linda A. Cinciotta, Director, Office of Attorney Personnel Management
Stuart Frisch, General Counsel
Michael A. Perez, Associate Director for Financial Management

Tax Division

Stephen J. Csontos, Senior Legislative Counsel
Robert S. Watkins, Section Chief, Civil Trial Section, Central Region
Joseph E. Young, Executive Officer

Bureau of Prisons

Keith E. Hall, Assistant Director, Human Resources Management Division
James B. Jones, Deputy Assistant Director, Administration Division
Thomas R. Kane, Assistant Director, Information, Policy, and Public Affairs
Bruce K. Sasser, Assistant Director, Administration Division
Morris L. Thigpen, Sr., Director, National Institute of Corrections
Ronald J. Waldron, Senior Deputy Assistant Director, Industries, Education, and Vocational Training

Immigration and Naturalization Service

John P. Chase, Director of Internal Audit
Gustavo De La Vina, Assistant Commissioner for Border Patrol
Carol A. Hall, Assistant Commissioner for Human Resources and Development
Michel A. Pearson, Executive Associate Commissioner for Field Operations
Jeffrey L. Weiss, Director, Asylum Division
David A. Yentzer, Assistant Commissioner for Administration

United States Marshals Service

Suzanne D. Smith, Assistant Director for Human Resources

Office of Justice Programs

Gary N. Silver, Director, Office of Administration

Executive Office for Immigration Review

Jack E. Perkins, Chief Administrative Hearing Officer

Executive Office for United States Attorneys

Michael W. Bailie, Director, Office of Legal Education
David W. Downs, Deputy Director for Operations
Frank M. Kalder, Deputy Director for Financial Management

Executive Office for United States Trustees

Jeffrey M. Miller, Associate Director

Valerie M. Willis,

Executive Secretary, Senior Executive Resources Board.

[FR Doc. 00–12480 Filed 5–17–00; 8:45 am]

BILLING CODE 4410–AR–M

DEPARTMENT OF JUSTICE

National Institute of Justice

[OJP (NIJ)–1274]

Announcement of the Availability of the National Institute of Justice Solicitation for a National Evaluation of the Domestic Violence Victims' Civil Legal Assistance Program.

AGENCY: Office of Justice Programs, National Institute of Justice, Justice.

ACTION: Notice of solicitation.

SUMMARY: Announcement of the availability of the National Institute of Justice ''National Evaluation of the Domestic Violence Victims' Civil Legal Assistance Program.''

DATES: Proposals must be received by close of business July 10, 2000.

ADDRESSES: National Institute of Justice, 810 Seventh Street NW, Washington, DC 20531.

FOR FURTHER INFORMATION CONTACT: For a copy of the solicitation, please call NCJRS 1–800–851–3420. For general information about application procedures for solicitations, please call the U.S. Department of Justice Response Center, 1–800–421–6770.

SUPPLEMENTARY INFORMATION:

Authority

This action is authorized under the Omnibus Crime Control and Safe Streets Act of 1968, Sections 201–03, as amended, 42 U.S.C. 3721–23 (1994).

Background

This announcement solicits proposals for a National Evaluation of the Violence Against Women Office's (VAWO) Domestic Violence Victims' Civil Legal Assistance Program. A description of this VAWO program can be found at http://www.ojp.usdoj.gov/vawo/grants/civil/descrip.htm.

The purpose of this national evaluation is to: (1) Document the range of local activities and programs supported by the FY1998, FY1999, and FY2000 Violence Against Women Office (VAWO) grants to provide civil legal assistance; (2) document local programs funded by other sources of assistance, the gaps these programs fill, whom they serve, and how VAWO funded programs fit into the larger funding picture in a jurisdiction; (3) examine and document grantee planning and implementation efforts; (4) evaluate the need for the adequacy of special conditions imposed on grantees to preserve victim safety and confidentiality, while simultaneously enhancing the professional services offered by grantees; and (5) determine the effectiveness of these programs in meeting the needs of the women they serve.

Under this solicitation, one evaluation project of up to $800,000 will be funded for a period of up to 36 months.

Interested organizations should call the National Criminal Justice Reference Service (NCJRS) at 1–800–3420 to obtain a copy of ''National Evaluation of the Domestic Violence Victims' Civil Legal Assistance Program'' (refer to document No. SL000424). For World Wide Web access, connect to either NIJ at http://www.ojp.usdoj.gov/nij/funding.htm, or the NCJRS Justice Information Center at http://www.ncjrs.org/fedgrant.htm#nij.

Julie E. Samuels,

Acting Director, National Institute of Justice.

[FR Doc. 00–12564 Filed 5–17–00; 8:45 am]

BILLING CODE 4410–18–M

DEPARTMENT OF JUSTICE

National Institute of Justice

[OJP (NIJ)–1273]

Announcement of the Availability of the National Institute of Justice Solicitation for a National Evaluation of Grants To Combat Violent Crimes Against Women on Campus

AGENCY: Office of Justice Programs, National Institute of Justice, Justice.

ACTION: Notice of solicitation.

SUMMARY: Announcement of the Availability of the National Institute of Justice ''National Evaluation of Grants to Combat Violent Crimes Against Women on Campus.''

DATES: Proposals must be received by close of business July 5, 2000.

ADDRESSES: National Institute of Justice, 810 Seventh Street, NW, Washington, DC 20531.

FOR FURTHER INFORMATION CONTACT: For a copy of the solicitation, please call NCJRS 1–800–851–3420. For general information about application procedures for solicitations, please call the U.S. Department of Justice Response Center 1–800–421–6770.

SUPPLEMENTARY INFORMATION:

Authority

This action is authorized under the Omnibus Crime Control and Safe Streets Act of 1968, Sections 201–03, as amended, 42 U.S.C. 3721–23 (1994).

Background

This solicitation is based on the Congressional reporting requirements of the Higher Education Amendments of 1998 for an evaluation of the effectiveness of the Grants to Combat Violent Crimes Against Women on Campuses Program (VAW Campus Program). The National Institute of Justice (NIJ), in collaboration with the Office of Justice Programs' Violence Against Women Office (VAWO), is soliciting proposals for this national evaluation. The evaluation should examine impact issues regarding those institutions of higher education that are VAW Campus Program grantees; implementing comprehensive, coordinated responses to violence against women, including sexual assault, domestic violence, and stalking. One grant of up to $850,000 will be awarded. The duration of the evaluation is up to 36 months, with summary reports required for each component of the evaluation—baseline data, process, and impact.

Interested organizations should call the National Criminal Justice Reference Service (NCJRS) at 1–800–851–3420 to obtain a copy of ''National Evaluation of Grants to Combat Violent Crimes Against Women on Campus'' (refer to document no. SL000422). For World Wide Web access, connect to either NIJ at http://www.ojp.usdoj.gov/nij/funding.htm, or the NCJRS Justice Information Center at http://www.ncjrs.org/fedgrant.htm#nij.

Julie E. Samuels,

Acting Director, National Institute of Justice.

[FR Doc. 00–12565 Filed 5–17–00; 8:45 am]

BILLING CODE 4410–18–U

DEPARTMENT OF LABOR

Employment and Training Administration

[TA–W–35,579 and TA–W–35,579A]

Mitchell Energy and Development Corporation Headquartered in the Woodlands, Texas, Operating Throughout the State of Texas and Mitchell Louisiana Gas Services L.P., and Operating Throughout the State of Louisiana; Termination of Certification Regarding Eligibility To Apply for Worker Adjustment Assistance

On March 24, 1999, the Department issued a Certification Regarding Eligibility to Apply for Worker Adjustment Assistance for the workers and former workers of Mitchell Energy and Development Corporation and Mitchell Louisiana Gas Services L.P. (TA–W–35,579.) Notice of the determination was published in the **Federal Register** on May 21, 1999 (64 FR 27811).

The certification was based on information supplied by the company which the Department concluded to indicate that crude oil production was approximately half of total company revenues. The Department issued the certification on the basis of increased aggregate U.S. imports of crude oil.

Following receipt of a request from the company that coverage of the certification be expanded to include workers not covered by the certification, the Department on December 6, 1999 instituted an investigation on behalf of workers employed in the following organizational subdivisions of the subject firm which had not been specifically identified in the certification as covered: Mitchell Energy Corporation, Mitchell Gas Services, L.P., and MND Services. The Department determined it appropriate to institute a new investigation with respect to the three above-mentioned subsidiary entities and that investigation was instituted as TA–W–37, 142.

Following the receipt and review of additional information requested by the Department in conjunction with its investigation with respect to the subsidiary entities, it was concluded less than six percent of revenues of Mitchell Energy and Development Corporation are derived from production of crude oil and that such crude oil is in fact a by-product of the subject firm's primary activities: the acquisition and processing of natural gas and natural gas liquids. Thus, upon the review of more detailed information than that initially submitted by the subject firm, it was concluded that a certification of eligibility to apply for worker adjustment assistance cannot be based upon increased imports of crude oil.

Based upon the additional evidence obtained and in accordance with Section 223(d) of the Act, on February 9, 2000, the Director of the Division of Trade Adjustment Assistance instituted an investigation to determine separations of workers from Mitchell Energy and Development Corporation and Mitchell Louisiana Gas Services L. P. (TA–W–35,579 and TA–W–35,579A) continue to be attributable to the conditions for certification specified in Section 222 of the Act. Notice of the investigation was published in the **Federal Register** on February 25, 2000.

The Department has surveyed customers of the primary products of Mitchell Energy and Development Corporation—natural gas and natural gas liquids—in order determine to whether imports of such products contributed importantly to the worker separations. None of the surveyed customers purchased imported natural gas or natural gas liquids.

Conclusion

Upon the review of the evidence it is determined that the Certification of Eligibility to Apply for Worker Adjustment Assistance with respect to workers of Mitchell Energy and Development Corporation, headquartered in the Woodlands, Texas operating throughout the state of Texas (TA–W–35,579) and Mitchell Louisiana Gas Services L.P. and operating throughout the state of Louisiana (TA–W–579A) is terminated. The effective date of this termination is May 18, 2000.

Signed at Washington, DC, this 10th day of May 2000.

Grant D. Beale,

Program Manager, Division of Trade Adjustment Assistance.

[FR Doc. 00–12508 Filed 5–17–00; 8:45 am]

BILLING CODE 4510–30–M

DEPARTMENT OF LABOR

Employment and Training Administration

[TA–W–37,553]

Swank, Inc., Attleboro, Massachusetts; Notice of Termination of Investigation

Pursuant to section 221 of the Trade Act of 1974, an investigation was initiated on April 10, 2000, in response to a petition filed on the same date on behalf of workers at Swank, Inc., Attleboro, Massachusetts.

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The petitioning group of workers are covered by an existing certification issued on April 30, 2000 (TA–W–37,531). Consequently, further investigation in this case would serve no purpose, and this investigation has been terminated.

Signed in Washington, DC, this 5th day of May, 2000.

Grant D. Beale,

Program Manager, Division of Trade Adjustment Assistance.

[FR Doc. 00–12509 Filed 5–17–00; 8:45 am]

BILLING CODE 4510–30–M

DEPARTMENT OF LABOR

Employment and Training Administration

[TA–W–37,243]

Whizard Protective Ware Corporation, Birmingham, Ohio; Dismissal of Application for Reconsideration

Pursuant to 29 CFR 90.18(C) an application for administrative reconsideration was filed with the Director of the Division of Trade Adjustment Assistance for workers at Whizard Protective Ware Corporation, Birmingham, Ohio. The application contained no new substantial information which would bear importantly on the Department's determination. Therefore, dismissal of the application was issued.

TA–W–37,243; Whizard Protective Ware Corporation, Birmingham, Ohio (May 10, 2000.

Signed at Washington, DC, this 12th day of May, 2000.

Grant D. Beale,

Program Manager, Division of Trade Adjustment Assistance.

[FR Doc. 00–12507 Filed 5–17–00; 8:45 am]

BILLING CODE 4510–30–M

DEPARTMENT OF LABOR

Employment and Training Administration

Proposed Information Collection Request; Submitted for Public Comment and Recommendations; Business Confidential Data Request

ACTION: Notice.

SUMMARY: The Department of Labor, as part of its continuing effort to reduce paperwork and respondent burden conducts a preclearance consultation program to provide the general public and Federal agencies with an opportunity to comment on proposed and/or continuing collections of information in accordance with the Paperwork Reduction Act of 1995 (PRA 95) (44 U.S.C. 3506(c)(2)(A)). This program helps to ensure that requested data can be provided in the desired format, reporting burden (time and financial resources) is minimized, collection instruments are clearly understood, and the impact of collection requirements on respondents can be properly assessed. Currently, the Employment and Training Administration is soliciting comments concerning the proposed extension of the information collection of the Business Confidential Data Request, ETA 9014.

A copy of the proposed information collection request can be obtained by contacting the employee listed below in the contact section of this notice.

DATES: Written comments must be submitted on or before July 17, 2000. Written comments should evaluate whether the proposed collection of information is necessary for the proper performance of the functions of the agency, including whether the information will have practical utility; evaluate the accuracy of the agency's estimate of the burden of the proposed collection of information including the validity of the methodology and assumptions used; enhance the quality, utility, and clarity of the information to be collected; and minimize the burden of the collection of information on those who are to respond, including through the use of appropriate automated, electronic, mechanical, or other technological automated, electronic, mechanical, or other technological collection techniques or other forms of information technology, e.g., permitting electronic submission of responses:

ADDRESSES: Edward A. Tomchick, Division of Trade Adjustment Assistance, Employment and Training Administration, Department of Labor, Room C–4318, 200 Constitution Avenue, NW, Washington, DC 20210, 202–219–5555 (this is not a toll-free number).

SUPPLEMENTARY INFORMATION:

I. Background

Sections 222, 223 and 249 of Title II, Chapter 2 of the Trade Act of 1974, as amended, authorizes the Secretary of Labor to collect the data necessary for the Secretary to determine worker eligibility of apply for Trade Adjustment Assistance (TAA). The Business Confidential Data Request is submitted to the workers' firm upon receipt of a TAA petition. The information requested is used by the investigative work group of the Division of Trade Adjustment Assistance to present an objective set of facts for the Secretary to determine whether increased imports of articles like or directly competitive with those produced by the petitioning workers' firm contributed importantly to declines in sales or production, and employment at the subject firm plant.

II. Current Actions

This is a request for OMB approval under [the Paperwork Reduction Act of 1995 (44 U.S.C. 3506(c)(2)(A)] for a extension of collection of information previously approved and assigned OMB Control No. 1205–0197. There is no change in burden.

Type of Review: Extension without change.

Agency: Employment and Training Administration.

Title: Business Confidential Data Request.

OMB Number: 1205–0197.

Agency Number: ETA 9014.

Affected Public: Businesses.

Frequency: On occasion.

Number of Respondents: 1,500 (Estimated 1,400 plus the carry over of 100 cases from the previous year.)

Estimated Time Per Respondent: 3 hours per response.

Total Burden Hours: 4,500.

Total Burden Cost (capital/startup): None.

Total Burden Cost (operating/maintaining): None.

Comments submitted in response to this notice will be summarized and/or included in the request for Office of Management and Budget approval of the information collection request; they will also become a matter of public record.

Dated: May 12, 2000.

Edward A. Tomchick,

Director, Division of Trade Adjustment Assistance.

[FR Doc. 00–12511 Filed 5–17–00; 8:45 am]

BILLING CODE 4510–30–M

DEPARTMENT OF LABOR

Employment and Training Administration

Proposed Information Collection Request Submitted for Public Comment and Recommendations; Customer Survey

ACTION: Notice.

SUMMARY: The Department of Labor, as part of its continuing effort to reduce paperwork and respondent burden conducts a preclearance consultation program to provide the general public

and Federal agencies with an opportunity to comment on proposed and/or continuing collections of information in accordance with the Paperwork Reduction Act of 1995 (PRA 95) (44 U.S.C. 3506(c)(2)(A)). This program helps to ensure that requested data can be provided in the desired format, reporting burden (time and financial resources) is minimized, collection instruments are clearly understood, and the impact of collection requirements on respondents can be properly assessed. Currently, the Employment and Training Administration is soliciting comments concerning the proposed extension of the information collection of the Customer Survey, ETA 8562.

A copy of the proposed information collection request can be obtained by contacting the employee listed below in the contact section of this notice.

DATES: Written comments must be submitted on or before July 17, 2000. Written comments should evaluate whether the proposed collection of information is necessary for the proper performance of the functions of the agency, including whether the information will have practical utility; evaluate the accuracy of the agency's estimate of the burden of the proposed collection of information including the validity of the methodology and assumptions used; enhance the quality, utility, and clarity of the information to be collected; and minimize the burden of the collection of information on those who are to respond, including through the use of appropriate automated, electronic, mechanical, or other technological automated, electronic, mechanical or other technological collection techniques or other forms of information technology, e.g., permitting electronic submission of responses.

ADDRESSES: Edward A. Tomchick, Division of Trade Adjustment Assistance, Employment and Training Administration, Department of labor, Room C–4318, 200 Constitution Avenue, NW, Washington, DC 20210, 202–219–5555 (this is not a toll-free number).

SUPPLEMENTARY INFORMATION:

I. Background

The Division of Trade Adjustment Assistance is required under the Trade Act of 1974 to conduct investigations to determine whether increased imports have contributed importantly to actual or threatened decreases in employment at firms whose workers have petitioned for Trade Adjustment Assistance benefits. The Customer Survey is designed to provide information on which determinations are based.

II. Current Actions

This is a request for OMB approval under [the Paperwork Reduction Act of 1995 (44 U.S.C. 3506(c)(2)(A)]] for a extension of collection of information previously approved and assigned OMB Control No. 1205–0190. There is no change in burden.

Type of Review: Extension without change.

Agency: Employment and Training Administration.

Title: Customer Survey.

OMB Number: 1205–0190.

Agency Number: ETA 8562.

Affected Public: Businesses.

Frequency: On occasion.

Number of Respondents: 2,220.

Estimated Time Per Resondent: 1.78 hours.

Total Burden Hours: 3,951.

Total Burden Cost (capital/startup): None.

Total Burden Cost (operating/maintaining): None.

Comments submitted in response to this notice will be summarized and/or included in the request for Office of Management and Budget approval of the information collection request; they will also become a matter of public record.

Dated: May 12, 2000.

Edward A. Tomchick,

Director, Division of Trade Adjustment Assistance.

[FR Doc. 00–12512 Filed 5–17–00; 8:45 am]

BILLING CODE 4510–30–M

DEPARTMENT OF LABOR

Employment and Training Administration

Proposed Information Collection Request Submitted for Public Comment and Recommendations; Oil and Gas Drilling and Exploration Oilfield Services

ACTION: Notice.

SUMMARY: The Department of Labor, as part of its continuing effort to reduce paperwork and respondent burden conducts a preclearance consultation program to provide the general public and Federal agencies with an opportunity to comment on proposed and/or continuing collections of information in accordance with the Paperwork Reduction Act of 1995 (PRA 95) (44 U.S.C. 3506(c)(2)(A)). This program helps to ensure that requested data can be provided in the desired format, reporting burden (time and financial resources) is minimized, collection instruments are clearly understood, and the impact of collection requirements on respondents can be properly assessed. Currently, the Employment and Training Administration is soliciting comments concerning the proposed extension of the information collection of the Oil and Gas Drilling and Exploration Oilfield Services, ETA 9018.

A copy of the proposed information collection request can be obtained by contacting the employee listed below in the contact section of this notice.

DATES: Written comments must be submitted on or before July 17, 2000. Written comments should evaluate whether the proposed collection of information is necessary for the proper performance of the functions of the agency, including whether the information will have practical utility; evaluate the accuracy of the agency's estimate of the burden of the proposed collection of information including the validity of the methodology and assumption used; enhance the quality, utility, and clarity of the information to be collected; and minimize the burden of the collection of information on those who are to respond, including through the use of appropriate automated, electronic, mechanical, or other technological automated, electronic, mechanical, or other technological collection techniques or other forms of information technology, *e.g.,* permitting electronic submission of responses.

ADDRESSES: Edward A. Tomchick, Division of Trade Adjustment Assistance, Employment and Training Administration, Department of Labor, Room C–4318, 200 Constitution Avenue, NW, Washington, DC 20210, 202–219–5555 (this is not a toll-free number).

SUPPLEMENTARY INFORMATION:

I. Background

The Division of Trade Adjustment Assistance is required under the Trade Act of 1974 to conduct investigations to determine whether increased imports have contributed importantly to actual or threatened decreases in employment at firms whose workers have petitioned for Trade Adjustment Assistance benefits. The ''Oil and Gas Drilling and Exploration Oilfield Services'' Business Confidential Data Request is designed to provide information on which determinations are based.

II. Current Actions

This is a request for OMB approval under [the Paperwork Reduction Act of 1995 (44 U.S.C. 3506(c)(2)(A)] for an

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extension of collection of information previously approved and assigned OMB Control No. 1205–0272. There is no change in burden.

Type of Review: Extension without change.

Agency: Employment and Training Administration.

Title: Oil and Gas Drilling and Exploration Oilfield Services.

OMB Number: 12205–0272.

Agency Number: ETA 9018.

Affected Public: Businesses.

Frequency: On occasion.

Number of Respondents: 75.

Estimated Time Per Respondent: 3 hours.

Total Burden Hours: 225.

Total Burden Cost: (capital/startup) None.

Total Burden Cost: (operating/maintaining) None.

Comments submitted in response to this notice will be summarized and/or included in the request for Office of Management and Budget approval of the information collection request; they will also become a matter of public record.

Dated: May 12, 2000.

Edward A. Tomchick,

Director, Division of Trade Adjustment Assistance.

[FR Doc. 00–12513 Filed 5–17–00; 8:45 am]

BILLING CODE 4510–30–M

DEPARTMENT OF LABOR

Employment and Training Administration

[NAFTA–003790]

3–I, Incorporated Murrells Inlet, South Carolina; Notice of Termination of Investigation

Pursuant to Title V of the North American Free Trade Agreement Implementation Act Public Law 103–1 concerning transitional adjustment assistance, hereinafter called NAFTA–TAA and in accordance with Section 250(a), Subchapter D, Chapter 2, Title II, of the Trade Act of 1974, as amended (19 U.S.C. 2331), an investigation was initiated on March 8, 2000, in response to a petition filed on behalf of workers at 3–I, Inc., Murrells Inlet, South Carolina. Workers produced t-shirts.

The petitioner has requested that the petition be withdrawn due to lack of significant worker separations. Consequently, further investigation in this case would serve no purpose, and the investigation has been terminated.

Signed in Washington, DC this 10th day of May, 2000.

Grant D. Beale,

Program Manager, Division of Trade Adjustment Assistance.

[FR Doc. 00–12510 Filed 5–17–00; 8:45 am]

BILLING CODE 4510–30–M

DEPARTMENT OF LABOR

Employment Standards Administration

Proposed Collection; Comment Request

ACTION: Notice.

SUMMARY: The Department of Labor, as part of its continuing effort to reduce paperwork and respondent burden, conducts a preclearance consultation program to provide the general public and Federal agencies with an opportunity to comment on proposed and/or continuing collections of information in accordance with the Paperwork Reduction Act of 1995 (PRA95) [44 U.S.C. 3506(c)(2)(A)]. This program helps to ensure that requested data can be provided in the desired format, reporting burden (time and financial resources) is minimized, collection instruments are clearly understood, and the impact of collection requirements on respondents can be properly assessed. Currently, the Employment Standards Administration is soliciting comments concerning the proposed extension collection of the following: (1) Rehabilitation Maintenance Certificate (OWCP–17); and Application to Employ Homeworkers (WH–46), Piece Rate Measurements, and Homeworker Handbook (WH–75). Copies of the proposed information collection requests can be obtained by contacting the office listed below in the **ADDRESSES** section of this Notice.

DATES: Written comments must be submitted to the office listed in the addresses section below on or before July 17, 2000.

ADDRESSES: Ms. Patricia A. Forkel, U.S. Department of Labor, 200 Constitution Ave., NW, Room S–3201, Washington, DC 20210, telephone (202) 693–0339 (this is not a toll-free number), fax (202) 693–1451.

SUPPLEMENTARY INFORMATION:

Rehabilitation Maintenance Certificate (OWCP–17)

I. Background

The Office of Workers' Compensation Programs (OWCP) administers the Longshore and Harbor Workers' Compensation Act and the Federal Employees' Compensation Act. These Acts provide employment rehabilitation benefits to eligible injured workers. The OWCP–17 is a form which is submitted, signed, and dated by an injured worker receiving rehabilitation services to request reimbursement from OWCP for expenses incurred as a result of participation in an approved rehabilitation effort. The form requires the signature of a facility official to verify that the employee is in attendance at the program.

II. Review Focus

The Department of Labor is particularly interested in comments which:

- Evaluate whether the proposed collection of information is necessary for the proper performance of the functions of the agency, including whether the information will have practical utility;
- Evaluate the accuracy of the agency's estimate of the burden of the proposed collection of information, including the validity of the methodology and assumptions used;
- Enhance the quality, utility and clarity of the information to be collected; and
- Minimize the burden of the collection of information on those who are to respond, including through the use of appropriate automated, electronic, mechanical, or other technological collection techniques or other forms of information technology, *e.g.,* permitting electronic submissions of responses.

III. Current Actions

The Department of Labor seeks the extension of approval to collect this information in order to carry out its responsibility to provide vocational rehabilitation services to injured workers currently unemployed as a result of their injury, to enhance their employment potential.

Type of Review: Extension.

Agency: Employment Standards Administration.

Title: Rehabilitation Maintenance Certificate.

OMB Number: 1215–0161.

Agency Number: OWCP–17.

Affected Public: Individuals or households, Businesses or other for-profit; Not-for-profit institutions.

Total Respondents: 1,300.

Frequency: Monthly.

Total Responses: 15,600.

Average Time per Response: 10 minutes.

Estimated Total Burden Hours: 2,605.

Total Burden Cost (capital/startup): $0.

Total Burden Cost (operating/maintenance): $0.

Application to Employ Homeworkers, (WH–46), Piece Rate Measurements, and Homeworker Handbook (WH–75)

I. Background

Section 11(d) of the Fair Labor Standards Act (FLSA) authorizes the Secretary of Labor to regulate, restrict, or prohibit industrial homework as necessary to prevent evasion of the minimum requirements of the Act. Restrictions exist on seven homework industries, (knitted outerwear, women's apparel, jewelry manufacturing, gloves and mittens, button and buckle manufacturing, handkerchief manufacturing, and embroideries). Homework in these industries is permitted only in certain hardship cases. Homework is permitted under the FLSA in all other industries, provided the employer maintains homeworker handbooks for such employees which record hours of work and certain other required payroll information. Further, employers of homeworkers in certain restricted industries must first obtain a certification from the Department of Labor authorizing the employment of such workers. Employers in the restricted industries under the certification program who pay workers based on piece rates must maintain documentation of the work measurements used to establish such piece rates and the circumstances under which measurements were conducted.

II. Review Focus

The Department of Labor is particularly interested in comments which:

- Evaluate whether the proposed collection of information is necessary for the proper performance of the functions of the agency, including whether the information will have practical utility;
- Evaluate the accuracy of the agency's estimate of the burden of the proposed collection of information, including the validity of the methodology and assumptions used;
- Enhance the quality, utility and clarity of the information to be collected; and
- Minimize the burden of the collection of information on those who are to respond, including through the use of appropriate automated, electronic, mechanical, or other technological collection techniques or other forms of information technology, *e.g.,* permitting electronic submissions of responses.

III. Current Actions

The Department of Labor seeks the extension of approval to collect this information in order assure compliance with the FLSA in homework employment.

Type of Review: Extension.

Agency: Employment Standards Administration.

Title: Application to Employ Homeworkers.

OMB Number: 1215–0013.

Affected Public: Business or other for-profit; Individuals or households; Not-for-profit institutions.

Frequency: On occasion.

Reporting Burden:

Title	Agency No.	No. of respondents	No. of responses	Average time per response	Burden hours
Application To Employ Homeworkers	WH–46	71	36	30 min.	18
Homeworker Handbooks	WH–75	4,684	18,736	30 min.	9,368

Recordkeeping Burden:

Title	No. of record-keepers	No. of records	Average time per response	Burden hours
Piece Rate Measurement	71	213	60½ min.	215
Homeworker Handbook	1,171	18,736	½ min.	156

Total Respondents (Recordkeeping and Reporting): 4,755.

Total Annual Responses (Recordkeeping and Reporting): 18,772.

Estimated Total Burden Hours (Recordkeeping and Reporting): 9,757.

Total Burden Cost (capital/startup): $0.

Total Burden Cost (operating/maintenance): $0.

Comments submitted in response to this notice will be summarized and/or included in the request for Office of Management and Budget approval of the information collection request; they will also become a matter of public record.

Dated: May 12, 2000.

Margaret J. Sherrill,

Chief, Branch of Management Review and Internal Control, Division of Financial Management, Office of Management, Administration and Planning, Employment Standards Administration.

[FR Doc. 00–12506 Filed 5–17–00; 8:45 am]

BILLING CODE 4510–47–P

DEPARTMENT OF LABOR

Mine Safety and Health Administration

Petitions for Modification

The following parties have filed petitions to modify the application of existing safety standards under section 101(c) of the Federal Mine Safety and Health Act of 1977.

1. Freeman United Coal Mining Company

[Docket No. M–2000–037–C]

Freeman United Coal Mining Company, 1999 Wabash Avenue, Suite 200B, Springfield, Illinois 62704–5364 has filed a petition to modify the application of 30 CFR 75.1909(b)(6) to its Crown II Mine (I.D. No. 11–02236) located in Macoupin County, Illinois. The petitioner requests a modification of the standard to permit a diesel-powered road grader to be operated without front wheel brakes. The petitioner proposes to operate its diesel grader at a maximum speed of 10 miles per hour, lower the grader blade (mold board) to increase stopping capability in emergencies, and provide training for the grader operators on how to recognize appropriate levels of speed for

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different road and slope conditions. The petitioner asserts that the proposed alternative method would provide at least the same measure of protection as the existing standard.

2. Neumeister Coal Company

[Docket No. M–2000–038–C]

Neumeister Coal Company, 28 Frank Lane, Ashland, Pennsylvania 17921 has filed a petition to modify the application of 30 CFR 49.2(b) (availability of mine rescue teams) to its #2 Slope Mine (I.D. No. 36–07166) located in Schuylkill County, Pennsylvania. The petitioner requests a modification of the standard to permit the reduction of two mine rescue teams with five members and one alternate each, to two mine rescue teams with three members and one alternate for either team. The petitioner asserts that application of the existing standard would result in a diminution of safety to the miners and members of the rescue team, and that the proposed alternative method would provide at least the same measure of protection as the existing standard.

3. Tito Coal

[Docket No. M–2000–039–C]

Tito Coal, 118 Fairview Lane, Williamstown, Pennsylvania 17098 has filed a petition to modify the application of 30 CFR 49.2(b) (availability of mine rescue teams) to its Whites Vein Slope (I.D. No. 36–06815) located in Schuylkill County, Pennsylvania. The petitioner requests a modification of the standard to permit the reduction of two mine rescue teams with five members and one alternate each, to two mine rescue teams with three members and one alternate for either team. The petitioner asserts that application of the existing standard would result in a diminution of safety to the miners and members of the rescue team, and that the proposed alternative method would provide at least the same measure of protection as the existing standard.

4. Canyon Fuel Company, L.L.C.

[Docket No. M–2000–040–C]

Canyon Fuel Company, L.L.C., HC 35 Box 380, Helper, Utah 84526 has filed a petition to modify the application of 30 CFR 75.350 (air courses and belt haulage entries) to its Skyline Mine No. 3 (I.D. No. 42–01566) located in Carbon County, Utah. The petitioner requests a modification of the standard to permit the belt entry to be used as the return entry during two-entry longwall panel development, and the operator the option to use the belt haulage entry as an intake entry for additional face ventilation during longwall panel retreat mining. The petitioner asserts that this modification will provide maximum protection for the miners during longwall panel development and retreat mining under adverse ground conditions, multiple seam mining conditions, and deep cover. Upon granting of this petition, the petitioner requests that the terms and conditions contained in the Decision and Order not apply in any panel during the period from completion of development mining of the two-entry longwall panel until the beginning of the longwall equipment set-up activities, and conditioned on the conveyor belt in the two-entry panel not being energized. The petitioner asserts that during this time, all other existing standards will apply. The petitioner proposes to install a low-level carbon monoxide or equivalent product of combustion detection system in all longwall panel belt entries used as an intake or return air course and in the primary intake entry. The petitioner asserts that the proposed alternative method would provide at least the same measure of protection as the existing standard and that application of the existing standard would result in a diminution of safety to the miners.

5. Canyon Fuel Company, L.L.C.

[Docket No. M–2000–041–C]

Canyon Fuel Company, L.L.C. has filed a petition to modify the application of 30 CFR 75.352 (return air courses) to its Skyline Mine No. 3 (I.D. No. 42–01566) located in Carbon County, Utah. The petitioner requests a modification of the standard to permit the belt entry to be used as the return entry during two-entry longwall panel development, and to allow the operator the option to use the belt haulage entry as an intake entry for additional face ventilation during longwall panel retreat mining. The petitioner asserts that this modification will provide maximum protection for the miners during longwall panel development and retreat mining under adverse ground conditions, multiple seam mining conditions, and deep cover. Upon granting of this petition, the petitioner requests that the terms and conditions contained in the Decision and Order not apply in any panel during the period from completion of development mining of the two-entry longwall panel until the beginning of the longwall equipment set-up activities, and conditioned on the conveyor belt in the two-entry panel not being energized. The petitioner asserts that during this time, all other existing standards will apply. The petitioner proposes to install a low-level carbon monoxide or equivalent product of combustion detection system in all longwall panel belt entries used as an intake or return air course and in the primary intake entry. The petitioner asserts that the proposed alternative method would provide at least the same measure of protection as the existing standard, and that application of the existing standard would result in a diminution of safety to the miners.

6. Marfork Coal Company, Inc.

[Docket No. M–2000–042–C]

Marfork Coal Company, Inc., P.O. Box 457, Whitesville, West Virginia 25209 has filed a petition to modify the application of 30 CFR 75.350 (air courses and belt haulage entries) to its Brushy Eagle Mine (I.D. No. 46–08315) located in Raleigh County, West Virginia. The petitioner requests a modification of the standard to permit the use of an automatic fire detection system based on carbon monoxide monitoring of the underground belt conveyor entries. The petitioner proposes to install a low-level carbon monoxide monitoring system as an early warning fire detection system in all belt entries used to course intake air to a working place. The petitioner asserts that the proposed alternative method would provide at least the same measure of protection as the existing standard.

7. Elk Run Coal Company, Inc.

[Docket No. M–2000–043–C]

Elk Run Coal Company, Inc., P. O. Box 497, Sylvester, West Virginia 25193 has filed a petition to modify the application of 30 CFR 75.1002 (location of trolley wires, trolley feeder wires, high-voltage cables and transformers) to its Castle Mine (I.D. No. 46–08055) located in Boone County, West Virginia. The petitioner proposes to use continuous mining machines with nominal voltage of the power circuits not to exceed 2,300 volts. The petitioner asserts that its alternative method would not result in a diminution of safety to the miners, and would provide at least the same measure of protection as the existing standard.

8. Appalachian Eagle, Inc.

[Docket No. M–2000–044–C]

Appalachian Eagle, Inc., P.O. Box 751, Bradley, West Virginia 25818–0772 has filed a petition to modify the application of 30 CFR 75.350 (air courses and belt haulage entries) to its Mine No. 1 (I.D. No. 46–05437) located in Kanawha County, West Virginia. The petitioner requests a modification of the

standard to permit the use of a carbon monoxide monitoring system to monitor belt air used in the face. The petitioner proposes to use a carbon monoxide monitoring system as an early warning fire detection in all belt entries used to course intake air to a working place. The petitioner asserts that the proposed alternative method would provide at least the same measure of protection as the existing standard.

9. Roberts Bros. Coal Company, Inc.

[Docket No. M–2000–045–C]

Roberts Bros. Coal Company, Inc., 660 B. John Hardy Road, Madisonville, Kentucky 42431 has filed a petition to modify the application of 30 CFR 75.701 (grounding metallic frames, casings, and other enclosures of electric equipment) to its Cardinal #2 Mine (I.D. No. 15–17216) located in Hopkins County, Kentucky. The petitioner proposes to use a 200KW, 480-volt, diesel powered generator set with an approved diesel drive engine to move equipment in and out of the mine and to perform rehab work in areas outby section loading points. The petitioner asserts that the proposed alternative method would provide at least the same measure of protection as the existing standard.

Request for Comments

Persons interested in these petitions are encouraged to submit comments via e-mail to ''comments@msha.gov,'' or on a computer disk along with an original hard copy to the Office of Standards, Regulations, and Variances, Mine Safety and Health Administration, 4015 Wilson Boulevard, Room 627, Arlington, Virginia 22203. All comments must be postmarked or received in that office on or before June 19, 2000. Copies of these petitions are available for inspection at that address.

Dated: May 8, 2000.

Carol J. Jones,

Director, Office of Standards, Regulations, and Variances.

[FR Doc. 00–12530 Filed 5–17–00; 8:45 am]

BILLING CODE 4510–43–P

DEPARTMENT OF LABOR

Mine Safety and Health Administration

Petitions for Modification

The following parties have filed petitions to modify the application of existing safety standards under section 101(c) of the Federal Mine Safety and Health Act of 1977.

1. Hopkins County Coal, LLC

[Docket No. M–2000–027–C]

Hopkins County Coal, LLC, P.O. Box 711, Madisonville, Kentucky 42431 has filed a petition to modify the application of 30 CFR 75.503 (permissible electric face equipment; maintenance) to its Island Mine (I.D. No. 15–17515) located in Madisonville County, Kentucky. The petitioner proposes to use a spring-loaded device with specific fastening characteristics instead of a padlock to secure plugs and electrical type connectors to batteries, and to permissible mobile powered equipment, to prevent the battery plugs from accidentally separating from the receptacle during normal operation of battery equipment. The petitioner asserts that the proposed alternative method would provide at least the same measure of protection as the existing standard.

2. Elk Run Coal Company, Inc.

[Docket No. M–2000–028–C]

Elk Run Coal Company, Inc., P.O. Box 497, Sylvester, West Virginia 25193 has filed a petition to modify the application of 30 CFR 75.1002 (location of trolley wires, trolley feeder wires, high-voltage cables and transformers) to its White Knight Mine (I.D. No. 46–08055) located in Sylvester County, West Virginia. The petitioner proposes to use continuous mining machines with nominal voltage of the power circuits not to exceed 2,300 volts. The petitioner asserts that its alternative method would not result in a diminution of safety to the miners and would provide at least the same measure of protection as the existing standard.

3. B & B Anthracite Coal Company

[Docket No. M–2000–029–C]

B & B Anthracite Coal Company, 225 Main Street, Joliett, Pennsylvania 17981 has filed a petition to modify the application of 30 CFR 49.2(b) (availability of mine rescue teams) to its Rock Ridge Slope Mine (I.D. No. 36–07741) located in Schuylkill County, West Virginia. The petitioner requests a modification of the standard to permit the reduction of two mine rescue teams with five members and one alternate each, to two mine rescue teams of three members with one alternate for either team. The petitioner asserts that application of the existing standard would result in a diminution of safety to the miners and members of the rescue team and that the proposed alternative method would provide at least the same measure of protection as the existing standard.

4. West Ridge Resources, Inc.

[Docket No. M–2000–030–C]

West Ridge Resources, Inc., P.O. Box 902, Price, Utah 84501 has filed a petition to modify the application of 30 CFR 75.500(d) (permissible electric equipment)to its West Ridge Mine (I.D. No. 42–02233) located in Carbon County, Utah. The petitioner proposes to use the following nonpermissible low-voltage or battery powered electronic testing and diagnostic equipment inby the last open crosscut: lap top computers, oscilloscopes, vibration analysis machines, cable fault detectors, point temperature probes, infrared temperature devices and recorders, pressure and flow measurement devices, signal analyzer devices, ultrasonic thickness gauges, electronic component testers, electronic tachometers and battery operated drills. The petitioner has listed in this petition for modification specific procedures that would be followed when using this equipment. The petitioner asserts that the proposed alternative method would provide at least the same measure of protection as the existing standard.

5. Genwal Resources, Inc.

[Docket No. M–2000–031–C]

Genwal Resources, Inc., P.O. Box 1420, Huntington, Utah 84528 has filed a petition to modify the application of 30 CFR 75.500(d) (permissible electric equipment) to its Crandall Canyon Mine (I.D. No. 42–01715) located in Carbon County, Utah. The petitioner proposes to use the following nonpermissible low-voltage or battery powered electronic testing and diagnostic equipment inby the last open crosscut: lap top computers, oscilloscopes, vibration analysis machines, cable fault detectors, point temperature probes, infrared temperature devices and recorders, pressure and flow measurement devices, signal analyzer devices, ultrasonic thickness gauges, electronic component testers, electronic tachometers and battery operated drills. The petitioner has listed in this petition for modification specific procedures that would be followed when using this equipment. The petitioner asserts that the proposed alternative method would provide at least the same measure of protection as the existing standard.

6. Sidney Coal Company, Inc.

[Docket No. M–2000–032–C]

Sidney Coal Company, Inc., P.O. Box 299, Sidney, Kentucky 41564 has filed a petition to modify the application of 30 CFR 75.350 (air courses and belt haulage entries) to its Rockhouse Energy Mining Company, Mine No. 1 (I.D. No.

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15–17651) located in Sidney County, Kentucky. The petitioner requests a modification of the standard to allow air coursed through belt haulage entries to be used to ventilate active working places. The petitioner proposes to install a low-level carbon monoxide detection system in all belt entries at certain locations as an early warning fire detection system. The petitioner also proposes to adhere to other conditions. The petitioner asserts that the proposed alternative method would provide at least the same measure of protection as the existing standard.

7. Sidney Coal Company, Inc.

[Docket No. M–2000–033–C]

Sidney Coal Company, Inc., P.O. Box 299, Sidney, Kentucky 41564 has filed a petition to modify the application of 30 CFR 75.1002 (location of trolley wires, trolley feeder wires, high-voltage cables and transformers) to its Rockhouse Energy Mining Company, Mine No. 1 (I.D. No. 15–17651) located in Sidney County, Kentucky. The petitioner proposes to use 4,160 volt longwall face equipment, and to submit proposed revisions for its approved part 48 training plans to the District Manager that would specify initial and refresher training. The petitioner has listed specific procedures in this petition for modification that would be followed when using the longwall equipment. The petitioner asserts that the proposed alternative method would provide at least the same measure of protection as the existing standard.

8. Sidney Coal Company, Inc.

[Docket No. M–2000–034–C]

Sidney Coal Company, Inc., P.O. Box 299, Sidney, Kentucky 41564 has filed a petition to modify the application of 30 CFR 75.1700 (oil and gas wells) to its Rockhouse Energy Mining Company, Mine No. 1 (I.D. No. 15–17651) located in Sidney County, Kentucky. The petitioner proposes to plug and mine through oil and gas wells using the specific procedures listed in this petition for modification, and notify the District Manager or designee prior to mining within 300 feet of a plugged oil and gas well. The petitioner asserts that the proposed alternative method would provide at least the same measure of protection as the existing standard and will not result in a diminution of safety to the miners.

9. West Ridge Resources, Inc.

[Docket No. M–2000–035–C]

West Ridge Resources, Inc., P.O. Box 902, Price, Utah 84501 has filed a petition to modify the application of 30 CFR 75.352 (return air courses) to its West Ridge Mine (I.D. No. 42–02233) located in Carbon County, Utah. The petitioner proposes to use the belt entry as a return air course during two-entry longwall development, and an intake during longwall extraction, to ensure adequate ventilation to dilute and render harmless any methane or other noxious gases that may accumulate. The petitioner asserts that the application of the existing standard would result in a diminution of safety and that the proposed alternative method would provide at least the same measure of protection as the existing standard.

10. West Ridge Resources, Inc.

[Docket No. M–2000–036–C]

West Ridge Resources, Inc., P.O. Box 902, Price, Utah 84501 has filed a petition to modify the application of 30 CFR 75.500(d) (permissible electric equipment)to its West Ridge Mine (I.D. No. 42–02233) located in Carbon County, Utah. The petitioner submitted this petition on March 22, 2000. This petition is a duplicate of a previously submitted petition. Therefore, the petitioner has rescinded this petition.

11. National Gypsum Company

[Docket No. M–2000–001–M]

National Gypsum Company, 2550 M Street, NW, Washington, DC 20037 has filed a petition to modify the application of 30 CFR 56.11001 (safe access) to its Kaufman-George Pit (I.D. No. 13–01615) located in Webster County, Iowa. The petitioner requests a modification of the standard to: permit the equipment operator to move between two parked pieces of mobile equipment provided that each piece of equipment is parked on level ground with the parking brakes engaged; the equipment operator has ensured that the pieces of equipment are no further than 36 inches apart; and the equipment operator uses the equipment's platforms, handholds, and foot supports to maintain three-point contact at all times when moving between the pieces of equipment. The petitioner asserts that application of the existing standard would result in a diminution of safety and that the proposed alternative method would provide equivalent or superior protection as the existing standard.

12. Original Sixteen to One Mine, Inc.

[Docket No. M–2000–002–M]

Original Sixteen to One Mine, Inc., P.O. Box 1621, Alleghany, California 95910 has filed a petition to modify the application of 30 CFR 57.11059 (respirable atmosphere for hoist operators underground) to its Sixteen to One Mine (I.D. No. 04–01299) located in Sierra County, California. The petitioner requests a modification of the standard to permit continued use of its ''permissible combination self-contained breathing apparatus (SCBA) and pressure demand Type C supplied air respirator'' (MSHA approved TC–13F–146 issued 4–13–88 and NIOSH approved). The petitioner states that in the interest of the health and safety of the hoist operator and miners, an exemption from the standard would allow the equipment to be used without modification, and continue to meet safety standards specific to the Sixteen to One Mine. The petitioner asserts that the proposed alternative method would provide at least the same measure of protection as the existing standard and that application of the existing standard would result in a diminution of safety to the miners.

Request for Comments

Persons interested in these petitions are encouraged to submit comments via e-mail to ''comments@msha.gov,'' or on a computer disk along with an original hard copy to the Office of Standards, Regulations, and Variances, Mine Safety and Health Administration, 4015 Wilson Boulevard, Room 627, Arlington, Virginia 22203. All comments must be postmarked or received in that office on or before June 19, 2000. Copies of these petitions are available for inspection at that address.

Dated: May 8, 2000.

Carol J. Jones,

Director, Office of Standards, Regulations, and Variances.

[FR Doc. 00–12529 Filed 5–17–00; 8:45 am]

BILLING CODE 4510–43–P

NATIONAL ARCHIVES AND RECORDS ADMINISTRATION

Nixon Presidential Historical Materials; Opening of Materials

AGENCY: National Archives and Records Administration (NARA).

ACTION: Notice of opening of materials.

SUMMARY: This notice announces the opening of additional files from the Nixon Presidential historical materials. Notice is hereby given that, in accordance with section 104 of Title I of the Presidential Recordings and Materials Preservation Act (''PRMPA'', 44 U.S. C. 2111 note) and 1275.42(b) of the PRMPA Regulations implementing the Act (36 CFR part 1275), NARA has identified, inventoried, and prepared for public access integral file segments

among the Nixon Presidential historical materials. In addition, NARA is preparing for public access approximately 400 pages of documents among the Nixon Presidential materials that are responsive to a February 1, 1999 interagency memo from the National Security Council (NSC) to declassify and release documents concerning human rights abuses in Chile from 1968–1991.

DATES: Except with respect to the materials responsive to the NSC memo on Chile, NARA intends to make these materials described in this notice available to the public beginning June 30, 2000. In accordance with 36 CFR 1275.44, any person who believes it necessary to file a claim of legal right or privilege concerning access to these materials must notify the Archivist of the United States in writing of the claimed right, privilege, or defense before June 19, 2000. The Chile material will be released no sooner than 30 days after the date of publication, at times determined by the NSC.

ADDRESSES: The materials will be made available to the public at the National Archives at College Park research room, located at 8601 Adelphi Road, College Park, Maryland beginning at 8:45 a.m. on June 30, 2000. Researchers must have a NARA researcher card, which they may obtain when they arrive at the facility.

Petitions asserting a legal or constitutional right or privilege which would prevent or limit access must be sent to the Archivist of the United States, National Archives at College Park, 8601 Adelphi Road, College Park, Maryland 20740–6001.

FOR FURTHER INFORMATION CONTACT: Karl Weissenbach, Director, Nixon Presidential Materials Staff, 301–713–6950.

SUPPLEMENTARY INFORMATION: The integral file segments of textual materials to be opened on June 30, 2000, consist of 4 cubic feet.

The White House Central Files Unit is a permanent organization within the White House complex that maintains a central filing and retrieval system for the records of the President and his staff. Some of the materials are from the White House Central Files, Subject Files. The Subject Files are based on an alphanumerical file scheme of 61 primary categories. Listed below are the integral file segments from the White House Central Files, Subject Files in this opening.

Subject Category: Volume: 3 cubic feet.
Federal Government (FG):

FG 66 Administrative Conference of the United States
FG 70 Advisory Commission on Postal Distribution Service
FG 71 Advisory Council on Historic Preservation
FG 73 American Battle Monuments Commission
FG 74 American Red Cross
FG 91 Commission on Executive, Legislative, and Judicial Salaries
FG 92 Commission on Fine Arts
FG 96 Commission on Presidential Scholars
FG 97 Commission to Study Mortgage Interest Rates
FG 98 Commission on Economic Development
FG 99 Committee on Population and Family Planning

Public access to some of the items in the file segments listed in this notice will be restricted as outlined in 36 CFR 1275.50 or 1275.52 (Public Access Regulations).

In response to the February 1, 1999, interagency memo from the National Security Council, documents concerning human rights abuses located among the Nixon Presidential materials previously classified will be made available at times determined by the NSC.

Additionally, other documents which were previously withheld from public access have been reviewed and/ or declassified under the Mandatory Review provisions of Executive Order 12958 and will be made available.

Previously restricted materials: Volume: 1 cubic feet.

Dated: May 12, 2000.

John W. Carlin,

Archivist of the United States.

[FR Doc. 00–12493 Filed 5–17–00; 8:45 am]

BILLING CODE 7515–01–P

NATIONAL SCIENCE FOUNDATION

Special Emphasis Panel in Bioengineering and Environmental Systems; Notice of Meeting

In accordance with the Federal Advisory Committee Act, Pub. L 92–463, as amended, the National Science Foundation announces the following meeting:

Name: Special Emphasis Panel in Bioengineering and Environmental Systems (1189).

Date/Time: June 8–9, 2000; 8 am–5 pm.

Place: Room 120, National Science Foundation, 4201 Wilson Blvd., Arlington, VA.

Type of Meeting: Closed.

Contact Person: Fred G. Heineken, Program, Director, Division of Bioengineering and Environmental Systems, NSF, 4201 Wilson Blvd., Arlington, VA 22230. (703) 306–1318.

Agenda: To review and evaluate proposals as part of the selection process for awards.

Purpose of Meeting: To review and evaluate Biochemical Eng./Biotechnology POWRE + Large proposals as part of the selection process for awards.

Reason for Closing: The proposals being reviewed include information of a proprietary or confidential nature, including technical information; financial data, such as salaries; and personal information concerning individuals associated with the proposals. These matters are exempt under 5 U.S.C. 552b(c), (4) and (6) of the Government in the Sunshine Act.

Dated: May 12, 2000.

Karen J. York,

Committee Management Officer.

[FR Doc. 00–12458 Filed 5–17–00; 8:45 am]

BILLING CODE 7555–01–M

NATIONAL SCIENCE FOUNDATION

Special Emphasis Panel in Civil and Mechanical Systems; Notice of Meeting

In accordance with the Federal Advisory Committee Act (Pub. L. 92–463, as amended), the National Science Foundation announces the following meeting:

Name: Special Emphasis Panel in Civil and Mechanical Systems (1205).

Date and Time: June 14, 2000 and June 15, 2000, 8 a.m. to 5 p.m.

Place: NSF, 4201 Wilson Boulevard, Room 580, Arlington, Virginia 22230.

Type of Meeting: Closed.

Contact Person: Dr. Joy Paushcke, Program Director, National Earthquake Engineering Simulation Program, Room 545, 4201 Wilson Boulevard, Arlington, VA (703) 306–1361.

Purpose of Meeting: To provide advice and recommendations concerning proposals submitted to NSF for financial support.

Agenda: To review and evaluate nominations for the FY'00 National Earthquake Engineering Simulation Review Panel proposals as part of the selection process for awards.

Reason for Closing: The proposals being reviewed include information of a proprietary or confidential nature, including technical information; financial data, such as salaries and personal information concerning individuals associated with the proposals. These matters are exempt under 5 U.S.C. 552b(c), (4) and (6) of the Government in the Sunshine Act.

Dated: May 12, 2000.

Karen J. York,

Committee Management Officer.

[FR Doc. 00–12456 Filed 5–17–00; 8:45 am]

BILLING CODE 7555–01–M

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NATIONAL SCIENCE FOUNDATION

Special Emphasis Panel in Design, Manufacture, and Industrial Innovation; Notice of Meeting

In accordance with the Federal Advisory Committee Act (Pub. L. 92–463, as amended), the National Science Foundation announces the following meeting:

Name: Special Emphasis Panel in Design, manufacture, and Industrial Innovation—(1194).

Date and Time: June 5–8, and June 13–14, 2000, 8 am–5:30 pm.

Place: National Science Foundation, 4201 Wilson Boulevard, Arlington, VA.

Type of Meeting: Closed.

Contact Person: Dr. Kamalakar Rajurkar, Program Director, Manufacturing Machines, and Equipment, (703) 306–1330, National Science Foundation, 4201 Wilson Boulevard, Arlington, VA 22230.

Purpose of Meeting: To provide advice and recommendations concerning proposals submitted to NSF for financial support.

Agenda: To review and evaluate Unsolicited proposals as part of the selection process for awards.

Reason for Closing: The proposals being reviewed include information of proprietary or confidential nature, including technical information, financial data such as salaries, and personal information concerning individuals associated with the proposals. These matters that are exempt under 5 U.S.C. 522b(c)(4) and (6) of the Government in the Sunshine Act.

Dated: May 12, 2000.

Karen J. York,

Committee Management Officer.

[FR Doc. 00–12447 Filed 5–17–00; 8:45 am]

BILLING CODE 7555–01–M

NATIONAL SCIENCE FOUNDATION

Special Emphasis Panel in Electrical and Communications Systems; Notice of Meeting

In accordance with the Federal Advisory Committee Act (Pub. L. 92–463, as amended), the National Science Foundation announces the following meetings of the Special Emphasis Panel in Electrical and Communications Systems (1196):

Date and Time: May 23, 2000, 8:30 am to 5 pm.

Place: Room 580, National Science Foundation, 4201 Wilson Blvd., Arlington, VA.

Type of Meeting: Closed.

Contact Person: Dr. Paul Werbos, Program Director, Control, Networks, and Computational Intelligence, Division of Electrical and Communications Systems, National Science Foundation, 4201 Wilson Blvd., Arlington, VA 22230. Telephone: (703) 306–1339.

Agenda: To review and evaluate CNCI proposals submitted to the Division as part of the selection process for awards.

Date and Time: June 1–2, 2000, 8:30 am to 5 pm.

Place: Room 580, National Science Foundation, 4201 Wilson Blvd., Arlington, VA.

Type of Meeting: Closed.

Contact Person: Dr. James Mink, Program Director, Electronics, Phonics, and Device Technologies, Division of Electrical and Communications Systems, National Science Foundation, 4201 Wilson Blvd., Arlington, VA 22230. Telephone: (703) 306–1339.

Agenda: To review and evaluate EPDT proposals submitted to the Division as part of the selection process for awards.

Purpose of Meetings: To provide advice and recommendations concerning proposals submitted to NSF for financial support.

Reason for Closing: The proposals being viewed include information of a proprietary or confidential nature, including technical information; financial data, such as salaries; and personal information concerning individuals associated with the proposals. These matters are exempt under 5 U.S.C. 552b(c), (4) and (6) of the Government in the Sunshine Act.

Dated: May 12, 2000.

Karen J. York,

Committee Management Officer.

[FR Doc. 00–12455 Filed 5–17–00; 8:45 am]

BILLING CODE 7555–01–M

NATIONAL SCIENCE FOUNDATION

Special Emphasis Panel in Electrical and Communications Systems; Notice of Meeting

In accordance with the Federal Advisory Committee Act (Pub. L. 92–463, as amended), the National Science Foundation announces the following meeting:

Name: Special Emphasis Panel in Electrical and Communications Systems (1196).

Date and Time: June 8–9, 2000—8:30 a.m. to 5:00 p.m.

Place: National Science Foundation, Room 580, 4201 Wilson Boulevard, Arlington, VA 22230.

Type of Meeting: Closed.

Contact Persons: Dr. Usha Varshney, Program Director, Electronic, Photonics and Device Technologies (EPDT), Division of Electrical and Communications Systems, National Science Foundation, 4201 Wilson Boulevard, Room 675, Arlington, VA 22230, Telephone: (703) 306–1339.

Purpose: To provide advice and recommendations concerning proposals submitted to NSF for financial support.

Agenda: To review and evaluate research proposals in the Electronics, Photonics and Device Technologies program as part of the selection process for awards.

Reason for Closing: The proposals being reviewed include information of a proprietary or confidential nature, including technical information; financial data, such as salaries; and personal information concerning individuals associated with the proposals. These matters are within exemptions 4 and 6 of 5 U.S.C. 552 b. (c), (4) and (6) the Government in the Sunshine Act.

Dated: May 12, 2000.

Karen J. York,

Committee Management Officer.

[FR Doc. 00–12457 Filed 5–17–00; 8:45 am]

BILLING CODE 7555–01–M

NATIONAL SCIENCE FOUNDATION

Special Emphasis Panel in Experimental & Integrative Activities; Notice of Meeting

In accordance with the Federal Advisory Committee Act (Pub. L. 92–463, as amended), the National Science Foundation announces the following meeting:

Name: Special Emphasis Panel in Experimental & Integrative Activities (1193).

Date and Time: June 29, 2000, 8 a.m.–5:30 p.m.

Place: Room 1235 and 530, National Science Foundation, 4201 Wilson Boulevard, Arlington, VA 22230.

Type of Meeting: Closed.

Contact Person: Dr. Anthony Maddox, CISE Educational Innovation, Experimental and Integrative Activities, Room 1160, National Science Foundation, 4201 Wilson Boulevard, Arlington, VA 22230, Telephone: (703) 306–1981.

Purpose of Meeting: To provide advice and recommendations concerning proposals submitted to the National Science Foundation for financial support.

Agenda: To review and evaluate CISE Educational Innovation proposals submitted in response to the program announcement (NSF) 00–33).

Reason for Closing: The proposals being reviewed include information of a proprietary or confidential nature, including technical information; financial data, such as salaries; and personal information concerning individuals associated with the proposals. These matters are exempt under 5 U.S.C. 522b(c), (4) and (6) of the Government in the Sunshine Act.

Dated: May 12, 2000.

Karen J. York,

Committee Management Officer.

[FR Doc. 00–12448 Filed 5–17–00; 8:45 am]

BILLING CODE 7555–01–M

NATIONAL SCIENCE FOUNDATION

Special Emphasis Panel in Experimental & Integrative Activities; Notice of Meeting

In accordance with the Federal Advisory Committee Act (Pub. L. 92–463, as amended), the National Science

Foundation announces the following meeting:

Name: Special Emphasis Panel in Experimental & Integrative Activities (1193).

Date and Time: July 24, 2000, 8 am–5 pm.

Place: Room 310, National Science Foundation, 4201 Wilson Blvd., Arlington, VA.

Type of Meeting: Closed.

Contact Person: Dr. Caroline Wardle, Information Technology Workforce, Experimental and Integrative Activities, Room 1160, National Science Foundation, 4201 Wilson Boulevard, Arlington, VA 22230. Telephone: (703) 306–1981.

Purpose of Meeting: To provide advice and recommendations concerning proposals submitted to the National Science Foundation for financial support.

Agenda: To review and evaluate information Technology Workforce proposals submitted in response to the program announcement (NSF 00–77).

Reason for Closing: The proposals being reviewed include information of a proprietary or confidential nature, including technical information, financial data, such as salaries; and personal information concerning individuals associated with the proposals. These matters are exempt under 5 U.S.C. 522b(c) (4) and (6) of the Government in the Sunshine Act.

Dated: May 12, 2000.

Karen J. York,

Committee Management Officer.

[FR Doc. 00–12453 Filed 5–17–00; 8:45 am]

BILLING CODE 7555–01–M

NATIONAL SCIENCE FOUNDATION

Advisory Panel for Genetics; Notice of Meeting

In accordance with the Federal Advisory Committee Act (Pub. L. 92–463, as amended), the National Science announces the following meeting.

Name: Advisory Panel for Genetics (1149) (Panel C).

Date and Time: Monday & Tuesday, June 5–6, 2000, 9 A.M.—5 P.M.

Place: National Science Foundation, 4201 Wilson Blvd., Room 320, Arlington, VA.

Type of Meeting: Closed.

Contact Person: Dr. Philip Harriman, Program Director, (703) 306–1439, Program Director for Microbial Observatories, Room 655, National Science Foundation, 4201 Wilson Boulevard, Arlington, VA 22230.

Purpose of Meeting: To provide advice and recommendations concerning proposals submitted to NSF for financial support.

Agenda: To review and evaluate research proposals submitted to the Microbial Observatories Program as part of the selection process for awards.

Reason for Closing: The proposals being reviewed include information of a proprietary or confidential nature, including technical information, financial data, such as salaries; and personal information concerning individuals associated with the proposals. These matters are exempt under 5 U.S.C. 552b(c), (4) and (6) of the Government in the Sunshine Act.

Dated: May 12, 2000.

Karen J. York,

Committee Management Officer.

[FR Doc. 00–12452 Filed 5–17–00; 8:45 am]

BILLING CODE 7555–01–M

NATIONAL SCIENCE FOUNDATION

Special Emphasis Panel in Geosciences; Notice of Meeting

In accordance with the Federal Advisory Committee Act (Public Law 92–463, as amended), the National Science Foundation announces the following meeting:

Name: Special Emphasis Panel in Geosciences (1756).

Date & Time: June 5–6, 2000, 8 A.M.

Place: Room 730, National Science Foundation, 4201 Wilson Boulevard, Arlington, VA 22230.

Type of Meeting: Closed.

Contact Person: Dr. Michael Mayhew, Program Director, Education and Human Resources Program, Division of Earth Sciences, Room 785, National Science Foundation, Arlington, VA 22230, (703) 306–1557.

Purpose of Meeting: To provide advice and recommendations concerning proposals submitted to NSF for financial support.

Agenda: To review and evaluate proposals submitted to the Geoscience Education Panel, as part of the selection process for awards.

Reason for Closing: The proposals being reviewed include information of a proprietary or confidential nature, including technical information; financial data, such as salaries; and personal information concerning individuals associated with proposals. These matters are exempt under 5 U.S.C. 552b(c), (4) and (6) of the Government in the Sunshine Act.

Dated: May 12, 2000.

Karen J. York,

Committee Management Officer.

[FR Doc. 00–12449 Filed 5–17–00; 8:45 am]

BILLING CODE 7555–01–M

NATIONAL SCIENCE FOUNDATION

Special Emphasis Panel in Information and Intelligent Systems; Notice of Meeting.

In accordance with the Federal Advisory Committee Act (Pub. L. 92–463, as amended), the National Science Foundation announces the following meeting.

Name: Special Emphasis Panel in Information and Intelligent Systems (#1200).

Dates of meetings	Locations
June 1–2, 2000.	National Science Foundation, Arlington, VA.
June 5–6, 2000.	National Science Foundation, Arlington, VA.

Type of Meeting: Closed.

Contact Persons: Michael Lesk and Richard Hilderbrandt, Division of Information and Intelligent Systems, Room 1115, National Science Foundation, 4201 Wilson Blvd., Arlington, VA 22230, Telephone: (703) 306–1930.

Minutes: May be obtained from the contact person listed above.

Purpose of Meeting: To provide advice and recommendations concerning proposals submitted to NSF for financial support.

Agenda: To review and evaluate Information Technology Research (ITR) proposals submitted to the Information Technology Research Program as part of the selection process for awards.

Reason for Closing: The proposals being reviewed include information of a proprietary or confidential nature, including technical information; financial data, such as salaries; and personal information concerning individuals associated with the proposals. These matters are exempt under 5 U.S.C. 552b(c), (4) and (6) of the Government in Sunshine Act.

Dated: May 12, 2000.

Karen J. York,

Committee Management Officer.

[FR Doc. 00–12450 Filed 5–17–00; 8:45 am]

BILLING CODE 7555–01–M

NATIONAL SCIENCE FOUNDATION

Committee of Visitors; Special Emphasis Panel in Integrative Activities; Notice of Meeting

In accordance with the Federal Advisory Committee Act (Pub. L. 92–463, as amended), the National Science Foundation announces the following meeting:

Name: Committee of Visitors, Special Emphasis Panel in Integrative Activities (1373).

Date and Time: June 14–15, 2000; 8:30 a.m.–5 p.m.; June 16, 2000; 8:30 a.m.–12 p.m.

Place: Room 390, National Science Foundation, 4201 Wilson Blvd., Arlington, VA.

Type of Meeting: Part-Open.

Agenda:

008578

Dates	Meeting times	Type of session	Agenda topic
6/14	8:30–11:00	Open	Program overview.
	11:00–5:00	Closed	Review of proposals, proposal processing.
6/15	8:30–5:00	Closed	Review of proposals, proposal processing.
6/16	8:30–11:00	Closed	Review of proposals, proposal processing.
	11:00–12:00	Open	Presentation of Findings.

Contact: Joseph F. Burt, Office of Integrative Activities, Room 1270, National Science Foundation, 4201 Wilson Blvd., Arlington, VA 22230, (703) 306–1040.

Purpose of Meeting: The Committee of Visitors for the Major Research Instrumentation Program (MRI) will meet to conduct a review of the process by which MRI proposals are reviewed and the outcomes achieved by funded MRI projects.

Reason for Closing: During clsoed sessions, the Committee of Visitors will examine proposals that include information of a proprietary or confidential nature, including technical information; financial data, such as salaries; and personal information concerning individuals associated with the proposals. These matters are exempt under 5 U.S.C. 552b(c), (4) and (6) of the Government in the Sunshine Act.

Dated: May 12, 2000.

Karen J. York,

Committee Management Officer.

[FR Doc. 00–12451 Filed 5–17–00; 8:45 am]

BILLING CODE 7555–01–M

NATIONAL SCIENCE FOUNDATION

Special Emphasis Panel in Physics; Notice of Meeting

In accordance with the Federal Advisory Committee Act (Pub. L. 92–463, as amended), the National Foundation announces the following meeting.

Name: Special Emphasis Panel in Physics (1208.

Date and Time: July 10–12, 2000 from 8 am to 5 pm.

Place: Laboratori Nazionali del Gran Sasso (LNGS) I–67010 Asergi (L'Aquila) Italy.

Type of Meeting: Closed.

Contact Person: Dr. Bradley D. Keister, Program Director for Nuclear Physics, Room 1015N, National Science Foundation, 4201 Wilson Blvd, Arlington, VA 22230. (703) 306–1891.

Purpose of Meeting: To provide advice and recommendations concerning the development and construction of the Borexino Solar neutrino detector.

Agenda: To hear presentations and write recommendations concerning the development and construction of the Borexino Solar neutrino detector.

Reason for Closing: The proposals being reviewed include information of a proprietary of confidential nature, including technical information; information on personnel and proprietary data for present and future subcontracts. These matters are exempt under 5 U.S.C. 552b(c), (4) and (6) of the Government in the Sunshine Act.

Dated: May 12, 2000.

Karen J. York,

Committee Management Officer.

[FR Doc. 00–12459 Filed 5–17–00; 8:45 am]

BILLING CODE 7555–01–M

NATIONAL SCIENCE FOUNDATION

Special Emphasis Panel in Physics; Notice of Meeting

In accordance with the Federal Advisory Committee Act (Pub. L. 92–463, as amended), the National Science Foundation announces the following meeting.

Name: Special Emphasis Panel in Physics (1208).

Date and Time: June 9, 2000 from 8:00 a.m. to 5:00 p.m.

Place: Department of Physics, Princeton University.

Type of Meeting: Closed.

Contact Person: Dr. Bradley D. Keister, Program Director for Nuclear Physics, Room 1015N, National Science Foundation, 4201 Wilson Blvd, Arlington, VA 22230, (703) 306–1891.

Purpose of Meeting: To provide advice and recommendations concerning the activities of the Princeton group in the development and Construction of the Borexino Solar neutrino detector.

Agenda: To hear presentations and write recommendations concerning the activities of the Princeton group development and Construction of the Borexino Solar neutrino detector.

Reason for Closing: The proposals being reviewed include information of a proprietary or Confidential nature, including technical information; information on personnel and proprietary data for Present and future subcontracts. These matters are exempt under 5 U.S.C. 552b(c), (4) and (6) of the Government in the Sunshine Act.

Dated: May 12, 2000.

Karen J. York,

Committee Management Officer.

[FR Doc. 00–12460 Filed 5–17–00; 8:45 am]

BILLING CODE 7555–01–M

NATIONAL SCIENCE FOUNDATION

Special Emphasis Panel in Research, Evaluation and Communication; Notice of Meeting

In accordance with the Federal Advisory Committee Act (Pub. L. 92–463, as amended), the National Science Foundation announces the following meeting:

Name: Research, Evaluation and Communication (1210).

Date/Time: June 26, 2000—Rooms 380 & 390 (8am–6pm)

June 27, 2000—Rooms 380 & 390 (8am–6pm)

July 13, 2000—Rooms 380 & 390 (8am–6pm)

July 14, 2000—Rooms 380 & 390 (8am–6pm)

Place: National Science Foundation, 4201 Wilson Boulevard, Arlington, VA 22230.

Type of Meeting: Closed.

Contact Person: Elizabeth VanderPutten, Program Director, Research Evaluation and Communications Division National Science Foundation, Room 855, 4201 Wilson Boulevard, Arlington, VA 22230. (703) 306–1650.

Purpose of Meeting: To provide advice and recommendations concerning proposals submitted to NSF for financial support.

Agenda: To review and evaluate ROLE Proposals as part of the selection process for awards.

Reason for Closing: The proposals being reviewed include information of a proprietary or confidential nature, including technical information; financial data, such as salaries; and personal information concerning individuals associated with the proposals. These matters are exempt under 5 U.S.C. 552b(c), (4) and(6) of the Government in the Sunshine Act.

Dated: May 12, 2000.

Karen J. York,

Committee Management Officer.

[FR Doc. 00–12446 Filed 5–17–00; 8:45 am]

BILLING CODE 7555–01–M

NATIONAL SCIENCE FOUNDATION

U.S. National Assessment Synthesis Team; Notice of Meeting

In accordance with the Federal Advisory Committee Act (Public Law 92–463, as amended), the National

Science Foundation announces the following meeting.

Name: U.S. National Assessment Synthesis Team (#5219).

Date and Time: May 31, 2000, 8:30 a.m.–5:30 p.m., June 1, 2000, 8:30 a.m.–3:30 p.m.

Place: Renaissance Hotel, 999 Ninth Street, NW, Washington DC 20001.

Type of Meeting: Open.

Contact Person: Dr. Thomas Spence, National Science Foundation, 4201 Wilson Blvd., Suite 705, Arlington, VA 22230. Tel. 703–306–1502; Fax: 703–306–0372; E-mail: tspence@nsf.gov. Interested persons should contact Ms. Susan Henson at the above number as soon as possible to ensure space provisions are made for all participants and observers.

Minutes: May be obtained subsequent to the meeting from the contact person listed above.

Purpose of Meeting: To review preparation of the report the National Assessment Synthesis Team is preparing for the interagency Subcommittee on Global Change Research to report on the findings of the National Assessment of the potential consequences of climate variability and climate change for the United States.

Agenda: Day 1 (May 31): Members will review technical comments received and will discuss revisions to report; and opportunity for public comment will be provided in later afternoon. Day 2 (June 1): Discussion of technical comments and revisions will continue.

Dated: May 12, 2000.

Karen J. York,

Committee Management Officer.

[FR Doc. 00–12454 Filed 5–17–00; 8:45 am]

BILLING CODE 7555–01–M

NATIONAL TRANSPORTATION SAFETY BOARD

Sunshine Act Meeting Notice

"FEDERAL REGISTER" CITATION OF PREVIOUS ANNOUNCEMENT: Vol. 65, No. 90/Tuesday, May 9, 2000.

PREVIOUSLY ANNOUNCED TIME AND DATE: 9:30 a.m., Tuesday, May 16, 2000.

CHANGE IN MEETING: A majority of the Board Members determined by recorded vote that the business of the Board required moving the Board Meeting date from Tuesday, May 16, 2000 to Wednesday, May 17, 2000 at this time and that no earlier announcement was possible.

FOR MORE INFORMATION CONTACT: Rhonda Underwood, (202) 314–6065.

Dated: May 15, 2000.

Rhonda Underwood,

Federal Register Liaison Officer.

[FR Doc. 00–12592 Filed 5–15–00; 8:45 am]

BILLING CODE 7533–01–M

NUCLEAR REGULATORY COMMISSION

[Docket No. 50–423–LA–3; ASLBP No. 00–771–01–LA]

In the Matter of Northeast Nuclear Energy Company (Millstone Nuclear Power Station, Unit No. 3; Facility Operating License NPF–49); Notice of Oral Argument and Opportunity for Oral Limited Appearance Statements

May 12, 2000.

This proceeding involves the proposed increase in capacity (through the addition of high-density storage racks) of the spent fuel storage pool of the Millstone Nuclear Power Station, Unit No. 3, in New London County, Connecticut. Notice is hereby given that, as described in the Atomic Safety and Licensing Board's Memorandum and Order (Schedules for Proceeding), dated April 19, 2000, the oral argument prescribed by 10 CFR Part 2, Subpart K, §§ 2.1109 and 2.1113 will take place at the Richard Martin Center Auditorium, 120 Broad Street, New London, CT, on Wednesday, July 19, 2000, beginning at 9:00 a.m. To the extent necessary, the oral argument will continue on Thursday, July 20, 2000, at the same location, beginning at 9:00 a.m.

As set forth in the February 9, 2000 Notice of Hearing for this proceeding, 65 FR 7573 (Feb. 15, 2000), the Atomic Safety and Licensing Board, pursuant to 10 CFR 2.715(a), will entertain limited appearance statements from any person who is not a party to the proceeding, for the purpose of stating his or her views on the issues involved in this proceeding. Although these statements are not testimony or evidence and do not become part of the decisional record, they may assist the Licensing Board and the parties in their consideration of matters at issue in this proceeding.

Limited appearance statements may be submitted in writing at any time during this proceeding. In addition, in conjunction with the aforesaid oral argument, the Board has determined to hear oral limited appearance statements, at the Radisson Hotel, Ballroom 1 and 2, 35 Governor Winthrop Blvd., New London, Connecticut, from 7:00–9:00 p.m. on Tuesday, July 18, 2000 (or such lesser time as is necessary to accommodate speakers who are present). Further oral limited appearance statements will be heard on Thursday, July 20, 2000, at the Richard Martin Center Auditorium, for a two-hour period (or such lesser time as is necessary to accommodate speakers who are present) beginning at 9:00 a.m. or following conclusion of the oral argument, if such argument is not completed on July 19. Each oral statement may normally extend for up to approximately 5 minutes.

Written limited appearance statements, and requests to make oral statements, should be submitted to the Office of the Secretary, Rulemaking and Adjudications Staff, U.S. Nuclear Regulatory Commission, Washington, DC 20555. A copy of such statement or request should also be served on the Chairman of this Atomic Safety and Licensing Board, T–3 F23, U.S. Nuclear Regulatory Commission, Washington, DC 20555, or CXB2@nrc.gov. Those who have filed written requests to make statements will be given preference as to the time of their statements.

Documents related to this proceeding, issued prior to December 1, 1999, are available in print form for public inspection at the Commission's Public Document Room (PDR), 2120 L St. NW, Washington, DC. Documents issued subsequent to November 1, 1999 are available electronically through the Agencywide Documents Access and Management System (ADAMS), with access to the public through NRC's Internet Web site (Public Electronic Reading Room Link, <http://www.nrc.gov/NRC/ADAMS/index.html>).

For the Atomic Safety and Licensing Board.

Dated at Rockville, Maryland, May 12, 2000.

Charles Bechhoefer,

Chairman, Administrative Judge.

[FR Doc. 00–12550 Filed 5–17–00; 8:45 am]

BILLING CODE 7590–01–P

NUCLEAR REGULATORY COMMISSION

[Docket No. 50–193]

Rhode Island Atomic Energy Commission, Nuclear Research Reactor; Environmental Assessment and Finding of No Significant Impact

The U.S. Nuclear Regulatory Commission (the Commission) is considering the issuance of a license amendment to Facility Operating License No. R–95, issued to Rhode Island Atomic Energy Commission (the licensee) for operation of the Rhode Island Atomic Energy Commission Research Reactor.

Environmental Assessment

Identification of the Proposed Action

The proposed action would allow extension of the license expiration time from August 27, 2002, to November 28,

008580

2004, for the Rhode Island Atomic Energy Commission Research Reactor. By letter dated March 4, 2000, and supplement dated March 21, 2000, the licensee requested this license extension in accordance with the provisions of 10 CFR 50.90. The licensee submitted an Environmental Report with their supplement dated March 21, 2000.

Need for the Proposed Action

The proposed action is needed to allow continued operation of the Rhode Island Atomic Energy Commission Research Reactor for medical, environmental and physical science research, and development activities beyond the current term of the license.

Environmental Impact of the Proposed Action

The Rhode Island Atomic Energy Commission Research Reactor is on the Narragansett Bay Campus of the University of Rhode Island, in Narragansett, Rhode Island. The research reactor is housed in a metal and concrete building.

The Rhode Island Atomic Energy Commission Research Reactor is a moderate power (2 megawatts), pool-type research reactor. The NRC licensed the facility for operation up to 1 megawatt power level in 1964 and authorized operations up to 2 megawatts in 1968. Since 1964, the facility has operated 1625.4 megawatt-hours per year on average. The NRC ordered conversion from high-enriched to low-enriched uranium fuel in 1993. Data from recent operations, from 1995 to 1999, was assessed. The gaseous radiological release of Argon-41, the primary airborne effluent, has ranged from a high of 236.52 curies (Ci) in 1995 to a low of 50 Ci in 1999. Liquid effluents have been relatively small with the highest value in 1999 at 0.55 mCi. Low-level solid radioactive waste between 1995 and 1999 was 11.6 mCi in 56.8 cubic feet of material.

The Commission concludes that the radiological effects of the continued operation will be minimal based on past radiological releases. The radiological exposures for facility operations have been within regulatory limits. Conditions are not expected to change significantly.

As for potential non-radiological impacts, the proposed action does not involve any historic sites. It does not affect non-radiological effluents and has no other environmental impact. Therefore, no significant non-radiological environmental impacts are associated with the proposed action.

In addition, the environmental impact associated with operation of research reactors has been generically evaluated by the staff and is discussed in the attached generic evaluation. This evaluation concludes that no significant environmental impact is associated with the operation of research reactors licensed to operate at power levels up to and including 2 megawatts thermal. We have determined that this generic evaluation is applicable to operation of the Rhode Island Atomic Energy Commission Research Reactor and that there are no special or unique features that would preclude reliance on the generic evaluation.

Accordingly, the Commission concludes that there are no significant environmental impacts associated with the proposed action. The proposed action will not increase the probability or consequences of accidents, no changes are being made in the types of any effluents that may be released off site, and there is no significant increase in occupational or public radiation exposure. Therefore, there are no significant radiological environmental impacts associated with the proposed action.

Alternatives to the Proposed Action

An alternative to the proposed action for the Research Reactor Facility is to deny the application (*i.e.,* ''no action'' alternative). If the applications is denied, the licensee has indicated that it would apply for license renewal and operate under the timely renewal provisions of 10 CFR 2.109 until the Commission renewed or denied the license renewal application. With operation under timely renewal or renewal, the actual conditions of the reactor would not change. If the Commission denied license renewal, Rhode Island Atomic Energy Commission Research Reactor Operations would stop and decommissioning would be required with a likely small impact on the environment. The environmental impacts of the proposed action and alternative action are similar.

Alternative Use of Resources

This action does not involve the use of any resources not previously considered in the Hazards Analysis prepared for the issuance of the license in April 1963.

Agencies and Persons Contacted

The proposed action will not increase the probability or consequences of accidents, no changes are being made in the types of any effluents that may be released off site, and there is no significant increase in occupational or public radiation exposure. Therefore, there are no significant radiological environmental impacts associated with the proposed action.

On March 22, 2000, the staff consulted with the State of Rhode Island Division of Occupational & Radiological Health Official, Charles McMahon, regarding the environmental impact of the proposed action. The State official had no comment.

Finding of No Significant Impact

On the basis of the environmental assessment, the Commission concludes that the proposed action will not have a significant effect on the quality of the human environment. Accordingly, the NRC has determined not to prepare an environmental impact statement for the proposed action.

For further details with respect to the proposed action, see the licensee's letter dated March 4, 2000, and supplement dated March 21, 2000, which is available for public inspection at the Commission's Public Document Room, the Gelman Building, 2120 L Street, NW., Washington, DC 20555.

Dated at Rockville, Maryland, this 5th day of April 2000.

For the Nuclear Regulatory Commission.

Ledyard B. Marsh,

Chief, Events Assessment, Generic Communications, and Non-Power Reactors Branch, Division of Regulatory Improvement Programs, Office of Nuclear Reactor Regulation.

Attachment—Environmental Considerations Regarding the Licensing of Research Reactors and Critical Facilities

Introduction

This discussion deals with research reactors and critical facilities which are designed to operate at low power levels, 2 MWt and lower, and are used primarily for basic research in neutron physics, neutron radiography, isotope production, experiments associated with nuclear engineering, training and as a part of a nuclear physics curriculum. Operation of such facilities will generally not exceed a 5-day week, 8-hour day, or about 2000 hours per year. Such reactors are located adjacent to technical service support facilities with convenient access for students and faculty.

Sited most frequently on the campuses of large universities, the reactors are usually housed in already existing structures, appropriately modified, or placed in new buildings that are designed and constructed to blend in with existing facilities. However, the environmental considerations discussed herein are not limited to those which are part of universities.

Facility

There are no exterior conduits, pipelines, electrical or mechanical structures or transmission lines attached to or adjacent to the facility other than for utility services, which are similar to those required in other

similar facilities, specifically laboratories. Heat dissipation is generally accomplished by use of a cooling tower located on the roof of the building. These cooling towers typically are on the order of 10′ × 10′ × 10′ and are comparable to cooling towers associated with the air-conditioning systems of large office buildings.

Make-up for the cooling system is readily available and usually obtained from the local water supply. Radioactive gaseous effluents are limited to Ar-41 and the release of radioactive liquid effluents can be carefully monitored and controlled. Liquid wastes are collected in storage tanks to allow for decay and monitoring prior to dilution and release to the sanitary sewer system. Solid radioactive wastes are packaged and shipped offsite for storage at NRC-approved sites. The transportation of such waste is done in accordance with existing NRC–DOT regulations in approved shipping containers.

Chemical and sanitary waste systems are similar to those existing at other similar laboratories and buildings.

Environmental Effects of Site Preparation and Facility Construction

Construction of such facilities invariably occurs in areas that have already been disturbed by other building construction and, in some cases, solely within an already existing building. Therefore, construction would not be expected to have any significant effect on the terrain, vegetation, wildlife or nearby waters or aquatic life. The societal, economic and aesthetic impacts of construction would be no greater than those associated with the construction of a large office building or similar research facility.

Environmental Effects of Facility Operation

Release of thermal effluents from a reactor of less than 2 MWt will not have a significant effect on the environment. This small amount of waste heat is generally rejected to the atmosphere by means of small cooling towers. Extensive drift and/or fog will not occur at this low power level.

Release of routine gaseous effluents can be limited to Ar-41, which Is generated by neutron activation of air. Even this will be kept as low as practicable by using gases other than air for supporting experiments. Yearly doses to un-restricted areas will be at or below established guidelines in 10 CFR part 20 limits. Routine releases of radioactive liquid effluents can be carefully monitored and controlled in a manner that will ensure compliance with current standards. Solid radioactive wastes will be shipped to an authorized disposal site in approved containers. These wastes should not require more than a few shipping containers a year.

Based on experience with other research reactors, specifically TRIGA reactors operating in the 1 to 2 MWt range, the annual release of gaseous and liquid effluents to unrestricted areas should be less than 30 curies and 0.01 curies, respectively.

No release of potentially harmful chemical substances will occur during normal operation. Small amounts of chemicals and/or high-solid content water may be released from the facility through the sanitary sewer during periodic blowdown of the cooling tower or from laboratory experiments.

Other potential effects of the facility, such as aesthetics, noise, societal or impact on local flora and fauna are expected to be too small to measure.

Environmental Effects of Accidents

Accidents ranging from the failure of experiments up to the largest core damage and fission product release considered possible result in doses that are less than 10 CFR part 20 guidelines and are considered negligible with respect to the environment.

Unavoidable Effects of Facility Construction and Operation

The unavoidable effects of construction and operation involve the materials used in construction that cannot be recovered and the fissionable material used in the reactor. No adverse impact on the environment is expected from either of these unavoidable effects.

Alternatives to Construction and Operation of the Facility

To accomplish the objectives associated with research reactors, there are no suitable alternatives. Some of these objectives are training of students in the operation of reactors, production of radioisotopes, and use of neutron and gamma ray beams to conduct experiments.

Long-Term Effects of Facility Construction and Operation

The long-tern effects of research facilities are considered to be beneficial as a result of the contribution to scientific knowledge and training. Because of the relatively small amount of capital resources involved and the small impact on the environment, very little irreversible and irretrievable commitment is associated with such facilities.

Costs and Benefits of Facility Alternatives

The costs are on the order of several millions of dollars with very little environmental impact. The benefits include, but are not limited to, some combination of the following: conduct of activation analyses, conduct of neutron radiography, training of operating personnel, and education of students. Some of these activities could be conducted using particle accelerators or radioactive sources which would be more costly and less efficient. There is no reasonable alternative to a nuclear research reactor for conducting this spectrum of activities.

Conclusion

The staff concludes that there will be no significant environmental impact associated with the licensing of research reactors or critical facilities designed to operate at power levels of 2 MWt or lower and that no environmental impact statements are required to be written for the issuance of construction permits or operating licenses for such facilities.

[FR Doc. 00–12554 Filed 5–17–00; 8:45 am]

BILLING CODE 7590–01–P

NUCLEAR REGULATORY COMMISSION

Experts' Meeting on High-Burnup Fuel Behavior Under Postulated Accident Conditions

AGENCY: Nuclear Regulatory Commission.

ACTION: Notice of meeting.

SUMMARY: The Nuclear Regulatory Commission will hold a meeting to further develop a Phenomena Identification and Ranking Table (PIRT) for fuel rod response to loss of coolant accidents (LOCAs). PIRTs have been used at NRC since 1988, and they provide a structured way to obtain a technical understanding that is needed to address certain issues. About twenty of the world's best technical experts are participating in this activity, and the experts represent a balance between industry, universities, foreign researchers, and regulatory organizations. The current PIRT activity is addressing postulated LOCAs in a BWR and a PWR.

DATES: May 31–June 2, 2000, 8:30 a.m.–5:30 p.m.

ADDRESSES: Room T10A1 (TWFN) of the Nuclear Regulatory Commission, 11545 Rockville Pike, Rockville, MD.

SUPPLEMENTARY INFORMATION: The meeting agenda will be posted on the NRC Web site at *http://www.nrc.gov/RES/meetings.htm* by May 25, 2000. The meeting is open to the public. Attendees will need to obtain a visitor badge at the TWFN building lobby.

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FOR FURTHER INFORMATION CONTACT: Dr. Ralph Meyer, SMSAB, Division of Systems Analysis and Regulatory Effectiveness, Office of Nuclear Regulatory Research, Washington, DC 20555–0001, telephone (301) 415–6789.

Dated at Rockville, Maryland, this 12th day of May 2000.

For the Nuclear Regulatory Commission.

Charles E. Rossi,

Director, Division of Systems Analysis and Regulatory Effectiveness, Office of Nuclear Regulatory Research.

[FR Doc. 00–12555 Filed 5–17–00; 8:45 am]

BILLING CODE 7590–01–P

NUCLEAR REGULATORY COMMISSION

Advisory Committee on Reactor Safeguards, Subcommittee Meeting on Severe Accident Management; Cancellation

The meeting of the ACRS Subcommittee on Severe Accident Management scheduled for May 18, 2000, in Room T–2B3, 11545 Rockville Pike, Rockville, Maryland has been canceled. Notice of this meeting was previously published in the **Federal Register** on Monday, May 8, 2000 (65 FR 26644).

Further information contact: Mr. Paul A. Boehnert, cognizant ACRS staff engineer, (telephone 301/415–8065) between 7:30 a.m. and 4:15 p.m. (EDT).

Dated: May 11, 2000.

Howard J. Larson,

Acting Associate Director for Technical Support, ACRS/ACNW.

[FR Doc. 00–12552 Filed 5–17–00; 8:45 am]

BILLING CODE 7590–01–P

NUCLEAR REGULATORY COMMISSION

Risk Analysis and Evaluation of Regulatory Options for Nuclear Byproduct Material Systems

AGENCY: Nuclear Regulatory Commission.

ACTION: Notice of availability.

SUMMARY: The Nuclear Regulatory Commission (NRC) is announcing the availability of NUREG/CR–6642, ''Risk Analysis and Evaluation of Regulatory Options for Nuclear Byproduct Material Systems,'' dated December 1999.

ADDRESSES: Copies of NUREG/CR–6642 may be obtained by writing to the Superintendent of Documents, U.S. Government Printing Office, P.O. Box 37082, Washington, DC 20402–9328. Copies are also available from the National Technical Information Service, 5285 Port Royal Road, Springfield, Virginia 22161. A copy of the document is also available for inspection and/or copying for a fee in the NRC Public Document Room, 2120 L Street, NW (Lower Level), Washington, DC 20555–0001.

FOR FURTHER INFORMATION CONTACT: Ms. Torre Taylor, Mail Stop TWFN 9-C–24, Division of Industrial and Medical Nuclear Safety, Office of Nuclear Material Safety and Safeguards, U.S. Nuclear Regulatory Commission, Washington, DC 20555, telephone: (301) 415–7900, e-mail: tmt@nrc.gov.

SUPPLEMENTARY INFORMATION: On August 25, 1999 (64 FR 46456), NRC published draft NUREG/CR–6642, ''Risk Analysis and Evaluation of Regulatory Options for Nuclear Byproduct Material Systems,'' for public comment. All comments received during the comment period were reviewed in the preparation of the final NUREG report. The final version of NUREG/CR–6642 is now available. NUREG/CR–6642 presents a detailed, comparative risk analysis of nuclear byproduct materials, organized into groups of activities or ''systems,'' such as nuclear pharmacy, pool irradiators, and industrial radiography. It also describes the methodology used in the risk analysis and provides the results of the analysis.

Electronic Access

NUREG/CR–6642 will also be available at NRC's web site under Reference Library—Technical Reports or directly at http://www.nrc.gov/NRC/NUREGS/CR6642/index.html.

Dated at Rockville, Maryland, this 10th day of March, 2000.

For the Nuclear Regulatory Commission.

Catherine Haney,

Acting Chief, Rulemaking and Guidance Branch, Division of Industrial and Medical Nuclear Safety, NMSS.

[FR Doc. 00–12553 Filed 5–17–00; 8:45 am]

BILLING CODE 7590–01–P

RAILROAD RETIREMENT BOARD

Proposed Collection; Comment Request

SUMMARY: In accordance with the requirement of Section 3506 (c)(2)(A) of the Paperwork Reduction Act of 1995 which provides opportunity for public comment on new or revised data collections, the Railroad Board (RRB) will publish periodic summaries of proposed data collections.

Comments are invited on: (a) Whether the proposed information collection is necessary for the proper performance of the functions of the agency, including whether the information has practical utility; (b) the accuracy of the RRB's estimate of the burden of the collection of the information; (c) ways to enhance the quality, utility, and clarity of the information to be collected; and (d) ways to minimize the burden related to the collection of information on respondents, including the use of automated collection techniques or other forms of information technology.

Title and purpose of information collection: Statement of Claimant or other Person: OMB 3220–0183.

To support an application for an annuity under Section 2 of the Railroad Retirement Act (RRA) or for unemployment benefits under Section 2 of the Railroad Unemployment Insurance Act (RUIA), pertinent information and proofs must be furnished for the RRB to determine benefit entitlement. Circumstances may require an applicant or other person(s) having knowledge of facts relevant to the applicant's eligibility for an annuity or benefits to provide written statements supplementing or changing statements previously provided by the applicant.

Under the railroad retirement program these statements may relate to changes in annuity beginning date(s), dates for marriage(s), birth(s), prior railroad or non-railroad employment, an applicants request for reconsideration of an unfavorable RRB eligibility determination for an annuity or various other matters. The statements may also be used by the RRB to secure a variety of information needed to determine eligibility to unemployment and sickness benefits. Procedures related to providing information needed for RRA annuity or RUIA benefit eligibility determinations are prescribed in 20 CFR parts 217 and 320 respectively.

The RRB utilizes Form G–93, Statement of Claimant or Other Person to obtain the supplemental or corrective information from applicants or persons needed to determine applicant eligibility for an RRA annuity or RUIA benefits.

The RRB proposes non-burden impacting formatting and editorial changes to Form G–93. The completion time for Form G–93 is estimated at 15 minutes per response. The RRB estimates that approximately 90 Form G–93's are received annually. Completion is voluntary. One response is requested of each respondent.

Additional Information or Comments: To request more information or to obtain a copy of the information collection justification, forms, and/or supporting material, please call the RRB Clearance Officer at (312) 751–3363. Comments regarding the information collection should be addressed to Ronald J. Hodapp, Railroad Retirement Board, 844 North Rush Street, Chicago, Illinois 60611–2092. Written comments should be received within 60 days of this notice.

Chuck Mierzwa,

Clearance Officer.

[FR Doc. 00–12531 Filed 5–17–00; 8:45 am]

BILLING CODE 7905–01–M

RAILROAD RETIREMENT BOARD

Sunshine Act Meeting

Notice of Public Meeting

The meeting of the Railroad Retirement Board which was to be held on May 17, 2000, 9 a.m., at the Board's meeting room on the 8th floor of its headquarters building, 844 North Rush Street, Chicago, Illinois, 60611, has been canceled.

The person to contact for more information is Beatrice Ezerski, Secretary to the Board. Phone No. 312–751–4920.

Dated: May 15, 2000.

Beatrice Ezerski,

Secretary to the Board.

[FR Doc. 00–12607 Filed 5–16–00; 9:50 am]

BILLING CODE 7905–01–M

SECURITIES AND EXCHANGE COMMISSION

Proposed Collection; Comment Request

Upon Written Request, Copies Available From: Securities and Exchange Commission, Office of Filings and Information Services, Washington, DC 20549.

Extension: Rule 11a–3; SEC File No. 270–321; OMB Control No. 3235–0358.

Notice is hereby given that, pursuant to the Paperwork Reduction Act of 1995 (44 U.S.C. 3501 *et seq.*) (''PRA''), the Securities and Exchange Commission (the ''Commission'') is soliciting comments on the collection of information summarized below. The Commission plans to submit this existing collection of information to the Office of Management and Budget for extension and approval.

Rule 11a–3 Under the Investment Company Act of 1940; Offers of Exchange by Open-End Investment Companies Other Than Separate Accounts

Rule 11a–3 under the Investment Company Act of 1940 [17 CFR 270.11a–3] is an exemptive rule that permits open-end investment companies (''funds''), other than insurance company separate accounts, and funds' principal underwriters, to make certain exchange offers to fund shareholders and shareholders of other funds in the same group of investment companies. The rule requires a fund, among other things: (i) To disclose in its prospectus and advertising literature the amount of any administrative or redemption fee imposed on exchange transactions, other than a nominal one, to maintain and preserve records with respect to the actual costs incurred in connection with exchanges for at least six years; and (iii) to give the fund's shareholders a sixty day notice of a termination of an exchange offer or any material amendment to the terms of an exchange offer (unless the only material effect of an amendment is to reduce or eliminate an administrative fee, sales load or redemption fee payable at the time of an exchange).

The rule's requirements are designed to protect investors against abuses associated with exchange offers, to provide fund shareholders with information necessary to evaluate exchange offers and certain material changes in the terms of exchange offers, and to enable the Commission staff to monitor funds' use of administrative fees charged in connection with exchange transactions.

It is estimated that approximately 2,900 funds may choose to rely on the rule, and each fund may spend one hour annually complying with the recordkeeping requirement and another one hour annually complying with the notice requirement. The burdens associated with the disclosure requirement of the rule are accounted for in the burdens associated with the Form N–1A registration statement for funds. The total annual burden associated with the rule thereof, is limited to the recordkeeping and notice requirements under the rule, which is estimated to be 5,800 hours. This estimate represents an increase of 800 hours over the prior estimate of 5,000 hours. This increase in burden hours is attributable to an increase in the estimated number of funds from 2,500 to 2,900. The estimate of average burden hours is made solely for the purposes of the PRA, and is not derived from a comprehensive or even a representative survey or study of the costs of Commission rules and forms.

Written comments are invited on: (a) Whether the collection of information is necessary for the proper performance of the functions of the Commission, including whether the information has practical utility; (b) the accuracy of the Commission's estimate of the burden of the collection of information; (c) ways to enhance the quality, utility, and clarity of the information collected; and (d) ways to minimize the burden of the collection of information on respondents, including through the use of automated collection techniques or other forms of information technology. Consideration will be given to comments and suggestions submitted in writing within 60 days of this publication.

Please direct your written comments to Michael E. Bartell, Associate Executive Director, Office of Information Technology, Securities and Exchange Commission, 450 5th Street, NW, Washington, DC 20549.

Dated: May 11, 2000.

Margaret H. McFarland,

Deputy Secretary.

[FR Doc. 00–12514 Filed 5–17–00; 8:45 am]

BILLING CODE 8010–01–M

008584

SECURITIES AND EXCHANGE COMMISSION

[Release No. 34–42773; File No. SR–Phlx–00–30]

Self-Regulatory Organizations; Notice of Filing and Immediate Effectiveness of Proposed Rule Change by the Philadelphia Stock Exchange, Inc. Amending the Exchange's Certificate of Incorporation

May 11, 2000.

Pursuant to Section 19(b)(1) of the Securities Exchange Act of 1934 (''Act''),[1] and Rule 19b–4 thereunder,[2] notice is hereby given that on April 10, 2000, the Philadelphia Stock Exchange, Inc. (''Phlx'' or ''Exchange'') filed with the Securities and Exchange Commission (''SEC'' or ''Commission'') the proposed rule change as described in Items I, II, III, below, which Items have been prepared by the Exchange. On May 3, 2000, the Phlx filed Amendment No. 1 to the proposed rule change.[3] The Commission is publishing this notice to solicit comments on the proposed rule change from interested persons.

I. Self-Regulatory Organization's Statement of the Terms of Substance of the Proposed Rule Change

The Phlx proposes to amend Article Twentieth of its Certificate of Incorporation to add the words ''owner'' and ''member organization'' to the text of Article Twentieth and define the term ''owner.''[4] Article Twentieth authorizes the Phlx Board of Governors (''Board'') to (1) assess fees, dues, and other charges upon members, lessors and lessees of memberships, and holders of permits as the Board may adopt by resolution or set forth in the Rules of the Board, and (2) assess penalties for failure to pay any fees, dues, or other charges owed to the Exchange, including cancellation of a membership or permit and forfeiture of all rights as a member, lessor, lessee, or holder of a permit. Under Article Twentieth the Board may delegate its powers with respect to the assessment of fees, dues, other charges, and penalties to any committee of the Board or the Chairman of the Board. Article Twentieth also provides that fees, dues, other charges, and penalties authorized under the Article are in addition to any fees, dues, other charges or penalties imposed under the By-Laws of the Phlx.

The proposed amendment to Article Twentieth adds ''owners'' and ''member organizations'' to the categories that will be subject to the Board's authority to assess fees, dues, and other charges. In addition, the amendment defines the term ''owner'' for purposes of the Phlx's Certificate of Incorporation and rules. As proposed, ''owner'' is defined as any person or entity who or which is a holder of equitable title to a membership in the Phlx.

The Exchange represents that ''owners'' and ''member organizations'' are implicitly covered under the current text of Article Twentieth; however, the Exchange believes that a direct reference to owners and member organizations will nevertheless help clarify matters relating to the interpretation of those terms. For example, a leasing agreement may expire, resulting in a situation where an owner who formerly leased its membership is not currently leasing that membership. The Exchange believes that the owner remains classified as a ''lessor'' even though the membership currently is not leased,[5] and, therefore, would be included in the current classes specified in Article Twentieth. However, the Exchange believes it is in the best interests of the members, owners and the Exchange to clarify the original intent of Article Twentieth by expanding the classes to include ''owners.''

The Exchange also believes that it is desirable to clarify that ''member organizations'' are intended to be within the scope of entities subject to fees, dues, and other charges imposed pursuant to Article Twentieth. For example, although member organizations are ''owners'' for purposes of Article Twentieth, there may be situations where the Exchange may wish to charge fees, dues, or other charges under Article Twentieth that affect certain classes of owners, such as member organizations, but not others. In such circumstances, an explicit reference to member organizations in Article Twentieth would be helpful.

II. Self-Regulatory Organization's Statement Regarding the Purpose of, and the Statutory Basis for, the Proposed Rule Change

In its filing with the Commission, the Exchange included statements concerning the purpose of and basis for the proposed rule change and discussed any comments it received on the proposed rule change. The text of these statements may be examined at the places specified in Item IV below. The Exchange has prepared summaries, set forth in sections A, B, and C below, of the most significant aspects of such statements.

A. Self-Regulatory Organization's Statement of the Purpose of, and Statutory Basis for, the Proposed Rule Change

1. Purpose

The purpose of the proposed rule change is to amend the Exchange's Certificate of Incorporation to specifically permit the Board to impose fees, dues, and other charges upon ''member organizations'' and ''owners.'' The proposed rule change clarifies the Board's authority to allocate dues, fees, and other charges among the Exchange's various constituents, thereby ensuring appropriate distribution of costs relating to maintaining and enhancing the competitive operations of the Exchange.

In addition, the amendment defines the term ''owner'' for purposes of the Exchange's Certificate of Incorporation and rules as any person or entity who or which is a holder of equitable title to a membership in the Exchange. The term ''owner'' is intended to encompass lessors and member organizations who are parties to A-B-C Agreements.[6] Lessors and member organizations that have provided all or part of the funds for the purchase of a membership pursuant to an A-B-C Agreement, are sometimes referred to in the Certificate of Incorporation and rules of the Exchange as holders of equitable title.[7] Therefore, defining the term ''owner'' as a holder of equitable title is consistent with the provisions relating to lessors and member organizations who are parties to A-B-C Agreements (both of whom are types of owners) and should

[1] 15 U.S.C. 78s(b)(1).

[2] 17 CFR 240.19b–4.

[3] *See* Letter from Cindy Hoekstra, Counsel, Phlx, to Nancy Sanow, Assistant Director, Division of Market Regulation, Commission, dated May 2, 2000 (''Amendment No. 1''). Amendment No. 1 defines the term ''owner'' for purposes of the Certificate of Incorporation. Because of the substantive nature of the amendment, the Commission deems the filing date of the proposed rule change to be the date the amendment was filed, May 3, 2000.

[4] The Commission approved the proposed rule change adopting Article Twentieth. *See* Securities Exchange Act Release No. 42317 (January 5, 2000), 65 FR 2215 (January 13, 2000) (SR–Phlx–99–48).

[5] *See e.g.,* Phlx By-Law, Article I, Section 1–1(f): ''The term 'lessor' means a holder of equitable title to a membership in the Exchange, including a former member of the Exchange, who has leased legal title to his membership to a lessee and has retained equitable title to such membership.'' *See also* Phlx Rule 17.

[6] The parties to an A-B-C Agreement are an employee, general partner, or officer, and the member organization with which such person is associated. *See* Phlx Rule 940.

[7] *See e.g.* Phlx Rules 17 and 940.

provide consistency throughout the Phlx's Certificate of Incorporation and rules.

2. Statutory Basis

For these reasons, the Exchange believes that the proposed rule change is consistent with section 6(b) of the Act [8] in general, and with Section 6(b)(4) [9] in particular in that it provides for the equitable allocation of reasonable dues, fees and other charges.

B. Self-Regulatory Organization's Statement on Burden on Competition

The Exchange believes that the proposed rule imposes no inappropriate burden on competition.

C. Self-Regulatory Organization's Statement on Comments on the Proposed Rule Change Received From Members, Participants or Others

The Exchange has neither solicited nor received written comments on the proposed rule change.

III. Date of Effectiveness of the Proposed Rule Change and Timing for Commission Action

The proposed rule change has been filed by the Exchange pursuant to Section 19(b)(3)(A) of the Act [10] and Rule 19b–4(f)(6) thereunder.[11] The Exchange represents that the proposed rule change:

''(i) Does not significantly affect the protection of investors or the public interest;

(ii) Does not impose any significant burden on competition; and

(iii) Does not become operative for 30 days after the date of the filing, or such shorter time as the Commission may designate if consistent with the protection of investors and the public interest; provided that the Exchange has given the Commission written notice of its intent to file the proposed rule change at least five business days prior to the date of filing of the proposed rule change, or such shorter time as designated by the Commission.'' [12]

The Exchange has requested that the Commission accelerate the operative date of the proposal. In addition, the Exchange provided the Commission with written notice of its intent to file the proposed rule change, along with a brief description of the proposed rule change, more than five business days prior to the date of filing the proposed rule change.

The Exchange represents that the operative date of this proposed rule change should be accelerated because the Exchange intends to implement the monthly capital funding fee on all seat owners as part of a long term financing plan.[13] Prior to implementing this fee, the Exchange wants to ensure that it is clear exactly who will be subject to the fee by amending Article Twentieth to add the two categories, ''owner'' and ''member organization,'' and defining ''owner.'' [14]

The Commission finds that it is appropriate to designate this proposal to become operative today because such designation is consistent with the protection of investors and the public interest.[15] Specifically, the Commission believes that adding the two additional categories and defining ''owner'' will clarify the original intent of Article Twentieth, and that it is appropriate to accelerate the operative date of the proposed rule change.

IV. Solicitation of Comments

Interested persons are invited to submit written data, views, and arguments concerning the foregoing, including whether the proposed rule change is consistent with the Act. Persons making written submissions should file six copies thereof with the Secretary, Securities and Exchange Commission, 450 Fifth Street, NW, Washington, DC 20549–0609. Copies of the submission, all subsequent amendments, all written statements with respect to the proposed rule change that are filed with the Commission, and all written communications relating to the proposed rule change between the Commission and any person, other than those that may be withheld from the public in accordance with the provisions of 5 U.S.C. 552, will be available for inspection and copying in the Commission's Public Reference Room, 450 Fifth Street NW, Washington DC 20549. Copies of such filing will also be available for inspection and copying at the principal office of the Phlx. All submissions should refer to File No. SR–Phlx–00–30 and should be submitted by June 8, 2000.

For the Commission, by the Division of Market Regulation, pursuant to delegated authority.[16]

Margaret H. McFarland,

Deputy Secretary.

[FR Doc. 00–12515 Filed 5–17–00; 8:45 am]

BILLING CODE 8010–01–M

[8] 15 U.S.C. 78f(b).

[9] 15 U.S.C. 78(b)(4).

[10] 15 U.S.C. 78s(b)(3)(A).

[11] 17 CFR 240.19b–4(f)(6).

[12] 17 CFR 240.19b–4(f)(6)(iii).

[13] *See* Securities Exchange Act Release No. 42714 (April 24, 2000), 65 FR 25782 (May 3, 2000).

[14] Telephone conversation between Cindy Hoekstra, Counsel, Phlx, and Marla Chidsey, Attorney, Division of Market Regulation, Commission (May 11, 2000).

[15] 17 CFR 240.19b–4(f)(6)(iii). For purposes only of accelerating the operative date of this proposal, the Commission has considered the proposed rule's impact on efficiency, competition, and capital formation. 15 U.S.C. 78c(f).

[16] 17 CFR 240.19b–4(f)(6)(iii).

DEPARTMENT OF STATE

[Public Notice #3281]

Shipping Coordinating Committee Council and Technical Cooperation Committee; Notice of Meeting

The Shipping Coordinating Committee (SHC) will conduct an open meeting at 10:30 a.m. on Thursday, 1 June 2000, in Room 6319, at U. S. Coast Guard Headquarters, 2100 Second Street, SW, Washington, DC 20593–0001. The purpose of the meeting is to finalize preparations for the 84th session of Council and the 48th Session of the Technical Cooperation Committee of the International Maritime Organization (IMO) which is scheduled for 12–16 June 2000, at the IMO Headquarters in London. Discussions will focus on papers received and draft U.S. positions.

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Among other things, the items of particular interest are:

—Reports of Committees;
—Financial Matters;
—Work Program and Budget Prospects for 2000;
—Integrated Technical Cooperation Program/Technical Cooperation Fund

Members of the public may attend these meetings up to the seating capacity of the room. Interested persons may seek information by writing: Director, International Affairs, U.S. Coast Guard Headquarters, Commandant (G–CI), Room 2114, 2100 Second Street, SW, Washington, DC 20593–0001 or by calling: (202) 267–2280.

Dated: May 5, 2000.

Stephen M. Miller,

Executive Secretary, Shipping Coordinating Committee.

[FR Doc. 00–12569 Filed 5–17–00; 8:45 am]

BILLING CODE 4710–07–U

TENNESSEE VALLEY AUTHORITY

Environmental Impact Statement—Land Between the Lakes Public Use Plan, Lyon and Trigg Countries, Kentucky and Stewart County, Tennessee

AGENCY: Tennessee Valley Authority (TVA).

ACTION: Cancellation Notice.

SUMMARY: On March 1, 1995, TVA published in the **Federal Register** (60 FR 11161–11162) a Notice of Intent (NOI) to prepare an Environmental Impact Statement (EIS) on alternatives for public use at the Land Between The Lakes (LBL) National Recreation Area. On October 1, 1999, pursuant to the Land Between The Lakes Protection Act of 1998, LBL was established as a unit of the National Forest System and administrative responsibility was transferred from TVA to the U.S. Department of Agriculture. The 1995 NOI is hereby rescinded.

FOR FURTHER INFORMATION CONTACT: Harold M. Draper, NEPA Administration, Environmental Policy and Planning, Tennessee Valley Authority, 400 West Summit Hill Drive, Knoxville, Tennessee 37902–1499; telephone (865) 632–6889 or e-mail hmdraper@tva.gov.

Dated: May 5, 2000.

Kathryn J. Jackson,

Executive Vice President, River System Operations and Environment.

[FR Doc. 00–12483 Filed 5–17–00; 8:45 am]

BILLING CODE 8120–08–M

DEPARTMENT OF TRANSPORTATION

Office of the Secretary

Aviation Proceedings, Agreements Filed During the Week of May 5, 2000

The following Agreements were filed with the Department of Transportation under the provisions of 49 U.S.C. Sections 412 and 414. Answers may be filed within 21 days after the filing of the applications.

Docket Number: OST–2000–7333.

Date Filed: May 4, 2000.

Parties: Members of the International Air Transport Association.

Subject: PTC12 NMS–ME 0105 dated 18 April 2000, North Atlantic-Middle East Resolution 002L, Special Readopting/Amending Resolution, between Canada, Mexico, USA and Middle East, Intended effective date: 31 May 2000.

Docket Number: OST–2000–7334.

Date Filed: May 4, 2000.

Parties: Members of the International Air Transport Association.

Subject: PTC12 NMS–ME 0106 dated 18 April 2000, North Atlantic-Middle East Resolutions r1–r18, PTC12 NMS–ME 0110 dated 20 April 2000 (Technical Correction), PTC12 NMS–ME 0107 dated 18 April 2000, North Atlantic-Israel Resolution r19–r37, Minutes—PTC12 NMS–ME 0109 dated 20 April 2000, Tables—PTC12 NMS–ME FARES 0057 dated 20 April 2000, Intended effective date: 1 June 2000.

Andrea M. Jenkins,

Federal Register Liaison.

[FR Doc. 00–12557 Filed 5–17–00; 8:45 am]

BILLING CODE 4910–62–P

DEPARTMENT OF TRANSPORTATION

Federal Railroad Administration

Proposed Agency Information Collection Activities; Comment Request

AGENCY: Federal Railroad Administration, DOT.

ACTION: Notice.

SUMMARY: In accordance with the Paperwork Reduction Act of 1995 and its implementing regulations, the Federal Railroad Administration (FRA) hereby announces that it is seeking renewal of the following currently approved information collection activities. Before submitting these information collection requirements for clearance by the Office of Management and Budget (OMB), FRA is soliciting public comment on specific aspects of the activities identified below.

DATES: Comments must be received no later than July 17, 2000.

ADDRESSES: Submit written comments on any or all of the following proposed activities by mail to either: Mr. Robert Brogan, Office of Safety, Planning and Evaluation Division, RRS–21, Federal Railroad Administration, 1120 Vermont Ave., NW, Mail Stop 17, Washington, DC 20590, or Ms. Dian Deal, Office of Information Technology and Productivity Improvement, RAD–20, Federal Railroad Administration, 1120 Vermont Ave., NW, Mail Stop 35, Washington, DC 20590. Commenters requesting FRA to acknowledge receipt of their respective comments must include a self-addressed stamped postcard stating, ''Comments on OMB control number ____.'' Alternatively, comments may be transmitted via facsimile to (202) 493–6265 or (202) 493–6170, or E-mail to Mr. Brogan at robert.brogan@fra.dot.gov, or to Ms. Deal at dian.deal@fra.dot.gov. Please refer to the assigned OMB control number in any correspondence submitted. FRA will summarize comments received in response to this notice in a subsequent notice and include them in its information collection submission to OMB for approval.

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FOR FURTHER INFORMATION CONTACT: Mr. Robert Brogan, Office of Planning and Evaluation Division, RRS–21, Federal Railroad Administration, 1120 Vermont Ave., NW, Mail Stop 17, Washington, DC 20590 (telephone: (202) 493–6292) or Dian Deal, Office of Information Technology and Productivity Improvement, RAD–20, Federal Railroad Administration, 1120 Vermont Ave., NW, Mail Stop 35, Washington, DC 20590 (telephone: (202) 493–6133). (These telephone numbers are not toll-free.)

SUPPLEMENTARY INFORMATION: The Paperwork Reduction Act of 1995 (PRA), Pub. L. 104–13, § 2, 109 Stat. 163 (1995) (codified as revised at 44 U.S.C. 3501–3520), and its implementing regulations, 5 CFR Part 1320, require Federal agencies to provide 60-days notice to the public for comment on information collection activities before seeking approval for reinstatement or renewal by OMB. 44 U.S.C. 3506(c)(2)(A); 5 CFR 1320.8(d)(1), 1320.10(e)(1), 1320.12(a). Specifically, FRA invites interested respondents to comment on the following summary of proposed information collection activities regarding: (i) Whether the information collection activities are necessary for FRA to properly execute its functions, including whether the activities will have practical utility; (ii) the accuracy of FRA's estimates of the burden of the information collection activities, including the validity of the methodology and assumptions used to determine the estimates; (iii) ways for FRA to enhance the quality, utility, and clarity of the information being collected; and (iv) ways for FRA to minimize the burden of information collection activities on the public by automated, electronic, mechanical, or other technological collection techniques or other forms of information technology (*e.g.*, permitting electronic submission of responses). *See* 44 U.S.C. 3506(c)(2)(A)(i)–(iv); 5 CFR 1320.8(d)(1)(i)–(iv). FRA believes that soliciting public comment will promote its efforts to reduce the administrative and paperwork burdens associated with the collection of information mandated by Federal regulations. In summary, FRA reasons that comments received will advance three objectives: (i) Reduce reporting burdens; (ii) ensure that it organizes information collection requirements in a ''user friendly'' format to improve the use of such information; and (iii) accurately assess the resources expended to retrieve and produce the information requested. *See* 44 U.S.C. 3501.

Below is a brief summary of currently approved information collection activities that FRA will submit for clearance by OMB as required under the PRA:

Title: Hours of Service Regulations.

OMB Control Number: 2130–0005.

Abstract: The collection of information is due to the railroad hours of service regulations set forth in 49 CFR Part 228 which require railroads to collect the hours of duty for covered employees, and records of train movements. Railroads whose employees have exceeded maximum duty limitations must report the circumstances. Also, a railroad that has developed plans for construction or reconstruction of sleeping quarters (Subpart C of 49 CFR part 228) must obtain approval of the Federal Railroad Administration (FRA) by filing a petition conforming to the requirements of Sections 228.101, 228.103, and 228.105.

Form Number(s): FRA F 6180.3.

Affected Public: Businesses.

Respondent Universe: 685 railroads.

Frequency of Submission: On occasion.

Reporting Burden:

CFR section	Respondent universe	Total annual responses	Average time per response	Total annual burden hours	Total annual burden cost
228.11—Hours of Duty Records	632 railroads	27,375,000 records..	10 min./2 min.	3,735,166	$130,730,810
228.17—Dispatchers of Train Movements	150 Dispatch Offices.	54,750 records.	6 hours	328,500	11,497,500
228.19—Monthly Reports of Excess Service	300 railroads	1,800 reports	2 hours	3,600	63,000
228.103—Construction of Employee Sleeping Quarters	632 railroads	1 petition	16 hours	16	560
45 U.S.C. 61–641—Hours of Service Act	15 railroads	15 petitions	10 hours	150	5,250

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Total Responses: 27,431,566.

Estimated Total Annual Burden: 4,067,432 hours.

Status: Regular Review.

Title: Railroad Operating Rules.

OMB Control Number: 2130–0035.

Abstract: The collection of information is due to the railroad operating rules set forth in 49 CFR part 217 which require Class I and Class II railroads to file with FRA copies of their operating rules, timetables, and timetable special instructions, and subsequent amendments thereto. Class III railroads are required to retain copies of these documents at their system headquarters. Also, the collection of information is due to 49 CFR 220.21 (b) which requires railroads to retain one copy of their current operating rules with respect to radio communications and one copy of each subsequent amendment thereto. These documents must be available to FRA upon request.

Affected Public: Businesses.

Respondent Universe: 633 railroads.

Frequency of Submission: On occasion.

Reporting Burden:

CFR section	Respondent universe	Total annual responses	Average time per response	Total annual burden hours	Total annual burden cost
217.7—Copy-FRA-operating rules, timetables-ClassI/II.	1 new railroad	2 submission	1 hour	1 hour	$35
—Amendments	32 railroads	96 amendments	20 minutes	32 hours	$1,120
—Copy of operating rules, etc.—ClassIII	20 new railroads	20 submissions	.92 hour	18 hours	$630
—Amendments	632 railroads	1,896 amendment.	.25 hour	474 hours	$16,590
217.9—Copy—prog. for perf. of Operational tests	20 new railroads	20 programs	9.92 hours	198 hours	$6,930
—Amendments	633 railroads	3,165 amendments.	1.92 hours	6,077 hours	$212,695
—Op. Test Records	633 railroads	495,000 test records.	.25 hour	123,750 hours	$4,331,250
—Summary-Tests, etc	55 railroads	55 summaries	7 hours	385 hours	$13.475
217.11–Copy—Inst Prog.—Employees	20 new railroads	20 programs	9.92 hours	198 hours	$6,930
—Amendments	633 railroads	75 amendments	.92 hour	69 hours	$2,380
220.21(b)-Copy-Op. Rules—Radio	Incl. under 217.7	Incl. under 217.7	Incl. under 217.7.	Incl. under 217.7	Incl. under 217.7
—Amendments.					

Total Responses: 500,348

Estimated Total Annual Burden: 131,202 hours.

Status: Regular Review.

Title: State Safety Participation Regulations and Remedial Actions.

OMB Control Number: 2130–0509.

Abstract: The collection of information is set forth under 49 CFR Part 212, and requires qualified state inspectors to provide various reports concerning state investigative, inspection, and and surveillance activities regarding railroad compliance with Federal railroad safety laws and regulations to FRA for monitoring and enforcement purposes. Additionally, railroads are required to report to FRA actions taken to remedy certain alleged violations of law.

Form Number(s): FRA F 6180. 10, 6180.29/29A/33, 6180.61/67/68/68A/69/96/96A/96B

Affected Public: Businesses

Respondent Universe: States and Railroads

Frequency of Submission: On occasion

Reporting Burden:

CFR section	Respondent universe (States)	Total annual responses	Average time per response (hours)	Total annual burden hours	Total annual burden cost
—Application For Participation	15	15 Updates	2.5	38	$1,330
—Training Funding Agreement	30	30 Agreement	1	30	1,050
—Inspector Training Reimbursement	30	300 Vouchers	1	300	10,500
—Annual Work Plan	30	30 reports	15	450	15,750
Inspection Form (FRA F 6180.96)	30	18,000 forms	.25	4,500	126,000
Motive Power and Equipment Violation Report (FRA F 6180.68, 6180.68A/69).	19	150 reports	1	150 hours	4,200
Violation of Oper. Practices Insp. Rpt (Form FRA F 6180.67).	13	40 reports	1	40	1,120
—Application For Participation	15	15 Updates	2.5	38	$1,330
—Training Funding Agreement	30	30 Agreements	1	30	1,050
—Inspector Training Reimbursement	30	300 Vouchers	1	300	10,500
Violation of Hazardous Materials Inspection Rept (Form FRA F 6180.67).	14	100 reports	13	1,300	36,400
Violation of Locomotive Inspection Act Rept. (Form FRA F 6180.10).	17	50 reports	1	50	1,400
Violation of Safety Appliance Law Rpt. (Form FRA F 6180.29/29A).	19	53 reports	1	53	1,484
Violation of Hours of Service Law Rpt. (Form FRA F 6180.33).	13	21 reports	1	21 reports	588
Violation of Accident/Incident Reporting Rules Rpt (Form FRA F 6180.61).	13	10 reports	1	10	280
Remedial Actions Rpt (209.405/407)	32	5,048 reports	.25	1,262	42,908
—Violation Rpt Challenge	[1] 685	1,010 challenges.	1	1,010	34,340
Delayed Reports (209.407)	[1] 685	505 reports	.50	253	8,602

[1] Railroads.

Total Responses: 25,362.

Estimated Total Annual Burden: 9,467 hours.

Status: Regular Review.

Title: Rear-End Marking Devices.

OMB Control Number: 2130–0523.

Abstract: The collection of information is set forth under 49 CFR part 221 which requires railroads to furnish a detailed description of the type of marking device to be used for the trailing end of rear cars in order to ensure rear cars meet minimum standards for visibility and display. Railroads are required to furnish a certification that the device has been tested in accordance with current ''Guidelines for Testing of FRA Rear End Marking Devices.'' Additionally, railroads are required to furnish detailed test records which include the testing organizations, description of tests number of samples tested, and the test results in order to demonstrate compliance with the performance standard.

Affected Public: Businesses.

Respondent Universe: 685 railroads.

Frequency of Submission: On occasion.

Reporting Burden:

008590

CFR section	Respondent universe	Total annual responses	Average time per response (hours)	Total annual burden hours	Total annual burden cost
Requests for Approval of Marking Devices & Signed Certification by Chief Operating Officer.	685 railroads	2 requests	4	8	$280
Recordkeeping—Requests for Marking Devices	685 railroads	2 records	.10	.20	7
Recordkeeping—Detailed Test Records	685 railroads	1 test record	20	20	700

Total Responses: 5.

Estimated Total Annual Burden: 28.2 hours.

Status: Regular Review.

Title: Certification of Glazing Materials.

OMB Control Number: 2130–0525.

Abstract: The collection of information is set forth under 49 CFR part 223 which requires the certification and permanent marking of glazing materials by the manufacturer along with the responsibility of the manufacturer to make available test verification data to railroads and FRA upon request.

Affected Public: Businesses.

Respondent Universe: 5 manufacturers.

Frequency of Submission: On occasion.

Reporting Burden:

CFR section	Respondent universe (manufacturers)	Total annual responses	Average time per response	Total annual burden hours	Total annual burden cost
Requests—Glazing Certification Info	5	75 requests	15 minutes	19	$475
Preparing/Recording Glazing Marking Information	5	25,000 pieces ...	.0021 minutes ...	52	1,300
Certification Test	5	1 test	14 hours	14	1,120

Total Responses: 76.

Estimated Total Annual Burden: 85 hours.

Status: Regular Review.

Pursuant to 44 U.S.C. 3507(a) and 5 CFR 1320.5(b), 1320.8(b)(3)(vi), FRA informs all interested parties that it may not conduct or sponsor, and a respondent is not required to respond to, a collection of information unless it displays a currently valid OMB control number.

Authority: 44 U.S.C. 3501–3520.

Issued in Washington, D.C. on May 12, 2000.

Margaret B. Reid,

Acting Director, Office of Information Technology and Support Systems, Federal Railroad Administration.

[FR Doc. 00–12568 Filed 5–17–00; 8:45 am]

BILLING CODE 4910–06–P

DEPARTMENT OF TRANSPORTATION

Federal Railroad Administration

Petition for Waiver of Compliance

In accordance with Part 211 of Title 49 of the Code of Federal Regulations (CFR), notice is hereby given that the Federal Railroad Administration (FRA) received a request for a waiver of compliance with certain requirements of its safety standards. The individual petition is described below, including the party seeking relief, the regulatory provisions involved, the nature of the relief being requested, and the petitioner's arguments in favor of relief.

Alaska Railroad Corporation

[Docket Number FRA–2000–7350]

The Alaska Railroad Corporation (ARR) seeks a temporary waiver of compliance with a provision of the Passenger Equipment Safety Standards (49 CFR part 238). ARR has been transporting full-length dome cars owned by Westours Motorcoaches, Inc. since 1987. ARR states that the cars currently have two emergency exits on each side of the car located in the staggered hallways (a total of four emergency exits per car located mid-way between the upper main level and a small lower level). Westours Motorcoaches, Inc. determined that the placement of the current emergency exits did not comply with 49 CFR 238.113(a) which addresses the number and location of emergency exits. Accordingly, Westours contracted for retrofit of existing dome cars to comply with section 238.1139(a). Although delivery of compliant emergency windows was originally scheduled for April 1, 2000, due to technical problems, delivery may not be accomplished until as late as August 1, 2000.

ARR is therefore requesting a temporary waiver from section 238.113(a) until August 1, 2000 to permit it to use Westours Motorcoaches, Inc. dome cars in revenue and non-revenue service until that time.

Interested parties are invited to participate in these proceedings by submitting written views, data, or comments. FRA does not anticipate scheduling a public hearing in connection with this proceeding since the facts do not appear to warrant a hearing. If any interested party desires an opportunity for oral comment, they should notify FRA, in writing, before the end of the comment period and specify the basis for their request.

All communications concerning this proceeding should identify the appropriate docket number (e.g. Docket No. FRA–2000–7350) and must be submitted to the Docket Clerk, DOT Docket Management Facility, Room PL–401 (Plaza Level), 400 7th Street, SW, Washington, DC 20590. Communications received within 15 days of the date of this notice will be considered by FRA before final action is taken. Comments received after that date will be considered as far as practicable. All written communications concerning this proceeding are available for examination during regular business hours (9:00 am—5:00 pm) at the above facility.

All documents in the public docket are also available for inspection and copying on the internet at the docket facility's web site at *http://dms.dot.gov.*

Issued in Washington, D.C. on May 11, 2000.

Grady C. Cothen, Jr.,

Deputy Associate Administrator for Safety Standards and Program Development.

[FR Doc. 00–12567 Filed 5–17–00; 8:45 am]

BILLING CODE 4910–06–P

DEPARTMENT OF TRANSPORTATION

National Highway Traffic Safety Administration

[Docket No. NHTSA 2000–7354; Notice 1]

Honda Motor Co., Ltd.; Receipt of Application for Temporary Exemption From Federal Motor Vehicle Safety Standard No. 123

Honda Motor Co. Ltd. (''Honda''), a Japanese corporation, through American Honda Motor Co., Inc., of Torrance, California, has applied for a temporary exemption of two years from a requirement of S5.2.1 (Table 1) of Federal Motor Vehicle Safety Standard No. 123 *Motorcycle Controls and Displays.* The basis of the request is that ''compliance with the standard would prevent the manufacturer from selling a motor vehicle with an overall safety level at least equal to the overall safety level of nonexempt vehicles,'' 49 U.S.C. 30113(b)(3)(B)(iv).

We are publishing this notice of receipt of an application in accordance with the requirements of 49 U.S.C. 30113(b)(2). This action does not represent any judgment of the agency on the merits of the application.

Honda has applied on behalf of its NSS250 motor scooters. The scooters are defined as ''motorcycles'' for purposes of compliance with the Federal motor vehicle safety standards.

If a motorcycle is produced with rear wheel brakes, S5.2.1 of Standard No. 123 requires that the brakes be operable through the right foot control (the left handlebar is permissible only for a motor driven cycle (Item 11, Table 1), i.e., a motorcycle with a motor that produces 5 brake horsepower or less).

Honda petitions that it be allowed to use the left handlebar as the control for the rear brakes of its NSS250, which is a motorcycle and not a motor driven cycle. The model features an automatic transmission that eliminates the left-hand clutch lever as well as any left-foot gearshift lever. This leaves the left hand of the rider free to operate a brake lever. In Honda's opinion, ''removal of the left-handlebar clutch lever, left-foot-controlled gearshift lever and right-foot-controlled rear brake pedal result in simpler operation.'' Honda points out that NHTSA exempted three other motorcycle manufacturers from this requirement of S5.2.1. in 1999 (Aprilia, 64 FR 44262; Vectrix, 64 FR 45585; and Italjet, 64 FR 58127).

Honda argues that the overall level of safety of the scooters equals or exceeds that of a motorcycle that complies with the brake control location requirement of Standard No. 123. Unlike the other exempted motorcycles, the NSS250 is equipped with a ''combined brake system'' which ''provides single-point, front- and rear-wheel braking action.'' The vehicle meets the braking performance requirements ''of both FMVSS 122 and ECE78.'' The company submitted test results demonstrating that the braking performance of the NSS250 with its combined brake system is better than that of a scooter without the combined brake system. For the second effectiveness test, for example, the NSS250 stopped in shorter distances than a Honda model equipped with a foot brake, that is to say, from a maximum speed of 65.4 mph in 165 feet (compared with 178 feet), and, from 30 mph, in 38 feet (compared with 40 feet).

Honda has developed the NSS250 for the world market. In Europe, Japan, and other Asian countries, scooters are equipped with handlebar-mounted front and rear brakes. Absent an exemption, then, Honda will be unable to sell the NSS250 in the United States. The cost to conform the NSS250 to comply with Standard No. 123 ''would add considerable cost to the product'' and result in a motorcycle that would not be competitive.

Honda will not sell more than 2,500 scooters a year while an exemption is in effect. It believes that an exemption would be in the public interest and consistent with the objectives of traffic safety because ''the level of safety is equal to similar vehicles certified under FMVSS No. 123.''

You may submit comments on the application described above. Comments should refer to the docket number and the notice number, and be submitted to: Docket Management, Room PL–401, 400 Seventh Street, SW, Washington, DC 20590. You should send at least two copies.

We shall consider all comments received before the close of business on the comment closing date indicated below. Comments will be available for examination in the docket at the above address both before and after that date. The Docket Room is open from 10:00 a.m. until 5:00 p.m. To the extent possible, comments filed after the closing date will also be considered.

We shall publish a notice of final action on the application pursuant to the authority indicated below.

Comment closing date: June 19, 2000.

(49 U.S.C. 30113; delegations of authority at 49 CFR 1.50. and 501.8)

Issued on May 11, 2000.

Stephen R. Kratzke,

Associate Administrator for Safety Performance Standards.

[FR Doc. 00–12556 Filed 5–17–00; 8:45 am]

BILLING CODE 4910–59–P

008592

DEPARTMENT OF TRANSPORTATION

Surface Transportation Board

[STB Docket No. AB–32 (Sub-No. 89)]

Boston and Maine Corporation—Abandonment—In Middlesex County, MA

On April 28, 2000, the Boston and Maine Corporation (B&M) filed with the Surface Transportation Board (Board), Washington, DC 20423, an application for permission to abandon and discontinue service on a line of railroad known as the Bemis Branch in Waltham and Watertown, MA, extending from milepost 8.83 to milepost 10.94, a distance of 2.11 miles, in Middlesex County, MA. The line traverses U.S. Postal Service Zip Codes 02451 and 02472. Applicant indicated that there are no agency stations located on the line.

The line does not contain federally granted rights-of-way. Any documentation in B&M's possession will be made available promptly to those requesting it. The applicants' entire case for abandonment and discontinuance was filed with the application.

The line of railroad has appeared on B&M's system diagram map or has been included in its narrative in category 1 since January 26, 1999.

The interest of railroad employees will be protected by *Oregon Short Line Railroad Co.—Abandonment—Goshen,* 360 I.C.C. 91 (1979).

Any interested person may file with the Board written comments concerning the proposed abandonment and discontinuance or protests (including the protestant's entire opposition case), by June 12, 2000. All interested persons should be aware that following any abandonment of rail service and salvage of the line, the line may be suitable for other public use, including interim trail use. Any request for a public use condition under 49 U.S.C. 10905 (49 CFR 1152.28 of the Board's rules) and any request for a trail use condition under 16 U.S.C. 1247(d) (49 CFR 1152.29 of the Board's rules) must be filed by June 12, 2000. Persons who may oppose the abandonment or discontinuance but who do not wish to participate fully in the process by appearing at any oral hearings or by submitting verified statements of witnesses containing detailed evidence should file comments. Persons interested only in seeking public use or trail use conditions should also file comments. Persons opposing the proposed abandonment or discontinuance that do wish to participate actively and fully in the process should file a protest.

In addition, a commenting party or protestant may provide:

(i) An offer of financial assistance, pursuant to 49 U.S.C. 10904 (due 120 days after the application is filed or 10 days after the application is granted by the Board, whichever occurs sooner);

(ii) Recommended provisions for protection of the interests of employees;

(iii) A request for a public use condition under 49 U.S.C. 10905; and

(iv) A statement pertaining to prospective use of the right-of-way for interim trail use and rail banking under 16 U.S.C. 1247(d) and 49 CFR 1152.29.

Parties seeking information concerning the filing of protests should refer to 49 CFR 1152.25.

Written comments and protests, including all requests for public use and trail use conditions, must indicate the proceeding designation STB No. AB–32 (Sub-No. 89) and should be filed with the Secretary, Surface Transportation Board, Washington, DC 20423, no later than June 12, 2000. Interested persons may file a written comment or protest with the Board to become a party to this proceeding. A copy of each written comment or protest shall be served upon the applicant's representative, Robert B. Culliford, Boston and Maine Corporation, Iron Horse Park, North Billerica, MA 10862. The original and 10 copies of all comments or protests shall be filed with the Board with a certificate of service. Except as otherwise set forth in part 1152, every document filed with the Board must be served on all parties to the abandonment proceeding. 49 CFR 1104.12(a).

The line sought to be abandoned and discontinued will be available for subsidy or sale for continued rail use, if the Board decides to permit the abandonment and discontinuance, in accordance with applicable laws and regulations (49 U.S.C. 10904 and 49 CFR 1152.27). No subsidy arrangement approved under 49 U.S.C. 10904 shall remain in effect for more than 1 year unless otherwise mutually agreed by the parties (49 U.S.C. 10904(f)(4)(B)). Applicant will promptly provide upon request to each interested party an estimate of the subsidy and minimum purchase price required to keep the line in operation. The carrier's representative to whom inquiries may be made concerning sale or subsidy terms is set forth above.

Persons seeking further information concerning abandonment procedures may contact the Board or refer to the full abandonment or discontinuance regulations at 49 CFR part 1152. Questions concerning environmental issues may be directed to the Board's Section of Environmental Analysis (SEA).

An environmental assessment (EA) (or environmental impact statement (EIS), if necessary) prepared by SEA will be served upon all parties of record and upon any agencies or other persons who commented during its preparation. Any other persons who would like to obtain a copy of the EA (or EIS) may contact SEA. EAs in abandonment proceedings normally will be made available within 33 days of the filing of the application. The deadline for submission of comments on the EA will generally be within 30 days of its service. The comments received will be addressed in the Board's decision. A supplemental EA or EIS may be issued where appropriate.

Decided: May 15, 2000.

By the Board, David M. Konschnik, Director, Office of Proceedings.

Vernon A. Williams,

Secretary.

[FR Doc. 00–12587 Filed 5–17–00; 8:45 am]

BILLING CODE 4915–00–P

008593

DEPARTMENT OF TRANSPORTATION

Surface Transportation Board

[STB Docket No. AB–57 (Sub–No. 51)]

Soo Line Railroad Company—Abandonment—in Roberts County, SD

On April 28, 2000, Soo Line Railroad Company, d/b/a Canadian Pacific Railway (Soo) filed with the Surface Transportation Board (Board) an application for permission to abandon a portion of its line of railroad known as the Veblen Line, extending from milepost 208.8 near Rosholt to the end of the line at milepost 228.2 west of Claire City, a distance of 19.4 miles, in Roberts County, SD. The line includes the stations of Victor (milepost 213.8), New Effington (milepost 218.3), Hammer (milepost 223.4), Claire City (milepost 227.3), and Veblen (milepost 236.3), and traverses U.S. Postal Service ZIP Codes 57260, 57255, and 57224.

The line does not contain federally granted rights-of-way. Any documentation in Soo's possession will be made available promptly to those requesting it. The applicant's entire case for abandonment (case-in-chief) was filed with the application.

The line of railroad has appeared on Soo's system diagram map or has been included in its narrative in category 1 since 1998.

The interest of railroad employees will be protected by *Oregon Short Line R. Co.—Abandonment—Goshen,* 360 I.C.C. 91 (1979).

Any interested person may file with the Board written comments concerning the proposed abandonment or protests (including the protestant's entire opposition case), by June 12, 2000. All interested persons should be aware that, following any abandonment of rail service and salvage of the line, the line may be suitable for other public use, including interim trail use. Any request for a public use condition under 49 U.S.C. 10905 (49 CFR 1152.28) or for a trail use condition under 16 U.S.C. 1247(d) (49 CFR 1152.29) must be filed by June 12, 2000. Each trail use request must be accompanied by a $150 filing fee. *See* 49 CFR 1002.2(f)(27). Applicant's reply to any opposition statements and its response to trail use requests must be filed by June 27, 2000. *See* 49 CFR 1152.26(a).

Persons opposing the abandonment that wish to participate actively and fully in the process should file a protest. Persons who may oppose the abandonment but who do not wish to participate fully in the process by appearing at any oral hearings or by submitting verified statements of witnesses containing detailed evidence should file comments. Persons seeking information concerning the filing of protests should refer to 49 CFR 1152.25. Persons interested only in seeking public use or trail use conditions should also file comments.

In addition, a commenting party or protestant may provide:

(i) An offer of financial assistance (OFA) for continued rail service under 49 U.S.C. 10904 (due 120 days after the application is filed or 10 days after the application is granted by the Board, whichever occurs sooner);

(ii) Recommended provisions for protection of the interests of employees;

(iii) A request for a public use condition under 49 U.S.C. 10905; and

(iv) A statement pertaining to prospective use of the right-of-way for interim trail use and rail banking under 16 U.S.C. 1247(d) and 49 CFR 1152.29.

All filings in response to this notice must indicate the proceeding designation STB Docket No. AB–57 (Sub-No. 51) and must be sent to: (1) Surface Transportation Board, Office of the Secretary, Case Control Unit, 1925 K Street, NW, Washington, DC 20423–0001; and (2) Diane P. Gerth, Leonard, Street, and Deinard, 150 South Fifth Street, Suite 2300, Minneapolis, MN 55402. The original and 10 copies of all comments or protests shall be filed with the Board with a certificate of service. Except as otherwise set forth in part 1152, every document filed with the Board must be served on all parties to the abandonment proceeding. 49 CFR 1104.12(a).

The line sought to be abandoned will be available for subsidy or sale for continued rail use, if the Board decides to permit the abandonment in accordance with applicable laws and regulations (49 U.S.C. 10904 and 49 CFR 1152.27). Each OFA must be accompanied by a $1,000 filing fee. See 49 CFR 1002.2(f)(25). No subsidy arrangement approved under 49 U.S.C. 10904 shall remain in effect for more than 1 year unless otherwise mutually agreed by the parties (49 U.S.C. 10904(f)(4)(B)). Applicant will promptly provide upon request to each interested party an estimate of the subsidy and minimum purchase price required to keep the line in operation. The carrier's representative to whom inquiries may be made concerning sale or subsidy terms is set forth above.

Persons seeking further information concerning abandonment procedures may contact the Board's Office of Public Services at (202) 565–1592 or refer to the full abandonment regulations at 49 CFR part 1152. Questions concerning environmental issues may be directed to the Board's Section of Environmental Analysis (SEA) at (202) 565–1545. [TDD for the hearing impaired is available at 1–800–877–8339.]

An environmental assessment (EA) (or environmental impact statement (EIS), if necessary) prepared by SEA will be served upon all parties of record and upon any agencies or other persons who commented during its preparation. Other interested persons may contact SEA to obtain a copy of the EA (or EIS). EAs in abandonment proceedings normally will be made available within 33 days of the filing of the application. The deadline for submission of comments on the EA will generally be within 30 days of its service. The comments received will be addressed in the Board's decision. A supplemental EA or EIS may be issued where appropriate.

Board decisions and notices are available on our website at ''WWW.STB.DOT.GOV.''

Decided: May 10, 2000.

By the Board, David M. Konschnik, Director, Office of Proceedings.

Vernon A. Williams,

Secretary.

[FR Doc. 00–12308 Filed 5–17–00; 8:45 am]

BILLING CODE 4915–00–P

008594

Corrections

Federal Register
Vol. 65, No. 97
Thursday, May 18, 2000

This section of the FEDERAL REGISTER contains editorial corrections of previously published Presidential, Rule, Proposed Rule, and Notice documents. These corrections are prepared by the Office of the Federal Register. Agency prepared corrections are issued as signed documents and appear in the appropriate document categories elsewhere in the issue.

SECURITIES AND EXCHANGE COMMISSION

[Release No. 35–27174]

Filings Under the Public Utility Holding Company Act of 1935, As Amended (''Act'')

Correction

In notice document 00–11961 beginning on page 30650 in the issue of Friday, May 12, 2000, make the following correction:

On page 30650, in the third column, in the first paragraph under the heading *Financings*, in the seventh line down, ''March 31, 2000'' should read ''March 31, 2002.''

[FR Doc. C0–11961 Filed 5–17–00; 8:45 am]

BILLING CODE 1505–01–D

008595

Federal Register

Thursday,
May 18, 2000

Part II

Department of Commerce

National Oceanic and Atmospheric Administration

15 CFR Part 922

Florida Keys National Marine Sanctuary Regulations; Proposed Rule

008596

DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

15 CFR Part 922

[Docket No. 000510129–0129–01]

RIN 0648–A018

Florida Keys National Marine Sanctuary Regulations

AGENCY: National Marine Sanctuary Program (NMSP), National Ocean Service (NOS), National Oceanic and Atmospheric Administration (NOAA), Department of Commerce (DOC).

ACTION: Proposed rule; proposed boundary expansion; summary of draft supplemental management plan for expansion area; public availability of draft supplemental management plan of expansion area; public hearings.

SUMMARY: By this document, NOAA is proposing to expand the boundary of the Florida Keys National Marine Sanctuary (FKNMS or Sanctuary) in the remote westernmost portion of the Sanctuary by 96 square nautical miles (nm^2) and to establish a 151 nm^2 no-take ecological reserve in the expanded area and in 55 nm^2 of the existing Sanctuary, to protect important coral reef resources.

This action is necessary to comprehensively protect some of the healthiest and most diverse coral reefs in the Florida Keys. The intended effect of this proposed rule is to protect the deepwater coral reef community in this area from being degraded by human activities.

DATES: Comments will be considered if received by July 31, 2000. For dates of hearings, see **SUPPLEMENTARY INFORMATION.**

ADDRESSES: Written comments must be submitted to Sanctuary Superintendent, Florida Keys National Marine Sanctuary, P.O. Box 500368, Marathon, Florida, 33050. Comments may also be sent by facsimile to: (305) 743–2357. Comments will not be considered if submitted by e-mail or internet. For addresses of hearings, see **SUPPLEMENTARY INFORMATION.**

FOR FURTHER INFORMATION CONTACT: Billy Causey, Sanctuary Superintendent, (305) 743–2437.

SUPPLEMENTARY INFORMATION: NOAA proposes to establish a no-take ecological reserve in the Tortugas region of the Florida Keys to protect nationally significant coral reef resources and to protect an area that serves as a source of biodiversity for the Sanctuary as well as for the southwest shelf of Florida. Establishment of the proposed reserve would include expansion of the Sanctuary boundary to ensure that the reserve protects sensitive coral habitats lying outside the existing boundary of the Sanctuary.

This document publishes the coordinates for the proposed expansion area and for the proposed ecological reserve, summarizes the draft supplemental management plan for the proposed ecological reserve and publishes the text of the Proposed Revised Designation Document for the Sanctuary. The draft supplemental management plan details the proposed goals and objectives, management responsibilities, research activities, interpretive and educational programs, and enforcement, including surveillance activities, for the proposed ecological reserve. By this document, NOAA also proposes regulations to implement the proposed boundary expansion and establishment of an ecological reserve and to regulative activities in the reserve consistent with the purposes of its establishment and to make minor revisions to the existing Sanctuary boundary and to the boundaries of various zoned areas within that boundary to correct errors, provide clarification, and reflect more accurate data. NOAA will announce shortly the public availability of the Draft Supplement Environmental Impact Statement/Draft Supplemental Management Plan (DSEIS/SMP) prepared for the proposed expansion and proposed establishment of the ecological reserve.

Public hearings on the proposed actions and on the DSEIS/SMP will be held on the following locations on the dates and times indicated:

June 12, 2000: Homestead Senior High School, SE 12th Avenue, Homestead, FL, Main Cafeteria; 3:00–8:00 p.m.

June 13, 2000: Comfort Inn Executive Suites, 3860 Toll Gate Blvd., Naples, FL, 2nd Floor Conference Room; 3:00–8:00 p.m.

June 14, 2000: University of South Florida, Campus Activities Center, 2nd Street and 6th Avenue South, St. Petersburg, FL, CAC Central Room; 3:00–8;00 p.m.

June 21, 2000: The Sombrero Country Club, 4000 Sombrero Blvd., Marathon, FL Nautilus Room, 3:00–8:00 p.m.

June 22, 2000: Holiday Inn Beachside, 3841 N. Roosevelt Blvd., Key West, FL, Main Ballroom; 3:00–8:00 p.m.

July 11, 2000: U.S. Department of Commerce, Herbert C. Hoover Building, First Floor, HCHB Auditorium, Washington, D.C., 2:00–5:00 p.m.

The FKNMS, which was designated by the Florida Keys National Marine Sanctuary and Protection Act (FKNMSPA, Pub. L. 101–605) on November 16, 1990, consists of aproximately 2800 nm^2 (9500 square kilometers) of coastal and oceanic waters, and the submerged lands thereunder, surrounding the Florida Keys and the Dry Tortugas. These waters contain the marine equivalent of tropical rain forests in that they support high levels of biological diversity, are fragile and easily susceptible to damage from human activities, and possess high value to human beings if properly conserved. These environments support a vibrant tourist-based economy worth more than $1.2 billion per year. The management plan (MP) for the Sanctuary was implemented by regulations that became effective on July 1, 1997.

The FKNMS currently contains a network of 23 no-take zones, one of which is an ecological reserve (Western Sambo Ecological Reserve). This proposal would establish a second ecological reserve to protect the nationally significant coral reef resources of the Tortugas area. This proposal is being made to further the objectives of the National Marine Sanctuaries Act (NMSA, 16 U.S.C. § 1431 *et seq.*) and the FKNMSPA and to meet the objectives of Executive Order 13089, Coral Reef Protection.

The Torugas is located in the westernmost portion of the FKNMS approximately 70 miles west of Key West, a very strategic position oceanographically that makes it an ideal location for an ecological reserve. It contains the healthiest coral reefs found in the Sanctuary. Coral pinnacles as high as forty feet with the highest coral cover (>30%) found in the Keys jut up from the ocean floor. These coral formations are bathed by some of the clearest and cleanest waters found in the Florida Keys. This occurs where the tropical waters of the Caribbean mingle with the more temperate waters of the Gulf of Mexico.

Recent studies reveal that the Tortugas region is unique in its location and the extent to which oceanographic processes impact the area. The Tortugas plays a dynamic role in supporting marine ecosystems throughout south Florida and the Florida Keys. Larvae that are spawned from adult populations in the Tortugas are spread throughout the Keys and south and southwest Florida by a persistent system of currents and eddies that provide the retention and current pathways necessary for successful recruitment of both local and foreign spawned

juveniles with larval stages remaining from hours for some coral species up to one year for spiny lobster. In addition, the upwellings and convergences of the current systems provide the necessary food supplies in concentrated frontal regions to support larval growth stages.

The Tortugas is located at the transition between the Gulf of Mexico and the Atlantic and is strongly impacted by two major current systems, the Loop Current in the eastern Gulf of Mexico and the Florida Current in the Straits of Florida, as well as by the system of eddies that form and travel along the boundary of these currents. Of particular importance to the marine communities of the Tortugas and Florida Keys is the formation of a large counterclockwise rotating gyre (large eddy) that forms just south of the Tortugas where the Loop Current turns abruptly into the Straits of Florida. This gyre can persist for several months before it is forced downstream along the Keys decreasing in size and increasing in forward speed until its demise in the middle Keys. This gyre serves as a retention mechanism for local recruits and as a pathway to inshore habitats for foreign recruits. It may also serve as a potential food provider through plankton production and concentration.

The Tortugas is also located adjacent to two coastal current systems, including the wind-driven currents of both the Florida Keys coastal zone and the west Florida Shelf. Persistent westward winds over the Keys create a downwelling system that drives a westward coastal countercurrent along the lower Keys to the Tortugas. The countercurrent provides a return route to the Tortugas and its gyre-dominated circulation, and onshore surface Ekman transport (a process whereby wind-driven upwelling bottom water is transported 45 degrees to the left of the actual wind direction in the northern hemisphere) provide a mechanism for larval entry into coastal habitats. Circulation on the west Florida shelf is strongly influenced by wind forcing, but there also appears to be a significant southward mean flow, possibly due to the Loop Current. The effect of these currents on the Tortugas is to provide a larval return mechanism to the Florida Bay nursery grounds during periods of southeast winds, as well as the transport mechanism for low-salinity shelf waters from the north when the mean southward flow is strong.

The combination of downstream transport in the Florida Current, onshore Ekman transport along the downwelling coast, upstream flow in the coastal countercurrent and recirculation in the Tortugas gyre forms a recirculating recruitment pathway stretching from the Dry Tortugas to the middle Keys that enhances larval retention and recruitment into the Keys coastal waters of larvae spawned locally or foreign larvae from remote upstream areas of the Gulf of Mexico and Caribbean Sea. Convergences between the Florida Current front and coastal gyres provide a mechanism to concentrate foreign and local larvae, as well as their planktonic food supply. Onshore Ekman transport and horizontal mixing from frontal instabilities enhance export from the oceanic waters into the coastal zone. A wind- and gyre-driven countercurrent provides a return leg to aid larval retention in local waters. Seasonal cycles of the winds, countercurrent and Florida Current favor recruitment to the coastal waters during the fall when the countercurrent can extend the length of the Keys from the Dry Tortugas to Key Largo, onshore Ekman transport is maximum and downstream flow in the Florida Current is minimum. The mix and variability of the different processes forming the recruitment conveyor provide ample opportunity for local recruitment of species with larval stages ranging from days to several months. For species with longer larval stages, such as the spiny lobster, which has a six to 12-month larval period, a local recruitment pathway exists that utilizes retention in the Tortugas gyre and southwest Florida shelf and return via the Loop Current and the Keys conveyor system. Return from the southwest Florida shelf could also occur through western Florida Bay and the Keys coastal countercurrent, due to a net southeastward flow recently observed connecting the Gulf of Mexico to the Atlantic through the Keys.

Two coral reef areas of unusual biological diversity and abundance would be included in the proposed ecological reserve: Sherwood Forest and Riley's Hump. Sherwood Forest is an area of low relief but high coral cover on the northwest flank of Tortugas Bank, lying just outside the existing Sanctuary boundary. The area's name was inspired by the bizarre mushroom-shaped coral heads that are an adaptation to the low light conditions. There seem to be indications that the mushroom shape is the result of a composite of two coral species. The coral reef is so well developed, that it forms a veneer over the true bottom approximately three feet (ft) below the reef. This veneer is riddled with holes and caves, providing ideal habitats for a high diversity of fish. Soft corals, gorgonian forests, sponges, and black corals are also present. Coral abundance exceeds 30% cover in many areas, compared to 10% for the rest of the Florida Keys.

Riley's Hump is a deep reef terrace (22–27 meters (m) deep) dominated by algae interspersed with coral, located approximately 10 nm southwest of the dry Tortugas National Park (DRTO). It is not known for spectacular coral formations but for its richness of fish and other marine life. A small population of sargassum, or red-tailed triggerfish, is among the unique species found in the area. Large pelagic fish (tunas, jacks, and sharks) are common in the area as well as dolphins. Evidence suggests that this low profile reef is an aggregation or spawning site for snapper-grouper species, including gray, cubera, mutton, dog, red and yellowtail snapper, black grouper and ocean triggerfish. The deeper water habitats to the south of Riley's Hump contain important habitat for red and goldeye snapper, tilefish, golden crab and snowy grouper.

Despite its beauty and productivity, the Tortugas has been exploited for decades, greatly diminishing its potential as a source of larval recruits to the downstream portion of the Florida Keys and to itself. Fish and lobster populations have been significantly depleted thus threatening the integrity and natural dynamics of the ecosystem. Currently large freighters use Riley's Hump as a secure place to anchor between port visits. The several-ton anchors and chains of these ships are devastating large areas of fragile coral reef habitat that provide the foundation for economically important fisheries.

Visitation to the Tortugas region has increased dramatically over the past 10 years. Visitation in the DRTO increased 400% from 1984 through 1998. The population of South Florida is projected to increase from the current 6.3 million people to more than 12 million by 2050. With continued technological innovations such as global positioning systems (GPS), electronic fish finders, better and faster vessels, this increase in population will translate to more pressure on the resources in the Tortugas. By designating this area an ecological reserve, NOAA hopes to create a seascape of promise—a place where the ecosystem's full potential can be realized and a place that humans can experience, learn from and respect. This goal is consistent with E.O. 13089, Coral Reef Protection, and the U.S. Coral Reef Task Force's recommendations.

This DSEIS/SMP supplements the FEIS/MP for the Sanctuary. Further, because this proposed reserve includes a Sanctuary boundary expansion, this

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DSEIS/SMP is developed pursuant to section 304(a)(2) of the NMSA, 16 U.S.C. § 1434(a)(2), consistent with, and in fulfillment of, the requirements of the National Environmental Policy Act of 1969.

Four other actions under various jurisdictions are underway to ensure comprehensive protection of the unique resources of the Tortugas region (Fig. 1):

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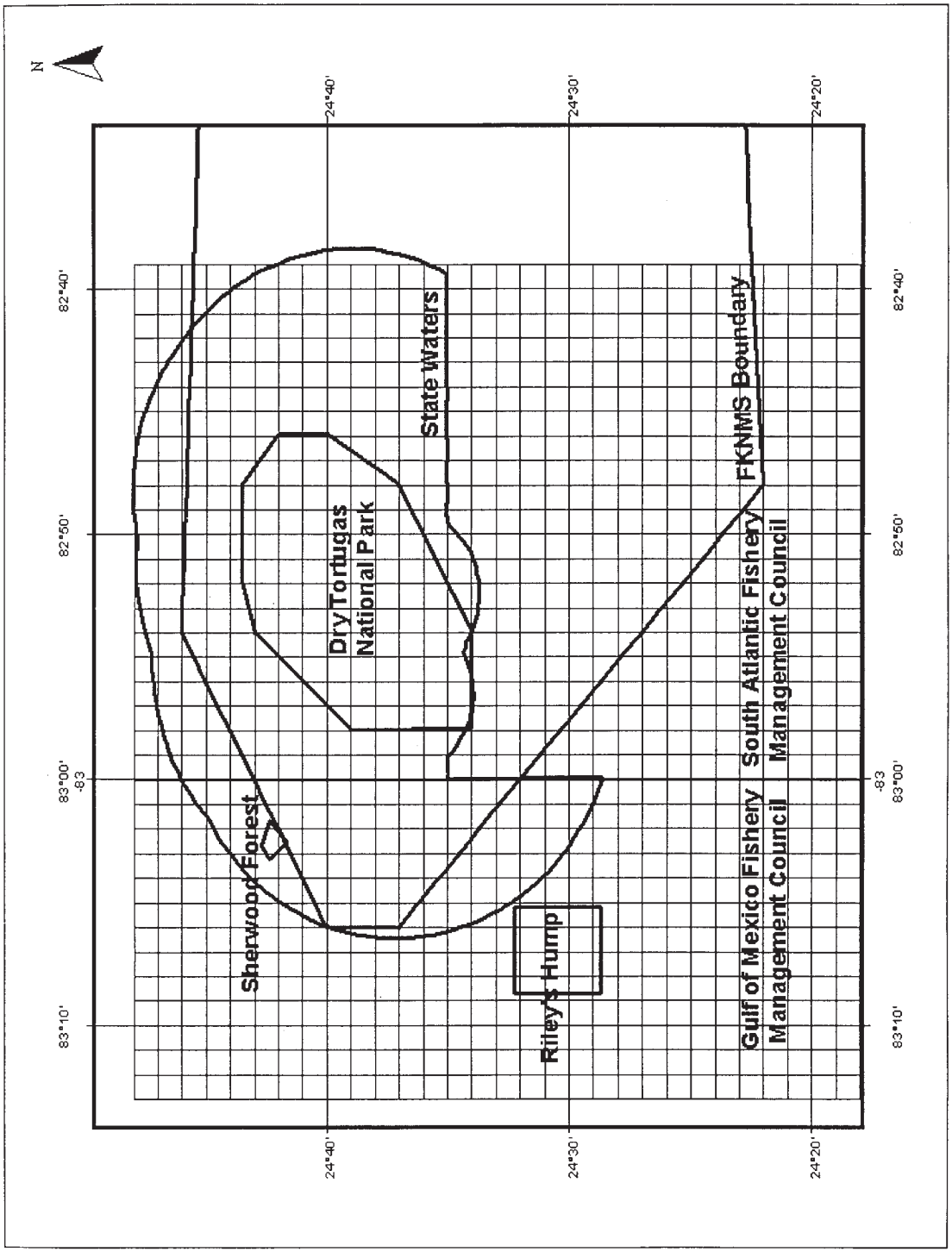

Figure 1. Tortugas Ecological Reserve Study Area (TERSA) showing resource agency jurisdictions and two coral banks: Sherwood Forest and Riley's Hump. The grid represents the study area for the proposed reserve and was used as a framework for collecting and organizing data and designing the proposed reserve (each grid cell represents one minute by one minute of latitude or approximately one square nautical mile.

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• The National Park Service (NPS) is revising the General Management Plan for the DRTO that will include as the preferred alternative a proposal to create a Research/Natural Area (RNA) within the Park. The proposed boundary and regulations for the RNA will be compatible with NOAA's proposed ecological reserve.

• Under the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act), the Gulf of Mexico Fishery Management Council (GMFMC) has primary federal responsibility and expertise for the development of fishery management plans (FMPs) throughout the Gulf of Mexico and has developed an Essential Fish Habitat Amendment to the Gulf of Mexico Fishery Management Plan (GMFMP) which includes the area of the proposed ecological reserve. The GMFMP is implemented by regulations promulgated by the National Marine Fisheries Service (NMFS) (50 CFR part 622). At the GMFMC's meeting on November 9, 1999, the FKNMS and NMFS requested that the GMFMC take steps to prohibit fishing, consistent with the purpose of the proposed ecological reserve. The GMFMC accepted this request and is now working toward amending the GMFMP to prohibit fishing in the proposed area. At its meeting on March 21, 2000, the GMFMC considered an options paper on the proposed Tortugas Ecological Reserve and voted to proceed with a preferred alternative that would be consistent with the no-take status of the reserve. Based on the GMFMC's action, the regulations for the ecological reserve proposed by the FKNMS would also prohibit fishing. Because the GMFMC's action is not yet final and NMFS has not issued final regulations to implement that action, the proposed ecological reserve regulations would state that fishing would be prohibited in the Tortugas Ecological Reserve except to the extent authorized by 50 CFR parts 622 and 635 (it is anticipated that the GMFMC's action and NMFS implementation would prohibit fishing in the location of the proposed Tortugas Ecological Reserve). The FKNMS regulations prohibiting fishing would be consistent with the GMFMC's preferred alternative.

• NMFS is amending the Fishery Management Plan for Atlantic Tunas, Swordfish, and Sharks to be consistent with the no-take status of the proposed reserve.

• The State of Florida is drafting fishing regulations to prohibit fishing in those portions of Tortugas North that lie within State waters. Sanctuary regulations implementing the reserve would not become effective in State waters until approved by the State of Florida.

Combined with the establishment of the proposed ecological reserve, these actions would result in comprehensive protection for the nationally significant coral reef habitats from shallow to deep water extending from the Park into Sanctuary and GMFMC waters.

Process To Define a Proposed Ecological Reserve Boundary

Since 1991, NOAA has been concerned about the need to better protect the Tortugas area. This need is documented in the Draft and Final Environmental Impact Statement (EIS)/ Management Plans for the Sanctuary (DOC 1995 and 1996). In the Draft Environmental Impact Statement and Draft Management Plan (DEIS/MP), NOAA proposed a boundary for a 110 nm^2 Replenishment Reserve (Ecological Reserve) in the Tortugas area to protect significant coral resources while minimizing or avoiding adverse impacts to users. Public comment indicated that the then-proposed boundary would not protect the most significant coral reef resources and identified serious adverse economic impacts on commercial fishers from the then-proposed boundary and then-proposed no-take regulations. Accepting these comments, NOAA postponed establishing a reserve and went back to the drawing board by convening an *ad hoc* 25-member Working Group (WG) of the Sanctuary Advisory Council (SAC), composed of key stakeholder representatives, eight SAC members, and government agency representatives with resource management authority in the Tortugas area to recommend a ''preferred boundary alternative'' for the reserve.

One of the key stakeholders in the WG process was the NPS because of its stewardship of the DRTO which is surrounded by but jurisdictionally separate from the FKNMS. The NPS's involvement in the design of the reserve was critical because of the important shallow water coral reef resources found within the Park and the connectivity of those resources with surrounding Sanctuary waters. Coordination with the NPS was further motivated by the fact that the Park is revising its general management plan concurrent with the design of the ecological reserve and is considering making part of the Park a no-take area.

The process to develop the proposed ecological reserve can be described in three phases. The design phase (Phase I) took place from April 1998 to June 1999 and culminated with the SAC's recommendation and NOAA's acceptance of a preferred boundary. Phase II is the development of this DSEIS/SMP and solicitation of public comments on them. Phase III will be the development of a Final Supplemental Environmental Impact Statement/Final Supplemental Management Plan (FSEIS/MP), responding to public comment and establishing the reserve.

The WG collaborated and reached agreement on a recommendation to the State of Florida and the SAC regarding a preferred alternative for an ecological reserve in the Tortugas area. The WG developed criteria for evaluating a broad range of location, size and regulatory alternatives.

Over a 13-month period, the WG met five times and built up a knowledge base on the Tortugas region using scientific information provided by Sanctuary staff, personal knowledge, information received from constituents, and anecdotal information. To inform the WG of the resources and human uses of the area, two forums were held: one on ecological aspects of the region and one on socioeconomic uses. Scientists and knowledgeable locals were invited to present their information to the WG. The Tortugas 2000 website (http://www.fknms.nos.noaa.gov/tortugas) was a critical tool for disseminating information and was constantly updated as the process evolved and products were produced.

The Sanctuary and the NPS commissioned an ecological site characterization document composed of three chapters covering: physical oceanography and recruitment; fish and fisheries; and benthic communities. The information contained in these analyses was used to inform the WG of the resources and uniqueness of the Tortugas region and the data was used to create geographic information system (GIS) maps of the resources.

In addition to the ecological information, socioeconomic data was gathered from the commercial and recreational users of the area. It was first determined that approximately 105–110 commercial fishermen used the area. Information was collected on catch, costs, and trips from 90 of the fishermen. These 90 fishermen caught more than 90% of the total harvest from the Tortugas. The entire population of recreational charter users was interviewed and data on trips and costs were obtained. The commercial and recreational data were input into a GIS format and maps were produced showing use intensity.

A critical aspect of this GIS data was the creation of maps with a consistent scale and a consistent grid cell

framework so comparisons could be made between the maps. The study area was partitioned into one minute by one minute (approximately one nm^2) grid cells which facilitated the collection and analysis of data and the creation of boundary alternatives.

In February, the WG developed criteria for the ecological reserve that addressed ecological and socioeconomic concerns. On April 7, 1999, a packet of GIS maps was sent to the WG to assist in formulating draft alternatives. At its April 22–23 meeting, the criteria were first prioritized by the entire WG and then, in order to develop a broad range of alternatives, the WG broke into two groups: those who were conservation-oriented and those who were use-oriented. The groups reprioritized the criteria according to their interests, resulting in a less protective profile and a more protective profile. This exercise produced a matrix of criteria profiles that were used to develop the draft alternatives. In order to develop alternatives, the WG was broken up into four groups of varied perspectives (this was done to facilitate the development of a consensus).

These groups convened around roundtables and were presented with large, blank grid maps with corresponding transparent overlays. They also had workbooks showing maps of resources and uses. Each group was instructed to develop one alternative for each criteria profile. Observers who were not WG members were allowed to provide input into the drawing of the maps. Twelve draft alternatives were produced representing a range of protection options.

At the May 22 meeting, the WG chose two of the 12 alternatives to focus on and from those two alternatives a compromise arose that was presented by members of the WG. After considerable deliberation, this compromise was ultimately endorsed by the WG through consensus as the recommended ''preferred alternative.''

The preferred alternative would expand the boundary of the Sanctuary by approximately 96 nm^2 to include two significant coral reef areas known as Sherwood Forest and Riley's Hump and establish a Tortugas Ecological Reserve of approximately 151 nm^2. This alternative would expand the boundary of the Sanctuary in its northwesternmost corner by approximately 36 nm^2 to include Sherwood Forest and would expand the boundary in its southwesternmost corner by adding a noncontiguous area of approximately 60 nm^2 to include Riley's Hump. The proposed ecological reserve would also incorporate approximately 55 nm^2 of the existing Sanctuary in its northwest corner. The area of the proposed Tortugas Ecological Reserve surrounding Sherwood Forest would encompass approximately 91 nm^2 and would be called Tortugas North; the area surrounding Riley's Hump would be called Tortugas South.

On June 15, 1999, a presentation on the WG's process and recommended preferred alternative was given to the SAC. Following a lengthy and thorough deliberation the SAC voted unanimously to adopt the recommendation of the WG and forward it to NOAA and the State of Florida.

In developing the boundary alternatives presented in this document, Sanctuary staff took into consideration the deliberations of the WG, the recommendation of the SAC, the requirements of the FKNMSPA, National Marine Sanctuaries Act and NEPA, and the NPS's proposed Research/Natural Area alternative. Sanctuary staff developed five boundary alternatives for analysis which represent a broad range of areas for protection. The basis for these alternatives was the SAC's recommended preferred boundary alternative as well as the two alternatives that the WG chose to focus on at their final meeting. The alternatives were modified in order to create a broad range of options for consideration.

Boundary Alternative I. This alternative would be taking no action, that is, not expanding the boundary of the Sanctuary and not establishing a Tortugas Ecological Reserve.

Boundary Alternative II (Fig. 2). This alternative would establish a Tortugas Ecological Reserve of approximately 55 nm^2 in the northwesternmost portion of the existing Sanctuary boundary.

Areas within the SAC's recommended reserve boundary that would be not protected by this alternative would have to be protected by the relevant management agency. This alternative includes a portion of Sherwood Forest and the coral pinnacles north of Tortugas Bank; it does not include Riley's Hump. It includes some coral and hardbottom habitat north of the DRTO.

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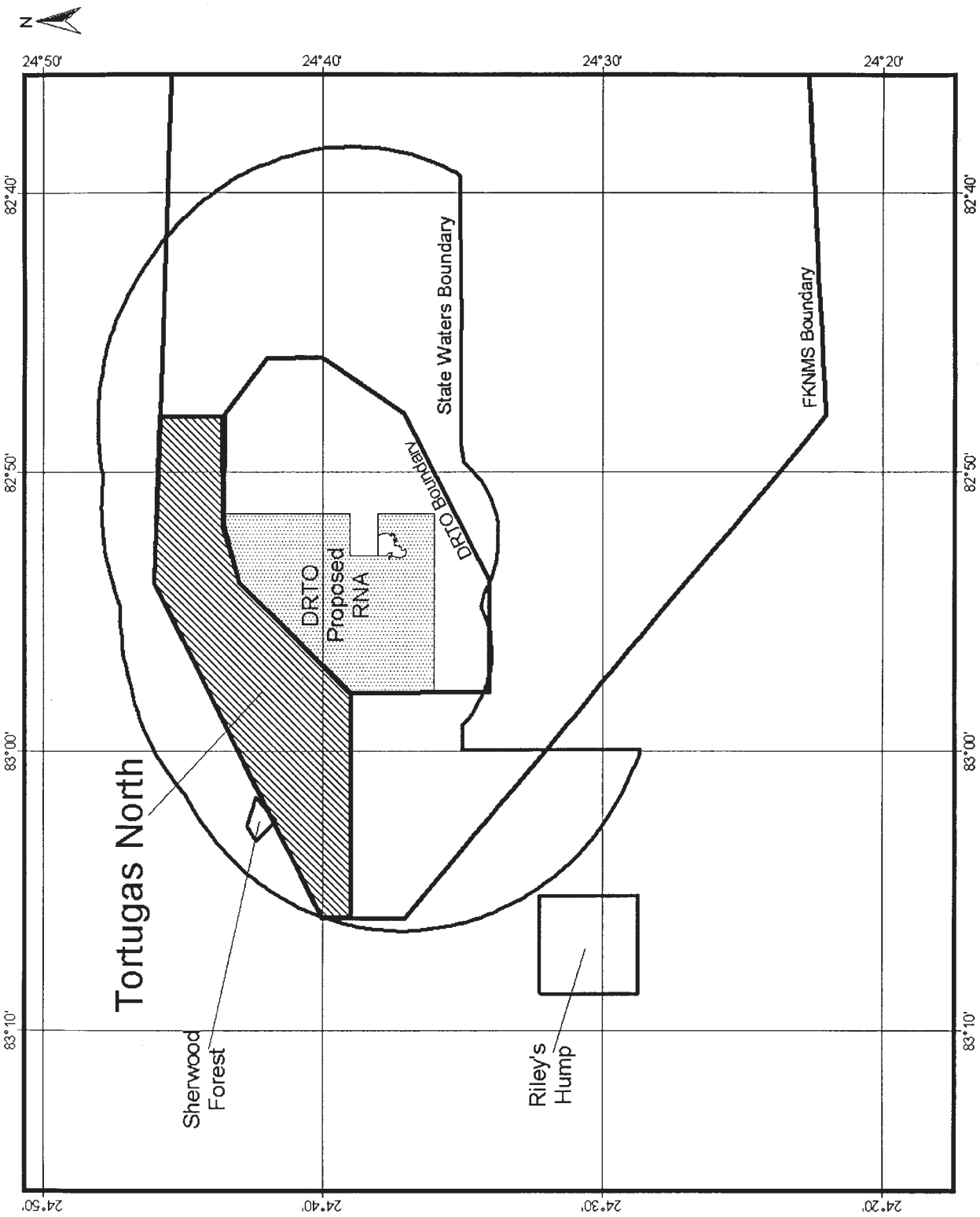

Figure 2. Boundary Alternative II

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Boundary Alternative III (Fig. 3—Preferred Boundary Alternative). This alternative would expand the boundary of the Sanctuary in its northwesternmost corner by approximately 36 nm^2 to include Sherwood Forest. In addition, this alternative would expand the boundary in its southwesternmost corner by adding a noncontiguous area of approximately 60 nm^2 to include Riley's Hump. The proposed ecological reserve would also incorporate approximately 55 nm^2 of the existing Sanctuary in its northwest corner, for a total Tortugas Ecological Reserve area of approximately 151 nm^2. The area of the proposed Tortugas Ecological Reserve surrounding Sherwood Forest would encompass approximately 91 nm^2 and would be called Tortugas North; the area surrounding Riley's Hump would be called Tortugas South. This alternative would involve four different management jurisdictions: FKNMS, State of Florida, GMFMC, and NMFS, all of which are in the process of taking steps to protect the areas within their respective jurisdictions. This alternative represents the WG's recommendation adopted by the SAC and recommended to NOAA and the State of Florida.

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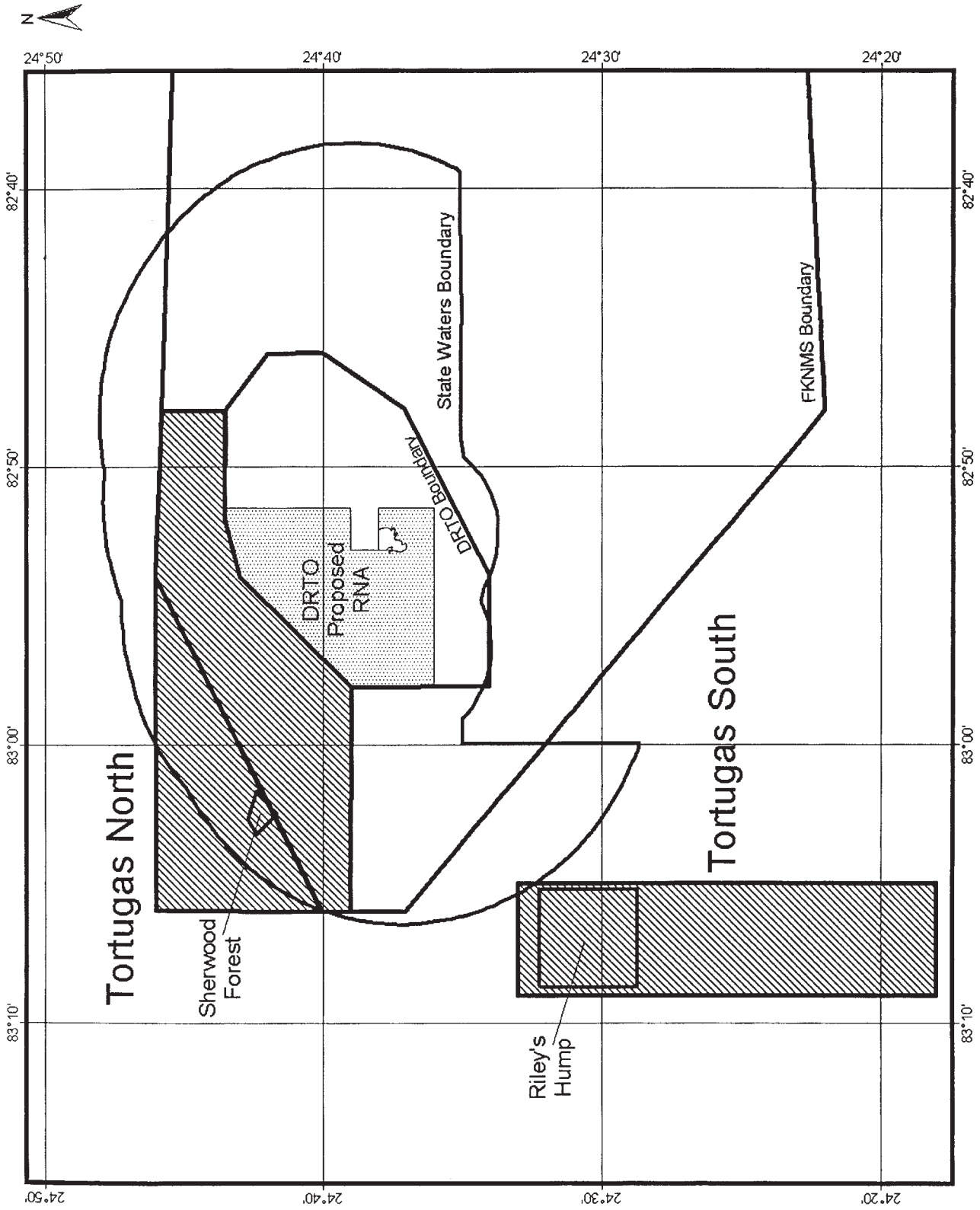

Figure 3. Boundary Alternative III (Preferred Boundary Alternative)

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Boundary Alternative IV (Fig. 4). This alternative would increase the area of Tortugas North over that in Alternative III by an additional 23 nm^2 to the south to make it conterminous with the NPS's proposed Research/Natural Area within the DRTO. The total area of the Tortugas North portion of the Tortugas Ecological Reserve would be approximately 115 nm^2. The Tortugas South area would be the same as in Alternative III. The total area for the Tortugas Ecological Reserve would be about 175 nm^2. This alternative would involve the same Sanctuary boundary expansion as in Alternative III.

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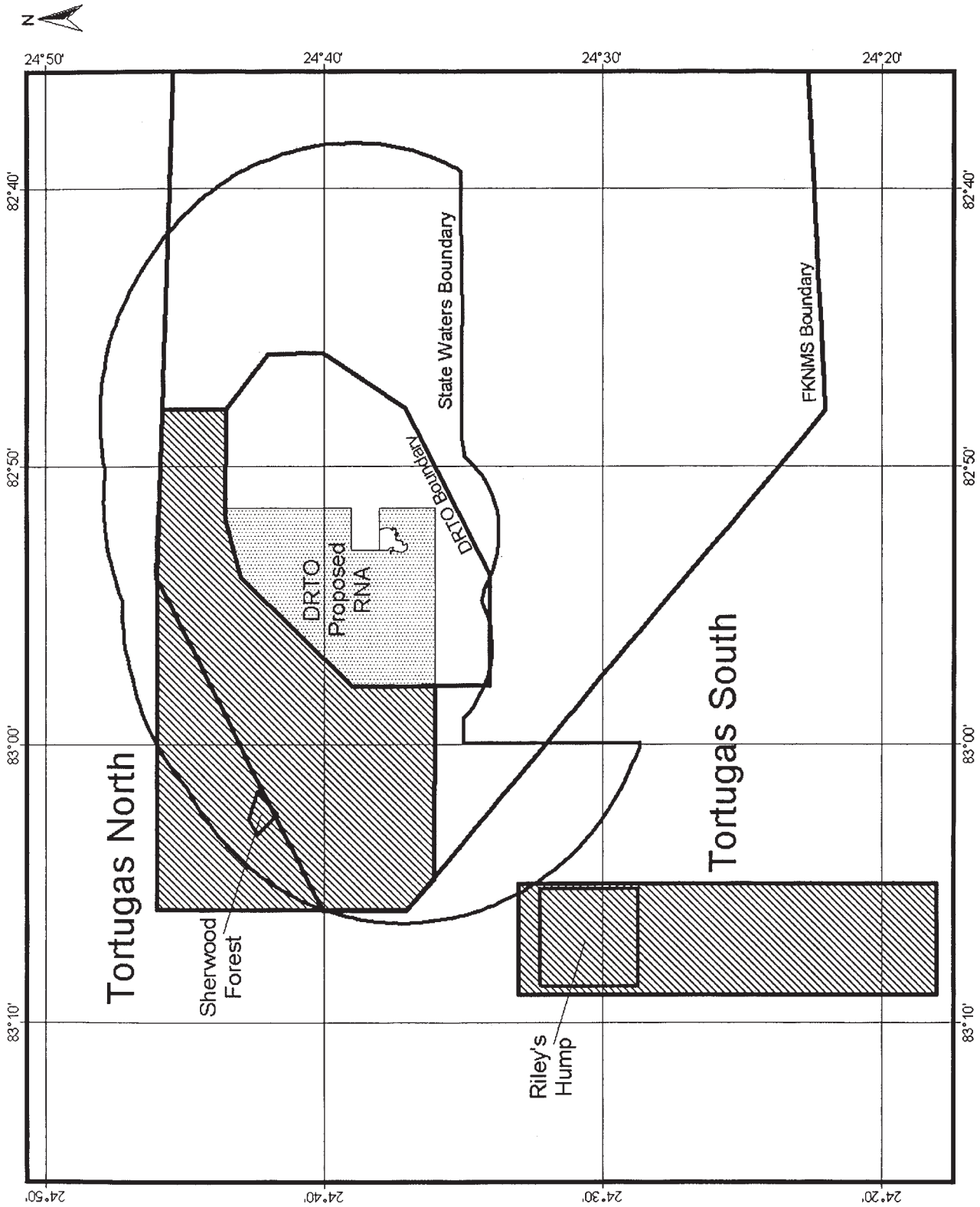

Figure 4. Boundary Alternative IV.

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Boundary Alternative V (Fig. 5). This alternative would expand the Sanctuary boundary over the expansions of Alternatives III and IV by three nm to the west in the northwesternmost corner of the Sanctuary. This would extend the western boundary of Tortugas North to the same longitude as the western boundary of Tortugas South. The area of Tortugas North would be increased by 31 nm^2 over Alternatives III and IV. The area of Tortugas North would be approximately 145 nm^2. Tortugas South would be reduced it in its southern extent over Alternatives III and IV by moving its southern boundary approximately 15 nm to the north. The area of Tortugas South would be approximately 45 nm^2 making the total area of the Tortugas Ecological Reserve approximately 190 nm^2.

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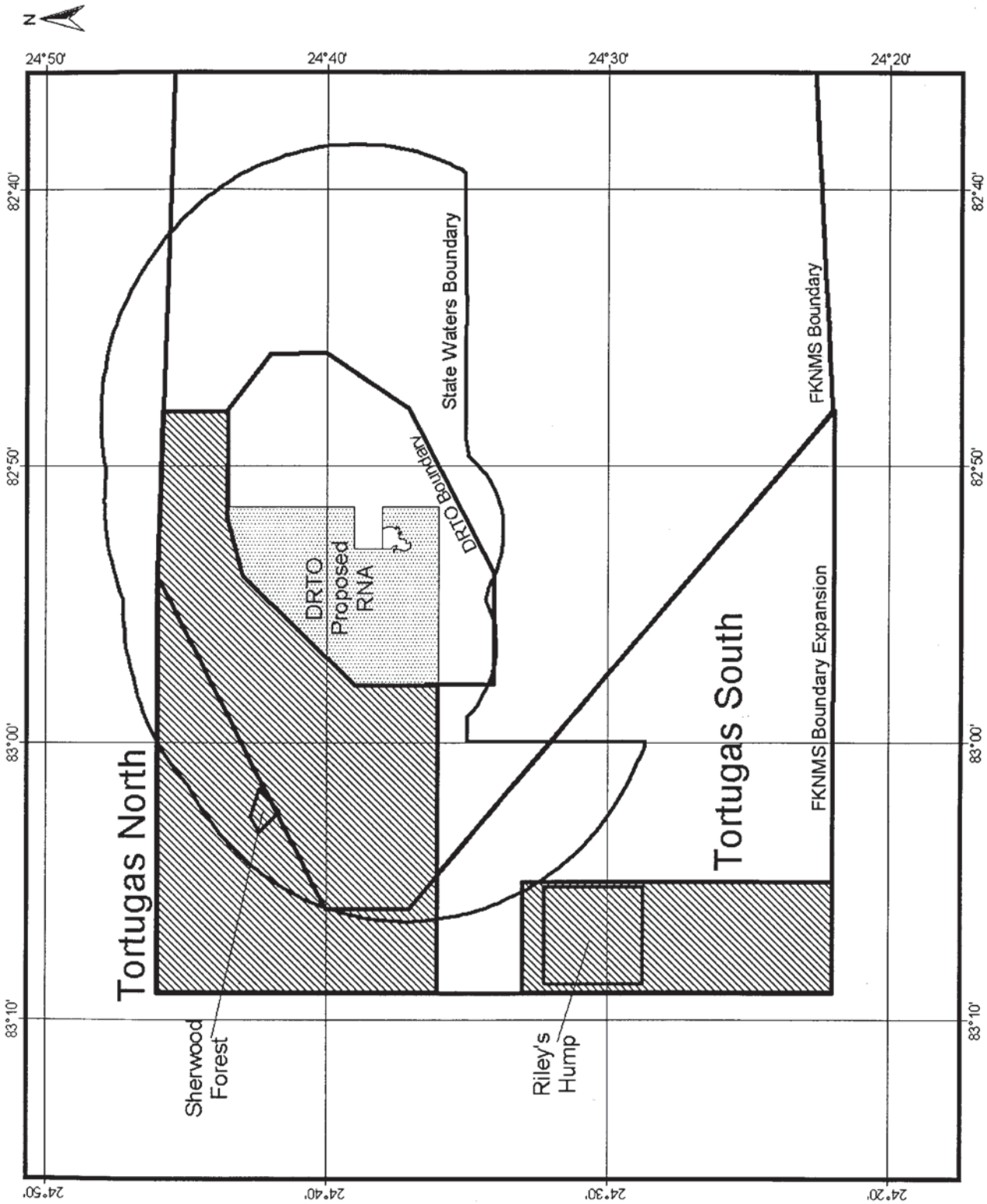

Figure 5. Boundary Alternative V

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Boundary Expansion (Fig. 6). Boundary Alternatives III, IV, and V would require expansion of the existing Sanctuary boundary. The original boundary in the western portion of the Sanctuary was drawn based on bathymetry as there was little information available at the time on significant ecological features. Consistent with E.O. 13089, Coral Reef Protection, and consistent with establishing an ecological reserve that comprehensively protects the resources, NOAA is now proposing to expand the boundary of the Sanctuary through the adoption of Boundary Alternative III to protect nationally significant coral reef resources that were unknown to the agency and to Congress at the time the Sanctuary was designated.

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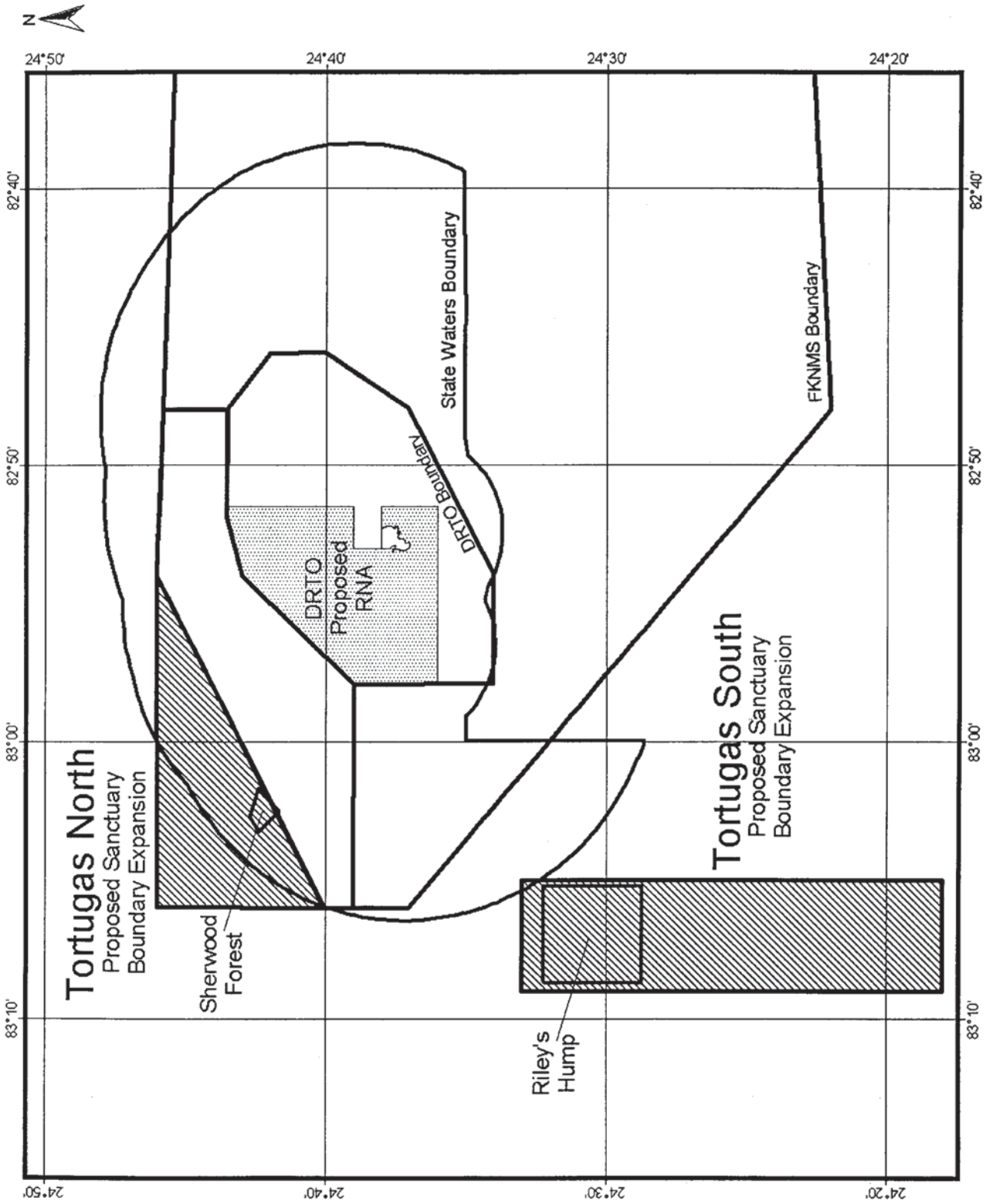

Figure 6. Proposed Sanctuary Boundary Expansion for Boundary Alternatives III and IV (shown in dark gray)

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Development and Description of Regulatory Alternatives

Four alternatives for regulating human activities within the reserve were developed. The regulatory alternatives are independent of the boundary alternatives (*i.e.,* regulatory alternatives can be paired with various boundary alternatives).

The foundation for these alternatives is the current FKNMS Sanctuary-wide regulations (15 CFR part 922, subpart P, in particular, § 922.163) and the additional regulations applicable to ecological reserves (15 CFR 922.164(d)). All of the alternatives begin with this foundation. In summary, the Sanctuary-wide regulations prohibit mineral and hydrocarbon exploration; removal of, injury to, or possession of coral or live rock; alteration of, or construction on, the seabed; discharge or deposit of materials or other matter; operation of vessels in a manner that endangers life, marine resources, or property; diving and snorkeling without flying a diver's down flag; releasing exotic species; damaging or removing markers; moving, removing, injuring, or possessing Sanctuary historical resources; taking or possessing protected wildlife; possessing or using explosives or electrical charges; harvesting or possessing marine life species not in accordance with the Florida Administrative Code; and interfering with law enforcement authorities.

In summary, the ecological reserve regulations prohibit the take or disturbance of any dead or living material; fishing; discharge or deposit of any material except cooling water or engine exhaust; anchoring when a mooring buoy is available or on living or dead coral; and touching living or dead coral. Transit by vessels is allowed provided that all fishing gear is stowed away. Currently, there is one ecological reserve in the Sanctuary (Western Sambo Ecological Reserve).

Other regulatory alternatives considered but rejected were taking no action, or making the entire proposed ecological reserve a no access, research/education-only area. The no-action alternative was rejected because it would not provide sufficient protection to coral reef resources from anchoring and other consumptive activities. Making the entire reserve a no access, research/education-only area appears to unnecessarily restrict non-consumptive activities.

Regulatory Alternative A

• Apply existing Sanctuary-wide and, with minor modifications described below, existing ecological reserve regulations, to Tortugas North and South.

Proposed regulations:

• *Tortugas North:* Apply existing Sanctuary-wide and, with minor modifications described below, existing ecological reserve regulations.

• *Tortugas South:* Apply existing Sanctuary-wide and, with minor modifications described below, existing ecological reserve regulations.

• The existing ecological reserve regulations would be revised at 15 CFR 922.164(d)(1) to reflect that fishing would be prohibited in the Tortugas Ecological Reserve except to the extent authorized by 50 CFR Parts 622 and 635 (it is anticipated that no fishing would be authorized in the Tortugas Ecological Reserve by these Parts).

• *Objective:* To minimize human disturbance in order to restore and maintain ecological integrity including a full assemblage of fishes, coral, and other benthic invertebrates.

Regulatory Alternative B

• Apply existing Sanctuary-wide and, with minor modifications, existing ecological reserve regulations to Tortugas North and South (as described in Alternative A).

• Prohibit anchoring in, prohibit mooring by vessels more than 100 ft in length overall (LOA), and control access to Tortugas South via permit and require a call-in prior to entering or when leaving.

Proposed regulations:

• Tortugas North. Same as in Alternative A above.

• Tortugas South. Same as in Alternative A above. In addition, prohibit anchoring, prohibit mooring by vessels more than 100 ft LOA, require a permit to enter the reserve for other than continuous transit, and require permitted vessels to call-in prior to entering or when leaving.

Description of access permit: Permit would be free, no paperwork would be required, and Sanctuary staff would be available year-round to handle requests.

Application: Applicant must call the Key West or Marathon Sanctuary office to request a permit and would have to radio into the Sanctuary staff person at Fort Jefferson (DRTO) prior to entering and upon leaving the reserve.

Required Information:

1. Names, addresses, and telephone numbers of owner, captain, and applicant.
2. Vessel name and home port.
3. USCG documentation number, state license, or boat registration number.
4. Length of vessel and primary propulsion type (*i.e.,*s motor or sail).
5. Number of divers.
6. Requested effective date and duration of permit.

Permit duration: For the time the vessel is in the area, not to exceed two weeks.

Restrictions: Vessels longer than 100 ft LOA cannot use the mooring buoys. Advance reservations no more than one month in advance.

Special Conditions: Doubling-up on mooring buoys would be permissible, leave and return privileges (dive during day, stay at the park overnight) would be allowed within the time period covered by the permit.

Call-in requirement: Permit holders must notify FKNMS staff at Fort Jefferson by radio no less than 30 minutes and no more than six hours before entering the reserve and upon leaving.

Objective: To minimize human disturbance in order to restore and maintain ecological integrity including a full assemblage of fishes, coral, and other benthic invertebrates and to create a reference area for studying human impacts on the ecosystem. This alternative would better protect Tortugas South by prohibiting anchoring and by controlling access (except for continuous transit) by a new type of permit. Prohibiting anchoring would better protect the coral reef resources in Tortugas South because the high cover of coral and the deep water depths make it difficult to anchor without damaging coral. The prohibition on mooring by vessels more than 100 ft LOA would protect the buoys from being ripped off their moorings by vessels exceeding the buoy's mooring capacity. Making Tortugas South a controlled access area would enhance its utility as a reference site for research and would facilitate enforcement of the regulations by giving advance notice to enforcement officers of the presence of a user vessel in this remote area.

Regulatory Alternative C (Preferred Regulatory Alternative)

• Apply existing Sanctuary-wide and, with minor modifications, existing ecological reserve regulations to Tortugas North and South (as described in Alternative A).

• Prohibit anchoring in, prohibit mooring by vessels more than 100 ft LOA, and control access to Tortugas North and South via permit and require call-in prior to entering and upon leaving (as described in Alternative B).

Proposed regulations:

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• *Tortugas North.* Same as for Tortugas South in Alternative B above.

• *Tortugas South.* Same as for Tortugas South in Alternative B above.

Objective: To minimize human disturbance in order to restore and maintain ecological integrity including a full assemblage of fishes, coral, and other benthic invertebrates and to create a reference area for studying human impacts on the ecosystem. Over Regulatory Alternative B, this alternative provides increased protection to Tortugas North by prohibiting anchoring and by controlling access (except for continuous transit) by access permit. Prohibiting anchoring would better protect the coral reef resources in Tortugas North because of the difficulty of anchoring without damaging coral due to the high cover of coral and the deep water depths. Anchoring by vessels 50 m or greater in length is already prohibited in approximately 19% of Tortugas North. The prohibition on mooring by vessels more than 100 ft LOA would protect the buoys from being ripped off their moorings by vessels exceeding the buoy's mooring capacity. Making Tortugas North a controlled access area would enhance its utility as a reference site for researching and would facilitate enforcement of the regulations by giving advance notice to enforcement officers of the presence of a user vessel in this remote area. The existing ATBA already prohibits vessels 50 m or greater from accessing approximately 23% of Tortugas North.

Regulatory Alternative D

• Apply existing Sanctuary-wide and, with minor modifications, existing ecological reserve regulations to Tortugas North and South (as described in Alternative A).

• Prohibit anchoring in, prohibit mooring by vessels more than 100 ft LOA, and control access to Tortugas North via permit and require call-in prior to entering and upon leaving (as described in Alternative B).

• Prohibit anchoring in, prohibit mooring by vessels more than 100 ft LOA, and restrict access to Tortugas South to research or educational activities only.

Proposed regulations:

• *Tortugas North.* Same as in Alternative C above.

• *Tortugas South.* Except for passage without interruption through the area with fishing gear stowed away or for law enforcement purposes, no person could enter Tortugas South except to conduct or cause to be conducted scientific research, or for educational use specifically authorized by and conducted in accordance with the scope, purpose, terms and conditions of a valid National Marine Sanctuary General permit (see 15 CFR 922.166(a)).

Objective: To minimize human disturbance in order to restore and maintain ecological integrity including a full assemblage of fishes, coral, and other benthic invertebrates and to create a reference area for studying human impacts on the ecosystem. Tortugas North would have the same protections as outlined in Regulatory Alternative C above. This alternative provides increased protection to Tortugas South over Alternative C by making it a research/education-only area. Making Tortugas South a research/education-only area would greatly enhance its utility as a reference site for researching and monitoring the effects of human activities on the functioning of a coral reef ecosystem. The prohibition on mooring by vessels more than 100 ft LOA would protect the buoys from being ripped off their moorings by vessels exceeding a buoy's mooring capacity.

The regulations proposed by this action would implement Regulatory Alternative C and would amend 15 CFR 922.161 to expand the boundary of the FKNMS to be consistent with Boundary Alternative III. The revised Sanctuary boundary coordinates would be set forth in Appendix I to part 922 which would also be revised to make minor revisions in the existing boundary to correct errors, provide clarification, and reflect more accurate data and, in the area of Biscayne National Park, to provide a fixed enforceable boundary. Appendix IV to part 922 would be revised to make the area within the coordinates for Boundary Alternative III an ecological reserve, to provide clarification, and to remove no longer needed introductory text. Appendices II, V, VI, and VII would be revised to correct errors, provide clarification, and reflect more accurate data.

The proposed regulations would revise the ecological reserve regulations at 15 CFR 922.164(d)(1) to reflect that fishing would be prohibited in the Tortugas Ecological Reserve except to the extent authorized by 50 CFR parts 622 and 635 (it is anticipated that no fishing would be authorized in the Tortugas Ecological Reserve by these parts); to prohibit anchoring in the Tortugas Ecological Reserve; entering the Tortugas Ecological Reserve without a valid access permit (except for continuous transit, law enforcement purposes, or monitoring); or tying a vessel greater than 100 ft (30.48 meters) LOA to a mooring buoy in the Tortugas Ecological Reserve or tying more than one vessel (other than vessels carried on board a vessel), if the combined lengths would exceed 100 ft (30.48 meters) LOA, to a mooring buoy or to a vessel tied to a mooring buoy in the ecological reserve. The reason for the length restriction is to prevent a buoy from being ripped off its mooring.

Because all anchoring would be prohibited in the northern portion of the Tortugas Bank no-anchoring zone established by 15 CFR 922.164(g), the proposed regulations would revise the zone to be consistent. The existing zone is an area within the Sanctuary boundary where vessels 50 m or greater in LOA are prohibited from anchoring. The northern portion of the zone overlaps the proposed ecological reserve.

The proposed regulations would add a new section to provide for permits for access to the ecological reserve. A person with a valid access permit would be allowed to enter the Tortugas Ecological Reserve. Access permits would not require written applications or the payment of any fee. Access permits would have to be requested at least 72 hours but no longer than one month before the date the permit would be effective. Permits could be requested via telephone or radio by contacting FKNMS at the Sanctuary offices at Key West or Marathon. A permit applicant would be required to provide, as applicable, the following information: vessel name; the names, addresses, and telephone number of the owner, operator and applicant; USCG documentation, state license, or registration number; home port; length of vessel and propulsion type (*i.e.,* motor or sail); number of divers; and the requested effective date and duration of permit (two weeks, maximum). The Sanctuary Superintendent would issue a permit to the owner or to the owner's representative for the vessel when all applicable information has been provided. FKNMS would provide a permit number to the applicant and confirm the effective date and duration period of the permit. Written confirmation of permit issuance would be provided upon request. Permit holders would be required to notify FKNMS staff at the Dry Tortugas National Park office, by telephone or radio, no less than 30 minutes and no more than six hours before entering and upon leaving the Tortugas Ecological Reserve. Permit holders could leave and return to the ecological reserve during the time their permit is effective.

Finally, the proposed regulations would add a new definition to 15 CFR

922.162, to define ''length overall (LOA) or length of a vessel.''

Proposed Revised Designation Document

Because NOAA is proposing to expand the boundary of the Sanctuary, the Designation Document for the Sanctuary needs to be revised to incorporate the new boundary coordinates, to authorize the regulation of entering or leaving specified areas of the Sanctuary, and to make necessary technical and editorial corrections of the Designation Document. The text of the Proposed Revised Designation Document follows:

Proposed Revised Designation Document for the Florida Keys National Marine Sanctuary

Article I. Designation and Effect

On November 16, 1990, the Florida Keys National Marine Sanctuary and Protection Act, Pub. L. 101–605 (16 U.S.C. 1433 note), became law. That Act designated an area of waters and submerged lands, including the living and nonliving resources within those waters future as described therein, as the Florida Keys National Marine Sanctuary (Sanctuary). By this revised Designation Document, the boundary of the Sanctuary is expanded to include important coral reef resources in two areas known as Sherwood Forest and Riley's Hump, just beyond the westernmost portion of the statutory Sanctuary boundary.

Section 304 of the National Marine Sanctuaries Act (NMSA), 16 U.S.C. 1431 *et seq.*, authorizes the Secretary of Commerce to issue such regulations as are necessary and reasonable to implement the designation, including managing and protecting the conservation, recreational, ecological, historical, research, educational and esthetic resources and qualities of a national marine sanctuary. Section 1 of Article IV of this Designation Document lists activities of the type that are presently being regulated or may have to be regulated in the future, in order to protect Sanctuary resources and qualities. Listing in section 1 does not mean that a type of activity will be regulated in the future; however, if a type of activity is not listed, it may not be regulated, except on an emergency basis, unless section 1 is amended following the procedures for designation of a sanctuary set forth in paragraphs (a) and (b) of section 304 of the NMSA, to include the type of activity.

Nothing in this Designation Document is intended to restrict activities that do not cause an adverse effect on the resources, or qualities of the Sanctuary or on Sanctuary property, or that do not pose a threat of harm to users of the Sanctuary.

Article II. Description of the Area

The Florida Keys National Marine Sanctuary boundary encompasses approximately 2900 nm² (9,800 square kilometers) of coastal and ocean waters, and the submerged lands thereunder, surrounding the Florida Keys in Florida. The easternmost point of the Sanctuary is the northeasternmost point of Biscayne National Park and the westernmost point is approximately 15 kilometers to the west of the western boundary of Dry Tortugas National Park, a linear distance of approximately 335 kilometers. The contiguous area boundary on the Atlantic Ocean side of the Florida Keys runs south from Biscayne National Park generally following the 300-foot isobath, curving in a southwesterly direction along the Florida Keys archipelago until south of the Dry Tortugas. The contiguous area boundary on the Gulf of Mexico side of the Florida Keys runs from this southern point in a straight line to the northwest and then when directly west of the Dry Tortugas in a straight line to the north. The boundary then turns to the east and slightly south and follows a straight line to just west of Key West and then turns to the northeast and follows a straight line parallel to the Florida Keys approximately five miles to the south, and then follows the Everglades National Park boundary until Division Point where the boundary then follows the western shore of Manatee Bay, Barnes Sound, and Card Sound. The boundary then follows the southern boundary of Biscayne National Park and up its eastern boundary until its northeasternmost point. Starting just to the east of the most western boundary line of the contiguous portion of the Sanctuary, there is a vertical rectangular shaped area of 60 nm² just to the south.

The shoreward boundary of the Sanctuary is the mean high-water mark except around the Dry Tortugas where it is the boundary of the Dry Tortugas National Park. The Sanctuary boundary encompasses the entire Florida coral reef tract, all of the mangrove islands of the Florida Keys, and some of the sea grass meadows of the Florida Keys. The precise boundary of the Sanctuary is set forth at the end of this Designation Document.

Article III. Characteristics of the Area That Give It Particular Value

The Florida Keys extend approximately 223 miles southwest from the southern tip of the Florida peninsula. Adjacent to the Florida Keys land mass are located spectacular unique, nationally significant marine environments, including sea grass meadows, mangrove islands, and extensive living coral reefs. These marine environments support rich biological communities possessing extensive conservation, recreational, commercial, ecological, historical, research, educational, and aesthetic values which give this area special national significance. These environments are the marine equivalent of tropical rain forests in that they support high levels of biodiversity, are fragile and easily susceptible to damage from human activities, and possess high value to humans if properly conserved. These marine environments are subject to damage and loss of their ecological integrity from a variety of sources of disturbance.

The Florida Keys are a limestone island archipelago. The Keys are located at the southern edge of the Florida Plateau, a large carbonate platform made of a depth of up to 7000 meters of marine sediments, which have been accumulating for 150 million years and which have been structurally modified by subsidence and sea level fluctuation. The Keys region is generally divided into five distinct areas: the Florida reef tract, one of the world's largest coral reef tracts and the only barrier reef in the United States; Florida Bay, described as an active lime-mud factory because of the high carbonate content of its silts and muds; the Southwest Continental Shelf; the Straits of Florida; and the Keys themselves.

The 2.5 million-acre Sanctuary contains one of north America's most diverse assemblages of terrestrial, estuarine, and marine fauna and flora, including, in addition to the Florida reef tract, thousands of patch reefs, one of the world's largest sea grass communities covering 1.4 million acres, mangrove fringed shorelines, mangrove islands, and various hardbottom habitats. These diverse habitats provide shelter and food for thousands of species of marine plants and animals, including more than 50 species of animals identified under Federal or State law, as endangered or threatened. The Keys were at one time a major sea faring center for European and American trade routes to the Caribbean, and the submerged cultural and historic resources (*i.e.,* shipwrecks) abound in the surrounding waters. In addition, the Sanctuary may contain substantial archaeological resources of pre-European cultures.

The uniqueness of the marine environment draws multitudes of

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visitors to the Keys. The major industry in the Florida Keys is tourism, including activities related to the Keys' marine resources, such as dive shops, charter fishing and dive boats and marinas, as well as hotels and restaurants. The abundance of the resources also supports a large commercial fishing employment sector.

The number of visitors to the Keys grows each year, with a concomitant increase in the number of residents, homes, jobs, and businesses. As population grows and the Keys accommodate ever-increasing resource-use pressures, the quality and quantity of Sanctuary resources are increasingly threatened. These pressures require coordinated and comprehensive monitoring and researching of the Florida Keys' region.

Article IV. Scope of Regulations

Section 1. Activities Subject to Regulation

The following activities are subject to regulation under the NMSA, either throughout the entire Sanctuary or within identified portions of it or, as indicated, in areas beyond the boundary of the Sanctuary, to the extent necessary and reasonable. Such regulation may include prohibitions to ensure the protection and management of the conservation, recreational, ecological, historical, research, educational, or aesthetic resources and qualities of the area. Because an activity is listed here does not mean that such activity is being or will be regulated. All listing means is that the activity can be regulated, after compliance with all applicable regulatory laws, without going through the designation procedures required by paragraphs (a) and (b) of section 304 of the NMSA, 16 U.S.C. 1434(a) and (b). Further, no regulation issued under the authority of the NMSA except an emergency regulation issued with the approval of the Governor of the State of Florida may take effect in the area of the Sanctuary lying within the seaward boundary of the State of Florida if the Governor of the State of Florida certifies to the Secretary of Commerce that such regulation is unacceptable within the forty-five-day review period specified in NMSA. Detailed definitions and explanations of the following ''activities subject to regulation'' appear in the Sanctuary Management Plan:

1. Exploring for, developing, or producing oil, gas, and/or minerals (*e.g.,* clay, stone, sand, gravel, metalliferous ores, nonmetalliferous ores) in the Sanctuary;

2. Touching, climbing on, taking, removing, moving, collecting, harvesting, injuring, destroying or causing the loss of, or attempting to take, remove, move, collect, harvest, injure, destroy or cause the loss of, coral in the Sanctuary;

3. Drilling into, dredging or otherwise altering the seabed of the Sanctuary, except incidental to allowed fishing and boating practices or construction activities permitted by county, state or federal regulatory agencies; or constructing, placing or abandoning any structure, material or other matter on the seabed of the Sanctuary, except as authorized by appropriate permits or incidental to allowed fishing practices;

4. Discharging or depositing, within or beyond the boundary of the Sanctuary, any material that subsequently enters the Sanctuary and injures a Sanctuary resource or quality;

5. Operating water craft in the Sanctuary

(a) In a manner that could injure coral, hardbottoms, seagrass, mangroves, or any other immobile organism attached to the seabed,

(b) In a manner that could injure or endanger the life of divers, fishermen, boaters or other users of the Sanctuary,

(c) In a manner that could disturb marine mammals, marine reptiles, or bird rookeries;

6. Diving or boating activities in the Sanctuary including anchoring that could harm Sanctuary resources, Sanctuary property, or other users of the Sanctuary;

7. Stocking within the Sanctuary or releasing within the Sanctuary or from beyond the boundary of the Sanctuary, native or exotic species of plant, invertebrate, fish, amphibian or mammals;

8. Defacing, marking, or damaging in any way or displacing, removing, or tampering with any markers, signs, notices, placards, navigational aids, monuments, stakes, posts, mooring buoys, boundary buoys, trap buoys, or scientific equipment in the Sanctuary;

9. Removal, injury, preservation, curation, and management of historic resources within the Sanctuary without the appropriate state and/or federal permits;

10. Taking, removing, moving, catching, collecting, harvesting, feeding, injuring, destroying, or causing the loss of, or attempting to take, remove, move, catch, collect, harvest, feed, injure, destroy or cause the loss of any marine mammal, marine reptile, or bird within the Sanctuary, without the appropriate state and/or federal permits;

11. Possessing, moving, harvesting, removing, taking, damaging, disturbing, breaking, cutting, spearing, or otherwise injuring any marine invertebrate, fish, bottom formation, algae, seagrass or other living or dead organism, including shells, or attempting any of these activities in any area of the Sanctuary designated as an Existing Management Area, Wildlife Management Area, Ecological Reserve, Sanctuary Preservation Area, or Special-Use Area;

12. The carrying and possessing of specified fishing gear in any area of the Sanctuary designated as an Existing Management Area, Wildlife Management Area, Ecological Reserve, Sanctuary Preservation Area, or Special-Use Area except for passage without interruption through;

13. Entering or leaving any Wildlife Management Area, Ecological Reserve, Sanctuary Preservation Area, or Special-Use Area except for passage without interruption through or for law enforcement purposes;

14. Harvest of marine life as defined and regulated by the State of Florida under its marinelife rule;

15. Mariculture;

16. Possessing or using explosives or releasing electrical charges or substances poisonous or toxic to fish and other living marine resources within the Sanctuary or beyond the boundary of the Sanctuary (possession of ammunition shall not be considered possession of explosives);

17. Removal and disposal of lost, out-of-season, or illegal gear discovered within the Sanctuary; removal of vessels grounded, lodged, stuck or otherwise perched on coral reefs, hardbottom, or seagrasses within the Sanctuary; and removal and disposal of derelict or abandoned vessels or other vessels within the Sanctuary for which ownership cannot be determined or for which the owner takes no action for removal or disposal; and salvaging and towing of vessels abandoned or disabled within the Sanctuary vessels or of vessels within the Sanctuary otherwise needing salvaging or towing; and

18. Interfering with, obstructing, delaying or preventing an investigation, search, seizure or deposition of seized property in connection with enforcement of the NMSA or any regulation or permit issued under the NMSA.

Section 2. Emergency Regulation

Where necessary to prevent or minimize the destruction of, loss of, or injury to a Sanctuary resource or quality; or to minimize the imminent risk of such destruction, loss or injury, any activity, including any not listed in Section 1 of this article, is subject to immediate temporary regulation,

including prohibition. However, no such regulation may take effect in any area of the Sanctuary lying within the seaward boundary of the State of Florida without the approval of the Governor of the State of Florida.

Article V. Effect on Leases, Permits, Licenses, and Rights

Pursuant to paragraph (c)(1) of section 304 of the NMSA, 16 U.S.C. 1434(c)(1), no valid lease, permit, license, approval or other authorization issued by any federal, State, or local authority of competent jurisdiction, or any right of subsistence use or access, may be terminated by the Secretary of Commerce, or his or her designee, as a result of a designation, or as a result of any sanctuary regulation, if such authorization or right was in effect on the effective date of the designation (November 16, 1990 with respect to the statutory Sanctuary boundary; , 2000 with respect to the expansion area made by this revision to the designation document).

In no event may the Secretary of Commerce or his or her designee issue a permit authorizing, or otherwise approving: (1) The exploration for, development of, or production of oil, gas, or minerals within the Sanctuary; or (2) The disposal of dredged materials within the Sanctuary (except by certification in accordance with applicable National Marine Sanctuary Program regulations of valid authorizations in existence on the effective date of Sanctuary designation). Any purported authorizations issued by other authorities after the effective date of Sanctuary designation for any of these activities within the Sanctuary shall be invalid.

Article VI. Alteration of This Designation

The terms of designation, as defined in paragraph (a) of section 304 of the NMSA, 16 U.S.C. 1434(a), may be modified only by the procedures outlined in paragraphs (a) and (b) of section 304 of the NMSA, 16 U.S.C. 1434(a) and (b), including public hearings, consultation with interested federal, state, and local government agencies, review by the appropriate Congressional committees, review by the Governor of the State of Florida, and approval by the Secretary of Commerce, or his or her designee. No designation, term of designation, or implementing regulation may take effect in the area of the Sanctuary lying within the seaward boundary of the State of Florida if the Governor of the State of Florida certifies to the Secretary of Commerce that such designation or term of designation regulation is unacceptable within the forty-five-day review period specified in NMSA.

Florida Keys National Marine Sanctuary Boundary Coordinates (Based on North American Datum of 1983)

The boundary of the Florida Keys National Marine Sanctuary—

(a) Begins at the northeasternmost point of Biscayne National Park located at a point approximately 25 degrees 39 minutes north latitude, 80 degrees 05 minutes west longitude, then runs eastward to the point located at 25 degrees 39 minutes north latitude, 80 degrees 04 minutes west longitude; and

(b) Then runs southward and connects in succession the points at the following coordinates:

(i) 25 degrees 34 minutes north latitude, 80 degrees 04 minutes west longitude,

(ii) 25 degrees 28 minutes north latitude, 80 degrees 05 minutes west longitude,

(iii) 25 degrees 21 minutes north latitude, 80 degrees 07 minutes west longitude, and

(iv) 25 degrees 16 minutes north latitude, 80 degrees 08 minutes west longitude;

(c) Then runs southwesterly and connects in succession the points at the following coordinates:

(i) 25 degrees 07 minutes north latitude, 80 degrees 13 minutes west longitude,

(ii) 24 degrees 57 minutes north latitude, 80 degrees 21 minutes west longitude,

(iii) 24 degrees 39 minutes north latitude, 80 degrees 52 minutes west longitude,

(iv) 24 degrees 30 minutes north latitude, 81 degrees 23 minutes west longitude,

(v) 24 degrees 25 minutes north latitude, 81 degrees 50 minutes west longitude,

(vi) 24 degrees 22 minutes north latitude, 82 degrees 48 minutes west longitude,

(vii) 24 degrees 37 minutes north latitude, 83 degrees 06 minutes west longitude,

(viii) 24 degrees 46 minutes north latitude, 83 degrees 06 minutes west longitude,

(ix) 24 degrees 46 minutes north latitude, 82 degrees 54 minutes west longitude,

(x) 24 degrees 44 minutes north latitude, 81 degrees 55 minutes west longitude,

(xi) 24 degrees 51 minutes north latitude, 81 degrees 26 minutes west longitude, and

(xii) 24 degrees 55 minutes north latitude, 80 degrees 56 minutes west longitude;

(d) Then follows the boundary of Everglades National Park in a southerly then northeasterly direction through Florida Bay, Buttonwood Sound, Tarpon Basin, and Blackwater Sound;

(e) After Division Point, then departs from the boundary of Everglades National Park and follows the western shoreline of Manatee Bay, Barnes Sound, and Card Sound;

(f) Then follows the southern boundary of Biscayne National Park to the southeasternmost point of Biscayne National Park; and

(g) Then follows the eastern boundary of Biscayne National Park to the beginning point specified in paragraph (a).

The shoreward boundary of the Florida Keys National Marine Sanctuary is the mean high-water mark except around the Dry Tortugas where the boundary is conterminous with that of the Dry Tortugas National Park, formed by connecting in succession the points at the following coordinates:

(i) 24 degrees 34 minutes 0 seconds north latitude, 82 degrees 54 minutes 0 seconds west longitude;

(ii) 24 degrees 34 minutes 0 seconds north latitude, 82 degrees 58 minutes 0 seconds west longitude;

(iii) 24 degrees 39 minutes 0 seconds north latitude, 82 degrees 58 minutes 0 seconds west longitude;

(iv) 24 degrees 43 minutes 0 seconds north latitude, 82 degrees 54 minutes 0 seconds west longitude;

(v) 24 degrees 43 minutes 32 seconds north latitude, 82 degrees 52 minutes 0 seconds west longitude;

(vi) 24 degrees 43 minutes 32 seconds north latitude, 82 degrees 48 minutes 0 seconds west longitude;

(vii) 24 degrees 42 minutes 0 seconds north latitude, 82 degrees 46 minutes 0 seconds west longitude;

(viii) 24 degrees 40 minutes 0 seconds north latitude, 82 degrees 46 minutes 0 seconds west longitude;

(ix) 24 degrees 37 minutes 0 seconds north latitude, 82 degrees 48 minutes 0 seconds west longitude; and

(x) 24 degrees 34 minutes 0 seconds north latitude, 82 degrees 54 minutes 0 seconds west longitude.

The Florida Keys National Marine Sanctuary also includes the area located within the boundary formed by connecting in succession the points at the following coordinates;

(i) 24 degrees 33 minutes north latitude, 83 degrees 09 minutes west longitude,

(ii) 24 degrees 33 minutes north latitude, 83 degrees 05 minutes west longitude,

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(iii) 24 degrees 18 minutes north latitude, 83 degrees 05 minutes west longitude,

(iv) 24 degrees 18 minutes north latitude, 83 degrees 09 minutes west longitude, and

(v) 24 degrees 33 minutes north latitude, 83 degrees 09 minute west longitude.

End of Proposed Revised Designation Document.

Summary of Draft Supplemental Management Plan

The draft supplemental management plan complements the existing Management Plan in several respects.

A supplement to the Administrative Action Plan targets the development of a memorandum of understanding to clearly define the roles and responsibilities if the various agencies responsible for resource management in the Tortugas region. The MOU would cover, at a minimum, the following activities: cooperative enforcement, research, and sharing of facilities. Management of the Tortugas Ecological Reserve would necessitate a high degree of coordination and cooperation between the affected agencies particularly the FKNMS and the NPS. Both agencies have similar missions and responsibilities. Consequently, cooperation would not only save money but would also improve resource protection. The NPS has a variety of assets, such as land, housing and dockage, that, under a workable agreement, could potentially be used to support management of the ecological reserve. An agreement on the use of these lands and facilities would be pursued by the FKNMS and NPS.

The State of Florida is the co-trustee for a significant portion of the waters and marine resources within the proposed reserve and would co-manage them with the FKNMS.

The NMFS has responsibility for regulating the fisheries in the federal waters of the reserve. NMFS has considerable expertise and some assets that could be utilized in managing the reserve, particularly in the areas of research and monitoring.

NOAA's Office of Law Enforcement also has responsibility for enforcing fishing and Sanctuary regulations and has assets and technology that could potentially be used for enforcement.

The U.S. Coast Guard has responsibility for enforcing federal laws within U.S. waters. It has several large offshore patrol vessels based in Key West that could be used in conjunction with Sanctuary patrol vessels for enforcement of the Sanctuary regulations within the reserve areas.

A supplement to the Education and Outreach Action Plan would facilitate the production of a documentary video or film on the development and environmental qualities and characteristics of the ecological reserve. In addition, the supplement to the Plan would develop a visitor's center in Key West to interpret the marine environment and resources of the reserve and the Tortugas region for the visiting public.

A supplement to the Enforcement Action Plan would be the hiring of additional enforcement officers to patrol the reserve; the installation, operation and maintenance of surveillance radar; the purchase and installation of housing for Sanctuary staff at Fort Jefferson; and the purchase, operation and maintenance of an offshore patrol vessel.

A supplement to the Mooring and Boundary Buoy Action Plan would be the installation and maintenance of mooring buoys in Tortugas North and South and boundary buoys in Tortugas North.

A supplement to the Regulatory Action Plan would be the issuance of final regulations to implement the boundary expansion and the establishment of the reserve. The supplement would call for extensive coordination with the State of Florida, the Gulf of Mexico Fishery Management Council, and NMFS to ensure that all approvals and required regulations are obtained and in place. A collateral aspect to the issuance of regulations would be publication on NOAA nautical charts of the new boundaries for the Sanctuary and the reserve.

A supplement to the Research and Monitoring Action Plan would be the hiring of additional support staff; the design and implementation of long-term ecological monitoring; the undertaking of a feasibility study in conjunction with the NPS on reestablishing the Dry Tortugas Marine Laboratory; establishment of a wireless data transfer capability using the existing two-way radio network; establishment of the Tortugas as a long-term ocean ecosystem observatory with continuous, automated collection of key physical and biological parameters; and the design and implementation of a non-use valuation study of the national significance of the coral reef resources in the Tortugas region.

Miscellaneous Rulemaking Requirements

Marine Protection, Research, and Sanctuaries Act

Paragraph (a)(4) of section 304 the NMSA, 16 U.S.C. 1434(a)(4), requires that the procedures specified in section 304 for designating a National Marine Sanctuary be followed for modifying any term of designation. Because this action would revise the Sanctuary boundary to include an additional 96 square nautical miles, it would revise the boundary terms of designation thus triggering the requirements of section 304. In particular, section 304 requires that the Secretary of Commerce to submit to the Committee on Resources of the United States House of Representatives and the Committee on Commerce, Science, and Transportation of the United States Senate, on the same day as this notice is published, a prospectus on the proposal, which must contain, among other things, the terms of the proposed designation, the proposed regulations, a draft management plan detailing the proposed goals and objectives, management responsibilities, research activities for the area, and a draft environmental impact statement. In accordance with section 304, the required prospectus is being submitted to the specified Congressional Committees.

Executive Order 12866

This action has been determined to be significant for purposes of E.O. 12866. That Order requires a draft text of the regulations to be proposed, a reasonably detailed description of the need for the action, an explanation of how the action will meet that need, and an assessment of the potential costs and benefits, including an explanation of the manner in which the action is consistent with statutory mandates, and, to the extent permitted by law, promotes the President's priorities and avoids undue interference with State, local, and tribal governments in the exercise of their governmental functions (referred to as a Regulatory Impact Review (RIR). In accordance with the requirements of the Executive Order, NOAA has prepared an RIR for this action. The RIR is contained in part V of the DSEIS/SMP. NOAA will announce shortly the public availability of the DSEIS/SMP.

Regulatory Flexibility Act

In accordance with the requirements of section 603(a) of the Regulatory Flexibility Act (5 U.S.C. 603(a)), NOAA has prepared an initial regulatory flexibility analysis (IRFA) describing the

impact of this proposed action on small entities. Section 603(b) (5 U.S.C. 603(b)) requires that each IRFA contain a description of the reasons why the action is being considered, a succinct statement of the objectives of, and legal basis for, the action, a description of and, where feasible, an estimate of the number of small entities to which the proposed action will apply, a description of the projected reporting, recordkeeping and other compliance requirements of the proposed action, including an estimate of the classes of small entities which would be subject to the requirement and the type of professional skills necessary for preparation of the report or record, and an identification, to the extent practicable, of all relevant Federal rules which may duplicate, overlap or conflict with the proposed action. In addition, section 603(c) (5 U.S.C. 603(c)) requires that each IRFA contain a description of any significant alternatives to the proposed action which accomplish the stated objectives of applicable statutes and which minimize any significant economic impact of the proposed action on small entities. The complete IRFA is contained in Parts I, IV, and V of the DSEIS/SMP.

The following is a summary of the IRFA:

Statement of Need and Why Regulatory Action is being Considered

As previously set forth in this regulatory preamble.

Goals, Objectives, and Legal Basis

As previously set forth in this regulatory preamble.

Description of the Projected Reporting, Recordkeeping and Other Compliance Requirements.

The only record keeping or reporting requirements are the permit and call-in, call-out requirements for the reserve previously described in the Preamble under proposed regulations. There are two classes of users that would be affected by these proposed requirements: commercial dive boat operators and private boaters. The type of skills necessary to request an access permit and to provide notification when entering or leaving the proposed ecological reserve would be use of marine radio equipment.

Relevant Federal Rules Which May Duplicate, Overlap or Conflict With the Proposed Action.

The GMFMC is amending the GMFMP to prohibit fishing in the areas of Tortugas North and South that are beyond State of Florida waters in the Exclusive Economic Zone. NMFS would implement these amendments by issuing a no-fishing rule for those areas. Also, NMFS is amending the Fishery Management Plan for Atlantic Tunas, Swordfish, and Sharks and its implementing regulations to be consistent with the no-take status of the proposed reserve.

The State of Florida is drafting fishing regulations to prohibit fishing in those portions of Tortugas North that lie within State waters. Sanctuary regulations implementing the reserve would not become effective in State waters until approved by the State of Florida. These actions in conjunction with the Sanctuary rule on no-take would ensure comprehensive protection for the coral reef resources and to facilitate user awareness and compliance with the rules.

Description and Estimate of the Number of Small Entities to Which the Proposed Rule Would Apply.

It is estimated that there are up to 64 commercial fishers and 10 recreational charter vessel (fishing and/or diving) operators who could be affected by the proposed rule. All of these are considered small entities for purposes of the Regulatory Flexibility Act.

Description of Any Significant Alternatives to the Proposed Action Which Accomplish the Stated Objectives of Applicable Statutes and Which Minimize any Significant Economic Impact of the Proposed Action on Small Entities

Approach to the Analysis of Alternatives.

The analysis of the alternatives focuses on market economic impacts as measured by direct revenue, costs and profits of the business firms directly affected by the ''no-take'' regulations. These impacts are then translated into the secondary or multiplier impacts on the local economy. For the recreational industry, the impact area is defined as Monroe County, Florida and, for the commercial fisheries the impact areas are Monroe County and Lee/Collier counties. For the commercial fisheries, the results presented here are an aggregation of the impacts on both Monroe and Lee/Collier counties. The market economic impacts include estimates of output/sales, income and employment.

The approach begins by first analyzing the ''no-take'' regulation for each boundary alternative.

Analyses are presented for the recreation industry (broken down into consumptive and nonconsumptive), the commercial fisheries, commercial shipping, treasure salvors and then other benefits (nonusers, scientific and education values). The other regulations are then analyzed. These include the no anchoring regulation, access restrictions, and sanctuary-wide regulations (for boundary alternatives that include areas outside current Sanctuary boundary). For most of the sanctuary-wide regulations, there is no additional or incremental impact over the ''no-take'' regulation.

For the recreation industry and the commercial fishing industry, the impacts first are estimated by assuming a complete loss for any activity displaced. This is done by adding up all the activities within the geographic area defined by an ecological reserve boundary (*i.e.*, the no-take area) and applying the appropriate economic parameters. Next, a qualitative approach is used to assess whether the results from step 1 are likely to occur. Mitigating and offsetting factors are taken into account. With respect to the recreational industry sector, consumptive recreation is separated from non-consumptive recreation since consumptive recreation activities are displaced from the ''no-take'' areas and may potentially be negatively impacted, while non-consumptive activities would be beneficiaries of the ''no-take'' areas. With respect to the commercial fisheries, all would be displaced from the ''no-take'' areas and, potentially, would be negatively impacted in the short term. Over the long term, creation of the ecological reserve is expected to generate replenishment effects to the fisheries. Over the longer term, there would be long-term benefits even to commercial reef fishermen and related dependent businesses. The analysis assumes that all entities impacted are small entities within the meaning of the Regulatory Flexibility Act.

Definition of the Study Areas. For purposes of the analyses presented in this report, there are five basic study areas. The first is a 1,020 nm^2 area called the TERSA (see Fig.1). This was the area selected by the FKNMS for analyzing different alternatives for the proposed Tortugas Ecological Reserve. All socioeconomic information was collected and organized in the TERSA at geographical resolution of one nm^2. Detailed descriptions of the data are included for the recreation industry and for the commercial fisheries.

Boundary Alternatives

As described earlier in this Preamble.

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No-take Regulations

Recreation Industry

Boundary Analysis

The interpretation of the estimates provided in this analysis is critical to understanding the ''true'' impact of the various alternatives proposed for the Tortugas Ecological Reserve. The estimates from the geographic information system (GIS) analysis for the different boundary alternatives are simply the sum of each measurement within the boundaries for a given alternative. The estimates therefore represent the maximum total potential loss from displacement of the consumptive recreational activities. This analysis ignores possible mitigating factors and the possibility of net benefits that might be derived if the proposed ecological reserve has replenishment effects. Although the extent of the mitigating factors or the potential benefits from replenishment are unknown, this analysis discusses these as well as other potential benefits of the proposed ecological reserve after the maximum potential losses from displacement of the current consumptive recreational uses are presented and discussed.

There are two types of potential losses identified and quantified in the analysis—non-market economic values and market economic values.

Non-Market Economic Values. There are two types of non-market economic values. The first is consumer's surplus, which is the amount of economic value a consumer receives by consuming a good or service over and above what he or she pays for the good or service. It is a net benefit to the consumer and in the context of recreation use of natural resources, where the natural resources go unpriced in markets, this value is often referred to as the net user value of the natural resource. The second type of non-market economic value is one received by producers or owners of the businesses providing goods or services to the users of the natural resources. This is commonly referred to as producer's surplus. The concept is similar to consumer's surplus in that the businesses do not pay a price for the use of natural resources when providing goods or services to users of the resources. However, this concept is a little more complicated because, in ''welfare economics,'' not all producers' surplus is considered a proper indicator in the improvement of welfare. Only that portion of producer's surplus called ''economic rent'' is appropriate for inclusion. Economic rent is the amount of profit a business receives over and above a normal return on investment (*i.e.*, the amount of return on investment that could be earned by switching to some alternative activity). Again, because businesses that depend on natural resources in the Tortugas do not have to pay for the use of them, there exists the possibility of earning above normal rates of return on investment or ''economic rent.'' This like consumer's surplus, would be additional economic value attributable to the natural resources (*i.e.*, another user value).

Economic rents are different from consumer's surplus in that supply and demand conditions are often likely to lead to dissipation of the economic rents. This is generally true for most open access situations. As new firms enter the industry because of the lure of higher than normal returns on investment, the net effect is to eliminate most if not all of the economic rent. However, given the remoteness of the TERSA, it is likely that all economic rents would not be eliminated. Accounting profits are used as a proxy for economic rents in the analysis. The absolute levels of accounting profits are not a good proxy for economic rents, however, they are used here as an index for assessing the relative impacts across the different boundary alternatives.

The estimates for consumer's surplus were derived by combining estimates of person-days from all the operators in the TERSA with estimates of consumer's surplus per person-day. The estimates were derived separately by season.

Market Economic Values. Revenues from the charter boat operations that provided service to the consumptive recreational users provide the basis for this portion of the analysis. Total output/sales, income and employment impacts on the Monroe County economy are then derived from these estimates. These impacts include the ripple or multiplier impacts. Total output/sales is equal to business revenue times the total-output multiplier of 1.12. Income was then derived by taking the total output/sales impact and dividing by the total output-to-income ratio (2.63). Total employment was derived by dividing the total income impact by the total income-to-employment ratio ($23,160).

Boundary Alternative I: No Action

The no-action alternative simply means that the proposed Tortugas Ecological Reserve would not be established and the corresponding no-take regulations would not be issued. The no-action alternative has a simple interpretation in that any costs of imposing the no-take regulations, for any given alternative with no-take regulations, would be the benefits of the no-action alternative. That is, by not adopting the no-take regulations, the costs are avoided. Similarly, any benefits from imposing the no-take regulations, for any given alternative with no-take regulations, would be the costs of the no action alternative. That is, by not adopting the no-take regulations, the costs are the benefits lost by not adopting the no-take regulations. Said another way, the opportunities lost. The impacts of the no-action alternative can only be understood by comparing them to the impacts of one of the alternatives.

Boundary Alternative II (See Fig. 2)

Non-Market Economic Values. This alternative would displace more than 26% of the total person-days of diving for lobsters, about 26% of the spearfishing, and just more than 2% of the fishing. Across all three consumptive recreational activities just less than 6% of the person-days would be displaced. This alternative is entirely within the existing Sanctuary boundary. Because of the way in which consumer's surpluses are calculated, they generally mirror the patterns in displaced use. Minor differences would be due to the distributions across activities by season. Only in the case of diving for lobsters are the impacts on person-days and profits equal. For spearfishing, the impacts on profits are lower than the affect on person-days (18.7% versus 25.9%), while for fishing the affect is greater on profits than on person-days (6.5% versus 1.2%). The GIS-generated maps show why diving for lobsters and spearfishing is relatively more affected than fishing. The reason is that diving for lobsters and spearfishing are concentrated on Tortugas Bank, while relatively little fishing currently takes place on the Tortugas Bank.

Market Economic Values. Presently, there are 12 charter boats operating within the TERSA, nine of which would be potentially affected by this alternative. Direct business revenue would include potential losses of 26.6% for diving for lobsters, 20% for spearfishing, and 3% for fishing. Across all three consumptive recreational activities, 9.5% of revenue would be potentially affected. Through the ripple or multiplier effects, 9.5% of output/sales, income and employment associated with all the consumptive recreational activities in the TERSA could potentially be lost. Although these costs could have an affect on the nine firms operating in the TERSA, the affect would not likely be noticed in the Monroe County economy because the affect would amount to only a fraction of a percent of the total economy

supported by recreating visitors to the Florida Keys.

Boundary Alternative III (Preferred Boundary Alternative—See Fig. 3)

Non-Market Economic Values. Because the portion of this alternative that is within the FKNMS boundary is exactly the same as Alternative II, the analysis for that portion of this alternative is exactly the same. The entire alternative would displace more than 26% of the total person-days of diving for lobsters, about 26% of the spearfishing, and just more than 3% of the fishing. Across all three consumptive recreational activities more than 7% of the person-days would be displaced. For fishing, 40% of the displaced activity would be from within the FKNMS boundary. Consumer's surpluses generally mirror patterns of displaced use. Again, minor differences would be due to the distributions across activities by season. Only in the case of diving for lobsters are the effects on person-days and profits equal. For spearfishing, the effect on profits is lower than the affect on person-days (18.7% versus 25.9%), while for fishing the effect is greater on profits than on person-days (10.2% versus 3.0%).

Market Economic Values. Nine of the twelve charter boats operating within the TERSA would be potentially affected by this alternative. Direct business revenue would include potential losses of 26.6% for diving for lobsters, 20.0% for spearfishing, and 6.3% for fishing. Across all three consumptive recreational activities, 11.7% of revenue would be potentially affected. Through the ripple or multiplier effects, 11.7% of output/sales, income and employment associated with all the consumptive recreational activities in the TERSA could potentially be lost. Although these costs could have an affect on the nine firms operating in the TERSA, the affect would not likely be noticed in the Monroe County economy because the affect would amount to only a fraction of a percent of the total economy supported by recreating visitors to the Florida Keys.

Boundary Alternative IV (See Fig. 4)

Non-Market Economic Values. This alternative would displace more than 73% of the total person-days of diving for lobsters, just less than 72% of the spearfishing, and more than 6% of the fishing. Across all three consumptive recreational activities more than 18% of the person-days would be displaced. All the diving for lobsters and spearfishing activity displaced would be from within the FKNMS boundary. For fishing, 71% of the displaced activity would be from within the FKNMS boundary. Similarly to the other alternatives, consumer's surpluses mirror the patterns in displaced use because of the way in which they are calculated. Minor differences would be due to the distributions across activities by season. Again, profits are only equal to the affect on person-days for diving for lobsters. For spearfishing, the effect on profits is lower than the affect on person-days (56.2% versus 71.7%), while for fishing the affect is greater on profits than on person-days (17.6% versus 6.3%).

Market Economic Values. Ten of the twelve charter boats operating within the TERSA would be potentially affected by this alternative. Direct business revenue would include potential losses of 73.4% for diving for lobsters, 59.0% for spearfishing, and 10.5% for fishing. Across all three consumptive recreational activities, 28.7% of revenue would be potentially affected. Through the ripple or multiplier effects, 28.7% of output/sales, income and employment associated with all the consumptive recreational activities in the TERSA could potentially be lost. Although these impacts could have significant affect on the ten firms operating in the TERSA, the affect would not likely be noticed in the Monroe County economy because the affect would amount to only a fraction of a percent of the total economy supported by recreating visitors to the Florida Keys.

Boundary Alternative V (See Fig. 5)

Non-Market Economic Values. This alternative would displace more than 86% of the total person-days of diving for lobsters, more than 84% of the spearfishing, and more than 7% of the fishing. Across all three consumptive recreational activities more than 21% of the person-days would be displaced. For diving for lobsters 85% of the displaced activity would be from within the FKNMS boundary, 59% of the fishing, and 85% of the spearfishing. Because of the way in which consumer's surpluses are calculated, they generally mirror the patterns in displaced use. Minor differences would be due to the distributions across activities by season. Profits are only equal to the affect on person-days for diving for lobsters. For spearfishing, the effects on profits are lower than the affect on person-days (65.5% versus 84.7%), while for fishing the affect is greater on profits than on person-days (21.9% versus 7.6%).

Market Economic Values. Eleven of the twelve charter boats operating within the TERSA would be potentially affected by this alternative. Direct business revenue would include potential losses of 86.7% for diving for lobsters, 69.0% for spearfishing, and 12.9% for fishing. Across all three consumptive recreational activities, 34.1% of revenue would be potentially affected. Through the ripple or multiplier effects, 34.1% of output/sales, income and employment associated with all the consumptive recreational activities in the TERSA could potentially be lost. Although these effects could have significant affect on the ten firms operating in the TERSA, the affect would not likely be noticed in the Monroe County economy because the affect would amount to only a fraction of a percent of the total economy supported by recreating visitors to the Florida Keys.

Mitigating Factors—Are the Potential Losses Likely? In the above GIS-based analysis, effects are referred to as ''potential losses.'' The reason is that there are several factors that could mitigate these potential losses and further there is a possibility that there might not be any losses at all. It is quite possible that there might be actual benefits to even the current displaced users. These factors are referred to only in qualitative terms because it is not possible to quantify them. Below two possible mitigating factors, how likely they might mitigate the potential losses from displacement, and further how this might differ for each of the three alternatives are discussed.

Substitution. If displaced users are simply able to relocate their activities, they may be able to fully or partially mitigate their losses. This of course depends on the availability of substitute sites and further depends on the substitute site qualities. Several scenarios are possible. Even when total activity remains constant (*i.e.,* person-days remain the same as they simply go to other sites), if the quality of the site is lower there could be some loss in consumer's surplus. If it costs more to get to the substitute sites, there could still be increases in costs and thus lower profits. If there is not a completely adequate supply of substitute sites, then there could be losses in total activity and in all the non-market and market economic measures referenced in our above analysis of displaced use. The possibilities for substitution vary by alternative.

Long-term benefits from Replenishment Effects. Ecological reserves or marine reserves may have beneficial effects beyond the direct ecological protection for the sites themselves. That is, both the size and

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number of fish, lobster and other invertebrates both inside and outside the reserves may increase. Five spawning areas have been identified in the western portion of the TERSA. The long-term benefits from the reserve could offset any losses from displacement and may also result in long-term benefits and no costs to recreational users that would be displaced by the proposed Tortugas Ecological Reserve. Again, this conclusion may still vary by alternative.

Boundary Alternative II

Substitution. Complete mitigation by substituting to alternative sites has a high probability for this alternative because over half of the Tortugas Bank would still be available for all consumptive recreation activities. Given the equal distribution of use for diving for lobsters and spearfishing on the Tortugas Bank, it is not likely that increased costs of relocation would occur or that there would be losses from users forced to go to sites of lower quality. Crowding effects, by pushing all the use currently spread over the whole Tortugas Bank onto half the bank, would also be unlikely given the small absolute amounts of activity. For fishing, only 1% of the activity would be displaced, so for this activity we would also expect there would be no crowding effects and recreational fishermen would not likely suffer any losses.

Long-term Benefits from Replenishment Effects. One spawning area has been identified in the Alternative II boundary area. As previously described, Alternative II is the portion of the preferred alternative (Alternative III) that lies within the existing Sanctuary boundary. Therefore the long-term benefits to stocks derived from the portion of the preferred alternative that lies outside of the existing Sanctuary boundary would not be realized. This alternative is the smallest one analyzed and so the potential long-term benefits to stocks outside the protected area would be smaller than for the other alternatives. However, the displaced activity to be mitigated is also much smaller and thus on net there is a high likelihood that there would be long-term benefits to all the consumptive recreational users in the TERSA.

Boundary Alternative III (Preferred Boundary Alternative)

Substitution. As with Alternative II, complete mitigation by substituting to alternative sites has a high probability for this alternative because of the small proportion of the Tortugas Bank included in the alternative. Given the equal distribution of use for diving for lobsters and spearfishing on the Tortugas Bank, it is not likely that increased costs of relocation would occur or that there would be losses from users forced to go to sites of lower quality. Crowding effects, again, would be unlikely given the small absolute amounts of activity. For fishing, only 3% of the activity would be displaced, so recreational fishermen would not likely suffer any losses.

Long-term Benefits from Replenishment Effects. Three spawning areas have been identified in the Alternative III boundary area. Because this alternative includes areas outside the existing sanctuary boundary, the potential long-term benefits to stocks outside the protected area would be comparatively larger than it would be for Alternative II. The mitigating effort required on the part of operators in the boundary alternative also would be comparatively larger, but as mentioned above, because of the small percentage of the active recreational area included in the alternative, the effect is likely to be very small. Therefore, there is a high likelihood that there would be long-term benefits to all the consumptive recreational users in the TERSA.

Boundary Alternative IV

Substitution. Under this alternative, about 73% of the diving for lobsters and 72% of the spearfishing would be displaced. The potential for substituting to other sites is greatly reduced as compared with Alternatives II and III. The reason is that all of the Tortugas Bank lies within this boundary alternative. Some substitution is possible, but the probability of crowding effects rises considerably for diving for lobsters and spearfishing.

For fishing, substitution mitigating all the losses is still highly probable since only about 6% of the fishing activity would be displaced. This represents a relatively low amount of activity and given the wide distribution of this activity in the study area, crowding effects are still a low probability under this alternative.

Long-term Benefits from Replenishment Effects. Four spawning sites have been identified within the Alternative IV boundary area. For diving for lobsters and spearfishing, it is not clear whether there would be significant benefits offsite given that most of this activity currently takes place on the Tortugas Bank and none of the bank available for the activity. Not much is currently known about other areas which might benefit from the stock effect and where they could relocate to reap these benefits. Whether the activities displaced could find alternative sites where both the quantity and quality of activity could be maintained or enhanced seems less likely given the extent of displacement.

For fishing, however, the small amount of displacement relative to the entire area plus the wider distribution of fishing activity still makes it highly likely that the long-term benefits of replenishment would more than offset the potential losses from displacement resulting in net benefits to this group.

Boundary Alternative V

Substitution. This alternative displaces about 87% of the diving for lobsters and 85% of the spearfishing. Substitution possibilities for these activities are reduced even more, meaning that losses given are more likely to actually occur.

For fishing, mitigating all the losses through substitution is still highly probable since only about 8% of the fishing activity would be displaced. This again, represents a relatively low amount of activity and given the wide distribution of this activity in the study area, crowding effects are still a low probability under this alternative.

Long-term Benefits from Stock Effects. Four spawning sites have been identified in the Alternative V boundary area. However, because the entire Tortugas Bank would be closed to diving for lobsters and spearfishing and the additionally large area encompassed by the proposed reserve, it is highly unlikely that these two user groups would benefit from the enhanced stocks of lobster and fish. Therefore, under this alternative, the maximum potential losses are highly likely to occur.

For fishing, however, the stock effects for the reserve could be substantial. Whether the benefits would be large enough to offset the displacement cannot immediately be determined. But given the past experience with reserves, it is still somewhat likely that the long-term benefits would offset the displacement costs yielding net benefits.

Benefits of the Proposed Tortugas Ecological Reserve to Recreational Users on Entire Florida Keys Reef Tract. Above we discussed the possibility that consumptive recreational users could possibly benefit if there were long-term offsite impacts. But there is also the possibility that a protected area in the Tortugas could yield beneficial stock effects to a wide variety of species all along the entire Florida Keys reef tract and to species such as sailfish that are primarily offshore species. Even small increases in recreational tourist activities along the entire Florida Keys

reef tract could more than offset the total displacements from the most extreme alternative analyzed here. One-tenth of one percent increase in the total recreational visitor contribution along the entire Florida Keys reef tract would more than offset the maximum potential losses from Boundary Alternative V.

Non-consumptive Users (Divers) in Tortugas. Currently there is one operator who brings divers to the TERSA for non-consumptive diving. There were 1,048 person-days of non-consumptive diving which account for 4.98% of the total recreational activity in the TERSA (excluding the National Park). Of the total non-consumptive diving, 83.3% is currently done within the existing Sanctuary boundary. It is expected that this group would be benefitted by the ecological reserve. As the site improves in quality, we would expect that the demand for this site would increase and person-days, consumer's surplus, business revenues and profits would all increase. This would be expected to vary by alternative with the more protective alternatives having greater benefits.

Commercial Fishery

Boundary Analysis

Boundary Analysis Methodology. In performing the boundary analysis, the impact estimates for each alternative are broken out by ''within the FKNMS boundary'' and ''outside the FKNMS boundary.''

Commercial fishing is prohibited in the DRTO so these grid cells are ''true'' zeroes in the analysis. Before breaking out the impact, the status of each grid cell (*i.e.,* inside or outside of the boundary) had to be determined. Two methods were considered to carry out this task: The ''centroid method'' and the ''intersection method.'' The centroid method characterizes a grid cell as within a boundary if the centroid (*e.g.,* center point) of the cell is within the boundary. The intersection method characterizes a grid cell as within a boundary if any part of the cell is intersected by the boundary. The centroid method was selected because it was more consistent with how the data was collected (*i.e.,* 1 nm^2 grid cells was the finest resolution).

The interpretation of the estimates provided in this analysis is critical to understanding the ''true'' impact of the various alternatives proposed for the Tortugas Ecological Reserve. The estimates from the geographic information system (GIS) analyses for the different boundary alternatives are the sum of each measurement within the boundary for a given alternative. The estimates therefore represent the maximum total potential loss from displacement of the commercial fishing activities. This analysis ignores possible mitigating factors and the possibility of net benefits that might be derived if the proposed ecological reserve has replenishment effect. Although the extent of the mitigating factors or the potential benefits from replenishment cannot be quantified, these as well as other potential benefits of the proposed ecological reserve are discussed after presenting and discussing the maximum potential losses from displacement of the current commercial fisheries.

The boundary analysis is driven by the catch summed across grid cells within each boundary alternative. The set of relationships, measures and methods described in Leeworthy and Wiley (1999) are then used to translate catch into estimates of market and non-market economic values potentially affected. These estimates are broken-down by area both inside and outside FKNMS boundary and are done by species.

The boundary alternatives are ordered according to size and potential impact. Alternative I is the ''No Action'' alternative and is the least protective alternative. Alternative III is the ''Preferred Alternative.'' Alternatives IV and V are the largest and ''Most Protective'' alternatives. For catch, generally the higher the alternative number the greater the potential affect on catch, except for king mackerel and shrimp. Potential affect on king mackerel catch is the same for both Alternatives IV and V and, the potential affect on shrimp catch is the same for the preferred Alternative III and Alternative IV.

Both the market and non-market economic values potentially lost from displacement for each alternative, except the ''No-action'' Alternative (Boundary Alternative I), are summarized in Leeworthy and Wiley (1999), which includes greater detail by species/species groups, and for the market economic values, separate estimates for Monroe and Collier/Lee counties.

Boundary Alternative I: No Action

The no action alternative simply means that the proposed Tortugas Ecological Reserve would not be established and the corresponding no-take regulations would not be issued. The no action alternative has a simple interpretation in that any costs of imposing the no-take regulations, for any given alternative with no-take regulations, would be the benefits of the no action alternative. That is, by not adopting the no-take regulations, the costs are avoided. Similarly, any benefits from imposing the no-take regulations, for any given alternative with no-take regulations, would be the costs of the no action alternative. That is, by not adopting the no-take regulations, the costs are the benefits lost by not adopting the no-take regulations. Said another way, the opportunities lost. The effects of the no action alternative can only be understood by comparing it to one of the alternatives. Thus the effects of the no action alternative can be obtained by reading the effects from any of the alternatives in reverse.

Boundary Alternative II

Market Economic Values. This alternative could potentially affect 4.2% of the catch of king mackerel, 6% of the lobster catch, 12.96% of the reef fish catch, and 1% of the shrimp catch in the TERSA. This would lead to a reduction in about $411 thousand in harvest revenue or 6% of the TERSA harvest revenue. This reduction in revenue would result in a reduction of 5.8% of total output, income and employment generated by the TERSA fishery. Since this alternative was restricted to reside within FKNMS current boundary, the effects are all inside FKNMS boundary. Although these effects might seem significant to those firms that might potentially be affected, the overall affect on the local economies would be so small they would not be noticed. Harvest revenue potentially impacted was only 0.67% of all harvest revenue of catch landed in Monroe County. In addition, this lost revenue would translate (accounting for the multiplier effects) into only fractions of a percent of the total Monroe County economy; 0.035% of total output, 0.046% of total income and 0.045% of total employment.

Non-market Economic Values. For all species/species groups, this alternative could result in a potential loss of over $473 thousand in consumer's surplus. This was 6.28% of the consumer's surplus generated by the entire TERSA. Although producer's surplus or economic rents are estimated to be zero, about 5.54% of the return to labor and capital of the TERSA fishery is potentially affected by this alternative.

Boundary Alternative III (Preferred Boundary Alternative)

Market Economic Values. This alternative could potentially affect 14% of the catch of king mackerel, 11.58% of the lobster catch, 20.30% of the reef fish catch, and 8.16% of the shrimp catch in the TERSA. This would lead to a

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reduction in about $844 thousand in harvest revenue or 12.26% of the TERSA harvest revenue. This reduction in revenue would result in a reduction of 12.16% of total output, income and employment generated by the TERSA fishery. The impacts are split almost evenly between the areas inside and outside the FKNMS boundary. Although these costs might seem significant to those firms that might potentially be affected, the overall affect on the local economies would be so small they would not be noticed. Harvest revenue potentially affected was only 1.16% of all harvest revenue of catch landed in Monroe County. In addition, this lost revenue would translate (accounting for the multiplier effects) into only fractions of a percent of the total Monroe County economy; 0.0596% of total output, 0.0779% of total income and 0.0785% of total employment.

Non-market Economic Values. For all species/species groups, this alternative could result in a potential loss of about $880 thousand in consumer's surplus. This was 11.7% of the consumer's surplus generated by the entire TERSA. Whereas the market economic values were almost evenly split inside and outside the FKNMS, 53.76% of the consumer's surplus potentially affected is from inside the FKNMS boundary. This is due to the distributions of lobster and reef fish catch where a higher proportion of the potentially affected catch come from inside the FKNMS boundary, whereas the distributions of shrimp and king mackerel come largely from outside the FKNMS boundary.

Although producer's surplus or economic rents are estimated to be zero, about 11.5% of the return to labor and capital of the TERSA fishery is potentially affected by this alternative. The distribution inside versus outside the FKNMS boundary follows that of the market economic values with 48% from catch inside the FKNMS boundary.

Boundary Alternative IV

Market Economic Values. This alternative could potentially affect 15.57% of the catch of king mackerel, 16.4% of the lobster catch, 28.19% of the reef fish catch, and 8.16% of the shrimp catch in the TERSA. This would lead to a reduction in about $1.126 million in harvest revenue or 16.45% of the TERSA harvest revenue. This reduction in revenue would result in a reduction of 16.05% of total output, income and employment generated by the TERSA fishery. About 61.65% of the harvest revenue and 60.34% of the output, income and employment impacts would come from catch displaced from within FKNMS boundary. Although the costs might seem significant to those firms that might potentially be affected, the overall impact on the local economies would be so small they would not be noticed. Harvest revenue potentially affected was only 1.82% of all harvest revenue of catch landed in Monroe County. In addition, this lost revenue would translate (accounting for the multiplier effects) into only fractions of a percent of the total Monroe County economy; 0.0968% of total output, 0.127% of total income and 0.1281% of total employment.

Non-market Economic Values. For all species/species groups, this alternative could result in a potential loss of about $1.1 million in consumer's surplus. This was 14.64% of the consumer's surplus generated by the entire TERSA and 63.14% of the consumer's surplus potentially affected is from catch from inside the FKNMS boundary. This is due to the distributions of lobster and reef fish catch where a higher proportion of the potentially affected catch come from inside the FKNMS boundary, whereas the distributions of shrimp and king mackerel come largely from outside the FKNMS boundary. Although producer's surplus or economic rents are estimated to be zero, about 15.6% of the return to labor and capital of the TERSA fishery is potentially affected by this alternative. The distribution inside versus outside the FKNMS boundary follows that of the market economic values with 61.68% from catch inside the FKNMS.

Boundary Alternative V

Market Economic Values. This alternative could potentially affect 15.57% of the catch of king mackerel, 17.58% of the lobster catch, 29.57% of the reef fish catch, and 10.26% of the shrimp catch in the TERSA. This would lead to a reduction in about $1.224 million in harvest revenue or 17.89% of the TERSA harvest revenue. This reduction in revenue would result in a reduction of 17.5% of total output, income and employment generated by the TERSA fishery. About 56.68% of the harvest revenue and 55.26% of the output, income and employment impacts would come from catch displaced from within the FKNMS boundary. Although the costs might seem significant to those firms that might potentially be affected, the overall impact on the local economies would be so small they would not be noticed. Harvest revenue potentially affected was only 1.98% of all harvest revenue of catch landed in Monroe County. In addition, this lost revenue would translate (accounting for the multiplier effects) into only fractions of a percent of the total Monroe County economy; 0.106% of total output, 0.138% of total income and 0.1399% of total employment.

Non-market Economic Values. For all species/species groups, this alternative could result in a potential loss of about $1.24 million in consumer's surplus. This was 16.4% of the consumer's surplus generated by the entire TERSA. 56.2% of the consumer's surplus potentially affected is from catch from inside the FKNMS boundary. This is due to the distributions of lobster and reef fish catch where a higher proportion of the potentially affected catch come from inside the FKNMS boundary, whereas the distributions of shrimp and king mackerel come largely from outside the FKNMS boundary. Although producer's surplus or economic rents are estimated to be zero, about 16.97% of the return to labor and capital of the TERSA fishery is potentially affected by this alternative. The distribution inside versus outside the FKNMS boundary follows that of the market economic values with 56.7% from catch inside the FKNMS boundary.

Profiles of Fishermen Potentially Affected

In the overview section, a profile of the approximately 110 TERSA fishermen based on a sample of 90 was given with a comparison with other commercial fishermen in Monroe County. The profiles of those potentially affected by each alternative are compared. Statistical tests were performed comparing the sample distributions for the groups that fished within each boundary alternative as compared with TERSA fishermen as a whole. Except for the number of fishing operations potentially affected, the only significant differences for all alternatives were in membership in organizations and in fish house usage.

In terms of memberships in organizations, the fishermen potentially affected by all alternatives had significantly lower participation rates in the Conch Coalition, the Organized Fishermen of Florida (OFF) and in the Monroe County Commercial Fishermen, Inc. (MCCF), but had a significantly higher participation rates in environmental organizations and the Chambers of Commerce. Fish house usage was significantly lower for those fishermen potentially affected by all alternatives.

Fishermen potentially affected by Boundary Alternative II were the only group that was significantly different. These fishermen had less experience

fishing in Monroe County than the general TERSA fishermen, however they were not significantly different with respect to years fishing in the TERSA. Fishermen potentially affected by Boundary Alternative II also earned a significantly lower proportion of their income from fishing than the general TERSA fishermen; however, they earned a significantly higher proportion of their income from fishing within the TERSA than the general TERSA fishermen.

Fishermen potentially affected by Boundary Alternative II were also significantly different from the general TERSA fishermen in the distribution of their primary hauling port. A significantly higher proportion of those potentially affected by this alternative used Key West/Stock Island and Tavenier than the general TERSA fishermen, and they used Big Pine Key, Marathon and Naples/Ft. Myers significantly less than the general TERSA fishermen.

Fifty-one (51) or 57% of the sampled fishing operations could be potentially affected by Boundary Alternative II followed by 64 operations or 71% for Alternative III, and 65 operations or 72% for both Boundary Alternatives IV and V. Twenty-four (24) of the 28 or 86% of all the lobster operations could be potentially affected by Boundary Alternative II, while 27 of the 28 lobster operations or 96% are potentially affected by Boundary Alternatives III, IV, and V. Six (6) of the 18 or 33.3% of the shrimp operations are potentially affected by Boundary Alternative II, while Boundary Alternative III could potentially affect 15 of 18 or 83% of the shrimp operations. Boundary Alternatives IV and V could potentially affect 14 of the 18 or 78% of the shrimp operations. Fifteen (15) of the 16 king mackerel operations could be potentially affected by Boundary Alternative II, while Boundary Alternatives III, IV and V could potentially affect all 16 of the king mackerel operations. Thirty-seven (37) of the 42 or 88% of the reef fish operations could be potentially affected by Boundary Alternative II, while 40 or 95% of the reef fish fishing operations could be potentially affected by Boundary Alternative III. Boundary Alternatives IV and V could potentially affect all 42 reef fish operations.

Other Potential Costs and Mitigating Factors—Are the Potential Losses Likely?

In the above GIS-based analysis, the effects are referred to as ''potential losses'' or ''maximum potential losses.'' There is the possibility that there could be an additional cost not discussed but which cannot be quantified, that is, crowding and the resulting conflicts among users forced to compete in a smaller area. There are also several factors that could mitigate all the potential losses and further there is a possibility that there might not be any losses at all. It is quite possible that there might be actual net benefits to even the current displaced users. Below the issue of crowding costs and the mitigating factors and potential for beneficial outcomes are discussed in qualitative terms because of the difficulty in quantifying them. Two mitigating factors, how likely they might mitigate the potential losses from displacement, and how this might differ for each of the alternatives, are discussed.

Crowding. As shown above, each of the alternatives would result in a certain amount of displacement. Displacement of commercial fishing activity is a certainty under all boundary alternatives, except Boundary Alternative I, the No-action Alternative. If this displacement results in the activity being transferred to other sites, there is a potential for crowding effects. Crowding effects could raise the costs of fishing, both private costs to each fishing operation and social costs in resolving conflicts.

Crowding conflicts were one of the issues mentioned when the State of Florida created the lobster trap certificate program which was designed to reduce the number of lobster traps. If fishing stocks outside the protected area are already fished to their limits (*i.e.,* limits of sustainable harvests), then displacement could also lead to adverse stock effects and a lower level of catch from all commercial fisheries. Crowding effects would represent a potential cost not accounted for in our above GIS-based analysis and the potential for the existence of crowding effects would vary by alternative. Whether crowding effects are experienced would depend on the status of the fisheries outside the proposed protected area, the extent of displacement, the current knowledge and fishing patterns of the displaced fishermen, and other potential regulations. The trap reduction program is an example where crowding effects could be mitigated by making room for the displaced traps.

Relocation. If displaced commercial fishermen are simply able to relocate their fishing effort and they are able to partially or completely replace their lost catch by fishing elsewhere, then there might be less or no affect. However, the possibility exists that displacement, even if it does not result in lower overall catch, may result in higher costs. This would result in lower profits to fishing operations. Whether fishermen are able to relocate to other fishing sites and replace lost catch or avoid cost increases would depend, like with the issue of crowding, on the status of the fisheries outside the proposed protected area, the extent of the displacement, the current knowledge and fishing patterns of the displaced fishermen, and other potential regulations.

Long-term benefits from Replenishment Effects. Ecological reserves or marine reserves may have beneficial effects beyond the direct ecological protection from the sites themselves. That is, both the size and number of fish, lobster, and other invertebrates both inside and outside the reserves may increase *i.e.,* the replenishment effect. It is clear that fishers all over the world believe no-take zones increase yields because they fish as close to the boundary as possible. The long-term benefits from the reserve could offset any losses from displacement and may also result in long-term benefits and no costs (net benefits) to commercial fishermen that would be displaced by a proposed reserve. Again, this conclusion may vary by alternative.

Boundary Alternative II

Crowding and Relocation. For the commercial lobster fishery, it appears that the lobster trap reduction program could fully mitigate the potential for crowding costs. This boundary alternative would displace 2,228 traps. A ten percent reduction in traps in the TERSA would provide space for 3,690 traps. Further, lobster fishermen in the TERSA only catch 68% of their lobsters from the TERSA. Thus, lobster fishermen are knowledgeable about fishing in other areas of the Keys where they might move their displaced traps. Thus, under this boundary alternative there would be no crowding costs for the commercial lobster fishery and the fishermen would be able to replace catch from other areas. Thus, for the commercial lobster fishery, the potential economic losses identified in Table 1 are not likely to occur under Boundary Alternative II.

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Table 1. Maximum Potential Losses to the Commercial Fisheries from Displacement

Area/Measure	Total TERSA	Alternatives: Alternative II	Preferred Alternative	Alternative IV	Alternative V
Total TERSA					
Market[1]					
Harvest Revenue	$ 6,884,992	$ 411,632	$ 843,583	$ 1,126,237	$ 1,224,849
Total Output	$ 14,957,717	$ 865,819	$ 1,817,843	$ 2,400,730	$ 2,621,627
Total Income	$ 9,273,785	$ 536,808	$ 1,127,063	$ 1,488,453	$ 1,625,409
Total Employment	404	23	49	65	71
Non-market					
Consumer's Surplus[2]	$ 7,537,781	$ 473,097	$ 879,973	$ 1,103,808	$ 1,239,587
Producer's Surplus[3]	$ -	$ -	$ -	$ -	$ -
Return to Labor & Capital[4]	$ 1,926,162	$ 106,789	$ 221,968	$ 300,599	$ 326,880
Inside FKNMS					
Market					
Harvest Revenue	$ 3,476,456	$ 411,632	$ 411,632	$ 694,284	$ 694,284
Total Output	$ 7,292,387	$ 865,819	$ 865,819	$ 1,448,700	$ 1,448,700
Total Income	$ 4,521,280	$ 536,808	$ 536,808	$ 898,194	$ 898,194
Total Employment	197	23	23	39	39
Non-market					
Consumer's Surplus	$ 3,890,933	$ 473,097	$ 473,097	$ 696,932	$ 696,932
Producer's Surplus	$ -	$ -	$ -	$ -	$ -
Return to Labor & Capital	$ 1,029,118	$ 106,789	$ 106,789	$ 185,420	$ 185,420
Outside FKNMS					
Market					
Harvest Revenue	$ 3,408,536	$ -	$ 431,951	$ 431,953	$ 530,565
Total Output	$ 7,665,330	$ -	$ 952,024	$ 952,030	$ 1,172,927
Total Income	$ 4,752,505	$ -	$ 590,255	$ 590,259	$ 727,215
Total Employment	207	-	26	26	32
Non-market					
Consumer's Surplus	$ 3,646,848	$ -	$ 406,876	$ 406,876	$ 542,655
Producer's Surplus	$ -	$ -	$ -	$ -	$ -
Return to Labor & Capital	$ 897,044	$ -	$ 115,179	$ 115,179	$ 141,460

1. Market economic measures include impacts on Monroe County and Collier/Lee counties. See Appendix A, Tables A.6 – A.11 in Leeworthy and Wiley (1999) for details by species and counties.
2. Maximum values from each species were used when range of estimates was generated from multiple demand equations. See Appendix B in Leeworthy and Wiley (1999) for detailed calculations by species and alternatives.
3. Producer's surplus or economic rents were assumed to be zero for two reasons. First, all fisheries, except spiny lobsters, are open access fisheries and therefore economic rents would be zero i.e., firms are earning only normal rates of return on investment. Second, even using total return to labor & capital, which overstates return on investment, does not yield rates of return on investment above normal rates of return.
4. Return to Labor & Capital is not a non-market value but would include rent if it existed.

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Crowding is not an issue for the king mackerel commercial fishery because king mackerel is a pelagic species and thus moves around and catching them elsewhere is highly likely without interfering with other fishermen. Shrimp fishermen currently only catch ten percent of their total shrimp catch from the TERSA. Displacement of shrimp catch under Boundary Alternative II would only be about one percent of their TERSA catch and less than one percent of their total shrimp catch. It would seem highly likely that there would be no crowding costs from displacement and given the small amounts of catch affected, it is highly likely that shrimp fishermen would be able to replace lost catch from other sites. Thus, for the king mackerel and shrimp commercial fisheries, the potential economic losses identified in Table 1 are not likely to occur under Boundary Alternative II.

Reef fish fishermen comprise the largest group of TERSA fishermen. Under Boundary Alternative II, 37 of the sampled 42 fishermen would be affected. Reef fish fishermen are knowledgeable of other fishing locations outside the TERSA. In 1997, they caught 52% of their reef fish from areas in the Keys outside the TERSA. However, stocks of reef fish in the TERSA and throughout the Keys appear to be overfished. Alternative II displaces about 13% of the reef fish catch in the TERSA. Given the status of reef fish stocks, the losses identified in Table 1 are likely to occur in the short-term until the benefits of replenishment could offset these losses in the longer-term.

Replenishment. No replenishment benefits to the king mackerel or shrimp commercial fisheries are expected. For the lobster and reef fish fisheries, replenishment benefits are expected. Invertebrates and reef fish at other marine reserves had shown estimated increases in yields of 46–50% within three kilometers of the protected areas. Also, five spawning areas were identified in the western portion of the TERSA. Only one of the five spawning areas is located within the Boundary Alternative II boundary. The reserve would protect this area, and this area would support the replenishment effect. For the commercial lobster fishery, we expect long-term net benefits under Boundary Alternative II. For the commercial reef fish fishery, it is not clear whether the full 13% lost catch from displacement would be replaced from replenishment, but the costs of displacement would be mitigated and the losses expected to be less than the 13% reductions that are the basis for the losses calculated and presented in Table 1.

Boundary Alternative III (Preferred Boundary Alternative)

Crowding and Relocation. For the lobster fishery, there is some potential for crowding costs. This boundary alternative would displace 4,346 traps. A ten percent reduction in traps in the TERSA would provide space for 3,690 traps. However, if the remaining 656 traps are relocated to zones 1–3 in the Keys, there would be more than adequate space given the 10% reduction in traps that took place in Monroe County between 1997–98 and 1998–99 (475,094 to 428,411). Lobster fishermen in the TERSA only catch 68% of their lobsters from the TERSA. Thus, lobster fishermen are knowledgeable about fishing in other areas of the Keys where they might move their displaced traps. Thus, under this alternative there would be no crowding costs for lobsters and we expect that the lobster fishermen would be able to replace catch from other areas. Thus, for the lobster fishery, the potential economic losses identified in Table 1 are not likely to occur under this alternative.

Crowding is not an issue for king mackerel commercial fishery because king mackerel is a pelagic species and thus moves around and catching them elsewhere is highly likely without interfering with other fishermen. Shrimp fishermen currently only catch ten percent of their total shrimp catch from the TERSA. Displacement of shrimp catch under Boundary Alternative III would only be about eight percent of their TERSA catch and less than one percent of their total shrimp catch. It would seem highly likely that there would be no crowding costs from displacement and given the small amounts of catch affected, it is highly likely that shrimp fishermen would be able to replace lost catch from other sites. Thus for the commercial king mackerel and shrimp fisheries, the potential economic losses identified in Table 1 are not likely to occur under this alternative.

Reef fish fishermen comprise the largest group of TERSA fishermen. Under Boundary Alternative III, 40 of the sampled 42 fishermen would be affected. Reef fish fishermen are knowledgeable of other fishing locations outside the TERSA. In 1997, they caught 52% of their reef fish from areas in the Keys outside the TERSA. However, stocks of reef fish in the TERSA and throughout the Keys appear to be overfished. Boundary Alternative III displaces 20% of the reef fish catch in the TERSA. Given the status of reef fish stocks, the losses identified in Table 1 are likely to occur in the short-term until the benefits of replenishment could offset these losses in the longer-term.

Replenishment. No replenishment benefits to the commercial king mackerel or shrimp fisheries are expected. For the commercial lobsters and reef fish fisheries, replenishment benefits are expected. Yields of invertebrates and reef fish of 46–50% have been reported within three kilometers of the protected areas at other marine reserves. Five spawning areas have been reported in the western portion of the TERSA. Three of the five spawning areas are located within the alternative III boundary and would be protected, thus bolstering the replenishment effect. For the commercial lobster fishery, long-term net benefits would be expected under Boundary Alternative III. For the commercial reef fish fishery, it is not clear whether the full 20% lost catch from displacement would be replaced from replenishment, but the costs of displacement would be mitigated and the losses expected to be less than the 20% reductions that are the basis for the losses calculated and presented in Table 1.

Boundary Alternative IV

Crowding and Relocation. For the commercial lobster fishery, there is some potential for crowding costs. This boundary alternative would displace an estimated 6,050 traps. A ten percent reduction in traps in the TERSA would provide space for 3,690 traps. However, if the remaining 2,360 traps are relocated to zones 1–3 in the Keys, there would be more than adequate space given the 10% reduction in traps that took place in Monroe County between 1997–98 and 1998–99 (475,094 to 428,411).

Lobster fishermen in the TERSA only catch 68% of their lobsters from the TERSA. Thus, lobster fishermen are knowledgeable about fishing in other areas of the Keys where they might move their displaced traps. Thus, under this alternative there would be no crowding costs for the commercial lobster fishery and fishermen would be able to replace catch from other areas. Thus, for the commercial lobster fishery, the potential economic losses identified in Table 1 are not likely to occur under Boundary Alternative IV.

Crowding is not an issue for the king mackerel fishery because king mackerel is a pelagic species and thus moves around and catching them elsewhere is highly likely without interfering with other fishermen. Shrimp fishermen

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currently only catch ten percent of their total shrimp catch from the TERSA. Displacement of shrimp catch under Boundary Alternative IV would only be about eight percent of their TERSA catch and less than one percent of their total shrimp catch. It would seem highly likely that there would be no crowding costs from displacement and given the small amounts of catch affected, it is highly likely that shrimp fishermen would be able to replace lost catch from other sites. Thus, for the commercial king mackerel and shrimp fisheries, the potential economic losses identified in Table 1 are not likely to occur under Boundary Alternative IV.

Reef fish fishermen comprise the largest group of TERSA fishermen. Under Boundary Alternative IV, all 42 of the sampled fishermen would be affected. Reef fish fishermen are knowledgeable of other fishing locations outside the TERSA. In 1997, they caught 52% of their reef fish from areas in the Keys outside the TERSA. However, stocks of reef fish in the TERSA and throughout the Keys appear to be overfished. Boundary Alternative IV displaces 28% of the reef fish catch in the TERSA. Given the status of reef fish stocks, the losses identified in Table 1 are likely to occur in the short-term until the benefits of replenishment could offset these losses in the longer-term.

Replenishment. No replenishment benefits to the commercial king mackerel and shrimp fisheries are expected. For the commercial lobster and reef fish fisheries, replenishment benefits are expected. Increases in yields of invertebrates and reef fish of 46–50% have been reported within three kilometers of the protected areas at other marine reserves. Five spawning areas have been in the western portion of the TERSA. Four of the five spawning areas are located within the Boundary Alternative IV boundary and would be protected, thus bolstering the replenishment effect. For the commercial lobster fishery, no long-term net benefits would be expected under Boundary Alternative IV. For the commercial reef fish fishery, it is not clear whether the full 28% lost catch from displacement would be replaced from replenishment, but the costs of displacement would be mitigated and the losses expected to be less than the 28% reductions that are the basis for the losses calculated and presented in Table 1.

Boundary Alternative V

Crowding and Relocation. For the commercial lobster fishery, there is some potential for crowding costs. This boundary alternative would displace 6,487 traps. A ten percent reduction in traps in the TERSA would provide space for 3,690 traps. However, if the remaining 2,797 traps are relocated to zones 1–3 in the Keys, there would be more than adequate space given the 10% reduction in traps that took place in Monroe County between 1997–98 and 1998–99 (475,094 to 428,411). Lobster fishermen in the TERSA only catch 68% of their lobsters from the TERSA and they are knowledgeable about fishing in other areas of the Keys where they might move their displaced traps. Thus, under this boundary alternative there would be no crowding costs for the commercial lobster fishery and fishermen would be able to replace catch from other areas. Therefore, for the commercial lobster fishery, the potential economic losses identified in Table 1 are not likely to occur under Boundary Alternative V.

Crowding is not an issue for the king mackerel commercial fishery because king mackerel is a pelagic species and thus moves around and catching them elsewhere is highly likely without interfering with other fishermen. Shrimp fishermen currently only catch ten percent of their total shrimp catch from the TERSA. Displacement of shrimp catch under Boundary Alternative V would only be about ten percent of their TERSA catch and about one percent of their total shrimp catch. It would seem highly likely that there would be no crowding costs from displacement and given the small amounts of catch affected, it is highly likely that shrimp fishermen would be able to replace lost catch from other sites. Thus, for the king mackerel and shrimp commercial fisheries, the potential economic losses identified in Table 1 are not likely to occur under Boundary Alternative V.

Reef fish fishermen comprise the largest group of TERSA fishermen. Of the 90 TERSA fishermen sampled, 42 were reef fish fishermen. Under Boundary Alternative V, all 42 would be affected. Reef fish fishermen are knowledgeable of other fishing locations outside the TERSA. In 1997, they caught 52% of their reef fish from areas in the Keys outside the TERSA. However, stocks of reef fish in the TERSA and throughout the Keys appear to be overfished. Boundary Alternative V displaces 29% of the reef fish catch in the TERSA. Given the status of reef fish stocks, the losses identified in Table 1 are likely to occur in the short-term until the benefits of replenishment could offset these losses in the longer-term.

Replenishment. No replenishment benefits to the king mackerel and shrimp commercial fisheries are expected. For the lobster and reef fish commercial fisheries, replenishment benefits are expected. Increases in yields of invertebrates and reef fish of 46–50% have been reported within three kilometers of the protected areas at other marine reserves. Five spawning areas have been identified in the western portion of the TERSA. Four of the five spawning areas are located within the Boundary Alternative V boundary and would be protected, thus bolstering the replenishment effect. For the lobster commercial fishery, long-term net benefits under Boundary Alternative V are expected. For reef fish, it is not clear whether the full 29% lost catch from displacement would be replaced from replenishment, but the costs of displacement would be mitigated and the losses expected to be less than the 29% reductions that are the basis for the losses calculated and presented in Table 1.

Commercial Shipping

No effect for any of the alternatives.

Treasure Salvors

No expected effect for any of the alternatives. One permit for inventorying submerged cultural resources in Sanctuary waters was issued for the Tortugas area of the Sanctuary. There were no submerged cultural resources found on the Tortugas Bank. Currently, it is unknown whether there are any submerged cultural resources on Riley's Hump, located in Tortugas South.

Other Regulations

Boundary Alternative I

This alternative is the no-action alternative required by NEPA that assumes that no reserve would be established and that the current management regime and range of human activities would continue. Thus, no regulatory alternatives are applicable.

Boundary Alternative II

This alternative limits the reserve to the existing Sanctuary boundary for a total area of approximately 55 square nautical miles (Fig. 2). This alternative includes a portion of Sherwood Forest and the coral pinnacles north of Tortugas Bank; it does not include Riley's Hump. It includes some coral and hardbottom habitat north of the DRTO.

Regulatory Alternative A: Apply existing Sanctuary-wide and, with minor modifications, existing ecological reserve regulations to Tortugas North

and South. The provisions of this alternative applicable to Tortugas South are not relevant under this boundary alternative. The Sanctuary-wide regulations already apply to Tortugas North and the effects of the ecological reserve regulations have been analyzed under the no-take discussion above. The existing ecological reserve regulations would be revised to reflect that fishing would be prohibited in the Tortugas Ecological Reserve except to the extent authorized by 50 CFR Parts 622 and 635 (it is anticipated that no fishing would be authorized in the Tortugas Ecological Reserve by these Parts).

Regulatory Alternative B: Apply existing Sanctuary-wide and, with minor modifications, existing ecological reserve regulations to Tortugas North and South (as described in Regulatory Alternative A); and prohibit anchoring in and control access to Tortugas South via permit, require call-in for entering and leaving, and prohibit vessels longer than 100 ft LOA from using a mooring buoy. The provisions of this alternative applicable to Tortugas South are not relevant under this boundary alternative. The Sanctuary-wide regulations already apply to Tortugas North and the effects of the ecological reserve regulations have been analyzed under the no-take discussion above. The existing ecological reserve regulations would be revised to reflect that fishing would be prohibited in the Tortugas Ecological Reserve except to the extent authorized by 50 CFR parts 622 and 635 (it is anticipated that no fishing would be authorized in the Tortugas Ecological Reserve by these Parts).

Regulatory Alternative C (Preferred Regulatory Alternative): Apply existing Sanctuary-wide and, with minor modifications, existing ecological reserve regulations to Tortugas North and South (as described in Regulatory Alternative A); and prohibit anchoring in and control access to Tortugas North and South via permit, require call-in for entering and leaving, and prohibit vessels longer than 100 ft LOA from using a mooring buoy (as described in Regulatory Alternative B). The provisions of this alternative applicable to Tortugas South are not relevant under this boundary alternative. The Sanctuary-wide regulations already apply to Tortugas North and the effects of the ecological reserve regulations have been analyzed under the no-take discussion above. The existing ecological reserve regulations would be revised to reflect that fishing would be prohibited in the Tortugas Ecological Reserve except to the extent authorized by 50 CFR parts 622 and 635 (it is anticipated that no fishing would be authorized in the Tortugas Ecological Reserve by these Parts).

This regulatory alternative has no incremental impact on commercial fishing or recreational consumptive users since they are displaced by the ''no-take'' regulation. The dive operator servicing nonconsumptive diving and currently operating in Tortugas North would be prohibited from anchoring. His vessel is less than 100 ft LOA and thus he would be unaffected by the prohibition on mooring. The location and availability of mooring buoys would constrain the number and choice of available dive sites. It is unknown whether this would have any impact on the future business volume of dive operators or the quality of the experience to nonconsumptive divers. The extent of impact would be dependent on the number and locations of mooring buoys (to be determined).

This regulatory alternative would have little impact on commercial shipping because continuous transit would be allowed. Vessels 50m or greater in registered length are already prohibited from anchoring in 19.3% of Tortugas North. The main effect would be to ban such vessels from anchoring on the remainder of Tortugas North. There would be no incremental impact to treasure salvors since they would be displaced by the ''no-take'' regulation. The one dive operator servicing nonconsumptive diving and currently operating in Tortugas North would be required to obtain Tortugas access permits. Any new dive operators would also be required to obtain a permit. There would be minor time costs associated with obtaining a permit and getting permission to access the reserve. It is expected that fulfilling all the permit requirements and obtaining permission to access the reserve will not exceed 10 minutes of each permittee's time for each visit to the reserve. No special professional skills would be necessary to apply for a permit.

Regulatory Alternative D: Apply existing Sanctuary-wide and, with minor modifications, existing ecological reserve regulations to Tortugas North and South (as described in Regulatory Alternative A); prohibit anchoring in and control access to Tortugas North via permit, require call-in for entering and leaving, and prohibit vessels longer than 100 ft LOA from using a mooring buoy (as described in Regulatory Alternative B); and prohibit anchoring and restrict access to Tortugas South to research or education activities only. Because the provisions of this alternative applicable to Tortugas South are not relevant under this boundary alternative, the impacts of this alternative are the same as described for Regulatory Alternative C, above. The existing ecological reserve regulations would be revised to reflect that fishing would be prohibited in the Tortugas Ecological Reserve except to the extent authorized by 50 CFR parts 622 and 635 (it is anticipated that no fishing would be authorized in the Tortugas Ecological Reserve by these Parts).

Boundary Alternative III (Preferred Boundary Alternative)

This alternative involves a Sanctuary boundary expansion and represents the WG's recommendation adopted by the SAC and recommended to NOAA and the State of Florida for a reserve with a total area of approximately 151 nm^2 (Fig. 3). It is NOAA's preferred boundary alternative.

Regulatory Alternative A: Apply existing Sanctuary-wide and, with minor modifications, existing ecological reserve regulations to Tortugas North and South. Boundary Alternative III includes areas currently outside the Sanctuary boundary. A small portion of Tortugas North and all of Tortugas South would be outside the existing Sanctuary boundary. The Sanctuary-wide regulations would become effective in the expansion areas of Tortugas North and South. The existing Sanctuary regulations and their impacts are presented in Table 21 of the DSEIS/SMP. More detailed descriptions of the regulations are included in Appendix C to the DSEIS/SMP. The effects of the ecological reserve regulations have been analyzed under the no-take discussion above. The existing ecological reserve regulations would be revised to reflect that fishing would be prohibited in the Tortugas Ecological Reserve except to the extent authorized by 50 CFR parts 622 and 635 (it is anticipated that no fishing would be authorized in the Tortugas Ecological Reserve by these Parts).

Regulatory Alternative B: Apply existing Sanctuary-wide and, with minor modifications, existing ecological reserve regulations to Tortugas North and South (as described in Regulatory Alternative A); and prohibit anchoring in and control access to Tortugas South via permit, require call-in for entering and leaving, and prohibit vessels longer than 100 ft LOA from using a mooring buoy (as described in Regulatory Alternative B). Boundary Alternative III includes areas currently outside the Sanctuary boundary. A small portion of Tortugas North and all of Tortugas South would be outside the existing Sanctuary boundary. The Sanctuary-wide regulations would become effective in the expansion areas of

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Tortugas North and South. The existing Sanctuary regulations and their impacts are presented in Table 21 of the DSEIS/SMP. More detailed descriptions of the regulations are included in Appendix C to the DSEIS/SMP. The existing ecological reserve regulations would be revised to reflect that fishing would be prohibited in the Tortugas Ecological Reserve except to the extent authorized by 50 CFR parts 622 and 635 (it is anticipated that no fishing would be authorized in the Tortugas Ecological Reserve by these Parts).

The effects of the ecological reserve regulations have been analyzed under the no-take discussion above. The prohibition on anchoring would have no incremental impact on commercial fishing or recreational consumptive users since they are displaced by the ''no-take'' regulation. The one dive operator servicing nonconsumptive diving and currently operating in Tortugas North would be prohibited from anchoring. There are no known recreational dive operators servicing Tortugus South. The location and availability of mooring buoys would constrain the number and choice of available dive sites. It is unknown whether this would have any impact on the future business volume of dive operators or the quality of the experience to nonconsumptive divers. The extent of impact would be dependent on the number and locations of mooring buoys (to be determined). The prohibition on anchoring would impact commercial shipping in the boundary expansion areas, especially in Tortugas South. The prohibition on anchoring in Tortugas North is discussed under Boundary/Regulatory Alternative II.C above. Anchoring by large commercial vessels is known to occur on Riley's Hump, which would be included in the Sanctuary as part of Tortugas South under Boundary Alternative III and thus would be subject to the anchoring prohibition. The impact of this regulation on commercial vessel operators is expected to be small since other anchorages are available a short distance outside the Sanctuary boundary.

There would be no incremental impact on treasure salvors from the no-anchoring prohibition since they would be displaced by the ''no-take'' regulation. The permit requirements would have no incremental impact on fishermen or salvors because they would be displaced by the ''no-take'' regulations. There are no known nonconsumptive dive operators currently operating in Tortugas South. Any nonconsumptive dive operators operating in Tortugas South in the future would be required to obtain Tortugas access permits. It is not possible to gauge the extent of any such future activity. There would be minor time costs associated with obtaining a permit and getting permission to access the reserve.

It is expected that fulfilling all the permit requirements and obtaining permission to access the reserve would not exceed 10 minutes of each permittee's time for each visit to the reserve. No special professional skills would be necessary to apply for a permit.

Regulatory Alternative C (Preferred Regulatory Alternative): Apply existing Sanctuary-wide and, with minor modifications, existing ecological reserve regulations to Tortugas North and South (as described in Regulatory Alternative A); and prohibit anchoring in and control access to Tortugas North and South via permit, require call-in for entering and leaving, and prohibit vessels longer than 100 ft LOA from using a mooring buoy (as described in Regulatory Alternative B). The only difference between the impacts of this regulatory alternative from those discussed under Regulatory Alternative B would be those associated with the requirement to obtain a permit for other than continuous transit access to Tortugas North. The permit requirements would have no incremental impact on fishermen or salvors because they would be displaced by the ''no-take'' regulations. There is only one known nonconsumptive dive operator currently operating in Tortugas North. He and any new nonconsumptive dive operators operating in Tortugas North would be required to obtain Tortugas access permits. There would be minor time costs associated with obtaining a permit and getting permission to access the reserve. It is expected that fulfilling all the permit requirements and obtaining permission to access the reserve would not exceed 10 minutes of each permittee's time for each visit to the reserve. No special professional skills would be necessary to apply for a permit. The existing ecological reserve regulations would be revised to reflect that fishing would be prohibited in the Tortugas Ecological Reserve except to the extent authorized by 50 CFR parts 622 and 635 (it is anticipated that no fishing would be authorized in the Tortugas Ecological Reserve by these Parts).

Regulatory Alternative D: Apply existing Sanctuary-wide and, with minor modifications, existing ecological reserve regulations to Tortugas North and South (as described in Regulatory Alternative A); prohibit anchoring in and control access to Tortugas North via permit, require call-in for entering and leaving, and prohibit vessels longer than 100 ft LOA from using a mooring buoy (as described in Regulatory Alternative B); and prohibit anchoring and restrict access to Tortugas South to research or education activities only. The only difference between the impacts of this regulatory alternative from those discussed under Regulatory Alternative C would be those associated with limiting noncontinuous transit access to Tortugas South to research/educational purposes. For the commercial fisheries, salvors, and recreational consumptive users, there would be no incremental impacts since the ''no-take'' regulation would displace these user groups. There are no known nonconsumptive dive operators currently operating in Tortugas South and no recreational diving is known to occur there. Under this alternative, none would be allowed in the future. The existing ecological reserve regulations would be revised to reflect that fishing would be prohibited in the Tortugas Ecological Reserve except to the extent authorized by 50 CFR parts 622 and 635 (it is anticipated that no fishing would be authorized in the Tortugas Ecological Reserve by these Parts).

Boundary Alternative IV

This alternative involves an expansion to the south by 23 nm^2 of Tortugas North to make it conterminous with the NPS's proposed Research/Natural Area within the DRTO for a total area of approximately 175 nm^2 not including the Park area (Fig. 4). It also involves the same boundary expansion as Boundary Alternative III.

Regulatory Alternative A: Apply existing Sanctuary-wide and, with minor modifications, existing ecological reserve regulations to Tortugas North and South. A small portion of Tortugas North and all of Tortugas South would be outside the existing Sanctuary boundary. The Sanctuary-wide regulations would become effective in the expansion areas of Tortugas North and South. The existing Sanctuary regulations and their impacts are presented in Table 21 of the DSEIS/SMP. More detailed descriptions of the regulations are included in Appendix C to the DSEIS/SMP. The effects of the ecological reserve regulations which, under Boundary Alternative IV would apply to a larger area because of the southern expansion of Tortugas North, have been analyzed under the no-take discussion above. The existing ecological reserve regulations would be revised to reflect that fishing would be prohibited in the Tortugas Ecological

Reserve except to the extent authorized by 50 CFR parts 622 and 635 (it is anticipated that no fishing would be authorized in the Tortugas Ecological Reserve by these parts).

Regulatory Alternative B: Apply existing Sanctuary-wide and, with minor modifications, existing ecological reserve regulations to Tortugas North and South (as described in Regulatory Alternative A); and prohibit anchoring in and control access to Tortugas South via permit, require call-in for entering and leaving, and prohibit vessels longer than 100 ft LOA from using a mooring buoy. A small portion of Tortugas North and all of Tortugas South would be outside the existing Sanctuary boundary. The Sanctuary-wide regulations would become effective in the expansion areas of Tortugas North and South. The existing Sanctuary regulations and their impacts are presented in Table 21 of the DSEIS/SMP. More detailed descriptions of the regulations are included in Appendix C to the DSEIS/SMP. The existing ecological reserve regulations would be revised to reflect that fishing would be prohibited in the Tortugas Ecological Reserve except to the extent authorized by 50 CFR parts 622 and 635 (it is anticipated that no fishing would be authorized in the Tortugas Ecological Reserve by these parts).

The effects of the ecological reserve regulations which under Boundary Alternative IV would apply to a larger area because of the southern expansion of Tortugas North have been analyzed under the no-take discussion above. The prohibition on anchoring would have no incremental impact on commercial fishing or recreational consumptive users since they are displaced by the ''no-take'' regulation. There are no known recreational dive operators servicing Tortugus South. The location and availability of mooring buoys would constrain the number and choice of available dive sites. It is unknown whether this would have any impact on the future business volume of dive operators or the quality of the experience to nonconsumptive divers. The extent of impact would be dependent on the number and locations of mooring buoys (to be determined).

The prohibition on anchoring would impact commercial shipping in the boundary expansion areas, especially in Tortugas South. The prohibition on anchoring in Tortugas North is discussed under Boundary/Regulatory Alternative II.C. above. Anchoring by large commercial vessels is known to occur on Riley's Hump, which would be included in the Sanctuary as part of Tortugas South under Boundary Alternative IV and thus would be subject to the anchoring prohibition. The impact of this regulation on commercial vessel operators is expected to be small since other non-coral reef anchorages outside the Sanctuary boundary are available a short distance away.

There would be no incremental impact on treasure salvors from the no-anchoring prohibition since they would be displaced by the ''no-take'' regulation.

The permit requirements would have no incremental impact on fishermen or salvors because they would be displaced by the ''no-take'' regulations. There are no known nonconsumptive dive operators currently operating in Tortugas South. Any nonconsumptive dive operators operating in Tortugas South in the future would be required to obtain Tortugas access permits. It is not possible to gauge the extent of any such future activity. There would be minor time costs associated with obtaining a permit and getting permission to access the reserve. It is expected that fulfilling all the permit requirements and obtaining permission to access the reserve would not exceed 10 minutes of each permittee's time for each visit to the reserve. No special professional skills would be necessary to apply for a permit.

Regulatory Alternative C (Preferred Regulatory Alternative): Apply existing Sanctuary-wide and, with minor modifications, existing ecological reserve regulations to Tortugas North and South (as described in Regulatory Alternative A); and prohibit anchoring in and control access to Tortugas North and South via permit, require call-in for entering and leaving, and prohibit vessels longer than 100 ft LOA from using a mooring buoy (as described in Regulatory Alternative B). The only difference between the impacts of this regulatory alternative from those discussed under Alternative B would be those associated with the requirement to obtain a permit for other than continuous transit access to Tortugas North. Under this boundary alternative there are 2.75 more person-days of recreational nonconsumptive use than under Boundary Alternatives II and III. While the area of Tortugas North would be increased by the expansion to the south, the permit requirements would have no incremental impact on fishermen or salvors because they would be displaced by the ''no-take'' regulations. There is only one known nonconsumptive dive operator currently operating in Tortugas North. He and any new nonconsumptive dive operators operating in Tortugas North would be required to obtain Tortugas access permits. There would be minor time costs associated with obtaining a permit and getting permission to access the reserve. It is expected that fulfilling all the permit requirements and obtaining permission to access the reserve would not exceed 10 minutes of each permittee's time for each visit to the reserve. No special professional skills would be necessary to apply for a permit. The existing ecological reserve regulations would be revised to reflect that fishing would be prohibited in the Tortugas Ecological Reserve except to the extent authorized by 50 CFR parts 622 and 635 (it is anticipated that no fishing would be authorized in the Tortugas Ecological Reserve by these Parts).

Regulatory Alternative D: Apply existing Sanctuary-wide and, with minor modifications, existing ecological reserve regulations to Tortugas North and South (as described in Regulatory Alternative A); prohibit anchoring in and control access to Tortugas North via permit, require call-in for entering and leaving, and prohibit vessels longer than 100 ft LOA from using a mooring buoy (as described in Regulatory Alternative B); and prohibit anchoring and restrict access to Tortugas South to research or education activities only. The only difference between the impacts of this regulatory alternative from those discussed under regulatory Alternative C would be those associated with limiting non-continuous transit access to Tortugas South to research/educational purposes. For the commercial fisheries, salvors, and recreational consumptive users, there would be no incremental impacts since the ''no-take'' regulation would displace these user groups. There are no known nonconsumptive dive operators currently operating in Tortugas South and no recreational diving is known to occur there. Under this alternative, none would be allowed in the future. The existing ecological reserve regulations would be revised to reflect that fishing would be prohibited in the Tortugas Ecological Reserve except to the extent authorized by 50 CFR parts 622 and 635 (it is anticipated that no fishing would be authorized in the Tortugas Ecological Reserve by these Parts).

Boundary Alternative V

This alternative involves a Sanctuary boundary expansion to the west by three minutes ending at longitude 83′09″ instead of 83′06″ and would increase the reserve area to 190 nm_2 (Fig. 5). Tortugas North would be expanded to the west and Tortugas South would be shortened to the north. Sanctuary-wide

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regulations would be applied to the expansion area.

Regulatory Alternative A: Apply existing Sanctuary-wide and, with minor modifications, existing ecological reserve regulations to Tortugas North and South. The Sanctuary-wide regulations would become effective in the expansion area. The existing Sanctuary regulations and their impacts are presented in Table 21 of the DSEIS/SMP. More detailed descriptions of the regulations are included in Appendix C to the DSEIS/SMP. The effects of the ecological reserve regulations which, under Boundary Alternative V apply to a larger area because of the Sanctuary expansion, have been analyzed under the no-take discussion above. The existing ecological reserve regulations would be revised to reflect that fishing would be prohibited in the Tortugas Ecological Reserve except to the extent authorized by 50 CFR parts 622 and 635 (it is anticipated that no fishing would be authorized in the Tortugas Ecological Reserve by these parts).

Regulatory Alternative B: Apply existing Sanctuary-wide and, with minor modifications, existing ecological reserve regulations to Tortugas North and South (as described under regulatory Alternative A); and prohibit anchoring in and control access to Tortugas South via permit, require call-in for entering and leaving, and prohibit vessels longer than 100 ft LOA from using a mooring buoy. A small portion of Tortugas North and all of Tortugas South would be outside the existing Sanctuary boundary. The Sanctuary-wide regulations would become effective in the expansion area. The existing Sanctuary regulations and their impacts are summarized in Table 21 of the DSEIS/SMP. More detailed descriptions of the regulations are included in Appendix C to the DSEIS/SMP. The existing ecological reserve regulations would be revised to reflect that fishing would be prohibited in the Tortugas Ecological Reserve except to the extent authorized by 50 CFR parts 622 and 635 (it is anticipated that no fishing would be authorized in the Tortugas Ecological Reserve by these Parts).

The effects of the ecological reserve regulations which, under Boundary Alternative V apply to a larger area because of the Sanctuary expansion, have been analyzed under the no-take discussion above. The prohibition on anchoring would have no incremental impact on commercial fishing or recreational consumptive users since they are displaced by the ''no-take'' regulation. There are no known recreational dive operators servicing Tortugus South. The location and availability of mooring buoys would constrain the number and choice of available dive sites. It is unknown whether this would have any impact on the future business volume of dive operators or the quality of the experience to nonconsumptive divers. The extent of impact would be dependent on the number and locations of mooring buoys (to be determined).

The prohibition on anchoring would impact commercial shipping in the boundary expansion area, especially in Tortugas South. Anchoring by large commercial vessels is known to occur on Riley's Hump, which would be included in the Sanctuary as part of Tortugas South under Boundary Alternative V and thus would be subject to the anchoring prohibition. While the Sanctuary area has been expanded, the impact of this regulation on commercial vessel operators is still expected to be small since other non-coral reef anchorages are available a short distance away outside the Sanctuary boundary.

There would be no incremental impact on treasure salvors from the no-anchoring prohibition since they would be displaced by the ''no-take'' regulation.

The permit requirements would have no incremental impact on fishermen or salvors because they would be displaced by the ''no-take'' regulations.

There are no known nonconsumptive dive operators currently operating in Tortugas South. Any nonconsumptive dive operators operating in Tortugas South in the future would be required to obtain Tortugas access permits. It is not possible to gauge the extent of any such future activity. There would be minor time costs associated with obtaining a permit and getting permission to access the reserve. It is expected that fulfilling all the permit requirements and obtaining permission to access the reserve would not exceed 10 minutes of each permittee's time for each visit to the reserve. No special professional skills would be necessary to apply for a permit.

Regulatory Alternative C (Preferred Regulatory Alternative): Apply existing Sanctuary-wide and, with minor modifications, existing ecological reserve regulations to Tortugas North and South (as described in Regulatory Alternative A); and prohibit anchoring in and control access to Tortugas North and South via permit, require call-in for entering and leaving, and prohibit vessels longer than 100 ft LOA from using a mooring buoy (as described in Regulatory Alternative B). The only difference between the impacts of this regulatory alternative from those discussed under Regulatory Alternative B would be those associated with the requirement to obtain a permit for other than continuous transit access to Tortugas North. Under this boundary alternative there are 3.25 more person-days of recreational nonconsumptive use than under Boundary Alternatives IV. While the area of Tortugas North would be increased by the expansion to the west, the permit requirements would have no incremental impact on fishermen or salvors because they would be displaced by the ''no-take'' regulations. There is one known nonconsumptive dive operator currently operating in Tortugas North. He and any new nonconsumptive dive operators operating in Tortugas North would be required to obtain Tortugas access permits. There would be minor time costs associated with obtaining a permit and getting permission to access the reserve. It is expected that fulfilling all the permit requirements and obtaining permission to access the reserve would not exceed 10 minutes of each permittee's time for each visit to the reserve. No special professional skills would be necessary to apply for a permit. The existing ecological reserve regulations would be revised to reflect that fishing would be prohibited in the Tortugas Ecological Reserve except to the extent authorized by 50 CFR parts 622 and 635 (it is anticipated that no fishing would be authorized in the Tortugas Ecological Reserve by these Parts).

Regulatory Alternative D: Apply existing Sanctuary-wide and, with minor modifications, existing ecological reserve regulations to Tortugas North and South (as described in Alternative A); prohibit anchoring in and control access to Tortugas North via permit, require call-in for entering and leaving, and prohibit vessels longer than 100 ft LOA from using a mooring buoy (as described in Regulatory Alternative B); and prohibit anchoring and restrict access to Tortugas South to research or education activities only. The only difference between the impacts of this regulatory alternative from those discussed under Regulatory Alternative C would be those associated with limiting noncontinuous transit access to Tortugas South to research/educational purposes. For the commercial fisheries, salvors, and recreational consumptive users, there would be no incremental impacts since the ''no-take'' regulation would displace these user groups. There are no known nonconsumptive dive operators currently operating in Tortugas South and no recreational diving is known to occur there. Under

this alternative, none would be allowed in the future. The existing ecological reserve regulations would be revised to reflect that fishing would be prohibited in the Tortugas Ecological Reserve except to the extent authorized by 50 CFR Parts 622 and 635 (it is anticipated that no fishing would be authorized in the Tortugas Ecological Reserve by these Parts).

Selection of the Preferred Alternative

Introduction

This section sets forth the agency's preferred alternative (Fig. 3) and why it was selected.

Preferred Alternative

NOAA has selected Boundary Alternative III combined with Regulatory Alternative C as its preferred alternative.

General Rationale

NOAA has adopted Boundary Alternative III and Regulatory Alternative C because this combination achieves the objectives of all five of the criteria listed below. Based on its analysis, NOAA believes that this preferred alternative would adequately protect the nationally significant coral reef resources of the Tortugas region and fulfill the objectives of the FKNMSPA and the NMSA.

The preferred alternative is of sufficient size and imposes adequate protection measures to achieve the goals and objectives of the FKNMSPA and the NMSA while not unduly impacting user groups. Boundary Alternative III is consistent with the recommendations of the SAC to NOAA and the State of Florida. While the WG and SAC recommended Regulatory Alternative A (application of the existing Sanctuary-wide and existing ecological reserve regulations) NOAA believes that the more protective approach of Regulatory Alternative C is warranted because of the threat to coral reef resources posed by the anchoring of vessels and the difficulty of enforcing regulations in this remote area, particularly Tortugas South. Coral cover is so high and water depths so deep in the Tortugas that anchoring is virtually impossible without damaging coral. Enforcement would be greatly facilitated by the notice of user presence that would be provided to the FKNMS by the permit requirement.

Comparison of Alternatives

This section compares the four alternatives based on five criteria which are: (1) Protect ecosystem integrity, (2) increase scientific understanding, (3) facilitate non-consumptive human activities, (4) protect natural spawning, nursery, and permanent residence areas, and (5) minimize adverse socioeconomic impacts. These criteria are consistent with the goals of the Florida Keys National Marine Sanctuary and Protection Act (FKNMSPA), the National Marine Sanctuaries Act (NMSA), the Final Management Plan (MP), the public scoping comments, the Working Group's criteria, and the U.S. Coral Reef Task Force (CRTF) recommendations.

Criteria: Protect ecosystem integrity.

Objective: Choose an area and protective measures that protect the highest biological diversity and widest range of contiguous habitats.

Rationale/Source: FKNMSPA, NMSA, scoping comments, and WG/SAC.

Analysis: Boundary Alternative II does not encompass enough range of habitat to adequately protect the integrity of the ecosystem. The critical areas of Sherwood Forest and Riley's Hump are not part of this alternative. Boundary Alternative II offers no insurance against the effects of a catastrophic event (*e.g.,* cold weather, low salinity) that could potentially damage resources of the area. Boundary Alternatives III, IV and V include a sufficient range of viable habitats to protect ecosystem integrity and include two replicate components that would help to ensure against the effects of catastrophic events. The increased area of Boundary Alternatives IV and V has negligible increased benefit to protecting ecosystem integrity compared to Alternative III. Regulatory Alternative A would not adequately protect ecosystem integrity because of the threat to coral reef resources by anchoring. Regulatory Alternative B would not adequately protect ecosystem integrity in Tortugas North because of the threat to coral reef resources by anchoring and would not provide notice to FKNMS of the presence of users to facilitate enforcement. Regulatory Alternative C adequately protects ecosystem integrity and facilitates enforcement. Regulatory Alternative D would adequately protect ecosystem integrity and facilitates enforcement but would unduly restrict uses in Tortugas South.

Criteria: Increase scientific understanding of human effects on ecosystem processes

Objective: Choose an area and protective measures that will facilitate the monitoring of anthropogenic impacts and the evaluation of the efficacy of the ecological reserve for protecting coral reef health and biodiversity.

Rationale/Source: FKNMSPA, NMSA, scoping comments, and WG/SAC.

Analysis: Given the absence of unexploited areas in the Tortugas region, Boundary Alternatives II-V would serve to increase scientific understanding of marine ecosystems, their response to management and their recovery from fishing impacts. Boundary Alternatives III-V offer the added scientific benefit of protecting Riley's Hump which would add to existing knowledge of effective reserve design regarding networks and energy flow between reserves. Also, the inclusion of Tortugas South would significantly add to the understanding of the importance of the Tortugas region in sustaining the Florida Keys ecosystem. Boundary Alternatives IV and V encompass all of Tortugas Bank which would compromise the study of fishing effects because there would be no comparable habitat for use as a reference site. Regulatory Alternatives A, B, and C would provide for essentially the same level of scientific understanding. Regulatory Alternative D would facilitate the most scientific understanding of human effects on ecosystem processes because it would create a research/education-only area in the Tortugas which could serve as a reference to areas where recreational diving is allowed.

Criteria: Facilitate non-consumptive uses.

Objective: Choose an area and protective measures that will allow non-consumptive uses and provide a range of habitats to observe and study.

Rationale/Source: FKNMSPA, NMSA, MP.

Analysis: Boundary Alternatives II–V would serve well in enhancing opportunities for non-consumptive activities such as education, photography, underwater wilderness opportunities, and ecotourism. Boundary Alternatives III–V provide enhanced opportunities over Alternative II because of the addition of Tortugas South. Regulatory Alternatives A, B, and C would provide the same non-consumptive opportunities. Regulatory Alternative D would prohibit all consumptive and non-consumptive activities in Tortugas South other than research and education.

Criteria: Protect natural spawning, nursery, and permanent residence areas.

Objective: Choose an area and protective measures that will protect known or reported spawning areas and habitat that supports resident fish and other marine life.

Rationale/Source: MP, scoping comments, and WG/SAC.

Analysis: Boundary Alternative II protects only one of eight known fish

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spawning aggregations and does not include Riley's Hump which is a critical source area for larvae. Sherwood Forest, an important permanent residence area for a variety of species, is not part of Boundary Alternative II. Boundary Alternative III would protect 5 of the 8 known fish spawning areas as well as approximately 87% of the known coral reef habitat and 76% of the known hardbottom habitat. Boundary Alternative IV would encompass 6 out of 8 known fish spawning sites as well as 100% of the known coral and hardbottom habitat. Boundary Alternative V would encompass 7 out of the 8 known fish spawning sites and would protect all of the known coral and hardbottom habitat. Boundary Alternative V's expansion of Tortugas North to the west would provide increased protection for deepwater habitats and associated species. The reduction in size of Tortugas South would provide less protection for deep water habitat has the least and associated species.

Criteria: Minimize adverse socioeconomic impacts.

Objective: Choose an area and protective measures that meets the objectives of the other criteria but that does not unduly impact users.

Rationale/Source: FKNMSPA, NMSA, scoping comments, and WG/SAC.

Analysis: Boundary Alternative II will have the least impact on recreational and commercial users whereas Boundary Alternatives IV and V will have the most. Boundary Alternative III has moderate impacts on users, mostly lobster fishermen and handline fishermen. Altenatives IV and V have significantly greater impacts because they include the southern half of Tortugas Bank which is heavily utilized by both recreational and commercial users. Alternative III offers a compromise because it allows for continued exploitation of the southern half of Tortugas Bank including trolling for pelagic species. Ignoring the potential of such effects as replenishment that would result in a net economic benefit, Regulatory Alternative A has significant adverse socioeconomic effects on users including small entities. There are 12 recreational charter operations that would be affected by this alternative and approximately 110 commercial fishing operations all of which are small entities. No lesser degree of protection than that provided by Regulatory Alternative A would provide an adequate degree of protection for the resources of the Tortugas and even Regulatory Alternative A by itself would not provide sufficient protection to coral reef resources from anchoring and would not provide FKNMS adequate notice to facilitate enforcement. Accordingly, other than the no-action alternative, no other regulatory alternatives that would provide a lesser degree of protection were considered. Regulatory Alternative B would provide adequate protection from anchoring damage in the Tortugas South and would provide adequate notification to FKNMS to facilitate enforcement there but would not provide adequate protection to Tortugas North. Regulatory Alternative C would provide both adequate resource protection and adequate notification to FKNMS to facilitate enforcement with insignificant incremental costs to users. NOAA's preferred alternative (Boundary Alternative III/Regulatory Alternative C) could potentially impact, if one assumes no mitigating factors, 9 recreational charter uses with total annual revenue losses of approximately $152,054 and 64 commercial fishermen with total annual revenue losses of approximately $843,583. Regulatory Alternative D would facilitate the study of fishing impacts and diver impacts but would prohibit any uses of the area.

Paperwork Reduction Act

Notwithstanding any other provision of law, no person is required to respond to, nor shall any person be subject to a penalty for failure to comply with, a collection of information subject to the requirements of the Paperwork Reduction Act (PRA) unless that collection of information displays a currently valid OMB control number.

This proposed rule contains collection-of-information requirements subject to review and approval by the Office of Management and Budget (OMB) under the PRA. The only record keeping or reporting requirements are the permit and call-in, call-out requirements for the reserve previously described in the Preamble under proposed regulations. There are two classes of users that would be affected by these proposed requirements: commercial dive boat operators and private boaters. The type of skills necessary to request an access permit and to provide notification when entering or leaving the proposed ecological reserve would be use of marine radio equipment. These requirements have been submitted to OMB for approval. The public reporting burden for these requirements is estimated to be 10 minutes per application for a permit and 2 minutes per call-in or call out, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information.

Public comment is sought regarding: whether these proposed collections of information are necessary for the proper performance of the functions of NOAA, including whether the information has practical utility; the accuracy of the burden estimates; ways to minimize the burden of the collection of information, including through use of automated collection techniques or other forms of information technology.

List of Subjects in 15 CFR Part 922

Administrative practice and procedure, Coastal zone, Education, Environmental protection, Marine resources, Penalties, Recreation and recreation areas, Reporting and recordkeeping requirements, Research.

Dated: May 10, 2000.

Ted Lillestolen,

Deputy Assistant Administrator for Ocean Services and Coastal Zone Management.

Accordingly, for the reasons set forth in the preamble, 15 CFR part 922 is proposed to be amended as follows:

PART 922—NATIONAL MARINE SANCTUARY PROGRAM REGULATIONS

1. The authority citation for part 922 continues to read as follows:

Authority: 16 U.S.C. 1431 *et seq.*

2. Section 922.161 is revised to read as follows:

§ 922.161 Boundary.

The Sanctuary consists of an area of approximately 2900 square nautical miles (9,800 square kilometers) of coastal and ocean waters, and the submerged lands thereunder, surrounding the Florida Keys in Florida. Appendix I to this subpart sets forth the precise Sanctuary boundary.

3. In § 922.162, definitions for ''Length overall (LOA) or length,'' ''Stem,'' and ''Stern'' are added alphabetically as follows:

§ 922.162 Definitions.

* * * * *

Length overall (LOA) or *length* means, as used in § 922.167 with respect to a vessel, the horizontal distance, rounded to the nearest foot (with 0.5 ft and above rounded upward), between the foremost part of the stem and the aftermost part of the stern, excluding bowsprits, rudders, outboard motor brackets, and similar fittings or attachments.

* * * * *

Stem means the foremost part of a vessel, consisting of a section of timber

or fiberglass, or cast, forged, or rolled metal, to which the sides of the vessel are united at the fore end, with the lower end united to the keel, and with the bowsprit, if one is present, resting on the upper end.

Stern means the aftermost part of the vessel.

* * * * *

4. In § 922.164, paragraphs (d)(1)(ii), (d)(1)(iii), (d)(1)(v) and (d)(1)(vi) are revised as follows:

§ 922.164 Additional activity regulations by Sanctuary area.

* * * * *

(d) * * *

(1) * * *

(ii) Possessing, moving, harvesting, removing, taking, damaging, disturbing, breaking, cutting, spearing, or otherwise injuring any coral, marine invertebrate, fish, bottom formation, algae, seagrass or other living or dead organism, including shells, or attempting any of these activities, except as authorized by paragraph (d)(1)(iii) of this section. However, fish, invertebrates, and marine plants may be possessed aboard a vessel in an Ecological Reserve or Sanctuary Preservation Area, provided such resources can be shown not to have been harvested within, removed from, or taken within, the ecological reserve or Sanctuary Preservation Area as applicable, by being stowed in a cabin, locker, or similar storage area prior to entering and during transit through such reserves or Areas, provided further that in an Ecological Reserve or Sanctuary Preservation Area located in Florida State waters, such vessel is in continuous transit through the Ecological Reserve or Sanctuary Preservation Area.

(iii) Except for catch and release fishing by trolling in the Conch Reef, Alligator Reef, Sombrero Reef, and Sand Key Sanctuary Preservation Areas, and except for fishing in the Tortugas Ecological Reserve authorized by 50 CFR parts 622 and 635, fishing by any means. However, gear capable of harvesting fish may be aboard a vessel in an Ecological Reserve or Sanctuary Preservation Area, provided such gear is not available for immediate use when entering and during transit through such Ecological Reserve or Sanctuary Preservation Area, and no presumption of fishing activity shall be drawn therefrom. * * *

(v) Anchoring in the Tortugas Ecological Reserve. In all other Ecological Reserves and Sanctuary Preservation Areas, placing any anchor in a way that allows the anchor or any portion of the anchor apparatus (including the anchor, chain or rope) to touch living or dead coral, or any attached living organism. When anchoring dive boats, the first diver down must inspect the anchor to ensure that it is not touching living or dead coral, and will not shift in such a way as to touch such coral or other attached organism. No further diving shall take place until the anchor is placed in accordance with these requirements.

(vi) Except in the Tortugas Ecological Reserve where mooring buoys must be used, anchoring instead of mooring when a mooring buoy is available or anchoring in other than a designated anchoring area when such areas have been designated and are available.

4. In § 922.164, paragraphs (d)(1)(viii) and (d)(1)(ix) are added to read as follows:

§ 922.164 Additional activity regulations by Sanctuary area.

* * * * *

(d) * * *

(1) * * *

(1) * * *

(viii) Except for passage without interruption through the area, for law enforcement purposes, or for purposes of monitoring pursuant to paragraph (d)(2) of this section, entering the Tortugas Ecological Reserve without a valid access permit issued pursuant to § 922.167 or entering or leaving the Tortugas Ecological Reserve with a valid access permit issued pursuant to § 922.167 without notifying FKNMS staff at the Dry Tortugas National Park office by telephone or radio no less than 30 minutes and no more than 6 hours, before entering and upon leaving the Tortugas Ecological Reserve.

(ix) Tying a vessel greater than 100 feet (30.48 meters) LOA, or tying more than one vessel (other than vessels carried on board a vessel) if the combined lengths would exceed 100 feet (30.48 meters) LOA, to a mooring buoy or to a vessel tied to a mooring buoy in the Tortugas Ecological Reserve.

5. In § 922.164, paragraph (g) is revised to read as follows:

§ 922.164 Additional activity regulations by Sanctuary area.

* * * * *

(g) *Anchoring on Tortugas Bank.* Vessels 50 meters or greater in registered length, are prohibited from anchoring on the portion of Tortugas Bank within the Florida Keys National Marine Sanctuary west of the Dry Tortugas National Park that is outside of the Tortugas Ecological Reserve. The boundary of the area closed to anchoring by vessels 50 meters or greater in registered length is formed by connecting in succession the points at the following coordinates (based on the North American Datum of 1983):

(1) 24 deg. 39.00′ N 83 deg. 06.00′ W

(2) 24 deg. 32.00′ N 83 deg. 00.05′ W

(3) 24 deg. 37.00′ N 83 deg. 06.00′ W

(4) 24 deg. 40.00′ N 83 deg. 06.00′ W

(5) 24 deg. 39.00′ N 83 deg. 06.00′ W

6. Revise the heading of § 922.166 to read as follows:

§ 922.166 Permits other than for access to the Tortugas Ecological Reserve-application procedures and issuance criteria.

7. Redesignate § 922.167 as § 922.168 and revise it to read as follows:

§ 922.168 Certification of preexisting leases, licenses, permits, approvals, other authorizations, or rights to conduct a prohibited activity.

(a) A person may conduct an activity prohibited by §§ 922.163 or 922.164 if such activity is specifically authorized by a valid Federal, State, or local lease, permit, license, approval, or other authorization in existence on July 1, 1997, or by any valid right of subsistence use or access in existence on July 1, 1997, provided that:

(1) The holder of such authorization or right notifies the Director, in writing, within 90 days of July 1, 1997, of the existence of such authorization or right and requests certification of such authorization or right; for the area added to the Sanctuary by the boundary expansion for the Tortugas Ecological Reserve, the holder of such authorization or right notifies the Director, in writing, within 90 days of __, 2000, of the existence of such authorization or right and requests certification of such authorization or right.

(2) The holder complies with the other provisions of this § 922.168; and

(3) The holder complies with any terms and conditions on the exercise of such authorization or right imposed as a condition of certification, by the Director, to achieve the purposes for which the Sanctuary was designated.

(b) The holder of an authorization or right described in paragraph (a) of this section authorizing an activity prohibited by §§ 922.163 or 922.164 may conduct the activity without being in violation of applicable provisions of §§ 922.163 or 922.164, pending final agency action on his or her certification request, provided the holder is in compliance with this § 922.168.

(c) Any holder of an authorization or right described in paragraph (a) of this section may request the Director to issue a finding as to whether the activity for which the authorization has been issued, or the right given, is prohibited

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by §§ 922.163 or 922.164, thus requiring certification under this section.

(d) Requests for findings or certifications should be addressed to the Director, Office of Ocean and Coastal Resource Management; ATTN: Sanctuary Superintendent, Florida Keys National Marine Sanctuary, P.O. Box 500368, Marathon, FL 33050. A copy of the lease, permit, license, approval, or other authorization must accompany the request.

(e) The Director may request additional information from the certification requester as he or she deems reasonably necessary to condition appropriately the exercise of the certified authorization or right to achieve the purposes for which the Sanctuary was designated. The information requested must be received by the Director within 45 days of the postmark date of the request. The Director may seek the views of any persons on the certification request.

(f) The Director may amend any certification made under this § 922.168 whenever additional information becomes available justifying such an amendment.

(g) Upon completion of review of the authorization or right and information received with respect thereto, the Director shall communicate, in writing, any decision on a certification request or any action taken with respect to any certification made under this § 922.168, in writing, to both the holder of the certified lease, permit, license, approval, other authorization, or right, and the issuing agency, and shall set forth the reason(s)for the decision or action taken.

(h) Any time limit prescribed in or established under this § 922.168 may be extended by the Director for good cause.

(i) The holder may appeal any action conditioning, amending, suspending, or revoking any certification in accordance with the procedures set forth in § 922.50.

(j) Any amendment, renewal, or extension made after July 1, 1997, to a lease, permit, license, approval, other authorization or right is subject to the provisions of Sec. 922.49.

8. Add a new § 922.167 to read as follows:

§ 922.167 Permits for access to the Tortugas Ecological Reserve.

(a) A person may enter the Tortugas Ecological Reserve other than for passage without interruption through the reserve, for law enforcement purposes, or for purposes of monitoring pursuant to paragraph (d)(2) of § 922.164, if authorized by a valid access permit issued pursuant to § 922.167.

(b)(1) Access permits must be requested at least 72 hours but no longer than one month before the date the permit is desired to be effective. Access permits do not require written applications or the payment of any fee. Permits may be requested via telephone or radio by contacting FKNMS at any of the following numbers:

Key West office: telephone: (305) 292–0311.

Marathon office: telephone: (305) 743–2437.

(2) The following information must be provided, as applicable:

(i) Vessel name.

(ii) Name, address, and telephone number of owner and operator.

(iii) Name, address, and telephone number of applicant.

(iv) USCG documentation, state license, or registration number.

(v) Home port.

(vi) Length of vessel and propulsion type (*i.e.,* motor or sail).

(vii) Number of divers.

(viii) Requested effective date and duration of permit (2 weeks, maximum).

(c) The Sanctuary Superintendent will issue a permit to the owner or to the owner's representative for the vessel when all applicable information has been provided. FKNMS will provide a permit number to the applicant and confirm the effective date and duration period of the permit. Written confirmation of permit issuance will be provided upon request.

9. Revise Appendices I, II, IV, V, VI, and VII to Subpart P of Part 922 to read as follows:

Appendix I to Subpart P of Part 922—Florida Keys National Marine Sanctuary Boundary Coordinates

(Appendix Based on North American Datum of 1983)

1. The boundary of the Florida Keys National Marine Sanctuary—

(a) Begins at the northeasternmost point of Biscayne National Park located at approximately 25 degrees 39 minutes north latitude, 80 degrees 05 minutes west longitude, then runs eastward to the point at 25 degrees 39 minutes north latitude, 80 degrees 04 minutes west longitude; and

(b) Then runs southward and connects in succession the points at the following coordinates:

(i) 25 degrees 34 minutes north latitude, 80 degrees 04 minutes west longitude,

(ii) 25 degrees 28 minutes north latitude, 80 degrees 05 minutes west longitude, and

(iii) 25 degrees 21 minutes north latitude, 80 degrees 07 minutes west longitude;

(iv) 25 degrees 16 minutes north latitude, 80 degrees 08 minutes west longitude;

(c) Then runs southwesterly approximating the 300-foot isobath and connects in succession the points at the following coordinates:

(i) 25 degrees 07 minutes north latitude, 80 degrees 13 minutes west longitude,

(ii) 24 degrees 57 minutes north latitude, 80 degrees 21 minutes west longitude,

(iii) 24 degrees 39 minutes north latitude, 80 degrees 52 minutes west longitude,

(iv) 24 degrees 30 minutes north latitude, 81 degrees 23 minutes west longitude,

(v) 24 degrees 25 minutes north latitude, 81 degrees 50 minutes west longitude,

(vi) 24 degrees 22 minutes north latitude, 82 degrees 48 minutes west longitude,

(vii) 24 degrees 37 minutes north latitude, 83 degrees 06 minutes west longitude,

(viii) 24 degrees 46 minutes north latitude, 83 degrees 06 minutes west longitude,

(ix) 24 degrees 44 minutes north latitude, 81 degrees 55 minutes west longitude,

(x) 24 degrees 51 minutes north latitude, 81 degrees 26 minutes west longitude, and

(xi) 24 degrees 55 minutes north latitude, 80 degrees 56 minutes west longitude;

(d) Then follows the boundary of Everglades National Park in a southerly then northeasterly direction through Florida Bay, Buttonwood Sound, Tarpon Basin, and Blackwater Sound;

(e) After Division Point, then departs from the boundary of Everglades National Park and follows the western shoreline of Manatee Bay, Barnes Sound, and Card Sound;

(f) Then follows the southern boundary of Biscayne National Park to the southeasternmost point of Biscayne National Park; and

(g) Then follows the eastern boundary of Biscayne National Park to the beginning point specified in paragraph (a).

2. The shoreward boundary of the Florida Keys National Marine Sanctuary is the mean high-water mark except around the Dry Tortugas where the boundary is coterminous with that of the Dry Tortugas National Park, formed by connecting in succession the points at the following coordinates:

(a) 24 degrees 34 minutes 0 seconds north latitude, 82 degrees 54 minutes 0 seconds west longitude;

(b) 24 degrees 34 minutes 0 seconds north latitude, 82 degrees 58 minutes 0 second west longitude;

(c) 24 degrees 39 minutes 0 seconds north latitude, 82 degrees 58 minutes 0 seconds west longitude;

(d) 24 degrees 43 minutes 0 seconds north latitude, 82 degrees 54 minutes 0 seconds west longitude;

(e) 24 degrees 43 minutes 32 seconds north latitude, 82 degrees 52 minutes 0 seconds west longitude;

(f) 24 degrees 43 minutes 32 seconds north latitude, 82 degrees 48 minutes 0 seconds west longitude;

(g) 24 degrees 42 minutes 0 seconds north latitude, 82 degrees 46 minutes, 0 seconds west longitude;

(h) 24 degrees 40 minutes 0 seconds north latitude, 82 degrees 46 minutes 0 seconds west longitude;

(i) 24 degrees 37 minutes 0 seconds north latitude, 82 degrees 48 minutes 0 seconds west longitude; and

(j) 24 degrees 34 minutes 0 seconds north latitude, 82 degrees 54 minutes 0 seconds west longitude.

3. The Florida Keys National Marine Sanctuary also includes the area located

within the boundary formed by connecting in succession the points at the following coordinates:

(a) 24 degrees 33 minutes north latitude, 83 degrees 09 minutes west longitude,

(b) 24 degrees 33 minutes north latitude, 83 degrees 05 minutes west longitude, and

(c) 24 degrees 18 minutes north latitude, 83 degrees 05 minutes west longitude;

(d) 24 degrees 18 minutes north latitude, 83 degrees 09 minutes west longitude; and

(e) 24 degrees 33 minutes north latitude, 83 degrees 09 minutes west longitude.

Appendix II to Subpart P of Part 922—Existing Management Areas Boundary Coordinates

1. The boundary of each of the Existing Management Areas is formed by connecting in succession the points at the following coordinates:

National Oceanic and Atmospheric Administration:

KEY LARGO-MANAGEMENT AREA

[Based on Differential Global Positioning Systems Data]

Point	Latitude	Longitude
1	25 deg. 19′45″ N	80 deg. 12′00″ W.
2	25 deg. 16′02″ N	80 deg. 08′07″ W.
3	25 deg. 07′05″ N	80 deg. 12′05″ W.
4	24 deg. 58′03″ N	80 deg. 19′08″ W.
5	25 deg. 02′02″ N	80 deg. 25′25″ W.
6	25 deg. 19′45″ N	80 deg. 12′00″ W.

LOOE KEY MANAGEMENT AREA

[Based on Differential Global Positioning Systems Data]

Point	Latitude	Longitude
1	24 deg. 31′62″ N	81 deg. 26′00″ W.
2	24 deg. 33′57″ N	81 deg. 26′00″ W.
3	24 deg. 34′15″ N	81 deg. 23′00″ W.
4	24 deg. 32′20″ N	81 deg. 23′00″ W.
5	24 deg. 31′62″ N	81 deg. 26′00″ W.

United States Fish and Wildlife Service:

GREAT WHITE HERON NATIONAL WILDLIFE REFUGE

[Based on the North American Datum of 1983]

Point	Latitude	Longitude
1	24 deg. 43.8′ N	81 deg. 48.6′ W.
2	24 deg. 43.8′ N	81 deg. 37.2′ W.
3	24 deg. 49.2′ N	81 deg. 37.2′ W.
4	24 deg. 49.2′ N	81 deg. 19.8′ W.
5	24 deg. 48.0′ N	81 deg. 19.8′ W.
6	24 deg. 48.0′ N	81 deg. 14.4′ W.
7	24 deg. 49.2′ N	81 deg. 14.4′ W.
8	24 deg. 49.2′ N	81 deg. 08.4′ W.
9	24 deg. 43.8′ N	81 deg. 08.4′ W.
10	24 deg. 43.8′ N	81 deg. 14.4′ W.
11	24 deg. 43.2′ N	81 deg. 14.4′ W.
12	24 deg. 43.2′ N	81 deg. 16.2′ W.
13	24 deg. 42.6′ N	81 deg. 16.2′ W.
14	24 deg. 42.6′ N	81 deg. 21.0′ W.
15	24 deg. 41.4′ N	81 deg. 21.0′ W.
16	24 deg. 41.4′ N	81 deg. 22.2′ W.
17	24 deg. 43.2′ N	81 deg. 22.2′ W.
18	24 deg. 43.2′ N	81 deg. 22.8′ W.
19	24 deg. 43.8′ N	81 deg. 22.8′ W.
20	24 deg. 43.8′ N	81 deg. 24.0′ W.
21	24 deg. 43.2′ N	81 deg. 24.0′ W.
22	24 deg. 43.2′ N	81 deg. 26.4′ W.
23	24 deg. 43.8′ N	81 deg. 26.4′ W.
24	24 deg. 43.8′ N	81 deg. 27.0′ W.
25	24 deg. 43.2′ N	81 deg. 27.0′ W.
26	24 deg. 43.2′ N	81 deg. 29.4′ W.
27	24 deg. 42.6′ N	81 deg. 29.4′ W.
28	24 deg. 42.6′ N	81 deg. 30.6′ W.
29	24 deg. 41.4′ N	81 deg. 30.6′ W.
30	24 deg. 41.4′ N	81 deg. 31.2′ W.
31	24 deg. 40.8′ N	81 deg. 31.2′ W.
32	24 deg. 40.8′ N	81 deg. 32.4′ W.

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GREAT WHITE HERON NATIONAL WILDLIFE REFUGE—Continued

[Based on the North American Datum of 1983]

Point	Latitude	Longitude
33	24 deg. 41.4′ N	81 deg. 32.4′ W.
34	24 deg. 41.4′ N	81 deg. 34.2′ W.
35	24 deg. 40.8′ N	81 deg. 34.2′ W.
36	24 deg. 48.0′ N	81 deg. 35.4′ W.
37	24 deg. 39.6′ N	81 deg. 35.4′ W.
38	24 deg. 39.6′ N	81 deg. 36.0′ W.
39	24 deg. 39.0′ N	81 deg. 36.0′ W.
40	24 deg. 39.0′ N	81 deg. 37.2′ W.
41	24 deg. 37.8′ N	81 deg. 37.2′ W.
42	24 deg. 37.8′ N	81 deg. 37.8′ W.
43	24 deg. 37.2′ N	81 deg. 37.8′ W.
44	24 deg. 37.2′ N	81 deg. 40.2′ W.
45	24 deg. 36.0′ N	81 deg. 40.2′ W.
46	24 deg. 36.0′ N	81 deg. 40.8′ W.
47	24 deg. 35.4′ N	81 deg. 40.8′ W.
48	24 deg. 35.4′ N	81 deg. 42.0′ W.
49	24 deg. 36.0′ N	81 deg. 42.0′ W.
50	24 deg. 36.0′ N	81 deg. 48.6′ W.
51	24 deg. 43.8′ N	81 deg. 48.6′ W.

KEY WEST NATIONAL WILDLIFE REFUGE

[Based on the North American Datum of 1983]

Point	Latitude	Longitude
1	24 deg. 40.0′ N	81 deg.49.0′ W.
2	24 deg. 40.0′ N	82 deg.10.0′ W.
3	24 deg. 27.0′ N	82 deg.10.0′ W.
4	24 deg. 27.0′ N	81 deg.49.0′ W.
5	24 deg. 40.0′ N	81 deg.49.0′ W.

2. When differential Global Positioning Systems data becomes available, these coordinates may be revised by publication in the **Federal Register** Notice to reflect the increased accuracy of such data.

Appendix IV to Subpart P of Part 922—Ecological Reserves Boundary Coordinates

1. The boundary of the Western Sambo Ecological Reserve is formed by connecting in succession the points at the following coordinates:

WESTERN SAMBO

[Based on differential Global Positioning Systems Data]

Point	Latitude	Longitude
1	24 deg. 33.70′ N	81 deg. 40.80′ W.
2	24 deg. 28.85′ N	81 deg. 41.90′ W.
3	24 deg. 28.50′ N	81 deg. 43.70′ W.
4	24 deg. 33.50′ N	81 deg. 43.10′ W.
5	24 deg. 33.70′ N	81 deg. 40.80′ W.

2. The Tortugas Ecological Reserve consists of two discrete areas, Tortugas North and Tortugas South.

3. The boundary of Tortugas North is formed by connecting in succession the points at the following coordinates:

TORTUGAS NORTH

Point	Latitude	Longitude
1	24 deg. 46′00″ N 83 deg.06′00″ W..	
2	24 deg. 46′00″ N	82 deg. 54′00″ W.
3	24 deg. 45′05″ N	82 deg. 48′00″ W.
4	24 deg. 43′32″ N	82 deg. 48′00″ W.
5	24 deg. 43′32″ N	82 deg. 52′00″ W.
6	24 deg. 43′00″ N	82 deg. 54′00″ W.
7	24 deg. 39′00″ N	82 deg. 58′00″ W.
8	24 deg. 39′00″ N 8183 deg. 06′00″ W..	
9	24 deg. 46′00″ N 8183 deg. 06′00″ W..	

4. The boundary of Tortugas South is formed by connecting in succession the points at the following coordinates:

TORTUGAS SOUTH

Point	Latitude	Longitude
1	24 deg. 33′00″ N	83 deg. 09′00″ W.
2	24 deg. 33′00″ N	83 deg. 05′00″ W.
3	24 deg. 18′00″ N	83 deg. 05′00″ W.
4	24 deg. 18′00″ N	83 deg. 09′00″ W.
5	24 deg. 33′00″ N	83 deg. 09′00″ W.

Appendix V to Subpart P of Part 922—Sanctuary Preservation Areas: Boundary Coordinates

The boundary of each of the Sanctuary Preservation Areas (SPAs) is formed by connecting in succession the points at the following coordinates:

ALLIGATOR REEF

[Based on Differential Global Positioning Systems Data]

Point	Latitude	Longitude
1	24 deg. 50.98′ N	80 deg. 36.84′ W.
2	24 deg. 50.51′ N	80 deg. 37.35′ W.
3	24 deg. 50.81′ N	80 deg. 37.63′ W.
4	24 deg. 51.23′ N	80 deg. 37.17′ W.
5	24 deg. 50.98′ N	80 deg. 36.84′ W.

Catch and release fishing by trolling only is allowed in this SPA.

CARYSFORT/SOUTH CARYSFORT REEF

[Based on Differential Global Positioning Systems Data]

Point	Latitude	Longitude
1	25 deg. 13.78′ N	80 deg. 12.00′ W.
2	25 deg. 12.03′ N	80 deg. 12.98′ W.
3	25 deg. 12.24′ N	80 deg. 13.77′ W.
4	25 deg. 14.13′ N	80 deg. 12.78′ W.
5	25 deg. 13.78′ N	80 deg. 12.00′ W.

CHEECA ROCKS

[Based on Differential Global Positioning Systems Data]

Point	Latitude	Longitude
1	24 deg. 54.42′ N	80 deg. 36.91′ W.
2	24 deg. 54.25′ N	80 deg. 36.77′ W.
3	24 deg. 54.10′ N	80 deg. 37.00′ W.
4	24 deg. 54.22′ N	80 deg. 37.15′ W.
5	24 deg. 54.42′ N	80 deg. 36.91′ W.

COFFINS PATCH

[Based on Differential Global Positioning Systems Data]

Point	Latitude	Longitude
1	24 deg. 41.47′ N	80 deg. 57.68′ W.
2	24 deg. 41.12′ N	80 deg. 57.53′ W.
3	24 deg. 40.75′ N	80 deg. 58.33′ W.
4	24 deg. 41.06′ N	80 deg. 58.48′ W.
5	24 deg. 41.47′ N	80 deg. 57.68′ W.

CONCH REEF

[Based on differential Global Positioning Systems Data]

Point	Latitude	Longitude
1	24 deg. 57.48′ N	80 deg. 27.47′ W.
2	24 deg. 57.34′ N	80 deg. 27.26′ W.
3	24 deg. 56.78′ N	80 deg. 27.52′ W.
4	24 deg. 56.96′ N	80 deg. 27.73′ W.
5	24 deg. 57.48′ N	80 deg. 27.47′ W.

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Catch and release fishing by trolling only is allowed in this SPA.

DAVIS REEF

[Based on differential Global Positioning Systems Data]

Point	Latitude	Longitude
1	24 deg. 55.61′ N	80 deg. 30.27′ W.
2	24 deg. 55.41′ N	80 deg. 30.05′ W.
3	24 deg. 55.11′ N	80 deg. 30.35′ W.
4	24 deg. 55.34′ N	80 deg. 30.52′ W.
5	24 deg. 55.61′ N	80 deg. 30.27′ W.

DRY ROCKS

[Based on Differential Global Positioning Systems Data]

Point	Latitude	Longitude
1	25 deg. 07.59′ N	80 deg. 17.91′ W.
2	25 deg. 07.41′ N	80 deg. 17.70′ W.
3	25 deg. 07.25′ N	80 deg. 17.82′ W.
4	25 deg. 07.41′ N	80 deg. 18.09′ W.
5	25 deg. 07.59′ N	80 deg. 17.91′ W.

GRECIAN ROCKS

[Based on Differential Global Positioning Systems Data]

Point	Latitude	Longitude
1	25 deg. 06.91′ N	80 deg. 18.20′ W.
2	25 deg. 06.67′ N	80 deg. 18.06′ W.
3	25 deg. 06.39′ N	80 deg. 18.32′ W.
4	25 deg. 06.42′ N	80 deg. 18.48′ W.
5	25 deg. 06.81′ N	80 deg. 18.44′ W.
6	25 deg. 06.91′ N	80 deg. 18.20′ W.

EASTERN DRY ROCKS

[Based on Differential Global Positioning Systems Data]

Point	atitude	Longitude
1	24 deg. 27.92′ N	81 deg. 50.55′ W.
2	24 deg. 27.73′ N	81 deg. 50.33′ W.
3	24 deg. 27.47′ N	81 deg. 50.80′ W.
4	24 deg. 27.72′ N	81 deg. 50.86′ W.
5	24 deg. 27.92′ N	81 deg. 50.55′ W.

THE ELBOW

[Based on Differential Global Positioning Systems data]

Point	Latitude	Longitude
1	25 deg. 08.97′ N	80 deg. 15.63′ W.
2	25 deg. 08.95′ N	80 deg. 15.22′ W.
3	25 deg. 08.18′ N	80 deg. 15.64′ W.
4	25 deg. 08.50′ N	80 deg. 16.07′ W.
5	25 deg. 08.97′ N	80 deg. 15.63′ W.

FRENCH REEF

[Based on Differential Global Positioning Systems data]

Point	Latitude	Longitude
1	25 deg. 02.20′ N	80 deg. 20.63′ W.
2	25 deg. 01.81′ N	80 deg. 21.02′ W.
3	25 deg. 02.36′ N	80 deg. 21.27′ W.
4	25 deg. 02.20′ N	80 deg. 20.63′ W.

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HEN AND CHICKENS

[Based on Differential Global Positioning Systems data]

Point	Latitude	Longitude
1	24 deg. 56.38′ N	80 deg. 32.86′ W.
2	24 deg. 56.21′ N	80 deg. 32.63′ W.
3	24 deg. 55.86′ N	80 deg. 32.95′ W.
4	24 deg. 56.04′ N	80 deg. 33.19′ W.
5	24 deg. 56.38′ N	80 deg. 32.86′ W.

LOOE KEY

[Based on Differential Global Positioning Systems Data]

Point	Latitude	Longitude
1	24 deg. 33.24′ N	81 deg. 24.03′ W.
2	24 deg. 32.70′ N	81 deg. 23.85′ W.
3	24 deg. 32.52′ N	81 deg. 24.70′ W.
4	24 deg. 33.12′ N	81 deg. 24.81′ W.
5	24 deg. 33.24′ N	81 deg. 24.03′ W.

MOLASSES REEF

[Based on Differential Global Positioning Systems Data]

Point	Latitude	Longitude
1	25 deg. 01.00′ N	80 deg. 22.53′ W.
2	25 deg. 01.06′ N	80 deg. 21.84′ W.
3	25 deg. 00.29′ N	80 deg. 22.70′ W.
4	25 deg. 00.72′ N	80 deg. 22.83′ W.
5	25 deg. 01.00′ N	80 deg. 22.53′ W.

NEWFOUND HARBOR KEY

[Based on Differential Global Positioning Systems Data]

Point	Latitude	Longitude
1	24 deg. 37.10′ N	81 deg. 23.34′ W.
2	24 deg. 36.85′ N	81 deg. 23.28′ W.
3	24 deg. 36.74′ N	81 deg. 23.80′ W.
4	24 deg. 37.00′ N	81 deg. 23.86′ W.
5	24 deg. 37.10′ N	81 deg. 23.34′ W.

ROCK KEY

[Based on Differential Global Positioning Systems Data]

Point	Latitude	Longitude
1	24 deg. 27.48′ N	81 deg. 51.35′ W.
2	24 deg. 27.30′ N	81 deg. 51.15′ W.
3	24 deg. 27.21′ N	81 deg. 51.60′ W.
4	24 deg. 27.45′ N	81 deg. 51.65′ W.
5	24 deg. 27.48′ N	81 deg. 51.35′ W.

SAND KEY

[Based on Differential Global Positioning Systems Data]

Point	Latitude	Longitude
1	24 deg. 27.58′ N	81 deg. 52.29′ W.
2	24 deg. 27.01′ N	81 deg. 52.32′ W.
3	24 deg. 27.02′ N	81 deg. 52.95′ W.
4	24 deg. 27.61′ N	81 deg. 52.94′ W.
5	24 deg. 27.58′ N	81 deg. 52.29′ W.

Catch and release fishing by trolling only is allowed in this SPA.

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SOMBRERO KEY

[Based on Differential Global Positioning Systems Data]

Point	Latitude	Longitude
1	24 deg. 37.91′ N	81 deg. 06.78′ W.
2	24 deg. 37.50′ N	81 deg. 06.19′ W.
3	24 deg. 37.25′ N	81 deg. 06.89′ W.
4	24 deg. 37.91′ N	81 deg. 06.78′ W.

Catch and release fishing by trolling only is allowed in this SPA.

Appendix VI to Subpart P of Part 922—Special-Use Areas Boundary Coordinates and Use Designations

The boundary of each of the Special-Use is formed by connecting in succession the points at the following coordinates:

CONCH REEF

[Research Only]

[Based on Differential Global Positioning Systems Data]

Point	Latitude	Longitude
1	24 deg. 56.83′ N	80 deg. 27.26′ W.
2	24 deg. 57.10′ N	80 deg. 26.93′ W.
3	24 deg. 56.99′ N	80 deg. 27.42′ W.
4	24 deg. 57.34′ N	80 deg. 27.26′ W.
5	24 deg. 56.83′ N	80 deg. 27.26′ W.

EASTERN SAMBO

[Research Only]

[Based on Differential Global Positioning Systems Data]

Point	Latitude	Longitude
1	24 deg. 29.84′ N	81 deg. 39.59′ W.
2	24 deg. 29.55′ N	81 deg. 39.35′ W.
3	24 deg. 29.37′ N	81 deg. 39.96′ W.
4	24 deg. 29.77′ N	81 deg. 40.03′ W.
5	24 deg. 29.84′ N	81 deg. 39.59′ W.

LOOE KEY

[Research Only]

[Based on Differential Global Positioning Systems Data]

Point	Latitude	Longitude
1	24 deg. 34.17′ N	81 deg. 23.01′ W.
2	24 deg. 33.98′ N	81 deg. 22.96′ W.
3	24 deg. 33.84′ N	81 deg. 23.60′ W.
4	24 deg. 34.23′ N	81 deg. 23.68′ W.
5	24 deg. 34.17′ N	81 deg. 23.01′ W.

TENNESSEE REEF

[Research Only]

[Based on Differential Global Positioning Systems Data]

Point	Latitude	Longitude
1	24 deg. 44.77′ N	80 deg. 47.12′ W.
2	24 deg. 44.57′ N	80 deg. 46.98′ W.
3	24 deg. 44.68′ N	80 deg. 46.59′ W.
4	24 deg. 44.95′ N	80 deg. 46.74′ W.
5	24 deg. 44.77′ N	80 deg. 47.12′ W.

Appendix VII to Subpart P of Part 922—Areas To Be Avoided Boundary Coordinates

IN THE VICINITY OF THE FLORIDA KEYS

[Reference Charts: United States 11466, 27th Edition—September 1, 1990 and United States 11450, 4th Edition—August 11,1990]

Point	Latitude	Longitude
1	25 deg. 45.00′ N	80 deg. 06.10′ W.
2	25 deg. 38.70′ N	80 deg. 02.70′ W.
3	25 deg. 22.00′ N	80 deg. 03.00′ W.
4	25 deg. 00.20′ N	80 deg. 13.40′ W.
5	24 deg. 37.90′ N	80 deg. 47.30′ W.
6	24 deg. 29.20′ N	81 deg. 17.30′ W.
7	24 deg. 22.30′ N	81 deg. 43.17′ W.
8	24 deg. 28.00′ N	81 deg. 43.17′ W.
9	24 deg. 28.70′ N	81 deg. 43.50′ W.
10	24 deg. 29.80′ N	81 deg. 43.17′ W.
11	24 deg. 33.10′ N	81 deg. 35.15′ W.
12	24 deg. 33.60′ N	81 deg. 26.00′ W.
13	24 deg. 38.20′ N	81 deg. 07.00′ W.
14	24 deg. 43.20′ N	80 deg. 53.20′ W.
15	24 deg. 46.10′ N	80 deg. 46.15′ W.
16	24 deg. 51.10′ N	80 deg. 37.10′ W.
17	24 deg. 57.50′ N	80 deg. 27.50′ W.
18	25 deg. 09.90′ N	80 deg. 16.20′ W.
19	25 deg. 24.00′ N	80 deg. 09.10′ W.
20	25 deg. 31.50′ N	80 deg. 07.00′ W.
21	25 deg. 39.70′ N	80 deg. 06.85′ W.
22	25 deg. 45.00′ N	80 deg. 06.10′ W.

IN THE VICINITY OF KEY WEST HARBOR

[Reference Chart: United States 11434, 21st Edition—August 11, 1990]

Point	Latitude	Longitude
23	24 deg. 27.95′ N	81 deg. 48.65′ W.
24	24 deg. 23.00′ N	81 deg. 53.50′ W.
25	24 deg. 26.60′ N	81 deg. 58.50′ W.
26	24 deg. 27.75′ N	81 deg. 55.70′ W.
27	24 deg. 29.35′ N	81 deg. 53.40′ W.
28	24 deg. 29.35′ N	81 deg. 50.00′ W.
29	24 deg. 27.95′ N	81 deg. 48.65′ W.

AREA SURROUNDING THE MARQUESAS KEYS

[Reference Chart: United States 11434, 21st Edition—August 11, 1990]

Point	Latitude	Longitude
30	24 deg. 26.60′ N	81 deg. 59.55′ W.
31	24 deg. 23.00′ N	82 deg. 03.50′ W.
32	24 deg. 23.60′ N	82 deg. 27.80′ W.
33	24 deg. 34.50′ N	82 deg. 37.50′ W.
34	24 deg. 43.00′ N	82 deg. 26.50′ W.
35	24 deg. 38.31′ N	81 deg. 54.06′ W.
36	24 deg. 37.91′ N	81 deg. 53.40′ W.
37	24 deg. 36.15′ N	81 deg. 51.78′ W.
38	24 deg. 34.40′ N	81 deg. 50.60′ W.
39	24 deg. 33.44′ N	81 deg. 49.73′ W.
40	24 deg. 31.20′ N	81 deg. 52.10′ W.
41	24 deg. 28.70′ N	81 deg. 56.80′ W.
42	24 deg. 26.60′ N	81 deg. 59.55′ W.

AREA SURROUNDING THE DRY TORTUGAS ISLANDS

[Reference Chart: United States 11434, 21st Edition—August 11, 1990]

Point	Latitude	Longitude
43	24 deg. 32.00′ N	82 deg. 53.50′ W.
44	24 deg. 32.00′ N	83 deg. 00.05′ W.
45	24 deg. 39.70′ N	83 deg. 00.05′ W.
46	24 deg. 45.60′ N	82 deg. 54.40′ W.
47	24 deg. 45.60′ N	82 deg. 47.02′ W.

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AREA SURROUNDING THE DRY TORTUGAS ISLANDS—Continued

[Reference Chart: United States 11434, 21st Edition—August 11, 1990]

Point	Latitude	Longitude
48	24 deg. 42.80′ N	82 deg. 43.90′ W.
49	24 deg. 39.50′ N	82 deg. 43.90′ W.
50	24 deg. 35.60′ N	82 deg. 46.40′ W.
51	24 deg. 32.00′ N	82 deg. 53.50′ W.

[FR Doc. 00–12150 Filed 5–12–00; 8:45 am]

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Federal Register

Thursday,
May 18, 2000

Part III

Environmental Protection Agency

40 CFR Part 131

Water Quality Standards; Establishment of Numeric Criteria for Priority Toxic Pollutants for the State of California; Rule

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ENVIRONMENTAL PROTECTION AGENCY

40 CFR Part 131

[FRL–6587–9]

RIN 2040–AC44

Water Quality Standards; Establishment of Numeric Criteria for Priority Toxic Pollutants for the State of California

AGENCY: Environmental Protection Agency.

ACTION: Final rule.

SUMMARY: This final rule promulgates: numeric aquatic life criteria for 23 priority toxic pollutants; numeric human health criteria for 57 priority toxic pollutants; and a compliance schedule provision which authorizes the State to issue schedules of compliance for new or revised National Pollutant Discharge Elimination System permit limits based on the federal criteria when certain conditions are met.

EPA is promulgating this rule based on the Administrator's determination that numeric criteria are necessary in the State of California to protect human health and the environment. The Clean Water Act requires States to adopt numeric water quality criteria for priority toxic pollutants for which EPA has issued criteria guidance, the presence or discharge of which could reasonably be expected to interfere with maintaining designated uses.

EPA is promulgating this rule to fill a gap in California water quality standards that was created in 1994 when a State court overturned the State's water quality control plans which contained water quality criteria for priority toxic pollutants. Thus, the State of California has been without numeric water quality criteria for many priority toxic pollutants as required by the Clean Water Act, necessitating this action by EPA. These Federal criteria are legally applicable in the State of California for inland surface waters, enclosed bays and estuaries for all purposes and programs under the Clean Water Act.

EFFECTIVE DATE: This rule shall be effective May 18, 2000.

ADDRESSES: The administrative record for today's final rule is available for public inspection at the U.S. Environmental Protection Agency, Region 9, Water Division, 75 Hawthorne Street, San Francisco, California 94105, between the hours of 8:00 a.m. and 4:30 p.m. For access to the administrative record, call Diane E. Fleck, P.E., Esq. at 415 744–1984 for an appointment. A reasonable fee will be charged for photocopies.

FOR FURTHER INFORMATION CONTACT: Diane E. Fleck, P.E., Esq. or Philip Woods, U.S. Environmental Protection Agency, Region 9, Water Division, 75 Hawthorne Street, San Francisco, California 94105, 415–744–1984 or 415–744–1997, respectively.

SUPPLEMENTARY INFORMATION: This preamble is organized according to the following outline:

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A. Potentially Affected Entities

Citizens concerned with water quality in California may be interested in this rulemaking. Entities discharging pollutants to waters of the United States in California could be affected by this rulemaking since water quality criteria are used by the State in developing National Pollutant Discharge Elimination System (NPDES) permit limits. Categories and entities that ultimately may be affected include:

Category	Examples of potentially affected entities
Industry	Industries discharging pollutants to surface waters in California or to publicly-owned treatment works.
Municipalities	Publicly-owned treatment works discharging pollutants to surface waters in California

This table is not intended to be exhaustive, but rather provides a guide for readers regarding entities likely to be affected by this action. This table lists the types of entities that EPA is now aware could potentially be affected by this action. Other types of entities not listed in the table could also be affected. To determine whether your facility might be affected by this action, you should carefully examine the applicability criteria in § 131.38(c). If you have questions regarding the applicability of this action to a particular entity, consult the persons listed in the preceding **FOR FURTHER INFORMATION CONTACT** section.

B. Introduction and Overview

1. Introduction

This section introduces the topics which are addressed in the preamble and provides a brief overview of EPA's basis and rationale for promulgating Federal criteria for the State of California. Section C briefly describes the evolution of the efforts to control toxic pollutants; these efforts include the changes enacted in the 1987 CWA Amendments, which are the basis for this rule. Section D summarizes California's efforts since 1987 to implement the requirements of CWA section 303(c)(2)(B) and describes EPA's procedure and actions for determining whether California has fully implemented CWA section 303(c)(2)(B). Section E provides the rationale and approach for developing this final rule, including a discussion of EPA's legal basis for this final rule. Section F describes the development of the criteria included in this rule. Section G summarizes the provisions of the final rule and discusses implementation issues. Sections H, I, J, K , L, M, N, O, P, and Q briefly address the requirements of Executive Order 12866, the Unfunded Mandates Reform Act of 1995, the Regulatory Flexibility Act, the Paperwork Reduction Act, the Endangered Species Act, the Congressional Review Act, Executive Order 13084, Consultation and Coordination with Indian Tribal Governments, the National Technology Transfer and Advancement Act, and Executive Order 13132, Federalism, respectively.

The proposal for this rulemaking was published in the **Federal Register** on August 5, 1997. Changes from the proposal are generally addressed in the body of this preamble and specifically addressed in the response to comments document included in the administrative record for this rulemaking. EPA responded to all comments on the proposed rule, including comments received after the September 26, 1997, deadline. Although EPA is under no legal obligation to respond to late comments, EPA made a policy decision to respond to all comments.

Since detailed information concerning many of the topics in this preamble was published previously in the **Federal Register** in preambles for this and other rulemakings, references are frequently made to those preambles. Those rulemakings include: Water Quality Standards; Establishment of Numeric Criteria for Priority Toxic Pollutants for the State of California; Proposed Rule, 62 FR 42159, August 5, 1997 (referred to as the ''proposed CTR''); Water Quality Standards; Establishment of Numeric Criteria for Priority Toxic Pollutants, 57 FR 60848, December 22, 1992 (referred to as the ''National Toxics Rule'' or ''NTR''); and the NTR as amended by Administrative Stay of Federal Water Quality Criteria for Metals and Interim Final Rule, Water Quality Standards; Establishment of Numeric Criteria for Priority Toxic Pollutants; States' Compliance—Revision of Metals Criteria, 60 FR 22228, May 4, 1995 (referred to as the ''National Toxics Rule [NTR], as amended''). The NTR, as amended, is codified at 40 CFR 131.36. A copy of the proposed CTR and its preamble, and the NTR, as amended, and its preambles are contained in the administrative record for this rulemaking.

EPA is making this final rule effective upon publication. Under the Administrative Procedure Act, 5 U.S.C. 553(d)(3), agencies must generally publish a rule no more than 30 days prior to the effective date of the rule except as otherwise provided for by the Agency for good cause. The purpose of the 30-day waiting period is to give affected parties a reasonable time to adjust their behavior before the final rule takes effect. See *Omnipoint Corp.* v. *F.C.C.,* 78 F.3d 620, 630–631 (D.C. Cir. 1996); *Riverbend Farms, Inc.* v. *Madigan*, 958 F.2d 1479, 1485 (9th Cir. 1992).

In this instance, EPA finds good cause to make the final rule effective upon publication. In order to find good cause, an Agency needs to find that the 30-day period would be: (1) Impracticable, (2) unnecessary, or (3) contrary to the public interest. Here EPA is relying on the second reason to support its finding of good cause. EPA also notes that the State has requested EPA to make the rule immediately effective.

EPA finds that in this instance, waiting 30 days to make the rule effective is unnecessary. As explained in further detail elsewhere in this preamble, this rule is not self implementing; rather it establishes ambient conditions that the State of California will implement in future permit proceedings. These permit proceedings will, by regulation, take longer than 30 days to complete. This means that although the rule is immediately effective, no discharger's conduct would be altered under the rule in less than 30 days, and therefore the 30-day period is unnecessary.

2. Overview

This final rule establishes ambient water quality criteria for priority toxic pollutants in the State of California. The criteria in this final rule will supplement the water quality criteria promulgated for California in the NTR, as amended. In 1991, EPA approved a number of water quality criteria (discussed in section D), for the State of California. Since EPA had approved these criteria, it was not necessary to include them in the 1992 NTR for these criteria. However, the EPA-approved criteria were subsequently invalidated in State litigation. Thus, this final rule contains criteria to fill the gap created by the State litigation.

This final rule does not change or supersede any criteria previously promulgated for the State of California in the NTR, as amended. Criteria which EPA promulgated for California in the NTR, as amended, are footnoted in the final table at 131.38(b)(1), so that readers may see the criteria promulgated in the NTR, as amended, for California and the criteria promulgated through this rulemaking for California in the same table. This final rule is not intended to apply to waters within Indian Country. EPA recognizes that there are possibly waters located wholly or partly in Indian Country that are included in the State's basin plans. EPA will work with the State and Tribes to identify any such waters and determine whether further action to protect water quality in Indian Country is necessary.

This rule is important for several environmental, programmatic and legal reasons. Control of toxic pollutants in surface waters is necessary to achieve the CWA's goals and objectives. Many of California's monitored river miles, lake acres, and estuarine waters have elevated levels of toxic pollutants. Recent studies on California water bodies indicate that elevated levels of toxic pollutants exist in fish tissue which result in fishing advisories or bans. These toxic pollutants can be attributed to, among other sources, industrial and municipal discharges.

Water quality standards for toxic pollutants are important to State and EPA efforts to address water quality problems. Clearly established water quality goals enhance the effectiveness of many of the State's and EPA's water programs including permitting, coastal water quality improvement, fish tissue quality protection, nonpoint source controls, drinking water quality protection, and ecological protection. Numeric criteria for toxic pollutants allow the State and EPA to evaluate the adequacy of existing and potential control measures to protect aquatic ecosystems and human health. Numeric criteria also provide a more precise basis for deriving water quality-based effluent limitations (WQBELs) in

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National Pollutant Discharge Elimination System (NPDES) permits and wasteload allocations for total maximum daily loads (TMDLs) to control toxic pollutant discharges. Congress recognized these issues when it enacted section 303(c)(2)(B) to the CWA.

While California recognizes the need for applicable water quality standards for toxic pollutants, its adoption efforts have been stymied by a variety of factors. The Administrator has decided to exercise her CWA authorities to move forward the toxic control program, consistent with the CWA and with the State of California's water quality standards program.

Today's action will also help restore equity among the States. The CWA is designed to ensure all waters are sufficiently clean to protect public health and/or the environment. The CWA allows some flexibility and differences among States in their adopted and approved water quality standards, but it should be implemented in a manner that ensures a level playing field among States. Although California has made important progress toward satisfying CWA requirements, it has not satisfied CWA section 303(c)(2)(B) by adopting numeric water quality criteria for toxic pollutants. This section was added to the CWA by Congress in 1987. Prior to today, the State of California had been the only State in the Nation for which CWA section 303(c)(2)(B) had remained substantially unimplemented after EPA's promulgation of the NTR in December of 1992. Section 303(c)(4) of the CWA authorizes the EPA Administrator to promulgate standards where necessary to meet the requirements of the Act. The Administrator determined that this rule was a necessary and important component for the implementation of CWA section 303(c)(2)(B) in California.

EPA acknowledges that the State of California is working to satisfy CWA section 303(c)(2)(B). When the State formally adopts, and EPA approves, criteria consistent with statutory requirements, as envisioned by Congress in the CWA, EPA intends to stay this rule. If within the applicable time frame for judicial review, the States' standards are challenged, EPA will withdraw this rule after such judicial review is complete and the State standards are sustained.

C. Statutory and Regulatory Background

The preamble to the August 5, 1997, proposed rule provided a general discussion of EPA's statutory and regulatory authority to promulgate water quality criteria for the State of California. See 62 FR 42160–42163. EPA is including that discussion in the record for the final rule. Commenters questioned EPA's authority to promulgate certain aspects of the proposal. EPA is responding to those comments in the appropriate sections of this preamble, and in the response to comments document included in the administrative record for this rulemaking. Where appropriate, EPA's responses expand upon the discussion of statutory and regulatory authority found in the proposal.

D. California Water Quality Standards Actions

1. California Regional Water Quality Control Board Basin Plans, and the Inland Surface Waters Plan (ISWP) and the Enclosed Bays and Estuaries Plan (EBEP) of April 1991

The State of California regulates water quality through its State Water Resources Control Board (SWRCB) and through nine Regional Water Quality Control Boards (RWQCBs). Each of the nine RWQCBs represents a different geographic area; area boundaries are generally along watershed boundaries. Each RWQCB maintains a Basin Plan which contains the designated uses of the water bodies within its respective geographic area within California. These designated uses (or ''beneficial uses'' under State law) together with legally-adopted criteria (or ''objectives'' under State law), comprise water quality standards for the water bodies within each of the Basin areas. Each of the nine RWQCBs undergoes a triennial basin planning review process, in compliance with CWA section 303. The SWRCB provides assistance to the RWQCBs.

Most of the Basin Plans contain conventional pollutant objectives such as dissolved oxygen. None of the Basin Plans contains a comprehensive list of priority toxic pollutant criteria to satisfy CWA section 303(c)(2)(B). The nine RWQCBs and the SWRCB had intended that the priority toxic pollutant criteria contained in the three SWRCB statewide plans, the Inland Surface Waters Plan (ISWP), the Enclosed Bays and Estuaries Plan (EBEP), and the Ocean Plan, apply to all basins and satisfy CWA section 303(c)(2)(B).

On April 11, 1991, the SWRCB adopted two statewide water quality control plans, the ISWP and the EBEP. These statewide plans contained narrative and numeric water quality criteria for toxic pollutants, in part to satisfy CWA section 303(c)(2)(B). The water quality criteria contained in the SWRCB statewide plans, together with the designated uses in each of the Basin Plans, created a set of water quality standards for waters within the State of California.

Specifically, the two plans established water quality criteria or objectives for all fresh waters, bays and estuaries in the State. The plans contained water quality criteria for some priority toxic pollutants, provisions relating to whole effluent toxicity, implementation procedures for point and nonpoint sources, and authorizing compliance schedule provisions. The plans also included special provisions affecting waters dominated by reclaimed water (labeled as Category (a) waters), and waters dominated by agricultural drainage and constructed agricultural drains (labeled as Category (b) and (c) waters, respectively).

2. EPA's Review of California Water Quality Standards for Priority Toxic Pollutants in the ISWP and EBEP, and the National Toxics Rule

The EPA Administrator has delegated the responsibility and authority for review and approval or disapproval of all new or revised State water quality standards to the EPA Regional Administrators (see 40 CFR 131.21). Thus, State actions under CWA section 303(c)(2)(B) are submitted to the appropriate EPA Regional Administrator for review and approval.

In mid-April 1991, the SWRCB submitted to EPA for review and approval the two statewide water quality control plans, the ISWP and the EBEP. On November 6, 1991, EPA Region 9 formally concluded its review of the SWRCB's plans. EPA approved the narrative water quality criterion and the toxicity criterion in each of the plans. EPA also approved the numeric water quality criteria contained in both plans, finding them to be consistent with the requirements of section 303(c)(2)(B) of the CWA and with EPA's national criteria guidance published pursuant to section 304(a) of the CWA.

EPA noted the lack of criteria for some pollutants, and found that, because of the omissions, the plans did not fully satisfy CWA section 303(c)(2)(B). The plans did not contain criteria for all listed pollutants for which EPA had published national criteria guidance. The ISWP contained human health criteria for only 65 pollutants, and the EBEP contained human health criteria for only 61 pollutants for which EPA had issued section 304(a) guidance criteria. Both the ISWP and EBEP contained aquatic life criteria for all pollutants except cyanide and chromium III (freshwater only) for which EPA has CWA section

304(a) criteria guidance. The SWRCB's administrative record stated that all priority pollutants with EPA criteria guidance were likely to be present in California waters. However, the SWRCB's record contained insufficient information to support a finding that the excluded pollutants were not reasonably expected to interfere with designated uses of the waters of the State.

Although EPA approved the statewide selenium objective in the ISWP and EBEP, EPA disapproved the objective for the San Francisco Bay and Delta, because there was clear evidence that the objective would not protect the designated fish and wildlife uses (the California Department of Health Services had issued waterfowl consumption advisories due to selenium concentrations, and scientific studies had documented selenium toxicity to fish and wildlife). EPA restated its commitment to object to National Pollutant Discharge Elimination System (NPDES) permits issued for San Francisco Bay that contained effluent limits based on an objective greater than 5 parts per billion (ppb) (four day average) and 20 ppb (1 hour average), the freshwater criteria. EPA reaffirmed its disapproval of Californias' site-specific selenium objective for portions of the San Joaquin River, Salt Slough, and Mud Slough. EPA also disapproved of the categorical deferrals and exemptions. These disapprovals included the disapproval of the State's deferral of water quality objectives to effluent dominated streams (Category a) and to streams dominated by agricultural drainage (Category b), and the disapproval of the exemption of water quality objectives to constructed agricultural drains (Category c). EPA found the definitions of the categories imprecise and overly broad which could have led to an incorrect interpretation.

Since EPA had disapproved portions of each of the California statewide plans which were necessary to satisfy CWA section 303(c)(2)(B), certain disapproved aspects of California's water quality standards were included in EPA's promulgation of the National Toxics Rule (NTR) (40 CFR 131.36, 57 FR 60848). EPA promulgated specific criteria for certain water bodies in California.

The NTR was amended, effective April 14, 1995, to stay certain metals criteria which had been promulgated as total recoverable. Effective April 15, 1995, EPA promulgated interim final metals criteria as dissolved concentrations for those metals which had been stayed (Administrative Stay of Federal Water Quality Criteria for Metals and Interim Final Rule, Water Quality Standards; Establishment of Numeric Criteria for Priority Toxic Pollutants; States' Compliance—Revision of Metals Criteria; 60 FR 22228, 22229, May 4, 1995 [the NTR, as amended]). The stay was in response to a lawsuit against EPA challenging, among other issues, metals criteria expressed as total recoverable concentrations. A partial Settlement Agreement required EPA to stay specific metals criteria in the NTR. EPA then promulgated certain metals criteria in the dissolved form through the use of conversion factors. These factors are listed in the NTR, as amended. A scientific discussion of these criteria is found in a subsequent section of this preamble.

Since certain criteria have already been promulgated for specific water bodies in the State of California in the NTR, as amended, they are not within the scope of today's final rule. However, for clarity in reading a comprehensive rule for the State of California, these criteria are incorporated into 40 CFR 131.38(d)(2). Footnotes to the Table in 40 CFR 131.38(b)(1) and 40 CFR 131.38(d)(3) clarify which criteria (and for which specific water bodies) were promulgated by the NTR, as amended, and are therefore excluded from this final rule. The appropriate (freshwater or saltwater) aquatic life criteria which were promulgated in the NTR, as amended, for all inland surface waters and enclosed bays and estuaries include: chromium III and cyanide. The appropriate (water and organism or organism only) human health criteria which were promulgated in the NTR, as amended, for all inland surface waters and enclosed bays and estuaries include:

antimony
thallium
asbestos
acrolein
acrylonitrile
carbon tetrachloride
chlorobenzene
1,2-dichloroethane
1,1-dichloroethylene
1,3-dichloropropylene
ethylbenzene
1,1,2,2-tetrachloroethane
tetrachloroethylene
1,1,2-trichloroethane
trichloroethylene
vinyl chloride
2,4-dichlorophenol
2-methyl-4,6-dinitrophenol
2,4-dinitrophenol
benzidine
bis(2-chloroethyl)ether
bis(2-ethylhexyl)phthalate
3,3-dichlorobenzidine
diethyl phthalate
dimethyl phthalate
di-n-butyl phthalate
2,4-dinitrotoluene
1,2-diphenylhydrazine
hexachlorobutadiene
hexachlorocyclopentadiene
hexachloroethane
isophorone
nitrobenzene
n-nitrosodimethylamine
n-nitrosodiphenylamine

Other pollutant criteria were promulgated in the NTR, as amended, for specific water bodies, but not all inland surface waters and enclosed bays and estuaries.

3. Status of Implementation of CWA Section 303(c)(2)(B)

Shortly after the SWRCB adopted the ISWP and EBEP, several dischargers filed suit against the State alleging that it had not adopted the two plans in compliance with State law. The plaintiffs in a consolidated case included: the County of Sacramento, Sacramento County Water Agency; Sacramento Regional County Sanitation District; the City of Sacramento; the City of Sunnyvale; the City of San Jose; the City of Stockton; and Simpson Paper Company.

The dischargers alleged that the State had not adopted the ISWP and EBEP in compliance with the California Administrative Procedures Act (Gov Code. Section 11340, *et seq.*), the California Environmental Quality Act (Pub. Re Code, Section 21000, *et seq.*), and the Porter-Cologne Act (Wat. Code, Section 13200, *et seq.*). The allegation that the State did not sufficiently consider economics when adopting water quality objectives, as allegedly required by Section 13241 of the Porter Cologne Act, was an important issue in the litigation.

In October of 1993, the Superior Court of California, County of Sacramento, issued a tentative decision in favor of the dischargers. In March of 1994, the Court issued a substantively similar final decision in favor of the dischargers. Final judgments from the Court in July of 1994 ordered the SWRCB to rescind the ISWP and EBEP. On September 22, 1994, the SWRCB formally rescinded the two statewide water quality control plans. The State is currently in the process of readopting water quality control plans for inland surface waters, enclosed bays and estuaries.

CWA section 303(c)(2)(B) was fully implemented in the State of California from December of 1992, when the NTR was promulgated, until September of 1994, when the SWRCB was required to rescind the ISWP and EBEP. The provisions for California in EPA's NTR together with the approved portions of

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California's ISWP and EBEP implemented the requirements of CWA section 303(c)(2)(B). However, since September of 1994, when the SWRCB rescinded the ISWP and EBEP, the requirements of section 303(c)(2)(B) have not been fully implemented in California.

The scope of today's rule is to re-establish criteria for the remaining priority toxic pollutants to meet the requirements of section 303(c)(2)(B) of the CWA. Pursuant to section 303(c)(4), the Administrator has determined that it is necessary to include in today's action criteria for priority toxic pollutants, which are not covered by the NTR, as amended, or by the State through EPA-approved site-specific criteria, for waters of the United States in the State of California.

4. State-Adopted, Site-Specific Criteria for Priority Toxic Pollutants

The State has the discretion to develop site-specific criteria when appropriate e.g., when statewide criteria appear over-or under-protective of designated uses. Periodically, the State through its RWQCBs will adopt site-specific criteria for priority toxic pollutants within respective Basin Plans. These criteria are intended to be effective throughout the Basin or throughout a designated water body. Under California law, these criteria must be publicly reviewed and approved by the RWQCB, the SWRCB, and the State's Office of Administrative Law (OAL). Once this adoption process is complete, the criteria become State law.

These criteria must be submitted to the EPA Regional Administrator for review and approval under CWA section 303. These criteria are usually submitted to EPA as part of a RWQCB Basin Plan Amendment, after the Amendment has been adopted under the State's process and has become State law.

a. State-Adopted Site-Specific Criteria Under EPA Review

The State of California has recently reviewed and updated all of its RWQCB Basin Plans. All of the Basin Plans have completed the State review and adoption process and have been submitted to EPA for review and approval. Some of the Basin Plans contain site-specific criteria. In these cases, the State-adopted site-specific criteria are used for water quality programs.

EPA has not yet concluded consultation under the Endangered Species Act with the U.S. Department of Interior, Fish and Wildlife Service, and the U.S. Department of Commerce, National Marine Fisheries Service, on EPA's tentative approval/disapproval actions on the RWQCB Basin Plans. In this situation, the more stringent of the two criteria (the State-adopted site-specific criteria in the RWQCB Basin Plans, or the Federal criteria in this final rule), would be used for water quality programs including the calculation of water quality-based effluent criteria in National Pollutant Discharge Elimination System (NPDES) permits.

b. State-Adopted Site-Specific Criteria With EPA Approval

In several cases, the EPA Regional Administrator has already reviewed and approved State-adopted site-specific criteria within the State of California. Several of these cases are discussed in this section. All of the EPA approval letters referenced in today's preamble are contained in the administrative record for today's rule.

Sacramento River: EPA has approved site-specific acute criteria for copper, cadmium and zinc in the Sacramento River, upstream of Hamilton City, in the Central Valley Region (RWQCB for the Central Valley Region) of the State of California. EPA approved these site-specific criteria by letter dated August 7, 1985. Specifically, EPA approved for the Sacramento River (and tributaries) above Hamilton City, a copper criterion of 5.6 µg/l (maximum), a zinc criterion of 16 µg/l (maximum) and a cadmium criterion of 0.22 µg/l (maximum), all in the dissolved form using a hardness of 40 mg/l as CaCO3. (These criteria were actually adopted by the State and approved by EPA as equations which vary with hardness.) These ''maximum'' criteria correspond to acute criteria in today's final rule. Therefore, Federal acute criteria for copper, cadmium, and zinc for the Sacramento River (and tributaries) above Hamilton City are not necessary to protect the designated uses and are not included in the final rule. However, the EPA Administrator is making a finding that it is necessary to include chronic criteria for copper, cadmium and zinc for the Sacramento River (and tributaries) above Hamilton City, as part of the statewide criteria promulgated in today's final rule.

San Joaquin River: The selenium criteria in this rule are not applicable to portions of the San Joaquin River, in the Central Valley Region, because selenium criteria have been either previously approved by EPA or previously promulgated by EPA as part of the NTR. EPA approved and disapproved State-adopted site-specific selenium criteria in portions of the San Joaquin River, in the Central Valley Region of the State of California (RWQCB for the Central Valley Region). EPA's determination on these site-specific criteria is contained in a letter dated April 13, 1990.

Specifically, EPA approved for the San Joaquin River, mouth of Merced River to Vernalis, an aquatic life selenium criterion of 12 µg/l (maximum with the understanding that the instantaneous maximum concentration may not exceed the objective more than once every three years). Today's final rule does not affect this Federally-approved, State-adopted site-specific acute criterion, and it remains in effect for the San Joaquin River, mouth of Merced River to Vernalis. Therefore, an acute criterion for selenium in the San Joaquin River, mouth of Merced River to Vernalis is not necessary to protect the designated use and thus is not included in this final rule.

By letter dated April 13, 1990, EPA also approved for the San Joaquin River, mouth of Merced River to Vernalis, a State-adopted site-specific aquatic life selenium criterion of 5 µg/l (monthly mean); however, EPA disapproved a State-adopted site-specific selenium criterion of 8 µg/l (monthly mean—critical year only) for these waters. Subsequently, EPA promulgated a chronic selenium criterion of 5 µg/l (4 day average) for waters of the San Joaquin River from the mouth of the Merced River to Vernalis in the NTR. This chronic criterion applies to all water quality programs concerning the San Joaquin River, mouth of Merced River to Vernalis. Today's final rule does not affect the Federally-promulgated chronic selenium criterion of 5 µg/l (4 day average) set forth in the NTR. This previously Federally-promulgated criterion remains in effect for the San Joaquin River, mouth of Merced River to Vernalis.

Grassland Water District, San Luis National Wildlife Refuge, and Los Banos State Wildlife Refuge: EPA approved for the Grassland Water District, San Luis National Wildlife Refuge, and Los Banos State Wildlife Refuge, a State-adopted site-specific aquatic life selenium criterion of 2 µg/l (monthly mean) by letter dated April 13, 1990. This Federally-approved, State-adopted site-specific chronic criterion remains in effect for the Grassland Water District, San Luis National Wildlife Refuge and Los Banos State Wildlife Refuge. Therefore it is not necessary to include in today's final rule, a chronic criterion for selenium for the Grassland Water District, San Luis National Wildlife Refuge and Los Banos State Wildlife Refuge, and thus, it is not included in this final rule.

San Francisco Regional Board Basin Plan of 1986: EPA approved several priority toxic pollutant objectives (CWA criteria) that were contained in the1986 San Francisco Regional Board Basin Plan, as amended by SWRCB Resolution Numbers 87–49, 87–82 and 87–92, by letters dated September 2, 1987 and December 24, 1987. This Basin Plan, the SWRCB Resolutions, and the EPA approval letters are contained in the administrative record for this rulemaking. It is not necessary to include these criteria for priority toxic pollutants that are contained in the San Francisco Regional Board's 1986 Basin Plan as amended, and approved by EPA. Priority pollutants in this situation are footnoted in the matrix at 131.38(b)(1) with footnote ''b.'' Where gaps exist in the State adoption and EPA approval of priority toxic pollutant objectives, the criteria in today's rule apply.

EPA is assigning ''human health, water and organism consumption'' criteria to waters with the States' municipal or ''MUN'' beneficial use designation in the Basin Plan. Also, some pollutants regulated through the Basin Plan have different averaging periods, *e.g.,* one hour as compared with the rule's ''short-term.'' However, where classes of chemicals, such as polynuclear aromatic hydrocarbons, or PAHs, and phenols, are regulated through the Basin Plan, but not specific chemicals within the category, specific chemicals within the category are regulated by today's rule.

E. Rationale and Approach for Developing the Final Rule

This section explains EPA's legal basis for today's final rule, and discusses EPA's general approach for developing the specific requirements for the State of California.

1. Legal Basis

CWA section 303(c) specifies that adoption of water quality standards is primarily the responsibility of the States. However, CWA section 303(c) also describes a role for the Federal government to oversee State actions to ensure compliance with CWA requirements. If EPA's review of the States' standards finds flaws or omissions, then the CWA authorizes EPA to correct the deficiencies (see CWA section 303(c)(4)). This water quality standards promulgation authority has been used by EPA to issue final rules on several separate occasions, including the NTR, as amended, which promulgated criteria similar to those included here for a number of States. These actions have addressed both insufficiently protective State criteria and/or designated uses and failure to adopt needed criteria. Thus, today's action is not unique.

The CWA in section 303(c)(4) provides two bases for promulgation of Federal water quality standards. The first basis, in paragraph (A), applies when a State submits new or revised standards that EPA determines are not consistent with the applicable requirements of the CWA. If, after EPA's disapproval, the State does not amend its rules so as to be consistent with the CWA, EPA is to promptly propose appropriate Federal water quality standards for that State. The second basis for an EPA action is in paragraph (B), which provides that EPA shall promptly initiate promulgation ''* * * in any case where the Administrator determines that a revised or new standard is necessary to meet the requirements of this Act.'' EPA is using section 303(c)(4)(B) as the legal basis for today's final rule.

As discussed in the preamble to the NTR, the Administrator's determination under CWA section 303(c)(4) that criteria are necessary to meet the requirements of the Act could be supported in several ways. Consistent with EPA's approach in the NTR, EPA interprets section 303(c)(2)(B) of the CWA to allow EPA to act where the State has not succeeded in establishing numeric water quality standards for toxic pollutants. This inaction can be the basis for the Administrator's determination under section 303(c)(4) that new or revised criteria are necessary to ensure designated uses are protected.

EPA does not believe that it is necessary to support the criteria in today's rule on a pollutant-specific, water body-by-water-body basis. For EPA to undertake an effort to conduct research and studies of each stream segment or water body across the State of California to demonstrate that for each toxic pollutant for which EPA has issued CWA section 304(a) criteria guidance there is a ''discharge or presence'' of that pollutant which could reasonably ''be expected to interfere with'' the designated use would impose an enormous administrative burden and would be contrary to the statutory directive for swift action manifested by the 1987 addition of section 303(c)(2)(B) to the CWA. Moreover, because these criteria are ambient criteria that define attainment of the designated uses, their application to all water bodies will result in additional controls on dischargers only where necessary to protect the designated uses.

EPA's interpretation of section 303(c)(2)(B) is supported by the language of the provision, the statutory framework and purpose of section 303, and the legislative history. In adding section 303(c)(2)(B) to the CWA, Congress understood the existing requirements in section 303(c)(1) for States to conduct triennial reviews of their water quality standards and submit the results of those reviews to EPA and in section 303(c)(4)(B) for promulgation. CWA section 303(c) includes numerous deadlines and section 303(c)(4) directs the Administrator to act ''promptly'' where the Administrator determines that a revised or new standard is necessary to meet the requirements of the Act. Congress, by linking section 303(c)(2)(B) to the section 303(c)(1) three-year review period, gave States a last chance to correct this deficiency on their own. The legislative history of the provision demonstrates that chief Senate sponsors, including Senators Stafford, Chaffee and others wanted the provision to eliminate State and EPA delays and force quick action. Thus, to interpret CWA section 303(c)(2)(B) and (c)(4) to require such a cumbersome pollutant specific effort on each stream segment would essentially render section 303(c)(2)(B) meaningless. The provision and its legislative background indicate that the Administrator's determination to invoke section 303(c)(4)(B) authority can be met by the Administrator making a generic finding of inaction by the State without the need to develop pollutant specific data for individual stream segments. Finally, the reference in section 303(c)(2)(B) to section 304(a) criteria suggests that section 304(a) criteria serve as default criteria; that once EPA has issued them, States were to adopt numeric criteria for those pollutants based on the 304(a) criteria, unless they had other scientifically defensible criteria. EPA also notes that this rule follows the approach EPA took nationally in promulgating the NTR for States that failed to comply with CWA section 303(c)(2)(B). 57 FR 60848, December 22, 1992. EPA incorporates the discussion in the NTR preamble as part of this rulemaking record.

This determination is supported by information in the rulemaking record showing the discharge or presence of priority toxic pollutants throughout the State. While this data is not necessarily complete, it constitutes a strong record supporting the need for numeric criteria for priority toxic pollutants with section 304(a) criteria guidance where the State does not have numeric criteria.

Today's final rule would not impose any undue or inappropriate burden on the State of California or its dischargers. It merely puts in place numeric criteria

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for toxic pollutants that are already used in other States in implementing CWA programs. Under this rulemaking, the State of California retains the ability to adopt alternative water quality criteria simply by completing its criteria adoption process. Upon EPA approval of those criteria, EPA will initiate action to stay the Federally-promulgated criteria and subsequently withdraw them.

2. Approach for Developing This Rule

In summary, EPA developed the criteria promulgated in today's final rule as follows. Where EPA promulgated criteria for California in the NTR, EPA has not acted to amend the criteria in the NTR. Where criteria for California were not included in the NTR, EPA used section 304(a) National criteria guidance documents as a starting point for the criteria promulgated in this rule. EPA then determined whether new information since the development of the national criteria guidance documents warranted any changes. New information came primarily from two sources. For human health criteria, new or revised risk reference doses and cancer potency factors on EPA's Integrated Risk Information System (IRIS) as of October 1996 form the basis for criteria values (see also 63 FR 68354). For aquatic life criteria, updated data sets resulting in revised criteria maximum concentrations (CMCs) and criteria continuous concentrations (CCCs) formed the basis for differences from the national criteria guidance documents. Both of these types of changes are discussed in more detail in the following sections. This revised information was used to develop the water quality criteria promulgated here for the State of California.

F. Derivation of Criteria

1. Section 304(a) Criteria Guidance Process

Under CWA section 304(a), EPA has developed methodologies and specific criteria guidance to protect aquatic life and human health. These methodologies are intended to provide protection for all surface waters on a national basis. The methodologies have been subject to public review, as have the individual criteria guidance documents. Additionally, the methodologies have been reviewed by EPA's Science Advisory Board (SAB) of external experts.

EPA has included in the record of this rule the aquatic life methodology as described in ''Appendix B—Guidelines for Deriving Water Quality Criteria for the Protection of Aquatic Life and Its Uses'' to the ''Water Quality Criteria Documents; Availability'' (45 FR 79341, November 28, 1980) as amended by the ''Summary of Revisions to Guidelines for Deriving Numerical National Water Quality Criteria for the Protection of Aquatic Organisms and Their Uses'' (50 FR 30792, July 29, 1985). (**Note:** Throughout the remainder of this preamble, this reference is described as the 1985 Guidelines. Any page number references are to the actual guidance document, not the notice of availability in the **Federal Register**. A copy of the 1985 Guidelines is available through the National Technical Information Service (PB85–227049), is in the administrative record for this rule, and is abstracted in Appendix A of *Quality Criteria for Water,* 1986.) EPA has also included in the administrative record of this rule the human health methodology as described in ''Appendix C—Guidelines and Methodology Used in the Preparation of Health Effects Assessment Chapters of the Consent Decree Water Criteria Documents'' (45 FR 79347, November 28, 1980). (Note: Throughout the remainder of this preamble, this reference is described as the Human Health Guidelines or the 1980 Guidelines.) EPA also recommends that the following be reviewed: ''Appendix D—Response to Comments on Guidelines for Deriving Water Quality Criteria for the Protection of Aquatic Life and Its Uses,'' (45 FR 79357, November 28, 1980); ''Appendix E—Responses to Public Comments on the Human Health Effects Methodology for Deriving Ambient Water Quality Criteria'' (45 FR 79368, November 28, 1980); and ''Appendix B—Response to Comments on Guidelines for Deriving Numerical National Water Quality Criteria for the Protection of Aquatic Organisms and Their Uses'' (50 FR 30793, July 29, 1985). EPA placed into the administrative record for this rulemaking the most current individual criteria guidance for the priority toxic pollutants included in today's rule. (**Note:** All references to appendices are to the associated **Federal Register** publication.)

EPA received many comments related to the issue of what criteria should apply in the CTR if the CWA section 304(a) criteria guidance is undergoing re-evaluation, or if new data are developed that may affect a recommended criterion. As science is always evolving, EPA is faced with the challenge of promulgating criteria that reflect the best science and sound science. EPA addressed this challenge in some detail in its **Federal Register** notice that contained the Agency's current section 304(a) criteria guidance (63 FR 68335, December 10, 1998). There, EPA articulated its policy, reiterated here, that the existing criteria guidance represent the Agency's best assessment until such time as EPA's re-evaluation of a criteria guidance value for a particular chemical is complete. The reason for this is that both EPA's human health criteria guidance and aquatic life criteria guidance are developed taking into account numerous variables. For example, for human health criteria guidance, EPA evaluates many diverse toxicity studies, whose results feed into a reference dose or cancer potency estimate that, along with a number of exposure factors and determination of risk level, results in a guidance criterion. For aquatic life, EPA evaluates many diverse aquatic toxicity studies to determine chronic and acute toxicity taking into account how other factors (such as pH, temperature or hardness) affect toxicity. EPA also, to the extent possible, addresses bioaccumulation or bioconcentration. EPA then uses this toxicity information along with exposure information to determine the guidance criterion. Importantly, EPA subjects such evaluation to peer review and/or public comment.

For these reasons, EPA generally does not make a change to the 304(a) criteria guidance based on a partial picture of the evolving science. This makes sense, because to address one piece of new data without looking at all relevant data is less efficient and results in regulatory impacts that may go back and forth, when in the end, the criteria guidance value does not change that much. Certain new changes, however, do warrant change in criteria guidance, such as a change in a value in EPA's Integrated Risk Information System (IRIS) because it represents the Agency consensus about human health impacts. These changes are sufficiently examined across the Agency such that EPA believes they can be incorporated into EPA's water quality criteria guidance. EPA has followed this approach in the CTR. Included in the administrative record for today's rule is a document entitled ''Status of Clean Water Act Section 304(a) Criteria'' which further explains EPA's policy on managing change to criteria guidance.

2. Aquatic Life Criteria

Aquatic life criteria may be expressed in numeric or narrative form. EPA's 1985 Guidelines describe an objective, internally consistent and appropriate way of deriving chemical-specific, numeric water quality criteria for the protection of the presence of, as well as

the uses of, both fresh and salt water aquatic organisms.

An aquatic life criterion derived using EPA's CWA section 304(a) method ''might be thought of as an estimate of the highest concentration of a substance in water which does not present a significant risk to the aquatic organisms in the water and their uses.'' (45 FR 79341.) EPA's guidelines are designed to derive criteria that protect aquatic communities. EPA's 1985 Guidelines attempt to provide a reasonable and adequate amount of protection with only a small possibility of substantial overprotection or underprotection. As discussed in detail below, there are several individual factors which may make the criteria somewhat overprotective or underprotective. The approach EPA is using is believed to be as well balanced as possible, given the state of the science.

Numerical aquatic life criteria derived using EPA's 1985 Guidelines are expressed as short-term and long-term averages, rather than one number, in order that the criterion more accurately reflect toxicological and practical realities. The combination of a criterion maximum concentration (CMC), a short-term concentration limit, and a criterion continuous concentration (CCC), a four-day average concentration limit, are designed to provide protection of aquatic life and its uses from acute and chronic toxicity to animals and plants, without being as restrictive as a one-number criterion would have to be (1985 Guidelines, pages 4 & 5). The terms CMC and CCC are the formal names for the two (acute and chronic) values of a criterion for a pollutant; however, this document will also use the informal synonyms acute criterion and chronic criterion.

The two-number criteria are intended to identify average pollutant concentrations which will produce water quality generally suited to maintenance of aquatic life and designated uses while restricting the duration of excursions over the average so that total exposures will not cause unacceptable adverse effects. Merely specifying an average value over a time period may be insufficient unless the time period is short, because excursions higher than the average may kill or cause substantial damage in short periods.

A minimum data set of eight specified families is recommended for criteria development (details are given in the 1985 Guidelines, page 22). The eight specific families are intended to be representative of a wide spectrum of aquatic life. For this reason it is not necessary that the specific organisms tested be actually present in the water body. EPA's application of its guidelines to develop the criteria matrix in this rule is judged by the Agency to be appropriate for all waters of the United States (U.S.), and to all ecosystems (1985 Guidelines, page 4) including those waters of the U.S. and ecosystems in the State of California.

Fresh water and salt water (including both estuarine and marine waters) have different chemical compositions, and freshwater and saltwater species often do not inhabit the same water. To provide additional accuracy, criteria are developed for fresh water and for salt water.

For this rule, EPA updated freshwater aquatic life criteria contained in CWA section 304(a) criteria guidance first published in the early 1980's and later modified in the NTR, as amended, for the following ten pollutants: arsenic, cadmium, chromium (VI), copper, dieldrin, endrin, lindane (gamma BHC), nickel, pentachlorophenol, and zinc. The updates used as the basis for this rule are explained in a technical support document entitled, *1995 Updates: Water Quality Criteria Documents for the Protection of Aquatic Life in Ambient Water* (U.S. EPA–820–B–96–001, September 1996), available in the administrative record to this rulemaking; this document presents the derivation of each of the final CMCs and CCCs and the toxicity studies from which the updated freshwater criteria for the ten pollutants were derived.

The polychlorinated biphenyls (PCB) criteria in the criteria matrix for this rule differs from that in the NTR, as amended; for this rule, the criteria are expressed as the sum of seven aroclors, while for the NTR, as amended, the criteria are expressed for each of seven aroclors. The aquatic life criteria for PCBs in the CTR are based on the criteria contained in the 1980 criteria guidance document for PCBs which is included in the administrative record for this rule. This criteria document explains the derivation of aquatic life criteria based on total PCBs. For more information see the Response to Comments document for this rule. Today's chronic aquatic life criteria for PCBs are based on a final residue value (FRV). In EPA's guidelines for deriving aquatic life criteria, an FRV-based criterion is intended to prevent concentrations of pollutants in commercially or recreationally important aquatic species from affecting the marketability of those species or affecting the wildlife that consume aquatic life.

The proposed CTR included an updated freshwater and saltwater aquatic life criteria for mercury. In today's final rule, EPA has reserved the mercury criteria for freshwater and saltwater aquatic life, but is promulgating human health criteria for mercury for all surface waters in California. In some instances, the human health mercury criteria included in today's final rule may not protect some aquatic species or threatened or endangered species. In such instances, more stringent mercury limits may be determined and implemented through use of the State's narrative criterion. The reasons for reserving the mercury aquatic life numbers are explained in further detail in Section L, Endangered Species Act.

a. Freshwater Acute Selenium Criterion

EPA proposed a different freshwater acute aquatic life criterion for selenium for this rule than was promulgated in the NTR, as amended. EPA's proposed action was consistent with EPA's proposed selenium criterion maximum concentration for the Water Quality Guidance for the Great Lakes System (61 FR 58444, November 14, 1996). This proposal took into account data showing that selenium's two most prevalent oxidation states, selenite and selenate, present differing potentials for aquatic toxicity, as well as new data which indicated that various forms of selenium are additive. Additivity increases the toxicity of mixtures of different forms of the pollutant. The proposed approach produces a different selenium acute criterion concentration, or CMC, depending upon the relative proportions of selenite, selenate, and other forms of selenium that are present.

The preamble to the August 5, 1997, proposed rule provided a lengthy discussion of this proposed criterion for the State of California. See 62 FR 42160–42208. EPA incorporates that discussion here as part of this rulemaking record. In 1996, a similar discussion was included in the proposed rule for the Great Lakes System. Commenters questioned several aspects of the Great Lakes proposal. EPA is continuing to respond to those comments, and to follow up with additional literature review and toxicity testing. In addition, the U.S. FWS and U.S. NMFS (collectively, the Services) are concerned that EPA's proposed criterion may not be sufficiently protective of certain threatened and endangered species in California. Because the Services believe there is a lack of data to show for certain that the proposed criterion would not affect threatened and endangered species, the Services prefer that EPA further investigate the protectiveness of the

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criterion before finalizing the proposed criterion. Therefore, EPA is not promulgating a final acute freshwater selenium criterion at this time.

b. Dissolved Metals Criteria

In December of 1992, in the NTR, EPA promulgated water quality criteria for several States that had failed to meet the requirements of CWA section 303(c)(2)(B). Included among the water quality criteria promulgated were numeric criteria for the protection of aquatic life for 11 metals: arsenic, cadmium, chromium (III), chromium (VI), copper, lead, mercury, nickel, selenium, silver and zinc. Criteria for two metals applied to the State of California: chromium III and selenium.

The Agency received extensive public comment during the development of the NTR regarding the most appropriate approach for expressing the aquatic life metals criteria. The principal issue was the correlation between metals that are measured and metals that are bioavailable and toxic to aquatic life. It is now the Agency's policy that the use of dissolved metal to set and measure compliance with aquatic life water quality standards is the recommended approach, because dissolved metal more closely approximates the bioavailable fraction of the metal in the water column than does total recoverable metal.

Since EPA's previous aquatic life criteria guidance had been expressed as total recoverable metal, to express the criteria as dissolved, conversion factors were developed to account for the possible presence of particulate metal in the laboratory toxicity tests used to develop the total recoverable criteria. EPA included a set of recommended freshwater conversion factors with its Metals Policy (see Office of Water Policy and Technical Guidance on Interpretation and Implementation of Aquatic Life Metals Criteria, Martha G. Prothro, Acting Assistant Administrator for Water, October 1, 1993). Based on additional laboratory evaluations that simulated the original toxicity tests, EPA refined the procedures used to develop freshwater conversion factors for aquatic life criteria. These new conversion factors were made available for public review and comment in the amendments to the NTR on May 4, 1995, at 60 FR 22229. They are also contained in today's rule at 40 CFR 131.38(b)(2).

The preamble to the August 5, 1997, proposed rule provided a more detailed discussion of EPA's metals policy concerning the aquatic life water quality criteria for the State of California. See 62 FR 42160–42208. EPA incorporates that discussion here as part of this rulemaking record. Many commenters strongly supported the Agency's policy on dissolved metals aquatic life criteria. A few commenters expressed an opinion that the metals policy may not provide criteria that are adequately protective of aquatic or other species. Responses to those comments are contained in a memo to the CTR record entitled ''Discussion of the Use of Dissolved Metals in the CTR'' (February 1, 2000, Jeanette Wiltse) and EPA's response to comments document which are both contained in the administrative record for the final rule.

Calculation of Aquatic Life Dissolved Metals Criteria: Metals criteria values for aquatic life in today's rule in the matrix at 131.38(b)(1) are shown as dissolved metal. These criteria have been calculated in one of two ways. For freshwater metals criteria that are hardness-dependent, the metals criteria value is calculated separately for each hardness using the table at 40 CFR 131.38(b)(2). (The hardness-dependent freshwater values presented in the matrix at 40 CFR 131.38(b)(1) have been calculated using a hardness of 100 mg/l as CaCO3 for illustrative purposes only.) The hardness-dependent criteria are then multiplied by the appropriate conversion factors in the table at 40 CFR 131.38(b)(2). Saltwater and freshwater metals criteria that are not hardness-dependent are calculated by taking the total recoverable criteria values (from EPA's national section 304(a) criteria guidance, as updated and described in section F.2.a.) before rounding, and multiplying them by the appropriate conversion factors. The final dissolved metals criteria values, as they appear in the matrix at 40 CFR 131.38(b)(1), are rounded to two significant figures.

Translators for Dissolved to Total Recoverable Metals Limits: EPA's National Pollutant Discharge Elimination System (NPDES) regulations require that limits for metals in permits be stated as total recoverable in most cases (see 40 CFR 122.45(c)) except when an effluent guideline specifies the limitation in another form of the metal, the approved analytical methods measure only dissolved metal, or the permit writer expresses a metal's limit in another form (*e.g.,* dissolved, specific valence, or total) when required to carry out provisions of the CWA. This is because the chemical conditions in ambient waters frequently differ substantially from those in the effluent and these differences result in changes in the partitioning between dissolved and absorbed forms of the metal. This means that if effluent limits were expressed in the dissolved form, additional particulate metal could dissolve in the receiving water causing the criteria to be exceeded. Expressing criteria as dissolved metal requires translation between different metal forms in the calculation of the permit limit so that a total recoverable permit limit can be established that will achieve water quality standards. Thus, it is important that permitting authorities and other authorities have the ability to translate between dissolved metal in ambient waters and total recoverable metal in effluent.

EPA has completed guidance on the use of translators to convert from dissolved metals criteria to total recoverable permit limits. The document, *The Metals Translator: Guidance for Calculating a Total Recoverable Permit Limit From a Dissolved Criterion* (EPA 823–B–96–007, June 1996), is included in the administrative record for today's rule. This technical guidance examines how to develop a metals translator which is defined as the fraction of total recoverable metal in the downstream water that is dissolved, *i.e.,* the dissolved metal concentration divided by the total recoverable metal concentration. A translator may take one of three forms: (1) It may be assumed to be equivalent to the criteria guidance conversion factors; (2) it may be developed directly as the ratio of dissolved to total recoverable metal; and (3) it may be developed through the use of a partition coefficient that is functionally related to the number of metal binding sites on the adsorbent in the water column (*e.g.,* concentrations of total suspended solids or TSS). This guidance document discusses these three forms of translators, as well as field study designs, data generation and analysis, and site-specific study plans to generate site-specific translators.

California Regional Water Quality Control Boards may use any of these methods in developing water quality-based permit limits to meet water quality standards based on dissolved metals criteria. EPA encourages the State to adopt a statewide policy on the use of translators so that the most appropriate method or methods are used consistently within California.

c. Application of Metals Criteria

In selecting an approach for implementing the metals criteria, the principal issue is the correlation between metals that are measured and metals that are biologically available and toxic. In order to assure that the metals criteria are appropriate for the chemical conditions under which they are applied, EPA is providing for the

adjustment of the criteria through application of the ''water-effect ratio'' procedure. EPA notes that performing the testing to use a site-specific water-effect ratio is optional on the part of the State.

In the NTR, as amended, EPA identified the water-effect ratio (WER) procedure as a method for optional site-specific criteria development for certain metals. The WER approach compares bioavailability and toxicity of a specific pollutant in receiving waters and in laboratory waters. A WER is an appropriate measure of the toxicity of a material obtained in a site water divided by the same measure of the toxicity of the same material obtained simultaneously in a laboratory dilution water.

On February 22, 1994, EPA issued *Interim Guidance on the Determination and Use of the Water-Effect Ratios for Metals* (EPA 823-B–94–001) now incorporated into the updated Second Edition of the Water Quality Standards Handbook, Appendix L. A copy of the Handbook is contained in the administrative record for today's rule. In accordance with the WER guidance and where application of the WER is deemed appropriate, EPA strongly encourages the application of the WER on a watershed or water body basis as part of a water quality criteria in California as opposed to the application on a discharger-by-discharger basis through individual NPDES permits. This approach is technically sound and an efficient use of resources. However, discharger specific WERs for individual NPDES permit limits are possible and potentially efficient where the NPDES discharger is the only point source discharger to a specific water body.

The rule requires a default WER value of 1.0 which will be assumed, if no site-specific WER is determined. To use a WER other than the default of 1.0, the rule requires that the WER must be determined as set forth in EPA's WER guidance or by another scientifically defensible method that has been adopted by the State as part of its water quality standards program and approved by EPA.

The WER is a more comprehensive mechanism for addressing bioavailability issues than simply expressing the criteria in terms of dissolved metal. Consequently, expressing the criteria in terms of dissolved metal, as done in today's rule for California, does not completely eliminate the utility of the WER. This is particularly true for copper, a metal that forms reduced-toxicity complexes with dissolved organic matter.

The *Interim Guidance on Determination and Use of Water-Effect Ratios for Metals* explains the relationship between WERs for dissolved criteria and WERs for total recoverable criteria. Dissolved measurements are to be used in the site-specific toxicity testing underlying the WERs for dissolved criteria. Because WERs for dissolved criteria generally are little affected by elevated particulate concentrations, EPA expects those WERs to be somewhat less than WERs for total recoverable criteria in such situations. Nevertheless, after the site-specific ratio of dissolved to total metal has been taken into account, EPA expects a permit limit derived using a WER for a dissolved criterion to be similar to the permit limit that would be derived from the WER for the corresponding total recoverable criterion.

d. Saltwater Copper Criteria

The saltwater copper criteria for aquatic life in today's rule are 4.8 µg/l (CMC) and 3.1 µg/l (CCC) in the dissolved form. These criteria reflect new data including data collected from studies for the New York/New Jersey Harbor and the San Francisco Bay indicating a need to revise the former copper 304(a) criteria guidance document to reflect a change in the saltwater CMC and CCC aquatic life values. These data also reflect a comprehensive literature search resulting in added toxicity test data for seven new species to the database for the saltwater copper criteria. EPA believes these new data have national implications and the national criteria guidance now contains a CMC of 4.8 µg/l dissolved and a CCC of 3.1 µg/l dissolved. In the amendments to the NTR, EPA noticed the availability of data to support these changes to the NTR, and solicited comments. The data can be found in the draft document entitled, *Ambient Water Quality Criteria—Copper, Addendum 1995.* This document is available from the Office of Water Resource Center and is available for review in the administrative record for today's rule.

e. Chronic Averaging Period

In establishing water quality criteria, EPA generally recommends an ''averaging period'' which reflects the duration of exposure required to elicit effects in individual organisms (TSD, Appendix D–2). The criteria continuous concentration, or CCC, is intended to be the highest concentration that could be maintained indefinitely in a water body without causing an unacceptable effect on the aquatic community or its uses (TSD, Appendix D–1). As aquatic organisms do not generally experience steady exposure, but rather fluctuating exposures to pollutants, and because aquatic organisms can generally tolerate higher concentrations of pollutants over a shorter periods of time, EPA expects that the concentration of a pollutant can exceed the CCC without causing an unacceptable effect if (a) the magnitude and duration of exceedences are appropriately limited and (b) there are compensating periods of time during which the concentration is below the CCC. This is done by specifying a duration of an ''averaging period'' over which the average concentration should not exceed the CCC more often than specified by the frequency (TSD, Appendix D–1).

EPA is promulgating a 4-day averaging period for chronic criteria, which means that measured or predicted ambient pollutant concentrations should be averaged over a 4-day period to determine attainment of chronic criteria. The State may apply to EPA for approval of an alternative averaging period. To do so, the State must submit to EPA the basis for such alternative averaging period.

The most important consideration for setting an appropriate averaging period is the length of time that sensitive organisms can tolerate exposure to a pollutant at levels exceeding a criterion without showing adverse effects on survival, growth, or reproduction. EPA believes that the chronic averaging period must be shorter than the duration of the chronic tests on which the CCC is based, since, in some cases, effects are elicited before exposure of the entire duration. Most of the toxicity tests used to establish the chronic criteria are conducted using steady exposure to toxicants for a least 28 days (TSD, page 35). Some chronic tests, however, are much shorter than this (TSD, Appendix D–2). EPA selected the 4-day averaging period based on the shortest duration in which chronic test effects are sometimes observed for certain species and toxicants. In addition, EPA believes that the results of some chronic tests are due to an acute effect on a sensitive life stage that occurs some time during the test, rather than being caused by long-term stress or long-term accumulation of the test material in the organisms.

Additional discussion of the rationale for the 4-day averaging period is contained in Appendix D of the TSD. Balancing all of the above factors and data, EPA believes that the 4-day averaging period falls within the scientifically reasonable range of values for choice of the averaging period, and is an appropriate length of time of

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pollutant exposure to ensure protection of sensitive organisms.

EPA established a 4-day averaging period in the NTR. In settlement of litigation on the NTR, EPA stated that it was ''in the midst of conducting, sponsoring, or planning research related to the basis for and application of'' water quality criteria and mentioned the issue of averaging period. See Partial Settlement Agreement in *American Forest and Paper Ass'n, Inc. et al.* v. *U.S. EPA* (Consolidated Case No. 93–0694 (RMU), D.D.C.). EPA is re-evaluating issues raised about averaging periods and will, if appropriate, revise the 1985 Guidelines.

EPA received public comment relevant to the averaging period during the comment period for the 1995 Amendments to the NTR (60 FR 22228, May 4, 1995), although these public comments did not address the chronic averaging period separately from the allowable excursion frequency and the design flow. Comments recommended that EPA use the 30Q5 design flow for chronic criteria.

While EPA is undertaking analysis of the chronic design conditions as part of the revisions to the 1985 Guidelines, EPA has not yet completed this work. Until this work is complete, for the reasons set forth in the TSD, EPA continues to believe that the 4-day chronic averaging period represents a reasonable, defensible value for this parameter.

EPA added language to the final rule which will enable the State to adopt alternative averaging periods and frequencies and associated design flows where appropriate. The State may apply to EPA for approval of alternative averaging periods and frequencies and related design flows; the State must submit the bases for any changes. Before approving any change, EPA will publish for public comment, a notice proposing the changes.

f. Hardness

Freshwater aquatic life criteria for certain metals are expressed as a function of hardness because hardness and/or water quality characteristics that are usually correlated with hardness can reduce or increase the toxicities of some metals. Hardness is used as a surrogate for a number of water quality characteristics which affect the toxicity of metals in a variety of ways. Increasing hardness has the effect of decreasing the toxicity of metals. Water quality criteria to protect aquatic life may be calculated at different concentrations of hardnesses measured in milligrams per liter (mg/l) as calcium carbonate ($CaCO_3$).

Section 131.38(b)(2) of the final rule presents the hardness-dependent equations for freshwater metals criteria. For example, using the equation for zinc, the total recoverable CMCs at a hardness of 10, 50, 100 or 200 mg/l as $CaCO_3$ are 17, 67, 120 and 220 micrograms per liter (μg/l), respectively. Thus, the specific value in the table in the regulatory text is for illustrative purposes only. Most of the data used to develop these hardness equations for deriving aquatic life criteria for metals were in the range of 25 mg/l to 400 mg/l as $CaCO_3$, and the formulas are therefore most accurate in this range. The majority of surface waters nationwide and in California have a hardness of less than 400 mg/l as $CaCO_3$.

In the past, EPA generally recommended that 25 mg/l as $CaCO_3$ be used as a default hardness value in deriving freshwater aquatic life criteria for metals when the ambient (or actual) hardness value is below 25 mg/l as $CaCO_3$. However, use of the approach results in criteria that may not be fully protective. Therefore, for waters with a hardness of less than 25 mg/l as $CaCO_3$, criteria should be calculated using the actual ambient hardness of the surface water.

In the past, EPA generally recommended that if the hardness was over 400 mg/l, two options were available: (1) Calculate the criterion using a default WER of 1.0 and using a hardness of 400 mg/l in the hardness equation; or (2) calculate the criterion using a WER and the actual ambient hardness of the surface water in the equation. Use of the second option is expected to result in the level of protection intended in the 1985 Guidelines whereas use of the first option is thought to result in an even more protective aquatic life criterion. At high hardness there is an indication that hardness and related inorganic water quality characteristics do not have as much of an effect on toxicity of metals as they do at lower hardnesses. Related water quality characteristics do not correlate as well at higher hardnesses as they do at lower hardnesses. Therefore, if hardness is over 400 mg/l as $CaCO_3$, a hardness of 400 mg/l as $CaCO_3$ should be used with a default WER of 1.0; alternatively, the WER and actual hardness of the surface water may be used.

EPA requested comments in the NTR amendments on the use of actual ambient hardness for calculating criteria when the hardness is below 25 mg/l as $CaCO_3$, and when hardness is greater than 400 mg/l as $CaCO_3$. Most of the comments received were in favor of using the actual hardness with the use of the water-effect ratio (1.0 unless otherwise specified by the permitting authority) when the hardness is greater than 400 mg/l as $CaCO_3$. A few commenters did not want the water-effect ratio to be mandatory in calculating hardness, and other commenters had concerns about being responsible for deriving an appropriate water-effect ratio. Overall, the commenters were in favor of using the actual hardness when calculating hardness-dependent freshwater metals criteria for hardness between 0–400 mg/l as $CaCO_3$. EPA took those comments into account in promulgating today's rule.

A hardness equation is most accurate when the relationships between hardness and the other important inorganic constituents, notably alkalinity and pH, are nearly identical in all of the dilution waters used in the toxicity tests and in the surface waters to which the equation is to be applied. If an effluent raises hardness but not alkalinity and/or pH, using the hardness of the downstream water might provide a lower level of protection than intended by the 1985 guidelines. If it appears that an effluent causes hardness to be inconsistent with alkalinity and/or pH, the intended level of protection will usually be maintained or exceeded if either (1) data are available to demonstrate that alkalinity and/or pH do not affect the toxicity of the metal, or (2) the hardness used in the hardness equation is the hardness of upstream water that does not contain the effluent. The level of protection intended by the 1985 guidelines can also be provided by using the WER procedure.

In some cases, capping hardness at 400 mg/l might result in a level of protection that is higher than that intended by the 1985 guidelines, but any such increase in the level of protection can be overcome by use of the WER procedure. For metals whose criteria are expressed as hardness equations, use of the WER procedure will generally be intended to account for effects of such water quality characteristics as total organic carbon on the toxicities of metals. The WER procedure is equally useful for accounting for any deviation from a hardness equation in a site water.

3. Human Health Criteria

EPA's CWA section 304(a) human health criteria guidance provides criteria recommendations to minimize adverse human effects due to substances in ambient water. EPA's CWA section 304(a) criteria guidance for human health are based on two types of

toxicological endpoints: (1) carcinogenicity and (2) systemic toxicity (i.e., all other adverse effects other than cancer). Thus, there are two procedures for assessing these health effects: one for carcinogens and one for non-carcinogens.

If there are no data on how a chemical agent causes cancer, EPA's existing human health guidelines assume that carcinogenicity is a ''non-threshold phenomenon,'' that is, there are no ''safe'' or ''no-effect levels'' because even extremely small doses are assumed to cause a finite increase in the incidence of the effect (i.e., cancer). Therefore, EPA's water quality criteria guidance for carcinogens are presented as pollutant concentrations corresponding to increases in the risk of developing cancer. See Human Health Guidelines at 45 FR 79347.

With existing criteria, pollutants that do not manifest any apparent carcinogenic effect in animal studies (i.e., systemic toxicants), EPA assumes that the pollutant has a threshold below which no effect will be observed. This assumption is based on the premise that a physiological mechanism exists within living organisms to avoid or overcome the adverse effect of the pollutant below the threshold concentration.

Note: Recent changes in the Agency's cancer guidelines addressing these assumptions are described in the Draft Water Quality Criteria Methodology: Human Health, 63 FR 43756, August 14, 1998.

The human health risks of a substance cannot be determined with any degree of confidence unless dose-response relationships are quantified. Therefore, a dose-response assessment is required before a criterion can be calculated. The dose-response assessment determines the quantitative relationships between the amount of exposure to a substance and the onset of toxic injury or disease. Data for determining dose-response relationships are typically derived from animal studies, or less frequently, from epidemiological studies in exposed populations.

The dose-response information needed for carcinogens is an estimate of the carcinogenic potency of the compound. Carcinogenic potency is defined here as a general term for a chemical's human cancer-causing potential. This term is often used loosely to refer to the more specific carcinogenic or cancer slope factor which is defined as an estimate of carcinogenic potency derived from animal studies or epidemiological data of human exposure. It is based on extrapolation from test exposures of high doses over relatively short periods of time to more realistic low doses over a lifetime exposure period by use of linear extrapolation models. The cancer slope factor, q1*, is EPA's estimate of carcinogenic potency and is intended to be a conservative upper bound estimate (e.g. 95% upper bound confidence limit).

For non-carcinogens, EPA uses the reference dose (RfD) as the dose-response parameter in calculating the criteria. For non-carcinogens, oral RfD assessments (hereinafter simply ''RfDs'') are developed based on pollutant concentrations that cause threshold effects. The RfD is an estimate (with uncertainty spanning perhaps an order of magnitude) of a daily exposure to the human population (including sensitive subgroups) that is likely to be without appreciable risk of deleterious effects during a lifetime. See Human Health Guidelines. The RfD was formerly referred to as an ''Acceptable Daily Intake'' or ADI. The RfD is useful as a reference point for gauging the potential effect of other doses. Doses that are less than the RfD are not likely to be associated with any health risks, and are therefore less likely to be of regulatory concern. As the frequency of exposures exceeding the RfD increases and as the size of the excess increases, the probability increases that adverse effect may be observed in a human population. Nonetheless, a clear conclusion cannot be categorically drawn that all doses below the RfD are ''acceptable'' and that all doses in excess of the RfD are ''unacceptable.'' In extrapolating non-carcinogen animal test data to humans to derive an RfD, EPA divides either a No Observed-Adverse Effect Level (NOAEL), Lowest Observed Adverse Effect Level (LOAEL), or other benchmark dose observed in animal studies by an ''uncertainty factor'' which is based on professional judgment of toxicologists and typically ranges from 10 to 10,000.

For CWA section 304(a) human health criteria development, EPA typically considers only exposures to a pollutant that occur through the ingestion of water and contaminated fish and shellfish. Thus, the criteria are based on an assessment of risks related to the surface water exposure route only where designated uses are drinking water and fish and shellfish consumption.

The assumed exposure pathways in calculating the criteria are the consumption of 2 liters per day of water at the criteria concentration and the consumption of 6.5 grams per day of fish and shellfish contaminated at a level equal to the criteria concentration but multiplied by a ''bioconcentration factor.'' The use of fish and shellfish consumption as an exposure factor requires the quantification of pollutant residues in the edible portions of the ingested species.

Bioconcentration factors (BCFs) are used to relate pollutant residues in aquatic organisms to the pollutant concentration in ambient waters. BCFs are quantified by various procedures depending on the lipid solubility of the pollutant. For lipid soluble pollutants, the average BCF is calculated from the weighted average percent lipids in the edible portions of fish and shellfish, which is about 3%; or it is calculated from theoretical considerations using the octanol/water partition coefficient. For non-lipid soluble compounds, the BCF is determined empirically. The assumed water consumption is taken from the National Academy of Sciences publication *Drinking Water and Health* (1977). (Referenced in the Human Health Guidelines.) This value is appropriate as it includes a margin of safety so that the general population is protected. See also EPA's discussion of the 2.0 liters/day assumption at 61 FR 65183 (Dec. 11, 1996). The 6.5 grams per day contaminated fish and shellfish consumption value was equivalent to the average per-capita consumption rate of all (contaminated and non-contaminated) freshwater and estuarine fish and shellfish for the U.S. population. See Human Health Guidelines.

EPA assumes in calculating water quality criteria that the exposed individual is an average adult with body weight of 70 kilograms. EPA assumes 6.5 grams per day of contaminated fish and shellfish consumption and 2.0 liters per day of contaminated drinking water consumption for a 70 kilogram person in calculating the criteria. Regarding issues concerning criteria development and differences in dose per kilogram of body weight, RfDs are always derived based on the most sensitive health effect endpoint. Therefore, when that basis is due to a chronic or lifetime health effect, the exposure parameters assume the exposed individual to be the average adult, as indicated above.

In the absence of this final rule, there may be particular risks to children. EPA believes that children are protected by the human health criteria contained in this final rule. Children are protected against other less sensitive adverse health endpoints due to the conservative way that the RfDs are derived. An RfD is a public health protective endpoint. It is an amount of a chemical that can be consumed on a daily basis for a lifetime without expecting an adverse effect. RfDs are based on sensitive health endpoints and

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are calculated to be protective for sensitive human sub-populations including children. If the basis of the RfD was due to an acute or shorter-term developmental effect, EPA uses exposure parameters other than those indicated above. Specifically, EPA uses parameters most representative of the population of concern (*e.g.,* the health criteria for nitrates based on infant exposure parameters). For carcinogens, the risk assessments are upper bound one in a million (10^{-6}) lifetime risk numbers. The risk to children is not likely to exceed these upper bounds estimates and may be zero at low doses. The exposure assumptions for drinking water and fish protect children because they are conservative for infants and children. EPA assumes 2 liters of untreated surface water and 6.5 grams of freshwater and estuarine fish are consumed each day. EPA believes the adult fish consumption assumption is conservative for children because children generally consume marine fish not freshwater and estuarine.

EPA has a process to develop a scientific consensus on oral reference dose assessments and carcinogenicity assessments (hereinafter simply cancer slope factors or slope factors or q1*s). Through this process, EPA develops a consensus of Agency opinion which is then used throughout EPA in risk management decision-making. EPA maintains an electronic data base which contains the official Agency consensus for oral RfD assessments and carcinogenicity assessments which is known as the Integrated Risk Information System (IRIS). It is available for use by the public on the National Institutes of Health's National Library of Medicine's TOXNET system, and through diskettes from the National Technical Information Service (NTIS). (NTIS access number is PB 90–591330.)

Section 304(a)(1) of the CWA requires EPA to periodically revise its criteria guidance to reflect the latest scientific knowledge: ''(A) On the kind and extent of all identifiable effects on health and welfare * * *; (B) on the concentration and dispersal of pollutants, or their byproducts, through biological, physical, and chemical processes; and (C) on the effects of pollutants on the biological community diversity, productivity, and stability, including information on the factors affecting eutrophication rates of organic and inorganic sedimentation for varying types of receiving waters.'' In developing up-to-date water quality criteria for the protection of human health, EPA uses the most recent IRIS values (RfDs and q1*s) as the toxicological basis in the criterion calculation. IRIS reflects EPA's most current consensus on the toxicological assessment for a chemical. In developing the criteria in today's rule, the IRIS values as of October 1996 were used together with currently accepted exposure parameters for bioconcentration, fish and shellfish and water consumption, and body weight. The IRIS cover sheet for each pollutant criteria included in today's rule is contained in the administrative record.

For the human health criteria included in today's rule, EPA used the Human Health Guidelines on which criteria recommendations from the appropriate CWA section 304(a) criteria guidance document were based. (These documents are also placed in the administrative record for today's rule.) Where EPA has changed any parameters in IRIS used in criteria derivation since issuance of the criteria guidance document, EPA recalculated the criteria recommendation with the latest IRIS information. Thus, there are differences between the original 1980 criteria guidance document recommendations, and those in this rule, but this rule presents EPA's most current CWA section 304(a) criteria recommendation. The basis (q1* or RfD) and BCF for each pollutant criterion in today's rule is contained in the rule's Administrative Record Matrix which is included in the administrative record for the rule. In addition, all recalculated human health numbers are denoted by an ''a'' in the criteria matrix in 40 CFR 131.38(b)(1) of the rule. The pollutants for which a revised human health criterion has been calculated since the December 1992 NTR include:

mercury
dichlorobromomethane
1,2-dichloropropane
1,2-trans-dichloroethylene
2,4-dimethylphenol
acenaphthene
benzo(a)anthracene
benzo(a)pyrene
benzo(b)flouranthene
benzo(k)flouranthene
2-chloronaphthalene
chrysene
dibenzo(a,h)anthracene
indeno(1,2,3-cd)pyrene
N-nitrosodi-n-propylamine
alpha-endosulfan
beta-endosulfan
endosulfan sulfate
2-chlorophenol
butylbenzyl phthalate
polychlorinated biphenyls.

In November of 1991, the proposed NTR presented criteria for several pollutants in parentheses. These were pollutants for which, in 1980, insufficient information existed to develop human health water quality criteria, but for which, in 1991, sufficient information existed. Since these criteria did not undergo the public review and comment in a manner similar to the other water quality criteria presented in the NTR (for which sufficient information was available in 1980 to develop a criterion, as presented in the 1980 criteria guidance documents), they were not proposed for adoption into the water quality criteria, but were presented to serve as notice for inclusion in future State triennial reviews. Today's rule promulgates criteria for these nine pollutants:

copper
1, 2-dichloropropane
1,2-trans-dichloroethylene
2,4-dimethylphenol
acenaphthene
2-chloronaphthalene
N-nitrosodi-n-propylamine
2-chlorophenol
butylbenzene phthalate

All the criteria are based on IRIS values—either an RfD or q1*—which were listed on IRIS as of November 1991, the date of the proposed NTR. These values have not changed since the final NTR was published in December of 1992. The rule's Administrative Record Matrix in the administrative record of today's rule contains the specific RfDs, q1*s, and BCFs used in calculating these criteria.

Proposed Changes to the Human Health Criteria Methodology: EPA recently proposed revisions to the 1980 ambient water quality criteria derivation guidelines (the Human Health Guidelines). See *Draft Water Quality Criteria Methodology: Human Health,* 63 FR 43756, August 14, 1998; see also *Draft Water Quality Criteria Methodology: Human Health,* U.S. EPA Office of Water, EPA 822–Z–98–001. The EPA revisions consist of five documents: *Draft Water Quality Criteria Methodology: Human Health,* EPA 822–Z–98–001; *Ambient Water Quality Criteria Derivation Methodology Human Health, Technical Support Document, Final Draft,* EPA–822–B–98–005; and three Ambient Water Quality Criteria for the Protection of Human Health, Drafts—one each for Acrylonitrile, 1,3-Dichloropropene (1,3-DCP), and Hexachlorobutadiene (HCBD), respectively, EPA–822–R–98–006, –005, and –004. All five documents are contained in the administrative record for today's rule.

The proposed methodology revisions reflect significant scientific advances that have occurred during the past nineteen years in such key areas as cancer and noncancer risk assessments, exposure assessments and bioaccumulation. For specific details on

these proposed changes and others, please refer to the **Federal Register** notice or the EPA document.

It should be noted that some of the proposed changes may result in significant numeric changes in the ambient water quality criteria. However, EPA will continue to rely on existing criteria as the basis for regulatory and non-regulatory decisions, until EPA revises and reissues a 304(a) criteria guidance using the revised final human health criteria methodology. The existing criteria are still viewed as scientifically acceptable by EPA. The intention of the proposed methodology revisions is to present the latest scientific advancements in the areas of risk and exposure assessment in order to incrementally improve the already sound toxicological and exposure bases for these criteria. As EPA's current human health criteria are the product of many years worth of development and peer review, it is reasonable to assume that revisiting all existing criteria, and incorporating peer review into such review, could require comparable amounts of time and resources. Given these circumstances, EPA proposed a process for revisiting these criteria as part of the overall revisions to the methodology for deriving human health criteria. This process is discussed in the Implementation Section of the Notice of *Draft Revisions to the Methodology for Deriving Ambient Water Quality Criteria for the Protection of Human Health* (see 63 FR 43771–43776, August 14, 1998).

The State of California in its Ocean Plan, adopted in 1990 and approved by EPA in 1991, established numeric water quality criteria using an average fish and shellfish consumption rate of 23 grams per day. This value is based on an earlier California Department of Health Services estimate. The State is currently in the process of readopting its water quality control plans for inland surface waters, enclosed bays, and estuaries. The State intends to consider information on fish and shellfish consumption rates evaluated and summarized in a report prepared by the State's Pesticide and Environmental Toxicology Section of the Office of Environmental Health Hazard Assessment of the California Environmental Protection Agency. The report, entitled, *Chemicals in Fish Report No. 1: Consumption of Fish and Shellfish in California and the United States,* was published in final draft form in July of 1997, and released to the public on September 16, 1997. The report is currently undergoing final evaluation, and is expected to published in final form in the near future. This final draft report is contained in the administrative record for today's rule. Although EPA has not used this fish consumption value here because this information has not yet been finalized, the State may use any appropriate higher state-specific fish and shellfish consumption rates in its readoption of criteria in its statewide plans.

a. 2,3,7,8-TCDD (Dioxin) Criteria

In today's action, EPA is promulgating human health water quality criteria for 2,3,7,8-tetrachlorodibenzo-p-dioxin (''dioxin'') at the same levels as promulgated in the NTR, as amended. These criteria are derived from EPA's 1984 CWA section 304(a) criteria guidance document for dioxin.

For National Pollutant Discharge Elimination System (NPDES) purposes, EPA supports the regulation of other dioxin and dioxin-like compounds through the use of toxicity equivalencies or TEQs in NPDES permits (see discussion below). For California waters, if the discharge of dioxin or dioxin-like compounds has reasonable potential to cause or contribute to a violation of a narrative criterion, numeric water quality-based effluent limits for dioxin or dioxin-like compounds should be included in NPDES permits and should be expressed using a TEQ scheme.

EPA has been evaluating the health threat posed by dioxin nearly continuously for over two decades. Following issuance of the 1984 criteria guidance document, evaluating the health effects of dioxin and recommending human health criteria for dioxin, EPA prepared draft reassessments reviewing new scientific information relating to dioxin in 1985 and 1988. EPA's Science Advisory Board (SAB), reviewing the 1988 draft reassessment, concluded that while the risk assessment approach used in 1984 criteria guidance document had inadequacies, a better alternative was unavailable (see SAB's *Dioxin Panel Review of Documents from the Office or Research and Development relating to the Risk and Exposure Assessment of 2,3,7,8-TCDD* (EPA–SAB–EC–90–003, November 28, 1989) included in the administrative record for today's rule). Between 1988 and 1990, EPA issued numerous reports and guidances relating to the control of dioxin discharges from pulp and paper mills. See e.g., EPA Memorandum, ''Strategy for the Regulation of Discharges of PHDDs & PHDFs from Pulp and Paper Mills to the Waters of the United States,'' from Assistant Administrator for Water to Regional Water Management Division Directors and NPDES State Directors, dated May 21, 1990 (AR NL–16); EPA Memorandum, ''State Policies, Water Quality Standards, and Permit Limitations Related to 2,3,7,8-TCDD in Surface Water,'' from the Assistant Administrator for Water to Regional Water Management Division Directors, dated January 5, 1990 (AR VA–66). These documents are available in the administrative record for today's rule.

In 1991, EPA's Administrator announced another scientific reassessment of the risks of exposure to dioxin (see Memorandum from Administrator William K. Reilly to Erich W. Bretthauer, Assistant Administrator for Research and Development and E. Donald Elliott, General Counsel, entitled *Dioxin: Follow-Up to Briefing on Scientific Developments,* April 8, 1991, included in the administrative record for today's rule). At that time, the Administrator made clear that while the reassessment was underway, EPA would continue to regulate dioxin in accordance with existing Agency policy. Thereafter, the Agency proceeded to regulate dioxin in a number of environmental programs, including standards under the Safe Drinking Water Act and the CWA.

The Administrator's promulgation of the dioxin human health criteria in the 1992 NTR affirmed the Agency's decision that the ongoing reassessment should not defer or delay regulating this potent contaminant, and further, that the risk assessment in the 1984 criteria guidance document for dioxin continued to be scientifically defensible. Until the reassessment process was completed, the Agency could not ''say with any certainty what the degree or directions of any changes in the risk estimates might be'' (57 FR 60863–64).

The basis for the dioxin criteria as well as the decision to include the dioxin criteria in the 1992 NTR pending the results of the reassessment were challenged. See *American Forest and Paper Ass'n, Inc. et al.* v. *U.S. EPA* (Consolidated Case No. 93–0694 (RMU) D.D.C.). By order dated September 4, 1996, the Court upheld EPA's decision. EPA's brief and the Court's decision are included in the administrative record for today's rule.

EPA has undertaken significant effort toward completion of the dioxin reassessment. On September 13, 1994, EPA released for public review and comment a draft reassessment of toxicity and exposure to dioxin. See *Health Assessment Document for 2,3,7,8-Tetrachlorobenzo-p-Dioxin (TCDD) and Related Compounds,* U.S. EPA, 1994. EPA is currently addressing comments made by the public and the SAB and anticipates that the final

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revised reassessment will go to the SAB in the near future. With today's rule, the Agency reaffirms that, notwithstanding the on-going risk reassessment, EPA intends to continue to regulate dioxin to avoid further harm to public health, and the basis for the dioxin criteria, both in terms of the cancer potency and the exposure estimates, remains scientifically defensible. The fact that EPA is reassessing the risk of dioxin, virtually a continuous process to evaluate new scientific information, does not mean that the current risk assessment is ''wrong''. It continues to be EPA's position that until the risk assessment for dioxin is revised, EPA supports and will continue to use the existing risk assessment for the regulation of dioxin in the environment. Accordingly, EPA today promulgates dioxin criteria based on the 1984 criteria guidance document for dioxin and promulgated in the NTR in 1992.

Toxicity Equivalency: The State of California, in its 1991 water quality control plans, adopted human health criteria for dioxin and dioxin-like compounds based on the concept of toxicity equivalency (TEQ) using toxicity equivalency factors (TEFs). EPA Region 9 reviewed and approved the State's use of the TEQ concept and TEFs in setting the State's human health water quality criteria for dioxin and dioxin-like compounds.

In 1987, EPA formally embraced the TEQ concept as an interim procedure to estimate the risks associated with exposures to 210 chlorinated dibenzo-p-dioxin and chlorinated dibenzofuran (CDD/CDF) congeners, including 2,3,7,8-TCDD. This procedure uses a set of derived TEFs to convert the concentration of any CDD/CDF congener into an equivalent concentration of 2,3,7,8-TCDD. In 1989, EPA updated its TEFs based on an examination of relevant scientific evidence and a recognition of the value of international consistency. This updated information can be found in EPA's 1989 *Update to the Interim Procedures for Estimating Risks Associated with Exposures to Mixtures of Chlorinated Dibenzo-p-dioxins and -dibenzofurans (CDDs and CDFs)* (EPA/625/3–89/016, March 1989). EPA had been active in an international effort aimed at adopting a common set of TEFs (International TEFs/89 or I–TEFs/89), to facilitate information exchange on environmental contamination of CDD/CDF. This document reflects EPA's support of an internationally consistent set of TEFs, the I–TEFs/89. EPA uses I–TEFs/89 in many of its regulatory programs.

In 1994, the World Health Organization (WHO) revised the TEF scheme for dioxins and furans to include toxicity from dioxin-like compounds (Ahlborg et al., 1994). However, no changes were made to the TEFs for dioxins and furans. In 1998, the WHO re-evaluated and revised the previously established TEFs for dioxins (Ds), furans (Fs) and dioxin-like compounds (Vanden Bers, 1998). The nomenclature for this TEF scheme is TEQDFP–WHO98, where TEQ represents the 2,3,7,8-TCDD Toxic Equivalence of the mixture, and the subscript DFP indicates that dioxins (Ds) furans (Fs) and dioxin-like compounds (P) are included in the TEF scheme. The subscript 98 following WHO displays the year changes were made to the TEF scheme.

EPA intends to use the 1998 WHO TEF scheme in the near future. At this point however, EPA will support the use of either the 1989 interim procedures or the 1998 WHO TEF scheme but encourages the use of the 1998 WHO TEF scheme in State programs. EPA expects California to use a TEF scheme in implementing the 2,3,7,8-TCDD water quality criteria contained in today's rule. The TEQ and TEF approach provide a methodology for setting NPDES water quality-based permit limits that are protective of human health for dioxin and dioxin-like compounds.

Several commenters requested EPA to promulgate criteria for other forms of dioxin, in addition to 2,3,7,8-TCDD. EPA's draft reassessment for dioxin examines toxicity based on the TEQ concept and I–TEFs/89. When EPA completes the dioxin reassessment, the Agency intends to adopt revised 304(a) water quality criteria guidance based on the reassessment for dioxin. If necessary, EPA will then act to amend the NTR and CTR to reflect the revised 304(a) water quality criteria guidance.

b. Arsenic Criteria

EPA is not promulgating human health criteria for arsenic in today's rule. EPA recognizes that it promulgated human health water quality criteria for arsenic for a number of States in 1992, in the NTR, based on EPA's 1980 section 304(a) criteria guidance for arsenic established, in part, from IRIS values current at that time. However, a number of issues and uncertainties existed at the time of the CTR proposal concerning the health effects of arsenic. These issues and uncertainties were summarized in ''Issues Related to Health Risk of Arsenic'' which is contained in the administrative record for today's rule. During the period of this rulemaking action, EPA commissioned a study of arsenic health effects by the National Research Council (NRC) arm of the National Academy of Sciences. EPA received the NRC report in March of 1999. EPA scientists reviewed the report, which recommended that EPA lower the Safe Drinking Water Act arsenic maximum contaminant level (MCL) as soon as possible (The arsenic MCL is currently 50 μg/l.) The bladder cancer analysis in the NRC report will provide part of the basis for the risk assessment of a proposed revised arsenic MCL in the near future. After promulgating a revised MCL for drinking water, the Agency plans to revise the CWA 304(a) human health criteria for arsenic in order to harmonize the two standards. Today's rule defers promulgating arsenic criteria based on the Agency's previous risk assessment of skin cancer. In the meantime, permitting authorities in California should rely on existing narrative water quality criteria to establish effluent limitations as necessary for arsenic. California has previously expressed its science and policy position by establishing a criterion level of 5 μg/l for arsenic. Permitting authorities may, among other considerations, consider that value when evaluating and interpreting narrative water quality criteria.

c. Mercury Criteria

The human health criteria promulgated here use the latest RfD in EPA's Integrated Risk Information System (IRIS) and the weighted average practical bioconcentration factor (PBCF) from the 1980 section 304(a) criteria guidance document for mercury. EPA considered the approach used in the Great Lakes Water Quality Guidance (''Guidance'') incorporating Bioaccumulation Factors (BAFs), but rejected this approach for reasons outlined below. The equation used here to derive an ambient water quality criterion for mercury from exposure to organisms and water is:

$$HHC = \frac{RfD \times BW}{WC + (FC \times PBCF)}$$

Where:

RfD = Reference Dose
BW = Body Weight
WC = Water Consumption
FC = Total Fish and Shellfish Consumption per Day
PBCF = Practical Bioconcentration Factor (weighted average)

For mercury, the most current RfD from IRIS is 1×10^{-4} mg/kg/day. The RfD used a benchmark dose as an estimate of a No Observed Adverse Effect Level (NOAEL). The benchmark dose was calculated by applying a Weibel model

for extra risk to all neurological effects observed in 81 Iraqi children exposed in utero as reported in Marsh, et. al. (1987). Maternal hair mercury was the measure of exposure. Extra risk refers to an adjustment for background incidence of a given health effect. Specifically, the extra risk is the added incidence of observing an effect above the background rate relative to the proportion of the population of interest that is not expected to exhibit such as effect. The resulting estimate was the lower 95% statistical bound on the 10% extra risk; this was 11 ppm mercury in maternal hair. This dose in hair was converted to an equivalent ingested amount by applying a model based on data from human studies; the resulting benchmark dose was 1×10^{-3} mg/kg body weight /day. The RfD was calculated by dividing the benchmark dose by a composite uncertainty factor of 10. The uncertainty factor was used to account for variability in the human population, in particular the wide variation in biological half-life of methylmercury and the variation that is observed in the ration of hair mercury to mercury in the blood. In addition the uncertainty factor accounts for lack of a two-generation reproductive study and the lack of data on long term effects of childhood mercury exposures. The RfD thus calculated is 1×10^{-4} mg/kg body weight/day or 0.1 μg/kg/day. The body weight used in the equation for the mercury criteria, as discussed in the Human Health Guidelines, is a mean adult human body weight of 70 kg. The drinking water consumption rate, as discussed in the Human Health Guidelines, is 2.0 liters per day.

The bioconcentration factor or BCF is defined as the ratio of chemical concentration in the organism to that in surrounding water. Bioconcentration occurs through uptake and retention of a substance from water only, through gill membranes or other external body surfaces. In the context of setting exposure criteria it is generally understood that the terms ''BCF'' and ''steady-state BCF'' are synonymous. A steady-state condition occurs when the organism is exposed for a sufficient length of time that the ratio does not change substantially.

The BCFs that were used herein are the ''Practical Bioconcentration Factors (PBCFs)'' that were derived in 1980: 5500 for fresh water, 3765 for estuarine coastal waters, and 9000 for open oceans. See pages C–100–1 of Ambient Water Quality Criteria for Mercury (EPA 440/5–80–058) for a complete discussion on the PBCF. Because of the way they were derived, these PBCFs take into account uptake from food as well as uptake from water. A weighted average PBCF was calculated to take into account the average consumption from the three waters using the following equation:

$$\text{Weighted Average Practical BCF} = \frac{\sum(\text{FC} \times \text{PBCF})}{\sum(\text{FC})} = \frac{(0.00172)(5500) + (0.00478)(3765) + (0.0122)(9000)}{0.00172 + 0.00478 + 0.0122} = \frac{137.3}{0.0187} = 7342.6$$

Given the large value for the weighted average PBCF, the contribution of drinking water to total daily intake is negligible so that assumptions concerning the chemical form of mercury in drinking water become less important. The human health mercury criteria promulgated for this rule are based on the latest RfD as listed in IRIS and a weighted PBCF from the 1980 § 304(a) criteria guidance document for mercury.

On March 23, 1995 (60 FR 15366), EPA promulgated the Great Lakes Water Quality Guidance (''Guidance''). The Guidance incorporated bioaccumulation factors (BAFs) in the derivation of criteria to protect human health because it is believed that BAFs are a better predictor than BCFs of the concentration of a chemical within fish tissue since BAFs include consideration of the uptake of contaminants from all routes of exposure. A bioaccumulation factor is defined as the ratio (in L/kg) of a substance's concentration in tissue to the concentration in the ambient water, in situations where both the organism and its food are exposed and the ratio does not change substantially over time. The final Great Lakes Guidance establishes a hierarchy of four methods for deriving BAFs for non-polar organic chemicals: (1) Field-measured BAFs; (2) predicted BAFs derived using a field-measured biota-sediment accumulation factor; (3) predicted BAFs derived by multiplying a laboratory-measured BCF by a food chain multiplier; and (4) predicted BAFs derived by multiplying a BCF calculated from the log Kow by a food-chain multiplier. The final Great Lakes Guidance developed BAFs for trophic levels three and four fish of the Great Lakes Basin. Respectively, the BAFs for mercury for trophic level 3 and 4 fish were: 27,900 and 140,000.

The BAF promulgated in the GLI was developed specifically for the Great Lakes System. It is uncertain whether the BAFs of 27,900 and 140,000 are appropriate for use in California at this time; therefore, today's final rule does not use the GLI BAF in establishing human health criteria for mercury in California. The magnitude of the BAF for mercury in a given system depends on how much of the total mercury is present in the methylated form. Methylation rates vary widely from one water body to another for reasons that are not fully understood. Lacking the data, it is difficult to determine if the BAF used in the GLI represents the true potential for mercury to bioaccumulate in California surface waters. The true, average BAF for California could be higher or lower. For more information see EPA's Response to Comments document in the administrative record for this rule (specifically comments CTR–002–007(b) and CTR–016–007).

EPA is developing a national BAF for mercury as part of revisions to its 304(a) criteria for human health; however, the BAF methodology that will be used is currently under evaluation as part of EPA's revisions to its National Human Health Methodology (see section F.3 above). EPA applied a similar methodology in its Mercury Study Report to Congress (MSRC) to derive a BAF for methylmercury. The MSRC is available through NTIS (EPA–452/R–97–003). Although a BAF was derived in the MSRC, EPA does not intend to use this BAF for National application. EPA is engaged in a separate effort to incorporate additional mercury bioaccumulation data that was not considered in the MSRC, and to assess uncertainties with using a National BAF approach for mercury. Once the proposed revised human health methodology, including the BAF component, is finalized, EPA will revise its 304(a) criteria for mercury to reflect changes in the underlying methodology, recommendations contained in the MSRC, and recommendations in a National Academy of Science report on human health assessment of methylmercury. When EPA changes its 304(a) criteria recommendation for mercury, States and Tribes will be expected to review their water quality standards for mercury and make any revisions necessary to ensure their standards are scientifically defensible.

New information may become available regarding the bioaccumulation

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of mercury in certain water bodies in California. EPA supports the use of this information to develop site-specific criteria for mercury. Further, if a California water body is impaired due to mercury fish tissue or sediment contamination, loadings of mercury could contribute to or exacerbate the impairment. Therefore, one option regulatory authorities should consider is to include water quality-based effluent limits (WQBELs) in permits based on mass for discharges to the impaired water body. Such WQBELs must be derived from and comply with applicable State water quality standards (including both numeric and narrative criteria) and assure that the discharge does not cause or contribute to a violation of water quality standards.

d. Polychlorinated Biphenyls (PCBs) Criteria

The NTR, as amended, calculated human health criteria for PCBs using a cancer potency factor of 7.7 per mg/kg-day from the Agency's IRIS. This cancer potency factor was derived from the Norback and Weltman (1985) study which looked at rats that were fed Aroclor 1260. The study used the linearized multistage model with a default cross-species scaling factor (body weight ratio to the ⅔ power). Although it is known that PCB mixtures vary greatly as to their potency in producing biological effects, for purposes of its carcinogenicity assessment, EPA considered Aroclor 1260 to be representative of all PCB mixtures. The Agency did not pool data from all available congener studies or generate a geometric mean from these studies, since the Norback and Weltman study was judged by EPA as acceptable, and not of marginal quality, in design or conduct as compared with other studies. Thereafter, the Institute for Evaluating Health Risks (IEHR, 1991) reviewed the pathological slides from the Norback and Weltman study, and concluded that some of the malignant liver tumors should have been interpreted as nonmalignant lesions, and that the cancer potency factor should be 5.1 per mg/kg-day as compared with EPA's 7.7 per mg/kg-day.

The Agency's peer-reviewed reassessment of the cancer potency of PCBs published in a final report, *PCBs: Cancer Dose-Response Assessment and Applications to Environmental Mixtures* (EPA/600/P–96/001F), adopts a different approach that distinguishes among PCB mixtures by using information on environmental processes. (The report is included in the administrative record of today's rule.) The report considers all cancer studies (which used commercial mixtures only) to develop a range of cancer potency factors, then uses information on environmental processes to provide guidance on choosing an appropriate potency factor for representative classes of environmental mixtures and different pathways. The reassessment provides that, depending on the specific application, either central estimates or upper bounds can be appropriate. Central estimates describe a typical individual's risk, while upper bounds provide assurance (*i.e.,* 95% confidence) that this risk is not likely to be underestimated if the underlying model is correct. Central estimates are used for comparing or ranking environmental hazards, while upper bounds provide information about the precision of the comparison or ranking. In the reassessment, the use of the upper bound values were found to increase cancer potency estimates by two or three-fold over those using central tendency. Upper bounds are useful for estimating risks or setting exposure-related standards to protect public health, and are used by EPA in quantitative cancer risk assessment. Thus, the cancer potency of PCB mixtures is determined using a tiered approach based on environmental exposure routes with upper-bound potency factors (using a body weight ratio to the ¾ power) ranging from 0.07 (lowest risk and persistence) to 2 (high risk and persistence) per mg/kg-day for average lifetime exposures to PCBs. It is noteworthy that bioaccumulated PCBs appear to be more toxic than commercial PCBs and appear to be more persistent in the body. For exposure through the food chain, risks can be higher than other exposures.

EPA issued the final reassessment report on September 27, 1996, and updated IRIS to include the reassessment on October 1, 1996. EPA updated the human health criteria for PCBs in the National Toxics Rule on September 27, 1999. For today's rule, EPA derived the human health criteria for PCBs using a cancer potency factor of 2 per mg/kg-day, an upper bound potency factor reflecting high risk and persistence. This decision is based on recent multimedia studies indicating that the major pathway of exposure to persistent toxic substances such as PCBs is via dietary exposure (*i.e.,* contaminated fish and shellfish consumption).

Following is the calculation of the human health criterion (HHC) for organism and water consumption:

$$HHC = \frac{RF \times BW \times (1{,}000\ \mu g/mg)}{q1^* \times [WC + (FC \times BCF)]}$$

Where:

RF = Risk Factor = 1 x 10^{-6}
BW = Body Weight = 70 kg
q1* = Cancer slope factor = 2 per mg/kg-day
WC = Water Consumption = 2 l/day
FC = Fish and Shellfish Consumption = 0.0065 kg/day
BCF = Bioconcentration Factor = 31,200

the HHC (μg/l) = 0.00017 μg/l (rounded to two significant digits).

Following is the calculation of the human health criterion for organism only consumption:

$$HHC = \frac{RF \times BW \times (1{,}000\ \mu g/mg)}{q1^* \times FC \times BCF}$$

Where:

RF = Risk Factor = 1 x 10^{-6}
BW = Body Weight = 70 kg
q1* = Cancer slope factor = 2 per mg/kg-day
FC = Total Fish and Shellfish Consumption per Day = 0.0065 kg/day
BCF = Bioconcentration Factor = 31,200

the HHC (μg/l) = 0.00017 μg/l (rounded to two significant digits).

The criteria are both equal to 0.00017 μg/l and apply to total PCBs. *See PCBs: Cancer Dose Response Assessment and Application to Environmental Mixtures* (EPA/600/9–96–001F). For a discussion of the body weight, water consumption, and fish and shellfish consumption factors, see the Human Health Guidelines. For a discussion of the BCF, see the 304(a) criteria guidance document for PCBs (included in the administrative record for today's rule).

e. Excluded Section 304(a) Human Health Criteria

As is the case in the NTR, as amended, today's rule does not promulgate criteria for certain priority pollutants for which CWA section 304(a) criteria guidance exists because those criteria were not based on toxicity to humans or aquatic organisms. The basis for those particular criteria is organoleptic effects (*e.g.,* taste and odor) which would make water and edible aquatic life unpalatable but not toxic. Because the basis for this rule is to protect the public health and aquatic life from toxicity consistent with the language and intent in CWA section 303(c)(2)(B), EPA is promulgating criteria only for those priority toxic pollutants whose criteria recommendations are based on toxicity. The CWA section 304(a) human health criteria based on organoleptic effects for zinc and 3-methyl-4-chlorophenol are excluded for this reason. See the 1992 NTR discussion at 57 FR 60864.

f. Cancer Risk Level

EPA's CWA section 304(a) criteria guidance documents for priority toxic pollutants that are based on carcinogenicity present concentrations for upper bound risk levels of 1 excess cancer case per 100,000 people (10^{-5}), per 1,000,000 people (10^{-6}), and per 10,000,000 people (10^{-7}). However, the criteria documents do not recommend a particular risk level as EPA policy.

As part of the proposed rule, EPA requested and received comment on the adoption of a 10^{-5} risk level for carcinogenic pollutants. The effect of a 10^{-5} risk level would have been to increase (*i.e.,* make less stringent) carcinogenic pollutant criteria values (noted in the matrix by footnote c) that are not already promulgated in the NTR, by one order of magnitude. For example, the organism-only criterion for gamma BHC (pollutant number 105 in the matrix) is 0.013 µg/l; the criterion based on a 10^{-5} risk level would have been 0.13 µg/l. EPA received several comments that indicated a preference for a higher (10^{-4} and 10^{-5}) risk level for effluent dependent waters or other types of special circumstances.

In today's rule, EPA is promulgating criteria that protect the general population at an incremental cancer risk level of one in a million (10^{-6}) for all priority toxic pollutants regulated as carcinogens, consistent with the criteria promulgated in the NTR for the State of California. Standards adopted by the State contained in the Enclosed Bays and Estuaries Plan (EBEP), and the Inland Surface Waters Plan (ISWP), partially approved by EPA on November 6, 1991, and the Ocean Plan approved by EPA on June 28, 1990, contained a risk level of 10^{-6} for most carcinogens. The State has historically protected at a 10^{-6} risk level for carcinogenic pollutants.

EPA, in its recent human health methodology revisions, proposed acceptable lifetime cancer risk for the general population in the range of 10^{-5} to 10^{-6}. EPA also proposed that States and Tribes ensure the most highly exposed populations do not exceed a 10^{-4} risk level. However, EPA's draft methodology revisions also stated that it will derive 304(a) criteria at a 10^{-6} risk level, which the Agency believes reflects the appropriate risk for the general population and which applies a risk management policy which ensures protection for all exposed population groups. (Draft Water Quality Criteria Methodology: Human Health, EPA 822–Z–98–001, August 1998, Appendix II, page 72).

Subpopulations within a State may exist, such as recreational and subsistence anglers, who as a result of greater exposure to a contaminant are at greater risk than the standard 70 kilogram person eating 6.5 grams per day of fish and shellfish and drinking 2.0 liters per day of drinking water with pollutant levels meeting the water quality criteria. EPA acknowledges that at any given risk level for the general population, those segments of the population that are more highly exposed face a higher relative risk. For example, if fish are contaminated at a level permitted by criteria derived on the basis of a risk level of 10^{-6}, individuals consuming up to 10 times the assumed fish consumption rate would still be protected at a 10^{-5} risk level. Similarly, individuals consuming 100 times the general population rate would be protected at a 10^{-4} risk level. EPA, therefore, believes that derivation of criteria at the 10^{-6} risk level is a reasonable risk management decision protective of designated uses under the CWA. While outside the scope of this rule, EPA notes that States and Tribes, however, have the discretion to adopt water quality criteria that result in a higher risk level (*e.g.,* 10^{-5}). EPA expects to approve such criteria if the State or Tribe has identified the most highly exposed subpopulation within the State or Tribe, demonstrates the chosen risk level is adequately protective of the most highly exposed subpopulation, and has completed all necessary public participation.

This demonstration has not happened in California. Further, the information that is available on highly exposed subpopulations in California supports the need to protect the general population at the 10^{-6} level. California has cited the Santa Monica Bay Seafood Consumption Study as providing the best available data set for estimating consumption of sport fish and shellfish in California for both marine or freshwater sources (Chemicals in Fish Report No. 1: Consumption of Fish and Shellfish in California and the United States, Final Draft Report, July 1997). Consumption rates of sport fish and shellfish of 21g/day, 50 g/day, 107 g/day, and 161 g/day for the median, mean, 90th, and 95th percentile rates, respectively, were determined from this study. Additional consumption of commercial species in the range of approximately 8 to 42 g/day would further increase these values. Clearly the consumption rates for the most highly exposed subpopulation within the State exceeds 10 times the 6.5 g/day rates used in the CTR. Therefore, use of a risk level of 10^{-5} for the general population would not be sufficient to protect the most highly exposed population in California at a 10^{-4} risk level. On the other hand, even the most highly exposed subpopulations cited in the California study do not have consumption rates approaching 100 times the 6.5 g/day rates used in the CTR. The use of the 10^{-6} risk level to protect average level consumers does not subject these subpopulations to risk levels as high as 10^{-4}.

EPA believes its decision to establish a 10^{-6} risk level for the CTR is also consistent with EPA's policy in the NTR to select the risk level that reflect the policies or preferences of CWA programs in the affected States. California adopted standards for priority toxic pollutants for its ocean waters in 1990 using a 10^{-6} risk level to protect human health (California Ocean Plan, 1990). In April 1991, and again in November 1992, California adopted standards for its inland surface waters and enclosed bays and estuaries in its Inland Surface Waters Plan (ISWP) and its Enclosed Bays and Estuaries Plan (EBEP) using a 10^{-6} risk level. To be consistent with the State's water quality standards, EPA used a 10^{-6} risk level for California in the NTR at 57 FR 60867. The State has continued using a 10^{-6} risk level to protect human health for its standards that were not withdrawn with the ISWP and EBEP. The most recent expression of risk level preference is contained in the Draft Functional Equivalent Document, Amendment of the Water Quality Control Plan for Ocean Waters of California, October 1998, where the State recommended maintaining a consistent risk level of 10^{-6} for the human health standards that it was proposing to revise.

EPA received several comments requesting a 10^{-5} risk level based on the risk level chosen for the Great Lakes Water Quality Guidance (the Guidance). There are several differences between the guidelines for the derivation of human health criteria contained in the Guidance and the California Toxics Rule (CTR) that make a 10^{-5} risk factor appropriate for the Guidance, but not for the CTR. These differences result in criteria developed using the 10^{-5} risk factor in the Guidance being at least as stringent as criteria derived under the CTR using a 10^{-6} risk factor. The relevant aspects of the Guidance include:

- Use of fish consumption rates that are considerably higher than fish consumption rates for the CTR.
- Use of bioaccumulation factors rather than bioconcentration factors in

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estimating exposure, considerably increasing the dose of carcinogens to sensitive subgroups.

• Consideration of additivity of effects of mixtures for both carcinogenic and noncarcinogenic pollutants.

This combination of factors increase the calculated carcinogenic risk substantially under the Guidance (the combination would generally be more than one order of magnitude), making a lower overall risk factor acceptable. The Guidance risk factor provides, in fact, criteria with at least the same level of protection against carcinogens as criteria derived with a higher risk factor using the CTR. A lower risk factor for the CTR would not be appropriate absent concomitant changes in the derivation procedures that provide equivalent risk protection.

G. Description of Final Rule

1. Scope

Paragraph (a) in 40 CFR 131.38, entitled ''Scope,'' states that this rule is a promulgation of criteria for priority toxic pollutants in the State of California for inland surface waters, enclosed bays, and estuaries. Paragraph (a) in 40 CFR 131.38 also states that this rule contains an authorizing compliance schedule provision.

2. EPA Criteria for Priority Toxic Pollutants

EPA's criteria for California are presented in tabular form at 40 CFR 131.38. For ease of presentation, the table that appears combines water quality criteria promulgated in the NTR, as amended, that are outside the scope of this rulemaking, with the criteria that are within the scope of today's rule. This is intended to help readers determine applicable water quality criteria for the State of California. The table contains footnotes for clarification.

Paragraph (b) in 40 CFR 131.38 presents a matrix of the applicable EPA aquatic life and/or human health criteria for priority toxic pollutants in California. Section 303(c)(2)(B) of the CWA addresses only pollutants listed as ''toxic'' pursuant to section 307(a) of the CWA for which EPA has developed section 304(a) criteria guidance. As discussed earlier in this preamble, the section 307(a) list of toxics contains 65 compounds and families of compounds, which potentially include thousands of specific compounds. Of these, the Agency identified a list of 126 ''priority toxic pollutants'' to implement the CWA (see 40 CFR 131.36(b)). Reference in this rule to priority toxic pollutants, toxic pollutants, or toxics refers to the 126 priority toxic pollutants.

EPA has not developed both aquatic life and human health CWA section 304(a) criterion guidance for all of the priority toxic pollutants. The matrix in 40 CFR 131.38(b) contains human health criteria in Column D for 92 priority toxic pollutants which are divided into Column 1: criteria for water consumption (i.e., 2.0 liters per day) and aquatic organism consumption (i.e., 6.5 grams per day of aquatic organisms); and Column 2: criteria for aquatic organism consumption only. The term aquatic organism includes fish and shellfish such as shrimp, clams, oysters and mussels. One reason the total number of priority toxic pollutants with criteria today differs from the total number of priority toxic pollutants contained in earlier published CWA section 304(a) criteria guidance is because EPA has developed and is promulgating chromium criteria for two valence states with respect to aquatic life criteria. Thus, although chromium is a single priority toxic pollutant, there are two criteria for chromium for aquatic life protection. See pollutant 5 in today's rule at 40 CFR 131.38(b). Another reason is that EPA is promulgating human health criteria for nine priority pollutants for which health-based national criteria have been calculated based on information obtained from EPA's IRIS database (EPA provided notice of these nine criteria in the NTR for inclusion in future State triennial reviews. See 57 FR 60848, 60890).

The matrix contains aquatic life criteria for 23 priority pollutants. These are divided into freshwater criteria (Column B) and saltwater criteria (Column C). These columns are further divided into acute and chronic criteria. The aquatic life criteria are considered by EPA to be protective when applied under the conditions described in the section 304(a) criteria documents and in the TSD. For example, water body uses should be protected if the criteria are not exceeded, on average, once every three year period. It should be noted that the criteria maximum concentrations (the acute criteria) are short-term concentrations and that the criteria continuous concentrations (the chronic criteria) are four-day averages. It should also be noted that for certain metals, the actual criteria are equations which are included as footnotes to the matrix. The toxicity of these metals is water hardness dependent and may be adjusted. The values shown in the table are illustrative only, based on a hardness expressed as calcium carbonate of 100 mg/l. Finally, the criterion for pentachlorophenol is pH dependent. The equation is the actual criterion and is included as a footnote. The value shown in the matrix is for a pH of 7.8. Several of the freshwater aquatic life criteria are incorporated into the matrix in the format used in the 1980 criteria methodology which uses a final acute value instead of a continuous maximum concentration. This distinction is noted in footnote g of the table.

The final rule at 40 CFR 131.38(c) establishes the applicability of the criteria to the State of California. 40 CFR 131.38(d) is described later in Section F, of this preamble. EPA has included in this rule provisions necessary to implement numeric criteria in a way that maintains the level of protection intended. These provisions are included in 40 CFR 131.38(c) of today's rule. For example, in order to do steady state waste load allocation analyses, most States have low flow values for streams and rivers which establish flow rates for various purposes. These low flow values become design flows for sizing treatment plants and developing water quality-based effluent limits and/or TMDLs. Historically, these design flows were selected for the purposes of waste load allocation analyses which focused on instream dissolved oxygen concentrations and protection of aquatic life. With the publication of the 1985 TSD, EPA introduced hydrologically and biologically based analyses for the protection of aquatic life and human health. (These concepts have been expanded subsequently in EPA's *Technical Guidance Manual for Performing Wasteload Allocations, Book 6, Design Conditions,* U.S. EPA, 1986. These analyses are included in Appendix D of the revised TSD. The discussion here is greatly simplified and is provided to support EPA's decision to promulgate design flows for instream flows and thereby maintain the adequacy of the criteria for priority toxic pollutants.) EPA recommended either of two methods for calculating acceptable low flows, the traditional hydrologic method developed by the U.S. Geological Survey or a biological based method developed by EPA. Other methods for evaluating the instream flow record may be available; use of these methods may result in TMDLs and/or water quality-based effluent limitations which adequately protect human health and/or aquatic life. The results of either of these two methods, or an equally protective alternative method, may be used.

The State of California may adopt specific design flows for streams and rivers to protect designated uses against the effects of toxics. EPA believes it is

important to specify design flows in today's rule so that, in the absence of state design flows, the criteria promulgated today would be implemented appropriately. The TSD also recommends the use of three dynamic models to perform wasteload allocations. Dynamic wasteload models do not generally use specific steady state design flows but accomplish the same effect by factoring in the probability of occurrence of stream flows based on the historical flow record.

The low flows specified in the rule explicitly contain duration and frequency of occurrence which represent certain probabilities of occurrence. Likewise, the criteria for priority toxic pollutants are defined with duration and frequency components. Dynamic modeling techniques explicitly predict the effects of variability in receiving water, effluent flow, and pollution variation. Dynamic modeling techniques, as described in the TSD, allow for calculating wasteload allocations that meet the criteria for priority toxic pollutants without using a single, worst-case concentration based on a critical condition. Either dynamic modeling or steady state modeling can be used to implement the criteria promulgated today. For simplicity, only steady state conditions are discussed here. Clearly, if the criteria were implemented using design flows that are too high, the resulting toxic controls would not be adequate, because the resulting ambient concentrations would exceed EPA's criteria.

In the case of aquatic life, assuming exceedences occur more frequently than once in three years on the average, exceedences would result in diminished vitality of stream ecosystems characterized by the loss of desired species. Numeric water quality criteria should apply at all flows that are equal to or greater than flows specified below. The low flow values are:

Type of criteria	Design flow
Acute Aquatic Life (CMC).	1 Q 10 or 1 B 3
Chronic Aquatic Life (CCC).	7 Q 10 or 4 B 3
Human Health	harmonic mean flow

Where:

1 Q 10 is the lowest one day flow with an average recurrence frequency of once in 10 years determined hydrologically;

1 B 3 is biologically based and indicates an allowable exceedence of once every 3 years. It is determined by EPA's computerized method (DFLOW model);

7 Q 10 is the lowest average 7 consecutive day low flow with an average recurrence frequency of once in 10 years determined hydrologically;

4 B 3 is biologically based and indicates an allowable exceedences for 4 consecutive days once every 3 years. It is determined by EPA's computerized method (DFLOW model);

EPA is requiring that the harmonic mean flow be applied with human health criteria. The harmonic mean is a standard calculated statistical value. EPA's model for human health effects assumes that such effects occur because of a long-term exposure to low concentration of a toxic pollutant, for example, two liters of water per day for seventy years. To estimate the concentrations of the toxic pollutant in those two liters per day by withdrawal from streams with a high daily variation in flow, EPA believes the harmonic mean flow is the correct statistic to use in computing such design flows rather than other averaging techniques. (For a description of harmonic means see ''Design Stream Flows Based on Harmonic Means,'' Lewis A. Rossman, Jr. of Hydraulics Engineering, Vol. 116, No. 7, July, 1990.)

All waters (including lakes, estuaries, and marine waters), whether or not suitable for such hydrologic calculations, are subject to the criteria promulgated today. Such criteria will need to be attained at the end of the discharge pipe, unless the State authorizes a mixing zone. Where the State plans to authorize a mixing zone, the criteria would apply at the locations allowed by the mixing zone. For example, the chronic criteria (CCC) would apply at the defined boundary of the chronic mixing zone. Discussion of and guidance on these factors are included in the revised TSD in Chapter 4.

EPA is aware that the criteria promulgated today for some of the priority toxic pollutants are at concentrations less than EPA's current analytical detection limits. Analytical detection limits have never been an acceptable basis for setting water quality criteria since they are not related to actual environmental impacts. The environmental impact of a pollutant is based on a scientific determination, not a measuring technique which is subject to change. Setting the criteria at levels that reflect adequate protection tends to be a forcing mechanism to improve analytical detection methods. See 1985 Guidelines, page 21. As the methods improve, limits based on the actual criteria necessary to protect aquatic life and human health become measurable. The Agency does not believe it is appropriate to promulgate criteria that are not sufficiently protective. EPA discusses this issue further in its Response to Comment Document for today's final rule.

EPA does believe, however, that the use of analytical detection limits are appropriate for assessing *compliance* with National Pollutant Discharge Elimination System (NPDES) permit limits. This view of the role of detection limits was first articulated in guidance for translating dioxin criteria into NPDES permit limits. See ''Strategy for the Regulation of Discharges of PHDDs and PHDFs from Pulp and Paper Mills to Waters of the U.S.'' Memorandum from the Assistant Administrator for Water to the Regional Water Management Division Directors, May 21, 1990. This guidance presented a model for addressing toxic pollutants which have criteria less than current detection limits. EPA, in more recent guidance, recommends the use of the ''minimum level'' or ML for reporting sample results to assess compliance with WQBELs (TSD page 111). The ML, also called the ''quantification level,'' is the level at which the entire analytical system gives recognizable mass spectra and acceptable calibration points, i.e., the point at which the method can reliably quantify the amount of pollutant in the sample. States can use their own procedures to average and otherwise account for monitoring data, *e.g.,* quantifying results below the ML. These results can then be used to assess compliance with WQBELs. (See 40 CFR part 132, Appendix F, Procedure 8.B.) This approach is applicable to priority toxic pollutants with criteria less than current detection limits. EPA's guidance explains that standard analytical methods may be used for purposes of assessing compliance with permit limits, but not for purposes of establishing water quality criteria or permit limits. Under the CWA, analytical methods are appropriately used in connection with NPDES permit limit compliance assessments. Because of the function of water quality criteria, EPA has not considered the sensitivity of analytical methods in deriving the criteria promulgated today.

EPA has promulgated 40 CFR 131.38(c)(3) to determine when freshwater or saltwater aquatic life criteria apply. This provision incorporates a time parameter to better define the critical condition. The structure of the paragraph is to establish

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applicable rules and to allow for site-specific exceptions where the rules are not consistent with actual field conditions. Because a distinct separation generally does not exist between freshwater and saltwater aquatic communities, EPA is establishing the following: (1) The freshwater criteria apply at salinities of 1 part per thousand and below at locations where this occurs 95% or more of the time; (2) saltwater criteria apply at salinities of 10 parts per thousand and above at locations where this occurs 95% more of the time; and (3) at salinities between 1 and 10 parts per thousand the more stringent of the two apply unless EPA approves the application of the freshwater or saltwater criteria based on an appropriate biological assessment. The percentiles included here were selected to minimize the chance of overlap, that is, one site meeting both criteria. Determination of these percentiles can be done by any reasonable means such as interpolation between points with measured data or by the application of calibrated and verified mathematical models (or hydraulic models). It is not EPA's intent to require actual data collection at particular locations.

In the brackish water transition zones of estuaries with varying salinities, there generally will be a mix of freshwater and saltwater species. Generally, therefore, it is reasonable for the more stringent of the freshwater or saltwater criteria to apply. In evaluating appropriate data supporting the alternative set of criteria, EPA will focus on the species composition as its preferred method. This assignment of criteria for fresh, brackish and salt waters was developed in consultation with EPA's research laboratories at Duluth, Minnesota and Narragansett, Rhode Island. The Agency believes such an approach is consistent with field experience.

Paragraph (d) in 40 CFR 131.38 lists the designated water and use classifications for which the criteria apply. The criteria are applied to the beneficial use designations adopted by the State of California; EPA has not promulgated any new use classifications in this rule.

Exceedences Frequency: In a water quality criterion for aquatic life, EPA recommends an allowable frequency for excursions of the criteria. See 1985 Guidelines, pages 11–13. This allowable frequency provides an appropriate period of time during which the aquatic community can recover from the effect of an excursion and then function normally for a period of time before the next excursion. An excursion is defined as an occurrence of when the average concentration over the duration of the averaging period is above the CCC or the CMC. As ecological communities are naturally subjected to a series of stresses, the allowable frequency of pollutant stress may be set at a value that does not significantly increase the frequency or severity of all stresses combined. See also TSD, Appendix D. In addition, providing an allowable frequency for exceeding the criterion recognizes that it is not generally possible to assure that criteria are never exceeded. (TSD, page 36.)

Based on the available data, today's rule requires that the acute criterion for a pollutant be exceeded no more than once in three years on the average. EPA is also requiring that the chronic criterion for a pollutant be exceeded no more than once in three years on the average. EPA acknowledges that States may develop allowable frequencies that differ from these allowable frequencies, so long as they are scientifically supportable, but believes that these allowable frequencies are protective of the designated uses where EPA is promulgating criteria.

The use of aquatic life criteria for developing water quality-based effluent limits in permits requires the permitting official to use an appropriate wasteload allocation model. (TSD, Appendix D–6.) As discussed above, there are generally two methods for determining design flows, the hydrologically-based method and the biologically-based method.

The biologically-based method directly uses the averaging periods and frequencies specified in the aquatic life criteria for determining design flows. (TSD, Appendix. D–8.) Because the biologically-based method calculates the design flow directly from the duration and allowable frequency, it most accurately provides the allowed number of excursions. The hydrologically based method applies the CMC at a design flow equal to or equivalent to the 1Q10 design flow (i.e., the lowest one-day flow with an average recurrence frequency of once in ten years), and applies the CCC at the 7Q10 design flow (i.e., the lowest average seven consecutive day flow with a recurrence frequency of once in ten years).

EPA established a three year allowable frequency in the NTR. In settlement of the litigation on the NTR, EPA stated that it was in the midst of conducting, sponsoring, or planning research aimed at addressing scientific issues related to the basis for and application of water quality criteria and mentioned the issue of allowable frequency. See Partial Settlement Agreement in *American Forest and Paper Ass'n, Inc. et al.* v. *U.S. EPA* (Consolidated Case No. 93–0694 (RMU) D.D.C. To that end, EPA is reevaluating issues raised about allowable frequency as part of its work in revising the 1985 Guidelines.

EPA recognizes that additional data concerning (a) the probable frequency of lethal events for an assemblage of taxa covering a range of sensitivities to pollutants, (b) the probable frequency of sublethal effects for such taxa, (c) the differing effects of lethal and sublethal events in reducing populations of such taxa, and (d) the time needed to replace organisms lost as a result of toxicity, may lead to further refinement of the allowable frequency value. EPA has not yet completed this work. Until this work is complete, EPA believes that where EPA promulgates criteria, the three year allowable frequency represents a value in the reasonable range for this parameter.

3. Implementation

Once the applicable designated uses and water quality criteria for a water body are determined, under the National Pollutant Discharge Elimination System (NPDES) program discharges to the water body must be characterized and the permitting authority must determine the need for permit limits. If a discharge causes, has the reasonable potential to cause, or contributes to an excursion of a numeric or narrative water quality criteria, the permitting authority must develop permit limits as necessary to meet water quality standards. These permit limits are water quality-based effluent limitations or WQBELs. The terms ''cause,'' ''reasonable potential to cause,'' and ''contribute to'' are the terms in the NPDES regulations for conditions under which water quality-based permit limits are required. See 40 CFR 122.44(d)(1).

Since the publication of the proposed CTR, the State of California adopted procedures which detail how water quality criteria will be implemented through NPDES permits, waste discharge requirements, and other regulatory approaches. These procedures entitled, *Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California* were adopted on March 2, 2000. Once these procedures are submitted for review under CWA section 303(c), EPA will review them as they relate to water quality standards, and approve or disapprove them.

Several commenters understood the language in the preamble to the proposed rule regarding implementation

to mean that site-specific criteria, variances, and other actions would be prohibited or severely limited by the CTR. Site-specific criteria, variances and other actions modifying criteria are neither prohibited nor limited by the CTR. The State, if it so chooses, still can make these changes to its water quality standards, subject to EPA approval. However, with this Federal rule in effect, the State cannot implement any modifications that are less stringent than the CTR without an amendment to the CTR to reflect these modifications. EPA will make every effort to expeditiously accommodate Federal rulemaking of appropriate modifications to California's water quality standards. In the preamble to the proposed CTR, and here today, EPA is emphasizing that these efforts to amend the CTR on a case-by-case basis will generally increase the time before a modification can be implemented.

4. Wet Weather Flows

EPA has for a longtime maintained that CWA section 301(b)(1)(C) applies to NPDES permits for discharges from municipal separate storm sewer systems. Recently, the U.S. Court of Appeals for the Ninth Circuit upheld NPDES permits issued by EPA for five Arizona municipal separate storm sewer systems and addressed this issue specifically. *Defenders of Wildlife, et al.* v. *Browner,* No. 98–71080 (9th Cir., October 1999). The Court held that the CWA does not require ''strict compliance'' with State water quality standards for municipal storm sewer permits under section 301(b)(1)(C), but that at the same time, the CWA does give EPA discretion to incorporate appropriate water quality-based effluent limitations under another provision, CWA section 402(p)(3)(B)(iii).

The Court based its decision on the structure of section 402(p)(3), which contains distinct language for discharges of industrial storm water and municipal storm water. In section 402(p)(3)(A), Congress requires that ''dischargers associated with industrial activity shall meet all applicable provisions of [section 402] and section [301].'' 33 U.S.C. section 1342(p)(3)(A). The Court noted, therefore, that by incorporation, industrial storm water discharges need to achieve ''any more stringent limitation, including those necessary to meet water quality standards * * *'' The Court explained that industrial storm water discharges ''must comply strictly with State water quality standards'' but that Congress chose not to include a similar provision for municipal storm sewer discharges, including instead a requirement for controls to reduce pollutants to the maximum extent practicable or MEP standard in section 402(p)(3)(B). Reading the two related sections together, the Court concluded that section 402(p)(3)(B)(iii) does not require ''strict compliance'' by municipal storm sewer discharges according to section 301(b)(1)(C). At the same time, however, the Court found that the language in CWA section 402(p)(3)(B)(iii) which states that permits for discharges from municipal storm sewers shall require ''such other provisions as the Administrator of the state determines appropriate for the control of such pollutants'' provides EPA with discretion to incorporate provisions lending to ultimate compliance with water quality standards.

EPA believes that compliance with water quality standards through the use of Best Management Practices (BMPs) is appropriate. EPA articulated its position on the use of BMPs in storm water permits in the policy memorandum entitled, ''Interim Permitting Approach for Water Quality-Based Effluent Limitations In Storm Water Permits'' which was signed by the Assistant Administrator for Water, Robert Perciasepe on August 1, 1996 (61 FR 43761, August 9, 1996). A copy of this memorandum is contained in the administrative record for today's rule. The policy affirms the use of BMPs as a means to attain water quality standards in municipal storm water permits, and embraces BMPs as an interim permitting approach.

The interim permitting approach uses BMPs in first-round storm water permits, and expanded or better-tailored BMPs in subsequent permits, where necessary, to provide for the attainment of water quality standards. In cases where adequate information exists to develop more specific conditions or limitations to meet water quality standards, these conditions or limitations are to be incorporated into storm water permits, as necessary and appropriate.

This interim permitting approach, however, only applies to EPA. EPA encourages the State to adopt a similar policy for municipal storm water permits. This interim permitting approach provides time, where necessary, to more fully assess the range of issues and possible options for the control of storm water discharges for the protection of water quality. More information on this issue is included in the response to comment document in response to specific storm water issues raised by commenters.

5. Schedules of Compliance

A compliance schedule refers to an enforceable sequence of interim requirements in a permit leading to ultimate compliance with water quality-based effluent limitations or WQBELs in accordance with the CWA. The authorizing compliance schedule provision authorizes, but does not require, the permit issuing authority in the State of California to include such compliance schedules in permits under appropriate circumstances. The State of California is authorized to administer the National Pollutant Discharge Elimination System (NPDES) program and may exercise its discretion when deciding if a compliance schedule is justified because of the technical or financial (or other) infeasibility of immediate compliance. An authorizing compliance schedule provision is included in today's rule because of the potential for existing dischargers to have new or more stringent effluent limitations for which immediate compliance would not be possible or practicable.

New and Existing Dischargers: The provision allows compliance schedules only for an ''existing discharger'' which is defined as any discharger which is not a ''new California discharger.'' A ''new California discharger'' includes ''any building, structure, facility, or installation from which there is, or may be, a 'discharge of pollutants', the construction of which commences after the effective date of this regulation.'' These definitions are modeled after the existing 40 CFR 122.2 definitions for parallel terms, but with a cut-off date modified to reflect this rule. Only ''new California dischargers'' are required to comply immediately upon commencement of discharge with effluent limitations derived from the criteria in this rule. For ''existing dischargers'' whose permits are reissued or modified to contain new or more stringent limitations based upon certain water quality requirements, the permit could allow up to five years, or up to the length of a permit, to comply with such limitations. The provision applies to new or more stringent effluent limitations based on the criteria in this EPA rule.

EPA has included ''increasing dischargers'' within the category of ''existing dischargers'' since ''increasing dischargers'' are existing facilities with a change—an increase—in their discharge. Such facilities may include those with seasonal variations. ''Increasing dischargers'' will already have treatment systems in place for their current discharge, thus, they have less

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opportunity than a new discharger does to design and build a new treatment system which will meet new water quality-based requirements for their changed discharge. Allowing existing facilities with an increasing discharge a compliance schedule will avoid placing the discharger at a competitive disadvantage vis-a-vis other existing dischargers who are eligible for compliance schedules.

Today's rule does not prohibit the use of a short-term ''shake down period'' for new California dischargers as is provided for new sources or new dischargers in 40 CFR 122.29(d)(4). These regulations require that the owner or operator of (1) a new source; (2) a new discharger (as defined in 40 CFR 122.2) which commenced discharge after August 13, 1979; or (3) a recommencing discharger shall install and implement all pollution control equipment to meet the conditions of the permit before discharging. The facility must also meet all permit conditions in the shortest feasible time (not to exceed 90 days). This shake-down period is not a compliance schedule. This approach may be used to address violations which may occur during a new facility's start-up, especially where permit limits are water quality-based and biological treatment is involved.

The burden of proof to show the necessity of a compliance schedule is on the discharger, and the discharger must request approval from the permit issuing authority for a schedule of compliance. The discharger should submit a description of the minimum required actions or evaluations that must be undertaken in order to comply with the new or more restrictive discharge limits. Dates of completion for the required actions or evaluations should be included, and the proposed schedule should reflect the shortest practicable time to complete all minimum required actions.

Duration of Compliance Schedules: Today's rule provides that compliance schedules may provide for up to five years to meet new or more stringent effluent limitations in those limited circumstances where the permittee can demonstrate to the permit authority that an extended schedule is warranted. EPA's regulations at 122.47 require compliance with standards as soon as possible. This means that permit authorities should not allow compliance schedules where the permittee fails to demonstrate their necessity. This provision should not be considered a default compliance schedule duration for existing facilities.

In instances where dischargers wish to conduct toxicological studies, analyze results, and adopt and implement new or revised water quality-based effluent limitations, EPA believes that five years is sufficient time within which to complete this process. See the preamble to the proposed rule.

Under this rule, where a schedule of compliance exceeds one year, interim requirements are to be specified and interim progress reports are to be submitted at least annually to the permit issuing authority, in at least one-year time intervals.

The rule allows all compliance schedules to extend up to a maximum duration of five years, which is the maximum term of any NPDES permit. See 40 CFR 122.46. The discharger's opportunity to obtain a compliance schedule occurs when the existing permit for that discharge is issued, reissued or modified to contain more stringent limits based on the water quality criteria in today's rule. Such compliance schedules, however, cannot be extended to any indefinite point of time in the future because the compliance schedule provision in this rule will sunset on May 18, 2005. The sunset applies to the authorizing provision in today's rule (40 CFR 131.38(e)), not to individual schedules of compliance included in specific NPDES permits. Delays in reissuing expired permits (including those which continue in effect under applicable NPDES regulations) cannot indefinitely extend the period of time during which a compliance schedule is in effect. This would occur where the permit authority includes the single maximum five-year compliance schedule in a permit that is reissued just before the compliance schedule provision sunsets (having been previously issued without WQBELS using the rule's criteria on the eve of the effective date of this rule). Instead, the effect of the sunset provision is to limit the longest time period for compliance to ten years after the effective date of this rule.

EPA recognizes that where a permit is modified during the permit term, and the permittee needs the full five years to comply, the five-year schedule may extend beyond the term of the modified permit. In such cases, the rule allows for the modified permit to contain a compliance schedule with an interim limit by the end of the permit term. When the permit is reissued, the permit authority may extend the compliance schedule in the next permit, provided that, taking into account the amount of time allowed under the previous permit, the entire compliance schedule contained in the permit shall not exceed five years. Final permit limits and compliance dates will be included in the record for the permit. Final compliance dates must occur within five years from the date of permit issuance, reissuance, or modification, unless additional or less time is provided for by law.

EPA would prefer that the State adopt an authorizing compliance schedule provision but recognizes that the State may not be able to complete this action for some time after promulgation of the CTR. Thus, EPA has chosen to promulgate the rule with a sunset provision which states that the authorizing compliance schedule provision will cease or sunset on May 18, 2005. However, if the State Board adopts, and EPA approves, a statewide authorizing compliance schedule provision significantly prior to May 18, 2005, EPA will act to stay the authorizing compliance schedule provision in today's rule. Additionally, if a Regional Board adopts, and the State Board adopts and EPA approves, a Regional Board authorizing compliance schedule provision, EPA will act to stay today's provision for the appropriate or corresponding geographic region in California. At that time, the State Board's or Regional Board's authorizing compliance schedule provision will govern the ability of the State regulatory entity to allow a discharger to include a compliance schedule in a discharger's NPDES permit.

Antibacksliding: EPA wishes to address the potential concern over antibacksliding where revised permit limits based on new information are the result of the completion of additional studies. The Agency's interpretation of the CWA is that the antibacksliding requirements of section 402(o) of the CWA do not apply to revisions to effluent limitations made before the scheduled date of compliance for those limitations.

State Compliance Schedule Provisions: EPA supports the State in adopting a statewide provision independent of or as part of the effort to readopt statewide water quality control plans, or in adopting individual basin-wide compliance schedule provisions through its nine Regional Water Quality Control Boards (RWQCBs). The State and RWQCBs have broad discretion to adopt a provision, including discretion on reasonable lengths of time for final compliance with WQBELs. EPA recognizes that practical time frames within which to set interim goals may be necessary to achieve meaningful, long-term improvements in water quality in California.

At this time, two RWQCBs have adopted an authorizing compliance schedule provision as an amendment to

their respective Basin Plans during the Boards' last triennial review process. The Basin Plans have been adopted by the State and have come to EPA for approval. Thus, the Basin Plans' provisions are effective for the respective Basins. If and when EPA approves of either Regional Basin Plan, EPA will expeditiously act to amend the CTR, staying its compliance schedule provision, for the appropriate geographic region.

6. Changes From Proposed Rule

A few changes were made in the final rule from the proposal both as a result of the Agency's consideration of issues raised in public comments and Endangered Species Act consultation with the U.S. Fish and Wildlife Service (FWS) and U.S. National Marine Fisheries Service (NMFS). The important changes include: reserving the mercury aquatic life criteria; reserving the selenium freshwater acute aquatic life criterion; reserving the chloroform human health criteria; and adding a sunset provision to the authorizing compliance schedule provision. EPA also clarified that the CTR will not replace priority toxic pollutant criteria which were adopted by the San Francisco Regional Water Quality Control Board in its 1986 Basin Plan, adopted by the State Board, and approved by EPA; specifying the harmonic mean for human health criteria for non-carcinogens and adding a provision which explicitly allows the State to adopt and implement an alternative averaging period, frequency, and design flow for a criterion after opportunity for public comment.

The first two changes, the reservation of mercury criteria and selenium criterion, are discussed in more detail below in Section L., The Endangered Species Act (ESA). The selenium criterion is also discussed in more detail above in Section E., Derivation of Criteria, in subsection 2.b., Freshwater Acute Selenium Criterion. EPA has also decided to reserve a decision on numeric criteria for chloroform and therefore not promulgate chloroform criteria in the final rule. As part of a large-scale regulation promulgated in December l998 under the Safe Drinking Water Act, EPA published a health-based goal for chloroform (the maximum contaminant level goal or MCLG) of zero, see 63 FR 69390, Dec. 16, 1998. EPA provided new data and analyses concerning chloroform for public review and comment, including a different, mode of action approach for estimating the cancer risk, 63 FR 15674, March 31, 1998, but did not reach a conclusion on how to use that new information in establishing the final MCLG, pending further review by the Science Advisory Board. EPA has now concluded that any further actions on water quality criteria should take into account the new data and analysis as reviewed by the SAB. This decision is consistent with a recent federal court decision vacating the MCLG for chloroform (*Chlorine Chemistry Council* v. *EPA,* No. 98–1627 (DC Cir., Mar. 31,2000)). EPA intends to reassess the human health 304(a) criteria recommendation for chloroform. For these reasons, EPA has decided to reserve a decision on numeric criteria for chloroform in the CTR and not promulgate water quality criteria as proposed. Permitting authorities in California should continue to rely on existing narrative criteria to establish effluent limitations as necessary for chloroform.

The sunset provision for the authorizing compliance schedule provision has been added to ease the transition from a Federal provision to the State's provision that was adopted in March 2000 as part of its' new statewide implementation plan. The sunset provision is discussed in more detail in Section G.5 of today's preamble. The CTR matrix at 40 CFR 131.38(b)(1) makes it explicit that the rule does not supplant priority toxic pollutant criteria which were adopted by the San Francisco Regional Water Quality Control Board in its 1986 Basin Plan, adopted by the State Board, and approved by EPA. This change is discussed more fully in Section D.4. of today's preamble. EPA modified the design flow for implementing human health criteria for non-carcinogens from a 30Q5 to a harmonic mean. Human health criteria for non-carcinogens are based on an RfD, which is an acceptable daily exposure over a lifetime. EPA matched the criteria for protection over a human lifetime with the longest stream flow averaging period, i.e., the harmonic mean. Lastly, the CTR now contains language which is intended to make it easier for the State to adopt and implement an alternative averaging period, frequency and related design flow, for situations where the default parameters are inappropriate. This language is found at 40 CFR 131.38(c)(2)(iv).

H. Economic Analysis

This final rule establishes ambient water quality criteria which, by themselves, do not directly impose economic impacts (see section K). These criteria combined with the State-adopted designated uses for inland surface waters, enclosed bays and estuaries, and implementation policies, will establish water quality standards. Until the State implements these water quality standards, there will be no effect of this rule on any entity. The State will implement these criteria by ensuring that NPDES permits result in discharges that will meet these criteria. In so doing, the State will have considerable discretion.

EPA has analyzed the indirect potential costs and benefits of this rule. In order to estimate the indirect costs and benefits of the rule, an appropriate baseline must be established. The baseline is the starting point for measuring incremental costs and benefits of a regulation. The baseline is established by assessing what would occur in the absence of the regulation. At present, State Basin Plans contain a narrative water quality criterion stating that all waters shall be maintained free of toxic substances in concentrations that produce detrimental physiological responses in human, plant, animal, or aquatic life. EPA's regulation at 40 CFR 122.44(d)(1)(vi) requires that where a discharge causes or has the reasonable potential to cause an excursion above a narrative criterion within a State water quality standard, the permitting authority must establish effluent limits but may determine limits using a number of options. These options include establishing ''effluent limits on a case-by-case basis, using EPA's water quality criteria published under section 304(a) of the CWA, supplemented where necessary by other relevant information'' (40 CFR 122.44(d)(1)(vi)(B)). Thus, to the extent that the State is implementing its narrative criteria by applying the CWA section 304(a) criteria, this rule does not impose any incremental costs because the criteria in this rule are identical to the CWA section 304(a) criteria. Alternatively, to the extent that the State is implementing its narrative criteria on a ''case-by-case basis'' using ''other relevant information'' in its permits this rule may impose incremental indirect costs because the criteria in these permits may not be based on CWA 304(a) criteria. Both of these approaches to establishing effluent limits are in full compliance with the CWA.

Because a specific basis for effluent limits in all existing permits in California is not known, it is not possible to determine a precise estimate of the indirect costs of this rule. The incremental costs of the rule may be as low as zero, or as high as $61 million. The high estimate of costs is based on the possibility that most of the effluent limits now in effect are not based on 304(a) criteria. EPA evaluated these

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indirect costs using two different approaches. The first approach uses existing discharge data and makes assumptions about future State NPDES permit limits. Actual discharge levels are usually lower than the level set by current NPDES permit limits. This approach, representing the low-end scenario, also assumes that some of the discretionary mechanisms that would enhance flexibility (*e.g.,* site specific criteria, mixing zones) would be granted by the State. The second approach uses a sample of existing permit limits and assumes that dischargers are actually discharging at the levels contained in their permits and makes assumptions about limits statewide that would be required under the rule. This approach, representing the high-end scenario, also assumes that none of the discretionary mechanisms that would enhance flexibility (*e.g.,* site specific criteria, mixing zones) would be granted by the State. These two approaches recognize that the State has significant flexibility and discretion in how it chooses to implement standards within the NPDES permit program, the EA by necessity includes many assumptions about how the State will implement the water quality standards. These assumptions are based on a combination of EPA guidance and current permit conditions for the facilities examined in this analysis. To account for the uncertainty of EPA's implementation assumptions, this analysis estimates a wide range of costs and benefits. By completing the EA, EPA intends to inform the public about how entities might be potentially affected by State implementation of water quality standards in the NPDES permit program. The costs and benefits sections that follow summarize the methodology and results of the analysis.

1. Costs

EPA assessed the potential compliance costs that facilities may incur to meet permit limits based on the criteria in today's rule. The analysis focused on direct compliance costs such as capital costs and operation and maintenance costs (O&M) for end-of-pipe pollution control, indirect source controls, pollution prevention, monitoring, and costs of pursuing alternative methods of compliance.

The population of facilities with NPDES permits that discharge into California's enclosed bays, estuaries and inland surface waters includes 184 major dischargers and 1,057 minor dischargers. Of the 184 major facilities, 128 are publicly owned treatment works (POTWs) and 56 are industrial facilities. Approximately 2,144 indirect dischargers designated as significant industrial users discharge wastewater to those POTWs. In the EA for the proposed CTR, EPA used a three-phased process to select a sample of facilities to represent California dischargers potentially affected by the State's implementation of permit limits based on the criteria contained in this rule.

The first phase consisted of choosing three case study areas for which data was thought to exist. The three case studies with a total of 5 facilities included: the South San Francisco Bay (the San Jose/Santa Clara Water Pollution Control Plant and Sunnyvale Water Pollution Control Plant); the Sacramento River (the Sacramento Regional Wastewater Treatment Plant); and the Santa Ana River (the City of Riverside Water Quality Control Plant and the City of Colton Municipal Wastewater Treatment Facility). The second phase consisted of selecting five additional major industrial dischargers to complement the case-study POTWs.

The third phase involved selecting 10 additional facilities to improve the basis for extrapolating the costs of the selected sample facilities to the entire population of potentially affected dischargers. The additional 10 facilities were selected such that the group examined: (1) Was divided between major POTWs and major industrial discharger categories in proportion to the numbers of facilities in the State; (2) gave greater proportionate representation to major facilities than minor facilities based on a presumption that the majority of compliance costs would be incurred by major facilities; (3) gave a proportionate representation to each of four principal conventional treatment processes typically used by facilities in specified industries in California; and (4) was representative of the proportionate facilities located within the different California Regional Water Quality Control Boards. Within these constraints, facilities were selected at random to complete the sample.

In the EA for today's final rule, EPA primarily used the same sample as the EA for the proposed rule with some modifications. EPA increased the number of minor POTWs and minor industrial facilities in the sample. EPA randomly selected four new minor POTW facilities and five new minor industrial facilities to add to the sample. The number of sample facilities selected in each area under the jurisdiction of a Regional Water Quality Control Board was roughly proportional to the universe of facilities in each area.

For those facilities that were projected to exceed permit limits based on the criteria, EPA estimated the incremental costs of compliance. Using a decision matrix or flow chart, costs were developed for two different scenarios—a ''low-end'' cost scenario and a ''high-end'' cost scenario—to account for a range of regulatory flexibility available to the State when implementing permit limits based on the water quality criteria. The assumptions for baseline loadings also vary over the two scenarios. The low-end scenario generally assumed that facilities were discharging at the maximum effluent concentrations taken from actual monitoring data, while the high-end scenario generally assumed that facilities were discharging at their current effluent limits. The decision matrix specified assumptions used for selection of control options, such as optimization of existing treatment processes and operations, in-plant pollutant minimization and prevention, and end-of-pipe treatment.

The annualized potential costs that direct and indirect dischargers may incur as a result of State implementation of permit limits based on water quality standards using today's criteria are estimated to be between $33.5 million and $61 million. EPA believes that the costs incurred as a result of State implementation of these permit limits will approach the low-end of the cost range. Costs are unlikely to reach the high-end of the range because State authorities are likely to choose implementation options that provide some degree of flexibility or relief to point source dischargers. Furthermore, cost estimates for both scenarios, but especially for the high-end scenario, may be overstated because the analysis tended to use conservative assumptions in calculating these permit limits and in establishing baseline loadings. The baseline loadings for the high-end were based on current effluent limits rather than actual pollutant discharge data. Most facilities discharge pollutants in concentrations well below current effluent limits. In addition, both the high-end and low-end cost estimates in the EA may be slightly overstated since potential costs incurred to reduce chloroform discharges were included in these estimates. EPA made a decision to reserve the chloroform human health criteria after the EA was completed.

Under the low-end cost scenario, major industrial facilities and POTWs would incur about 27 percent of the potential costs, indirect dischargers would incur about 70 percent of the potential costs, while minor dischargers would incur about 3 percent. Of the major direct dischargers, POTWs would incur the largest share of projected costs (87 percent). However, distributed

among 128 major POTWs in the State, the average cost per plant would be $61,000 per year. Chemical and petroleum industries would incur the highest cost of the industrial categories (5.6 percent of the annual costs, with an annual average of $25,200 per plant). About 57 percent of the low-end costs would be associated with pollution prevention activities, while nearly 38 percent would be associated with pursuing alternative methods of compliance under the regulations.

Under the high-end cost scenario, major industrial facilities and POTWs would incur about 94 percent of the potential costs, indirect dischargers would incur about 17 percent of the potential costs, while minor dischargers would incur about 5 percent. Among the major, direct dischargers, two categories would incur the majority of potential costs—major POTWs (82 percent), Chemical/Petroleum Products (9 percent). The average annual per plant cost for different industry categories would ranges from zero to $324,000. The two highest average cost categories would be major POTWs ($324,000 per year) and Chemical/Petroleum Products ($221,264 per year). The shift in proportion of potential costs between direct and indirect dischargers is due to the assumption that more direct dischargers would use end-of-pipe treatment under the high-end scenario. Thus, a smaller proportion of indirect dischargers would be impacted under the high-end scenario, since some municipalities are projected to add end-of-pipe treatment which would reduce the need for controls from indirect discharges. Over 91 percent of the annual costs are for waste minimization and treatment optimization costs. Waste minimization would represent nearly 84% of the total annual costs. Capital and operation and maintenance costs would make up less than 9 percent of annual costs.

Cost-Effectiveness: Cost-effectiveness is estimated in terms of the cost of reducing the loadings of toxic pollutants from point sources. The cost-effectiveness is derived by dividing the projected annual costs of implementing permit limits based on water quality standards using today's criteria by the toxicity-weighted pounds (pound-equivalents) of pollutants removed. Pound-equivalents are calculated by multiplying pounds of each pollutant removed by the toxic weight (based on the toxicity of copper) for that pollutant.

Based on this analysis, State implementation of permit limits based on today's criteria would be responsible for the reduction of about 1.1 million to 2.7 million toxic pound-equivalents per year, or 15 to 50 percent of the toxic-weighted baseline loadings for the high- and low-end scenarios, respectively. The cost-effectiveness of the scenarios would range from $22 (high-end scenario) to $31 (low-end scenario) per pound-equivalent.

2. Benefits

The benefits analysis is intended to provide insight into both the types and potential magnitude of the economic benefits expected as a result of implementation of water quality standards based on today's criteria. To the extent feasible, empirical estimates of the potential magnitude of the benefits were developed and then compared to the estimated costs of implementing water quality standards based on today's criteria.

To perform a benefits analysis, the types or categories of benefits that apply need to be defined. EPA relied on a set of benefits categories that typically apply to changes in the water resource environment. Benefits were categorized as either use benefits or passive (nonuse) benefits depending on whether or not they involve direct use of, or contact with, the resource. The most prominent use benefit categories are those related to recreational fishing, boating, and swimming. Another use benefit category of significance is human health risk reduction. Human health risk reductions can be realized through actions that reduce human exposure to contaminants such as exposure through the consumption of fish containing elevated levels of pollutants. Passive use benefits are those improvements in environmental quality that are valued by individuals apart from any use of the resource in question.

Benefits estimates were derived in this study using an approach in which benefits of discrete large-scale changes in water quality beyond present day conditions were estimated wherever feasible. A share of those benefits was then apportioned to implementation of water quality standards based on today's criteria. The apportionment estimate was based on a three-stage process:

First, EPA assessed current total loadings from all sources that are contributing to the toxics-related water quality problems observed in the State. This defines the overall magnitude of loadings. Second, the share of total loadings that are attributable to sources that would be controlled through implementation of water quality standards based on today's criteria was estimated. Since this analysis was designed to focus only on those controls imposed on point sources, this stage of the process entailed estimating the portion of total loadings originating from point sources. Third, the percentage reduction in loadings expected due to implementation of today's criteria was estimated and then multiplied by the share of point source loadings to calculate the portion of benefits that could be attributed to implementation of water quality standards based on today's criteria.

Total monetized annual benefits were estimated in the range of $6.9 to $74.7 million. By category, annual benefits would be $1.3 to $4.6 million for avoided cancer risk, $2.2 to $15.2 million for recreational angling, and $3.4 to $54.9 million for passive use benefits.

There are numerous categories of potential or likely benefits that have been omitted from the quantified and monetized benefit estimates. In terms of potential magnitudes of benefit, the following are likely to be significant contributors to the underestimation of the monetized values presented above:

- Improvements in water-related (in-stream and near stream) recreation apart from fishing. The omission of potential motorized and nonmotorized boating, swimming, picnicking, and related in-stream and stream-side recreational activities from the benefits estimates could contribute to an appreciable underestimation of total benefits. Such recreational activities have been shown in empirical research to be highly valued, and even modest changes in participation and or user values could lead to sizable benefits statewide. Some of these activities can be closely associated with water quality attributes (notably, swimming). Other recreational activities may be less directly related to the water quality improvements, but might nonetheless increase due to their association with fishing, swimming, or other activities in which the participants might engage.
- Improvements in consumptive and nonconsumptive land-based recreation, such as hunting and wildlife observation. Improvements in aquatic habitats may lead (via food chain and related ecologic benefit mechanisms) to healthier, larger, and more diverse populations of avian and terrestrial species, such as waterfowl, eagles, and otters. Improvements in the populations for these species could manifest as improved hunting and wildlife viewing opportunities, which might in turn increase participation and user day values for such activities. Although the scope of the benefits analysis has not allowed a quantitative assessment of these values at either pre- or post-rule

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conditions, it is conceivable that these benefits could be appreciable.

• Improvements in human health resulting from reduction of non-cancer risk. EPA estimated that implementation of water quality standards based on the criteria would result in a reduction of mercury concentrations in fish tissue and, thus, a reduction in the hazard from consumption of mercury contaminated fish. However, EPA was unable to monetize benefits due to reduced non-cancer health effects.

• Human health benefits for saltwater anglers outside of San Francisco Bay were not estimated. The number of saltwater anglers outside of San Francisco Bay is estimated to be 673,000 (based on Huppert, 1989, and U.S. FWS, 1993). The omission of other saltwater anglers may cause human health benefits to be underestimated. In addition, benefit estimates in the EA may be slightly overstated since potential benefits from reductions in chloroform discharges were included in these estimates. EPA made a decision to reserve the chloroform human health criteria after the EA was completed.

EPA received a number of comments which requested the Agency use the cost-benefit analysis in the EA as a factor in setting water quality criteria. EPA does not use the EA as a basis in determining protective water quality criteria. EPA's current regulations at 40 CFR 131.11 state that the criteria must be based on sound scientific rationale and must protect the designated use. From the outset of the water quality standards program, EPA has explained that while economic factors may be considered in designating uses, they may not be used to justify criteria that are not protective of those uses. 44 FR 25223–226, April 30, 1979. See e.g. *Mississippi Commission on Natural Resources* v. *Costle,* 625 F. 2d 1269, 1277 (5th Cir. 1980). EPA reiterated this interpretation of the CWA and its implementing regulations in discussing section 304(a) recommended criteria guidance stating that ''they are based solely on data and scientific judgments on the relationship between pollutant concentrations and environmental and human health effects and do not reflect consideration of economic impacts or the technological feasibility of meeting the chemical concentrations in ambient water.'' 63 FR 36742 and 36762, July 7, 1998.

I. Executive Order 12866, Regulatory Planning and Review

Under Executive Order 12866 (58 FR 51735, October 4, 1993), the Agency must determine whether the regulatory action is ''significant'' and therefore subject to Office of Management and Budget (OMB) review and the requirements of the Executive Order. The Order defines ''significant regulatory action'' as one that is likely to result in a rule that may:

(1) Have an annual effect on the economy of $100 million or more or adversely affect in a material way the economy, a sector of the economy, productivity, competition, jobs, the environment, public health or safety, or State, local, or tribal governments or communities;

(2) Create a serious inconsistency or otherwise interfere with an action taken or planned by another Agency;

(3) Materially alter the budgetary impact of entitlements, grants, user fees, or loan programs or the rights and obligations of recipients thereof; or

(4) Raise novel legal or policy issues arising out of legal mandates, the President's priorities, or the principles set forth in the Executive Order.

It has been determined that this rule is not a ''significant regulatory action'' under the terms of Executive Order 12866 and is therefore not subject to OMB review.

J. Unfunded Mandates Reform Act of 1995

Title II of the Unfunded Mandates Reform Act of 1995 (UMRA), Public Law 104–4, establishes requirements for Federal agencies to assess the effects of their regulatory actions on State, local, and tribal governments and the private sector. Under section 202 of the UMRA, EPA generally must prepare a written statement, including a cost-benefit analysis, for proposed and final rules with ''Federal mandates'' that may result in expenditures to State, local, and tribal governments, in the aggregate, or to the private sector, of $100 million or more in any one year. Before promulgating any regulation for which a written statement is needed, section 205 of the UMRA generally requires EPA to identify and consider a reasonable number of regulatory alternatives and adopt the least costly, most cost-effective or least burdensome alternative that achieves the objectives of the rule. The provisions of section 205 do not apply when they are inconsistent with applicable law. Moreover, section 205 allows an Agency to adopt an alternative other than the least costly, most cost-effective or least burdensome alternative if the Administrator publishes with the final rule an explanation why that alternative was not adopted. Before EPA establishes any regulatory requirements that may significantly or uniquely affect small governments, including tribal governments, it must have developed under section 203 of the UMRA a small government Agency plan. The plan must provide for notifying potentially affected small governments, enabling officials of the affected small governments to have meaningful and timely input in the development of regulatory proposals with significant Federal intergovernmental mandates, and EPA informing, educating, and advising small governments on compliance with the regulatory requirements.

Today's rule contains no Federal mandates (under the regulatory provisions of Title II of the Unfunded Mandates Reform Act (UMRA)) for State, local, or tribal governments or the private sector. Today's rule imposes no enforceable duty on any State, local or Tribal governments or the private sector; rather, the CTR promulgates ambient water quality criteria which, when combined with State-adopted uses, will create water quality standards for those water bodies with adopted uses. The State will then use these resulting water quality standards in implementing its existing water quality control programs. Thus, today's rule is not subject to the requirements of sections 202 and 205 of the UMRA.

EPA has determined that this rule contains no regulatory requirements that might significantly or uniquely affect small governments. This rule establishes ambient water quality criteria which, by themselves do not directly impact any entity. The State will implement these criteria by ensuring that NPDES permits result in discharges that will meet these criteria. In so doing, the State will have considerable discretion. Until the State implements these water quality standards, there will be no effect of this rule on any entity. Thus, today's rule is not subject to the requirements of section 203 of UMRA.

K. Regulatory Flexibility Act

The Regulatory Flexibility Act generally requires Federal agencies to prepare a regulatory flexibility analysis of any rule subject to notice and comment rulemaking requirements under the Administrative Procedure Act or any other statute unless the Agency certifies that the rule will not have a significant economic impact of a substantial number of small entities. Small entities include small businesses, small organizations, and small governmental jurisdictions. For purposes of assessing the impacts of today's rule on small entities, small entity is defined as: (1) A small business according to RFA default definitions for small businesses (based on SBA size

standards); (2) a small governmental jurisdiction that is a government of a city, county, town, school district or special district with a population of less than 50,000; and (3) a small organization that is any not-for-profit enterprise which is independently owned and operated and is not dominant in its field.

After considering the economic impacts of today's final rule on small entities, I certify that this action will not have a significant economic impact on a substantial number of small entities. This final rule will not impose any requirements on small entities.

Under the CWA water quality standards program, States must adopt water quality standards for their waters that must be submitted to EPA for approval. If the Agency disapproves a State standard and the State does not adopt appropriate revisions to address EPA's disapproval, EPA must promulgate standards consistent with the statutory requirements. EPA has authority to promulgate criteria or standards in any case where the Administrator determines that a revised or new standard is necessary to meet the requirements of the Act. These State standards (or EPA-promulgated standards) are implemented through various water quality control programs including the National Pollutant Discharge Elimination System (NPDES) program that limits discharges to navigable waters except in compliance with an EPA permit or permit issued under an approved State NPDES program. The CWA requires that all NPDES permits must include any limits on discharges that are necessary to meet State water quality standards.

Thus, under the CWA, EPA's promulgation of water quality criteria or standards establishes standards that the State, in turn, implements through the NPDES permit process. The State has considerable discretion in deciding how to meet the water quality standards and in developing discharge limits as needed to meet the standards. In circumstances where there is more than one discharger to a water body that is subject to water quality standards or criteria, a State also has discretion in deciding on the appropriate limits for the different dischargers. While the State's implementation of federally-promulgated water quality criteria or standards may result indirectly in new or revised discharge limits for small entities, the criteria or standards themselves do not apply to any discharger, including small entities.

Today's rule, as explained above, does not itself establish any requirements that are applicable to small entities. As a result of EPA's action here, the State of California will need to ensure that permits it issues include limits as necessary to meet the water quality standards established by the criteria in today's rule. In so doing, the State will have a number of discretionary choices associated with permit writing. While California's implementation of today's rule may ultimately result in some new or revised permit conditions for some dischargers, including small entities, EPA's action today does not impose any of these as yet unknown requirements on small entities.

The RFA requires analysis of the economic impact of a rule only on the small entities subject to the rule's requirements. Courts have consistently held that the RFA imposes no obligation on an Agency to prepare a small entity analysis of the effect of a rule on entities not regulated by the rule. *Motor & Equip. Mrfrs. Ass'n* v. *Nichols,* 142 F.3d 449, 467 & n.18 (D.C. Cir. 1998)(quoting *United States Distribution Companies* v. *FERC,* 88 F.3d 1105, 1170 (D.C. Cir. 1996); see also *American Trucking Association, Inc.* v. *EPA,* 175 F.3d 1027 (D.C. Cir. 1999). This final rule will have a direct effect only on the State of California which is not a small entity under the RFA. Thus, individual dischargers, including small entities, are not directly subject to the requirements of the rule. Moreover, because of California's discretion in implementing these standards, EPA cannot assess the extent to which the promulgation of this rule may subsequently affect any dischargers, including small entities. Consequently, certification under section 605(b) is appropriate. *State of Michigan, et al.* v. *U.S. Environmental Protection Agency,* No. 98–1497 (D.C. Cir. Mar. 3, 2000), slip op. at 41–42.

L. Paperwork Reduction Act

This action requires no new or additional information collection, reporting, or record keeping subject to the Paperwork Reduction Act, 44 U.S.C. 3501 *et seq.*

M. Endangered Species Act

Pursuant to section 7(a) of the Endangered Species Act (ESA), EPA has consulted with the U.S. Fish and Wildlife Service and the U.S. National Marine Fisheries Service (collectively, the Services) concerning EPA's rulemaking action for the State of California. EPA initiated informal consultation in early 1994, and completed formal consultation in April 2000. As a result of the consultation, EPA modified some of the provisions in the final rule.

As part of the consultation process, EPA submitted to the Services a Biological Evaluation for their review in October of 1997. This evaluation found that the proposed CTR was not likely to jeopardize the continued existence of any Federally listed species or result in the destruction or adverse modification of designated critical habitat. In April of 1998, the Services sent EPA a draft Biological Opinion which tentatively found that EPA's proposed rule would jeopardize the continued existence of several Federally listed species and result in the destruction or have adverse effect on designated critical habitat. After lengthy discussions with the Services, EPA agreed to several changes in the final rule and the Services in turn issued a final Biological Opinion finding that EPA's action would not likely jeopardize the continued existence of any Federally listed species or result in the destruction or adverse modification of designated critical habitat. EPA's Biological Evaluation and the Services' final Biological Opinion are contained in the administrative record for today's rule.

In order to ensure the continued protection of Federally listed threatened and endangered species and to protect their critical habitat, EPA agreed to reserve the aquatic life criteria for mercury and the acute freshwater aquatic life criterion for selenium. The Services believe that EPA's proposed criteria are not sufficiently protective of Federally listed species and should not be promulgated. EPA agreed that it would reevaluate these criteria in light of the Services concerns before promulgating them for the State of California. Other commitments made by EPA are described in a letter to the Services dated December 16, 1999; this letter is contained in the administrative record for today's rule.

N. Congressional Review Act

The Congressional Review Act, 5 U.S.C. 801 *et seq.*, as added by the Small Business Regulatory Enforcement Fairness Act of 1996, generally provides that before a rule may take effect, the Agency promulgating the rule must submit a rule report, which includes a copy of the rule, to each House of the Congress and to the Comptroller General of the United States. EPA will submit a report containing this rule and other required information to the U.S. Senate, the U.S. House of Representatives, and the Comptroller General of the United States prior to publication of the rule in the **Federal Register**. A major rule cannot take effect until 60 days after it is published in the **Federal Register**. This rule is not a major rule as defined

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by 5 U.S.C. 804(2). This rule will be effective May 18, 2000.

O. Executive Order 13084, Consultation and Coordination With Indian Tribal Governments

Under Executive Order 13084, EPA may not issue a regulation that is not required by statute, that significantly or uniquely affects the communities of Indian tribal governments, and that imposes substantial direct compliance costs on those communities, unless the Federal government provides the funds necessary to pay the direct compliance costs incurred by the tribal governments, or EPA consults with those governments. If EPA complies by consulting, Executive Order 13084 requires EPA to provide to the Office of Management and Budget, in a separately identified section of the preamble to the rule, a description of the extent of EPA's prior consultation with representatives of affected tribal governments, a summary of the nature of their concerns, and a statement supporting the need to issue the regulation. In addition, Executive Order 13084 requires EPA to develop an effective process permitting elected officials and other representatives of Indian tribal governments ''to provide meaningful and timely input in the development of regulatory policies on matters that significantly or uniquely affect their communities.''

Today's rule does not significantly or uniquely affect the communities of Indian tribal governments nor does it impose substantial direct compliance cots on them. Today's rule will only address priority toxic pollutant water quality criteria for the State of California and does not apply to waters in Indian country. Accordingly, the requirements of section 3(b) of Executive Order 13084 do not apply to this rule.

P. National Technology Transfer and Advancement Act

Section 12(d) of the National Technology Transfer and Advancement Act of 1995 (''NTTAA''), Public Law No. 104–113, section 12(d) (15 U.S.C. 272 note) directs EPA to use voluntary consensus standards in its regulatory activities unless to do so would be inconsistent with applicable law or otherwise impractical. Voluntary consensus standards are technical standards (e.g., materials specifications, test methods, sampling procedures, and business practices) that are developed or adopted by voluntary consensus standards bodies. The NTTAA directs EPA to provide Congress, through OMB, explanations when the Agency decides not to use available and applicable voluntary consensus standards.

This final rule does not involve technical standards. Therefore, EPA did not consider the use of any voluntary consensus standards.

Q. Executive Order 13132 on Federalism

Executive Order 13132, entitled ''Federalism'' (64 FR 43255, August 10, 1999), requires EPA to develop an accountable process to ensure ''meaningful and timely input by State and local officials in the development of regulatory policies that have federalism implications.'' ''Policies that have federalism implications'' is defined in the Executive Order to include regulations that have ''substantial direct effects on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government.''

Under section 6 of Executive Order 13132, EPA may not issue a regulation that has federalism implications, that imposes substantial direct compliance costs, and that is not required by statute, unless the Federal government provides the funds necessary to pay the direct compliance costs incurred by State and local governments, or EPA consults with State and local officials early in the process of developing the proposed regulation. EPA also may not issue a regulation that has federalism implications and that preempts State law, unless the Agency consults with State and local officials early in the process of developing the proposed regulation.

This final rule does not have federalism implications. It will not have substantial direct effects on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government, as specified in Executive Order 13132. The rule does not affect the nature of the relationship between EPA and States generally, for the rule only applies to water bodies in California. Further, the rule will not substantially affect the relationship of EPA and the State of California, or the distribution of power or responsibilities between EPA and the State. The rule does not alter the State's authority to issue NPDES permits or the State's considerable discretion in implementing these criteria. The rule simply implements Clean Water Act section 303(c)(2)(B) requiring numeric ambient water quality criteria for which EPA has issued section 304(a) recommended criteria in a manner that is consistent with previous regulatory guidance that the Agency has issued to implement CWA section 303(c)(2)(B). Further, this rule does not preclude the State from adopting water quality standards that meet the requirements of the CWA. Thus, the requirements of section 6 of the Executive Order do not apply to this rule.

Although section 6 of Executive Order 13132 does not apply to this rule, EPA did consult with State and local government representatives in developing this rule. EPA and the State reached an agreement that to best utilize its respective resources, EPA would promulgate water quality criteria and the State would concurrently work on a plan to implement the criteria. Since the proposal of this rule, EPA has kept State officials fully informed of changes to the proposal. EPA has continued to invite comment from the State on these changes. EPA believes that the final CTR incorporates comments from State officials and staff.

R. Executive Order 13045 on Protection of Children From Environmental Health Risks and Safety Risks

Executive Order 13045: ''Protection of Children from Environmental Health Risks and Safety Risks'' (62 FR 19885, April 23, 1997) applies to any rule that: (1) Is determined to be ''economically significant'' as defined under Executive Order 12866, and (2) concerns an environmental health or safety risk that EPA has reason to believe may have a disproportionate effect on children. If the regulatory action meets both criteria, the Agency must evaluate the environmental health or safety effects of the planned rule on children, and explain why the planned regulation is preferable to other potentially effective and reasonably feasible alternatives considered by the Agency.

While this final rule is not subject to the Executive Order because it is not economically significant as defined in Executive Order 12866, we nonetheless have reason to believe that the environmental health or safety risk addressed by this action may have a disproportionate effect on children. As a matter of EPA policy, we therefore have assessed the environmental health or safety effects of ambient water quality criteria on children. The results of this assessment are contained in section F.3., Human Health Criteria.

List of Subjects in 40 CFR Part 131

Environmental protection, Indians—lands, Intergovernmental relations, Reporting and recordkeeping requirements, Water pollution control.

Dated: April 27, 2000.

Carol Browner,

Administrator.

For the reasons set out in the preamble, part 131 of chapter I of title 40 of the Code of Federal Regulations is amended as follows:

PART 131—WATER QUALITY STANDARDS

1. The authority citation for part 131 continues to read as follows:

Authority: 33 U.S.C. 1251 *et seq.*

Subpart D—[Amended]

2. Section 131.38 is added to subpart D to read as follows:

§ 131.38 Establishment of Numeric Criteria for Priority Toxic Pollutants for the State of California.

(a) *Scope.* This section promulgates criteria for priority toxic pollutants in the State of California for inland surface waters and enclosed bays and estuaries. This section also contains a compliance schedule provision.

(b)(1) Criteria for Priority Toxic Pollutants in the State of California as described in the following table:

BILLING CODE 6560–50–P

A		B Freshwater		C Saltwater		D Human Health (10^{-6} risk for carcinogens) For consumption of:	
# Compound	CAS Number	Criterion Maximum Conc. [d] B1	Criterion Continuous Conc. [d] B2	Criterion Maximum Conc. [d] C1	Criterion Continuous Conc. [d] C2	Water & Organisms (μg/L) D1	Organisms Only (μg/L) D2
1. Antimony	7440360					14 a,s	4300 a,t
2. Arsenic [b]	7440382	340 i,m,w	150 i,m,w	69 i,m	36 i,m		
3. Beryllium	7440417					n	n
4. Cadmium [b]	7440439	4.3 e,i,m,w,x	2.2 e,i,m,w	42 i,m	9.3 i,m	n	n
5a. Chromium (III)	16065831	550 e,i,m,o	180 e,i,m,o			n	n
5b. Chromium (VI) [b]	18540299	16 i,m,w	11 i,m,w	1100 i,m	50 i,m	n	n
6. Copper [b]	7440508	13 e,i,m,w,x	9.0 e,i,m,w	4.8 i,m	3.1 i,m	1300	
7. Lead [b]	7439921	65 e,i,m	2.5 e,i,m	210 i,m	8.1 i,m	n	n
8. Mercury [b]	7439976	[Reserved]	[Reserved]	[Reserved]	[Reserved]	0.050 a	0.051 a
9. Nickel [b]	7440020	470 e,i,m,w	52 e,i,m,w	74 i,m	8.2 i,m	610 a	4600 a
10. Selenium [b]	7782492	[Reserved] p	5.0 q	290 i,m	71 i,m	n	n
11. Silver [b]	7440224	3.4 e,i,m		1.9 i,m			
12. Thallium	7440280					1.7 a,s	6.3 a,t
13. Zinc [b]	7440666	120 e,i,m,w,x	120 e,i,m,w	90 i,m	81 i,m		
14. Cyanide [b]	57125	22 o	5.2 o	1 r	1 r	700 a	220,000 a,j
15. Asbestos	1332214					7,000,000 fibers/L k,s	
16. 2,3,7,8-TCDD (Dioxin)	1746016					0.000000013 c	0.000000014 c
17. Acrolein	107028					320 s	780 t
18. Acrylonitrile	107131					0.059 a,c,s	0.66 a,c,t
19. Benzene	71432					1.2 a,c	71 a,c
20. Bromoform	75252					4.3 a,c	360 a,c
21. Carbon Tetrachloride	56235					0.25 a,c,s	4.4 a,c,t
22. Chlorobenzene	108907					680 a,s	21,000 a,j,t
23. Chlorodibromomethane	124481					0.401 a,c	34 a,c
24. Chloroethane	75003						
25. 2-Chloroethylvinyl Ether	110758						

26. Chloroform	67663					[Reserved]	[Reserved]
27. Dichlorobromomethane	75274					0.56 a,c	46 a,c
28. 1,1-Dichloroethane	75343						
29. 1,2-Dichloroethane	107062					0.38 a,c,s	99 a,c,t
30. 1,1-Dichloroethylene	75354					0.057 a,c,s	3.2 a,c,t
31. 1,2-Dichloropropane	78875					0.52 a	39 a
32. 1,3-Dichloropropylene	542756					10 a,s	1,700 a,t
33. Ethylbenzene	100414					3,100 a,s	29,000 a,t
34. Methyl Bromide	74839					48 a	4,000 a
35. Methyl Chloride	74873					n	n
36. Methylene Chloride	75092					4.7 a,c	1,600 a,c
37. 1,1,2,2-Tetrachloroethane	79345					0.17 a,c,s	11 a,c,t
38. Tetrachloroethylene	127184					0.8 c,s	8.85 c,t
39. Toluene	108883					6,800 a	200,000 a
40. 1,2-Trans-Dichloroethylene	156605					700 a	140,000 a
41. 1,1,1-Trichloroethane	71556					n	n
42. 1,1,2-Trichloroethane	79005					0.60 a,c,s	42 a,c,t
43. Trichloroethylene	79016					2.7 c,s	81 c,t
44. Vinyl Chloride	75014					2 c,s	525 c,t
45. 2-Chlorophenol	95578					120 a	400 a
46. 2,4-Dichlorophenol	120832					93 a,s	790 a,t
47. 2,4-Dimethylphenol	105679					540 a	2,300 a
48. 2-Methyl-4,6-Dinitrophenol	534521					13.4 s	765 t
49. 2,4-Dinitrophenol	51285					70 a,s	14,000 a,t
50. 2-Nitrophenol	88755						
51. 4-Nitrophenol	100027						
52. 3-Methyl-4-Chlorophenol	59507						
53. Pentachlorophenol	87865	19 f,w	15 f,w	13	7.9	0.28 a,c	8.2 a,c,j
54. Phenol	108952					21,000 a	4,600,000 a,j,t
55. 2,4,6-Trichlorophenol	88062					2.1 a,c	6.5 a,c
56. Acenaphthene	83329					1,200 a	2,700 a
57. Acenaphthylene	208968						
58. Anthracene	120127					9,600 a	110,000 a

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59. Benzidine	92875					0.00012 a,c,s	0.00054 a,c,t
60. Benzo(a)Anthracene	56553					0.0044 a,c	0.049 a,c
61. Benzo(a)Pyrene	50328					0.0044 a,c	0.049 a,c
62. Benzo(b)Fluoranthene	205992					0.0044 a,c	0.049 a,c
63. Benzo(ghi)Perylene	191242						
64. Benzo(k)Fluoranthene	207089					0.0044 a,c	0.049 a,c
65. Bis(2-Chloroethoxy)Methane	111911						
66. Bis(2-Chloroethyl)Ether	111444					0.031 a,c,s	1.4 a,c,t
67. Bis(2-Chloroisopropyl)Ether	39638329					1,400 a	170,000 a,t
68. Bis(2-Ethylhexyl)Phthalate	117817					1.8 a,c,s	5.9 a,c,t
69. 4-Bromophenyl Phenyl Ether	101553						
70. Butylbenzyl Phthalate	85687					3,000 a	5,200 a
71. 2-Chloronaphthalene	91587					1,700 a	4,300 a
72. 4-Chlorophenyl Phenyl Ether	7005723						
73. Chrysene	218019					0.0044 a,c	0.049 a,c
74. Dibenzo(a,h)Anthracene	53703					0.0044 a,c	0.049 a,c
75. 1,2 Dichlorobenzene	95501					2,700 a	17,000 a
76. 1,3 Dichlorobenzene	541731					400	2,600
77. 1,4 Dichlorobenzene	106467					400	2,600
78. 3,3'-Dichlorobenzidine	91941					0.04 a,c,s	0.077 a,c,t
79. Diethyl Phthalate	84662					23,000 a,s	120,000 a,t
80. Dimethyl Phthalate	131113					313,000 s	2,900,000 t
81. Di-n-Butyl Phthalate	84742					2,700 a,s	12,000 a,t
82. 2,4-Dinitrotoluene	121142					0.11 c,s	9.1 c,t
83. 2,6-Dinitrotoluene	606202						
84 Di-n-Octyl Phthalate	117840						
85. 1,2-Diphenylhydrazine	122667					0.040 a,c,s	0.54 a,c,t
86. Fluoranthene	206440					300 a	370 a
87. Fluorene	86737					1,300 a	14,000 a
88. Hexachlorobenzene	118741					0.00075 a,c	0.00077 a,c
89. Hexachlorobutadiene	87683					0.44 a,c,s	50 a,c,t
90. Hexachlorocyclopentadiene	77474					240 a,s	17,000 a,j,t
91. Hexachloroethane	67721					1.9 a,c,s	8.9 a,c,t

92. Indeno(1,2,3-cd) Pyrene	193395					0.0044 a,c	0.049 a,c
93. Isophorone	78591					8.4 c,s	600 c,t
94. Naphthalene	91203						
95. Nitrobenzene	98953					17 a,s	1,900 a,j,t
96. N-Nitrosodimethylamine	62759					0.00069 a,c,s	8.1 a,c,t
97. N-Nitrosodi-n-Propylamine	621647					0.005 a	1.4 a
98. N-Nitrosodiphenylamine	86306					5.0 a,c,s	16 a,c,t
99. Phenanthrene	85018						
100. Pyrene	129000					960 a	11,000 a
101. 1,2,4-Trichlorobenzene	120821						
102. Aldrin	309002	3 g		1.3 g		0.00013 a,c	0.00014 a,c
103. alpha-BHC	319846					0.0039 a,c	0.013 a,c
104. beta-BHC	319857					0.014 a,c	0.046 a,c
105. gamma-BHC	58899	0.95 w		0.16 g		0.019 c	0.063 c
106. delta-BHC	319868						
107. Chlordane	57749	2.4 g	0.0043 g	0.09 g	0.004 g	0.00057 a,c	0.00059 a,c
108. 4,4'-DDT	50293	1.1 g	0.001 g	0.13 g	0.001 g	0.00059 a,c	0.00059 a,c
109. 4,4'-DDE	72559					0.00059 a,c	0.00059 a,c
110. 4,4'-DDD	72548					0.00083 a,c	0.00084 a,c
111. Dieldrin	60571	0.24 w	0.056 w	0.71 g	0.0019 g	0.00014 a,c	0.00014 a,c
112. alpha-Endosulfan	959988	0.22 g	0.056 g	0.034 g	0.0087 g	110 a	240 a
113. beta-Endosulfan	33213659	0.22 g	0.056 g	0.034 g	0.0087 g	110 a	240 a
114. Endosulfan Sulfate	1031078					110 a	240 a
115. Endrin	72208	0.086 w	0.036 w	0.037 g	0.0023 g	0.76 a	0.81 a,j
116. Endrin Aldehyde	7421934					0.76 a	0.81 a,j
117. Heptachlor	76448	0.52 g	0.0038 g	0.053 g	0.0036 g	0.00021 a,c	0.00021 a,c
118. Heptachlor Epoxide	1024573	0.52 g	0.0038 g	0.053 g	0.0036 g	0.00010 a,c	0.00011 a,c
119-125. Polychlorinated biphenyls (PCBs)			0.014 u		0.03 u	0.00017 c,v	0.00017 c,v
126. Toxaphene	8001352	0.73	0.0002	0.21	0.0002	0.00073 a,c	0.00075 a,c
Total Number of Criteria [h]		22	21	22	20	92	90

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Footnotes to Table in Parargraph (b)(1):

a. Criteria revised to reflect the Agency q1* or RfD, as contained in the Integrated Risk Information System (IRIS) as of October 1, 1996. The fish tissue bioconcentration factor (BCF) from the 1980 documents was retained in each case.

b. Criteria apply to California waters except for those waters subject to objectives in Tables III–2A and III–2B of the San Francisco Regional Water Quality Control Board's (SFRWQCB) 1986 Basin Plan, that were adopted by the SFRWQCB and the State Water Resources Control Board, approved by EPA, and which continue to apply.

c. Criteria are based on carcinogenicity of 10 (-6) risk.

d. Criteria Maximum Concentration (CMC) equals the highest concentration of a pollutant to which aquatic life can be exposed for a short period of time without deleterious effects. Criteria Continuous Concentration (CCC) equals the highest concentration of a pollutant to which aquatic life can be exposed for an extended period of time (4 days) without deleterious effects. ug/L equals micrograms per liter.

e. Freshwater aquatic life criteria for metals are expressed as a function of total hardness (mg/L) in the water body. The equations are provided in matrix at paragraph (b)(2) of this section. Values displayed above in the matrix correspond to a total hardness of 100 mg/l.

f. Freshwater aquatic life criteria for pentachlorophenol are expressed as a function of pH, and are calculated as follows: Values displayed above in the matrix correspond to a pH of 7.8. CMC = exp(1.005(pH) − 4.869). CCC = exp(1.005(pH) − 5.134).

g. This criterion is based on 304(a) aquatic life criterion issued in 1980, and was issued in one of the following documents: Aldrin/Dieldrin (EPA 440/5–80–019), Chlordane (EPA 440/5–80–027), DDT (EPA 440/5–80–038), Endosulfan (EPA 440/5–80–046), Endrin (EPA 440/5–80–047), Heptachlor (440/5–80–052), Hexachlorocyclohexane (EPA 440/5–80–054), Silver (EPA 440/5–80–071). The Minimum Data Requirements and derivation procedures were different in the 1980 Guidelines than in the 1985 Guidelines. For example, a ''CMC'' derived using the 1980 Guidelines was derived to be used as an instantaneous maximum. If assessment is to be done using an averaging period, the values given should be divided by 2 to obtain a value that is more comparable to a CMC derived using the 1985 Guidelines.

h. These totals simply sum the criteria in each column. For aquatic life, there are 23 priority toxic pollutants with some type of freshwater or saltwater, acute or chronic criteria. For human health, there are 92 priority toxic pollutants with either ''water + organism'' or ''organism only'' criteria. Note that these totals count chromium as one pollutant even though EPA has developed criteria based on two valence states. In the matrix, EPA has assigned numbers 5a and 5b to the criteria for chromium to reflect the fact that the list of 126 priority pollutants includes only a single listing for chromium.

i. Criteria for these metals are expressed as a function of the water-effect ratio, WER, as defined in paragraph (c) of this section. CMC = column B1 or C1 value x WER; CCC = column B2 or C2 value x WER.

j. No criterion for protection of human health from consumption of aquatic organisms (excluding water) was presented in the 1980 criteria document or in the 1986 Quality Criteria for Water. Nevertheless, sufficient information was presented in the 1980 document to allow a calculation of a criterion, even though the results of such a calculation were not shown in the document.

k. The CWA 304(a) criterion for asbestos is the MCL.

l. [Reserved]

m. These freshwater and saltwater criteria for metals are expressed in terms of the dissolved fraction of the metal in the water column. Criterion values were calculated by using EPA's Clean Water Act 304(a) guidance values (described in the total recoverable fraction) and then applying the conversion factors in § 131.36(b)(1) and (2).

n. EPA is not promulgating human health criteria for these contaminants. However, permit authorities should address these contaminants in NPDES permit actions using the State's existing narrative criteria for toxics.

o. These criteria were promulgated for specific waters in California in the National Toxics Rule (''NTR''), at § 131.36. The specific waters to which the NTR criteria apply include: Waters of the State defined as bays or estuaries and waters of the State defined as inland, i.e., all surface waters of the State not ocean waters. These waters specifically include the San Francisco Bay upstream to and including Suisun Bay and the Sacramento-San Joaquin Delta. This section does not apply instead of the NTR for this criterion.

p. A criterion of 20 ug/l was promulgated for specific waters in California in the NTR and was promulgated in the total recoverable form. The specific waters to which the NTR criterion applies include: Waters of the San Francisco Bay upstream to and including Suisun Bay and the Sacramento-San Joaquin Delta; and waters of Salt Slough, Mud Slough (north) and the San Joaquin River, Sack Dam to the mouth of the Merced River. This section does not apply instead of the NTR for this criterion. The State of California adopted and EPA approved a site specific criterion for the San Joaquin River, mouth of Merced to Vernalis; therefore, this section does not apply to these waters.

q. This criterion is expressed in the total recoverable form. This criterion was promulgated for specific waters in California in the NTR and was promulgated in the total recoverable form. The specific waters to which the NTR criterion applies include: Waters of the San Francisco Bay upstream to and including Suisun Bay and the Sacramento-San Joaquin Delta; and waters of Salt Slough, Mud Slough (north) and the San Joaquin River, Sack Dam to Vernalis. This criterion does not apply instead of the NTR for these waters. This criterion applies to additional waters of the United States in the State of California pursuant to 40 CFR 131.38(c). The State of California adopted and EPA approved a site-specific criterion for the Grassland Water District, San Luis National Wildlife Refuge, and the Los Banos State Wildlife Refuge; therefore, this criterion does not apply to these waters.

r. These criteria were promulgated for specific waters in California in the NTR. The specific waters to which the NTR criteria apply include: Waters of the State defined as bays or estuaries including the San Francisco Bay upstream to and including Suisun Bay and the Sacramento-San Joaquin Delta. This section does not apply instead of the NTR for these criteria.

s. These criteria were promulgated for specific waters in California in the NTR. The specific waters to which the NTR criteria apply include: Waters of the Sacramento-San Joaquin Delta and waters of the State defined as inland (*i.e.,* all surface waters of the State not bays or estuaries or ocean) that include a MUN use designation. This section does not apply instead of the NTR for these criteria.

t. These criteria were promulgated for specific waters in California in the NTR. The specific waters to which the NTR criteria apply include: Waters of the State defined as bays and estuaries including San Francisco Bay upstream to and including Suisun Bay and the Sacramento-San Joaquin Delta; and waters of the State defined as inland (i.e., all surface waters of the State not bays or estuaries or ocean) without a MUN use designation. This section does not apply instead of the NTR for these criteria.

u. PCBs are a class of chemicals which include aroclors 1242, 1254, 1221, 1232, 1248, 1260, and 1016, CAS numbers 53469219, 11097691, 11104282, 11141165, 12672296, 11096825, and 12674112, respectively. The aquatic life criteria apply to the sum of this set of seven aroclors.

v. This criterion applies to total PCBs, e.g., the sum of all congener or isomer or homolog or aroclor analyses.

w. This criterion has been recalculated pursuant to the 1995 Updates: Water Quality Criteria Documents for the Protection of Aquatic Life in Ambient Water, Office of Water, EPA–820–B–96–001, September 1996. See also Great Lakes Water Quality Initiative Criteria Documents for the Protection of Aquatic Life in Ambient Water, Office of Water, EPA–80–B–95–004, March 1995.

x. The State of California has adopted and EPA has approved site specific criteria for the Sacramento River (and tributaries) above Hamilton City; therefore, these criteria do not apply to these waters.

General Notes to Table in Paragraph (b)(1)

1. The table in this paragraph (b)(1) lists all of EPA's priority toxic pollutants whether or not criteria guidance are available. Blank spaces indicate the absence of national section 304(a) criteria guidance. Because of variations in chemical nomenclature systems, this listing of toxic pollutants does not duplicate the listing in Appendix A to 40 CFR Part 423–126 Priority Pollutants. EPA has added the Chemical Abstracts Service (CAS) registry numbers, which provide a unique identification for each chemical.

2. The following chemicals have organoleptic-based criteria recommendations that are not included on this chart: zinc, 3-methyl-4-chlorophenol.

3. Freshwater and saltwater aquatic life criteria apply as specified in paragraph (c)(3) of this section.

(2) Factors for Calculating Metals Criteria. Final CMC and CCC values should be rounded to two significant figures.

(i) $CMC = WER \times (Acute\ Conversion\ Factor) \times (\exp\{m_A[\ln(hardness)]+b_A\})$

(ii) $CCC = WER \times (Acute\ Conversion\ Factor) \times (\exp\{m_C[\ln(hardness)]+b_C\})$

(iii) Table 1 to paragraph (b)(2) of this section:

Metal	m_A	b_A	m_C	b_C
Cadmium	1.128	−3.6867	0.7852	−2.715
Copper	0.9422	−1.700	0.8545	−1.702
Chromium (III)	0.8190	3.688	0.8190	1.561
Lead	1.273	−1.460	1.273	−4.705
Nickel	0.8460	2.255	0.8460	0.0584
Silver	1.72	−6.52		
Zinc	0.8473	0.884	0.8473	0.884

Note to Table 1: The term ''exp'' represents the base e exponential function.

(iv) Table 2 to paragraph (b)(2) of this section:

Metal	Conversion factor (CF) for freshwater acute criteria	CF for freshwater chronic criteria	CF for saltwater acute criteria	CF [a] for saltwater chronic criteria
Antimony	([d])	([d])	([d])	([d])
Arsenic	1.000	1.000	1.000	1.000
Beryllium	([d])	([d])	([d])	([d])
Cadmium	[b] 0.944	[b] 0.909	0.994	0.994
Chromium (III)	0.316	0.860	([d])	([d])
Chromium (VI)	0.982	0.962	0.993	0.993
Copper	0.960	0.960	0.83	0.83
Lead	[b] 0.791	[b] 0.791	0.951	0.951
Mercury	.....	.....	.....	.....
Nickel	0.998	0.997	0.990	0.990
Selenium	.....	([c])	0.998	0.998
Silver	0.85	([d])	0.85	([d])
Thallium	([d])	([d])	([d])	([d])
Zinc	0.978	0.986	0.946	0.946

Footnotes to Table 2 of Paragraph (b)(2):

[a] Conversion Factors for chronic marine criteria are not currently available. Conversion Factors for acute marine criteria have been used for both acute and chronic marine criteria.

[b] Conversion Factors for these pollutants in freshwater are hardness dependent. CFs are based on a hardness of 100 mg/l as calcium carbonate ($CaCO_3$). Other hardness can be used; CFs should be recalculated using the equations in table 3 to paragraph (b)(2) of this section.

[c] Bioaccumulative compound and inappropriate to adjust to percent dissolved.

[d] EPA has not published an aquatic life criterion value.

Note to Table 2 of Paragraph (b)(2): The term ''Conversion Factor'' represents the recommended conversion factor for converting a metal criterion expressed as the total recoverable fraction in the water column to a criterion expressed as the dissolved fraction in the water column. See ''Office of Water Policy and Technical Guidance on Interpretation and Implementation of Aquatic Life Metals Criteria'', October 1, 1993, by Martha G. Prothro, Acting Assistant Administrator for Water available from Water Resource Center, USEPA, Mailcode RC4100, M Street SW, Washington, DC, 20460 and the note to § 131.36(b)(1).

(v) Table 3 to paragraph (b)(2) of this section:

	Acute	Chronic
Cadmium	CF=1.136672—[(ln {hardness}) (0.041838)]	CF = 1.101672—[(ln {hardness})(0.041838)]
Lead	CF=1.46203—[(ln {hardness})(0.145712)]	CF = 1.46203—[(ln {hardness})(0.145712)]

(c) *Applicability.* (1) The criteria in paragraph (b) of this section apply to the State's designated uses cited in paragraph (d) of this section and apply concurrently with any criteria adopted by the State, except when State regulations contain criteria which are more stringent for a particular parameter and use, or except as provided in footnotes p, q, and x to the table in paragraph (b)(1) of this section.

(2) The criteria established in this section are subject to the State's general rules of applicability in the same way and to the same extent as are other Federally-adopted and State-adopted numeric toxics criteria when applied to the same use classifications including mixing zones, and low flow values below which numeric standards can be exceeded in flowing fresh waters.

(i) For all waters with mixing zone regulations or implementation procedures, the criteria apply at the appropriate locations within or at the boundary of the mixing zones; otherwise the criteria apply throughout the water body including at the point of discharge into the water body.

(ii) The State shall not use a low flow value below which numeric standards can be exceeded that is less stringent than the flows in Table 4 to paragraph (c)(2) of this section for streams and rivers.

(iii) Table 4 to paragraph (c)(2) of this section:

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Criteria	Design flow
Aquatic Life Acute Criteria (CMC).	1 Q 10 or 1 B 3
Aquatic Life Chronic Criteria (CCC).	7 Q 10 or 4 B 3
Human Health Criteria.	Harmonic Mean Flow

Note to Table 4 of Paragraph (c)(2): 1. CMC (Criteria Maximum Concentration) is the water quality criteria to protect against acute effects in aquatic life and is the highest instream concentration of a priority toxic pollutant consisting of a short-term average not to be exceeded more than once every three years on the average.

2. CCC (Continuous Criteria Concentration) is the water quality criteria to protect against chronic effects in aquatic life and is the highest in stream concentration of a priority toxic pollutant consisting of a 4-day average not to be exceeded more than once every three years on the average.

3. 1 Q 10 is the lowest one day flow with an average recurrence frequency of once in 10 years determined hydrologically.

4. 1 B 3 is biologically based and indicates an allowable exceedence of once every 3 years. It is determined by EPA's computerized method (DFLOW model).

5. 7 Q 10 is the lowest average 7 consecutive day low flow with an average recurrence frequency of once in 10 years determined hydrologically.

6. 4 B 3 is biologically based and indicates an allowable exceedence for 4 consecutive days once every 3 years. It is determined by EPA's computerized method (DFLOW model).

(iv) If the State does not have such a low flow value below which numeric standards do not apply, then the criteria included in paragraph (d) of this section apply at all flows.

(v) If the CMC short-term averaging period, the CCC four-day averaging period, or once in three-year frequency is inappropriate for a criterion or the site to which a criterion applies, the State may apply to EPA for approval of an alternative averaging period, frequency, and related design flow. The State must submit to EPA the bases for any alternative averaging period, frequency, and related design flow. Before approving any change, EPA will publish for public comment, a document proposing the change.

(3) The freshwater and saltwater aquatic life criteria in the matrix in paragraph (b)(1) of this section apply as follows:

(i) For waters in which the salinity is equal to or less than 1 part per thousand 95% or more of the time, the applicable criteria are the freshwater criteria in Column B;

(ii) For waters in which the salinity is equal to or greater than 10 parts per thousand 95% or more of the time, the applicable criteria are the saltwater criteria in Column C except for selenium in the San Francisco Bay estuary where the applicable criteria are the freshwater criteria in Column B (refer to footnotes p and q to the table in paragraph (b)(1) of this section); and

(iii) For waters in which the salinity is between 1 and 10 parts per thousand as defined in paragraphs (c)(3)(i) and (ii) of this section, the applicable criteria are the more stringent of the freshwater or saltwater criteria. However, the Regional Administrator may approve the use of the alternative freshwater or saltwater criteria if scientifically defensible information and data demonstrate that on a site-specific basis the biology of the water body is dominated by freshwater aquatic life and that freshwater criteria are more appropriate; or conversely, the biology of the water body is dominated by saltwater aquatic life and that saltwater criteria are more appropriate. Before approving any change, EPA will publish for public comment a document proposing the change.

(4) *Application of metals criteria.* (i) For purposes of calculating freshwater aquatic life criteria for metals from the equations in paragraph (b)(2) of this section, for waters with a hardness of 400 mg/l or less as calcium carbonate, the actual ambient hardness of the surface water shall be used in those equations. For waters with a hardness of over 400 mg/l as calcium carbonate, a hardness of 400 mg/l as calcium carbonate shall be used with a default Water-Effect Ratio (WER) of 1, or the actual hardness of the ambient surface water shall be used with a WER. The same provisions apply for calculating the metals criteria for the comparisons provided for in paragraph (c)(3)(iii) of this section.

(ii) The hardness values used shall be consistent with the design discharge conditions established in paragraph (c)(2) of this section for design flows and mixing zones.

(iii) The criteria for metals (compounds #1—#13 in the table in paragraph (b)(1) of this section) are expressed as dissolved except where otherwise noted. For purposes of calculating aquatic life criteria for metals from the equations in footnote i to the table in paragraph (b)(1) of this section and the equations in paragraph (b)(2) of this section, the water effect ratio is generally computed as a specific pollutant's acute or chronic toxicity value measured in water from the site covered by the standard, divided by the respective acute or chronic toxicity value in laboratory dilution water. To use a water effect ratio other than the default of 1, the WER must be determined as set forth in Interim Guidance on Determination and Use of Water Effect Ratios, U.S. EPA Office of Water, EPA–823–B–94–001, February 1994, or alternatively, other scientifically defensible methods adopted by the State as part of its water quality standards program and approved by EPA. For calculation of criteria using site-specific values for both the hardness and the water effect ratio, the hardness used in the equations in paragraph (b)(2) of this section must be determined as required in paragraph (c)(4)(ii) of this section. Water hardness must be calculated from the measured calcium and magnesium ions present, and the ratio of calcium to magnesium should be approximately the same in standard laboratory toxicity testing water as in the site water.

(d)(1) Except as specified in paragraph (d)(3) of this section, all waters assigned any aquatic life or human health use classifications in the Water Quality Control Plans for the various Basins of the State (''Basin Plans'') adopted by the California State Water Resources Control Board (''SWRCB''), except for ocean waters covered by the Water Quality Control Plan for Ocean Waters of California (''Ocean Plan'') adopted by the SWRCB with resolution Number 90–27 on March 22, 1990, are subject to the criteria in paragraph (d)(2) of this section, without exception. These criteria apply to waters identified in the Basin Plans. More particularly, these criteria apply to waters identified in the Basin Plan chapters designating beneficial uses for waters within the region. Although the State has adopted several use designations for each of these waters, for purposes of this action, the specific standards to be applied in paragraph (d)(2) of this section are based on the presence in all waters of some aquatic life designation and the presence or absence of the MUN use designation (municipal and domestic supply). (See Basin Plans for more detailed use definitions.)

(2) The criteria from the table in paragraph (b)(1) of this section apply to the water and use classifications defined in paragraph (d)(1) of this section as follows:

Water and use classification	Applicable criteria
(i) All inland waters of the United States or enclosed bays and estuaries that are waters of the United States that include a MUN use designation.	(A) Columns B1 and B2—all pollutants (B) Columns C1 and C2—all pollutants (C) Column D1—all pollutants
(ii) All inland waters of the United States or enclosed bays and estuaries that are waters of the United States that do not include a MUN use designation.	(A) Columns B1 and B2—all pollutants (B) Columns C1 and C2—all pollutants (C) Column D2—all pollutants

(3) Nothing in this section is intended to apply instead of specific criteria, including specific criteria for the San Francisco Bay estuary, promulgated for California in the National Toxics Rule at § 131.36.

(4) The human health criteria shall be applied at the State-adopted 10 (−6) risk level.

(5) Nothing in this section applies to waters located in Indian Country.

(e)*Schedules of compliance.* (1) It is presumed that new and existing point source dischargers will promptly comply with any new or more restrictive water quality-based effluent limitations (''WQBELs'') based on the water quality criteria set forth in this section.

(2) When a permit issued on or after May 18, 2000 to a new discharger contains a WQBEL based on water quality criteria set forth in paragraph (b) of this section, the permittee shall comply with such WQBEL upon the commencement of the discharge. A new discharger is defined as any building, structure, facility, or installation from which there is or may be a ''discharge of pollutants'' (as defined in 40 CFR 122.2) to the State of California's inland surface waters or enclosed bays and estuaries, the construction of which commences after May 18, 2000.

(3) Where an existing discharger reasonably believes that it will be infeasible to promptly comply with a new or more restrictive WQBEL based on the water quality criteria set forth in this section, the discharger may request approval from the permit issuing authority for a schedule of compliance.

(4) A compliance schedule shall require compliance with WQBELs based on water quality criteria set forth in paragraph (b) of this section as soon as possible, taking into account the dischargers' technical ability to achieve compliance with such WQBEL.

(5) If the schedule of compliance exceeds one year from the date of permit issuance, reissuance or modification, the schedule shall set forth interim requirements and dates for their achievement. The dates of completion between each requirement may not exceed one year. If the time necessary for completion of any requirement is more than one year and is not readily divisible into stages for completion, the permit shall require, at a minimum, specified dates for annual submission of progress reports on the status of interim requirements.

(6) In no event shall the permit issuing authority approve a schedule of compliance for a point source discharge which exceeds five years from the date of permit issuance, reissuance, or modification, whichever is sooner. Where shorter schedules of compliance are prescribed or schedules of compliance are prohibited by law, those provisions shall govern.

(7) If a schedule of compliance exceeds the term of a permit, interim permit limits effective during the permit shall be included in the permit and addressed in the permit's fact sheet or statement of basis. The administrative record for the permit shall reflect final permit limits and final compliance dates. Final compliance dates for final permit limits, which do not occur during the term of the permit, must occur within five years from the date of issuance, reissuance or modification of the permit which initiates the compliance schedule. Where shorter schedules of compliance are prescribed or schedules of compliance are prohibited by law, those provisions shall govern.

(8) The provisions in this paragraph (e), Schedules of compliance, shall expire on May 18, 2005.

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Federal Register

Thursday,
May 18, 2000

Part IV

National Credit Union Administration

12 CFR Parts 716 and 741

Privacy of Consumer Financial Information; Requirements for Insurance; Final Rule

008683

NATIONAL CREDIT UNION ADMINISTRATION

12 CFR Parts 716 and 741

Privacy of Consumer Financial Information; Requirements for Insurance

AGENCY: National Credit Union Administration (NCUA).

ACTION: Final rule.

SUMMARY: The NCUA Board is issuing a final privacy rule applicable to all federally-insured credit unions, as required by the recently enacted Gramm-Leach-Bliley Act (the GLB Act or Act). The final rule requires credit unions to have a privacy policy and provide certain disclosures and notices to individuals about whom credit unions collect nonpublic personal information. It also restricts a credit union's ability to disclose nonpublic personal information, including giving individuals in some cases an opportunity to opt out of the disclosure. In drafting the rule, the NCUA participated as part of an interagency group composed of representatives from the NCUA, the Federal Trade Commission, the Office of the Comptroller of the Currency, Board of Governors of the Federal Reserve System, Federal Deposit Insurance Corporation, Office of Thrift Supervision, Secretary of the Treasury, and Securities and Exchange Commission (collectively, the Agencies). The other Agencies are also required to issue regulations to implement the GLB Act. NCUA's final rule takes into account the unique circumstances of federally-insured credit unions and their members but is comparable and consistent with the regulations of the other Agencies as required by the GLB Act.

EFFECTIVE DATE: This rule is effective November 13, 2000. However, compliance is not required until July 1, 2001.

ADDRESSES: National Credit Union Administration, 1775 Duke Street, Alexandria, Virginia 22314–3428.

FOR FURTHER INFORMATION CONTACT: Mary F. Rupp or Regina M. Metz, Staff Attorneys, Division of Operations, Office of General Counsel, at the above address or telephone: (703) 518–6540.

SUPPLEMENTARY INFORMATION:

I. Background

On February 24, 2000, NCUA issued a proposed privacy regulation as required by the GLB Act. 65 FR 10988, March 1, 2000. The comment period for the proposed rule ended March 31, 2000. Ninety-nine comments were received on the proposal, 26 from natural person credit unions; two from corporate credit unions; four from national credit union trade associations; 20 from state credit union leagues; one from a credit union service organization; one from the Congressional Privacy Caucus; five from law firms; seven from insurance companies; three from banks; two from federal agencies; 13 from businesses; one from a special interest group; one from a private party; and 13 from miscellaneous trade groups.

As required by the GLB Act, the NCUA has consulted with the other Agencies to ensure that its final rule is consistent and comparable with the final rules of the other Agencies. However, the NCUA's rule takes into account the comments received from the credit union community. Those commenters asked NCUA to take into account the unique nature of credit union structure and operations, particularly, the relationship between a credit union and its members and credit unions and credit union service organizations (CUSOs).

NCUA's final rule mirrors the other Agencies' final rules except for modifications appropriate to address the different circumstances of credit unions such as references to credit unions, CUSOs, members and nonmembers. The section-by-section summary of comments that follows points out those provisions that differ from the other Agencies' final rules. Besides differences in terms or definitions, a significant modification is in the use of examples in the rule. All of the Agencies' final rules will contain examples to aid understanding. NCUA has attempted to use examples pertinent to credit union circumstances and, therefore, has changed or deleted some examples used in the other Agencies' rule.

NCUA and the other Agencies are adding subparts to the table of contents in the final rule and reorganizing some of the subsections. NCUA and the other Agencies are also changing some of the language in the section names in the table of contents so that references to various notices are consistent with one another. In addition, NCUA and the other Agencies are revising various terms so that terminology is used consistently in the final rule and changing the passive voice to the active voice in several places. In some places, such as § 716.6, long provisions are broken into lists. Lastly, NCUA and the other Agencies are adding sample clauses as an appendix to the final rule.

NCUA and the other Agencies are developing examination standards and guidelines. A credit union's compliance with this rule will be reviewed as part of the regular examination process.

II. Summary of Comments

The NCUA requested comment on all aspects of the proposed rule as well as comment on specific provisions and issues highlighted in the proposal. Below is a discussion of the comments and changes to the proposal based on the comments. If a provision was not commented on and is not being changed in the final rule, the discussion from the proposal is not repeated.

Section 716.1 Purpose and Scope

Proposed paragraph (b) set out the scope of the NCUA rule, stating that it applies to all federally-insured credit unions. Section 505(a)(2) of the GLB Act provides that the NCUA Board has enforcement authority for federally-insured credit unions and any subsidiaries. One commenter objected to the statement in the proposal that, while CUSOs may be considered ''subsidiaries,'' the Federal Credit Union Act does not give the NCUA direct regulatory or supervisory authority over CUSOs. The commenter states that NCUA should take regulatory responsibility for CUSOs so that there is one regulator for all credit union activities. In addition to the fact that NCUA does not have direct regulatory or supervisory authority over these entities, NCUA's position is that CUSOs should be regulated, depending on the type of business in which they engage, by the primary regulators for those activities. For example, a CUSO engaged in securities brokerage activities would be subject to the Securities and Exchange Commission's privacy regulation.

The NCUA Board specifically requested comment on whether it would be appropriate to exempt federally-insured corporate credit unions from the rule because the membership of corporate credit unions, with the exception of a few natural person incorporators, is natural person credit unions, not consumers. Twelve of the 13 commenters that responded requested that corporates be exempt. The one commenter in opposition to exemption was the Congressional Privacy Caucus. Its reason for opposing exemption is persuasive, namely that there is no authority in the GLB Act for an exemption, and therefore, if a corporate has a customer or consumer it should be required to provide the appropriate notice.

The commenters in support of exemption noted that: a corporate credit union's only contact with a consumer is

through a natural person credit union; a corporate is member-owned and should be defined as an affiliate of each of its member owners; a corporate cannot perform under the burden of having to provide a privacy notice directly to natural persons; since the few natural person members a corporate may have only maintain a share account and receive no other consumer services, the rule should clarify that those individuals are not consumers; and, if a corporate receives nonpublic personal information about a natural person as part of processing member accounts for a natural person credit union, it is required to adhere to the ''reuse of information'' limitations in section 502(c)of the GLB Act. One commenter notes that a natural person credit union may disclose nonpublic personal information to a corporate credit union in connection with a proposed or actual securitization of a loan portfolio. The commenter incorrectly equates this type of activity with ''servicing and processing transactions.'' The proposal treated those individuals whose loans are purchased by a credit union as customers of the credit union. The final rule treats them as consumers, unless the credit union is servicing their loan, then they are members/customers. Therefore, a corporate credit union's duty to provide notice and an opportunity to opt out to individuals whose loans it purchases is only triggered if the corporate is servicing the loan or sharing nonpublic personal information about the consumers with nonaffiliated third parties that are not within an exception.

The Board agrees with the Congressional Privacy Caucus that it has no authority to exempt corporate credit unions. It appears from the comments that a corporate credit union will rarely have natural person members or customers. Members appear limited to those corporate credit unions that have natural person incorporators that maintain a share account. Those members are limited in number and so the burden to provide initial and annual notices should be minimal. On the other hand, corporate credit unions may have consumers. Consistent with the interpretation discussed in the Federal Trade Commission's proposal and now part of the final rule, the Board does not consider the members of a natural person credit union, that itself is a member of a corporate credit union, to be the corporate credit union's members or consumers, if the corporate credit union merely provides services to the natural person credit union. In this case, the corporate credit union may receive financial information about the natural person credit union's members, but it is only as a result of providing a service to its own member credit union. 65 FR 11174, 11177 (March 1, 2000). The final rule, consistent with the other Agencies, has added an example to the definition of consumer to clarify this. 12 CFR 716.3(e)(2)(iv). In that situation, the corporate is governed by the limitations on redisclosure in § 716.11.

NCUA, consistent with the other Agencies, has clarified in its final rule that initial notices are always required for customers, now defined as members, but not always for consumers by replacing ''consumer'' with ''member'' in paragraph (a)(1) and relying on paragraph (a)(2) to address consumers.

The final rule adds language to paragraph (b)(1) to clarify that commercial or agricultural purposes are included within the business purpose exemption. In addition language is added to this paragraph, clarifying that nothing in this part modifies, limits or supersedes the standards governing certain health information promulgated by the Secretary of Health and Human Services under the Health Insurance Portability and Accountability Act of 1996.

Section 716.2 Rule of Construction

Proposed § 716.2 of the rule set out a rule of construction intended to clarify the effect of the examples used in the rule. It stated that the examples are not exclusive and that compliance with an example, to the extent applicable, constituted compliance with the rule. A few commenters objected to having the examples in the rule and suggested that they be an Appendix to the rule, so that they are not misinterpreted as being part of the regulation. An equal number of commenters supported having the examples in the rule. They found it helpful to have the examples adjacent to the provision they are clarifying. The Board agrees with those commenters and has retained the examples in the rule and at the request of the commenters provided additional examples where appropriate.

Several commenters requested that NCUA provide examples of model forms. The Board is including, as an Appendix to the rule, examples of disclosure language that a credit union may, if applicable, use as part of its disclosure.

Section 716.3 Definitions

(a) and (g) *Affiliate and Control.* The proposed rule defined ''affiliate'' and ''control'' using the same definitions as the other Agencies. The Board asked for comment on whether the definitions should be amended to reflect the particular relationship between a credit union and its CUSO. The proposal, adopting the definition in section 509(6) of the GLB Act, stated that an affiliation is found when one company controls, is controlled by, or is under common control with another company. It defined control as a 25% ownership interest; control in any manner over the election of directors or management; or the power to exercise a controlling influence over the management or policies of a company as determined by NCUA.

All 41 commenters that commented on this issue supported having a different definition of control. One of the reasons given in support of a different definition was that CUSOs are much more limited than bank affiliates. The Federal Credit Union Act (FCU Act) limits whom CUSOs can serve and the services they can provide. CUSOs must primarily serve credit unions and their members, and their services must be related to the routine operations of credit unions. Therefore, because of statutory limitations, CUSOs are closely affiliated with credit unions in the types of services they provide and the persons or entities they serve.

The commenters noted that the FCU Act limits the amount a federal credit union can invest in a CUSO to one percent of its paid-in unimpaired capital and surplus, making it difficult for a small credit union to have a 25% ownership interest in certain kinds of CUSOs. The commenters concluded that the proposed definition has a discriminatory impact on smaller credit unions because it will result in fewer smaller credit unions having affiliates and, therefore, smaller credit unions will have more burdensome disclosure requirements than larger credit unions.

Several of the commenters stressed that credit unions are part of a cooperative movement that includes their CUSOs. They all work together to solve operational problems and help credit unions compete. There are often more than four credit unions investing in one CUSO. Members of the credit union view the CUSO as an extension of their credit union, and, in their minds, it is an affiliate of their credit union.

A few commenters suggested that certain types of CUSOs should not be covered under the privacy rules because they are performing credit union functions on behalf of the credit union's members. The examples given were shared branching and ATM services. It is unclear what the commenters meant by this comment but, if their concern was that credit unions be able to share

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with those CUSOs, these types of activities are specifically excluded from the opt out requirements by § 716.10. If on the other hand, their concern is that CUSOs that are also financial institutions not be subject to the privacy regulation, the Agency with primary regulatory authority over the CUSO will make that determination. Section 716.3(e)(2)(iv) of the final rule clarifies that members of the credit union would not be the CUSO's customer or consumer if the CUSO's function is limited to providing services to the natural person credit union and, as part of that service, it receives financial information about the natural person credit union's member.

The proposed rule included examples of entities that are affiliates for credit unions. For a federal credit union, the only entity that is an affiliate is a CUSO, as addressed in 12 CFR part 712, that is controlled by the federal credit union. For a state-chartered credit union, an affiliate is a company that is controlled by a credit union. One commenter asked that the example for state-chartered credit unions be changed to ''a company that is controlled by one or more credit unions.'' The current example does not limit control to one credit union, it merely addresses how one credit union has an affiliate. The number of credit unions affiliated with a particular company will be determined by the definition of control, not by changing the example of how a credit union is an affiliate of a company.

The Board asked for comment on whether a CUSO that is 100% owned by credit unions should be considered an affiliate of all the investing credit unions, regardless of whether any one credit union owns 25%. Although unanimous in their desire to expand the definition, the commenters had different suggestions on how to handle the issue of control. Several opposed limiting the expansion to 100% credit union owned because: A limited partnership CUSO would never qualify because the CUSO rule does not permit a credit union to be a general partner; CUSOs were often started in a cooperative manner with a state league as the initial investor; and majority credit union owned CUSOs often have some non-credit union investors because of the nature of their product or service or because of the need for additional capital.

Some of the suggestions for control of a CUSO were: 100% credit union owned; 100% credit union or CUSO owned; 100% credit union or credit union related entity owned; primarily or wholly owned by credit unions; 65% credit union owned; 25% credit union owned; and any credit union ownership.

Rather than change the definition of control, the NCUA Board believes that it should remain consistent and comparable with the other Agencies, and so it has added an example to category (3) of the definition that recognizes the unique relationship between a credit union and its CUSO. Category (3) states that control of a company includes the power to exercise control, directly or indirectly over the management or policies of the company, as determined by the NCUA. The new example states that NCUA will presume a controlling influence if the CUSO is 67% credit union owned. This percentage reflects a controlling interest by credit unions in the CUSO. In addition, the Board suggests credit unions that do not fall within the example, but believe that they have the power to exercise control, directly or indirectly, over the management or policies of their CUSO, petition the Board for a determination. The Board will process these requests for action pursuant to § 790.3 of the rules. 12 CFR 790.3.

(b) *Clear and conspicuous.* Title V of the GLB Act and the proposed rule required that various notices be ''clear and conspicuous.'' The proposed rule defined this term to mean that the notice is reasonably understandable and designed to call attention to the nature and significance of the information contained in the notice. The proposed rule did not mandate the use of any particular technique for making the notices clear and conspicuous, but instead allowed each credit union the flexibility to decide for itself how best to comply with this requirement. Ways in which a notice may satisfy the clear and conspicuous standard would include, for instance, using a plain-language caption, in a type set easily seen, that is designed to call attention to the information contained in the notice. Other plain language principles were provided in the examples that follow the general rule.

Several commenters recommended that the Board replace this definition with one more consistent with other Federal Reserve Board regulation definitions or modify the examples. In the final rule, NCUA and the other Agencies have retained the definition in the proposed rule, but revised the examples. The examples are not mandatory. A credit union must decide for itself how best to comply with the general rule, and may use techniques not listed in the examples.

Several commenters requested that the Board provide clarification on the form of the notice and whether it is permissible to insert it in a newsletter or statement. The final rule clarifies that a credit union may provide the notice separately or combined with another document if the notice uses distinctive type size, style, and graphic devices.

The final rule also provides examples of how notices provided on a web site can be clear and conspicuous. This might entail, for instance, a dialogue box that pops up whenever a member accesses a web page or a simple graphic (hypertext link or hotlink) near the top of the page or in close proximity to the credit union's logo. Other elements on the web site, such as text, graphics, hyperlinks, or sound, should not distract the consumer's attention away from the notice. The example also provides that the credit union should either place the notice or a link to the notice on a screen that consumers frequently access, such as a home page. Any link to the notice should be labeled appropriately to convey the importance, nature, and relevance of the notice.

(c) *Collect.* The proposed rule in § 716.3(c) defined collect as ''to obtain information that is organized or retrievable on a personally identifiable basis, irrespective of the source of the underlying information.'' Several commenters recommended NCUA specify whether information that is organized or retrievable only in the aggregate is excluded from the definition. In the final rule, the NCUA and the other Agencies are revising the definition to specify that information must be organized or retrievable by the credit union by the individual's name or by identifying number, symbol, or other particular assigned to the individual.

(e),(i) and (j) *Consumer, Customer, and Customer relationship; (n) and (o) Member and Member relationship.* The proposed rule defined ''customer'' as any consumer who has a customer relationship with a particular credit union. A customer relationship means that there is an ongoing relationship between the credit union and a consumer. These definitions paralleled the ones used by the other Agencies. Eleven commenters requested that the term ''member'' be used rather than customer. Some of those commenters suggested that only members be considered customers. This suggestion is contrary to the GLB Act that makes a distinction between the protections for consumers who obtain a financial product or services and those consumers that establish a relationship of a more lasting nature. Sometimes, those consumers with relationships of a more lasting nature are not actual members of the credit union and so, the

definition of customer cannot be limited to actual members.

Some of the reasons in support of using the term ''member,'' rather than ''customer,'' and including certain nonmembers within that category were that: credit unions have a unique relationship with their members and that relationship should be reflected in their regulations; and only a member is entitled to borrow, vote, and serve on the board of a credit union.

The Board agrees with the commenters that a credit union's relationship with its members is unique and so, it has substituted the term ''member'' for ''customer'' in the final rule. NCUA used this same approach successfully in its Truth in Savings Rule. 12 CFR part 707. However, the Board cautions credit unions that the term ''member,'' as used in this rule, essentially parallels the term ''customer'' used by the other Agencies. The term ''member'' includes individuals who are not actually members, but are entitled to the same privacy protections provided to members. Examples of individuals that fall within the definition of ''member'' in part 716 are nonmember joint account holders, nonmembers establishing an account at a low-income designated credit union and nonmembers holding an account in a state-chartered credit union under state law.

Several commenters stated that customer relationship is too broadly defined and should not apply to the situation where a credit union purchases a nonmember's loan, but not the servicing rights. NCUA and the other Agencies agree and are deleting this relationship from the definition of member/customer relationship. A consumer will be the member/customer of the financial institution that holds the servicing rights and a consumer of the other financial institutions that own the loan.

Several commenters asked that the final rule clarify that a series of isolated transactions does not transform a consumer to a member/customer. The final rule has added an ''s'' to isolated transaction to clarify this point.

A few commenters noted that notices and an opportunity to opt out should not have to be provided to both the consumer and the consumer's legal representative. NCUA and the other Agencies agree and are amending § 716.3(e)(1) to reflect that it is the consumer ''or'' the consumer's legal representative.

(f) *Federal functional regulator.* NCUA, consistent with the other Agencies, adopted the definition of ''government regulator'' in proposed rule § 716.3(m) to include the federal functional regulators, as defined in the GLB Act, the state insurance authorities, the Department of Treasury, and the Federal Trade Commission. One commenter objected to the definition and asked NCUA to revise it to include state regulators. The rule already takes into account the role of state regulators on the issue of affiliates.

In the final rule, the NCUA and the other Agencies are deciding not to use a definition for government regulator and instead have restated the definition for ''Federal functional regulator'' from the GLB Act. The term is used in the exception set out in § 716.15(a)(4) for disclosures to law enforcement agencies, including a federal functional regulator, the Department of Treasury, a state insurance authority, and the Federal Trade Commission.

(l), (m) Financial institution and Financial product or service. The proposed rule defined ''financial institution'' in § 716.3(k) as any institution the business of which is engaging activities that are financial in nature, or incidental to such financial activities, as described in section 4(k) of the Bank Holding Company Act of 1956 (12 U.S.C. 1843(k)). The proposed rule also exempted from the definition of ''financial institution'' those entities specifically excluded by the GLB Act. The proposed rule defined ''financial product or service'' in § 716.3(l) as any product or service that a financial holding company could offer by engaging in an activity that is financial in nature or incidental to such a financial activity under section 4(k). The definition included the financial institution's evaluation of information collected in connection with an application by a consumer for a financial service or product even if the application is ultimately rejected or withdrawn. It also included the distribution of information about a consumer for the purpose of assisting the consumer obtain a financial product or service. In the final rule, NCUA, consistent with the other Agencies, no longer includes such distribution of information to be a financial service. Other than this change, NCUA has retained both definitions in § 716.3(l) and (m) of the final rule, but NCUA has added examples of financial institutions.

Several commenters requested that the Board list financial activities or attach section 4(k) to part 716. One commenter provided sample language. One commenter supported a *de minimis* exception for companies whose consumer component is less than one percent. A few commenters requested that the Board adopt the Federal Trade Commission's example which provides that an entity is a financial institution if it is significantly engaged in financial activities, such as a retailer that extends credit by issuing its own credit card directly to consumers. The Federal Trade Commission also provided an example that a financial institution does not include a business that only accepts payment by check or cash, or through credit cards issued by others, or through deferred payment or ''lay-away'' plans. A few commenters also requested that the Board clarify the definition of financial products and services or expand it with examples.

Examples of activities that are financial in nature include: lending, exchanging, transferring, investing for others, or safeguarding money or securities; insuring, guaranteeing, or indemnifying against loss, harm, damage, illness, disability, or death, or providing and issuing annuities, and acting as principal, agent, or broker for purposes of the foregoing, in any state; providing financial, investment, or economic advisory services; and underwriting, dealing in, or making a market in securities. Examples of activities that are incidental to financial activities include: brokering or servicing loans; leasing real or personal property (or acting as agent, broker, or advisor in such leasing) without operating, maintaining or repairing the property; appraising real or personal property; check guaranty, collection agency, credit bureau, and real estate settlement services; providing financial or investment advisory activities including tax planning, tax preparation, and instruction on individual financial management; management consulting and counseling activities (including providing financial career counseling); courier services for banking instruments; printing and selling checks and related documents; community development or advisory activities; selling money orders, savings bonds, or traveler's checks. The activities also include leasing real or personal property (or acting as agent, broker, or advisor in such leasing) where the lease is functionally equivalent to an extension of credit; acting as fiduciary; providing investment, financial, or economic advisory services; and operating a travel agency in connection with financial services. The Board of Governors of the Federal Reserve and the Department of Treasury have authority under section 4(k) to determine other activities in the future to be financial in nature or incidental to financial activities.

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Due to the wide range of activities that are defined as financial in nature under section 4(k) of the Bank Holding Company Act, the definition of ''financial institution'' encompasses a broad spectrum of businesses. In the final rule, the NCUA has added examples of financial institutions, including nontraditional financial institutions. These may include, but are not limited to: personal property appraisers; real estate appraisers; career counselors for employees in financial occupations; digital signature services; courier services; real estate settlement services; manufacturers of computer software and hardware; and travel agencies operated in connection with financial services. However, many entities that are within the broad definition of financial institution likely will not be subject to the rule's disclosure requirements because not all financial institutions have consumers.

(q), (r), and (s) Nonpublic personal information, Personally identifiable financial information, and Publicly available information.

(q) *Nonpublic personal information.* The Board invited comment on two alternative interpretations of the definition of nonpublic personal information in proposed § 716.3(o). Alternative A defined nonpublic personal information to include personally identifiable financial information and any list, description, or other grouping of consumers and any publicly available information pertaining to them that is derived using personally identifiable financial information. The proposed rule excluded publicly available information from the scope of ''nonpublic personal information'' when the information is part of a list, description, or other grouping of consumers that is derived without using personally identifiable financial information. The example that followed the general definition clarified that publicly available information and other identifying information about consumers, such as addresses, would be considered nonpublic personal information if the information is derived from information consumers provided to a financial institution on an application.

Alternative B would have permitted a financial institution to release publicly available information regardless of the source, but still would have prohibited the release of this information as part of a list, description or other grouping of consumers that was derived using personally identifiable financial information. Thus, under alternative B, a credit union could have disclosed the name, address, or other information available to the general public about an individual, as long as it was not disclosed as part of a list.

Alternative A would have required compliance with the notice and opt out requirements if the credit union had received such information from the individual. Under alternative A, in order for the information to be considered publicly available, the credit union would have had to obtain the information from government records, widely distributed media, or government-mandated disclosures. The fact that information was available from those sources would have been immaterial if the credit union did not actually obtain the information from one of them.

Approximately 40 commenters supported alternative B, that information should not be nonpublic personal information if it is publicly available. A few commenters supported alternative A. The Congressional Privacy Caucus urged the Agencies to adopt alternative A because, unless the financial institution has actually obtained the data from a public source, it cannot be certain the information is publicly available. The consensus of the interagency group is to adopt the broader, alternative B, with modifications. Therefore, nonpublic personal information does not include publicly available information, except if it is disclosed in the form of a list derived using personal identifiable financial information.

The final rule adopts an approach that the NCUA and the other Agencies believe incorporates the benefits of both alternatives. Under the final rule, information will be deemed to be ''publicly available'' and therefore excluded from the definition of ''nonpublic personal information'' if a credit union reasonably believes that the information is lawfully made available to the general public from one of the three categories of sources listed in the rule. 12 CFR § 716.3(s)(2). In this way, a credit union will be able to avoid the burden of having to actually obtain information from a public source, but will not be free simply to assume that information is publicly available without some reasonable basis for that belief. The final rule cites, as an example of information a credit union might reasonably believe to be publicly available, the fact that someone has a loan that is secured by a mortgage in jurisdictions where mortgages are recorded. 12 CFR § 716.3(s)(3)(iii)(1). The rule also states that a credit union will have a reasonable basis to believe that a telephone number is publicly available if the credit union either looked the number up in a telephone book or was informed by the consumer that the number is not unlisted. 12 CFR § 716.3(s)(iii)(2).

NCUA also specifically invited comment on whether the definition of ''nonpublic personal information'' would cover information about a consumer that contains no indicators of a consumer's identity. Approximately 40 commenters said no, that aggregated data should not be nonpublic personal information because it is not personally identifiable.

Some commenters contended that the fact that an individual is a customer or consumer of a financial institution is not nonpublic personal information. They also requested that the regulation allow financial institutions to sell lists of consumers and customers. A couple of commenters concurred with the Board's inclusion of lists of consumers as nonpublic personal information.

The final rule in § 716.3(q) includes examples of lists that would and would not be considered nonpublic personal information. A list of individuals' names and street addresses that is derived using personally identifiable financial information, other than publicly available information, would be nonpublic personal information. Such a list that is not derived using personally identifiable financial information and does not indicate that individuals on the list are a consumer of the credit union would not be nonpublic personal information.

(r) *Personally identifiable financial information.* The GLB Act defined ''nonpublic personal information'' to include ''personally identifiable financial information'' but did not define the latter term. The proposed rule in § 716.3(p) generally defined personally identifiable information as information a credit union obtains in connection with providing a consumer a financial service or product. A few commenters supported this definition. Approximately 30 commenters said that proposed definition is too broad and that personally identifiable financial information should not include nonfinancial information.

NCUA continues to believe that this approach creates a workable and clear standard for distinguishing information that is financial from information that is not, while at the same time giving meaning to the word ''financial.'' The broad scope of what is deemed a ''financial product or service'' under the GLB Act requires a comparably broad scope of what is deemed ''financial information.''

NCUA and the other Agencies have revised the definition in the final rule

§ 716.3(r) to add a couple of additional examples of what would and would not be personally identifiable financial information. One of the new examples of personally identifiable financial information is information the credit union collects through an Internet cookie, an information collecting device from a web server. A new example of what would not be personally identifiable financial information is information that does not identify a consumer, such as aggregate information or blind data that does not contain personal identifiers, such as account numbers, names or addresses.

NCUA has retained other examples of personally identifiable financial information from the proposed rule. One such example is the fact that an individual has been a credit union's member or has obtained a financial product or service from it. NCUA disagrees with those commenters who maintain that member relationships should not be considered personally identifiable financial information. Clearly, information that a particular person has a member relationship identifies that person, and this is personally identifiable. The NCUA believes that this information is also financial, because it communicates that the person has a financial relationship with the credit union. While this information would in many cases be a matter of public record, that does not change the analysis of whether the information is personally identifiable financial information.

(s) *Publicly available information.* The proposed rule in § 716.3(q) defined ''publicly available information'' as information lawfully made available to members of the general public that is obtained from three broad types of sources: Official public records, widely distributed media, or information from public disclosures required by law. The proposed rule stated that information obtained over the Internet would be considered publicly available information if it was obtainable from a site available to the general public without requiring a password or similar restriction.

The Board invited comment on what information should be considered publicly available, particularly in the context of information available over the Internet. Approximately 35 commenters wrote that publicly available information includes information that could be derived from a public source, even if it is obtained from a nonpublic source, such as an application for financial services. Several commenters wrote that publicly available information should include name, address, and phone number. A couple of commenters suggested that the Board model its definition after the Securities and Exchange Commission's definition of publicly available information.

The NCUA and the other Agencies have modified and adopted the Securities and Exchange Commission's proposed definition in the final rule. NCUA's final rule defines ''publicly available information'' as information the financial institution has a reasonable basis to believe is lawfully made available to the general public from the three broad types of sources. 12 CFR 716.3(s). The NCUA and the other Agencies have decided that financial institutions have a reasonable basis to believe information is lawfully available to the general public if they take steps to determine that the information is of the type available to the general public and, if an individual can direct that the information not be made available to the general public, that an individual has not done so. The examples of what constitutes a reasonable basis were discussed in the above section on nonpublic personal information.

Publicly available information will be excluded from the scope of ''nonpublic personal information,'' whether or not the credit union obtains it from a publicly available source (unless, as previously noted, it is part of a list of consumers that is derived using personally identifiable financial information). Under this approach, the fact that a consumer has given publicly available information to a credit union would not automatically extend to that information the protections afforded to nonpublic personal information.

Several commenters objected to the example in § 716.3(q)(2)(ii) of the proposed rule that publicly available information from widely distributed media includes information from an Internet site that is available to the general public ''without requiring a password or similar restriction.'' The NCUA and the other Agencies agree with the commenters that some web sites require a password or fee to obtain public information. Therefore, the example in the final rule provides that widely distributed media includes information from a web site that is available to the general public on an unrestricted basis. The fact that a web site has a fee or password does not render the web site restricted.

Subpart A—Privacy and Opt Out Notices

Section 716.4 Initial Privacy Notice to Consumers Required

The GLB Act requires a financial institution to provide an initial notice of its privacy policies and practices in two circumstances. For customers, the notice must be provided at the time of establishing a customer relationship. For credit unions, ordinarily this will be at the time an individual applies for membership. For consumers who do not become members, the credit union must provide the notice prior to disclosing nonpublic personal information about the consumer to a nonaffiliated third party.

Proposed § 716.4(a) required a credit union to provide an individual a privacy notice prior to the time that it establishes a customer relationship. The final rule provides that the credit union must provide the initial notice not later than the time it has established a member relationship. Nothing in the proposed rule is intended to discourage a credit union from providing a privacy notice at an earlier point in the relationship to make it easier for an individual to compare several institutions' privacy policies and practices in advance of conducting transactions.

The final rule provides in § 716.4(c)(2) that a credit union establishes a member relationship with a consumer when the credit union originates or the consumer's loan. However, if the credit union transfers the servicing rights to a loan, the membership relationship transfers with the servicing rights. The final rule provides examples of this ''loan rule'' in § 716.4(c)(3)(ii), including examples of a credit union that originates the loan and retains the servicing rights or purchases the servicing rights to the loan.

A few commenters requested that the rule not require a new opt out notice when an existing customer opens a new account. NCUA agrees that it is unnecessary for a credit union to provide a member with additional copies of its initial notice every time the member obtains a financial product or service. The final rule in § 716.4(d) contains a new provision that the credit union need not provide a new privacy notice to an existing member who has already received a notice that was accurate with respect to the new financial product or service. If the credit union's privacy policies and practices have changed, the credit union may provide the member with a revised privacy notice if it chooses to do so. Under § 716.8, the credit union would

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have to provide a new privacy notice if the new account was not covered by the previously provided notice.

The proposed rule in § 716.4(f) provided that, if a credit union and consumer orally enter into a contract for financial services over the telephone, the credit union may provide the consumer with the initial notice after providing the service so as not to delay the transaction. Several commenters wrote that when accounts are opened over the phone it would be reasonable for the credit union to provide the disclosures, including opt out notices at a reasonable time after the transaction, such as within 20 days. They contended that the rule should not require the consumer to consent to the subsequent delivery of the notice. This would be consistent with the requirements under the Truth in Savings Act. One commenter wrote that the notice should be in writing at the time the service is provided, not later.

Consistent with the proposed rule, the final rule allows, in some cases, for subsequent delivery of initial notices within a reasonable time after the credit union establishes a member relationship and examples of this under § 716.4(e). First, the credit union may provide notice after the fact if the establishment of the member relationship is not at the customer's election. This might occur, for instance, when a share account is transferred. Second, a credit union may send notice after establishing a member relationship when to do otherwise would substantially delay the consumer's transaction and the consumer agrees to receive the notice at a later time. An example of this would be when a transaction is conducted over the telephone and the member desires prompt delivery of the financial product or service. Third, the final rule also permits after-the-fact notices when an independent third party arranges the member relationship on the credit union's behalf without its prior knowledge. Typical of this type of arrangement would be the submission to a credit union by a college's financial aid office of a completed student loan application along with a request for prompt disbursement upon the credit union's acceptance of the application.

The Board notes that in most situations, and particularly in situations involving the establishment of a member relationship in person, a credit union should give the initial notice at a point when the consumer still has a meaningful choice about whether to enter into the member relationship. The exceptions listed in the examples, while not exhaustive, are intended to illustrate the less frequent situations when delivery either would pose a significant impediment to the conduct of a routine business practice or the consumer agrees to receive the notice later in order to obtain a financial product or service immediately.

In circumstances when it is appropriate to deliver an initial notice after the member relationship is established, a credit union should deliver the notice within a reasonable time thereafter. A few commenters requested that the final rule specify precisely how many days a credit union has in which to deliver the notice under these circumstances. However, the Board believes that a rule prescribing the maximum number of days would be inappropriate because (a) the circumstances of when an after-the-fact notice is appropriate are likely to vary significantly, and (b) a rule that attempts to accommodate every circumstance is likely to provide more time than is appropriate in many instances. Thus, rather than establish a rule that the Board believes may be viewed as applicable in all circumstances, the Board elected to retain the more general rule as set out in the proposal in § 716.4(e)(1).

As the Board noted in the preamble to the proposed rule, nothing in the rule is intended to discourage a credit union from providing an individual with a privacy notice at an earlier point in the relationship if the institution wishes to do so in order to make it easier for the individual to compare its privacy policies and practices with those of other financial institutions in advance of conducting transactions. The Board requested comment on who should receive a notice where there is more than one party to an account. Approximately 50 commenters replied that the regulation should require only that the primary account holder should receive the notice and right to opt out. The reasons in support of giving only the primary account holder notice and opt out rights were that: This is consistent with other regulations; some joint account holders are minors; some live in the same households as each other; addresses for some joint account holders are not available; and it would be burdensome to provide notice and opt out to all account holders. A few commenters wrote that the financial institution should have the option to offer more than one party to an account individual notice and opt out rights and incur the extra cost.

The commenters who noted that one notice is consistent with other regulations cited those implementing the Equal Credit Opportunity Act (Regulation B, 12 CFR part 202) and the Truth in Lending Act (Regulation Z, 12 CFR part 225). Commenters noted that under both regulations, a financial institution is permitted to give only one notice. The authorities cited include requirements that the financial institution give disclosures, as appropriate, to the ''primary applicant'' if this is readily apparent (in the case of Regulation B; *see* 12 CFR 202.9(f)) or to a person ''primarily liable on the account'' (in the case of Regulation Z; *see* 12 CFR 226.5(b)).

The Board found these comments persuasive with respect to financial products and services, other than loans (including lines of credit). The Board believes that co-makers and guarantors on loans should receive the notice and right to opt out because of the extent and nature of nonpublic personal information provided to the credit union in conjunction with these types of transactions. Co-makers and guarantors of loans are entitled to receive separate notices. The final rule in § 716.4(f) provides that if two or more consumers obtain a financial product or service, other than a loan, from the credit union jointly, it may satisfy the initial notice requirement by providing one initial notice to those consumers jointly, but that either consumer may exercise the opt out right.

For ease of reference, the final rule provides in § 716.4(g) that credit unions should refer to § 716.9 for methods of delivering an initial privacy notice or § 716.6 for initial notices for nonmember consumers.

Section 716.5 Annual Privacy Notice to Members Required

The proposed rule required a credit union to provide customers with a clear and conspicuous notice that accurately reflects the privacy policies and practices, once during any period of twelve consecutive months. Although the GLB Act requires financial institutions to provide annual notices to customers, several commenters recommended eliminating the requirement. A few commenters wrote that the Board should require credit unions to send the notice once every calendar year, not once annually, so that they can send the notices to all customers in a mass mailing with other required disclosures. The final rule provides that the credit union may define the 12-consecutive-month period, and includes a new example.

The Board requested comment on whether the example of dormant accounts provides a clear standard for whether an individual is exempt from the annual notice requirement and whether the applicable standard should

be the credit union's policies or state law. The Board also requested comment on whether the standard should apply to members as well as nonmembers.

A few commenters supported application of the dormant account standard under state law. Several commenters supported use of the term inactive instead of dormant. Several commenters wrote that the credit union's policy on inactive accounts, rather than state law on dormant accounts should apply. These commenters contended that reliance on state dormancy laws might produce conflicting results and unnecessary burden for credit unions operating in more than one state. Several commenters supported a standard of 12 months with no documented account activity rather than either term. The final rule retains the examples and uses the term inactive instead of dormant. The Board believes an example that suggests credit unions look to their own inactive account policies provides adequate guidance and greater flexibility than suggesting credit unions look to state dormancy laws.

Some commenters said members and nonmembers should be treated the same with regard to the standard for dormant accounts. The Board has retained the distinction between nonmember and member inactive accounts because a credit union may still have a duty to provide notices to an individual who is a member under the credit union's bylaws, regardless of whether a member's account has been declared inactive. The duty to provide notice to an individual who is a member under the credit union's bylaws only ceases when the member relationship terminates.

Section 716.6 Information To Be Included in Initial and Annual Privacy Notices

The proposed rule provides the required content for the initial and annual notices to customers. The proposed rule required notices to include: categories of nonpublic personal information that a credit union may collect; categories it may disclose; categories of affiliates and nonaffiliated third parties to whom a credit union discloses nonpublic personal information; information about former customers; information disclosed to service providers; the right to opt out; disclosures made under the Fair Credit Reporting Act (FCRA); and confidentiality, security, and integrity standards. The final rule provides that a credit union need only include each of the above items that apply to it, but may include other information.

Several commenters found these requirements burdensome and more detailed than the GLB Act requires. One commenter requested that the right to opt out not be disclosed in the privacy notice. A few commenters requested that the Board use the plain language of the GLB Act for the content of the notice and delete other requirements. The final rule provides that a credit union may send a short-form initial notice with an opt out notice for nonmember consumers under § 716.6(c). This short-form must state that a privacy notice is available upon request and provide a reasonable means, such as a toll-free number, by which the consumer may obtain the notice.

The proposed rule requested comment on whether a disclosure that a credit union makes disclosures as permitted by law to nonaffiliated third parties in addition to those described in the notice would be adequate. Several commenters wrote that this disclosure was adequate. A couple of commenters objected to this disclosure because the GLB Act specifically exempts notice in these instances and it could cause consumer confusion. The final rule retains the provision for disclosures as permitted by law as the NCUA and the other Agencies proposed it.

Several commenters requested that the Board clarify the meaning of the terms ''categories of information'' that are ''collected'' and ''disclosed'' and amend the examples. A few commenters recommended the rule retain the examples used for the categories of information collected and repeat those examples for the categories of information disclosed. NCUA and the other Agencies are revising and expanding the examples for these terms in the final rule in § 716.6(e).

One commenter suggested that the Board create an exemption from the annual notice requirement for credit unions that do not share nonpublic personal information with nonaffiliated third parties. NCUA and the other Agencies are rejecting this suggestion, but the final rule in § 716.6(e)(5) permits credit unions to provide simplified notices if they do not disclose or intend to disclose nonpublic personal information to affiliates or nonaffiliated third parties except under the exceptions authorized in §§ 716.14 and 716.15.

The proposed rule stated that the NCUA was in the process of preparing proposed section 501 standards relating to administrative, technical, and physical safeguards. A few commenters wrote that credit unions need guidance on security standards. The NCUA intends to issues proposed standards as an appendix to this regulation for notice and public comment in approximately one month.

A couple of commenters wrote that the disclosures of who has access to the information were unnecessary and could be harmful to a financial institution's security. The final rule provides that the credit union need only describe in general terms who is authorized to have access to the information and provides an example in § 716.6(e)(6).

A few commenters requested that the rule clarify that the privacy policies and practices of several different affiliated financial institutions may be described on a single notice. Related to this point, commenters requested that the final rule address whether affiliated financial institutions, each of whom has a customer or member relationship with the same consumer, may elect to send only one notice to the consumer on behalf of all of the affiliates covered by the notice and have that one notice satisfy the disclosure obligations under § 716.4 of each affiliate. NCUA and the other Agencies agree that financial institutions should be able to combine initial disclosures in one document. The final rule reflects this flexibility, in § 716.6(e)(7). NCUA and the other Agencies emphasize that the notice must be accurate for all financial institutions using the notice.

Section 716.7 Form of Opt Out Notice to Consumers and Opt Out Methods

The proposed rule in § 716.8 provided as an example that a credit union will provide adequate notice of the right to opt out if it identifies: The categories of information that may be disclosed; the categories of nonaffiliated third parties to whom the information may be disclosed; and that the consumer may opt out of those disclosures. The final rule adds that the credit union should also identify the financial products or services that the consumer obtains, either singly or jointly from the credit union, to which the opt out direction would apply.

The proposed rule also provided several examples by which a credit union may provide a reasonable means for the consumer to opt out, including check off boxes, self-addressed stamped reply forms, and electronic mail addresses. Approximately 20 commenters requested that the Board delete the stamped reply example, contending it is unreasonable, unfair, costly to financial institutions, and not a statutory requirement. A couple of commenters supported the concept of stamped reply forms so that opting out would be convenient for the consumer.

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In the final rule, the Board has deleted the reference to self-addressed and stamped, but has retained the example of a reply form in § 716.7(a)(2)(ii)(B).

Several commenters wrote that they supported allowing opt outs by electronic means. The final rule retains this example in § 716.7(a)(2)(ii)(C).

A few commenters recommended that the Board permit the consumer to opt out orally. Approximately 16 commenters requested that the final rule include an example of opt out by means of a toll-free telephone number. The final rule adds the example of a credit union providing a toll-free telephone number that consumers may call to opt out in § 716.7(a)(2)(ii)(D).

The proposed rule stated that a credit union does not provide a reasonable means of opting out if it requires a consumer to send his or her own letter informing the credit union of the opt out election. One commenter supported this interpretation. Four commenters disagreed and wrote that the proposed rule goes beyond the GLB Act on this issue. The final rule retains this example in § 716.7(a)(2)(iii)(A). The final rule also provides another example of an unreasonable means of opting out. This would be if the credit union describes in a subsequent opt out notice that a consumer may opt out by designating check-off boxes that were provided with the initial notice, but not included with the subsequent notice.

Several commenters requested that the Board provide that credit unions will be able to impose their own requirements on how consumers opt out. For example, a commenter requested that the Board permit credit unions to require customers to submit account numbers with an opt out request. The final rule provides that a credit union may require each consumer to opt out through a specific means, if it is reasonable for that consumer. 12 CFR 716.7(a)(2)(iv). The final rule provides that a credit union may provide the opt out notice together with or on the same form as the initial notice. 12 CFR 716.7(b).

NCUA requested comment on how the right to opt out should apply to joint account holders and trustees of commingled trust accounts, where a trustee manages a single account on behalf of multiple beneficiaries. For the same reasons as in the discussion on initial notice under § 716.4, approximately 50 commenters supported only requiring that the primary account holder get a right to opt out. A few commenters wrote that either party on a joint account should have the right to opt out. One commenter requested that, if one party to a joint account wants to opt out, the financial institution should honor his or her request. The final rule provides that the credit union need only provide one opt out notice to holders of accounts, other than loans, but that either party to the joint account may exercise an opt out direction. 12 CFR 716.7(d). The final rule provides that the credit union may treat the opt out direction by a joint consumer as applying to all of the associated joint consumers or permit each joint consumer to opt out separately. The final rule also provides an example. 12 CFR 716.7(d)(5).

With regard to application of the right to opt out to trustees, as previously discussed in connection with the definition of consumer, 12 CFR § 716.3(e)(1), a credit union need not provide notice to both a consumer and a consumer's legal representative. Thus, a credit union may provide notice of the right to opt out to either the beneficiaries or their legal representative.

The proposed rule in § 716.8(d) stated that a consumer has the right to opt out at any time. The proposed rule also required that the sharing of nonpublic personal information stop promptly when the consumer opts out. Some commenters asked the Board to clarify in the final rule how long a credit union has after receiving an opt out to cease disclosing nonpublic personal information to nonaffiliated third parties. Several commenters requested that the rule provide no opt out rights once a sharing or affinity program has begun. Several commenters requested that the right to opt out should only affect disclosures after the consumer has opted out and should not apply retroactively. One commenter requested that the rule require a financial institution has to comply with a consumer's subsequent opt out within 30 days of his or her request.

The final rule retains the consumer's continuing right to opt out. 12 CFR 716.7(f). The final rule also requires the sharing of nonpublic personal information to stop as soon as reasonably practicable after the credit union receives the opt out direction. 12 CFR 716.7(e). NCUA, consistent with the other Agencies, believes that it is appropriate to retain this more general rule in light of the wide range of practices throughout the financial institutions industry. A potential drawback of a more prescriptive rule is that a credit union might use the standard as a safe harbor in all instances and thus fail to honor an opt out as early as it is otherwise capable of doing. Another drawback is that a standard that is set in light of current industry practices and capabilities is likely to become outmoded quickly as advances in technology increase efficiency. NCUA therefore declines to adopt a more rigid standard, and instead retains the rule as set out in § 716.7(e) of the final rule.

The proposed rule in § 716.8(e) stated that an opt out will continue until a consumer revokes it in writing, or, if the consumer agrees, electronically. The final rule retains those requirements in § 716.7(g). The final rule clarifies that when the member relationship terminates, the opt out direction continues to apply to information collected during the relationship. If the individual then enters into a new member relationship with the credit union, the former opt out direction does not apply to the new relationship. 12 CFR 716.7(g)(2). The final rule states that requirements for delivery of the opt out notices are found in § 716.9. 12 CFR 716.7(h).

NCUA requested comment on the regulatory burden of complying with opt out notices. How do credit unions expect to give opt out opportunities? How many opt outs do credit unions expect to receive and need to process? Commenters who responded generally did not address these issues with specificity, but some stated that complying with the opt out notice requirements and directions will be burdensome.

Section 716.8 Revised Privacy Notices

For ease of reference in the final rule, NCUA and the other Agencies are grouping the provisions concerning revised notices into one section. The proposed rule contained requirements that a credit union send a customer a new notice and opt out when there is a change in terms. A couple of commenters recommended eliminating these requirements. A couple of commenters recommended the Board revise the language to specify a ''material'' change in terms. One commenter wrote that when a financial institution changes its terms, a consumer's prior opt out should remain in effect for 30 days while he or she is permitted to consider the new right to opt out. NCUA and the other Agencies are retaining these requirements in the final rule as proposed, but are adding an additional example. The new example provides that the credit union must provide a revised policy notice if it discloses nonpublic personal information to a nonaffiliated third party about a former customer who has not had the opportunity to exercise an opt out right regarding that disclosure. The final rule moves the requirements

for delivery of the revised notices to § 716.9.

Section 716.9 Delivering Privacy and Opt Out Notices

In the proposed rule, the rules governing how credit unions must provide the initial and annual privacy notices and opt out notices were found in various sections depending on the type of notice. For ease of reference in the final rule, NCUA and the other Agencies are grouping the provisions concerning delivery of privacy and opt out notices into one section.

The proposed rule provided that the notices may be delivered in writing or, if the consumer agrees, electronically. The proposed rule required that the credit union provide the notices so that each recipient can reasonably be expected to receive actual notice. A few commenters objected to the requirement that the credit union must reasonably expect the customer will receive the notice. Their reasons were that this requirement is: Not expressly stated in the statute, not consistent with other disclosure regulations, and burdensome. The final rule in § 716.9(a) contains the requirements for any privacy notices and opt out notices, including short-form initial notices.

The proposed rule provided examples of acceptable methods of delivery of the notice to customers where the credit union may reasonably expect the customer will receive the notice. The Board requested comment on the regulatory burden of providing the initial notice and the methods credit unions expect to use to provide the notice.

One commenter recommended the reference to sending the consumer an electronic mail notice be deleted because a preferable method would be for a customer to access the notice on a secure site. Several commenters requested that the regulation provide examples of other means of electronic delivery, such as posting the notice on the web and informing the consumer to access the site, or sending an electronic mail with a link to the notice. The final rule retains the examples of reasonable and unreasonable expectations of delivery in § 716.9(b).

The proposed rule stated that oral notices alone are insufficient. A few commenters requested that oral notice be permitted where the financial institution establishes the customer relationship over the telephone. A few commenters objected that it would be costly to train staff to provide oral notices. The final rule retains the provision that oral notices alone are insufficient in § 716.9(d).

Several commenters wrote that providing the annual notice will be burdensome and a waste of resources. One commenter requested that credit unions not be required to send the notice unless their policies have changed. Some commenters requested that the regulation permit the credit union to comply with the annual notice requirement by posting the notice on its web site. NCUA and the other Agencies agree with the commenters. For annual notices only, the final rule permits a credit union to reasonably expect a member to receive notice if the member uses the credit union's web site to access financial products and services electronically, agrees to receive notices there, and the credit union posts the current privacy policy there in a clear and conspicuous manner. 12 CFR § 716.9(c).

Several commenters requested that customers should be able to waive the right to receive the annual notice. Another commenter wrote that a credit union should be able to comply with the law by providing the policy to customers only upon their request. A couple of commenters requested that credit unions should not have to send the notice to customers who have opted out. The final rule permits the credit union to reasonably expect that a member will receive actual notice of the privacy notice if he or she has requested the credit union refrain from sending any information regarding the member relationship and the current policy remains available to the member upon request. 12 CFR 716.9(c).

The proposed rule in § 716.4(g) required the credit union to provide the notice to the customer in a form that can be retained or obtained at a later time, in a written form or if the customer agrees, in electronic form. Some commenters supported the requirement for the notice to be retainable or obtainable and some opposed it as burdensome. A few commenters wrote that the Board should delete the requirement that the consumer must agree to the electronic form. One commenter suggested that the agreement should be implied if the customer initiates an electronic transaction.

NCUA requested comment on whether there are situations where providing notice by mail is impracticable. Several commenters suggested the credit union should not have to provide the notice by mail if the credit union does not have the customer's current address. Some commenters suggested that the credit union should not have to provide the disclosures at all if it does not have the address or another way to contact the customer.

Section 716.9(e) of the final rule retains the requirement that the initial notice, annual notice, and any revised notice be given in a way so that the member may either retain them or access them at a later time and provides examples, such as mailing the notice to the last known address. NCUA acknowledges that, in some cases, credit unions will not have any means of delivery.

Subpart B—Limits on Disclosures

Section 716.10 Limits on Disclosure of Nonpublic Personal Information to Nonaffiliated Third Parties

NCUA and the other Agencies are moving the main operative provisions from § 716.7 in the proposed rule to § 716.10 in the final rule. The proposed rule in § 716.7 required that a credit union give the consumer a reasonable opportunity to opt out before it discloses the consumer's information. The proposed rule provided an example that when a credit union has mailed a privacy notice to a customer, he or she will have 30 days to opt out. NCUA invited comment on whether 30 days is a reasonable opportunity to opt out in the case of notices sent by mail. Several commenters requested that NCUA remove the reference to 30 days. Several commenters wrote that 30 days was a reasonable time period. A few commenters recommended 15 days and one recommended 60 days. The final rule retains 30 days as an example of a reasonable period of time to allow the consumer to opt out by mailing a form, calling a toll-free number, or any other reasonable means. 12 CFR 716.10(a)(3)(i).

NCUA also requested comment on whether an example in the context of transactions conducted using an electronic medium would be helpful. One commenter wrote that three days was a reasonable period for the consumer to opt out when the delivery of the notice was by electronic methods. A few commenters requested that the Board specify a uniform time frame as a reasonable opt out period, no matter how the credit union has delivered the notice. The Board agrees with these commenters. The final rule adds an example of reasonable opportunity to opt out by electronic means for a member who opens an on-line account with a credit union. If the credit union makes the notices available on its web site, the member may opt out by any reasonable means within 30 days after the date he or she acknowledges receipt of a notice. 12 CFR 716.10(a)(3)(ii).

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The proposed rule also provided an example of a reasonable method for the consumer to opt out in an isolated transaction. One commenter recommended not requiring the opt out to be a necessary part of the transaction. A couple of commenters recommended allowing the consumer to opt out at a later time by mail. The final rule retains the example from the proposed rule. 12 CFR 716.10(a)(3)(iii).

A couple of commenters requested that the Board clarify the description of partial opt outs. The Board believes the description is adequate and the final rule retains the description from the proposed rule. 12 CFR 716.10(c).

Section 716.11 Limits on Redisclosure and Reuse of Information

Section 716.12 of the proposed rule implemented the GLB Act's limitations on redisclosure and reuse of nonpublic personal information about consumers. Section 502(c) provides that a nonaffiliated third party that receives nonpublic personal information from a financial institution shall not, directly or through an affiliate of the third party, disclose the information to any person that is not affiliated with either the financial institution or the third party, unless the disclosure would be lawful if made directly by the financial institution. The final rule revises the language and adds examples.

Paragraph (a)(1) of the proposed rule set out the GLB Act's redisclosure limitation as it applies to a credit union that receives information from another financial institution. Paragraph (b)(1) of the proposed rule mirrored the provisions of paragraph (a)(1), but applied the redisclosure limits to any nonaffiliated third party that receives nonpublic personal information from a credit union.

The Board requested comment on whether subsequent disclosures by the third party to parties other than the credit union are lawful. One commenter wrote that no third party reuse should be allowed. Approximately 11 commenters thought some reuse by third parties should be allowed as permitted by law or the exceptions.

Some of these commenters criticized imposing limits on reuse premised on the conclusion that Congress, by addressing limits on redisclosures in section 502(c) of the GLB Act, provided the only limits that may be imposed on what a recipient of nonpublic personal information can do with that information. The Board, consistent with the other Agencies, disagrees with that premise. Section 502(c) is silent on the question of reuse, making it necessary to look to the overall purpose of the statute to determine whether the Board should impose limits on the ability of nonaffiliated third parties to reuse nonpublic personal information that they receive from a credit union. The Board, consistent with the other Agencies, believes that the overall purposes of subpart A of Title V of the Act makes it appropriate to impose limits on reuse, depending on whether the information was obtained pursuant to one of the exceptions in section 502(e) of the GLB Act (as implemented by §§ 716.14 and 716.15 of the final rule).

When disclosures are made in connection with one of the purposes set out in section 502(e), those disclosures are exempt from the notice and opt out protections altogether. A consumer has no right to prohibit those disclosures or even to know more than the financial institution is making the disclosures ''as permitted by law.'' The only protection afforded by the statute for disclosures made under section 502(e) is the limited nature of the exceptions. The Board believes it would be inappropriate to undermine the protection by allowing the recipient of nonpublic personal information to reuse the information for any purpose, including marketing.

By contrast, when a consumer decides not to opt out after being given adequate notices and the opportunity to do so, that consumer has made a decision to permit the sharing of his or her nonpublic personal information to the categories of entities identified in the financial institution's notices. The consumer's primary protection in the case of a disclosure falling outside the 502(e) exceptions comes from receiving the mandatory disclosures and the right to opt out. The statute provides only the additional protection in section 502(c), restricting a recipient's ability to redisclose information to entities that are not affiliated with either the recipient or the financial institution making the disclosure initially. Thus, if a consumer permits a financial institution to disclose nonpublic personal information to the categories of nonaffiliated third parties that are described in the institution's notices, recipients of that nonpublic personal information appear authorized under the statute to make disclosures that comply with those notices.

To implement this statutory scheme, the Board, consistent with the other Agencies, has retained a limit on reuse in addition to the limit on redisclosures. The final rule addresses a credit union's disclosure of the information it receives from a financial institution to: The credit union's own affiliates, the financial institution's affiliates, and others. A credit union may disclose the information to its affiliates who, in turn, may disclose and use the information only to the same extent as the credit union. Second, a credit union may disclose the information to the affiliates of the financial institution from whom the credit union received the information. Third, a credit union may disclose and use the information pursuant to the exceptions under §§ 716.14 and 716.15. The limits on redisclosure and reuse that apply to recipients of information and their affiliates will vary, depending on whether the information was provided pursuant to one of the exceptions in §§ 716.14 and 716.15.

If a credit union received the nonpublic personal information from a financial institution pursuant to an exception under §§ 716.14 and 716.15, the credit union may disclose the information to its affiliates or to affiliates of the financial institution from which the information was received. In addition, the credit union may disclose and use the information pursuant to an exception in 716.14 or 716.15 in the ordinary course of business to carry out the activity covered by that exception. 12 CFR 716.11(a)(1)(iii). An example of this is if a credit union performs correspondent services for another credit union and receives a list containing member information, the credit union performing the services may disclose the list in response to a subpoena or to its attorneys, accountants, or auditors. The credit union could not use the list for its own marketing or disclose the list to a third party for marketing. The credit union's affiliates may disclose and use the information, but only to the extent permissible for the credit union.

If a credit union received the nonpublic personal information from a financial institution other than pursuant to an exception under § 716.14 or 716.15, the credit union may disclose the information to its affiliates or to the affiliates of the financial institution that made the initial disclosure. In addition, the credit union may disclose the information to any other person if the disclosure would be lawful if the financial institution made the disclosure directly to that person. The final rule also provides an example. The credit union may disclose a list it receives from a financial institution to another nonaffiliated third party only if the financial institution could have lawfully disclosed it to the nonaffiliated third party. The credit union may disclose the list in accordance with the privacy policy of the financial institution, as limited by the opt out directions of each

consumer whose information the credit union intends to disclose. The affiliates of the credit union may disclose the information only to the extent that the credit union may disclose the information.

The Board requested comment on whether the rule should require a credit union that discloses nonpublic personal information to a nonaffiliated third party to develop policies and procedures to ensure that the third party complies with the limits on redisclosure of that information. Approximately 25 commenters thought that the credit union should not be responsible for third party compliance because it would be burdensome and unnecessary. A few commenters replied that financial institutions should develop policies and procedures on third party compliance. A few commenters wrote that the Board should suggest confidentiality agreements between credit unions and vendors. One commenter suggested that a credit union should use due diligence when selecting the third party.

The Board, consistent with the other Agencies, has given these comments due consideration and § 716.11 of the final rule does not impose a specific duty on credit unions to monitor third parties' use of nonpublic personal information provided by the credit unions. The Board notes, however, that credit unions may have contracts in place that limit what the recipient may do with the information. The Board also notes that the limits on reuse as stated in the final rule provide a basis for an action to be brought against an entity that violates those limits.

Paragraphs (c) and (d) of the final rule mirror the provisions of paragraphs (a) and (b) of the final rule. The same general redisclosure and reuse limits apply to any nonaffiliated financial institution that receives nonpublic personal information from a credit union as would apply to a credit union that receives such information from a nonaffiliated financial institution.

Section 716.12 Limits on Sharing of Account Number Information for Marketing Purposes

Section 502(d) of the GLB Act prohibits a financial institution from disclosing, other than to a consumer reporting agency, an account number or similar form of access number or access code for a credit card account, deposit account, or transaction account of a consumer to any nonaffiliated third party for use in telemarketing, direct mail marketing, or other marketing through electronic mail to the consumer. Proposed § 716.13 restated this statutory prohibition with minor stylistic changes intended to make the rule easier to read.

A few commenters recommended that the Board clarify that these limits only apply to credit card accounts, transaction accounts and deposit accounts. Several commenters requested that the Agencies provide a definition and specific examples of a transaction account. A few commenters requested confirmation that transaction accounts do not include mortgage accounts or insurance accounts. The final rule clarifies that a transaction account is an account other than a share account or credit card account, and does not include an account to which a third party cannot initiate a charge. 12 CFR 716.12(c)(2).

The Board also requested comment on whether a flat prohibition would disrupt routine, unobjectionable practices. Several commenters were concerned that it would disrupt the practices of a service provider who prepares and distributes monthly credit union statements and includes literature about products with the statement. Approximately 18 commenters requested that the Board clarify that the scope of the prohibition is narrow. One commenter requested that the Agencies adopt this rule unchanged from the proposed and not add any exceptions.

The commenters requested clarification that the limits on sharing do not apply to a financial institution itself or those acting on behalf of the financial institution. Some credit unions noted that they use agents or service providers to conduct marketing on the credit union's behalf. This might occur, for instance, when a credit union instructs a service provider that assists in the delivery of monthly statements to include a ''statement stuffer'' with the statement informing consumers about a financial product or service offered by the credit union. NCUA, consistent with the other Agencies, recognizes the need to disclose account numbers in this instance, and believes that there is little risk to the consumer presented by such disclosure. Similarly, NCUA recognizes that a credit union may use agents to market the credit union's own financial products and services. Commenters advocating that the final rule exclude disclosures to agents stated that the agents effectively act as the credit union in the marketing of its financial products and services. These commenters suggested that there was no more reason to preclude sharing the account numbers with an agent hired to market the credit union's financial products and services than there would be to preclude sharing between two departments of the same credit union.

The final rule provides for an exception to the prohibition on account number disclosure to the credit union's agent or service provider solely in order to perform marketing for the credit union's products or services, as long as the agent or service provider cannot directly initiate charges to the account. 12 CFR 716.12(b)(1).

The Board requested comment on whether the GLB Act prohibits a credit union from disclosing encrypted account numbers to a marketing firm if the credit union does not provide the key to the marketer. The Board also requested comment on whether an exception could avoid creating risks that may arise when a third party is provided access to a consumer's account. Approximately 21 commenters requested that the rule permit a financial institution to disclose an encrypted, truncated, scrambled, reference, or similarly coded form number to identify a customer. NCUA, consistent with the other Agencies, believes that consumers will be adequately protected by disclosures of encrypted account numbers that do not enable the recipient to access the consumer's account. The final rule provides a negative example that an account number, or similar form of access number or code, does not include a number or code in an encrypted form, if the credit union does not provide the recipient with a means to decode the number or code. 12 CFR 716.12(c)(1).

The Board also requested comment on whether a consumer should be able to consent to the disclosure of his or her account number and what standards should apply. All of the approximately ten commenters who commented on this issue wrote that the regulation should state that a consumer may consent to disclosure. A few commenters requested that the rule permit credit unions to share a customer's account number with a third party if the customer actually purchases the marketed product. The final rule addresses consumer consent in § 716.15, and does not address it again in this section.

Several commenters requested that a credit union should be able to disclose an account number to a participant in a private label credit card program or an affinity or similar program where participants are identified to the member when the member enters the program. Under these programs, a consumer typically will be offered certain benefits, often by a retail merchant, in return for using a credit card that is issued by a particular financial institution. In the example of a private label credit card, the consumer

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understands the need for the merchant and the financial institution to share the consumer's account number. The NCUA and the other Agencies believe this sort of disclosure is appropriate and does not create a significant risk to the consumer. The final rule provides for this exception in § 716.12(b)(2) where the participants are identified to the consumer at the time the consumer enters into the program.

Subpart C—Exceptions

Section 716.13 Exception to Opt Out Requirements for Service Providers and Joint Marketing

Section 502(b) of the GLB Act creates an exception to the opt out rules for the disclosure of information to service providers and for marketing. A consumer will not have the right to opt out of disclosing nonpublic personal information to nonaffiliated third parties under these circumstances, if the credit union satisfies certain requirements. Section 502(b) of the GLB Act provides that the financial institution must ''fully disclose'' to the consumer that it will provide this information to the nonaffiliated third party before the information is shared. This disclosure should be provided as part of the initial notice that is required by § 716.4. NCUA invited comment on whether the proposed rule in § 716.9 appropriately implemented the requirement of ''full'' disclosure.

A couple of commenters suggested that consumers should be fully informed of the parties to the joint marketing agreements. One supported this approach so that members can report abuses to NCUA. Another commenter opposed specific, separate disclosures for joint marketing agreements. The Board believes that the notice requirement as proposed satisfies the full disclosure requirement of the GLB Act and, therefore, retains the same notice requirement in the final rule.

The GLB Act allows the Agencies to impose requirements on the disclosure of information pursuant to the exception for service providers beyond those imposed in the statute. NCUA, like the other Agencies, did not do so in the proposed rules, but invited comment on whether additional requirements should be imposed, and, if so, what those requirements should address. Approximately ten commenters wrote that the Agencies should reconsider this exception for opt out requirements for service providers and also eliminate the notice requirement. These commenters wrote that the notice and contract requirements under § 502(b) should not apply to outsourcing arrangements where the third party agent, processor or server is performing operational functions on behalf of the credit union. They requested that service providers instead should be exempt from notice and opt out requirements under the § 716.10 exception. The final rule in § 716.13 retains application of this section to service providers because it is statutory.

One commenter requested that the Agencies provide examples of this service provider exception. The exception would apply, for example, to service providers whose services are not necessary in order for the credit union to provide financial services or products to consumers. The final rule provides a new example, that if a credit union discloses nonpublic personal information to a financial institution with whom it performs joint marketing, the contract must prohibit the institution from disclosing or using the information except as necessary to carry out the joint marketing or under an exception in § 716.14 or 716.15 in the ordinary course of business to carry out that marketing.

The proposed rule in § 716.9 required the credit union to enter into a contract with the third party that requires the third party to maintain the confidentiality of the information. Several commenters requested that the Board exempt existing contracts from the requirement of the confidentiality provision or extend the time frame for existing contracts to comply. The final rule provides a two-year grandfather period for service agreements entered into before July 1, 2000, under § 716.18(c).

The proposed rule in § 716.9 provided that the contract should require the third party: (i) To maintain the confidentiality of the information at least to the same extent as is required for the credit union; and (ii) to use the information solely for the purposes for which the information is disclosed or as otherwise permitted by the exceptions in § § 716.10 and 716.11 of the proposed rule. The final rule in § 716.13 deletes the first provision as redundant and clarifies that the use under the exceptions (§ § 716.14 and 716.15 of the final rule) is in the ordinary course of business to carry out the purposes for which the credit union disclosed the information.

The Board requested comment on the application of the exception to credit unions that contract with credit scoring vendors to evaluate borrower creditworthiness. Approximately nine commenters responded that the exception should be interpreted so that it does not inhibit credit scoring, market response, or consumer behavioral models.

NCUA sought comment on whether the rule should require a credit union to take steps to assure itself that the product being jointly marketed and the other participants in the joint marketing agreement do not present undue risks for the credit union. Several commenters opposed the Board requiring credit unions to take steps to ensure that the products and participants do not present undue risks. One commenter wrote that Letter to Credit Unions No. 150 already provides adequate protection against undue risks. One commenter supported the credit unions taking steps against undue risks. The final rule does not add new requirements to ensure against undue risks.

Section 716.14 Exceptions to Notice and Opt Out Requirements for Processing and Servicing Transactions

The proposed rule in § 716.13 set out certain exceptions for disclosures of nonpublic personal information in connection with the administration, processing, servicing, and sale of a consumer's account. One commenter suggested the Board should apply the exception in cases where the use of information is for the benefit of the credit union and not the third party. Several commenters requested that the Board make the rule consistent with the plain language of the GLB Act and use the terms ''in connection with,'' not ''required'' for servicing. NCUA and the other Agencies agree with the commenters. NCUA has made stylistic changes and has revised its use of the terms ''in connection with'' in the final rule. NCUA has also deleted the reference to underwriting insurance at the consumer's request or for reinsurance purposes, because credit unions do not engage directly in those activities.

Several of the commenters requested that the Board broaden the exception and clarify the definition and list examples of servicing transactions. Approximately ten commenters requested that the Board clarify that the exceptions should include collection activities or products or services associated with a loan, such as those to protect collateral securing a loan. Commenters also recommended adding other examples to the list of exceptions, such as private label credit cards, electronic funds transfer transactions, statement mailing, ATMs, mechanical breakdown insurance, gap insurance on leasing, and one credit union phoning another to check on available funds before depositing a check drawn on the

other credit union. Some of these examples have been included and the Board believes they are sufficiently illustrative of transactions that would qualify as servicing transactions.

Section 716.15 Other Exceptions to Notice and Opt Out Requirements

The proposed rule in § 716.11 set out other exceptions, not made in connection with the administration, processing, servicing, and sale of a consumer's account. One of the exceptions was for disclosures made with the consent or at the direction of the consumer. The Board requested comment whether it should add safeguards to this exception to minimize the potential for consumer confusion. One commenter recommended that the Agencies not allow the consumer consent provision to be a way to evade the notice and opt out in the rest of the GLB Act.

Several commenters wrote that the consumer consent requirement should be a flexible requirement that the consumer can exercise by phone, email, or Internet. A few commenters requested that the Agencies eliminate the consent requirement. A couple of commenters wrote that the exception should permit implied consent.

Approximately ten commenters wrote that the consent exception should permit financial institutions to share nonpublic personal information about consumers with third parties with whom they have co-branding and affinity relationships. For example, in these cases, the name of a third party who is the provider of a financial product is prominently displayed on credit cards or private label cards. If the third party is a financial institution, the proposed rule already provided an exception to the opt out requirement. Commenters requested that the same exception should also apply where the third party is not a financial institution. Commenters wrote that an opt out requirement would be burdensome and would delay providing customers the benefits they expect to receive.

After considering these comments, the NCUA and the other Agencies have decided to adopt this section of the final rule in § 716.15 virtually as proposed in § 716.11. However, the NCUA and the other Agencies are changing the reference in the proposed rule from government regulator to federal functional regulator, the Secretary of Treasury, a state insurance authority, and the Federal Trade Commission.

Subpart D—Relation to Other Laws; Effective Date

Section 716.16 rotection of Fair Credit Reporting Act

The Agencies and NCUA are adopting § 716.16 as proposed in § 716.15.

Section 716.17 Relation to State Laws

Section 507 of the GLB Act states that Title V does not preempt any state law that provides greater protections than are provided by Title V. Determinations of whether a state law or Title V provides greater protections are to be made by the Federal Trade Commission after consultation with the agency that regulates either the party filing a complaint or the credit union about whom the complaint was filed. Determinations of whether state or federal law afford greater protections may be initiated by any interested party or on the Federal Trade Commission's own motion.

Proposed § 716.15 was substantively identical to section 507. Although statutorily mandated, many commenters felt compelled to note the hardship, if not impossibility, it will be for financial institutions to comply with the federal regulation and the many different state laws that may apply to them. The difficulties include: when to follow state law; what state law to follow; and redesigning computer systems to take into account the different requirements.

One commenter suggested that ''federal credit unions may be subject to a state compliance examination'' in states where state law is controlling. The Board would treat compliance by a federal credit union with a state privacy law the same as it treats a federal credit union's compliance with other controlling state law. The NCUA will coordinate with the appropriate state regulator to ensure that a federal credit union is in compliance with the controlling state privacy provisions.

Section 716.18 Effective Date; Transition Rule

Section 510 of the GLB Act states that, as a general rule, the relevant provisions of Title V take effect 6 months after the date on which rules are required to be prescribed. However, section 510(1) authorizes the Agencies to prescribe a later date in the rules enacted pursuant to section 504.

Proposed § 716.16(a) had an effective date of November 13, 2000. NCUA invited comment on whether six months following adoption of final rules was sufficient to enable credit unions to comply with the rules. Fifty-four of the 55 commenters that commented on this provision requested that the effective date for mandatory compliance be extended. The sole dissenting commenter was the Congressional Privacy Caucus.

The Congressional Privacy Caucus' rationale was that six months is sufficient time for financial institutions to comply. The other 54 commenters offered a variety of reasons why six months is not sufficient. Some of the reasons in support of extending the compliance date were: operationally and financially it is a burden for financial institutions because they must identify customers and consumers and the sources and uses of consumer information, train staff, prepare disclosure statement and reprogram computers; prompt corrective action compliance, Y2K compliance and end of year timing, all make this a difficult period for credit unions to comply; credit unions would not be able to include the disclosure with their annual statements; this is the holiday season which is a busy time for the members and the post office; this was not budgeted for in the 2000 budget; and Congress gave the Agencies authority to extend the compliance date. Some commenters noted that, if financial institutions are required to rush compliance, there is a much greater likelihood of mistakes.

The Board agrees that six months after publication of the final rule may be insufficient time in certain instances for a credit union to ensure that its forms, systems, and procedures comply with the rule. In order to accommodate situations requiring additional time, the Board retained the effective date of November 13, 2000, but, consistent with its authority under section 510(1) of the GLB Act to extend the effective date, the Board will give credit unions until July 1, 2001 to be in full compliance with the regulation.

Credit unions are expected, however, to begin compliance efforts promptly, to use the period prior to June 30, 2001, to implement and test their systems, and be in full compliance by July 1, 2001. Given that this provides credit unions with slightly over 13 months in which to comply with the rule, the Board has determined that there no longer is any need for a separate phase-in for providing initial notices. Thus, a credit union will need to deliver all required opt out notices and initial notices before July 1, 2001. The final rule provides a new example that the credit union provides an initial notice to consumers who are members as of July 1, 2001, if by that date, it has established a system for providing initial notice to all new members and has mailed the initial notice to all existing members.

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Credit unions are encouraged to provide disclosures as soon as practicable. Depending on the readiness of a credit union to process opt out elections, credit unions might wish to consider including the privacy and opt out notices in the same mailing as is used to provide tax information to members in the first quarter of 2001 to increase the likelihood that a member will not mistake the notices for an unwanted solicitation. The Board believes that this extension represents a fair balance between those seeking prompt implementation of the protections afforded by the statute and those concerned about the reliability of the systems that are put in place.

In response to a concern by some commenters that existing service contracts may not comply with § 716.13(a)(2) of the final rule, the NCUA and the other Agencies are agreeing to postpone the mandatory compliance date for existing third party service contracts to state that the third party agrees to maintain the confidentiality of nonpublic personal information, until July 1, 2002. All third party service contracts entered into after July 1, 2000, however, must comply with the requirement.

Appendix A

Approximately 19 commenters requested that the Agencies provide sample or model disclosure forms of the notice. The Board, consistent with the other Agencies, has provided sample disclosure language in Appendix A to its final rule. The Board urges credit unions to carefully review whether these clauses accurately reflect a given credit union's policies and practices before using the clauses. Credit unions are free to use different language and to include as much detail as they think is appropriate in their notices.

The sample clauses are intended to minimize the burden and costs to credit unions, including small credit unions. This is especially true for small credit unions that only share nonpublic personal information with nonaffiliated third parties pursuant to the exceptions provided in § § 716.14 and 716.15. These credit unions may provide relatively simple initial and annual notices to members.

III. Regulatory Procedures

A. Paperwork Reduction Act

NCUA has submitted the reporting requirements in Parts 716 and 741 to the Office of Management and Budget and is awaiting approval and issuance of a new OMB control number (3133;____). Approximately 20 commenters wrote that this regulation will result in increased costs. Several commenters also wrote that there will be increased paperwork burden. Commenters cited dollar amounts from $500 to ten million dollars, for system changes, staff hours, and mailing costs. A few commenters wrote that the cost may depend on what their vendors will charge to upgrade their systems. One commenter wrote that there would be no increased costs. Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB number. The control number will be displayed in the table at 12 CFR part 795.

B. Regulatory Flexibility Act

The Regulatory Flexibility Act (5 U.S.C. 601–612) requires, subject to certain exceptions, that NCUA prepare an initial regulatory flexibility analysis (IRFA) with a proposed rule and a final regulatory flexibility analysis (FRFA) with a final rule, unless NCUA certifies that the rule will not have a significant economic impact on a substantial number of small credit unions. For purposes of the Regulatory Flexibility Act, and in accordance with NCUA's authority under 5 U.S.C. 601(4), NCUA has determined that small credit unions are those with less than one million dollars in assets. *See* 12 CFR 791.8(a). NCUA's final rule will apply to approximately 1,626 small credit unions, out of a total of approximately 10,627 federally-insured credit unions.

At the time of issuance of the proposed rule, NCUA could not make such a determination for certification. Therefore, NCUA issued an IRFA pursuant to section 603 of the Regulatory Flexibility Act. After reviewing the comments submitted in response to the proposed rule, NCUA believes that it does not have sufficient information to determine whether the final rule would have a significant economic impact on a substantial number of small credit unions. Therefore, pursuant to section 604 of the Regulatory Flexibility Act, NCUA provides the following FRFA.

This FRFA incorporates NCUA's initial findings, as set forth in the IRFA; addresses the comments submitted in response to the IRFA; and describes the steps NCUA has taken in the final rule to minimize the impact on small entities, consistent with the objectives of the GLB Act. Also, in accordance with Section 212 of the Small Business Regulatory Enforcement Fairness Act of 1996 (Public Law 104–121), NCUA will in the near future issue a Small Credit Union Compliance Guide to assist small credit unions in complying with this rule.

1. *Statement of the Need and Objectives of the Rule.* The final rule implements the provisions of Title V, Subtitle A of the GLB Act addressing consumer privacy. In general, these statutory provisions require financial institutions to provide notice to consumers about an institution's privacy policies and practices, restrict institutions from sharing nonpublic personal information about consumers with nonaffiliated third parties, and permit consumers to prevent institutions from disclosing nonpublic personal information about them to certain nonaffiliated third parties by ''opting out'' of that disclosure. Section 504 of the GLB Act requires NCUA and the other Agencies, in consultation with representatives of state insurance authorities, to prescribe ''such regulations as may be necessary'' to carry out the purposes of Title V, Subtitle A. NCUA believes that the final rule gives credit unions greater certainty on how to comply with the statute.

2. *Summary of Significant Issues Raised in Public Comments and Assessment of Issues.* NCUA does not have a practicable or reliable basis for quantifying the costs of the proposed rule or any alternatives, but sought comment on the potential costs. NCUA specifically requested information on the costs of creating privacy policy disclosures, distributing privacy policy disclosures, implementing ''opt out'' disclosure and processing requirements, and complying with the proposed rule in its entirety.

The comments varied, and were not specific to small credit unions. Approximately 20 commenters wrote that this regulation will result in increased costs. Commenters cited dollar amounts from $500 to ten million dollars, for system changes, staff hours, and mailing costs. A few commenters wrote that the cost may depend on what their vendors will charge to upgrade their systems. One commenter wrote that there would be no increased costs.

After considering the comments received, NCUA does not have a practicable or reliable basis for quantifying the costs of implementing the requirements of the GLB Act. We expect that compliance costs will vary significantly between credit unions depending on information sharing practices.

NCUA believes that the new compliance requirements will indeed create additional economic costs for some credit unions, especially those that choose to disclose information to nonaffiliated third parties. Most, if not,

all of these costs result from requirements expressly mandated by the GLB Act. These costs include, but are not limited to: (1) Reviewing current information sharing practices; (2) determining operational and computer programming changes necessary; (3) identifying sources and uses of member information; (4) preparing disclosure forms; and (5) training staff. Credit unions that disclose nonpublic personal information about consumers to nonaffiliated third parties will be required to provide opt out notices to consumers, as well as a reasonable opportunity to opt out of certain disclosures. These credit unions will have to develop systems for keeping track of consumers' opt out directions. Some credit unions, particularly those that disclose nonpublic information about consumers to nonaffiliated third parties, may need the advice of legal counsel to ensure that they comply with the rule.

However, NCUA continues to believe that the costs of implementing the opt out provisions of the final rule will be insubstantial for credit unions that do not disclose nonpublic personal information about consumers to nonaffiliated third parties. These credit unions may provide relatively simple initial and annual notices to consumers with whom they establish member relationships. However, NCUA cannot determine either the number or identity of credit unions that will not disclose nonpublic personal information about consumers to nonaffiliated third parties.

In the IRFA, NCUA recognized that the Congressional Conferees on the Act wished to ensure that smaller financial institutions are not placed at a competitive disadvantage by a statutory regime that permits certain information to be shared freely within an affiliate structure while limiting the ability to share that same information with nonaffiliated third parties. The Conferees stated that, in prescribing regulations, the federal regulatory agencies should take into consideration any adverse competitive effects upon small commercial banks, thrifts, and credit unions. *See* H.R. Conf. Rep. No. 106–434, at 173 (1999).

Accordingly, NCUA also sought comment on whether the requirements of the Act and this rule will create additional burden for small credit unions, particularly those that disclose nonpublic personal information about consumers to nonaffiliated third parties. In connection with any such burden, NCUA requested comment on whether any exemptions for small credit unions would be appropriate. A few commenters suggested that small credit unions not have to provide opt out notices, but those suggestions were not consistent with the objectives of the GLB Act. Although NCUA could exempt small credit unions from providing a notice and opportunity for consumers to opt out of certain information disclosures, NCUA does not believe that such an exemption would be appropriate, given the purpose of the Act to protect the confidentiality and security of nonpublic personal information about consumers.

Several commenters noted that small credit unions are penalized by the definition of ''control'' in the rule. The Board has added an example to the definition of control that will assist small credit unions.

Further, NCUA, consistent with the other Agencies, has revised some of the requirements in the final rule so that they are less burdensome. The discussion below reviews some of the other significant changes:

a. *Sample disclosure clauses* (Appendix A to Part 716) and Compliance Guide for Certain Credit Unions (Supplementary Information, Part V). Many commenters expressed concern over the amount of detail that appears to be required in both initial and annual notices. In addition, many of the commenters requested model forms for guidance as to the level of detail required. NCUA did not intend for the disclosures to be overly detailed and thus, burdensome for credit unions and potentially overwhelming for consumers. In response to these comments, Appendix A to Part 716 contains sample clauses to clarify the level of detail that NCUA believes is necessary and appropriate to be consistent with the statute.

NCUA has also provided additional assistance under the caption ''Guidance for Certain Credit Unions'' (Guidance). Supplementary Information, Part V. The Guidance generally clarifies the operation of the final rule. It also provides an example of a notice for small credit unions that only share nonpublic personal information with nonaffiliated third parties pursuant to the exceptions provided in §§ 716.14 and 716.15. The Guidance may be used in conjunction with the sample clauses contained in Appendix A.

The sample clauses under Appendix A and the Guidance are intended to minimize the burden and costs to credit unions, including small credit unions. This is especially true for small credit unions that only share nonpublic personal information with nonaffiliated third parties pursuant to the exceptions provided in §§ 716.14 and 716.15. These credit unions may provide relatively simple initial and annual notices to members.

b. *Definition of nonpublic personal information.* In the preamble to the proposed rule, NCUA offered for comment two alternatives for defining nonpublic personal information. The first, (Alternative A) deemed information as publicly available only if a credit union *actually obtained* the information from a public source, whereas the second (Alternative B) treated information as publicly available if a credit union *could* obtain it from such a source. A significant majority of commenters favored Alternative B. Many commenters suggested that implementing Alternative A would be overly burdensome. Credit unions would have to develop some sort of methodology to distinguish between information obtained from consumers, versus information obtained through public sources. In response to these comments, the final rule adopts a modified version of Alternative B (refer to Section-by-section analysis for additional information) that treats information as publicly available if a credit union could obtain the information from a public source. The final rule addresses the concerns of credit unions—including small credit unions—by adopting the least economically burdensome definition of nonpublic personal information.

c. *Effective date.* Section 510 of the GLB Act states that, as a general rule, the relevant provisions of Title V take effect six months after the date on which rules are required to be prescribed, *i.e.,* November 12, 2000. However, section 510(1) authorizes the NCUA and the other Agencies to prescribe a later date in the rules enacted pursuant to section 504. The proposed rule sought comment on the effective date prescribed by the statute. The overwhelming majority of commenters requested additional time to comply with the final rule. Several commenters noted that credit unions may encounter difficulty managing the expenses and resources required to comply with the final rule as the credit union's budget for the current year was established prior to the issuance of the proposed regulation. This may be especially true for small credit unions that face already tight budgetary constraints due to heightened competition. In response to these concerns, NCUA has retained the effective date of November 13, 2000, but, consistent with its authority under section 510(1) of the GLB Act to extend the effective date, NCUA will give credit unions until July 1, 2001 to be in full compliance with the regulation. This

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additional time will allow credit unions to properly budget for any necessary expenses and staff resources required to comply with this rule and to make all necessary operational changes.

d. *New notices not required for each new financial product or service.* Some commenters expressed concern that the proposed rule may require a new initial notice each time a consumer obtains a new financial product or service. This would be especially burdensome for credit unions that adopt a universal privacy policy that covers multiple products and services. To address these concerns and minimize economic burden, the final rule was clarified to instruct credit unions that a new initial notice is not required if the credit union has given its initial notice to the member, and that initial notice remains accurate with respect to the new product or service.

e. *Short form initial notice for consumers.* In the proposed rule, credit unions were required to provide consumers a copy of a credit union's complete initial notice even when there is no member relationship. NCUA agrees with commenters that suggested that the statute's objectives for the initial notice requirements could be achieved in a less burdensome way. Therefore, NCUA has exercised its exemptive authority as provided in section 504(b) to create an exception to the general rule that otherwise requires a credit union to provide a consumer with both the initial and opt out notices before disclosing nonpublic personal information about that consumer to nonaffiliated third parties. A credit union may provide a ''short-form'' initial notice along with the opt out notice to a consumer with whom the credit union does not have a member relationship. This short-form notice must state that the disclosure containing information about the credit union's privacy policies and practices is available upon request and provide one or more reasonable means by which the consumer may obtain a copy of the notice. This provision in the final rule will lessen the burden on credit unions, including small credit unions.

3. *Steps to Minimize the Significant Economic Impact on Small Entities Consistent with the Objectives of the GLB Act.* The objectives of Title V of the GLB Act are that each financial institution has an affirmative and continuing obligation to respect the privacy of its consumers and to protect the security and confidentiality of those consumers' nonpublic personal information. NCUA carefully considered comments that suggested a variety of alternatives that could minimize the economic and overall burden of complying with the final rule. As stated above, NCUA has made changes to the proposal as a result of the comments that it hopes will ease the burden for small credit unions.

Nonetheless, the statute does not authorize the NCUA to create exemptions from the GLB Act based on a credit union's size or to mandate different compliance standards for small credit unions. The rule applies to all federally-insured credit unions, regardless of size. Moreover, different compliance standards would be inconsistent with the purposes of the GLB Act.

NCUA believes that the burden is relatively small for credit unions that only disclose nonpublic personal information about consumers to nonaffiliated third parties pursuant to the exceptions provided under §§ 716.14 and 716.15. NCUA's determination is based on an analysis of comments received in response to the proposed rule. These credit unions may provide relatively simple initial and annual notices to consumers with whom they establish member relationships. At this time, it is not clear if information-sharing among affiliates in large institutional entities will place small credit unions at a disadvantage. NCUA believes that further experience under the regulation would be appropriate before considering any exemptions in this area for small credit unions.

C. Executive Order 13132

Executive Order 13132 encourages independent regulatory agencies to consider the impact of their regulatory actions on state and local interests. In adherence to fundamental federalism principles, NCUA, an independent regulatory agency as defined in 44 U.S.C. 3502(5), voluntarily complies with the executive order. This final rule will apply to all federally-insured credit unions, but it will not have substantial direct effects on the states, on the relationship between the national government and the states, or on the distribution of power and responsibilities among the various levels of government. Section 507 of the GLB Act states that state law may provide greater consumer protections than this proposed rule. In that event, federal law would not preempt state law. NCUA has determined the proposed rule does not constitute a policy that has federalism implications for purposes of the executive order.

D. Small Business Regulatory Enforcement Fairness Act

The Small Business Regulatory Enforcement Fairness Act of 1996 (Pub. L. 104–121) provides generally for congressional review of agency rules. A reporting requirement is triggered in instances where NCUA issues a final rule as defined by section 551 of the Administrative Procedures Act. 5 U.S.C. 551. NCUA has recommended to The Office of Management and Budget that it determine that this is not a major rule, and is awaiting its determination.

E. The Treasury and General Government Appropriations Act, 1999—Assessment of Federal Regulations and Policies on Families

NCUA has determined that the final rule will not affect family well-being within the meaning of section 654 of the Treasury and General Government Appropriations Act, 1999, Pub. L. 105–277, 112 Stat. 2681 (1998).

IV. Agency Regulatory Goal

NCUA's goal is clear, understandable regulations that impose minimal regulatory burden. Some commenters responded that the rule is not understandable and intrusive if implemented as proposed. The majority of the commenters did not address this issue.

V. Guidance for Certain Credit Unions

To minimize the burden and costs to a credit union and generally clarify the operation of the final rule, NCUA and the other Agencies are including this compliance guide that may be used in conjunction with the sample clauses contained in Appendix A. This guide specifically applies to a credit union that: (1) Does not have any affiliates; only discloses nonpublic personal information to nonaffiliated third parties in accordance with an exception under § § 716.14 and 716.15, such as in connection with servicing or processing a financial product or service that a consumer requests or authorizes; and (3) does not intend to reserve the right to disclose nonpublic personal information to nonaffiliated third parties, except under § § 716.14 and 716.15.[1]

In general, if a credit union discloses nonpublic personal information to nonaffiliated third parties only as

[1] A credit union that discloses or reserves the right to disclose nonpublic personal information to a nonaffiliated third party under other circumstances must comply with other provisions in the rule, notably §§ 716.7, 716.8, and 716.3, if applicable. A creidt union that discloses or reserves the right to disclose nonpublic personal information to an affiliate must comply with other provisions in the rule, notably § 716.6(a)(7), if applicable.

authorized under an exception, then that credit union's only responsibilities under the regulation are to provide an initial and annual notice of its privacy policies and practices to each of its members. The credit union is not required to provide an opt out notice to its member.

A. *Initial notice to members.* A credit union must provide a notice of its policies and practices to each of its members. A member is a natural person who has a continuing relationship with a credit union, as described in § 716.4(c). For instance, an individual who is accepted for membership under the credit union's bylaws is a member of that credit union. By contrast, an individual who uses a credit union's ATM to withdraw funds from a checking account maintained at *another* financial institution is not a member of that credit union. Even if an individual repeatedly uses a credit union's ATM that individual is not the credit union's member. In other words, the credit union is obligated to provide an initial and annual notices to each of its own members, but not its consumers.

B. *Time to provide initial notice.* A credit union must provide a notice of its policies and practices to each of its members not later than when it establishes a member relationship (§ 716.4(a)(1)). For instance, a credit union must provide a notice to an individual not later than when he or she is accepted for membership. Thus, a credit union can provide the notice to a potential member together with the membership agreement and signature card.

If an existing member of a credit union obtains a new financial product or service from it, that credit union need not provide another initial notice to him or her (§ 716.4(d)) if the initial notice has covered the subsequent product.

For instance, if Alison Individual walks into Credit Union for the first time on July 2, 2001, to apply for membership and open a share account, Credit Union complies with this provision of the rule if it provides an initial notice to Alison together with the documents that constitute the contract for membership and the share account. When Alison is accepted for membership and opens her account on that day, she becomes a member of Credit Union. Allison maintains her membership and, six months later, returns to Credit Union to obtain a loan. If the initial notice that Credit Union provided to Alison was accurate when she became a member and opened her account, then Credit Union need not provide another initial notice to her when she obtains the loan because it has provided the notice to Allison when she became a member.

C. *Method of providing the initial notice.* A credit union must provide its initial notice so that each member can reasonably be expected to receive actual notice, in writing, of its privacy policies and practices (§ 716.9(a)). For example, a credit union may provide the initial notice by mailing a printed copy of it together with the documents and other materials that constitute the share account agreement or at an earlier time. Similarly, a credit union may provide the initial notice by hand-delivering a printed copy of it to the member together with the documents that constitute the membership and share account agreement or at an earlier time.

D. *Compliance with initial notice requirement for existing members by effective date.* A credit union is required to provide an initial notice to each of its current members not later than July 1, 2001 (§ 716.18(b)). A credit union complies with this provision of the rule if it mails a printed copy of the notice to the member's last known address.

E. *Annual notice.* During the continuation of the member relationship, a credit union also must provide an annual notice to the member, as described in § 716.5(a). A credit union must provide an annual notice to each member at least once in any period of 12 consecutive months during which the member relationship exists. A credit union may define the 12-consecutive-month period, but must consistently apply that period to the member. A credit union may define the 12-consecutive-month period as a calendar year and provide the annual notice to the member once in each calendar year following the calendar year in which it provided the initial notice.

For example, assume that Credit Union defines the 12-consecutive-month period as a calendar year and provides annual notices to all of its members on October 1 of each year. If Alison Individual is accepted for membership by Bonanza on July 2, 2001, and thereby becomes a member, then Credit Union must provide an initial notice to Alison together with the documents that constitute the contract for membership or at an earlier time. Credit Union also must provide an annual notice to Alison by December 31, 2002. If Credit Union provides an annual notice to Alison on October 1, 2002, as it does for other members, then it must provide the next annual notice to Alison not later than October 1, 2003.

F. *Method of providing the annual notice.* Like the initial notice, the annual notice must be provided so that each member can reasonably be expected to receive actual notice, in writing, of a credit union's privacy policies and practices (§ 716.9(a)). A credit union complies with this provision of the rule if it mails a printed copy of the notice to the member's last known address.

G. *Joint accounts.* If two or more members jointly obtain a financial product or service, other than a loan, then a credit union may provide one initial notice to those members jointly. Similarly, a credit union may provide one annual notice to those members jointly.

H. *Information described in the initial and annual notices.* The initial and annual notices must include an accurate description of the following four items of information:

1. The categories of nonpublic personal information that the credit union collects (§ 716.6(a)(1));

2. The fact that the credit union does not disclose nonpublic personal information about its current members to affiliates or nonaffiliated third parties, except as authorized by § § 716.14 and 716.15 (§ 716.6(a)(2)–(3)). When describing the categories with respect to those parties, the credit union is required to state only that it makes disclosures to other nonaffiliated third parties as permitted by law (§ 716.6(c));

3. The categories of nonpublic personal information about the credit union's former members that it discloses and the categories of affiliates and nonaffiliated third parties to whom it discloses nonpublic personal information about its former members (§ 716.6(a)(4));

4. The credit union's policies and practices with respect to protecting the confidentiality and security of nonpublic personal information (§ 716.6(a)(8)).

For each of these four items of information above, a credit union may use a sample clause contained in Appendix A. The NCUA Board emphasizes that a credit union may use a sample clause only if that clause accurately describes its actual policies and practices.

I. *Sample notice.* A credit union (''Credit Union'') that (i) does not have any affiliates and (ii) only discloses nonpublic personal information to nonaffiliated third parties as authorized under § § 716.14 and 716.15, may comply with the requirements of § 716.6 of the rule by using the following sample notice, if applicable.

Credit union collects nonpublic personal information about you from the following sources:

- Information we receive from you on applications or other forms;

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• Information about your transactions with us or others; and

• Information we receive from a consumer reporting agency. [2]

We do not disclose any nonpublic personal information about you to anyone, except as permitted by law.

If you decide to terminate your membership or become an inactive member, we will adhere to the privacy policies and practices as described in this notice.

Credit union restricts access to your personal and account information to those employees who need to know that information to provide products or services to you. Credit union maintains physical, electronic, and procedural safeguards that comply with federal regulations to guard your nonpublic personal information.

J. *Initial and annual notices must be clear and conspicuous.* NCUA emphasizes that a credit union must ensure that both the initial and annual notices must be clear and conspicuous, as defined in § 716.3(b).

List of Subjects

12 CFR Part 716

Consumer protection, Credit unions, Privacy, Reporting and recordkeeping requirements.

12 CFR Part 741

Bank deposit insurance, Credit unions, Reporting and recordkeeping requirements.

By the National Credit Union Administration Board on May 8, 2000.

Sheila A. Albin,

Acting Secretary of the Board.

For the reasons set out in the preamble, it is proposed that 12 CFR chapter VII be amended by adding a new part 716 to read as follows:

PART 16—PRIVACY OF CONSUMER FINANCIAL INFORMATION

Sec.
716.1 Purpose and scope.
716.2 Rule of construction.
716.3 Definitions.

Subpart A—Privacy and Opt Out Notices

716.4 Initial privacy notice to consumers required.
716.5 Annual privacy notice to members required.
716.6 Information to be included in initial and annual privacy notices.
716.7 Form of opt out notice to consumers and opt out methods.
716.8 Revised privacy notices.
716.9 Delivering privacy and opt out notices.

Subpart B—Limits on Disclosures

716.10 Limits on disclosure of nonpublic personal information to nonaffiliated third parties.
716.11 Limits on redisclosure and reuse of information.
716.12 Limits on sharing of account number information for marketing purposes.

Subpart C—Exceptions

716.13 Exception to opt out requirements for service providers and joint marketing.
716.14 Exceptions to notice and opt out requirements for processing and servicing transactions.
716.15 Other exceptions to notice and opt out requirements

Subpart D—Relation To Other Laws; Effective Date

716.16 Protection of Fair Credit Reporting Act.
716.17 Relation to state laws.
716.18 Effective date; transition rule.

Appendix A to Part 716—Sample Clauses

Authority: 15 U.S.C. 6801 *et seq.*, 12 U.S.C. 1751 *et seq.*

§ 716.1 Purpose and scope.

(a) *Purpose.* This part governs the treatment of nonpublic personal information about consumers by the credit unions listed in paragraph (b) of this section. This part:

(1) Requires a credit union to provide notice to members about its privacy policies and practices;

(2) Describes the conditions under which a credit union may disclose nonpublic personal information about consumers to nonaffiliated third parties; and

(3) Provides a method for consumers to prevent a credit union from disclosing that information to most nonaffiliated third parties by ''opting out'' of that disclosure, subject to the exceptions in § § 716.13, 716.14, and 716.15.

(b) *Scope.* (1) This part applies only to nonpublic personal information about individuals who obtain financial products or services for personal, family or household purposes. This part does not apply to information about companies or about individuals who obtain financial products or services for business, commercial or agricultural purposes. This part applies to federally-insured credit unions. This part refers to a federally-insured credit union as ''you'' or ''the credit union.''

(2) Nothing in this part modifies, limits, or supersedes the standards governing individually identifiable financial information promulgated by the Secretary of Health and Human Services under the authority of §§ 262 and 264 of the Health Insurance Portability and Accountability Act of 1996 (42 U.S.C. 1320d–1320d–8).

§ 716.2 Rule of construction.

The examples in this part and the sample clauses in appendix A of this part are not exclusive. Compliance with an example or use of a sample clause, to the extent applicable, constitutes compliance with this part.

§ 716.3 Definitions.

As used in this part, unless the context requires otherwise:

(a)(1) *Affiliate* means any company that controls, is controlled by, or is under common control with another company.

(2) *Examples.* (i) An affiliate of a federal credit union is a credit union service organization (CUSO), as provided in 12 CFR part 712, that is controlled by the federal credit union.

(ii) An affiliate of a federally-insured, state-chartered credit union is a company that is controlled by the credit union.

(b)(1) *Clear and conspicuous* means that a notice is reasonably understandable and designed to call attention to the nature and significance of the information in the notice.

(2) *Examples.* (i) *Reasonably understandable.* You make your notice reasonably understandable if you:

(A) Present the information contained in the notice in clear, concise sentences, paragraphs and sections;

(B) Use short, explanatory sentences or bullet lists whenever possible;

(C) Use definite, concrete, everyday words and active voice whenever possible;

(D) Avoid multiple negatives;

(E) Avoid legal and highly technical business terminology wherever possible; and

(F) Avoid explanations that are imprecise and readily subject to different interpretations.

(ii) *Designed to call attention.* You design your notice to call attention to the nature and significance of the information in it if you:

(A) Use a plain-language heading to call attention to the notice;

(B) Use a typeface and type size that are easy to read;

(C) Provide wide margins and ample line spacing;

(D) Use boldface or italics for key words; and

(E) In a form that combines your notice with other information, use distinctive type size, style, and graphic devices, such as shading or sidebars.

[2] A credit union is required to describe only those general categories that apply to its policies and practices. Accordingly, if a credit union does not collect information from ''a consumer reporting agency,'' for instance, then it need not describe that category in its notices.

(iii) *Notices on web sites.* If you provide notices on a web page, you design your notice to call attention to the nature and significance of the information in it if you use text or visual cues to encourage scrolling down the page if necessary to view the entire notice and ensure that other elements on the web site (such as text graphics, hyperlinks or sound) do not distract attention form the notice, and you either:

(A) Place the notice on a screen frequently accessed by consumers, such as a home page or a page on which transactions are conducted; or

(B) Place a link on a screen frequently accessed by consumers, such as a home page or a page on which transactions are conducted, that connects directly to the notice and is labeled appropriately to convey the importance, nature and relevance of the notice.

(c) *Collect* means to obtain information that you organize or can retrieve by the name of an individual or by identifying number, symbol, or other identifying particular assigned to the individual, irrespective of the source of the underlying information.

(d) *Company* means any corporation, limited liability company, business trust, general or limited partnership, association or similar organization.

(e)(1) *Consumer* means an individual who obtains or has obtained a financial product or service from you, that is to be used primarily for personal, family or household purposes, or that individual's legal representative.

(2) *Examples.* (i) An individual who provides nonpublic personal information to you in connection with obtaining or seeking to obtain credit union membership is your consumer regardless of whether you establish a member relationship.

(ii) An individual who provides nonpublic personal information to you in connection with using your ATM is your consumer.

(iii) If you hold ownership or servicing rights to an individual's loan, the individual is your consumer, even if you hold those rights in conjunction with one or more financial institutions. (The individual is also a consumer with respect to the other financial institutions involved). This applies, even if you, or another financial institution with those rights, hire an agent to collect on the loan or to provide processing or other services.

(iv) An individual who is a consumer of another financial institution is not your consumer solely because you act as agent for, or provide processing or other services to, that financial institution.

(v) An individual is not your consumer solely because he or she is a participant or a beneficiary of an employee benefit plan that you sponsor or for which you act as a trustee or fiduciary.

(f) *Consumer reporting agency* has the same meaning as in section 603(f) of the Fair Credit Reporting Act (15 U.S.C. 1681a(f)).

(g) *Control* of a company means:

(1) Ownership, control, or power to vote 25 percent or more of the outstanding shares of any class of voting security of the company, directly or indirectly, or acting through one or more other persons;

(2) Control in any manner over the election of a majority of the directors, trustees or general partners (or individuals exercising similar functions) of the company; or

(3) The power to exercise, directly or indirectly, a controlling influence over the management or policies of the company, as the NCUA determines. With respect to state-chartered credit unions, NCUA will consult with the appropriate state regulator prior to making its determination.

(4) *Example.* NCUA will presume a credit union has a controlling influence over the management or policies of a CUSO, if the CUSO is 67% owned by credit unions.

(h) *Credit union* means a federal or state-chartered credit union that the National Credit Union Share Insurance Fund insures.

(i) *Customer* means a consumer who has a customer relationship with a financial institution other than a credit union.

(j) *Customer relationship* means a continuing relationship between a consumer and a financial institution other than a credit union.

(k) *Federal functional regulator* means—

(1) The National Credit Union Administration Board;

(2) The Board of Governors of the Federal Reserve System;

(3) The Office of the Comptroller of the Currency;

(4) The Board of Directors of the Federal Deposit Insurance Corporation;

(5) The Director of the Office of Thrift Supervision; and

(6) The Securities and Exchange Commission.

(l)(1)*Financial institution* means any institution the business of which is engaging in activities that are financial in nature or incidental to such financial activity as described in section 4(k) of the Bank Holding Company Act of 1956 (12 U.S.C. 1843(k)).

(2) Examples of financial institutions may include, but are not limited to: credit unions; banks; insurance companies; securities brokers, dealers, and underwriters; loan brokers and servicers; tax planners and preparation services; personal property appraisers; real estate appraisers; career counselors for employees in financial occupations; digital signature services; courier services; real estate settlement services; manufacturers of computer software and hardware; and travel agencies operated in connection with financial services.

(3) *Financial institution* does not include:

(i) Any person or entity with respect to any financial activity that is subject to the jurisdiction of the Commodity Futures Trading Commission under the Commodity Exchange Act (7 U.S.C. 1 *et seq.*);

(ii) The Federal Agricultural Mortgage Corporation or any entity chartered and operating under the Farm Credit Act of 1971 (12 U.S.C. 2001 *et seq.*); or

(iii) Institutions chartered by Congress specifically to engage in securitizations, secondary market sales (including sales of servicing rights) or similar transactions related to a transaction of a consumer, as long as such institutions do not sell or transfer nonpublic personal information to a nonaffiliated third party.

(m) (1) *Financial product or service* means any product or service that a financial holding company could offer by engaging in an activity that is financial in nature or incidental to such a financial activity under section 4(k) of the Bank Holding Company Act of 1956 (12 U.S.C. 1843(k)).

(2) *Financial service* includes your evaluation or brokerage of information that you collect in connection with a request or an application from a consumer for a financial product or service.

(n) *Member* means a consumer who has a member relationship with you. For purposes of this part only, it will include certain nonmembers.

(o)(1) *Member relationship* means a continuing relationship between a consumer and you under which you provide one or more financial products or services to the consumer that are to be used primarily for personal, family or household purposes. As noted in the examples, this will include certain consumers that are not your members.

(2) *Examples.* (i) A consumer has a continuing relationship with you if the consumer:

(A) Is your member as defined in your bylaws;

(B) Is a nonmember who has a share, share draft, or credit card account with you jointly with a member;

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(C) Is a nonmember who has a loan that you service;

(D) Is a nonmember who has an account with you and you are a credit union that has been designated as a low-income credit union; or

(E) Is a nonmember who has an account in a federally-insured, state-chartered credit union pursuant to state law.

(ii) A consumer does not, however, have a member relationship with you if the consumer is a nonmember and:

(A) The consumer only obtains a financial product or service in isolated transactions, such as using your ATM to withdraw cash from an account maintained at another financial institution or purchasing travelers checks; or

(B) You sell the consumer's loan and do not retain the rights to service that loan. (p)(1) *Nonaffiliated third party* means any person except:

(i) Your affiliate; or

(ii) A person employed jointly by you and any company that is not your affiliate (but nonaffiliated third party includes the other company that jointly employs the person).

(q)(1) *Nonpublic personal information* means:

(i) Personally identifiable financial information; and

(ii) Any list, description or other grouping of consumers (and publicly available information pertaining to them) that is derived using any personally identifiable financial information.

(2) *Nonpublic personal information* does not include:

(i) Publicly available information, except as included on a list described in paragraph (q)(1)(ii) of this section; or

(ii) Any list, description, or other grouping of consumers (and publicly available information pertaining to them) that is derived without using any personally identifiable financial information, other than publicly available information.

(3) *Examples of lists.* (i) Nonpublic personal information includes any list of individuals' names and street addresses that is derived in whole or in part using personally identifiable financial information, other than publicly available information, such as account numbers.

(ii) Nonpublic personal information does not include any list of individuals' names and addresses that contains only publicly available information, is not derived using personally identifiable financial information, other than publicly available information, either in whole or in part, and is not disclosed in a manner that indicates that any of the individuals on the list is a consumer of a credit union, other than publicly available information.

(r)(1) *Personally identifiable financial information* means any information:

(i) A consumer provides to you to obtain a financial product or service from you;

(ii) About a consumer resulting from any transaction involving a financial product or service between you and a consumer; or

(iii) You otherwise obtain about a consumer in connection with providing a financial product or service to that consumer.

(2) Personally identifiable financial information does not include publicly available information.

(3) *Examples.* (i) *Information included.* Personally identifiable financial information includes:

(A) Information a consumer provides to you on an application to obtain membership, a loan, credit card or other financial product or service;

(B) Account balance information, payment history, overdraft history, and credit or debit card purchase information;

(C) The fact that an individual is or has been one of your members or has obtained a financial product or service from you;

(D) Any information about your consumer if it is disclosed in a manner that indicates that the individual is or has been your consumer;

(E) Any information that a consumer provides to you or that you or your agent otherwise obtain in connection with collecting on a loan or servicing a loan;

(F) Any information you collect through an Internet ''cookie'' (an information collecting device from a web server); and

(G) Information from a consumer report.

(ii) *Information not included.* Personally identifiable financial information does not include:

(A) A list of names and addresses of customers of an entity that is not a financial institution; and

(B) Information that does not identify a consumer, such as aggregate information or blind data that does not contain personal identifiers such as account numbers, names, or addresses.

(s)(1) *Publicly available information* means any information that you have a reasonable basis to believe is lawfully made available to the general public from:

(i) Federal, state or local government records;

(ii) Widely distributed media; or

(iii) Disclosures to the general public that are required to be made by federal, state or local law.

(2) *Reasonable basis.* You have a reasonable basis to believe that information is lawfully made available to the general public if you have taken steps to determine:

(i) That the information is of the type that is available to the general public; and

(ii) Whether an individual can direct that the information not be made available to the general public and, if so, that your member or consumer has not done so.

(3) *Examples.* (i) *Government records.* Publicly available information in government records includes information in government real estate records and security interest filings.

(ii) *Widely distributed media.* Publicly available information from widely distributed media includes information from a telephone book, a television or radio program, a newspaper or a web site that is available to the general public on an unrestricted basis. A web site is not restricted merely because an Internet service provider or site operator requires a fee or a password, so long as access is available to the general public.

(iii) *Reasonable basis.* (1) You have a reasonable basis to believe that mortgage information is lawfully made available to the general public if you have determined that the information is of the type included on the public record in the jurisdiction where the mortgage would be recorded.

(2) You have a reasonable basis to believe that an individual's telephone number is lawfully made available to the general public if you have located the telephone number in the telephone book or have been informed by the consumer that the telephone number is not unlisted.

(t) *You* means a federally-insured credit union.

Subpart A—Privacy and Opt Out Notices

§ 716.4 Initial privacy notice to consumers required.

(a) *Initial notice requirement.* You must provide a clear and conspicuous notice that accurately reflects your privacy policies and practices to a:

(1) *Member*, not later than when you establish a member relationship, except as provided in paragraph (e) of this section; and

(2) *Consumer*, before you disclose any nonpublic personal information about the consumer to any nonaffiliated third party, if you make such a disclosure other than as authorized by § § 716.14 and 716.15.

(b) *When initial notice to a consumer is not required.* You are not required to provide an initial notice to a consumer under paragraph (a) of this section if:

(1) You do not disclose any nonpublic personal information about the consumer to any nonaffiliated third party, other than as authorized by §§ 716.14 and 716.15; and

(2) You do not have a member relationship with the consumer.

(c) *When you establish a member relationship.* (1) *General rule.* You establish a member relationship when you and the consumer enter into a continuing relationship.

(2) *Special rule for loans.* You establish a member relationship with a consumer when you originate, or acquire the servicing rights to a loan to the consumer for personal, household or family purposes and that is the only basis for the member relationship. If you subsequently transfer the servicing rights to that loan to another financial institution, the member relationship transfers with the servicing rights.

(3)(i) *Examples of establishing member relationship.* You establish a member relationship when the consumer:

(A) Becomes your member under your bylaws;

(B) Is a nonmember and opens a credit card account with you jointly with a member under your procedures;

(C) Is a nonmember and executes the contract to open a share or share draft account with you or obtains credit from you jointly with a member, including an individual acting as a guarantor;

(D) Is a nonmember and opens an account with you and you are a credit union designated as a low-income credit union;

(E) Is a nonmember and opens an account with you pursuant to state law and you are a state-chartered credit union.

(ii) *Examples of loan rule.* You establish a member relationship with a consumer who obtains a loan for personal, family, or household purposes when you:

(A) Originate the loan to the consumer and retain the servicing rights; or

(B) Purchase the servicing rights to the consumer's loan.

(d) *Existing members.* When an existing member obtains a new financial product or service that is to be used primarily for personal, family, or household purposes, you satisfy the initial notice requirements of paragraph (a) of this section as follows:

(1) You may provide a revised policy notice, under § 716.8, that covers the member's new financial product or service; or

(2) If the initial, revised, or annual notice that you most recently provided to that member was accurate with respect to the new financial product or service, you do not need to provide a new privacy notice under paragraph (a) of this section.

(e) *Exceptions to allow subsequent delivery of notice.* (1) You may provide the initial notice required by paragraph (a)(1) of this section within a reasonable time after you establish a member relationship if:

(i) Establishing the member relationship is not at the member's election;

(ii) Providing notice not later than when you establish a member relationship would substantially delay the member's transaction and the member agrees to receive the notice at a later time.

(2) *Examples of exceptions.* (i) *Not at member's election.* Establishing a member relationship is not at the member's election if you acquire a member's deposit liability from another financial institution and the member does not have a choice about your acquisition.

(ii) *Substantial delay of member's transaction.* Providing notice not later than when you establish a member relationship would substantially delay the member's transaction when:

(A) You and the individual agree over the telephone to enter into a member relationship involving prompt delivery of the financial product or service; or

(B) You establish a member relationship with an individual under a program authorized by Title IV of the Higher Education Act of 1965 (20 U.S.C. 1070 *et seq.*) or similar student loan programs where loan proceeds are disbursed promptly without prior communication between you and the member.

(iii) *No substantial delay of member's transaction.* Providing notice not later than when you establish a member relationship would not substantially delay the member's transaction when the relationship is initiated in person at your office or through other means by which the member may view the notice, such as on a web site.

(f) *Joint relationships.* If two or more consumers jointly obtain a financial product or service, other than a loan, from you, you may satisfy the requirements of paragraph

(a) of this section by providing one initial notice to those consumers jointly.

(g) *Delivery.* When you are required to deliver an initial privacy notice by this section, you must deliver it according to the methods in § 716.9. If you use a short-form initial notice for nonmember consumers according to § 716.6(c), you may deliver your privacy notice according to § 716.6(c)(3).

§ 716.5 Annual privacy notice to members required.

(a)(1) *General rule.* You must provide a clear and conspicuous notice to members that accurately reflects your privacy policies and practices not less than annually during the continuation of the member relationship. *Annually* means at least once in any period of 12 consecutive months during which that relationship exists. You may define the 12-consecutive-month period, but you must apply it to the member on a consistent basis.

(2) *Example.* You provide a notice annually if you define the 12-consecutive-month period as a calendar year and provide the annual notice to the member once in each calendar year following the calendar year in which you provide the initial notice. For example, if a member opens an account on any day of year one, you must provide an annual notice to that member by December 31 of year two.

(b) (1) *Termination of member relationship.* You are not required to provide an annual notice to a former member.

(2) *Examples.* Your member becomes your former member when:

(i) An individual is no longer your member as defined in your bylaws;

(ii) In the case of a nonmember's share or share draft account, the account is inactive under the credit union's policies;

(iii) In the case of a nonmember's closed-end loan, the loan is paid in full, you charge off the loan, or you sell the loan without retaining servicing rights;

(iv) In the case of a credit card relationship or other open-end credit relationship with a nonmember, you no longer provide any statements or notices to the nonmember concerning that relationship or you sell the credit card receivables without retaining servicing rights; or

(v) You have not communicated with the nonmember about the relationship for a period of twelve consecutive months, other than to provide annual privacy notices or promotional material.

(c) *Delivery.* When you are required to deliver an annual privacy notice by this section, you must deliver it according to the methods in § 716.9.

§ 716.6 Information to be included in initial and annual privacy notices.

(a) *General rule.* The initial and annual privacy notices under §§ 716.4 and 716.5 must include each of the following items of information that

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applies to you or to the consumers to whom you send your privacy notice, in addition to any other information you wish to provide:

(1) The categories of nonpublic personal information that you collect;

(2) The categories of nonpublic personal information that you disclose;

(3) The categories of affiliates and nonaffiliated third parties to whom you disclose nonpublic personal information, other than those parties to whom you disclose information under §§ 716.14 and 716.15;

(4) The categories of nonpublic personal information about your former members that you disclose and the categories of affiliates and nonaffiliated third parties to whom you disclose it, other than those parties to whom you disclose information under §§ 716.14 and 716.15;

(5) If you disclose nonpublic personal information to a nonaffiliated third party under § 716.13 (and no other exception applies to that disclosure), a separate statement of the categories of information you disclose and the categories of third parties with whom you have contracted;

(6) An explanation of the consumer's right under § 716.10(a) to opt out of the disclosure of nonpublic personal information to nonaffiliated third parties, including the methods by which the consumer may exercise that right at that time;

(7) Any disclosures that you make under section 603(d)(2)(A)(iii) of the Fair Credit Reporting Act (15 U.S.C. 1681a(d)(2)(A)(iii)) (that is, notices regarding the ability to opt out of disclosure of information among affiliates);

(8) Your policies and practices with respect to protecting the confidentiality and security of nonpublic personal information; and

(9) Any disclosures you make under paragraph (b) of this section.

(b) *Description of nonaffiliated third parties subject to exceptions.* If you disclose nonpublic personal information to third parties as authorized under § § 716.14 and 716.15, you are not required to list those exceptions in the initial or annual privacy notices required by § § 716.4 and 716.5. When describing the categories with respect to those parties, you are required to state only that you make disclosures to other nonaffiliated third parties as permitted by law.

(c) *Short-form initial notice with opt out notice for nonmember consumers.* (1) You may satisfy the initial notice requirements in §§ 716.4(a)(2), 716.7(b), and 716.7(c) for a consumer who is not a member by providing a short-form initial notice at the same time as you deliver an opt out notice as required in § 716.7.

(2) A short-form initial notice must:

(i) Be clear and conspicuous;

(ii) State that your privacy notice is available upon request; and

(iii) Explain a reasonable means by which the consumer may obtain that notice.

(3) You must deliver your short-form initial notice according to § 716.9. You are not required to deliver your privacy notice with your short form initial notice. You instead may simply provide the consumer a reasonable means to obtain your privacy notice. If a consumer who receives your short-form notice requests your privacy notice, you must deliver your privacy notice according to § 716.9.

(4) *Examples of obtaining privacy notice.* You provide a reasonable means by which a consumer may obtain a copy of your privacy notice if you:

(i) Provide a toll-free telephone number that the consumer may call to request the notice; or

(ii) For a consumer who conducts business in person at your office, maintain copies of the notice on hand that you provide to a consumer immediately upon request.

(d) *Future disclosures.* Your notice may include:

(1) Categories of nonpublic personal information that you reserve the right to disclose in the future, but do not currently disclose; and

(2) Categories of affiliates or nonaffiliated third parties to whom you reserve the right in the future to disclose, but to whom you do not currently disclose, nonpublic personal information.

(e) *Examples.* (1) *Categories of nonpublic personal information that you collect.*

You satisfy the requirement to categorize the nonpublic personal information that you collect if you list the following categories, as applicable:

(i) Information from the consumer;

(ii) Information about the consumer's transactions with you or your affiliates;

(iii) Information about the consumer's transactions with nonaffiliated third parties; and

(iv) Information from a consumer reporting agency.

(2) *Categories of nonpublic personal information you disclose.* (i) You satisfy the requirement to categorize the nonpublic personal information that you disclose if you list the categories described in paragraph (e)(1) of this section, as applicable, and a few examples to illustrate the types of information in each category.

(ii) If you reserve the right to disclose all of the nonpublic personal information about consumers that you collect, you may simply state that fact without describing the categories or examples of the nonpublic personal information you disclose.

(3) *Categories of affiliates and nonaffiliated third parties to whom you disclose.* You satisfy the requirement to categorize the affiliates and nonaffiliated third parties to whom you disclose nonpublic personal information if you list the following categories, as applicable, and a few examples to illustrate the types of third parties in each category.

(i) Financial service providers;

(ii) Non-financial companies; and

(iii) Others.

(4) *Disclosures under exception for service providers and joint marketers.* If you disclose nonpublic personal information under the exception in § 716.13 to a nonaffiliated third party to market products or services that you offer alone or jointly with another financial institution, you satisfy the disclosure requirement of paragraph (a)(5) of this section if you:

(i) List the categories of nonpublic personal information you disclose, using the same categories and examples you used to meet the requirements of paragraphs (a)(2) of this section, as applicable; and

(ii) State whether the third party is:

(A) A service provider that performs marketing services on your behalf or on behalf of you and another financial institution; or

(B) A financial institution with whom you have a joint marketing agreement.

(5) *Simplified notices.* If you do not disclose, and do not intend to disclose, nonpublic personal information about members or former members to affiliates or nonaffiliated third parties except as authorized under §§ 716.14 and 716.15, you may simply state that fact, in addition to the information you must provide under paragraphs (a)(1), (a)(8), (a)(9) and (c) of this section.

(6) *Confidentiality and security.* You describe your policies and practices with respect to protecting the confidentiality and security of nonpublic personal information if you do both of the following:

(i) Describe in general terms who is authorized to have access to the information.

(ii) State whether you have security practices and procedures in place to ensure the confidentiality of the information in accordance with your policy. You are not required to describe technical information about the safeguards you use.

(7) *Joint notice with affiliates.* You may provide a joint notice from you and one or more of your affiliates or other financial institutions, as specified in the notice, as long as the notice is accurate with respect to you and the other institution.

§ 716.7 Form of opt out notice to consumers and opt out methods.

(a)(1) *Form of opt out notice.* If you are required to provide an opt out notice under § 716.10(a)(1), you must provide a clear and conspicuous notice to each of your consumers that accurately explains the right to opt out under that section. The notice must state:

(i) That you disclose or reserve the right to disclose nonpublic personal information about your consumer to a nonaffiliated third party;

(ii) That the consumer has the right to opt out of that disclosure; and

(iii) A reasonable means by which the consumer may exercise the opt out right.

(2) *Examples.* (i) *Adequate opt out notice.* You provide adequate notice that the consumer can opt out of the disclosure of nonpublic personal information to a nonaffiliated third party if you:

(A) Identify all of the categories of nonpublic personal information that you disclose or reserve the right to disclose and all of the categories of nonaffiliated third parties to whom you disclose the information, as described in § 716.6(a)(2) and (3) and state that the consumer can opt out of the disclosure of that information; and

(B) Identify the financial products or services that the consumer obtains from you, either singly or jointly, to which the opt out direction would apply.

(ii) *Reasonable opt out means.* You provide a reasonable means to exercise an opt out right if you:

(A) Designate check-off boxes in a prominent position on the relevant forms with the opt out notice;

(B) Include a reply form together with the opt out notice;

(C) Provide an electronic means to opt out, such as a form that can be sent via electronic mail or a process at your web site, if the consumer agrees to the electronic delivery of information; or

(D) Provide a toll-free telephone number that consumers may call to opt out.

(iii) *Unreasonable opt out means.* You *do not* provide a reasonable means of opting out if:

(A) The only means of opting out is for the consumer to write his or her own letter to exercise that opt out right; or

(B) The only means of opting out as described in any notice subsequent to the initial notice is to use a check-off box that was provided with the initial notice but not included with the subsequent notice.

(iv) *Specific opt out means.* You may require each consumer to opt out through a specific means, as long as that means is reasonable for that consumer.

(b) *Same form as initial notice permitted.* You may provide the opt out notice together with or on the same written or electronic form as the initial notice you provide in accordance with § 716.4.

(c) *Initial notice required when opt out notice delivered subsequent to initial notice.* If you provide the opt out notice later than required for the initial notice in accordance with § 716.4, you must also include a copy of the initial notice in writing or, if the consumer agrees, electronically.

(d) *Joint relationships.* (1) If two or more consumers jointly obtain a financial product or service, other than a loan, from you, you may provide only a single opt out notice. Your opt out notice must explain how you will treat an opt out direction by a joint consumer as explained in the examples in paragraph (d)(5) of this section.

(2) Any of the joint consumers may exercise the right to opt out. You may either:

(i) Treat an opt out direction by a joint consumer to apply to all of the associated joint consumers; or

(ii) Permit each joint consumer to opt out separately.

(3) If you permit each joint consumer to opt out separately, you must permit one of the joint consumers to opt out on behalf of all of the joint consumers.

(4) You may not require all joint consumers to opt out before you implement any opt out direction.

(5) *Example.* If John and Mary have a joint share account with you and arrange for you to send statements to John's address, you may do any of the following, but you must explain in your opt out notice which opt out policy you will follow:

(i) Send a single opt out notice to John's address, but you must accept an opt out direction from either John or Mary.

(ii) Treat an opt out direction by either John or Mary as applying to the entire account. If you do so, and John opts out, you may not require Mary to opt out as well before implementing John's opt out direction.

(iii) Permit John and Mary to make different opt out directions. If you do so, and if John and Mary both opt out, you must permit one or both of them to notify you in a single response (such as on a form or through a telephone call).

(e) *Time to comply with opt out.* You must comply with the consumer's opt out direction as soon as reasonably practicable after you receive it.

(f) *Continuing right to opt out.* A consumer may exercise the right to opt out at any time.

(g) *Duration of consumer's opt out direction.* (1) A consumer's direction to opt out under this section is effective until the consumer revokes it in writing or, if the consumer agrees, electronically.

(2) When a member relationship terminates, the member's opt out direction continues to apply to the nonpublic personal information that you collected during or related to the relationship. If the individual subsequently establishes a new member relationship with you, the opt out direction that applied to the former relationship does not apply to the new relationship.

(h) *Delivery.* When you are required to deliver an opt out notice by this section, you must deliver it according to the methods in § 716.9.

§ 716.8 Revised privacy notices.

(a) *General rule.* Except as otherwise authorized in this part, you must not, directly or through any affiliate, disclose any nonpublic personal information about a consumer to a nonaffiliated third party other than as described in the initial notice that you provided to that consumer under § 716.4, unless:

(1) You have provided to the consumer a revised notice that accurately describes your policies and practices;

(2) You have provided to the consumer a new opt out notice;

(3) You have given the consumer a reasonable opportunity, before you disclose the information to the nonaffiliated third party, to opt out of the disclosure; and

(4) The consumer does not opt out.

(b) *Examples.* (1) Except as otherwise permitted by § § 716.13, 716.14 and 716.15, you must provide a revised notice if you—

(i) Disclose a new category of nonpublic personal information to any nonaffiliated third party;

(ii) Disclose nonpublic personal information to a new category of nonaffiliated third party; or

(iii) Disclose nonpublic personal information about a former member to a nonaffiliated third party, and that former member has not had the opportunity to exercise an opt out right regarding that disclosure.

(2) A revised notice is not required if you disclose nonpublic personal information to a new nonaffiliated third

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party that you adequately described in your prior notice.

(c) *Delivery.* When you are required to deliver a revised privacy notice by this section, you must deliver it according to the methods in § 716.9.

§ 716.9 Delivering privacy and opt out notices.

(a) *How to provide notices.* You must provide any privacy notices and opt out notices, including short-form initial notices, that this part requires so that each consumer can reasonably be expected to receive actual notice in writing or, if the consumer agrees, electronically.

(b) (1) *Examples of reasonable expectation of actual notice.* You may reasonably expect that a consumer will receive actual notice if you:

(i) Hand-deliver a printed copy of the notice to the consumer;

(ii) Mail a printed copy of the notice to the last known address of the consumer;

(iii) For the consumer who conducts transactions electronically, post the notice on the electronic site and require the consumer to acknowledge receipt of the notice as a necessary step to obtaining a particular financial product or service;

(iv) For an isolated transaction with the consumer, such as an ATM transaction, post the notice on the ATM screen and require the consumer to acknowledge receipt of the notice as a necessary step to obtaining the particular financial product or service.

(2) *Examples of unreasonable expectations of actual notice.* You may not, however, reasonably expect that a consumer will receive actual notice if you:

(i) Only post a sign in your branch or office or generally publish advertisements of your privacy policies and practices;

(ii) Send the notice via electronic mail to a consumer who does not obtain a financial product or service from you electronically.

(c) *Annual notices only.* You may reasonably expect that a member will receive actual notice of your annual privacy notice if:

(1) The member uses your web site to access financial products and services electronically and agrees to receive notices at your web site and you post your current privacy notice continuously in a clear and conspicuous manner on your web site; or

(2) The member has requested that you refrain from sending any information regarding the member relationship, and your current privacy notice remains available to the member upon request.

(d) *Oral description of notice insufficient.* You may not provide any notice required by this part solely by orally explaining the notice, either in person or over the telephone.

(e) *Retention or accessibility of notices for members.* (1) For members only, you must provide the initial notice required by § 716.4 (a)(1), the annual notice required by § 716.5(a) and the revised notice required by § 716.8 so that the member can retain them or obtain them later in writing or, if the member agrees, electronically.

(2) *Examples of retention or accessibility.* You provide the privacy notice to the member so that the member can retain it or obtain it later if you:

(i) Hand-deliver a printed copy of the notice to the member;

(ii) Mail a printed copy of the notice to the last known address of the member upon request of the member; or

(iii) Make your current privacy notice available on a web site (or a link to another web site) for the member who obtains a financial product or service electronically and agrees to receive the notice at the web site.

Subpart B—Limits on Disclosures

§ 716.10 Limits on disclosure of nonpublic personal information to nonaffiliated third parties.

(a) (1) *Conditions for disclosure.* Except as otherwise authorized in this part, you may not, directly or through any affiliate, disclose any nonpublic personal information about a consumer to a nonaffiliated third party unless:

(i) You have provided to the consumer an initial notice as required under § 716.4;

(ii) You have provided to the consumer an opt out notice as required in § 716.7;

(iii) You have given the consumer a reasonable opportunity, before you disclose the information to the nonaffiliated third party, to opt out of the disclosure; and

(iv) The consumer does not opt out.

(2) *Opt out definition.* Opt out means a direction by the consumer that you not disclose nonpublic personal information about that consumer to a nonaffiliated third party, other than as permitted by §§ 716.13, 716.14 and 716.15.

(3) *Examples of reasonable opportunity to opt out.* You provide a consumer with a reasonable opportunity to opt out if:

(i) *By mail.* You mail the notices required in paragraph (a)(1) of this section to the consumer and allow the consumer to opt out by mailing a form, calling a toll-free telephone number, or any other reasonable means within 30 days from the date you mailed the notices.

(ii) *By electronic means.* A member opens an on-line account with you and agrees to receive the notices required in paragraph (a)(1) of this section electronically, and you make the notices available to the member on your web site and allow the member to opt out by any reasonable means within 30 days after the date that the member acknowledges receipt of the notices.

(iii) *Isolated transaction with consumer.* For an isolated transaction, such as the purchase of a traveler's check by a consumer, you provide the consumer with a reasonable opportunity to opt out if you provide the notices required in paragraph (a)(1) of this section at the time of the transaction and request that the consumer decide, as a necessary part of the transaction, whether to opt out before completing the transaction.

(b) *Application of opt out to all consumers and all nonpublic personal information.* (1) You must comply with this section, regardless of whether you and the consumer have established a member relationship.

(2) Unless you comply with this section, you may not, directly or through an affiliate, disclose any nonpublic personal information about a consumer that you have collected, regardless of whether you collected it before or after receiving the direction to opt out from the consumer.

(c) *Partial opt out.* You may allow a consumer to select certain nonpublic personal information or certain nonaffiliated third parties with respect to which the consumer wishes to opt out.

§ 716.11 Limits on redisclosure and reuse of information.

(a)(1) *Information you receive under an exception.* If you receive nonpublic personal information from a nonaffiliated financial institution under an exception in § 716.14 or 716.15 of this part, your disclosure and use of that information is limited as follows:

(i) You may disclose the information to the affiliates of the financial institution from which you received the information; and

(ii) You may disclose the information to your affiliates, but your affiliates may, in turn, disclose and use the information only to the extent that you may disclose and use the information; and

(iii) You may disclose and use the information pursuant to an exception in § 716.14 or 716.15 in the ordinary course of business to carry out the

activity covered by the exception under which you received the information.

(2) *Example.* If you receive a member list from a credit union in order to provide correspondent services under the exception in § 716.14(a), you may disclose that information under any exception in § 716.14 or 716.15 in order to provide those services. For example, you could disclose the information in response to a properly authorized subpoena or to your attorneys, accountants, and auditors. You could not disclose that information to a third party for marketing purposes or use that information for your own marketing purposes.

(b)(1) *Information you receive outside of an exception.* If you receive nonpublic personal information from a nonaffiliated financial institution other than under an exception in § 716.14 or 716.15 of this part, you may disclose the information only:

(i) To the affiliates of the financial institution from which you received the information;

(ii) To your affiliates, but your affiliates may, in turn, disclose the information only to the extent that you can disclose the information;

(iii) To any other person, if the disclosure would be lawful if made directly to that person by the financial institution from which you received the information; and

(iv) Pursuant to an exception in § 716.14 or 716.15.

(2) *Example.* If you obtain a customer list from a nonaffiliated financial institution outside of the exceptions in § § 716.14 and 716.15,

(i) You may use the list for your own purposes;

(ii) You may disclose that list to another non-affiliated third party only if the financial institution from which you purchased the list could have disclosed the list to that third party, that is you may disclose the list in accordance with the privacy policy of the financial institution from which you received the list, as limited by the opt out direction of each consumer whose nonpublic personal information you intend to disclose; and

(iii) You may disclose that list as permitted by § 716.14 or 716.15, such as to your attorneys or accountants.

(c) *Information you disclose under an exception.* If you disclose nonpublic personal information to a nonaffiliated third party under an exception in § 716.14 or 716.15 of this part, the disclosure and use of that information by the third party is limited as follows:

(1) The third party may disclose the information to your affiliates;

(2) The third party may disclose the information to its affiliates, but its affiliates may, in turn, disclose and use the information only to the extent that the third party may disclose and use the information; and

(3) The third party may disclose and use the information pursuant to an exception in § 716.14 or 716.15 in the ordinary course of business to carry out the activity covered by the exception under which it received the information.

(d) *Information you disclose outside of an exception.* If you disclose nonpublic personal information to a nonaffiliated third party other than under an exception in § 716.14 or 716.15 of this part, the third party may disclose the information only:

(1) To your affiliates;

(2) To its affiliates, but its affiliates, in turn, may disclose the information only to the extent the third party can disclose the information;

(3) To any other person, if the disclosure would be lawful if made directly to that person by you; and

(4) Pursuant to an exception in § 716.14 or 716.15.

§ 716.12 Limits on sharing of account number information for marketing purposes.

(a) *General prohibition on disclosure of account numbers.* You must not, directly or through an affiliate, disclose, other than to a consumer reporting agency, an account number or similar form of access number or access code for a consumer's credit card account, share account or transaction account to any nonaffiliated third party for use in telemarketing, direct mail marketing or other marketing through electronic mail to the consumer.

(b) *Exceptions.* Paragraph (a) of this section does not apply if you disclose an account number or similar form of access number or access code:

(1) To your agent or service provider solely in order to perform marketing for your own products or services, as long as the agent or service provider cannot directly initiate charges to the account; or

(2) To a participant in a private label credit card program or an affinity or similar program where the participants in the program are identified to the member when the member enters into the program.

(c) *Examples.* (1) *Account number.* An account number, or similar form of access number or access code, does not include a number or code in an encrypted form, as long as you do not provide the recipient with a means to decode the number or code.

(2) *Transaction account.* A transaction account is an account other than a share or credit card account. A transaction account does not include an account to which a third party cannot initiate a charge.

Subpart C—Exceptions

§ 716.13 Exception to opt out requirements for service providers and joint marketing.

(a) *General rule.* (1) The opt out requirements in § § 716.7 and 716.10 do not apply when you provide nonpublic personal information to a nonaffiliated third party to perform services for you or functions on your behalf, if you:

(i) Provide the initial notice in accordance with § 716.4; and

(ii) Enter into a contractual agreement with the third party that prohibits the third party from disclosing or using the information other than to carry out the purposes for which you disclosed the information, including use under an exception in § 716.14 or 716.15 in the ordinary course of business to carry out those purposes.

(2) *Example.* If you disclose nonpublic personal information under this section to a financial institution with which you perform joint marketing, your contractual agreement with that institution meets the requirements of paragraph (a)(1)(ii) of this section if it prohibits the institution from disclosing or using the nonpublic personal information except as necessary to carry out the joint marketing or under an exception in § 716.14 or 716.15 in the ordinary course of business to carry out that joint marketing.

(b) *Service may include joint marketing.* The services that a nonaffiliated third party performs for you under paragraph (a) of this section may include marketing of your own products or services or marketing of financial products or services offered pursuant to joint agreements between you and one or more financial institutions.

(c) *Definition of joint agreement.* For purposes of this section, *joint agreement* means a written contract pursuant to which you and one or more financial institutions jointly offer, endorse, or sponsor a financial product or service.

§ 716.14 Exceptions to notice and opt out requirements for processing and servicing transactions.

(a) *Exceptions for processing transactions at consumer's request.* The requirements for initial notice in § 716.4(a)(2), the opt out in § § 716.7 and 716.10 and service providers and joint marketing in § 716.13 do not apply if

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you disclose nonpublic personal information as necessary to effect, administer, or enforce a transaction that a consumer requests or authorizes, or in connection with:

(1) Servicing or processing a financial product or service that a consumer requests or authorizes;

(2) Maintaining or servicing the consumer's account with you, or with another entity as part of a private label credit card program or other extension of credit on behalf of such entity; or

(3) A proposed or actual securitization, secondary market sale (including sales of servicing rights) or similar transaction related to a transaction of the consumer.

(b) *Necessary to effect, administer, or enforce a transaction* means that the disclosure is:

(1) Required, or is one of the lawful or appropriate methods, to enforce your rights or the rights of other persons engaged in carrying out the financial transaction or providing the product or service; or

(2) Required, or is a usual, appropriate or acceptable method:

(i) To carry out the transaction or the product or service business of which the transaction is a part, and record, service or maintain the consumer's account in the ordinary course of providing the financial service or financial product;

(ii) To administer or service benefits or claims relating to the transaction or the product or service business of which it is a part;

(iii) To provide a confirmation, statement or other record of the transaction, or information on the status or value of the financial service or financial product to the consumer or the consumer's agent or broker;

(iv) To accrue or recognize incentives or bonuses associated with the transaction that are provided by you or any other party;

(v) In connection with:

(A) The authorization, settlement, billing, processing, clearing, transferring, reconciling or collection of amounts charged, debited, or otherwise paid using a debit, credit or other payment card, check or account number, or by other payment means;

(B) The transfer of receivables, accounts or interests therein; or

(C) The audit of debit, credit or other payment information.

§ 716.15 Other exceptions to notice and opt out requirements.

(a) *Exceptions to opt out requirements.* The requirements for initial notice to consumers in § 716.4(a)(2), the opt out in § § 716.7 and 716.10 and service providers and joint marketing in § 716.13 do not apply when you disclose nonpublic personal information:

(1) With the consent or at the direction of the consumer, provided that the consumer has not revoked the consent or direction;

(2)(i) To protect the confidentiality or security of your records pertaining to the consumer, service, product or transaction;

(ii) To protect against or prevent actual or potential fraud, unauthorized transactions, claims or other liability;

(iii) For required institutional risk control or for resolving consumer disputes or inquiries;

(iv) To persons holding a legal or beneficial interest relating to the consumer; or

(v) To persons acting in a fiduciary or representative capacity on behalf of the consumer;

(3) To provide information to insurance rate advisory organizations, guaranty funds or agencies, agencies that are rating you, persons that are assessing your compliance with industry standards, and your attorneys, accountants, and auditors;

(4) To the extent specifically permitted or required under other provisions of law and in accordance with the Right to Financial Privacy Act of 1978 (12 U.S.C. 3401 *et seq.*), to law enforcement agencies (including a federal functional regulator, the Secretary of the Treasury, with respect to 31 U.S.C. Chapter 53, Subchapter II (Records and Reports on Monetary Instruments and Transactions) and 12 U.S.C. Chapter 21 (Financial Recordkeeping), a state insurance authority, with respect to any person domiciled in that insurance authority's state that is engaged in providing insurance, and the Federal Trade Commission), self-regulatory organizations, or for an investigation on a matter related to public safety;

(5)(i) To a consumer reporting agency in accordance with the Fair Credit Reporting Act (15 U.S.C. 1681 *et seq.*), or

(ii) From a consumer report reported by a consumer reporting agency;

(6) In connection with a proposed or actual sale, merger, transfer, or exchange of all or a portion of a business or operating unit if the disclosure of nonpublic personal information concerns solely consumers of such business or unit; or

(7)(i) To comply with federal, state or local laws, rules and other applicable legal requirements;

(ii) To comply with a properly authorized civil, criminal or regulatory investigation, or subpoena or summons by federal, state or local authorities; or

(iii) To respond to judicial process or government regulatory authorities having jurisdiction over you for examination, compliance or other purposes as authorized by law.

(b) *Examples of consent and revocation of consent.* (1) A consumer may specifically consent to your disclosure to a nonaffiliated insurance company of the fact that the consumer has applied to you for a mortgage so that the insurance company can offer homeowner's insurance to the consumer.

(2) A consumer may revoke consent by subsequently exercising the right to opt out of future disclosures of nonpublic personal information as permitted under § 716.7(f).

SUBPART D—RELATION TO OTHER LAWS; EFFECTIVE DATE

§ 716.16 Protection of Fair Credit Reporting Act.

Nothing in this part shall be construed to modify, limit, or supersede the operation of the Fair Credit Reporting Act (15 U.S.C. 1681 *et seq.*), and no inference shall be drawn on the basis of the provisions of this part regarding whether information is transaction or experience information under section 603 of that Act.

§ 716.17 Relation to state laws.

(a) *In general.* This part shall not be construed as superseding, altering, or affecting any statute, regulation, order or interpretation in effect in any state, except to the extent that such state statute, regulation, order or interpretation is inconsistent with the provisions of this part, and then only to the extent of the inconsistency.

(b) *Greater protection under state law.* For purposes of this section, a state statute, regulation, order or interpretation is not inconsistent with the provisions of this part if the protection such statute, regulation, order or interpretation affords any consumer is greater than the protection provided under this part, as determined by the Federal Trade Commission, after consultation with the National Credit Union Administration, on the Federal Trade Commission's own motion or upon the petition of any interested party.

§ 718.18 Effective date; transition rule.

(a) *Effective date.* This part is effective November 13, 2000. In order to provide sufficient time for you to establish policies and systems to comply with the requirements of this part, the National Credit Union Administration Board has

extended the time for compliance with this part until July 1, 2001.

(b)(1) *Notice requirement for consumers who were your members on the compliance date.* By July 1, 2001, you must provide an initial notice, as required by § 716.4, to consumers who are your members on July 1, 2001.

(2) *Example.* You provide an initial notice to consumers who are your members on July 1, 2001, if, by that date, you have established a system for providing an initial notice to all new members and have mailed the initial notice to all your existing members.

(c) *Two-year grandfathering of service agreements.* Until July 1, 2002, a contract that you have entered into with a nonaffiliated third party to perform services for you or functions on your behalf satisfies the provisions of § 716.13(a)(2) of this part, even if the contract does not include a requirement that the third party maintain the confidentiality of nonpublic personal information, as long as the agreement was entered into on or before July 1, 2000.

APPENDIX A TO PART 716—SAMPLE CLAUSES

Credit unions, including a group of affiliates that use a common privacy notice, may use the following sample clauses, if the clause is accurate for each institution that uses the notice.

A–1—Categories of information you collect (all credit unions)

You may use this clause, as applicable, to meet the requirement of § 716.6(a)(1) to describe the categories of nonpublic personal information you collect.

Sample Clause A–1:

We collect nonpublic personal information about you from the following sources:

- Information we receive from you on applications or other forms;
- Information about your transactions with us, our affiliates, or others; and
- Information we receive from a consumer reporting agency.

A–2—Categories of information you disclose (credit unions that disclose outside of the exceptions)

You may use one of these clauses, as applicable, to meet the requirement of § 716.6(a)(2) to describe the categories of nonpublic personal information you disclose. These clauses may be used if you disclose nonpublic personal information other than as permitted by the exceptions in § § 716.13, 716.14, and 716.15.

Sample Clause A–2, Alternative 1:

We may disclose the following kinds of nonpublic personal information about you:

- Information we receive from you on applications or other forms, such as [*provide illustrative examples, such as ''your name, address, social security number, assets, and income''*];
- Information about your transactions with us, our affiliates, or others, such as [*provide illustrative examples, such as ''your account balance, payment history, parties to transactions, and credit card usage''*]; and
- Information we receive from a consumer reporting agency, such as [*provide illustrative examples, such as ''your creditworthiness and credit history''*].

Sample Clause A–2, Alternative 2:

We may disclose all of the information that we collect, as described [*describe location in the notice, such as ''above'' or ''below''*].

A–3—Categories of information you disclose and parties to whom you disclose (credit unions that do not disclose outside of the exceptions)

You may use this clause, as applicable, to meet the requirements of § 716.6(a)(2), (3) and (4) to describe the categories of nonpublic personal information about members and former members that you disclose and the categories of affiliates and nonaffiliated third parties to whom you disclose. This clause may be used if you do not disclose nonpublic personal information to any party, other than as permitted by the exceptions in § § 716.14, and 716.15.

Sample Clause A–3:

We do not disclose any nonpublic personal information about our members and former members to anyone, except as permitted by law.

A–4—Categories of parties to whom you disclose (credit unions that disclose outside of the exceptions)

You may use this clause, as applicable, to meet the requirement of § 716.6(a)(3) to describe the categories of affiliates and nonaffiliated third parties to whom you disclose nonpublic personal information. This clause may be used if you disclose nonpublic personal information other than as permitted by the exceptions in § § 716.13, 716.14, and 716.15, as well as when permitted by the exceptions in § § 716.14, and 716.15.

Sample Clause A–4:

We may disclose nonpublic personal information about you to the following types of third parties:

- Financial service providers, such as [*provide illustrative examples, such as ''mortgage bankers, securities broker-dealers, and insurance agents''*];
- Non-financial companies, such as [*provide illustrative examples, such as ''retailers, direct marketers, airlines, and publishers''*]; and
- Others, such as [*provide illustrative examples, such as ''non-profit organizations''*].

We may also disclose nonpublic personal information about you to nonaffiliated third parties as permitted by law.

A–5—Service provider/joint marketing exception

You may use one of these clauses, as applicable, to meet the requirements of § 716.6(a)(5) related to the exception for service providers and joint marketers in § 716.13. If you disclose nonpublic personal information under this exception, you must describe the categories of nonpublic personal information you disclose and the categories of third parties with whom you have contracted.

Sample Clause A–5, Alternative 1:

We may disclose the following information to companies that perform marketing services on our behalf or to other financial institutions with whom we have joint marketing agreements:

- Information we receive from you on applications or other forms, such as [*provide illustrative examples, such as ''your name, address, social security number, assets, and income''*];
- Information about your transactions with us, our affiliates, or others, such as [*provide illustrative examples, such as ''your account balance, payment history, parties to transactions, and credit card usage''*]; and
- Information we receive from a consumer reporting agency, such as [*provide illustrative examples, such as ''your creditworthiness and credit history''].*

Sample Clause A–5, Alternative 2:

We may disclose all of the information we collect, as described [*describe location in the notice, such as ''above'' or ''below''*] to companies that perform marketing services on our behalf or to other financial institutions with whom we have joint marketing agreements.

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A–6—Explanation of opt out right (credit unions that disclose outside of the exceptions)

You may use this clause, as applicable, to meet the requirement of § 716.6(a)(6) to provide an explanation of the consumer's right to opt out of the disclosure of nonpublic personal information to nonaffiliated third parties, including the method(s) by which the consumer may exercise that right. This clause may be used if you disclose nonpublic personal information other than as permitted by the exceptions in §§ 716.13, 716.14, and 716.15.

Sample Clause A–6:

If you prefer that we not disclose nonpublic personal information about you to nonaffiliated third parties, you may opt out of those disclosures, that is, you may direct us not to make those disclosures (other than disclosures permitted by law). If you wish to opt out of disclosures to nonaffiliated third parties, you may [*describe a reasonable means of opting out, such as ''call the following toll-free number: (insert number)*].

A–7—Confidentiality and security (all credit unions)

You may use this clause, as applicable, to meet the requirement of § 716.6(a)(8) to describe your policies and practices with respect to protecting the confidentiality and security of nonpublic personal information.

Sample Clause A–7:

We restrict access to nonpublic personal information about you to [*provide an appropriate description, such as ''those employees who need to know that information to provide products or services to you''*]. We maintain physical, electronic, and procedural safeguards that comply with federal regulations to guard your nonpublic personal information.

PART 741—REQUIREMENTS FOR INSURANCE

1. The authority citation for part 741 continues to read as follows:

Authority: 12 U.S.C. 1757, 1766, and 1781–1790. Section 741.4 is also authorized by 31 U.S.C. 3717.

2. Add § 741.220 to part 741 to read as follows:

§ 741.220 Privacy of consumer financial information.

Any credit union which is insured pursuant to Title II of the Act must adhere to the requirements stated in part 716 of this chapter.

[FR Doc. 00–12014 Filed 5–17–00; 8:45 am]

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008712

Federal Register

Thursday,
May 18, 2000

Part V

Department of Education

National Institute on Disability and Rehabilitation Research, Office of Special Education and Rehabilitative Services; Final Funding Priorities for Research and Training Centers and Inviting Applications; Notices

008713

DEPARTMENT OF EDUCATION

National Institute on Disability and Rehabilitation Research

AGENCY: Department of Education.

ACTION: Notice of Final Funding Priorities for Fiscal Years 2000–2001 for Research and Training Centers.

SUMMARY: The Assistant Secretary for the Office of Special Education and Rehabilitative Services announces final funding priorities for three Rehabilitation Research and Training Centers (RRTCs) under the National Institute on Disability and Rehabilitation Research (NIDRR) for fiscal years 2000–2001. The Assistant Secretary takes this action to focus research attention on areas of national need. These priorities are intended to improve rehabilitation services and outcomes for individuals with disabilities.

EFFECTIVE DATE: These priorities take effect on June 19, 2000.

FOR FURTHER INFORMATION CONTACT: Donna Nangle. Telephone: (202) 205–5880. Individuals who use a telecommunications device for the deaf (TDD) may call the TDD number at (202) 205–9136. Internet: Donna__Nangle@ed.gov

Individuals with disabilities may obtain this document in an alternate format (e.g., Braille, large print, audiotape, or computer diskette) on request to the contact person listed in the preceding paragraph.

SUPPLEMENTARY INFORMATION: This notice contains final priorities for one RRTC related to Rehabilitation for Persons with Long-Term Mental Illness and two RRTCs related to Independent Living. The final priorities refer to NIDRR's Long Range Plan (the Plan). The Plan can be accessed on the World Wide Web at: *http://www.ed.gov/legislation/FedRegister/other/1999–12/68576.html.*

These final priorities support the National Education Goal that calls for every adult American to possess the skills necessary to compete in a global economy.

The authority for the Secretary to establish research priorities by reserving funds to support particular research activities is contained in sections 202(g) and 204 of the Rehabilitation Act of 1973, as amended (29 U.S.C. 762(g) and 764).

Note: This notice of final priorities does *not* solicit applications. A notice inviting applications is published in this issue of the **Federal Register**.

Analysis of Comments and Changes

On February 23, 2000 the Assistant Secretary published a notice of proposed priorities in the **Federal Register** (64 FR 9182). The Department of Education received 13 letters commenting on the notice of proposed priority by the deadline date. Technical and other minor changes—and suggested changes the Assistant Secretary is not legally authorized to make under statutory authority—are not addressed.

Rehabilitation Research and Training Centers

Rehabilitation of Persons with Long-term Mental Illness

Comment: Eleven commenters suggested that the RRTC should add a priority addressing the role of technology in self-determination.

Discussion: The RRTC is established for the purpose of conducting research that can facilitate improving services and supports for individuals with Long-Term Mental Illness (LTMI). NIDRR recognizes the need for better understanding of the role of technology in rehabilitation of individuals with disabilities, including applications of information technologies in the delivery of supports and services to individuals with LTMI.

Changes: The priority has been revised to require that applicants conduct research on technology in self-determination.

Comment: The request for application should specifically ask for research and development issues related to societal barriers that result from the problems related to the stigma and discrimination experienced by persons with mental illness.

Discussion: Applicants have the discretion to propose to address stigmas, discrimination, and barriers as they relate to self-determination. However, after consulting with officials at the National Institute on Mental Health (NIMH), NIDRR has determined that research on these topics duplicate NIMH research. NIDRR declines to add a requirement that applicants specifically address research and development issues related to societal barriers that result from the problems related to the stigma and discrimination experienced by persons with mental illness.

Change: None.

Comment: NIDRR is encouraged to examine opportunities to enhance self-determination efforts, particularly opportunities to expand consumer and family member initiated acts of self-determination in delivery of patient care and rehabilitative services and other self-determination efforts that are succeeding.

Discussion: The priority provides a discussion on the issue of enhancing opportunities to expand consumer and family member initiated acts of self-determination in delivery of patient care and rehabilitative services. The applicant has the discretion to pursue research related to all aspects of improving self-determination services and supports for individuals with LTMI in the proposal. The peer review process will evaluate the merits of the proposals.

Change: None.

Comment: NIDRR is encouraged to use resources to increase availability of evidence-based service delivery programs such as the Program of Assertive Community Treatment (PACT).

Discussion: The priority provides a discussion on the issue of community-based and evidence-based service delivery. Applicants could propose to address examples of evidence-based service delivery in fulfilling the requirements of the priority. However, NIDRR has no basis to determine that all applicants should be required to address this issue or to utilize a specific theory, model, or approach.

Change: None.

The Department of Education received two letters commenting upon the two proposed priorities on independent living.

Improved Management of CIL Programs and Services

Comment: One commenter suggested that NIDRR require the RRTC to address successful management practices applied by organizations in the for-profit sector that could be utilized by CILs.

Discussion: In the background statement, NIDRR notes that CILs operate in an environment of public and private and nonprofit and business entities. We agree that the for-profit sector may offer CILs models of successful management practices. In addressing the required research activities, applicants have the discretion to propose specific research approaches and theoretical perspectives. The peer review process will evaluate the merits of the proposals.

Changes: We have revised the fourth activity to reflect that business organizations are potential models of successful management for CILs.

Comment: One commenter recommended that the training to improve core competency skills be extended to all staff members, including

those facing barriers related to cultural and linguistic diversity. The same commenter recommended that the statement regarding evaluation of strategies for improved recruitment and retention of staff be worded so that it includes all center staff, with an emphasis on people from diverse backgrounds.

Discussion: In the background statement, NIDRR notes that staffing problems in general are an issue for CILs that must be addressed. Similarly, NIDRR recognizes that improvement of core competencies is an issue for all CIL staff. The language of the proposed activities needs to be changed to fully address the concerns of NIDRR.

Changes: NIDRR has revised the activities to clarify that the training needs and the recruitment and retention of all staff, including those who are geographically dispersed or cultural and linguistic minorities, must be addressed.

Comment: One commenter recommended that the focus be broadened to include examination of CIL partnerships with public and private agencies that may have newly acquired authority and resources aimed at the mission of employment of people with disabilities.

Discussion: In the priority, NIDRR notes that CILs operate in an environment of public and private and nonprofit and business entities. NIDRR notes that the ability to form effective working relationships with a range of organizations is essential for successful CIL operation. As noted in the background statement, recent developments in employment services and entitlement benefits for individuals pose additional challenges. NIDRR prefers to allow the applicant to develop and propose plans that draw upon the range of actors that may facilitate employment. The peer review process will evaluate the merits of the proposals.

Changes: None.

Il and the New Paradigm of Disability

Comment: One commenter indicated that the priority was not clearly worded when presenting the activity that references ''generic community services''.

Discussion: The background statement indicates that a challenge to facilitating independent living and community integration is the changing universe of disability. NIDRR encourages applicants to address a range of strategies that could facilitate advocacy and community services for persons with significant disabilities, including persons from a changing universe population. An applicant might propose to focus upon a range of appropriate populations with different degrees of need for services. The peer review process will evaluate the merits of the proposals.

Changes: None.

Comment: One commenter asked for clarification so that the priority explicitly includes ''the policy environment as part of the social environment'' cited in the opening paragraph.

Discussion: NIDRR has long supported policy research on disability and independent living. Inclusion of a policy focus is in line with positions established in the Plan.

Changes: The priority has been revised to explicitly include ''the policy environment''.

Rehabilitation Research and Training Centers

The authority for the RRTC program is contained in section 204(b)(2) of the Rehabilitation Act of 1973, as amended (29 U.S.C. 764(b)(2)). Under this program the Secretary makes awards to public and private organizations, including institutions of higher education and Indian tribes or tribal organizations for coordinated research and training activities. These entities must be of sufficient size, scope, and quality to effectively carry out the activities of the Center in an efficient manner consistent with appropriate State and Federal laws. They must demonstrate the ability to carry out the training activities either directly or through another entity that can provide that training. The Assistant Secretary may make awards for up to 60 months through grants or cooperative agreements. The purpose of the awards is for planning and conducting research, training, demonstrations, and related activities leading to the development of methods, procedures, and devices that will benefit individuals with disabilities, especially those with the most severe disabilities.

Description of Rehabilitation Research and Training Centers

RRTCs are operated in collaboration with institutions of higher education or providers of rehabilitation services or other appropriate services. RRTCs serve as centers of national excellence and national or regional resources for providers and individuals with disabilities and the parents, family members, guardians, advocates or authorized representatives of the individuals.

RRTCs conduct coordinated, integrated, and advanced programs of research in rehabilitation targeted toward the production of new knowledge to improve rehabilitation methodology and service delivery systems, to alleviate or stabilize disabling conditions, and to promote maximum social and economic independence of individuals with disabilities.

RRTCs provide training, including graduate, pre-service, and in-service training, to assist individuals to more effectively provide rehabilitation services. They also provide training including graduate, pre-service, and in-service training, for rehabilitation research personnel and other rehabilitation personnel.

RRTCs serve as informational and technical assistance resources to providers, individuals with disabilities, and the parents, family members, guardians, advocates, or authorized representatives of these individuals through conferences, workshops, public education programs, in-service training programs and similar activities.

RRTCs disseminate materials in alternate formats to ensure that they are accessible to individuals with a range of disabling conditions.

NIDRR encourages all Centers to involve individuals with disabilities and individuals from minority backgrounds as recipients of research training, as well as clinical training.

The Department is particularly interested in ensuring that the expenditure of public funds is justified by the execution of intended activities and the advancement of knowledge and, thus, has built this accountability into the selection criteria. Not later than three years after the establishment of any RRTC, NIDRR will conduct one or more reviews of the activities and achievements of the Center. In accordance with the provisions of 34 CFR 75.253(a), continued funding depends at all times on satisfactory performance and accomplishment.

Priority 1: Long-Term Mental Illness

Background

The Surgeon General estimates that approximately 20 percent of the U.S. population experience a mental disorder in any given year, that 9 percent of the adult population have a diagnosable major mental illness, and that a subpopulation of 5.4 percent of the population is considered to have a significant mental illness (Kessler, R.C., McGonagle, K.A., Zhoa, S., Nelson, C.B., Hughes, M., Eshlemon, S., Wittchen, H.U., Kendler, K.S. (1994). Lifetime and 12-month prevalence of DSM–IIIR psychiatric disorders in the United States. Results from the National

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Comorbidity Survey. Archives of General Psychiatry, 51–8–19). The costs to society of mental illness are substantial. The indirect costs of mental illness in 1990, stemming from lost productivity at work, school, or home, were estimated at $78.6 billion (Rice and Miller, 1996). As the population grows, the needs of a growing number of individuals with a significant mental illness are not being met. Only one in four adults with a diagnosable mental disorder receives treatment and one third of children and adolescents needing mental health services are treated (Manderscheid and Henderson, 1998), this can be attributed to many factors. Inadequate community resources, including lack of access to new medications and psychosocial treatments, unemployment, and lack of options for long-term care complicate the lives of individuals with long-term mental illness. Many individuals also experience homelessness, family disruptions, chronic medical conditions, alcohol and substance abuse, incarceration, and social isolation, as well as the potential for periodic exacerbation.

Quality is an important factor in the delivery of effective mental health services. Defining quality services is not an easy task, nor is there ready consensus on all components of the concept. The Institute of Medicine states that quality of services is ''the degree to which health services for individuals and populations increase the likelihood of desired health outcomes and are consistent with current professional knowledge'' (Marder, 1999). However, measuring the quality of services provided to individuals with significant mental illness, as well as measuring outcomes, present numerous challenges because of the periodic and chronic nature of the illness, and the ongoing need for intensive therapeutic services and long-term support. Practitioners, policy makers, and consumers continue to ask questions about how to adequately meet the multifaceted needs of individuals with significant mental illness.

Generally, family members and consumers want community-based support services and treatment programs that are accessible and designed to meet long-term needs. The potential for individuals with serious mental illness to be maintained in the community rather than in institutions, work productively, live independently, and participate in rehabilitation planning is increased when a comprehensive support system is available in community settings. Research on consumer participation and community-based programs has provided evidence that there is a positive relationship between the level of consumer participation and therapeutic outcomes (Kent & Read, 1998).

Proponents of community-based service programs and support systems long have advocated that consumers be empowered to participate in the decisionmaking process. However, one reason individuals with disabilities have limited opportunities to participate in decisions about their services is related to the lack of consensus on a definition for self-determination. Self-determination is defined and implemented differently (Ward, 1999) depending on the program, philosophy, and purposes for implementing a self-determination model. However, there are some common concepts in the definitions for self-determination, in particular, consumer control, choice, self-direction, empowerment, leadership, and self-advocacy (Ward & Roger, 1999) as potential elements of self-direction. While most mental health professionals support the concept of self-determination, not all agree that individuals with psychiatric disabilities should have control over or participate in planning and decisionmaking activities (Kent & Read, 1998).

Individuals with psychiatric disabilities are not yet full participants in the disability self-determination movement. It is widely alleged that professionals in the psychiatric disabilities community continue to use medical compliance as a control mechanism and as a determining factor for awarding patients certain privileges. The right to choose among treatment options is often regarded as a privilege that is earned through medical compliance (Chamberlain & Powers, 1999).

Obstacles to the development and implementation of self-determination efforts include controversy over whether severe mental illness is a lifelong process or whether recovery is possible. Some discussions of this issue suggest that the need for extensive, lifelong support and the severity of the illness preclude using a self-determination approach. In addition, the impact of self-determination approaches on quality of services is unknown. Methodologies, indicators, and standards for measuring quality of care within self-determination models would facilitate understanding the impact of this approach on rehabilitation outcomes. In particular, research that addresses questions about the ability of individuals with serious mental illnesses to make decisions about treatment and medication management is lacking.

Traditionally, program planning and treatment decisions in the mental health field have been made by clinicians, and often involve maintaining patients on medication without consumer input or choice. Policies and service systems tend to be based on a paternalistic model that restricts consumer control and input. However, there is evidence that consumer and family involvement in decisionmaking and program planning have the potential to foster higher quality services and responsiveness from providers.

The quality of services can potentially be improved by using information technology to involve consumers and families in decisionmaking. Efforts to support individual choice can be enhanced by using emerging technologies to improve access to services, particularly for individuals in remote areas, reduce information dissemination barriers, improve employment training and job opportunities, and enhance training options for service providers. Although recent studies have discussed the digital divide for individuals with disabilities (New York Times, 2000; Disability Statistics Center, 2000) there is a paucity of research on the benefits of using technology to support self-determination. Research addressing consumer benefits and satisfaction with uses of technology for activities associated with improving their independence, barriers that prevent access and expanded use of technology, service provider knowledge and experience using technology to support self-determination, and the effectiveness of technology to improve or enhance self-determination is limited.

Similarly, the effectiveness service models incorporating self-determination and their relationship to rehabilitation outcomes have not been evaluated. In addition, there has not been adequate study of the impact of the various components of self-determination models on the rehabilitation process.

Better understanding of the implications of self-determination for rehabilitation outcomes potentially will answer questions related to competency, patient rights, recovery, outcomes, and policies. Research addressing these issues, describing standards for quality, and establishing outcome measures for consumer driven decisions is lacking in the research literature. Studies evaluating self-determination will potentially further the understanding of the rehabilitation process for individuals with significant mental illness, and identify strengths,

weaknesses, and needed improvements in the existing models.

The Plan emphasizes the importance of independent living and community integration. Central to independent living is the recognition that each individual has a right to independence that comes from exercising maximal control over his or her life. These activities include making decisions involved in managing one's own life, sustaining the ability and opportunity to make choices in performing everyday activities, and minimizing physical and psychological dependence on others. Independent living is a concept that also emphasizes participation and equity in the right to share in the opportunities, risks, and rewards available to all citizens.

Priority: Improving Services and Supports for Individuals With Long-Term Mental Illness

The Assistant Secretary, in collaboration with the Substance Abuse and Mental Health Services Administration and the Center for Mental Health Services, will establish an RRTC for the purpose of improving services and supports for individuals with long-term mental illness. In carrying out these purposes, the Center must:

(1) Develop measures that can be applied to evaluate self-determination activities in terms of rehabilitation outcomes, quality of services, and availability of community resources;

(2) Identify and assess self-determination direction theories, models, and activities, as well as the barriers to participation in self-determination activities for individuals with disabilities;

(3) Develop and evaluate management tools to enable service providers to support self-determination;

(4) With significant and persistent mental illness and publish a comprehensive report in the fourth year of the grant; and

(5) Address in its research the specific needs of minority populations with LTMI.

Two Priorities on Independent Living

Background

The mission of NIDRR emphasizes developing knowledge that will ''improve substantially the options for disabled individuals to perform regular activities in the community, and the capacity of society to provide full opportunities and appropriate supports for its disabled'' as stated in the Plan. Much of NIDRR's work reflects the components of the Independent Living (IL) philosophy: consumer control, self-help, advocacy, peer relationships and peer role models, and equal access to society, programs, and activities. NIDRR has funded subject-specific RRTCs in IL since 1980 and supports other projects that incorporate principles of IL.

Most recently, NIDRR has funded one RRTC on Centers for Independent Living (CIL) management and services and a second on IL and disability policy. The last year of the five-year project period for the awards was 1999. In light of the research agenda established in the Plan, and input obtained from the Rehabilitation Services Administration (RSA) and other Federal agencies and constituents, in various meetings that addressed related themes, NIDRR has identified critical issues in independent living to be addressed at this time. There is a continuing need to fund two Centers that study independent living and community integration.

Independent living and achieving community integration to the maximum extent possible are issues at the crux of NIDRR's mission. NIDRR is committed to the creation of a theoretical framework with measurable outcomes that is based upon the experiences of individuals with disabilities. The new paradigm of disability embodied in the Plan requires analysis of the extent to which socioenvironmental factors help or hinder individuals with disabilities in attaining full participation in society. Questions as basic as defining independent living in the context of diverse socioeconomic factors must be addressed. Current challenges to independent living derive from the changing characteristics of both the IL service system and the disability population.

Substantial administrative, advocacy, strategic and service-delivery issues affect the daily activities of Centers for Independent Living (CILs). Critical issues include funding and resource management, quality staffing, and relationships with other agencies key to the success of CILs. The issue of financial management of CILs calls for a balanced approach to identify existing policies, regulations, models, and programs that serve to hinder or help in establishing sound fiscal operation. Financial management requires expertise in fiscal analysis, budgeting, understanding grant requirements and program rules, accounting, auditing, and fundraising.

CILs, which spend substantial amounts of money on personnel, are subject to staffing problems typical of human service organizations and small businesses, including recruitment problems, training and competency development, and retention problems. Staffing problems may impede the ability of CILs to deliver individualized information and support services. An essential step in strengthening continuity in services is to recruit, train, and retain first line managers.

CILs lack documentation of the competencies required for IL management. Awareness of competency needs is key to developing successful recruitment strategies and staff development programs. For example, innovative recruitment strategies are needed to attract youth with disabilities that are transitioning from school to independent living to obtain employment expeiences in CIL service programs. Creative efforts to attract young persons entering the job market as employees could assist the CILs in understanding the needs of youth with disabilities as consumers as well, including work experience opportunities while still in school, upon graduation and after college. Career development, with pathways to more responsible positions in CILs, can be a key to the retention of competent staff.

CILs exist in a framework of public agencies, nonprofit organizations, and the local business sectors. The ability to form effective partnerships and cooperative working relationships with appropriate entities is essential to successful CIL operation. Historically, relationships with State governments, including Vocational Rehabilitation agencies, Statewide Independent Living Councils, State Consumer Advocacy Organizations and County and City governments have been at the heart of CIL operations and responsibilities. Recent developments in the area of employment services and entitlement benefits for individuals with disabilities pose additional opportunities and challenges for CILs by introducing new actors, new clients, and new rules. Passage of the Workforce Investment Act of 1998 and the Work Incentives Improvement Act of 1999 might provide new opportunities for CILs to play a role in the process of vocational rehabilitation and employment.

A challenge to facilitating independent living and community integration is the changing universe of disability. Demographic, social and environmental trends affect the prevalence and distribution of various types of disability as well as the demands of those disabilities on social policy and service systems. Within the universe of disabilities are: (1) Changing etiologies for existing disabilities; (2) growth in segments of the population with higher prevalence rates for certain

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disabilities; (3) the consequences of changes in public policy and in health care services and technologies; and (4) the appearance of new disabilities. Some of the RRTCs sponsored by NIDRR that address these issues including the following: Aging with a Disability, Measuring Rehabilitative Outcomes, and Economic Research on Employment Policy for Persons with Disabilities.

The CILs and consumer organizations can prepare to address changing needs of diverse populations with attention to the infrastructure of resource availability and management strategy. At the same time, there is a need to frame the history and role of the independent living movement within the context of theories of society and social movements and organizational and group structure. Such a framework could identify ways to: (1) Reach out to underserved populations, (2) collaborate with key organizations that might not be perceived as traditional disability advocates, and (3) recognize the role of environmental factors on successfully independent living and achieving community integration. A sound theoretical base can be drawn upon to develop policy and service-delivery models that can help maximize social participation for individuals with disabilities.

Researchers have identified an association between disabilities and poverty, especially among youth (Fujiura G *et al.,* ''Disability Among Ethnic and Racial Minorities in the United States,'' *Journal of Disability Policy Studies,* Vol. 9, No. 2, pgs. 112–130, 1998). The growing number of individuals aging with long-standing disabilities, as well as the increase in the population of older persons who acquire disabilities as they age, is another aspect of a changing disability population. Newer etiologies of disability, such as HIV/AIDS, multiple chemical sensitivity and environmental illness, challenge IL concepts, services, and research. CILs and other organizations can serve as a resource to teach youth, aging persons, and underserved populations, including those from cultural and linguistic diversity about independent living. There may be an opportunity for CILs to develop strong alliances with parent information training centers and schools (from pre-school through postsecondary programs) and with the aging and underserved populations through appropriate partnerships.

As an example of the role of demographic factors, disability has a disproportionate impact upon African Americans, Hispanic Americans, and American Indians. An array of culturally-sensitive service-delivery models, community organizations, and other resources is necessary to provide services to individuals from minority backgrounds. Organizations with grassroots orientations, including CILs, are in a unique position to help identify the specific needs of individuals from those affected populations. Model strategies in other countries might be adapted to reach unserved and underserved populations in the United States.

Physical environment, including the built environment, can pose numerous obstacles that confound living independently. Individuals with disabilities living in rural communities may be isolated from CILs and vocational rehabilitation services. Isolation resulting from distance, lack of available transportation, lack of monetary resources to support social services, limited job opportunities, lack of a health care delivery system, the digital divide due to a lack of technology, and unavailability of accessible and affordable housing can be problems for rural Americans. Similar problems may confront persons from minority backgrounds in inner cities and remote areas, persons who are homeless, and migrants. For all populations, and for all salient issues that affect independent living and community integration, the social and economic costs and benefits of various strategies must be evaluated.

The Plan discusses research on physical inclusion, including the identification and evaluation of models that facilitate housing that are consistent with consumer choice. In addition to physical and economic accessibility, model housing approaches must maximize community integration and ability to participate in a range of normative activities.

Priority 1: Improved Management of CIL Programs and Services

The Assistant Secretary will establish an RRTC on IL management, services and strategies that will conduct research and training activities and develop and evaluate model approaches to enhance the capacity of CILs to operate and manage effective advocacy, service programs and businesses, and develop and maintain effective external partnerships. In carrying out this purpose, the Center must:

(1) Develop a database of existing CIL funding and economic resources, and identify innovative and best practices in creating secure economic foundations for CILs;

(2) Working in collaboration with appropriate entities, design and test several options for generating funding from alternative sources, including business development strategies and analyze policy-related and programmatic consequences of various funding options, especially those independent of public financing;

(3) Identify best practices and develop and test programs for CILs in expanding services to youth with disabilities and their families, including those from diverse cultural backgrounds, and in interfacing with education and transition programs to prepare children and youth for independent living, including life long learning;

(4) Develop and test strategies to enable CILs to benefit from management models of other successful community-based organizations or business organizations. Develop and test innovative models of cost-effective training to improve core competency skills of CIL staff, including geographically dispersed and culturally and linguistically diverse CIL staff, including but not limited to those from Indian tribes and tribal organizations, and evaluate strategies for improved recruitment and retention of CIL staff, including those from diverse backgrounds;

(5) Review CIL and vocational rehabilitation agency policies related to collaborations, and design strategies for innovative partnerships to promote employment outcomes for individuals with disabilities;

(6) Coordinate activities with and provide instruments, curricula, methodologies, and resource guides, as well as research findings, including but not necessarily limited to distance learning and web-based technologies, to the RSA training and technical assistance provider under Part C of Title VII of the Rehabilitation Act; and

(7) Provide training and information for CILs, policy makers, including business leaders and educators, administrators, and advocates on research findings and identified strategies.

In carrying out these purposes, the Center must coordinate with other NIDRR, including Section 21 Leadership Training and the RRTCs on Disability Statistics and Persons with Disabilities from Minority Backgrounds, and OSERS grantees and community-based organizations that focus upon independent living and with the National Center for the Dissemination of Disability Research. The RRTC on improved management of CIL programs and services will be funded jointly by NIDRR and RSA and will be required to work closely with the RSA grantee providing training, technical assistance,

and transition assistance to CILs and Statewide Independent Living Councils under Part C of Title VII of the Rehabilitation Act.

Priority 2: IL and the New Paradigm of Disability

The Assistant Secretary will establish an RRTC on IL and the New Paradigm of Disability that will facilitate the development of innovative independent living strategies to meet the challenges of the 21st century. This Center will promote an understanding of independent living concepts and practices in the context of the physical and social environments noted in the new paradigm of disability, including assessment of the application of independent living to the changing universe of disability. In carrying out these purposes, the Center must:

(1) Develop an analytical framework for research on living independently that incorporates the definition of IL, the contextual framework of disability and an accessible community, and the changing universe of disability as articulated in the Plan, and is grounded in social science theory and methods;

(2) Identify and evaluate strategies to promote accessible cost-effective advocacy and generic community services for individuals with significant disabilities, and address specifically at least one changing universe population;

(3) Evaluate the use of peer networks and communication channels to assist individuals with disabilities to maintain wellness, access community services, and participate in community life, including education and employment;

(4) Assess the concept and application of independent living for diverse populations of cultural and linguistic minorities, including but not limited to those from Indian tribes and tribal organizations, Latinos and Asians and identify and evaluate culturally appropriate independent living approaches and strategies to assist individuals within these groups to attain self-determined independent living goals; and

(5) Provide training and information for CILs, policy makers, including business leaders and educators, administrators, and advocates on research findings and identified strategies.

In carrying out these purposes, the project must coordinate with other NIDRR, including Section 21 Leadership Training and the RRTCs on Disability Statistics and Persons with Disabilities from Minority Backgrounds, and OSERS grantees and community-based organizations that focus on independent living, the Center on Emergent Disability, the National Center for the Dissemination of Disability Research, and the RSA training and technical assistance provider under Part C of Title VII of the Rehabilitation Act.

Electronic Access to This Document

You may view this document, as well as all other Department of Education documents published in the **Federal Register**, in text or Adobe Portable Document Format (PDF) on the Internet at either of the following sites:

http://ocfo.ed.gov/fedreg.htm
http://www.ed.gov/news.html

To use the PDF you must have the Adobe Acrobat Reader, which is available free at either of the preceding sites. If you have questions about using the PDF, call the U.S. Government Printing Office (GPO), toll free, at 1–888–293–6498; or in the Washington, D.C. area at (202) 512–1530.

Note: The official version of this document is the document published in the **Federal Register**. Free Internet access to the official edition of the **Federal Register** and the Code of Federal Regulations is available on GPO Access at: http://www.access.gpo.gov/nara/index.html.

Applicable Program Regulations: 34 CFR Part 350

Program Authority: 29 U.S.C. 760–762.

(Catalog of Federal Domestic Assistance Number: 84.133B, Rehabilitation Research and Training Centers)

Dated: May 11, 2000.

Judith E. Heumann,

Assistant Secretary for Special Education and Rehabilitative Services.

[FR Doc. 00–12502 Filed 5–17–00; 8:45 am]

BILLING CODE 4000–01–U

DEPARTMENT OF EDUCATION

[CFDA No.: 84.133B]

Office of Special Education and Rehabilitative Services, National Institute on Disability and Rehabilitation Research, Notice Inviting Applications for New Rehabilitation Research Training Centers for Fiscal Year 2000

NOTE TO APPLICANTS: This notice is a complete application package. Together with the statute authorizing the programs and applicable regulations governing the programs, including the Education Department General Administrative Regulations (EDGAR), this notice contains information, application forms, and instructions needed to apply for a grant under these competitions.

These programs support the National Education Goal that calls for all Americans to possess the knowledge and skills necessary to compete in a global economy and exercise the rights and responsibilities of citizenship.

The estimated funding levels in this notice do not bind the Department of Education to make awards in any of these categories, or to any specific number of awards or funding levels, unless otherwise specified in statute.

APPLICABLE REGULATIONS: The Education Department General Administrative Regulations (EDGAR), 34 CFR Parts 74, 75, 77, 80, 81, 82, 85, and 86; Disability and Rehabilitation Research Projects and Centers—34 CFR Part 350, and the Notice of Final Priority published elsewhere in this issue of the **Federal Register**.

PRE-APPLICATION MEETINGS: Interested parties are invited to participate in a pre-application meeting to discuss the funding priority for the two RRTCs on Improved Management of Centers for Independent Living (CIL) Programs and Services and Independent Living (IL) and the New Paradigm of Disability and to receive technical assistance through individual consultation and information about the funding priorities.

A pre-application meeting for the RRTC on Improving Service and Supports for Individuals with Long-Term Mental Illness will be held on June 13, 2000 at the Department of Education, Office of Special Education and Rehabilitative Services, Switzer Building, Room 3065, 330 C St. SW, Washington, DC between 10:00 a.m. and 12:00 a.m.

The pre-application meeting for the Independent Living priorities will be held on June 15, 2000 at the Department of Education, Office of Special Education and Rehabilitative Services, Switzer Building, Room 3065, 330 C St. SW, Washington, DC between 10:00 a.m. and 12:00 a.m.

NIDRR staff will also be available at this location on from 1:30 p.m. to 5:00 p.m. on that same day of the meeting to provide technical assistance through individual consultation and information about the funding priorities. NIDRR will make alternate arrangements to accommodate interested parties who are unable to attend the pre-application meeting in person. For further information or to make arrangements to attend either in person or by telephone contact the following: for the pre-application meeting on the Long-Term Mental Illness priority contact Connie Pledger, Switzer Building, room 3423, 400 Maryland Avenue, SW, Washington, DC 20202. Telephone (202)

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205–4352. And for the pre-application meeting on the Independent Living priority contact David Keer, Switzer Building, room 3431, 400 Maryland Avenue, SW, Washington, DC 20202. Telephone (202) 205–5633. If you use a Telecommunication Device for the Deaf (TDD), you may call (202) 205–4475.

Assistance to Individuals with Disabilities at the Public Meetings

The meeting site is accessible to individuals with disabilities, and a sign language interpreter will be available. If you need an auxiliary aid or service other than a sign language interpreter in order to participate in the meeting (e.g. other interpreting service such as oral, cued speech, or tactile interpreter; assistive listening device; or materials in alternate format), notify the contact person listed in this Notice at least two weeks before the scheduled meeting date. Although we will attempt to meet a request we receive after this date, we may not be able to make available the requested auxiliary aid or service because of insufficient time to arrange it.

APPLICATION NOTICE FOR FISCAL YEAR 2000 REHABILITATION RESEARCH AND TRAINING CENTERS

[CFDA No. 84–133B]

Funding priority	Deadline for transmittal of applications	Estimated number of awards	Award amount (per year)*	Project period (months)
84.133B–1 Improved management of CIL programs and services.	July 17, 2000	1	$500,000	60
84.133B–5 IL and the new paradigm of disability	July 17, 2000	1	500,000	60
84.133B–7 Improving service and supports for individuals.	July 17, 2000	1	550,000	60

Program Title: Rehabilitation Research and Training Center.

CFDA Number: 84.133B.

Purpose of Program: RRTCs are operated in collaboration with institutions of higher education or providers of rehabilitation services or other appropriate services. RRTCs serve as centers of national excellence and national or regional resources for providers and individuals with disabilities and the parents, family members, guardians, advocates or authorized representatives of the individuals.

RRTCs conduct coordinated, integrated, and advanced programs of research in rehabilitation targeted toward the production of new knowledge to improve rehabilitation methodology and service delivery systems, to alleviate or stabilize disabling conditions, and to promote maximum social and economic independence of individuals with disabilities.

RRTCs provide training, including graduate, pre-service, and in-service training, to assist individuals to more effectively provide rehabilitation services. They also provide training including graduate, pre-service, and in-service training, for rehabilitation research personnel and other rehabilitation personnel.

RRTCs serve as informational and technical assistance resources to providers, individuals with disabilities, and the parents, family members, guardians, advocates, or authorized representatives of these individuals through conferences, workshops, public education programs, in-service training programs and similar activities.

RRTCs disseminate materials in alternate formats to ensure that they are accessible to individuals with a range of disabling conditions.

Eligible Applicants: Parties eligible to apply for grants under this program are States, public or private agencies, including for-profit agencies, public or private organizations, including for-profit organizations, institutions of higher education, and Indian tribes and tribal organizations.

Selection Criteria: The Assistant Secretary uses the following selection criteria to evaluate applications for RRTCs on Improved Management of CIL Programs and Services, IL and the New Paradigm of Disability and Improving Service and Supports for Individuals with Long-Term Mental Illness (See section 350.54). The total maximum score for the criteria is 100 points.

(a) *Importance of the problem* (9 points total). (1) The Secretary considers the importance of the problem.

(2) In determining the importance of the problem, the Secretary considers the following factors:

(i) The extent to which the applicant clearly describes the need and target population (3 points).

(ii) The extent to which the proposed activities address a significant need of those who provide services to individuals with disabilities (3 points).

(iii) The extent to which the proposed project will have beneficial impact on the target population (3 points).

(b) *Responsiveness to an absolute or competitive priority* (4 points total). (1) The Secretary considers the responsiveness of the application to an absolute or competitive priority published in the **Federal Register**.

(2) In determining the application's responsiveness to the absolute or competitive priority, the Secretary considers the extent to which the applicant's proposed activities are likely to achieve the purposes of the absolute or competitive priority (4 points).

(c) *Design of research activities* (35 points total). (1) The Secretary considers the extent to which the design of research activities is likely to be effective in accomplishing the objectives of the project.

(2) In determining the extent to which the design is likely to be effective in accomplishing the objectives of the project, the Secretary considers the following factors:

(i) The extent to which the research activities constitute a coherent, sustained approach to research in the field, including a substantial addition to the state-of-the-art (5 points).

(ii) The extent to which the methodology of each proposed research activity is meritorious, including consideration of the extent to which—

(A) The proposed design includes a comprehensive and informed review of the current literature, demonstrating knowledge of the state-of-the-art (5 points);

(B) Each research hypothesis is theoretically sound and based on current knowledge (5 points);

(C) Each sample population is appropriate and of sufficient size (5 points);

(D) The data collection and measurement techniques are appropriate and likely to be effective (5 points); and (E) The data analysis methods are appropriate (5 points).

(iii) The extent to which anticipated research results are likely to satisfy the original hypotheses and could be used for planning additional research, including generation of new hypotheses where applicable (5 points).

(d) *Design of training activities* (11 points total). (1) The Secretary considers the extent to which the design of training activities is likely to be effective in accomplishing the objectives of the project.

(2) In determining the extent to which the design is likely to be effective in accomplishing the objectives of the project, the Secretary considers the following factors:

(i) The extent to which the proposed training materials are likely to be effective, including consideration of their quality, clarity, and variety (2 points).

(ii) The extent to which the proposed training methods are of sufficient quality, intensity, and duration (2 points).

(iii) The extent to which the proposed training content—

(A) Covers all of the relevant aspects of the subject matter (1 point); and

(B) If relevant, is based on new knowledge derived from research activities of the proposed project (1 point).

(iv) The extent to which the proposed training materials, methods, and content are appropriate to the trainees, including consideration of the skill level of the trainees and the subject matter of the materials (2 points).

(v) The extent to which the proposed training materials and methods are accessible to individuals with disabilities (1 point).

(vi) The extent to which the applicant is able to carry out the training activities, either directly or through another entity (2 points).

(e) *Design of dissemination activities* (8 points total). (1) The Secretary considers the extent to which the design of dissemination activities is likely to be effective in accomplishing the objectives of the project.

(2) In determining the extent to which the design is likely to be effective in accomplishing the objectives of the project, the Secretary considers the following factors:

(i) The extent to which the content of the information to be disseminated—

(A) Covers all of the relevant aspects of the subject matter (1 point); and

(B) If appropriate, is based on new knowledge derived from research activities of the project (1 point).

(ii) The extent to which the materials to be disseminated are likely to be effective and usable, including consideration of their quality, clarity, variety, and format (2 points).

(iii) The extent to which the methods for dissemination are of sufficient quality, intensity, and duration (2 points).

(iv) The extent to which the materials and information to be disseminated and the methods for dissemination are appropriate to the target population, including consideration of the familiarity of the target population with the subject matter, format of the information, and subject matter (1 point).

(v) The extent to which the information to be disseminated will be accessible to individuals with disabilities (1 point).

(f) *Design of technical assistance activities* (4 points total). (1) The Secretary considers the extent to which the design of technical assistance activities is likely to be effective in accomplishing the objectives of the project.

(2) In determining the extent to which the design is likely to be effective in accomplishing the objectives of the project, the Secretary considers the following factors:

(i) The extent to which the methods for providing technical assistance are of sufficient quality, intensity, and duration (1 point).

(ii) The extent to which the information to be provided through technical assistance covers all of the relevant aspects of the subject matter (1 point).

(iii) The extent to which the technical assistance is appropriate to the target population, including consideration of the knowledge level of the target population, needs of the target population, and format for providing information (1 point).

(iv) The extent to which the technical assistance is accessible to individuals with disabilities (1 point).

(g) *Plan of operation* (4 points total). (1) The Secretary considers the quality of the plan of operation.

(2) In determining the quality of the plan of operation, the Secretary considers the following factors:

(i) The adequacy of the plan of operation to achieve the objectives of the proposed project on time and within budget, including clearly defined responsibilities, and timelines for accomplishing project tasks (2 points).

(ii) The adequacy of the plan of operation to provide for using resources, equipment, and personnel to achieve each objective (2 points).

(h) *Collaboration* (2 points total). (1) The Secretary considers the quality of collaboration.

(2) In determining the quality of collaboration, the Secretary considers the following factors:

(i) The extent to which the applicant's proposed collaboration with one or more agencies, organizations, or institutions is likely to be effective in achieving the relevant proposed activities of the project (1 point).

(ii) The extent to which agencies, organizations, or institutions demonstrate a commitment to collaborate with the applicant (2 points).

(i) *Adequacy and reasonableness of the budget* (3 points total). (1) The Secretary considers the adequacy and the reasonableness of the proposed budget.

(2) In determining the adequacy and the reasonableness of the proposed budget, the Secretary considers the following factors:

(i) The extent to which the costs are reasonable in relation to the proposed project activities (1 point).

(ii) The extent to which the budget for the project, including any subcontracts, is adequately justified to support the proposed project activities (2 points).

(j) *Plan of evaluation* (7 points total). (1) The Secretary considers the quality of the plan of evaluation.

(2) In determining the quality of the plan of evaluation, the Secretary considers the following factors:

(i) The extent to which the plan of evaluation provides for periodic assessment of progress toward—

(A) Implementing the plan of operation (1 point); and

(B) Achieving the project's intended outcomes and expected impacts (1 point).

(ii) The extent to which the plan of evaluation will be used to improve the performance of the project through the feedback generated by its periodic assessments (1 point).

(iii) The extent to which the plan of evaluation provides for periodic assessment of a project's progress that is based on identified performance measures that—

(A) Are clearly related to the intended outcomes of the project and expected impacts on the target population (2 points); and

(B) Are objective, and quantifiable or qualitative, as appropriate (2 points).

(k) *Project staff* (9 points total). (1) The Secretary considers the quality of the project staff.

(2) In determining the quality of the project staff, the Secretary considers the extent to which the applicant encourages applications for employment from persons who are members of groups that have traditionally been

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underrepresented based on race, color, national origin, gender, age, or disability (1 point).

(3) In addition, the Secretary considers the following factors:

(i) The extent to which the key personnel and other key staff have appropriate training and experience in disciplines required to conduct all proposed activities (2 points).

(ii) The extent to which the commitment of staff time is adequate to accomplish all the proposed activities of the project (2 points).

(iii) The extent to which the key personnel are knowledgeable about the methodology and literature of pertinent subject areas (2 points).

(iv) The extent to which the project staff includes outstanding scientists in the field (2 points).

(l) *Adequacy and accessibility of resources* (3 points total). (1) The Secretary considers the adequacy and accessibility of the applicant's resources to implement the proposed project.

(2) In determining the adequacy and accessibility of resources, the Secretary considers the following factors:

(i) The extent to which the applicant is committed to provide adequate facilities, equipment, other resources, including administrative support, and laboratories, if appropriate (2 points).

(ii) The extent to which the facilities, equipment, and other resources are appropriately accessible to individuals with disabilities who may use the facilities, equipment, and other resources of the project (1 point).

Instructions for Application Narrative

The Assistant Secretary strongly recommends the following:

(a) A one-page abstract;

(b) An application narrative (i.e., Part III that addresses the selection criteria that will be used by reviewers in evaluating individual proposals) of no more than 125 pages double-spaced (no more than 3 lines per vertical inch) 8–1/2″× 11″pages (on one side only) with one inch margins (top, bottom, and sides). The application narrative page limit recommendation does not apply to: Part I—the electronically scannable form; Part II—the budget section (including the narrative budget justification); and Part IV—the assurances and certifications; and

(c) A font no smaller than a 12-point font and an average character density no greater than 14 characters per inch.

Instructions for Transmittal of Applications

(a) If an applicant wants to apply for a grant, the applicant must—

(1) Mail the original and two copies of the application on or before the deadline date to: U.S. Department of Education, Application Control Center, Attention: (CFDA # 84.133B [Applicant should include title]), Washington, DC 20202–4725, or

(2) Hand deliver or express mail the original and two copies of the application by 4:30 p.m. [Washington, DC time] on or before the deadline date to: U.S. Department of Education, Application Control Center, Attention: (CFDA # 84.133B [Applicant should include title]), Room #3633, Regional Office Building #3, 7th and D Streets, SW., Washington, DC 20202.

(b) An applicant must show one of the following as proof of mailing:

(1) A legibly dated U.S. Postal Service postmark.

(2) A legible mail receipt with the date of mailing stamped by the U.S. Postal Service.

(3) A dated shipping label, invoice, or receipt from a commercial carrier.

(4) Any other proof of mailing acceptable to the Secretary.

(c) If an application is mailed through the U.S. Postal Service, the Secretary does not accept either of the following as proof of mailing:

(1) A private metered postmark.

(2) A mail receipt that is not dated by the U.S. Postal Service.

Notes:

(1) The U.S. Postal Service does not uniformly provide a dated postmark. Before relying on this method, an applicant should check with its local post office.

(2) An applicant wishing to know that its application has been received by the Department *must* include with the application a stamped self-addressed postcard containing the CFDA number and title of this program.

(3) The applicant must indicate on the envelope and—if not provided by the Department—in Item 10 of the Application for Federal Assistance (Standard Form 424) the CFDA number—and letter, if any—of the competition under which the application is being submitted.

Application Forms and Instructions

The appendix to this application is divided into four parts. These parts are organized in the same manner that the submitted application should be organized. These parts are as follows:

Part I: Application for Federal Assistance (Standard Form 424 (Rev. 1/12/1999) and instructions.

Part II: Budget Form—Non-Construction Programs (Standard Form 524A) and instructions.

Part III: Application Narrative.

Additional Materials

Estimated Public Reporting Burden.

Assurances—Non-Construction Programs (Standard Form 424B).

Certification Regarding Lobbying, Debarment, Suspension, and Other Responsibility Matters: and Drug-Free Work-Place Requirements (ED Form 80–0013).

Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion: Lower Tier Covered Transactions (ED Form 80–0014) and instructions. (NOTE: ED Form GCS–014 is intended for the use of primary participants and should not be transmitted to the Department.)

Certification of Eligibility for Federal Assistance in Certain Programs (ED Form 80–0016).

Disclosure of Lobbying Activities (Standard Form LLL (if applicable) and instructions; and Disclosure Lobbying Activities Continuation Sheet (Standard Form LLL–A).

An applicant may submit information on a photostatic copy of the application and budget forms, the assurances, and the certifications. However, the application form, the assurances, and the certifications must each have an *original signature*. No grant may be awarded unless a completed application form has been received.

For Applications Contact: The Grants and Contracts Service Team (GCST), Department of Education, 400 Maryland Avenue S.W., room 3317, Switzer Building, Washington, D.C. 20202 or call (202) 205–8207. Individuals who use a Telecommunications Device for the Deaf (TDD) may call the TDD number at (202) 205–9860. The preferred method for requesting information is to FAX your request to (202) 205–8717.

Individuals with disabilities may obtain a copy of the application package in an alternate format by contacting the GCST. However, the Department is not able to reproduce in an alternate format the standard forms included in the application package.

FOR FURTHER INFORMATION CONTACT: Donna Nangle, U.S. Department of Education, 400 Maryland Avenue, S.W., room 3414, Switzer Building, Washington, D.C. 20202–2645. Telephone: (202) 205–5880 or TDD (202) 205–4475. Internet: Donna_Nangle@ed.gov

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http://www.access.gpo.gov/nara/index.html

(Catalog of Federal Domestic Assistance Numbers: 84.133B, Rehabilitation Research Training Centers)

Program Authority: 29 U.S.C. 760–762.

Dated: May 11, 2000.

Judith E. Heumann,

Assistant Secretary for Special Education and Rehabilitative Services.

Appendix—Application Forms and Instructions

Applicants are advised to reproduce and complete the application forms in this Section. Applicants are required to submit an original and two copies of each application as provided in this Section. However, applicants are encouraged to submit an original and seven copies of each application in order to facilitate the peer review process and minimize copying errors.

Frequent Questions

1. Can I Get an Extension of the Due Date?

No. On rare occasions the Department of Education may extend a closing date for all applicants. If that occurs, a notice of the revised due date is published in the **Federal Register**. However, there are no extensions or exceptions to the due date made for individual applicants.

2. What Should Be Included in the Application?

The application should include a project narrative, vitae of key personnel, and a budget, as well as the Assurances forms included in this package. Vitae of staff or consultants should include the individual's title and role in the proposed project, and other information that is specifically pertinent to this proposed project. The budgets for both the first year and all subsequent project years should be included.

If collaboration with another organization is involved in the proposed activity, the application should include assurances of participation by the other parties, including written agreements or assurances of cooperation. It is not useful to include general letters of support or endorsement in the application.

If the applicant proposes to use unique tests or other measurement instruments that are not widely known in the field, it would be helpful to include the instrument in the application.

Many applications contain voluminous appendices that are not helpful and in many cases cannot even be mailed to the reviewers. It is generally not helpful to include such things as brochures, general capability statements of collaborating organizations, maps, copies of publications, or descriptions of other projects completed by the applicant.

3. What Format Should Be Used for the Application?

NIDRR generally advises applicants that they may organize the application to follow the selection criteria that will be used. The specific review criteria vary according to the specific program, and are contained in this Consolidated Application Package.

4. May I Submit Applications to More Than One NIDRR Program Competition or More Than One Application to a Program?

Yes. You may submit applications to any program for which they are responsive to the program requirements. You may submit the same application to as many competitions as you believe appropriate. You may also submit more than one application in any given competition.

5. What Is the Allowable Indirect Cost Rate?

The limits on indirect costs vary according to the program and the type of application. The Rehabilitation Research Training Centers are limited to a 15% indirect cost rate.

6. Can Profitmaking Businesses Apply for Grants?

Yes. However, for-profit organizations will not be able to collect a fee or profit on the grant, and in some programs will be required to share in the costs of the project.

7. Can Individuals Apply for Grants?

No. Only organizations are eligible to apply for *grants* under NIDRR programs. However, individuals are the only entities eligible to apply for fellowships.

8. Can NIDRR Staff Advise me Whether my Project is of Interest to NIDRR or Likely to be Funded?

No. NIDRR staff can advise you of the requirements of the program in which you propose to submit your application. However, staff cannot advise you of whether your subject area or proposed approach is likely to receive approval.

9. How do I Assure That my Application Will be Referred to the Most Appropriate Panel for Review?

Applicants should be sure that their applications are referred to the correct competition by clearly including the competition title and CFDA number, including alphabetical code, on the Standard Form 424, and including a project title that describes the project.

10. How Soon After Submitting my Application Can I Find Out if it Will be Funded?

The time from closing date to grant award date varies from program to program. Generally speaking, NIDRR endeavors to have awards made within five to six months of the closing date. Unsuccessful applicants generally will be notified within that time frame as well. For the purpose of estimating a project start date, the applicant should estimate approximately six months from the closing date, but no later than the following September 30.

11. Can I Call NIDRR to Find Out if my Application is Being Funded?

No. When NIDRR is able to release information on the status of grant applications, it will notify applicants by letter. The results of the peer review cannot be released except through this formal notification.

12. If my Application is Successful, Can I Assume I Will Get the Requested Budget Amount in Subsequent Years?

No. Funding in subsequent years is subject to availability of funds and project performance.

13. Will all Approved Applications be Funded?

No. It often happens that the peer review panels approve for funding more applications than NIDRR can fund within available resources. Applicants who are approved but not funded are encouraged to consider submitting similar applications in future competitions.

Estimated Public Reporting Burden

Public reporting burden for these collections of information is estimated to average 30 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of these collections of information, including suggestions for reducing this burden, to: the U.S. Department of Education, Information Management and Compliance Division, Washington, DC 20202–4651; and to the Office of Management and Budget, Paperwork Reduction Project 1820–0027, Washington, DC 20503.

Rehabilitation Research Training Center

(CFDA No. 84.133B) 34 CFR Part 350.

BILLING CODE 4000–01–U

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Application for Federal Education Assistance

Note: If available, please provide application package on diskette and specify the file format.

U.S. Department of Education

Form Approved
OMB No. 1875-0106
Exp. 06/30/2001

Applicant Information

1. Name and Address
   Legal Name: _____
   Address: _____
   _____
   City _____ State _____ County _____ ZIP Code + 4 _____-_____

   Organizational Unit

2. Applicant's D-U-N-S Number [ ][ ][ ][ ][ ][ ][ ][ ][ ]
3. Applicant's T-I-N [ ][ ]-[ ][ ][ ][ ][ ][ ][ ]
4. Catalog of Federal Domestic Assistance #: 8 4 [ ][ ][ ][ ] → Title: _____
5. Project Director: _____
   Address: _____
   City _____ State _____ ZIP Code + 4 _____-_____
   Tel. #: ( ) _____-_____ Fax #: ( ) _____-_____
   E-Mail Address: _____
6. Is the applicant delinquent on any Federal debt? ☐ Yes ☐ No
   (If "Yes," attach an explanation.)
7. Type of Applicant *(Enter appropriate letter in the box.)* ☐

A State	H Independent School District
B County	I Public College or University
C Municipal	J Private, Non-Profit College or University
D Township	K Indian Tribe
E Interstate	L Individual
F Intermunicipal	M Private, Profit-Making Organization
G Special District	N Other *(Specify)*: _____

8. Novice Applicant ☐ Yes ☐ No

Application Information

9. Type of Submission:

—PreApplication	*—Application*
☐ Construction	☐ Construction
☐ Non-Construction	☐ Non-Construction

10. Is application subject to review by Executive Order 12372 process?
    ☐ Yes *(Date made available to the Executive Order 12372 process for review):* ___/___/_____
    ☐ No *(If "No," check appropriate box below.)*
    ☐ Program is not covered by E.O. 12372.
    ☐ Program has not been selected by State for review.

11. Proposed Project Dates: **Start Date:** ___/___/_____ **End Date:** ___/___/_____

12. Are any research activities involving human subjects planned at any time during the proposed project period? ☐ Yes ☐ No
    a. If "Yes," Exemption(s) #: [ ] ***OR*** b. Assurance of Compliance #: [ ]
    c. IRB approval date: _____ { ☐ Full IRB **or** ☐ Expedited Review

13. Descriptive Title of Applicant's Project:

Estimated Funding

14a. Federal	$	.00
b. Applicant	$	.00
c. State	$	.00
d. Local	$	.00
e. Other	$	.00
f. Program Income	$	.00
g. TOTAL	$	.00

Authorized Representative Information

15. To the best of my knowledge and belief, all data in this preapplication/application are true and correct. The document has been duly authorized by the governing body of the applicant and the applicant will comply with the attached assurances if the assistance is awarded.

a. Typed Name of Authorized Representative

b. Title

c. Tel. #: ( ) _____-_____ Fax #: ( ) _____-_____

d. E-Mail Address:

e. **Signature of Authorized Representative** Date: ___/___/_____

REV. 11/12/99

ED 424

008724

Instructions for ED 424

1. **Legal Name and Address.** Enter the legal name of applicant and the name of the primary organizational unit which will undertake the assistance activity.

2. **D-U-N-S Number.** Enter the applicant's D-U-N-S Number. If your organization does not have a D-U-N-S Number, you can obtain the number by calling 1-800-333-0505 or by completing a D-U-N-S Number Request Form. The form can be obtained via the Internet at the following URL: **http://www.dnb.com/dbis/aboutdb/intlduns.htm.**

3. **Tax Identification Number.** Enter the tax identification number as assigned by the Internal Revenue Service.

4. **Catalog of Federal Domestic Assistance (CFDA) Number.** Enter the CFDA number and title of the program under which assistance is requested.

5. **Project Director.** Name, address, telephone and fax numbers, and e-mail address of the person to be contacted on matters involving this application.

6. **Federal Debt Delinquency.** Check **"Yes"** if the applicant's organization is delinquent on any Federal debt. (This question refers to the applicant's organization and not to the person who signs as the authorized representative. Categories of debt include delinquent audit disallowances, loans and taxes.) Otherwise, check **"No."**

7. **Type of Applicant.** Enter the appropriate letter in the box provided.

8. **Novice Applicant.** Check **"Yes"** only if assistance is being requested under a program that gives special consideration to novice applicants and you meet the program requirements for novice applicants. By checking "Yes" the applicant certifies that it meets the novice applicant requirements specified by ED. Otherwise, check **"No."**

9. **Type of Submission.** Self-explanatory.

10. **Executive Order 12372.** Check **"Yes"** if the application is subject to review by Executive Order 12372. Also, please enter the month, date, and four (4) digit year (e.g., 12/12/2000). Applicants should contact the State Single Point of Contact (SPOC) for Federal Executive Order 12372 to determine whether the application is subject to the State intergovernmental review process. Otherwise, check **"No."**

11. **Proposed Project Dates.** Please enter the month, date, and four (4) digit year (e.g., 12/12/2000).

12. **Human Subjects.** Check "Yes" **or** "No". If research activities involving human subjects are **not** planned **at any time** during the proposed project period, check **"No." The remaining parts of item 12 are then not applicable.**

    If research activities involving human subjects, whether or not exempt from Federal regulations for the protection of human subjects, **are** planned **at any time** during the proposed project period, either at the applicant organization or at any other performance site or collaborating institution, check **"Yes."** If **all** the research activities are designated to be exempt under the regulations, enter, in item 12a, the exemption number(s) corresponding to one or more of the six exemption categories listed in **"Protection of Human Subjects in Research"** attached to this form. Provide sufficient information in the application to allow a determination that the designated exemptions in item 12a, are appropriate. **Provide this narrative information in an "Item 12/Protection of Human Subjects Attachment" and insert this attachment immediately following the ED 424 face page. Skip the remaining parts of item 12.**

    If **some or all** of the planned research activities involving human subjects are covered (nonexempt), skip item 12a and continue with the remaining parts of item 12, as noted below. In addition, follow the instructions in **"Protection of Human Subjects in Research"** attached to this form to prepare the six-point narrative about the nonexempt activities. **Provide this six-point narrative in an "Item 12/Protection of Human Subjects Attachment" and insert this attachment immediately following the ED 424 face page.**

    If the applicant organization has an approved Multiple Project Assurance of Compliance on file with the Grants Policy and Oversight Staff (GPOS), U.S. Department of Education, or with the Office for Protection from Research Risks (OPRR), National Institutes of Health, U.S. Department of Health and Human Services, that covers the specific activity, enter the Assurance number in item 12b and the date of approval by the Institutional Review Board (IRB) of the proposed activities in item 12c. This date must be no earlier than one year before the receipt date for which the application is submitted and must include the four (4) digit year (e.g., 2000). Check the type of IRB review in the appropriate box. An IRB may use the expedited review procedure if it complies with the requirements of 34 CFR 97.110. If the IRB review is delayed beyond the submission of the application, enter **"Pending"** in item 12c. If your application is recommended/selected for funding, a follow-up certification of IRB approval from an official signing for the applicant organization must be sent to and received by the designated ED official within 30 days after a specific formal request from the designated ED official. **If the applicant organization does not have** on file with GPOS or OPRR **an approved Assurance of Compliance** that covers the proposed research activity, enter **"None"** in item 12b and skip 12c. In this case, the applicant organization, by the signature on the application, is declaring that it will comply with 34 CFR 97 within 30 days after a specific formal request from the designated ED official for the Assurance(s) and IRB certifications.

13. **Project Title.** Enter a brief descriptive title of the project. If more than one program is involved, you should append an explanation on a separate sheet. If appropriate (e.g., construction or real property projects), attach a map showing project location. For preapplications, use a separate sheet to provide a summary description of this project.

14. **Estimated Funding.** Amount requested or to be contributed during the first funding/budget period by each contributor. Value of in-kind contributions should be included on appropriate lines as applicable. If the action will result in a dollar change to an existing award, indicate **only** the amount of the change. For decreases, enclose the amounts in parentheses. If both basic and supplemental amounts are included, show breakdown on an attached sheet. For multiple program funding, use totals and show breakdown using same categories as item 14.

15. **Certification.** To be signed by the authorized representative of the applicant. A copy of the governing body's authorization for you to sign this application as official representative must be on file in the applicant's office.

    Be sure to enter the telephone and fax number and e-mail address of the authorized representative. Also, in item 15e, please enter the month, date, and four (4) digit year (e.g., 12/12/2000) in the date signed field.

Paperwork Burden Statement

According to the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless such collection displays a valid OMB control number. The valid OMB control number for this information collection is **1875-0106**. The time required to complete this information collection is estimated to average between 15 and 45 minutes per response, including the time to review instructions, search existing data resources, gather the data needed, and complete and review the information collection. **If you have any comments concerning the accuracy of the estimate(s) or suggestions for improving this form, please write to:** U.S. Department of Education, Washington, D.C. 20202-4651. **If you have comments or concerns regarding the status of your individual submission of this form write directly to:** Joyce I. Mays, Application Control Center, U.S. Department of Education, 7th and D Streets, S.W. ROB-3, Room 3633, Washington, D.C. 20202-4725.

PROTECTION OF HUMAN SUBJECTS IN RESEARCH (Attachment to ED 424)

I. Instructions to Applicants about the Narrative Information that Must be Provided if Research Activities Involving Human Subjects are Planned

If you marked item 12 on the application "Yes" and designated exemptions in 12a , **(all research activities are exempt),** provide sufficient information in the application to allow a determination that the designated exemptions are appropriate. Research involving human subjects that is exempt from the regulations is discussed under **II.B. "Exemptions,"** below. The Narrative must be succinct. **Provide this information in an "Item 12/Protection of Human Subjects Attachment" and insert this attachment immediately following the ED 424 face page.**

If you marked "Yes" to item 12 on the face page, and designated no exemptions from the regulations **(some or all of the research activities are nonexempt),** address the following six points for each nonexempt activity. In addition, if research involving human subjects will take place at collaborating site(s) or other performance site(s), provide this information before discussing the six points. Although no specific page limitation applies to this section of the application, be succinct. Provide the six-point narrative and discussion of other performance sites in an **"Item 12/Protection of Human Subjects Attachment" and insert this attachment immediately following the ED 424 face page.**

(1) Provide a detailed description of the proposed involvement of human subjects. Describe the characteristics of the subject population, including their anticipated number, age range, and health status. Identify the criteria for inclusion or exclusion of any subpopulation. Explain the rationale for the involvement of special classes of subjects, such as children, children with disabilities, adults with disabilities, persons with mental disabilities, pregnant women, prisoners, institutionalized individuals, or others who are likely to be vulnerable.

(2) Identify the sources of research material obtained from individually identifiable living human subjects in the form of specimens, records, or data. Indicate whether the material or data will be obtained specifically for research purposes or whether use will be made of existing specimens, records, or data.

(3) Describe plans for the recruitment of subjects and the consent procedures to be followed. Include the circumstances under which consent will be sought and obtained, who will seek it, the nature of the information to be provided to prospective subjects, and the method of documenting consent. State if the Institutional Review Board (IRB) has authorized a modification or waiver of the elements of consent or the requirement for documentation of consent.

(4) Describe potential risks (physical, psychological, social, legal, or other) and assess their likelihood and seriousness. Where appropriate, describe alternative treatments and procedures that might be advantageous to the subjects.

(5) Describe the procedures for protecting against or minimizing potential risks, including risks to confidentiality, and assess their likely effectiveness. Where appropriate, discuss provisions for ensuring necessary medical or professional intervention in the event of adverse effects to the subjects. Also, where appropriate, describe the provisions for monitoring the data collected to ensure the safety of the subjects.

(6) Discuss why the risks to subjects are reasonable in relation to the anticipated benefits to subjects and in relation to the importance of the knowledge that may reasonably be expected to result.

II. Information on Research Activities Involving Human Subjects

A. Definitions.

A research activity involves human subjects if the activity is research, as defined in the Department's regulations, and the research activity will involve use of human subjects, as defined in the regulations.

—Is it a research activity?

The ED Regulations for the Protection of Human Subjects, Title 34, Code of Federal Regulations, Part 97, define research as "a systematic investigation, including research development, testing and evaluation, designed to develop or contribute to generalizable knowledge." *If an activity follows a deliberate plan whose purpose is to develop or contribute to generalizable knowledge, such as an exploratory study or the collection of data to test a hypothesis, it is research.* Activities which meet this definition constitute research whether or not they are conducted or supported under a program which is considered research for other purposes. For example, some demonstration and service programs may include research activities.

U.S. DEPARTMENT OF EDUCATION

BUDGET INFORMATION

NON-CONSTRUCTION PROGRAMS

OMB Control Number: 1890-0004

Expiration Date: 02/28/2003

Name of Institution/Organization

Applicants requesting funding for only one year should complete the column under "Project Year 1." Applicants requesting funding for multi-year grants should complete all applicable columns. Please read all instructions before completing form.

SECTION A - BUDGET SUMMARY
U.S. DEPARTMENT OF EDUCATION FUNDS

Budget Categories	Project Year 1 (a)	Project Year 2 (b)	Project Year 3 (c)	Project Year 4 (d)	Project Year 5 (e)	Total (f)
1. Personnel						
2. Fringe Benefits						
3. Travel						
4. Equipment						
5. Supplies						
6. Contractual						
7. Construction						
8. Other						
9. Total Direct Costs (lines 1-8)						
10. Indirect Costs						
11. Training Stipends						
12. Total Costs (lines 9-11)						

ED Form No. 524

Name of Institution/Organization	Applicants requesting funding for only one year should complete the column under "Project Year 1." Applicants requesting funding for multi-year grants should complete all applicable columns. Please read all instructions before completing form.

SECTION B - BUDGET SUMMARY
NON-FEDERAL FUNDS

Budget Categories	Project Year 1 (a)	Project Year 2 (b)	Project Year 3 (c)	Project Year 4 (d)	Project Year 5 (e)	Total (f)
1. Personnel						
2. Fringe Benefits						
3. Travel						
4. Equipment						
5. Supplies						
6. Contractual						
7. Construction						
8. Other						
9. Total Direct Costs (lines 1-8)						
10. Indirect Costs						
11. Training Stipends						
12. Total Costs (lines 9-11)						

SECTION C - OTHER BUDGET INFORMATION (see instructions)

ED Form No. 524

008728

Public reporting burden for this collection of information is estimated to vary from 13 to 22 hours per response, with an average of 17.5 hours per response, including the time reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to the U.S. Department of Education, Information Management and Compliance Division, Washington, D.C. 20202-4651; and the Office of Management and Budget, Paperwork Reduction Project 1875-0102, Washington DC 20503.

INSTRUCTIONS FOR ED FORM 524

General Instructions

This form is used to apply to individual U.S. Department of Education discretionary grant programs. Unless directed otherwise, provide the same budget information for each year of the multi-year funding request. Pay attention to applicable program specific instructions, if attached.

Section A - Budget Summary U.S. Department of Education Funds

All applicants must complete Section A and provide a breakdown by the applicable budget categories shown in lines 1-11.

Lines 1-11, columns (a)-(e): For each project year for which funding is requested, show the total amount requested for each applicable budget category.

Lines 1-11, column (f): Show the multi-year total for each budget category. If funding is requested for only one project year, leave this column blank.

Line 12, columns (a)-(e): Show the total budget request for each project year for which funding is requested.

Line 12, column (f): Show the total amount requested for all project years. If funding is requested for only one year, leave this space blank.

Section B - Budget Summary Non-Federal Funds

If you are required to provide or volunteer to provide matching funds or other non-Federal resources to the project, these should be shown for each applicable budget category on lines 1-11 of Section B.

Lines 1-11, columns (a)-(e): For each project year for which matching funds or other contributions are provided, show the total contribution for each applicable budget category.

Lines 1-11, column (f): Show the multi-year total for each budget category. If non-Federal contributions are provided for only one year, leave this column blank.

Line 12, columns (a)-(e): Show the total matching or other contribution for each project year.

Line 12, column (f): Show the total amount to be contributed for all years of the multi-year project. If non-Federal contributions are provided for only one year, leave this space blank.

Section C - Other Budget Information Pay attention to applicable program specific instructions, if attached.

1. Provide an itemized budget breakdown, by project year, for each budget category listed in Sections A and B.

2. If applicable to this program, enter the type of indirect rate (provisional, predetermined, final or fixed) that will be in effect during the funding period. In addition, enter the estimated amount of the base to which the rate is applied, and the total indirect expense.

3. If applicable to this program, provide the rate and base on which fringe benefits are calculated.

4. Provide other explanations or comments you deem necessary.

008729

OMB Approval No. 0348-0040

ASSURANCES - NON-CONSTRUCTION PROGRAMS

Public reporting burden for this collection of information is estimated to average 15 minutes per response, including time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding the burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to the Office of Management and Budget, Paperwork Reduction Project (0348-0040), Washington, DC 20503.

PLEASE DO NOT RETURN YOUR COMPLETED FORM TO THE OFFICE OF MANAGEMENT AND BUDGET. SEND IT TO THE ADDRESS PROVIDED BY THE SPONSORING AGENCY.

NOTE: Certain of these assurances may not be applicable to your project or program. If you have questions, please contact the awarding agency. Further, certain Federal awarding agencies may require applicants to certify to additional assurances. If such is the case, you will be notified.

As the duly authorized representative of the applicant, I certify that the applicant:

1. Has the legal authority to apply for Federal assistance and the institutional, managerial and financial capability (including funds sufficient to pay the non-Federal share of project cost) to ensure proper planning, management and completion of the project described in this application.

2. Will give the awarding agency, the Comptroller General of the United States and, if appropriate, the State, through any authorized representative, access to and the right to examine all records, books, papers, or documents related to the award; and will establish a proper accounting system in accordance with generally accepted accounting standards or agency directives.

3. Will establish safeguards to prohibit employees from using their positions for a purpose that constitutes or presents the appearance of personal or organizational conflict of interest, or personal gain.

4. Will initiate and complete the work within the applicable time frame after receipt of approval of the awarding agency.

5. Will comply with the Intergovernmental Personnel Act of 1970 (42 U.S.C. §§4728-4763) relating to prescribed standards for merit systems for programs funded under one of the 19 statutes or regulations specified in Appendix A of OPM's Standards for a Merit System of Personnel Administration (5 C.F.R. 900, Subpart F).

6. Will comply with all Federal statutes relating to nondiscrimination. These include but are not limited to: (a) Title VI of the Civil Rights Act of 1964 (P.L. 88-352) which prohibits discrimination on the basis of race, color or national origin; (b) Title IX of the Education Amendments of 1972, as amended (20 U.S.C. §§1681-1683, and 1685-1686), which prohibits discrimination on the basis of sex; (c) Section 504 of the Rehabilitation Act of 1973, as amended (29 U.S.C. §794), which prohibits discrimination on the basis of handicaps; (d) the Age Discrimination Act of 1975, as amended (42 U.S.C. §§6101-6107), which prohibits discrimination on the basis of age; (e) the Drug Abuse Office and Treatment Act of 1972 (P.L. 92-255), as amended, relating to nondiscrimination on the basis of drug abuse; (f) the Comprehensive Alcohol Abuse and Alcoholism Prevention, Treatment and Rehabilitation Act of 1970 (P.L. 91-616), as amended, relating to nondiscrimination on the basis of alcohol abuse or alcoholism; (g) §§523 and 527 of the Public Health Service Act of 1912 (42 U.S.C. §§290 dd-3 and 290 ee 3), as amended, relating to confidentiality of alcohol and drug abuse patient records; (h) Title VIII of the Civil Rights Act of 1968 (42 U.S.C. §§3601 et seq.), as amended, relating to nondiscrimination in the sale, rental or financing of housing; (i) any other nondiscrimination provisions in the specific statute(s) under which application for Federal assistance is being made; and, (j) the requirements of any other nondiscrimination statute(s) which may apply to the application.

7. Will comply, or has already complied, with the requirements of Titles II and III of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (P.L. 91-646) which provide for fair and equitable treatment of persons displaced or whose property is acquired as a result of Federal or federally-assisted programs. These requirements apply to all interests in real property acquired for project purposes regardless of Federal participation in purchases.

8. Will comply, as applicable, with provisions of the Hatch Act (5 U.S.C. §§1501-1508 and 7324-7328) which limit the political activities of employees whose principal employment activities are funded in whole or in part with Federal funds.

9. Will comply, as applicable, with the provisions of the Davis-Bacon Act (40 U.S.C. §§276a to 276a-7), the Copeland Act (40 U.S.C. §276c and 18 U.S.C. §874), and the Contract Work Hours and Safety Standards Act (40 U.S.C. §§327-333), regarding labor standards for federally-assisted construction subagreements.

10. Will comply, if applicable, with flood insurance purchase requirements of Section 102(a) of the Flood Disaster Protection Act of 1973 (P.L. 93-234) which requires recipients in a special flood hazard area to participate in the program and to purchase flood insurance if the total cost of insurable construction and acquisition is $10,000 or more.

11. Will comply with environmental standards which may be prescribed pursuant to the following: (a) institution of environmental quality control measures under the National Environmental Policy Act of 1969 (P.L. 91-190) and Executive Order (EO) 11514; (b) notification of violating facilities pursuant to EO 11738; (c) protection of wetlands pursuant to EO 11990; (d) evaluation of flood hazards in floodplains in accordance with EO 11988; (e) assurance of project consistency with the approved State management program developed under the Coastal Zone Management Act of 1972 (16 U.S.C. §§1451 et seq.); (f) conformity of Federal actions to State (Clean Air) Implementation Plans under Section 176(c) of the Clean Air Act of 1955, as amended (42 U.S.C. §§7401 et seq.); (g) protection of underground sources of drinking water under the Safe Drinking Water Act of 1974, as amended (P.L. 93-523); and, (h) protection of endangered species under the Endangered Species Act of 1973, as amended (P.L. 93-205).

12. Will comply with the Wild and Scenic Rivers Act of 1968 (16 U.S.C. §§1271 et seq.) related to protecting components or potential components of the national wild and scenic rivers system.

13. Will assist the awarding agency in assuring compliance with Section 106 of the National Historic Preservation Act of 1966, as amended (16 U.S.C. §470), EO 11593 (identification and protection of historic properties), and the Archaeological and Historic Preservation Act of 1974 (16 U.S.C. §§469a-1 et seq.).

14. Will comply with P.L. 93-348 regarding the protection of human subjects involved in research, development, and related activities supported by this award of assistance.

15. Will comply with the Laboratory Animal Welfare Act of 1966 (P.L. 89-544, as amended, 7 U.S.C. §§2131 et seq.) pertaining to the care, handling, and treatment of warm blooded animals held for research, teaching, or other activities supported by this award of assistance.

16. Will comply with the Lead-Based Paint Poisoning Prevention Act (42 U.S.C. §§4801 et seq.) which prohibits the use of lead-based paint in construction or rehabilitation of residence structures.

17. Will cause to be performed the required financial and compliance audits in accordance with the Single Audit Act Amendments of 1996 and OMB Circular No. A-133, "Audits of States, Local Governments, and Non-Profit Organizations."

18. Will comply with all applicable requirements of all other Federal laws, executive orders, regulations, and policies governing this program.

SIGNATURE OF AUTHORIZED CERTIFYING OFFICIAL	TITLE
APPLICANT ORGANIZATION	DATE SUBMITTED

Standard Form 424B (Rev. 7-97) Back

CERTIFICATIONS REGARDING LOBBYING; DEBARMENT, SUSPENSION AND OTHER RESPONSIBILITY MATTERS; AND DRUG-FREE WORKPLACE REQUIREMENTS

Applicants should refer to the regulations cited below to determine the certification to which they are required to attest. Applicants should also review the instructions for certification included in the regulations before completing this form. Signature of this form provides for compliance with certification requirements under 34 CFR Part 82, "New Restrictions on Lobbying," and 34 CFR Part 85, "Government-wide Debarment and Suspension (Nonprocurement) and Government-wide Requirements for Drug-Free Workplace (Grants)." The certifications shall be treated as a material representation of fact upon which reliance will be placed when the Department of Education determines to award the covered transaction, grant, or cooperative agreement.

1. LOBBYING

As required by Section 1352, Title 31 of the U.S. Code, and implemented at 34 CFR Part 82, for persons entering into a grant or cooperative agreement over $100,000, as defined at 34 CFR Part 82, Sections 82.105 and 82.110, the applicant certifies that:

(a) No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the making of any Federal grant, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal grant or cooperative agreement;

(b) If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal grant or cooperative agreement, the undersigned shall complete and submit Standard Form - LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions;

(c) The undersigned shall require that the language of this certification be included in the award documents for all subawards at all tiers (including subgrants, contracts under grants and cooperative agreements, and subcontracts) and that all subrecipients shall certify and disclose accordingly.

2. DEBARMENT, SUSPENSION, AND OTHER RESPONSIBILITY MATTERS

As required by Executive Order 12549, Debarment and Suspension, and implemented at 34 CFR Part 85, for prospective participants in primary covered transactions, as defined at 34 CFR Part 85, Sections 85.105 and 85.110—

A. The applicant certifies that it and its principals:

(a) Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by any Federal department or agency;

(b) Have not within a three-year period preceding this application been convicted of or had a civil judgement rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State, or local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property;

(c) Are not presently indicted for or otherwise criminally or civilly charged by a governmental entity (Federal, State, or local) with commission of any of the offenses enumerated in paragraph (2)(b) of this certification; and

(d) Have not within a three-year period preceding this application had one or more public transaction (Federal, State, or local) terminated for cause or default; and

B. Where the applicant is unable to certify to any of the statements in this certification, he or she shall attach an explanation to this application.

3. DRUG-FREE WORKPLACE (GRANTEES OTHER THAN INDIVIDUALS)

As required by the Drug-Free Workplace Act of 1988, and implemented at 34 CFR Part 85, Subpart F, for grantees, as defined at 34 CFR Part 85, Sections 85.605 and 85.610 -

A. The applicant certifies that it will or will continue to provide a drug-free workplace by:

(a) Publishing a statement notifying employees that the unlawful manufacture, distribution, dispensing, possession, or use of a controlled substance is prohibited in the grantee's workplace and specifying the actions that will be taken against employees for violation of such prohibition;

(b) Establishing an on-going drug-free awareness program to inform employees about:

(1) The dangers of drug abuse in the workplace;

(2) The grantee's policy of maintaining a drug-free workplace;

(3) Any available drug counseling, rehabilitation, and employee assistance programs; and

(4) The penalties that may be imposed upon employees for drug abuse violations occurring in the workplace;

(c) Making it a requirement that each employee to be engaged in the performance of the grant be given a copy of the statement required by paragraph (a);

(d) Notifying the employee in the statement required by paragraph (a) that, as a condition of employment under the grant, the employee will:

(1) Abide by the terms of the statement; and

(2) Notify the employer in writing of his or her conviction for a violation of a criminal drug statute occurring in the workplace no later than five calendar days after such conviction;

(e) Notifying the agency, in writing, within 10 calendar days after receiving notice under subparagraph (d)(2) from an employee or otherwise receiving actual notice of such conviction. Employers of convicted employees must provide notice, including position title, to: Director, Grants Policy and Oversight Staff, U.S. Department of Education, 400 Maryland Avenue, S.W. (Room 3652, GSA Regional Office Building No. 3), Washington, DC 20202-4248. Notice shall include the identification number(s) of each affected grant;

(f) Taking one of the following actions, within 30 calendar days of receiving notice under subparagraph (d)(2), with respect to any employee who is so convicted:

(1) Taking appropriate personnel action against such an employee, up to and including termination, consistent with the requirements of the Rehabilitation Act of 1973, as amended; or

(2) Requiring such employee to participate satisfactorily in a drug abuse assistance or rehabilitation program approved for such purposes by a Federal, State, or local health, law enforcement, or other appropriate agency;

(g) Making a good faith effort to continue to maintain a drug-free workplace through implementation of paragraphs (a), (b), (c), (d), (e), and (f).

B. The grantee may insert in the space provided below the site(s) for the performance of work done in connection with the specific grant:

Place of Performance (Street address. city, county, state, zip code)

_____

_____

_____

Check [ ] if there are workplaces on file that are not identified here.

DRUG-FREE WORKPLACE (GRANTEES WHO ARE INDIVIDUALS)

As required by the Drug-Free Workplace Act of 1988, and implemented at 34 CFR Part 85, Subpart F, for grantees, as defined at 34 CFR Part 85, Sections 85.605 and 85.610-

A. As a condition of the grant, I certify that I will not engage in the unlawful manufacture, distribution, dispensing, possession, or use of a controlled substance in conducting any activity with the grant; and

B. If convicted of a criminal drug offense resulting from a violation occurring during the conduct of any grant activity, I will report the conviction, in writing, within 10 calendar days of the conviction, to: Director, Grants Policy and Oversight Staff, Department of Education, 400 Maryland Avenue, S.W. (Room 3652, GSA Regional Office Building No. 3), Washington, DC 20202-4248. Notice shall include the identification number(s) of each affected grant.

As the duly authorized representative of the applicant, I hereby certify that the applicant will comply with the above certifications.

NAME OF APPLICANT	PR/AWARD NUMBER AND / OR PROJECT NAME
PRINTED NAME AND TITLE OF AUTHORIZED REPRESENTATIVE	
SIGNATURE	DATE

008733

Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion — Lower Tier Covered Transactions

This certification is required by the Department of Education regulations implementing Executive Order 12549, Debarment and Suspension, 34 CFR Part 85, for all lower tier transactions meeting the threshold and tier requirements stated at Section 85.110.

Instructions for Certification

1. By signing and submitting this proposal, the prospective lower tier participant is providing the certification set out below.

2. The certification in this clause is a material representation of fact upon which reliance was placed when this transaction was entered into. If it is later determined that the prospective lower tier participant knowingly rendered an erroneous certification, in addition to other remedies available to the Federal Government, the department or agency with which this transaction originated may pursue available remedies, including suspension and/or debarment.

3. The prospective lower tier participant shall provide immediate written notice to the person to which this proposal is submitted if at any time the prospective lower tier participant learns that its certification was erroneous when submitted or has become erroneous by reason of changed circumstances.

4. The terms "covered transaction," "debarred," "suspended," "ineligible," "lower tier covered transaction," "participant," " person," "primary covered transaction," " principal," "proposal," and "voluntarily excluded," as used in this clause, have the meanings set out in the Definitions and Coverage sections of rules implementing Executive Order 12549. You may contact the person to which this proposal is submitted for assistance in obtaining a copy of those regulations.

5. The prospective lower tier participant agrees by submitting this proposal that, should the proposed covered transaction be entered into, it shall not knowingly enter into any lower tier covered transaction with a person who is debarred, suspended, declared ineligible, or voluntarily excluded from participation in this covered transaction, unless authorized by the department or agency with which this transaction originated.

6. The prospective lower tier participant further agrees by submitting this proposal that it will include the clause titled "Certification Regarding Debarment, Suspension, Ineligibility, and Voluntary Exclusion-Lower Tier Covered Transactions," without modification, in all lower tier covered transactions and in all solicitations for lower tier covered transactions.

7. A participant in a covered transaction may rely upon a certification of a prospective participant in a lower tier covered transaction that it is not debarred, suspended, ineligible, or voluntarily excluded from the covered transaction, unless it knows that the certification is erroneous. A participant may decide the method and frequency by which it determines the eligibility of its principals. Each participant may but is not required to, check the Nonprocurement List.

8. Nothing contained in the foregoing shall be construed to require establishment of a system of records in order to render in good faith the certification required by this clause. The knowledge and information of a participant is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.

9. Except for transactions authorized under paragraph 5 of these instructions, if a participant in a covered transaction knowingly enters into a lower tier covered transaction with a person who is suspended, debarred, ineligible, or voluntarily excluded from participation in this transaction, in addition to other remedies available to the Federal Government, the department or agency with which this transaction originated may pursue available remedies, including suspension and/or debarment.

Certification

(1) The prospective lower tier participant certifies, by submission of this proposal, that neither it nor its principals are presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participation in this transaction by any Federal department or agency.

(2) Where the prospective lower tier participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal.

NAME OF APPLICANT	PR/AWARD NUMBER AND/OR PROJECT NAME
PRINTED NAME AND TITLE OF AUTHORIZED REPRESENTATIVE	
SIGNATURE	DATE

ED 80-0014, 9/90 (Replaces GCS-009 (REV.12/88), which is obsolete)

008734

Certification of Eligibility for Federal Assistance in Certain Programs

I understand that 34 CFR 75.60, 75.61, and 75.62 require that I make specific certifications of eligibility to the U.S. Department of Education as a condition of applying for Federal funds in certain programs and that these requirements are in addition to any other eligibility requirements that the U.S. Department of Education imposes under program regulations. Under 34 CFR 75.60 – 75.62:

I. I certify that

A. I do not owe a debt, or I am current in repaying a debt, or I am not in default (as that term is used at 34 CFR Part 668) on a debt:

1. To the Federal Government under a nonprocurement transaction (e.g., a previous loan, scholarship, grant, or cooperative agreement); or

2. For a fellowship, scholarship, stipend, discretionary grant, or loan in any program of the U.S. Department of Education that is subject to 34 CFR 75.60, 75.61, and 75.62, including:

- Federal Pell Grant Program (20 U.S.C. 1070a, et seq.);
- Federal Supplemental Educational Opportunity Grant (SEOG) Program (20 U.S.C. 1070(b), et seq.):
- State Student Incentive Grant Program (SSIG) 20 U.S.C. 1070c, et seq.);
- Federal Perkins Loan Program (20 U.S.C. 1087aa, et seq.);
- Income Contingent Direct Loan Demonstration Project (20 U.S.C. 1087a, note);
- Federal Stafford Loan Program, Federal Supplemental Loans for Students [SLS], Federal PLUS, or Federal Consolidation Loan Program (20 U.S.C. 1071, et seq.);
- Cuban Student Loan Program (20 U.S.C. 2601, et seq.);
- Robert C. Byrd Honors Scholarship Program (20 U.S.C. 1070d-31, et seq.);
- Jacob K. Javits Fellows Program (20 U.S.C. 1134h-1134l);
- Patricia Roberts Harris Fellowship Program (20 U.S.C. 1134d-1134g);
- Christa McAuliffe Fellowship Program (20 U.S.C. 1105-1105i);
- Bilingual Education Fellowship Program (20 U.S.C. 3221-3262);
- Rehabilitation Long-Term Training Program (29 U.S.C. 774(b));
- Paul Douglas Teacher Scholarship Program (20 U.S.C. 1104, et seq.);
- Law Enforcement Education Program (42 U.S.C. 3775);
- Indian Fellowship Program (29 U.S.C. 774(b));

OR

B. I have made arrangements satisfactory to the U.S. Department of Education to repay a debt as described in A.1. or A.2. (above) on which I had not been current in repaying or on which I was in default (as that term is used in 34 CFR Part 668).

II. I certify also that I have not been declared by a judge, as a condition of sentencing under section 5301 of the Anti-Drug Abuse Act of 1988 (21 U.S.C. 862), ineligible to receive Federal assistance for the period of this requested funding.

I understand that providing a false certification to any of the statements above makes me liable for repayment to the U.S. Department of Education for funds received on the basis of this certification, for civil penalties, and for criminal prosecution under 18 U.S.C. 1001.

_____ _____
(Signature) (Date)

_____
(Typed or Printed Name)

Name or number of the USDE program under which this certification is being made: _____

ED 80-0016 (9/92)

008735

DISCLOSURE OF LOBBYING ACTIVITIES

Approved by OMB 0348-0046

Complete this form to disclose lobbying activities pursuant to 31 U.S.C. 1352
(See reverse for public burden disclosure.)

1. Type of Federal Action: ☐ a. contract b. grant c. cooperative agreement d. loan e. loan guarantee f. loan insurance	**2. Status of Federal Action:** ☐ a. bid/offer/application b. initial award c. post-award	**3. Report Type:** ☐ a. initial filing b. material change **For Material Change Only:** year _____ quarter _____ date of last report _____
4. Name and Address of Reporting Entity: ☐ **Prime** ☐ **Subawardee** Tier _____, *if known*: **Congressional District**, *if known*:	**5. If Reporting Entity in No. 4 is a Subawardee, Enter Name and Address of Prime:** **Congressional District**, *if known*:	
6. Federal Department/Agency:	**7. Federal Program Name/Description:** CFDA Number, *if applicable*: _____	
8. Federal Action Number, *if known*:	**9. Award Amount,** *if known*: $	
10. a. Name and Address of Lobbying Registrant (*if individual, last name, first name, MI*):	**b. Individuals Performing Services** (*including address if different from No. 10a*) (*last name, first name, MI*):	
11. Information requested through this form is authorized by title 31 U.S.C. section 1352. This disclosure of lobbying activities is a material representation of fact upon which reliance was placed by the tier above when this transaction was made or entered into. This disclosure is required pursuant to 31 U.S.C. 1352. This information will be reported to the Congress semi-annually and will be available for public inspection. Any person who fails to file the required disclosure shall be subject to a civil penalty of not less that $10,000 and not more than $100,000 for each such failure.	Signature: _____ Print Name: _____ Title: _____ Telephone No.: _____ Date: _____	
Federal Use Only:	Authorized for Local Reproduction Standard Form LLL (Rev. 7-97)	

008736

INSTRUCTIONS FOR COMPLETION OF SF-LLL, DISCLOSURE OF LOBBYING ACTIVITIES

This disclosure form shall be completed by the reporting entity, whether subawardee or prime Federal recipient, at the initiation or receipt of a covered Federal action, or a material change to a previous filing, pursuant to title 31 U.S.C. section 1352. The filing of a form is required for each payment or agreement to make payment to any lobbying entity for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with a covered Federal action. Complete all items that apply for both the initial filing and material change report. Refer to the implementing guidance published by the Office of Management and Budget for additional information.

1. Identify the type of covered Federal action for which lobbying activity is and/or has been secured to influence the outcome of a covered Federal action.

2. Identify the status of the covered Federal action.

3. Identify the appropriate classification of this report. If this is a followup report caused by a material change to the information previously reported, enter the year and quarter in which the change occurred. Enter the date of the last previously submitted report by this reporting entity for this covered Federal action.

4. Enter the full name, address, city, State and zip code of the reporting entity. Include Congressional District, if known. Check the appropriate classification of the reporting entity that designates if it is, or expects to be, a prime or subaward recipient. Identify the tier of the subawardee, e.g., the first subawardee of the prime is the 1st tier. Subawards include but are not limited to subcontracts, subgrants and contract awards under grants.

5. If the organization filing the report in item 4 checks "Subawardee," then enter the full name, address, city, State and zip code of the prime Federal recipient. Include Congressional District, if known.

6. Enter the name of the Federal agency making the award or loan commitment. Include at least one organizational level below agency name, if known. For example, Department of Transportation, United States Coast Guard.

7. Enter the Federal program name or description for the covered Federal action (item 1). If known, enter the full Catalog of Federal Domestic Assistance (CFDA) number for grants, cooperative agreements, loans, and loan commitments.

8. Enter the most appropriate Federal identifying number available for the Federal action identified in item 1 (e.g., Request for Proposal (RFP) number; Invitation for Bid (IFB) number; grant announcement number; the contract, grant, or loan award number; the application/proposal control number assigned by the Federal agency). Include prefixes, e.g., "RFP-DE-90-001."

9. For a covered Federal action where there has been an award or loan commitment by the Federal agency, enter the Federal amount of the award/loan commitment for the prime entity identified in item 4 or 5.

10. (a) Enter the full name, address, city, State and zip code of the lobbying registrant under the Lobbying Disclosure Act of 1995 engaged by the reporting entity identified in item 4 to influence the covered Federal action.

    (b) Enter the full names of the individual(s) performing services, and include full address if different from 10 (a). Enter Last Name, First Name, and Middle Initial (MI).

11. The certifying official shall sign and date the form, print his/her name, title, and telephone number.

According to the Paperwork Reduction Act, as amended, no persons are required to respond to a collection of information unless it displays a valid OMB Control Number. The valid OMB control number for this information collection is OMB No. 0348-0046. Public reporting burden for this collection of information is estimated to average 10 minutes per response, including time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding the burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to the Office of Management and Budget, Paperwork Reduction Project (0348-0046), Washington, DC 20503.

[FR Doc. 00–12503 Filed 5–17–00; 8:45 am]

BILLING CODE 4000–01–C

008737

Federal Register

Thursday,
May 18, 2000

Part VI

Department of Housing and Urban Development

24 CFR Parts 3280 and 3282
Manufactured Home Construction and Safety Standards: Smoke Alarms; Proposed Rule

008738

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT

24 CFR Parts 3280 and 3282

[Docket No. FR–4552–P–01]

RIN 2502–AH48

Manufactured Home Construction and Safety Standards: Smoke Alarms

AGENCY: Office of the Assistant Secretary for Housing-Federal Housing Commissioner, HUD.

ACTION: Proposed rule.

SUMMARY: This proposed rule would amend the Federal Manufactured Home Construction and Safety Standards to revise the requirements for the location and placement of smoke alarms. The purpose of these amendments is to improve the effectiveness and performance of smoke alarms in early warning detection of manufactured home fires and to reduce the rate of fire fatalities in new manufactured housing.

DATES: *Comments Due Date:* July 17, 2000.

ADDRESSES: Address all comments concerning this proposed rule to the Rules Docket Clerk, Office of the General Counsel, Room 10276, U.S. Department of Housing and Urban Development, 451 Seventh Street, SW, Washington, DC 20410. Comments should refer to the docket number and title listed above. A copy of each comment submitted will be available for public inspection and copying weekdays between 7:30 a.m. and 5:30 p.m. at the above address. Comments submitted by facsimile (FAX) will not be accepted.

FOR FURTHER INFORMATION CONTACT: Rebecca J. Holtz, Acting Director, Office of Consumer and Regulatory Affairs, Room 9156, U.S. Department of Housing and Urban Development, 451 Seventh Street, SW, Washington, DC 20410; telephone (202) 708–0502 (this is not a toll-free number). Persons who have difficulty hearing or speaking may access this number via TTY by calling the toll-free Federal Information Relay Service at (800) 877–8339.

SUPPLEMENTARY INFORMATION:

I. Background

The National Manufactured Housing Construction and Safety Standards Act of 1974 (42 U.S.C. 5401–5426) (''the Act'') authorizes the Secretary to establish and amend the Federal Manufactured Home Construction and Safety Standards (''the Standards'' or ''HUD Code''), codified in 24 CFR part 3280. The purpose of the Act is to reduce the number of personal injuries and deaths and the amount of insurance costs and property damage resulting from manufactured home accidents, and to improve the quality and durability of manufactured homes (42 U.S.C. 5401).

One of the most significant factors in meeting these objectives, from the perspective of fire safety, is the requirement in the Standards for the installation of permanently wired smoke detectors in manufactured homes (24 CFR 3280.208). The enforcement program for this requirement is designed to ensure that a manufactured home is not labeled or shipped without such smoke alarms. Nevertheless, fire data studies conducted for HUD by the National Fire Protection Association (NFPA) have continued to indicate that in about 40% of HUD-code homes where fatal fires have occurred smoke alarms were not present or operational.

This fact suggests a high rate of occupant disabling of smoke alarms. This may be a result of frequent false and nuisance alarms caused, for example, by the close proximity of these devices to cooking appliances. In addition, findings from the National Smoke Detector Project conducted by the Consumer Product Safety Commission (CPSC) indicated that for all homes investigated only about 70% of the smoke alarms were working.

The NFPA also reported that the rate of fire fatalities for all manufactured homes was cut nearly in half when alarms were operational. This emphasizes the importance of reducing the occupant disabling problem and improving the reliability and effectiveness of smoke alarms.

HUD had also previously designated the NFPA to undertake a consensus process to develop recommendations for new manufactured housing standards. The Department has received both a proposal (TIA 97–1) and the NFPA 501 Standard (1999 edition) developed through that process. The proposal and relevant provisions in NFPA 501 contained recommendations that would revise the present smoke alarm requirements in HUD's Standards. The Department also commissioned the National Institute of Standards and Technology (NIST) to evaluate the adequacy of the current requirements for smoke alarms in the Standards and to recommend alternatives that are consistent with national fire safety standards for other types of housing and that would reduce the incidence of nuisance alarms.

The findings and recommendations from the NFPA and NIST evaluations were compatible and have formed the basis for the proposed revisions to the smoke alarm requirements in the Standards contained in this rule. In addition, HUD has included provisions in the rule for testing smoke alarms to ensure that all installed smoke alarms are operational. These testing provisions are based in part on recommendations in the NFPA study on manufactured home fire data and other proposals now being considered by the NFPA Consensus Committee.

II. Proposed Changes

The proposed rule would make the following major changes to the Standards:

—The proposed rule would replace the term ''smoke detector'' with the term ''smoke alarm''. While these terms are commonly used interchangeably, other housing codes generally define a ''smoke detector'' as a device that detects visible or invisible particles of combustion but does not include an alarm. By contrast, a ''smoke alarm'' is a self-contained unit that is responsive to smoke and incorporates a sensor, controls, and an alarm-sounding device.

—The proposed rule would revise all of the current location requirements contained in the Standards to enhance performance, improve audibility, and minimize the potential for false alarms. In general, the proposed rule would require more smoke alarms per home.

—The proposed rule would require manufacturers to install a smoke alarm that protects the living room and kitchen areas. However, the proposed rule would restrict manufacturers from installing a smoke alarm in the kitchen to minimize false alarms due to cooking and the potential for occupants to disable the alarm. If installed within 20 feet of a cooking appliance, the proposed rule would require that the smoke alarm include a temporary silencing feature (hush button) to provide consumers with a mechanism to shut off the alarm temporarily for about 15–20 minutes (e.g., if the alarm sounds frequently during periods of cooking). Alternatively, the proposed rule would permit manufacturers to install photoelectric type smoke alarms, which are less sensitive to cooking fumes.

—The proposed rule would require manufacturers to install a smoke alarm in each bedroom rather than outside each bedroom because occupants are most vulnerable when asleep.

—The proposed rule would permit manufacturers to mount smoke alarms on ceilings to avoid other locations

that may be more vulnerable to false alarms. The proposed rule would prescribe clearance distances, and manufacturers would not be able to modify them, even if permitted by the listing for the alarm. In rooms with sloping ceilings, the proposed rule would require manufacturers to mount smoke alarms within the distance determined by the hypotenuse of a right triangle whose horizontal leg measures 3 feet and whose vertical leg is perpendicular to its horizontal leg from the highest point of the ceiling.

—The proposed rule would require manufacturers to install smoke alarms that are interconnected so that the operation of any one alarm activates all other alarms in the home to maximize the likelihood of being awakened to nighttime fires. In addition, as recommended by both the NFPA and NIST evaluations, the proposed rule would permit the use of smoke alarms powered by a battery rated for a 10-year life as an alternative to permanently wired alarms with battery back-up. While HUD is aware that there are currently no commercially available 10-year battery-powered alarms that include an interconnection feature, HUD decided to include the 10-year battery alarm option in this proposed rule as an incentive to develop the interconnection feature. HUD is interested in receiving comments on the use of 10-year battery smoke alarms, including any suggestions regarding methods to encourage homeowners to maintain or replace these alarms as needed.

—The proposed rule would establish separate operational, location, and connection requirements for visual and tactile appliances that can benefit hearing- and sight-impaired persons.

—The proposed rule would require additional restrictions on the placement of smoke alarms for bathrooms, kitchens, and areas where forced air equipment is located to improve the effectiveness and functionality of the alarms.

—The proposed rule would require operational testing at the factory to ensure that all alarms are responding. The proposed rule would also require manufacturers to replace any alarm that, though correctly wired, does not function properly during testing. The proposed rule would also require manufacturers to provide installers with specific written instructions for inspecting and testing smoke alarms during installation of the home, and to provide homeowners with the smoke alarm manufacturer's information describing the operation, method and frequency of testing, and proper maintenance of the smoke alarm.

In addition to addressing these changes, commenters are encouraged to submit other recommendations that would make smoke alarms more tamper resistant and less susceptible to nuisance alarms, and to suggest methods that would encourage homeowners to replace smoke alarms because of their age or other factors that may hinder their performance.

A conforming change to the terminology used in 24 CFR part 3282, Manufactured Home Procedural and Enforcement Regulations, substituting ''alarms'' in place of ''detectors'' is also made by this rule.

III. Findings and Certifications

Regulatory Planning and Review

The Office of Management and Budget (OMB) has reviewed this rule in accordance with Executive Order 12866, (captioned ''Regulatory Planning and Review''). OMB determined that this rule is a ''significant regulatory action'' as defined in section 3(f) of the Order (although not an economically significant regulatory action under the Order). Any changes to the rule resulting from this review are available for public inspection between 7:30 a.m. and 5:30 p.m. weekdays in the Office of the Rules Docket Clerk.

Paperwork Reduction Act

The proposed new information collection requirements contained in § 3280.208(f) have been submitted to the Office of Management and Budget (OMB) for review under the Paperwork Reduction Act of 1995 (44 U.S.C. 3501–3520). Under this Act, an agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless the collection displays a valid control number. OMB has issued HUD the control number 2502–0253 for the information collection requirements under the current Manufactured Housing Construction and Safety Standards Program.

The public reporting burden for this new collection of information is estimated to include the time for reviewing the instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Information on the estimated public reporting burden is provided in the following table.

Information collection	Number of respondents	Responses per respondent	Total annual responses	Hours per response	Total hours
§ 3280.208(f) Manufacturer's Alarm Instructions	340	1,088	370,600	.0833	30,833

In accordance with 5 CFR 1320.8(d)(1), HUD is soliciting comments from members of the public and affected agencies concerning the proposed collection of information to:

(1) Evaluate whether the proposed collection of information is necessary for the proper performance of the functions of the agency, including whether the information will have practical utility;

(2) Evaluate the accuracy of the agency's estimate of the burden of the proposed collection of information;

(3) Enhance the quality, utility, and clarity of the information to be collected; and

(4) Minimize the burden of the collection of information on those who are to respond, including through the use of appropriate automated collection techniques or other forms of information technology, e.g., permitting electronic submission of responses.

Interested persons are invited to submit comments regarding the information collection requirements in this proposal. Comments must be received by July 17, 2000. Comments must refer to the proposal by name and docket number (FR–4552–P–01) and must be sent to:

Joseph F. Lackey, Jr., HUD Desk Officer, Office of Management and Budget, New Executive Office Building, Washington, DC 20503

and

Rules Docket Clerk, Office of the General Counsel, Room 10276, U.S. Department of Housing and Urban Development, 451 Seventh Street, SW, Washington, DC 20410

008740

Unfunded Mandates Reform Act

Title II of the Unfunded Mandates Reform Act of 1995 (2 U.S.C. 1531–1538) establishes requirements for Federal agencies to assess the effects of their regulatory actions on State, local, and tribal governments and the private sector. This rule will not impose any Federal mandates on any State, local, or tribal governments or the private sector within the meaning of the Unfunded Mandates Reform Act of 1995.

Environmental Review

A Finding of No Significant Impact (FONSI) with respect to the environment was made in accordance with HUD regulations in 24 CFR part 50 that implement section 102(2)(C) of the National Environmental Policy Act of 1969 (42 U.S.C. 4223). The FONSI is available for public inspection during regular business hours in the Office of the Rules Docket Clerk, Office of General Counsel, Room 10276, U.S. Department of Housing and Urban Development, 451 Seventh Street, SW, Washington, DC 20410.

Impact on Small Entities

The Secretary, in accordance with the Regulatory Flexibility Act (5 U.S.C. 605(b)), has reviewed and approved this proposed rule and in so doing certifies that the rule would not have a significant economic impact on a substantial number of small entities. The rule would revise HUD's existing regulations for the placement and installation of smoke alarms in new manufactured housing. The requirements would ensure that smoke alarms installed in new homes will be more effective in warning of the presence of smoke. This is accomplished primarily by changing the location requirements to ensure that alarms operate more effectively. Because manufacturers are already required to provide working smoke alarms in manufactured homes, the costs associated with complying with new requirements would be minimal.

HUD has conducted a material and labor cost impact analysis for this rule. The potential cost impact, based on a per home cost determined to be approximately $28.05, multiplied by 350,000 homes produced in a year (assuming conservatively that no manufacturer currently uses AC smoke alarms with battery backups), is $9.8 million annually. This does not represent a significant economic effect on either an industry-wide or per unit basis.

The following chart provides a comparison of cost based on HUD's existing regulation and this proposed rule, and the estimate of the approximate cost increase of this new rule.

	Current rule	New rule	Change	Cost increase
(1) Smoke alarm	2 × $5.50=$11 2 AC powered alarms (Ionization).	2 × $8.50=$17.00 2 × $8.50=$17.00 4 AC+Battery alarms (Ionization).	34 − 11=23	$23
(2) Wiring	40′ × $0.06=$2.40	40′ × $0.07=$2.80 20′ × $0.07=$1.40	4.20 − 2.40=1.80	1.80
(3) Labor	$3.25	6.50	6.50 − 3.25=3.25	3.25
Total				28.05

In estimating the cost under the current regulation and proposed new regulation, HUD used the following assumptions based on an average home (28″ × 60″) that contains three bedrooms: (1) The home has a smoke alarm in each bedroom and one in the common area (all four smoke alarms have battery backups); (2) installation involves 40 feet of 14–2 wiring for two smoke detectors (current rule), and an additional 20 feet of 14–3 wiring for the two newly required alarms in each bedroom); (3) the cost of installation of 14–2 wiring = $0.06 per lineal foot; (4) the cost of installation of 14–3 wiring = $0.07 per lineal foot; (5) the labor costs are lump sum costs that were obtained from manufactured home builders; (6) the prices reflected in the table were obtained from manufactured home producers (i.e., close to actual costs incurred by manufactured home builders); (7) the cost obtained from smoke alarm manufacturers are generally higher than costs paid by home producers (the costs do not include larger quantity discounts); and (8) approximately 30% of manufactured home producers currently are using AC+ battery smoke alarms.

Notwithstanding HUD's determination that this rule would not have a significant economic effect on a substantial number of small entities, HUD specifically invites comments regarding any less burdensome alternatives to this rule that will meet HUD's objectives as described in this preamble.

Federalism Impact

This rule does not have Federalism implications and does not impose substantial direct compliance costs on State and local governments or preempt State law within the meaning of Executive Order 13132.

List of Subjects

24 CFR Part 3280

Fire prevention, Housing standards, Manufactured homes.

24 CFR Part 3282

Administrative practice and procedure, Consumer protection, Intergovernmental relations, Investigations, Manufactured homes, Reporting and recordkeeping requirements, Warranties.

Accordingly, for the reasons stated in the preamble, HUD proposes to amend 24 CFR parts 3280 and 3282 as follows:

PART 3280—MANUFACTURED HOME CONSTRUCTION AND SAFETY STANDARDS

1. The authority citation for 24 CFR part 3280 continues to read as follows:

Authority: 42 U.S.C. 3535(d), 5403, and 5424.

2. Amend § 3280.202 as follows:

a. Remove from the definition of ''Single-station alarm device'' the word ''detector'' and add in its place the word ''alarm'';

b. Remove the definition of ''Smoke detector''; and

c. Add the definition of ''Smoke alarm'' to read as follows:

§ 3280.202 Definitions.

* * * * *

Smoke alarm: A single- or multiple-station alarm device that is responsive to smoke.

3. Revise § 3280.208 to read as follows:

§ 3280.208 Smoke alarm requirements.

(a) *Labeling.* Each smoke alarm required under this section must conform with the requirements of ANSI UL 217–1993, Single and Multiple Station Smoke Alarms, or ANSI UL 268–1989, Smoke Detectors for Fire Protective Signaling, and must bear a label to evidence conformance.

(b) *Required smoke alarm locations.* (1) At least one smoke alarm must be installed in each of the following locations:

(i) To protect the living room and kitchen space. When located within 20 feet horizontally from cooking appliances, the smoke alarm must incorporate a temporary silencing feature or be of a photoelectric type.

(ii) In each sleeping room.

(iii) On the ceiling of the upper level above each stairway, other than a basement stairway, in any multistory home completed in accordance with this part or part 3282 of this chapter. The alarm must be located so that smoke rising in the stairway cannot be prevented from reaching the alarm by an intervening door or obstruction.

(iv) For each basement stairway, the instructions for installers and information for homeowners required in paragraph (f) of this section must clearly indicate that a smoke alarm is to be located on the basement ceiling near the stairway.

(2) A smoke alarm required under this section must not be placed in a location that impairs its effectiveness or in any of the following locations:

(i) Kitchens, garages, and any space where the temperature can reasonably be expected to fall below 40 °F or exceed 100 °F;

(ii) Within 3 feet horizontally from a door to a kitchen, a bathroom containing a tub or shower, or a supply grille of a forced-air heating or cooling system or appliance;

(iii) Within 3 feet horizontally from any discharge grille when a home is equipped or designed for future installation of a roof-mounted evaporative cooler or other equipment discharging conditioned air through a ceiling grille into the living space; and

(iv) Any location that is not in accordance with the listing, unless required under this section.

(c) *Mounting requirements.* (1) Except in rooms with sloped ceilings or as permitted pursuant to paragraph (e) of this section, smoke alarms must be mounted either on the ceiling at least 4 inches from each wall or on a wall with the top of the alarm not less than 4 inches or more than 12 inches below the ceiling.

(2) Except as permitted pursuant to paragraph (e) of this section, in rooms with sloped ceilings, smoke alarms must be mounted on the ceiling within 3 feet, measured horizontally, from one of the highest points of the ceiling and at least 4 inches from any structural element.

(d) *Connection to power source.* (1) Each smoke alarm must be powered from:

(i) The electrical system of the home as the primary power source and a battery as a secondary power source; or

(ii) A battery rated for a 10-year life, provided the smoke alarm is listed for use with a 10-year battery.

(2) Each smoke alarm whose primary power source is the home electrical system must be mounted on an electrical outlet box and connected by a permanent wiring method to a general electrical circuit. The wiring circuit for the alarm must not include any switches between the over-current protective device and the alarm and must not be protected by a ground fault circuit interrupter.

(3) Smoke alarms must be interconnected such that the operation of any one smoke alarm causes the alarm to be triggered in all smoke alarms in the home.

(e) *Visible and tactile notification appliances.* (1) In addition to the smoke alarms required pursuant to this section, the manufacturer must provide visible and listed tactile notification appliances when ordered by the purchaser. These appliances are required to operate from the primary power source, but are not required to operate from a secondary power source.

(2) A visible notification appliance in a sleeping room:

(i) Must have a minimum rating of 177 candela, except that where the visible notification appliance is wall-mounted or suspended more than 24 inches below the ceiling, a minimum rating of 110 candela is permitted; and

(ii) Must be located within 16 feet of the pillow, in any sleeping room that is larger than 14 × 16 feet.

(3) A visible notification appliance in an area other than a sleeping room must have a minimum rating of 15 candela.

(f) *Testing and maintenance.* (1) After being installed by the home manufacturer at the factory, each smoke alarm must be tested in accordance with the alarm manufacturer's instructions. Any smoke alarm that is correctly wired and does not function as designed during the test must be replaced. Any smoke alarm that is replaced by the home manufacturer also must be tested in accordance with this paragraph.

(2) Home manufacturers must provide specific written instructions for installers on how to inspect and test the operation of smoke alarms during installation of the home. These instructions must indicate that any smoke alarm that does not meet the inspection or testing requirements needs to be replaced and retested.

(3) Home manufacturers must provide the homeowner with the alarm manufacturer's information describing the operation of the smoke alarm, method and frequency of testing, and proper maintenance. This information shall be placed in a conspicuous location within the manufactured home in a manner likely to assure that it is not removed until removed by the purchaser. No dealer, distributor, construction contractor, or other person shall interfere with the distribution of this information.

PART 3282—MANUFACTURED HOME PROCEDURAL AND ENFORCEMENT REGULATIONS

4. The authority citation for 24 CFR part 3282 continues to read as follows:

Authority: 42 U.S.C. 3535(d) and 5424.

5. Amend § 3282.203(b)(4) by removing the word ''detectors'' and adding in its place the word ''alarms''.

Dated: April 21, 2000.

William C. Apgar,

Assistant Secretary for Housing-Federal Housing Commissioner.

[FR Doc. 00–12563 Filed 5–17–00; 8:45 am]

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S.J. Res. 40/P.L. 106–198
Providing for the appointment of Alan G. Spoon as a citizen regent of the Board of Regents of the Smithsonian Institution. (May 5, 2000; 114 Stat. 249)

S.J. Res. 42/P.L. 106–199
Providing for the reappointment of Manuel L. Ibanez as a citizen regent of the Board of Regents of the Smithsonian Institution. (May 5, 2000; 114 Stat. 250)

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United States
Environmental Protection
Agency

Office of Water (4503F)
Washington, DC 20460

EPA841-S-00-001
June 2000

The Quality of Our Nation's Waters

A Summary of the National Water Quality Inventory: 1998 Report to Congress

o v e r v i e w

States, territories, tribes, and interstate commissions assessed 23% of the nation's 3.6 million miles of rivers and streams for their 1998 water quality assessment reports to EPA. Of the assessed stream miles, 55% are rated as good, 10% good but threatened, and 35% impaired. States and other jurisdictions assessed 42% of the nation's 41.6 million acres of lakes, reservoirs, and ponds and reported that 46% of assessed lake acres are rated as good, 9% good but threatened, and 45% impaired. States and other jurisdictions assessed 32% of the nation's 90,500 square miles of estuaries and reported that 47% of assessed estuary square miles are rated as good, 9% as good but threatened, and 44% as impaired. Principal pollutants causing water quality problems include nutrients, siltation, metals, and pathogens.

Why Do States and Other Jurisdictions Assess Water Quality?

Section 305(b) of the Clean Water Act requires states, territories, tribes, and interstate commissions to assess the health of their waters and the extent to which their waters support state water quality standards and the basic goals of the Clean Water Act. The goals of the Clean Water Act are to achieve and maintain water quality that provides for healthy communities of fish and shellfish and that allows for recreation in and on the water. States collect data and information that allow them to characterize whether water quality meets these and other uses for their waters which are expressed in standards that each state sets.

States and other jurisdictions such as territories, tribes, and interstate commissions submit their water quality assessments to the U.S. Environmental Protection Agency (EPA) every 2 years. EPA summarizes this information in a biennial report to Congress. The *National Water Quality Inventory: 1998 Report to Congress* is the twelfth biennial report to Congress and the public about the quality of our nation's rivers, streams, lakes, ponds, reservoirs, wetlands, estuaries, coastal waters, and ground water.

States' Section 305(b) assessments are an important component of their water resource management programs. These assessments help states:

✓ Implement their water quality standards by identifying healthy waters that need to be maintained and impaired waters that need to be restored

✓ Prepare their lists of impaired waters under Section 303(d) of the Clean Water Act

✓ Identify priority watersheds for protection and restoration using their Watershed Restoration Action Strategies, total maximum daily loads, and pollutant source controls

✓ Evaluate the effectiveness of activities undertaken to restore impaired waters and protect healthy waters.

The 305(b)/ 303(d) Connection

Under Section 303(d), the Clean Water Act includes a second reporting requirement—that states provide a prioritized list of all their impaired waters. Current requirements are that states submit these 303(d) lists to EPA every 2 years. The most recent set of 303(d) lists were submitted to EPA in April 1998.

These lists of impaired waters are then used to prioritize state restoration activities. One of the most important restoration tools is the development of Total Maximum Daily Loads (TMDLs)—calculations of the amount of a pollutant that a waterbody can receive and still meet water quality standards. A TMDL is the sum of all available loads of a single pollutant from all contributing point and nonpoint sources. It includes reductions needed to meet water quality standards and allocates these reductions among sources in the watershed.

The 305(b) and 303(d) reporting processes are connected. State 305(b) data is used to assist in the identification and priority ranking of 303(d) waters, although for their 303(d) listings, states may supplement the 305(b) information with other assessments or choose only that data in which they have the highest confidence. As a result, the findings on impaired waters reported by the states in their 303(d) lists build on, and are, in general, consistent with their 305(b) reports to EPA. Both sources find similar amounts of impaired waters and conclude that siltation, nutrients, bacteria, and metals are among the top pollutants causing impairments.

EPA and the states continue to work to improve and harmonize both these assessments through better and more extensive monitoring. Our goal is comprehensive monitoring of all waters for all applicable water quality standards—a challenging task given the demands placed on limited state, tribal, and federal resources, but a particularly vital one because of the important and costly water resource management decisions that depend on high quality water data.

This National Water Quality Inventory report reflects incremental progress toward the goal of comprehensive assessment. It includes information submitted by all 50 states, the District of Columbia, and 5 territories, 4 interstate commissions, and 9 Indian tribes. In addition, the amount of waters assessed for this report has increased slightly since the previous report. States assessed 150,000 more river and stream miles and 600,000 more lake acres in 1998 than in 1996.

How Do States and Other Jurisdictions Assess Water Quality?

Water quality assessment begins with setting goals through water quality standards adopted by states, tribes, and other jurisdictions such as territories. These standards must then be approved by EPA before they become effective under the Clean Water Act.

Water quality standards have three elements:

1. **Designated uses.** The Clean Water Act envisions that all waters be able to provide for recreation and the protection and propagation of aquatic life. Additional uses described in the Act that can be adopted in standards by states and tribes include drinking water supply and fish consumption.

2. **Criteria.** Criteria help protect designated uses. For example, criteria include chemical-specific thresholds that protect fish and humans from exposure to levels that may cause adverse effects. They may also include descriptions of the best possible biological condition of aquatic communities such as fish and insects.

3. **Antidegradation policy.** This policy is intended to prevent waters that do meet standards from deteriorating from their current condition.

After setting water quality standards, states then assess their waters to determine the degree to which these standards are being met and report this information in their 305(b) reports.

Currently states use two categories of data to assess water quality. The first and most desirable category is monitored data. This refers to field measurements, not more than 5 years old, of biological, habitat, toxicity, and physical/chemical conditions in water, sediments, and fish tissue. The second category, frequently used to fill information gaps, is evaluated data. Evaluated data includes field measurements that are more than 5 years old and estimates generated using land use and source information, predictive models, and surveys of fish and game biologists. This type of data provides an indicator of potential water quality.

Because evaluated data varies in quality and confidence, it is used for different purposes by different states. Most states use evaluated data to supplement monitoring data for their 305(b) reports. This information helps states identify waters that need additional monitoring.

After comparing water quality data to standards, states, tribes, and jurisdictions classify their waters into the following general categories:

Attaining Water Quality Standards

- **Good/Fully Supporting**: These waters meet applicable water quality standards, both criteria and designated uses.
- **Good/Threatened**: These waters currently meet water quality standards, but water quality may degrade in the near future.

Not Attaining Water Quality Standards/Impaired

- **Fair/Partially Supporting**: These waters meet water quality standards most of the time but exhibit occasional exceedances.
- **Poor/Not Supporting**: These waters do not meet water quality standards.

Water Quality Standards Not Attainable

- **Not Attainable**: The state has performed a use-attainability analysis and demonstrated that support of one or more designated uses is not attainable due to specific biological, chemical, physical, or economic/social conditions.

How Many of Our Waters Were Assessed for 1998?

This report does not describe the health of all U.S. waters because states and other jurisdictions have not yet achieved comprehensive assessment of all their waters (see Figure 1). Therefore, this report summarizes the health of only the subset of waters that states assessed in their individual 1998 water quality inventories: 23% of river and stream miles, 42% of lake acres, 32% of estuary square miles, 5% of ocean shoreline miles, and 90% of Great Lakes shoreline miles.

Oceans, coral reefs, wetlands, and ground water quality are poorly represented in state monitoring programs. In part, this is due to the fact that few states have adopted water quality standards for these resources. EPA's wetlands and ground water protection programs continue to work with states to develop assessment methods and water quality standards and to improve monitoring coverage. EPA is initiating a coastal monitoring program, Coastal 2000, that will provide a national baseline characterization of coastal waters and data needed to assist in development of water quality standards (particularly biological and nutrient criteria) for these waters.

Figure 1

Percentage of Waters Assessed for the 1998 Report

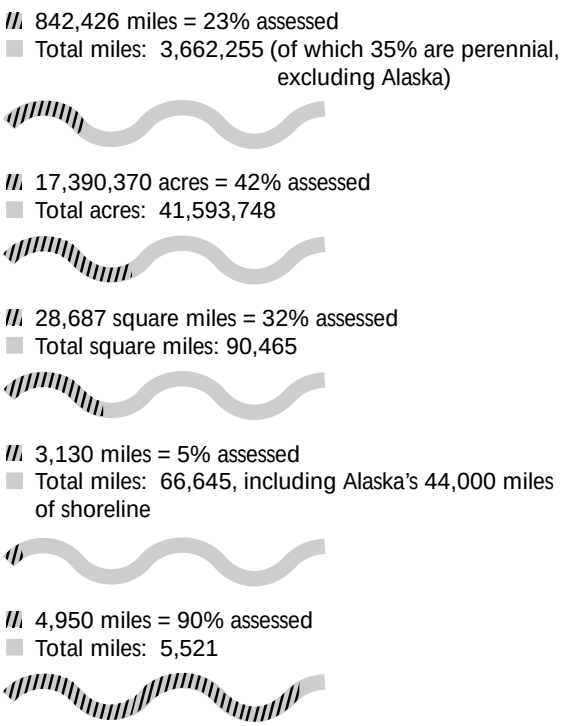

Source: 1998 Section 305(b) reports submitted by states, tribes, territories, and commissions.

What Is the Status of Our Assessed Waters?

Rivers and Streams

The United States has a total of 3,662,255 miles of rivers and streams. States and other jurisdictions assessed 23% of these river and stream miles, focusing primarily on perennial streams (i.e., those that flow year round). Altogether, the states and other jurisdictions reported that of the 23% of assessed stream miles, 65% fully support designated uses and 35% are impaired. They also report that 10% of the assessed rivers and streams are fully supporting but are threatened for one or more uses (Figure 2). Aquatic life use is the most frequently impaired individual use in assessed rivers and streams (Figure 3).

According to the states and other jurisdictions, siltation and bacteria are the most common pollutants affecting assessed rivers and streams (Figure 4). Siltation alters aquatic habitat and suffocates fish eggs and other bottom-dwelling organisms. Excessive siltation can also interfere with drinking water treatment processes and recreational use of a river. Bacteria provide evidence of possible fecal contamination that may cause waters to be unsafe for swimming and other recreational activities. Both pollutants raise the costs of drinking water treatment to remove them.

States and other jurisdictions reported agriculture as the most widespread

Figure 2

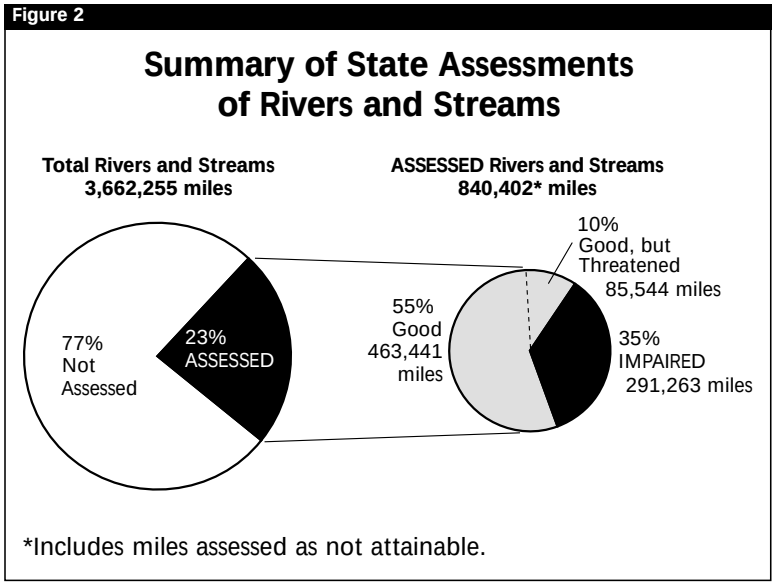

States assessed 23% of river and stream miles for the 1998 305(b) report. For the subset of assessed waters, 55% are rated as good, 10% as good but threatened, and 35% as impaired.

Figure 3

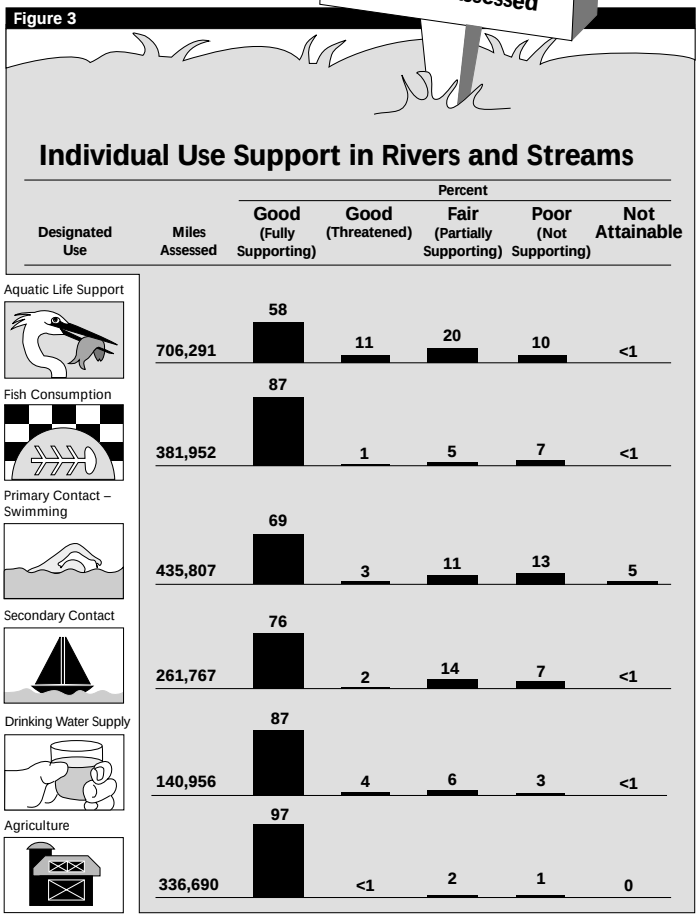

This figure presents a tally of the river and stream miles for each key designated use. For each use, the figure presents the percentage of assessed waters in each water quality category.

source of pollution in assessed rivers and streams. Agricultural activities may introduce siltation, nutrients, pesticides, and organic matter that deplete oxygen in surface water. Nutrients and pesticides can also leach into and contaminate ground water. While the impact of agricultural activities is significant, it should be considered in context of the amount of land supporting agricultural activities. According to the 1997 Census of Agriculture, 41% of the continental United States, about 900 million acres, is used for agricultural production.

Other leading sources of pollution in assessed rivers and streams include hydromodifications such as flow regulation and modification, channelization, dredging, and construction of dams—which may alter a river's habitat in such a way that it becomes less suitable for aquatic life—and urban area runoff and storm sewer discharges.

Lakes, Reservoirs, and Ponds

There are a total of 41,593,748 acres of lakes, reservoirs and ponds in the United States. In 1998, states and other jurisdictions assessed 42%, or about 17.4 million acres. Altogether, states and jurisdictions reported that of the 42% of lake acres assessed, 55% fully support all of their uses and 45% are impaired. They also reported that 9% of the assessed acres are fully supporting but threatened for one or more uses (Figure 5).

Figure 4

Leading Pollutants and Sources Impairing Assessed Rivers and Streams

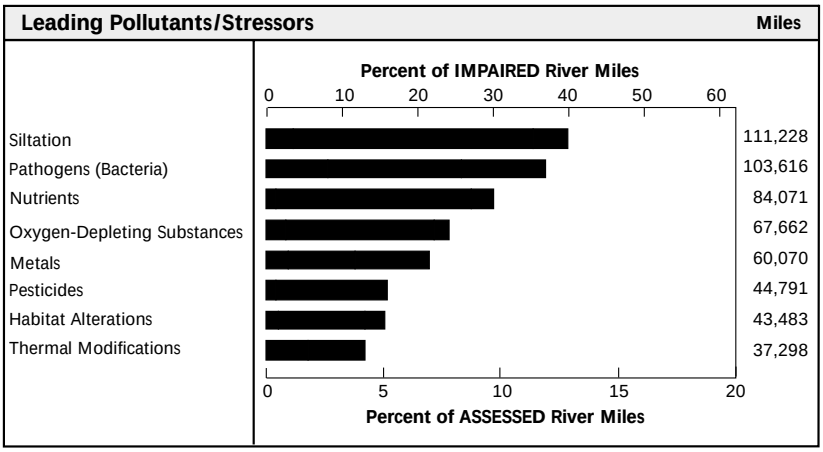

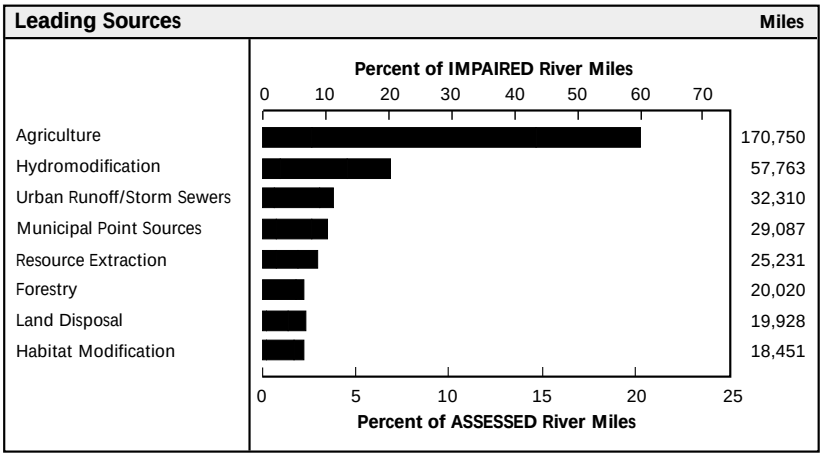

These bar charts present the leading pollutants and sources reported by the states. The percent scale on the lower axis compares the miles impacted to the total ASSESSED miles. The upper axis compares the miles impacted to the total IMPAIRED miles.

Figure 5

Summary of State Assessments of Lakes, Reservoirs, and Ponds

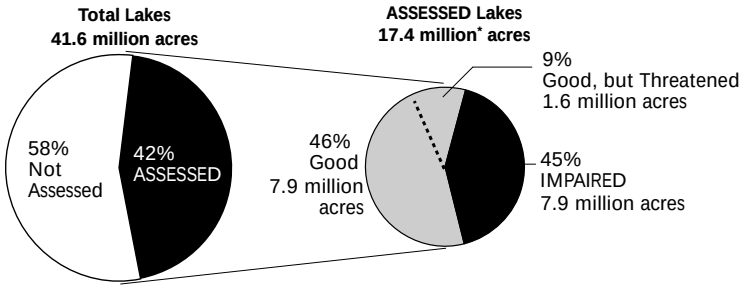

*Includes acres assessed as not attainable.

States assessed 42% of lake, reservoir, and pond acres for the 1998 305(b) report. For the subset of assessed waters, 45% are rated as good, 9% as good but threatened, and 45% as impaired.

More lake, reservoir, and pond acres were reported as impaired for aquatic life use support than any other assessed use (Figure 6). However, where fish consumption use was assessed, it was responsible for a higher percentage of impaired acres. (Many states did not evaluate fish consumption use support in lakes because they have not included this use in their water quality standards.) Through separate tracking of state fish consumption advisories, EPA estimates that about 6.5 million lake acres were under fish consumption advisories in 1998.

According to the states and other jurisdictions, nutrients are the most common pollutant affecting assessed lakes, reservoirs, and ponds (Figure 7). While healthy lake ecosystems contain nutrients in small quantities from natural sources, too many nutrients disrupt the balance of lake ecosystems. Nutrient overenrichment can initiate a chain of impacts that includes algal blooms, low dissolved oxygen conditions, fish kills, foul odors, and excessive aquatic weed growth that can interfere with recreational activities.

Metals are the second most common pollutants in assessed lake acres, mainly due to the widespread detection of mercury in fish tissue samples. The mercury problem is especially complex because it often includes atmospheric transport from power-generating facilities, waste incinerators, and other sources.

The most widespread source of pollution reported for assessed lakes is agriculture, followed by hydrologic modification, urban runoff and storm sewers, municipal point sources, and atmospheric deposition (Figure 7).

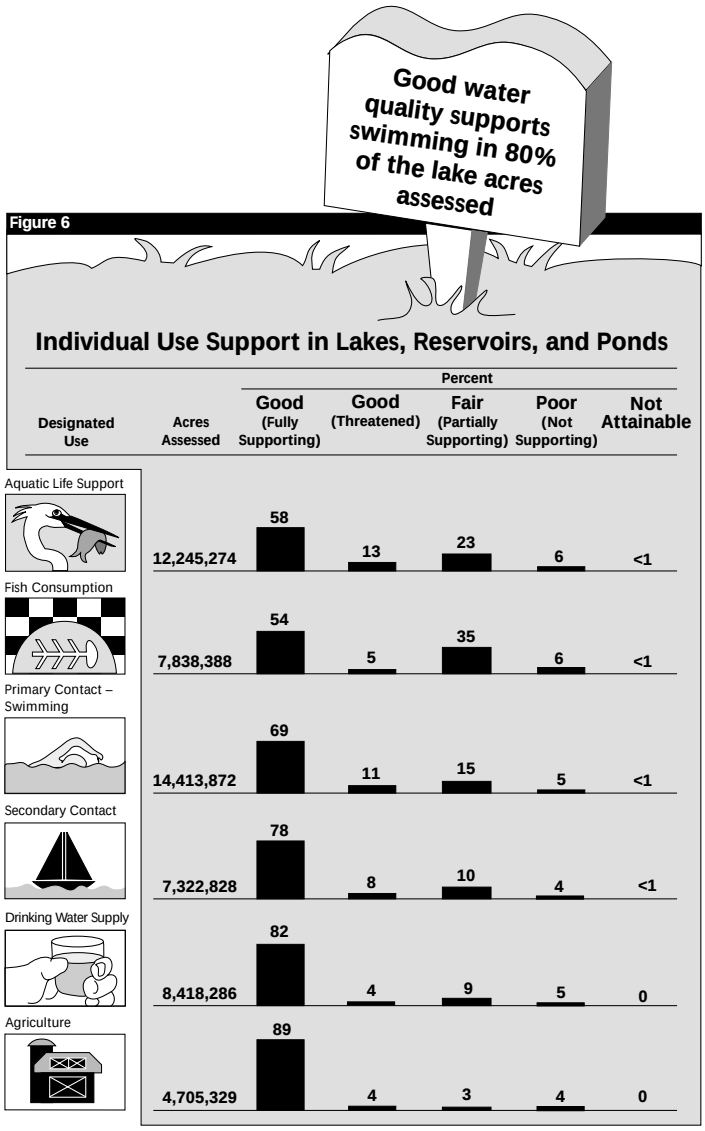

This figure presents a tally of the lake, pond, and reservoir acres assessed for each key designated use. For each use, the figure presents the percentage of assessed waters in each water quality category.

Figure 7

Leading Pollutants and Sources Impairing Assessed Lakes, Reservoirs, and Ponds

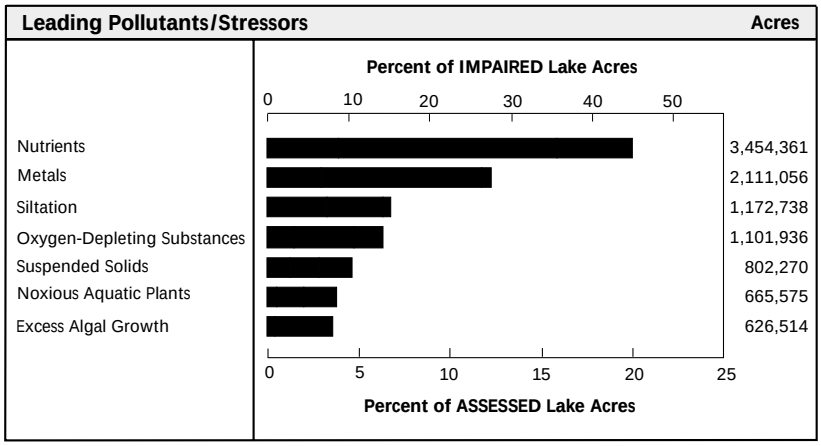

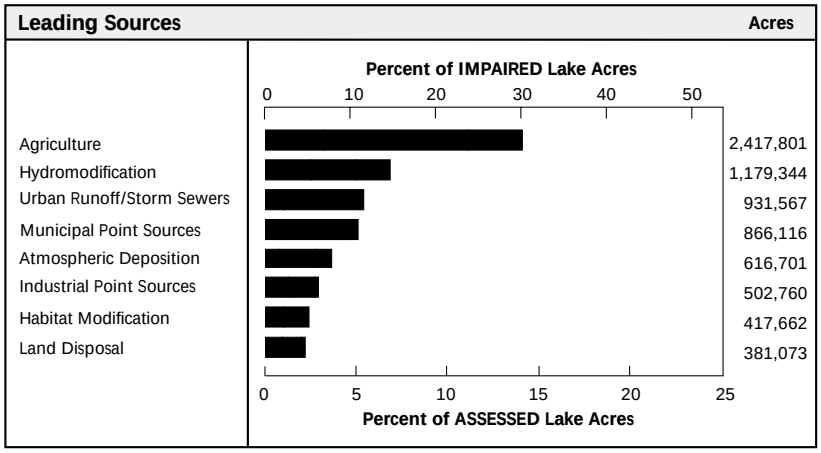

These bar charts present the leading pollutants and sources reported by the states. The percent scale on the lower axis compares the acres impacted to the total ASSESSED acres. The upper axis compares the acres impacted to the total IMPAIRED acres.

Figure 8

Summary of State Assessments of Estuaries

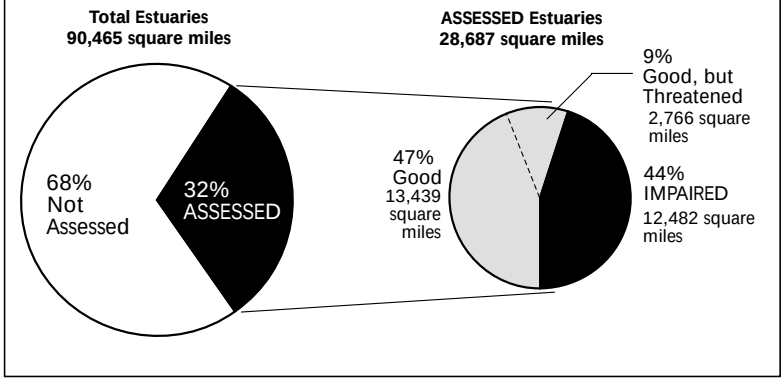

States assessed 32% of estuary square miles for the 1998 305(b) report. For the subset of assessed waters, 56% are rated as good, 9% as good but threatened, and 44% as impaired.

Coastal Resources—

Estuaries, The Great Lakes, Ocean Shoreline Waters, and Coral Reefs

The United States' extensive coastal resources include nearly 67,000 miles of ocean shoreline, more than 5,500 miles of Great Lakes shoreline, about 90,500 square miles of tidal estuaries, and extensive coral reef areas.

Estuaries

There are 90,465 square miles of estuaries in the United States. Estuaries are where rivers meet oceans, and they include bays and tidal rivers. They serve as nursery areas for many commercial fish and most shellfish populations, including shrimp, oysters, crabs, and scallops. States and other jurisdictions assessed 32% of the total square miles of estuaries in the country (Figure 8). Altogether, states and other jurisdictions reported that of the 32% of estuarine square miles assessed, 56% fully support designated uses and 44% are impaired. They reported that 9% of the assessed square miles are fully supporting but threatened for one or more uses. Aquatic life use is the most frequently impaired individual use in assessed estuaries (Figure 9).

States reported that bacteria (pathogens) are the most common pollutants affecting assessed estuaries. Most states monitor indicator bacteria, such as *Esherichia coli*, which provide evidence that an estuary is contaminated with sewage that may contain numerous viruses and bacteria that cause illness in people. Humans can become exposed to

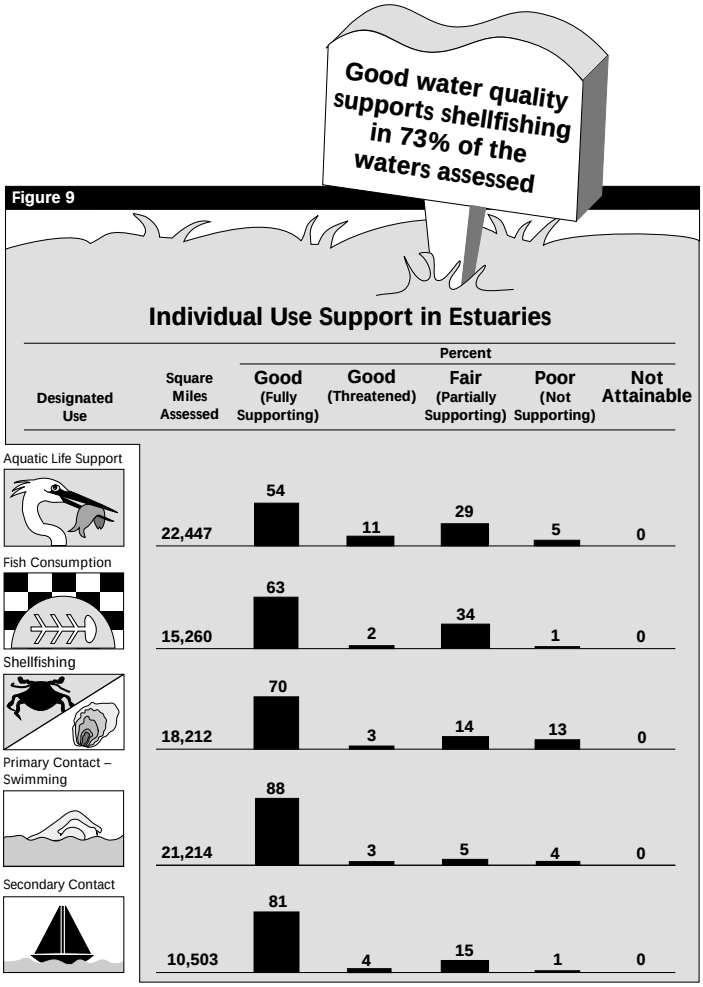

This figure presents a tally of the estuary square miles assessed for each key designated use. For each use, the figure presents the percentage of assessed waters in each water quality category.

these pathogens by consuming contaminated fish and shellfish or contacting or ingesting contaminated water during swimming.

In addition to pathogens, the states also reported that oxygen depletion from organic wastes, metals, nutrients, thermal modifications, PCBs, and priority toxic chemicals impacts more square miles of estuarine waters than other pollutants and stressors.

Municipal point sources and urban runoff and storm sewers are cited as the most widespread sources of pollution in assessed estuaries (Figure 10). These urban sources are significant contributors to the degradation of estuarine waters because large cities are located near most U.S. estuaries.

The Great Lakes

There are 5,521miles of Great Lakes shoreline in the United States. The Great Lakes contain nearly one-fifth of the fresh surface water on earth. Despite their large size, the Great Lakes are sensitive to the effects of a broad range of contaminants that enter the Lakes from polluted air, ground water, surface water, wastewater discharges, and overland runoff. For the 1998 report, five of the eight Great Lakes states assessed conditions of 90% of the nation's total Great Lakes shoreline miles (Figure 11). The states reported that of the 90% of assessed shoreline miles, 4% fully support designated uses and 96% are impaired. They also report that 2% of the assessed waters are fully supporting but threatened for one more uses.

The reporting states indicated that the greatest impacts to Great Lakes shoreline are on fishing activities (Figure 12). The states bordering the Great Lakes have issued advisories to restrict consumption of fish caught along their entire shorelines. Depending upon the location, mercury, PCBs, pesticides, or dioxins are found in fish tissues

Figure 10

Leading Pollutants and Sources Impairing Estuaries

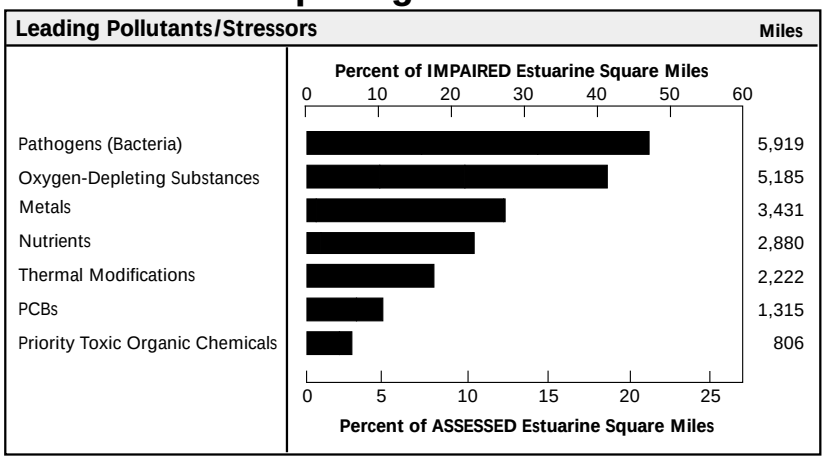

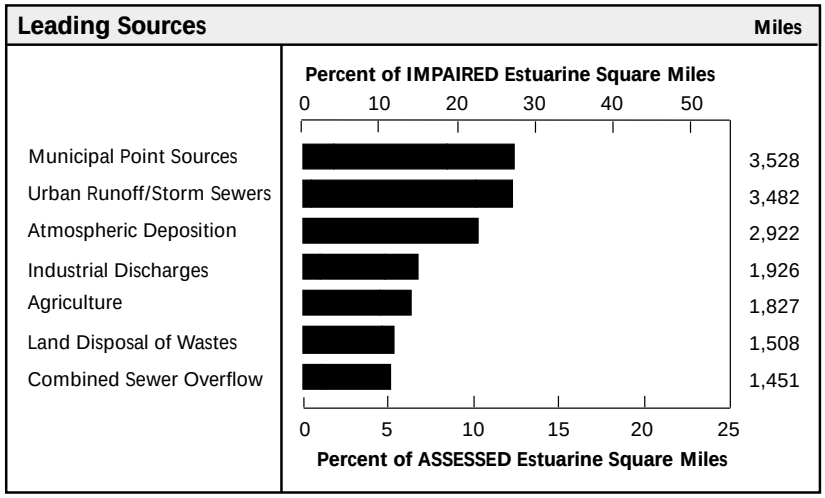

These bar charts present the leading pollutants and sources reported by the states. The percent scale on the lower axis compares the square miles impacted to the total ASSESSED square miles. The upper axis compares the square miles impacted to the total IMPAIRED square miles.

Figure 11

Summary of State Assessments of Great Lakes Shoreline

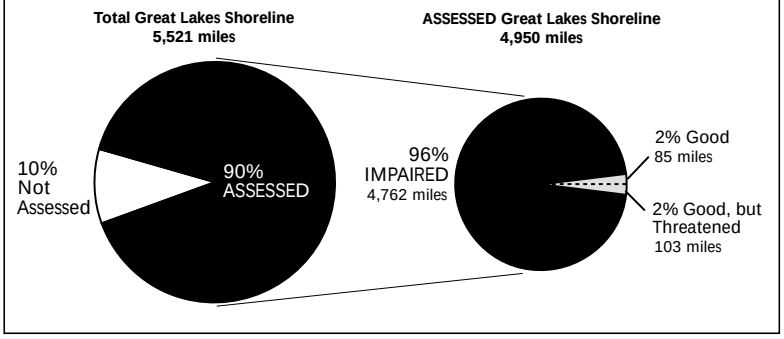

States assessed 90% of Great Lake shoreline miles for the 1998 305(b) report. For the subset of assessed waters, 2% are rated as good, 2% as good but threatened, and 96% as impaired.

at levels that exceed standards set to protect human health.

Priority organic chemicals, pesticides, and nonpriority organic chemicals are the most common pollutants affecting the waters along the Great Lakes shoreline, according to the three states that reported on pollutants and sources (Figure 13). These states reported that atmospheric deposition, discontinued discharges from factories that no longer operate, and contaminated sediments are the primary sources of these pollutants.

Ocean Shoreline Waters

There are 66,645 miles of ocean shoreline in the United States, including Alaska. Our ocean shoreline waters provide critical habitat for various life stages of commercial fish and shellfish (such as shrimp), provide habitat for endangered species (such as sea turtles), and support popular recreational activities, including sport fishing and swimming. Despite their vast size and volume, oceans are vulnerable to impacts from pollutants, especially in nearshore waters that receive inputs from adjoining surface waters, ground water, wastewater discharges, and nonpoint source runoff.

Fifteen of the 27 coastal states and territories assessed conditions in 5% of the nation's total ocean shoreline miles (Figure 14). The states and territories reported that of the 5% assessed, 88% of ocean shoreline miles fully support designated uses and 12% are impaired. They report that 8% of the assessed miles are threatened for one or more uses.

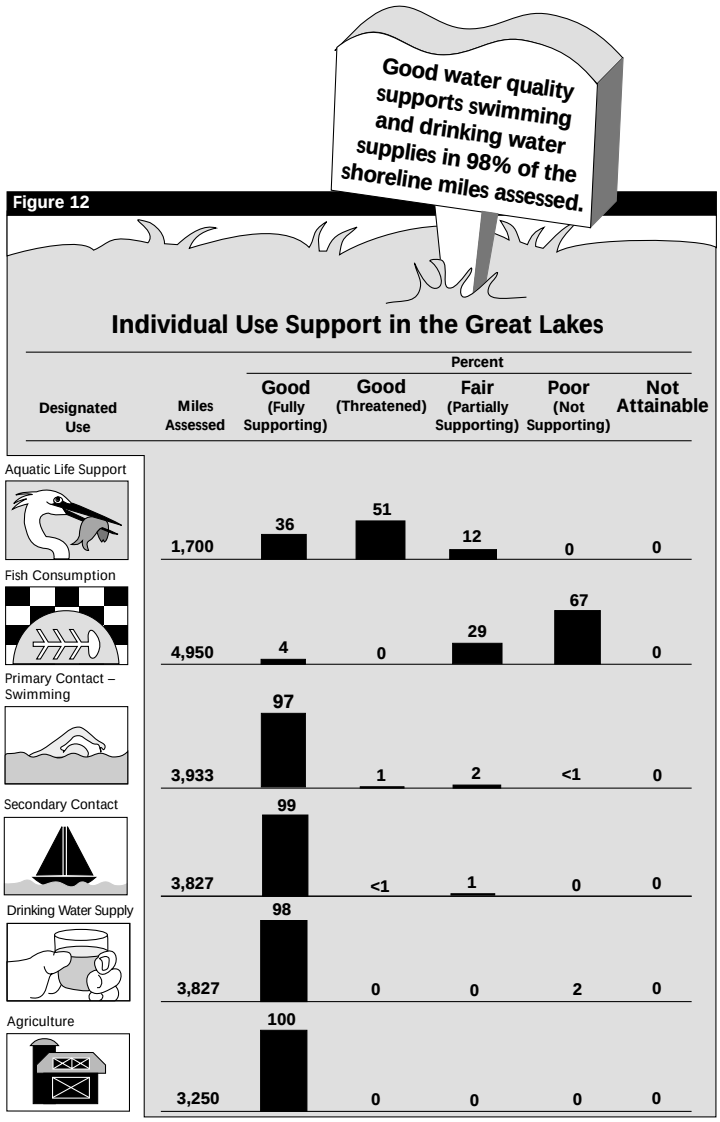

This figure presents a tally of the Great Lakes shoreline miles assessed for each key designated use. For each use, the figure presents the percentage of assessed waters in each water quality category.

Figure 13

Leading Pollutants and Sources Impairing Great Lakes Shoreline

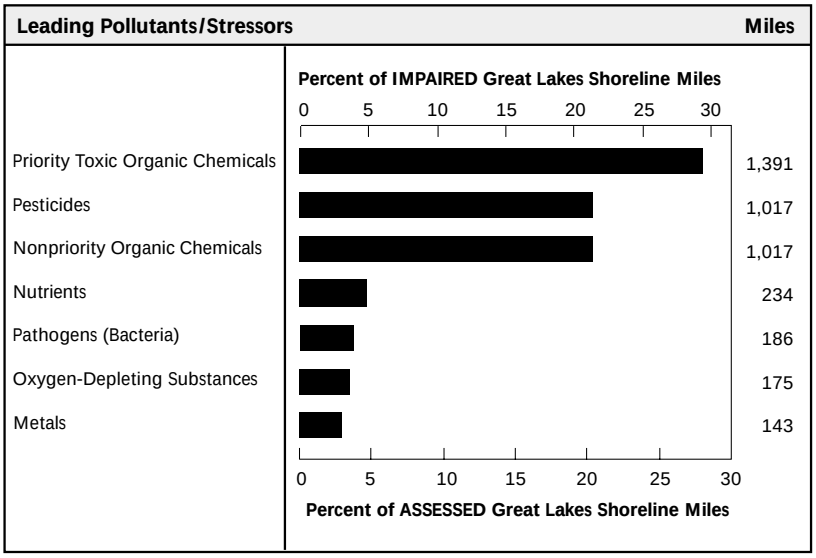

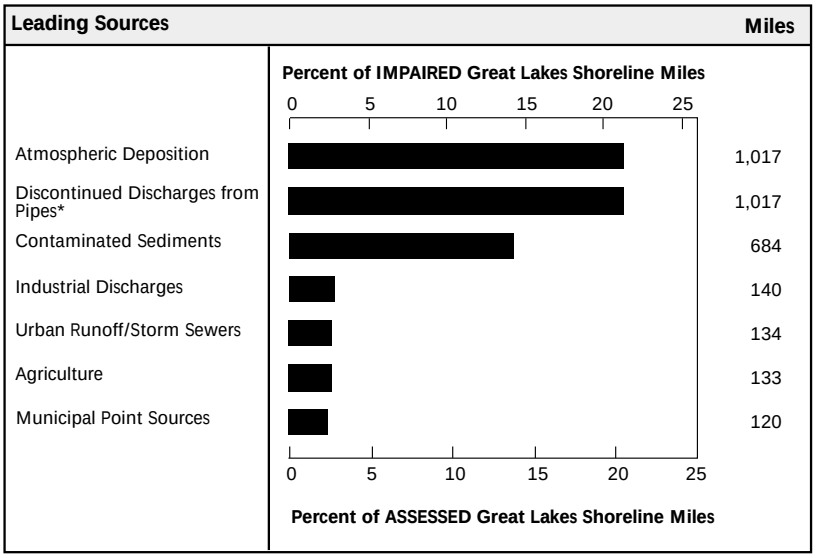

These bar charts present the leading pollutants and sources reported by the states. The percent scale on the lower axis compares the miles impacted to the total ASSESSED miles. The upper axis compares the miles impacted to the total IMPAIRED miles.

Figure 14

Summary of State Assessments of Ocean Shoreline

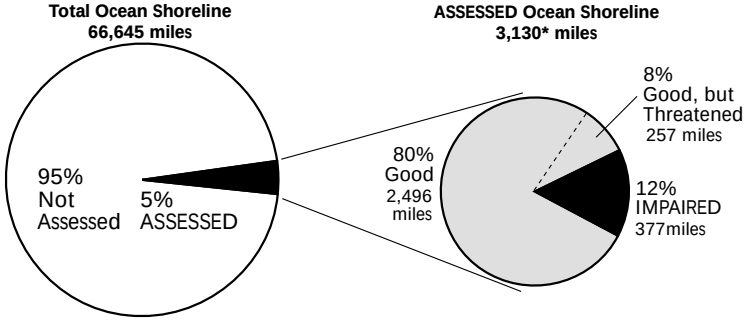

*Includes miles assessed as not attainable.

States assessed 5% of ocean shoreline miles for the 1998 305(b) report. For the subset of assessed waters, 80% are rated as good, 8% as good but threatened, and 12% as impaired.

Swimming was the most frequently assessed use in ocean shoreline waters (Figure 15).

Bacteria (pathogens), turbidity, and excess nutrients are the most common pollutants affecting the assessed ocean shoreline. The primary sources of pollution to assessed shoreline miles include urban runoff and storm sewers and land disposal of wastes (Figure 16).

Coral Reefs

Coral reefs are among the most productive ecosystems in the ocean. They are inhabited by a wide variety of fish, invertebrates, and plant species and provide important economic opportunities, primarily in terms of fishing and tourism. Coral reefs are found in three states—Hawaii, Florida, and Texas, and five U.S. territories—American Samoa, Guam, Northern Mariana Islands, Puerto Rico, and the U.S. Virgin Islands (Figure 17).

Recent evidence indicates that coral reefs are deteriorating worldwide. To prevent further deterioration of coral ecosystems, President Clinton signed Executive Order 13089 on Coral Reef Protection. This order created the U.S. Coral Reef Task Force, composed of representatives from the states and territories with coral resources. In response, these areas have initiated or increased efforts to identify the causes of coral reef degradation and approaches to prevent further loss.

Efforts are under way in Hawaii, Florida, and American Samoa to assess the status of coral reefs and identify pollutants and stressors to coral reef ecosystems.

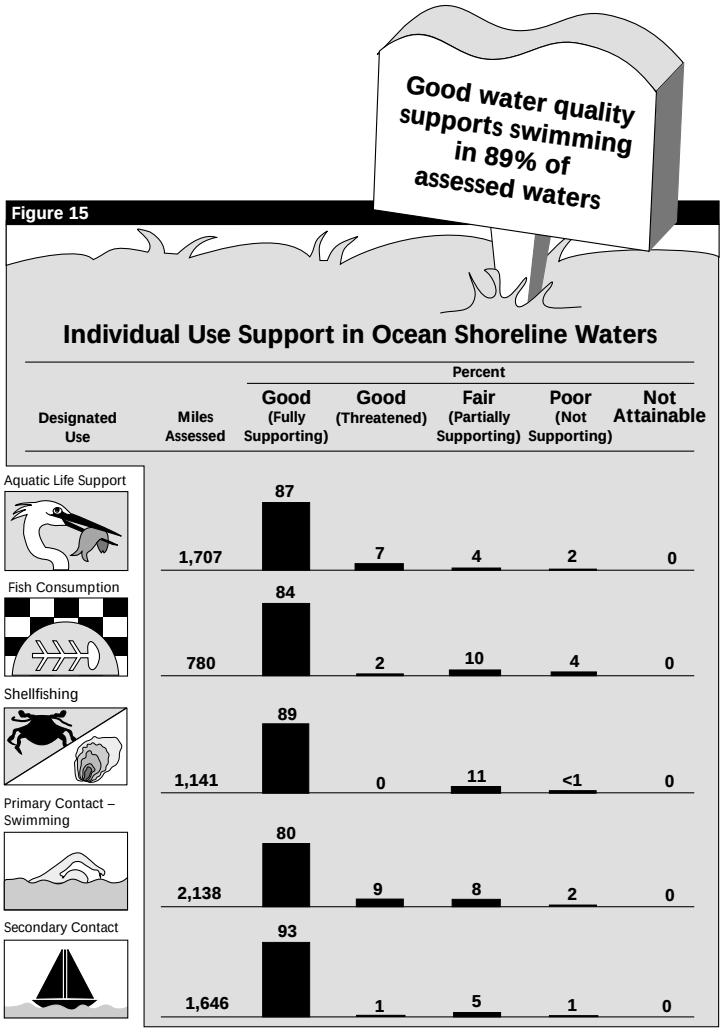

This figure presents a tally of the ocean shoreline miles assessed for each key designated use. For each use, the figure presents the percentage of assessed waters in each water quality category.

Figure 16

Leading Pollutants and Sources Impairing Ocean Shoreline

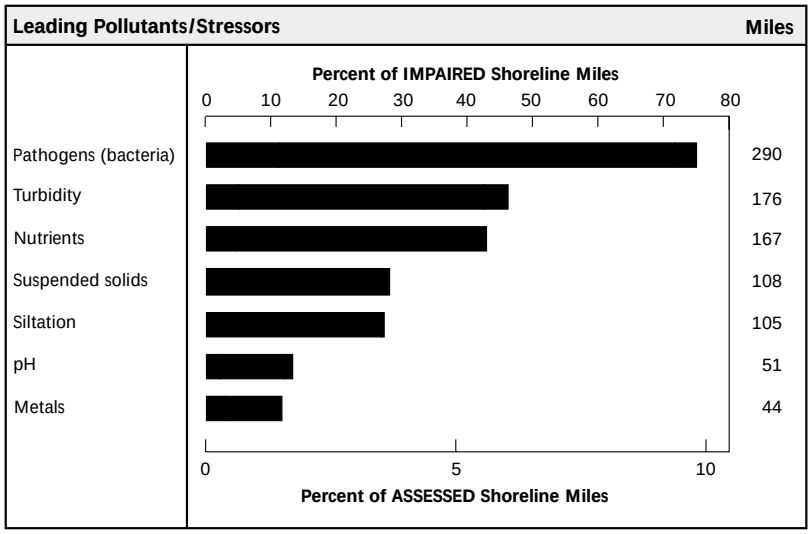

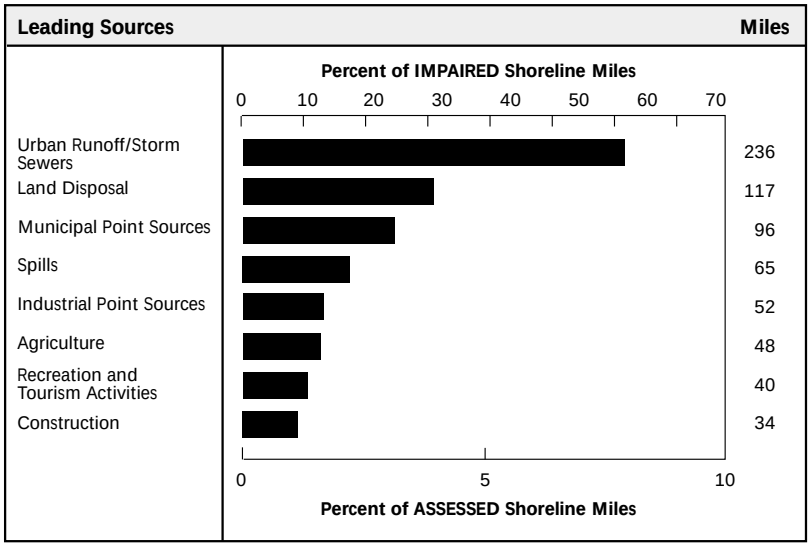

These bar charts present the leading pollutants and sources reported by the states. The percent scale on the lower axis compares the miles impacted to the total ASSESSED miles. The upper axis compares the miles impacted to the total IMPAIRED miles.

Figure 17

United States Coral Reef Areas

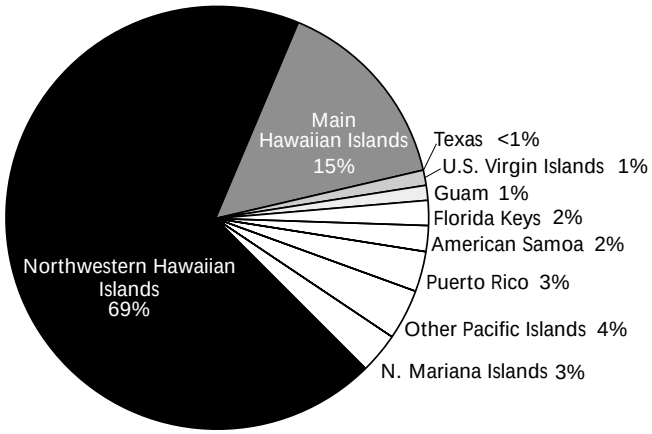

The findings will be used to develop management actions to protect coral reefs in these areas. Coral reef stressors identified to date include invasive species, marine debris, petroleum spills, nutrient runoff, and septic discharges.

Wetlands

Wetlands are intermittently or permanently flooded areas that are the link between land and water. The functions and values of healthy wetlands include the following:

- **Storage of water –** Wetlands help prevent flooding by storing and slowing the flow of water through a watershed.
- **Storage of sediment and nutrients –** Wetlands act like filters that purify water in a watershed.
- **Growth and reproduction of plants and animals –** Wetlands produce a wealth of natural products, including fish and shellfish, wildlife, timber, and wild rice.
- **Diversity of plants and animals –** Wetlands are critical to the survival of a wide variety of plants and animals, including numerous rare or endangered species as well as many species of great commercial value to man.

It is estimated that over 200 million acres of wetlands existed in the lower 48 states at the time of European settlement. Since then, extensive wetlands acreage has been lost, with many of the original wetlands drained and converted to farmland and urban areas. Today, less than half of our nation's original wetlands remain. Recent federal studies estimate an average net loss of wetlands around 100,000 acres per year in the contiguous United States. Although losses continue to decline, we still have to make progress toward our Administration's goal of an annual net gain of 100,000 wetland acres per year by the year 2005 and every year thereafter.

Eleven states and tribes listed sources of recent wetlands loss in their 1998 305(b) reports. Eight states cited agriculture as a leading source of current losses. Other losses were due to construction of roads, highways, and bridges; residential growth and urban development; filling and/or draining; construction; industrial development; commercial development; and channelization.

The states and tribes are making progress in incorporating wetlands into water quality standards and developing designated uses and criteria specifically for wetlands. But many states and tribes still lack wetland-specific designated uses, criteria, and monitoring programs for wetlands. Without criteria and monitoring data, most states and tribes cannot evaluate use support.

Ground Water

Ground water—water found in natural underground formations called aquifers—is an important component of our nation's fresh water resources. About 77,500 million gallons of the nation's ground water are withdrawn daily for use in drinking and bathing, irrigation of crop lands, livestock watering, mining, industrial and commercial uses, and thermoelectric cooling applications (Figure 18). Unfortunately, this valuable resource is vulnerable to contamination, and ground water contaminant problems are being reported throughout the country. Ground water contamination can occur through relatively well defined, localized pollution plumes emanating from specific sources such as leaking underground storage tanks, or it can occur as a general deterioration of ground water quality over a wide area due to diffuse nonpoint sources such as agricultural fertilizer and pesticide applications, septic systems, and urban runoff.

Based on results reported by states in their 1998 305(b) reports, ground water quality in the nation is good and can support the many different uses of this

resource. However, despite these positive results, measurable negative impacts to aquifers across the nation have been detected, and they are usually traced back to human activities.

States identified leaking underground storage tanks as an important potential threat to our nation's ground water resources. This was based on the sheer number of underground storage tanks and the risk posed to human health and the environment from releases. States also report that the organic chemicals found in petroleum products such as gasoline are common ground water contaminants. Other potential sources of ground water contamination include septic systems, landfills, industrial facilities, fertilizer and pesticide applications, accidental spills, surface impoundments, and animal feedlots. Contaminants occur in the form of organic compounds, metals, and nitrate.

Assessing the quality of our nation's ground water resources is no easy task. An accurate and representative assessment of ambient ground water quality requires a well-planned and well-executed monitoring plan. Although the 305(b) ground water program is improving, there is still much to be done. States need to increase their monitoring coverage and focus on collecting ground water data that are most representative of the resource.

Figure 18

National Ground Water Use

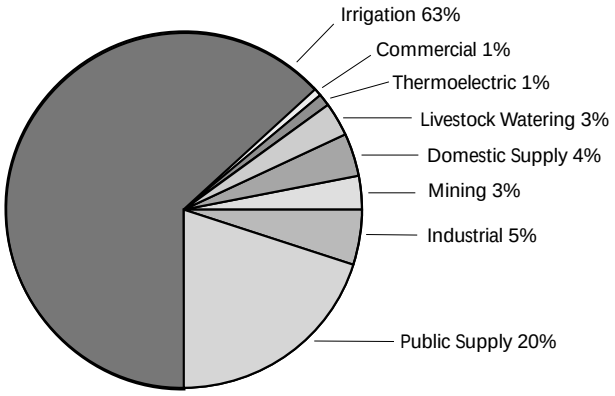

Source: *Estimated Use of Water in the United States in 1995.* U.S. Geological Survey Circular 1200, 1998.

How Does Impaired Water Quality Impact Public Health and Aquatic Life?

Water pollution threatens both public health and aquatic life. Public health may be threatened directly through the consumption of contaminated food or drinking water or indirectly through skin exposure to contaminants present in recreational and boating waters. Aquatic organisms can be affected by the presence of toxic chemicals in their environment and are also particularly susceptible to changes in the physical quality of their environments, such as changes in pH, temperature, dissolved oxygen, and habitat.

Public Health Concerns

The 1998 EPA Listing of Fish and Wildlife Advisories listed 2,506 advisories in effect in 47 states, the District of Columbia, and American Samoa (Figure 19). Mercury, PCBs, chlordane, dioxins, and DDT (with its byproducts) caused 99% of all the fish consumption advisories in effect in 1998.

In their 1998 305(b) reports, 11 of the 27 coastal states and jurisdictions reported shellfish harvesting restrictions in over 2,300 square miles of estuarine waters. These areas are monitored for bacteria as part of the National Shellfish Sanitation Program.

Advisories were also issued to warn the public about health risks from water-based recreation. Sixteen states and tribes identified 240 sites where recreation was restricted at least once during the reporting cycle. The states and tribes identified sewage treatment plant bypasses and malfunctions, urban runoff and storm sewers, and faulty septic systems as the most common sources of elevated bacteria concentrations in bathing areas.

Thirty-eight states, tribes, and other jurisdictions provided information about the degree to which drinking water use is met. Of the 23% of river and stream miles assessed, only 3% do not support drinking water where it is a designated use; of the 42% of lake and reservoir acres assessed, 5% do not support drinking water use.

Increasingly, states are coordinating their efforts under the Safe Drinking Water Act (SDWA) and the Clean Water Act (CWA) to assess sources of drinking water. SDWA requires states to determine the susceptibility to contamination of drinking water sources, while the CWA calls for them to assess the ability of waters to support drinking water use. Assessments under both laws will provide the information necessary for states to develop tailored monitoring programs and for water systems to work with states and local governments to protect drinking water sources.

Figure 19

Fish and Wildlife Consumption Advisories in the United States

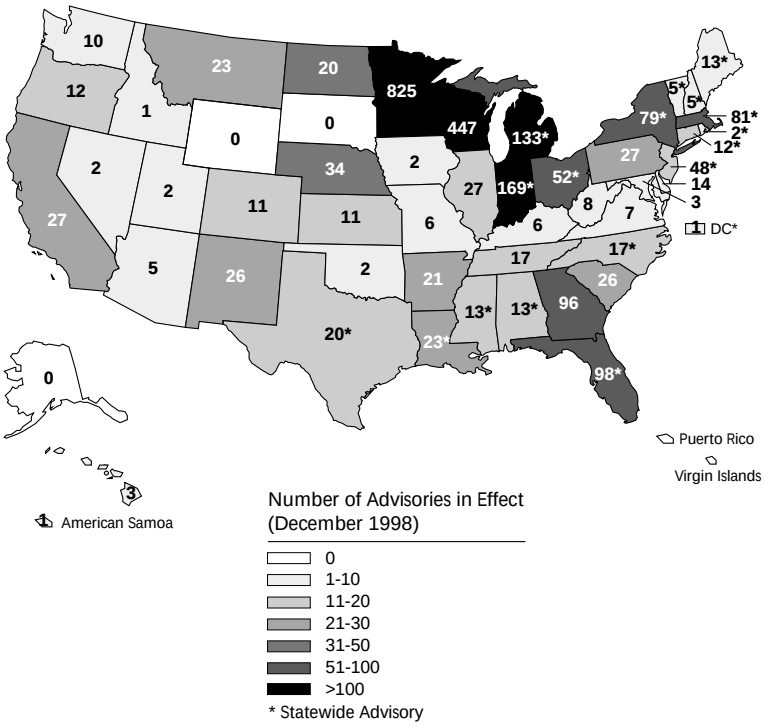

Note: States that perform routine fish tissue analysis (such as the Great Lakes states) will detect more cases of fish contamination and issue more advisories than states with less rigorous fish sampling programs. In many cases, the states with the most fish advisories support the best monitoring programs for measuring toxic contamination in fish, and their water quality may be no worse than the water quality in other states.

Aquatic Ecosystem Concerns

A fish kill is one of the most obvious effects of pollution on aquatic life. This phenomenon is normally attributed to exceptionally low dissolved oxygen levels—usually due to excessive nutrients in the water—or to the discharge of toxic contaminants to the water column. A more insidious impact of pollution on aquatic organisms is the development of growths, lesions, and eroded fins, or increased body burden of toxic chemicals.

The most common impact of pollution on aquatic life is the shift of a waterbody's naturally occurring and self-sustaining population from one type of aquatic community to another. An example is the shift of a cold water trout stream to a warm water carp-dominated stream. Changes in aquatic community structure and function may occur due to a variety of reasons, but the most common are an elevation of temperature, a lowering of available dissolved oxygen, and an increase in sedimentation due to land use practices within the watershed.

The persistence of chemicals in bottom sediment poses risks to both aquatic life and humans. These chemicals may be toxic to bottom-dwelling aquatic organisms. Some of these chemicals, like mercury and PCBs, bioaccumulate in fish tissue and pose a potential threat to humans and other organisms that consume the fish. In their 1998 305(b) reports, 11 states and tribes listed 115 separate sites with contaminated sediments. These states and tribes most

frequently listed metals, PCBs, pesticides, PAHs, and other priority organic chemicals as the source of contamination. They identified industrial and municipal discharges (both past and present), landfills, resource extraction, and abandoned hazardous waste disposal sites as the primary sources of contamination.

What Is Being Done to Restore and Maintain Water Quality?

Public polls consistently document that Americans value water quality. In addition to its economic benefits, clean water provides recreational and aesthetic benefits. As a result, local, state, and federal agencies, the private sector, and other organizations are working to improve water quality. According to President Clinton's *Clean Water Act Initiative: Analysis of Costs and Benefits*, these partners spend between $63 billion and $65 billion dollars each year to improve and protect water quality.

This study estimated that private sources spend a combined total of about $30 billion per year on pollution prevention and control efforts. Agriculture spends another $500 million per year on activities that reduce its impact on water quality, including implementation of best management practices to control the effects of nonpoint source runoff. Municipalities spend a total of $23 billion per year, primarily on wastewater treatment plants, drinking water treatment, and storm water pollution control.

State governments dedicate almost $500 million and federal governments dedicate almost $10 billion to water resource protection and restoration efforts each year. These efforts include developing and revising water quality standards, monitoring and assessing water quality, characterizing causes and sources of impairment, developing total maximum daily loads and allocating these loads to point and nonpoint sources, implementing permitting programs to address point sources, and developing and implementing best management practices to control nonpoint source pollution.

Significant resources are dedicated to restoring and maintaining water quality. Water quality monitoring and assessment is a critical tool to help ensure that these resources are used effectively to achieve water quality goals. EPA and state environmental agencies recognize that water quality monitoring and assessment programs need continued strengthening to be able to evaluate the effectiveness of water quality protection and restoration efforts.

EPA continues to work with states and other partners to increase the quality and comprehensiveness of water quality monitoring and assessment programs. This is achieved through data sharing and development of consistent monitoring designs and assessment criteria. EPA provides technical assistance, guidance, and resources for monitoring design and implementation. EPA and its partners including states, tribes, other federal agencies, and other public and private monitoring organizations are developing a Consolidated Assessment and Listing Methodology (CALM) that will provide a consistent approach for characterizing water quality under both Sections 305(b) and 303(d) of the Clean Water Act.

For more information on CALM, visit EPA's website at **www.epa.gov/owow/monitoring/wqreport.html.**

For More Information

For more information about the *National Water Quality Inventory: 1998 Report to Congress*, visit EPA's Office of Water 305(b) website at http://www.epa.gov/305b, call EPA's Assessment and Watershed Protection Division at (202) 260-7040, or contact:

U.S. EPA (4503F)
Assessment and Watershed Protection Division
401 M Street, SW
Washington, DC 20460

For a copy of the *National Water Quality Inventory: 1998 Report to Congress* (EPA-841-R-00-001) or related materials, call 1-800-490-9198, fax your order to EPA's National Service Center for Environmental Publications at (513) 489-8695 (include EPA number and document title), or send your order to:

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- ❑ *National Water Quality Inventory: 1998 Report to Congress* (434 pages) (EPA841-R-00-001)
- ❑ *National Water Quality Inventory: 1998 Report to Congress Appendixes* (diskette) (EPA841-C-00-001)
- ❑ *Water Quality Conditions in the United States: A Profile from the National Water Quality Inventory: 1998 Report to Congress* (2 pages) (EPA841-F-00-006)

A Preliminary Assessment of Design Criteria for Vector Prevention in Structural Best Management Practices in Southern California

CALIFORNIA DEPARTMENT OF HEALTH SERVICES

VECTOR-BORNE DISEASE SECTION

Gray Davis
Governor
State of California

June 2001

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Introduction and Background

The importance of managing stormwater runoff is well known among transportation and stormwater management agencies and municipalities across the country. Federal and state laws regulating stormwater runoff have several purposes such as flood control, erosion control, improvement of water quality, and re-charge of underground aquifers. In recent years, stormwater management strategies have fallen under increasingly stringent regulations requiring the implementation of what have been termed Best Management Practices (BMPs). In general, BMPs serve to reduce the adverse environmental impact of human activities through the improvement of existing strategies or by the creation of new ones. BMPs for stormwater management may include modifying activity schedules, prohibitions or modifications of practices, maintenance procedures, etc. Best Management Practices may also involve the use of structures such as retention and detention ponds, swales, ditches, channels, vaults, infiltration basins, filtration systems and others.

The California Department of Transportation (Caltrans) is the agency responsible for managing California's state highway system. Its Storm Water Program has two primary goals: to comply with requirements of the federal Clean Water Act and resulting National Pollution Discharge Elimination System (NPDES) permit and other state requirements, and to provide the most cost-effective solutions for mitigating the harmful effects of stormwater runoff. In 1997, Caltrans began an extensive program plan to retrofit 32 selected facilities with 39 structural BMPs in Los Angeles (Caltrans District 7) and San Diego Counties (Caltrans District 11). These BMPs included biofiltration strips and swales, various media filtration technologies, extended detention basins, infiltration basins and trenches, continuous deflective separators, an oil/water separator, drain inlet inserts, and a wet basin. Construction began in September 1998 and was almost entirely completed during the following six months. There are currently 37 operational BMPs that are being monitored (2 remain to be constructed in Caltrans District 7), including 24 in Caltrans District 7 at 19 sites, and 13 in Caltrans District 11 at 12 sites.

The purpose of the Caltrans BMP Retrofit Pilot Study was to evaluate the water quality benefits and cost effectiveness of various structural designs retrofitted into

existing locations including freeways, interchanges, park and ride facilities, and maintenance stations. Potential negative consequences of these efforts may include direct impacts on the operations of vector control agencies and public health by increasing habitat availability for disease vectors[1] and nuisance pests. In 1998, the California Department of Health Services, Vector-Borne Disease Section (VBDS) entered into a Memorandum of Understanding (MOU) with Caltrans to provide technical expertise regarding vector production and the potential of vector-borne diseases within its stormwater BMP Retrofit Pilot Study. It was the intent of this MOU to protect public health by documenting and, where possible, mitigating vector production and harborage at the BMP study sites. The agreement required VBDS to establish a comprehensive vector surveillance and monitoring study, develop vector abatement protocols, and recommend appropriate engineering modifications to Caltrans BMPs that would reduce the potential of these structures to produce or harbor vectors. In addition to reviewing the BMP design criteria and monitoring maintenance and operations, VBDS conducted studies to identify which of these designs were least conducive to vector production.

The following report is based on observations and data obtained from weekly BMP site visits that began in early May 1999 and ran through April 2001. During this two-year study, numerous design features and operational events resulted in water accumulating and standing within BMP structures for various lengths of time. Standing water provided the habitat needed for the development of certain vectors, particularly mosquitoes. Caltrans attempted to resolve the design and maintenance issues that allowed vector breeding based on recommendations made by VBDS and the local vector control districts, and successfully implemented solutions to many of them. The purpose of this report is to address design features and other factors that created suitable habitat for the propagation of vectors within BMPs and provide corrective and/or preventative recommendations for future designs. This study provides an initial assessment of design criteria for vector prevention within stormwater structures.

[1] California Health & Safety Code, Section 2200. “Vector" means any animal capable of transmitting the causative agent of human disease or capable of producing human discomfort or injury, including, but not limited to, mosquitoes, flies, other insects, ticks, mites, and rodents.

Vector Surveillance, Monitoring, and Abatement

In accordance with the MOU, VBDS staff established comprehensive vector surveillance and monitoring plans for the 37 operational BMP devices conducted in collaboration with Greater Los Angeles County Vector Control District (GLACVCD), San Gabriel Valley Mosquito and Vector Control District (SGVMVCD), Los Angeles County West Vector Control District (LACWVCD), and San Diego County Vector Surveillance and Control (SDCVSC) in their respective jurisdictions. The primary tasks of the local vector control districts were weekly monitoring of all BMP study sites for immature stages of mosquitoes and midges. At the same time, VBDS staff maintained an overall independent surveillance schedule to monitor vegetative cover, predators of immature mosquitoes, physical and chemical properties of water, and evidence of rodent and other vector populations.

Several mosquito abatement procedures are currently accepted in California. For immature stages, control can be achieved by using microbial larvicides (*Bacillus thuringensis* var. *israelensis* [Bti]; *Bacillus sphaericus*), insect growth regulators (i.e. methoprene), and/or mosquitocidal oils that create a surface film (e.g. Witco® Golden Bear GB1111). For adults, pyrethroid insecticides may be applied as space sprays by air or ground equipment. A single vector abatement regimen was prepared by VBDS and implemented by the collaborating vector control districts as needed. A liquid formulation of methoprene (Altosid EC®: a juvenile hormone mimic that inhibits successful development of immature mosquitoes and a variety of midges) was selected because of its short residual activity, extremely low environmental toxicity, and negligible effects on larval population dynamics.

General Design and Maintenance Recommendations

A variety of vector species including mosquitoes, midges and rodents may utilize artificial habitats created by BMP structures designed to receive stormwater runoff. The following design and maintenance recommendations serve to prevent or reduce vector habitats within BMPs; however, the impacts, if any, of these recommendations on the intended pollutant removal efficiency of the structures are not addressed. During this two-year study, mosquitoes were found to be the most significant and persistent vectors associated with BMP structures. Because of this, recommendations focus primarily on preventing standing water, which is needed for the development of immature mosquitoes.

Stormwater BMPs are intended to have minimal operational oversight and maintenance; thus it is critical to design facilities in as simple a manner as possible. As a general recommendation, all BMP structures should be easily and safely accessible (e.g. avoid structures that fall under the definition of "confined space") to allow vector control personnel to effectively monitor and, if necessary, abate vectors. If utilizing covers, spring loaded or light weight access hatches should be included in the design that open easily and allow for sampling of vectors. Covers should seal completely. Mosquito larvicides are applied with hand held equipment at small sites and with backpack or truck mounted high-pressure sprayers at large sites. The effective swath width of most backpack or truck mounted larvicide sprayers (liquid or granule) is approximately seven meters on a windless day. As a result, road access (with provisions for turning a full-size work vehicle) should be provided along at least one side of large above-ground BMPs that are less than seven meters wide. Those BMPs that have shoreline-to-shoreline distances in excess of seven meters should have a perimeter road for access to both sides. It is important not to have vegetation and/ or other obstacles between the access road and the BMP that might obstruct the path of larvicides to the water; thus, roads should be built as close to the shoreline as possible. The periodic removal or mowing of invasive cattails and/ or other tall wetland vegetation including shrubs and trees is necessary.

The following criteria should be incorporated into the design of all structural BMPs to reduce the probability of mosquito breeding.

Dry Systems

1. Structures should be designed such that they not hold standing water for more than 72 hours (the minimum length of time for mosquito development). Provisions to prevent or reduce the possibility of clogged discharge orifices (e.g. debris screens) should be incorporated into the design. The use of weep holes are not recommended due to rapid clogging when adjacent to or within a sediment-laden area.
2. The hydraulic grade line of each site should be a primary factor in determining the appropriate BMP that will allow water to flow by gravity through the structure. (Pumps are subject to failure and require sumps that hold water and may create mosquito habitats. Structures that do not require pumping should be favored over those that do).
3. Designs should avoid the use of rip rap or concrete depressions that may hold standing water.
4. Distribution piping and containment basins should be designed with adequate slopes to drain fully and prevent standing water. The design slope should take into consideration buildup of sediment between maintenance periods
5. The use of barriers or diversions that result in standing water should be avoided.

Systems with Sumps or Basins

Structures designed with sumps or basins that retain water permanently or semi-permanently (e.g. MCTT, CDS, Delaware-type sand media filters, Canister-type media filters) should be sealed completely against adult mosquitoes. Adult female mosquitoes may utilize openings as small as 1/16th of an inch to access water for egg laying.

1. Structures should be designed with the appropriate pumping, piping, valves, or other necessary equipment to allow for easy dewatering of the unit if necessary.
2. If the sump or basin is completely sealed, with the exception of the inlet and outlet, the inlet and outlet should be fully submerged so female mosquitoes have access to only a limited surface area of water for egg laying.

Permanent Ponds

1. Permanent ponds should maintain water quality sufficient to support surface-feeding fish such as mosquitofish, *Gambusia affinis*, which feed on mosquito larvae.
2. Permanent pond shorelines should be accessible to both maintenance and vector control crews for: 1) periodic maintenance and/or control of emergent and pond-edge vegetation, and 2) for routine monitoring of mosquito immatures and abatement procedures, if necessary. Emergent plant density should be controlled so that natural mosquito predators are not inhibited or excluded from pond edges (i.e. fish should be able to swim between plant bases).
3. If possible, permanent ponds should be maintained with depths in excess of 4 feet to preclude invasive emergent vegetation such as cattails. The pond edges below the water surface should be fairly steep and uniform to discourage dense plant growth and reduce favorable mosquito habitat.
4. Rip rap or liners should be used in areas where vegetation is not necessary, to prevent unwanted growth.
5. Permanent ponds should be designed to allow for easy dewatering of the basin when needed.

Treatment Technologies

Biofiltration Strips and Swales

Design Criteria. Biofiltration swales and strips are densely vegetated BMPs that filter stormwater as it flows over and through vegetation. Biofiltration strips are broad vegetated surfaces that receive stormwater sheet flow directly from an impermeable surface and allow it to flow through in relatively thin sheets. In contrast, biofiltration swales are conveyance channels (typically trapezoidal shaped) that receive captured runoff. In the Caltrans BMP Retrofit Pilot Study, one strip and six swales were built to treat stormwater runoff from sections of freeway. The criteria for the vegetation required that it filter suspended solids, withstand a typical one-year storm event in southern California, adapt to the local climate, tolerate periods of high and low moisture, be slow growing, and require minimum maintenance. A species of grass, "saltgrass", met most of these criteria and was used exclusively in biofiltration structures. Figure 1 shows a typical biofiltration swale and biofiltration strip.

Monitoring Results. The four biofiltration swales in Caltrans District 7 incorporated energy dissipaters composed of small rock rip rap housed in shallow concrete depressions. During their first few months of operation, these energy dissipaters retained water following storm events and irrigation of saltgrass, and provided habitat for immature mosquitoes. In October 1999, the energy dissipaters were modified per VBDS and GLACVCD recommendations by filling the rip rap depressions with concrete and imbedding rocks into it. Following this modification, no other vector sources were detected at these sites. Mosquitoes and other vectors were not detected at the two biofiltration swales in Caltrans District 11 or at the biofiltration strip in Caltrans District 7 during this study.

Design Recommendations. With the exception of the original energy dissipaters used in Caltrans District 7, biofiltration strips and swales did not pond significant amounts of water during this study. Energy dissipaters that do not hold water are recommended (e.g. rocks embedded into concrete). Figure 2 shows biofiltration swale

inlet modifications that were made at sites in Caltrans District 7 to prevent accumulations of standing water.

Operation and Maintenance. Maintenance of biofiltration swales included monthly visual inspections during the wet season for evidence of ponding and channeling. Any ponding or channeling noted was corrected within ten days. Vegetation height was maintained at less than ten inches and barren spots were re-planted during the fall season. The maintenance that was performed was adequate to prevent ponding of water and breeding of mosquitoes; however, Figure 2 illustrates sediment build-up outside a biofiltration swale inlet pipe that could lead to standing water if not maintained regularly.

Biofiltration strip.
8/25/00
I-605 & SR 91

Biofiltration swale.
10/13/99
SR 78 & Melrose Ave.

Vector Prevention in Structural BMPs

Figure 1. Biofiltration Strips & Swales

State of California, DHS Vector-Borne Disease Section

Early-style energy dissipater. Rip rap depression holding water.
9/15/99
I-5 & I-605

9/15/99, I-605 & Del Amo Ave.

8/25/00
I-5 & I-605

Modified energy dissipaters grouted in to prevent standing water.

Inlet area subject to sediment build-up and subsequent ponding.
1/25/01
Cerritos MS

Vector Prevention in Structural BMPs

Figure 2. Inlets to Biofiltration Swales

State of California, DHS Vector-Borne Disease Section

Filtration Technologies

Media filters remove sediment and particulate pollutants from stormwater runoff. They are used for treating relatively small areas such as parking lots and maintenance yards. In general, water is directed into a sedimentation or settling vault where larger particulates settle out and accumulate on the bottom. From there, water is slowly released to a second filtering vault where fine particulates are removed as water percolates through a media matrix. Four filtration technologies (Austin, Multi-Chambered Treatment Train [MCTT], Canister, and Delaware) are included in 9 different structures of the Caltrans BMP Retrofit Pilot Study.

1) Austin-Type Sand Media Filters

Design Criteria. The design criteria for Austin-type sand media filters were originally developed in Austin, TX. A total of five structures were constructed for the Caltrans BMP Retrofit Pilot Study; three in Caltrans District 7 (Foothill and Eastern Regional Maintenance Stations and Termination Park and Ride) and two in Caltrans District 11 (La Costa Park and Ride and I-5 & SR 78 Park and Ride). These were designed to handle a 1-year, 24-hour storm in southern California.

Austin-type sand media filters consist of sedimentation vaults followed by sand media filter vaults. Sedimentation vaults were built 7-16 feet deep with a length to width ratio of 2:1, a slope of 0.1%, and a design detention time of 24 hours. They were designed with a 6 inch (150 mm) diameter PVC riser pipe with sized discharge orifices that draw down water slowly over time by gravity to a spreader trough in the sand media filter vault. If needed, a gate valve at the PVC riser connection in the sedimentation vault could be closed to detain water.

The sand media filters were designed to operate at a filtration rate of 0.0545 gpm/sq.ft (10.5 ft/d) assuming an average hydraulic head of 3 feet. The sand media consisted of 18 inches of 0.02 to 0.04 inch diameter sand over a layer of ½-inch to 2-inch diameter gravel. The sand and gravel were separated by a layer of geotextile fabric. The underdrain is a 6-inch diameter pipe with four-inch diameter laterals at a slope of 1%. The perforations are ½ inch on both sides of the pipe.

Because of the hydraulic grade line of the structures in Caltrans District 7, it is necessary to pump the filtered effluent into the storm drain system. The pumping system consists of a sump pump from the sand media filter bed, at the bottom of a 900 mm diameter vertical corrugated polyethylene pipe located approximately six feet below the surface of the sand media. The vertical corrugated polyethylene pipe was originally designed to be open to the atmosphere.

The design of Caltrans District 11 structures differed slightly from those built in Caltrans District 7. The sand media filters were built in line with the hydraulic grade line of the storm drain system and therefore, no pumping to the storm drain is required. This eliminated a potential habitat for immature mosquitoes.

Monitoring Results. Austin-type sand media filters regularly provided suitable aquatic habitats for immature mosquitoes following storm events. The two Caltrans District 11 sites, La Costa Park and Ride and the I-5 & SR 78 Park and Ride held standing water in spreader troughs and occasionally in the sedimentation vaults due to clogging and sediment build up. The spreader troughs at these sites were slightly modified to clear 4 inch diameter PVC connecting pipes, which unintentionally created persistent pockets of standing water. In Caltrans District 7, the three structures occasionally retained water in the spreader troughs, whereas sedimentation vaults occasionally retained water due to clogged pipes and/or failed effluent sump pumps. Standing water accumulated in a corner of the sedimentation vault of the Termination Park and Ride site due to a faulty grade.

Design Recommendations. In general, Austin-type sand media filters functioned as intended during this study; however, the following recommendations should be considered for future designs to minimize potential vector habitats. Figure 3 illustrates some examples of vector habitats created by these structures.

1. Pump sumps hold water and provide habitat for immature mosquitoes. In addition, these sumps cannot be sampled easily due to their depth and inaccessibility. Where possible, the installation of pumps and sumps

should be avoided. Where pumping cannot be avoided, a "mosquito proof" material should be installed over the top of the sump to prevent mosquitoes from accessing water.

2. It is critical that design plans, particularly hydraulic grades, are carefully adhered to during construction. The design slope of 0.1% in the sedimentation vaults was acceptable for proper drainage; however, the Termination Park and Ride site was constructed with a faulty grade in the sedimentation vault, which resulted in standing water that accumulated opposite the PVC riser pipe.
3. Spreader troughs designed to deliver water uniformly to adjacent sand media filters frequently hold water for long periods of time. Future designs should avoid the use of spreader troughs, or ensure that they hold water for no more than 72 hrs.

Operation and Maintenance. There are numerous maintenance issues associated with the Austin-type sand media filters that should be performed on a regular basis and are critical to prevent standing water and associated vector production. Any mosquito proofing materials (i.e. mosquito nets) should be inspected frequently and replaced annually as part of routine maintenance. Regular inspections should also include checking for clogged pipes or other vital components, measuring debris depth in the sedimentation vault, checking effluent pump function, and monitoring sand media filter performance. Appropriate maintenance should be performed based on inspections or as needed.

Proper and timely removal of sediment and debris from the sedimentation vault is necessary to prevent standing water as well as growth of opportunistic plants and the production of vectors that utilize exposed aquatic habitats with soil-lined bottoms for reproduction, particularly midges. During the course of the study, sedimentation vaults were inspected monthly during the wet season for sediment depth and were designed to be cleaned when the depth of sediment reaches 12 inches or greater. Cleaning of the sedimentation vaults was not required during the study period.

Where effluent pumps were installed, proper maintenance or a back-up system is necessary to ensure that water does not back up into the sedimentation and sand filter media vaults. Because the sand media filters are not backwashed, it is necessary to remove the top layer of sand media and replace it whenever draw down time exceeds 48 hours. Failure to remove and replace clogged sand media will result in inadequate filtration rates and ponding of water in the vaults. Removal of the top 2 inches of sand in these structures was necessary after approximately two years due to clogging.

Standing water in sedimentation vault
due to faulty grade.
10/5/99, Termination P&R

Standing water in sedimentation vault
due to clogged pipe.
12/00, La Costa Ave. P&R

Standing water in spreader trough.
10/5/00
Foothill MS

Mosquito netting on effluent pump sump in
sand media filter vault.
8/16/00, Foothill MS

Vector Prevention in Structural BMPs

Figure 3. Austin-Type Sand Media Filters

State of California, DHS Vector-Borne Disease Section

2) Multi-Chambered Treatment Trains (MCTT)

Design Criteria. Functionally, MCTT technology is similar to that of Austin-type sand media filters. MCTTs consist of a catch basin, a sedimentation vault with tube settlers and floating sorbent pads, and a sand/peat media filtration vault. Two MCTTs were constructed in Caltrans District 7 (Via Verde Park and Ride and Lakewood Park and Ride).

As part of the original design, the catch basin contained several mesh bags full of plastic "aeration balls" at the outlet of the influent pipe. These were supported on a grate above the water in the catch basin and served to facilitate removal of volatile organic compounds from stormwater as it passed through them. The bags were later removed for several reasons: 1) they did not provide significant removal of pollutants, 2) they clogged with trash and leaves, and 3) they prevented vector control personnel from monitoring the standing water below the support grate. As a result, no vector monitoring samples were collected from the catch basin prior to October 24, 2000.

From the catch basin, stormwater flows via a pipe into a sedimentation vault with a detention time of 12 hours. The sedimentation vault contains inclined tube settlers that facilitate sedimentation from incoming stormwater as well as floating sorbent pads designed to remove hydrocarbons. The tube settlers sit on top of fiberglass grating located on 30 mm deep beams three feet from the basin floor. Water passes upward through the plastic tube settlers over a three-foot high weir into a pump sump from where it is pumped into an adjacent sand/peat media filter vault. The design and placement of the pump sump results in a permanent pool of standing water in the sedimentation vault.

Water is pumped from the sedimentation vault pump sump onto a 24-inch-deep filter media bed consisting of a 50/50 blend of sand and peat moss. A geotextile fabric sits on top of the media to eliminate scouring and prolong filter media life. Water is then pumped to the storm drain system from a second sump located below the media filter, similar in design and function to pump sumps described for Austin-type sand media filter vaults in Caltrans District 7.

Monitoring Results. During this study, immature mosquitoes were consistently detected in the sedimentation vaults of the MCTTs. Of all the BMPs monitored in this study, MCTTs produced the greatest number of mosquitoes for the longest periods of time. Vector monitoring and abatement became difficult when the water level in the sedimentation vault dropped below the top of the tube settlers, allowing each plastic tube to become a protected "microhabitat" for immature mosquitoes.

Design Recommendations. Because of the frequency and density of immature mosquitoes detected in the MCTT sedimentation vaults during the study, numerous changes were proposed and/or made. Figure 4 illustrates the complexity of MCTT structures and provides a photo of the sedimentation vault cover retrofit. The following are recommendations for modifications, or modifications that were made during course of the study in an attempt to reduce or minimize vector habitat:

1. No immature mosquitoes have been detected in the catch basins since the aeration bags were removed; however, the current covers are made of wood and have wide gaps between the planks, which could allow mosquitoes to access the water below. Since the catch basins hold standing water permanently, the wood covers should be replaced with sealed units.
2. The pump sump design in the media filter vault is almost identical to those built for Austin-type sand media filters in Caltrans District 7. Pump sumps hold water and provide habitat for immature mosquitoes. In addition, these sumps cannot be sampled easily due to their depth and inaccessibility. Where possible, the installation of pumps and sumps should be avoided. Where pumping cannot be avoided, a "mosquito proof" material should be installed over the top of the sump to prevent mosquitoes from accessing water.
3. Several steps were taken to prevent mosquitoes from accessing permanent standing water present in multiple locations of the MCTTs. The effluent pump sump in the media filter vault was covered with fine-

mesh cloth. An aluminum cover was installed over the settling chamber during February 2001 (the influent pipe to the sedimentation vault is submerged in the catch basin). All joints at openings and hatches are constructed with tongue and groove joints and are sealed with gaskets meeting ASTM standard C 509. A smoke test was conducted to ensure that the covers were airtight. Vents for the basin were covered with a fine-mesh screen. No mosquitoes have been detected since the covers were installed. Further monitoring will be necessary to validate the effectiveness of the covers.

Operation and Maintenance. Where pumps were installed, proper pump maintenance is necessary to ensure that water does not back up into the sedimentation and media filter vaults. Because the media filters are not backwashed, it will be necessary to periodically remove the top layer of filter media and replace it. The media should be replaced whenever the drain time is greater than 72 hours or sediment accumulation is greater than 0.1 inch over more than 50 percent of the fabric surface area. Failure to remove and replace clogged filter media will result in standing water on the filter surface. The filters in this study were functional for over two years. It has not been necessary to replace media.

The biggest factor contributing to mosquito production was the fact that the sedimentation vault held water continuously. In an initial attempt to mitigate this, the sedimentation vault was pumped out annually on May 1, to avoid standing water during the dry summer months when mosquitoes are most abundant. However, even with pumping, it took several weeks for the vaults to dry completely, and mosquito breeding continued into the summer months. This maintenance was not an adequate solution to prevent breeding of mosquitoes and weekly monitoring and abatement was necessary for months. The aluminum covers may preclude access to mosquitoes. Routine maintenance of the aluminum covers should include replacing gaskets whenever they deteriorate and ensuring that the hatches are properly closed each time after opening. In addition, routine inspection and/or replacement of all mosquito screens is necessary.

Tube settlers in sedimentation vault. Standing water under grate. 8/25/00

Standing water in sedimentation vault pump sump. 8/25/00

Catch basin. Standing water below hinged grate. 2/08/01

Vector sampling below grate in sedimentation vault. 9/15/99

Retrofit aluminum cover over sedimentation vault. 3/26/01

Vector Prevention in Structural BMPs

Figure 4. Multi-Chambered Treatment Trains (MCTT) (Lakewood P&R)

State of California, DHS Vector-Borne Disease Section

3) Canister-Type Media Filter

Design Criteria. A single canister-type media filter manufactured by Stormwater Management Inc. (StormFilter™) was included in the Caltrans BMP Retrofit Pilot Study and installed at the Kearny Mesa Maintenance Station in Caltrans District 11. This BMP was built below ground and consists of sedimentation followed by treatment through canister filters containing a mixture of perlite/zeolite. The Kearny Mesa MS unit was built with a primary catch basin followed by three in-line canister filter vaults designed to handle a one year, 24 hour storm in southern California. Water moves through the structure via 12-inch diameter pipe. The influent pipe delivers water to an initial catch basin designed to remove large sediments and debris. Water then flows to a second, smaller catch basin located in the first canister filter vault. Water is directed over a weir, through a flow spreader, and into contact with the canister filters through which it passes to the storm drain.

According to the manufacturer's design criteria, 30 canisters are needed for each cfs of stormwater. As a result, three canister filter vaults (8 ft deep by 80 ft^2), containing a total of 81 perlite/zeolite filter canisters were included in the Kearny Mesa MS design. These vaults fill sequentially depending on the volume of stormwater runoff and the canister filters operate at a minimum hydraulic head of 2.3 feet. Each canister filter vault has a depression at the inflow designed to spread the flow of water. Because of its design, standing water remains permanently in both catch basins as well as in the spreader depressions.

The catch basin and the three canister filter vaults are sealed from above with aluminum covers. Covers were installed with spring-loaded doors for easy access, but were not completely sealed to prevent the entry of mosquitoes. Figure 5 illustrates the different components of the canister-type media filter.

Monitoring Results. Mosquito immatures were detected in the two catch basins as well as in the spreader troughs of the canister filter vaults. The aluminum covers may have reduced mosquito access to the standing water below, but gaps around and between the doors as well as small spaces around the door handles allowed many adult females to enter and lay eggs.

Design Recommendations. Several design features of the canister-type media filter allowed mosquito access to permanent sources of nutrient-rich standing water. The following are recommendations that should be considered in future designs to prevent or reduce vector production.

1. The sediment catch basins should not hold permanent standing water. They should be designed to drain down rapidly (72 hours or less).
2. Flow spreaders in the canister filter vaults should be designed to eliminate standing water.
3. If standing water must be present, access covers should be designed with adequate gaskets to prevent entry of mosquitoes. In addition, the potential for mosquitoes to access standing water under covered vaults via inlet or outlet pipes should be addressed.

Operation and Maintenance. Maintenance of these units includes changing out the filter media whenever it is discolored and packed with sediment and removing the sediment when it reaches 12 inches in the catch basin. Other necessary maintenance may include dewatering the unit during the summer months or routine treatment with a mosquito larvicide if breeding persists.

Standing water in
sediment catch basin.
8/17/00

Filter canisters containing a
mixture of perlite/zeolite media.
8/17/00

Aluminum covers over vaults.
8/17/00

Vector Prevention in Structural BMPs

Figure 5. Canister-Type Media Filter (Kearny Mesa MS)

State of California, DHS Vector-Borne Disease Section

4) Delaware-Type Sand Media Filter

Design Criteria. The design criteria for Delaware-type sand media filters were originally developed in the State of Delaware. A single Delaware-type sand media filter was included in the Caltrans BMP Retrofit Pilot Study and installed at the Escondido Maintenance Station in Caltrans District 11. This stormwater BMP was built below ground and consists of a sedimentation vault followed by a sand media filter vault designed to handle a one-year, 24-hour storm in southern California, with a total filter surface area of 720 ft^2 per acre of tributary area (the sedimentation chamber volume is 540 cubic feet per acre of tributary area). Stormwater flows from the maintenance station grounds to a 36" culvert and into the sedimentation vault. The sedimentation vault was constructed parallel to a sand media filter vault. To reach the sand media filter vault, the water level in the sedimentation vault must reach approximately 36 cm in depth and flow over a weir (1.5 feet of hydraulic head is required for filtration through the sand media). Standing water remains in the sedimentation vault permanently.

An 8-inch (200 mm) bypass line and gate valve are located at the end of the sedimentation vault to allow it to be dewatered for maintenance. This valve is normally closed; however, some water unintentionally seeps past, slowly draining the sedimentation vault until water only a few centimeters in depth remains.

The sedimentation and sand media vaults were sealed from above by heavy steel doors; however, the covers do not adequately seal to prevent entry of mosquitoes. In addition, the heavy steel doors do not have springs to allow for reasonable access to this structure. Figure 6 illustrates the different components of the Delaware-type sand media filter.

Monitoring Results. Small gaps between the individual steel doors allowed adult mosquitoes to access the standing water found in the sedimentation vault. This water, often as shallow as 1 inch, provided adequate habitat for immature mosquitoes.

Design Recommendations. Several design features of the Delaware-type sand media filter allowed mosquito to access the permanent standing water in the

sedimentation vault. The following are recommendations that should be considered in future designs to prevent or reduce vector production.

1. The weir between the sedimentation and sand media filter vaults results in permanent standing water in the sedimentation vault. The structure should not hold permanent standing water.
2. The sedimentation vault should be designed to drain down rapidly (72 hours or less) to prevent standing water. The slope of the sedimentation vault should be increased slightly to allow for proper and complete drainage when necessary.
3. Adequate gaskets need to be provided with covers to prevent entry of mosquitoes. In addition, future designs should include the use of lightweight aluminum and/or spring-loaded covers to improve access for maintenance and/or vector monitoring.

Operation and Maintenance. Delaware-type sand media filters require maintenance in several areas to prevent or reduce vector production, including sand media filter maintenance, sediment removal, and proper draining of the sedimentation basin between storm events.

Since the sand media filters are not backwashed, it is necessary to remove the top layer of sand filter media and replace it whenever there is excessive buildup of sediment or when the filtration rate drops to less than 9 ft per day. Failure to remove and replace sand media when it is clogged will result in inadequate filtration rates and ponding of water on the filter surface. The sand filter media in this structure was changed after approximately two years due to clogging.

Proper and timely removal of sediment and debris from the sedimentation basin is necessary to prevent standing water and the production of vectors. During the course of the study, the basin was inspected monthly during the wet season for sediment depth and was designed to be cleaned when the depth of sediment reached 12 inches or greater. The sedimentation basin was cleaned out and replaced in February 2001, with only a few centimeters of accumulated sediment build-up.

Provided that adequate time has passed for settling of suspended solids, the valve at the end of the sedimentation vault should be opened to allow the basin to drain between storm events and particularly prior to the summer months.

Heavy steel covers over sedimentation and sand media vaults. 1999

Sand media filter vault. 8/17/00

Sampling standing water for vectors in sedimentation vault. 1999

Vector Prevention in Structural BMPs

Figure 6. Delaware-Type Sand Media Filter (Escondido MS)

State of California, DHS Vector-Borne Disease Section

Extended Detention Basins (EDB)

Design Criteria. An EDB is a shallow depression lined with bare soil, vegetated soil, or concrete. Stormwater runoff is directed into these basins from where it slowly drains down (48-72 hours) into the storm drains by means of an outlet structure with appropriately sized discharge orifices. The extended detention period allows sediment and other pollutant particulates to settle to the floor of the structure, resulting in a cleaner effluent. Five EDBs were constructed as part of the Caltrans BMP Retrofit Pilot Study, two in Caltrans District 7 and three in Caltrans District 11. Each structure is unique in size and shape, and several have additional design features not found in others; however, they all have the same intended function. Figure 7 illustrates several examples of EDBs and their design and maintenance concerns.

Monitoring Results. No vector issues were detected at three of the soil-lined EDBs (two in Caltrans District 11 and one in Caltrans District 7) during this study; however, the remaining two sites had features that provided suitable habitat for immature mosquitoes.

The I-5 & I-605 EDB in Caltrans District 7 was built with a concrete-lined bottom. The effluent drained through discharge orifices in a PVC pipe that led into a 3ft^2 concrete outlet sump, approximately 22 inches below the main exit pipe. This design resulted in a permanent pool of standing water as well as consistent mosquito production. The sump was modified and filled in February of 2001. No standing water or vector production has been detected at this site since.

The I-5 & SR-56 site (Sorrento Valley) in Caltrans District 11 incorporated two large rock rip-rap zones placed over filter fabric: one at the inlet to the basin (approximately 13 x 12 ft) and one in the center section of the basin (approximately 17 x 90 ft). An unintended consequence of this design feature was that over time, the rip rap created depressions in the basin floor up to 12 inches deep, despite the underlying filter fabric, that resulted in an attractive habitat for mosquitoes,. Water entering this basin drains at approximately the prescribed rate from the outflow, but the rip rap depressions do not infiltrate well and hold standing water for weeks. This habitat between the rocks not only protected larvae from potential predators and sunlight, but also effectively hid

them from vector control inspectors and made effective abatement difficult or impossible. In addition, VBDS noted that irrigation water runoff from a nearby hillside contributed to the water source present in the rip rap depression closest to the mouth of the influent pipe.

Design Recommendations. With the exception of the I-5 & SR 56 site, Caltrans EDBs generally did not hold significant amounts of standing water. Several recommendations pertaining to EDBs are listed below and should be considered in future designs to prevent or reduce vector production.

1. Avoid the use of sumps that hold water. The sump at the south end of the I-5 and I-605 EDB basin held water permanently. Initially, the sump was routinely pumped dry, but this maintenance had to be terminated due to water discharge regulations, resulting in mosquito production.
2. Avoid the use of loose-rock rip rap. Mosquitoes and other vectors are highly attracted to protected aquatic habitats. The I-5 and SR-56 site drained adequately with the exception of the rip rap zones where water collected between the rocks. The rip rap at the inlet of this basin should be replaced with rock embedded into concrete. The rip rap in the middle of the basin should be removed.

Operation and Maintenance. Routine sediment removal and control of invasive vegetation as well as frequent inspections of the outlet debris screen and discharge orifices are critical to the prevention of standing water in EDBs. During the course of this study, EDBs were inspected following every storm event. Debris was removed from the outlet screen when necessary and vegetation was trimmed and/or removed at least once per year. Sediment is scheduled for removal when it reaches 18 inches in depth or fills 10% of the basin volume, whichever is less. Further monitoring will be required to determine if the proposed sediment removal schedule will be adequate. During the course of the study, no sediment removal was required.

I-5 & Manchester Ave.

Recently completed. 10/13/99

Sediment and vegetation build-up around inlet. Subject to ponding. 3/26/01

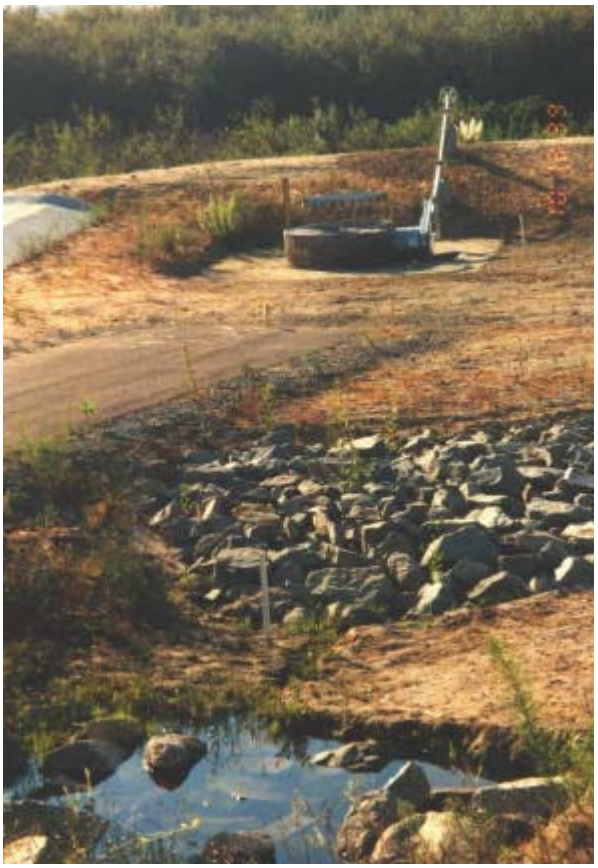

Standing water in rip rap depressions.
10/13/99
I-5 & SR 56

Concrete-lined basin.
8/25/00
I-5 & I-605

Vector Prevention in Structural BMPs

Figure 7. Extended Detention Basins

State of California, DHS Vector-Borne Disease Section

Infiltration Basin/Infiltration Trenches

Design Criteria. Infiltration basins and trenches are depressions used to detain stormwater for a short period of time until it percolates to the groundwater table. During percolation, water is essentially filtered through the soil and pollutants are captured in site vegetation and soils by adsorption. Basins are used for large drainage areas such as freeways and store water in visible ponds whereas trenches are used for small drainage areas such as maintenance yards and store water out of sight within a gravel or aggregate matrix. In both designs, permeability has to be periodically restored by removing trapped sediments. The two infiltration trenches in the Caltrans BMP Retrofit Pilot Study (Altadena MS in Caltrans District 7 and at the Carlsbad MS in Caltrans District 11) are combined with biofiltration strips that function as a pre-filter. A single infiltration basin was built at the cloverleaf connector between northbound I-605 and westbound SR 91. The infiltration trenches are shown in Figure 8 while the infiltration basin is shown in Figure 9.

The Altadena Maintenance Station was designed with a biofiltration strip pre-filter that receives stormwater runoff before it reaches the infiltration trench. The biofiltration strip is approximately 25 ft x 64 ft, with a 2% slope. The curb-type flow spreader placed prior to the biofiltration strip can hold standing water permanently, if the plug located at the end of the curb is not removed to allow it to drain. The adjacent infiltration trench is filled with 3 feet of graded gravel and is approximately 30 x 62 ft. During this study, no standing water was ever detected in the trench.

The Carlsbad Maintenance Station was also designed with a biofiltration strip pre-filter followed by an infiltration trench. The biofiltration strip is approximately 91 feet long by 22 feet wide. Stormwater runoff is conveyed by a concrete swale through a partial flume to a concrete gutter, which acts as a side weir to spread flow over the length of the biofiltration strip, and was designed to handle runoff from a 25-year storm in southern California. Following the biofiltration strip, water is delivered to an infiltration trench designed to hold the volume from a one-year storm. The trench is 8 feet wide by 180 feet long. Infiltration rate was determined by two tests, which resulted in an I of 2.8 x 10^{-5} fps (8.7 x 10^{-6} m/s) average for the in-drill hole and 2.3 x 10^{-6} fps (7.1 x 10^{-7} m/s)

average for the laboratory sample. The total area of the trench (241 m^2) would give an 11-hour to 5.61-day detention time prior to percolation.

The infiltration basin at the I-605 & SR 91 was designed to handle flow volume from a 1-year, 24-hour storm in southern California. Water enters the basin from two locations: the first is a 300 mm plastic pipe on the east end of the basin with a 2% slope, the second is a 600 mm plastic pipe with a 1% slope on the south end of the basin. Outlets of both influent pipes into the basin have loose-rock rip rap energy dissipaters. Minimum infiltration rate of 1.94×10^{-4} cm/s was recommended in the design, which corresponds to a sand, loamy sand, sandy loam and silt loam soil group. Borings were collected which showed a soil with sandy material from 0.9 to 3.0 meters. From surface to 0.9 meters and 3.9 to 9.1 meters was sandy silt to clayey silt. Permeability rate was 1.6×10^{-4} cm/s, which was considered to be marginal. A detention time of 38 hours was estimated, based on a basin volume of 432 m^3, a depth of 0.22 m, and bottom surface area of 1,935 sq.m.

Monitoring Results. The two infiltration trenches and the infiltration basin percolated adequately during this study. No vectors were detected.

Design Recommendations. The primary concern with both the infiltration basins and trenches is ensuring adequate percolation to prevent standing water. Infiltration basins should not be constructed at locations that do not percolate due to improper soil type or high groundwater. The hydrogeology in California varies significantly from one site to the next and there are many locations that are not amenable to infiltration. Therefore it is important to develop statewide guidelines for evaluating sites and designing infiltration devices. To prevent standing water and mosquito production, standard design principles for infiltration basins should be followed such that standing water does not occur.

Operation and Maintenance. General guidelines for infiltration devices includes monitoring drain time after storm events, infiltration rates, depth to groundwater, sediment buildup, and condition of vegetation.

Properly designed infiltration basins require periodic maintenance to remove sediment, scarify the ground, or replant vegetation. Failure to conduct proper maintenance will result in reduced percolation rates and result in standing water.

In designs that include infiltration trench prefilters, such as the biofiltration strip prefilter at Altadena MS, the prefilter should be designed such that they do not hold standing water. The spreader trough at Altadena MS holds water after a storm event. In this design, the drain plug should be removed and the ditch drained within 72 hours of every storm event and the plug should be removed at the beginning of the dry season.

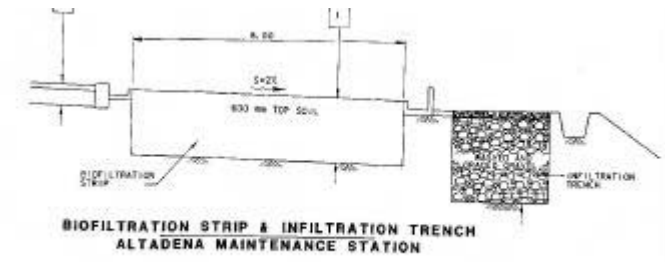

Typical design profile for an infiltration trench with a biofiltration strip prefilter.

Infiltration trench with biofiltration strip prefilter.
8/00
Carlsbad MS

Mosquito emergence traps above infiltration trench.
8/25/00

Altadena MS

Biofiltration strip prefilter. Spreader trough with standing water.
3/26/01

Biofiltration strip prefilter. Spreader trough drain plug. 08/25/00

Vector Prevention in Structural BMPs

Figure 8. Infiltration Trenches

State of California, DHS Vector-Borne Disease Section

11/17/00

8/25/00

Vector Prevention in Structural BMPs

Figure 9. Infiltration Basin
(I-605 & SR 91)

State of California, DHS Vector-Borne Disease Section

Continuous Deflective Separators (CDS)

Design Criteria. Continuous Deflective Separators (manufactured by CDS Technologies Inc.) are pre-cast, cylindrical devices designed to remove trash and debris, sand and sediments, and some oil and grease from stormwater runoff. The devices are typically placed downstream of drain inlets and installed below ground.

Two CDS units were installed in Caltrans right-of-ways as part of the BMP Retrofit Pilot Study, one located at I-210, east of Orcas Avenue and the other at I-210, east of Filmore Street. These were completed in early 2000, approximately 1 year after most of the other structures. Incoming stormwater runoff is directed by a weir from the storm drain at a 45-degree angle through an 8 x 12 inch rectangular opening into a cylindrical sump (3 ft diameter) where it creates a vortex. Debris, sand, and other large particles are deflected by this action into a debris basket at the bottom of the sump. Treated water passes through a metal screen (2400 micron screen at I-210, east of Orcas Avenue and 4800 micron screen at I-210, east of Filmore Street) and exits the unit through a 9 x 6 inch rectangular outlet, from where it flows by gravity back into the storm drain. By design, CDS devices hold permanent standing water in the cylindrical sump.

The CDS devices included in the Caltrans study are atypical installations. In most cases, CDS devices are installed completely below ground; however, the location of the Caltrans retrofit required that a portion of the device remain above ground. The influent and effluent pipes as well as approximately 20% of the cylindrical sump are above ground. Fiberglass lids were made for the sump and for the influent/effluent weir box. Two holes near the top of the sump support a rope that is attached to the debris basket to allow the basket to be lifted out of the unit for routine cleaning and maintenance. Figure 10 shows the east of Orcas Ave. site and illustrates many of the modifications made to the device in an attempt to prevent or reduce mosquito access to the permanent water in the sump.

Monitoring Results. The CDS devices provided a very attractive and accessible habitat for egg-laying adult mosquitoes. Adult female mosquitoes had multiple entrance points to access the sump water for egg laying including 1) the effluent pipe, 2) the

influent pipe, 3) the poorly sealed sump lid, 4) the poorly sealed weir box lid, and 5) the rope support holes in the sump. As a result, immature mosquitoes were extremely abundant in the nutrient-rich sump water.

Between November 2000 and January 2001, several modifications were made to the CDS devices in an attempt to "mosquito proof" the sumps. No mosquitoes have been detected since the modifications were made. Further monitoring will be necessary to validate the effectiveness of the modifications.

Design Recommendations. Because of the extensive mosquito production in these devices, numerous modifications were retrofitted to correct the problem. The modifications were limited by the design and installation of these particular devices, including the location of the hydraulic grade line; however, they were the most practical changes that could be made at these sites. The following is a list of modifications made to the CDS units in an attempt to eliminate vector production.

1. A ½ inch thick foam strip was glued to the weir box and CDS sump lids to eliminate access to mosquitoes through uneven sealing surfaces. In addition, the rope holes in the sump were sealed with caulk.
2. A mosquito net bag was installed over the effluent pipe to prevent entry of adult mosquitoes to the standing water in the sump. The first bag failed during high water flows and was modified to open during storm events and remain closed during periods of no flow.
3. The drain inlets to the CDS devices are located approximately 20 meters from the treatment sump (along the I-210) and could not be easily sealed against possible entry of mosquitoes. As a result, no changes were made to the inlet.

Permanent standing water will be present in the sumps of CDS devices by the nature of their design, unless they are pumped dry following every storm event. General recommendations for preventing mosquito access to the sumps in future CDS installations are provided below.

1. All lids or covers should seal tightly. If gaskets are present between the lid and the CDS device, they should be inspected periodically and replaced when necessary. Avoid lids with uneven sealing surfaces.
2. The inlet and outlet pipes to the device should be sealed or submerged to prevent access by mosquitoes. The inlet and outlet may be sealed either on the unit itself, or the inlet and outlet piping.
3. If the device cannot be properly sealed against mosquitoes, the sump should be pumped completely dry following every storm event. In addition, routine inspections should be made to check the sump for accumulation of water from illegal or non-stormwater discharges.
4. An alternative that may be considered is the inclusion of seep holes in the bottom of the sump that would allow the water to percolate into the ground. This would require testing to ensure that water can percolate into the soil. Percolation time should not exceed 72 hours and provisions to prevent or reduce the possibility of clogged seep holes should be incorporated into the design.

Operation and Maintenance. To prevent mosquito production during the summer months, water was pumped from the units in late May and taken off-site and the units were left dry until the fall storms. It was difficult to fully dewater the units, resulting in several inches of standing water at the bottom and continued mosquito breeding after dewatering. This maintenance alone was not adequate to prevent breeding of mosquitoes.

Ongoing maintenance will require routine inspections of all the mosquito proofing modifications including the sealing foam on the lids and the mosquito net bag on the effluent pipe. These should be replaced each year or as needed.

August 2000

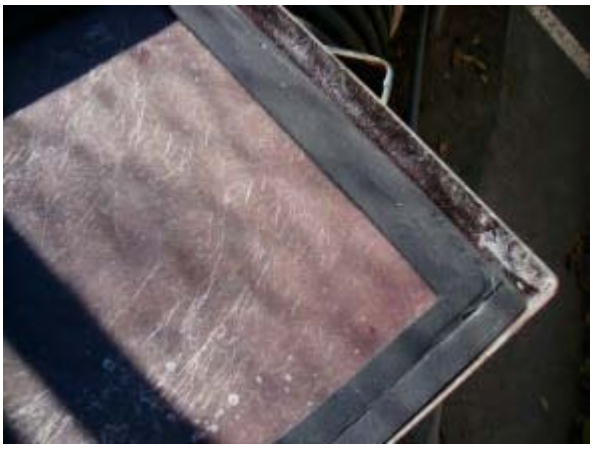

Foam seal on weir box lid. 11/17/00

Foam seal for sump lid. 11/17/00

Mosquito-proof bag on effluent pipe during storm. No end release for debris. 1/11/01

Modified mosquito-proof bag on effluent pipe with end release for debris. 3/26/01

Vector Prevention in Structural BMPs

Figure 10. Continuous Deflective Separators (CDS) (East of Orcas)

State of California, DHS Vector-Borne Disease Section

Oil/Water Separator

Design Criteria. A single oil/water separator device was included in the Caltrans BMP Retrofit Pilot Study and installed at the Alameda Maintenance Station in Caltrans District 7. The device consists of a cylindrical, horizontal, atmospheric steel vessel containing three separate sequential compartments. Stormwater runoff from the maintenance yard enters the first chamber through a flanged inlet pipe, which is located below the normal water surface level. Energy is dissipated by a head diffusion baffle located prior to the sedimentation chamber. A sludge baffle, which retains settleable solids, follows the sedimentation chamber. The water then enters an oil water separation chamber containing a removable polypropylene coalescer, designed to intercept oil globules. Water then exits the third chamber by gravity to the storm drain. The steel vessel was installed below grade with two covered access hatches above grade. Figure 11 provides design plans and an above-ground photo of the installed device.

Monitoring Results. During this study, immature mosquitoes were detected in a small plastic flume (not part of the oil/water separator) that held a small pool of standing water. This flume was used to monitor water flow during storm events. Although the oil/water separator is designed to hold standing water inside the steel vessel, no vectors were noted inside the structure. This is most likely due to the following reasons:

1. The steel vessel's inlet and outlet are both submerged.
2. Access ports into the vessel are tightly sealed.
3. Oil on the surface of the water inside the device may create lethal conditions for immature mosquitoes.

Design Recommendations. During the course of the study, this device did not harbor vectors. No modifications are recommended at this time.

8/25/00

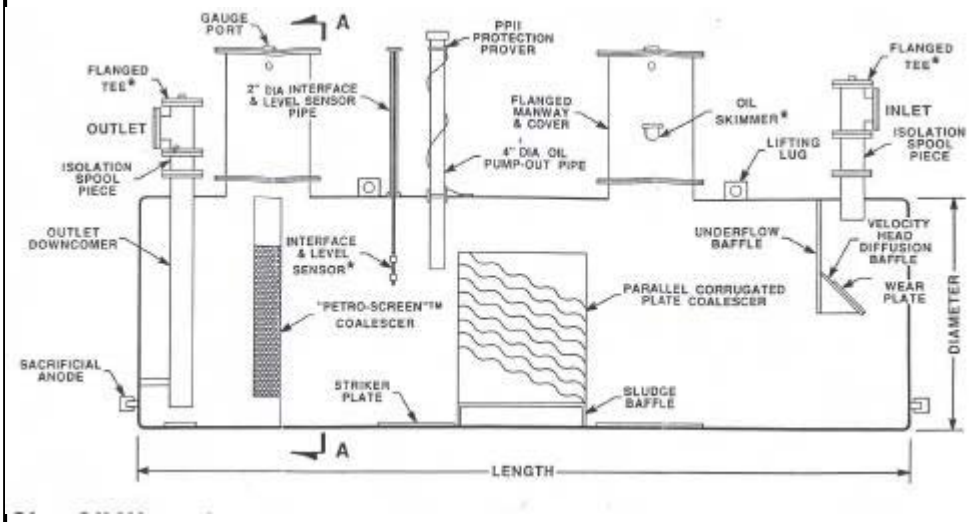

Below-ground design plans.

Vector Prevention in Structural BMPs
Figure 11. Oil / Water Separator (Alameda MS)
State of California, DHS Vector-Borne Disease Section

Drain Inlet Inserts

Design Criteria. Proprietary drain inlet inserts (DII) filters by two manufacturers were included in the Caltrans BMP Retrofit Pilot Study; Fossil Filter™ (KriStar Enterprizes, Inc.) and Stream Guard™ (Foss Environmental). Fossil Filter™ inserts are trough-type devices filled with granular amorphous alumina silicate media, whereas the Stream Guard™ device is a sock-type insert made of a geotextile fabric. Both filters are designed to remove sediment (and adsorbed pollutants), oil, and grease. Three Caltrans maintenance stations in Caltrans District 7 were selected for DII retrofits including Foothill MS, Rosemead MS, and Las Flores MS. Each site was provisioned with both a Fossil Filter™ and a Stream Guard™.

Monitoring Results. During this study, no standing water was noted in the DII devices. However, each DII was provisioned with a small downstream, underground plastic effluent flume (not part of the DII) that held a small pool of standing water. These flumes were used to monitor water flow during storm events. Immature mosquitoes were detected in the Fossil Filter™ flume at Rosemead MS on several occasions.

Operation and Maintenance. Caltrans expended significant effort in the maintenance of DII devices to prevent debris from clogging the filters. Debris and trash were inspected and removed before and during each storm event. If these filters are not adequately maintained at this level, standing water and vector production could ensue.

Wet Basin

Design Criteria. Wet basins are permanent pools of water surrounded by a variety of wetland plant species. Stormwater from adjacent freeways and roadways and urban runoff is routed into these systems and pollutants are removed by physical and biological processes. Soluble nutrients in the water are reduced by plant uptake and constituents such as sediments, particulate trace metals, and organic nutrients settle and collect at the bottom of the basin. Wet basins maintain a permanent pool level. Only one wet basin was constructed as part of the Caltrans BMP Retrofit Pilot Study, located at I-5 and La Costa Ave. in Caltrans District 11.

The wet basin was designed to treat runoff from a 1-year, 24-hour storm in southern California. Water enters the structure through a forebay with a 4:1 side slope and a volume of 0.16 acre-ft. This is followed by a wet basin with a permanent pool volume of 0.63 acre-ft, and an average depth of 2.3 feet, which provides an effective 14-day detention time. Water will return to the permanent pool volume within 24 hours of a storm event. The side slopes of the wet basin are 1:6 around the sides and 1:3 from the basin invert to the shallow bench. Water is routed through the basin in a meandering fashion through the use of berms to avoid short-circuiting.

Mosquitofish, *Gambusia affinis*, were stocked in the pond at an initial density of 200 per surface acre for control of immature mosquitoes in the pond. Plant species at the wet basin include various species of bulrush, spikerush, and other marsh and/or aquatic plants that are native to southern California. Some of these plants can grow in water depths up to four feet.

Monitoring Results. Mosquitofish thrived in the wet basin during this study. Fish density remained high throughout the year, and smaller individuals were frequently observed swimming among the stems of the dense shoreline emergent vegetation. Despite the predatory fish, immature mosquitoes were frequently detected in small, isolated shoreline pockets of water among fallen cattails, accumulations of vegetation and plant debris, and algal mats.

Design Recommendations. The biggest concerns associated with wet basins or other permanent water sources are the control of emergent, invasive vegetation such as cattails and sedge as well as the maintenance of mosquitofish populations that keep mosquitoes in check. Wet basins should be designed to reduce the required maintenance and avoid creating vector habitats. Figure 12 illustrates the rapid growth of invasive, emergent vegetation in the wet basin. Dense emergent vegetation causes several problems: 1) it provides predator-free shoreline habitats for mosquito production, 2) it reduces or eliminates access to the pond for routine inspections and/or maintenance, and 3) it can interfere with volume capacity, water flow, and intended water quality benefits. Wet basins should be designed to allow the growth of vegetation only where it is necessary, and to limit the growth of vegetation throughout the remainder of the basin. The following design criteria should be considered:

1. The potential for cattail and sedge growth should be minimized. A minimal constant water depth of four feet or greater will reduce or prevent growth.
2. Side slopes of 2:1 will contain the width or thickness of emergent vegetation to 5 or 6 feet in the basin periphery. This should allow some penetration by mosquitofish and will allow access for vector control staff if mosquito abatement is necessary.
3. The maximum vegetated surface coverage should be 50%. Clumps or islands are preferred. Designs utilizing concrete, rock or liners should be used in areas where vegetation is not desired.
4. For large basins, a launch ramp should be provided to facilitate access for vector control and/or maintenance equipment.
5. A method for water inflow diversion from influent channels and pipes as well as a method for total basin dewatering should be incorporated in the design.

Operation and Maintenance. Regular maintenance of the basin is critical to maintaining a healthy population of mosquitofish. Overgrowth of vegetation and/or decaying vegetation may adversely impact mosquitofish and limit their access to

portions of the basin, while providing attractive habitats for vectors. The following maintenance procedures are recommended.

1. Monthly inspections to determine if and when vegetation control measures are necessary. When emergent vegetation spreads beyond the design parameters, or otherwise contributes to a problem with vector control, it should be promptly removed (or treated with a herbicide where appropriate). It is critical to begin vegetation control actions before the basin is excessively overgrown. Vegetation control may be needed annually, bi-annually, or more frequently as conditions demand.
2. Floating vegetation, such as water hyacinth and primrose, should be controlled monthly by physical removal (or the use of an aquatic herbicide where appropriate).
3. When prevailing winds, or surface currents within the basin, cause an accumulation of vegetation on a portion of the surface, removal should occur more frequently.
4. Outlets and overflow channels should be kept free of debris so surface outflows are not impeded by debris/vegetation accumulations in a portion of the basin.
5. The sediment in the bottom of the permanent pool should be removed every 2-5 years.
6. The presence or intermittent presence of mosquito eggs, larvae or pupae is evidence of mosquito breeding. Control measures should be initiated to supplement the maintenance recommendations already discussed.
    a. Consult the local vector control agency.
    b. Maintain an adequate population of the mosquitofish.
    c. Maintain a residual larvicide in the basin or establish a control plan that utilizes frequent treatments with non-residual larvicides.

Completed June 1999

January 2000

Dense cattail plants. April 11, 2000

Vegetation hand-removal.
August 17, 2000

Rapid vegetation re-growth and colonization.
February 8, 2001

Vector Prevention in Structural BMPs

Figure 12. Wet Basin
(I-5 & La Costa Ave.)

State of California, DHS Vector-Borne Disease Section

Conclusions

This collaborative study provides a preliminary assessment of vectors associated with a number of different structural BMP designs. During the course of the study, VBDS and the four collaborating vector control districts made design and maintenance recommendations that, once implemented, reduced or eliminated habitat previously available for vector production. It is critical that vector control professionals be consulted with regard to BMP design and maintenance to help minimize or prevent vector production. Vector control professionals can provide recommendations based on experience and research that can minimize the potential of structural BMPs to harbor and/or produce vectors. In other cases, local agencies may disapprove of specific designs or structures if they provide excessive habitat for vector species. Proper review of designs to ensure that vector issues have been addressed is necessary. This proactive, rather than reactive approach to the prevention of potential vector problems will ultimately result in cost savings, reduce the need for ongoing vector surveillance and control, and ensure compliance with the California Health and Safety Code. However, it is understood that some structural BMP designs will require ongoing vector surveillance and control.

Stormwater BMP structures are intended to have minimal operational oversight and maintenance, thus it is critical to design facilities in as simple a manner as possible. VBDS and vector control agencies throughout California recommend against the construction of stormwater BMP structures that hold permanent or semi-permanent sources of standing water; however, it is understood that some designs require this for water quality purposes and/ or for proper operation. Operation and maintenance criteria that reduces or prevents vector production should be incorporated into operation and maintenance manuals. Adequate funding for plan review, structure maintenance, and vector surveillance and control activities should be provided for prior to BMP construction. Ongoing cooperation between agencies and others responsible for construction and/or maintenance of stormwater management structures and vector control agencies will be needed to ensure that public health is not compromised.

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FINAL REPORT

CALIFORNIA DEPARTMENT OF TRANSPORTATION DISTRICT 7 LITTER MANAGEMENT PILOT STUDY

CONTRACT NO. 43A0004C, TASK ORDER NO. 18
CALTRANS DOCUMENT NO. CT-SW-RT-00-013

State of California - Business, Transportation and Housing Agency
Department of Transportation
Environmental Program (MS-27)
1120 N Street
Sacramento, CA 95814

URSGWC Project No. 58-977001NJ.01-FR400

June 26, 2000

June 26, 2000

Roger Churchwell
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California Department of Transportation
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Sacramento, CA 95814

Subject: Final Report - Litter Management Pilot Study
Contract No. 43A0004C
URSGWC Project No. 58-977001NJ.01-FR400

Dear Roger and Gary:

In accordance with Contract 43A0004C, Task Order No. 18, enclosed please find the Final Report for the Litter Management Pilot Study (LMPS). Distribution of this report represents completion of the LMPS and fulfills URS's responsibilities related to Task Order 18. Please note that additional copies have been provided to Mr. Bill Evans for distribution to the plaintiffs.

Please call us at (619) 294-9400 if you have any questions.

Very truly yours,

URS GREINER WOODWARD CLYDE

David E. Marx
Task Order Manager

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List of Abbreviations

AAH	Adopt-A-Highway
AAHMC	Adopt-a-Highway Maintenance Corporation
ac	Acres
ANOVA	Analysis of Variance
BMP	Best Management Practice
CEL	Calscience
cf	cubic feet
CMP	corrugated metal pipe
COV	Coefficient of Variation
CSUS	California State University Sacramento
DI	Deionized
EMC	Event Mean Concentrations
EPA	Environmental Protection Agency
g	grams
Ha	Hectare
HOV	high occupancy vehicle lane
kg	kilogram
l	liter
LCS	Laboratory Control Samples
LID	Litter Inlet Deflector
LMPS	Litter Management Pilot Study
LWA	Larry Walker & Associates
mg	milligram
ml	milliliter
MS/MSD	Matrix Spike/Matrix Spike Duplicates
ND	Non Detect
NRDC	Natural Resources Defense Council
PM	Post Mile
QA/QC	quality assurance and quality control
QPFs	Quantitative Precipitation Forecasts
RPD	relative percent difference
ROW	Right of Way
SEC	Storm Event Coordinator
SMBRP	Santa Monica Bay Restoration Project
SOPs	Standard Operating Procedures
Study Plan	Final Detailed Study Design and Plan
TAG	Technical Advisory Group
TKN	Total Kjeldahl Nitrogen
TOC	Total Organic Carbon
TPH	Total Petroleum-Hydrocarbon
TSS	total suspended solids
UCLA	University of California Los Angeles
µg	microgram
URSGWC	URS Greiner Woodward Clyde

The Litter Management Pilot Study (LMPS) is one of many ongoing programs undertaken by Caltrans to improve the quality of runoff from Caltrans highway drainage facilities. The focus of the LMPS is field testing and evaluation of litter management practices to assess their effectiveness in reducing litter that is discharged from Caltrans storm water conveyance systems. The LMPS is a Caltrans study in response to the Stipulation and Order RE 1997-1998 Drain Inlet Cleaning Program, Attachment 1. The LMPS is a two-year field study that was conducted during the 1998/1999 and 1999/2000 rain seasons, following the methodology presented in the May 18, 1998 Final Detailed Study Design and Plan, Caltrans Document No. CTSW-RT-98-057 (Study Plan). This Final Report fulfills the requirements of the Stipulation in accordance with the Study Plan, and describes study implementation, data, and results that were obtained during the two year study.

Caltrans has brought together a team to design and implement this study consisting of the following parties:

- Caltrans Environmental Program
- California State University Sacramento (CSUS), Office of Water Programs
- URS Greiner Woodward Clyde (URSGWC)
- University of California Los Angeles (UCLA), Civil and Environmental Engineering Department

URSGWC has provided consulting services related to majority of LMPS activities related to project scoping, design, technical implementation, field monitoring, data review and analysis. UCLA has provided laboratory testing and prototype development of the Litter Inlet Deflector (LID) Best Management Practice (BMP) that was evaluated during year 2 of the LMPS. This team effort, in addition to review and input received from the project Technical Advisory Group (TAG), has shaped the overall direction of the LMPS and monitored compliance with study objectives.

The objective of the LMPS is to evaluate the effectiveness of structural and non-structural BMPs that could result in a reduction of litter in the Caltrans freeway storm drain system. The structural BMPs focus on freeway drain inlet modifications. The non-structural BMPs that were evaluated include increasing the frequency of mechanical broom street sweeping from monthly to weekly and increasing the frequency of manual litter pick-up programs from monthly to weekly.

Four sites (see Figure 1-1) were identified and matched with BMPs as follows:

- Site 1E – Litter Pick-Up: Eastbound Interstate 105, Post Mile (PM) 12.30 to PM 12.87
- Site 1W – Street Sweeping: Westbound Interstate 105, PM 12.87 to 12.30
- Site 6 – Structural BMP, Modified Inlet Grate: Eastbound Freeway 60, PM 15.12 to 15.58
- Site 8 – Structural BMP, LID (1999/2000), Bicycle Grate (1998/1999): Eastbound and Westbound Freeway 60, PM 5.60 to PM 5.95

Site locations are identified in Figure 1-1. Six outfalls are monitored at each site. Three outfalls at each site convey surface water from the BMP treatment area, and the other three convey

surface water from control areas. Each treatment outfall is paired with a control outfall and site details are summarized in Table ES-1.

This study has defined litter in storm water as:

- Manufactured items that can be retained by ¼-inch mesh made from paper, plastic, cardboard, etc.
- Materials that are not of natural origin (i.e., does not include sand, soil, gravel, vegetation, etc.)

Litter was quantified by weight (24-hour air-dried), volume, and count. Litter monitoring was conducted by attaching ¼-inch mesh collection bags to the 24 study outfalls. Eight of the 24 outfalls were also monitored for flow, rainfall, and chemical water quality parameters (see Table 5-1). When a litter collection bag was removed from an outfall for analysis, it was immediately replaced. All litter that came through the outfall during the study period was collected, characterized, and quantified. A litter lab was setup and protocols were developed to quantitatively measure and characterize the litter collected during the LMPS.

Litter samples were also collected and characterized for each trigger storm. Litter was collected from each of the 24 outfalls during 10 storms during the first year of the study, between November 1, 1998 and April 30, 1999, and for 13 storms during the second year of the study between October 1, 1999 and April 1, 2000. Chemical water quality samples were collected for 20 trigger storms monitored during the study. The litter from the first storm was used to fine-tune the litter measuring characterization protocols in the litter lab.

Table ES-1
FIELD STUDY SITE INFORMATION

Study Site Number	Study Site Location	Subject BMP	Monitored "Treatment" Outfalls	Monitored "Control" Outfalls	Study Pair Designation
1E	I-105 Eastbound (Lynwood) between Gertrude Ave. and Atlantic Blvd. overpass (PM12.30 to PM12.87)	Manual litter pick-up	1-47 1-46 1-44 *treatment frequency pick-up once per week	1-B110 1-42 1-B111 **control frequency pick-up once per four weeks	LP1 LP2 LP3
1W	I-105 Westbound (Lynwood) between Atlantic Blvd. and Gertrude Ave. overpass (PM12.87 to PM12.30)	Street sweepers (mechanical brooms)	1-58 1-59 1-60 *treatment frequency sweep once per week	1-52 1-50 1-51 **control frequency sweep once per four weeks	P1 P2 P3
6	Freeway 60, Pomona freeway (Hacienda Heights) between Turnbull Canyon undercrossing and Kwis St. overcrossing (PM 16.12 to PM 15.58)	Modified inlet grate (option A – perforated steel plate)	6-20H 6-20F 6-20B *treatment employs perforated plate on inlet	6-20G 6-20E 6-20C **control employs conventional grate inlet	P1 P2 P3
8	Freeway 60, Pomona freeway (Montebello and Monterey Park) between Garfield Ave.	LID (1999/2000)	8-B001 8-24B 8-24F	8-23C 8-24D 8-24E	P1 P2 P3

	undercrossing and Fulton Ave. (PM 5.60 to PM 5.95)	Bicycle grate (1998/1999)	*treatment employs subject BMP at inlet	**control employs conventional grate inlet	

The LMPS was designed to evaluate the effectiveness of structural and non-structural BMPs in reducing litter in the Caltrans storm water system by comparing litter amounts at paired treatment and control catchments. It should be emphasized that the objective of this study is specifically to evaluate the stated BMPs in a freeway environment and that these data are specific to Los Angeles conditions. In addition, litter data appear to be inherently variable and the data presented herein apply to the project-specific environment and conditions.

BMP Effectiveness

Caltrans litter data from samples collected at outfalls after storm events and compiled for the rainy season were qualitatively and quantitatively evaluated to identify whether or not each of the study BMPs was demonstrated to be effective. Data collected at each outfall were normalized by area and flow, and this data was then evaluated using the statistical methods described in Section 7.1. The results are summarized as follows:

- Statistical tests indicate that increasing the frequency of street sweeping from monthly to weekly does not statistically reduce ($\alpha = 0.05$) the count or weight of litter observed at the outfalls or in the total system load. This is the case for weight regardless of whether the litter data are normalized by catchment area or flow. For count, the reduction is not significant for the area-normalized analysis, but is statistically significant for the flow-normalized analysis. Because the number of data points is substantially larger for the area-normalized analysis, the results of that analysis are considered more powerful. These results suggest that weekly sweeping is not more effective than monthly sweeping in reducing litter in runoff from freeways with standard inlet grates.
- Statistical tests indicate that increasing the frequency of litter pickup from monthly to weekly reduces the quantity of litter observed at the outfalls, with $\alpha = 0.05$. This is the case for all measuring parameters (weight, volume, and count) regardless of whether the litter data are normalized by watershed area or flow. The average annual reduction between the treatment and control outfalls during the two-year study period were 30% by weight, 33% by count and 41% by volume.
- Statistical tests have shown that the modified inlet grate reduces the quantity of litter observed at the outfalls, with $\alpha = 0.05$. This is the case for all measuring parameters (weight, volume, and count) regardless of whether the litter data are normalized by watershed area or flow. The average annual reduction between the treatment and control outfalls during the two-year study period was 26% by weight, 23% by count and 19% by volume.
- Statistical tests indicate that the standard Caltrans bicycle grate does not statistically reduce ($\alpha = 0.05$) the litter observed at the outfalls or in the total system load. The bicycle grate BMP was evaluated during the first year of the study, and it was removed and replaced with the LID for the second year.

- Results of inlet deposition monitoring indicate that the LID is effective in reducing dry weather deposition (see Figure 4-5). Additionally, an important finding from the field evaluation of the LID BMP is that the LID gates operated well in storm conditions. The statistical analysis did not confirm that the BMP is effective in reducing volume or weight regardless of whether the litter data are normalized by watershed area or flow and which method of paired analysis is used. For count, the reduction is significant for the outfall-discharged, area-normalized load, but is not significant for either the outfall-discharged, flow-normalized load or the total system load.
- Statistical analysis conducted to assess the effect of the litter BMPs on the concentration of chemical constituents (e.g. heavy metals, total dissolved solids, etc.) between treatment and control areas did not show a reduction in chemical constituent concentrations that could be attributed to BMP implementation.

Other Results

Although the major focus of the LMPS was to evaluate BMP effectiveness, the data collected during this pilot study provides extensive information that can be used to enhance knowledge related to litter on Caltrans highways. The following general observations and trends from the LMPS may be useful related to future projects designed to understand and/or control litter on Caltrans highways.

- The material collected in the outfall monitoring nets consisted of gross pollutants comprising litter and vegetative material. The majority of all material collected was found to be vegetation. Site averages for percent vegetative material monitored in the outfalls range from 75 to 87 percent by wet weight for the four sites. These results also suggest that any device designed to capture litter will capture a majority of vegetation.
- Litter collected during outfall monitoring consists of paper, plastic, wood, cigarette butts, styrofoam, metal, and glass. The distribution by category is presented in Figures 6-2 to 6-7. The size of litter pieces was consistent and small (typically less than 2 square centimeters), suggesting that the standard parallel bar inlet grate that has 35 mm (1½-inch) bar spacing is effective in keeping large pieces of litter out of the inlets.
- Annual air-dried litter loads during the two-year study period ranged from 3.1 kg/acre at Site 8 to 7.5 kg/acre at Site 1E. It should be noted that the data normalized by area assume a straight-line relationship between catchment size and litter load. It is not the intent of this data presentation to predict average litter loads in other areas but instead give a general indication of loads and the variation between the LMPS sites.
- Data from the LMPS indicate that smoking- and food-related litter account for 20-30% of the litter by weight and volume. Seventy-nine percent of items by weight and 71% by volume were assigned to the “other” category. The LMPS data also indicate that approximately 80% of the litter collected at the outfall is floatable (see Table 6-2).
- Analysis shows that the types of litter materials present in sweeper litter are similar to outfall litter, with higher proportions of glass, moldable plastics, and metals, and a lower proportion of paper and film plastic in sweeper litter (see Figures 4-6 to 4-8).

- Analysis shows that the types of materials present in litter collected from the freeway ROW are similar to outfall litter with higher proportions of chipboard/cardboard, glass, and wood, and a much lower proportion of cigarette butts in ROW litter (see Figures 4-6 to 4-8).
- No clear relationships between litter and rainfall intensity, peak flow, total flow, and antecedent dry period for monitored events at each outfall were identified.
- No correlation between litter quantity and chemical concentrations for any of the constituents monitored was observed.

The LMPS team identified a number of recommendations related to further studies and research to advance the state of the knowledge of litter in storm water. These recommendations are presented in Section 8.2.

1.1 BACKGROUND

Caltrans is currently conducting numerous research projects with the common goal of improving the quality of runoff discharged from Caltrans highway drainage facilities. The Litter Management Pilot Study (LMPS) is one of these programs and is a direct result of Attachment 1 of the Stipulation and Order regarding the 1997/1998 Drain Inlet Cleaning Program that stemmed from a lawsuit filed against Caltrans by the Natural Resources Defense Council (NRDC) in Caltrans District 7 (Los Angeles area). The focus of the LMPS is field testing and evaluation of litter management practices to assess their effectiveness in reducing litter that is discharged from Caltrans storm water conveyance systems. The LMPS has defined litter as manufactured material that can be retained by a ¼-inch mesh and specifically addresses the following litter management practices:

- Increase street sweeping frequency
- Increase litter pick-up frequency
- Employ structurally modified inlets

At the core of the LMPS is a two-year field study that was conducted during the 1998-1999 and 1999-2000 rain seasons, following the methodology presented in the May 18, 1998 Final Detailed Study Design and Plan, Caltrans Document No. CTSW-RT-98-057 (Study Plan). This Final Report describes study implementation, data, and results that were obtained during the two-year study. The following additional reports have been prepared during the LMPS:

- Literature Review in Support of the LMPS, Caltrans Document No. CTSW-RT-99-015, 1997.
- Interim Report – District 7 LMPS, Caltrans Document No. CTSW-RT-99-056, 1999.

Caltrans has assembled a team of university representatives and consultants to assist the Caltrans Environmental Program in the design and implementation of the LMPS, including:

- California State University Sacramento (CSUS), Office of Water Programs
- URS Greiner Woodward Clyde (URSGWC)
- University of California Los Angeles (UCLA), Civil and Environmental Engineering Department

URS Greiner Woodward Clyde (URSGWC) has provided consulting services related to the majority of LMPS activities associated with project scoping, design, technical implementation, field monitoring, data review and analysis. UCLA has provided laboratory testing and prototype development of the Litter Inlet Deflector (LID) Best Management Practice (BMP) that was evaluated during year 2 of the LMPS.

1.2 OBJECTIVES

The objective of the LMPS is to evaluate the effectiveness of structural and non-structural BMPs that could result in a reduction of litter that enters or discharges from Caltrans freeway storm drain systems. The structural BMPs focus on freeway drain inlet modifications. The non-structural BMPs that were evaluated are mechanical broom street sweeping and manual litter pick-up programs.

1.3 STUDY DESIGN

The methodology followed during LMPS implementation is outlined in the Study Plan. The methodology was based on a systematic approach to research, evaluation, and work plan development. A key component of this process has been the project review provided by the Technical Advisory Group (TAG). The TAG consists of representatives from NRDC, Caltrans, the Santa Monica Bay Restoration Project (SMBRP), URSGWC, and the City of Los Angeles. The TAG has provided review and feedback throughout the project, acting as a steering committee to maintain project compliance with mutually agreed upon objectives. TAG support has included review of project documents, teleconferences, and periodic TAG meetings.

The Study Plan describes the basis for the study design in three primary sections:

- Section 2 – Identification and Monitoring of Litter in Storm Drains;
- Section 3 – Selection of Test and Control Areas; and
- Section 4 – BMPs to be tested.

A general overview of each section of the Study Plan is provided below.

1.3.1 Study Plan Section 2 – Identification and Monitoring of Litter

The Study Plan describes the equipment and approach used in the LMPS for monitoring litter and select chemical water quality constituents in the discharge from the monitored outfalls. Chemical water quality constituents monitored for this study are listed in Table 5-2. A unique litter monitoring program (e.g., field and laboratory facilities and procedures, plus data analysis procedures) was developed specifically to support this study. This was necessary because no standard or accepted methods and equipment are available for sampling and analyzing litter from storm water. The monitoring program was developed through the following process:

- **Defined litter for the LMPS**. This study has defined litter in storm water as:
  - Manufactured items that can be retained by ¼-inch mesh made from paper, plastic, cardboard, etc.
  - Materials that are not of natural origin (i.e., does not include sand, soil, gravel, vegetation, etc.)

Litter was quantified by weight (24-hour air-dried), volume, and count.

- **Identified monitoring locations and the method for collecting litter samples at those locations.** The Study Plan identified outfalls as the most suitable monitoring locations for this study. Outfall monitoring was selected over inlet monitoring because inlet monitoring would require traffic control for each set-up and post-storm collection and may result in traffic control during wet weather, which could impair the safety of the motoring public. For the purpose of this study, "outfall" is defined as a point in the drainage system, downgradient of inlets, where a transition that can be monitored occurs, generally between the Caltrans drainage system and the receiving municipal system. The general litter monitoring method comprises installing monitoring equipment at each monitored outfall, setting monitoring equipment before each trigger storm to collect litter from discrete storm events, and collecting and analyzing litter from each event.

- **Designed a litter sample collection device**. During development of the study design, four monitoring concepts were evaluated. These included two devices designed to be installed inside the outfall pipe and two devices for monitoring outside the pipe. A nylon mesh bag attached to a transition collar was the design selected based on its simplistic design and adaptability to various outfall configurations. More detail regarding the litter monitoring device is presented in Section 2 of this report.
- **Developed methods for quantifying and categorizing the collected litter.** The Study Plan presents a litter analysis methodology and its basis for development. The overall objective of litter analysis for this study is to generate data to evaluate the effectiveness of structural and non-structural BMPs. This objective was used in conjunction with an evaluation of litter analysis methods used in other studies (Folen and Zagar, 1990; and Syrek, 1998) to develop an initial litter analysis methodology. The initial methodology included the following general components:
  - Air drying the samples
  - Specieating the samples by material type and size
  - Weighing the samples
  - Measuring volume for each specieated sample component
  - Identifying the highly floatable fraction of the sample
  - Documenting the likely prior usage of the individual litter components (e.g., food container, smoking related, other)

The Study Plan also describes the quality assurance and quality control protocols to be used for litter monitoring, including standard data verification procedures and a sample recovery protocol. The sample recovery protocol was established to track the transport of litter from inlet to outfall at the study sites. The method involves spiking the inlets prior to every trigger storm event with a known set of materials that are similar to litter collected during pilot monitoring. The spike items are marked with unique identifiers for each event so that recovery can be tracked during litter characterization. Spike recovery is further discussed in Section 6 of this report.

The Study Plan additionally describes the procedures to be used for chemical water quality monitoring. Calibrated flow measurement flumes and automatic sampling equipment were used to collect flow-weighted composite samples to enable the calculation of Event Mean Concentrations (EMC) for chemical water quality constituents. Appendix B of the Study Plan presents the LMPS Monitoring Plan, which provides additional detail on both litter and chemical water quality monitoring procedures. Monitoring protocols are outlined further in Section 4 of this report.

1.3.2 Study Plan Section 3 – Selection of Test and Control Areas

The Study Plan describes the process used to identify the four final study sites, each with three BMP pairs. Each pair includes two outfalls: an outfall that drains a treatment (enhanced BMP) catchment area and an outfall that drains a control (non-enhanced BMP) catchment area. Site selection was conducted in a tiered or phased approach using database management techniques to organize and query siting information. During the initial phase, a list of 25 preliminary study

areas was developed by applying exclusionary criteria in several stages to outfalls that were identified through the review of an existing District 7 drain inlet database and Caltrans drainage system "as-built" plans. The list of 25 preliminary study areas was reduced to 7 potential areas that had inlet configurations that were considered to be representative of other District 7 configurations, areas outside major proposed Caltrans construction projects, and areas outside Caltrans environmental studies. (This latter criterion was applied to be sure that this study would not interfere with, or be interfered by, other studies that Caltrans is conducting nearby.) Detailed field reconnaissance was conducted at the remaining seven preliminary site study areas to make final study area selections. As a result, four final study sites were identified and matched with BMPs as follows:

- Site 1E – Litter Pick-Up: Eastbound Interstate 105, Post Mile (PM) 12.30 to PM 12.87
- Site 1W – Street Sweeping: Westbound Interstate 105, PM 12.87 to 12.30
- Site 6 – Structural BMP, Modified Inlet Grate: Eastbound Freeway 60, PM 15.12 to 15.58
- Site 8 – Structural BMP, LID - 1999/2000 (year 2), Bicycle Grate - 1998/1999 (year 1), Eastbound and Westbound Freeway 60, PM 5.60 to PM 5.95

Site locations are identified in Figure 1-1. Detailed site maps are provided in Section 2 of this report. The rationale for siting particular BMPs at their respective sites is provided in the Study Plan.

1.3.3 Study Plan Section 4 – BMPs to be Tested

The Study Plan outlines BMP implementation strategies for each of the three litter management practices evaluated in this study. The implementation strategies for each BMP are summarized below.

1.3.3.1 Street Sweeping

A review of municipal and commercial street sweeping equipment and practices and Caltrans freeway sweeping operations was conducted to develop a BMP implementation strategy for the LMPS. Various aspects of street sweeping were evaluated during this investigation including: equipment types, operational frequency, area of sweeping, operational variables affecting sweeping efficiency, traffic control requirements, pilot study site location, and the identification of candidate subcontractors. Caltrans routine street sweeping frequencies are based on loading criteria outlined in the Caltrans Maintenance Manual. The manual states that schedules are based on loading rates of ½ to 1 cubic yard of debris per mile. Sweeping frequencies can also be

Legend

- Final Site Areas
- Interstate Freeway
- State Freeway

N

SCALE

3 0 3 6 9

(IN MILES)

1 inch = 6 miles

Caltrans

SITE AREA LOCATIONS
CALTRANS LMPS

FIGURE 1-1

FN: DIST7A	PM: DEM	CHECKED BY:	DATE: 3-20-00	PROJECT NO: 58-977001NJ.01

adjusted in response to local aesthetics and safety considerations. The objective of the LMPS street sweeping BMP evaluation is to study the effect of increased street sweeping frequency using mechanical broom sweepers on reducing the quantity of litter that enters the Caltrans storm drain system. Based on this objective, the following BMP implementation strategy was described in the Study Plan and was implemented for the LMPS:

- Sweeping frequency – Increase the frequency of street sweeping at enhanced BMP sites. Street sweeping was conducted on a weekly basis in the enhanced BMP area and once every 4 weeks in the control BMP area.
- Swept areas – Caltrans currently conducts sweeping on shoulders, the center median, and on and off ramps. Lane sweeping is only conducted during spills or emergencies due to traffic and safety impacts. BMPs implemented during the LMPS maintained the current Caltrans practice.
- Scheduling – A majority of District 7 street sweeping is conducted between 8:30 a.m. and 3:00 p.m. Work associated with the LMPS was conducted during daytime hours, subject to restrictions based on heavy traffic hours for site-specific areas.
- Sweeper speed – Street sweeping was performed at manufacturer's recommended speeds (5 mph).
- Control conditions – Caltrans standard maintenance operations were discontinued during the study period in both the enhanced BMP and the control areas. Caltrans maintenance personnel respond to emergency street sweeping activities resulting from accidents or other circumstances, and these incidents were tracked via weekly communication with District 7 maintenance crews.
- Sweeper settings – Manufacturer's recommended practices for operation variables related to broom strike, broom material, and rear-broom coning were followed during street sweeping.

1.3.3.2 Manual Litter Pick-Up

An investigation of industry practice and District 7 Caltrans operations related to manual litter pick-up was conducted to develop a BMP implementation strategy for the LMPS. Various aspects of litter pick-up were evaluated during this investigation including resources, frequency, area of pick-up, procedures used, traffic control requirements, pilot study site location, and the identification of candidate subcontractors. Based on this evaluation, the following implementation strategy was described in the Study Plan and was implemented for the LMPS:

- Pick-up frequency – Increase the frequency of manual litter pick-up at enhanced BMP sites. At the start of the LMPS, Caltrans District 7 required a minimum frequency of 12 pick-ups per year for Adopt-A-Highway (AAH) Program participants. In some areas, AAH participants voluntarily collect litter on a more frequent basis. Litter is collected by Caltrans or Special Programs People on a minimum monthly basis in areas not covered by the AAH program. Litter pick-up frequency for the LMPS was once-per-week in the enhanced BMP area and once- per-four-weeks in the control area. Note that during the course of the LMPS, the District 7 AAH minimum required frequency has increased to two pick-ups per month and 24 pick-ups per year.

- Implementation – Caltrans District 7 litter pick-up is currently conducted by AAH participants and Special Programs People in the right-of-way (ROW) beyond the right shoulder only. Due to safety concerns, Caltrans prohibits litter pick-up on the roadway, medians, or shoulders by non-Caltrans personnel. Caltrans maintenance crews collect litter and debris in these areas on an as-needed basis. BMP implementation for the LMPS was conducted by AAH subcontractors and was therefore conducted in ROW areas only (i.e., not on paved surfaces).
- Pick-up procedures – The LMPS used procedures similar to those currently used by AAH, Special Programs, and Caltrans District 7 for litter collection. Litter pick-up was conducted in the Caltrans ROW, between the edge of pavement for the right shoulder and the ROW fence. Litter pick-up was not conducted on the roadway or median. Litter was picked up using mechanical, manually-operated, lever-actuated tongs and was placed into collection bags.

1.3.3.3 Structural Modifications to Drainage Inlets

The objective of the inlet control BMP is to reduce the amount of litter entering the storm drain system. A review of existing Caltrans standard inlet structures was conducted, and five candidate BMP alternatives were developed. Because the predominance of drain inlets in District 7 are "grate inlet" type, the original BMP alternatives were designed for this configuration as opposed to other Caltrans standards, such as curb cut inlets or k-rail opening-type inlets. The original candidate BMP alternatives included:

- a low-flow inlet with perimeter grate having small openings to trap floating litter while allowing low flows to enter the inlet;
- a litter-basket drain insert;
- a low-flow perforated plate similar to the first alternative;
- a Caltrans standard bicycle grate; and
- a synthetic whisker barrier upgradient of the inlet to trap litter.

Each alternative was rated using an evaluation matrix. The matrix included the following criteria: ease of installation; installation and maintenance cost; safety; compatibility with existing maintenance activities; safety; reliability; versatility; and flood protection. Based on this evaluation, the bicycle grate retrofit and the perforated plate retrofit were originally selected for field testing during the LMPS.

1.3.4 Study Design Modifications

One important modification was made to the LMPS after year 1 of monitoring. An alternative structural BMP was developed that was designed to substantially reduce dry weather deposition into the inlet. This new structural BMP, called the LID, consists of replacing the open grated inlet with a curb inlet containing a LID. All parties (the LMPS team, NRDC, and TAG participants) concurred that the LID retrofit had much greater potential to prohibit litter from entering the storm drain system than the bicycle grate retrofit monitored during year 1. The LID

BMP was installed in place of the bicycle grate structural BMP at Site 8. The LID structural BMP is described in further detail in Section 3.

1.4 COMMENTS

The objective of this study is specifically to evaluate the stated BMPs in a freeway environment. This study represents first-of-its-kind research in Southern California related to BMP effectiveness for litter removal in storm water systems. The principal objective of this Final Report is to present a summary of study activities, data, and results. It is important to realize that the data and conclusions reported herein are specific to Southern California freeway conditions. Therefore, use of the information reported herein should be tempered by consideration of the following caveats:

- The methodologies and the data presented herein apply strictly to small urban freeway catchments (less than one acre) and to site-specific hydrology.
- Rainfall during the 1998/1999 storm season (year 1) was approximately 50% below average for the monitored period (October – April). Rainfall during the 1999/2000 storm season (year 2) was approximately 80% of the average precipitation for the monitored period (October – March).

In addition, litter data appear to be inherently variable, and the data presented herein apply to the project-specific environment and conditions.

Data included in this report are presented in a combination of English and Metric units. All laboratory data (chemical water quality and litter) are measured and reported in metric units (e.g., liters, grams, milligrams per liter, etc.). Hydrologic data and area measurements, however, are typically presented in english units (e.g., flow in cubic feet or watershed inches, rainfall in inches, and area in acres). English units are maintained for consistency with recorded field values. Site data loggers were set to record flow and rainfall in cubic feet and inches, respectively, so that data collected could be readily compared to data from the National Weather Service and other Southern California meteorology reporting services.

The LMPS employed four field study sites, each of which was used to test and evaluate a separate BMP. Each study site included three replicate testing pairs. Each pair included two outfalls: an outfall that discharges runoff from a treatment or enhanced BMP catchment area and an outfall that discharges runoff from a control or non-enhanced BMP catchment area. Of the three outfall pairs at each site, two pairs were used to monitor only litter constituents, and one pair was used to monitor both litter and chemical water quality parameters. This section provides a general description of each site and identifies monitored outfalls. This section additionally describes litter and chemical water quality monitoring equipment used for this study.

2.1 SITE LOCATIONS AND OUTFALL DESCRIPTIONS

The four LMPS study sites are described below (a summary is provided in Table 2-1). Outfall locations and pair designations are shown on Figures 2-1 through 2-4. Photos 2-1 to 2-4 show typical conditions at each site.

- **Site 1E (Litter Pick-Up)** — Site 1E (Figure 2-1) is located on the eastbound side of I-105 (the Century Freeway), between the Gertrude Avenue overpass (PM 12.30) and the Atlantic Boulevard overpass (PM 12.87) in Lynwood, California. The freeway in this area was constructed on fill slopes that are vegetated with small shrubs, with grass and bare earth at the toe of the slope. A vegetated earthen berm is present in the ROW along the edge of the shoulder pavement. The freeway consists of four travel lanes, a high occupancy vehicle (HOV) lane, and right and median shoulders. BMP implementation was monitored using three treatment/control pairs: LP1, LP2, and LP3. The outfalls (1-B110, 1-B111, and 1-42) used to monitor the litter pick-up control area are located in the western portion of the site, between the Gertrude Avenue and Harris Avenue overpasses. The outfalls used to monitor the litter pick-up treatment area (1-44, 1-46, and 1-47) are located in the eastern portion of the site, between the Harris Avenue and the Atlantic Boulevard overpasses.
- **Site 1W (Street Sweeping)** — Site 1W (Figure 2-2) is located on the westbound side of I-105 (the Century Freeway), between the Atlantic Boulevard overpass (PM 12.87) and the Gertrude Avenue overpass (PM 12.30) in Lynwood, California. The freeway in this area was constructed on fill slopes that are vegetated with small shrubs, with grass and bare earth at the toe of slope. A vegetated earthen berm is present in the ROW along the edge of the shoulder pavement. The freeway consists of four travel lanes, an HOV lane, and right and median shoulders. BMP implementation was monitored at three treatment/control pairs: P1, P2, and P3. The outfalls used to monitor the street sweeping control area (1-51, 1-50, and 1-52) are located in the eastern portion of the site, between the Atlantic Boulevard and Harris Avenue overpasses. The outfalls used to monitor the street sweeping treatment area (1-58, 1-59, and 1-60) are located in the western portion of the site, between the Harris Avenue and Gertrude Avenue overpasses.
- **Site 6 (Modified Inlet Grate)** – Site 6 (Figure 2-3) is located on the eastbound side of State Route 60 (the Pomona Freeway) between the Turnbull Canyon undercrossing (PM 15.12) and the Kwis Street pedestrian overcrossing (PM 15.58) in Hacienda Heights, California. The freeway in this area was constructed on fill slopes. A soundwall is present at the edge of the shoulder along the length of the site. Trees overhang the top of the soundwall at several locations.

Table 2-1
FIELD STUDY SITE INFORMATION

Study Site Number	Study Site Location	Subject BMP	Monitored "Treatment" Outfalls	Monitored "Control" Outfalls	Study Pair Designation
1E	I-105 Eastbound (Lynwood) between Gertrude Ave. and Atlantic Blvd. overpass (PM12.30 to PM12.87)	Manual litter pick-up	1-47 1-46 1-44 *treatment frequency pick-up once per week	1-B110 1-42 1-B111 **control frequency pick-up once per four weeks	LP1 LP2 LP3
1W	I-105 Westbound (Lynwood) between Atlantic Blvd. and Gertrude Ave. overpass (PM12.87 to PM12.30)	Street sweepers (mechanical brooms)	1-58 1-59 1-60 *treatment frequency sweep once per week	1-52 1-50 1-51 **control frequency sweep once per four weeks	P1 P2 P3
6	Freeway 60, Pomona freeway (Hacienda Heights) between Turnbull Canyon undercrossing and Kwis St. overcrossing (PM 16.12 to PM 15.58)	Modified inlet grate (option A – perforated steel plate)	6-20H 6-20F 6-20B *treatment employs perforated plate on inlets	6-20G 6-20E 6-20C **control employs standard grate inlet	P1 P2 P3
8	Freeway 60, Pomona freeway (Montebello and Monterey Park) between Garfield Ave. undercrossing and Fulton Ave. (PM 5.60 to PM 5.95)	LID (1999/2000) Bicycle grate (1998/1999)	8-B001 8-24B 8-24F *treatment employs the BMP at inlets	8-23C 8-24D 8-24E **control employs standard grate inlet	P1 P2 P3

The freeway consists of five travel lanes and a right shoulder. BMP implementation was monitored at three treatment/control pairs: P1, P2, and P3. Outfalls and catchment areas for these pairs are located sequentially from west to east along the freeway. Outfall locations and pair designations are shown on Figure 2-3.

- **Site 8 (LID – 1999/2000, Bicycle Grate – 1998/1999)** — Site 8 (Figure 2-4) is located on the eastbound and westbound sides of State Route 60 (the Pomona Freeway) between Garfield Avenue undercrossing (PM 5.60) and Fulton Avenue (PM 5.95) in Montebello and Monterey Park, California. The freeway in this area was constructed on fill slopes that are vegetated with large shrubs and trees, with grass at the toe of slope. A guardrail is present along the edge of the shoulder pavement. The freeway consists of four travel lanes and right and median shoulders. BMP implementation was monitored at three treatment/control pairs. P1 (Outfalls B001 and 23C) is located on the westbound side of the freeway, whereas P2 (Outfalls 24B and 24D) and P3 (Outfalls 24E and 24F) are located on the eastbound side of the freeway. Outfall locations and pair designations are shown on Figure 2-4.

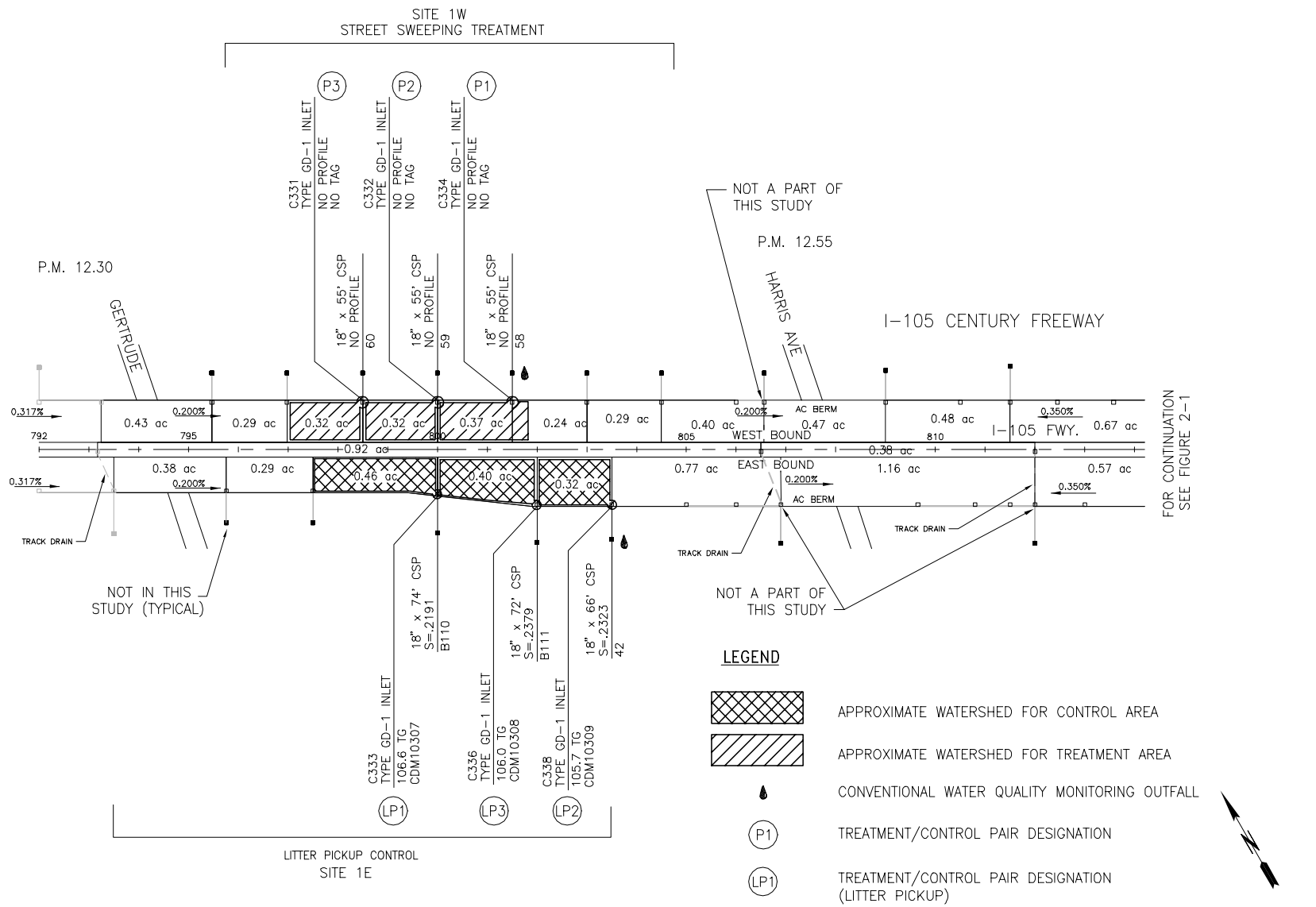

NOTE:
LMPS CATCHMENT AREAS ARE DERIVED FROM CALTRANS AS-BUILTS ADJUSTED AS APPROPRIATE FOLLOWING FIELD RECONNAISSANCE (JUNE 2-3, 1999). SCALED FREEWAY WIDTHS ON DRAWING MAY NOT REPRESENT ACTUAL CONDITIONS.

Caltrans

SITE 1
CALTRANS LMPS

FN: SITE1-1B	PM: DEM	CHECKED BY:	DATE: 5-12-00	PROJECT NO: 58-977001NJ.01

FIGURE 2-1

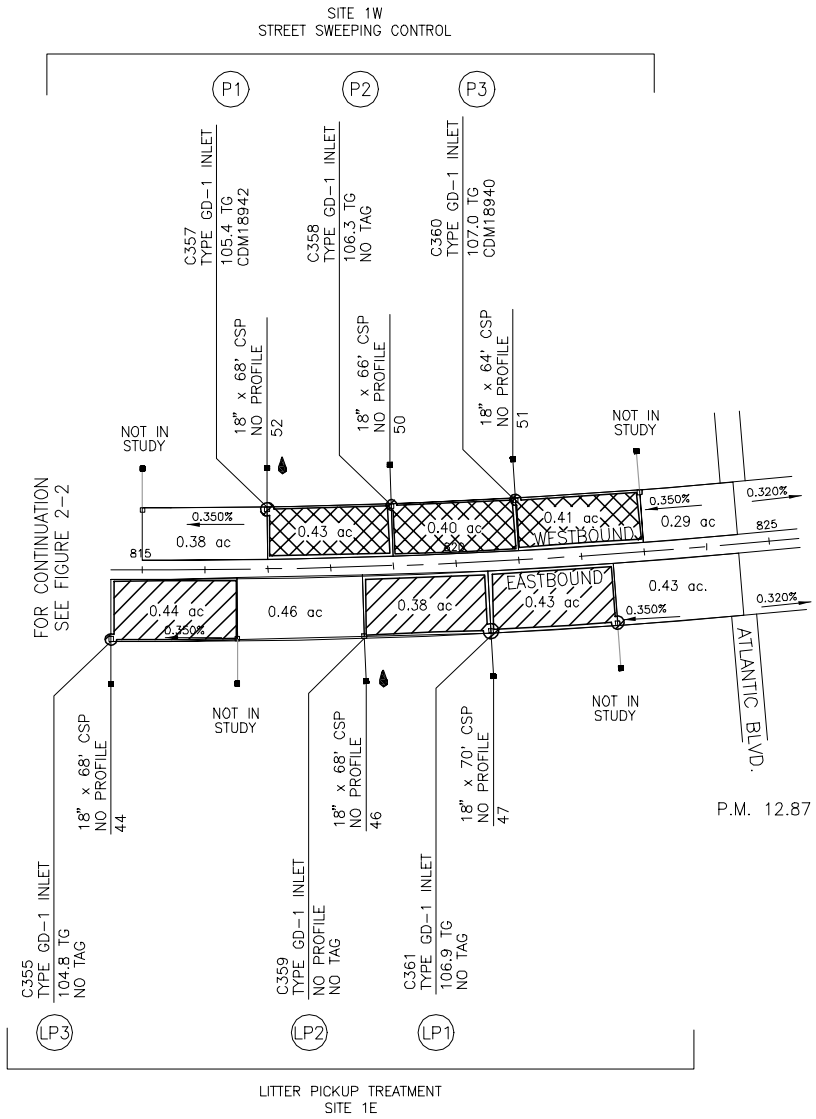

I-105 CENTURY FREEWAY

LEGEND

- APPROXIMATE WATERSHED FOR CONTROL AREA
- APPROXIMATE WATERSHED FOR TREATMENT AREA
- CONVENTIONAL WATER QUALITY MONITORING OUTFALL
- (P1) TREATMENT/CONTROL PAIR DESIGNATION
- (LP1) TREATMENT/CONTROL PAIR DESIGNATION (LITTER PICKUP)

0 300 600

APPROXIMATE GRAPHIC SCALE (FEET)

NOTE:
LMPS CATCHMENT AREAS ARE DERIVED FROM CALTRANS AS-BUILTS ADJUSTED AS APPROPRIATE FOLLOWING FIELD RECONNAISSANCE (JUNE 2-3, 1999). SCALED FREEWAY WIDTHS ON DRAWING MAY NOT REPRESENT ACTUAL CONDITIONS.

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SITE 1
CALTRANS LMPS

FIGURE 2-2

FN: SITE1-02	PM: DEM	CHECKED BY:	DATE: 5-12-00	PROJECT NO: 58-977001NJ.01

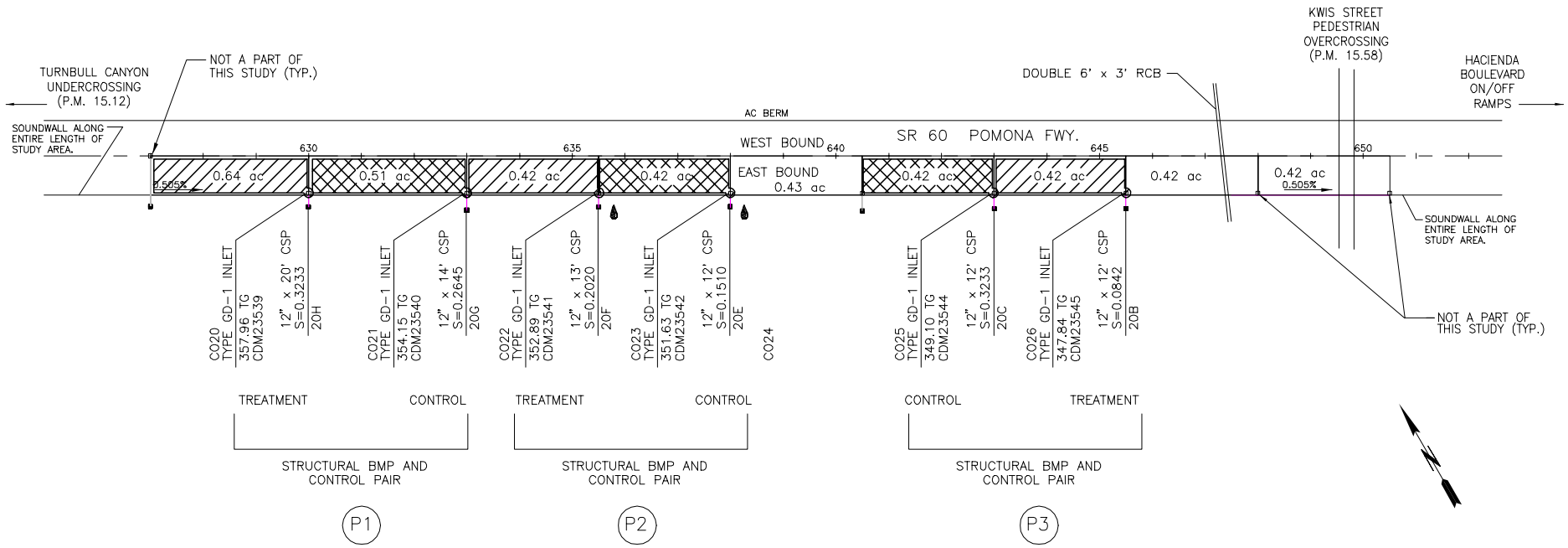

STRUCTURAL BMP – MODIFIED INLET GRATE

LEGEND

- APPROXIMATE WATERSHED FOR CONTROL AREA
- APPROXIMATE WATERSHED FOR TREATMENT AREA
- CONVENTIONAL WATER QUALITY MONITORING OUTFALL
- (P1) TREATMENT/CONTROL PAIR DESIGNATION

0 300 600

APPROXIMATE GRAPHIC SCALE (FEET)

NOTE:
LMPS CATCHMENT AREAS ARE DERIVED FROM CALTRANS AS-BUILTS ADJUSTED AS APPROPRIATE FOLLOWING FIELD RECONNAISSANCE (JUNE 2-3, 1999). SCALED FREEWAY WIDTHS ON DRAWING MAY NOT REPRESENT ACTUAL CONDITIONS.

Caltrans

SITE 6
CALTRANS LMPS

FIGURE 2-3

FN: SITE6-1B	PM: DEM	CHECKED BY:	DATE: 5-12-00	PROJECT NO: 58-977001NJ.01

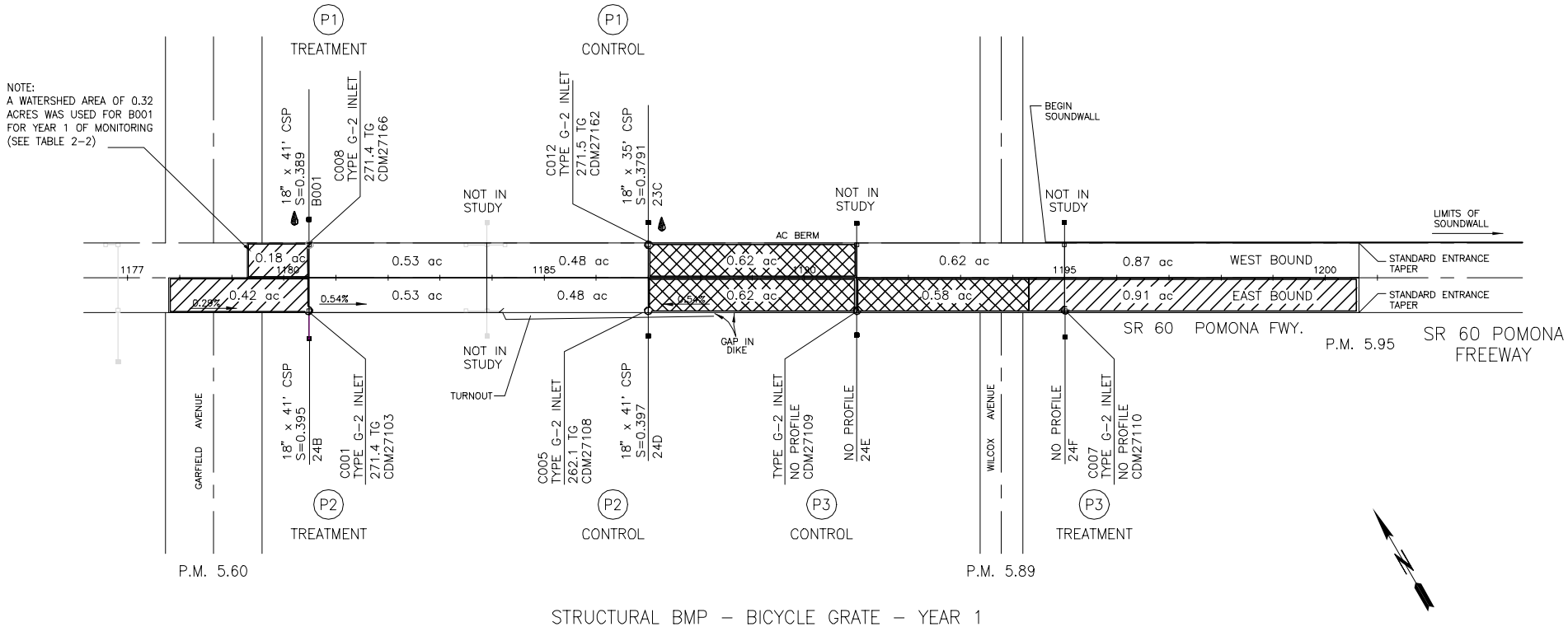

STRUCTURAL BMP – BICYCLE GRATE – YEAR 1
LITTER INLET DEFLECTOR (LID) – YEAR 2

LEGEND

- APPROXIMATE WATERSHED FOR CONTROL AREA
- APPROXIMATE WATERSHED FOR TREATMENT AREA
- CONVENTIONAL WATER QUALITY MONITORING OUTFALL
- (P1) TREATMENT/CONTROL PAIR DESIGNATION

0 300 600
APPROXIMATE GRAPHIC SCALE (FEET)

Caltrans

SITE 8
CALTRANS LMPS

FN: SITE8	PM: DEM	CHECKED BY:	DATE: 5-23-00	PROJECT NO: 58-977001NJ.01

FIGURE 2-4

Photo 2–1
Typical Freeway and Shoulder Conditions–Site 1E (Litter Pick-Up)

Photo 2–2
Typical Freeway and Shoulder Conditions–Site 1W (Street Sweeping)

Photo 2–3
Typical Freeway and Shoulder Conditions–Site 6 (Modified Inlet Grate)

Photo 2–4
Typical Freeway and Shoulder Conditions–Site 8 (LID-1999/2000; Bicycle Grate-1998/2000)

Table 2-2 presents estimated catchment areas and pair designations for outfalls at each site and designates which outfalls are monitored for chemical water quality constituents. Two sets of estimated catchment area values are presented in Table 2-2. One set represents the initial estimate, which was based on an interpretation of Caltrans as-built drawings. The second set represents adjusted values, which reflect the findings from the following: a focused field reconnaissance conducted on June 2–3, 1999, year 2 wet weather field observations, and final hydrologic data analysis.

During development of the Study Plan, catchment areas were estimated, based primarily on information shown on as-built engineering drawings. Additional field reconnaissance was conducted after year 1 of monitoring, because analysis of site hydrologic data for some catchment areas yielded runoff coefficients that were unusual for freeway pavement conditions. As a result, the LMPS team suspected that watershed sizes (i.e., the actual drainage areas) may be different from those originally estimated from the as-built drawings. Field reconnaissance was conducted to further define catchment sizes and to look for pavement conditions or other features that could explain unexpected runoff coefficients. Some catchment areas were adjusted as a result of field investigations and hydrologic data were re-analyzed, yielding more realistic runoff coefficients. Additional wet-weather field observations were conducted during year 2 of monitoring to confirm runoff patterns in Site 1 and Site 8 catchments. These observations were conducted during 4 events (1990-05, 1999-08, 1999-11, 1999-12). In general, adjusted catchment areas were confirmed by wet weather observations. Based on year 2 hydrologic data analysis and wet weather observations, the catchment area at B001 was adjusted to 0.18 acres, and the catchment areas at 24E and 24F were adjusted to 0.58 acres and 0.91 acres, respectively. Summaries of both dry and wet weather field investigation findings are presented in Appendix A.

2.2 MONITORING EQUIPMENT

As indicated above, some outfalls were monitored for litter-only, whereas others were monitored for both litter and chemical water quality constituents. Equipment installed at each type of monitoring outfall is described in the following subsections.

2.2.1 Litter Monitoring Equipment

The litter monitoring device used at all outfalls consists of a ¼-inch mesh bag that is attached to a metal collar at the outfall via a web strap. Metal collars were designed and fabricated to site-specific specifications (i.e., tailored for pipe diameter and outfall type). Two primary types of collars were installed; one type attached to an existing corrugated metal pipe at flared-end sections and one type attached to circular pipe headwalls. Litter bags with ¼-inch mesh were manufactured specifically for the study. Nylon belt straps were used to secure the litter mesh bags to the metal collars. Buckle straps were chosen for their ease of removal in case of emergency. For each of the 16 outfalls monitored for litter only, a chain-link protective enclosure was constructed to surround the outfall. A typical litter-only monitoring station is shown in Photos 2-5 and 2-6.

Table 2–2
ESTIMATED WATERSHED AREAS AND PAIR DESIGNATIONS FOR LMPS OUTFALLS

Site	Best Management Practice (BMP)	Outfall Pair		Outfall	Estimated Watershed Area (ac) Based on As-Builts Only	Final Estimated Watershed Area (ac)[1]
1 East	Litter Pick-up	LP1	Control	B-110	0.42	0.46
			Treatment	47	0.46	0.43
		LP2[2]	Control	42	0.34	0.32
			Treatment	46	0.46	0.38
		LP3	Control	B111	0.41	0.40
			Treatment	44	0.46	0.44
1 West	Street Sweeping	P1[2]	Control	52	0.38	0.43
			Treatment	58	0.29	0.32
		P2	Control	50	0.38	0.40
			Treatment	59	0.29	0.32
		P3	Control	51	0.38	0.41
			Treatment	60	0.29	0.32
6	Modified Inlet	P1	Control	20G	0.51	0.51
			Treatment	20H	0.51	0.64
		P2[2]	Control	20E	0.42	0.42
			Treatment	20F	0.42	0.42
		P3	Control	20C	0.42	0.42
			Treatment	20B	0.42	0.42
8	LID (1999/2000)	P1[2]	Control	23C	0.62	0.62
			Treatment	B001	0.57	0.32/0.18[3]
		P2	Control	24D	0.62	0.62
	Bicycle Grate (1998/1999)		Treatment	24B	0.57	0.42
		P3	Control	24E	0.62	0.58
			Treatment	24F	0.62	0.91

1 Final estimated watershed areas are based on previous estimates and revisions due to wet weather observations and final hydrologic analysis.

2 Outfalls monitored for chemical water quality constituents.

3 0.32 acres used in evaluation of year 1 bicycle grate retrofit. 0.18 acres used in evaluation of year 2 LID retrofit. Adjustment resulting from non-study related changes to pavement conditions at Site 8 prior to year 2 monitoring.

Photo 2–5
Typical Litter Monitoring Bag at Outfall

Photo 2–6
Litter Monitoring Station with Fence Enclosure

2.2.2 Chemical Water Quality Monitoring Equipment

Eight of the 24 study outfalls were monitored for chemical water quality constituents in addition to litter. These outfalls are shown on Figures 2-1 through 2-4. At these stations, samples were collected on a flow-weighted basis via automatic sampling equipment. The following equipment was installed at each of these sites: a custom H-flume with a bubbler flow-meter; a tipping-bucket rain gauge; an automatic sampler and data logger; and an equipment enclosure. A detailed list of components installed at each site is provided in Table 2-3. In addition to components listed in Table 2-3, sites were also outfitted with the litter monitoring equipment described in Section 2.2.1. The litter bags used at the chemical water quality monitoring outfalls were modified to include a Velcro™ grab-sampling port at the top of each bag. A typical chemical water quality monitoring station is shown in Photo 2–7. Equipment installed in an enclosure is shown in Photo 2–8.

2.3 EQUIPMENT INSTALLATION

Monitoring equipment was installed from October 13, 1998 to October 23, 1998. Site preparation activities preceded the actual installation of litter monitoring and water monitoring equipment. Site preparation and equipment installation activities are described below.

Site Preparation Work

The following site preparation work was conducted between September 21, 1998 to October 8, 1998:

- Removal and proper disposal of vegetation (small trees, shrubs, and weeds) at designated outfalls;
- Soil grading and contouring to level water-quality monitoring sites and provide for proper drain pipe discharge;
- Truncation of existing 12-inch corrugated metal pipe (CMP) at Site 6, Outfalls 20E and 20F;
- Installation of concrete slabs for flume foundations and equipment enclosures;
- Installation of equipment enclosures onto the concrete slabs at each chemical water quality monitoring location;
- Installation of rain gauge pole, solar panel pole, and solar panels at each chemical water quality monitoring location;
- Installation of 8-foot-high perimeter security fences each with 4-foot-wide walk gates at each chemical water quality monitoring location; and
- Installation of protective chain-link fence enclosures at 16 litter monitoring outfalls.

Table 2–3
CHEMICAL WATER QUALITY EQUIPMENT COMPONENTS

Equipment Manufacturer	Part No.	Quantity	Description
FLOW METER			
American Sigma	2672	8	Sigma 950 bubbler flow meter with graphics display
	2921	2	Vinyl bubble tubing, 1/8-inch ID x 100 feet
	2900	8	Bubble tube mounting plate with holes
	1414	16	Battery, gel electrolyte, 12 VDC, 6 amp-hr
	1602	8	Modem, 14,400 baud
	2666	8	Rain gauge input
	940	8	Multi-purpose full cable, 10 feet, 6 pin connector both ends
AUTOMATED SAMPLER			
American Sigma	8925	8	SIGMA 900 portable sampler controller with cover
	8976	8	Standard insulated base for SIGMA 900 sampler
	1414	16	Battery, gel electrolyte, 12 VDC, 6 amp-hr
	1118	24	Bottles, set of (8) 1.9 liter glass with caps (for standard base)
	1422	8	Retainer for (8) 1.9 liter glass bottles
	8584	8	Distributor with arm for 8 bottle standard base
	925	3	Teflon lined polyethylene tubing 3/8 inch x 100 feet
	2186	8	Connection kit for Teflon lined polyethylene tubing
	2071	8	Strainer for shallow depth applications, 316 stainless steel
RAIN GAUGE			
American Sigma	2149	8	Rain Gauge with 25 feet cable and base mounting plate
	0003	8	Junction box to connect rain gauge leads to flowmeter
TELEMETRY / MISC			
American Sigma	5120	8	Cellular phone option (with phone)
	1760	4	Charger, 5 station, 115 VAC for gel electrolyte
	0003	8	Solar power panel custom wired and sized with 75 foot cable
	3975	1	Insight and Vision Software on 3.5” Disk
ENCLOSURE			
American Sigma	6989	4	Weatherguard enclosure (full size, walk-in)
Hoffman Industrial	A-691	4	Industrial Enclosure
FLUME			
Corrosion Control	--	8	1.5-ft. Custom H-Flumes

Photo 2–7
Chemical Water Quality Monitoring Station

Photo 2–8
Enclosure with Automatic Sampler, Battery, Cell Phone, and Data Logger for Chemical Water Quality Monitoring

Access Gate Installation

Four access gates (4-foot-wide) were installed in the Caltrans ROW fence in accordance with Caltrans Standard Specifications Section 80, Fences, Caltrans Standard Plans A85, as part of the installation effort.

Removal and Disposal of Vegetation (Small Trees, Shrubs, and Weeds)

Site 6 required the removal of vegetation prior to installation of litter and water-quality monitoring equipment. Outfalls 20B, 20C, 20G, and 20H are litter monitoring outfalls, and each required clearing of vegetation and sediment surrounding the flared end outfalls. These outfalls required excavation to prepare the site, and the surrounding soil was contoured to minimize ponding of discharge at the mouth of the outfall.

Site 6 — Outfalls 20E and 20F are both litter and water-quality monitoring outfalls, and required some removal of vegetation consisting of shrubs, bushes, and small trees. Vegetation was cut back and removed as necessary to perform grading and leveling within the footprint required for protective perimeter fencing.

Installation of Solar Panel and Mounting Pole

A 12-foot galvanized steel pole (for solar panel mounting) embedded into 2 feet of concrete (10-foot finished height) was installed at Site 8 - Outfalls B001 and 23C, and Site 1 - Outfalls 52 and 58. For these four outfalls, solar panels were set on the embankment adjacent to the freeway shoulder.

The remaining 4 outfalls requiring solar panels, Site 6 - Outfalls 20E and 20F, and Site 1 - Outfalls 42 and 46, all face the southerly direction. These solar panels were set within the limits of the perimeter fenced area with directional settings aimed to capture the most sunlight. After each pole was set, solar panels were then mounted at the top of the poles, and wiring was routed back to the equipment enclosure encased in ¾-inch outdoor-rated conduit.

Installation of Perimeter Fence with Gate

At each of the eight water-quality monitoring outfall locations, a 6-foot-high galvanized chain-link fence and 4-foot-wide gates were installed. Installation was completed according to Caltrans Standard Specifications, Section 80 - Fences, and Caltrans Standard Plan A85.

Chain-Link Fence Enclosures — Litter Monitoring Outfalls

Sixteen chain-link protective enclosures with locking mechanisms were installed at designated outfalls. The chain-link enclosures were constructed with galvanized hardware, posts, and chain-link. The posts were placed at a minimum of 2 feet below grade and set in concrete footings.

For Site 8 — Outfalls 24B, 24D, 24E, and 24F, located in the City of Montebello, the enclosures were surface mounted on a concrete pad approximately 88 inches wide and 60 inches long. For

the remaining 12 sites with natural ground at drainage outfalls, crushed stone was placed at 3-inch-depth within the limits of the fenced enclosure.

Litter Monitoring Equipment Installation

All 16 litter metal collars were installed between September 28, 1998 and October 2, 1998. Litter mesh bags were strapped onto the metal collars for litter monitoring commencing on October 2, 1998.

Chemical Water Quality Monitoring Equipment

Equipment installation for the 8 chemical water quality monitoring sites was completed from October 13 to October 23, 1998. Custom designed H-flumes were also installed during this period. An American Sigma technical specialist field-tested and verified the water sampling equipment installation from October 27 to October 30, 1998.

BMPs related to three litter management practices were implemented in conjunction with the LMPS. These BMPs are: street sweeping, manual litter pick-up, and structural modifications to drainage inlets. Street sweeping and manual litter removal do not require structural modifications to the storm water conveyance system and are, therefore, referred to as "non-structural" BMPs. This section outlines BMP implementation for each of the three litter management methods. This section additionally discusses drain inlet cleaning conducted at study outfalls and tracking of Caltrans maintenance activities potentially affecting the LMPS.

3.1 INLET CLEANING

To provide a baseline "clean" condition for portions of the freeway drainage systems monitored in this study, each of the 24 inlet/outfall piping systems was cleaned prior to the start of BMP implementation. Cleaning was conducted by United Pumping from September 30, 1998 through October 2, 1998 using a wet jetting method from the outfall side of the drainage system. The wet jetting method generated co-mingled sediment/cleaning water residuals that were collected at the outfall by a vactor truck. The portions of freeway drainage systems monitored in this study consist of single inlets connected to a single outfall by a short section of corrugated metal pipe. Subsequent to cleaning, it was possible to look into the outfall pipes and visually see each corresponding inlet. Therefore, no additional investigative methods (e.g., subsurface video inspection) were necessary to verify that the systems were free of obstructions. A photo of a typical drainage system being cleaned is provided in Photo 3-1.

Inlet cleaning was also conducted at Sites 6 and 8 prior to the onset of the first rain event for year 2 monitoring. At Site 8, inlets and pipelines were cleaned prior to (September 16, 1999) and at the completion of (October 1, 1999) construction activities associated with the installation of the LID

Photo 3–1
Pipeline Cleaning Using Wet Jetting Method and Vactor Hose

structural retrofit. Cleaning involved removing inlet debris manually and placing debris in bags labeled by inlet/outfall number. Pipelines were then cleaned by dry methods by pulling a "train" of connected chimney brushes through the pipes (from inlet to outfall). A minimum of two passes were made through the pipes with the brush train. Inlet and pipe debris collected prior to construction was sent to the litter lab for analysis, representing the final set of data collected for the bicycle grate retrofit BMP. After construction, Site 8 inlets and pipes were cleaned, using the above manual methods to establish baseline clean conditions for evaluation of the LID BMP. Inlet debris collected after the construction period was not retained for analysis.

At Site 6, inlets were cleaned on October 26, 1999 as a result of a substantial amount of debris accumulation in study inlets (predominantly leaves and vegetation). Debris depth measurements performed in early October 1999 indicated that the buildup of debris was within 6 inches of the top of the grate at several inlets. Inlets were cleaned only to avoid full inlet conditions that could prohibit deposition or cause hydraulic or outfall monitoring problems. Debris from the six inlets was removed manually, placed in labeled bags, and sent to the litter lab for analysis. As a result of the substantial debris accumulation at Site 6, a LMPS cleanout criteria was established, such that all inlets at a site would be cleaned if any one inlet had accumulation depths less than one foot below the inlet grate.

At the conclusion of year 2 of monitoring, all study inlets and pipes were cleaned by dry methods described for Site 8 above. Debris was transported to the Santa Ana litter lab for analysis.

3.2 STREET SWEEPING - SITE 1W

3.2.1 BMP Implementation Strategy

The street sweeping BMP was conducted at Site 1W. Three replicate outfalls were located in the enhanced BMP (treatment) area. This consisted of a contiguous stretch of the I-105 freeway that extends from the Harris Avenue overpass to the Gertrude Avenue overpass (approximately ¼ mile long). Three replicate outfalls were located in the control area, a contiguous stretch of freeway from the Atlantic Boulevard overpass to the Harris Avenue overpass (also approximately ¼ mile long). The LMPS street sweeping BMP was implemented in these areas as follows:

- Street sweeping was conducted on a weekly basis in the enhanced BMP (treatment) area and once every 4 weeks in the control BMP area.
- Street sweeping was conducted by a contractor using a Mobil M-8A mechanical broom sweeper (Photo 3-2). Manufacturer's recommended practice for street sweeper operational parameters including broom strike, coning, and sweeper speed (5 miles per hour) were followed during the LMPS.
- Sweeping was conducted on the shoulder and median only. There are no on- or off-ramps in the study area, and travel lanes are not typically swept by Caltrans.

Photo 3–2
Mechanical Broom Sweeper

- Street sweeping activities that would normally be conducted by District 7 maintenance were discontinued in the treatment and control areas during the two-year study period. However, Caltrans maintenance personnel were still responsible for responding to emergency street sweeping activities resulting from accidents or other circumstances.
- Sweeping was conducted between 9am and 3pm but was not conducted during rain or any weather with reduced visibility.

Dates and corresponding sweeping locations (i.e., treatment vs. control) are listed in Table 3-1. An inspector accompanied the street sweeper (operated by a contractor) during all sweeping events to ensure that manufacturer's recommended practices were followed, as well as to ensure that sweeping was conducted in the appropriate location each week. Sweeping inspection was documented each week. A sample inspection form is provided in Appendix B.

3.3 MANUAL LITTER PICK-UP – SITE 1E

3.3.1 Manual Litter Pick-Up BMP Implementation Strategy

- The litter pick-up BMP was conducted at Site 1E, located on the eastbound side of the 105 Freeway in Lynwood, between the Gertrude Avenue overpass and the Atlantic Boulevard overpass. Three replicate outfalls were located in the enhanced BMP (treatment) area, a contiguous stretch of freeway that extends from the Harris Avenue overpass to the Atlantic Boulevard overpass (approximately ¼ mile long). Three replicate outfalls were located in the control area, a contiguous stretch of freeway that extends from the Gertrude Avenue overpass to the Harris Avenue overpass (also approximately ¼ mile long).

Table 3–1
Sites 1W and 1E
NON-STRUCTURAL BMP IMPLEMENTATION
October 1998 – March 2000

	Street Sweeping - Site 1W		Litter Pick-Up - Site 1E	
Week No.	Date	Implementation	Date	Implementation
1	10/7/98	Control (Atlantic to Gertrude)	10/6/98	Control (Gertrude to Atlantic)
2	10/15/98	Treatment (Harris to Gertrude)	10/13/98	Treatment(Harris to Atlantic)
3	10/22/98	Treatment (Harris to Gertrude)	10/20/98	Treatment(Harris to Atlantic)
4	10/29/98	Treatment (Harris to Gertrude)	10/27/98	Treatment(Harris to Atlantic)
5	11/5/98	Control (Atlantic to Gertrude)	11/3/98	Control (Gertrude to Atlantic)
6	11/12/98	Treatment (Harris to Gertrude)	11/10/98	Treatment(Harris to Atlantic)
7	11/19/98	Treatment (Harris to Gertrude)	11/17/98	Treatment(Harris to Atlantic)
8	11/25/98	Treatment (Harris to Gertrude)	11/24/98	Treatment(Harris to Atlantic)
9	12/2/98	Control (Atlantic to Gertrude)	12/2/98	Control (Gertrude to Atlantic)
10	12/11/98	Treatment (Harris to Gertrude)	12/8/98	Treatment(Harris to Atlantic)
11	12/17/98	Treatment (Harris to Gertrude)	12/15/98	Treatment(Harris to Atlantic)
12	12/23/98	Treatment (Harris to Gertrude)	12/22/98	Treatment(Harris to Atlantic)
13	12/29/98	Control (Atlantic to Gertrude)	12/29/98	Control (Gertrude to Atlantic)
14	1/7/99	Treatment (Harris to Gertrude)	1/5/99	Treatment(Harris to Atlantic)
15	1/14/99	Treatment (Harris to Gertrude)	1/12/99	Treatment(Harris to Atlantic)
16	1/20/99	Rain Cancellation	1/19/99	Treatment(Harris to Atlantic)
17	1/28/99	Control (Atlantic to Gertrude)	1/27/99	Treatment(Harris to Atlantic)
18	2/4/99	Treatment (Harris to Gertrude)	2/2/99	Control (Gertrude to Atlantic)
19	2/11/99	Treatment (Harris to Gertrude)	2/11/99	Treatment (Harris to Atlantic)
20	2/18/99	Treatment (Harris to Gertrude)	2/16/99	Treatment (Harris to Atlantic)
21	2/25/99	Control (Atlantic to Gertrude)	2/23/99	Treatment (Harris to Atlantic)
22	3/4/99	Treatment (Harris to Gertrude)	3/2/99	Control (Gertrude to Atlantic)
23	3/11/99	Treatment (Harris to Gertrude)	3/9/99	Treatment (Harris to Atlantic)
24	3/18/99	Treatment (Harris to Gertrude)	3/16/99	Treatment (Harris to Atlantic)
25	3/26/99	Control (Atlantic to Gertrude)	3/23/99	Treatment (Harris to Atlantic)
26	4/1/99	Treatment (Harris to Gertrude)	3/30/99	Control (Gertrude to Atlantic)
27	4/8/99	Treatment (Harris to Gertrude)	No Pick-up	Contractor Scheduling Error
28	4/15/99	Treatment (Harris to Gertrude)	4/14/99	Treatment (Harris to Atlantic)
29	4/22/99	Control (Atlantic to Gertrude)	4/21/99	Treatment (Harris to Atlantic)
30	4/29/99	Treatment (Harris to Gertrude)	4/27/99	Treatment (Harris to Atlantic)
31	5/6/99	Treatment (Harris to Gertrude)	5/4/99	Control (Gertrude to Atlantic)
32	5/14/99	Treatment (Harris to Gertrude)	5/11/99	Treatment (Harris to Atlantic)
33	5/20/99	Control (Atlantic to Gertrude)	5/18/99	Treatment (Harris to Atlantic)
34	5/27/99	Treatment (Harris to Gertrude)	5/25/99	Treatment (Harris to Atlantic)
35	6/30/99	Treatment (Harris to Gertrude)	6/01/99	Control (Gertrude to Atlantic)
36	6/10/99	Treatment (Harris to Gertrude)	6/08/99	Treatment(Harris to Atlantic)
37	6/17/99	Control (Atlantic to Gertrude)	6/15/99	Treatment(Harris to Atlantic)
38	6/24/99	Treatment (Harris to Gertrude)	6/22/99	Treatment(Harris to Atlantic)

Table 3–1 (Continued)
NON-STRUCTURAL BMP IMPLEMENTATION
October 1998 – March 2000

	Street Sweeping - Site 1W		Litter Pick-Up - Site 1E	
Week No.	Date	Implementation	Date	Implementation
39	7/1/99	Treatment (Harris to Gertrude)	6/29/99	Control (Gertrude to Atlantic)
40	7/8/99	Treatment (Harris to Gertrude)	7/13/99	Treatment(Harris to Atlantic)
41	7/15/99	Control (Atlantic to Gertrude)	7/13/99	Treatment(Harris to Atlantic)
42	7/22/99	Treatment (Harris to Gertrude)	7/20/99	Treatment(Harris to Atlantic)
43	7/30/99	Treatment (Harris to Gertrude)	7/27/99	Control (Gertrude to Atlantic)
44	8/6/99	Treatment (Harris to Gertrude)	8/3/99	Treatment(Harris to Atlantic)
45	8/13/99	Control (Atlantic to Gertrude)	8/10/99	Treatment(Harris to Atlantic)
46	8/20/99	Treatment (Harris to Gertrude)	8/17/99	Treatment(Harris to Atlantic)
47	8/27/99	Treatment (Harris to Gertrude)	8/24/99	Control (Gertrude to Atlantic)
48	9/3/99	Treatment (Harris to Gertrude)	8/31/99	Treatment(Harris to Atlantic)
49	9/10/99	Control (Atlantic to Gertrude)	9/7/99	Treatment(Harris to Atlantic)
50	9/17/99	Treatment (Harris to Gertrude)	9/14/99	Treatment(Harris to Atlantic)
51	9/24/99	Treatment (Harris to Gertrude)	9/21/99	Control (Gertrude to Atlantic)
52	10/1/99	Treatment (Harris to Gertrude)	9/28/99	Treatment (Harris to Atlantic)
53	10/8/99	Control (Atlantic to Gertrude)	10/5/99	Treatment (Harris to Atlantic)
54	10/15/99	Treatment (Harris to Gertrude)	10/12/99	Treatment (Harris to Atlantic)
55	10/22/99	Treatment (Harris to Gertrude)	10/19/99	Control (Gertrude to Harris)
56	10/29/99	Treatment (Harris to Gertrude)	10/26/99	Treatment (Harris to Atlantic)
57	11/4/99	Control (Atlantic to Gertrude)	11/2/99	Treatment (Harris to Atlantic)
58	11/12/99	Treatment (Harris to Gertrude)	11/9/99	Treatment (Harris to Atlantic)
59	11/18/99	Treatment (Harris to Gertrude)	11/16/99	Control (Gertrude to Harris)
60	11/24/99	Treatment (Harris to Gertrude)	11/23/99	Treatment (Harris to Atlantic)
61	12/2/99	Control (Atlantic to Gertrude)	11/30/99	Treatment (Harris to Atlantic)
62	12/9/99	Treatment (Harris to Gertrude)	12/7/99	Treatment (Harris to Atlantic)
63	12/16/99	Treatment (Harris to Gertrude)	12/14/99	Control (Gertrude to Atlantic)
64	12/23/99	Treatment (Harris to Gertrude)	12/21/99	Treatment (Harris to Atlantic)
65	12/29/99	Control (Atlantic to Gertrude)	12/28/99	Treatment (Harris to Atlantic)
66	1/6/00	Treatment (Harris to Gertrude)	1/4/00	Treatment (Harris to Atlantic)
67	1/13/00	Treatment (Harris to Gertrude)	1/11/00	Control (Gertrude to Atlantic)
68	1/20/00	Treatment (Harris to Gertrude)	1/18/00	Treatment (Harris to Atlantic)
69	1/27/00	Control (Atlantic to Gertrude)	1/26/00	Treatment (Harris to Atlantic)
70	2/3/00	Treatment (Harris to Gertrude)	2/1/00	Treatment (Harris to Atlantic)
71	2/11/00	Treatment (Harris to Gertrude)	2/8/00	Control (Gertrude to Atlantic)
72	2/18/00	Control (Atlantic to Gertrude)	2/15/00	Treatment (Harris to Atlantic)
73	2/24/00	Treatment (Harris to Gertrude)	2/22/00	Treatment (Harris to Atlantic)
74	3/02/00	Treatment (Harris to Gertrude)	2/29/00	Treatment (Harris to Atlantic)
75	3/10/00	Treatment (Harris to Gertrude)	3/07/00	Control (Gertrude to Atlantic)
76	3/16/00	Control (Atlantic to Gertrude)	3/14/00	Treatment (Harris to Atlantic)
77	3/23/00	Treatment (Harris to Gertrude)	3/21/00	Treatment (Harris to Atlantic)

Table 3–1 (Continued)
NON-STRUCTURAL BMP IMPLEMENTATION
October 1998 – March 2000

	Street Sweeping - Site 1W		Litter Pick-Up - Site 1E	
Week No.	Date	Implementation	Date	Implementation
78			3/28/00	Treatment (Harris to Atlantic)

The LMPS litter pick-up BMP was implemented in the above-described areas using the following strategy (as outlined in the Study Plan):

- Standard practice in District 7 was for litter pick-up to be conducted by one of the following labor resources (AAH program participants, Special Programs People, and Caltrans staff). District 7 requires AAH participants to conduct pick-up in 2-mile freeway segments. Information obtained during the literature review for the LMPS (Woodward Clyde, 1997) indicates that increased litter frequency may achieve a reduction in the amount of freeway litter available to be transported to drainage inlets. Therefore, increased frequency of pick-up was selected for evaluation. Litter pick-up was conducted once-per-week in the enhanced BMP area and once-per-four-weeks in the control area. Note that at the start of the LMPS, Caltrans District 7 AAH permits required litter pick-up 12 times per year and the required frequency has since been increased to 24 times per year (2 pick-ups per month).
- The litter pick-up BMP was conducted only in those portions of the freeway ROW that extend beyond the limits of paved shoulder areas. Due to safety concerns, Caltrans District 7 prohibits litter pick-up on the roadway, medians, or shoulders by non-Caltrans personnel. Caltrans maintenance crews collect litter and debris on the roadway and the shoulders on an as-needed basis.
- The litter pick-up BMP used litter collection practices similar to standard practices utilized by AAH contractors, Special Programs People, and Caltrans District 7 staff. Litter was picked up (using mechanical, manually-operated, lever-actuated tongs) and was placed into collection bags. Litter too small to be collected by tongs (e.g., a cigarette butt) was not picked up.

Dates and corresponding litter pick-up locations (i.e., treatment vs. control) are listed in Table 3-1. The litter pick-up BMP was initiated on October 6, 1998 with pick-up being conducted in both the enhanced BMP and the control areas. During the initial implementation, inspectors were present during pick-up to verify implementation location and observe methods used by the subcontractor, Adopt-a-Highway Maintenance Corporation (AAHMC). Throughout study implementation, the litter pick-up area was inspected on a weekly basis in conjunction with street sweeping inspection to confirm that litter pick-up had been conducted as required. Litter pick-up was typically conducted on Tuesdays, with litter pick-up inspection conducted on the following Thursdays. Litter pick-up inspection was documented each week on a non-structural BMP inspection form. A sample inspection form is provided in Appendix B.

3.4 STRUCTURAL CONTROLS

Three different structural controls were tested during the LMPS. These include a modified inlet grate tested at Site 6, a Caltrans standard bicycle grate tested at Site 8 during year 1, and a LID curb inlet tested at Site 8 during year 2. Each of the three structural retrofits is discussed further in subsections below.

3.4.1 Modified Inlet Grate

The modified inlet grate consists of a standard parallel bar grate, to which perforated metal plates have been added along the inflow perimeter of the inlet, as shown in Photo 3–3. Hole sizes in the metal plates are 0.25 inches in diameter. The perforated plates were installed by welding

Photo 3–3
Modified Inlet Grate–Site 6

them to the top of new parallel bar grates. The plates were designed to be approximately flush with the surrounding finished grade so that low flows would not be impeded. A 14-gauge perforated metal plate with a corresponding thickness of 0.08 inches was chosen.

During design of the inlet retrofit, a hydraulic analysis was performed to evaluate whether the modified inlet grates would impact inlet hydraulic capacity. Details of the hydraulic analysis are provided in "Technical Memorandum No. 2, Structural BMP Hydrology/Hydraulic Analysis and Pre-Construction Design." Results of the analysis indicated that the hydraulic capacity of all retrofitted inlets was sufficient without increasing the surface area of inlets.

Installation of structural retrofits involved replacing existing inlet grates at designated treatment locations with BMP grates. Installation work was completed on August 12, 1999. During installation, debris was manually removed from each inlet and placed in 50-gallon plastic bags. Debris was then sorted and evaluated to fine-tune the litter characterization protocol for the LMPS prior to the onset of the first storm season.

3.4.2 Bicycle Grate

The Caltrans standard bicycle grate (shown in Photo 3–4) is identical to existing parallel bar grates at Site 8 with the addition of cross bars, resulting in reduced grate openings. This retrofit was evaluated during year 1. Based on analysis of year 1 data and field observations, the project team including Caltrans, NRDC, and TAG members agreed to discontinue testing of the bicycle grate alternative. All parties agreed that the bicycle grate appeared to have little potential to reduce the quantity of litter entering drain inlets. Results of data analysis for BMP effectiveness are presented in Sections 7.1.4 and 7.1.5.

3.4.3 Litter Inlet Deflector

Based on field review of the structural retrofits and review of the LMPS data from year 1, Caltrans and NRDC agreed that the bicycle grate retrofit did not hold a great potential to reduce litter in the freeway drainage system. Testing of the bicycle grate retrofit was replaced by the

Photo 3–4
Bicycle Grate–Site 8

LID during year 2 of monitoring. The LID is designed to reduce dry weather litter deposition in drainage inlets. To assess dry deposition patterns, inlet deposition monitoring (see Section 4.3.1) was initiated at the LMPS sites in conjunction with evaluation of the LID retrofit. A schematic representation of the LID is provided in Figure 3-1. A photo of a typical LID is shown in Photo 3-5. This design was installed at inlets currently designated as treatment inlets at Site 8. The design consists of reconfiguring the current drop inlet to make it function as a curb inlet. The curb opening was fitted with a gate that acts as a "board-over" during dry weather conditions, thereby blocking litter that would be conveyed into the inlet opening by air transport (e.g., wind and/or vehicle-induced turbulence). Blocked litter would then be available to be picked up by Caltrans street sweepers during regular maintenance. Field tests were conducted to measure wind speed at the curb face, and the gates are designed not to open under traffic-related wind pressure alone.

The gate hangs from a hinge that uses a Teflon™-coated rod and bracket device, and is designed to open only during flow conditions to allow storm water into the inlet. The gate is additionally slotted to allow the passage of dry weather (nuisance) flows that would be insufficient to open the gate to enter the basin. Two observation ports are located on the structure's top, allowing visual identification of any litter within the new system. Access through the original grate is preserved in five locations to allow deposition monitoring at the inlets. The entire LID structure is designed to replace the existing dike in profile, resting well beneath the guardrail and offering no obstruction to passing vehicles.

During design of the LID, the watershed areas contributing runoff to each inlet to be retrofitted were calculated from as-builts and were also confirmed in the field. Using these areas, 25-year-storm flows for each outfall were calculated, thus the required flow capacity for each of the new structures was estimated. The hydraulics of the gates were analyzed and compared to typical curb inlets. The design of each LID was standardized, except for the length of the LID opening;

Figure 3-1
LID SCHEMATIC – Site 8

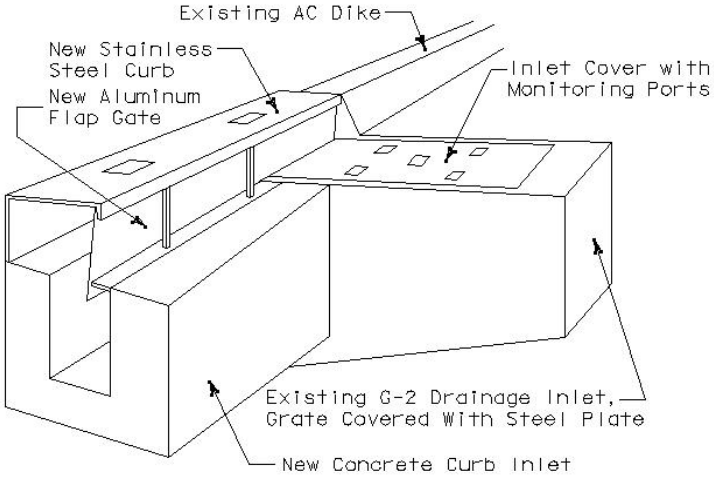

Photo 3-5
LID-Site 8

the greater the required flow capacity, the greater the structure's length. To further increase capacity and ensure that the gates open reliably, flow diverters were added to the design. These flow diverters consist of angled channels in the asphalt surfacing before the LID, designed to redirect passing storm water toward the hanging gate. Prototype testing of the LID design was conducted at the UCLA hydraulics lab. Initial testing was conducted on May 26, 1999. During this initial round of testing, the flume in the UCLA lab was modified to accommodate a reduced-size LID prototype. For ease of prototype construction, this prototype used an alternate hanger bearing suspension mechanism in lieu of the Teflon™-coated rod and bracket mechanism. The gate was tested using varying flow rates (and therefore depths) of water, up to 26 gallons per minute. A second LID prototype was then constructed that more closely met design specifications, matching units installed in the field. Additional flume testing using this prototype

and varying flow rates was conducted throughout year 2 of the LMPS. A report of laboratory test findings is provided in Appendix M. The flume channel was constructed to simulate the design pavement slope and scallop pattern at the inlet entrance.

Field construction of the LID BMPs was conducted between September 16, 1999 and October 15, 1999.

3.5 CALTRANS MAINTENANCE ACTIVITIES

Caltrans maintenance personnel were contacted throughout the LMPS study period to monitor activities conducted by Caltrans or accidents occurring in the study areas that could potentially affect the study. A standard maintenance contact form was used to interview road crew supervisors and landscape crew supervisors and to track activities such as Caltrans street sweeping, landscape maintenance, accidents, pavement repair, painting, or other activities that may affect chemical water quality. A copy of the maintenance contact form is provided in Appendix B. Unique events that occurred at study sites are discussed below. This information is based on information provided by Caltrans maintenance personnel or through other Caltrans sources.

Site 1W (Street Sweeping)

Caltrans conducted exploratory borings in the shoulder area at two locations at Site 1W on February 10, 1999. The purpose of the activity was to identify potential soil voids at bridge abutments at the Atlantic Boulevard and Harris Avenue overpasses. Caltrans completed concrete coring at both locations, followed by hand augering to 5.4 feet below grade. No voids were encountered and the boreholes were backfilled with concrete slurry. Water used for concrete coring was collected by a vacuum at the boring location and no runoff was generated. The Caltrans resident engineer indicated that no runoff from the slurry backfill was generated.

On Monday, November 1, 1999 the Lynwood Fire Department was dispatched to extinguish a fire on the westbound 105 freeway approximately 0.2 mile after the merging of the 105 and 710 freeways. This fire occurred immediately adjacent to, and around, site 1-52 and damaged an area approximately 70 feet by 40 feet, or approximately 280 square feet of ground cover. The fire was characterized in the Lynwood fire report as a “tree, brush, grass, crops fire” which notes that the fire was most likely caused by “heat, open flame, smoking materials.” The slope will be re-planted with permanent landscaping and measures taken as per Caltrans operating and planting procedures to ensure the continued stability of the slope.

The fire occurred at the top of slope in the vicinity of Outfall 1-52. Photo 3-6 shows the fire-damaged area and the solar panel pole for the monitoring station at Outfall 1-52. Caltrans re-seeded the area and laid down additional groundcover in order to stabilize soil and provide temporary repair of vegetation on the slope. On December 2, 1999 “mud-jacking” operations were

Photo 3-6
(Site 1W)
Fire Damage at Top of Slope Near Outfall 1-52 – Solar Panel Pole is Shown

performed in the vicinity of the project site. "Mud-jacking" refers to the injection of mud underneath the concrete slab of the freeway in order to correct and prevent any subsidence and 'dips' in the freeway surface that may have occurred. The causes for this subsidence can range from biotic effects (such as gophers and rodents) to seismic events. Caltrans indicated that this activity does not generate runoff and is not anticipated to effect chemical water quality or litter monitoring at the study sites.

Site 6 (Modified Inlet Gate)

Caltrans maintenance personnel indicated during the week of March 22, 1999 that asphalt work was ongoing in conjunction with the installation of closed circuit TV cable.

The guardrail along the 60 freeway in the approximate vicinity of the study site was repaired on Wednesday, November 17, 1999 in response to a vehicle accident occurring earlier in the week. The exact date of the accident and how many vehicles were involved are not known.

Site 8 (Bicycle Grate/LID)

A spill of loose oranges was reported by Caltrans maintenance personnel between November 11, 1998 and November 24, 1998.

Construction activities were initiated by a Caltrans contractor in early March 1999 in the vicinity of Outfall 24D to install a maintenance turnout associated with closed circuit TV installation. Approximately 400 feet of k-rail were placed at the edge of the shoulder upgradient and downgradient of 24D. Work was complete on the freeway surface prior to year 2 monitoring.

On Sunday, November 21, 1999 a moving road crew passed along the LMPS study area and the surrounding freeways, checking the surface of the freeway cement slab. These slabs were surveyed for damage and future maintenance, repair, and replacement needs and then counted so as to maintain current Caltrans records.

On Monday, November 29, 1999 through Thursday, December 9, 1999 the guardrails about and along State Route 60 were surveyed for damage, and repairs or plans to repair the structures were made as needed.

During the week of November 1, 1999 through November 5, 1999 a search for pot holes was made in the study area. The pot holes, when discovered, are typically filled with “bag-mix” asphalt. This is an asphalt that sets up quickly so that traffic can be restored immediately after the repair. Caltrans indicated that no major pot holes were encountered at the site.

4.1 MONITORING PROCEDURES FOR CHEMICAL WATER QUALITY AND LITTER SAMPLING

Numerous tasks were performed prior to, during, and after each storm event to successfully perform monitoring for the LMPS.

Litter monitoring required the following tasks prior to and after a storm event:

- photographing storm drain inlet conditions,
- litter bag replacement,
- spiking the storm drain inlets,
- record keeping and field notes, and
- field QA/QC.

Tasks related to chemical water quality monitoring included the following additional tasks:

- weather tracking,
- field equipment and sample bottle organization,
- sampling station set up,
- basic equipment maintenance,
- programming sampler operation,
- grab sample collection,
- sample collection, handling, and transfer,
- sampler bottle replacement,
- record keeping and field notes, and
- field quality assurance and quality control (QA/QC).

The following field Standard Operating Procedures (SOPs) were developed and implemented to assure these tasks were performed correctly and consistently during each monitored storm event:

- Pre-Event (Storm Water and Litter),
- Bottle Replacement (Storm Water Only),
- Grab Sampling (Storm Water Only), and
- Post-Event (Storm Water and Litter).

Each SOP contains detailed instructions (step-by-step) on how to perform the various tasks.

4.1.1 Pre-Event SOPs

Key criteria for event monitoring included the following:

- The storm event should produce a minimum of 0.20 inches of rainfall.
- The probability of precipitation should be 70 percent or greater.
- The event would generate sufficient runoff volume at each station to meet sample collection volume requirements.
- In addition, samples would be collected following at least 24 hours of dry weather (defined as a 24-hour period with no rainfall > 0.10 inches).

Initially, the LMPS used the following event monitoring criterion: an 80 percent probability of 0.1 inches or greater of rainfall with a 72-hour antecedent period. However, after the first storm

event during year 1 (November 8, 1998), the criterion was modified slightly. Based upon flow data from the first event, the criterion for minimum amount of rainfall predicted for an event was increased to 0.20 inches, because the sites were estimated to have depression storage that was approximately equal to the original 0.10-inch criterion. Additionally, the criterion for probability of precipitation was reduced from 80% to 70%, and the criterion for antecedent dry weather was reduced from 72 hours to 24 hours. These reductions were based upon an expectation that the 1998/99 rain season would follow a "La Nina" pattern—i.e., the number of storm events and the total precipitation would be below average in Southern California during the 1998/1999 rain season. Meteorologists predicted that the "La Nina" pattern would continue for the 1999/2000 rain season, so the revised criteria were followed during year 2 of monitoring.

Given these criteria for a monitoring event, the Storm Event Coordinator (SEC) tracked weather forecasts on a daily basis. The daily tracking included review of the probability of precipitation for each day of a 10-day forecast provided by a meteorologist. In cases when a 60% probability of precipitation was specified in the 10-day forecast, the SEC had frequent telephone briefings with the meteorologist. Typically, field crew staff were notified 3-4 days prior to a predicted event to alert them to a potential monitoring event. Once within the 72-hour window preceding the forecasted event, the meteorologist provided at least two Quantitative Precipitation Forecasts (QPFs) each day until the storm event had passed through the study area. The QPFs provided forecasts of rainfall volume and associated probabilities for 3-hour intervals over a rolling 24-hour period. The QPFs were used to determine the "trigger" volume for automatic sampler pacing at each chemical water quality monitoring station and to identify the best time frame for field crews to collect grab samples.

About 72 hours prior to an event predicted to have at least 0.2 inch rainfall with 70% or greater probability of precipitation, the SEC initiated preparation for the events. Specific field crews were designated, automatic sampler and grab sample bottles were labeled, and field boxes were checked for necessary supplies and equipment. Since photographs of the storm drain inlets and the surrounding area were required, it was beneficial for pre-event setup to be performed during daylight hours. Therefore, depending upon the time of day that precipitation was forecast to begin, field crews were typically mobilized 12 to 24 hours prior to the time of rainfall onset specified in the forecast.

During pre-event setups, two-person field crews performed the following tasks:

- Inspected the condition of sampling station equipment (flume, tubing, battery power level, etc.),
- Programmed the flowmeter and sampler for sample collection,
- Photographed storm drain inlet grates and adjacent road surface and ROW conditions, (initiated mid-way through the storm season),
- Replaced litter bags,
- Spiked the storm drain inlets, and
- Completed field activity forms.

While performing the pre-event setup, each field crew completed an "Automated Sampler Station Checklist" and a "Pre-Storm Event Litter Collection Field Data Form." Field forms are

provided in Appendix B. If any litter had accumulated in the bags during the time between "monitored" events, the bags were labeled and returned to the litter lab for characterization.

4.1.2 Grab Sampling SOPs

Several water quality analyses (e.g., oil & grease, total petroleum hydrocarbons-gasoline and diesel fractions, total coliform, fecal coliform) and physical measurements (e.g., temperature, pH, specific conductance) required collection of manual grab samples and/or field measurements.

For field QA/QC of each event, one of the eight stations was designated to prepare field equipment blanks for laboratory analysis, and another of the eight stations was designated to prepare field duplicates. The field crews also measured temperature, pH, and specific conductance in the field at the time of grab sampling and recorded those measurements on a "Grab Sampling Field Data Log" (Appendix B). The field crews completed the sample bottle labels, and then the sample bottles, including field equipment blanks and duplicates, were placed in coolers with ice and submitted to the laboratory for analysis.

4.1.3 Post-Event SOPs

During a storm event, the SEC frequently communicated with the meteorologist to track the predicted end of the storm event. The SEC mobilized field crews to retrieve bottles from the automatic samplers and the litter bags during daylight hours as soon as possible after conclusion of the storm event. The field crews removed the sample bottles from the automatic samplers, completed the bottle labels, and then placed the bottles in coolers with ice. The field crews also removed litter bags from the outfalls and labeled the bags to be delivered to the Litter Laboratory for characterization. A "clean" litter bag was placed on each outfall before the field crew left the site.

While performing post-event activities, each field crew completed an "Automated Sampler Station Checklist" and a "Post Storm Event Litter Collection Field Data Form" (Appendix B). Upon return to the field office/litter lab and before the bottles were submitted to the laboratory for compositing and analysis, the SEC verified the information on the "Automated Sampler Station Checklist" regarding the number of bottles filled and the fraction full for each bottle.

Data from the flowmeter data loggers were downloaded remotely via modem as soon as possible after the storm event concluded to allow for timely preparation of sample compositing schemes. Field crews also had data transfer units available to download data directly from the flowmeter data loggers if for some reason a modem connection to the flowmeter could not be established. Flow data and sampling history data from each station were used to prepare compositing schemes that were submitted to the laboratory. The preparation of compositing schemes was necessary, since it is very common for automatic samplers to only partially fill bottles or to fill less than the full set of eight bottles. Compositing schemes for each station were faxed to the laboratory as soon as they were completed.

4.2 STORM EVENT HYDROGRAPHS

During the 1998/1999 rain season (year 1), ten storm events were monitored at the LMPS sites. The first event, 1998-01 (November 8, 1999) was monitored only for litter constituents. The next nine events were monitored for both litter and chemical water quality constituents. During the 1999/2000 rain season (year 2), thirteen storm events were monitored at LMPS sites. Events 1999-03 and 1999-15A were monitored for litter only. Rainfall and flow data were recorded for all events. This section summarizes hydrologic data collected for each event and discusses the general approach used in analysis and QA/QC of the data. The following storms were monitored during the LMPS.

Storm Event	Date	Comment
1998-01	11/8/98	Litter only
1998-02	11/28/98	Chemical water quality and litter
1998-03	12/1/98	Chemical water quality and litter(1)
1998-05	1/25/99	Chemical water quality and litter
1998-06	2/9/99	Chemical water quality and litter
1998-09	3/15/99	Chemical water quality and litter
1998-10	3/20/99	Chemical water quality and litter(1)
1998-11	3/25/99	Chemical water quality and litter
1998-12	4/6/99	Chemical water quality and litter
1998-13	4/11/99	Chemical water quality and litter
1999-03	12/31/00	Litter only(2)
1999-05	1/25/00	Chemical water quality and litter
1999-06	1/30/00	Chemical water quality and litter
1999-08	2/10/00	Chemical water quality and litter
1999-09	2/12/00	Chemical water quality and litter
1999-10	2/13/00	Chemical water quality and litter(3)
1999-11	2/16/00	Chemical water quality and litter
1999-12	2/20/00	Chemical water quality and litter
1999-13	2/23/00	Chemical water quality and litter
1999-14	2/27/00	Chemical water quality and litter
1999-15A	3/03/00	Litter only
1999-15	3/05/00	Chemical water quality and litter
1999-16	3/08/00	Chemical water quality and litter

1 Precipitation at Site 6 did not meet Caltrans Storm Water Program definition of a precipitation event (LWA 1999).

2 Precipitation at Sites 1E and 1W did not meet the Caltrans Storm Water Program definition of a precipitation event (LWA 1999).

3 Event 1999-10 does not meet the 24-hour antecedent dry period criteria established for the LMPS.

The event numbers listed above identify only storms that were monitored. The numbers are not continuous due to “false-start” events. The term “false start” refers to events that were predicted by the contract meteorologist and/or the National Weather Service but were later downgraded

(immediately prior to the onset of the event) and were not actually monitored. The "pre-storm set-up" activities discussed in Section 4.1.1 were conducted, but the storms were never realized. Three "false-starts" occurred during the 1998/1999 rain season (year 1), and four "false-starts" occurred during the 1999/2000 rain season (year 2). A more detailed discussion for each "false-start" event is provided in Appendix C.

Throughout the LMPS, flow and rainfall monitoring equipment recorded minute-by-minute continuous rainfall and flow records at each station. After each storm, hydrologic information was reviewed for each station and hydrographs for each event were prepared. Figure 4-1 presents a sample hydrograph for Event No. 1998-01, Outfalls 1-42 and 1-46. Appendix D provides a detailed discussion of the process used to review the data and Appendix E presents storm event hydrographs for both years of monitoring.

4.2.1 QA/QC of the Raw Data

QA/QC of the raw data was performed to facilitate the identification of anomalies such as clogged rainfall gauges or spikes in the flow record unrelated to rainfall increases. The procedures applied to QA/QC of the raw data included the following steps:

1. Generation of hydrographs, hyetographs, and summaries for each storm at each outfall including: peak rainfall intensity, total precipitation, total flow volume, total depth of flow (watershed inches), peak flow rate, and the event's beginning and ending time and date.
2. Visual inspection of hydrographs and hyetographs to identify instances where flow rate, change in flow rate, or flow duration appeared to be outside expected ranges.
3. Comparison of rainfall observations (i.e., total depths and plots of cumulative rainfall as a function of time during the event) at each site (i.e., adjacent control and treatment outfalls and NWS data) to identify data anomalies.
4. Preparation and assessment of scatter plots by plotting runoff as a function of rainfall on an outfall basis over the period of record. Regression analysis was conducted on these plots to quantitatively identify potential outliers that might indicate additional anomalies in the data record. Data collected later in the study had the advantage of having a larger data set for comparison. This allowed individual events to be analyzed in light of the expected runoff coefficient for the outfall. Outliers were examined to identify specific anomalies in rainfall or flow as described in steps 5 and 6.
5. Updates of rainfall totals (i.e., rainfall totals from adjacent stations were used to estimate total rainfall for rain gauges that were not functioning correctly).
6. Review of flow records that contained anomalies to identify relationships to specific known equipment problems.
7. If data anomalies associated with outliers could not be corrected by methods in steps 5 and 6, data outliers were flagged and excluded from the final data set and further analysis.
8. Using the final data set to calculate runoff coefficients using final regression analysis and other hydrologic summary information.

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Figure 4-1
SITE 1 E (LITTER PICK-UP) – OUTFALLS 42 AND 46 — EVENT NO. 1998-01 11/08/98

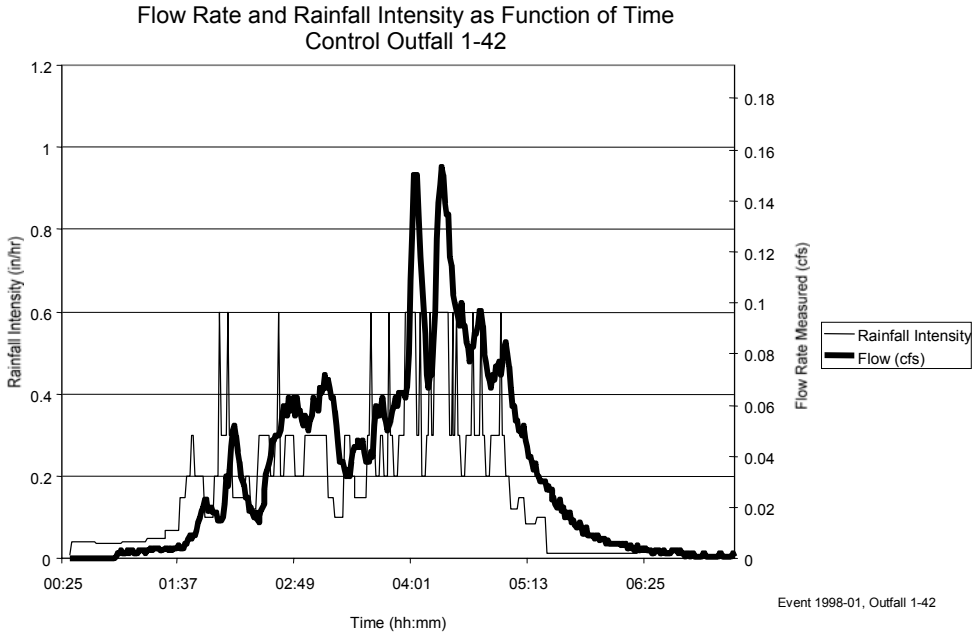

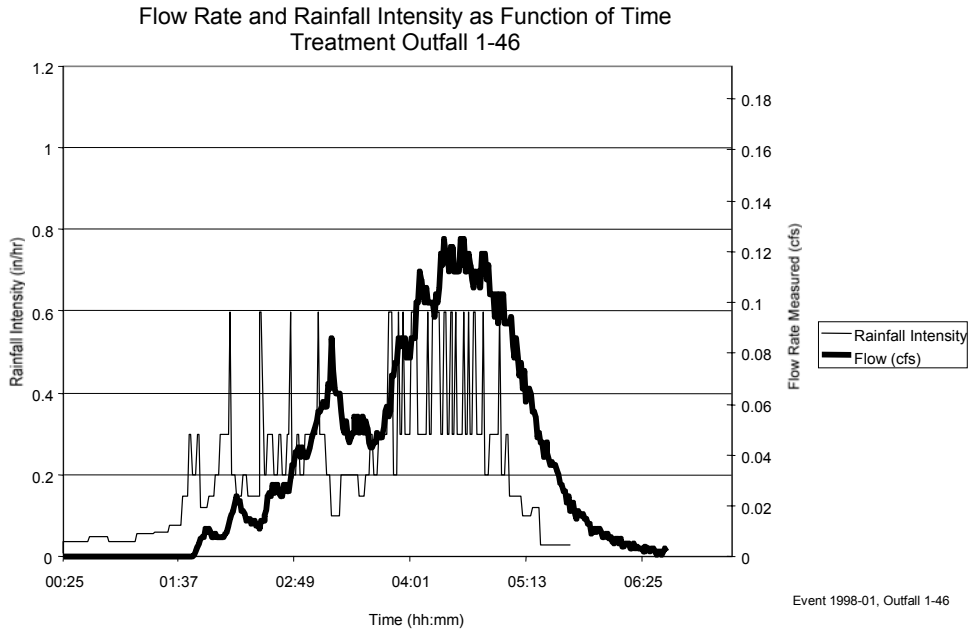

A detailed discussion of the above QA/QC process for storm event hydrologic data is presented in Appendix D.

4.2.2 Field Investigation and Reevaluation of Watershed Areas and Freeway Surface Conditions

Results of interim regression analyses performed during the QA/QC process after year 1 of monitoring yielded unexpected runoff coefficients for freeway pavement conditions for some of the outfalls. The analysis was based on catchment areas for each outfall that were calculated from dimensions provided on as-built engineering drawings obtained from Caltrans. Because data analysis indicated unexpected coefficients, anomalies were suspected in the areas of the catchments (i.e., watersheds varied from the original interpretation of the as-builts). Therefore, field reconnaissance was conducted to further define catchment sizes and look for pavement conditions or other features that could explain unexpected runoff coefficients. Catchment areas were adjusted as a result of field investigations, and regression analyses were re-run for each site using combined data from both years of monitoring, yielding a better estimate of runoff coefficients. Comparative catchment sizes are shown in Table 4-1. Field investigation results are discussed further in Appendix A.

Adjusted final catchment areas and runoff coefficients calculated from combined year 1 and year 2 data are listed in Table 4-1. This table also lists the calculated areas for each catchment. Such calculations were based on assumed Rational Method runoff coefficients for each of the watersheds (e.g., it was assumed that impervious surfaces have a runoff coefficient of 0.8, and unpaved berms have a runoff coefficient of 0.2). Ideally, catchment areas estimated from field investigations and as-builts would match areas that are back-calculated from measured flow data and an assumed runoff coefficient. The absolute percent difference in areas listed in Table 4-1 ranges from 4% to 23%. The field survey indicated that losses on the freeway surface may be in excess of the approximately 10-20% typically found for “impervious” surfaces (see Appendix A). The remaining discrepancies in the assumed versus empirical runoff coefficients are most likely a result of multiple factors, such as joint and crack integrity, monitoring equipment limitations, and the assumption that the assumed runoff coefficient is correct for the catchment.

4.2.3 Catchment Hydrology Observations and Estimated Final Catchment Areas

During year 2 of monitoring, flow patterns were observed on the monitored catchments and at study inlets to verify some of the assumptions made in the hydrologic analysis conducted during year 1.

Wet weather field observations were conducted during four storm events during year 2 (i.e., Events 1999-05, 1999-08, 1999-11, and 1999-12). Generally, the observations of catchment hydrology were consistent with catchment area limits observed during the June 1999 dry weather field investigations. However, modifications to the freeway surface in the B001 catchment were observed during wet weather investigations. Prior to implementation of year 2 monitoring, an underground fiber-optics cable was installed along the shoulder at Site 8. This construction included installation of an asphalt trench patch and utility box immediately upgradient of the B001 inlet. The trench patch in this area is not flush with the surrounding grade of the shoulder pavement and has been observed to collect runoff during storm events. B001 catchment limits were not confirmed during wet weather observations because a large portion of the assumed catchment area consists of a relatively flat bridge deck that can not be safely accessed during wet weather. More details on wet weather observations are provided in Appendix A.

Table 4-1
RESULTS OF FINAL REGRESSION ANALYSIS OF RAINFALL/RUNOFF CURVES AFTER QA/QC OF DATA BASED ON REVISED WATERSHED AREAS

Site	Outfall	As-Built Area (ac)	Final Values		Assumed Rational Runoff Coefficient (0.8 for impervious surfaces, and 0.2 for pervious berm and vegetation)	Calculated Area (ac), Based on Assumed Rational Runoff Coefficient	Percent Difference in Final Catchment Area and Calculated Area (%)
			Final Catchment Area Based on Field Investigation (ac)	Runoff Coefficient Using Final Catchment Areas (Calculated) (C)			
1	42	0.34	0.32	0.70	0.75	0.30	7%
1	46	0.46	0.38	0.67	0.75	0.34	11%
1	52	0.38	0.43	0.68	0.75	0.39	9%
1	58	0.29	0.37	0.89	0.75	0.44	-16%
6	20e	0.42	0.42	0.62	0.80	0.33	23%
6	20f	0.42	0.42	0.69	0.80	0.36	14%
8	23c	0.62	0.62	0.77	0.80	0.60	4%
8	B001[(1)]	0.57	0.32 (0.18)	0.74	0.80	0.30 (0.17)	8%

[1] 0.32 acres used in evaluation of year 1 bicycle grate retrofit. 0.18 acres used in evaluation of year 2 LID retrofit. Adjustment resulting from non-study related changes to pavement conditions at Site 8 prior to year 2 monitoring.

Additional regression analysis was performed on year 2 hydrologic data for B001 to calculate the effective catchment area for year 2 of monitoring. The year 2 regression analysis modifies the catchment area for B001 to 0.18 acres for year 2. This effective watershed area is not inconsistent with field observations of the behavior of runoff in the watershed. Because upgradient catchment limits are uncertain, based on visual observations at this site, the analysis of hydrologic data was used to determine the year 2 catchment area.

Adjustments were also made to the watershed area for 1-58 based on field observations and the flow record for this outfall. Backflow was observed to occur from a section approximately 25 feet upstream of the inlet at 1-58. This additional drainage area of 0.05 acres brought the final catchment area to 0.37 acres, as seen in Table 4-1.

4.2.4 Event Overview

Ten storm events were monitored during the 1998/1999 rain season (year 1) and thirteen storm events were monitored during the 1999/2000 rain season (year 2). Summary hydrologic data for each event are listed in Table 4-2.

Table 4-2 provides comparative hydrologic data before and after QA/QC and indicates rain and flow values that were considered to be abnormal as a result of QA/QC analysis. Information from field personnel on equipment problems and the results of the analysis of rainfall totals (as discussed above) were examined in concert with the results from the statistical analysis of the

rainfall/runoff pairs to identify abnormalities. Data abnormalities and the action taken regarding each are further described in Table 4-3.

Table 4-2
SUMMARY OF HYDROLOGIC DATA FOR MONITORED STORM EVENTS

Site	Outfall	Total Meas. Rainfall (inch)	Rain After QA/QC (inch)	Rain Abnorm.	Total Meas. Flow (cf)	Flow Abnorm.	Total Flow After QA/QC (cf)	Total Flow After QA/QC (inch)	Begining Date of Monitoring Period	Begining Time of Monitoring Period	Ending Date of Monitoring Period	Ending Time of Monitoring Period	Duration (hh:mm)
Event 1998e01 - 11/08/1998													
1E	1-42	1.07	1.07	☐	826	☐	826	0.71	11/08/1998	0:31	11/08/1998	6:21	5:50
1E	1-46	1.1	1.1	☐	845	☐	845	0.61	11/08/1998	0:25	11/08/1998	5:41	5:16
1W	1-52	0.95	0.95	☐	806	☐	806	0.52	11/08/1998	0:29	11/08/1998	5:33	5:40
1W	1-58	1.04	1.04	☐	1130	☐	1130	0.84	11/08/1998	0:28	11/08/1998	5:25	4:57
6	6-20E	0.69	0.69	☐	685	☐	685	0.45	11/08/1998	1:46	11/08/1998	5:52	4:60
6	6-20F	0.67	0.67	☐	593	☐	593	0.39	11/08/1998	1:46	11/08/1998	5:56	4:10
8	8-23C	0.22	0.45	☑	329	☐	329	0.15	11/08/1998	1:28	11/08/1998	5:50	4:22
8	8-B001	0.45	0.45	☐	206	☐	206	0.18	11/08/1998	1:27	11/08/1998	6:10	4:43
Event 1998e02 - 11/28/1998													
1E	1-42	0.29	0.29	☐	182	☐	182	0.16	11/28/1998	3:24	11/28/1998	6:50	3:26
1E	1-46	0.27	0.27	☐	78	☐	78	0.04	11/28/1998	3:22	11/28/1998	6:50	3:28
1W	1-52	0.26	0.26	☐	139	☐	139	0.09	11/28/1998	3:19	11/28/1998	5:58	2:39
1W	1-58	0.29	0.29	☐	268	☐	268	0.2	11/28/1998	3:22	11/28/1998	6:47	3:25
6	6-20E	0.33	0.33	☐	218	☐	218	0.14	11/28/1998	3:43	11/28/1998	5:56	2:13
6	6-20F	0.32	0.32	☐	188	☐	188	0.12	11/28/1998	3:41	11/28/1998	5:52	2:11
8	8-23C	0.69	0.85	☑	505	☑	1194	0.53	11/28/1998	3:31	11/28/1998	14:34	11:03
8	8-B001	0.85	0.85	☐	886	☑	886	0.76	11/28/1998	3:28	11/28/1998	14:34	11:06
Event 1998e03 - 12/01/1998													
1E	1-42	0.17	0.17	☐	68	☐	68	0.06	12/01/1998	13:08	12/01/1998	17:50	4:42
1E	1-46	0.2	0.2	☐	39	☐	39	0.03	12/01/1998	13:06	12/01/1998	17:43	4:37
1W	1-52	0.2	0.2	☐	90	☐	90	0.06	12/01/1998	13:10	12/01/1998	17:49	4:39
1W	1-58	0.19	0.19	☐	117	☐	117	0.09	12/01/1998	13:10	12/01/1998	18:04	4:54
6	6-20E	0.09	0.09	☐	8	☐	8	0	12/01/1998	14:22	12/01/1998	16:19	1:57
6	6-20F	0.08	0.08	☐	4	☐	4	0	12/01/1998	14:31	12/01/1998	16:50	2:19
8	8-23C	0.25	0.25	☐	192	☐	192	0.09	12/01/1998	13:21	12/01/1998	17:07	3:46
8	8-B001	0.26	0.26	☐	404	☑	93	0.08	12/01/1998	13:20	12/01/1998	17:25	4:05

Table 4-2
SUMMARY OF HYDROLOGIC DATA FOR MONITORED STORM EVENTS

Site	Outfall	Total Meas. Rainfall (inch)	Rain After QA/QC (inch)	Rain Abnorm.	Total Meas. Flow (cf)	Flow Abnorm.	Total Flow After QA/QC (cf)	Total Flow After QA/QC (inch)	Begining Date of Monitoring Period	Begining Time of Monitoring Period	Ending Date of Monitoring Period	Ending Time of Monitoring Period	Duration (hh:mm)
Event 1998e05 - 01/25/1999													
1E	1-42	0.17	0.51	☑	359	☑	321	0.28	01/25/1999	0:46	01/25/1999	7:50	7:04
1E	1-46	0.52	0.52	☐	468	☐	468	0.34	01/25/1999	0:56	01/25/1999	7:51	6:55
1W	1-52	0.5	0.5	☐	370	☐	370	0.24	01/25/1999	0:46	01/25/1999	7:48	7:02
1W	1-58	0.51	0.51	☐	580	☐	580	0.43	01/25/1999	0:37	01/25/1999	7:51	7:14
6	6-20E	0.36	0.36	☐	271	☐	271	0.18	01/25/1999	1:49	01/25/1999	8:13	6:24
6	6-20F	0.36	0.36	☐	251	☐	251	0.16	01/25/1999	1:46	01/25/1999	8:18	6:32
8	8-23C	0.41	0.41	☐	400	☐	400	0.18	01/25/1999	1:26	01/25/1999	7:09	5:43
8	8-B001	0.37	0.37	☐	198	☐	198	0.17	01/25/1999	1:31	01/25/1999	7:02	5:31
Event 1998e06 - 02/09/1999													
1E	1-42	0.35	0.35	☐	223	☐	223	0.19	02/09/1999	11:02	02/09/1999	16:17	5:15
1E	1-46	0.35	0.35	☐	281	☐	281	0.2	02/09/1999	11:17	02/09/1999	16:20	5:03
1W	1-52	0.36	0.36	☐	233	☐	233	0.15	02/09/1999	11:07	02/09/1999	16:20	5:13
1W	1-58	0.37	0.37	☐	325	☐	325	0.24	02/09/1999	11:03	02/09/1999	16:18	5:15
6	6-20E	0.45	0.45	☐	446	☐	446	0.29	02/09/1999	10:40	02/09/1999	18:47	8:07
6	6-20F	0.42	0.42	☐	1033	☑	332	0.22	02/09/1999	11:33	02/09/1999	18:35	7:02
8	8-23C	-	0.29	☑	-	☑	223	0.1	02/09/1999	11:00	02/09/1999	18:04	7:04
8	8-B001	0.29	0.29	☐	173	☐	173	0.15	02/09/1999	11:00	02/09/1999	18:04	7:04
Event 1998e09 - 03/15/1999													
1E	1-42	0.58	0.58	☐	395	☐	395	0.34	03/15/1999	7:01	03/15/1999	10:48	3:47
1E	1-46	0.61	0.61	☐	423	☐	423	0.31	03/15/1999	7:01	03/15/1999	10:49	3:48
1W	1-52	0.59	0.59	☐	462	☐	462	0.3	03/15/1999	7:01	03/15/1999	10:47	3:46
1W	1-58	0.61	0.61	☐	602	☐	602	0.45	03/15/1999	7:02	03/15/1999	10:52	3:50
6	6-20E	0.5	0.5	☐	523	☐	523	0.34	03/15/1999	7:17	03/15/1999	11:21	4:04
6	6-20F	0.48	0.48	☐	1797	☑	395	0.26	03/15/1999	7:14	03/15/1999	11:20	4:06
8	8-23C	0.46	0.46	☐	525	☐	525	0.23	03/15/1999	7:18	03/15/1999	11:09	3:51
8	8-B001	0.46	0.46	☐	260	☐	260	0.22	03/15/1999	7:14	03/15/1999	11:04	3:50

Table 4-2
SUMMARY OF HYDROLOGIC DATA FOR MONITORED STORM EVENTS

Site	Outfall	Total Meas. Rainfall (inch)	Rain After QA/QC (inch)	Rain Abnorm.	Total Meas. Flow (cf)	Flow Abnorm.	Total Flow After QA/QC (cf)	Total Flow After QA/QC (inch)	Begining Date of Monitoring Period	Begining Time of Monitoring Period	Ending Date of Monitoring Period	Ending Time of Monitoring Period	Duration (hh:mm)
Event 1998e10 - 03/20/1999													
1E	1-42	0.18	0.18	☐	74	☑	74	0.06	03/20/1999	4:25	03/20/1999	8:23	3:58
1E	1-46	0.17	0.17	☐	30	☐	30	0.02	03/20/1999	4:31	03/20/1999	8:08	3:37
1W	1-52	0.17	0.17	☐	72	☐	72	0.05	03/20/1999	4:29	03/20/1999	8:20	3:51
1W	1-58	0.18	0.18	☐	125	☐	125	0.09	03/20/1999	4:28	03/20/1999	8:33	4:05
6	6-20E	0.08	0.08	☐	17	☐	17	0.01	03/20/1999	5:42	03/20/1999	9:30	3:48
6	6-20F	0.06	0.06	☐	0	☐	0	0	03/20/1999	5:42	03/20/1999	9:31	3:49
8	8-23C	0.21	0.21	☐	161	☐	161	0.07	03/20/1999	4:53	03/20/1999	9:25	4:32
8	8-B001	0.19	0.19	☐	62	☐	62	0.05	03/20/1999	4:48	03/20/1999	9:41	4:53
Event 1998e11 - 03/25/1999													
1E	1-42	0.58	0.58	☐	367	☐	367	0.32	03/25/1999	6:30	03/25/1999	18:29	11:59
1E	1-46	0.58	0.58	☐	387	☐	387	0.28	03/25/1999	6:30	03/25/1999	18:29	11:59
1W	1-52	0.55	0.55	☐	408	☐	408	0.26	03/25/1999	10:35	03/25/1999	17:41	7:06
1W	1-58	0.57	0.57	☐	484	☐	484	0.36	03/25/1999	10:29	03/25/1999	17:40	7:11
6	6-20E	0.14	0.14	☐	44	☐	44	0.03	03/25/1999	12:19	03/25/1999	17:23	5:04
6	6-20F	0.14	0.14	☐	26	☑	26	0.02	03/25/1999	12:12	03/25/1999	17:29	5:17
8	8-23C	0.2	0.2	☐	168	☐	168	0.07	03/25/1999	13:04	03/25/1999	16:54	3:50
8	8-B001	0.2	0.2	☐	64	☐	64	0.06	03/25/1999	11:32	03/25/1999	17:05	5:33
Event 1998e12 - 04/06/1999													
1E	1-42	0.41	0.41	☐	205	☐	205	0.18	04/06/1999	9:19	04/06/1999	14:44	5:25
1E	1-46	0.37	0.37	☐	207	☐	207	0.15	04/06/1999	9:06	04/06/1999	14:20	5:14
1W	1-52	0.28	0.28	☐	224	☐	224	0.14	04/06/1999	10:05	04/06/1999	14:11	4:06
1W	1-58	0.31	0.31	☐	264	☐	264	0.2	04/06/1999	9:49	04/06/1999	14:19	4:30
6	6-20E	0.79	0.79	☐	1129	☑	1129	0.74	04/06/1999	7:13	04/06/1999	15:43	8:30
6	6-20F	0.76	0.76	☐	501	☐	501	0.33	04/06/1999	7:08	04/06/1999	15:41	8:33
8	8-23C	-	0.98	☑	-	☑	1419	0.63	04/06/1999	10:40	04/07/1999	10:38	23:58
8	8-B001	0.98	0.98	☐	686	☐	686	0.59	04/06/1999	10:40	04/07/1999	10:38	23:58

Table 4-2
SUMMARY OF HYDROLOGIC DATA FOR MONITORED STORM EVENTS

Site	Outfall	Total Meas. Rainfall (inch)	Rain After QA/QC (inch)	Rain Abnorm.	Total Meas. Flow (cf)	Flow Abnorm.	Total Flow After QA/QC (cf)	Total Flow After QA/QC (inch)	Begining Date of Monitoring Period	Begining Time of Monitoring Period	Ending Date of Monitoring Period	Ending Time of Monitoring Period	Duration (hh:mm)
Event 1998e13 - 04/11/1999													
1E	1-42	1.44	1.44	☑	987	☑	1077	0.93	04/11/1999	13:13	04/12/1999	0:24	11:01
1E	1-46	1.52	1.52	☐	1450	☐	1450	1.05	04/11/1999	13:18	04/12/1999	0:10	10:52
1W	1-52	1.36	1.36	☐	1254	☐	1254	0.8	04/11/1999	13:14	04/12/1999	0:11	10:57
1W	1-58	1.43	1.43	☐	1478	☐	1478	1.1	04/11/1999	13:07	04/12/1999	0:50	11:43
6	6-20E	0.96	0.96	☐	1189	☐	1189	0.78	04/11/1999	12:39	04/12/1999	2:21	13:42
6	6-20F	0.94	0.94	☐	1477	☑	879	0.58	04/11/1999	12:39	04/12/1999	1:53	13:14
8	8-23C	0.79	1.09	☑	1491	☐	1491	0.66	04/11/1999	12:52	04/12/1999	1:31	12:39
8	8-B001	1.09	1.09	☐	710	☐	710	0.61	04/11/1999	12:48	04/12/1999	1:22	12:34
Event 1999e03 - 12/31/1999													
1E	1-42	-	0.04	☑	-	☑	0	0	12/31/1999	13:19	12/31/1999	14:10	0:51
1E	1-46	0.04	0.04	☐	2	☐	2	0	12/31/1999	13:16	12/31/1999	14:14	0:58
1W	1-52	0.04	0.04	☐	1	☐	1	0	12/31/1999	13:23	12/31/1999	13:52	0:29
1W	1-58	0.05	0.05	☐	30	☐	30	0.02	12/31/1999	13:17	12/31/1999	14:07	0:50
6	6-20E	0.16	0.16	☐	36	☐	36	0.02	12/31/1999	9:56	12/31/1999	16:41	6:45
6	6-20F	0.17	0.17	☐	45	☐	45	0.03	12/31/1999	9:55	12/31/1999	16:46	6:51
8	8-23C	0.24	0.24	☐	113	☐	113	0.05	12/31/1999	13:31	12/31/1999	17:50	4:19
8	8-B001	0.29	0.29	☐	-	☑	87	0.13	12/31/1999	13:29	12/31/1999	17:52	4:23
Event 1999e05 - 01/25/2000													
1E	1-42	0.57	0.57	☐	210	☑	210	0.18	01/25/2000	2:06	01/25/2000	20:50	18:44
1E	1-46	0.58	0.58	☐	159	☑	159	0.12	01/25/2000	2:16	01/25/2000	20:43	18:27
1W	1-52	0.52	0.52	☐	279	☐	279	0.18	01/25/2000	2:07	01/25/2000	20:42	18:35
1W	1-58	0.54	0.54	☐	501	☐	501	0.37	01/25/2000	2:07	01/25/2000	20:47	18:40
6	6-20E	0.78	0.78	☐	504	☐	504	0.33	01/24/2000	23:16	01/25/2000	21:13	21:57
6	6-20F	0.79	0.79	☐	584	☐	584	0.38	01/24/2000	23:19	01/25/2000	20:50	21:31
8	8-23C	0.34	0.55	☑	437	☐	437	0.19	01/25/2000	2:29	01/25/2000	20:52	18:23
8	8-B001	0.55	0.55	☐	77	☐	77	0.12	01/25/2000	2:28	01/25/2000	20:30	18:20

Table 4-2
SUMMARY OF HYDROLOGIC DATA FOR MONITORED STORM EVENTS

Site	Outfall	Total Meas. Rainfall (inch)	Rain After QA/QC (inch)	Rain Abnorm.	Total Meas. Flow (cf)	Flow Abnorm.	Total Flow After QA/QC (cf)	Total Flow After QA/QC (inch)	Begining Date of Monitoring Period	Begining Time of Monitoring Period	Ending Date of Monitoring Period	Ending Time of Monitoring Period	Duration (hh:mm)
Event 1999e06 - 01/30/2000													
1E	1-42	0.23	0.23	☐	71	☐	71	0.06	01/30/2000	19:14	01/31/2000	1:45	6:31
1E	1-46	0.22	0.22	☐	24	☐	24	0.02	01/30/2000	19:21	01/31/2000	1:36	6:15
1W	1-52	0.18	0.18	☐	79	☐	79	0.05	01/30/2000	19:30	01/31/2000	1:26	5:56
1W	1-58	0.20	0.2	☐	144	☐	144	0.11	01/30/2000	19:31	01/31/2000	1:29	5:58
6	6-20E	0.24	0.24	☐	113	☐	113	0.07	01/30/2000	20:02	01/31/2000	1:21	5:19
6	6-20F	0.24	0.24	☐	128	☐	128	0.08	01/30/2000	20:02	01/31/2000	1:15	5:14
8	8-23C	0.07	0.15	☑	27	☐	27	0.01	01/30/2000	20:02	01/31/2000	1:15	5:13
8	8-B001	0.15	0.15	☐	3	☐	3	0.01	01/30/2000	19:55	01/31/2000	1:23	5:28
Event 1999e08 - 02/10/2000													
1E	1-42	0.30	0.3	☐	186	☐	186	0.16	02/10/2000	13:56	02/10/2000	16:41	2:45
1E	1-46	0.32	0.32	☐	111	☐	111	0.08	02/10/2000	13:58	02/10/2000	16:44	2:46
1W	1-52	0.32	0.32	☐	212	☐	212	0.14	02/10/2000	13:56	02/10/2000	17:26	3:30
1W	1-58	0.32	0.32	☐	287	☐	287	0.21	02/10/2000	13:57	02/10/2000	16:42	2:45
6	6-20E	0.52	0.52	☐	376	☐	376	0.25	02/10/2000	13:57	02/10/2000	23:56	9:59
6	6-20F	0.51	0.51	☐	397	☐	397	0.26	02/10/2000	14:02	02/10/2000	23:55	9:53
8	8-23C	0.27	0.27	☐	230	☐	230	0.1	02/10/2000	13:18	02/10/2000	17:06	3:48
8	8-B001	0.19	0.19	☐	65	☐	65	0.1	02/10/2000	13:15	02/10/2000	17:18	4:03
Event 1999e09 - 02/12/2000													
1E	1-42	-	0.52	☑	-	☑	329	0.28	02/12/2000	0:55	02/12/2000	3:15	2:20
1E	1-46	0.53	0.53	☐	392	☐	392	0.28	02/12/2000	0:59	02/12/2000	3:22	2:23
1W	1-52	0.51	0.51	☐	523	☐	523	0.34	02/12/2000	0:56	02/12/2000	3:11	2:15
1W	1-58	0.51	0.51	☐	542	☐	542	0.4	02/12/2000	0:51	02/12/2000	3:12	2:21
6	6-20E	0.40	0.4	☐	342	☐	342	0.22	02/12/2000	1:15	02/12/2000	3:11	1:56
6	6-20F	0.40	0.4	☐	361	☐	361	0.24	02/12/2000	1:15	02/12/2000	3:40	2:25
8	8-23C	0.65	0.65	☐	878	☐	878	0.39	02/12/2000	0:39	02/12/2000	5:59	5:20
8	8-B001	0.62	0.62	☐	202	☐	202	0.31	02/12/2000	0:30	02/12/2000	5:38	5:08

Table 4-2
SUMMARY OF HYDROLOGIC DATA FOR MONITORED STORM EVENTS

Site	Outfall	Total Meas. Rainfall (inch)	Rain After QA/QC (inch)	Rain Abnorm.	Total Meas. Flow (cf)	Flow Abnorm.	Total Flow After QA/QC (cf)	Total Flow After QA/QC (inch)	Begining Date of Monitoring Period	Begining Time of Monitoring Period	Ending Date of Monitoring Period	Ending Time of Monitoring Period	Duration (hh:mm)
Event 1999e10 - 02/13/2000													
1E	1-42	0.35	0.35	☐	183	☐	183	0.16	02/13/2000	18:26	02/14/2000	11:08	16:42
1E	1-46	0.38	0.38	☐	131	☐	131	0.09	02/13/2000	18:22	02/14/2000	10:30	16:08
1W	1-52	0.28	0.28	☐	228	☐	228	0.15	02/13/2000	18:09	02/14/2000	10:25	16:16
1W	1-58	0.31	0.31	☐	346	☐	346	0.26	02/13/2000	18:22	02/14/2000	10:45	16:23
6	6-20E	0.32	0.32	☐	125	☐	125	0.08	02/13/2000	19:14	02/14/2000	11:53	16:39
6	6-20F	0.34	0.34	☐	89	☐	89	0.06	02/13/2000	18:48	02/14/2000	12:02	17:14
8	8-23C	0.20	0.33	☑	291	☐	291	0.04	02/13/2000	18:53	02/14/2000	12:32	17:39
8	8-B001	0.33	0.33	☐	53	☐	53	0.08	02/13/2000	18:53	02/14/2000	12:32	17:39
Event 1999e11 - 02/16/2000													
1E	1-42	0.54	0.54	☐	336	☐	336	0.29	02/16/2000	3:45	02/16/2000	20:02	16:17
1E	1-46	0.50	0.5	☐	306	☐	306	0.22	02/16/2000	3:52	02/16/2000	19:53	16:01
1W	1-52	0.48	0.48	☐	380	☐	380	0.24	02/16/2000	3:52	02/16/2000	19:50	15:58
1W	1-58	0.52	0.52	☐	533	☐	533	0.4	02/16/2000	3:43	02/16/2000	19:53	16:10
6	6-20E	0.72	0.72	☐	654	☐	654	0.43	02/16/2000	3:58	02/16/2000	20:47	16:49
6	6-20F	0.74	0.74	☐	672	☐	672	0.44	02/16/2000	3:46	02/16/2000	20:04	16:18
8	8-23C	0.74	0.74	☐	1117	☐	1117	0.5	02/16/2000	3:59	02/16/2000	19:56	15:57
8	8-B001	0.78	0.78	☐	323	☐	323	0.49	02/16/2000	3:57	02/16/2000	19:53	15:56
Event 1999e12 - 02/20/2000													
1E	1-42	-	2.33	☑	-	☑	1800	1.55	02/20/2000	5:40	02/21/2000	16:11	34:31
1E	1-46	2.43	2.43	☐	1961	☐	1961	1.42	02/20/2000	5:40	02/21/2000	16:22	34:42
1W	1-52	2.29	2.29	☐	2292	☐	2292	1.47	02/20/2000	5:39	02/21/2000	16:08	34:29
1W	1-58	2.26	2.26	☐	2548	☐	2548	1.9	02/20/2000	5:40	02/21/2000	15:59	34:19
6	6-20E	2.61	2.61	☐	2291	☐	2291	1.5	02/20/2000	6:14	02/21/2000	17:07	34:53
6	6-20F	2.57	2.57	☐	2509	☐	2509	1.65	02/20/2000	6:16	02/21/2000	17:03	34:47
8	8-23C	1.91	2.35	☑	4058	☐	4058	1.8	02/20/2000	6:05	02/21/2000	13:52	31:47
8	8-B001	2.35	2.35	☐	1113	☐	1113	1.7	02/20/2000	6:03	02/21/2000	14:25	32:22

Table 4-2
SUMMARY OF HYDROLOGIC DATA FOR MONITORED STORM EVENTS

Site	Outfall	Total Meas. Rainfall (inch)	Rain After QA/QC (inch)	Rain Abnorm.	Total Meas. Flow (cf)	Flow Abnorm.	Total Flow After QA/QC (cf)	Total Flow After QA/QC (inch)	Begining Date of Monitoring Period	Begining Time of Monitoring Period	Ending Date of Monitoring Period	Ending Time of Monitoring Period	Duration (hh:mm)
Event 1999e13 - 02/23/2000													
1E	1-42	1.16	1.16	☐	0	☑	849	0.73	02/23/2000	3:45	02/23/2000	14:17	10:32
1E	1-46	1.12	1.12	☐	1053	☐	1053	0.76	02/23/2000	3:46	02/23/2000	14:11	10:25
1W	1-52	1.05	1.05	☐	1073	☐	1073	0.69	02/23/2000	3:43	02/23/2000	14:03	10:20
1W	1-58	1.14	1.14	☐	1202	☐	1202	0.89	02/23/2000	3:45	02/23/2000	14:03	10:18
6	6-20E	1.23	1.23	☐	1321	☐	1321	0.87	02/23/2000	5:10	02/23/2000	14:32	09:22
6	6-20F	1.21	1.21	☐	1574	☑	1574	1.03	02/23/2000	4:29	02/23/2000	14:30	10:01
8	8-23C	1.15	1.49	☑	2356	☐	2356	1.05	02/23/2000	4:23	02/23/2000	14:11	09:48
8	8-B001	1.49	1.49	☐	549	☑	667	1.02	02/23/2000	4:25	02/23/2000	14:25	10:00
Event 1999e14 - 02/27/2000													
1E	1-42	0.16	0.16	☐	65	☐	65	0.06	02/27/2000	12:28	02/27/2000	14:21	01:53
1E	1-46	0.18	0.18	☐	63	☐	63	0.05	02/27/2000	12:28	02/27/2000	14:04	01:36
1W	1-52	0.18	0.18	☐	112	☐	112	0.07	02/27/2000	12:25	02/27/2000	14:22	01:57
1W	1-58	0.16	0.16	☐	118	☐	118	0.09	02/27/2000	12:27	02/27/2000	14:06	01:39
6	6-20E	0.19	0.19	☐	166	☐	166	0.11	02/27/2000	12:25	02/27/2000	14:50	02:25
6	6-20F	0.19	0.19	☐	167	☐	167	0.11	02/27/2000	12:24	02/27/2000	14:24	02:00
8	8-23C	0.26	0.19	☑	346	☐	346	0.15	02/27/2000	12:10	02/27/2000	14:17	02:07
8	8-B001	0.19	0.19	☐	83	☐	83	0.13	02/27/2000	12:10	02/27/2000	14:16	02:06
Event 1999e15 - 03/04/2000													
1E	1-42	1.79	1.79	☐	1398	☐	1398	1.2	03/04/2000	22:41	03/06/2000	4:58	30:17
1E	1-46	1.76	1.76	☐	1517	☐	1517	1.1	03/04/2000	22:46	03/06/2000	4:56	30:10
1W	1-52	1.58	1.58	☐	1713	☐	1713	1.1	03/04/2000	22:39	03/06/2000	5:46	31:07
1W	1-58	1.72	1.72	☐	2199	☑	2199	1.64	03/04/2000	22:43	03/06/2000	4:56	30:13
6	6-20E	1.56	1.56	☐	1187	☐	1187	0.78	03/04/2000	17:53	03/06/2000	3:04	33:11
6	6-20F	1.55	1.55	☐	1334	☐	1334	0.88	03/04/2000	17:54	03/06/2000	3:01	33:07
8	8-23C	0.96	1.59	☑	2129	☐	2129	0.95	03/04/2000	22:23	03/05/2000	22:39	24:16
8	8-B001	1.59	1.59	☐	679	☐	679	1.04	03/04/2000	19:04	03/05/2000	21:55	26:51

Table 4-2
SUMMARY OF HYDROLOGIC DATA FOR MONITORED STORM EVENTS

Site	Outfall	Total Meas. Rainfall (inch)	Rain After QA/QC (inch)	Rain Abnorm.	Total Meas. Flow (cf)	Flow Abnorm.	Total Flow After QA/QC (cf)	Total Flow After QA/QC (inch)	Begining Date of Monitoring Period	Begining Time of Monitoring Period	Ending Date of Monitoring Period	Ending Time of Monitoring Period	Duration (hh:mm)
Event 1999e15a - 03/03/2000													
1E	1-42	0.35	0.35	☐	167	☐	167	0.14	03/03/2000	18:19	03/03/2000	21:57	3:38
1E	1-46	0.36	0.36	☐	209	☐	209	0.15	03/03/2000	18:20	03/03/2000	22:25	4:05
1W	1-52	0.34	0.34	☐	255	☐	255	0.16	03/03/2000	18:17	03/03/2000	22:21	4:04
1W	1-58	0.33	0.33	☐	344	☐	344	0.26	03/03/2000	18:18	03/03/2000	22:23	4:05
6	6-20E	0.54	0.54	☐	463	☐	463	0.3	03/03/2000	19:55	03/03/2000	22:41	2:46
6	6-20F	0.53	0.53	☐	501	☐	501	0.33	03/03/2000	19:56	03/03/2000	22:42	2:46
8	8-23C	0.45	0.45	☐	566	☐	566	0.25	03/03/2000	20:03	03/03/2000	22:34	2:31
8	8-B001	0.50	0.5	☐	134	☐	134	0.21	03/03/2000	20:00	03/03/2000	22:32	2:32
Event 1999e16 - 03/08/2000													
1E	1-42	0.86	0.86	☐	510	☐	510	0.44	03/08/2000	1:54	03/08/2000	10:47	08:53
1E	1-46	0.94	0.94	☐	796	☐	796	0.58	03/08/2000	2:01	03/08/2000	10:44	08:43
1W	1-52	0.80	0.8	☐	860	☐	860	0.55	03/08/2000	2:26	03/08/2000	10:39	08:13
1W	1-58	0.81	0.81	☐	927	☐	927	0.69	03/08/2000	0:26	03/08/2000	10:42	10:16
6	6-20E	1.22	1.22	☐	1296	☐	1296	0.85	03/08/2000	2:36	03/08/2000	11:28	08:52
6	6-20F	1.23	1.23	☐	1398	☐	1398	0.92	03/08/2000	2:32	03/08/2000	12:53	10:21
8	8-23C	0.42	0.86	☑	295	☑	1211	0.54	03/07/2000	23:56	03/08/2000	11:05	11:09
8	8-B001	0.86	0.86	☐	267	☐	267	0.41	03/07/2000	23:52	03/08/2000	11:14	11:22

Table 4-3
DESCRIPTION OF HYDROLOGIC DATA ABNORMALITIES AND ADJUSTMENTS

Event Number	Date	Site	Outfall	Type of Abnormality	Recorded Value (inches or watershed inches)	Action Taken During Analysis of Rainfall/Runoff Relationships	Description or Abnormality
1998e01	11/8/98	8	23c	Rain	0.22 in	Rainfall total set to value recorded at outfall B001, 0.45 in.	Rainfall total is appreciably lower than recorded value at B001. Vegetative mater present in rain gauge.
1998e02	11/28/98	8	B001	Statistical Outlier	0.76 in (886 cf) of Runoff	No action taken, point was not corrected. The storm was extremely peaky and had an appreciable intensity, these could be major factors contributing to the observations for this storm at Site 8.	Identified as a possible outlier based on a high studentized residual of 3.757. Trace rain followed the event. Flow is much higher than expected for similar magnitude events for this outfall.
1998e02	11/28/98	8	23c	Flow and Rain	0.69 in of Rainfall and 0.22 (505 cf) in of Runoff	Rainfall adjusted to 0.85 inches and flow adjusted to 0. 53 inches (1194 cf) based on rainfall at B001 for this event and the runoff coefficient and depression storage observed for other events at this outfall. The storm was extremely peaky and had an appreciable intensity, these could be major factors contributing to the observations for this storm at Site 8. The rain gauge may have not functioned well under the severe wind/rain conditions present.	Rainfall total does not agree with other outfall at site and total for Montbello NWS Rain Gauge rain gauge, which recorded 1.00 in during the 24 hour period from 11/27 at 16:00 to 11/28 at 16:00. The flow total is quite low compared to the amount expected. 0.22 watershed inches is the runoff expected from a storm of magnitude less than 0.5 in.
1998e03	12/1/98	8	B001	Flow	0.20 in (404 cf)	Value was corrected to 0.08 inch (93 cf) based on runoff coefficient and depression storage observed for other events at this outfall. The flow abnormality was most likely due to an equipment problem.	Flow recorded was higher than expected. Bubbler was clogged with sediment during set-up. The tube was cleared prior to event, but problem appears to have continued during event.
1998e05	1/25/99	1	42	Rain, Flow, Start Time	0.17 in Rainfall and 0.31 in (359 cf)	Rainfall total set to average value recorded at other three outfalls at Site 1, 0.51 inches (321 cf). Runoff was recalculated based on adjusted start time.	Rainfall total is much less than other gauges at site 1 for this event. The rain gauge was clogged during event due to bird droppings. As a result of the clogged rain gauge, the flow start time was not accurate.

Table 4-3 (Continued)
DESCRIPTION OF HYDROLOGIC DATA ABNORMALITIES AND ADJUSTMENTS

Event Number	Date	Site	Outfall	Type of Abnormality	Recorded Value (inches or watershed inches)	Action Taken During Analysis of Rainfall/Runoff Relationships	Description or Abnormality
1998e06	2/9/99	6	20f	Flow	0.68 in (1033 cf)	Value was corrected to 0.22 inch (332 cf) based on runoff coefficient and depression storage observed for other events at this outfall.	Flow total was higher than expected from other events. Unknown measurement error. Possible sporadic equipment problem or clogging of bubbler tube. Runoff coefficient for event was greater than unity (1.62).
1998e06	2/9/99	8	23c	Flow and Rainfall	-	For total flow and rainfall calculations, rainfall was taken from 8-B001 and flow was estimated from runoff coefficient and rainfall. After QA values were set to 0.29 inches of rainfall and 0.10 inches (223 cf) of runoff.	Data record not available.
1998e09	3/15/99	6	20f	Flow	1.18 in (1797 cf)	Value was corrected to 0.26 inch (395 cf) based on runoff coefficient and depression storage observed for other events at this outfall.	Flow total was higher than expected from previous events. Unknown measurement error. Possible sporadic equipment problem or clogging of bubbler tube. Runoff coefficient for event is greater than unity (2.46).
1998e10	3/20/99	1	42	Spike in flow record	0.06 (74 cf)	Spike removed from record and measured value was recalculated from field data. Value shown is after removal of spike from record.	Flow record spikes with no corresponding sudden change in rainfall rate. The measurement was in error
1998e11	3/25/99	6	20f	Spike in flow record	0.02 in (26 cf)	Spike removed from record and measured value was recalculated from field data. Value shown is after removal of spike from record.	Flow total was higher than expected from other events. Flow reading jumped abruptly upward during modem call-in.
1998e12	4/8/99	6	20e	Statistical Outlier, Flow	0.74 (1129 cf)	No action taken, point remains in QA data set.	After QA, identified as a possible outlier based on a high studentized residual of 3.145.
1998e12	4/8/99	8	23c	Flow and Rainfall	-	For total flow and rainfall calculations, rainfall was taken from 8-B001 and flow was estimated from runoff coefficient and rainfall. After QA values were set to 0.98 inches of rainfall and 0.63 inches (1419 cf) of runoff.	Data record not available.

Table 4-3 (Continued)
DESCRIPTION OF HYDROLOGIC DATA ABNORMALITIES AND ADJUSTMENTS

Event Number	Date	Site	Outfall	Type of Abnormality	Recorded Value (inches or watershed inches)	Action Taken During Analysis of Rainfall/Runoff Relationships	Description or Abnormality
1998e13	4/11/99	1	42	Flow, Start and Stop Time	0.85 (987 cf)	Flow was adjusted to 0.93 inch (1077 cf) watershed inches based on start and stop time for 1-46 and flow measured at 1-42.	An apparently clogged rain gauge was at fault causing the storm start time to be in error. A start time from adjacent gauges was used and flow was recalculated.
1998e13	4/11/99	6	20F	Flow, Statistical Outlier	0.97 in (1477 cf)	Value was corrected to 0.58 inch (879 cf) based on runoff coefficient and depression storage observed for other events at this outfall.	Runoff coefficient for event was greater than unity. Event was identified during QA as a possible outlier based on a high studentized residual of 3.145.
1998e13	4/11/99	8	23c	Rain	0.79 in	Rainfall total set to value recorded at outfall B001, 1.09 in.	Rainfall total lower than expected. Possible clogging/partial obstruction of rain gauge, although not reported in the field. Total rainfall recorded at Montebello NWS rain gauge was 1.64 in from 17:00 4/10 to 17:00 4/12. Using rainfall total from outfall B001 (1.09 in) puts the event close to the rainfall/runoff curve from other events.
1999e03	12/31/99	1	42	Rain, Flow	-	For total flow and rainfall calculations, rainfall was taken from average of other stations at Site 1 and flow was estimated from runoff coefficient and depression storage observed for other events at this outfall. Values were set to 0.04 inches of rainfall and 0.00 inches of runoff.	Data record not available.
1999e03	12/31/99	8	B001	Flow	-	Flow was estimated from runoff coefficient, and depression storage observed for other events at this outfall. The value was set to 0.13 inches (87 cf) of runoff.	Flow data record not available due to a dislodged bubbler tube.
1999e05	1/25/00	1	42	Flow	0.18 in (210 cf)	No action taken, point remains in QA data set.	After QA, identified as a possible outlier based on a high studentized residual of –4.776. Measurement abnormality is most likely due to the long duration low intensity of the event.

Table 4-3 (Continued)
DESCRIPTION OF HYDROLOGIC DATA ABNORMALITIES AND ADJUSTMENTS

Event Number	Date	Site	Outfall	Type of Abnormality	Recorded Value (inches or watershed inches)	Action Taken During Analysis of Rainfall/Runoff Relationships	Description or Abnormality
1999e05	1/25/00	1	46	Flow	0.12 in (159 cf)	No action taken, point remains in QA data set.	After QA, identified as a possible outlier based on a high studentized residual of –3.040. Measurement abnormality is most likely due to the long duration low intensity of the event.
1999e05	1/25/00	8	23c	Rain	0.34 in	Rainfall total set to value recorded at outfall B001, 0.55 in.	Rainfall total lower than expected. Possible obstruction of rain gauge or rain shadow from vegetation.
1999e06	1/30/00	8	23c	Rain	0.07 in	Rainfall total set to value recorded at outfall B001, 0.15 in.	Rainfall total lower than expected. Possible obstruction of rain gauge or rain shadow from vegetation.
1999e09	2/12/00	1	42	Rain, Flow	-	For total flow and rainfall calculations, rainfall was taken from average of other stations at Site 1 and flow was estimated from runoff coefficient and depression storage observed for other events at this outfall. Values were set to 0.52 inches of rainfall and 0.28 inches (329 cf) of runoff.	Data record not available.
1999e10	2/13/00	8	23c	Rain	0.20 in	Rainfall total set to value recorded at outfall B001, 0.33 in.	Rainfall total lower than expected. Possible obstruction of rain gauge or rain shadow from vegetation.
1999e12	2/20/00	1	42	Rain, Flow	-	For total flow and rainfall calculations, rainfall was taken from average of other stations at Site 1 and flow was estimated from runoff coefficient and depression storage observed for other events at this outfall. Values were set to 2.33 inches of rainfall and 1.55 inches (1800 cf) of runoff.	Data record not available.

Table 4-3 (Continued)
DESCRIPTION OF HYDROLOGIC DATA ABNORMALITIES AND ADJUSTMENTS

Event Number	Date	Site	Outfall	Type of Abnormality	Recorded Value (inches or watershed inches)	Action Taken During Analysis of Rainfall/Runoff Relationships	Description or Abnormality
1999e12	2/20/00	8	23c	Rain, Statistical Outlier	1.91 in	Rainfall total set to value recorded at outfall B001, 2.35 in.	Rainfall total lower than expected. Possible obstruction of rain gauge or rain shadow from vegetation. After QA, marginally identified as a possible outlier based on a studentized residual of 2.837.
1999e13	2/23/00	1	42	Flow	0 in	Flow was estimated from runoff coefficient, and depression storage observed for other events at this outfall. The value was set to 0.73 inches (849 cf) of runoff.	No flow data recorded. Bubbler on flow meter failed.
1999e13	2/23/00	6	20F	Statistical Outlier, Flow	1.03 in (1574 cf)	No action taken, point remains in QA data set.	After QA, identified as a possible outlier based on a high studentized residual of 4.631.
1999e13	2/23/00	8	B001	Flow	0.84 in (549 cf)	Flow was estimated from runoff coefficient, and depression storage observed for other events at this outfall. The value was set to 1.02 inches (667 cf) of runoff.	Runoff lower than expected from other events. Hydrograph of flow indicated that flow record was not responsive to rainfall intensity.
1999e13	2/23/00	8	23c	Rain	1.15 in	Rainfall total set to value recorded at outfall B001, 1.49 in.	Rainfall total lower than expected. Possible obstruction of rain gauge or rain shadow from vegetation.
1999e14	2/27/00	8	23c	Rain	0.26 in	Rainfall total set to value recorded at outfall B001, 0.19 in.	Rainfall total higher than expected. Possible obstruction of rain gauge or additional rain falling from vegetation during wind and low intensity rainfall.
1999e15	3/4/00	1	58	Statistical Outlier, Flow	1.89 in (2199 cf)	No action taken, point remains in QA data set.	After QA, identified as a possible outlier based on a high studentized residual of 5.990.
1999e15	3/4/00	8	23c	Rain, Statistical Outlier	0.96 in	Rainfall total set to value recorded at outfall B001, 1.59 in.	Rainfall total lower than expected. Possible obstruction of rain gauge or rain shadow from vegetation. After QA, identified as a possible outlier based on a high studentized residual of -2.965.

Table 4-3 (Continued)
DESCRIPTION OF HYDROLOGIC DATA ABNORMALITIES AND ADJUSTMENTS

Event Number	Date	Site	Outfall	Type of Abnormality	Recorded Value (inches or watershed inches)	Action Taken During Analysis of Rainfall/Runoff Relationships	Description or Abnormality
1999e16	3/8/00	8	23c	Rain, Flow	0.42 in of Rainfall and 0.13 in (293 cf) of Runoff	For total flow and rainfall calculations, rainfall was taken from B001 and flow was estimated from runoff coefficient and depression storage observed for other events at this outfall. Values were set to 0.86 inches of rainfall and 0.54 inches (1211 cf) of runoff.	Rainfall total lower than expected. Possible obstruction of rain gauge or rain shadow from vegetation. Runoff much lower than expected from other events with a runoff coefficient of 0.15 after rainfall was corrected. Hydrograph of flow indicated that flow record was not responsive to rainfall intensity.

4.2.5 Total Seasonal Rainfall and Flow Data

Rainfall gauges and flow meters remained active during rainfall events and in between successive events. This provided a total seasonal data record for both rainfall and flow. Table 4-4 shows the total rainfall for four National Weather Service stations in proximity to the monitored sites and rainfall totals by month of the monitoring period. The seasonal rainfall record, as adjusted based on QA/QC (Appendix D), was used along with the analysis of the relationship between flow and rainfall during chemical water quality monitoring events to predict the total volume of runoff for each of the chemical water quality sites. Although flow data were collected during inter-event periods, the minute-by-minute flow record contained abnormalities related to flow readings that were outside Caltrans storm criteria. Therefore, the calculated flow total was considered to better estimate actual flow conditions.

4.3 OTHER MONITORING ACTIVITIES

During the course of the LMPS, several monitoring activities were initiated to supplement the monitoring activities prescribed in the Study Plan. These monitoring activities comprise inlet deposition monitoring, characterization of street sweeping debris, and characterization of litter pick-up debris. Details and results of these activities are discussed in subsections below.

4.3.1 Inlet Deposition Monitoring

Inlet deposition monitoring was initiated at the 24 LMPS study inlets in June 1999. This supplementary monitoring consisted of observing deposition within drain inlets. The purpose of the effort was to obtain field insights regarding the amount of litter that enters a drain inlet as a result of transport by wind and vehicle-induced turbulence. Inlet deposition monitoring was conducted once every four weeks during June, July, and August 1999. Between September 1999 and April 2000, inlet deposition monitoring was conducted every other week. Deposition monitoring consists of taking debris depth measurements (i.e., as a way to estimate the volume of litter contained inside the chambers of the drain inlet structures) and making visual observations at each inlet. Depth measurements were taken at twelve points marked on each grate. Depth measurements taken during each monitoring event were then compared to base inlet depths at each measurement point location. Field procedures for inlet deposition monitoring are provided in Appendix F.

The inlet debris volume data are presented for each site in Figures 4-2 to 4-5. The data indicate that the volume of debris in the inlets gradually increased through the summer. Additionally, between January 11, 2000 and February 8, 2000, the volumes of debris continued to generally accumulate even though 3 monitored storms occurred during this period. Five monitored storms occurred during the 2-week period between February 8, 2000 and February 22, 2000, and a substantial reduction in inlet debris volume was measured during this period. This trend is supported by field observations during Event 1999-12 on February 21, 2000, where high flows appeared to “scour” debris in drain inlets at Site 1.

Table 4-4
SEASONAL RAINFALL AND TOTAL FLOW

	1998		1999						1999		2000				
	Nov.	Dec.	Jan.	Feb.	Mar.	April	Seasonal Total Rainfall[3]	Seasonal Total Flow[1]	Nov.	Dec.	Jan.	Feb.	Mar.	Seasonal Total Rainfall[4]	Seasonal Total Flow[1]
Station	Rainfall (in)						(in)	(cf)	Rainfall (in)					(in)	(cf)
Site 1W/1E – Lynnwood (NWS – LAX is 12 miles northwest and NWS – Torrance 12 miles southwest.															
NWS – LAX (045114)	1.89	0.74	1.19	0.5	2.28	2.26	8.86		0.36	0.00	0.85	4.75	2.39	8.35	
NWS – Torrance (048973)	1.12	0.48	1.22	0.45	2.17 4 days missing	2.33	7.77		0.36 4 days missing	0.00 3 days missing	0.75 8 days missing	3.78 4 days missing	2.36 8 days missing	7.25	
NWS – Long Beach (045085)	1.40	0.57	1.46	0.41	1.81	2.31	7.96		0.17 1 days missing	0.00	0.59	2.85	1.70	5.31	
1-42	1.36	0.82	1.11	0.36	1.36	2.55	7.56	6485	0.33	0.01	0.81	5.56[2]	3.05	9.76	7877
1-46	1.42	0.99	1.64	0.36	1.37	2.43	8.21	7370	0.34	0.04	0.83	5.78	3.09	10.08	8953
1-52	1.23	0.97	1.58	0.37	1.35	2.25	7.75	8465	0.34	0.05	0.74	5.41	2.75	9.29	10282
1-58	1.35	1.01	1.69	0.51	1.39	2.43	8.38	11255	0.39	0.06	0.78	5.50	2.89	9.62	12921
NWS -Montebello (045790)	1.65	0.6 1 day missing	2.05 4 days missing	0.64	0.75 12 days missing	2.88 4 days missing	8.57		0.25 8 days missing	0.00 6 days missing	0.06 11 days missing	4.59 11 days missing	2.51 10 days missing	7.41	
Site 6 – Hacienda Heights (NWS – Montebello, above, is 6 miles east)															
6-20e	1.02	0.60	1.52	0.90	0.75	2.65	7.43	6948	0.11	0.17	1.10	6.30	3.38	11.06	10417
6-20f	1.00	0.58	1.52	0.89	0.71	2.57	7.27	7732	0.11	0.17	1.11	6.26	3.33	10.98	11593
Site 8 – Montebello (NWS – Montebello is 4 miles west)															
8-23c	1.30[2]	0.49	1.72	0.61	0.89	1.97[2]	6.98	12113	0.22	0.30	0.45	6.28[2]	2.97[2]	10.22	17841
8-b001	1.30	0.51	1.74	0.61	0.87	1.97	7.00	5695	0.11	0.25	0.76	6.28	2.97	10.37	4722

NWS = National Weather Service, distances to NWS gauges are approximate.

1. Seasonal flow estimated from average rainfall at all rain gauges at site and the runoff coefficient determined from both years of rainfall and runoff event data. Depression storage is not included in the estimate.
2. Value has been approximated based on information from adjacent rain gauges for periods where rain gauge was not functioning properly.
3. Average seasonal rainfall totals (October-April) for the LA area are as follows: NWS-LAX 11.67 inch; NWS-Torrance 13.00 inch; NWS-Long Beach 11.76 inch; NWS-Montebello 16.21inch; NWS-Civic Center 14.14 inch.
4. Average seasonal rainfall totals (October-March) for the LA area are as follows: NWS-LAX 10.89 inch; NWS-Torrance 12.13 inch; NWS-Long Beach 11.02 inch; NWS-Montebello 15.19 inch; NWS-Civic Center 13.08 inch.

Figure 4-2
Inlet Material Volumes Based on Inlet Deposition Monitoring at Site 1E - Litter Pick-up

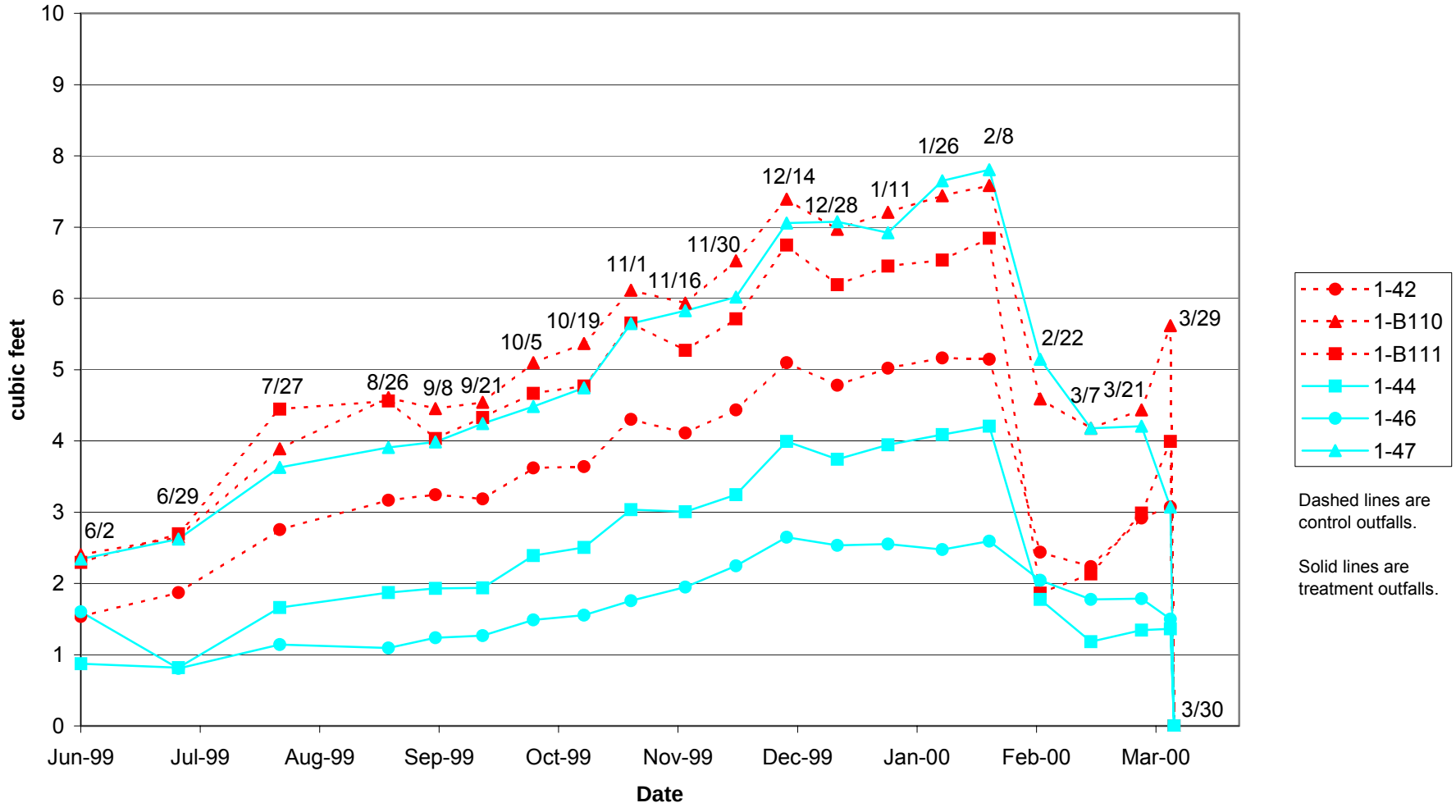

Figure 4-3
Inlet Material Volumes Based on Inlet Deposition Measurements at Site 1W - Street Sweeping

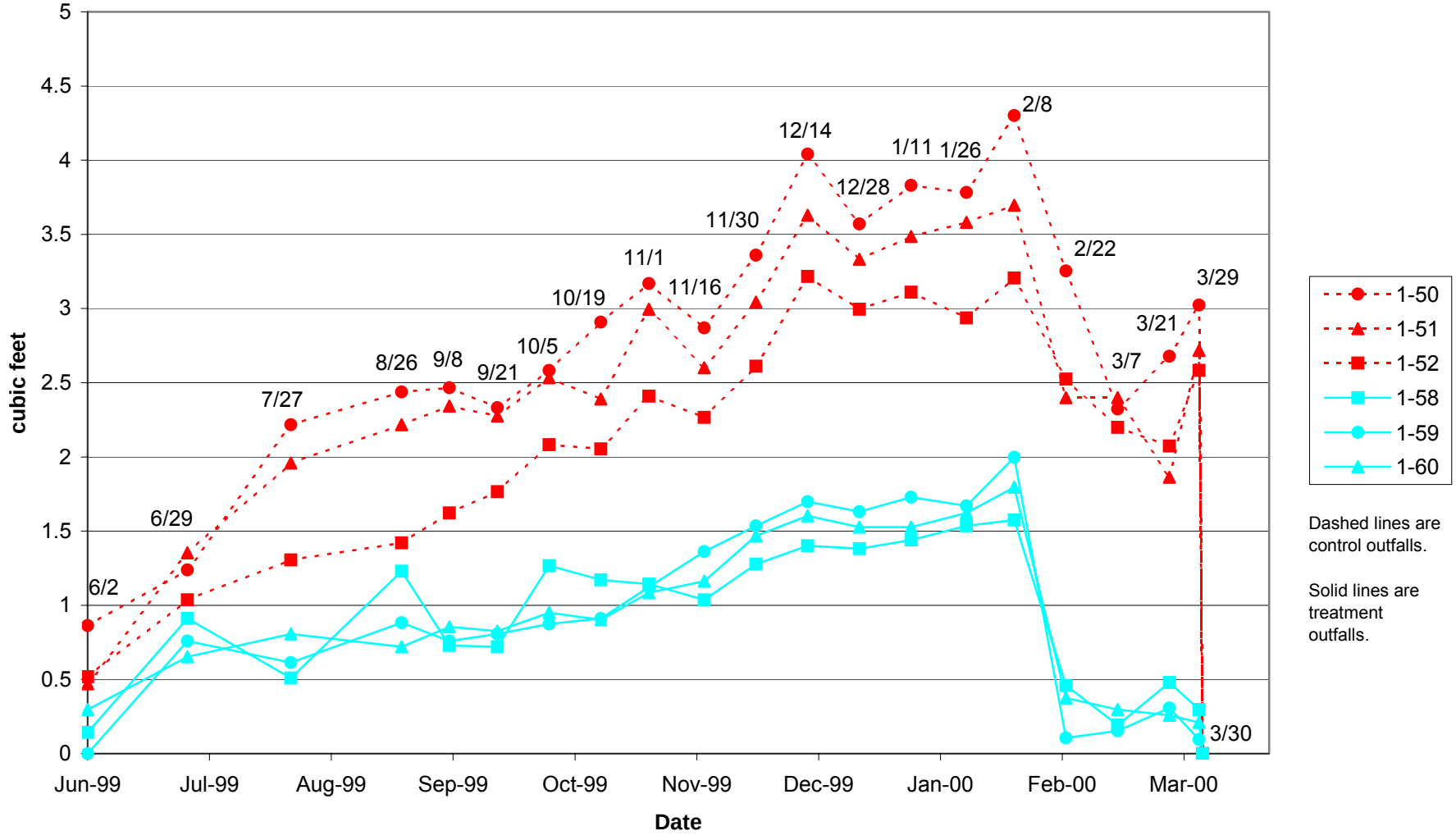

Figure 4-4
Inlet Material Volumes Based on Inlet Deposition Measurements at Site 6 - Modified Inlet

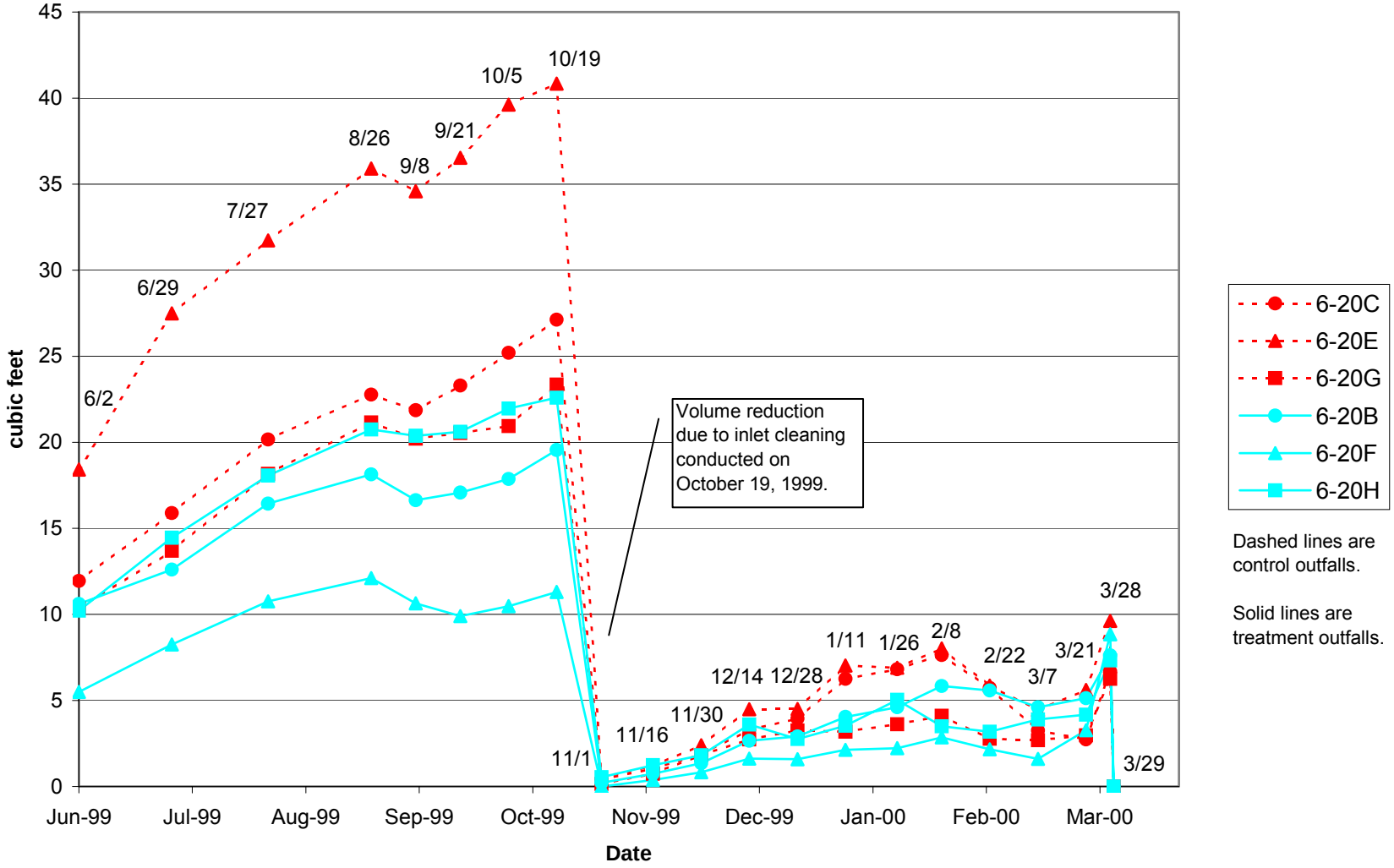

Figure 4-5
Inlet Material Volumes Based on Inlet Deposition Measurements at Site 8 - Bicycle Grate (Year 1) and LID (Year 2)

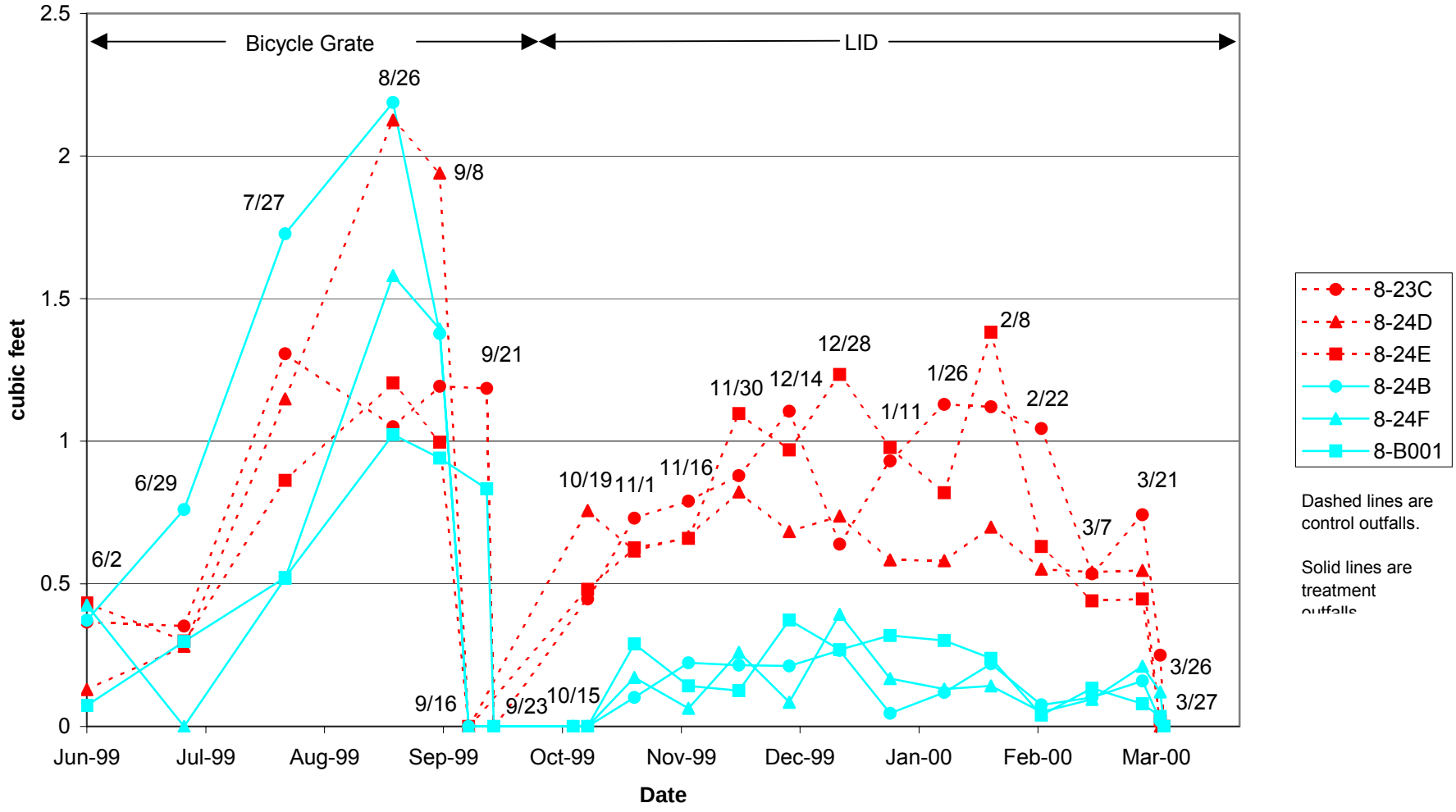

Figures 4-2 and 4-4 do not reveal clear trends with respect to BMPs reducing inlet material volume at Site 1E (litter pick-up) or Site 6 (modified inlet grate). Figure 4-3 shows a pattern of reduced volumes of inlet material for street sweeping treatment inlets compared to street sweeping control inlets at Site 1W. A similar pattern of reduced inlet material volumes is apparent for LID treatment inlets compared to control inlets at Site 8. However, these inlet material volume trends are not supported by litter monitoring results at the outfall. The trends are not demonstrated in either the cumulative litter monitoring results (Section 7.1.2) or the results of statistical testing for BMP effectiveness (Sections 7.1.4 and 7.1.5).

4.3.2 Street Sweeper Debris Characterization

In addition to the monitoring activities prescribed in the Study Plan, weight and volume measurements of sweeper debris were also taken. On several occasions, samples of sweeper debris were also collected for analysis in the litter lab. The purpose of these activities was to assess whether the litter collected by street sweepers was similar to the litter collected by the net bags at the ends of the drainage system outfalls, with respect to their composition and visual appearance.

Weight and volume measurements of sweeper debris were made on a weekly basis after the sweeper had finished both median and shoulder sweeping in the study area. Debris weight was measured by subtracting the tare weight of the sweeper (measured at truck scales upon exiting the transfer station) from the gross weight of the sweeper (taken upon entering the transfer station). Net weights of debris were found to be very small compared to the sweeper weight. Therefore, these weight data are not considered representative. Volume data are discussed below.

From March to October 1999, debris was collected from street sweeping operations (at Site 1) and then separated and analyzed. The volume of all of the material collected was estimated in the field. Volumes were measured after the debris was dumped from the hopper onto the ground. The following methods were used to measure debris volume: (1) shoveling debris into a 5-gallon bucket or (2) placing a calibrated wooden frame around the debris and taking width and length measurements for a standard depth (6 inches). Photo 4–1 depicts the calibrated frame technique. A sample of the material was then sieved to remove sediments, and the litter that was retained was taken to the litter lab for categorization.

Photo 4-1

Calibration Frame Used to Measure Volume of Sweeper Debris

Street sweeper debris was sorted and categorized 25 times from the westbound side of Site 1. The collected material was either collected during weekly sweeping (at the treatment site only) or during sweeping conducted every four weeks (from the treatment and control sites combined) and was analyzed in the litter lab. The analysis gave an indication of the types of litter that street sweepers collect on highways. These litter categories were then compared with the litter collected in the net bags at the ends of the drainage outfalls.

Figures 4-6 to 4-8 show the percent composition of street sweeping litter compared to litter monitored in the drainage system and litter collected from the ROW for each category by weight, volume, and count. Figures 4-6 to 4-8 show that the types of materials collected by freeway street sweepers is quite similar to the litter collected by the net bags at drainage system outfalls, except for some differences in the proportions of glass, moldable plastics, metal, paper, film plastic, styrofoam, and wood.

The percent composition of glass in sweeper debris ranges from 1 to 11 percent but was less than one percent in drainage system litter for the three measurement parameters (air-dried weight, volume, and count). Metal in sweeper debris ranged from 7 to 19 percent and 5 to 13 percent in drainage system litter. Moldable plastic in sweeper debris ranged from 27 to 38 percent but only 11 to 21 percent in drainage system litter. Paper and film plastic in sweeper debris ranged from 2 to 4 percent and 1 to 2 percent, respectively, whereas paper and film plastic ranged from 9 to 14 percent and 7 to 12 percent, respectively, in outfall litter.

The exceptions of higher proportions of moldable plastic and metal may be partly explained by considering the sweepers' ability to remove items such as drink bottles, cans, and vehicle parts that cannot fit through grates into drain inlets (typically 35mm/1 ½-inch bar-spacing) but can be removed by sweepers. Figure 4-8 also shows the very high proportion of the number of cigarette butts, which is consistent with the net bag monitoring results from the drainage system.

Figure 4-6
Drainage System, Street Sweeper, and ROW Litter Composition by Air-Dried Weight

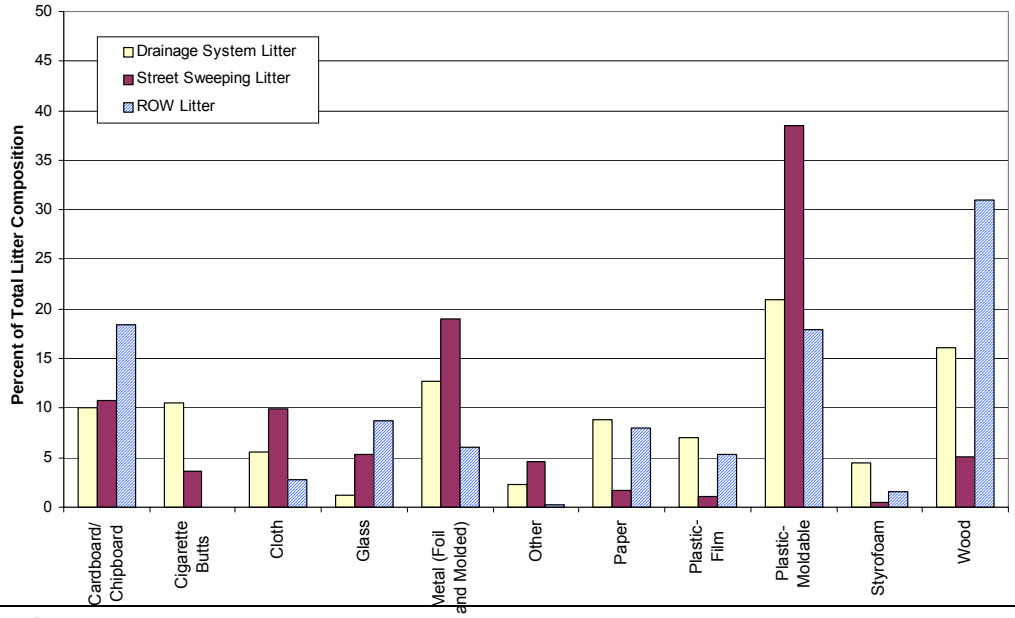

Figure 4-7
Drainage System, Street Sweeper, and ROW Litter Composition by Volume

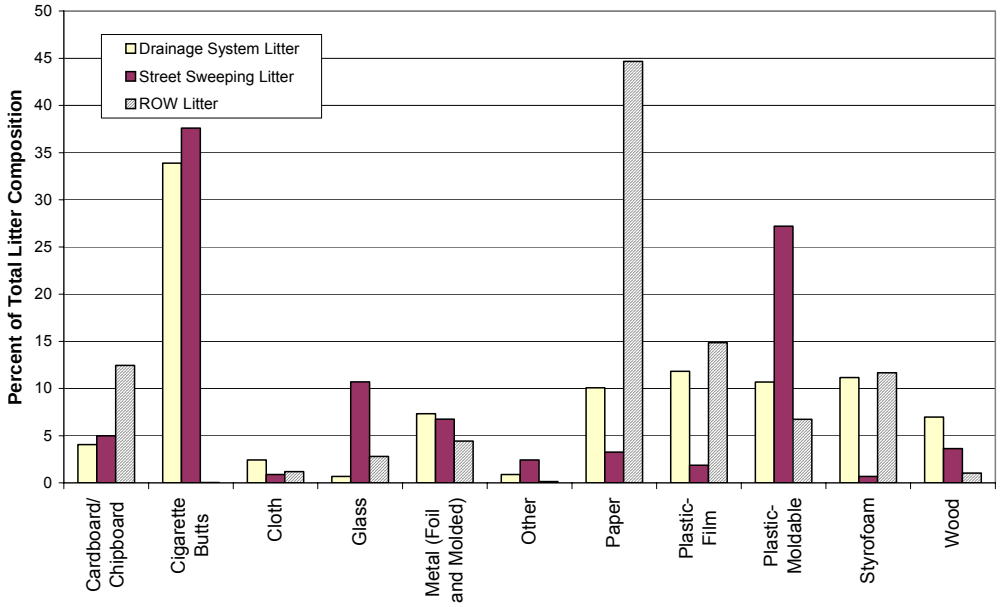

Figure 4-8
Drainage System, Street Sweeper, and ROW Litter Composition by Count

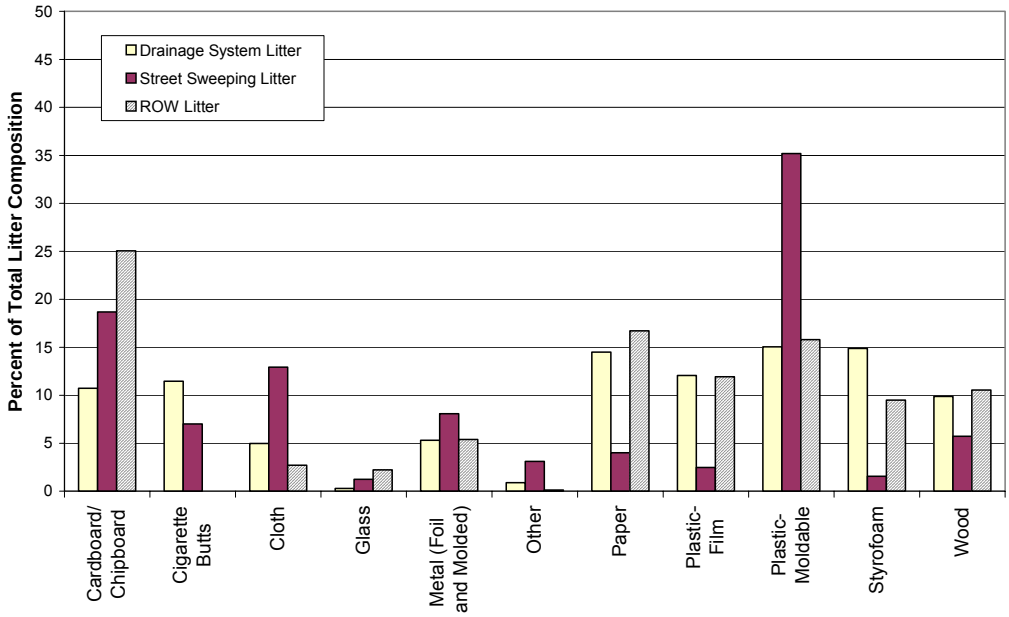

Differences in visual appearance between outfall litter and sweeper debris were evaluated by comparing laboratory observations regarding the general size and condition of items characterized. In general, items collected by the sweeper contained larger-sized items compared to outfall items. This difference is demonstrated in Photos 4-2 and 4-3.

4.3.3 Litter Pick-Up Debris Characterization

Throughout the LMPS, the litter pick-up subcontractor recorded the number of 20-gallon trash bags collected from the study area each week. Based on this accounting, 189 bags of litter were collected during 52 weekly pick-ups.

In addition to street sweeping debris characterization, ROW litter collected during implementation of the litter pick-up BMP was characterized. Litter from ROW pick-up was characterized during a 6-week period from September and October 1999. The purpose of characterization was to investigate whether litter during AAH litter pick-up was similar to litter retained in the net bags at the drainage outfalls, with respect to litter composition and size. The 6-week collection period provides a snap-shot of ROW litter that is expected to be similar to ROW litter collected throughout the study.

The litter pick-up collection and characterization methodologies are described below:

- As described in Section 3.3.1, litter pick-up is conducted on a weekly basis in the Site 1E treatment area ROW (Harris Avenue to Atlantic Boulevard on the I-105 freeway) and once every four weeks in the Site 1E control area ROW (Gertrude Avenue to Harris Avenue).
- The litter pick-up BMP uses litter collection practices similar to standard practices utilized by AAH contractors, Special Programs People, and Caltrans District 7 staff. Therefore, litter was picked up using mechanical, lever-actuated tongs and placed into collection bags; litter too small (e.g., cigarette butts) for pick-up was not collected.
- Standard practice for the LMPS was for the AAH contractor to place the collected litter in standard Caltrans District 7 AAH program trash bags and dispose of debris off-site as municipal solid waste.
- The AAH contractor was instructed to leave the trash bags on-site after collection in the appropriate treatment or control area. The bags were then retrieved from the site within a day of collection, each bag was properly labeled with date and collection area, and the bags were transported to the Santa Ana litter lab for characterization.
- Litter was characterized in accordance with the LMPS protocol. Additionally, the proportion of the ROW litter that could fit through a typical inlet grate was estimated.

Analysis of litter pick-up characterization data gives an indication of the types of litter present in the freeway ROW and collected by AAH programs. These litter categories were then compared with the litter monitored in the drainage outfalls.

Photo 4-2

Typical Litter in Sweeper Debris Collected From Site 1W, Harris to Gertrude, on 4/1/99

Photo 4-3

Typical Litter in Outfall Debris from Outfall 1-58, Event 1998-11, 3/25/99

Figures 4-6 to 4-8 show a plot of the proportions of litter categories for the ROW litter compared to drainage system and street sweeping litter. The material collected by the AAH contractor is similar to the litter retained in the net bags at the drainage systems, but the proportions of constituents differ. The data indicate that there are higher proportions of chipboard/cardboard, glass, and wood in the ROW litter compared to outfall litter, and much lower proportions of cigarette butts. The percent composition of cardboard/chipboard ranged from 12 to 25 percent in ROW litter and from 5 to 10 percent in drainage litter depending on measurement parameter (air-dried weight, volume, or count). For glass, the ROW percent composition ranged from 2 to 9 percent and drainage systems litter was 1 percent or less. For wood, the ROW percent composition ranged from 1 to 31 percent and the drainage system percent composition was 7 to 16 percent. For cigarette butts, the drainage system percent composition ranged from 10 to 34 percent and ROW litter contained no cigarette butts.

One explanation for this trend may be the size of the material collected during litter pick-up. In accordance with standard District 7 AAH litter collection practices, the AAH contractor did not remove individual cigarette butts, and this could explain why there is such as low proportion compared to the litter in the drainage system. Large litter items, such as wood from broken pallets, glass bottles, and large cardboard pieces, can be picked up by AAH contractors but would be unlikely to find their way into the drain system because of their size.

The size analysis involved placing the litter items from the ROW onto a typical inlet grate in the lab and measuring what proportion of material could fit through the grate. This analysis showed that approximately 90% of the litter collected from the ROW was too large to fit into a typical inlet grate.

4.3.4 LID Observations

Observations were made of the three LID BMPs during monitored storm events to assess BMP performance during wet weather. The hydraulic characteristics of the gates at each of the three treatment inlets (B001, 24B, and 24F) appeared to be satisfactory under all storm conditions observed. During low-flow periods, the vertical slots in the gate were sufficient to convey flow to the inlet without bypass. During higher flows (e.g., Event 1999-12), the gates opened to allow flows to enter the inlets, again without bypass. The flow diverters (angled asphalt channels) worked well to direct flow to the curb inlets. The current LID design includes vertical supports between the gate panels. These vertical supports tend to trap and collect debris, at times prying the gate open. More details regarding LID observations are provided in Appendix A.

5.1 SAMPLE ANALYSIS

A monitoring objective of the Caltrans LMPS was to obtain chemical water quality data from each of the eight stations for up to 18 storm events, or a total of 144 station events. During year 1 of monitoring, results for 90% of the targeted storm event chemical water quality constituents were obtained. During year 2 of monitoring, results for 87% (as of Event 1999-11) of the targeted constituents were obtained. Samples were not obtained for the remaining constituents because either lower than forecast rain volumes were observed or monitoring equipment malfunctioned. See Table G-2 in Appendix G for a breakdown of the constituents that were not analyzed.

5.1.1 Chemical Water Quality Parameters and Analytical Methods

The chemical water quality parameters and the associated sampling method, analytical method number, target detection limit, and holding time selected for the LMPS are shown in Table 5-1.

5.1.2 Sample Compositing

For each monitored storm event, the analytical laboratory prepared composite samples for each of the eight chemical water quality monitoring stations using aliquots from each of the automatic sampler bottles containing storm water runoff. The aliquot volume was determined by utilizing the sampling history recorded by the data logger, cumulative flow, and the representative proportion of flow captured for the event in each bottle.

Each automatic sampler was configured to contain eight 1900 ml bottles. The samplers were programmed to deliver three 600 ml samples to each of the eight bottles on a flow-weighted basis. Therefore, ideally, at the end of a storm event, each sampler would contain eight bottles, each holding exactly 1800 ml of storm water runoff. The entire set of bottles would then represent the entire duration of the storm event. However, for several reasons, partially-filled bottles are fairly common when using automatic samplers. Partially-filled bottles may occur because the flow is too low or there is a partial blockage of the intake tube such that the sampler cannot draw 600 ml when it is triggered. The calibration of the automatic sampler can degrade over time, such that the sampler does not draw exactly 600 ml (for example, a sampler may only draw 575 ml when triggered). Also, if the actual precipitation is less than forecast, the last bottle holding storm water sample may only have received one or two of the three samples programmed for each bottle.

To prepare a composite sample representative of the monitored event, the aliquots taken from each bottle had to be in proportion to the fraction of the cumulative flow represented by the sample in each bottle. Since each sample bottle did not always contain 1800 ml of storm water runoff, the composite sample could not be comprised of equal aliquots from each bottle. A worksheet was developed to compute the fraction of the cumulative flow represented by each bottle. This fraction was then used to determine the volume of the aliquot to be taken from each sample bottle when preparing the composite sample.

Table 5-1
CHEMICAL WATER QUALITY PARAMETERS AND ANALYTICAL METHODS

Parameter	Sampling Method	Method Number	Target Detection Limit	Holding Times
Metals (Total and Dissolved)				
Cadmium	Flow-weighted Automatic Sampling	EPA 6020	0.2 µg/L	6 months
Chromium	Flow-weighted Automatic Sampling	EPA 6020	1.0 µg/L	6 months
Copper	Flow-weighted Automatic Sampling	EPA 6020	1.0 µg/L	6 months
Lead	Flow-weighted Automatic Sampling	EPA 6020	1.0 µg/L	6 months
Nickel	Flow-weighted Automatic Sampling	EPA 6020	1.0 µg/L	6 months
Zinc	Flow-weighted Automatic Sampling	EPA 6020	1.0 µg/L	6 months
Nutrients				
Orthophosphate	Flow-weighted Automatic Sampling	EPA 365.3	0.05 mg/L	48 hours
Phosphorus - Total	Flow-weighted Automatic Sampling	EPA 365.3	0.05 mg/L	28 days
Total Kjeldahl Nitrogen (TKN)	Flow-weighted Automatic Sampling	EPA 351.3	0.3 mg/L	28 days
Nitrate-N	Flow-weighted Automatic Sampling	EPA 300.0	0.1 mg/L	48 hours
Other				
Coliform - Total	Manual Grab Sampling	SM 9221C	- -	6 hours
Coliform - Fecal	Manual Grab Sampling	SM 9221E	- -	6 hours
Hardness	Flow-weighted Automatic Sampling	EPA 130.2	1.0 mg/L	6 months
Oil and Grease	Manual Grab Sampling	EPA 413.1	1 mg/L	28 days
Temperature	Manual Grab Sampling	Field Test	—	—
pH	Manual Grab Sampling	Field Test and EPA 150.1	0.01	24 hours
Specific Conductance	Manual Grab Sampling	Field Test and EPA 120.1	1µhos/cm	NA
Total Petroleum Hydrocarbon (TPH) - Diesel fraction	Manual Grab Sampling	8015M	1000 µg/L	14 days
TPH - Gasoline fraction	Manual Grab Sampling	8015M	500 µg/L	14 days
Total Organic Carbon (TOC)	Flow-weighted Automatic Sampling	EPA 415.2	0.05 mg/L	28 days
Total Suspended Solids (TSS)	Flow-weighted Automatic Sampling	EPA 160.2	1.0 mg/L	7 days
Volatile Solids	Flow-weighted Automatic Sampling	EPA 160.4	1 ppm	7 days

5.1.3 Prioritization of Analytical Parameters

The chemical water quality parameters were prioritized for circumstances in which the volume of composite sample for a monitoring station was insufficient to conduct all of the analyses. This was particularly likely for those storm events where the actual precipitation was substantially less than the forecast precipitation amount which had been used to determine the

sampler pacing volume. Of the 147 composite chemical water quality station events for both years of monitoring, all of the analyses were conducted for all but 13 station events. The prioritization was developed based on discussion with Larry Walker and Associates (LWA), under contract with Caltrans to develop monitoring and analytical procedures for Caltrans chemical water quality studies. The general prioritization is presented in Table 5-2.

However, depending upon the minimum volume required to conduct an analysis and the amount of composite sample remaining, the "next" analysis in priority may be omitted, and a subsequent analysis in priority may be conducted. For example, if the total volume of composite sample was 700 ml, the following analyses would be conducted: Metals (100 ml), TSS (200 ml), Volatile Solids (200 ml), TOC (100 ml), pH and specific conductance (50 ml), and Nitrate (25 ml). In this example, the analysis for Total Phosphorus was skipped because it would have required 100 ml and only 50 ml of composite sample would be available. Therefore, the analysis for Nitrate would be specified, because it would require only 25 ml.

Table 5-2
PRIORITIZATION OF CHEMICAL WATER QUALITY PARAMETERS

Analytical Parameter in Order of Priority	Minimum Volume of Sample to Conduct Analysis (ml)
1) Metals - Total and Dissolved	100
2) TSS	200
3) Volatile Solids	200
4) TOC	100
5) pH and specific conductance	50
6) Total Phosphorus	100
7) Nitrate	25
8) Orthophosphate	100
9) TKN	300
10) Hardness	100

5.1.4 QA/QC

Several types of quality assurance and quality control (QA/QC) were applied to the chemical water quality data. First, data validation was performed in accordance with U.S. Environmental Protection Agency (EPA) and Caltrans Storm Water Program protocols on data from each storm event throughout both years of monitoring. Secondly, lab data that were submitted electronically (in Access format) were compared to hard copy reports to ensure that information in both data sets was consistent. This was accomplished by generating database reports in the format of the hard copy reports and comparing sets for approximately 12% of outfalls (one random outfall per storm event).

Chemical water quality data were reviewed for the following QA/QC elements of precision, accuracy, reporting limits, and contamination in accordance with the LWA protocols.

- Holding time
- Detection limits
- Blanks
- Surrogates
- Matrix spike/matrix spike duplicates
- Laboratory control samples
- Total vs. dissolved metals
- Field duplicates

Holding Times

Analytical methods adhered to sample holding times that were established for this study. The term "holding time" refers to the maximum amount of time after collection that a sample may be held prior to sample preparation and/or analysis. Although holding times were almost always met, on two occasions several samples were analyzed for nitrate out of holding time in year 1 due to sample compositing delays. These are presented in Table 5-3. All of the exceedances were less than 20 hours, and nitrate was detected in all of the affected samples at levels that were comparable to unaffected samples. In addition, all samples were analyzed by the laboratory within 48 hours of receipt. Therefore, no qualification was judged to be necessary.

Table 5-3
NITRATE HOLDING TIMES IN EXCESS OF 48 HOURS

Storm Event	Sample ID	Sample Start Date and Time	Sample Analysis Date and Time	Holding Time Exceeded by:
1998-02	1-58	11/28/98 4:07	11/30/98 19:42	15 hrs 35 mins
	1-46	11/28/98 4:23	11/30/98 20:28	16 hrs 5 mins
	1-42	11/28/98 4:10	11/30/98 21:13	17 hrs 3 mins
	1-52	11/28/98 4:31	11/30/98 21:59	17 hrs 28 mins
	8-23C	11/28/98 4:39	11/30/98 22:44	18 hrs 5 mins
	8-B001	11/28/98 4:36	11/30/98 23:29	18 hrs 53 mins
	6-20F	11/28/98 4:59	12/1/98 00:15	19 hrs 14 mins
	6-20E	11/28/98 5:01	12/1/98 1:00	19 hrs 59 mins
1998-03	1-58	12/1/98 13:45	12/4/98 00:09	10 hrs 24 mins
	8-23C	12/1/98 15:07	12/4/98 00:39	9 hrs 32 mins
	8-B001	12/1/98 14:15	12/4/98 1:10	10 hrs 55 mins

Detection Limits

Actual laboratory detection limits were compared to the detection limits specified in the Study Plan to determine compliance. During year 1, Study Plan detection limits were met for all analytes except two:

- TKN - 0.5 mg/L was used instead of 0.3 mg/L (storm event 3 only)
- Zinc - 5 μg/L instead of 1 μg/L

However, in all cases, samples had detected concentrations of these analytes. During year 2, Study Plan detection limits were met for all analytes except two:

- Hardness - 2 mg/L instead of 1 mg/L
- Nitrate - 0.5 mg/L was used instead of 0.1 mg/L for several station events

However, in all cases samples had detected concentrations of these analytes. In addition, nitrate detection limits were raised only in cases where dilution was required to quantify the nitrate present.

Blanks

Method blanks, consisting of deionized water (DI), were carried through each step of the analysis with the samples and were analyzed with each analytical parameter. For year 1, in four cases (zinc in 1998-06, cadmium in 1998-09, lead in 1998-11, and chromium in 1998-12) concentrations of metals above the detection limit, but below the reporting limit, were observed in the method blanks. All samples with concentrations less than five times the concentration found in the associated method blank were qualified as undetected (**U)**. For year 2, all method blanks had undetected analyte concentrations.

Equipment blanks were collected for storm events 1998-03, 1998-05, 1998-09, 1998-10, 1998-11, 1998-12, and 1998-13 and were analyzed for pH, specific conductance, hydrocarbons, coliforms, and fecal coliforms. Three of the equipment blanks had detected concentrations of oil and grease ranging from 1 to 2 mg/l. All samples with concentrations less than five times the concentration found in the associated equipment blank were qualified as undetected (**U)**.

Equipment blanks were collected and analyzed from the automated sampler tubing prior to year 2 monitoring at each of the eight monitoring stations. Teflon™ sample collection tubing was replaced at each sampler, prior to collecting samples using laboratory grade DI water. However, rubber tubing located inside the sampler pump was not replaced due to the additional work required to replace internal tubing. Tubing was flushed with DI water several times before collection of equipment blanks. Analytes were detected above the reporting limit in all samples. Table 5-4 compares the range of results found to the reporting limit and the range of expected EMCs based on year 1 data. Detected analytes in equipment blanks were most likely the result of residual constituents inside rubber sampler tubing. In each case, the expected EMC was at least one order of magnitude higher than the concentration detected in the equipment blanks. Therefore, data are not expected to be affected by on the low detections observed in the field blanks.

Table 5-4
AUTOMATED SAMPLER TUBING EQUIPMENT BLANK RESULTS COMPARED TO YEAR 1 EMCs

Analyte	Units	Reporting Limit	Range of Equipment Blank Results	Range of Expected EMCs Based on Year 1 Data
Ortho-phosphate	mg/l	0.03	0.04-0.06	0.11-0.22
Total phosphorus	mg/l	0.03	0.04-0.09	0.22-0.71
Copper (dissolved)	µg/l	1.0	1.19-4.49	13-41
Zinc (dissolved)	µg/l	1.0	3.37-14.8	42-70

Equipment blanks were collected for storm events 1999-05, 1999-08, 1999-09, 1999-10, 1999-11, 1999-12, 1999-13, 1999-14, 1999-15, and 1999-16 and were analyzed for pH, specific conductance, hydrocarbons, coliforms, and fecal coliforms. Oil and grease (1 mg/L) and TPH-diesel (16 mg/L) were detected in the 1999-05 equipment blank. Oil and grease (16 mg/L) was detected in the 1999-16 equipment blank. All samples with concentrations less than five times the concentration found in the associated blank were qualified as undetected **U**. All other equipment blanks had undetected hydrocarbon concentrations.

Surrogates

Surrogates were spiked into blanks, samples, quality control samples, and standards for organic analyses to evaluate accuracy on a sample-specific basis. All surrogate recoveries were within the associated control limits for both years 1 and 2.

Matrix Spike/Matrix Spike Duplicates (MS/MSD)

MS/MSD samples were analyzed to evaluate matrix interference for an analytical batch and to assess accuracy and precision. Several MS/MSD recoveries were determined to be outside control limits for the metals analyses. Results are summarized in Table 5-5. There may be several explanations for these irregularities including the following: matrix interference, matrix heterogeneity, inclusion of non-project samples in the analyses, and use of lower-than-recommended concentrations in the spikes (less than four times the sample concentration). Non-project samples were selected for MS/MSD analysis from the same laboratory batch as LMPS samples but were from other environmental projects.

Use of the MS/MSD recoveries for non-project samples would not be an appropriate measure of how well the project data met the target success rates, because the concentrations of pollutants in the non-project samples are unknown and therefore cannot be directly compared to the monitored samples. If these samples are eliminated from consideration, the success rates increase from 85% and 79% to 85% and 82% respectively for MS and MSD recoveries in year 1. This represents a substantial improvement for matrix spike duplicates but is still below the target success rate.

Table 5-5
MS/MSD RECOVERIES OUTSIDE CONTROL LIMITS

QC Batch	Sample ID	Analyte	MS % Rec.	MSD % Rec.	RPD	Comments	Qualification
Control Limits			75-125	75-125	<20		
981201lcs2	98-11-0790-1	Zinc	85	63	21	NPS	no qual
981130lcs5	8-B001	Zinc	58	53	5	spike <4x sample	no qual
981204lcs4	98-12-0105-7	Copper	84	73	9	NPS	no qual
980127lcs3	Site 1-52	Cadmium	71	76	7		no qual
		Copper	71	81	11		no qual
		Zinc	45	61	18	spike <4x sample	no qual
990211lcs6	1-58	Zinc	78	71	8	spike <4x sample	no qual
990318	1-46	Copper	76	150	49	spike <4x sample	no qual
		Nickel	97	591	139	heterogeneous	no qual
		Zinc	62	149	47	spike <4x sample	no qual
990326lcs5	1-42	Zinc	119	136	6	spike <4x sample	no qual
990322	1-58	Cadmium	71	72	2		J or UJ
		Nickel	74	76	3		no qual
		Zinc	38	52	9	spike <4x sample	no qual
990323	99-03-0675-25	Zinc	70	66	3	NPS	no qual
990408lcs1	1-42	Zinc	90	67	13	spike <4x sample	no qual
990413lcs1	1-46	Zinc	44	1	46	spike <4x sample	no qual
000127lcs3	1-46	Zinc	96	163	25	sample = spike	J or no qual
000127lcs5	1-58	Zinc	59	47	3	sample = 3x spike	no qual
000221lcs6	6-20E	Lead	134	135	0	sample =4x spike	no qual
000218lcs7	1-42 Dup	Zinc	68	47	11	sample = spike	no qual
000221lcs5	00-02-0563-3	Zinc	68	69	1	NPS	no qual
000223lcs5	1-58	Zinc	340	250	26	spike < 4x sample	J or no qual
000223lcs6	8-B001	Cadmium	62	64	3	spike >> sample	J or UJ
		Chromium	66	68	2	spike >> sample	J or UJ
		Nickel	62	64	3	spike >> sample	J or UJ
		Zinc	10	8	1	sample > 4x spike	no qual
000228lcs5	1-58 Dup	Zinc	51	68	11	sample = spike	no qual
000228lcs7	1-52	Zinc	71	71	0	sample = spike	no qual
000310lcs9	1-42	Zinc	58	61	2	sample = spike	no qual

NPS – non-project sample (a random environmental sample analyzed in the same laboratory batch as LMPS samples).

Another consideration of these samples is the spike concentrations. Unless the spike concentration is at least 4 times the sample concentration, then the expected MS/MSD recovery ranges would be quite different than the 75% - 125% recovery range specified in the USEPA Guidelines. This is a direct result of the combination of how the recoveries are calculated and the expected variation in laboratory precision under normal circumstances. MS/MSD recoveries are calculated by subtracting the original sample result from the spiked sample concentration and dividing the remainder by the spike concentration to determine the percent of spike recovered.

Given that laboratory precision is generally within ± 25%, expected MS/MSD recoveries would vary depending on the relationship of sample concentration to spike concentration, as shown in Table 5-6.

Table 5-6
EXPECTED MS/MSD RECOVERIES BASED ON MS/MSD CONCENTRATIONS

If the spike concentration equals:	Expected spike recovery range equals:
50% of the sample concentration	25% - 175%
100% of the sample concentration	50% - 150%
200% of the sample concentration	63% - 138%
400% of the sample concentration	69% - 131%

It is also relevant to point out that the laboratory did not know the concentration of the sample before introducing the spike and therefore may have underestimated the concentration required.

If this phenomenon is taken into account and if exceedances within the range of expected values are counted as successes, then the success rates would climb to 95% and 93%, respectively, for year 1. Non-project samples were of necessity, eliminated from consideration because we do not know what the original sample concentrations were.

MS/MSD recoveries had a success rate of 91% and 91%, respectively, in year 2.

Laboratory Control Samples (LCS)

LCS are well-characterized, laboratory-generated samples used to monitor the laboratory's day-to-day performance for analyses and assess the accuracy of the analytical process independent of matrix effects. All LCS recoveries were within control limits for years 1 and 2.

Total vs. Dissolved Metals

For year 1, in very few instances, dissolved metals concentrations exceeded total metals concentrations. Five observations out of a total of 402 observations over the course of year 1 of monitoring exhibited this discrepancy. In other words, 99% of the individual metals observations had a total concentration exceeding the associated dissolved concentration. Clearly the dissolved fraction of metals should not exceed the total concentration of metals. The discrepancy during the 1% of occasions during year 1 is expected to be due to inadequate sample homogenization.

In no case during year 2 did dissolved concentrations exceed total concentrations.

Duplicates

Lab duplicates were analyzed to evaluate analytical precision in each batch. All relative percent differences (RPDs) were within control limits.

Field duplicate samples were collected and analyzed for pH, specific conductance, coliforms, and fecal coliforms. The results and calculated RPDs are summarized in Table 5-7. In general, agreement between the duplicates is reasonable for pH and specific conductance. However, the RPDs for the coliforms and fecal coliforms analyses were larger. This is not particularly surprising, and these discrepancies are not expected to invalidate the data. In addition, one conductance RPD was quite high (100%). However, the values were close to the detection limit, and this discrepancy is therefore not expected to invalidate the data.

Quality Control Summary

The data from the water quality analyses sampling were reviewed to evaluate their usability for project decisions. The success rates of the quality control measures are summarized below.

For year 1, all QA/QC checks met or exceeded the target of 85%, except for MS/MSD for metals (see Table 5-8). This could be due to matrix interference and is discussed in the MS/MSD subsection. For year 2, all QA/QC checks exceeded the target of 85% (see Table 5-9). Overall, the accuracy and precision of the data were found to be adequate to allow use of these data in project decisions.

5.2 DATA MANAGEMENT

The chemical water quality data were submitted by Calscience Environmental Laboratories (CEL) in a Microsoft Access database format compatible with the Caltrans data reporting protocols (LWA, 1999). In order to perform data summaries, after data validation had been completed, selected columns from the spreadsheet were imported to a database contained on the accompanying CD-ROM. Queries were designed in the database to meet the data summary needs.

5.3 DATA ANALYSIS

Chemical water quality data were analyzed to calculate event mean concentrations and seasonal mass quantities for each constituent. In addition, observations have been made that compare study data to other appropriate studies. Each of these three objectives is described in subsections below.

5.3.1 Event Mean Concentrations

Analytical results provided by CEL were compiled, and descriptive statistics were generated to estimate the mean of the measured EMCs of each of the 27 pollutants sampled for each of the stations over the sampling period. As an example, Table 5–10 shows the measured EMCs for total nickel at each station for each of the events in which total nickel was analyzed. At the bottom of the table, the estimated station mean, median, and coefficient of variation (COV) of the mean are given. Null data are explained in Table G-2 in Appendix G. Similar tables have been compiled for the other parameters analyzed. They are provided in Appendix G.

Table 5-7
SUMMARY OF FIELD DUPLICATE RESULTS FOR GRAB SAMPLES

Storm Event	Sample ID	PH [pH units]	Conductance [umhos/cm]	Coliforms [MPN/100 ml]	Fecal Coliforms [MPN/100 ml]
1998-09	1-42	7.50	80	40	23
	1-42D	7.41	83	500	110
RPD		1.2	3.7	170	130
1998-10	8-23C	7.28	207	300	170
	8-23D	7.60	200	2300	1300
RPD		4.3	3.4	150	150
1998-11	6-20F	7.24	138	1700	500
	6D-20F	7.18	139	800	500
		0.83	0.72	72	0
1998-13	1-58	7.70	99	NA	NA
	1D-58	7.67	102	NA	NA
RPD		0.39	3.0	--	--
1999-05	1-58	7.69	321	3000	80
	1D-58	7.57	321	3000	300
RPD		1.6	0	0	116
1999-08	1-42	7.10	129	17000	<20
	1-42 Dup	7.14	129	3000	<20
RPD		0.56	0	140	--
1999-09	8-23C	4.8	9	<20	<20
	8-23C D	5.76	3	<20	<20
RPD		18.2	100	--	--
1999-10	6-20F	7.87	371	13000	1100
	6D-20F	7.84	377	3000	230
RPD		0.38	1.6	125	131
1999-11	1-52	8.57	237	1700	<20
	1D-52	8.6	237	1100	800
RPD		0.35	0	43	--
1999-12	8-B001	7.95	103	3500	20
	8D-B001	7.92	103	2200	20
RPD		0.38	0	46	0
1999-13	1-46	8.85	102	2300	800
	1D-46	8.88	102	1300	300
RPD		0.34	0	56	91
1999-14	6-20E	8.12	156	500	40
	6D-20E	8.13	155	300	80
RPD		0.12	0.64	50	67
1999-15	8-23C	7.82	64	40	<20
	8D-23C	7.75	65	90	<20
RPD		0.90	1.6	77	--
1999-16	1-52	8.71	153	3500	500
	1-52 Dup	8.67	151	500	40
RPD		0.46	1.3	150	170

NA - not analyzed

Table 5-7
SUMMARY OF FIELD DUPLICATE RESULTS FOR GRAB SAMPLES

Storm Event	Sample ID	PH [pH units]	Conductance [umhos/cm]	Coliforms [MPN/100 ml]	Fecal Coliforms [MPN/100 ml]
1998-09	1-42	7.50	80	40	23
	1-42D	7.41	83	500	110
RPD		1.2	3.7	170	130
1998-10	8-23C	7.28	207	300	170
	8-23D	7.60	200	2300	1300
RPD		4.3	3.4	150	150
1998-11	6-20F	7.24	138	1700	500
	6D-20F	7.18	139	800	500
		0.83	0.72	72	0
1998-13	1-58	7.70	99	NA	NA
	1D-58	7.67	102	NA	NA
RPD		0.39	3.0	--	--
1999-05	1-58	7.69	321	3000	80
	1D-58	7.57	321	3000	300
RPD		1.6	0	0	116
1999-08	1-42	7.10	129	17000	<20
	1-42 Dup	7.14	129	3000	<20
RPD		0.56	0	140	--
1999-09	8-23C	4.8	9	<20	<20
	8-23C D	5.76	3	<20	<20
RPD		18.2	100	--	--
1999-10	6-20F	7.87	371	13000	1100
	6D-20F	7.84	377	3000	230
RPD		0.38	1.6	125	131
1999-11	1-52	8.57	237	1700	<20
	1D-52	8.6	237	1100	800
RPD		0.35	0	43	--
1999-12	8-B001	7.95	103	3500	20
	8D-B001	7.92	103	2200	20
RPD		0.38	0	46	0
1999-13	1-46	8.85	102	2300	800
	1D-46	8.88	102	1300	300
RPD		0.34	0	56	91
1999-14	6-20E	8.12	156	500	40
	6D-20E	8.13	155	300	80
RPD		0.12	0.64	50	67
1999-15	8-23C	7.82	64	40	<20
	8D-23C	7.75	65	90	<20
RPD		0.90	1.6	77	--
1999-16	1-52	8.71	153	3500	500
	1-52 Dup	8.67	151	500	40
RPD		0.46	1.3	150	170

NA - not analyzed

Table 5-8
RESULTS OF QA/QC ANALYSIS FOR YEAR 1

Category	QA/QC Check	Number of Observations	Observations Outside of Objectives	Success Rate
Conventionals, Nutrients, and Miscellaneous	Field Blanks	14	0	100%
	Method Blanks	44	0	100%
	Field Duplicates	8	0	100%
	Lab Duplicates	56	0	100%
	Matrix Spikes	36	0	100%
	Matrix Spike Duplicates	36	0	100%
	Laboratory Control Samples	36	0	100%
Metals	Method Blanks	72	4	94%
	Matrix Spikes	66	17	74%
	Matrix Spike Duplicates	66	22	67%
	Laboratory Control Samples	72	0	100%
Organics	Field Blanks	21	3	86%
	Method Blanks	25	0	100%
	Lab Duplicates	8	0	100%
	Matrix Spikes	9	0	100%
	Matrix Spike Duplicates	9	0	100%
	Laboratory Control Samples	17	0	100%
	Surrogate Spikes	165	0	100%

Table 5-9
RESULTS OF QA/QC ANALYSIS FOR YEAR 2

Category	QA/QC Check	Number of Observations	Observations Outside of Objectives	Success Rate
Conventionals, Nutrients, and Miscellaneous	Field Blanks	20	1	100%
	Method Blanks	55	0	100%
	Field Duplicates	20	0	100%
	Lab Duplicates	64	0	100%
	Matrix Spikes	33	0	100%
	Matrix Spike Duplicates	33	0	100%
	Laboratory Control Samples	33	0	100%
Metals	Method Blanks	180	0	100%
	Matrix Spikes	138	12	91%
	Matrix Spike Duplicates	138	13	91%
	Laboratory Control Samples	138	0	100%
Organics	Field Blanks	29	3	90%
	Method Blanks	42	0	100%
	Lab Duplicates	10	0	100%
	Matrix Spikes	11	0	100%
	Matrix Spike Duplicates	11	0	100%
	Laboratory Control Samples	28	0	100%

	Surrogate Spikes	181	0	100%

Table 5–10
EVENT MEAN CONCENTRATIONS AND STATION MEANS FOR TOTAL NICKEL

Nickel, Total ug/l

	Storm Event Date		1-42	1-46	1-52	1-58	6-20E	6-20F	8-23C	8-B001
1998	1998-02	11/28/98	ND	ND	ND	ND	ND	ND	ND	ND
	1998-03	12/01/98	ND	0.6	0.5	2.3	*****	*****	0.8	0.6
	1998-05	01/25/99	0.3	0.4	ND	ND	0.3	0.5	0.4	ND
	1998-06	02/09/99	ND	ND	ND	ND	1.5	0.5	0.3	*****
	1998-09	03/15/99	ND	ND	*****	ND	ND	ND	ND	ND
	1998-10	03/20/99	ND	ND	*****	0.2	ND	ND	ND	ND
	1998-11	03/25/99	ND	ND	ND	ND	1.0	ND	0.2	*****
	1998-12	04/06/99	ND	ND	ND	ND	ND	ND	ND	ND
	1998-13	04/11/99	ND	ND	ND	ND	ND	ND	ND	ND
	COV*		*****	*****	*****	*****	4.15	*****	0.76	*****
	Mean*		*****	*****	*****	*****	0.6	*****	0.4	*****
	Median*		*****	*****	*****	*****	0.1	*****	0.3	*****
1999	1999-05	01/25/00	ND	0.31	ND	0.47	0.33	0.39	ND	ND
	1999-06	01/30/00	ND	ND	ND	0	ND	ND	ND	*****
	1999-08	02/10/00	0	ND	ND	0	ND	0	ND	0
	1999-09	02/12/00	*****	*****	ND	ND	ND	ND	ND	ND
	1999-10	02/13/00	ND	*****	ND	ND	0	0	ND	0
	1999-11	02/16/00	ND	ND	ND	ND	ND	0	ND	ND
	1999-12	02/20/00	*****	ND	ND	ND	ND	ND	ND	ND
	1999-13	02/23/00	*****	ND	ND	ND	ND	0	ND	ND
	1999-14	02/27/00	ND	ND	ND	ND	ND	0	*****	ND
	1999-15	03/04/00	ND	ND	ND	ND	ND	ND	ND	ND
	1999-16	03/08/00	ND	ND	ND	ND	ND	ND	ND	ND
	COV*		*****	*****	*****	1.08	*****	0.60	*****	*****
	Mean*		*****	*****	*****	0	*****	0	*****	*****
	Median*		*****	*****	*****	0	*****	0	*****	*****
Combined	COV*		*****	1.15	*****	11.37	4.97	0.69	1.24	0.60
	Mean*		*****	0	*****	0	0	0	0	0
	Median*		*****	0	*****	0	0	0	0	0

* Parameters based on an assumed log-normal distribution; will differ from estimations based on other distributions

***** Insufficient data to calculated population statistics

The station mean is an estimate of the average concentration of a pollutant that can be expected at a sampling station during a storm event and is useful for the comparison of runoff characteristics between sites. Since a flow-weighted sampling approach was used in this project, the reported lab results are equivalent to the measured estimate of EMC values for each event, and therefore, could be used directly to estimate station means. For this analysis, the station means were estimated assuming that their distribution was best described by the log-normal distribution. Therefore, the log-transformed data were utilized to estimate population statistics and they will differ from arithmetic means.

Log Conversion and Statistical Parameter Calculations

In the 1990 Federal Highway Administration (FHWA) runoff study summarized in *Pollutant Loadings and Impacts from Highway Stormwater Runoff,* Driscoll et al. concluded that estimating statistical parameters from storm water pollutant data based on the assumption that the EMC population is lognormally distributed was appropriate for the data set that they examined. As their study is one of the more comprehensive studies done for highway runoff to

date, this approach was followed for this project. This approach involves converting the data to log form (taking the natural log EMC values) and calculating new statistical parameters based on the relationship between central tendency and error that exist for log-converted data.

The formulas used for generation of statistical summary parameters are shown below:

$$\text{Let} \quad y_i = \text{Ln}\left(\text{Station} \quad EMC_i\right)$$

$$\bar{y} = \frac{\sum y_i}{n}$$

$$S_y^2 = \frac{\sum \left(y_i - \bar{y}\right)^2}{n-1}$$

$$\text{Then, median EMC} \approx \exp\left(\bar{y}\right)$$

$$\text{Coefficient of variation of EMC, COV} = \sqrt{\left[\exp\left(S_y^2\right) - 1\right]}$$

$$\text{Mean EMC} = \text{median} \times \exp\left(S_y^2 / 2\right)$$

Non-Detects

In order to calculate the station mean, median, and coefficient of variation of the mean for constituent EMCs, non-detect values (below the detection limit) must be assigned an appropriate value.

Several approaches have historically been used to estimate concentrations of constituents that are reported by the laboratory as less than the detection limit. In the past, researchers have used the detection limit value or one-half the detection limit value. The LMPS used a robust method to deal with the non-detect values. Helsel and Hirsch (1992) evaluated several methods for handling non-detect data including substitution, distributional, and robust methods. They concluded that robust methods consistently produced smaller errors when estimating summary statistics, even when multiple reporting limits were present in the data set. Robust methods combine observed data above the laboratory reporting limit with extrapolated values for below-limit values. The method discussed by Helsel and Hirsch (1992, p. 364) for data containing multiple detection limits is selected for this analysis. This method uses a maximum likelihood estimation method for estimation of percentiles and the robust probability plot method for estimating the mean and standard deviation. The extrapolated values will be randomly assigned to the non-detect samples. These values will not be considered to be actual values at the specific sample locations. However, because of the random assignment, they can be used collectively to estimate the statistical parameters (such as the mean and variance) of the EMCs.

The robust method requires a minimum of two detect values. If a data set contains no detect values or only one detect value (and one or more nondetects), the robust method cannot be used, and no statistical analysis is feasible. In this case, for purposes of statistical summaries, all parameters (mean, median, and coefficient of variation) were identified with a qualifier “ND”. For the box and whisker plots, all data points (including a single detect value, if present) were

assigned a value of zero so that the plots simply show lines at the zero value indicating that all values (or all except one value) are non-detects.

For this data set, two parameters were analyzed as described above due to a substantial number of non-detects, cadmium and lead. TPH-gasoline had no detections at any of the eight stations for any of the storm events, therefore, no population statistics were calculated.

Box and Whisker Plots

Box and whisker plots, which are a graphical tool for summarizing estimated population statistics, were generated for each parameter at each station. They provide a visual indication of the spread in the data. Figure 5-1 shows a box and whisker plot for total nickel. Since the means were calculated on log transformed data, these diagrams were plotted on a log scale using log-transformed data. The waist-like constriction in the middle zone of the box is the mean of the log-transformed data (which when transformed is an estimate of the median concentration). The 95% confidence interval about the median of the log-transformed data is indicated by the section of the box that is less than full width. The first and third quartiles delimit the range in which the central 50% of values lie (i.e., 25% of the values lie below the first quartile and 25% of the values lie above the third quartile). The whiskers on the plots show the range of values that lie within the inner fences which are defined by the following equations:

Lower inner fence = value of the first quartile - (1.5 * (median - value of 1st quartile))

Upper inner fence = value of the third quartile + (1.5 * (value of the third quartile - median))

Figure 5–1
BOX AND WHISKER PLOT – TOTAL NICKEL (µg/l)

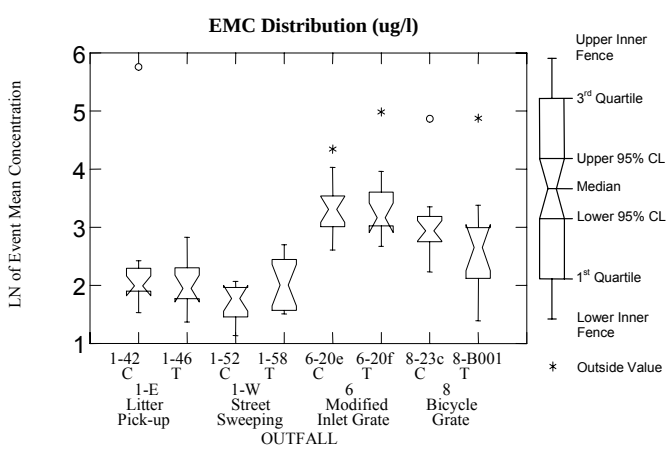

In some cases, in the box and whisker plots, the 95% confidence limit is either in excess of the third quartile or less than the first quartile. In many instances, these cases correspond to a distribution of values that are either very skewed, poorly represented by a normal distribution, low in number, and/or widely scattered.

Box and whisker plots for all of the parameters are provided in Appendix G.

5.3.2 Seasonal Mass Quantities

Seasonal mass quantities were calculated for each chemical water quality constituent at each BMP control monitoring location. These quantities were calculated by multiplying the estimated seasonal outfall flow volume by the station mean EMCs and station mean concentration of each constituent over the course of the two-year study (presented in Tables in Appendix G). Table 5-11 presents seasonal mass quantities for the study. The range of seasonal quantities based on the upper and lower 95% confidence limits about the mean are also presented. Seasonal flows are presented in Table 4-4 for each outfall by year for comparison purposes.

5.3.3 Data Observations

The mean concentrations of total copper, total and dissolved lead, total zinc, and total suspended solids were higher at LMPS Station 6-20e than at the other LMPS stations (see Table 5-12). The results suggest the metals at this location were generally associated with the total suspended solids that were present. The other stations had lower concentrations.

Table 5-11
SEASONAL MASS QUANTITIES
FOR CALTRANS LMPS CONTROL OUTFALLS

Site 1-E	Area (Ha)	Loads 1998 - 1999			Loads 1999 - 2000		
Station 1-42	0.13	Flow (liters/yr)	183625		Flow (liters/yr)	223056	
PARAMETER	Units	LL (95%) Load	Mean Load kg/Ha/yr	UL (95%) Load	LL (95%) Load	Mean Load kg/Ha/yr	UL (95%) Load
Total Organic Carbon	mg/l	23	30	44	28	37	53
Total Volatile Solids	mg/l	47	63	95	57	77	115
Hardness as CaCO3	mg/l	61	73	93	74	89	113
Total Suspended Solids	mg/l	44	61	98	53	74	119
Nitrate Nitrogen	mg/l	2	2	3	2	3	4
Total Kjedhal Nitrogen	mg/l	3	3	4	3	4	5
Total Phosphorus	mg/l	0.34	0.42	0.56	0.41	0.51	0.68
Ortho-Phosphorus	mg/l	0.15	0.18	0.24	0.18	0.22	0.29
Chromium, Dissolved	ug/l	0.004	0.005	0.006	0.005	0.006	0.007
Chromium, Total	ug/l	0.008	0.009	0.012	0.009	0.011	0.015
Cadmium, Dissolved	ug/l	****	****	****	****	****	****
Cadmium, Total	ug/l	0.001	0.001	0.002	0.001	0.001	0.002
Copper, Dissolved	ug/l	0.019	0.024	0.031	0.023	0.029	0.037
Copper, Total	ug/l	0.039	0.047	0.057	0.048	0.057	0.069
Lead, Dissolved	ug/l	0.002	0.002	0.003	0.002	0.003	0.003
Lead, Total	ug/l	0.021	0.026	0.034	0.026	0.032	0.041
Nickel, Dissolved	ug/l	0.005	0.006	0.008	0.006	0.007	0.009
Nickel, Total	ug/l	0.013	0.020	0.043	0.016	0.025	0.052
Zinc, Dissolved	ug/l	0.051	0.085	0.198	0.062	0.104	0.241
Zinc, Total	ug/l	0.19	0.23	0.30	0.23	0.28	0.37
Oil & Grease	mg/l	14	22	47	16	26	57
TPH (Diesel)	mg/l	10	22	93	12	26	113
TPH (Gasoline)	mg/l	****	****	****	****	****	****

****Data were insufficient to calculate a station mean due to fewer than three events with detected values.

Site 1-W	Area (Ha)	Loads 1998 - 1999			Loads 1999 - 2000		
Station 1-52	0.17	Flow (liters/yr)	239697		Flow (liters/yr)	291168	
PARAMETER	Units	LL (95%) Load	Mean Load kg/Ha/yr	UL (95%) Load	LL (95%) Load	Mean Load kg/Ha/yr	UL (95%) Load
Total Organic Carbon	mg/l	19	25	36	23	30	44
Total Volatile Solids	mg/l	41	56	87	49	68	106
Hardness as CaCO3	mg/l	42	46	50	51	56	61
Total Suspended Solids	mg/l	24	36	65	29	44	79
Nitrate Nitrogen	mg/l	2	2	3	2	3	4
Total Kjedhal Nitrogen	mg/l	2	2	3	2	3	3
Total Phosphorus	mg/l	0.27	0.34	0.47	0.33	0.42	0.57
Ortho-Phosphorus	mg/l	0.15	0.19	0.26	0.19	0.23	0.32
Chromium, Dissolved	ug/l	0.003	0.004	0.004	0.004	0.005	0.005
Chromium, Total	ug/l	0.006	0.007	0.009	0.007	0.008	0.011
Cadmium, Dissolved	ug/l	****	****	****	****	****	****
Cadmium, Total	ug/l	0.001	0.001	0.002	0.001	0.001	0.002
Copper, Dissolved	ug/l	0.014	0.017	0.023	0.017	0.021	0.028
Copper, Total	ug/l	0.030	0.034	0.040	0.036	0.042	0.049
Lead, Dissolved	ug/l	0.002	0.002	0.002	0.002	0.002	0.003
Lead, Total	ug/l	0.017	0.020	0.025	0.020	0.024	0.030
Nickel, Dissolved	ug/l	0.003	0.004	0.005	0.003	0.004	0.006
Nickel, Total	ug/l	0.005	0.007	0.009	0.007	0.008	0.011
Zinc, Dissolved	ug/l	0.031	0.055	0.150	0.038	0.067	0.182
Zinc, Total	ug/l	0.13	0.17	0.22	0.16	0.20	0.26
Oil & Grease	mg/l	16	30	86	20	36	105
TPH (Diesel)	mg/l	5	10	31	7	13	38
TPH (Gasoline)	mg/l	****	****	****	****	****	****

Table 5-11 (continued)
SEASONAL MASS QUANTITIES
FOR CALTRANS LMPS CONTROL OUTFALLS

Site 6	Area (Ha)	Loads 1998 - 1999			Loads 1999 - 2000		
Station 6-20E	0.17	Flow (liters/yr)	196735		Flow (liters/yr)	294969	
PARAMETER	Units	LL (95%) Load	Mean Load kg/Ha/yr	UL (95%) Load	LL (95%) Load	Mean Load kg/Ha/yr	UL (95%) Load
Total Organic Carbon	mg/l	16	26	39	23	39	58
Total Volatile Solids	mg/l	62	137	132	93	205	198
Hardness as CaCO3	mg/l	89	155	175	134	233	263
Total Suspended Solids	mg/l	232	466	559	348	699	838
Nitrate Nitrogen	mg/l	1	2	2	2	2	4
Total Kjedhal Nitrogen	mg/l	2	4	5	3	5	7
Total Phosphorus	mg/l	0.74	1.08	4.35	1.10	1.61	6.52
Ortho-Phosphorus	mg/l	0.11	0.17	0.23	0.17	0.26	0.34
Chromium, Dissolved	ug/l	0.002	0.003	0.003	0.004	0.005	0.005
Chromium, Total	ug/l	0.015	0.033	0.065	0.023	0.049	0.098
Cadmium, Dissolved	ug/l	****	****	****	****	****	****
Cadmium, Total	ug/l	0.002	0.004	0.007	0.003	0.006	0.011
Copper, Dissolved	ug/l	0.019	0.034	0.039	0.028	0.051	0.059
Copper, Total	ug/l	0.101	0.174	0.202	0.151	0.261	0.304
Lead, Dissolved	ug/l	0.009	0.016	0.019	0.013	0.025	0.028
Lead, Total	ug/l	0.321	0.680	0.810	0.482	1.020	1.215
Nickel, Dissolved	ug/l	0.003	0.005	0.006	0.004	0.008	0.009
Nickel, Total	ug/l	0.014	0.031	0.060	0.021	0.046	0.090
Zinc, Dissolved	ug/l	0.023	0.069	0.480	0.034	0.103	0.719
Zinc, Total	ug/l	0.31	0.48	0.57	0.46	0.72	0.85
Oil & Grease	mg/l	18	44	118	27	66	177
TPH (Diesel)	mg/l	7	16	78	10	24	116
TPH (Gasoline)	mg/l	****	****	****	****	****	****

Site 8	Area (Ha)	Loads 1998 - 1999			Loads 1999 - 2000		
Station 8-23C	0.25	Flow (liters/yr)	343015		Flow (liters/yr)	505199	
PARAMETER	Units	LL (95%) Load	Mean Load kg/Ha/yr	UL (95%) Load	LL (95%) Load	Mean Load kg/Ha/yr	UL (95%) Load
Total Organic Carbon	mg/l	20	26	36	29	38	53
Total Volatile Solids	mg/l	67	88	129	98	130	190
Hardness as CaCO3	mg/l	85	109	151	125	161	223
Total Suspended Solids	mg/l	63	357	811	93	525	1195
Nitrate Nitrogen	mg/l	2	2	3	2	3	4
Total Kjedhal Nitrogen	mg/l	3	4	6	5	6	9
Total Phosphorus	mg/l	0.48	0.61	0.83	0.71	0.90	1.22
Ortho-Phosphorus	mg/l	0.21	0.26	0.35	0.30	0.38	0.52
Chromium, Dissolved	ug/l	0.003	0.003	0.004	0.004	0.004	0.005
Chromium, Total	ug/l	0.019	0.027	0.044	0.028	0.039	0.065
Cadmium, Dissolved	ug/l	0.000	0.000	0.001	0.000	0.0005	0.001
Cadmium, Total	ug/l	0.002	0.003	0.004	0.003	0.004	0.006
Copper, Dissolved	ug/l	0.022	0.028	0.037	0.032	0.041	0.055
Copper, Total	ug/l	0.100	0.123	0.158	0.147	0.181	0.233
Lead, Dissolved	ug/l	0.006	0.009	0.015	0.009	0.013	0.022
Lead, Total	ug/l	0.316	0.409	0.574	0.466	0.602	0.846
Nickel, Dissolved	ug/l	0.004	0.005	0.008	0.006	0.008	0.011
Nickel, Total	ug/l	0.022	0.033	0.064	0.032	0.049	0.094
Zinc, Dissolved	ug/l	0.038	0.055	0.173	0.055	0.080	0.254
Zinc, Total	ug/l	0.33	0.39	0.50	0.49	0.57	0.73
Oil & Grease	mg/l	23	38	88	34	56	129
TPH (Diesel)	mg/l	10	16	32	15	24	47
TPH (Gasoline)	mg/l	****	****	****	****	****	****

****Data were insufficient to calculate a station mean due to fewer than three events with detected values.

Table 5-12
CALTRANS LMPS STATION MEANS
FROM COMBINED YEARS OF MONITORING

Parameter	Units	1-42	1-52	6-20e	8-23c
Cadmium, Dissolved	ug/l	—	—	0.27	0.23
Cadmium, Total	ug/l	0.76	0.63	3.21	2.06
Copper, Dissolved	ug/l	16.6	12.6	29.7	20.2
Copper, Total	ug/l	32.9	24.9	150	89.7
Lead, Dissolved	ug/l	1.66	1.31	14.19	6.56
Lead, Total	ug/l	18.5	14.4	588	299
Nickel, Dissolved	ug/l	4.0	2.6	5.2	3.3
Nickel, Total	ug/l	14.5	4.9	26.7	24.5
Nitrate Nitrogen	mg/l	1.8	1.6	1.4	1.1
Total Kjedhal Nitrogen	mg/l	2.3	1.6	3.1	3.2
Total Phosphorus	mg/l	0.3	0.3	0.9	0.5
Total Suspended Solids	mg/l	43	26	403	262
Zinc, Dissolved	ug/l	60	40	59	40
Zinc, Total	ug/l	164	121	417	284

6.1 CHARACTERIZATION PROTOCOLS

Litter characterization for the LMPS was conducted at a specially designed litter lab located at URSGWC's Santa Ana, California office. Characterization was conducted in accordance with a protocol developed for the LMPS that evolved during the early stages of the study. The laboratory analysis protocol and corresponding data analysis sheets are provided in Appendix H. The general protocol is discussed below.

Preparation

All litter samples/bags collected from the outfall locations are returned to the litter lab for analysis. The litter bags contain all material retained by the ¼-inch mesh openings. This material is termed gross pollutants and consists of both vegetation and litter. The weight and volume of the litter bag contents were measured at the start of the characterization process. The contents of the litter bags were then emptied into a sorting tub, and the vegetation was sorted from the litter material. The weight and volume of vegetative material was recorded on the data sheet and then disposed. The protocol included identification of potentially toxic materials during the initial sorting phase so they could be handled appropriately. It should be noted that no such materials were found in debris analyzed during the LMPS.

The litter material was then sifted through to recover any spike material. Recovered spike material was weighed as a composite and the weight was recorded on the data sheet. The spike materials were then sorted and segregated into different material categories (i.e., cigarette butts, styrofoam, fabric, etc.). Both the color and category of the recovered spike material were recorded on the data sheet.

The remaining litter material was placed on a drying screen and was allowed to dry for a minimum of 24 hours. The time that air-drying begins was recorded on the data sheet. The amount of time (in days) that had passed between the previous storm for which litter collection took place and the storm for which the litter analysis being conducted was recorded on the data sheet. The litter on the drying screen was photographed and identified by site/outfall number, storm number, and event number (see Photo 6-1). Drying screen photos collected during the LMPS are provided electronically in a photo database on the accompanying CD-ROM located at the end of this report.

Litter Characterization

Once the litter material had air dried, it was sorted into 12 different categories to investigate the source of the material. These categories included:

- cardboard/chipboard
- cigarette butts
- cloth
- glass
- metal
- paper
- plastic film
- plastic moldables
- styrofoam
- wood debris
- accident related
- other

Photo 6-1
Typical Litter on a Drying Screen

The litter material was further segregated according to usage (e.g., smoking-related, food-related, or general unknown) as specified on the data sheets. The segregated material was weighed on electronic scales, and the weight was recorded on a data sheet. The volume of each category of segregated litter material was then estimated and recorded. Each individual item was counted and total numbers were recorded on the data sheet.

An additional component of analysis was added for year 2 of monitoring. Sub-samples from each of the litter categories were oven-dried. This analysis was performed to investigate the moisture content of the air-dried litter. The procedure involved placing sub-samples of litter into an oven set at approximately 60 degrees Celsius for 24 hours. The weights of the sample before and after the oven drying were used to estimate a wet to dry ratio for the air-dried litter.

After the oven drying analysis was complete, the oven dried samples were returned to the segregated litter material and all litter from a given event was then placed within a tub full of water and was allowed to sit for at least 30 seconds. The floatable litter was separated from the non-floatable litter and was discarded. The non-floatable litter was then allowed to dry in the drying screens for 24 hours. After the 24-hour drying time, the non-floatable litter was weighed and the weight was recorded on the data sheet.

At the end of the characterization process, data from all completed data sheets were entered into a computer database. These data are presented on the accompanying CD-ROM (located at the end of the report).

6.2 DATA MANAGEMENT

Data management consisted of four procedures covering database setup, data entry, data QA/QC, and data queries.

6.2.1 Database Setup

The litter characterization data are stored in a Microsoft Access database designed to store site and event information and link the site and event information with collected data. The database contains the reference tables "Site Reference" and "Event Reference" and data tables, "Total Litter," "Non-Floatable," "Bag Totals," and "Spike Data." The Site Reference table contains descriptive information about each site, including the site number, outfall number, BMP, type (treatment or control), pair designation, as-built watershed area, inlet dimensions, and whether the site is also a chemical water quality outfall. Outfall number is the primary key in the Site Reference table, and links the site reference table to the data tables. The Event Reference table contains descriptive information about the events, including event ID, type of event, event start date, spike color associated with the event, and event sequence. The event ID field is the primary key in the Event Reference table, and links the Event Reference table to the data tables. The Total Litter Event 1 table contains the total dry weight, volume, and count of litter within the litter usage designations in each litter category at each site for event 1998e01. The All Event Total Litter data table contains the total dry weight, volume, and count of litter within the litter usage designations in each litter category at each site for each of events 1998i01 through 1999e16. (The litter characterization protocol was changed after event 1; therefore the total litter for event 1998e01 has a slightly different format than events 1998i01 through 1999e16). The Bag Totals data table contains the total bag weights, total vegetation wet weights, and total spike wet weights collected at each outfall during each event, including event 1998e01. The Spike Data table contains the color, category, and number of spike items collected at each outfall during each event, including event 1998e01.

6.2.2 Data Entry

Litter characterization data forms were completed at the litter lab and submitted for data entry. Litter lab personnel inspected the forms for consistency before turning them over to word processors. All data entry was performed in Microsoft Access. Data were entered in blank templates of the data tables. A separate set of data tables was created for each event. Data entry was performed in an "active" file created for use by the word processors. Double data entry was performed, using separate tables for each word processor. The data tables for each event were combined in single data tables in the master database after all monitoring had been completed and after quality assurance/quality control of data for each event had been performed.

6.2.3 Data Quality Assurance/Quality Control (QA/QC)

QA/QC of litter data was performed at both the reporting and data entry stages. Before litter characterization data were entered into the database, data sheets were reviewed for completeness and consistency by the litter lab supervisor. QA/QC of data entry was performed by a double-data entry process. All litter lab data was entered twice by separate data processors into separate data tables. A query was then performed to compare both data sets and identify records that did not match. These records were corrected to prepare a final data set.

6.2.3.1 Data Queries

Data queries were performed in Access to sort data, arrange the data in a format suitable for making charts, performing summary calculations, and presenting data. The use of data queries from single data tables prevents multiple versions of the data set. When data was exported to Excel for charts or other analysis, an active link was maintained with the original data tables in Access to ensure that multiple versions of the data set were not created.

6.3 LITTER AND VEGETATIVE MATERIAL CHARACTERISTICS

This section presents monitored litter and vegetative material characteristics from sampling gross pollutants found in storm water flowing through Caltrans' freeway storm drain system. Storm water gross pollutant samples were collected from the 24 LMPS outfalls. Samples were collected during year 1 of monitoring after ten storm events and in-between storm events on eight occasions from October 1998 to April 1999. Samples were collected during year 2 of monitoring after thirteen storm events and in-between storm events on one occasion from October 1999 to March 2000.

The litter samples were sorted and characterized by specific categories according to the type of material and sorted using three parameters; weight, volume, and the number of items. The categories selected were based on typical litter such as: cigarette butts, paper products, food wrappers, and wood pieces. Litter data were compiled at the end of the storm season, and the total amounts for the season are presented here. Individual storm event data are available, but not discussed here.

6.3.1 Wet Weight of Material

The first steps in litter analysis for the LMPS were (1) to weigh total material retained by the litter monitoring bags at each outfall (gross pollutants), (2) separate the litter from vegetative material and spikes placed in the inlets prior to storm events, and (3) weigh the vegetative and spike portions. These measurements were then used to calculate the percent vegetative material in the material collected from the outfalls. The weight of spikes were removed from the total weight and the vegetation weight to prevent them from influencing the percent vegetative material. Figure 6-1 shows the distribution of the percent vegetative material in trigger event outfall samples for each BMP site over the entire study. The plotted data points represent the combined site total percent vegetative material per event (i.e., weights were combined from all outfalls to get a single percent vegetative material for each site for each event). Site averages for percent vegetative material monitored in the outfalls range from 75 to 87 percent.

There are few studies worldwide with which to compare these results, with the exception of Australian and South African research. The composition data in this study appear to be similar to those for Australia urban watersheds (eg. Nielsen and Carleton, 1989, and Allison et al., 1998), with typically 60-90% vegetation found in Australian urban storm water (by weight). However, this study shows different compositions than South African research (as summarized by Armitage et al., 1998), which suggests that debris in South African urban storm water mainly consists of litter with little vegetation reported.

Figure 6-1
PERCENT VEGETATIVE MATERIAL BY WET WEIGHT

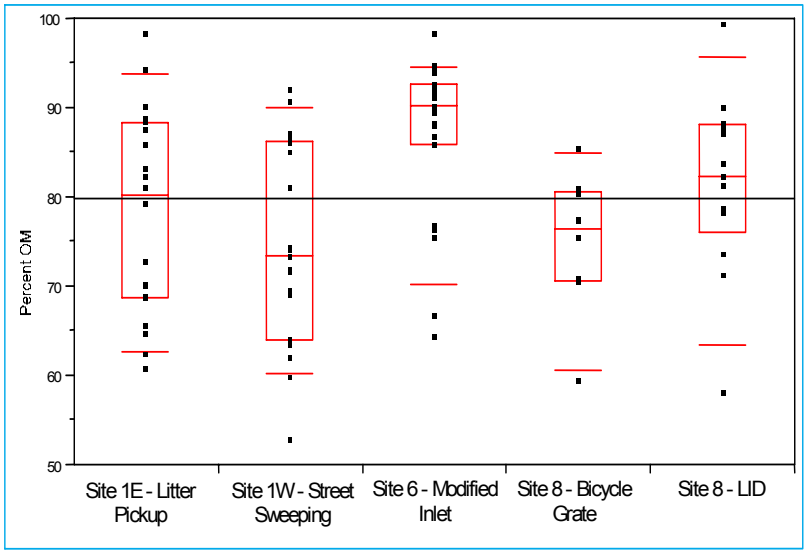

Site	Site 1E - Litter Pick-up	Site 1W - Street Sweeping	Site 6 – Modified Inlet	Site 8 - Bicycle Grate	Site 8 - LID
Mean	78.25	74.62	87.25	74.96	81.64
Std Dev	11.35	11.36	8.99	7.31	10.19
Min	60.79	52.84	64.51	59.54	58.17
Median	80.22	73.43	90.25	76.53	82.40
Max	98.33	92.19	98.37	85.52	99.47
N	20	21	23	10	13

The sites show relatively similar proportions of litter to vegetation except for Site 6. The average percent vegetative material at Sites 1E, 1W, and 8 range from 75 to 82 percent. The average percent vegetation at Site 6 was 87 percent. This may be due to the ROW conditions at each of the sites. At Sites 1E, 1W, and 8, the ROW is a vegetated strip that could retain leaves and debris as they fall. Site 6, however, has a vertical sound wall that borders the freeway such that all plant debris from the trees above and from vines that are growing on the wall will accumulate on the freeway surface. This likely accounts for the high proportion of vegetation at this site.

6.3.2 Air-Dried Weight of Litter

The air-dried weights of litter items collected from all sites and from all events and inlet cleaning are presented in Figure 6-2. The plots show that approximately one-third of the material is plastic (including plastic film, moldable plastic, and styrofoam) and the remainder of the material is approximately equal proportions of paper, cardboard/ chipboard, cigarette butts, wood, and miscellaneous items (metal, cloth, and glass etc.).

Common plastic items that were recovered include soft drink caps, broken pieces of vehicle lights, molded plastic containers (eg. soft drink bottles and oil containers), as well as plastic film and styrofoam. The average RPD for air-dried weight for the laboratory duplicates analysis (See Appendix H) is five percent.

6.3.3 Volumes of Litter

Sorting each of the classifications by their volume shows similar trends in the dry weight analyses, with a few exceptions as shown in Figure 6-3. Figure 6-3 shows there is a relatively even proportion of materials from most categories used, with plastic-moldable being the largest component by volume, with the exception of only small amounts of cloth, glass, metal, wood, and others.

The results show that approximately one-third of the litter are plastics and approximately 14% are paper, by volume. The increased proportion of paper and reduced proportion of wood by volume may be attributed to the differences in their densities. Another observation is the increased proportion of styrofoam compared to weight, due to its low density, and the reverse trend for the dense moldable plastics. The average RPD for litter volume for the laboratory duplicates analysis is 12 percent (see Appendix H).

6.3.4 Numbers of Items

Sorting the litter samples by count revealed a different composition compared to the weight and volume analyses. Figure 6-4 shows that cigarette butts are the largest single component of all litter items.

Following cigarette butts, plastic items account for a third of all items collected (including plastic film, moldable, and styrofoam). Another approximately 10% of the number of items were paper, and the remainder of the material accounted for smaller proportions. The average RPD for litter count for the laboratory duplicates analysis (see Appendix H) is two percent.

Additional pie charts are provided in Appendix I that show category breakdown for total seasonal litter at each site for air-dried weight, volume, and count. These plots provide a breakdown of litter categories for combined treatment vs. control outfalls.

6.3.5 Categories by Sources

To investigate the sources of the monitored litter items a number of usage categories were established. However, during the analysis it became evident that identification of particular items was often difficult. This difficulty limited the proportion of items that could be classified.

The sources of material are grouped into food-related (candy wrappers, ketchup packets, etc.), smoking-related (butts, packs, and cellophane wrappers), and other items. The relative proportions according to air-dried weight, volume, and the number of items are shown in Figures 6-5 through 6-7 for all events. The proportions remained consistent for both years of monitoring as shown in Figure 6-8. Figure 6-8 shows the usage distribution by year by air-dried weight. The distribution is consistent for other parameters as well, although not shown graphically.

Figure 6-2
LITTER CATEGORY DISTRIBUTION BY AIR-DRIED WEIGHT FOR ALL EVENTS COMBINED

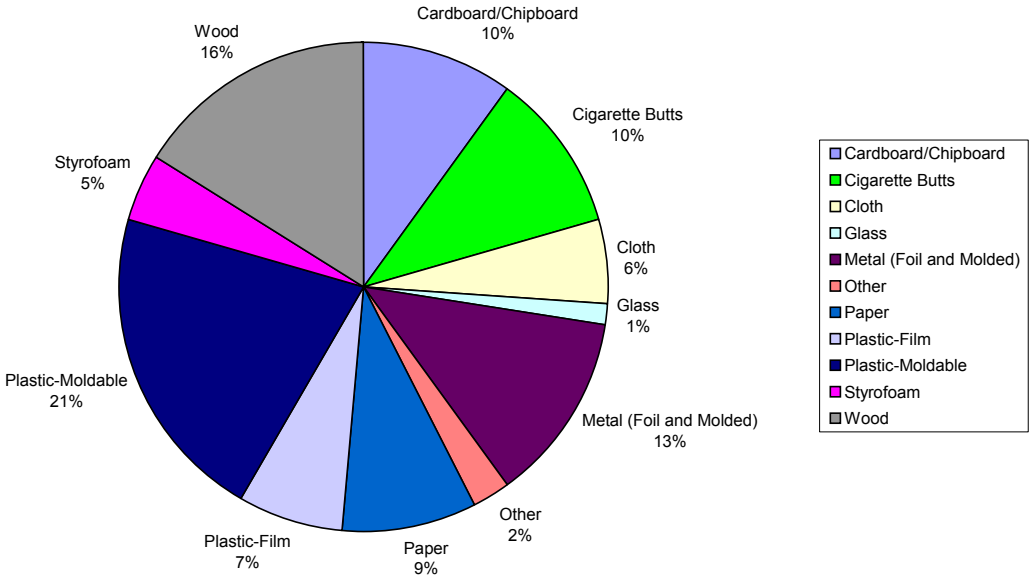

Figure 6-3
LITTER CATEGORY DISTRIBUTION BY VOLUME FOR ALL EVENTS COMBINED

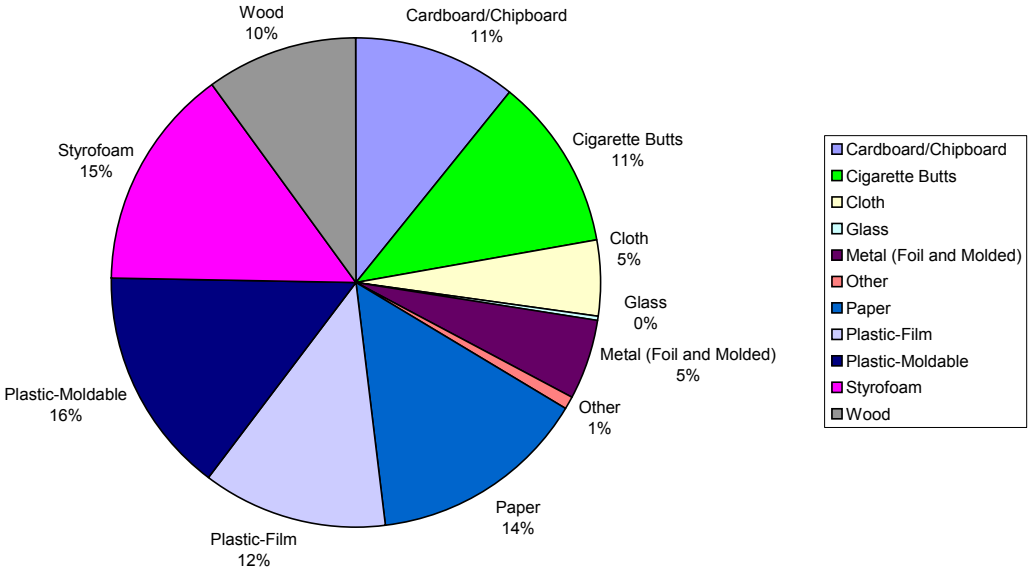

Figure 6-4
LITTER CATEGORY DISTRIBUTION BY COUNT FOR ALL EVENTS COMBINED

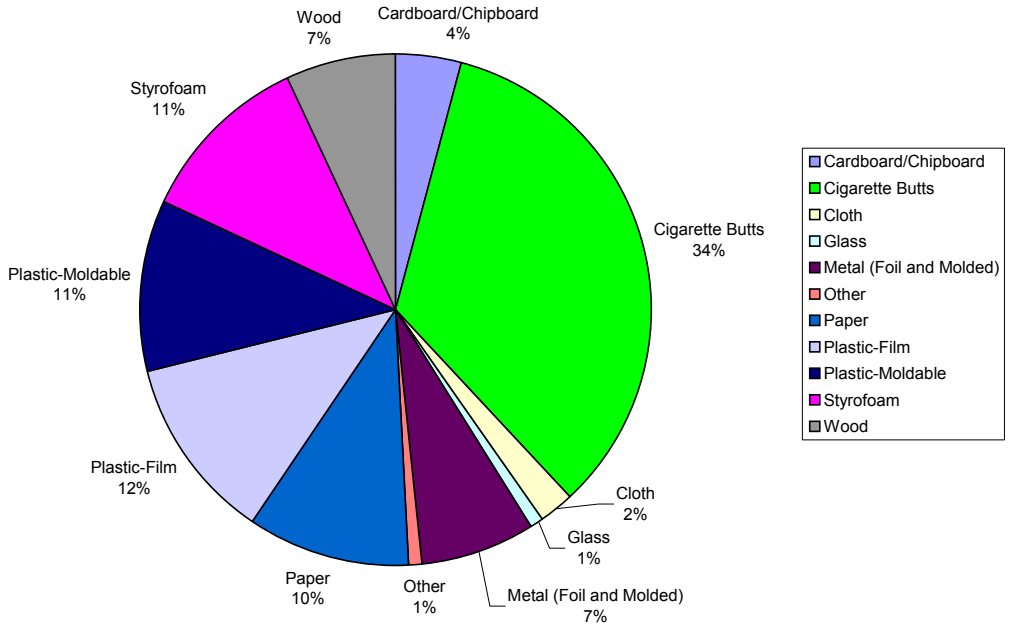

6.3.6 Oven-Dried Weights

There was an addition to the lab procedures during year 2 of monitoring. Further analysis was conducted to evaluate the moisture content of air-dried litter. This analysis provides an estimate of moisture content for each litter category.

An 'air-dried weight' to 'oven-dried weight' moisture content was determined for every analysis event. A sample was collected from the air-dried litter trays at the end of each analysis day from each category of the sorted material. This sample was then placed into an oven tray, weighed, and then placed in an oven for 24 hours at 60 degrees Celsius. On removal, the dry sample was weighed again and, after subtracting the tray weight, was compared to the air-dried weight (the weight before it went into the oven).

The formula for determining the percent moisture content of a sample is:

$$\mathrm{MC} = \frac{\left(\left(\text{sample air - dried weight}\right) - \left(\text{sample oven - dried weight}\right)\right)}{\left(\text{sample oven - dried weight}\right)} \times 100$$

Moisture contents were then calculated for each event for each category by averaging moisture contents for all analysis days for a given event. These values, along with overall averages for each category, are presented in Table 6-1.

Figure 6-5
LITTER USAGE DISTRIBUTION BY AIR-DRIED WEIGHT FOR ALL EVENTS

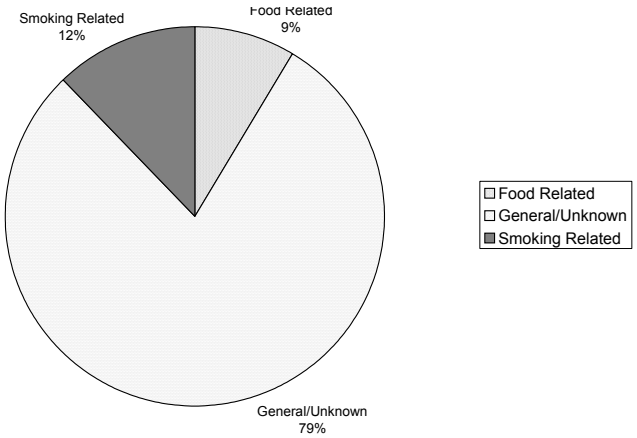

Figure 6-6
LITTER USAGE DISTRIBUTION BY VOLUME FOR ALL EVENTS

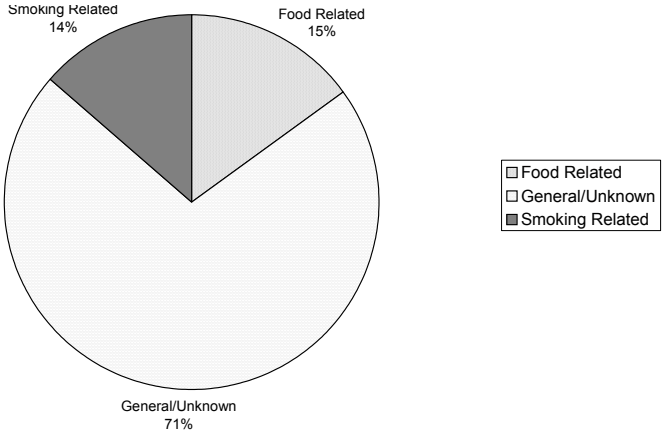

The moisture content of litter from storm events generally ranged from two percent to twenty-three percent (all categories combined), with the exception of events, 1999-08 and 1999-10, that had a combined litter moisture content of 38% and 82%, and 1999-12 that had a combined moisture content of 23%. However, Event 1999-10 did not have a 24-hour antecedent dry period which may have contributed to the high moisture content of litter from this event. Average moisture contents of individual litter categories ranged from zero percent to thirty-six percent. The categories of glass, metal, plastic-moldable, and styrofoam has the lowest moisture contents, ranging from zero percent for glass, to seven percent for styrofoam. The categories of wood,

plastic film, and cigarette butts had the highest moisture contents, ranging from twenty-one percent for wood and plastic film to thirty-six percent for cigarette butts.

Figure 6-7
LITTER USAGE DISTRIBUTION BY COUNT FOR ALL EVENTS

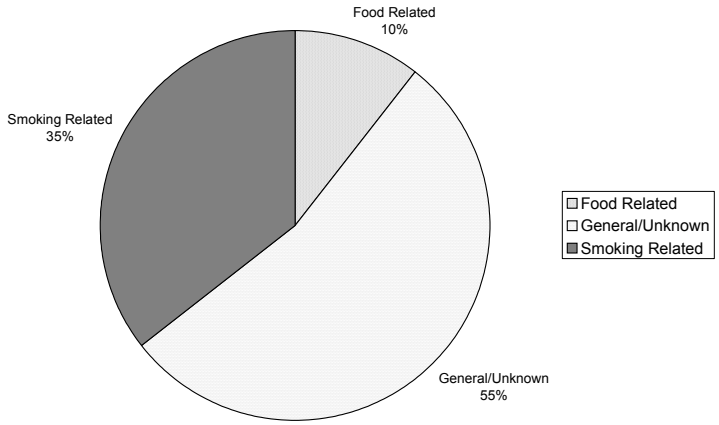

Figure 6-8
USAGE DISTRIBUTION BY AIR-DRIED WEIGHT BY YEAR

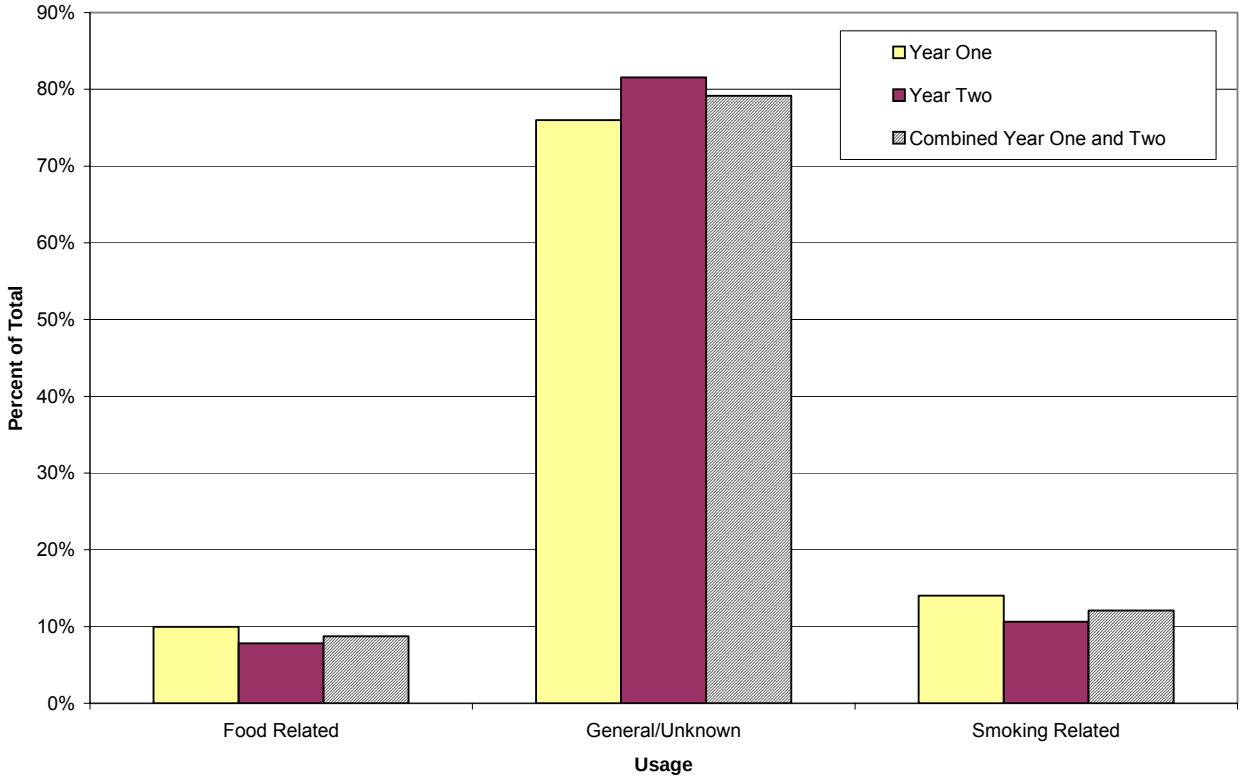

Table 6-1
MOISTURE CONTENTS OF LITTER AND VEGETATIVE MATERIAL[1]

Litter Category	Litter Event																
	Cleanout6*	1999e03	1999e05	1999e06	1999e08	1999e09	1999e10	1999e11	1999e12	1999e13	1999e14	1999e15A	1999e15	1999e16	Final Outfall Cleanout	Final Inlet Cleanout	Average[2]
Cardboard/Chipboard	3%	3%	6%	4%	47%	28%	NA	6%	40%	7%	11%	7%	29%	6%	26%	9%	17%
Cigarette Butts	2%	3%	27%	4%	81%	64%	162%	25%	57%	33%	8%	10%	44%	7%	38%	8%	36%
Cloth	1%	1%	3%	2%	31%	14%	NA	2%	21%	7%	5%	2%	10%	10%	1%	2%	10%
Glass	0%	NA	2%	1%	0%	1%	NA	0%	0%	0%	2%	0%	1%	0%	0%	0%	0%
Metal (Foil and Molded)	1%	1%	2%	1%	15%	12%	NA	1%	5%	2%	4%	4%	1%	0%	1%	0%	2%
Other	NA	NA	NA	5%	NA	4%	NA	9%	8%	2%	0%	1%	1%	1%	3%	1%	2%
Paper	3%	2%	4%	3%	43%	31%	120%	10%	39%	6%	5%	4%	23%	2%	3%	3%	16%
Plastic-Film	1%	4%	4%	3%	19%	13%	8%	2%	16%	8%	6%	5%	13%	5%	4%	68%	21%
Plastic-Moldable	0%	0%	0%	1%	7%	2%	NA	0%	2%	1%	1%	0%	1%	1%	2%	1%	2%
Styrofoam	1%	1%	1%	1%	11%	11%	19%	1%	21%	16%	2%	1%	19%	1%	13%	1%	7%
Wood	6%	7%	11%	7%	50%	20%	59%	14%	25%	32%	17%	13%	31%	15%	29%	15%	21%
Total of Litter Categories	2%	3%	7%	3%	38%	19%	82%	7%	23%	12%	6%	6%	16%	6%	10%	4%	12%
Vegetative Material	NM	36%	49%	147%	39%	26%	81%	34%	42%	35%	44%	46%	31%	58%	5%	28%	

Notes:

* Mid season cleanout of Site 6 on October 19, 1999

[1] Moisture contents based on oven drying analysis for representative litter samples for each event.

[2] Weighted average based on event-by-event air-dried weights by category.

NA = Not applicable because no litter was recovered in the category during the event.

NM = Not measured.

6.3.7 Floatable Portion of Litter

An estimate of the floatable portion of the litter collected at the outfalls was made by placing samples of the litter into large containers of water, manually stirring, waiting 30 seconds, and measuring the portions that float and those that sink. Table 6-2 shows the percent of floatable litter by event for all events and a total percent floatable for all year one and two events.

Findings indicate that a large portion (approximately 80% of litter collected for each year) of litter collected during the study was floatable, using the methodology selected for the LMPS. Allison et. al. found that 20% of storm water litter floats, based on collecting the floatable portion of debris in a CDS unit from 10 storms. One explanation for the difference in the findings of the studies may be attributable to the difference in residence time of the litter in both studies. The percentage of litter collected in storm water that is floatable may depend on how long the litter has been entrained in the system (i.e. if the litter has had a longer period of time to become more saturated). The CDS unit monitored by Allison et al. treated storm water from a 50 hectare (124 acre) urban catchment that contained 192 drainage inlets. The much lower percentage of floatables found by Allision et. al. may be a result of a longer litter residence time and turbulence associated with storm water flowing through an extensive piping system containing multiple bends etc. LMPS findings may reflect the short residence time of litter in the smaller LMPS drainage systems. Allison et. al. indicated that based on their findings, BMPS should be designed for floating and sinking gross pollutants because of the low percentage of floatables found in that study. The LMPS findings would indicate that a large portion of freeway litter collected after a short residence time in the drainage system is floatable.

6.3.8 Litter Spike Recovery

Spike materials were placed in the drain inlet upstream of each outfall during pre-storm preparation for events. A standard set of materials was used in each spike, and the set of materials was painted a different color for each event. The standard spike materials were:

- 4 gum wrappers
- 3 styrofoam popcorn
- 5 cigarette butts
- 2 tongue depressors
- 2 popsicle sticks
- 2 metal cans
- 2 fabric scraps
- 1 plastic lid
- 1 poker chip

Table 6-3 shows the event and date associated with each spike color. The event number and date represent the first opportunity for recovery of the associated spike color because the spike material was placed during pre-storm preparation for the associated event. Spike material placed for earlier events was also recovered from in-between event litter bags collected during pre-storm preparation for later events.

Table 6-4 displays the pattern of spike recovery for each storm event. The majority of the spike material in each color is recovered within the first two events after placement. However, spikes from the early part of the 1998/1999 rainy season were recovered as late as February 2000, during the most intense storm during the study period. Additionally, some spikes were not recovered at all during storm events and remained in the drainage system until the inlets were manually cleaned. Five percent of the total number of spike items that were placed in the inlets

during both seasons were recovered during cleanouts (including the October 1999 cleanouts conducted at Sites 6 and 8 and the final inlet cleanout).

Table 6–2
PERCENT FLOATABLE LITTER BY VOLUME

Year One Event	Date	Percent Floatable	Year Two Event	Date	Percent Floatable
1998i01	11/7/98	97%	Cleanout6*	10/28/99	84%
1998i02	11/27/98	93%	1999e03	12/31/99	74%
1998e02	11/28/98	83%	1999e05	1/25/00	82%
1998e03	12/1/98	84%	1999e06	1/30/00	86%
1998i05	1/23/99	85%	1999e08	2/10/00	80%
1998e05	1/25/99	84%	1999e09	2/12/00	94%
1998i06	2/7/99	77%	1999e10	2/13/00	71%
1998e06	2/9/99	86%	1999e11	2/16/00	76%
1998i09	3/14/99	58%	1999e12	2/20/00	79%
1998e09	3/15/99	79%	1999e13	2/23/00	68%
1998e10	3/20/99	76%	1999e14	2/27/00	77%
1998e11	3/25/99	76%	1999e15A	3/3/00	81%
1998i12	4/5/99	85%	1999e15	3/4/00	79%
1998e12	4/6/99	77%	1999e16	3/8/00	76%
1998i13	4/10/99	55%	Final Outfall Cleanout	3/23/00	50%
1998e13	4/11/99	63%	Final Inlet Cleanout	3/26/00	72%
1998d01	6/7/99	67%			
Bicycle Grate Closeout	9/27/99	67%			
TOTAL[1]		78%			80%

[1] Seasonal total: calculated by comparing the total volume and total non-floatable volume summed over all events for the season (listed above).

*Midseason cleanout of Site 6 on October 19, 1999

Table 6-5 shows the total percent recovery of each spike color at each outfall throughout the entire study. Table 6-5 also shows the average total recovery of each spike color for each site. Table 6-5 is useful in comparing relative spike recovery at the four sites.

Outfalls at Site 1W and Site 8 experienced the highest spike recovery. The Site 1W average recovery of spike colors placed during year 1 and year 2 of monitoring were 87 percent and 83 percent, respectively. The Site 8 average recovery of spike colors placed during year 1 and year 2 of monitoring were 83 percent and 86 percent, respectively. Outfalls at Site 6 had the lowest spike recovery, with average site recoveries of spike colors placed during year 1 and year 2 of monitoring of 59 percent and 76 percent, respectively. The Site 1E average recovery of spike colors placed during year 1 and year 2 of monitoring were 73 percent and 74 percent, respectively.

Table 6–3
SPIKE COLORS BY EVENT

Spike Color	Date Spiked	Associated Storm Event	Storm Event Date
red	11/7/98	1998e01	11/8/98
blue	11/27/98	1998e02	11/28/98
yellow	11/30/98	1998e03	12/1/98
brown	12/4/98	1998e04 (false start)	12/5/98
pink	1/24/99	1998e05	1/25/99
orange	2/8/99	1998e06	2/9/99
green	2/18/99	1998e07 (false start)	2/19/99
no spike	no spike	1998e08 (false start)	3/5/99
no spike	no spike	1998e09	3/15/99
purple	3/19/99	1998e10	3/20/99
aqua green	3/24/99	1998e11	3/25/99
maroon/fuschia	4/5/99	1998e12	4/6/99
no spike	no spike	1998e13	4/11/99
blue dot hot pink	11/13/99	1999e01 (false start)	11/14/99
no spike	no spike	1999e02 (false start)	12/9/99
no spike	no spike	1999e03	12/31/99
blue dot yellow	1/13/00	1999e04 (false start)	1/14/00
no spike	no spike	1999e05	1/25/00
blue dot blue	1/29/00	1999e06	1/30/00
blue dot red	2/4/00	1999e07 (false start)	2/5/00
no spike	no spike	1999e08	2/10/00
blue dot orange	2/11/00	1999e09	2/12/00
blue dot green	2/12/00	1999e10	2/13/00
blue dot brown	2/15/00	1999e11	2/16/00
blue dot purple	2/19/00	1999e12	2/20/00
blue dot gold	2/22/00	1999e13	2/23/00
blue dot silver	2/26/00	1999e14	2/27/00
no spike	no spike	1999e15A	3/3/00
blue dot light pink	3/3/00	1999e15	3/4/00
blue dot black	3/7/00	1999e16	3/8/00

Table 6-4
NUMBER OF SPIKE ITEMS RECOVERED BY DATE RECOVERED AND ASSOCIATED EVENT

Date Spiked	Total Number of Spike Items Recovered*	1998e01, 11/8/98	1998i02, 11/27/98	1998e02, 11/28/98	1998e03, 12/1/98	1998i05, 1/23/99	1998e05, 1/25/99	1998i06, 2/7/99	1998e06, 2/9/99	1998i09, 3/14/99	1998e09, 3/15/99	1998e10, 3/20/99	1998e11, 3/25/99	1998i12, 4/5/99	1998e12, 4/6/99	1998i13, 4/10/99	1998e13, 4/11/99	Bicycle Grate Closeout at Site 8, 9/27/99	Site 6 Cleanout, 10/28/99	1999e03, 12/31/99	1999e05, 1/25/00	1999e06, 1/30/00	1999e08, 2/10/99	1999e09, 2/12/00	1999e10, 2/13/00	1999e11, 2/16/00	1999e12, 2/20/00	1999e13, 2/23/00	1999e14, 2/27/00	1999e15A, 3/3/00	1999e15, 3/4/00	1999e16, 3/8/00	Final Outfall Cleanout, 3/23/00	Final Cage Cleanout, 3/23/00
11/7/98	401	363	1	20		3	1							1			1		8								1							
11/27/98	349			325		20		1																										
11/30/98	412				145	237	12	5			1				1												1							
12/4/98	425					395	21	4	1					2																				
1/24/99	437						209	169	32		10		1			1	1		10									1						
2/8/99	422								374	3	18		2	5			2	3	6								3							
2/18/99	434									21	307		21	11	7		7	3	22								8						1	
3/19/99	419											82	141	69	78		16		13								7							
3/24/99	369												193	81	69	1	7																	
4/5/99	403														337		26		15														1	
11/13/99	323																			80	14		51	19			78	13			1	5		
1/13/00	392																				110	1	130	48		2	41	6				3	1	1
1/29/00	446																					61	243	55		18	29	1			1	6		
2/4/00	432																						292	61			44	1				5		
2/11/00	474																							355		7	78	5			1	2	2	
2/12/00	422																								52	173	151	9	1	2	1	8		3
2/15/00	374																									168	171	4	1		1	7	1	1
2/19/00	369																										341	1	1		3	5	1	
2/22/00	449																											392	3	5	5	9	2	
2/26/00	477																												209	171	52	12		
3/3/00	485																														390	27	1	1
3/7/00	461																															416	1	
various	13																										11					1		

Notes:
Shaded boxes indicate spike items recovered during the first litter bag collection following the date spiked.
*Total number of items available for recovery is 528 (22 items per outfall in 24 outfalls).
**13 metal cans were recovered with only the blue dot portion of the spike visible.

Table 6-5
PERCENT OF TOTAL SPIKE MATERIAL RECOVERED AT EACH OUTFALL BY COLOR

		Site 1E - Litter Pick-up						
		Control Outfalls			Treatment Outfalls			
	Spike Color	1-42	1-B110	1-B111	1-44	1-46	1-47	Site Average by Color
Year 1 Spike Colors	Red	91%	95%	82%	82%	91%	68%	85%
	Blue	55%	77%	64%	59%	68%	55%	63%
	Yellow	91%	95%	82%	59%	95%	59%	80%
	Brown	100%	82%	86%	86%	64%	45%	77%
	Pink	77%	77%	86%	64%	100%	9%	69%
	Orange	59%	91%	73%	64%	91%	77%	76%
	Green	73%	59%	100%	27%	100%	45%	67%
	Purple	95%	86%	59%	64%	100%	82%	81%
	aqua green	95%	100%	41%	36%	27%	82%	64%
	Maroon/fuschia	77%	0%	68%	86%	100%	100%	72%
	Year 1 Average Recovery	81%	76%	74%	63%	84%	62%	73%
Year 2 Spike Colors	blue dot hot pink	41%	59%	55%	68%	86%	45%	59%
	blue dot yellow	73%	68%	59%	73%	73%	55%	67%
	blue dot blue	86%	91%	68%	73%	77%	59%	76%
	blue dot red	86%	82%	77%	68%	86%	68%	78%
	blue dot orange	100%	91%	86%	45%	91%	82%	83%
	blue dot green	91%	64%	59%	82%	86%	64%	74%
	blue dot brown	77%	68%	64%	64%	82%	50%	67%
	blue dot purple	68%	73%	59%	50%	73%	9%	55%
	blue dot gold	64%	82%	82%	91%	82%	64%	77%
	blue dot silver	100%	91%	91%	86%	95%	86%	92%
	blue dot light pink	77%	100%	86%	91%	86%	55%	83%
	blue dot black	68%	91%	82%	68%	100%	45%	76%
	Year 2 Average Recovery	78%	80%	72%	72%	85%	57%	74%
	Average Recovery of Spikes from Both Years	79%	78%	73%	68%	84%	59%	74%

**During some events, metal cans were recovered with only the blue dot portion of the spike visible.

Table 6-5 (continued)
PERCENT OF TOTAL SPIKE MATERIAL RECOVERED AT EACH OUTFALL BY COLOR

		Site 1W - Street Sweeping						
		Control Outfalls			Treatment Outfalls			
	Spike Color	1-50	1-51	1-52	1-58	1-59	1-60	Site Average by Color
Year 1 Spike Colors	Red	82%	91%	95%	95%	86%	77%	88%
	Blue	91%	86%	95%	86%	64%	64%	81%
	Yellow	95%	100%	100%	82%	86%	86%	92%
	Brown	91%	100%	91%	95%	100%	82%	93%
	Pink	59%	82%	100%	82%	86%	73%	80%
	Orange	95%	77%	86%	100%	100%	95%	92%
	Green	95%	100%	100%	91%	100%	91%	96%
	Purple	73%	73%	86%	100%	86%	86%	84%
	Aqua green	91%	45%	95%	95%	64%	86%	80%
	Maroon/fuschia	82%	100%	77%	82%	77%	100%	86%
	Year 1Average Recovery	85%	85%	93%	91%	85%	84%	87%
Year 2 Spike Colors	Blue dot hot pink	55%	55%	73%	77%	59%	55%	62%
	Blue dot yellow	95%	82%	91%	68%	64%	91%	82%
	Blue dot blue	95%	100%	68%	77%	100%	86%	88%
	Blue dot red	77%	95%	91%	64%	91%	82%	83%
	Blue dot orange	100%	95%	95%	100%	86%	86%	94%
	Blue dot green	82%	86%	59%	82%	100%	64%	79%
	Blue dot brown	68%	86%	73%	77%	73%	91%	78%
	Blue dot purple	73%	77%	64%	73%	55%	82%	70%
	blue dot gold	100%	100%	82%	82%	86%	91%	90%
	blue dot silver	95%	95%	68%	86%	100%	82%	88%
	blue dot light pink	100%	82%	91%	100%	95%	82%	92%
	blue dot black	95%	100%	86%	91%	86%	95%	92%
	Year 2 Average Recovery	86%	88%	78%	81%	83%	82%	83%
	Average Recovery of Spikes from Both Years	86%	87%	85%	86%	84%	83%	85%

**During some events, metal cans were recovered with only the blue dot portion of the spike visible.

Table 6-5 (continued)
PERCENT OF TOTAL SPIKE MATERIAL RECOVERED AT EACH OUTFALL BY COLOR

		Site 6 - Modified Inlet						
		Control Outfalls			Treatment Outfalls			
	Spike Color	6-20C	6-20E	6-20G	6-20B	6-20F	6-20H	Site Average by Color
Year 1 Spike Colors	Red	32%	18%	91%	36%	64%	41%	47%
	Blue	41%	91%	82%	64%	45%	64%	64%
	Yellow	68%	59%	45%	14%	59%	41%	48%
	Brown	77%	68%	82%	50%	32%	50%	60%
	Pink	50%	100%	100%	27%	77%	100%	76%
	Orange	45%	86%	82%	55%	9%	50%	55%
	Green	55%	32%	77%	36%	50%	59%	52%
	Purple	55%	64%	68%	23%	100%	68%	63%
	Aqua green	32%	50%	95%	59%	82%	55%	62%
	Maroon/fuschia	18%	55%	73%	100%	100%	36%	64%
	Year 1 Average Recovery	85%	62%	80%	46%	62%	56%	59%
Year 2 Spike Colors	Blue dot hot pink	27%	9%	64%	64%	50%	45%	43%
	Blue dot yellow	59%	50%	82%	59%	41%	45%	56%
	Blue dot blue	82%	91%	95%	77%	91%	60%	83%
	Blue dot red	68%	68%	82%	95%	77%	55%	74%
	Blue dot orange	91%	100%	100%	82%	91%	91%	92%
	Blue dot green	73%	55%	91%	82%	86%	73%	77%
	Blue dot brown	64%	73%	68%	73%	68%	45%	65%
	Blue dot purple	73%	77%	73%	68%	82%	73%	74%
	Blue dot gold	91%	77%	95%	73%	91%	82%	85%
	Blue dot silver	95%	100%	100%	86%	68%	86%	89%
	Blue dot light pink	100%	100%	82%	100%	77%	91%	92%
	Blue dot black	73%	68%	95%	95%	95%	95%	87%
	Year 2 Average Recovery	86%	72%	86%	80%	77%	70%	76%
	Average Recovery of Spikes from Both Years	62%	68%	83%	65%	70%	64%	69%

**During some events, metal cans were recovered with only the blue dot portion of the spike visible.

Table 6-5 (continued)
PERCENT OF TOTAL SPIKE MATERIAL RECOVERED AT EACH OUTFALL BY COLOR

		Site 8 - Bicycle Grate (1998/1999) and LID (1999/2000)						
		Control Outfalls			Treatment Outfalls			
	Spike Color	8-23C	8-24D	8-24E	8-24B	8-24F	8-B001	Site Average by Color
Year 1 Spike Colors	Red	91%	73%	86%	68%	100%	86%	84%
	Blue	82%	23%	59%	32%	64%	77%	56%
	Yellow	86%	95%	100%	91%	91%	86%	92%
	Brown	91%	91%	95%	91%	91%	91%	92%
	Pink	95%	100%	86%	100%	95%	86%	94%
	Orange	100%	91%	100%	95%	95%	95%	96%
	Green	100%	100%	100%	86%	82%	100%	95%
	Purple	95%	100%	82%	91%	82%	45%	83%
	aqua green	95%	100%	14%	64%	100%	50%	70%
	maroon/fuschia	100%	86%	91%	68%	18%	18%	64%
	Year 1 Average Recovery	94%	86%	81%	79%	82%	74%	83%
Year 2 Spike Colors	blue dot hot pink	82%	100%	77%	91%	100%	32%	80%
	blue dot yellow	95%	86%	91%	95%	95%	91%	92%
	blue dot blue	100%	82%	82%	100%	86%	86%	89%
	blue dot red	91%	91%	95%	91%	86%	95%	92%
	blue dot orange	64%	100%	82%	91%	91%	100%	88%
	blue dot green	77%	95%	82%	86%	91%	100%	89%
	blue dot brown	86%	59%	77%	77%	77%	59%	73%
	blue dot purple	73%	95%	82%	82%	73%	73%	80%
	blue dot gold	82%	91%	82%	82%	86%	100%	87%
	blue dot silver	91%	73%	95%	91%	100%	91%	90%
	blue dot light pink	86%	95%	95%	95%	95%	82%	92%
	blue dot black	95%	95%	100%	77%	95%	100%	94%
	Year 2 Average Recovery	85%	88%	84%	90%	90%	81%	86%
	Average Recovery of Spikes from Both Years	89%	87%	84%	84%	86%	79%	85%

**During some events, metal cans were recovered with only the blue dot portion of the spike visible.

Insight related to spike recovery percentages was gained during final inlet cleaning laboratory analysis. Litter lab technicians indicated that spike materials had degraded substantially so that the original form, material, and markings were at times unrecognizable, particularly for cigarette butts, gum wrappers, and fabric. This may partially explain lower than anticipated spike recovery results. In particular, the lowest overall spike recovery results at Site 6 may be explained by a higher potential for material degradation due to the high vegetation content (87 percent average per monitored event). This is unlikely to affect results related to the BMPs tested during the LMPS because there is no reason to suspect that the rate of degradation would be different in treatment vs. control inlets.

Table 6-6 shows the recovery of spike items by type for the LMPS monitoring period. Recovery of each type of spike item ranged from 56% recovery of placed cigarette butts over the study to 93% recovery of both metal cans and plastic lids.

6.4 EVENT LITTER DATA

This section contains a summary of the event by event litter loads and storm-related characteristics from the control outfalls at each site during the two seasons of monitoring. The data are useful to compare the litter rates between individual storm events, BMP sites, and seasons.

Table 6-7 presents the amount of litter monitored during each trigger storm (for air-dried weight, volume, and count) from the sum of the three control outfalls and the sum of the three treatment outfalls at each site (normalized by area). It should be noted that normalization by this method assumes a straight-line relationship between catchment size and litter load. Data were also normalized by flow for the purpose of evaluating BMP effectiveness. In addition to the storm event litter, rainfall volumes, maximum rainfall intensities, flow volumes, maximum flow rates, event durations, the antecedent dry days and antecedent rainfall are presented.

The control sites are used to present litter data from 'typical' highway conditions. The sites are similar in many ways including: drainage systems with one inlet directly connected to one outfall; location on fill slopes; catchment areas less than one acre; and each are in urban freeway settings. However, there are substantial variations in the litter loads between the sites. Site ADT and litter loads by weight and volume are presented in Table 6-8. Comparison of ADTs, truck traffic and surrounding land use as well as litter load for these sites does not indicate a clear relationship. Surrounding land uses and types of vehicles (number of axles) were also compared to litter load on a cursory basis and no apparent trends were identified. Differences between the site litter loads could be influenced by other factors that were not evaluated during the LMPS including different traffic patterns, different prevailing wind directions, and highway shoulder conditions.

Observations from the litter data suggest that there were:

- Similar seasonal rainfall and runoff volumes observed at all sites (within approximately 20%).
- The largest amount of outfall litter at control areas was observed at Site 1-E, approximately 14 kg/ac, 104 L/ac, and 14,000 pieces/ac of litter for the study, captured during trigger events from two rain seasons (October 1998 to April 2000).
- The control outfalls at Sites 1-W and Site 6 had similar loads of litter and were about 25% less that site1E.
- Site 8 had between one-third and one-half the loads compared to site 1E.

All sites had higher outfall litter loads for the second year of monitoring.

Table 6–6
RECOVERY OF SPIKE ITEMS BY TYPE

Spike Type	Number of items placed, 1998-1999	Number of items placed, 1999-2000	Number of items recovered, 1998-1999	Number of items recovered, 1999-2000	Overall Percent Recovery
Cigarette Butts	1200	1440	684	782	56%
Fabric Scraps	480	576	340	472	77%
Gum Wrappers	960	1149	690	909	76%
Metal Cans	480	576	413	573	93%
Plastic Lids	240	287	205	287	93%
Poker Chips	240	288	185	288	90%
Popsicle Sticks	480	576	408	562	92%
Styrofoam	720	864	585	854	91%
Tongue Depressors	480	576	351	576	88%

Table 6-7
EVENT LITTER DATA - NORMALIZED BY AREA

Site 1E
Litter Pickup
Control

EVENT NUMBER	EVENT DATE	DRY WEIGHT*	VOLUME*	COUNT*	RAIN VOLUME**	MAX RAIN INTENSITY**	FLOW VOLUME**	MAX FLOW RATE**	EVENT DURATION**	ANT. DRY DAYS**	ANT. RAIN**
		(g/ac)	(ml/ac)	(#/ac)	(in)	(in/hr)	(in)	(cfs)	(hours)	(days)	(in)
1998e01	11/08/1998	1055	13936	1654	1.07	0.6	0.71	0.153	5:50	-	-
1998e02	11/28/1998	939	8305	968	0.29	0.3	0.16	0.239	3:26	20	0
1998e03	12/01/1998	6	108	25	0.17	0.15	0.06	0.01	4:42	3	0
1998e05	01/25/1999	139	2627	236	0.51	0.3	0.28	0.042	7:04	5	0.4
1998e06	02/09/1999	680	4507	854	0.35	1.8	0.19	0.29	5:15	5	0.3
1998e09	03/15/1999	911	6994	1145	0.58	2.4	0.34	0.202	3:47	34	0
1998e10	03/20/1999	2	33	25	0.18	0.15	0.06	0.007	3:58	5	0
1998e11	03/25/1999	465	5414	337	0.58	0.6	0.32	0.067	11:59	5	0
1998e12	04/06/1999	361	2352	635	0.41	0.6	0.18	0.018	5:25	12	0
1998e13	04/11/1999	107	1285	288	1.44	0.6	0.93	0.109	11:01	4	0.7
1999e03	12/31/1999	0	0	0	0.04	0.37	0	-	0:51	53	0.09
1999e05	01/25/2000	130	2237	269	0.57	0.6	0.18	0.016	18:44	78	0
1999e06	01/30/2000	0	0	0	0.23	0.15	0.06	0.01	6:31	5	0.07
1999e08	02/10/2000	1463	11352	1214	0.3	1.8	0.16	0.153	2:45	11	0
1999e09	02/12/2000	1102	8962	1368	0.52	1.2	0.28	-	2:20	2	0
1999e10	02/13/2000	0	0	0	0.35	0.1	0.16	0.008	16:42	1	0
1999e11	02/16/2000	110	1021	220	0.54	1.2	0.29	0.092	16:17	2	0
1999e12	02/20/2000	4217	23530	2966	2.33	3.4	1.55	-	34:31	4	0
1999e13	02/23/2000	867	4025	583	1.16	2.4	0.73	-	10:32	2	0
1999e14	02/27/2000	49	619	97	0.16	0.2	0.06	0.019	01:53	4	0
1999e15	03/04/2000	648	3373	582	1.79	2.4	1.2	0.271	30:17	1	0
1999e15A	03/03/2000	166	1241	334	0.35	1.2	0.14	0.037	3:38	5	0.01
1999e16	03/08/2000	552	2292	477	0.86	0.6	0.44	0.079	08:53	2	0
1998-99 Subtotal	**-**	**4664**	**45561**	**6167**	**5.58**	**-**	**3.23**	**-**	**-**	**-**	**-**
1999-00 Subtotal	**-**	**9305**	**58652**	**8111**	**9.2**	**-**	**5.25**	**-**	**-**	**-**	**-**
Total	**-**	**13970**	**104213**	**14278**	**14.78**	**-**	**8.48**	**-**	**-**	**-**	**-**

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*sum of three litter outfalls for the Control

**flow and rainfall measured at outfall 1-42

Table 6-7
EVENT LITTER DATA - NORMALIZED BY AREA

Site 1E
Litter Pickup
Treatment

EVENT NUMBER	EVENT DATE	DRY WEIGHT*	VOLUME*	COUNT*	RAIN VOLUME**	MAX RAIN INTENSITY**	FLOW VOLUME**	MAX FLOW RATE**	EVENT DURATION**	ANT. DRY DAYS**	ANT. RAIN**
		(g/ac)	(ml/ac)	(#/ac)	(in)	(in/hr)	(in)	(cfs)	(hours)	(days)	(in)
1998e01	11/08/1998	535	9084	851	1.1	0.6	0.61	0.125	5:16	-	-
1998e02	11/28/1998	534	5132	555	0.27	1.8	0.04	0.083	3:28	20	0
1998e03	12/01/1998	5	119	18	0.2	0.2	0.03	0.008	4:37	3	0
1998e05	01/25/1999	253	1974	347	0.52	0.3	0.34	0.055	6:55	5	0.4
1998e06	02/09/1999	662	3337	676	0.35	1.8	0.2	0.173	5:03	5	0.3
1998e09	03/15/1999	595	4472	743	0.61	2.4	0.31	0.115	3:48	34	0
1998e10	03/20/1999	1	16	15	0.17	0.15	0.02	0.005	3:37	5	0
1998e11	03/25/1999	156	1139	286	0.58	0.6	0.28	0.047	11:59	5	0
1998e12	04/06/1999	407	3112	418	0.37	0.12	0.15	0.02	5:14	12	0
1998e13	04/11/1999	171	960	277	1.52	0.6	1.05	0.132	10:52	4	0.7
1999e03	12/31/1999	0	0	0	0.04	0.2	0	0.004	0:58	53	0.14
1999e05	01/25/2000	2	124	22	0.58	0.3	0.12	0.011	18:27	78	0.01
1999e06	01/30/2000	0	0	0	0.22	0.15	0.02	0.006	6:15	5	0.09
1999e08	02/10/2000	1498	10444	1208	0.32	2.4	0.08	0.094	2:46	11	0
1999e09	02/12/2000	1077	4624	842	0.53	1.2	0.28	0.135	2:23	2	0
1999e10	02/13/2000	0	0	0	0.38	0.12	0.09	0.011	16:08	1	0
1999e11	02/16/2000	55	420	149	0.5	1.2	0.22	0.029	16:01	2	0
1999e12	02/20/2000	2111	9188	1301	2.43	3	1.42	0.327	34:42	4	0
1999e13	02/23/2000	683	2224	434	1.12	1.8	0.76	0.122	10:25	2	0
1999e14	02/27/2000	26	356	74	0.18	0.2	0.05	0.024	01:36	4	0
1999e15	03/04/2000	282	904	382	1.76	1.8	1.1	0.161	30:10	1	0
1999e15A	03/03/2000	196	1020	228	0.36	0.6	0.15	0.055	4:05	5	0
1999e16	03/08/2000	577	3032	761	0.94	1.2	0.58	0.122	08:43	2	0
1998-99 Subtotal	**-**	**3320**	**29346**	**4186**	**5.69**	**-**	**3.03**	**-**	**-**	**-**	**-**
1999-00 Subtotal	**-**	**6508**	**32336**	**5399**	**9.36**	**-**	**4.87**	**-**	**-**	**-**	**-**
Total	**-**	**9828**	**61682**	**9586**	**15.05**	**-**	**7.9**	**-**	**-**	**-**	**-**

ADT for Freeway Section211300

*sum of three litter outfalls for the Treatment

**flow and rainfall measured at outfall 1-46

Table 6-7
EVENT LITTER DATA - NORMALIZED BY AREA

Site 1W
Street Sweeping
Control

EVENT NUMBER	EVENT DATE	DRY WEIGHT*	VOLUME*	COUNT*	RAIN VOLUME**	MAX RAIN INTENSITY**	FLOW VOLUME**	MAX FLOW RATE**	EVENT DURATION**	ANT. DRY DAYS**	ANT. RAIN**
		(g/ac)	(ml/ac)	(#/ac)	(in)	(in/hr)	(in)	(cfs)	(hours)	(days)	(in)
1998e01	11/08/1998	670	11277	1214	0.95	0.6	0.52	0.124	5:40	-	-
1998e02	11/28/1998	711	5948	835	0.26	1.8	0.09	0.142	2:39	20	0
1998e03	12/01/1998	12	173	44	0.2	0.2	0.06	0.013	4:39	3	0
1998e05	01/25/1999	370	7702	769	0.5	0.2	0.24	0.04	7:02	5	1.2
1998e06	02/09/1999	402	2804	690	0.36	1.8	0.15	0.299	5:13	5	0.7
1998e09	03/15/1999	451	3999	715	0.59	1.8	0.3	0.261	3:46	34	0
1998e10	03/20/1999	11	88	43	0.17	0.15	0.05	0.009	3:51	5	0
1998e11	03/25/1999	90	873	181	0.55	1.2	0.26	0.05	7:06	5	0.1
1998e12	04/06/1999	334	2034	497	0.28	0.15	0.14	0.025	4:06	12	0
1998e13	04/11/1999	132	990	235	1.36	0.6	0.8	0.109	10:57	4	0.6
1999e03	12/31/1999	0	0	0	0.04	0.3	0	0.003	0:29	53	0.15
1999e05	01/25/2000	286	3319	412	0.52	0.3	0.18	0.026	18:35	78	0.01
1999e06	01/30/2000	0	0	0	0.18	0.1	0.05	0.015	5:56	5	0.09
1999e08	02/10/2000	2194	17379	2144	0.32	1.8	0.14	0.268	3:30	11	0
1999e09	02/12/2000	699	5085	1018	0.51	1.2	0.34	0.305	2:15	2	0
1999e10	02/13/2000	0	0	0	0.28	0.08	0.15	0.014	16:16	1	0
1999e11	02/16/2000	80	452	112	0.48	1.2	0.24	0.034	15:58	2	.01
1999e12	02/20/2000	2172	9500	1518	2.29	3	1.47	0.439	34:29	4	0
1999e13	02/23/2000	408	1254	285	1.05	1.8	0.69	0.189	10:20	2	0
1999e14	02/27/2000	42	577	105	0.18	0.2	0.07	0.032	01:57	4	0
1999e15	03/04/2000	211	1077	360	1.58	1.2	1.1	0.181	31:07	1	0
1999e15A	03/03/2000	120	915	284	0.34	0.6	0.16	0.064	4:04	5	0
1999e16	03/08/2000	292	1492	560	0.8	1.2	0.55	0.15	08:13	2	0
1998-99 Subtotal	**-**	**3184**	**35886**	**5223**	**5.22**	**-**	**2.61**	**-**	**-**	**-**	**-**
1999-00 Subtotal	**-**	**6504**	**41048**	**6797**	**8.57**	**-**	**5.14**	**-**	**-**	**-**	**-**
Total	**-**	**9688**	**76935**	**12020**	**13.79**	**-**	**7.75**	**-**	**-**	**-**	**-**

ADT for Freeway Section211300

*sum of three litter outfalls for the Control

**flow and rainfall measured at outfall 1-52

Table 6-7
EVENT LITTER DATA - NORMALIZED BY AREA

Site 1W
Street Sweeping
Treatment

EVENT NUMBER	EVENT DATE	DRY WEIGHT*	VOLUME*	COUNT*	RAIN VOLUME**	MAX RAIN INTENSITY**	FLOW VOLUME**	MAX FLOW RATE**	EVENT DURATION**	ANT. DRY DAYS**	ANT. RAIN**
		(g/ac)	(ml/ac)	(#/ac)	(in)	(in/hr)	(in)	(cfs)	(hours)	(days)	(in)
1998e01	11/08/1998	1338	12542	1207	1.04	1.2	0.84	0.193	4:57	-	-
1998e02	11/28/1998	495	6847	747	0.29	1.8	0.2	0.31	3:25	20	0
1998e03	12/01/1998	13	110	28	0.19	0.15	0.09	0.024	4:54	3	0
1998e05	01/25/1999	144	2165	311	0.51	0.2	0.43	0.068	7:14	5	1.2
1998e06	02/09/1999	566	2283	603	0.37	2.4	0.24	0.362	5:15	5	0.7
1998e09	03/15/1999	715	4120	955	0.61	2.4	0.45	0.327	3:50	34	0
1998e10	03/20/1999	5	64	45	0.18	0.2	0.09	0.017	4:05	5	0
1998e11	03/25/1999	152	1844	370	0.57	1.2	0.36	0.169	7:11	5	0.1
1998e12	04/06/1999	259	2452	509	0.31	0.15	0.2	0.022	4:30	12	0
1998e13	04/11/1999	63	490	200	1.43	0.6	1.1	0.15	11:43	4	0.6
1999e03	12/31/1999	0	0	0	0.05	0.6	0.02	0.018	0:50	53	0.2
1999e05	01/25/2000	91	1020	194	0.54	0.6	0.37	0.03	18:40	78	0.01
1999e06	01/30/2000	39	446	47	0.2	0.15	0.11	0.021	5:58	5	0.13
1999e08	02/10/2000	2881	14248	2260	0.32	2.4	0.21	0.253	2:45	11	0
1999e09	02/12/2000	851	3426	861	0.51	1.2	0.4	0.278	2:21	2	0
1999e10	02/13/2000	0	0	0	0.31	0.09	0.26	0.016	16:23	1	0
1999e11	02/16/2000	139	896	230	0.52	1.2	0.4	0.146	16:10	2	0
1999e12	02/20/2000	5369	15010	3723	2.26	4.2	1.9	1.2	34:19	4	0
1999e13	02/23/2000	315	1005	212	1.14	2.4	0.89	0.316	10:18	2	0
1999e14	02/27/2000	12	173	31	0.16	0.2	0.09	0.029	01:39	4	0
1999e15	03/04/2000	290	1139	270	1.72	1.8	1.64	0.439	30:13	1	0
1999e15A	03/03/2000	172	1193	309	0.33	0.6	0.26	0.139	4:05	5	0
1999e16	03/08/2000	77	550	177	0.81	0.6	0.69	0.161	10:16	2	0
1998-99 Subtotal	**-**	**3751**	**32918**	**4974**	**5.5**	**-**	**4**	**-**	**-**	**-**	**-**
1999-00 Subtotal	**-**	**10238**	**39104**	**8314**	**8.87**	**-**	**7.24**	**-**	**-**	**-**	**-**
Total	**-**	**13990**	**72022**	**13288**	**14.37**	**-**	**11.24**	**-**	**-**	**-**	**-**

ADT for Freeway Section211300

*sum of three litter outfalls for the Treatment

**flow and rainfall measured at outfall 1-58

Table 6-7
EVENT LITTER DATA - NORMALIZED BY AREA

Site 6
Modified Inlet
Control

EVENT NUMBER	EVENT DATE	DRY WEIGHT*	VOLUME*	COUNT*	RAIN VOLUME**	MAX RAIN INTENSITY**	FLOW VOLUME**	MAX FLOW RATE**	EVENT DURATION**	ANT. DRY DAYS**	ANT. RAIN**
		(g/ac)	(ml/ac)	(#/ac)	(in)	(in/hr)	(in)	(cfs)	(hours)	(days)	(in)
1998e01	11/08/1998	417	8763	783	0.69	0.6	0.45	0.133	4:60	-	-
1998e02	11/28/1998	680	7476	822	0.33	0.6	0.14	0.133	2:13	20	0
1998e03	12/01/1998	6	78	11	0.09	0.06	0	-	1:57	3	0
1998e05	01/25/1999	197	2893	336	0.36	0.2	0.18	0.06	6:24	5	0.7
1998e06	02/09/1999	375	2788	536	0.45	0.6	0.29	0.104	8:07	4	1.4
1998e09	03/15/1999	608	5078	904	0.5	0.6	0.34	0.172	4:04	34	0
1998e10	03/20/1999	3	26	9	0.08	0.1	0.01	-	3:48	5	0
1998e11	03/25/1999	4	58	5	0.14	0.15	0.03	0.009	5:04	5	0
1998e12	04/06/1999	227	1570	406	0.79	0.6	0.74	0.144	8:30	5	0.6
1998e13	04/11/1999	404	662	144	0.96	0.3	0.78	0.068	13:42	4	0.3
1999e03	12/31/1999	383	2881	472	0.16	0.6	0.02	0.051	6:45	53	0.06
1999e05	01/24/2000	387	3037	644	0.78	0.2	0.33	0.066	21:57	25	0.01
1999e06	01/30/2000	127	1222	288	0.24	0.3	0.07	0.051	5:19	5	0.12
1999e08	02/10/2000	1578	6837	1090	0.52	1.8	0.25	0.278	9:59	11	0
1999e09	02/12/2000	254	1686	359	0.4	0.6	0.22	0.115	1:56	2	0
1999e10	02/13/2000	30	148	53	0.32	0.3	0.08	0.031	16:39	1	0
1999e11	02/16/2000	323	1730	301	0.72	0.6	0.43	0.076	16:49	2	0
1999e12	02/20/2000	1403	6700	784	2.61	3	1.5	0.788	34:53	4	0
1999e13	02/23/2000	296	1685	376	1.23	1.8	0.87	0.333	09:22	2	0
1999e14	02/27/2000	76	756	101	0.19	0.15	0.11	0.047	02:25	4	0
1999e15	03/04/2000	75	615	167	1.56	0.6	0.78	0.089	33:11	1	0
1999e15A	03/03/2000	280	2189	458	0.54	1.2	0.3	0.146	2:46	5	0.01
1999e16	03/08/2000	302	2630	427	1.22	1.2	0.85	0.294	08:52	3	0.08
1998-99 Subtotal	**-**	**2922**	**29391**	**3957**	**4.39**	**-**	**2.96**	**-**	**-**	**-**	**-**
1999-00 Subtotal	**-**	**5515**	**32116**	**5519**	**10.49**	**-**	**5.81**	**-**	**-**	**-**	**-**
Total	**-**	**8437**	**61506**	**9476**	**14.88**	**-**	**8.77**	**-**	**-**	**-**	**-**

ADT for Freeway Section216600

*sum of three litter outfalls for the Control

**flow and rainfall measured at outfall 6-20E

Table 6-7
EVENT LITTER DATA - NORMALIZED BY AREA

Site 6
Modified Inlet
Treatment

EVENT NUMBER	EVENT DATE	DRY WEIGHT*	VOLUME*	COUNT*	RAIN VOLUME**	MAX RAIN INTENSITY**	FLOW VOLUME**	MAX FLOW RATE**	EVENT DURATION**	ANT. DRY DAYS**	ANT. RAIN**
		(g/ac)	(ml/ac)	(#/ac)	(in)	(in/hr)	(in)	(cfs)	(hours)	(days)	(in)
1998e01	11/08/1998	574	8389	676	0.67	0.6	0.39	0.109	4:10	-	-
1998e02	11/28/1998	787	10554	965	0.32	0.6	0.12	0.115	2:11	20	0
1998e03	12/01/1998	0	0	0	0.08	0.06	0	-	2:19	3	0
1998e05	01/25/1999	276	3770	466	0.36	0.2	0.16	0.045	6:32	5	0.7
1998e06	02/09/1999	140	1053	214	0.42	0.6	0.22	0.174	7:02	4	1.4
1998e09	03/15/1999	447	3269	632	0.48	0.6	0.26	0.332	4:06	34	0
1998e10	03/20/1999	9	61	22	0.06	0.1	0	-	3:49	5	0
1998e11	03/25/1999	0	0	0	0.14	0.08	0.02	0.007	5:17	5	0
1998e12	04/06/1999	143	661	172	0.76	0.6	0.33	0.155	8:33	5	0.6
1998e13	04/11/1999	78	296	127	0.94	0.3	0.58	0.073	13:14	4	0.3
1999e03	12/31/1999	259	2135	472	0.17	1.2	0.03	0.081	6:51	53	0.05
1999e05	01/24/2000	336	2845	520	0.79	0.2	0.38	0.066	21:31	25	0.01
1999e06	01/30/2000	159	1182	347	0.24	0.3	0.08	0.057	5:14	5	0.11
1999e08	02/10/2000	730	3311	525	0.51	2.4	0.26	0.299	9:53	11	0
1999e09	02/12/2000	197	1075	201	0.4	0.6	0.24	0.128	2:25	2	0
1999e10	02/13/2000	6	41	30	0.34	0.3	0.06	0.023	17:14	1	0
1999e11	02/16/2000	413	2068	287	0.74	0.6	0.44	0.083	16:18	2	0
1999e12	02/20/2000	1007	4615	573	2.57	3	1.65	1.042	34:47	4	0
1999e13	02/23/2000	233	824	200	1.21	1.8	1.03	0.392	10:01	2	0
1999e14	02/27/2000	38	584	89	0.19	0.2	0.11	0.049	02:00	4	0
1999e15	03/04/2000	45	291	80	1.55	0.6	0.88	0.103	33:07	1	0
1999e15A	03/03/2000	265	1601	353	0.53	1.8	0.33	0.174	2:46	5	0
1999e16	03/08/2000	195	1402	353	1.23	1.2	0.92	0.338	10:21	3	0.08
1998-99 Subtotal	**-**	**2454**	**28054**	**3275**	**4.23**	**-**	**2.08**	**-**	**-**	**-**	**-**
1999-00 Subtotal	**-**	**3882**	**21974**	**4030**	**10.47**	**-**	**6.41**	**-**	**-**	**-**	**-**
Total	**-**	**6336**	**50027**	**7305**	**14.7**	**-**	**8.49**	**-**	**-**	**-**	**-**

ADT for Freeway Section216600

*sum of three litter outfalls for the Treatment

**flow and rainfall measured at outfall 6-20F

Table 6-7
EVENT LITTER DATA - NORMALIZED BY AREA

Site 8
Bicycle Grate/LID
Control

EVENT NUMBER	EVENT DATE	DRY WEIGHT*	VOLUME*	COUNT*	RAIN VOLUME**	MAX RAIN INTENSITY**	FLOW VOLUME**	MAX FLOW RATE**	EVENT DURATION**	ANT. DRY DAYS**	ANT. RAIN**
		(g/ac)	(ml/ac)	(#/ac)	(in)	(in/hr)	(in)	(cfs)	(hours)	(days)	(in)
1998e01	11/08/1998	466	4540	485	0.45	0.12	0.15	0.077	4:22	-	-
1998e02	11/28/1998	461	3016	266	0.85	4.2	0.53	0.137	11:03	20	0
1998e03	12/01/1998	113	545	57	0.25	0.15	0.09	0.036	3:46	3	0
1998e05	01/25/1999	234	2287	202	0.41	0.6	0.18	0.048	5:43	5	0.5
1998e06	02/09/1999	54	534	148	0.29	0.6	0.1	-	7:04	4	1.3
1998e09	03/15/1999	321	1594	332	0.46	1.2	0.23	0.225	3:51	34	0
1998e10	03/20/1999	57	394	97	0.21	0.3	0.07	0.036	4:32	5	0
1998e11	03/25/1999	53	212	98	0.2	0.15	0.07	0.038	3:50	5	0
1998e12	04/06/1999	328	992	240	0.98	1.8	0.63	-	23:58	5	0.1
1998e13	04/11/1999	39	288	92	1.09	0.3	0.66	0.082	12:39	4	0
1999e03	12/31/1999	687	4003	697	0.24	0.6	0.05	0.086	4:19	53	0.03
1999e05	01/25/2000	487	3011	447	0.55	0.6	0.19	0.105	18:23	25	0.01
1999e06	01/30/2000	13	143	30	0.15	0.05	0.01	0.012	5:13	5	0.11
1999e08	02/10/2000	173	1409	240	0.27	1.2	0.1	0.177	3:48	11	0
1999e09	02/12/2000	311	1022	173	0.65	1.2	0.39	0.339	5:20	2	0
1999e10	02/13/2000	0	0	0	0.33	0.12	0.04	0.016	17:39	1	0
1999e11	02/16/2000	142	615	158	0.74	1.2	0.5	0.268	15:57	2	0
1999e12	02/20/2000	286	1560	291	2.35	2.4	1.8	0.628	31:47	4	0
1999e13	02/23/2000	353	1063	188	1.49	3	1.05	0.918	09:48	2	0
1999e14	02/27/2000	44	420	45	0.19	0.3	0.15	0.092	02:07	4	0
1999e15	03/04/2000	23	184	52	1.59	1.2	0.95	0.197	24:16	1	0
1999e15A	03/03/2000	125	481	153	0.45	1.8	0.25	0.233	2:31	5	0
1999e16	03/07/2000	77	357	107	0.86	1.2	0.54	0.014	11:09	3	0.01
1998-99 Subtotal	**-**	**2128**	**14402**	**2017**	**5.19**	**-**	**2.71**	**-**	**-**	**-**	**-**
1999-00 Subtotal	**-**	**2720**	**14269**	**2580**	**9.86**	**-**	**6.02**	**-**	**-**	**-**	**-**
Total	**-**	**4848**	**28671**	**4597**	**15.05**	**-**	**8.73**	**-**	**-**	**-**	**-**

ADT for Freeway Section227100

*sum of three litter outfalls for the Control

**flow and rainfall measured at outfall 8-23C

Table 6-7
EVENT LITTER DATA - NORMALIZED BY AREA

Site 8
Bicycle Grate/LID
Treatment

EVENT NUMBER	EVENT DATE	DRY WEIGHT*	VOLUME*	COUNT*	RAIN VOLUME**	MAX RAIN INTENSITY**	FLOW VOLUME**	MAX FLOW RATE**	EVENT DURATION**	ANT. DRY DAYS**	ANT. RAIN**
		(g/ac)	(ml/ac)	(#/ac)	(in)	(in/hr)	(in)	(cfs)	(hours)	(days)	(in)
1998e01	11/08/1998	462	4561	870	0.45	0.6	0.18	0.058	4:43	-	-
1998e02	11/28/1998	503	3436	375	0.85	3	0.76	0.988	11:06	20	0
1998e03	12/01/1998	109	516	68	0.26	0.15	0.08	0.048	4:05	3	0
1998e05	01/25/1999	137	1330	189	0.37	0.3	0.17	0.035	5:31	5	0.5
1998e06	02/09/1999	67	322	146	0.29	0.6	0.15	0.08	7:04	4	1.3
1998e09	03/15/1999	440	2524	570	0.46	0.6	0.22	0.157	3:50	34	0
1998e10	03/20/1999	49	319	107	0.19	0.2	0.05	0.012	4:53	5	0
1998e11	03/25/1999	51	296	64	0.2	0.12	0.06	0.012	5:33	5	0
1998e12	04/06/1999	238	883	183	0.98	1.8	0.59	0.212	23:58	5	0.1
1998e13	04/11/1999	48	258	110	1.09	0.6	0.61	0.056	12:34	4	0
1999e03	12/31/1999	191	990	268	0.29	0.6	0.13	-	4:23	53	0.03
1999e05	01/25/2000	199	1020	315	0.55	0.6	0.12	0.033	18:20	25	0
1999e06	01/30/2000	1	17	7	0.15	0.2	0.01	0.003	5:28	5	0.03
1999e08	02/10/2000	156	788	240	0.19	0.6	0.1	0.057	4:03	11	0
1999e09	02/12/2000	358	1732	235	0.62	1.2	0.31	0.097	5:08	2	0
1999e10	02/13/2000	0	0	0	0.33	0.15	0.08	0.01	17:39	1	0
1999e11	02/16/2000	185	689	146	0.78	1.2	0.49	0.086	15:56	2	0
1999e12	02/20/2000	1550	5662	357	2.35	1.2	1.7	0.135	32:22	4	0
1999e13	02/23/2000	736	2311	214	1.49	2.4	1.02	0.049	10:00	2	0
1999e14	02/27/2000	0	0	0	0.19	0.3	0.13	0.021	02:06	4	0
1999e15	03/04/2000	96	434	85	1.59	1.2	1.04	0.047	26:51	1	0
1999e15A	03/03/2000	118	689	207	0.5	1.2	0.21	0.043	2:32	5	0
1999e16	03/07/2000	115	603	135	0.86	1.2	0.41	0.039	11:22	3	0.01
1998-99 Subtotal	**-**	**2103**	**14447**	**2681**	**5.14**	**-**	**2.87**	**-**	**-**	**-**	**-**
1999-00 Subtotal	**-**	**3705**	**14934**	**2208**	**9.89**	**-**	**5.75**	**-**	**-**	**-**	**-**
Total	**-**	**5808**	**29381**	**4889**	**15.03**	**-**	**8.62**	**-**	**-**	**-**	**-**

ADT for Freeway Section 227100

*sum of three litter outfalls for the Treatment

**flow and rainfall measured at outfall 8-B001

Table 6–8
COMPARISON OF SITE AADT TO CONTROL OUTFALL LITTER LOADS[1]

Site	Rte	Postmile	Litter Loads			Average Annual Gross Pollutants[2] (kg/ac)	AADT	Rank	% Non-Truck	%Truck	% 2 and 3 Axle Trucks	% 4 and 5 Axle Trucks	Surrounding Land Use
			Average Annual Air-Dried Weight (kg/ac)	Average Annual Volume (l/ac)	Rank								
Site 1E/1W (PM 12.30-12.87)													
1W	105	13.47	5.3	43	2	90	216000	3	90%	10%	6%	4%	Residential
1E	105	13.47	7.5	58	1	115	216000	3	90%	10%	6%	4%	Residential
Site 6 (PM 15.12-15.58)													
6	60	15.93	5.3	39	3	185	236000	2	89%	11%	5%	6%	Residential
Site 8 (PM 5.60-5.95)													
8	60	5.89	3.1	18	4	58	238000	1	90%	10%	5%	4%	Commercial

[1] Loads represent total outfall litter monitored for trigger storms and litter collected from non-trigger events.

[2] Average annual gross pollutant load represents the average annual total wet weight of litter and vegetation collected from trigger and non-trigger events.

7.1 BMP EFFECTIVENESS

This section evaluates the performance of the five BMPs used in the LMPS based on litter monitoring results. Performances are evaluated by calculating the reduction in litter reaching the drainage system outfalls where BMPs are implemented/enhanced (treatment outfalls), as compared to litter collected in the control outfalls.

This section also presents the annual data from the monitoring, explains the performance analysis methodology, and then presents results for area-normalized and flow-normalized data. To allow relative comparisons between the outfalls and sites, litter data from each outfall were normalized by unit area of the outfall catchment (i.e. presented in weight, volume, or items of litter per acre). In addition, the data were normalized by flow (i.e., presented in weight, volume, or items of litter per liter of storm water). Both area-normalized and flow-normalized data were used to assess BMP effectiveness. There are three times as many data points for the area-normalized data as only one treatment control pair was monitored for flow at each BMP site. The area-normalized and flow-normalized analyses are discussed separately in this section.

Discussion and implications of the results are presented in Section 8.

7.1.1 Collected Field Data Summary

Tables 7-1 and 7-2 present the seasonal total litter without normalization at each of the outfalls for litter air-dried weight, volume, and the number of items. The totals are a combination of litter collected during storm events and litter collection bags that were cleared either for false starts or non-monitored events (when there was not enough rainfall for a defined event). In addition, the outfall catchment areas, rainfall, and outfall flow volumes are presented. See Table 4-4 for an explanation of the rainfall and flow totals. The monitored litter for each outfall presented in Tables 7-1 and 7-2 are derived from different catchment areas and different flow volumes (as shown in the tables).

7.1.2 Cumulative Monitoring Results

Plots were prepared for the four study sites to illustrate the litter measured during the monitoring period in both the treatment and control outfalls. The plots show the cumulative quantity of litter monitored during individual events at each of the outfalls, normalized by area. These are presented for each parameter that was investigated (i.e. litter air-dried weight, litter volume, and litter count).

Figure 7-1 is an example of the cumulative plots; the remainder of the plots are presented in Appendix J. The plots illustrate the litter collected at the monitored outfalls, as well as litter collected from the inlet catch basin during, and at the conclusion of, the monitoring period. Close examination of the plots allows a visual QA step that quickly identifies where appreciable differences in litter discharges are monitored, either between outfalls or events.

Table 7-1
1998/1999 STORM SEASON
YEAR 1 LITTER MONITORING RESULTS(2)

Site	Outfall Pair	Outfall Type	Outfall	Catchment Area (ac)	Rainfall[1] (inches)	Flow Volumes[1] (cf)	Litter Air Dried Weight (kg)	Litter Volume (liters)	Litter Item Count
1E	P1	Control	1-B110	0.46			2.8	23.2	3492
		Treatment	1-47	0.43			2.1	17.3	2626
Litter	P2	Control	1-42	0.32	7.56	6485	2.0	20.5	2690
Pick-Up		Treatment	1-46	0.38	8.21	7370	1.0	9.5	1180
	P3	Control	1-B111	0.40			1.9	24.2	2946
		Treatment	1-44	0.44			1.9	16.2	2574
1W	P1	Control	1-52	0.43	7.75	8465	1.3	12.5	2105
		Treatment	1-58	0.37	8.38	11255	2.2	14.8	2080
Street	P2	Control	1-50	0.40			1.7	18.4	2645
Sweeping		Treatment	1-59	0.32			1.6	13.9	2172
	P3	Control	1-51	0.41			1.7	23.5	2884
		Treatment	1-60	0.32			1.2	13.5	2271
6	P1	Control	6-20G	0.51			2.6	22.1	4007
		Treatment	6-20H	0.64			3.3	30.9	4009
Modified	P2	Control	6-20E	0.42	7.43	6948	1.8	16.8	2695
Inlet		Treatment	6-20F	0.42	7.27	7732	2.2	18.7	2273
Grate	P3	Control	6-20C	0.42			2.5	23.1	2849
		Treatment	6-20B	0.42			1.5	15.3	2226
8	P1	Control	8-23C	0.62	6.98	12113	2.0	10.6	1398
		Treatment	8-B001	0.32	7.00	5695	0.8	5.3	1062
Bicycle	P2	Control	8-24D	0.62			2.3	13.9	2326
Grate		Treatment	8-24B	0.42			1.8	13.0	2197
	P3	Control	8-24E	0.58			2.0	14.5	1921
		Treatment	8-24F	0.91			2.7	18.5	3288

(1) See Table 4-4 for explanations of the flow and rainfall totals.

(2) Total outfall litter monitored for trigger storms and litter collected from non-trigger events.

Table 7-2
1999/2000 STORM SEASON
YEAR 2 LITTER MONITORING RESULTS(2)

Site	Outfall Pair	Outfall Type	Outfall	Catchment Area (ac)	Rainfall[1] (inches)	Flow Volumes[1] (cf)	Litter Air Dried Weight (kg)	Litter Volume (liters)	Litter Item Count
1E	P1	Control	1-B110	0.46			3.3	20.0	3351
		Treatment	1-47	0.43			3.0	14.5	2967
Litter	P2	Control	1-42	0.32	9.76	7877	2.7	18.7	2663
Pick-Up		Treatment	1-46	0.38	10.08	8953	1.0	5.1	977
	P3	Control	1-B111	0.40			4.9	30.5	3565
		Treatment	1-44	0.44			4.2	22.6	3021
1W	P1	Control	1-52	0.43	9.29	10282	2.1	12.9	2154
		Treatment	1-58	0.37	9.62	12921	3.3	14.2	2487
Street	P2	Control	1-50	0.40			3.4	16.4	3156
Sweeping		Treatment	1-59	0.32			3.8	11.5	2718
	P3	Control	1-51	0.41			2.9	23.1	3277
		Treatment	1-60	0.32			3.7	15.6	3501
6	P1	Control	6-20G	0.51			3.2	17.6	3314
		Treatment	6-20H	0.64			2.8	16.1	3184
Modified	P2	Control	6-20E	0.42	11.06	10417	2.0	11.6	1850
Inlet		Treatment	6-20F	0.42	10.98	11593	1.5	7.8	1414
Grate	P3	Control	6-20C	0.42			2.2	14.1	2287
		Treatment	6-20B	0.42			1.5	9.1	1443
8	P1	Control	8-23C	0.62	10.22	17841	1.7	8.9	1445
		Treatment	8-B001	0.18	10.37	4722	0.7	3.9	422
LID	P2	Control	8-24D	0.62			0.8	3.5	764
		Treatment	8-24B	0.42			1.5	6.5	1152
	P3	Control	8-24E	0.58			2.4	13.6	2512
		Treatment	8-24F	0.91			3.5	13.8	1858

(1) See Table 4-4 for explanations of the flow and rainfall totals.

(2) Total outfall litter monitored for trigger storms and litter collected from non-trigger events.

Figure 7-1
EXAMPLE PLOT OF CUMULATIVE AIR-DRIED WEIGHT OF LITTER PER ACRE SITE 1E-LITTER PICK-UP

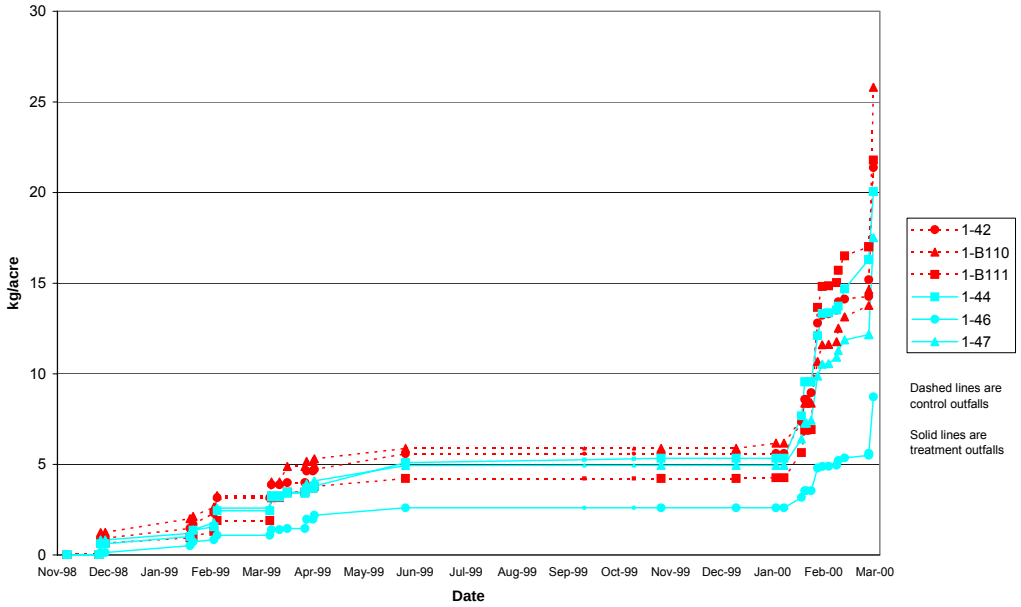

The plots also allow an initial visual qualitative investigation of the performance of the treatment outfalls compared to the control outfalls (dashed lines are control outfalls and solid lines are treatment outfalls). Section 7.1.3 outlines the statistical approach for estimating BMP performance.

One observation from the cumulative plots, presented in Appendix J, is the very different storm pattern between year 1 and year 2 of the study. In year 1, the cumulative litter collected gradually increased throughout the rainy season (November – April). In year 2, a large majority of the litter was collected during an 8-week period (late February – early March), corresponding to the storm pattern for the season. There does not appear to be a disproportionate amount of litter associated with the first rainstorm of either season. Relationships between litter discharge and hydrologic factors are discussed in Section 7.2.1.

7.1.3 Methods of Data Analysis

The BMP effectiveness at each site was evaluated by identifying whether the average event litter discharge was significantly reduced at treatment outfalls relative to control outfalls. A flow chart depicting the methodology for selecting the preferred statistical method is presented on Figure 7-2. The preferred method of statistical analysis for the LMPS is a paired analysis in which each treatment outfall is paired with one or more comparable control outfalls, in contrast to a marginal analysis. The differences in the event litter discharge between paired control and treatment outfalls were analyzed statistically to determine whether the average difference was greater than zero. In addition to analyzing litter discharged at the outfalls in monitored storm events, the total system litter during the study period were also analyzed. The total system litter was calculated as the sum of the cumulative litter discharged at an outfall and the litter retained in the corresponding inlet structure during the study period. Details of the statistical methods are provided in Appendix K.

Figure 7-2
FLOWCHART OF SELECTING THE PREFERRED STATISTICAL METHOD

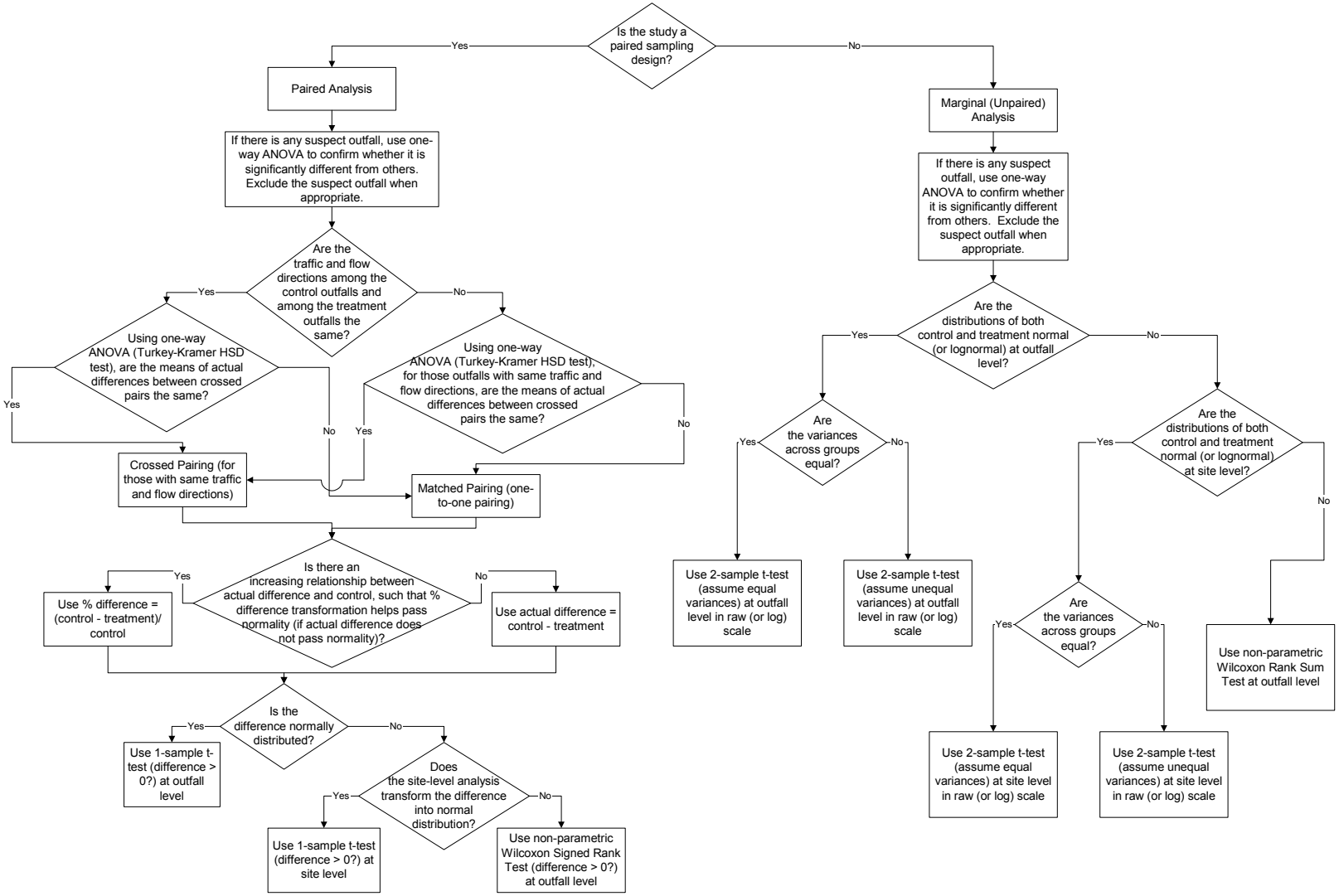

The main steps of the data analysis were as follows:

1. Normalize data for each outfall by area and flow volume in the catchments. Perform exploratory data analysis (EDA) and check for data anomolies (See Appendix K, Attachment 1).
2. Check whether data differences among the control outfalls and among the treatment outfalls at each site are statistically significant. The appropriate method of statistical analysis is the one-way Analysis of Variance (ANOVA). During the project siting phase treatment and control outfalls that were as similar as possible were selected to maximize the likelihood that they would behave similarly and any differences among them would be purely random. However, unlike a controlled laboratory setting, a field study on an active freeway is a dynamic environment and unanticipated field conditions might affect a particular outfall, making it behave differently from others. If such conditions are known or suspected to have occurred at a site, the statistical analysis may be used to confirm whether an outfall has been significantly affected by these conditions.
3. Evaluate the statistical significance of the observed differences in the litter between comparable pairs of control and treatment outfalls. The appropriate method of statistical analysis is the paired test (a paired t-test if data are normally distributed and a signed rank test if not). Two approaches to pairing the outfalls were investigated – matched pairing and crossed pairing. In the first approach, each treatment outfall was matched with a specific control outfall based on similar field conditions. In the second approach, where treatment and control field conditions are similar for more than one pair, each similar treatment outfall was matched with each of the similar control outfalls. If the ANOVA of all pairs of control and treatment outfalls with the same traffic and water flow directions did not show systematic differences, each treatment outfall could be paired with each of the control outfalls in the same traffic and water flow directions (i.e., the three control outfalls were not different from each other, and separately, the three treatment outfalls were not different from each other). Cross-pairing increases the number of pairs and the resulting data used in analysis, and would be preferred when it is valid.
4. Perform the paired test both at the site level and outfall level, using both actual and percentage differences.

   At the outfall level, each data point at each outfall is considered to be an independent, random sample. At the site level, all control outfalls are grouped together and all treatment outfalls are grouped together. The total litter over all outfalls in each group is considered to be an independent, random sample. The site-level analysis filters some of the “noise” in the data associated with non-normally distributed outfall-level data and may result in normally distributed site-level data sets. If the site-level analysis consistently transforms data into normally distributed data sets, this analysis would be preferred to the outfall-level analysis.
5. If the actual differences show a large amount of variability and do not pass the normality test, transform the data by calculating the percentage difference (i.e., difference between control and treatment divided by the control amount, expressed as a percentage). If the differences show an increasing relationship with the control amount, the percentage difference transformation would be appropriate to consider. This is because, under these circumstances, the transformation may reduce the coefficient of variation of the data and is more likely to

produce normally distributed data. If the actual differences are not normally distributed, but the percentage differences are, use the percentage differences.

6. Evaluate the results of the different methods to determine the statistical significance of the observed differences, taking into account the validity of each method for the given data. If the p-value is less than 0.05, it can be concluded that the results are significant.

7.1.4 Statistical Results – Normalized By Area

Detailed results of the evaluation of BMP effectiveness, normalized by area, are presented in Appendix K. Recommendations regarding the results are presented in Section 8.1. Results (p-values) are summarized in Table 7-3 and discussed below.

Conclusions of the statistical tests are as follows:

1. Increasing the frequency of litter pick-up (Site 1E) from monthly to weekly appears to be effective at a five percent significance level for all parameters (count, volume, and weight). This conclusion is quite robust because it remains unchanged under most of the other methods of paired analysis (see Appendix K). The ANOVA results did not show any significant differences among the three treatment outfalls.
2. Increasing the frequency of street sweeping (Site 1W) from monthly to weekly does not appear to be effective at a five percent significance level for count or weight, but appears to be effective for volume. This conclusion is very robust for count and weight because it remains unchanged under all methods of paired analysis (see Appendix K). The conclusion regarding volume is not robust because it changes if other methods of paired analysis are used. Additionally, the average volume reduction is only about 9% and does not appear to be practically significant.
3. Modified inlet (Site 6) appears to be effective at a five percent significance level for all parameters (count, volume, and weight) This conclusion is fairly robust because it remains unchanged under most methods of paired analysis.
4. Bicycle grate (Site 8) does not appear to be effective at a five percent significance level for any of the measures. This conclusion is very robust because it remains unchanged under all methods of paired analysis.
5. LID (Site 8) appears to be effective at a five percent significance level for reducing count, but not volume or weight. This conclusion is fairly robust because it remains unchanged under most methods of paired analysis.
6. The marginal analysis consistently fails to conclude that the observed differences are significant for any BMP and any measure. For a paired sampling design (which was used in the LMPS), this generally will be the case. This is because a paired analysis typically reduces the data variability caused by factors other than the application of a BMP. In a paired sampling design, other factors can be assumed to affect both control and treatment outfalls in a similar way. The marginal analysis fails to reduce the variability caused by other factors and generally results in a higher variance. The higher variance means that the power of detecting a specified difference would be less.

Table7-3
RESULTS OF EVALUATION OF BMP EFFECTIVENESS (DATA NORMALIZED BY CATCHMENT AREA) (1)

Site	BMP	Measure	Paired Analysis					
			Matched Pairs		Crossed Pairs		Site Level	
			Actual Diff.	% Diff.	Actual Diff.	% Diff.	Actual Diff.	% Diff.
1E	Litter Pickup	Count	***0.000***	***0.001***	***0.000****	***0.000***	***0.003***	***0.040***
		Volume	***0.000***	***0.000***	***0.000****	***0.000***	***0.000***	***0.000***
		Weight	***0.012***	***0.016***	***0.000****	***0.002***	***0.046***	0.059
1W	Street Sweeping	Count	0.351	0.367	0.426*	0.530	0.463	0.370
		Volume	0.109	0.254	***0.032****	0.151	0.256	0.277
		Weight	0.643	0.817	0.656*	0.890	0.774	0.721
6	Modified Inlet	Count	***0.001***	***0.023***	***0.000****	***0.002***	***0.028***	***0.030***
		Volume	***0.022***	***0.047***	***0.000****	***0.002***	***0.045***	***0.013***
		Weight	***0.017***	0.161	***0.000****	***0.020***	0.064	0.051
8	Bicycle Grate	Count	0.918	0.890	0.991*	0.985	0.912	0.905
		Volume	0.273	0.315	0.546	0.351	0.626*	0.335
		Weight	0.297	0.173	0.321	0.429	0.133*	0.635
8	LID	Count	0.512	0.846	0.566	0.924	0.682	0.607
		Volume	0.746	0.943	0.816	0.965	0.604	0.830
		Weight	0.815	0.966	0.901	0.991	0.773	0.793
1E (w/o outfall 1-46)	Litter Pickup	Count	0.179	0.319	***0.013***	0.056	0.125	0.329
		Volume	***0.018***	***0.027***	***0.000***	***0.001***	***0.011***	***0.009***
		Weight	0.578	0.546	0.481	0.685	0.526	0.555
8 (w/o outfall 8-24D)	LID	Count	***0.041***	0.119	***0.008****	***0.046***	***0.040***	0.137
		Volume	0.343	0.511	0.241	0.397	0.338*	0.607
		Weight	0.314	0.489	0.279*	0.379	0.446	0.527

* Preferred Method (See Appendix K Table 3)

(1) Large bold font indicates that the average litter amount in the control is greater than the treatment based on statistical testing (α=0.05).

(2) Preferred method is without Control 8-24D below.

(3) Preferred method is 1E above.

Detailed results of BMP effectiveness normalized by area are presented in Appendix K. The following discussion describes the results for an example litter measurement parameter. The example illustrates the percentage difference by count using outfall-level data. Positive values of percentage difference mean that the average litter discharged at treatment outfalls is lower than at control outfalls, thus suggesting that the BMP may be effective in reducing litter.

The box plot (Figure 7-3) illustrates the range of litter reduction efficiencies that could be expected for the different BMPs. The plot shows that litter pickup (Site 1E) demonstrates a reduction in the litter measured in count (items/acre) for 75% or more of the events, with the 25th-percentile above 0% difference. Modified inlet (Site 6) may appear to reduce litter measured in count, with the 25th-percentile just below 0% difference.

Figure 7-3
DISTRIBUTION OF EVENT PERCENTAGE DIFFERENCE BY BMPS FOR COUNT (DATA NORMALIZED BY CATCHMENT AREA)

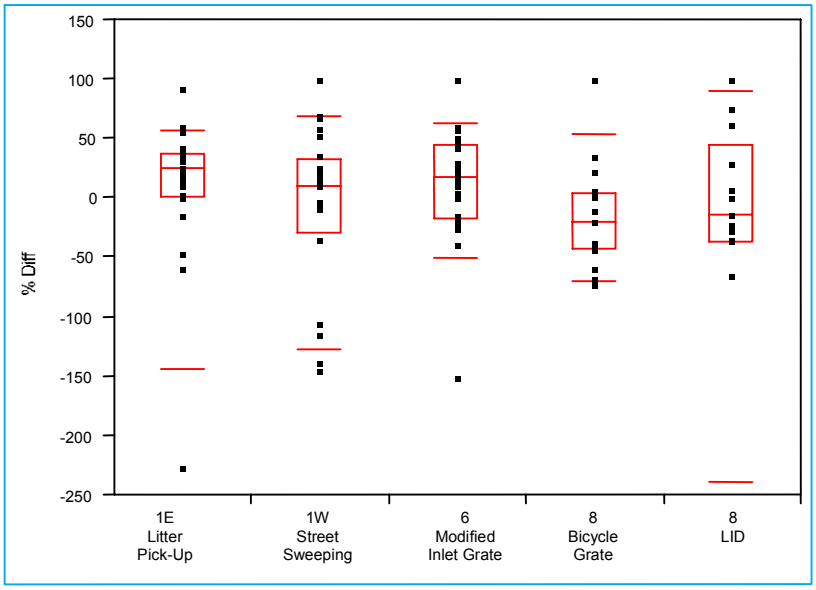

7.1.5 Statistical Results – Normalized By Flow

Detailed results of the evaluation of BMP effectiveness normalized by flow are also presented in Appendix K. Results (p-values) are summarized in Table 7-4 and discussed below. Recommendations regarding these results are presented in Section 8.1.

One of the three pairs of control/treatment outfalls at each site has flow volume data, and only monitored storm events have flow volume data, therefore, the number of data points are substantially smaller than the normalized by catchment area analysis. Thus, the results and conclusions are less powerful for data normalized by flow volume. The statistical test results confirm that litter pick-up (Site 1E) and modified inlet (Site 6) appear to be effective in litter reduction in all three measures (as seen in normalized by catchment area analysis). Also, bicycle

Table 7-4
RESULTS OF EVALUATION OF BMP EFFECTIVENESS
(DATA NORMALIZED BY FLOW VOLUME) (1)

Site	BMP	Measure	Paired Analysis Matched Pairs Actual Diff.	% Diff.
1E	Litter Pickup	Count	***0.000***	***0.000****
		Volume	***0.000****	***0.001***
		Weight	***0.000****	***0.002***
1W	Street Sweeping	Count	***0.045****	***0.000***
		Volume	***0.027****	***0.001***
		Weight	***0.082****	***0.024***
6	Modified Inlet	Count	***0.030****	0.060
		Volume	***0.016****	***0.030***
		Weight	***0.002****	***0.022***
8	Bicycle Grate	Count	0.402*	0.500
		Volume	0.104*	0.213
		Weight	0.090*	0.057
8	LID	Count	0.840	0.895*
		Volume	0.449*	0.748
		Weight	0.449*	0.593

* Preferred Method (See Appendix K Table 5)

(1) Large, bold font indicates that the average litter amount in the control is greater than the treatment based on statistical testing (α=0.05).

grate (Site 8 in 1998/1999) and LID (Site 8 in 1999/2000) do not show significant litter reduction. For the actual difference analysis, street sweeping (Site 1W) appears to be effective for count and volume, but not for weight.

The results of flow-normalized analysis are consistent with those of area-normalized analysis for all parameters except for two for the preferred statistical method. The exceptions are count at Site 1W and count at Site 8 (LID). For count at Site 1W, the reduction is significant for the flow-normalized analysis, but not for the area-normalized analysis. For count at Site 8 (LID), the reduction is not significant for the flow-normalized analysis, but is significant for the area-normalized analysis. As noted above, the number of data points is substantially larger for the area-normalized analysis and hence the results of that analysis are considered more reliable.

7.1.6 Results of Total System Litter Analysis

Litter data were collected for two components of the storm drain system – the litter retained in the inlet during a given study period and the litter discharged to an outfall in each monitored storm event during the study period. Each inlet was cleaned at the start and end of the study

period. These data provided an estimate of the litter retained in the system during the study period. The total system annual litter for each outfall was calculated as the sum of two components: (1) the litter retained in the system in the study period (measured using the inlet cleanout data); and (2) the cumulative litter collected at an outfall in monitoring events during the study period. The differences in the total system litter were analyzed statistically using the methods described in Section 7.1.3. The details of the analysis are presented in Appendix K.

The main conclusions of the analysis of the total system litter were identical to those of the analysis of the outfall-discharged litter with the only exception of count at Site 8 (LID). Thus, litter pickup (Site 1E) and modified inlet (Site 6) appear to be effective in reducing both the total system litter and the litter discharged to an outfall in storm events. Street sweeping (Site 1W) appears to reduce both total system litter volume and outfall-discharged litter volume, but not for litter count and weight. Bicycle grate (Site 8, 1998/1999) and LID (Site 8, 1999/2000) do not appear to be effective in reducing either the total system litter or the litter discharged to an outfall in a storm event. At Site 8 (LID), the count reduction is not significant at the level of the total system litter, but is significant at the level of outfall-discharged litter. The data at Site 8 (LID) show that the average litter count is lower for the treatment in the outfall-discharged litter, but higher in the litter retained in inlets. The net effect is that the count reduction is not significant for the total system. It should be noted that the LID construction was completed in October 1999. As a result, it was not in place during the late spring through early fall dry season.

7.1.7 Statistical Analysis of Water Quality Data

The chemical water quality data were evaluated to characterize the effectiveness of the litter BMPs in removing pollutants from storm water. The approach used for evaluating chemical water quality is similar to the approach used for litter data. A paired analysis was done to determine whether or not there was a significant difference between the station or event mean concentrations (EMCs) of the control and treatment outfall for each of the sites. By design, only one pair of treatment and control outfalls for each BMP was monitored for chemical water quality data. This allows a “matched pair” analysis for chemical water quality data for each BMP. If either the treatment or control outfall was non-detect one-half of the reported detection limit was assigned to the sample that was below the detection limit.

The steps involved in the data analysis are described as follows:

1. Calculate the difference between each pair of control and treatment outfalls for each BMP, for each storm event.
2. Test the distribution of difference for normality using Lilliefors Test at 5% significance level.
3. Hypothesis testing:

   Null hypothesis, H_0: $\mu_{difference} = 0$

   Alternative hypothesis, H_A: $\mu_{difference} \neq 0$

1) If the distribution of *difference* is normal, the one-sample two-sided t-Test at an overall 5% significance level is used to test the hypotheses. A minimum sample size of 7 is

recommended for this test to obtain meaningful results (USEPA, 1989). Because a large number (more than 25) of chemical parameters would be analyzed, the overall significance level was adjusted using the Bonferroni method to reduce the false positive error. In order to maintain an adequate power of detecting specified differences, USEPA has recommended that the significance level for an individual test be no less than 1% (USEPA, 1989). Based on this guideline, the hypothesis testing was performed using a significance level of 1% for all individual tests. The two-sided test is appropriate because the interest is in finding whether a BMP increases or decreases concentrations. If the two-sided p-value of the t-Test is less than 0.01, the null hypothesis is rejected and it is concluded that the average *difference* is different from 0, i.e., there is a statistically significant change in the chemical constituent concentration at the treatment outfalls.

2) If the distribution of *difference* is not normal, the two-sided Wilcoxon Signed-Rank Test (a non-parametric test) is used instead of the t-Test at an overall 5% significance level. A minimum sample size of 9 is recommended for this test (USEPA, 1989). Again, a significance level of 1% was used for individual tests based on USEPA guidelines. If the two-sided p-value of the Wilcoxon Signed-Rank Test is less than 0.01, the null hypothesis is rejected and it is concluded that the average *difference* is different from 0.

The Lilliefors test showed that normal distribution could be assumed for 55% of the data sets, but not for the remaining data sets. Because the transformation to percentage differences did not improve the normality of the non-normal data sets and because actual differences are less sensitive to small values at the control outfalls than percent differences, the actual paired difference was chosen for BMP effectiveness analyses.

The paired t-test or Wilcoxon Signed-Rank test was done on the difference between treatment and controls and this evaluation indicated that for the vast majority (93%) of the parameters, the mean or median difference was not significantly different from zero. However, there were 9 individual tests for which the mean or median difference between treatment and control EMCs was different from zero. The results that show statistical significance are presented in Table 7-5. At Site 8 (LID), none of the constituents showed a statistically significant difference. At Sites 1E, 6, and 8 (Bicycle), only one constituent showed a statistically significant difference. The difference at Site 8 (Bicycle) is only marginally significant, because the sample size is seven, which barely meets the minimum sample size criterion, and the p-value is only slightly below the threshold of 0.01. At Site 1W, 6 constituents showed a statistically significant difference. Five of these differences are negative, suggesting that the concentrations are higher on the treatment side.

Examination of box plots done on the difference data also showed that the confidence interval about the median of these distributions did not include zero, another indication that the concentrations are different. Figure 7-4 presents the box plots of the distributions for parameters that the statistical tests indicated were different between the BMP treatment and control sites.

The analyses performed on the water quality data failed to show that any of the BMPs consistently reduced or increased chemical constituent concentrations in storm water runoff for the parameters monitored. Site-1W (street sweeping) did have several pollutants for which the difference between treatment and control sites was statistically significant; all of which (except

for NO3-N:Total) were negative. This would indicate that increasing street sweeping from monthly to weekly could actually be increasing the average chemical constituent concentration in runoff at this site.

Table 7-5
SIGNIFICANT RESULTS ON MEAN OR MEDIAN DIFFERENCE BETWEEN TREATMENT AND CONTROL OUTFALLS

Site	Parameter	Number of Samples	P-Value (Two-sided)	Mean or Median Difference (Control – Treatment)	Standard Deviation of Mean Difference	Units
Litter Pickup						
Site-1E	Copper, Dissolved	16	0.008	2.85	3.76	ug/l
Street Sweeping						
Site-1W	Hardness	17	0.006	-15.41	23.95	mg/l
Site-1W	TPH (Diesel)	13	0.002	-7.49	9.98	mg/l
Site-1W	Copper, Total	18	0.004	-5.12	7.98	ug/l
Site-1W	Copper, Dissolved	18	0.010	-2.05	3.45	ug/l
Site-1W	Nickel, Dissolved	18	0.007	-1.61	2.21	ug/l
Site-1W	NO_3-N	17	0	0.58	0.45	mg/l
Perforated Plate						
Site-6	Hardness	17	0.005	14.59	27.43	mg/l
Bicycle Grate						
Site-8-98	Copper, Total	7	0.009	18.30	12.74	ug/l

Figure 7-4
BOX PLOTS OF CONSTITUENTS THAT SHOWED A STATISTICAL DIFFERENCE BETWEEN TREATMENT AND CONTROL OUTFALLS

Copper, Total

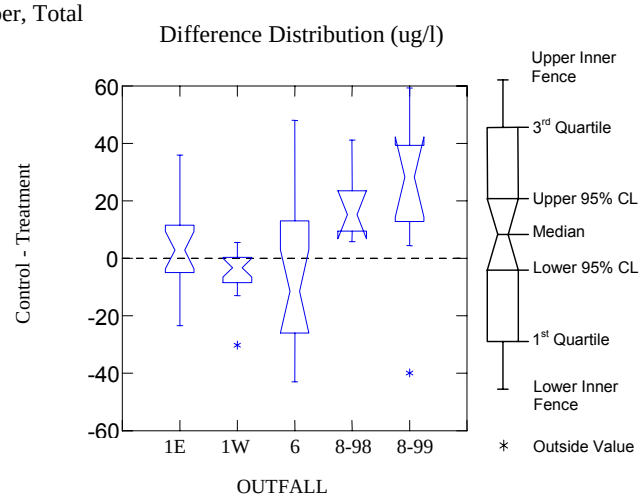

Copper, Dissolved

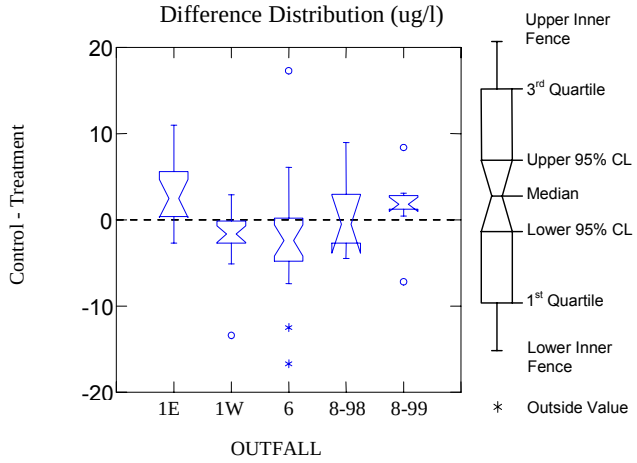

Nickel, Dissolved

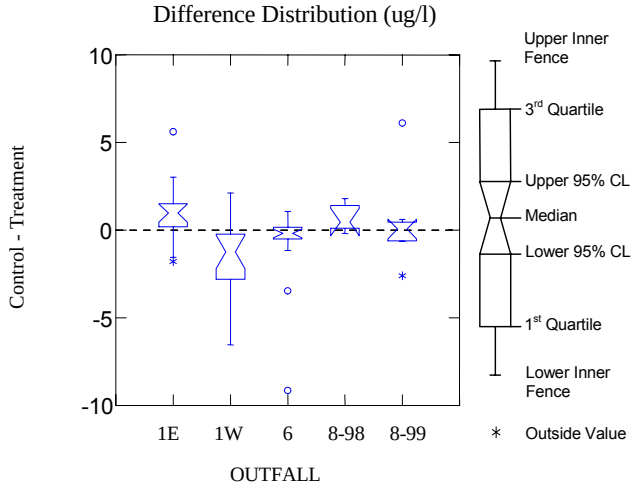

Figure 7-4 (continued)
BOX PLOTS OF CONSTITUENTS THAT SHOWED A STATISTICAL DIFFERENCE BETWEEN TREATMENT AND CONTROL OUTFALLS

NO3-N

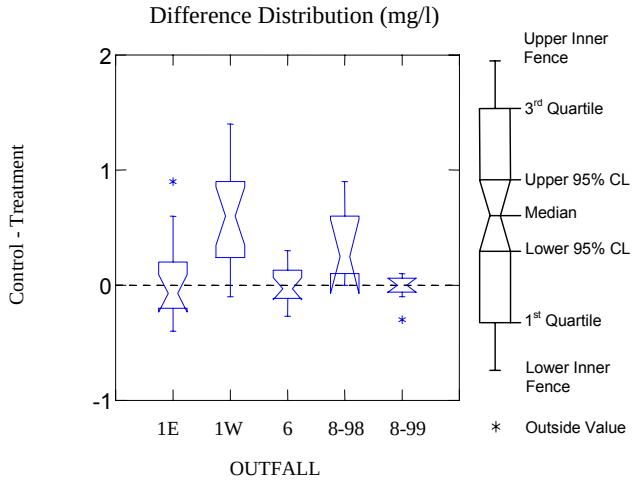

Hardness

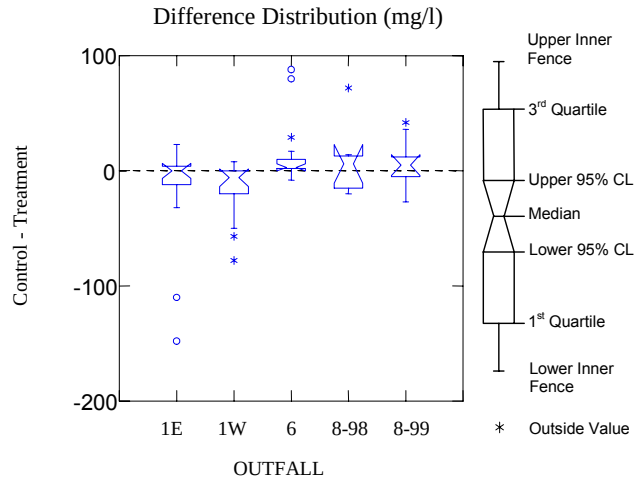

TPH (Diesel)

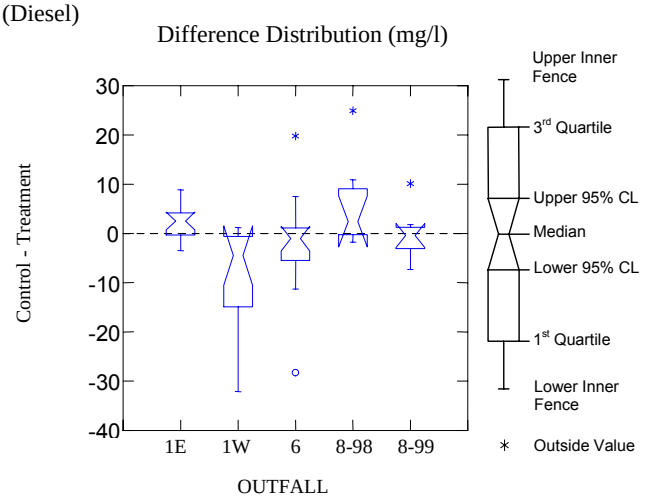

7.2 OTHER ANALYSES

Though the objective of the LMPS is to evaluate the effectiveness of BMPs in reducing litter on Caltrans highways, the data collected allow for a general analysis of trends that might exist between litter and various other elements, such as site hydrology, chemical constituents, and inlet volumes. Analysis of trends between litter and each of these elements is presented in subsections below.

7.2.1 Evaluation of Relationships Between Litter and Site Hydrology

Data collected during the LMPS can be used to examine the relationship between storm water litter discharge and hydrologic factors. Data presented previously in this report may suggest a relationship between total seasonal litter and total seasonal rainfall and flow.

Table 6-7 shows total annual litter from outfall monitoring and total seasonal rainfall. Rainfall totals for year 2 of monitoring were higher than totals for year 1 at all sites. Seasonal outfall litter discharges were also higher at all control sites during year 2 of monitoring. The increased amount of litter during year 2 is also apparent in the cumulative litter plot shown in Figure 7-1. The cumulative litter plot also shows that litter is transported to the outfalls and collected during wet weather periods.

If a correlation between litter and hydrologic factors exists for the LMPS it would be consistent with the findings of Allison et al. (1998). Allison et al. conducted grab sampling of gross pollutants (combined vegetative material and litter) at one to twenty minute intervals during storms in large (2.5 to 20 Ha) urban catchments during a one year period (1994-1995). In contrast, the LMPS conducted litter monitoring over a two year period in small freeway catchments (<0.4 Ha), collecting all litter discharged during a storm after the event. Allison et. al. found that the highest amount of gross pollutants occurred mostly during peak discharges. Allison et. al. also found that during rain periods of similar magnitude that occurred frequently (i.e. two distinct rain periods on the same day), gross pollutant discharges were similar. Allison et. al. stated that these observations suggest a relationship between rainfall, runoff volume, and gross pollutant loads. These observations were based on one year of data and are not supported by statistical analysis.

In order to examine the relationship between hydrologic factors and litter discharge more closely for LMPS data, correlations were examined between event litter discharges and various hydrologic parameters. Litter data were compared to peak flow, total flow, and rainfall intensity, and antecedent dry period for monitored events at each outfall. Control outfalls with flumes (chemical water quality sites) were used in the comparison with peak and total flow, while all outfalls were used in the comparison with antecedent period. The antecedent dry period used was the number of days between rain events of 0.1 inches or greater. The data are presented on Figures 7-5 to 7-9. These figures illustrate that no clear relationship between event litter discharges and any of the individual factors can be identified. Several regressions were performed on the data sets, including linear, logarithmic, and 2nd and 3rd order polynomial. None of these regressions demonstrate that a strong correlation between a single event parameter and litter load exist. An r-squared value of 0.85 is typically considered the minimum value that indicates a good correlation. In

addition, similar plots were prepared, though not presented here, to look at any site-specific correlations and none were found. Intuitively, it should be expected that a multi-factor relationship exists. For example, if two intense storms occur days apart, the first storm would flush the majority of the litter, leaving little for the second storm, even if the second storm was more intense.

Several different analyses were conducted in an attempt to identify a multi-factor relationship that might exist. Figure 7-9 is an example of one analysis conducted that attempts to identify the relationship between litter and flow, also taking the antecedent dry period into account. Other various multi-factor analyses were conducted, such as using alternative groupings of antecedent days and evaluating multi-variable relationships between event total flow, event litter, and antecedent days. These additional analyses also failed to identify a strong correlation.

The event-by-event analysis described above was initially selected as the best method to assess correlations between hydrologic data and litter discharge because it provides an opportunity to use a large number of data points. Because the event-by-event analysis did not reveal any correlations, additional correlations were performed looking at seasonal totals for litter, flow, and rainfall. The correlation between total seasonal litter (air-dried weight) and flow with data from all sites plotted together was poor (R^2 = 0.4). The data population was low for Site 6 (n=4) and Site 8 (n=4) because there are only two stations with rainfall and flow data at each site and two years of data. Therefore, regression was not considered meaningful at these sites. A site-specific regression for Site 1 data was performed (n=8). The highest r-squared value was0.65 for the correlation between total seasonal litter (air-dried weight/both trigger and non-trigger events) and total seasonal rainfall (See Figure 7-10), where the seasonal litter load was the area normalized combined loads of treatment or control outfalls.

7.2.2 Evaluation of Relationship Between Litter and Chemical Constituent Quantities

Event litter and chemical constituent data for each outfall were plotted to determine if a correlation exists between litter and chemical constituents. Constituent loads were calculated by multiplying the constituent concentration by the total flow per event at the water quality sites. Probability plots were then created with both the litter and chemical constituent data. These plots indicate that both the litter and constituent chemical data are

Figure 7-5
CORRELATION BETWEEN EVENT PEAK FLOW AND LITTER LOAD

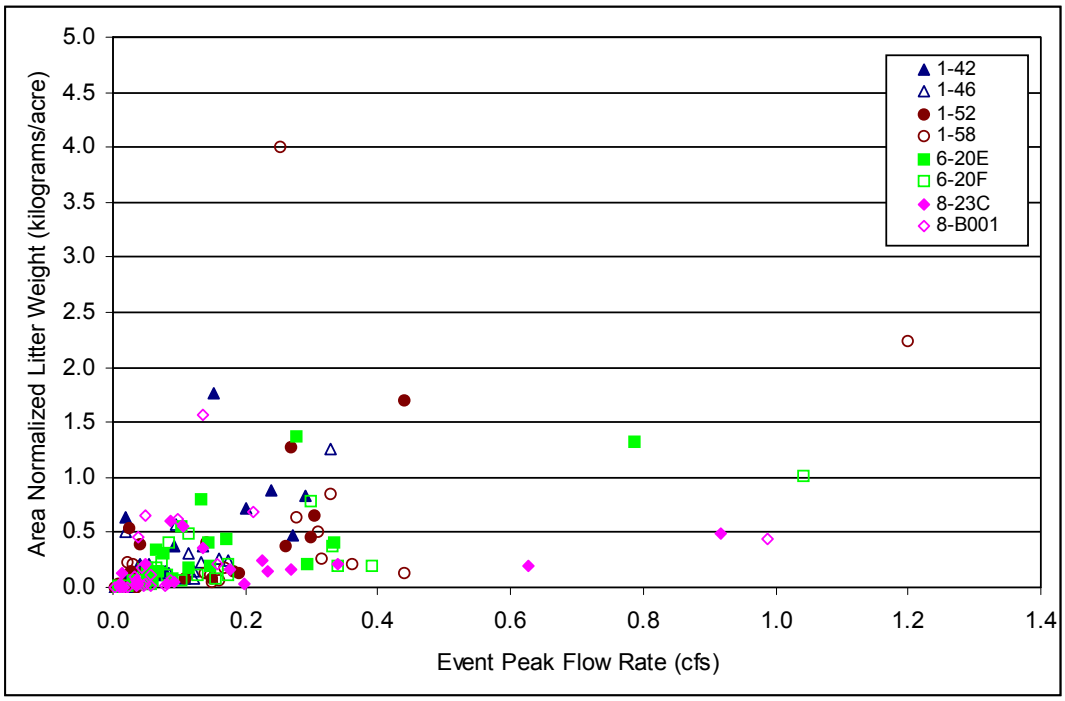

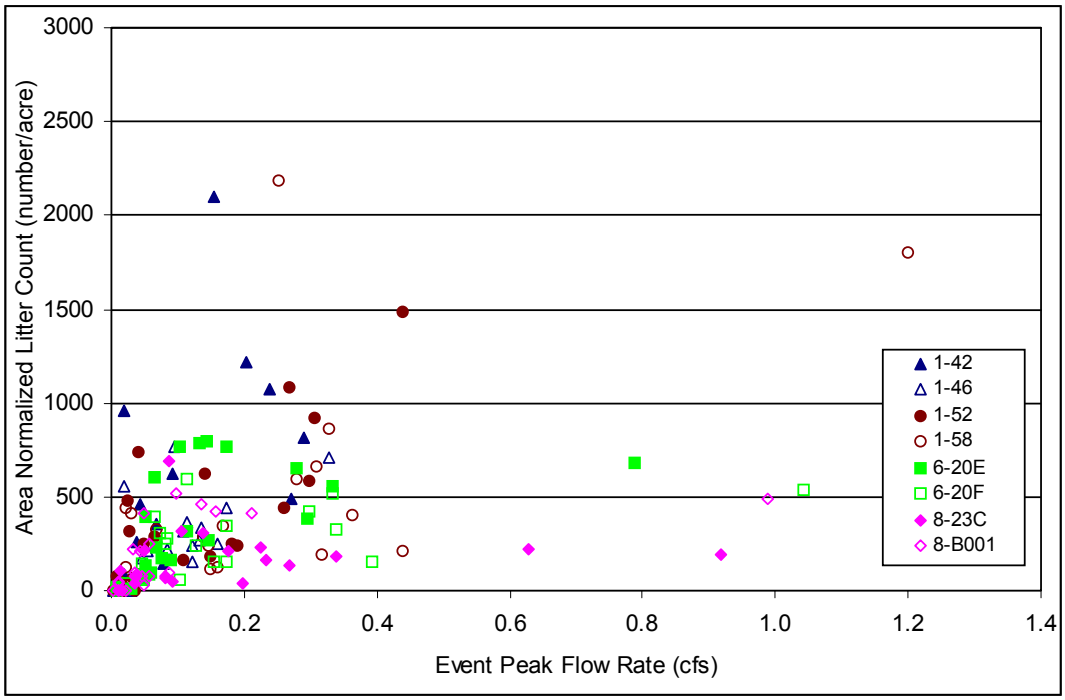

Figure 7-6
CORRELATION BETWEEN EVENT TOTAL FLOW AND LITTER LOAD

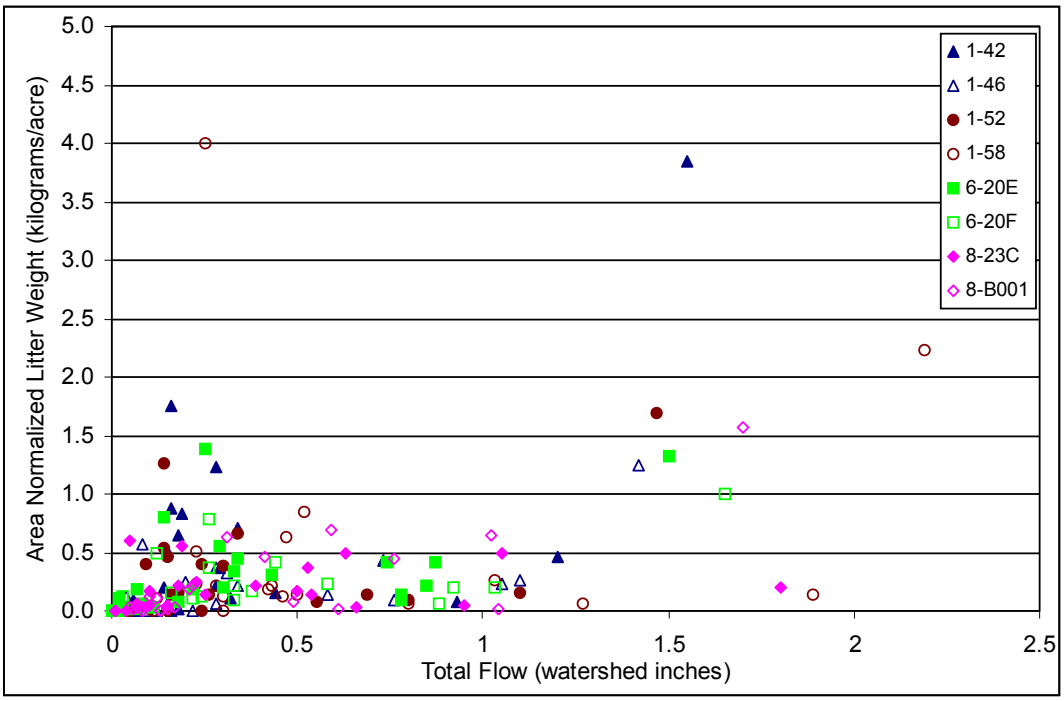

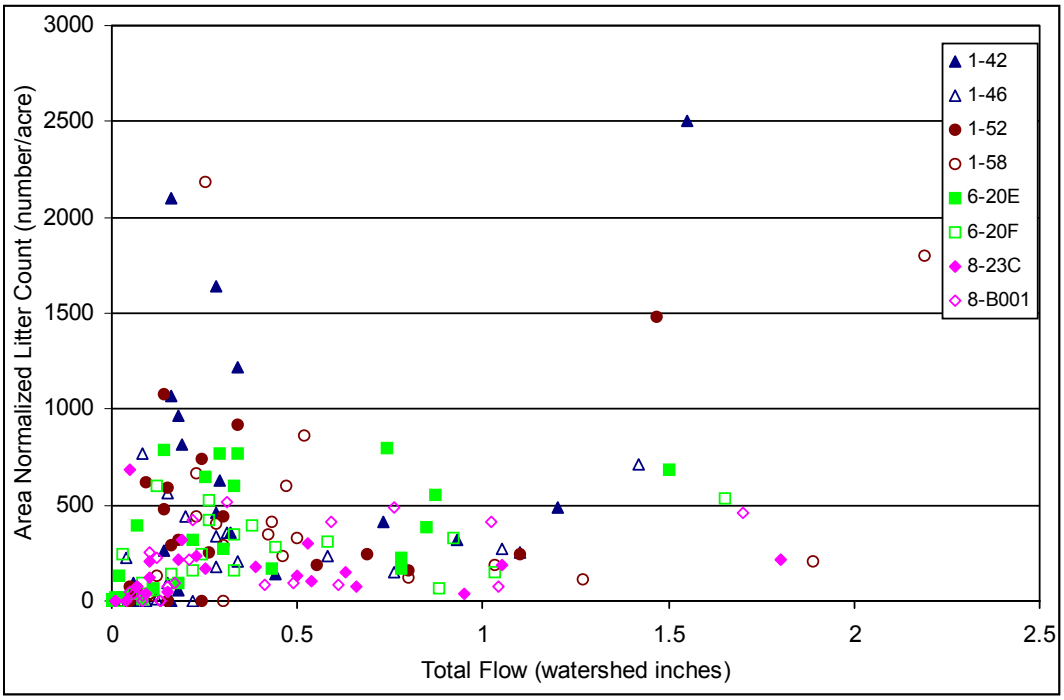

Figure 7-7
CORRELATION BETWEEN ANTECEDENT DAYS AND LITTER LOAD

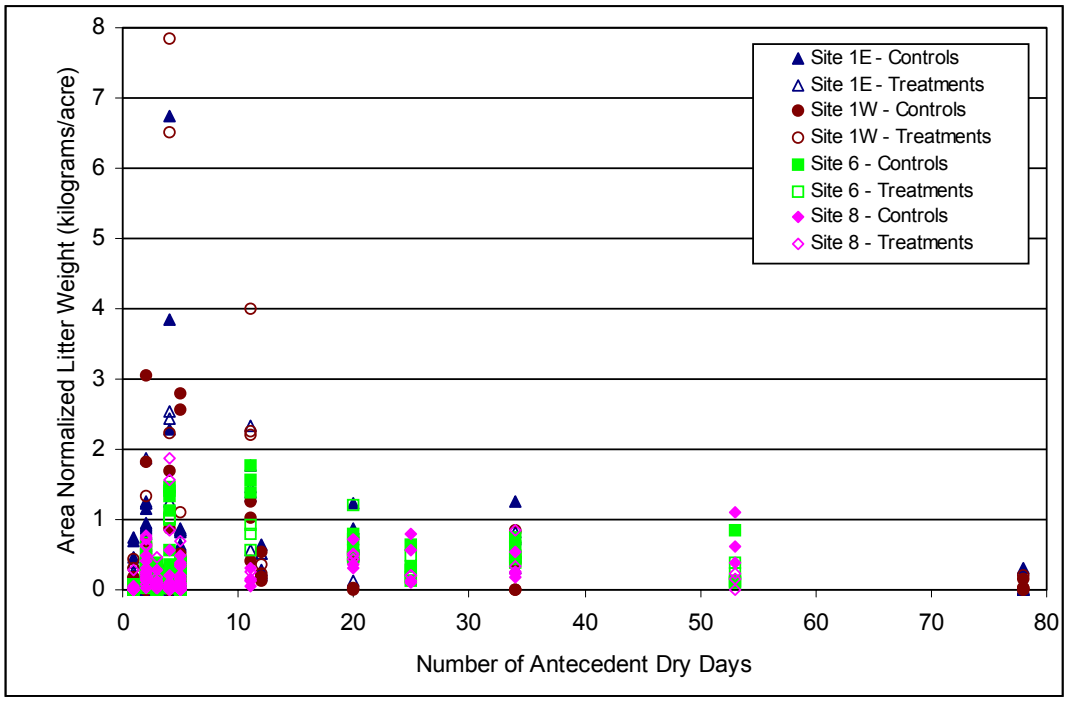

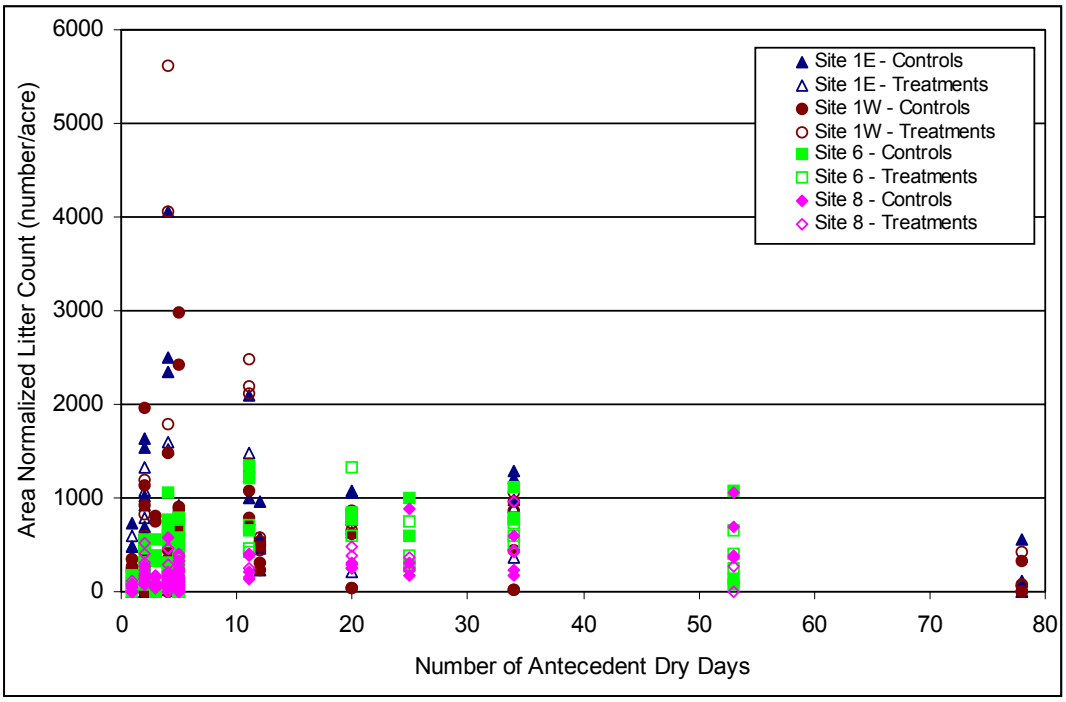

Figure 7-8
CORRELATION BETWEEN EVENT MAXIMUM RAINFALL INTENSITY AND LITTER LOAD

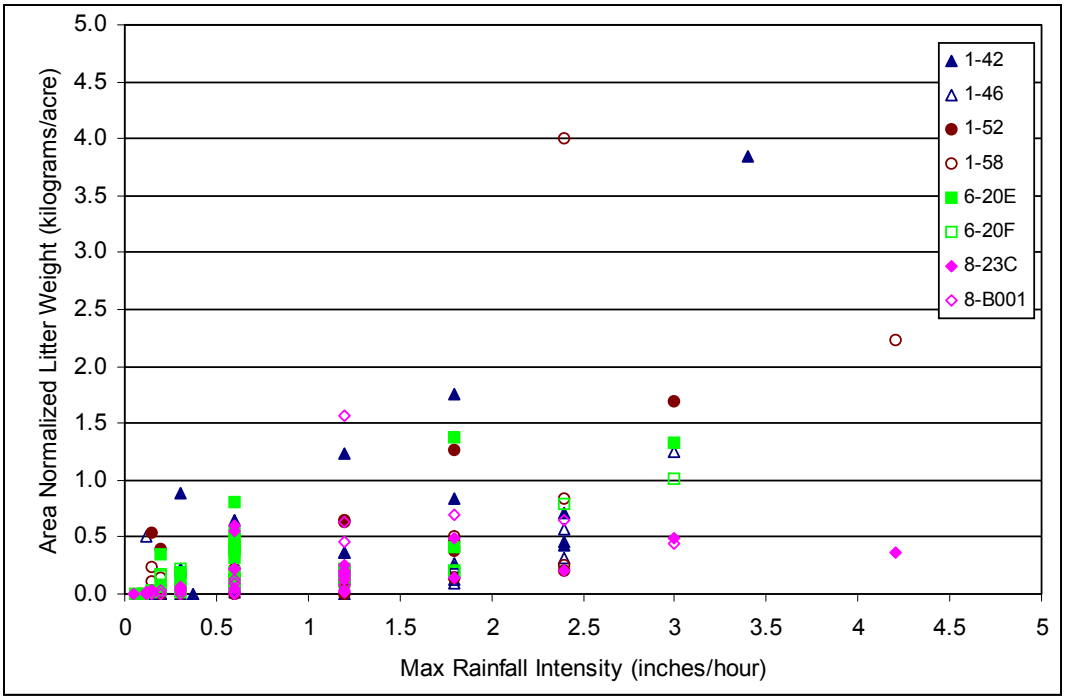

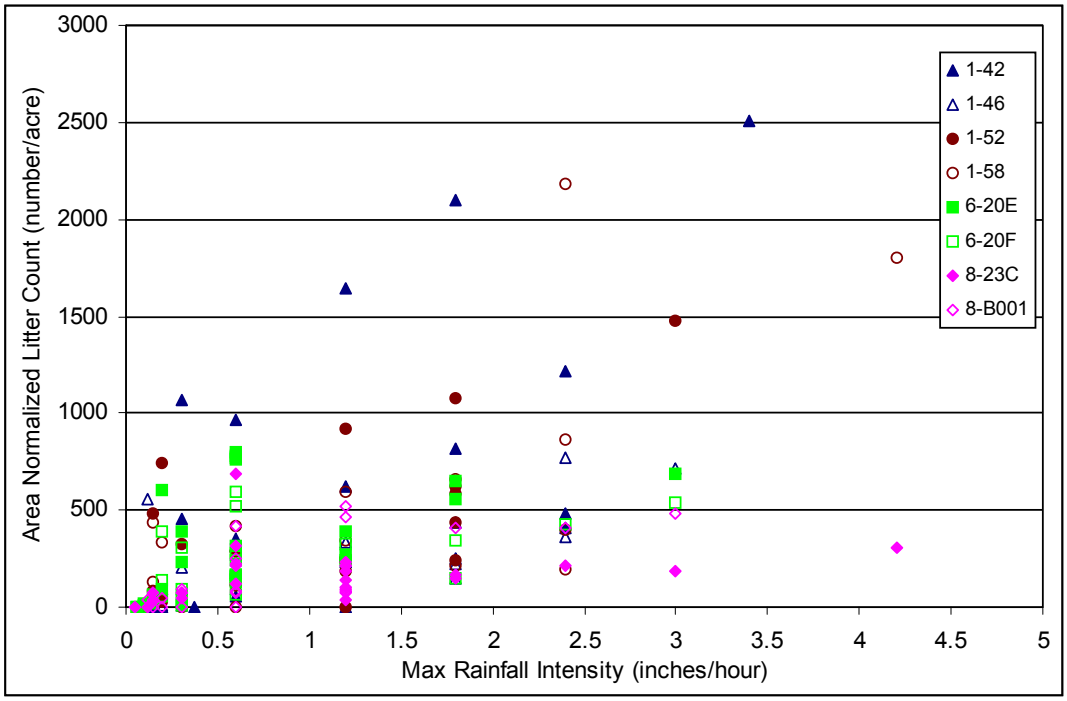

Figure 7-9
CORRELATION BETWEEN EVENT PEAK FLOW, ANTECEDENT DAYS, AND LITTER LOAD

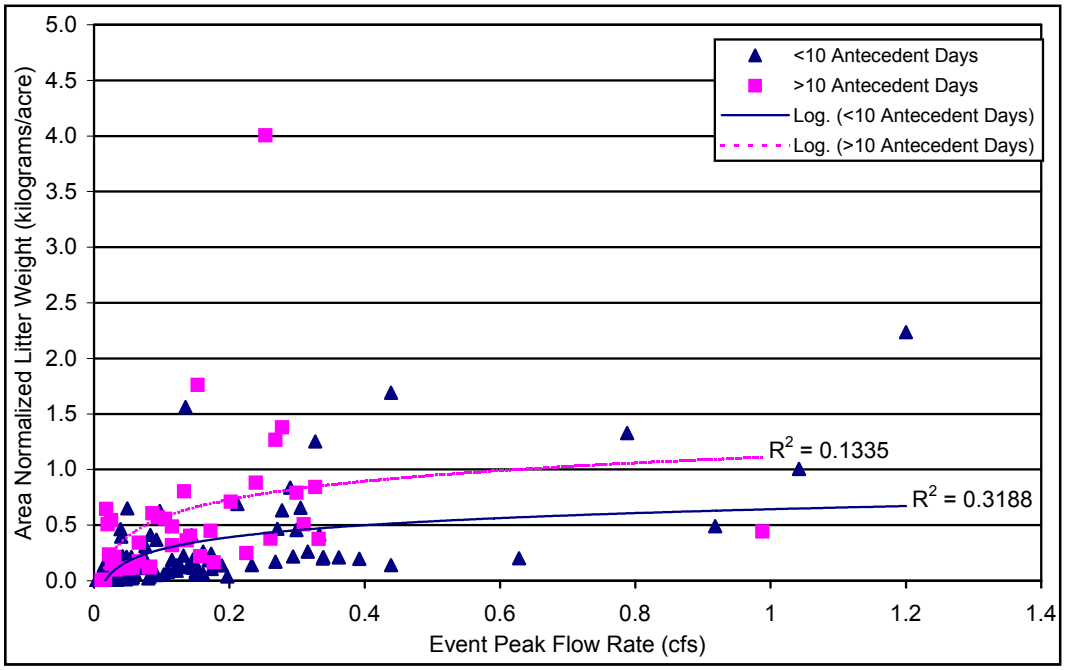

Figure 7-10
SEASONAL RAINFALL (IN) VS. TOTAL AIR-DRIED WEIGHT - COMBINED SITE OUTFALLS - TRIGGER AND NON-TRIGGER EVENTS

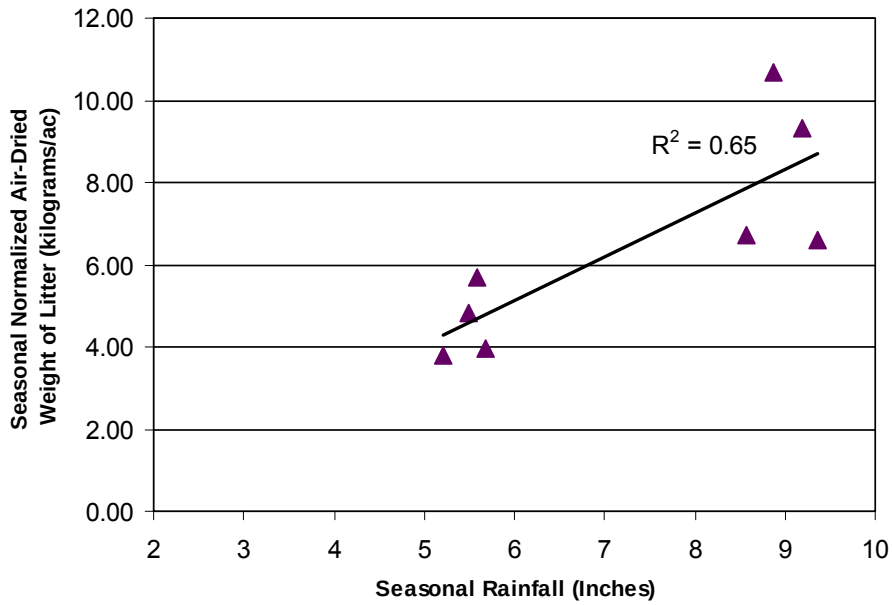

relatively log-normally distributed and would be best represented in log-log space. Scatter plots were then generated for each constituent and outfall to evaluate the relationship between the log-transformed data sets. These plots are presented in Appendix L. Regression analyses were conducted for each plot. A linear model of the log-transformed data was selected from a variety of standard functional relationships (e.g., linear, exponential, polynomial, and power functions). In the absence of either a theoretical or empirical basis for utilizing any of the more complex models examined, the linear fit (in log-log space) was chosen as the best approximation for inclusion in this report. The highest r-squared value is 0.66 for the relationship between litter and oil and grease. An r-squared value of 0.85 is typically considered the minimum value that indicates a good correlation. The results indicate that there is no correlation between litter and chemical water quality for any of the constituents monitored.

7.2.3 Assessment of Wet vs. Dry Inlet Deposition for the LID BMP

As discussed in Section 4.3.1, inlet deposition patterns were monitored at the Site 8 (LID) inlets to estimate the relative amount of material that makes its way into inlets during dry weather as opposed to wet weather. This information can be used in evaluating the benefit of pursuing dry weather deposition BMPs such as the LID. From June 1999 through March 2000, inlet deposition measurements were taken at the 24 LMPS study inlets. In addition, the quantity of material that was transported through the drain system during specific storm events was measured by collecting material (vegetative material and litter) at outfalls associated with each inlet. Although the LMPS was not designed with the above objective in mind, measurements collected may be used to estimate

dry vs. wet weather deposition of material at the Site 8 inlets to evaluate the benefit of the LID to reduce dry weather deposition.

Figure 7-11 shows the comparative volumes of the following material measured in the drainage system during year 2 of monitoring:

- The total volume of material captured at the outfall due to storm event monitoring (January - March 2000)
- The total volume of material measured to accumulate in the inlets during dry weather (October - December 1999).

Figure 7-11 shows that for the LID treatment inlets (8-24B, 8-24F, and 8-B0001), the amount of material measured at the outfall substantially exceeds the amount of material that accumulated in the inlets during dry weather. Because the LID reduces dry weather deposition as shown in Figure 7-11, there was little material in the LID treatment inlets (10 liters or less per inlet) prior to the storm season and therefore little inlet material available for transport via flow to the outfalls. However, there were similar quantities of material monitored in the outfalls from both treatment and control inlets, suggesting that the large size openings of the LID allow larger items to enter the drainage system during storms. The LIDs were installed in October 1999, which allowed three months of dry weather accumulation in both treatment and control inlets. If dry weather inlet volumes were larger at the start of the rain season, a larger amount of material may have been transported to the outfalls from the control inlets, thereby off-setting the amount of material transported through the LIDs during storms.

Figure 7-11
OUTFALL WET WEATHER MATERIAL VOLUMES (NOT NORMALIZED) AND DRY WEATHER INLET MATERIAL VOLUMES - Site 8 (LID)

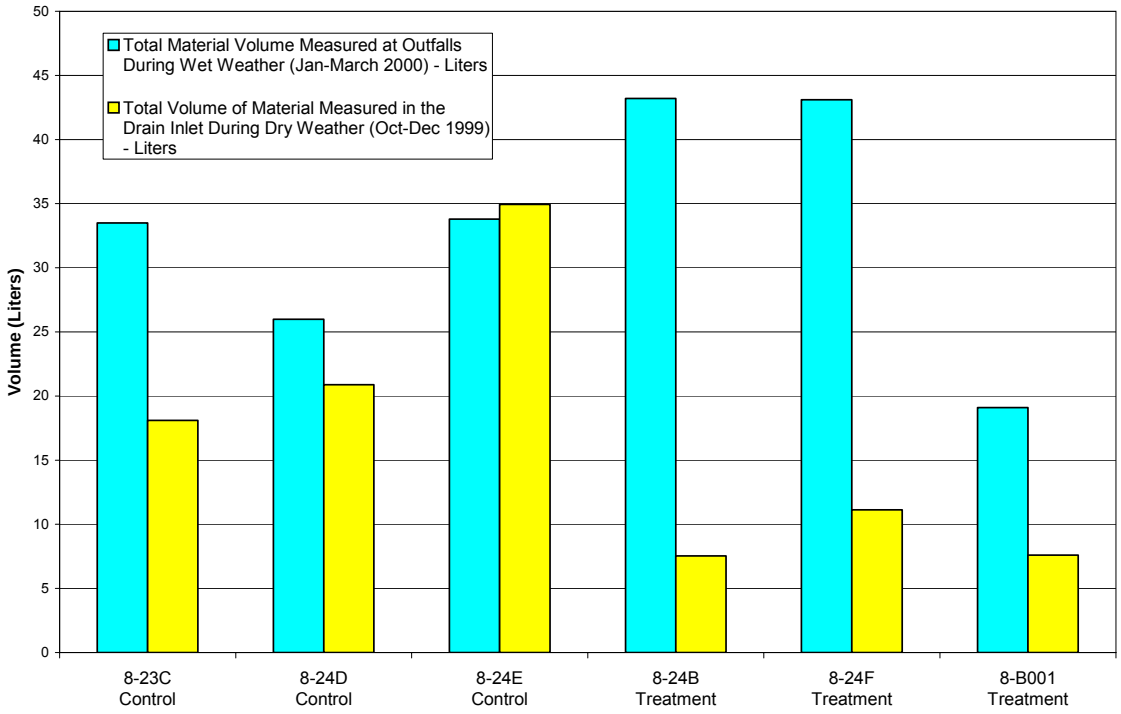

The LMPS is one of numerous research projects currently conducted by Caltrans with the common goal of improving the quality of runoff from Caltrans highway drainage facilities. The focus of the LMPS was field-testing and evaluation of litter management practices to assess their effectiveness in reducing litter that is discharged from Caltrans storm water conveyance systems. The conclusions and recommendations are presented in separate subsections. Each subsection is organized into two parts, one related specifically to the study objective of evaluating BMP effectiveness and the second for other data observations collected during the course of the LMPS. The LMPS focuses on litter (manufactured material) that can discharge through the Caltrans freeway storm drain system that are larger than ¼ inch, and that could impact beneficial uses of receiving waters. All the BMPs tested were at the freeway surface and not at the end-of-pipe (point of discharge).

8.1 CONCLUSIONS

8.1.1 BMP Effectiveness

The LMPS was designed to evaluate the effectiveness of non-structural and structural BMPs in reducing litter in the Caltrans storm water system by comparing litter amounts at outfalls from paired treatment and control catchments. The non-structural BMPs evaluated were increased street-sweeping frequency and increased litter pick-up frequency. The structural BMPs evaluated were replacing the standard parallel bar inlet grate with a bicycle grate, replacing the standard parallel bar inlet grate with a perforated plate modified grate, and replacing the standard top-entry inlet with a curb inlet including the LID BMP described in Section 3.4.3.

Catchments monitored for the LMPS range in size from 0.18 acres to 0.91 acres. In order to compare litter results from individual catchments for BMP evaluation and between sites, data were normalized by unit area and by unit flow per storm event. Statistical analysis for BMP effectiveness was performed using both area-normalized and flow-normalized data. Area-normalized data are considered to be more robust because there were three times as many data points as only one treatment-control pair was monitored for flow at each BMP site. Where BMPs were demonstrated to result in a statistically significant reduction, an estimate of the average annual reduction observed is presented.

8.1.1.1 Street Sweeping

As detailed in Section 7.1, statistical tests have shown that increasing the frequency of street sweeping from monthly to weekly does not statistically reduce ($\alpha = 0.05$) the count or weight of litter observed at the outfalls or in the total system load. This is the case for weight regardless of whether the litter data are normalized by catchment area or flow, and which method of paired analysis is used. For count, the reduction is not significant for the area-normalized analysis, but is statistically significant for the flow-normalized analysis. Because the number of data points is substantially larger for the area-normalized analysis, the results of that analysis are considered more powerful. The volume reduction for this BMP is statistically significant under one method of paired analysis (crossed pairs using *Act Diff*) but not under other methods. The statistical analysis of the total system litter (sum of the litter manually collected from the inlets during cleaning at the end of the study and litter monitored at the outfalls) corroborates these

conclusions. These results suggest that weekly sweeping is not more effective than monthly sweeping in reducing litter in runoff from freeways with standard inlet grates.

8.1.1.2 Litter Pick-Up

Statistical tests have shown that increasing the frequency of litter pickup from monthly to weekly reduces the quantity of litter observed at the outfalls, with $\alpha = 0.05$. This is the case for all measuring parameters (weight, volume, and count) regardless of whether the litter data are normalized by watershed area or flow. Additionally, the statistical analysis of the total system litter (sum of the litter manually collected from the inlets and litter monitored at the outfalls) corroborates these conclusions.

Based on the total event litter collected at treatment and control outfalls for each year of the LMPS (Table 6-7), the average annual reductions demonstrated by study data normalized by area are as follows:

	Weight	Volume	Count
Average Annual Reduction Between Treatment and Control Areas	2.1kg/acre (30%)	21.3 liters/acre (41%)	2346 items/acre (33%)

8.1.1.3 Modified Inlet Grate

Statistical tests have shown that the modified inlet grate reduces the quantity of litter observed at the outfalls, with $\alpha = 0.05$. This is the case for all measuring parameters (weight, volume, and count) regardless of whether the litter data are normalized by watershed area or flow and which method of paired analysis is used. Additionally, the statistical analysis of the total system litter (sum of the litter manually collected from the inlets and litter monitored at the outfalls) corroborates these conclusions

Based on the total event litter collected at treatment and control outfalls for each year of the LMPS (Table 6-7), the average annual reductions demonstrated by study data normalized by area are as follows:

	Weight	Volume	Count
Average Annual Reduction Between Treatment and Control Areas	1.1 kg/acre (26%)	5.7 liters/acre (19%)	1,086 items/acre (23%)

8.1.1.4 Bicycle Grate

The standard Caltrans bicycle grate is shown in Photo 3–4 and is identical to the existing parallel bar grates at Site 8, with the addition of cross bars, resulting in reduced grate opening size. This retrofit was evaluated during the first study year. Based on analysis of year one data and field observations, the project team including Caltrans, NRDC, and TAG members agreed to discontinue

testing of the bicycle grate alternative. All parties agreed that the bicycle grate appeared to have little potential to reduce the quantity of litter entering drain inlets. More details are provided in Section 7.1.

8.1.1.5 Curb Inlet with LID

Results of inlet deposition monitoring indicate that the LID BMP is effective in reducing dry weather deposition (see Figure 4-5). Additionally, an important finding from the field evaluation of the LID BMP, is that the LID gates operated well in storm conditions. The gates remained closed during low flows, allowing runoff to enter the inlets through slots designed in the flap. Under heavier flows, the gates opened allowing water to pass freely into the inlets.

The statistical analysis however, did not confirm that the BMP is effective in reducing volume or weight regardless of whether the litter data are normalized by watershed area or flow and which method of paired analysis is used. For count, the reduction is significant for the outfall-discharged, area-normalized load, but is not significant for either the outfall-discharged, flow-normalized load or the total system load. The data suggest that the litter count is lower at the treatment outfalls, but higher in the treatment inlet with the net effect showing no significant reduction in the litter count.

It should be noted that the LID is designed to minimize the amount of litter that can move from the highway surface and shoulder area into the drain inlet and drainage system during dry-weather conditions. In order to assess inlet deposition patterns associated with the LID BMP, inlet deposition monitoring was initiated before the second year of LMPS monitoring. Though results of statistical tests show no reduction in outfall litter from the LID, this result may have been influenced by the 1999-2000 storm pattern and dry-weather deposition period. The storm pattern during the period that the LID was evaluated had a large majority of the storms occur in a six- to eight-week period in February and early March 2000, with only short dry-weather periods between each storm. The LIDs were in-place for three months of dry weather preceding the monitored storm season.

8.1.1.6 BMP Effectiveness for Chemical Water Quality Constituents

Statistical analysis was also conducted to assess the effectiveness of the litter BMPs evaluated during the LMPS for any improvement in chemical water quality between treatment and control areas. The BMPs did not show a reduction in chemical water quality concentration that could clearly be attributed to the BMP under evaluation, see Table 7-5. One interesting observation in the data shown on Table 7-5 is the higher concentrations of hardness, total copper, dissolved copper, dissolved nickel, and TPH(Diesel) in the treatment outfall as compared to the control outfall at Site 1W. This indicates that an increase in street sweeping frequency from monthly to weekly may have the tendency to increase some chemical water quality constituents

8.1.2 Conclusions Related to Other Observations

Although the major focus of the LMPS was to evaluate BMP effectiveness, the data collected during this pilot study provides extensive information that can be used to enhance the state of

knowledge related to litter on Caltrans highways. The following general observations may be useful related to future projects designed to understand and/or control litter on Caltrans highways.

8.1.2.1 Litter Characteristics Collected from Outfalls

The LMPS included a monitoring program of collecting litter discharged from highway storm drain outfalls. Lab analysis showed that such litter consists of paper, plastic, wood, cigarette butts, styrofoam, metal, and glass. The distribution by category is presented in Figures 6-2 to 6-7. Litter pieces collected from the drainage system were small in size resulting from the sieving effect of the Caltrans standard parallel bar grate. The Caltrans standard parallel bar inlet grate has 1-meter bars, with 35 mm (1½-inch) spacing and is effective in keeping large pieces of litter out of the drain inlets.

8.1.2.2 Composition of Gross Pollutants Collected

The material collected in the outfall monitoring nets consisted of gross pollutants comprising litter and vegetative material. The majority of all material collected was found to be vegetation. Site averages for percent vegetative material monitored in the outfalls range from 75 to 87 percent by wet weight for the four sites (see Figure 6-1). Site 6 had the highest average with 87 percent vegetative material in outfall material collected. The higher percentage at Site 6 likely results from trees that overhang a soundwall at the site. The high percent vegetative material in storm water gross pollutants is consistent with other studies conducted in Australia that found 60-90 percent vegetative material. The high percentage of vegetative material should be considered in the design of treatment BMPs because it is infeasible to separate vegetation from litter during treatment. These results also suggest that any device designed to capture litter will capture a majority of vegetation.

8.1.2.3 Control Area Outfall Litter Loads

Annual litter loads for each of the study sites can be derived from data collected at the LMPS control outfalls. Data presented below are the average combined total loads for the three control outfalls at each site normalized by the total area of control catchments. It should be noted that normalization by this method assumes a straight-line relationship between catchment size and litter load. The loads below include litter monitored at control outfalls from trigger events as well as litter collected from non-trigger storms. It is not the intent of this data presentation to predict average litter loads in other areas but instead give a general indication of loads and the variation between the LMPS sites. Based on these results, it is apparent that substantial variation exists in typical outfall litter loads between the LMPS sites. This did not affect the study objective of determining BMP effectiveness. However, additional monitoring would be required in other areas to provide an estimate of Caltrans litter load in the Los Angeles area. The average annual LMPS litter loads observed are as follows:

Average Annual LMPS Litter Load Per Site	Air-Dried Weight (kg/acre)	Volume (l/acre)	Count (#/acre)
Site 1E	7.5	58.1	7,926
Site 1W	5.3	43.0	6,541
Site 6	5.3	39.0	6,297
Site 8	3.1	17.9	2,848

Observations related to the site litter data include:

- Similar seasonal rainfall and runoff volumes were observed at all sites (within approximately 20%).
- The greatest amount of litter was observed at Site 1-E,
- Sites 1-W and Site 6 had similar loads of litter and were about 25% less than the quantities at Site 1E.
- Site 8 had between one-third and one-half the loads compared to Site 1E.

The sites are similar in many ways including: drainage systems with one inlet directly connected to one outfall; location on fill slopes; catchment areas less than one acre; and each are in urban freeway settings. However, there are substantial variations in the litter loads between the sites. Differences between the site litter loads could be influenced by many factors that were not evaluated during the LMPS including different traffic congestion patterns, different prevailing wind directions, and highway shoulder conditions. A comparison of litter load for these sites to ADTs, truck traffic or adjacent land use of did not indicate a clear relationship.

8.1.2.4 Litter Characterization Activities

Litter was characterized in many different ways during the LMPS. The litter data collected at the 24 outfalls during this two-year study are believed to provide a generally representative sample of the litter characteristic from Caltrans Los Angeles highways. Conclusions from characterization activities are presented below.

- ***Litter Usage Analysis*** – Data from the LMPS indicate that smoking- and food-related litter account for 20-30% of the litter by weight and volume. However, the relatively small size of individual litter pieces likely contributed to item usage not being identifiable, and may contribute to the large percentage (79% by weight and 71% by volume) of usage in the "other" category. These results are consistent between year 1 and year 2 data. Due to the high percentage of material that cannot be identified, determining the sources of freeway storm water litter is not possible by conducting inlet or outfall monitoring.
- ***Floatable Litter Analysis*** - During the development of the Study Plan it was believed that identifying the floatable fraction of the litter might provide some insight related to selecting and designing BMPs more effectively and to assess the portion of litter that would be most

likely to be transported to receiving waters. The LMPS data indicate that approximately 80% of the litter collected by count, weight, and volume is floatable (Table 6-2). It should be noted that the method that was developed for the LMPS floatable analysis is a laboratory procedure that assessed general floatability of litter items without attempting to replicate flow, turbulence, and other physical conditions present in a Caltrans storm water conveyance system.

- ***Oven Drying Analysis*** – The LMPS performed oven drying on litter sub-samples during the second year of monitoring to assess litter moisture content by category and event. Moisture contents by category, after a minimum of 24 hours of air-drying, ranged from a season average of 0% for glass items to a high of 36% for cigarette butts (Table 6-1). The total moisture content of all categories by event generally ranged from 2% to 23%.

8.1.2.5 Street Sweeper Litter Characterization

The litter portion of sweeper debris was characterized in the litter lab from March to October 1999 to compare sweeper litter to outfall litter with respect to visual appearance and composition. Analysis shows that the types of litter materials present in sweeper litter are similar to outfall litter, with higher proportions of glass, moldable plastics, and metals, and a lower proportion of paper and film plastic in sweeper litter (Figures 4-6 to 4-8). This may be explained by the sweepers' ability to remove larger items such as bottles, plastic containers and large metal scraps that can not fit through drain inlet grates. The proportion of the number of cigarette butts in sweeper debris (38%) is comparable to the percentage of cigarette butts in outfall litter by count (34%).

8.1.2.6 Litter Pick-Up Characterization

The litter portion of litter pick-up debris was characterized in the litter lab during September and October 1999 to compare litter collected during litter pick-up activities to outfall litter with respect to visual appearance and composition. Analysis shows that the types of materials present in litter collected from the freeway ROW are similar to outfall litter with higher proportions of chipboard/cardboard, glass, and wood, and a much lower proportion of cigarette butts in ROW litter (Figures 4-6 to 4-8). This may be explained by the removal of larger items during litter pick-up that can not fit through drain inlet grates. In accordance with standard District 7 AAH litter collection practices, the AAH contractor does not remove individual cigarette butts, and no butts were found in the ROW litter analyzed.

8.1.2.7 Site Hydrology and Litter Collected at Outfall

The data were evaluated to identify trends that might exist between litter and various elements related to site hydrology. Litter data were compared to rainfall intensity, peak flow, total flow, and antecedent dry period for monitored events at each outfall. No clear relationship between litter and any of the individual factors were identified for the analysis of event by event or total seasonal data.

8.1.2.8 Litter Load vs. Chemical Constituents

Litter and chemical constituent quantities for each outfall were plotted to look for possible correlations (Appendix L). The highest r-squared value is 0.66 for the relationship between litter and oil and grease. The results indicate that there is no correlation between litter and chemical quantities for any of the constituents monitored.

8.1.2.9 Inlet Litter Deposition

The volume of debris in each inlet was measured at two-week intervals during year 2 of the LMPS using the protocol presented in Appendix F. Inlet deposition monitoring was conducted to evaluate the effectiveness of the LID BMP to reduce dry weather deposition. Plots of inlet material volumes (Figures 4-2 to 4-5) show that dry weather deposition contributes to material present in LMPS drainage systems.

Inlet litter deposition rates were calculated using the percentage of litter observed in each inlet during each inlet deposition measurement event. Average litter deposition rates for the LMPS occurred at up to 0.04 liters/day during dry weather periods (May 1999 to December 1999). Wet weather deposition rates averaged -0.22 liters per day to 0.07 liters per day. These rates indicate that inlet volumes are reduced during wet weather. It should be noted that the percentage of litter applied to the measured inlet material volumes from each measurement event are based on visual observations that are inherently subjective and represent an estimate of the litter on the surface of the inlet material only.

8.2 RECOMMENDATIONS

8.2.1 Recommendations for Further Study

While the original study objectives have been achieved, some recommendations regarding other potential studies were able to be drawn from this research.

8.2.1.1 Street Sweeping

Increasing the frequency of street sweeping did not result in a significant reduction in freeway storm water litter based on data normalized by area. As presented in the Study Plan, varying the frequency of the street sweeping was considered as the operational change most likely to reduce litter in Caltrans storm drain systems. Therefore, no additional studies are recommended to evaluate the use of sweepers as a BMP to reduce litter in freeway storm water.

8.2.1.2 Litter Pick-Up

No further evaluation of litter pick-up as a storm water litter BMP is recommended.

8.2.1.3 Modified Inlet Grate

No further evaluation of the modified inlet grate as a storm water litter BMP is recommended.

8.2.1.4 Bicycle Grate

No further evaluation of the bicycle grate as a storm water litter BMP is recommended.

8.2.1.5 Litter Inlet Deflector Improvements

As a prototype, it is expected that the LID design will evolve with continuing improvements. The following observations should be considered as the design of the LID BMP evolves:

- Litter and debris accumulate around the vertical support riser in front of the gate. A re-design to remove the vertical riser would eliminate this problem.
- Litter and debris lodge the gate open and get stuck during storm events, leaving the gate ajar during dry weather. A re-design to allow the litter to easily fall away from the gate, after it enters the curb inlet, could minimize this problem and further reduce dry-weather deposition.
- Grooving the pavement in front of the curb inlet to direct flow into the inlet will likely increase maintenance costs as it reduces the depth of the topcoat. Evaluating the use of a standard Caltrans gutter depression instead of grooving the pavement is recommended.
- Design a feature to reduce wet weather transport of litter to the drainage system upgradient of the LID BMP.

APPENDIX A

This appendix consists of findings from dry weather field investigations conducted in June 1999 and wet weather field investigation conducted during year 2 of monitoring.

INTRODUCTION

The current District 7 Litter Management Pilot Study includes 3 distinct sites on I-105 and State Route 60. Site 1 spans the I-105 freeway from Gertrude to Atlantic on both the eastbound (1E) and westbound (1W) sides. Site 6 covers the eastbound side of State Route 60 from Turnbull Canyon Road to the Kwis Street pedestrian overcrossing. Site 8 is located between Garfield and Fulton, also along State Route 60.

The watershed areas for each of the inlets at the study sites were initially calculated using engineering as-built drawings. After year 1 runoff volumes were obtained, a dry weather field survey was conducted on June 2-3, 1999 to perform a more detailed assessment of field characteristics that could influence runoff at each study site. The dry weather field survey provided a more complete picture of catchment characteristics than could be determined from the as-built drawings alone. The results of this field survey are detailed in this appendix, along with some explanation regarding the influences those characteristics could have on actual runoff into the study site inlets. Wet weather observations were conducted during year 2 of monitoring and are described in the second part of these findings. Final estimated watershed areas are presented in Table 2-2 of this report and are based on as-built areas, field investigation findings, and final hydrologic analysis.

PART 1 - DRY WEATHER INVESTIGATION FINDINGS

Site 6

General Site Conditions

Most of the pavement characteristics within Site 6 are consistent throughout the site. The concrete slabs of the roadway itself are well worn with seams, occasional lips, and slope irregularities. These conditions are expected and appear typical of well-traveled freeway surfaces and could contribute to limited infiltration throughout the site.

Outfall specific findings

20H (0.64 acres)

The contributing watershed area for 20H is larger than originally calculated. Tapering super-elevation in the upstream section of the watershed area extended the length to 385 feet, creating a new watershed area of 0.64 acres, as compared to the previous estimate of 0.51 acres.

20G (0.51 acres), **20F** (0.42 acres), **20E** (0.42 acres), **20C** (0.42 acres), **20B** (0.42 acres)

Site 8

General Site Conditions

The concrete slabs making up the travelway at this site are seamed, particularly at the edge of the travelway (See Picture 1.)

Picture 1

The slopes here are very low (0.3%-0.5%), which could contribute to less than expected runoff into the adjacent inlets during storms.

Outfall specific findings

23C (0.62 acres)

B001 (0.32 acres)

Over half of B001's expected watershed area is on or before the bridge crossing Garfield Ave. The bridge itself arches upwards, and an asphalt lip and slight ridge exist on the upstream bridge seam, both of which could combine to divert water that would otherwise travel down the slope to B001 to instead flow 'upstream' to another drainage. This characteristic is estimated to reduce the watershed for B001 from 0.51 acres to 0.32 acres.

24B (0.42 acres)

Like B001, 24B's watershed area spans the Garfield Bridge and, also similar to B001, a lip at the upstream bridge seam reduces the watershed area to from 0.57 acres to 0.42 acres.

24D (0.62 acres)

Signs of pumping were observed approximately 260 feet upstream of 24D.

24E (0.62 acres)

The watershed area for 24E includes a bridge crossing over Wilcox. There is a lip at the bridge seams, which may divert flow back to 24F, the inlet just upstream. Wet weather observations are necessary to confirm.

24F (0.87 acres)

A new asphalt top-coat from the recent installation of fiber-optics creates a lip and the possibility for flow-by inlet. Ponding was also evident in a long, flat spot in front of the construction area inlet. 24F may receive flow from the 24E catchment (see above). Wet weather observations are necessary to confirm.

SITE 1

General Site Conditions

The 105 freeway is a relatively recent construction and the roadway is in good condition throughout. An earthen mound rises next to the shoulder along each watershed area in the site, the runoff from which was not included in the original watershed area calculations.

Outfall Specific Findings

58 (0.29 roadway + 0.03 lightly vegetated earthen mound = 0.32)

59 (0.29 roadway + 0.03 lightly vegetated earthen mound = 0.32)

60 (0.29 roadway + 0.03 lightly vegetated earthen mound = 0.32)

52 (0.40 roadway + 0.03 heavily vegetated earthen mound = 0.43)

The inside shoulder in this area has an approximate 10-foot-wide median turn-out. The area has therefore been increased to 0.40 acres of roadway and 0.03 acres of heavily vegetated earthen mound.

50 (0.36 roadway + 0.04 heavily vegetated earthen mound = 0.40)

51 (0.37 roadway + 0.04 heavily vegetated earthen mound = 0.41)

The furthest lane from the median contains a slight taper from a merging lane, causing a slight increase in watershed area from that previously estimated.

42 (0.29 roadway + 0.03 lightly vegetated earthen mound = 0.32)

Based on as-built engineering drawings, the study plan presented watershed areas along the eastbound side calculated with an additional lane of travel; the areas have now been recalculated.

B111 (0.36 roadway + 0.04 moderately vegetated earthen mound = 0.40)

The watershed area for B111 was recalculated.

B110 (Indeterminable from dry weather investigation + lightly vegetated earthen mound)

An existing turnout upstream of B110 spanning B109 (See Picture 2) is not shown on the construction as-builts. This turnout adds area to B110's watershed and may allow flow-by at B109, which may contribute to B110's watershed. Wet weather observations are necessary to confirm the watershed area.

Picture 2

44 (0.41 roadway + 0.03 medium vegetated earthen mound = 0.44)

The inside shoulder in this area is slightly larger than previously estimated, and the area has been recalculated to include the wider shoulder and correct number of lanes.

46 (Indeterminable from dry weather investigation + lightly vegetated earthen mound)

A turnout spans the 46 inlet and it no longer lays flush with the outside of the shoulder but instead is located in the middle of the shoulder (See Picture 3).

The distances between the inlets to either side of 46 differ from as-built dimensions used to calculate areas in the study plan. The inside shoulder is also wider than estimated through this area.

Picture 3

47 (0.40 roadway + 0.03 lightly vegetated earthen mound = 0.43)

The inside shoulder is slightly wider than the as-built engineering drawings showed, which adds to the watershed area for 47.

Wet weather field observations were conducted during year 2 of monitoring to observe runoff patterns at the outfall catchments. These observations were used to verify the earlier dry-weather survey that identified possible characteristics of each study site that could influence freeway runoff. The following presents a summary of the observed wet weather conditions.

PART 2 – WET WEATHER OBSERVATIONS

Site 8

Outfall B001

Wet weather observation shows ponding on the bridge shoulder; however, no water was observed leaving the west edge of the bridge deck. Minor flow was noted moving off the deck to the east towards inlet B001.

Ponding to the east of the bridge deck during storm events occurs due to a newly built fiber-optics line and submerged cabinet (See Picture 4). Observations during a post-storm trip to the site noted that while ponding remained on the bridge and in various portions of the shoulder, ponding on and around the fiber-optics trench and cabinet had dissipated.

Picture 4 – Fiber-optics trench and cabinet upstream of B001

Minor flow was observed entering the LID at B001 from the east due to moderate ponding caused by the roadway's shallow slope. During a relatively heavy event, a moderate flow was observed entering the LID from the west. The gates deflected open to accommodate the water, which required one-half of the four-foot gate.

Outfall 24B

Flow from the bridge over Garfield Avenue is higher to 24B than bridge flow in Outfall B001's watershed directly across the freeway. The entire bridge may be contributing to the watershed area for Outfall 24B, with the seam at the west edge of the bridge deck acting as the upgradient catchment limit. Flow into the LID at 24B was more substantial than at B001 during the same storm events.

During moderate flows water passed over the flow diverters and angled towards the front of the LID gate faces, which opened allow the water to enter the inlet. The flow decreased in depth and intensity as it passed down the length of the LID gates (See Picture 5). No flow-by at any of the LID inlets was observed.

Floatable debris flowed along the shoulder until it reached the LID inlets. Buoyant debris, such as sticks, plastics, and vegetation, was pressed up against the gate faces, often clogging the voids created by the open LID gate and slowing the water flow into the gate. However, observed flow did not exceed the capacity of the LID gates. Post-storm event observations noted that debris remained wedged in some of the gates and continued to prop them open.

Outfall 23C

The hydraulic conditions within the watershed area of Outfall 23C functioned well during all wet weather observations. Slight ponding was evident due to the shallow slope of the freeway, but water flowed steadily after a short period of rain.

Picture 5 – Moderate flow into 24B

Outfall 24D

A turnout was constructed in the area of Outfall 24D prior to year 2 of monitoring, which shifted the outfall to the middle, rather than the new edge, of pavement (See Picture 6). The flow-line has been preserved, however, and water flows directly towards the inlet, down the middle of the turnout. The flow was wide and slow during several storm events with moderate to heavy rain, although 20-30% of the water flowed past the inlet.

Picture 6 – Flow-by at Inlet 24D

Outfall 24E

Wet weather observations at Outfall 24E indicate that the outfall's upgradient catchment limit is the east edge of the Wilcox Avenue overpass bridge deck. Rain east of the bridge deck flowed towards Outfall 24F.

Outfall 24F

As noted above, Outfall 24F's downgradient catchment limit was shown to be greater than the as-built engineering drawings illustrated.

Outfall 24F's watershed area is larger than the other outfalls in the study at Site 8 and therefore had a larger flow into the large 16-foot LID inlet. During all observations the flow diverters worked well in directing water towards the LID gates and into the inlet. Bots dots have been placed in rows beyond the flow diverters to channel water to the inlet, but they are located nearly 4 feet from the curb and are therefore only partially utilized during observed flow levels.

More debris was evident at this outfall than either of the other two LID inlets. Plastics and branches floated in front of some of the LID gates and were wedged into the open gates, partially blocking and slowing flow (See Picture 7). The vertical support bars placed along the front of the LID also collect and hold debris; however long or flexible litter was observed wrapping around the bars, potentially contributing to litter blockage.

Picture 7 – Flow into Inlet 24F

SITE 1

Outfalls 42, 44, 47, 50, 51, 52, 58, 59, 60, B110, B111

The hydraulic conditions within these watershed areas functioned well.

Outfall 46

An existing turn-out is present at this inlet (See Picture 8). The flow-line was preserved, but during moderate rainfall 10-20% flow-by was observed.

Picture 8 – Outfall 46 during moderate rainfall

Site 6

Site 6 was found to perform very well hydraulically. Although ponding was evident in areas along the shoulder, all flow continued downstream rather than flowing back to an upgradient inlet and all water was diverted back to the shoulder before by-passing any catch basins.

APPENDIX B Field and Contact Forms

Grab Sampling Field Data Log

(Fill out one for each station visit)

GENERAL:

Site & Outfall ID _____ Your Name _____

Date _____ Field Crew _____

GRAB SAMPLES : *Put on latex gloves*

24-hr Time of Collection _____

One outfall will have additional bottles for field duplicates and equipment blanks _____

If this station has equipment blanks, you MUST prepare the equipment blanks BEFORE the scoop contacts storm water (or anything else). If you have any questions about preparing an equipment blank or a duplicate PLEASE refer to the Standard Operating Procedures or call the SEC.

	Filled and labeled (Check)
2 - 500 mL amber glass (HCL preservative) for oil & grease, TPH-diesel:	_____
2 - 40 mL VOA vials are filled to the top (no head space) for TPH-gasoline:	_____
1 - plastic bottle (approx. 100 mL) with preservative tablet for coliform:	_____
1 - glass bottle (approx. 100 mL) for pH and conductivity:	_____
Field duplicates	_____
Field equipment blanks	_____

Temperature _____ ^{o}F ***(Be sure to keep temperature meter dry)***

Conductivity _____umho/cm ***(Be sure to keep pH/conductivity meter dry)***

pH_____ pH units ***(Be sure to keep pH/conductivity meter dry)***

PRE-STORM EVENT LITTER COLLECTION FIELD DATA FORM

Names of Field Crew Members: _____ Signed: _____

_____ Today's Date: _____

OBSERVATIONS AND ACTIVITIES	8-B001	8-23C	8-24B	8-24D	8-24E	8-24F
Time:						
Damage, vandalism, stolen equipment, etc. Check box and provide specific comments below.						
Photograph area around, inlet grate to document any accumulated litter or debris.						
Pour contents of litter spike into the storm drain inlet.						
For good housekeeping of sites, clear enclosure areas of trash. Place in trash bag to dispose later.						
Replace existing ("old") litter bag with new bag. Ensure the litter bag is securely fastened by strap. Water quality sampling sites MUST receive litter bag with black velcro flap for grab sampling. Velcro flap should be positioned facing up.						
Put "old" litter bag in plastic trash bag, and label with date and location.						
Second field crew member review label and initial that it is accurate.						
Return labeled trash bag containing the litter bag to the litter lab.						

Comments: _____

_____

_____

PRE-STORM EVENT LITTER COLLECTION FIELD DATA FORM

Names of Field Crew Members: _____ Signed: _____

_____ Today's Date: _____

OBSERVATIONS AND ACTIVITIES	6-20E	6-20F	6-20B	6-20C	6-20G	6-20H
Time:						
Damage, vandalism, stolen equipment, etc. Check box and provide specific comments below.						
Photograph area around, inlet grate to document any accumulated litter or debris.						
Pour contents of litter spike into the storm drain inlet.						
For good housekeeping of sites, clear enclosure areas of trash. Place in trash bag to dispose later.						
Replace existing ("old") litter bag with new bag. Ensure the litter bag is securely fastened by strap. Water quality sampling sites MUST receive litter bag with black velcro flap for grab sampling. Velcro flap should be positioned facing up.						
Put "old" litter bag in plastic trash bag, and label with date and location.						
Second field crew member review label and initial that it is accurate.						
Return labeled trash bag containing the litter bag to the litter lab.						

Comments: _____

_____

_____

PRE-STORM EVENT LITTER COLLECTION FIELD DATA FORM

Names of Field Crew Members: _____ Signed: _____

_____ Today's Date: _____

OBSERVATIONS AND ACTIVITIES	1-42	1-B110	1-B111	1-46	1-44	1-47
Time:						
Damage, vandalism, stolen equipment, etc. Check box and provide specific comments below.						
Photograph area around, inlet grate to document any accumulated litter or debris.						
Pour contents of litter spike into the storm drain inlet.						
For good housekeeping of sites, clear enclosure areas of trash. Place in trash bag to dispose later.						
Replace existing ("old") litter bag with new bag. Ensure the litter bag is securely fastened by strap. Water quality sampling sites MUST receive litter bag with black velcro flap for grab sampling. Velcro flap should be positioned facing up.						
Put "old" litter bag in plastic trash bag, and label with date and location.						
Second field crew member review label and initial that it is accurate.						
Return labeled trash bag containing the litter bag to the litter lab.						

Comments: _____

_____

_____

PRE-STORM EVENT LITTER COLLECTION FIELD DATA FORM

Names of Field Crew Members: _____ Signed: _____

_____ Today's Date: _____

OBSERVATIONS AND ACTIVITIES	1-52	1-50	1-51	1-58	1-59	1-60
Time:						
Damage, vandalism, stolen equipment, etc. Check box and provide specific comments below.						
Photograph area around, inlet grate to document any accumulated litter or debris.						
Pour contents of litter spike into the storm drain inlet.						
For good housekeeping of sites, clear enclosure areas of trash. Place in trash bag to dispose later.						
Replace existing ("old") litter bag with new bag. Ensure the litter bag is securely fastened by strap. Water quality sampling sites MUST receive litter bag with black velcro flap for grab sampling. Velcro flap should be positioned facing up.						
Put "old" litter bag in plastic trash bag, and label with date and location.						
Second field crew member review label and initial that it is accurate.						
Return labeled trash bag containing the litter bag to the litter lab.						

Comments: _____

_____

_____

POST-STORM EVENT LITTER COLLECTION FIELD DATA FORM

Names of Field Crew Members: _____ Signed: _____

_____ Today's Date: _____

OBSERVATIONS AND ACTIVITIES	8-B001	8-23C	8-24B	8-24D	8-24E	8-24F
Time:						
Damage, vandalism, stolen equipment, etc. Check box and provide specific comments below.						
Remove existing ("old") litter bag and place inside plastic trash bag. Label trash bag with date and location.						
Second field crew member review label and initial that it is accurate.						
Look up into storm drain pipe and note what type of material is still present.						
Place new litter bag on outfall and ensure it is securely fastened by strap. Water quality sampling sites MUST receive litter bag with black velcro flap for grab sampling. Velcro flap should be positioned facing up.						
Return "old" litter bag to litter lab						

Comments: _____

_____

_____

POST-STORM EVENT LITTER COLLECTION FIELD DATA FORM

Names of Field Crew Members: _____ Signed: _____

_____ Today's Date: _____

OBSERVATIONS AND ACTIVITIES	6-20E	6-20F	6-20B	6-20C	6-20G	6-20H
Time:						
Damage, vandalism, stolen equipment, etc. Check box and provide specific comments below.						
Remove existing ("old") litter bag and place inside plastic trash bag. Label trash bag with date and location.						
Second field crew member review label and initial that it is accurate.						
Look up into storm drain pipe and note what type of material is still present.						
Place new litter bag on outfall and ensure it is securely fastened by strap. Water quality sampling sites MUST receive litter bag with black velcro flap for grab sampling. Velcro flap should be positioned facing up.						
Return "old" litter bag to litter lab						

Comments: _____

_____

_____

POST-STORM EVENT LITTER COLLECTION FIELD DATA FORM

Names of Field Crew Members: _____ Signed: _____

_____ Today's Date: _____

OBSERVATIONS AND ACTIVITIES	1-42	1-B110	1-B111	1-46	1-44	1-47
Time:						
Damage, vandalism, stolen equipment, etc. Check box and provide specific comments below.						
Remove existing ("old") litter bag and place inside plastic trash bag. Label trash bag with date and location.						
Second field crew member review label and initial that it is accurate.						
Look up into storm drain pipe and note what type of material is still present.						
Place new litter bag on outfall and ensure it is securely fastened by strap. Water quality sampling sites MUST receive litter bag with black velcro flap for grab sampling. Velcro flap should be positioned facing up.						
Return "old" litter bag to litter lab						

Comments: _____

_____

_____

POST-STORM EVENT LITTER COLLECTION FIELD DATA FORM

Names of Field Crew Members: _____ Signed: _____

_____ Today's Date: _____

OBSERVATIONS AND ACTIVITIES	1-52	1-50	1-51	1-58	1-59	1-60
Time:						
Damage, vandalism, stolen equipment, etc. Check box and provide specific comments below.						
Remove existing ("old") litter bag and place inside plastic trash bag. Label trash bag with date and location.						
Second field crew member review label and initial that it is accurate.						
Look up into storm drain pipe and note what type of material is still present.						
Place new litter bag on outfall and ensure it is securely fastened by strap. Water quality sampling sites MUST receive litter bag with black velcro flap for grab sampling. Velcro flap should be positioned facing up.						
Return "old" litter bag to litter lab						

Comments: _____

_____

_____

AUTOMATED SAMPLER STATION CHECKLIST

One crew member performs actions, other crew member checks that all actions were completed correctly

Site and Outfall #: _____

MUST Check One: ☐ Pre-Storm Set Up ☐ Post-Storm Shut Down

Field Crew Names: _____

Date and Time: _____

SET-UP CHECKS:

_____ Check desiccant indicator (color); blue is acceptable, pink is not
_____ Check flow monitor connections; bubbler line is connected, no kinks or loose fittings
_____ Check pump tubing condition/connections; no cracks, properly positioned
_____ Check intake tubing conditions/connections; no kinks or loose fittings; tubing slopes downward
_____ Clear away any accumulated sediment around the intake tubing in mouth of outfall pipe
_____ Insert sample bottles (check for retainer ring and proper bottle position)
_____ Put ice in sampler; ensure ice does not impede movement of distributor arm
_____ Remove all jar lids. Put lids in a clean Ziploc bag and place in enclosure
_____ Replace existing battery with freshly charged battery.
_____ Start sampler program→NEW program; DO NOT RESUME program. Verify "Program Running".
_____ Program flow meter: sampler pacing and cell phone to hourly for 20 minutes
_____ Start flow meter→NEW program; DO NOT RESUME program. Verify "RUNNING."

SHUT-DOWN CHECKS:

_____ Turn the sampler "**OFF**."
_____ Put lids on sample bottles
_____ Properly label all sample bottles
_____ Complete the following table.

Bottle #	Sample Volume? (1/3, 1/2, 2/3, 3/4, full, etc.)
1	
2	
3	
4	
5	
6	
7	
8	

_____ Put ice in Ziploc bags and place in cooler with bottles. **Use bubblewrap to protect bottles.**
_____ Replace existing battery with freshly charged battery.
_____ Program flow meter for cell phone to be turned on daily at time specified for sampling station.
_____ RESUME program. Verify that the flow meter is "RUNNING."

Noted Problems:_____

Actions Taken to Correct Problems:_____

URS Greiner Woodward Clyde

Completed By: _____
Date: _____

Check list for Weekly BMP Inspection

Part 1

Monday

- [ ] Contact Anthony Guyon (310.397.5347) regarding any scheduled maintenance activities to be conducted in the study area for the week. Check off items from the LMPS weekly maintenance report.
- [ ] Notify Masoud Nassimi (310.609.0363) regarding the days and times that litter pick-up & street sweeping will be done for the week.
- [ ] Call Adopt a Highway - Joe Dillman (800)358-0231 xt.207; Paul Morin pgr (949)737-0643

Wednesday

- [ ] Receive and log faxed copy of Adopt a Highways report for litter pick-up. Check problem report section for anything unusual.

Thursday

- [ ] Meet with Chase at 10:00 (at California Street Maintenance yard) Go through Check list.

Equipment:

Shovel (flat)	5 gallon bucket
Wheel barrow	Gloves
Volume measuring frame	Trash bags
Sifter	

Friday

- [ ] Receive and log faxed copy of California Street Maintenance report for street sweeping. Insure that there is a weight ticket.

Fax to Kim Walter in the San Diego Office:
1) Caltrans maintenance weekly
2) Adopt a Highway weekly report
3) California Street Maintenance weekly report
4) WWC weekly BMP inspector report

URS Greiner Woodward-Clyde

Completed By: _____
Date: _____

Check list for Weekly BMP Inspection

Part 2

Completed During Street Sweeping

SWEEPER

- ☐ Insure that Crew chief (Chase) is aware of area to be swept
- ☐ Drop off truck with equipment at the Transfer station - exit Garfield Ave. from the 105 E., turn right, right at Peterson St.
- ☐ Check that caution signal on rear truck is operational
- ☐ Hydraulics operational
- ☐ Water level @ 1/2 min.
- ☐ Rotating beacon operational
- ☐ Water spray system operational
- ☐ Sweeper broom operational (right and left gutter & rear)
- ☐ Sweeper Speed _____ (MPH)

AREA SWEPT

Scenario 1

☐ **Treatment Implementation Westbound Harris to Gertrude (once a week)**
Hopper Percentage full_____%

☐ Create date card and take picture of large debris

VOLUME

Width of Frame _____
Length of Frame _____
Irregularities in debris:_____

Volume of debris sifted (goal: 15 gallons) _____ gallons
Volume of sediment after sifting _____ gallons

Problem Report:

Scenario 2 ☐ **Control Implementation Westbound & Eastbound Atlantic to Gertrude (once a month)**

Westbound ☐ Medium & Shoulder Dump & get weight ticket

☐ Hopper Percentage full_____%

VOLUME
Width of Frame _____
Length of Frame _____
Irregularities in debris: _____
_____
_____
Volume of debris sifted (goal: 15 gallons) _____ gallons
Volume of sediment after sifting _____ gallons

Eastbound ☐ Medium & Shoulder Dump & get weight ticket

☐ Hopper Percentage full_____%

☐ Create date card and take picture of large debris

VOLUME
Width of Frame _____
Length of Frame _____
Irregularities in debris: _____
_____
_____
Volume of debris sifted (goal: 15 gallons) _____ gallons
Volume of sediment after sifting _____ gallons

Problem Report: _____
_____
_____
_____

Part 3

Litter Pick-up Inspection

☐ From the 105 W. exit Long Beach Bl. go south, left (east) at Josephine.
Inspect Harris to Atlantic for scenario 1 or Gertrude to Atlantic for scenario 2

Scenario 1 ☐ Treatment Implementation **Eastbound** Harris to Atlantic (once a week)

Problem Report: _____
_____
_____
_____

Scenario 2 ☐ Control Implementation **Eastbound** Gertrude to Atlantic (once a month)

Problem Report: _____
_____
_____
_____

CALTRANS DISTRICT 7 LITTER MANAGEMENT PILOT STUDY (LMPS)
MAINTENANCE REPORT

Completed by:			
Date:		Period:	
Site:			
Caltrans Maintenance Region/Area:			
Caltrans Road Crew Point of Contact::			
Title:		Phone:	
Caltrans Landscape Crew Point of Contact::			
Title:		Phone:	

MAINTENANCE ACTIVITIESCONDUCTED IN THE STUDY AREA

Activity – Indicate activities which were conducted during this period with a check mark		Description (Date(s)/Location)
	Street Sweeping	
	Lane Closures Scheduled in the Study Area by Special Crews or Others (Site 1 only)	
	Large Debris Removed From Lanes/ Shoulder/Row	
	Flooding - Maintenance Response Activities	
	Accidents - Debris Generated/Cleaned	
	Pavement Repair - Lanes or Shoulders	
	Painting/Stripping	
	Other Activities Which May Impact Water Quality	
	Landscape Maintenance - Tree Trimming; Other Shrub Trimming or Mowing	
	Litter Pick-Up - AAH Bags Collected by CT (Applicable to Sites 6 & 8 only).	
	Litter Pick-Up – Conducted by Caltrans	

APPENDIX C Description of False Start Events

Year 1 (1998-1999)

False Starts Event Nos. 1998-04,1998-07,1998-08

On three occasions during year 1 of monitoring, December 3, 1998, February 19, 1999, and March 5, 1999, field crews were mobilized for pre-event setup based on quantitative precipitation forecasts. However, as each storm onset time approached, actual storm conditions did not meet predicted precipitation forecasts to warrant mobilization of field crews for grab sampling.

Predicted Event: December 4, 1998 (1998-04)

Based on the QPFs issued for December 4, field crews mobilized on the afternoon of December 3. The initial QPF on December 3, 1998, 0947 PST, indicated a storm would deliver 0.95 to 0.99 inches at the monitoring sites. By December 4, 1999 - 0500 PST, a new QPF indicated a lesser rainfall total ranging from 0.40 to 0.46 inches, with a rainfall probability of 70 percent. By December 4, 1000 PST, a new QPF lowered the precipitation total to between 0.20 and 0.23 inches, with a probability of 60 percent. Based on this QPF, the SEC suspended the monitoring event. Post-storm event rain gauge recordings for the monitored sites indicated rainfall totals at sites ranging from 0.05 to 0.13 inches.

Predicted Event: February 21, 1999 (1998-07)

On February 19, 1999, 0549 PST, a QPF was issued by Fox Weather indicating an impending storm with rainfall totals ranging from 0.70 to 0.88 inches for the monitoring sites. The probability of 0.20 inches of precipitation was estimated at 90 percent for onset beginning February 21 at approximately 0600 PST. Based upon this QPF, the SEC mobilized a pre-setup crew at Noon on February 19, 1999. A subsequent QPF issued at 1418 PST, lowered expected total rainfall to between 0.48 and 0.57 inches, with a probability of 80 percent. This updated QPF, despite indicating lowered expectations, continued to represent a storm event sufficient for monitoring. By February 20, 1999, 1500 PST, the QPF still indicated a total rainfall of between 0.39 and 0.55 inches, with 80 to 90 percent probability. The SEC also relied upon National Weather Service (NWS) reports from Oxnard, California. These NWS reports indicated a significantly less total rainfall and probability. Based on the accuracy of past forecasts, the SEC decided to not mobilize field teams for storm water grab sampling. This decision proved to be accurate as post-event rain gauge checks revealed no precipitation at monitored sites for February 21, 1999.

Predicted Event: March 6, 1999 (1998-08)

On March 5, 1999 - 0424 PST, a QPF was issued for a storm event with rain onset for March 6 at 0900 PST. Forecasts indicated a total rainfall of 0.15 to 0.20 inches, with probability of 50 percent. However, Fox Weather indicated through verbal discussions with the SEC that the issued QPF was a conservative forecast. Fox Weather indicated that the system moving into southern California would likely gain more moisture locally. Based upon the QPF and these additional factors, the SEC mobilized a pre-storm setup team on the afternoon of March 5. By March 6, 0354 PST, a newly issued QPF predicted total rainfall of 0.11 to 0.15 inches.

Probability for rainfall remained at 40 percent for 0.20 inches rainfall. On March 7, 1999, 0530 PST, Fox Weather issued a QPF with decreased predicted rainfall totals of 0.10 to 0.14 inches, with a 20 percent probability for 0.20 inches rainfall. Based on the latest QPF, the SEC decided to not mobilize a grab sampling crew. Rain gauges at monitored outfalls recorded no precipitation, except for Site 6-20E and 6-20F, with total recorded rainfall of 0.02 and 0.03 inches.

Year 2 (1999-2000)

False Starts Event Nos. 1999-01, 1999-02, 1999-04, 1999-07

On four occasions during year 2 of monitoring, November 14-17, 1999, December 10, 1999, January 15-18, 2000, and February 5, 2000, field crews were mobilized for pre-event setup based on quantitative precipitation forecasts. However, as each storm onset time approached, actual storm conditions did not meet predicted precipitation forecasts to warrant mobilization of field crews for grab sampling. Each event is described below.

Predicted Event: November 14-17, 1999 (1999-01)

Based on QPFs issued for an event predicted to occur on November 15, 1999, field crews mobilized on November 14, 1999 to perform pre-storm set-up activities. However, the storm predictions weakened throughout the late afternoon and evening of November 14, 1999 and sampling activities for November 15, 1999 were cancelled. The contract meteorologist, Fox Weather, indicated that another storm was predicted (85 percent probability of 0.7 inch rainfall) to occur on November 16, 1999 with onset around 9pm. Crews were dispatched to re-ice samplers during the morning of November 16, 2000. By 9pm on November 16, 2000, Fox Weather indicated that the second front had weakened as well and that the storm was not anticipated to meet trigger criteria. Rain gauges indicated no recorded precipitation during this period.

Predicted Event: December 10, 1999 (1999-02)

Based on QPF's issued for an event predicted to occur on December 10, 1999, field crews mobilized on December 9, 1999 to perform pre-storm set-up activities. A 70 percent average probability of 0.25+ inch rainfall was predicted at the four LMPS sites. By 3pm on December 9, 1999, Fox Weather substantially lowered the precipitation forecast to 0.1 inch rainfall and by 9 pm, Fox Weather indicated that the storm had dried up and would not likely generate conditions for storm water sampling. Rain gauges indicated no recorded precipitation during this period.

Predicted Event: January 15-18, 2000 (1999-04)

Based on QPFs issued for an event predicted to occur on January 16, 2000, field crews mobilized on January 15, 2000 to perform pre-storm set-up activities. A 80 percent probability of 0.2 inch rainfall at all sites was predicted to begin at approximately 8 am on January 16, 2000. However, at 6 am on January 16, 2000 Fox weather indicated that the front had weakened and the storm would not be suitable for grab sampling, but that sampling would be possible for the night of

January 16-17, 2000. By 1 pm on January 16, 2000, the predicted nighttime rain had also weakened. Grab sampling was cancelled. The contract meteorologist, Fox Weather, indicated that another storm was to occur for the night of January 17-18, 2000 so field crews re-iced samplers and performed set-up checks on January 17, 2000 for the newly predicted event. At 9pm on January 17, 2000, Fox Weather indicated that rain would not occur before 3am on January 18, 2000. At 6 am on January 18, 2000, Fox Weather's QPF predicted rainfall totals of 0.00 to 0.03 inches at the four LMPS sites. Sampling activities were called off. Rain gauges indicated no recorded precipitation during this period.

Predicted Event: February 5, 2000 (1999-07)

Based on QPFs issued for, and discussion with Fox Weather regarding, an event predicted to occur on February 5, 2000, field crews mobilized on February 4, 2000 to perform pre-storm set-up activities. An 80 percent probability of 0.20 inch rainfall was predicted at the four LMPS sites. By 11pm on February 4, 2000, Fox Weather issued an updated SSMI moisture analysis, indicating that there was a "substantial decrease in intensity of the front." A QPF issued at 5:31 am on February 5, 2000 indicated that the storm had dried up and would not generate conditions for storm water sampling. Rain gauges indicated no recorded precipitation during this period.

D.1 METHODS USED FOR VALIDATING HYDROLOGIC RAW DATA

Event hydrographs were generated for each event using minute by minute rainfall and flow data recorded by each outfall's data logger. The plots are provided in Appendix E. Additional parameters were calculated after initial analysis of the hydrologic and hydraulic conditions present during early events. These parameters were used to determine the validity of the values originally estimated for each catchment, (e.g., estimated runoff coefficient, sample pacing). A macro was used to perform calculations on event specific data in a consistent and rigorous manner.

D.1.1 VARIABLES AND HYDROLOGIC DATA

Variables Initially Assumed

Assumed outfall variables included drainage area, runoff coefficient, and depression storage. As-built areas from Caltrans drawings were assumed to represent the areas draining to each outfall. For the first event, an assumed runoff coefficient of 0.90 and depression storage of 0.00 were used at all outfalls. Following the first event, values calculated for runoff coefficient and depression storage from the first event at each outfall were used as a basis for assumptions for the outfall for the 1998-1999 wet weather season. As the study progressed, these assumed values were corrected and refined based on available data.

For Event 1998-01 the intra-event cumulative rainfall records were used to determine an initial estimate for the runoff coefficient and check assumptions about watershed characteristics for sample pacing purposes. The rainfall record over the duration of the event is shown in Figure 1. This graph was the first examination in a series of integrated QA/QC checks (summarized in Section 4.2.1) of the rainfall and runoff field data. In addition to ensuring that the equipment was functioning properly, the cumulative rainfall curves for the four water quality outfalls at Site 1 were used as replicates to increase the level of confidence in the rainfall recorded.

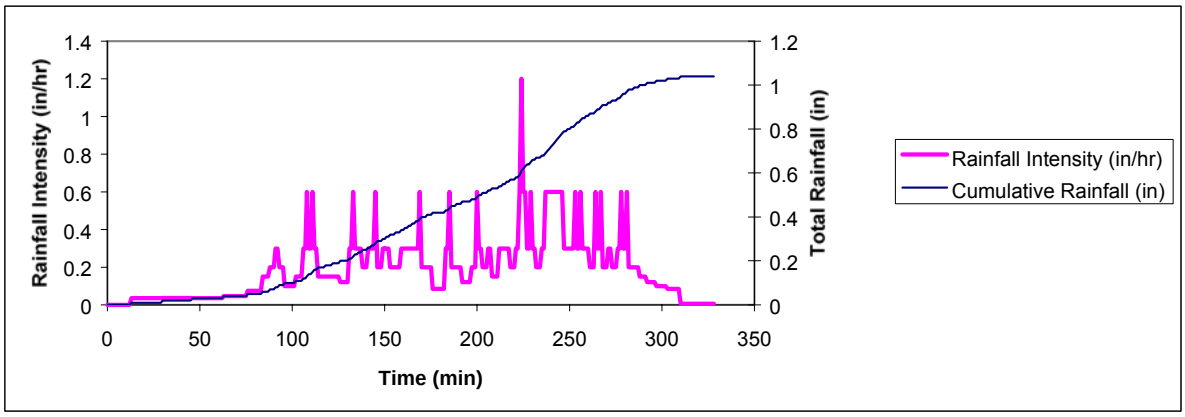

Figure 1
Recorded Cumulative Rainfall and
Rainfall Intensity for Event 1998-01 at Outfall 1-58

Having a high degree of confidence in the rainfall record at the Site based on the replicate rainfall records, the flow data was examined along with the rainfall record to approximate the time of concentration, and response of the watershed to rainfall. Figure 2 shows the runoff flow rate as a function of rainfall intensity.

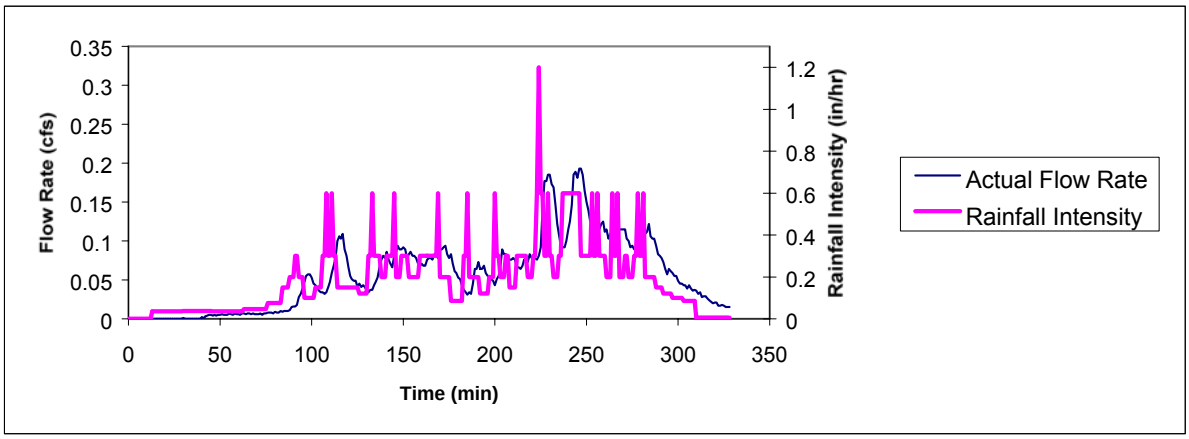

Figure 2
Recorded Rainfall and Flow Rate for Event 1998-01 at Outfall 1-58

Based on the initial assumptions [a runoff coefficient of approximately 0.9 for an imperivous surface and an approximate time of concentration (TOC) of 4 minutes], and the actual rainfall intensity, predicted flow rate was calculated for the first event. This calculated flow rate is shown along with the actual recorded flow rate in Figure 3, and the recorded cumulative flow volume and the predicted flow volume are shown in Figure 4.

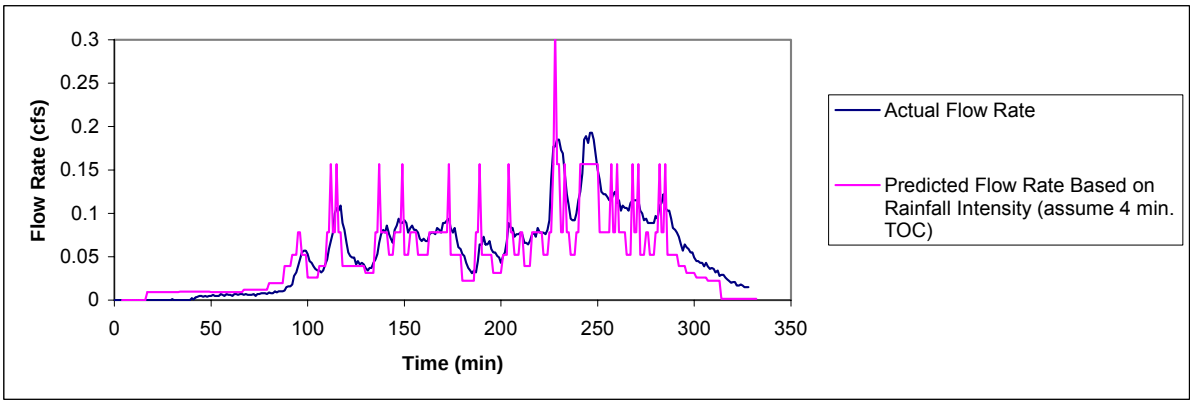

Figure 3
Flow Rate Recorded and Predicted Flow for Event 1998-01 at Outfall 1-58

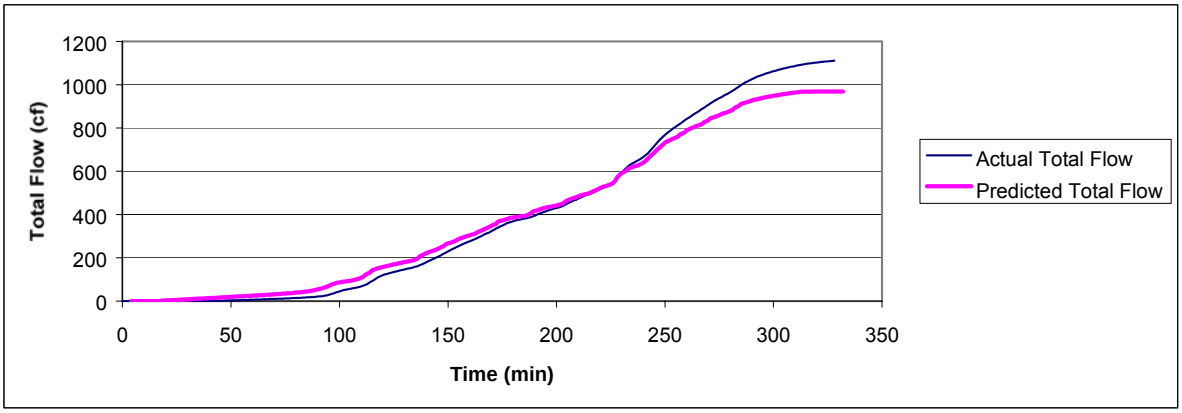

Figure 4

Comparison of Actual Cumulative Flow and Predicted Cumulative Flow Based on a Runoff Coefficient of 0.90 for Event 1998-01 at Outfall 1-58

Regressing the two variables for the Event 1998-01 generated the slope of the rainfall/runoff curve for the intra-event cumulative rainfall and runoff values. The data and regression lines are shown in Figure 5. A portion of the early rainfall/runoff record was excluded from the regression due to the violation of the assumption that the time of concentration is approximately four minutes.

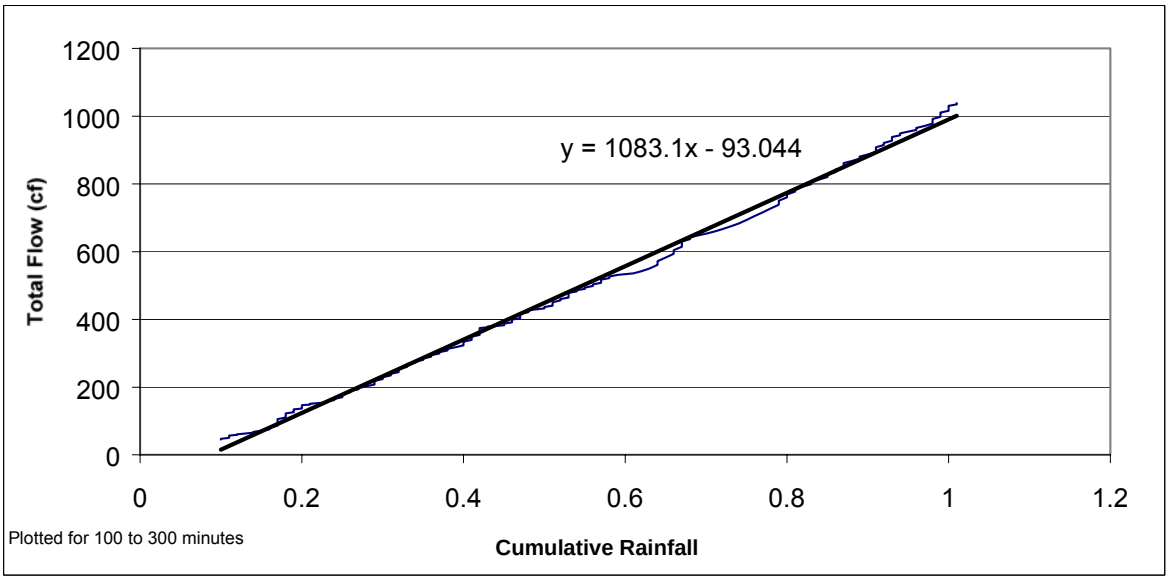

Figure 5

Regression of Intra-Event Runoff as a Function of Rainfall for Event 1998-01 at Outfall 1-58

The slope of the regression given by the rainfall/runoff curve was converted to units of watershed inches of flow per inch of rainfall [1083.1 ft^3 flow/in / (0.29 ac) / (3630 ft^3/ac-in) / (1 in) = 1.03 watershed in / in rainfall or a runoff coefficient of 1.029. Depression storage was estimated from the x-intercept of the regression line. An assumed value for depression storage

for each outfall was generated based on the Event 1998-01 calculated depression storage for the outfall. Analyses identical to that shown in Figures 1-5 were conducted for each outfall in the study. The resulting estimates for the runoff coefficient are shown in Table 1.

Table 1
Initial Estimates for Runoff Coefficient (C) and Depression Storage Based on Event 1998-01

Site	Outfall	As-Built Area (acres)	Assumed C Events 1998-02 to 1998-13	Assumed Depression Storage (in) Events 1998-02 to 1998-13
1E	42	0.34	0.664	0.150
	46	0.46	0.488	0.252
1W	52	0.38	0.633	0.165
	58	0.29	1.029	0.086
6	20e	0.42	0.730	0.113
	20f	0.42	0.655	0.112
8	23c	0.62	0.281	0.119
	b001	0.57	0.281	0.119

The monitoring results for Event 1998-02 were checked against the information gleaned from the intra-event analysis of Event 1998-01. Event 1998-02 was a short duration storm (~3 hours) with high one minute peak intensity at Site 8 (as much as 4.2 in/hr at outfall b001 and 23c), and low volume at Sites 1 and 6. Although Event 1998-02 did not provide a large quantity of useful intra-event information, the total rainfall and runoff amounts were not inconsistent with those found for Event 1998-01.

Refinement of Watershed Characteristics

As further detailed event rainfall and runoff information became available throughout the study, the characteristics of the watershed draining to each outfall were better understood, which in turn made estimates of runoff increasingly accurate. The refined information describing the runoff characteristics of the watershed was useful for both pre-event equipment setup (sampler pacing) and data analysis.

Hydrologic Data

Hydrologic data recorded for each outfall consisted of unedited minute by minute rainfall and flow data downloaded directly from the outfalls' data logger.

D.1.2 CALCULATIONS

Definition of the Event

The LWA data reporting protocol provides a definition of a precipitation event that contains three criteria indicating the start of a storm and three criteria indicating the end of a storm when

minute by minute precipitation data is used. The criteria for the start of the precipitation event include 1) the event begins in a minute in which precipitation is recorded, 2) within the 6 hours following and including the first minute of the storm, 0.1 inches of precipitation or greater are recorded, and 3) within the first hour following and including the first minute, greater than 0.01 inches of precipitation are recorded. The criteria defining the end of a precipitation event include 1) the event ends in a minute in which precipitation is recorded, 2) within the hour preceding and including the last minute, greater than 0.01 inches of precipitation are recorded, and 3) during the six hours following and not including the last minute, less than 0.01 inches of precipitation is recorded in each hour.

In order to identify the start and stop times of each event, a series of if/then statements were created to evaluate each minute of rainfall data that was downloaded from the Sigma Samplers. Two if/then statements checked the start criteria, and two if/then statements checked the end criteria. A fifth if/then statement checked each column of start/stop criteria for the first occurrence of all start criteria being met in one minute and the occurrence of all stop criteria being met in one minute, and then placed the flag "STARTTIME" or "STOPTIME" in the appropriate row.

It was assumed that event flow began in the same minute that marked the start of the precipitation event. Event flow was truncated 60 minutes after the end of the precipitation event to remove flow values that were potentially based on standing water in the flumes from calculations of event flow. This time was shown to be well in excess of the time of concentration for each of the watersheds in the study even at very low rainfall intensities.

Event Precipitation and Flow Calculations

All calculations were performed using the minute by minute data between the marked start and end times for precipitation and flow.

Rainfall intensity was calculated in each minute in which rainfall was recorded by using the value of how much time had passed since the previous minute with recorded rainfall to determine an average intensity over the time period. Rainfall intensities in the hydrographs are presented as one minute intensities. Although this format does not give intensity on the order of the time of concentration, it was used due to the increased ability for the hydrographs to quickly identify rainfall errors and accurately represent the rainfall record. In addition, the use of 15-min rainfall averages would minimize the ability to gauge the response of the watershed to rapid changes in rainfall intensity. Time of concentration can be quite low for the smaller watersheds during large events.

Flow rate was calculated for each minute by the data logger based on the level in the flume. Only flow between the marked start and end times was used for identification of the peak flow rate and summing of total flow during the event.

Event Observed Runoff Coefficient and Depression Storage Calculations

The observed runoff coefficient was calculated using the total flow recorded between the start and end flow times, the as-built area draining to the outfall, and the total rainfall recorded between the start and end of the precipitation event.

The observed depression storage was calculated by determining the total rainfall that had fallen since the start rainfall time and the when the flow was less than or equal to 1 cf.

D.2 RAINFALL QA/QC

The study strategy of using reference watersheds and the required use of multiple water quality monitoring stations at each site allows for comparisons of the rainfall record at adjacent outfalls. Site 1E, Site 1W, Sites 6 and Site 8 each have two sets of water quality monitoring equipment and thus have two rainfall gauges. Section 3, the Addendum and Figures 3-3 through 3-5 in the Final Detailed Study Plan and Design (URSGWC, 1998) provide specific information about the relative location of each of the rainfall gauges. For the events monitored, the rainfall record, intra-storm rainfall accumulations, and calculated intensities can be compared between each set of co-located rainfall gauges. Table 4–2 shows the recorded rainfall totals for each water quality event. The column labeled "Rainfall Abnormality" shows rainfall records that were deemed to be outside of the expected rainfall total for the event. A total of 18 "abnormalities" were identified from examination of the replicates and supporting information about the rainfall total for each location.

Three primary reasons for disagreement between gauges at the same site are plausible:

1. Introduction of foreign materials into or on top of the rain gauge, (e.g., bird droppings or vegetative mater)
2. Rain shadow resulting from vegetation
3. Unexplained equipment problems

In a number of cases, the introduction of foreign materials into the rain gauge was documented by field crews. This is the case for the low rainfall totals during event 1998e01 at outfall 23c, event 1998e02 at outfall 46, event 1998e5 outfall 42 (see Table 4–2). The other cases (e.g., event 1998e02 and event 1998e13 at outfall 23c) could not be directly identified as being caused by plugging or the presence of foreign material on the rain gauge funnel screen. During analysis of year 2 data it became apparent that the rain gauge at outfall 8-23c recorded a low rainfall total for a number of events. Initial indications for the abnormal gauge measurements at 8-23c during year 1 were assumed to be the result of vegetative matter in the rain gauge during the event, however, during year 2 a rigorous field check of the gauges indicated that this was not the case. Each gauge was checked to ensure the gauge was level and clean prior to each event. This is most likely due to rain shadow resulting from nearby vegetation. The average rainfall totals recorded at the site were used to correct rainfall abnormalities.

D.3 RUNOFF QA/QC AND ANALYSIS OF RAINFALL/RUNOFF CURVES

After the raw data was separated into discrete storm events, the relationship between runoff and rainfall volume was examined for all of the events at each outfall. Rainfall totals are based on Caltrans definition of an event as provided by Larry Walker and Associates. Flow totals are for a period beginning at the start time of the event and ending one hour after the event ends. Four steps were followed in evaluating the quality of the rainfall/runoff pairs and the observed relationship between rainfall and runoff: The initial analysis of runoff was based on as-built

areas. Revised regressions are based on additional field work conducted as shown following this section.

1. The rainfall/runoff data was examined for outliers using a linear regression model and the studentized residual as an indicator of points that are possible outliers. The goal of this analysis is to identify points that are "contaminated" by external factors not related to the phenomena of interest (i.e., the rainfall/runoff curve for each watershed). Outliers are identified where the studentized residual is large (absolute value greater than 2 or 3). The results of this analysis are shown in Figures 6–13.
2. The studentized residual is used to determine if a given point is an outlier with respect to the dependent variable. The following description of the studentized residual for outlier detection is presented in *Data Quality Control/Quality Assurance* by Edwards.

"Outliers in regression can be detected by means of studentized residuals. Several varieties have been defined, but the so-called externally studentized residual is recommended:

$$r_i = \frac{e_i}{\sqrt{MSE_{(-i)}\left(1-h_i\right)}}$$

where e_i is the ith ordinary residual (actual Y_i - predicted Y_i) and $MSE_{(-i)}$ is the error mean square for the regression excluding the ith pair. (h_i is the y-value for the ith data point)

If the formal assumptions of the regression analysis hold, studentized residuals can be used to test for contamination, since each r_i follows a Student's t-distribution with (n-3) degrees of freedom under the hypothesis of no contamination.

These outlier tests are only valid if the assumptions of the regression hold, however. These assumptions, verbally stated, are:

- The values of the regressor X are known constants (measured with negligible error).
- At any fixed X, the long-run mean of many Y-values, say m(X), is a linear function of X.
- The regression "errors" (the deviations of repeated Y-values at a given X from their long-run mean m(X)) are Normally distributed, with constant variance, and are independent."

A studentized residual in excess of 2 is often considered an outlier. Leverage is determined by using Cook's distance (D).

Cook's distance measures the influence of each sample observation on the coefficient estimates. Observations that are far from the average of all the independent variable values or that have large residuals tend to have a large Cook's distance value. Cook's D actually follows closely an F distribution, so aberrant values depend on the sample size. As a rule of thumb, under normal regression assumptions, the (Cook's distance) can be compared to an F distribution with p and N-p degrees of freedom. We don't want to find a large Cook's D value for an observation because it would mean that the coefficient estimates would change substantially if we deleted that observation. (SPSS, 1998)

Typically a point with Cook's D in excess of 0.5 is considered to have high leverage. In none of the cases presented in the following discussion, was high leverage cause for exclusion from the final regression analysis. In fact, it is these high rainfall/runoff values that are most interesting and informational.

When examining the statistical analysis done in this section it should be noted that the approach does not identify data contamination of pairs of rainfall/runoff data that lie close to the regression model.

The analysis of year 1 rainfall and runoff data is presented below. Year 2 data was analyzed identically. Identified rainfall and flow abnormalities in year 2 were corrected in an analogous manner to the year 1 data.

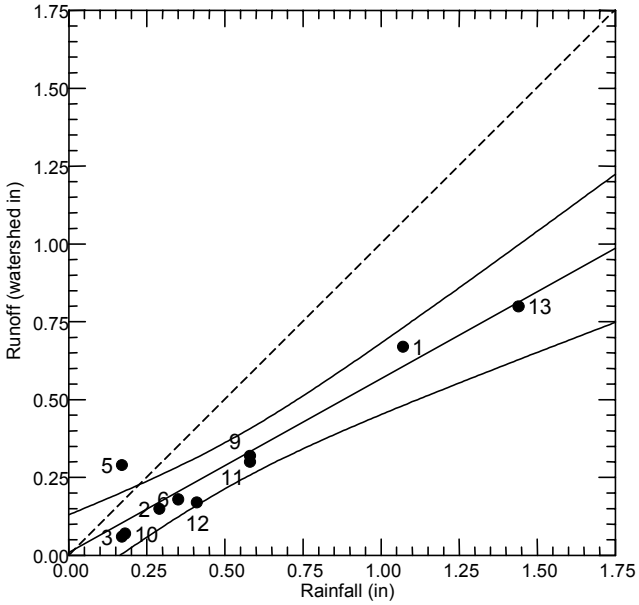

Figure 6

Initial year 1 regression of rainfall versus runoff for Outfall 42. Slope of regression line is 0.56, Event 5 is considered an outlier with a Studentized Residual of 6.607. Event one has large leverage (0.621), (95% confidence interval shown along with 1:1 reference line).

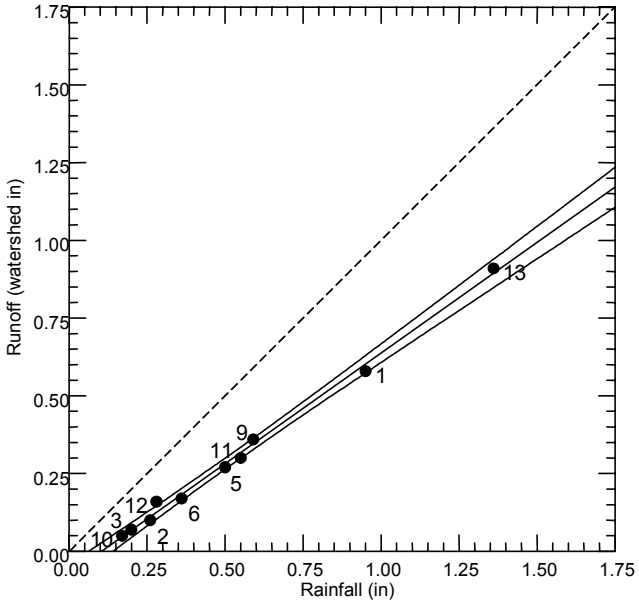

Figure 7

Initial year 1 regression of rainfall versus runoff for Outfall 46. Slope of regression line is 0.59, Event 13 is considered an outlier with a Studentized Residual of 2.391. Event 13 has large leverage (0.631), (95% confidence interval shown along with 1:1 reference line).

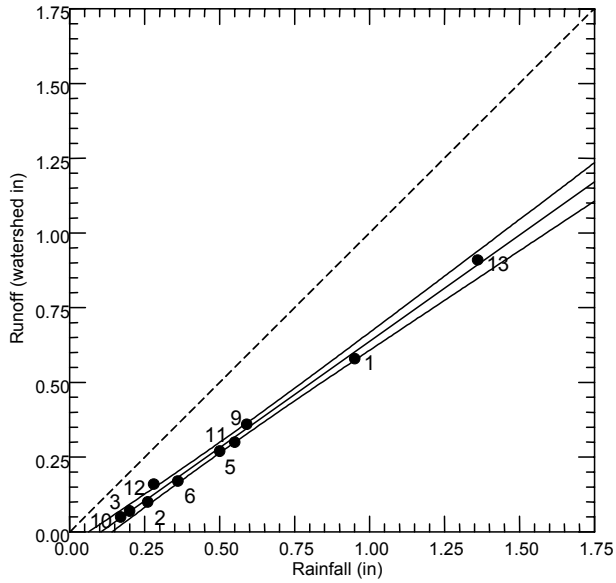

Figure 8

Initial year 1 regression of rainfall versus runoff for Outfall 52. Slope of regression line is 0.719, Event 12 is considered an outlier with a Studentized Residual of 2.663. Event 13 has large leverage (0.652), (95% confidence interval shown along with 1:1 reference line).

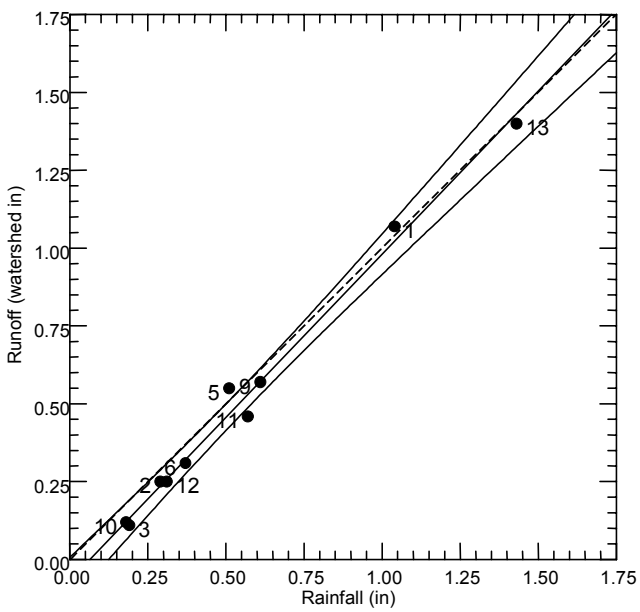

Figure 9

Initial year 1 regression of rainfall versus runoff for Outfall 58. Slope of regression line is 1.048, Event 5 is considered an outlier with a Studentized Residual of 2.559. Event 13 has large leverage (0.636), (95% confidence interval shown along with 1:1 reference line).

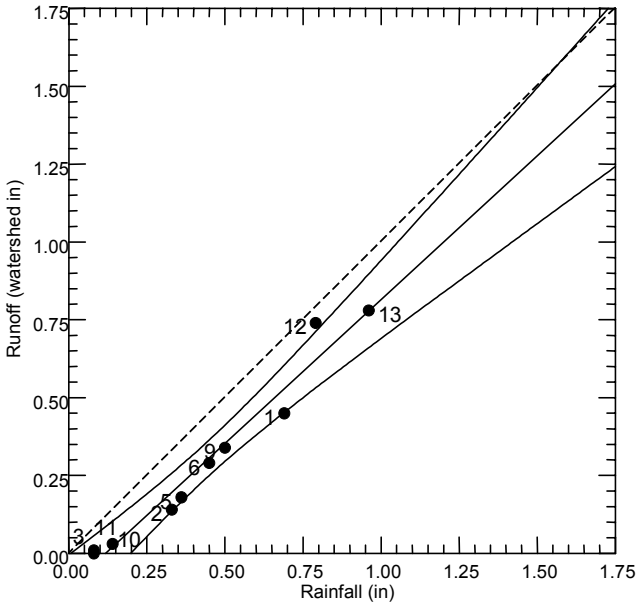

Figure 10

Initial year 1 regression of rainfall versus runoff for Outfall 20e. Slope of regression line is 0.924, Event 12 is considered an outlier with a Studentized Residual of 3.560, (95% confidence interval shown along with 1:1 reference line).

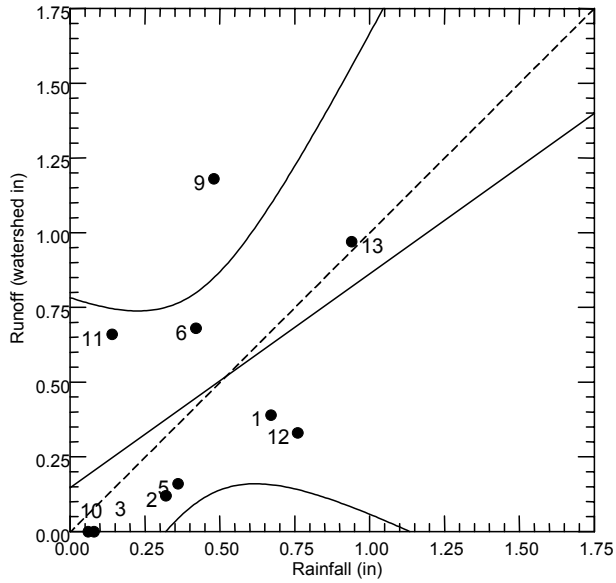

Figure 11

Initial year 1 regression of rainfall versus runoff for Outfall 20f. Slope of regression line is 0.716, Event 9 is considered an outlier with a Studentized Residual of 2.533, (95% confidence interval shown along with 1:1 reference line)

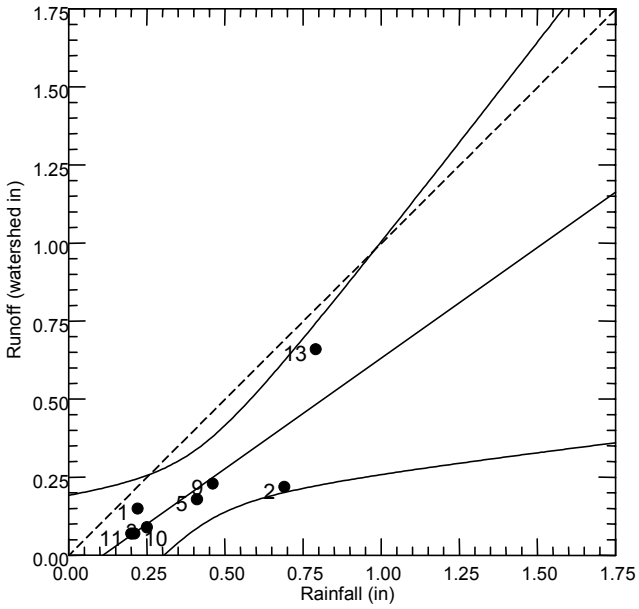

Figure 12

Initial year 1 regression of rainfall versus runoff for Outfall 23c. Slope of regression line is 0.709, Events 2 and 13 are considered outliers with Studentized Residuals of –3.864 and 6.373 respectively, (95% confidence interval shown along with 1:1 reference line).

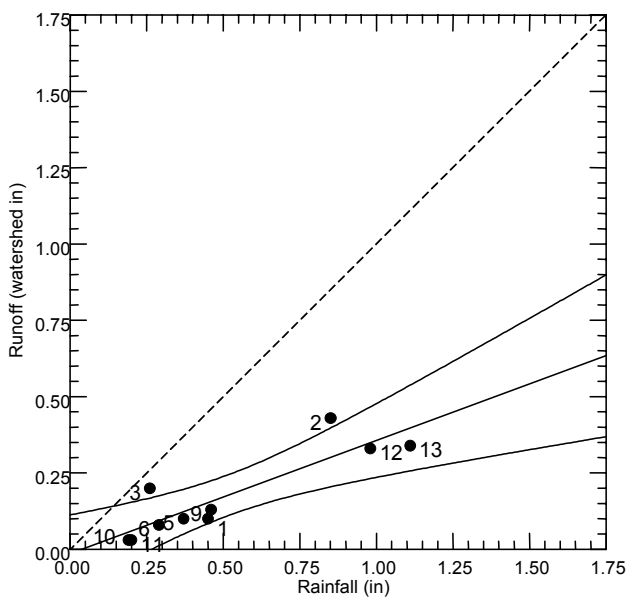

Figure 13

Initial year 1 regression of rainfall versus runoff for Outfall b001. Slope of regression line is 0.307, Event 2 is considered an outlier with a Studentized Residual of 2.805, (95% confidence interval shown along with 1:1 reference line).

ELIMINATION OF KNOWN EQUIPMENT PROBLEMS

The quantitative identification of contaminated data is supported by additional analysis of intra-event flow information. In two situations, spikes in the flow record occurred due to equipment problems as indicated in the flow record:

- Event 10 at outfall 42
- Event 11 at outfall 20f

These spikes were identified through examination of hydrographs and cumulative flow curves for all events and outfalls. In neither case was there a corresponding increase in rainfall intensity that would account for the rapid increase and subsequent decrease in flow rate. For event 11 at outfall 20f the reading for flow rate far exceeded the capacity of the measuring device. The spikes were removed from the flow record. After this was done, the cumulative flow volumes for the storms were adjusted appropriately and the rainfall/runoff curves for these outfalls were redone. These modified rainfall/runoff curves, including year 1 events, are presented in Figures 14 and 15.

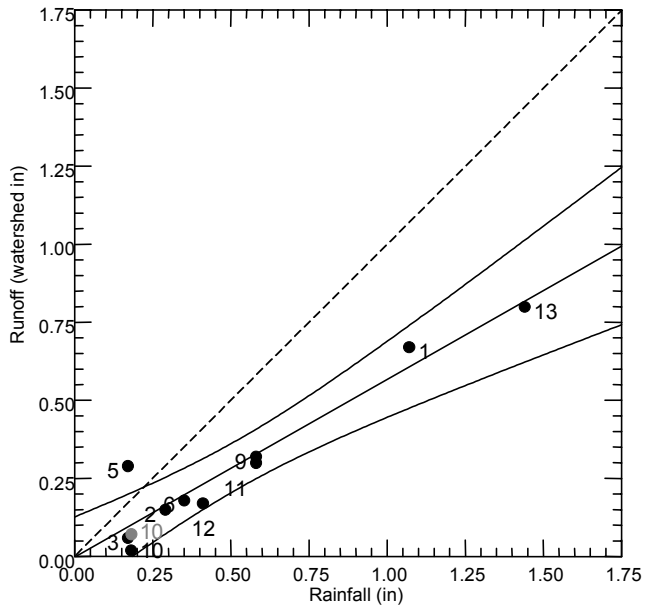

Figure 14

Regression of rainfall versus runoff for Outfall 42. Slope of regression line is 0.569. Removal of spike in flow record for event 10.

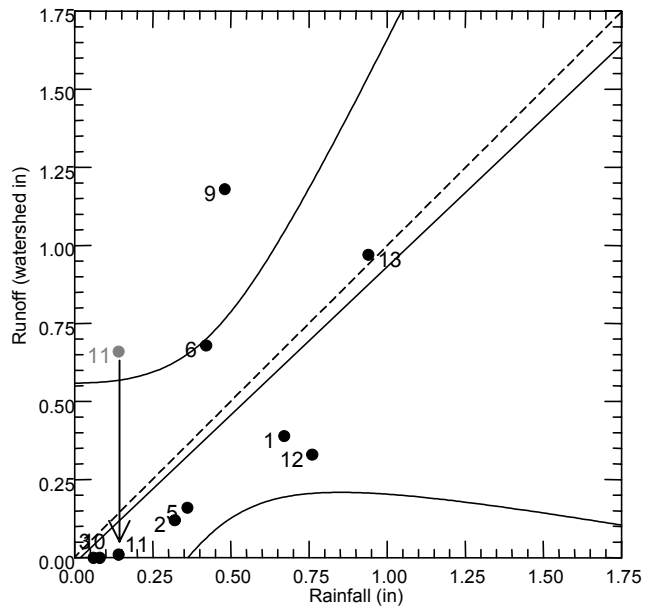

Figure 15

Regression of rainfall versus runoff for Outfall 20f. Slope of regression line is 0.949. Removal of spike in flow record for event 11.

REMOVAL OF RAINFALL ANOMALIES.

Four cases in the year 1 rainfall record were verified as having abnormal rainfall totals. Adjacent rainfall gauges at each site were used as surrogate values for each of these instances. The modifications made are shown graphically in Figures 16 through 18 and described in Table 4–3.

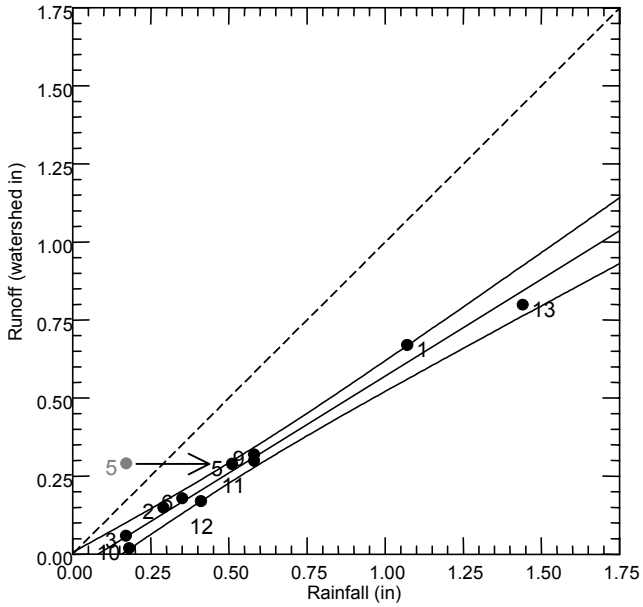

Figure 16

Modification made to rainfall record for event 5 at outfall 42 and resulting regression. Replacement value taken from average of values recorded at outfalls 42,52, and 58. (95% confidence interval shown).

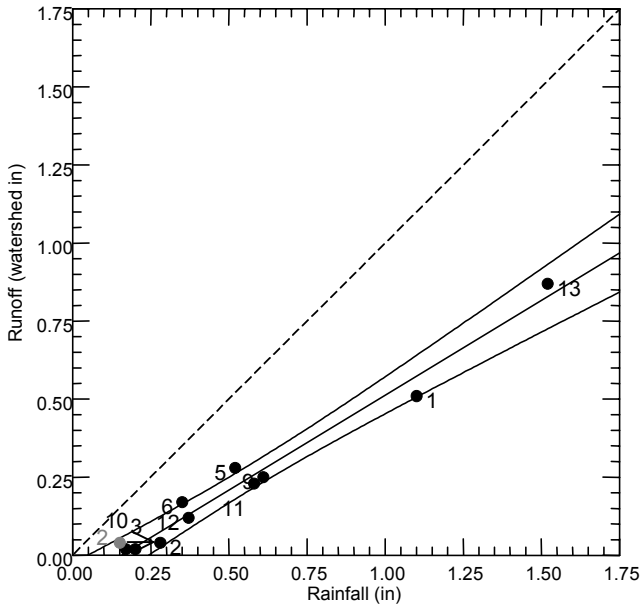

Figure 17

Modification made to rainfall record for event 2 at outfall 46 and resulting regression. Replacement value taken from average of values recorded at outfalls 42,52, and 58. (95% confidence interval shown).

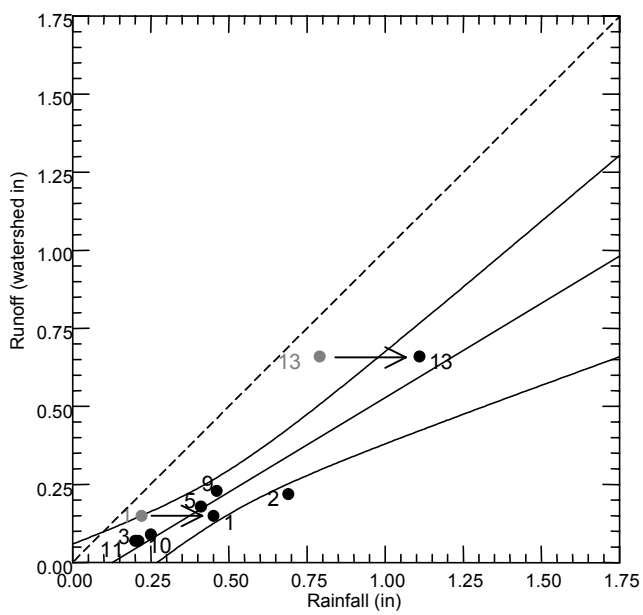

Figure 18

Modification made to rainfall record for events 13 and 1 at outfall 23c and resulting regression. Replacement values taken from outfall b001. (95% confidence interval shown).

Similar analysis and adjustments were made to all abnormal rainfall totals in year 2.

YEAR 1 REGRESSIONS. ELIMINATION OF ADDITIONAL DATA POINTS THAT ARE SIGNIFICANTLY OUTSIDE THE EXPECTED RANGE

Graphs for outfalls affected are presented addition to those that remain unchanged. A detailed description of the rationale behind the exclusion of data points is given in Table 4–3.

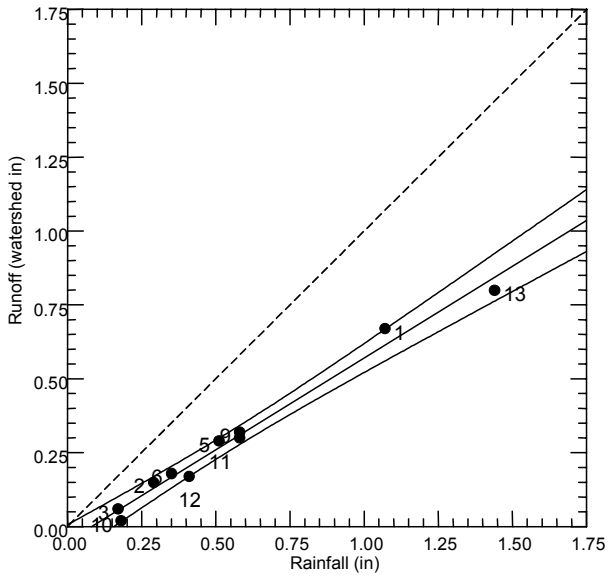

Figure 19

Final regression of rainfall/runoff data for outfall 42. Slope of regression line is 0.621. (95% confidence interval shown)

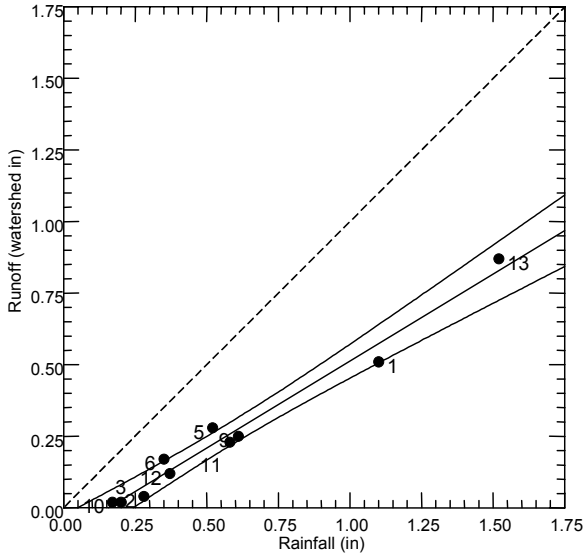

Figure 20

Final regression of rainfall/runoff data for outfall 46. Slope of regression line is 0.612. (95% confidence interval shown).

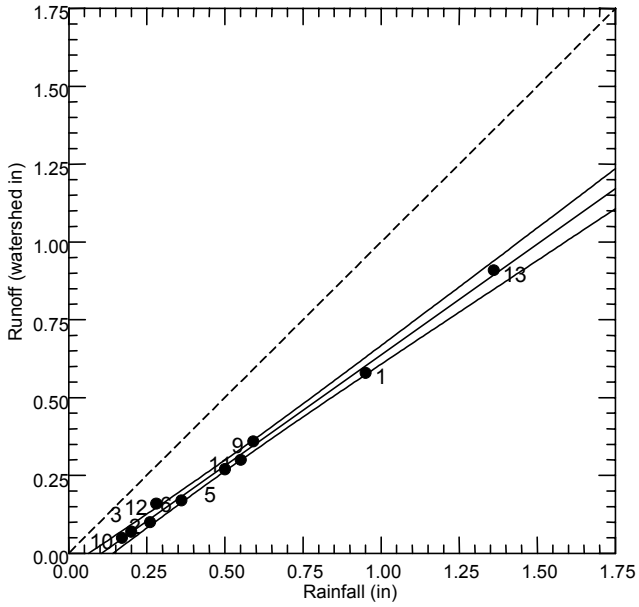

Figure 21

Final regression of rainfall/runoff data for outfall 52. Slope of regression line is 0.711. (95% confidence interval shown).

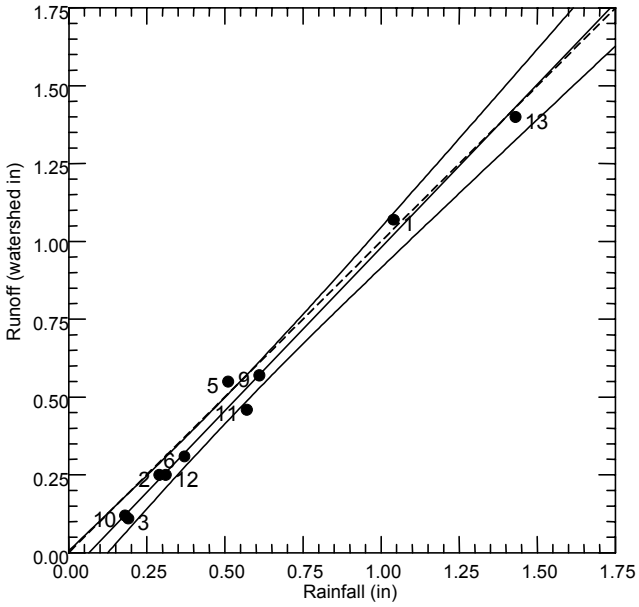

Figure 22

Final regression of rainfall/runoff data for outfall 58. Slope of regression line is 1.048. (95% confidence interval shown).

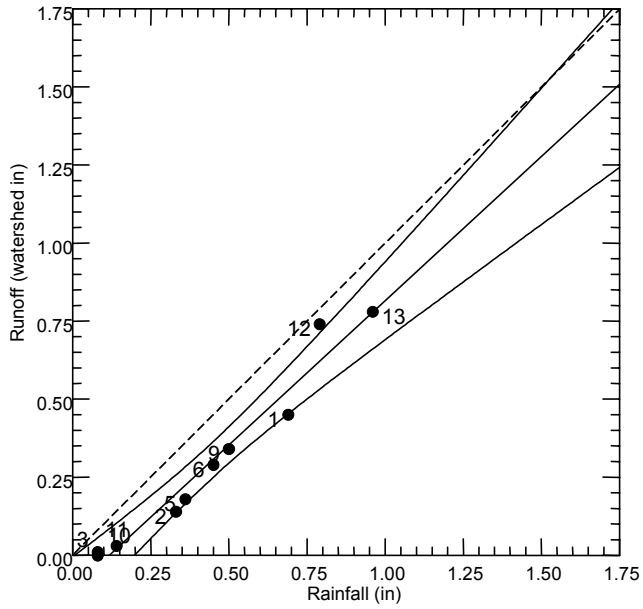

Figure 23

Final regression of rainfall/runoff data for outfall 20e. Slope of regression line is 0.924. (95% confidence interval shown).

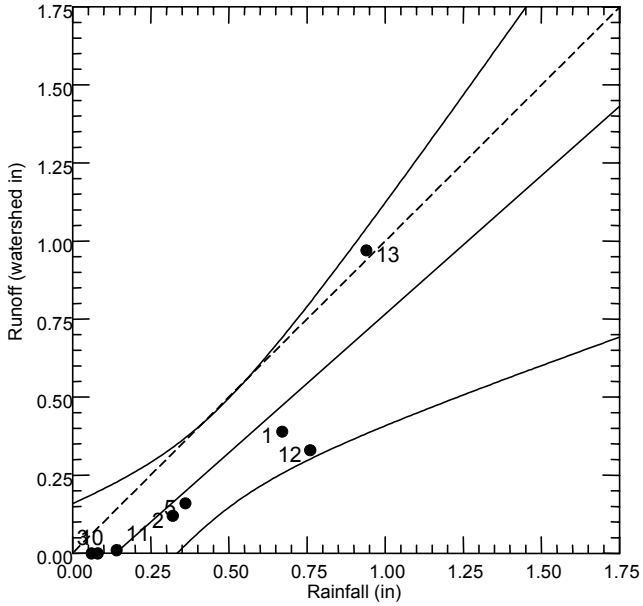

Figure 24

Final regression of rainfall/runoff data for outfall 20f. Slope of regression line is 0.887. (95% confidence interval shown).

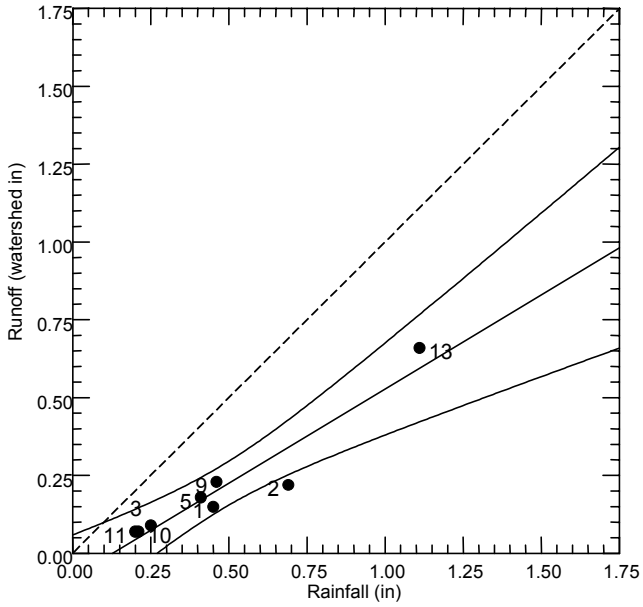

Figure 25

Final regression of rainfall/runoff data for outfall 23c. Slope of regression line is 0.605. (95% confidence interval shown)

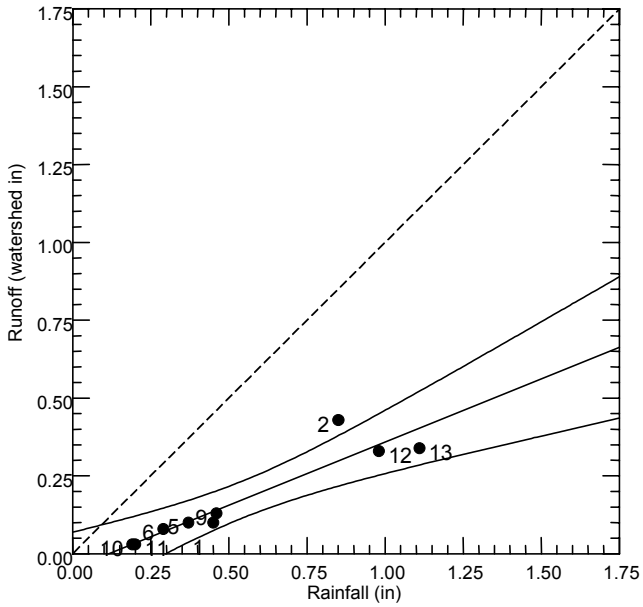

Figure 26

Final regression of rainfall/runoff data for outfall b001. Slope of regression line is 0.405. (95% confidence interval shown)

D.4 RE-EVALUATION OF YEAR 1 RAINFALL/RUNOFF RELATIONSHIP AFTER UPDATE OF WATERSHED AREAS RESULTING FROM FIELD VERIFICATION

Additional fieldwork, prior to the year 2 monitoring season, confirmed that both the watershed areas, and thus, the estimated runoff coefficient for many of the water quality outfalls could be improved. Figures 27 through 34 show the results of the revised watershed areas on runoff versus rainfall curves for year 1 data.

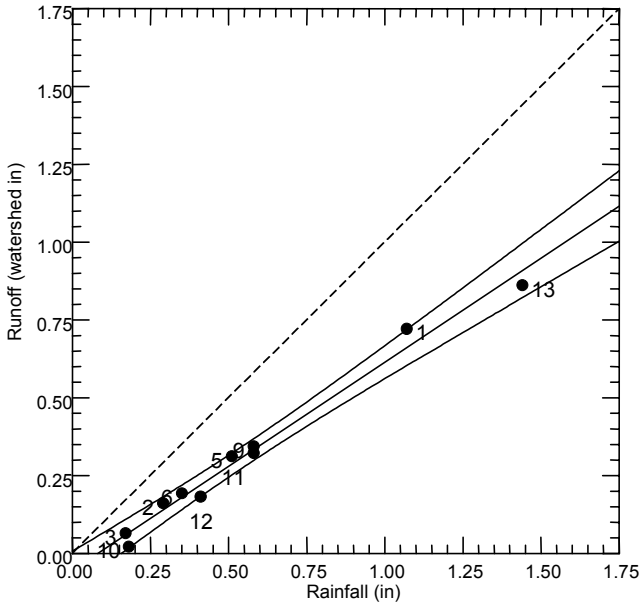

Figure 27

Regression of rainfall/runoff data for outfall 42 after year 1. Slope of regression line is 0.669. (95% confidence interval shown).

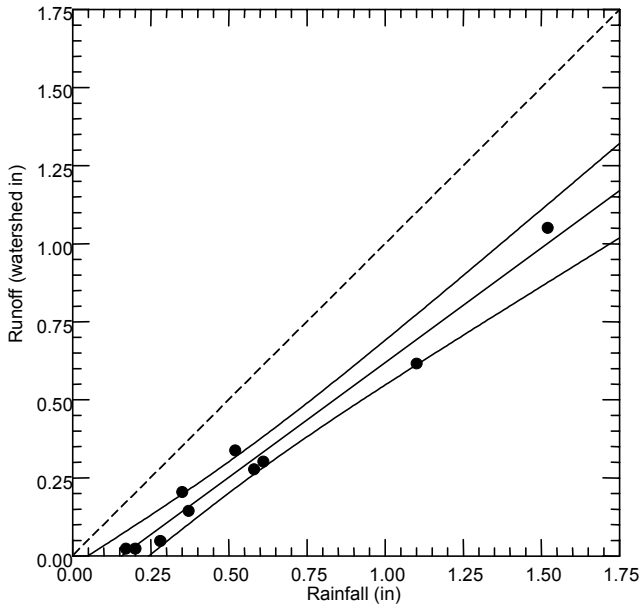

Figure 28

Regression of rainfall/runoff data for outfall 46 after year 1. Slope of regression line is 0.734. (95% confidence interval shown).

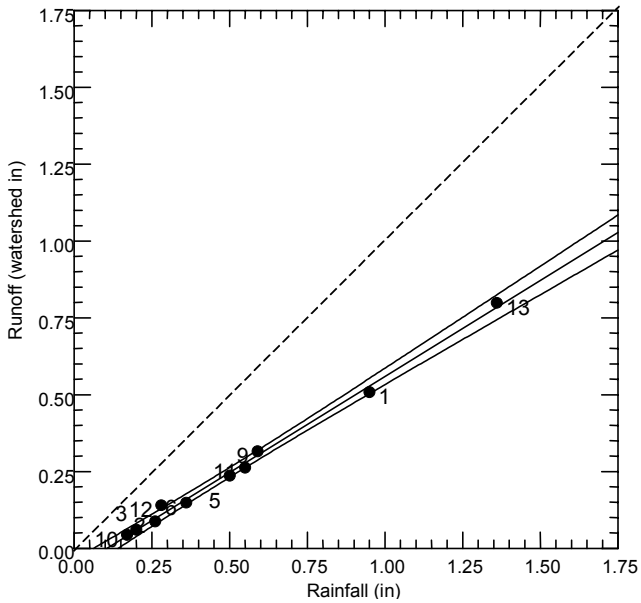

Figure 29

Regression of rainfall/runoff data for outfall 52 after year 1. Slope of regression line is 0.625. (95% confidence interval shown).

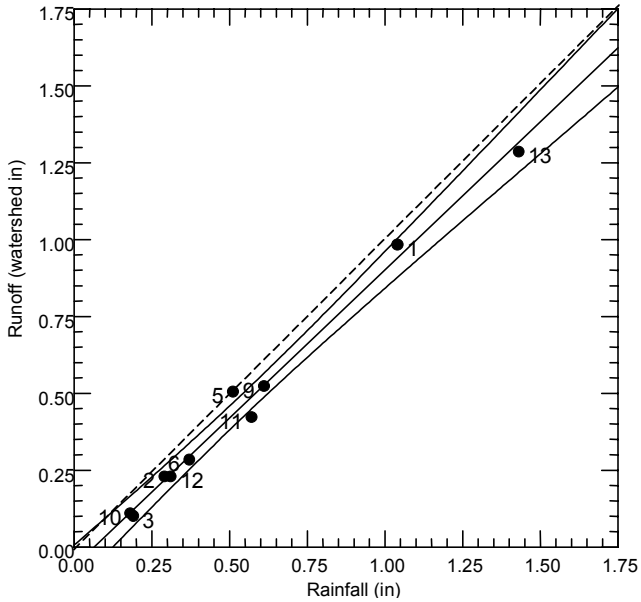

Figure 30

Regression of rainfall/runoff data for outfall 58 after year 1. Slope of regression line is 0.963. (95% confidence interval shown).

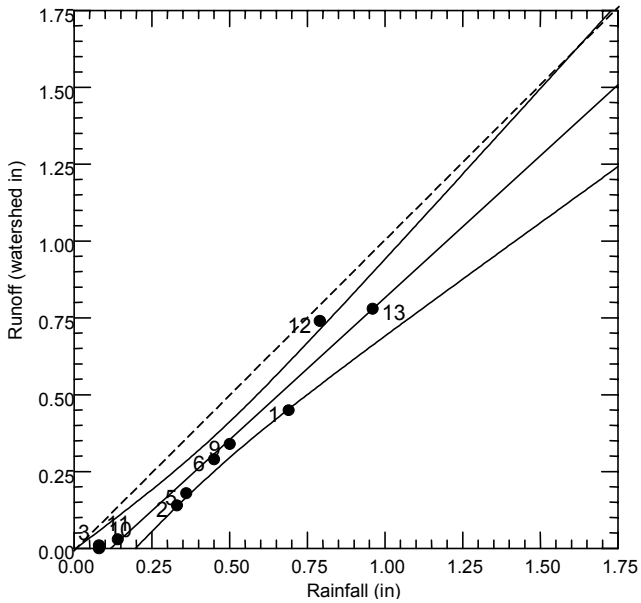

Figure 31

Regression of rainfall/runoff data for outfall 20e after year 1. Slope of regression line is 0.924. (95% confidence interval shown)

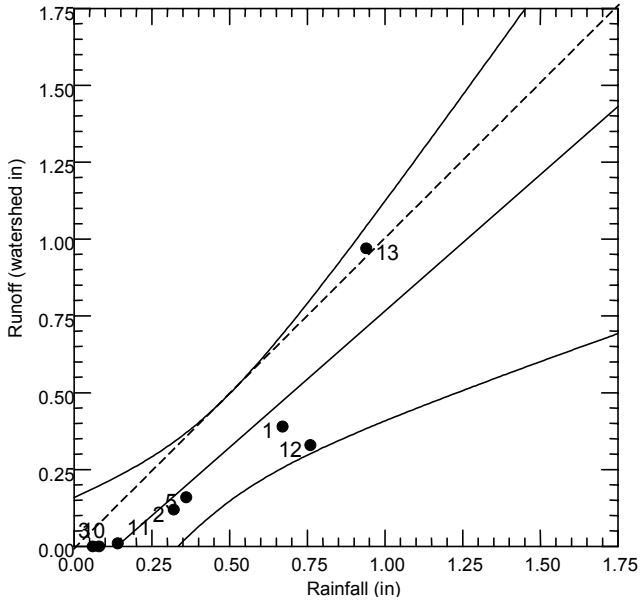

Figure 32

Regression of rainfall/runoff data for outfall 20f after year 1. Slope of regression line is 0.887. (95% confidence interval shown)

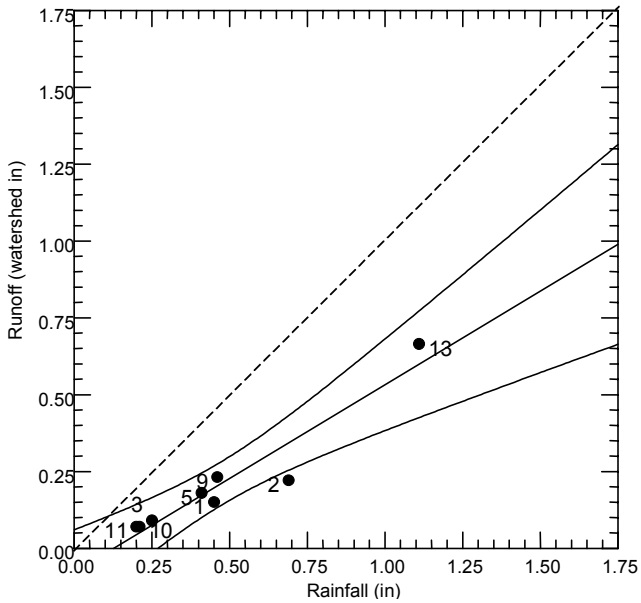

Figure 33

Regression of rainfall/runoff data for outfall 23c after year 1. Slope of regression line is 0.609. (95% confidence interval shown)

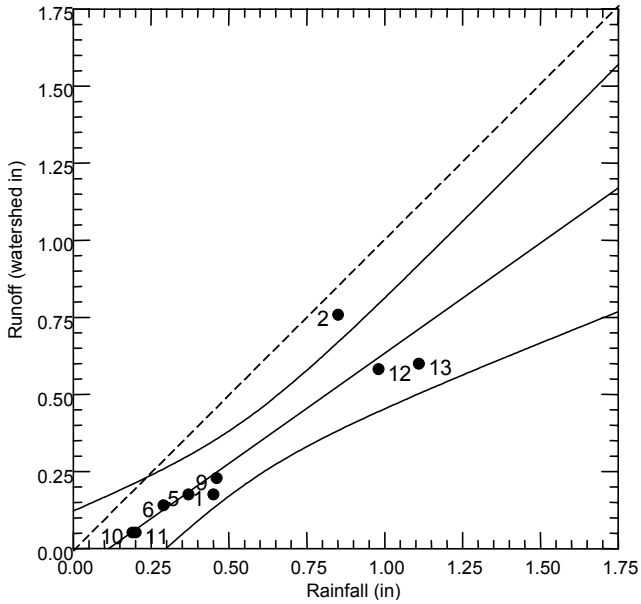

Figure 34

Regression of rainfall/runoff data for outfall b001 after year 1. Slope of regression line is 0.715. (95% confidence interval shown)

D.5 FINAL POST QA/QC RAINFALL/RUNOFF CURVES FOR COMBINED YEAR 1 AND YEAR 2 DATA

Year 2 monitoring data was analyzed and added to the continuous record as events occurred. The updated information from these events allowed for the comparison between values obtained from year 1 of the study shown in the previous section. This additional data helped to support and refine watershed characteristics identified during year 1. With the exception of the runoff observations made at outfall 8-B001, year 2 data was generally consistent with observations made during year 1.

As discussed in Section 4.2.3, the runoff observed at 8-B001 during the second year of the study was appreciably less than the runoff for similar magnitude events observed during the first year of the study. Figure 35 shows the marked difference between year 1 and year 2 rainfall versus runoff values at 8-B001. The runoff is presented here in cubic feet in order to demonstrate the difference.

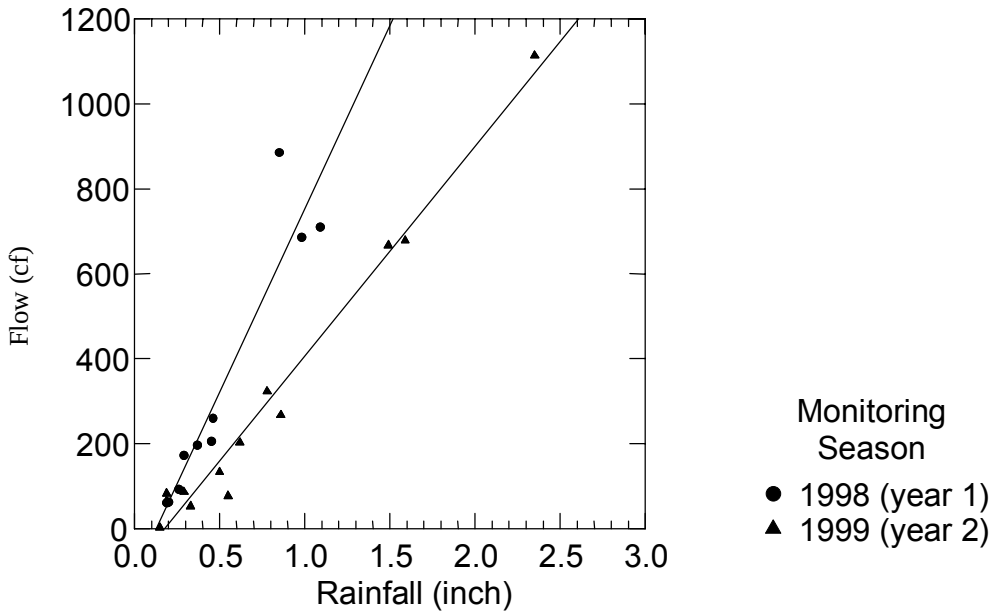

Figure 35

Runoff for outfall 8-B001 as a function of rainfall depth for year 1 and year 2 monitoring periods.

As a result of field wet weather observations and measured flow at 8-B001, the watershed area was adjusted from 0.32 ac, for year 1, to 0.18 ac, for year 2. This adjustment allowed for maintenance of the runoff coefficient of 0.74 in each of two monitoring years. The changes to the watershed area are due to a portion of the freeway being effectively hydraulically disconnected from the inlet for 8-B001. This change most likely resulted from changes to shoulder pavement conditions in the B001 catchment due to the installation of a fiber-optics trench between year 1 and year 2 monitoring. This shift in runoff quantity was not observed consistently at the other seven water quality outfalls.

Year 2 data provided a number of events that had depths that were larger than the maximum depth observed during year 1. These additional relatively large events helped to further clarify watershed runoff characteristics.

Data were reviewed using a formal outlier analysis to identify abnormal rainfall and runoff values. All data from both years were subjected to the QA/QC procedures described in Section 4.2.1. Regressions of runoff as a function of rainfall were regularly updated during year 2 monitoring and used on a continuing basis to assess the year 2 results in a manner similar to the summary of year 1 data described in Section D.3 above.

At the conclusion of the year 2 monitoring period, final regressions of the relationship between rainfall and runoff were compiled. These curves are presented in Figures 36 – 43. These plots provide a graphical means for assessing watershed characteristics and data precision for the values used in various analyses throughout the study. All values that were estimated, as identified in Section 4 in Tables 4-2 and 4-3, are in the figures. Table 4-1 provides a tabular summary of runoff coefficients (slopes of the regression lines presented here). Large storms are identified in these plots by study year and event number.

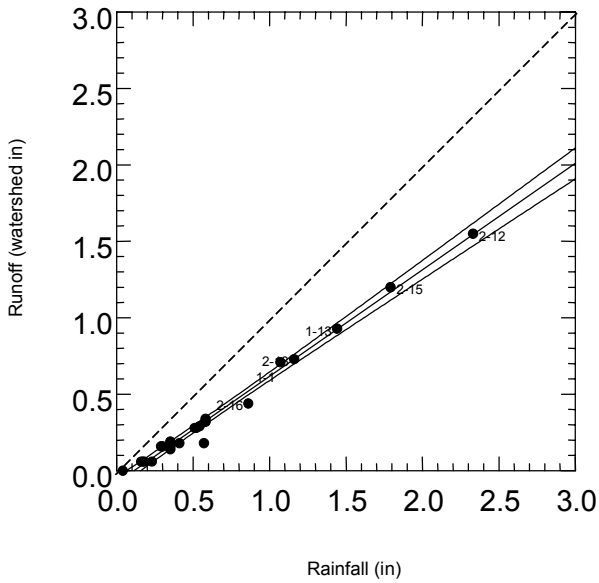

Figure 36

Regression of rainfall/runoff data for outfall 42, combined year 1 and year 2. Slope of regression line is 0.70. (95% confidence interval and 1:1 dotted reference line shown).

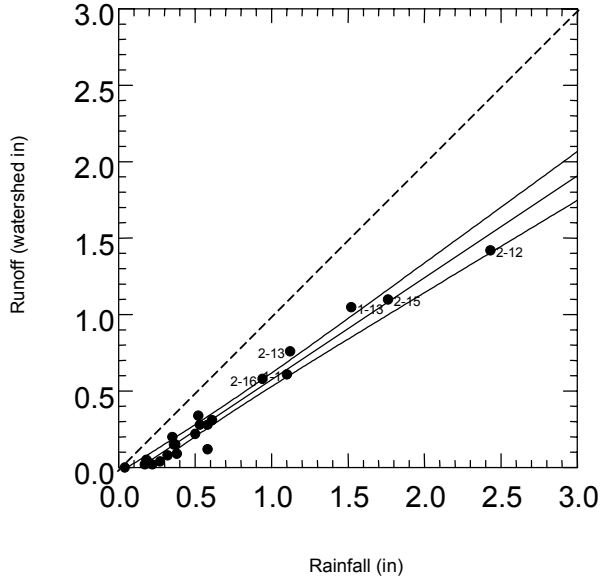

Figure 37

Regression of rainfall/runoff data for outfall 46, combined year 1 and year 2. Slope of regression line is 0.67. (95% confidence interval and 1:1 dotted reference line shown).

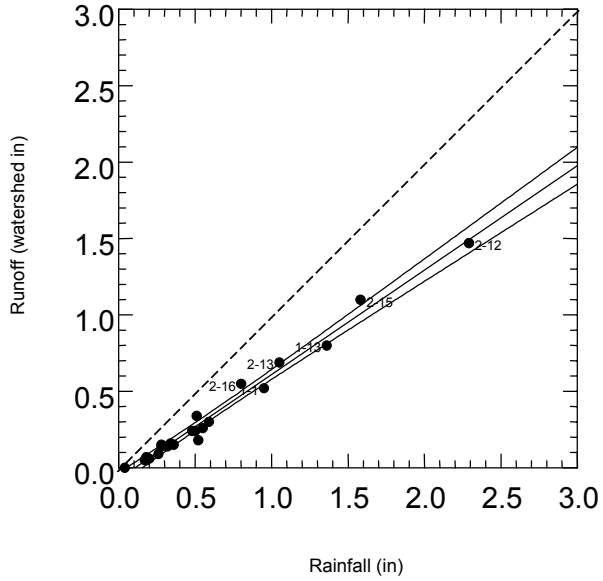

Figure 38

Regression of rainfall/runoff data for outfall 52, combined year 1 and year 2. Slope of regression line is 0.68. (95% confidence interval and 1:1 dotted reference line shown).

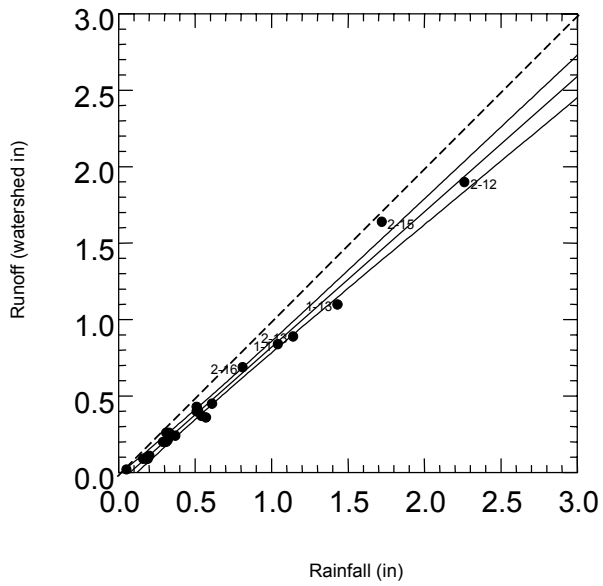

Figure 39

Regression of rainfall/runoff data for outfall 58, combined year 1 and year 2. Slope of regression line is 0.89. (95% confidence interval and 1:1 dotted reference line shown).

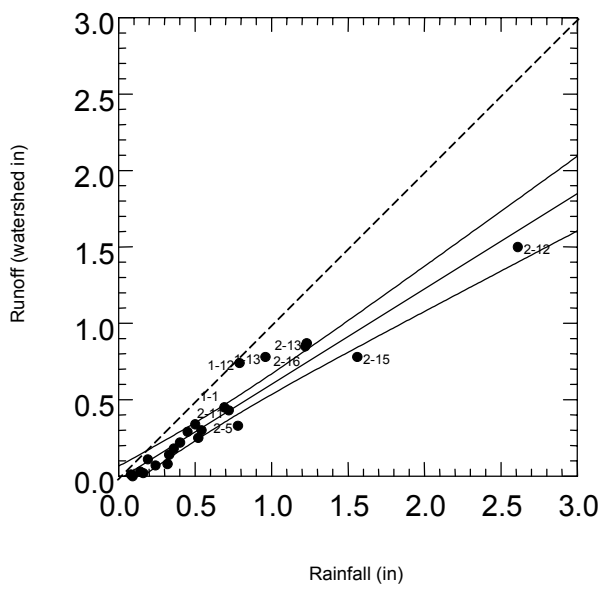

Figure 40

Regression of rainfall/runoff data for outfall 20E, combined year 1 and year 2. Slope of regression line is 0.62. (95% confidence interval and 1:1 dotted reference line shown).

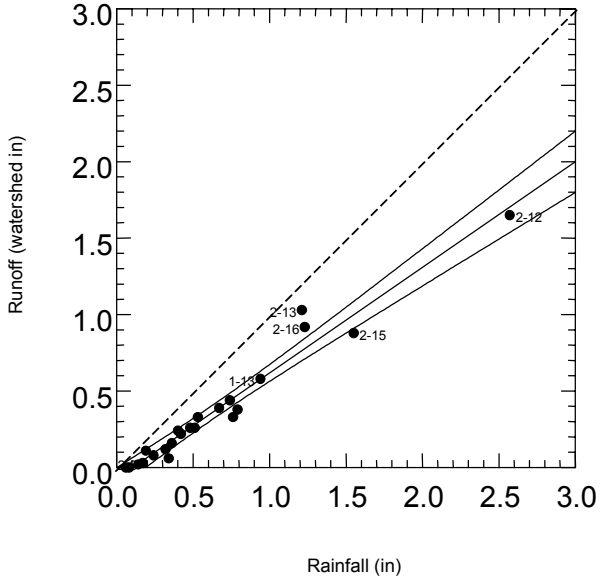

Figure 41

Regression of rainfall/runoff data for outfall 20-f, combined year 1 and year 2. Slope of regression line is 0.69. (95% confidence interval and 1:1 dotted reference line shown).

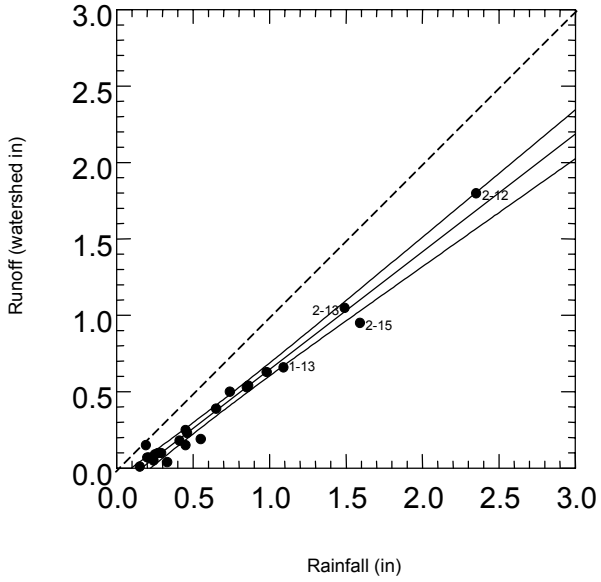

Figure 42

Regression of rainfall/runoff data for outfall 8-23c, combined year 1 and year 2. Slope of regression line is 0.77. (95% confidence interval and 1:1 dotted reference line shown).

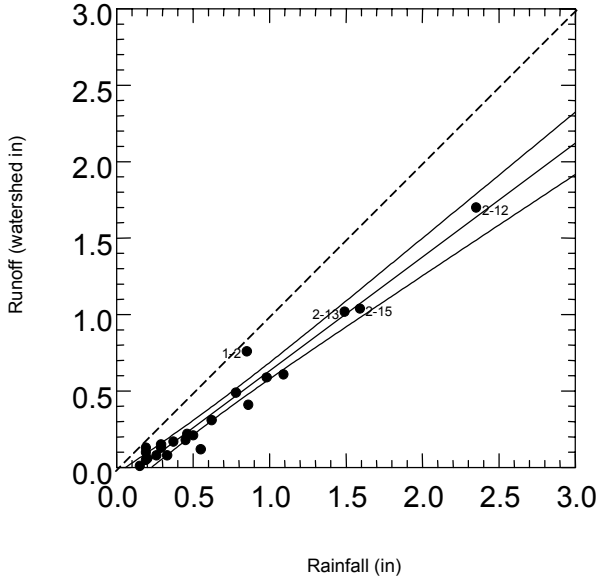

Figure 43

Regression of rainfall/runoff data for outfall 8-B001, combined year 1 and year 2. Slope of regression line is 0.74. (95% confidence interval and 1:1 dotted reference line shown).

Site 1E - Litter Pickup Event No. 1998e01 - 11/8/98

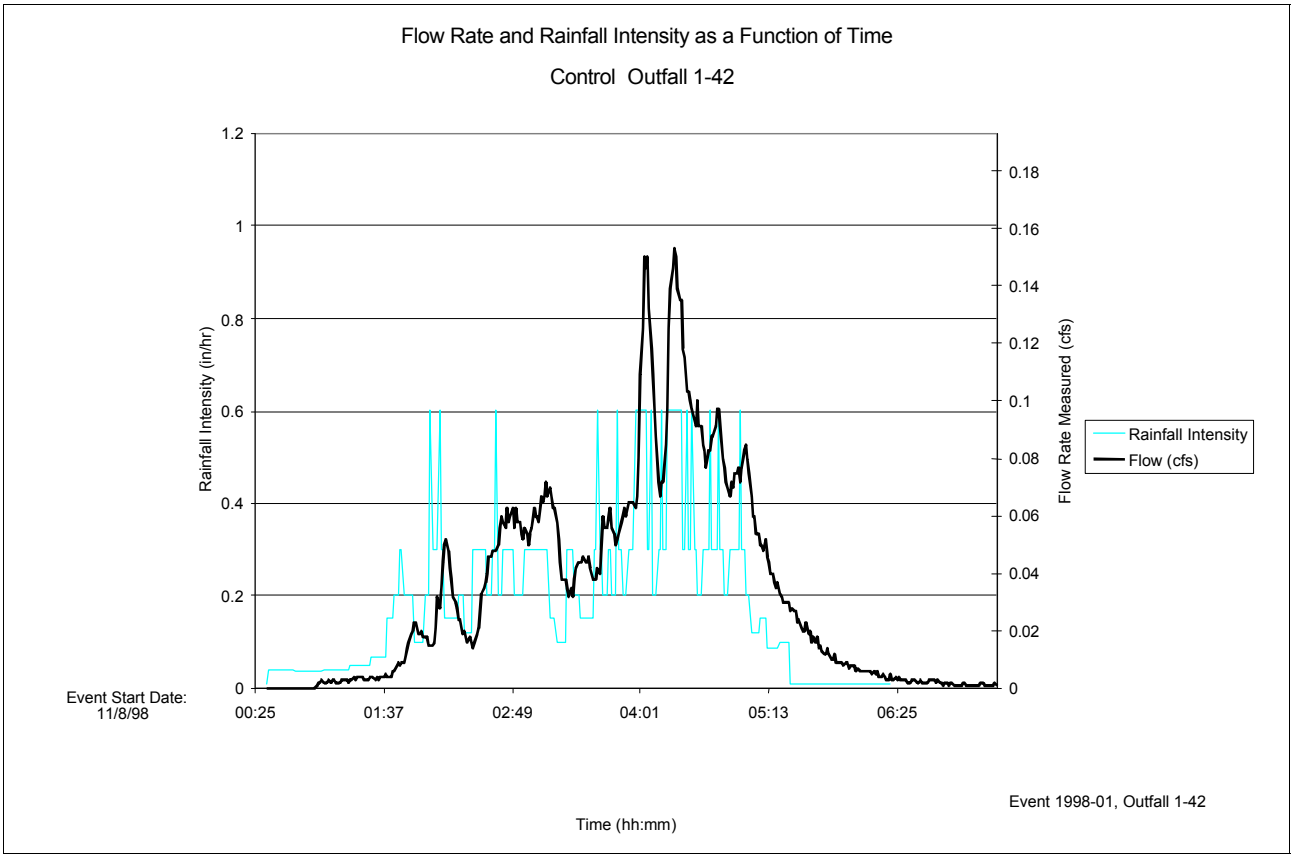

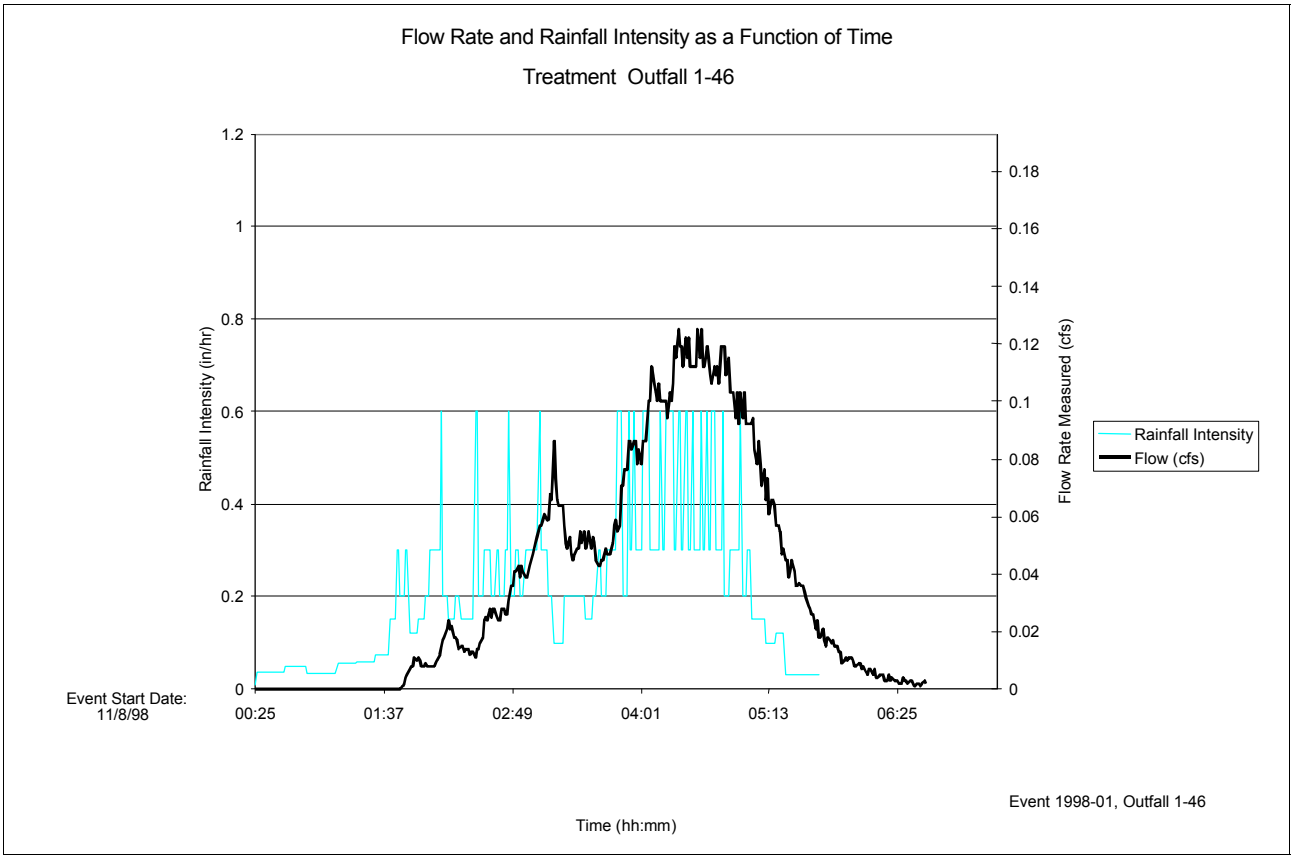

Site 1W - Street Sweeping Event No. 1998e01 - 11/8/98

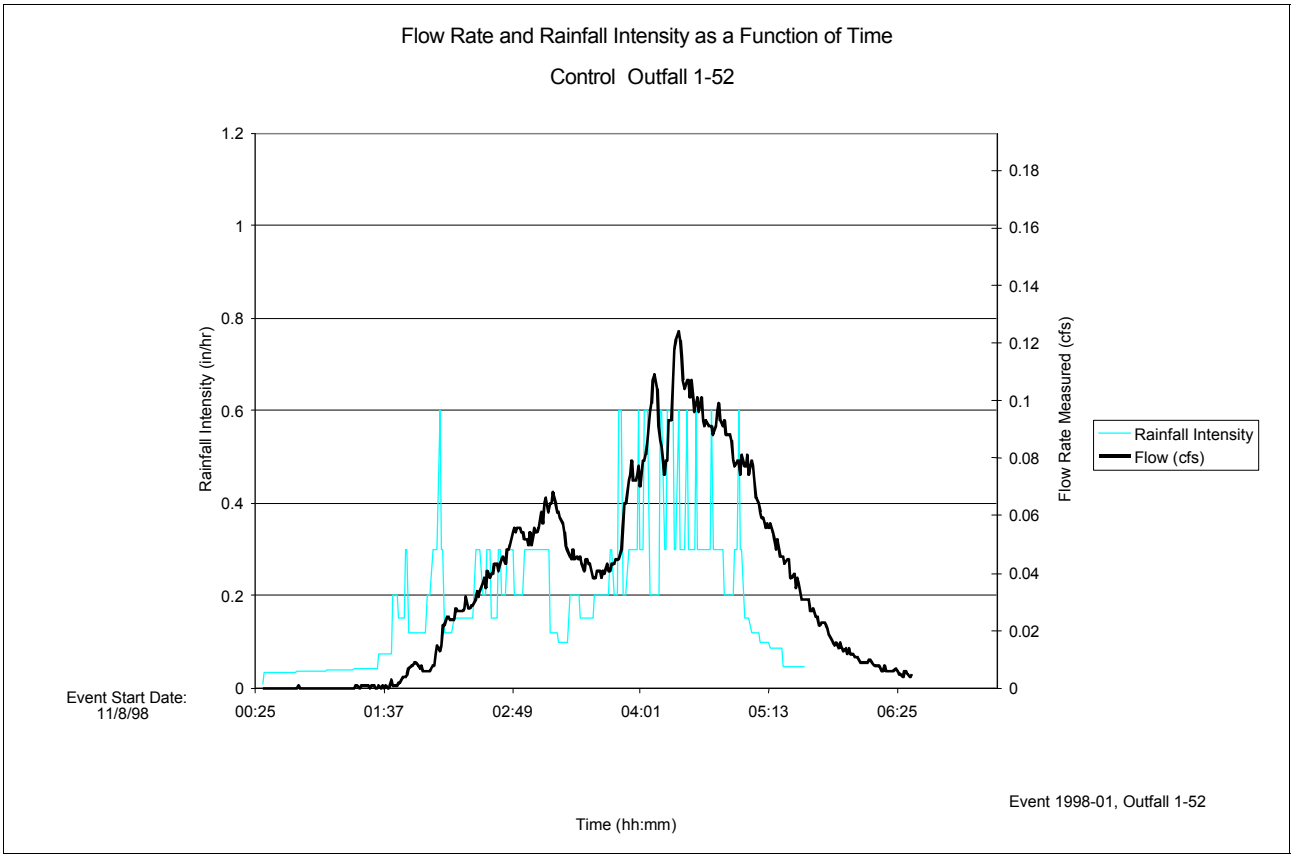

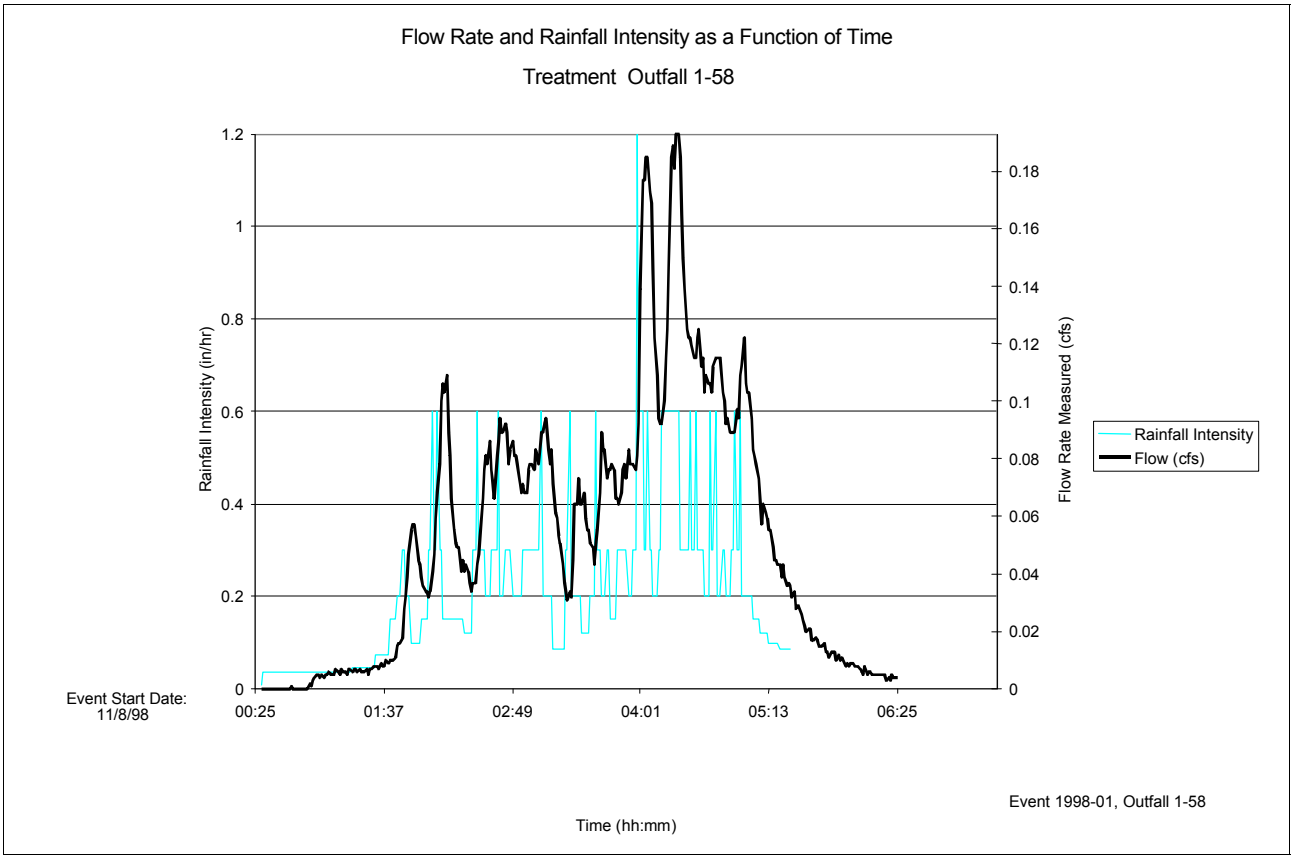

Site 6 - Modified Inlet Event No. 1998e01 - 11/8/98

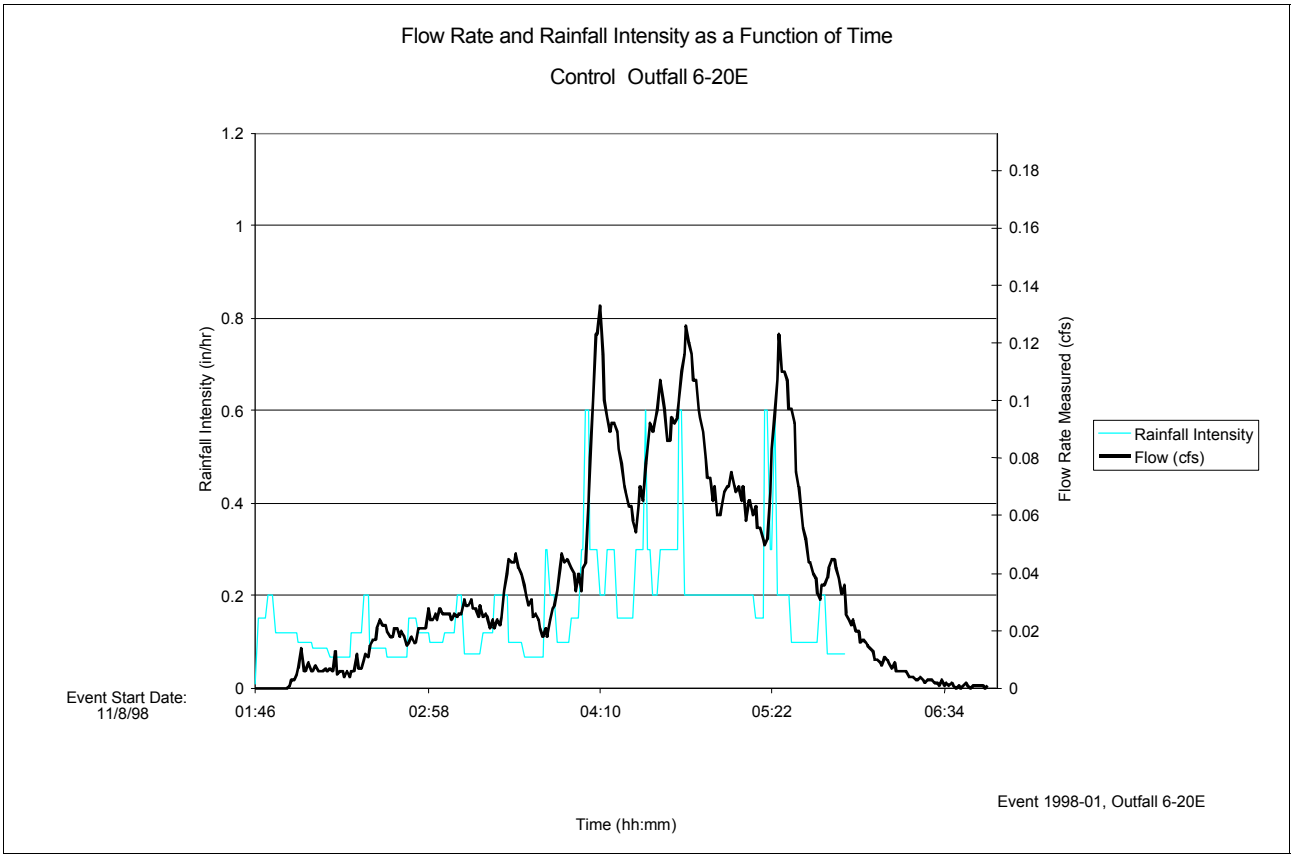

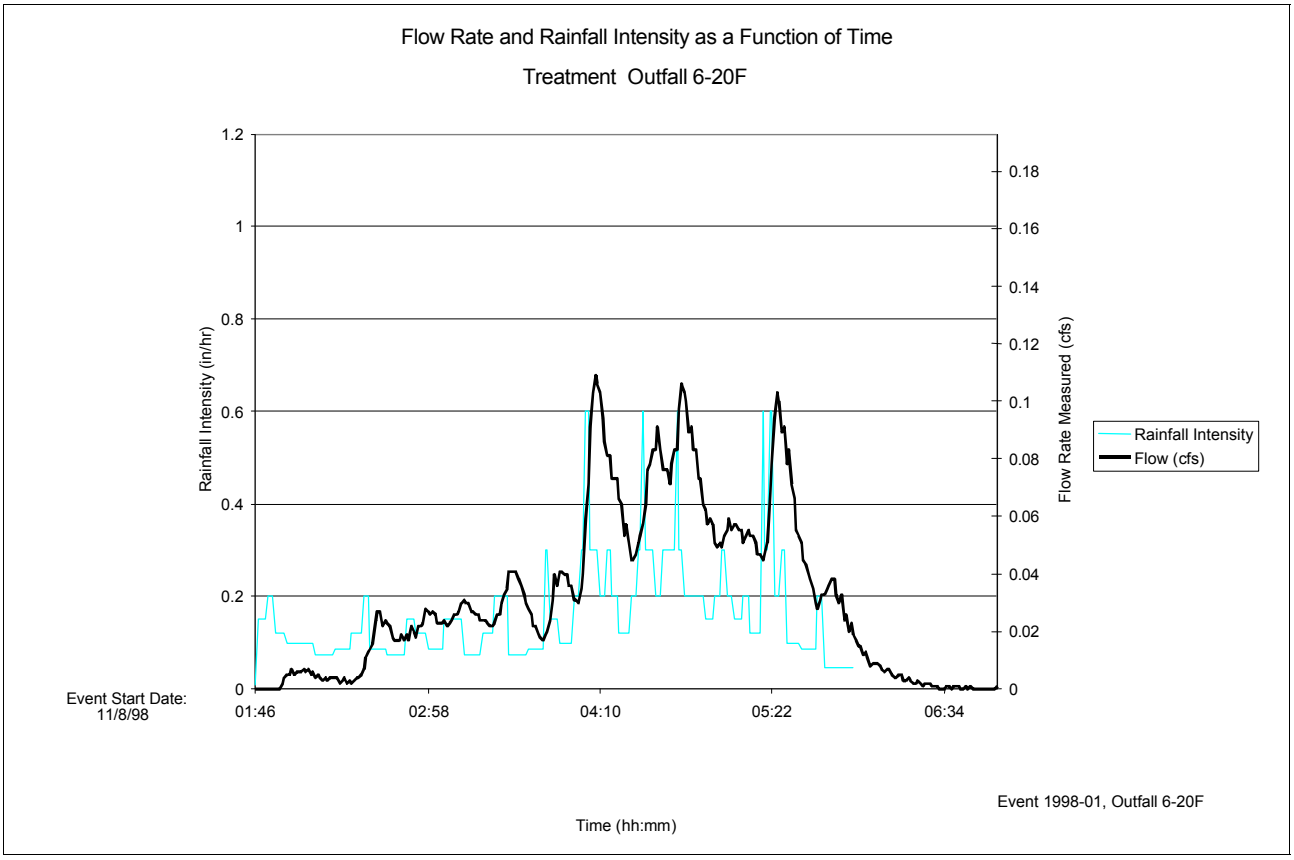

Site 8 - Bicycle Grate/LID Event No. 1998e01 - 11/8/98

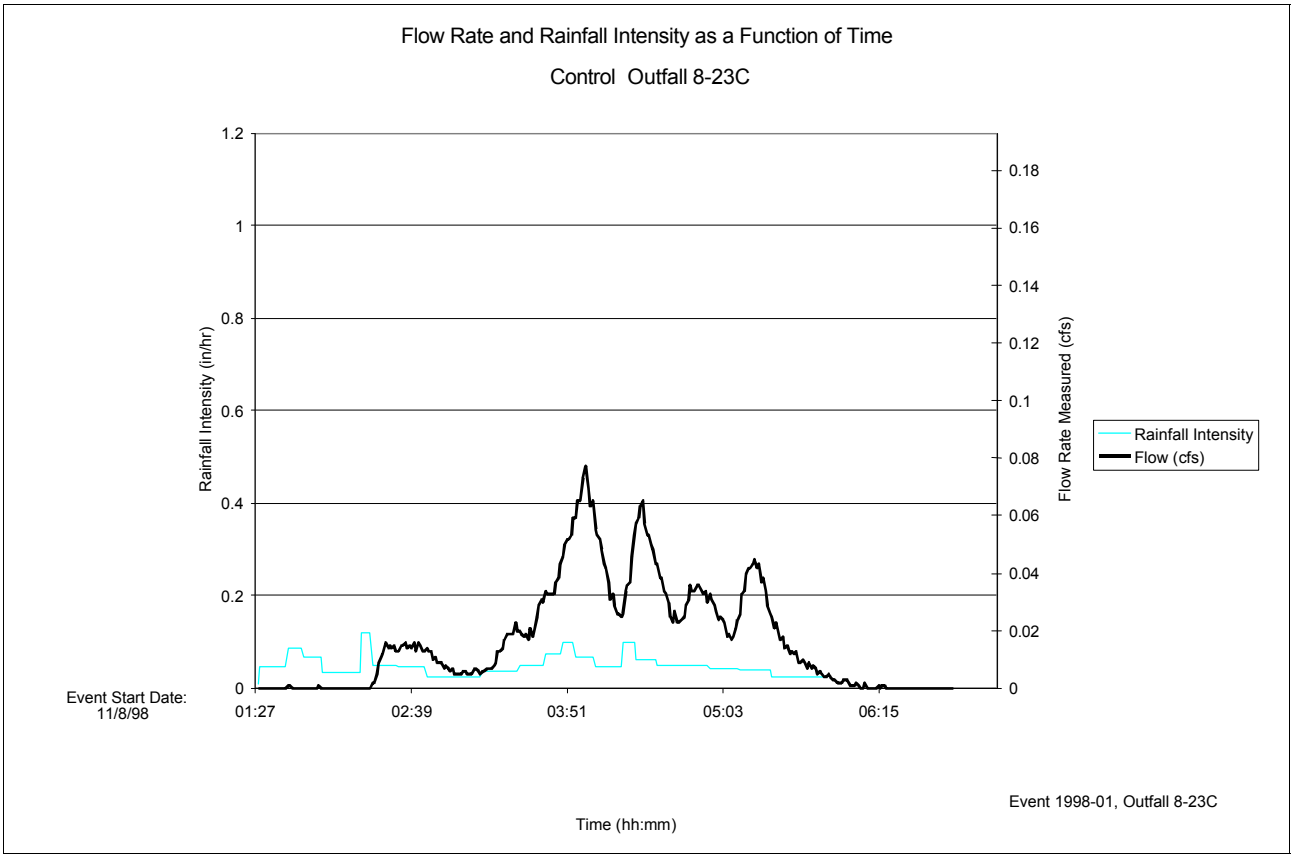

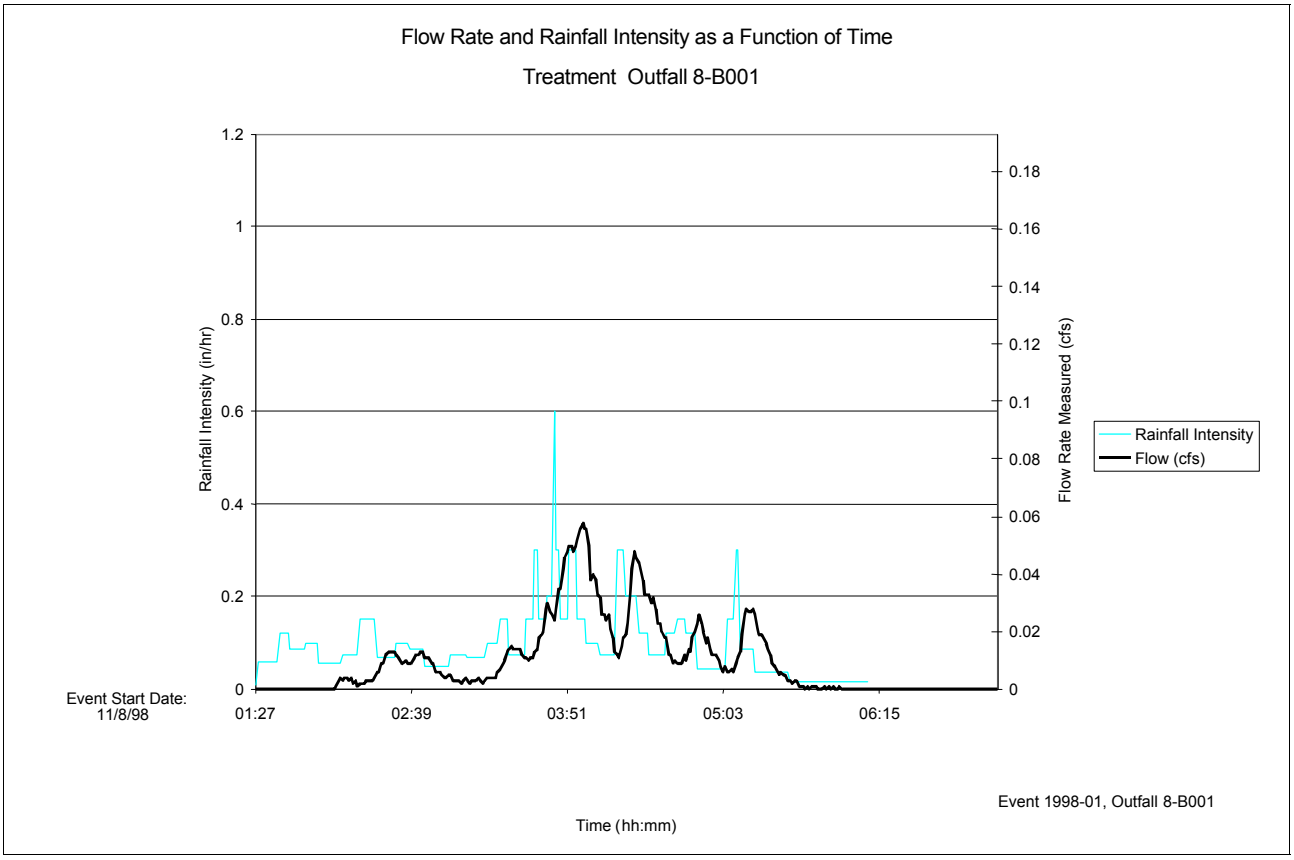

Site 1E - Litter Pickup Event No. 1998e02 - 11/28/98

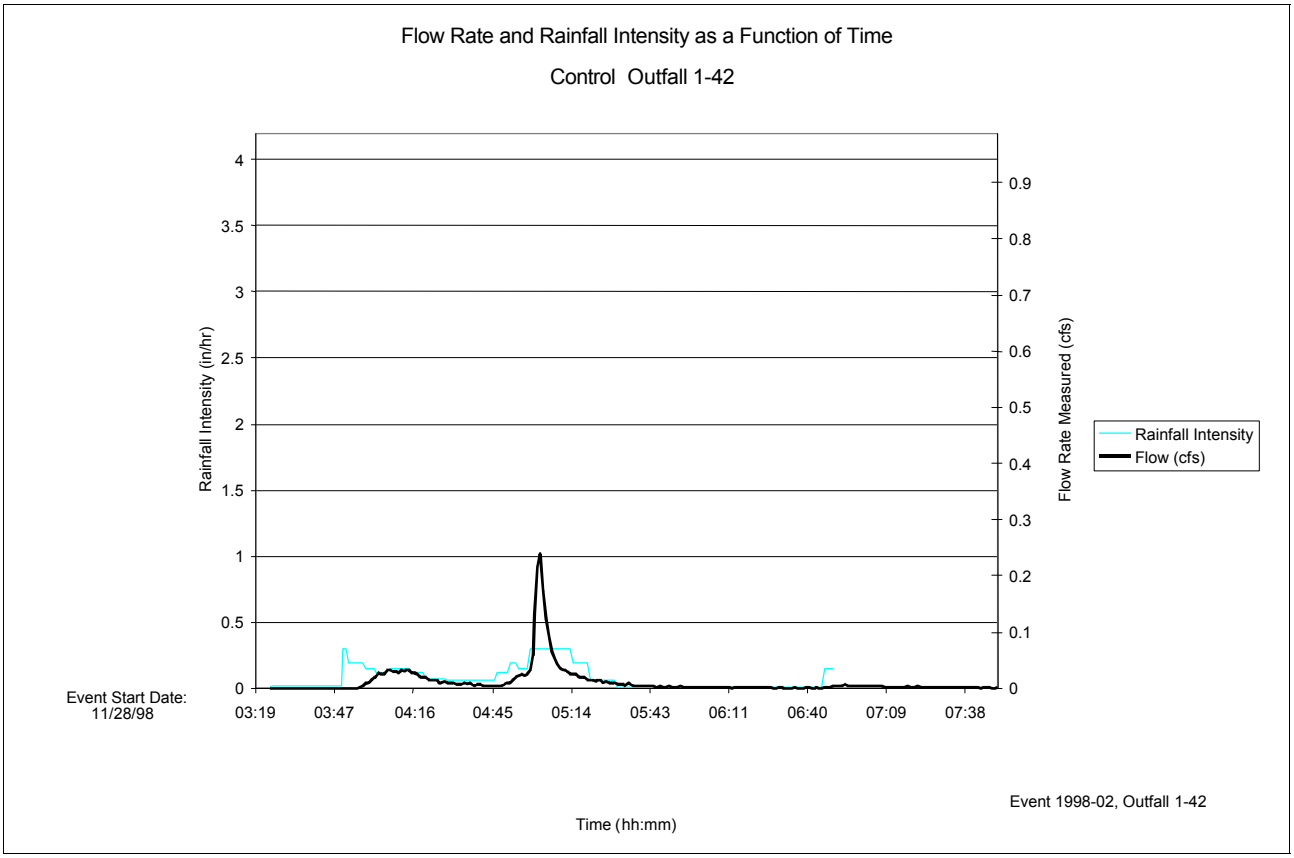

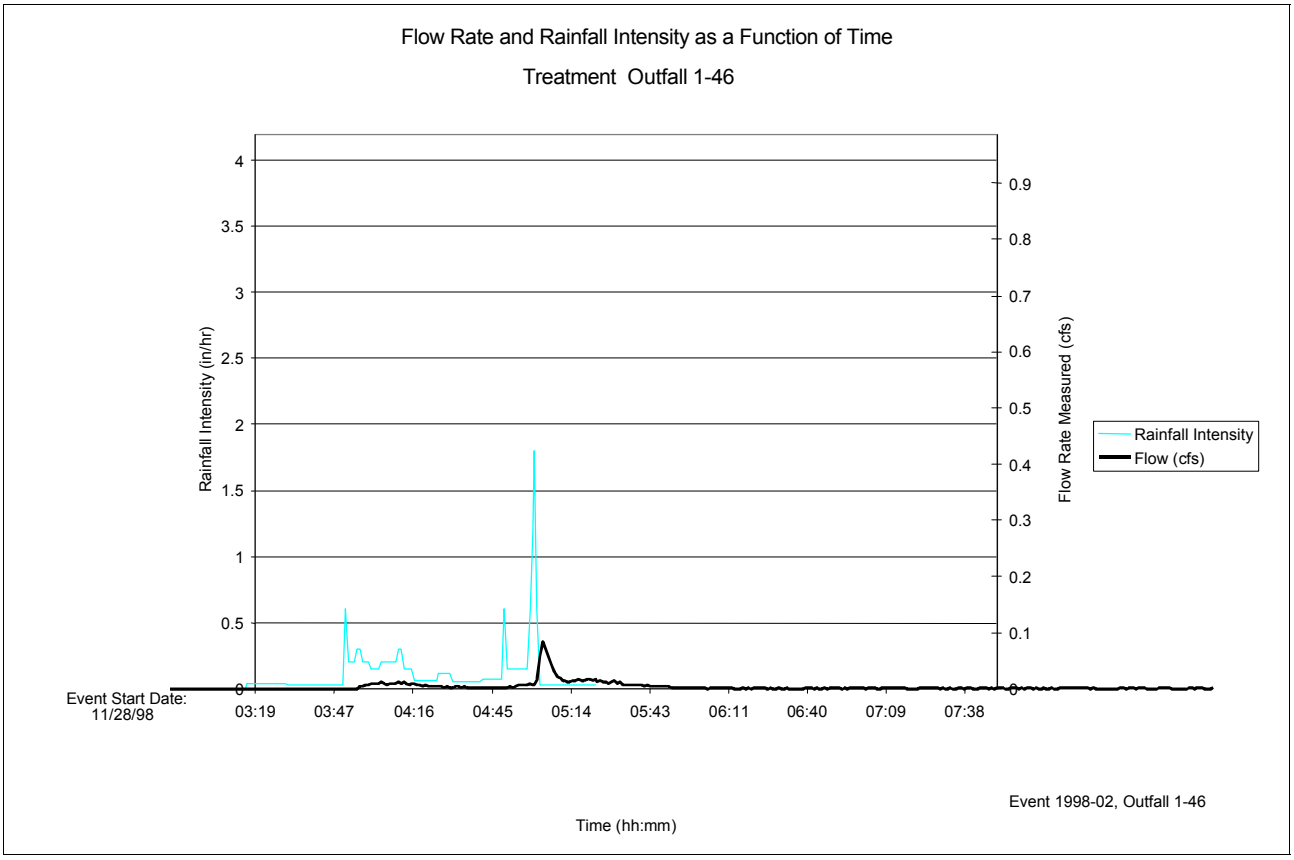

Site 1W - Street Sweeping Event No. 1998e02 - 11/28/98

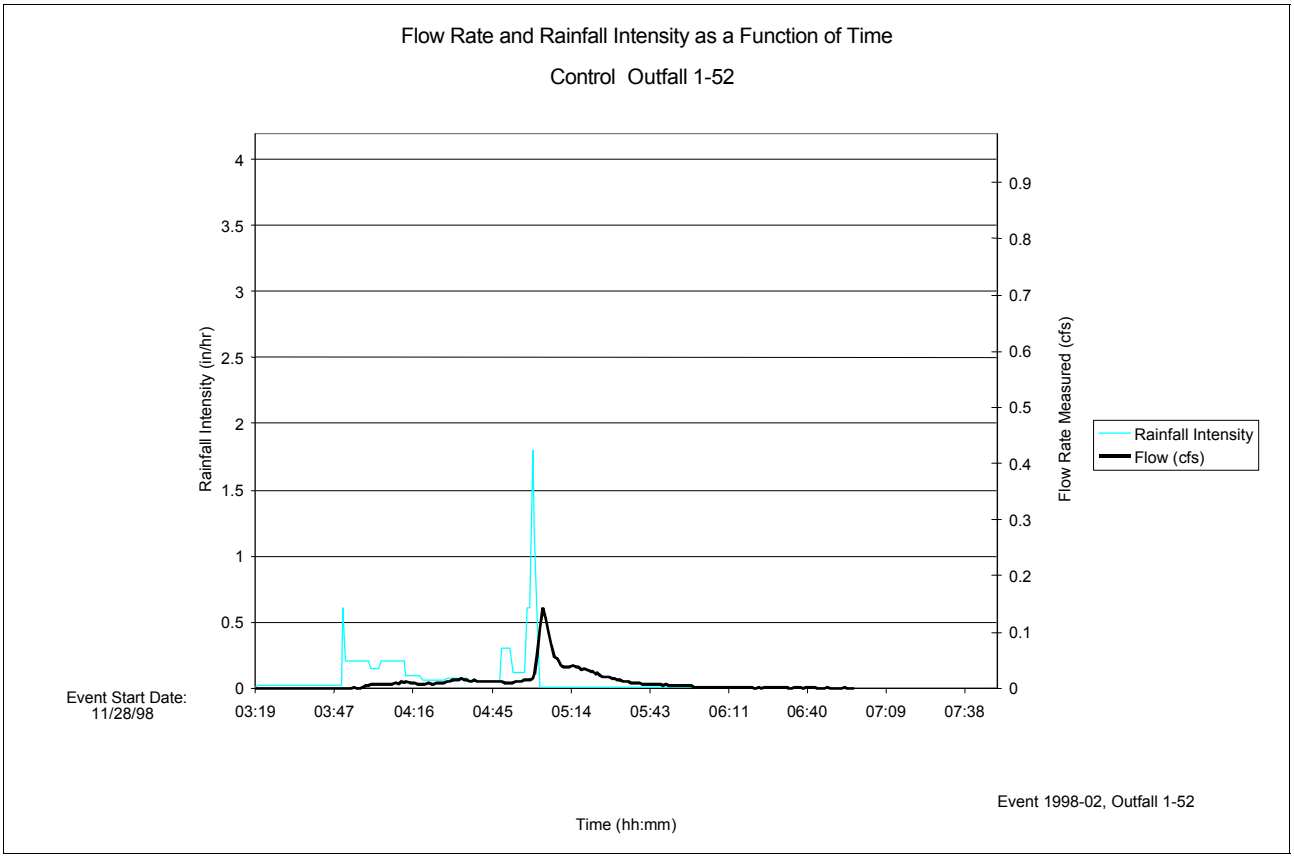

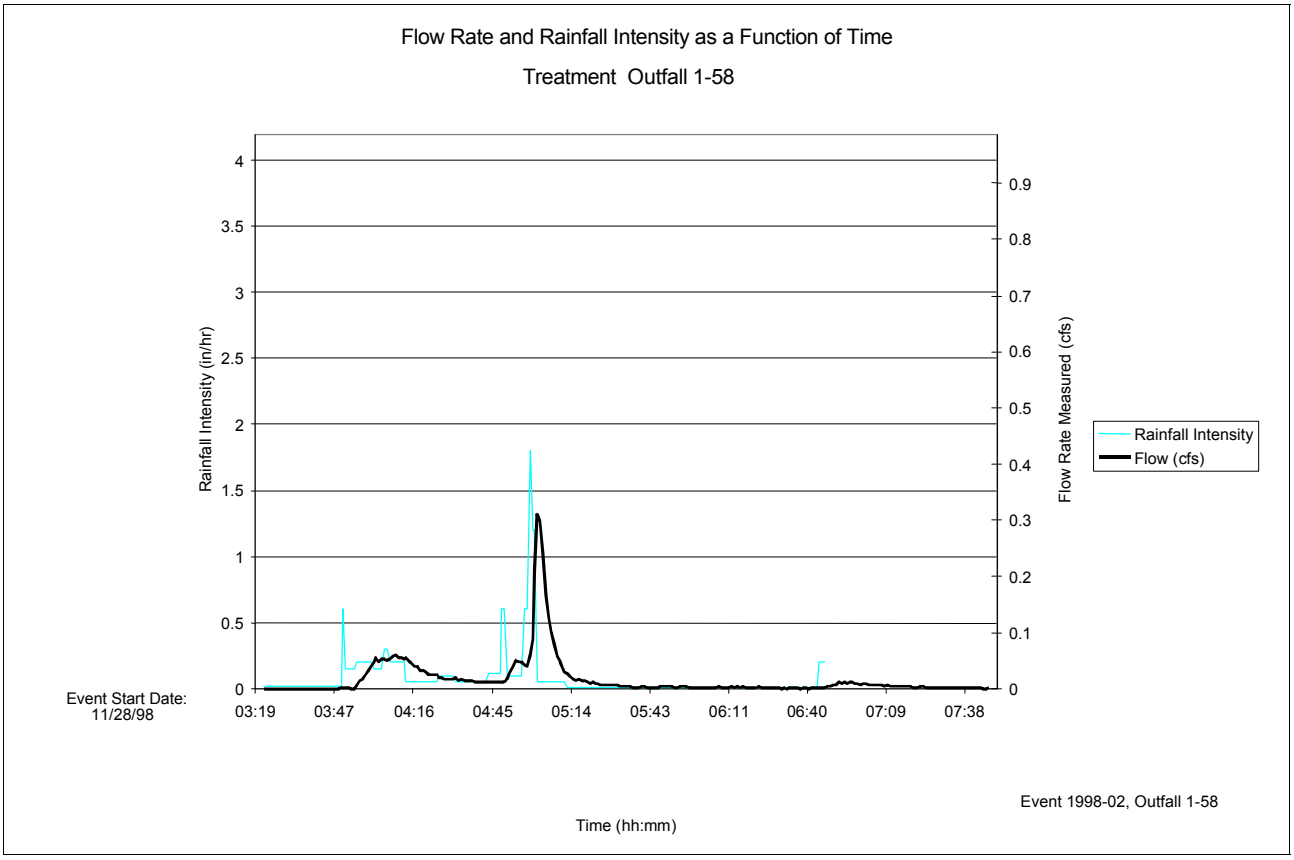

Site 6 - Modified Inlet Event No. 1998e02 - 11/28/98

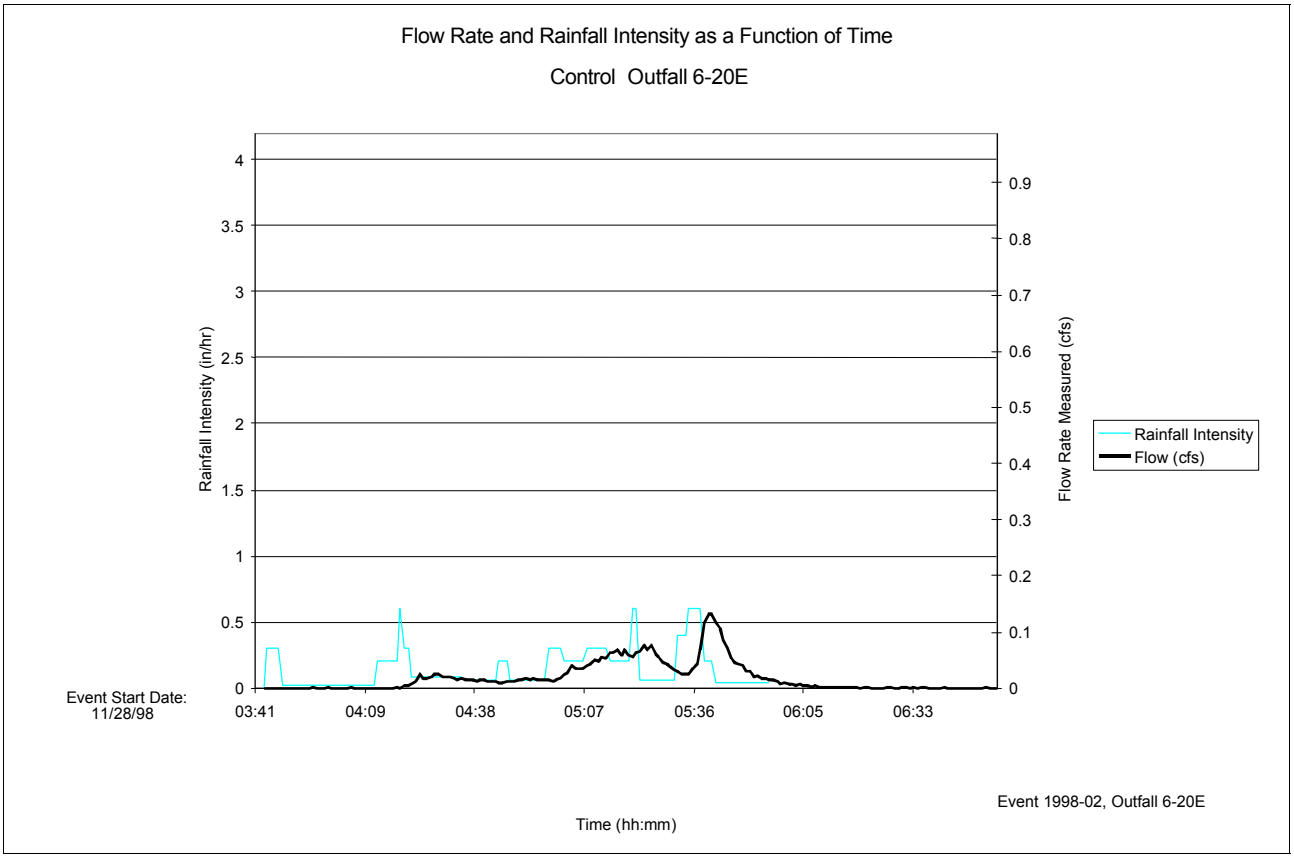

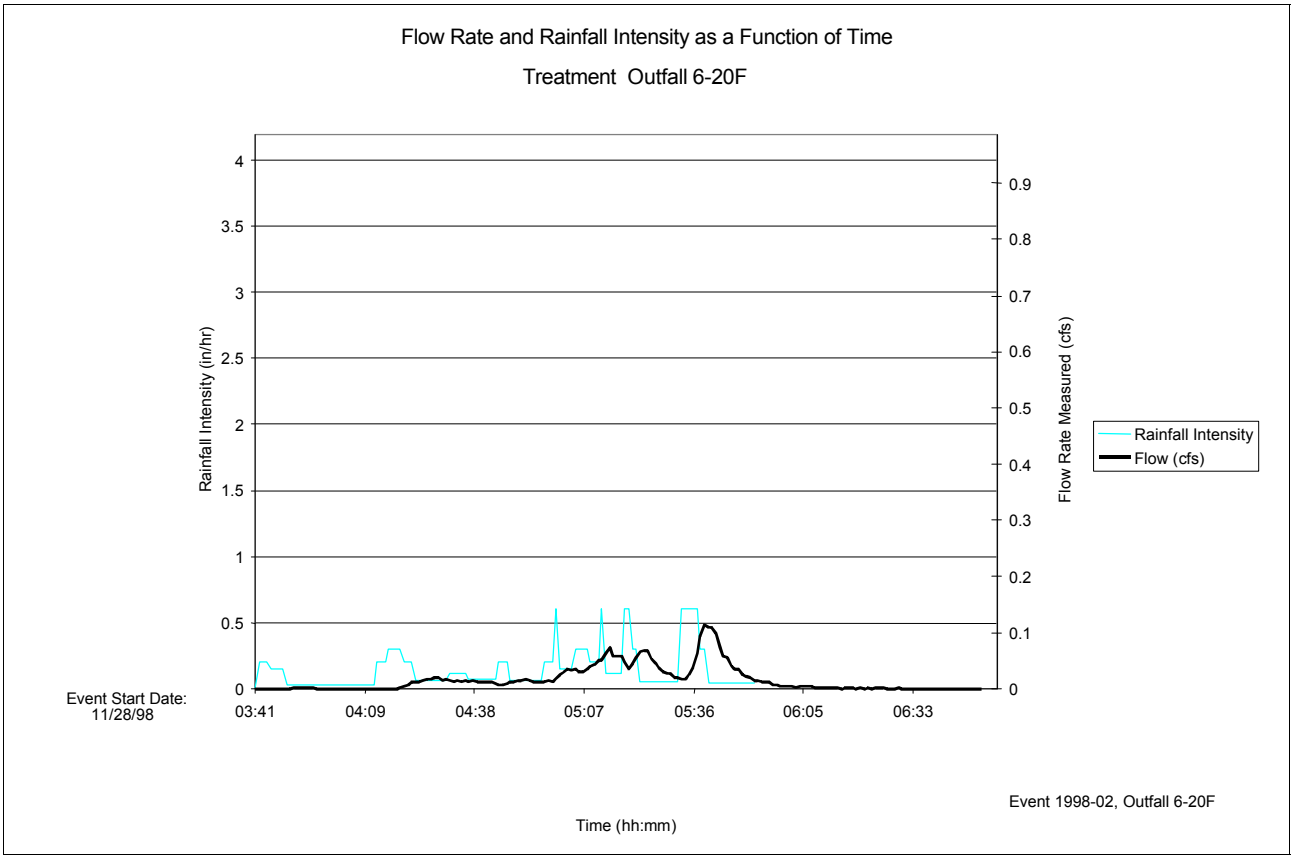

Site 8 - Bicycle Grate/LID Event No. 1998e02 - 11/28/98

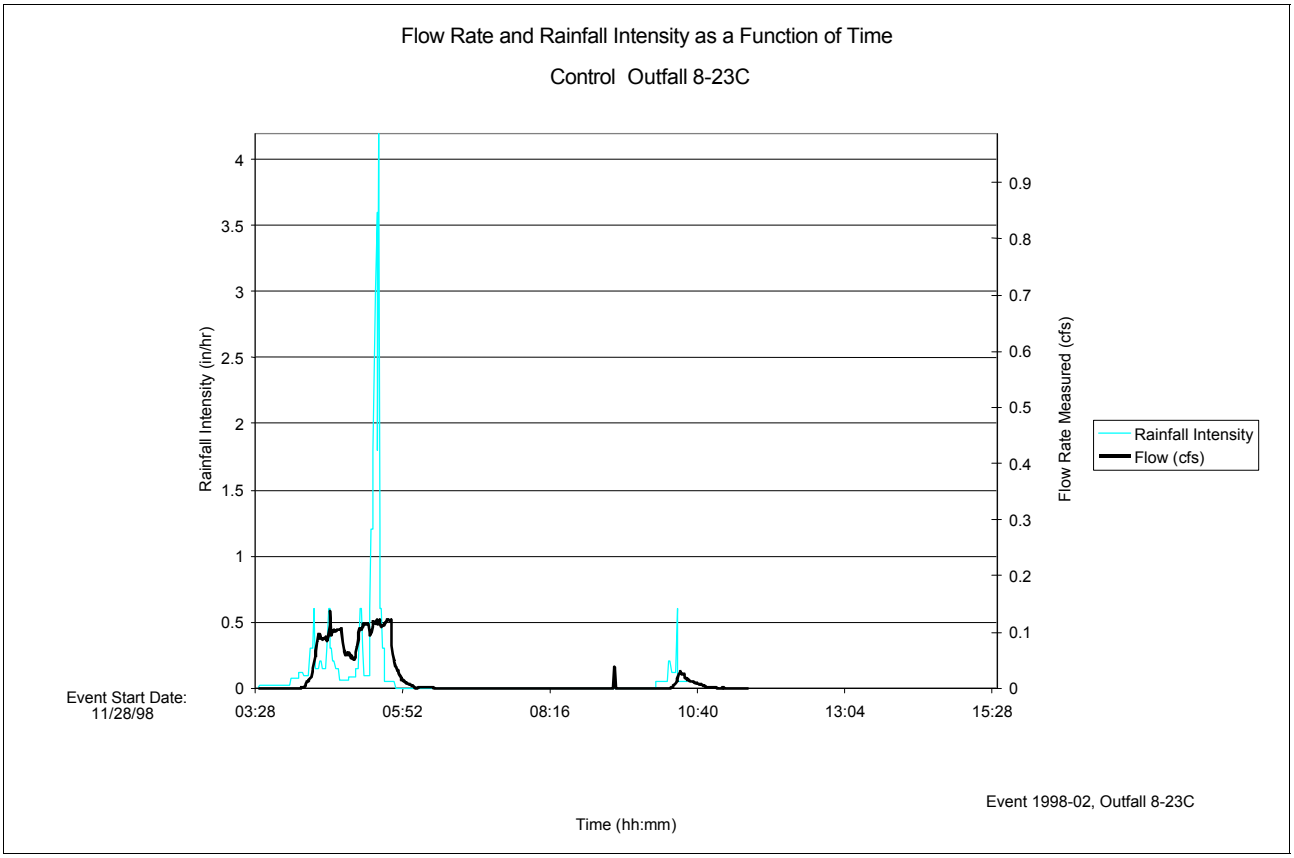

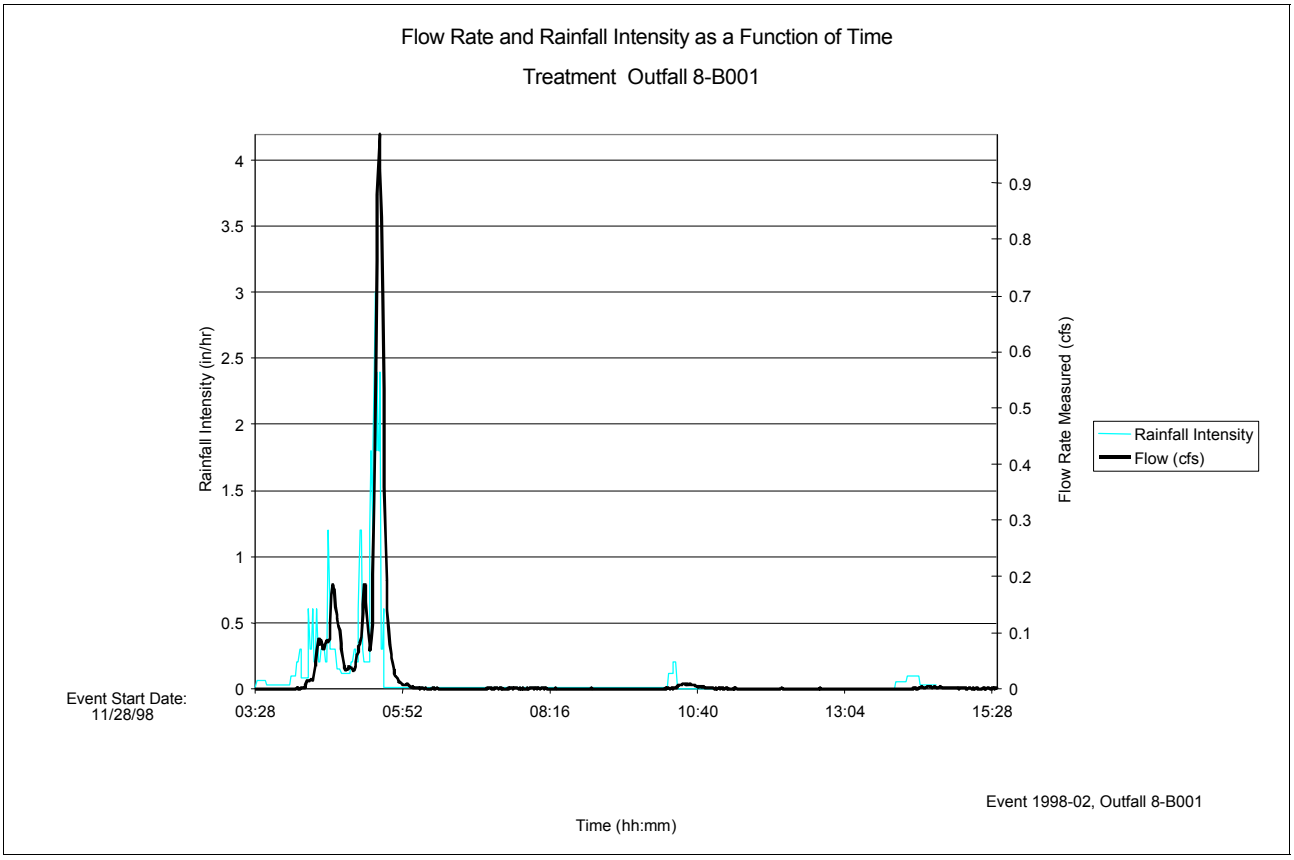

Site 1E - Litter Pickup Event No. 1998e03 - 12/1/98

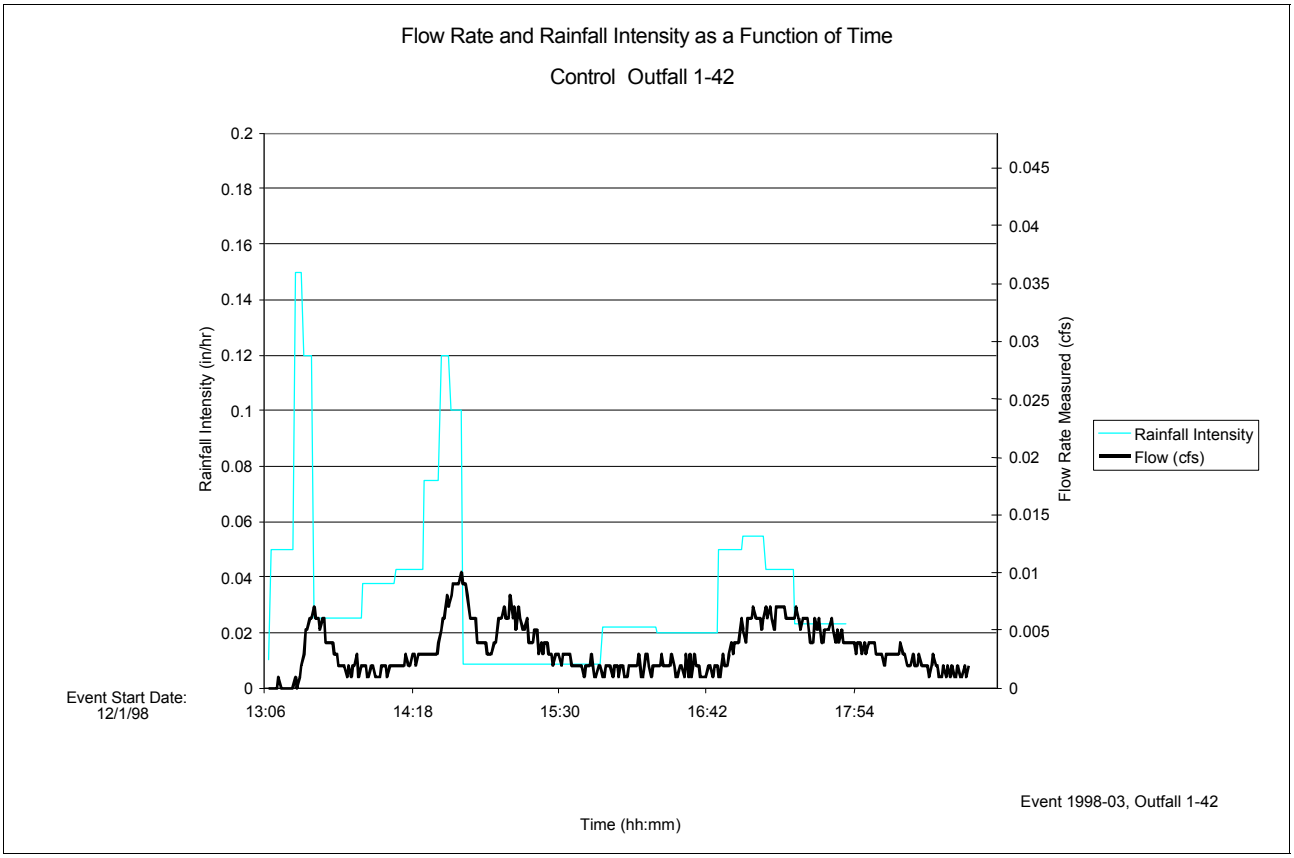

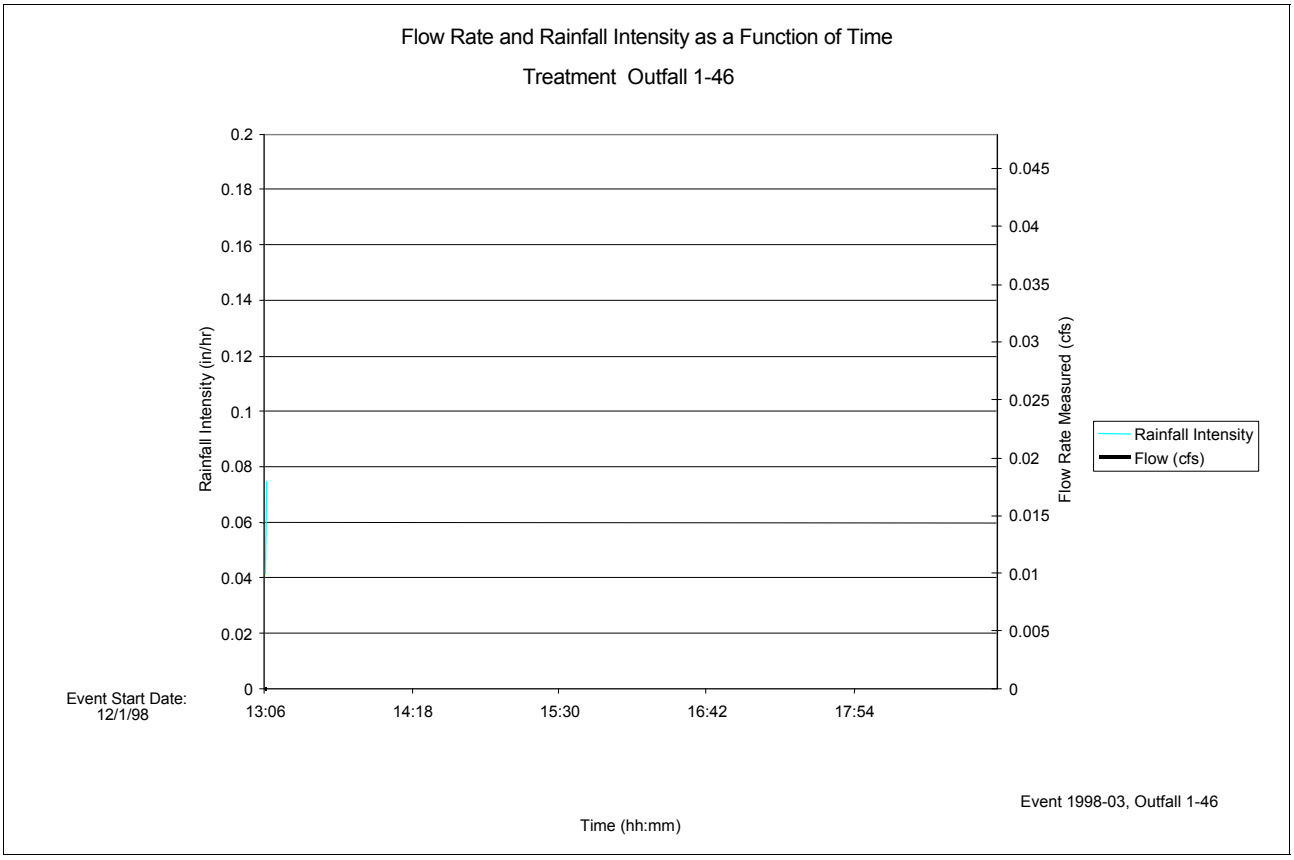

Site 1W - Street Sweeping Event No. 1998e03 - 12/1/98

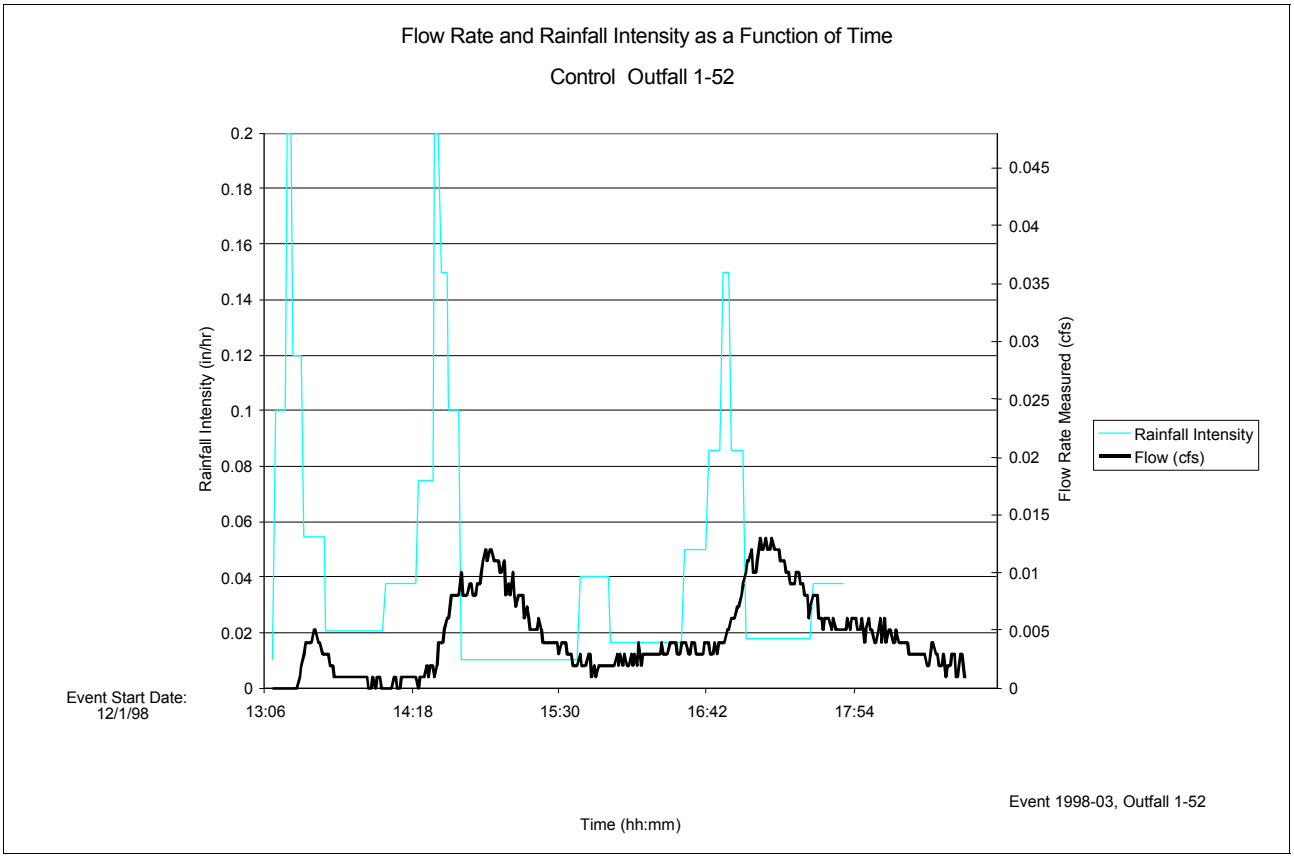

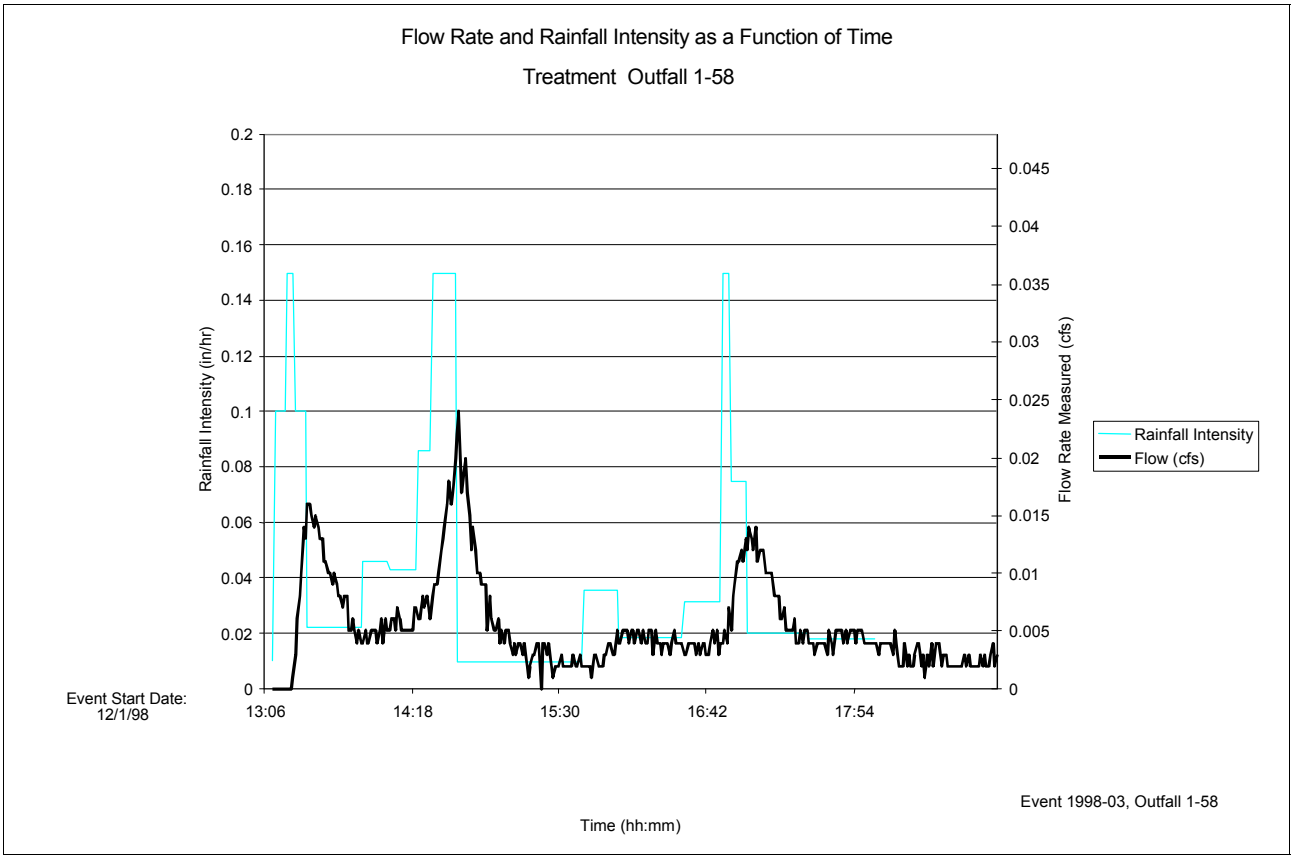

Site 6 - Modified Inlet Event No. 1998e03 - 12/1/98

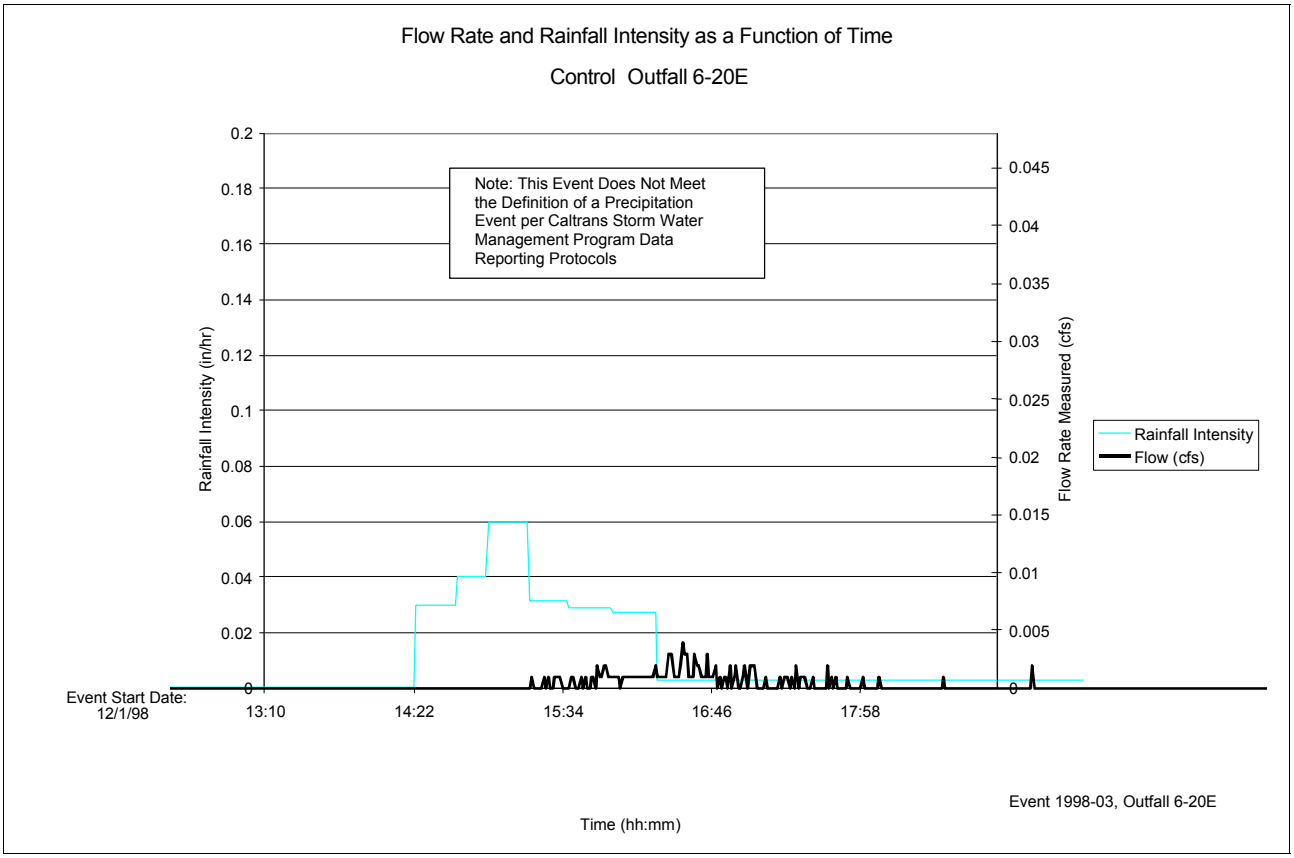

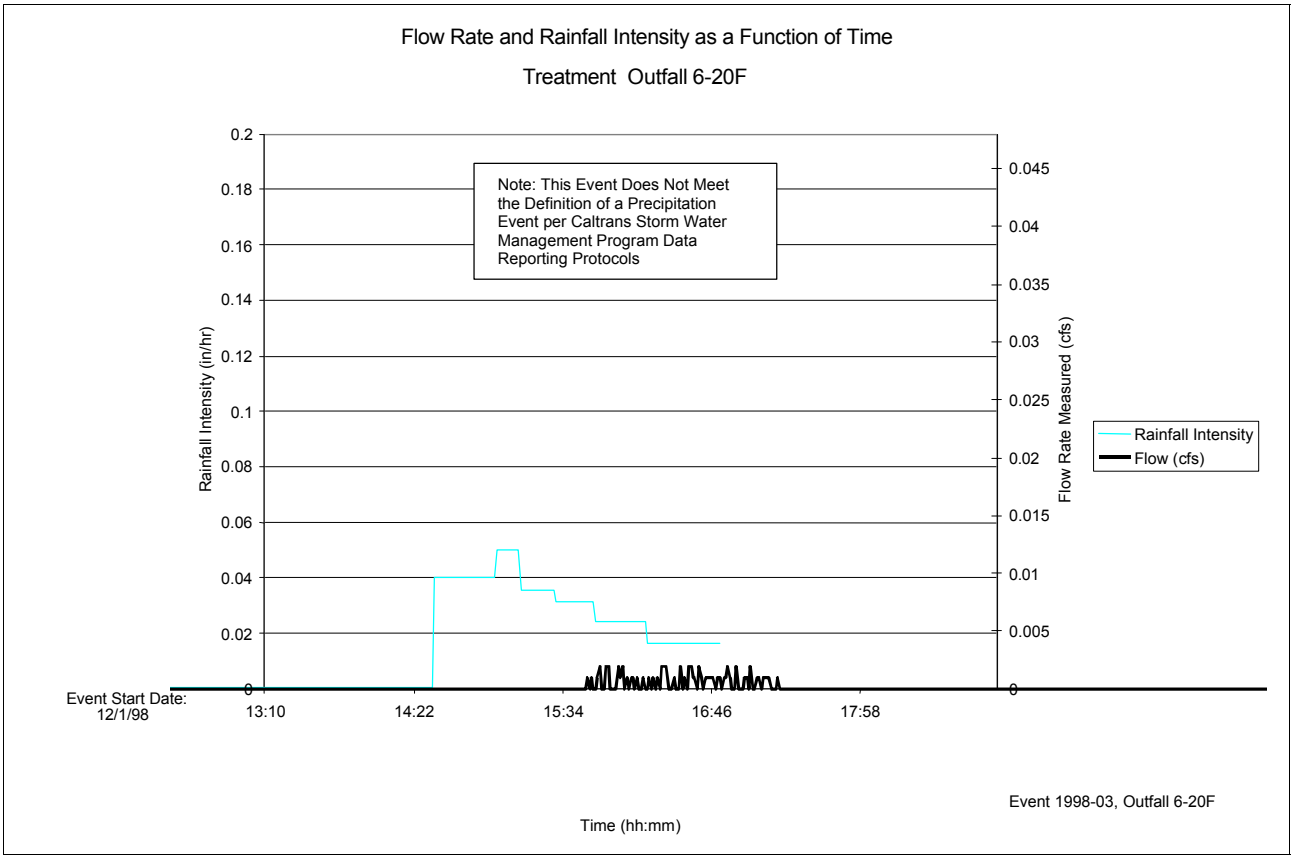

Site 8 - Bicycle Grate/LID Event No. 1998e03 - 12/1/98

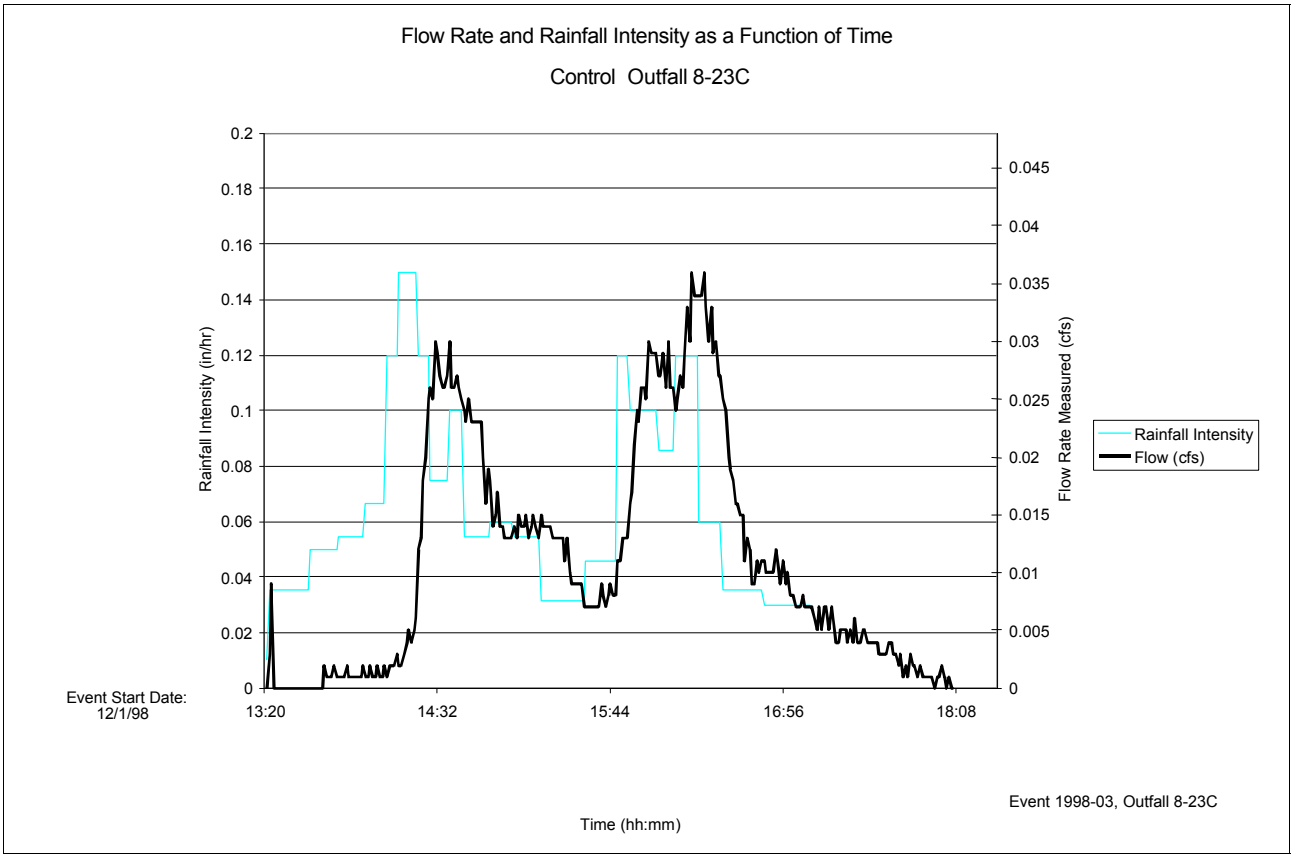

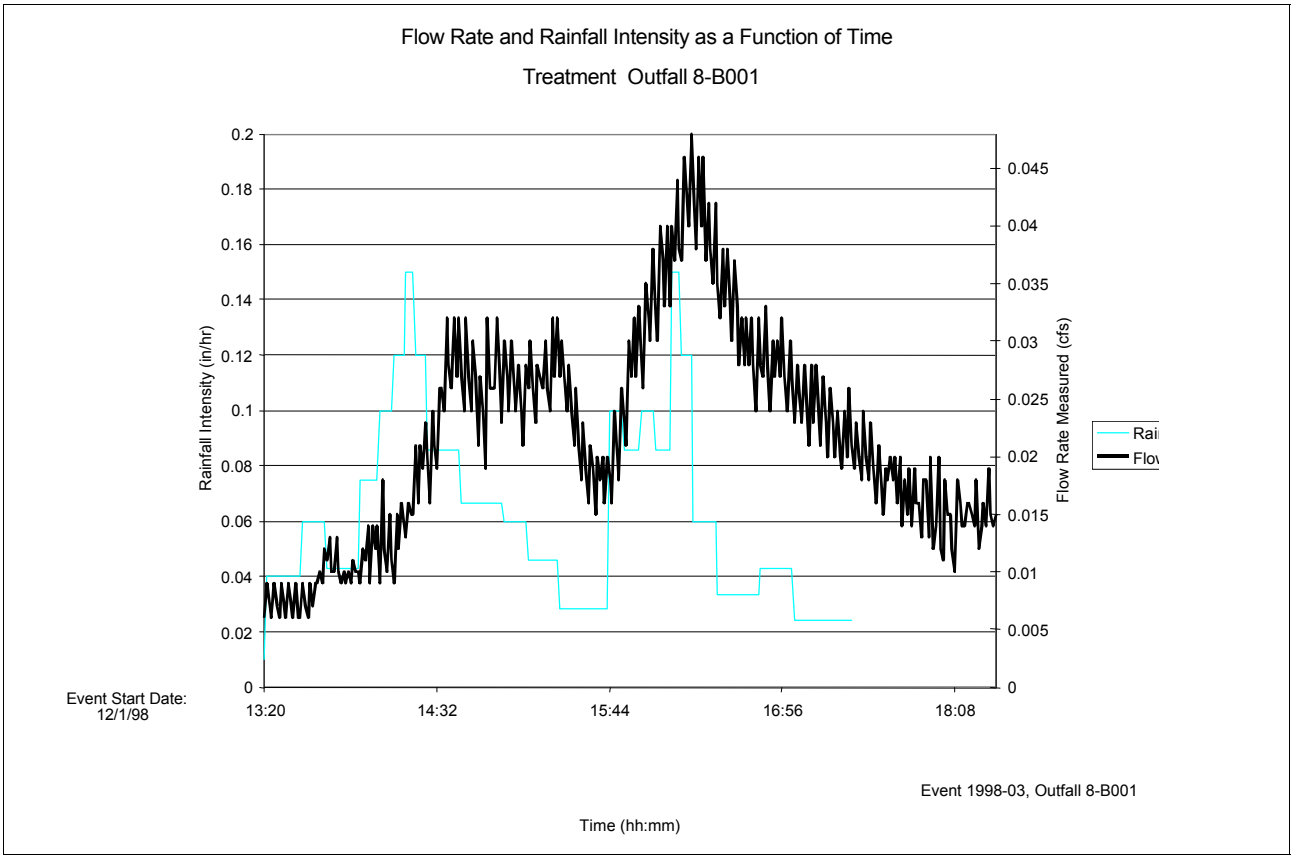

Site 1E - Litter Pickup Event No. 1998e05 - 1/25/99

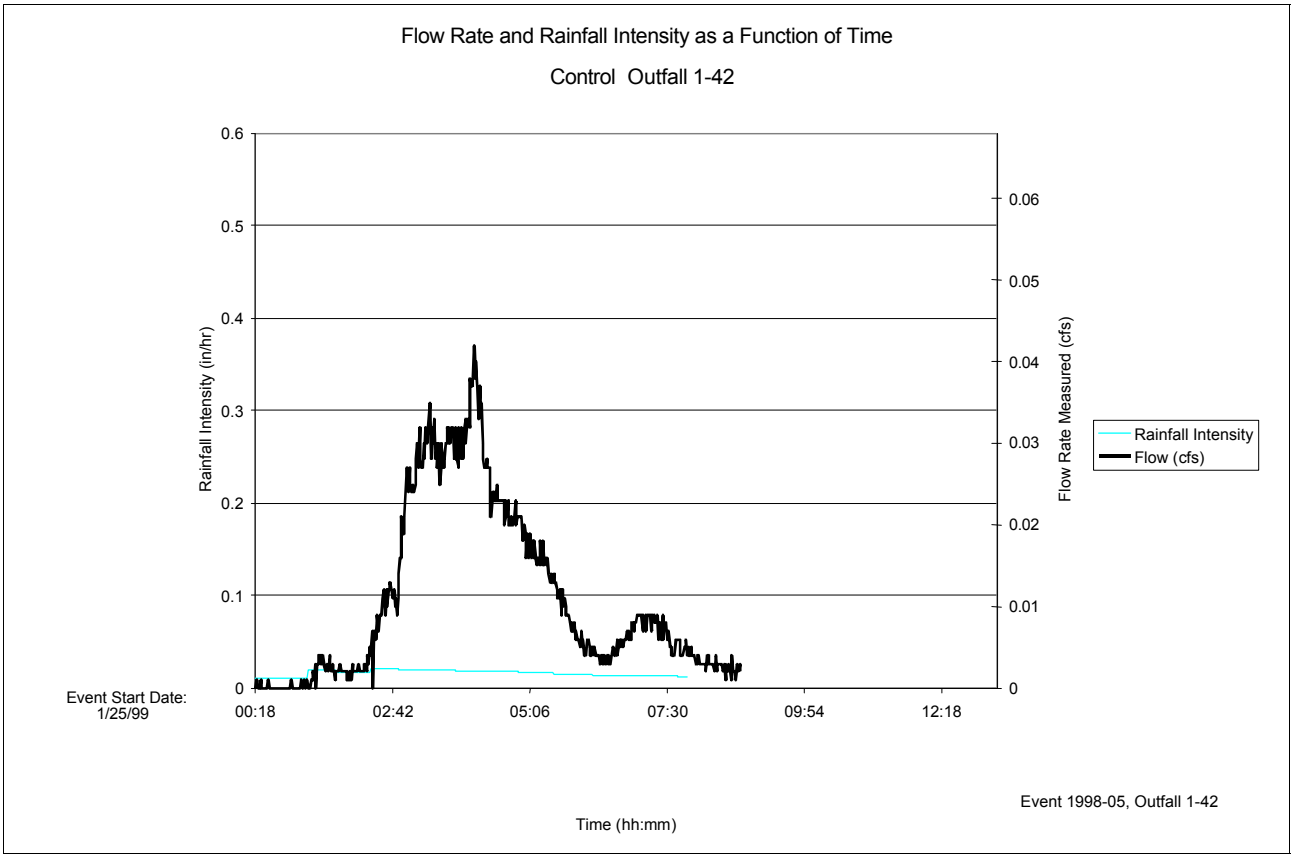

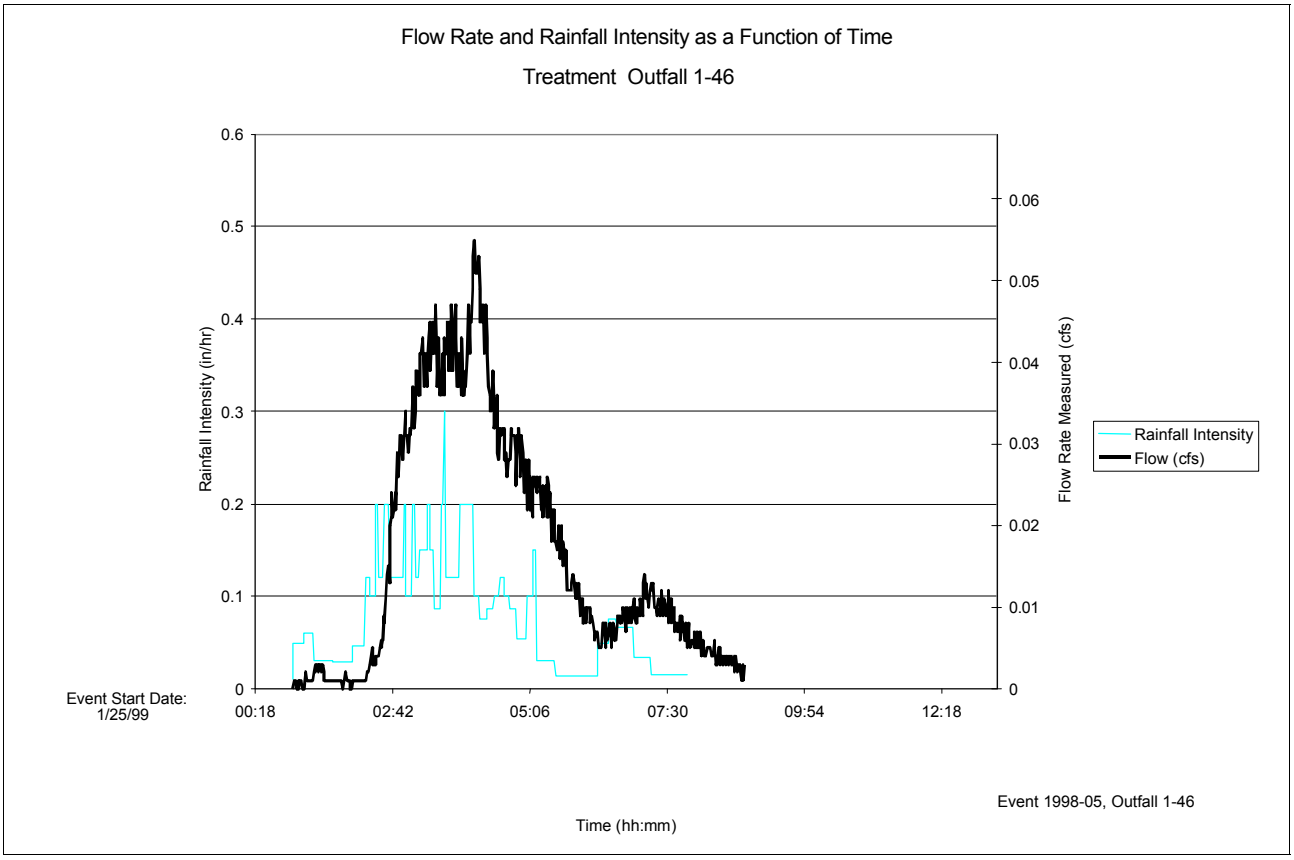

Site 1W - Street Sweeping Event No. 1998e05 - 1/25/99

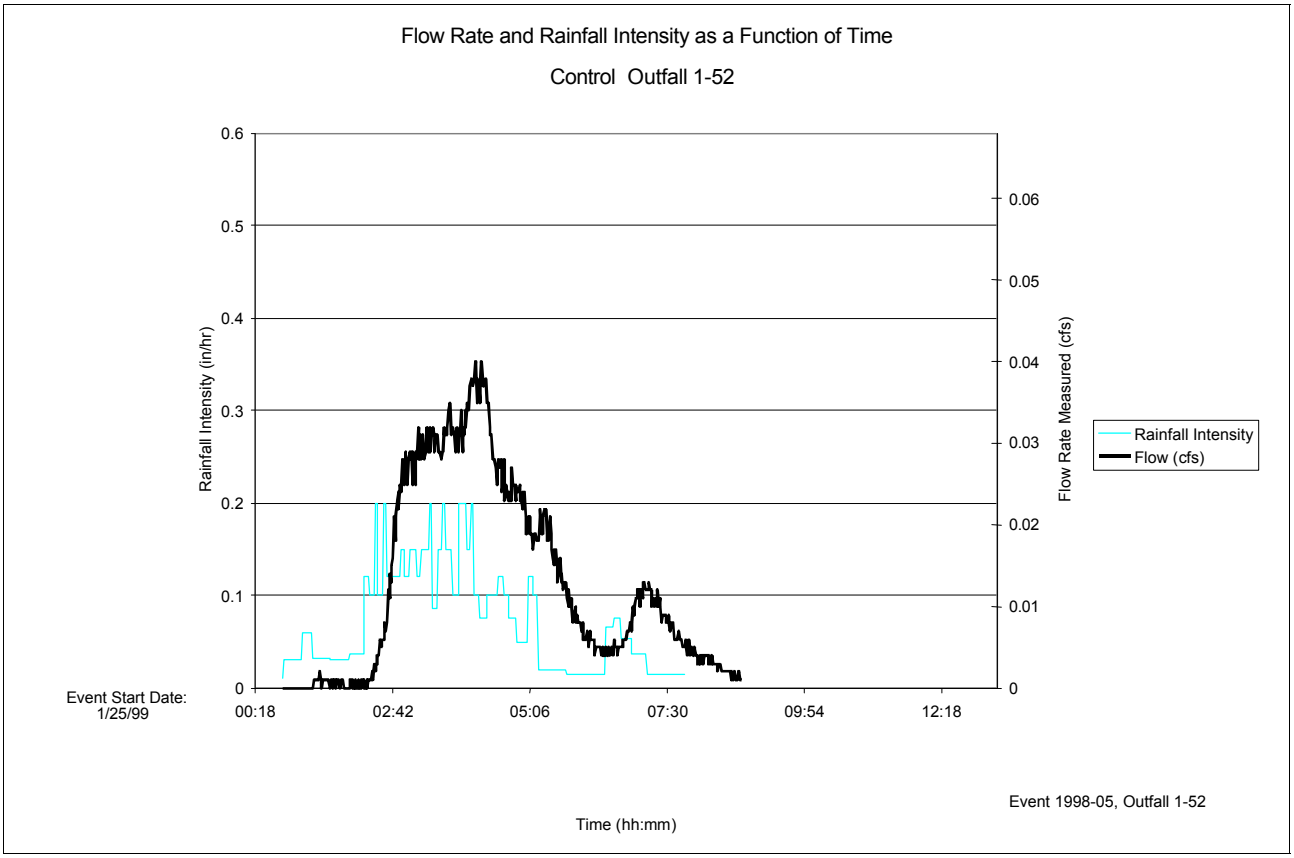

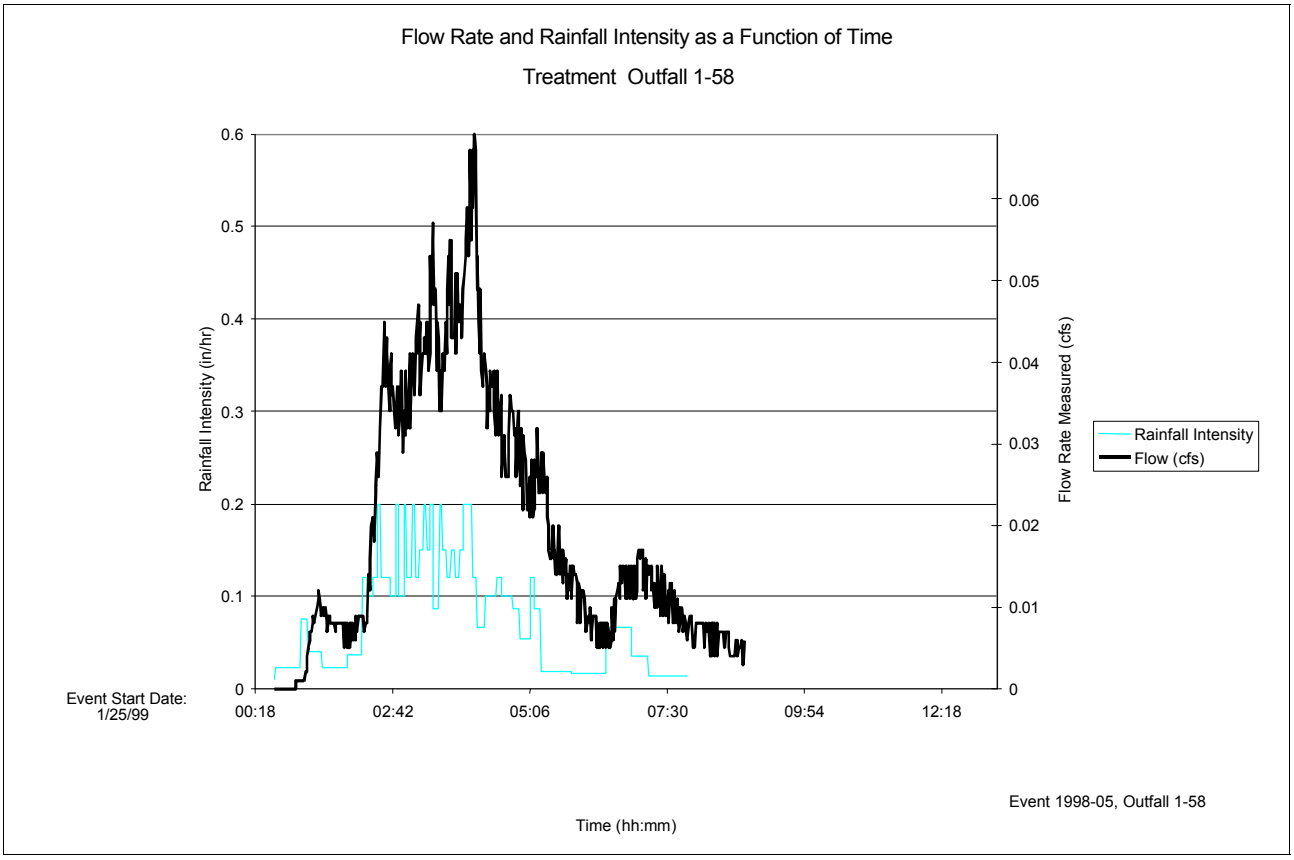

Site 6 - Modified Inlet Event No. 1998e05 - 1/25/99

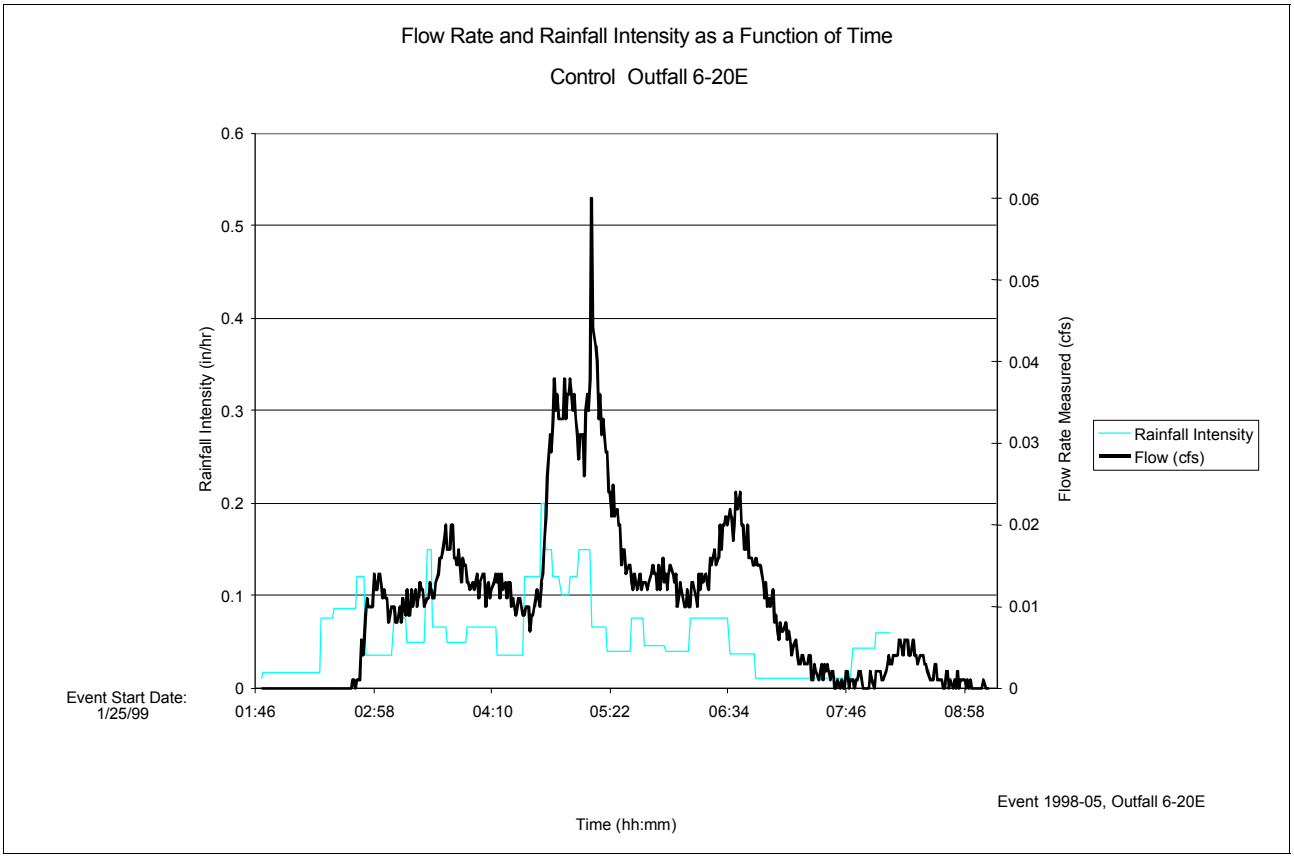

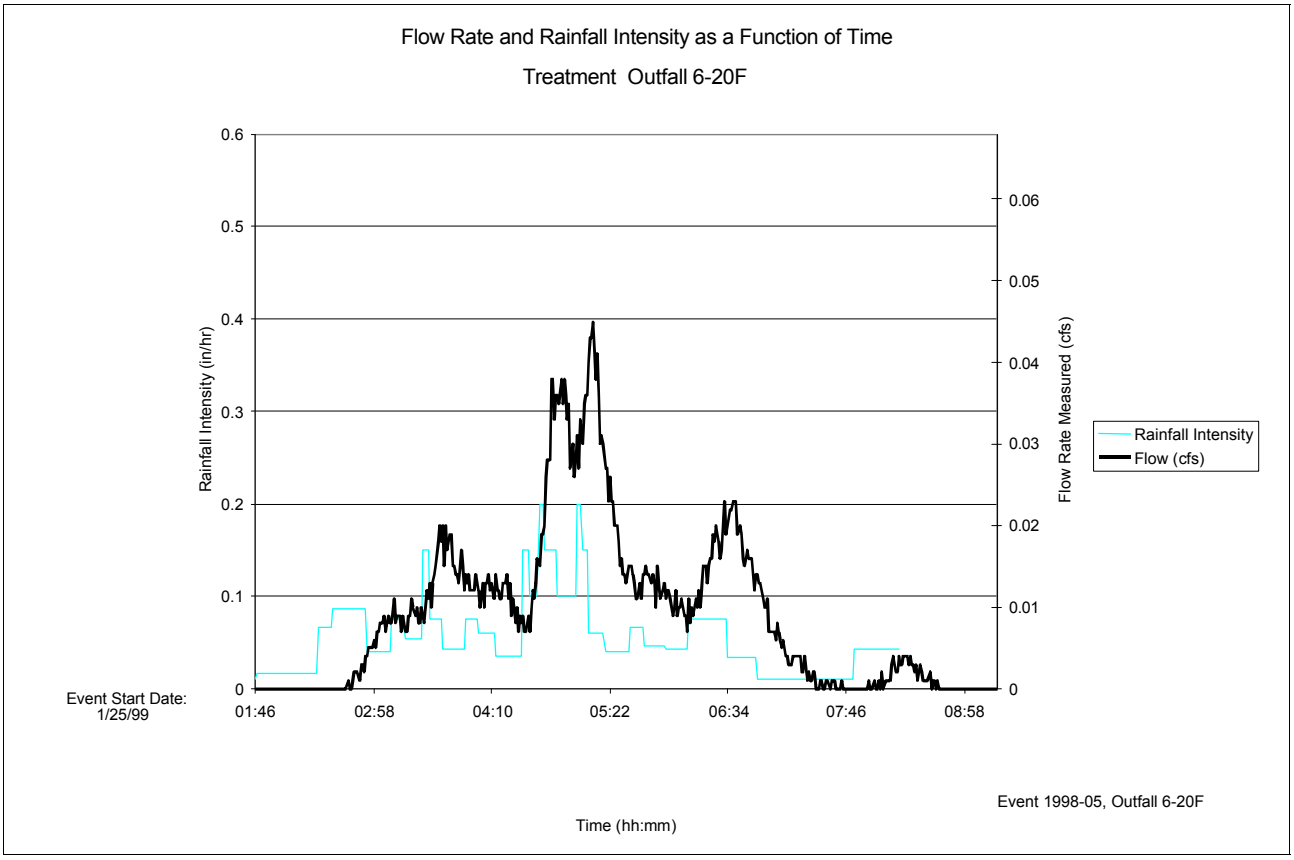

Site 8 - Bicycle Grate/LID Event No. 1998e05 - 1/25/99

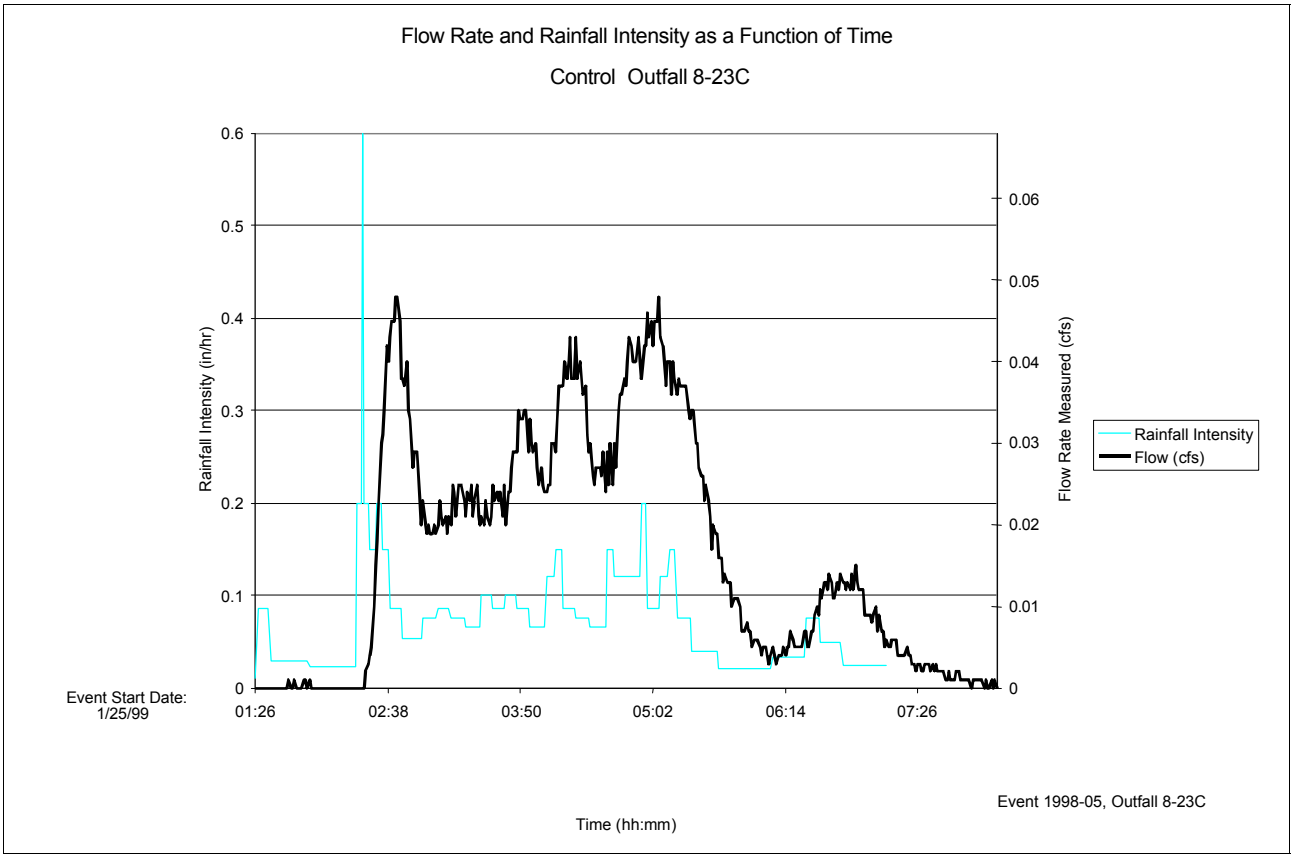

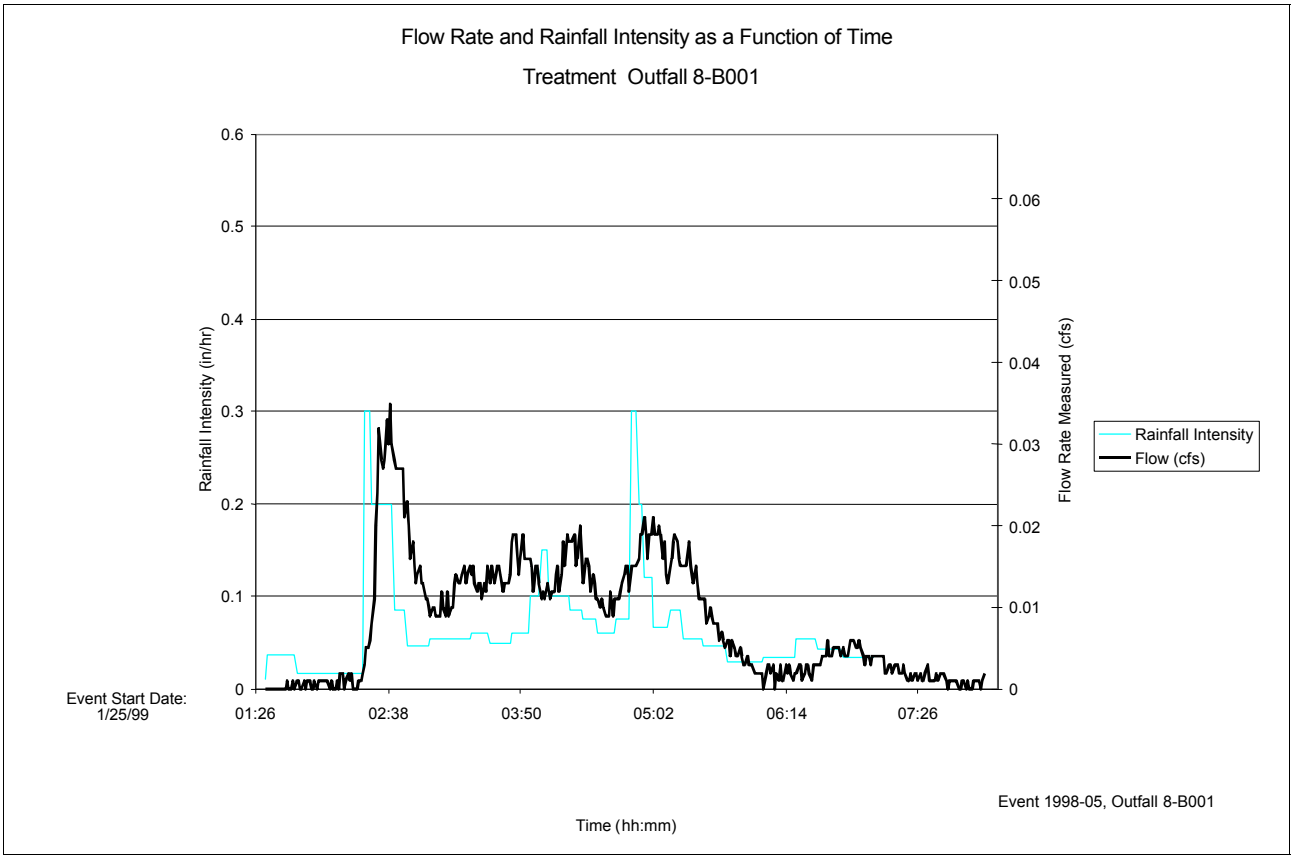

Site 1E - Litter Pickup Event No. 1998e06 - 2/9/99

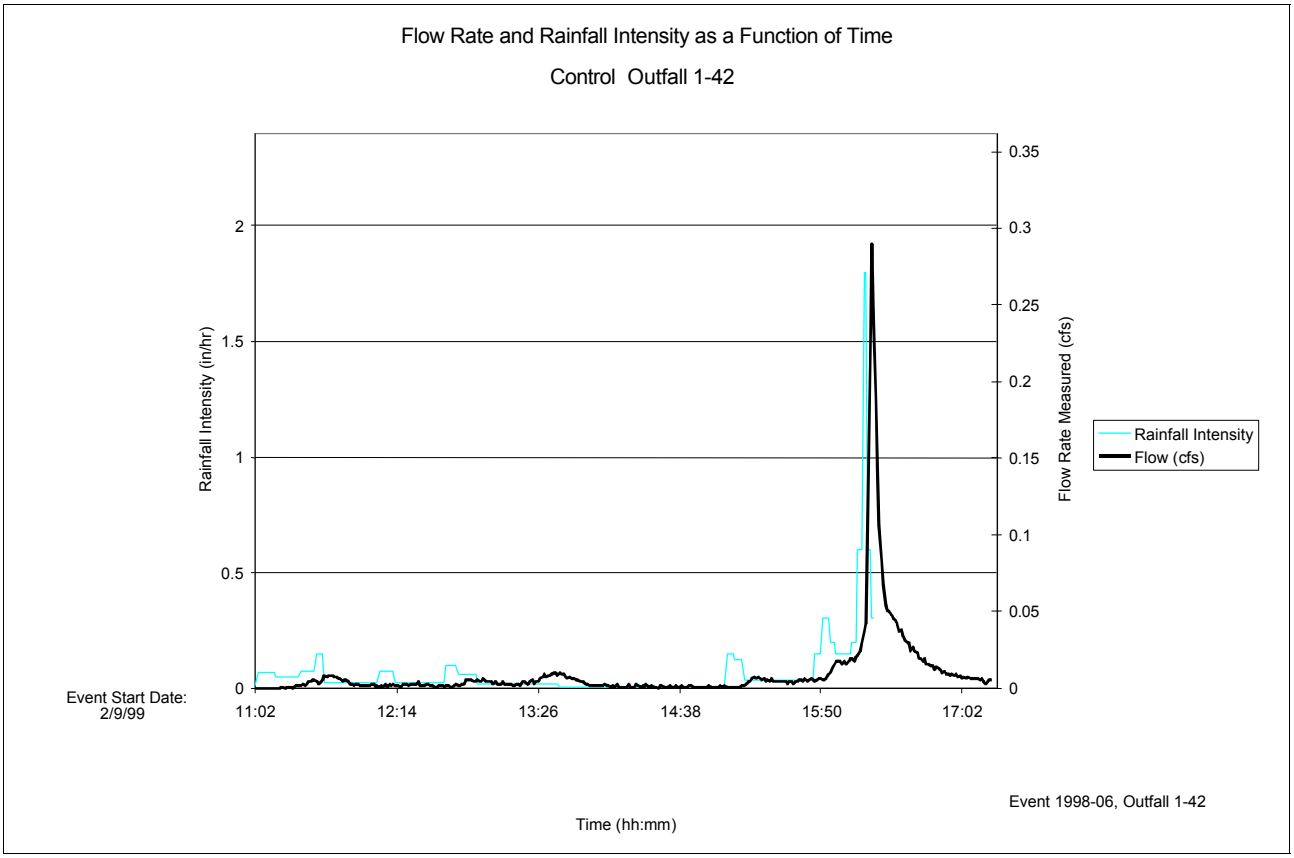

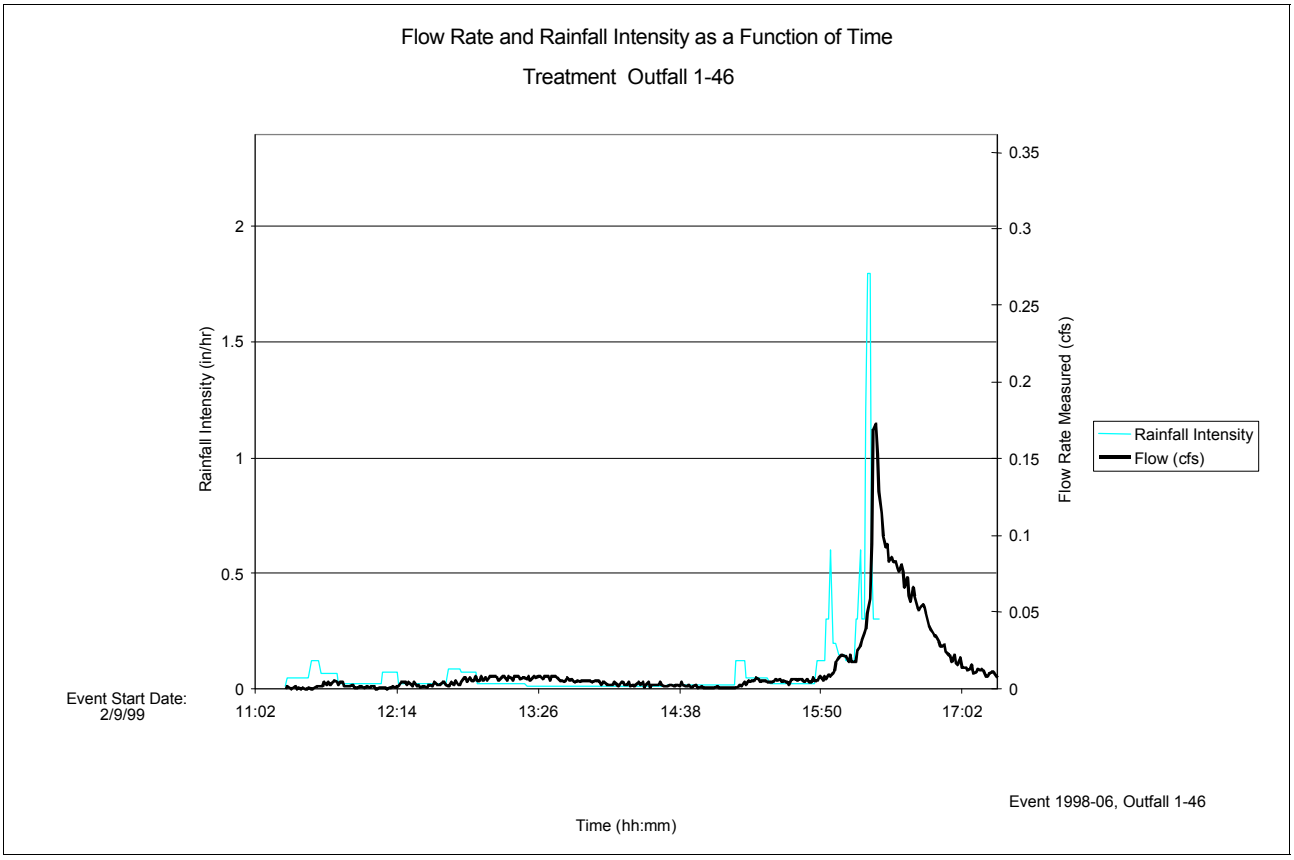

Site 1W - Street Sweeping Event No. 1998e06 - 2/9/99

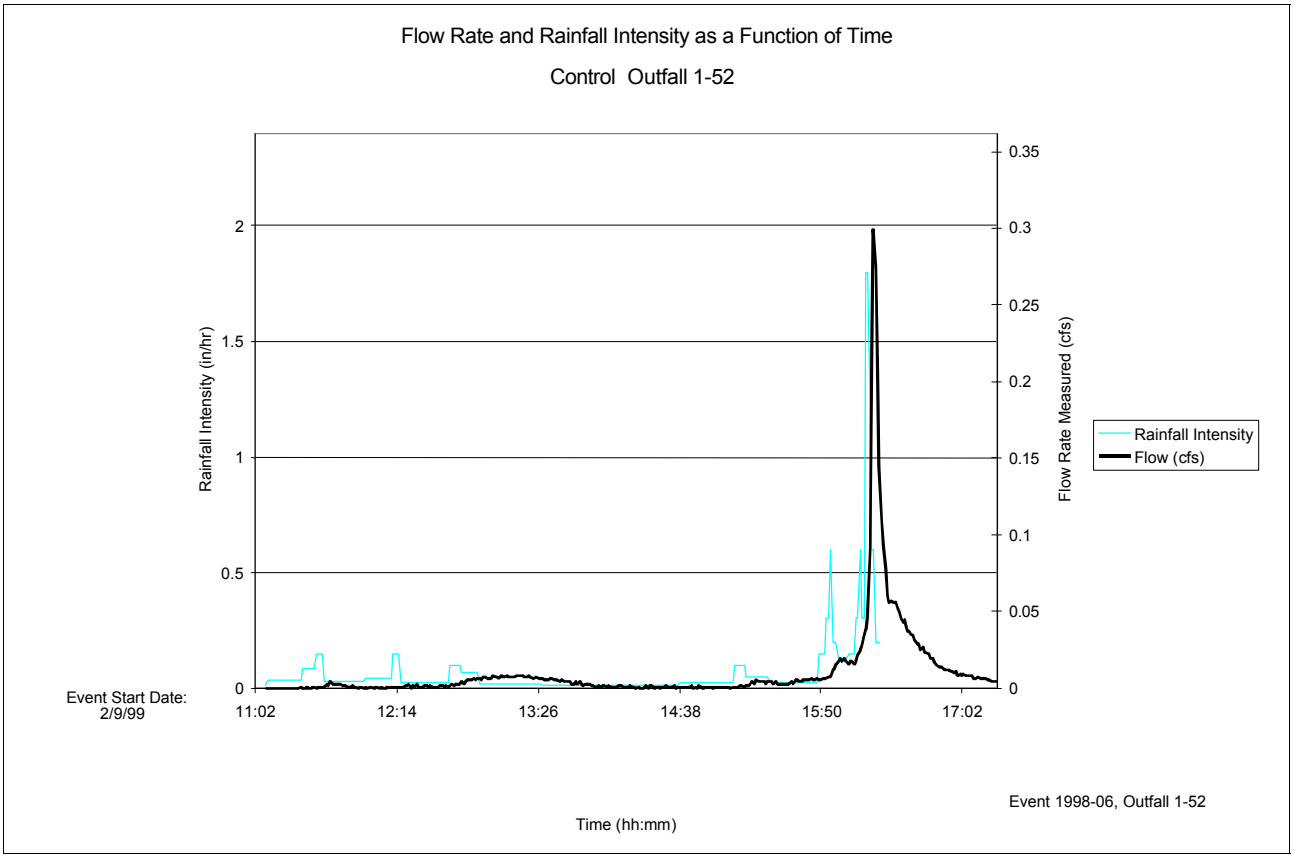

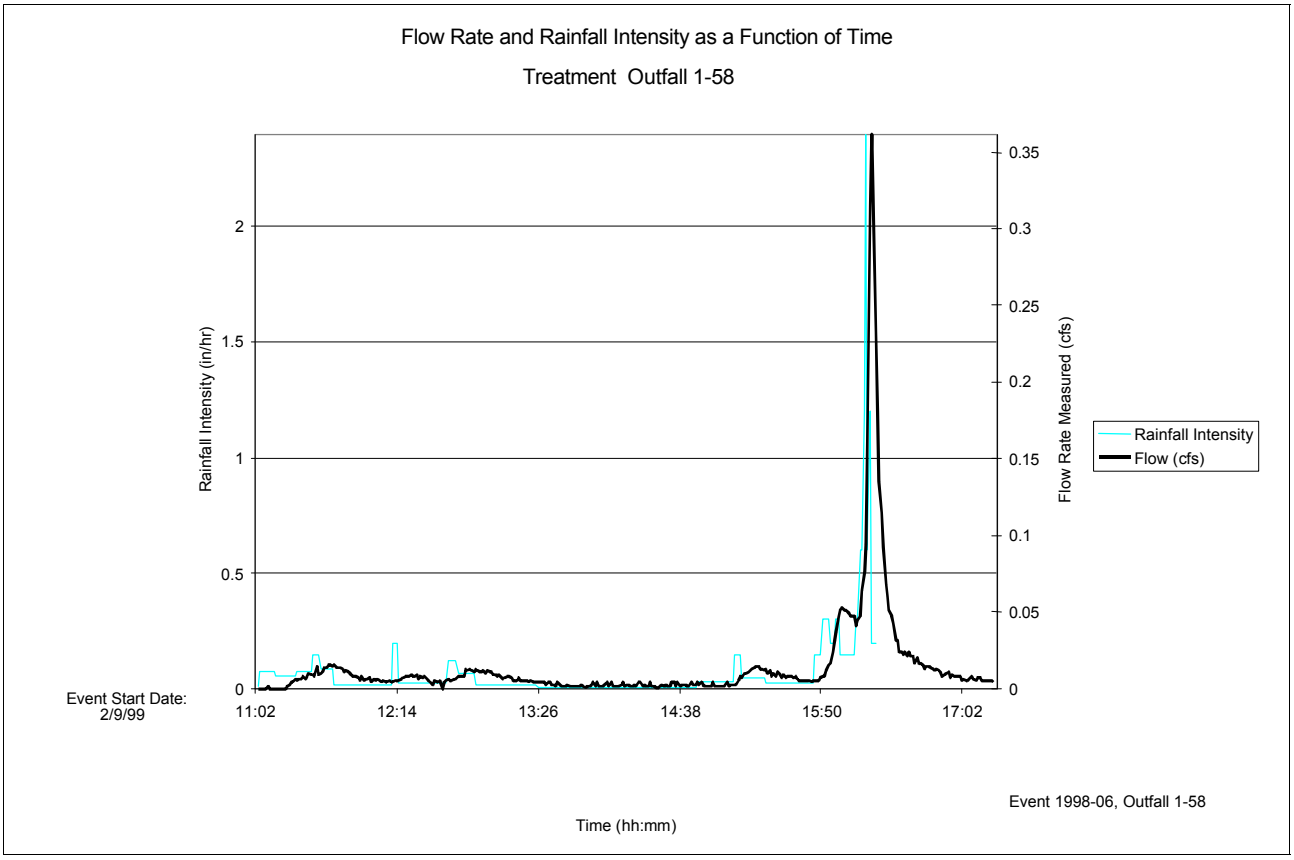

Site 6 - Modified Inlet Event No. 1998e06 - 2/9/99

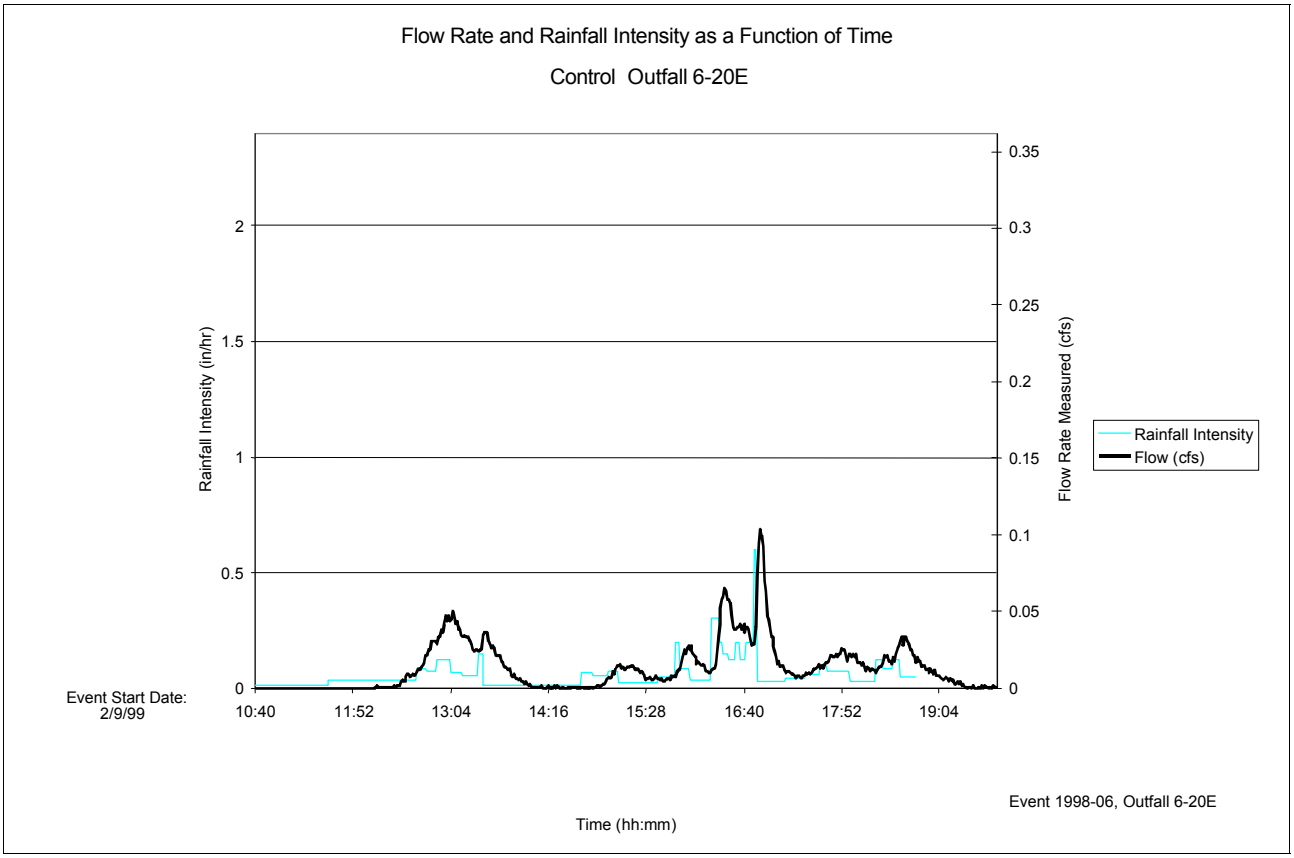

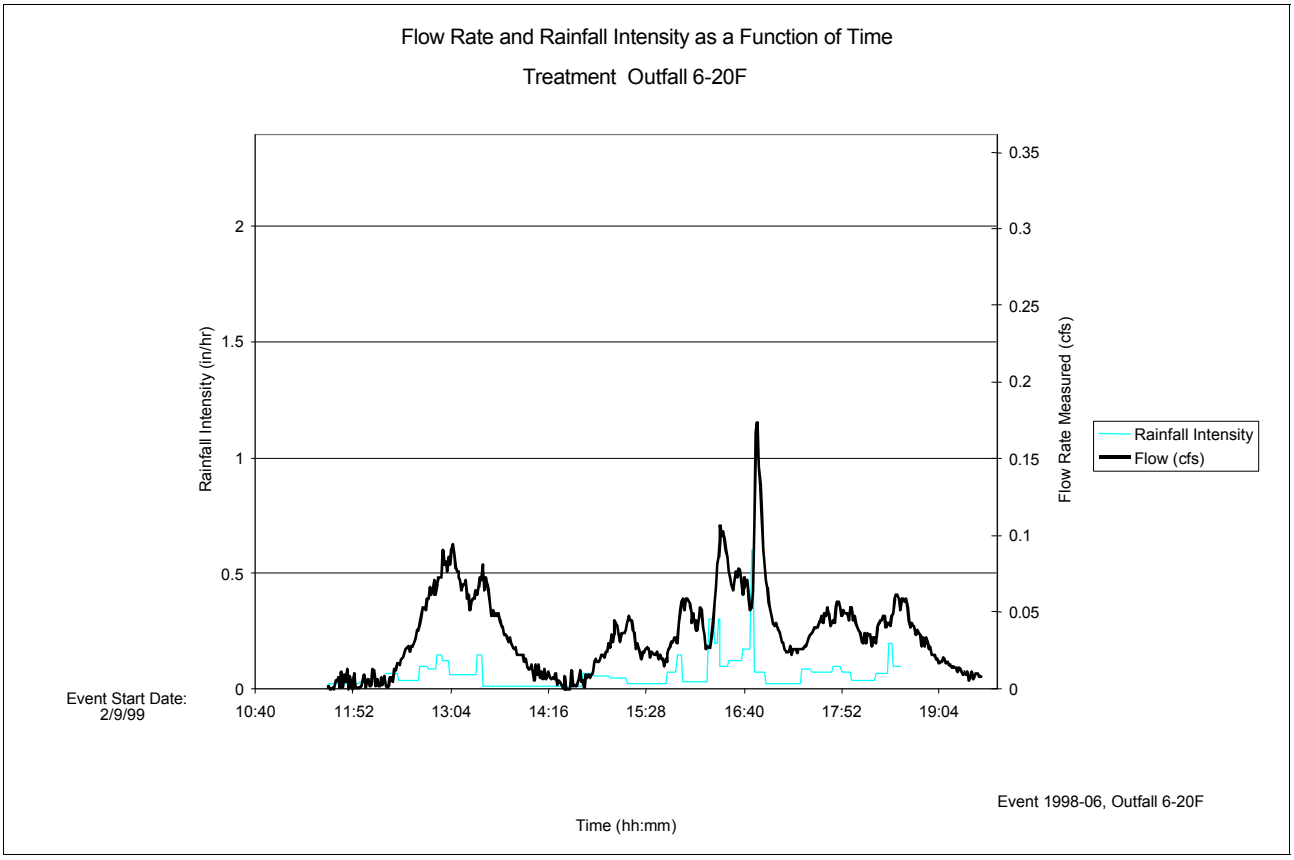

Site 8 - Bicycle Grate/LID Event No. 1998e06 - 2/9/99

Flow Rate and Rainfall Intensity as a Function of Time

Control Outfall 8-23C

No Hydrologic Data Available for this Event For this Outfall

Event Start Date:
2/9/99

Flow Rate and Rainfall Intensity as a Function of Time

Treatment Outfall 8-B001

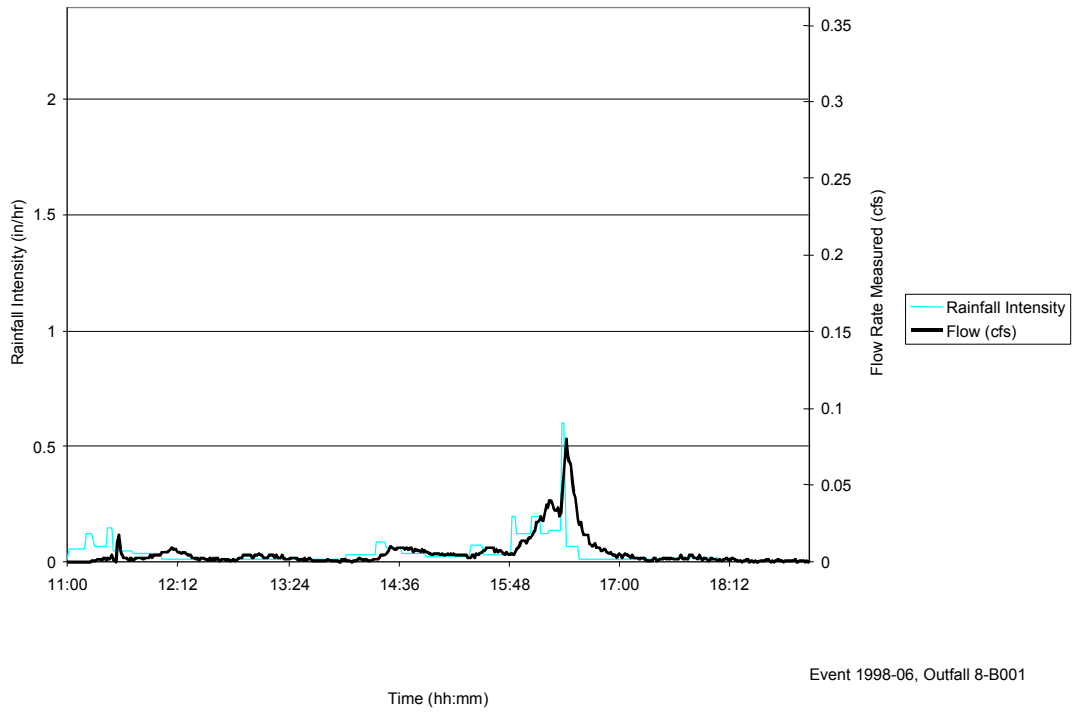

Event Start Date:
2/9/99

Event 1998-06, Outfall 8-B001

Site 1E - Litter Pickup Event No. 1998e09 - 3/15/99

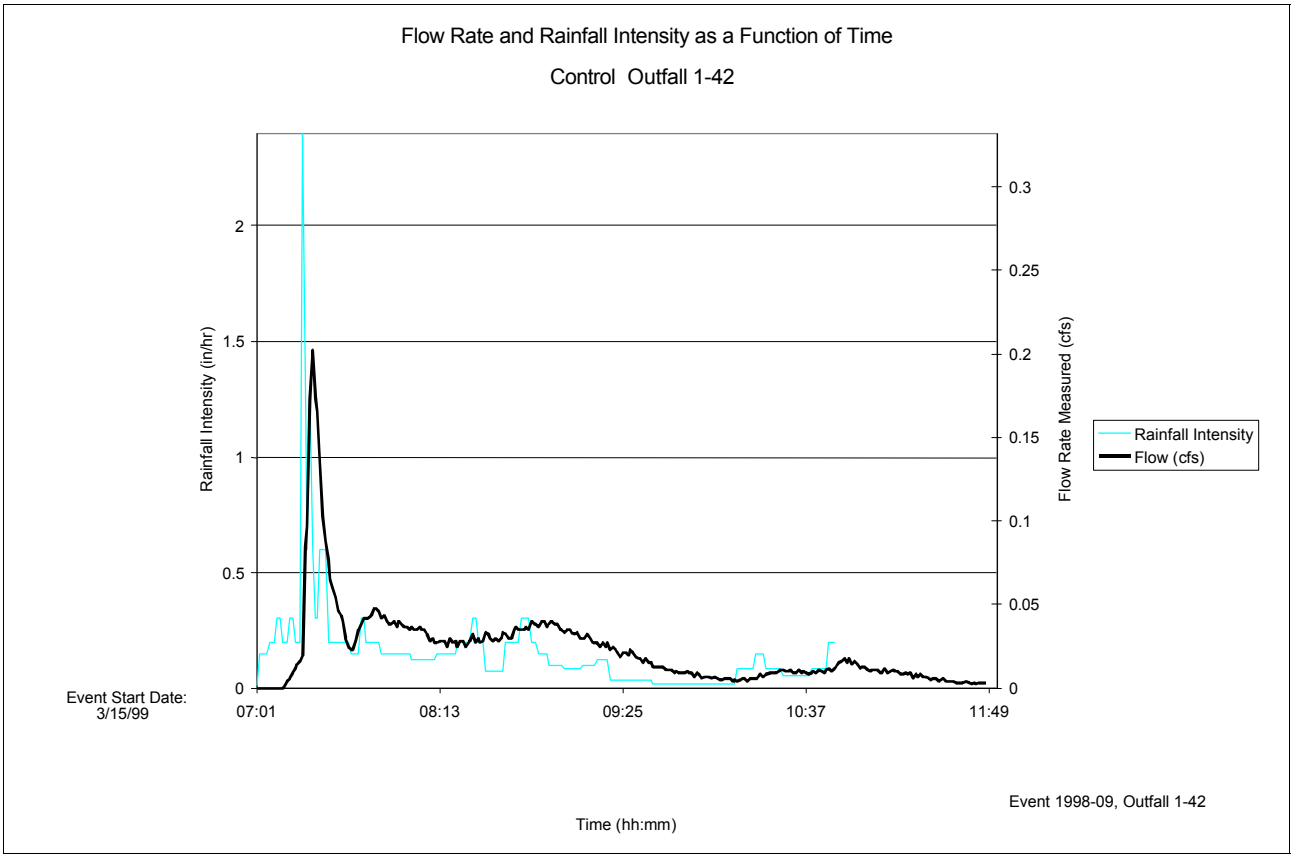

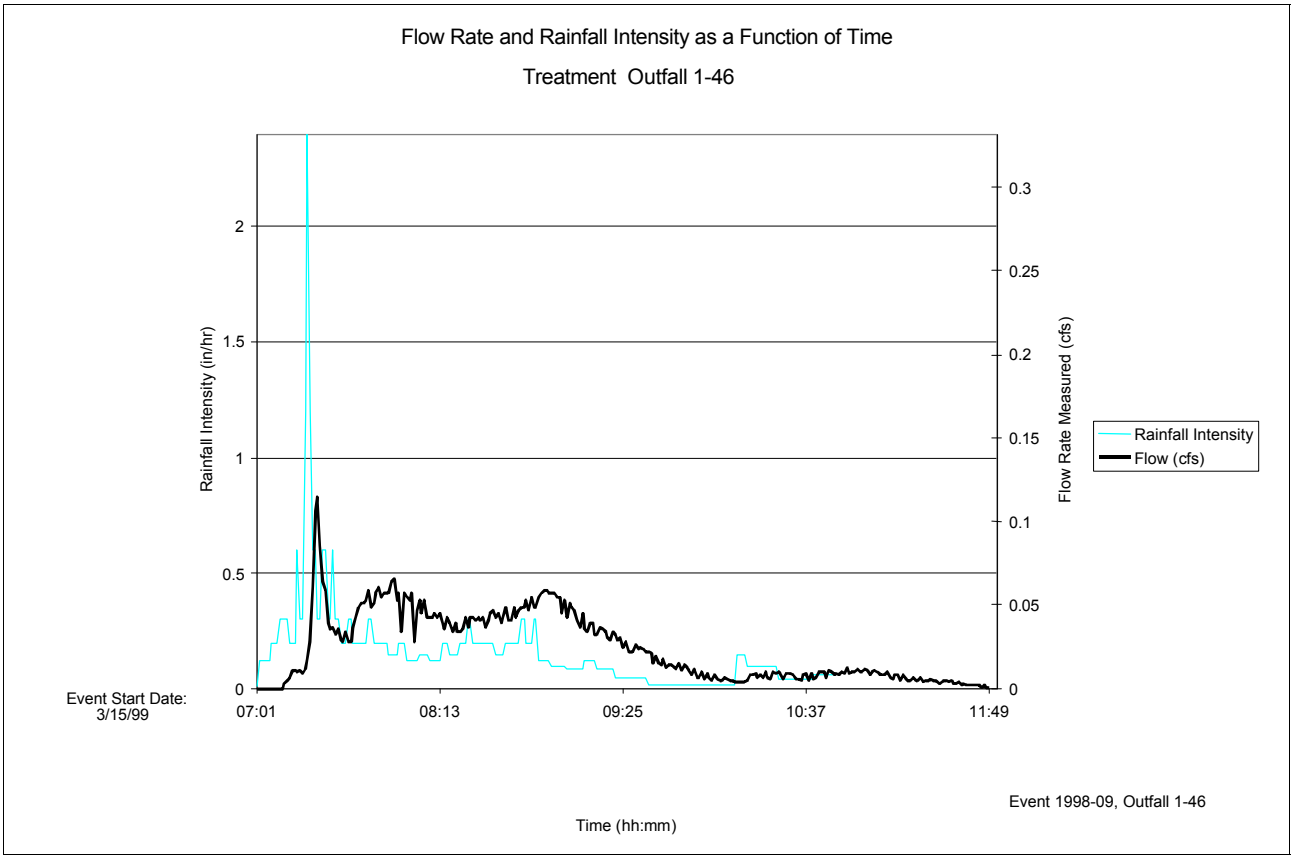

Site 1W - Street Sweeping Event No. 1998e09 - 3/15/99

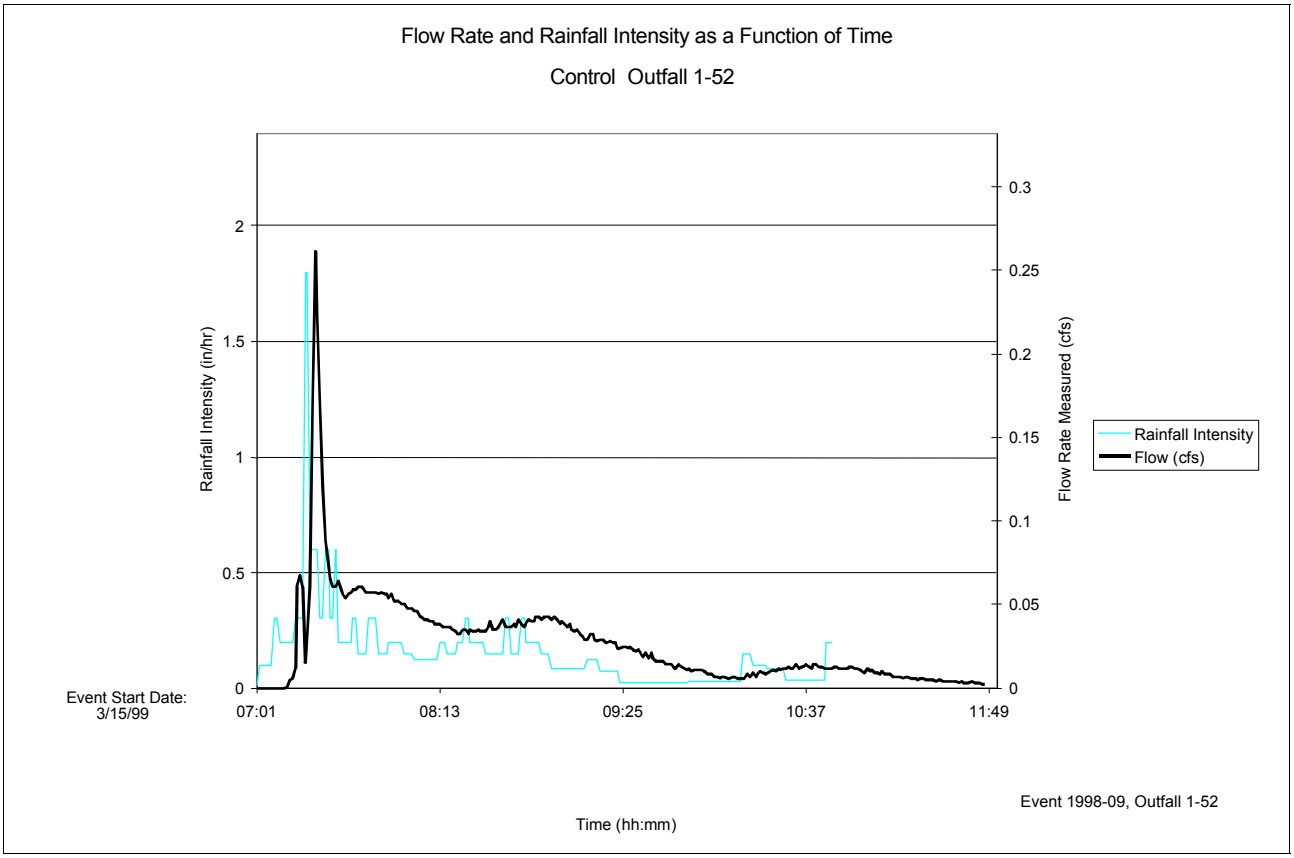

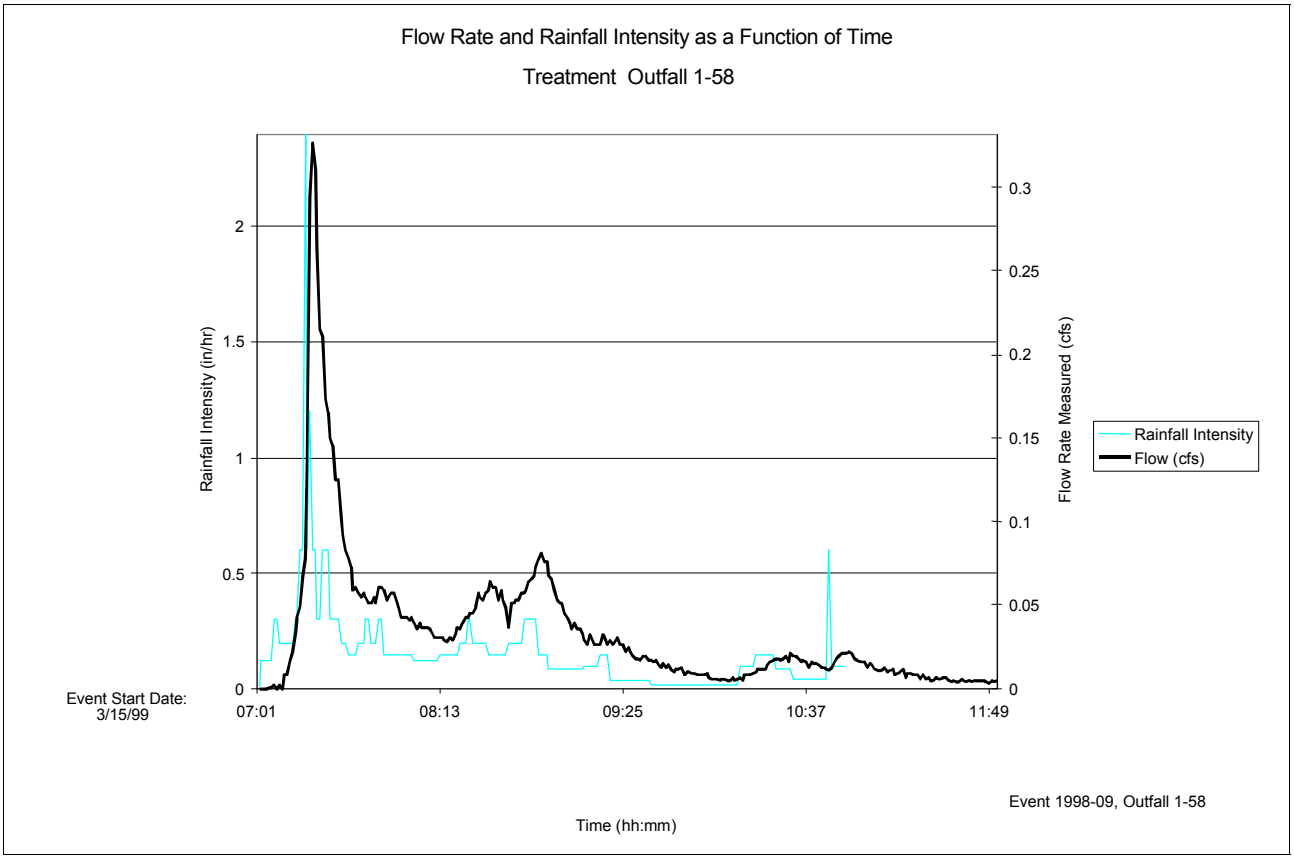

Site 6 - Modified Inlet Event No. 1998e09 - 3/15/99

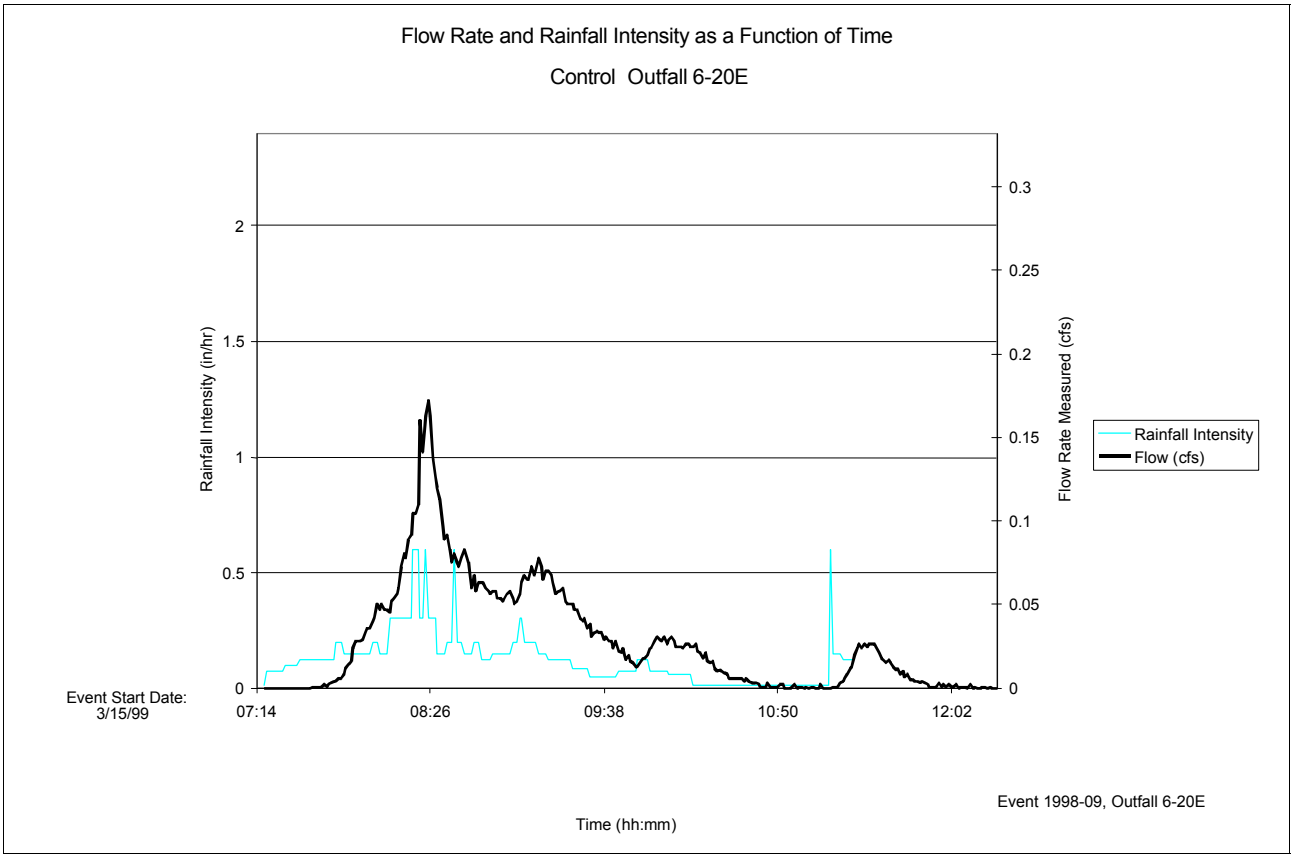

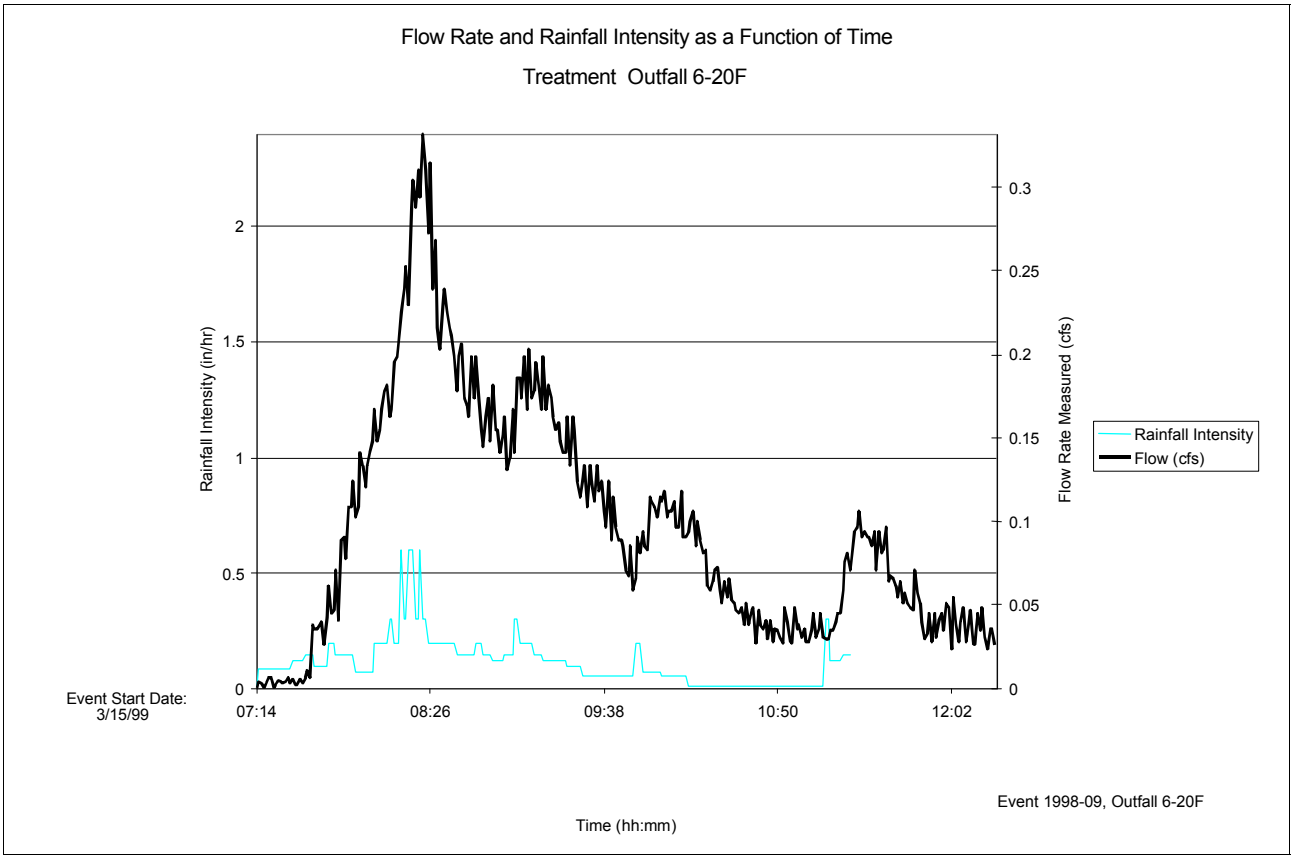

Site 8 - Bicycle Grate/LID Event No. 1998e09 - 3/15/99

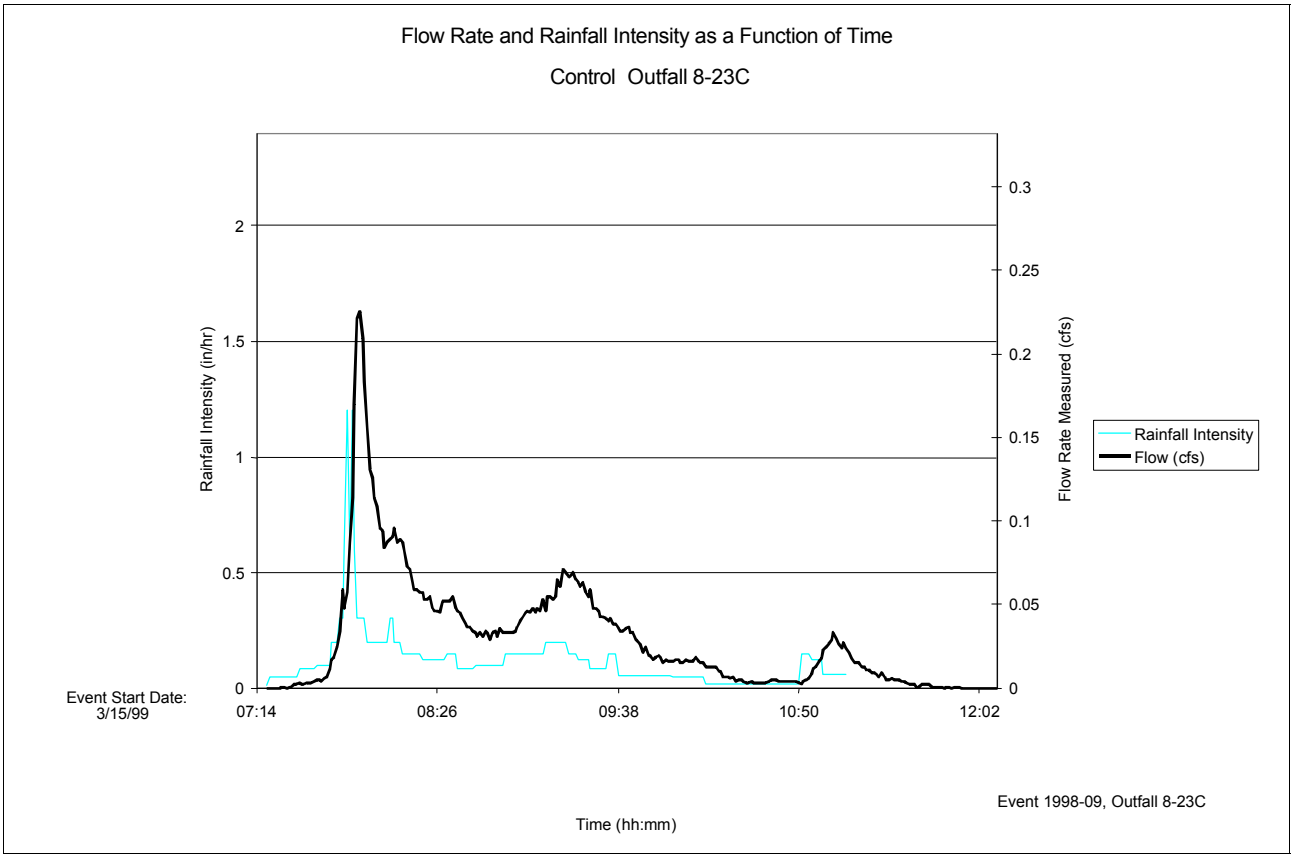

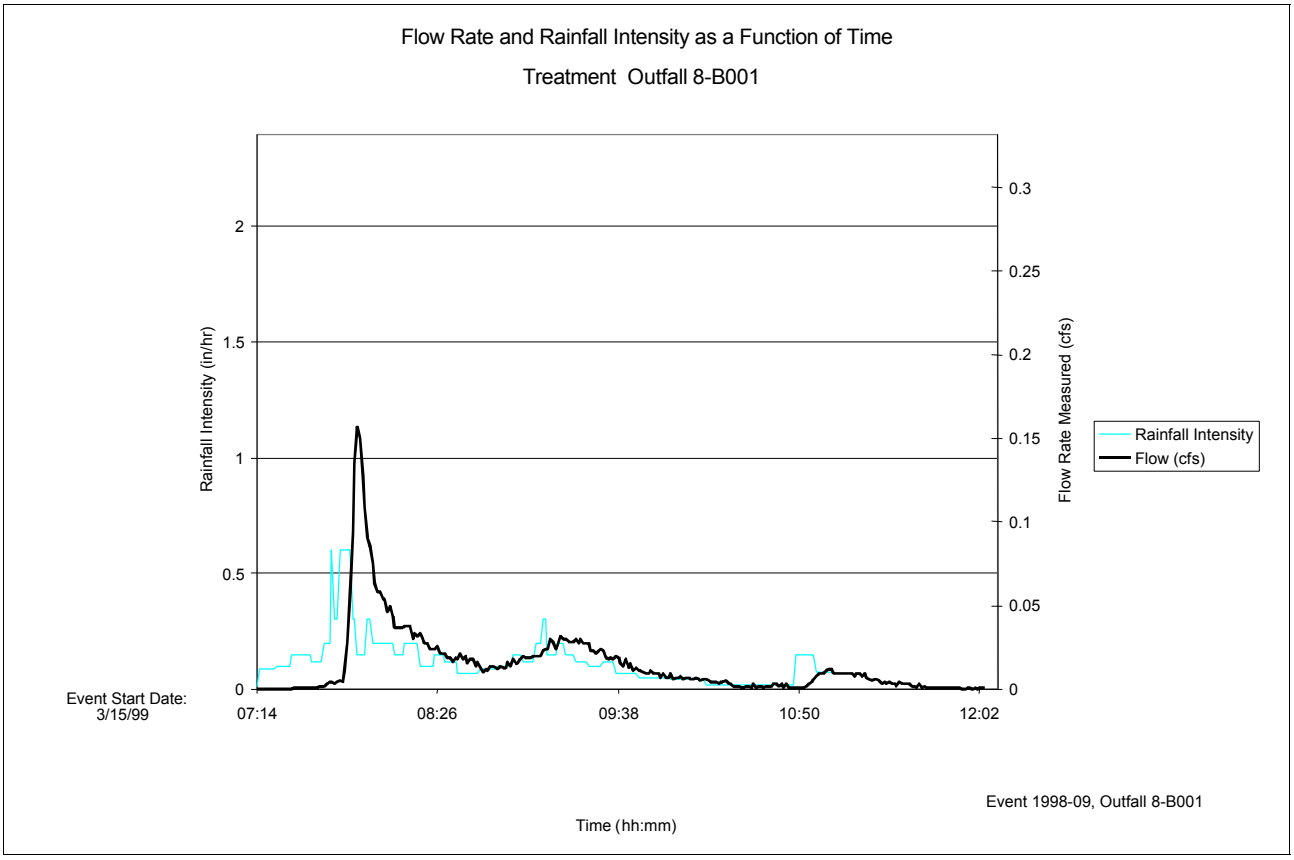

Site 1E - Litter Pickup

Event No. 1998e10 - 3/20/99

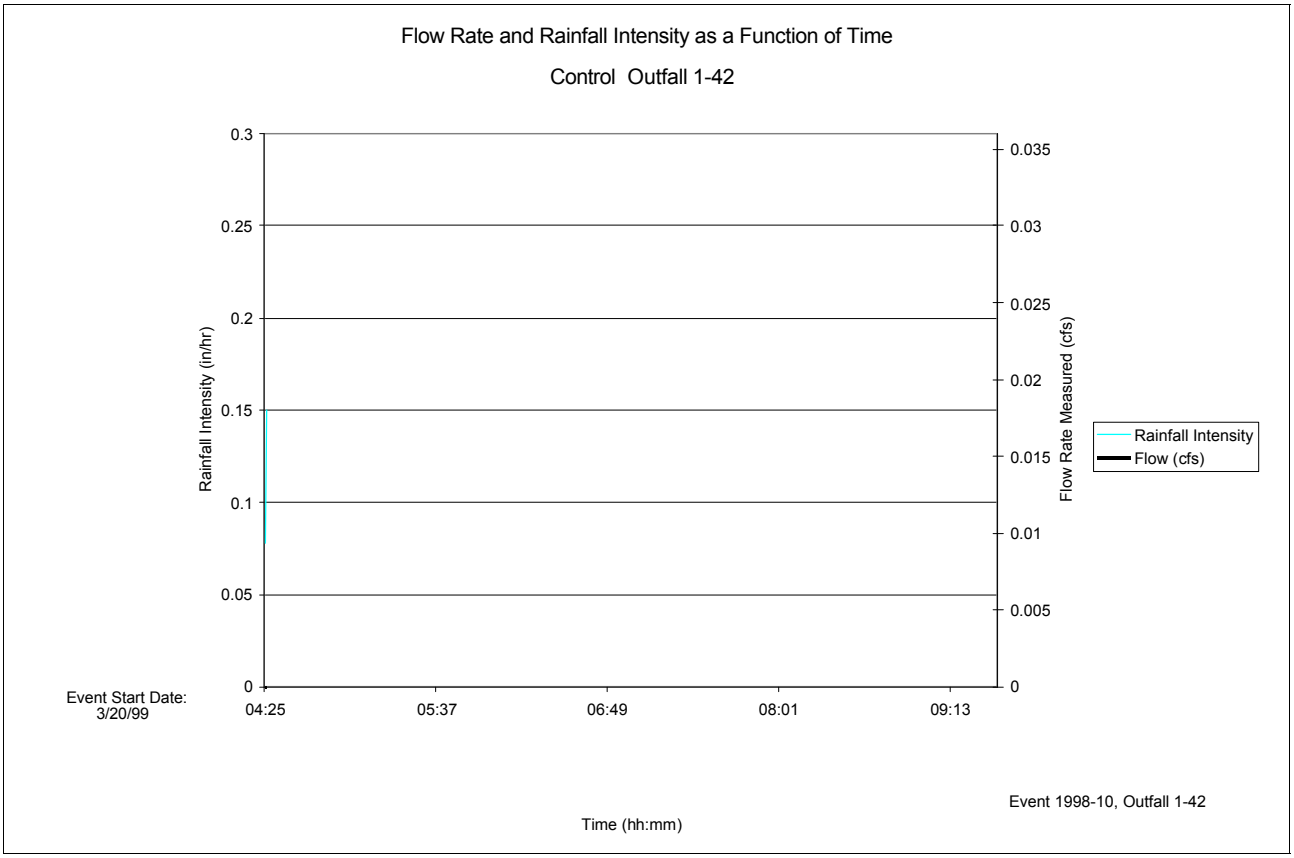

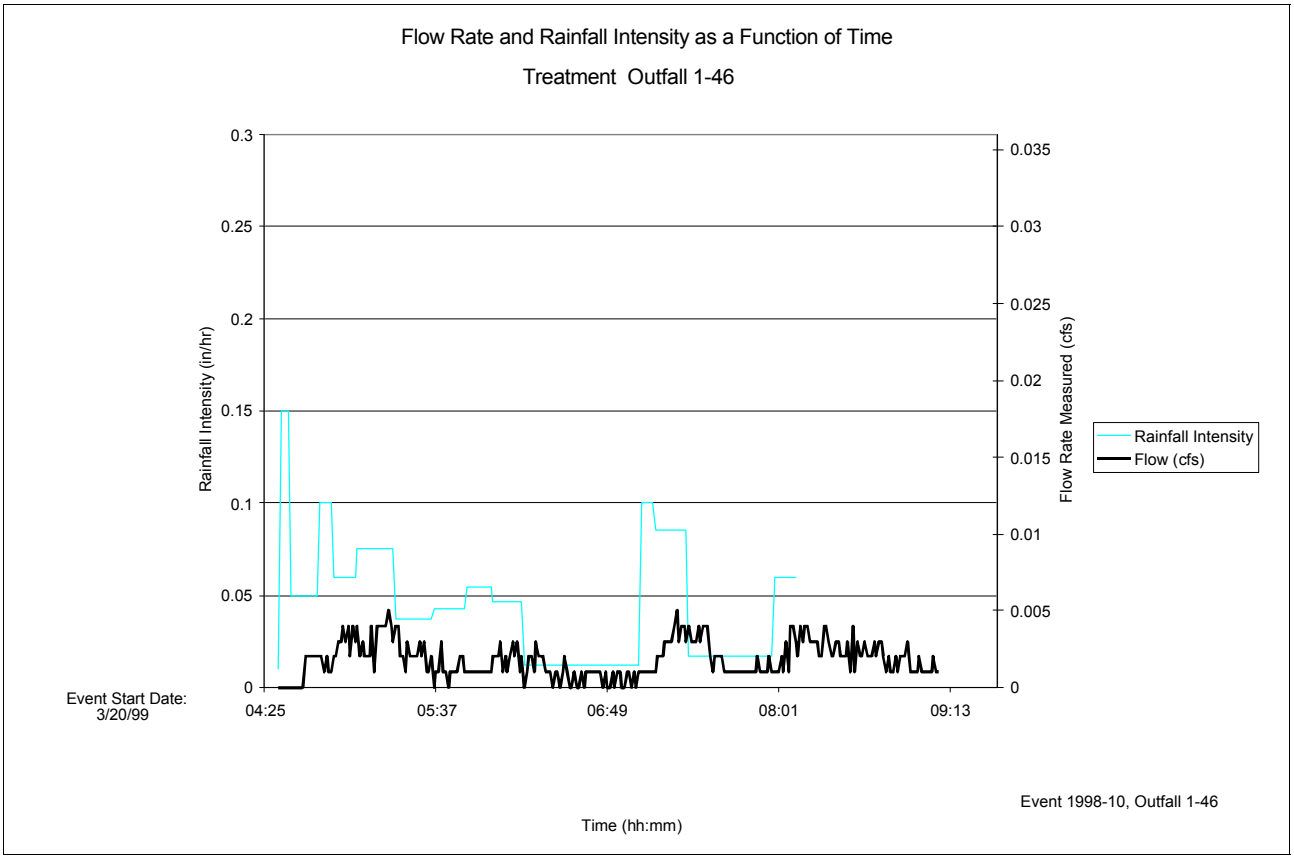

Site 1W - Street Sweeping Event No. 1998e10 - 3/20/99

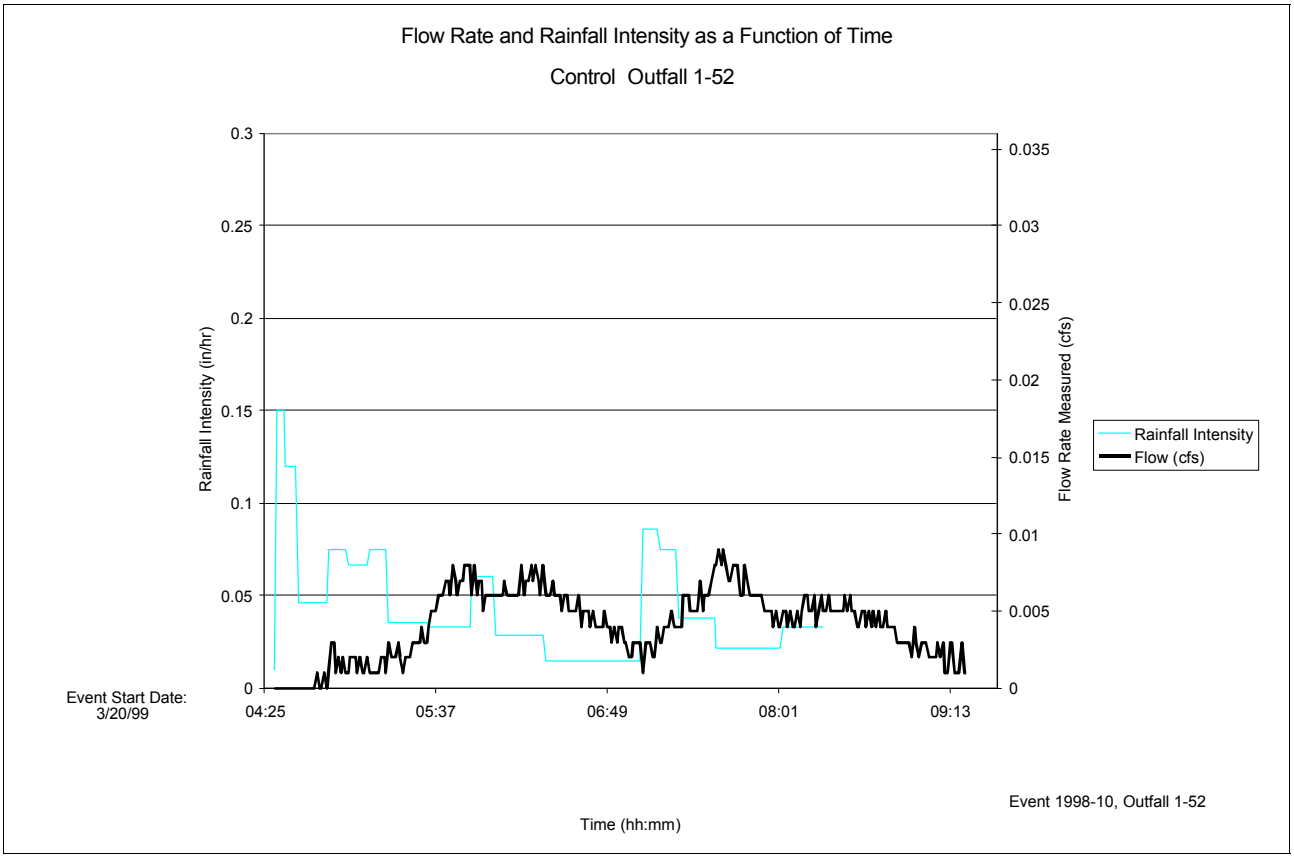

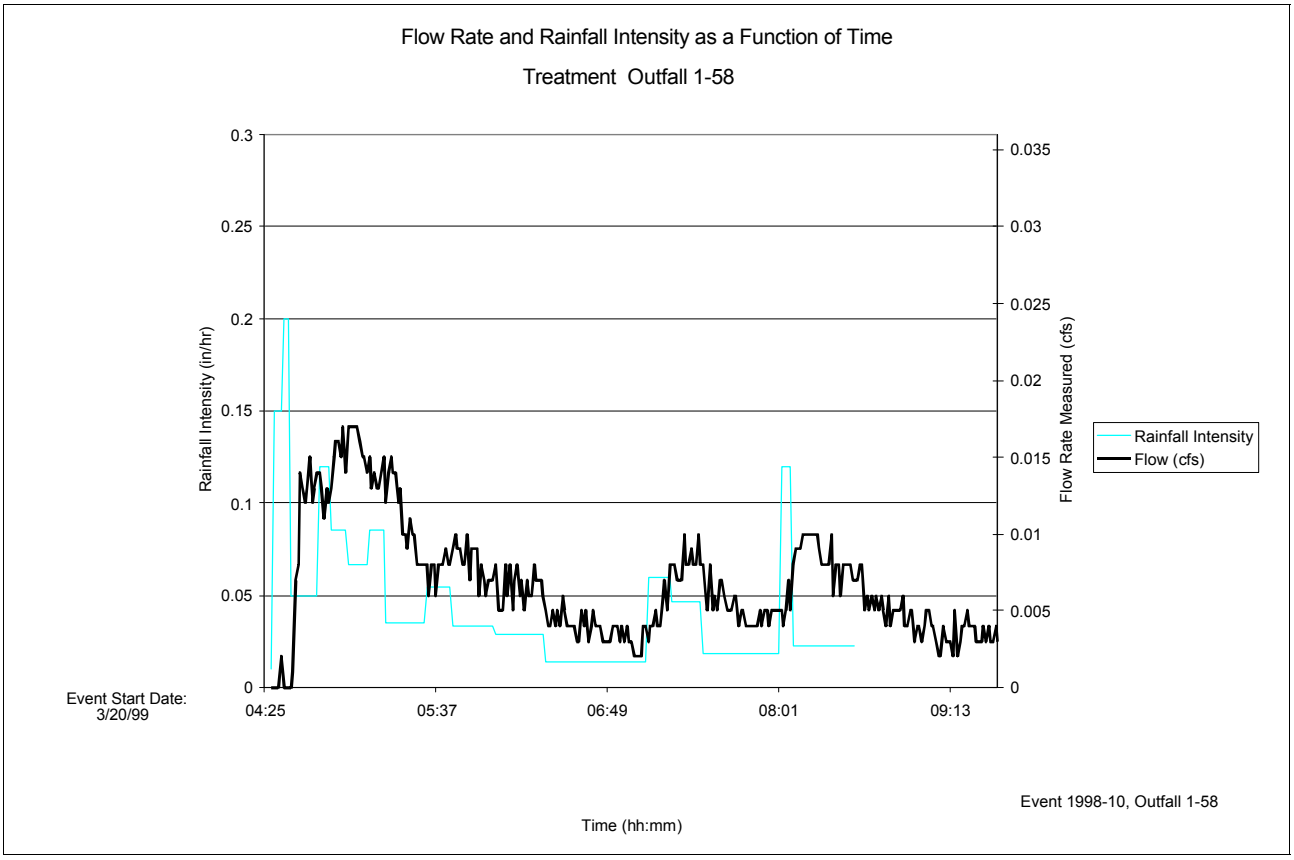

Site 6 - Modified Inlet Event No. 1998e10 - 3/20/99

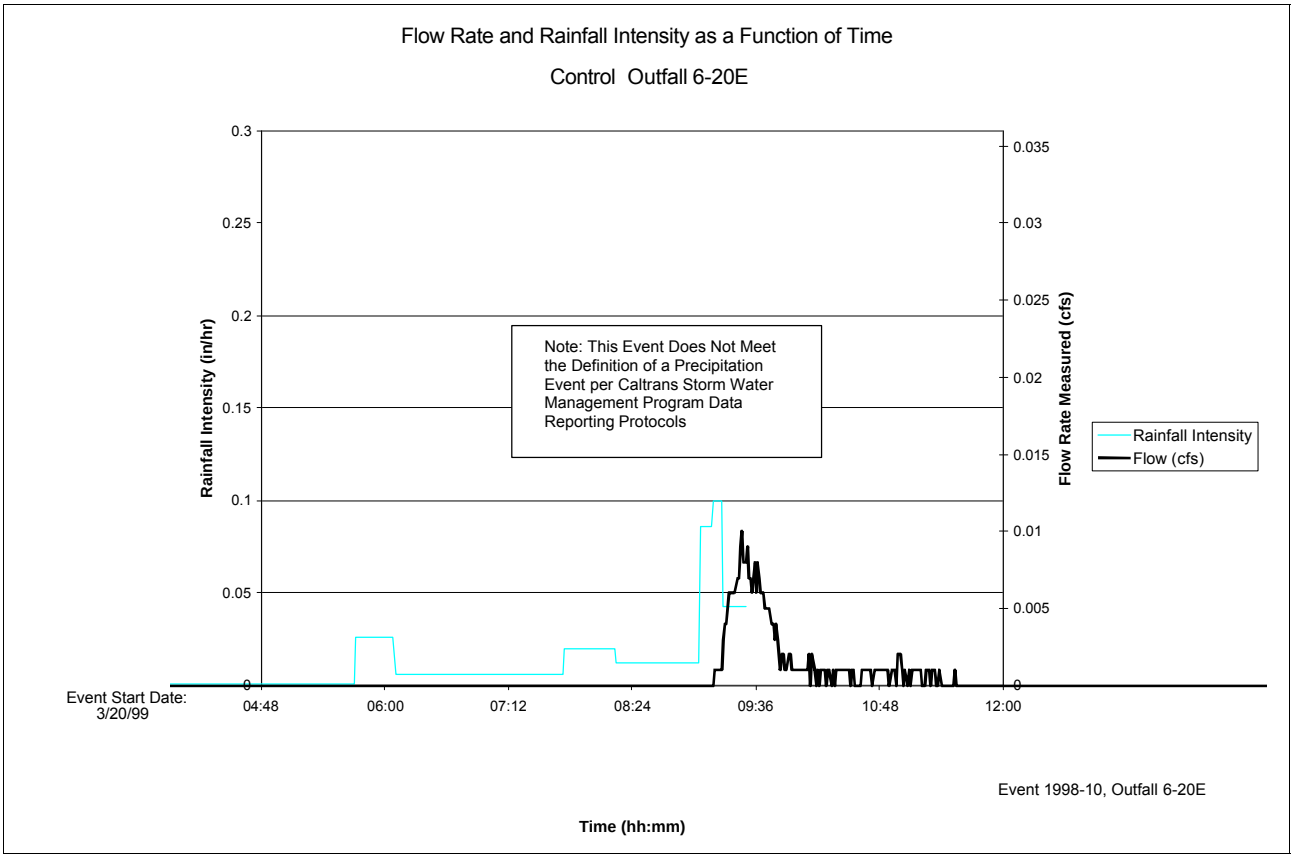

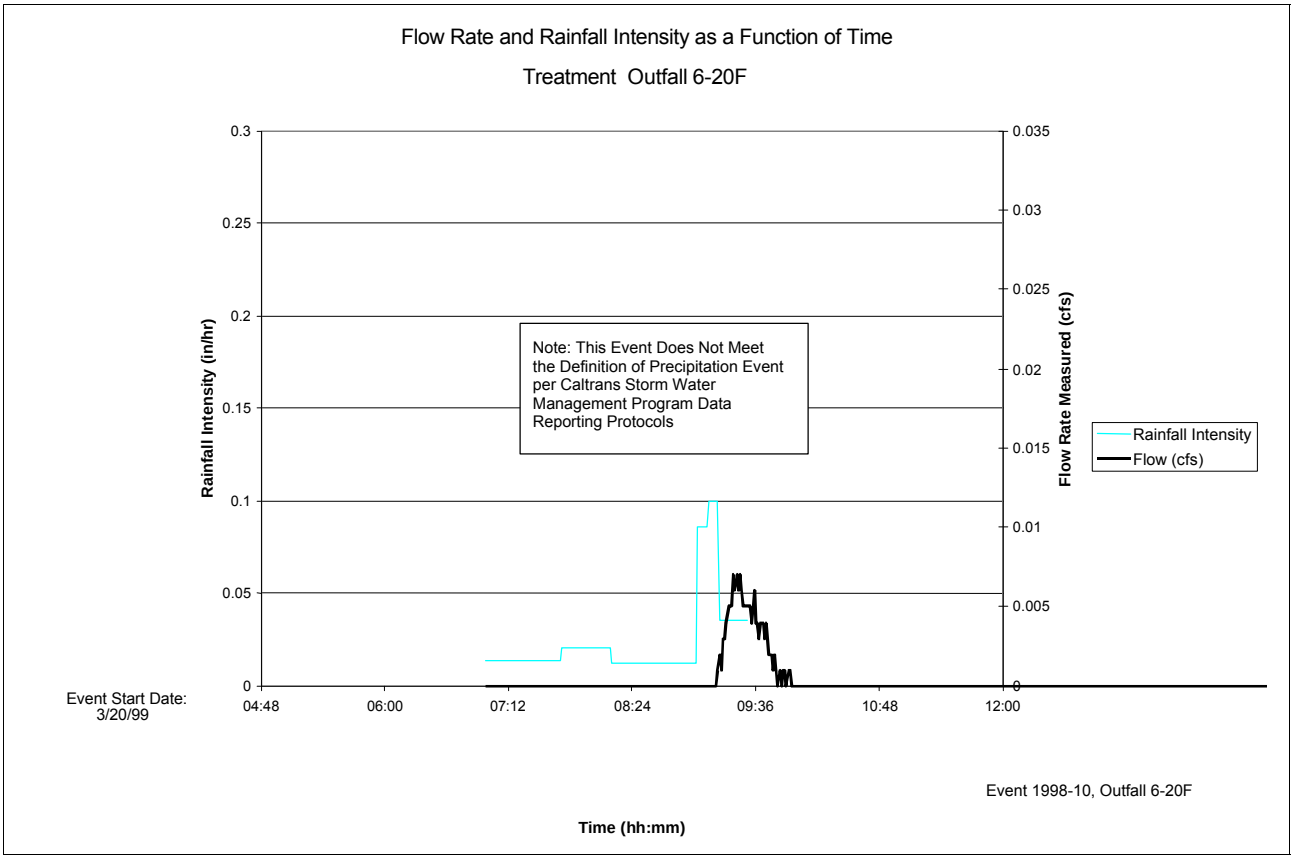

Site 8 - Bicycle Grate/LID Event No. 1998e10 - 3/20/99

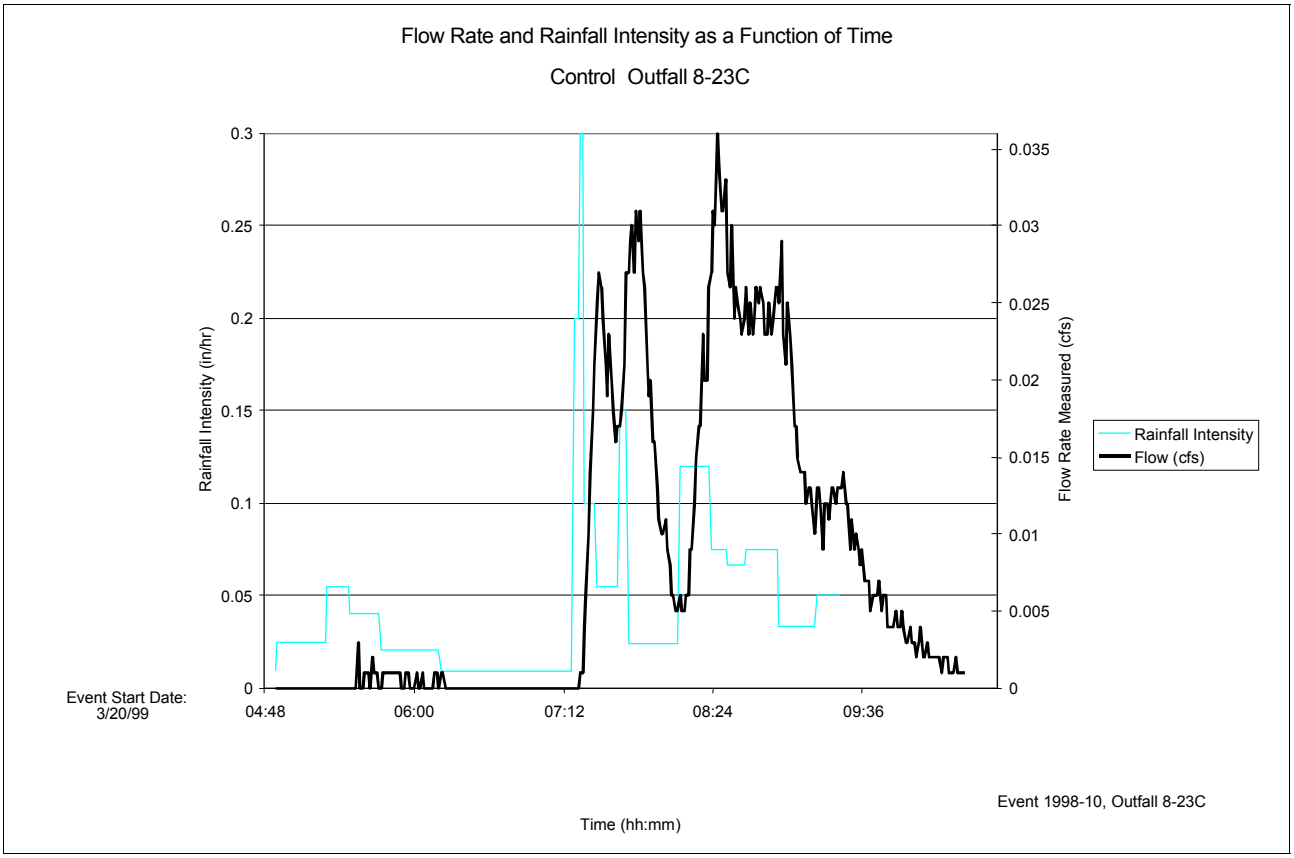

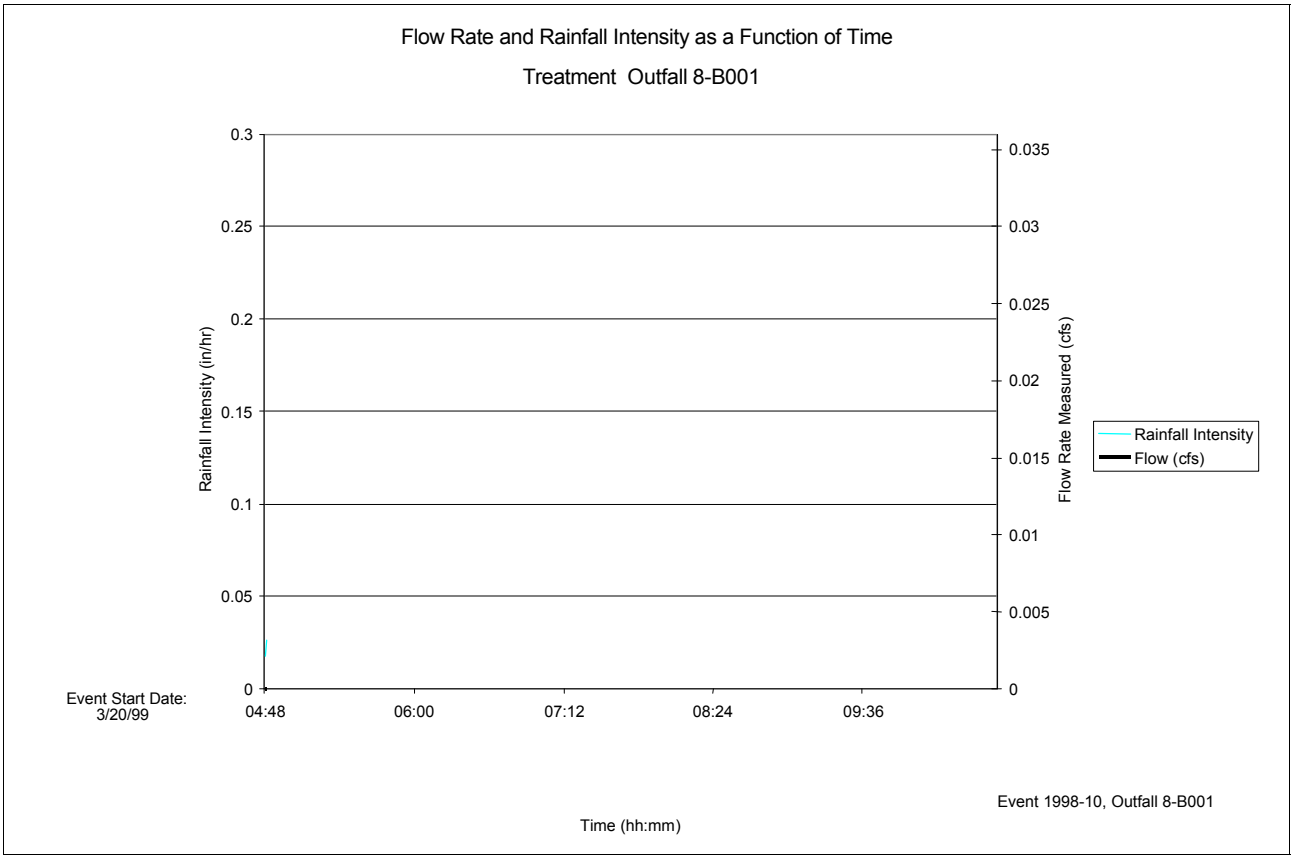

Site 1E - Litter Pickup Event No. 1998e11 - 3/25/99

Flow Rate and Rainfall Intensity as a Function of Time

Control Outfall 1-42

No Hydrologic Data Available for this Event For this Outfall

Event Start Date:
3/25/99

Flow Rate and Rainfall Intensity as a Function of Time

Treatment Outfall 1-46

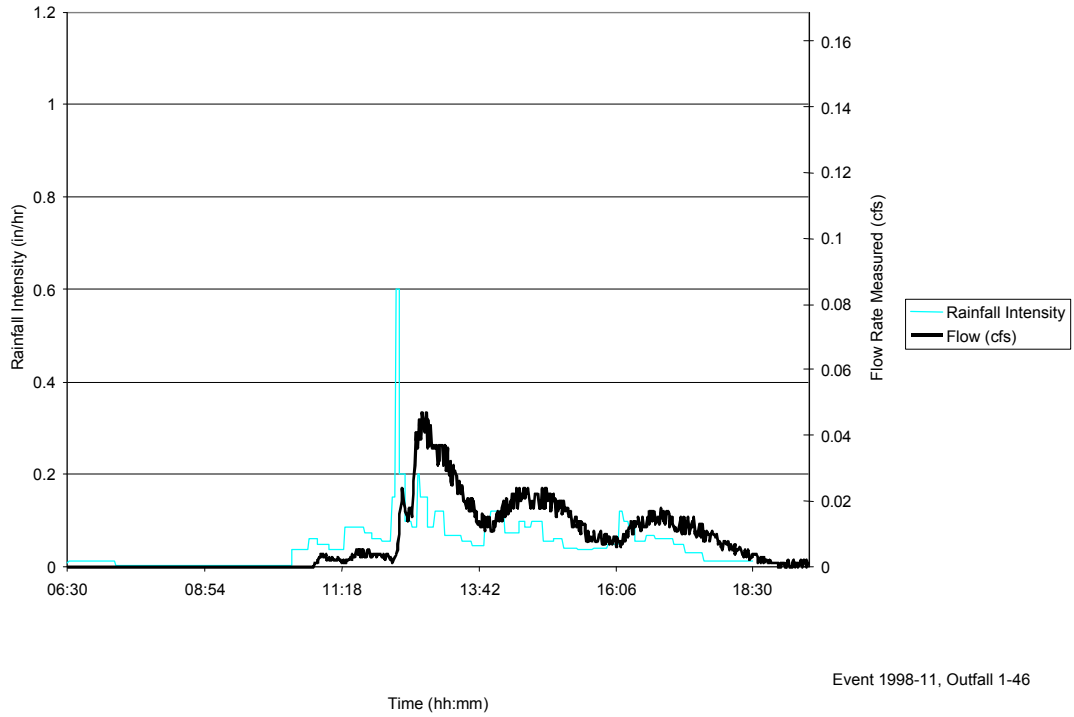

Event Start Date:
3/25/99

Event 1998-11, Outfall 1-46

Site 1W - Street Sweeping Event No. 1998e11 - 3/25/99

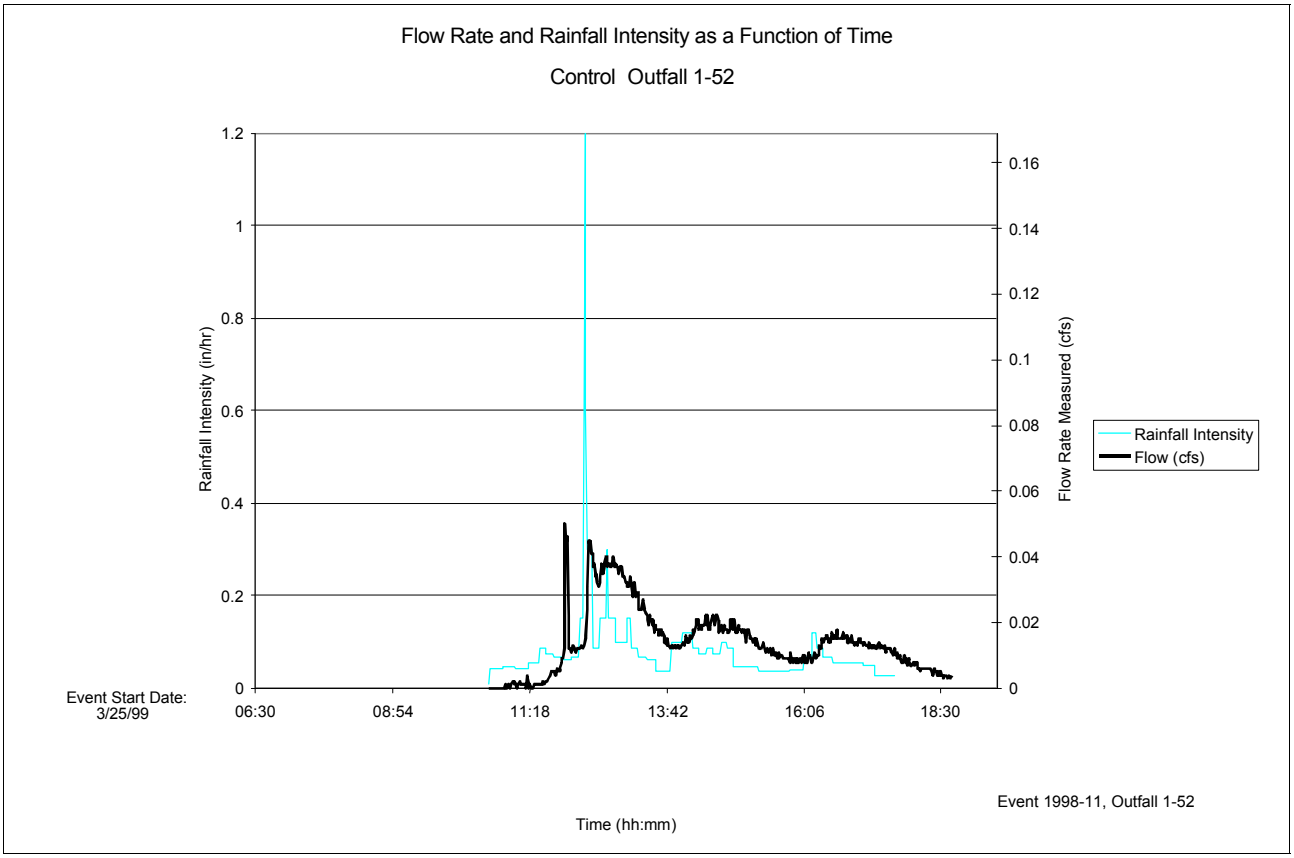

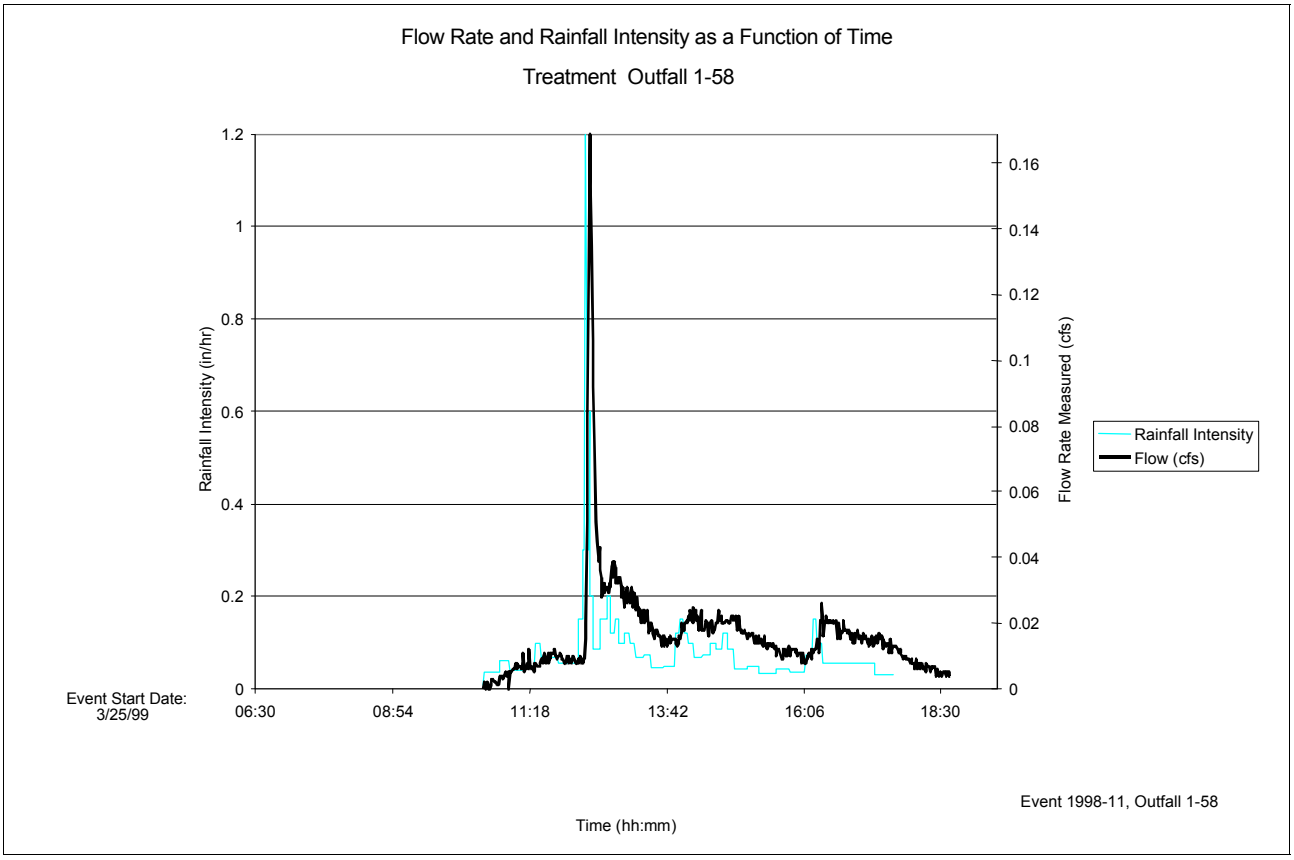

Site 6 - Modified Inlet Event No. 1998e11 - 3/25/99

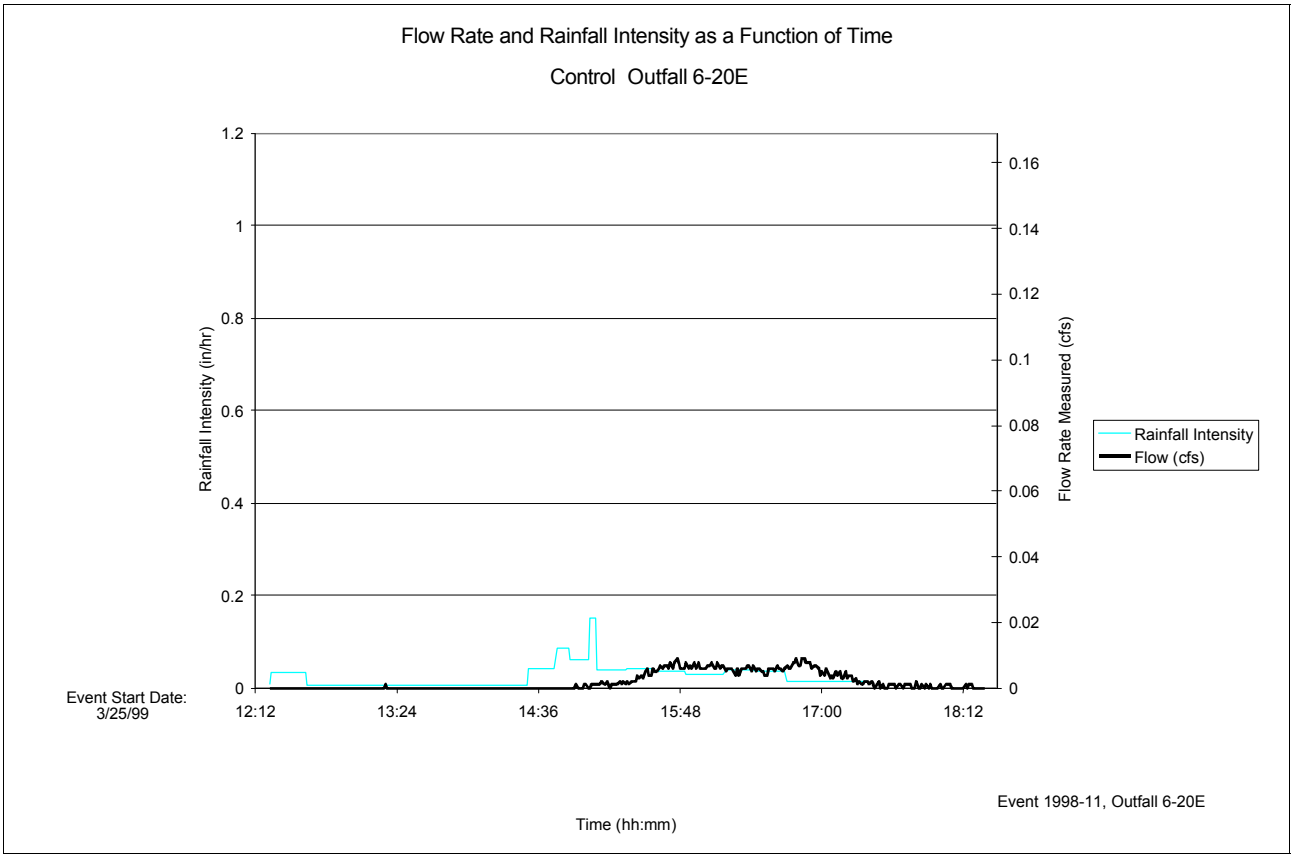

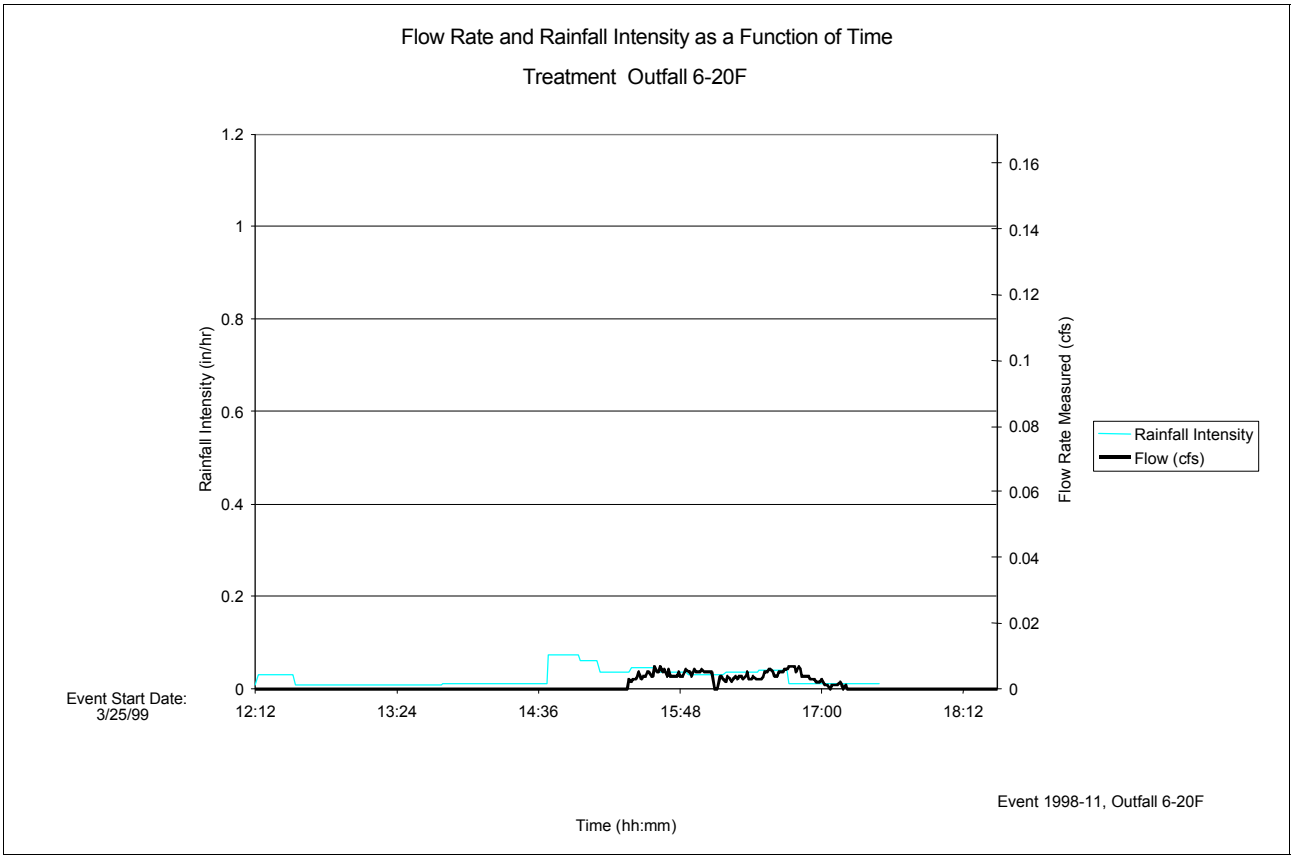

Site 8 - Bicycle Grate/LID Event No. 1998e11 - 3/25/99

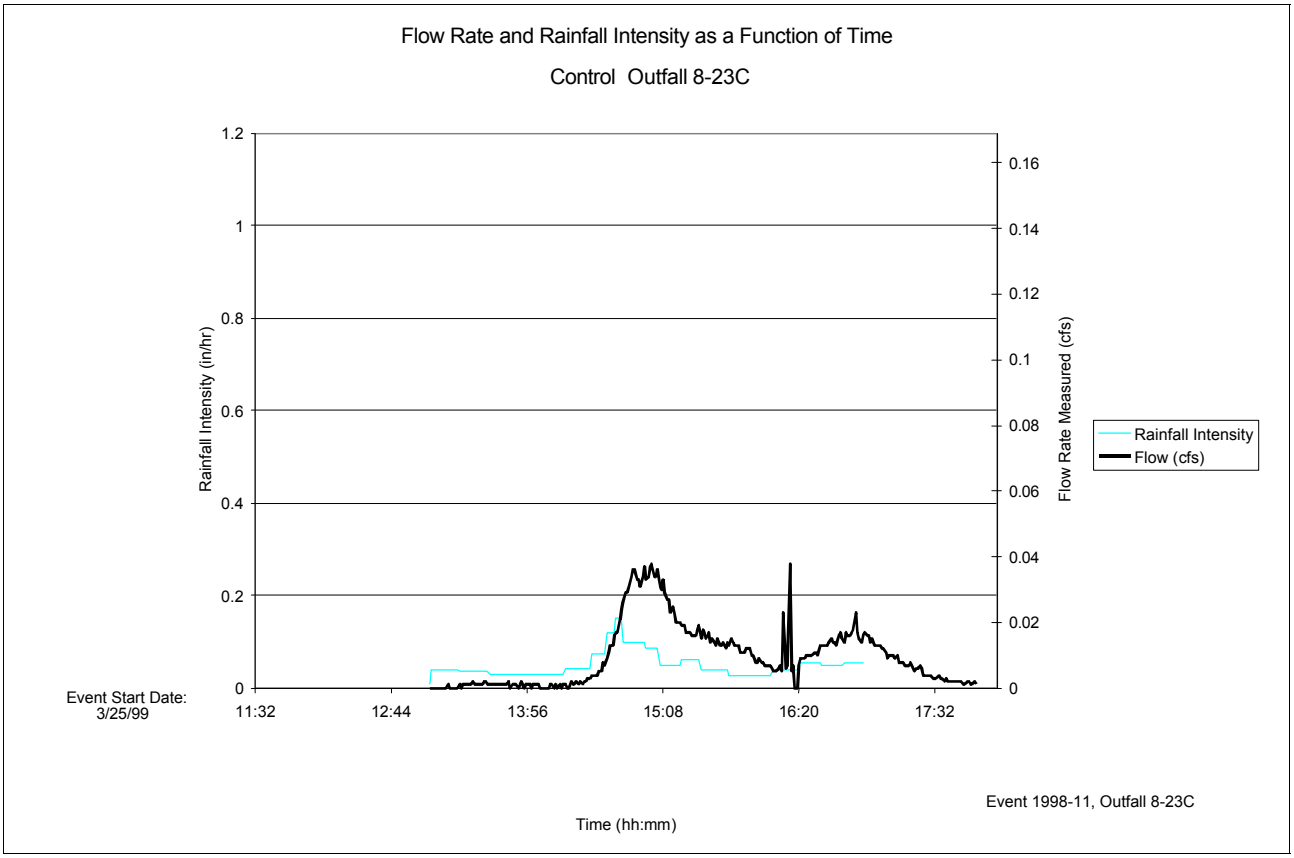

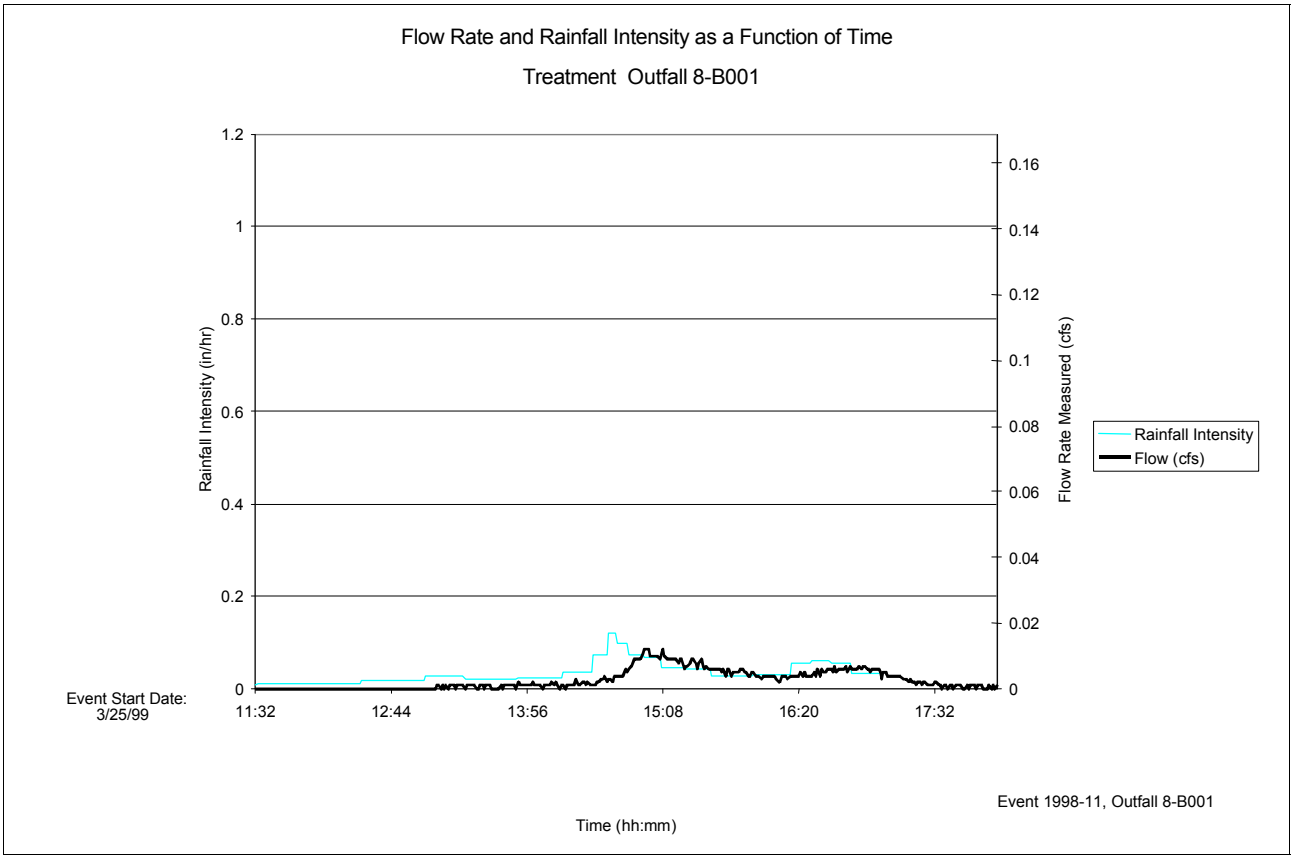

Site 1E - Litter Pickup Event No. 1998e12 - 4/6/99

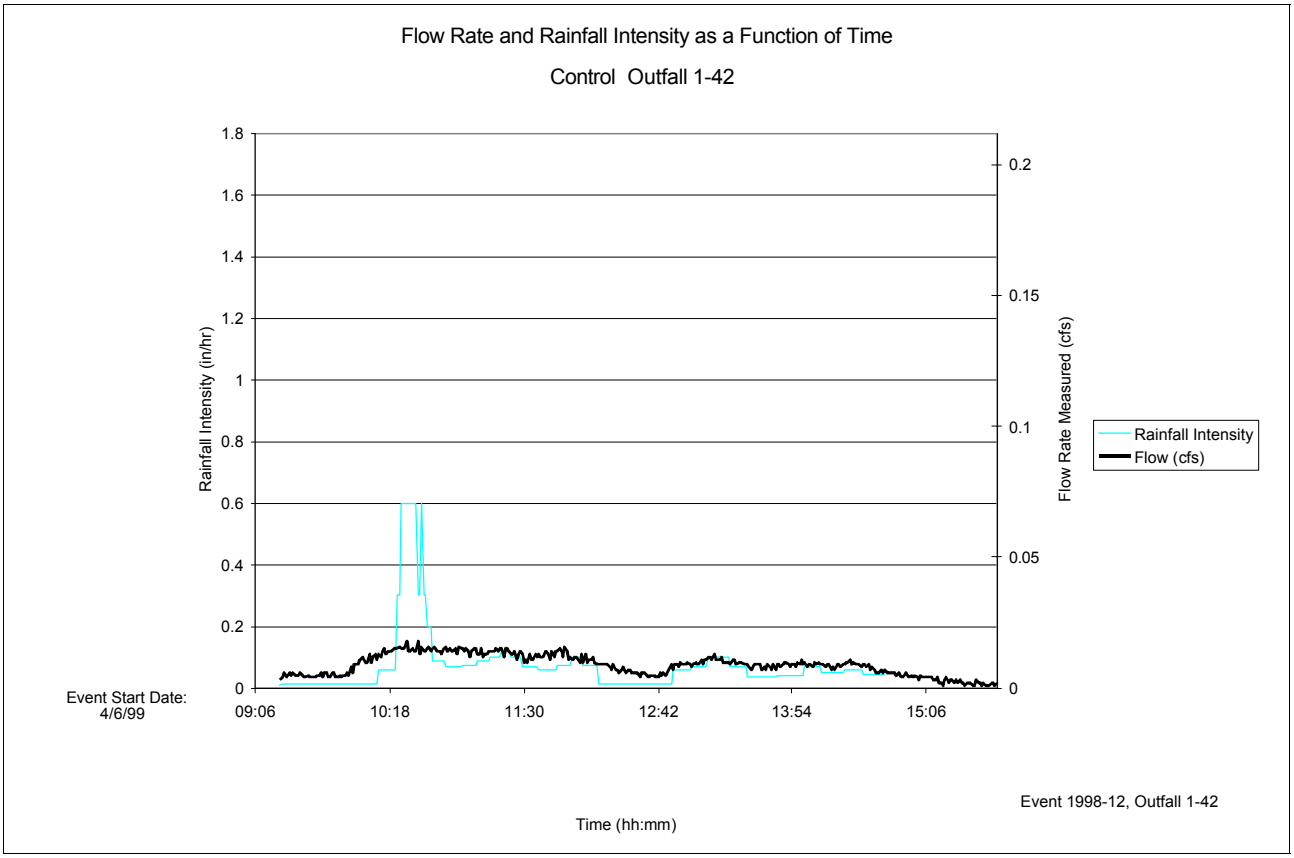

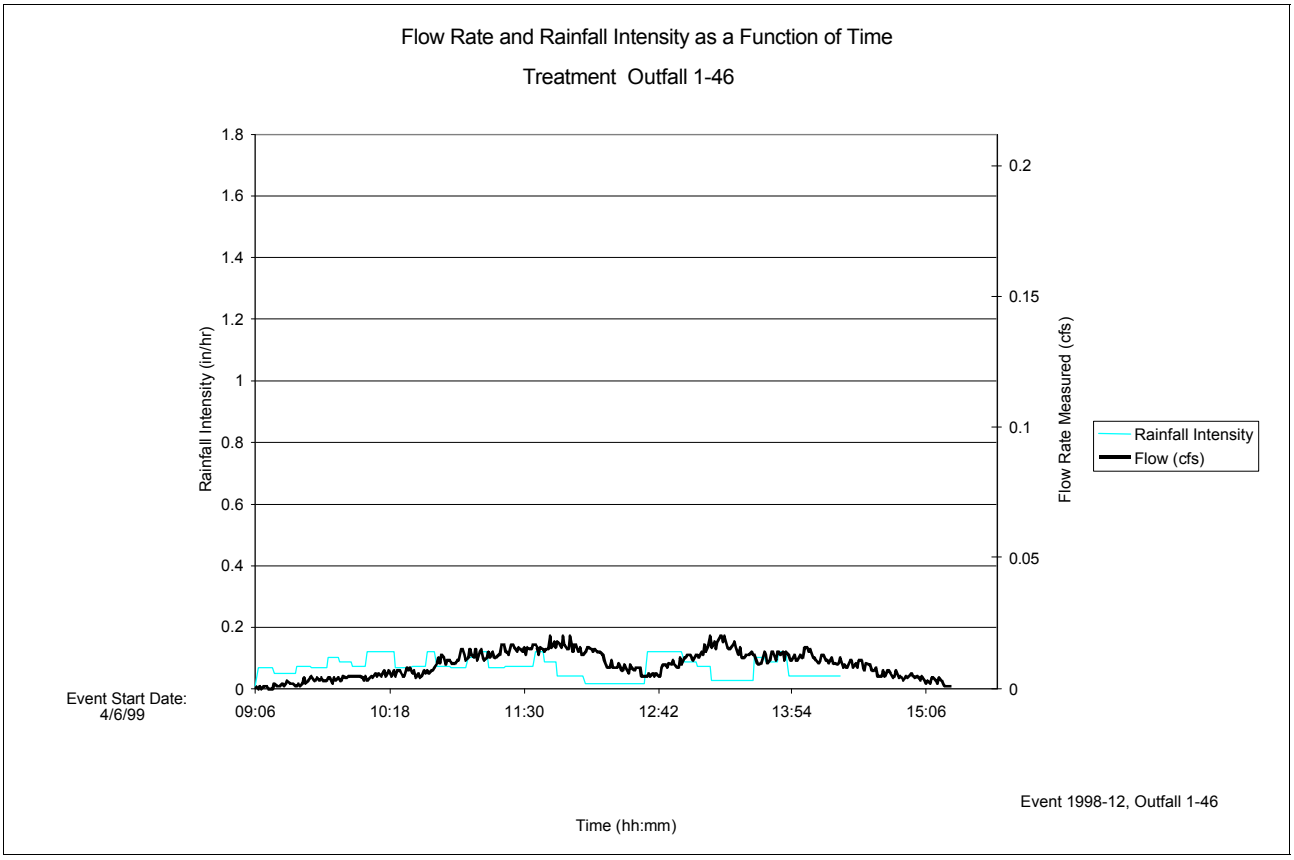

Site 1W - Street Sweeping Event No. 1998e12 - 4/6/99

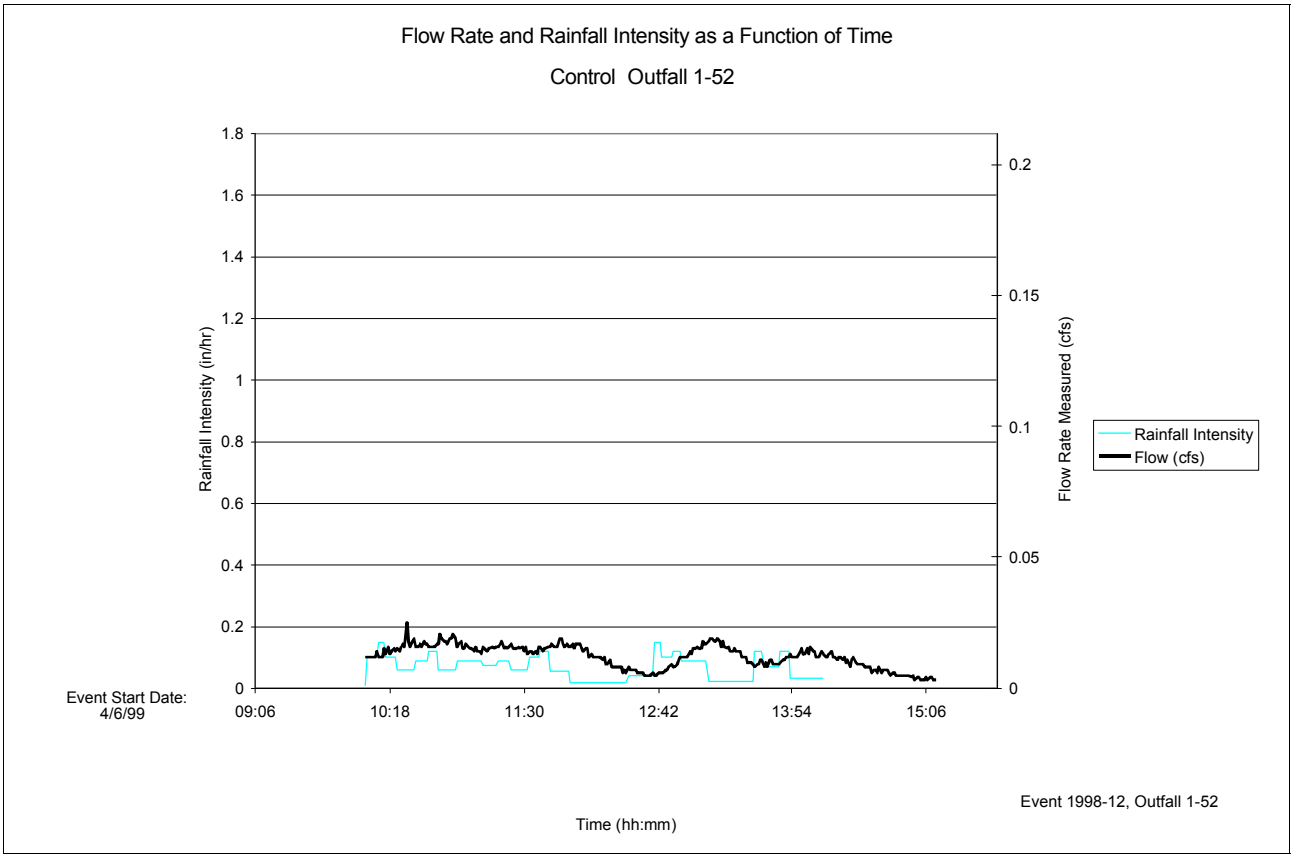

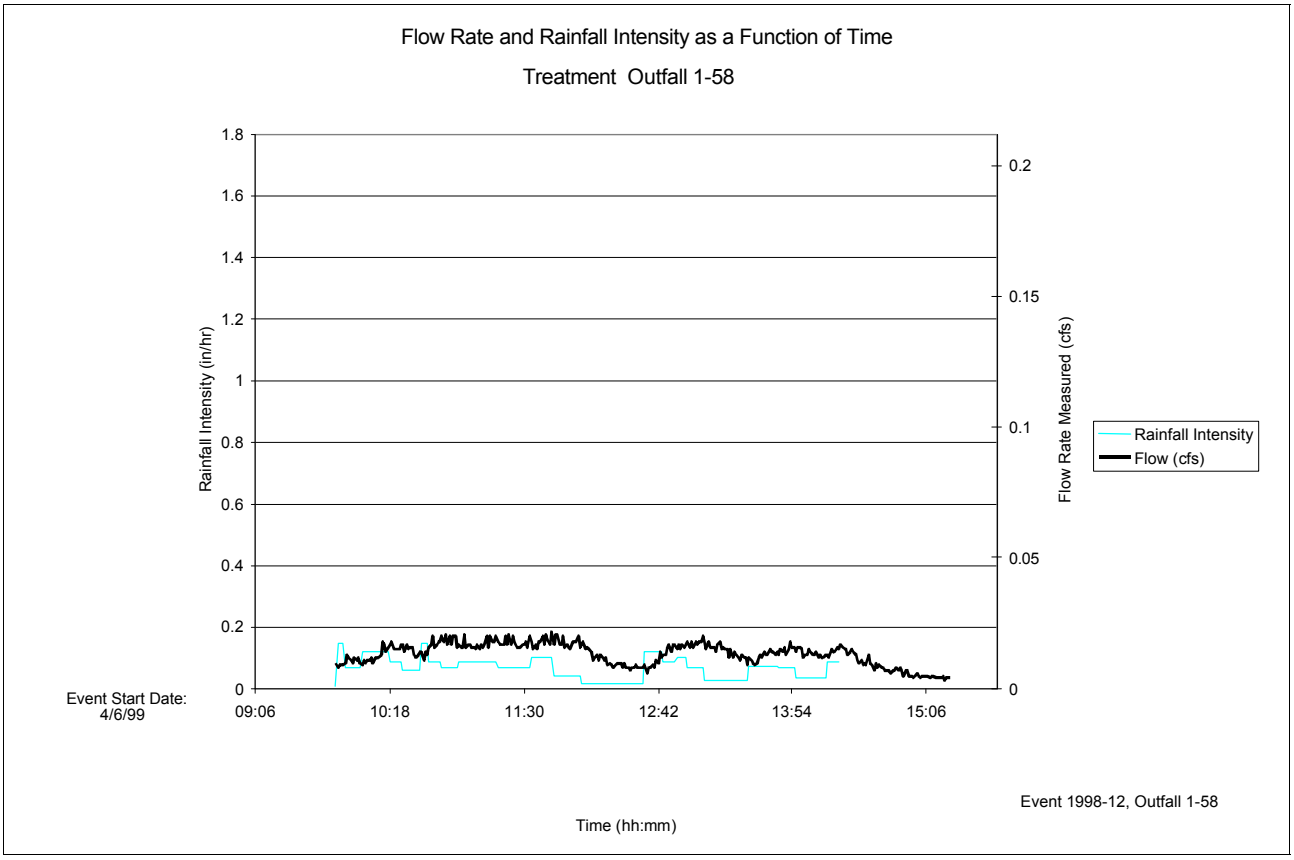

Site 6 - Modified Inlet Event No. 1998e12 - 4/6/99

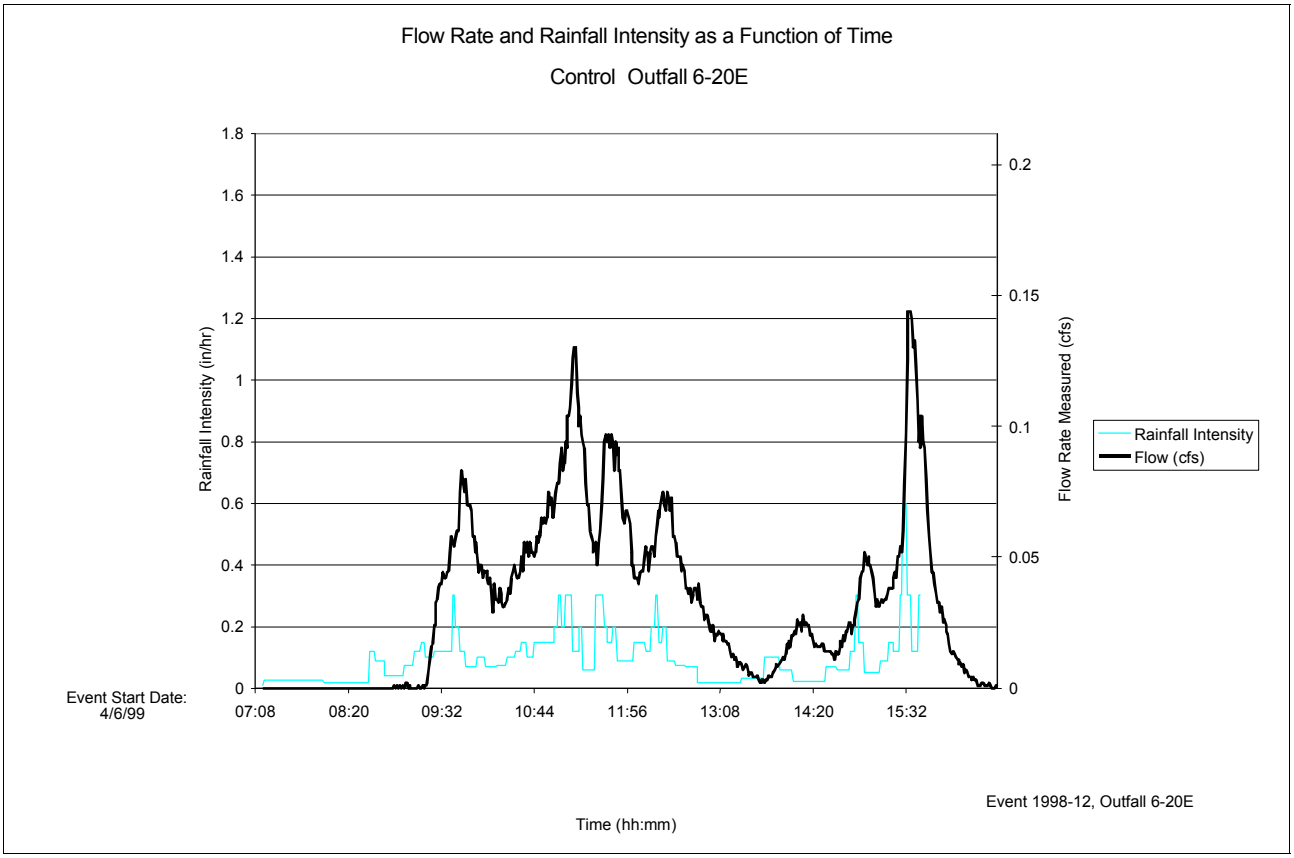

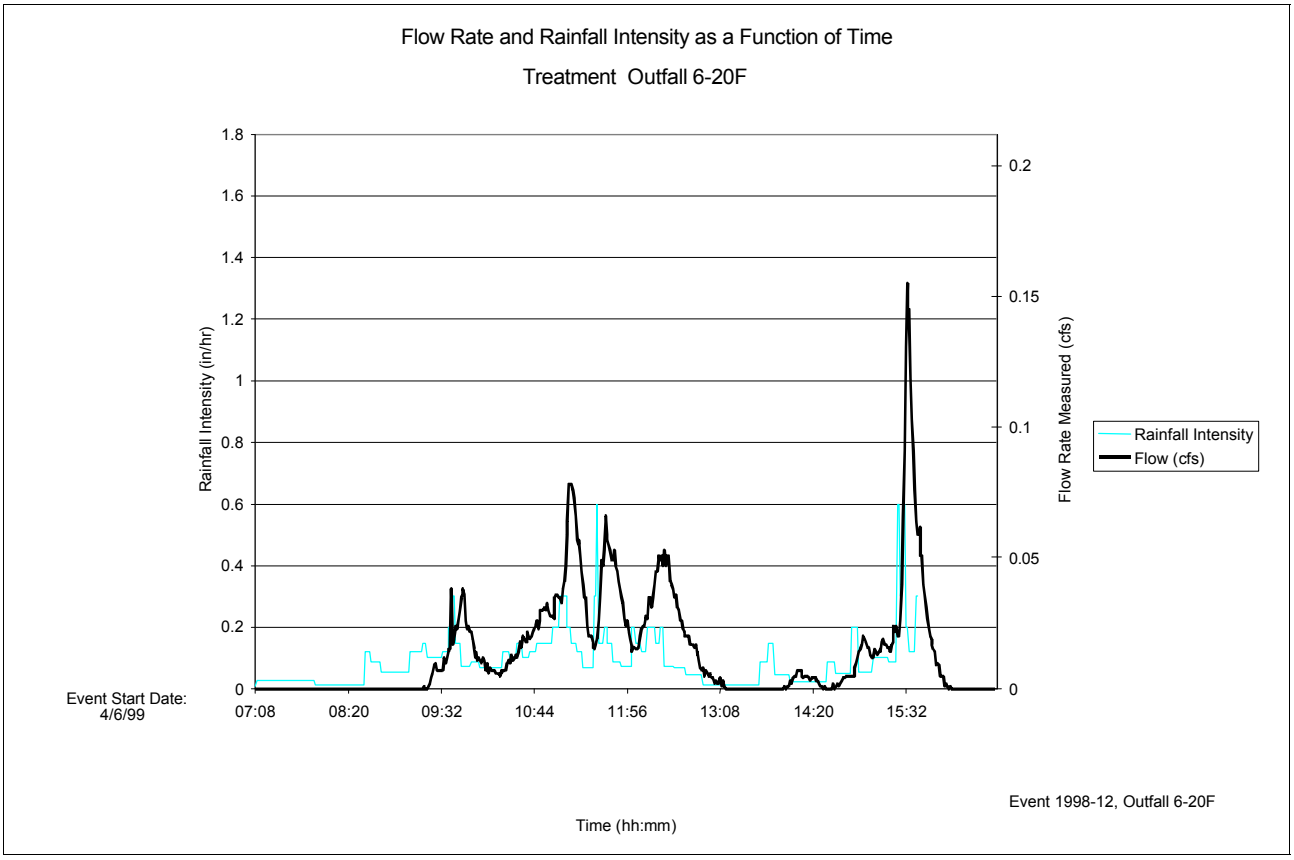

Site 8 - Bicycle Grate/LID **Event No. 1998e12 - 4/6/99**

Flow Rate and Rainfall Intensity as a Function of Time

Control Outfall 8-23C

No Hydrologic Data Available for this Event For this Outfall

Event Start Date:
4/6/99

Flow Rate and Rainfall Intensity as a Function of Time

Treatment Outfall 8-B001

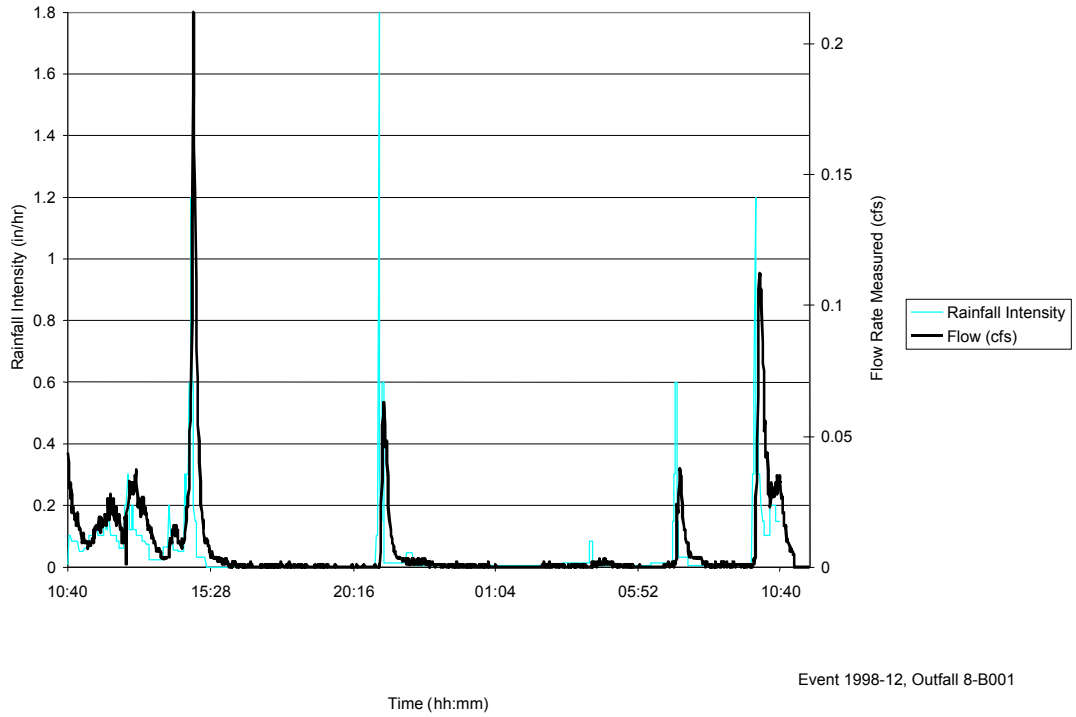

Event Start Date:
4/6/99

Event 1998-12, Outfall 8-B001

Site 1E - Litter Pickup Event No. 1998e13 - 4/11/99

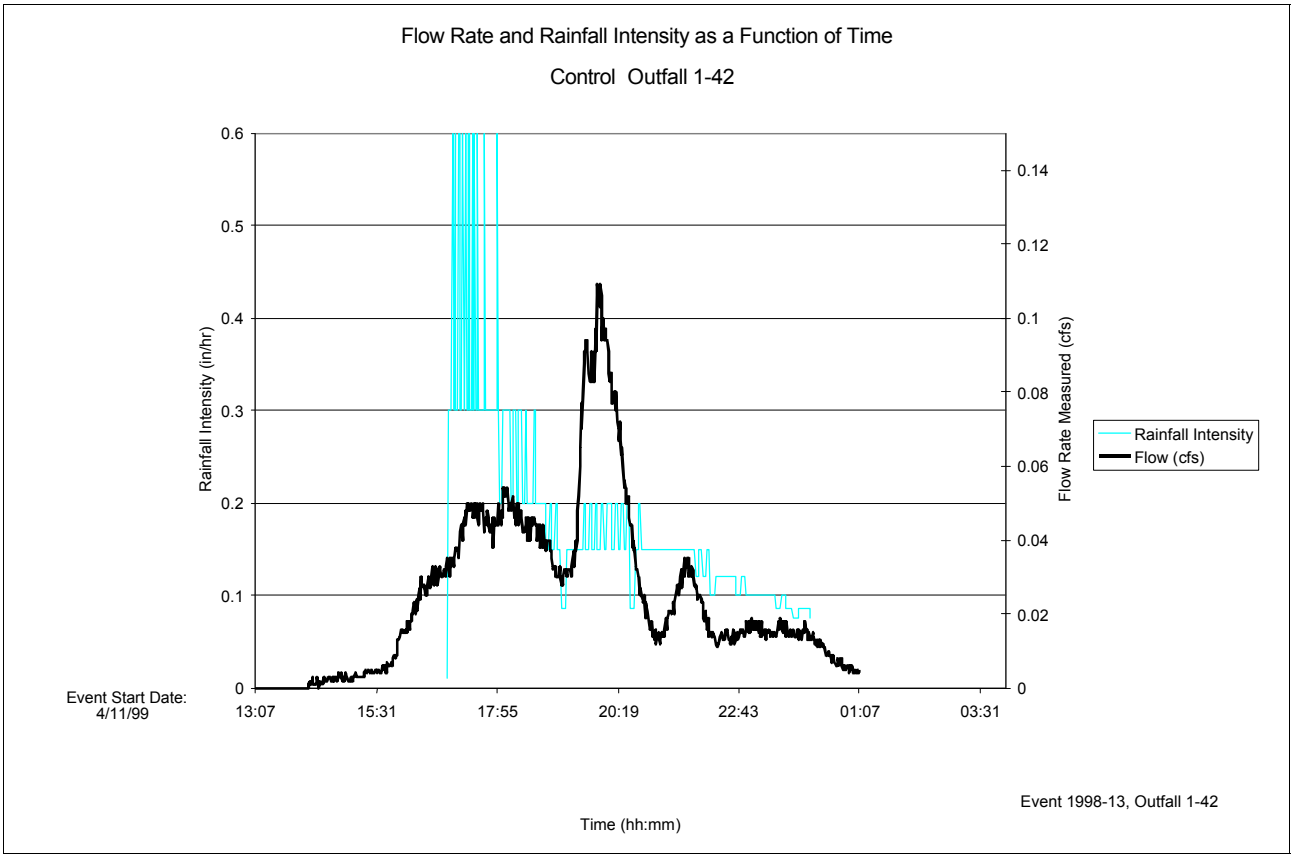

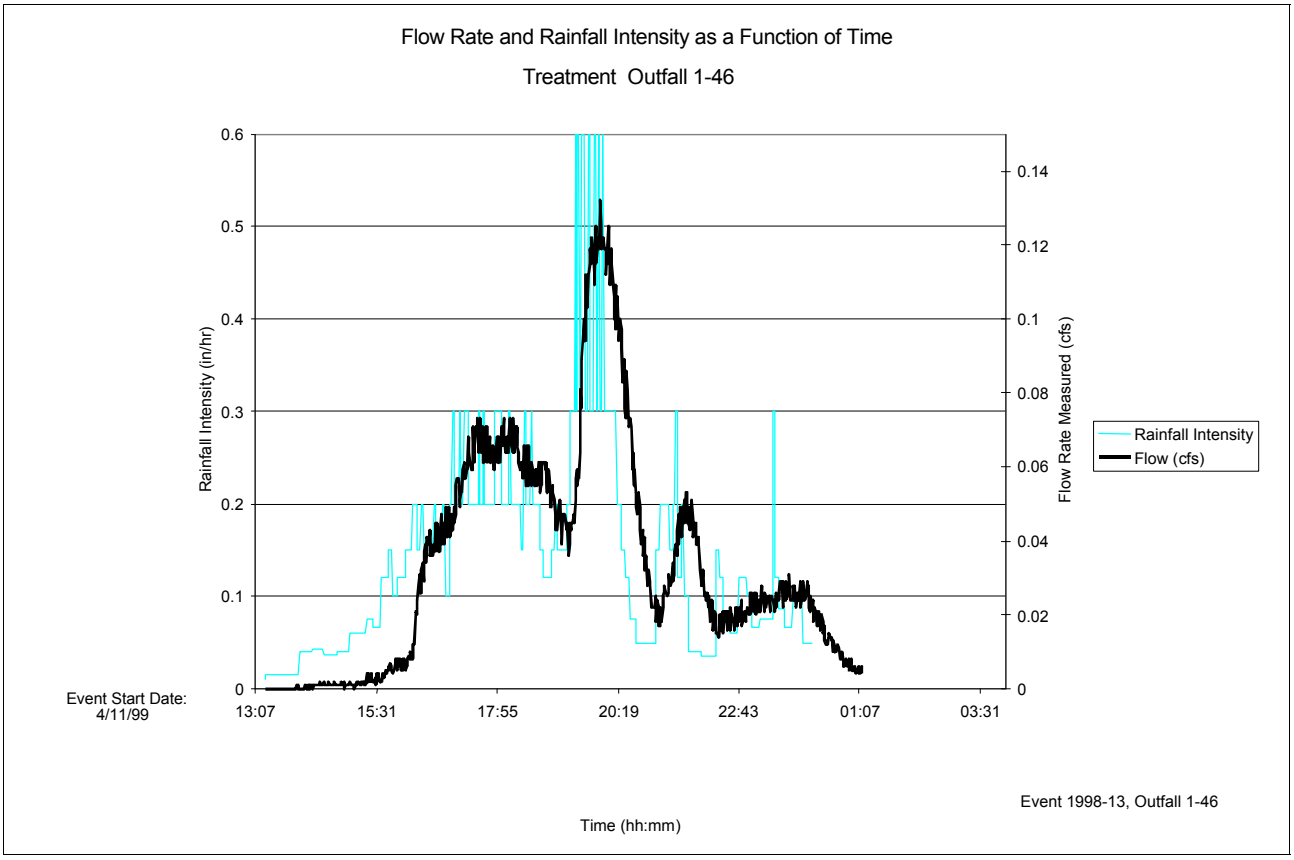

Site 1W - Street Sweeping Event No. 1998e13 - 4/11/99

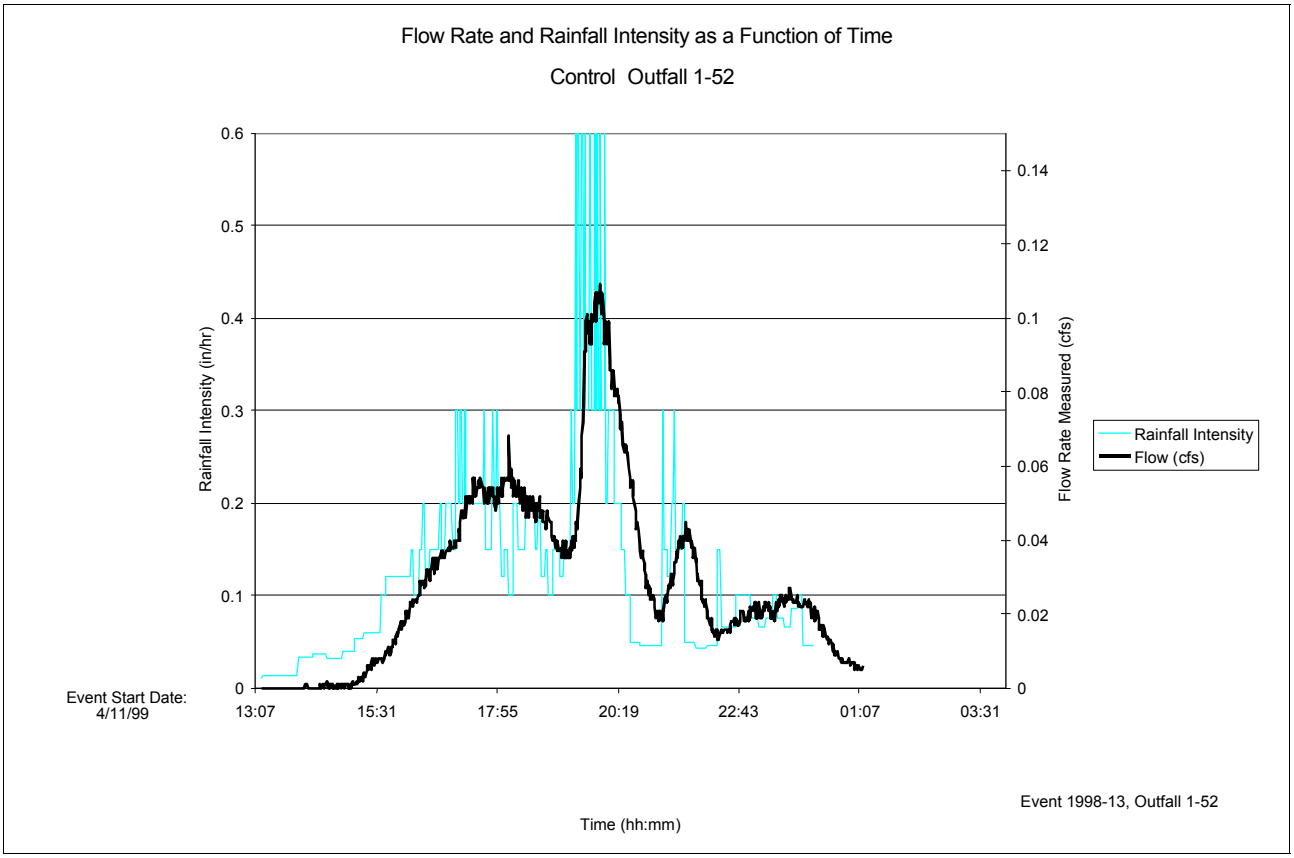

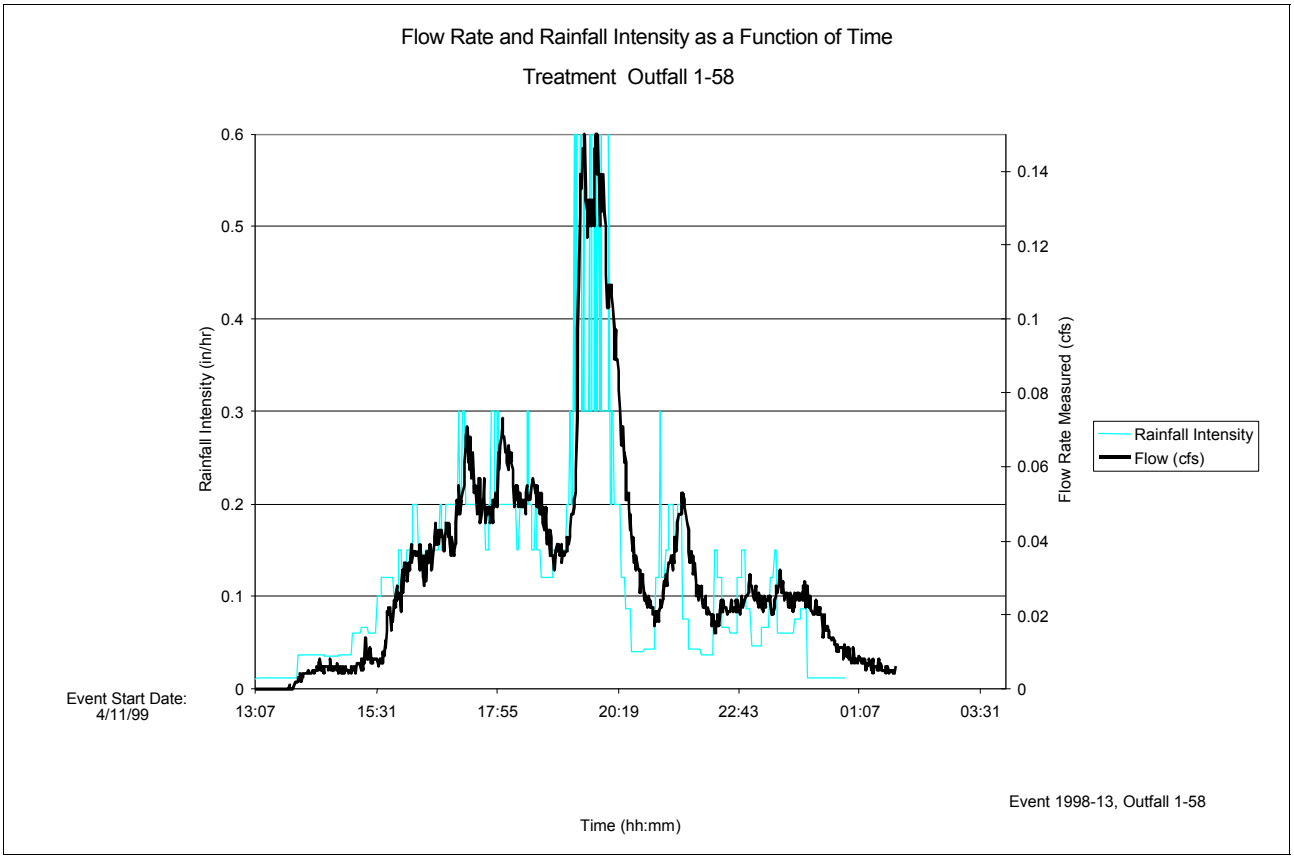

Site 6 - Modified Inlet Event No. 1998e13 - 4/11/99

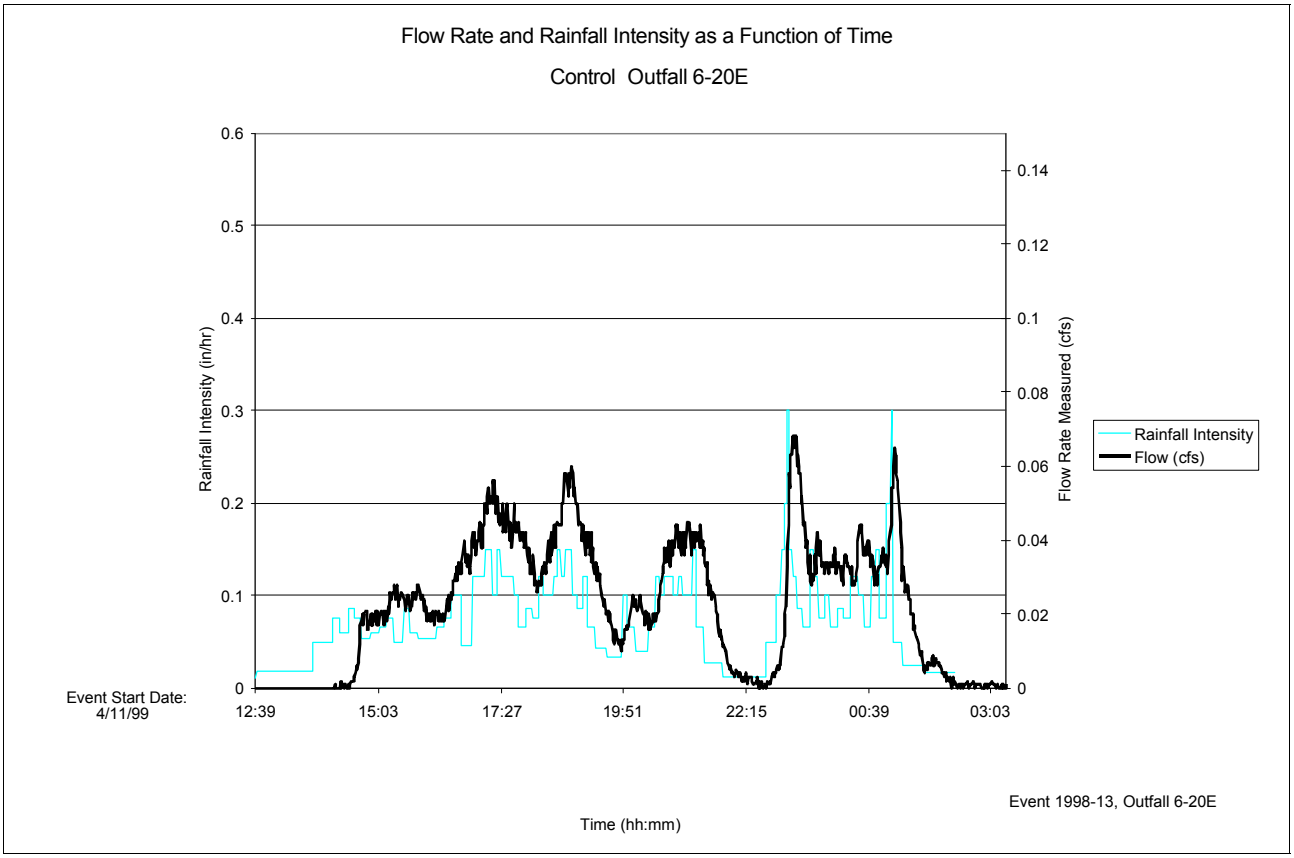

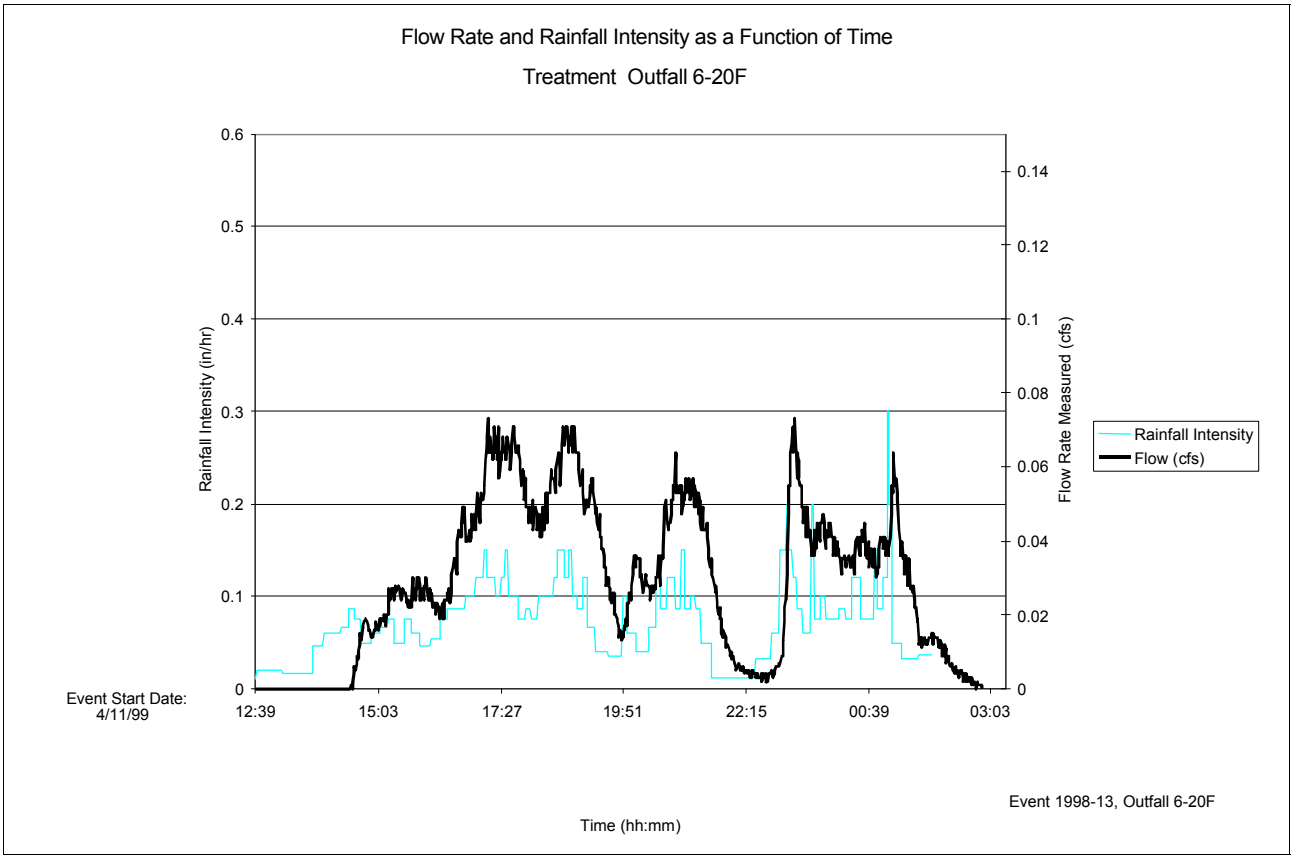

Site 8 - Bicycle Grate/LID Event No. 1998e13 - 4/11/99

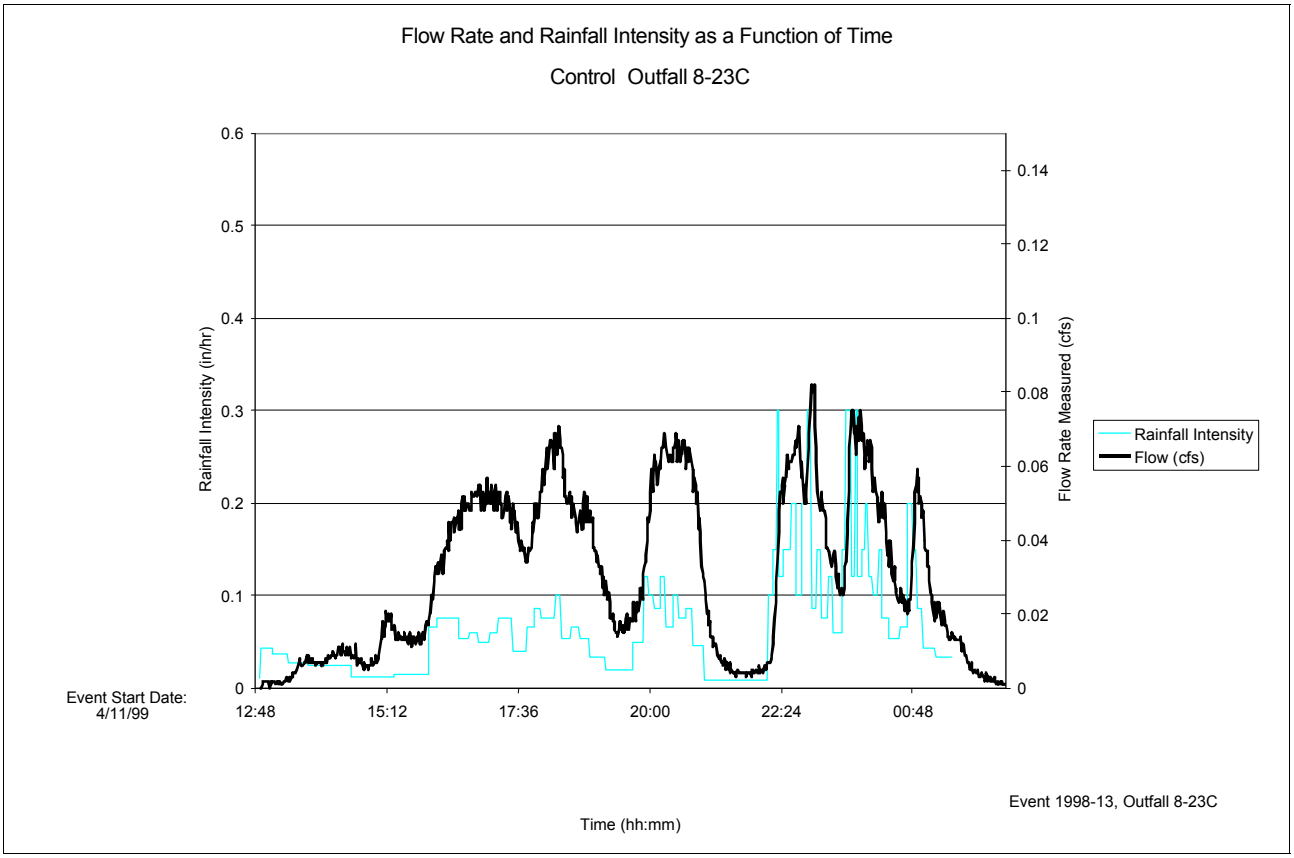

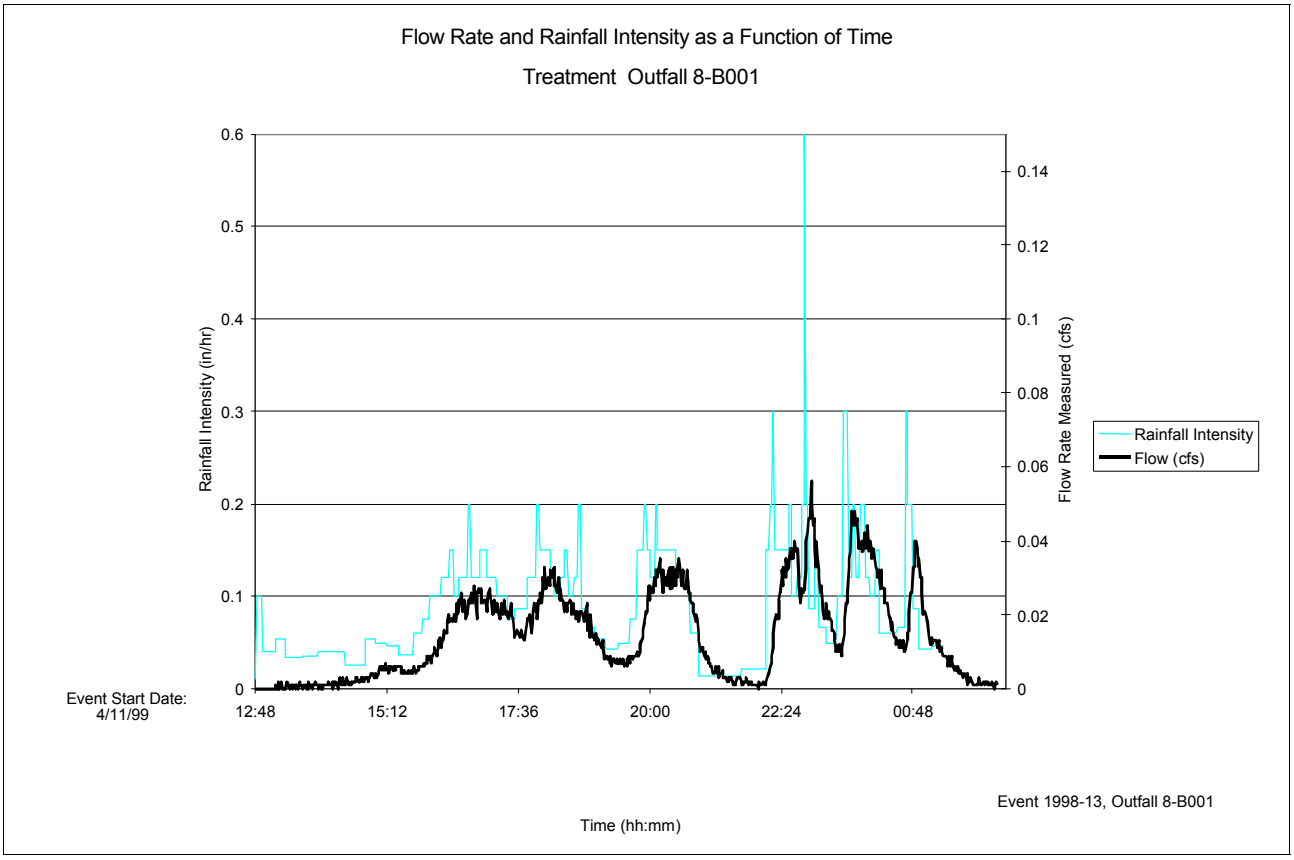

Site 1E - Litter Pickup Event No. 1999e03 - 12/31/99

Flow Rate and Rainfall Intensity as a Function of Time

Control Outfall 1-42

No Hydrologic Data Available for this Event For this Outfall

Event Start Date:
12/31/99

Flow Rate and Rainfall Intensity as a Function of Time

Treatment Outfall 1-46

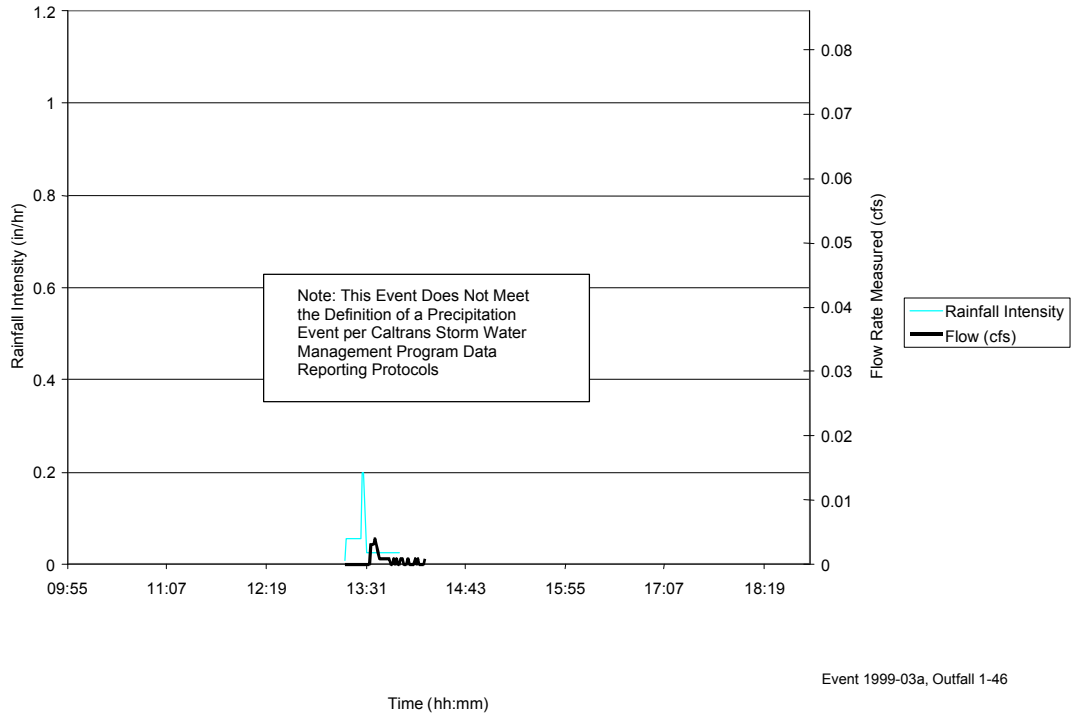

Event Start Date:
12/31/99

Event 1999-03a, Outfall 1-46

Site 1W - Street Sweeping Event No. 1999e03 - 12/31/99

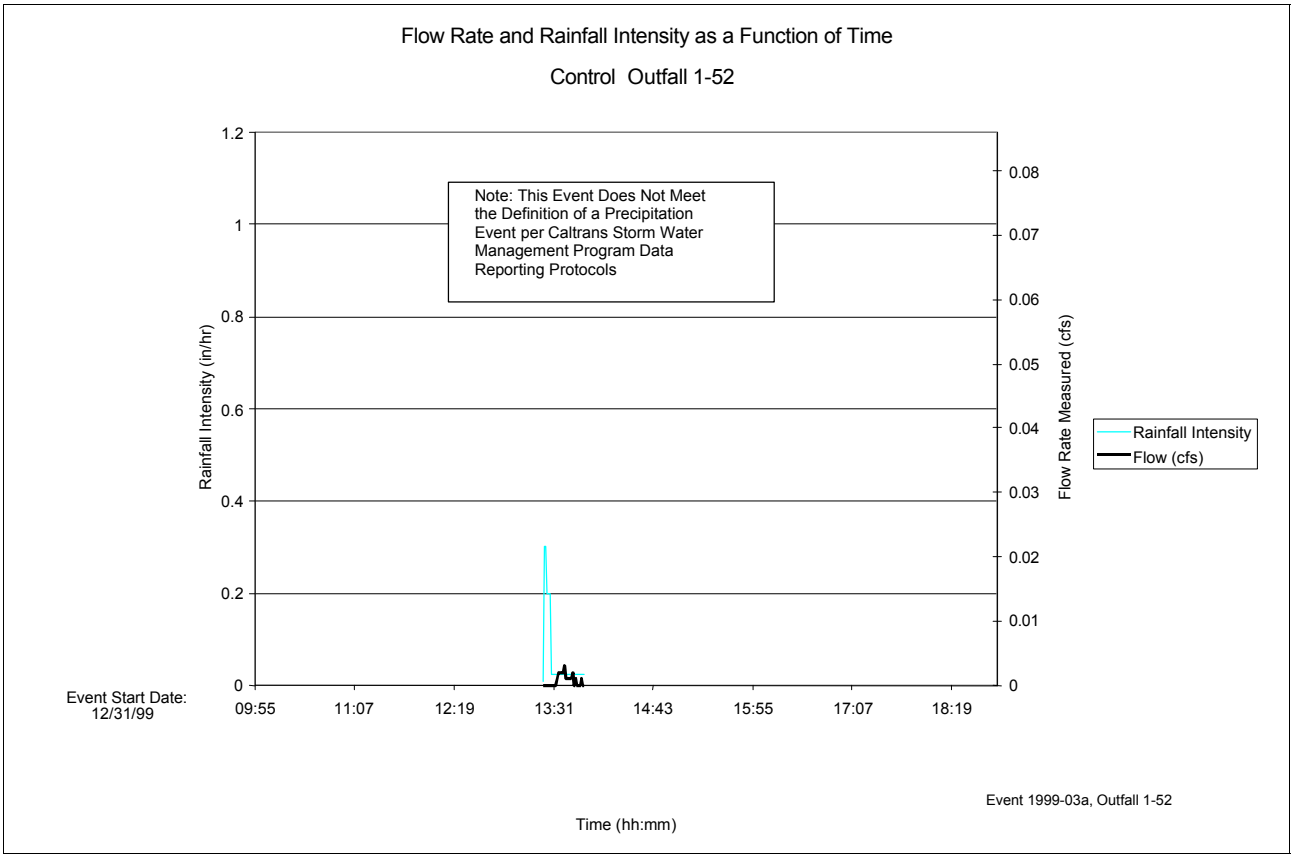

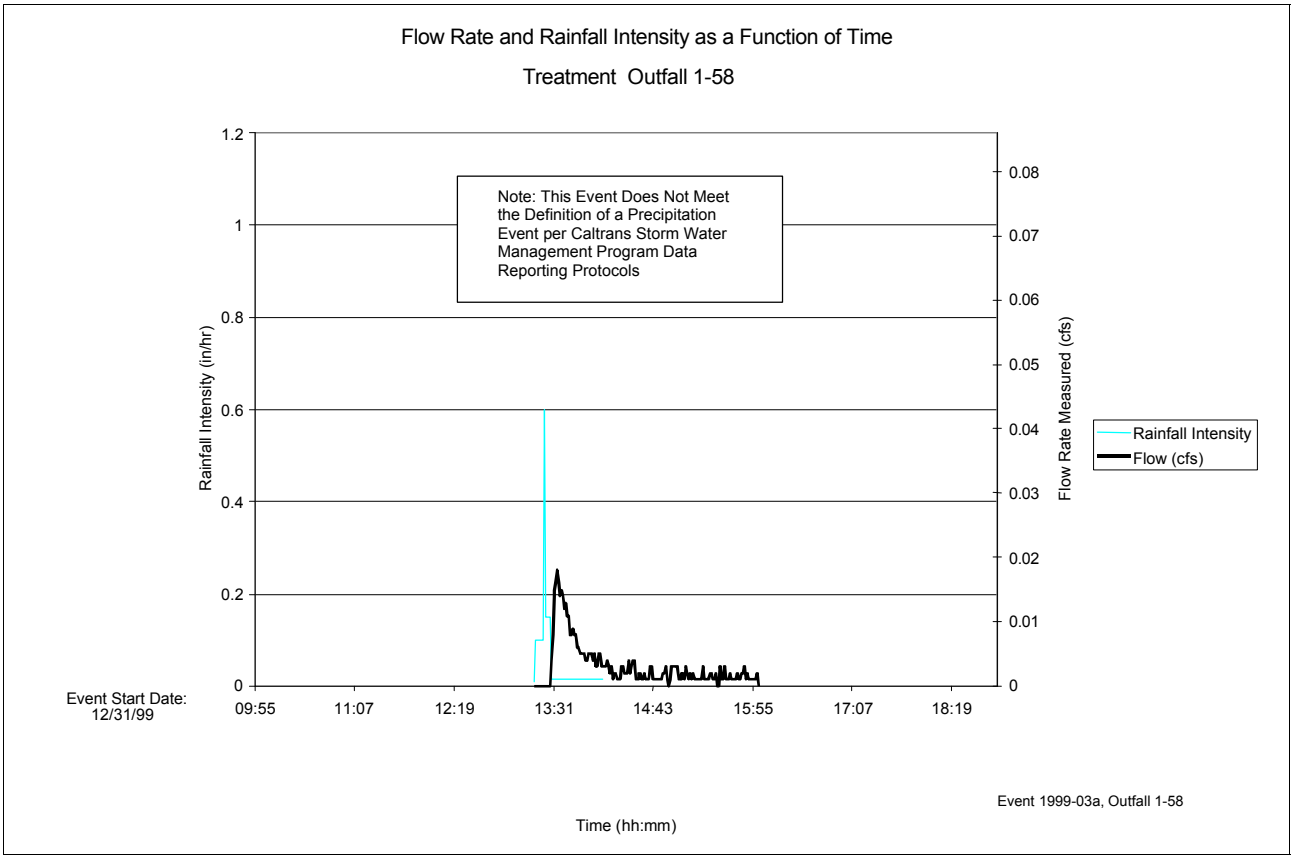

Site 6 - Modified Inlet Event No. 1999e03 - 12/31/99

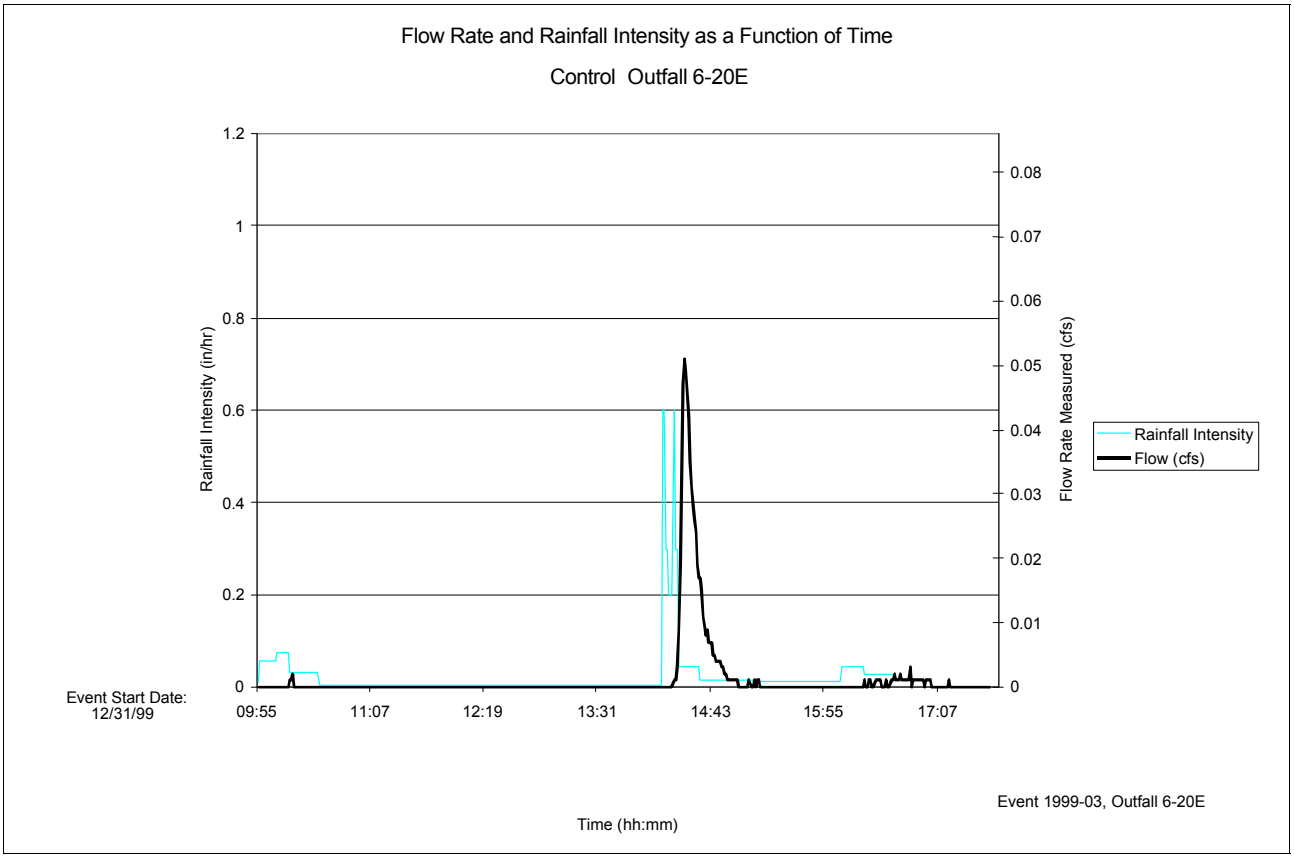

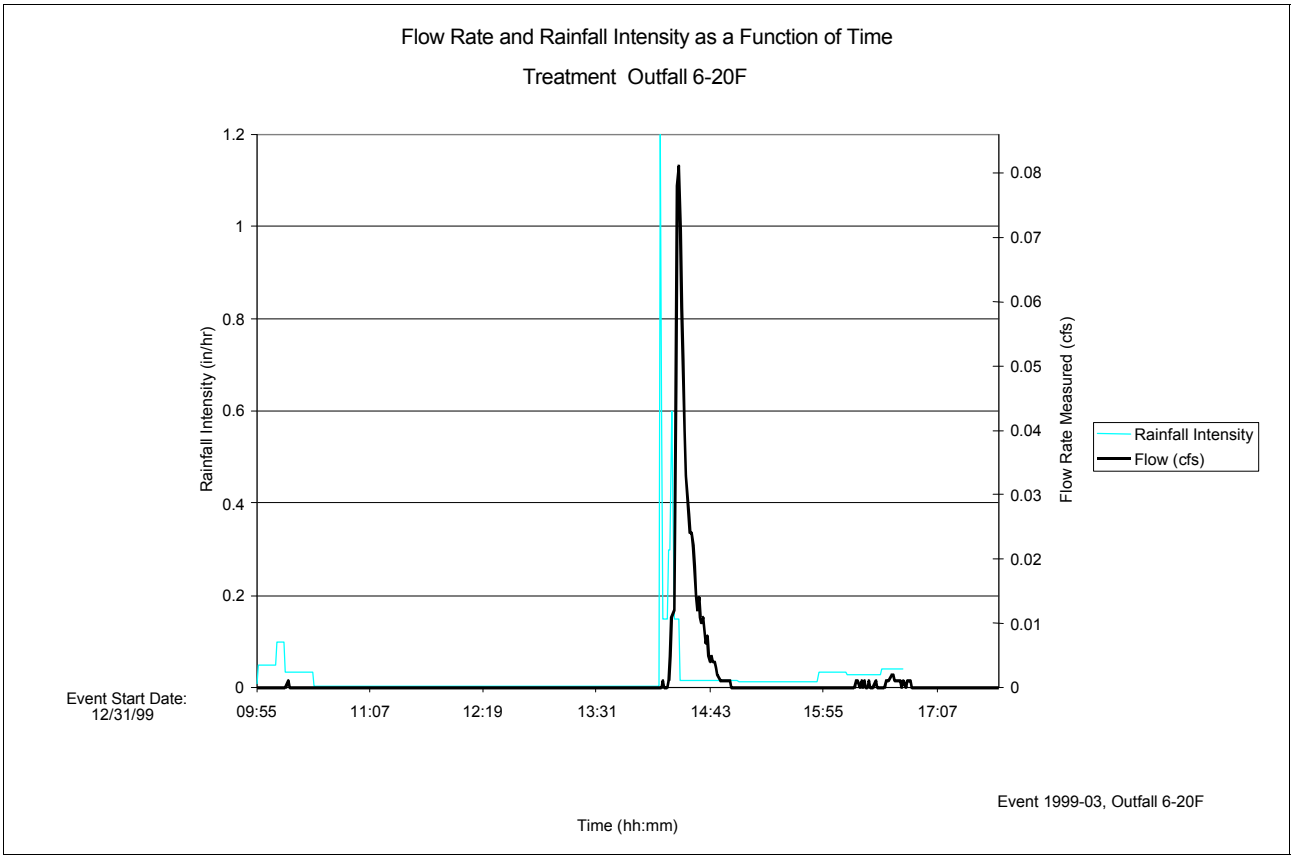

Site 8 - Bicycle Grate/LID Event No. 1999e03 - 12/31/99

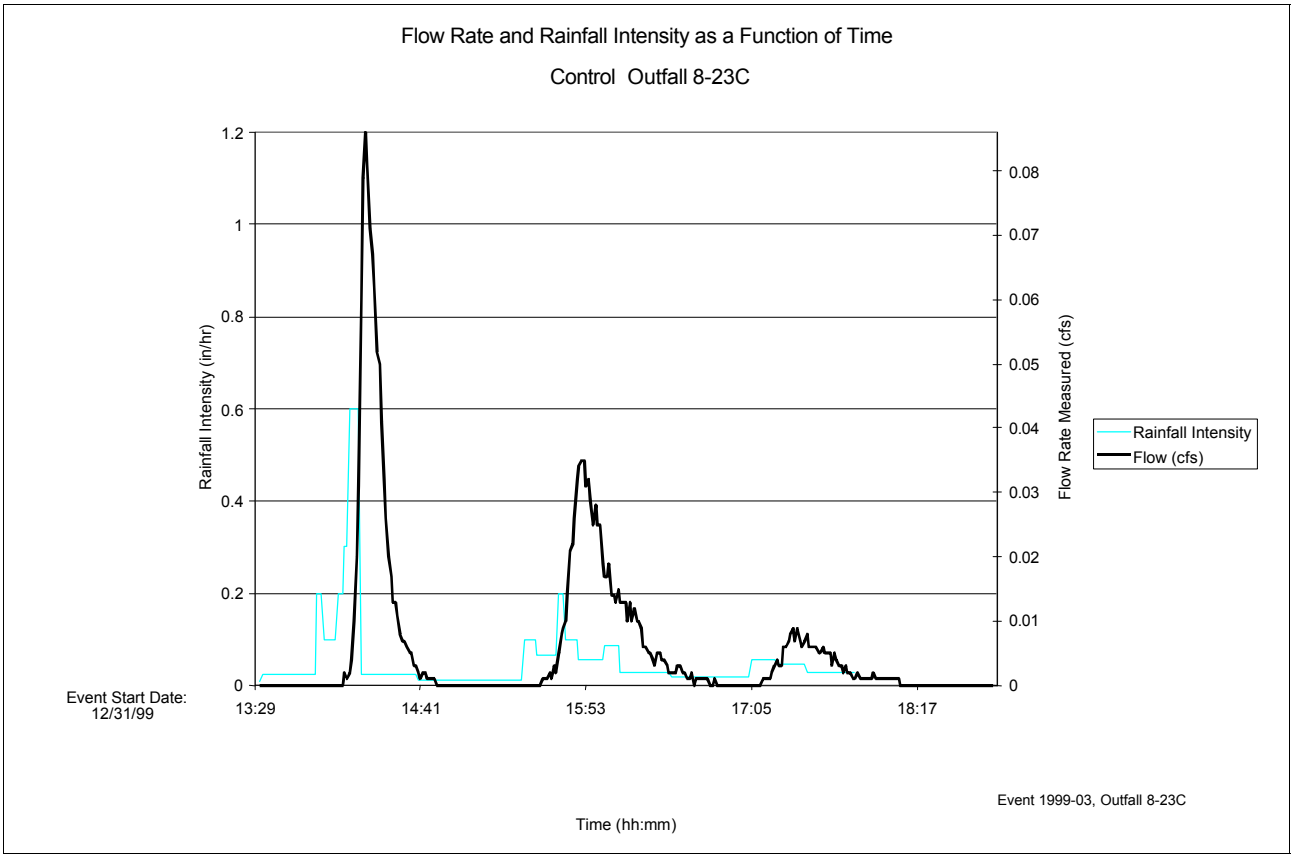

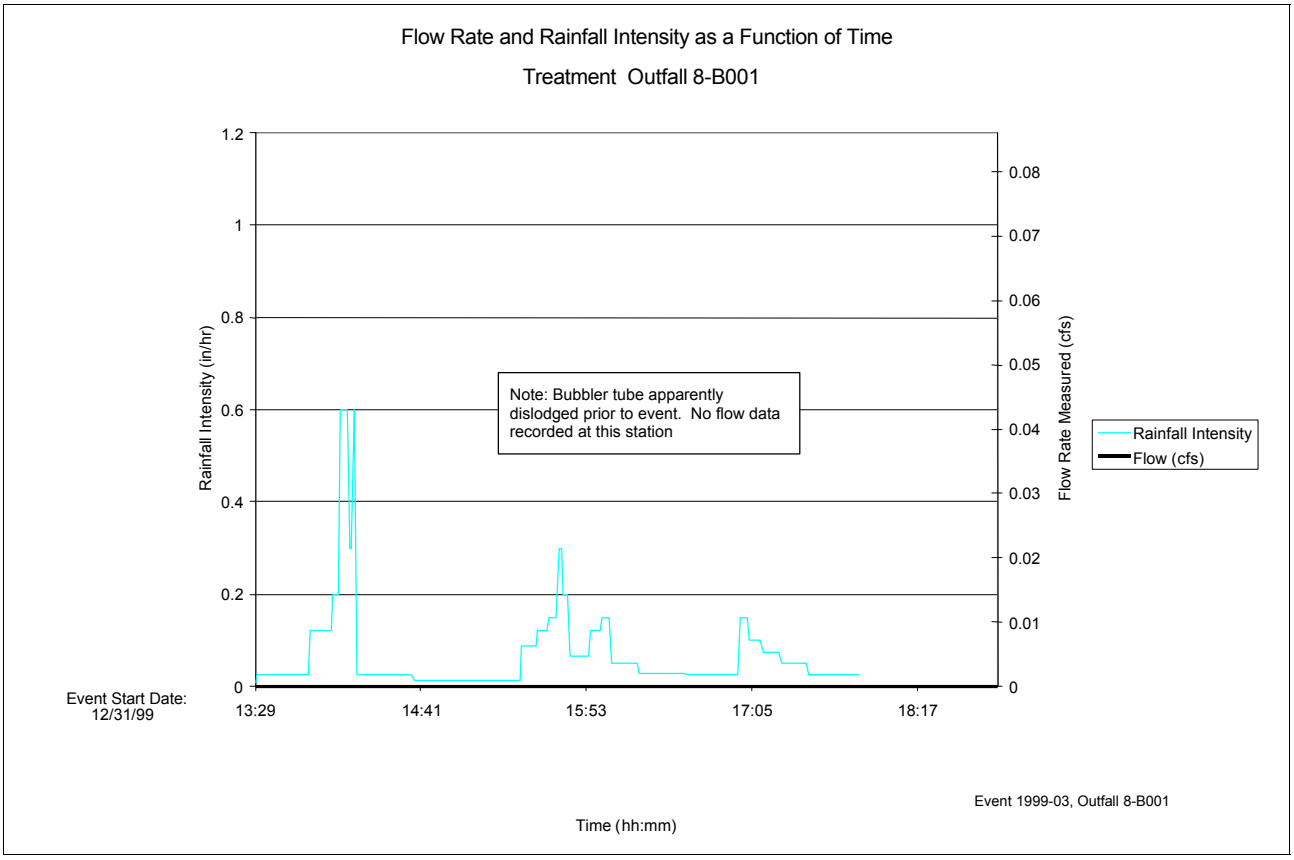

Site 1E - Litter Pickup

Event No. 1999e05 - 1/25/00

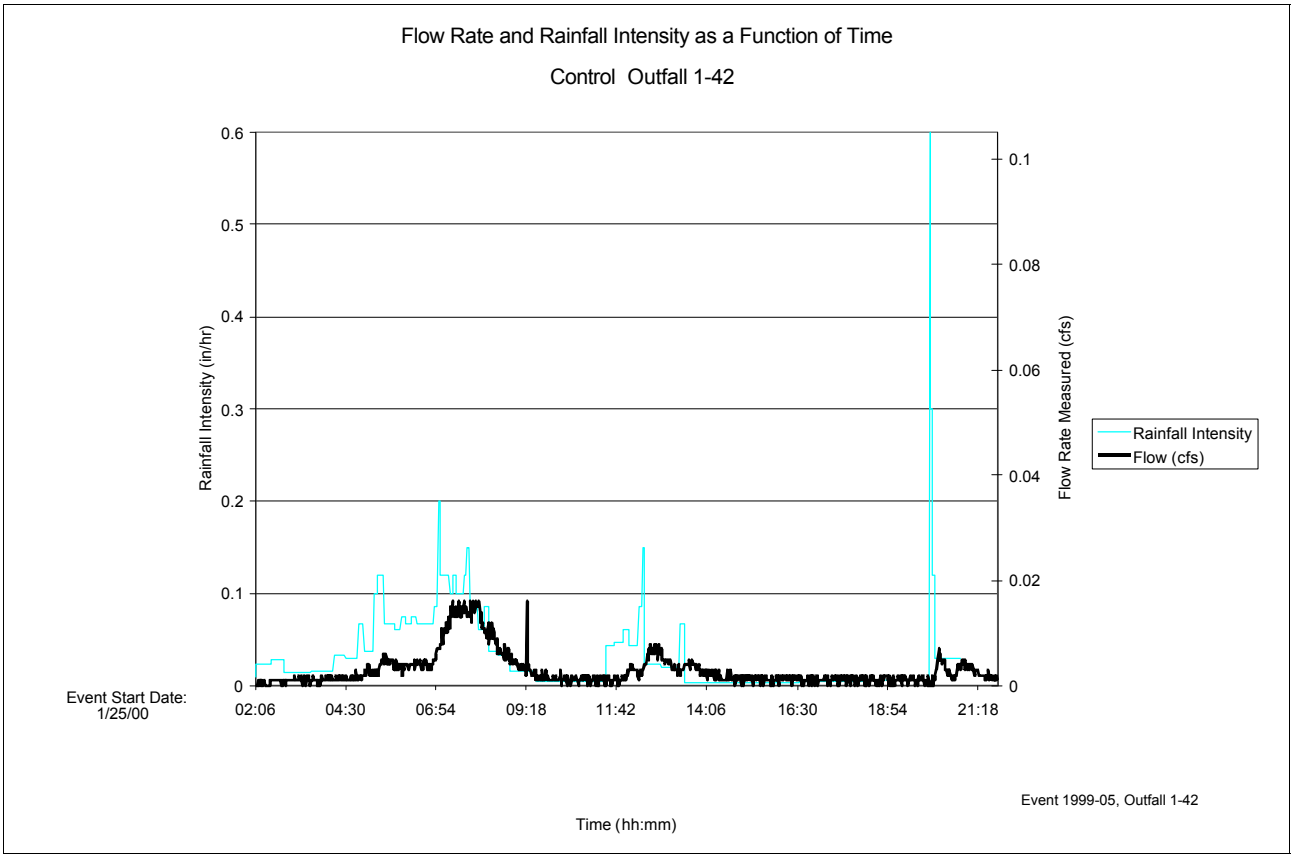

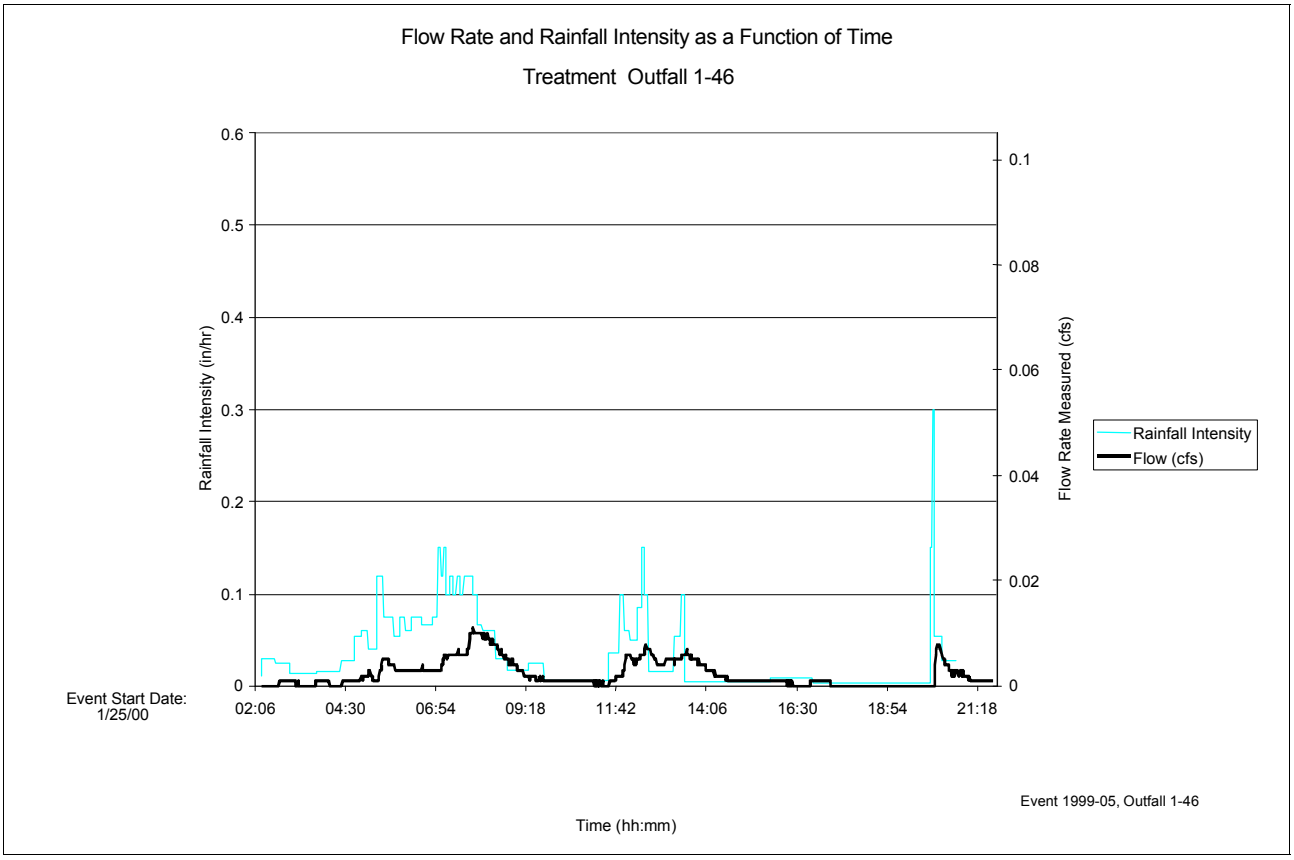

Site 1W - Street Sweeping Event No. 1999e05 - 1/25/00

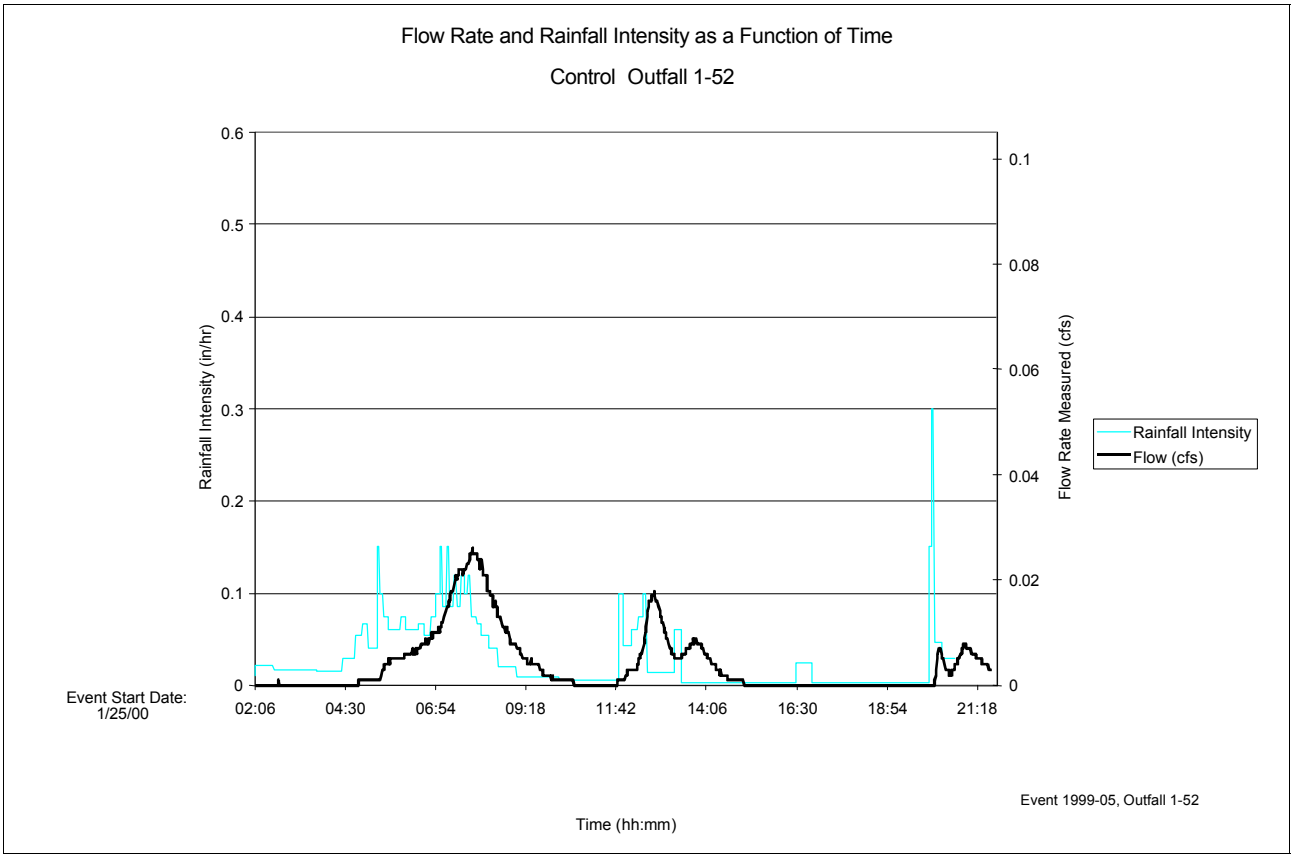

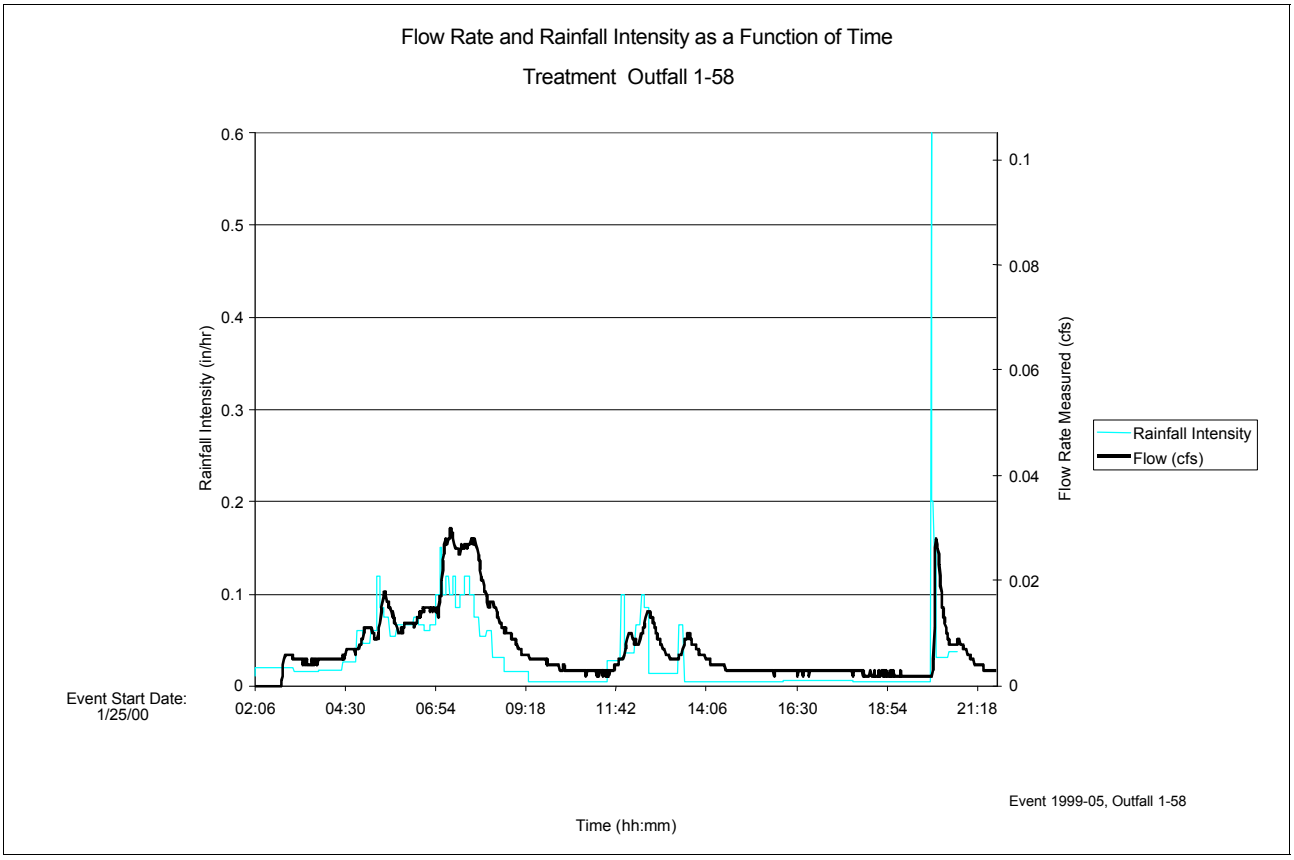

Site 6 - Modified Inlet Event No. 1999e05 - 1/25/00

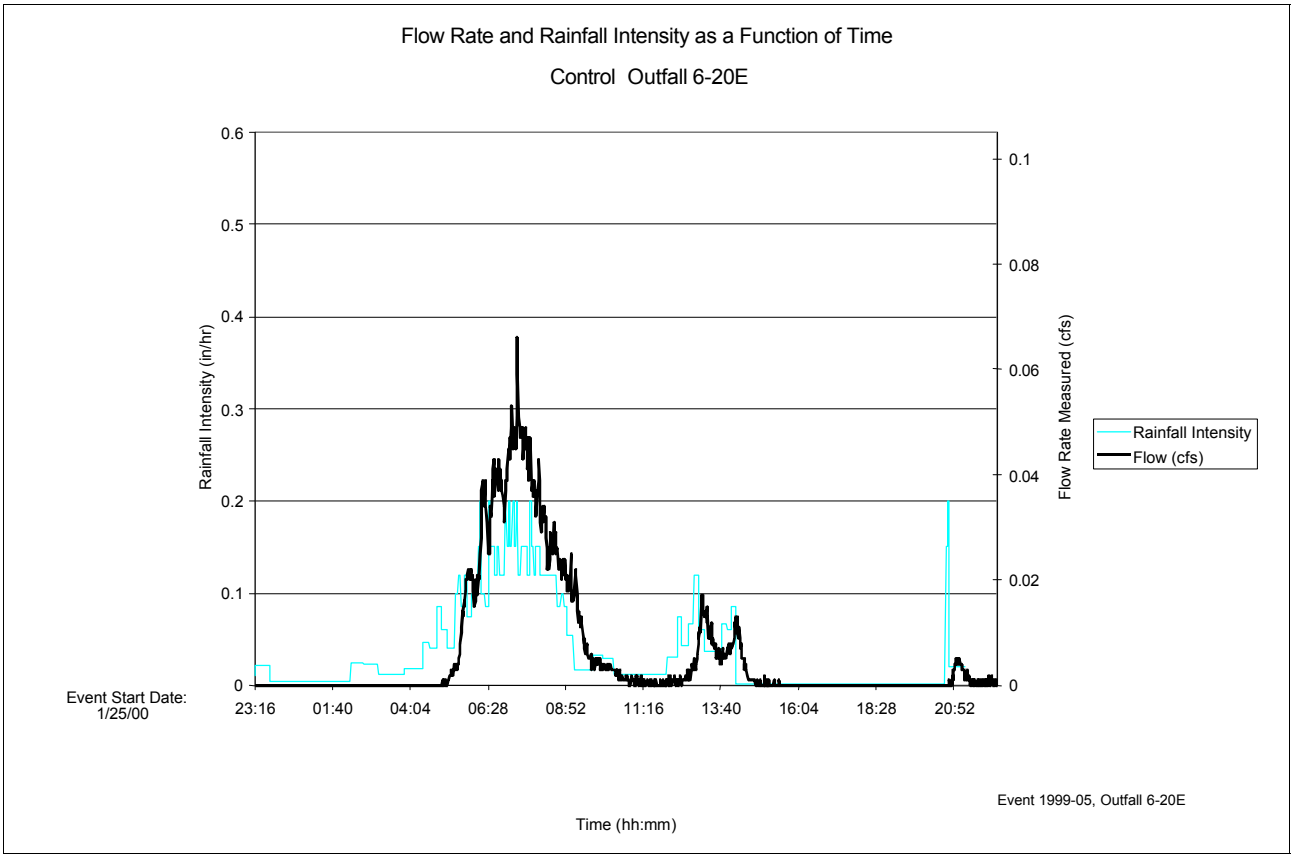

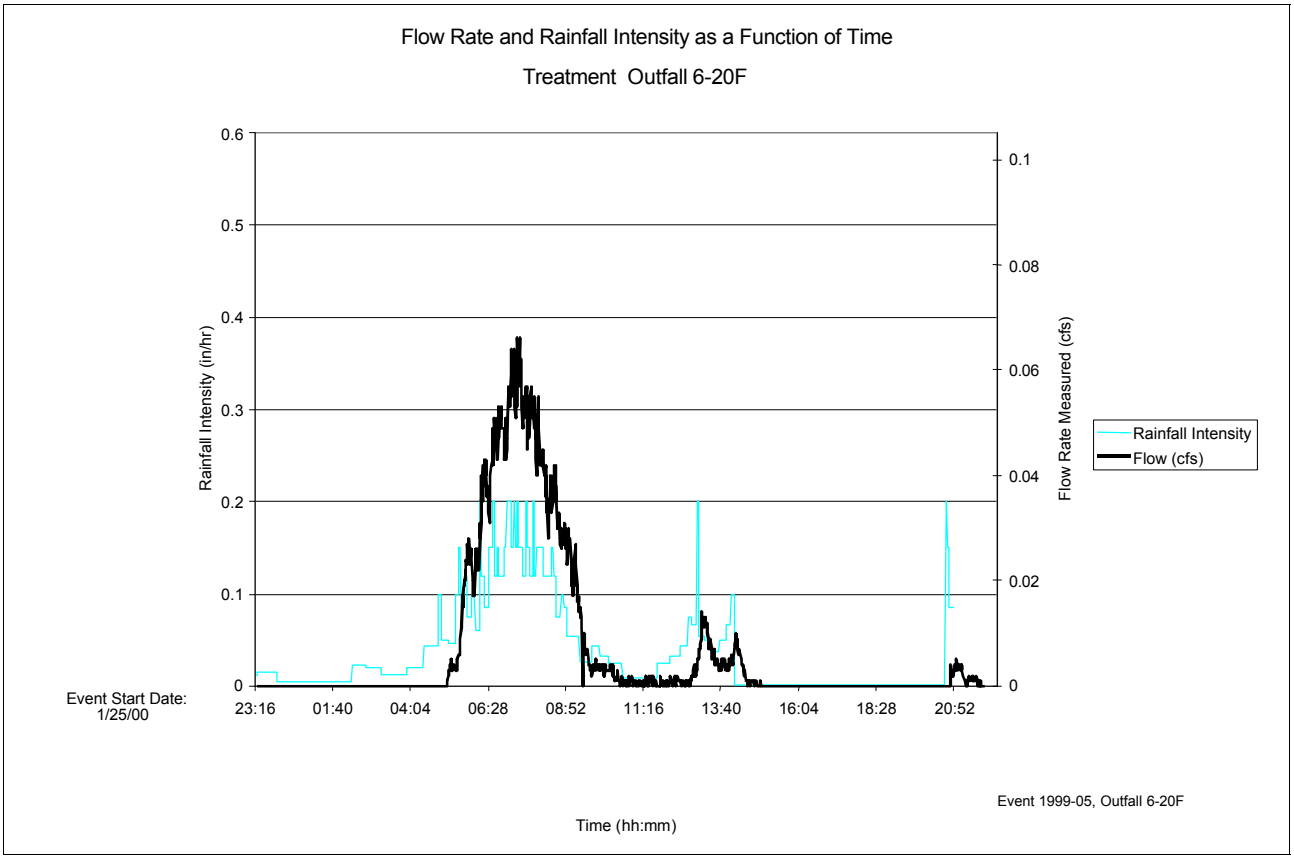

Site 8 - Bicycle Grate/LID Event No. 1999e05 - 1/25/00

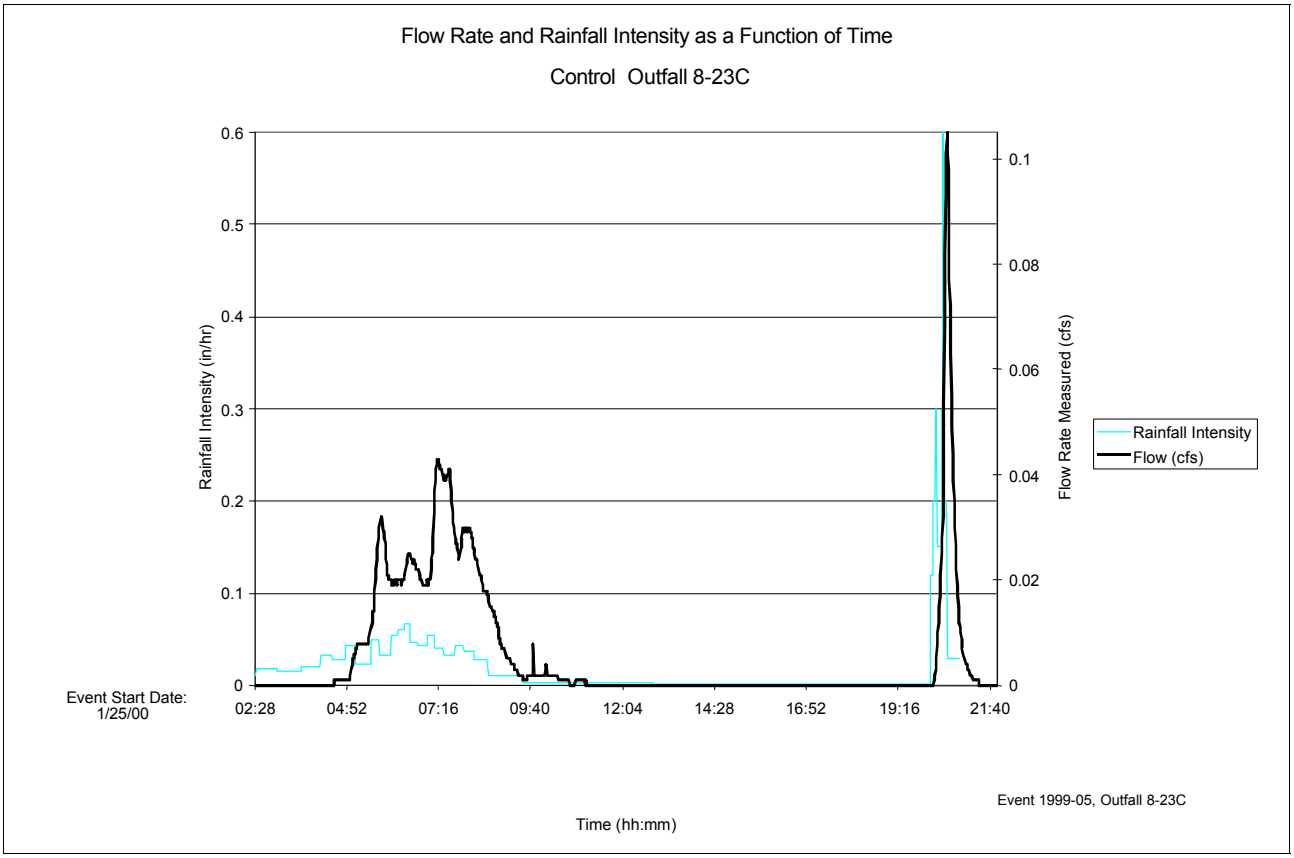

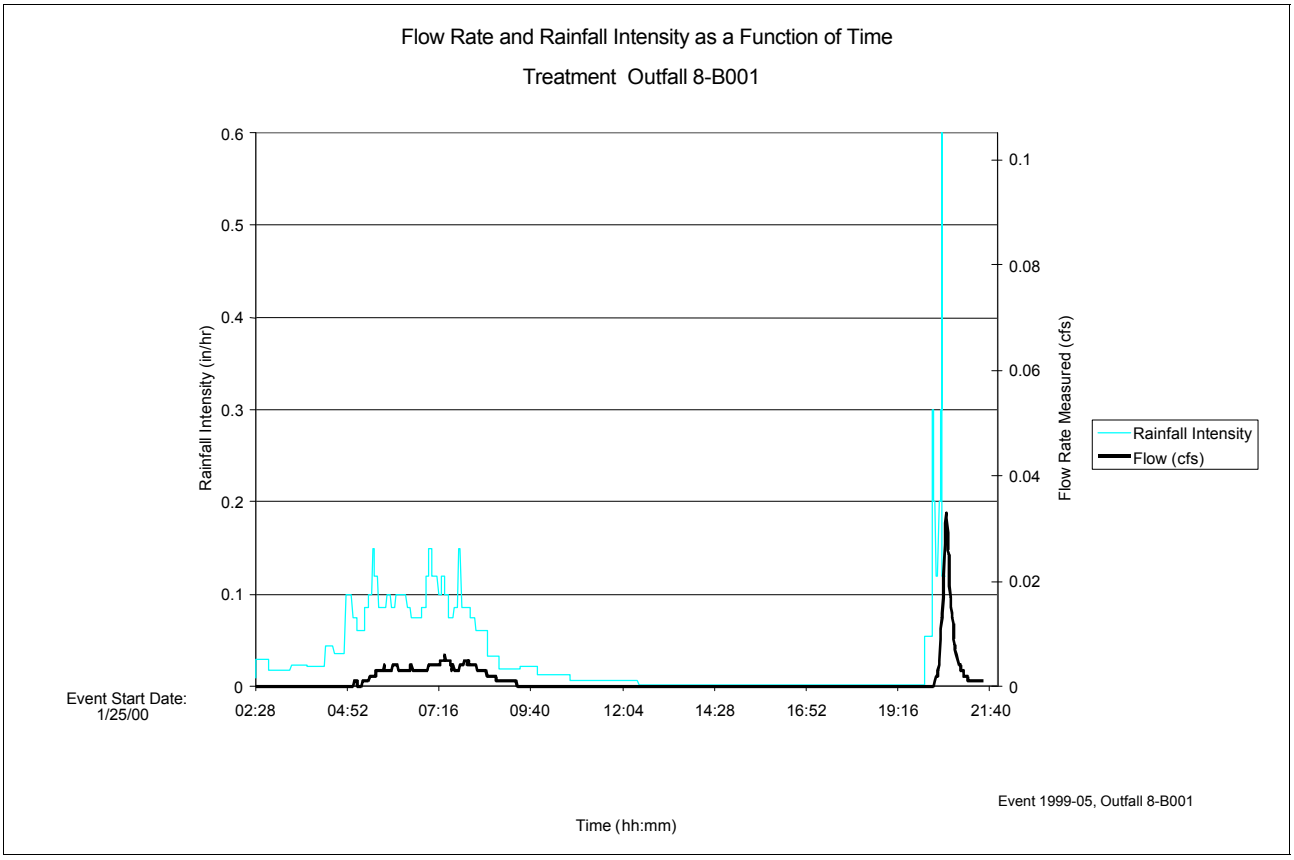

Site 1E - Litter Pickup

Event No. 1999e06 - 1/30/00

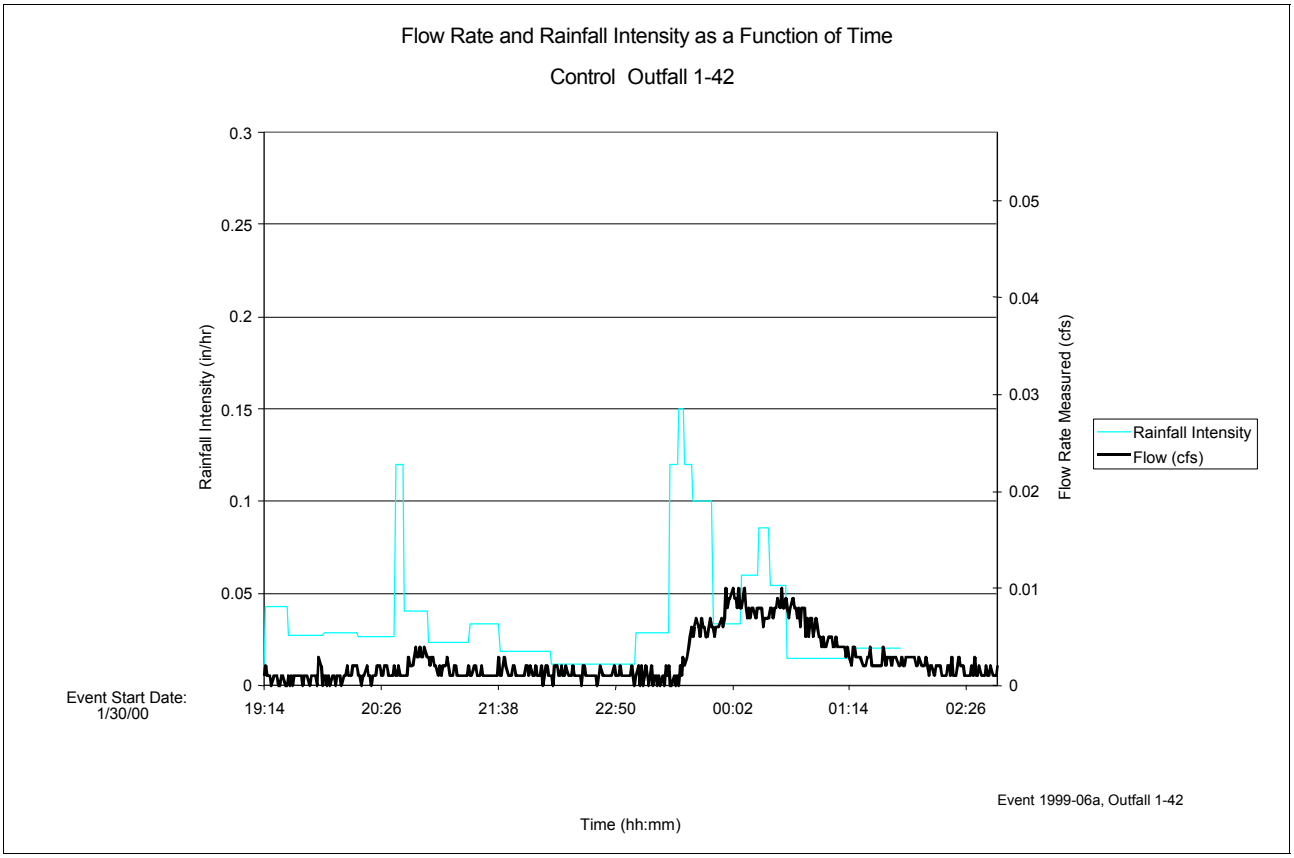

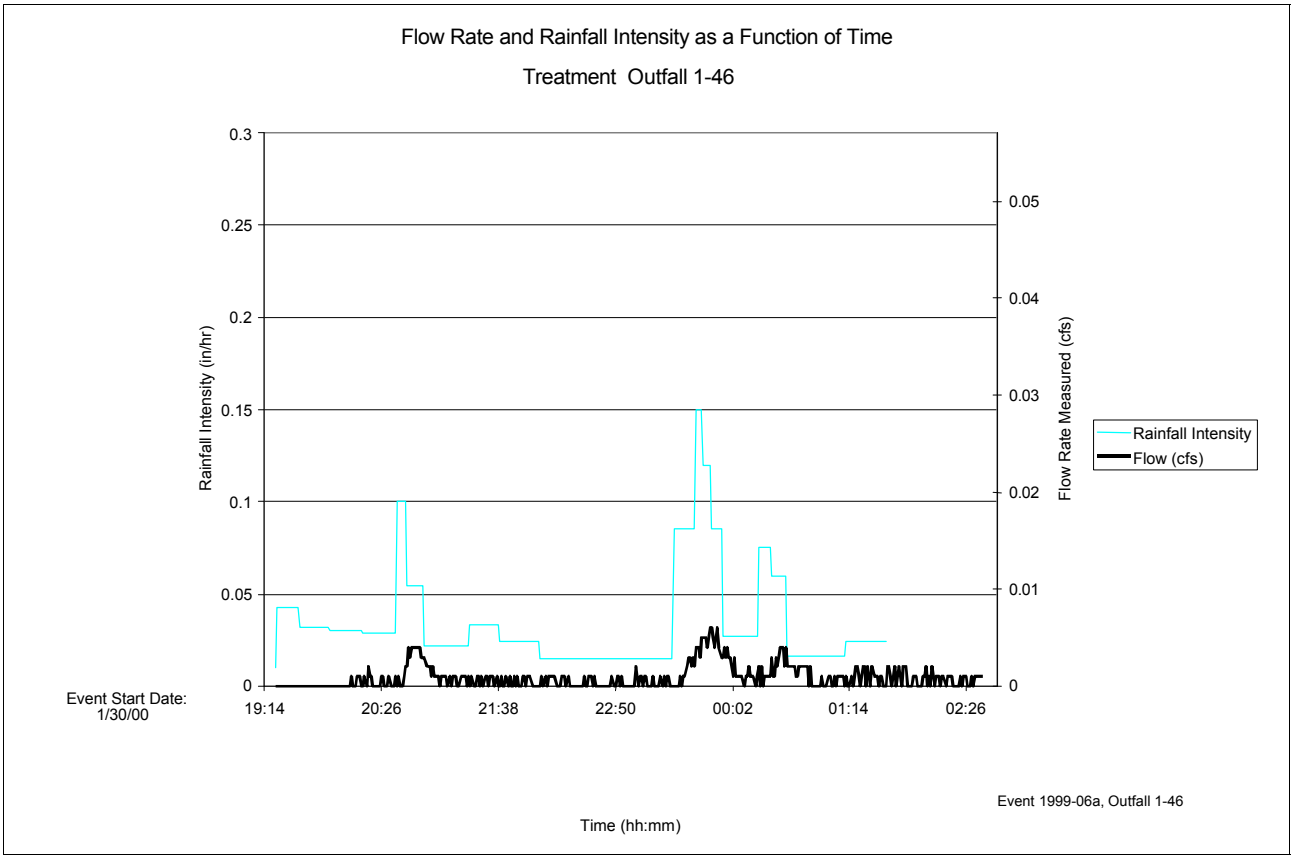

Site 1W - Street Sweeping Event No. 1999e06 - 1/30/00

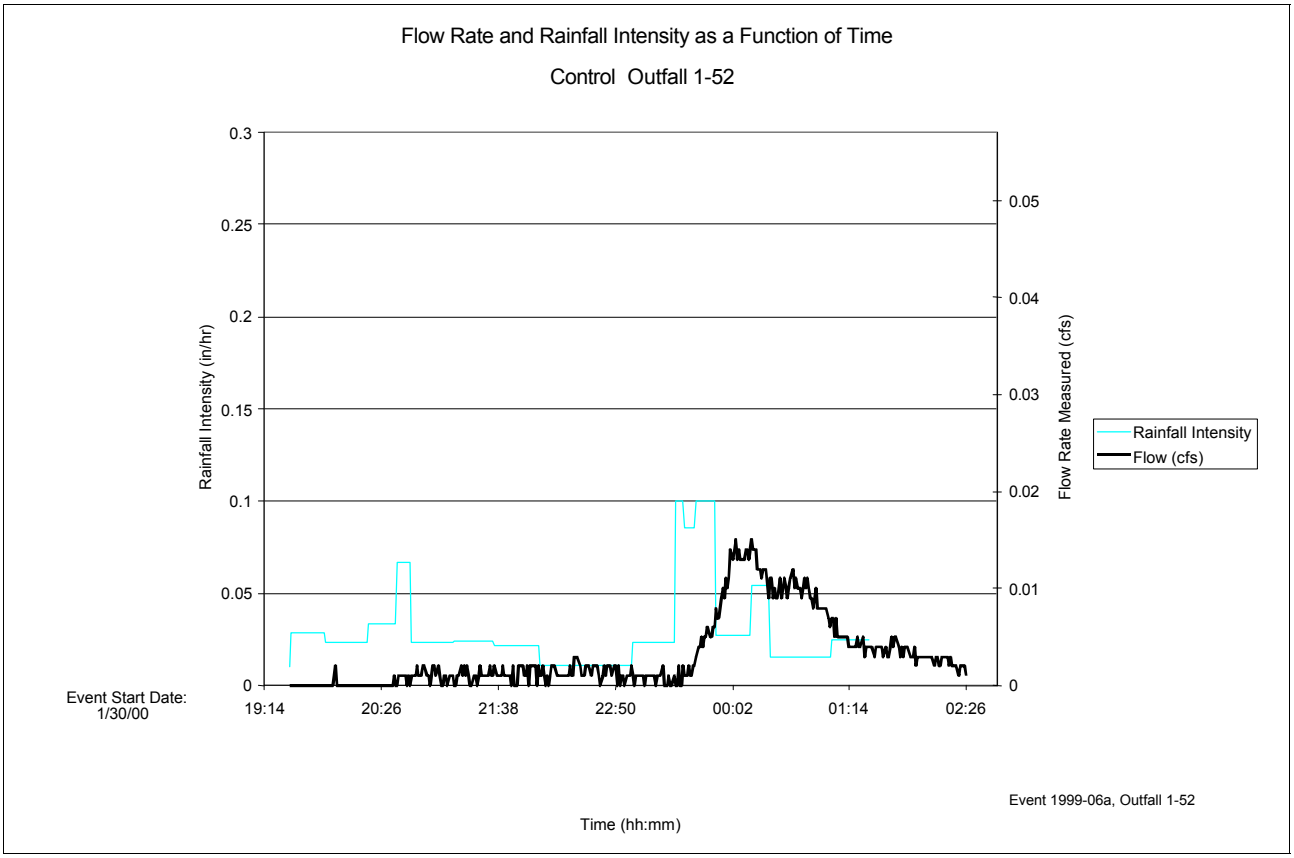

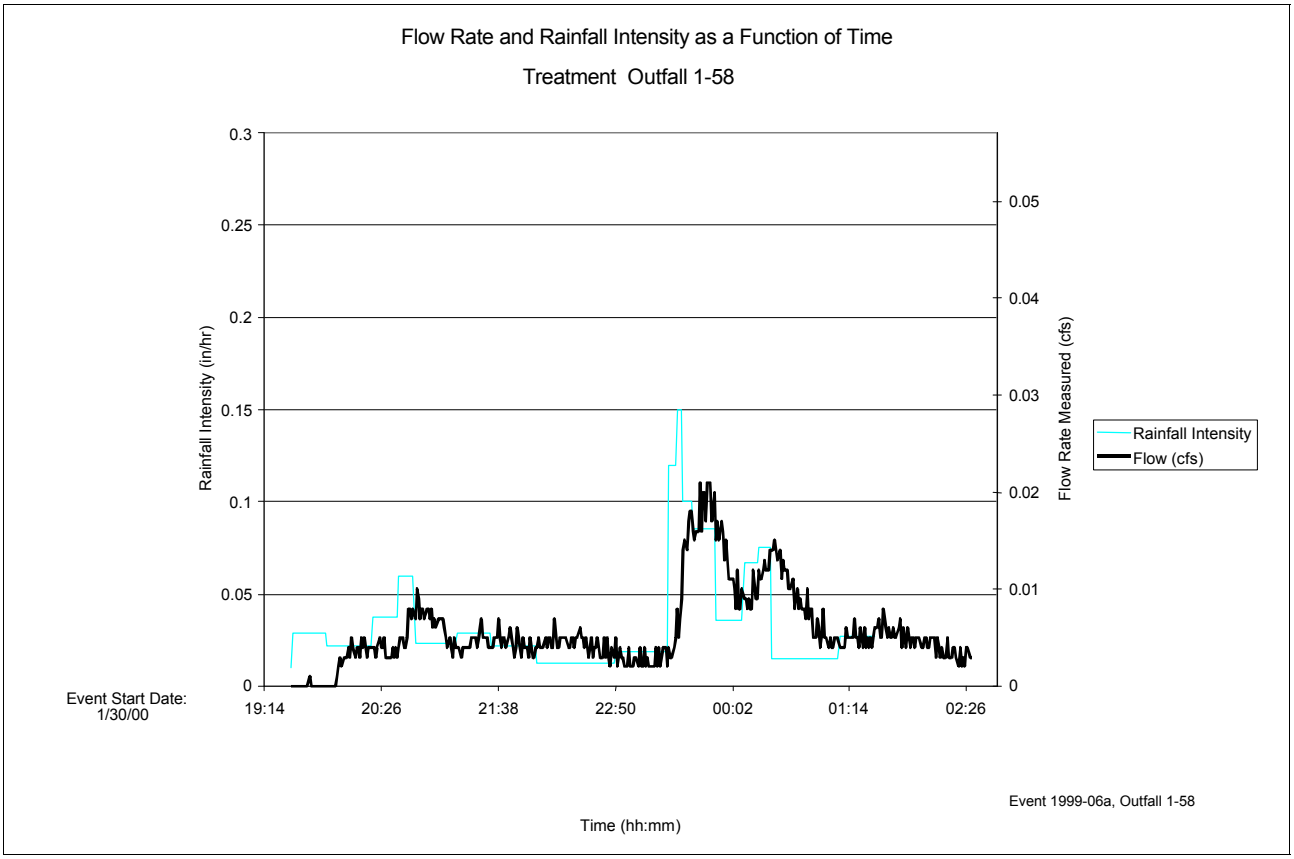

Site 6 - Modified Inlet Event No. 1999e06 - 1/30/00

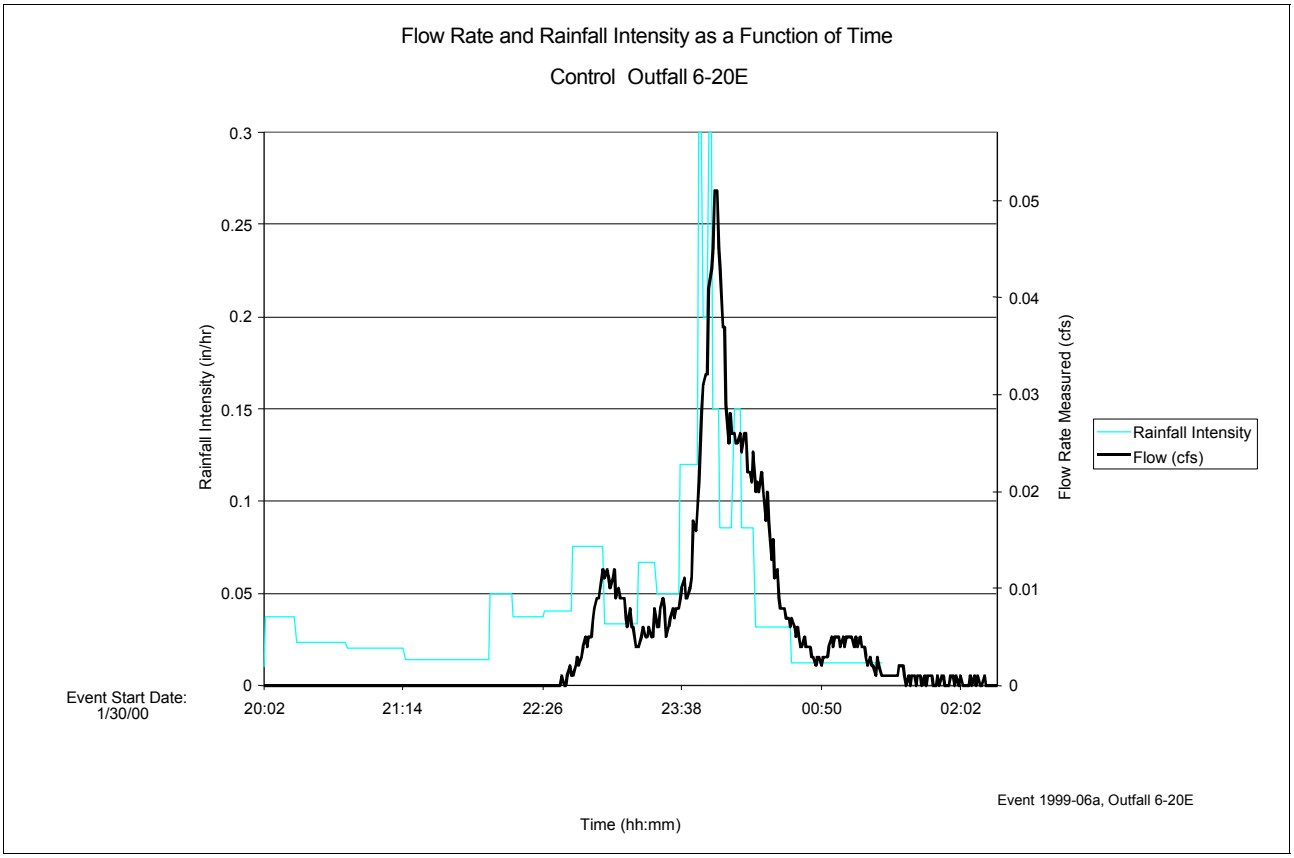

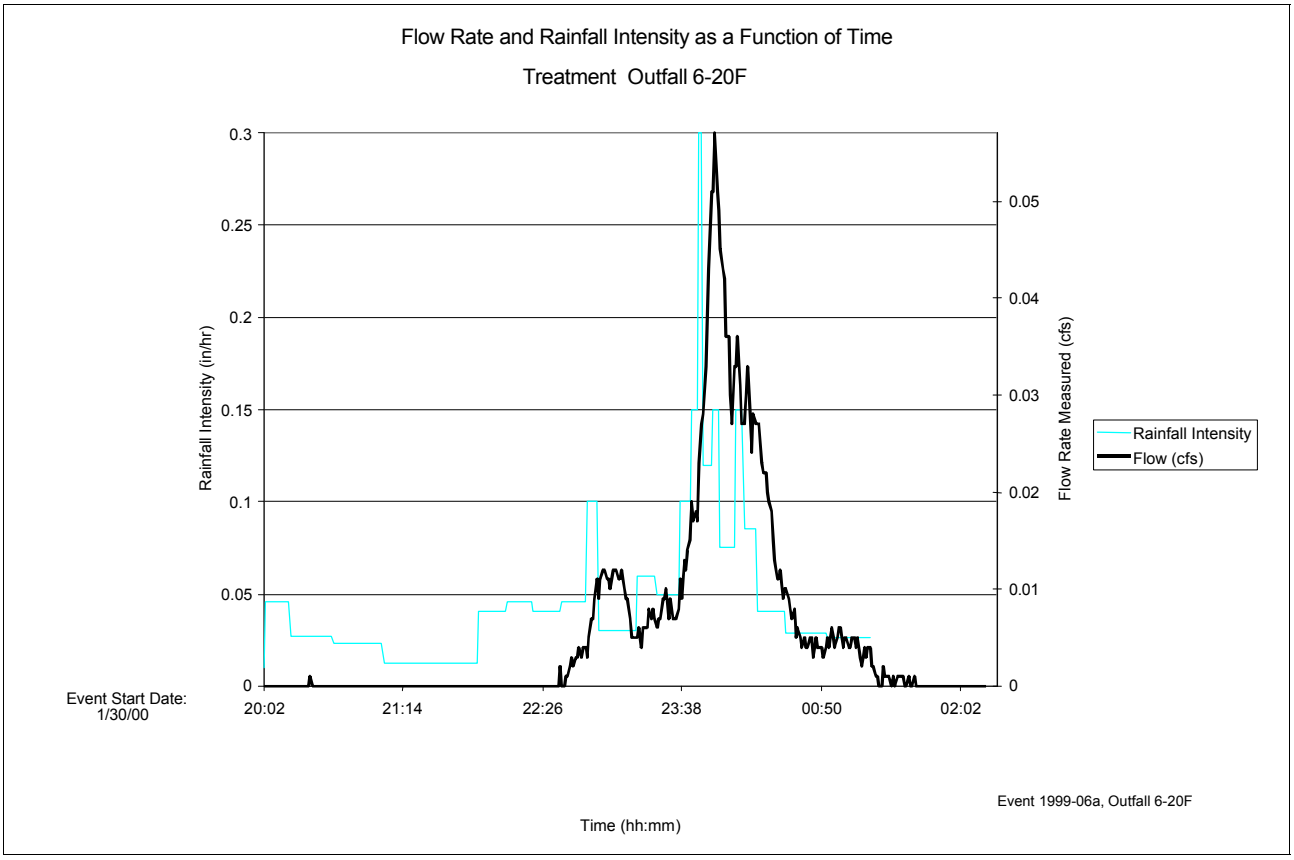

Site 8 - Bicycle Grate/LID Event No. 1999e06 - 1/30/00

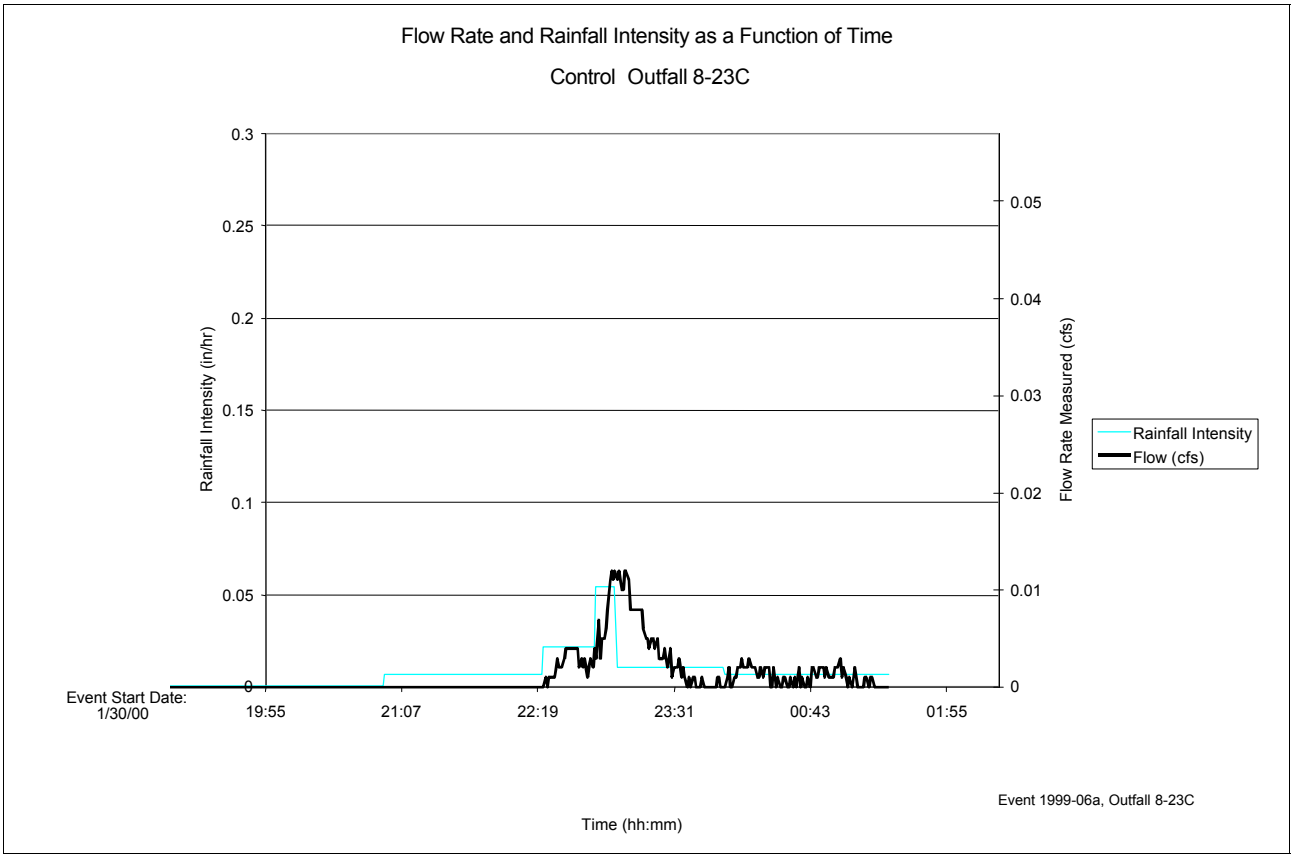

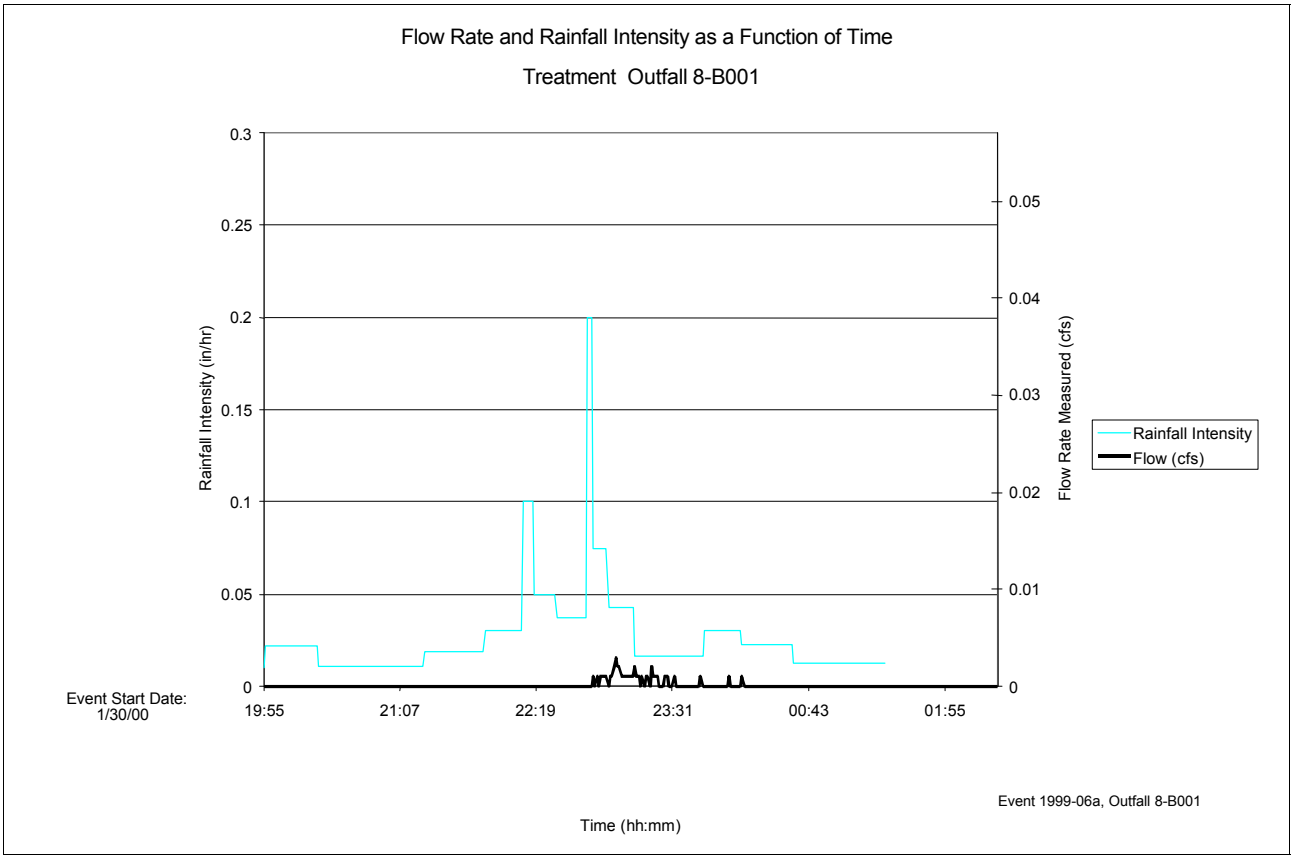

Site 1E - Litter Pickup Event No. 1999e08 - 2/10/00

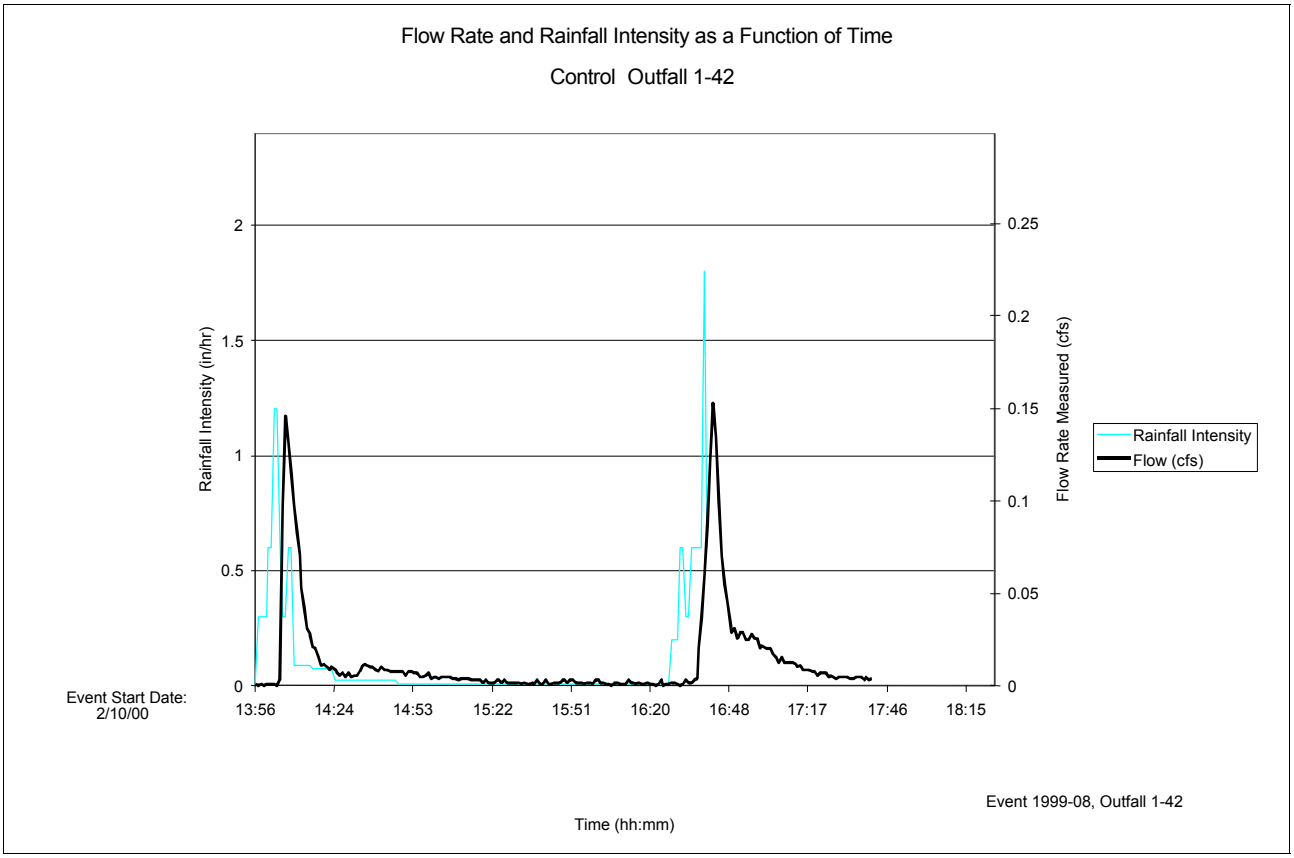

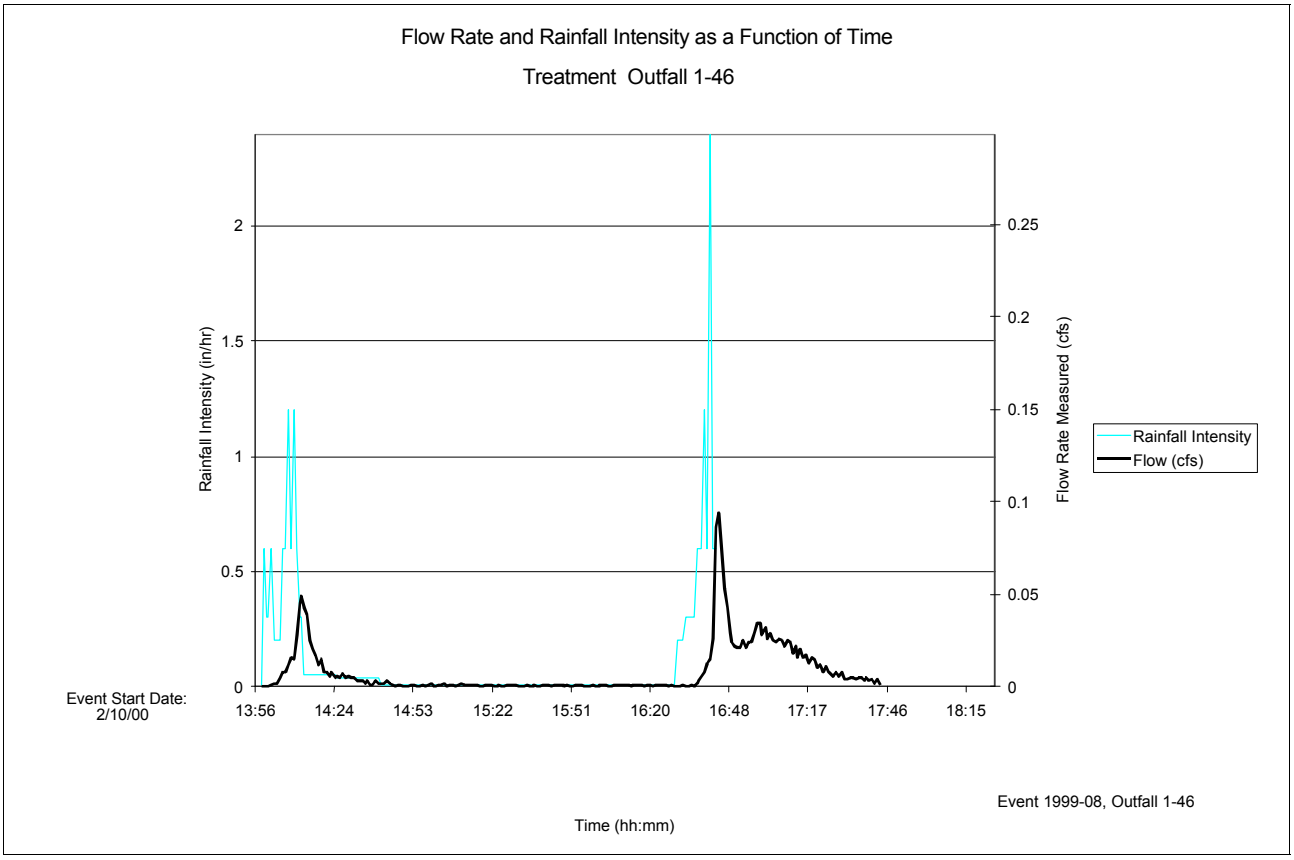

Site 1W - Street Sweeping Event No. 1999e08 - 2/10/00

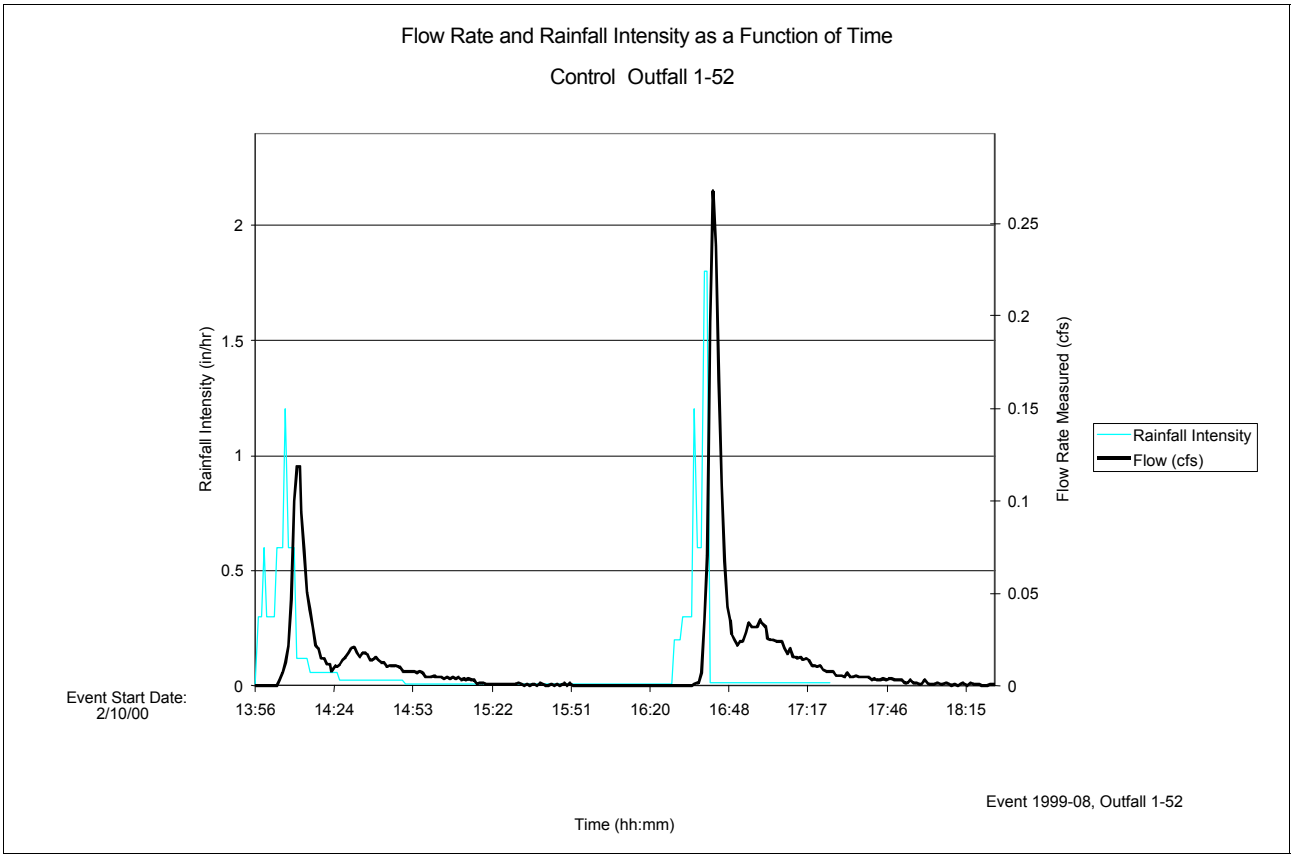

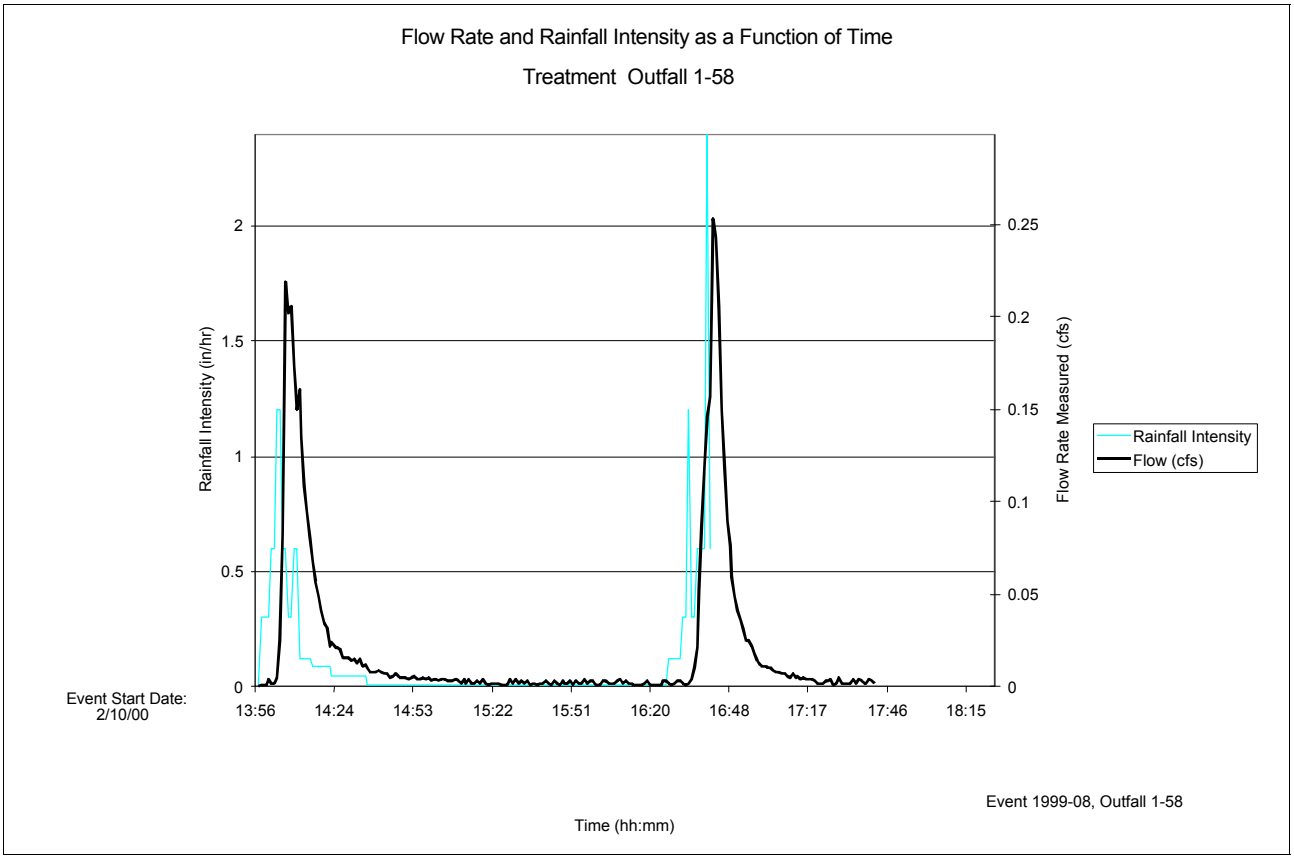

Site 6 - Modified Inlet Event No. 1999e08 - 2/10/00

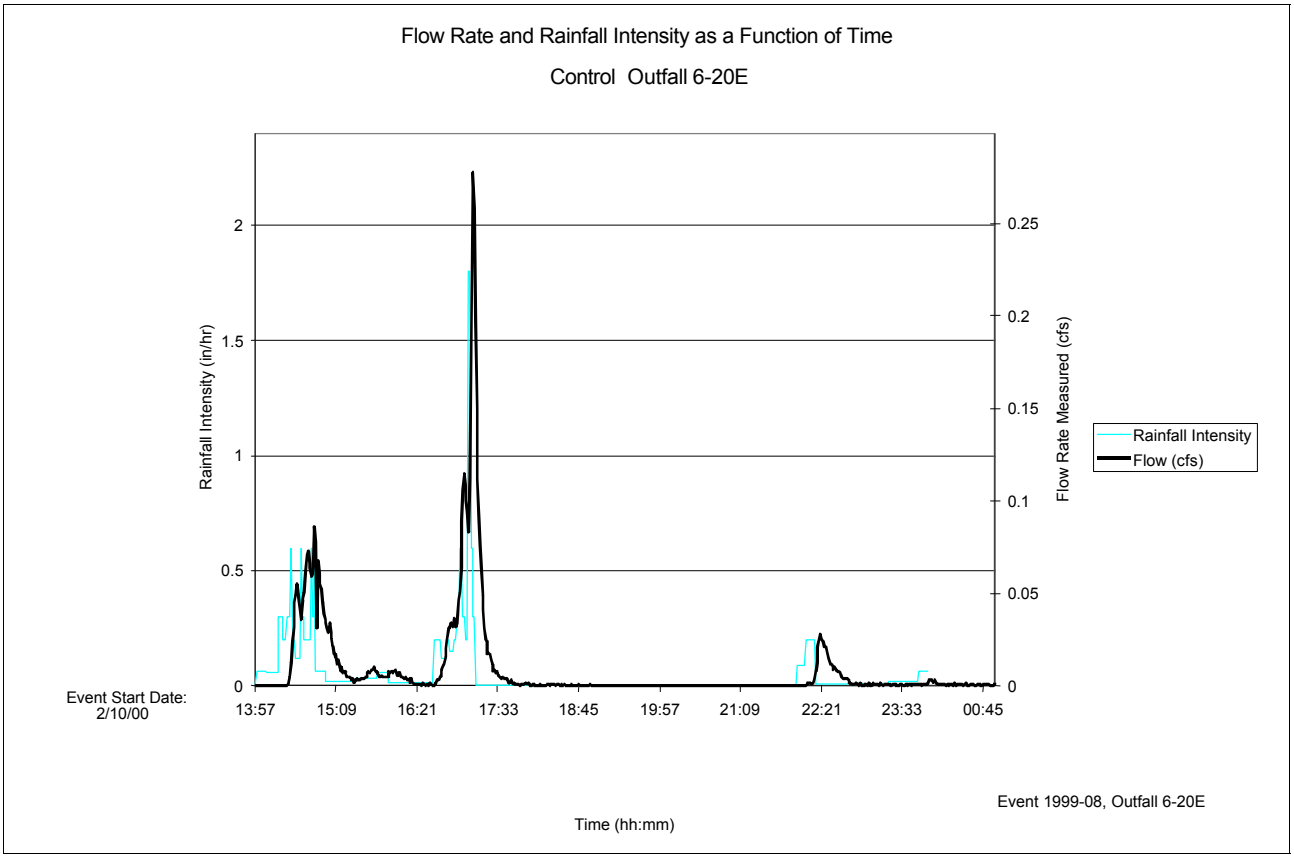

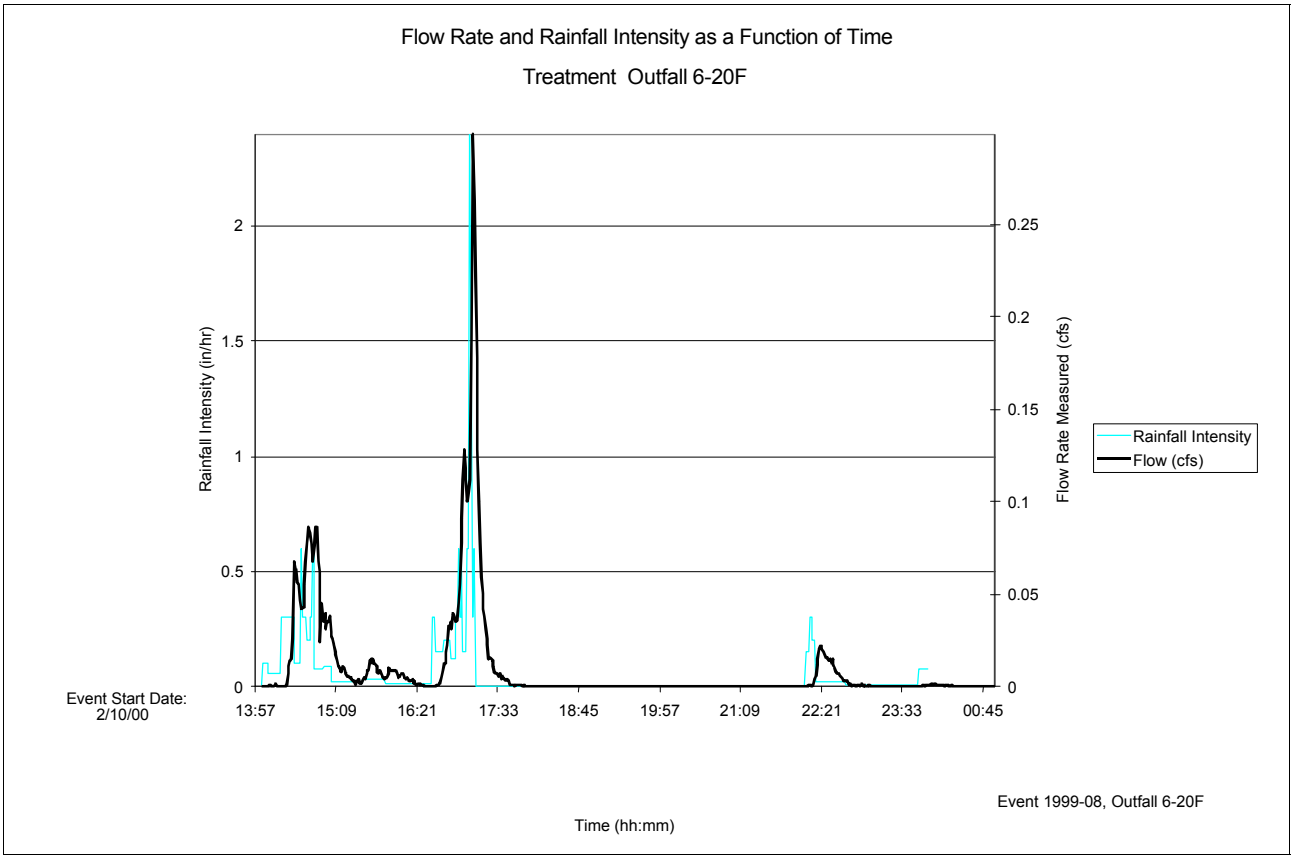

Site 8 - Bicycle Grate/LID Event No. 1999e08 - 2/10/00

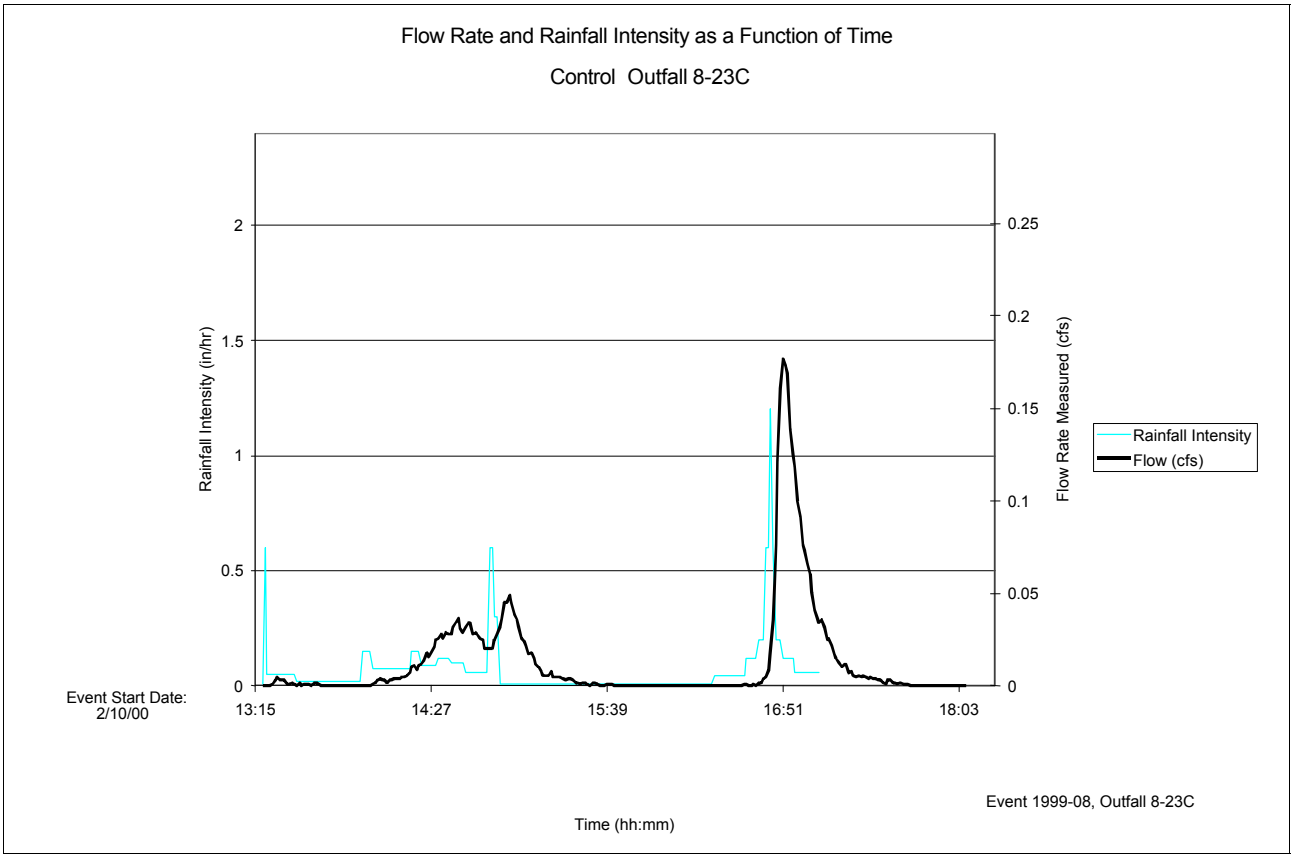

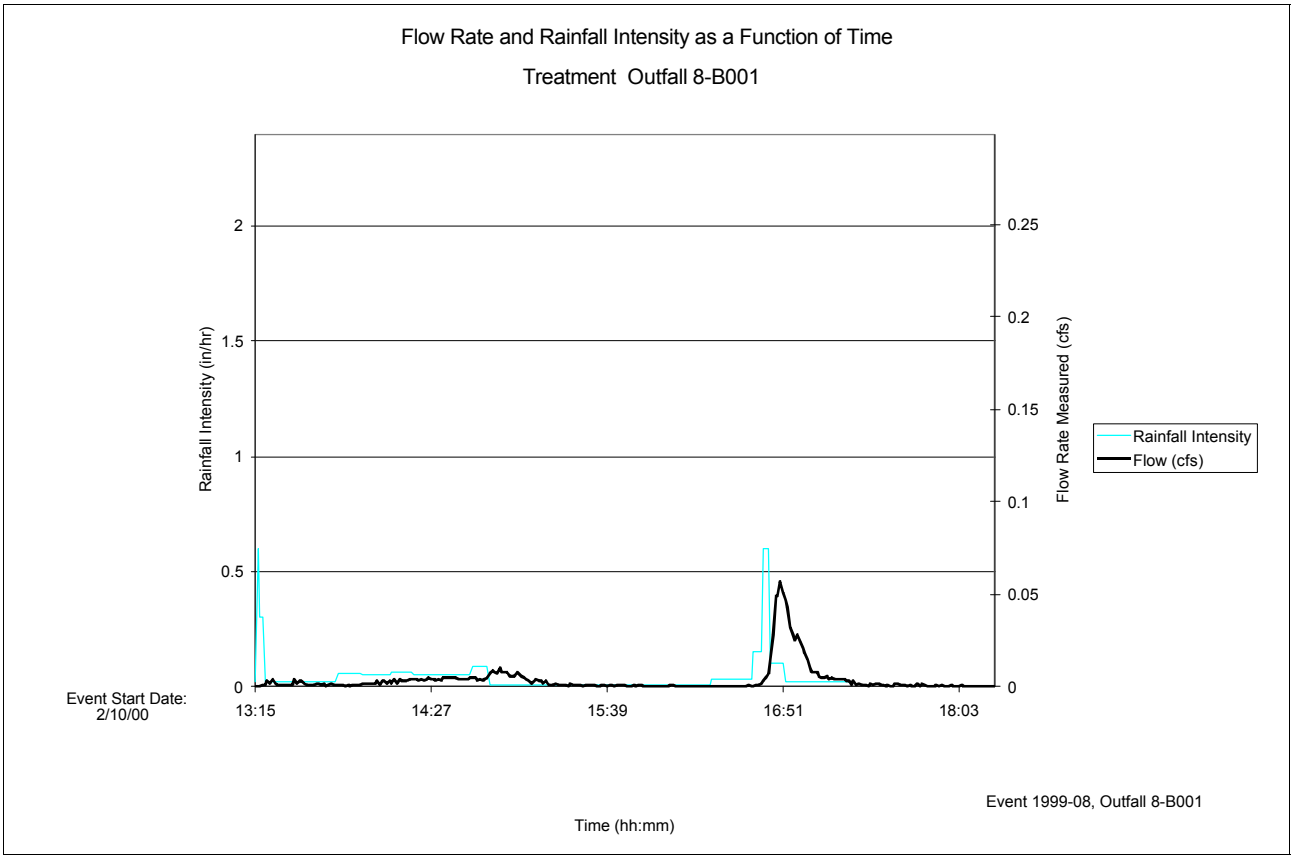

Site 1E - Litter Pickup Event No. 1999e09 - 2/12/00

Flow Rate and Rainfall Intensity as a Function of Time

Control Outfall 1-42

No Hydrologic Data Available for this Event For this Outfall

Event Start Date:
2/12/00

Flow Rate and Rainfall Intensity as a Function of Time

Treatment Outfall 1-46

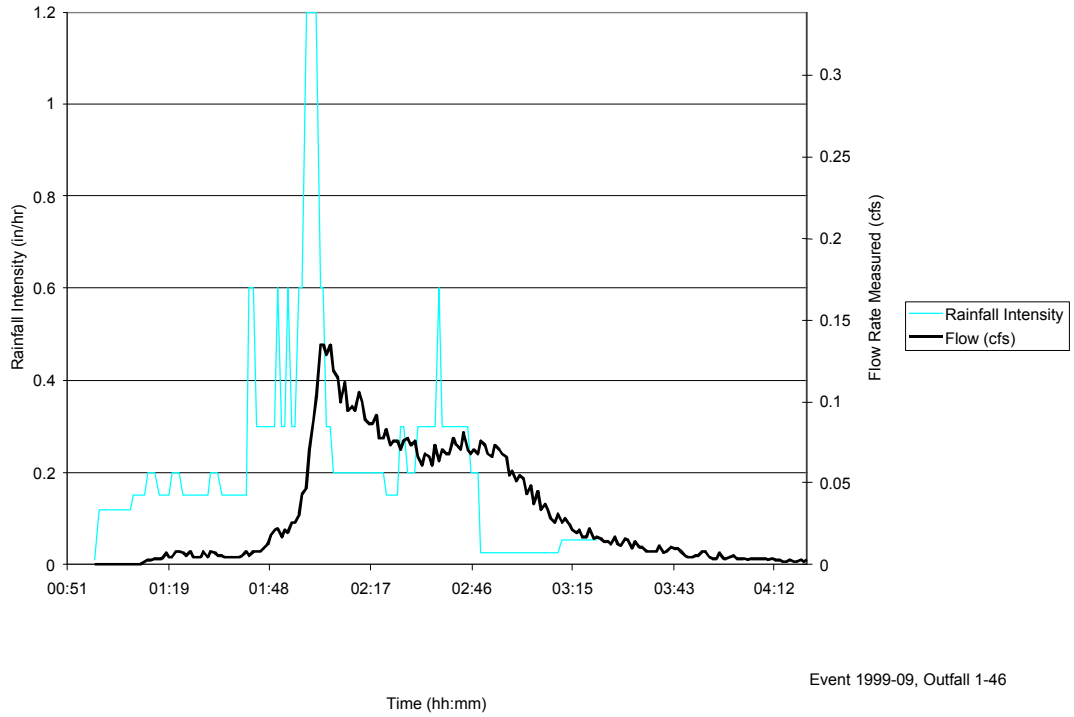

Event Start Date:
2/12/00

Event 1999-09, Outfall 1-46

Site 1W - Street Sweeping Event No. 1999e09 - 2/12/00

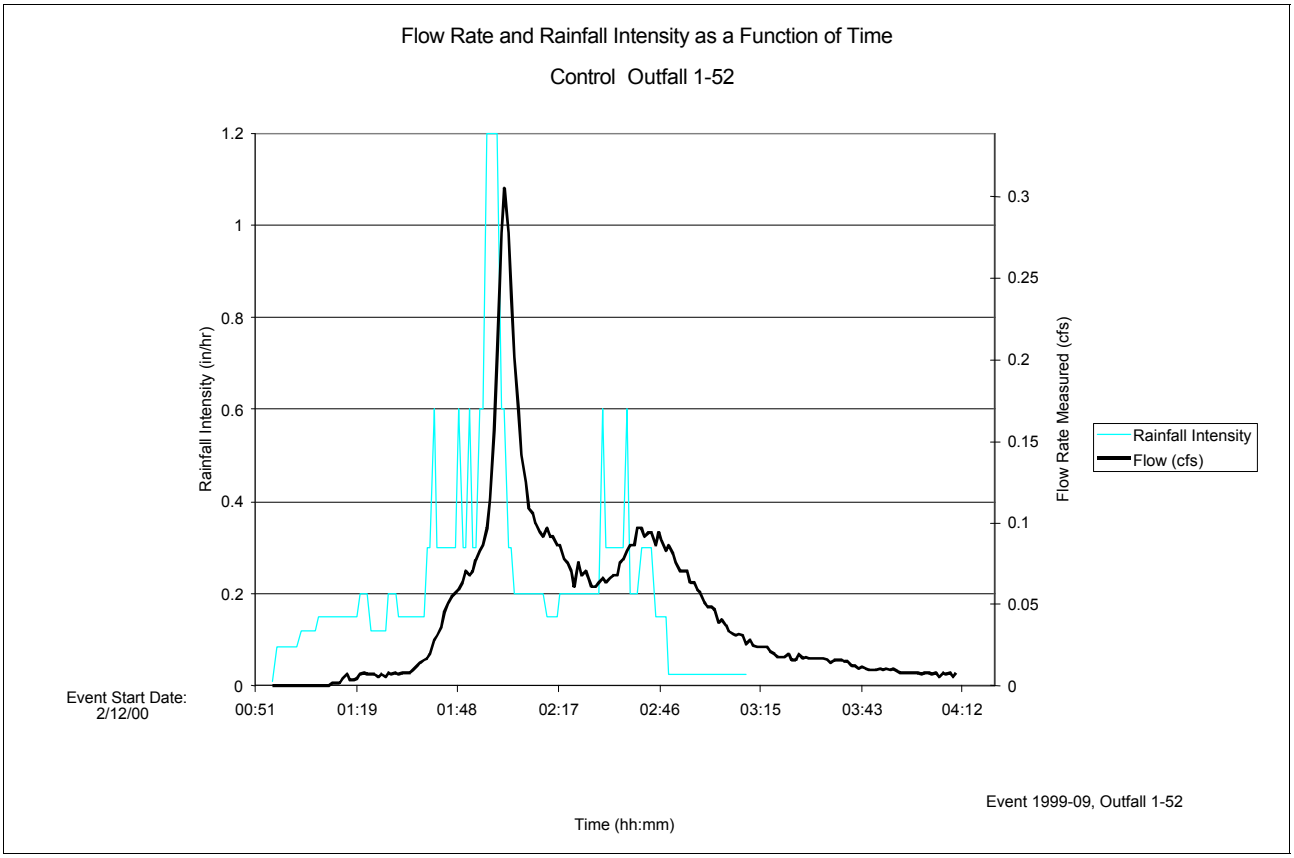

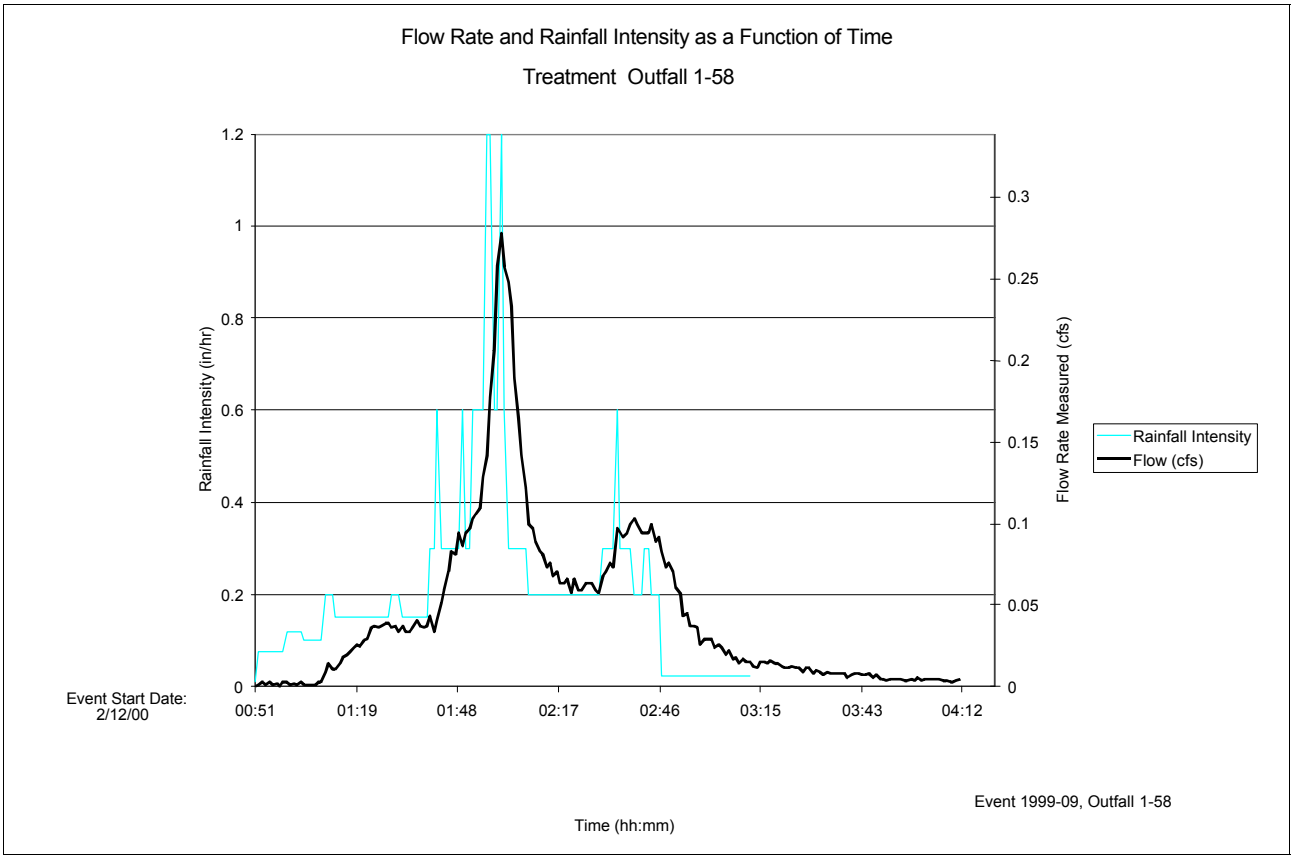

Site 6 - Modified Inlet Event No. 1999e09 - 2/12/00

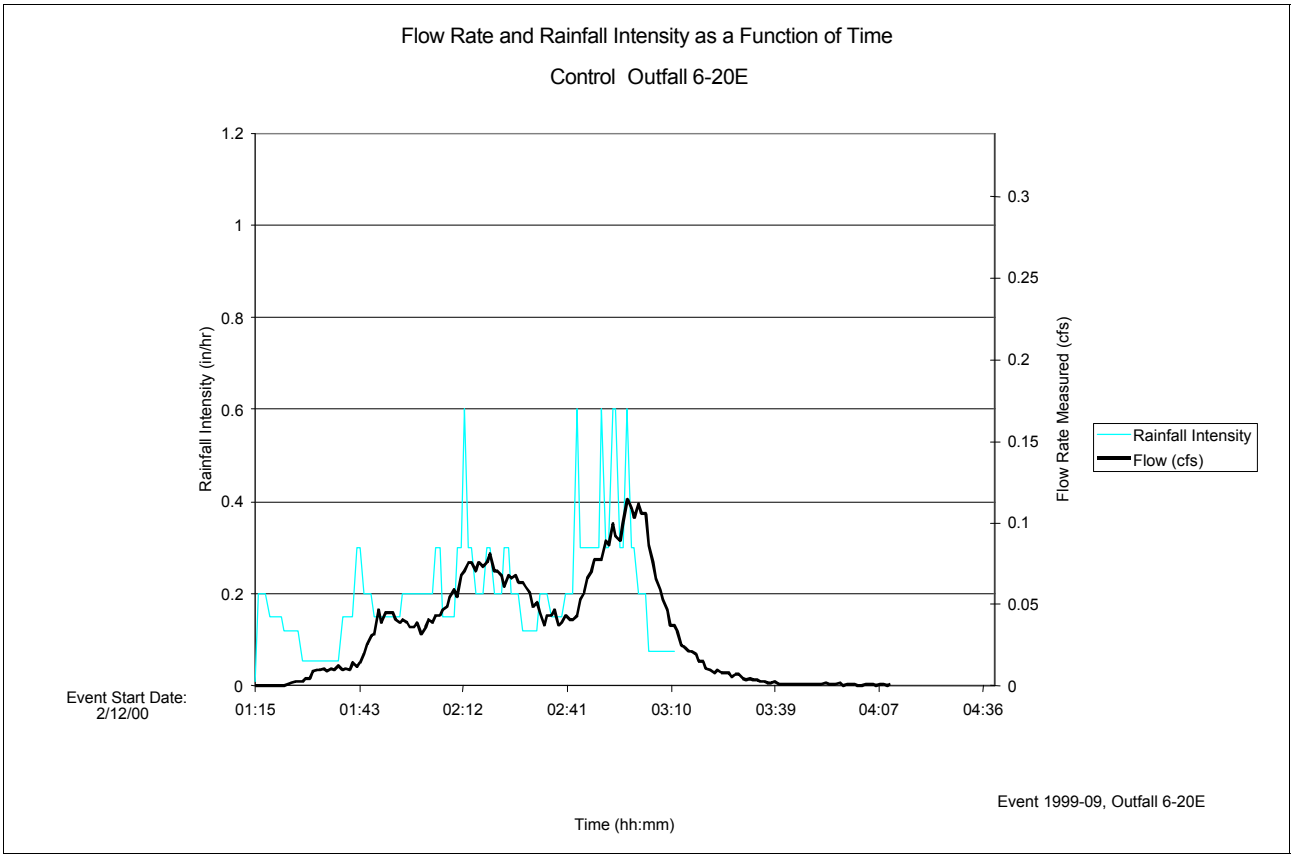

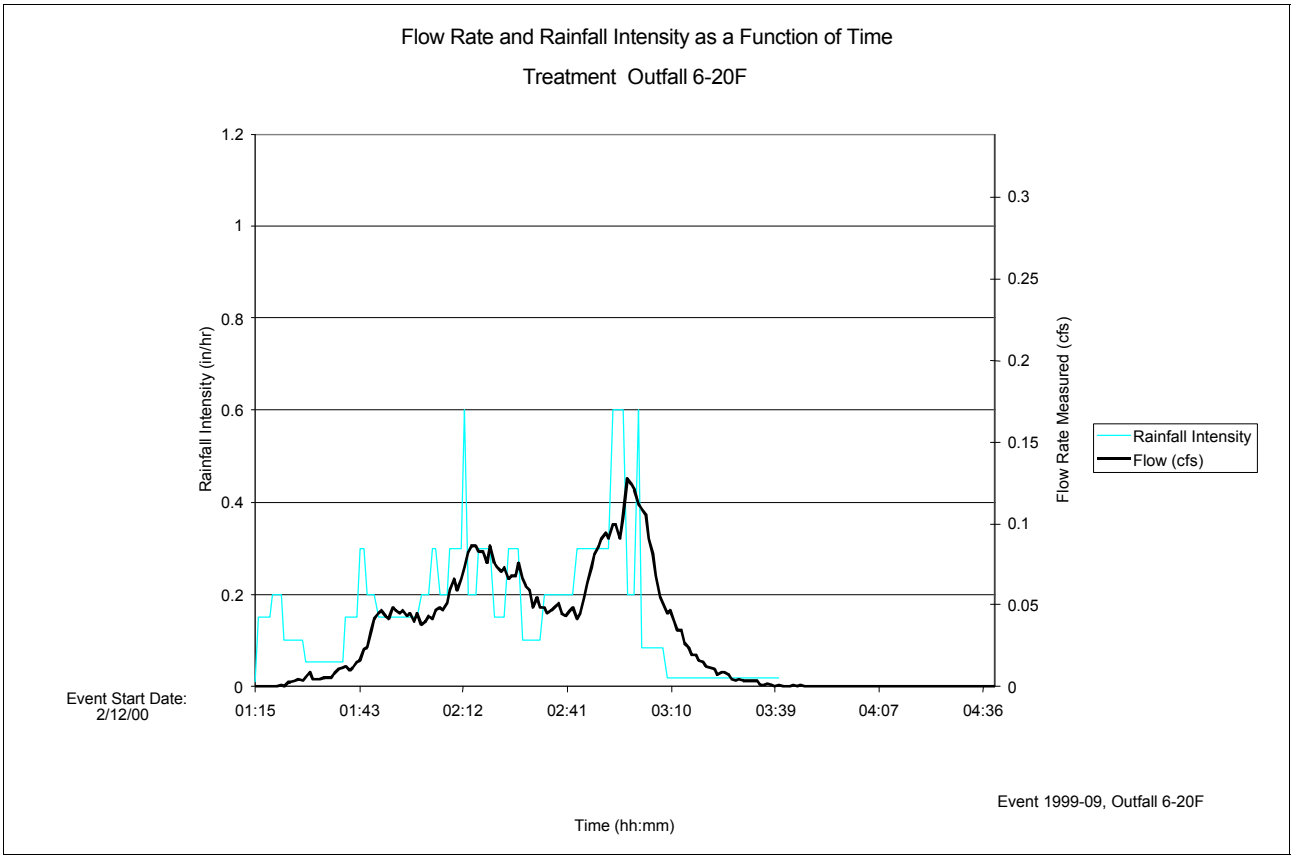

Site 8 - Bicycle Grate/LID Event No. 1999e09 - 2/12/00

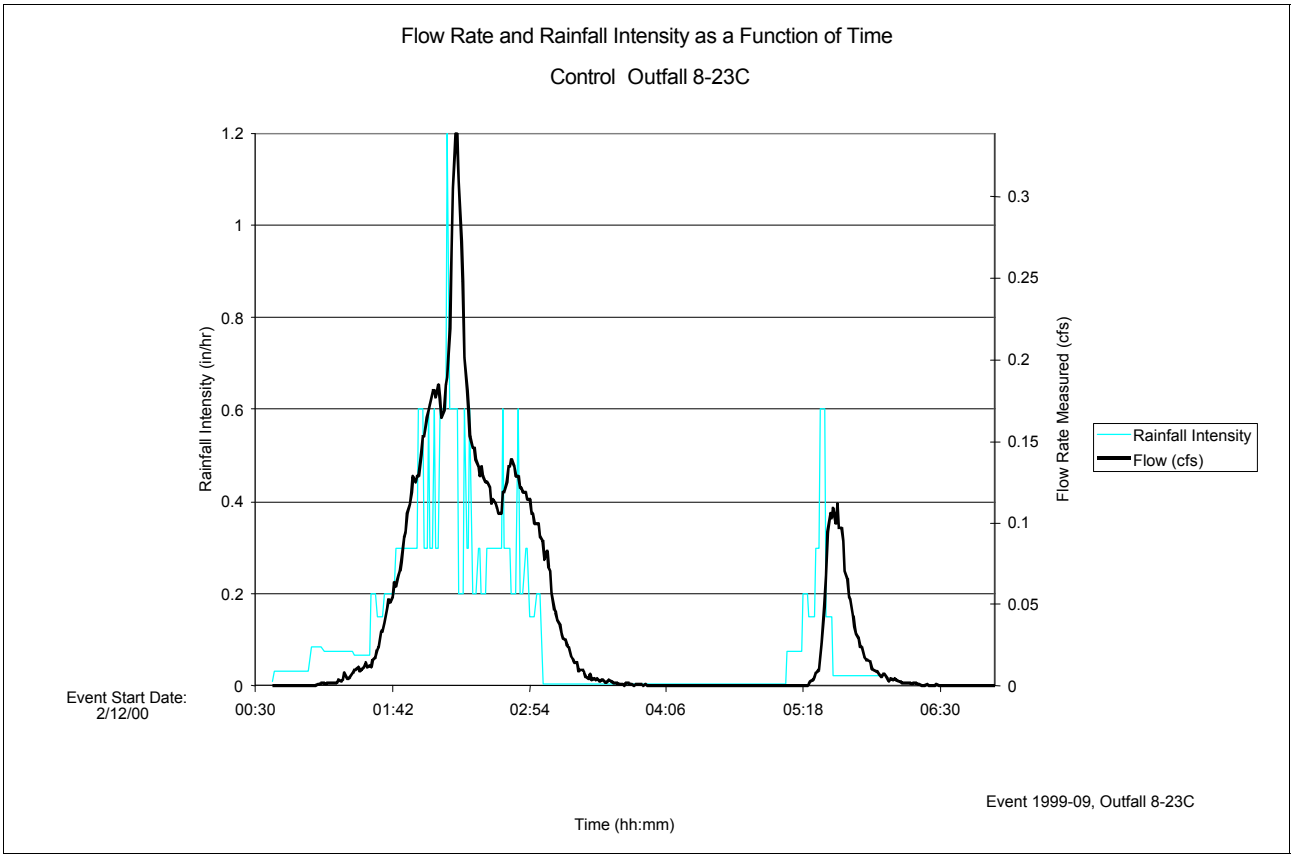

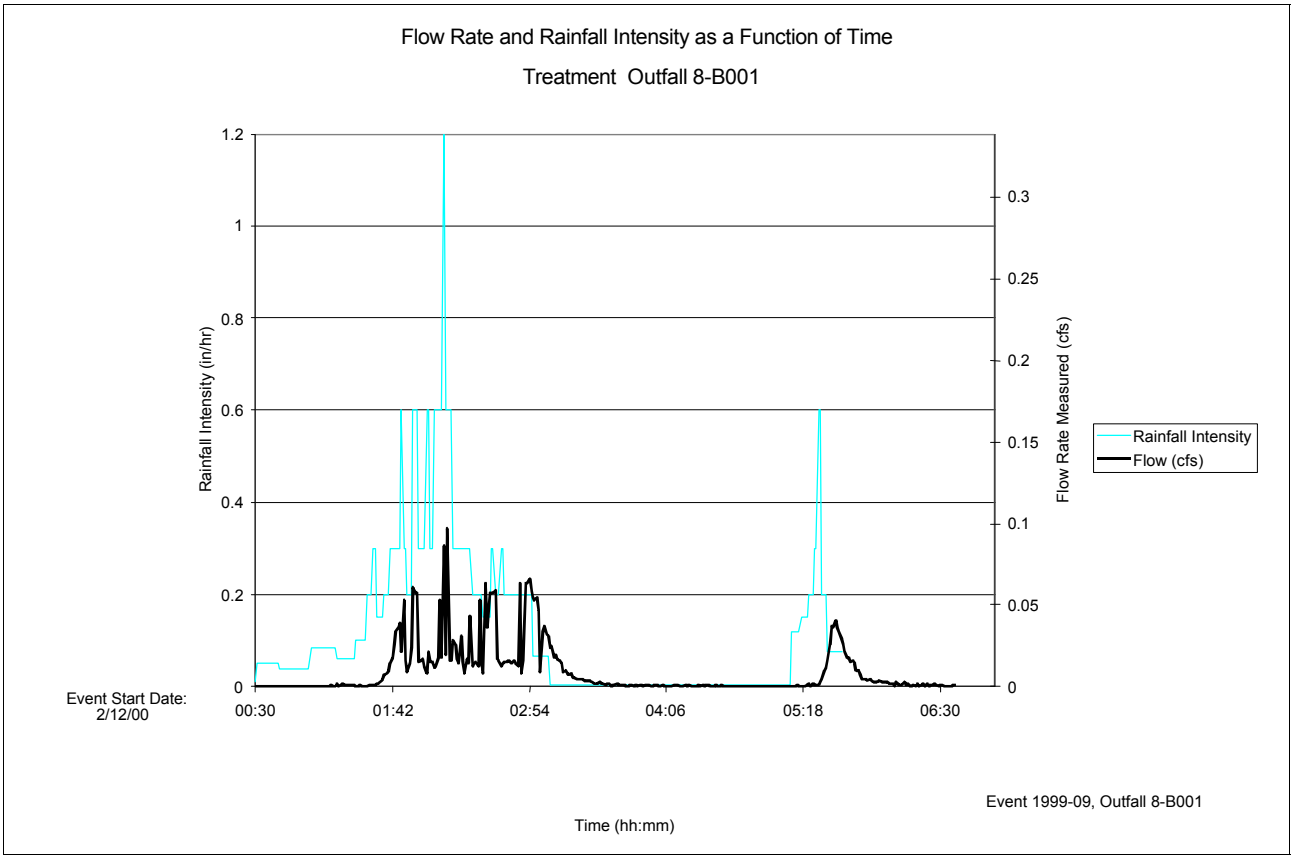

Site 1E - Litter Pickup Event No. 1999e10 - 2/13/00

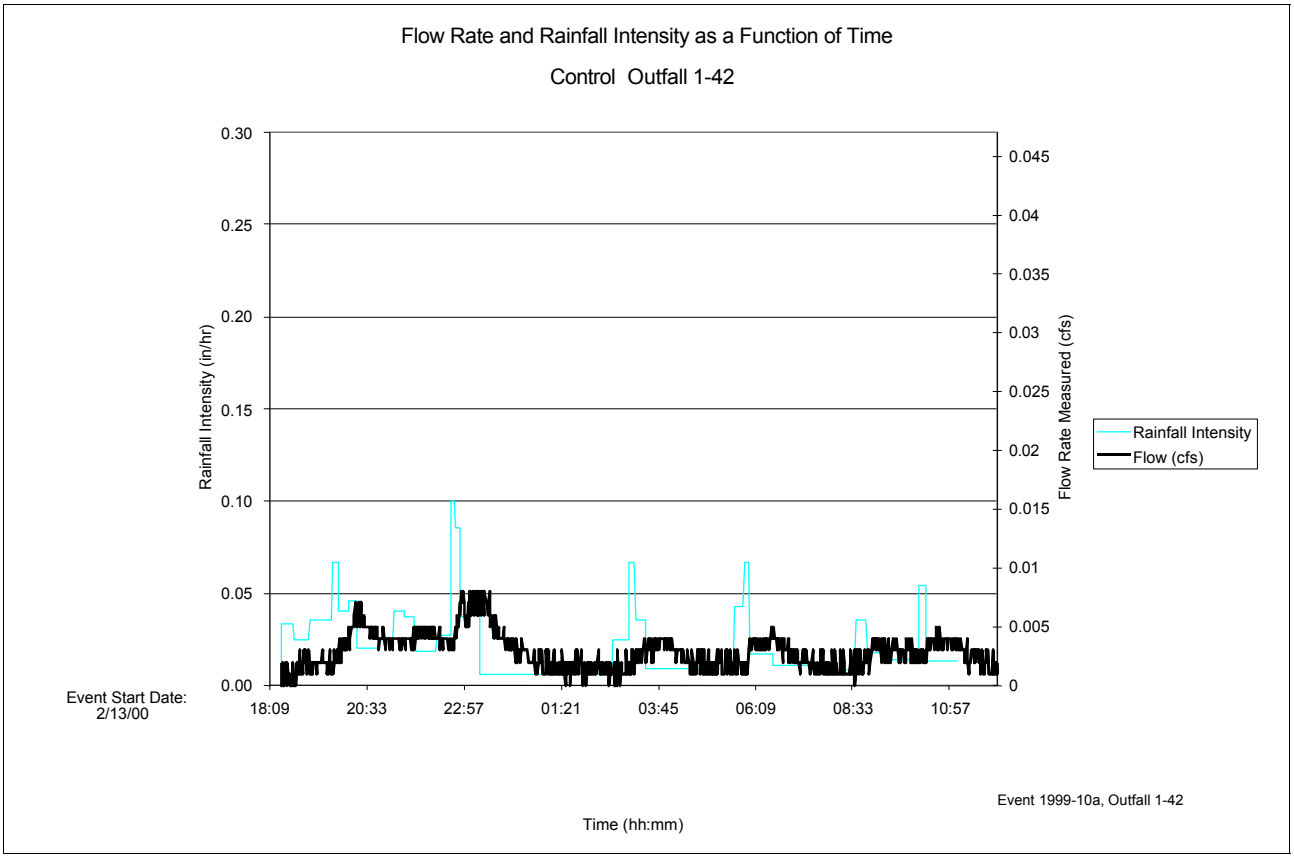

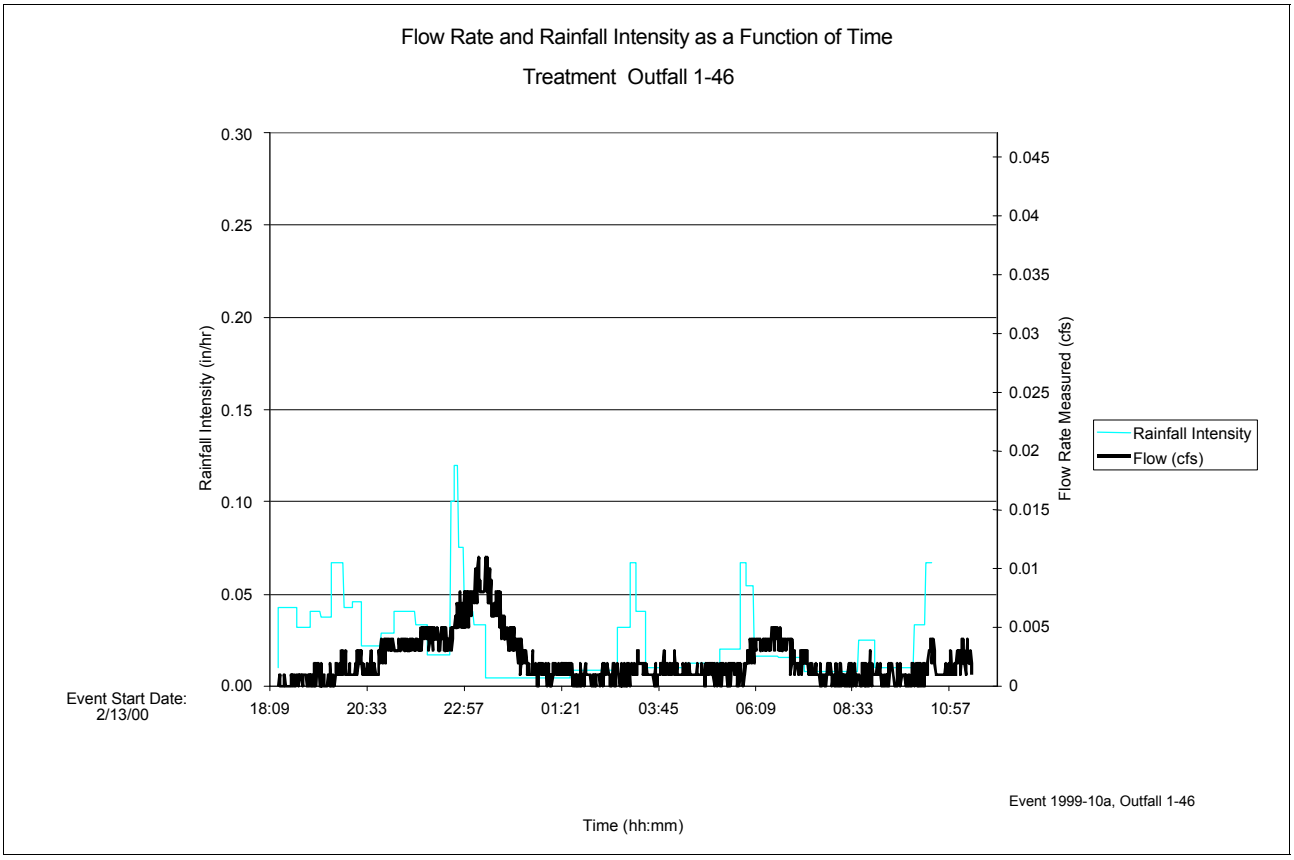

Site 1W - Street Sweeping Event No. 1999e10 - 2/13/00

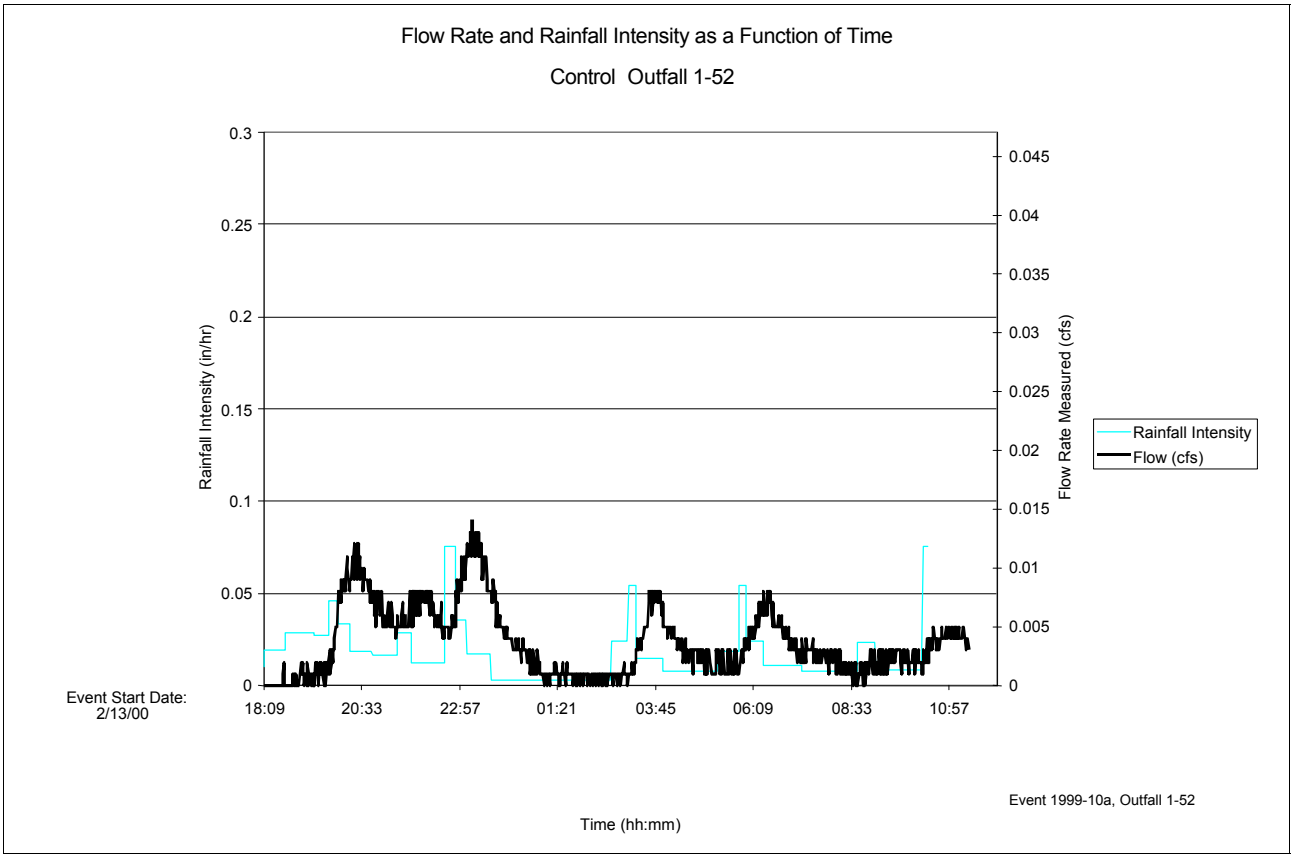

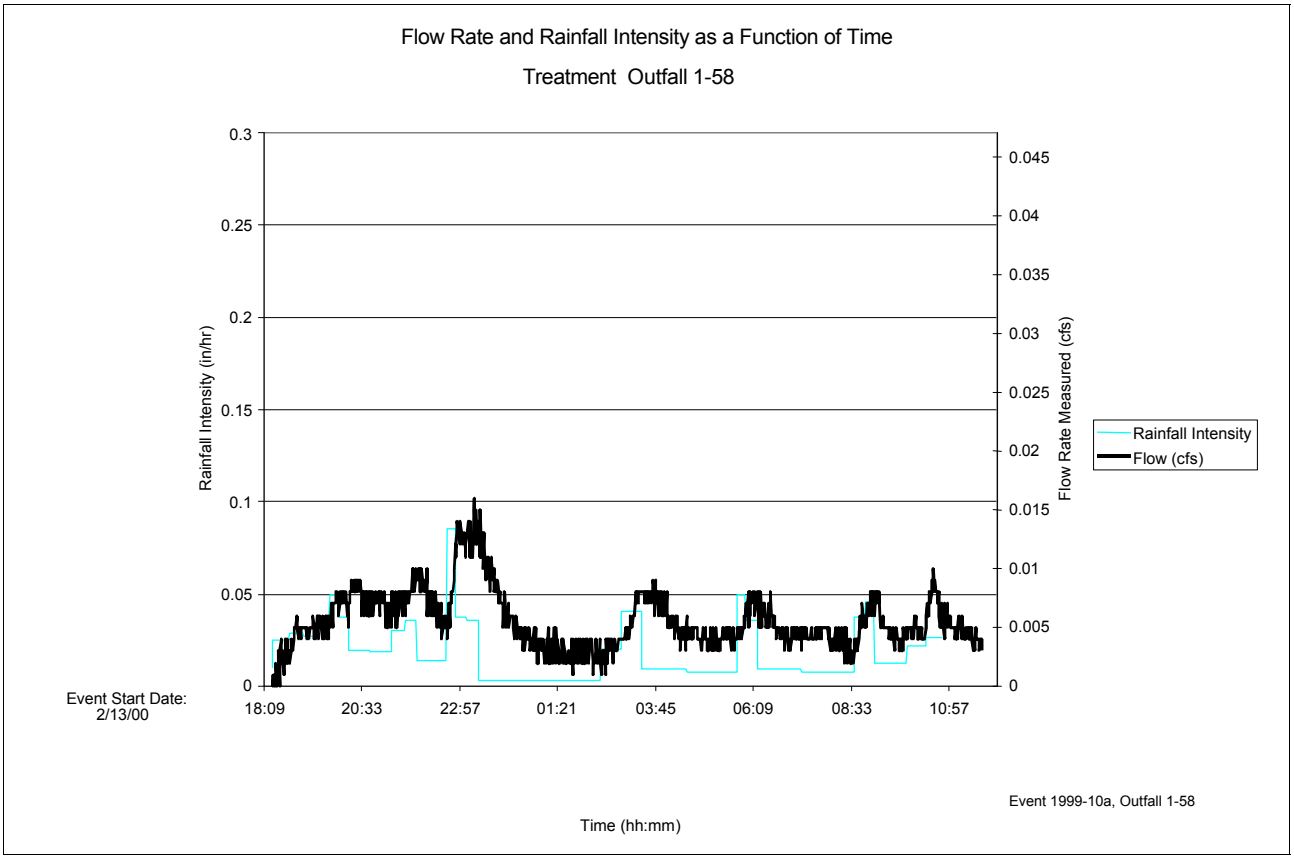

Site 6 - Modified Inlet Event No. 1999e10 - 2/13/00

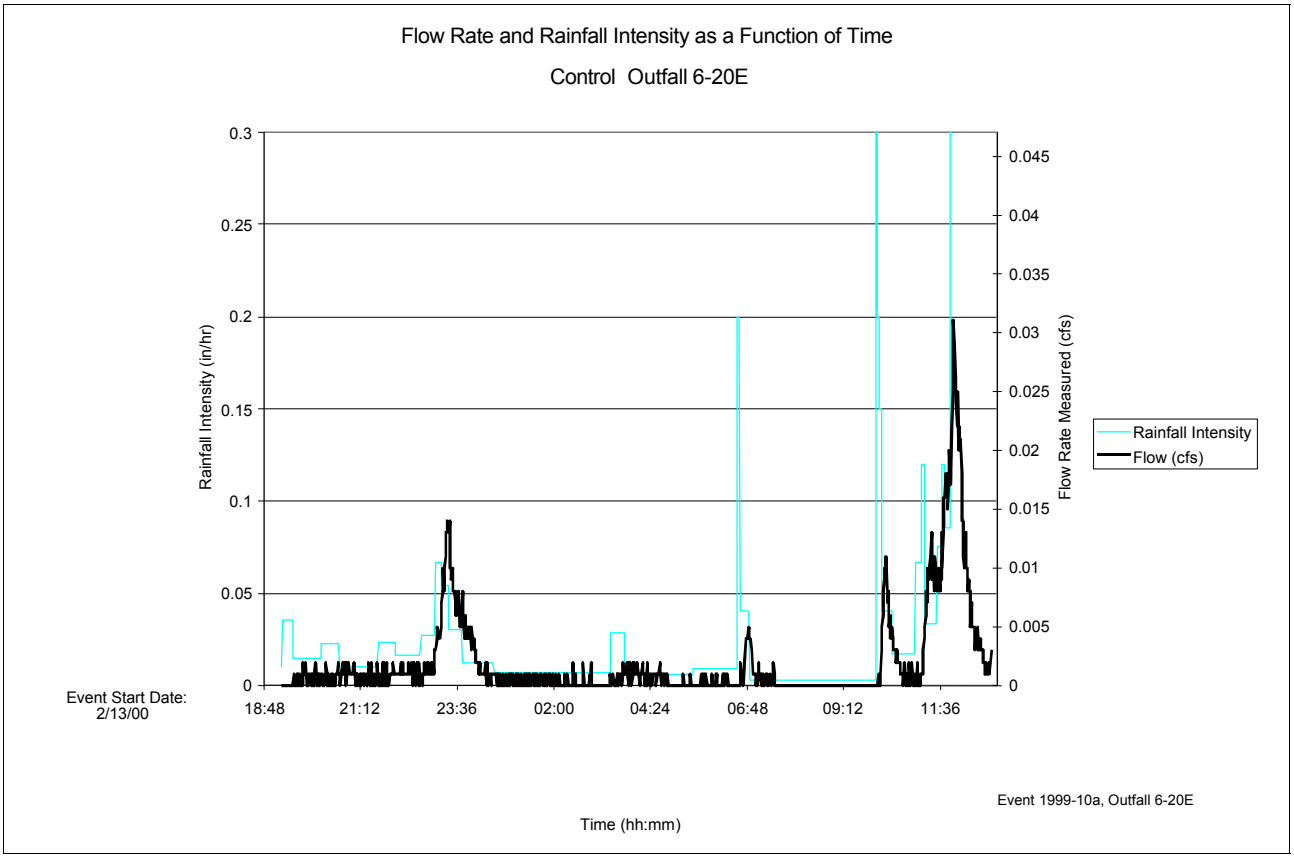

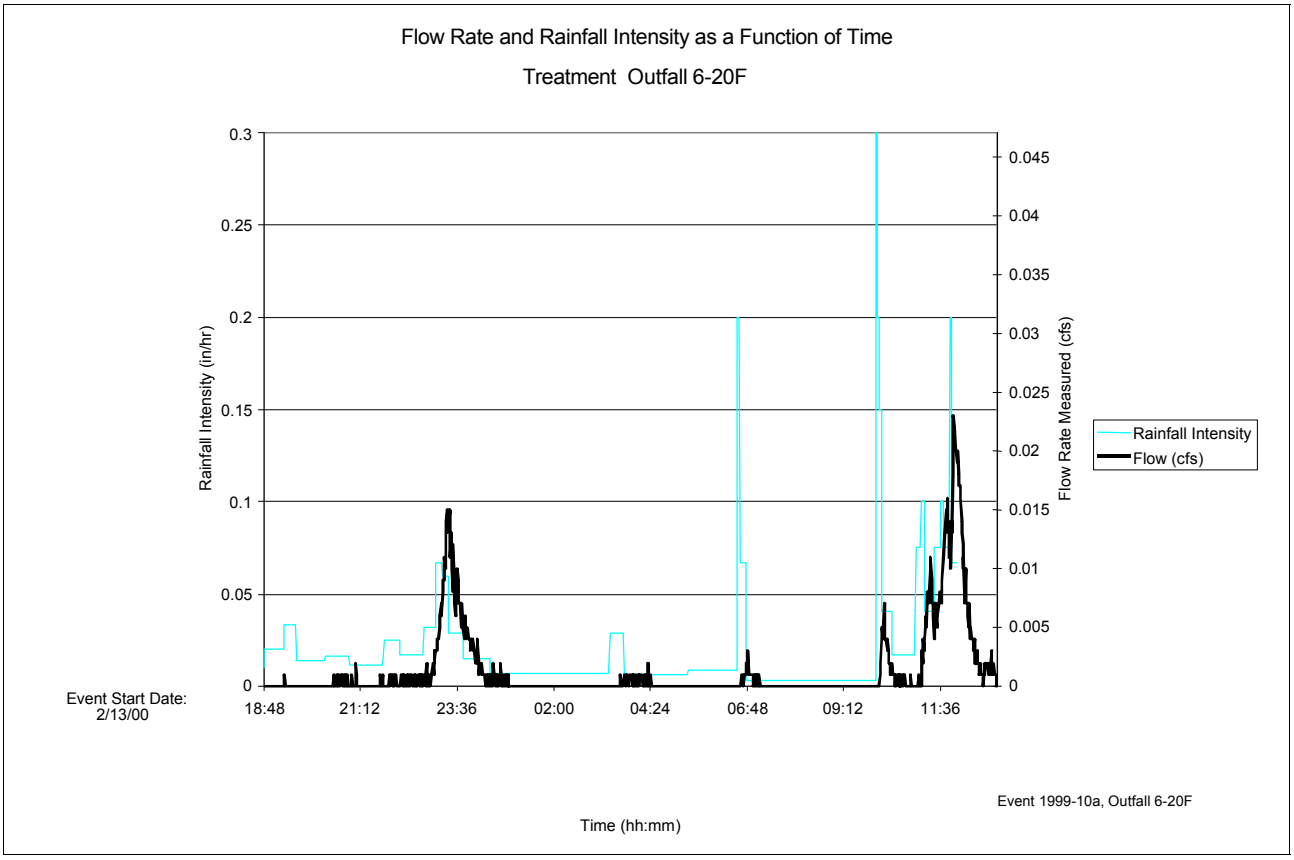

Site 8 - Bicycle Grate/LID Event No. 1999e10 - 2/13/00

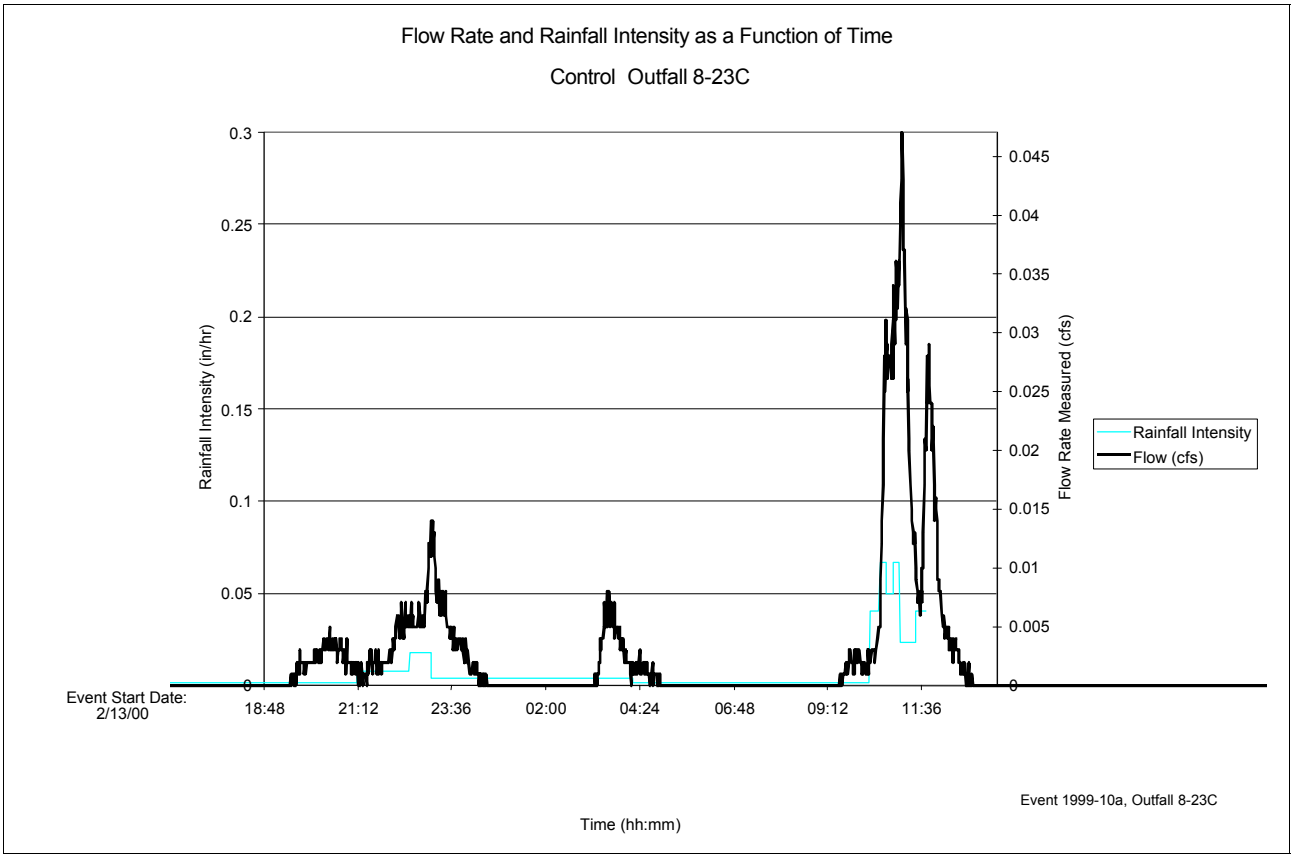

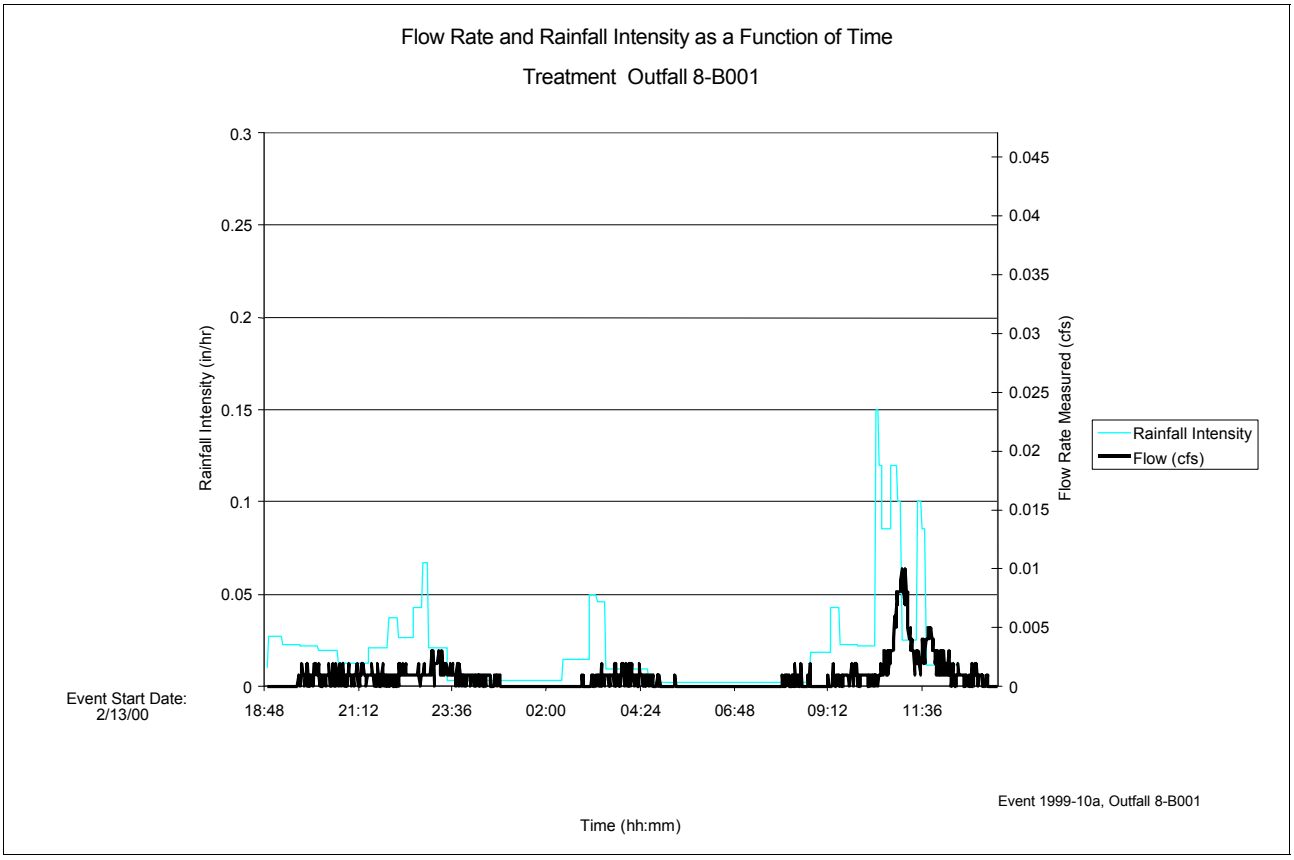

Site 1E - Litter Pickup Event No. 1999e11 - 2/16/00

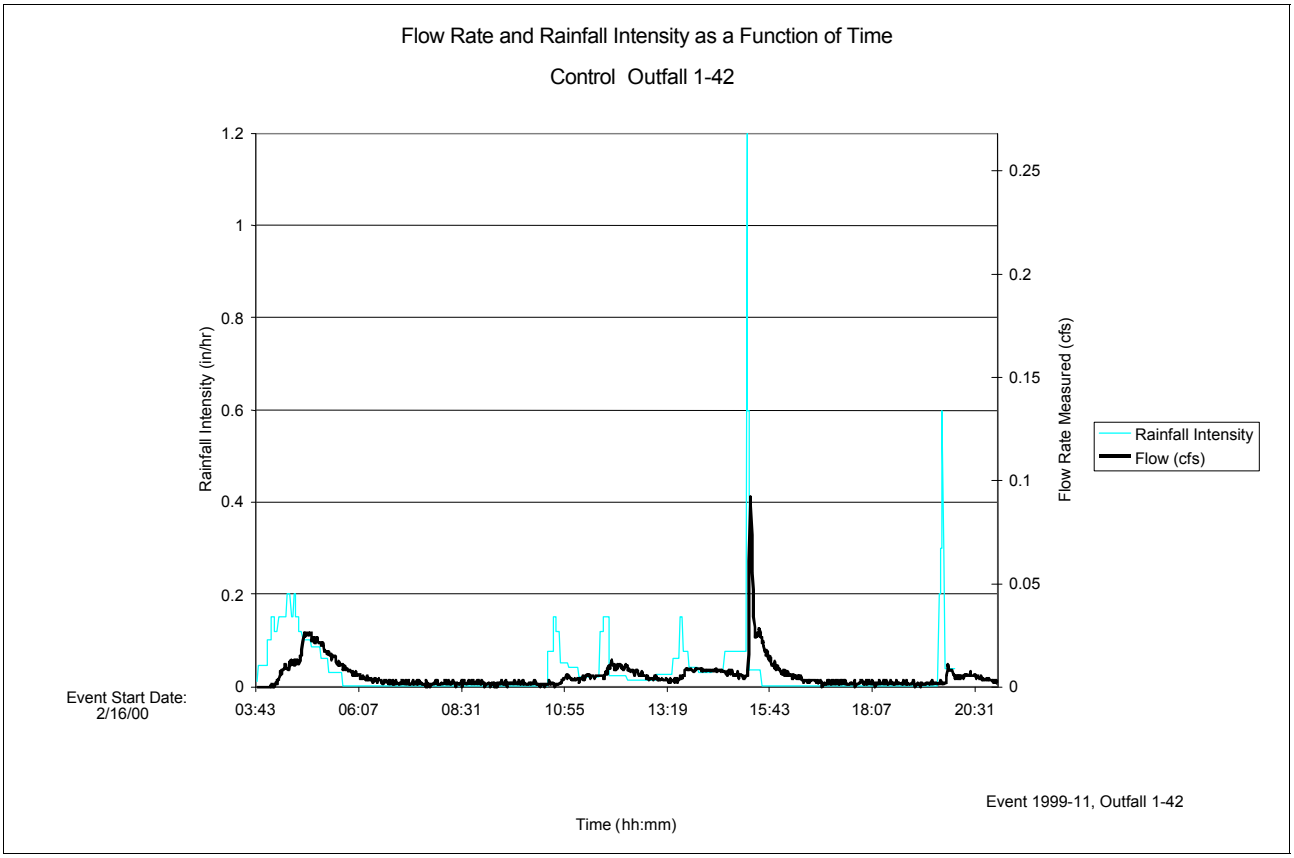

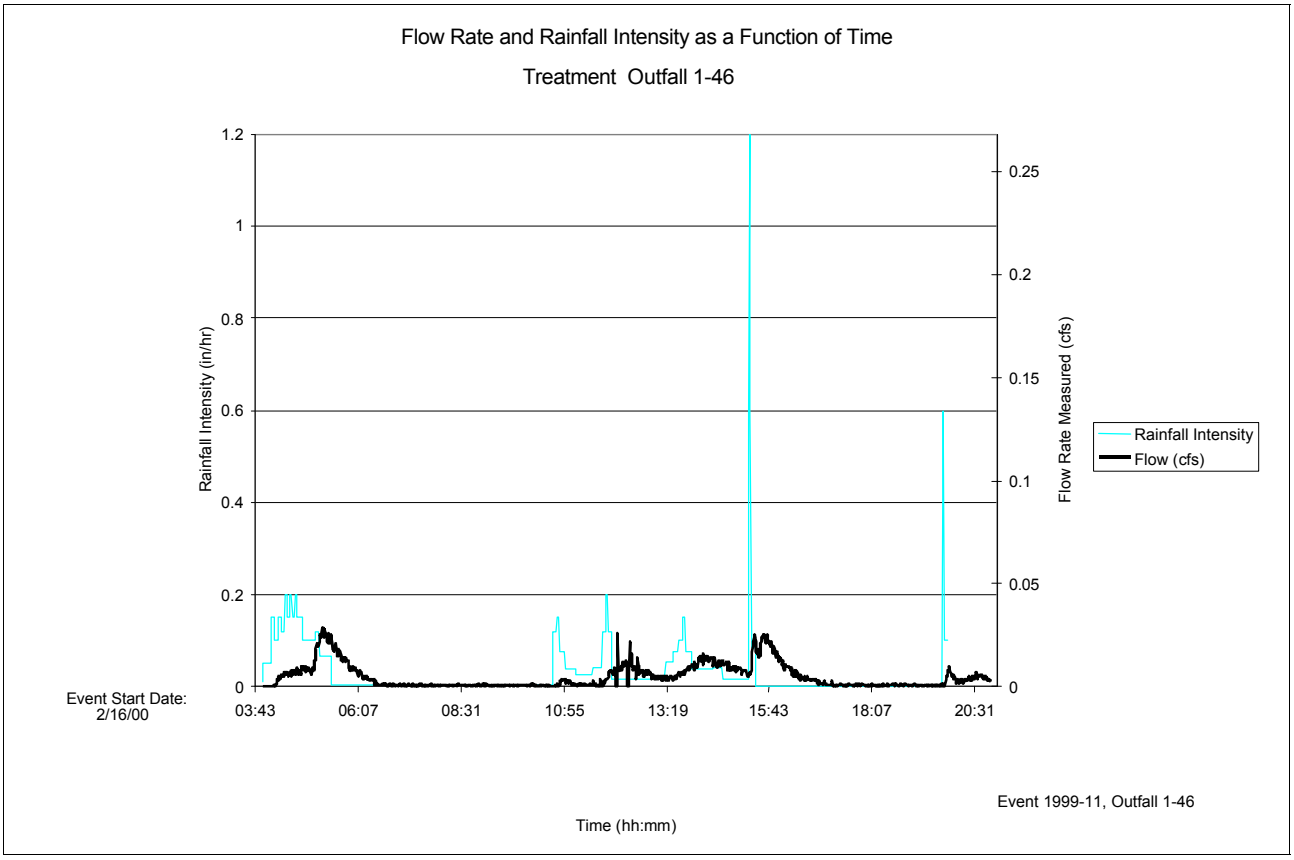

Site 1W - Street Sweeping Event No. 1999e11 - 2/16/00

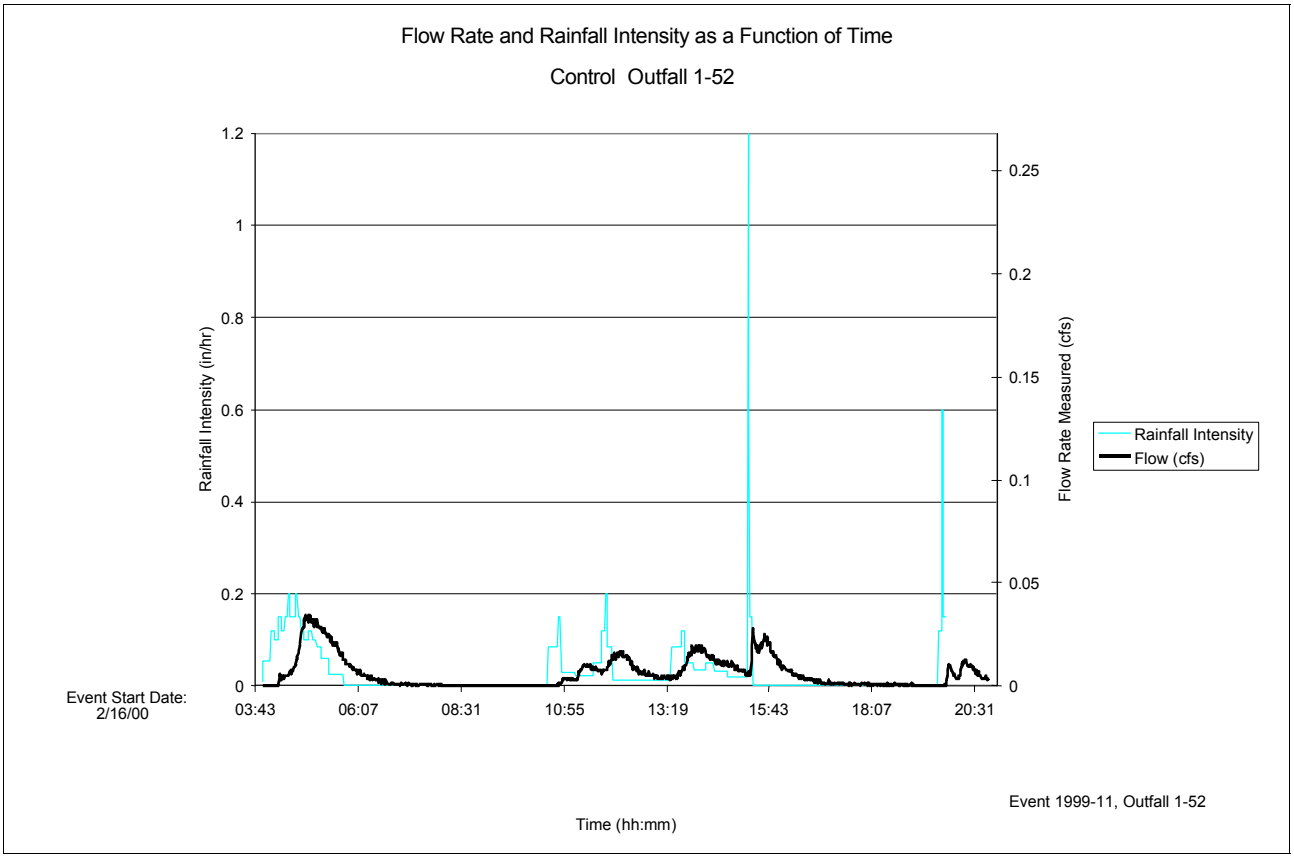

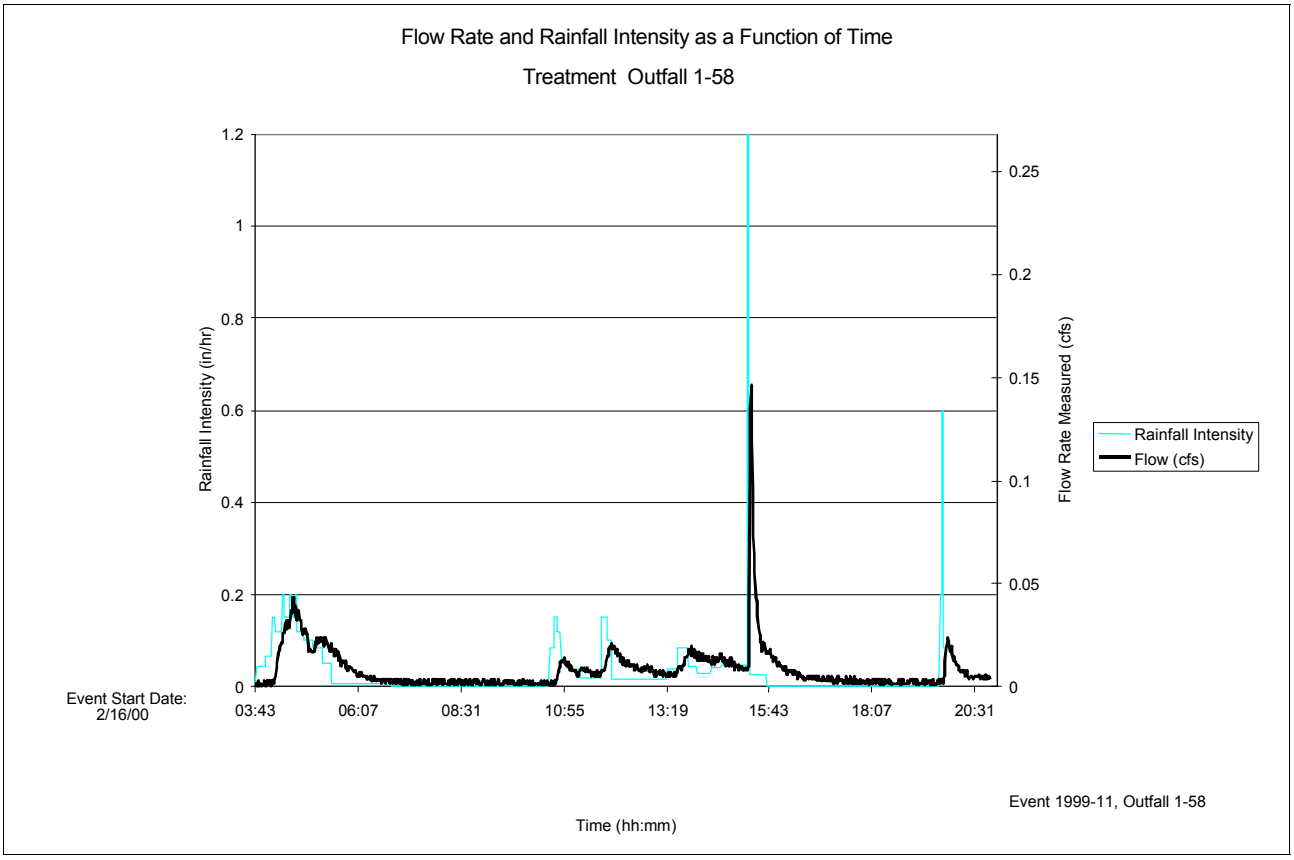

Site 6 - Modified Inlet Event No. 1999e11 - 2/16/00

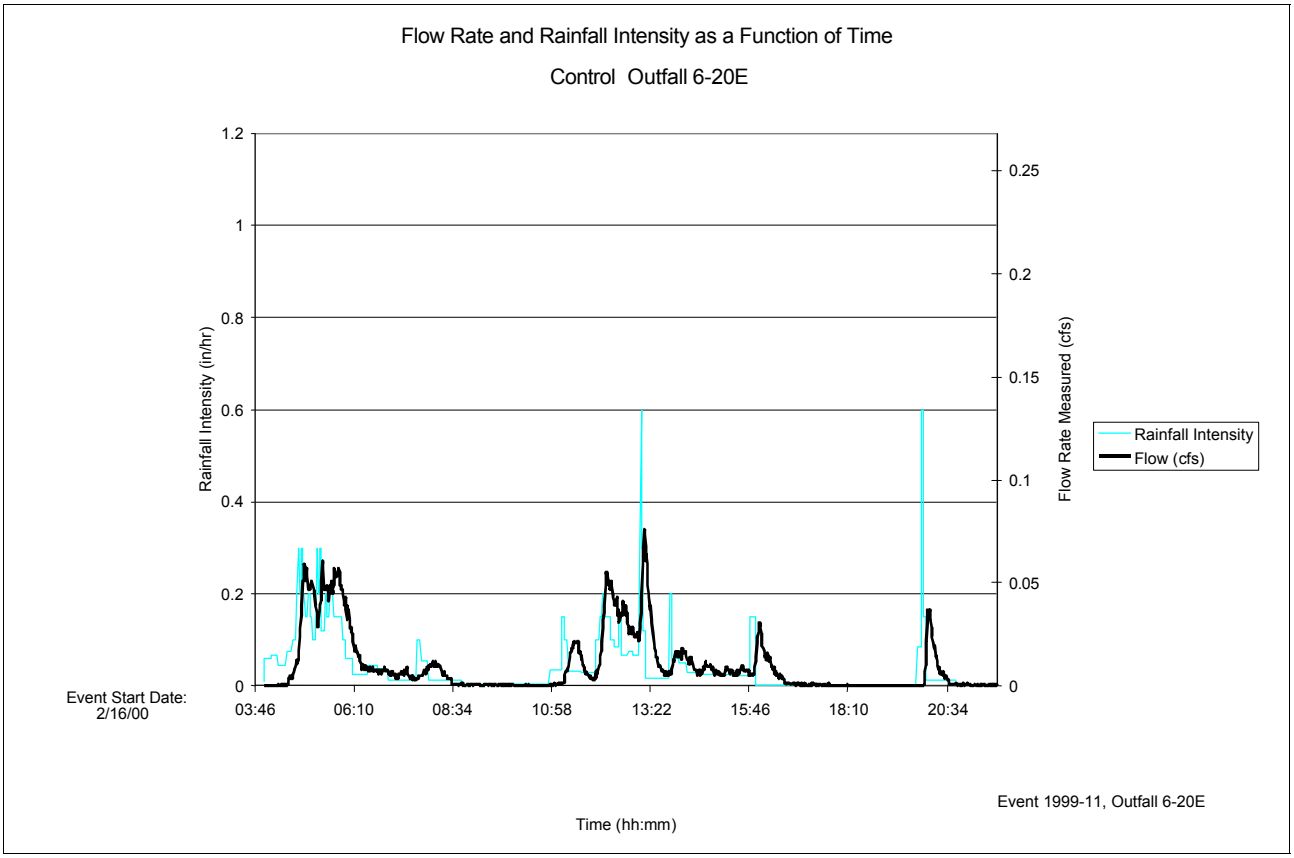

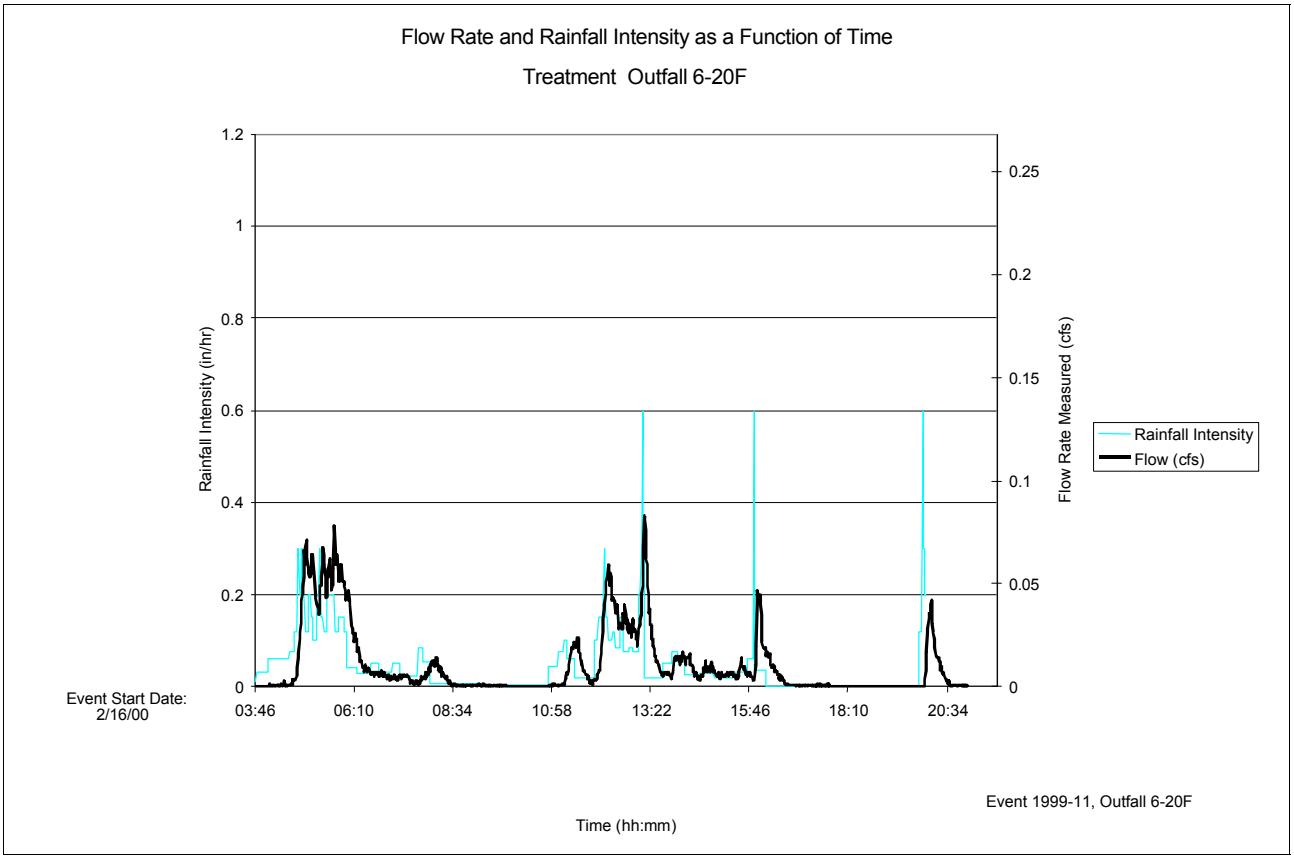

Site 8 - Bicycle Grate/LID Event No. 1999e11 - 2/16/00

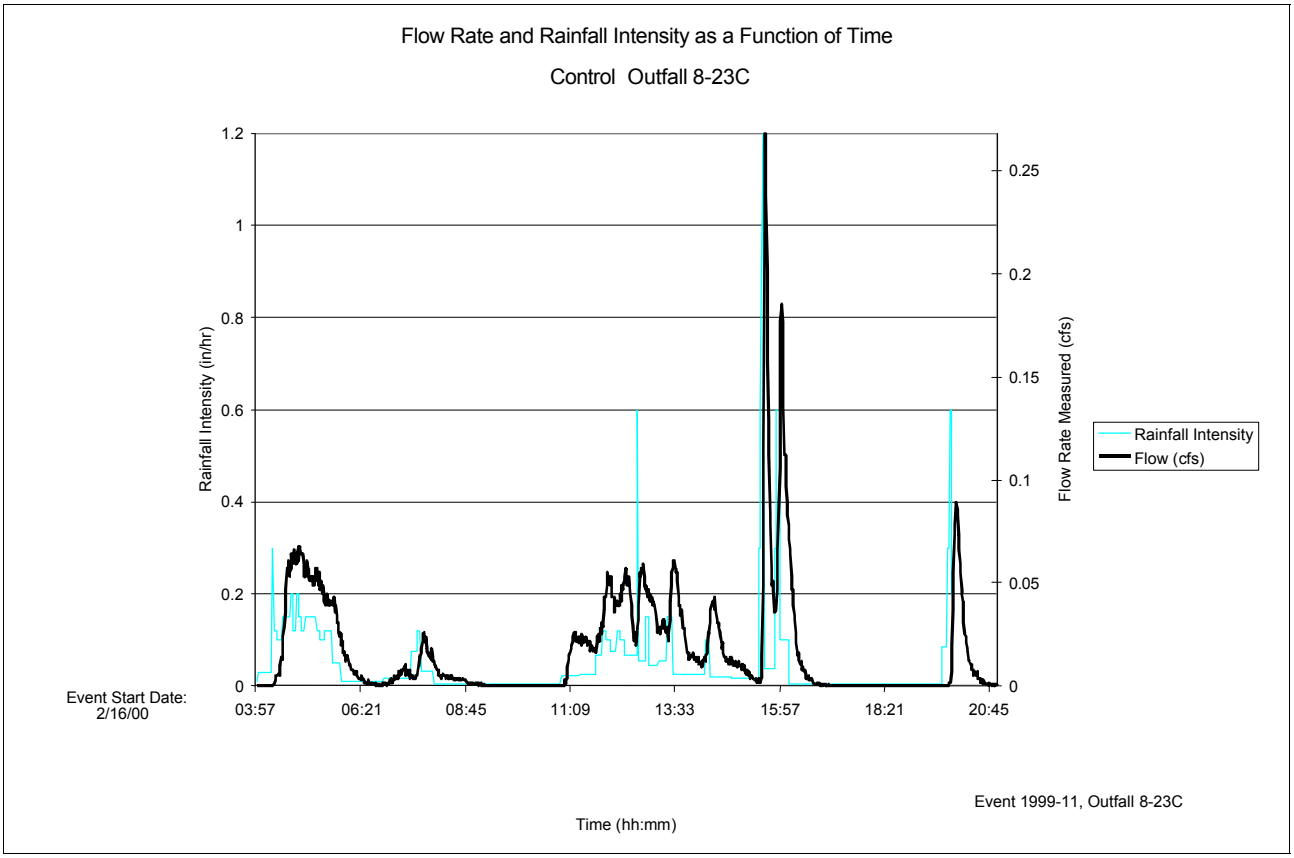

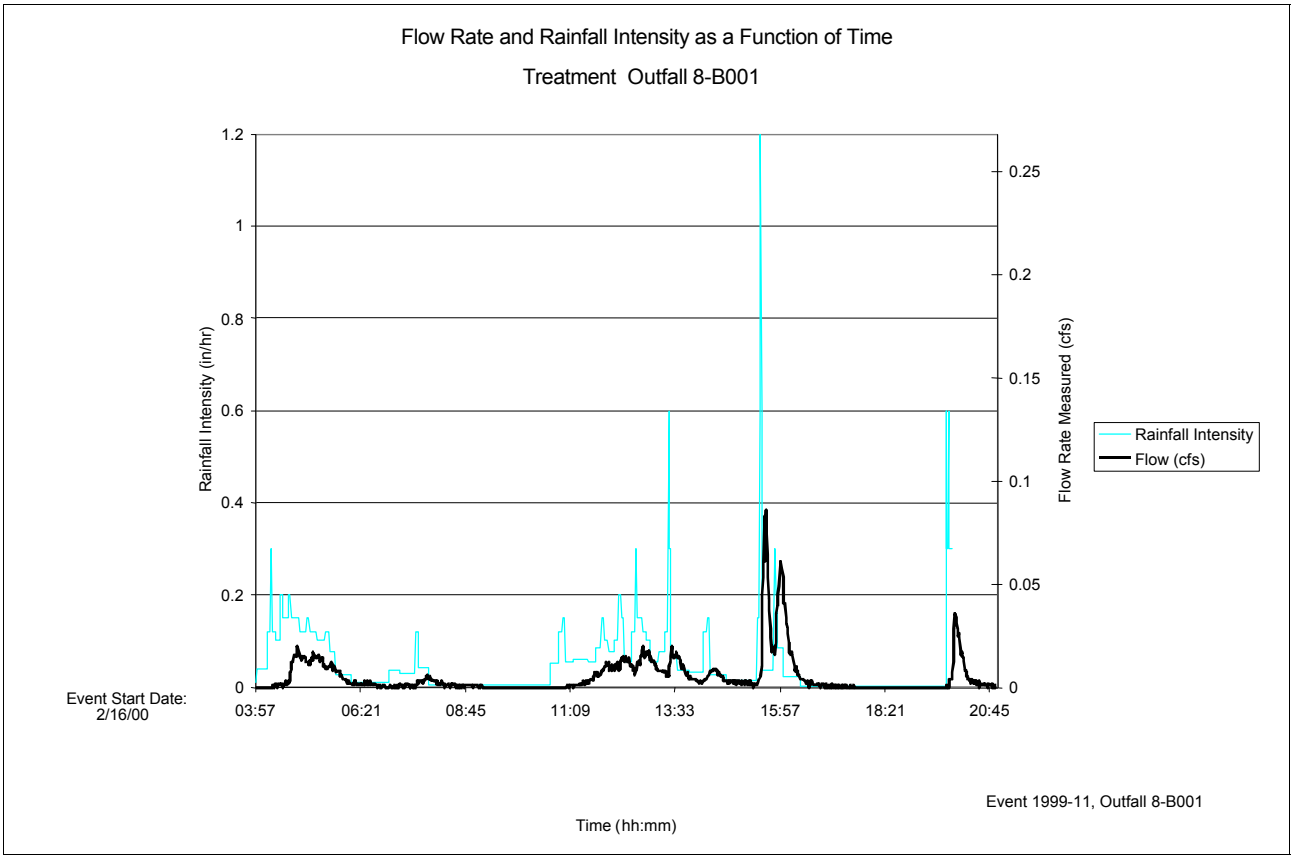

Site 1E - Litter Pickup

Event No. 1999e12 - 2/20/00

Flow Rate and Rainfall Intensity as a Function of Time

Control Outfall 1-42

No Hydrologic Data Available for this Event For this Outfall

Event Start Date:
2/20/00

Flow Rate and Rainfall Intensity as a Function of Time

Treatment Outfall 1-46

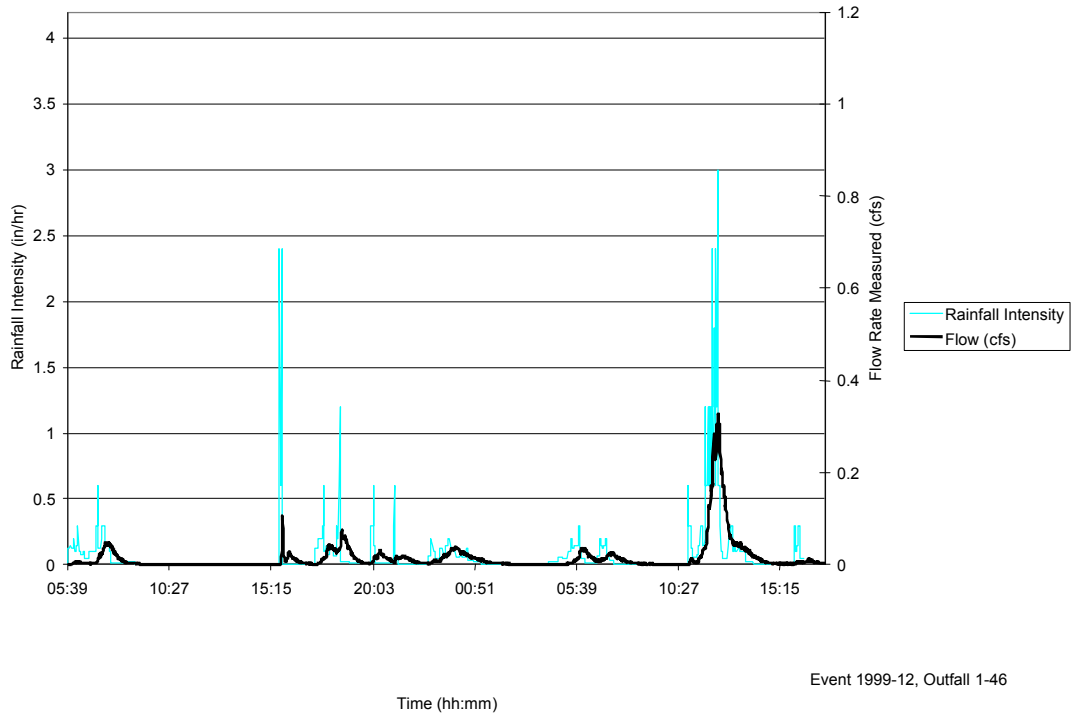

Site 1W - Street Sweeping Event No. 1999e12 - 2/20/00

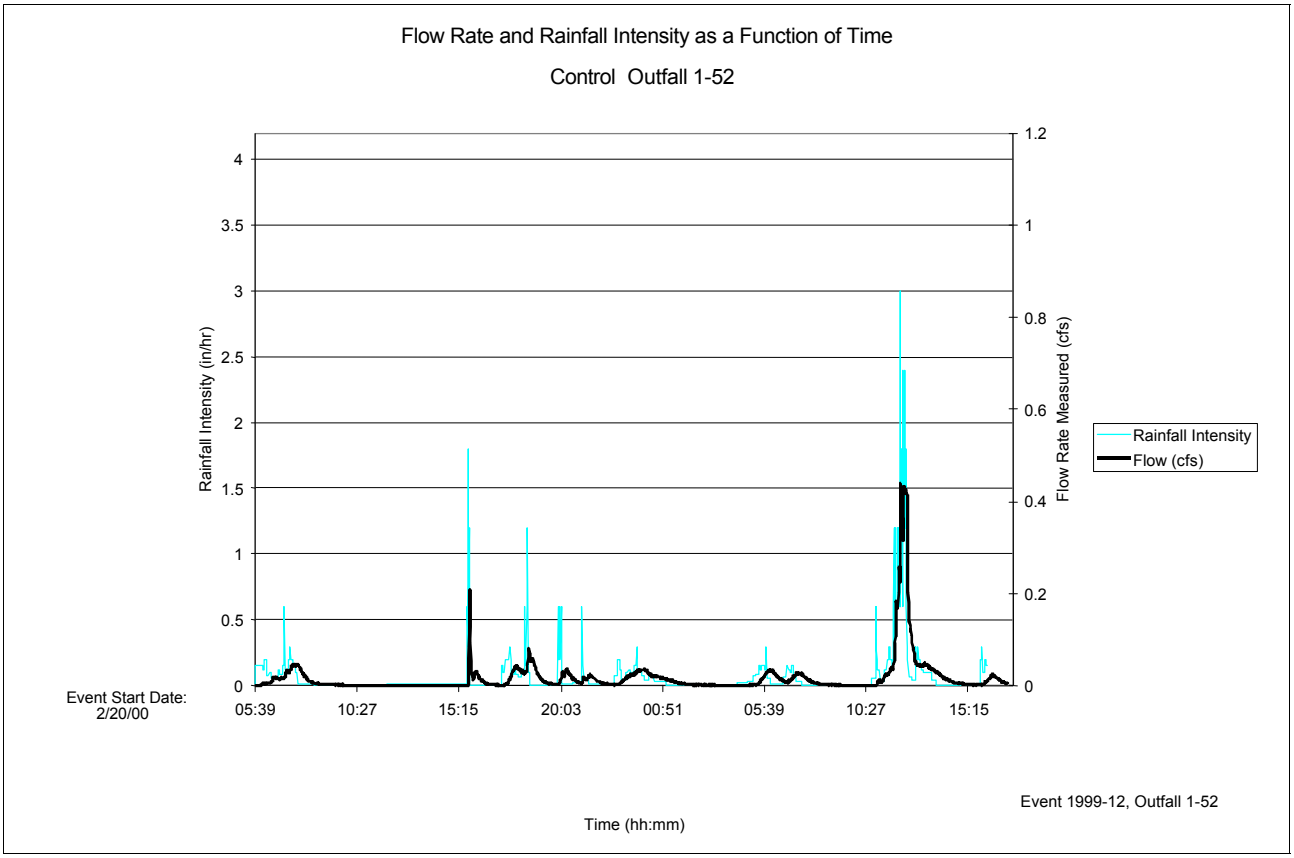

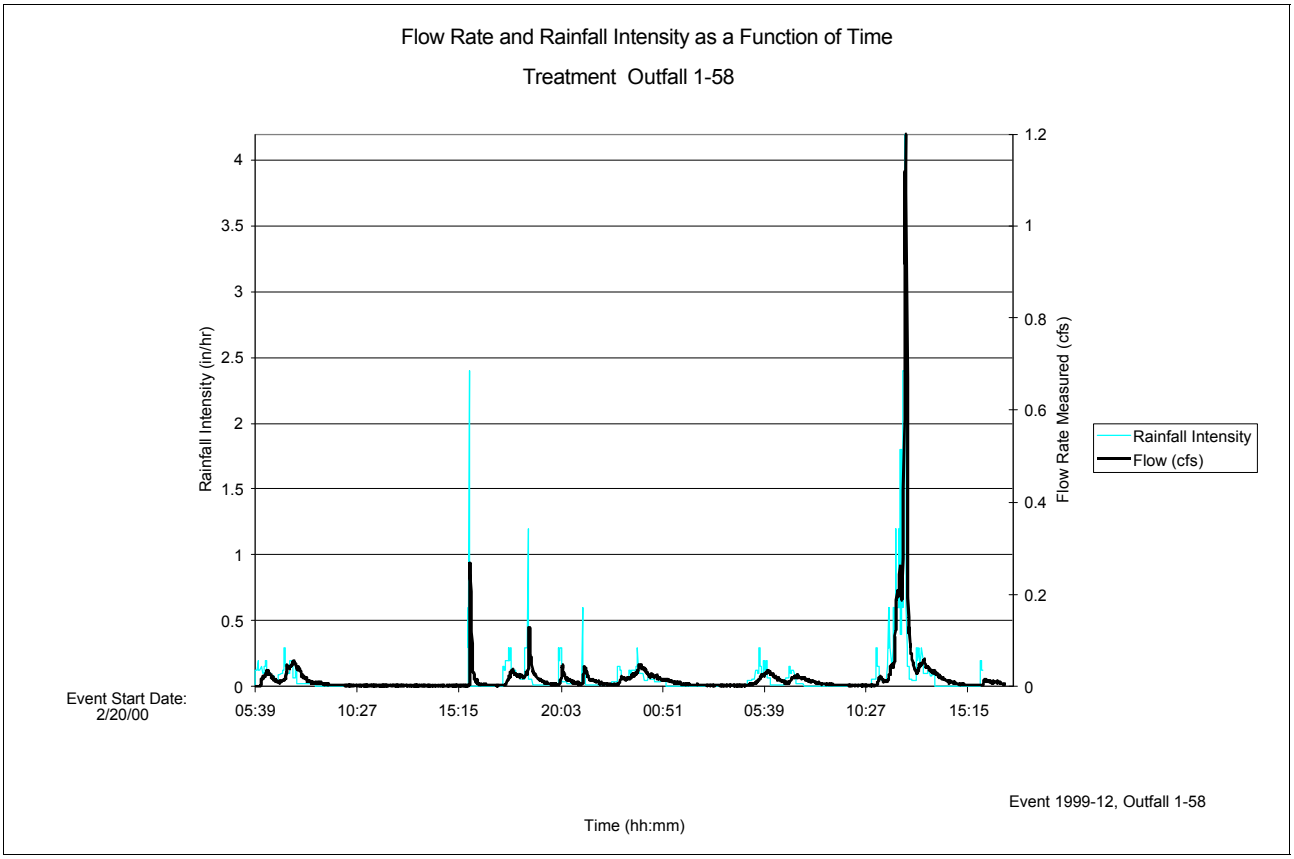

Site 6 - Modified Inlet Event No. 1999e12 - 2/20/00

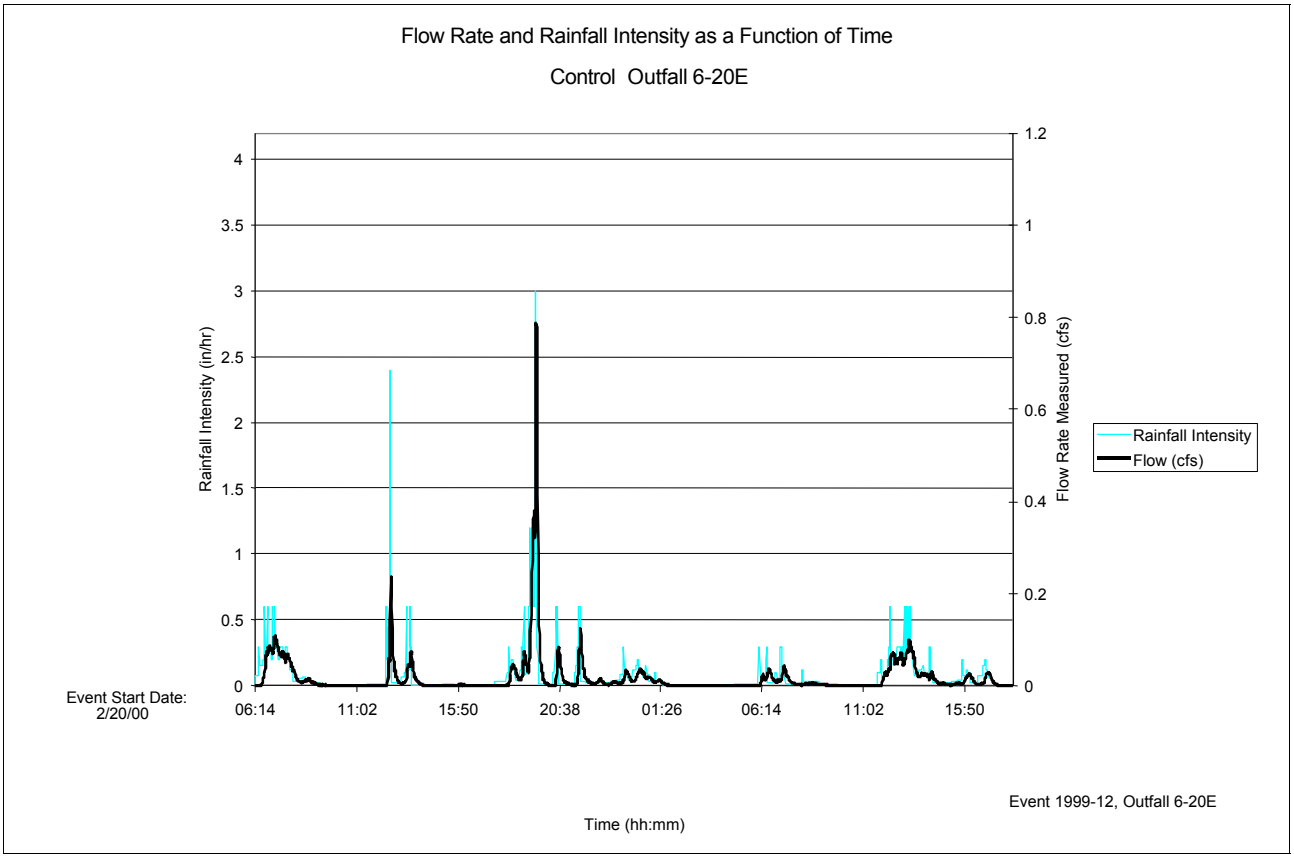

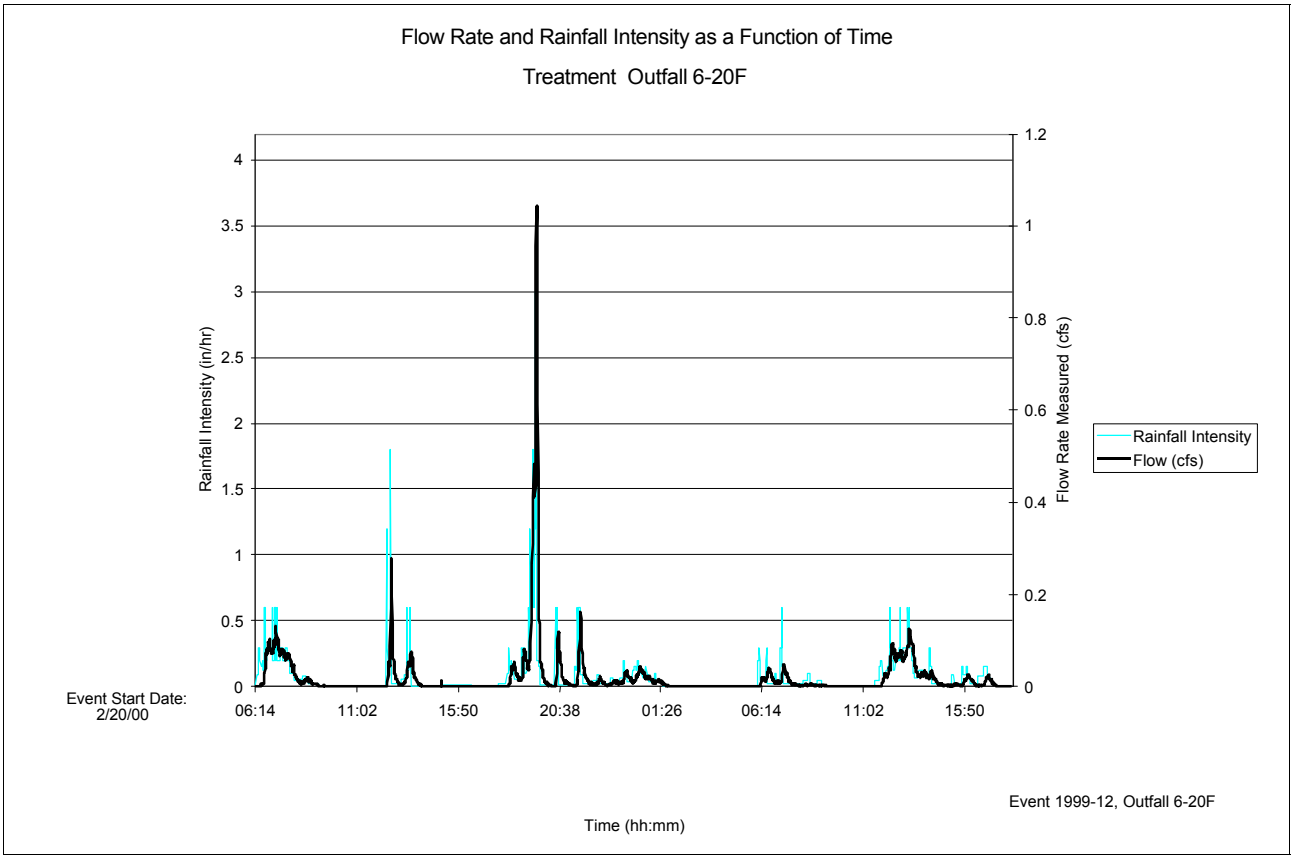

Site 8 - Bicycle Grate/LID Event No. 1999e12 - 2/20/00

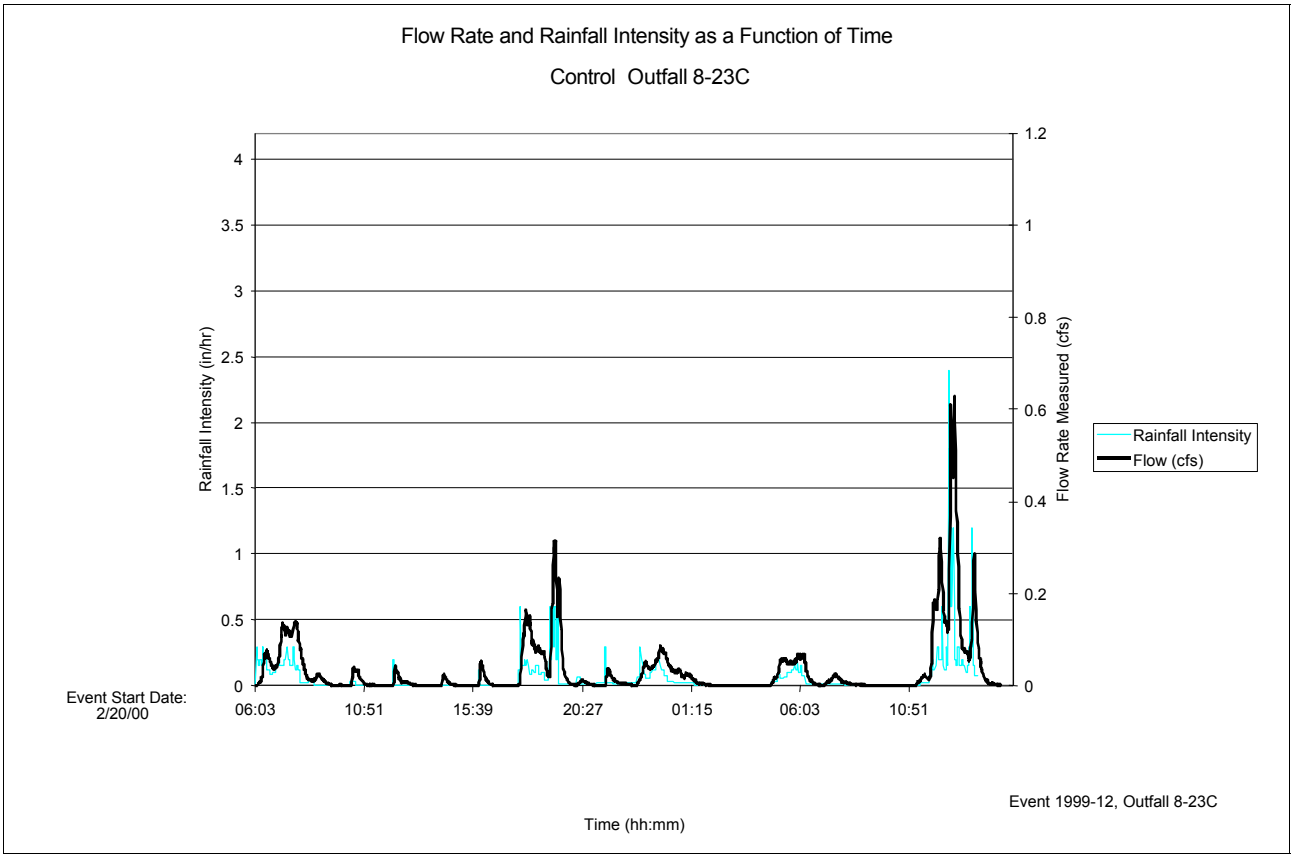

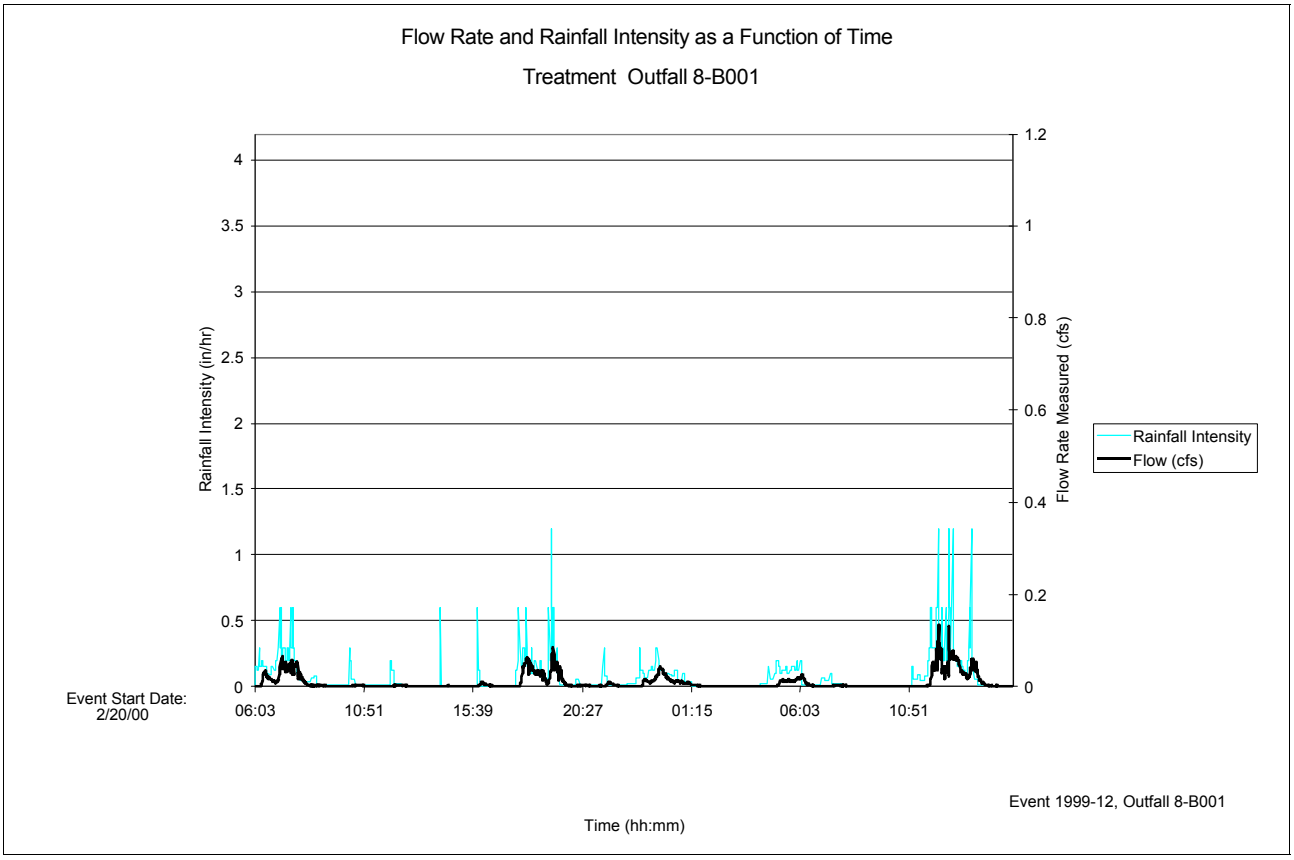

Site 1E - Litter Pickup Event No. 1999e13 - 2/23/00

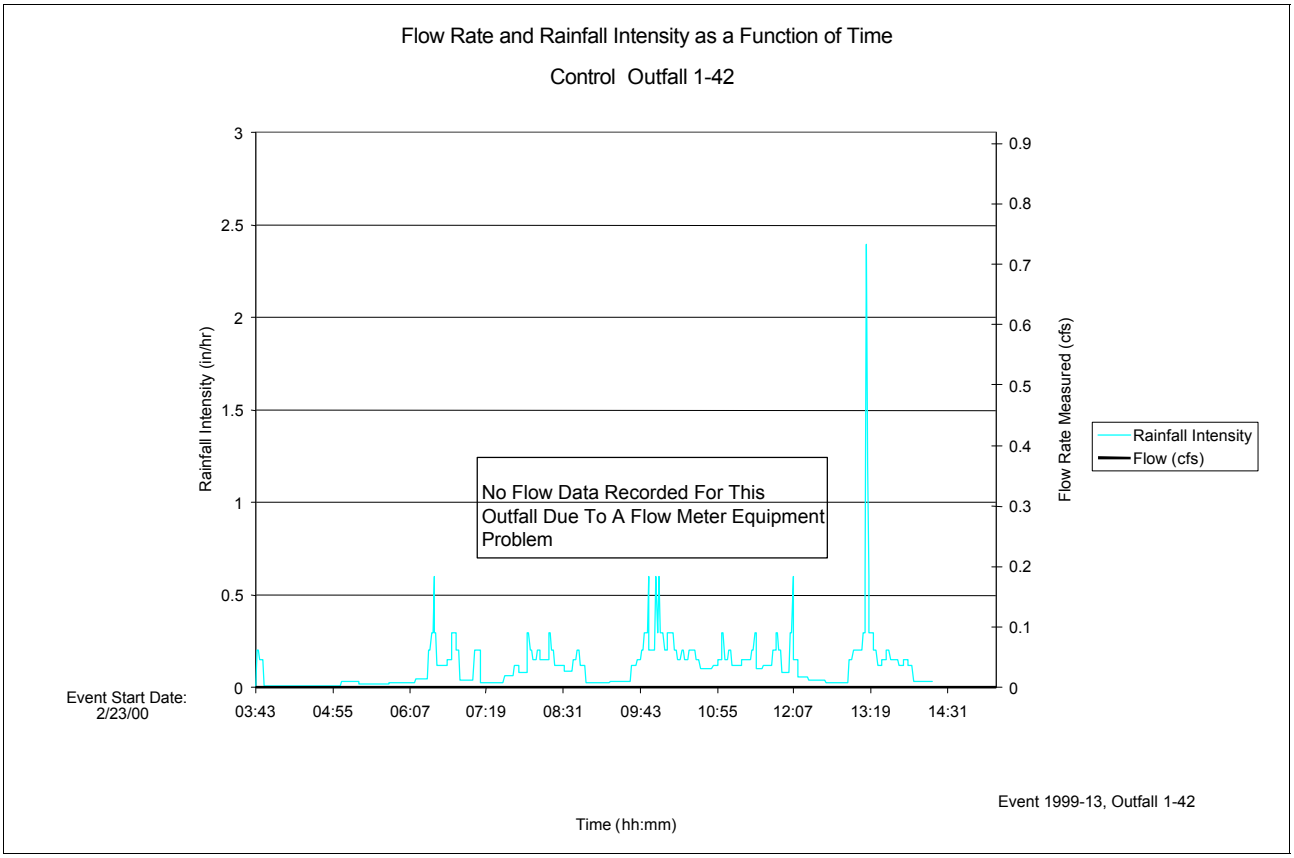

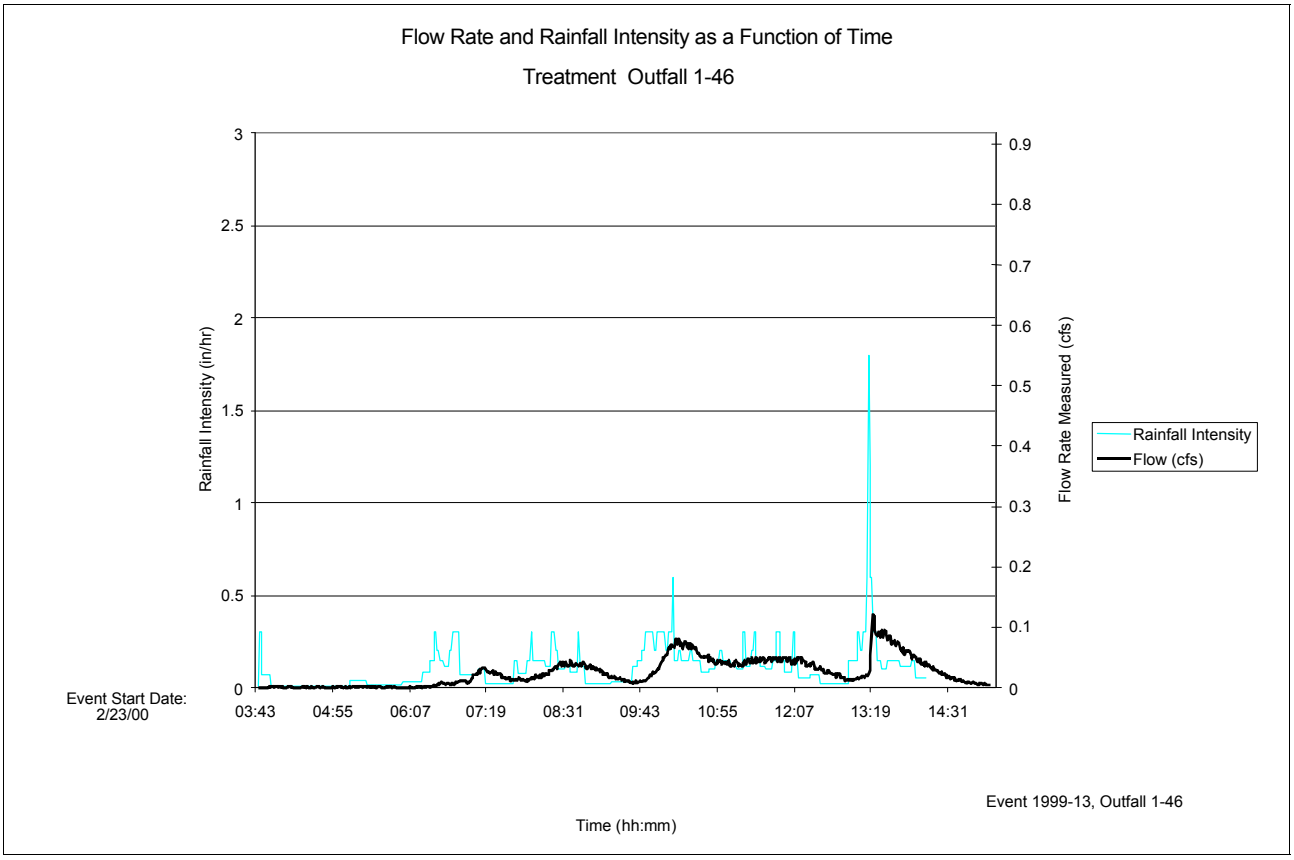

Site 1W - Street Sweeping Event No. 1999e13 - 2/23/00

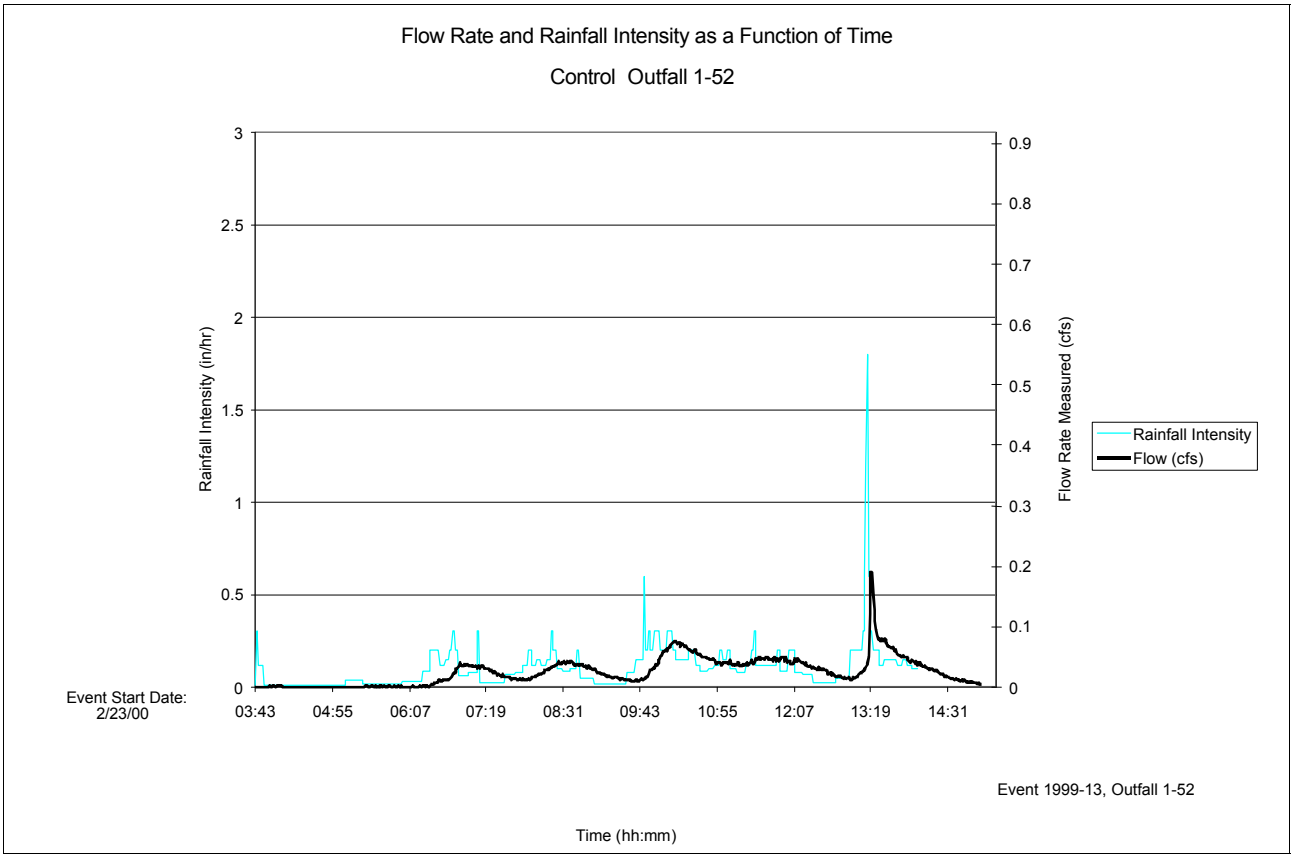

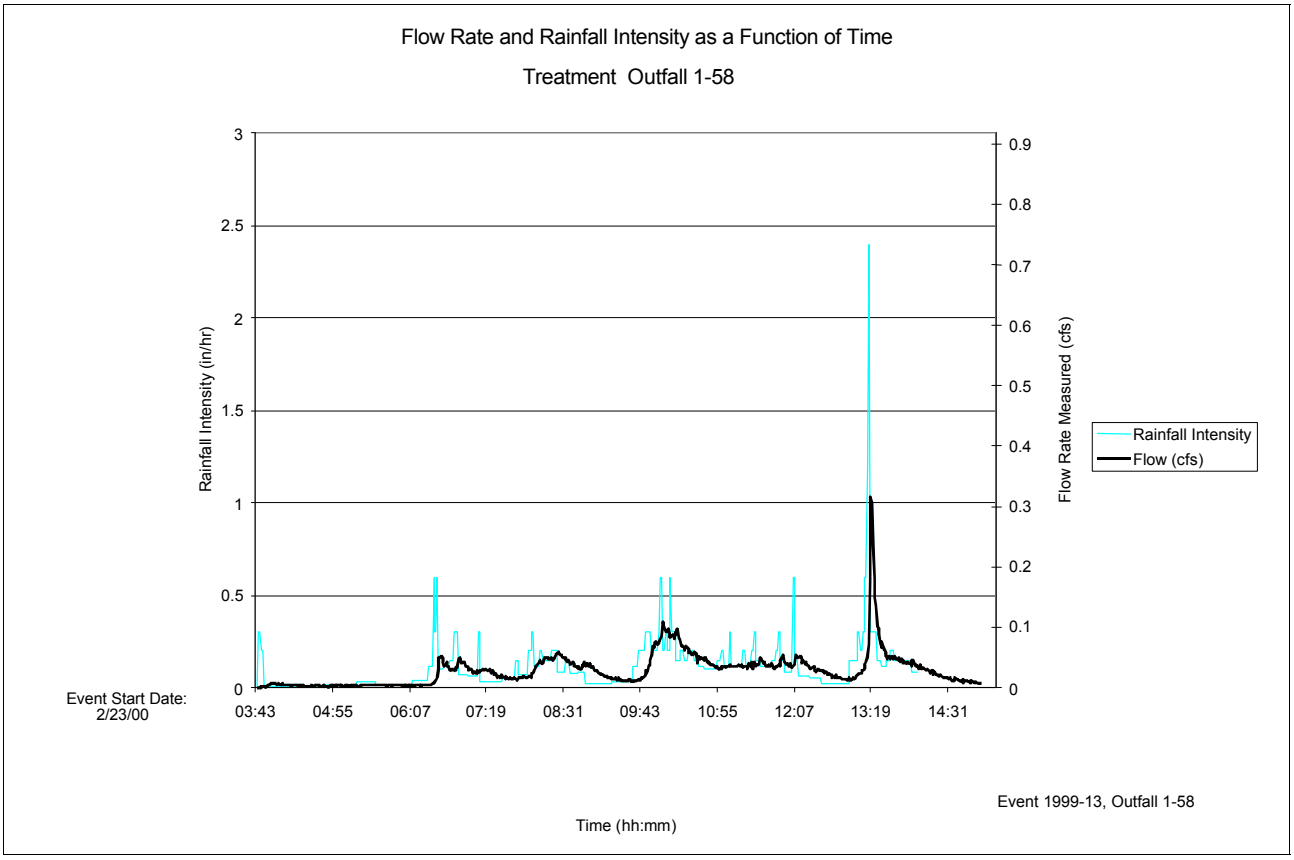

Site 6 - Modified Inlet Event No. 1999e13 - 2/23/00

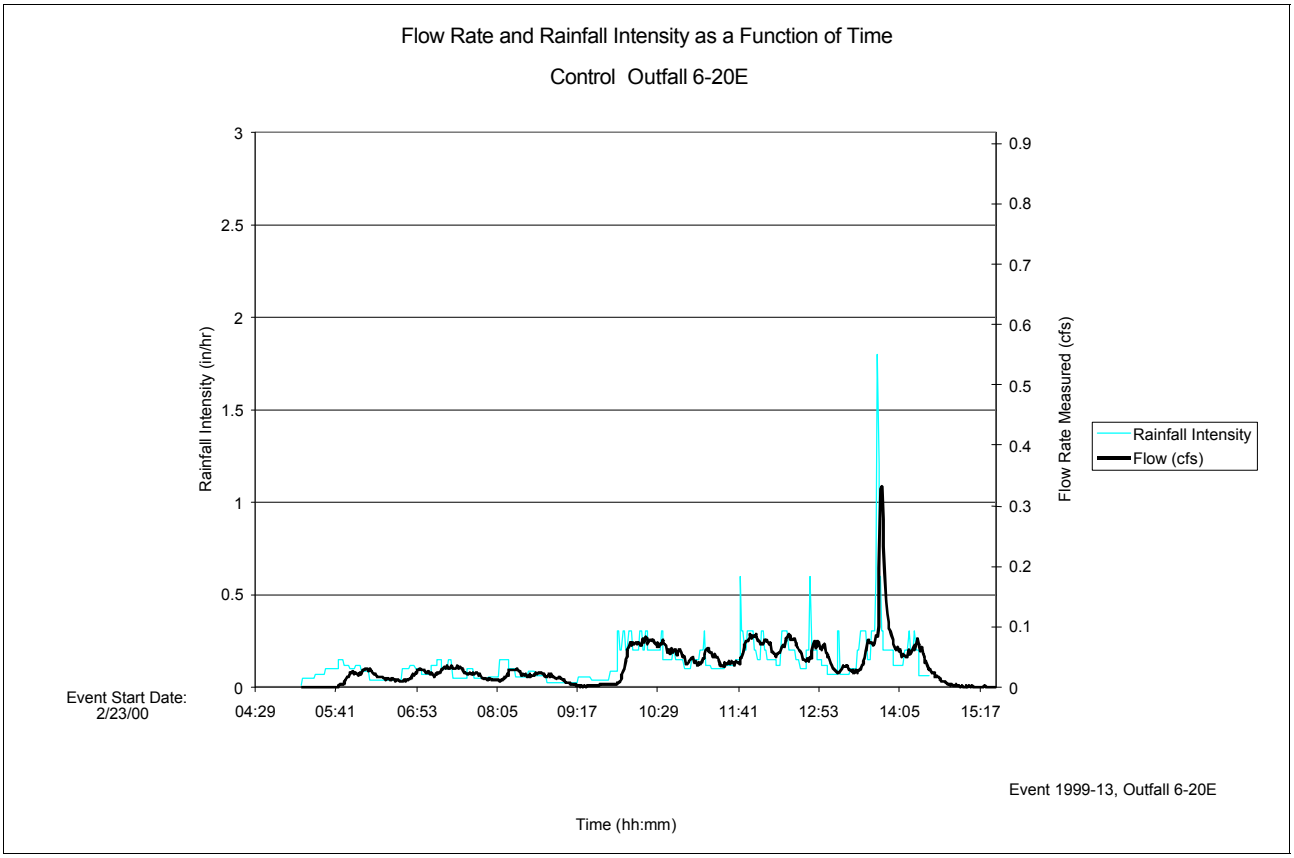

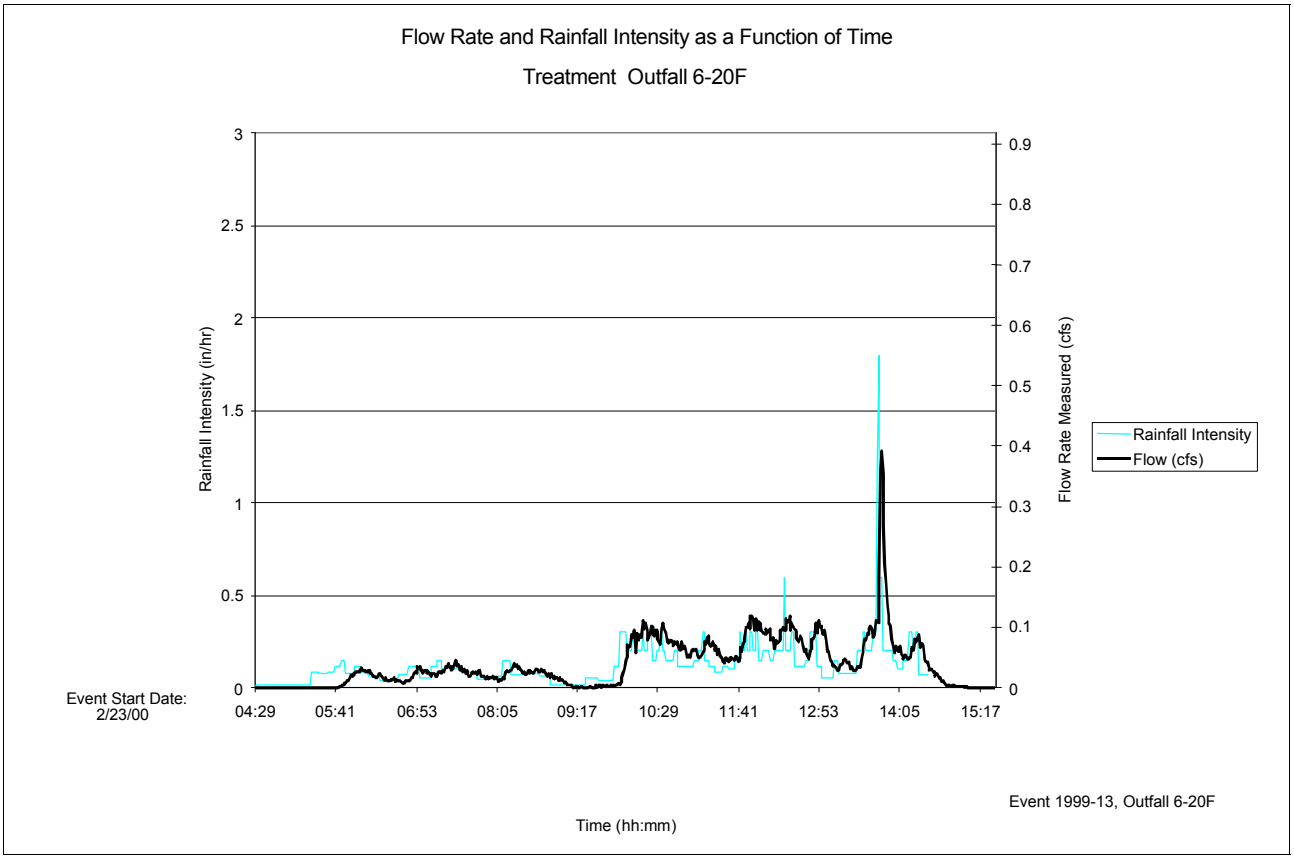

Site 8 - Bicycle Grate/LID Event No. 1999e13 - 2/23/00

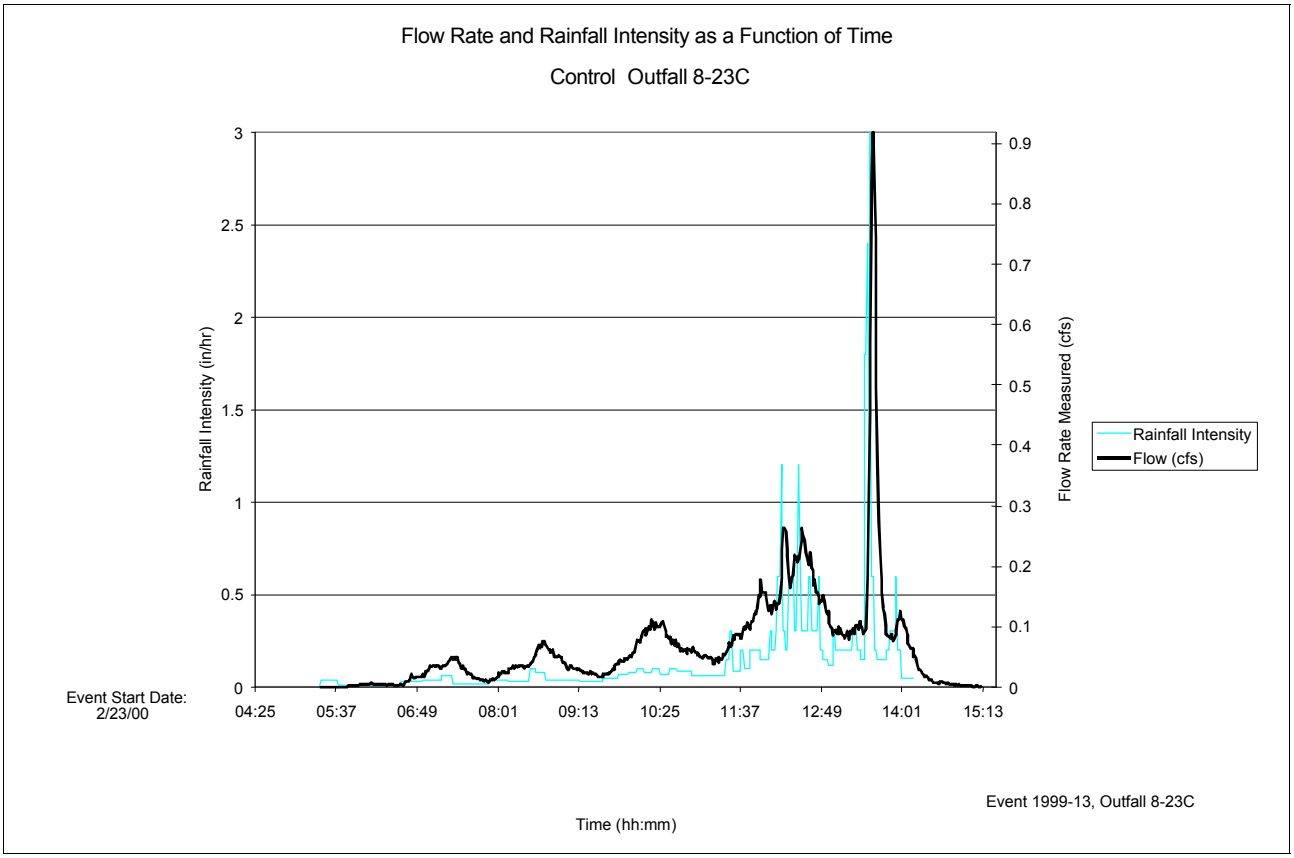

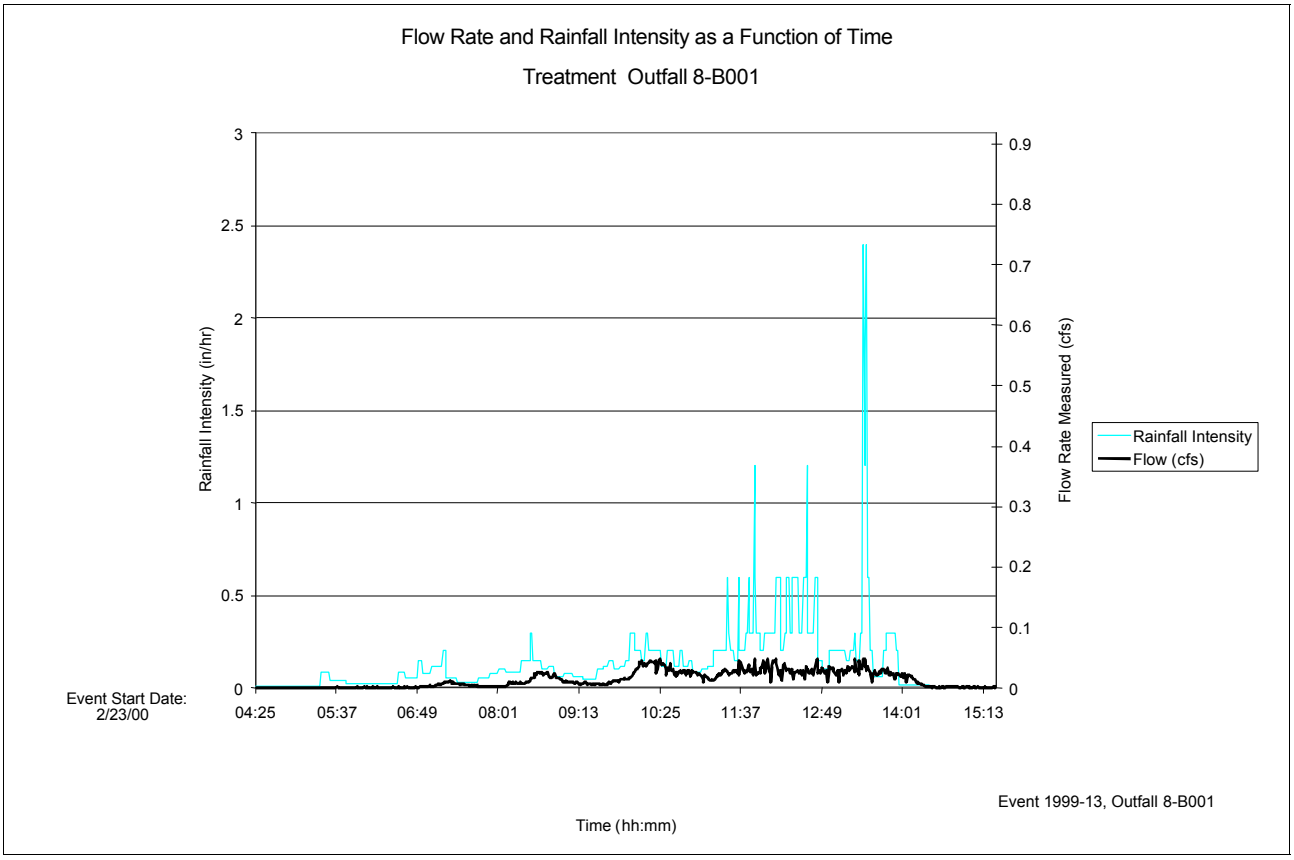

Site 1E - Litter Pickup

Event No. 1999e14 - 2/27/00

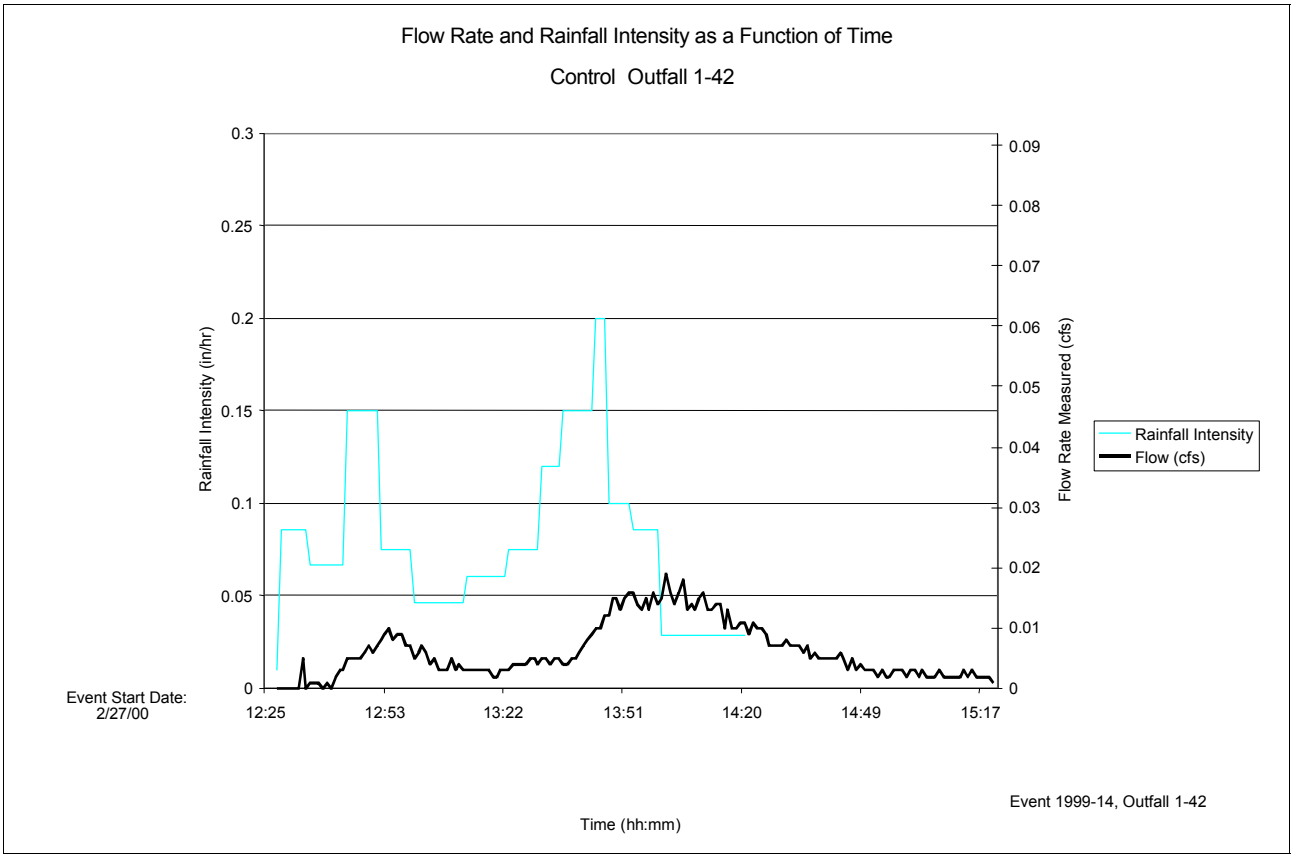

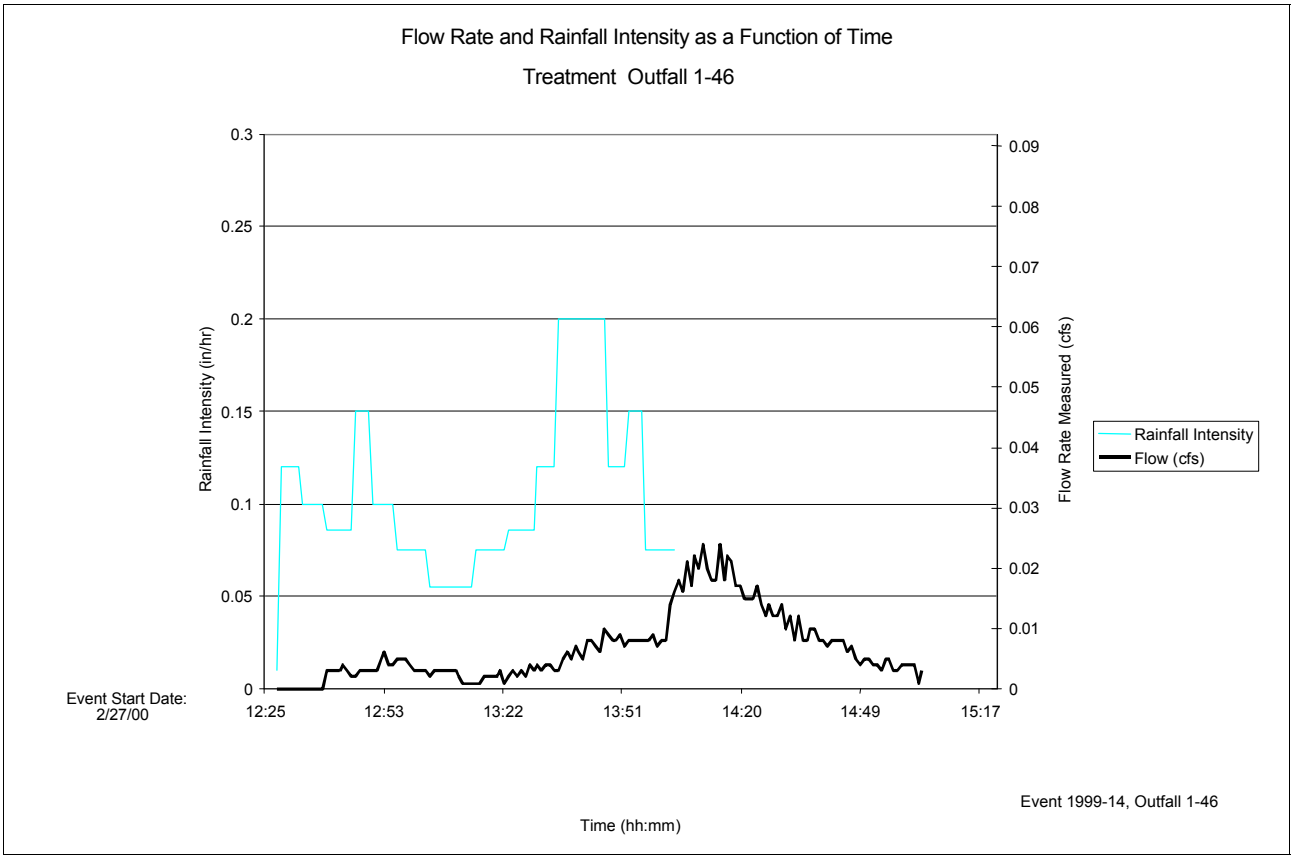

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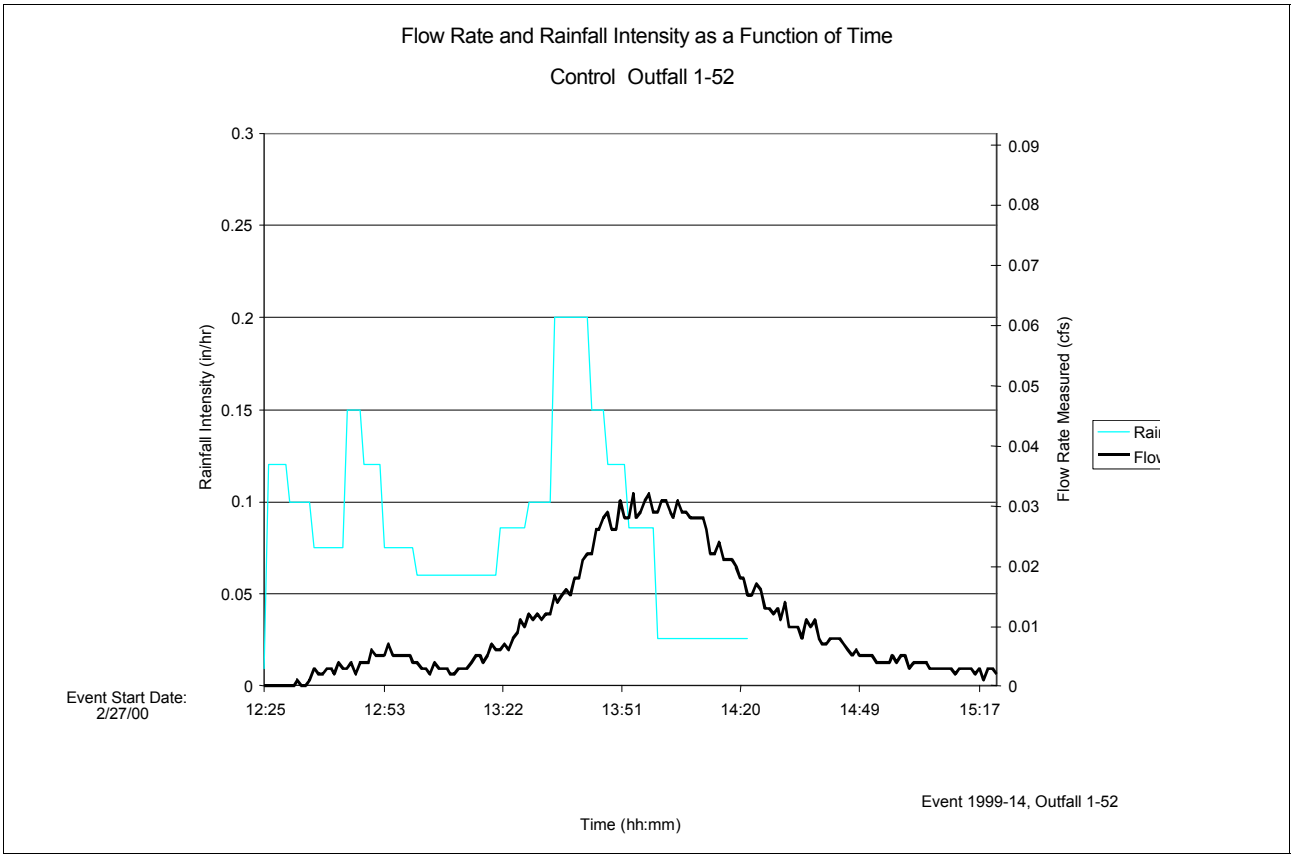

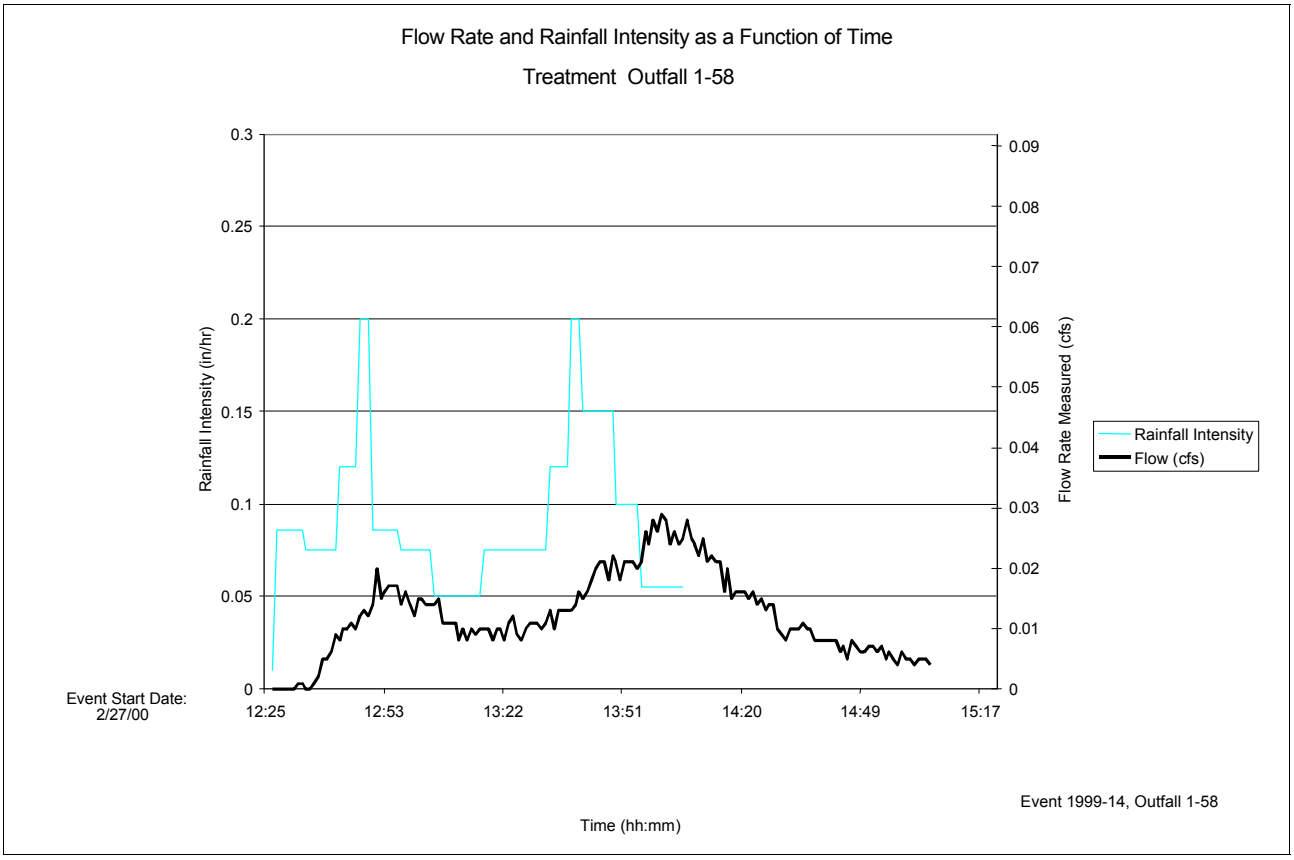

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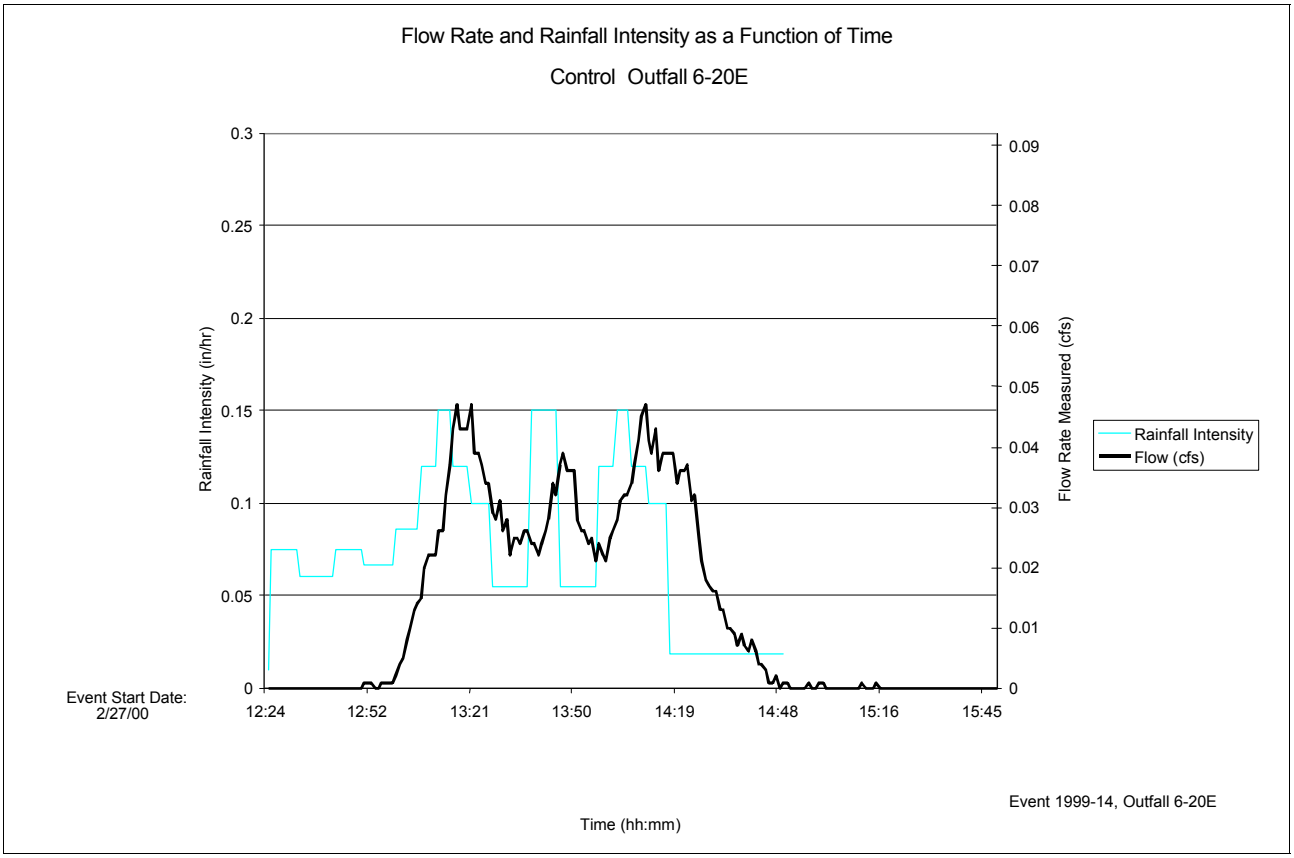

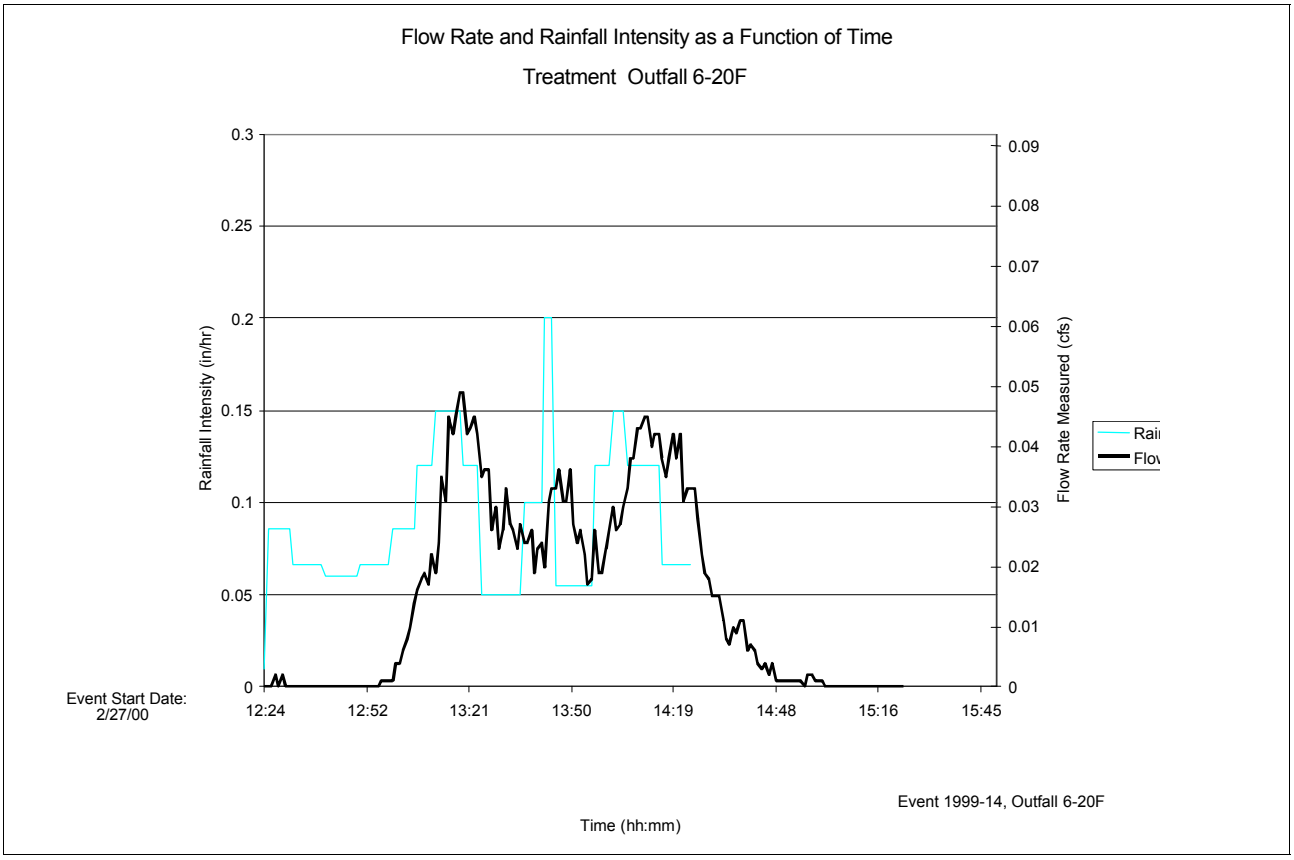

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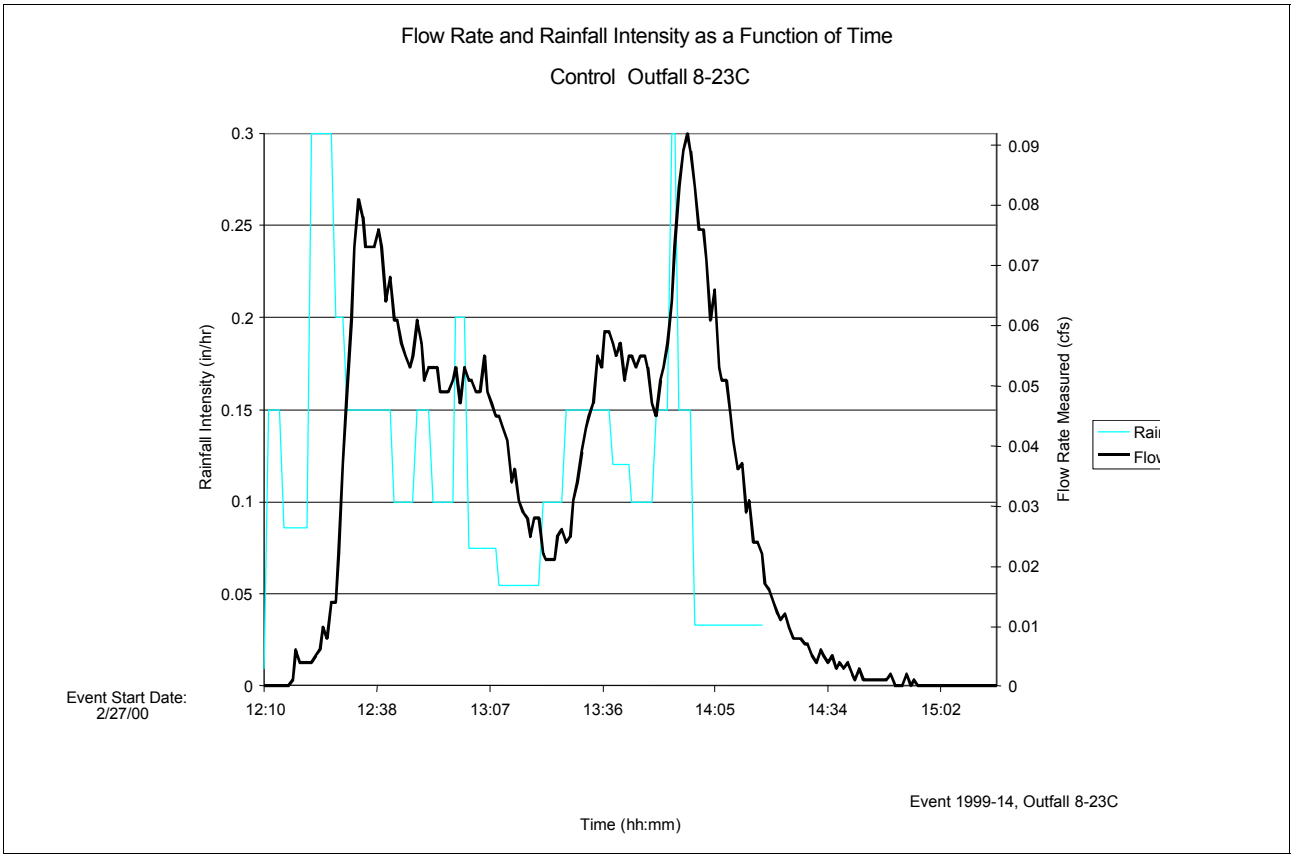

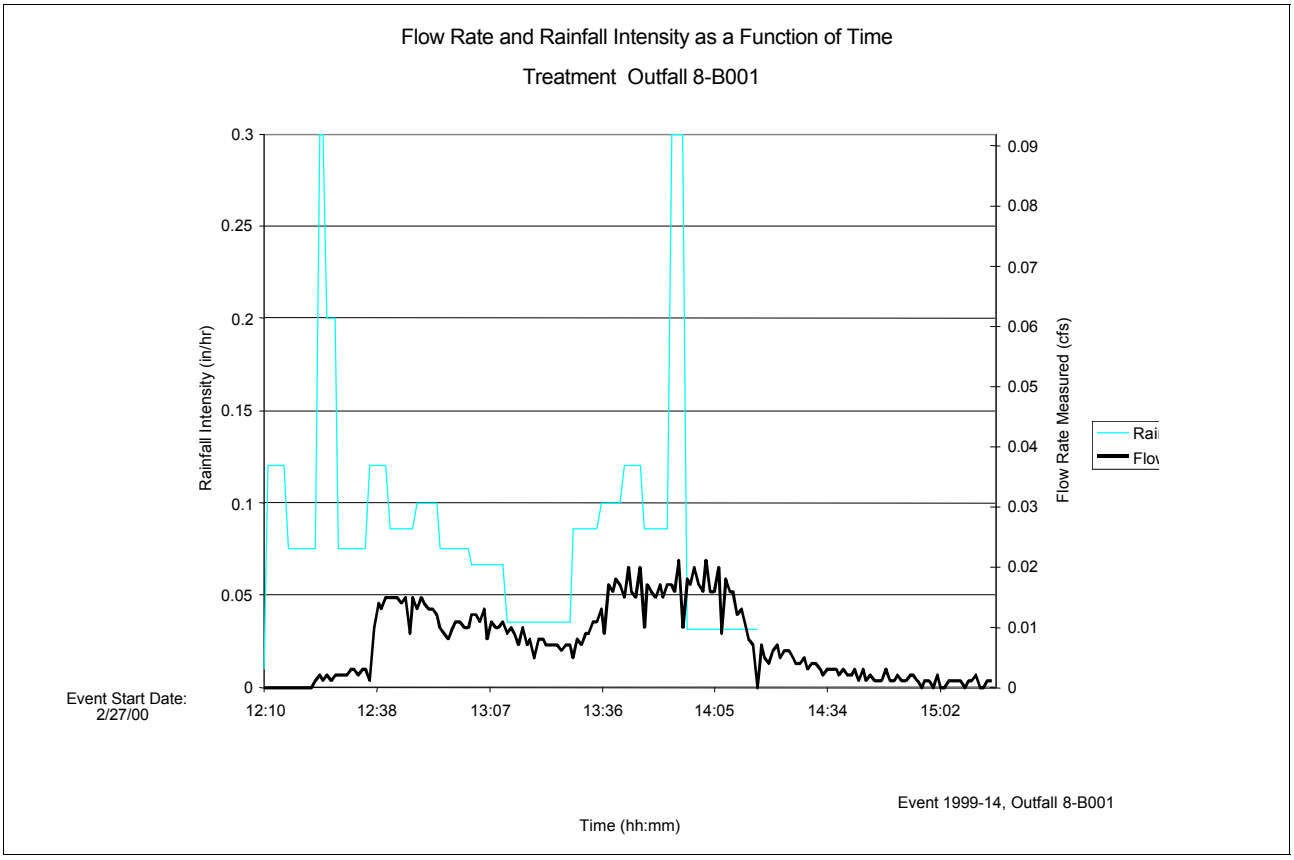

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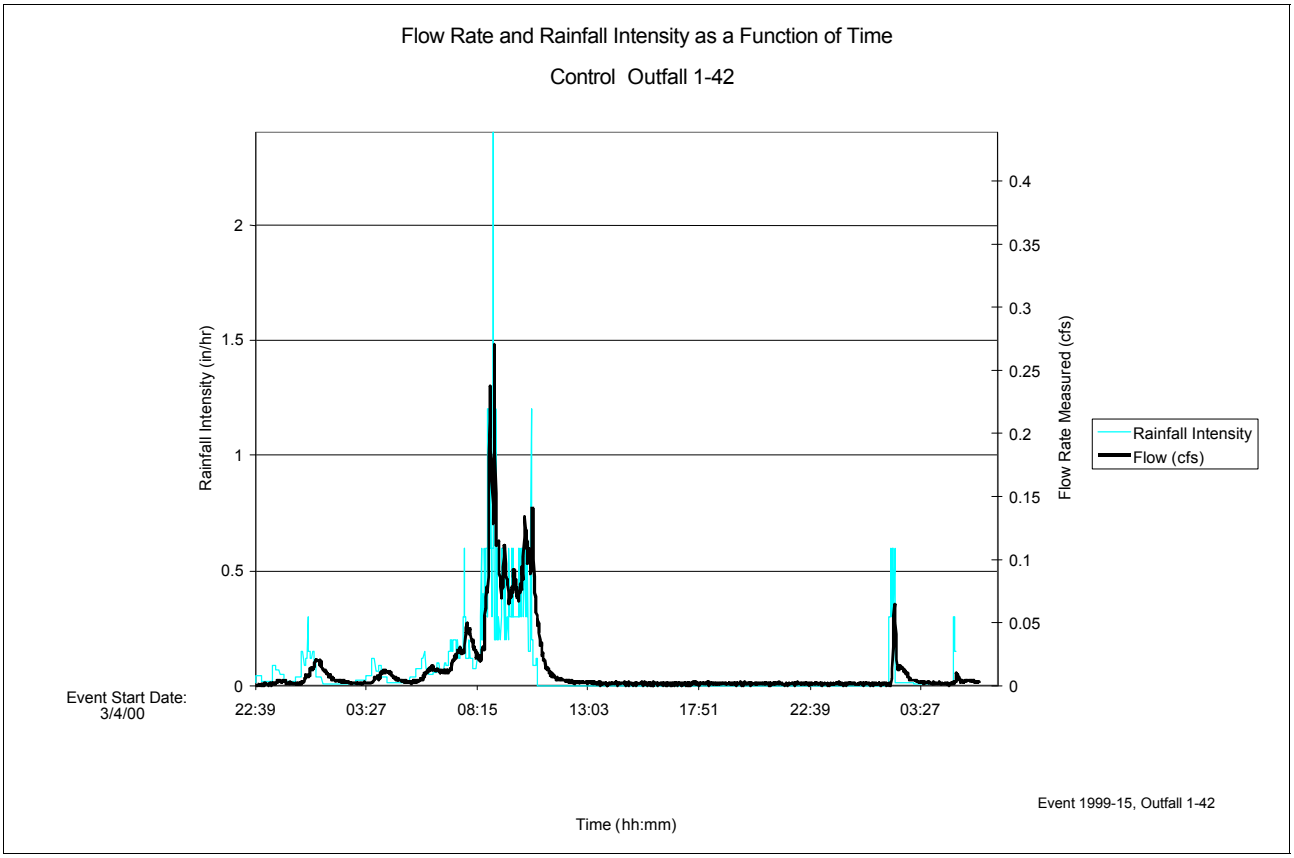

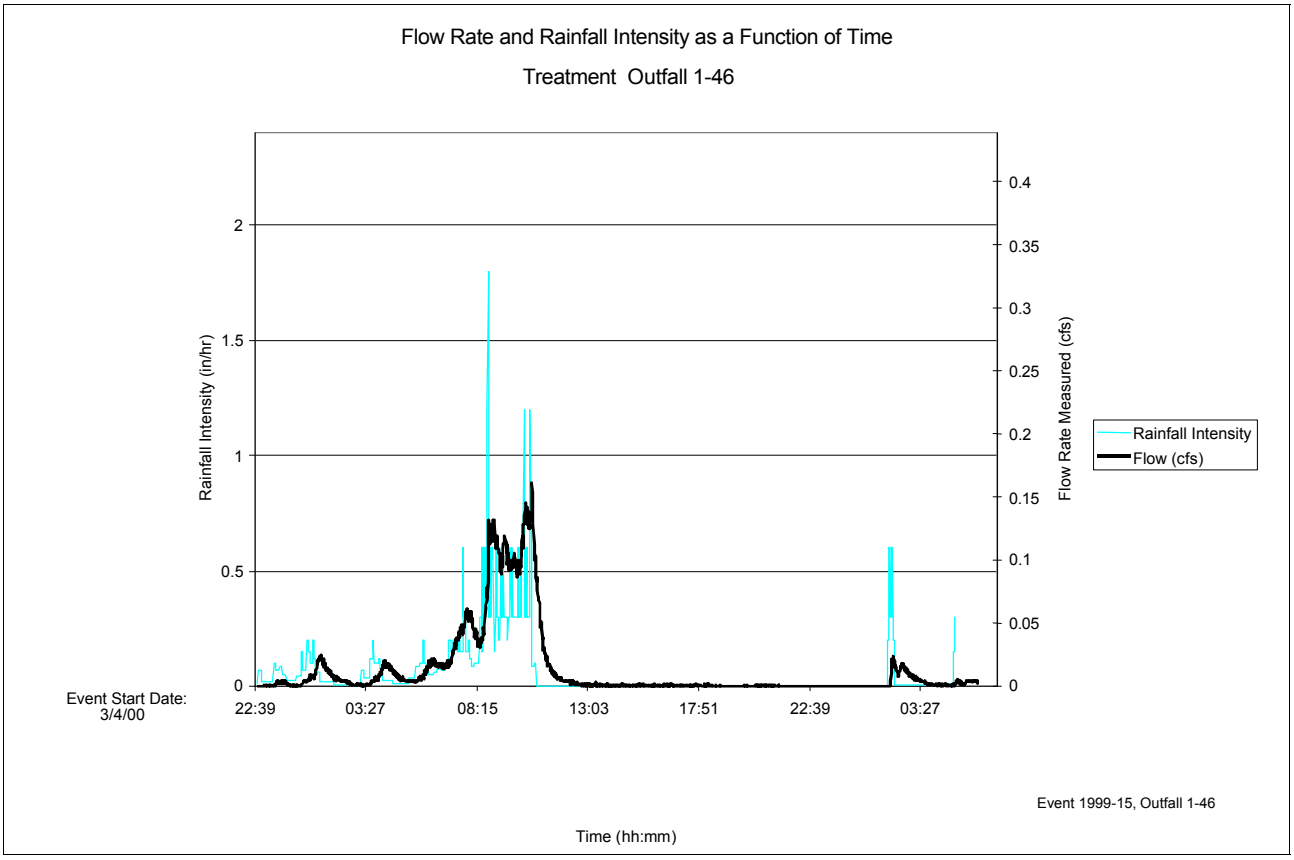

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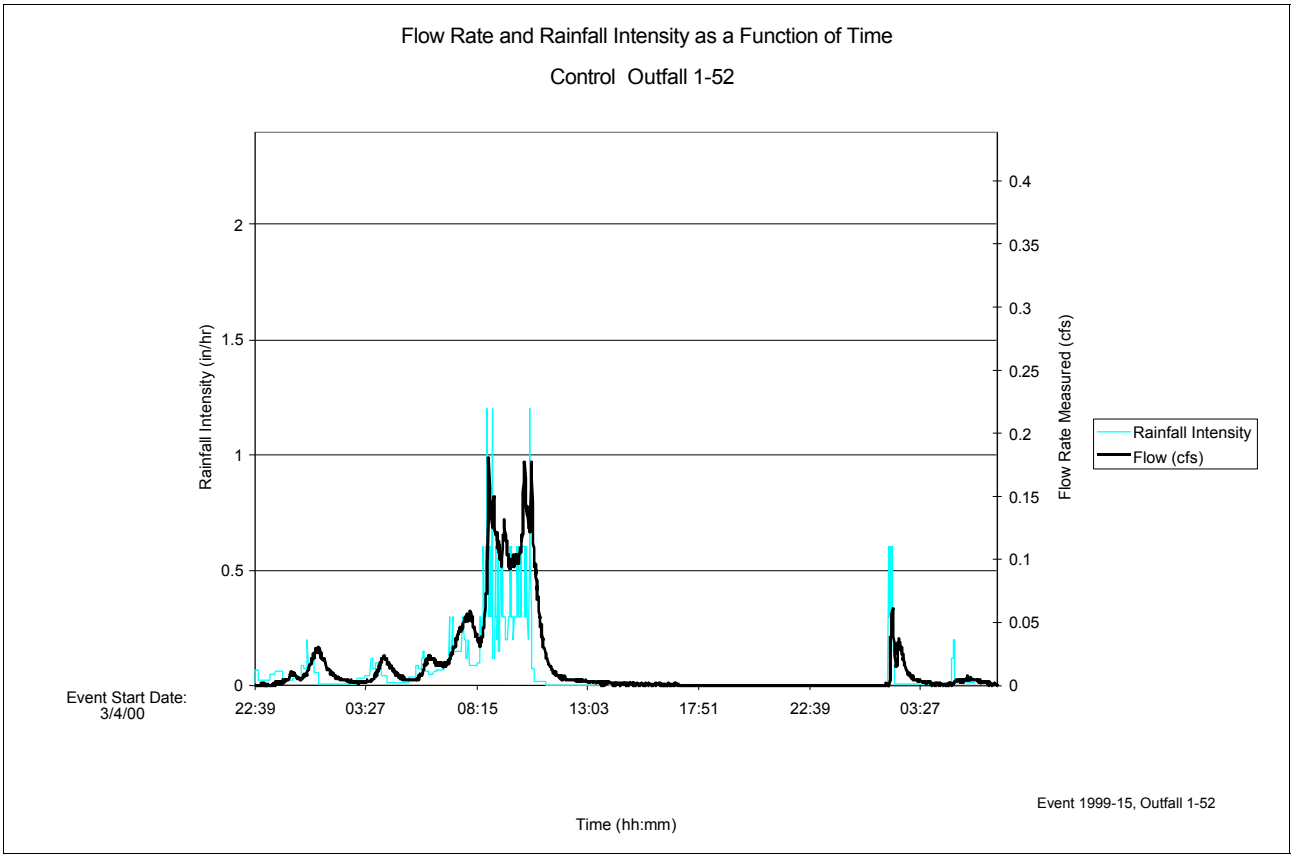

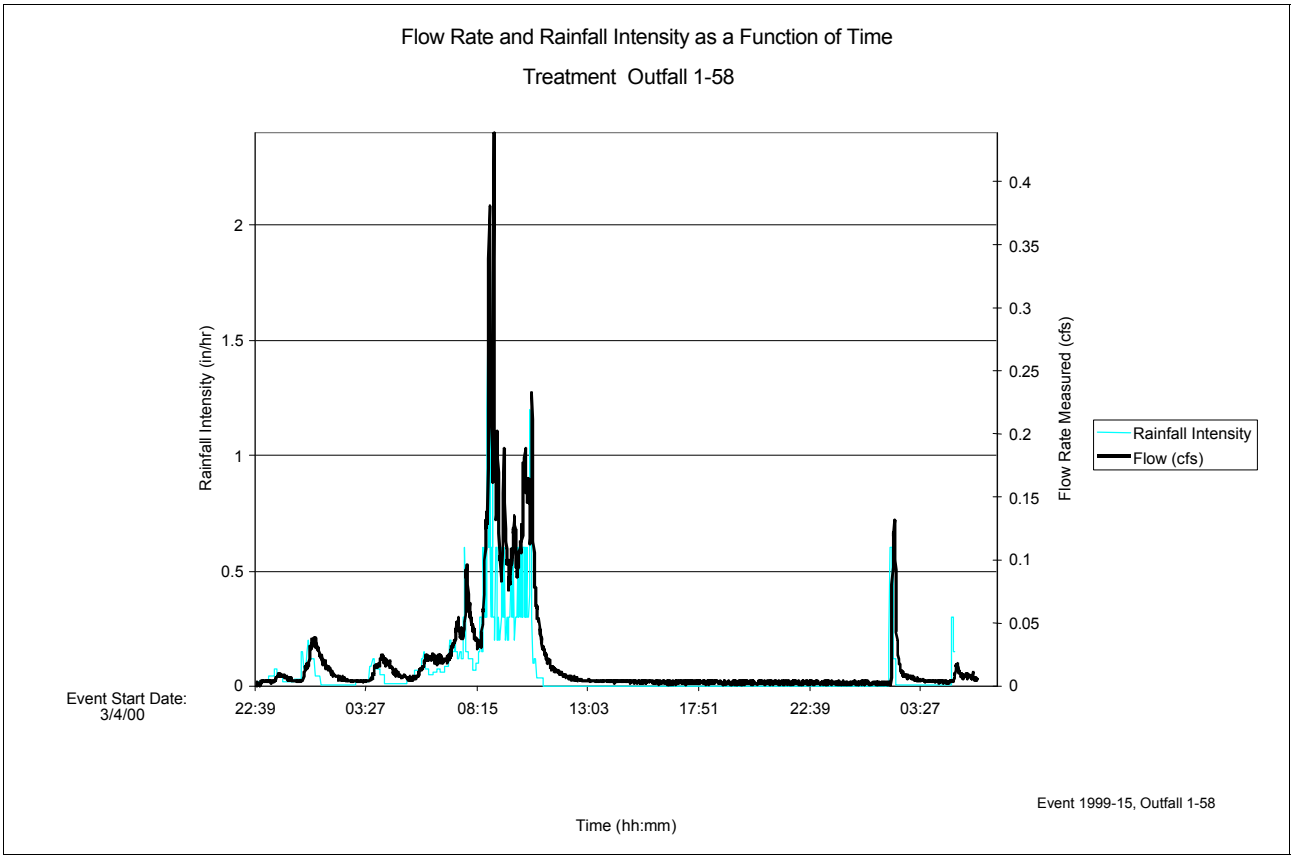

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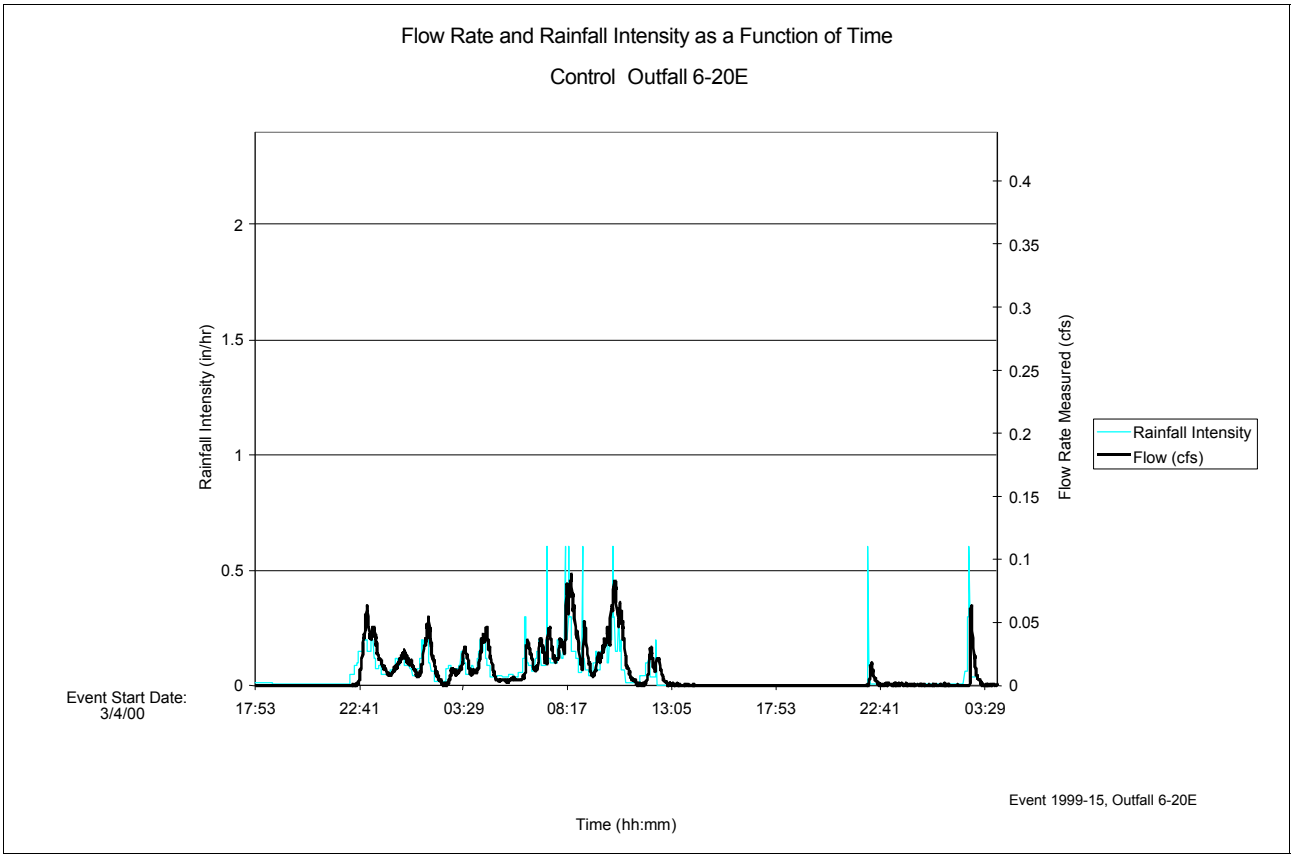

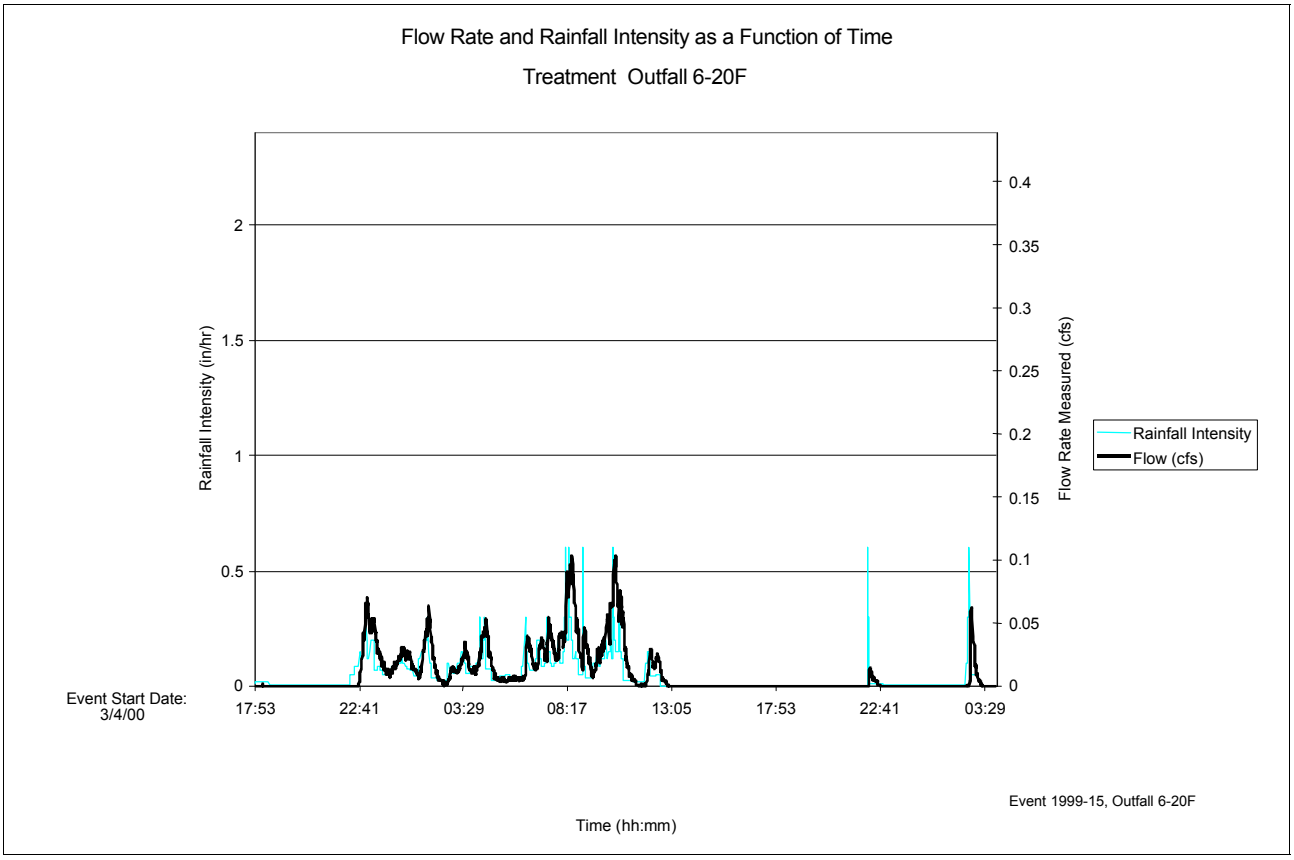

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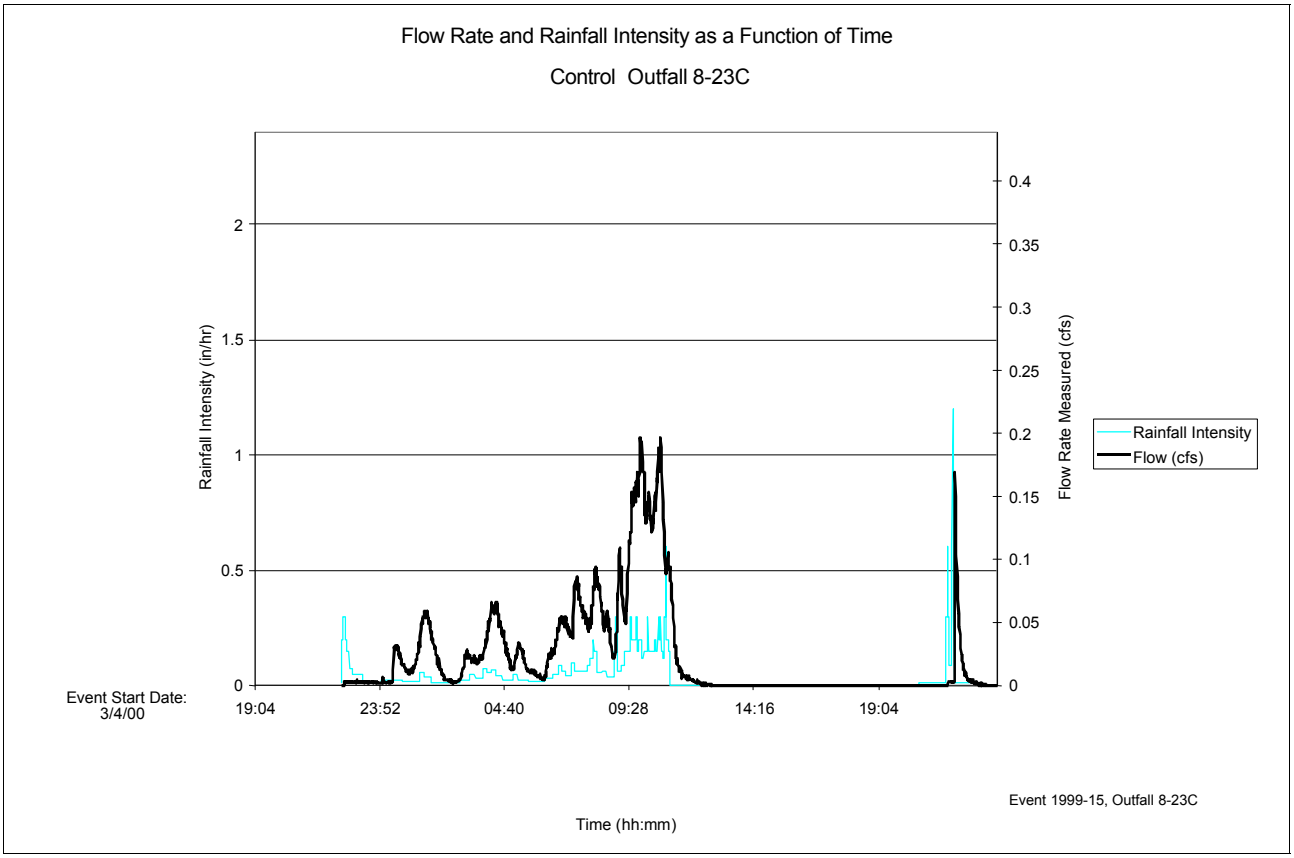

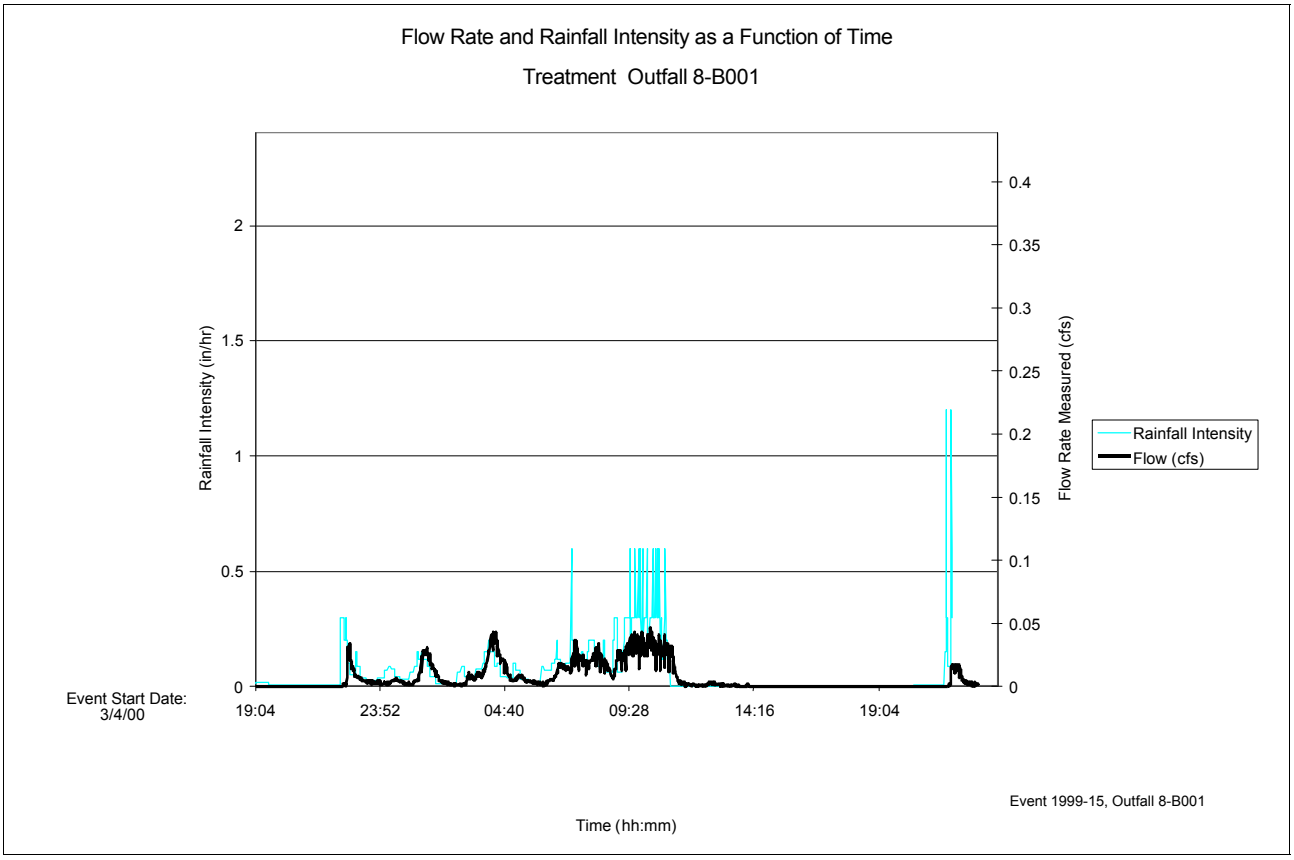

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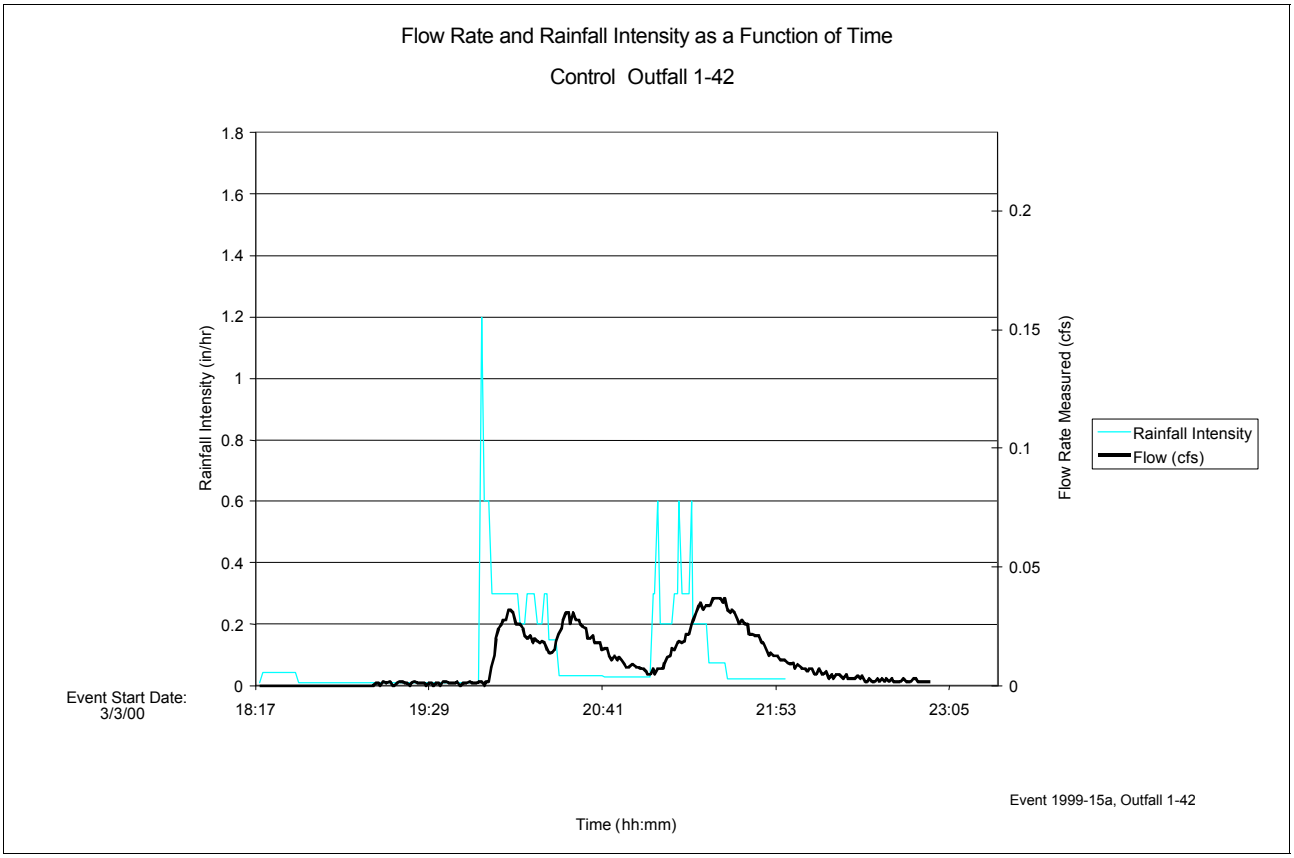

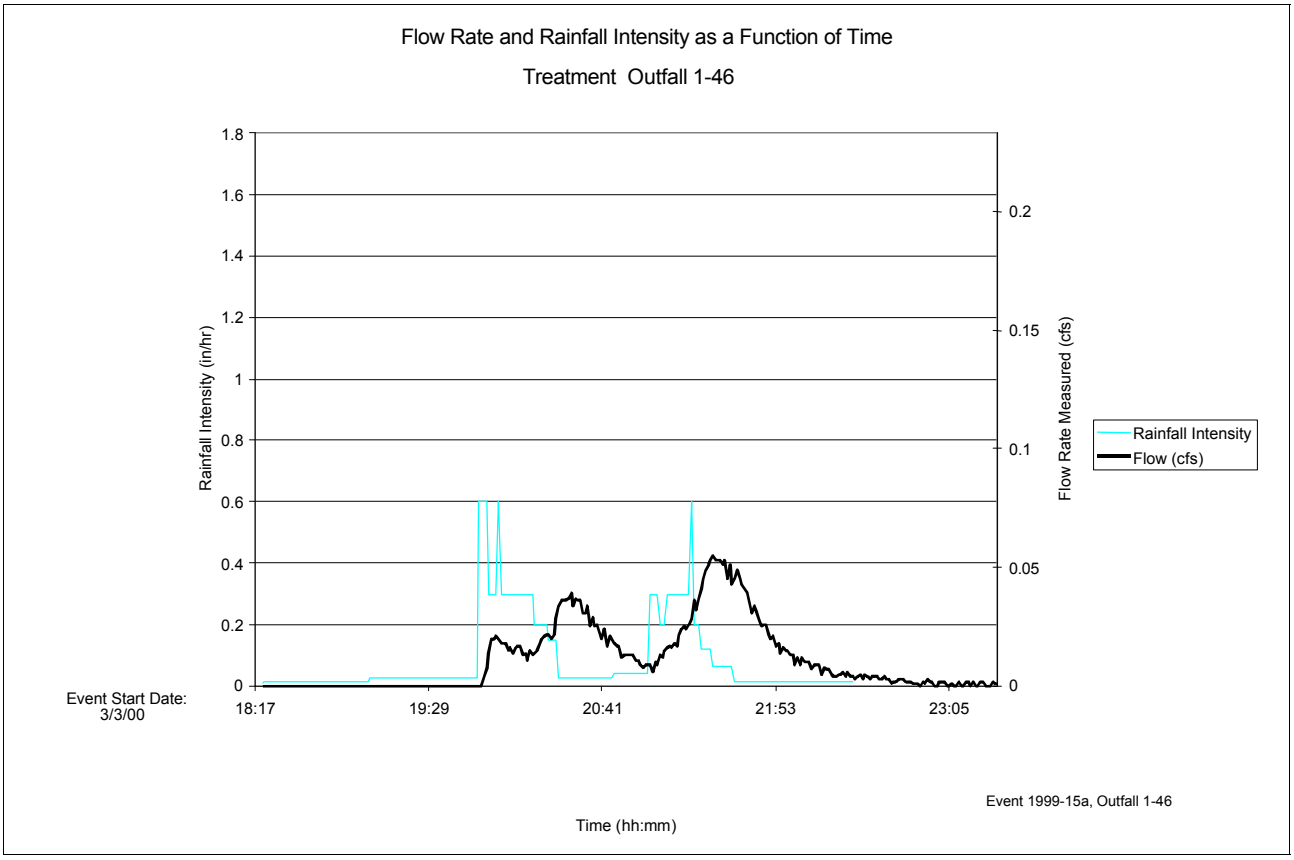

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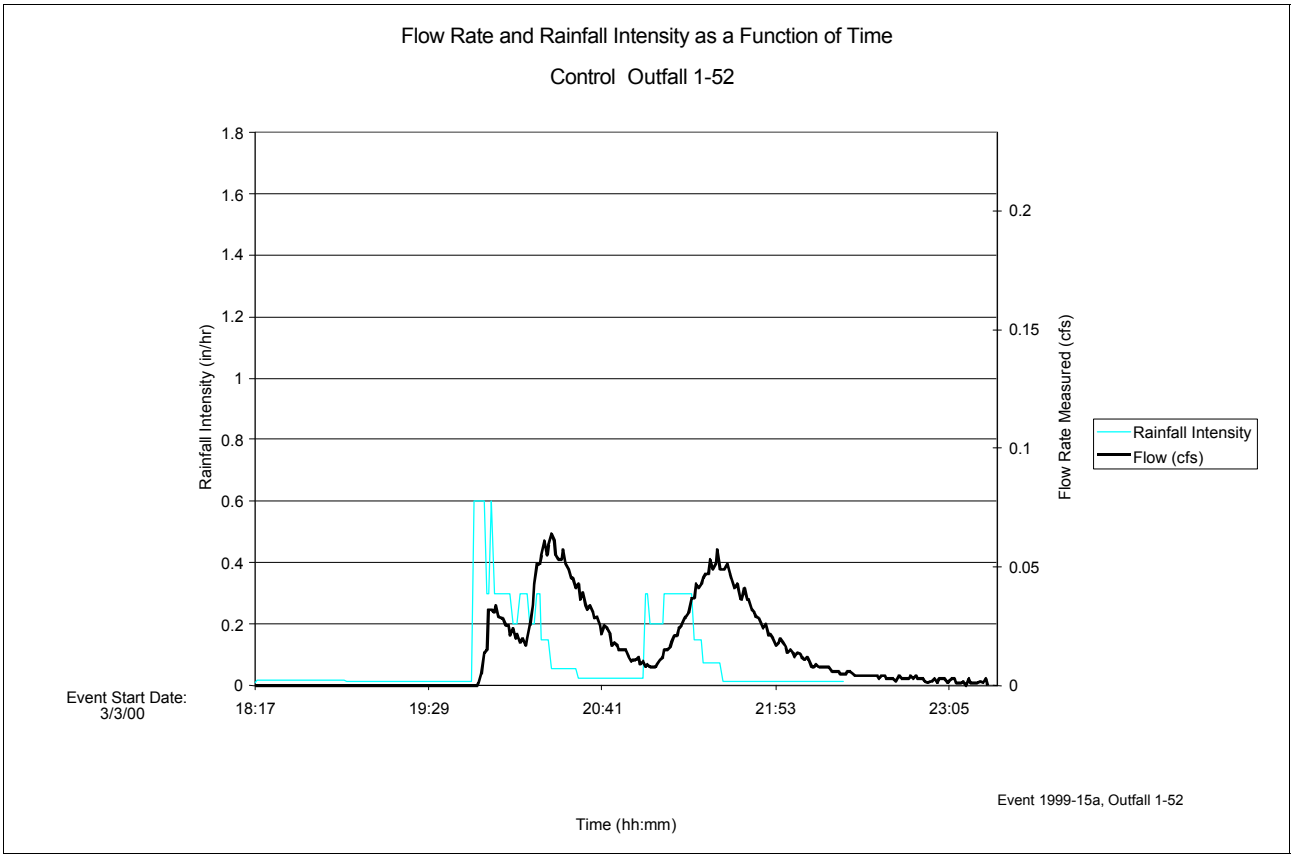

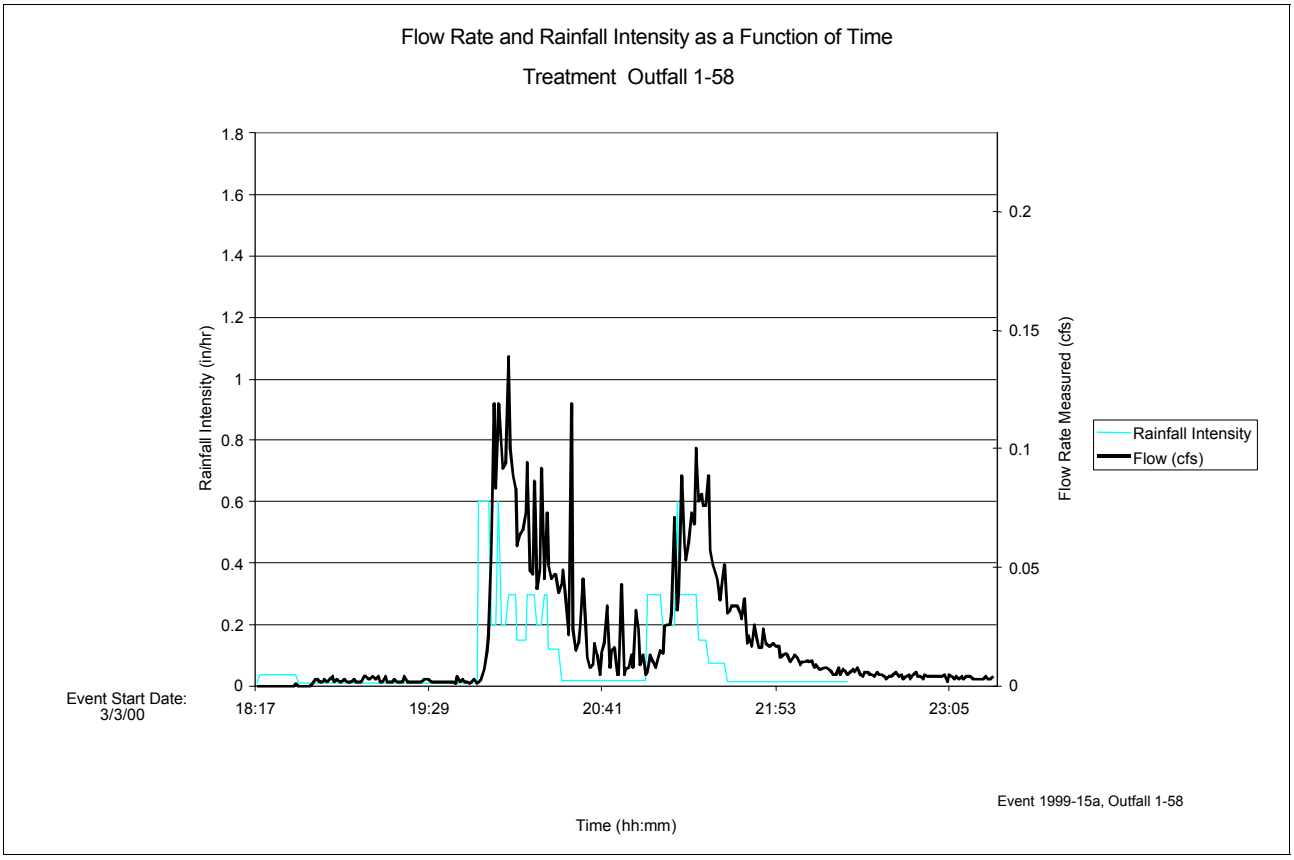

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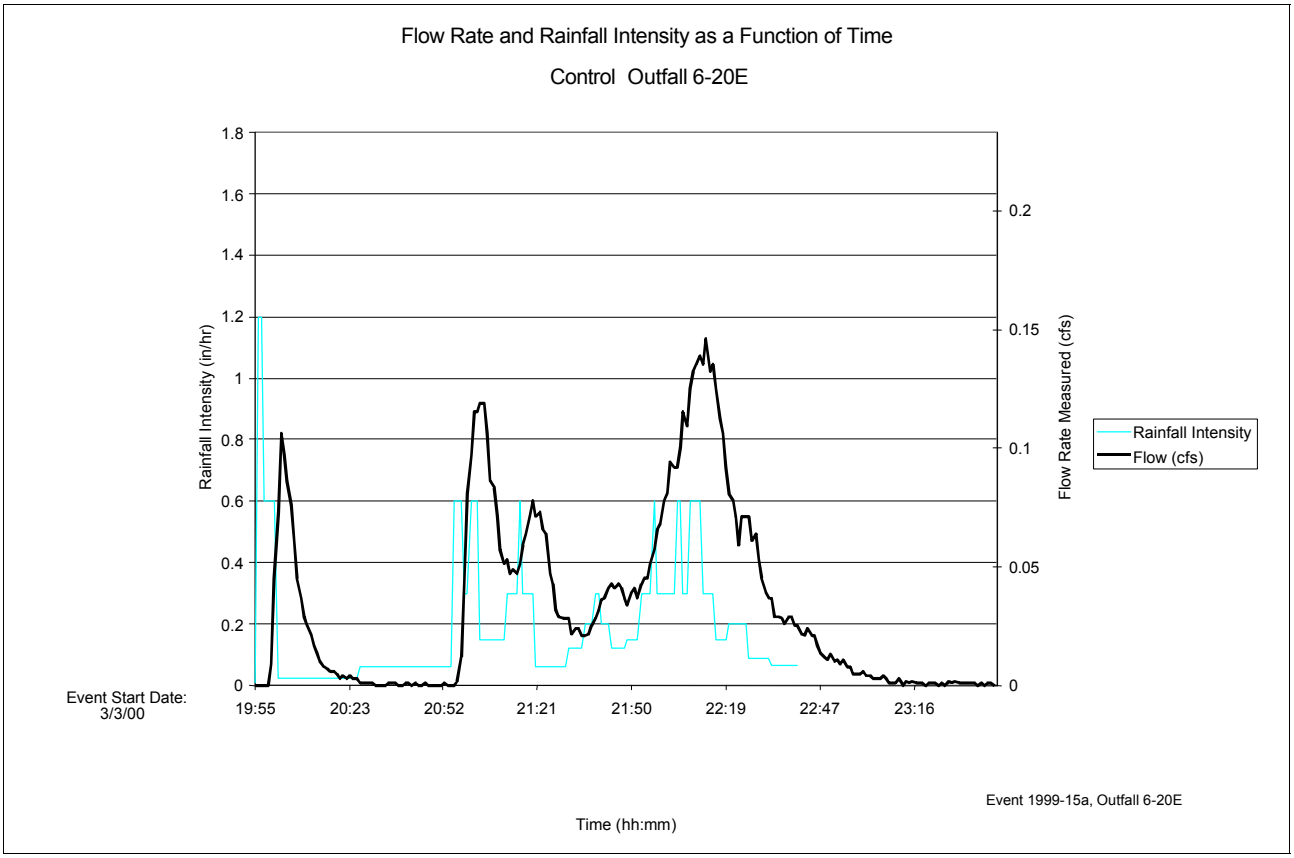

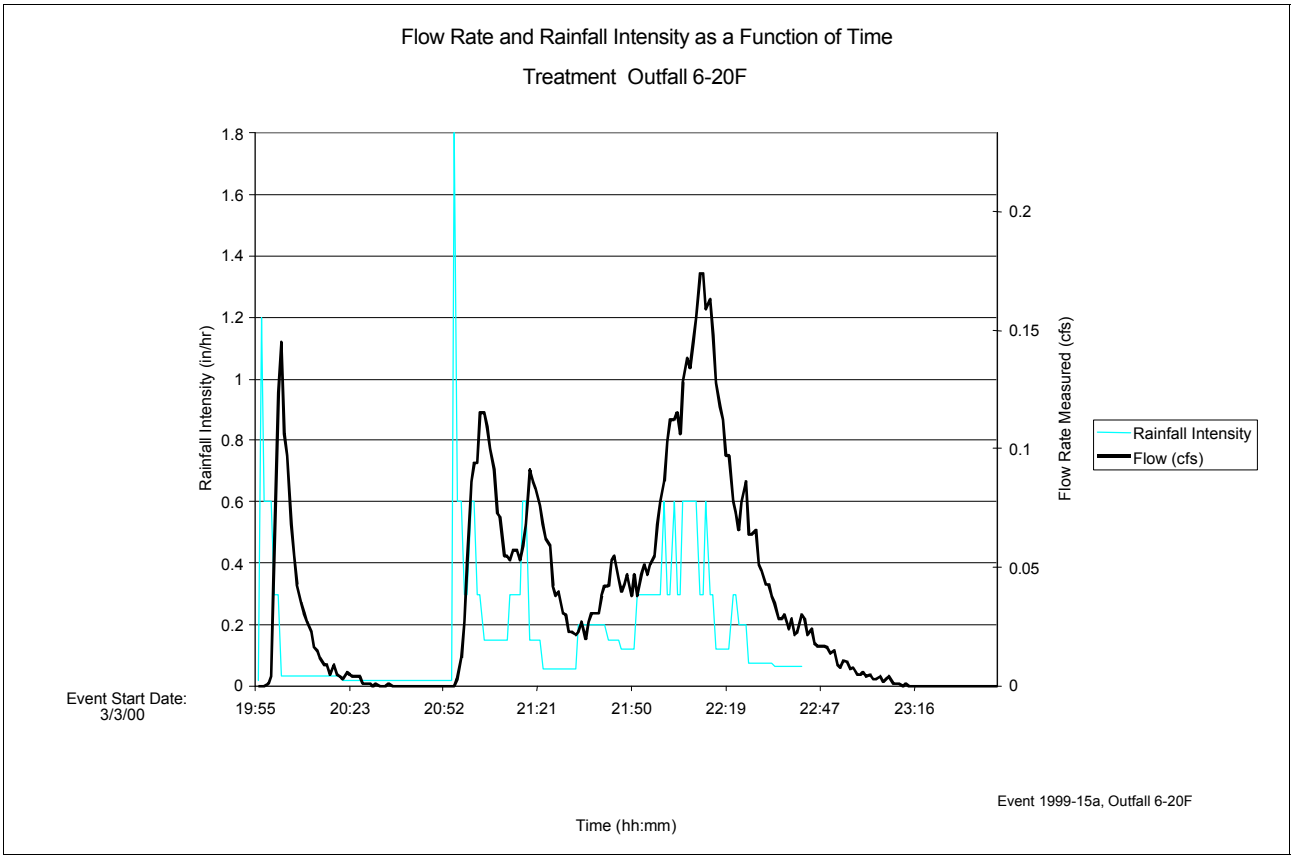

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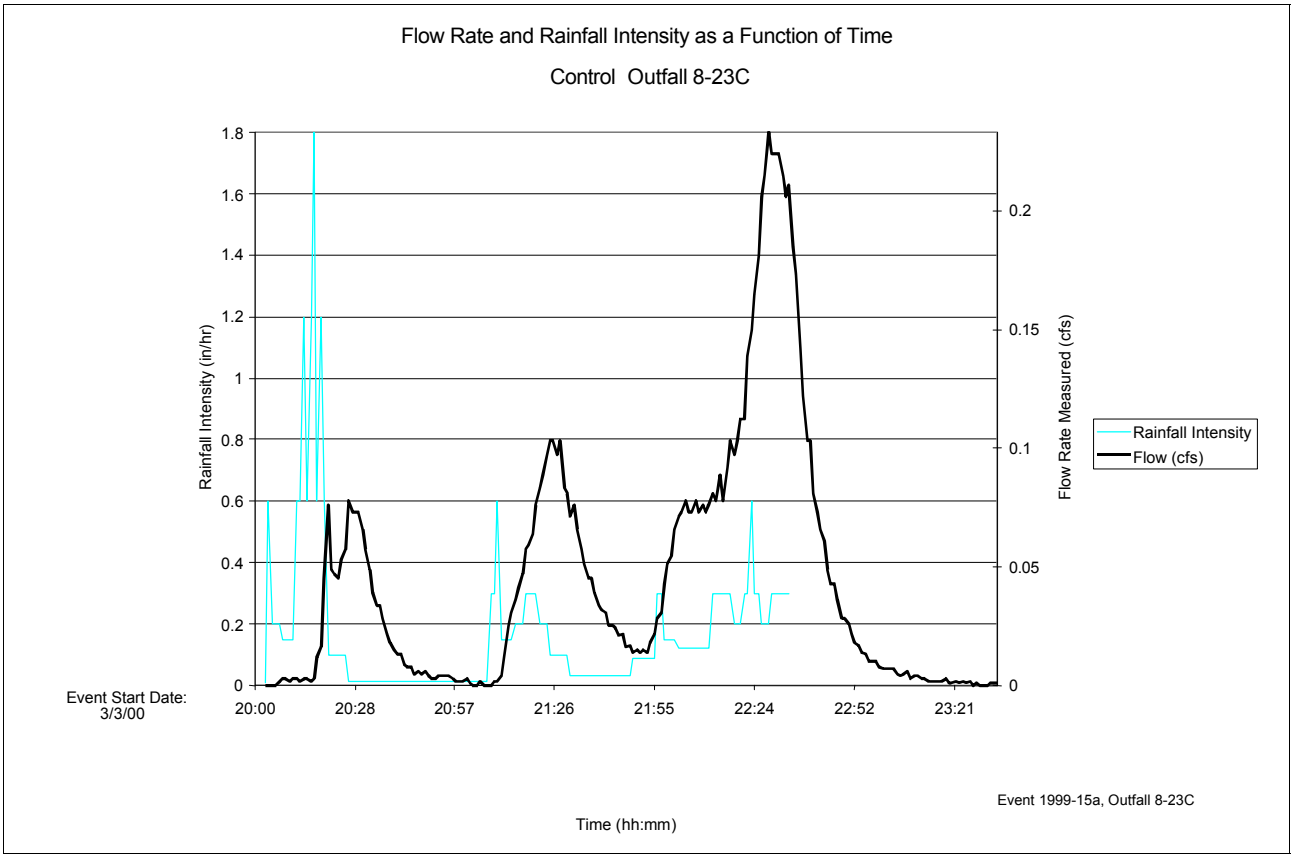

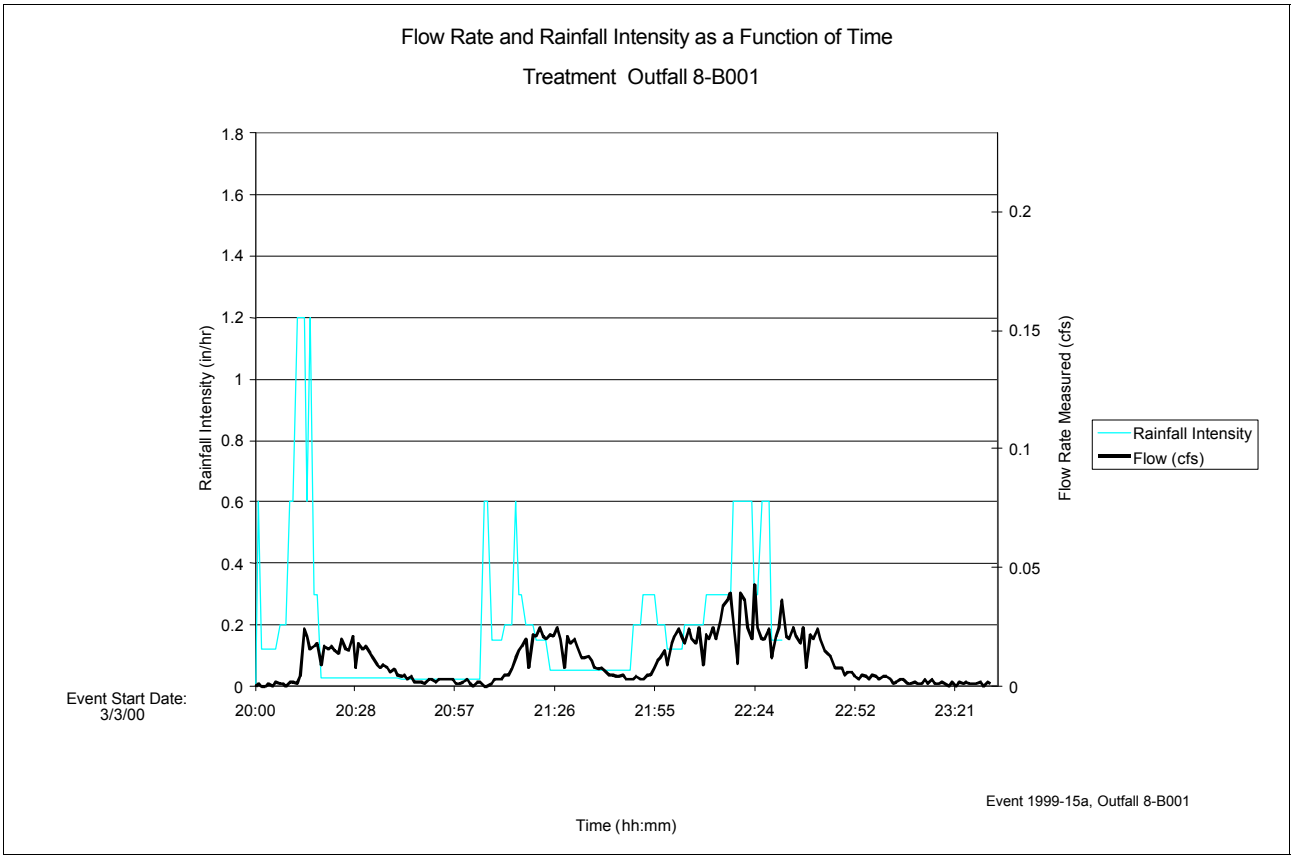

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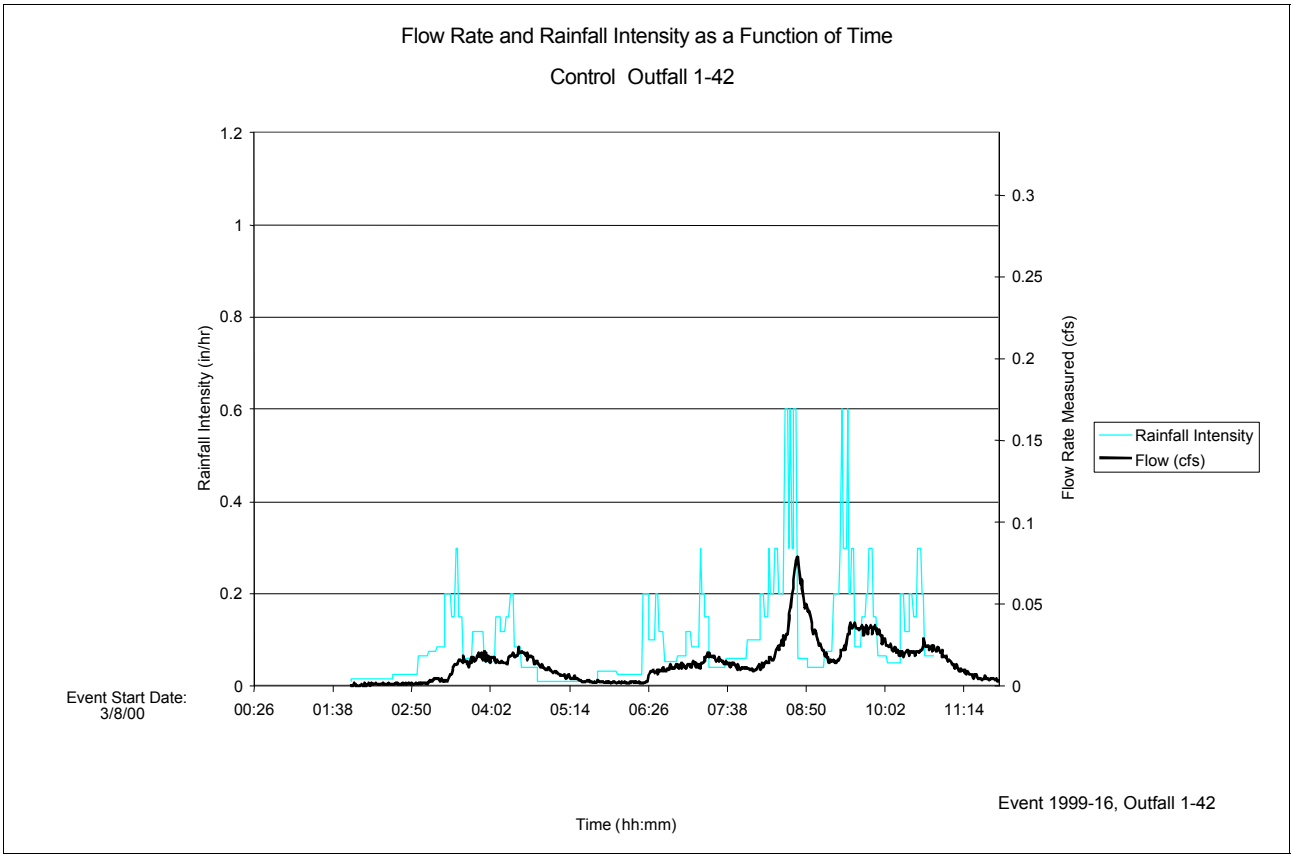

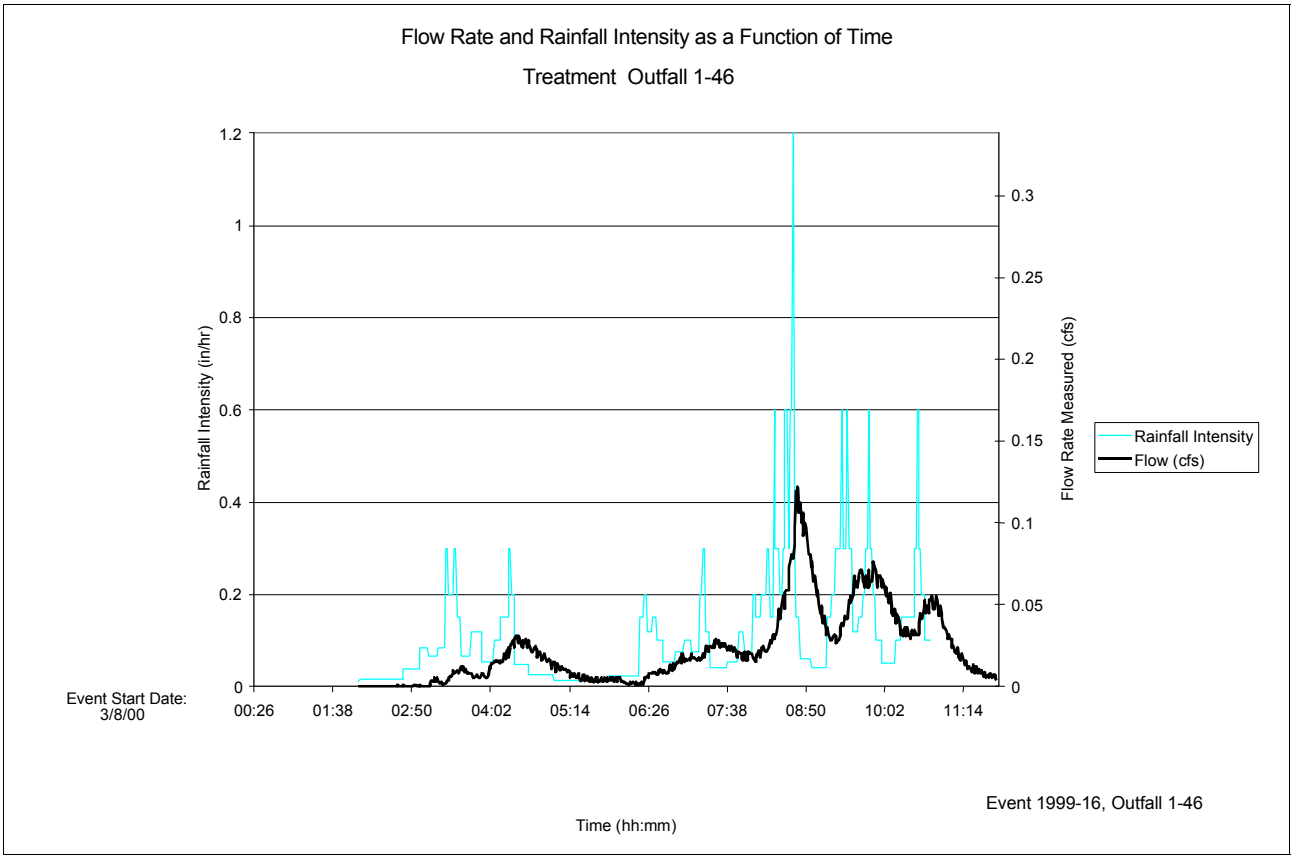

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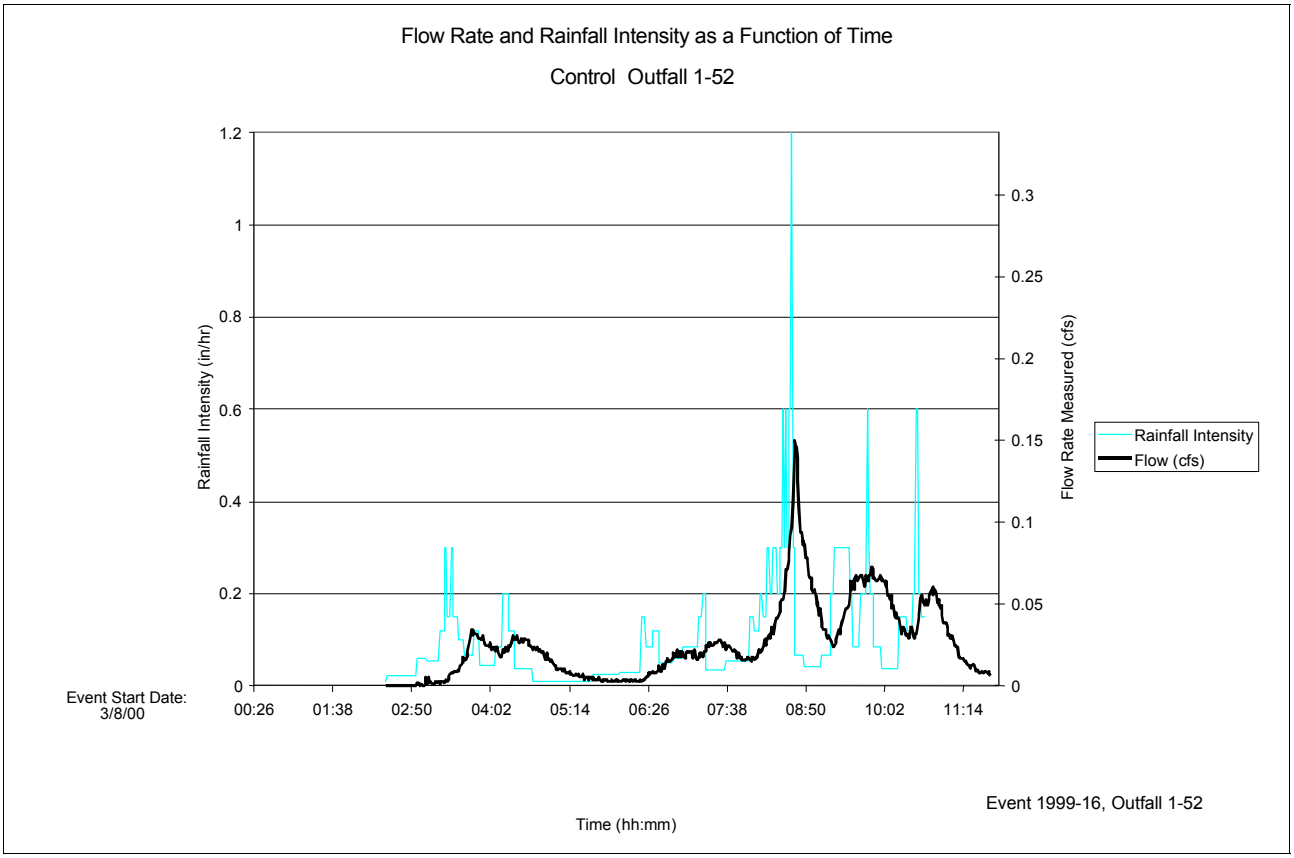

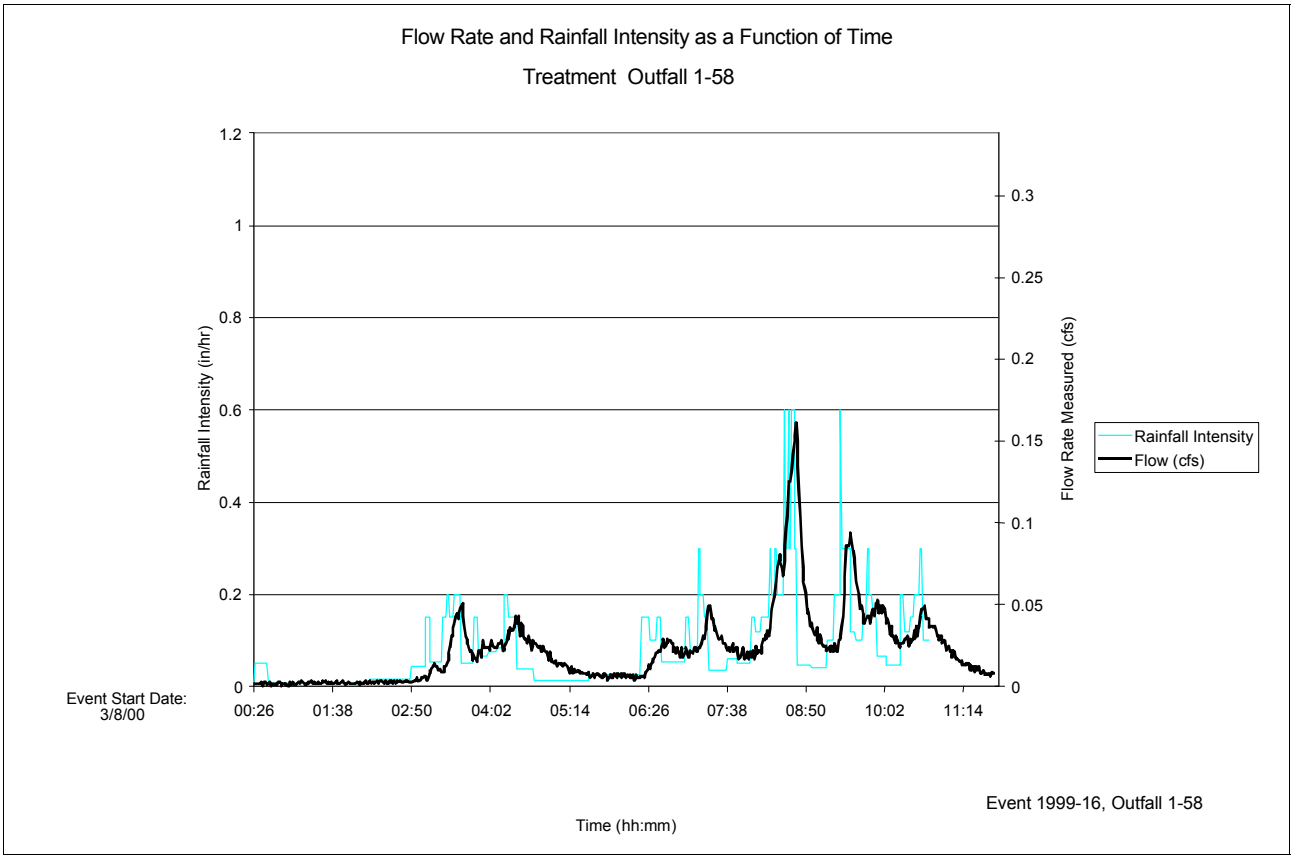

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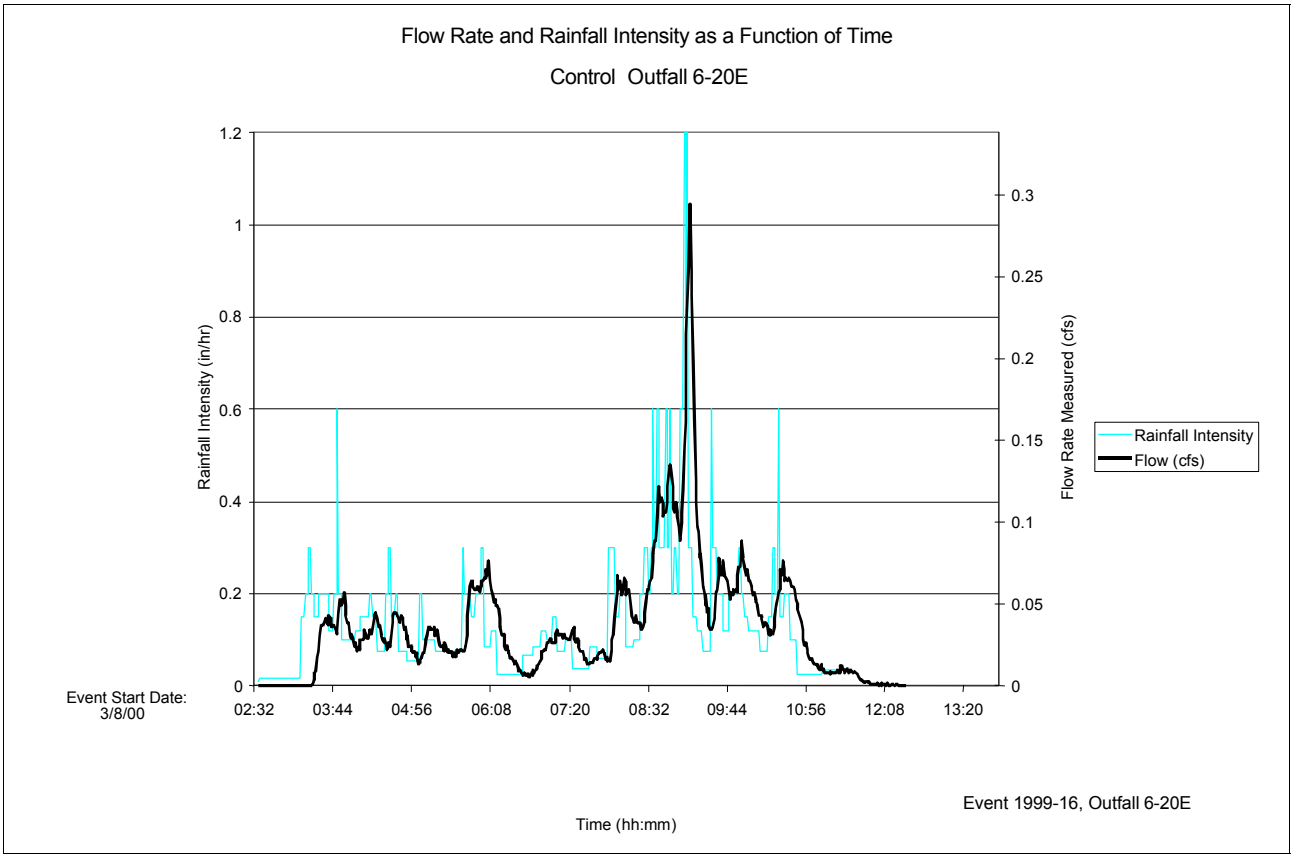

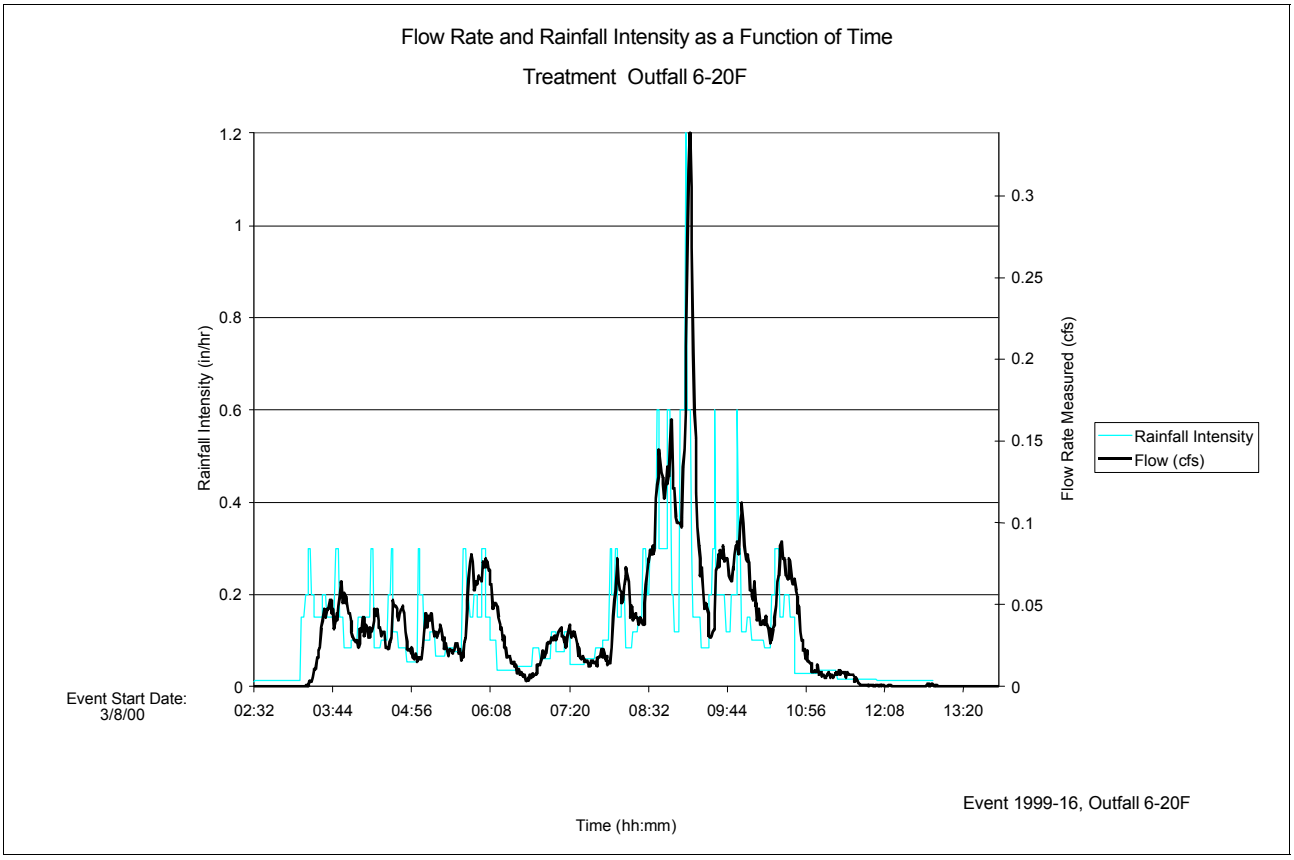

Site 8 - Bicycle Grate/LID Event No. 1999e16 - 3/8/00

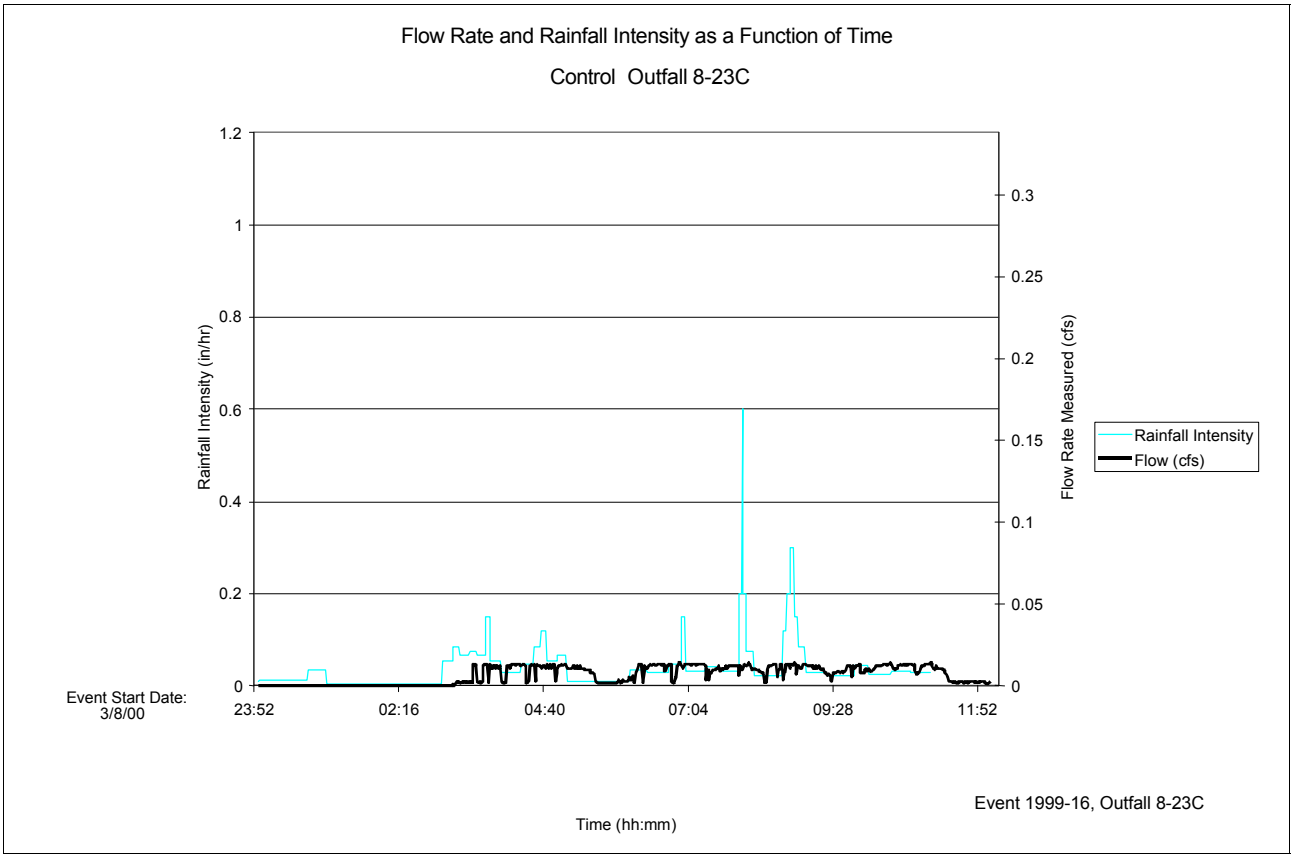

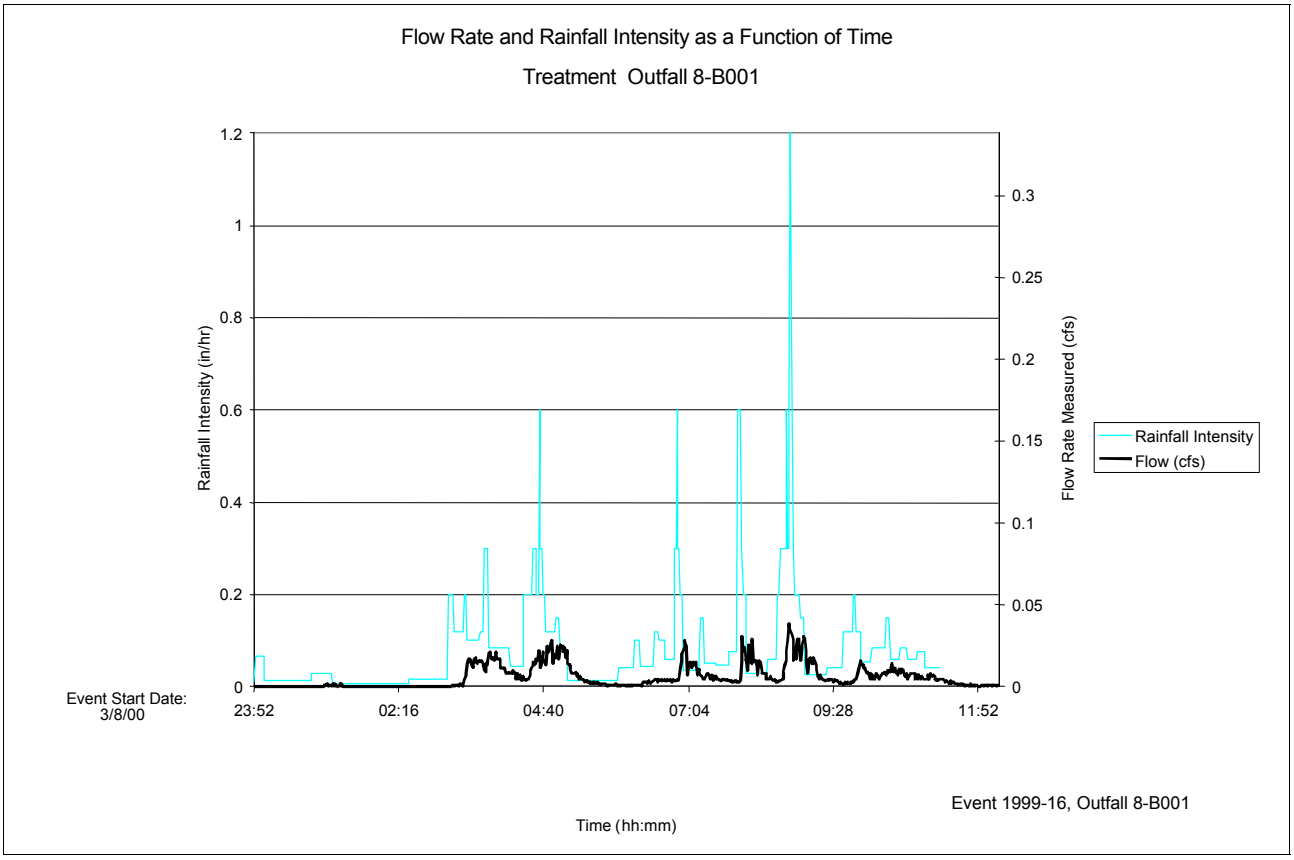

1.0 INTRODUCTION

This Standard Operating Procedure (SOP) applies to measuring solid mass accumulation at 24 drain inlets in conjunction with the Litter Management Pilot Study (LMPS). This SOP describes the schedule of implementation, site locations, procedures, necessary equipment, and the requirements of personnel performing the solids accumulation measurements. The intent of the inlet deposition monitoring is to evaluate seasonal fluctuations of solids within drain inlets.

2.0 SITE LOCATIONS

Inlet deposition monitoring will be performed at 24 inlets, 6 inlets at each of four LMPS sites. Directions to each site are provided in Attachment 1.

3.0 SCHEDULE

Inlet deposition monitoring will generally be performed at a frequency of once every four weeks from June through August 1999 and once every two weeks from September 1999 to April 2000. Projected dates of implementation are provided in Attachment 2. The schedule has been developed to account for holidays and not to conflict with the LMPS street sweeping schedule as the subcontractor (California Street Maintenance) uses the same barrier vehicle for both activities.

4.0 PROCEDURES

4.1 PREMOBILIZATION

- Identify the drain inlet to be monitored from Figures 2.1 through 2.4 for Sites 1E, 1W, 6, and 8 on the scheduled day.
- Collect and pack all required equipment, listed in Attachment 3 of this SOP, within the field vehicle.
- Verify the meeting time and location of the traffic control support vehicle (Truck Mounted Crash Cushion [TMCC]) and personnel.

TMCC Contact Information:
California Street Maintenance
Rick Anderson (626) 961-9326

4.2 MOBILIZATION

Drive to the Site as guided by the directions provided in Attachment 1.

Drain inlets are located on the highway shoulders (within the right of way). Inlets to be monitored have been labeled with the appropriate inlet identification number, red lines painted twenty feet before and after the inlet, and labels indicating “Do Not Clean” (in red paint). Upon arriving at a designated inlet, the field vehicle should pull forward past the inlet to the red spray

painted line and the TMCC should pull up to the red spray painted line prior to the inlet. The positioning of vehicles in this manner is intended to provide temporary protection from traffic. The TMCC should have the crash cushion in the proper horizontal configuration and the Flashing Arrow Sign (FAS) should indicate "caution" ahead during monitoring activities. At inlets where the field crew deems feasible, cones and a "Shoulder Work Ahead" sign should be placed behind the TMCC during monitoring activities.

Full shoulder closure is not required for "Short-Term Operations" (activities under 10 minutes) as defined in Caltrans Division of Maintenance manual (Chapter 8 – "Protection of Workers"). The inlet deposition monitoring falls under this definition but all relevant requirements, such as working near moving traffic and protective vehicles, within Caltrans Division of Maintenance manual (Chapter 8 – "Protection of Workers") must be followed.

4.3 MONITORING PROCEDURES

1. Confirm that the drain inlet is the correct one by locating its identification number. If no identification number can be found or if the number is different, contact the project coordinator (Ian Forrest (714) 648-2881) to confirm the location.
2. Clear debris from the top of the grate and in between the bars only as necessary to make measurements. Try to remove all matter including dried mud, tar, cement, and stones. Be careful to minimize the amount of soil and debris that is allowed to fall into the inlet.
3. Identify the 12 measurement stations marked in yellow on the grate. If the station points have worn off they must be replaced with the proper paint (see equipment list) at the designated distances from the pavement edge (origin), as identified within the "Inlet Deposition Monitoring – Initial Setup" forms located in Attachment 4.
4. Complete the "Inlet Deposition Monitoring Field Measurement and Observation" form (Attachment 5) which includes:
   - Date,
   - Field crew,
   - Inlet number,
   - Site Number,
   - Inlet description (Single Grate, Double Grate, etc.),
   - Description of inlet composition (described in Section 3.3.1),
   - Check list of pictures taken (e.g., inlet number with surrounding area and inlet number with contents),
   - Notes describing the physical properties of the inlet contents (e.g., vegetation type, litter types, and observations), and
   - Inlet deposition measurements (for each station as described in section 3.3.2).

4.3.1 Inlet Composition Estimates

Estimate the inlet composition of the accumulated solids by following the procedures below:

1. Divide the inlet bottom into four quadrants such that each area equals 25% of the total bottom area. Quadrant 1 should be located upstream of the traffic flow and next to the highway. Quadrant 2 should be downstream of traffic flow and next to Quadrant 1. Quadrant 3 should be behind Quadrant 1 and next to the curb. Quadrant 4 should be behind Quadrant 2 and next to the curb. See Figure 1 for a schematic of the proper quadrant delineation.

Figure 1 – Schematic of Quadrant Delineation

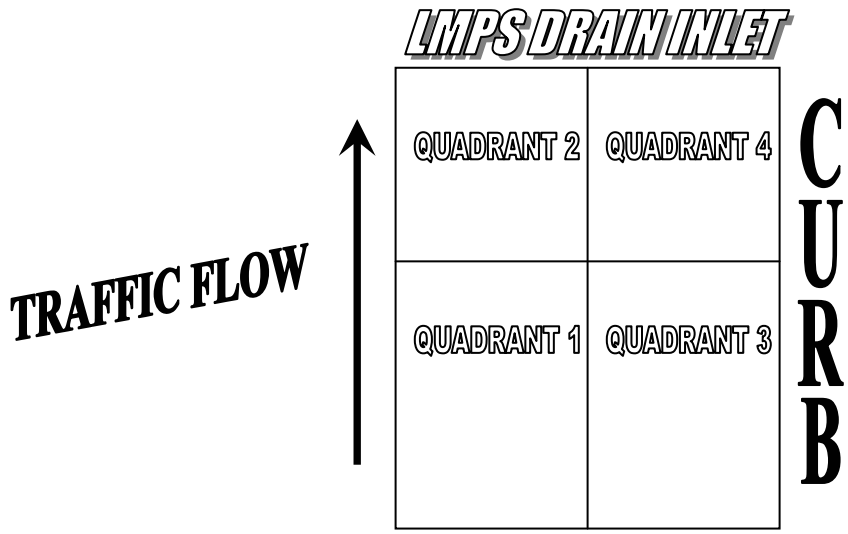

2. Estimate the percentage of concrete bottom, sediment, vegetation, and litter within each quadrant such that the sum of the four quadrants equals 100%. Moisture content should also be categorized in each quadrant as either dry, moist, or saturated.

4.3.2 Inlet Deposition Measurements

Uncompacted Depths

Starting at measuring Station 1 on the grate, insert the bottom of the measuring rod through the grate; always place the rod behind (toward the curb) the grate bar that is marked with the station number.

Use the spirit level to adjust the rod so it is vertical and slowly lower it down until it just touches the top of the accumulated solids or inlet bottom.

With the measuring rod plumb, just touching the accumulated solids or inlet bottom, take a depth reading, using the measuring tape mounted on the rod, from the top of the grate directly above the station number.

Record the depth to top of the accumulated solids on the line provided for “Uncompacted” depths at Station 1.

Compacted Depths

With the measuring rod plumb and just above the accumulated solids (as described above), allow the rod to press down on the solids. DO NOT push on the rod or add additional weight when performing the compacted measurement.

Using the measuring tape mounted on the rod, take a depth reading from the top if the grate to the top of compacted solids. Record the value on the line provided for "Compacted" depths for each station number.

Repeat the process of measuring and recording uncompacted and compacted depths at each of the 12 stations.

4.4 REQUIRED EQUIPMENT

The equipment list for inlet deposition monitoring is provided in Attachment 3.

4.5 QUALITY ASSURANCE

- Confirm the identity of each drain inlet that is visited.
- Assemble the measuring rod in a constant manner to ensure its actual length remains true to the gradations.
- Identify each monitoring station on the grate.
- Hold the measuring rod as vertical (plumb) as possible when measuring depths at each station.
- Lay a straight edge or ruler across the bars on the grate to gain a closer approximation of the depth of solids.
- Document the date, field crew, measurements, and observations in the proper location and form.
- Record the measurement from the measuring rod to the nearest hundredth of a foot (0.01 feet)
- Be sure that all photos contain the inlet identification number for reference.
- Reapply paint to the inlet identification number, measuring stations, and "Do Not Clean" sign and symbol as necessary. Do not allow the paint to completely wear off.

ATTACHMENT 1 Site Directions

Caltrans Litter Management Pilot Study (LMPS)
Directions to Sites

*Site 1 (105 Freeway) - Outfalls #60, #59, #58**

5 Freeway North or 57 Freeway North
91 Freeway West
605 Freeway North
105 Freeway West

Exit Long Beach Boulevard
Right on Long Beach Boulevard
Right at the first street (Mulford Ave.)
Right at first stop sign (look for church)
Proceed on Fernwood Ave. (east)
Park across the street from the perimeter fenced
monitoring equipment (nearest cross street is Muriel Dr.)
Enter Caltrans gate

*Water quality monitoring outfall

*Site 1 (105 Freeway) - Outfalls #50, #51, #52**

(Same as above)

Proceed on Fernwood Ave (east)
Park across street on Fernwood Ave (nearest cross street is Elm St.)
Walk across Fernwood Ave
Enter Caltrans gate

*Water quality monitoring outfall

Caltrans Litter Management Pilot Study (LMPS)
Directions to Sites (Continued)

Site 1 (105 Freeway) - Outfalls #47, #46, #44*

(Same as above)

Proceed on Fernwood Ave (east)
Right on Atlantic Blvd.
Right on Josephine St. (KFC Restaurant on corner)
Right on Second St.

Outfall #46 is at end of cul-de-sac (Second St.) surrounded by perimeter fencing
Enter Caltrans gate
Walk 200 feet east to reach Outfall #47
Walk 400 feet west to reach Outfall #44

*Water quality monitoring outfall

Site 1 (105 Freeway) - Outfalls #42, #B111, #B110*

(Same as before)

Back on Second Street (south)
Right on Josephine St. (KFC Restaurant on corner), proceed west
Right on Thorsen (cul-de-sac)

Outfall #42 is located 100 feet west from the Caltrans gate
Walk 150 feet west of Outfall #42 to reach Outfall #B111
Walk 150 feet west of Outfall #B111 to reach Outfall #B110 (Outfall #B110 can also be accessed through Caltrans gate located at Muriel Dr. & Louise St.)

*Water quality monitoring outfall

Caltrans Litter Management Pilot Study (LMPS)
Directions to Sites (Continued)

Site 6 (60 Freeway) - Outfalls #20B and #20C

5 Freeway North
57 Freeway North
60 Freeway West

Exit Hacienda Blvd.
Left on Hacienda Blvd.
Right at Three Palms
Proceed straight at stop sign
Right at Kwis Ave
Park at cul-de-sac
Enter through Caltrans gate
Proceed west along crushed stone path for 150 feet to reach Outfall #20B
Proceed west beyond Outfall #20B for 250 feet to reach Outfall #20C

Site 6 (60 Freeway) - Outfalls #20H, #20G, 20F, 20E**

(same as before)
If proceeding from at Kwis Ave cul-de-sac, proceed
south on Kwis Ave
Right at Los Robles
Right on Turnbull Canyon Rd., proceed north
Open side gate of Los Altos High School Parking area
(located across street from St. John's church)
Park in parking lot (close gate after driving vehicle through gate)
Walk 150 feet to gate
Outfall #20H and Outfall #20G are 300 feet from each other
Proceed 250 feet east along Caltrans right-of-way fence
Outfall #20F is surrounded by perimeter fencing
Outfall #20E is 250 feet east of Outfall #20F

***** Water quality monitoring outfalls

Site 8 (60 Freeway) - Outfalls #23C and #B001**

These outfalls drain the 60 Fwy (west) lanes)

5 Freeway North
57 Freeway North
60 Freeway West

Exit Wilcox/Garfield Ave
Proceed straight along W. Pomona Way (one way street)
Pass Wilcox Ave intersection
Park along right side of road midway between Wilcox Ave and Garfield Ave
Enter Caltrans gate
Walk 100 feet east to reach Outfall #23C

For Access to Outfall #B001 (located on corner of W. Pomona Way/Garfield)
Proceed along W. Pomona Way (west) until before Garfield Ave
Park across the street from the perimeter fencing
Enter through the Caltrans gate to reach Outfall #B001

* Water quality monitoring outfalls

Site 8 (60 Freeway) - Outfalls #24B, #24D, #24E and #24F

Outfalls are along the right-of-way along the 60 Fwy (east)

From Outfall #B001
Proceed straight in west direction along W. Pomona Way
Turn left at Garfield Ave
Turn left on Via Campo
Park at the East West Bank on the right side along Via Campo
Walk across the street to Caltrans right-of-way gate
Proceed left (west) within the Caltrans right-of-way fence
Outfall #24B is located near the intersection of Via Campo/Garfield
Proceed east to reach Outfall #24D
Proceed further east to reach Outfall #24E
Exit Caltrans gate
Walk across the intersection to the northeast corner of Wilcox Ave. and Via Campo
Enter the Caltrans gate to reach Outfall #24F (located around the corner intersection)

ATTACHMENT 2 Inlet Deposition Monitoring Schedule

INLET DEPOSITION MONITORING TENTATIVE SCHEDULE

Month	Tuesday (Scheduled Day)	Wednesday (Contingency Day)
June	1	2
June	29	30
July	27	28
August	24	25
September	7	8
September	21	22
October	5	6
October	19	20
November	2	3
November	16	17
November	30	
December		1
December	14	15
December	27 (Mon)	28 (Tues)
January	11	12
January	25	26
February	8	9
February	22	23
March	7	8
March	21	22

ATTACHMENT 3 Equipment Checklist

INLET DEPOSITION MONITORING EQUIPMENT CHECKLIST

FIELD/SPECIALTY BOX

____ pH/Conductivity Meter (1)
____ Temperature Meter (1)
____ Keys for Caltrans gates & enclosures (1 set)
____ Pens/Pencils (3)
_____ Sigma Sampler and Flow Meter Manuals (1)
____ Health & Safety Plan (1)
____ Encroachment Permit (1)
____ Pepper Spray (1)
____ Leather Gloves (2 pairs)
____ Latex Gloves (8 pairs; some medium & large)
____ Paper Towels (1 roll)
____ Ziploc Bags (1 box)
____ Solvex (green) Gloves (2 pairs)
____ Duct Tape (1 roll)
____ First Aid Kit (1)
____ Flashlight w/ extra batteries (2)
____ Hard-hat Headlamps w/good batteries (2)
_____ Extra Straps (REI straps) (2)
_____ Disposal Camera (1)
_____ Trash Bags for waste pick-up (2)
_____ Masks (2)
_____ Goggles (1)
_____ Fire Extinguisher (1)

SAFETY/TRAFFIC EQUIPMENT

_____ Cellular Telephone (1)
_____ Hard Hat for each Crew Member
_____ Traffic Safety Vests
_____ Safety Boots (with Steel Toes)
____ 6 Traffic Cones (24")
_____ "Shoulder Work Ahead" Sign

INLET DEPOSITION MONITORING EQUIPMENT

_____ Standard Operating Procedures
_____ Measuring Rod
_____ Inlet Deposition Monitoring Forms (28)
_____ Three Rolls of 24 Exposure Film
_____ Camera (or Three Disposable Cameras) With Flash

OTHER

_____ Markal Ball Paint Marker (for grate stations)
_____ White & Red Spray Paint (for remarking LMPS inlets)

Note: If any non-reusable items are used, replace the item at the end of the workday. The Field/ Specialty Box is also used for storm water sampling therefore items may be needed in a moments notice during the "Rain Season". If any items are missing, restock and if item is out of stock please let the coordinator know for purchasing.

Signature_____ Date _____ Time: _____

URSGWC – Caltrans Litter Management Pilot Study

Inlet Deposition Monitoring - Initial Set Up

Date: 5/13/1999 Field Crew: AY/HR/TL/NJ

Site Number: 1 (East + West) Inlet Number: All Double Grates for Site 1E+1W

Inlet Description (circle one):

Single Grate (Double Grate) Single Grate Structural BMP Double Grate Structural BMP

Overhang Inlet?: Yes ☑ No ☐

Distance of Stations from Pavement:

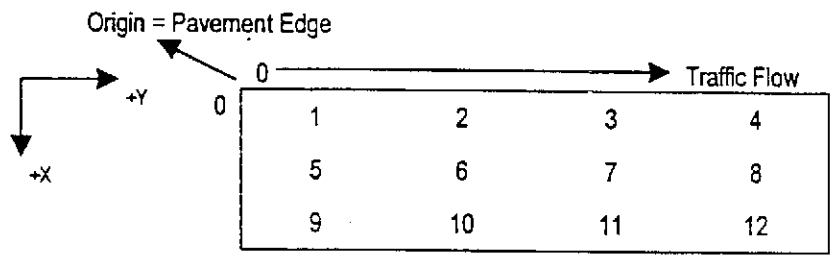

In all cases place the station number on the grate bar closest to the below coordinates.

Station 1	Station 2	Station 3	Station 4
X 11 in	X 11 in	X 11 in	X 11 in
Y 4.5 in	Y 13 in	Y 21.5 in	Y 30 in

Station 5	Station 6	Station 7	Station 8
X 24.5 in	X 24.5 in	X 24.5 in	X 24.5 in
Y 4.5 in	Y 13 in	Y 21.5 in	Y 30 in

Station 9	Station 10	Station 11	Station 12
X 38 in	X 38 in	X 38 in	X 38 in
Y 4.5 in	Y 13 in	Y 21.5 in	Y 30 in

Painted? (check when completed) Do Not Clean ☑ Caltrans ID# ☑ Station Points ☑ Not Symbol ☑ URSGWC ID# ☑

URSGWC – Caltrans Litter Management Pilot Study

Inlet Deposition Monitoring Initial Set Up

Date: 5/12/1999 Field Crew: AY/HR/TL/NJ

Site Number: 6 Inlet Number: All Double Grates w/ BMP

Inlet Description (circle one):

Single Grate | Double Grate | Single Grate Structural BMP | Double Grate Structural BMP

Overhang Inlet?: Yes ☐ No ☑

Distance of Stations from Pavement:

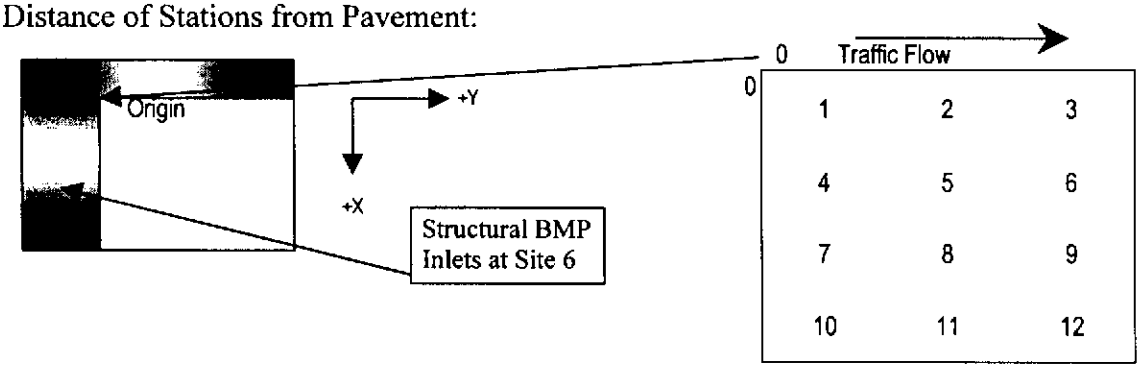

In all cases place the station number on the grate bar closest to the below coordinates.

Station 1	Station 2	Station 3
X 2 in	X 2 in	X 2 in
Y 1 in	Y 9 in	Y 22 in
Station 4	**Station 5**	**Station 6**
X 11 in	X 11 in	X 11 in
Y 1 in	Y 9 in	Y 22 in
Station 7	**Station 8**	**Station 9**
X 21.5 in	X 21.5 in	X 21.5 in
Y 1 in	Y 9 in	Y 22 in
Station 10	**Station 11**	**Station 12**
X 31 in	X 31 in	X 31 in
Y 1 in	Y 9 in	Y 22 in

Painted? (check when completed) Do Not Clean ☑ Caltrans ID# ☑ Station Points ☑ Not Symbol ☑ URSGWC ID# ☑

URSGWC – Caltrans Litter Management Pilot Study

Inlet Deposition Monitoring - Initial Set Up

Date: 5/12/1999 Field Crew: AV/HR/TL/NJ

Site Number: 6 Inlet Number: All Double Grates

Inlet Description (circle one):

Single Grate | (Double Grate) | Single Grate Structural BMP | Double Grate Structural BMP

Overhang Inlet?: Yes ☐ No ☑

Distance of Stations from Pavement:

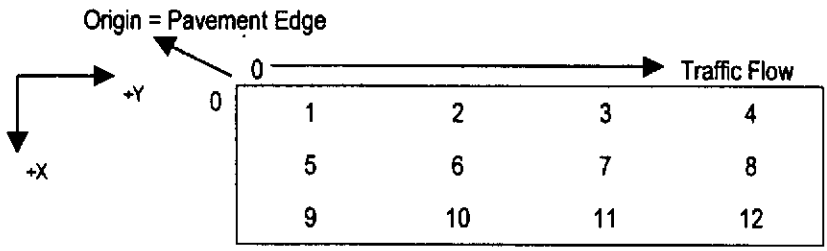

In all cases place the station number on the grate bar closest to the below coordinates.

Station 1	Station 2	Station 3	Station 4
X 9 in	X 9 in	X 9 in	X 9 in
Y 4.5 in	Y 13.5 in	Y 22.5 in	Y 31.5 in

Station 5	Station 6	Station 7	Station 8
X 25 in	X 25 in	X 25 in	X 25 in
Y 4.5 in	Y 13.5 in	Y 22.5 in	Y 31.5 in

Station 9	Station 10	Station 11	Station 12
X 39 in	X 39 in	X 39 in	X 39 in
Y 4.5 in	Y 13.5 in	Y 22.5 in	Y 31.5 in

Painted? (check when completed) Do Not Clean ☑ Caltrans ID# ☑ Station Points ☑ Not Symbol ☑ URSGWC ID# ☑

URSGWC – Caltrans Litter Management Pilot Study

Inlet Deposition Monitoring - Initial Set Up

Date: 5/12/1999 Field Crew: AY/HR/TL/NJ

Site Number: 8 Inlet Number: All Single Grates w/ BMP

Inlet Description (circle one):

Single Grate | Double Grate | Single Grate Structural BMP | Double Grate Structural BMP

Overhang Inlet?: Yes ☑ No ☐

Distance of Stations from Pavement:

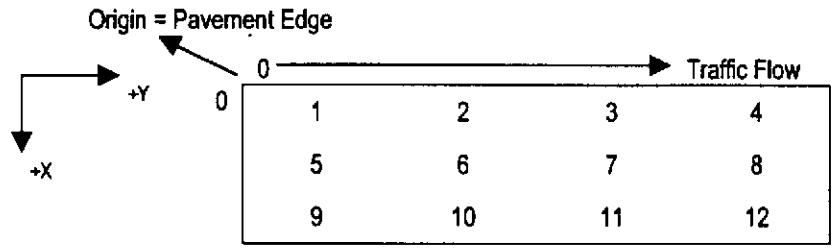

In all cases place the station number on the grate bar closest to the below coordinates.

Station 1	Station 2	Station 3	Station 4
X 5.5 in	X 5.5 in	X 5.5 in	X 5.5 in
Y 4.5 in	Y 13.25 in	Y 22 in	Y 30.75 in

Station 5	Station 6	Station 7	Station 8
X 13 in	X 13 in	X 13 in	X 13 in
Y 4.5 in	Y 13.25 in	Y 22 in	Y 30.75 in

Station 9	Station 10	Station 11	Station 12
X 21 in	X 21 in	X 21 in	X 21 in
Y 4.5 in	Y 13.25 in	Y 22 in	Y 30.75 in

Painted? (check when completed) Do Not Clean ☑ Caltrans ID# ☑ Station Points ☑ Not Symbol ☑ URSGWC ID# ☑

URSGWC – Caltrans Litter Management Pilot Study

Inlet Deposition Monitoring - Initial Set Up

Date: 5/12/1999 Field Crew: AY/HR/TL/NJ

Site Number: 8 Inlet Number: All Single Grates

Inlet Description (circle one):

(Single Grate) Double Grate Single Grate Structural BMP Double Grate Structural BMP

Overhang Inlet?: Yes ☑ No ☐

Distance of Stations from Pavement:

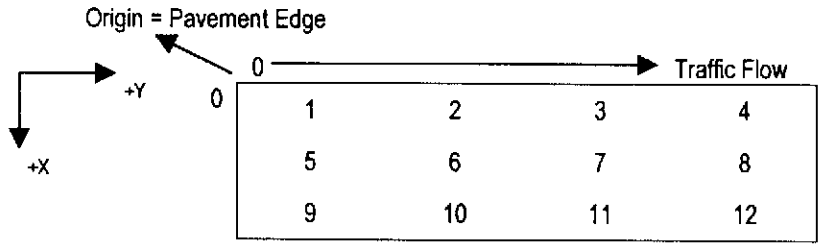

In all cases place the station number on the grate bar closest to the below coordinates.

Station 1	Station 2	Station 3	Station 4
X 5 in	X 5 in	X 5 in	X 5 in
Y 3.75 in	Y 12.5 in	Y 21.25 in	Y 30 in

Station 5	Station 6	Station 7	Station 8
X 13 in	X 13 in	X 13 in	X 13 in
Y 3.75 in	Y 12.5 in	Y 21.25 in	Y 30 in

Station 9	Station 10	Station 11	Station 12
X 21 in	X 21 in	X 21 in	X 21 in
Y 3.75 in	Y 12.5 in	Y 21.25 in	Y 30 in

Painted? (check when completed) Do Not Clean ☑ Caltrans ID# ☑ Station Points ☑ Not Symbol ☑ URSGWC ID# ☑

URSGWC – Caltrans Litter Management Pilot Study

Inlet Deposition Monitoring - Initial Set Up

Date: 12/14/99

Field Crew: D Vukic, L. Forest

Site Number: C009/B001

Inlet Number: C009/B001

Inlet Description (circle one):

Single Grate | Double Grate | Single Grate Structural BMP – Flap Gate | Double Grate Structural BMP

Overhang Inlet?: Yes ☐ No ☐

Distance of Stations from Pavement:

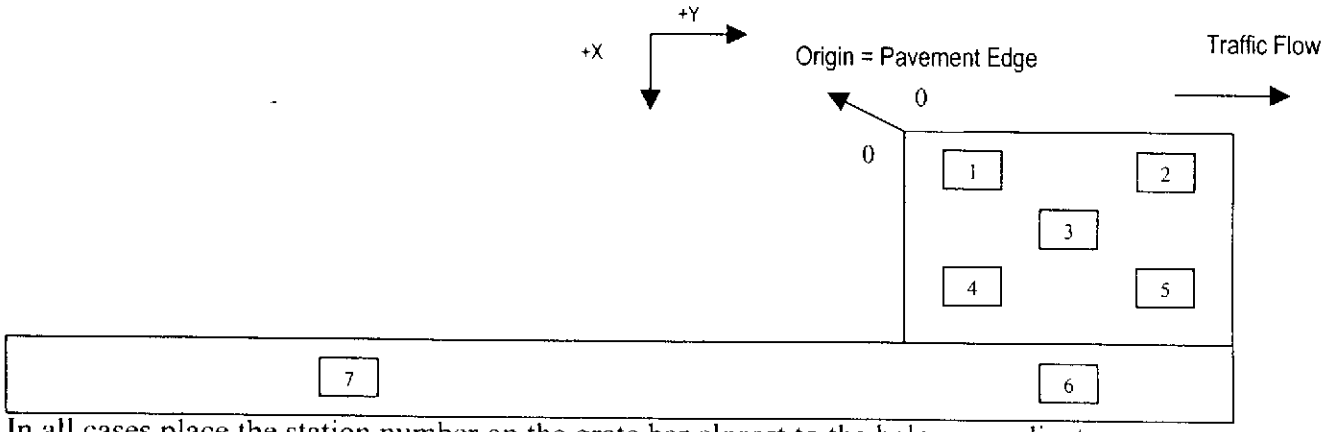

In all cases place the station number on the grate bar closest to the below coordinates.

Station 1	Station 2	Station 3	Station 4
X 4" in	X 4" in	X 12" in	X 20.25" in
Y 12" in	Y 28" in	Y 20" in	Y 12.5" in

Station 5	Station 6	Station 7
X 20" in	X 32" in	X 33" in
Y 27" in	Y 20" in	Y .74" in

Painted? (check when completed) Do Not Clean ☐ Caltrans ID# ☐ Station Points ☐ Not Symbol ☐ URSGWC ID# ☐

URSGWC – Caltrans Litter Management Pilot Study

Inlet Deposition Monitoring - Initial Set Up

Date: 12/14/99 Field Crew: D. Vukovic, I. Forrest

Site Number: C001 - 24B Inlet Number: C001 - 24B

Inlet Description (circle one):

Single Grate | Double Grate | Single Grate Structural BMP – Flap Gate | Double Grate Structural BMP

Overhang Inlet?: Yes ☐ No ☐

Distance of Stations from Pavement:

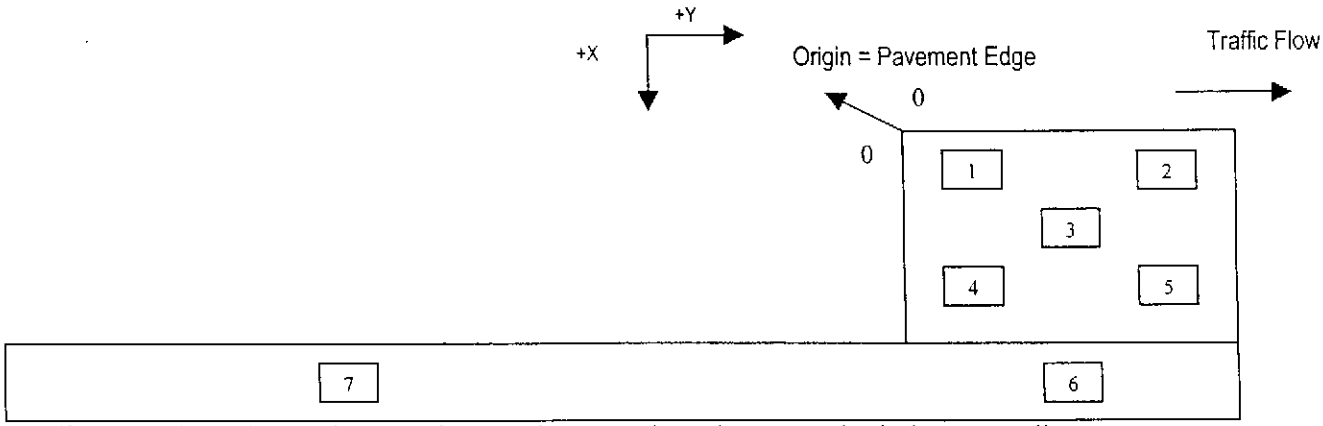

In all cases place the station number on the grate bar closest to the below coordinates.

Station 1	Station 2	Station 3	Station 4
X 4" in	X 4 in	X 12 in	X 20.25 in
Y 12 in	Y 27.5 in	Y 20 in	Y 13 in

Station 5	Station 6	Station 7
X 20.5 in	X 32.5 in	X 32.5 in
Y 27.25 in	Y 21.5 in	Y 34.5 in

Painted? (check when completed) Do Not Clean ☐ Caltrans ID# ☐ Station Points ☐ Not Symbol ☐ URSGWC ID# ☐

URSGWC – Caltrans Litter Management Pilot Study

Inlet Deposition Monitoring - Initial Set Up

Date: 12/14/99 Field Crew: D. Vukov / Forrest

Site Number: C007 - 24F Inlet Number: C007 - 24F

Inlet Description (circle one):

Single Grate | Double Grate | Single Grate Structural BMP – Flap Gate | Double Grate Structural BMP

Overhang Inlet?: Yes ☐ No ☐

Distance of Stations from Pavement:

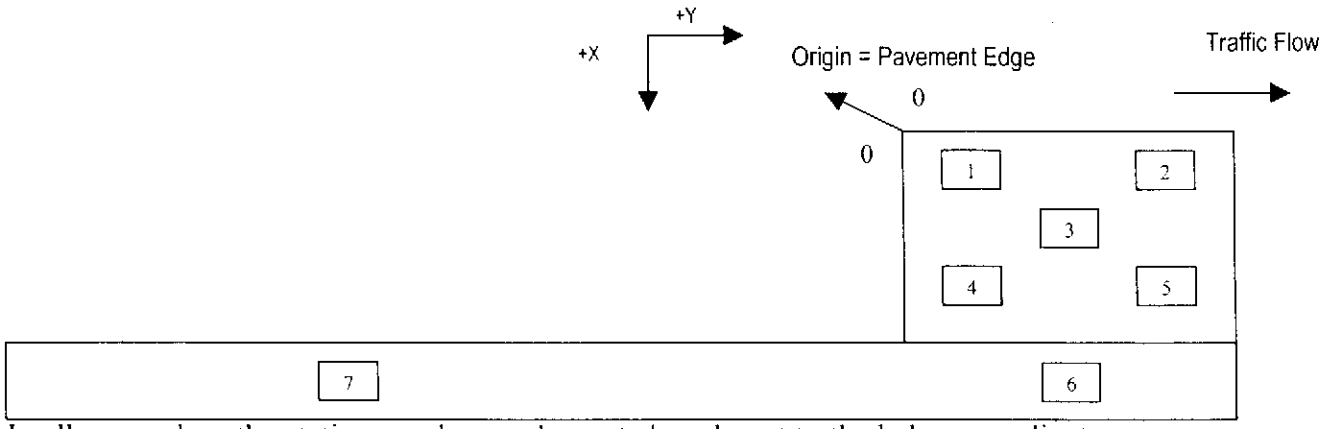

In all cases place the station number on the grate bar closest to the below coordinates.

Station 1	Station 2	Station 3	Station 4
X 4 in	X 4 in	X 12.25 in	X 20.25 in
Y 13 in	Y 27.5 in	Y 20.25 in	Y 13 in

Station 5	Station 6	Station 7
X 20.25 in	X 32 in	X 32 in
Y 27.25 in	Y 21.5 in	Y -123 in

Painted? (check when completed) Do Not Clean ☐ Caltrans ID# ☐ Station Points ☐ Not Symbol ☐ URSGWC ID# ☐

URSGWC- Caltrans Litter Management Pilot Study
Inlet Deposition Monitoring
Field Measurements & Observations

009168

Field Crew: _____ **Date:** _____

Total Miles Driven: _____ **Site Number:** _____

Problems/Peripheral Conditions that could possibly affect study: _____

_____ (cont. on back if necessary)

Moisture is either:

Dry (D);
Moist (M); or
Saturated (S).

>>> Traffic Flow >>>

Quadrant 1 (Q 1)	Quadrant 2 (Q 2)
Quadrant 3 (Q 3)	Quadrant 4 (Q 4)

Inlet Description

Single Grate	SG
Sinlge Grate Structural BMP	SG/BMP
Double Grate	DG
Double Grate Structural BMP	DG/BMP

Inlet Number: **Inlet Description (circle one)** SG SG/BMP DG DG/BMP

Description of Inlet Contents (i.e., leaves and newspaper) Downstream Road:

	Q 1	Q 2	Q 3	Q 4
Concrete Bottom	%	%	%	%
Sediment	%	%	%	%
Vegetation	%	%	%	%
Litter	%	%	%	%
Moisture				

Inlet Deposition Measurements per station in feet.

	1	2	3	4
Uncompacted				
Compacted				
	5	6	7	8
Uncompacted				
Compacted				
	9	10	11	12
Uncompacted				
Compacted				

Pictures Taken (check when completed)

Inlet Number w/ Surrounding Area Inlet w/ Contents

Inlet Number: **Inlet Description (circle one)** SG SG/BMP DG DG/BMP

Description of Inlet Contents (i.e., leaves and newspaper) Downstream Road:

	Q 1	Q 2	Q 3	Q 4
Concrete Bottom	%	%	%	%
Sediment	%	%	%	%
Vegetation	%	%	%	%
Litter	%	%	%	%
Moisture				

Inlet Deposition Measurements per station in feet.

	1	2	3	4
Uncompacted				
Compacted				
	5	6	7	8
Uncompacted				
Compacted				
	9	10	11	12
Uncompacted				
Compacted				

Pictures Taken (check when completed)

Inlet Number w/ Surrounding Area Inlet w/ Contents

Inlet Number: **Inlet Description (circle one)** SG SG/BMP DG DG/BMP

Description of Inlet Contents (i.e., leaves and newspaper) Downstream Road:

	Q 1	Q 2	Q 3	Q 4
Concrete Bottom	%	%	%	%
Sediment	%	%	%	%
Vegetation	%	%	%	%
Litter	%	%	%	%
Moisture				

Inlet Deposition Measurements per station in feet.

	1	2	3	4
Uncompacted				
Compacted				
	5	6	7	8
Uncompacted				
Compacted				
	9	10	11	12
Uncompacted				
Compacted				

Pictures Taken (check when completed)

Inlet Number w/ Surrounding Area Inlet w/ Contents

Inlet Number: **Inlet Description (circle one)** SG SG/BMP DG DG/BMP

Description of Inlet Contents
(i.e., leaves and newspaper) Downstream Road:

	Q 1	Q 2	Q 3	Q 4
Concrete Bottom	%	%	%	%
Sediment	%	%	%	%
Vegetation	%	%	%	%
Litter	%	%	%	%
Moisture				

Pictures Taken (check when completed)

Inlet Number w/ Surrounding Area Inlet w/ Contents

Inlet Deposition Measurements per station in feet.

	1	2	3	4
Uncompacted				
Compacted				
	5	6	7	8
Uncompacted				
Compacted				
	9	10	11	12
Uncompacted				
Compacted				

Inlet Number: **Inlet Description (circle one)** SG SG/BMP DG DG/BMP

Description of Inlet Contents
(i.e., leaves and newspaper) Downstream Road:

	Q 1	Q 2	Q 3	Q 4
Concrete Bottom	%	%	%	%
Sediment	%	%	%	%
Vegetation	%	%	%	%
Litter	%	%	%	%
Moisture				

Pictures Taken (check when completed)

Inlet Number w/ Surrounding Area Inlet w/ Contents

Inlet Deposition Measurements per station in feet.

	1	2	3	4
Uncompacted				
Compacted				
	5	6	7	8
Uncompacted				
Compacted				
	9	10	11	12
Uncompacted				
Compacted				

Inlet Number: **Inlet Description (circle one)** SG SG/BMP DG DG/BMP

Description of Inlet Contents
(i.e., leaves and newspaper) Downstream Road:

	Q 1	Q 2	Q 3	Q 4
Concrete Bottom	%	%	%	%
Sediment	%	%	%	%
Vegetation	%	%	%	%
Litter	%	%	%	%
Moisture				

Pictures Taken (check when completed)

Inlet Number w/ Surrounding Area Inlet w/ Contents

Inlet Deposition Measurements per station in feet.

	1	2	3	4
Uncompacted				
Compacted				
	5	6	7	8
Uncompacted				
Compacted				
	9	10	11	12
Uncompacted				
Compacted				

Notes

URSGWC- Caltrans Litter Management Pilot Study
Inlet Deposition Monitoring
Field Measurements & Observations

009170

Field Crew: _____ **Date:** _____

Total Miles Driven: _____ **Site Number:** **8**

Problems/Peripheral Conditions that could possibly affect study: _____

(cont. on back if necessary)

Flap Gate BMP

>>> Traffic Flow >>>

	1	2
	3	
	4	5
7	6	

Moisture is either:

Dry (D);
Moist (M); or
Saturated (S).

Inlet Description

Single Grate	SG
Sinlge Grate Structural BMP	SG/BMP
Double Grate	DG
Double Grate Structural BMP	DG/BMP

Inlet Number: **Inlet Description (circle one)** SG SG/BMP DG DG/BMP

Description of Inlet Contents
(i.e., leaves and newspaper) Downstream Road:

	Q 1	Q 2	Q 3	Q 4
Concrete Bottom	%	%	%	%
Sediment	%	%	%	%
Vegetation	%	%	%	%
Litter	%	%	%	%
Moisture				

Pictures Taken (check when completed)

Inlet Number w/ Surrounding Area Inlet w/ Contents

Inlet Deposition Measurements per station in feet.

	1	2	3	4
Uncompacted				
Compacted				

	5	6	7	8
Uncompacted				
Compacted				

	9	10	11	12
Uncompacted				
Compacted				

Description of Inlet Contents
(i.e., leaves and newspaper) Downstream Road:

	Q 1	Q 2	Q 3	Q 4
Concrete Bottom	%	%	%	%
Sediment	%	%	%	%
Vegetation	%	%	%	%
Litter	%	%	%	%
Moisture				

Pictures Taken (check when completed)

Inlet Number w/ Surrounding Area Inlet w/ Contents

Inlet Deposition Measurements per station in feet.

	1	2	3	4
Uncompacted				
Compacted				

	5	6	7
Uncompacted			
Compacted			

Description of Inlet Contents
(i.e., leaves and newspaper) Downstream Road:

	Q 1	Q 2	Q 3	Q 4
Concrete Bottom	%	%	%	%
Sediment	%	%	%	%
Vegetation	%	%	%	%
Litter	%	%	%	%
Moisture				

Pictures Taken (check when completed)

Inlet Number w/ Surrounding Area Inlet w/ Contents

Inlet Deposition Measurements per station in feet.

	1	2	3	4
Uncompacted				
Compacted				

	5	6	7
Uncompacted			
Compacted			

Inlet Number: **Inlet Description (circle one)** SG SG/BMP DG DG/BMP 009171

Description of Inlet Contents
(i.e., leaves and newspaper) Downstream Road:

	Q 1	Q 2	Q 3	Q 4
Concrete Bottom	%	%	%	%
Sediment	%	%	%	%
Vegetation	%	%	%	%
Litter	%	%	%	%
Moisture				

Pictures Taken (check when completed)

Inlet Number w/ Surrounding Area Inlet w/ Contents

Inlet Deposition Measurements per station in feet.

	1	2	3	4
Uncompacted				
Compacted				

	5	6	7	8
Uncompacted				
Compacted				

	9	10	11	12
Uncompacted				
Compacted				

Inlet Number: **Inlet Description (circle one)** SG SG/BMP DG DG/BMP

Description of Inlet Contents
(i.e., leaves and newspaper) Downstream Road:

	Q 1	Q 2	Q 3	Q 4
Concrete Bottom	%	%	%	%
Sediment	%	%	%	%
Vegetation	%	%	%	%
Litter	%	%	%	%
Moisture				

Pictures Taken (check when completed)

Inlet Number w/ Surrounding Area Inlet w/ Contents

Inlet Deposition Measurements per station in feet.

	1	2	3	4
Uncompacted				
Compacted				

	5	6	7	8
Uncompacted				
Compacted				

	9	10	11	12
Uncompacted				
Compacted				

Description of Inlet Contents
(i.e., leaves and newspaper) Downstream Road:

	Q 1	Q 2	Q 3	Q 4
Concrete Bottom	%	%	%	%
Sediment	%	%	%	%
Vegetation	%	%	%	%
Litter	%	%	%	%
Moisture				

Pictures Taken (check when completed)

Inlet Number w/ Surrounding Area Inlet w/ Contents

Inlet Deposition Measurements per station in feet.

	1	2	3	4
Uncompacted				
Compacted				

	5	6	7
Uncompacted			
Compacted			

Notes

Figure G-1. SUMMARY STATISTICS FOR WATER QUALITY CONSTITUENTS

Cadmium, Dissolved

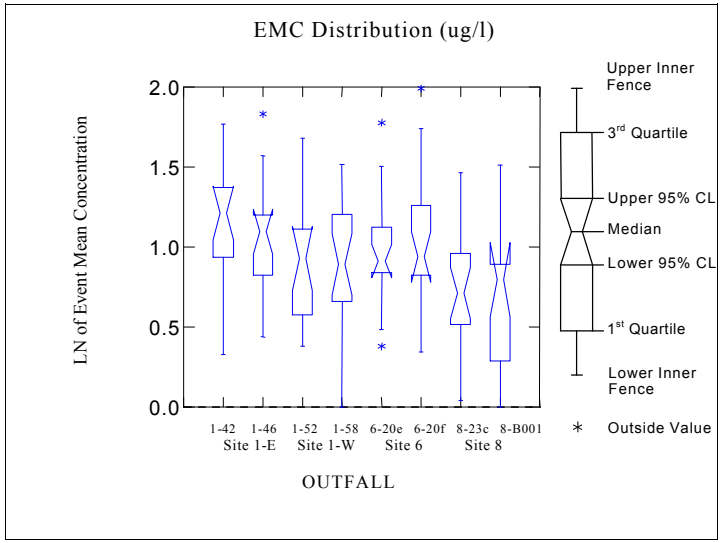

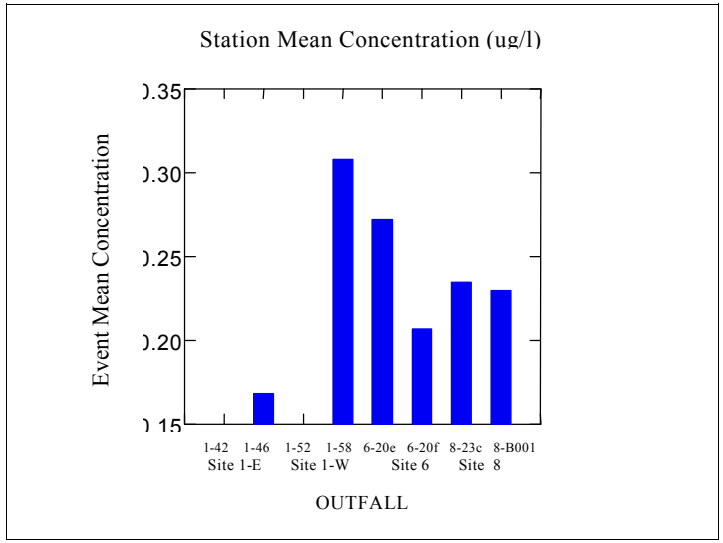

Cadmium, Total

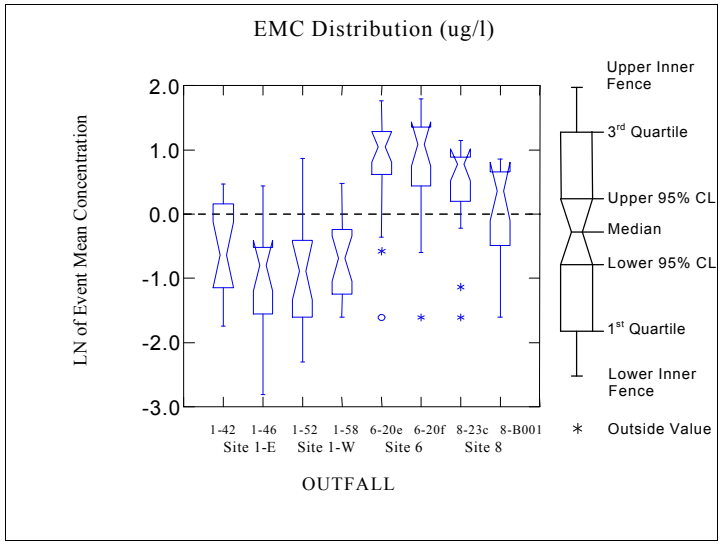

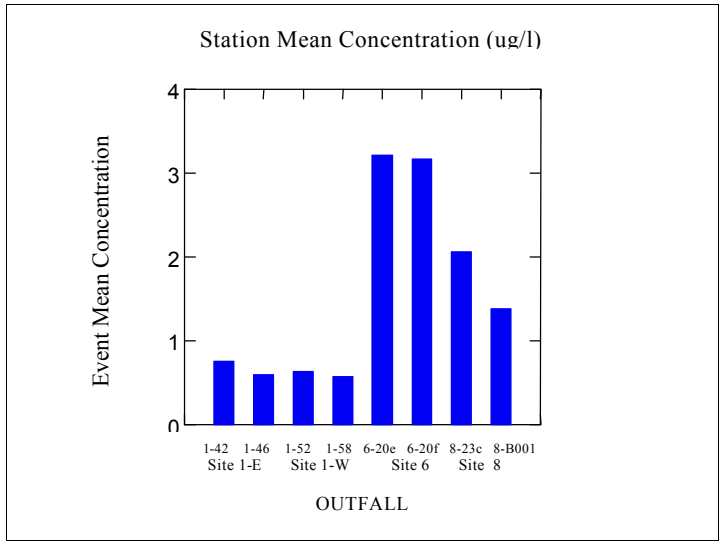

Figure G-1. SUMMARY STATISTICS FOR WATER QUALITY CONSTITUENTS

Chromium, Dissolved

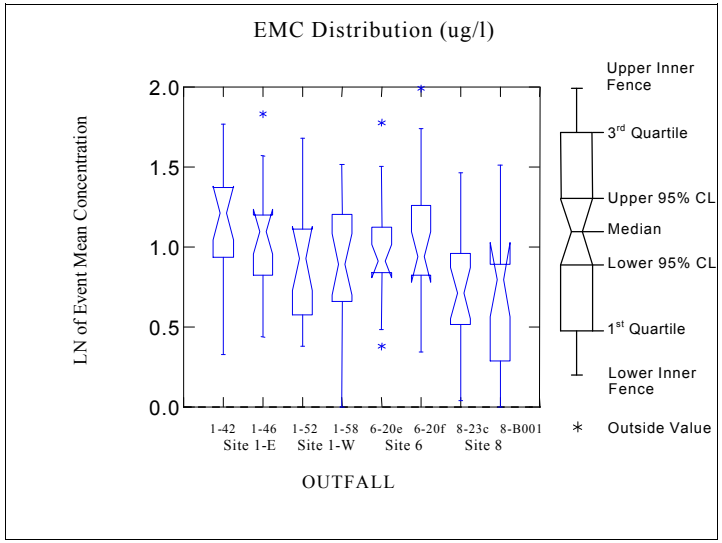

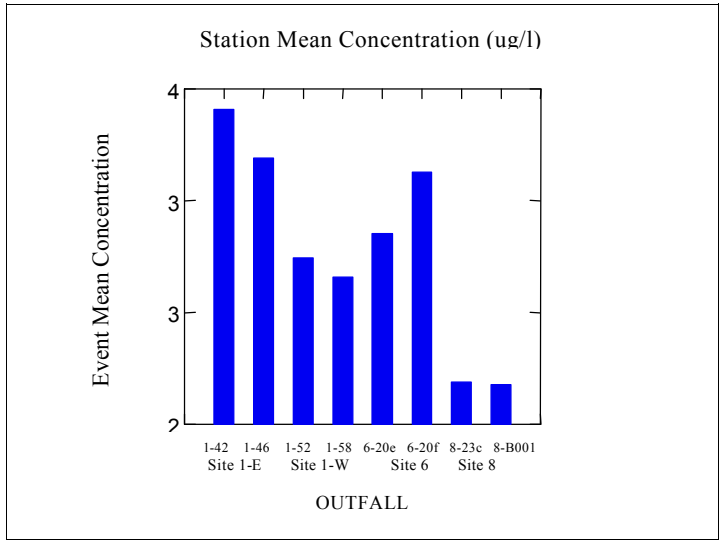

Chromium, Total

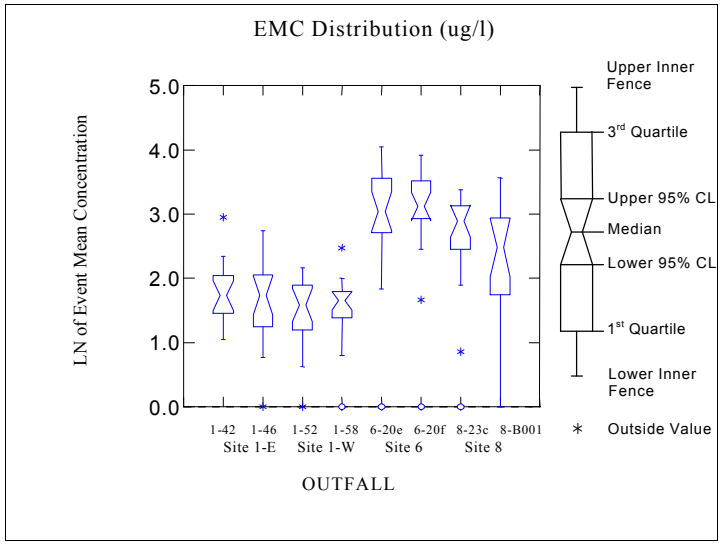

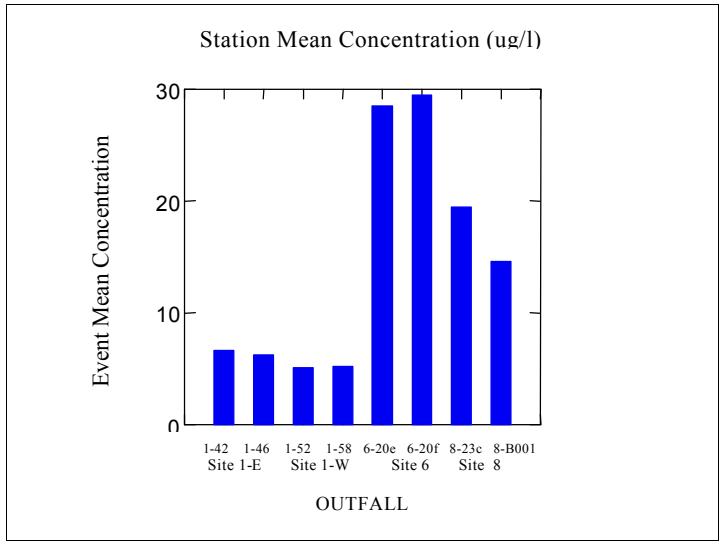

Figure G-1. SUMMARY STATISTICS FOR WATER QUALITY CONSTITUENTS

Copper, Dissolved

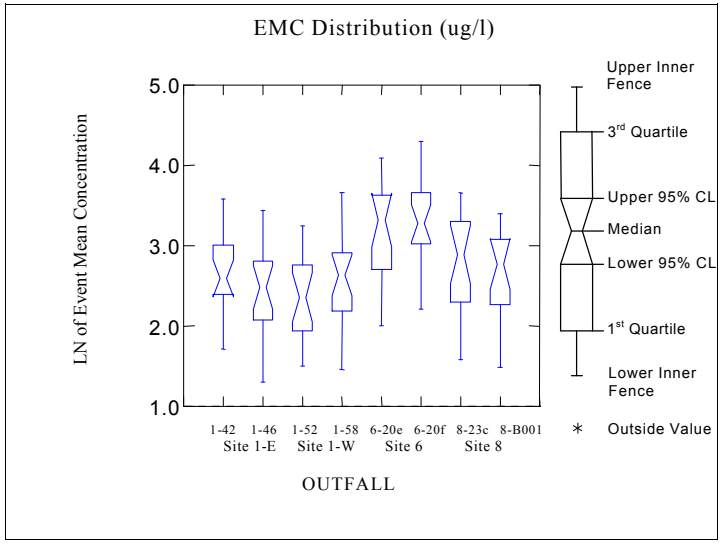

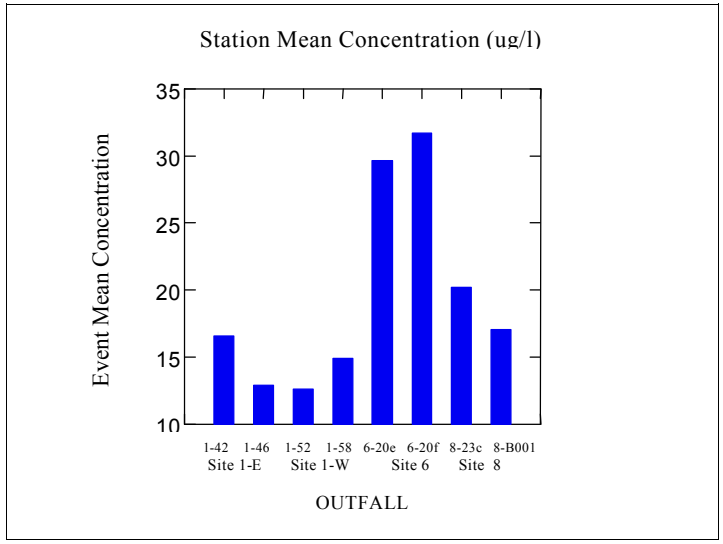

Copper, Total

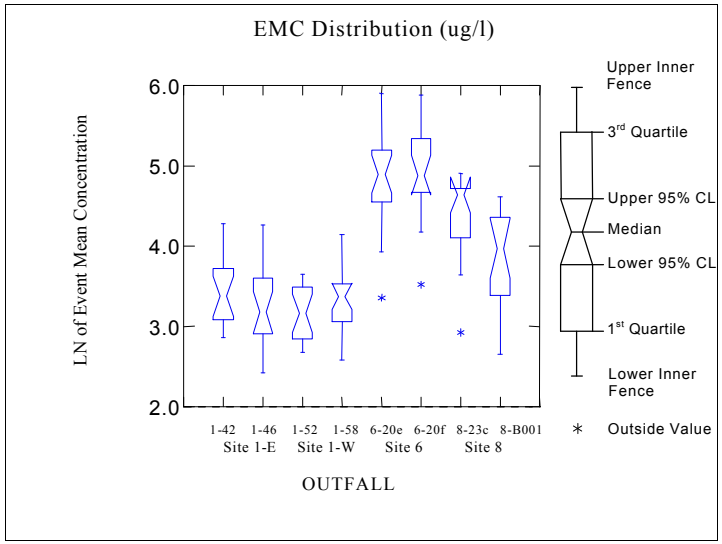

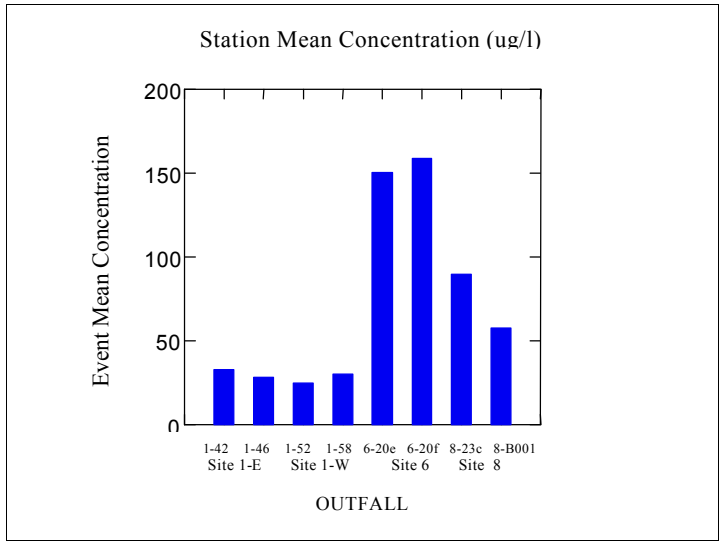

Figure G-1. SUMMARY STATISTICS FOR WATER QUALITY CONSTITUENTS

Nickel, Dissolved

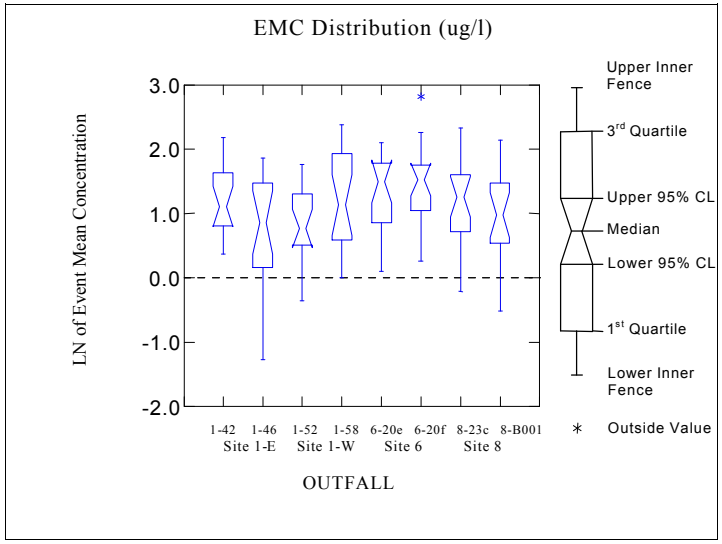

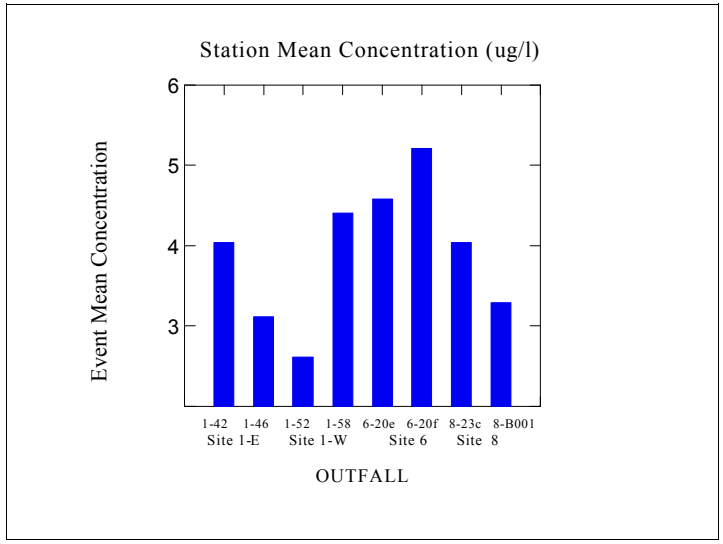

Nickel, Total

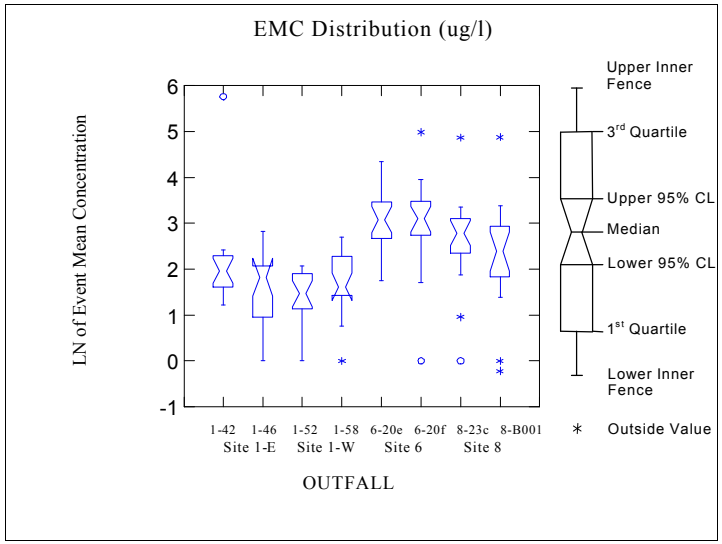

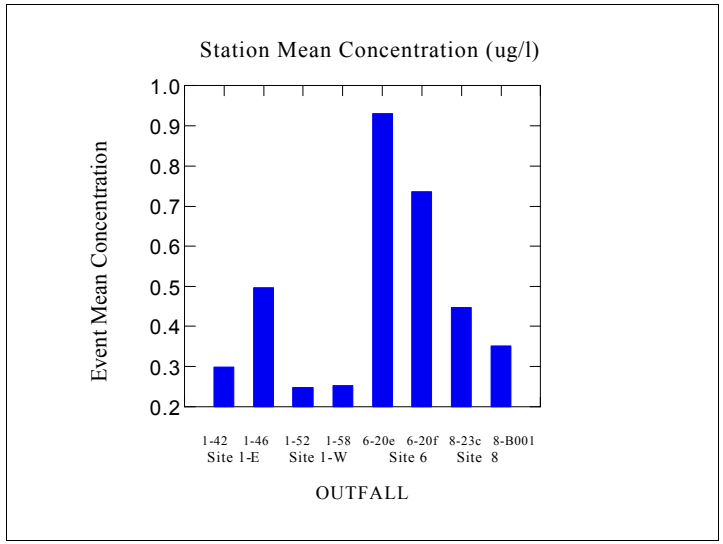

Figure G-1. SUMMARY STATISTICS FOR WATER QUALITY CONSTITUENTS

Lead, Dissolved

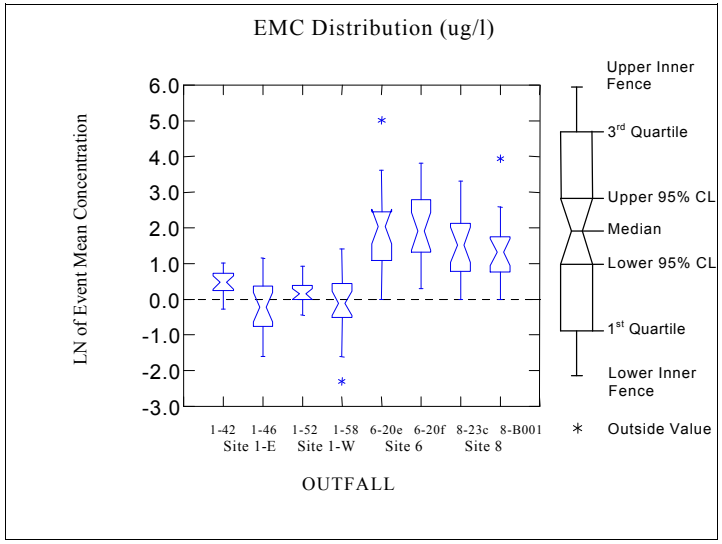

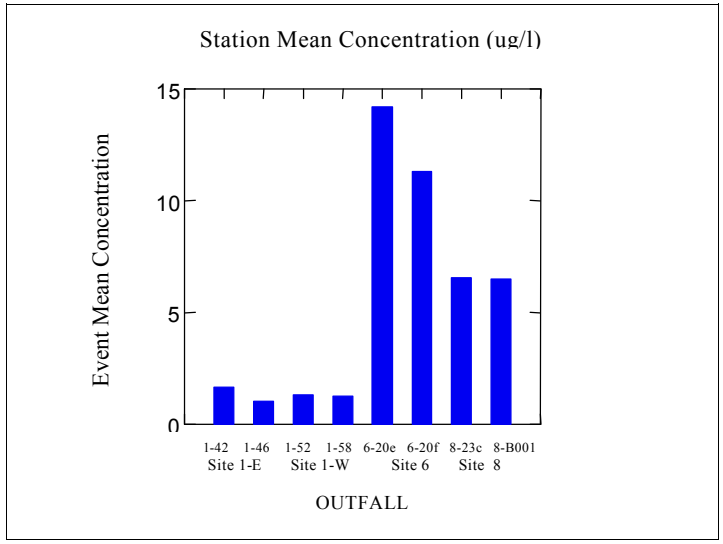

Lead, Total

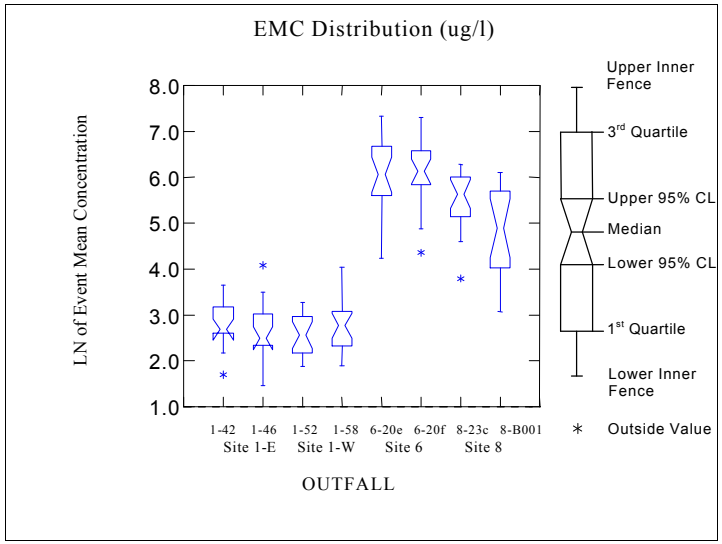

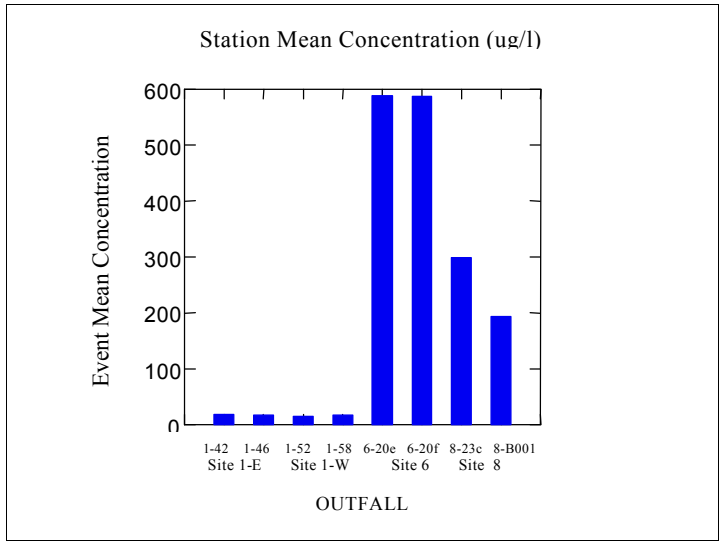

Figure G-1. SUMMARY STATISTICS FOR WATER QUALITY CONSTITUENTS

Zinc, Dissolved

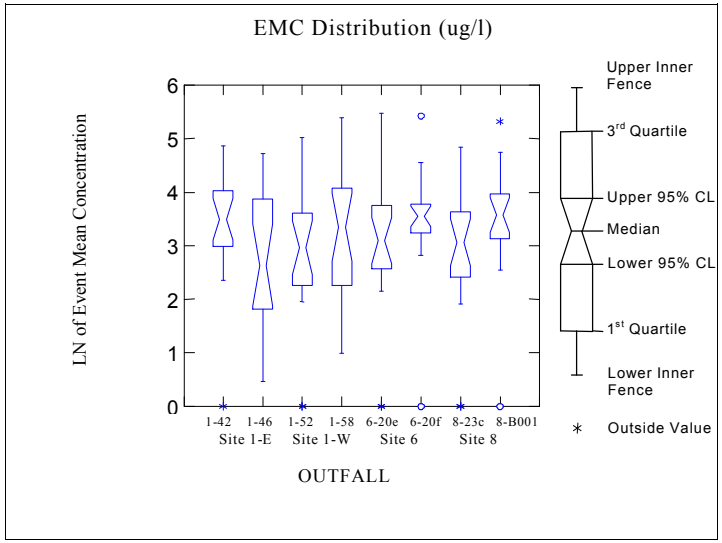

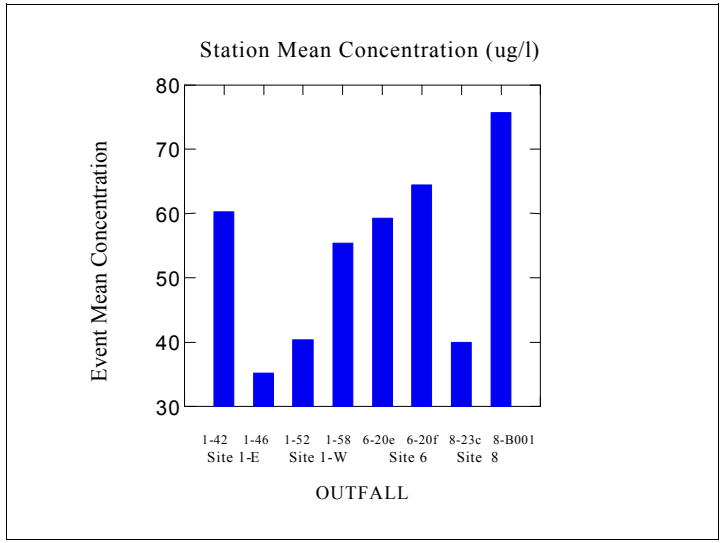

Zinc, Total

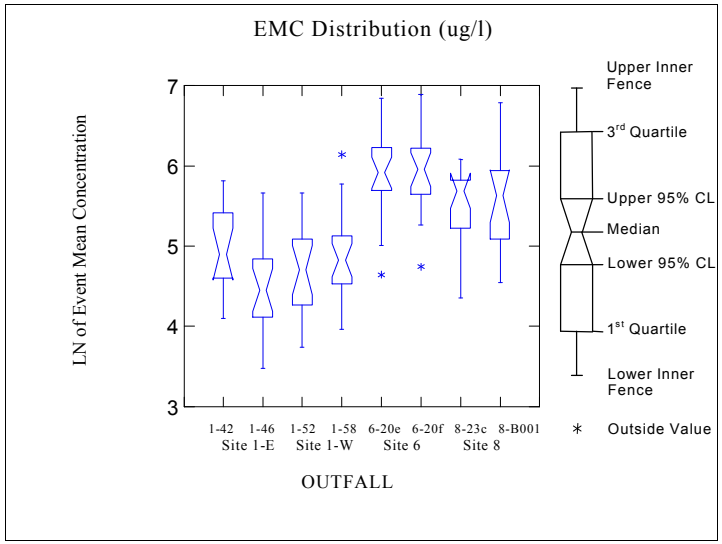

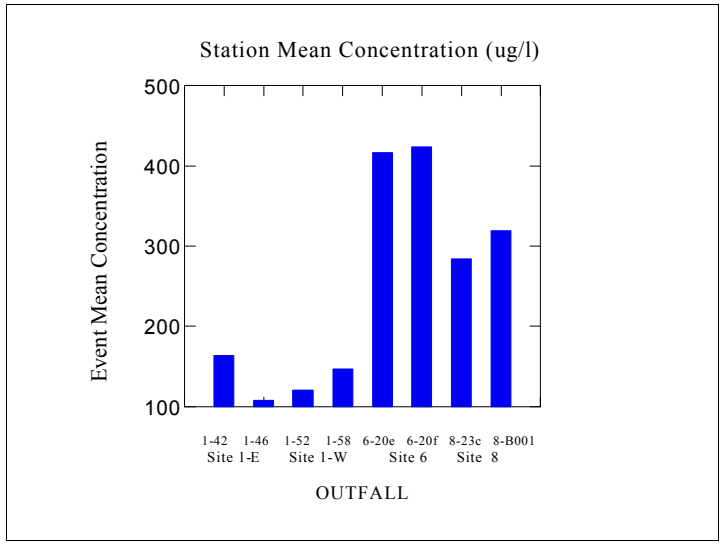

Figure G-1. SUMMARY STATISTICS FOR WATER QUALITY CONSTITUENTS

Nitrate Nitrogen 1998

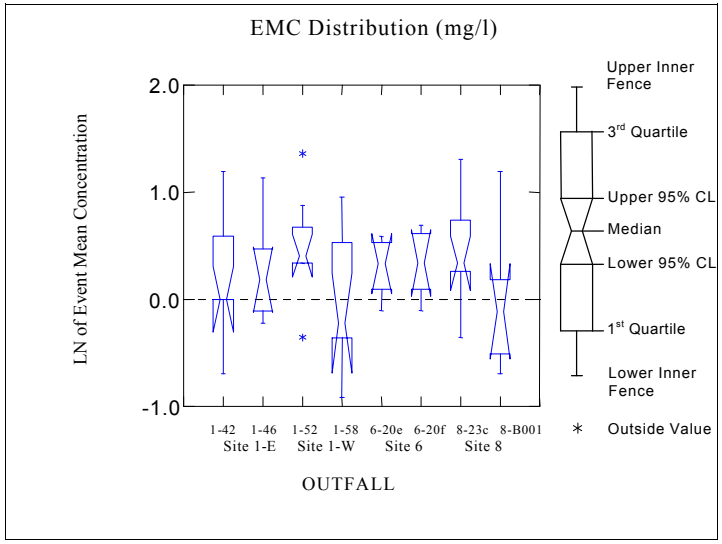

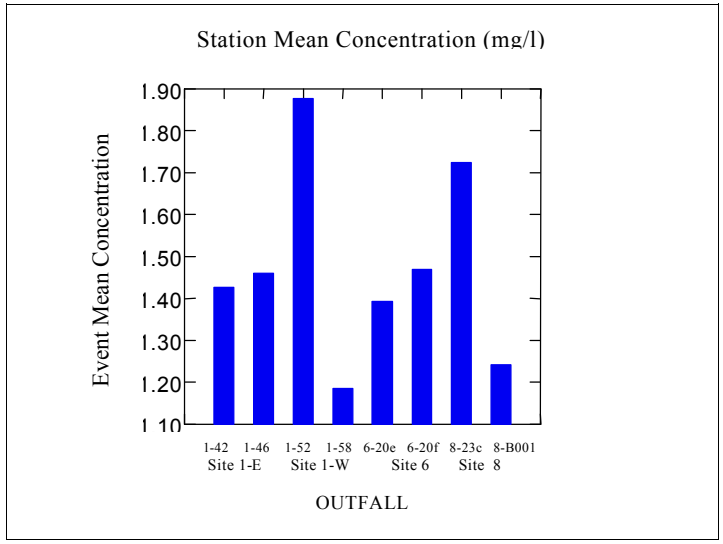

Nitrate Nitrogen 1999

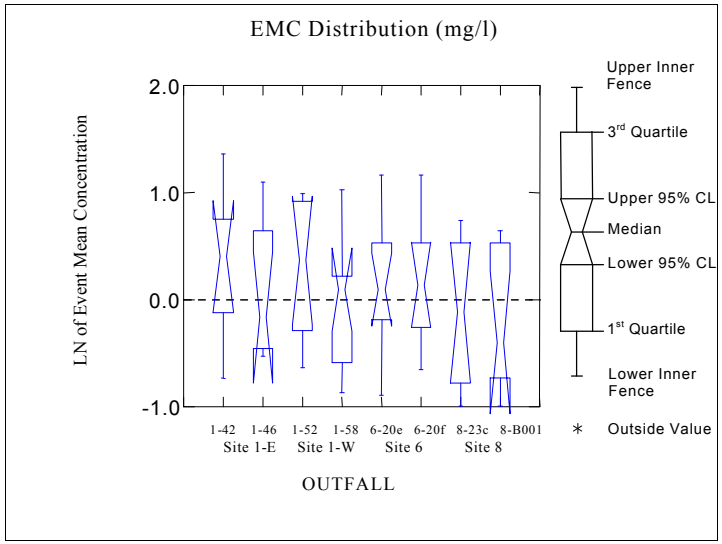

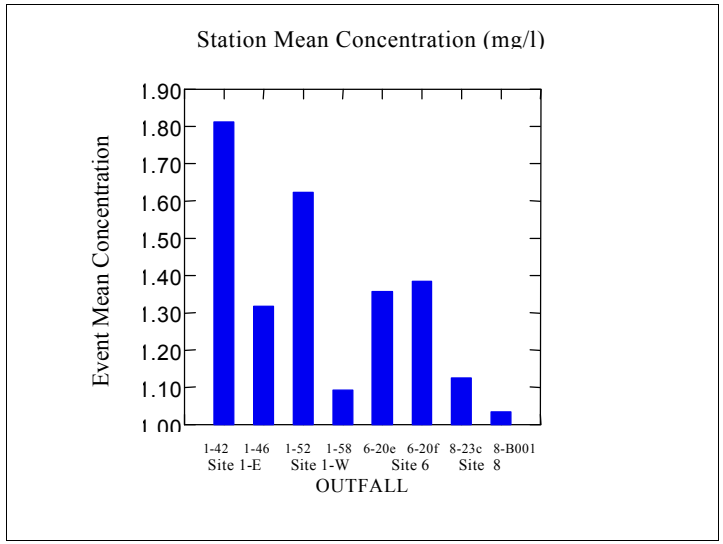

Figure G-1. SUMMARY STATISTICS FOR WATER QUALITY CONSTITUENTS

Total Kjedhal Nitrogen

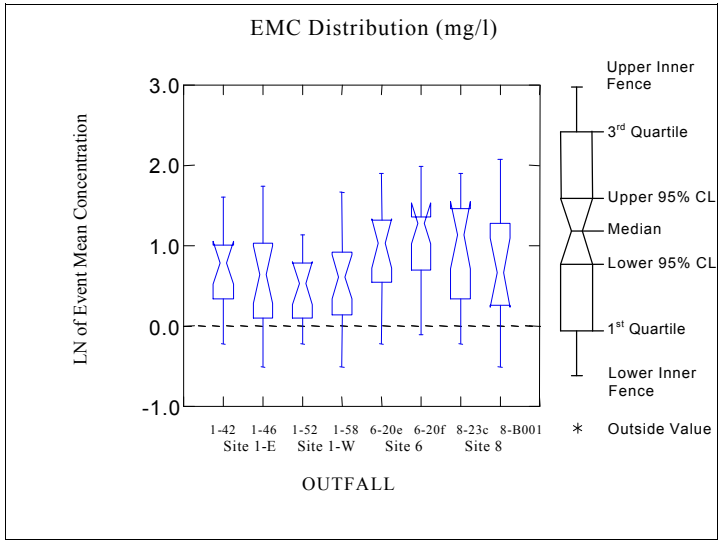

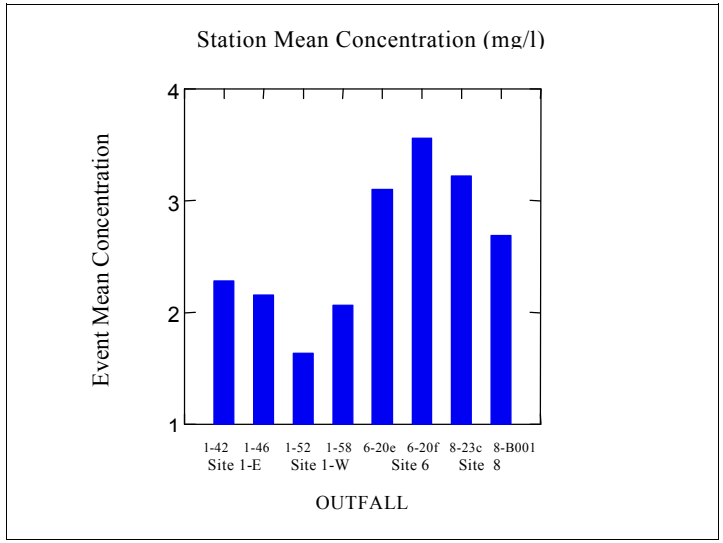

Ortho-Phosphorus

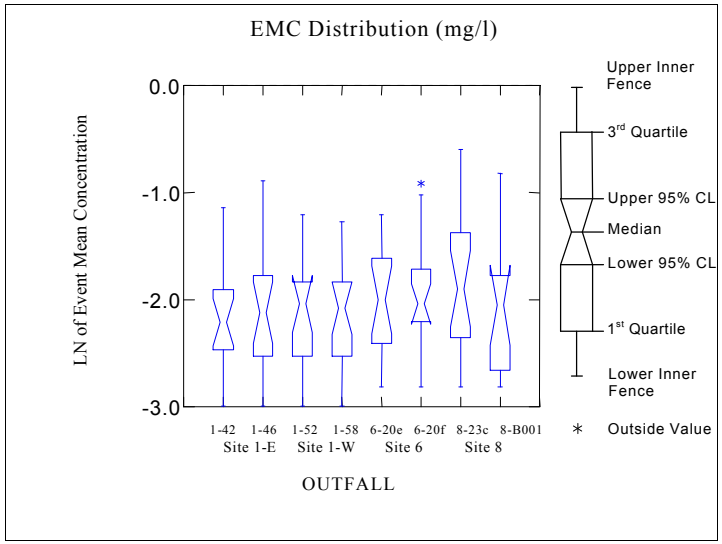

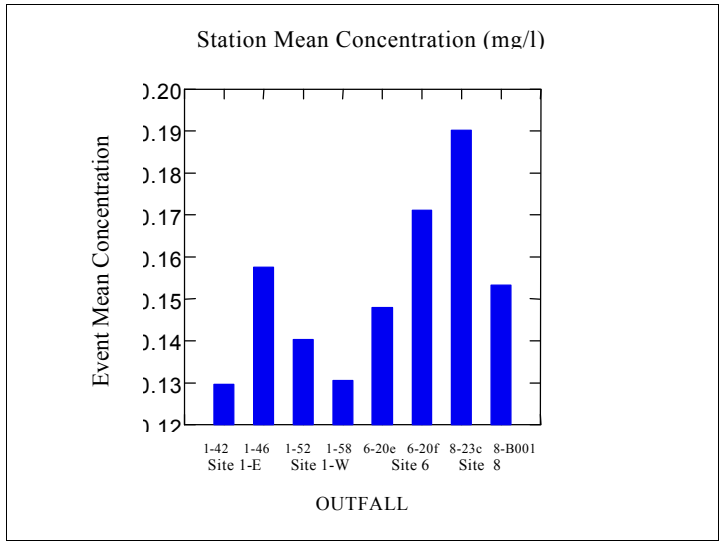

Figure G-1. SUMMARY STATISTICS FOR WATER QUALITY CONSTITUENTS

Total Phosphorus

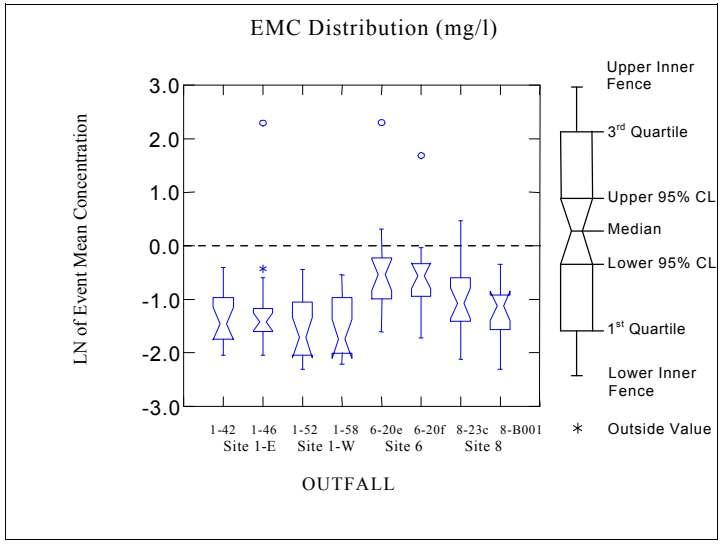

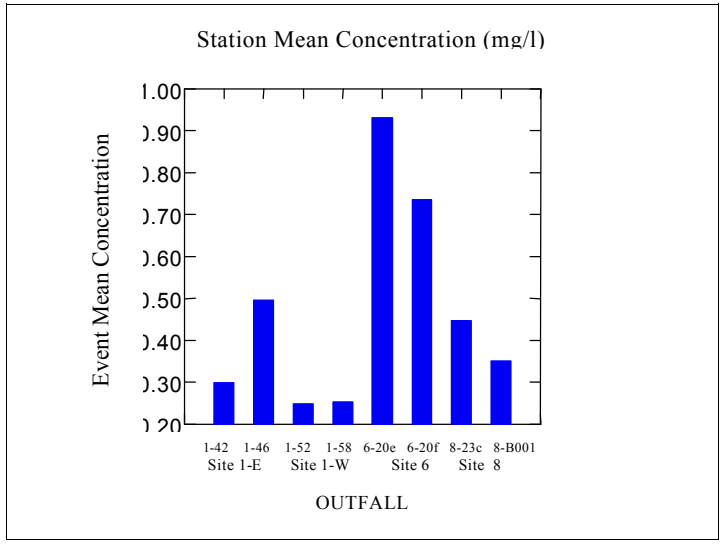

Coliforms, Total

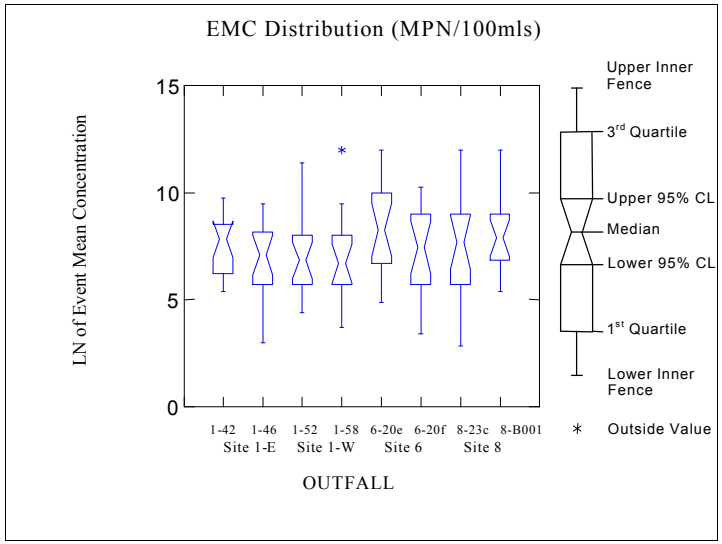

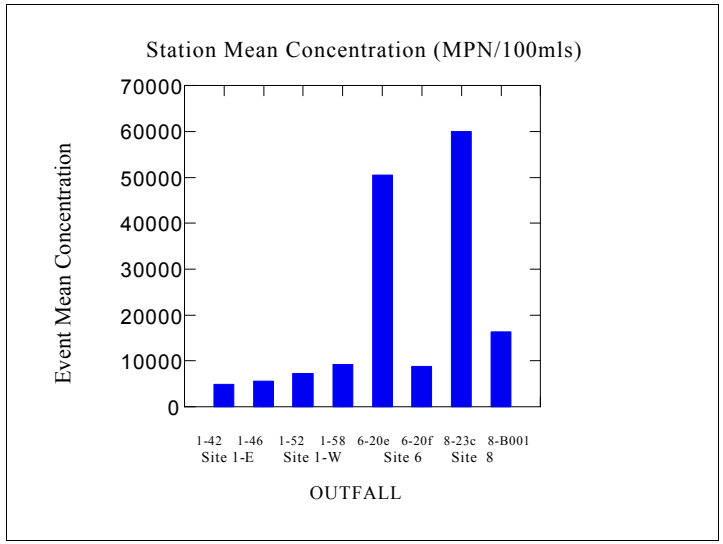

Figure G-1. SUMMARY STATISTICS FOR WATER QUALITY CONSTITUENTS

Coliforms, Fecal

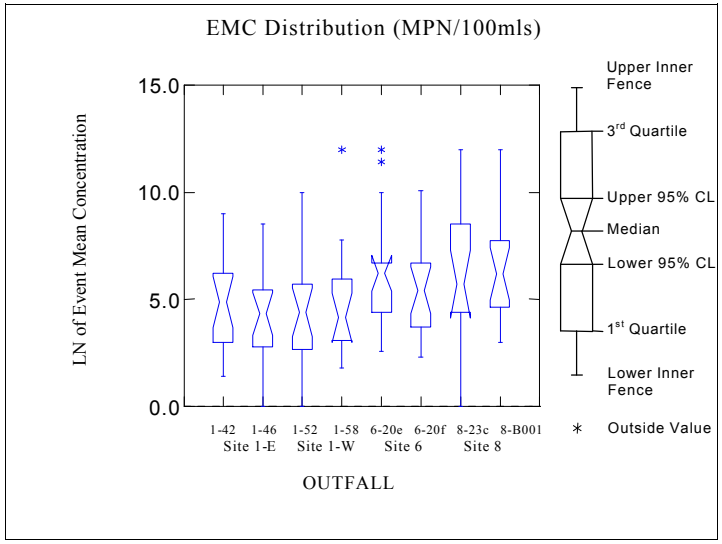

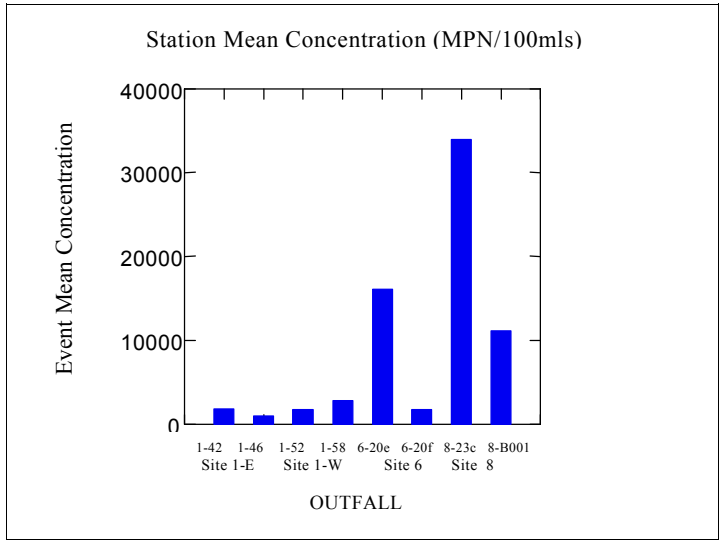

TPH (Diesel)

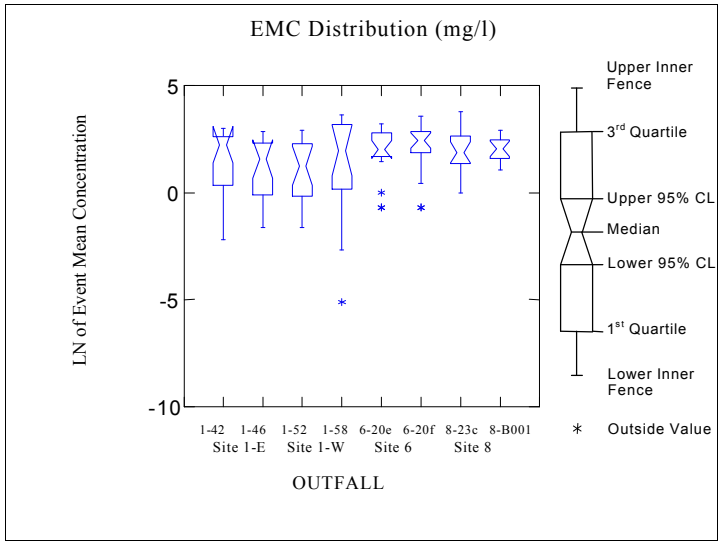

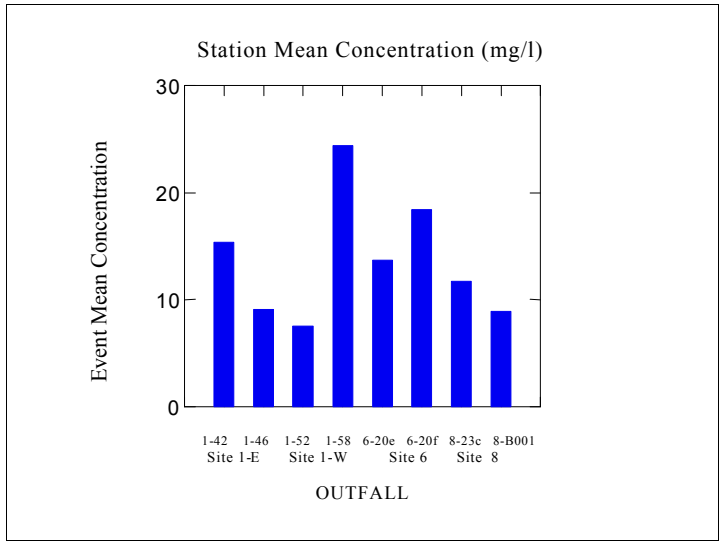

Figure G-1. SUMMARY STATISTICS FOR WATER QUALITY CONSTITUENTS

Oil & Grease

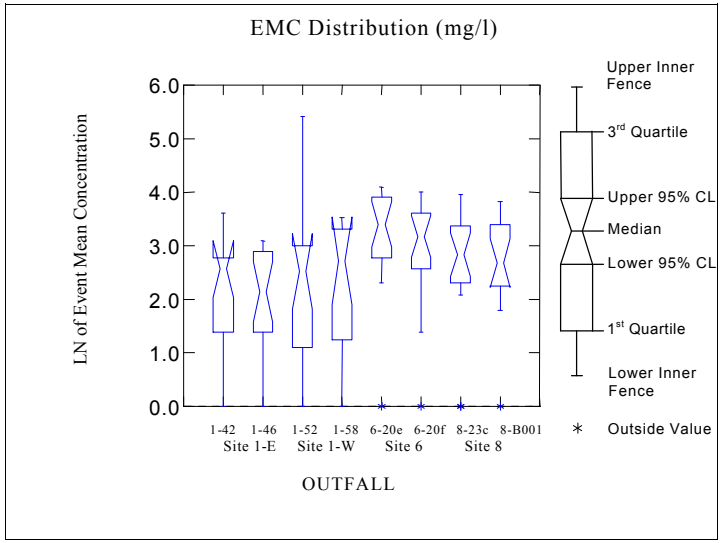

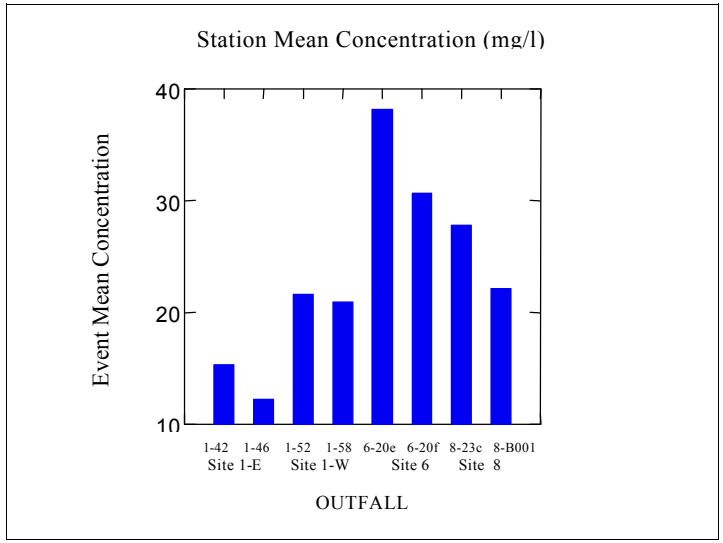

Conductivity

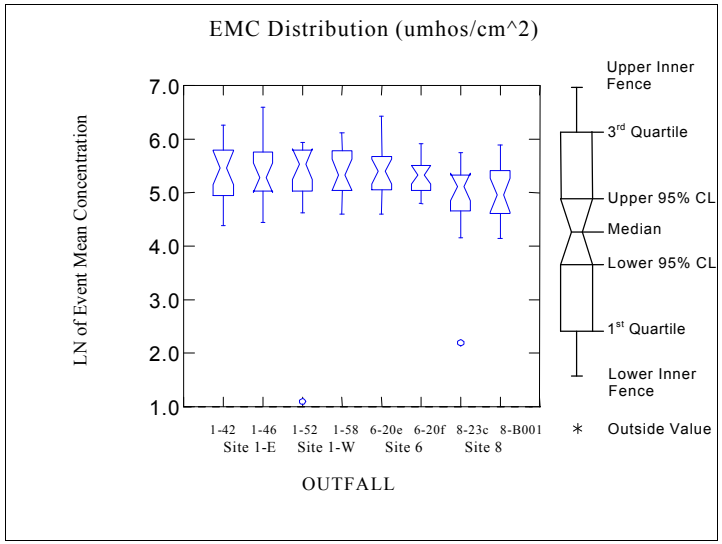

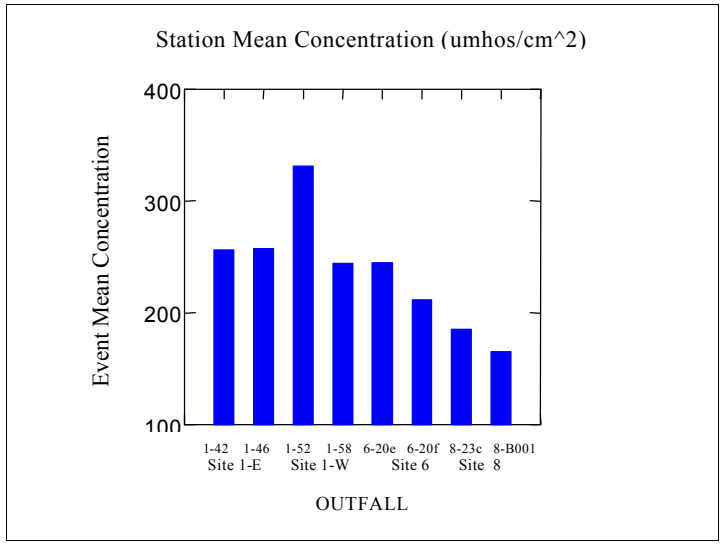

Figure G-1. SUMMARY STATISTICS FOR WATER QUALITY CONSTITUENTS

Hardness as CaCO3

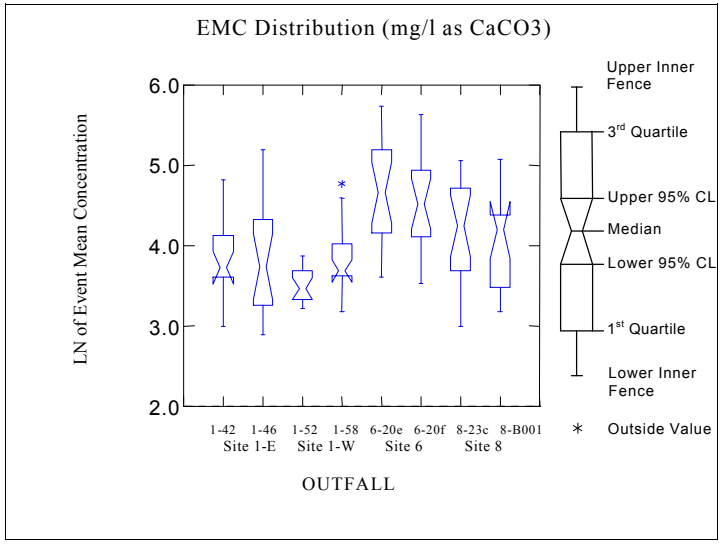

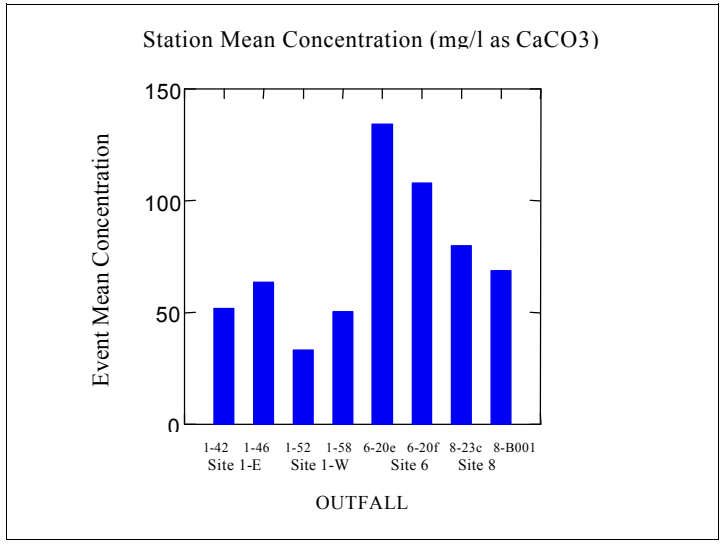

pH

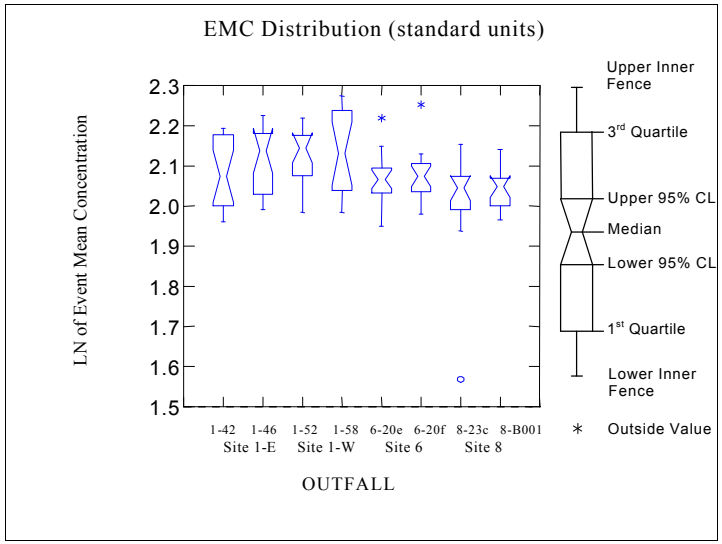

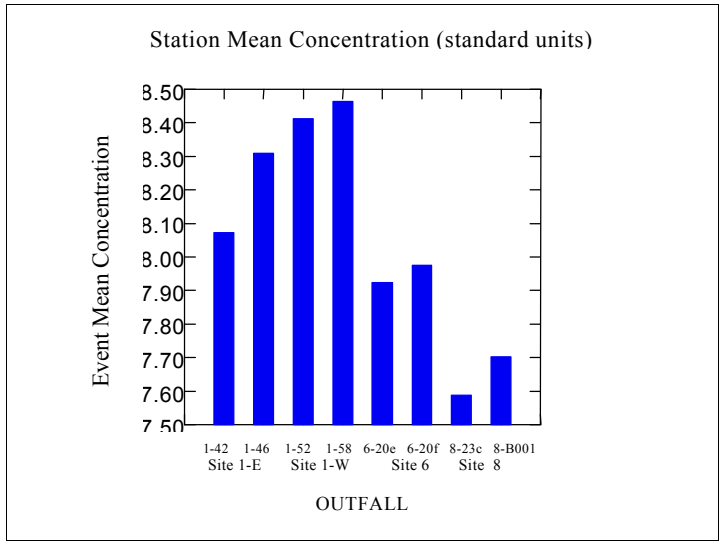

Figure G-1. SUMMARY STATISTICS FOR WATER QUALITY CONSTITUENTS

Total Suspended Solids

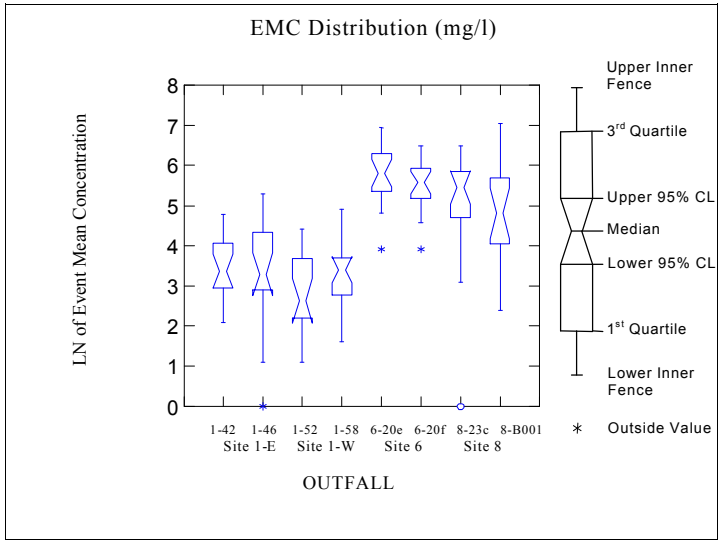

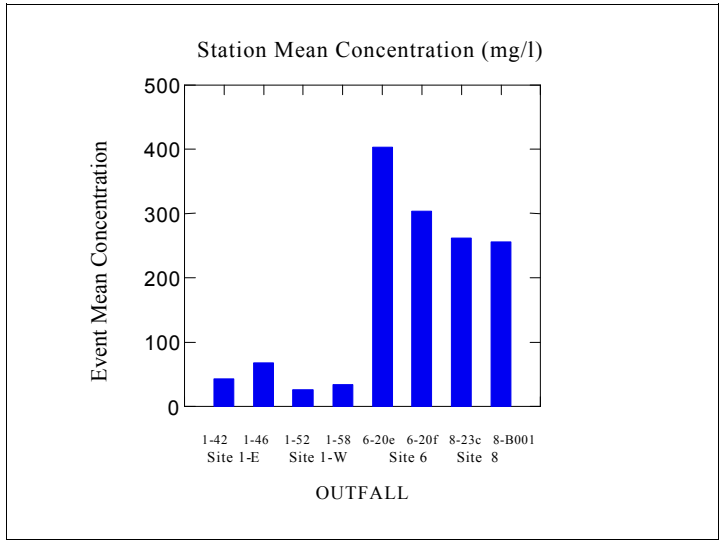

Total Volatile Solids

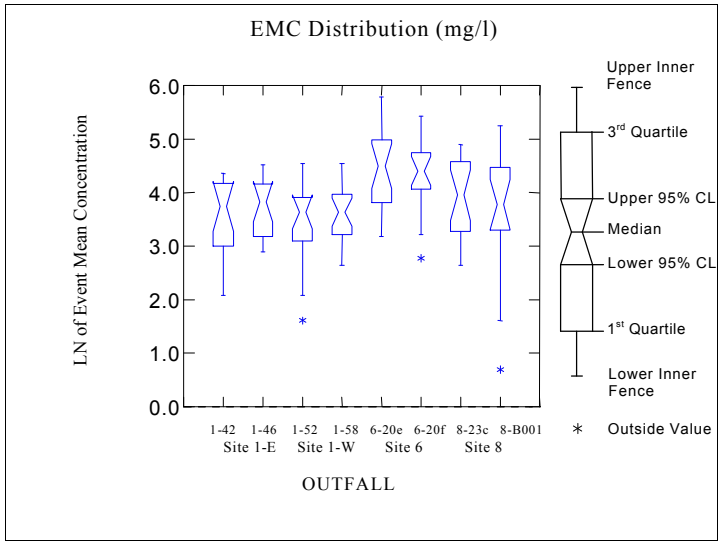

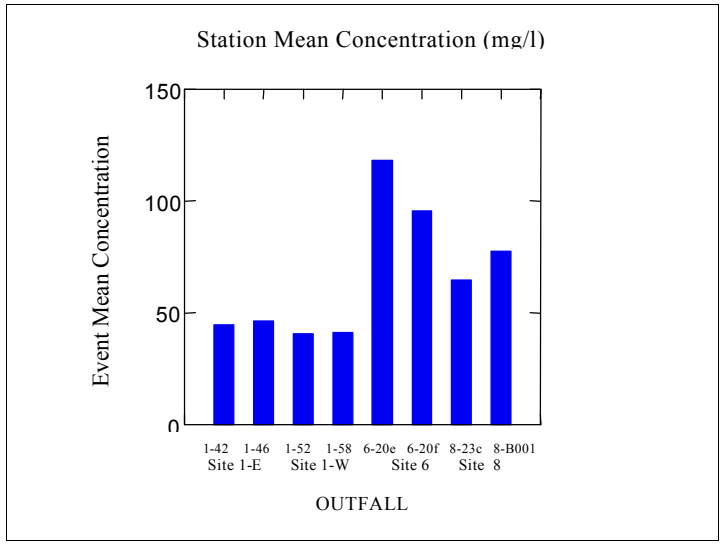

Figure G-1. SUMMARY STATISTICS FOR WATER QUALITY CONSTITUENTS

Total Organic Carbon

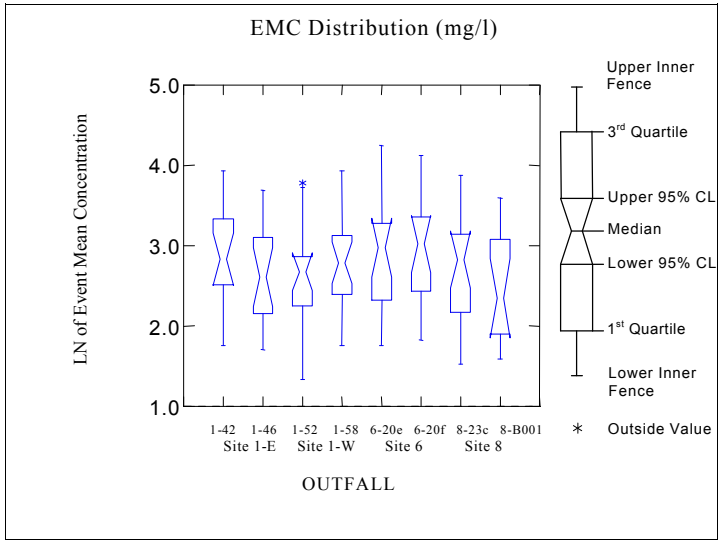

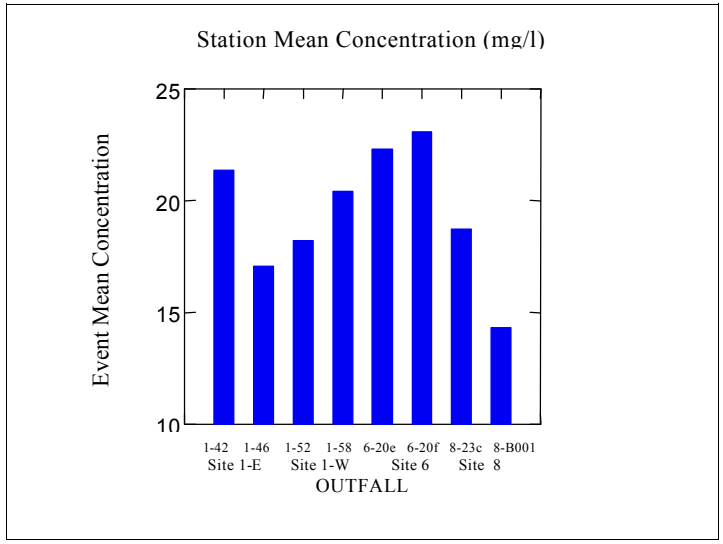

TPH (Gasoline)

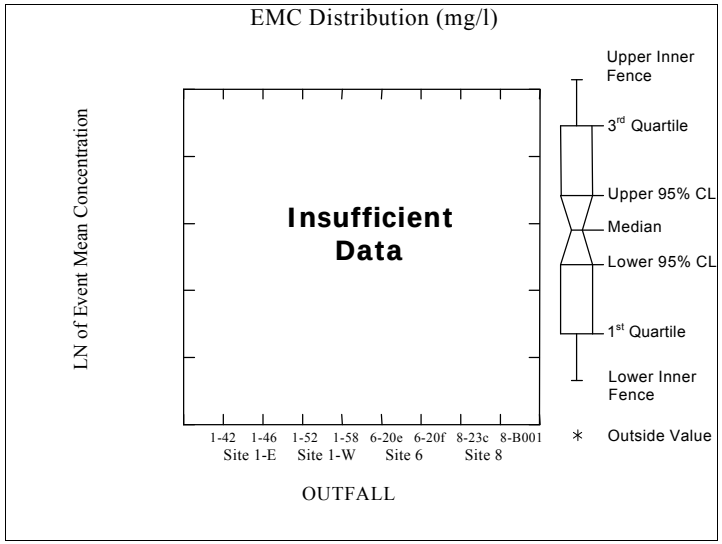

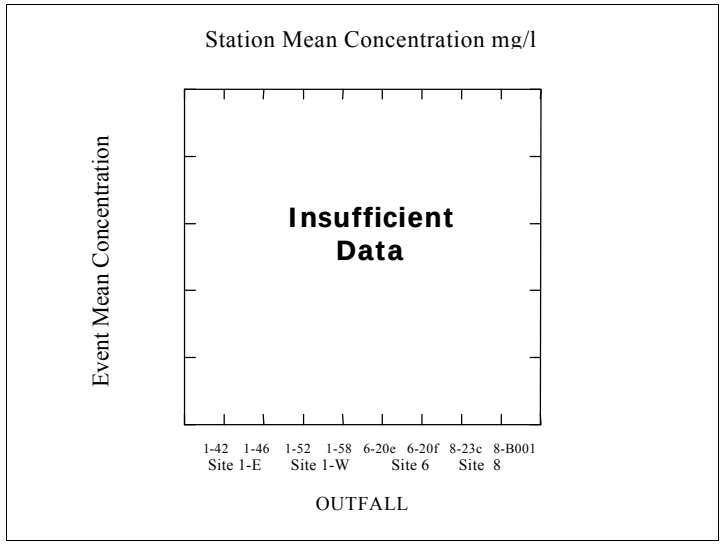

Table G-1. CHEMICAL WATER QUALITY DATA

Cadmium, Dissolved ug/l

			1-42	1-46	1-52	1-58	6-20E	6-20F	8-23C	8-B001
1998	1998-02	11/28/98	ND	ND	ND	ND	ND	ND	ND	ND
	1998-03	12/01/98	ND	0.581	0.489	2.29	*****	*****	0.785	0.571
	1998-05	01/25/99	0.310	0.370	ND	ND	0.278	0.534	0.360	ND
	1998-06	02/09/99	ND	ND	ND	ND	1.54	0.466	0.286	*****
	1998-09	03/15/99	ND	ND	*****	ND	ND	ND	ND	ND
	1998-10	03/20/99	ND	ND	*****	0.216	ND	ND	ND	ND
	1998-11	03/25/99	ND	ND	ND	ND	0.954	ND	0.208	*****
	1998-12	04/06/99	ND	ND	ND	ND	ND	ND	ND	ND
	1998-13	04/11/99	ND	ND	ND	ND	ND	ND	ND	ND
	COV		*****	*****	*****	*****	4.15	*****	0.760	*****
	Mean		*****	*****	*****	*****	0.580	*****	0.391	*****
	Median		*****	*****	*****	*****	0.136	*****	0.311	*****
1999	1999-05	01/25/00	ND	0.309	ND	0.466	0.332	0.392	ND	ND
	1999-06	01/30/00	ND	ND	ND	0.212	ND	ND	ND	*****
	1999-08	02/10/00	0.205	ND	ND	0.364	ND	0.254	ND	0.388
	1999-09	02/12/00	*****	*****	ND	ND	ND	ND	ND	ND
	1999-10	02/13/00	ND	*****	ND	ND	0.265	0.286	ND	0.418
	1999-11	02/16/00	ND	ND	ND	ND	ND	0.244	ND	ND
	1999-12	02/20/00	*****	ND	ND	ND	ND	ND	ND	ND
	1999-13	02/23/00	*****	ND	ND	ND	ND	0.209	ND	ND
	1999-14	02/27/00	ND	ND	ND	ND	ND	0.264	*****	ND
	1999-15	03/04/00	ND	ND	ND	ND	ND	ND	ND	ND
	1999-16	03/08/00	ND	ND	ND	ND	ND	ND	ND	ND
	COV		*****	*****	*****	1.20	*****	0.730	*****	*****
	Mean		*****	*****	*****	0.171	*****	0.280	*****	*****
	Median		*****	*****	*****	0.109	*****	0.227	*****	*****
Combined	COV		*****	1.17	*****	11.39	5.01	0.737	1.36	0.698
	Mean		*****	0.168	*****	0.308	0.272	0.207	0.235	0.230
	Median		*****	0.109	*****	0.027	0.053	0.166	0.139	0.188

Cadmium, Total ug/l

			1-42	1-46	1-52	1-58	6-20E	6-20F	8-23C	8-B001
1998	1998-02	11/28/98	1.51	1.36	2.39	0.661	2.45	2.96	2.72	0.612
	1998-03	12/01/98	0.664	0.494	0.956	0.719	*****	*****	2.76	2.16
	1998-05	01/25/99	1.60	0.420	1.84	0.400	3.08	2.09	2.38	2.35
	1998-06	02/09/99	1.09	0.520	0.663	0.821	3.47	3.08	2.39	*****
	1998-09	03/15/99	1.37	ND	*****	0.849	4.03	4.19	2.22	2.13
	1998-10	03/20/99	ND	0.692	*****	0.337	5.70	0.555	1.60	1.72
	1998-11	03/25/99	0.354	0.449	0.432	0.499	5.82	6.03	2.16	*****
	1998-12	04/06/99	0.403	0.569	0.391	0.302	3.31	3.00	1.41	1.17
	1998-13	04/11/99	0.241	ND	ND	ND	0.696	0.758	0.804	0.306
	COV		1.01	0.570	1.09	0.536	0.75	0.987	0.414	0.903
	Mean		0.888	0.560	1.05	0.544	3.85	3.13	2.09	1.65
	Median		0.624	0.486	0.714	0.480	3.08	2.23	1.93	1.22
1999	1999-05	01/25/00	0.596	0.643	0.566	0.801	4.48	5.28	2.46	1.65
	1999-06	01/30/00	0.285	1.42	0.24	0.502	2.71	2.13	2.87	*****
	1999-08	02/10/00	1.20	1.55	0.58	1.62	3.75	4.06	3.16	1.95
	1999-09	02/12/00	*****	*****	0.36	0.663	1.85	*****	1.05	0.804
	1999-10	02/13/00	*****	*****	1.09	0.770	3.12	3.83	2.10	1.91
	1999-11	02/16/00	1.13	0.593	0.355	0.865	2.85	3.89	2.23	1.33
	1999-12	02/20/00	*****	ND	ND	ND	ND	ND	ND	ND
	1999-13	02/23/00	*****	0.283	ND	0.399	2.31	3.04	1.76	1.06
	1999-14	02/27/00	0.473	ND	ND	0.276	1.86	1.55	*****	0.472
	1999-15	03/04/00	0.455	ND	0.556	0.201	0.562	0.548	0.321	0.292
	1999-16	03/08/00	ND	0.200	ND	0.204	1.63	2.39	0.914	1.53
	COV		0.740	1.60	0.932	0.807	1.14	1.38	1.20	0.97
	Mean		0.644	0.631	0.405	0.607	2.71	3.33	1.99	1.23
	Median		0.517	0.335	0.297	0.472	1.79	1.96	1.27	0.885
Combined	COV		0.867	1.072	1.145	0.669	1.019	1.154	0.870	0.929
	Mean		0.761	0.592	0.634	0.572	3.21	3.17	2.06	1.38
	Median		0.575	0.404	0.417	0.476	2.25	2.08	1.55	1.01

Note: Statistics are based on a log-normal distribution.
**** Insufficient data.

Table G-1. CHEMICAL WATER QUALITY DATA

Chromium, Dissolved ug/l

			1-42	1-46	1-52	1-58	6-20E	6-20F	8-23C	8-B001
1998	1998-02	11/28/98	1.39	2.17	3.04	ND	1.46	1.41	1.04	ND
	1998-03	12/01/98	5.87	6.24	5.37	2.47	*****	*****	3.14	2.29
	1998-05	01/25/99	3.56	3.88	3.47	4.04	4.50	7.33	4.32	4.54
	1998-06	02/09/99	2.82	2.95	2.24	2.44	2.49	2.18	1.86	*****
	1998-09	03/15/99	2.36	3.04	*****	1.27	2.51	3.10	2.06	2.28
	1998-10	03/20/99	4.77	4.81	*****	4.24	5.92	5.69	3.14	2.85
	1998-11	03/25/99	3.85	2.49	2.43	4.00	3.96	4.15	3.31	*****
	1998-12	04/06/99	4.82	4.73	4.16	4.00	4.30	4.12	2.74	2.99
	1998-13	04/11/99	2.56	2.77	2.13	2.07	2.94	3.61	2.18	2.05
	COV		0.469	0.362	0.354	0.575	0.465	0.559	0.438	0.487
	Mean		3.62	3.70	3.28	2.93	3.57	4.05	2.69	2.63
	Median		3.28	3.48	3.10	2.54	3.24	3.54	2.46	2.37
1999	1999-05	01/25/00	3.33	3.32	2.93	1.81	2.61	2.32	1.89	3.56
	1999-06	01/30/00	4.19	2.87	4.39	2.44	2.48	2.48	2.49	*****
	1999-08	02/10/00	3.36	3.31	2.50	2.48	1.78	2.31	1.83	1.55
	1999-09	02/12/00	*****	*****	1.75	1.65	2.32	2.73	1.35	1.33
	1999-10	02/13/00	2.55	*****	2.56	2.79	2.31	2.25	2.04	2.31
	1999-11	02/16/00	3.94	3.32	2.71	2.70	3.10	3.44	2.40	2.22
	1999-12	02/20/00	*****	2.21	1.75	2.28	1.91	1.96	1.63	1.07
	1999-13	02/23/00	*****	2.09	1.78	2.44	2.48	2.56	1.72	1.30
	1999-14	02/27/00	3.88	3.30	2.97	4.56	3.05	3.40	*****	1.92
	1999-15	03/04/00	1.95	1.55	1.68	1.69	1.62	2.08	1.05	1.03
	1999-16	03/08/00	2.30	2.28	1.46	2.40	2.42	2.38	1.17	2.44
	COV		0.286	0.280	0.342	0.288	0.207	0.181	0.293	0.419
	Mean		3.21	2.71	2.41	2.48	2.38	2.54	1.77	1.89
	Median		3.08	2.61	2.28	2.38	2.33	2.50	1.70	1.74
Combined	COV		0.380	0.349	0.373	0.421	0.369	0.409	0.411	0.465
	Mean		3.41	3.19	2.74	2.66	2.85	3.13	2.19	2.18
	Median		3.19	3.01	2.57	2.45	2.68	2.89	2.02	1.97

Chromium, Total ug/l

			1-42	1-46	1-52	1-58	6-20E	6-20F	8-23C	8-B001
1998	1998-02	11/28/98	5.40	8.22	8.72	4.60	20.9	23.0	12.1	4.14
	1998-03	12/01/98	9.34	8.44	7.75	6.38	*****	*****	22.4	18.9
	1998-05	01/25/99	5.51	6.62	4.79	5.55	29.9	20.2	23.3	35.2
	1998-06	02/09/99	8.30	5.61	7.94	5.79	28.4	22.3	18.0	*****
	1998-09	03/15/99	19.1	7.81	*****	7.37	37.9	39.0	27.2	29.0
	1998-10	03/20/99	3.43	4.34	*****	4.51	57.2	48.1	18.8	19.4
	1998-11	03/25/99	5.77	6.85	5.88	6.24	46.0	50.2	22.6	*****
	1998-12	04/06/99	6.72	9.42	5.91	6.17	35.7	26.9	16.6	14.7
	1998-13	04/11/99	4.54	4.84	4.99	5.90	11.3	12.7	8.23	6.47
	COV		0.53	0.270	0.241	0.157	0.536	0.501	0.387	0.914
	Mean		7.55	6.94	6.60	5.84	34.4	30.8	19.1	19.9
	Median		6.68	6.70	6.41	5.77	30.3	27.6	17.8	14.7
1999	1999-05	01/25/00	6.53	7.69	6.64	5.19	35.7	38.9	23.3	19.0
	1999-06	01/30/00	7.19	4.40	4.96	2.79	22.4	19.4	29.4	*****
	1999-08	02/10/00	10.4	15.4	7.32	11.9	34.2	33.7	29.1	16.8
	1999-09	02/12/00	*****	*****	4.11	5.20	16.3	*****	11.1	4.80
	1999-10	02/13/00	*****	*****	3.50	3.79	19.3	24.9	15.0	9.37
	1999-11	02/16/00	4.41	5.72	4.67	5.33	17.2	29.8	19.0	11.9
	1999-12	02/20/00	*****	ND	ND	ND	ND	ND	ND	ND
	1999-13	02/23/00	*****	3.09	2.38	3.93	17.6	19.8	12.3	9.39
	1999-14	02/27/00	4.14	3.47	3.30	4.12	14.0	11.6	*****	5.72
	1999-15	03/04/00	3.48	2.15	1.86	2.23	6.26	5.27	2.35	2.10
	1999-16	03/08/00	2.85	2.74	2.08	4.08	13.1	18.7	6.66	12.5
	COV		0.478	0.920	0.651	0.678	1.28	1.54	1.57	1.19
	Mean		5.64	5.24	3.93	4.64	22.1	26.8	19.0	10.7
	Median		5.09	3.86	3.29	3.84	13.6	14.6	10.2	6.89
Combined	COV		0.512	0.704	0.636	0.536	1.11	1.15	1.07	1.18
	Mean		6.66	6.22	5.06	5.23	28.5	29.5	19.5	14.6
	Median		5.93	5.08	4.27	4.61	19.1	19.3	13.3	9.41

Note: Statistics are based on a log-normal distribution.
**** Insufficient data.

Table G-1. CHEMICAL WATER QUALITY DATA

Copper, Dissolved ug/l

			1-42	1-46	1-52	1-58	6-20E	6-20F	8-23C	8-B001
1998	1998-02	11/28/98	20.2	14.7	21.1	18.2	27.6	32.7	18.6	9.62
	1998-03	12/01/98	27.6	16.6	25.7	24.7	*****	*****	30.9	29.9
	1998-05	01/25/99	19.2	13.3	13.0	14.7	46.3	45.0	27.6	28.6
	1998-06	02/09/99	9.39	9.01	10.2	9.31	43.8	26.5	18.0	*****
	1998-09	03/15/99	13.3	13.0	*****	14.3	28.2	40.7	17.9	18.4
	1998-10	03/20/99	22.3	16.7	*****	19.6	57.2	73.9	33.0	28.1
	1998-11	03/25/99	11.0	10.2	10.2	15.3	59.9	53.8	27.0	*****
	1998-12	04/06/99	13.4	16.1	12.1	12.8	29.7	25.7	15.0	19.5
	1998-13	04/11/99	8.27	8.73	9.52	9.66	20.3	23.3	10.6	15.0
	COV		0.43	0.26	0.40	0.33	0.41	0.42	0.39	0.43
	Mean		16.2	13.2	14.6	15.5	39.6	40.5	22.3	21.7
	Median		14.9	12.8	13.6	14.7	36.7	37.3	20.8	19.9
1999	1999-05	01/25/00	35.9	31.1	25.7	39.1	51.8	54.2	34.9	26.5
	1999-06	01/30/00	29.5	20.6	21.2	25.9	32.3	37.3	38.8	*****
	1999-08	02/10/00	18.3	18.3	15.8	18.5	26.1	30.7	24.9	21.8
	1999-09	02/12/00	*****	*****	6.93	8.54	14.5	18.5	7.08	5.9
	1999-10	02/13/00	15.8	*****	11.8	14.7	32.5	31.9	22.9	21.1
	1999-11	02/16/00	11.0	11.0	10.9	13.5	22.6	24.5	14.8	12.0
	1999-12	02/20/00	*****	6.24	6.60	7.35	9.7	9.9	8.54	7.05
	1999-13	02/23/00	*****	5.31	5.26	7.47	13.3	17.8	9.39	7.19
	1999-14	02/27/00	11.1	7.98	9.27	11.4	15.4	22.8	*****	10.3
	1999-15	03/04/00	5.54	3.69	4.50	4.30	7.42	9.10	4.88	4.42
	1999-16	03/08/00	7.33	6.78	5.43	6.73	11.2	13.6	8.82	16.0
	COV		0.719	0.805	0.638	0.722	0.653	0.599	0.822	0.680
	Mean		17.3	12.6	11.3	14.5	21.8	25.0	18.1	13.6
	Median		14.0	9.83	9.6	11.7	18.3	21.5	14.0	11.2
Combined	COV		0.556	0.574	0.574	0.565	0.681	0.606	0.661	0.662
	Mean		16.6	12.9	12.6	14.9	29.7	31.7	20.2	17.0
	Median		14.5	11.2	10.9	13.0	24.5	27.1	16.9	14.2

Copper, Total ug/l

			1-42	1-46	1-52	1-58	6-20E	6-20F	8-23C	8-B001
1998	1998-02	11/28/98	34.9	40.1	37.0	34.9	152	139	61.4	20.2
	1998-03	12/01/98	38.5	24.4	33.0	41.4	*****	*****	107	77.5
	1998-05	01/25/99	20.6	21.0	17.4	20.6	172	124	103	97.2
	1998-06	02/09/99	29.0	18.3	31.7	29.2	134	125	135	*****
	1998-09	03/15/99	72.4	36.5	*****	33.4	177	211	111	101
	1998-10	03/20/99	23.2	19.9	*****	29.1	366	359	103	85.5
	1998-11	03/25/99	29.5	23.8	36.3	30.8	292	331	125	*****
	1998-12	04/06/99	30.2	43.5	23.7	27.0	184	150	80.2	65.0
	1998-13	04/11/99	19.8	20.3	23.7	26.9	73	81.7	46.8	37.9
	COV		0.409	0.341	0.285	0.197	0.520	0.548	0.358	0.646
	Mean		33.1	27.6	29.2	30.4	197	193	98.1	72.9
	Median		30.6	26.2	28.1	29.9	175	169	92.4	61.3
1999	1999-05	01/25/00	49.3	46.9	38.4	51.4	211	237	113	84.7
	1999-06	01/30/00	44.4	27.7	24.7	29.2	141	124	129	*****
	1999-08	02/10/00	47.6	71.0	32.8	63.0	188	208	126	66.7
	1999-09	02/12/00	*****	*****	28.6	38.3	100	*****	59.7	23.7
	1999-10	02/13/00	*****	*****	21.1	24.3	122	149	83.8	44.5
	1999-11	02/16/00	24.8	30.7	19.7	30.8	123	166	106	53.0
	1999-12	02/20/00	*****	15.1	17.2	16.9	50.7	65.4	40.9	28.1
	1999-13	02/23/00	*****	17.0	14.6	21.1	99.1	113	65.0	44.6
	1999-14	02/27/00	25.4	13.0	15.9	21.6	90.0	75.6	*****	29.6
	1999-15	03/04/00	17.5	11.3	15.0	13.2	28.7	33.8	18.6	14.2
	1999-16	03/08/00	19.5	24.2	15.0	17.4	82.0	107	38.1	78.0
	COV		0.460	0.672	0.351	0.511	0.617	0.638	0.699	0.620
	Mean		33.1	28.8	22.2	29.9	116	133	81.8	48.1
	Median		30.1	23.9	20.9	26.6	99.0	112	67.0	40.9
Combined	COV		0.416	0.508	0.354	0.390	0.654	0.629	0.568	0.654
	Mean		32.9	28.1	24.9	30.1	150	159	89.7	57.7
	Median		30.4	25.0	23.4	28.0	126	134	78.0	48.3

Note: Statistics are based on a log-normal distribution.
**** Insufficient data.

Table G-1. CHEMICAL WATER QUALITY DATA

Conductivity **umhos/cm**

			1-42	1-46	1-52	1-58	6-20E	6-20F	8-23C	8-B001
1998	1998-03	12/01/98	326	240	271	157	282	272	198	252
	1998-05	01/25/99	327	735	181	104	303	340	166	163
	1998-06	02/09/99	461	474	196	225	291	251	302	198
	1998-09	03/15/99	80	169	153	103	208	246	106	123
	1998-10	03/20/99	177	171	308	189	616	190	207	264
	1998-11	03/25/99	140	140	162	393	322	138	176	260
	1998-12	04/06/99	214	219	268	151	211	212	112	110
	1998-13	04/11/99	305	171	325	99	226	225	315	195
	COV		0.614	0.634	0.305	0.501	0.360	0.271	0.416	0.347
	Mean		263	289	234	178	307	236	200	198
	Median		224	244	224	160	289	227	185	187
1999	1999-05	01/25/00	345	417	339	321	215	205	218	*****
	1999-08	02/10/00	129	356	330	290	230	209	268	363
	1999-09	02/12/00	233	294	351	*****	155	154	9	109
	1999-10	02/13/00	523	318	378	*****	392	371	*****	*****
	1999-11	02/16/00	239	285	237	399	202	193	162	165
	1999-12	02/20/00	250	175	122	327	250	241	167	103
	1999-13	02/23/00	144	102	102	164	99	124	76	76
	1999-14	02/27/00	132	85	3	320	156	181	89	84
	1999-15	03/04/00	400	123	343	455	110	121	64	63
	1999-16	03/08/00	123	152	153	158	123	126	117	98
	COV		0.553	0.614	2.737	0.399	0.442	0.361	1.333	0.595
	Mean		255	237	445	309	194	193	161	131
	Median		223	202	153	287	178	182	96	113
Combined	COV		0.56	0.61	1.53	0.55	0.48	0.34	1.00	0.55
	Mean		256	258	331	244	245	212	185	166
	Median		223	220	181	214	221	201	131	145

Note: Statistics are based on a log-normal distribution.
**** Insufficient data.

Table G-1. CHEMICAL WATER QUALITY DATA

Coliforms, Fecal MPN/100mL

			1-42	1-46	1-52	1-58	6-20E	6-20F	8-23C	8-B001
1998	1998-03	12/01/98	2300	2700	22000	160000	90000	24000	160000	160000
	1998-05	01/25/99	30	30	30	23	500	130	300	800
	1998-06	02/09/99	8000	200	1100	2400	22000	5000	17000	9000
	1998-09	03/15/99	23	23	80	300	500	170	300	170
	1998-10	03/20/99	130	80	80	50	160000	800	170	2300
	1998-11	03/25/99	8000	5000	800	500	800	500	5000	11000
	1998-12	04/06/99	230	70	230	80	80	30	300	300
	1998-13	04/11/99	500	230	230	700	500	230	230	2300
	COV		14.43	6.99	8.39	48.17	53.63	9.75	25.11	11.37
	Mean		6427	1402	2909	23935	142879	5301	35059	31557
	Median		444	198	344	497	2664	541	1395	2765
1999	1999-05	01/25/00	20	80	70	80	ND	ND	5000	*****
	1999-08	02/10/00	ND	20	ND	ND	230	220	5000	130
	1999-09	02/12/00	ND	500	300	*****	1300	ND	ND	80
	1999-10	02/13/00	110	170	80	*****	130	1100	*****	*****
	1999-11	02/16/00	130	ND	ND	40	300	500	ND	800
	1999-12	02/20/00	220	ND	ND	ND	80	40	40	20
	1999-13	02/23/00	1300	800	20	40	800	1300	130	170
	1999-14	02/27/00	20	ND	ND	ND	40	110	80	70
	1999-15	03/04/00	ND	ND	ND	20	ND	ND	ND	20
	1999-16	03/08/00	500	ND	500	110	800	500	1300	1100
	COV		5.4	14.1	10.7	1.3	3.5	4.2	91.1	2.9
	Mean		334	359	208	45	546	604	9055	364
	Median		60	25	19	27	151	141	99	120
Combined	COV		12.5	15.8	24.9	24.0	29.8	6.9	98.5	19.4
	Mean		1833	1000	1735	2775	16152	1795	33941	11173
	Median		147	63	70	115	541	256	345	577

Hardness as CaCO3 mg/l

			1-42	1-46	1-52	1-58	6-20E	6-20F	8-23C	8-B001
1998	1998-02	11/28/98	46	42	28	48	58	50	42	30
	1998-03	12/01/98	124	120	40	118	*****	*****	136	152
	1998-05	01/25/99	32	180	30	38	180	92	140	160
	1998-06	02/09/99	68	178	40	40	68	68	52	*****
	1998-09	03/15/99	36	34	*****	50	200	198	152	80
	1998-10	03/20/99	50	70	*****	62	310	*****	66	80
	1998-11	03/25/99	30	26	32	32	272	280	*****	*****
	1998-12	04/06/99	40	44	44	42	220	140	80	66
	1998-13	04/11/99	20	20	30	24	64	54	36	30
	COV		0.56	0.97	0.18	0.47	0.79	0.74	0.62	0.76
	Mean		50	83	35	50	181	130	90	90
	Median		43	59	34	46	142	104	77	71
1999	1999-05	01/25/00	92	92	42	99	172	164	111	116
	1999-06	01/30/00	75	76	34	84	137	134	158	*****
	1999-08	02/10/00	38	70	28	48	169	140	112	70
	1999-09	02/12/00	*****	*****	25	30	94	77	31	24
	1999-10	02/13/00	56	*****	25	38	107	110	74	69
	1999-11	02/16/00	42	29	28	40	105	103	80	44
	1999-12	02/20/00	*****	24	27	31	46	39	36	24
	1999-13	02/23/00	*****	20	32	38	64	61	42	37
	1999-14	02/27/00	*****	*****	*****	70	*****	*****	*****	*****
	1999-15	03/04/00	41	18	32	37	37	34	20	35
	1999-16	03/08/00	38	33	48	40	69	70	40	67
	COV		0.37	0.72	0.22	0.42	0.56	0.58	0.75	0.58
	Mean		55	46	32	50	102	96	73	55
	Median		51	38	31	47	89	83	58	48
Combined	COV		0.48	0.88	0.20	0.43	0.70	0.64	0.69	0.68
	Mean		52	64	33	50	134	108	80	69
	Median		47	48	33	46	110	91	66	57

Note: Statistics are based on a log-normal distribution.
**** Insufficient data.

Table G-1. CHEMICAL WATER QUALITY DATA

Nickel, Dissolved ug/l

			1-42	1-46	1-52	1-58	6-20E	6-20F	8-23C	8-B001
1998	1998-02	11/28/98	5.12	3.72	3.73	5.44	4.47	4.62	3.33	1.71
	1998-03	12/01/98	8.87	5.85	5.84	9.63	*****	*****	10.30	8.50
	1998-05	01/25/99	3.03	4.82	2.88	4.63	5.96	5.78	4.19	4.38
	1998-06	02/09/99	2.20	1.78	1.87	1.75	5.03	4.88	3.61	*****
	1998-09	03/15/99	2.80	4.35	*****	3.96	6.12	9.58	2.97	3.07
	1998-10	03/20/99	8.20	2.58	*****	7.84	7.66	16.80	5.10	3.91
	1998-11	03/25/99	3.08	1.47	1.66	7.30	8.19	7.12	5.14	*****
	1998-12	04/06/99	2.69	2.50	2.86	2.01	4.13	3.09	3.47	3.16
	1998-13	04/11/99	2.90	2.23	2.40	2.63	5.98	5.74	2.91	2.45
	COV		0.545	0.499	0.445	0.673	0.244	0.548	0.411	0.536
	Mean		4.33	3.30	3.06	5.19	5.96	7.24	4.54	3.92
	Median		3.80	2.95	2.80	4.31	5.79	6.35	4.20	3.46
1999	1999-05	01/25/00	8.14	6.44	4.26	10.8	7.74	8.37	5.55	5.10
	1999-06	01/30/00	5.57	4.39	3.72	7.68	4.40	4.79	4.88	*****
	1999-08	02/10/00	4.80	4.86	3.72	6.53	4.82	4.94	4.90	5.54
	1999-09	02/12/00	*****	*****	ND	1.88	1.83	2.66	1.07	1.20
	1999-10	02/13/00	3.55	*****	1.93	3.09	5.14	4.58	3.90	4.51
	1999-11	02/16/00	2.24	2.05	1.83	3.15	3.53	3.85	2.34	2.27
	1999-12	02/20/00	*****	1.13	1.29	1.53	1.57	1.48	1.80	1.47
	1999-13	02/23/00	*****	0.72	ND	1.29	1.80	2.17	1.11	ND
	1999-14	02/27/00	2.16	1.17	1.72	2.50	3.05	4.21	*****	1.87
	1999-15	03/04/00	1.46	ND	ND	ND	1.11	1.30	0.81	ND
	1999-16	03/08/00	1.54	ND	3.60	1.48	1.43	1.76	1.43	1.85
	COV		0.698	1.503	0.696	0.925	0.699	0.643	0.900	0.797
	Mean		3.77	2.70	2.31	3.77	3.38	3.73	3.50	2.86
	Median		3.09	1.50	1.90	2.77	2.77	3.13	2.59	2.23
Combined	COV		0.608	1.090	0.629	0.840	0.684	0.725	0.730	0.720
	Mean		4.04	3.11	2.61	4.41	4.58	5.21	4.04	3.29
	Median		3.45	2.10	2.21	3.38	3.78	4.22	3.26	2.67

Nickel, Total ug/l

			1-42	1-46	1-52	1-58	6-20E	6-20F	8-23C	8-B001
1998	1998-02	11/28/98	9.89	10.0	6.72	7.87	21.7	23.7	12.6	4.02
	1998-03	12/01/98	10.6	6.62	6.67	12.1	*****	*****	25.4	21.0
	1998-05	01/25/99	6.70	5.88	7.14	4.66	28.7	18.2	21.2	29.4
	1998-06	02/09/99	6.92	3.94	7.43	4.52	26.0	20.6	16.1	*****
	1998-09	03/15/99	317	11.8	*****	11.6	77.0	146	130	131
	1998-10	03/20/99	7.29	4.16	*****	11.5	56.3	52.5	18.9	18.7
	1998-11	03/25/99	7.33	6.51	5.91	7.42	43.7	46.2	21.6	*****
	1998-12	04/06/99	6.28	7.95	5.51	5.17	32.2	23.7	16.2	12.5
	1998-13	04/11/99	4.77	6.99	4.34	4.88	13.6	14.5	10.4	6.84
	COV		2.04	0.372	0.188	0.436	0.595	0.878	0.838	1.58
	Mean		25.1	7.15	6.27	7.82	38.2	42.5	28.0	32.9
	Median		11.1	6.70	6.16	7.17	32.8	31.9	21.5	17.6
1999	1999-05	01/25/00	11.3	11.1	7.91	13.90	34.40	36.8	23.1	18.9
	1999-06	01/30/00	8.53	7.76	4.30	8.33	22.6	19.7	28.6	*****
	1999-08	02/10/00	9.93	16.90	7.45	14.9	31.2	32.5	26.8	16.0
	1999-09	02/12/00	*****	*****	3.92	4.71	14.7	*****	9.32	4.51
	1999-10	02/13/00	*****	*****	3.11	4.62	20.3	23.6	15.3	10.8
	1999-11	02/16/00	4.62	4.96	3.52	6.44	16.8	24.9	17.2	10.2
	1999-12	02/20/00	*****	ND	ND	ND	ND	ND	ND	ND
	1999-13	02/23/00	*****	2.59	1.93	3.29	14.2	16.2	10.5	8.10
	1999-14	02/27/00	5.15	2.04	3.04	3.82	13.9	12.3	*****	2.91
	1999-15	03/04/00	4.03	2.52	2.79	2.12	5.78	5.50	2.60	ND
	1999-16	03/08/00	3.40	2.56	3.21	3.86	11.3	15.4	6.53	12.8
	COV		0.50	1.13	0.62	0.92	1.27	1.46	1.63	1.09
	Mean		6.82	5.99	3.93	6.40	20.7	24.2	19.5	11.4
	Median		6.09	3.97	3.34	4.70	12.8	13.7	10.2	7.72
Combined	COV		1.37	0.83	0.59	0.75	0.67	1.34	1.32	1.41
	Mean		14.5	6.69	4.92	7.10	26.7	33.3	24.5	19.2
	Median		8.52	5.16	4.23	5.69	22.3	20.0	14.8	11.1

Note: Statistics are based on a log-normal distribution.
**** Insufficient data.

Table G-1. CHEMICAL WATER QUALITY DATA

Nitrate Nitrogen mg/l

			1-42	1-46	1-52	1-58	6-20E	6-20F	8-23C	8-B001
1998	1998-02	11/28/98	1.90	1.60	2.40	1.90	1.80	2.00	1.40	0.50
	1998-03	12/01/98	3.30	3.10	3.90	2.60	*****	*****	3.70	3.30
	1998-05	01/25/99	1.00	0.90	1.60	0.70	1.70	1.40	1.60	*****
	1998-06	02/09/99	1.00	1.20	1.40	0.80	1.10	1.20	1.40	*****
	1998-09	03/15/99	1.00	1.20	*****	0.70	1.50	1.70	1.30	1.20
	1998-10	03/20/99	1.80	2.00	*****	1.70	*****	*****	2.30	*****
	1998-11	03/25/99	1.00	0.90	1.40	0.80	*****	2.00	2.10	*****
	1998-12	04/06/99	1.20	1.40	1.50	0.90	1.30	1.00	0.80	0.80
	1998-13	04/11/99	0.50	0.80	0.70	0.40	0.90	0.90	0.70	0.60
	COV		0.58	0.45	0.57	0.65	0.27	0.33	0.55	0.75
	Mean		1.43	1.46	1.88	1.19	1.39	1.47	1.72	1.24
	Median		1.24	1.33	1.63	0.99	1.34	1.40	1.51	0.99
1999	1999-05	01/25/00	3.90	3.00	2.70	2.80	3.20	3.20	1.70	1.70
	1999-06	01/30/00	2.50	1.90	2.50	1.80	2.20	2.00	2.10	*****
	1999-08	02/10/00	1.20	*****	1.30	1.10	1.20	1.20	1.80	1.90
	1999-09	02/12/00	*****	*****	1.60	0.46	0.83	1.10	0.37	0.37
	1999-10	02/13/00	1.80	*****	2.50	1.10	1.80	1.50	1.50	1.80
	1999-11	02/16/00	1.50	1.90	2.30	1.30	1.60	1.70	1.30	1.20
	1999-12	02/20/00	*****	0.60	0.86	0.52	0.41	0.52	0.45	0.39
	1999-13	02/23/00	*****	0.67	0.75	0.59	0.83	0.95	0.58	0.48
	1999-14	02/27/00	*****	*****	*****	1.20	1.10	*****	*****	*****
	1999-15	03/04/00	0.48	0.59	0.66	0.42	0.83	0.77	0.46	0.52
	1999-16	03/08/00	0.65	0.72	0.53	0.60	0.70	0.76	0.61	0.67
	COV		0.84	0.70	0.69	0.67	0.64	0.57	0.76	0.77
	Mean		1.81	1.32	1.62	1.09	1.36	1.38	1.12	1.04
	Median		1.4	1.08	1.34	0.91	1.14	1.20	0.90	0.82

Oil & Grease mg/l

			1-42	1-46	1-52	1-58	6-20E	6-20F	8-23C	8-B001
1998	1998-03	12/01/98	25.0	15.0	226	27.0	28.0	30.0	35.0	44.0
	1998-05	01/25/99	16.0	16.0	8.0	7.00	58.0	18.0	29.0	46.0
	1998-06	02/09/99	37.0	22.0	27.0	24.0	60.0	39.0	34.0	21.0
	1998-09	03/15/99	23.0	ND	ND	ND	53.0	55.0	13.0	17.0
	1998-10	03/20/99	13.0	12.0	20.0	34.0	19.0	4.00	52.0	31.0
	1998-11	03/25/99	20.0	19.0	15.0	34.0	24.0	16.0	49.0	29.0
	1998-12	04/06/99	15.0	13.0	18.0	19.0	56.0	6.00	24.0	36.0
	1998-13	04/11/99	16.0	20.0	20.0	28.0	41.0	49.0	23.0	15.0
	COV		0.351	1.33	2.87	1.83	0.48	1.24	0.47	0.44
	Mean		20.7	19.2	49.9	31.6	43.3	31.3	33.0	30.3
	Median		19.5	11.5	16.4	15.2	39.0	19.6	29.9	27.7
1999	1999-05	01/25/00	10.0	18.0	14.0	23.0	32.0	37.0	29.0	*****
	1999-08	02/10/00	15.0	21.0	15.0	34.0	50.0	27.0	17.0	11.0
	1999-09	02/12/00	3.00	5.00	3.00	*****	11.0	13.0	ND	14.0
	1999-10	02/13/00	3.00	6.00	25.0	*****	34.0	42.0	*****	*****
	1999-11	02/16/00	4.00	4.00	4.00	12.0	34.0	32.0	16.0	8.00
	1999-12	02/20/00	*****	3.00	3.00	3.00	16.0	18.0	8.00	6.00
	1999-13	02/23/00	6.00	6.00	3.00	4.00	13.0	21.0	10.0	10.0
	1999-14	02/27/00	10.0	6.00	11.00	4.00	24.0	37.0	12.0	11.0
	1999-15	03/04/00	*****	2.00	2.00	2.00	10.0	8.00	10.0	9.00
	1999-16	03/08/00	ND	ND	ND	ND	ND	ND	ND	ND
	COV		1.26	1.15	1.40	1.86	1.57	1.59	1.80	1.01
	Mean		6.58	7.60	8.80	11.7	29.5	31.8	15.5	10.2
	Median		4.10	5.00	5.12	5.55	15.9	16.9	7.51	7.21
Combined	COV		1.49	1.36	2.31	2.05	1.26	1.37	1.65	1.20
	Mean		15.3	12.2	21.6	20.9	38.1	30.7	27.8	22.1
	Median		8.54	7.25	8.60	9.17	23.7	18.1	14.4	14.1

Note: Statistics are based on a log-normal distribution.
**** Insufficient data.

Table G-1. CHEMICAL WATER QUALITY DATA

Ortho-Phosphorus mg/l

			1-42	1-46	1-52	1-58	6-20E	6-20F	8-23C	8-B001
1998	1998-02	11/28/98	0.17	0.29	0.25	0.20	0.30	0.26	0.29	0.15
	1998-03	12/01/98	0.05	0.08	0.30	0.23	*****	*****	0.41	0.44
	1998-05	01/25/99	0.10	0.11	0.14	0.14	0.13	0.17	0.18	*****
	1998-06	02/09/99	0.08	0.11	0.11	0.10	0.12	0.13	0.15	*****
	1998-09	03/15/99	0.13	0.12	*****	0.11	0.14	0.12	0.15	0.17
	1998-10	03/20/99	0.09	0.07	*****	0.14	*****	*****	0.17	*****
	1998-11	03/25/99	0.12	0.12	0.13	0.17	*****	0.36	0.22	*****
	1998-12	04/06/99	0.12	0.13	0.13	0.13	0.19	0.18	0.15	0.15
	1998-13	04/11/99	0.12	0.17	0.16	0.13	0.17	0.18	0.11	0.16
	COV		0.36	0.43	0.39	0.27	0.35	0.40	0.42	0.49
	Mean		0.11	0.13	0.18	0.15	0.18	0.20	0.20	0.22
	Median		0.10	0.12	0.16	0.15	0.17	0.19	0.19	0.19
1999	1999-05	01/25/00	0.32	0.41	0.26	0.22	0.23	0.17	0.30	0.27
	1999-06	01/30/00	0.25	0.34	0.22	0.28	0.21	0.40	0.55	*****
	1999-08	02/10/00	0.19	0.33	0.16	0.15	0.24	0.26	0.31	0.23
	1999-09	02/12/00	*****	*****	0.11	0.12	0.14	0.13	0.10	0.11
	1999-10	02/13/00	0.10	*****	0.06	0.08	0.06	0.06	0.09	0.07
	1999-11	02/16/00	0.10	0.13	0.08	0.09	0.09	0.11	0.12	0.10
	1999-12	02/20/00	*****	0.09	0.08	0.08	0.09	0.10	0.08	0.07
	1999-13	02/23/00	*****	0.07	0.05	0.05	0.06	0.07	0.09	0.06
	1999-14	02/27/00	*****	*****	*****	0.06	*****	*****	*****	*****
	1999-15	03/04/00	0.07	0.05	0.05	0.05	0.07	0.07	0.06	0.06
	1999-16	03/08/00	0.06	0.06	0.06	0.05	0.10	0.12	0.08	0.10
	COV		0.72	1.04	0.67	0.66	0.59	0.66	0.86	0.60
	Mean		0.16	0.20	0.11	0.11	0.13	0.15	0.18	0.12
	Median		0.13	0.14	0.09	0.09	0.11	0.12	0.13	0.10
Combined	COV		0.53	0.71	0.63	0.56	0.54	0.59	0.67	0.65
	Mean		0.13	0.16	0.14	0.13	0.15	0.17	0.19	0.15
	Median		0.11	0.13	0.12	0.11	0.13	0.15	0.16	0.13

Total Phosphorus mg/l

			1-42	1-46	1-52	1-58	6-20E	6-20F	8-23C	8-B001
1998	1998-02	11/28/98	0.39	0.30	0.36	0.38	0.80	0.76	0.36	0.21
	1998-03	12/01/98	0.32	0.24	0.47	0.38	*****	*****	0.67	0.58
	1998-05	01/25/99	0.17	0.13	0.14	0.20	0.21	0.20	0.20	*****
	1998-06	02/09/99	0.37	0.17	0.24	0.13	0.80	0.57	0.49	*****
	1998-09	03/15/99	0.21	0.32	*****	0.12	0.69	0.61	0.60	0.56
	1998-10	03/20/99	0.32	0.13	*****	0.38	*****	*****	0.26	*****
	1998-11	03/25/99	0.19	0.24	0.22	0.27	1.37	0.97	0.24	*****
	1998-12	04/06/99	0.19	0.23	0.18	0.18	0.58	0.44	0.30	0.38
	1998-13	04/11/99	0.13	0.22	0.16	0.15	0.32	0.33	0.23	0.21
	COV		0.40	0.34	0.46	0.50	0.69	0.57	0.46	0.53
	Mean		0.26	0.22	0.26	0.25	0.71	0.57	0.38	0.40
	Median		0.24	0.21	0.23	0.22	0.59	0.50	0.34	0.35
1999	1999-05	01/25/00	0.56	0.65	0.35	0.48	0.86	0.89	0.79	0.33
	1999-06	01/30/00	0.50	0.55	0.33	0.47	0.76	0.69	1.60	*****
	1999-08	02/10/00	0.67	9.90	0.64	0.58	10.00	5.40	0.68	0.71
	1999-09	02/12/00	*****	*****	0.41	0.38	0.88	0.57	0.34	0.40
	1999-10	02/13/00	0.26	*****	0.13	0.15	0.56	0.48	0.41	0.27
	1999-11	02/16/00	0.18	0.20	0.10	0.17	0.51	0.72	0.50	0.32
	1999-12	02/20/00	*****	0.31	0.15	0.12	0.27	0.28	0.25	0.17
	1999-13	02/23/00	*****	0.25	0.11	0.12	0.42	0.40	0.30	0.24
	1999-14	02/27/00	*****	*****	*****	0.14	*****	*****	*****	*****
	1999-15	03/04/00	0.17	0.14	0.11	0.14	0.20	0.18	0.12	0.10
	1999-16	03/08/00	0.13	0.21	0.11	0.11	0.37	0.39	0.22	0.35
	COV		0.74	2.29	0.78	0.73	1.48	1.14	0.85	0.59
	Mean		0.37	1.12	0.25	0.26	1.16	0.89	0.53	0.33
	Median		0.29	0.45	0.19	0.21	0.65	0.59	0.41	0.28
Combined	COV		0.55	1.32	0.64	0.61	1.11	0.89	0.66	0.56
	Mean		0.30	0.50	0.25	0.25	0.93	0.73	0.45	0.35
	Median		0.26	0.30	0.21	0.22	0.62	0.55	0.37	0.31

Note: Statistics are based on a log-normal distribution.
**** Insufficient data.

Table G-1. CHEMICAL WATER QUALITY DATA

Lead, Dissolved ug/l

			1-42	1-46	1-52	1-58	6-20E	6-20F	8-23C	8-B001
1998	1998-02	11/28/98	ND	ND	ND	ND	2.58	1.55	ND	ND
	1998-03	12/01/98	2.08	1.71	2.50	1.71	*****	*****	4.62	3.73
	1998-05	01/25/99	2.77	3.18	2.33	2.12	37.4	45.6	27.6	51.3
	1998-06	02/09/99	ND	ND	1.46	ND	151	4.22	1.53	*****
	1998-09	03/15/99	ND	ND	*****	ND	2.84	4.40	2.10	2.14
	1998-10	03/20/99	2.10	ND	*****	ND	3.11	5.31	3.08	1.36
	1998-11	03/25/99	ND	ND	ND	1.55	5.28	2.10	1.92	*****
	1998-12	04/06/99	ND	ND	ND	ND	ND	1.35	1.28	1.60
	1998-13	04/11/99	2.43	1.45	ND	4.10	2.80	3.32	4.82	2.15
	COV		0.25	1.07	0.53	1.15	3.83	1.55	1.32	2.19
	Mean		1.93	1.14	1.48	1.51	24.12	7.36	4.81	7.10
	Median		1.87	0.78	1.31	0.99	6.09	4.00	2.91	2.94
1999	1999-05	01/25/00	1.80	1.03	1.43	1.53	7.78	5.45	2.29	9.42
	1999-06	01/30/00	1.11	1.68	ND	ND	1.81	1.86	2.84	*****
	1999-08	02/10/00	2.18	1.16	1.86	1.47	8.01	14.8	6.71	5.73
	1999-09	02/12/00	*****	*****	ND	ND	10.5	15.7	9.49	2.40
	1999-10	02/13/00	1.19	*****	1.25	1.11	19.6	17.0	13.1	7.99
	1999-11	02/16/00	1.40	1.62	1.58	1.72	7.68	16.6	8.27	5.71
	1999-12	02/20/00	*****	ND	ND	ND	7.49	6.75	8.70	2.72
	1999-13	02/23/00	*****	0.82	ND	ND	14.9	16.7	11.4	5.79
	1999-14	02/27/00	1.34	ND	ND	1.51	11.4	16.8	*****	4.34
	1999-15	03/04/00	ND	ND	ND	ND	6.20	6.79	4.11	2.12
	1999-16	03/08/00	ND	ND	1.48	ND	11.6	15.3	6.97	13.3
	COV		0.35	0.58	0.26	0.96	0.68	0.82	0.64	0.67
	Mean		1.35	0.936	1.22	1.10	10.2	13.2	7.67	6.10
	Median		1.27	0.810	1.18	0.791	8.48	10.2	6.46	5.08
Combined	COV		0.36	0.80	0.37	1.02	1.64	1.30	1.09	1.25
	Mean		1.66	1.02	1.31	1.25	14.2	11.3	6.56	6.50
	Median		1.56	0.795	1.23	0.874	7.38	6.90	4.43	4.06

Lead, Total ug/l

			1-42	1-46	1-52	1-58	6-20E	6-20F	8-23C	8-B001
1998	1998-02	11/28/98	23.4	32.9	23.0	23.7	401	445	174	44.2
	1998-03	12/01/98	24.6	10.6	22.7	30.7	*****	*****	413	344
	1998-05	01/25/99	12.8	15.7	7.16	13.8	822	504	462	448
	1998-06	02/09/99	24.9	10.8	26.6	17.5	476	420	213	*****
	1998-09	03/15/99	38.8	21.4	*****	23.4	881	894	401	396
	1998-10	03/20/99	5.47	7.70	*****	14.4	1530	1360	310	305
	1998-11	03/25/99	14.6	13.4	15.4	19.5	1260	1500	467	*****
	1998-12	04/06/99	17.8	28.5	19.1	21.2	878	609	272	227
	1998-13	04/11/99	12.9	10.4	13.9	13.0	213	244	127	120
	COV		0.610	0.529	0.468	0.29	0.725	0.687	0.490	0.990
	Mean		20.1	17.0	18.7	19.8	849	767	322	305
	Median		17.2	15.0	17.0	19.0	687	632	289	217
1999	1999-05	01/25/00	18.9	17.7	19.4	19.7	759	823	363	171
	1999-06	01/30/00	14.6	6.44	6.89	7.20	481	438	533	*****
	1999-08	02/10/00	32.5	59.3	23.6	56.8	660	716	427	144
	1999-09	02/12/00	*****	*****	13.7	18.2	383	*****	167	41.1
	1999-10	02/13/00	*****	*****	10.1	11.5	430	474	281	104
	1999-11	02/16/00	14.3	20.6	11.2	22.3	424	540	358	127
	1999-12	02/20/00	*****	12.3	8.76	8.05	117	132	99.1	38.7
	1999-13	02/23/00	*****	11.9	9.67	12.3	291	343	193	133
	1999-14	02/27/00	14.0	4.29	6.55	9.12	250	219	*****	56.4
	1999-15	03/04/00	14.3	5.26	12.3	6.67	69.8	78.2	44.5	21.6
	1999-16	03/08/00	8.71	11.3	7.68	8.27	255	352	103	297
	COV		0.413	0.948	0.42	0.714	0.813	0.859	0.926	0.965
	Mean		16.9	16.5	11.8	16.0	400	442	277	121
	Median		15.6	12.0	10.9	13.1	310	335	203	87
Combined	COV		0.514	0.734	0.492	0.578	0.916	0.863	0.741	1.15
	Mean		18.5	16.7	14.4	17.8	588	587	299	193
	Median		16.5	13.4	12.9	15.4	434	445	240	127

Note: Statistics are based on a log-normal distribution.
**** Insufficient data.

Table G-1. CHEMICAL WATER QUALITY DATA

pH pH Units

			1-42	1-46	1-52	1-58	6-20E	6-20F	8-23C	8-B001
1998	1998-03	12/01/98	7.63	8.84	7.79	7.90	7.72	7.58	7.70	7.87
	1998-05	01/25/99	7.64	8.69	9.20	8.87	8.21	8.21	8.30	8.03
	1998-06	02/09/99	7.47	7.53	7.42	7.50	7.84	7.39	7.31	7.23
	1998-09	03/15/99	7.50	9.05	8.81	8.47	7.82	7.66	7.73	7.46
	1998-10	03/20/99	7.33	7.61	8.71	7.66	7.03	7.47	7.28	7.88
	1998-11	03/25/99	7.37	7.33	7.27	7.27	7.16	7.24	7.33	7.24
	1998-12	04/06/99	8.97	8.69	8.51	8.38	9.20	9.51	7.95	7.72
	1998-13	04/11/99	7.39	7.48	7.97	7.70	8.04	8.06	7.34	7.36
	COV		0.07	0.09	0.09	0.07	0.08	0.09	0.05	0.04
	Mean		7.66	8.16	8.21	7.97	7.88	7.89	7.62	7.60
	Median		7.65	8.12	8.18	7.95	7.85	7.86	7.61	7.59
1999	1999-05	01/25/00	8.96	7.85	9.04	7.69	8.11	8.22	7.86	*****
	1999-08	02/10/00	7.10	7.46	8.82	7.59	7.97	8.02	6.94	7.44
	1999-09	02/12/00	8.85	8.40	8.43	*****	7.41	7.76	4.80	7.57
	1999-10	02/13/00	8.29	8.55	8.28	*****	7.63	7.87	*****	*****
	1999-11	02/16/00	8.88	8.30	8.57	8.79	7.83	8.02	7.47	7.14
	1999-12	02/20/00	8.70	9.25	9.14	9.65	7.57	7.82	7.90	7.95
	1999-13	02/23/00	8.74	8.85	8.74	9.43	8.57	8.39	8.62	8.51
	1999-14	02/27/00	7.20	7.61	7.65	9.46	8.12	8.02	8.12	7.82
	1999-15	03/04/00	8.82	9.15	8.33	9.31	7.96	7.90	7.82	8.23
	1999-16	03/08/00	8.42	8.88	8.71	9.72	8.41	8.41	8.35	7.79
	COV		0.09	0.08	0.05	0.10	0.05	0.03	0.18	0.06
	Mean		8.40	8.43	8.57	8.96	7.96	8.04	7.57	7.81
	Median		8.37	8.41	8.56	8.92	7.95	8.04	7.45	7.80
Combined	COV		0.09	0.08	0.07	0.10	0.06	0.06	0.13	0.05
	Mean		8.07	8.31	8.41	8.46	7.92	7.98	7.59	7.70
	Median		8.04	8.28	8.39	8.42	7.91	7.96	7.52	7.69

Total Kjedhal Nitrogen mg/l

			1-42	1-46	1-52	1-58	6-20E	6-20F	8-23C	8-B001
1998	1998-02	11/28/98	2.7	1.9	2.4	2.2	3.6	3.1	2.7	1.1
	1998-03	12/01/98	3.4	5.7	2.5	3.5	*****	*****	6.7	8.0
	1998-05	01/25/99	2.0	1.4	1.4	1.1	3.9	3.1	2.8	*****
	1998-06	02/09/99	2.2	1.7	1.7	1.5	2.8	3.6	3.4	*****
	1998-09	03/15/99	2.5	3.1	*****	2.1	6.7	6.2	4.3	3.6
	1998-10	03/20/99	3.6	2.5	*****	3.4	*****	*****	4.8	*****
	1998-11	03/25/99	1.1	2.0	1.7	1.7	*****	7.3	*****	*****
	1998-12	04/06/99	2.5	2.8	2.2	2.5	3.4	3.9	3.1	3.6
	1998-13	04/11/99	1.4	1.1	2.0	2.0	2.8	2.5	1.4	2.0
	COV		0.40	0.51	0.21	0.38	0.33	0.41	0.49	0.86
	Mean		2.4	2.5	2.0	2.2	3.9	4.3	3.7	3.9
	Median		2.2	2.2	1.9	2.1	3.7	4.0	3.3	3.0
1999	1999-05	01/25/00	5.0	3.6	3.1	5.3	5.6	6.0	4.5	5.6
	1999-06	01/30/00	2.8	2.2	2.3	3.4	3.6	3.6	6.2	*****
	1999-08	02/10/00	2.2	2.8	1.7	2.5	3.9	4.5	4.2	1.8
	1999-09	02/12/00	*****	*****	1.1	1.4	1.5	1.7	1.1	1.4
	1999-10	02/13/00	1.4	*****	0.8	2.0	2.8	3.9	3.1	3.1
	1999-11	02/16/00	1.4	1.7	0.8	1.7	2.5	3.6	3.1	2.2
	1999-12	02/20/00	*****	0.6	0.8	0.8	1.4	1.7	1.4	0.8
	1999-13	02/23/00	*****	1.1	1.1	1.2	2.0	1.7	1.4	1.3
	1999-14	02/27/00	*****	*****	*****	0.6	*****	*****	*****	*****
	1999-15	03/04/00	0.8	0.6	0.8	0.8	0.8	0.9	0.8	0.6
	1999-16	03/08/00	1.1	1.1	1.1	1.1	1.1	2.0	1.4	1.9
	COV		0.68	0.76	0.52	0.74	0.67	0.64	0.79	0.76
	Mean		2.1	1.8	1.4	1.9	2.6	3.0	2.8	2.1
	Median		1.8	1.4	1.2	1.5	2.1	2.6	2.2	1.7
Combined	COV		0.53	0.67	0.48	0.61	0.63	0.59	0.69	0.83
	Mean		2.3	2.2	1.6	2.1	3.1	3.6	3.2	2.7
	Median		2.0	1.8	1.5	1.8	2.6	3.1	2.7	2.1

Note: Statistics are based on a log-normal distribution.
**** Insufficient data.

Table G-1. CHEMICAL WATER QUALITY DATA

Total Organic Carbon mg/l

			1-42	1-46	1-52	1-58	6-20E	6-20F	8-23C	8-B001
1998	1998-02	11/28/98	26.2	22.3	31.3	25.4	31.6	35.0	19.7	10.2
	1998-03	12/01/98	43.0	35.4	43.8	51.0	*****	*****	48.2	36.4
	1998-05	01/25/99	12.5	11.4	10.5	14.9	24.6	22.4	20.6	*****
	1998-06	02/09/99	12.8	12.4	15.4	10.8	17.5	20.2	15.8	*****
	1998-09	03/15/99	17.0	15.5	*****	15.1	7.2	33.0	5.9	5.9
	1998-10	03/20/99	30.0	26.0	*****	31.0	*****	*****	24.0	*****
	1998-11	03/25/99	25.0	11.9	14.5	17.3	70.0	62.0	34.0	*****
	1998-12	04/06/99	15.3	17.5	17.4	16.8	24.8	21.5	16.9	16.1
	1998-13	04/11/99	7.5	7.4	8.5	9.8	10.6	11.4	5.8	5.9
	COV		0.58	0.51	0.63	0.56	0.86	0.57	0.81	0.89
	Mean		21.5	18.0	20.5	21.4	27.7	29.9	22.4	15.5
	Median		18.6	16.0	17.4	18.7	21.0	26.0	17.4	11.6
1999	1999-05	01/25/00	51.0	40.0	41.5	48.0	37.5	34.3	24.0	30.0
	1999-06	01/30/00	34.8	27.3	34.6	51.0	32.4	28.8	31.6	*****
	1999-08	02/10/00	18.0	18.5	17.5	16.7	23.3	20.5	20.9	21.7
	1999-09	02/12/00	*****	*****	11.0	13.1	14.6	14.7	8.5	8.3
	1999-10	02/13/00	17.0	*****	16.1	20.6	26.6	25.1	22.4	21.9
	1999-11	02/16/00	12.2	13.6	14.1	17.1	19.6	20.5	16.7	12.8
	1999-12	02/20/00	*****	8.6	9.5	11.1	9.1	10.4	10.2	7.5
	1999-13	02/23/00	*****	6.6	6.7	9.5	10.2	10.8	7.9	6.7
	1999-14	02/27/00	*****	*****	*****	15.8	*****	*****	*****	*****
	1999-15	03/04/00	5.8	5.5	3.8	5.8	5.8	6.2	4.6	4.9
	1999-16	03/08/00	6.7	6.5	8.9	8.8	6.3	9.8	9.0	10.7
	COV		0.94	0.85	0.82	0.75	0.76	0.60	0.68	0.68
	Mean		21.9	16.2	16.8	19.8	19.3	18.5	16.1	14.1
	Median		15.9	12.4	13.0	15.9	15.4	15.9	13.3	11.7
Combined	COV		0.72	0.67	0.74	0.65	0.79	0.64	0.74	0.72
	Mean		21.4	17.1	18.2	20.4	22.3	23.1	18.7	14.3
	Median		17.4	14.2	14.6	17.1	17.5	19.5	15.1	11.6

Coliforms, Total MPN/100mL

			1-42	1-46	1-52	1-58	6-20E	6-20F	8-23C	8-B001
1998	1998-03	12/01/98	3000	11000	90000	160000	90000	24000	160000	160000
	1998-05	01/25/99	500	1100	500	800	13000	3000	13000	8000
	1998-06	02/09/99	8000	6000	13000	5000	22000	28000	160000	28000
	1998-09	03/15/99	40	300	300	2400	3000	3000	1300	220
	1998-10	03/20/99	1400	500	220	800	160000	1100	300	2300
	1998-11	03/25/99	13000	13000	2300	1700	1700	1700	5000	30000
	1998-12	04/06/99	300	300	300	230	300	30	800	500
	1998-13	04/11/99	5000	1300	3000	13000	160000	8000	1300	8000
	COV		2.31	3.21	9.78	7.70	14.13	10.30	17.14	11.24
	Mean		6601	5555	17003	23138	189084	27800	91903	69916
	Median		2617	1651	1729	2982	13349	2687	5354	6197
1999	1999-05	01/25/00	2800	2300	340	3000	1300	230	2200	*****
	1999-08	02/10/00	17000	11000	23000	3000	30000	220	5000	2300
	1999-09	02/12/00	5000	500	1700	*****	2300	500	ND	1700
	1999-10	02/13/00	300	1700	80	*****	130	13000	*****	*****
	1999-11	02/16/00	3000	ND	1700	300	11000	8000	ND	2200
	1999-12	02/20/00	220	80	80	40	800	130	9000	3500
	1999-13	02/23/00	1300	2300	2200	500	8000	3000	2300	3000
	1999-14	02/27/00	270	230	500	300	500	500	270	220
	1999-15	03/04/00	500	40	300	40	230	300	40	300
	1999-16	03/08/00	2200	3500	3500	300	5000	1700	8000	3500
	COV		2.64	9.23	4.66	3.71	4.65	3.50	29.67	1.54
	Mean		3771	5108	3987	1320	8797	3180	17021	2689
	Median		1337	550	836	344	1851	875	573	1462
Combined	COV		2.50	6.20	6.20	9.03	11.28	6.03	36.58	5.34
	Mean		4844	5629	7251	9195	50438	8803	60029	16367
	Median		1801	897	1155	1012	4454	1440	1641	3010

Note: Statistics are based on a log-normal distribution.
**** Insufficient data.

Table G-1. CHEMICAL WATER QUALITY DATA

TPH (Diesel) mg/l

			1-42	1-46	1-52	1-58	6-20E	6-20F	8-23C	8-B001
1998	1998-03	12/01/98	14.2	15.6	13.4	22.3	ND	1.56	9.79	7.45
	1998-05	01/25/99	15.6	8.48	6.48	5.28	4.30	9.77	6.61	7.64
	1998-06	02/09/99	20.5	17.7	18.2	33.1	7.35	35.6	18.4	11.2
	1998-09	03/15/99	7.16	4.65	4.05	7.02	7.69	7.02	6.48	8.25
	1998-10	03/20/99	13.8	9.39	16.8	37.4	25.3	23.0	43.4	18.5
	1998-11	03/25/99	12.9	10.1	4.01	26.4	14.0	6.53	27.5	16.6
	1998-12	04/06/99	9.80	7.27	10.0	11.4	19.2	16.2	13.0	12.5
	1998-13	04/11/99	12.0	13.0	13.4	12.6	21.0	32.3	14.2	11.7
	COV		0.32	0.45	0.67	0.83	1.46	1.39	0.75	0.35
	Mean		13.4	10.9	11.2	20.6	15.5	19.6	17.8	11.8
	Median		12.7	10.0	9.3	15.8	8.8	11.5	14.2	11.1
1999	1999-05	01/25/00	ND	ND	ND	ND	ND	ND	ND	*****
	1999-08	02/10/00	17.0	13.0	4.90	37.0	5.90	13.0	4.70	12.0
	1999-09	02/12/00	0.570	ND	0.850	*****	ND	ND	ND	5.60
	1999-10	02/13/00	1.40	4.90	1.80	*****	5.40	9.60	*****	*****
	1999-11	02/16/00	2.30	1.90	2.20	2.80	18.0	26.0	2.50	2.90
	1999-12	02/20/00	ND	ND	ND	ND	16.0	17.0	3.90	4.30
	1999-13	02/23/00	3.50	2.80	3.00	3.00	5.90	7.30	3.30	4.20
	1999-14	02/27/00	10.0	3.90	2.50	7.40	15.0	14.0	7.80	6.00
	1999-15	03/04/00	ND	ND	ND	ND	5.70	4.60	4.60	3.90
	1999-16	03/08/00	9.10	ND	ND	ND	13.0	16.0	18.0	7.9
	COV		4.06	2.14	1.44	5.71	2.18	2.55	1.02	0.47
	Mean		6.81	3.31	1.93	6.30	12.5	17.4	5.41	5.89
	Median		1.63	1.40	1.10	1.70	5.22	6.33	3.78	5.33
Combined	COV		3.64	2.52	2.45	24.40	1.83	1.99	1.33	0.58
	Mean		15.3	9.09	7.52	24.4	13.7	18.4	11.7	8.92
	Median		4.06	3.35	2.85	3.44	6.57	8.25	7.05	7.70

TPH (Gasoline) mg/l

			1-42	1-46	1-52	1-58	6-20E	6-20F	8-23C	8-B001
1998	1998-03	12/01/98	ND	ND	ND	ND	ND	ND	ND	ND
	1998-05	01/25/99	ND	ND	ND	ND	ND	ND	ND	ND
	1998-06	02/09/99	ND	ND	ND	ND	ND	ND	ND	ND
	1998-09	03/15/99	ND	ND	ND	ND	ND	ND	ND	ND
	1998-10	03/20/99	ND	ND	ND	ND	ND	ND	ND	ND
	1998-11	03/25/99	ND	ND	ND	ND	ND	ND	ND	ND
	1998-12	04/06/99	ND	ND	ND	ND	ND	ND	ND	ND
	1998-13	04/11/99	ND	ND	ND	ND	ND	ND	ND	ND
	COV		*****	*****	*****	*****	*****	*****	*****	*****
	Mean		*****	*****	*****	*****	*****	*****	*****	*****
	Median		*****	*****	*****	*****	*****	*****	*****	*****
1999	1999-05	01/25/00	ND	ND	ND	ND	ND	ND	ND	*****
	1999-08	02/10/00	ND	ND	ND	ND	ND	ND	ND	ND
	1999-09	02/12/00	ND	ND	ND	*****	ND	ND	ND	ND
	1999-10	02/13/00	ND	ND	ND	*****	ND	ND	*****	*****
	1999-11	02/16/00	ND	ND	ND	ND	ND	ND	ND	ND
	1999-12	02/20/00	ND	ND	ND	ND	ND	ND	ND	ND
	1999-13	02/23/00	ND	ND	ND	ND	ND	ND	ND	ND
	1999-14	02/27/00	ND	ND	ND	ND	ND	ND	ND	ND
	1999-15	03/04/00	ND	ND	ND	ND	ND	ND	ND	ND
	1999-16	03/08/00	ND	ND	ND	ND	ND	ND	ND	ND
	COV		*****	*****	*****	*****	*****	*****	*****	*****
	Mean		*****	*****	*****	*****	*****	*****	*****	*****
	Median		*****	*****	*****	*****	*****	*****	*****	*****
Combined	COV		*****	*****	*****	*****	*****	*****	*****	*****
	Mean		*****	*****	*****	*****	*****	*****	*****	*****
	Median		*****	*****	*****	*****	*****	*****	*****	*****

Note: Statistics are based on a log-normal distribution.
**** Insufficient data.

Table G-1. CHEMICAL WATER QUALITY DATA

Total Suspended Solids mg/l

			1-42	1-46	1-52	1-58	6-20E	6-20F	8-23C	8-B001
1998	1998-02	11/28/98	70	77	80	41	332	324	179	53
	1998-03	12/01/98	57	30	49	50	*****	*****	357	296
	1998-05	01/25/99	48	108	16	52	486	253	348	1150
	1998-06	02/09/99	120	56	83	34	402	255	233	*****
	1998-09	03/15/99	79	76	*****	56	700	657	425	386
	1998-10	03/20/99	10	24	*****	40	1040	*****	263	333
	1998-11	03/25/99	18	24	9	20	556	559	205	*****
	1998-12	04/06/99	38	199	40	32	662	422	298	253
	1998-13	04/11/99	8	15	9	18	145	130	78	57
	COV		1.2	1.0	1.2	0.4	0.6	0.6	0.5	1.5
	Mean		56	71	46	39	564	383	274	417
	Median		36	50	29	36	473	329	241	229
1999	1999-05	01/25/00	58	52	22	36	525	314	353	611
	1999-06	01/30/00	29	20	12	9	347	274	660	*****
	1999-08	02/10/00	70	174	52	135	605	477	395	203
	1999-09	02/12/00	*****	*****	17	30	246	177	89	43
	1999-10	02/13/00	19	*****	3	5	260	290	143	66
	1999-11	02/16/00	23	30	6	30	247	372	261	117
	1999-12	02/20/00	*****	22	22	16	122	126	75	42
	1999-13	02/23/00	*****	18	8	20	220	231	136	122
	1999-14	02/27/00	22	3	12	16	159	97	*****	94
	1999-15	03/04/00	23	ND	5	15	50	50	22	11
	1999-16	03/08/00	11	14	12	7	205	243	80	155
	COV		0.7	2.9	0.9	1.1	0.8	0.7	1.3	1.5
	Mean		32	51	16	28	285	254	246	160
	Median		27	16	12	19	225	205	149	90
Combined	COV		0.9	2.1	1.2	0.9	0.8	0.7	0.9	1.7
	Mean		43	68	26	34	403	304	262	256
	Median		31	29	17	25	308	247	190	132

Total Volatile Solids mg/l

			1-42	1-46	1-52	1-58	6-20E	6-20F	8-23C	8-B001
1998	1998-02	11/28/98	76	70	94	50	144	132	54	22
	1998-03	12/01/98	44	40	42	38	*****	*****	90	82
	1998-05	01/25/99	50	64	50	66	180	116	102	190
	1998-06	02/09/99	40	54	52	32	90	74	96	*****
	1998-09	03/15/99	66	46	*****	48	210	106	100	96
	1998-10	03/20/99	66	68	*****	68	326	*****	130	134
	1998-11	03/25/99	8	22	28	14	267	228	26	*****
	1998-12	04/06/99	30	52	20	27	132	100	52	53
	1998-13	04/11/99	20	22	5	15	45	25	27	5
	COV		0.8	0.5	1.2	0.6	0.7	0.8	0.7	1.9
	Mean		48	50	49	41	183	119	78	116
	Median		37	45	31	35	150	95	66	53
1999	1999-05	01/25/00	78	92	62	66	130	144	58	92
	1999-06	01/30/00	64	34	52	30	118	82	134	*****
	1999-08	02/10/00	56	68	42	94	148	138	120	84
	1999-09	02/12/00	*****	*****	44	38	86	70	38	38
	1999-10	02/13/00	14	*****	22	24	40	82	24	34
	1999-11	02/16/00	20	24	12	24	72	96	46	28
	1999-12	02/20/00	*****	32	36	40	42	38	20	26
	1999-13	02/23/00	*****	24	32	24	32	48	38	34
	1999-14	02/27/00	*****	*****	*****	56	50	*****	*****	*****
	1999-15	03/04/00	16	18	8	26	24	16	14	2
	1999-16	03/08/00	32	46	38	38	46	58	20	50
	COV		0.8	0.6	0.7	0.5	0.7	0.7	0.9	1.6
	Mean		42	43	37	42	73	81	52	58
	Median		33	37	30	38	61	66	39	31
Combined	COV		0.8	0.5	0.9	0.5	0.9	0.8	0.8	1.7
	Mean		45	46	41	41	118	96	65	77
	Median		35	41	30	36	89	76	50	39

Note: Statistics are based on a log-normal distribution.
**** Insufficient data.

Table G-1. CHEMICAL WATER QUALITY DATA

Zinc, Dissolved ug/l

			1-42	1-46	1-52	1-58	6-20E	6-20F	8-23C	8-B001
1998	1998-02	11/28/98	29.7	6.6	7.0	66.0	17.5	19.5	6.76	53.2
	1998-03	12/01/98	104	112	152	219	*****	*****	127	205
	1998-05	01/25/99	45.8	39.2	37.1	30.4	46.4	228	58.1	42.8
	1998-06	02/09/99	32.9	ND	50.0	ND	166	38.8	25.1	*****
	1998-09	03/15/99	21.2	31.6	*****	46.8	50.7	66.5	10.1	12.7
	1998-10	03/20/99	108	75.5	*****	55.3	20.6	94.5	22.2	33.2
	1998-11	03/25/99	129	13.7	11.8	55.9	110	28.2	78.4	*****
	1998-12	04/06/99	15.4	88.6	31.9	9.83	8.60	34.7	12.1	65.2
	1998-13	04/11/99	44.7	28.7	63.8	26.5	36.2	46.6	21.4	23.0
	COV		0.88	1.57	1.38	1.55	1.25	0.91	1.28	1.07
	Mean		61.3	52.8	57.2	64.8	61.7	69.5	42.4	63.8
	Median		46.1	28.4	33.5	35.2	38.5	51.5	26.1	43.5
1999	1999-05	01/25/00	ND	ND	ND	ND	ND	ND	ND	ND
	1999-06	01/30/00	94.3	48.2	30.3	150	30.0	71.8	50.5	*****
	1999-08	02/10/00	55.7	48.2	35.2	98.3	239	31.0	21.8	107
	1999-09	02/12/00	*****	*****	8.11	19.8	8.73	16.8	10.3	29.7
	1999-10	02/13/00	48.9	*****	11.3	23.1	39.4	40.7	66.4	115
	1999-11	02/16/00	23.6	14.2	18.7	61.6	20.1	30.7	16.1	35.6
	1999-12	02/20/00	*****	ND	ND	ND	ND	ND	ND	ND
	1999-13	02/23/00	*****	6.14	9.7	9.43	22.0	26.8	16.0	15.2
	1999-14	02/27/00	19.0	12.2	20.1	55.2	30.0	39.3	*****	46.2
	1999-15	03/04/00	10.6	5.08	18.7	7.68	9.89	34.7	19.0	37.2
	1999-16	03/08/00	20.0	10.4	54.4	24.1	17.5	24.4	28.0	24.8
	COV		2.46	1.66	2.18	2.02	3.33	2.70	2.70	4.00
	Mean		52.7	18.4	26.9	49.3	50.2	49.8	35.8	80.9
	Median		19.9	9.5	11.2	21.8	14.4	17.3	12.6	19.6
Combined	COV		1.66	1.90	2.12	1.78	2.53	2.13	2.00	2.59
	Mean		60.3	35.2	40.3	55.3	59.3	64.5	40.0	75.7
	Median		31.0	16.4	17.2	27.1	21.8	27.4	17.8	27.2

Zinc, Total ug/l

			1-42	1-46	1-52	1-58	6-20E	6-20F	8-23C	8-B001
1998	1998-02	11/28/98	275	193	156	168	468	454	188	94.5
	1998-03	12/01/98	187	112	182	173	*****	*****	325	382
	1998-05	01/25/99	124	74.2	74.1	100	339	283	309	418
	1998-06	02/09/99	167	54.4	288	91.7	394	290	286	*****
	1998-09	03/15/99	146	79.6	*****	129	439	496	295	369
	1998-10	03/20/99	94.6	58.5	*****	120	940	983	267	302
	1998-11	03/25/99	159	73.7	84.7	137	666	687	308	*****
	1998-12	04/06/99	92.5	126	129	169	637	382	352	277
	1998-13	04/11/99	60.2	187	133	94.5	189	233	132	107
	COV		0.47	0.50	0.48	0.26	0.52	0.51	0.32	0.68
	Mean		147	107	152	132	520	481	277	294
	Median		133	96.2	136	128	462	427	263	243
1999	1999-05	01/25/00	336	168	163	321	561	670	409	889
	1999-06	01/30/00	269	106	55.7	151	387	289	438	*****
	1999-08	02/10/00	269	287	186	465	550	559	436	420
	1999-09	02/12/00	*****	*****	162	163	242	*****	183	147
	1999-10	02/13/00	*****	*****	42.3	76.4	370	430	384	317
	1999-11	02/16/00	117	92.5	77.5	196	352	503	321	242
	1999-12	02/20/00	*****	61.3	71.3	52.8	150	193	155	634
	1999-13	02/23/00	*****	52.2	64.6	96.7	340	390	271	210
	1999-14	02/27/00	104	32.4	47.6	111	372	220	*****	162
	1999-15	03/04/00	86.4	119	94.6	56.3	104	115	78.2	102
	1999-16	03/08/00	118	62.4	136	90.4	260	346	173	267
	COV		0.60	0.74	0.57	0.78	0.55	0.58	0.62	0.75
	Mean		190	111	101	163	345	382	295	344
	Median		163	89.4	88.3	129	302	330	251	275
Combined	COV		0.52	0.60	0.58	0.56	0.57	0.56	0.47	0.70
	Mean		164	108	121	147	417	424	284	319
	Median		145	92.7	105	128	361	370	256	261

Note: Statistics are based on a log-normal distribution.
**** Insufficient data.

APPENDIX H Litter Characterization Protocol and Lab Data Sheets

Caltrans Litter Management Pilot Study
Litter Characterization Protocol

A. Preparation

1. Put on Tyvek suit, apron, gloves, and safety glasses.

2. Check to see whether this set of sample bags will need to be duplicate for quality assurance/control purposes (every 5th bag for the first 3 storms events and every 10th bag thereafter).

3. Weigh the bag with contents on calibrated scale. Record weight on data sheet.

4. At the work table, pour out contents of litter bag in tub, and separate out litter material from leaves/organic debris. ***See note "b" below regarding possible contaminated or hazardous materials that you may encounter***.

5. Weigh leaves/organic debris on calibrated scale and record on data sheet. Discard leaves/organic debris into trash can.

6. Sift through litter and remove spike materials. Record the recovery of spike material on spike data sheet. Weigh spike materials (as a whole) on calibrated scale and recorded weight on data sheet. Dispose of spike materials as described under Section C - Disposal Procedures.

7. Place remaining litter in the # drying screen corresponding to the # litter bag. Litter should be placed on drying screen to achieve maximum drying (e.g., spread out as much as possible, avoid covering/overlapping of materials).

8. Leave materials to air-dry on drying screens for 24 hours. Record on data sheet the time that air-drying begins.

9. Record on data sheet how much time (in days) has passed between the previous storm for which litter collection took place and the storm for which you are now conducting litter analysis.

10. Photograph litter on drying screen. Be sure to include event and site/outfall identification information in the photograph.

B. Litter Characterization

11. Put on Tyvek suit, gloves, and safety glasses.

12. Take material off drying screen and segregate litter into the following categories:

    - Cardboard/Chipboard
    - Cigarette Butts
    - Cloth
    - Glass
    - Metal (foil and molded)
    - Other
    - Paper
    - Plastic-Film
    - Plastic-Moldable
    - Styrofoam
    - Wood Debris

13. If any materials appear to be accident- or spill-related (e.g., 5 or more pieces of related materials, broken glass, pellets, etc.,) consult the litter team's Accident Specialist for a determination if the materials are actually accident- or spill-related. If the Accident Specialist determines the materials to be accident- or spill-related, the Accident Specialist must fill in data on Accident/Spill form.

14. Further segregate the litter according to usage (e.g., smoking-related, food-related, or general unknown), as specified on the data sheet.

15. Weigh segregated materials on calibrated scale and record weight on data sheet ***(See note "b" below).***

16. Measure volume of segregated materials using appropriate volume measurement container and record volume on data sheet.

17. Count individual segregated items and record number on data sheet.

18. Conduct percent floatable analysis using "Percent of Floating Material Procedure."

19. Conduct oven-drying analysis using "Oven Drying Procedure."

C. Litter Disposal Procedures

20. Recyclable materials should be placed in recycle bin.

21. Non-recyclable materials should be placed in trash bin.

D. Clean-Up Procedures

22. Drying screens should be cleaned with water after each use. This should be accomplished at the geotechnical lab's large sink using a spray bottle.

23. Water from the tubs should be disposed into the sink of the geotechnical lab.

Health and Safety

- Do not smell or taste the contents of any container.

- All open wounds on the hand must be protected with protective gloves.

- If you get a cut or puncture wound from any litter materials, immediately disinfect and bandage using the first aid kit, etc. Serious infections can arise unless proper treatment is received. If necessary, seek emergency assistance at the nearest hospital, which is Western Medical Center located on Tustin Avenue between 4th St. and 17th St. in Tustin. Also, notify Ron Miller by pager @ 800-970-8131 or by phone @ ext. 503. If you have not had a tetanus shot within the past 10 years, you are advised to get one at the hospital immediately. For any wound, also contact Greany Medical at 1-800-455-6155 (they are associated with Western Medical Center).

- If you get any foreign objects or fluids in the eye, do not rub the eye. Flush eye with eye water rinse located in the litter lab. Liquid should be flushed for fifteen minutes and then consult a physician. If flushing fails to remove the object, apply a dry, protective dressing and consult a physician (Western Medical Center located on Tustin Ave. between 4th St. and 17th St. in Tustin). Also notify Ron Miller by pager @ 1800-970-8131 or by phone @ ext. 503.

NOTES

a. For the first set of characterization analyses, every 5th bag of litter should be weighed in duplicate (by one other team member to ensure accuracy of measurement). Through the duration of the study, 10% of the litter bags should be weighed in duplicate (both pre- and post-drying) for quality assurance/control purposes. The volumes of litter should also be measured in duplicate for 10% of the samples.
b. Any litter materials that appear to be contaminated or hazardous should be put aside. Then contact Ron Miller by pager @: 800-970-8131, or by phone @ ext. 503 for assessment. Material will likely be placed in a 55-gallon drum for disposal by a licensed hauler with Caltrans noted as the generator.

PERCENTAGE OF FLOATING MATERIAL PROCEDURE

OBJECTIVE
To estimate the proportion of litter that floats from the litter samples collected in highway runoff.

SUMMARY
This procedure involves submerging the collected litter into a drum of water, leaving the material for 30 seconds, and then retrieving the proportions that float and those that sink. An estimate of the volume that floats and that which sinks will be made; then the non-floatable material will be drained for 24 hours (on the existing drying screens) and weighed.

Samples to be used for analysis will be each type-classification summed over a whole storm event (i.e., all material from the event, grouped according the type, i.e., 11 samples for each event). The drum of water will need to be of sufficient size to allow all the material to become thoroughly wet.

Outputs from this analysis will be floatable and non-floatable volume estimates and a weight for the non-floatable material after 24 hours of air-drying for each category of material (11 type classifications).

PROCEDURE
1. At the end of litter sorting analysis, all litter should be placed into the labeled type-classification bins (the same bins from which the oven drying samples are taken).
2. These bins should be added together at the end of each analysis day until the complete storm event has been analyzed (including material from the oven-drying).
3. Take one type-classification bin and empty into a tub of water.
4. Stir thoroughly, ensuring everything gets submerged.
5. Leave for 30 seconds.
6. Scoop out floating material with sieve and place into volume measuring containers (select appropriate size container).
7. Estimate and record WET FLOATING VOLUME on data sheet.
8. Dispose of floating material.
9. Drain water and place remaining material into volume measuring container, estimate, and record WET NON-FLOATABLE VOLUME.
10. Place non-floatable material onto drying screens and leave for at least 24 hours.
11. Repeat for each type-classification.
12. After 24 hours, remove material and weigh and record each type-classification on data sheet.

OVEN DRYING PROCEDURE (sorted-weight: dry-weight ratio)

OBJECTIVE

To evaluate the comparative moisture content of different types of litter and litter from different storm events.

SUMMARY

This procedure involves oven-drying samples of litter and organic categories at the end of each analysis day to determine the moisture content of air-dried litter by litter type. The moisture contents care then be compared by litter type and between storms.

PROCEDURE

1. At the end of every day a representative samples for EACH CATEGORY INCLUDING ORGANIC MATERIAL – should be taken (i.e., for organic, cardboard, cig. butts, cloth etc.). Samples should be between 0.5 and 1 pound
2. Each sample to be placed into a clean drying container, labeled (with date and category) and weighed.
3. Record the label (date and category) and the weight of each sample (including tray).
4. Place into the drying oven (set at approximately 60 degrees Celsius) for at least 24 hours (potentially longer for very wet material).
5. When completely dry, remove from oven and weigh the sample, record along with label information.
6. Remove all material, weigh the drying container, and record values.
7. REPEAT AT THE END OF EACH ANALYSIS DAY.

OUTFALL LITTER BAG SUMMARY

SITE/OUTFALL #:_____
STORM EVENT #: _____

SUMMARY INFORMATION:

DUPLICATE ANALYSIS? YES ☐ NO ☐

Litter Analysis Team Member(s): _____

Date & Time collected bag (from bag label): _____

Date & Time started sort: _____

LITTER AIR DRYING:

Date & Time start drain litter (for min. 24 hrs): _____

Date & Time start measuring drained weight: _____

Is there any accident debris present? YES ☐ NO ☐

BAG TOTALS (litter & organic)

TOTAL WET WEIGHT	TOTAL WET VOLUME
(grams to 0.1)	(milliliters to 0.1)

ORGANIC MATERIAL

ORGANIC WEIGHT	ORGANIC VOLUME
(grams to 0.1)	(milliliters to 0.1)

Spike Color:		**Spike Color:**		**Spike Color:**		**Spike Color:**	
Wet Weight	**Count**	**Wet Weight**	**Count**	**Wet Weight**	**Count**	**Wet Weight**	**Count**
	Cigarette Butts: ____ Gum Wrappers: ____ Fabric Scraps: ____ Metal Cans: ____ Plastic Lids: ____ Poker Chips: ____ Popsicle Stick: ____ Styrofoam: ____ Tongue Depress.:____		Cigarette Butts: ____ Gum Wrappers: ____ Fabric Scraps: ____ Metal Cans: ____ Plastic Lids: ____ Poker Chips: ____ Popsicle Stick: ____ Styrofoam: ____ Tongue Depress.:____		Cigarette Butts: ____ Gum Wrappers: ____ Fabric Scraps: ____ Metal Cans: ____ Plastic Lids: ____ Poker Chips: ____ Popsicle Stick: ____ Styrofoam: ____ Tongue Depress.:____		Cigarette Butts: ____ Gum Wrappers: ____ Fabric Scraps: ____ Metal Cans: ____ Plastic Lids: ____ Poker Chips: ____ Popsicle Stick: ____ Styrofoam: ____ Tongue Depress.:____

LITTER CHARACTERIZATION -USING AIR DRIED LITTER

1. Minimum volume is 5mL.
2. Weights to 0.01 grams (small scales)
3. Fill in zeros if no material

	USAGE								
	General/Unknown			Smoking Related			Food Related		
Classification type	Count	Volume (mL)	Weight (g)	Count	Volume (mL)	Weight (g)	Count	Volume (mL)	Weight (g)
CARDBOARD/ CHIPBOARD									
CIG. BUTTS	-	-	-				-	-	-
CLOTH				-	-	-	-	-	-
GLASS				-	-	-			
METAL									
PAPER									
PLASTIC-FILM									
PLASTIC-MOLDABLE									
STYROFOAM				-	-	-			
WOOD				-	-	-			
OTHER*									

* "other" should be the sum of all non-characterized material together (i.e. do not show more than one "other" category) - but note composition of items found

"OTHER" COMPOSITION (briefly describe): _____

OVEN DRYING DATA RECORDING SHEET

Event #: _____

Date samples go into oven: _____

Date removed from oven: _____

Initials of person weighing: _____

BAGS NUMBERS SORTED DURING DAY:

CATEGORY	OVEN TRAY LABEL	CLEAN TRAY WEIGHT	WET WEIGHT WITH TRAY	DRY WEIGHT WITH TRAY
		(grams to 0.01)	(grams to 0.01)	(grams to 0.01)
ORGANIC MATERIAL				
CARDBOARD/ CHIPBOARD				
CIGARETTE BUTTS				
CLOTH				
GLASS				
METAL				
PAPER				
PLASTIC FILM				
PLASTIC MOLDABLE				
STYROFOAM				
WOOD DEBRIS				
ACCIDENT RELATED				
OTHER				

% FLOATABLE DATA RECORDING SHEET

Initials of person weighing: _____

Event #: _____

Date & time samples go into water: _____

Date & time samples placed onto racks: _____

Date & time weighing performed: _____

	BEFORE DRAINING		AFTER DRAINING		
CLASSIFICATION TYPE	**VOLUME FLOATABLE**	**VOLUME NON-FLOATABLE**	**NUMBER OF NON-FLOATABLE ITEMS**	**VOLUME OF NON-FLOATABLE (after draining)**	**NON-FLOATABLE AIR DRIED WEIGHT**
	(milliliters to 0.1)	(milliliters to 0.1)	(integer)	(integer)	(grams to 0.01)
CARDBOARD/ CHIPBOARD					
CIGARETTE BUTTS					
CLOTH					
GLASS					
METAL					
PAPER					
PLASTIC FILM					
PLASTIC MOLDABLE					
STYROFOAM					
WOOD DEBRIS					
ACCIDENT RELATED					
OTHER					

ONLY TO BE COMPLETED BY ACCIDENT/SPILL SPECIALIST

	USAGE: ACCIDENT/SPILL DEBRIS								
	General/Unknown			**Smoking Related**			**Food Related**		
MATERIAL	**Count**	**Volume (mL)**	**Weight (g)**	**Count**	**Volume (mL)**	**Weight (g)**	**Count**	**Volume (mL)**	**Weight (g)**
Glass									

	USAGE: ACCIDENT/SPILL DEBRIS								
	General/Unknown			**Smoking Related**			**Food Related**		
MATERIAL	**Count**	**Volume (mL)**	**Weight (g)**	**Count**	**Volume (mL)**	**Weight (g)**	**Count**	**Volume (mL)**	**Weight (g)**
Metal (foil and molded)									

	USAGE: ACCIDENT/SPILL DEBRIS								
	General/Unknown			**Smoking Related**			**Food Related**		
MATERIAL	Count	Volume (mL)	Weight (g)	Count	Volume (mL)	Weight (g)	Count	Volume (mL)	Weight (g)
Plastic-Moldable									

	USAGE: ACCIDENT/SPILL DEBRIS								
	General/Unknown			**Smoking Related**			**Food Related**		
MATERIAL	Count	Volume (mL)	Weight (g)	Count	Volume (mL)	Weight (g)	Count	Volume (mL)	Weight (g)
Other:									

Litter Category Distribution by Air Dried Weight
All Events Combined
Control Outfalls Site 1E - Litter Pickup

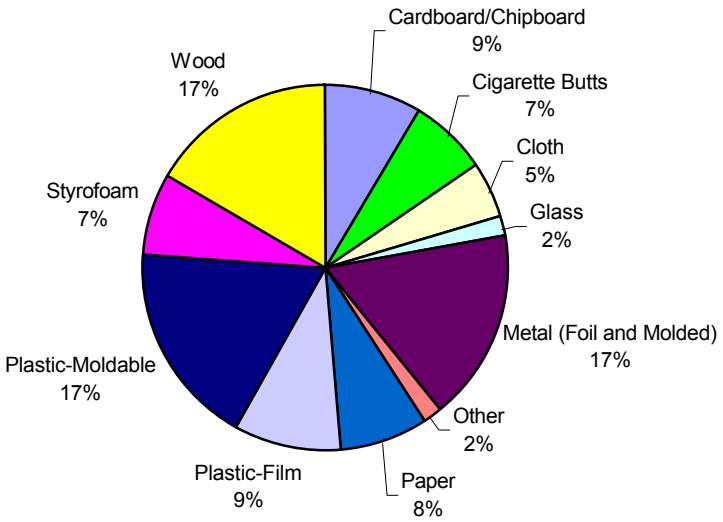

Litter Category Distribution by Air Dried Weight
All Events Combined
Treatment Outfalls Site 1E - Litter Pickup

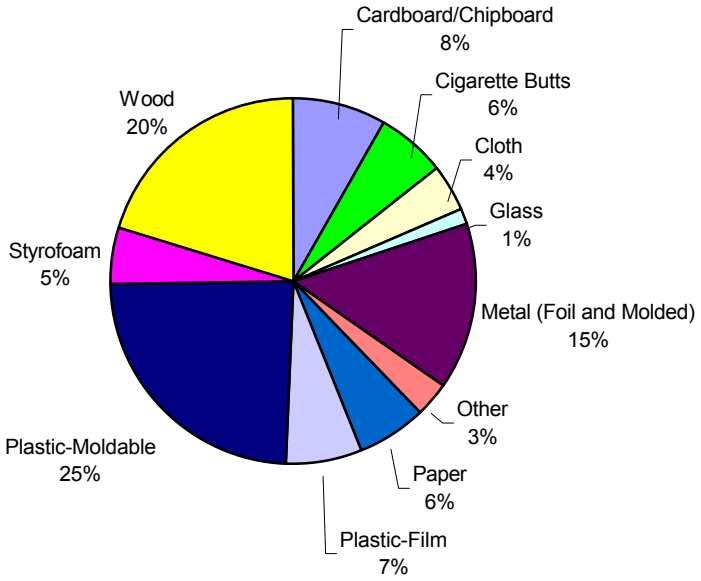

Litter Category Distribution by Volume
All Events Combined
Control Outfalls Site 1E - Litter Pickup

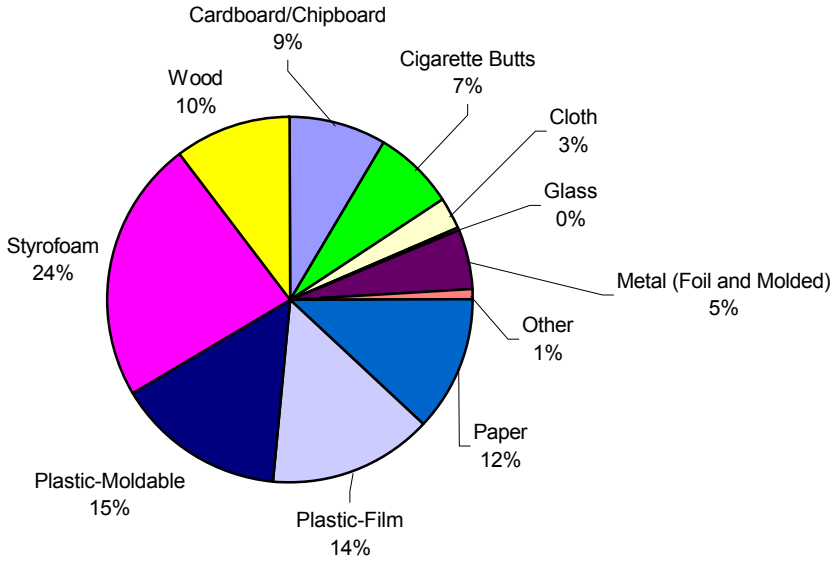

Litter Cateogry Distribution by Volume
All Events Combined
Treatment Outfalls Site 1E - Litter Pickup

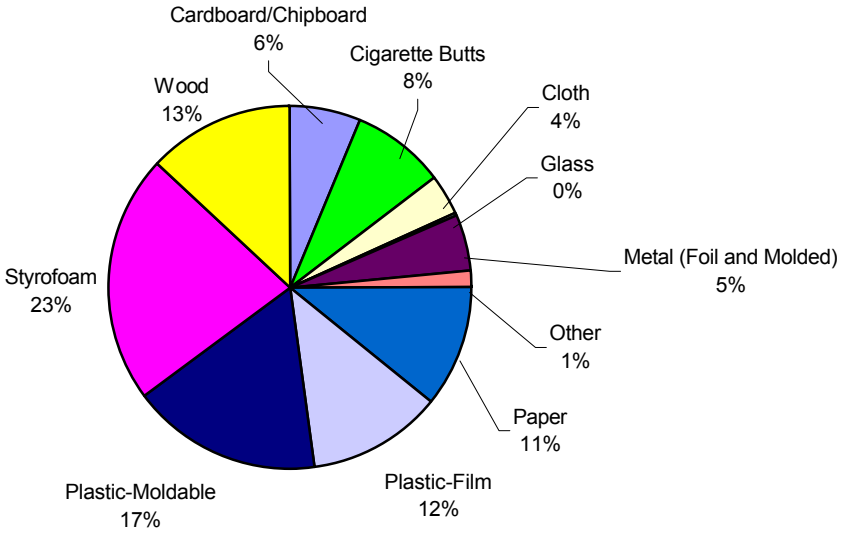

Litter Category Distribution by Count
All Events Combined
Control Outfalls Site 1E - Litter Pickup

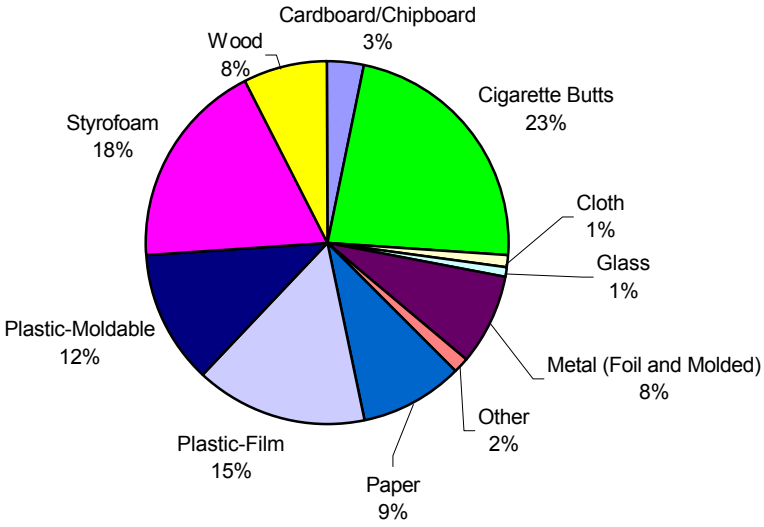

Litter Category Distribution by Count
All Events Combined
Treatment Outfalls Site 1E - Litter Pickup

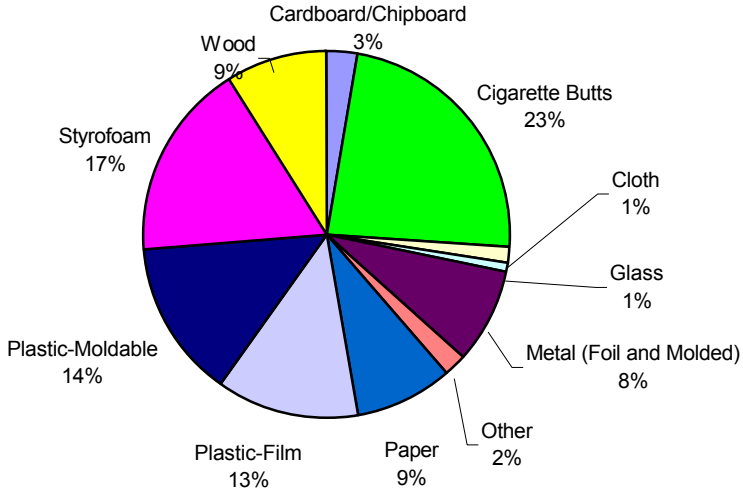

Litter Category Distribution by Air Dried Weight
All Events Combined
Control Outfalls Site 1W - Street Sweeping

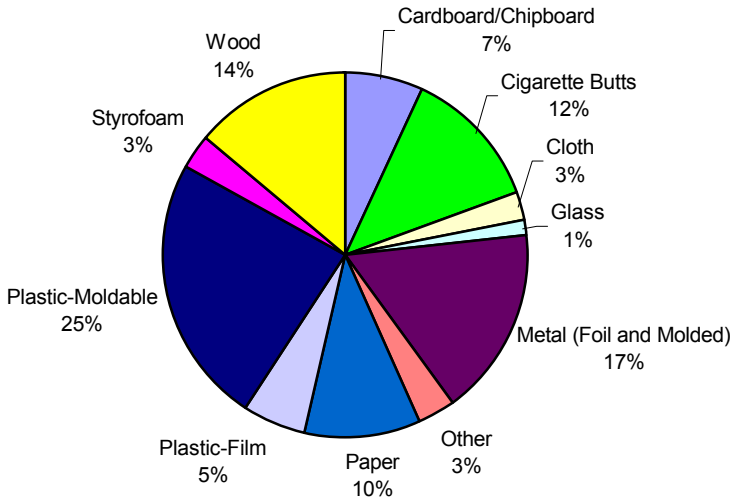

Litter Category Distribution by Air Dried Weight
All Events Combined
Treatment Outfalls Site 1W - Street Sweeping

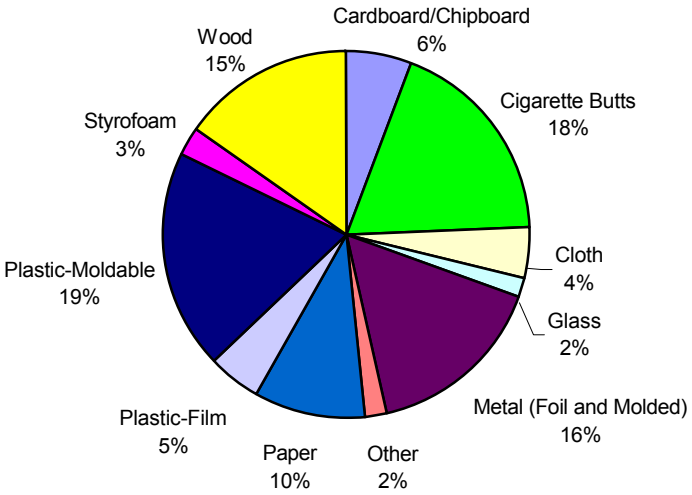

Litter Category Distribution by Volume
All Events Combined
Control Outfalls Site 1W - Street Sweeping

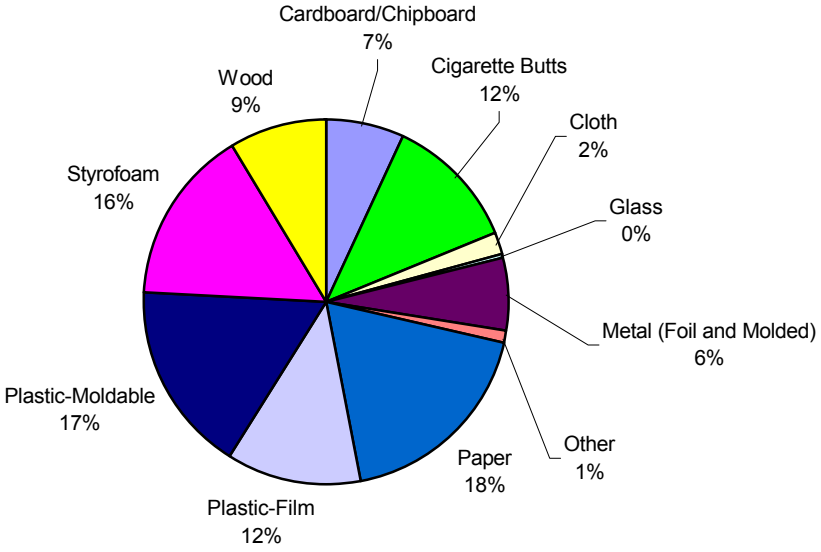

Litter Category Distribution by Volume
All Events Combined
Treatment Outfalls Site 1W - Street Sweeping

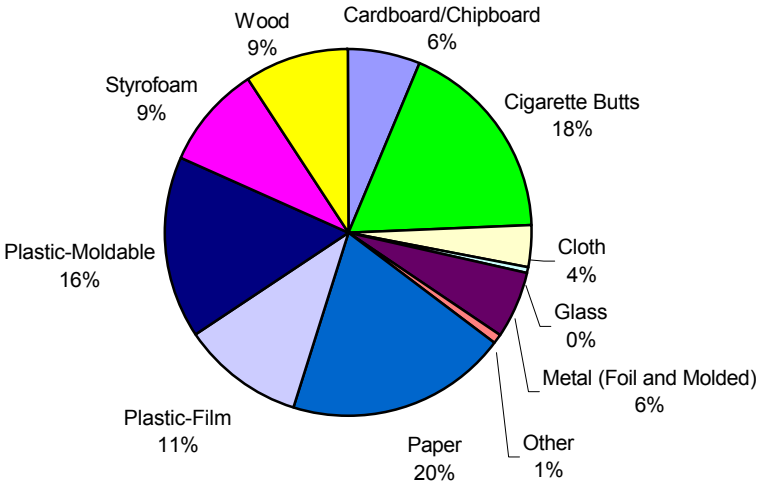

Litter Category Distribution by Count
All Events Combined
Control Outfalls Site 1W - Street Sweeping

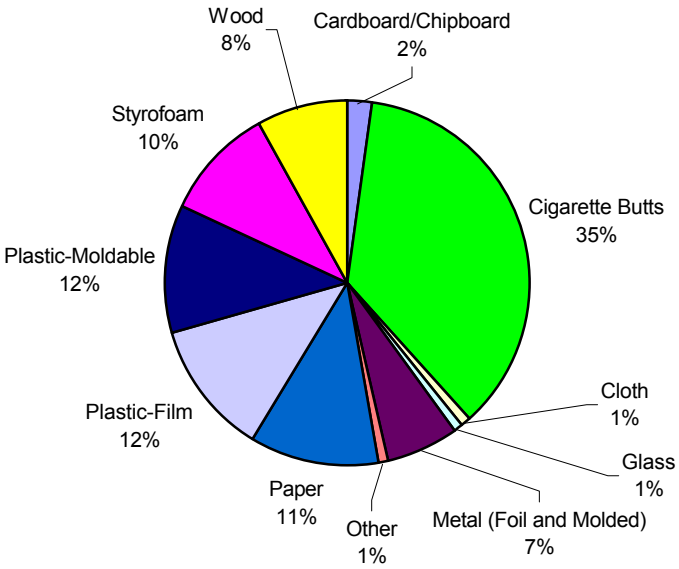

Litter Category Distribution by Count
All Events Combined
Treatment Outfalls Site 1W - Street Sweeping

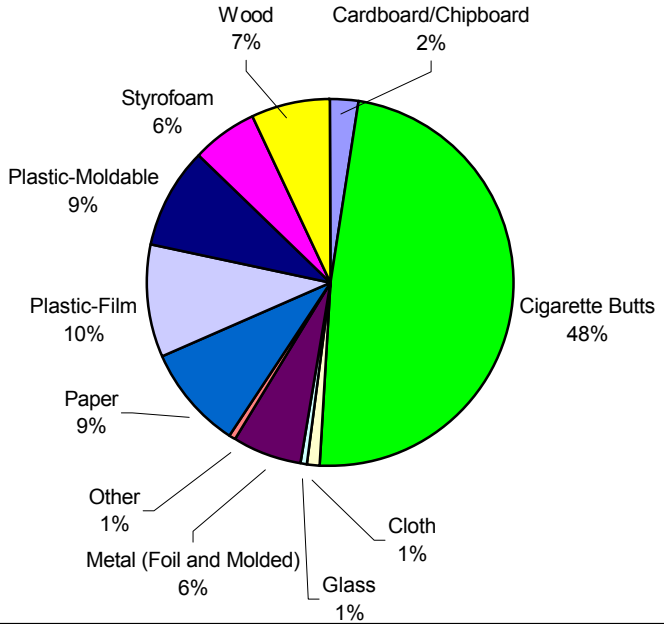

Litter Category Distribution by Air Dried Weight
All Events Combined
Control Outfalls Site 6 - Modified Inlet

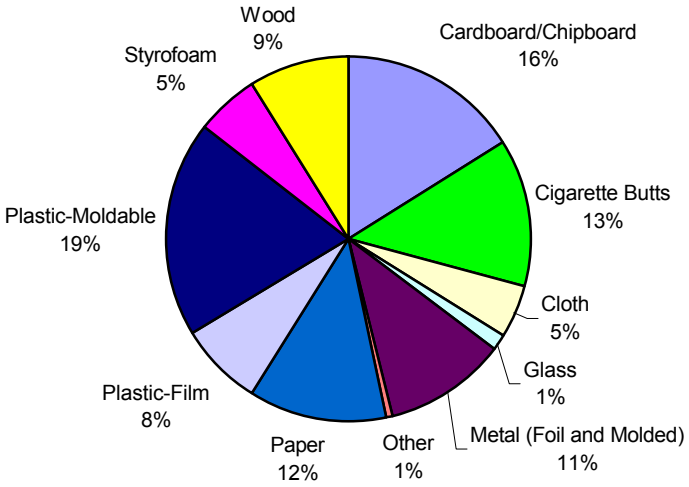

Litter Category Distribution by Air Dried Weight
All Events Combined
Treatment Outfalls Site 6 - Modified Inlet

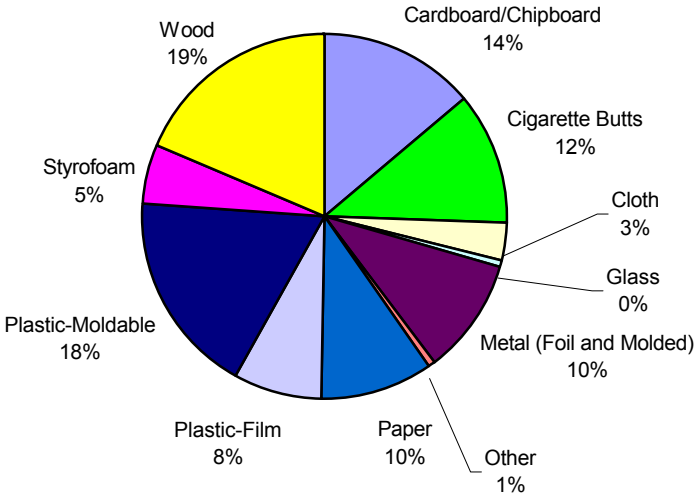

Litter Category Distribution by Volume
All Events Combined
Control Outfalls Site 6 - Modified Inlet

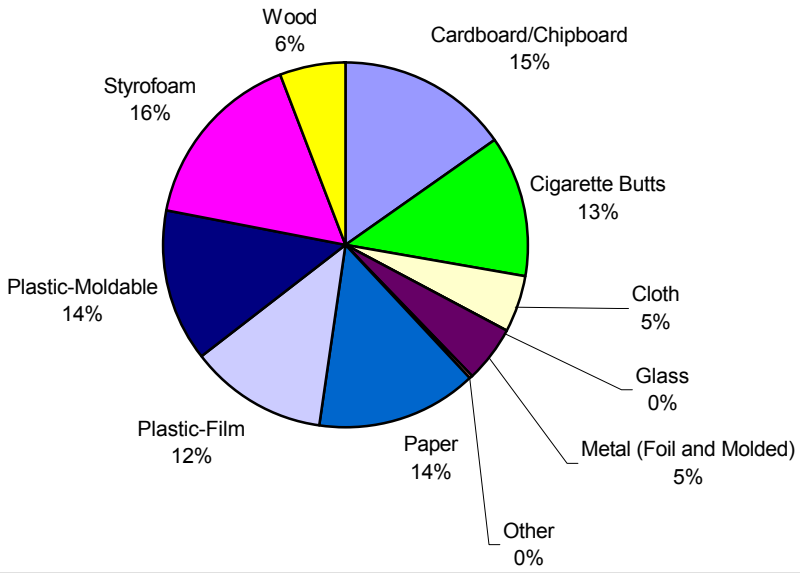

Litter Category Distribution by Volume
All Events Combined
Treatment Outfalls Site 6 - Modified Inlet

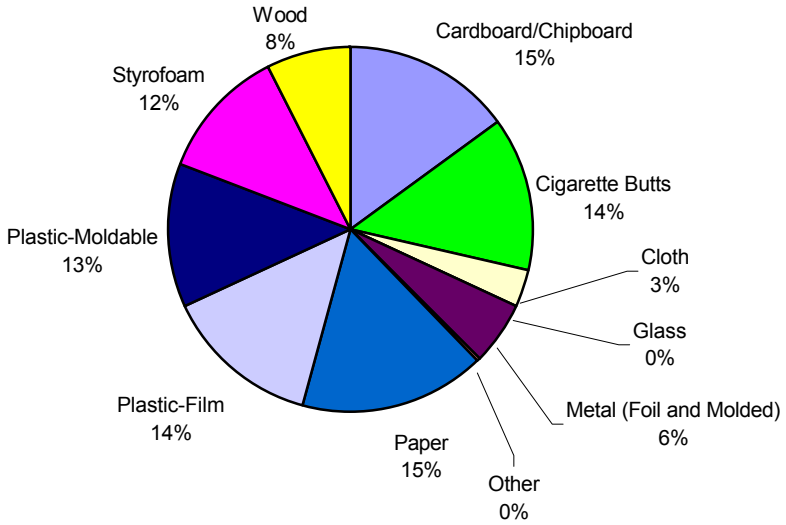

Litter Category Distribution by Count
All Events Combined
Control Outfalls Site 6 - Modified Inlet

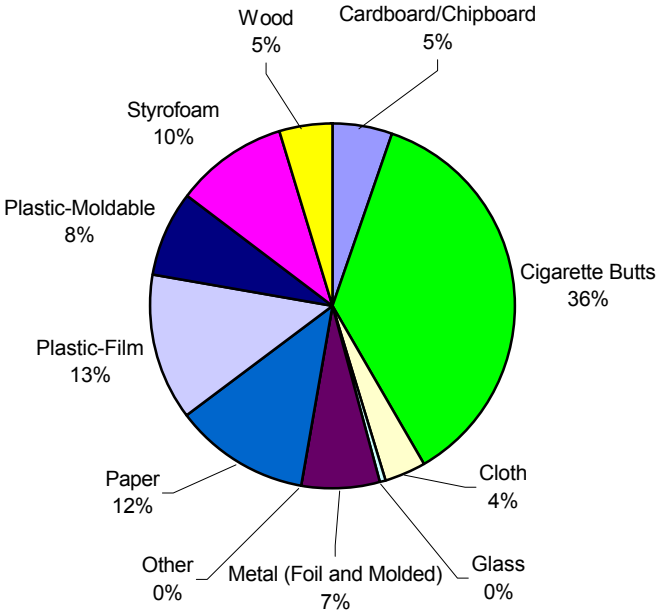

Litter Category Distribution by Count
All Events Combined
Treatment Outfalls Site 6 - Modified Inlet

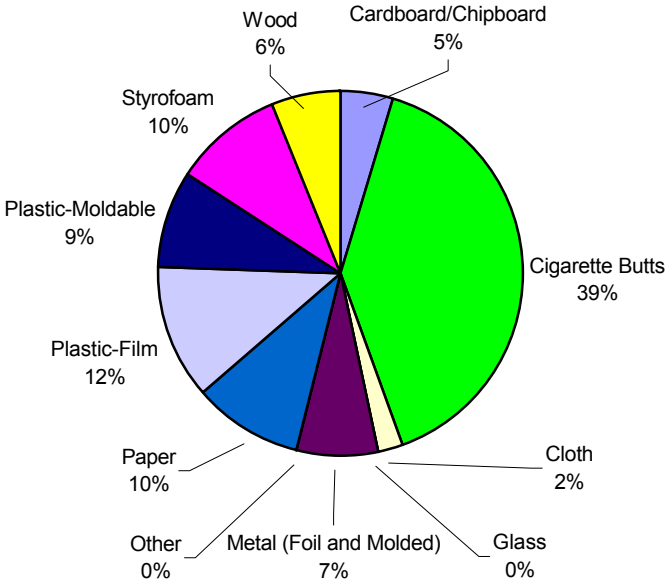

Litter Category Distribution by Air Dried Weight
All Events Combined
Control Outfalls Site 8 - Bicycle Grate (1998-1999)

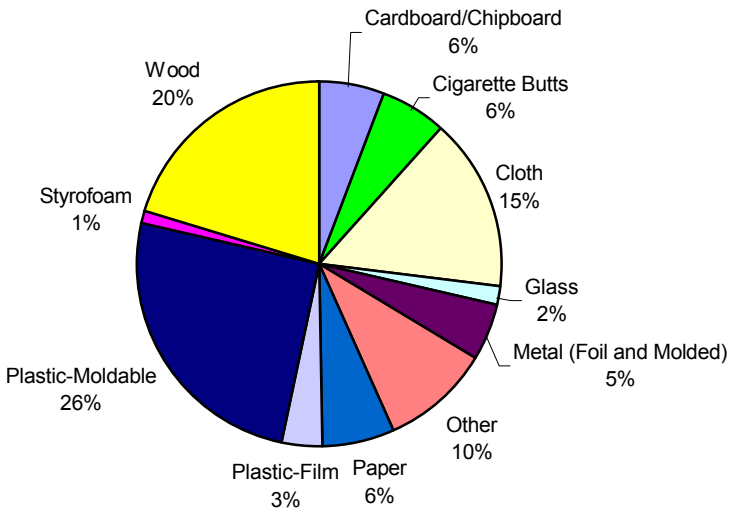

Litter Category Distribution by Air Dried Weight
All Events Combined
Treatment Outfalls Site 8 - Bicycle Grate (1998-1999)

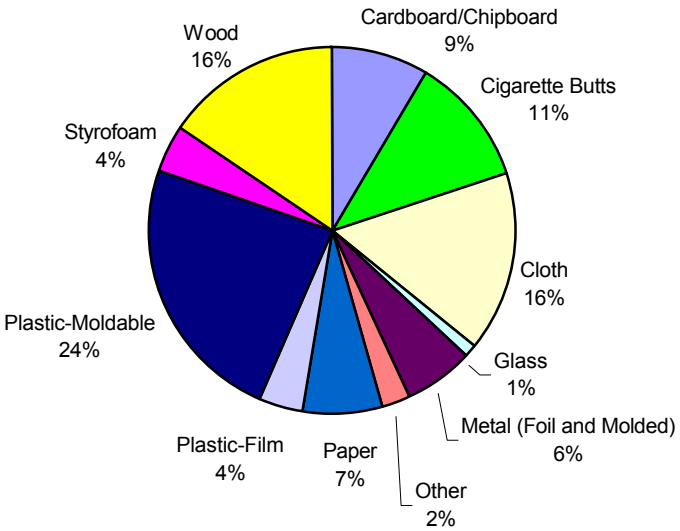

Litter Category Distribution by Volume
All Events Combined
Control Outfalls Site 8 - Bicycle Grate (1998-1999)

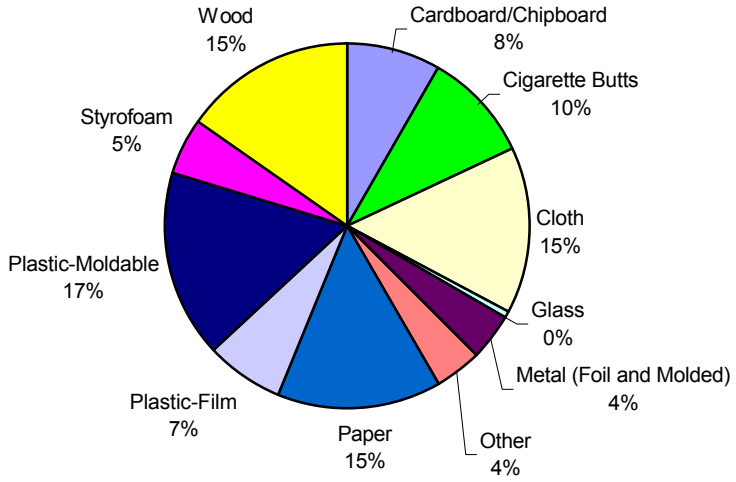

Litter Category Distribution by Volume
All Events Combined
Treatment Outfalls Site 8 - Bicycle Grate (1998-1999)

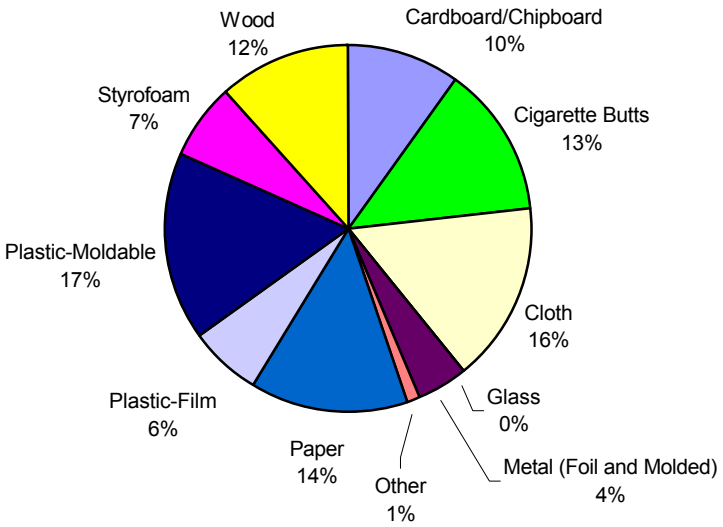

Litter Category Distribution by Count
All Events Combined
Control Outfalls Site 8 - Bicycle Grate (1998-1999)

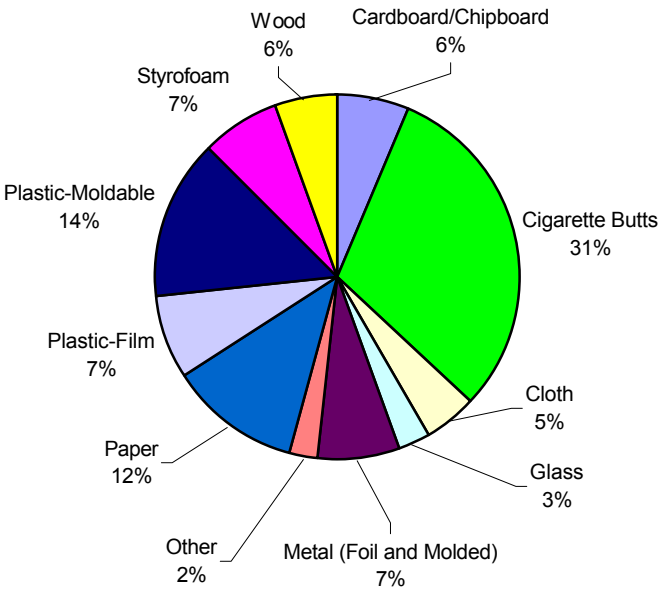

Litter Category Distribution by Count
All Events Combined
Treatment Outfalls Site 8 - Bicycle Grate (1998-1999)

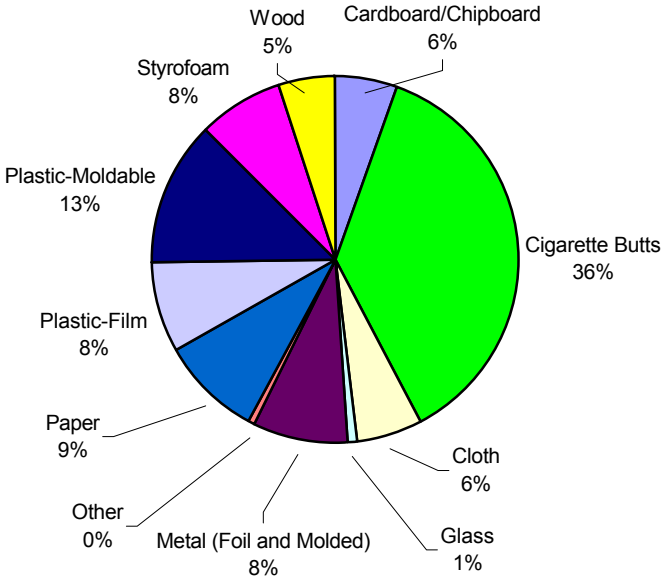

Litter Category Distribution by Air Dried Weight
All Events Combined
Control Outfalls Site 8 - LID (1999-2000)

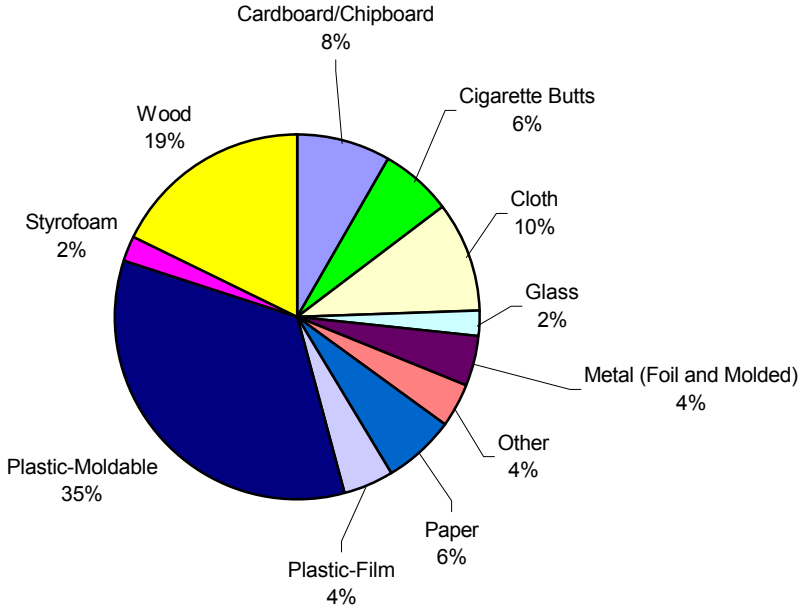

Litter Category Distribution by Air Dried Weight
All Events Combined
Treatment Outfalls Site 8 - LID (1999-2000)

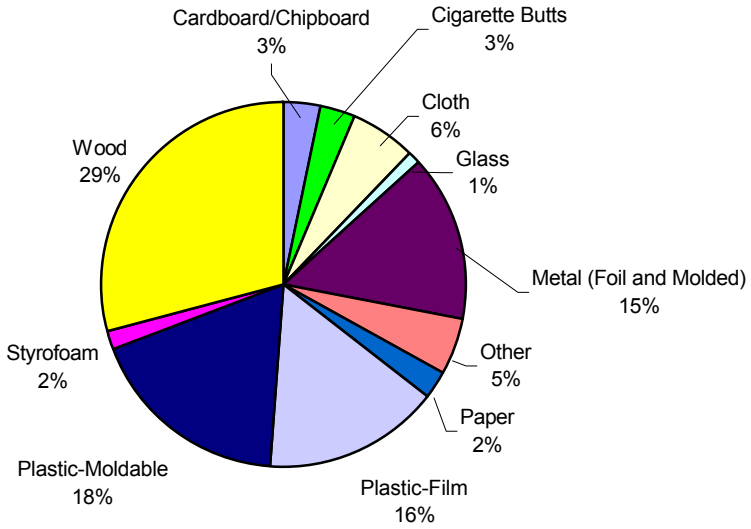

Litter Category Distribution by Volume
All Events Combined
Control Outfalls Site 8 - LID (1999-2000)

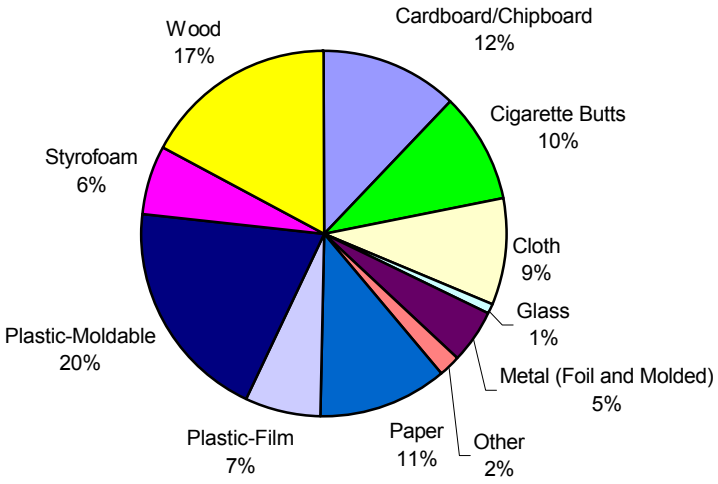

Litter Category Distribution by Volume
All Events Combined
Treatment Outfalls Site 8 - LID (1999-2000)

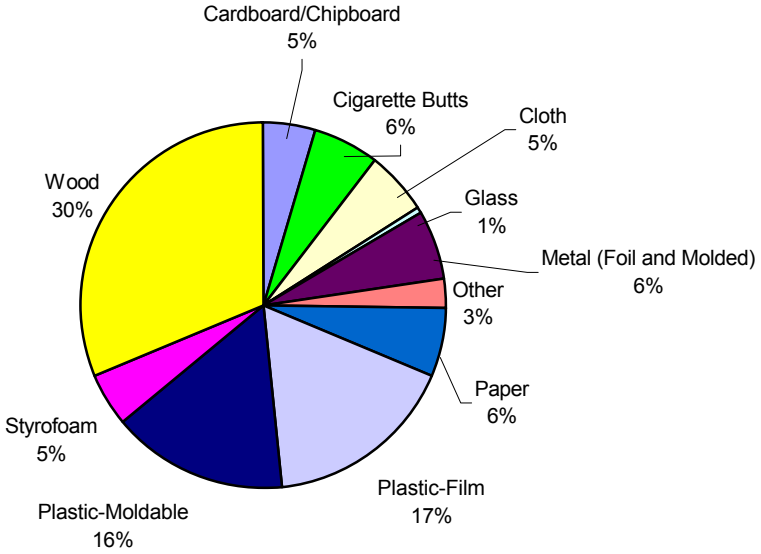

Litter Category Distribution by Count
All Events Combined
Control Outfalls Site 8 - LID (1999-2000)

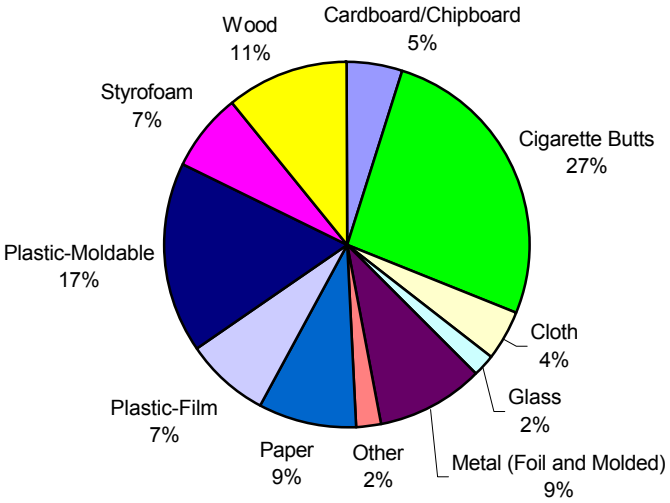

Litter Category Distribution by Count
All Events Combined
Treatment Outfalls Site 8 - LID (1999-2000)

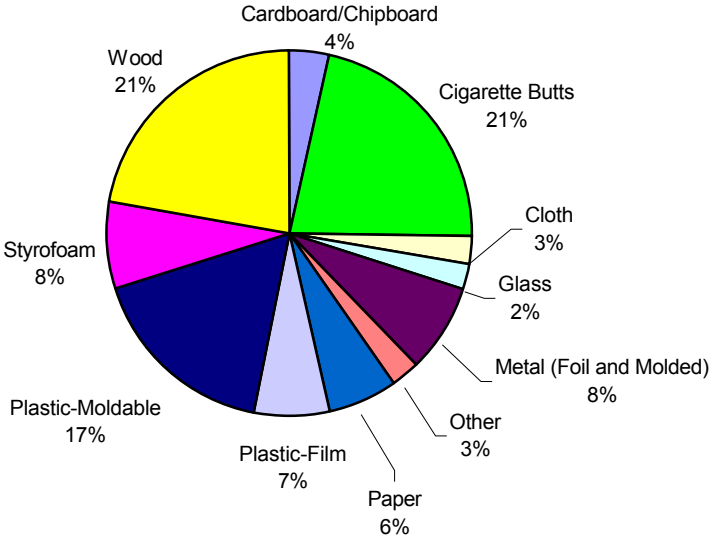

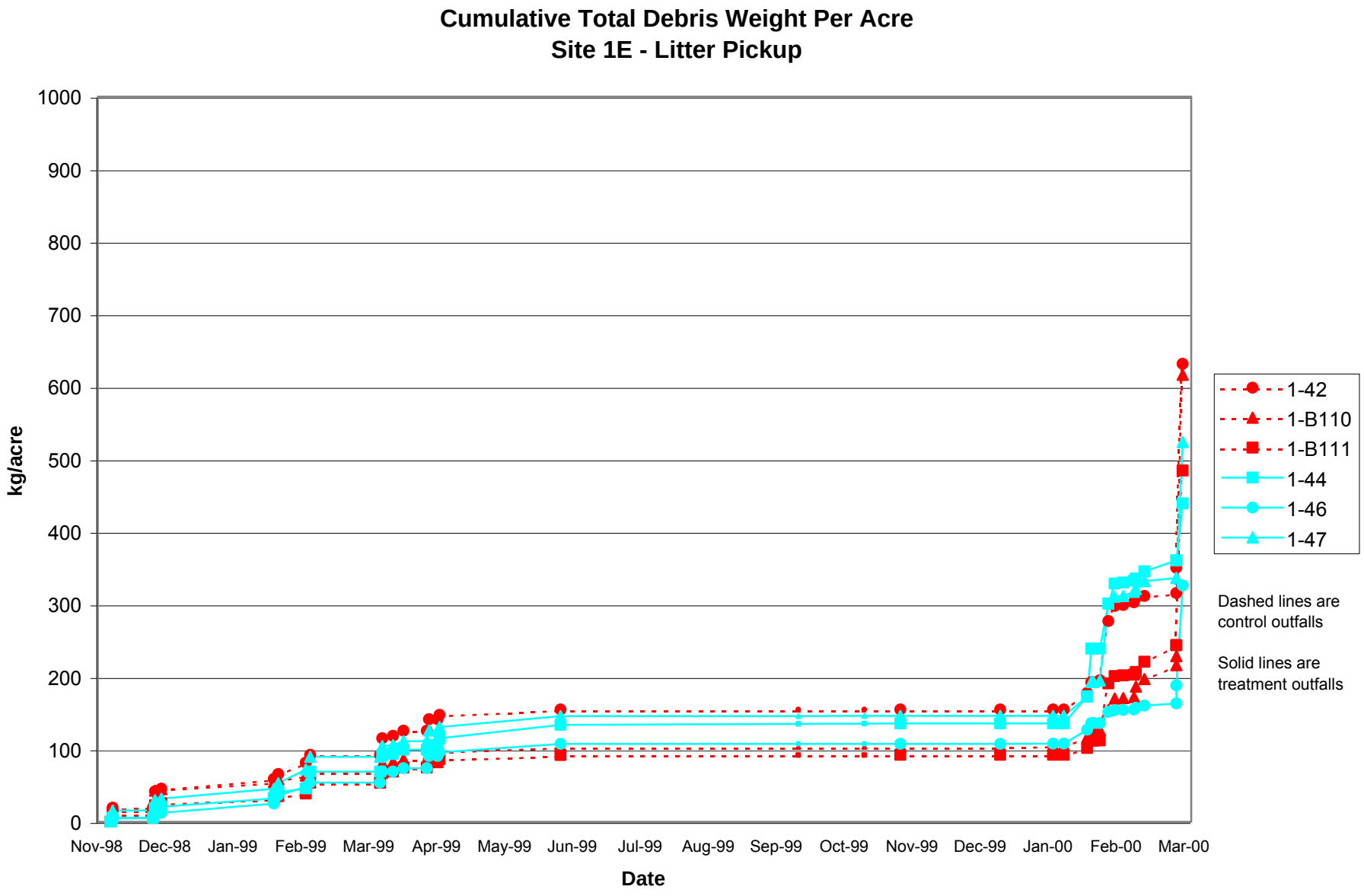
Cumulative Total Debris Weight Per Acre
Site 1E - Litter Pickup
kg/acre
1000
900
800
700
600
500
400
300
200
100
0
Nov-98
Dec-98
Jan-99
Feb-99
Mar-99
Apr-99
May-99
Jun-99
Jul-99
Aug-99
Sep-99
Oct-99
Nov-99
Dec-99
Jan-00
Feb-00
Mar-00
Date
1-42
1-B110
1-B111
1-44
1-46
1-47
Dashed lines are control outfalls
Solid lines are treatment outfalls

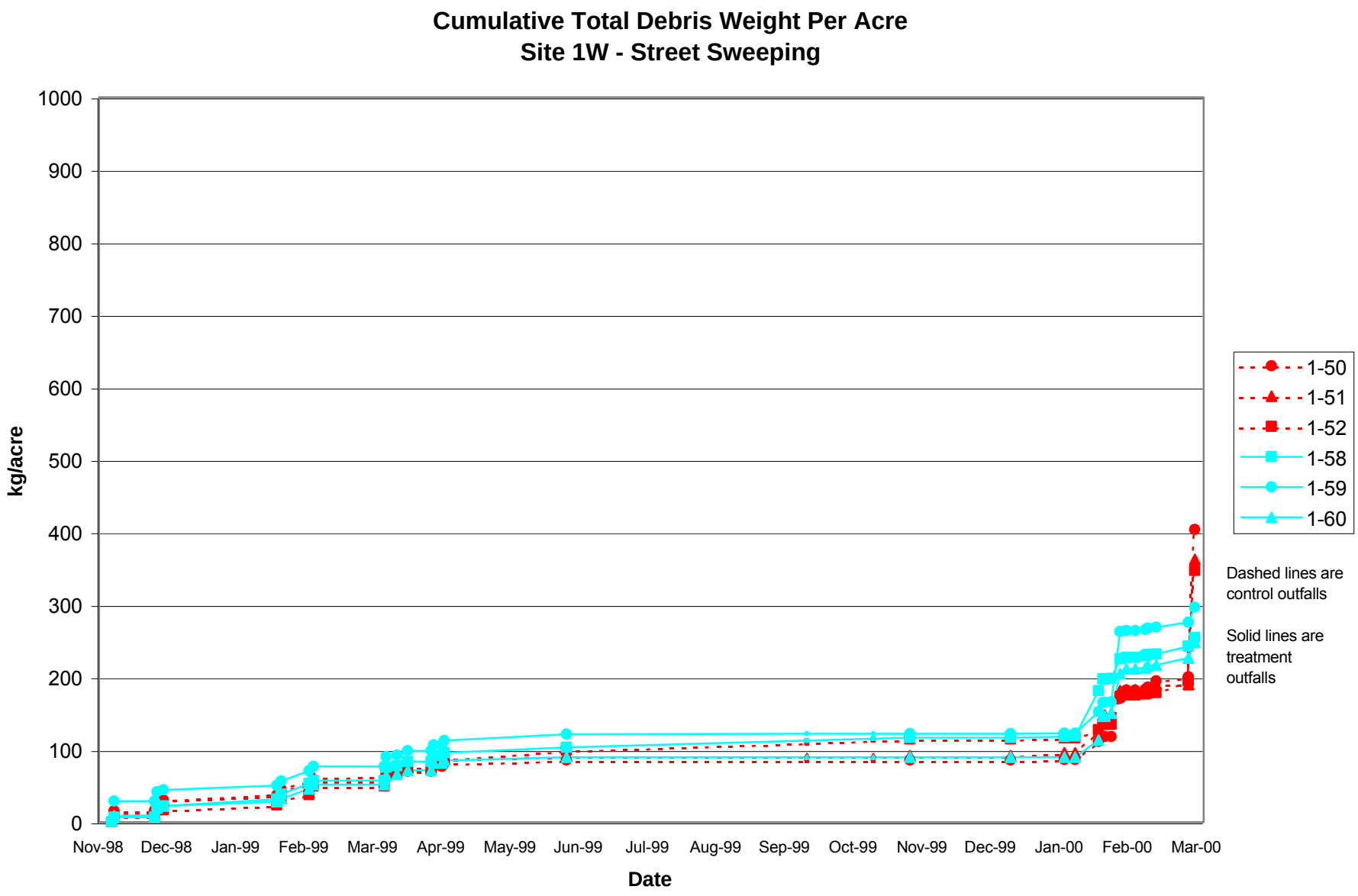
Cumulative Total Debris Weight Per Acre
Site 1W - Street Sweeping
kg/acre
1000
900
800
700
600
500
400
300
200
100
0
Nov-98
Dec-98
Jan-99
Feb-99
Mar-99
Apr-99
May-99
Jun-99
Jul-99
Aug-99
Sep-99
Oct-99
Nov-99
Dec-99
Jan-00
Feb-00
Mar-00
Date
1-50
1-51
1-52
1-58
1-59
1-60
Dashed lines are control outfalls
Solid lines are treatment outfalls

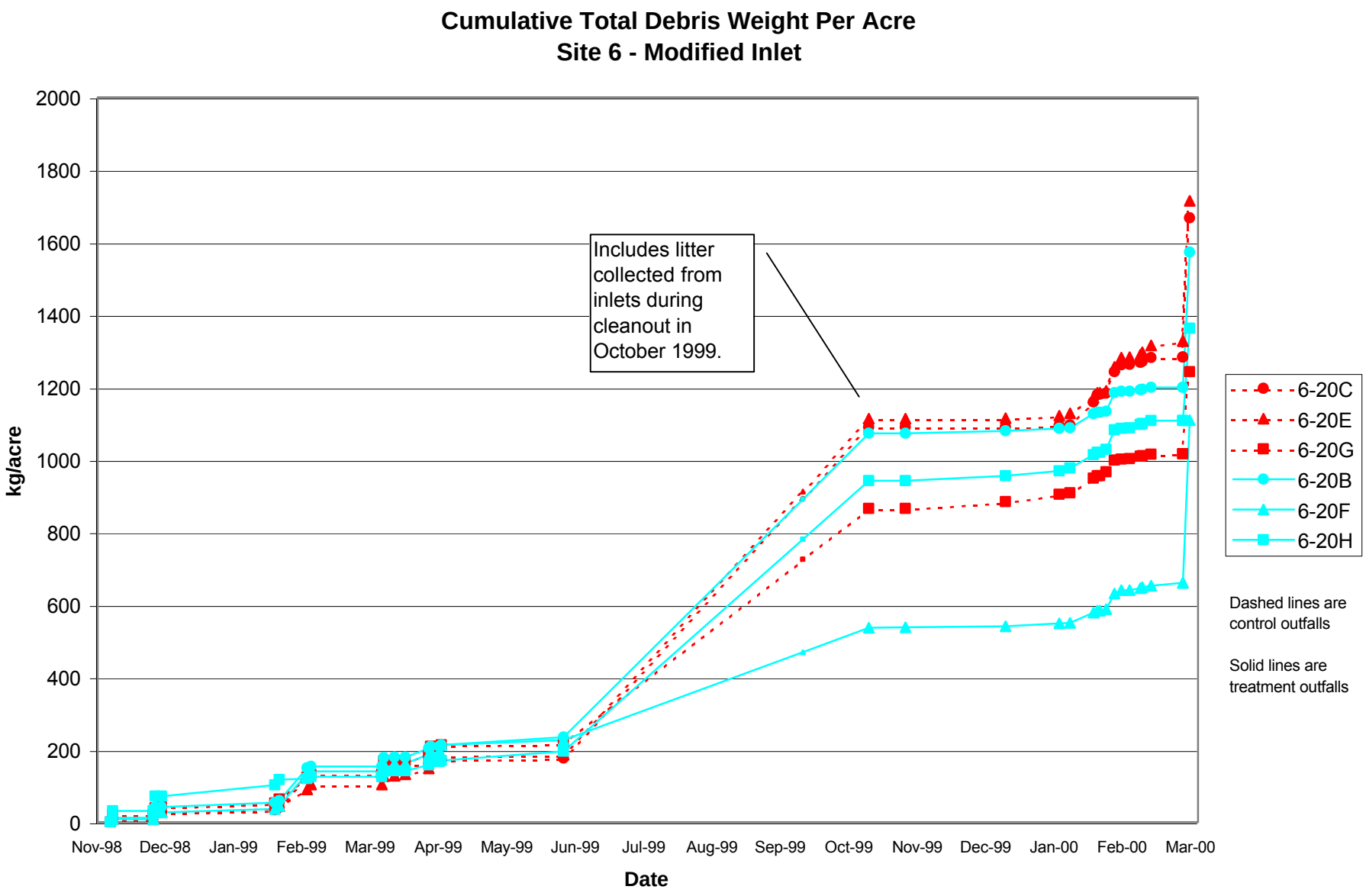
Cumulative Total Debris Weight Per Acre
Site 6 - Modified Inlet
kg/acre
2000
1800
1600
1400
1200
1000
800
600
400
200
0
Nov-98
Dec-98
Jan-99
Feb-99
Mar-99
Apr-99
May-99
Jun-99
Jul-99
Aug-99
Sep-99
Oct-99
Nov-99
Dec-99
Jan-00
Feb-00
Mar-00
Date
Includes litter collected from inlets during cleanout in October 1999.
6-20C
6-20E
6-20G
6-20B
6-20F
6-20H
Dashed lines are control outfalls
Solid lines are treatment outfalls

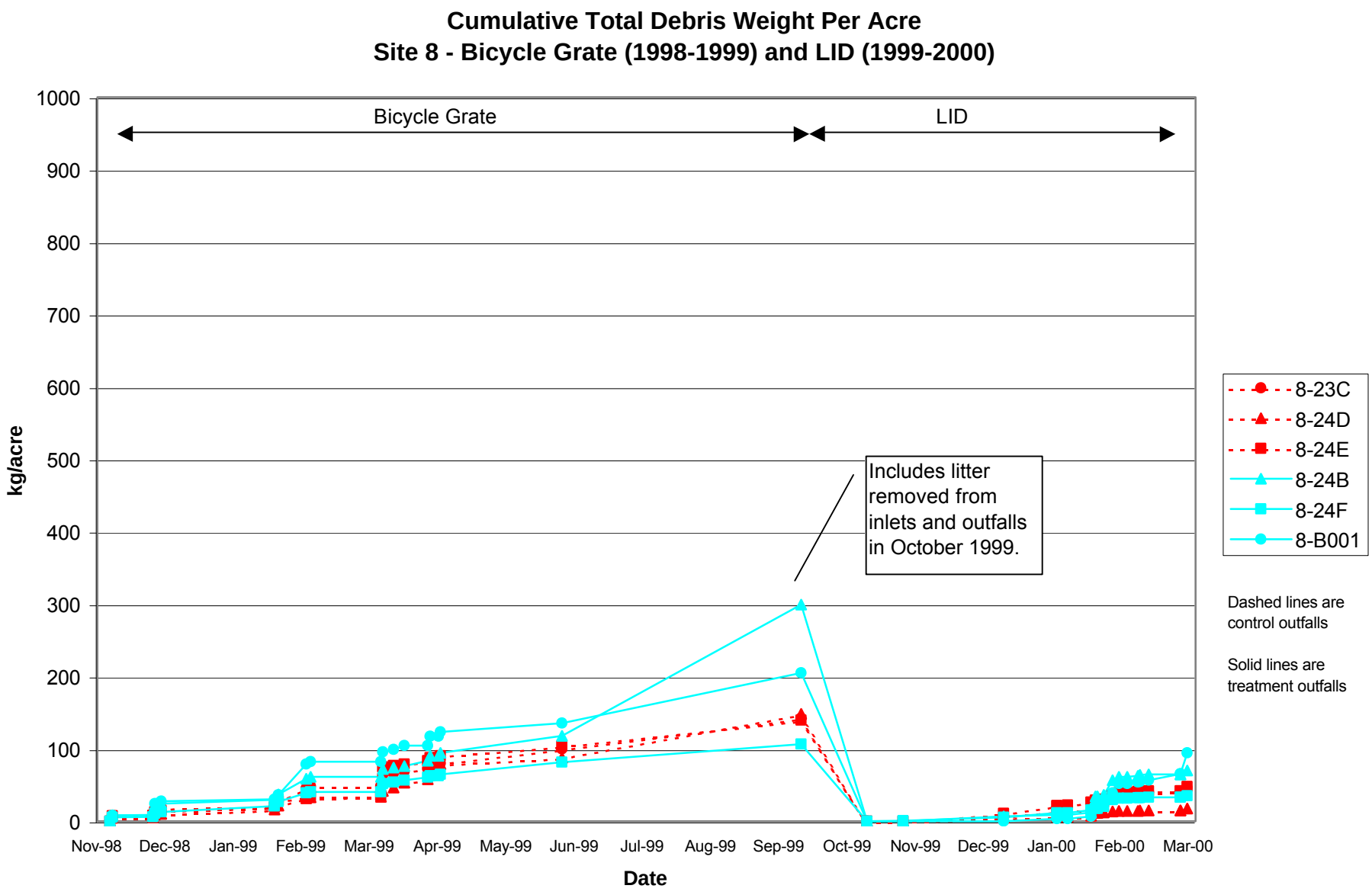
Cumulative Total Debris Weight Per Acre
Site 8 - Bicycle Grate (1998-1999) and LID (1999-2000)
Bicycle Grate
LID
kg/acre
1000
900
800
700
600
500
400
300
200
100
0
Nov-98
Dec-98
Jan-99
Feb-99
Mar-99
Apr-99
May-99
Jun-99
Jul-99
Aug-99
Sep-99
Oct-99
Nov-99
Dec-99
Jan-00
Feb-00
Mar-00
Date
Includes litter removed from inlets and outfalls in October 1999.
8-23C
8-24D
8-24E
8-24B
8-24F
8-B001
Dashed lines are control outfalls
Solid lines are treatment outfalls

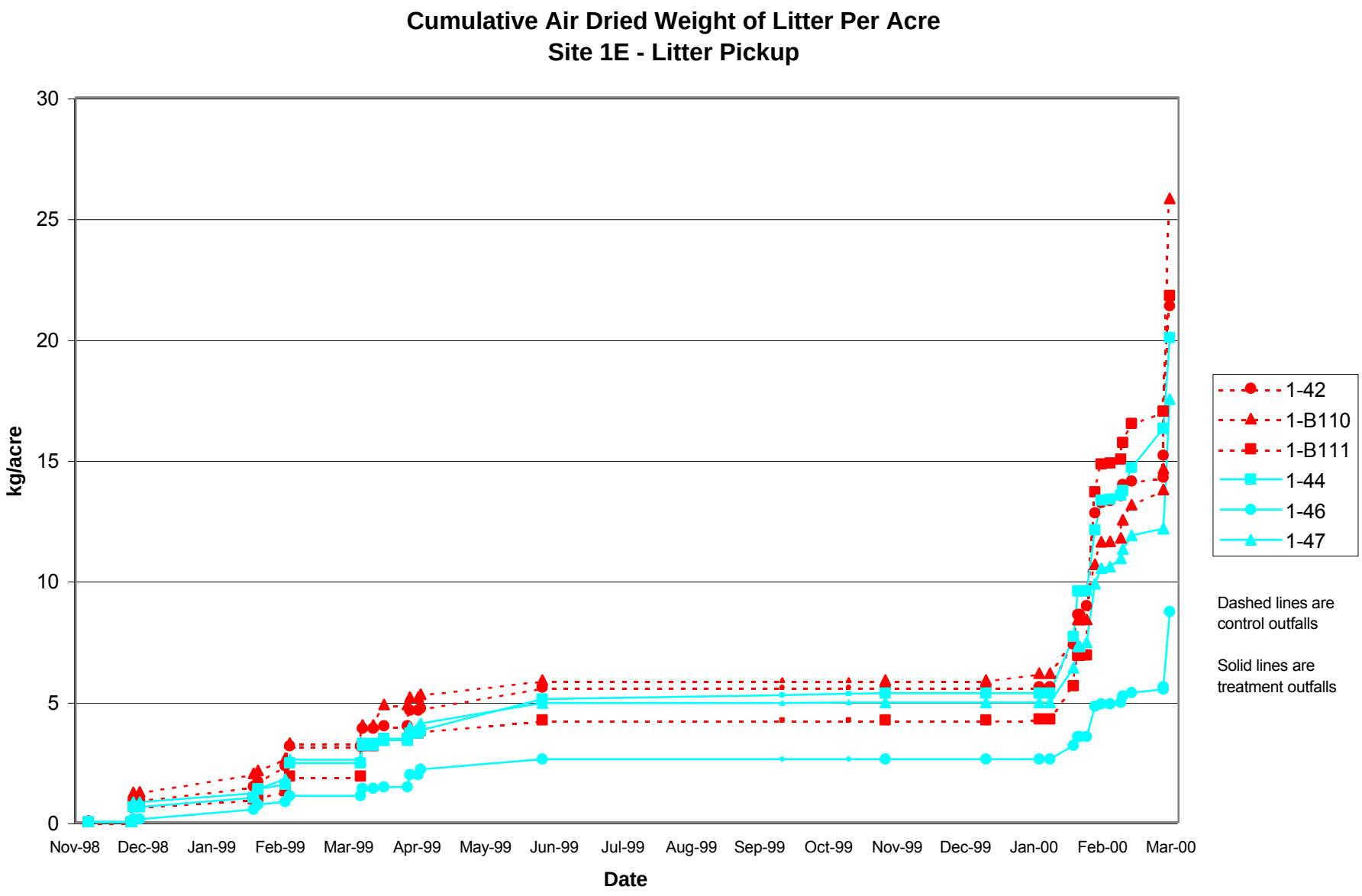
Cumulative Air Dried Weight of Litter Per Acre
Site 1E - Litter Pickup
kg/acre
30
25
20
15
10
5
0
Nov-98
Dec-98
Jan-99
Feb-99
Mar-99
Apr-99
May-99
Jun-99
Jul-99
Aug-99
Sep-99
Oct-99
Nov-99
Dec-99
Jan-00
Feb-00
Mar-00
Date
1-42
1-B110
1-B111
1-44
1-46
1-47
Dashed lines are control outfalls
Solid lines are treatment outfalls

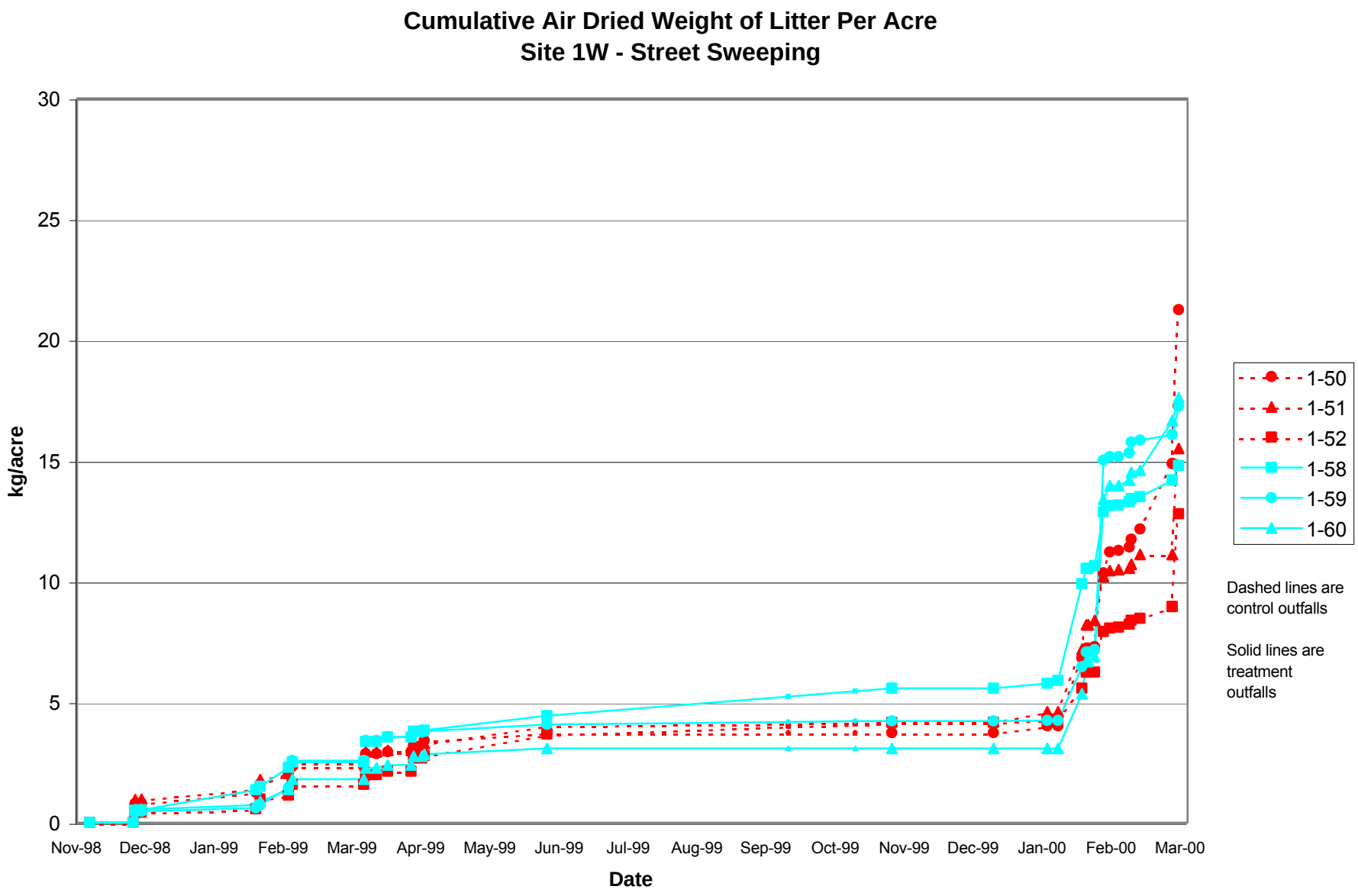
Cumulative Air Dried Weight of Litter Per Acre
Site 1W - Street Sweeping
kg/acre
30
25
20
15
10
5
0
Nov-98
Dec-98
Jan-99
Feb-99
Mar-99
Apr-99
May-99
Jun-99
Jul-99
Aug-99
Sep-99
Oct-99
Nov-99
Dec-99
Jan-00
Feb-00
Mar-00
Date
1-50
1-51
1-52
1-58
1-59
1-60
Dashed lines are control outfalls
Solid lines are treatment outfalls

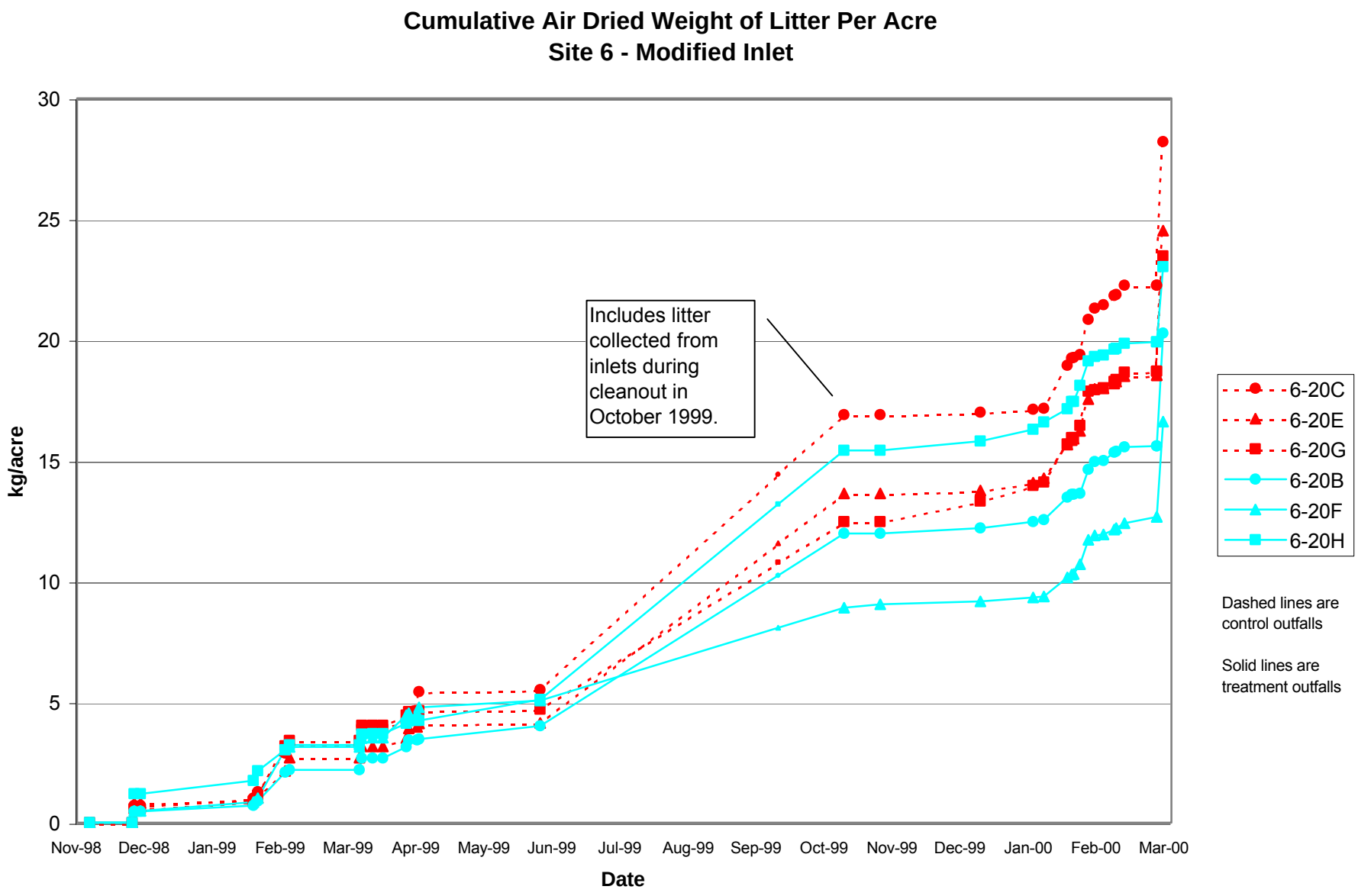
Cumulative Air Dried Weight of Litter Per Acre
Site 6 - Modified Inlet
kg/acre
30
25
20
15
10
5
0
Nov-98
Dec-98
Jan-99
Feb-99
Mar-99
Apr-99
May-99
Jun-99
Jul-99
Aug-99
Sep-99
Oct-99
Nov-99
Dec-99
Jan-00
Feb-00
Mar-00
Date
Includes litter collected from inlets during cleanout in October 1999.
6-20C
6-20E
6-20G
6-20B
6-20F
6-20H
Dashed lines are control outfalls
Solid lines are treatment outfalls

Cumulative Air Dried Weight of Litter Per Acre
Site 8 - Bicycle Grate (1998-1999) and LID (1999-2000)

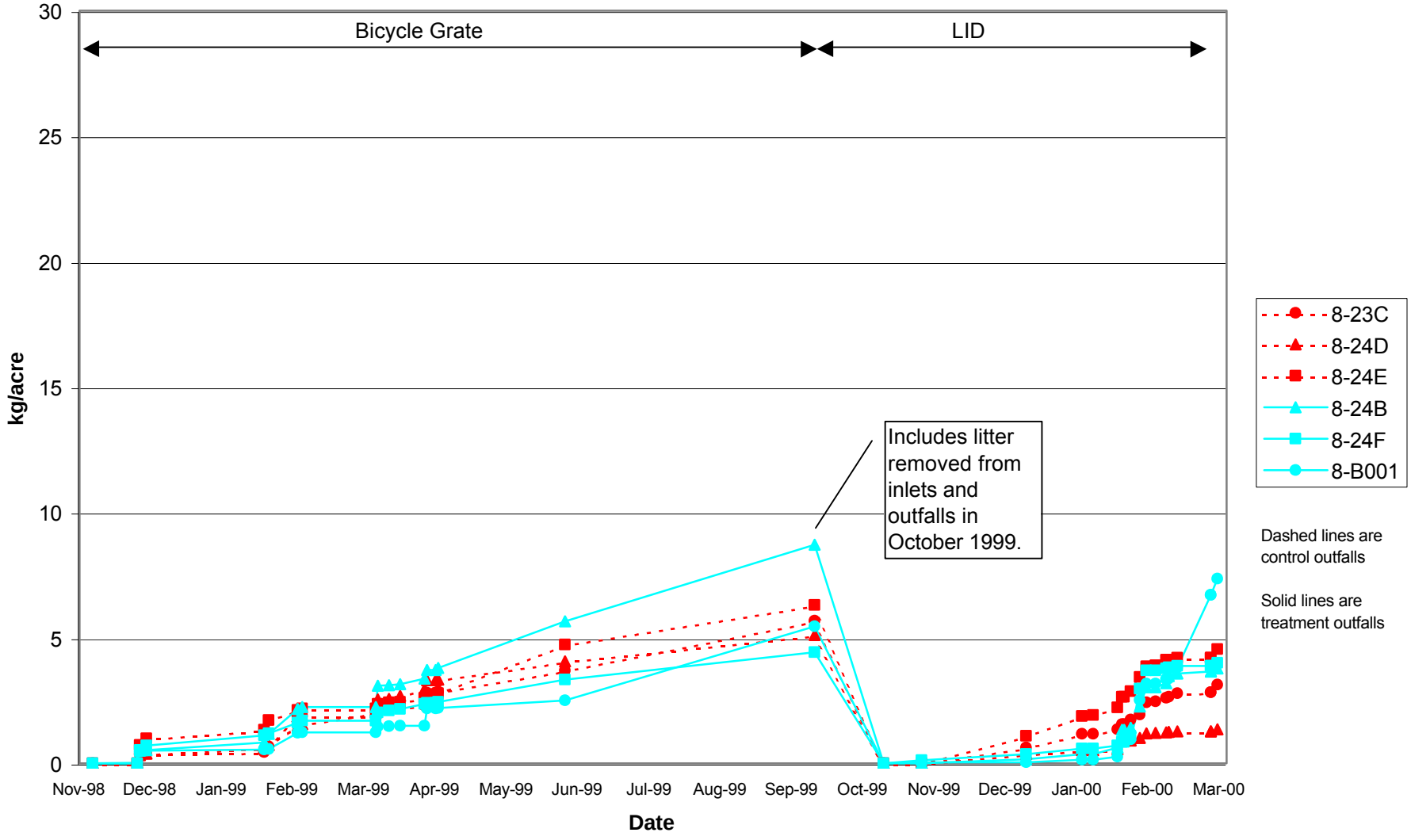

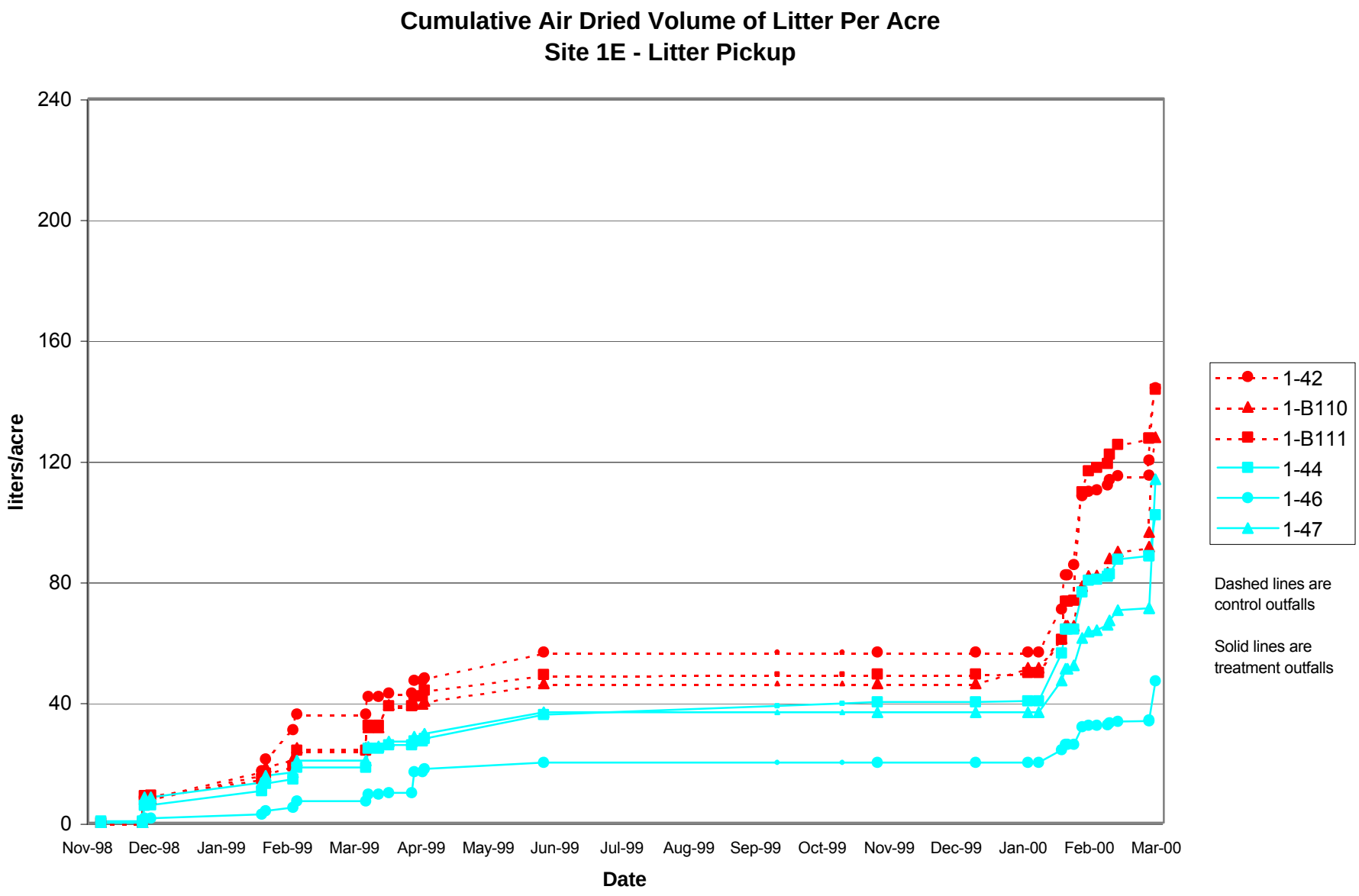
Cumulative Air Dried Volume of Litter Per Acre
Site 1E - Litter Pickup
liters/acre
240
200
160
120
80
40
0
Nov-98
Dec-98
Jan-99
Feb-99
Mar-99
Apr-99
May-99
Jun-99
Jul-99
Aug-99
Sep-99
Oct-99
Nov-99
Dec-99
Jan-00
Feb-00
Mar-00
Date
1-42
1-B110
1-B111
1-44
1-46
1-47
Dashed lines are control outfalls
Solid lines are treatment outfalls

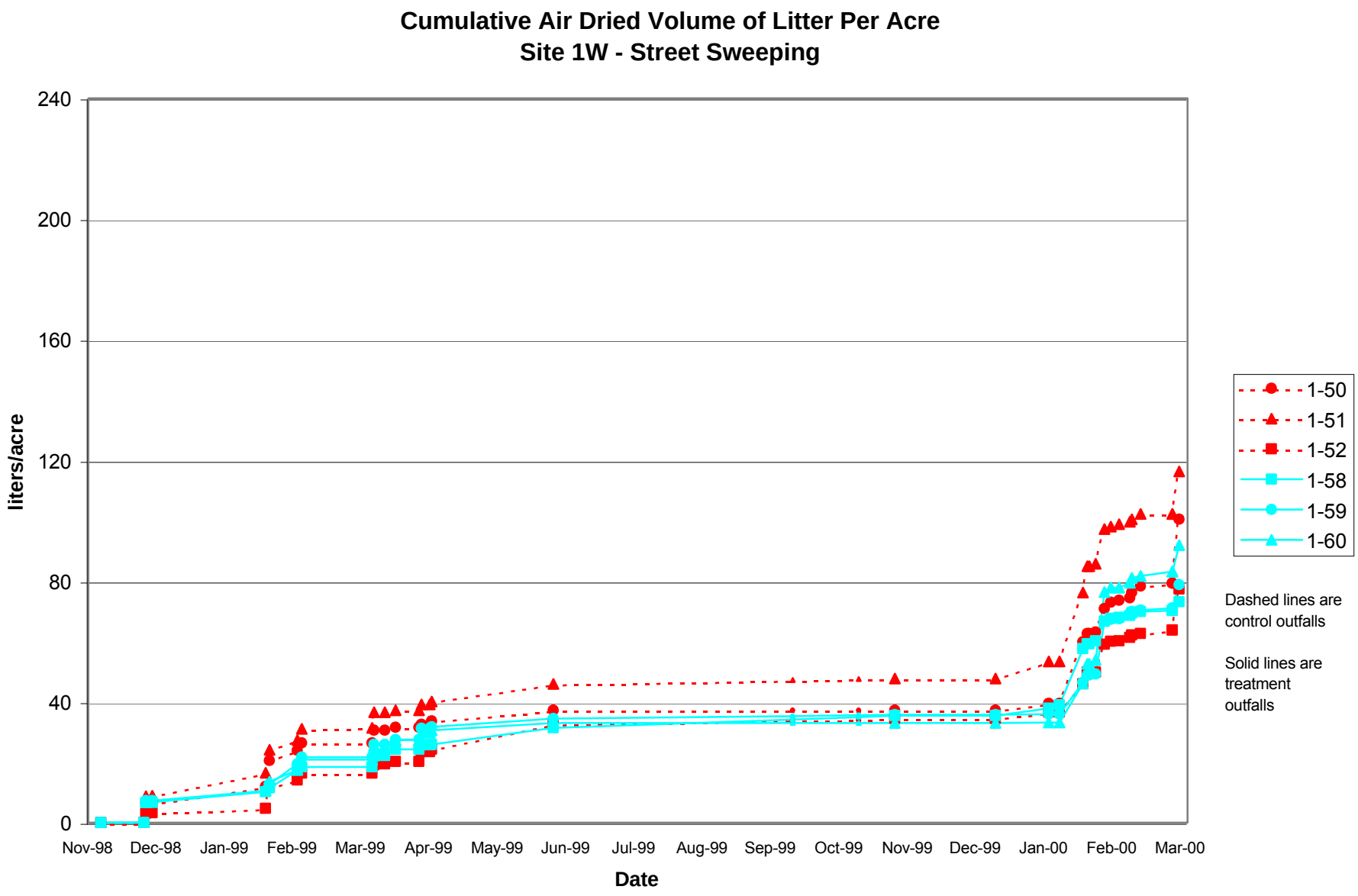
Cumulative Air Dried Volume of Litter Per Acre
Site 1W - Street Sweeping
liters/acre
240
200
160
120
80
40
0
Nov-98
Dec-98
Jan-99
Feb-99
Mar-99
Apr-99
May-99
Jun-99
Jul-99
Aug-99
Sep-99
Oct-99
Nov-99
Dec-99
Jan-00
Feb-00
Mar-00
Date
1-50
1-51
1-52
1-58
1-59
1-60
Dashed lines are control outfalls
Solid lines are treatment outfalls

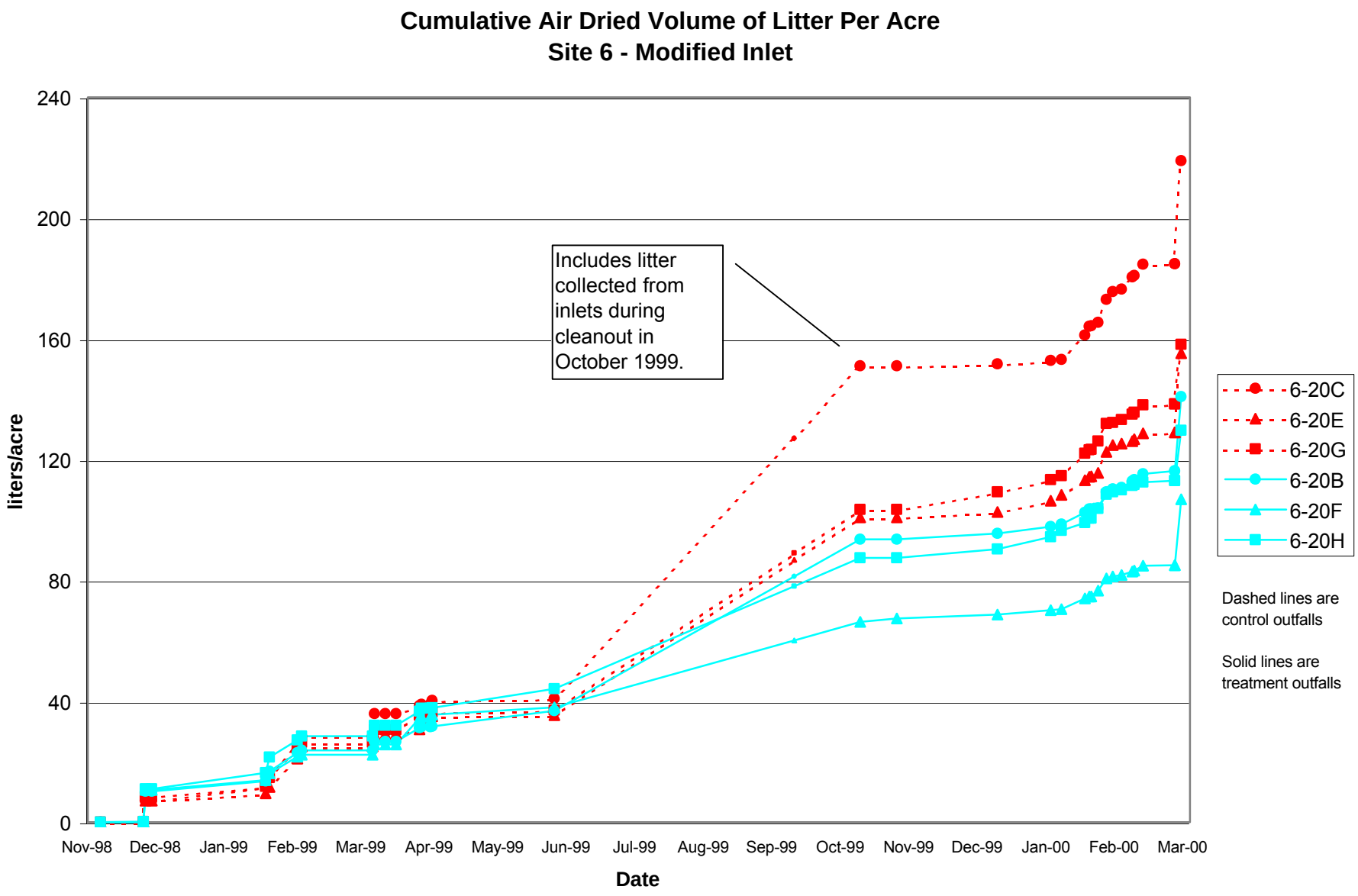
Cumulative Air Dried Volume of Litter Per Acre
Site 6 - Modified Inlet
liters/acre
240
200
160
120
80
40
0
Nov-98
Dec-98
Jan-99
Feb-99
Mar-99
Apr-99
May-99
Jun-99
Jul-99
Aug-99
Sep-99
Oct-99
Nov-99
Dec-99
Jan-00
Feb-00
Mar-00
Date
Includes litter collected from inlets during cleanout in October 1999.
6-20C
6-20E
6-20G
6-20B
6-20F
6-20H
Dashed lines are control outfalls
Solid lines are treatment outfalls

Cumulative Air Dried Volume of Litter Per Acre
Site 8 - Bicycle Grate (1998-1999) and LID (1999-2000)

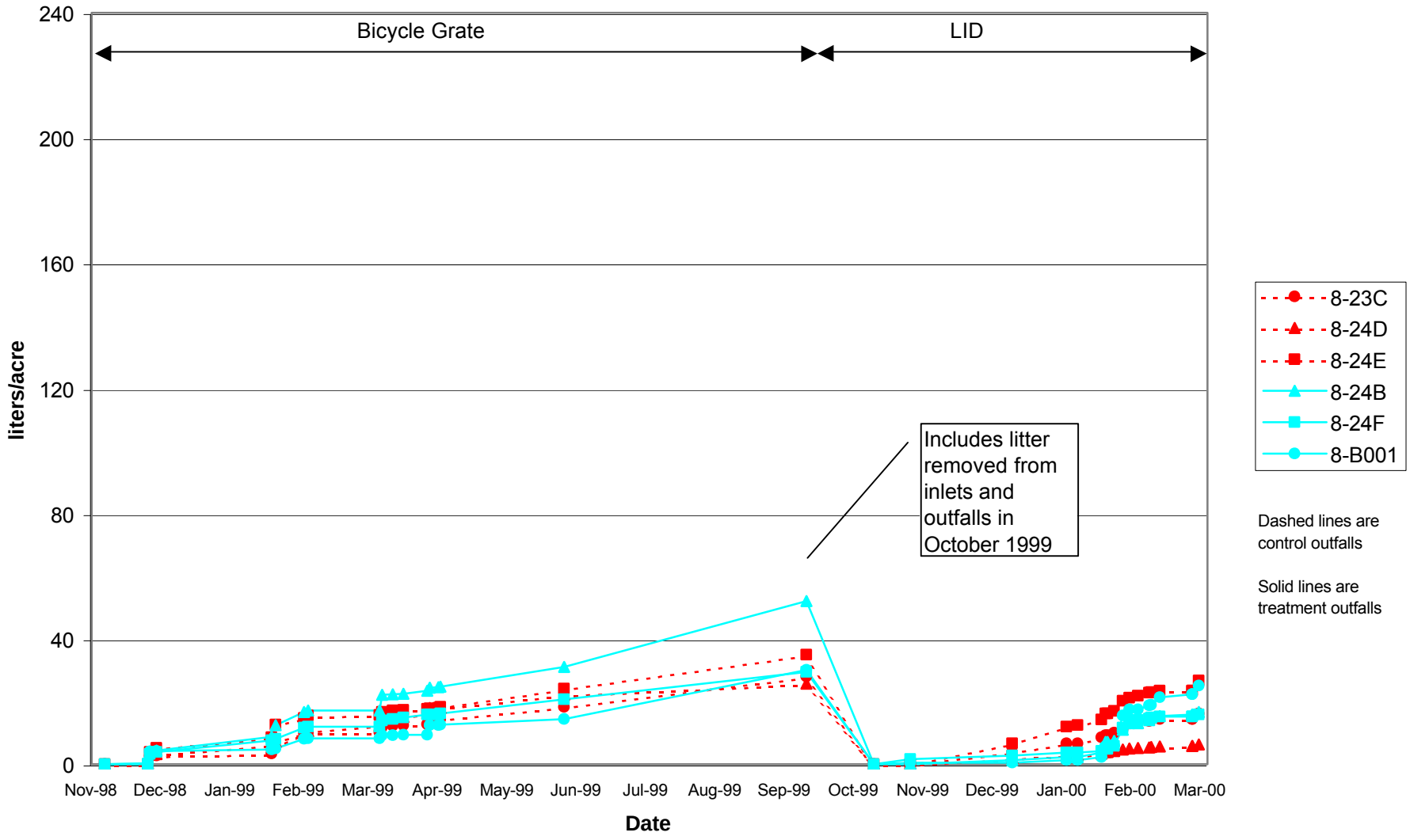

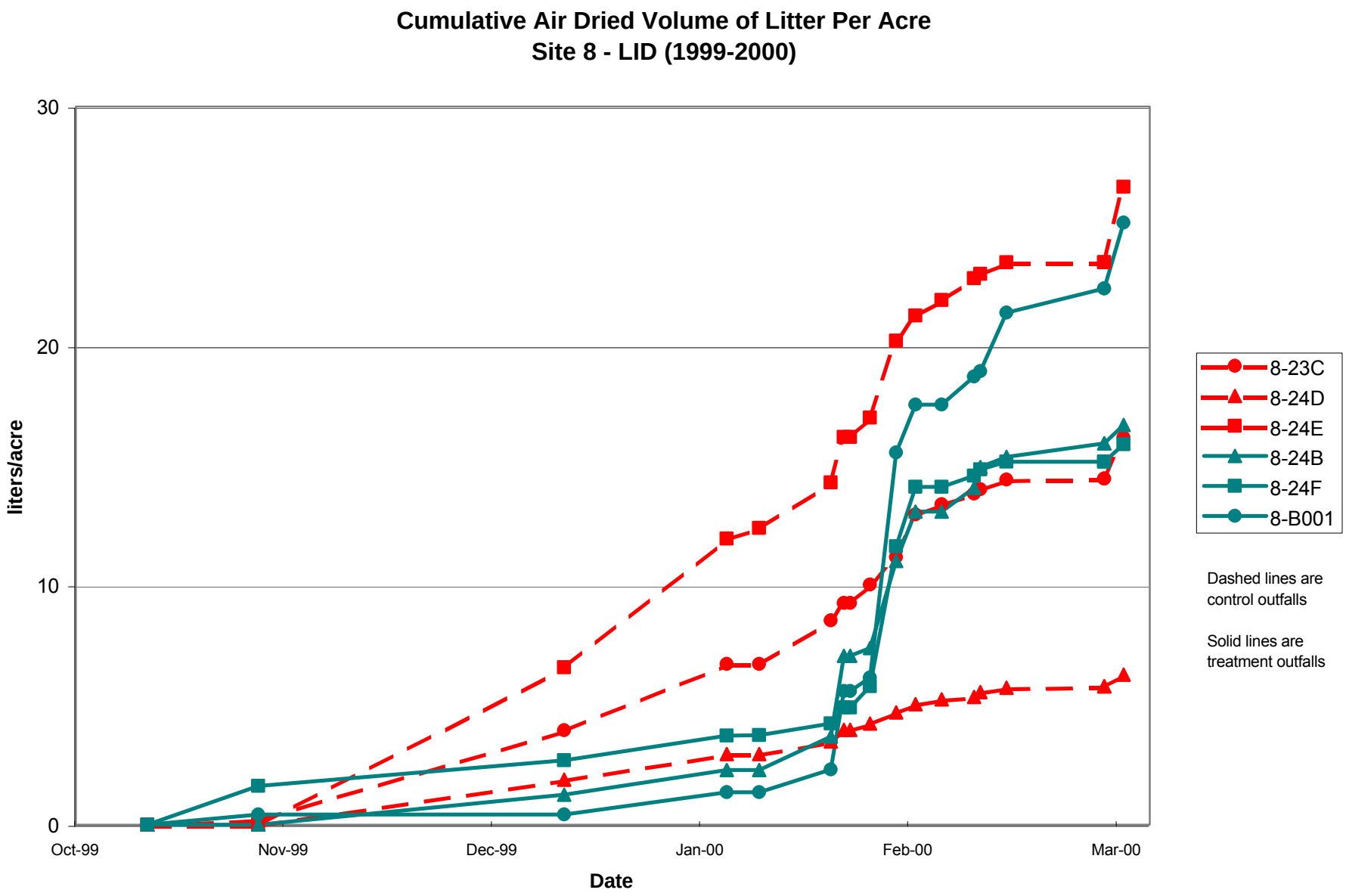
Cumulative Air Dried Volume of Litter Per Acre
Site 8 - LID (1999-2000)
30
20
10
0
liters/acre
Oct-99
Nov-99
Dec-99
Jan-00
Feb-00
Mar-00
Date
8-23C
8-24D
8-24E
8-24B
8-24F
8-B001
Dashed lines are control outfalls
Solid lines are treatment outfalls

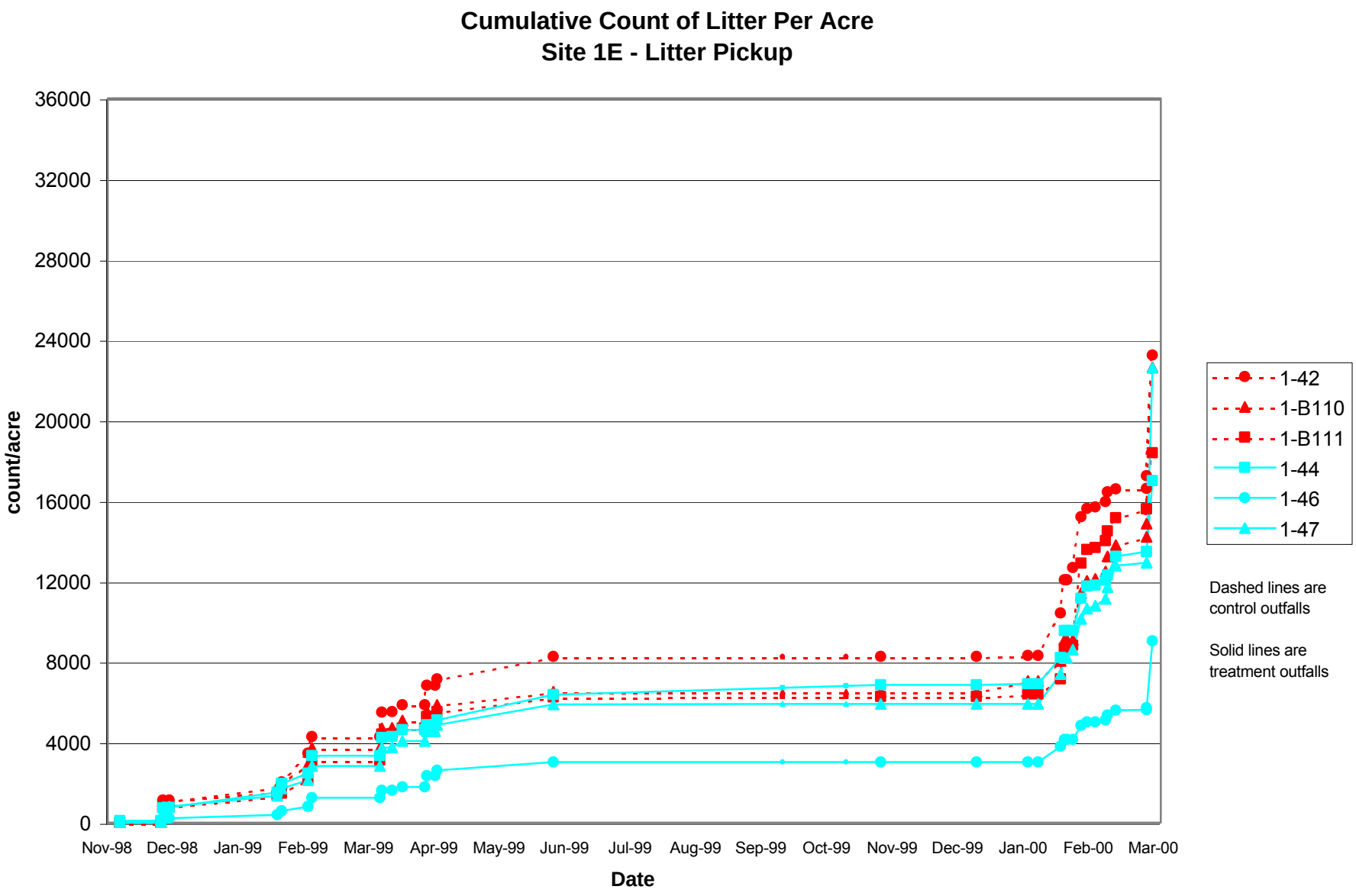
Cumulative Count of Litter Per Acre
Site 1E - Litter Pickup
count/acre
36000
32000
28000
24000
20000
16000
12000
8000
4000
0
Nov-98
Dec-98
Jan-99
Feb-99
Mar-99
Apr-99
May-99
Jun-99
Jul-99
Aug-99
Sep-99
Oct-99
Nov-99
Dec-99
Jan-00
Feb-00
Mar-00
Date
1-42
1-B110
1-B111
1-44
1-46
1-47
Dashed lines are control outfalls
Solid lines are treatment outfalls

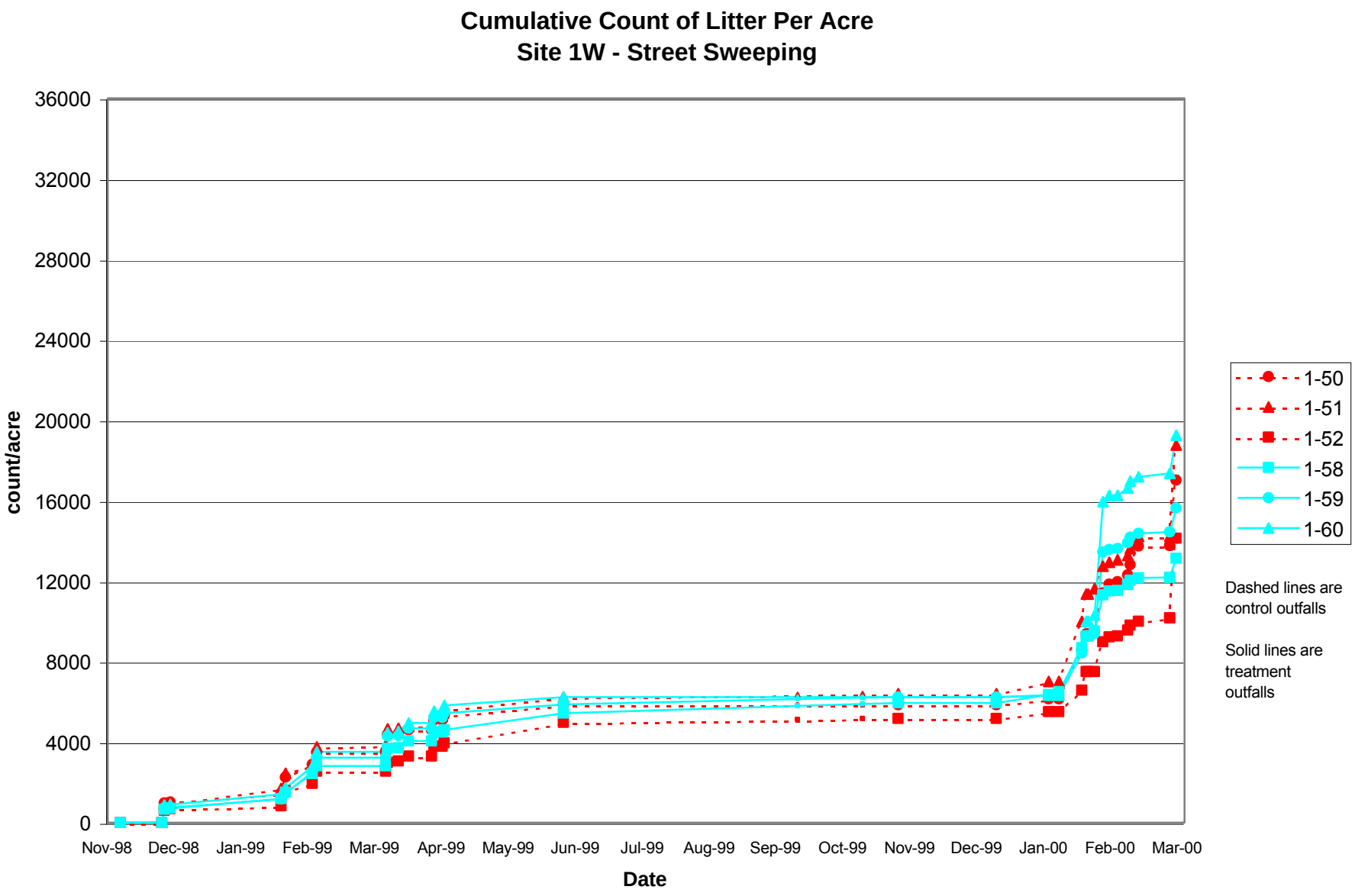
Cumulative Count of Litter Per Acre
Site 1W - Street Sweeping
36000
32000
28000
24000
20000
16000
12000
8000
4000
0
count/acre
Nov-98
Dec-98
Jan-99
Feb-99
Mar-99
Apr-99
May-99
Jun-99
Jul-99
Aug-99
Sep-99
Oct-99
Nov-99
Dec-99
Jan-00
Feb-00
Mar-00
Date
1-50
1-51
1-52
1-58
1-59
1-60
Dashed lines are control outfalls
Solid lines are treatment outfalls

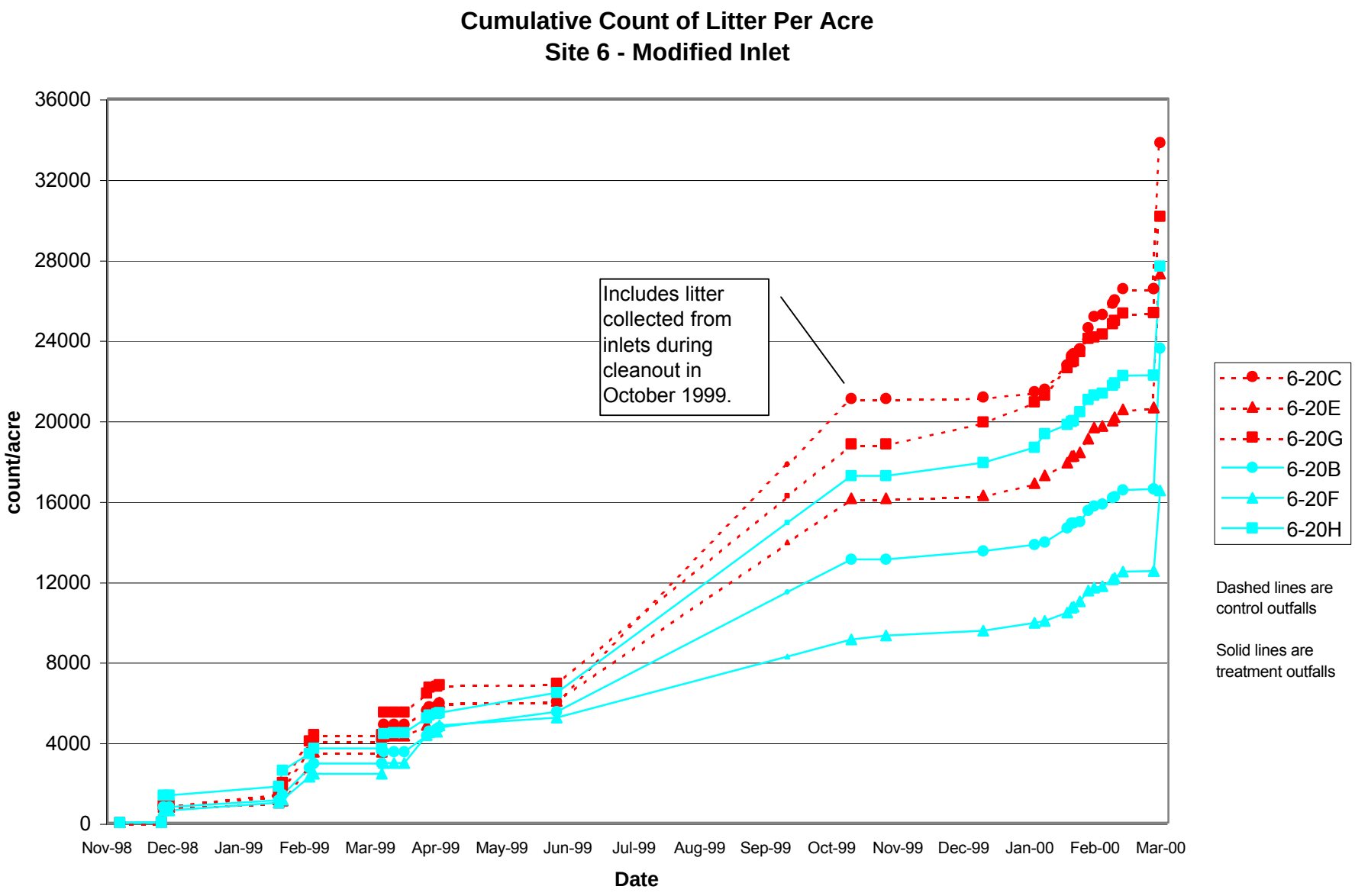
Cumulative Count of Litter Per Acre
Site 6 - Modified Inlet
count/acre
36000
32000
28000
24000
20000
16000
12000
8000
4000
0
Nov-98
Dec-98
Jan-99
Feb-99
Mar-99
Apr-99
May-99
Jun-99
Jul-99
Aug-99
Sep-99
Oct-99
Nov-99
Dec-99
Jan-00
Feb-00
Mar-00
Date
Includes litter collected from inlets during cleanout in October 1999.
6-20C
6-20E
6-20G
6-20B
6-20F
6-20H
Dashed lines are control outfalls
Solid lines are treatment outfalls

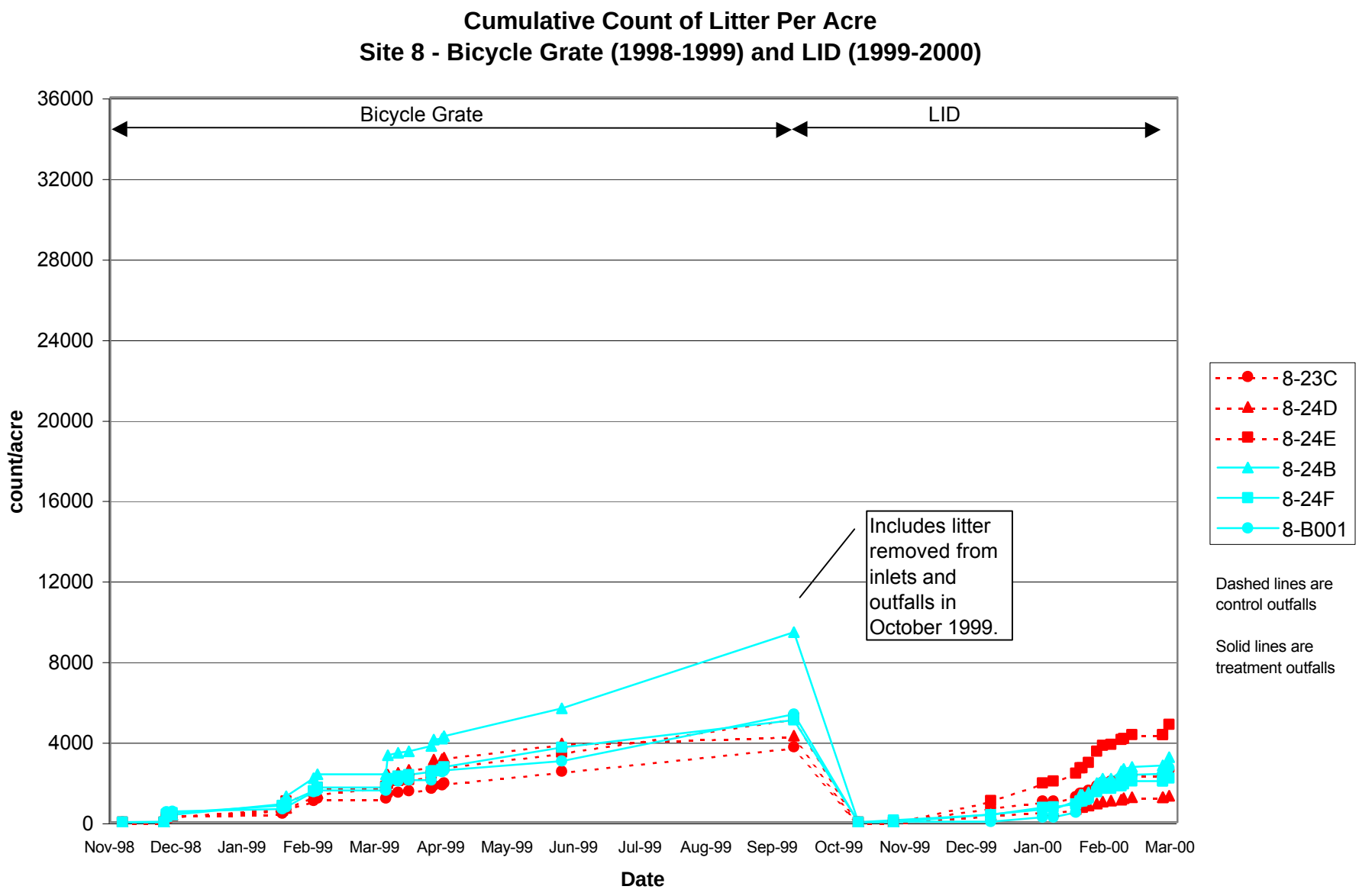
Cumulative Count of Litter Per Acre
Site 8 - Bicycle Grate (1998-1999) and LID (1999-2000)
Bicycle Grate
LID
count/acre
36000
32000
28000
24000
20000
16000
12000
8000
4000
0
Nov-98
Dec-98
Jan-99
Feb-99
Mar-99
Apr-99
May-99
Jun-99
Jul-99
Aug-99
Sep-99
Oct-99
Nov-99
Dec-99
Jan-00
Feb-00
Mar-00
Date
Includes litter removed from inlets and outfalls in October 1999.
8-23C
8-24D
8-24E
8-24B
8-24F
8-B001
Dashed lines are control outfalls
Solid lines are treatment outfalls

APPENDIX K

Appendix K
Statistical Analysis of Litter BMP Effectiveness

K.1. Objective

This appendix describes the statistical methods used to evaluate the BMP effectiveness and presents the results of the analysis. Data analysis was performed using JMP version 3.2.6 statistical software.

K.2. Sampling Design

The following four BMPs were analyzed for the study period of 1998/1999:

- Manual litter pick-up (Site 1E),
- Street sweepers (Site 1W),
- Modified inlet grate (Site 6), and
- Bicycle grate (Site 8).

The bicycle grate at Site 8 was replaced with a curb inlet and Litter Inlet Deflector (LID) for the 1999/2000 study period.

Three pairs of control and treatment outfalls were monitored for litter for each BMP. There were a total of 16 litter collection storm events at the outfalls during 1998/1999. Litter was collected after 9 trigger storm events (a 70% probability of 0.2 inches of rain) and 6 times, after extended antecedent dry period, prior to the forecasted trigger storm events. During the 1999/2000 rainy season, there were 15 litter collections at the outfalls. Litter was collected after 13 storms and two times prior to forecasted trigger storms. During each litter collection event, litter was collected from each outfall and measured in count (number of items), volume (milliliters), and dry weight (grams).

K.3. Approach and Methodology – Data Normalized by Catchment Area

Several statistical methods can be used to evaluate the BMP effectiveness. When the statistical evaluation involves two data populations (control and treatment outfalls for this study), either a marginal (unpaired) analysis or a paired analysis can be utilized. For the marginal analysis, the marginal distributions of the two populations are characterized and the distributions of the treatment and control outfall data are tested to evaluate if the average values of the two distributions are the same. For the paired analysis, the difference in each pair of data is first calculated and tested to evaluate if the average difference is zero. These two approaches are explained in detail below.

Each of these two analyses (paired and unpaired) can be performed at the outfall level or the site level. At the outfall level, each data point at each outfall is considered to be an independent, random sample. At the site level, the 3 control outfalls are grouped together, and similarly, the 3 treatment outfalls are grouped together. The total litter collected in each event over all outfalls in each group is considered to be an independent, random sample. The site-level analysis filters

some of the "noise" in the data and may be more powerful in evaluating the significance of observed differences. This is especially true if data distributions are highly variable. Thus, if the site-level analysis transforms non-normally distributed outfall-level data into more robust, normally distributed data, the site-level analysis would be preferred to the outfall-level analysis.

For both marginal and paired analyses, the variability among the control outfalls and the variability among the treatment outfalls are assumed to be purely random. This assumption can be checked using a one-way Analysis of Variance (ANOVA) for control outfalls and separately for treatment outfalls. During the siting phase, the outfalls were selected to make sure that they would be expected to behave similarly and differences among them would be random. However, unanticipated field conditions may affect a particular outfall, making it behave differently from others. If such conditions are known, or suspected, to have occurred at a site, the statistical analysis may be used to confirm whether an outfall has been significantly affected by these conditions. An outfall that is confirmed to have been systematically affected by field conditions would be excluded from the analysis.

Each treatment outfall may be paired with exactly one control outfall that is considered to have very similar field conditions. This approach is termed "matched pairs". If there is no strong field evidence for matching a treatment outfall with only one control outfall, a treatment outfall may be matched with each of similar control outfalls. This approach is termed "cross pairing". ANOVA can again be used to evaluate the differences among various pairs of treatment and control outfalls. If these differences are statistically significant, the matched pairing would be more appropriate. If the differences are statistically not significant, the cross pairing would be more appropriate.

The paired analysis may be performed using either actual differences between control and treatment outfalls or percentage differences between the two outfalls, relative to the control outfall litter load. If the actual differences show a large amount of variability and do not pass the normality test, one can transform the data by calculating the percentage difference (i.e., difference between control and treatment divided by the control amount, expressed as a percentage). If the differences show an increasing relationship with the control amount, the percentage difference would be appropriate to consider. This is because, under these circumstances, using the percent difference may reduce the coefficient of variation of the data and is more likely to produce normally distributed data. Thus, if the actual differences are not normally distributed, but the percentage differences are, the use of the percentage differences would be more appropriate.

The steps involved in these methods of analysis (unpaired at outfall- and site-levels and paired at outfall- and site-levels) are described as follows:

(I) MARGINAL (UNPAIRED) ANALYSIS

1. Outfall-level analysis: for each BMP and measuring unit combination (e.g., litter from the street sweeping site measured in count), pool all data from control outfalls together and all

data from treatment outfalls together (i.e., 31 events × 3 control outfalls = 93 data points for control, and similarly, 93 data points for treatment).

2. Normalize the litter measurement with the corresponding catchment area (i.e., convert the litter data to count/acre, milliliter/acre, and gram/acre).
3. Perform exploratory data analysis (EDA) and check for anomalies in the data. Exploratory data analysis consists of calculating the summary statistics of the data, such as mean, median, minimum, maximum, standard deviation, variance, coefficient of variation, skewness, kurtosis, etc., (see Attachment 1 to this appendix) as well as examining the data using graphical representations, such as histogram, box and whisker plot, and normal probability plot. The purpose of performing EDA is to ensure that the data are behaved within expectations, and a continual distribution rather than a bi-modal or multi-modal distribution[1] is observed. By reviewing the data both numerically and graphically, the "structure" of the data can be evaluated and thereby appropriate approaches and limitations for using the data can be identified. Other data anomalies, such as extreme outliers or other obvious data recording/transcribing errors, can be readily identified if they exist.
4. Test the distributions of control and treatment data for normality using Shapiro-Wilk W Test at a 5% significance level. The frequency plot of a normally distributed variable has a bell-shaped curve (see Figure 1), with the highest point located at the mean (which is also equal to the median), and the population is distributed symmetrically about the mean.

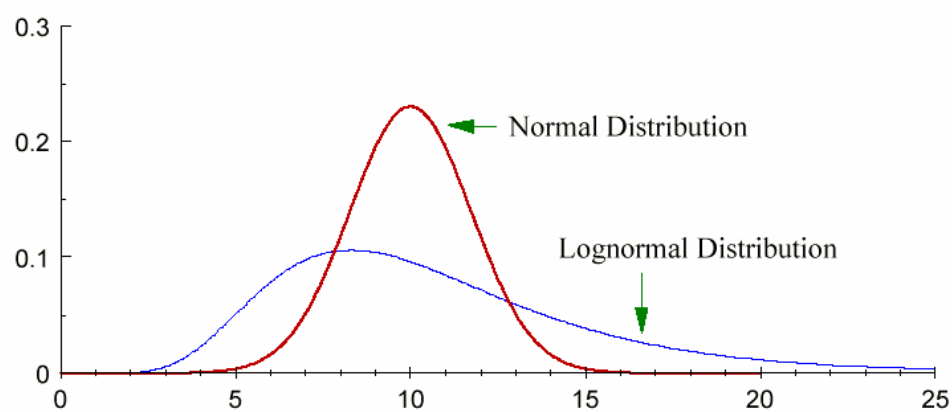

Figure 1. Frequency plot of normally and lognormally distributed variables

The assumption of normality is important, as it is the basis for the majority of statistical parametric tests. The Shapiro-Wilk W Test is recommended by U.S. EPA for testing data normality (USEPA, 1998). The test is similar to computing a correlation between the quantiles of the standard normal distribution and the ordered values of a data set. If the normal probability plot is approximately linear (i.e., the data follow a normal curve), the test

[1] A mode of a distribution is its peak. Distributions with more than one mode are usually problematic, and a different statistical analysis strategy may be required since conventional statistical procedures may not handle them well.

statistic will be relatively high. If the normal probability plot contains significant curves, the test statistic will be relatively low.

A 5% significance level is commonly used when applying the Shapiro-Wilk W Test, as described in DTSC Final Policy (DTSC, 1997), Gibbons (1994), and USEPA Guidance Document (USEPA, 1998). If the p-value (Prob < W) is less than 0.05, then it can be concluded that the data distribution is significantly different from a normal distribution; otherwise, it can be concluded that the data is normally distributed (or more precisely, the hypothesis that the data are normally distributed cannot be rejected).

5. Identify a null and alternative hypotheses and evaluate the data to test if the null hypothesis should be rejected. For the LMPS, the null hypothesis is that the litter collected in the treatment and control pairs is equal and the alternative hypothesis is that the litter in the control pairs is greater than the litter in the treatment pairs. These hypotheses are presented mathematically as:

   Null hypothesis, H_0: $\mu_{control} = \mu_{treatment}$

   Alternative hypothesis, H_A: $\mu_{control} > \mu_{treatment}$

   (a) If both control and treatment distributions are normal:

      (i) Use Levene Test at a 5% significance level to test if the variances are equal across groups. The variance is evaluated because the subsequent t-Test (in (ii) below) requires the assumption of equal variances across groups. If the variances are not equal across groups, a slightly modified version of conventional standard two-sample t-Test will be used. The Levene Test is recommended in the USEPA Guidance Document (USEPA, 1998), and the detail procedures of Levene Test can also be found in this document.

      (ii) Use two-sample (unpaired) t-Test to compare the mean litter amount at a 5% significance level, assuming equal variances or unequal variances based on the result of Levene Test. The two-sample t-Test is recommended by USEPA (USEPA, 1998) for comparing two populations when the data distributions are normal. For the LMPS this step answers the question "Is the mean normalized litter amount collected in control outfalls higher than that of treatment outfalls?".

      (iii) If the p-value of the respective t-Test is less than 0.05, the null hypothesis is rejected and the conclusion is that the average litter amount is higher at the control outfalls, i.e., there is statistically significant litter reduction using the BMP at the treatment outfalls.

   (b) If either the control or the treatment distribution is not normal:

      (i) Repeat (3) with log-transformed data. By transforming the data, the normality assumption that is not satisfied in the original data may be satisfied by the log-transformed data, particularly if the data distribution is positively skewed (see Figure 1). The following equation is used to for the log-transformation in order to accommodate data values that equal zero:

Original data is x and log-transformed data, y, is:

$$y = \ln(x+1)$$

(ii) If both the control and treatment distributions are lognormal, repeat (4) (a) with log-transformed data (i.e., y).

(iii) If either the control or the treatment distribution is not lognormal, use Wilcoxon Rank-Sum Test (a non-parametric test) to compare the litter amount at a 5% significance level using the raw data.[2] The Wilcoxon Rank-Sum Test is recommended by USEPA (1998) for populations of data that are neither normally nor lognormally distributed. It compares the distributions (shapes and locations) of two populations based on the relative rank of each data point when both populations are pooled together, and it does not assume a normal distribution for the data. If the p-value of Wilcoxon Rank-Sum Test is less than 0.05, the null hypothesis is rejected and it is concluded that the average litter amount is higher at the control outfalls; otherwise, the conclusion is that there are no significant differences in terms of average litter amount between control and treatment outfalls.

6. Site-level analysis: Sum the litter amount collected in all three control outfalls in each event, and similarly, sum the litter amount collected in all three treatment outfalls (i.e., 31 data points for control and 31 data points for treatment). Normalize the litter measurement with the corresponding total site catchment area. Repeat (3) to (5).
7. Repeat (1) to (6) for other BMP and measuring unit combinations.

(II) PAIRED ANALYSIS

1. Outfall-level analysis: Calculate the percentage differences of normalized litter amount for each BMP and measuring unit combination collected between each pair of control and treatment outfalls in each storm event. For example:

   BMP = manual litter pick-up (Site 1E)

   Measuring unit = count

   Storm event = 1

   Outfall pair = P1

$$\text{Percentage difference, } \%\,diff = \frac{\left(\begin{array}{l}\text{No. of items per acre collected at Outfall 1-47 (control outfall)}\\ \text{- No. of items per acre collected at Outfall B-110 (treatment outfall)}\end{array}\right)}{\text{No. of items per acre collected at Outfall 1-47 (control outfall)}} \times 100\%$$

The same calculations are done for the data from the other two outfall pairs for the litter collection events. If only a small amount of litter was collected in the control outfalls, the (absolute) value of *% diff* could become extremely large, thus resulting in an anomalous value relative to the rest of the data points. For this reason, if the litter amount collected in

[2] The Wilcoxon Rank-Sum Test results are the same for raw and log-transformed data.

the control outfalls was less than the following screening values, the respective event/data point was excluded from our analysis (for that measurement):

- count ≤ 5 items
- volume ≤ 30 ml
- dry weight ≤ 1 g

These screening values were based on the judgement that average sampling errors (the level of error that is expected due to the limits of the sample collection and measuring methodologies utilized) would be similar to the screening values. Thus, a measured value less than a screening value was considered to be within the range of the average sampling error.

Two approaches to pairing the outfalls were investigated – matched pairing and crossed pairing. In the first approach, each treatment outfall was matched with a specific control outfall based on similar field conditions. In the second approach, each treatment outfall was matched with each of the control outfalls. If the ANOVA of all pairs of control and treatment outfalls with the same traffic and water flow directions did not show systematic differences, each treatment outfall could be paired with each of the control outfalls in the same traffic and water flow directions. Cross-pairing increases the number of pairs and the resulting data used in the analysis, and would be preferred when it is valid.

2. Perform exploratory data analysis on *% diff*. Check for anomalies in the data. Check whether data differences among the control outfalls and among the treatment outfalls at each site are statistically significant. The appropriate method of statistical analysis is the one-way Analysis of Variance (ANOVA). During the project siting phase treatment and control outfalls that were as similar as possible were selected to maximize the likelihood that they would behave similarly and any differences among them would be purely random. However, unanticipated field conditions might affect a particular outfall, making it behave differently from others. If such conditions are known or suspected to have occurred at a site, the statistical analysis may be used to confirm whether an outfall has been significantly affected by these conditions.

3. Test the distribution of *% diff* for normality using Shapiro-Wilk W Test at a 5% significance level.

4. Hypothesis testing:

   Null hypothesis, H_0: $\mu_{\%\ diff} = 0$

   Alternative hypothesis, H_A: $\mu_{\%\ diff} > 0$

   (a) If the distribution of *% diff* is normal, use the one-sample one-sided t-Test at a 5% significance level to test the hypotheses. The one-sample t-Test compares the mean of *% diff* with 0. If the p-value of the t-Test is less than 0.05, the null hypothesis is rejected and it is concluded that the average *% diff* is greater than 0, i.e., there is statistically significant litter reduction using the BMP at the treatment outfalls. Otherwise, it is concluded that the average litter reduction due to the BMP does not appear to be statistically significant.

(b) If the distribution of *% diff* is not normal, the Wilcoxon Signed-Rank Test (a non-parametric test) is used instead of the t-Test at a 5% significance level. Similar to the Wilcoxon Rank-Sum Test, this statistical test does not require assumption of parametric distribution existed in the data, and it is based on the ranking of the data relative to the threshold for comparison (in this case, the threshold is zero). If the p-value of the Wilcoxon Signed-Rank Test is less than 0.05, the null hypothesis is rejected and it is concluded that the average *% diff* is greater than 0; otherwise, it is concluded that the average litter reduction due to the BMP does not appear to be statistically significant.

5. Site-level analysis: sum the litter amount collected in all three control outfalls in each event, and similarly, sum the litter amount collected in all three treatment outfalls. Normalize the litter measurement with the corresponding total site catchment area. Repeat the calculation of *% diff* using the site total (normalized) litter. Repeat (2) to (4) and apply the same small quantity screening criteria as described in (1).

6. Repeat (1) to (5) for other BMP and measuring unit combinations.

7. Alternatively, the paired analysis is repeated using the actual differences of normalized litter amount (instead of *% diff*) between each pair of control and treatment outfalls (for both outfall-level and site-level analyses). The actual differences are calculated as follows (using the same example as illustrated in (1)):

$$\text{Actual difference, } Act\ diff = \text{No. of items per acre collected at Outfall 1-47 (control outfall)} - \text{No. of items per acre collected at Outfall B-110 (treatment outfall)}$$

8. Cross pairing outfall-level analysis: for the outfall-level analysis described above, the one-to-one outfall pairing may not be "absolute," i.e., a treatment outfall may be comparable to two or three control outfalls, not just one. Further investigation of the site characteristics showed that most control and treatment outfalls followed the same pattern of traffic flow and water flow directions in each site, except at Site 8 (See Table 1). The exploratory data analysis described in (II) (2) indicated that the pairing comparison may be affected if either one of the directions is different between one pair and another. For example:

At Site 1E,

Treatment LP1 (1-47) can be compared to … → Control LP1 (1-B110)
→ Control LP2 (1-42)
→ Control LP3 (1-B111)

Site conditions are similar, including traffic-water flow directions, at treatment outfalls (E-W) and at control outfalls (E-E). Thus, besides the original pairing comparison between Treatment LP1 and Control LP1, there appeared to be no bias in comparing Treatment LP1 with Control LP2 and LP3.

However, at Site 8,

Treatment LP1 (8-B001) can be compared to → Control LP1 (8-23C)

Treatment LP2 (8-24B) can be compared to → Control LP2 (8-24D)
→ Control LP3 (8-24E)

The traffic direction is different between Control LP1 and Control LP2/LP3; therefore, Treatment LP1 can be compared with Control LP1 but not with Control LP2 or LP3. However, for Treatment LP2, besides the original paired "partner" Control LP2, Treatment LP2 can also be compared to Control LP3 because Control LP2 and LP3 had the same traffic and water flow directions.

Table 1. Traffic flow directions and water flow directions of all outfalls, and the associated "valid" comparison between control and treatment outfalls

Site Number	BMP	Outfall Type	Pair Design-ation	Outfall	Traffic Flow Direction	Water Flow Direction	Compare to Control Outfalls
1E	Litter Pickup	Control	LP1	1-B110	E	E	
			LP2	1-42	E	E	
			LP3	1-B111	E	E	
		Treatment	LP1	1-47	E	W	1-B110, 1-42, 1-B111
			LP2	1-46	E	W	1-B110, 1-42, 1-B111
			LP3	1-44	E	W	1-B110, 1-42, 1-B111
1W	Street Sweeping	Control	SP1	1-52	W	W	
			SP2	1-50	W	W	
			SP3	1-51	W	W	
		Treatment	SP1	1-58	W	E	1-52, 1-50, 1-51
			SP2	1-59	W	E	1-52, 1-50, 1-51
			SP3	1-60	W	E	1-52, 1-50, 1-51
6	Modified Inlet	Control	MP1	6-20G	E	E	
			MP2	6-20E	E	E	
			MP3	6-20C	E	E	
		Treatment	MP1	6-20H	E	E	6-20G, 6-20E, 6-20C
			MP2	6-20F	E	E	6-20G, 6-20E, 6-20C
			MP3	6-20B	E	E	6-20G, 6-20E, 6-20C
8	Bicycle Grate / LID	Control	BP1	8-23C	W	W	
			BP2	8-24D	E	W	
			BP3	8-24E	E	W	
		Treatment	BP1	8-B001	W	E	8-23C
			BP2	8-24B	E	E	8-24D, 8-24E
			BP3	8-24F	E	W	8-24D, 8-24E

Table 1 shows all possible cross pairing comparisons based on compatibility of traffic and water flow directions between control and treatment outfalls. As described in (1), if the ANOVA of all pairs of control and treatment outfalls with the same traffic and water flow directions do not show systematic differences, each treatment outfall could be paired with each of the control outfalls in the same traffic and water flow directions. Both variables, *% diff* and *Act diff*, are

used for this cross-pairing analysis at the outfall level[3] (Repeat steps 1 to 4, 6, and 7 above). One noticeable difference of this analysis is that the number of data points is much larger (i.e., for each litter collection event at Site 1E, there are nine pairs of comparison (nine *% diff*'s or *Act diff*'s) instead of three.

Approach and Methodology – Data Normalized by Flow Volume

Flow volume data (in litre) were collected for 22 storm events (out of 31 litter collection events) and for only one pair of control/treatment outfall at each site. Therefore, the statistical analysis procedures were reduced to the following two approaches:

(I) MARGINAL (UNPAIRED) ANALYSIS: Outfall-level analysis for raw data and log-transformed analysis. No site-level analysis.

(II) PAIRED ANALYSIS: Outfall-level analysis with matched pairs for *Act Diff* and *% Diff*. No site-level analysis and crossed pairs analysis (also, no one-way ANOVA on three controls and three treatments).

Otherwise, the same statistical procedures were used as described in the previous section.

Approach and Methodology – Analysis of Total System Litter Load

Litter load data were collected for two components of the storm drain system – the litter retained in the inlet during a given study period and the litter discharged to an outfall in each monitored storm event during the study period. Each inlet was cleaned at the start and end of the study period. These data provided an estimate of the litter load retained in the system during the study period. The total system annual litter load for each outfall was calculated as the sum of two components: (1) the litter load retained in the system and collected from inlet cleaning at an inlet during the study period and (2) the cumulative litter load collected in litter monitoring bags at an outfall in monitored events during the study period.

The differences in the total system litter load can be analyzed using the methods of paired analysis described above. Both actual and percentage differences can be analyzed. To provide an adequate number of data points, the cross-pairing of treatment and control outfalls is appropriate.

K.4. Results – Data Normalized by Catchment Area

Main Results

Table 2 summarizes the results of the statistical evaluation of BMP effectiveness. For each site and each litter measure, Table 2 presents the results of the paired analyses. For the paired

[3] Not at the site level, because all control outfalls and all treatment outfalls are combined together in the site-level analysis.

analysis, results are presented for three cases – matched pairs, crossed pairs, and site-level analysis. For each case, both actual and percentage differences are analyzed.

The data for Site 1E were analyzed with or without the treatment outfall 1-46, which was considered to be potentially suspect because of noticeably lower litter amount seen at this outfall (see Appendix J, pages 1, 5, and 9). However, the ANOVA results showed that the data at outfall 1-46 were statistically no different from the other two outfalls at this site.

Year 2 data for Site 8 (LID) were analyzed with and without the control outfall 8-24D, which was considered to be potentially affected by construction impacts (see Appendix J, pages 4, 8 and 12). In this case, the ANOVA results did confirm that this outfall behaved differently from the other control outfall (8-24E) in the same traffic direction.

For all other sites, there were no outfalls that were potentially suspect and ANOVA did not show the presence of statistically significant differences among either the three control outfalls or the three treatment outfalls. The analysis, therefore, used all outfalls at Sites 1W, 6, and 8 (bicycle grate).

Using the criteria discussed in Section L.3 “Approach and Methodology”, a preferred method of analysis was identified for each site and measure. Table 3 shows the preferred methods of analysis.

Note that for a paired sampling design (which was employed in the LMPS), the paired analysis should be preferred to the marginal analysis.

Table 2. Results (p-values) of Evaluation of BMP Effectiveness (data normalized by catchment area) (1)

Site	BMP	Measure	Paired Analysis					
			Matched Pairs		Crossed Pairs		Site Level	
			Actual Diff.	% Diff.	Actual Diff.	% Diff.	Actual Diff.	% Diff.
1E	Litter Pickup	Count	***0.000***	***0.001***	***0.000****	***0.000***	***0.003***	***0.040***
		Volume	***0.000***	***0.000***	***0.000****	***0.000***	***0.000***	***0.000***
		Weight	***0.012***	***0.016***	***0.000****	***0.002***	***0.046***	0.059
1W	Street Sweeping	Count	0.351	0.367	0.426*	0.530	0.463	0.370
		Volume	0.109	0.254	***0.032****	0.151	0.256	0.277
		Weight	0.643	0.817	0.656*	0.890	0.774	0.721
6	Modified Inlet	Count	***0.001***	***0.023***	***0.000****	***0.002***	***0.028***	***0.030***
		Volume	***0.022***	***0.047***	***0.000****	***0.002***	***0.045***	***0.013***
		Weight	***0.017***	0.161	***0.000****	***0.020***	0.064	0.051
8	Bicycle Grate	Count	0.918	0.890	0.991*	0.985	0.912	0.905
		Volume	0.273	0.315	0.546	0.351	0.626*	0.335
		Weight	0.297	0.173	0.321	0.429	0.133*	0.635
8 (2)	LID	Count	0.512	0.846	0.566	0.924	0.682	0.607
		Volume	0.746	0.943	0.816	0.965	0.604	0.830
		Weight	0.815	0.966	0.901	0.991	0.773	0.793
1E (w/o outfall 1-46)(3)	Litter Pickup	Count	0.179	0.319	***0.013***	0.056	0.125	0.329
		Volume	***0.018***	***0.027***	***0.000***	***0.001***	***0.011***	***0.009***
		Weight	0.578	0.546	0.481	0.685	0.526	0.555
8 (w/o outfall 8-24D)	LID	Count	***0.041***	0.119	***0.008****	***0.046***	***0.040***	0.137
		Volume	0.343	0.511	0.241	0.397	0.338*	0.607
		Weight	0.314	0.489	0.279*	0.379	0.446	0.527

* Preferred Method (See Table 3)
(1) Large, bold text indicates that the average litter amount in the control is greater than the treatment based on statistical testing (α=0.05)
(2) Preferred method is without Control 8-24D below.
(3) Preferred method is 1E above.

Table 3. Preferred Method of Statistical Analysis (data normalized by catchment area)

Site	BMP	Measure	Preferred Method of Analysis	Reasons
1E	Litter pickup	Count	Crossed pairs using actual difference	• all pairs behave similarly • site level does not transform data to normally distributed • difference in litter load does not increase with control load and % difference transformation does not help pass normality
		Volume	Crossed pairs using actual difference	• all pairs behave similarly • site level does not transform data to normally distributed • difference in litter load does not increase with control load and % difference transformation does not help pass normality
		Weight	Crossed pairs using actual difference	• all pairs behave similarly • site level does not transform data to normally distributed • difference in litter load does not increase with control load and % difference transformation does not help pass normality
1W	Street Sweeping	Count	Crossed pairs using actual difference	• all pairs behave similarly • site level does not transform data to normally distributed • difference in litter load does not increase with control load and % difference transformation does not help pass normality
		Volume	Crossed pairs using actual difference	• all pairs behave similarly • site level does not transform data to normally distributed • difference in litter load does not increase with control load and % difference transformation does not help pass normality
		Weight	Crossed pairs using actual difference	• all pairs behave similarly • site level does not transform data to normally distributed • difference in litter load does not increase with control load and % difference transformation does not help pass normality
6	Modified Inlet	Count	Crossed pairs using actual difference	• all pairs behave similarly • site level does not transform data to normally distributed • difference in litter load does not increase with control load and % difference transformation does not help pass normality
		Volume	Crossed pairs using actual difference	• all pairs behave similarly • site level does not transform data to normally distributed • difference in litter load does not increase with control load and % difference transformation does not help pass normality

Table 3. Preferred Method of Statistical Analysis (data normalized by catchment area) (cont'd)

Site	BMP	Measure	Preferred Method of Analysis	Reasons
6	Modified Inlet	Weight	Crossed pairs using actual difference	• all pairs behave similarly • site level does not transform data to normally distributed • difference in litter load does not increase with control load and % difference transformation does not help pass normality
8	Bicycle Grate	Count	Crossed pairs using actual difference	• all pairs behave similarly • site level does not transform data to normally distributed • difference in litter load does not increase with control load and % difference transformation does not help pass normality
		Volume	Site level using actual difference	• all pairs behave similarly • site level transforms data to normally distributed • difference in litter load does not increase with control load and % difference transformation does not help pass normality
		Weight	Site level using actual difference	• all pairs behave similarly • site level transforms data to normally distributed • difference in litter load does not increase with control load and % difference transformation does not help pass normality
8 (w/o outfall 8-24D	LID	Count	Crossed pairs using actual difference	• all pairs behave similarly • site level does not transform data to normally distributed • difference in litter load does not increase with control load and % difference transformation does not help pass normality
		Volume	Site level using actual difference	• all pairs behave similarly • site level transforms data to normally distributed • difference in litter load does not increase with control load and % difference transformation does not help pass normality
		Weight	Crossed pairs using actual difference	• all pairs behave similarly • site level does not transform data to normally distributed • difference in litter load does not increase with control load and % difference transformation does not help pass normality

Details of Statistical Analysis

Details of the statistical analysis are provided in Attachment 1. Figure 1 to Figure 16 in Attachment 1 show the box plots of each BMP and measuring unit combination respectively across six individual outfalls, and Figure 16 to Figure 30 in Attachment 1 show the box plots of combining all three control outfalls and all three treatment outfalls. Each box plot is followed by the corresponding summary statistics and moments. The following diagram illustrates how to interpret these box plots:

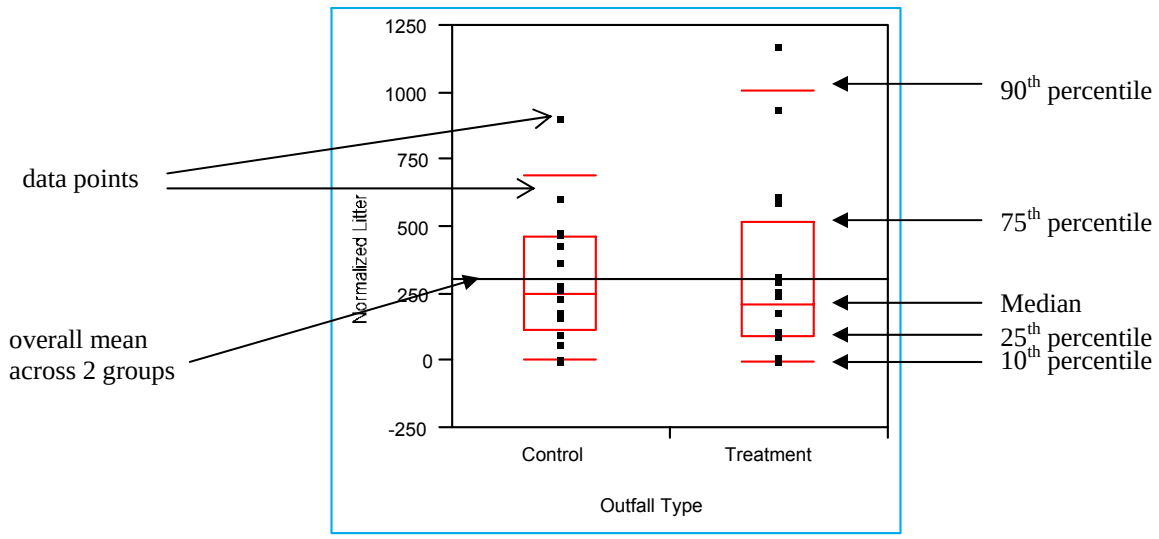

Figure 1. Key for Box and Whiskers Plots

The exploratory data analysis does not show any data anomalies. All statistical tests were carried out as described in the previous section. The test results are shown in tables in Attachment 2.

K.5. Conclusions - Data Normalized by Catchment Area

The main conclusions from the results shown in Tables 2 and 3 are as follows:

1. Litter pickup (Site 1E) appears to be effective at a 5% significance level for all parameters (count, volume, and weight). This conclusion is quite robust because it remains unchanged under most of the other methods of paired analysis. The ANOVA results did not show any significant differences among the three treatment outfalls; thus, the suspect treatment outfall, 1-46, is included in this analysis.

2. Street sweeping (Site 1W) does not appear to be effective at a 5% significance level for count or weight, but appears to be effective for volume. This conclusion is very robust for count and weight because it remains unchanged under all methods of paired analysis. The conclusion regarding volume is not robust because it changes if other methods of paired analysis are used. Additionally, the average volume reduction is only about 9% and does not appear to be practically significant.

3. Modified inlet (Site 6) appears to be effective at a 5% significance level for all parameters (count, volume, and weight). This conclusion is fairly robust because it remains unchanged under most methods of paired analysis.
4. Bicycle grate (Site 8) does not appear to be effective at a 5% significance level for any of the measures. This conclusion is very robust because it remains unchanged under all methods of paired analysis.
5. LID (Site 8) appears to be effective at a 5% significance level for reducing count, but not volume or weight. This conclusion is fairly robust because it remains unchanged under most methods of paired analysis. The ANOVA results show that the two control outfalls (8-24D and 8-24E) are significantly difference from each other; thus, outfall 8-24D may have been affected by the construction project and is excluded in this analysis.
6. The marginal analysis consistently fails to conclude that the observed differences are significant for any BMP and any measure. For a paired sampling design (which was used in the LMPS), this generally will be the case. This is because a paired analysis typically reduces the data variability caused by factors other than the application of a BMP. In a paired sampling design, other factors can be assumed to affect both control and treatment outfalls in a similar way. The marginal analysis fails to reduce the variability caused by other factors and generally results in a higher variance. The higher variance means that the power of detecting a specified difference would be less and that a larger number of data points would be necessary to show a statistically significant difference.

K.6. Results and Conclusions – Data Normalized by Flow Volume

Since only one pair of control/treatment outfalls has flow volume data for each site, and only storm events have flow volume data, the number of data points are much fewer than the normalized by catchment area analysis. Thus, the results and conclusions are considered less powerful for data normalized by flow volume. The statistical test results confirm that litter pickup (Site 1E) and modified inlet (Site 6) appear to be effective in litter reduction in all three measures (as seen in normalized by catchment area analysis). Also, bicycle grate (Site 8 in 1998/1999) and LID (Site 8 in 1999/2000) do not show significant litter reduction. Street sweeping (Site 1W) appears to be effective for count and volume, but not for weight.

The results of flow-normalized analysis are consistent with those of area-normalized analysis for all parameters except for two. The exceptions are count at Site 1W and count at Site 8 (LID). For count at Site 1W, the reduction is significant for the flow-normalized analysis, but not for the area-normalized analysis. For count at Site 8 (LID), the reduction is not significant for the flow-normalized analysis, but is significant for the area-normalized analysis. As noted above, the number of data points is substantially larger for the area-normalized analysis and hence the results of that analysis are considered more powerful.

K.7. Results and Conclusions – Analysis of Total System Load

Litter load data were collected for two components of the storm drain system – the litter retained in the inlet during a given study period and the litter discharged to an outfall in each monitored storm event during the study period. Each inlet was cleaned at the start and end of the study period. These data provided an estimate of the litter load retained in the system during the study period. The total system annual litter load for each outfall was calculated as the sum of two

components: (1) the litter load retained in the system and collected from inlet cleaning during the study period and (2) the cumulative litter load collected in litter monitoring bags at an outfall in monitored events during the study period. The differences in the total system litter load were analyzed statistically using the methods of paired analysis described above. A summary of results is shown in Table 6.

The main conclusions of the analysis of the total system loads were identical to those of the analysis of the outfall-discharged loads with the only exception of count at Site 8 (LID). Thus, litter pickup (Site 1E) and modified inlet (Site 6) appear to be effective in reducing both the total system load and the load discharged to an outfall in storm events. Street sweeping (site 1W) appears to reduce both total system litter volume and outfall-discharged litter volume, but not for litter count and weight. Bicycle grate (Site 8, 1998/1999) and LID (Site 8, 1999/2000) do not appear to be effective in reducing either the total system load or the load discharged to an outfall in a storm event. At Site 8 (LID), the count reduction is not significant at the level of the total system load, but is significant at the level of outfall-discharged load. The data at Site 8 (LID) show that the average litter count is lower for the treatment in the outfall-discharged load, but higher in the inlet retention load. The net effect is that the count reduction is not significant for the total system load.

Table 4. Results (p-values) of Evaluation of BMP Effectiveness (data normalized by flow volume) (1)

Site	BMP	Measure	Paired Analysis Matched Pairs Actual Diff.	% Diff.
1E	Litter Pickup	Count	*0.000*	*0.000**
		Volume	*0.000**	*0.001*
		Weight	*0.000**	*0.002*
1W	Street Sweeping	Count	*0.045**	*0.000*
		Volume	*0.027**	*0.001*
		Weight	*0.082**	*0.024*
6	Modified Inlet	Count	*0.030**	0.060
		Volume	*0.016**	*0.030*
		Weight	*0.002**	*0.022*
8	Bicycle Grate	Count	0.402*	0.500
		Volume	0.104*	0.213
		Weight	0.090*	0.057
8	LID	Count	0.840	0.895*
		Volume	0.449*	0.748
		Weight	0.449*	0.593

* Preferred Method (See Table 5)
(1) Large, Bold fond indicate that the average litter amount in the control is greater than the treatment based on statistical testing (α=0.05).

Table 5. Preferred Method of Statistical Analysis (data normalized by flow volume)

Site	BMP	Measure	Preferred Method of Analysis	Reasons
1E	Litter pickup	Count	Matched pairs using % difference	• difference in litter load increases with control load and % difference transformation helps pass normality
		Volume	Matched pairs using actual difference	• difference in litter load does not increase with control load and % difference transformation does not help pass normality
		Weight	Matched pairs using actual difference	• difference in litter load does not increase with control load and % difference transformation does not help pass normality
1W	Street Sweeping	Count	Matched pairs using actual difference	• difference in litter load does not increase with control load and % difference transformation does not help pass normality
		Volume	Matched pairs using actual difference	• difference in litter load does not increase with control load and % difference transformation does not help pass normality
		Weight	Matched pairs using actual difference	• difference in litter load does not increase with control load and % difference transformation does not help pass normality
6	Modified Inlet	Count	Matched pairs using actual difference	• difference in litter load does not increase with control load and % difference transformation does not help pass normality
		Volume	Matched pairs using actual difference	• difference in litter load does not increase with control load and % difference transformation does not help pass normality
		Weight	Matched pairs using actual difference	• difference in litter load does not increase with control load and % difference transformation does not help pass normality
8	Bicycle Grate	Count	Matched pairs using actual difference	• difference in litter load does not increase with control load and % difference transformation does not help pass normality
		Volume	Matched pairs using actual difference	• difference in litter load does not increase with control load and % difference transformation does not help pass normality
		Weight	Matched pairs using actual difference	• difference in litter load does not increase with control load and % difference transformation does not help pass normality

Table 5. Preferred Method of Statistical Analysis (data normalized by flow volume) (cont'd)

Site	BMP	Measure	Preferred Method of Analysis	Reasons
8	LID	Count	Matched pairs using % difference	• difference in litter load increases with control load and % difference transformation helps pass normality
		Volume	Matched pairs using actual difference	• difference in litter load does not increase with control load and % difference transformation does not help pass normality
		Weight	Matched pairs using actual difference	• difference in litter load does not increase with control load and % difference transformation does not help pass normality

Table 6. Results (p-values) of Evaluation of BMP Effectiveness (data normalized by catchment area) Analysis of Total System Load (1)

Site	BMP	Measure	Total System Analysis (Crossed Pairs) Actual Diff.	% Diff.
1E	Litter Pickup	Count	*0.019**	*0.022*
		Volume	*0.002**	*0.002*
		Weight	*0.002**	*0.002*
1W	Street Sweeping	Count	0.297*	0.368
		Volume	*0.015**	*0.020*
		Weight	0.508*	0.711
6	Modified Inlet	Count	*0.000**	*0.000*
		Volume	*0.000*	*0.000**
		Weight	*0.000**	*0.000*
8	Bicycle Grate	Count	0.960*	0.962
		Volume	0.900*	0.900
		Weight	0.720*	0.731
8 (2)	LID	Count	0.376*	0.739
		Volume	0.500*	0.874
		Weight	0.913*	0.947
1E (w/o outfall 1-46)(3)	Litter Pickup	Count	0.176*	0.211
		Volume	*0.000**	*0.000*
		Weight	*0.005**	*0.003*
8 (w/o outfall 8-24D)	LID	Count	0.115*	0.127
		Volume	0.303*	0.418
		Weight	0.695*	0.725

* Preferred Method (See Table 5)

(1) Large, Bold fond indicate that the average litter amount in the control is greater than the treatment based on statistical testing (α=0.05).

(2) Preferred method is without Control 8-24D below.

(3) Preferred method is 1E above.

References

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Gibbons, R. D. (1994). Statistical Methods for Groundwater Monitoring. John Wiley & Sons, Inc., New York.

USEPA (1998). Guidance for Data Quality Assessment: Practical Methods for Data Analysis. USEPA QA/G-9.

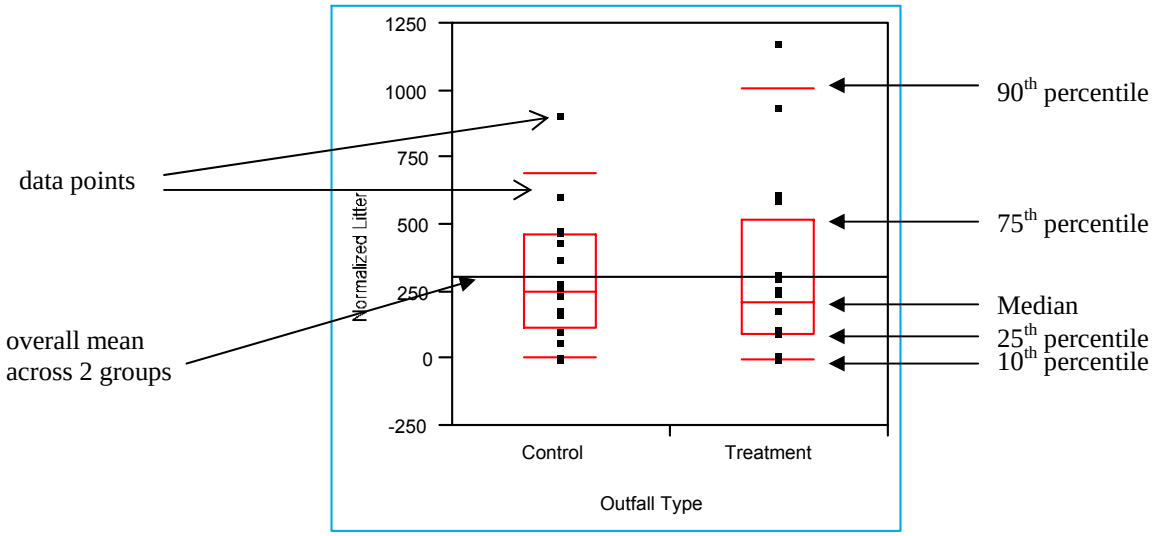

Key for Box and Whiskers Plots

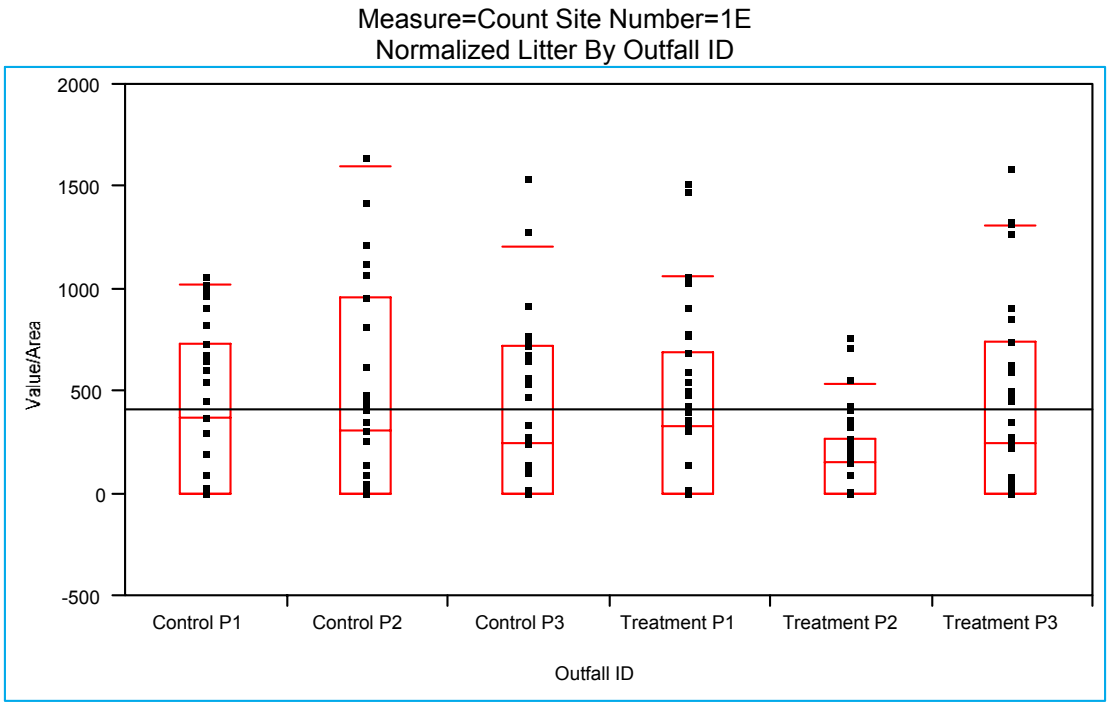

Moments	LP1 Control, Outfall 1-B110	LP2 Control, Outfall 1-42	LP3 Control, Outfall 1-B111	LP1 Treatment, Outfall 1-47	LP2 Treatment, Outfall 1-46	LP3 Treatment, Outfall 1-44
Mean	444.53	534.88	488.71	412.23	180.22	426.83
Std Dev	516.83	672.54	779.55	444.72	218.00	477.86
Std Error Mean	92.82	120.79	140.01	79.87	39.15	85.83
Upper 95% Mean	634.10	781.57	774.65	575.35	260.18	602.11
Lower 95% Mean	254.96	288.19	202.77	249.10	100.26	251.55
N	31	31	31	31	31	31
Sum	13,780.44	16,581.25	15,150.00	12,779.07	5,586.84	13,231.82
Variance	267,109.92	452,306.05	607,691.61	197,780.05	47,525.80	228,347.25
Skewness	1.72	1.45	3.45	1.02	1.27	1.01
Kurtosis	4.55	1.58	14.82	0.38	1.08	-0.03
CV	116.26	125.74	159.51	107.88	120.97	111.95
Minimum	0.00	0.00	0.00	0.00	0.00	0.00
Maximum	2,337.00	2,506.20	4,057.50	1,520.90	768.42	1,593.20

Figure 1. Box plots and summary statistics of individual outfalls (outfall-level) for manual litter pick-up (Site 1E) measured in count (normalized by catchment area, item/acre)

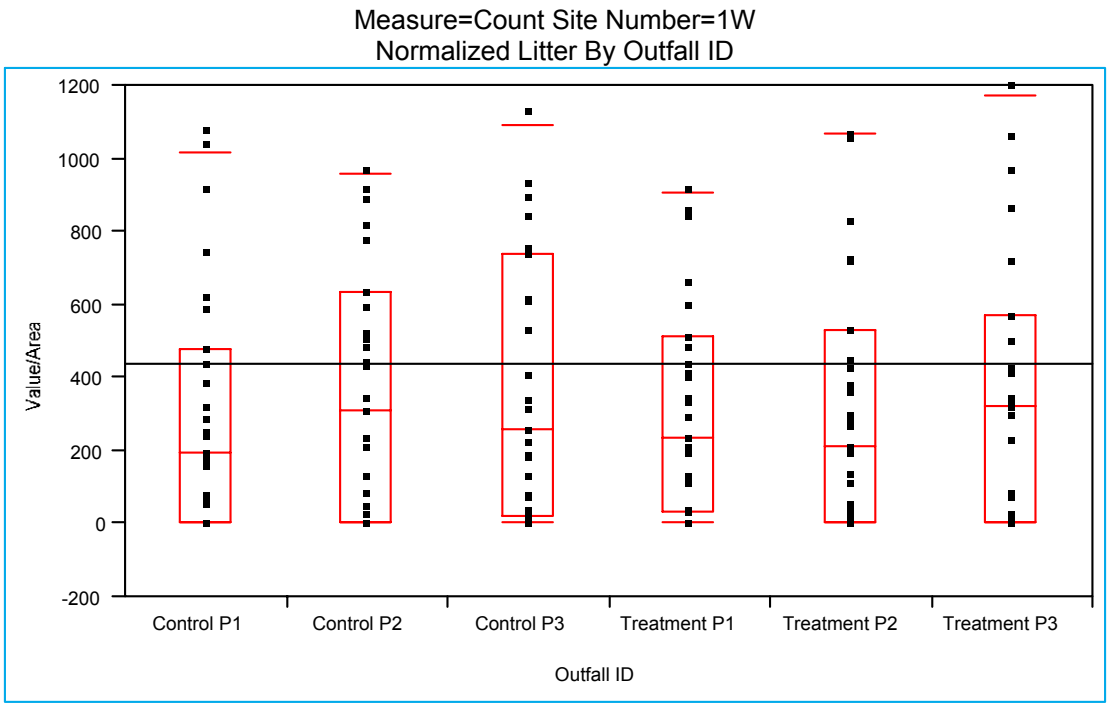

Moments	P1 Control, Outfall 1-52	P2 Control, Outfall 1-50	P3 Control, Outfall 1-51	P1 Treatment, Outfall 1-58	P2 Treatment, Outfall 1-59	P3 Treatment, Outfall 1-60
Mean	322.51	442.98	458.85	392.50	463.51	554.34
Std Dev	382.92	568.85	603.85	510.74	808.39	1072.65
Std Error Mean	68.78	102.17	108.45	91.73	145.19	192.65
Upper 95% Mean	462.96	651.64	680.34	579.84	760.02	947.78
Lower 95% Mean	182.05	234.33	237.36	205.16	166.99	160.89
N	31	31	31	31	31	31
Sum	9,997.67	13,732.50	14,224.39	12,167.57	14,368.75	17,184.38
Variance	146,630.75	323,593.09	364,635.23	260,854.50	653,489.84	1,150,574.00
Skewness	1.47	2.08	2.63	2.21	3.40	3.89
Kurtosis	1.74	5.03	9.45	5.45	13.47	17.24
CV	118.73	128.41	131.60	130.12	174.41	193.50
Minimum	0.00	0.00	0.00	0.00	0.00	0.00
Maximum	1,481.40	2,432.50	2,978.00	2,186.50	4,062.50	5,609.40

Figure 2. Box plots and summary statistics of individual outfalls (outfall-level) for street sweeping (Site 1W) measured in count (normalized by catchment area, item/acre)

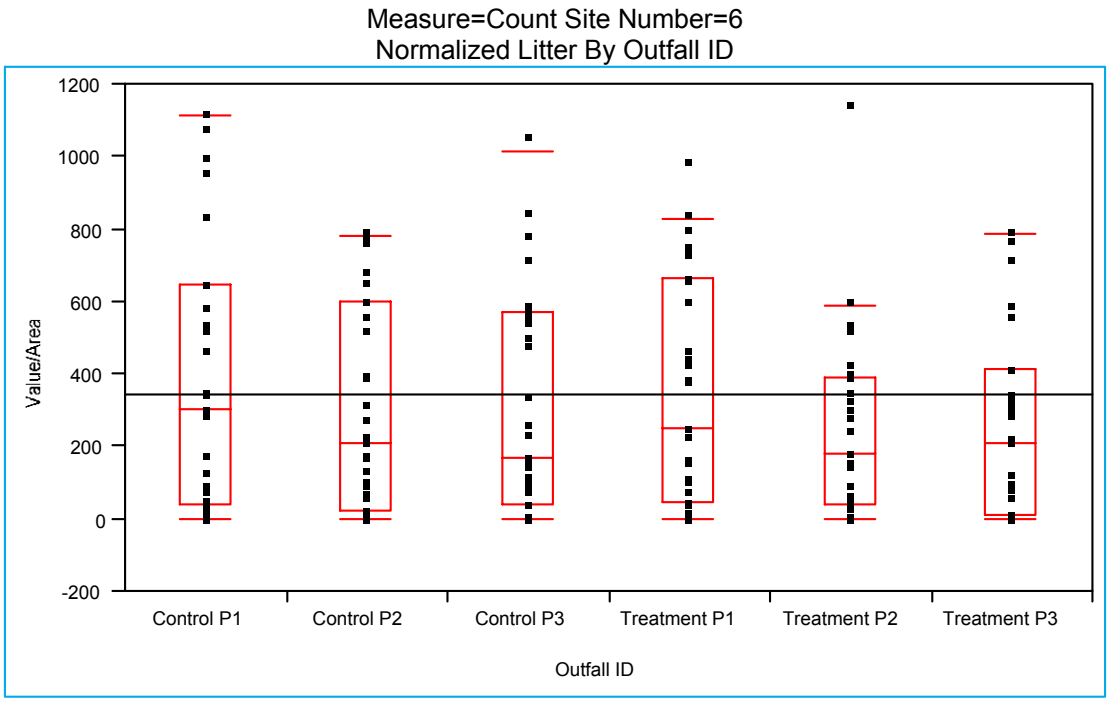

Moments	P1 Control, Outfall 6-20G	P2 Control, Outfall 6-20E	P3 Control, Outfall 6-20C	P1 Treatment, Outfall 6-20H	P2 Treatment, Outfall 6-20F	P3 Treatment, Outfall 6-20B
Mean	432.89	336.79	369.97	368.55	277.11	288.94
Std Dev	496.69	373.52	430.58	357.52	318.10	321.20
Std Error Mean	89.21	67.09	77.33	64.21	57.13	57.69
Upper 95% Mean	615.08	473.80	527.91	499.69	393.79	406.76
Lower 95% Mean	250.70	199.78	212.03	237.41	160.43	171.12
N	31	31	31	31	31	31
Sum	13,419.61	10,440.48	11,469.05	11,425.00	8,590.48	8,957.14
Variance	246,700.94	139,515.06	185,398.59	127,817.83	101,184.69	103,169.52
Skewness	1.53	1.65	1.62	0.82	2.05	1.48
Kurtosis	2.50	3.80	2.94	-0.01	4.94	2.23
CV	114.74	110.91	116.38	97.01	114.79	111.17
Minimum	0.00	0.00	0.00	0.00	0.00	0.00
Maximum	2,062.70	1,664.30	1,809.50	1,332.80	1,373.80	1,326.20

Figure 3. Box plots and summary statistics of individual outfalls (outfall-level) for modified inlet grate (Site 6) measured in count (normalized by catchment area, item/acre)

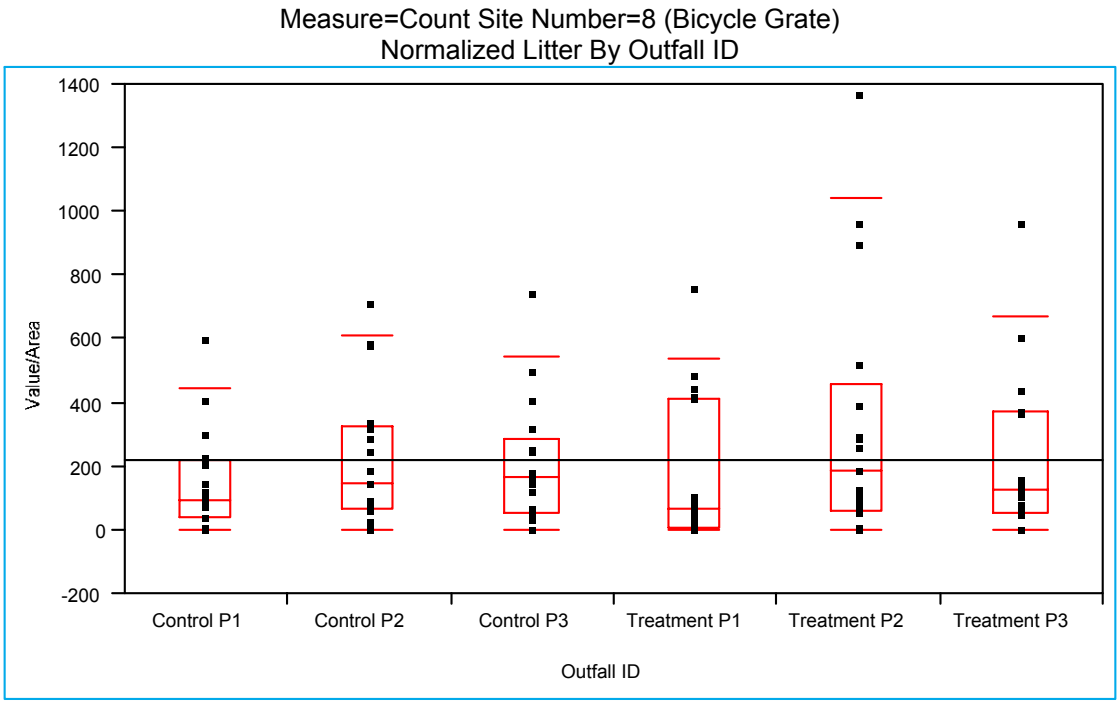

Moments	P1 Control, Outfall 8-23C	P2 Control, Outfall 8-24D	P3 Control, Outfall 8-24E	P1 Treatment, Outfall 8-B001	P2 Treatment, Outfall 8-24B	P3 Treatment, Outfall 8-24F
Mean	148.96	229.89	204.67	178.13	332.07	217.71
Std Dev	161.58	218.10	198.34	232.53	394.35	258.75
Std Error Mean	39.19	52.90	48.10	56.40	95.64	62.76
Upper 95% Mean	232.03	342.02	306.64	297.68	534.83	350.75
Lower 95% Mean	65.88	117.75	102.69	58.57	129.32	84.68
N	17	17	17	17	17	17
Sum	2,532.26	3,908.06	3,479.31	3,028.13	5,645.24	3,701.10
Variance	26,106.58	47,568.00	39,337.38	54,072.27	155,508.16	66,949.93
Skewness	1.71	1.08	1.47	1.34	1.59	1.81
Kurtosis	2.94	0.21	2.26	0.81	1.90	3.35
CV	108.47	94.87	96.91	130.55	118.75	118.85
Minimum	0.00	0.00	0.00	0.00	0.00	0.00
Maximum	603.23	712.90	744.83	762.50	1,369.00	963.74

Figure 4. Box plots and summary statistics of individual outfalls (outfall-level) for bicycle grate (Site 8) measured in count (normalized by catchment area, item/acre)

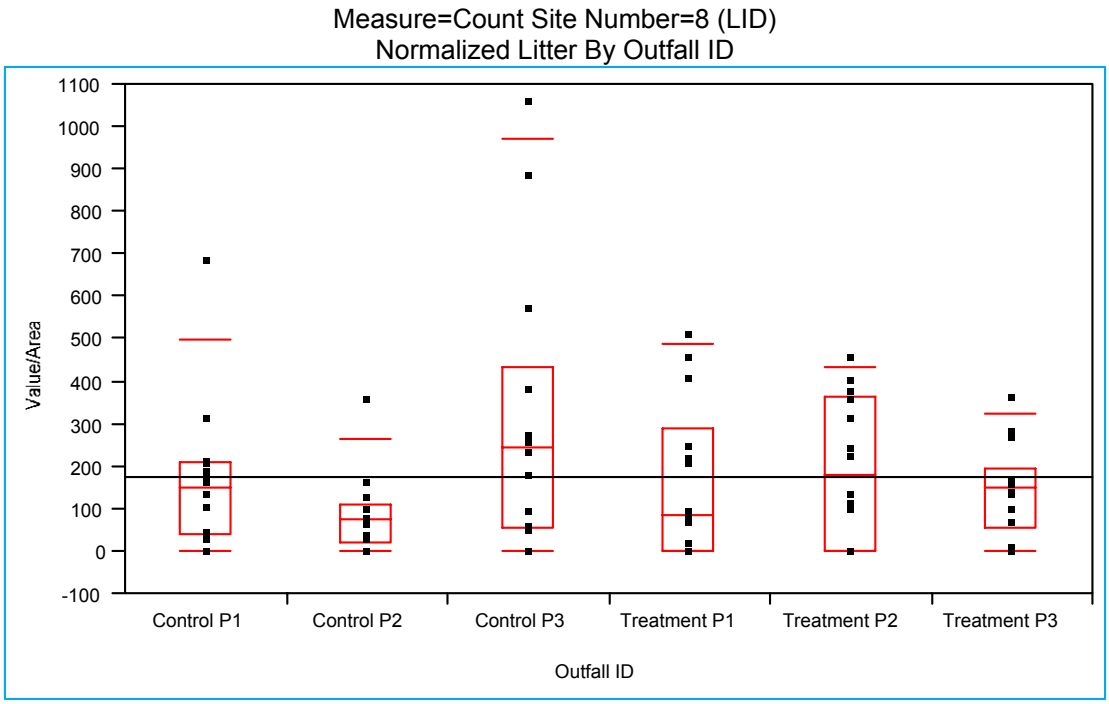

Moments	P1 Control, Outfall 8-23C	P2 Control, Outfall 8-24D	P3 Control, Outfall 8-24E	P1 Treatment, Outfall 8-B001	P2 Treatment, Outfall 8-24B	P3 Treatment, Outfall 8-24F
Mean	166.47	88.02	309.36	167.46	195.92	145.84
Std Dev	177.22	93.58	324.74	182.72	167.79	108.05
Std Error Mean	47.36	25.01	86.79	48.83	44.84	28.88
Upper 95% Mean	268.80	142.05	496.86	272.96	292.80	208.23
Lower 95% Mean	64.15	33.98	121.86	61.96	99.04	83.45
N	14	14	14	14	14	14
Sum	2,330.65	1,232.26	4,331.03	2,344.44	2,742.86	2,041.76
Variance	31,405.66	8,757.99	105,459.03	33,384.89	28,152.30	11,674.63
Skewness	2.10	2.08	1.40	0.88	0.17	0.43
Kurtosis	5.74	5.65	1.29	-0.59	-1.51	-0.12
CV	106.45	106.32	104.97	109.11	85.64	74.09
Minimum	0.00	0.00	0.00	0.00	0.00	0.00
Maximum	688.71	362.90	1,062.10	516.67	461.90	363.74

Figure 5. Box plots and summary statistics of individual outfalls (outfall-level) for LID (Site 8) measured in count (normalized by catchment area, item/acre)

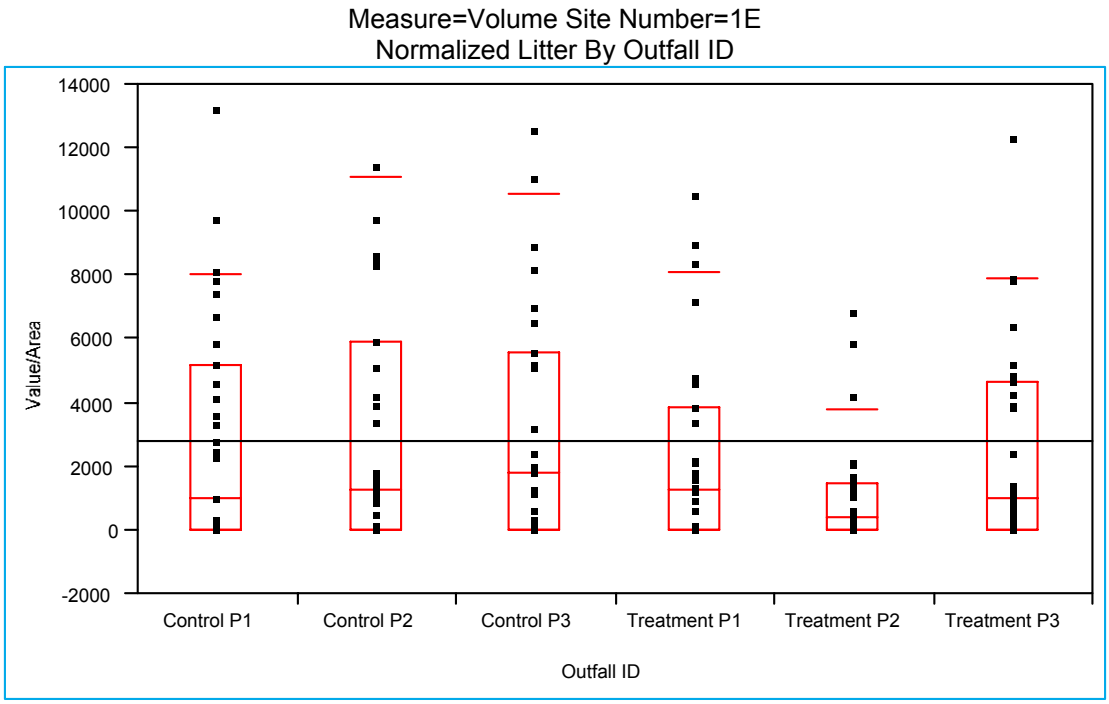

Moments	LP1 Control, Outfall 1-B110	LP2 Control, Outfall 1-42	LP3 Control, Outfall 1-B111	LP1 Treatment, Outfall 1-47	LP2 Treatment, Outfall 1-46	LP3 Treatment, Outfall 1-44
Mean	2,895.86	3706.16	4041.21	2269.90	1080.12	2812.39
Std Dev	3,556.30	5339.94	6909.27	2950.79	1709.95	3886.74
Std Error Mean	638.73	959.08	1240.94	529.98	307.12	698.08
Upper 95% Mean	4,200.31	5664.85	6575.53	3352.25	1707.33	4238.05
Lower 95% Mean	1,591.40	1747.47	1506.89	1187.55	452.91	1386.73
N	31	31	31	31	31	31
Sum	89,771.52	114,890.97	125,277.50	70,366.98	33,483.71	87,184.09
Variance	12,647,284.00	28,515,005.00	47,738,071.00	8,707,159.20	2,923,915.10	15,106,708.00
Skewness	1.22	1.98	3.54	1.51	2.24	1.87
Kurtosis	0.88	4.46	15.36	1.47	4.94	3.59
CV	122.81	144.08	170.97	130.00	158.31	138.20
Minimum	0.00	0.00	0.00	0.00	0.00	0.00
Maximum	13,217.00	22,859.00	35,925.00	10,477.00	6,834.20	15,795.00

Figure 6. Box plots and summary statistics of individual outfalls (outfall-level) for manual litter pick-up (Site 1E) measured in volume (normalized by catchment area, ml/acre)

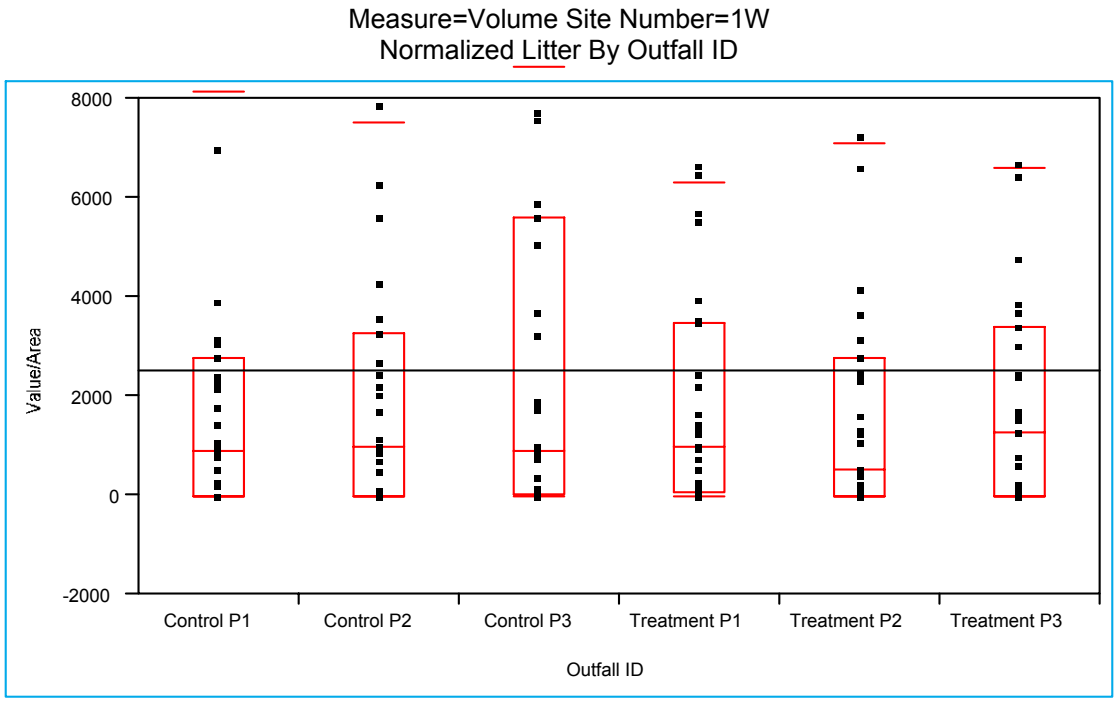

Moments	P1 Control, Outfall 1-52	P2 Control, Outfall 1-50	P3 Control, Outfall 1-51	P1 Treatment, Outfall 1-58	P2 Treatment, Outfall 1-59	P3 Treatment, Outfall 1-60
Mean	2,019.73	2527.22	3301.71	2255.49	2271.86	2637.00
Std Dev	2,783.27	4085.48	4879.55	3643.01	3758.51	4621.00
Std Error Mean	499.89	733.77	876.39	654.30	675.05	829.96
Upper 95% Mean	3,040.63	4025.77	5091.53	3591.75	3650.48	4331.98
Lower 95% Mean	998.83	1028.66	1511.89	919.24	893.23	942.01
N	31	31	31	31	31	31
Sum	62,611.63	78,343.75	102,352.98	69,920.27	70,427.53	81,746.88
Variance	7,746,585.50	16,691,129.00	23,810,020.00	13,271,499.00	14,126,387.00	21,353,672.00
Skewness	1.74	3.12	2.48	3.25	2.75	3.17
Kurtosis	2.11	12.02	7.79	13.12	8.68	11.55
CV	137.80	161.66	147.79	161.52	165.44	175.24
Minimum	0.00	0.00	0.00	0.00	0.00	0.00
Maximum	9,337.20	20,400.00	22,866.00	18,514.00	17,437.00	22,437.00

Figure 7. Box plots and summary statistics of individual outfalls (outfall-level) for street sweeping (Site 1W) measured in volume (normalized by catchment area, ml/acre)

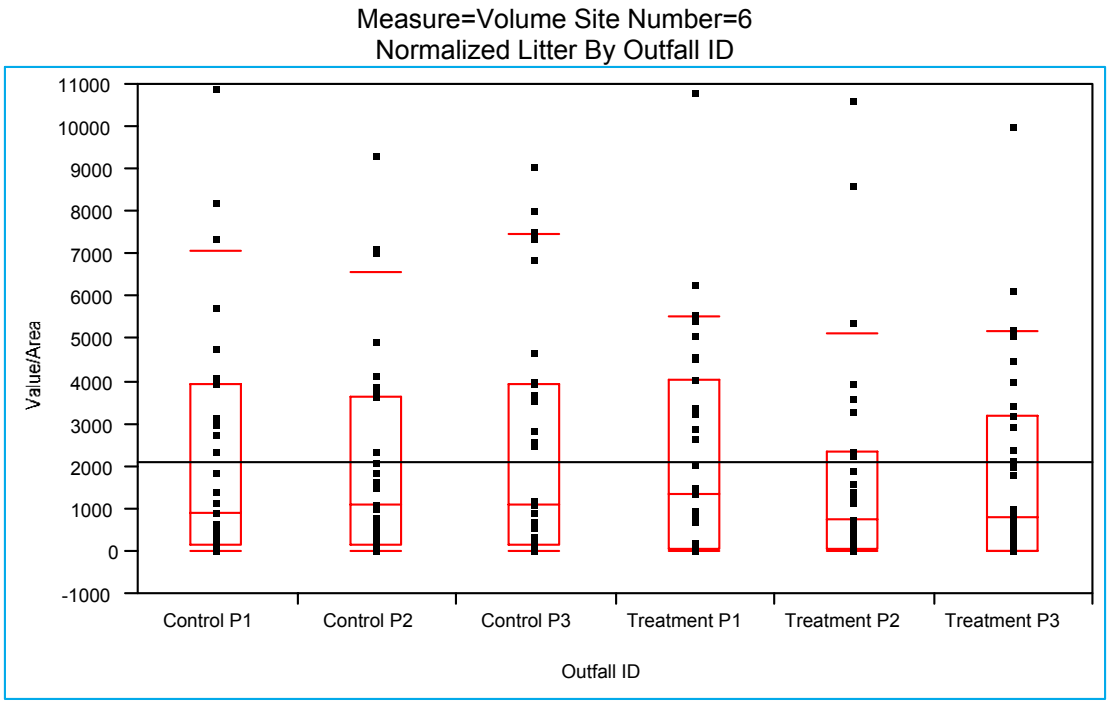

Moments	P1 Control, Outfall 6-20G	P2 Control, Outfall 6-20E	P3 Control, Outfall 6-20C	P1 Treatment, Outfall 6-20H	P2 Treatment, Outfall 6-20F	P3 Treatment, Outfall 6-20B
Mean	2,304.12	2035.29	2406.67	2235.97	1824.25	1885.42
Std Dev	2,838.55	2418.03	2804.41	2584.15	2516.68	2387.22
Std Error Mean	509.82	434.29	503.69	464.13	452.01	428.76
Upper 95% Mean	3,345.31	2922.23	3435.33	3183.83	2747.37	2761.05
Lower 95% Mean	1,262.94	1148.36	1378.01	1288.10	901.13	1009.79
N	31	31	31	31	31	31
Sum	71,427.84	63,094.05	74,606.71	69,315.00	56,551.69	58,448.10
Variance	8,057,365.20	5,846,890.30	7,864,700.70	6,677,819.30	6,333,679.30	5,698,804.80
Skewness	1.49	1.53	1.13	1.47	2.23	1.69
Kurtosis	1.77	1.94	0.07	2.55	5.24	3.22
CV	123.19	118.81	116.53	115.57	137.96	126.61
Minimum	0.00	0.00	0.00	0.00	0.00	0.00
Maximum	10,951.00	9,322.60	9,107.60	10,852.00	10,607.00	10,048.00

Figure 8. Box plots and summary statistics of individual outfalls (outfall-level) for modified inlet grate (Site 6) measured in volume (normalized by catchment area, ml/acre)

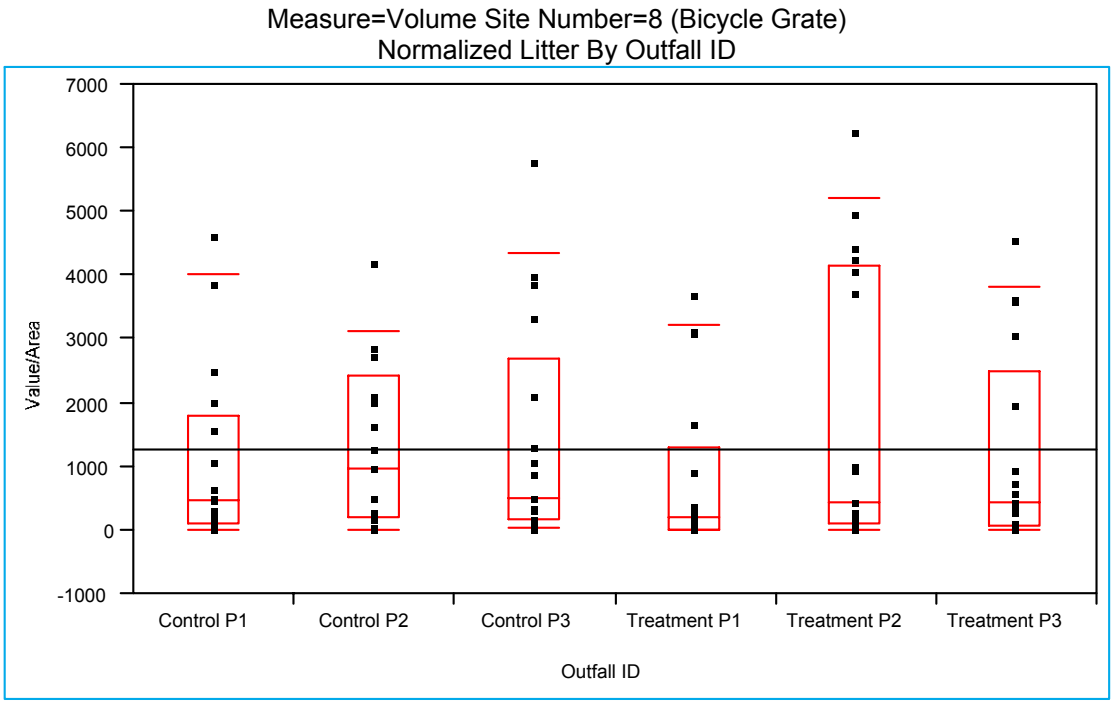

Moments	P1 Control, Outfall 8-23C	P2 Control, Outfall 8-24D	P3 Control, Outfall 8-24E	P1 Treatment, Outfall 8-B001	P2 Treatment, Outfall 8-24B	P3 Treatment, Outfall 8-24F
Mean	1,075.93	1307.78	1420.01	842.74	1827.33	1221.56
Std Dev	1,411.56	1294.90	1764.63	1253.20	2202.60	1522.63
Std Error Mean	342.35	314.06	427.99	303.95	534.21	369.29
Upper 95% Mean	1,801.68	1973.55	2327.30	1487.07	2959.80	2004.42
Lower 95% Mean	350.17	642.00	512.73	198.41	694.87	438.70
N	17	17	17	17	17	17
Sum	18,290.75	22,232.19	24,140.24	14,326.59	31,064.64	20,766.50
Variance	1,992,507.50	1,676,762.60	3,113,923.20	1,570,505.00	4,851,433.60	2,318,412.20
Skewness	1.59	0.78	1.36	1.54	0.82	1.21
Kurtosis	1.71	-0.41	0.84	0.88	-1.04	-0.03
CV	131.20	99.02	124.27	148.71	120.54	124.65
Minimum	0.00	0.00	0.00	0.00	0.00	0.00
Maximum	4,637.10	4,196.80	5,784.50	3,687.50	6,260.20	4,571.40

Figure 9. Box plots and summary statistics of individual outfalls (outfall-level) for bicycle grate (Site 8) measured in volume (normalized by catchment area, ml/acre)

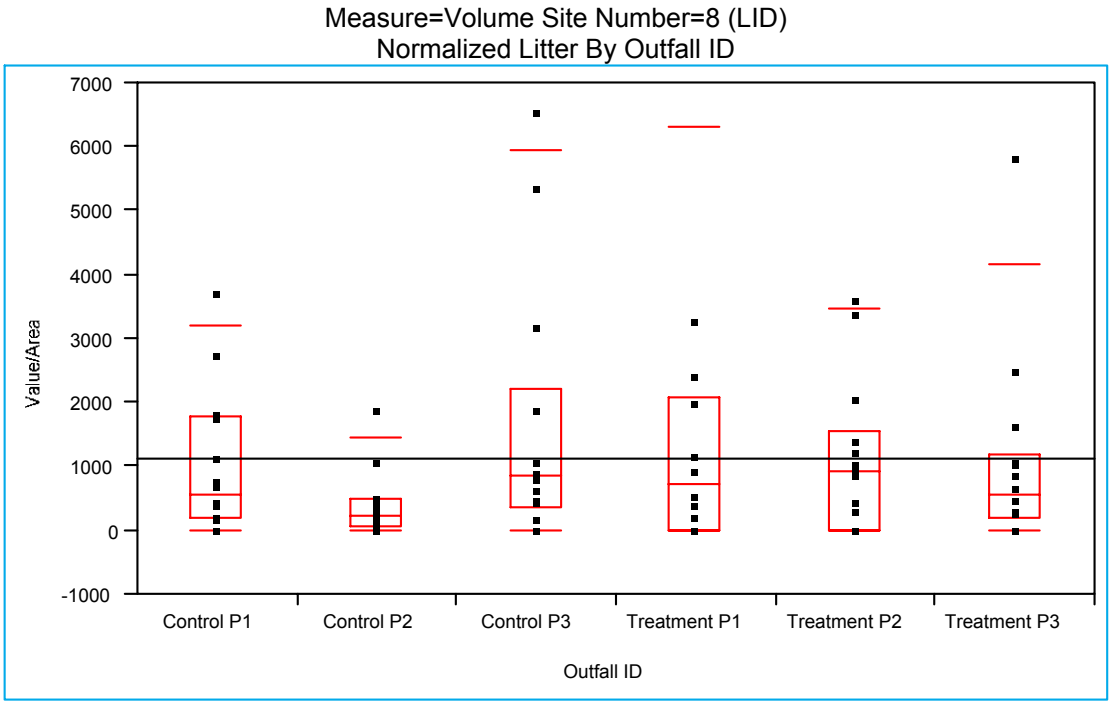

Moments	P1 Control, Outfall 8-23C	P2 Control, Outfall 8-24D	P3 Control, Outfall 8-24E	P1 Treatment, Outfall 8-B001	P2 Treatment, Outfall 8-24B	P3 Treatment, Outfall 8-24F
Mean	1,029.95	408.41	1677.96	1527.78	1097.87	1083.20
Std Dev	1,116.15	509.94	2029.62	2486.77	1196.88	1537.36
Std Error Mean	298.30	136.29	542.44	664.62	319.88	410.88
Upper 95% Mean	1,674.40	702.84	2849.82	2963.59	1788.93	1970.85
Lower 95% Mean	385.51	113.98	506.09	91.96	406.81	195.56
N	14	14	14	14	14	14
Sum	14,419.36	5,717.74	23,491.38	21,388.89	15,370.24	15,164.84
Variance	1,245,791.90	260,041.69	4,119,358.90	6,183,998.10	1,432,532.30	2,363,482.00
Skewness	1.40	2.20	1.63	2.79	1.21	2.63
Kurtosis	1.36	5.31	1.85	8.67	0.67	7.74
CV	108.37	124.86	120.96	162.77	109.02	141.93
Minimum	0.00	0.00	0.00	0.00	0.00	0.00
Maximum	3,725.80	1,887.10	6,560.30	9,416.70	3,631.00	5,857.10

Figure 10. Box plots and summary statistics of individual outfalls (outfall-level) for LID (Site 8) measured in volume (normalized by catchment area, ml/acre)

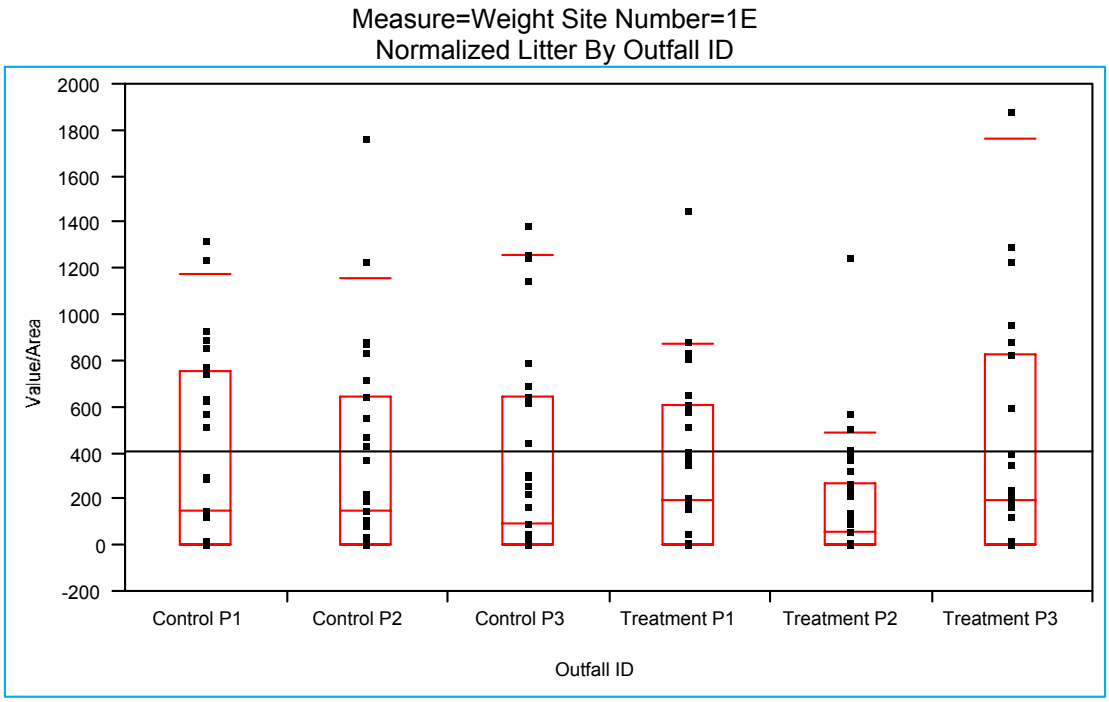

Moments	LP1 Control, Outfall 1-B110	LP2 Control, Outfall 1-42	LP3 Control, Outfall 1-B111	LP1 Treatment, Outfall 1-47	LP2 Treatment, Outfall 1-46	LP3 Treatment, Outfall 1-44
Mean	423.66	455.37	532.28	382.92	172.69	473.55
Std Dev	536.17	763.17	1230.64	528.57	263.02	706.04
Std Error Mean	96.30	137.07	221.03	94.93	47.24	126.81
Upper 95% Mean	620.32	735.30	983.68	576.80	269.17	732.53
Lower 95% Mean	226.99	175.44	80.88	189.04	76.22	214.58
N	31	31	31	31	31	31
Sum	13,133.35	14,116.38	16,500.63	11,870.58	5,353.45	14,680.16
Variance	287,473.67	582,427.82	1,514,470.90	279,382.91	69,177.75	498,491.19
Skewness	1.64	3.24	4.56	2.30	2.58	1.80
Kurtosis	3.44	12.91	23.09	6.81	8.73	2.55
CV	126.56	167.59	231.20	138.04	152.30	149.09
Minimum	0.00	0.00	0.00	0.00	0.00	0.00
Maximum	2,285.80	3,840.50	6,740.40	2,433.20	1,252.30	2,538.50

Figure 11. Box plots and summary statistics of individual outfalls (outfall-level) for manual litter pick-up (Site 1E) measured in dry weight (normalized by catchment area, g/acre)

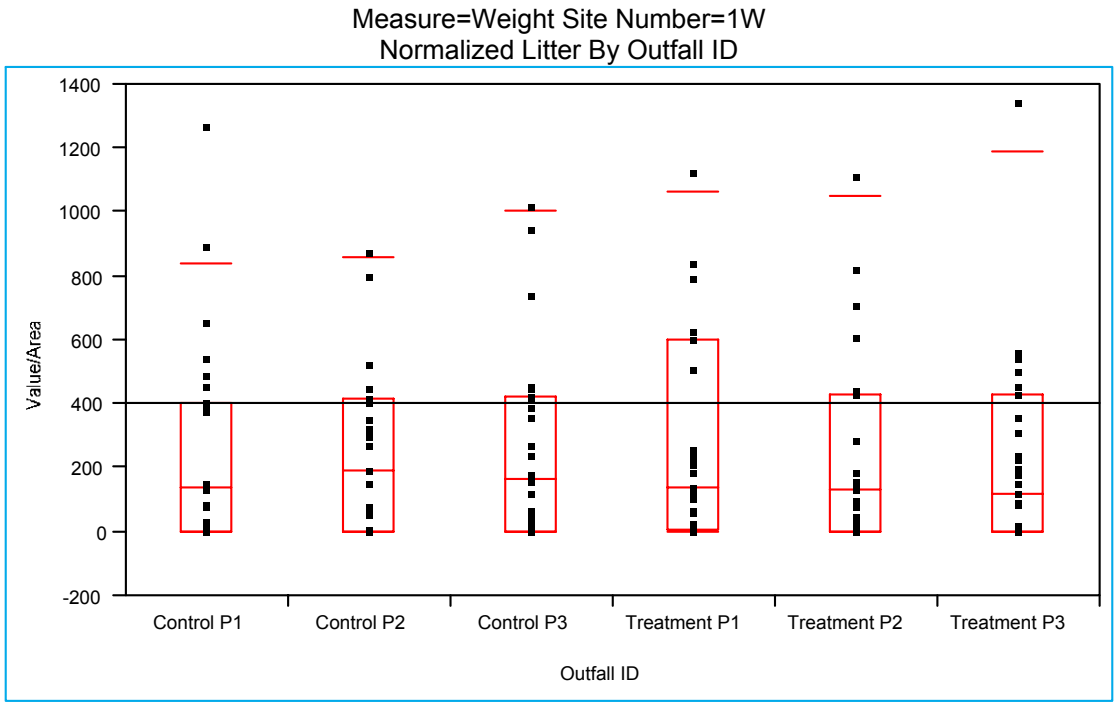

Moments	P1 Control, Outfall 1-52	P2 Control, Outfall 1-50	P3 Control, Outfall 1-51	P1 Treatment, Outfall 1-58	P2 Treatment, Outfall 1-59	P3 Treatment, Outfall 1-60
Mean	272.70	392.26	357.97	434.94	510.88	470.71
Std Dev	398.86	717.19	570.23	813.22	1435.79	1213.03
Std Error Mean	71.64	128.81	102.42	146.06	257.88	217.87
Upper 95% Mean	419.00	655.32	567.14	733.23	1037.53	915.65
Lower 95% Mean	126.40	129.19	148.81	136.65	-15.77	25.77
N	31	31	31	31	31	31
Sum	8,453.77	12,159.95	11,097.17	13,483.19	15,837.34	14,591.88
Variance	159,085.62	514,363.73	325,167.43	661,324.21	2,061,485.20	1,471,448.00
Skewness	2.20	3.11	2.68	3.36	4.79	4.50
Kurtosis	5.17	9.60	7.91	12.86	24.54	21.98
CV	146.26	182.84	159.30	186.97	281.04	257.71
Minimum	0.00	0.00	0.00	0.00	0.00	0.00
Maximum	1,691.20	3,051.70	2,574.00	4,005.90	7,848.20	6,514.10

Figure 12. Box plots and summary statistics of individual outfalls (outfall-level) for street sweeping (Site 1W) measured in dry weight (normalized by catchment area, g/acre)

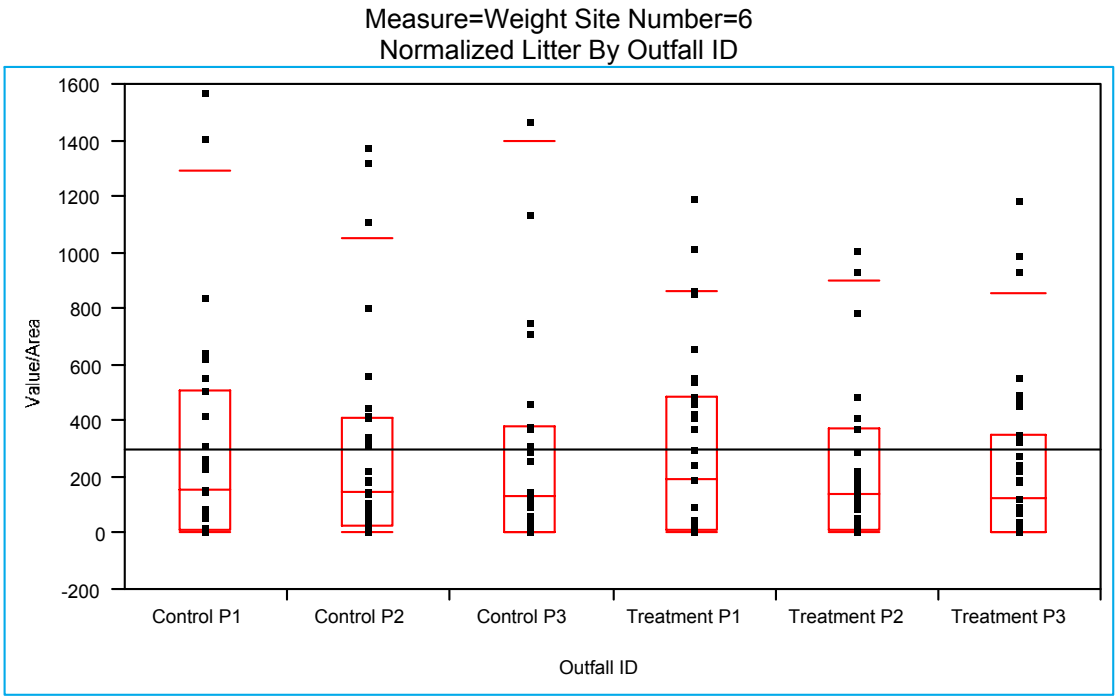

Moments	P1 Control, Outfall 6-20G	P2 Control, Outfall 6-20E	P3 Control, Outfall 6-20C	P1 Treatment, Outfall 6-20H	P2 Treatment, Outfall 6-20F	P3 Treatment, Outfall 6-20B
Mean	351.27	289.70	349.60	306.57	276.12	245.03
Std Dev	502.86	381.62	499.36	334.83	418.30	315.88
Std Error Mean	90.32	68.54	89.69	60.14	75.13	56.73
Upper 95% Mean	535.72	429.68	532.77	429.38	429.55	360.90
Lower 95% Mean	166.82	149.73	166.43	183.75	122.69	129.17
N	31	31	31	31	31	31
Sum	10,889.35	8,980.76	10,837.55	9,503.58	8,559.62	7,596.00
Variance	252,864.56	145,630.47	249,365.30	112,111.44	174,971.80	99,780.20
Skewness	2.11	1.85	1.83	1.10	2.82	1.67
Kurtosis	4.27	2.79	2.48	0.49	9.44	2.39
CV	143.15	131.73	142.84	109.22	151.49	128.91
Minimum	0.00	0.00	0.00	0.00	0.00	0.00
Maximum	2,042.70	1,380.00	1,779.00	1,193.70	2,008.10	1,190.10

Figure 13. Box plots and summary statistics of individual outfalls (outfall-level) for modified inlet grate (Site 6) measured in dry weight (normalized by catchment area, g/acre)

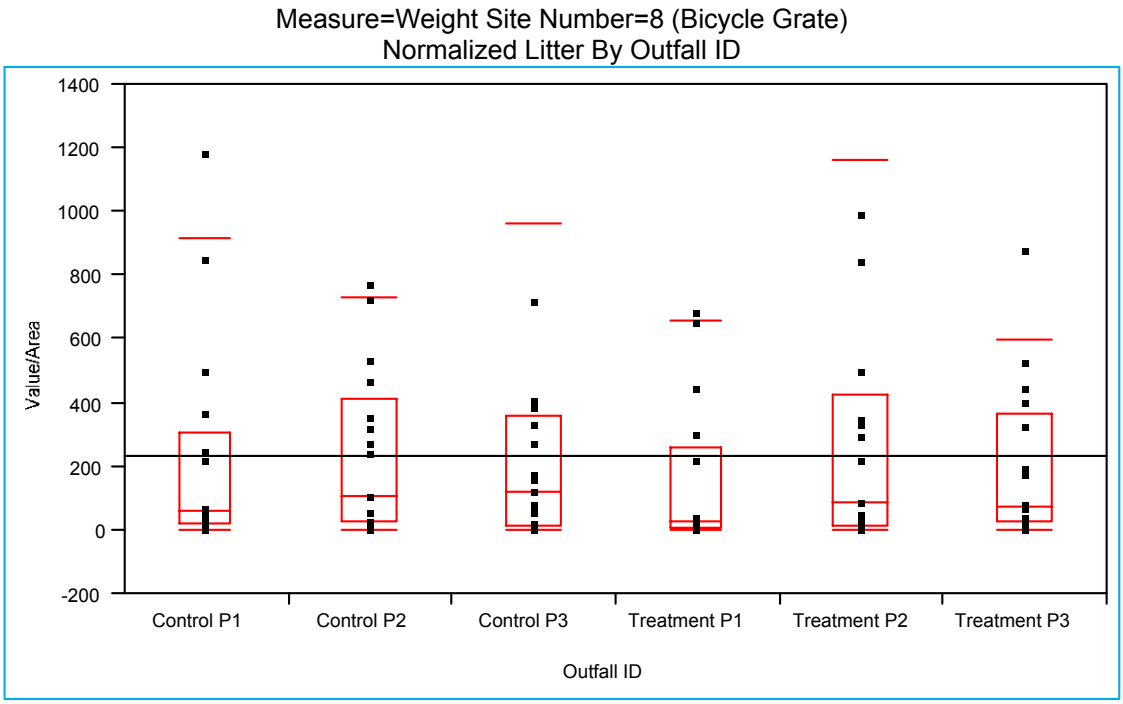

Moments	P1 Control, Outfall 8-23C	P2 Control, Outfall 8-24D	P3 Control, Outfall 8-24E	P1 Treatment, Outfall 8-B001	P2 Treatment, Outfall 8-24B	P3 Treatment, Outfall 8-24F
Mean	217.57	239.26	278.59	147.14	332.65	195.97
Std Dev	337.67	254.77	471.57	233.00	492.70	243.92
Std Error Mean	81.90	61.79	114.37	56.51	119.50	59.16
Upper 95% Mean	391.19	370.25	521.04	266.94	585.97	321.38
Lower 95% Mean	43.96	108.27	36.13	27.35	79.32	70.56
N	17	17	17	17	17	17
Sum	3,698.76	4,067.44	4,735.95	2,501.41	5,654.98	3,331.51
Variance	114,024.16	64,906.17	222,374.65	54,288.15	242,752.50	59,496.46
Skewness	2.04	0.98	3.08	1.62	2.18	1.64
Kurtosis	3.74	-0.14	10.62	1.36	5.10	2.58
CV	155.20	106.48	169.27	158.35	148.12	124.47
Minimum	0.00	0.00	0.00	0.00	0.00	0.00
Maximum	1,184.80	772.26	1,943.30	688.75	1,851.70	878.79

Figure 14. Box plots and summary statistics of individual outfalls (outfall-level) for bicycle grate (Site 8) measured in dry weight (normalized by catchment area, g/acre)

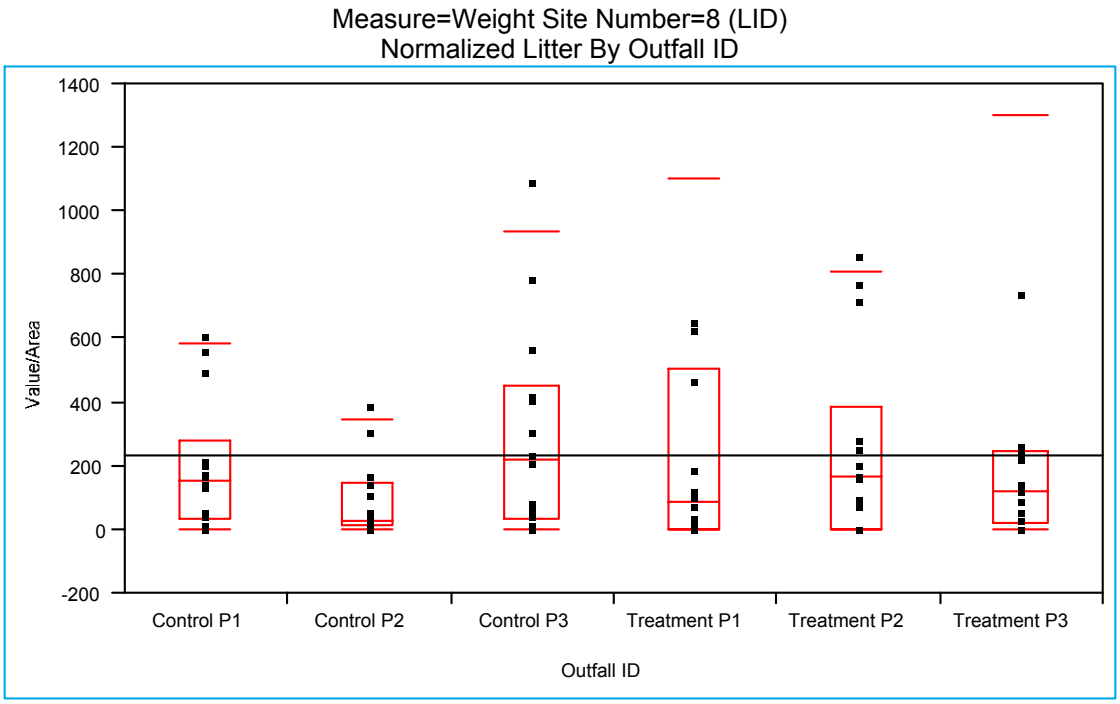

Moments	P1 Control, Outfall 8-23C	P2 Control, Outfall 8-24D	P3 Control, Outfall 8-24E	P1 Treatment, Outfall 8-B001	P2 Treatment, Outfall 8-24B	P3 Treatment, Outfall 8-24F
Mean	199.00	91.02	300.69	273.62	255.05	276.52
Std Dev	206.00	121.42	329.57	437.69	301.86	495.27
Std Error Mean	55.06	32.45	88.08	116.98	80.68	132.37
Upper 95% Mean	317.94	161.12	490.98	526.33	429.34	562.48
Lower 95% Mean	80.06	20.91	110.40	20.91	80.76	-9.44
N	14	14	14	14	14	14
Sum	2,786.05	1,274.26	4,209.71	3,830.67	3,570.69	3,871.30
Variance	42,435.93	14,742.65	108,617.56	191,568.63	91,119.53	245,293.71
Skewness	1.12	1.64	1.28	2.26	1.23	2.96
Kurtosis	0.05	1.90	1.22	5.58	0.11	9.31
CV	103.52	133.40	109.60	159.96	118.35	179.11
Minimum	0.00	0.00	0.00	0.00	0.00	0.00
Maximum	607.52	386.26	1,092.70	1,561.80	857.29	1,866.70

Figure 15. Box plots and summary statistics of individual outfalls (outfall-level) for LID (Site 8) measured in dry weight (normalized by catchment area, g/acre)

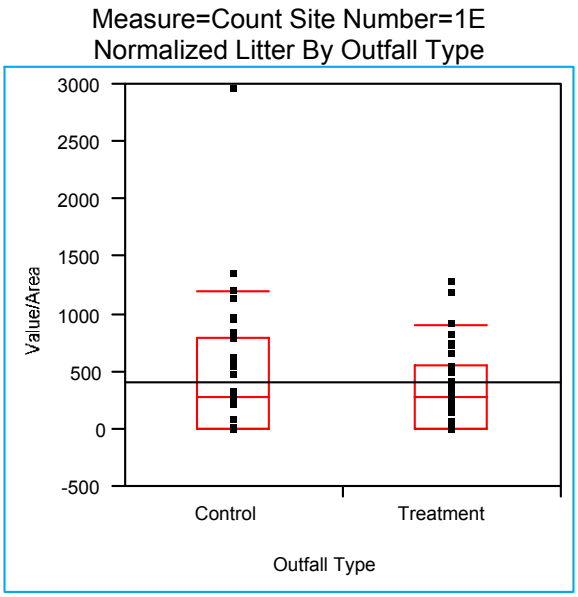

Moments	Control	Treatment
Mean	484.01	346.84
Std Dev	622.20	373.56
Std Error Mean	111.75	67.09
Upper 95% Mean	712.23	483.86
Lower 95% Mean	255.78	209.82
N	31	31
Sum	15,004.24	10,752.00
Variance	387,133.76	139,548.28
Skewness	2.32	1.05
Kurtosis	7.49	0.39
CV	128.55	107.70
Minimum	0.00	0.00
Maximum	2,966.10	1,300.80

Figure 16. Box plots and summary statistics of combined outfalls (site-level) for manual litter pick-up (Site 1E) measured in count (normalized by catchment area, item/acre)

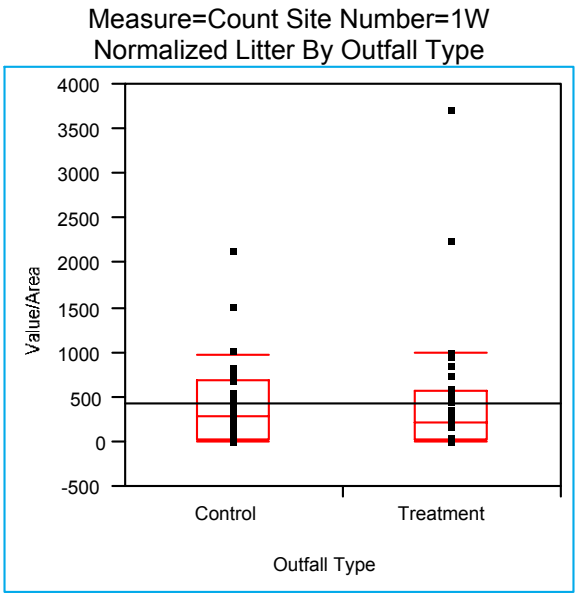

Moments	Control	Treatment
Mean	406.45	466.27
Std Dev	489.70	760.55
Std Error Mean	87.95	136.60
Upper 95% Mean	586.07	745.24
Lower 95% Mean	226.83	187.30
N	31	31
Sum	12,600.00	14,454.46
Variance	239,808.06	578,440.34
Skewness	1.93	3.20
Kurtosis	4.55	11.70
CV	120.48	163.11
Minimum	0.00	0.00
Maximum	2,143.50	3,722.80

Figure 17. Box plots and summary statistics of combined outfalls (site-level) for street sweeping (Site 1W) measured in count (normalized by catchment area, item/acre)

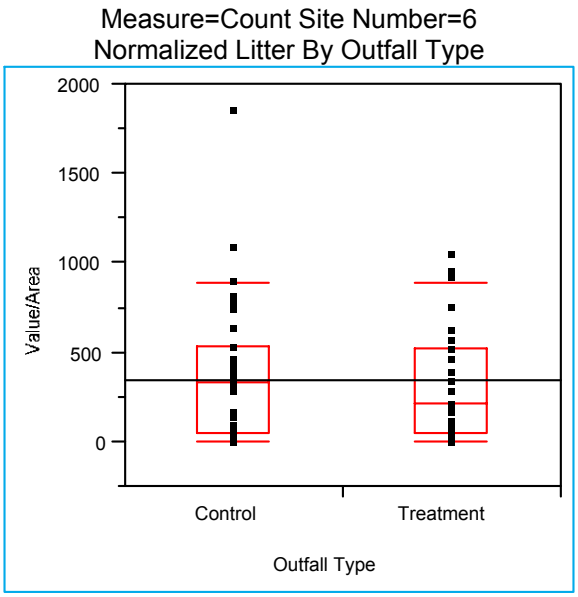

Moments	Control	Treatment
Mean	383.42	320.01
Std Dev	410.75	308.50
Std Error Mean	73.77	55.41
Upper 95% Mean	534.08	433.17
Lower 95% Mean	232.75	206.85
N	31	31
Sum	11,885.93	9,920.27
Variance	168,715.38	95,172.68
Skewness	1.75	0.94
Kurtosis	4.33	0.08
CV	107.13	96.40
Minimum	0.00	0.00
Maximum	1,860.00	1,062.80

Figure 18. Box plots and summary statistics of combined outfalls (site-level) for modified inlet grate (Site 6) measured in count (normalized by catchment area, item/acre)

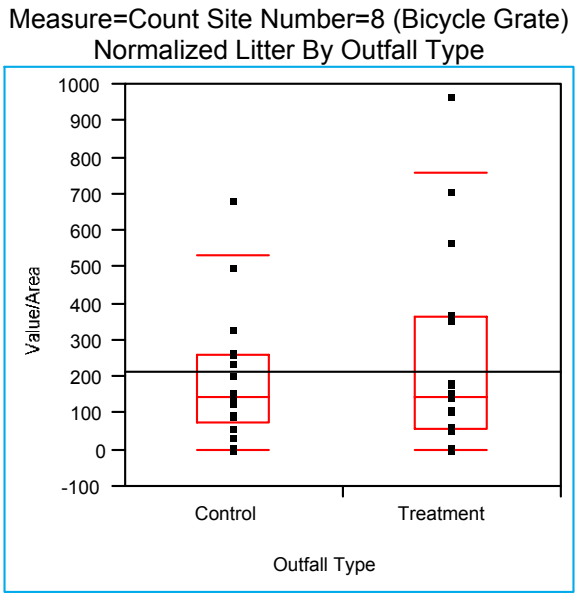

Moments	Control	Treatment
Mean	194.28	239.14
Std Dev	180.00	275.08
Std Error Mean	43.66	66.72
Upper 95% Mean	286.83	380.58
Lower 95% Mean	101.73	97.71
N	17	17
Sum	3,302.75	4,065.45
Variance	32,400.87	75,669.61
Skewness	1.53	1.59
Kurtosis	2.51	2.00
CV	92.65	115.03
Minimum	0.00	0.00
Maximum	685.71	967.27

Figure 19. Box plots and summary statistics of combined outfalls (site-level) for bicycle grate (Site 8) measured in count (normalized by catchment area, item/acre)

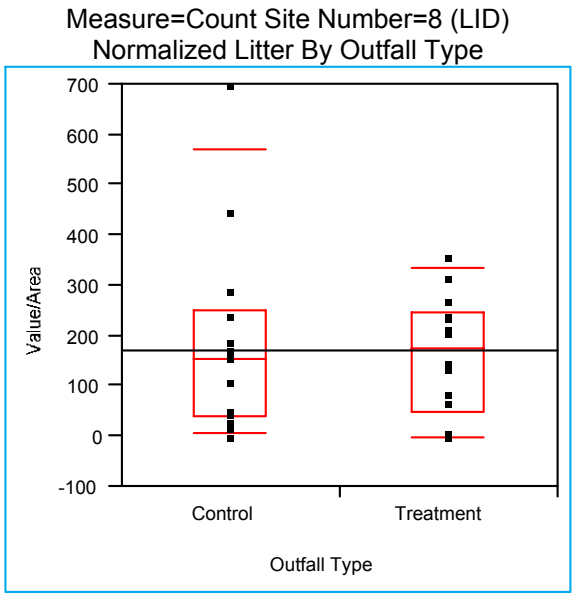

Moments	Control	Treatment
Mean	185.28	162.35
Std Dev	191.63	118.09
Std Error Mean	51.22	31.56
Upper 95% Mean	295.93	230.53
Lower 95% Mean	74.64	94.16
N	14	14
Sum	2,593.96	2,272.85
Variance	36,723.09	13,944.72
Skewness	1.69	-0.03
Kurtosis	3.11	-1.16
CV	103.43	72.74
Minimum	0.00	0.00
Maximum	696.70	356.95

Figure 20. Box plots and summary statistics of combined outfalls (site-level) for LID (Site 8) measured in count (normalized by catchment area, item/acre)

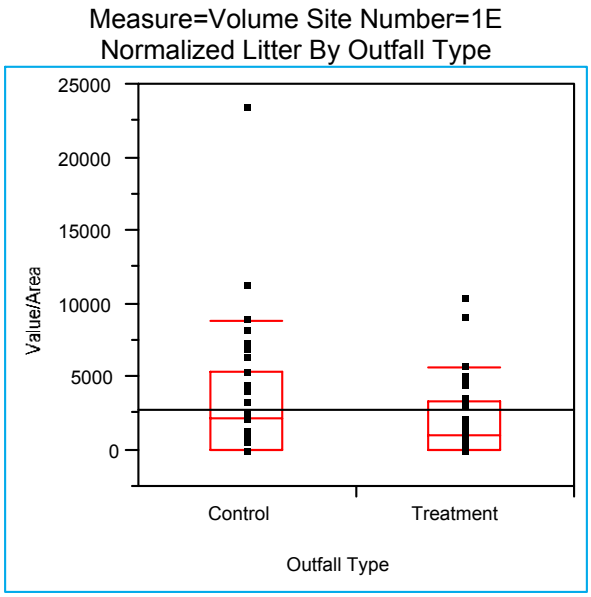

Moments	Control	Treatment
Mean	3,503.86	2,099.16
Std Dev	4,900.10	2,704.92
Std Error Mean	880.08	485.82
Upper 95% Mean	5,301.21	3,091.33
Lower 95% Mean	1,706.50	1,107.00
N	31	31
Sum	108,619.50	65,074.09
Variance	24,010,948.00	7,316,611.90
Skewness	2.54	1.70
Kurtosis	8.56	2.73
CV	139.85	128.86
Minimum	0.00	0.00
Maximum	23,530.00	10,444.00

Figure 21. Box plots and summary statistics of combined outfalls (site-level) for manual litter pick-up (Site 1E) measured in volume (normalized by catchment area, ml/acre)

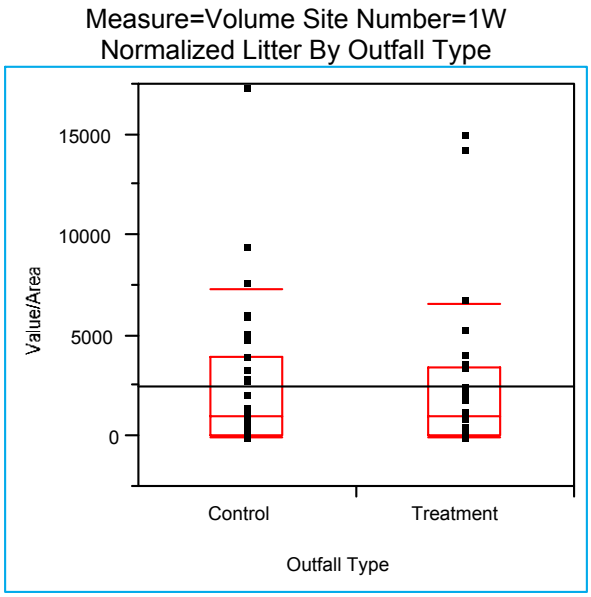

Moments	Control	Treatment
Mean	2,607.32	2,381.55
Std Dev	3,739.08	3,703.04
Std Error Mean	671.56	665.09
Upper 95% Mean	3,978.81	3,739.83
Lower 95% Mean	1,235.82	1,023.27
N	31	31
Sum	80,826.79	73,828.03
Variance	13,980,751.00	13,712,521.00
Skewness	2.44	2.56
Kurtosis	7.38	6.66
CV	143.41	155.49
Minimum	0.00	0.00
Maximum	17,379.00	15,010.00

Figure 22. Box plots and summary statistics of combined outfalls (site-level) for street sweeping (Site 1W) measured in volume (normalized by catchment area, ml/acre)

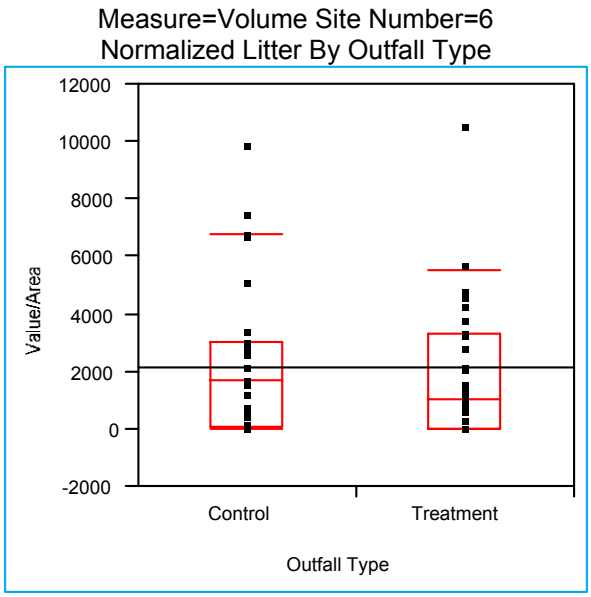

Moments	Control	Treatment
Mean	2,252.39	2,019.65
Std Dev	2,544.49	2,421.27
Std Error Mean	457.00	434.87
Upper 95% Mean	3,185.71	2,907.77
Lower 95% Mean	1,319.07	1,131.53
N	31	31
Sum	69,824.09	62,609.13
Variance	6,474,436.80	5,862,542.20
Skewness	1.47	1.75
Kurtosis	1.78	3.77
CV	112.97	119.89
Minimum	0.00	0.00
Maximum	9,870.90	10,554.00

Figure 23. Box plots and summary statistics of combined outfalls (site-level) for modified inlet grate (Site 6) measured in volume (normalized by catchment area, ml/acre)

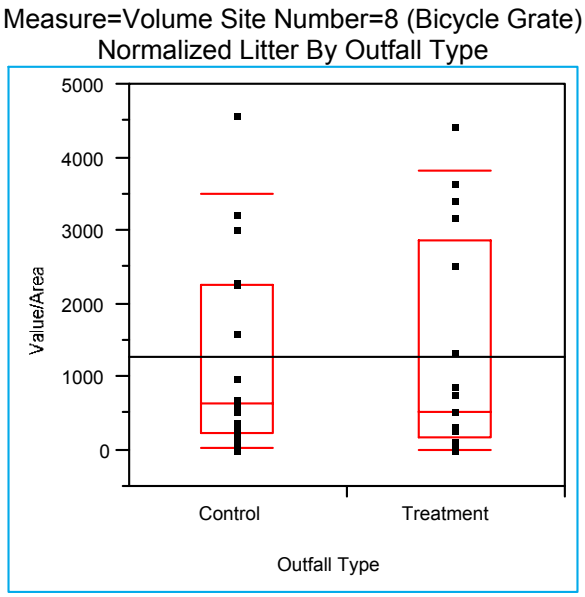

Moments	Control	Treatment
Mean	1,264.56	1,302.29
Std Dev	1,348.35	1,510.81
Std Error Mean	327.02	366.43
Upper 95% Mean	1,957.82	2,079.07
Lower 95% Mean	571.31	525.50
N	17	17
Sum	21,497.56	22,138.89
Variance	1,818,052.20	2,282,552.30
Skewness	1.24	1.02
Kurtosis	0.72	-0.53
CV	106.63	116.01
Minimum	0.00	0.00
Maximum	4,591.80	4,440.80

Figure 24. Box plots and summary statistics of combined outfalls (site-level) for bicycle grate (Site 8) measured in volume (normalized by catchment area, ml/acre)

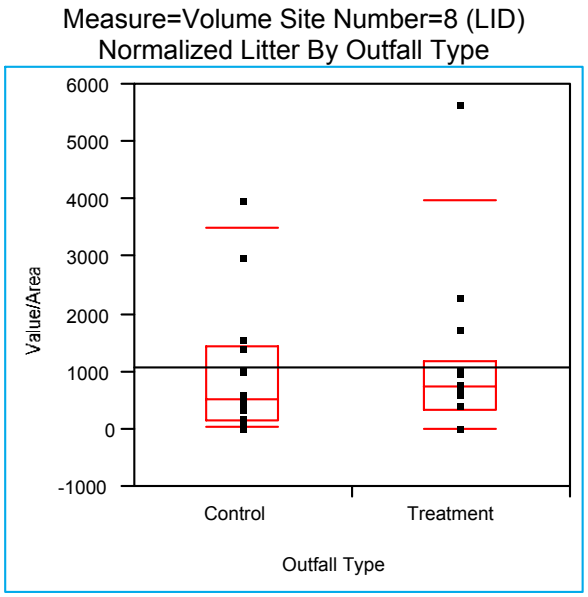

Moments	Control	Treatment
Mean	1,024.73	1,140.28
Std Dev	1,175.31	1,451.83
Std Error Mean	314.11	388.02
Upper 95% Mean	1,703.33	1,978.54
Lower 95% Mean	346.12	302.02
N	14	14
Sum	14,346.15	15,963.91
Variance	1,381,343.30	2,107,809.00
Skewness	1.69	2.62
Kurtosis	2.43	7.88
CV	114.70	127.32
Minimum	0.00	0.00
Maximum	4,002.70	5,662.30

Figure 25. Box plots and summary statistics of combined outfalls (site-level) for LID (Site 8) measured in volume (normalized by catchment area, ml/acre)

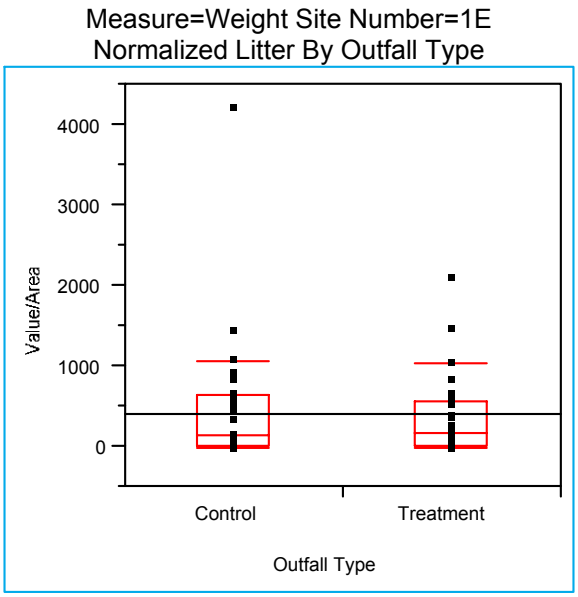

Moments	Control	Treatment
Mean	469.08	350.91
Std Dev	801.83	492.99
Std Error Mean	144.01	88.54
Upper 95% Mean	763.19	531.74
Lower 95% Mean	174.96	170.09
N	31	31
Sum	14,541.38	10,878.34
Variance	642,933.22	243,040.22
Skewness	3.65	2.09
Kurtosis	16.31	4.88
CV	170.94	140.49
Minimum	0.00	0.00
Maximum	4,217.40	2,111.30

Figure 26. Box plots and summary statistics of combined outfalls (site-level) for manual litter pick-up (Site 1E) measured in dry weight (normalized by catchment area, g/acre)

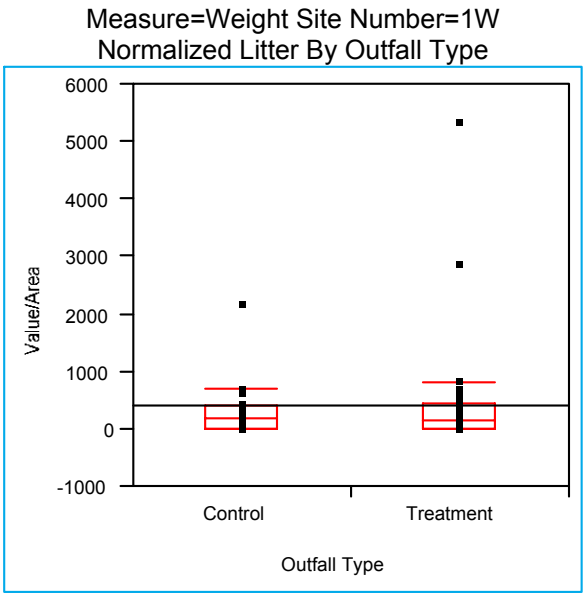

Moments	Control	Treatment
Mean	339.46	470.33
Std Dev	537.57	1,055.41
Std Error Mean	96.55	189.56
Upper 95% Mean	536.64	857.46
Lower 95% Mean	142.28	83.21
N	31	31
Sum	10,523.34	14,580.33
Variance	288,979.08	1,113,885.50
Skewness	2.80	3.95
Kurtosis	8.04	16.70
CV	158.36	224.40
Minimum	0.00	0.00
Maximum	2,194.30	5,368.90

Figure 27. Box plots and summary statistics of combined outfalls (site-level) for street sweeping (Site 1W) measured in dry weight (normalized by catchment area, g/acre)

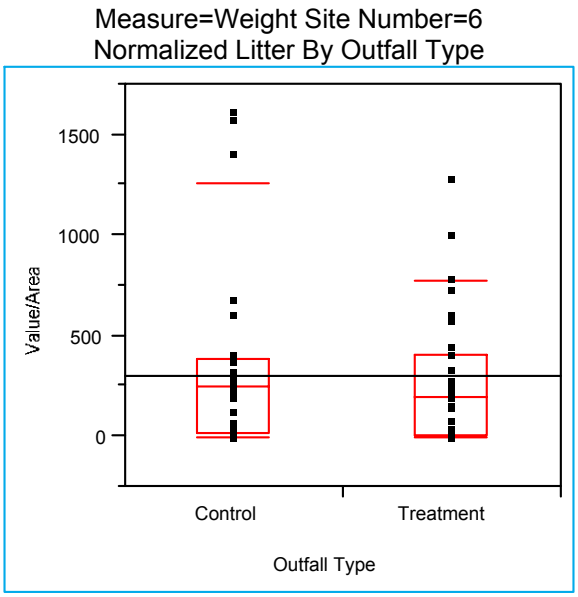

Moments	Control	Treatment
Mean	331.60	280.46
Std Dev	440.21	323.93
Std Error Mean	79.06	58.18
Upper 95% Mean	493.06	399.28
Lower 95% Mean	170.13	161.65
N	31	31
Sum	10,279.45	8,694.36
Variance	193,781.92	104,931.07
Skewness	2.08	1.52
Kurtosis	3.85	2.11
CV	132.75	115.50
Minimum	0.00	0.00
Maximum	1,619.60	1,281.50

Figure 28. Box plots and summary statistics of combined outfalls (site-level) for modified inlet grate (Site 6) measured in dry weight (normalized by catchment area, g/acre)

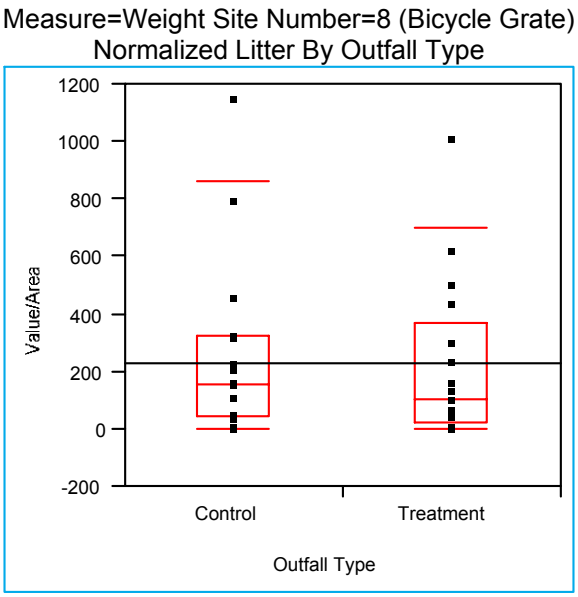

Moments	Control	Treatment
Mean	244.41	221.29
Std Dev	311.33	279.21
Std Error Mean	75.51	67.72
Upper 95% Mean	404.48	364.85
Lower 95% Mean	84.33	77.74
N	17	17
Sum	4,154.89	3,761.95
Variance	96,929.03	77,957.62
Skewness	2.02	1.74
Kurtosis	4.09	2.95
CV	127.38	126.17
Minimum	0.00	0.00
Maximum	1,155.30	1,013.60

Figure 29. Box plots and summary statistics of combined outfalls (site-level) for bicycle grate (Site 8) measured in dry weight (normalized by catchment area, g/acre)

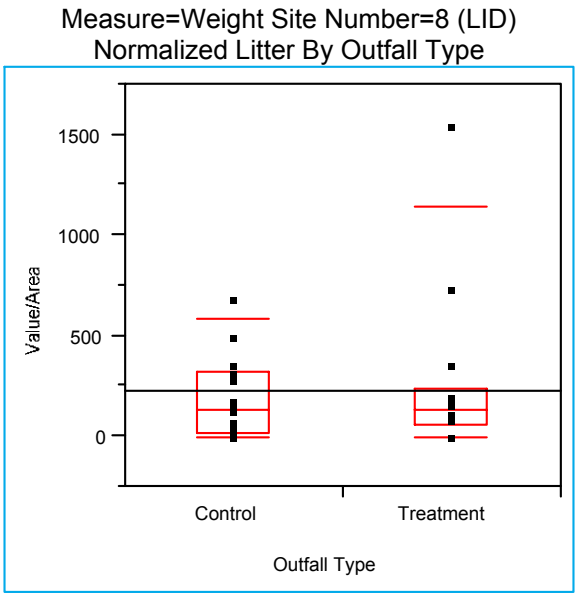

Moments	Control	Treatment
Mean	194.62	270.20
Std Dev	206.83	413.85
Std Error Mean	55.28	110.61
Upper 95% Mean	314.05	509.15
Lower 95% Mean	75.20	31.25
N	14	14
Sum	2,724.74	3,782.84
Variance	42,780.24	171,271.16
Skewness	1.21	2.68
Kurtosis	1.00	7.62
CV	106.27	153.16
Minimum	0.00	0.00
Maximum	686.76	1,549.60

Figure 30. Box plots and summary statistics of combined outfalls (site-level) for LID (Site 8) measured in dry weight (normalized by catchment area, g/acre)

Statistical test results of the marginal analysis, raw data at outfall-level (normalized by catchment area)

Mean normalized litter for control and treatment datasets:

		Count (items/acre)		Volume (ml/acre)		Weight (g/acre)	
Site	**BMP**	**Control**	**Treatment**	**Control**	**Treatment**	**Control**	**Treatment**
1E	Manual litter pick-up	489	340	3548	2054	470	343
1W	Street sweepers	408	470	2616	2388	341	472
6	Modified inlet grate	380	312	2249	1982	330	276
8	Bicycle grate (98/99)	195	243	1268	1297	245	225
8	LID (99/00)	188	170	1039	1236	197	268
1E	Manual litter pick-up (w/o Outfall 1-46)	489	420	3548	2541	470	428
8	LID (99/00) (w/o Outfall 8-24D)	238	170	1354	1236	250	268

A p-value > 0.05 indicates that the data sets are normally distributed based on the Shapiro-Wilk Normality Test at 5% significance level.

		Count		Volume		Weight	
Site	**BMP**	**Control**	**Treatment**	**Control**	**Treatment**	**Control**	**Treatment**
1E	Manual litter pick-up	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
1W	Street sweepers	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
6	Modified inlet grate	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
8	Bicycle grate (98/99)	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
8	LID (99/00)	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
1E	Manual litter pick-up (w/o Outfall 1-46)	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
8	LID (99/00) (w/o Outfall 8-24D)	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05

Results of hypothesis testing (p-values)*:
A p-value <0.05 indicates that the null hypothesis can be rejected, i.e., the average litter amount in control is greater than treatment.

Site	BMP	Count	Volume	Weight
1E	Manual litter pick-up	>0.05	>0.05	>0.05
1W	Street sweepers	>0.05	>0.05	>0.05
6	Modified inlet grate	>0.05	>0.05	>0.05
8	Bicycle grate (98/99)	>0.05	>0.05	>0.05
8	LID (99/00)	>0.05	>0.05	>0.05
1E	Manual litter pick-up (w/o Outfall 1-46)	>0.05	>0.05	>0.05
8	LID (99/00) (w/o Outfall 8-24D)	>0.05	>0.05	>0.05

*Based on the results of the normality test, data are not normally distributed in one or both datasets, and the Wilcoxon Rank-Sum Test (at 5% significance level) was used.

Statistical test results of the marginal analysis, raw data at site-level (normalized by catchment area)

Mean normalized litter for control and treatment datasets:

		Count (items/acre)		Volume (ml/acre)		Weight (g/acre)	
Site	**BMP**	**Control**	**Treatment**	**Control**	**Treatment**	**Control**	**Treatment**
1E	Manual litter pick-up	484	347	3504	2099	469	351
1W	Street sweepers	406	466	2607	2382	339	470
6	Modified inlet grate	383	320	2252	2020	332	280
8	Bicycle grate (98/99)	194	239	1265	1302	244	221
8	LID (99/00)	185	162	1025	1140	195	270
1E	Manual litter pick-up (w/o Outfall 1-46)	484	420	3504	2544	469	429
8	LID (99/00) (w/o Outfall 8-24D)	236	162	1343	1140	248	270

A p-value > 0.05 indicates that the data sets are normally distributed based on the Shapiro-Wilk Normality Test at 5% significance level.

		Count		Volume		Weight	
Site	**BMP**	**Control**	**Treatment**	**Control**	**Treatment**	**Control**	**Treatment**
1E	Manual litter pick-up	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
1W	Street sweepers	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
6	Modified inlet grate	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
8	Bicycle grate (98/99)	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
8	LID (99/00)	<0.05	>0.05	<0.05	<0.05	<0.05	<0.05
1E	Manual litter pick-up (w/o Outfall 1-46)	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
8	LID (99/00) (w/o Outfall 8-24D)	<0.05	>0.05	<0.05	<0.05	<0.05	<0.05

Results of hypothesis testing (p-values)*:
A p-value <0.05 indicates that the null hypothesis can be rejected, i.e., the average litter amount in control is greater than treatment

Site	BMP	Count	Volume	Weight
1E	Manual litter pick-up	>0.05	>0.05	>0.05
1W	Street sweepers	>0.05	>0.05	>0.05
6	Modified inlet grate	>0.05	>0.05	>0.05
8	Bicycle grate (98/99)	>0.05	>0.05	>0.05
8	LID (99/00)	>0.05	>0.05	>0.05
1E	Manual litter pick-up (w/o Outfall 1-46)	>0.05	>0.05	>0.05
8	LID (99/00) (w/o Outfall 8-24D)	>0.05	>0.05	>0.05

*Based on the results of the normality test, data are not normally distributed in one or both datasets, and the Wilcoxon Rank-Sum Test (at 5% significance level) was used.

Statistical test results of the marginal analysis, log-transformed data at outfall-level (normalized by catchment area)

Mean normalized log-transformed litter for control and treatment datasets:

		Count (items/acre)		Volume (ml/acre)		Weight (g/acre)	
Site	**BMP**	**Control**	**Treatment**	**Control**	**Treatment**	**Control**	**Treatment**
1E	Manual litter pick-up	4.30	3.95	5.54	5.02	3.94	3.66
1W	Street sweepers	4.31	4.31	5.51	5.43	3.93	3.91
6	Modified inlet grate	4.63	4.51	6.04	5.83	4.29	4.13
8	Bicycle grate (98/99)	4.48	4.25	5.91	5.42	4.23	3.88
8	LID (99/00)	4.17	3.93	5.48	5.24	4.04	3.93
1E	Manual litter pick-up (w/o Outfall 1-46)	4.30	4.29	5.54	5.44	3.94	3.97
8	LID (99/00) (w/o Outfall 8-24D)	4.48	3.93	5.90	5.24	4.41	3.93

A p-value > 0.05 indicates that the data sets are lognormally distributed based on the Shapiro-Wilk Normality Test at 5% significance level.

		Count		Volume		Weight	
Site	**BMP**	**Control**	**Treatment**	**Control**	**Treatment**	**Control**	**Treatment**
1E	Manual litter pick-up	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
1W	Street sweepers	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
6	Modified inlet grate	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
8	Bicycle grate (98/99)	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
8	LID (99/00)	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
1E	Manual litter pick-up (w/o Outfall 1-46)	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
8	LID (99/00) (w/o Outfall 8-24D)	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05

Results of hypothesis testing (p-values)*:
A p-value <0.05 indicates that the null hypothesis can be rejected, i.e., the average litter amount in control is greater than treatment.

Site	BMP	Count	Volume	Weight
1E	Manual litter pick-up	>0.05	>0.05	>0.05
1W	Street sweepers	>0.05	>0.05	>0.05
6	Modified inlet grate	>0.05	>0.05	>0.05
8	Bicycle grate (98/99)	>0.05	>0.05	>0.05
8	LID (99/00)	>0.05	>0.05	>0.05
1E	Manual litter pick-up (w/o Outfall 1-46)	>0.05	>0.05	>0.05
8	LID (99/00) (w/o Outfall 8-24D)	>0.05	>0.05	>0.05

*Based on the results of the normality test, data are not lognormally distributed in one or both datasets, and the Wilcoxon Rank-Sum Test (at 5% significance level) was used.

Statistical test results of the marginal analysis, log-transformed data at site-level (normalized by catchment area)

Mean normalized log-transformed litter for control and treatment datasets:

		Count (items/acre)		Volume (ml/acre)		Weight (g/acre)	
Site	**BMP**	**Control**	**Treatment**	**Control**	**Treatment**	**Control**	**Treatment**
1E	Manual litter pick-up	4.46	4.31	5.81	5.54	4.13	3.95
1W	Street sweepers	4.51	4.53	5.82	5.81	4.12	4.16
6	Modified inlet grate	4.83	4.75	6.34	6.14	4.51	4.37
8	Bicycle grate (98/99)	4.62	4.48	6.24	5.84	4.50	4.24
8	LID (99/00)	4.50	4.25	5.99	5.69	4.33	4.28
1E	Manual litter pick-up (w/o Outfall 1-46)	4.46	4.47	5.81	5.70	4.13	4.11
8	LID (99/00) (w/o Outfall 8-24D)	4.71	4.25	6.24	5.69	4.57	4.28

A p-value > 0.05 indicates that the data sets are lognormally distributed based on the Shapiro-Wilk Normality Test at 5% significance level.

		Count		Volume		Weight	
Site	**BMP**	**Control**	**Treatment**	**Control**	**Treatment**	**Control**	**Treatment**
1E	Manual litter pick-up	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
1W	Street sweepers	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
6	Modified inlet grate	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
8	Bicycle grate (98/99)	<0.05	<0.05	<0.05	<0.05	>0.05	>0.05
8	LID (99/00)	<0.05	<0.05	<0.05	<0.05	>0.05	<0.05
1E	Manual litter pick-up (w/o Outfall 1-46)	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
8	LID (99/00) (w/o Outfall 8-24D)	<0.05	<0.05	<0.05	<0.05	>0.05	<0.05

Results of hypothesis testing (p-values)*:
A p-value <0.05 indicates that the null hypothesis can be rejected, i.e., the average litter amount in control is greater than treatment.

Site	BMP	Count	Volume	Weight
1E	Manual litter pick-up	>0.05	>0.05	>0.05
1W	Street sweepers	>0.05	>0.05	>0.05
6	Modified inlet grate	>0.05	>0.05	>0.05
8	Bicycle grate (98/99)	>0.05	>0.05	>0.05**
8	LID (99/00)	>0.05	>0.05	>0.05
1E	Manual litter pick-up (w/o Outfall 1-46)	>0.05	>0.05	>0.05
8	LID (99/00) (w/o Outfall 8-24D)	>0.05	>0.05	>0.05

*Based on the results of the normality test, data are not lognormally distributed in one or both datasets, and the Wilcoxon Rank-Sum Test (at 5% significance level) was used (except as noted).
**Data are lognormally distributed, one-sample t-test (at 5% significance level) was used.

Statistical test results of the paired analysis, using actual difference (*Act diff*) at outfall-level (normalized by catchment area)

Mean actual difference, *Act Diff*, between normalized litter of control and treatment:

Site	BMP	Count (items/acre)	Volume (ml/acre)	Weight (g/acre)
1E	Manual litter pick-up	150	1494	127
1W	Street sweepers	-62	228	-131
6	Modified inlet grate	68	267	54
8	Bicycle grate (98/99)	-48	-29	20
8	LID (99/00)	18	-198	-71
1E	Manual litter pick-up (w/o Outfall 1-46)	47	927	50
8	LID (99/00) (w/o Outfall 8-24D)	81	48	-25

A p-value > 0.05 indicates that the actual difference, *Act diff*, is normally distributed based on the Shapiro-Wilk Normality Test at 5% significance level.

Site	BMP	Count	Volume	Weight
1E	Manual litter pick-up	0.000	0.000	0.000
1W	Street sweepers	0.000	0.000	0.000
6	Modified inlet grate	0.000	0.000	0.000
8	Bicycle grate (98/99)	0.000	0.003	0.000
8	LID (99/00)	0.000	0.000	0.000
1E	Manual litter pick-up (w/o Outfall 1-46)	0.000	0.000	0.000
8	LID (99/00) (w/o Outfall 8-24D)	0.001	0.002	0.000

Results of hypothesis testing (p-values)*:
A p-value <0.05 indicates that the null hypothesis (*Act diff* = 0) can be rejected, i.e., the average litter amount in control greater than treatment.

Site	BMP	Count	Volume	Weight
1E	Manual litter pick-up	0.000	0.000	0.012
1W	Street sweepers	0.351	0.109	0.643
6	Modified inlet grate	0.001	0.022	0.017
8	Bicycle grate (98/99)	0.918	0.273	0.297
8	LID (99/00)	0.512	0.746	0.815
1E	Manual litter pick-up (w/o Outfall 1-46)	0.179	0.018	0.578
8	LID (99/00) (w/o Outfall 8-24D)	0.041	0.343	0.314

*Based on the results of the normality test, data are not normally distributed, and the Wilcoxon Signed-Rank Test (at 5% significance level) was used.

Statistical test results of the paired analysis, using actual difference (*Act diff*) at site-level (normalized by catchment area)

Mean actual difference, *Act Diff*, between normalized litter of control and treatment:

Site	BMP	Count (items/acre)	Volume (ml/acre)	Weight (g/acre)
1E	Manual litter pick-up	137	1405	118
1W	Street sweepers	-60	226	-131
6	Modified inlet grate	63	233	51
8	Bicycle grate (98/99)	-45	-38	23
8	LID (99/00)	23	-116	-76
1E	Manual litter pick-up (w/o Outfall 1-46)	64	960	40
8	LID (99/00) (w/o Outfall 8-24D)	73	203	-22

A p-value > 0.05 indicates that the actual difference, *Act diff*, is normally distributed based on the Shapiro-Wilk Normality Test at 5% significance level.

Site	BMP	Count	Volume	Weight
1E	Manual litter pick-up	0.000	0.000	0.000
1W	Street sweepers	0.000	0.000	0.000
6	Modified inlet grate	0.001	0.007	0.001
8	Bicycle grate (98/99)	0.021	0.091	0.069
8	LID (99/00)	0.000	0.085	0.000
1E	Manual litter pick-up (w/o Outfall 1-46)	0.000	0.000	0.000
8	LID (99/00) (w/o Outfall 8-24D)	0.000	0.064	0.002

Results of hypothesis testing (p-values)*:
A p-value <0.05 indicates that the null hypothesis (Act diff = 0) can be rejected, i.e., the average litter amount in control greater than treatment.

Site	BMP	Count	Volume	Weight
1E	Manual litter pick-up	0.003	0.000	0.046
1W	Street sweepers	0.463	0.256	0.774
6	Modified inlet grate	0.028	0.045	0.064
8	Bicycle grate (98/99)	0.912	0.626**	0.133**
8	LID (99/00)	0.682	0.604**	0.773
1E	Manual litter pick-up (w/o Outfall 1-46)	0.125	0.011	0.526
8	LID (99/00) (w/o Outfall 8-24D)	0.040	0.338**	0.446

Least significant value (LSV) of t-Test***

Site	BMP	Count	Volume	Weight
1E	Manual litter pick-up	--	--	--
1W	Street sweepers	--	--	--
6	Modified inlet grate	--	--	--
8	Bicycle grate (98/99)	--	202	35
8	LID(99/00)	--	759	--
1E	Manual litter pick-up (w/o Outfall 1-46)	--	--	--
8	LID (99/00) (w/o Outfall 8-24D)	--	842	--

Statistical test results of the paired analysis, using percentage difference *(% diff)* at outfall-level (normalized by catchment area)

Mean percentage difference, *% diff*, between normalized litter of control and treatment:

Site	BMP	Count (%)	Volume (%)	Weight (%)
1E	Manual litter pick-up	-14	26	-74
1W	Street sweepers	-15	-1	-30
6	Modified inlet grate	-27	-24	-37
8	Bicycle grate (98/99)	-22	-9	-12
8	LID (99/00)	-39	-123	-138
1E	Manual litter pick-up (w/o Outfall 1-46)	-53	8	-134
8	LID (99/00) (w/o Outfall 8-24D)	13	-50	-32

A p-value > 0.05 indicates that the percentage difference, *% diff*, is normally distributed based on the Shapiro-Wilk Normality Test at 5% significance level.

Site	BMP	Count	Volume	Weight
1E	Manual litter pick-up	0.000	0.000	0.000
1W	Street sweepers	0.000	0.000	0.000
6	Modified inlet grate	0.000	0.000	0.000
8	Bicycle grate (98/99)	0.000	0.000	0.000
8	LID (99/00)	0.000	0.000	0.000
1E	Manual litter pick-up (w/o Outfall 1-46)	0.000	0.000	0.000
8	LID (99/00) (w/o Outfall 8-24D)	0.004	0.000	0.000

Results of hypothesis testing (p-values)*:

A p-value <0.05 indicates that the null hypothesis (% diff = 0) can be rejected, i.e., the average litter amount in control is greater than treatment.

Site	BMP	Count	Volume	Weight
1E	Manual litter pick-up	0.001	0.000	0.012
1W	Street sweepers	0.351	0.109	0.643
6	Modified inlet grate	0.001	0.022	0.017
8	Bicycle grate (98/99)	0.918	0.273	0.297
8	LID (99/00)	0.512	0.746	0.815
1E	Manual litter pick-up (w/o Outfall 1-46)	0.179	0.018	0.578
8	LID (99/00) (w/o Outfall 8-24D)	0.041	0.343	0.314

*Based on the results of the normality test, data are not normally distributed, and the Wilcoxon Signed-Rank Test (at 5% significance level) was used.

Statistical test results of the paired analysis, using percentage difference (*% diff*) at site-level (normalized by catchment area)

Mean percentage difference, *% diff*, between normalized litter of control and treatment:

Site	BMP	Count (%)	Volume (%)	Weight (%)
1E	Manual litter pick-up	-91	36	-239
1W	Street sweepers	-7	7	-8
6	Modified inlet grate	-16	-8	-22
8	Bicycle grate (98/99)	-15	4	-4
8	LID (99/00)	-21	-121	-175
1E	Manual litter pick-up (w/o Outfall 1-46)	-159	23	-368
8	LID (99/00) (w/o Outfall 8-24D)	4	-62	-99

A p-value > 0.05 indicates the percentage difference, *% diff*, is normally distributed based on the Shapiro-Wilk Normality Test at 5% significance level.

Site	BMP	Count	Volume	Weight
1E	Manual litter pick-up	0.000	0.593	0.000
1W	Street sweepers	0.016	0.330	0.294
6	Modified inlet grate	0.000	0.000	0.000
8	Bicycle grate (98/99)	0.183	0.341	0.104
8	LID (99/00)	0.001	0.000	0.000
1E	Manual litter pick-up (w/o Outfall 1-46)	0.000	0.217	0.000
8	LID (99/00) (w/o Outfall 8-24D)	0.022	0.000	0.000

Results of hypothesis testing (p-values)*:
A p-value <0.05 indicates that the null hypothesis (% diff = 0) can be rejected, i.e., the average litter amount in control greater than treatment.

Site	BMP	Count	Volume	Weight
1E	Manual litter pick-up	0.003	0.000**	0.046
1W	Street sweepers	0.463	0.256**	0.774**
6	Modified inlet grate	0.028	0.045	0.064
8	Bicycle grate (98/99)	0.912**	0.626**	0.133**
8	LID (99/00)	0.682	0.604	0.773
1E	Manual litter pick-up (w/o Outfall 1-46)	0.125	0.011**	0.526
8	LID (99/00) (w/o Outfall 8-24D)	0.040	0.338	0.446

Least significant value (LSV) of t-Test***

Site	BMP	Count	Volume	Weight
1E	Manual litter pick-up	--	12	--
1W	Street sweepers	--	20	24
6	Modified inlet grate	--	--	--
8	Bicycle grate (98/99)	19	17	22
8	LID (99/00)	--	--	--
1E	Manual litter pick-up (w/o Outfall 1-46)	--	15	--
8	LID (99/00) (w/o Outfall 8-24D)	--	--	--

Statistical test results of the outfall-level paired analysis, using actual difference (*Act diff*), comparison between each treatment outfall and all three control outfalls (normalized by catchment area)

Mean actual difference, *Act Diff*, between normalized litter of control and treatment:

Site	BMP	Count (items/acre)	Volume (ml/acre)	Weight (g/acre)
1E	Manual litter pick-up	150	1494	127
1W	Street sweepers	-62	228	-131
6	Modified inlet grate	68	267	54
8	Bicycle grate (98/99)	-52	-82	10
8	LID (99/00)	22	-137	-71
1E	Manual litter pick-up (w/o Outfall 1-46)	70	1007	42
8	LID (99/00) (w/o Outfall 8-24D)	92	226	-2

A p-value > 0.05 indicates that the actual difference, *Act diff*, is normally distributed based on the Shapiro-Wilk Normality Test at 5% significance level.

Site	BMP	Count	Volume	Weight
1E	Manual litter pick-up	0.000	0.000	0.000
1W	Street sweepers	0.000	0.000	0.000
6	Modified inlet grate	0.000	0.000	0.000
8	Bicycle grate (98/99)	0.000	0.000	0.000
8	LID (99/00)	0.000	0.000	0.000
1E	Manual litter pick-up (w/o Outfall 1-46)	0.000	0.000	0.000
8	LID(99/00) (w/o Outfall 8-24D)	0.000	0.000	0.000

Results of hypothesis testing (p-values)*:
A p-value <0.05 indicates that the null hypothesis (*Act diff* = 0) can be rejected, i.e., the average litter amount in control is greater than treatment.

Site	BMP	Count	Volume	Weight
1E	Manual litter pick-up	0.000	0.000	0.000
1W	Street sweepers	0.426	0.032	0.656
6	Modified inlet grate	0.000	0.000	0.000
8	Bicycle grate (98/99)	0.991	0.546	0.321
8	LID (99/00)	0.566	0.816	0.901
1E	Manual litter pick-up (w/o Outfall 1-46)	0.013	0.000	0.481
8	LID (99/00) (w/o Outfall 8-24D)	0.008	0.241	0.279

*Based on the results of the normality test, data are not normally distributed, and the Wilcoxon Signed-Rank Test (at 5% significance level) was used.

Statistical test results of the outfall-level paired analysis, using percentage difference (*% diff*), comparison between each treatment outfall and all three control outfalls (normalized by catchment area)

Mean percentage difference, *% diff* , between normalized litter of control and treatment:

Site	BMP	Count (%)	Volume (%)	Weight (%)
1E	Manual litter pick-up	4	15	-23
1W	Street sweepers	-16	0	-26
6	Modified inlet grate	-37	-33	-58
8	Bicycle grate (98/99)	-27	-17	-19
8	LID (99/00)	-34	-117	-167
1E	Manual litter pick-up (w/o Outfall 1-46)	-24	5	-58
8	LID (99/00) (w/o Outfall 8-24D)	16	-37	-65

A p-value > 0.05 indicates that the percentage difference, *% diff* , is normally distributed based on the Shapiro-Wilk Normality Test at 5% significance level.

Site	BMP	Count	Volume	Weight
1E	Manual litter pick-up	0.000	0.000	0.000
1W	Street sweepers	0.000	0.000	0.000
6	Modified inlet grate	0.000	0.000	0.000
8	Bicycle grate (98/99)	0.000	0.000	0.000
8	LID (99/00)	0.000	0.000	0.000
1E	Manual litter pick-up (w/o Outfall 1-46)	0.000	0.000	0.000
8	LID (99/00) (w/o Outfall 8-24D)	0.001	0.000	0.000

Results of hypothesis testing (p-values)*:
A p-value <0.05 indicates that the null hypothesis (% diff = 0) can be rejected, i.e., the average litter amount in control is greater than treatment.

Site	BMP	Count	Volume	Weight
1E	Manual litter pick-up	0.000	0.000	0.000
1W	Street sweepers	0.530	0.151	0.890
6	Modified inlet grate	0.002	0.002	0.020
8	Bicycle grate (98/99)	0.985	0.351	0.429
8	LID (99/00)	0.924	0.965	0.991
1E	Manual litter pick-up (w/o Outfall 1-46)	0.056	0.001	0.685
8	LID(99/00) (w/o Outfall 8-24D)	0.046	0.397	0.379

*Based on the results of the normality test, data are not normally distributed, and the Wilcoxon Signed-Rank Test (at 5% significance level) was used.

Statistical test results of the marginal analysis, raw data at outfall-level (normalized by flow volume)

Mean normalized litter for control and treatment datasets:

		Count (items/L)		Volume (ml/L)		Weight (g/L)	
Site	**BMP**	**Control**	**Treatment**	**Control**	**Treatment**	**Control**	**Treatment**
1E	Manual litter pick-up	2.39E-02	1.13E-02	1.49E-01	7.16E-02	1.87E-02	8.54E-03
1W	Street sweepers	1.75E-02	1.29E-02	1.04E-01	8.29E-02	1.37E-02	1.42E-02
6	Modified inlet grate	1.58E-02	1.22E-02	1.14E-01	9.51E-02	1.31E-02	8.85E-03
8	Bicycle grate (98/99)	7.33E-03	6.91E-03	4.22E-02	2.58E-02	6.46E-03	4.52E-03
8	LID (99/00)	1.47E-02	6.16E-03	8.80E-02	3.64E-02	1.44E-02	5.87E-03

A p-value > 0.05 indicates that the data sets are normally distributed based on the Shapiro-Wilk Normality Test at 5% significance level.

		Count		Volume		Weight	
Site	**BMP**	**Control**	**Treatment**	**Control**	**Treatment**	**Control**	**Treatment**
1E	Manual litter pick-up	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
1W	Street sweepers	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
6	Modified inlet grate	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
8	Bicycle grate (98/99)	>0.05	<0.05	>0.05	>0.05	>0.05	>0.05
8	LID (99/00)	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05

Results of hypothesis testing (p-values)*:
A p-value <0.05 indicates that the null hypothesis can be rejected, i.e., the average litter amount in control is greater than amount.

Site	BMP	Count	Volume	Weight
1E	Manual litter pick-up	<0.05	<0.05	>0.05
1W	Street sweepers	>0.05	>0.05	>0.05
6	Modified inlet grate	>0.05	>0.05	>0.05
8	Bicycle grate (98/99)	>0.05	>0.05**	>0.05**
8	LID (99/00)	>0.05	>0.05	>0.05

*Based on the results of the normality test, data are not normally distributed in one or both datasets, and the Wilcoxon Rank-Sum Test (at 5% significance level) was used (except as noted).
**Data are normally distributed, two-sample t-test (at 5% significance level) was used.

Statistical test results of the marginal analysis, log-transformed data at outfall-level (normalized by flow volume)

Mean normalized log-transformed litter for control and treatment datasets:

		Count (items/L)		Volume (ml/L)		Weight (g/L)	
Site	**BMP**	**Control**	**Treatment**	**Control**	**Treatment**	**Control**	**Treatment**
1E	Manual litter pick-up	2.32E-02	1.10E-02	1.25E-01	6.20E-02	1.82E-02	8.39E-03
1W	Street sweepers	1.72E-02	1.27E-02	9.10E-02	6.96E-02	1.34E-02	1.35E-02
6	Modified inlet grate	1.55E-02	1.19E-02	9.87E-02	7.94E-02	1.29E-02	8.75E-03
8	Bicycle grate (98/99)	7.30E-03	6.88E-03	4.09E-02	2.54E-02	6.43E-03	4.51E-03
8	LID (99/00)	1.40E-02	6.11E-03	7.25E-02	3.51E-02	1.39E-02	5.84E-03

A p-value > 0.05 indicates that the data sets are lognormally distributed based on the Shapiro-Wilk Normality Test at 5% significance level.

		Count		Volume		Weight	
Site	**BMP**	**Control**	**Treatment**	**Control**	**Treatment**	**Control**	**Treatment**
1E	Manual litter pick-up	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
1W	Street sweepers	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
6	Modified inlet grate	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
8	Bicycle grate (98/99)	>0.05	<0.05	>0.05	>0.05	>0.05	>0.05
8	LID (99/00)	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05

Results of hypothesis testing (p-values)*:
A p-value <0.05 indicates that the null hypothesis can be rejected, i.e., the average litter amount in control is greater than treatment.

Site	BMP	Count	Volume	Weight
1E	Manual litter pick-up	<0.05	<0.05	>0.05
1W	Street sweepers	>0.05	>0.05	>0.05
6	Modified inlet grate	>0.05	>0.05	>0.05
8	Bicycle grate (98/99)	>0.05	>0.05**	>0.05**
8	LID (99/00)	>0.05	>0.05	>0.05

*Based on the results of the normality test, data are not lognormally distributed in one or both datasets, and the Wilcoxon Rank-Sum Test (at 5% significance level) was used (except as noted).
**Data are lognormally distributed, two-sample t-test (at 5% significance level) was used.

Statistical test results of the paired analysis, using actual difference (*Act diff*) at outfall-level (normalized by flow volume)

Mean actual difference, *Act Diff*, between normalized litter of control and treatment:

Site	BMP	Count (items/L)	Volume (ml/L)	Weight (g/L)
1E	Manual litter pick-up	1.20.E-02	7.43.E-02	9.77.E-03
1W	Street sweepers	4.57.E-03	2.12.E-02	-5.30.E-04
6	Modified inlet grate	3.49.E-03	2.29.E-02	4.75.E-03
8	Bicycle grate (98/99)	4.20.E-04	1.64.E-02	1.93.E-03
8	LID (99/00)	8.52.E-03	5.16.E-02	8.54.E-03

A p-value > 0.05 indicates that the actual difference, *Act diff*, is normally distributed based on the Shapiro-Wilk Normality Test at 5% significance level.

Site	BMP	Count	Volume	Weight
1E	Manual litter pick-up	0.009	0.007	0.000
1W	Street sweepers	0.175	0.007	0.000
6	Modified inlet grate	0.001	0.000	0.004
8	Bicycle grate (98/99)	0.696	0.482	0.337
8	LID (99/00)	0.000	0.000	0.000

Results of hypothesis testing (p-values)*:
A p-value <0.05 indicates that the null hypothesis (*Act diff* = 0) can be rejected, i.e., the average litter amount in control is greater than treatment.

Site	BMP	Count	Volume	Weight
1E	Manual litter pick-up	0.000	0.000	0.000
1W	Street sweepers	0.045**	0.027	0.082
6	Modified inlet grate	0.030	0.016	0.002
8	Bicycle grate (98/99)	0.402**	0.104**	0.090**
8	LID (99/00)	0.840	0.449	0.449

Least significant value (LSV) of t-Test***

Site	BMP	Count	Volume	Weight
1E	Manual litter pick-up	--	--	--
1W	Street sweepers	4.43E-03	--	--
6	Modified inlet grate	--	--	--
8	Bicycle grate (98/99)	3.04E-03	2.23E-02	2.45E-03
8	LID (99/00)	--	--	--

*Based on the results of the normality test, data are not normally distributed, and the Wilcoxon Signed-Rank Test (at 5% significance level) was used (except as noted).
**Data are normally distributed, one-sample t-test (at 5% significance level) was used.
***This is the minimum mean *Act diff* required before the t-Test can detect a significant difference.

Statistical test results of the paired analysis, using percentage difference *(% diff)* at outfall-level (normalized by flow volume)

Mean percentage difference, *% diff*, between normalized litter of control and treatment:

Site	BMP	Count (%)	Volume (%)	Weight (%)
1E	Manual litter pick-up	57	55	46
1W	Street sweepers	36	38	26
6	Modified inlet grate	20	24	20
8	Bicycle grate (98/99)	-17	10	26
8	LID (99/00)	-43	-169	-93

A p-value > 0.05 indicates that the percentage difference, *% diff*, is normally distributed based on the Shapiro-Wilk Normality Test at 5% significance level.

Site	BMP	Count	Volume	Weight
1E	Manual litter pick-up	0.260	0.000	0.000
1W	Street sweepers	0.028	0.099	0.041
6	Modified inlet grate	0.249	0.213	0.007
8	Bicycle grate (98/99)	0.048	0.005	0.896
8	LID (99/00)	0.676	0.009	0.004

Results of hypothesis testing (p-values)*:
A p-value <0.05 indicates that the null hypothesis (% diff = 0) can be rejected, i.e., the average litter amount in control is greater than treatment.

Site	BMP	Count	Volume	Weight
1E	Manual litter pick-up	0.000**	0.001	0.002
1W	Street sweepers	0.000	0.001**	0.024
6	Modified inlet grate	0.060**	0.030**	0.022
8	Bicycle grate (98/99)	0.500	0.213	0.057**
8	LID (99/00)	0.895**	0.748	0.593
	Least significant value (LSV) of t-Test* **			
Site	**BMP**	**Count**	**Volume**	**Weight**
1E	Manual litter pick-up	13	--	--
1W	Street sweepers	--	17	--
6	Modified inlet grate	21	21	--
8	Bicycle grate (98/99)	--	--	27
8	LID (99/00)	58	--	--

*Based on the results of the normality test, data are not normally distributed, and the Wilcoxon Signed-Rank Test (at 5% significance level) was used (except as noted).
**Data are normally distributed, one-sample t-test (at 5% significance level) was used.
***This is the minimum mean *% diff* required before the t-Test can detect a significant difference.

Water Quality Constituents Per Event Versus Litter Per Event

Cadmium, Dissolved

Units: mg

BMP: Litter Pick-Up

R^2 = 0.17

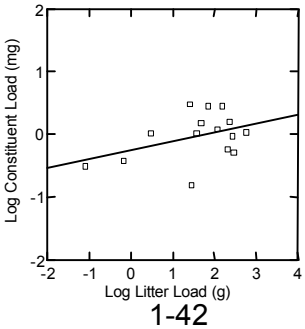

1-42

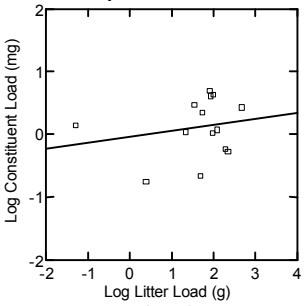

1-46

R^2 = 0.04

BMP: Street Sweeping

R^2 = 0.01

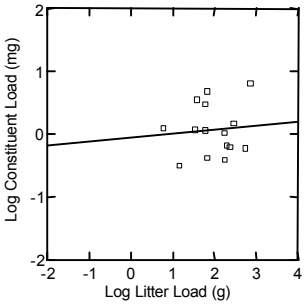

1-52

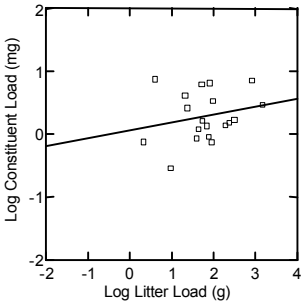

1-58

R^2 = 0.05

BMP: Modified Inlet

R^2 = 0.39

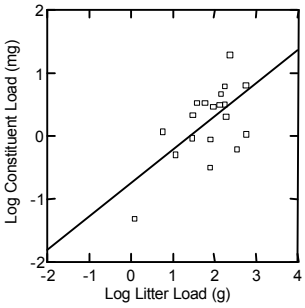

6-20E

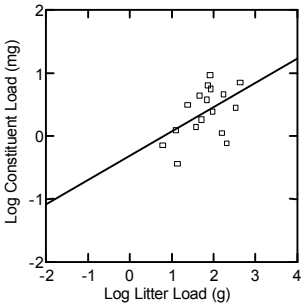

6-20F

R^2 = 0.24

BMP: Bicycle Grate/LID

R^2 = 0.03

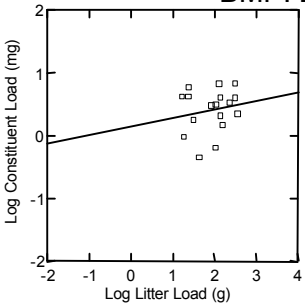

8-23C

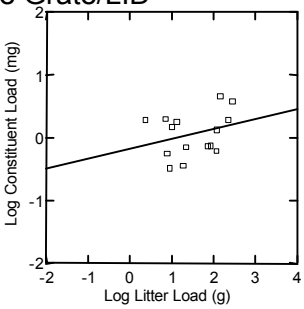

8-B001

R^2 = 0.09

Water Quality Constituents Per Event Versus Litter Per Event

Cadmium, Total

Units: mg

BMP: Litter Pick-Up

R^2 = 0.55

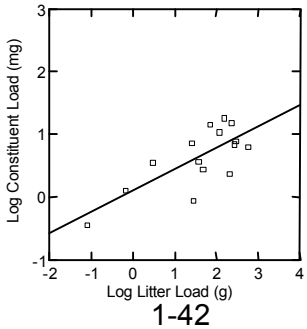

1-42

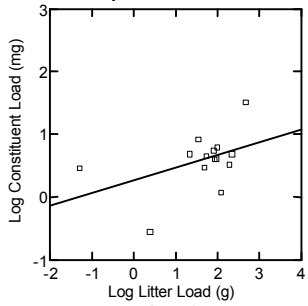

1-46

R^2 = 0.20

BMP: Street Sweeping

R^2 = 0.20

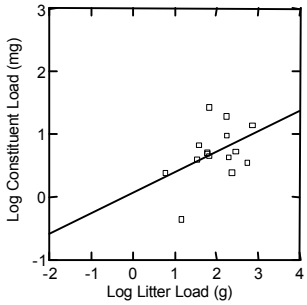

1-52

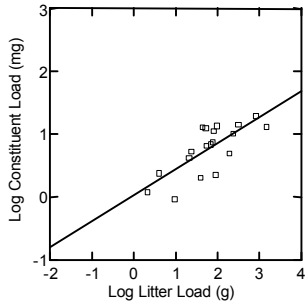

1-58

R^2 = 0.56

BMP: Modified Inlet

R^2 = 0.63

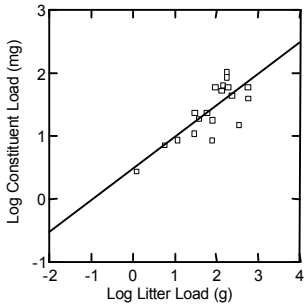

6-20E

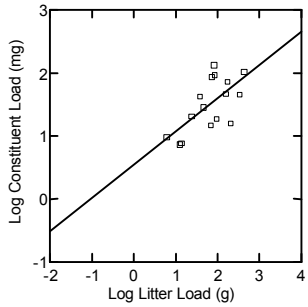

6-20F

R^2 = 0.44

BMP: Bicycle Grate/LID

R^2 = 0.48

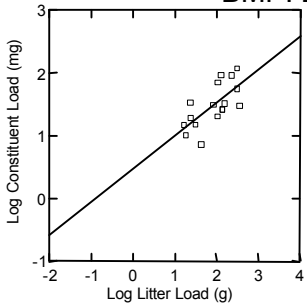

8-23C

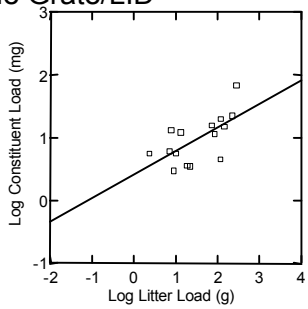

8-B001

R^2 = 0.42

Water Quality Constituents Per Event Versus Litter Per Event

Chromium, Dissolve

Units: mg

BMP: Litter Pick-Up

R^2 = 0.09

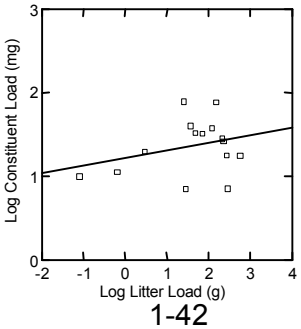

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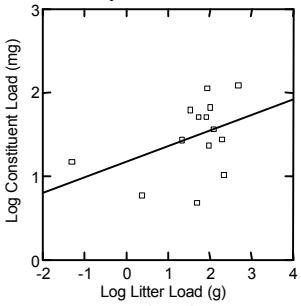

1-46

R^2 = 0.18

BMP: Street Sweeping

R^2 = 0.05

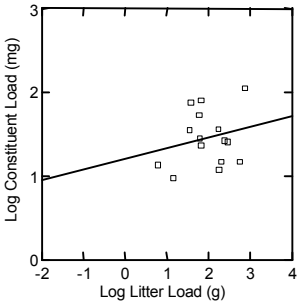

1-52

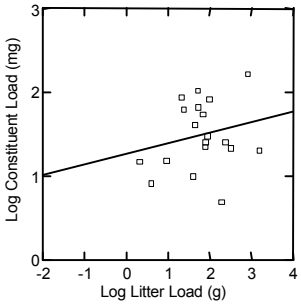

1-58

R^2 = 0.05

BMP: Modified Inlet

R^2 = 0.36

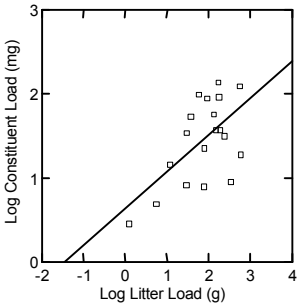

6-20E

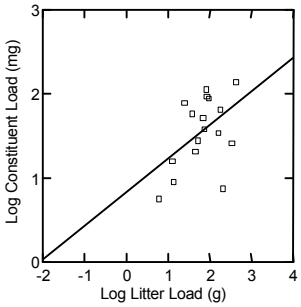

6-20F

R^2 = 0.23

BMP: Bicycle Grate/LID

R^2 = 0.14

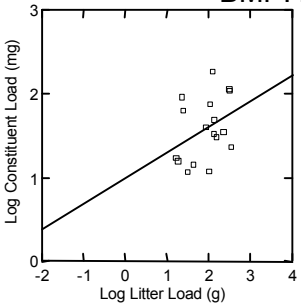

8-23C

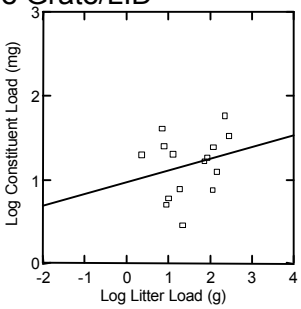

8-B001

R^2 = 0.06

Water Quality Constituents Per Event Versus Litter Per Event

Chromium, Total

Units: mg

BMP: Litter Pick-Up

R^2 = 0.34

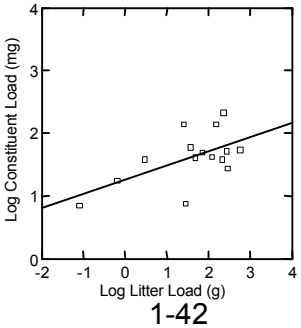

1-42

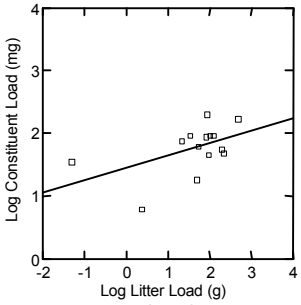

1-46

R^2 = 0.26

BMP: Street Sweeping

R^2 = 0.18

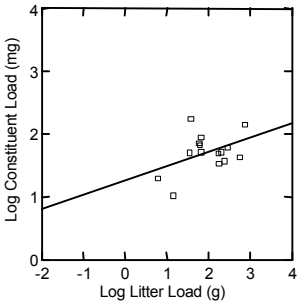

1-52

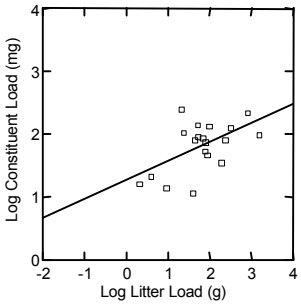

1-58

R^2 = 0.30

BMP: Modified Inlet

R^2 = 0.58

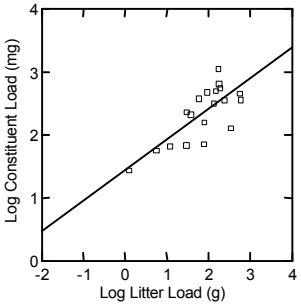

6-20E

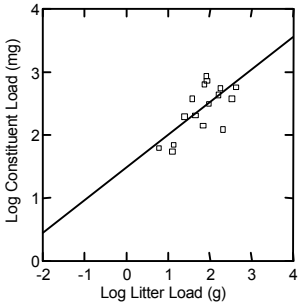

6-20F

R^2 = 0.47

BMP: Bicycle Grate/LID

R^2 = 0.55

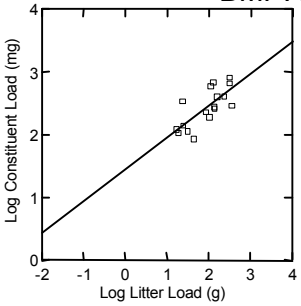

8-23C

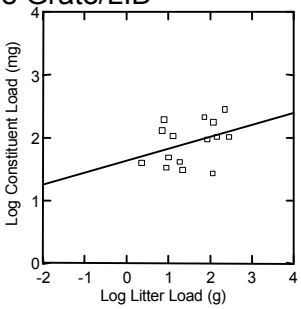

8-B001

R^2 = 0.13

Water Quality Constituents Per Event Versus Litter Per Event

Copper, Dissolved

Units: mg

BMP: Litter Pick-Up

R^2 = 0.07

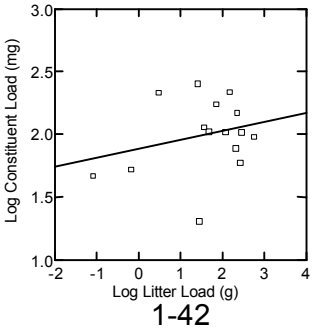

1-42

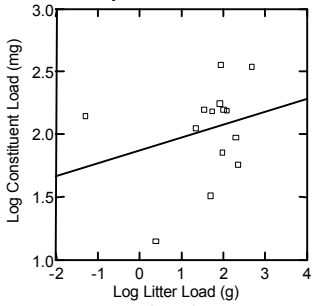

1-46

R^2 = 0.07

BMP: Street Sweeping

R^2 = 0.09

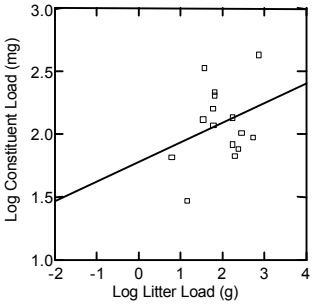

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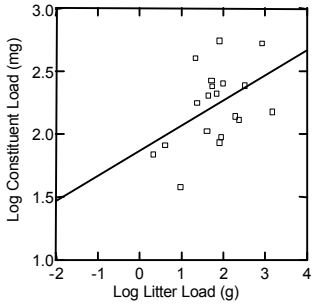

1-58

R^2 = 0.22

BMP: Modified Inlet

R^2 = 0.56

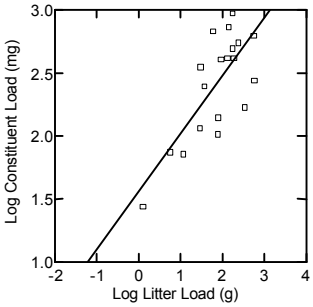

6-20E

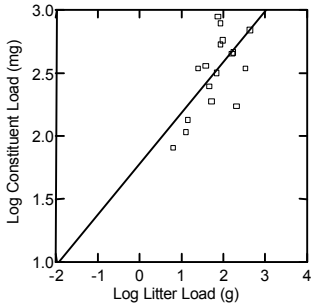

6-20F

R^2 = 0.44

BMP: Bicycle Grate/LID

R^2 = 0.37

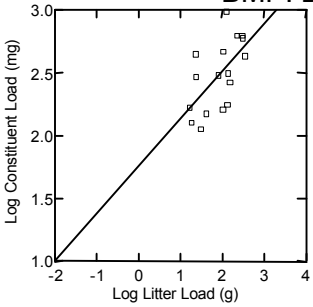

8-23C

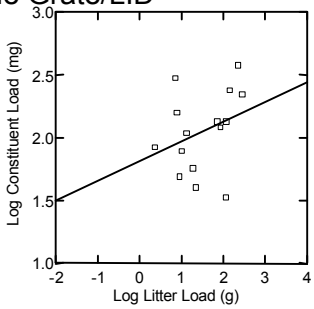

8-B001

R^2 = 0.10

Water Quality Constituents Per Event Versus Litter Per Event

Copper, Total

Units: mg

BMP: Litter Pick-Up

R^2 = 0.30

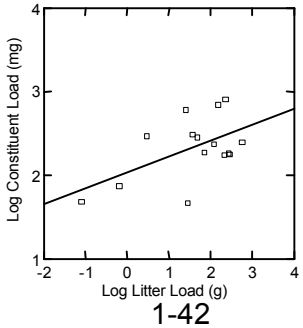

1-42

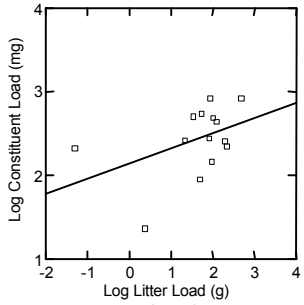

1-46

R^2 = 0.19

BMP: Street Sweeping

R^2 = 0.13

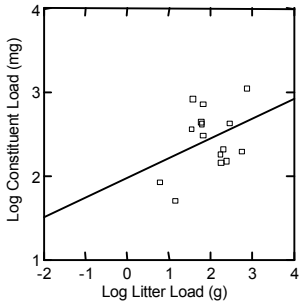

1-52

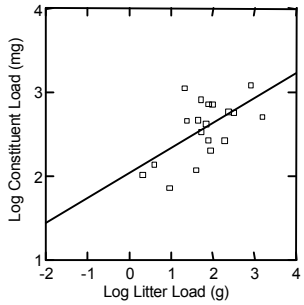

1-58

R^2 = 0.36

BMP: Modified Inlet

R^2 = 0.60

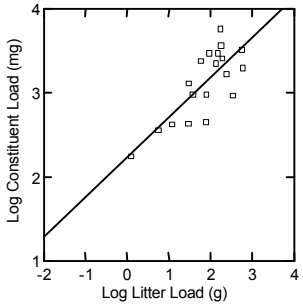

6-20E

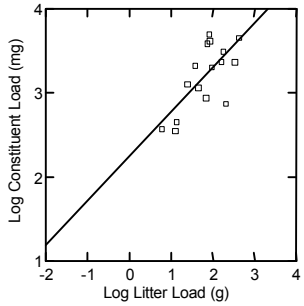

6-20F

R^2 = 0.50

BMP: Bicycle Grate/LID

R^2 = 0.41

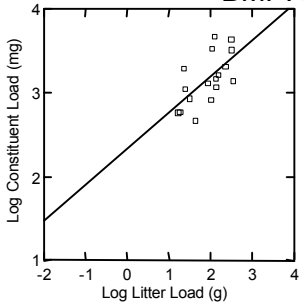

8-23C

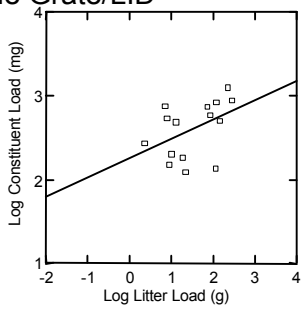

8-B001

R^2 = 0.20

Water Quality Constituents Per Event Versus Litter Per Event

Nickel, Dissolved

Units: mg

BMP: Litter Pick-Up

R^2 = 0.01

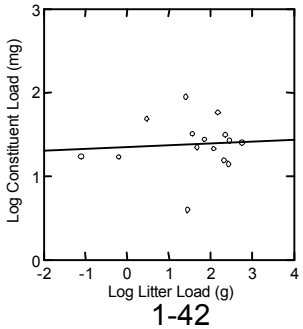

1-42

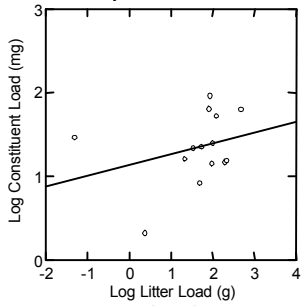

1-46

R^2 = 0.09

BMP: Street Sweeping

R^2 = 0.03

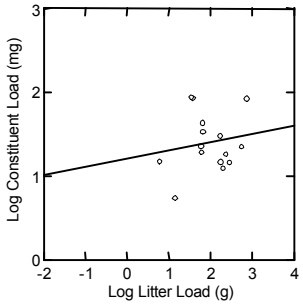

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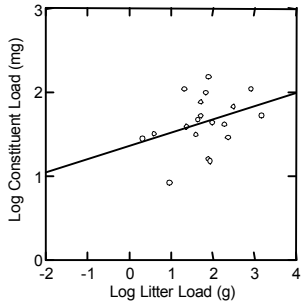

1-58

R^2 = 0.12

BMP: Modified Inlet

R^2 = 0.54

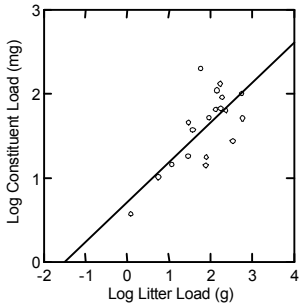

6-20E

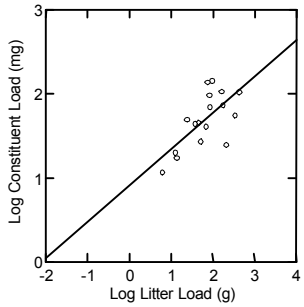

6-20F

R^2 = 0.46

BMP: Bicycle Grate/LID

R^2 = 0.16

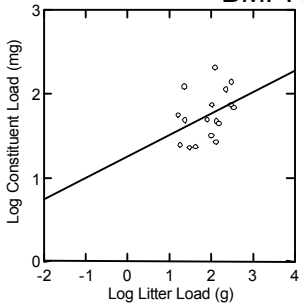

8-23C

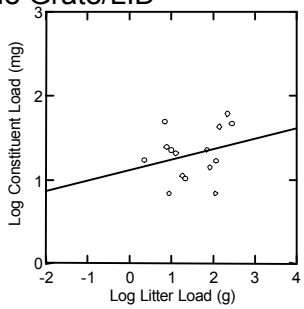

8-B001

R^2 = 0.07

Water Quality Constituents Per Event Versus Litter Per Event

Nickel, Total

Units: mg

BMP: Litter Pick-Up

R^2 = 0.16

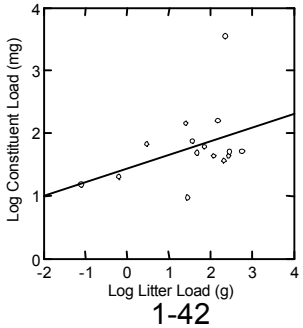

1-42

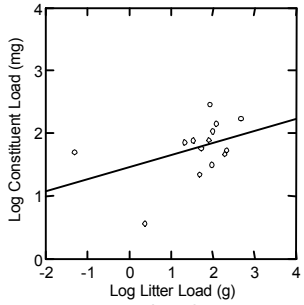

1-46

R^2 = 0.18

BMP: Street Sweeping

R^2 = 0.16

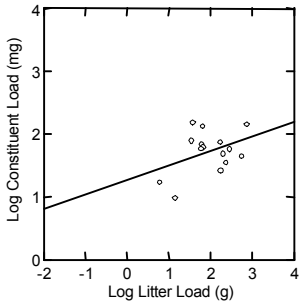

1-52

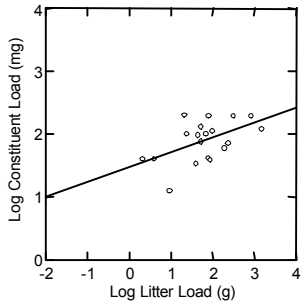

1-58

R^2 = 0.26

BMP: Modified Inlet

R^2 = 0.56

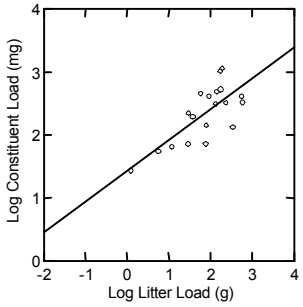

6-20E

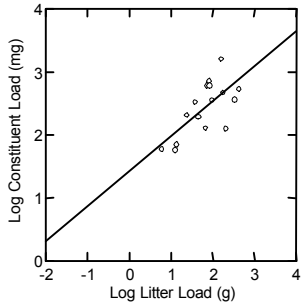

6-20F

R^2 = 0.48

BMP: Bicycle Grate/LID

R^2 = 0.40

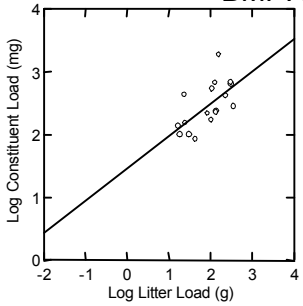

8-23C

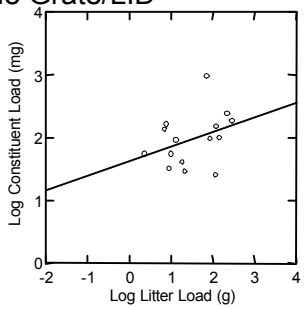

8-B001

R^2 = 0.13

Water Quality Constituents Per Event Versus Litter Per Event

Lead, Dissolved

Units: mg

BMP: Litter Pick-Up

R^2 = 0.01

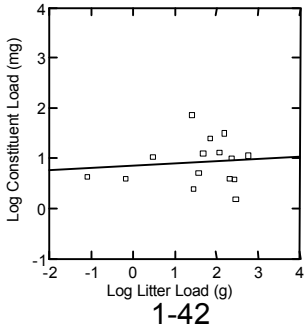

1-42

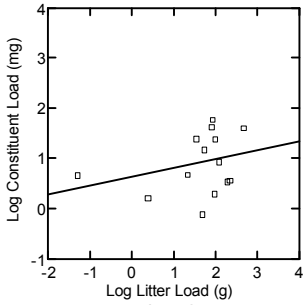

1-46

R^2 = 0.09

BMP: Street Sweeping

R^2 = 0.01

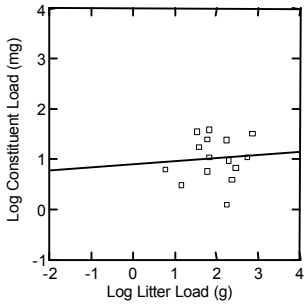

1-52

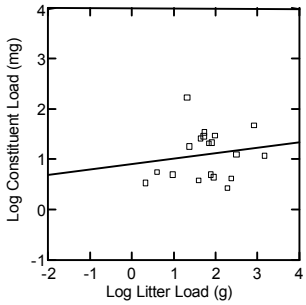

1-58

R^2 = 0.03

BMP: Modified Inlet

R^2 = 0.31

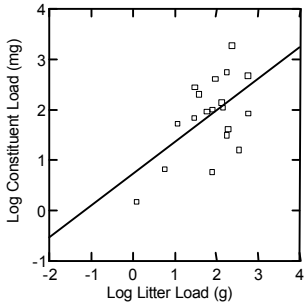

6-20E

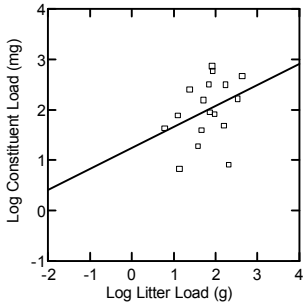

6-20F

R^2 = 0.12

BMP: Bicycle Grate/LID

R^2 = 0.08

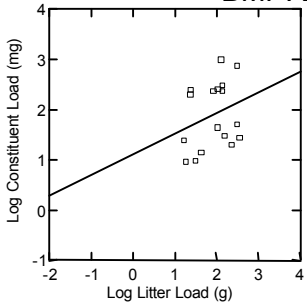

8-23C

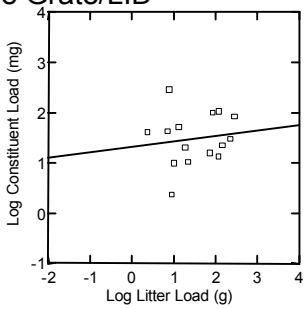

8-B001

R^2 = 0.02

Water Quality Constituents Per Event Versus Litter Per Event

Lead, Total

Units: mg

BMP: Litter Pick-Up

R^2 = 0.47

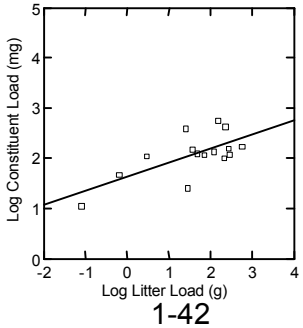

1-42

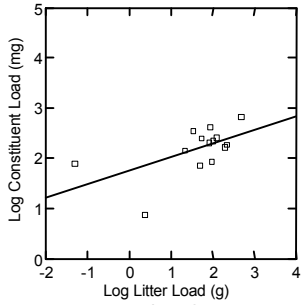

1-46

R^2 = 0.33

BMP: Street Sweeping

R^2 = 0.15

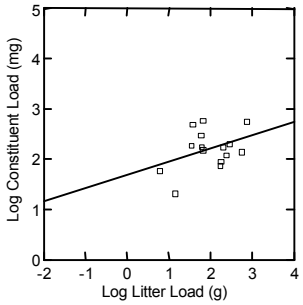

1-52

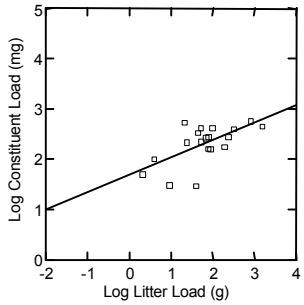

1-58

R^2 = 0.39

BMP: Modified Inlet

R^2 = 0.50

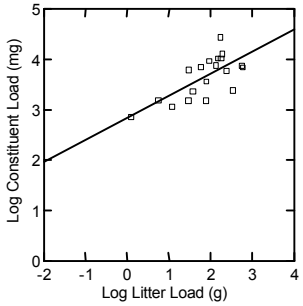

6-20E

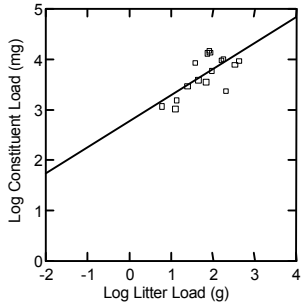

6-20F

R^2 = 0.48

BMP: Bicycle Grate/LID

R^2 = 0.47

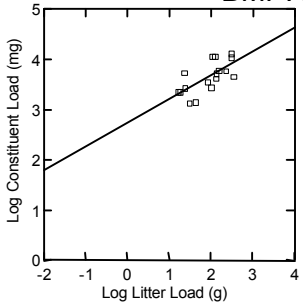

8-23C

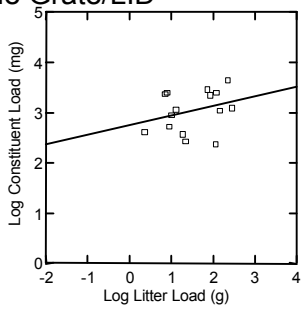

8-B001

R^2 = 0.09

Water Quality Constituents Per Event Versus Litter Per Event

Zinc, Dissolved

Units: mg

BMP: Litter Pick-Up

R^2 = 0.01

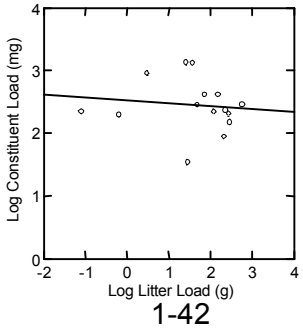

1-42

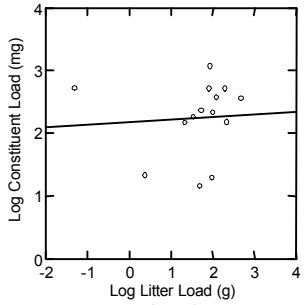

1-46

R^2 = 0.01

BMP: Street Sweeping

R^2 = 0.01

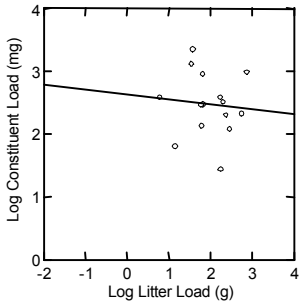

1-52

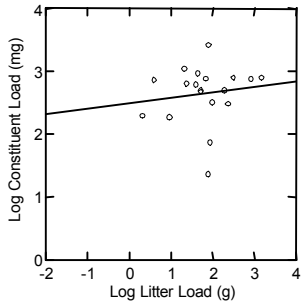

1-58

R^2 = 0.02

BMP: Modified Inlet

R^2 = 0.52

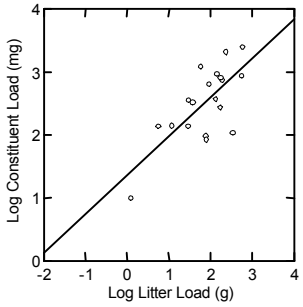

6-20E

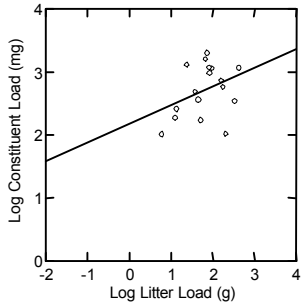

6-20F

R^2 = 0.13

BMP: Bicycle Grate/LID

R^2 = 0.00

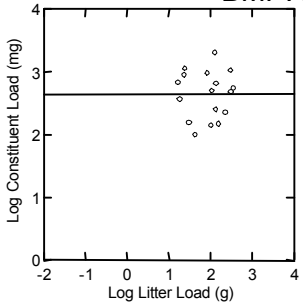

8-23C

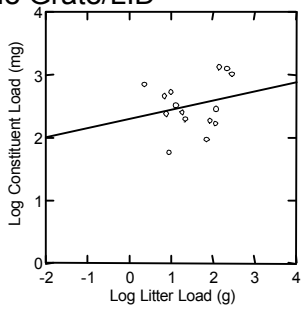

8-B001

R^2 = 0.06

Water Quality Constituents Per Event Versus Litter Per Event

Zinc, Total

Units: mg

BMP: Litter Pick-Up

R^2 = 0.30

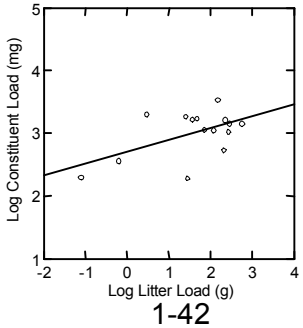

1-42

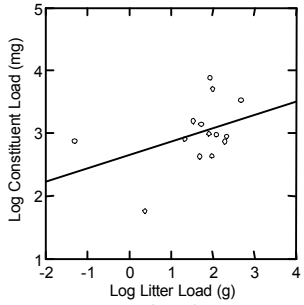

1-46

R^2 = 0.17

BMP: Street Sweeping

R^2 = 0.13

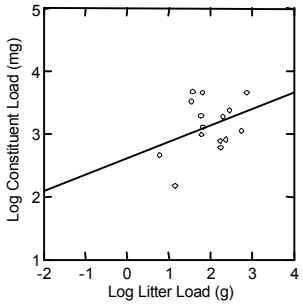

1-52

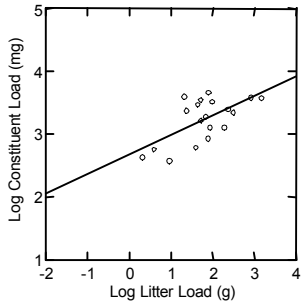

1-58

R^2 = 0.40

BMP: Modified Inlet

R^2 = 0.61

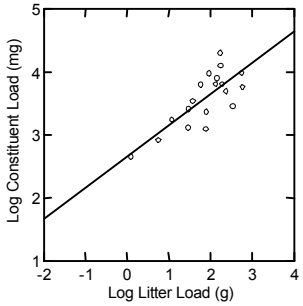

6-20E

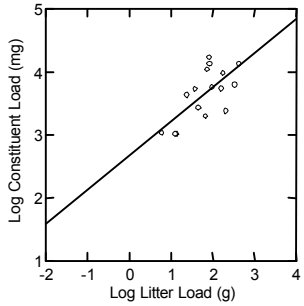

6-20F

R^2 = 0.47

BMP: Bicycle Grate/LID

R^2 = 0.43

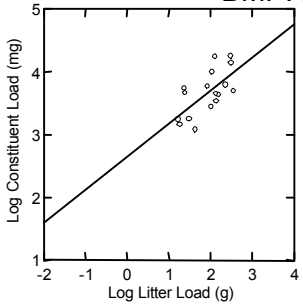

8-23C

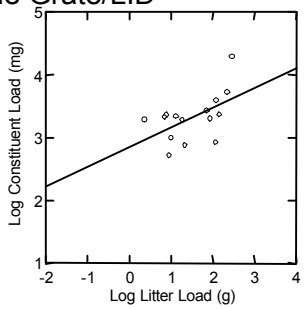

8-B001

R^2 = 0.28

Water Quality Constituents Per Event Versus Litter Per Event

Nitrate Nitrogen 199

Units: mg

BMP: Litter Pick-Up

R^2 = 0.36

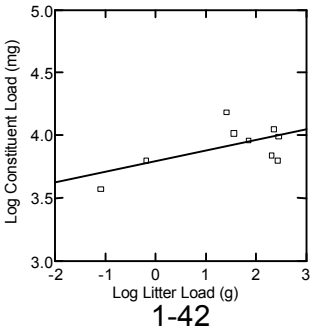

1-42

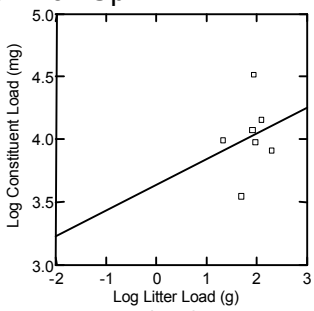

1-46

R^2 = 0.05

BMP: Street Sweeping

R^2 = 0.03

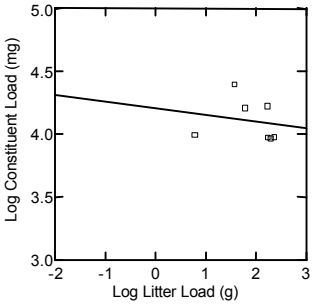

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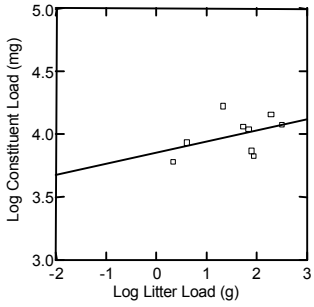

1-58

R^2 = 0.18

BMP: Modified Inlet

R^2 = 0.01

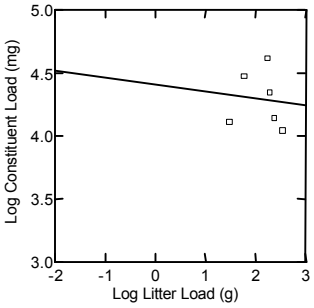

6-20E

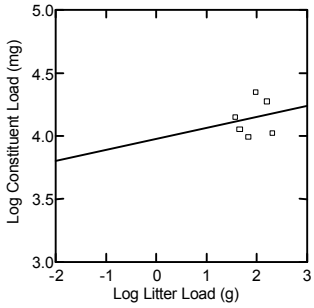

6-20F

R^2 = 0.03

BMP: Bicycle Grate/LID

R^2 = 0.33

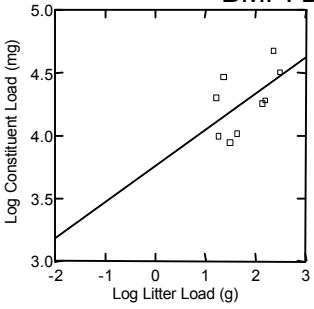

8-23C

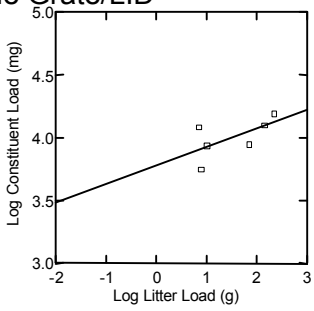

8-B001

R^2 = 0.40

Water Quality Constituents Per Event Versus Litter Per Event

Nitrate Nitrogen 199

Units: mg

BMP: Litter Pick-Up

R^2 = 0.48

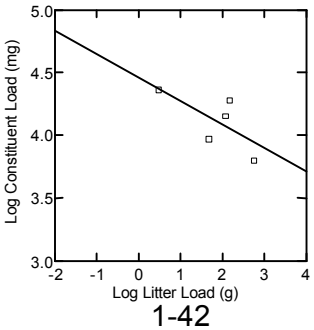

1-42

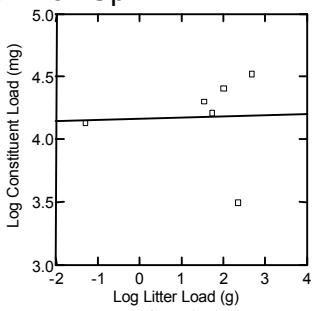

1-46

R^2 = 0.00

BMP: Street Sweeping

R^2 = 0.02

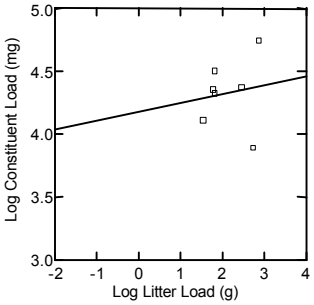

1-52

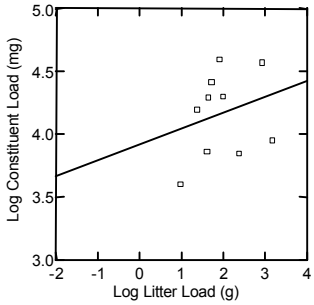

1-58

R^2 = 0.07

BMP: Modified Inlet

R^2 = 0.27

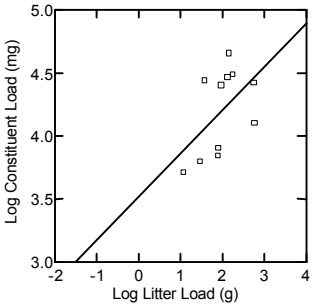

6-20E

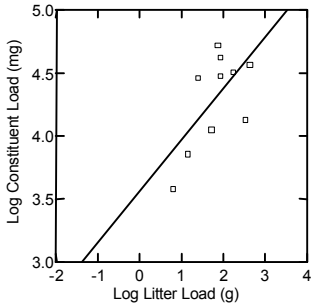

6-20F

R^2 = 0.41

BMP: Bicycle Grate/LID

R^2 = 0.00

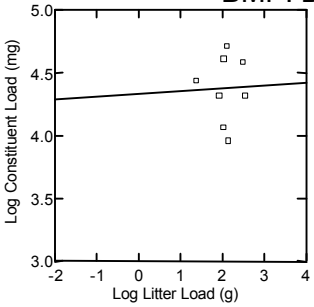

8-23C

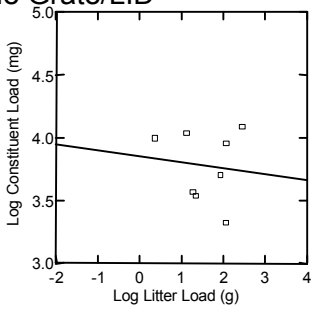

8-B001

R^2 = 0.01

Water Quality Constituents Per Event Versus Litter Per Event

Total Kjedhal Nitrog

Units: mg

BMP: Litter Pick-Up

R^2 = 0.13

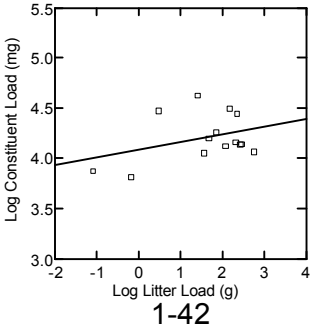

1-42

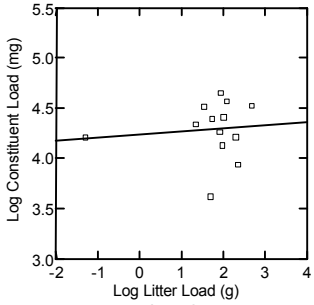

1-46

R^2 = 0.01

BMP: Street Sweeping

R^2 = 0.00

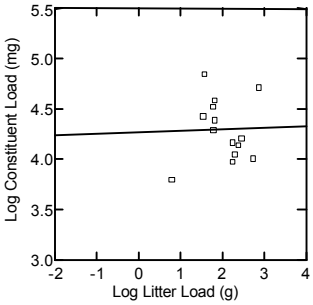

1-52

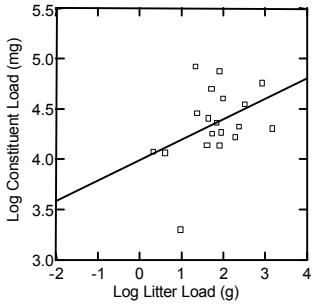

1-58

R^2 = 0.16

BMP: Modified Inlet

R^2 = 0.20

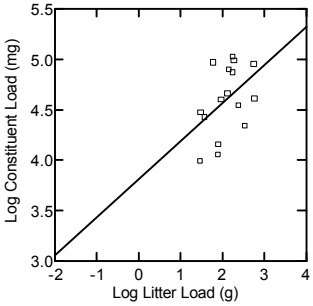

6-20E

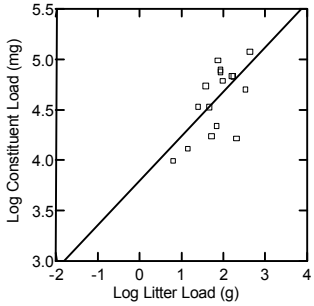

6-20F

R^2 = 0.41

BMP: Bicycle Grate/LID

R^2 = 0.24

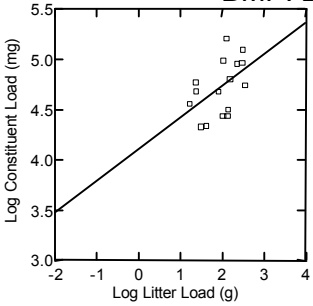

8-23C

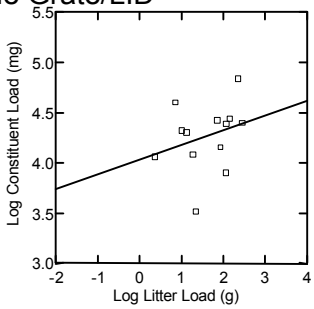

8-B001

R^2 = 0.08

Water Quality Constituents Per Event Versus Litter Per Event

Ortho-Phosphorus

Units: mg

BMP: Litter Pick-Up

R^2 = 0.29

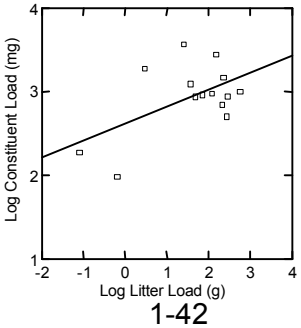

1-42

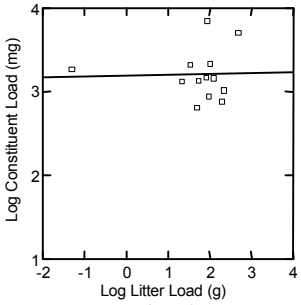

1-46

R^2 = 0.00

BMP: Street Sweeping

R^2 = 0.01

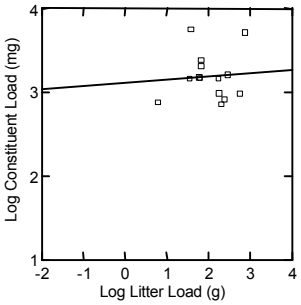

1-52

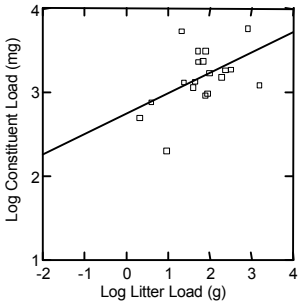

1-58

R^2 = 0.25

BMP: Modified Inlet

R^2 = 0.25

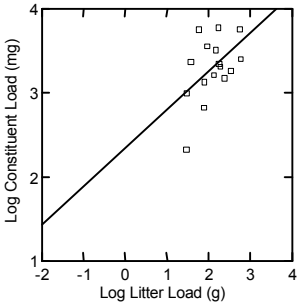

6-20E

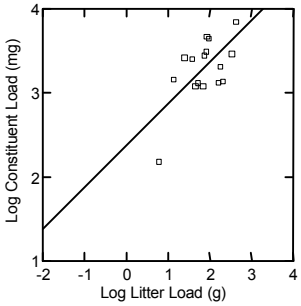

6-20F

R^2 = 0.42

BMP: Bicycle Grate/LID

R^2 = 0.29

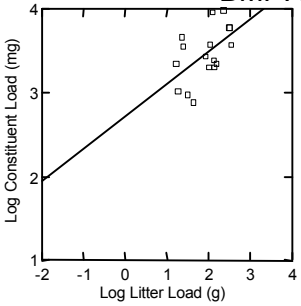

8-23C

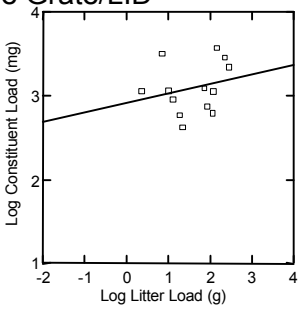

8-B001

R^2 = 0.06

Water Quality Constituents Per Event Versus Litter Per Event

Total Phosphorus

Units: mg

BMP: Litter Pick-Up

R^2 = 0.32

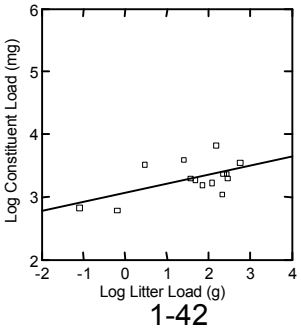

1-42

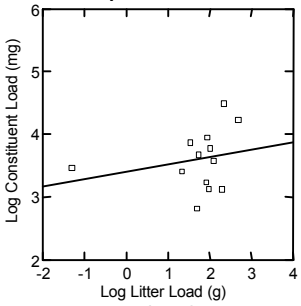

1-46

R^2 = 0.06

BMP: Street Sweeping

R^2 = 0.09

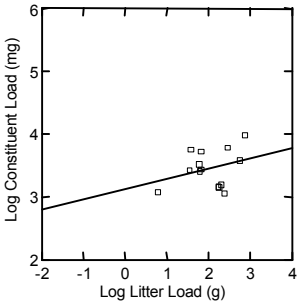

1-52

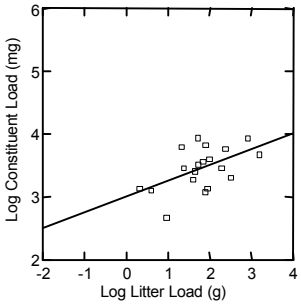

1-58

R^2 = 0.28

BMP: Modified Inlet

R^2 = 0.58

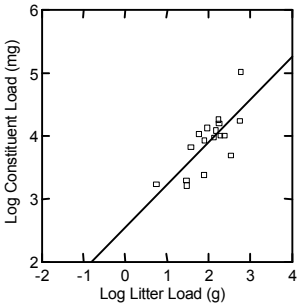

6-20E

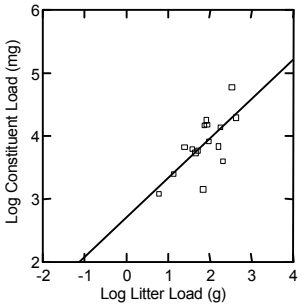

6-20F

R^2 = 0.49

BMP: Bicycle Grate/LID

R^2 = 0.34

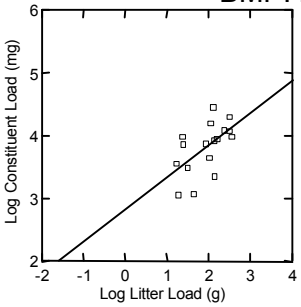

8-23C

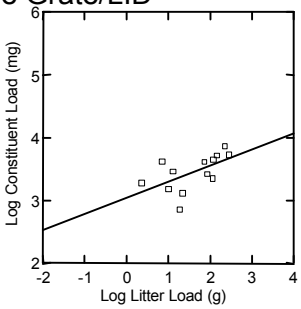

8-B001

R^2 = 0.33

Water Quality Constituents Per Event Versus Litter Per Event

Coliforms, Total

Units: MPN/100 ml

BMP: Litter Pick-Up

R^2 = 0.02

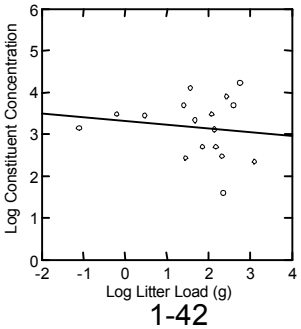

1-42

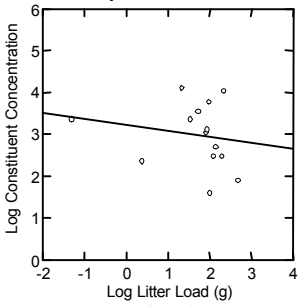

1-46

R^2 = 0.04

BMP: Street Sweeping

R^2 = 0.05

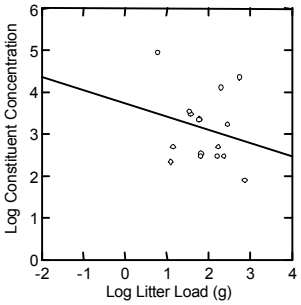

1-52

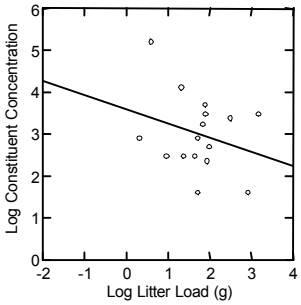

1-58

R^2 = 0.08

BMP: Modified Inlet

R^2 = 0.08

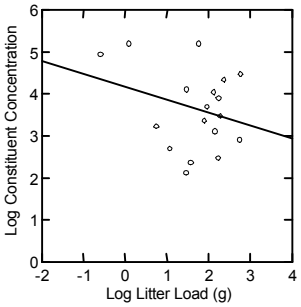

6-20E

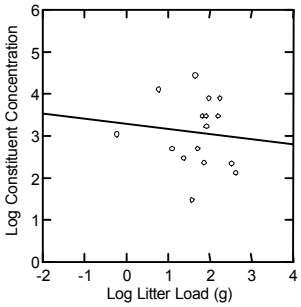

6-20F

R^2 = 0.01

BMP: Bicycle Grate/LID

R^2 = 0.03

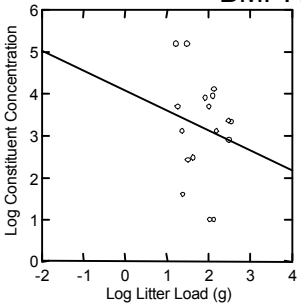

8-23C

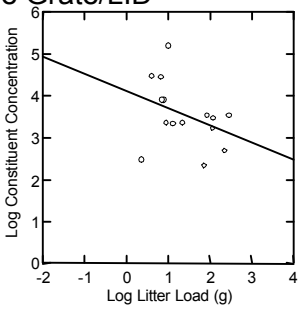

8-B001

R^2 = 0.13

Water Quality Constituents Per Event Versus Litter Per Event

Coliforms, Fecal

Units: MPN/100 ml

BMP: Litter Pick-Up

R^2 = 0.02

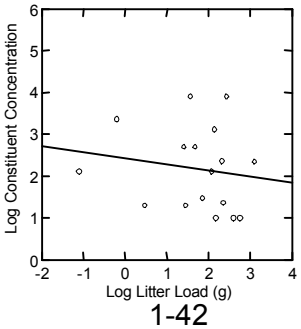

1-42

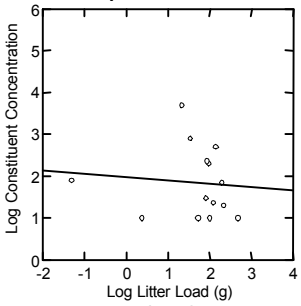

1-46

R^2 = 0.01

BMP: Street Sweeping

R^2 = 0.15

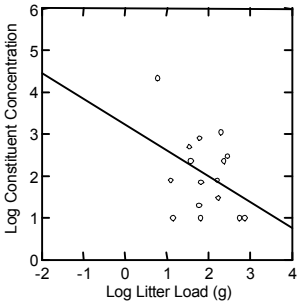

1-52

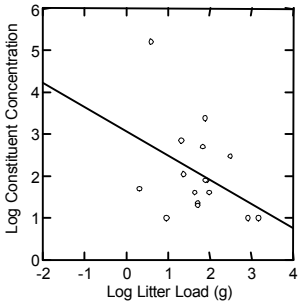

1-58

R^2 = 0.16

BMP: Modified Inlet

R^2 = 0.29

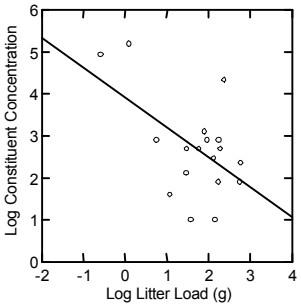

6-20E

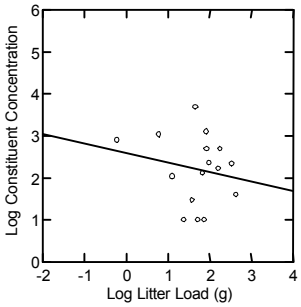

6-20F

R^2 = 0.04

BMP: Bicycle Grate/LID

R^2 = 0.06

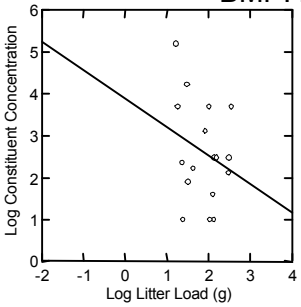

8-23C

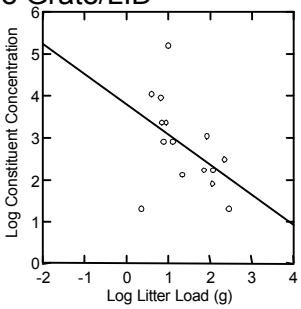

8-B001

R^2 = 0.21

Water Quality Constituents Per Event Versus Litter Per Event

TPH (Diesel)

Units: mg

BMP: Litter Pick-Up

R^2 = 0.02

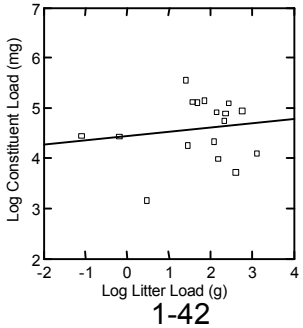

1-42

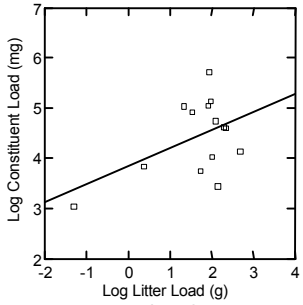

1-46

R^2 = 0.23

BMP: Street Sweeping

R^2 = 0.00

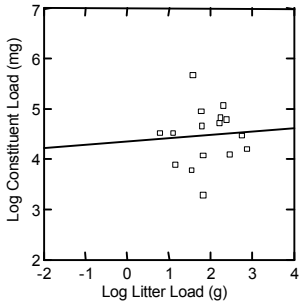

1-52

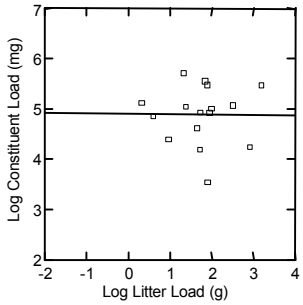

1-58

R^2 = 0.00

BMP: Modified Inlet

R^2 = 0.44

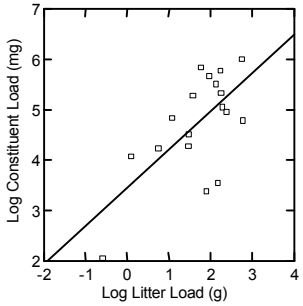

6-20E

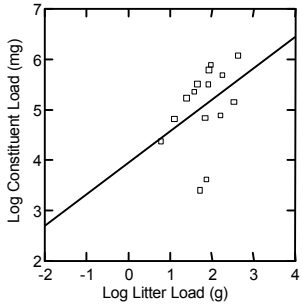

6-20F

R^2 = 0.15

BMP: Bicycle Grate/LID

R^2 = 0.06

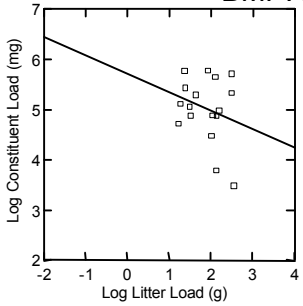

8-23C

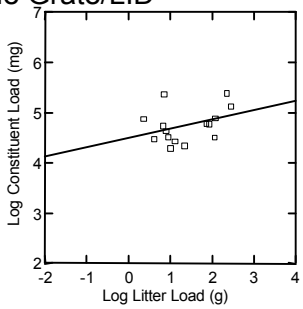

8-B001

R^2 = 0.13

Water Quality Constituents Per Event Versus Litter Per Event

Oil & Grease

Units: mg

BMP: Litter Pick-Up

R^2 = 0.06

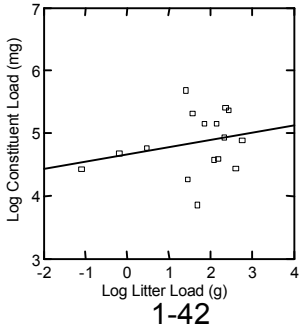

1-42

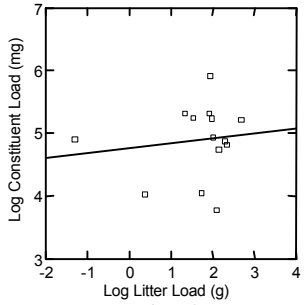

1-46

R^2 = 0.02

BMP: Street Sweeping

R^2 = 0.01

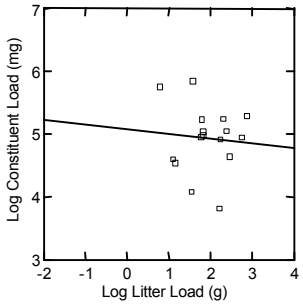

1-52

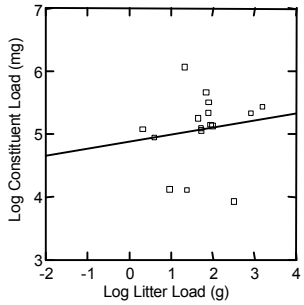

1-58

R^2 = 0.02

BMP: Modified Inlet

R^2 = 0.66

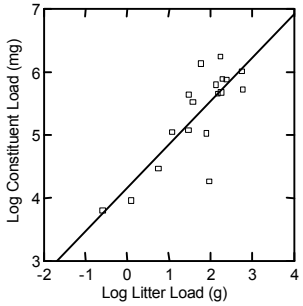

6-20E

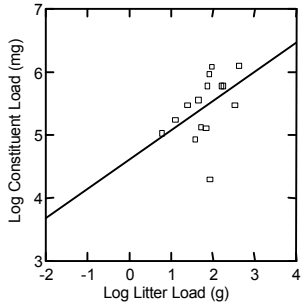

6-20F

R^2 = 0.21

BMP: Bicycle Grate/LID

R^2 = 0.00

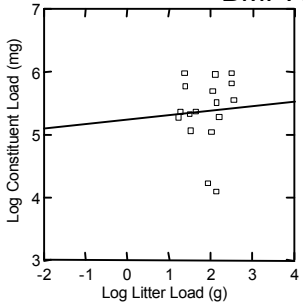

8-23C

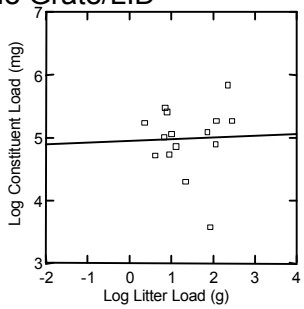

8-B001

R^2 = 0.00

Water Quality Constituents Per Event Versus Litter Per Event

Conductivity

Units: umhos/cm

BMP: Litter Pick-Up

R^2 = 0.00

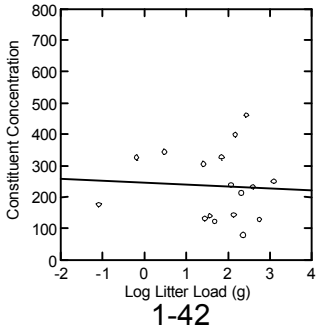

1-42

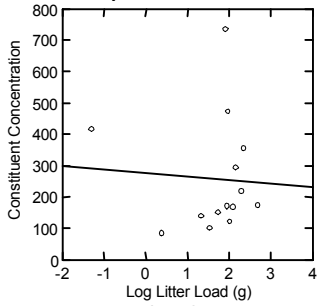

1-46

R^2 = 0.00

BMP: Street Sweeping

R^2 = 0.01

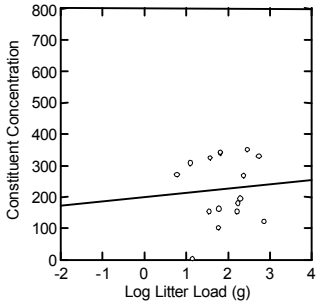

1-52

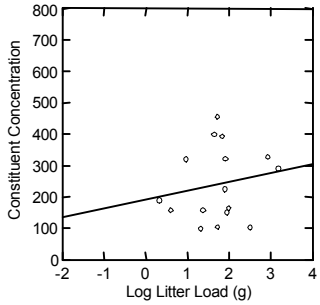

1-58

R^2 = 0.03

BMP: Modified Inlet

R^2 = 0.25

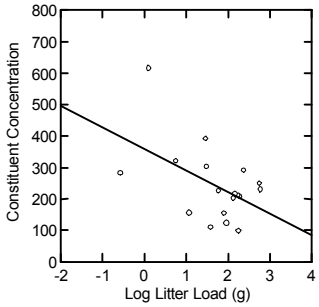

6-20E

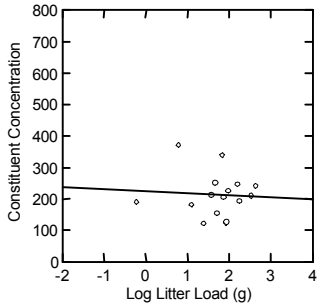

6-20F

R^2 = 0.00

BMP: Bicycle Grate/LID

R^2 = 0.10

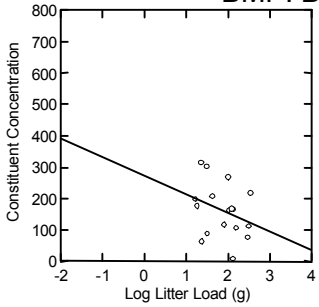

8-23C

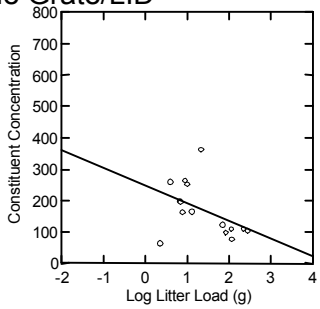

8-B001

R^2 = 0.20

Water Quality Constituents Per Event Versus Litter Per Event

Hardness as CaCO3

Units: mg

BMP: Litter Pick-Up

R^2 = 0.12

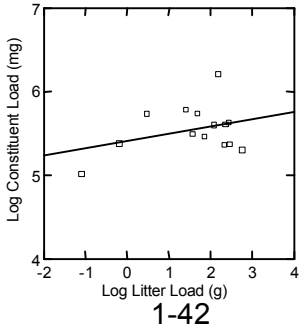

1-42

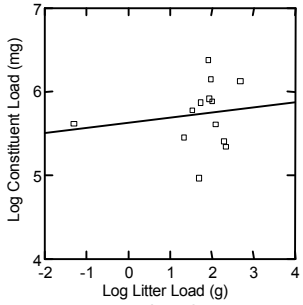

1-46

R^2 = 0.02

BMP: Street Sweeping

R^2 = 0.00

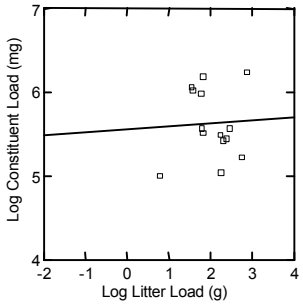

1-52

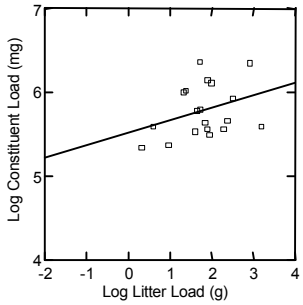

1-58

R^2 = 0.12

BMP: Modified Inlet

R^2 = 0.41

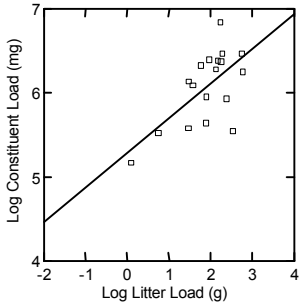

6-20E

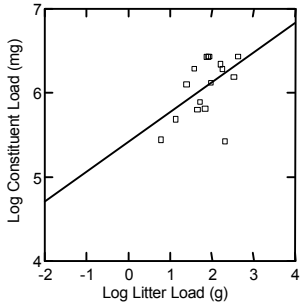

6-20F

R^2 = 0.24

BMP: Bicycle Grate/LID

R^2 = 0.31

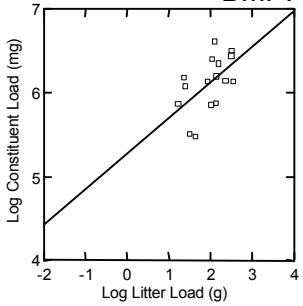

8-23C

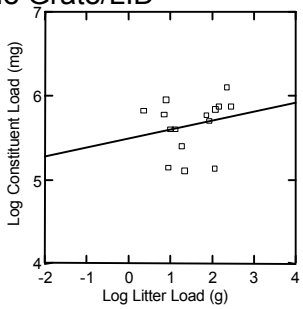

8-B001

R^2 = 0.05

Water Quality Constituents Per Event Versus Litter Per Event

pH

Units: pH units

BMP: Litter Pick-Up

R^2 = 0.07

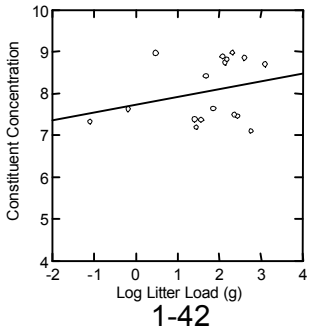

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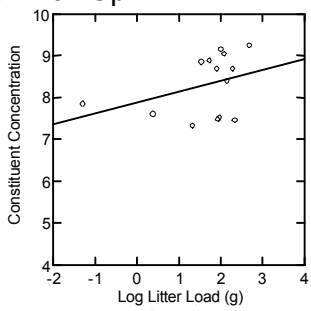

1-46

R^2 = 0.13

BMP: Street Sweeping

R^2 = 0.17

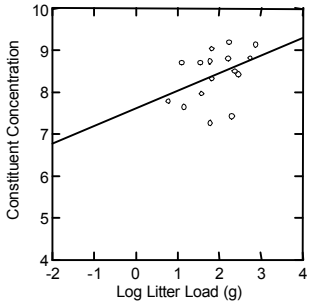

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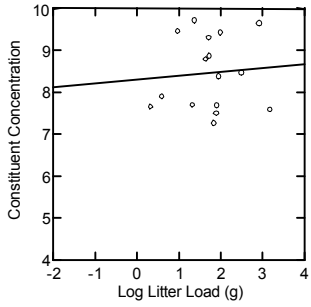

1-58

R^2 = 0.01

BMP: Modified Inlet

R^2 = 0.17

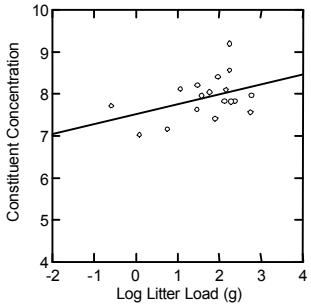

6-20E

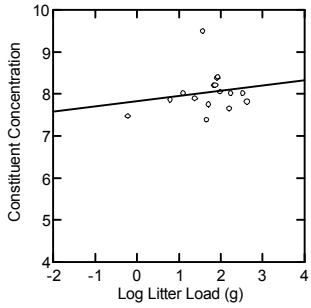

6-20F

R^2 = 0.03

BMP: Bicycle Grate/LID

R^2 = 0.01

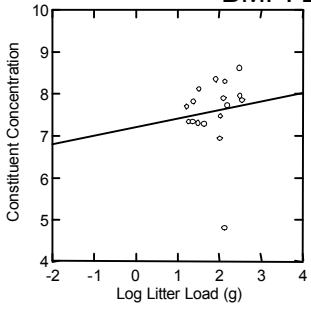

8-23C

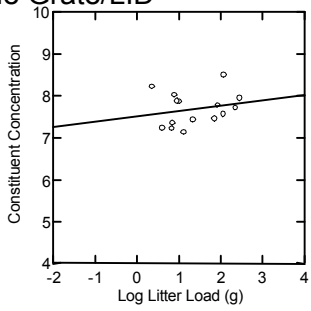

8-B001

R^2 = 0.05

Water Quality Constituents Per Event Versus Litter Per Event

Total Suspended Sc

Units: mg

BMP: Litter Pick-Up

R^2 = 0.51

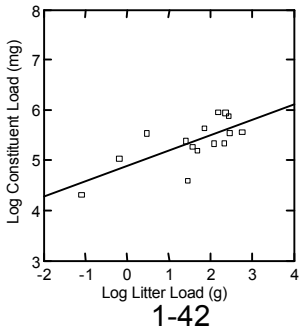

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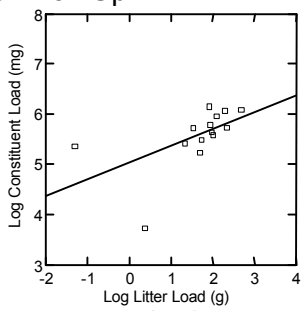

1-46

R^2 = 0.31

BMP: Street Sweeping

R^2 = 0.47

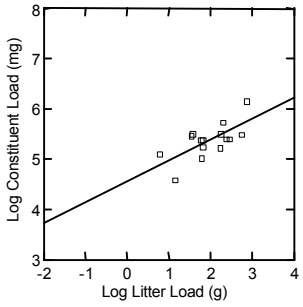

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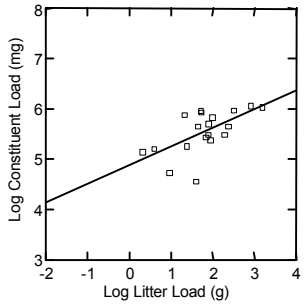

1-58

R^2 = 0.38

BMP: Modified Inlet

R^2 = 0.59

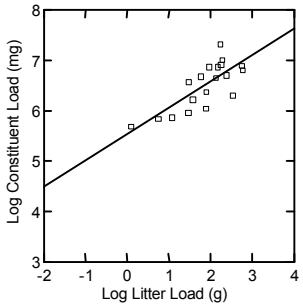

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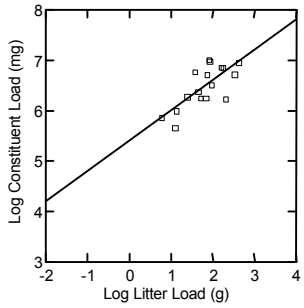

6-20F

R^2 = 0.54

BMP: Bicycle Grate/LID

R^2 = 0.62

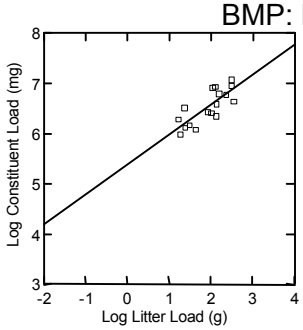

8-23C

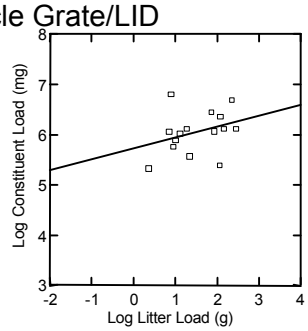

8-B001

R^2 = 0.11

Water Quality Constituents Per Event Versus Litter Per Event

Total Volatile Solids

Units: mg

BMP: Litter Pick-Up

R^2 = 0.18

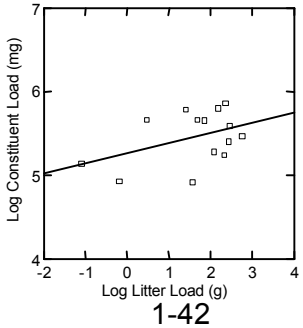

1-42

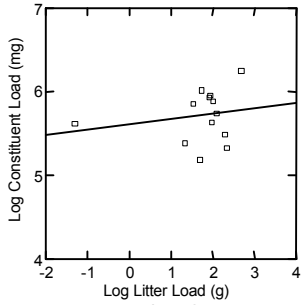

1-46

R^2 = 0.04

BMP: Street Sweeping

R^2 = 0.16

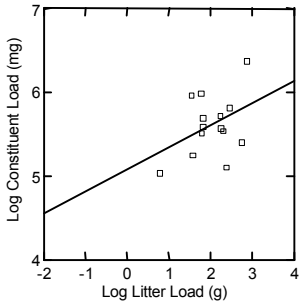

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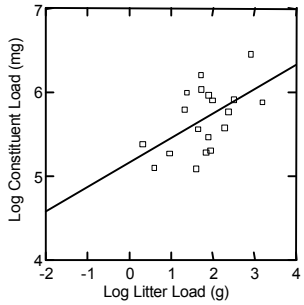

1-58

R^2 = 0.29

BMP: Modified Inlet

R^2 = 0.56

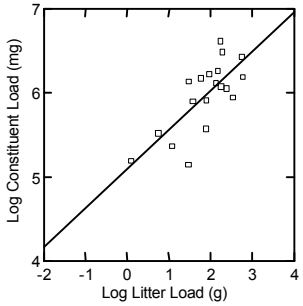

6-20E

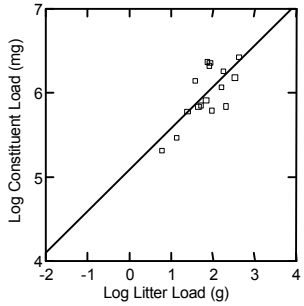

6-20F

R^2 = 0.54

BMP: Bicycle Grate/LID

R^2 = 0.46

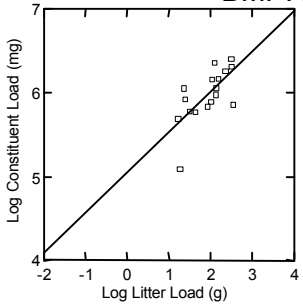

8-23C

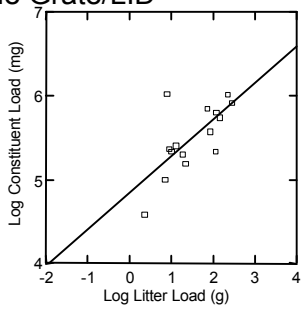

8-B001

R^2 = 0.49

Water Quality Constituents Per Event Versus Litter Per Event

Total Organic Carbo

Units: mg

BMP: Litter Pick-Up

R^2 = 0.03

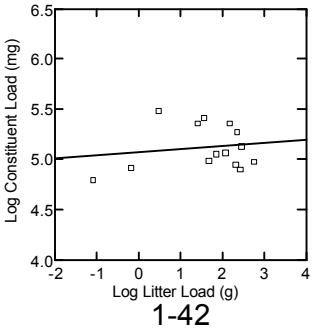

1-42

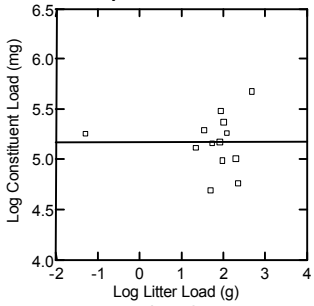

1-46

R^2 = 0.00

BMP: Street Sweeping

R^2 = 0.00

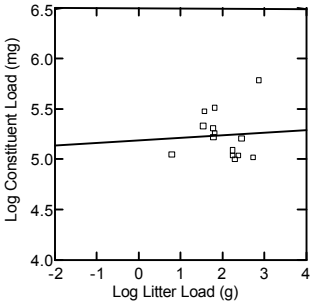

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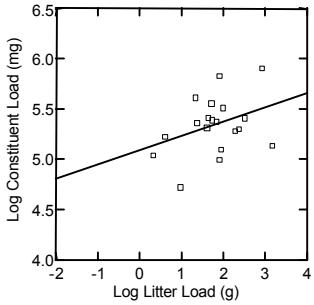

1-58

R^2 = 0.13

BMP: Modified Inlet

R^2 = 0.29

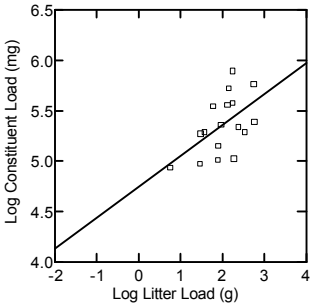

6-20E

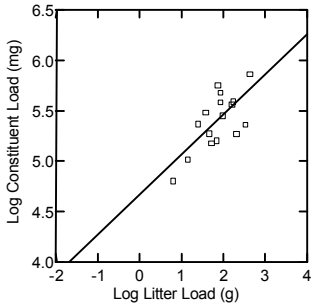

6-20F

R^2 = 0.48

BMP: Bicycle Grate/LID

R^2 = 0.20

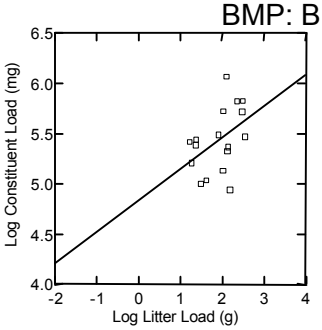

8-23C

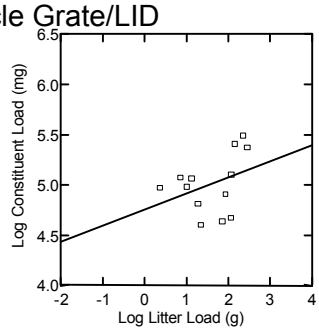

8-B001

R^2 = 0.13

Water Quality Constituents Per Event Versus Litter Per Event

TPH (Gasoline)

Units: mg

BMP: Litter Pick-Up

R^2 = 0.35

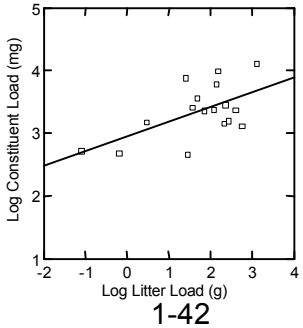

1-42

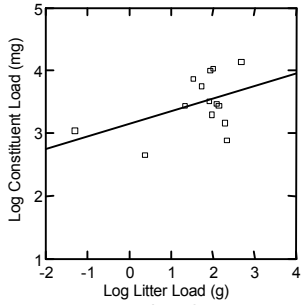

1-46

R^2 = 0.21

BMP: Street Sweeping

R^2 = 0.19

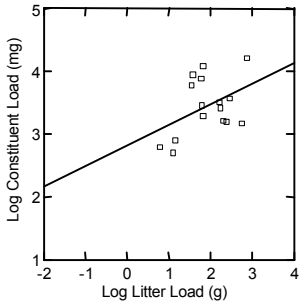

1-52

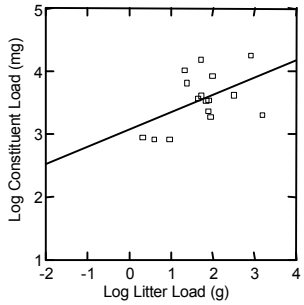

1-58

R^2 = 0.23

BMP: Modified Inlet

R^2 = 0.78

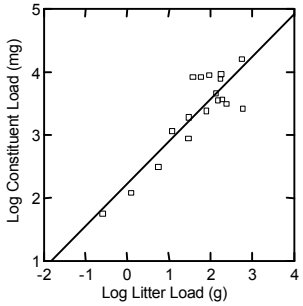

6-20E

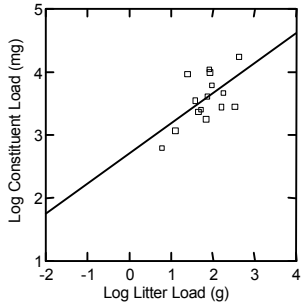

6-20F

R^2 = 0.36

BMP: Bicycle Grate/LID

R^2 = 0.15

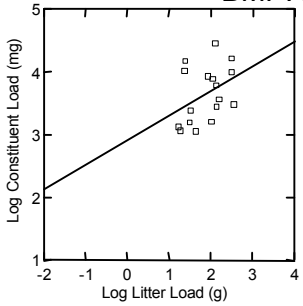

8-23C

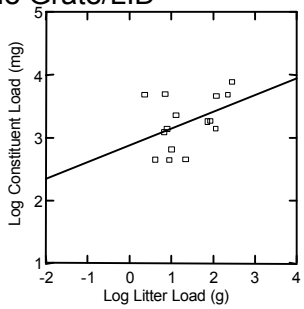

8-B001

R^2 = 0.18

Litter Inlet Deflector Feasibility Study Report

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Lee-Hyung Kim
Haejin Ha
Civil and Environmental Engineering Department
UCLA
May 16, 2000

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Introduction

Stormwater pollution has increased in importance over the past decade and it is now recognized as a greater source of many pollutants to receiving waters than point sources. Stormwater now transports more conventional pollutants to Santa Monica Bay than wastewater treatment plants (Wong et al., 1997). Landuses associated with vehicular activity, such as streets and highways are important sources of pollutants. Catch basins and stormwater inserts are the hydraulic devices that direct stormwater to stormdrains. Materials from highways, such as sediment, litter and debris travel through catch basins and inserts (both will be called inserts in this report) to receiving waters.

Southern California has distinct dry and wet periods. Typically there is no rain from April to November. During this dry period, sediment, litter and debris accumulate in inserts. The inserts must be cleaned or the accumulated material will be flushed into the environment during the first large storm. This in effect concentrates six to eight months' dry accumulation into a single discharge, called a "seasonal first flush." This large discharge magnifies the environmental impact of the pollutants. Large trash plumes along the shores of Santa Monica Bay are routinely observed after such events.

To avoid the negative impacts of the first seasonal flush, public agencies have adopted insert cleaning policies. For example, in the City of Santa Monica, inserts in sensitive areas, or areas of high pedestrian activity, may be cleaned twice per month; other inserts may only be cleaned yearly. When only annual cleaning is performed, it is most desirable to clean at the end of the dry season to remove the accumulated material before the first rain.

Catch basins along freeways are difficult to clean because of access and safety concerns. The crews that perform the cleaning must be protected from traffic. As a result, it may take three crews and several vehicles to create a cleaning team. Only one crew may perform the actual cleaning, while two crews direct traffic. This compares to city streets where cleaning teams can be composed of only one vehicle and two workers. In addition, cleaning disrupts traffic. Consequently cleaning may only be allowed at times of low freeway use.

In an effort to reduce cleaning cost, it is desirable to use alternative insert designs. Inserts that do not accumulate material in dry weather by passing sediment and debris are not a feasible alterative; there is no storm flow for transport. Also, this ignores an opportunity for environmental protection. An alternative is to develop inserts that are closed during dry periods. Debris would be retained on streets or shoulders where it could be removed by street sweepers.

A variant of this procedure has been used by the City of Santa Monica for several years. City crews cover the openings of inserts with plywood boards at the end of the rainy season. The boards are attached to curbs in such a way that a 0.5-inch gap exists to accommodate nuisance water flow. These boards effectively eliminate dry weather accumulation in inserts. They eliminate the need for summer cleaning and prevent putrefaction of accumulated material. Tests conducted by our research group showed that street sweepers remove material that accumulates

in front of the inserts and within the 0.5-inch gap below the board. Screens are also being evaluated for this purpose. The disadvantage of this technique is that the boards must be removed before the first winter storm. Unexpected rainstorms or failure to remove the boards may result in flood risk.

Preventing dry weather accumulation is attractive for several reasons. One is that street sweeping in most places is routinely performed. The additional removal of debris will only marginally increase cost. It is also easier to perform routine yearly maintenance than to implement an intensive maintenance program over one to two months. Finally, protection from accumulation is provided for the periods between storms, which may be as long as one month.

Installing and removing boards such as the Santa Monica Boards are expensive and inconvenient for CalTrans due to the additional cost freeway access and traffic control. A permanent insert cover that can be hydraulically operated was proposed by CalTrans and designed by URS in 1999. UCLA was asked to test prototypes in its full-scale catch basin and flume. This facility was constructed in an earlier project with the City of Santa Monica and the Santa Monica Bay Restoration Project. We have evaluated more than 12 different insert devices and one CDS unit in this laboratory. This report describes the testing program.

Background

CalTrans and URS proposed a "flap gate" or "litter inlet deflector" design in 1999. This design uses a hinged deflector that is kept closed by gravity and forced open by the hydraulic action of storm flows. The deflector is used with a sheet metal cover that transforms an existing insert from a top entering design to a side or curb entering design.

To evaluate the concept, two prototypes were constructed. The first was a modification of the UCLA's existing flume and was performed to test the concept. We cut a 12.5-inch wide opening into our existing flume. A piece of 12-inch wide sheet material with 0.5 inch steel rod formed the deflector and hinge. Various flow rates, deflector angles, deflector materials (aluminum, plastic, fiberglass, etc) and flow deflectors were qualitatively evaluated. Observations and qualitative measurements were made. Suggestions to improve the field prototypes were also made. The first prototype was valuable in that it provided early evidence that the insert deflector concept was feasible, and that the presence of flow deflectors was an important concept in the success of the design.

The second prototype benefited from experience with the first prototype, and used moving parts that were virtually identical to the field devices being evaluated by CalTrans. A new flume had to be constructed to accommodate the second prototype.

Figure 1 shows the testing system for the second prototype. The top and middle portions of the figure are plan and section views, respectively. The lower part of the figure shows details of the deflector and flow director designs.

City water is used for testing. The flume is connected by 3-inch diameter pipe to an isolated water supply that is protected from cross connections. Water flows to a stilling chamber and is controlled by an isolation valve (not shown) and a control valve. High flows rates are measured by an ultrasonic flow measuring device (not shown); low flow rates, used for virtually all the experiments described in this report, are measured by a paddle wheel flow meter (Cole Palmer). The operating range of the flume is approximately 15 to 175 gallons per minute (GPM). A larger range is possible with replumbing but was not necessary for these experiments.

The pipe size is reduced to 2-inch diameter and flows through a "tee" which accommodates the paddle wheel flow meter. After the flow meter, the water enters the stilling tank. The stilling tank dissipates the water pressure and removes velocity currents. The water flows under, over and under three baffles (better seen from the elevation view in the middle of Figure 1). Finally, the water enters the flume.

The flume is 25 inches wide and has a perpendicular slope of 1-inch per 24-inches or 4.2%. This slope simulates the slope of the shoulder of a roadway, and has been used consistently in our testing. Flow proceeds down the flume to the deflector and catch basin. There is no slope along the flume. The slope is provided by water elevation (i.e., the water level in the stilling basin rises to create sufficient head to flow to the catch basin).

The deflector is cut into the left side of the flume. Figures 2 and 3 show the flume opening and inlet deflector. The deflector is hinged at the top using a hollow 0.5-inch OD Teflon tube. A 3/8-inch diameter aluminum dowel is inserted through the center of the Teflon tube to provide support. The dowel is secured at each end to the flume wall. The deflector has two semi-circular hinges that partially wrap the outside of the Teflon tube. The deflector is free to swing around the Teflon tube through movement of the semi-circular hinges relative to Teflon tube, as well as the Teflon tube relative to the aluminum dowel. The second degree of freedom was provided in anticipation of dust or other debris interfering with the circular hinges. During this study, movement always occurred between the hinges and Teflon tube, which probably results because the surface area of contact is less (i.e., less friction).

The top of the deflector is secured using movable pillow blocks. The pillow blocks can be moved back and forth to allow different resting angles to be created. In this manner, the deflector angle can be changed from vertical to approximately 60 degrees (top sloping toward the flume). Various "set back" distances can be used as well. The deflector can be set so that the bottom of the deflector rests against the edge of the flume, which means the top of the deflector extends into the flume at deflector angles less than 90. Aluminum angles were constructed to allow the bottom of the flume edge to extend outward 1 or 2 inches. When these spacers were used, the deflector hinge is not required to rest above the flume with non-zero deflector angles.

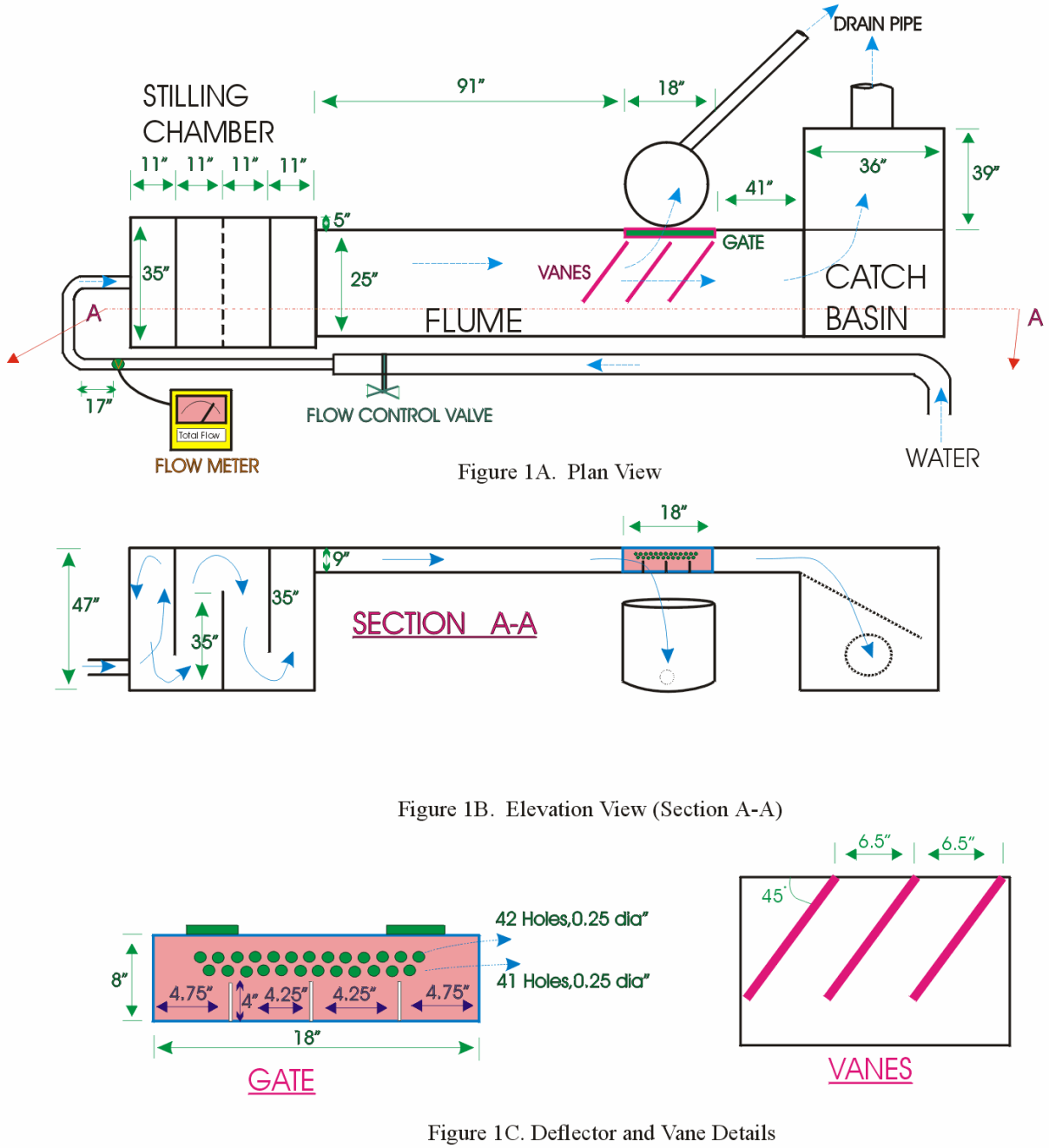

Figure 1. Litter Inlet Deflector Test System with Vanes

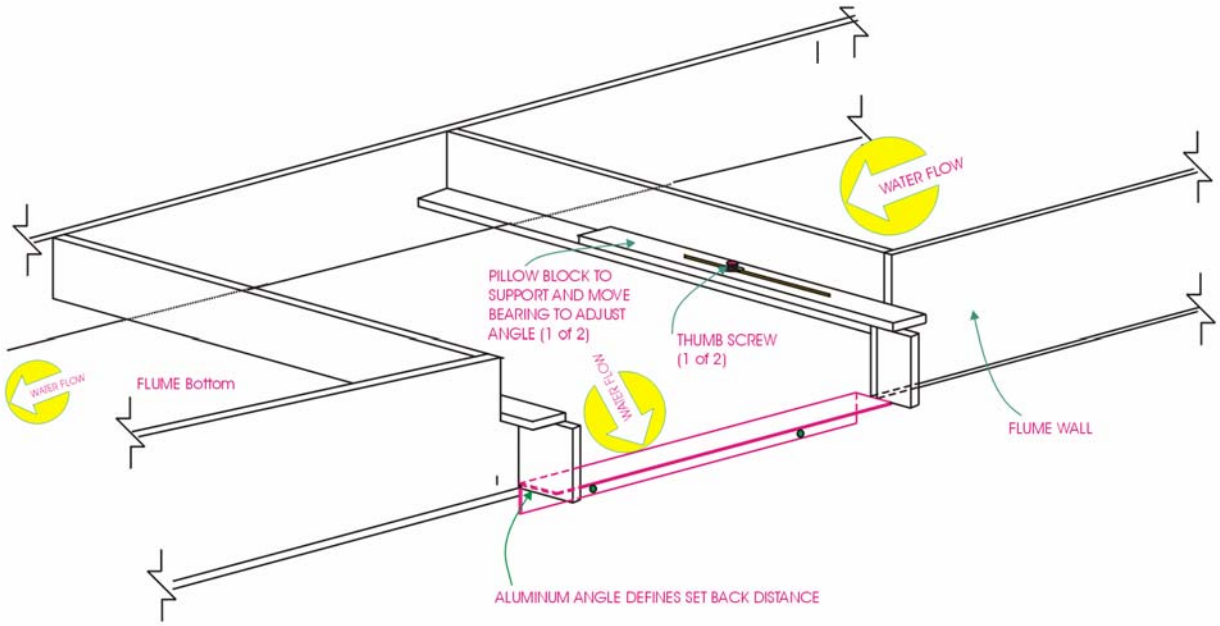

Figure 2. Flume Showing Opening for Inlet Deflector

Figure 2. Flume Showing Opening for Inlet Deflector

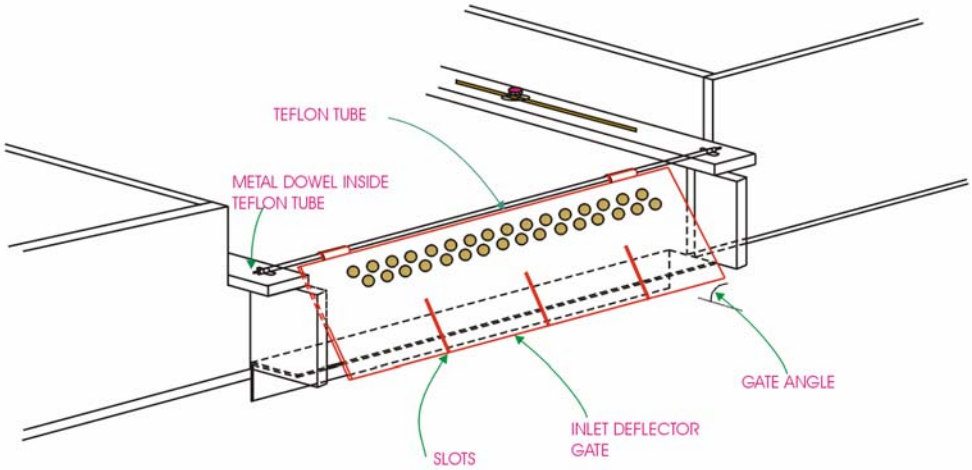

Figure 3. Flume Showing Inlet Deflector in Flume Opening

Figure 3. Flume Showing Litter Inlet Deflector in Flume Opening

The deflectors were constructed of 1/8-inch thick aluminum. This deflector size represents the smallest of the full-scale deflectors used in the field studies. Holes, 0.25 inches in diameter, were drilled in the top of the deflector to reduce weight and the center of gravity. The holes were specified by URS. Slots were also cut into the deflector to allow nuisance water to pass through the deflector without requiring the deflector to open. In the first designs, circular holes were specified, but slots were chosen to avoid clogging. Deflectors were constructed with slots that penetrated the deflector and grooves that created a vertical water path but did not penetrate the deflector. Grooves and slots were evaluated because water can pass through the slots, reducing the force to open the deflector. Experiments were performed with grooves, slots and taped slots.

Water flowing through the deflector was trapped in a plastic tank. The tank had a 1.5-inch diameter PVC pipe outlet. The pipe was connected to the tank with a short length of flexible hose. If the pipe is lowered to a horizontal position, the water flows out of the tank. If the pipe is lifted to the vertical position, water is retained in the tank. Water that bypasses the deflector flows to the catch basin and exits the system through the 12-inch diameter drainpipe.

Vanes were placed in front of the deflectors. The object of the vanes is to direct the flowing water against the deflector to force it open. Various devices were evaluated for directing water flow. The bulk of the tests used 0.5-inch square dowels, as shown in the bottom right corner of Figure 1. Bot dots and a 3/4-inch drop were also evaluated, and are shown in Figure 4.

The flow meters were calibrated with each other and using displaced volume. The time required to raise the water level in the stilling tank can be used to verify flow meter accuracy. The paddle wheel and ultrasonic flow meter were operated in parallel and agreed within 5%. The ultrasonic flow meter was not used during these experiments because of the time required to obtain stable conditions. The injected air to create target surface area was difficult adjust to an ideal rate. At higher flow rates, or with smaller feed pipes, the injected air is easier to adjust. The paddle wheel meter required no air injection and allowed more rapid flow measurement.

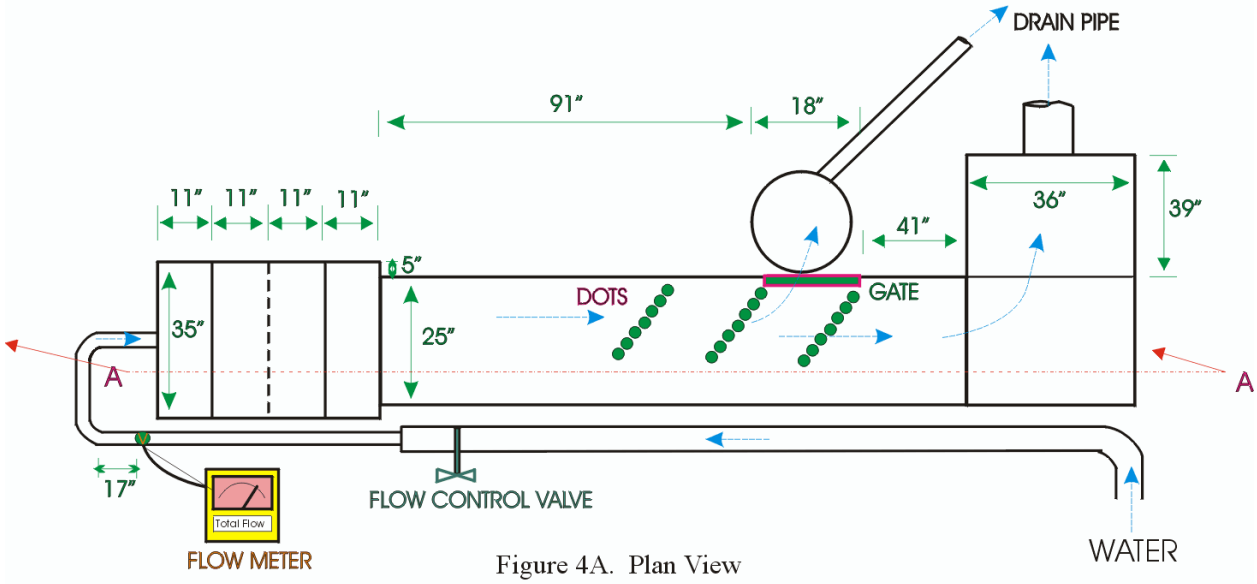

Figure 4A. Plan View

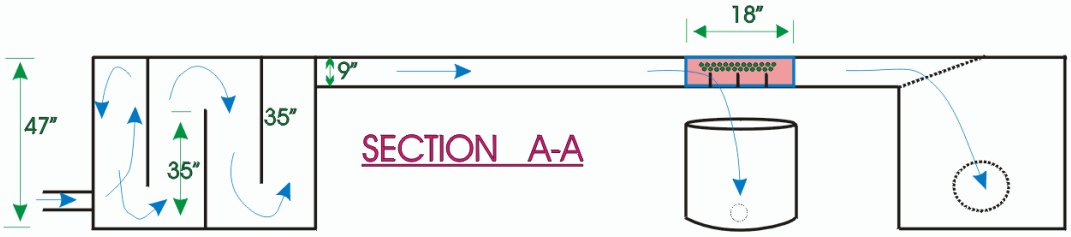

Figure 4B. Elevation View (Section A-A)

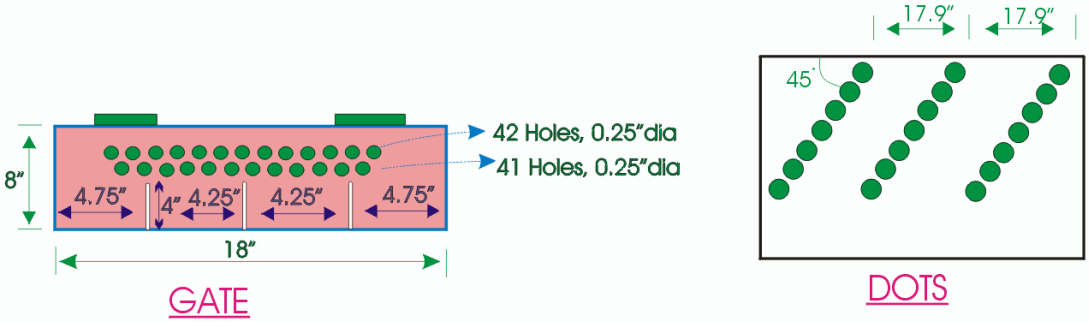

Figure 4C. Deflector and Vane Details

Figure 4. Litter Inlet Deflector System with Bot Dots.

Test Protocol

Tests were performed in the following way:

1. At the beginning of a new day of testing, city water was allowed to flow through the flume at high flow rate (~100 GPM) for a few minutes to allow corrosion products and dust to flush from the system. The building piping is old and corrosion products accumulate in the feed pipe after several days of non-use.
2. The flume was equipped with the desired deflector and vane configuration and flow rate was adjusted to the desired value.
3. The system was allowed to run for a few minutes to insure stable conditions.
4. The pipe was lifted to retain the water flowing through the deflector. At the same time a timer was started.
5. The experiment continued until the bypass tank filled. The time was recorded. Efficiency was calculated by dividing the volume of water collected in the tank (calculated by multiplying the height of water in the tank by the area of the tank) by the volume of water flowing through the system during the elapsed time. In general, each condition was replicated three times. Replications were very close, and usually agreed within 2 to 3%.

Test results were analyzed and plotted using a spreadsheet.

Test Summary

Table 1 summarizes test conditions. Eighteen tests or series of tests were performed. Column 1 shows the test number or series. Tables and graphs are presented later and correspond to this number. Flow rate is shown in column 2; "various" corresponds to a test when flow was varied to obtain efficiency over a range of flow rates. Columns 3 to 5 describe the deflector. In two experiments no deflector was present; these tests were used to compare the deflector and a bare opening. "Tape" refers to the slots shown and described previously. If the tape is present (Y), the slots were taped (making them grooves) which allowed less water to flow through the slots, and generally increased performance. Angle refers to the deflector angle; 90 degrees corresponds to a vertical deflector. When "various" appears, it means the test was conducted over a range of angles to evaluate the impact of angle.

Column 7 refers to the number of vanes used to direct the flow. The number zero refers to a flat flume with no vanes or flow directors. Blank refers to some other type of flow director, as shown in column 11 or 12. Column 8 and 9 show the amount of set back. The set back is the distance from the bottom of the deflector to the edge of the flume. The set back is created by inserting a machined aluminum piece to create the specified distance. In field installations, the set back distance is part of the design and does not require a machined piece. Column 10 shows the presence or absence of 3/8-inch tabs on the flume-side of the deflector. Tabs were evaluated because they appeared to be an excellent way of increasing the hydraulic force available to open the deflector.

Columns 11 and 12 refer to other flow directors. The drop cavity is a 3/4-inch drop in front of the deflector. This was created by elevating the level of the flume 3/4-inches by placing sections of 3/4-inch plywood in the flume. The plywood was not placed in front of the deflector. This arrangement resulted in a drop in front of the flume, and is important because it is the most efficient method of operation. "Bot dots" refers to the use of plastic circles commonly used on freeways. They were glued to the surface of the flume to create flow towards the deflector. Figure 4 shows this configuration.

Table 1. Test Summary

Test	Q_T	Deflector			Deflector angle	Vanes	Set Back		Tabs	Drop Cavity (3/4")	Dots
	(GPM)	Opening (no deflector)	Deflector (with tape)	Deflector (without tape)	Angle(degree)	Number of vanes	1"	2"			
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
1	various			Y	90	3	Y				
2	various	Y				3	Y				
3	various			Y	90	0	Y				
4	various	Y				0	Y				
5	31.3		Y		various (67~90 degree)	3	Y				
6	31.3		Y		90	3	Y				
7	31.3			Y	90	3	Y				
8	31.3			Y	90	3	Y		Y		
9	31.6		Y		various (63~90 degree)	3		Y			
10	31.6			Y	90	3		Y			
11	31.6			Y	90	3		Y	Y		
12	various			Y	90	3		Y			
13	25.6		Y		various (63~90 degree)	3		Y			
14	35.6		Y		various (63~90 degree)	3		Y			
15	various			Y	80 and 85	3		Y			
16	various			Y	85			Y		Y	
17	various			Y	85			Y			2
18	various			Y	85			Y			3

Results and Discussion

The first few tests were conducted to determine the range of deflector operation and the range of deflector angle. Generally, flow rates of 20 to 40 GPM were selected for testing. Below 20 GPM, most alternatives were very efficient. Flow rates above 40 to 50 GPM are beyond the capacity of an 18-inch wide deflector; therefore testing was generally conducted between 20 and 40 GPM.

Results for the various conditions are reported in tabular and graphical format. Table 2 shows the results for test 1. Data for the remaining tests are shown in the Appendix. In Test 1, flow rates from 21 to 38 GPM were evaluated with three vanes and the inlet deflector. The angle of the deflector was 90 degrees (from Table 1).

Table 2. Test 1 with 3 vanes and litter inlet deflector at 90 deg.

Q_T(GPM)	Q_G(GPM)	Q_B(GPM)=Q_T-Q_G	Efficiency for Q_G
21.00	20.00	1.00	95.24
25.13	21.80	3.33	86.75
28.70	24.15	4.55	84.15
38.15	32.26	5.89	84.56

Figure 5 compares the results all tests that had varying flow rates. Tests 1 to 4 are shown in the upper graph. This most basic series of tests compares vanes with no vanes and an inlet deflector with no deflector. The most important parameter observed in these tests is the method of directing flow towards the deflector. Without vanes, even an open flume does not efficiently divert flow. The defector reduces efficiency by only 5 to 10 percent.

The results of tests 12 and 15 through 18 are shown in the lower graph. These tests were performed after determining the optimum angle for the deflector (85 degrees). Test 12 is comparable to Test 1, showing that the 2-inch set back is more efficient that a 1-inch set back. Tests 17 and 18 evaluate bot dots, which are not as efficient as the vanes. Test 16 is the most efficient of the entire program, and used a 3/4 inch depression or drop in front of the deflector.

Figure 6 compares deflector angle for various conditions. The improved performance of the 2-inch set back over 1-inch set back is easily observable. One can conclude from this graph that the greatest angle that will keep the deflector closed in dry conditions is best for overall performance.

Figure 7 shows the effect of grooves, slots and tabs. The effect of these different treatments are small.

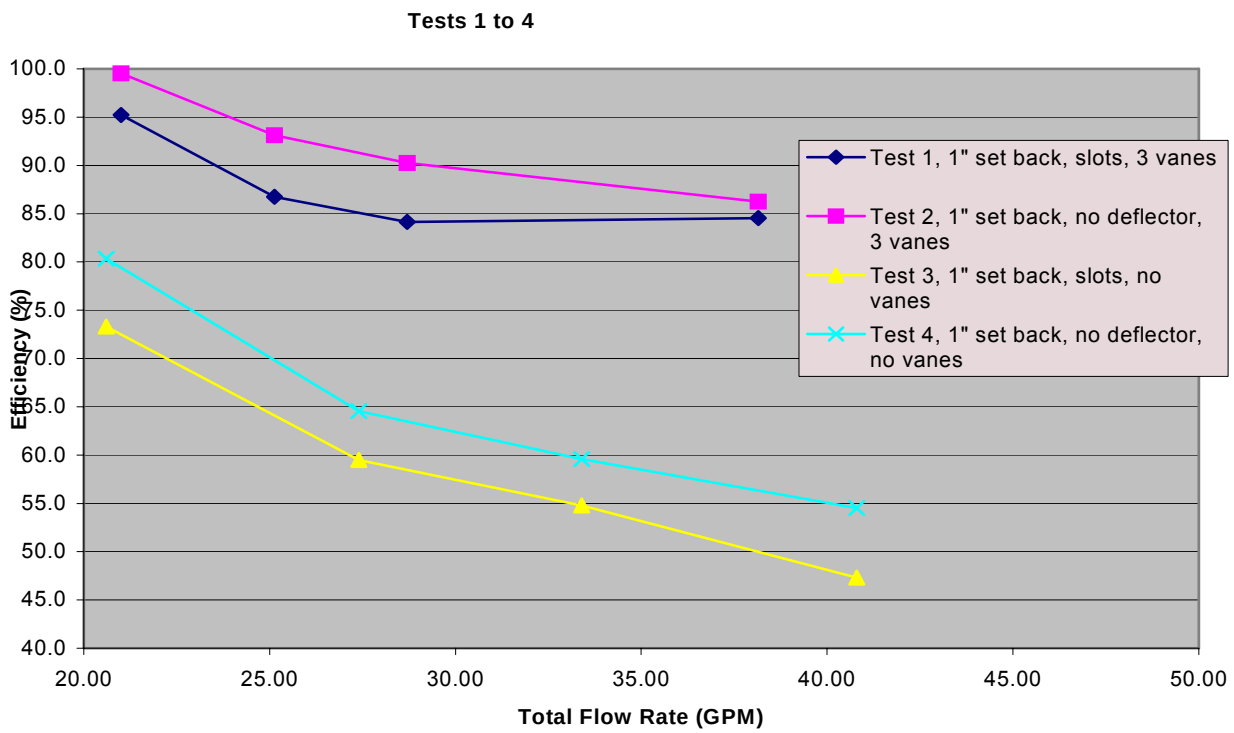

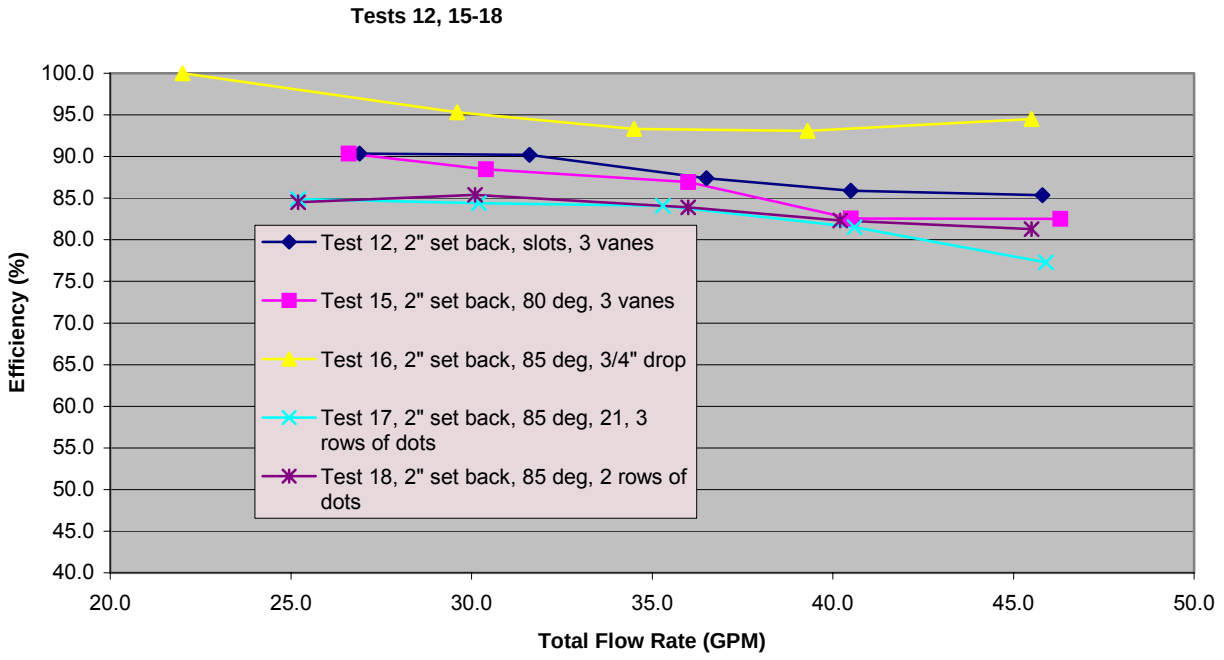

Figure 5. Litter Inlet Deflector Efficiency versus Flow Rate for Various Conditions.

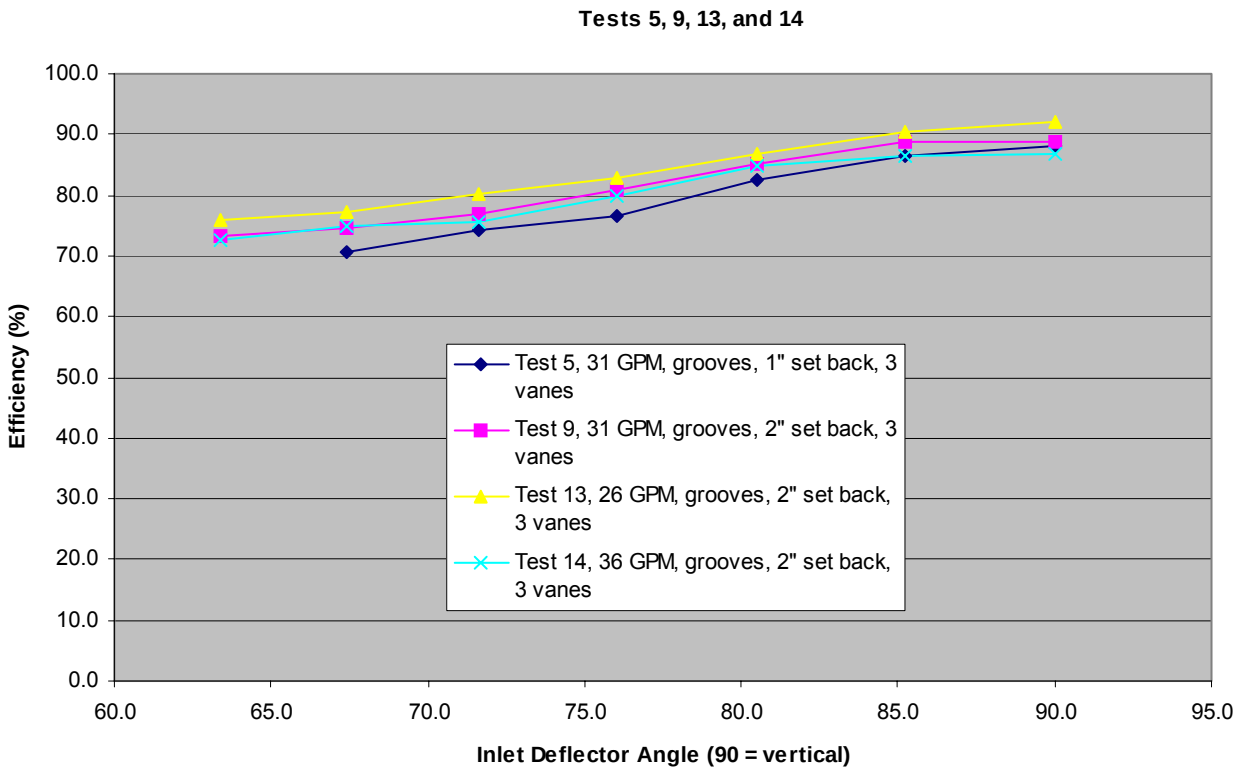

Figure 6. Effect of Inlet Deflector Angle for Various Conditions.

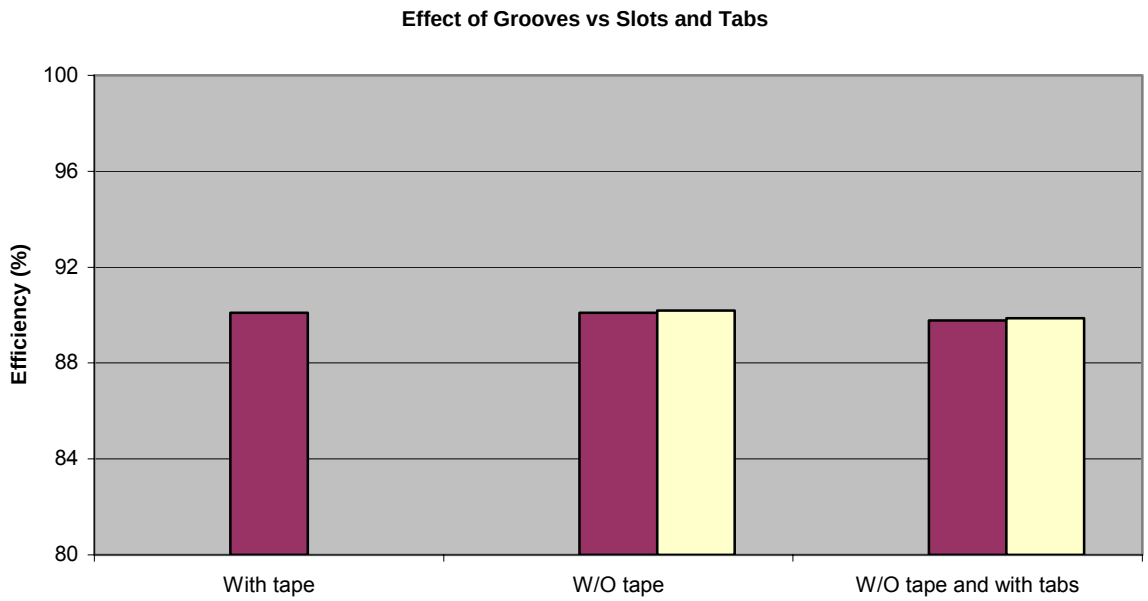

Figure 7. Effect of Grooves., Slots and Tabs at 32 GPM.

The raw data are in the Appendix and can be reviewed if more information is desired. .

The following observations are made:

At lower flow rates, an open flume (no deflector) flow diverters (3 vanes) was nearly 100% efficient. Flow diversion decreased to 86% at 38 GPM. These same conditions with an inlet deflector resulted in 95 and 84% diversion. Therefore the deflector only marginally reduced flow diversion. For the best case (3/4 drop, Test 16), the efficiency of the diversion efficiency of the litter inlet deflector was better than an open flume with three vanes.
The vanes or flow diverters are essential to litter inlet deflector operation. An open flume without vanes diverts only 54% of the flow at 40 GPM, as compared to 86% with vanes. The results are similar when an inlet deflector is installed.
The most efficient deflector angle is 90 degrees (vertical), which is not practical since there is insufficient force to keep the deflector closed in dry conditions. An angle of 85 degrees works nearly as well and is sufficient to keep the deflector closed. If lesser angles are required, the efficiency is reduced, which can be compensated by a longer litter inlet deflector for the same flow conditions. The angle of the deflector has about the same impact on efficiency at different flow rates.
The presence or absence of tabs on the deflector only marginally changed efficiency. They should not be used since they provide no benefit and they present an opportunity for clogging.
The performance of slots and grooves is quite similar. Grooves might be a better choice to reduce the chance of clogging and dust entry, although slots will be easier to manufacture.
Bot Dots were less efficient than other flow diverters.
The 3/4-in depression in front of the deflector was the best flow diverter.

Conclusions

A litter inlet deflector utilizing the action of flowing water to open can be constructed to collect freeway runoff. The deflector with flow diversion methods such as vanes or a depression in the street is more efficient that an opening without flow diversion. An 18-inch long deflector can divert 20 to 40 GPM at 100 to 95% efficiency, respectively.

Reference

Wong, K., E.W. Strecker and M.K. Stenstrom, “A Geographic Information System to Estimate Stormwater Pollutant Mass Loadings,” *Journal of the Environmental Engineering Division*, ASCE, Vol. 123, pp. 737-745, 1997.

Appendix

Test 2 Case with 3 vanes and no inlet deflector

Q_T(GPM)	Q_G(GPM)	Q_B(GPM)=Q_T-Q_G	Efficiency for Q_G
38.15	32.90	5.25	86.24
28.70	25.90	2.80	90.24
25.13	23.40	1.73	93.12
21.00	20.90	0.10	99.52

Test 3 Case with inlet deflector and no vanes

Q_T(GPM)	Q_G(GPM)	Q_B(GPM)=Q_T-Q_G	Efficiency for Q_G
40.80	19.30	21.50	47.30
33.40	18.30	15.10	54.79
27.40	16.30	11.10	59.49
20.60	15.10	5.50	73.30

Test 4 Case with no inlet deflector and no vanes

Q_T(GPM)	Q_G(GPM)	Q_B(GPM)=Q_T-Q_G	Efficiency for Q_G
40.80	22.24	18.56	54.51
33.40	19.90	13.50	59.58
27.40	17.69	9.71	64.56
20.60	16.55	4.05	80.34

Test 5 Different angle case with 1 inch set back, vanes and tape (Q_T=31.1 GPM)

Angle of inlet deflector	Q_G(GPM)	Q_B(GPM)=Q_T-Q_G	Efficiency for Q_G
90.0	27.4	3.7	88.2
85.2	26.9	4.2	86.5
80.5	25.7	5.4	82.6
76.0	23.8	7.3	76.5
71.6	23.1	8.0	74.3
67.4	22.0	9.1	70.7

Test 6, 7 and 8 Cases of 90 degree angle with Q_T=31.3 GPM

Test	Type of flap	Q_G(GPM)	Q_B(GPM)=Q_T-Q_G	Efficiency for Q_G
6	With tape	28.2	3.1	90.1
7	W/O tape	28.2	3.1	90.1
8	W/O tape and with tabs *	28.1	3.2	89.8

Test 9 Different angle case with 2 inch piece, vanes and tape (Q_T=31.6 GPM)

Angles of inlet deflector	Q_G(GPM)	Q_B(GPM)=Q_T-Q_G	Efficiency for Q_G
90.0	28.1	3.5	88.8
85.2	28.1	3.5	88.8
80.5	26.9	4.7	85.1
76.0	25.5	6.1	80.7
71.6	24.3	7.4	76.7
67.4	23.6	8.0	74.7
63.4	23.1	8.5	73.2

Test 10 and 11 Cases of 90 degree angle with Q_T=31.6 GPM

Test	Type of flap	Q_G(GPM)	Q_B(GPM)=Q_T-Q_G	Efficiency for Q_G
10	W/O tape	28.5	3.1	90.2
11	W/O tape and with tabs	28.4	3.2	89.9

Test 12 Case with 2 inch set back, 90 degree angle of inlet deflector, no tabs and no tape

Q_T(GPM)	Q_B(GPM)	Efficiency(%)
26.9	24.3	90.3
31.6	28.5	90.2
36.5	31.9	87.4
40.5	34.8	85.9
45.8	39.1	85.4

Test 13 Different angle case with 2 inch set back, vanes and tapes (Q_T=25.6 GPM)

Angles of inlet deflector	Q_G(GPM)	Q_B(GPM)=Q_T-Q_G	Efficiency for Q_G
90.0	23.6	2.0	92.2
85.2	23.1	2.5	90.4
80.5	22.2	3.4	86.7
76.0	21.2	4.4	82.8
71.6	20.5	5.1	80.1
67.4	19.8	5.8	77.3
63.4	19.5	6.1	76.1

Test 14 Different angle case with 2 inch set back, vanes and tape (Q_T=35.6 GPM)

Angles of inlet deflector	Q_G(GPM)	Q_B(GPM)=Q_T-Q_G	Efficiency for Q_G
90.0	30.9	4.7	86.9
85.2	30.8	4.9	86.4
80.5	30.2	5.4	84.9
76.0	28.5	7.2	79.9
71.6	26.9	8.7	75.6
67.4	26.7	8.9	75.0
63.4	25.9	9.7	72.8

Test 15 Cases of 80 and 85 degree inlet deflector angle with 2 inch set back, no tabs and no tape

Q_T(GPM)	85 degree		80 degree	
	Q_B(GPM)	Efficiency(%)	Q_B(GPM)	Efficiency(%)
26.6	24.0	90.3	22.8	85.7
30.4	26.9	88.5	26.5	87.2
36.0	31.3	86.9	30.0	83.3
40.5	33.4	82.5	32.7	80.7
46.3	38.2	82.5	37.0	79.9

Test 16 Case with ¾ inch board, 2 inch piece, no tape, no tabs and 85 degree inlet deflector angle

Q_T(GPM)	Q_G(GPM)	Efficiency (%) for Q_G
22.0	22.0	100.0
29.6	28.2	95.3
34.5	32.2	93.3
39.3	36.6	93.1
45.5	43.0	94.5

Test 17 Case with dots, 2 inch piece, no tape, no tabs and 85 degree inlet deflector angle (3 rows, each row=7 dots)

Q_T(GPM)	Q_G(GPM)	Efficiency (%) for Q_G
25.2	21.4	84.9
30.2	25.5	84.4
35.3	29.7	84.1
40.6	33.1	81.5
45.9	35.5	77.3

Test 18 Case with dots, 2 inch piece, no tape, no tabs and 85 degree inlet deflector angle (2 rows, each row=7 dots)

Q_T(GPM)	Q_G(GPM)	Efficiency (%) for Q_G
25.2	21.3	84.5
30.1	25.7	85.4
36.0	30.2	83.9
40.2	33.1	82.3
45.5	37.0	81.3

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United States
Environmental
Protection Agency

Office of Wetlands, Oceans and Watersheds
Washington, DC
(4502F)

EPA 843-B-00-003
October 2000

GUIDING PRINCIPLES FOR CONSTRUCTED TREATMENT WETLANDS:

Providing for Water Quality and Wildlife Habitat

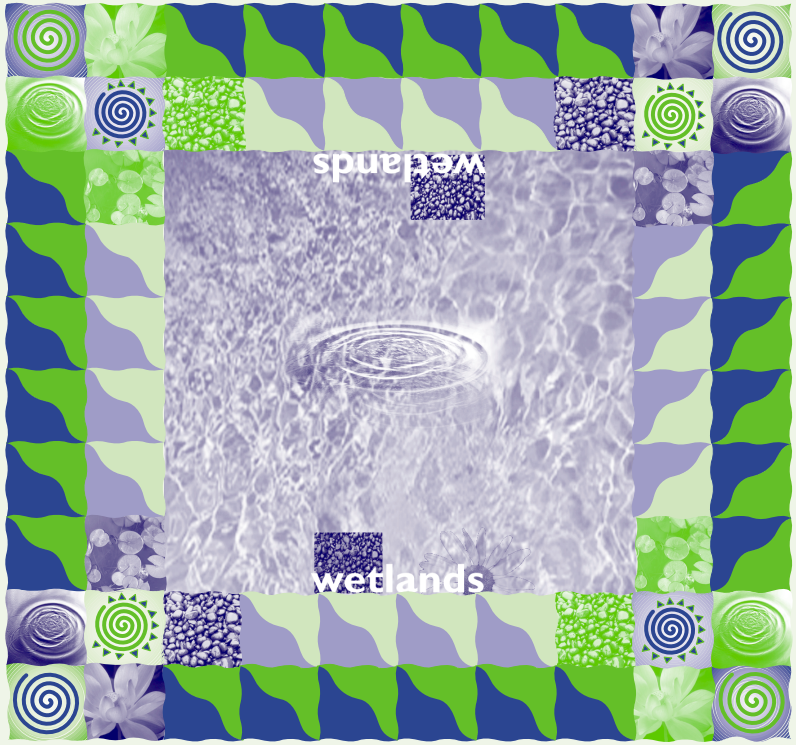

October 2000

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Environmental Protection Agency

Natural Resources Conservation Service

U.S. Fish and Wildlife Service

National Marine Fisheries Service

U.S. Bureau of Reclamation

U.S. Army Corps of Engineers

Guiding Principles for Constructed Treatment Wetlands: Providing for Water Quality and Wildlife Habitat

DEVELOPED BY THE INTERAGENCY WORKGROUP ON CONSTRUCTED WETLANDS

Environmental Protection Agency, U.S. Army Corps of Engineers, U.S. Fish and Wildlife Service, Natural Resources Conservation Service, National Marine Fisheries Service, and U.S. Bureau of Reclamation

** This is a guidance document only - it does not establish legally binding requirements or regulations*

This User's Guide Provides:

- Guiding principles for planning, siting, design, construction, operation, maintenance, and monitoring of constructed treatment wetlands.
- Information on current Agency policies, permits, regulations, and resources.
- Answers to common questions.

Acknowledgements

This document is the result of the collective efforts of many individuals. All members of the Interagency Workgroup on Constructed Wetlands, listed in Appendix V, worked extremely hard reviewing multiple drafts to make these Guiding Principles a reality. The Environmental Protection Agency's Wetlands Division extends its heartfelt gratitude to all Workgroup members for their contributions. The Wetlands Division would like to make special recognition of Bob Bastian and Fran Eargle, who led the efforts of the Workgroup from its inception, and of Matt Little, who worked tirelessly to develop the document and incorporate the comments of the members. It is the hope of the Workgroup that this guidance will help improve the planning, siting, design, construction, operation/maintenance, and monitoring of constructed treatment wetlands that aim to provide water quality and wildlife habitat.

Considerable insight into the design, construction, and operation issues facing treatment wetlands that support valuable wildlife habitat was gained by many members of the Workgroup during a Wetlands Roundtable meeting and field trip to Phoenix and ShowLow, AZ, in November 1997. The Workgroup greatly appreciated the input and assistance provided by Paul Kinshella and Roland Wass from the City of Phoenix and others associated with the Tres Rios Project, as well as the insights provided by many others, especially Bob Knight, Bob Kadlec, Sherwood Reed, Bob Gearheart, Brad Finney, Jim Kreissl, and Mel Wilhelm, all of whom shared many examples of interesting situations from their extensive personal experiences working with constructed wetlands projects in various parts of the country.

Disclaimer

This document provides guidance to Environmental Protection Agency (EPA) Regions, States, Tribes, Local Governments, and other organizations and individuals involved in the planning, siting, design, construction, operation/maintenance, monitoring, and legal oversight of constructed treatment wetlands. It also provides guidance to the public and the regulated community on how EPA intends to exercise its discretion in implementing the Clean Water Act as it relates to constructed treatment wetlands. The guidance is designed to implement national policy on these issues. The document does not, however, substitute for the Clean Water Act or EPA's regulations; nor is it a regulation itself. Thus it cannot impose legally binding requirements on EPA, States, or the regulated community, and may not apply to a particular situation based upon the circumstances. EPA and State decision-makers retain the discretion to adopt approaches on a case-by-case basis that differ from this guidance where appropriate. EPA may change this guidance in the future.

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I Introduction

A. Purpose and Background

Purpose: *To promote the development of environmentally-beneficial constructed wetlands for water treatment systems by providing information on the legal, policy, and technical issues associated with these systems as well as guidelines for those developing and managing constructed treatment wetlands.*

Background: The number of constructed treatment wetland projects receiving wastewater from municipal and industrial treatment sources as well as agricultural and storm water sources has increased to more than 600 active projects across the United States. If planned properly, these treatment wetlands offer opportunities to regain some of the natural functions of wetlands and offset some of the significant losses in wetland acreage. In arid regions and communities reaching the limits of water availability, water reuse via these systems is an attractive option that may help achieve water conservation and wildlife habitat goals. With appropriate siting, design, preapplication treatment, operation, maintenance, monitoring, and management, these manmade systems can often emulate natural wetlands by providing integrated ecological functions within the watershed and landscape.

Constructed treatment wetland project proponents and regulators have expressed a desire for more efficient and consistent policy guidelines for the development and permitting of such projects, especially those providing both water quality and wildlife habitat benefits. An initial effort to develop this guidance was funded by Environmental Protection Agency (EPA) Environmental Technology Initiative (ETI) Program. A Workgroup[1] was formed to identify general policy and permitting issues for a constructed treatment wetlands project, the Tres Rios Constructed Wetlands in Phoenix, Arizona. The Tres Rios Constructed Wetlands project is a wildlife habitat and treatment wetland proposed by the City of Phoenix, the U.S. Army Corps of Engineers, the U.S. Bureau of Reclamation, and other organizations. For more information on the Tres Rios Constructed Wetlands Demonstration Project see their website at http://www.tresrios.net .

In September 1997, EPA convened a Federal Interagency Workgroup consisting of the U.S. Army Corps of Engineers, U.S. Fish and Wildlife Service, National Marine Fisheries Service, Natural Resources Conservation Service, and the U.S.

[1]The ETI Project Workgroup that participated in this effort included active participation by representatives from the City of Phoenix and their contractor, CH_2M-Hill (and Wetland Management Services); EPA and its contractor, SAIC; U.S. Bureau of Reclamation; U.S. Army Corps of Engineers; U.S. Fish and Wildlife Service; AZ Dept. of Water Resources; AZ Dept. of Environmental Quality; AZ Game & Fish Dept; along with extensive input from many local organizations interested in the proposed Tres Rios Project.

Bureau of Reclamation to evaluate the technical and policy issues identified by the ETI project team (see their final report entitled *Wetlands for Water Quality Management and Habitat Enhancement: Policy and Permitting Issues*, January 1997) in order to provide a starting point for a national policy dialogue and for analysis of the issues associated with these wastewater treatment systems and the wildlife habitat they may be able to provide. Common factors in successful constructed treatment wetland projects and lessons learned from less successful projects provided, in part, the basis for development of the technical and policy recommendations in these guidelines.

The process of writing and reviewing the guiding principles was highly educational, collaborative, and iterative. The Workgroup decided to ***focus upon and encourage those projects that not only provide water treatment, but also strive to provide water reuse, wildlife habitat, and public use benefits.*** While this document focuses on municipal wastewater treatment wetlands, many of the principles can be used to help guide other treatment wetland projects, such as those treating acid mine drainage, agricultural and urban storm water runoff, livestock and poultry operations, and industrial wastewater. Information from specific case study projects, and scientific literature was used to develop these principles, along with technical information provided by constructed wetlands experts and dialogue during the Workgroup meetings. We hope this document will facilitate the establishment of future projects, while improving compliance with the Clean Water Act (CWA).

B. What are Constructed Treatment Wetlands?

For the purposes of these Guiding Principles, constructed treatment wetlands are defined as engineered or constructed wetlands that utilize natural processes involving wetland vegetation, soils, and their associated microbial assemblages to assist, at least partially, in treating an effluent or other water source. In general, these systems should be engineered and constructed in uplands, outside waters of the U.S., unless the source water can be used to restore a degraded or former wetland (see II.B "Opportunities for Restoration of Degraded or Former Wetlands").

The degree of wildlife habitat provided by constructed treatment wetlands, or sections of these wetlands, varies broadly across a spectrum. At one end of the spectrum are those systems that are intended only to provide treatment for an effluent or other water source, in order to meet the requirements of the CWA, and that provide little to no wildlife habitat. At the other end are those systems that are intended to provide water reuse, wildlife habitat, and public use,

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while also providing a final polishing function for a pretreated effluent or other water source. This guidance primarily addresses the latter end of this spectrum.

C. What Are the Guiding Principles?

The Guiding Principles are intended to:

- provide a framework for promoting sustainable, environmentally safe constructed treatment wetland projects.
- be usable nationally under a variety of settings and circumstances.
- educate and inform public and private decision makers, Federal, State, Tribal and Local regulatory and resource agency personnel, and the general public.
- provide guidance for environmental performance, especially for projects which are intended to provide water reuse, wildlife habitat, and public use, in addition to other possible objectives.
- highlight opportunities to restore and create wetlands.
- be applied, when appropriate, to any effluent or other source water treatment system as long as the source is adequately treated to meet applicable standards, protects the existing beneficial uses, and does not degrade the receiving waters.
- create opportunities for beneficial uses of dredged material, if feasible.
- minimize risks from contamination, toxicity, and vector-borne disease.
- be applied in a watershed context.
- be flexible enough to accommodate regional differences in climate, hydrogeomorphology, wildlife habitat needs, etc.
- complement Federal, Regional, State, Tribal, or Local authority, rules, and regulations and policies.

II Guidelines for Siting Constructed Treatment Wetlands

A. Waters of the U.S. and Floodplains

Constructed treatment wetlands should generally be constructed on uplands (outside waters of the U.S.) and outside floodplains or floodways (unless the next section, II.B, applies) in order to avoid damage to natural wetlands and other aquatic resources. Also, wetlands constructed on uplands may be somewhat more predictable than natural wetlands in terms of pollutant removal efficiency and in structural soundness. This is believed to be due to the engineering of constructed wetlands to provide favorable flow capacity and routing patterns (excerpted from Strecker, et al., 1992). Consequently, siting may include consideration of such factors as flood control, hydraulic routing, flood damage potential, and wetland hydrology. (For more information on waters of the U.S., see VII.A "Clean Water Act and 'Waters of the U.S.,'" Appendix I: "Waters of the U.S.," and Executive Order 11988, *Floodplain Management*.)

B. Opportunities for Restoration of Degraded or Former Wetlands

Opportunities exist to use pretreated effluent, or other source waters, to restore degraded wetland systems. In general, you should only locate constructed treatment wetlands in existing wetlands, or other waters of the U.S., if (1) the source water meets all applicable water quality standards and criteria, (2) its use would result in a net environmental benefit to the aquatic system's natural functions and values, and (3) it would help restore the aquatic system to its historic, natural condition. Prime candidates for restoration may include wetlands that were degraded or destroyed through the diversion of water supplies, a common occurrence in the arid western U.S., and in heavily farmed or developed regions. You should avoid siting in degraded wetlands if the functions and values of the existing wetland will be adversely affected or water quality standards will be violated. The appropriate Regional/District or State authorities will make these determinations on a case-by-case basis. (Note: Many degraded wetlands are still considered waters of the U.S.)

C. Watershed Considerations

When developing a constructed treatment wetland, you should consider its role within the watershed, as well as within the broader ecosystem context of the region. Aspects of this role include: potential water quality impacts (physical, chemical, biological, thermal) to surface waters and groundwater; surrounding and upstream land uses; location of the wetland in relation to wildlife corridors

or flyways; potential threats from the introduction of non-native plant or animal species; and local citizens' perception of the appropriateness of constructed treatment wetlands in their watershed. Whenever possible, your constructed treatment wetland project should be planned in the context of a community-based watershed program.

D. Water-Depleted and Effluent-Dependent Ecosystems

Constructed treatment wetland projects may provide valuable ecological benefits in regions where water resources, and especially wetlands, are limited due to climatic conditions and human-induced impacts, such as in the arid western U.S., heavily farmed regions, and developed areas. For example, in the arid west, there are often historic (now degraded) wetlands that no longer have a reliable water source due to upstream water allocations or sinking groundwater tables. Pretreated effluent from wastewater treatment plants and seasonal return irrigation flows may be the only sources of water available for these areas and their dependent ecosystems.

Please note that water quality standards and permitting requirements apply if these areas are still considered waters of the U.S. EPA has developed regional guidance to assist dischargers and regulators in demonstrating a net ecological benefit from maintenance of a wastewater discharge to a waterbody (*Guidance for Modifying Water Quality Standards and Protecting Effluent-Dependent Ecosystems*, U.S. EPA Region 9 Interim Final Guidance, 1992).

E. Other Site Selection Factors

The suitability of a site for constructing a treatment wetland may depend on the condition of one or more of the following factors: substrate, soil chemistry, hydrology/geomorphology, vegetation, presence of endangered species or critical habitat, wildlife, cultural/socioeconomic impacts including environmental justice issues, the surrounding landscape, land use/zoning considerations, and potential impacts to safety and health, such as impacts from major flooding events and vector-borne disease. Project proponents and permit applicants should carefully examine these factors and consult with applicable agencies in determining the most appropriate site(s) for their projects, and should follow the necessary environmental impact review procedures or other requirements in selecting the final project location and characteristics.

III Guidelines for Design of Constructed Treatment Wetlands

A. Minimal Impact

Adverse impacts to waters of the U.S. should be avoided. Potential adverse impacts may include, but are not limited to: disruption of the composition and diversity of plant and animal communities; alteration of the existing hydrologic regime of natural wetlands or adjacent surface water bodies; introduction and spread of noxious species; threats to fish and wildlife from toxins and/or pathogens; and degradation of downstream water quality and groundwater sources.

B. Natural Structure

Constructed treatment wetland designs should avoid rectangular basins, rigid structures and straight channels whenever possible (See Mitsch and Gosselink, 2000; Kusler and Kentula, 1989; National Research Council, 1992). The use of soft structures, diverse and sinuous edges in design configuration, and bio-engineering practices that incorporate the existing natural landscape and native vegetation in constructed treatment wetlands is encouraged. Use landform and gravity to your advantage and design your project for minimal maintenance. For example, sites, slopes, and grades can be used to create depth variability and diversity. Site planning should avoid conditions conducive to stagnant water and "short circuiting" and problems such as avian botulism and vector production.

C. Buffer Zones

Design the margins of your constructed treatment wetland system as natural transition zones, including woody vegetated buffer areas around the site. Where appropriate, integrate the facility with other natural resource features to provide wildlife corridors and open space.

D. Vector Control

Where necessary, design your facilities to minimize mosquito problems by minimizing the potential formation of stagnant water, facilitating vegetation management, and by using natural biological control mechanisms, such as mosquito fish, stickleback, etc. (where native), bats, and purple martins. Local mosquito abatement districts and local codes may provide valuable assistance in designing your project to minimize mosquito habitat. In some cases, it may be important to consider providing access for active vector control.

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E. Hazing and Exclusion Devices

Hazing or wildlife exclusion devices, such as noise-making devices or netting and fencing, should be used if the effluent or other water source being treated is toxic or presents a significant threat to wildlife. Such devices may be necessary in facilities that are designed only for treatment, but their need should be decided on a case-by-case basis.

Using these wildlife control methods may also be necessary if excessive wildlife use is causing water quality problems. In some circumstances, excessive use of wetlands by wildlife can result in: (1) wildlife stress and disease problems, (2) degradation of water quality due to high loadings of nutrients, solids, and fecal coliform, and (3) erosion resulting from loss of vegetation due to over-grazing and trampling.

F. Dedicated Water Source

Plans should be made for maintaining the wetland habitat during periods of drought. Projects that are intended to provide wildlife habitat should have a dedicated water source for the life of the project and, if possible, beyond the life of the project to meet the long-term hydrological needs of the desired aquatic and terrestrial communities. When doing this, be sure that adequate water supplies remain in adjacent streams for aquatic use and if ground water is used, be sure that its mineral content is not toxic to plant species (for example, excess iron can kill some plants).

G. Biological Diversity and Physical Heterogeneity

Where appropriate, design your constructed treatment wetland to provide habitat with a diversity of native species comparable to similar wetlands in the region. Maximize vegetative species diversity, where appropriate, without increasing the proportion of weedy, nonindigenous, or invasive species at the expense of native species. Project plans should include mechanisms to control or eliminate undesirable species. The biological diversity of your project may be linked to, or dependent upon, physical heterogeneity. This could include having both surface and subsurface flow while providing some areas of open water, creating nesting islands for waterfowl, and leaving some upland and buffer areas for other nesting species. Developing a wide variety of wetland types will provide a range of diversity for different types of wildlife. Considerations may include seasonal hydroperiods, depth-flow changes, vegetative succession, and accumulation of sediments.

H. Seasonality and Capacity Exceedences

Your project design should be able to accommodate extremes in meteorologic conditions and temporary exceedences of water storage and treatment capacity. Considerations should be made for extremes in temperature and precipitation which can impact normal operations.

I. Forebays

Utilize sediment collection/settling forebays for treatment of storm water inflows and for additional treatment of wastewater. Design and locate the forebays for ease of maintenance and to achieve greatest protection of wetland habitat and receiving waters. Monitor forebay sediments, wetland vegetation tissues, and water quality to ensure the system is functioning properly and not becoming an attractive nuisance problem to wildlife. Identify an upland disposal site to dispose of accumulated sediments that is consistent with sediment disposal requirements and monitoring criteria and standards. Note that special disposal requirements may be applied for sediments containing hazardous waste materials.

J. Multiple Cells

The use of multiple cells may allow for residuals clean-out, repair of flow control structures, and specialized management of specific effluents without disruption of the overall systems operations. They also facilitate the flexibility of the system to manage different portions of the system (i.e., individual cells) for different purposes, such as the use of cells nearest the influent source to settle out sediment, final cells to strip out algae produced within the system, and other cells used to encourage the development of habitat and food production for specific wildlife species, etc. From a wastewater treatment standpoint, multiple cells often provide better treatment in part because "short circuiting" is minimized.

K. Maintenance Access

Design your constructed treatment wetland so that maintenance vehicles and personnel can safely and easily access the site with a minimum of disturbance. Proper access design will facilitate proper operation and maintenance of the wetland so that it performs as designed.

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L. Public Acceptance

Consider the public's perception of your constructed treatment wetland project and its effects on neighboring populations and adjacent land uses. Take into account potential concerns like drinking water contamination, unpleasant odors, mosquitos, access by small children and other safety and health issues. By planning your project with community involvement early in the process, you will help ensure public support and approval for your goals and objectives while developing a safe project for everyone to enjoy.

M. Public Use

When appropriate, encourage public access and use, work with local educators to design informative displays to install at your project, and help foster community education programs, especially for projects developed for water reuse and wildlife habitat. In some cases, public access may need to be prevented due to safety and health concerns.

N. Pilot Projects and Design Criteria

A pilot project may be necessary for designing your full-scale project. If a pilot is not utilized, then design considerations should be fully described and made available to future operators and regulatory staff. To assist in project design, see the reference, *Constructed Wetlands Treatment of Municipal Wastewater Process Design Manual* (EPA 625-R-99-010), as well as other technical references such as those listed in Appendix IV. Planning, design, and construction information is available from Natural Resources Conservation Service (NRCS) offices nationwide; technical assistance may also be available from NRCS offices based on local priorities and workloads. EPA's North American Treatment Wetland Database is a good avenue for networking by owners and their designers. Information is generally not complete enough for design, as most of the data is not quality assured and key parameters may be missing.

IV Construction Guidelines for Constructed Treatment Wetlands

A. Construction Practices/Specifications/Drawings

Good construction practices should be followed during construction of your treatment wetland. Examples include properly evaluating the site, limiting damage to the local landscape by minimizing excavation and surface runoff during construction, and maximizing flexibility of the system to adapt to extreme conditions. Construction specifications and drawings should be utilized that clearly convey procedures to be used and required quality of final product. Note that a general construction storm water CWA Section 402 (NPDES) permit must be obtained for any projects 5 acres in size or greater (or 1 acre expected to begin in 2002). This permit requires development and implementation of a Storm Water Pollution Prevention Plan including best management practices to minimize pollutant loading during construction.

While designs should generally be kept as simple as possible to facilitate ease of construction and operation, the use of irregular depths and shapes can be highly beneficial to enhancing wildlife habitat value. Proper construction is best ensured by the involvement of experienced inspectors and equipment operators who are knowledgeable about wetlands creation and the goals of the project. Careful construction inspection is essential to ensuring that the project is constructed as designed.

B. Soils

If possible, avoid soil sources that contain a seed bank of unwanted species. Carefully consider the soil's permeability and the implications for ground water protection. Highly permeable soils may allow infiltration and possible contamination of groundwater and could prevent the development of hydrological conditions suitable to support wetland vegetation. You may need to use an impermeable barrier in some instances. Dredged material may be useful to help create a base substrate layer, however you may need to test it to ensure that it doesn't contain unwanted contaminants or materials. Matching a local dredging project's disposal need with a beneficial use solution such as creating a constructed treatment wetland is likely to be more practical, cost-effective, and environmentally advantageous when made as part of a broad, watershed-level planning effort. Contact your local U.S. Army Corps of Engineers office to see if there are any dredging projects in your area. For detailed guidance on beneficial uses of dredged material, please see the *Beneficial Use Manual - Identifying, Planning, and Financing Beneficial Use Projects Using Dredged Material* (EPA 842-B-98-001).

C. Vegetation Selection

Vegetation selection needs to accommodate the hydraulic operations of the wetland system and still support habitat objectives. In general, use a diversity of native, locally obtained species. You should obtain seeds from a local seed bank or seedlings from a local nursery, whenever possible. Native plants from existing wetlands may be harvested provided that removal of the plants does not result in damage to the existing wetland or violate any applicable Local, State, or Federal regulations. Species should be chosen both for water quality and wildlife habitat functions, if that is the intent of the project. The use of weedy, invasive, or non-native species should be avoided. Also consider the plants' abilities to adapt to various water depths and soil and light conditions at your site.

V. Guidelines for Operation and Maintenance of Constructed Treatment Wetlands

A. Management Plan

Designers or managers who decide to create a treatment wetland must factor in long-term maintenance costs and needs to provide for the proper functioning of the wetland over time. Factor in these maintenance needs by creating a long-term operations, maintenance, monitoring, and funding plan that identifies the party or parties responsible for maintenance and monitoring of your project, their responsibilities, and the funding mechanisms. Some funding sources are listed in Appendix III, "Federal Funding Sources." The management plan needs to ensure maintenance of the functions the project is designed to provide. Where vector control is likely to be a concern, provisions to control vegetation will be an important component of the management plan. In some cases, you may need to secure performance bonds prior to facility approval.

B. Regular Inspections and Maintenance Activities

You will need to make regular inspections of your constructed treatment wetland. The definition of "regular" is case-specific and will depend on the design and operation of your treatment wetland. These considerations should be described in your maintenance plan. Examples of maintenance activities that you should conduct during these inspections include checking weir settings and the inlet and outlet structures, cleaning off surfaces where solids and floatable substances have accumulated to the extent that they may block flows, removing nuisance species and maintaining the appearance and general status of the vegetation and wildlife populations, and removing sediment accumulations in forebays. Save time and energy by conducting your routine monitoring activities, such as sample collections and wildlife counts, at the same time as your inspections.

C. Operator Training

Train and/or certify your operators in the operation and maintenance of constructed treatment wetlands. Where available, this may be done in cooperation with your State regulatory agencies, the facility engineer, and public or private training centers, as directed by the certifying entity. Seek assistance from regulators and local experts and attend constructed treatment wetland seminars and conferences for additional technical assistance.

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D. Contingency Plan

Project designers and operators should jointly develop a contingency plan to address problems that could develop during facility operations. Such problems may be due to: unrealistic or unattainable goals; design, construction, or operational errors; or unpredictable events. The first situation can be addressed by revising project goals or regulatory criteria (e.g., water quality standards), the second by reducing system capacity, increasing its area, or changing operational practices, and the third by anticipation through conservative design. Contingency plans should include measures for determining and remediating nuisance conditions, addressing any toxicity observed in the wetland, and dealing with upstream treatment plant failure or bypass. Auxiliary storage basins can be helpful for dealing with many of these situations.

VI Guidelines for Monitoring Constructed Treatment Wetlands

A. Reference Wetland

Reference sites may be useful as a basis of comparison to identify various changes and impacts to your constructed treatment wetland ecology and to evaluate its success. Where feasible and appropriate, consider using more than one wetland of the same type (e.g., depressional, riverine), class, size, vegetative cover, hydroperiod, and geographic region (preferably nearby and within the same watershed), while allowing for natural variability, as a reference to measure the success of your project. Depending on your project's goals and objectives, you may want to compare only certain functions or characteristics of your treatment wetlands with the reference wetlands.

B. Methods and Criteria

Depending on the primary goals and objectives of your project, site monitoring can be used to determine the chemical, physical, and biological health of your project and its success in treating effluent or other water sources. Monitoring criteria may include water quality (surface and ground water), sediment quality, temperature, hydrology (fluctuation, loading, variability and flow pattern monitoring by means of tracer studies), plant, benthic macroinvertebrate, fish tissue analyses, toxicity testing, seasonal vegetation mapping or physical sampling, habitat structure and diversity (including species richness), and wildlife use surveys (birds, amphibians, macro-invertebrates, and fish, if appropriate). Certain species, such as migratory birds, will require Federal and State permits to collect for monitoring purposes. Also, nuisance insects should be monitored to evaluate the need for vector control measures. Where appropriate, methods for monitoring should draw from the scientific literature for assessing biological conditions. The specific details of your monitoring plan should be determined through discussions with the permitting agencies. If your State has a wetlands biomonitoring program, it may be appropriate to incorporate your efforts into the program. Volunteer monitoring groups, such as the Izaak Walton League or local schools, may be able to assist you with your monitoring efforts.

C. Early Identification of Potential Problems

Try to anticipate potential problems and monitor for potential dangers to the wetland ecosystem, such as bioaccumulation, avian botulism and other avian diseases, vector problems, invasion of non-native plants and animals, debris accumulation, and nuisance conditions, and be prepared to respond quickly. Potential responses to such problems should be described in your contingency plan.

D. Timeframe

Be sure to monitor the constructed treatment wetland for the entire life of the project to help ensure that the wetland system performs as designed and meets its ecological integrity goals.

VII Federal Permits and Other Legal Issues

Federal, State, Tribal, and/or Local regulations, in addition to those listed below, may be applicable. Please be sure to coordinate with the appropriate agencies on all projects and, when appropriate, have cooperative and collaborative planning and information-sharing sessions with community and business representatives, environmental groups, regulatory agencies, and the general public.

A. Clean Water Act and "Waters of the U.S."

"Waters of the United States" or "waters of the U.S." are those waters regulated by the Clean Water Act (CWA) (see definition in Appendix I). By definition, waste treatment systems designed to meet the requirements of the Clean Water Act are not considered waters of the U.S. (40 CFR 122.2 9). If, however, your constructed treatment wetland is constructed in an existing water of the U.S., the area will remain a water of the U.S. unless an individual CWA Section 404 permit is issued that explicitly identifies it as an excluded waste treatment system designed to meet the requirements of the CWA.

If your constructed treatment wetland is constructed in uplands and is designed to meet the requirements of the CWA, then it generally will not be considered a water of the U.S. under the waste treatment system exclusion to the definition of waters of the U.S. If the constructed treatment wetland is abandoned or is no longer being used as a treatment system, it may revert to (or become) a water of the U.S. if it otherwise meets the definition of waters of the U.S. This definition is met if the system has wetland characteristics (hydrology, soils, vegetation) *and* it is (1) an interstate wetland, (2) is adjacent to another water of the U.S. (other than waters which are themselves wetlands), or (3) if it is an isolated intrastate water which has a connection to interstate commerce (for example, it is used by interstate or foreign travelers for recreation or other purposes).

The U.S. Army Corps of Engineers and the EPA decide on a case-by-case basis whether or not particular bodies of water are waters of the U.S. Contact your U.S. Army Corps of Engineers district or regional Environmental Protection Agency office for more information on this subject. If your constructed treatment wetland, or a portion of your constructed treatment wetland, is considered a water of the U.S., then it falls under the jurisdiction of the CWA and one or more of the following sections of the CWA may apply. If the constructed treatment wetland is not itself a water of the U.S. but it discharges pollutants into a water of the U.S., the discharge requires a permit under CWA Section 402.

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B. Clean Water Act Section 303 Water Quality Standards

Under the CWA, States and Tribes (and in a few cases EPA) are to adopt water quality standards for all waters of the U.S. Water quality standards include designated uses for water bodies, criteria to protect these designated uses, and an antidegradation policy (Section 303). Permits for discharges to waters of the U.S., including jurisdictional wetlands, must ensure the discharges will not cause or contribute to a violation of water quality criteria or impair designated uses in the receiving water or downstream waters. If there are no water quality standards specific to a wetland, the water quality standards for the adjacent open waterbody may be applied to the wetland, depending on your state's policies. Please see Appendix II, "Section 303 of the Clean Water Act," for additional information.

C. Clean Water Act Section 401 Certification

Projects involving a federally-licensed activity that may result in discharges to waters of the U.S. (such as a CWA Section 402 permit from EPA and/or a CWA Section 404 permit from the U.S. Army Corps of Engineers) require certification under Section 401 of the CWA. Your permit application will need certification that the proposed activity will not violate water quality standards or other State or Tribal requirements. This certification must come from the State or authorized Tribe in whose geographic jurisdiction the discharge would occur, or in some circumstances from EPA. Note that the State or Tribe may place conditions on its certification that are intended to prevent such violations. States and Tribes may waive certification.

D. Clean Water Act Section 402

The CWA Section 402 program, also known as the National Pollutant Discharge Elimination System (NPDES) program, regulates the discharge of pollutants (other than dredged or fill material, which is covered, below, under Section 404 of the Clean Water Act) from point sources into waters of the U.S. Over forty states are authorized by EPA to administer the NPDES permitting program within their state boundaries. The construction and/or operation of a treatment wetland may involve these discharges to waters of the U.S. and, as a result, require an NPDES permit.

If construction of the treatment wetland will disturb 5 acres or more (1 acre expected to apply in 2002), an NPDES permit for the discharge of storm water is required. In most areas of the country, EPA or State NPDES permitting authori-

ties have issued storm water general permits for discharges from construction activities. These storm water general permits typically require operators of the construction project to submit a notice of intent (NOI) form, and prepare a site specific storm water pollution prevention plan, prior to disturbing any land at the site. For more information, please contact your NPDES permitting authority. A current list of State/Federal Storm Water Contacts is available at: http://www.epa.gov/owm/swlib.htm. For more information, see VIII., Question and Answer #1, and Appendix II, "Section 402 of the Clean Water Act."

E. Clean Water Act Section 404

If your construction activities involve the discharge of dredged or fill material (e.g., rock, sand, and soil) to waters of the U.S., you will need authorization under CWA Section 404. For example, if you wish to use a degraded jurisdictional wetland for wastewater treatment and plan to construct water control structures, such as berms or levees, this construction will typically involve discharges of dredged or fill material into that wetland. (Note: The use of existing wetlands for purposes of wastewater treatment is generally discouraged.) Subsequent maintenance may also require a permit, although Section 404(f) may exempt some routine maintenance from 404 permitting requirements. You should contact the U.S. Army Corps of Engineers (or the appropriate state agency) to determine the regulatory requirements associated with the proposed discharge of dredged or fill material. For more information, see Appendix II, "Section 404 of the Clean Water Act."

Compensatory Mitigation: In general, wetlands constructed or restored for the primary purpose of treating wastewater will not be recognized as compensatory mitigation to offset wetland losses authorized under federal regulatory programs. In some cases, however, components of constructed wetland treatment systems that provide wetland functions and values beyond what is needed for treatment purposes may be used for compensatory mitigation. For example, project sponsors may be eligible to receive mitigation "credit" for using treated effluent as part of a constructed treatment wetland system that restores or creates *additional* wetland acreage beyond the acreage needed for treatment purposes. The use of constructed treatment wetlands for mitigation for CWA Section 404 purposes is subject to approval by the U.S. Army Corps of Engineers, in consultation with other Federal and State resource agencies. Such decisions need to be made on a case-by-case basis, considering, among other factors, the appropriateness of the constructed treatment wetland to fully offset the anticipated impacts from the loss of natural wetlands.

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F. Preapplication Treatment (see definition in Appendix I)

If your constructed treatment wetland is considered a water of the U.S. (e.g., is constructed in a water of the U.S.), you must treat the effluent, or other source water (storm water runoff, agricultural and livestock waste, etc.) prior to its entering the constructed treatment wetland sufficiently to meet all applicable water quality standards (and to prevent degradation of wildlife or biological integrity) and technology-based requirements. Municipal wastewater effluent generally must be treated to at least secondary levels before it enters waters of the U.S. (CWA Section 301). Other examples of treatment include best management practices for storm water and confined animal feeding operations.

G. Other Federal Legal and Programmatic Considerations (for descriptions, see Appendix II: Federal Statutes and Regulations)

- Clean Water Act Section 319 (Nonpoint Source Pollution Program)
- Estuary management plans under Clean Water Act Section 320
- Coastal Zone Management Act, including Reauthorization Amendments of 1990
- Endangered Species Act
- Fish and Wildlife Coordination Act
- Magnuson-Stevens Fishery Conservation and Management Act
- Migratory Bird Treaty Act
- National Environmental Policy Act
- National Wild and Scenic Rivers Act
- National Historic Preservation Act

VIII Questions and Answers

Question 1:

I am planning to build 50 acres of constructed treatment wetlands for post-secondary wastewater treatment of my small community's municipal wastewater effluent. I anticipate that the wetland will provide high value wetland habitat for wildlife and public use. Do I need any permits, do water quality standards apply to my project, and can I get mitigation credits?

If your new constructed treatment wetland is considered waters of the U.S. or will discharge pollutants to waters of the U.S., you will need a CWA Section 402 (NPDES) permit at the discharge point (please see the discussion on waters of the U.S. under VII.A and Appendix I). The permit's requirements will be based on the applicable water quality standards for the receiving waterbody. Three options for this are outlined below:

Option 1

If the post-secondary effluent meets the applicable water quality standards requirements, you may receive a CWA Section 402 (NPDES) permit (with appropriate limits) to discharge directly into the waters of the U.S.

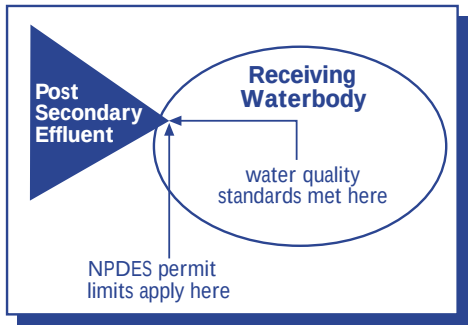

Option 1

Option 2

If the post-secondary effluent almost meets the applicable water quality standards for waters of the U.S., and can meet those standards within a short distance of the discharge, you may be able to use a mixing zone and receive a CWA Section 402 (NPDES) permit (with appropriate limits) to discharge directly into the waters of the U.S. Check with your state to see if mixing zones are allowed.

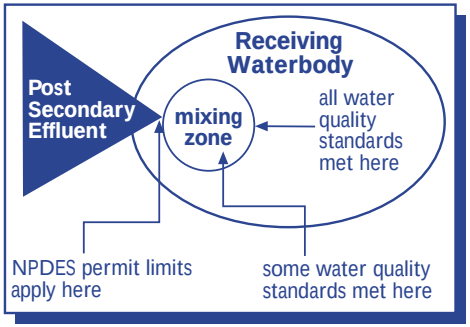

Option 2

Option 3

If the post secondary effluent will not meet the water quality standards for waters of the U.S. at or near the point of discharge, you may be able to discharge the post-secondary effluent to still another constructed treatment wetland that is not a water of the U.S. for further treatment. The discharge from this treatment wetland could then be treated in a manner similar to the effluent in Options 1 or 2.

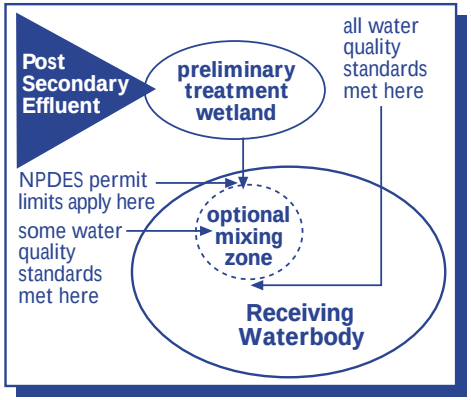

Option 3

Be sure to coordinate with the appropriate NPDES permitting authorities prior to constructing the wetland. Also check with your state, because some states have developed specific water quality standards for wetlands, which may apply to your constructed treatment wetland project. Other water quality standards and technology-based effluent limitations may also apply, depending on the effluent source. For more information on standards, see VII: "Federal Permits and Other Legal Issues" and Appendix II, "Section 303 of the Clean Water Act."

If construction activities are proposed in existing wetlands or waters of the U.S., then the U.S. Army Corps of Engineers and appropriate State agencies must also be consulted for CWA Section 404 permitting (see VII.E, "Clean Water Act Section 404").

Portions of your project may be eligible for use as mitigation, depending on case-specific circumstances. Also, see the discussion of compensatory mitigation in VII.E, "Clean Water Act Section 404."

Question 2:

I live in an arid area and am hoping to use secondary wastewater effluent to restore a highly degraded natural wetland, while providing advanced treatment to the secondary effluent to meet requirements for downstream recreational use. Because of local water allocations and a drop in the water table, this site is now dry most of the year. The addition of effluent as a water source will help restore the wetland back to its historical hydrology and bring back the wetland dependent birds and wildlife. Do I still need permits and can I get mitigation credits for my restoration efforts?

Depending on the specific circumstances of your proposal, you may need federal authorization of your project. For example, if the particular degraded wetlands are considered waters of the U.S., discharges to create the waste treatment system will require a CWA Section 404 permit. A CWA Section 402 (NPDES) permit will also be required. As noted earlier, we encourage the use of appropriately treated effluent for restoration efforts only when it benefits the environment (See II.B "Opportunities for Restoration of Degraded or Former Wetlands.") Under some circumstances, portions of the restored wetland may be used as compensatory mitigation (see discussion of compensatory mitigation in VII.E "Clean Water Act Section 404").

Question 3:

Does my constructed treatment wetland become a water of the U.S. after it is no longer used as a treatment system?

If the treatment wetland is a water of the U.S., it will remain so after it stops being used as a treatment system. If the treatment wetland is not a water of the U.S., it may become (or revert back to, as the case may be) a water of the U.S. if it has wetland characteristics (hydrology, soils, and vegetation) and the following conditions apply: (1) it is an interstate wetland, (2) it is adjacent to another water of the U.S. (other than a water which is itself a wetland), or (3) it meets the interstate commerce requirements for an isolated intrastate water of the U.S. (for example, it is used by interstate or foreign travelers for recreation or other purposes). These decisions are made on a case-by-case basis. (See VII.A "Clean Water Act and 'Waters of the U.S.'")

Question 4:

If I need to perform general maintenance in the constructed treatment wetland, will I need a Section 404 permit to deposit removed vegetation or dredge sediments?

If the constructed treatment wetland is a water of the U.S., you may need a permit. Specifically, if the proposed activity involves discharges into waters of the U.S. or placement of fill material into waters of the U.S., a CWA Section 404 permit is needed unless the 404(f) exemption applies (see VII.E "Clean Water Act Section 404"). Activities such as building levees or sidecasting rock, sand, or soil into the wetland are likely to require such permits. We generally encourage constructing forebays in uplands to collect effluent and storm water prior to discharge to wetlands. You must obtain a permit to construct forebays in an existing wetland. Forebays should be designed to promote sedimentation and decrease the disruptive forces of the wastewater entering the system and thereby reducing impacts to water quality. Maintenance activities that are confined to

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such areas will not require authorization if they do not involve discharges to waters of the U.S. Discharge from the maintenance of levees will likely be exempt from permit requirements under Section 404(f). (See VII.A and E for more information).

Question 5:

Will I need a groundwater permit for my constructed treatment wetland?

In general, groundwater protection permits are issued by State or Local agencies. You should coordinate with the appropriate State and Local agencies before you construct the treatment wetland. If the water in your constructed treatment wetland interacts with groundwater, then you may need a permit. If the wetland is lined with an impermeable liner, then interaction is unlikely and a permit may not be necessary. A Clean Water Act 402 (NPDES) permit may be required for discharges to groundwater where that groundwater has a direct hydrologic connection to surface waters of the U.S.

Question 6:

I am considering using constructed treatment wetlands to treat my municipality's stormwater flows. What general issues must I consider?

First of all, the treatment wetland should not be constructed in a waters of the U.S. unless you can sufficiently pretreat the stormwater flows to protect the values and functions of the waters of the U.S. Because storm water is an unpredictable effluent source and can contain high levels of toxic substances, nutrients, and pathogens, we strongly encourage that you construct the treatment wetland in uplands and use best management practices in these projects (see EPA's *Protecting Natural Wetlands: A Guide to Stormwater Best Management Practices*, EPA/843-B-96-001). Depending on the size of your municipality and other factors, you may need to get a CWA Section 402 (NPDES) permit. Be sure to contact all the appropriate wastewater authorities in your area during the early planning stages of this type of project.

Question 7:

Can I use constructed treatment wetlands to treat other effluents or source waters?

Yes, as long as you (1) generally avoid using natural wetlands which are waters of the U.S., (2) adequately pretreat the effluent or source water to protect the treatment wetlands and other nearby surface and groundwater sources, (3) contact the appropriate authorities, and (4) meet all applicable requirements. We also encourage you to follow the principles established in this document.

Appendix I

DEFINITIONS

COMPENSATORY MITIGATION
For the purposes of CWA Section 404, compensatory mitigation is the restoration, creation, enhancement, or in exceptional circumstances, preservation of wetlands and/or other aquatic resources for the purpose of compensating for unavoidable adverse impacts of a dredge or fill project which remain after all appropriate and practicable avoidance and minimization has been achieved.

CONSTRUCTED TREATMENT WETLAND
Engineered and constructed wetlands that utilize natural processes involving wetland vegetation, soils, and their associated microbial assemblages to assist, at least partially, in treating an effluent or other source water. In general, these systems should be engineered and constructed in uplands, outside waters of the U.S., unless the source water can be used to restore a degraded or former wetland (see II.B "Opportunities for Restoration of Degraded or Former Wetlands").

DEGRADED WETLANDS
Wetland systems that have lost some or all of their characteristic functions and values due to hydrologic alterations, discharges of fill material and/or other impacts such as pollutants, nuisance and invasive species, and discharge of point and nonpoint sources.

DESIGNATED USES
Classifications for waters of a State or Tribe by the State or Tribe that are to be achieved and protected. These uses must take into consideration the existing use and potential value of water for public water supplies, protection and propagation of fish, shellfish and wildlife, recreation in and on the water, agricultural, industrial, and other purposes including navigation. Note that in no case shall a State adopt waste transport or waste assimilation as a designated use for any waters of the U.S. (*40 CFR 131.10(a)*)

DISCHARGE OF POLLUTANTS
The addition of pollutants, including dredge and fill material, from a point source to waters of the U.S.

DREDGED MATERIAL
Material that is excavated or dredged from waters of the U.S.

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EFFLUENT
Wastewater, normally treated.

FILL MATERIAL
Any material that has the effect of replacing an aquatic area with dry land or of changing the bottom elevation of a waterbody.

FLOODPLAIN
The area that would be inundated by the flood which has a 1% chance of occurring in any given year, also referred to as the “100-year” flood (National Flood Insurance Program definition).

FLOODWAY
That area of the watercourse plus adjacent floodplain lands which must be reserved in order to allow the discharge of the base flood (“100-year” flood) without increasing flood heights more than a designated amount (National Flood Insurance Program definition).

FOREBAY
An area within a management pond, wetland, etc., that is sized to capture sediments and other debris as the material enters the unit. This area is designed to provide for equipment access to facilitate periodic removal of accumulated material.

INVASIVE SPECIES
Species that spread rapidly, are frequently non-native to the region, and tend to out-compete more desirable native forms and to become dominant.

JURISDICTIONAL WATERS, or JURISDICTIONAL WETLANDS
See "Waters of the U.S."

MITIGATION
See "Compensatory Mitigation."

MIXING ZONE
An area where an effluent discharge undergoes initial dilution and is extended to cover the secondary mixing in the ambient waterbody. A mixing zone is an allocated impact zone where water quality criteria can be exceeded as long as acutely toxic conditions are prevented. Compliance with effluent treatment standards typically is measured at the edge of the mixing zone. (*Water Quality Standards Handbook - Second Edition,* EPA-823-B-94-005, p. GLOSS-4.)

MONOTYPIC
Having a nearly total dominance of one species of plant, such as *Phragmites australis*, or *Typha spp.*, within an area.

NONINDIGENOUS or NON-NATIVE SPECIES
Species which are not native to the environment in which they currently exist and have been introduced by and often proliferate because of human activities.

NONPOINT SOURCE (NPS) POLLUTION
Sources of pollution not defined by statute as point sources. NPS pollution results from the transport of pollutants into receiving waters via overland flow runoff within a drainage basin. Because NPS pollution is diffuse, its specific sources can be difficult to identify.

OTHER SOURCE WATERS
Categories of wastewater other than municipal wastewater, such as acid mine drainage, industrial wastewater, agricultural and urban runoff, effluent from livestock operations, landfill leachates, etc.

POINT SOURCE
Any discernible, confined, and discrete conveyance, including but not limited to, any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, landfill leachate collection system, vessel or other floating craft from which pollutants are or may be discharged. This term does not include return flows from irrigated agriculture or agricultural stormwater runoff. *(40 CFR § 122.2)*

PREAPPLICATION TREATMENT
The treatment of wastewaters prior to their introduction to constructed treatment wetlands, such that they do not negatively impact the wetlands' functions and values.

RESTORATION
"Return of an ecosystem to a close approximation of its condition prior to disturbance" and "the reestablishment of predisturbance aquatic functions and related physical, chemical and biological characteristics" (National Research Council, 1992).

SOURCE WATERS or WATER SOURCES
See "Other Source Waters."

STORMWATER
Flows and discharges resulting from precipitation events, such as rainfall or snowmelt, and include municipal and industrial stormwater runoff, combined sewer overflows (CSOs), and sanitary sewer overflows (SSOs). Urban stormwater runoff, which is often collected by storm drains and transported to receiving waters, can contain many pollutants that are accumulated as rainwater or snowmelt flow across the surface of the earth. Such pollutants include oil and grease, chemicals, nutrients, pesticides, heavy metals, bacteria, viruses, and oxygen-demanding compounds. (http://www.epa.gov/owm/wfaq.htm)

WATERS OF THE U.S.
All waters that are currently used or were used in the past, or may be susceptible to use in interstate commerce, including: all waters that are subject to ebb and flow of the tide; all interstate waters including interstate wetlands; all other waters such as intrastate lakes, rivers, streams including intermittent streams, mudflats, sandflats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds, the use, degradation or destruction of which would or could affect interstate or foreign commerce; all impoundments of waters otherwise defined as waters of the U.S. under this definition; tributaries of waters defined above; the territorial sea; and wetlands adjacent to waters (other than waters that are themselves wetlands) identified above. Courts have found that this includes such waters as isolated, intrastate waters which are used by migratory birds or which attract interstate travelers or from which fish or animals are or could be harvested and sold in interstate commerce. Waste treatment systems, including treatment ponds or lagoons designed to meet the requirements of the CWA, are excluded from waters of the U.S. If such treatment systems are abandoned and otherwise meet the definition of waters of the U.S., they become or revert to regulated waters of the U.S. (See the regulations for specific details: *40 CFR § 230.3(s)(1-7),122.2 and COE Regulations at 33 CFR § 328.3(a)(1-7))*

WATERSHED
The total drainage area contributing runoff to a single point or "hydrologically defined geographic areas. . . typically the areas that drain to surface waters or that recharge or overlay ground waters or a combination of both." (June 1996 EPA *Watershed Approach Framework*)

WETLAND

Those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas. (Definitions taken from EPA regulations at *40 CFR § 230.3(t)* and COE Regulations at *33 CFR § 328.3(b)*.)

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FEDERAL STATUTES AND REGULATIONS

MAJOR FEDERAL PROGRAMS AND REGULATIONS THAT MAY APPLY TO CONSTRUCTED TREATMENT WETLANDS

The U.S. Congress enacted the Clean Water Act to RESTORE AND MAINTAIN THE CHEMICAL, PHYSICAL AND BIOLOGICAL INTEGRITY OF THE NATION'S WATERS.

Section 303 of the Clean Water Act.

States and Tribes are to develop water quality standards for all waters of the U.S., including wetlands, subject to EPA approval. These standards, at a minimum, must consist of three major components:

1. **Designated Uses** - These are environmental goals for each waterbody within a State or Tribe. Each body of water is given one or more designated uses, such as "groundwater recharge" or "aquatic life support." The goal of the State or Tribe is to achieve, protect, and maintain these designated uses.
2. **Water Quality Criteria** - States and Tribes develop water quality criteria to support the designated uses of each waterbody in their respective jurisdictions. The criteria are either narrative statements or numeric limits on factors affecting the waterbody's health. A number of states are now establishing biological criteria, in addition to the more traditional physical and chemical criteria, to help determine the health of wetlands.
3. **Antidegradation Policy** - All States must have antidegradation policy language consistent with *40 CFR § 131.12* in their water quality standards, and must develop appropriate implementation procedures. Antidegradation policies, at a minimum, must maintain and protect existing instream water uses and the level of water quality necessary to protect the existing uses. These policies also ensure the protection of water quality for a particular waterbody where the water quality exceeds levels necessary to protect fish and wildlife propagation and recreation on and in the water.

Section 319(b) of the Clean Water Act (Nonpoint Source (NPS) Pollution Program).

EPA has oversight for a national program to control nonpoint sources of pollution. This program requires that States develop management programs for the control of nonpoint source pollution. EPA emphasizes a watershed-based approach, which can include protection and/or restoration of wetlands and riparian areas.

Section 401 of the Clean Water Act.

Certification verifying compliance with a State or Tribe's water quality standards and other requirements is necessary is required for federally-permitted or licensed activities that involve discharges to waters of the U.S.

Section 402 of the Clean Water Act (National Pollutant Discharge Elimination System (NPDES)).

Clean Water Act Section 402 establishes a program to regulate the discharge of a pollutant (other than dredged or fill materials, which are covered under Section 404 of the Clean Water Act) from a point source into waters of the U.S. The Section 402 Program is administered at the Federal level by the EPA. A State or Tribe, however, can be authorized to administer all or part of the program, upon approval by the EPA. As of 1998, 43 States have assumed the NPDES program.

The CWA defines a "discharge of a pollutant" to mean any addition of any pollutant to navigable waters from any point source. The term "pollutant" is defined as dredged spoil, solid waste, sewage, sewage sludge, chemical wastes, biological materials, industrial, municipal, and agricultural waste, etc. discharged into water. A "point source" is a discernible, confined and discrete conveyance, such as a pipe, ditch, channel or sewer, etc. from which pollutants are or may be discharged.

The CWA prohibits discharge of a pollutant from a point source except in accordance with a permit. Discharges to waters of the U.S. may be authorized by obtaining and complying with the terms of a National Pollutant Discharge Elimination System (NPDES) permit. NPDES permits commonly contain numerical and narrative limits on the amounts of specified pollutants that may be discharged. These "effluent limitations" implement both technology-based and water quality-based requirements of the Act. Technology-based limitations represent the degree of control that can be achieved by point sources using various levels of pollution control technology. In addition, if necessary to achieve compliance with applicable water quality standards (see Section 303 above), NPDES permits must contain water quality-based limitations more stringent than the applicable technology-based standards.

Section 404 of the Clean Water Act.

CWA Section 404 establishes a program to regulate the discharge of dredged or fill materials into waters of the U.S. At the Federal level, the U.S. Army Corps of Engineers and the EPA administer the 404 program. The U.S. Fish and Wildlife Service and the National Marine Fisheries Service have important advisory roles.

The U.S. Army Corps of Engineers has the primary responsibility for the permit program and is authorized, after notice and opportunity for public hearing, to issue permits for the discharge of dredged or fill material. EPA's responsibilities include development of the environmental guidelines by which permit applications are evaluated and review of proposed permits. States can assume a portion of the permit program from the Federal government. As of 1998, Michigan and New Jersey have assumed the 404 program.

The basic premise of the Section 404 program is that no discharge of dredged or fill material can be permitted if a practicable alternative exists that is less damaging to the aquatic environment, or if the nation's waters would be significantly degraded. Accordingly, applicants for a Section 404 permit must demonstrate that no practicable alternative exists that would meet the basic purpose of the project and have less impact on the aquatic environment. Once potential impacts to the aquatic environment have been avoided and minimized to the maximum extent practicable, applicants are required to provide practicable compensatory mitigation, such as wetlands restoration or enhancement, to offset any remaining adverse effects.

Coastal Zone Act Reauthorization Amendments of 1990, Section 6217(g).

This program is jointly administered by EPA and National Oceanic and Atmospheric Administration (NOAA), and calls upon states to develop and implement State Coastal Nonpoint Source Pollution Control Programs. EPA and NOAA have developed guidance specifying management measures for nonpoint source pollution affecting coastal waters (*Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters*, EPA/84-B-92-002). Included in this guidance is a chapter on protection and restoration of wetlands and riparian areas, and the use of vegetated systems for nonpoint source control.

The Endangered Species Act (ESA).

The 1973 Endangered Species Act provides for the conservation of ecosystems upon which threatened and endangered species of fish, wildlife, and plants depend. Among other things, the ESA prohibits unauthorized taking, possession, sale, and transport of threatened and endangered species. It also requires Federal agencies to insure that any action authorized, funded or carried out by them is not likely to jeopardize the continued existence of listed species or modify their critical habitat. The U.S. Fish and Wildlife Service and National Marine Fisheries Service can provide information on the location of threatened or endangered species and their habitats.

Fish and Wildlife Coordination Act.

This Act authorizes the U.S. Fish and Wildlife Service and the National Marine Fisheries Service to cooperate with Federal, State, public, and private organizations in the protection of wildlife (including fish) and its habitat. It also requires that impacts to wildlife be given equal consideration in water-resource development programs. The U.S. Fish and Wildlife Service and the National Marine Fisheries Service must be contacted regarding all new Federal water projects or federally-authorized water projects that modify streams or other bodies of water.

Magnuson-Stevens Fishery Conservation and Management Act.

The 1996 amendments to this Act require the Fishery Management Councils to describe "essential fish habitat" (EFH) for managed fish, including shellfish. The Act also requires Federal agencies to consult with National Marine Fisheries Service on any federal action (including those federally-funded or authorized) that may adversely affect EFH. National Marine Fisheries Service regulations emphasize the use of existing coordination processes (e.g., National Environmental Policy Act, Fish and Wildlife Coordination Act) for accomplishing EFH consultation. National Marine Fisheries Service is required to provide EFH conservation recommendations to both Federal and State agencies whose actions would adversely affect EFH. Federal agencies are required to respond to these recommendations.

Migratory Bird Treaty Act (as amended).

This Act implements four international treaties that individually affect migratory birds common to the United States, Canada, Mexico, Japan, and the former Soviet Union. The Act establishes Federal responsibility for protecting and managing migratory and nongame birds, including the issuance of permits to band, possess or otherwise make use of migratory birds, and the establishment of season length, bag limits, and other hunting regulations. Except as allowed by implementing regulations, the Act makes it unlawful to pursue, hunt, kill, capture, possess, buy, sell, purchase, or barter any migratory bird, including the feathers or other parts, nests, eggs, or migratory bird products.

National Environmental Policy Act (NEPA).

NEPA requires Federal agencies to make informed, environmentally-responsible decisions when considering Federal actions that may have a significant impact on the environment, such as when issuing a Section 404 permit. Generally, agencies must evaluate potential environmental consequences of proposed actions using Environmental Assessments (EAs) and/or Environmental Impact Statements (EISs).

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National Wild and Scenic Rivers Act.

This Act selects certain rivers of the nation that possess outstandingly remarkable scenic, recreational, geologic, fish and wildlife, historic, cultural, or other similar values; preserves them in a free-flowing condition; and protects them and their immediate environment for the benefit and enjoyment of present and future generations. It describes procedures and limitations for the control of lands in federally-administered components of the system and for dealing with the disposition of lands and minerals under Federal ownership. Rivers are classified as wild, scenic or recreational, and various prohibitions on the use of the waters and land apply, respectively. To preserve its current free-flowing condition, a designated river is protected from federally-supported dam building and other federally-authorized structural changes which would adversely effect the values upon which its designation was based.

National Historic Preservation Act.

This Act provides for the preservation of significant historical features (buildings, objects and sites). It established a National Register of Historic Places. Federal agencies are directed to take into account the effects of their actions on items or sites listed or eligible for listing in this National Register.

Appendix III

FEDERAL FUNDING SOURCES

EPA's Clean Water Act State Revolving Fund (SRF)

Purpose: Provides grant funds to States to help them establish state revolving fund (SRF) programs. States, in turn, offer loans and other types of financial assistance from their SRFs to municipalities, individuals, and others for high-priority water quality activities.

Projects: While traditionally used to build or improve wastewater treatment plants, loans are also used increasingly for: agricultural, rural, and urban runoff control; wetland and estuary improvement projects; stormwater flow control and sewer overflows; alternative treatment technologies such as constructed wetlands.

Assistance: States offer loan rates that are two to four percent below market rates. Some states offer even lower interest rates to small, economically disadvantaged communities. 1999 budget: $1.35 billion.

Eligibility: Municipalities, individuals, communities, citizen groups, and non-profit organizations, though each State ultimately determines eligibility.

Address: U. S. EPA, Office of Wastewater Management, 1200 Pennsylvania Avenue, N.W. (4204), Washington, DC 20460
Phone: (202) 564-0748
Facsimile: (202) 501-2338
E-mail: srfinfo.group@epa.gov
Web Site: www.epa.gov/OWM

EPA's Nonpoint Source Implementation Grants (319 Program)

Purpose: To help States, Territories, and Tribes develop and implement programs to prevent and control nonpoint source pollution, such as creating constructed treatment wetlands to clean-up urban runoff and agricultural wastes.

Projects: States, Territories, and Tribes receive grant money (and may then provide funding and assistance to local groups) to support a wide variety of activities, such as technical assistance, financial assistance, technical programs, education, training, technology transfer, demonstration projects (e.g., best management practices), and monitoring specific to nonpoint source implementation.

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Assistance: Grants are first awarded to State agencies. Local organizations can then apply for grants through the agencies, but they must provide 40 percent of the total project or program cost as non-federal dollars. 1999 budget: approx. $200 million.

Eligibility: State, Local, and Tribal governments, nonprofit and local organizations, etc. (Check with your state contact.)

Address: U.S. EPA, Office of Wetlands, Oceans, and Watersheds, 1200 Pennsylvania Avenue, N.W. (4502F), Washington, DC 20460
Phone: (202) 260-1799
Facsimile: (202) 260-2356
E-mail: ow-general@epa.gov
Web Site: www.epa.gov/owow/NPS

Appendix IV

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Appendix V

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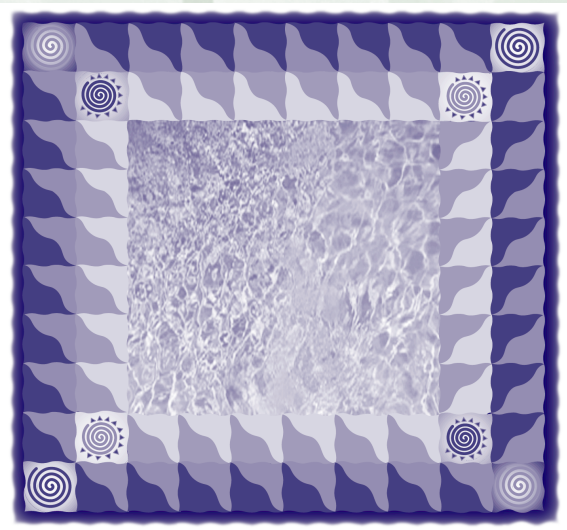

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LOW-IMPACT DEVELOPMENT CENTER

Low Impact Development (LID)

A Literature Review

EXECUTIVE SUMMARY

A literature review was conducted to determine the availability and reliability of data to assess the effectiveness of low impact development (LID) practices for controlling stormwater runoff volume and reducing pollutant loadings to receiving waters.

Background information concerning the uses, ownership and associated costs for LID measures was also compiled. In general LID measures are more cost effective and lower in maintenance than conventional, structural stormwater controls. Not all sites are suitable for LID. Considerations such as soil permeablility, depth of water table and slope must be considered, in addition to other factors. Further, the use of LID may not completely replace the need for conventional stormwater controls.

Maintenance issues can be more complicated than for conventional stormwater controls because the LID measures reside on private property. In most instances, homeowners agree to only the first year of maintenance. Homeowner associations could be a mechanism for providing long-term maintenance to these areas. Generally, bioretention facilities require replacement of dead or diseased vegetation, remulching as needed, and replacement of soils after 5–10 years. Grass swales require periodic mowing and removal of sediments. Maintenance of permeable pavements requires annual high-powered vacuuming of the area to remove sediments.

Several studies have been conducted to analyze the effectiveness of various LID practices based on hydrology and pollutant removal capabilities. Bioretention areas, grass swales, permeable pavements and vegetated roof tops were the most common practices studied. These techniques reduce the amount of Effective Impervious Area (EIA) in a watershed. EIA is the directly connected impervious area to the storm drain system and contributes to increased watershed volumes and runoff rates. There are documented case studies that conclusively link urbanization and increased watershed imperviousness to hydrologic impacts on streams. Existing reports and case studies provide strong evidence that urbanization negatively affects streams and results in water quality problems such as loss of habitat, increased temperatures, sedimentation and loss of fish populations (USEPA, 1997)

In general bioretention areas were found to be effective in reducing runoff volume and in treating the first flush (first ½ inch) of stormwater. Results from three different studies indicate that removal efficiencies were quite good for both metals and nutrients. Removal rates for metals were more consistent than for nutrients. Removal rates for metals ranged from 70–97% for lead, 43–97% for copper and 64–98% for zinc. Nutrient removal was more variable and ranged from 0–87% for phosphorus, 37–80% for Total Kjeldahl Nitrogen, <0–92% for ammonium and for nitrate <0–26%. Effluent volumes were lower than influent volumes. These studies were conducted by means of simulated rainfall events. Analysis of actual long-term rainfall events would produce more reliable data.

The effectiveness of grass swales was also quite good for both pollutant removal and runoff volume reduction. A study of three different sites in the United States reveal similar results despite the differences in location. In general, performance of swales is

dependant on not only channel length, but also longitudinal slope and the use of check dams to slow flows and allow for greater infiltration. Further, the removal of metals was found to be directly related to the removal rate of total suspended solids, and the removal rate of metals was greater than removal of nutrients.

Reduction of impervious surfaces can greatly reduce the volume of runoff generated by rainfall. Several methods can be employed to reduce total impervious surface area. Permeable pavements and vegetated rooftops are two methods to accomplish this goal. Vegetated rooftops have been used extensively in Germany for more than 25 years and results show up to 50% reduction in annual runoff in temperate climates. Many opportunities exist to retrofit these systems into older highly urbanized areas of the United States. The Philadelphia project case study provides an example of this practice.

Permeable pavements can also reduce impervious surfaces. However, they are more expensive to construct than traditional asphalt pavements. Costs of these systems may be off set by the reduction of traditional curb and gutter systems to convey stormwater. Benefits of these alternate pavement types include better infiltration, ground water recharge, reduction in runoff volume and treatment of stormwater for pollutants. The study conducted in Tampa, Florida outlines these benefits as well as the opportunity to retrofit permeable pavements into existing parking lots with little or no loss of parking space. Less than 20% of rainfall was converted to runoff when using permeable pavements. Study results from the University of Washington, compare several different treatments of varying permeablility. The study shows that the higher the amount of perviousness of the treatment, the greater the reduction of runoff volume and pollutant loadings.

The use of LID is relatively new and not widespread. Most of the available data are from Prince George's County, Maryland, which pioneered the use of LID. The data available for bioretention analysis were from single simulated storm events in actual bioretention facilities or from laboratory constructed and tested bioretention systems. The data for grass swales were for only a few storm events, collected over a short period of time. The only available data for a long-term study came from the Aquarium parking lot in Tampa, Florida and the Washington permeable pavement project. More long-term analysis is required to more accurately assess the effectiveness of LID and to determine long term trends.

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1 LOW IMPACT DEVELOPMENT

1.1 Introduction

Low impact development (LID) is a relatively new concept in stormwater management. LID techniques were pioneered by Prince George's County, Maryland, in the early 1990's, and several projects have been implemented within the state. Some LID principles are now being applied in other parts of the country, however, the use of LID is infrequent and opportunities are often not investigated. The purpose of this report is to conduct a literature review to determine existing information about the application of LID in new development and existing urbanized areas, including ownership, operation and maintenance issues. A related objective was to locate relevant studies of LID projects, which would provide evidence of the effectiveness of LID in retaining predevelopment hydrology and as a mechanism for pollutant removal for stormwater. The data from the studies were analyzed for usefulness and validity and the findings are summarized.

LID is a site design strategy with a goal of maintaining or replicating the pre-development hydrologic regime through the use of design techniques to create a functionally equivalent hydrologic landscape. Hydrologic functions of storage, infiltration, and ground water recharge, as well as the volume and frequency of discharges are maintained through the use of integrated and distributed micro-scale stormwater retention and detention areas, reduction of impervious surfaces, and the lengthening of flow paths and runoff time (Coffman, 2000). Other strategies include the preservation/protection of environmentally sensitive site features such as riparian buffers, wetlands, steep slopes, valuable (mature) trees, flood plains, woodlands and highly permeable soils.

LID principles are based on controlling stormwater at the source by the use of micro-scale controls that are distributed throughout the site. This is unlike conventional approaches that typically convey and manage runoff in large facilities located at the base of drainage areas. These multifunctional site designs incorporate alternative stormwater management practices such as functional landscape that act as stormwater facilities, flatter grades, depression storage and open drainage swales. This system of controls can reduce or eliminate the need for a centralized best management practice (BMP) facility for the control of stormwater runoff. Although traditional stormwater control measures have been documented to effectively remove pollutants, the natural hydrology is still negatively affected (inadequate base flow, thermal fluxes or flashy hydrology), which can have detrimental effects on ecosystems, even when water quality is not compromised (Coffman, 2000). LID practices offer an additional benefit in that they can be integrated into the infrastructure and are more cost effective and aesthetically pleasing than traditional, structural stormwater conveyance systems.

Conventional stormwater conveyance systems are designed to collect, convey and discharge runoff as efficiently as possible. The intent is to create a highly efficient drainage system, which will prevent on lot flooding, promote good drainage and quickly convey runoff to a BMP or stream. This runoff control system decreases groundwater

recharge, increases runoff volume and changes the timing, frequency and rate of discharge. These changes can cause flooding, water quality degradation, stream erosion and the need to construct end of pipe BMPs. Discharge rates using traditional BMPs may be set only to match the predevelopment peak rate for a specific design year. This approach only controls the rate of runoff allowing significant increases in runoff volume, frequency and duration of runoff from the predevelopment conditions and provides the mechanisms for further degradation of receiving waters (Figure 1).

LID has often been compared to other innovative practices, such as Conservation Design, which uses similar approaches in reducing the impacts of development, such as reduction of impervious surfaces and conservation of natural features. Although the goals of Conservation Design protect natural flow paths and existing vegetative features, stormwater is not treated directly at the source. Conservation Design protects large areas adjacent to the development site and stormwater is directed to these common areas.

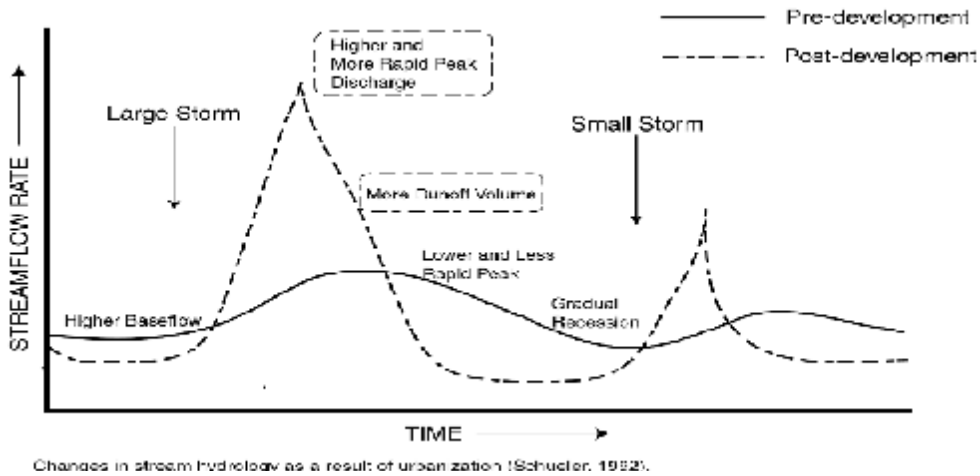

Changes in stream hydrology as a result of urbanization (Schueler, 1992).

Figure 1: Changes in Stormwater Hydrology as a Result of Urbanization

Although this approach protects trees and does reduce runoff, there is still potentially a significant amount of connected impervious area and centralized stormwater facilities that may contribute to stream degradation through stormwater volume, frequency and thermal impacts. Therefore, the hydrologic and hydraulic impacts of this approach on receiving waters may still be significant, although the volume and flows will be less than without the conservation design. The stormwater control measures used in Conservation Design are off-site and therefore not the individual property owner's responsibility. However, maintenance is generally provided by the homeowners association and financed through association fees.

1.2 Benefits and Limitations

The use of LID practices offers both economical and environmental benefits. LID measures result in less disturbance of the development area, conservation of natural features and can be less cost intensive than traditional stormwater control mechanisms. Cost savings for control mechanisms are not only for construction, but also for long-term

maintenance and life cycle cost considerations. For example, an alternative LID stormwater control design for a new 270 unit apartment complex in Aberdeen, NC will save the developer approximately 72% or $175,000 of the stormwater construction costs. On this project, almost all of the subsurface collection systems associated with curb and gutter projects have been eliminated. Strategically located bioretention areas, compact weir outfalls, depressions, grass channels, wetland swales and specially designed storm water basins are some of the LID techniques used. These design features allow for longer flow paths, reduce the amount of polluted runoff and filter pollutants from stormwater runoff (Blue Land, Water and Infrastructure, 2000).

Today many states are facing the issue of urban sprawl, a form of development that consumes green space, promotes auto dependency and widens urban fringes, which puts pressure on environmentally sensitive areas. "Smart growth" strategies are designed to reconfigure development in a more eco-efficient and community oriented style. LID addresses many of the environmental practices that are essential to smart growth strategies including the conservation of open green space. LID does not address the subject of availability of public transportation.

LID provides many opportunities to retrofit existing highly urbanized areas with pollution controls, as well as address environmental issues in newly developed areas. LID techniques such as rooftop retention, permeable pavements, bioretention and disconnecting rooftop rain gutter spouts are valuable tools that can be used in urban areas. For example, stormwater flows can easily be directed into rain barrels, cisterns or across vegetated areas in high-density urban areas. Further, opportunities exist to implement bioretention systems in parking lots with little or no reduction in parking space. The use of vegetated rooftops and permeable pavements are 2 ways to reduce impervious surfaces in highly urbanized areas.

LID techniques can be applied to a range of lot sizes. The use of LID, however, may necessitate the use of structural BMPs in conjunction with LID techniques in order to achieve watershed objectives. The appropriateness of LID practices is dependent on site conditions, and is not based strictly on spatial limitations. Evaluation of soil permeability, slope and water table depth must be considered in order to effectively use LID practices. Another obstacle is that many communities have development rules that may restrict innovative practices that would reduce impervious cover. These "rules" refer to a mix of subdivision codes, zoning regulations, parking and street standards and other local ordinances that determine how development happens (Center for Watershed Protection, 1998). These rules are responsible for wide streets, expansive parking lots and large-lot subdivisions that reduce open space and natural features. These obstacles are often difficult to overcome.

Additionally, community perception of LID may prevent its implementation. Many homeowners want large-lots and wide streets and view reduction of these features as undesirable and even unsafe. Furthermore, many people believe that without conventional controls, such as curbs and gutters and end of pipe BMPs, they will be required to contend with basement flooding and subsurface structural damage.

2 LOW IMPACT DEVELOPMENT PRACTICES

LID measures provide a means to address both pollutant removal and the protection of predevelopment hydrological functions. Some basic LID principles include conservation of natural features, minimization of impervious surfaces, hydraulic disconnects, disbursement of runoff and phytoremediation. LID practices such as bioretention facilities or rain gardens, grass swales and channels, vegetated rooftops, rain barrels, cisterns, vegetated filter strips and permeable pavements perform both runoff volume reduction and pollutant filtering functions.

2.1 Bioretention

Bioretention systems are designed based on soil types, site conditions and land uses. A bioretention area can be composed of a mix of functional components, each performing different functions in the removal of pollutants and attenuation of stormwater runoff (Figure 2).

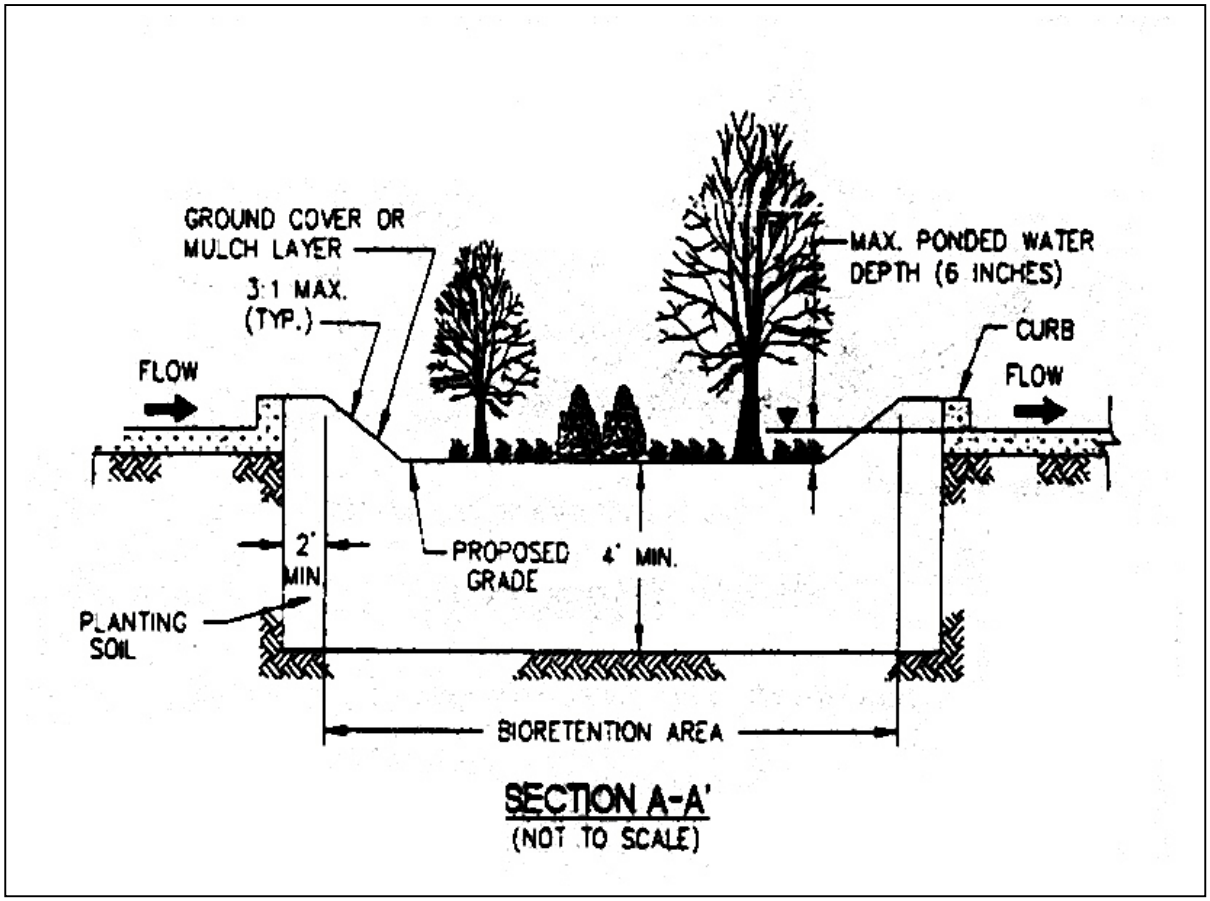

Figure 2: Typical Bioretention System (Prince George's County Department of Environmental Resources, 1993)

Six typical components found in bioretention cells:

- Grass buffer strips reduce runoff velocity and filter particulate matter.
- Sand bed provides aeration and drainage of the planting soil and assists in the flushing of pollutants from soil materials.
- Ponding area provides storage of excess runoff and facilitates the settling of particulates and evaporation of excess water.
- Organic layer performs the function of decomposition of organic material by providing a medium for biological growth (such as microorganisms) to degrade petroleum-based pollutants. It also filters pollutants and prevents soil erosion.
- Planting soil provides the area for stormwater storage and nutrient uptake by plants. The planting soils contain some clays which adsorb pollutants such as hydrocarbons, heavy metals and nutrients.
- Vegetation (plants) functions in the removal of water through evapotranspiration and pollutant removal through nutrient cycling.

Bioretention facilities are less cost intensive than traditional structural stormwater conveyance systems. Construction of a typical bioretention area in Prince George's County, Maryland is between $5,000 and $10,000 per acre drained, depending on soil type (Weinstein, 2000). Other sources estimate the costs for developing bioretention sites at between $3 and $15 per square foot of bioretention area. Design guidelines recommend that bioretention systems occupy 5-7% of the drainage basin. Additional savings can be realized in reduced construction costs for storm drainpipe. For example, bioretention practices reduced the amount of storm drain pipe at a Medical Office building in Prince George's County, Maryland from 800 to 230 feet, which resulted in a cost savings of $24,000 or 50% of the overall drainage cost for the site (Dept. of Env. Resources, 1993).

Components of the bioretention area should meet required guidelines in order to provide the most productive system possible. The mulch layer should be approximately 2-3 inches thick and replaced annually. Soil should be tested for several criteria before being used.

- pH range 5.5–6.5
- Organic matter 1.5–3.0%
- Magnesium (Mg) 35lbs/acre
- Phosphorus (P2O5) 100lbs/acre
- Potassium (K2O) 85lbs/acre
- Soluble salts < 500 ppm

Plant material should be obtained from certified nurseries that have been inspected by state or federal agencies (Dept. of Env. Resources, 1993). Native species should be used and selected according to their moisture regime, morphology, susceptibility to pests and diseases and tolerance to pollutants. Selection of plant species should be based on site conditions and ecological factors. A minimum of three species of trees and three species of shrubs should be selected to insure diversity, differing rates of transpiration and ensure a more constant rate of evapotransportation and nutrient and pollutant uptake throughout the growing season (Dept. of Env. Resources, 1993). Species that require regular maintenance should be avoided or restricted. Prince George's County recommends a warranty be established with the nursery as part of the plant installation, and should include care and 80% replacement of plants for the first year.

Table 1: Example Maintenance Schedule for Bioretention Areas (Prince George's County, Department of Environmental Resources, 1993)

Description	Method	Frequency	Time of Year
Soil			
Inspect and Repair Erosion	Visual	Monthly	Monthly
Organic Layer			
Remulch void areas	By Hand	As Needed	As Needed
Remove previous mulch layer before applying new layer (optional)	By Hand	Once a Year	Spring
Additional mulch added (optional)	By Hand	Once a Year	Spring
Plants			
Remove and replace all dead and diseased vegetation that cannot be treated	See Planting Specifications	Twice a Year	Mar 15–Apr 30 and Oct 1–Nov 30
Treat all diseased trees and shrubs	Mechanical or by Hand	N/A	Varies, depends on insect or disease infestation
Water of plant materials, at the end of the day for 14 consecutive days after planting	By Hand	Immediately after Completion of Projects	N/A
Replace stakes after one year	By Hand	Once a Year	Remove only in the Spring
Replace deficient stakes or wires	By Hand	N/A	As Needed

Annual maintenance is required for the overall success of bioretention systems. This includes maintenance of plant material, soil layer and the mulch layer. A maintenance schedule outlining methods, frequency and time of year for bioretention maintenance should be developed. Table 1 is a typical maintenance checklist. Plants will provide enhanced environmental benefit over time as root systems and leaf canopies increase in size and pollutant uptake and removal efficiencies. Soils, however, begin filtering pollutants immediately and can lose their ability to function in this capacity over time. Therefore, evaluation of soil fertility is important in maintaining an effective bioretention system. Substances in runoff such as nutrients and metals eventually disrupt normal soil

functions by lowering the cation exchange capacity (CEC) (Dept. of Env. Resources, 1993). CEC is the soil's ability to adsorb pollutant particles through ion attraction and will decrease over time. It is recommended that soils be tested annually and replaced when soil fertility is lost. Depending on environmental factors, this usually occurs within 5-10 years of construction. Replacement of soil can be accomplished in 1-2 days for approximately $1,000-$2,000 for a typical system which will drain one acre in the northeastern U.S. (Weinstein, 2000).

2.2 Grass Swales

Grass swales or channels are adaptable to a variety of site conditions, are flexible in design and layout, and are relatively inexpensive (USDOT, 1996). Generally open channel systems are most appropriate for smaller drainage areas with mildly sloping topography (Center for Watershed Protection, 1998). Their application is primarily along residential streets and highways. They function as a mechanism to reduce runoff velocity and as filtration/infiltration devices. Sedimentation is the primary pollutant removal mechanism, with additional secondary mechanisms of infiltration and adsorption. In general grass channels are most effective when the flow depth is minimized and detention time is maximized. The stability of the channel or overland flow is dependant on the erodibility of the soils in which the channel is constructed (USDOT, 1996). Decreasing the slope or providing dense cover will aid in both stability and pollutant removal effectiveness.

Engineered swales are less costly than installing curb and gutter/storm drain inlet and storm drain pipe systems. The cost for traditional structural conveyance systems ranges from $40–$50 per running foot. This is two to three times more expensive than an engineered grass swale (Center for Watershed Protection, 1998). Concerns that open channels are potential nuisance problems, present maintenance problems, or impact pavement stability can be alleviated by proper design. Periodic removal of sediments and mowing are the most significant maintenance requirements.

2.3 Vegetated Roof Covers

Vegetative roof covers or green roofs are an effective means of reducing urban stormwater runoff by reducing the percentage of impervious surfaces in urban areas. They are especially effective in older urban areas with chronic combined sewer overflow (CSO) problems, due to the high level of imperviousness. The green roof is a multilayered constructed material consisting of a vegetative layer, media, a geotextile layer and a synthetic drain layer. Vegetated roof covers in urban areas offer a variety of benefits, such as extending the life of roofs, reducing energy costs and conserving valuable land that would otherwise be required for stormwater runoff controls. Green roofs have been used extensively in Europe to accomplish these objectives. Many opportunities are available to apply this LID measure in older U.S. cities with stormwater infrastructures that have reached their capacities.

Green roofs are highly effective in reducing total runoff volume. Simple vegetated roof covers, with approximately 3 inches of substrate can reduce annual runoff by more than 50 percent in temperate climates (Miller, 2000). Research in Germany shows that the 3-inch design offers the highest benefit to cost ratio. Properly designed systems not only reduce runoff flows, but also can be added to existing rooftops without additional reinforcement or structural design requirements. The value of green roofs for reducing runoff is directly linked to the design rainfall event considered. Design should be developed for the storm events that most significantly contribute to CSOs, hydraulic overloads and runoff problems for a given area.

2.4 Permeable Pavements

The use of permeable pavements is an effective means of reducing the percent of imperviousness in a drainage basin. More than thirty different studies have documented that stream, lake and wetland quality is reduced sharply when impervious cover in an upstream watershed is greater than 10%. Porous pavements are best suited for low traffic areas, such as parking lots and sidewalks. The most successful installations of alternative pavements are found in coastal areas with sandy soils and flatter slopes (Center for Watershed Protection, 1998). Permeable pavements allow stormwater to infiltrate into underlying soils promoting pollutant treatment and recharge, as opposed to producing large volumes of rainfall runoff requiring conveyance and treatment. Costs for paving blocks and stones range from $2 to $4, whereas asphalt costs $0.50 to $1 (Center for Watershed Protection, 1998).

2.5 Other LID Strategies

Another strategy to minimize the impacts of development is the implementation of rain gutter disconnects. This practice involves redirecting rooftop runoff conveyed in rain gutters out of storm sewers, and into grass swales, bioretention systems and other functional landscape devices. Redirecting runoff from rooftops into functional landscape areas can significantly reduce runoff flow to surface waters and reduce the number of CSO events in urban areas. As long as the stormwater is transported well away from foundations, concerns of structural damage and basement flooding can be alleviated. As an alternative to redirection of stormwater to functional landscape, rain gutter flows can be directed into rain barrels or cisterns for later use in irrigating lawns and gardens. Disconnections of rain gutters can effectively be implemented on existing properties with little change to present site designs.

Many strategies exist to reduce the amount of impervious surface in development areas. Designing residential streets for the minimum required width needed to support traffic, on-street parking and emergency service vehicles, can reduce imperviousness. Other practices include shared driveways and parking lots, alternative pavements for overflow parking areas, center islands in cul-de-sacs, alternative street designs rather than traditional grid patterns and reduced setbacks and frontages for homes.

3 EVALUATION OF LID EFFECTIVENESS

3.1 Hydrological Measures

Enhancements in site drainage from traditional stormwater control measures, such as curbs and gutters that eliminate potential on-site flooding, often result in an increase in surface runoff. These alterations can cause an increase in volume, frequency and velocity of runoff flows, resulting in flooding, high erosion and a reduction in groundwater infiltration, as well as a reduction in water quality and habitat degradation. Four hydrological functions should be considered when investigating the effectiveness of LID practices. The runoff curve number (CN), time of concentration, retention and detention. LID techniques and the hydrological design and analysis components are represented in (Table 2).

Table 2: Low Impact Hydrologic Design and Analysis Components (Coffman, 2000)

	Low Impact Hydrologic Design and Analysis Components			
LID Practice	Lower Post-Development CN	Increase Tc	Retention	Detention
Flatten Slopes		X		
Increase Flow Path		X		
Increase Roughness		X		
Minimize Disturbances	X			
Flatten Slopes on Swale		X		X
Infiltration Swales	X		X	
Vegetative Filter Strips	X	X	X	
Disconnected Impervious Areas	X	X		
Reduce Curb and Gutter	X	X		
Rain Barrels		X	X	X
Rooftop Storage		X	X	X
Bioretention	X	X	X	
Revegetation	X	X	X	
Vegetation Presentation	X	X	X	

The runoff potential for a site is characterized by the runoff curve number or CN. One method of measuring hydrological function on a developed site is to compare the pre and post developed curve number. The CN method is used extensively in the analysis of environmental impact and design rainfall-runoff hydrology. The curve number measures a watershed or subwatershed's hydrological response and is determined based on soil type, land cover and amount of impervious surfaces (Hawkins 1998). A detailed evaluation of both proposed and existing land cover is the basis for determining the low-impact development CN, which is a calculation of the potential for runoff at a development site. One of the goals of LID is to design a system so that the post-developed CN is as close as possible to the predevelopment CN for the site. Limiting the percent of imperviousness is one technique to accomplishing this. The runoff coefficient, which can be derived from the CN, calculates the percent of rainfall converted to runoff.

The time of concentration (Tc) refers to the amount of time it takes for water to travel from the most distant point to the watershed outlet. By retaining predevelopment Tc, negative impacts associated with development can be reduced. Retention and detention of rainfall are the key components of increases in Tc. As the amount of impervious surface increases within a site, altering drainage paths, the contribution of total land area to excess rainfall increases, causing the time for stormwater to reach downstream outlets to decrease. This decrease in Tc reduces the pollutant removal capabilities of the site as well as resulting in an increase in the peak runoff rate. Maintaining Tc can be achieved by:

- Maintaining flow path lengths
- Increasing surface roughness
- Detaining flows
- Minimizing disturbances at the site
- Flattening grades in impact areas
- Disconnecting impervious surfaces
- Connecting pervious surfaces

3.2 Pollutant Removal Measures

Changes in site runoff characteristics can contribute to a reduction in water quality and degradation of aquatic and terrestrial habitats. LID practices provide a high level of water quality treatment controls due to runoff volume control of the "first flush" (first ½ inch) of runoff, which contains the highest pollutant loadings. Often LID practices control up to the first 2 inches of runoff and therefore treat a much greater volume of annual runoff (Coffman, 2000). By increasing the Tc and decreasing the flow velocity, LID practices result in a reduction in pollutant transport capacity and overall pollutant loading. Further, LID practices support pollution prevention by modifying human activities, which lower the introduction of pollutants into the environment.

LID practices such as bioretention facilities or rain gardens can be used as a mechanism for infiltration and pollutant removal, which is performed through physical and biological treatment processes occurring in the plant and soil complex. These processes include filtration, decomposition, ion exchange, adsorption and volatilization (Dept. of Env. Resources, 1993). Pollutant loadings are concentrated in the "first flush" of runoff from impervious surfaces and contain grease and oil, nutrients (nitrogen and phosphorous), sediments and heavy metals. Pollutant loadings and water quality impacts from development have been well documented in numerous studies. Concentrations of pollutants are appropriate to look at bio affects, but pollutant loads are better for assessing impacts to downstream habitats when cumulative effects are considered (Rushton, 1999). Studies should consider investigating both total metals and dissolved metals, when analyzing LID practice's effectiveness.

4 CASE STUDIES

The LID "functional landscape" is designed to mimic the predevelopment hydrological conditions through runoff volume control, peak runoff rate control, flow frequency/duration control and water quality control. Determining effectiveness of LID practices can be achieved by evaluating hydrological function and pollutant removal capabilities. Little investigation has been done to prove the actual effectiveness of LID in retaining predevelopment hydrology and preventing or reducing pollutant loadings caused by stormwater runoff on developed sites. LID is a relatively new concept in stormwater management and not widely implemented in all areas and climates in the United States. Limited research and analysis has been conducted on the various practices, due to this limited application.

The following case studies, though limited, represent the best examples of projects that use LID concepts for stormwater management. Both hydrologic and pollutant removal effectiveness are investigated. The most significant source for data is Prince George's County, Maryland where many of the LID practices were developed and first implemented. The Low-Impact Development Center, also located in Maryland, has done significant work in design and planning of LID sites. First year data from a two-year study of a Tampa, Florida, retrofit parking lot and an on-going permeable pavement project in Washington state provide the only long term analysis for the effectiveness of LID concepts (permeable pavements and swales) currently available.

4.1 Bioretention Facility Laboratory and Field Study Beltway Plaza Mall Parking Lot, Greenbelt, MD

Introduction

Land development results in increased stormwater runoff at the expense of infiltration. Additionally, surface runoff contains a broad range of pollutants and has been identified as one of the major sources for pollution of natural waters. Detention basins are commonly used for stormwater quality improvement and to optimize the infiltration of stormwater for recharge. A simple, yet effective method to control stormwater is through the use of bioretention areas or rain gardens.

Bioretention systems generally require less space, are more economical to build and require less maintenance than large-scale detention ponds. In addition these landscaped areas have aesthetic value. The design capacity for the system is generally for a typical storm event (0.5-0.7 inches per hour of rainfall over six hours) and to handle runoff from a small development area. The goal of this study is to compare field results with baseline data obtained through a laboratory constructed and tested bioretention systems.

Study Site

This study was conducted in two phases. The first phase took place at the University of Maryland, Department of Civil Engineering, Stormwater Lab in College Park, Maryland. Two different-sized bioretention prototypes were constructed and fitted with ports at varying depths in order to collect and analyze water quality and infiltration data. The small prototype was 2.5 ft wide and 3.5 ft long with a depth of 24 inches of material. The small bioretention system was fitted with two port depths. The large prototype was 10 ft long, 5 ft wide with a depth of 36 inches, and was fitted with three ports at various depth levels. Both systems had a freeboard of 6 inches, to allow water to accumulate if necessary. The soil, organic mulch layer and vegetation, were analyzed prior to construction to assure that the system was constructed according to design recommendations. Simulated runoff was applied to both systems at a rate of 1.6 inches per hour for six hours. A total of 16 simulations were tested on the small box, and four on the large prototype. The total volume of runoff applied to the small system was 200 L, and 1,000 L for the large system. These volumes represent the bioretention prototypes occupying 5% of a drainage area.

The second phase, a field study, took place at an existing bioretention facility located in the parking lot of Beltway Plaza in Greenbelt, Maryland. The depth of the system is 42" and is designed so that runoff infiltrates through the system and is collected by a 6-inch diameter perforated pipe underdrain, which feeds into the main storm drain system. A 7.5-ft x 7.5-ft area of the bioretention facility was used to conduct the study. Approximately 1,000 L of synthetic runoff, with characteristics similar to those used in the laboratory, were applied to the system over a 6-hour period. Effluent samples were collected from the main storm drain at 25-30 minutes intervals.

Study Results Summary

The laboratory results for the smaller prototype showed overall that the removal of heavy metals by the system was good. Cooper, lead and zinc levels in both upper and lower effluents had removal of more than 90%. Copper removal from samples taken from both ports was 94%. Lead removal was more effective from lower ports at 98%, but still good from upper ports at 94%. The average zinc removal from upper and lower ports was >96% (Table 3). No major variation of removal of metals occurred over time and all samples were less than EPA standards for freshwater. Nutrient removal for phosphorous was 65-75% from lower ports and approximately 40% from upper ports. The Total Kjeldahl Nitrogen (TKN) removal is 45-60% for the upper ports and 65-80% for the lower ports. Ammonium and nitrate removal followed no pattern and ranged from zero to 90%.

Table 3: Summary of Results for Smaller System—Standard Conditions

	Cu	Pb	Zn	P	TKN	NH_4^+	NO_3^-	Tn
Removal Upper	94%	94%	97%	25%	55%	60%	11%	60%
Removal Lower	94%	98%	98%	83%	80%	83%	26%	75%

Results from the large prototype correlated with those of the smaller constructed system. Experimental results indicated that removal of metals in most cases was more than 90%. Average copper removal for upper ports was 90% and 93% for middle and lower ports. Lead removal from upper ports was 93%, and >97% for middle and lower ports. The removal of zinc was 87% for upper ports and >96% for middle and lower ports. The data showed a trend of greater metal removal with depth. Nutrient removal was better from lower ports in most cases compared to removal of middle and upper ports. Phosphorous removal for lower ports was about 70-80% and 50-60% for middle ports. The upper ports showed a 10-15% increase in phosphorous levels above the influent amounts. The TKN removal was 50-75% for the lower and middle ports and a 45-30% increase was noted for upper ports. Removal of ammonium was 54% at upper ports, 86% for middle ports and 79% at lower ports (Table 4). Doubling or halving the influent pollutant levels during the laboratory testing had little effect on the effluent pollutant levels. Higher levels of phosphorous and TKN in effluent at the upper ports can be attributed to the vegetation.

Table 4: Summary of Results for Large System—Standard Conditions

	Cu	Pb	Zn	P	TKN	NH_4^+	NO_3^-	TN
Removal Upper	90%	93%	87%	0%	37%	54%	(-97%)	(-29%)
Removal Middle	93%	>97%	>96%	73%	60%	86%	(-194%)	0%
Removal Lower	93%	>97%	>96%	81%	68%	79%	23%	43%

During the field test at Beltway Plaza, a total of 1,000 L of synthetic runoff were applied to the bioretention area over a 6 hour period at a rate of approximately 0.5 inches per hour. Of the 1,000 L of influent, only 39% left the system. The remaining water leaked through cracks into the manhole, was held in the facility, or infiltrated. Effluent samples were analyzed for removal of nutrients and heavy metals (copper, lead and zinc).

The TKN removal was about 50% and the phosphorous removal was observed at approximately 65%. Nitrate concentrations were below input levels, with a removal of about 17%. The removal for ammonia was very good at >95%. Removal of metals was very good and was consistent with the laboratory results. The removal of copper was 97% and for lead, and zinc, the removal was >95% (Table 5).

Table 5: Summary of Results for Field Bioretention Study

	Cu	Pb	Zn	P	TKN	NH_4^+	NO_3^-	TN
Removal	97%	>95%	>95%	65%	52%	92%	16%	49%

Removal rates for the field study corresponded with the rates observed for the two laboratory constructed bioretention systems. In all cases pollutant removal rates approached 100% for the metals copper, zinc and lead. Doubling or halving the concentration levels of the influent had no effect on removal efficiencies and were statistically equivalent in nearly all cases. Pollutant removal rates for all systems are compared in the above graph (Figure 3). The negative removal rate for nitrate in the large prototype, upper and middle ports, was attributed to the release of previously captured nitrated or nitrate from nitrification processes.

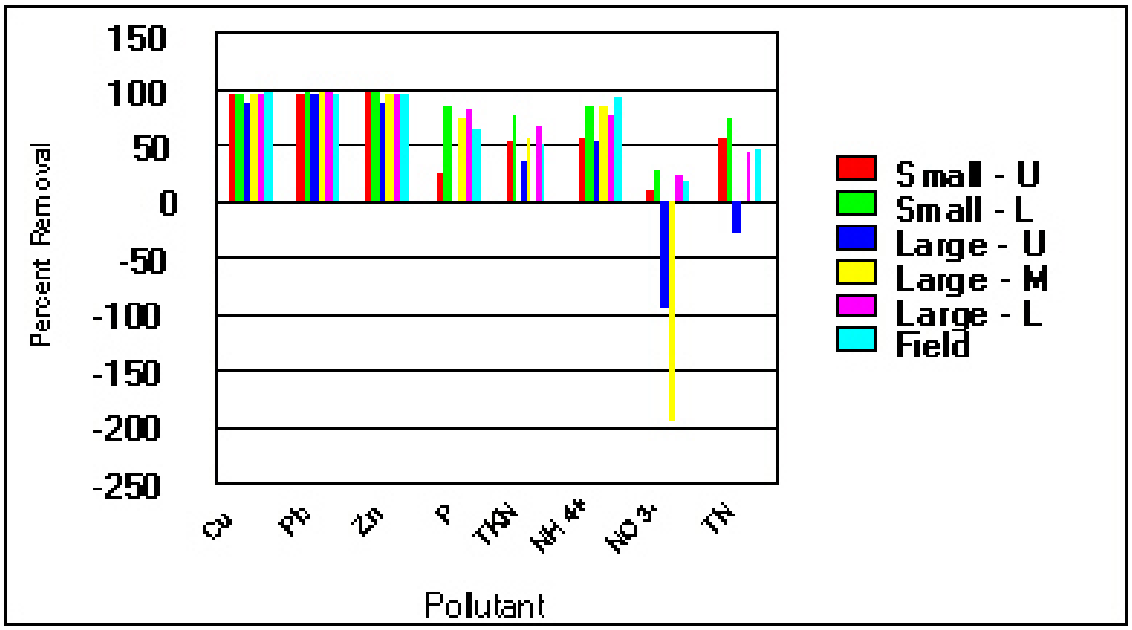

Figure 3: Pollutant Removal Rates for All Systems

4.2 Bioretention Facility Field Study Peppercorn Plaza Parking Lot at Inglewood Center, Landover, MD

Introduction

Impervious surfaces, such as parking lots, are a major contributor to pollutant loads in receiving waters in urban areas. These surfaces provide a place for pollutants to accumulate and later wash-off in the first flush of rainfall events. Parking lots are good site locations for bioretention systems, since they can be retrofit into existing lots with little or no loss of parking space. In addition, patrons have expressed appreciation of green space within parking areas. Bioretention areas are a natural means of controlling pollutants from entering urban water bodies. The hydrologically functional landscape, can be used as a mechanism for pollutant removal, through physical and biological treatment processes occurring in the plant and soil complex. The bioretention area in the Inglewood Center Parking lot, was analyzed for pollutant removal efficiency during a simulated rainfall event.

Study Site

The study was conducted at one of the two bioretention areas in the Inglewood Plaza parking lot. An area of 50 ft^2 was used in the south facility for the simulated rainfall event. The bioretention facility contains a T-shaped under drain that runs the entire length of the system and is located 32.5 inches below the surface (Figure 4). The under drain directly connects with the storm drainage system. Samples were collected from a pool of water in the storm drain observation area. Output samples were collected every 30 minutes. The soil was dry at the onset of the experiment, due to lack of rainfall for a period of several days prior to the experiment. The synthetic rainfall was applied at a rate of 1.6 inches per hour for a duration of six hours. A total of 300 gallons (1100L) was applied over the course of the experiment.

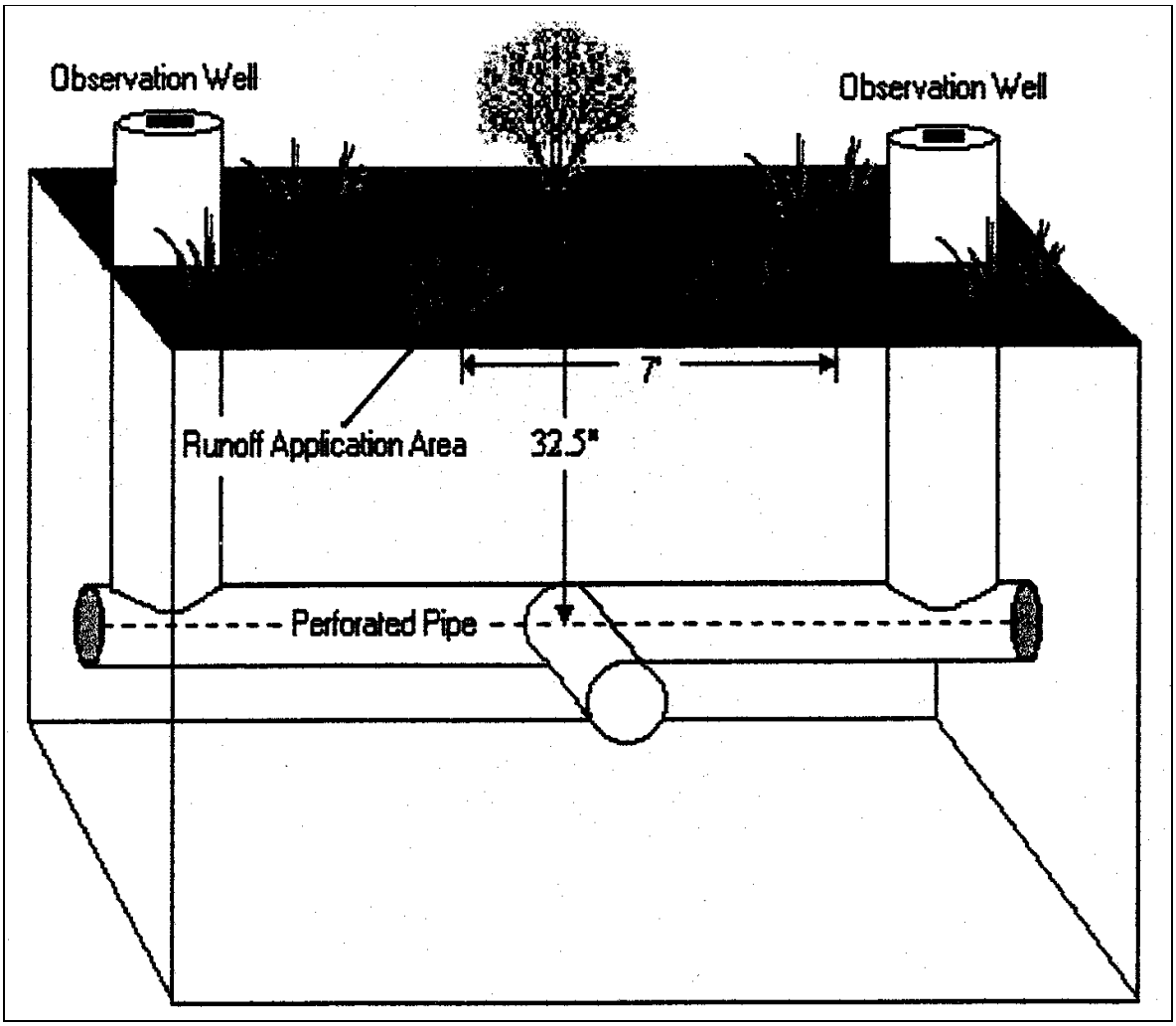

Figure 4: Bioretention System at Peppercorn Place, Inglewood Plaza (Davis, 1999)

Project Results Summary

Effluent concentrations for metals were fairly constant over the sampling period, with zinc being the exception by showing improved removal over time. Average removals for total copper was 43%, total lead was 70% and total zinc 64%. The removals were 5–14% better for dissolved metals. Nutrient concentrations were all below input levels. Removal of phosphorous was very good at 87%. Removal of TKN was observed at 67% and nitrate averaged 15% (Table 6). Ammonium was not detected in either the influent or the effluent. In addition, the bioretention facility removed some calcium, however chloride concentrations were higher in the effluent than in the influent, which is attributed to salting of the parking lot in the winter. Also, temperature variations during the experiment showed evidence of the system cooling the runoff water temperature.

Table 6: Summary of Pollutant Removal Results of Bioretention System at Inglewood Place

	Cu	Pb	Zn	Ca	P	TKN	NO_3^-
Removal	43%	70%	64%	27%	87%	67%	15%

By using synthetic runoff, the concentrations of applied pollutants could be controlled and accurately measured and compared to levels found in the effluent. However, testing has not been done on an actual rainfall event to determine effectiveness of the system for reducing runoff volume and pollutant loads.

4.3 Permeable Pavements and Swales Field Study Stormwater Management, Florida Aquarium Parking Lot, Tampa, FL

Introduction

Impervious surfaces are responsible for more stormwater runoff than any other type of land use. Paved surfaces that often replace vegetated areas increase the volume and frequency of rainfall runoff. In addition, these surfaces provide a place for pollutants to accumulate between rainfall events, and are later washed off into receiving waters. Keeping runoff on-site to allow for infiltration as well as chemical, physical and biological processes to take place is the most effective means of reducing pollutant loadings. This study quantifies how much runoff and pollutant loadings can be reduced by using swales and landscaped depressions in parking lots. In additional to investigating basins with and without swales, three paving surfaces were compared. The research is designed to determine pollutant load reductions measured from three different treatments within the parking lot; different paving materials in the parking lot, a planted strand with native trees and a small pond used for final treatment. Pollutant concentrations and infiltration were measured and analyzed for the various control methods. First year data collected in the parking lot between August 1998 and August 1999 were evaluated for this study. Also, sediment samples were collected from each of the swales, two locations in the strand and two locations in the pond.

Project Area

The study site is a parking lot at the Florida Aquarium in Tampa, Florida. The study uses the entire parking area, 4.65 ha, to define the drainage basin. The parking lot was modified for the study by reducing the length of each parking space by 61 centimeters, which allows for a 122-cm wide grass swale between rows. The vehicle front end now hangs over a grass swale instead of pavement, which prevented any reduction in the number of parking spaces within the parking area. Four different scenarios were investigated to determine the most efficient method of runoff reduction and pollutant removal. Eight basins, two of each type, were constructed and fitted with instrumentation to collect flow weighted water quality samples and measure discharge amounts during storm events (Figure 5). The four treatment types are:

- Asphalt paving with no swale
- Asphalt paving with a swale
- Cement paving with a swale
- Permeable pavement with a swale

Rainfall quality and volume were compared to runoff quality and volume to determine the effectiveness of each treatment type.

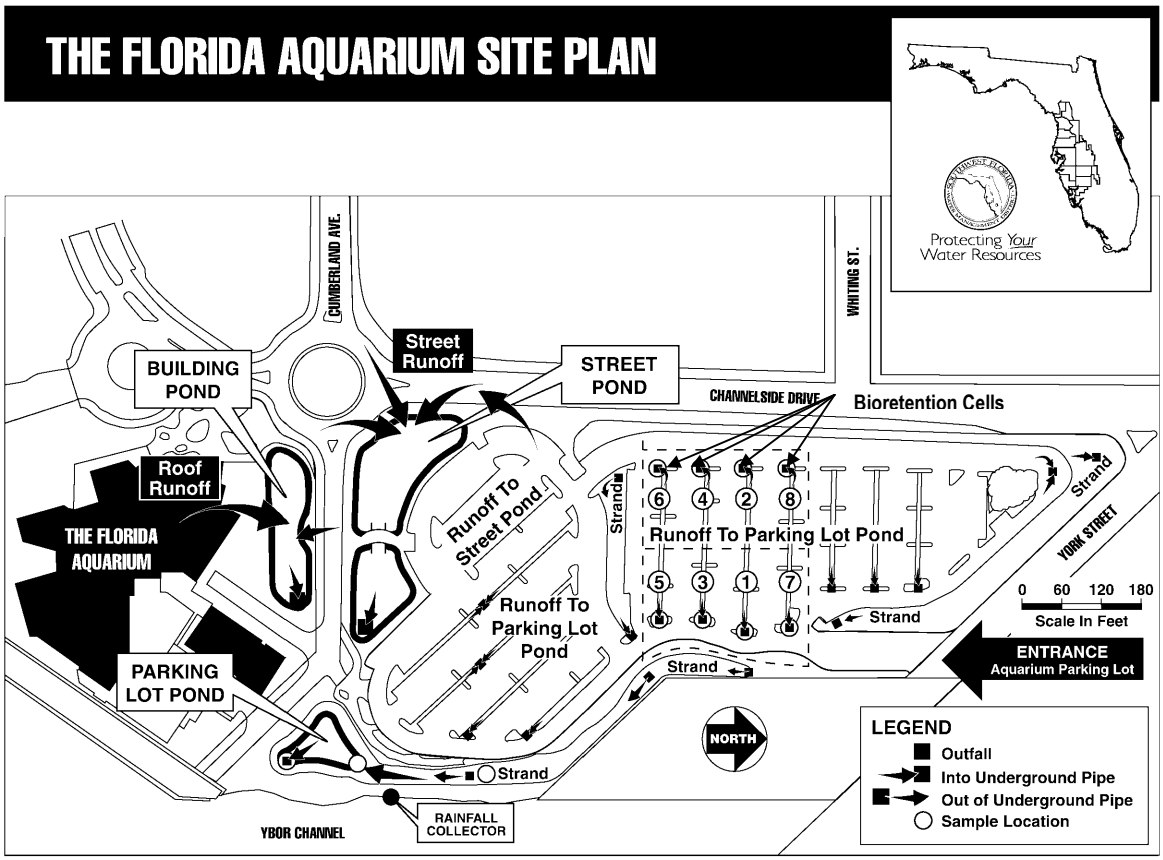

Figure 5: Florida Parking Lot Study Site (Rushton, 1999)

Project Results Summary

The larger garden areas (approximately the size of one parking space) account for a runoff coefficient calculation reduction of 40-50 percent for the smaller basins. The runoff coefficient is a value that ranges from zero to one and expresses the fraction of rainfall volume that is actually converted into storm runoff volume. The runoff coefficient closely tracks percent impervious cover. For rainfall events less than 2 cm, basins with swales and permeable pavement have 80-90% less runoff than basins without swales, and 60-80% less runoff than basins with the other pavement types and swales. The percent of rainfall converted to runoff for each treatment type is shown in Figure 6.

Larger rainfall amounts show fewer differences in runoff amounts between the different pavement types, but basins with swales have approximately 40% less runoff than the basins without swales. Soil analysis at the site shows a higher than average gravel content (8.9%) which may account for the good infiltration rates. Comparisons of rainfall with storm runoff amounts showed that swales reduced runoff for all rainfall events and paving types.

Water quality analysis shows that average concentrations varied by paving and depression storage types. Rainfall has been identified in other studies as a significant source of nitrogen in runoff. This site displayed the same correlation between

concentrations of ammonia and nitrate in rainfall and their concentrations in runoff. Phosphorous concentrations displayed the inverse, since concentrations were higher in effluent samples than in the initial rainfall. The levels were somewhat higher in the runoff of basins without planted swales and the highest concentrations of phosphorous were noted in basins where runoff traveled through grassed swales.

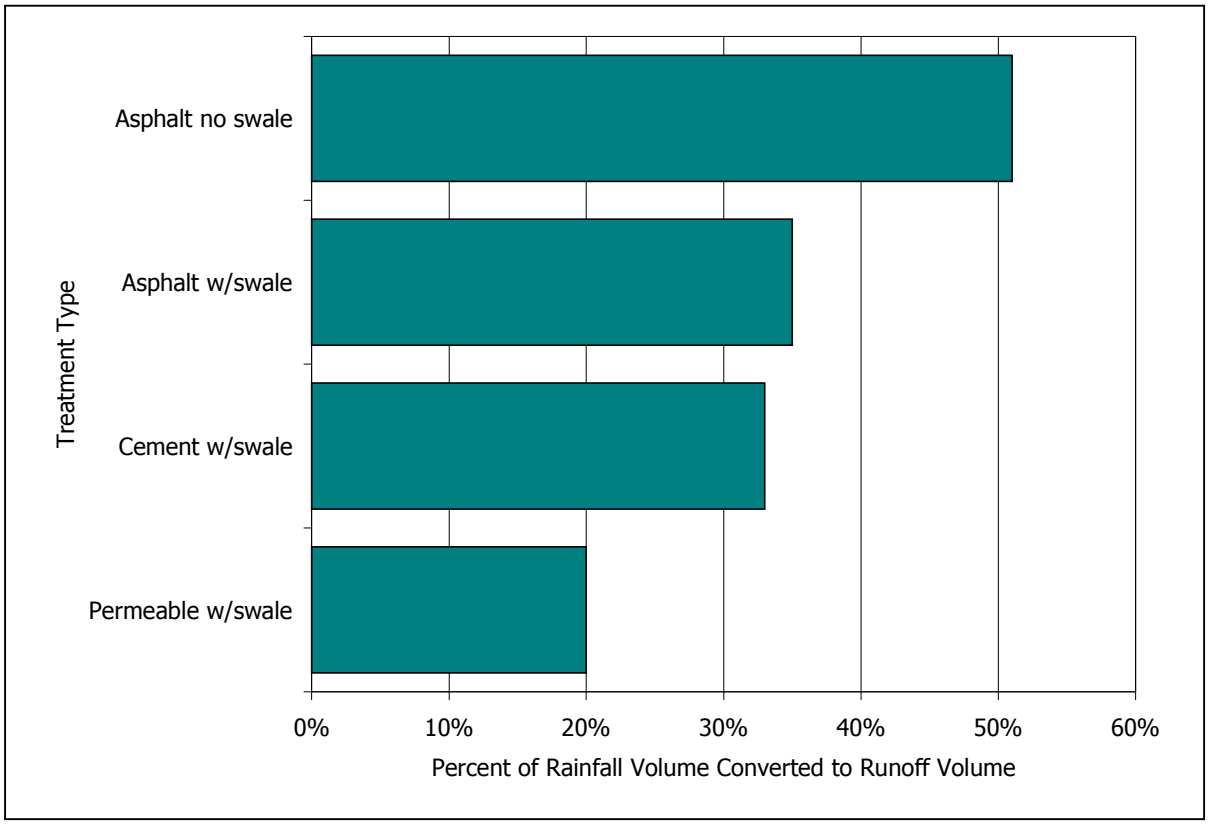

Figure 6: Percent of Rainfall Volume Converted to Runoff Volume for Events Less Than 2cm

Paving material showed an effect on the concentration of metals in runoff. Basins paved with asphalt showed higher concentrations of iron, manganese, lead, copper and zinc than those paved with cement or permeable paving. Many of the major ions also showed a correlation with the paving material. Potassium, sodium, sulfate and calcium concentration were much higher in the basins paved with cement, which is made from limestone, although these levels were still well below levels considered detrimental to the environment. No consistent pattern was discernable for suspended solids, but generally measurements were low when compared to similar stormwater studies.

Water quality loads were examined because they provide a more realistic measure for understanding the impacts of stormwater on receiving waters. Pollutant loads include both the volume of water discharged and the concentration of pollutants measured. Higher loads for all constituents, except phosphorous, were noted for basins without swales, since more water was discharged from these basins. Although phosphorous concentrations were much lower in basins without swales, loads were about the same.

Removal for Ammonia was 45% for asphalt with swale, 73% for cement with swale and 85% for permeable pavement with swale. Total nitrogen removal was 42% for permeable pavement with swale, 16% for cement with swale and 9% for asphalt with swale. TSS removal varied from 91% for permeable pavement with swales to 46% for asphalt with swales.

Table 7 summarizes the constituent load efficiency of the various treatments. The concentrations and loads measured during this study were compared to other stormwater studies conducted in Florida, and the values were much lower than measured values at other sites. Metal removal was good for the permeable pavement with swale treatment, with copper at 81%, iron 92%, lead 85%, manganese 92% and zinc 75%. The removals for the cement with swale treatment were somewhat lower, with the asphalt with swale treatment showing the poorest performance of the three treatments with swales.

Table 7: Summary of Pollutant Removal Efficiency for the Various Treatment Types

Constituent	Asphalt with swale	Cement with swale	Permeable with swale
Ammonia	45%	73%	85%
Nitrate	44%	41%	66%
Total Nitrogen	9%	16%	42%
Ortho Phosphorus	-180%	-180%	-74%
Total Phosphorus	-94%	-62%	3%
Suspended Solids	46%	78%	91%
Copper	23%	72%	81%
Iron	52%	84%	92%
Lead	59%	78%	85%
Manganese	40%	68%	92%
Zinc	46%	62%	75%

The concentrations of metals in sediment samples collected in swales were consistent with concentrations measured in stormwater runoff. Higher concentrations of metals were found in swales paved with asphalt than those of grass. None of the metals measured in the sediments exceed the level where toxicity to organisms is probable when compared to the Environmental Protection Agency (EPA) and the National Oceanic and Atmospheric Administration (NOAA) chemical toxicity guidelines for marine environments. However, copper and zinc concentrations were above the level where toxicity is possible.

Nutrient concentrations measured in sediment samples for TKN and total phosphorus were lower in the basins without grassed swales. Sediment samples taken from locations in the strand and the wet-detention pond were compared to swale samples. The comparison showed that most of the metals are being settled out in the swales or

deposited in the drop boxes. Sediment samples at the site were tested for 100 organic pollutants, but only 16 were detected at the site. The high concentrations found in this and similar studies indicate that atmospheric deposition is the source for most of the 16 detected organic pollutants.

4.4 Vegetated Roof Covers
Field Study
Green Rooftop, Philadelphia, PA

Introduction

Many older American cities are plagued with nuisance flooding on roads and walkways and chronic overflows of combined sewer systems. In highly impervious cities, vegetated rooftops offer a practical solution for controlling runoff at the source. A vegetated roof cover is a veneer of living vegetation installed on top of a conventional roof. By mimicking natural hydrologic processes, they can achieve runoff characteristics similar to open space conditions. Green roofs are comprised of three components; subsurface drainage, growth media and vegetation. Specific hydraulic performance objectives are achieved through the appropriate selection of these components. Vegetated roof covers have been used extensively in Germany for 25 years.

Project Area

A 3,000-ft^2 rooftop in Philadelphia was fitted with a demonstration vegetated rooftop. The performance objective was the restoration of predevelopment runoff peak rates for a 24-hour, 2-year return-frequency storm. Although in the Philadelphia area, 90% of all rainfall is contributed by storms with volumes of 2 inches or less over a 24-hour period. The "green roof" used is only 3.4 inches (8.6cm) thick, including the drain layer (Figure 7). Its maximum saturated weight is less than 17 lb/ft^2 and it weighs less than 5lb/ft^2 when dry. No additional structural support was necessary for installation. The saturated infiltration capacity is 3.5 inches per hour. The key features of this system are a synthetic under drain layer which promotes rapid water drainage from the roof surface, thin, lightweight growth media suitable for installation on existing roof surfaces and a meadow-like setting of perennial *Sedum* varieties selected for hardiness and the ability to withstand seasonal conditions typical of the area.

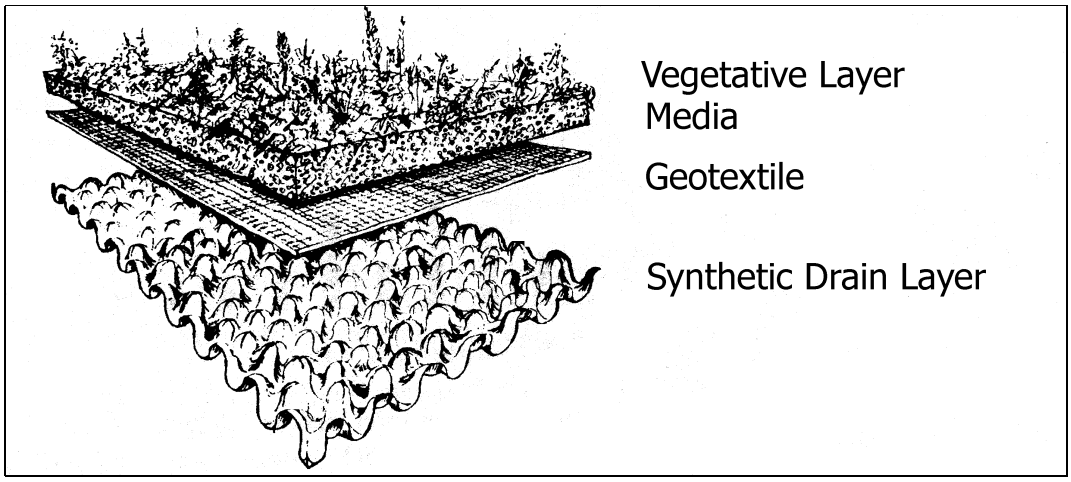

Figure 7: Structure of the Philadelphia Vegetated Roof Cover (Miller, 1998)

Project Results Summary

Currently too few storms have been observed to permit quantitative assessment of the vegetative covered roof. Data are available from one intense storm monitored during a 0.4 inch, 20-minute rainfall event (Figure 8). Supplemental data from a pilot-scale experimental station were used in this study. Test data show that for storms with less than 0.6 inches, runoff is negligible. During a 9-month period, 44 inches of rainfall was recorded at the pilot-scale test station, with only 15.5 inches of runoff generated. Runoff occurred for precipitation events between 0.6 and 1.0 inches, but lagged rainfall significantly. Attenuation was lower for the pilot-scale experiment than the anticipated modeled value (40% vs. 48%), which has been attributed to differing drain conditions and a steeper slope at the test site. Additional benefits of this project include extended life of the underlying roof materials, reduction of energy costs by improving effectiveness of insulation and restoration of ecological aesthetic value of open space in densely populated areas.

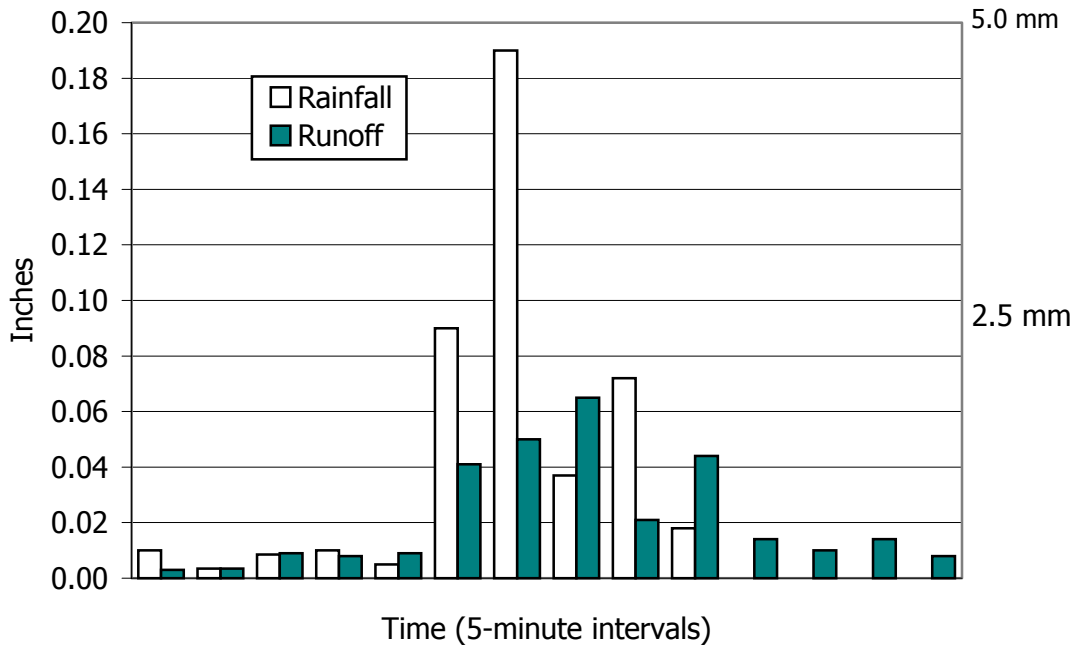

Figure 8: A Rainfall Event of 0.4 inches with Media Completely Saturated (Miller, 1998)

4.5 Permeable Pavements
Field Study
Permeable Pavements for Stormwater Management, Olympia, WA

Introduction

This study demonstrates the use of permeable surfaces for reducing runoff volume, improving infiltration and reducing pollutant loadings in an urban parking area. Numerous problems associated with urbanization, such as flooding, channel erosion and destruction of aquatic habitats are directly linked to the loss of water-retaining function of soil in urban landscape. As imperviousness increases, a stormwater runoff reservoir of tremendous volume is removed. Water that may have lingered in this reservoir for anywhere from a few hours to many weeks now flows rapidly across land surfaces and arrives at stream channels in short, concentrated bursts. The scope of this project was to review existing information on types and characteristics of permeable pavements, construct and monitor a full-scale test site and evaluate long-term performance of these systems. This study of permeable pavements evolved from a growing recognition of the limitations of traditional stormwater management in keeping water in the soil by allowing excess of water to the soil over large areas of landscape.

Study Site

The study site is an employee parking lot on the southeast corner of the King County Public Works facility in Renton, Washington. The permeable pavement sections of the lot were constructed for the purpose of this study. A total of eight stalls using four different pavement types were constructed. In addition a ninth stall of traditional asphalt was used as a control. The parking stalls are fitted with pipe, gutters and gauges to collect and measure the quantity and quality of storm runoff from each pavement type. Subsurface troughs were constructed down the middle of each stall and imbedded into the subgrade six to 8 inches below the surface. This allows for the collection of only a fraction of the infiltrated water (about 1.8%). The permeable pavement types studied were:

- A plastic network with grass infilling (<5% impervious)
- An equivalent plastic network with gravel infilling (<5% impervious)
- Impervious blocks with grass infilling (~60% impervious)
- Impervious blocks with gravel infilling (~90% impervious)

Project Results Summary

Data used to monitor the various permeable pavements were from three different storm events during the autumn of 1996. The volume of runoff generated from cement blocks with 60% impervious surface stalls and runoff from traditional asphalt are compared (Figure 9). The storm had a fairly uniform distribution of rainfall (4mm per hour) throughout the duration of the event. Rain falling on the asphalt yielded sharp hydrograph

peaks and a high total volume of runoff water. Only about one peak per hour (0.03mm per hour of runoff) was recorded for the cement blocks with 60% impervious surface. These data are representative of data gathered at the other stalls and reflect little or no runoff from the permeable pavement stalls.

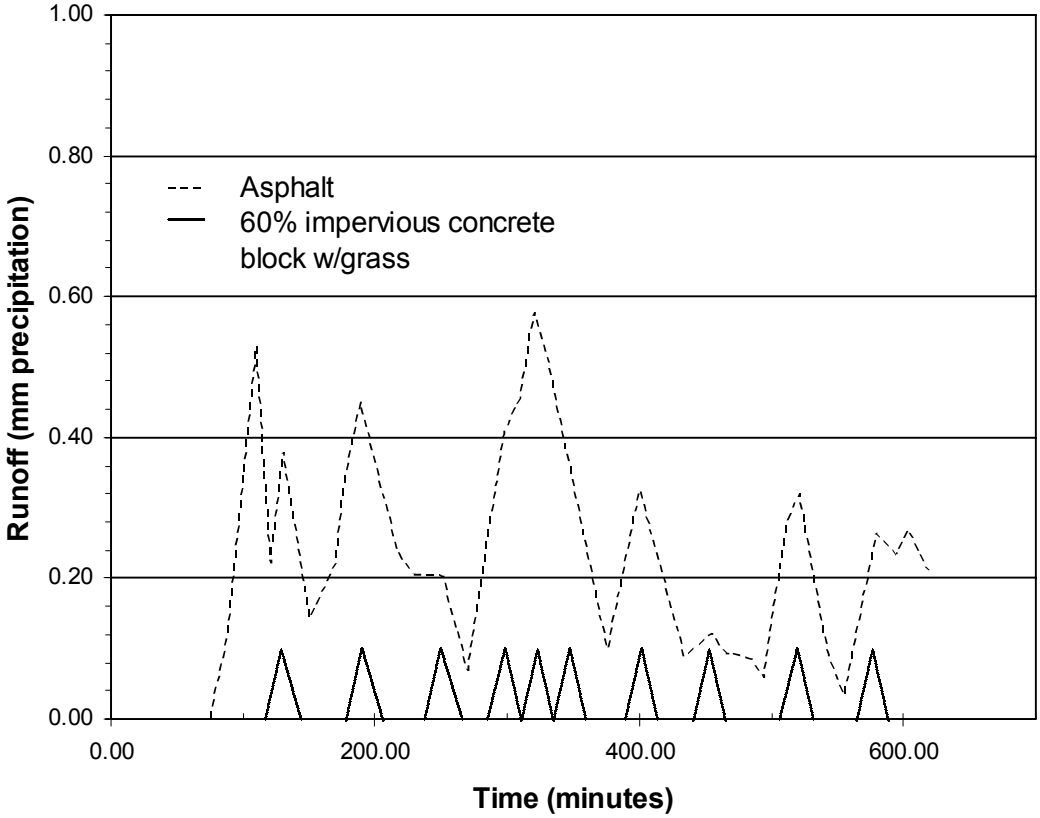

Figure 9: Surface Runoff from 60% Impervious Pavement vs. Asphalt (Booth, 1996)

In contrast to surface runoff, subsurface flow generally responds more slowly and more uniformly. The data for a storm of short duration and moderate intensity are represented in the following graph (Figure 10). Individual peaks on the bar graph indicate rainfall rates as high as 14mm per hour, lasting for short durations (15-minute intervals). Runoff gauges on all four systems showed virtually no surface runoff (on average 0.03 mm). It displays a characteristically attenuated discharge peak and lagged response to the rainfall inputs. All pervious surfaces responded similarly. For the asphalt surface, the volume of water running off the asphalt responded quickly to changes in the rate of rainfall. This is indicated by high peak flows corresponding with precipitation amounts, with little lag time noted (Figure 11).

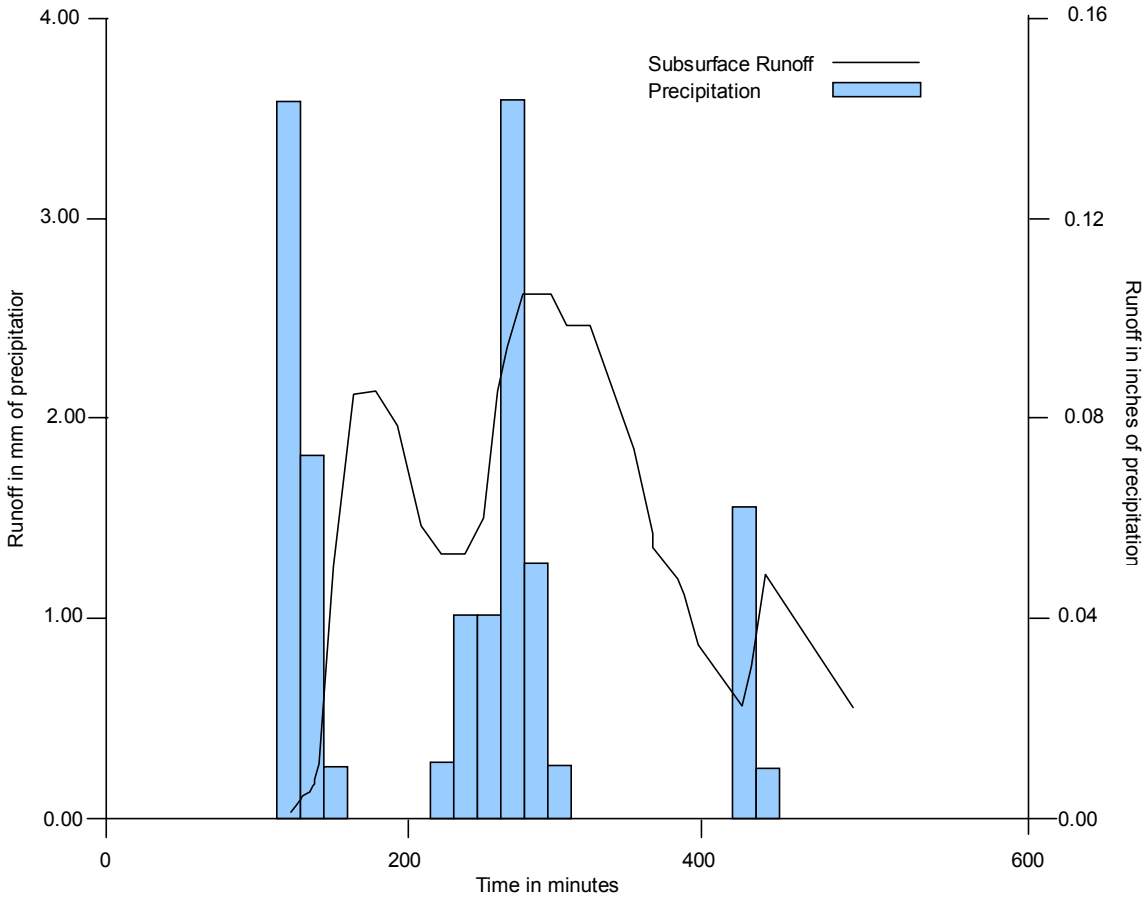

Figure 10: Subsurface Runoff From Pavement Less Than 5% Impervious Compared to Precipitation (Booth, 1996)

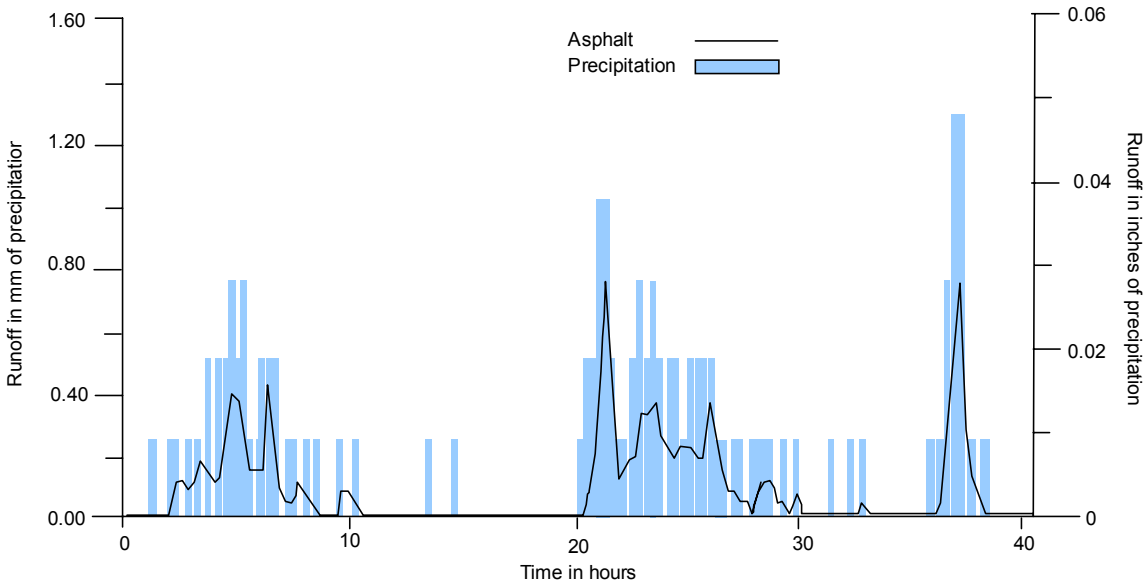

Figure 11: Surface Runoff From Asphalt Compared to Precipitation (Booth, 1996)

Water quality results were obtained from samples collected directly from tipping bucket gauges. Only five samples from the four subsurface collection troughs and the asphalt surface runoff were analyzed. Chemical analysis of the subsurface samples showed sub-detection levels for many of the constituents and relatively low levels for all tested compounds. Measured concentrations of common metals (copper, lead, zinc aluminum and iron) were substantially below the reported national averages. Subsurface samples did show slightly higher concentrations than runoff, which can be attributed to the troughs collecting the "dirtiest" 2 percent of runoff, from directly under where vehicles park. Still, these concentrations were below typical values seen in urban runoff.

4.6 Grass Swales
Field Study
Highway Grass Channels, Northern Virginia, Maryland, and Florida

Introduction

The U.S. Department of Transportation, Federal Highway Administration conducted a field study to determine the pollutant removal efficiencies of grassed channels and swales along highways in Northern Virginia, Maryland and Florida. Sampling was conducted at the inflow and outflow areas of the channels, which provided data for quantity and quality of waters entering and leaving the channels. The samples were analyzed for the following pollutants:

- Total Suspended Solids (TSS)
- Heavy Metals (cadmium, copper, lead and zinc)
- Nitrogen (Total Kjeldahl Nitrogen and nitrite/nitrate)
- Total Phosphorus
- Total Organic Carbon

Twelve rainfall events were monitored, including both frequent and infrequent rainfall periods, most involving discrete stormwater runoff events following a minimum of two days of dry weather. In addition continuous rainfall periods of seven to 14 days were included to determine overall removal efficiencies.

Project Area

The test area in northern Virginia is located along I-66. The channel has an average slope of 4.7% with a total drainage area of 1.27 acres (0.51 ha). Stormwater enters the channel indirectly, by means of overland flow. Stormwater data were collected from June 13, 1987 through November 12, 1987. The test site in Maryland is a grass channel located alongside I-270. This channel has a slope of 3.2% and a total drainage area of 1 acre (0.40 ha) with stormwater entering by means of overland flow. Data were collected for the period beginning June 18, 1987 and ending mid-September 1987. The Florida test site is a grass channel median located between the East and West lanes of I-4. The Florida grass channel has a lower slope than the other two test sites with a drainage area of 0.56 acres (0.23 ha). Data collection began at this site on February 25, 1988 and ended on October 31, 1988.

Project Results Summary

All three locations showed some effectiveness with regard to pollutant removals, although results varied depending on the method of analysis and the location. The results for all three locations are represented in Table 8. Sediment core samples were obtained from the channels and compared to samples from adjacent, upland areas, to determine

pollutant removal effectiveness of the grass channels. Based on the data from the analysis the following conclusions were made. Removal of metals appears to be directly related to the removal of TSS, whereas nutrient removal is not. Removal of TSS can be estimated using flow depth and travel time relationships. Relatively low nutrient removal may be observed in channels that are effective in removing other pollutants. The controlling factors in pollutants removal of grass channels are length, channel geometry, channel slope and average flow. Both metals and nutrients are removed in grass channels, but metal removal is more reliable.

Table 8: Long Term Pollutant Removal Estimates for Grassed Swales

	TSS	TOC	TKN	NO_2/NO_3	TP	Cd	Cr	Cu	Pb	Zn
VA	65%	76%	17%	11%	41%	12-98%	12-16%	28%	41-55%	49%
MD	-85%	23%	9%	-143%	40%	85-91%	22-72%	14%	18-92%	47%
FL	98%	64%	48%	45%	18%	29-45%	51-61%	62-67%	67-94%	81%

5 CONCLUSION

Pollutant loading reduction data for bioretention systems are promising in that removal percentages for heavy metals and nutrients seem quite high. Generally, the experimental data show a fairly consistent removal rate for all of the tested bioretention systems for heavy metals and most nutrients (Table 9). Field study results support the laboratory baseline data collected by the University of Maryland, College Park. However, the field studies provide data for single, simulated rainfall events using synthetic rainfall. A larger number of sampled events would be required for statistical validity of the results.

Table 9: Pollutant Removal Efficiencies for Laboratory and Field Bioretention Studies

Pollutant	Laboratory (small)	Laboratory (large)	Beltway Plaza	Inglewood Plaza
Pb	93–97%	93–97%	>95%	70%
Cu	91–97%	90–93%	97%	43%
Zn	93–98%	87–96%	>95%	64%
P	16–83%	0–81%	65%	87%
TKN	55–80%	37–68%	52%	67%
NH_4^+	<0 -83%	54 -86%	92%	N/A
NO_3^-	11–26%	<0–23%	16%	15%
TN	60–75%	<0–43%	49%	N/A

The use of synthetic runoff during the bioretention experiments, both in the lab and field, allowed the concentrations of applied pollutants to be controlled and accurately measured, so that influent and effluent levels could be compared. In addition, infiltration could be determined based on the volume of runoff verses volume input. The statistical analysis applied for the mass loadings was sound. However, testing for these studies has not been conducted for any actual rainfall events to determine effectiveness of the system for reducing runoff volume and pollutant loads. A comparison of average pollutant removal efficiencies is shown in Figure 12.

The grass swale data from the Federal Highway study show trends in removal of metals as they relate to TSS removal for three different areas in the United States. However a short study period, using data from only a few storm events, is used to quantify the results. Additional data from numerous storm events would be required to provide statistical validity to the analysis. The data from additional, less extensive studies conducted by the University of Virginia help to validate the highway data, as pollutant loading removal rates and runoff volume reduction rates were fairly consistent between the two studies. Conclusions drawn from both studies indicate that not only length, but also longitudinal slope and the presence of check dams increase the pollutant removal capabilities (Kuo, 1999).

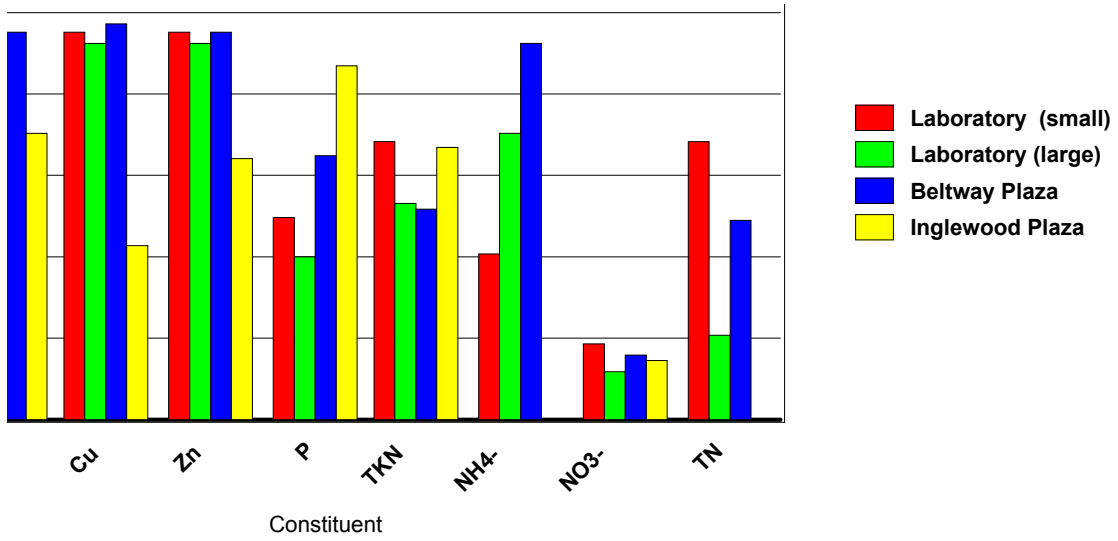

Figure 12: Pollutant Removal Rates for Laboratory and Field Experiments of Bioretention Systems

In addition, a study conducted in Ontario, Canada concluded that no evidence existed to show that nutrient or metal concentrations in soils increased with age in grass swales, as concentrations varied regardless of age. Also, the Canadian study determined that no degradation in vegetative quality resulted from continuous exposure to stormwater runoff. It was shown that vegetation quality was similar to what would be found along conventional systems (Sabourin, 1999). The Canadian study also showed that total runoff volumes from grassed swales were 6-30% less than conventional systems and that a loading comparison revealed that the system released significantly less pollutants than conventional systems.

Permeable pavements can reduce the percent imperviousness for urban areas, which allows for greater infiltration rates and reduced runoff volumes. In addition these alternate pavement types function as stormwater pollutant removal mechanisms. Preliminary data from the Washington project show effectiveness, but too few storms have been analyzed. Only the Florida Aquarium parking lot data represent an analysis of a significant number of actual storm events. As the study continues, and second year data become available, more compelling proof of the pollutant removal effectiveness and runoff volume reduction can be realized. The methodology for testing runoff volume reduction and mass pollutant loadings in the Florida study provided reliable data.

Extensive data exist that show runoff volume reduction using vegetated roof covers in Europe, especially Germany. The data are specific to temperate climates and results may vary considerably for other areas in the United States. However, the Philadelphia project shows the benefits of this application in reducing runoff volume by reducing the level of imperviousness in urbanized areas. Further, it demonstrates the capacity for retrofit of green roofs in highly impervious, older, urbanized U.S. cities experiencing chronic CSO problems. Little data are available from this demonstration project. However, with continued monitoring, evidence of the suitability of green roofs in the United States may become more apparent.

6 RECOMMENDATIONS

A detailed comparison of pre- and post-development conditions and an analysis of adjacent areas using traditional stormwater controls and LID practices side-by-side, would provide the best possible assessment of LID effectiveness hydrologically and as a mechanism for reducing pollutant loadings. The Jordan Cove Urban Watershed project in Waterford, Connecticut, is currently under construction for a side-by-side analysis, however, no data are available at this time. Baseline predevelopment hydrological data are currently being collected for comparison once the development is completed and monitoring begins.

Most of the current field data available for bioretention facilities are for single, simulated rainfall events. Fitting the existing, tested bioretention areas in Prince George's County with monitoring equipment and running a significant number of tests on actual rainfall events over 9 months to 1 year, would provide higher quality data. Long term studies would prove or disprove the long-term effectiveness of bioretention systems, as well as provide information on trends in soil fertility lifetimes and trends in reduced capabilities over time. The two-year Florida Aquarium study is currently the best possible source for these data.

The majority of case studies cited above are ongoing investigations, and reported data represent preliminary findings. Follow-up on these studies will provide better support for proof of effectiveness of LID practices. Additional studies testing LID practices should be identified as the use of these practices grows. Preliminary findings should be viewed as a starting point, and not the empirical proof of effectiveness for the various LID practices studied. The development of a database for entry and storage of LID study data could provide a useful tool for future investigation of LID effectiveness.

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STATE OF CALIFORNIA
STATE WATER RESOURCES CONTROL BOARD

ORDER WQ 2001- 15

In the Matter of the Petitions of

BUILDING INDUSTRY ASSOCIATION OF SAN DIEGO COUNTY
AND
WESTERN STATES PETROLEUM ASSOCIATION

For Review Of Waste Discharge Requirements Order No. 2001-01
for Urban Runoff from San Diego County
[NPDES No. CAS0108758]
Issued by the
California Water Quality Control Board,
San Diego Region

SWRCB/OCC FILES A-1362, A-1362(a)

BY THE BOARD:

On February 21, 2001, the San Diego Regional Water Quality Control Board (Regional Water Board) issued a revised national pollutant discharge elimination system (NPDES) permit in Order No. 2001-01 (permit) to the County of San Diego (County), the 18 incorporated cities within the County, and the San Diego Unified Port District. The permit covers storm water discharges from municipal separate storm sewer systems (MS4) throughout the County. The permit is the second MS4 permit issued for the County, although the first permit was issued more than ten years earlier.[1]

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[1] NPDES permits generally expire after five years, but can be extended administratively where the Regional Water Board is unable to issue a new permit prior to the expiration date. As the record in this matter amply demonstrates, the Regional Water Board engaged in an extensive process of issuing draft permits, accepting comments, and holding workshops and hearings since at least 1995.

The permit includes various programmatic and planning requirements for the permittees, including construction and development controls, controls on municipal activities, controls on runoff from industrial, commercial, and residential sources, and public education. The types of controls and requirements included in the permit are similar to those in other MS4 permits, but also reflect the expansion of the storm water program since the first MS4 permit was adopted for San Diego County 11 years ago.[2]

On March 23, 2001, the State Water Resources Control Board (State Water Board or Board) received petitions for review of the permit from the Building Industry Association of San Diego County (BIA) and from the Western States Petroleum Association (WSPA).[3] The petitions are legally and factually related, and have therefore been consolidated for purposes of review.[4] None of the municipal dischargers subject to the permit filed a petition, nor did they file responses to the petitions.

I. BACKGROUND

MS4 permits are adopted pursuant to Clean Water Act section 402(p). This federal law sets forth specific requirements for permits for discharges from municipal storm sewers. One of the requirements is that permits "shall require controls to reduce the discharge of

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[2] For a discussion of the evolution of the storm water program, consistent with guidance from the United States Environmental Protection Agency (U.S. EPA), see Board Order WQ 2000-11.

[3] On March 23, the State Water Board also received brief letters from the Ramona Chamber of Commerce, the North San Diego County Association of Realtors, the San Diego County Apartment Association, the National Association of Industrial and Office Properties, and the California Building Industry Association. All of these letters state that they are "joining in" the petition filed by BIA. None of the letters contain any of the required information for petitions, which is listed at Cal. Code of Regs., tit. 23, section 2050. These letters will be treated as comments on the BIA petition. To the extent the authors intended the letters be considered petitions, they are dismissed.

[4] Cal. Code of Regs., tit. 23, section 2054.

pollutants to the maximum extent practicable [MEP]." States establish appropriate requirements for the control of pollutants in the permits.

This Board very recently reviewed the need for controls on urban runoff in MS4 permits, the emphasis on best management practices (BMPs) in lieu of numeric effluent limitations, and the expectation that the level of effort to control urban runoff will increase over time.[5] We pointed out that urban runoff is a significant contributor of impairment to waters throughout the state, and that additional controls are needed. Specifically, in Board Order WQ 2000-11 (hereinafter, LA SUSMP order), we concluded that the Los Angeles Regional Water Board acted appropriately in determining that numeric standards for the design of BMPs to control runoff from new construction and redevelopment constituted controls to the MEP.[6]

The San Diego permit incorporates numeric design standards for runoff from new construction and redevelopment similar to those considered in the LA SUSMP order.[7] In addition, the permit addresses programmatic requirements in other areas. The LA SUSMP order was a precedential decision,[8] and we will not reiterate our findings and conclusions from that decision.[9]

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[5] Board Order WQ 2000-11.

[6] As explained in that Order, numeric design standards are not the same as numeric effluent limitations. While BIA contends that the permit under review includes numeric effluent limitations, it does not. A numeric design standard only tells the dischargers how much runoff must be treated or infiltrated; it does not establish numeric effluent limitations proscribing the quality of effluent that can be discharged following infiltration or treatment.

[7] The San Diego permit also includes provisions that are different from those approved in the LA SUSMP Order, but which were not the subject of either petition. Such provisions include the inclusion of non-discretionary projects. We do not make any ruling in this Order on matters that were not addressed in either petition.

[8] Government Code section 11425.60; State Board Order WR 96-1 (Lagunitas Creek), at footnote 11.

[9] BIA restates some of the issues this Board considered in the LA SUSMP order. For instance, BIA contends that it is inappropriate for the permit to regulate erosion control. While this argument was not specifically addressed in our prior Order, it is obvious that the most serious concern with runoff from construction is the potential for increased erosion. It is absurd to contend that the permit should have ignored this impact from urban runoff.

The petitioners make numerous contentions, mostly concerning requirements that they claim the dischargers will not be able to, or should not be required to, comply with. We note that none of the dischargers has joined in these contentions. We further note that BIA raises contentions that were already addressed in the LA SUSMP order. In this Order, we have attempted to glean from the petition issues that are not already fully addressed in Board Order Board Order WQ 2000-11, and which may have some impact on BIA and its members. WSPA restated the contentions it made in the petition it filed challenging the LA SUSMP order. We will not address those contentions again.[10] But we will address whether the Regional Water Board followed the precedent established there as it relates to retail gasoline outlets.[11]

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[10] On November 8, 2001, following the October 31 workshop meeting that was held to discuss the draft order, BIA submitted a "supplemental brief" that includes many new contentions raised for the first time. (Interested persons who were not petitioners filed comments on the draft order asking the State Water Board to address some of these.) The State Water Board will not address these contentions, as they were not timely raised. (Wat. Code § 13320; Cal. Code of Regs., tit. 23, § 2050(a).) Specific contentions that are not properly subject to review under Water Code section 13320 are objections to findings 16, 17, and 38 of the permit, the contention that permit provisions constitute illegal unfunded mandates, challenges to the permit's inspection and enforcement provisions, objections to permit provisions regarding construction sites, the contention that post-construction requirements should be limited to "discretionary" approvals, the challenge to the provisions regarding local government compliance with the California Environmental Quality Act, and contentions regarding the term "discharge" in the permit. BIA did not meet the legal requirements for seeking review of these portions of the permit.

[11] On November 8, 2001, the State Water Board received eight boxes of documents from BIA, along with a "Request for Entry of Documents into the Administrative Record." BIA failed to comply with Cal. Code of Regs., tit. 23, section 2066(b), which requires such requests be made "prior to or during the workshop meeting." The workshop meeting was held on October 31, 2001. The request will therefore not be considered. BIA also objected in this submittal that the Regional Water Board did not include these documents in its record. The Regional Water Board's record was created at the time the permit was adopted, and was submitted to the State Water Board on June 11, 2001. BIA's objection is not timely.

II. CONTENTIONS AND FINDINGS[12]

Contention: BIA contends that the discharge prohibitions contained in the permit are "absolute" and "inflexible," are not consistent with the standard of "maximum extent practicable" (MEP), and financially cannot be met.

Finding: The gist of BIA's contention concerns Discharge Prohibition A.2, concerning exceedance of water quality objectives for receiving waters: "Discharges from MS4s which cause or contribute to exceedances of receiving water quality objectives for surface water or groundwater are prohibited." BIA generally contends that this prohibition amounts to an inflexible "zero contribution" requirement.

BIA advances numerous arguments regarding the alleged inability of the dischargers to comply with this prohibition and the impropriety of requiring compliance with water quality standards in municipal storm water permits. These arguments mirror arguments made in earlier petitions that required compliance with water quality objectives by municipal storm water permittees. (See, e.g., Board Orders WQ 91-03, WQ 98-01, and WQ 99-05.) This Board has already considered and upheld the requirement that municipal storm water discharges must not cause or contribute to exceedances of water quality objectives in the receiving water. We adopted an iterative procedure for complying with this requirement, wherein municipalities must report instances where they cause or contribute to exceedances, and then must review and improve BMPs so as to protect the receiving waters. The language in the permit in Receiving

[12] This Order does not address all of the issues raised by the petitioners. The Board finds that the issues that are not addressed are insubstantial and not appropriate for State Water Board review. (See *People v. Barry* (1987) 194 Cal.App.3d 158 [239 Cal.Rptr. 349]; Cal. Code Regs., tit. 23, § 2052.) We make no determination as to whether we will address the same or similar issues when raised in future petitions.

Water Limitation C.1 and 2 is consistent with the language required in Board Order WQ 99-05, our most recent direction on this issue.[13]

While the issue of the propriety of requiring compliance with water quality objectives has been addressed before in several orders, BIA does raise one new issue that was not addressed previously. In 1999, the Ninth Circuit Court of Appeals issued an opinion addressing whether municipal storm water permits must require "strict compliance" with water quality standards.[14] (*Defenders of Wildlife v. Browner* (9th Cir. 1999) 191 F.3d 1159.) The court in *Browner* held that the Clean Water Act provisions regarding storm water permits do not require that municipal storm-sewer discharge permits ensure strict compliance with water quality standards, unlike other permits.[15] The court determined that: "Instead, [the provision for municipal storm water permits] *replaces* the requirements of [section 301] with the requirement that municipal storm-sewer dischargers 'reduce the discharge of pollutants to the maximum extent practicable, including management practices, control techniques and system, design and engineering methods, and such other provisions as the Administrator . . . determines appropriate for the control of such pollutants'." (191 F.3d at 1165.) The court further held that the Clean Water Act does grant the permitting agency discretion to determine what pollution controls are appropriate for municipal storm water discharges. (*Id.* at 1166.) Specifically, the court stated

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[13] In addition to Discharge Prohibition A.2, quoted above, the permit includes Receiving Water Limitation C.1, with almost identical language: "Discharges from MS4s that cause or contribute to the violation of water quality standards (designated beneficial uses and water quality objectives developed to protect beneficial uses) are prohibited." Receiving Water Limitation C.2 sets forth the iterative process for compliance with C.1, as required by Board Order WQ 99-05.

[14] "Water quality objectives" generally refers to criteria adopted by the state, while "water quality standards" generally refers to criteria adopted or approved for the state by the U.S. EPA. Those terms are used interchangeably for purposes of this Order.

[15] Clean Water Act § 301(b)(1)(C) requires that most NPDES permits require strict compliance with quality standards.

that U.S. EPA had the authority either to require "strict compliance" with water quality standards through the imposition of numeric effluent limitations, or to employ an iterative approach toward compliance with water quality standards, by requiring improved BMPs over time. (*Id.*) The court in *Browner* upheld the EPA permit language, which included an iterative, BMP-based approach comparable to the language endorsed by this Board in Order WQ 99-05.

In reviewing the language in this permit, and that in Board Order WQ 99-05, we point out that our language, similar to U.S. EPA's permit language discussed in the *Browner* case, does not require strict compliance with water quality standards. Our language requires that storm water management plans be designed to achieve compliance with water quality standards. Compliance is to be achieved over time, through an iterative approach requiring improved BMPs. As pointed out by the *Browner* court, there is nothing inconsistent between this approach and the determination that the Clean Water Act does not mandate strict compliance with water quality standards. Instead, the iterative approach is consistent with U.S. EPA's general approach to storm water regulation, which relies on BMPs instead of numeric effluent limitations.

It is true that the holding in *Browner* allows the issuance of municipal storm water permits that limit their provisions to BMPs that control pollutants to the maximum extent practicable (MEP), and which do not require compliance with water quality standards. For the reasons discussed below, we decline to adopt that approach. The evidence in the record before us is consistent with records in previous municipal permits we have considered, and with the data we have in our records, including data supporting our list prepared pursuant to Clean Water Act section 303(d). Urban runoff is causing and contributing to impacts on receiving waters throughout the state and impairing their beneficial uses. In order to protect beneficial uses and to achieve compliance with water quality objectives in our streams, rivers, lakes, and the ocean, we

must look to controls on urban runoff. It is not enough simply to apply the technology-based standards of controlling discharges of pollutants to the MEP; where urban runoff is causing or contributing to exceedances of water quality standards, it is appropriate to require improvements to BMPs that address those exceedances.

While we will continue to address water quality standards in municipal storm water permits, we also continue to believe that the iterative approach, which focuses on timely improvement of BMPs, is appropriate. We will generally not require "strict compliance" with water quality standards through numeric effluent limitations and we will continue to follow an iterative approach, which seeks compliance over time.[16] The iterative approach is protective of water quality, but at the same time considers the difficulties of achieving full compliance through BMPs that must be enforced throughout large and medium municipal storm sewer systems.[17]

We have reviewed the language in the permit, and compared it to the model language in Board Order WQ 99-05. The language in the Receiving Water Limitations is virtually identical to the language in Board Order WQ 99-05. It sets a limitation on discharges that cause or contribute to violation of water quality standards, and then it establishes an iterative approach to complying with the limitation. We are concerned, however, with the language in Discharge Prohibition A.2, which is challenged by BIA. This discharge prohibition is similar to the Receiving Water Limitation, prohibiting discharges that cause or contribute to exceedance of

[16] Exceptions to this general rule are appropriate where site-specific conditions warrant. For example, the Basin Plan for the Lake Tahoe basin, which protects an outstanding national resource water, includes numeric effluent limitations for storm water discharges.

[17] While BIA argues that the permit requires "zero contribution" of pollutants in runoff, and "in effect" contains numeric effluent limitations, this is simply not true. The permit is clearly BMP-based, and there are no numeric effluent limitations. BIA also claims that the permit will require the construction of treatment plants for storm water similar to the publicly-owned treatment works for sanitary sewage. There is no basis for this contention; there is no requirement in the permit to treat all storm water. The emphasis is on BMPs.

water quality objectives. The difficulty with this language, however, is that it is not modified by the iterative process. To clarify that this prohibition also must be complied with through the iterative process, Receiving Water Limitation C.2 must state that it is also applicable to Discharge Prohibition A.2. The permit, in Discharge Prohibition A.5, also incorporates a list of Basin Plan prohibitions, one of which also prohibits discharges that are not in compliance with water quality objectives. (See, Attachment A, prohibition 5.) Language clarifying that the iterative approach applies to that prohibition is also necessary.[18]

BIA also objects to Discharge Prohibition A.3, which appears to require that treatment and control of discharges must always occur prior to entry into the MS4: "Discharges into and from MS4s containing pollutants which have not been reduced to the [MEP] are prohibited."[19] An NPDES permit is properly issued for "discharge of a pollutant" to waters of the United States.[20] (Clean Water Act § 402(a).) The Clean Water Act defines "discharge of a pollutant" as an "addition" of a pollutant to waters of the United States from a point source. (Clean Water Act section 502(12).) Section 402(p)(3)(B) authorizes the issuance of permits for discharges "from municipal storm sewers."

We find that the permit language is overly broad because it applies the MEP standard not only to discharges "from" MS4s, but also to discharges "into" MS4s. It is certainly

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[18] The iterative approach is not necessary for all Discharge Prohibitions. For example, a prohibition against pollution, contamination or nuisance should generally be complied with at all times. (See, Discharge Prohibition A.1.) Also, there may be discharge prohibitions for particularly sensitive water bodies, such as the prohibition in the Ocean Plan applicable to Areas of Special Biological Significance.

[19] Discharge Prohibition A.1 also refers to discharges into the MS4, but it only prohibits pollution, contamination, or nuisance that occurs "in waters of the state." Therefore, it is interpreted to apply only to discharges to receiving waters.

[20] Since NPDES permits are adopted as waste discharge requirements in California, they can more broadly protect "waters of the state," rather than being limited to "waters of the United States." In general, the inclusion of "waters (footnote continued)

true that in most instances it is more practical and effective to prevent and control pollution at its source. We also agree with the Regional Water Board's concern, stated in its response, that there may be instances where MS4s use "waters of the United States" as part of their sewer system, and that the Board is charged with protecting all such waters. Nonetheless, the specific language in this prohibition too broadly restricts all discharges "into" an MS4, and does not allow flexibility to use regional solutions, where they could be applied in a manner that fully protects receiving waters.[21] It is important to emphasize that dischargers into MS4s continue to be required to implement a full range of BMPs, including source control. In particular, dischargers subject to industrial and construction permits must comply with all conditions in those permits prior to discharging storm water into MS4s.

Contention: State law requires the adoption of wet weather water quality standards, and the permit improperly enforces water quality standards that were not specifically adopted for wet weather discharges.

Finding: This contention is clearly without merit. There is no provision in state or federal law that mandates adoption of separate water quality standards for wet weather conditions. In arguing that the permit violates state law, BIA states that because the permit applies the water quality objectives that were adopted in its Basin Plan, and those objectives were not specifically adopted for wet weather conditions only, the Regional Water Board violated

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of the state" allows the protection of groundwater, which is generally not considered to be "waters of the United States."

[21] There are other provisions in the permit that refer to restrictions "into" the MS4. (See, e.g., Legal Authority D.1.) Those provisions are appropriate because they do not apply the MEP standard to the permittees, but instead require the permittees to demand appropriate controls for discharges into their system. For example, the federal regulations require that MS4s have a program "to reduce pollutants in storm water runoff from construction sites to the municipal storm sewer system . . . ." (40 C.F.R. § 122.26(d)(2)(iv)(D).)

Water Code section 13241. These allegations appear to challenge water quality objectives that were adopted years ago. Such a challenge is clearly inappropriate as both untimely, and because Basin Plan provisions cannot be challenged through the water quality petition process. (See Wat. Code § 13320.) Moreover, there is nothing in section 13241 that supports the claim that Regional Water Boards must adopt separate wet weather water quality objectives. Instead, the Regional Water Board's response indicates that the water quality objectives were based on all water conditions in the area. There is nothing in the record to support the claim that the Regional Water Board did not in fact consider wet weather conditions when it adopted its Basin Plan. Finally, Water Code section 13263 mandates the Regional Water Board to implement its Basin Plan when adopting waste discharge requirements. The Regional Water Board acted properly in doing so.

BIA points to certain federal policy documents that authorize states to promulgate water quality standards specific to wet-weather conditions.[22] Each Regional Water Board considers revisions to its Basin Plan in a triennial review. That would be the appropriate forum for BIA to make these comments.

Contention: BIA contends that the permit improperly classifies urban runoff as "waste" within the meaning of the Water Code.

Finding: BIA challenges Finding 2, which states that urban runoff is a waste, as defined in the Water Code, and that it is a "discharge of pollutants from a point source" under the federal Clean Water Act. BIA contends that the legislative history of section 13050(d) supports

[22] These documents do not support the claim that U.S. EPA and the Clinton Administration indicated that the absence of such regulations "is a major problem that needs to be addressed," as claimed in BIA's Points and Authorities, at page 18.

its position that "waste" should be interpreted to exclude urban runoff. The Final Report of the Study Panel to the California State Water Resources Control Board (March, 1969) is the definitive document describing the legislative intent of the Porter-Cologne Water Quality Control Act. In discussing the definition of "waste," this document discusses its broad application to "current drainage, flow, or seepage into waters of the state of harmful concentrations" of materials, including eroded earth and garbage.

As we stated in Board Order WQ 95-2, the requirement to adopt permits for urban runoff is undisputed, and Regional Water Boards are not required to obtain any information on the impacts of runoff prior to issuing a permit. (At page 3.) It is also undisputed that urban runoff contains "waste" within the meaning of Water Code section 13050(d), and that the federal regulations define "discharge of a pollutant" to include "additions of pollutants into waters of the United States from: surface runoff which is collected or channeled by man." (40 C.F.R. § 122.2.) But it is the waste or pollutants in the runoff that meet these definitions of "waste" and "pollutant," and not the runoff itself.[23] The finding does create some confusion, since there are discharge prohibitions that have been incorporated into the permit that broadly prohibit the discharge of "waste" in certain circumstances. (See Attachment A to the permit.) The finding will therefore be amended to state that urban runoff contains waste and pollutants.

Contention: BIA contends that the Regional Water Board violated California Environmental Quality Act (CEQA).

[23] The Regional Water Board is appropriately concerned not only with pollutants in runoff but also the volume of runoff, since the volume of runoff can affect the discharge of pollutants in the runoff. (See Board Order WQ 2000-11, at page 5.)

Finding: As we have stated in several prior orders, the provisions of CEQA requiring adoption of environmental documents do not apply to NPDES permits.[24] BIA contends that the exemption from CEQA contained in section 13389 applies only to the extent that the specific provisions of the permit are required by the federal Clean Water Act. This contention is easily rejected without addressing whether federal law mandated all of the permit provisions. The plain language of section 13389 broadly exempts the Regional Water Board from the requirements of CEQA to prepare environmental documents when adopting "any waste discharge requirement" pursuant to Chapter 5.5 (§§ 13370 et seq., which applies to NPDES permits).[25] BIA cites the decision in *Committee for a Progressive Gilroy v. State Water Resources Control Board* (1987) 192 Cal.App.3d 847. That case upheld the State Water Board's view that section 13389 applies only to NPDES permits, and not to waste discharge requirements that are adopted pursuant only to state law. The case did not concern an NPDES permit, and does not support BIA's argument.

Contention: WSPA contends that the Regional Water Board did not follow this Board's precedent for retail gasoline outlets (RGOs) established in the LA SUSMP order.

Finding: In the LA SUSMP order, this Board concluded that construction of RGOs is already heavily regulated and that owners may be limited in their ability to construct infiltration facilities. We also noted that, in light of the small size of many RGOs and the proximity to underground tanks, it might not always be feasible or safe to employ treatment methodologies. We directed the Los Angeles Regional Water Board to mandate that RGOs

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[24] Water Code section 13389; see, e.g., Board Order WQ 2000-11.

[25] The exemption does have an exception for permits for "new sources" as defined in the Clean Water Act, which is not applicable here.

employ the BMPs listed in a publication of the California Storm Water Quality Task Force. (*Best Management Practice Guide – Retail Gasoline Outlets* (March 1997).) We also concluded that RGOs should not be subject to the BMP design standards at this time. Instead, we recommended that the Regional Water Board undertake further consideration of a threshold relative to size of the RGO, number of fueling nozzles, or some other relevant factor. The LA SUSMP order did not preclude inclusion of RGOs in the SUSMP design standards, with proper justification, when the permit is reissued.

The permit adopted by the Regional Water Board did not comply with the directions we set forth in the LA SUSMP order for the regulation of RGOs. The permit contains no findings specific to the issues discussed in our prior order regarding RGOs, and includes no threshold for inclusion of RGOs in SUSMPs. Instead, the permit requires the dischargers to develop and implement SUSMPs within one year that include requirements for "Priority Development Project Categories," including "retail gasoline outlets." While other priority categories have thresholds for their inclusion in SUSMPs, the permit states: "Retail Gasoline Outlet is defined as any facility engaged in selling gasoline."[26]

The Regional Water Board responded that it did follow the directions in the LA SUSMP order. First, it points to findings that vehicles and pollutants they generate impact receiving water quality. But the only finding that even mentions RGOs is finding 4, which simply lists RGOs among the other priority development project categories as land uses that generate more pollutants. The Regional Water Board staff also did state some justifications for the inclusion of RGOs in two documents. The Draft Fact Sheet explains that RGOs contribute

[26] Permit at F.1.b(2)(a)(x).

pollutants to runoff, and opines that there are appropriate BMPs for RGOs. The staff also prepared another document after the public hearing, which was distributed to Board Members prior to their vote on the permit, and which includes similar justifications and references to studies.[27] The LA SUSMP order called for some type of threshold for inclusion of RGOs in SUSMPs. The permit does not do so. Also, justifications for permit provisions should be stated in the permit findings or the final fact sheet, and should be subject to public review and debate.[28] The discussion in the document submitted after the hearing did not meet these criteria. There was some justification in the "Draft Fact Sheet," but the fact sheet has not been finalized.[29] In light of our concerns over whether SUSMP sizing criteria should apply to RGOs, it was incumbent on the Regional Water Board to justify the inclusion of RGOs in the permit findings or in a final fact sheet, and to consider an appropriate threshold, addressing the concerns we stated. The Regional Water Board also responded that when the dischargers develop the SUSMPs, the dischargers might add specific BMPs and a threshold as directed in the LA SUSMP order. But the order specifically directed that any threshold, and the justification therefore, should be included in the permit. The Regional Water Board did not comply with these directions.

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[27] See "Comparison Between Tentative Order No. 2001-01 SUSMP Requirements and LARWQCB SUSMP Requirements (as Supported by SWRCB Order WQ 2000-11)."

[28] See 40 C.F.R. sections 124.6(e) and 124.8.

[29] U.S. EPA regulations require that there be a fact sheet accompanying the permit. (40 C.F.R. § 124.8.) The record contains only a draft fact sheet, which was never published or distributed in final form. The Regional Water Board should finalize the fact sheet, accounting for any revisions made in the final permit, and publish it on its web site as a final document.

III. CONCLUSIONS

Based on the discussion above, the Board concludes that:

1. The Regional Water Board appropriately required compliance with water quality standards and included requirements to achieve reduction of pollutants to the maximum extent practicable. The permit must be clarified so that the reference to the iterative process for achieving compliance applies not only to the receiving water limitation, but also to the discharge prohibitions that require compliance with water quality standards. The permit should also be revised so that it requires that MEP be achieved for discharges "from" the municipal sewer system, and for discharges "to" waters of the United States, but not for discharges "into" the sewer system.

2. The Regional Water Board was not required to adopt wet-weather specific water quality objectives.

3. The Regional Water Board inappropriately defined urban runoff as "waste."

4. The Regional Water Board did not violate the California Environmental Quality Act.

5. The permit will be revised to delete retail gasoline outlets from the Priority Development Project Categories for Standard Urban Storm Water Mitigation Plans. The Regional Water Board may consider adding retail gasoline outlets, upon inclusion of appropriate findings and a threshold describing which outlets are included in the requirements.

IV. ORDER

IT IS HEREBY ORDERED that the Waste Discharge Requirements for Discharges of Urban Runoff from the Municipal Separate Storm Sewer Systems in San Diego County (Order No. 2001-01) are revised as follows:

1. Part A.3: The words "into and" are deleted.

2. Part C.2: Throughout the first paragraph, the words ", Part A.2, and Part A.5 as it applies to Prohibition 5 in Attachment A" shall be inserted following "Part C.1."

3. Finding 2: Revise the finding to read: **URBAN RUNOFF CONTAINS "WASTE" AND "POLLUTANTS"**: Urban runoff contains waste, as defined in the California Water Code, and pollutants, as defined in the federal Clean Water Act, and adversely affects the quality of the waters of the State.

4. Part F.1.b(2)(a): Delete section "x."

In all other respects the petitions are dismissed.

CERTIFICATION

The undersigned, Clerk to the Board, does hereby certify that the foregoing is a full, true, and correct copy of a resolution duly and regularly adopted at a meeting of the State Water Resources Control Board held on November 15, 2001.

AYE: Arthur G. Baggett, Jr.
Peter S. Silva
Richard Katz

NO: None

ABSENT: None

ABSTAIN: None

Maureen Marché
Clerk to the Board

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Review

Pesticide effects on freshwater zooplankton: an ecological perspective

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Received 1 February 2000; accepted 11 March 2000

"Capsule": *Effects of pesticides on freshwater zooplankton are considered from an ecological perspective.*

Abstract

The effects of pesticides on zooplankton are reviewed and their ecological significance is discussed. Toxicity is shown to vary depending on animal species, genotype, life stage, and size at birth. Natural stresses such as food shortage, oxygen depletion and odors of potential predators can also affect toxicity. Populations in the growth phase are vulnerable to pesticides but have the potential to recover rapidly from the damage. Pesticides may affect the population dynamics by controlling individual survival and reproduction, and by altering the sex ratio. Furthermore, toxic chemicals may control predation risk by changing swimming behavior and body morphology, and this in turn influences the population dynamics. Many zooplankton display morphological and behavioral responses to predators when exposed to their odor-producing chemicals. However, pesticides induce a maladaptive response to predator odor, and this poses an ecological risk. The following patterns are recognized as effects of pesticides at the community and ecosystem levels: (1) induction of dominance by small species; (2) an increase of species richness and diversity; and (3) elongation of the food chain and reduction of energy transfer efficiency from primary producers to top predators. © 2001 Elsevier Science Ltd. All rights reserved.

Keywords: Pesticides; Zooplankton; Toxicity tests; Ecological interpretation

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1. Introduction

Surface water bodies are contaminated with many anthropogenic toxic chemicals that can affect their natural communities. It is necessary to assess the effects of these chemicals in order to conserve aquatic ecosystems. Among the anthropogenic chemicals, pesticides may cause the most serious problems because they are designed specifically to kill organisms (both the noxious target organisms and other non-target ones) and they are released into the natural environment intentionally. It has been widely documented that pesticide concentrations in the natural environment are often high enough to kill certain organisms (Hatakeyama et al., 1991, 1994) and affect the structure and function of natural communities (Helgen et al., 1988; Hatakeyama et al., 1990).

Pesticides exert their impacts at multiple levels — including molecules, tissues, organs, individuals, populations and communities — and a variety of ecotoxicological tests have been designed to assess these effects (Cairns and Niederlehner, 1995). However, this assessment is hindered by the fact that natural ecosystems are diverse and the effects are complicated.

Zooplankton are frequently used in ecotoxicological tests because they are one of the groups most sensitive to toxic chemicals and they occupy a central position in the lentic (standing water) food chain. The responses of zooplankton to toxicity tests are considered to be informative of relative impacts on the ecosystem as a whole. In the present paper I review the results of pesticide toxicity tests conducted with zooplankton at different levels of organization, ranging from individuals to communities, and discuss the effects of chemicals from an ecological perspective.

2. Individual-level responses

In order to evaluate pesticide toxicity, standardized acute and chronic toxicity tests have been intensively conducted using cladocerans, in particular the species *Daphnia* (OECD, 1981; ASTM, 1994). In these tests, the direct toxic effects on animals are quantified and standard test statistics, such as LC_{50}, are determined. These tests indicate clearly that pesticides exert species-specific effects on zooplankton. This has been documented both in standard laboratory tests and in larger-scale mesocosms (small artificial ponds, or enclosures set up in lakes and ponds), where changes in zooplankton population density have been followed after a chemical application. For example, Hanazato (1991a) applied the carbamate insecticide carbaryl to outdoor experimental ponds in Japan and found that the large-sized cladoceran *Daphnia* was most sensitive to the chemical, followed in order by the medium-sized cladocerans *Moina* and *Diaphanosoma*, the small *Bosmina*, and finally rotifers, which show the lowest sensitivity. This same tendency for larger species to have the greatest sensitivity to carbaryl was observed in a lake in Ohio, USA (Havens, 1994a), and the same response was observed in Japan for the organophosphorus insecticide fenthion (Hanazato and Kasai, 1995). Gliwicz and Sieniawska (1986) have also shown in a laboratory study that there is a positive relationship between body size and sensitivity to lindane in cladocerans. This was considered to be due to the fact that cladocerans are most sensitive to chemicals just after molting, and that large-sized animals molt more times than smaller ones prior to reproduction.

Size-related responses have been documented for a wide range of stressors, including acidification, eutrophication and global warming (Geller and Müller, 1981; Richman and Dodson, 1983; Havens and Hanazato, 1993; Moore and Folt, 1993; Stemberger and Lazorchak, 1994). Rotifers are the zooplankton that are least sensitive to lake acidification as well as pesticides, and Havens and Hanazato (1993) explained this by the fact that rotifers have high species diversity and thus are likely to contain both tolerant and sensitive taxa. The same explanation may apply to the tolerance of rotifers to pesticides. However, there are exceptions to the size-based rule. Large cladoceran *Simocepharus* is less sensitive to the organochlorine insecticide endosulfan than the smaller *Ceriodaphnia* (Barry and Logan, 1998). Small *Bosmina* is more sensitive to DDT and arsenate than larger *Daphnia* (May-Passino and Novak, 1984), and small species are more sensitive to the pyrethroid insecticide fenvalerate than large ones among three species of Cladocera, *Daphnia magna*, *D. galeata mendotae* and *Ceriodaphnia lacustris* (Day and Kaushik, 1987).

Sensitivity to pesticides also varies within species depending on genotype. Baird et al. (1990) determined LC_{50} values of eight clones of *D. magna* in acute toxicity tests and their LOEC (lowest effective concentration) in chronic toxicity tests for cadmium and 3,4-dichloroaniline (DCA), and found a large difference in sensitivity among the clones. The LC_{50} ranged over three orders of magnitude for cadmium and one order for DCA, and the range of LOEC was within one order of magnitude for cadmium (0.6–6 μg/l) and two orders for DCA (25–50 μg/l).

The developmental stage of an animal also can affect its tolerance to pesticide exposure. Day and Kaushik (1987) performed acute toxicity tests and documented that juveniles of *D. magna* were more sensitive to fenvalerate than were adults. Hanazato (1991b) exposed *D. ambigua* to carbaryl for a short time (10 h) at different life stages ranging from egg to the third juvenile instar (neonate), and demonstrated that the first instar was most sensitive to the chemical. Similarly, Breukelman (1932) found that the first instar of *D. magna* was more sensitive to mercuric chloride than individuals at other

developmental stages. This suggests that first instar *Daphnia* should be used in standardized acute and chronic toxicity tests (OECD, 1981; ASTM, 1994).

Enserink et al. (1990) demonstrated that smaller neonates are more sensitive than larger ones to cadmium, so that sensitivities to pesticides may also differ even among neonates depending on their body size. Neonatal size is affected by various factors, some of which can be readily controlled under laboratory conditions. These include food conditions, oxygen concentration, maternal clutch number, maternal body size, pesticide concentration and odor of potential predators. It has been suggested that size increases with increasing clutch number (Glazier, 1992; Lampert, 1993; Hanazato and Dodson, 1995). However, Glazier (1992), Lampert (1993) and Hanazato and Dodson (1995) have also pointed out that neonatal size depends on maternal body size more than clutch number. On the other hand, mother daphnids produce larger neonates under food-limited conditions (Gliwicz and Guisande, 1992; Glazier, 1992) whereas they produce smaller neonates in water with low oxygen concentrations or with high insecticide concentrations (Hanazato and Dodson, 1995). Furthermore, neonatal size is controlled by the maternal response to odor released from invertebrate (e.g. the phantom midge *Chaoborus*, the backswimmer *Notonecta*) and vertebrate (fish) predators (Dodson and Havel, 1988; Dodson, 1989; Stibor, 1992; Machacek, 1993).

Aquatic organisms in the natural environment often are exposed to multiple pesticides and toxic chemicals simultaneously. The chemicals have complex effects on the organisms, sometimes being antagonistic or additive, and at other times synergistic (Lichtenstein et al., 1973; Cairns, 1983; Hoegland et al., 1993; Wijk et al., 1994). Therefore, the effect of a pesticide on a zooplankton species may be modified by other chemicals contaminating the water body. In addition, natural stressors such as predation, food shortage, oxygen deficiency, and high temperature can affect pesticide toxicity. Folt et al. (1999) tested the effects of sodium dodecyl sulfate, low food availability and high temperature on *Daphnia* and found that a combination of these stressors was more harmful than either one alone. Hanazato and Dodson (1995) demonstrated that predator odor, low oxygen concentration and an insecticide can reduce the population fitness of *Daphnia* synergistically. The odor of predators induces morphological and behavioral changes in *Daphnia* as defense mechanisms, but it also reduces the population growth rate and tolerance to environmental stress (Havel and Dodson, 1987; Black and Dodson, 1990; Hanazato and Dodson, 1992; Hanazato, 1998a). This is a cost associated with the defense. These results indicate that natural stressors alter the sensitivity of zooplankton to pesticides, and that zooplankton species in the natural environment may be more sensitive to pesticides than the same species cultured under favorable conditions in the laboratory. Thus standard tests may underestimate toxicity.

A good example of zooplankton being exposed to both anthropogenic and natural stressors is the diel vertical migration (DVM) of *Daphnia* in a pesticide-contaminated lake. The animals migrate downward into dark waters in the morning to avoid fish predation and upwards in the evening to obtain algae, which are a primary source of their food (Lampert, 1989; Fig. 1). Fish odor is a strong cue for inducing the DVM of *Daphnia* (Lampert and Loose, 1992), even when they must migrate downward into water that is low in oxygen and lacking in food resources. During DVM, *Daphnia* experience stress from oxygen and food deficiency, and they become more sensitive to pesticides than expected from laboratory toxicity tests.

Pesticides also can affect the feeding rate of zooplankton. Day and Kaushik (1987) measured the filtering rate (volume of water cleared of food per unit time) of the cladoceran *Ceriodaphnia lacustris* exposed to fenvalerate for 24 h. They found that the chemical concentration at which the filtering rate was reduced significantly was 20-fold lower than the 48-h EC_{50} obtained in an acute toxicity test. This indicates that feeding behavior is quickly affected by pesticides (<24 h) even at sub-lethal concentrations. Lower feeding rates may result in reduced rates of growth and reproduction of the animals, which may be detected in chronic toxicity tests.

Another behavior that may be affected by pesticide exposure is swimming. When this occurs it is a life-threatening situation for zooplankton, which swim to obtain food, maintain their position in the water

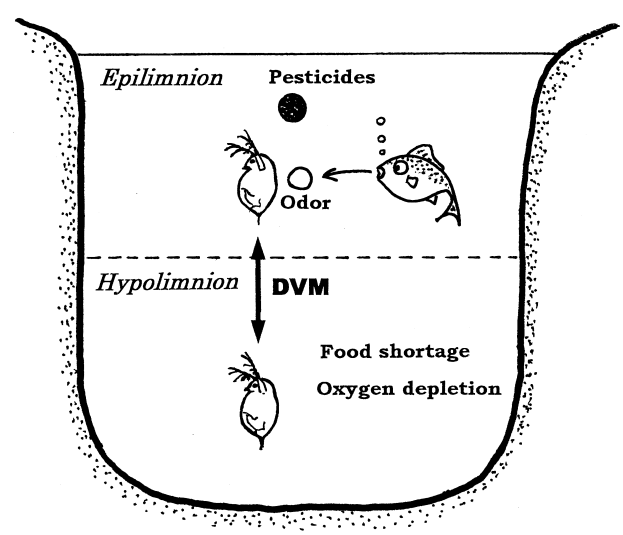

Fig. 1. A scheme showing *Daphnia* performing diel vertical migration (DVM) when exposed to anthropogenic (pesticides) and natural stressors in lakes.

column and avoid predators. Dodson et al. (1995) quantified the behavioral response of *Daphnia* to carbaryl exposure by analyzing digitized three-dimensional video records of free-swimming animals exposed to the chemical. The *Daphnia* showed two kinds of swimming behavior in response to pesticide exposure: (1) 'spinning' (extreme and continuous escape behavior) in response to acutely toxic levels of carbaryl, and (2) 'irritation' (an increase in escape-like behavior) in response to sublethal levels. Pesticide exposure changes the swimming speed of various zooplankton species, sometimes increasing it (Preston et al., 1999) but at other times causing a decrease (Taylor et al., 1995). Such behavioral changes may be used as endpoints for assessing chemical toxicity (Goodrich and Lech, 1990; Di Delupis and Rotondo, 1998).

3. Population-level responses

Effects of pesticides on zooplankton populations can be predicted from individual-level responses to pesticide exposure. As mentioned earlier, the neonate is the life stage most sensitive to pesticides, suggesting that among other things, populations composed of a large proportion of neonates are most sensitive to pesticides, and that a population vulnerable to pesticides is likely in a growing phase (i.e. producing neonates intensively).

It was noted that small neonates are more sensitive to chemicals than large ones, and that neonate size is affected by various environmental factors. This suggests that a *Daphnia* population exposed to a low oxygen concentration and predator odor, which induce production of small neonates, will become more sensitive to pesticides, while a population under food limitation stress, which has larger neonates, will be less sensitive. It has also been demonstrated that pesticides induce the production of smaller neonates in *Daphnia* (Hanazato and Dodson, 1995), suggesting that a *Daphnia* population exposed to pesticides will become even more sensitive to chemicals.

In the standardized chronic toxicity test using *Daphnia* proposed by the OECD (1981) and ASTM (1994), reproduction (number of offspring produced) of the test animals is analyzed. Analysis of reproduction may be useful for assessing the effects of chemicals on population growth. However, Hanazato (1998b) has cautioned that the number of offspring per clutch is not affected directly by toxic chemicals. Rather, it is a function of maternal body size, which in turn is governed by growth rate during the juvenile stage. Thus, a reduction of reproductive output by chemicals in a *Daphnia* results indirectly from the perturbation of juvenile growth (Fig. 2). This is an important distinction that should be understood by persons carrying out the tests.

Cladocerans usually display asexual reproduction, allowing their populations to increase rapidly. Sometimes sexual reproduction and formation of resting eggs (diapause stage) occurs, and this can be triggered by unfavorable environmental conditions. Sexual reproduction is an important process in population dynamics, and is initiated by production of males and haploid resting eggs. Dodson and co-workers have found that anthropogenic chemicals, including nonylphenol, dieldrin and atrazine, affect the production of *Daphnia* males and alter the sex ratio (Shurin and Dodson, 1997; Dodson et al., 1999a, b). This means that the chemicals control the *Daphnia* population dynamics not only by affecting individual survivorship and fecundity but also by determining the sex ratio, which influences the success of resting egg production. Interestingly, the *Daphnia* sex ratio is 1–2 orders of magnitude more sensitive to atrazine than survivorship or fecundity (Dodson et al., 1999b). Dodson and Hanazato (1995) found that the yearly maximum percentage of males in populations of three *Daphnia* species in Lake Mendota, USA, decreased drastically from 1885 to 1975. They hypothesized that anthropogenic chemicals, which began to be widely used in the 1940s, altered the *Daphnia* sex ratio in the lake through their hormone-like effects.

Effects of toxicants on the population dynamics of zooplankton have rarely been analyzed in the laboratory (van der Hoeven, 1990), but they have been observed in experimental ponds and enclosures (Hurlbert et al., 1972; Papst and Boyer, 1980; Kaushik et al., 1985; Day et al., 1987; Hanazato and Yasuno, 1987; Yasuno et al., 1988; Hanazato, 1991a). Hanazato and Yasuno (1987) analyzed summer population dynamics (changes in density, growth rate, birth and death rates) of the cladoceran *Moina micrura* in an experimental pond treated with the insecticide carbaryl, which has a high dissipation rate in water (Hanazato

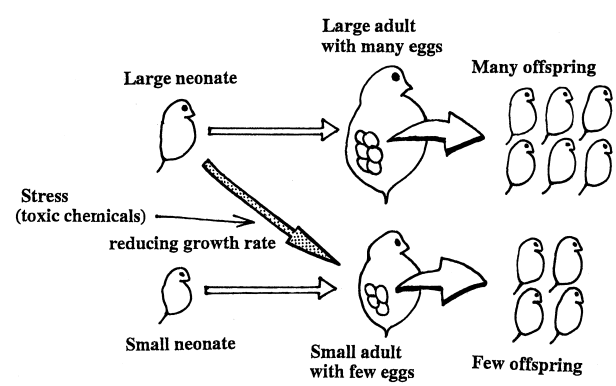

Fig. 2. A schematic drawing showing the relationship among neonatal size (size at birth), adult size and clutch size in zooplankton. A large neonate grows to a large adult, which in turn produces many offspring. A small neonate matures at a small size and produces fewer eggs. Toxic chemicals such as pesticides reduce the growth rate of neonates and cause the neonates to mature at a smaller size with subsequently fewer eggs (redrawn from Hanazato, 1998b).

and Yasuno, 1990a). The population at first seemed to be eliminated by the chemical, but it redeveloped 2 days after the application and showed rapid growth with a high birth rate. This phenomenon was linked with improved food resource conditions, due to the local extinction of less-tolerant competitors. Similar increases in of population size after pesticide application has often been observed in some zooplankton species (Hurlbert et al., 1972; Papst and Boyer, 1980; Kaushik et al., 1985; Day et al., 1987; Yasuno et al., 1988; Hanazato and Yasuno, 1990b; Hanazato, 1991a).

The effects of pesticides on natural populations may differ depending on their stage of development. In a pond experiment conducted by Hanazato and Yasuno (1990a), the rotifer *Keratella valga* was able to recover from losses due to carbaryl application when the population was in a growing phase. On the other hand, recovery did not occur when the same treatment was applied during a period of population decline. Hanazato and Yasuno (1990a) considered that the population had some intrinsic factors controlling its cycle, and that these factors might have prevented a response to the sudden change in environmental conditions caused by application of the chemical, such as the increased available food density after disappearance of competitors.

4. Biological interactions

Biological interactions such as competition and predation can play a major role in regulating the population dynamics of zooplankton. Pesticides also affect these interactions and cause secondary effects on the structure and function of the biological community. Thus, analysis of the effects of pesticides on biological interactions is an important issue in ecotoxicological studies.

It was mentioned earlier that larger animals tend to be more sensitive to pesticides than smaller ones. Interestingly, the same tendency can be applied to competitive superiority (Hanazato, 1998c). Namely, large animals such as *Daphnia* are vulnerable to pesticide contamination but they are superior in competition with other zooplankters, while small animals such as *Bosmina* and rotifers are tolerant to the chemicals but inferior in terms of competition. In the case of competition between *Daphnia* and rotifers, however, not only exploitative competition but also interference competition (where large herbivores damage and/or kill smaller ones due their feeding activities) is an important mechanism (Burns and Gilbert, 1986; Gilbert, 1988; MacIsaac and Gilbert, 1991). There is evidence that very large daphnids also can eat small rotifers. As a result, relatively low pesticide concentrations, which damage only large taxa (*Daphnia*), may affect the population dynamics of small zooplankton species indirectly through competitive relationships. In fact, it is often observed in zooplankton communities that rotifers bloom after destruction of the *Daphnia* population by pesticides (Hurlbert et al., 1972; Papst and Boyer, 1980; Kaushik et al., 1985; Day et al., 1987; Yasuno et al., 1988).

Zooplankters change their swimming behavior when exposed to pesticides, as mentioned earlier. Such behavioral changes may alter predator–prey relationships. Dodson et al. (1995) observed that the 'spinning' behavior of *Daphnia* induced by carbaryl increased the probability of *Daphnia* being eaten by fish. This suggests that even sub-lethal concentrations of pesticides contribute to *Daphnia* population crashes in the presence of predators (Dodson et al., 1995). Preston et al. (1999) demonstrated that the toxicant pentachlorophenol increases swimming speed in the rotifer *Brachionus calyciflorus*, thus increasing the encounter rate of the prey animals with their predators, and consequently reducing prey survivorship. Similar indirect effects of pesticides, which increase risk for prey organisms, have been reported for grass shrimp (Farr, 1977) and juvenile guppy (Brown et al., 1985). In contrast, the insecticide lindane seems to reduce predation risk in *D. magna* by suppressing the animals' swimming activity, which then reduces their encounter rate with the predator *Hydra* (Taylor et al., 1995). This same effect, of course, might be detrimental if it resulted in a lowered amount of food intake or reduced ability to maintain a vertical position in the water column of a lake. In any event, it can be concluded that, even at sub-lethal concentrations, pesticides may affect the survivorship of zooplankton in the presence of predators by controlling prey behavior.

The fact that animals exposed to pesticides have a higher predation risk provides another important consideration in ecotoxicology. That is, there is an increase in the rate of pesticide uptake by predators that feed on pesticide-exposed animals, thus promoting biomagnification in the aquatic food web.

Daphnia and other cladocerans can also develop morphological responses to predators. *Daphnia* develops protuberant structures on its carapace such as neckteeth, high helmets and long tailspines when exposed to chemicals released from predators such as the larva of the phantom midge *Chaoborus*, the backswimmer *Notonecta*, the predacious cladoceran *Leptodora*, and fish (Grant and Bayly, 1981; Krueger and Dodson, 1981; Hebert and Grewe, 1985; Dodson, 1989; Tollrian, 1990, 1994; Fig. 3). These structures reduce the vulnerability of *Daphnia* to the predators by making handling and ingestion more difficult (Havel and Dodson, 1984; Mort, 1986; Parejko, 1990). Hanazato (1991c, 1992) and Hanazato and Dodson (1993) found that the same morphological changes can be induced by organophosphorus and carbamate insecticides in several species of cyclomorphic *Daphnia*, if the animals are

exposed to high concentrations of the chemicals during the final embryo to the first instar stages. Furthermore, Hanazato (1995) and Hanazato and Dodson (1992, 1995) observed that sub-lethal concentrations of the chemicals affect the morphology of *Daphnia* when the animals are exposed to both insecticides and predator (*Chaoborus*) odor simultaneously. Barry (1998) documented the induction of a protuberant structure (crest) by the insecticide endosulfan in *Daphnia longicephala*. Induction occurred even when the insecticide was applied alone (without the predator odor) and at a very low concentration (more than three orders of magnitude lower than the EC_{50}). Because these morphologies are anti-predator defenses, such effects of pesticides must alter predator–prey relationships.

The induction of protuberant structures in *Daphnia* is a positive effect of natural predator odor, which decreases the prey's mortality due to predation. However, there is a negative effect as well, since animals with anti-predator devices have lower clutch sizes and increased maturation time. In *Daphnia* this reduces population growth rate (Hanazato and Dodson, 1992), probably due to the energy costs associated with the morphological response. Hanazato and Dodson (1992, 1995) demonstrated that carbaryl reduces the growth rate and productivity of *Daphnia* more in the presence of predator odor, and found synergism in the combined effect of the anthropogenic and natural chemicals. These observations suggest that pesticides might also disturb natural organic chemical communication in aquatic communities (Hanazato, 1999). There is increasing evidence that aquatic organisms communicate with one another using organic chemicals (Larsson and Dodson, 1993). This is a largely unstudied but potentially critical area of pesticide impacts.

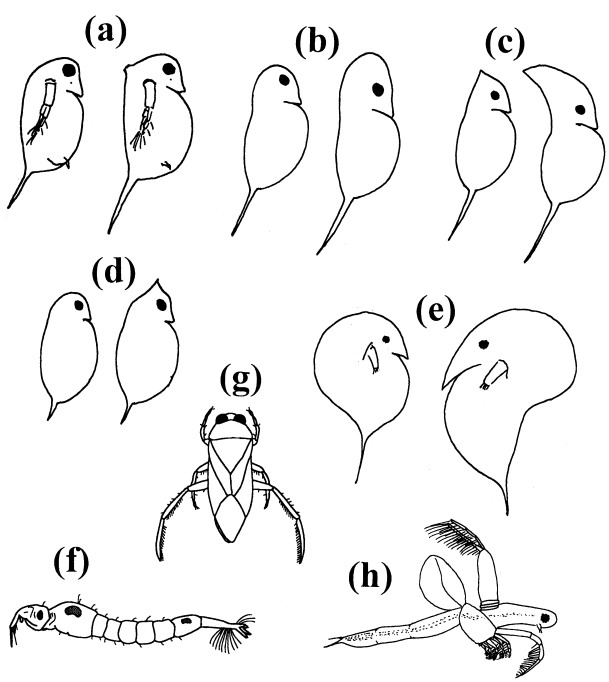

Fig. 3. *Daphnia* species that change their morphology in response to predator odor [a: *Daphnia pulex*; b: *D. galeata mendotae*; c: *D. retrocurva*; d: *D. ambigua*; e: *D. carinata*; in each pair, the left picture shows the typical morph (grown without the odor) and that on the right indicates the morph bearing protuberant structures (grown with the odor)] and predators releasing the odor [f: phantom midge larva (*Chaoborus*: 2–10 mm in body length; g: backswimmer (Notonectidae: ca. 10 mm); h: predacious Cladocera (*Leptodora*: 2–10 mm)].

5. Community- and ecosystem-level responses

Community-level responses to pesticides have often been assessed in enclosures and experimental ponds to which pesticides are experimentally applied (Kennedy et al., 1995), and in natural ponds that are occasionally contaminated with pesticides at relatively high concentrations (Helgen et al., 1988). The most frequently reported response is a change in community structure from dominance by *Daphnia* to dominance by small zooplankters such as rotifers and *Bosmina* (Hurlbert et al., 1972; Papst and Boyer, 1980; Kaushik et al., 1985; Day et al., 1987; Yasuno et al., 1988; Hanazato and Yasuno, 1990b; Hanazato, 1991a). Therefore, it is suggested that pesticides induce dominance of small zooplankton species, and consequently they reduce the mean body size of individuals in the community (Havens and Hanazato, 1993; Hanazato, 1998c).

Because *Daphnia* depresses the populations of most small zooplankton taxa through competition, a *Daphnia*-dominant community has low species richness. However, if the *Daphnia* population has been destroyed by pesticides, small zooplankton species increase in abundance, and the species richness of the community becomes higher (Hanazato, 1994). The increased diversity due to pesticide contamination (Hanazato, 1998c) differs from the response of the zooplankton to other stressors such as heavy metals and acidification (a kind of chemical stress), which reduce diversity (Sprules, 1975; Confer and Kaaret, 1983; Schindler, 1990; Havens, 1991, 1994b; Locke, 1992; Locke and Sprules, 1994). Hanazato (1998c) explained that heavy metals and acidification exert continuous stress (direct toxic effects), so that the species richness and diversity are maintained at low levels. On the other hand, pesticides have a relatively short life span in the environment and zooplankton communities are exposed to the chemical stress for a shorter period of time. Therefore, the process of community recovery from destruction by pesticides is usually observed for populations of diverse small taxa, and the community diversity increases during the process (Hanazato, 1998c). Hanazato (1998c) therefore concluded that short-term or intermittent perturbation by chemical stress (in general) would increase the diversity of natural communities. Hanazato (1997)

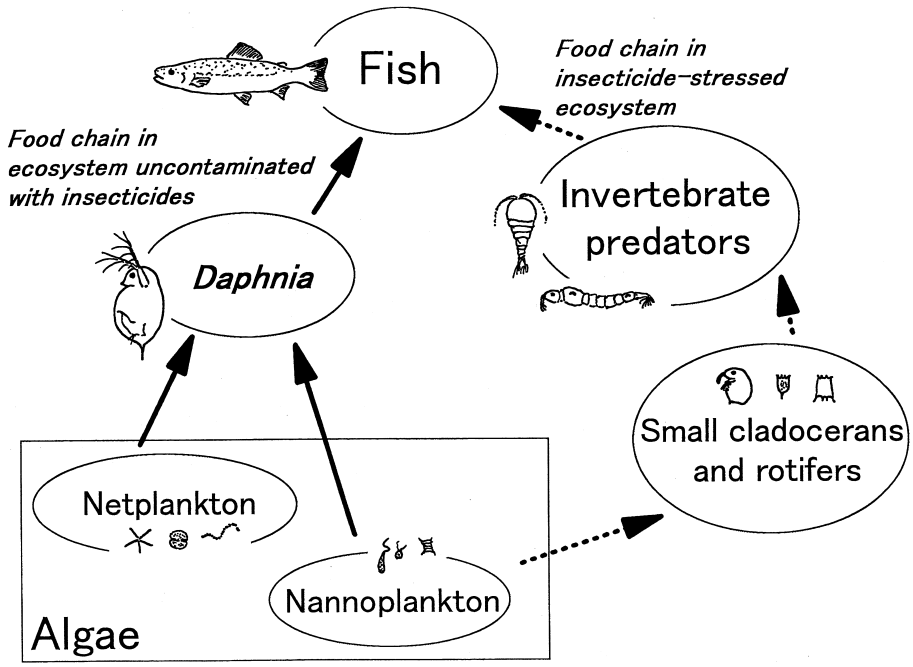

Fig. 4. The main pathways of carbon and energy flow from algae through zooplankton to fish in lake ecosystems contaminated and uncontaminated with pesticides (redrawn from Hanazato, 1998c).

has also demonstrated that repeated application of an insecticide at a moderately toxic level to a rotifer community maintains the species richness at a high level. Probably the chemical suppress the population growth of sensitive species moderately and allows an increase of species that are tolerant to the chemical but inferior in terms of competition. This is another case of pesticides increasing the biodiversity of a plankton community, and is consistent with the intermediate disturbance hypothesis of Connell (1978), and Menge and Sutherland (1987).

Changes in zooplankton community structure induced by pesticides may also affect the functioning of lake ecosystems (Hanazato, 1998c). In an uncontaminated lake containing abundant *Daphnia,* a large proportion of phytoplankton primary production is transferred to top predators (fish and birds) through the algae→zooplankton→fish pathway. In a lake that is impacted by insecticides, where there are many small zooplankton and few *Daphnia,* a smaller proportion of primary production is transferred upwards, due to longer food chains that include invertebrate predators (Fig. 4). Because energy loss occurs during transfer from one trophic level to another, efficiency of energy transfer from primary producers to top predator is lower in a pesticide-stressed ecosystem than in an ecosystem uncontaminated by chemicals. Hanazato (1998c) suggested that reduced energy transfer efficiency is a common effect of various anthropogenic stresses such as contamination with insecticides, herbicides and heavy metals, acidification, eutrophication and global warming.

6. Concluding remarks

In standardized toxicity tests for zooplankton, survival and reproduction are the attributes most often observed. However, analysis of these factors alone is not enough for assessing the full ecological impacts of toxicants (Forbes and Calow, 1999). Analysis of toxicant effects on other life history characteristics such as offspring size, morphology and behavior is necessary to evaluate the effects on populations, communities and ecosystems.

In the natural environment, aquatic organisms are exposed to multiple pesticides simultaneously, and therefore multiple effects must be assessed (Cairns, 1983). Furthermore, the organisms are exposed to a combination of pesticides and natural stressors such as high and low temperature, food shortage, oxygen depletion and predator odor, whose effects may be worse in combination than alone. Few studies have addressed how a combination of stressors affects aquatic organisms (Folt et al., 1999) and pursuit of such studies should be encouraged.

Ecosystems are comprised of a huge number of species that have complex interactions with one another. Biological interactions play an important role in maintaining ecosystems, and pesticides or other toxicants can influence them. Therefore, effects of toxicants on biological interactions need to be studied in ecotoxicology investigations. Up to now, however, such studies have been few.

The presence of biological interactions mediated by a chemical cue released from organisms (e.g. development

of protuberant structure in *Daphnia* in response to odors from potential predators) was discovered in the 1980s (Larsson and Dodson, 1993). In the 1990s, it was demonstrated for the first time that pesticides disturb the natural organic chemical communication between predator and prey (Hanazato, 1999). Hanazato (1999) then considered that the effect of pesticides was similar to that of environmental endocrine disrupters — anthropogenic chemicals that disturb chemical communication between tissues or organs in the bodies of animals. These findings suggested the presence of a new ecological risk posed by pesticides.

There are many common patterns in the structural and functional responses of ecosystems to pesticides and other anthropogenic stressors such as acidification, heavy metal pollution and climatic warming, as originally hypothesized by Odum (1985). Identification of these common patterns is helpful for predicting the ecological risks of environmental problems created by human activities, and is thus an important research topic in both ecotoxicology and fundamental ecology. Accordingly, more emphasis needs to be placed on ecological analysis in future ecotoxicology research.

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Restoration of riparian vegetation in the south-western United States: importance of flow regimes and fluvial dynamism

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Riparian ecosystems in the south-western United States have undergone extensive physical and biological changes, due, in part, to alteration of natural flow regimes and suppression of fluvial processes. Many riparian ecosystem restoration projects are achieving success because they recognize the importance of restoring the hydrologic regime. In other words, these projects are restoring flows of water and sediment in sufficient quantities and with appropriate temporal and spatial patterns. Other projects have proceeded without recognition of the need to incorporate environmental stream flow requirements into management plans. To increase success rate of riparian ecosystem restoration, this paper describes some changes that have occurred within riparian ecosystems of the southwestern United States, reviews the role of stream flow regimes in structuring riparian plant communities, and assesses various ways in which riparian plant communities can be restored by naturalizing ecological processes.

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Keywords: restoration; riparian ecosystem; hydrology; stream flow regime; arid and semi-arid; *Populus*

Introduction

Restoration of riparian ecosystems has become a major enterprise in developed nations. Many projects have been implemented in the western United States that have a goal of reversing the riparian loss and degradation that streams have undergone over the past century (Goodwin *et al.*, 1997). Some of these restoration efforts have achieved greater success than others. To improve success rate, greater information sharing is needed on the ecology of riparian ecosystems, causes of degradation, and strengths and limitations of various restoration approaches. To this end, this paper describes some changes that have occurred within riparian ecosystems of the south-western United States, reviews the role of key environmental factors that structure riparian plant communities, and assesses various ways in which riparian vegetation can be restored by naturalizing ecological processes.

Riparian ecosystem losses and the need for restoration

The physical settings and dynamic processes of streams in the south-western United States have been changed dramatically over the past century. The Colorado River, the

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largest stream in the region, has been transformed from a free-flowing, dynamic waterway to a string of storage pools. Its stream flow has been greatly reduced and only rarely reaches the Colorado River delta. Multiple impoundments also disrupt patterns of water and sediment flow on major and minor tributaries of the Colorado River (Graf, 1999). Diversion structures, including Granite Reef Dam on the Salt River, and New Waddell Dam on Arizona's Agua Fria River, completely reroute stream flow into canals, leaving dry river beds below (Graf, 1982; Springer *et al.*, 1999). Other streams, such as the Santa Cruz in Arizona, have been dewatered as a result of ground-water pumping. Ground-water mining, stream flow diversion, and damming in combination have caused ground-water tables along a portion of the Gila River to plummet by 200 m in the last century (Judd *et al.*, 1971). Concentrations of dissolved solids (salinity levels) have increased in many streams, a result of high rates of evaporation from expansive, shallow impoundments, and run-off from agricultural fields. Vast areas of flood plains have been converted to agricultural fields and urban settlements, necessitating construction of dikes and levees to constrain flood waters.

These physical changes have led to biological losses and various types of biological change (Rood & Mahoney, 1990; Patten, 1998; Johnson, 1998). Along some reaches in which floods have been suppressed but stream flows not diverted, riparian biomass has increased. For example, riparian vegetation has increased significantly along the Bill Williams River, a small tributary to the Colorado, since closure of Alamo Dam in 1968. Most of the new vegetation, however, is composed of the exotic woody plant *Tamarix ramosissima* and the dense riparian forests have become fire-prone (Busch, 1995; Shafroth, 1999). Along the Colorado River, narrow strips of marshland and riparian forest have developed in areas of the narrow Glen Marble and Grand Canyon reaches that formerly were scoured by annual floods (Stevens *et al.*, 1994). Along much of the lower Colorado River and major tributaries, however, riparian vegetation has declined and the vegetation mosaic in the flood plain has simplified. Much of the lower Colorado River flood plain is now vegetated by *Tamarix ramosissima* and *Pluchea sericea* (Ohmart *et al.*, 1988). Both are reproductively opportunistic, stress-tolerant shrubs, that can withstand saline soils, drought, and repeated burning. Near the delta of the Colorado River, the cumulative effects of river use have nearly obliterated the most extensive wetlands in the south-western United States and northern Mexico, leaving only a few scattered ecological remnants amidst an expanse of dry, salty, unvegetated land (Glenn *et al.*, 1992, 1996; Briggs & Cornelius, 1998).

Generally, in arid regions, riparian species diversity is lower along streams that do not flow perennially (Tabacchi *et al.*, 1996). As streams are dewatered, species decline in number because the wetland to upland species continuum is truncated: obligate wetland species that depend upon shallow water tables or perennial stream flows decline, while upland species that grow on drier portions of the flood plain may be unaffected or expand into areas once occupied by riparian obligates (Stromberg *et al.*, 1996). Lowered ground water levels have killed phreatophytic riparian plants along the Carmel River in California, Coal Creek in Colorado, and the Santa Cruz and Gila Rivers in Arizona, among others (Bryan, 1928; Rea, 1983; Groeneveld & Griepentrog, 1985; Scott *et al.*, 1999). Fremont cottonwood (*Populus fremontii*)-Godding willow (*Salix gooddingii*) forest associations, dependent on ample amounts of fresh water and specific flooding patterns, have become globally imperiled (Fenner *et al.*, 1985; Busch & Smith, 1995). Riverine marshlands have become rare (Hendrickson & Minckley, 1984).

Declines in species diversity also can occur if flood disturbance becomes infrequent or if the temporal and spatial diversity of flood disturbance declines (Pollock *et al.*, 1998). Flood suppression may be a key reason why plant diversity is low in the dense thickets of *Tamarix* that develop on flow-regulated streams (Brock, 1994). Although these declines have been attributed to changes produced by *Tamarix*, the ultimate cause may be river damming and flood suppression. Plant biodiversity levels can be equally high in

understories of the patchy forests of *Populus* and *Tamarix* that occur along free-flowing streams (Stromberg, 1998*a*).

The combined effects of physical and vegetational changes in riparian habitats has endangered many riparian-dependent animal species, including south-western willow flycatcher (*Empidonax traillii extimus*), Yuma clapper rail (*Rallus longirostris yumanensis*), and least Bell's vireo (*Vireo bellii pusillus*). Large percentages of native fish species have become endangered or extinct (Minckley & Deacon, 1991; Richter *et al.*, 1997*a*). Restoration of habitat for endangered species has been one impetus for restoration projects in the south-western U.S.A. (Kus, 1998). Other restoration goals expressed by managers of Nature Conservancy preserves, National Wildlife Refuges, flood control districts, and other sites, include increasing the abundance of rare native riparian vegetation types, shifting dominance from exotic plant communities to native, improving wildlife habitat and recreational amenities, and reducing the size of flood peaks that have increased due to activities such as road construction and urbanization.

Approaches to riparian ecosystem recovery

Success rates for effecting desired ecosystem changes vary widely. Our ability to restore riparian ecosystems sometimes falls short of our desire, despite some assertions to the contrary (Hey & Phillipi, 1999). Sometimes, efforts fail because of an inability to implement or sustain necessary changes. In other cases, the failure lies with inadequate scientific recommendations. Too often, restoration efforts fail because the underlying factors that caused the riparian degradation are not addressed (Briggs, 1996; Briggs *et al.*, 1994; Hobbs & Norton, 1996; Alpert *et al.*, 1999). For example, a decade ago in the south-western United States, riparian restoration was synonymous with cottonwood pole planting. Many of these planting efforts failed, because no-one asked, 'What factors caused the loss of the cottonwoods?'. Today, removal of exotic plant species seemingly has become a restoration panacea, but again, few are asking 'What factors have allowed for establishment of the exotics?'. Additions or removals of plants can sometimes suffice as the sole restoration effort. More frequently, though, there is a need to 'dig deeper' to identify and reverse the root causes of ecosystem degradation (Wissmar & Beschta, 1998). Because we do not yet have all the answers, restoration projects should be designed as science-based experiments or at least integrate some degree of experimentation. Adaptive research and management policies should be integral to the process.

Primary root causes of riparian loss and degradation are alteration of herbivory regimes, disruption of hydrologic regimes, and direct conversion to irrigated cropland and urban areas. Restoration measures to reverse impacts of livestock grazing generally require exclusion of the grazing animals or large declines in their stocking rates in riparian zones as well as upland sites throughout the watershed (Williams *et al.*, 1997). Active intervention may be required to reverse long-term effects of overgrazing, such as compacted soils and lowered water-tables. With respect to direct disruptions of hydrologic regimes, there is growing recognition that restoring natural flow regimes, including natural patterns of flood disturbance and fluvial dynamism, is critical to restoration success (Briggs, 1996; Middleton, 1999; Graf *et al.*, 2001). Projects with the greatest chance for sustainable improvement encompass an 'ecosystem management agenda' of restoring ecological processes, as a basis for restoring ecosystem complexity (Whisenant, 1999). Active restoration techniques such as planting trees or shaping land forms sometimes are used to jumpstart the recovery but the ultimate goal is to allow process restoration to naturally drive ecosystem recovery (Kauffman *et al.*, 1997).

One such ecosystem management effort is underway in California. Los Angeles Department of Water and Power, in conjunction with Mono County, is involved in a multi-year effort to restore the Owens River gorge. Restoration of flood pulses and

base flows has allowed for re-establishment of riparian vegetation as well as redevelopment of aquatic micro-habitat features such as pools and runs (Hill & Platts, 1998). In Utah, the U.S. Bureau of Reclamation, through the Utah Reclamation Mitigation and Conservation Commission (URMCC), is restoring a portion of the Provo River, as mitigation for riparian degradation resulting from Federal reclamation projects. The Provo River Restoration Project seeks to modify the geomorphology and hydrology of the river to create a more naturally functioning riparian system. The project operates according to an 'ecosystem restoration standard' that integrates multiple aspects of the environment (URMCC, 1997). Unfortunately, full restoration of water and sediment flow is prevented by a new, upstream dam.

Another case in point is the Truckee River in Nevada. The U.S. Fish and Wildlife Service began managing Stampede Reservoir along the Truckee River for occasional spring flood release, to stimulate spawning of endangered fish species including the cui-ui (*Chasmistes cujus*). An ancillary benefit was establishment of *Populus fremontii* seedlings, which also depend upon appropriately timed floods. Gourley (1998) states, 'A whole array of ecosystem components may begin to recover when restoring a basic ecosystem process', such as the natural flow regime of a river. The chances of meeting the needs of many native species and providing sustainable ecosystem improvement are increased if we take an ecosystem approach that restores hydrologic and geomorphic processes, including flood disturbance (Bayley, 1991; Stanford *et al.*, 1996). However, the Truckee River ecosystem and many others remain under threat due to continued demands on stream water, barriers imposed by dams, and lack of restoration of the full complexity of the flood regime.

Approaches that are less self-sustaining and more contingent on human intervention continue to be undertaken. For example, a $90 million effort is underway to restore Sonoran riparian vegetation to a dewatered section of Phoenix's Salt River. The Rio Salado project is a joint effort by the City of Phoenix, U.S. Army Corps of Engineers, and other groups, and is funded largely by Federal monies. Goals include creation of wildlife habitat and passive recreational opportunities: indirect benefits including economic revitalization of neighborhoods along the river corridor also are anticipated. While the outcome of this effort remains to be seen, the project is conceptually flawed as a true ecosystem restoration effort because it involves artificial approaches that do not address the root causes of ecosystem degradation. There are no plans to release water or sediment from upstream dams or to recharge the alluvial aquifer. Rather, the plan calls for releasing pumped ground water into excavated surface channels and planting 75,000 contract-grown trees. The rehabilitation efforts probably will result in creation of an urban park with some wildlife habitat value. It remains to be seen how biodiversity, bioproductivity, and ecosystem resilience will compare to that of free-flowing streams, in the absence of a restored flood regime and ground water source, and without connectivity to high-quality riparian ecosystems.

Natural stream flow regimes

As a broad restoration guide, restoration of natural stream flow regimes is fundamental (Poff *et al.*, 1997). The natural flow regime hypothesis states that riverine species require the temporal and spatial pattern of stream flow to which they have adapted over time. Thus, to maintain native riparian ecosystems, one must retain regional flow regimes. However, the specifics of implementation are complicated by many factors. For one, the context within which natural flows exert influence has changed. Because so many factors that influence riparian structure and function have been altered, full restoration of natural flows may not be the preferred option in all circumstances. For example, very large scouring floods may not be desirable if a stream reach has become detached from potential post-flood recolonization sources, as might occur if the habitat

has become fragmented. Analogously, prairie restorationists are finding that it is not always appropriate to restore natural fire regimes to tiny patches of prairie, because the net effect can be a reduction in species diversity (Collins *et al.*, 1998).

Another complication arises because of the high degree of temporal hydrologic variability in arid regions. Which time-period defines historic norms? How much can we deviate from these norms before we alter biotic components in unacceptable ways (Richter *et al.*, 1997*b*)? Will ecosystems be sufficiently restored if we allow for the 25-year return flood but not the 100-year return flood? What if we increase flood frequency to twice per year rather than three times per year? Which flow regime components are most ecologically sensitive or influential? A small deviation in ground water depths or flood timing may cause greater change than, for example, a small deviation in flood magnitude. What are the consequences of restoring flood waters but not associated sediments? Such questions demand research. In restoration contexts, these questions could be tested using an adaptive management approach until uncertainty levels decline.

There is a compelling reason to study the relationships between stream flows and riparian ecosystem structure and function: competing pressures on water resources. While riparian restoration efforts are on the increase, so too are water development and extraction pressures on streams and aquifers. We are in the midst of a water crisis, regionally and globally (Duda & El-Ashry, 2000). Although per capita municipal water consumption has decreased in the United States, overall human population size is up and so is total water use. Desert cities, including Las Vegas and Phoenix, are among the most rapidly growing in the United States, putting increasing pressure on limited water supplies. People even argue over the rights to water run-off from irrigated lawns (Oad & DiSpigno, 1997). Irrigated agriculture continues to use the largest share of the water resources in the south-western United States, with most going for production of livestock feed. Electrical power grids are at their limit, a consequence in part of years of rejecting investment in solar and other renewable power sources; thus, pressures are high to manage streams for hydro-power production. Where there is competition for a limited resource, such as water, one must be able to justify the ecological importance of virtually every drop.

Research into environmental water needs intensified in the 1970s and 1980s, triggered by fisheries ecologists who wished to quantify in-stream flow needs for declining populations of fish (Maddock, 1999). Ecologists soon realized that in addition to in-channel flow needs, there was a need for over-bank flows and sub-surface (groundwater) flows to maintain the riparian vegetation that helps to shape aquatic habitat features (Hill *et al.*, 1991). Studies to determine the water needs of riparian vegetation have since branched in many directions.

One branch includes transpiration studies, which seek to determine how much water a plant population or assemblage needs by asking how much it uses. Techniques ranging from canopy-scale micrometeorological measurements of heat flux to plant-scale measurements of sap flow and heat-pulse velocity, have revealed a wide range of responses to the question of 'how much water does a patch of riparian vegetation require?'. Transpiration rates vary with stand composition, biomass structure, and plant age. Along Arizona's San Pedro River, transpiration rates among *Populus fremontii* patches ranged from 3 to 6 mm per day (Schaeffer *et al.*, 2000). Young, densely-foliated stands transpired more water than did older stands, although individually, old *P. fremontii* trees transpired more water than young ones. Transpiration rates also vary with water availability (Devitt *et al.*, 1997). *Populus* trees along the San Pedro River transpired twice as much water when growing at sites with shallow *vs.* deep ground water (Goodrich *et al.*, 2000). Flood-inundated *Tamarix ramosissima* along New Mexico's Rio Grande transpired twice as much water as did those that were not flooded (Cleverly *et al.*, 2000). Bioproductivity and transpiration rates of other riparian plant species, including *Prosopis velutina* and *Sporobolus wrightii,* vary depending on the quantity of

summer rains (Scott *et al.*, 2000*a*). With sufficient data on transpiration rates by plant assemblage and with vegetation maps, one can estimate total water use rates for long river reaches (O'Keefe & Davies, 1991; Goodrich *et al.*, 2000). With a knowledge of the water requirements for high-quality states of each assemblage, one can estimate the amount of water necessary to restore or maintain ecosystem integrity.

In addition to knowing quantities of water needed, it is important to know how water should be distributed in time and space. A plant's requirement for a particular spatial and temporal distribution of water can be determined by examining how population demographic processes such as recruitment, growth, and mortality vary in relation to hydrologic factors such as flood timing or ground water depth. One can then define thresholds and quantify relationships between plant processes and hydrologic conditions. Spatial and temporal components of water needs also can be determined by analysing water samples for stable isotopes of oxygen and hydrogen. This can help to identify the source and depth of water used by the plant, be it the flood plain aquifer, regional aquifer, stream channel, rain water, or some combination thereof.

Water requirements can not be individually quantified for all species in riparian ecosystems (Sparks, 1995). Riparian ecosystems are 'hot-spots' of biodiversity and hundreds of different plant species can occur along perennial and intermittent streams (Naiman *et al.*, 1993; Brown, 1994; Wolden *et al.*, 1994; Tabacchi *et al.*, 1996; Dixon & Johnson, 1999). However, it may be possible to classify species into guilds, select indicator or focal species within each guild, and thereby quantify the water needs for a large number of species. Each focal species could define 'different spatial and compositional attributes that must be present in a landscape and their appropriate management regimes' (Lambeck, 1997).

Salix gooddingii and *Populus fremontii* are representative of a guild of Sonoran riparian species that depend on shallow ground water and periodic winter/spring flooding. Dense productive stands of these trees occur where ground water averages less than about three meters deep (Busch *et al.*, 1992; Stromberg *et al.*, 1996; Smith *et al.*, 1998). Of the two species, *P. fremontii* seems to be able to utilize water from unsaturated soil layers to a greater degree then *S. gooddingii,* a more strict phreatophyte (Snyder & Williams, 2000). Both are quite sensitive to drought (Rood *et al.*, 2000; Leffler *et al.*, 2000). Annual growth rate of *Populus* and *Salix* species declines in years with low stream flows and deep ground-water tables, with seasonal or annual declines of 1 m having been observed to kill adults and juveniles (Stromberg & Patten, 1995; Willms *et al.*, 1998; Scott *et al.,* 1999; Scott *et al.*, 2000*b*; Shafroth *et al.*, 2000). Other woody pioneer plants of low-elevation south-western streams that appear to depend on similarly shallow ground-water include *Baccharis salicifolia*, *Salix exigua*, and *Salix bonplandiana* (Gary, 1963).

Continued establishment of *Populus fremontii* and *Salix gooddingii* depends on periodic occurrence of years with appropriately timed flood flows, high growing-season stream flows, and very shallow water tables (Everitt, 1995). Along free-flowing streams in the Sonoran Desert, regeneration floods occur about once every 5–10 years (Stromberg, 1998*b*; Stromberg *et al.*, 1991). Recruitment patterns are irregular, varying to a large degree with frequencies of El Niño years (Webb & Betancourt, 1992; Swetnam & Betancourt, 1998). In recent decades, there has been a high frequency of years with abundant winter rains and floods and consequently many new cohorts of *Populus fremontii* and *Salix gooddingii* have established.

After a flood pulse, survivorship of *Populus* and *Salix* seedlings depends on their ability to maintain root contact with the declining water table. Yearlings are able to tap water at a depth of about a metre or so by summers' end (Stromberg *et al.*, 1991; Mahoney & Rood, 1998). Along the Green River in Colorado, however, some *P. deltoides* subsp. *wislizenii* did not become phreatophytic until they were several years old (Cooper *et al.*, 1999). Between-site differences in ground water requirements may arise due to differences in climate (rainfall, temperature, evaporative stresses),

soil types and stratigraphy (soil water holding capacity, clay lenses and perched water layers) and other hydrologic modifiers (inundation frequencies).

Mahoney & Rood (1998) have developed a model, coined the recruitment box, that bounds the requirements for *Populus* seedling establishment with respect to post-flood recession rate, river stage, and flood timing. Recruitment also depends on high-energy floods to perform the geomorphic 'work' necessary to create recruitment sites and reinitiate community succession. Small winter or spring floods result in only a small amount of sediment movement, erosion, and deposition, and produce only small recruitment bands (Stromberg *et al.*, 1993*a*). Large, long winter floods, such as occurred during the 1992–1993 El Niño rainy season, form new channels and widen existing channels (Huckleberry, 1994). Extensive stands of *Populus* and *Salix* can establish on the expanses of bare mineral soil (Stromberg, 1997).

The period of water recession following the winter flood peaks can extend well into summer. This creates recruitment opportunities for species with a range of temporal regeneration niches, including spring-seeding *Populus* and *Salix* and summer-seeding *Baccharis salicifolia*, *Tessaria sericea*, and *Tamarix* spp. Late-summer monsoon floods also directly create recruitment opportunities. Sonoran panic-grass (*Panicum sonorum*), for example, depends on summer floods to complete its life-cycle. Once common along the lower Colorado River, the plant has been locally extirpated, due partly to suppression of summer floods (Nabhan, 1985). Many other plants also belong in this guild of summer-flood dependent pioneer species.

Prosopis velutina, Prosopis glandulosa, Prosopis pubsecens, Sporobolus wrightii and *Sporobolus airoides* are among a guild of seral, warm-season species that establish in response to summer rains or summer floods. They are deep-rooted, facultative phreatophytes that can utilize deep ground-water and shallow soil moisture. In wetter parts of their range, they can survive solely on precipitation (Scott *et al.*, 2000*a*; Tiller, unpublished data). Biomass structure varies greatly for *P. velutina* depending on ground-water availability. Canopy heights of 4 m are typical for *P. velutina* trees in Sonoran desert uplands. Larger size is attained for trees growing along ephemeral stream courses that receive periodic flooding. Trees reach greatest heights (up to 12 m) when growing along rivers where ground-water is at a depth of less than about 10 m (Stromberg *et al.*, 1992; Stromberg *et al.*, 1993*b*). Small, low-energy floods that deposit sediment around pioneer plants serve to create aggraded fluvial surfaces upon which these seral species establish.

Natural flood regimes help to maintain high biodiversity not only by creating a diversity of temporal regeneration niches but also by creating micro-habitats that vary spatially in depth to the water table, light availability, and soil properties. For example, flood deposits vary in depth, texture, and nutrient content, and support different assemblages of plants (Marks, 1950). Deep deposits of sand and gravel, too dry for marsh plants or for *Populus-Salix* seedlings, favor a guild of drought-tolerant shrubs including *Atriplex linearis, Bebbia juncea, Chrysothamnus nauseosus, Hymenoclea monogyra, Petalonyx thurberi* and herbs including *Cleome lutea, Dicoria cansescens, Eriogonum spp., Euphorbia hyssopifolia, Heterotheca psammophila, Polanisia dodecandra, Sporobolus contractus, Sporobolus cryptandrus,* and *Tiquilia plicata* (Rea, 1983; Wolden *et al.*, 1994; Stromberg *et al.*, 1996, 1997). Nutrient-rich soils with high content of silt and clay favour *Lycium andersonii, Lycium fremontii, Viguiera dentata, Panicum obtusum, Plueraphis mutica, Sporobolus wrightii, Sporobolus airoides, Ziziphus obtusifolia* and many other species. Salty areas in flood plains support a guild of halophytes including *Allenrolfea occidentalis, Atriplex lentiformis, Distichlis spicata*, and *Suaeda torreyana.*

Floods also influence biodiversity patterns by causing river channels to relocate and meander, creating abandoned channels and backwater depressions, and inducing channel widening and subsequent re-narrowing. Areas with standing water or near-surface water tables, such as might develop after floods erode terraces or form off-channel depressions, support marshlands vegetated by species including *Juncus articulatus*,

Juncus torreyi, Typha domingensis, and *Scirpus americanus* (Grace, 1989; Stromberg *et al.*, 1996, 1997). Beavers, keystone species in riparian ecosystems, also engineer the marshy conditions favoured by these obligate and facultative wetland plants.

Summer and winter floods maintain high productivity rates of riparian forests by providing water for ground-water recharge, wetting flood plain soils, depositing nutrients, and flushing salts. Growth rate of the phreatophytic tree *Platanus wrightii*, for example, increases not only with size of the winter floods (a primary source of ground-water recharge), but also with the frequency of small summer floods, which increase nutrient availability (Grimm & Fisher, 1986; Stromberg, 2001). Several plant species, including *Populus fremontii* and *Salix gooddingii*, do not tolerate high concentrations of salts (Shafroth *et al.*, 1995; Glenn *et al.*, 1998) and decline in germination rate and growth-rate if salt concentrations are not flushed by flood flows. Large floods also function to fire-proof riparian ecosystems (Ellis, 2001). Without floods, plant debris and litter accumulates, plant water content decreases, and fires become larger and more frequent (Busch, 1995). Fires favour species that are clonal or readily resprout from the root crown, such as *Tessaria sericea*, *Chloracantha spinosa* and *Tamarix ramosissima*, *Populus fremontii*, in contrast, is readily killed by summer burns.

Restoration constraints and compromises

Ultimately, full restoration of riparian ecosystems hinges on removing impediments to the natural flows of water and sediments (Schmidt *et al.*, 1998). There are cases in which flow regimes have been fully restored, in response to changing societal goals. In central Arizona, for example, a decision was made to decommission the hydro-power dam on Fossil Creek and restore full flows to the stream. Benefits from restoring downstream aquatic and riparian habitat were believed to outweigh the small loss of hydro-power production and loss of habitat developed above the dam. There are other cases where full naturalization of fluvial processes is not desired by all stakeholders. In such cases, how do we make compromises between water needs of the riparian and aquatic ecosystems and direct human water demands? Can we maintain or restore ecosystem integrity while accommodating some degree of water extraction, hydro-power production, flood control, and/or flood plain agriculture (Schmidt *et al.*, 1998)? Generally, management emphasis on the production of commodities requires that one accept ecological costs of reduced site potential and functional abilities of the riparian ecosystem. However, there are many changes that can be made to restore a greater degree of riparian ecosystem structure and function. Some changes are described below, organized by ecological stress factors.

Loss of stream flows or declines in ground water

There are several sustainable solutions for restoring stream flows and raising water tables to levels that allow for recovery of hydrophytic and mesophytic vegetation types such as *Populus-Salix* forests or riverine marshlands, while also allowing for water extraction for human consumption. Water can be stored in aquifers rather than reservoirs, municipal water can be recycled and released into stream channels, stream channels rather than canals can be used for water delivery, efficiency of municipal, agricultural, and industrial water-use can be increased, and extraction demands can be reduced. Ultimately, integrated, watershed-based approaches to water management are needed to reverse adverse effects of ground water mining and surface water diversions. All water users, municipal, agricultural, or industrial, need to work together and address water overdraft problems.

In the arid south-west, where open water evaporation rates are greater than $2{\cdot}7\ \mathrm{m\,year^{-1}}$, it seems more ecologically advantageous to store water in aquifers than in

surface impoundments. A case in point involves the Agua Fria River in central Arizona. Lake Pleasant Reservoir, behind New Waddell Dam, stores Colorado River water that is delivered through Central Arizona Project canals and pipelines. The reservoir loses more water to evaporation per year than arrives from the in-flows of the Agua Fria River itself. The reach downstream of the dam is completely dewatered. A modeling study showed that a several mile stream reach below the dam could be used as a conduit for delivery of water to a ground water recharge and recovery site (Springer *et al.*, 1999). If Central Arizona Project water was released from the dam, the shallow bedrock layer would allow water in the aquifer to rise to levels that would sustain riverine marshland, *Populus-Salix* forest and *Prosopis* woodland. No more water would be released to the atmosphere through evapotranspiration than if the water were stored in the reservoir, and there would be substantial increases in riparian habitat.

Many cities, such as Nogales, Arizona and Phoenix, Arizona are recycling water by releasing treated municipal effluent into stream channels. With increased planning efforts, more riparian corridors could benefit from such a process. For example, a recent decision in Pima County, Arizona allows the county to buy reclaimed water (municipal effluent) for riparian restoration projects. Projects that secure endorsement by the U.S. Fish and Wildlife Service will be eligible for a portion of a 5000 acre-foot pool for each of the first 5 years of conservation efforts. A key concern is where to utilize the water to maximize its habitat value. Regional planning efforts are underway to identify sites that would maximize the environmental benefits of reclaimed water. Hydrogeologic studies can identify sites where shallow water tables exist or are likely to develop, and thus sites able to support phreatophytic riparian vegetation. Ecological studies can identify sites that are connected to high quality patches of riparian vegetation and thus more likely to have value as wildlife habitat.

Agricultural return flows constitute yet another source of water for riparian restoration efforts. Return flows are being considered as a water source to maintain cottonwood-willow habitat in the Limnitrophe area of the Lower Colorado River, to allow for survivorship of plants that established after the 1992–1993 winter floods (LCRBR, 2000). Elsewhere in the lower Colorado River flood plain, agricultural return flows have been used to increase survivorship of riparian trees and shrubs planted as part of revegetation efforts (Briggs & Cornelius, 1998). When using such flows to maintain or restore riparian habitat, it seems prudent to restrict or minimize use of biocides and fertilizers on farm fields, periodically flush soils to reduce concentrations of salts, and provide a year-round water source. Multiple drainage ditches could be created to simulate the multi-channeled pattern of desert streams and provide the dense strips of riparian forests intermingled with forest edges required by some bird species.

Daily fluctuations in water levels

A reach of the Salt River below Phoenix Arizona has been revitalized by the daily release of over 100 million gallons of treated municipal water into the channel (Rea, 1983). Water level in the channel, however, varies over the course of a day with the water use patterns of urbanites. To minimize diel fluctuations, restoration efforts are underway through the Tres Rios project. Water will be released into side basins and wetland treatment cells and then into the stream channel. Research and adaptive management are needed to determine whether there also is a need to restore seasonal fluctuations in water level.

Stream flows also can vary below hydro-power dams. Below Glen Canyon Dam on the Colorado River, the river stage once fluctuated up to 5 or 7 m day^{-1}, in response to diel cycles of hydro-power demands. To minimize adverse impacts, fluctuations presently are limited to about 1 m day^{-1}, which constrains the ability of Glen Canyon Dam

to fully respond to daily power demands. In the long-term, efforts are needed to shift to more sustainable energy sources such as solar power and thereby eliminate the need for peaking power from hydro-power dams.

Physical barriers

Dikes, levees, and other structures separate channels from flood plains on many streams. To remedy this situation on California's Cosumnes River, the Nature Conservancy has implemented a large-scale restoration project that entails breaching levees and allowing flood waters free access to abandoned farm land (Reiner, 2000). Potential for success was demonstrated by a natural breaching of the levee about 10 years ago, which was followed by development of a diverse riparian forest. Restoration efforts also have been made in urban areas to reconnect rivers and flood plains (Riley, 1998; de Waal *et al.*, 1998). There are opportunities to remove physical barriers and restore some degree of channel-flood plain connectivity along many desert streams, including the Colorado and Rio Grande. By allowing periodic flows onto flood plains, one provides the water, nutrients, sediments, and plant propagules to restore and sustain productive, diverse riparian forests (Molles *et al.*, 1998). Such efforts may require purchase of agricultural land for conservation purposes, or restrictions on home development in flood plains. Benefits accrue, however, in the form of downstream flood reduction (as the flood waters spread laterally across the flood plain), aquifer recharge, and biodiversity increases.

High concentrations of dissolved solids

Primary causes of the increased salinity of Colorado River water, as for many other streams, are use of flood plain lands for irrigated agriculture and storage of water in shallow reservoirs (Briggs & Cornelius, 1998). Water chemistry can be improved to levels that support a wide range of riparian plant species, including fresh-water dependent *Populus* and *Salix*, by reducing amounts of irrigated flood plain lands, increasing efficiency of irrigation systems, growing low-water-use crops, and/or reducing use of agricultural fertilizers. Reducing reliance on reservoirs for water storage will result in less evaporation of water and thus lower salinity levels. Released of flood pulses from dams can flush salts that have accumulated in flood plain soils.

Flood flow alteration

On many streams in western United States and Canada, recruitment rates of *Populus* and *Salix* species have declined because floods have been suppressed or altered in ways that do not meet their regeneration requirements. To remedy this situation in Alberta, Canada, scientists and Environmental Advisory Committees have provided information that has led to changed operation of some dams (Rood *et al.*, 1995, 1998; Mahoney & Rood, 1998). St. Mary and Oldman Rivers are managed for delivery of summer irrigation water and still flood fairly regularly in wet years. Rates of river meandering and channel realignment are relatively unaltered, and so are the processes that create 'nursery bars' for establishment of *Populus* seedlings. Changes have been made, however, such that flood waters now recede slowly enough to allow for high survival of the seedlings. Ecological models call for the stream stage to drop less than four cm per day, allowing seedling roots to maintain contact with moist soil. Another part of the agreement calls for an increase in summer base flow levels, thereby reducing risk of tree death from drought.

Such operating agreements could be put in place for the many flow-regulated streams in the south-western United States, including the Verde, Gila, and Colorado Rivers. Large flows are released from water-storage dams on these streams during occasional wet years, but the water is not released so as to optimize its environmental benefits. Sometimes, releases fortuitously meet the regeneration needs of riparian plants. El Niño weather patterns in 1978, 1983 and 1993 variously allowed for establishment of *Populus* and *Salix* trees along portions of the lower Gila and Colorado; reservoirs were filled to levels that necessitated large releases during winter and spring (Rea, 1983; Briggs & Cornelius, 1998; Zamora-Arroyo *et al.*, 2001). With operating agreements in place, dam managers could be prepared to release flows during wet years in ways that mimic natural hydrographs and favor establishment of native species adapted to natural flow patterns. To keep the trees alive, maintenance flows would have to be secured.

Often, there are constraints on the degree to which natural flood regimes can be restored. The Bill Williams River in western Arizona is regulated by Alamo Dam, which was built to minimize flood pulses into the Colorado River. Over the past 25 years, size and frequency of winter and summer flood peaks in the Bill Williams River have decreased. The U.S. Fish and Wildlife Service, Army Corps of Engineers, and university scientists have worked together to develop a flow-release plan. The plan calls for release of high base flows and periodic flood flows to improve the quality of riparian habitat in the below-dam wildlife refuge, while also maintaining flood control and recreational and wildlife benefits in Alamo Lake. However, there are physical constraints and design features that restrict the size of flood pulses that can be released from the dam (Shafroth *et al.*, 2001). Without large scouring floods, dense post-dam vegetation (much of which is exotic *Tamarix*) will remain fire-prone. Another anticipated consequence of the lack of large scouring floods is a decline in rates of establishment of pioneering *Populus* and *Salix*. These rates are predicted to decline despite the release of appropriately timed spring flows (Shafroth *et al.*, 1998). Solutions being pursued at the Bill Williams National Wildlife Refuge are intervention in the form of small-scale clearing of *Tamarix*, to be followed by *Populus-Salix* regeneration flows.

Actions that mimic fluvial processes, such as flood plain clearing followed by flood irrigation, also are being undertaken at other sites where natural processes cannot be fully restored (Friedman *et al.*, 1995). For example, at Bosque del Apache Wildlife Refuge, as on much of New Mexico's highly regulated Rio Grande, *Tamarix* has become dominant. Lowered water tables, increased river salinity, and lack of winter/spring floods have all contributed to decline of *Populus* forests, while past flood plain clearing and at least one appropriately timed summer flood allowed for influx of *Tamarix* (Everitt, 1998). To restore native forests, Refuge managers have mimicked the effects of large floods by using bulldozers, herbicides, and fire to clear extensive stands of *Tamarix* at a cost of \$750–1300 ha^{-1} (Taylor & McDaniel, 1998; Taylor *et al.*, 1999). They then released water onto the bare flood plains in spring with a seasonal timing that mimicked the natural flood hydrograph of the Rio Grande. This allowed for establishment of a diverse assemblage of plant species. Flood pulsing followed by seeding of native species also can be undertaken on agricultural fields, as has been done at places along the lower Colorado River. Restoration of agricultural fields ultimately may prove more cost-effective than restoration of *Tamarix* lands. Although land costs may be high, water delivery structures already are in place and vegetation clearing costs are negligible.

Loss of sediment

Dams and reservoirs impede downstream flows of sediment. Reduced transport of silt and clay may reduce biodiversity below dams, given that abundance of herbaceous

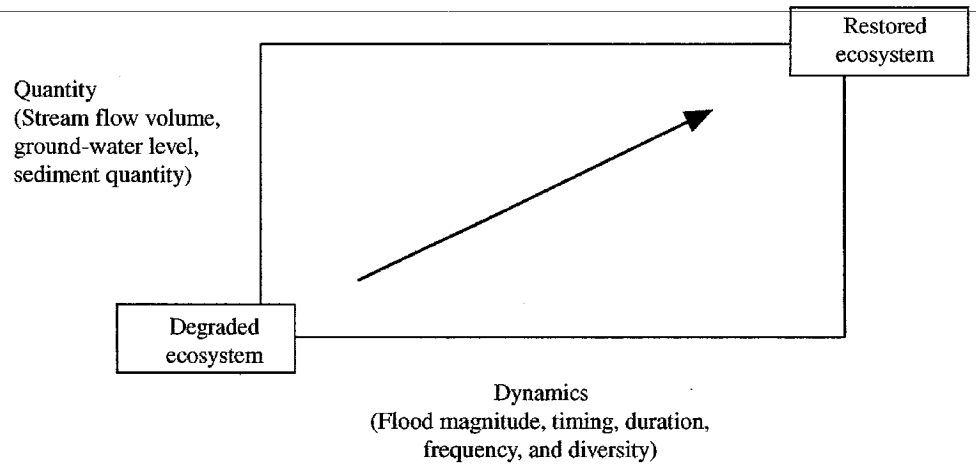

Figure 1. Conceptual diagram of flow regime changes needed for riparian ecosystem restoration.

riparian species tends to increase on fine soil textures (Stromberg, 1998*a*; Jansson *et al.*, 2000*a*). Biodiversity also declines as dynamic fluvial processes, such as channel migration, erosion, and sedimentation, become static (Shields *et al.* 2000) and spatial and temporal heterogeneity decline (Pollock *et al.*, 1998). Orthophosphates typically adheres to clays and silts and thus decline in below-dam systems as fine sediments are deposited in reservoirs, contributing to downstream productivity declines.

Sediment and nutrients can be restored to some below-dam reaches by adding sediment bypass structures (Schmidt *et al.*, 1998). Other barriers imposed by dams, such as restricted dispersal of plant propagules (Jansson *et al.*, 2000*b*), are more difficult to remedy, short of de-commissioning dams. Given such limitations, there is a need to assess economic and environmental costs and benefits of all dams in the south-western United States, as a basis for deciding which warrant removal or breaching (Shuman, 1995; Born *et al.*, 1998). At some sites, dam removal provides substantial ecological benefit, while minimally reducing the production of 'goods' (Wunderlich *et al.*, 1994).

Watershed alterations

Full restoration of riparian ecosystems depends on restoration of upland ecosystems throughout the watershed. Long-term overgrazing, fuel-wood harvest, and urbanization have, in places, reduced plant cover and soil in the uplands. These land-uses can result in flashier streams characterized by larger flood peaks and smaller base flows. In some areas, fire suppression has resulted in greater tree densities, higher transpiration rates, and smaller stream flows (Covington *et al.* 1997). Watershed restoration will require a mix of passive measures, such as restoring natural fire regimes and grazing regimes, and active measures. Controlled burns may be necessary for restoring structure and function to upland forests.

Conclusions

There is growing recognition of the important influence exerted by stream flows and fluvial processes on riparian vegetation structure and composition. Many riparian restoration projects are on a trajectory towards success because restoration managers

recognize the importance of restoring stream flow regimes, in other words, of restoring flows of water and sediment in sufficient quantities and with appropriate temporal and spatial patterns (Fig. 1). Substantial changes need to be made in the way we manage streams and water resources in the south-western United States. These changes include naturalizing flood pulses to restore fluvial dynamism, allowing rivers access to their flood plains and letting them be their own 'managers', recharging ground-water, reducing rates of water extraction, reducing dependence on hydro-power, and removing selected dams. Without such changes, we acquiesce to continued biodiversity losses and reduced function of riparian ecosystems. As Stanford *et al.* (1996) state, stream restoration calls for 'instituting a management belief system that relies upon natural habitat restoration' as opposed to artificial techniques such as plant propagation or installation of artificial in-stream structures (river engineering). Changes need to be made throughout society so that we become more efficient and less wasteful in our use of water and power. Scientists can help to insure that we restore desired conditions by focusing research endeavors on the water needs of aquatic and riparian ecosystems.

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Impacts of Stabilization Measures

by Craig Fischenich[1]

May 2001

Complexity

Low — Moderate — High

Value as a Planning Tool

Low — Moderate — High

Cost

Low — Moderate — High

OVERVIEW

Streambank stabilization affects many of the structural characteristics and functions of a stream. The basic purpose of any stabilization project is to interrupt erosion processes where they are deemed to conflict with social needs or ecological requirements. These efforts also interrupt or affect other processes and alter the physical environment. Because of the strong interrelations among the structural components and functions of a stream/riparian system, a number of secondary and tertiary impacts are associated with bank stabilization measures.

Knowledge of the direct and ancillary impacts of stabilization can be used, for example, to select measures and develop a design that restores or enhances the structure or function of a degraded ecosystem. Further, few alterations to the structure or function of the environment are universally adverse or universally beneficial. Most measures benefit some components of the ecosystem at the expense of others.

In this technical note, the term “impact” denotes a measurable change, without regard for the significance or value of the change. These changes or impacts are, by nature, very site-dependent; thus, generalizations provided herein may run contrary to some observations. Factors that influence the nature of impacts are too numerous to mention. In addition to those factors associated with the stabilization measures themselves, the nature and extent (spatial and temporal) of impacts will be influenced by

- Local geology
- Climate
- Physical characteristics of the stream
- Physical characteristics of the riparian zone
- System stability
- Watershed and adjacent land use
- Proximity to control features (bridges, bedrock, etc.,)
- Construction practice
- Timing

The following sections present an overview of likely impacts from common bank stabilization practices. These impacts are based on the review of the materials summarized in the attached bibliography, along with hundreds of other written works reviewed by the author and his experiences in research, design, construction, and monitoring literally thousands of bank stabilization structures.

The scope of this effort is limited to a few specific structural characteristics and

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processes. The requested impact assessment includes a review of

- Impacts on water surface elevations
- Impacts on velocities, including secondary velocities
- Impacts on erosion/scour and deposition
- Impacts on sediment transport through the design reach
- Length of the river that is impacted by the specific structure type

Impacts on water surface elevations

Stabilization practices can alter water surface elevations in one of two ways: 1) changing the resistance characteristics (either form or friction) of the reach, or 2) altering the channel geometry (slope or cross section). These changes can be direct (e.g., adding a weir to change channel slope), or indirect (e.g., structures that may cause a sorting of bed materials, resulting in a coarser surface fraction with higher resistance). In addition to the type of stabilization measure, the materials used and the geometry and location of the measures also affect the extent of impacts. Any impacts must be related to some baseline condition (usually the immediate pre-project condition and not some former "stable" condition). Impacts to water surface elevations are seldom static. Channels tend to adjust their bed elevations to compensate for changes in water surface, and the resistance characteristics of most stabilization measures change as they mature (vegetation growth being the primary factor). Table 1 shows the impacts on water surface elevations by type of stabilization measure.

Table 1. Impacts on Water Surface Elevations

Category	*Impacts*
General	No generalization can be made on the impacts of bank stabilization on water surface elevations.
Armor Techniques	Armoring techniques, in general, have little local or cumulative effect on water surface elevations with the exception of change in resistance. Exceptions occur when the measure requires an alteration to the channel cross-sectional area. Impacts from resistance or cross section changes can be readily quantified through the application of the de Saint Venant Equations and resistance compositing techniques. Expansions and contractions of less than 10 percent generally result in negligible impacts. Impacts from changes to resistance, which depend on the magnitude and length of the change, are greatest for streams with a low width/depth ratio. Measures with potential to increase water surface elevation: - Any bioengineering technique or other method that employs dense woody vegetation Measures with potential to decrease water surface elevation: - Bulkheads, gabions, and other vertical architecture structures Any structure that uses concrete or other smooth finishes

Table 1 (continued)

Category	*Impacts*
Deflection Techniques	Deflectors, which create form roughness and reduce the cross-sectional area of the channel, have the potential to increase water surface elevations and frequently do so. They also commonly generate scour and deepen the unprotected portion of the channel, offsetting cross-sectional reductions. Unfortunately, techniques to quantify these impacts are generally lacking. The impacts depend on the flow condition, character of the channel, and geometry of the deflector, making empiricism of limited use in evaluating impacts. Impacts depend also on flow magnitude and diminish with increasing depth of flow over the top of the structure. Measures with potential to increase water surface elevation: - Any deflector that extends more that 15 percent across the channel or occupies more than 10 percent of the cross section area. Measures with potential to decrease water surface elevation: – Closely-spaced, low-profile structures that induce scour
Slope Stabilization Techniques	See *Armoring Techniques* above. Measures with potential to increase water surface elevation: - Any bioengineering technique or other method that employs dense woody vegetation. Measures with potential to decrease water surface elevation: – Bins, crib walls, and other vertical architecture structures
Energy Reduction Techniques	Energy reduction techniques reduce kinetic energy, which is usually converted to potential energy in the form of increased water surface elevation. Channel blocks and grade control structures also modify the slope of the channel, further raising water levels. Methods to quantify impacts to water surface elevations are straightforward, and generally consist of backwater analyses. The impact of vanes, however, has not been adequately studied. Clearing and snagging reduces local turbulent energy and removes form roughnes from the channel, and can lower water surface elevations. Measures with potential to increase water surface elevation: - Grade control, channel blocks and (to a lesser extent) vanes Measures with potential to decrease water surface elevation: - Clearing and snagging of large woody debris

Impacts on velocities, including secondary velocities

Bank stabilization measures can have a number of impacts on velocities, and the impacts from a single structure can vary spatially. For example, a structure that causes a constriction in the channel cross section will generally increase local velocities but decrease upstream velocities due to the backwater effects. Within a given cross section, a structure usually has no effect on the average cross-sectional velocity but causes a redistribution of the velocities (higher in the zone adjacent the structure. In addition to the stream-wise velocity, stabilization measures can increase or decrease turbulent velocities and secondary current velocities. Variables that influence the impact of stabilization measures on velocity include 1) the materials (affect resistance and turbulence), 2) structure geometry and location (affect slope, degree of expansion or contraction, flow convergence or

separation, and influence secondary currents), and 3) structure type. Impacts to velocity tend to be localized, and only extend far beyond the project reach when the stabilization measure induces backwater conditions. Velocity impacts of stabilization measures are presented in Table 2.

Table 2. Impacts on Velocities

Category	*Impacts*
General	No generalization can be made on the impacts of bank stabilization on velocities.
Armor Techniques	Armoring techniques, in general, have little local or cumulative effect on velocities, with the exception of change in resistance. Exceptions occur when the measure requires an alteration to the channel cross-sectional area. Impacts from resistance or cross-sectional changes can be quantified with one-dimensional backwater models (for average velocity), or two-dimensional hydraulic models (for velocity variation across a section). Impacts to the vertical velocity profile can also be quantified by assuming a logarithmic velocity profile, and a resistance coefficient and using a known water surface elevation and mean velocity. Average channel velocities tend to be insensitive to armoring of the banks. Local velocity (within a few feet) generally increases for smooth surfaces and decreases for rough surfaces (such as vegetation). Armor materials frequently increase local turbulence but have little impact on secondary currents. Measures with potential to increase velocity: - Any structure that uses “smooth” materials or constricts the channel Measures with potential to decrease velocity: – Any bioengineering technique or other method that employs dense woody vegetation.
Deflection Techniques	Deflectors reduce the cross-sectional area of the channel by constriction, tending to increase both mean cross-sectional and local velocities. They also commonly disrupt secondary currents, generate eddies, and increase turbulence. Unfortunately, techniques to quantify these impacts are generally lacking. Further, the impacts are highly dependent on the flow condition, character of the channel, and geometry of the deflector, making empiricism of limited use in evaluating impacts. Impacts also depend on flow magnitude and vary with fluctuating depth of flow over the top of the structure. Impacts to velocity from deflectors tend to be localized, but these structures create the most dynamic and diverse velocity fields of any stabilization technique.

Table 2 (continued)

Category	*Impacts*
Slope Stabilization Techniques	Slope stabilization techniques affect velocities only slightly, due to changes in resistance or alteration to the channel cross-sectional area (with contractions increasing velocity and expansions decreasing it). Impacts can be quantified in the same manner as *Armor Techniques* (above). Average channel velocities tend to be insensitive to slope stabilization, but local velocity (within a few feet) tends to increase for smooth surfaces and decrease for rough surfaces (such as vegetation). Slope stabilization can increase local turbulence, but has little impact on secondary currents. Measures with potential to increase velocity: - Any structure that uses "smooth" materials or constricts the channel Measures with potential to decrease velocity: Any bioengineering technique or other method that employs dense woody vegetation
Energy Reduction Techniques	Energy reduction techniques reduce kinetic energy (which is proportional to the velocity squared). Channel blocks and grade control structures reduce velocity for as far upstream as the backwater conditions persist and completely disrupt secondary currents except when overtopped by flows more that three to five times the height of the structure. Clearing and snagging reduce only turbulent velocity and slightly increase mean channel velocity. Removing debris obstructions can also restore secondary currents. Vanes are intended to reduce secondary velocities, which has the effect of increasing the local average cross-sectional velocity. Methods to quantify impacts to velocity from channel blocks and grade control measures are straightforward and generally consist of backwater analyses. Quantification of the impacts to velocity from vanes and clearing and snagging has not been adequately studied. Measures with potential to increase velocity: - Clearing and snagging (though they reduce turbulence) and vanes (though these reduce secondary velocities) Measures with potential to decrease velocity: - Grade control and channel block structures

Impacts on erosion, scour, and deposition

All stabilization structures and measures impact sedimentation processes (Table 3). They reduce or eliminate sediment yield and tend to generate local scour, usually at the toe of the structure or immediately downstream. Measures that reduce local transport capacity tend to induce sediment deposition in those areas. Rates of sediment sorting, both from the streambed and from the water column, tend to increase in stabilized areas. The primary variables that influence sedimentation processes are sediment yield, sediment characteristics, and the impacts of the stabilization measure on flow parameters, particularly velocity, stream power, and shear stress. Algorithms for computing erosion, deposition, and scour are often inaccurate and of limited value in assessing the true impacts and localized nature of these processes associated with bank stabilization.

Table 3. Impacts on Erosion and Deposition

Category	*Impacts*
General	All bank stabilization measures at least temporarily change sediment yield characteristics of a channel. Most cause local scour and many induce sediment deposition. These impacts tend to be temporary, though their results may persist for long periods of time, particularly in streams with armored beds and few tributaries.
Armor Techniques	Armoring techniques generally reduce local bank erosion but induce local scour. Scour usually occurs at the toe of the armor structure and extends into the stream about two to three times the scour depth. Algorithms to compute scour depths are notoriously poor but provide some means of estimating the magnitude of the scour depth. Armor techniques that use materials with high resistance values can also induce local sediment deposition, usually on and within the armor material.
Deflection Techniques	Flow deflection structures alter the channel geometry, create flow blockages, and generate form roughness. Consequently, they tend to significantly alter the flow field, which, in turn, generates zones where both scour and deposition occur within relatively small areas and in close proximity. Scour holes nearly always form at the ends of the structures but may also occur on the face if oriented perpendicular to the flow or angled downstream. Deflection structures usually establish an eddy on their downstream side and, if strong enough, may create some scour in concentrated areas. More often, however, the zone immediately downstream from a deflection structure is subject to sediment deposition as the flow velocity and shear stress decrease in these zones. The overall impact on scour, deposition, and sediment movement varies greatly with the channel type, planform, bed material characteristics, nature of transported sediments, and the location, geometry, and orientation of the deflectors. Scour and deposition increase with structure length, height, and angle from the upstream bank and with increasing values of the ratio of the stream width to the radius of curvature of the bend, though there are limits to each of these values beyond which impacts tend to diminish.
Slope Stabilization Techniques	Slope stabilization techniques generally reduce local bank erosion, but may also increase local scour. Scour generally occurs at the toe of the structure, and extends into the stream about two to three times the scour depth. Algorithms to compute scour depths are notoriously poor, but provide some means of estimating the magnitude of the scour depth. Techniques that use materials with high resistance values can also induce local sediment deposition, usually on the slope itself. Regrading an eroding bank can modify the strength of secondary currents in a bendway and affects the growth and development of point bars, modifies thalweg depths, and alters secondary transport of sediments.

Table 3. (continued)

Category	Impacts
Energy Reduction Techniques	Techniques used to reduce energy within a stream have a significant impact on sediment transport, scour, and deposition. Grade control measures create backwater in upstream reaches, increasing depth and reducing velocity. These upstream impacts reduce sediment transport capacity, and stream reaches immediately upstream from these structures often have finer bed materials than those found in adjacent reaches. The extent of the upstream impacts depends on the height of the structure and the streambed slope. Size of downstream scour pools generally depends on the relative height of the structure and its geometric configuration. Secondary channels blocked with chute closures may become backwater zones or wetlands, trapping fine sediments during flood events. Flows in the main channel may deepen, with a corresponding coarsening of the bed material and corresponding increase in sediment transport. Vanes have similar effects to those described above for *Deflection Structures*; however, the magnitude of scour and deposition diminishes, compared to conventional deflection structures. Snagging and clearing reduce local turbulence, decrease local scour and deposition, but increase overall sediment transport capacity for a stream reach.

Impacts on sediment transport through the design reach

Stabilization measures are intended to reduce sediment yield from an eroding bank. Many temporarily affect sediment transport through a design reach, while others promote deposition or scour. Sediment transport is also determined by upstream sediment yield in areas beyond the influence of the stabilization measures. Streams generally adjust to the changes imparted by stabilization and reestablish sediment continuity through a design reach in time. Many analytical tools exist for estimating sediment transport capacity. Determination can be made by direct measurement or by capacity analyses coupled with knowledge of sediment yield characteristics. Sediment transport impacts are presented in Table 4.

Table 4. Impacts on Sediment Transport

Category	Impacts
General	The only applicable generalization on the impacts of bank stabilization on sediment transport through a project reach is that, given sufficient time, streams normally reestablish sediment continuity through a reach modified by stabilization measures.
Armor Techniques	In general, the only limited effects of armor techniques on sediment transport are influencing change in resistance and reduced sediment yield from the eroding bank. Any impacts tend to be short-term, and the channel will reestablish continuity through the reach through slope adjustments and sorting processes.
Deflection Techniques	Deflection techniques generally have only limited effects on sediment transport beyond the change in resistance, alterations to secondary currents and turbulence, and the reduction of sediment yield from the eroding bank. Like armor techniques, impacts tend to be short-term (especially in braided systems), and the channel will reestablish continuity through the reach through slope adjustments and sorting processes.

Table 4. (continued)

Category	Impacts
Slope Stabilization Techniques	Slope stabilization techniques, in general, have only limited effects on sediment transport beyond influencing change in resistance and the reduction of sediment yield from the eroding bank. Any impacts tend to be short-term, and the channel will reestablish continuity through the reach through slope adjustments and sorting processes.
Energy Reduction Techniques	Energy reduction techniques generally reduce velocity, shear stress and stream power, three surrogate measures for sediment transport. Channel blocks and grade control structures reduce sediment transport through a reach and induce local sediment deposition. In time, continuity may be reestablished, depending on sediment yield and the characteristics of the stream and structure. Clearing and snagging reduce only turbulent velocity, while mean channel velocity, power, and shear stress generally increase slightly. Removing debris obstructions can thus increase sediment transport capacity through a reach. Vanes, which are intended to reduce secondary velocities, have the effect of reducing secondary sediment transport, generally a minor transport component usually offset by an increase in longitudinal transport. Measures that don't affect or increase sediment transport: - Clearing and snagging and vanes Measures with potential to decrease sediment transport capacity: - Grade control and channel block structures

Length of the stream reach impacted by specific structure type

Channel slope is the primary determinant in defining length of stream reach impacted by stabilization measures (Table 5). Techniques that realign the channel or adjust the planform also tend to impact farther up- or downstream than techniques that are employed within the existing channel geometry. Streams with highly erodible beds and banks are most sensitive to change. Impacts on these systems are more widely distributed than are relatively erosion-resistant streams. The extent of impacts can be limited by geologic or anthropogenic controls and tend to be localized unless they modify the energy gradient or significantly alter the cross section.

Table 5. Length of Stream Reach Impacted

Category	Impacts
General	No generalization can be made regarding the stream lengths that bank stabilization impacts, except to note that the length is very closely related to the channel slope and bed material composition. Impact lengths are greatest over low-gradient streams and streams with sand beds. Impact lengths are least on steep-gradient streams, streams with erosion-resistant bed materials, and streams with controls.

Table 5. (continued)

Category	*Impacts*
Armor Techniques	Armoring techniques seldom affect the channel more than a few feet up- or downstream of the project extents. Erosion may persist downstream from an improperly terminated armor structure, and the local scour and increased local velocities can accelerate and exacerbate this erosion. Armor structures rarely impact areas of the channel more than one half a meander wavelength up- or downstream (for a meandering stream) or more than two channel widths up- or downstream (for a braided stream). Sediment transport models could be applied to evaluate up- and downstream extents of impacts as they relate to hydraulic or sediment transport variables. No models exist for the prediction or quantification of impacts to up- or downstream bank erosion. Measures with potential to affect areas outside the zones defined above: - Armor devices that constrict the channel to the extent that contraction scour occurs completely across the section, which could induce a nick point that travels farther upstream. - Any armor that protects a bank that was a significant sediment source for the channel could result in increased or accelerated bed or bank erosion downstream.
Deflection Techniques	Deflectors create a greater number of and more substantial local impacts than do armor techniques. The potential for cumulative impacts of greater spatial extent is higher from some of these measures than for armor techniques. Impacts from deflectors that significantly alter flow fields generally persist for one bendway (one half a meander wavelength) up- or downstream for a meandering stream) or about four channel widths downstream and one or two widths upstream for a braided stream. Though hydraulic and sediment transport modeling could be applied to assess the sensitivity of a system to up- and downstream perturbations from deflectors, the accuracy of impact quantification would be highly suspect. In general, greater impacts to the flow field yield greater up- and downstream impacts.
Slope Stabilization Techniques	Slope stabilization techniques seldom affect the channel more than a few feet up- or downstream of the project extents. Erosion may persist downstream from an improperly terminated structure, and the local scour and increased local velocities can accelerate and exacerbate this erosion. Rarely will a structure impact areas of the channel farther than one half a meander wavelength up- or downstream (for a meandering stream) or more than two channel widths up- or downstream (for a braided stream). Measures with potential to affect areas outside the zones defined above: - Measures that constrict the channel to the extent that contraction scour occurs completely across the section. This could induce a nick point that travels further upstream. Any stabilization of a bank that was a significant sediment source for the channel could result in increased or accelerated bed or bank erosion downstream.

Table 5. (continued)

Category	Impacts
Energy Reduction Techniques	Energy reduction techniques tend to have the greatest spatial extent of all stabilization measures. Channel blocks can raise upstream water surface elevations and can dewater the entire downstream reach. Grade control structures also modify the slope of the channel, raising water levels and decreasing velocity and sediment transport upstream. They can also trap sediments and induce downstream degradation. Impacts from clearing and snagging operations tend to be limited to the local area and the area upstream to where the backwater reductions no longer persist. They seldom affect downstream reaches beyond one half a meander wavelength up- or downstream (for a meandering stream) or more than two channel widths up- or downstream (for a braided stream). Impacts from vanes are comparable to those described above for deflector structures. Methods to quantify impacts to water surface elevations, velocities and sediment transport in up- and downstream reaches are straightforward for energy reduction measures and generally consist of backwater and sediment transport analyses. An exception is the impact of vanes, which has not been adequately studied at this time.

Summary

Streambank stabilization affects many of the structural characteristics and functions of a stream. These impacts can often be viewed as either adverse or beneficial, depending upon the perspective of the individual assigning values to the system.

The prevailing philosophy in ecosystem management is that physical alterations of the structure and character of an ecosystem are most significant if they also impact process-based functions.

Distinctions among various bank stabilization measures can be made on the basis of 1) how they work, 2) the materials used, 3) their geometry and position in the landscape, and (in some cases), 4) the character of the stream system to which they are applied.

The geometry and position of a structure can influence its function and impact. The nature and extent of impact depend also upon the character of the stream and riparian system. The various materials, design, and construction methods used for a particular stabilization measure can result in a wide range of positive and adverse environmental impacts. Through proper planning and design, negative impacts can be minimized and positive impacts maximized.

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JAN 1 9 2001

LEAST BELL'S VIREO SURVEY GUIDELINES

The following suggested guidelines are provided to facilitate accurate assessments of the presence/absence of the State and federally endangered least Bell's vireo (*Vireo bellii pusillus*, vireo), to provide the Fish and Wildlife Service with sufficient information to adequately respond to requests for applicable Federal permits and licenses, and to fulfill our mandate to conserve and recover the species. Currently, a recovery permit pursuant to section 10(a)(1)(A) of the Endangered Species Act is not required to conduct presence/absence surveys for the vireo, as long as this protocol is utilized and vocalization tapes are not used. These guidelines include minor modifications to our February 1992 guidelines and provide clarification of what we have been verbally recommending.

1. Under normal circumstances, all riparian areas and any other potential vireo habitats should be surveyed at least eight (8) times during the period from April 10 to July 31. However, we may concur, on a case by case basis, with a reduced effort if unusual circumstances dictate that this is a prudent course of action. For instance, intensive surveys of small, marginal or extralimital habitats by experienced personnel may well result in defensible conclusions that eight (or more) individual survey are unnecessary. Under such unusual circumstances, we will consider requests for reductions in the prescribed number of individual surveys. In any case, site visits should be conducted at least 10 days apart to maximize the detection of, for instance, late and early arrivals, females, particularly "non vocal" birds of both sexes, and nesting pairs.

2. Although the period from April 10 to July 31 encompasses the period during which most vireo nesting activity occurs, eight surveys are generally sufficient to detect most (if not all) vireo adults in occupied habitats. Precise vireo censuses and estimations of home range likely will not be possible unless surveys are conducted outside of this time window. Although focused surveys conducted in accordance with these guidelines substantially reduce the risk of an unauthorized take* that could potentially occur as a result of land development or other projects, individual project proponents may wish to conduct surveys that are more rigorous than those that would otherwise result from strict adherence to these survey guidelines. If additional information (e.g., extent of occupied habitat, total numbers of adult and juvenile vireos in study area) is desired or necessary, surveys should be extended to August 31 and conducted in such a manner as to collect the data necessary to prepare reports that reflect the methods and standards established in the current scientific literature on this subject. In particular, information collected after July

15 will reflect a broader extent to the riparian habitat and other adjacent habitat types that the vireo typically utilizes during the latter phase of the breeding season, especially when the young become independent of the adults.

3. Surveys should be conducted by a qualified biologist familiar with the songs, whisper songs, calls, scolds, and plumage characteristics of adult and juvenile vireos. These skills are essential to maximize the probability of detecting vireos and to avoid potentially harassing the species in occupied habitats.

4. Surveys should be conducted between dawn and 11:00 a.m. Surveys should not be conducted during periods of excessive or abnormal cold, heat, wind, rain, or other inclement weather that individually or collectively may reduce the likelihood of detection.

5. Surveyors should not survey more than 3 linear kilometers or more than 50 hectares of habitat on any given survey day. Although surveyors should generally station themselves in the best possible locations to hear or see vireos, care should be taken not to disturb potential or actual vireo habitats and nests or the habitat of any sensitive or listed riparian species.

6. All vireo detections (e.g., vocalization points, areas used for foraging, etc.) should be recorded and subsequently plotted to estimate the location and extent of habitats utilized. These data should be mapped on the appropriate USGS quadrangle map.

7. Data pertaining to vireo status and distribution (e.g., numbers and locations of paired or unpaired territorial males, ages and sexes of all birds encountered) should be noted and recorded during each survey. In addition, surveyors should look for leg bands on vireo adults and juveniles if, in fact, it is possible to do so without disturbing or harassing the birds. If leg bands or other markers are observed, then surveyors should record and report the detection and associated circumstances to us by telephone, facsimile, or electronic mail as soon as possible. Reports should include the colors and relative locations of any and all bands detected, the age and sex of the marked bird, and the precise location of the detection.

8. The numbers and locations of all brown-headed cowbirds (*Molothrus ater*) detected within vireo territories should be recorded during each survey and subsequently reported to us. In addition, all detections of the State and federally endangered southwestern willow flycatcher (*Empidonax trallii extimus*, flycatcher) and State endangered yellow-billed cuckoo (*Coccyzus americanus*, cuckoo) should be recorded and reported. Any and all cuckoo and flycatcher adults, young, or nests should not be approached, and taped vocalizations of these species should not be used unless authorized in advance by scientific permits to take* issued by us (if appropriate) and the California Department of Fish and Game. Flycatcher presence/absence surveys require a recovery permit issued by us per section 10(a)(1)(A) of the Endangered Species Act.

9. To avoid the potential harassment of vireos, flycatchers, and cuckoos resulting from vireo surveys, other riparian species survey efforts, or multiple surveys within a given riparian habitat patch, detections of these three species should be reported to us as soon possible by telephone, facsimile, or electronic mail.

10. A final report (including maps) should be prepared that depicts survey dates and times and includes descriptions or accounts of the methods, locations, data and information identified in preceding sections.

11. This final report should be provided to us (at the letterhead address) and to the local office of the Department of Fish and Game within 45 calendar days following the completion of the survey effort. Additionally, a summary of all vireo survey efforts conducted during the calendar year should be submitted to each of the above offices by January 31 of the following year.

Should you have data or information to report, or have any questions regarding these survey guidelines, please contact Christine Moen (christine_moen@fws.gov), or Loren Hays (loren_hays@fws.gov) of my staff at (760) 431-9440 (facsimile 760-431-9624), or John Gustafson (jgustafs@hq.dfg.ca.gov) with the Department of Fish and Game at (916) 654-4260 (facsimile 916-653-1019).

Sincerely,

Andrew R. Green

Ken S. Berg
Acting Field Supervisor

* The term "take," as defined in Section 3, paragraph 18 of the Endangered Species Act of 1973 as amended (Act), means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in any such conduct. "Take" (specifically "harass") is further defined to mean "an act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns, which include, but are not limited to, breeding, feeding, and sheltering" "Take" (specifically "harm") is further defined as an "act which actually kills or injures wildlife. Such act may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavior patterns, including breeding feeding or sheltering" (50 CFR 17.3). Please be advised that the take of the vireo and other listed species is prohibited by section 9 of the Act unless authorized by permits issued pursuant to section 7 or section 10 to the Act.

Office of Governor
Edmund G. Brown Jr.
Visit his Website

Revised Total Maximum Daily Loads for Indicator Bacteria, Project I – Twenty Beaches and Creeks in the San Diego Region (Including Tecolote Creek) (updated 07/25/10)

Public Documents | REC-1 Triennial Review Project

Introduction

On February 10, 2010 the San Diego Water Board adopted Resolution No. R9-2010-0001, an amendment incorporating Revised Bacteria TMDLs Project I into the San Diego Basin Plan. This TMDL Basin Plan amendment was subsequently approved by the State Water Resources Control Board on December 14, 2010, the Office of Administrative Law (OAL) on April 4, 2011, and the United States Environmental Protection Agency (USEPA) on June 22, 2011. Under state law, this TMDL Basin Plan Amendment became fully effective on April 4, 2011, the date of OAL approval.

Adoption of these TMDLs meets the requirements of Clean Water Act section 303(d). The Basin Plan amendment process is authorized under Water Code section 13240 and is subject to the California Environmental Quality Act (CEQA).

Background

Fecal bacteria originate from the intestinal biota of warm-blooded animals, and their presence in surface water is used as an indicator of human pathogens. Pathogens can cause illness in recreational water users. Bacteria have been historically used as indicators of human pathogens because they are much easier and less costly to measure than the pathogens themselves.

According to section 303(d)(1)(A), "Each state shall identify those waters within its boundaries for which the effluent limitations…are not stringent enough to implement any water quality standard (WQS) applicable to such waters." The Clean Water Act also requires states to establish a priority ranking of Water Quality Limited Segments and to establish Total Maximum Daily Loads (TMDLs) for such waters. The purpose of a TMDL is to restore and protect the beneficial uses of an impaired waterbody. A TMDL is defined as the sum of the individual wasteload allocations (WLAs) for point sources and load allocations (LAs) for nonpoint sources and natural background. TMDLs must be established at levels necessary to attain and maintain the applicable narrative and numerical water quality standards with seasonal variations and a margin of safety which takes into account any lack of knowledge between effluent limitations and water quality. In summary, a TMDL represents a strategy to restore an impaired waterbody so the water quality can once again meet applicable water quality standards.

In late 2003, when this project was first initiated, the 2002 Clean Water Act Section 303(d) List of Water Quality Limited Segments (CWA section 303(d) List) indicated that the most common cause of impairments to waters in the San Diego Region was elevated bacteria levels. Accordingly, the San Diego Water Board identified waterbodies with bacteria impairments as one of its highest regional priorities for TMDL development and commenced work on this project. Although later withdrawn from State Board consideration and revised, the first bacteria TMDL project known as Total Maximum Daily Loads for Indicator Bacteria, Project I - Beaches and Creeks in the San Diego Region (Bacteria TMDLs Project I) was adopted by the San Diego Water Board on December 12, 2007. For historical references purposes only, copies of the documents adopted for the Bacteria TMDLs Project I are available at the end of the Public Documents section below. On December 17, 2008 the San Diego Water Board withdrew the Bacteria TMDLs Project I from State Water Board

consideration to address several issues. In addition to significant revisions, bacteria TMDLs for an additional waterbody, Tecolote Creek, were also incorporated into the project. The project was re-released to the public as Revised Total Maximum Daily Loads for Indicator Bacteria, Project I - Twenty Beaches and Creek in the San Diego Region (Including Tecolote Creek), hereafter referred to as Revised Bacteria TMDLs Project I.

REVISED BACTERIA TMDLS PROJECT I

On February 10, 2010 the San Diego Water Board adopted Resolution No. R9-2010-0001, an Amendment to the Water Quality Control Plan for the San Diego Region to Incorporate the Revised Total Maximum Daily Loads for Indicator Bacteria, Project I - Twenty Beaches and Creeks in the San Diego Region (Including Tecolote Creek). This TMDL Basin Plan amendment was subsequently approved by the State Water Resources Control Board on December 14, 2010, the Office of Administrative Law (OAL) on April 4, 2011, and the United States Environmental Protection Agency (USEPA) on June 22, 2011. Under state law, this TMDL Basin Plan became fully effective on April 4, 2011, the date of OAL approval.

As can be seen from the USEPA 2010 approved CWA section 303(d) List, elevated bacteria levels remain the most common cause of impairment to waters in the San Diego Region. Copies of the documents adopted for the Revised Bacteria TMDLs Project I are available in the Public Documents section below.

CONTACT INFORMATION

Any questions or comments regarding Revised Bacteria TMDLs Project I may be sent to Ms. Cynthia Gorham at 619-521-3921, or email at Cynthia.Gorham@waterboards.ca.gov.

PUBLIC DOCUMENTS (ALL DOCUMENTS ARE PDF FORMAT UNLESS OTHERWISE NOTED)

Revised Bacteria TMDLs Project I Documents (This Basin Plan amendment is currently in effect)

- State Water Resources Control Board Resolution No. 2010-0064
- Resolution No. R9-2010-0001 and Basin Plan Amendment (adopted February 10, 2010)
- Final Technical Report - (dated February 10, 2010)
  - Appendix A - Peer Review
  - Appendix B - Tentative Resolution and Draft Basin Plan Amendment
  - Appendix C - What are Indicator Bacteria?
  - Appendix D - Bacteria-Impaired Waterbodies Addressed in the TMDLs
  - Appendix E - Maps of Impaired Watersheds
  - Appendix F - Water Quality Objectives for Indicator Bacteria
  - Appendix G - Data Sources
  - Appendix H - Shoreline Bacteria Data Water Quality Objectives Exceedance Analysis
  - Appendix I - Methodology for Calculating TMDLs for Impaired Beaches and Creeks and Allocating to Sources
  - Appendix J - Wet Weather Model Configuration, Calibration and Validation
  - Appendix K - Dry Weather Model Configuration, Calibration and Validation
  - Appendix L - Assumptions
  - Appendix M - Wet Weather Model Hydrology, Calibration, and Validation Summary Statistics
  - Appendix N - Comparison of Wet Weather Modeling Results to Observed Densities
  - Appendix O - Wet Weather Interim Period Bacteria Load Duration Curves
  - Appendix P - Recommended Components for Bacteria and Comprehensive Load Reduction Plans
  - Appendix Q - Small MS4s in the Revised Bacteria TMDL Project I Watersheds

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- Appendix R - Environmental Analysis and Checklist
- Appendix S - Responses to Comments
- Appendix T - Comparison of 2002, 2006, and 2008 303(d) Listings Included in Revised Bacteria TMDLs Project I
- Appendix U - Responses to Comments II
- Appendix V - Responses to Comments III

- Notice of Public Hearing (dated November 25, 2009)

Bacteria TMDLs Project I Withdrawn Documents (Provided for historical reference purposes only)

- Withdrawal Request (dated December 17, 2008)
- Resolution No. R9-2007-0044 & Basin Plan Amendment (adopted December 12, 2007)
- Final Technical Report (dated December 12, 2007)
  - Appendix A - Peer Review
  - Appendix B - Resolution and Basin Plan Amendment
  - Appendix C - What are Indicator Bacteria?
  - Appendix D - Bacteria-Impaired Waterbodies Addressed in the TMDLs
  - Appendix E - Maps of Impaired Watersheds
  - Appendix F - Water Quality Objectives for Indicator Bacteria
  - Appendix G - Data Sources
  - Appendix H - Shoreline Bacteria Data Water Quality Objectives Exceedance Analysis
  - Appendix I - Methodology for Calculating TMDLs for Impaired Beaches and Creeks and Allocating to Sources
  - Appendix J - Wet Weather Model Configuration, Calibration and Validation
  - Appendix K - Dry Weather Model Configuration, Calibration and Validation
  - Appendix L - Assumptions
  - Appendix M - Wet Weather Model Hydrology, Calibration, and Validation Summary Statistics
  - Appendix N - Comparison of Wet Weather Modeling Results to Observed Densities
  - Appendix O - Wet Weather Interim Period Bacteria Load Duration Curves
  - Appendix P - Wet Weather Final Bacteria Load Duration Curves
  - Appendix Q - Small MS4s in the Project I Watersheds
  - Appendix R - Environmental Analysis and Checklist
  - Appendix S - Responses to Comments
  - Appendix T - Unimpaired Beaches
  - Appendix U - Response to Comments II

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The California Water Boards include the State Water Resources Control Board and nine Regional Boards
The State Water Board is one of five environmental entities operating under
the authority of the California Environmental Protection Agency
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Apartment Assn. of Los Angeles County, Inc. v. City of Los Angeles (2001)

Annotate this Case

[No. S082645. Jan. 8, 2001.]

APARTMENT ASSOCIATION OF LOS ANGELES COUNTY, INC., et al., Plaintiffs and Appellants, v. CITY OF LOS ANGELES, Defendant and Respondent.

(Superior Court of Los Angeles County, No. BC195216, Charles W. McCoy, Jr., Judge.)

(The Court of Appeal, Second Dist., Div. One, No. B130243.)

(Opinion by Mosk, J., with George, C. J., Kennard, Werdegar, and Chin, JJ., concurring. Dissenting opinion by Brown, J., with Baxter, J., concurring (see p. 845).)

COUNSEL

California Apartment Law Information Foundation, Trevor Grimm and Craig Mordoh for Plaintiffs and Appellants.

Sharon L. Browne and Stephen R. McCutcheon, Jr., for Pacific Legal Foundation as Amicus Curiae on behalf of Plaintiffs and Appellants.

James K. Hahn, City Attorney, Pedro B. Echeverria, Chief Assistant City Attorney, Ronald Tuller,

Assistant City Attorney, and Miguel A. Dager, Deputy City Attorney, for Defendant and Respondent.

Hart, King & Coldren, Robert S. Coldren and C. William Dahlin for Western Manufactured Housing Communities Association as Amicus Curiae on behalf of Defendant and Respondent.

Gibson, Dunn & Crutcher, James P. Clark, Joel M. Tantalo; Western Center on Law & Poverty, Richard Rothschild; Bet Tzedek Legal Services and Lauren Saunders for the Los Angeles Blue Ribbon Citizens' Committee on Slum Housing, Bet Tzedek Legal Services, the Inner City Law Center, Los Angeles Center for Law and Justice, Legal Aid Foundation of Los Angeles, Legal Services of Northern California, Los Angeles Housing Law Project, Public Counsel, San Fernando Valley Neighborhood Legal Services, Western Center on Law and Poverty, Esperanza Community Housing Corporation, Southern California Association of Non-Profit Housing, Southern California Mutual Housing Association, the Coalition for Economic Survival, Inquilinos Unidos, the St. Francis Center, the Fair Housing Congress of Southern California and SEIU Local 347 as Amici Curiae on behalf of Defendant and Respondent.

Richard Doyle, City Attorney (San Jose), George Rios, Assistant City Attorney, and Robert Fabela, Deputy City Attorney, for the City of San Jose, 89 Additional California Cities, the California State Association of Counties and the California Association of Sanitation Agencies as Amici Curiae on behalf of Defendant and Respondent. **[24 Cal. 4th 833]**

OPINION

MOSK, J.-

We granted review to decide whether a city ordinance imposing an inspection fee on private landlords violates article XIII D of the California Constitution (article XIII D), added by initiative measure, Proposition 218, in 1996. We conclude that it does not.

In July 1998, the City of Los Angeles put into effect the Los Angeles Housing Code. It is codified as article 1 of chapter XVI of the Los Angeles Municipal Code (§ 161.101 et seq.). Later that month, plaintiffs sued the city for declaratory and injunctive relief, alleging that Los Angeles Municipal Code section 161.352, imposing an inspection fee on private landlords, is unenforceable because it was enacted without complying with section 6 of article XIII D. The city demurred. The trial court sustained the demurrer without leave to amend, finding that the fee was not subject to the constitutional requirements. It entered judgment for the city.

In its statement of decision, the trial court recognized that the inspection fee "appears arguably to fall within the wide range of assessments which Proposition 218 was apparently written to encompass." But it added, "In Pennell v. City of San Jose (1986) 42 Cal. 3d 365, 375 [228 Cal. Rptr. 726, **[24 Cal. 4th 834]** 721 P.2d 1111], the California Supreme Court held that a fee charged to cover the costs of operating San Jose's rent control ordinances, and not used to raise general revenue, is not subject to Article XIII A of the California Constitution. The City's ordinance here fits squarely within both the reason and rule of Pennell. The ordinance levies only property used for residential apartment rentals, and the

money is used only to pay for regulat[ing such] rentals to insure, among other things, that they do not degenerate into what is commonly called 'slum conditions.' The assessment is not imposed on all property ownersonly a subset of owners who rent apartments."

The Court of Appeal reversed, holding that the state constitutional provision invalidated the city ordinance. The court wrote: "There is nothing in Proposition 218 that exempts regulatory fees imposed on residential rental properties. It thus adds nothing to say, as does the City, that the fees are not 'imposed upon property owners in general, but only those who voluntarily engage in the business of renting, generate the risks of slum housing, and specially benefit from regular inspections as they contribute to the overall reputability and safety of the housing provided.' Quite plainly, Proposition 218 applies to any 'fee' or 'charge,' both of which are defined to mean 'any levy other than an ad valorem tax, a special tax, or an assessment, imposed by an agency upon a parcel or upon a person as an incident of property ownership, including a user fee or charge for a property-related service.' (Art. XIII D, § 2, subd. (e) ....) However well intentioned the City's program to abolish slum housing may be, we find it impossible to say that a fee imposed upon the owners of rental units so the City can locate and eradicate substandard housing is anything other than a user fee or charge for a property-related service." (Italics and fn. omitted.)

I.

A.

Section 161.102 of the Los Angeles Municipal Code states the reason for enacting the Los Angeles Housing Code: "It is found and declared that there exist in the City of Los Angeles substandard and unsanitary residential buildings and dwelling units the physical conditions and characteristics of which render them unfit or unsafe for human occupancy and habitation, and which conditions and characteristics are such as to be detrimental to or jeopardize the health, safety and welfare of their occupants and of the public.

"It is further found and declared that the existence of such substandard buildings as dwelling units threatens the physical, social and economic stability of sound residential buildings and areas, and of their supporting **[24 Cal. 4th 835]** neighborhood facilities and institutions; necessitates disproportionate expenditures of public funds for remedial action; impairs the efficient and economical exercise of governmental powers and functions; and destroys the amenity of residential areas and neighborhoods and of the community as a whole."

Los Angeles Municipal Code section 161.301, entitled Scope, declares that the Los Angeles Housing Code applies to "all residential rental properties with two or more dwelling units on the same lot, the land, buildings and structures appurtenant thereto," but not to owner-occupied units, on-campus dormitory housing, hotels, motels, or certain other types of housing also specifically exempted.

Division 3.5 of the Los Angeles Housing Code (§ 161.351 et seq.) is entitled Housing Inspection Fees. Section 161.351 limits the scope of division 3.5 to "residential rental properties with two or more dwellings

subject to the provisions of this Code." Those properties "will be subject to regular inspection by the General Manager or an authorized representative. Inspections may also be complaint-based." (Ibid.)

Section 161.352 of the Los Angeles Municipal Code, at issue here, sets forth the inspection fee schedule. It provides, in its entirety: "Owners of all buildings subject to inspection shall pay a service fee of $12.00 per unit per year. The fee will be used to finance the cost of inspection and enforcement by the Housing Department. Should the owner fail to pay the required fee, the City of Los Angeles will recover it, plus accrued interest, utilizing any remedies provided by law including nuisance abatement or municipal tax lien procedures established by ordinance or state law. This fee shall be known as the 'Systematic Code Enforcement Program Fee.' " (Ibid., boldface omitted.)

B.

In November 1996 the voters approved Proposition 218, the Right to Vote on Taxes Act. (Ballot Pamp., Gen. Elec. (Nov. 5, 1996) text of Prop. 218, § 1, p. 108; reprinted as Historical Notes, 2A West's Ann. Cal. Const. (2001 supp.) foll. art. XIII C, § 1, p. 33.) The proposition amended the California Constitution, adding article XIII D. Section 3, subdivision (a)(3) of article XIII D provides that, with certain exceptions not relevant here, "No tax, assessment, fee, or charge shall be assessed by any agency upon any parcel of property or upon any person as an incident of property ownership except: [¶] ... [¶] ... as provided by this article." An agency is a local or regional governmental entity. (Id., § 2, subd. (a); Cal. Const., art. XIII C, § 1, subd. (b).) **[24 Cal. 4th 836]**

Section 1 of article XIII D provides that it applies to "all assessments, fees and charges, whether imposed pursuant to state statute or local government charter authority." Fees and charges are defined in subdivision (e) of section 2 thereof. " 'Fee' or 'charge' means any levy other than an ad valorem tax, a special tax, or an assessment, imposed by an agency upon a parcel or upon a person as an incident of property ownership, including a user fee or charge for a property-related service." (Ibid.)

"Property-related service" is further defined. It "means a public service having a direct relationship to property ownership." (Art. XIII D, § 2, subd. (h).)

Thus, and in summary, article XIII D applies, with certain exceptions not relevant here, to "any levy ... upon a parcel or upon a person as an incident of property ownership, including a user fee or charge for a property-related service." (Art. XIII D, § 2, subd. (e).) As will appear, the outcome of this case turns on the meaning of this language.

C.

[1] Before us is "a question of law for the appellate courts to decide on independent review of the facts." (Sinclair Paint Co. v. State Bd. of Equalization (1997) 15 Cal. 4th 866, 874 [64 Cal. Rptr. 2d 447, 937 P.2d 1350].) Though our reasoning turns on the language of the constitutional stricture, it may be helpful to explain, as did the Court of Appeal in Howard Jarvis Taxpayers Assn. v. City of Riverside (1999) 73 Cal. App. 4th 679 [86 Cal. Rptr. 2d 592] (Howard Jarvis), the reasons that led to placing Proposition 218

on the ballot.

[2a] "Proposition 218 can best be understood against its historical background, which begins in 1978 with the adoption of Proposition 13. 'The purpose of Proposition 13 was to cut local property taxes. [Citation.]' [Citation.] Its principal provisions limited ad valorem property taxes to 1 percent of a property's assessed valuation and limited increases in the assessed valuation to 2 percent per year unless and until the property changed hands. (Cal. Const., art. XIII A, §§ 1, 2.)

"To prevent local governments from subverting its limitations, Proposition 13 also prohibited counties, cities, and special districts from enacting any special tax without a two-thirds vote of the electorate. (Cal. Const., art. XIII A, § 4; Rider v. County of San Diego (1991) 1 Cal. 4th 1, 6-7 [2 Cal. Rptr. 2d 490, 820 P.2d 1000].) It has been held, however, that a special assessment is not a special tax within the meaning of Proposition 13. (Knox v. City of **[24 Cal. 4th 837]** Orland (1992) 4 Cal. 4th 132, 141 [14 Cal. Rptr. 2d 159, 841 P.2d 144], and cases cited.) Accordingly, a special assessment could be imposed without a two-thirds vote.

"In November 1996, in part to change this rule, the electorate adopted Proposition 218, which added articles XIII C and XIII D to the California Constitution. Proposition 218 allows only four types of local property taxes: (1) an ad valorem property tax; (2) a special tax; (3) an assessment; and (4) a fee or charge. (Cal. Const., art. XIII D, § 3, subd. (a)(1)-(4); see also [id.], § 2, subd. (a).) It buttresses Proposition 13's limitations on ad valorem property taxes and special taxes by placing analogous restrictions on assessments, fees, and charges." (Howard Jarvis, supra, 73 Cal. App. 4th 679, 681-682.)

D.

[3a] The Court of Appeal explained the parties' differing views of the effect of article XIII D on the city ordinance. "As viewed by [plaintiffs], the fee is imposed 'upon a parcel or upon a person as an incident of property ownership' and is, therefore, subject to the procedural requirements of Proposition 218. As viewed by the City, the fee is imposed upon a business activity (the rental of residential dwellings), separate and apart from property ownership, and purely for regulatory purposes, and it is therefore not subject to Proposition 218." (Italics omitted.)

Adhering before us to their point of view, plaintiffs contend that "nothing in Proposition 218 ... support[s] the contention that [it] was not meant to affect the ability of local governments to impose and collect business 'regulatory fees.' " The city also adheres to its position, devoting much of its briefing to an argument that because its inspection fee is a regulatory fee on business operations, it falls outside the purview of article XIII D. Examining the ballot arguments for and against Proposition 218 and the Legislative Analyst's analysis of the measure, the city also contends that article XIII D was intended only to restrict fees imposed directly on property owners in their capacity as such. A regulatory fee imposed on residential rental businesses, the city argues, necessarily falls outside article XIII D's ambit, even if the fee bears some relation to ownership of real property. fn. 1

As will appear, neither party is entirely correct. The relevant language of article XIII D does not compel a

conclusion in plaintiffs' favor; rather, it **[24 Cal. 4th 838]** compels the opposite. The city also misses the mark when it contends (or at least implies) that a regulatory fee or a levy on the operation of a business necessarily falls outside the scope of article XIII D.

But both parties are partly correct. Plaintiffs accurately state that the constitutional provision does not speak of regulatory fees or levies on business operations. Hence, the mere fact that a levy is regulatory (as this inspection fee clearly is) or touches on business activities (as it clearly does) is not enough, by itself, to remove it from article XIII D's scope. But the city is correct that article XIII D only restricts fees imposed directly on property owners in their capacity as such. The inspection fee is not imposed solely because a person owns property. Rather, it is imposed because the property is being rented. It ceases along with the business operation, whether or not ownership remains in the same hands. For that reason, the city must prevail.

II.

Section 2 of Proposition 218 stated the measure's purpose. "The people of the State of California hereby find and declare that Proposition 13 was intended to provide effective tax relief and to require voter approval of tax increases. However, local governments have subjected taxpayers to excessive tax, assessment, fee and charge increases that not only frustrate the purposes of voter approval for tax increases, but also threaten the economic security of all Californians and the California economy itself. This measure protects taxpayers by limiting the methods by which local governments exact revenue from taxpayers without their consent." (Ballot Pamp., Gen. Elec., supra, text of Prop. 218, § 2, p. 108; reprinted as Historical Notes, 2A West's Ann. Cal. Const., supra, foll. art. XIII C, § 1, p. 33.)

The repeated references to taxes and taxpayers suggest an intent to prohibit unratified exactions imposed on property owners as such, rather than on the business of renting or leasing apartmentsi.e., "residential rental properties with two or more dwellings" (L.A. Mun. Code, § 161.351).

[2b] As explained in Howard Jarvis, supra, 73 Cal. App. 4th 679, Proposition 218 is Proposition 13's progeny. Accordingly, it must be construed in that context. (People ex rel. Lungren v. Superior Court (1996) 14 Cal.4th **[24 Cal. 4th 839]** 294, 301 [58 Cal. Rptr. 2d 855, 926 P.2d 1042].) Specifically, because Proposition 218 was designed to close government-devised loopholes in Proposition 13, the intent and purpose of the latter informs our interpretation of the former. Proposition 13 was directed at taxes imposed on property owners, in particular homeowners. The text of Proposition 218, the ballot arguments (both in favor and against), the Legislative Analyst's analysis, and the annotations of the Howard Jarvis Taxpayers Association, which drafted Proposition 218, all focus on exactions, whether they are called taxes, fees, or charges, that are directly associated with property ownership.

[3b] The Legislative Analyst's analysis, printed in the November 1996 ballot pamphlet, is illustrative. It explained that Proposition 218 "would constrain local governments' ability to impose fees, assessments, and taxes," meaning "property-related" fees, including fees for water, sewer and refuse collection, but excluding gas and electricity charges (see Cal. Const., art. XIII D, § 3, subd. (b)) and development fees

(see id., § 1, subd. (b)). (Ballot Pamp., Gen. Elec., supra, Legis. Analyst's analysis, p. 73.) It did not refer to levies linked more indirectly to property ownership.

[2c] The ballot arguments for Proposition 218 are also illustrative. "Proposition 218 guarantees your right to vote on local tax increaseseven when they are called something else, like 'assessments' or 'fees' and imposed on homeowners." (Ballot Pamp., Gen. Elec., supra, argument in favor of Prop. 218, p. 76.) "After voters passed Proposition 13, politicians created a loophole in the law that allows them to raise taxes without voter approval by calling taxes 'assessments' and 'fees.' " (Ibid.) "There are now over 5,000 local districts which can impose fees and assessments without the consent of local voters. Special districts have increased assessments by over 2400% over 15 years. Likewise, cities have increased utility taxes 415% and raised benefit assessments 976%, a ten-fold increase." (Ibid.) "To confirm the impact of fees and assessments on you, look at your property tax bill. You will see a growing list of assessments imposed without voter approval. The list will grow even longer unless Proposition 218 passes." (Ibid.)

[3c] The ballot arguments identify what was perhaps the drafter's main concern: tax increases disguised via euphemistic relabeling as "fees," "charges," or "assessments." But in fairness to plaintiffs, it cannot be denied that the text of article XIII D does not limit its scope to taxes and taxpayers. We turn to the definitive language: restrictions on any levy imposed "upon a parcel or upon a person as an incident of property ownership." (Art. XIII D, § 2, subd. (e).)

The foregoing language means that a levy may not be imposed on a property owner as suchi.e., in its capacity as property ownerunless it **[24 Cal. 4th 840]** meets constitutional prerequisites. In this case, however, the fee is imposed on landlords not in their capacity as landowners, but in their capacity as business owners. The exaction at issue here is more in the nature of a fee for a business license than a charge against property. It is imposed only on those landowners who choose to engage in the residential rental business, and only while they are operating the business.

The contrary reasoning of the Court of Appeal, and of plaintiffs, stems from a reliance on the word "incident," leaving aside that the constitutional provision does not refer to fees imposed on an incident of property ownership, but on a parcel or a person as an incident of property ownership. As amicus curiae for the city persuasively argue, the distinction is crucial.

Were the principal words parcel and person missing, and were as replaced with on, so that article XIII D restricted the city's ability to impose fees "on an incident of property ownership," plaintiffs' argument might have merit. [4] For among the incidents fn. 2 of estates in land are the so-called bundle of rights that flow from such tenure. (31 C.J.S. (1996) Estates § 12, pp. 28-30; id., § 14, pp. 32, 34; id., § 31, p. 58.) Among them is the fundamental right to alienate one's property held in fee simple. (E.g., id., § 12, p. 30; Holien v. Trydahl (N.D. 1965) 134 N.W.2d 851, 856; Davis v. Geyer (1942) 151 Fla. 362, 369 [9 So. 2d 727, 728]; Hardy v. Galloway **[24 Cal. 4th 841]** (1892) 111 N.C. 519, 523 [15 S.E. 890]; see also Yee v. City of Escondido (1992) 503 U.S. 519, 528 [112 S. Ct. 1522, 1528-1529, 118 L. Ed. 2d 153].) That incident, or right, has been called "inseparable" (Holien, supra, 134 N.W.2d at p. 856; Hardy, supra, 15 S.E. at p. 890), "indispensable" (Dukes v. Crumpton (1958) 233 Miss. 611, 620 [103 So. 2d 385, 388]), and

"necessary" (Re Collier (Nfld. 1966) 60 D.L.R.2d 70, 75 [52 M.P.R. 211, 216] (per Puddester, J.)).

The power to alienate property or a property right is not limited to the right to sell or assign it. It means generally the power "to transfer or convey [it] to another." (Black's Law Dict., supra, p. 73, col. 1.) The conveyance need not be the whole fee. The right of alienation applies when fee holders seek to convey lesser estates. fn. 3 " '[T]he power or right of alienation' " " 'incident to the ownership of an estate in fee-simple' " " 'include[s] the power or right to dispose of property held in fee ... by lease, mortgage, or other mode of conveyance ....' " (Porter v. Barrett (1925) 233 Mich. 373, 379-380 [206 N.W. 532, 535], quoting Manierre v. Welling (1911) 32 R.I. 104, 140 [78 A. 507, 522], italics added here.)

[3d] Accordingly, if article XIII D restricted the city's ability to impose a "tax, assessment, fee, or charge on an incident of property ownership" (cf. id., §§ 2, subd. (e), 3), plaintiffs' argument might be persuasive. The business of renting apartments is an incident of owning them, an activity necessarily dependent on that ownership but not vice versa. One can own apartments without renting them, but no one can rent them without owning them. (See fn. 2, ante, at p. 840.) fn. 4

But the language of article XIII D is materially dissimilar. As stated, article XIII D, section 3 provides that " [n]o tax, assessment, fee, or charge **[24 Cal. 4th 842]** shall be assessed by any agency upon any parcel of property or upon any person as an incident of property ownership except ... [¶] ... [¶] ... as provided by this article." (See also id., § 2, subd. (e).) In other words, taxes, assessments, fees, and charges are subject to the constitutional strictures when they burden landowners as landowners. The ordinance does not do so: it imposes a fee on its subjects by virtue of their ownership of a businessi.e., because they are landlords. fn. 5 What plaintiffs ask us to do is to alter the foregoing languagechanging "as an incident of property ownership" to "on an incident of property ownership." But to do so would be to ignore its plain meaningnamely, that it applies only to exactions levied solely by virtue of property ownership. We may not interpret article XIII D as if it had been rewritten. (Accord, People ex rel. Lungren v. Superior Court, supra, 14 Cal. 4th 294, 301.)

The language of article XIII D, sections 2, subdivision (e), and 3, shows that it applies to levies imposed on a person or on property strictly as an incident of property ownership. Had the law included levies imposed on incidents of the ownership or use of residential real property (as relevant **[24 Cal. 4th 843]** here, the exercise of the right to rent one's property), its text would have said so. But it did not. And although the plain language of the relevant constitutional provisions requires us not to consider extrinsic evidence of the voters' intent, we reiterate, purely as an aside, that neither the ballot arguments nor the Legislative Analyst's analysis suggested that article XIII D was intended to encompass fees of the type at issue here.

The subordinate clause in section 2, subdivision (e), of article XIII D, as clarified in section 2, subdivision (h), supports our conclusion. It may be recalled that among the fees or charges covered by article XIII D, section 2, subdivision (e), is "a user fee or charge for a property-related service." Such a service "means a public service having a direct relationship to property ownership." (Id., § 2, subd. (h).) In this case, the relationship between the city's inspection fee and property ownership is indirectit is overlain by the

requirement that the landowner be a landlord. 009498

As stated, the foregoing clause is subordinate. It does not include all possible fees and charges that fall within the ambit of article XIII D.[5] **(See fn. 6.)** But it does provide additional evidence of the scope of the constitutional provision. fn. 6

[3e] At oral argument, plaintiffs emphasized article XIII D's exemptions for existing development fees and all charges to provide gas and electrical **[24 Cal. 4th 844]** service. (Art. XIII D, §§ 1, subd. (b), 3, subd. (b).) They assert that a developer fee is a fee on an incident of propertythe right to improve itand that there would have been no need to exempt such fees if other fees imposed on incidents of property did not fall within article XIII D's scope. Similarly, they argue that one can own property without having utility service, and that if article XIII D applied strictly to levies that are imposed solely on the basis of property ownership, there would have been no need to exempt such utility charges in the constitutional provision.

We note, however, that the provision regarding development fees refers only to those existing at the time of article XIII D's enactment. Moreover, it is unclear to us whether a fee to provide gas or electricity service is the same as a fee imposed on the consumption of electricity or gas. In any event, we believe that the aforementioned exemptions may have been included in an abundance of caution in case court interpretations of article XIII D similar to the Court of Appeal's should prevail. Finally, we do not believe that any incongruity can trump the plain language we have discussed herein. In short, we are unpersuaded.

Similarly unpersuasive is plaintiffs' contention, also emphasized at oral argument, that the city's ability to enforce payment of the inspection fee by imposing a lien on the property shows that the fee is property-related, not business-related. The fact is that the city is simply availing itself of all possible means to collect the fee. Property liens may be precipitated by at least one cause unconnected to land ownership (except ownership of the land on which the lien is imposed): the cost of removing graffiti. (Gov. Code, § 38772.) A lien may be imposed on parents' land to defray the cost of removing graffiti their child has scrawled on that belonging to another. (Id., subd. (b).)

Plaintiffs also advert to section 5 of Proposition 218, which requires that "[t]he provisions of this act shall be liberally construed to effectuate its purposes of limiting local government revenue and enhancing taxpayer consent." (Ballot Pamp., Gen. Elec., supra, text of Prop. 218, § 5, p. 109; reprinted as Historical Notes, 2A West's Ann. Cal. Const., supra, foll. art. XIII C, p. 33.) But "[l]iberal construction cannot overcome the plain language of Proposition 218 limiting [its] scope ... to [levies] based on real property." (Howard Jarvis Taxpayers Assn. v. City of San Diego (1999) 72 Cal. App. 4th 230, 237-238 [84 Cal. Rptr. 2d 804].) [6] As a rule, a command that a constitutional provision or a statute be liberally construed "does not license either enlargement or restriction of its evident meaning" (People v. Cruz (1974) 12 Cal. 3d 562, 566 [116 Cal. Rptr. 242, 526 P.2d 250]). Thus, **[24 Cal. 4th 845]** given that article XIII D's scope is, as we have explained, unambiguously limited to burdens on landowners as such, " 'no resort to this command [of liberal construction] is required' " (Howard Jarvis, supra, 73 Cal. App. 4th 679, 687, quoting Buhlert Trucking v. Workers' Comp. Appeals Bd. (1988) 199 Cal. App. 3d 1530, 1533, fn. 4 [247 Cal.Rptr.

190]) or even permitted. 009499

III.

The Court of Appeal's judgment is reversed.

George, C. J., Kennard, J., Werdegar, J., and Chin, J., concurred.

DISSENTING OPINION:

BROWN, J.-

I respectfully dissent.

Under the provisions of Proposition 218, affected property owners must approve the imposition of any new or increased fee, which is "any levy other than an ad valorem tax, a special tax, or an assessment, imposed by an agency upon a parcel or upon a person as an incident of property ownership, including a user fee or charge for a property-related service." (Cal. Const., art. XIII D, § 2, subd. (e) (article XIII D).) The dispositive determination in this case is whether a rental inspection fee is imposed "upon a person as an incident of property ownership." (Ibid.) To find that it is not, the majority concludes the Court of Appeal erroneously substituted "on" for "as." It is the majority that errs, however, in assuming "incident" denotes "the so-called bundle of rights that flow from [estates in land]." (Maj. opn., ante, at p. 840; see maj. opn., ante, at pp. 840-841.) In my view, the voters did not intend the courts to look any further than a standard dictionary in applying the terms of article XIII D.

"A constitutional amendment should be construed in accordance with the natural and ordinary meaning of its words. [Citation.]" (Amador Valley Joint Union High Sch. Dist. v. State Bd. of Equalization (1978) 22 Cal. 3d 208, 245 [149 Cal. Rptr. 239, 583 P.2d 1281]; People ex rel. Lungren v. Superior Court (1996) 14 Cal. 4th 294, 302 [58 Cal. Rptr. 2d 855, 926 P.2d 1042].) Nothing in the ballot arguments in favor of or against Proposition 218 or in the Legislative Analyst's analysis implies that a different rule should obtain with respect to "incident," or that the voters intended it to have other than a plain meaning. The dictionary defines an "incident" as "something incident to something else," that is, "dependent upon or involved in something else." (Webster's New World Dict. (3d college ed. 1988) p. 682; see also Black's Law Dict. (4th ed. 1968) p. 904, col. 2 ["Used as a noun, [incident] denotes anything which inseparably belongs to, or is connected with, or inherent in, another thing .... Also, less strictly, it denotes anything which is usually **[24 Cal. 4th 846]** connected with another, or connected for some purposes, though not inseparably"].) In other words, if the imposition of a fee depends upon one's ownership of property, it comes within the purview of article XIII D unless otherwise excepted.

The fee at issue here plainly meets this definition. Pursuant to its police powers, the City of Los Angeles (City) enacted a Housing Code (L.A. Mun. Code, § 161.101 et seq.), which provides that residential rental properties are subject to regular inspection for substandard and unsanitary conditions. Under the Housing Code, funding for these inspections devolves to a particular class of property owners, the landlords of the

rental units, who must pay a $12 fee for every unit owned. (Id., § 161.352.) fn. 1 As the majority 998500 acknowledges, "no one can rent [apartments] without owning them." (Maj. opn., ante, at p. 841; see also Nash v. City of Santa Monica (1984) 37 Cal. 3d 97, 105 [207 Cal. Rptr. 285, 688 P.2d 894].) And no one is subject to the rental inspection fee without owning them. This exaction is thus imposed "as an incident of property ownership" (art. XIII D, § 2, subd. (e)); that is, it is dependent upon such ownership. (Cf. Off. of Legis. Analyst, Understanding Proposition 218 (Dec. 1996) p. 30 ["Generally, we think these fees would be considered property-related if there were no practical way that the owner could avoid the fee, short of selling the property or fundamentally changing its use"].) Moreover, "[s]hould the owner fail to pay the required fee, the City of Los Angeles will recover it, plus accrued interest, utilizing any remedies provided by law including nuisance abatement or municipal tax lien procedures established by ordinance or state law." (L.A. Mun. Code, § 161.352.) The use of tax lien procedures is a typical enforcement mechanism for delinquent levies imposed against property.

The majority avoids this result in part by finding the City "imposes a fee on its subjects by virtue of their ownership of a businessi.e., because they are landlords." (Maj. opn., ante, at p. 842.) The last portion of this statement proves too much: Landlords are property owners. Imposition of the fee is an incident of, i.e., depends upon, that status and thereby runs afoul of article XIII D. As for the first portion of the statement, it ignores or disregards what the majority elsewhere concedes, that the business at issue is inseparable from property ownership. No amount of parsing can change that ineluctable fact. **[24 Cal. 4th 847]**

The majority also concludes "neither the ballot arguments nor the Legislative Analyst's analysis suggested that article XIII D was intended to encompass fees of the type at issue here." (Maj. opn., ante, at p. 843.) Ultimately, the terms of the measure as enacted control our interpretation (see Kopp v. Fair Pol. Practices Com. (1995) 11 Cal. 4th 607, 673 [47 Cal. Rptr. 2d 108, 905 P.2d 1248] (conc. opn. of Mosk, J.)); and their plain meaning does not support the majority's reasoning. But the ballot materials also belie the majority's conclusion. While those materials do not specifically mention rental inspection fees, such an intention is readily discernable from any fair reading. The Legislative Analyst warned generally that "[t]his measure would constrain local governments' ability to impose fees" and "[r]educe the amount of fees ... businesses pay." (Ballot Pamp., Gen. Elec. (Nov. 5, 1996), analysis of Prop. 218 by the Legis. Analyst, p. 73 (Ballot Pamphlet).) More particularly, the Legislative Analyst's list of "most likely fees and assessments affected by these provisions" (id. at p. 74) easily encompasses this type of exaction: "park and recreation programs, fire protection, lighting, ambulance, business improvement programs, library, and water service." (Ibid.) The argument in favor of Proposition 218 reminded the electorate that "[a]fter voters passed Proposition 13, politicians created a loophole in the law that allows them to raise taxes without voter approval by calling taxes 'assessments' and 'fees.' " (Ballot Pamp., supra, argument in favor of Prop. 218, p. 76.) "Proposition 218 guarantees your right to vote on local tax increaseseven when they are called something else, like 'assessments' or 'fees' ...." (Ibid.) The argument did not limit the type of "fee" that would be subject to a vote under article XIII D but instead promised, "Proposition 218 ... stops politicians' end-runs around Proposition 13." (Ballot Pamp., supra, rebuttal to argument against Prop. 218, p. 77.) Particularly in light of its timing, the City's rental inspection fee appears to be just the

kind of evasive maneuver at which proponents aimed Proposition 218. (See generally Huntington Park Redevelopment Agency v. Martin (1985) 38 Cal. 3d 100, 105 [211 Cal. Rptr. 133, 695 P.2d 220] [purpose, in part, of Prop. 13 was "to prevent the government from recouping its losses from decreased property taxes by imposing or increasing other taxes"].)

In this regard, the majority also fails to accord any significance to two important provisions of Proposition 218. In any action challenging imposition of a new or increased fee or charge, the initiative assigns to the agency "the burden ... to demonstrate compliance with this article" (art. XIII D, § 6, subd. (b)(5)), thereby reversing the usual deference accorded governmental action in such matters and making it more difficult to defend its legitimacy. (See Ballot Pamp., supra, analysis of Prop. 218 by the Legis. **[24 Cal. 4th 848]** Analyst, p. 74; see also art. XIII D, § 4, subd. (f) [imposing same burden for assessments].) The voters also expressly provided that Proposition 218 "shall be liberally construed to effectuate its purposes of limiting local government revenue and enhancing taxpayer consent." (Ballot Pamp., supra, text of Prop. 218, § 5, p. 109, also reprinted as Historical Notes, 2A West's Ann. Cal. Const. (2000 supp.) foll. art. XIII C, § 1, p. 25.) The majority's construction frustrates both these goals.

The City argues that conditioning imposition of its rental inspection fee on compliance with the procedures set forth in article XIII D would allow landlords to defeat regulation of their businesses. This argument misses two critical points: First and generally, since the City has decided its rental inspections are necessary to eradicate "substandard and unsanitary residential buildings and dwelling units the physical conditions and characteristics of which ... are such as to be detrimental to or jeopardize the health, safety and welfare of their occupants and of the public" (L.A. Mun. Code, § 161.102), it can reasonably expect the public to pay for the program.

Second and specifically, the Los Angeles Municipal Code already provides substantial enforcement authority to prosecute landlords who violate the City's Housing Code. If a property owner fails to correct violations, the City may recover its administrative as well as abatement costs (L.A. Mun. Code, § 161.206.2), may seek criminal penalties including fines and imprisonment (id., § 161.206.3), and may pursue civil remedies as provided in the Health and Safety Code (L.A. Mun. Code, § 161.206.4).

When the voters passed Proposition 13 in 1978, they sought to restrict the ability of government to impose taxes and other charges on property owners without their approval. For almost two decades, however, they witnessed politicians evade this constitutional limitation. The message of Proposition 218 is that they meant what they said. With the majority turning a deaf ear to that message, we may well expect a future effort to "stop[] politicians' end-runs around Proposition 13." (Ballot Pamp., supra, rebuttal to argument against Prop. 218, p. 77.)

Baxter, J., concurred.

FN 1. We have also received several amicus curiae briefs. Along with one of them is a request to judicially notice three purported local mobilehome park rent control ordinances and two other documents regarding that topic. The request is denied. The five documents have no bearing on the question before

us.

Amici curiae also include a printed discussion issued by the Legislative Analyst in December 1996 and entitled Understanding Proposition 218. This document contains material relevant to the question at bench, and we grant the request for judicial notice regarding it. (Evid. Code, §§ 452, subd. (c), 459, subd. (a).)

FN 2. Over time, "incident" has meant many things. As a noun, the meanings include the burden of the risk of a diminution of the value of real property during condemnation proceedings (Agins v. City of Tiburon (1980) 447 U.S. 255, 263, fn. 9 [100 S. Ct. 2138, 2143, 65 L.Ed.2d 106]), the " 'burdens and disabilities' " of slavery prohibited by the Thirteenth Amendment to the United States Constitution (Jones v. Mayer Co. (1968) 392 U.S. 409, 441 [88 S. Ct. 2186, 2204, 20 L.Ed.2d 1189]), or, in earlier times, the monetary obligations imposed by the king or a mesne lord (McPherson, Revisiting the Manor of East Greenwich (1998) 42 Am. J. Legal Hist. 35, 39; see also 2 Coke (1641) Institutes of the Lawes of England (Butler & Hargrave's Notes ed.) 69a, § 95, fn. 7). And, in a more general sense, the meanings of "incident" include benefits or duties that appertain to some greater right or interest, i.e., the principal. (Civ. Code, §§ 662, 1084, 3540; Owsley v. Hamner (1951) 36 Cal. 2d 710, 716-717 [227 P.2d 263, 24 A.L.R.2d 112]; Fender v. Waller (1941) 139 Neb. 612, 616 [298 N.W. 349, 351]; Harris v. Elliott (1836) 35 U.S. (10 Pet.) 25, 54 [9 L. Ed. 333].) In its fourth edition (1897), Bouvier's Law Dictionary defined "incident" as a term "used both substantively and adjectively of a thing which, either usually or naturally and inseparably depends upon, appertains to, or follows another that is more worthy. For example, ... the right of alienation is necessarily incident to a fee-simple at common law ...." (Id. at p. 1006, col. 1.) Many cases have followed the Bouvier's Law Dictionary definition, or ones similar to it. (E.g., Watts v. Copeland (1933) 170 S.C. 449, 452 [170 S.E. 780]; Moccasin State Bank v. Waldron (1928) 81 Mont. 579, 586 [264 P. 940].) "Thus, timber trees are incident to the freehold, and so is a right of way." (In re Estate of Bellesheim (N.Y. Surr. 1888) 1 N.Y.S. 276, 278 [dictum]; accord, Harris v. Elliott, supra, 35 U.S. (10 Pet.) at p. 54 [9 L.Ed. at p. 344] [easements]; Black's Law Dict. (7th ed. 1999) p. 765, col. 1 ["the utility easement is incident to the ownership of the tract"].)

FN 3. It is, of course, axiomatic in Anglo-American law that ownership of real property in fee simple absolute is the greatest possible estate (1 Coke (1628) Institutes of the Lawes of England (Butler & Hargrave's Notes ed.) 18a, § 11), and among the panoply of lesser estates are such nonfreehold chattels real as leases for a specific term and periodic tenancies (Pacific Southwest Realty Co. v. County of Los Angeles (1991) 1 Cal. 4th 155, 162 [2 Cal. Rptr. 2d 536, 820 P.2d 1046])in common parlance, rentals or leases of limited duration. (1 Tiffany, The Law of Real Property (3d ed. 1939) § 76, pp. 112-113; Wilgus v. Commonwealth (1873) 72 Ky. (9 Bush.) 556, 557 [1873 WL 6660], citing 2 Blackstone, Commentaries 143 [" 'An estate for years in land is regarded in law as inferior to an estate for life or an inheritance' "]; Brydges v. Millionair Club (1942) 15 Wash. 2d 714, 719 [132 P.2d 188, 190]; see also Williams v. R. R. (1921) 182 N.C. 267, 272 [108 S.E. 915, 918].)

FN 4. In Acme Freight Lines v. City of Vidalia (1942) 193 Ga. 334 [18 S.E.2d 540] (Acme Freight), similar statutory language favored an analogous argumentthat a tax on an incident of the trucking business was

a tax on a trucking company's ancillary delivery business.

In Acme Freight, a trucking company sought an injunction against a city's practice of imposing a business tax on those ancillary operations. The firm relied on this law: " 'No subdivision of this State ... shall levy any excise, license, or occupation tax of any nature on ... any incidents of said motor carrier business, or on a motor common carrier.' " (Acme Freight, supra, 193 Ga. 334, 335 [18 S.E.2d 540, 541], italics added.)

The city, Vidalia, acknowledged "its lack of authority to levy any tax against the plaintiff in reference to its transportation of freight as a motor common carrier .... Justification for the tax is founded upon the fact that, in addition to the operation of trucks for the transportation of freight ..., the plaintiff carries on ... a 'pick-up and delivery service' in and around the city. The trial judge ruled that this 'is not a necessary incident to the operation of a common carrier,' and that as to it 'the plaintiff is not a motor common carrier, but is engaged in a special and distinct business in the City of Vidalia, and is taxable as such.' This formula interpolates before the word 'incidents,' used in the statute, the word 'necessary' so as to require, as a condition of tax immunity, that the operation be a necessary incident of the business of a motor common carrier. This appears to us to be erroneous. [Rather,] ... an incident of the business of a motor common carrier of freight would be something naturally associated as pertinent to such transportation and necessarily dependent upon it, but without which the business of transportation might nevertheless be carried on. In other words, the incidental operation would be necessarily dependent upon the transportation, but the business of transportation would not be necessarily dependent upon the incidental operation.... As we understand the evidence adduced in this case, the plaintiff's operations against which the tax is said to be levied is of the above-described character; and accordingly we conclude that the tax is illegal, and should have been enjoined." (Acme Freight, supra, 193 Ga. 334, 335-336 [18 S.E.2d 540, 541].)

FN 5. We acknowledge that landlords may rent because they wish to keep the property occupied in their absence, for philanthropic reasons, or to a family member for a nominal charge. Such arrangements are not rare, and may lie within the province of the ordinance, which refers to "residential rental properties." But even nonprofit or charitable purposes are business purposes under broad constructions of the term, and we believe that as long as the property is being rented for consideration, it is being conveyed for a business purpose. (Cf. Marin Municipal Water Dist. v. Chenu (1922) 188 Cal. 734, 738 [207 P. 251] [" 'business' " has "a narrower meaning applicable to occupation or employment for livelihood or gain, and to mercantile or commercial enterprises or transactions"].)

FN 6. We turn to discuss briefly the authorities on which the city chiefly relies. They consist of two cases: Sinclair Paint Co. v. State Bd. of Equalization, supra, 15 Cal. 4th 866; and Pennell v. City of San Jose (1986) 42 Cal. 3d 365 [228 Cal. Rptr. 726, 721 P.2d 1111] (affd. sub nom. Pennell v. San Jose (1988) 485 U.S. 1 [108 S. Ct. 849, 99 L.Ed.2d 1]). They are inapposite.

In Sinclair we held that an exaction on sources of lead contamination to remediate the effects of lead poisoning was a fee, not a tax. In Pennell, we held that a $3.75 charge on each residential rental unit,

imposed by a rent control ordinance to fund its hearing process, also was a fee, not a tax. In Sinclair and Pennell, we defined such fees, which are similar to the city's inspection charge, as regulatory in nature. Regulatory fees are those " ' "charged in connection with regulatory activities[,] which fees do not exceed the reasonable cost of providing services necessary to the activity for which the fee is charged and which are not levied for unrelated revenue purposes." ' " (Sinclair Paint Co. v. State Bd. of Equalization, supra, 15 Cal. 4th 866, 876, quoting Pennell v. City of San Jose, supra, 42 Cal. 3d 365, 375, in turn quoting Mills v. County of Trinity (1980) 108 Cal. App. 3d 656, 659-660 [166 Cal. Rptr. 674], bracketed material added here.)

We have stated that the city's inspection fee is a regulatory fee. And we have concluded that it does not fall within article XIII D's ambit. But Sinclair and Pennell do not concern themselves with the issue we confront here. Indeed, in Sinclair we cautioned that "We are not here concerned with issues arising under constitutional amendments effected by a recent initiative measure (Proposition 218) adopted at the November 5, 1996, General Election. That measure contains new restrictions on local agencies' power to impose fees and assessments." (Sinclair Paint Co. v. State Bd. of Equalization, supra, 15 Cal. 4th 866, 873, fn. 2.) In Pennell v. City of San Jose, supra, 42 Cal. 3d 365, we could not have written a similar caveat, for article XIII D did not exist at the time. But it applies just as well.

FN 1. Los Angeles Municipal Code section 161.352 provides: "Owners of all buildings subject to inspection shall pay a service fee of $12.00 per unit per year. The fee will be used to finance the cost of inspection and enforcement by the Housing Department. Should the owner fail to pay the required fee, the City of Los Angeles will recover it, plus accrued interest, utilizing any remedies provided by law including nuisance abatement or municipal tax lien procedures established by ordinance or state law. This fee shall be known as the 'Systematic Code Enforcement Program Fee.' " (Italics added.)

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FACT SHEET

Water Quality Standards; Establishment of Numeric Criteria for Priority Toxic Pollutants for the State of California

Summary

The U.S. Environmental Protection Agency today promulgated numeric water quality criteria for priority toxic pollutants and other water quality standards provisions to be applied to waters in the State of California. EPA promulgated this rule based on the Administrator's determination that the numeric criteria are necessary in the State of California to protect human health and the environment.

EPA promulgated this rule to fill a gap in California water quality standards that was created in 1994 when a State court overturned the State's water quality control plans containing water quality criteria for priority toxic pollutants. Thus, the State of California has been without numeric water quality criteria for many priority toxic pollutants as required by the Clean Water Act, necessitating this action by EPA. These Federal criteria are legally applicable in the State of California for inland surface waters, enclosed bays and estuaries for all purposes and programs under the Clean Water Act.

Background

Under section 303(c)(2)(B) of the Clean Water Act, states must adopt numeric criteria for the priority toxic pollutants listed under section 307(a) if those pollutants could be reasonably expected to interfere with the designated uses of States' waters. In April 1991 California adopted numeric criteria for priority toxic pollutants in the State's Inland Surface Water Plans and Enclosed Bays and Estuaries Plans. In 1994, a California State court ordered California to rescind these water quality control plans. Today's final rule promulgated numeric water quality criteria to replace the criteria that were rescinded by the State court. California also remains in the National Toxics Rule promulgated in 1992 for certain waters and pollutants.

Today's Action

Today's final rule promulgated 1) ambient aquatic life criteria for 23 priority toxics; 2) ambient human health criteria for 57 priority toxics; and 3) a compliance schedule provision which authorizes the State to issue schedules of compliance for new or revised NPDES permit limits based on the federal criteria when certain conditions are met. The State must use the

criteria together with the State's existing water quality standards when controlling pollution in inland waters and enclosed bays and estuaries. The numeric water quality criteria contained in the final rule are identical to EPA's recommended Clean Water Act section 304(a) criteria for these pollutants published in December 1998 (see 63 FR 68353).

EPA did not receive any substantive comments during the public comment period which warranted significant changes to the proposed rule. The CTR will serve as a place holder until the State re-adopts its own numeric criteria for toxics. However, as a result of consultation with the National Marine Fisheries Service and the Fish and Wildlife Service under the Endangered Species Act, EPA did not include the following proposed numeric criteria in the final rule: acute and chronic criteria for mercury to protect freshwater and saltwater aquatic life; and acute criteria for selenium to protect freshwater aquatic life. The final rule also does not contain numeric criteria for chloroform. For these reasons, EPA's final rule is narrower in scope than the proposed rule.

Costs and Benefits

At present, State Basin Plans contain a narrative water quality criterion stating that all waters shall be maintained free of toxic substances in concentrations that produce detrimental physiological responses in human, plant, animal, or aquatic life. Thus, to the extent that the State is implementing the narrative as required by EPA's permitting regulations at 40 CFR § 122.44(d)(1)(vi)/40 CFR § 123.25, this rule would not impose any incremental costs.

In addition, the ambient water quality criteria in this rule do not directly impose economic impacts by themselves. The Clean Water Act requires the State to implement the criteria by ensuring that NPDES permits result in discharges that will meet the criteria. In so doing, the State will have considerable discretion. Until the State implements these water quality standards, there will be no effect of this rule on any entity.

Despite the requirement that the State implement its narrative criteria and the considerable discretion the State has in implementing the federal numeric criteria, EPA attempted to estimate the potential indirect costs and benefits of this final rule. The analysis calculated costs using two approaches. The first approach used existing, actual discharge data. (Actual discharge levels are usually lower than the level set by current NPDES permit limits.). Using this approach, annual costs are $33.5 million (up from $15 million for the proposal). The second approach used a sample of existing permit limits, assuming that dischargers are actually discharging the full levels contained in their permits. The second approach also assumes that none of the discretionary mechanisms that would enhance flexibility (e.g., site specific criteria, mixing zones, phased TMDLs) would be granted by the State. Under the second approach, annual costs are $61 million (down from $87 million for the proposal). EPA refined the estimated costs for the final rule based on facility-specific information submitted as part of the public comments. EPA believes that the second approach overstates actual costs because it does not take into account the discretionary mechanisms that are often used, and frequently result in

use of cheaper control technologies. Further, EPA believes that basing costs on current permit limits rather than actual discharge data overstates the actual costs to comply with new limits because most facilities discharge pollutants in concentrations well below current permit limits.

Total monetized annual benefits were estimated in the range of $6.9 to $74.7 million. By category, annual benefits were $1.3 to $4.6 million for avoided cancer risk, $2.2 to $15.2 million for recreational angling, and $3.4 to $54.9 million for passive use benefits. In addition, EPA could not put dollar values on several other categories of benefits, such as

- Improvements in water-related (in-stream and near stream) recreation apart from fishing.
- Improvements in consumptive and non-consumptive land-based recreation, such as hunting and wildlife observation.
- Improvements in human health resulting from reduction of non-cancer risk.
- Human health benefits for saltwater anglers outside of San Francisco Bay were not estimated.

Therefore, the monetized values presented above are likely to underestimate the full benefits of the new criteria.

Additional Information

For more information, please call Diane E. Fleck at 415-744-1984, or Philip Woods at 415-744-1997, U.S. Environmental Protection Agency, Region 9, Water Division, 75 Hawthorne Street, San Francisco, California 94105.

Once the rule is published in the *Federal Register*, you may view the *Federal Register* notice, Response to Comments Document, and the Economic Analysis Document for this final rule on the Internet at: http://www.epa.gov/OST/rules. The *Federal Register* notice gives complete information on how to obtain additional information and how to review the complete administrative record for this final rule.

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records. Appellate determinations, including extensions of time on appeal, with respect to records of the United States Secret Service will be made by the Deputy Director, United States Secret Service. Appeals may be mailed or delivered personally to: Privacy Act Amendment Appeal, Deputy Director, United States Secret Service, 950 H Street, NW., Suite 8300, Washington, DC 20373–5802.

* * * * *

5. Amend 31 CFR part 1, subpart C, appendix D—UNITED STATES SECRET SERVICE, paragraph 6, by removing ''Room 843, 1800 G Street NW., Washington, DC 20223,'' and adding in its place, ''Suite 8300, 950 H Street, NW., Washington, DC 20373–5802.''

Date: February 6, 2001.

W. Earl Wright, Jr.,

Chief Management and Administrative Programs Officer.

[FR Doc. 01–3634 Filed 2–12–01; 8:45 am]

BILLING CODE 4810–42–P

ENVIRONMENTAL PROTECTION AGENCY

40 CFR Part 131

[FRL –6941–1]

RIN 2040–AC44

Water Quality Standards; Establishment of Numeric Criteria for Priority Toxic Pollutants for the State of California; Correction

AGENCY: Environmental Protection Agency.

ACTION: Final Rule; correction.

SUMMARY: This document contains corrections to a final rule, *Water Quality Standards; Establishment of Numeric Criteria for Priority Toxic Pollutants for the State of California,* also know as the California Toxics Rule, which was published in the **Federal Register** on Thursday, May 18, 2000 (65 FR 31682). The California Toxics Rule promulgated numeric aquatic life and human health criteria for priority toxic pollutants and a compliance schedule provision which authorizes the State to issue schedules of compliance for new or revised National Pollutant Discharge Elimination System permit limits based on the federal criteria when certain conditions are met.

EFFECTIVE DATE: This action is effective February 13, 2001.

ADDRESSES: The administrative record for the final rule is available for public inspection at the U.S. Environmental Protection Agency, Region 9, Water Division, 75 Hawthorne Street, San Francisco, California 94105, between the hours of 8 a.m. and 4:30 p.m. For access to the administrative record, call Diane E. Fleck, P.E., Esq. at (415) 744–1997 for an appointment. A reasonable fee will be charged for photocopies.

FOR FURTHER INFORMATION CONTACT: Diane E. Fleck, P.E., Esq. or Philip Woods, U.S. Environmental Protection Agency, Region 9, Water Division, 75 Hawthorne Street, San Francisco, California 94105, (415) 744–1984 or (415) 744–1997, respectively.

SUPPLEMENTARY INFORMATION: On May 18, 2000, EPA published a final rule in the **Federal Register** titled *Water Quality Standards; Establishment of Numeric Criteria for Priority Toxic Pollutants for the State of California* (see 65 FR 31682) that contained typographical errors. These typographical errors consisted of omission of units in the column headings to a table, inadvertent placement of a zero in one of the numeric criteria values, an oversight in the correct CAS number for a pollutant, and the incorrect placement of a parameter in a formula. This action corrects those typographical errors. These corrections are all minor in nature and do not substantively alter the final rule.

Section 553 of the Administrative Procedure Act, 5 U.S.C. 553(b)(B), provides that, when an agency for good cause finds that notice and public procedure are impracticable, unnecessary or contrary to the public interest, the agency may issue a rule without providing notice and an opportunity for public comment. EPA has determined that there is good cause for making today's rule final without prior proposal and opportunity for comment because this action merely corrects typographical errors in a rule that already went through public notice and comment. Furthermore, the corrections in today's rule are all minor in nature and do not substantively alter the final rule. Thus, notice and public procedure are unnecessary. EPA finds that this constitutes good cause under 5 U.S.C. 553(b)(B).

Under Executive Order 12866 (58 FR 51735, October 4, 1993), this action is not a ''significant regulatory action'' and is therefore not subject to review by the Office of Management and Budget. Because the agency has made a ''good cause'' finding that this action is not subject to notice-and-comment requirements under the Administrative Procedure Act or any other statute, it is not subject to the regulatory flexibility provisions of the Regulatory Flexibility Act (5 U.S.C. 601 *et seq.*), or to sections 202 and 205 of the Unfunded Mandates Reform Act of 1995 (UMRA) (Pub. L. 104–4). In addition, this action does not significantly or uniquely affect small governments or impose a significant intergovernmental mandate, as described in sections 203 and 204 of UMRA. This rule also does not significantly or uniquely affect the communities of tribal governments, as specified by Executive Order 13084 (63 FR 27655, May 10, 1998). This rule will not have substantial direct effects on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government, as specified in Executive Order 13132 (64 FR 43255, August 10, 1999). This rule also is not subject to Executive Order 13045 (62 FR 19885, April 23, 1997), because it is not economically significant. This technical correction action does not involve technical standards; thus, the requirements of section 12(d) of the National Technology Transfer and Advancement Act of 1995 (15 U.S.C. 272 note) do not apply. This rule does not impose an information collection burden under the provisions of the Paperwork Reduction Act of 1995 (44 U.S.C. 3501 *et seq.*). EPA's compliance with these statutes and Executive Orders for the underlying rule is discussed in the May 18, 2000, **Federal Register** notice (65 FR 31682).

The Congressional Review Act (5 U.S.C. 801 *et seq.*), as added by the Small Business Regulatory Enforcement Fairness Act of 1996, generally provides that before a rule may take effect, the agency promulgating the rule must submit a rule report, which includes a copy of the rule, to each House of the Congress and to the Comptroller General of the United States. Section 808 allows the issuing agency to make a rule effective sooner than otherwise provided by the CRA if the agency makes a good cause finding that notice and public procedure is impracticable, unnecessary or contrary to the public interest. This determination must be supported by a brief statement. 5 U.S.C. 808(2). As stated previously, EPA has made such a good cause finding, including the reasons therefor, and established an effective date of February 13, 2001. EPA will submit a report containing this rule and other required information to the U.S. Senate, the U.S. House of Representatives, and the Comptroller General of the United States prior to publication of the rule in the **Federal Register**. This action is not

a ''major rule'' as defined by 5 U.S.C. 804(2).

List of Subjects in 40 CFR Part 131

Environmental protection, Intergovernmental relations, Reporting and recordkeeping requirements, water pollution control.

Dated: January 19, 2001.

J. Charles Fox,

Assistant Administrator, Office of Water.

For the reasons set out in the preamble, part 131 of chapter 1 of title 40 of the Code of Federal Regulations is amended as follows:

PART 131—WATER QUALITY STANDARDS

1. The authority citation for part 131 continues to read as follows:

Authority: 33 U.S.C. 1251 *et seq.*

Subpart D—[Amended]

2. Section 131.38 is amended:

a. In the table to paragraph (b)(1) under the column heading for ''B Freshwater'' by revising the column headings for ''Criterion Maximum Concentration'' and ''Criterion Continuous Concentration''.

b. In the table to paragraph (b)(1) under the column heading for ''C Saltwater'' by revising the column headings for ''Criterion Maximum Concentration'' and ''Criterion Continuous Concentration''.

c. Revising entry ''23.'' to the table in paragraph (b)(1).

d. Revising entry ''67.'' to the table in paragraph (b)(1).

e. Revising paragraph (b)(2)(ii).

The revisions read as follows:

§ 131.38 Establishment of Numeric Criteria for priority toxic pollutants for the State of California.

* * * * *

(b)(1) * * *

A		B Freshwater		C Saltwater		D Human health (10^{-6}) risk for carcinogens) For consumption of:	
# Compound	CAS number	Criterion maximum conc. (µg/L)[d] B1	Criterion continous conc. (µg/L)[d] B2	Criterion maximum conc. (µg/L)[d] C1	Criterion continious conc. (µg/L)[d] C2	Water & organisms (µg/L) D1	Organisms only (µg/L) D2
* * *		*	*		*	*	
23. Chlorodibromomethane	124481					[a,c] 0.41	[a,c] 34
* * *		*	*		*	*	
67. Bis(2-Chloroisopropyl)Ether	108601					[a] 1,400	[a,t] 170,000
* * *		*	*		*	*	

Footnotes to table in Paragraph (b)(1):

* * * * * * *

[a] Criteria revised to reflect the Agency q1* or RfD, as contained in the Integrated Risk Information System (IRIS) as of October 1, 1996. The fish tissue bioconcentration factor (BCF) from the 1980 documents was retained in each case.

[c] Criteria are based on carcinogenicity of 10^{-6} risk.

[d] Criteria Maximum Concentration (CMC) equals the highest concentration of a pollutant to which aquatic life can be exposed for a short period of time without deleterious effects. Criteria Continuous Concentration (CCC) equals the highest concentration of a pollutant to which aquatic life can be exposed for an extended period of time (4 days) without deleterious effects. µg/L equals micrograms per liter.

* * * * * * *

[t] These criteria were promulgated for specific waters in California in the NTR. The specific waters to which the NTR criteria apply include: Waters of the State defined as bays and estuaries including San Francisco Bay upstream to and including Suisun Bay and the Sacramento-San Joaquin Delta; and waters of the State defined as inland (i.e., all surface waters of the State not bays or estuaries or ocean) without a MUN use designation. This section does not apply instead of the NTR for these criteria.

* * * * *

(2) * * *

(ii) CCC = WER x (Chronic Conversion Factor) x (exp{m_c[ln(hardness)]+b_c})

* * * * *

[FR Doc. 01–3617 Filed 2–12–01; 8:45 am]

BILLING CODE 6560–50–P

FEDERAL COMMUNICATIONS COMMISSION

47 CFR Parts 21, 73, and 76

[MM Docket Nos. 94–150, 92–51, and 87–154; FCC 00–438]

[RIN 3060–AF82]

Attribution Rules

AGENCY: Federal Communications Commission.

ACTION: Final rule; petition for reconsideration.

SUMMARY: This document concerns rules and policies for attributing cognizable interests in applying the broadcast multiple ownership rules, the broadcast-cable cross-ownership rule, and the cable-Multipoint Distribution Service cross-ownership rule. The intended effect of this action is to clarify and resolve issues raised in petitions for reconsideration pertaining to the application of the Commission's attribution rules.

DATES: Effective April 16, 2001. Written comments by the public on the proposed information collections are due April 16, 2001. Written comments must be submitted by the Office of Management and Budget (OMB) on the proposed information collection(s) on or before April 16, 2001.

ADDRESSES: Federal Communications Commission, 445 Twelfth Street, SW, Washington DC 20554. A copy of any comments on the information collections contained herein should be submitted to Judy Boley, Federal Communications Commission, Room 1–C804, 445 12th Street, SW, Washington, DC 20554, or via the Internet to *jboley@fcc.gov,* and the Edward C. Springer, OMB Desk Officer, Room 10236 NEOB, 725 17th Street, NW., Washington, DC 20503 or via the Internet to *edward.springer@omb.eop.gov.*

FOR FURTHER INFORMATION CONTACT: Cyndi Thomas or Mania Baghdadi, Policy and Rules Division, Mass Media Bureau, at (202) 418–2120. For additional information concerning the information collection(s) contained in this document, contact Judy Boley at 202–418–0214, or via the Internet at *jboley@fcc.gov.*

SUPPLEMENTARY INFORMATION: This is a summary of the *Memorandum Opinion and Order on Reconsideration (''MO&O'')* in MM Docket Nos. 94–150, 92–51, and 87–154, FCC 00–438, adopted on December 14, 2000, and released on January 19, 2001. The full text of this decision is available for inspection and copying during regular business hours in the FCC Reference Center, 445 Twelfth Street, SW, Room CY–A257, Washington DC, and also may be purchased from the Commission's copy contractor, International Transcription Service, (202) 857–3800, 445 Twelfth Street, SW, Room CY–B402, Washington DC. The complete text is also available under the file name fcc00438.doc on the Commission's Internet site at *www.fcc.gov.*

This MO&O contains either new or modified information collection(s) subject to the Paperwork Reduction Act of 1995 (PRA). The general public and other Federal agencies are invited to comment on the proposed information collections contained in this proceeding.

Paperwork Reduction Act

This *MO&O* contains either new or modified information collections. The Commission, therefore, as part of its continuing effort to reduce paperwork burdens, invites the general public and the Office of Management and Budget to comment on the information collections contained in this *MO&O* as required by the Paperwork Reduction Act of 1995, Public Law 104–13. Public and agency comments are due 60 days from date of publication of this *MO&O* in the **Federal Register**. Comments should address: (a) Whether the new or modified collection of information is necessary for the proper performance of the functions of the Commission, including whether the information shall have practical utility; (b) the accuracy of the Commission's burden estimates; (c) ways to enhance the quality, utility, and clarity of the information collected; and (d) ways to minimize the burden of the collection of information on the respondents, including the use of automated collection techniques or other forms of information technology.

OMB Approval Number: 3060–XXXX

Title: Reconsideration of Mass Media Attribution Rules, MM Docket Nos. 94–150, 92–51, and 87–154.

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Federal Register

Thursday,
May 18, 2000

Part III

Environmental Protection Agency

40 CFR Part 131

Water Quality Standards; Establishment of Numeric Criteria for Priority Toxic Pollutants for the State of California; Rule

009516

ENVIRONMENTAL PROTECTION AGENCY

40 CFR Part 131

[FRL–6587–9]

RIN 2040–AC44

Water Quality Standards; Establishment of Numeric Criteria for Priority Toxic Pollutants for the State of California

AGENCY: Environmental Protection Agency.

ACTION: Final rule.

SUMMARY: This final rule promulgates: numeric aquatic life criteria for 23 priority toxic pollutants; numeric human health criteria for 57 priority toxic pollutants; and a compliance schedule provision which authorizes the State to issue schedules of compliance for new or revised National Pollutant Discharge Elimination System permit limits based on the federal criteria when certain conditions are met.

EPA is promulgating this rule based on the Administrator's determination that numeric criteria are necessary in the State of California to protect human health and the environment. The Clean Water Act requires States to adopt numeric water quality criteria for priority toxic pollutants for which EPA has issued criteria guidance, the presence or discharge of which could reasonably be expected to interfere with maintaining designated uses.

EPA is promulgating this rule to fill a gap in California water quality standards that was created in 1994 when a State court overturned the State's water quality control plans which contained water quality criteria for priority toxic pollutants. Thus, the State of California has been without numeric water quality criteria for many priority toxic pollutants as required by the Clean Water Act, necessitating this action by EPA. These Federal criteria are legally applicable in the State of California for inland surface waters, enclosed bays and estuaries for all purposes and programs under the Clean Water Act.

EFFECTIVE DATE: This rule shall be effective May 18, 2000.

ADDRESSES: The administrative record for today's final rule is available for public inspection at the U.S. Environmental Protection Agency, Region 9, Water Division, 75 Hawthorne Street, San Francisco, California 94105, between the hours of 8:00 a.m. and 4:30 p.m. For access to the administrative record, call Diane E. Fleck, P.E., Esq. at 415 744–1984 for an appointment. A reasonable fee will be charged for photocopies.

FOR FURTHER INFORMATION CONTACT: Diane E. Fleck, P.E., Esq. or Philip Woods, U.S. Environmental Protection Agency, Region 9, Water Division, 75 Hawthorne Street, San Francisco, California 94105, 415–744–1984 or 415–744–1997, respectively.

SUPPLEMENTARY INFORMATION: This preamble is organized according to the following outline:

A. Potentially Affected Entities
B. Introduction and Overview
1. Introduction
2. Overview
C. Statutory and Regulatory Background
D. California Water Quality Standards Actions
1. California Regional Water Quality Control Board Basin Plans, and the Inland Surface Waters Plan (ISWP) and the Enclosed Bays and Estuaries Plan (EBEP) of April 1991
2. EPA's Review of California Water Quality Standards for Priority Toxic Pollutants in the ISWP and EBEP, and the National Toxics Rule
3. Status of Implementation of CWA Section 303(c)(2)(B)
4. State-Adopted, Site-Specific Criteria for Priority Toxic Pollutants
a. State-Adopted Site-Specific Criteria Under EPA Review
b. State-Adopted Site-Specific Criteria With EPA Approval
E. Rationale and Approach For Developing the Final Rule
1. Legal Basis
2. Approach for Developing this Rule
F. Derivation of Criteria
1. Section 304(a) Criteria Guidance Process
2. Aquatic Life Criteria
a. Freshwater Acute Selenium Criterion
b. Dissolved Metals Criteria
c. Application of Metals Criteria
d. Saltwater Copper Criteria
e. Chronic Averaging Period
f. Hardness
3. Human Health Criteria
a. 2,3,7,8–TCDD (Dioxin) Criteria
b. Arsenic Criteria
c. Mercury Criteria
d. Polychlorinated Biphenyls (PCBs) Criteria
e. Excluded Section 304(a) Human Health Criteria
f. Cancer Risk Level
G. Description of Final Rule
1. Scope
2. EPA Criteria for Priority Toxic Pollutants
3. Implementation
4. Wet Weather Flows
5. Schedules of Compliance
6. Changes from Proposed Rule
H. Economic Analysis
1. Costs
2. Benefits
I. Executive Order 12866, Regulatory Planning and Review
J. Unfunded Mandates Reform Act of 1995
K. Regulatory Flexibility Act
L. Paperwork Reduction Act
M. Endangered Species Act
N. Congressional Review Act
O. Executive Order 13084, Consultation and Coordination With Indian Tribal Governments
P. National Technology Transfer and Advancement Act
Q. Executive Order 13132 on Federalism
R. Executive Order 13045 on Protection of Children From Environmental Health Risks and Safety Risks

A. Potentially Affected Entities

Citizens concerned with water quality in California may be interested in this rulemaking. Entities discharging pollutants to waters of the United States in California could be affected by this rulemaking since water quality criteria are used by the State in developing National Pollutant Discharge Elimination System (NPDES) permit limits. Categories and entities that ultimately may be affected include:

Category	Examples of potentially affected entities
Industry	Industries discharging pollutants to surface waters in California or to publicly-owned treatment works.
Municipalities	Publicly-owned treatment works discharging pollutants to surface waters in California

This table is not intended to be exhaustive, but rather provides a guide for readers regarding entities likely to be affected by this action. This table lists the types of entities that EPA is now aware could potentially be affected by this action. Other types of entities not listed in the table could also be affected. To determine whether your facility might be affected by this action, you should carefully examine the applicability criteria in § 131.38(c). If you have questions regarding the applicability of this action to a particular entity, consult the persons listed in the preceding **FOR FURTHER INFORMATION CONTACT** section.

B. Introduction and Overview

1. Introduction

This section introduces the topics which are addressed in the preamble and provides a brief overview of EPA's basis and rationale for promulgating Federal criteria for the State of California. Section C briefly describes the evolution of the efforts to control toxic pollutants; these efforts include the changes enacted in the 1987 CWA Amendments, which are the basis for this rule. Section D summarizes California's efforts since 1987 to implement the requirements of CWA section 303(c)(2)(B) and describes EPA's procedure and actions for determining whether California has fully implemented CWA section 303(c)(2)(B). Section E provides the rationale and approach for developing this final rule, including a discussion of EPA's legal basis for this final rule. Section F describes the development of the criteria included in this rule. Section G summarizes the provisions of the final rule and discusses implementation issues. Sections H, I, J, K , L, M, N, O, P, and Q briefly address the requirements of Executive Order 12866, the Unfunded Mandates Reform Act of 1995, the Regulatory Flexibility Act, the Paperwork Reduction Act, the Endangered Species Act, the Congressional Review Act, Executive Order 13084, Consultation and Coordination with Indian Tribal Governments, the National Technology Transfer and Advancement Act, and Executive Order 13132, Federalism, respectively.

The proposal for this rulemaking was published in the **Federal Register** on August 5, 1997. Changes from the proposal are generally addressed in the body of this preamble and specifically addressed in the response to comments document included in the administrative record for this rulemaking. EPA responded to all comments on the proposed rule, including comments received after the September 26, 1997, deadline. Although EPA is under no legal obligation to respond to late comments, EPA made a policy decision to respond to all comments.

Since detailed information concerning many of the topics in this preamble was published previously in the **Federal Register** in preambles for this and other rulemakings, references are frequently made to those preambles. Those rulemakings include: Water Quality Standards; Establishment of Numeric Criteria for Priority Toxic Pollutants for the State of California; Proposed Rule, 62 FR 42159, August 5, 1997 (referred to as the ''proposed CTR''); Water Quality Standards; Establishment of Numeric Criteria for Priority Toxic Pollutants, 57 FR 60848, December 22, 1992 (referred to as the ''National Toxics Rule'' or ''NTR''); and the NTR as amended by Administrative Stay of Federal Water Quality Criteria for Metals and Interim Final Rule, Water Quality Standards; Establishment of Numeric Criteria for Priority Toxic Pollutants; States' Compliance—Revision of Metals Criteria, 60 FR 22228, May 4, 1995 (referred to as the ''National Toxics Rule [NTR], as amended''). The NTR, as amended, is codified at 40 CFR 131.36. A copy of the proposed CTR and its preamble, and the NTR, as amended, and its preambles are contained in the administrative record for this rulemaking.

EPA is making this final rule effective upon publication. Under the Administrative Procedure Act, 5 U.S.C. 553(d)(3), agencies must generally publish a rule no more than 30 days prior to the effective date of the rule except as otherwise provided for by the Agency for good cause. The purpose of the 30-day waiting period is to give affected parties a reasonable time to adjust their behavior before the final rule takes effect. See *Omnipoint Corp.* v. *F.C.C.,* 78 F.3d 620, 630–631 (D.C. Cir. 1996); *Riverbend Farms, Inc.* v. *Madigan*, 958 F.2d 1479, 1485 (9th Cir. 1992).

In this instance, EPA finds good cause to make the final rule effective upon publication. In order to find good cause, an Agency needs to find that the 30-day period would be: (1) Impracticable, (2) unnecessary, or (3) contrary to the public interest. Here EPA is relying on the second reason to support its finding of good cause. EPA also notes that the State has requested EPA to make the rule immediately effective.

EPA finds that in this instance, waiting 30 days to make the rule effective is unnecessary. As explained in further detail elsewhere in this preamble, this rule is not self implementing; rather it establishes ambient conditions that the State of California will implement in future permit proceedings. These permit proceedings will, by regulation, take longer than 30 days to complete. This means that although the rule is immediately effective, no discharger's conduct would be altered under the rule in less than 30 days, and therefore the 30-day period is unnecessary.

2. Overview

This final rule establishes ambient water quality criteria for priority toxic pollutants in the State of California. The criteria in this final rule will supplement the water quality criteria promulgated for California in the NTR, as amended. In 1991, EPA approved a number of water quality criteria (discussed in section D), for the State of California. Since EPA had approved these criteria, it was not necessary to include them in the 1992 NTR for these criteria. However, the EPA-approved criteria were subsequently invalidated in State litigation. Thus, this final rule contains criteria to fill the gap created by the State litigation.

This final rule does not change or supersede any criteria previously promulgated for the State of California in the NTR, as amended. Criteria which EPA promulgated for California in the NTR, as amended, are footnoted in the final table at 131.38(b)(1), so that readers may see the criteria promulgated in the NTR, as amended, for California and the criteria promulgated through this rulemaking for California in the same table. This final rule is not intended to apply to waters within Indian Country. EPA recognizes that there are possibly waters located wholly or partly in Indian Country that are included in the State's basin plans. EPA will work with the State and Tribes to identify any such waters and determine whether further action to protect water quality in Indian Country is necessary.

This rule is important for several environmental, programmatic and legal reasons. Control of toxic pollutants in surface waters is necessary to achieve the CWA's goals and objectives. Many of California's monitored river miles, lake acres, and estuarine waters have elevated levels of toxic pollutants. Recent studies on California water bodies indicate that elevated levels of toxic pollutants exist in fish tissue which result in fishing advisories or bans. These toxic pollutants can be attributed to, among other sources, industrial and municipal discharges.

Water quality standards for toxic pollutants are important to State and EPA efforts to address water quality problems. Clearly established water quality goals enhance the effectiveness of many of the State's and EPA's water programs including permitting, coastal water quality improvement, fish tissue quality protection, nonpoint source controls, drinking water quality protection, and ecological protection. Numeric criteria for toxic pollutants allow the State and EPA to evaluate the adequacy of existing and potential control measures to protect aquatic ecosystems and human health. Numeric criteria also provide a more precise basis for deriving water quality-based effluent limitations (WQBELs) in

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National Pollutant Discharge Elimination System (NPDES) permits and wasteload allocations for total maximum daily loads (TMDLs) to control toxic pollutant discharges. Congress recognized these issues when it enacted section 303(c)(2)(B) to the CWA.

While California recognizes the need for applicable water quality standards for toxic pollutants, its adoption efforts have been stymied by a variety of factors. The Administrator has decided to exercise her CWA authorities to move forward the toxic control program, consistent with the CWA and with the State of California's water quality standards program.

Today's action will also help restore equity among the States. The CWA is designed to ensure all waters are sufficiently clean to protect public health and/or the environment. The CWA allows some flexibility and differences among States in their adopted and approved water quality standards, but it should be implemented in a manner that ensures a level playing field among States. Although California has made important progress toward satisfying CWA requirements, it has not satisfied CWA section 303(c)(2)(B) by adopting numeric water quality criteria for toxic pollutants. This section was added to the CWA by Congress in 1987. Prior to today, the State of California had been the only State in the Nation for which CWA section 303(c)(2)(B) had remained substantially unimplemented after EPA's promulgation of the NTR in December of 1992. Section 303(c)(4) of the CWA authorizes the EPA Administrator to promulgate standards where necessary to meet the requirements of the Act. The Administrator determined that this rule was a necessary and important component for the implementation of CWA section 303(c)(2)(B) in California.

EPA acknowledges that the State of California is working to satisfy CWA section 303(c)(2)(B). When the State formally adopts, and EPA approves, criteria consistent with statutory requirements, as envisioned by Congress in the CWA, EPA intends to stay this rule. If within the applicable time frame for judicial review, the States' standards are challenged, EPA will withdraw this rule after such judicial review is complete and the State standards are sustained.

C. Statutory and Regulatory Background

The preamble to the August 5, 1997, proposed rule provided a general discussion of EPA's statutory and regulatory authority to promulgate water quality criteria for the State of California. See 62 FR 42160–42163. EPA is including that discussion in the record for the final rule. Commenters questioned EPA's authority to promulgate certain aspects of the proposal. EPA is responding to those comments in the appropriate sections of this preamble, and in the response to comments document included in the administrative record for this rulemaking. Where appropriate, EPA's responses expand upon the discussion of statutory and regulatory authority found in the proposal.

D. California Water Quality Standards Actions

1. California Regional Water Quality Control Board Basin Plans, and the Inland Surface Waters Plan (ISWP) and the Enclosed Bays and Estuaries Plan (EBEP) of April 1991

The State of California regulates water quality through its State Water Resources Control Board (SWRCB) and through nine Regional Water Quality Control Boards (RWQCBs). Each of the nine RWQCBs represents a different geographic area; area boundaries are generally along watershed boundaries. Each RWQCB maintains a Basin Plan which contains the designated uses of the water bodies within its respective geographic area within California. These designated uses (or ''beneficial uses'' under State law) together with legally-adopted criteria (or ''objectives'' under State law), comprise water quality standards for the water bodies within each of the Basin areas. Each of the nine RWQCBs undergoes a triennial basin planning review process, in compliance with CWA section 303. The SWRCB provides assistance to the RWQCBs.

Most of the Basin Plans contain conventional pollutant objectives such as dissolved oxygen. None of the Basin Plans contains a comprehensive list of priority toxic pollutant criteria to satisfy CWA section 303(c)(2)(B). The nine RWQCBs and the SWRCB had intended that the priority toxic pollutant criteria contained in the three SWRCB statewide plans, the Inland Surface Waters Plan (ISWP), the Enclosed Bays and Estuaries Plan (EBEP), and the Ocean Plan, apply to all basins and satisfy CWA section 303(c)(2)(B).

On April 11, 1991, the SWRCB adopted two statewide water quality control plans, the ISWP and the EBEP. These statewide plans contained narrative and numeric water quality criteria for toxic pollutants, in part to satisfy CWA section 303(c)(2)(B). The water quality criteria contained in the SWRCB statewide plans, together with the designated uses in each of the Basin Plans, created a set of water quality standards for waters within the State of California.

Specifically, the two plans established water quality criteria or objectives for all fresh waters, bays and estuaries in the State. The plans contained water quality criteria for some priority toxic pollutants, provisions relating to whole effluent toxicity, implementation procedures for point and nonpoint sources, and authorizing compliance schedule provisions. The plans also included special provisions affecting waters dominated by reclaimed water (labeled as Category (a) waters), and waters dominated by agricultural drainage and constructed agricultural drains (labeled as Category (b) and (c) waters, respectively).

2. EPA's Review of California Water Quality Standards for Priority Toxic Pollutants in the ISWP and EBEP, and the National Toxics Rule

The EPA Administrator has delegated the responsibility and authority for review and approval or disapproval of all new or revised State water quality standards to the EPA Regional Administrators (see 40 CFR 131.21). Thus, State actions under CWA section 303(c)(2)(B) are submitted to the appropriate EPA Regional Administrator for review and approval.

In mid-April 1991, the SWRCB submitted to EPA for review and approval the two statewide water quality control plans, the ISWP and the EBEP. On November 6, 1991, EPA Region 9 formally concluded its review of the SWRCB's plans. EPA approved the narrative water quality criterion and the toxicity criterion in each of the plans. EPA also approved the numeric water quality criteria contained in both plans, finding them to be consistent with the requirements of section 303(c)(2)(B) of the CWA and with EPA's national criteria guidance published pursuant to section 304(a) of the CWA.

EPA noted the lack of criteria for some pollutants, and found that, because of the omissions, the plans did not fully satisfy CWA section 303(c)(2)(B). The plans did not contain criteria for all listed pollutants for which EPA had published national criteria guidance. The ISWP contained human health criteria for only 65 pollutants, and the EBEP contained human health criteria for only 61 pollutants for which EPA had issued section 304(a) guidance criteria. Both the ISWP and EBEP contained aquatic life criteria for all pollutants except cyanide and chromium III (freshwater only) for which EPA has CWA section

304(a) criteria guidance. The SWRCB's administrative record stated that all priority pollutants with EPA criteria guidance were likely to be present in California waters. However, the SWRCB's record contained insufficient information to support a finding that the excluded pollutants were not reasonably expected to interfere with designated uses of the waters of the State.

Although EPA approved the statewide selenium objective in the ISWP and EBEP, EPA disapproved the objective for the San Francisco Bay and Delta, because there was clear evidence that the objective would not protect the designated fish and wildlife uses (the California Department of Health Services had issued waterfowl consumption advisories due to selenium concentrations, and scientific studies had documented selenium toxicity to fish and wildlife). EPA restated its commitment to object to National Pollutant Discharge Elimination System (NPDES) permits issued for San Francisco Bay that contained effluent limits based on an objective greater than 5 parts per billion (ppb) (four day average) and 20 ppb (1 hour average), the freshwater criteria. EPA reaffirmed its disapproval of Californias' site-specific selenium objective for portions of the San Joaquin River, Salt Slough, and Mud Slough. EPA also disapproved of the categorical deferrals and exemptions. These disapprovals included the disapproval of the State's deferral of water quality objectives to effluent dominated streams (Category a) and to streams dominated by agricultural drainage (Category b), and the disapproval of the exemption of water quality objectives to constructed agricultural drains (Category c). EPA found the definitions of the categories imprecise and overly broad which could have led to an incorrect interpretation.

Since EPA had disapproved portions of each of the California statewide plans which were necessary to satisfy CWA section 303(c)(2)(B), certain disapproved aspects of California's water quality standards were included in EPA's promulgation of the National Toxics Rule (NTR) (40 CFR 131.36, 57 FR 60848). EPA promulgated specific criteria for certain water bodies in California.

The NTR was amended, effective April 14, 1995, to stay certain metals criteria which had been promulgated as total recoverable. Effective April 15, 1995, EPA promulgated interim final metals criteria as dissolved concentrations for those metals which had been stayed (Administrative Stay of Federal Water Quality Criteria for Metals and Interim Final Rule, Water Quality Standards; Establishment of Numeric Criteria for Priority Toxic Pollutants; States' Compliance—Revision of Metals Criteria; 60 FR 22228, 22229, May 4, 1995 [the NTR, as amended]). The stay was in response to a lawsuit against EPA challenging, among other issues, metals criteria expressed as total recoverable concentrations. A partial Settlement Agreement required EPA to stay specific metals criteria in the NTR. EPA then promulgated certain metals criteria in the dissolved form through the use of conversion factors. These factors are listed in the NTR, as amended. A scientific discussion of these criteria is found in a subsequent section of this preamble.

Since certain criteria have already been promulgated for specific water bodies in the State of California in the NTR, as amended, they are not within the scope of today's final rule. However, for clarity in reading a comprehensive rule for the State of California, these criteria are incorporated into 40 CFR 131.38(d)(2). Footnotes to the Table in 40 CFR 131.38(b)(1) and 40 CFR 131.38(d)(3) clarify which criteria (and for which specific water bodies) were promulgated by the NTR, as amended, and are therefore excluded from this final rule. The appropriate (freshwater or saltwater) aquatic life criteria which were promulgated in the NTR, as amended, for all inland surface waters and enclosed bays and estuaries include: chromium III and cyanide. The appropriate (water and organism or organism only) human health criteria which were promulgated in the NTR, as amended, for all inland surface waters and enclosed bays and estuaries include:

antimony
thallium
asbestos
acrolein
acrylonitrile
carbon tetrachloride
chlorobenzene
1,2-dichloroethane
1,1-dichloroethylene
1,3-dichloropropylene
ethylbenzene
1,1,2,2-tetrachloroethane
tetrachloroethylene
1,1,2-trichloroethane
trichloroethylene
vinyl chloride
2,4-dichlorophenol
2-methyl-4,6-dinitrophenol
2,4-dinitrophenol
benzidine
bis(2-chloroethyl)ether
bis(2-ethylhexyl)phthalate
3,3-dichlorobenzidine
diethyl phthalate
dimethyl phthalate
di-n-butyl phthalate
2,4-dinitrotoluene
1,2-diphenylhydrazine
hexachlorobutadiene
hexachlorocyclopentadiene
hexachloroethane
isophorone
nitrobenzene
n-nitrosodimethylamine
n-nitrosodiphenylamine

Other pollutant criteria were promulgated in the NTR, as amended, for specific water bodies, but not all inland surface waters and enclosed bays and estuaries.

3. Status of Implementation of CWA Section 303(c)(2)(B)

Shortly after the SWRCB adopted the ISWP and EBEP, several dischargers filed suit against the State alleging that it had not adopted the two plans in compliance with State law. The plaintiffs in a consolidated case included: the County of Sacramento, Sacramento County Water Agency; Sacramento Regional County Sanitation District; the City of Sacramento; the City of Sunnyvale; the City of San Jose; the City of Stockton; and Simpson Paper Company.

The dischargers alleged that the State had not adopted the ISWP and EBEP in compliance with the California Administrative Procedures Act (Gov Code. Section 11340, *et seq.*), the California Environmental Quality Act (Pub. Re Code, Section 21000, *et seq.*), and the Porter-Cologne Act (Wat. Code, Section 13200, *et seq.*). The allegation that the State did not sufficiently consider economics when adopting water quality objectives, as allegedly required by Section 13241 of the Porter Cologne Act, was an important issue in the litigation.

In October of 1993, the Superior Court of California, County of Sacramento, issued a tentative decision in favor of the dischargers. In March of 1994, the Court issued a substantively similar final decision in favor of the dischargers. Final judgments from the Court in July of 1994 ordered the SWRCB to rescind the ISWP and EBEP. On September 22, 1994, the SWRCB formally rescinded the two statewide water quality control plans. The State is currently in the process of readopting water quality control plans for inland surface waters, enclosed bays and estuaries.

CWA section 303(c)(2)(B) was fully implemented in the State of California from December of 1992, when the NTR was promulgated, until September of 1994, when the SWRCB was required to rescind the ISWP and EBEP. The provisions for California in EPA's NTR together with the approved portions of

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California's ISWP and EBEP implemented the requirements of CWA section 303(c)(2)(B). However, since September of 1994, when the SWRCB rescinded the ISWP and EBEP, the requirements of section 303(c)(2)(B) have not been fully implemented in California.

The scope of today's rule is to re-establish criteria for the remaining priority toxic pollutants to meet the requirements of section 303(c)(2)(B) of the CWA. Pursuant to section 303(c)(4), the Administrator has determined that it is necessary to include in today's action criteria for priority toxic pollutants, which are not covered by the NTR, as amended, or by the State through EPA-approved site-specific criteria, for waters of the United States in the State of California.

4. State-Adopted, Site-Specific Criteria for Priority Toxic Pollutants

The State has the discretion to develop site-specific criteria when appropriate e.g., when statewide criteria appear over-or under-protective of designated uses. Periodically, the State through its RWQCBs will adopt site-specific criteria for priority toxic pollutants within respective Basin Plans. These criteria are intended to be effective throughout the Basin or throughout a designated water body. Under California law, these criteria must be publicly reviewed and approved by the RWQCB, the SWRCB, and the State's Office of Administrative Law (OAL). Once this adoption process is complete, the criteria become State law.

These criteria must be submitted to the EPA Regional Administrator for review and approval under CWA section 303. These criteria are usually submitted to EPA as part of a RWQCB Basin Plan Amendment, after the Amendment has been adopted under the State's process and has become State law.

a. State-Adopted Site-Specific Criteria Under EPA Review

The State of California has recently reviewed and updated all of its RWQCB Basin Plans. All of the Basin Plans have completed the State review and adoption process and have been submitted to EPA for review and approval. Some of the Basin Plans contain site-specific criteria. In these cases, the State-adopted site-specific criteria are used for water quality programs.

EPA has not yet concluded consultation under the Endangered Species Act with the U.S. Department of Interior, Fish and Wildlife Service, and the U.S. Department of Commerce, National Marine Fisheries Service, on EPA's tentative approval/disapproval actions on the RWQCB Basin Plans. In this situation, the more stringent of the two criteria (the State-adopted site-specific criteria in the RWQCB Basin Plans, or the Federal criteria in this final rule), would be used for water quality programs including the calculation of water quality-based effluent criteria in National Pollutant Discharge Elimination System (NPDES) permits.

b. State-Adopted Site-Specific Criteria With EPA Approval

In several cases, the EPA Regional Administrator has already reviewed and approved State-adopted site-specific criteria within the State of California. Several of these cases are discussed in this section. All of the EPA approval letters referenced in today's preamble are contained in the administrative record for today's rule.

Sacramento River: EPA has approved site-specific acute criteria for copper, cadmium and zinc in the Sacramento River, upstream of Hamilton City, in the Central Valley Region (RWQCB for the Central Valley Region) of the State of California. EPA approved these site-specific criteria by letter dated August 7, 1985. Specifically, EPA approved for the Sacramento River (and tributaries) above Hamilton City, a copper criterion of 5.6 μg/l (maximum), a zinc criterion of 16 μg/l (maximum) and a cadmium criterion of 0.22 μg/l (maximum), all in the dissolved form using a hardness of 40 mg/l as CaCO3. (These criteria were actually adopted by the State and approved by EPA as equations which vary with hardness.) These ''maximum'' criteria correspond to acute criteria in today's final rule. Therefore, Federal acute criteria for copper, cadmium, and zinc for the Sacramento River (and tributaries) above Hamilton City are not necessary to protect the designated uses and are not included in the final rule. However, the EPA Administrator is making a finding that it is necessary to include chronic criteria for copper, cadmium and zinc for the Sacramento River (and tributaries) above Hamilton City, as part of the statewide criteria promulgated in today's final rule.

San Joaquin River: The selenium criteria in this rule are not applicable to portions of the San Joaquin River, in the Central Valley Region, because selenium criteria have been either previously approved by EPA or previously promulgated by EPA as part of the NTR. EPA approved and disapproved State-adopted site-specific selenium criteria in portions of the San Joaquin River, in the Central Valley Region of the State of California (RWQCB for the Central Valley Region). EPA's determination on these site-specific criteria is contained in a letter dated April 13, 1990.

Specifically, EPA approved for the San Joaquin River, mouth of Merced River to Vernalis, an aquatic life selenium criterion of 12 μg/l (maximum with the understanding that the instantaneous maximum concentration may not exceed the objective more than once every three years). Today's final rule does not affect this Federally-approved, State-adopted site-specific acute criterion, and it remains in effect for the San Joaquin River, mouth of Merced River to Vernalis. Therefore, an acute criterion for selenium in the San Joaquin River, mouth of Merced River to Vernalis is not necessary to protect the designated use and thus is not included in this final rule.

By letter dated April 13, 1990, EPA also approved for the San Joaquin River, mouth of Merced River to Vernalis, a State-adopted site-specific aquatic life selenium criterion of 5 μg/l (monthly mean); however, EPA disapproved a State-adopted site-specific selenium criterion of 8 μg/l (monthly mean—critical year only) for these waters. Subsequently, EPA promulgated a chronic selenium criterion of 5 μg/l (4 day average) for waters of the San Joaquin River from the mouth of the Merced River to Vernalis in the NTR. This chronic criterion applies to all water quality programs concerning the San Joaquin River, mouth of Merced River to Vernalis. Today's final rule does not affect the Federally-promulgated chronic selenium criterion of 5 μg/l (4 day average) set forth in the NTR. This previously Federally-promulgated criterion remains in effect for the San Joaquin River, mouth of Merced River to Vernalis.

Grassland Water District, San Luis National Wildlife Refuge, and Los Banos State Wildlife Refuge: EPA approved for the Grassland Water District, San Luis National Wildlife Refuge, and Los Banos State Wildlife Refuge, a State-adopted site-specific aquatic life selenium criterion of 2 μg/l (monthly mean) by letter dated April 13, 1990. This Federally-approved, State-adopted site-specific chronic criterion remains in effect for the Grassland Water District, San Luis National Wildlife Refuge and Los Banos State Wildlife Refuge. Therefore it is not necessary to include in today's final rule, a chronic criterion for selenium for the Grassland Water District, San Luis National Wildlife Refuge and Los Banos State Wildlife Refuge, and thus, it is not included in this final rule.

San Francisco Regional Board Basin Plan of 1986: EPA approved several priority toxic pollutant objectives (CWA criteria) that were contained in the1986 San Francisco Regional Board Basin Plan, as amended by SWRCB Resolution Numbers 87–49, 87–82 and 87–92, by letters dated September 2, 1987 and December 24, 1987. This Basin Plan, the SWRCB Resolutions, and the EPA approval letters are contained in the administrative record for this rulemaking. It is not necessary to include these criteria for priority toxic pollutants that are contained in the San Francisco Regional Board's 1986 Basin Plan as amended, and approved by EPA. Priority pollutants in this situation are footnoted in the matrix at 131.38(b)(1) with footnote ''b.'' Where gaps exist in the State adoption and EPA approval of priority toxic pollutant objectives, the criteria in today's rule apply.

EPA is assigning ''human health, water and organism consumption'' criteria to waters with the States' municipal or ''MUN'' beneficial use designation in the Basin Plan. Also, some pollutants regulated through the Basin Plan have different averaging periods, *e.g.,* one hour as compared with the rule's ''short-term.'' However, where classes of chemicals, such as polynuclear aromatic hydrocarbons, or PAHs, and phenols, are regulated through the Basin Plan, but not specific chemicals within the category, specific chemicals within the category are regulated by today's rule.

E. Rationale and Approach for Developing the Final Rule

This section explains EPA's legal basis for today's final rule, and discusses EPA's general approach for developing the specific requirements for the State of California.

1. Legal Basis

CWA section 303(c) specifies that adoption of water quality standards is primarily the responsibility of the States. However, CWA section 303(c) also describes a role for the Federal government to oversee State actions to ensure compliance with CWA requirements. If EPA's review of the States' standards finds flaws or omissions, then the CWA authorizes EPA to correct the deficiencies (see CWA section 303(c)(4)). This water quality standards promulgation authority has been used by EPA to issue final rules on several separate occasions, including the NTR, as amended, which promulgated criteria similar to those included here for a number of States. These actions have addressed both insufficiently protective State criteria and/or designated uses and failure to adopt needed criteria. Thus, today's action is not unique.

The CWA in section 303(c)(4) provides two bases for promulgation of Federal water quality standards. The first basis, in paragraph (A), applies when a State submits new or revised standards that EPA determines are not consistent with the applicable requirements of the CWA. If, after EPA's disapproval, the State does not amend its rules so as to be consistent with the CWA, EPA is to promptly propose appropriate Federal water quality standards for that State. The second basis for an EPA action is in paragraph (B), which provides that EPA shall promptly initiate promulgation ''* * * in any case where the Administrator determines that a revised or new standard is necessary to meet the requirements of this Act.'' EPA is using section 303(c)(4)(B) as the legal basis for today's final rule.

As discussed in the preamble to the NTR, the Administrator's determination under CWA section 303(c)(4) that criteria are necessary to meet the requirements of the Act could be supported in several ways. Consistent with EPA's approach in the NTR, EPA interprets section 303(c)(2)(B) of the CWA to allow EPA to act where the State has not succeeded in establishing numeric water quality standards for toxic pollutants. This inaction can be the basis for the Administrator's determination under section 303(c)(4) that new or revised criteria are necessary to ensure designated uses are protected.

EPA does not believe that it is necessary to support the criteria in today's rule on a pollutant-specific, water body-by-water-body basis. For EPA to undertake an effort to conduct research and studies of each stream segment or water body across the State of California to demonstrate that for each toxic pollutant for which EPA has issued CWA section 304(a) criteria guidance there is a ''discharge or presence'' of that pollutant which could reasonably ''be expected to interfere with'' the designated use would impose an enormous administrative burden and would be contrary to the statutory directive for swift action manifested by the 1987 addition of section 303(c)(2)(B) to the CWA. Moreover, because these criteria are ambient criteria that define attainment of the designated uses, their application to all water bodies will result in additional controls on dischargers only where necessary to protect the designated uses.

EPA's interpretation of section 303(c)(2)(B) is supported by the language of the provision, the statutory framework and purpose of section 303, and the legislative history. In adding section 303(c)(2)(B) to the CWA, Congress understood the existing requirements in section 303(c)(1) for States to conduct triennial reviews of their water quality standards and submit the results of those reviews to EPA and in section 303(c)(4)(B) for promulgation. CWA section 303(c) includes numerous deadlines and section 303(c)(4) directs the Administrator to act ''promptly'' where the Administrator determines that a revised or new standard is necessary to meet the requirements of the Act. Congress, by linking section 303(c)(2)(B) to the section 303(c)(1) three-year review period, gave States a last chance to correct this deficiency on their own. The legislative history of the provision demonstrates that chief Senate sponsors, including Senators Stafford, Chaffee and others wanted the provision to eliminate State and EPA delays and force quick action. Thus, to interpret CWA section 303(c)(2)(B) and (c)(4) to require such a cumbersome pollutant specific effort on each stream segment would essentially render section 303(c)(2)(B) meaningless. The provision and its legislative background indicate that the Administrator's determination to invoke section 303(c)(4)(B) authority can be met by the Administrator making a generic finding of inaction by the State without the need to develop pollutant specific data for individual stream segments. Finally, the reference in section 303(c)(2)(B) to section 304(a) criteria suggests that section 304(a) criteria serve as default criteria; that once EPA has issued them, States were to adopt numeric criteria for those pollutants based on the 304(a) criteria, unless they had other scientifically defensible criteria. EPA also notes that this rule follows the approach EPA took nationally in promulgating the NTR for States that failed to comply with CWA section 303(c)(2)(B). 57 FR 60848, December 22, 1992. EPA incorporates the discussion in the NTR preamble as part of this rulemaking record.

This determination is supported by information in the rulemaking record showing the discharge or presence of priority toxic pollutants throughout the State. While this data is not necessarily complete, it constitutes a strong record supporting the need for numeric criteria for priority toxic pollutants with section 304(a) criteria guidance where the State does not have numeric criteria.

Today's final rule would not impose any undue or inappropriate burden on the State of California or its dischargers. It merely puts in place numeric criteria

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for toxic pollutants that are already used in other States in implementing CWA programs. Under this rulemaking, the State of California retains the ability to adopt alternative water quality criteria simply by completing its criteria adoption process. Upon EPA approval of those criteria, EPA will initiate action to stay the Federally-promulgated criteria and subsequently withdraw them.

2. Approach for Developing This Rule

In summary, EPA developed the criteria promulgated in today's final rule as follows. Where EPA promulgated criteria for California in the NTR, EPA has not acted to amend the criteria in the NTR. Where criteria for California were not included in the NTR, EPA used section 304(a) National criteria guidance documents as a starting point for the criteria promulgated in this rule. EPA then determined whether new information since the development of the national criteria guidance documents warranted any changes. New information came primarily from two sources. For human health criteria, new or revised risk reference doses and cancer potency factors on EPA's Integrated Risk Information System (IRIS) as of October 1996 form the basis for criteria values (see also 63 FR 68354). For aquatic life criteria, updated data sets resulting in revised criteria maximum concentrations (CMCs) and criteria continuous concentrations (CCCs) formed the basis for differences from the national criteria guidance documents. Both of these types of changes are discussed in more detail in the following sections. This revised information was used to develop the water quality criteria promulgated here for the State of California.

F. Derivation of Criteria

1. Section 304(a) Criteria Guidance Process

Under CWA section 304(a), EPA has developed methodologies and specific criteria guidance to protect aquatic life and human health. These methodologies are intended to provide protection for all surface waters on a national basis. The methodologies have been subject to public review, as have the individual criteria guidance documents. Additionally, the methodologies have been reviewed by EPA's Science Advisory Board (SAB) of external experts.

EPA has included in the record of this rule the aquatic life methodology as described in ''Appendix B—Guidelines for Deriving Water Quality Criteria for the Protection of Aquatic Life and Its Uses'' to the ''Water Quality Criteria Documents; Availability'' (45 FR 79341, November 28, 1980) as amended by the ''Summary of Revisions to Guidelines for Deriving Numerical National Water Quality Criteria for the Protection of Aquatic Organisms and Their Uses'' (50 FR 30792, July 29, 1985). (**Note:** Throughout the remainder of this preamble, this reference is described as the 1985 Guidelines. Any page number references are to the actual guidance document, not the notice of availability in the **Federal Register**. A copy of the 1985 Guidelines is available through the National Technical Information Service (PB85–227049), is in the administrative record for this rule, and is abstracted in Appendix A of *Quality Criteria for Water,* 1986.) EPA has also included in the administrative record of this rule the human health methodology as described in ''Appendix C—Guidelines and Methodology Used in the Preparation of Health Effects Assessment Chapters of the Consent Decree Water Criteria Documents'' (45 FR 79347, November 28, 1980). (Note: Throughout the remainder of this preamble, this reference is described as the Human Health Guidelines or the 1980 Guidelines.) EPA also recommends that the following be reviewed: ''Appendix D—Response to Comments on Guidelines for Deriving Water Quality Criteria for the Protection of Aquatic Life and Its Uses,'' (45 FR 79357, November 28, 1980); ''Appendix E—Responses to Public Comments on the Human Health Effects Methodology for Deriving Ambient Water Quality Criteria'' (45 FR 79368, November 28, 1980); and ''Appendix B—Response to Comments on Guidelines for Deriving Numerical National Water Quality Criteria for the Protection of Aquatic Organisms and Their Uses'' (50 FR 30793, July 29, 1985). EPA placed into the administrative record for this rulemaking the most current individual criteria guidance for the priority toxic pollutants included in today's rule. (**Note:** All references to appendices are to the associated **Federal Register** publication.)

EPA received many comments related to the issue of what criteria should apply in the CTR if the CWA section 304(a) criteria guidance is undergoing re-evaluation, or if new data are developed that may affect a recommended criterion. As science is always evolving, EPA is faced with the challenge of promulgating criteria that reflect the best science and sound science. EPA addressed this challenge in some detail in its **Federal Register** notice that contained the Agency's current section 304(a) criteria guidance (63 FR 68335, December 10, 1998). There, EPA articulated its policy, reiterated here, that the existing criteria guidance represent the Agency's best assessment until such time as EPA's re-evaluation of a criteria guidance value for a particular chemical is complete. The reason for this is that both EPA's human health criteria guidance and aquatic life criteria guidance are developed taking into account numerous variables. For example, for human health criteria guidance, EPA evaluates many diverse toxicity studies, whose results feed into a reference dose or cancer potency estimate that, along with a number of exposure factors and determination of risk level, results in a guidance criterion. For aquatic life, EPA evaluates many diverse aquatic toxicity studies to determine chronic and acute toxicity taking into account how other factors (such as pH, temperature or hardness) affect toxicity. EPA also, to the extent possible, addresses bioaccumulation or bioconcentration. EPA then uses this toxicity information along with exposure information to determine the guidance criterion. Importantly, EPA subjects such evaluation to peer review and/or public comment.

For these reasons, EPA generally does not make a change to the 304(a) criteria guidance based on a partial picture of the evolving science. This makes sense, because to address one piece of new data without looking at all relevant data is less efficient and results in regulatory impacts that may go back and forth, when in the end, the criteria guidance value does not change that much. Certain new changes, however, do warrant change in criteria guidance, such as a change in a value in EPA's Integrated Risk Information System (IRIS) because it represents the Agency consensus about human health impacts. These changes are sufficiently examined across the Agency such that EPA believes they can be incorporated into EPA's water quality criteria guidance. EPA has followed this approach in the CTR. Included in the administrative record for today's rule is a document entitled ''Status of Clean Water Act Section 304(a) Criteria'' which further explains EPA's policy on managing change to criteria guidance.

2. Aquatic Life Criteria

Aquatic life criteria may be expressed in numeric or narrative form. EPA's 1985 Guidelines describe an objective, internally consistent and appropriate way of deriving chemical-specific, numeric water quality criteria for the protection of the presence of, as well as

the uses of, both fresh and salt water aquatic organisms.

An aquatic life criterion derived using EPA's CWA section 304(a) method ''might be thought of as an estimate of the highest concentration of a substance in water which does not present a significant risk to the aquatic organisms in the water and their uses.'' (45 FR 79341.) EPA's guidelines are designed to derive criteria that protect aquatic communities. EPA's 1985 Guidelines attempt to provide a reasonable and adequate amount of protection with only a small possibility of substantial overprotection or underprotection. As discussed in detail below, there are several individual factors which may make the criteria somewhat overprotective or underprotective. The approach EPA is using is believed to be as well balanced as possible, given the state of the science.

Numerical aquatic life criteria derived using EPA's 1985 Guidelines are expressed as short-term and long-term averages, rather than one number, in order that the criterion more accurately reflect toxicological and practical realities. The combination of a criterion maximum concentration (CMC), a short-term concentration limit, and a criterion continuous concentration (CCC), a four-day average concentration limit, are designed to provide protection of aquatic life and its uses from acute and chronic toxicity to animals and plants, without being as restrictive as a one-number criterion would have to be (1985 Guidelines, pages 4 & 5). The terms CMC and CCC are the formal names for the two (acute and chronic) values of a criterion for a pollutant; however, this document will also use the informal synonyms acute criterion and chronic criterion.

The two-number criteria are intended to identify average pollutant concentrations which will produce water quality generally suited to maintenance of aquatic life and designated uses while restricting the duration of excursions over the average so that total exposures will not cause unacceptable adverse effects. Merely specifying an average value over a time period may be insufficient unless the time period is short, because excursions higher than the average may kill or cause substantial damage in short periods.

A minimum data set of eight specified families is recommended for criteria development (details are given in the 1985 Guidelines, page 22). The eight specific families are intended to be representative of a wide spectrum of aquatic life. For this reason it is not necessary that the specific organisms tested be actually present in the water body. EPA's application of its guidelines to develop the criteria matrix in this rule is judged by the Agency to be appropriate for all waters of the United States (U.S.), and to all ecosystems (1985 Guidelines, page 4) including those waters of the U.S. and ecosystems in the State of California.

Fresh water and salt water (including both estuarine and marine waters) have different chemical compositions, and freshwater and saltwater species often do not inhabit the same water. To provide additional accuracy, criteria are developed for fresh water and for salt water.

For this rule, EPA updated freshwater aquatic life criteria contained in CWA section 304(a) criteria guidance first published in the early 1980's and later modified in the NTR, as amended, for the following ten pollutants: arsenic, cadmium, chromium (VI), copper, dieldrin, endrin, lindane (gamma BHC), nickel, pentachlorophenol, and zinc. The updates used as the basis for this rule are explained in a technical support document entitled, *1995 Updates: Water Quality Criteria Documents for the Protection of Aquatic Life in Ambient Water* (U.S. EPA–820–B–96–001, September 1996), available in the administrative record to this rulemaking; this document presents the derivation of each of the final CMCs and CCCs and the toxicity studies from which the updated freshwater criteria for the ten pollutants were derived.

The polychlorinated biphenyls (PCB) criteria in the criteria matrix for this rule differs from that in the NTR, as amended; for this rule, the criteria are expressed as the sum of seven aroclors, while for the NTR, as amended, the criteria are expressed for each of seven aroclors. The aquatic life criteria for PCBs in the CTR are based on the criteria contained in the 1980 criteria guidance document for PCBs which is included in the administrative record for this rule. This criteria document explains the derivation of aquatic life criteria based on total PCBs. For more information see the Response to Comments document for this rule. Today's chronic aquatic life criteria for PCBs are based on a final residue value (FRV). In EPA's guidelines for deriving aquatic life criteria, an FRV-based criterion is intended to prevent concentrations of pollutants in commercially or recreationally important aquatic species from affecting the marketability of those species or affecting the wildlife that consume aquatic life.

The proposed CTR included an updated freshwater and saltwater aquatic life criteria for mercury. In today's final rule, EPA has reserved the mercury criteria for freshwater and saltwater aquatic life, but is promulgating human health criteria for mercury for all surface waters in California. In some instances, the human health mercury criteria included in today's final rule may not protect some aquatic species or threatened or endangered species. In such instances, more stringent mercury limits may be determined and implemented through use of the State's narrative criterion. The reasons for reserving the mercury aquatic life numbers are explained in further detail in Section L, Endangered Species Act.

a. Freshwater Acute Selenium Criterion

EPA proposed a different freshwater acute aquatic life criterion for selenium for this rule than was promulgated in the NTR, as amended. EPA's proposed action was consistent with EPA's proposed selenium criterion maximum concentration for the Water Quality Guidance for the Great Lakes System (61 FR 58444, November 14, 1996). This proposal took into account data showing that selenium's two most prevalent oxidation states, selenite and selenate, present differing potentials for aquatic toxicity, as well as new data which indicated that various forms of selenium are additive. Additivity increases the toxicity of mixtures of different forms of the pollutant. The proposed approach produces a different selenium acute criterion concentration, or CMC, depending upon the relative proportions of selenite, selenate, and other forms of selenium that are present.

The preamble to the August 5, 1997, proposed rule provided a lengthy discussion of this proposed criterion for the State of California. See 62 FR 42160–42208. EPA incorporates that discussion here as part of this rulemaking record. In 1996, a similar discussion was included in the proposed rule for the Great Lakes System. Commenters questioned several aspects of the Great Lakes proposal. EPA is continuing to respond to those comments, and to follow up with additional literature review and toxicity testing. In addition, the U.S. FWS and U.S. NMFS (collectively, the Services) are concerned that EPA's proposed criterion may not be sufficiently protective of certain threatened and endangered species in California. Because the Services believe there is a lack of data to show for certain that the proposed criterion would not affect threatened and endangered species, the Services prefer that EPA further investigate the protectiveness of the

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criterion before finalizing the proposed criterion. Therefore, EPA is not promulgating a final acute freshwater selenium criterion at this time.

b. Dissolved Metals Criteria

In December of 1992, in the NTR, EPA promulgated water quality criteria for several States that had failed to meet the requirements of CWA section 303(c)(2)(B). Included among the water quality criteria promulgated were numeric criteria for the protection of aquatic life for 11 metals: arsenic, cadmium, chromium (III), chromium (VI), copper, lead, mercury, nickel, selenium, silver and zinc. Criteria for two metals applied to the State of California: chromium III and selenium.

The Agency received extensive public comment during the development of the NTR regarding the most appropriate approach for expressing the aquatic life metals criteria. The principal issue was the correlation between metals that are measured and metals that are bioavailable and toxic to aquatic life. It is now the Agency's policy that the use of dissolved metal to set and measure compliance with aquatic life water quality standards is the recommended approach, because dissolved metal more closely approximates the bioavailable fraction of the metal in the water column than does total recoverable metal.

Since EPA's previous aquatic life criteria guidance had been expressed as total recoverable metal, to express the criteria as dissolved, conversion factors were developed to account for the possible presence of particulate metal in the laboratory toxicity tests used to develop the total recoverable criteria. EPA included a set of recommended freshwater conversion factors with its Metals Policy (see Office of Water Policy and Technical Guidance on Interpretation and Implementation of Aquatic Life Metals Criteria, Martha G. Prothro, Acting Assistant Administrator for Water, October 1, 1993). Based on additional laboratory evaluations that simulated the original toxicity tests, EPA refined the procedures used to develop freshwater conversion factors for aquatic life criteria. These new conversion factors were made available for public review and comment in the amendments to the NTR on May 4, 1995, at 60 FR 22229. They are also contained in today's rule at 40 CFR 131.38(b)(2).

The preamble to the August 5, 1997, proposed rule provided a more detailed discussion of EPA's metals policy concerning the aquatic life water quality criteria for the State of California. See 62 FR 42160–42208. EPA incorporates that discussion here as part of this rulemaking record. Many commenters strongly supported the Agency's policy on dissolved metals aquatic life criteria. A few commenters expressed an opinion that the metals policy may not provide criteria that are adequately protective of aquatic or other species. Responses to those comments are contained in a memo to the CTR record entitled ''Discussion of the Use of Dissolved Metals in the CTR'' (February 1, 2000, Jeanette Wiltse) and EPA's response to comments document which are both contained in the administrative record for the final rule.

Calculation of Aquatic Life Dissolved Metals Criteria: Metals criteria values for aquatic life in today's rule in the matrix at 131.38(b)(1) are shown as dissolved metal. These criteria have been calculated in one of two ways. For freshwater metals criteria that are hardness-dependent, the metals criteria value is calculated separately for each hardness using the table at 40 CFR 131.38(b)(2). (The hardness-dependent freshwater values presented in the matrix at 40 CFR 131.38(b)(1) have been calculated using a hardness of 100 mg/l as CaCO3 for illustrative purposes only.) The hardness-dependent criteria are then multiplied by the appropriate conversion factors in the table at 40 CFR 131.38(b)(2). Saltwater and freshwater metals criteria that are not hardness-dependent are calculated by taking the total recoverable criteria values (from EPA's national section 304(a) criteria guidance, as updated and described in section F.2.a.) before rounding, and multiplying them by the appropriate conversion factors. The final dissolved metals criteria values, as they appear in the matrix at 40 CFR 131.38(b)(1), are rounded to two significant figures.

Translators for Dissolved to Total Recoverable Metals Limits: EPA's National Pollutant Discharge Elimination System (NPDES) regulations require that limits for metals in permits be stated as total recoverable in most cases (see 40 CFR 122.45(c)) except when an effluent guideline specifies the limitation in another form of the metal, the approved analytical methods measure only dissolved metal, or the permit writer expresses a metal's limit in another form (*e.g.,* dissolved, specific valence, or total) when required to carry out provisions of the CWA. This is because the chemical conditions in ambient waters frequently differ substantially from those in the effluent and these differences result in changes in the partitioning between dissolved and absorbed forms of the metal. This means that if effluent limits were expressed in the dissolved form, additional particulate metal could dissolve in the receiving water causing the criteria to be exceeded. Expressing criteria as dissolved metal requires translation between different metal forms in the calculation of the permit limit so that a total recoverable permit limit can be established that will achieve water quality standards. Thus, it is important that permitting authorities and other authorities have the ability to translate between dissolved metal in ambient waters and total recoverable metal in effluent.

EPA has completed guidance on the use of translators to convert from dissolved metals criteria to total recoverable permit limits. The document, *The Metals Translator: Guidance for Calculating a Total Recoverable Permit Limit From a Dissolved Criterion* (EPA 823–B–96–007, June 1996), is included in the administrative record for today's rule. This technical guidance examines how to develop a metals translator which is defined as the fraction of total recoverable metal in the downstream water that is dissolved, *i.e.,* the dissolved metal concentration divided by the total recoverable metal concentration. A translator may take one of three forms: (1) It may be assumed to be equivalent to the criteria guidance conversion factors; (2) it may be developed directly as the ratio of dissolved to total recoverable metal; and (3) it may be developed through the use of a partition coefficient that is functionally related to the number of metal binding sites on the adsorbent in the water column (*e.g.,* concentrations of total suspended solids or TSS). This guidance document discusses these three forms of translators, as well as field study designs, data generation and analysis, and site-specific study plans to generate site-specific translators.

California Regional Water Quality Control Boards may use any of these methods in developing water quality-based permit limits to meet water quality standards based on dissolved metals criteria. EPA encourages the State to adopt a statewide policy on the use of translators so that the most appropriate method or methods are used consistently within California.

c. Application of Metals Criteria

In selecting an approach for implementing the metals criteria, the principal issue is the correlation between metals that are measured and metals that are biologically available and toxic. In order to assure that the metals criteria are appropriate for the chemical conditions under which they are applied, EPA is providing for the

adjustment of the criteria through application of the ''water-effect ratio'' procedure. EPA notes that performing the testing to use a site-specific water-effect ratio is optional on the part of the State.

In the NTR, as amended, EPA identified the water-effect ratio (WER) procedure as a method for optional site-specific criteria development for certain metals. The WER approach compares bioavailability and toxicity of a specific pollutant in receiving waters and in laboratory waters. A WER is an appropriate measure of the toxicity of a material obtained in a site water divided by the same measure of the toxicity of the same material obtained simultaneously in a laboratory dilution water.

On February 22, 1994, EPA issued *Interim Guidance on the Determination and Use of the Water-Effect Ratios for Metals* (EPA 823-B–94–001) now incorporated into the updated Second Edition of the Water Quality Standards Handbook, Appendix L. A copy of the Handbook is contained in the administrative record for today's rule. In accordance with the WER guidance and where application of the WER is deemed appropriate, EPA strongly encourages the application of the WER on a watershed or water body basis as part of a water quality criteria in California as opposed to the application on a discharger-by-discharger basis through individual NPDES permits. This approach is technically sound and an efficient use of resources. However, discharger specific WERs for individual NPDES permit limits are possible and potentially efficient where the NPDES discharger is the only point source discharger to a specific water body.

The rule requires a default WER value of 1.0 which will be assumed, if no site-specific WER is determined. To use a WER other than the default of 1.0, the rule requires that the WER must be determined as set forth in EPA's WER guidance or by another scientifically defensible method that has been adopted by the State as part of its water quality standards program and approved by EPA.

The WER is a more comprehensive mechanism for addressing bioavailability issues than simply expressing the criteria in terms of dissolved metal. Consequently, expressing the criteria in terms of dissolved metal, as done in today's rule for California, does not completely eliminate the utility of the WER. This is particularly true for copper, a metal that forms reduced-toxicity complexes with dissolved organic matter.

The *Interim Guidance on Determination and Use of Water-Effect Ratios for Metals* explains the relationship between WERs for dissolved criteria and WERs for total recoverable criteria. Dissolved measurements are to be used in the site-specific toxicity testing underlying the WERs for dissolved criteria. Because WERs for dissolved criteria generally are little affected by elevated particulate concentrations, EPA expects those WERs to be somewhat less than WERs for total recoverable criteria in such situations. Nevertheless, after the site-specific ratio of dissolved to total metal has been taken into account, EPA expects a permit limit derived using a WER for a dissolved criterion to be similar to the permit limit that would be derived from the WER for the corresponding total recoverable criterion.

d. Saltwater Copper Criteria

The saltwater copper criteria for aquatic life in today's rule are 4.8 μg/l (CMC) and 3.1 μg/l (CCC) in the dissolved form. These criteria reflect new data including data collected from studies for the New York/New Jersey Harbor and the San Francisco Bay indicating a need to revise the former copper 304(a) criteria guidance document to reflect a change in the saltwater CMC and CCC aquatic life values. These data also reflect a comprehensive literature search resulting in added toxicity test data for seven new species to the database for the saltwater copper criteria. EPA believes these new data have national implications and the national criteria guidance now contains a CMC of 4.8 μg/l dissolved and a CCC of 3.1 μg/l dissolved. In the amendments to the NTR, EPA noticed the availability of data to support these changes to the NTR, and solicited comments. The data can be found in the draft document entitled, *Ambient Water Quality Criteria—Copper, Addendum 1995.* This document is available from the Office of Water Resource Center and is available for review in the administrative record for today's rule.

e. Chronic Averaging Period

In establishing water quality criteria, EPA generally recommends an ''averaging period'' which reflects the duration of exposure required to elicit effects in individual organisms (TSD, Appendix D–2). The criteria continuous concentration, or CCC, is intended to be the highest concentration that could be maintained indefinitely in a water body without causing an unacceptable effect on the aquatic community or its uses (TSD, Appendix D–1). As aquatic organisms do not generally experience steady exposure, but rather fluctuating exposures to pollutants, and because aquatic organisms can generally tolerate higher concentrations of pollutants over a shorter periods of time, EPA expects that the concentration of a pollutant can exceed the CCC without causing an unacceptable effect if (a) the magnitude and duration of exceedences are appropriately limited and (b) there are compensating periods of time during which the concentration is below the CCC. This is done by specifying a duration of an ''averaging period'' over which the average concentration should not exceed the CCC more often than specified by the frequency (TSD, Appendix D–1).

EPA is promulgating a 4-day averaging period for chronic criteria, which means that measured or predicted ambient pollutant concentrations should be averaged over a 4-day period to determine attainment of chronic criteria. The State may apply to EPA for approval of an alternative averaging period. To do so, the State must submit to EPA the basis for such alternative averaging period.

The most important consideration for setting an appropriate averaging period is the length of time that sensitive organisms can tolerate exposure to a pollutant at levels exceeding a criterion without showing adverse effects on survival, growth, or reproduction. EPA believes that the chronic averaging period must be shorter than the duration of the chronic tests on which the CCC is based, since, in some cases, effects are elicited before exposure of the entire duration. Most of the toxicity tests used to establish the chronic criteria are conducted using steady exposure to toxicants for a least 28 days (TSD, page 35). Some chronic tests, however, are much shorter than this (TSD, Appendix D–2). EPA selected the 4-day averaging period based on the shortest duration in which chronic test effects are sometimes observed for certain species and toxicants. In addition, EPA believes that the results of some chronic tests are due to an acute effect on a sensitive life stage that occurs some time during the test, rather than being caused by long-term stress or long-term accumulation of the test material in the organisms.

Additional discussion of the rationale for the 4-day averaging period is contained in Appendix D of the TSD. Balancing all of the above factors and data, EPA believes that the 4-day averaging period falls within the scientifically reasonable range of values for choice of the averaging period, and is an appropriate length of time of

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pollutant exposure to ensure protection of sensitive organisms.

EPA established a 4-day averaging period in the NTR. In settlement of litigation on the NTR, EPA stated that it was ''in the midst of conducting, sponsoring, or planning research related to the basis for and application of'' water quality criteria and mentioned the issue of averaging period. See Partial Settlement Agreement in *American Forest and Paper Ass'n, Inc. et al.* v. *U.S. EPA* (Consolidated Case No. 93–0694 (RMU), D.D.C.). EPA is re-evaluating issues raised about averaging periods and will, if appropriate, revise the 1985 Guidelines.

EPA received public comment relevant to the averaging period during the comment period for the 1995 Amendments to the NTR (60 FR 22228, May 4, 1995), although these public comments did not address the chronic averaging period separately from the allowable excursion frequency and the design flow. Comments recommended that EPA use the 30Q5 design flow for chronic criteria.

While EPA is undertaking analysis of the chronic design conditions as part of the revisions to the 1985 Guidelines, EPA has not yet completed this work. Until this work is complete, for the reasons set forth in the TSD, EPA continues to believe that the 4-day chronic averaging period represents a reasonable, defensible value for this parameter.

EPA added language to the final rule which will enable the State to adopt alternative averaging periods and frequencies and associated design flows where appropriate. The State may apply to EPA for approval of alternative averaging periods and frequencies and related design flows; the State must submit the bases for any changes. Before approving any change, EPA will publish for public comment, a notice proposing the changes.

f. Hardness

Freshwater aquatic life criteria for certain metals are expressed as a function of hardness because hardness and/or water quality characteristics that are usually correlated with hardness can reduce or increase the toxicities of some metals. Hardness is used as a surrogate for a number of water quality characteristics which affect the toxicity of metals in a variety of ways. Increasing hardness has the effect of decreasing the toxicity of metals. Water quality criteria to protect aquatic life may be calculated at different concentrations of hardnesses measured in milligrams per liter (mg/l) as calcium carbonate ($CaCO_3$).

Section 131.38(b)(2) of the final rule presents the hardness-dependent equations for freshwater metals criteria. For example, using the equation for zinc, the total recoverable CMCs at a hardness of 10, 50, 100 or 200 mg/l as $CaCO_3$ are 17, 67, 120 and 220 micrograms per liter (µg/l), respectively. Thus, the specific value in the table in the regulatory text is for illustrative purposes only. Most of the data used to develop these hardness equations for deriving aquatic life criteria for metals were in the range of 25 mg/l to 400 mg/l as $CaCO_3$, and the formulas are therefore most accurate in this range. The majority of surface waters nationwide and in California have a hardness of less than 400 mg/l as $CaCO_3$.

In the past, EPA generally recommended that 25 mg/l as $CaCO_3$ be used as a default hardness value in deriving freshwater aquatic life criteria for metals when the ambient (or actual) hardness value is below 25 mg/l as $CaCO_3$. However, use of the approach results in criteria that may not be fully protective. Therefore, for waters with a hardness of less than 25 mg/l as $CaCO_3$, criteria should be calculated using the actual ambient hardness of the surface water.

In the past, EPA generally recommended that if the hardness was over 400 mg/l, two options were available: (1) Calculate the criterion using a default WER of 1.0 and using a hardness of 400 mg/l in the hardness equation; or (2) calculate the criterion using a WER and the actual ambient hardness of the surface water in the equation. Use of the second option is expected to result in the level of protection intended in the 1985 Guidelines whereas use of the first option is thought to result in an even more protective aquatic life criterion. At high hardness there is an indication that hardness and related inorganic water quality characteristics do not have as much of an effect on toxicity of metals as they do at lower hardnesses. Related water quality characteristics do not correlate as well at higher hardnesses as they do at lower hardnesses. Therefore, if hardness is over 400 mg/l as $CaCO_3$, a hardness of 400 mg/l as $CaCO_3$ should be used with a default WER of 1.0; alternatively, the WER and actual hardness of the surface water may be used.

EPA requested comments in the NTR amendments on the use of actual ambient hardness for calculating criteria when the hardness is below 25 mg/l as $CaCO_3$, and when hardness is greater than 400 mg/l as $CaCO_3$. Most of the comments received were in favor of using the actual hardness with the use of the water-effect ratio (1.0 unless otherwise specified by the permitting authority) when the hardness is greater than 400 mg/l as $CaCO_3$. A few commenters did not want the water-effect ratio to be mandatory in calculating hardness, and other commenters had concerns about being responsible for deriving an appropriate water-effect ratio. Overall, the commenters were in favor of using the actual hardness when calculating hardness-dependent freshwater metals criteria for hardness between 0–400 mg/l as $CaCO_3$. EPA took those comments into account in promulgating today's rule.

A hardness equation is most accurate when the relationships between hardness and the other important inorganic constituents, notably alkalinity and pH, are nearly identical in all of the dilution waters used in the toxicity tests and in the surface waters to which the equation is to be applied. If an effluent raises hardness but not alkalinity and/or pH, using the hardness of the downstream water might provide a lower level of protection than intended by the 1985 guidelines. If it appears that an effluent causes hardness to be inconsistent with alkalinity and/or pH, the intended level of protection will usually be maintained or exceeded if either (1) data are available to demonstrate that alkalinity and/or pH do not affect the toxicity of the metal, or (2) the hardness used in the hardness equation is the hardness of upstream water that does not contain the effluent. The level of protection intended by the 1985 guidelines can also be provided by using the WER procedure.

In some cases, capping hardness at 400 mg/l might result in a level of protection that is higher than that intended by the 1985 guidelines, but any such increase in the level of protection can be overcome by use of the WER procedure. For metals whose criteria are expressed as hardness equations, use of the WER procedure will generally be intended to account for effects of such water quality characteristics as total organic carbon on the toxicities of metals. The WER procedure is equally useful for accounting for any deviation from a hardness equation in a site water.

3. Human Health Criteria

EPA's CWA section 304(a) human health criteria guidance provides criteria recommendations to minimize adverse human effects due to substances in ambient water. EPA's CWA section 304(a) criteria guidance for human health are based on two types of

toxicological endpoints: (1) carcinogenicity and (2) systemic toxicity (i.e., all other adverse effects other than cancer). Thus, there are two procedures for assessing these health effects: one for carcinogens and one for non-carcinogens.

If there are no data on how a chemical agent causes cancer, EPA's existing human health guidelines assume that carcinogenicity is a ''non-threshold phenomenon,'' that is, there are no ''safe'' or ''no-effect levels'' because even extremely small doses are assumed to cause a finite increase in the incidence of the effect (i.e., cancer). Therefore, EPA's water quality criteria guidance for carcinogens are presented as pollutant concentrations corresponding to increases in the risk of developing cancer. See Human Health Guidelines at 45 FR 79347.

With existing criteria, pollutants that do not manifest any apparent carcinogenic effect in animal studies (i.e., systemic toxicants), EPA assumes that the pollutant has a threshold below which no effect will be observed. This assumption is based on the premise that a physiological mechanism exists within living organisms to avoid or overcome the adverse effect of the pollutant below the threshold concentration.

Note: Recent changes in the Agency's cancer guidelines addressing these assumptions are described in the Draft Water Quality Criteria Methodology: Human Health, 63 FR 43756, August 14, 1998.

The human health risks of a substance cannot be determined with any degree of confidence unless dose-response relationships are quantified. Therefore, a dose-response assessment is required before a criterion can be calculated. The dose-response assessment determines the quantitative relationships between the amount of exposure to a substance and the onset of toxic injury or disease. Data for determining dose-response relationships are typically derived from animal studies, or less frequently, from epidemiological studies in exposed populations.

The dose-response information needed for carcinogens is an estimate of the carcinogenic potency of the compound. Carcinogenic potency is defined here as a general term for a chemical's human cancer-causing potential. This term is often used loosely to refer to the more specific carcinogenic or cancer slope factor which is defined as an estimate of carcinogenic potency derived from animal studies or epidemiological data of human exposure. It is based on extrapolation from test exposures of high doses over relatively short periods of time to more realistic low doses over a lifetime exposure period by use of linear extrapolation models. The cancer slope factor, q1*, is EPA's estimate of carcinogenic potency and is intended to be a conservative upper bound estimate (e.g. 95% upper bound confidence limit).

For non-carcinogens, EPA uses the reference dose (RfD) as the dose-response parameter in calculating the criteria. For non-carcinogens, oral RfD assessments (hereinafter simply ''RfDs'') are developed based on pollutant concentrations that cause threshold effects. The RfD is an estimate (with uncertainty spanning perhaps an order of magnitude) of a daily exposure to the human population (including sensitive subgroups) that is likely to be without appreciable risk of deleterious effects during a lifetime. See Human Health Guidelines. The RfD was formerly referred to as an ''Acceptable Daily Intake'' or ADI. The RfD is useful as a reference point for gauging the potential effect of other doses. Doses that are less than the RfD are not likely to be associated with any health risks, and are therefore less likely to be of regulatory concern. As the frequency of exposures exceeding the RfD increases and as the size of the excess increases, the probability increases that adverse effect may be observed in a human population. Nonetheless, a clear conclusion cannot be categorically drawn that all doses below the RfD are ''acceptable'' and that all doses in excess of the RfD are ''unacceptable.'' In extrapolating non-carcinogen animal test data to humans to derive an RfD, EPA divides either a No Observed-Adverse Effect Level (NOAEL), Lowest Observed Adverse Effect Level (LOAEL), or other benchmark dose observed in animal studies by an ''uncertainty factor'' which is based on professional judgment of toxicologists and typically ranges from 10 to 10,000.

For CWA section 304(a) human health criteria development, EPA typically considers only exposures to a pollutant that occur through the ingestion of water and contaminated fish and shellfish. Thus, the criteria are based on an assessment of risks related to the surface water exposure route only where designated uses are drinking water and fish and shellfish consumption.

The assumed exposure pathways in calculating the criteria are the consumption of 2 liters per day of water at the criteria concentration and the consumption of 6.5 grams per day of fish and shellfish contaminated at a level equal to the criteria concentration but multiplied by a ''bioconcentration factor.'' The use of fish and shellfish consumption as an exposure factor requires the quantification of pollutant residues in the edible portions of the ingested species.

Bioconcentration factors (BCFs) are used to relate pollutant residues in aquatic organisms to the pollutant concentration in ambient waters. BCFs are quantified by various procedures depending on the lipid solubility of the pollutant. For lipid soluble pollutants, the average BCF is calculated from the weighted average percent lipids in the edible portions of fish and shellfish, which is about 3%; or it is calculated from theoretical considerations using the octanol/water partition coefficient. For non-lipid soluble compounds, the BCF is determined empirically. The assumed water consumption is taken from the National Academy of Sciences publication *Drinking Water and Health* (1977). (Referenced in the Human Health Guidelines.) This value is appropriate as it includes a margin of safety so that the general population is protected. See also EPA's discussion of the 2.0 liters/day assumption at 61 FR 65183 (Dec. 11, 1996). The 6.5 grams per day contaminated fish and shellfish consumption value was equivalent to the average per-capita consumption rate of all (contaminated and non-contaminated) freshwater and estuarine fish and shellfish for the U.S. population. See Human Health Guidelines.

EPA assumes in calculating water quality criteria that the exposed individual is an average adult with body weight of 70 kilograms. EPA assumes 6.5 grams per day of contaminated fish and shellfish consumption and 2.0 liters per day of contaminated drinking water consumption for a 70 kilogram person in calculating the criteria. Regarding issues concerning criteria development and differences in dose per kilogram of body weight, RfDs are always derived based on the most sensitive health effect endpoint. Therefore, when that basis is due to a chronic or lifetime health effect, the exposure parameters assume the exposed individual to be the average adult, as indicated above.

In the absence of this final rule, there may be particular risks to children. EPA believes that children are protected by the human health criteria contained in this final rule. Children are protected against other less sensitive adverse health endpoints due to the conservative way that the RfDs are derived. An RfD is a public health protective endpoint. It is an amount of a chemical that can be consumed on a daily basis for a lifetime without expecting an adverse effect. RfDs are based on sensitive health endpoints and

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are calculated to be protective for sensitive human sub-populations including children. If the basis of the RfD was due to an acute or shorter-term developmental effect, EPA uses exposure parameters other than those indicated above. Specifically, EPA uses parameters most representative of the population of concern (*e.g.,* the health criteria for nitrates based on infant exposure parameters). For carcinogens, the risk assessments are upper bound one in a million (10^{-6}) lifetime risk numbers. The risk to children is not likely to exceed these upper bounds estimates and may be zero at low doses. The exposure assumptions for drinking water and fish protect children because they are conservative for infants and children. EPA assumes 2 liters of untreated surface water and 6.5 grams of freshwater and estuarine fish are consumed each day. EPA believes the adult fish consumption assumption is conservative for children because children generally consume marine fish not freshwater and estuarine.

EPA has a process to develop a scientific consensus on oral reference dose assessments and carcinogenicity assessments (hereinafter simply cancer slope factors or slope factors or q1*s). Through this process, EPA develops a consensus of Agency opinion which is then used throughout EPA in risk management decision-making. EPA maintains an electronic data base which contains the official Agency consensus for oral RfD assessments and carcinogenicity assessments which is known as the Integrated Risk Information System (IRIS). It is available for use by the public on the National Institutes of Health's National Library of Medicine's TOXNET system, and through diskettes from the National Technical Information Service (NTIS). (NTIS access number is PB 90–591330.)

Section 304(a)(1) of the CWA requires EPA to periodically revise its criteria guidance to reflect the latest scientific knowledge: ''(A) On the kind and extent of all identifiable effects on health and welfare * * *; (B) on the concentration and dispersal of pollutants, or their byproducts, through biological, physical, and chemical processes; and (C) on the effects of pollutants on the biological community diversity, productivity, and stability, including information on the factors affecting eutrophication rates of organic and inorganic sedimentation for varying types of receiving waters.'' In developing up-to-date water quality criteria for the protection of human health, EPA uses the most recent IRIS values (RfDs and q1*s) as the toxicological basis in the criterion calculation. IRIS reflects EPA's most current consensus on the toxicological assessment for a chemical. In developing the criteria in today's rule, the IRIS values as of October 1996 were used together with currently accepted exposure parameters for bioconcentration, fish and shellfish and water consumption, and body weight. The IRIS cover sheet for each pollutant criteria included in today's rule is contained in the administrative record.

For the human health criteria included in today's rule, EPA used the Human Health Guidelines on which criteria recommendations from the appropriate CWA section 304(a) criteria guidance document were based. (These documents are also placed in the administrative record for today's rule.) Where EPA has changed any parameters in IRIS used in criteria derivation since issuance of the criteria guidance document, EPA recalculated the criteria recommendation with the latest IRIS information. Thus, there are differences between the original 1980 criteria guidance document recommendations, and those in this rule, but this rule presents EPA's most current CWA section 304(a) criteria recommendation. The basis (q1* or RfD) and BCF for each pollutant criterion in today's rule is contained in the rule's Administrative Record Matrix which is included in the administrative record for the rule. In addition, all recalculated human health numbers are denoted by an ''a'' in the criteria matrix in 40 CFR 131.38(b)(1) of the rule. The pollutants for which a revised human health criterion has been calculated since the December 1992 NTR include:

mercury
dichlorobromomethane
1,2-dichloropropane
1,2-trans-dichloroethylene
2,4-dimethylphenol
acenaphthene
benzo(a)anthracene
benzo(a)pyrene
benzo(b)flouranthene
benzo(k)flouranthene
2-chloronaphthalene
chrysene
dibenzo(a,h)anthracene
indeno(1,2,3-cd)pyrene
N-nitrosodi-n-propylamine
alpha-endosulfan
beta-endosulfan
endosulfan sulfate
2-chlorophenol
butylbenzyl phthalate
polychlorinated biphenyls.

In November of 1991, the proposed NTR presented criteria for several pollutants in parentheses. These were pollutants for which, in 1980, insufficient information existed to develop human health water quality criteria, but for which, in 1991, sufficient information existed. Since these criteria did not undergo the public review and comment in a manner similar to the other water quality criteria presented in the NTR (for which sufficient information was available in 1980 to develop a criterion, as presented in the 1980 criteria guidance documents), they were not proposed for adoption into the water quality criteria, but were presented to serve as notice for inclusion in future State triennial reviews. Today's rule promulgates criteria for these nine pollutants:

copper
1, 2-dichloropropane
1,2-trans-dichloroethylene
2,4-dimethylphenol
acenaphthene
2-chloronaphthalene
N-nitrosodi-n-propylamine
2-chlorophenol
butylbenzene phthalate

All the criteria are based on IRIS values—either an RfD or q1*—which were listed on IRIS as of November 1991, the date of the proposed NTR. These values have not changed since the final NTR was published in December of 1992. The rule's Administrative Record Matrix in the administrative record of today's rule contains the specific RfDs, q1*s, and BCFs used in calculating these criteria.

Proposed Changes to the Human Health Criteria Methodology: EPA recently proposed revisions to the 1980 ambient water quality criteria derivation guidelines (the Human Health Guidelines). See *Draft Water Quality Criteria Methodology: Human Health,* 63 FR 43756, August 14, 1998; see also *Draft Water Quality Criteria Methodology: Human Health,* U.S. EPA Office of Water, EPA 822–Z–98–001. The EPA revisions consist of five documents: *Draft Water Quality Criteria Methodology: Human Health,* EPA 822–Z–98–001; *Ambient Water Quality Criteria Derivation Methodology Human Health, Technical Support Document, Final Draft,* EPA–822–B–98–005; and three Ambient Water Quality Criteria for the Protection of Human Health, Drafts—one each for Acrylonitrile, 1,3-Dichloropropene (1,3-DCP), and Hexachlorobutadiene (HCBD), respectively, EPA–822–R–98–006, –005, and –004. All five documents are contained in the administrative record for today's rule.

The proposed methodology revisions reflect significant scientific advances that have occurred during the past nineteen years in such key areas as cancer and noncancer risk assessments, exposure assessments and bioaccumulation. For specific details on

these proposed changes and others, please refer to the **Federal Register** notice or the EPA document.

It should be noted that some of the proposed changes may result in significant numeric changes in the ambient water quality criteria. However, EPA will continue to rely on existing criteria as the basis for regulatory and non-regulatory decisions, until EPA revises and reissues a 304(a) criteria guidance using the revised final human health criteria methodology. The existing criteria are still viewed as scientifically acceptable by EPA. The intention of the proposed methodology revisions is to present the latest scientific advancements in the areas of risk and exposure assessment in order to incrementally improve the already sound toxicological and exposure bases for these criteria. As EPA's current human health criteria are the product of many years worth of development and peer review, it is reasonable to assume that revisiting all existing criteria, and incorporating peer review into such review, could require comparable amounts of time and resources. Given these circumstances, EPA proposed a process for revisiting these criteria as part of the overall revisions to the methodology for deriving human health criteria. This process is discussed in the Implementation Section of the Notice of *Draft Revisions to the Methodology for Deriving Ambient Water Quality Criteria for the Protection of Human Health* (see 63 FR 43771–43776, August 14, 1998).

The State of California in its Ocean Plan, adopted in 1990 and approved by EPA in 1991, established numeric water quality criteria using an average fish and shellfish consumption rate of 23 grams per day. This value is based on an earlier California Department of Health Services estimate. The State is currently in the process of readopting its water quality control plans for inland surface waters, enclosed bays, and estuaries. The State intends to consider information on fish and shellfish consumption rates evaluated and summarized in a report prepared by the State's Pesticide and Environmental Toxicology Section of the Office of Environmental Health Hazard Assessment of the California Environmental Protection Agency. The report, entitled, *Chemicals in Fish Report No. 1: Consumption of Fish and Shellfish in California and the United States,* was published in final draft form in July of 1997, and released to the public on September 16, 1997. The report is currently undergoing final evaluation, and is expected to published in final form in the near future. This final draft report is contained in the administrative record for today's rule. Although EPA has not used this fish consumption value here because this information has not yet been finalized, the State may use any appropriate higher state-specific fish and shellfish consumption rates in its readoption of criteria in its statewide plans.

a. 2,3,7,8-TCDD (Dioxin) Criteria

In today's action, EPA is promulgating human health water quality criteria for 2,3,7,8-tetrachlorodibenzo-p-dioxin (''dioxin'') at the same levels as promulgated in the NTR, as amended. These criteria are derived from EPA's 1984 CWA section 304(a) criteria guidance document for dioxin.

For National Pollutant Discharge Elimination System (NPDES) purposes, EPA supports the regulation of other dioxin and dioxin-like compounds through the use of toxicity equivalencies or TEQs in NPDES permits (see discussion below). For California waters, if the discharge of dioxin or dioxin-like compounds has reasonable potential to cause or contribute to a violation of a narrative criterion, numeric water quality-based effluent limits for dioxin or dioxin-like compounds should be included in NPDES permits and should be expressed using a TEQ scheme.

EPA has been evaluating the health threat posed by dioxin nearly continuously for over two decades. Following issuance of the 1984 criteria guidance document, evaluating the health effects of dioxin and recommending human health criteria for dioxin, EPA prepared draft reassessments reviewing new scientific information relating to dioxin in 1985 and 1988. EPA's Science Advisory Board (SAB), reviewing the 1988 draft reassessment, concluded that while the risk assessment approach used in 1984 criteria guidance document had inadequacies, a better alternative was unavailable (see SAB's *Dioxin Panel Review of Documents from the Office or Research and Development relating to the Risk and Exposure Assessment of 2,3,7,8-TCDD* (EPA–SAB–EC–90–003, November 28, 1989) included in the administrative record for today's rule). Between 1988 and 1990, EPA issued numerous reports and guidances relating to the control of dioxin discharges from pulp and paper mills. See e.g., EPA Memorandum, ''Strategy for the Regulation of Discharges of PHDDs & PHDFs from Pulp and Paper Mills to the Waters of the United States,'' from Assistant Administrator for Water to Regional Water Management Division Directors and NPDES State Directors, dated May 21, 1990 (AR NL–16); EPA Memorandum, ''State Policies, Water Quality Standards, and Permit Limitations Related to 2,3,7,8-TCDD in Surface Water,'' from the Assistant Administrator for Water to Regional Water Management Division Directors, dated January 5, 1990 (AR VA–66). These documents are available in the administrative record for today's rule.

In 1991, EPA's Administrator announced another scientific reassessment of the risks of exposure to dioxin (see Memorandum from Administrator William K. Reilly to Erich W. Bretthauer, Assistant Administrator for Research and Development and E. Donald Elliott, General Counsel, entitled *Dioxin: Follow-Up to Briefing on Scientific Developments,* April 8, 1991, included in the administrative record for today's rule). At that time, the Administrator made clear that while the reassessment was underway, EPA would continue to regulate dioxin in accordance with existing Agency policy. Thereafter, the Agency proceeded to regulate dioxin in a number of environmental programs, including standards under the Safe Drinking Water Act and the CWA.

The Administrator's promulgation of the dioxin human health criteria in the 1992 NTR affirmed the Agency's decision that the ongoing reassessment should not defer or delay regulating this potent contaminant, and further, that the risk assessment in the 1984 criteria guidance document for dioxin continued to be scientifically defensible. Until the reassessment process was completed, the Agency could not ''say with any certainty what the degree or directions of any changes in the risk estimates might be'' (57 FR 60863–64).

The basis for the dioxin criteria as well as the decision to include the dioxin criteria in the 1992 NTR pending the results of the reassessment were challenged. See *American Forest and Paper Ass'n, Inc. et al.* v. *U.S. EPA* (Consolidated Case No. 93–0694 (RMU) D.D.C.). By order dated September 4, 1996, the Court upheld EPA's decision. EPA's brief and the Court's decision are included in the administrative record for today's rule.

EPA has undertaken significant effort toward completion of the dioxin reassessment. On September 13, 1994, EPA released for public review and comment a draft reassessment of toxicity and exposure to dioxin. See *Health Assessment Document for 2,3,7,8-Tetrachlorobenzo-p-Dioxin (TCDD) and Related Compounds,* U.S. EPA, 1994. EPA is currently addressing comments made by the public and the SAB and anticipates that the final

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revised reassessment will go to the SAB in the near future. With today's rule, the Agency reaffirms that, notwithstanding the on-going risk reassessment, EPA intends to continue to regulate dioxin to avoid further harm to public health, and the basis for the dioxin criteria, both in terms of the cancer potency and the exposure estimates, remains scientifically defensible. The fact that EPA is reassessing the risk of dioxin, virtually a continuous process to evaluate new scientific information, does not mean that the current risk assessment is ''wrong''. It continues to be EPA's position that until the risk assessment for dioxin is revised, EPA supports and will continue to use the existing risk assessment for the regulation of dioxin in the environment. Accordingly, EPA today promulgates dioxin criteria based on the 1984 criteria guidance document for dioxin and promulgated in the NTR in 1992.

Toxicity Equivalency: The State of California, in its 1991 water quality control plans, adopted human health criteria for dioxin and dioxin-like compounds based on the concept of toxicity equivalency (TEQ) using toxicity equivalency factors (TEFs). EPA Region 9 reviewed and approved the State's use of the TEQ concept and TEFs in setting the State's human health water quality criteria for dioxin and dioxin-like compounds.

In 1987, EPA formally embraced the TEQ concept as an interim procedure to estimate the risks associated with exposures to 210 chlorinated dibenzo-p-dioxin and chlorinated dibenzofuran (CDD/CDF) congeners, including 2,3,7,8-TCDD. This procedure uses a set of derived TEFs to convert the concentration of any CDD/CDF congener into an equivalent concentration of 2,3,7,8-TCDD. In 1989, EPA updated its TEFs based on an examination of relevant scientific evidence and a recognition of the value of international consistency. This updated information can be found in EPA's 1989 *Update to the Interim Procedures for Estimating Risks Associated with Exposures to Mixtures of Chlorinated Dibenzo-p-dioxins and -dibenzofurans (CDDs and CDFs)* (EPA/625/3–89/016, March 1989). EPA had been active in an international effort aimed at adopting a common set of TEFs (International TEFs/89 or I–TEFs/89), to facilitate information exchange on environmental contamination of CDD/CDF. This document reflects EPA's support of an internationally consistent set of TEFs, the I–TEFs/89. EPA uses I–TEFs/89 in many of its regulatory programs.

In 1994, the World Health Organization (WHO) revised the TEF scheme for dioxins and furans to include toxicity from dioxin-like compounds (Ahlborg et al., 1994). However, no changes were made to the TEFs for dioxins and furans. In 1998, the WHO re-evaluated and revised the previously established TEFs for dioxins (Ds), furans (Fs) and dioxin-like compounds (Vanden Bers, 1998). The nomenclature for this TEF scheme is TEQDFP–WHO98, where TEQ represents the 2,3,7,8-TCDD Toxic Equivalence of the mixture, and the subscript DFP indicates that dioxins (Ds) furans (Fs) and dioxin-like compounds (P) are included in the TEF scheme. The subscript 98 following WHO displays the year changes were made to the TEF scheme.

EPA intends to use the 1998 WHO TEF scheme in the near future. At this point however, EPA will support the use of either the 1989 interim procedures or the 1998 WHO TEF scheme but encourages the use of the 1998 WHO TEF scheme in State programs. EPA expects California to use a TEF scheme in implementing the 2,3,7,8-TCDD water quality criteria contained in today's rule. The TEQ and TEF approach provide a methodology for setting NPDES water quality-based permit limits that are protective of human health for dioxin and dioxin-like compounds.

Several commenters requested EPA to promulgate criteria for other forms of dioxin, in addition to 2,3,7,8-TCDD. EPA's draft reassessment for dioxin examines toxicity based on the TEQ concept and I–TEFs/89. When EPA completes the dioxin reassessment, the Agency intends to adopt revised 304(a) water quality criteria guidance based on the reassessment for dioxin. If necessary, EPA will then act to amend the NTR and CTR to reflect the revised 304(a) water quality criteria guidance.

b. Arsenic Criteria

EPA is not promulgating human health criteria for arsenic in today's rule. EPA recognizes that it promulgated human health water quality criteria for arsenic for a number of States in 1992, in the NTR, based on EPA's 1980 section 304(a) criteria guidance for arsenic established, in part, from IRIS values current at that time. However, a number of issues and uncertainties existed at the time of the CTR proposal concerning the health effects of arsenic. These issues and uncertainties were summarized in ''Issues Related to Health Risk of Arsenic'' which is contained in the administrative record for today's rule. During the period of this rulemaking action, EPA commissioned a study of arsenic health effects by the National Research Council (NRC) arm of the National Academy of Sciences. EPA received the NRC report in March of 1999. EPA scientists reviewed the report, which recommended that EPA lower the Safe Drinking Water Act arsenic maximum contaminant level (MCL) as soon as possible (The arsenic MCL is currently 50 μg/l.) The bladder cancer analysis in the NRC report will provide part of the basis for the risk assessment of a proposed revised arsenic MCL in the near future. After promulgating a revised MCL for drinking water, the Agency plans to revise the CWA 304(a) human health criteria for arsenic in order to harmonize the two standards. Today's rule defers promulgating arsenic criteria based on the Agency's previous risk assessment of skin cancer. In the meantime, permitting authorities in California should rely on existing narrative water quality criteria to establish effluent limitations as necessary for arsenic. California has previously expressed its science and policy position by establishing a criterion level of 5 μg/l for arsenic. Permitting authorities may, among other considerations, consider that value when evaluating and interpreting narrative water quality criteria.

c. Mercury Criteria

The human health criteria promulgated here use the latest RfD in EPA's Integrated Risk Information System (IRIS) and the weighted average practical bioconcentration factor (PBCF) from the 1980 section 304(a) criteria guidance document for mercury. EPA considered the approach used in the Great Lakes Water Quality Guidance (''Guidance'') incorporating Bioaccumulation Factors (BAFs), but rejected this approach for reasons outlined below. The equation used here to derive an ambient water quality criterion for mercury from exposure to organisms and water is:

$$HHC = \frac{RfD \times BW}{WC + (FC \times PBCF)}$$

Where:

RfD = Reference Dose
BW = Body Weight
WC = Water Consumption
FC = Total Fish and Shellfish Consumption per Day
PBCF = Practical Bioconcentration Factor (weighted average)

For mercury, the most current RfD from IRIS is 1×10^{-4} mg/kg/day. The RfD used a benchmark dose as an estimate of a No Observed Adverse Effect Level (NOAEL). The benchmark dose was calculated by applying a Weibel model

for extra risk to all neurological effects observed in 81 Iraqi children exposed in utero as reported in Marsh, et. al. (1987). Maternal hair mercury was the measure of exposure. Extra risk refers to an adjustment for background incidence of a given health effect. Specifically, the extra risk is the added incidence of observing an effect above the background rate relative to the proportion of the population of interest that is not expected to exhibit such as effect. The resulting estimate was the lower 95% statistical bound on the 10% extra risk; this was 11 ppm mercury in maternal hair. This dose in hair was converted to an equivalent ingested amount by applying a model based on data from human studies; the resulting benchmark dose was 1×10^{-3} mg/kg body weight /day. The RfD was calculated by dividing the benchmark dose by a composite uncertainty factor of 10. The uncertainty factor was used to account for variability in the human population, in particular the wide variation in biological half-life of methylmercury and the variation that is observed in the ration of hair mercury to mercury in the blood. In addition the uncertainty factor accounts for lack of a two-generation reproductive study and the lack of data on long term effects of childhood mercury exposures. The RfD thus calculated is 1×10^{-4} mg/kg body weight/day or 0.1 μg/kg/day. The body weight used in the equation for the mercury criteria, as discussed in the Human Health Guidelines, is a mean adult human body weight of 70 kg. The drinking water consumption rate, as discussed in the Human Health Guidelines, is 2.0 liters per day.

The bioconcentration factor or BCF is defined as the ratio of chemical concentration in the organism to that in surrounding water. Bioconcentration occurs through uptake and retention of a substance from water only, through gill membranes or other external body surfaces. In the context of setting exposure criteria it is generally understood that the terms ''BCF'' and ''steady-state BCF'' are synonymous. A steady-state condition occurs when the organism is exposed for a sufficient length of time that the ratio does not change substantially.

The BCFs that were used herein are the ''Practical Bioconcentration Factors (PBCFs)'' that were derived in 1980: 5500 for fresh water, 3765 for estuarine coastal waters, and 9000 for open oceans. See pages C–100–1 of Ambient Water Quality Criteria for Mercury (EPA 440/5–80–058) for a complete discussion on the PBCF. Because of the way they were derived, these PBCFs take into account uptake from food as well as uptake from water. A weighted average PBCF was calculated to take into account the average consumption from the three waters using the following equation:

$$\text{Weighted Average Practical BCF} = \frac{\sum(\text{FC} \times \text{PBCF})}{\sum(\text{FC})} = \frac{(0.00172)(5500) + (0.00478)(3765) + (0.0122)(9000)}{0.00172 + 0.00478 + 0.0122} = \frac{137.3}{0.0187} = 7342.6$$

Given the large value for the weighted average PBCF, the contribution of drinking water to total daily intake is negligible so that assumptions concerning the chemical form of mercury in drinking water become less important. The human health mercury criteria promulgated for this rule are based on the latest RfD as listed in IRIS and a weighted PBCF from the 1980 § 304(a) criteria guidance document for mercury.

On March 23, 1995 (60 FR 15366), EPA promulgated the Great Lakes Water Quality Guidance (''Guidance''). The Guidance incorporated bioaccumulation factors (BAFs) in the derivation of criteria to protect human health because it is believed that BAFs are a better predictor than BCFs of the concentration of a chemical within fish tissue since BAFs include consideration of the uptake of contaminants from all routes of exposure. A bioaccumulation factor is defined as the ratio (in L/kg) of a substance's concentration in tissue to the concentration in the ambient water, in situations where both the organism and its food are exposed and the ratio does not change substantially over time. The final Great Lakes Guidance establishes a hierarchy of four methods for deriving BAFs for non-polar organic chemicals: (1) Field-measured BAFs; (2) predicted BAFs derived using a field-measured biota-sediment accumulation factor; (3) predicted BAFs derived by multiplying a laboratory-measured BCF by a food chain multiplier; and (4) predicted BAFs derived by multiplying a BCF calculated from the log Kow by a food-chain multiplier. The final Great Lakes Guidance developed BAFs for trophic levels three and four fish of the Great Lakes Basin. Respectively, the BAFs for mercury for trophic level 3 and 4 fish were: 27,900 and 140,000.

The BAF promulgated in the GLI was developed specifically for the Great Lakes System. It is uncertain whether the BAFs of 27,900 and 140,000 are appropriate for use in California at this time; therefore, today's final rule does not use the GLI BAF in establishing human health criteria for mercury in California. The magnitude of the BAF for mercury in a given system depends on how much of the total mercury is present in the methylated form. Methylation rates vary widely from one water body to another for reasons that are not fully understood. Lacking the data, it is difficult to determine if the BAF used in the GLI represents the true potential for mercury to bioaccumulate in California surface waters. The true, average BAF for California could be higher or lower. For more information see EPA's Response to Comments document in the administrative record for this rule (specifically comments CTR–002–007(b) and CTR–016–007).

EPA is developing a national BAF for mercury as part of revisions to its 304(a) criteria for human health; however, the BAF methodology that will be used is currently under evaluation as part of EPA's revisions to its National Human Health Methodology (see section F.3 above). EPA applied a similar methodology in its Mercury Study Report to Congress (MSRC) to derive a BAF for methylmercury. The MSRC is available through NTIS (EPA–452/R–97–003). Although a BAF was derived in the MSRC, EPA does not intend to use this BAF for National application. EPA is engaged in a separate effort to incorporate additional mercury bioaccumulation data that was not considered in the MSRC, and to assess uncertainties with using a National BAF approach for mercury. Once the proposed revised human health methodology, including the BAF component, is finalized, EPA will revise its 304(a) criteria for mercury to reflect changes in the underlying methodology, recommendations contained in the MSRC, and recommendations in a National Academy of Science report on human health assessment of methylmercury. When EPA changes its 304(a) criteria recommendation for mercury, States and Tribes will be expected to review their water quality standards for mercury and make any revisions necessary to ensure their standards are scientifically defensible.

New information may become available regarding the bioaccumulation

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of mercury in certain water bodies in California. EPA supports the use of this information to develop site-specific criteria for mercury. Further, if a California water body is impaired due to mercury fish tissue or sediment contamination, loadings of mercury could contribute to or exacerbate the impairment. Therefore, one option regulatory authorities should consider is to include water quality-based effluent limits (WQBELs) in permits based on mass for discharges to the impaired water body. Such WQBELs must be derived from and comply with applicable State water quality standards (including both numeric and narrative criteria) and assure that the discharge does not cause or contribute to a violation of water quality standards.

d. Polychlorinated Biphenyls (PCBs) Criteria

The NTR, as amended, calculated human health criteria for PCBs using a cancer potency factor of 7.7 per mg/kg-day from the Agency's IRIS. This cancer potency factor was derived from the Norback and Weltman (1985) study which looked at rats that were fed Aroclor 1260. The study used the linearized multistage model with a default cross-species scaling factor (body weight ratio to the ⅔ power). Although it is known that PCB mixtures vary greatly as to their potency in producing biological effects, for purposes of its carcinogenicity assessment, EPA considered Aroclor 1260 to be representative of all PCB mixtures. The Agency did not pool data from all available congener studies or generate a geometric mean from these studies, since the Norback and Weltman study was judged by EPA as acceptable, and not of marginal quality, in design or conduct as compared with other studies. Thereafter, the Institute for Evaluating Health Risks (IEHR, 1991) reviewed the pathological slides from the Norback and Weltman study, and concluded that some of the malignant liver tumors should have been interpreted as nonmalignant lesions, and that the cancer potency factor should be 5.1 per mg/kg-day as compared with EPA's 7.7 per mg/kg-day.

The Agency's peer-reviewed reassessment of the cancer potency of PCBs published in a final report, *PCBs: Cancer Dose-Response Assessment and Applications to Environmental Mixtures* (EPA/600/P–96/001F), adopts a different approach that distinguishes among PCB mixtures by using information on environmental processes. (The report is included in the administrative record of today's rule.) The report considers all cancer studies (which used commercial mixtures only) to develop a range of cancer potency factors, then uses information on environmental processes to provide guidance on choosing an appropriate potency factor for representative classes of environmental mixtures and different pathways. The reassessment provides that, depending on the specific application, either central estimates or upper bounds can be appropriate. Central estimates describe a typical individual's risk, while upper bounds provide assurance (*i.e.,* 95% confidence) that this risk is not likely to be underestimated if the underlying model is correct. Central estimates are used for comparing or ranking environmental hazards, while upper bounds provide information about the precision of the comparison or ranking. In the reassessment, the use of the upper bound values were found to increase cancer potency estimates by two or three-fold over those using central tendency. Upper bounds are useful for estimating risks or setting exposure-related standards to protect public health, and are used by EPA in quantitative cancer risk assessment. Thus, the cancer potency of PCB mixtures is determined using a tiered approach based on environmental exposure routes with upper-bound potency factors (using a body weight ratio to the ¾ power) ranging from 0.07 (lowest risk and persistence) to 2 (high risk and persistence) per mg/kg-day for average lifetime exposures to PCBs. It is noteworthy that bioaccumulated PCBs appear to be more toxic than commercial PCBs and appear to be more persistent in the body. For exposure through the food chain, risks can be higher than other exposures.

EPA issued the final reassessment report on September 27, 1996, and updated IRIS to include the reassessment on October 1, 1996. EPA updated the human health criteria for PCBs in the National Toxics Rule on September 27, 1999. For today's rule, EPA derived the human health criteria for PCBs using a cancer potency factor of 2 per mg/kg-day, an upper bound potency factor reflecting high risk and persistence. This decision is based on recent multimedia studies indicating that the major pathway of exposure to persistent toxic substances such as PCBs is via dietary exposure (*i.e.,* contaminated fish and shellfish consumption).

Following is the calculation of the human health criterion (HHC) for organism and water consumption:

$$HHC = \frac{RF \times BW \times (1{,}000\ \mu g/mg)}{q1^* \times [WC + (FC \times BCF)]}$$

Where:

RF = Risk Factor = 1×10^{-6}
BW = Body Weight = 70 kg
q1* = Cancer slope factor = 2 per mg/kg-day
WC = Water Consumption = 2 l/day
FC = Fish and Shellfish Consumption = 0.0065 kg/day
BCF = Bioconcentration Factor = 31,200
the HHC (μg/l) = 0.00017 μg/l (rounded to two significant digits).

Following is the calculation of the human health criterion for organism only consumption:

$$HHC = \frac{RF \times BW \times (1{,}000\ \mu g/mg)}{q1^* \times FC \times BCF}$$

Where:

RF = Risk Factor = 1×10^{-6}
BW = Body Weight = 70 kg
q1* = Cancer slope factor = 2 per mg/kg-day
FC = Total Fish and Shellfish Consumption per Day = 0.0065 kg/day
BCF = Bioconcentration Factor = 31,200
the HHC (μg/l) = 0.00017 μg/l (rounded to two significant digits).

The criteria are both equal to 0.00017 μg/l and apply to total PCBs. *See PCBs: Cancer Dose Response Assessment and Application to Environmental Mixtures* (EPA/600/9–96–001F). For a discussion of the body weight, water consumption, and fish and shellfish consumption factors, see the Human Health Guidelines. For a discussion of the BCF, see the 304(a) criteria guidance document for PCBs (included in the administrative record for today's rule).

e. Excluded Section 304(a) Human Health Criteria

As is the case in the NTR, as amended, today's rule does not promulgate criteria for certain priority pollutants for which CWA section 304(a) criteria guidance exists because those criteria were not based on toxicity to humans or aquatic organisms. The basis for those particular criteria is organoleptic effects (*e.g.,* taste and odor) which would make water and edible aquatic life unpalatable but not toxic. Because the basis for this rule is to protect the public health and aquatic life from toxicity consistent with the language and intent in CWA section 303(c)(2)(B), EPA is promulgating criteria only for those priority toxic pollutants whose criteria recommendations are based on toxicity. The CWA section 304(a) human health criteria based on organoleptic effects for zinc and 3-methyl-4-chlorophenol are excluded for this reason. See the 1992 NTR discussion at 57 FR 60864.

f. Cancer Risk Level

EPA's CWA section 304(a) criteria guidance documents for priority toxic pollutants that are based on carcinogenicity present concentrations for upper bound risk levels of 1 excess cancer case per 100,000 people (10^{-5}), per 1,000,000 people (10^{-6}), and per 10,000,000 people (10^{-7}). However, the criteria documents do not recommend a particular risk level as EPA policy.

As part of the proposed rule, EPA requested and received comment on the adoption of a 10^{-5} risk level for carcinogenic pollutants. The effect of a 10^{-5} risk level would have been to increase (*i.e.,* make less stringent) carcinogenic pollutant criteria values (noted in the matrix by footnote c) that are not already promulgated in the NTR, by one order of magnitude. For example, the organism-only criterion for gamma BHC (pollutant number 105 in the matrix) is 0.013 µg/l; the criterion based on a 10^{-5} risk level would have been 0.13 µg/l. EPA received several comments that indicated a preference for a higher (10^{-4} and 10^{-5}) risk level for effluent dependent waters or other types of special circumstances.

In today's rule, EPA is promulgating criteria that protect the general population at an incremental cancer risk level of one in a million (10^{-6}) for all priority toxic pollutants regulated as carcinogens, consistent with the criteria promulgated in the NTR for the State of California. Standards adopted by the State contained in the Enclosed Bays and Estuaries Plan (EBEP), and the Inland Surface Waters Plan (ISWP), partially approved by EPA on November 6, 1991, and the Ocean Plan approved by EPA on June 28, 1990, contained a risk level of 10^{-6} for most carcinogens. The State has historically protected at a 10^{-6} risk level for carcinogenic pollutants.

EPA, in its recent human health methodology revisions, proposed acceptable lifetime cancer risk for the general population in the range of 10^{-5} to 10^{-6}. EPA also proposed that States and Tribes ensure the most highly exposed populations do not exceed a 10^{-4} risk level. However, EPA's draft methodology revisions also stated that it will derive 304(a) criteria at a 10^{-6} risk level, which the Agency believes reflects the appropriate risk for the general population and which applies a risk management policy which ensures protection for all exposed population groups. (Draft Water Quality Criteria Methodology: Human Health, EPA 822–Z–98–001, August 1998, Appendix II, page 72).

Subpopulations within a State may exist, such as recreational and subsistence anglers, who as a result of greater exposure to a contaminant are at greater risk than the standard 70 kilogram person eating 6.5 grams per day of fish and shellfish and drinking 2.0 liters per day of drinking water with pollutant levels meeting the water quality criteria. EPA acknowledges that at any given risk level for the general population, those segments of the population that are more highly exposed face a higher relative risk. For example, if fish are contaminated at a level permitted by criteria derived on the basis of a risk level of 10^{-6}, individuals consuming up to 10 times the assumed fish consumption rate would still be protected at a 10^{-5} risk level. Similarly, individuals consuming 100 times the general population rate would be protected at a 10^{-4} risk level. EPA, therefore, believes that derivation of criteria at the 10^{-6} risk level is a reasonable risk management decision protective of designated uses under the CWA. While outside the scope of this rule, EPA notes that States and Tribes, however, have the discretion to adopt water quality criteria that result in a higher risk level (*e.g.,* 10^{-5}). EPA expects to approve such criteria if the State or Tribe has identified the most highly exposed subpopulation within the State or Tribe, demonstrates the chosen risk level is adequately protective of the most highly exposed subpopulation, and has completed all necessary public participation.

This demonstration has not happened in California. Further, the information that is available on highly exposed subpopulations in California supports the need to protect the general population at the 10^{-6} level. California has cited the Santa Monica Bay Seafood Consumption Study as providing the best available data set for estimating consumption of sport fish and shellfish in California for both marine or freshwater sources (Chemicals in Fish Report No. 1: Consumption of Fish and Shellfish in California and the United States, Final Draft Report, July 1997). Consumption rates of sport fish and shellfish of 21g/day, 50 g/day, 107 g/day, and 161 g/day for the median, mean, 90th, and 95th percentile rates, respectively, were determined from this study. Additional consumption of commercial species in the range of approximately 8 to 42 g/day would further increase these values. Clearly the consumption rates for the most highly exposed subpopulation within the State exceeds 10 times the 6.5 g/day rates used in the CTR. Therefore, use of a risk level of 10^{-5} for the general population would not be sufficient to protect the most highly exposed population in California at a 10^{-4} risk level. On the other hand, even the most highly exposed subpopulations cited in the California study do not have consumption rates approaching 100 times the 6.5 g/day rates used in the CTR. The use of the 10^{-6} risk level to protect average level consumers does not subject these subpopulations to risk levels as high as 10^{-4}.

EPA believes its decision to establish a 10^{-6} risk level for the CTR is also consistent with EPA's policy in the NTR to select the risk level that reflect the policies or preferences of CWA programs in the affected States. California adopted standards for priority toxic pollutants for its ocean waters in 1990 using a 10^{-6} risk level to protect human health (California Ocean Plan, 1990). In April 1991, and again in November 1992, California adopted standards for its inland surface waters and enclosed bays and estuaries in its Inland Surface Waters Plan (ISWP) and its Enclosed Bays and Estuaries Plan (EBEP) using a 10^{-6} risk level. To be consistent with the State's water quality standards, EPA used a 10^{-6} risk level for California in the NTR at 57 FR 60867. The State has continued using a 10^{-6} risk level to protect human health for its standards that were not withdrawn with the ISWP and EBEP. The most recent expression of risk level preference is contained in the Draft Functional Equivalent Document, Amendment of the Water Quality Control Plan for Ocean Waters of California, October 1998, where the State recommended maintaining a consistent risk level of 10^{-6} for the human health standards that it was proposing to revise.

EPA received several comments requesting a 10^{-5} risk level based on the risk level chosen for the Great Lakes Water Quality Guidance (the Guidance). There are several differences between the guidelines for the derivation of human health criteria contained in the Guidance and the California Toxics Rule (CTR) that make a 10^{-5} risk factor appropriate for the Guidance, but not for the CTR. These differences result in criteria developed using the 10^{-5} risk factor in the Guidance being at least as stringent as criteria derived under the CTR using a 10^{-6} risk factor. The relevant aspects of the Guidance include:

- Use of fish consumption rates that are considerably higher than fish consumption rates for the CTR.
- Use of bioaccumulation factors rather than bioconcentration factors in

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estimating exposure, considerably increasing the dose of carcinogens to sensitive subgroups.

• Consideration of additivity of effects of mixtures for both carcinogenic and noncarcinogenic pollutants.

This combination of factors increase the calculated carcinogenic risk substantially under the Guidance (the combination would generally be more than one order of magnitude), making a lower overall risk factor acceptable. The Guidance risk factor provides, in fact, criteria with at least the same level of protection against carcinogens as criteria derived with a higher risk factor using the CTR. A lower risk factor for the CTR would not be appropriate absent concomitant changes in the derivation procedures that provide equivalent risk protection.

G. Description of Final Rule

1. Scope

Paragraph (a) in 40 CFR 131.38, entitled ''Scope,'' states that this rule is a promulgation of criteria for priority toxic pollutants in the State of California for inland surface waters, enclosed bays, and estuaries. Paragraph (a) in 40 CFR 131.38 also states that this rule contains an authorizing compliance schedule provision.

2. EPA Criteria for Priority Toxic Pollutants

EPA's criteria for California are presented in tabular form at 40 CFR 131.38. For ease of presentation, the table that appears combines water quality criteria promulgated in the NTR, as amended, that are outside the scope of this rulemaking, with the criteria that are within the scope of today's rule. This is intended to help readers determine applicable water quality criteria for the State of California. The table contains footnotes for clarification.

Paragraph (b) in 40 CFR 131.38 presents a matrix of the applicable EPA aquatic life and/or human health criteria for priority toxic pollutants in California. Section 303(c)(2)(B) of the CWA addresses only pollutants listed as ''toxic'' pursuant to section 307(a) of the CWA for which EPA has developed section 304(a) criteria guidance. As discussed earlier in this preamble, the section 307(a) list of toxics contains 65 compounds and families of compounds, which potentially include thousands of specific compounds. Of these, the Agency identified a list of 126 ''priority toxic pollutants'' to implement the CWA (see 40 CFR 131.36(b)). Reference in this rule to priority toxic pollutants, toxic pollutants, or toxics refers to the 126 priority toxic pollutants.

EPA has not developed both aquatic life and human health CWA section 304(a) criterion guidance for all of the priority toxic pollutants. The matrix in 40 CFR 131.38(b) contains human health criteria in Column D for 92 priority toxic pollutants which are divided into Column 1: criteria for water consumption (i.e., 2.0 liters per day) and aquatic organism consumption (i.e., 6.5 grams per day of aquatic organisms); and Column 2: criteria for aquatic organism consumption only. The term aquatic organism includes fish and shellfish such as shrimp, clams, oysters and mussels. One reason the total number of priority toxic pollutants with criteria today differs from the total number of priority toxic pollutants contained in earlier published CWA section 304(a) criteria guidance is because EPA has developed and is promulgating chromium criteria for two valence states with respect to aquatic life criteria. Thus, although chromium is a single priority toxic pollutant, there are two criteria for chromium for aquatic life protection. See pollutant 5 in today's rule at 40 CFR 131.38(b). Another reason is that EPA is promulgating human health criteria for nine priority pollutants for which health-based national criteria have been calculated based on information obtained from EPA's IRIS database (EPA provided notice of these nine criteria in the NTR for inclusion in future State triennial reviews. See 57 FR 60848, 60890).

The matrix contains aquatic life criteria for 23 priority pollutants. These are divided into freshwater criteria (Column B) and saltwater criteria (Column C). These columns are further divided into acute and chronic criteria. The aquatic life criteria are considered by EPA to be protective when applied under the conditions described in the section 304(a) criteria documents and in the TSD. For example, water body uses should be protected if the criteria are not exceeded, on average, once every three year period. It should be noted that the criteria maximum concentrations (the acute criteria) are short-term concentrations and that the criteria continuous concentrations (the chronic criteria) are four-day averages. It should also be noted that for certain metals, the actual criteria are equations which are included as footnotes to the matrix. The toxicity of these metals is water hardness dependent and may be adjusted. The values shown in the table are illustrative only, based on a hardness expressed as calcium carbonate of 100 mg/l. Finally, the criterion for pentachlorophenol is pH dependent. The equation is the actual criterion and is included as a footnote. The value shown in the matrix is for a pH of 7.8. Several of the freshwater aquatic life criteria are incorporated into the matrix in the format used in the 1980 criteria methodology which uses a final acute value instead of a continuous maximum concentration. This distinction is noted in footnote g of the table.

The final rule at 40 CFR 131.38(c) establishes the applicability of the criteria to the State of California. 40 CFR 131.38(d) is described later in Section F, of this preamble. EPA has included in this rule provisions necessary to implement numeric criteria in a way that maintains the level of protection intended. These provisions are included in 40 CFR 131.38(c) of today's rule. For example, in order to do steady state waste load allocation analyses, most States have low flow values for streams and rivers which establish flow rates for various purposes. These low flow values become design flows for sizing treatment plants and developing water quality-based effluent limits and/or TMDLs. Historically, these design flows were selected for the purposes of waste load allocation analyses which focused on instream dissolved oxygen concentrations and protection of aquatic life. With the publication of the 1985 TSD, EPA introduced hydrologically and biologically based analyses for the protection of aquatic life and human health. (These concepts have been expanded subsequently in EPA's *Technical Guidance Manual for Performing Wasteload Allocations, Book 6, Design Conditions,* U.S. EPA, 1986. These analyses are included in Appendix D of the revised TSD. The discussion here is greatly simplified and is provided to support EPA's decision to promulgate design flows for instream flows and thereby maintain the adequacy of the criteria for priority toxic pollutants.) EPA recommended either of two methods for calculating acceptable low flows, the traditional hydrologic method developed by the U.S. Geological Survey or a biological based method developed by EPA. Other methods for evaluating the instream flow record may be available; use of these methods may result in TMDLs and/or water quality-based effluent limitations which adequately protect human health and/or aquatic life. The results of either of these two methods, or an equally protective alternative method, may be used.

The State of California may adopt specific design flows for streams and rivers to protect designated uses against the effects of toxics. EPA believes it is

important to specify design flows in today's rule so that, in the absence of state design flows, the criteria promulgated today would be implemented appropriately. The TSD also recommends the use of three dynamic models to perform wasteload allocations. Dynamic wasteload models do not generally use specific steady state design flows but accomplish the same effect by factoring in the probability of occurrence of stream flows based on the historical flow record.

The low flows specified in the rule explicitly contain duration and frequency of occurrence which represent certain probabilities of occurrence. Likewise, the criteria for priority toxic pollutants are defined with duration and frequency components. Dynamic modeling techniques explicitly predict the effects of variability in receiving water, effluent flow, and pollution variation. Dynamic modeling techniques, as described in the TSD, allow for calculating wasteload allocations that meet the criteria for priority toxic pollutants without using a single, worst-case concentration based on a critical condition. Either dynamic modeling or steady state modeling can be used to implement the criteria promulgated today. For simplicity, only steady state conditions are discussed here. Clearly, if the criteria were implemented using design flows that are too high, the resulting toxic controls would not be adequate, because the resulting ambient concentrations would exceed EPA's criteria.

In the case of aquatic life, assuming exceedences occur more frequently than once in three years on the average, exceedences would result in diminished vitality of stream ecosystems characterized by the loss of desired species. Numeric water quality criteria should apply at all flows that are equal to or greater than flows specified below. The low flow values are:

Type of criteria	Design flow
Acute Aquatic Life (CMC).	1 Q 10 or 1 B 3
Chronic Aquatic Life (CCC).	7 Q 10 or 4 B 3
Human Health	harmonic mean flow

Where:

1 Q 10 is the lowest one day flow with an average recurrence frequency of once in 10 years determined hydrologically;

1 B 3 is biologically based and indicates an allowable exceedence of once every 3 years. It is determined by EPA's computerized method (DFLOW model);

7 Q 10 is the lowest average 7 consecutive day low flow with an average recurrence frequency of once in 10 years determined hydrologically;

4 B 3 is biologically based and indicates an allowable exceedences for 4 consecutive days once every 3 years. It is determined by EPA's computerized method (DFLOW model);

EPA is requiring that the harmonic mean flow be applied with human health criteria. The harmonic mean is a standard calculated statistical value. EPA's model for human health effects assumes that such effects occur because of a long-term exposure to low concentration of a toxic pollutant, for example, two liters of water per day for seventy years. To estimate the concentrations of the toxic pollutant in those two liters per day by withdrawal from streams with a high daily variation in flow, EPA believes the harmonic mean flow is the correct statistic to use in computing such design flows rather than other averaging techniques. (For a description of harmonic means see ''Design Stream Flows Based on Harmonic Means,'' Lewis A. Rossman, Jr. of Hydraulics Engineering, Vol. 116, No. 7, July, 1990.)

All waters (including lakes, estuaries, and marine waters), whether or not suitable for such hydrologic calculations, are subject to the criteria promulgated today. Such criteria will need to be attained at the end of the discharge pipe, unless the State authorizes a mixing zone. Where the State plans to authorize a mixing zone, the criteria would apply at the locations allowed by the mixing zone. For example, the chronic criteria (CCC) would apply at the defined boundary of the chronic mixing zone. Discussion of and guidance on these factors are included in the revised TSD in Chapter 4.

EPA is aware that the criteria promulgated today for some of the priority toxic pollutants are at concentrations less than EPA's current analytical detection limits. Analytical detection limits have never been an acceptable basis for setting water quality criteria since they are not related to actual environmental impacts. The environmental impact of a pollutant is based on a scientific determination, not a measuring technique which is subject to change. Setting the criteria at levels that reflect adequate protection tends to be a forcing mechanism to improve analytical detection methods. See 1985 Guidelines, page 21. As the methods improve, limits based on the actual criteria necessary to protect aquatic life and human health become measurable. The Agency does not believe it is appropriate to promulgate criteria that are not sufficiently protective. EPA discusses this issue further in its Response to Comment Document for today's final rule.

EPA does believe, however, that the use of analytical detection limits are appropriate for assessing *compliance* with National Pollutant Discharge Elimination System (NPDES) permit limits. This view of the role of detection limits was first articulated in guidance for translating dioxin criteria into NPDES permit limits. See ''Strategy for the Regulation of Discharges of PHDDs and PHDFs from Pulp and Paper Mills to Waters of the U.S.'' Memorandum from the Assistant Administrator for Water to the Regional Water Management Division Directors, May 21, 1990. This guidance presented a model for addressing toxic pollutants which have criteria less than current detection limits. EPA, in more recent guidance, recommends the use of the ''minimum level'' or ML for reporting sample results to assess compliance with WQBELs (TSD page 111). The ML, also called the ''quantification level,'' is the level at which the entire analytical system gives recognizable mass spectra and acceptable calibration points, i.e., the point at which the method can reliably quantify the amount of pollutant in the sample. States can use their own procedures to average and otherwise account for monitoring data, *e.g.,* quantifying results below the ML. These results can then be used to assess compliance with WQBELs. (See 40 CFR part 132, Appendix F, Procedure 8.B.) This approach is applicable to priority toxic pollutants with criteria less than current detection limits. EPA's guidance explains that standard analytical methods may be used for purposes of assessing compliance with permit limits, but not for purposes of establishing water quality criteria or permit limits. Under the CWA, analytical methods are appropriately used in connection with NPDES permit limit compliance assessments. Because of the function of water quality criteria, EPA has not considered the sensitivity of analytical methods in deriving the criteria promulgated today.

EPA has promulgated 40 CFR 131.38(c)(3) to determine when freshwater or saltwater aquatic life criteria apply. This provision incorporates a time parameter to better define the critical condition. The structure of the paragraph is to establish

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applicable rules and to allow for site-specific exceptions where the rules are not consistent with actual field conditions. Because a distinct separation generally does not exist between freshwater and saltwater aquatic communities, EPA is establishing the following: (1) The freshwater criteria apply at salinities of 1 part per thousand and below at locations where this occurs 95% or more of the time; (2) saltwater criteria apply at salinities of 10 parts per thousand and above at locations where this occurs 95% more of the time; and (3) at salinities between 1 and 10 parts per thousand the more stringent of the two apply unless EPA approves the application of the freshwater or saltwater criteria based on an appropriate biological assessment. The percentiles included here were selected to minimize the chance of overlap, that is, one site meeting both criteria. Determination of these percentiles can be done by any reasonable means such as interpolation between points with measured data or by the application of calibrated and verified mathematical models (or hydraulic models). It is not EPA's intent to require actual data collection at particular locations.

In the brackish water transition zones of estuaries with varying salinities, there generally will be a mix of freshwater and saltwater species. Generally, therefore, it is reasonable for the more stringent of the freshwater or saltwater criteria to apply. In evaluating appropriate data supporting the alternative set of criteria, EPA will focus on the species composition as its preferred method. This assignment of criteria for fresh, brackish and salt waters was developed in consultation with EPA's research laboratories at Duluth, Minnesota and Narragansett, Rhode Island. The Agency believes such an approach is consistent with field experience.

Paragraph (d) in 40 CFR 131.38 lists the designated water and use classifications for which the criteria apply. The criteria are applied to the beneficial use designations adopted by the State of California; EPA has not promulgated any new use classifications in this rule.

Exceedences Frequency: In a water quality criterion for aquatic life, EPA recommends an allowable frequency for excursions of the criteria. See 1985 Guidelines, pages 11–13. This allowable frequency provides an appropriate period of time during which the aquatic community can recover from the effect of an excursion and then function normally for a period of time before the next excursion. An excursion is defined as an occurrence of when the average concentration over the duration of the averaging period is above the CCC or the CMC. As ecological communities are naturally subjected to a series of stresses, the allowable frequency of pollutant stress may be set at a value that does not significantly increase the frequency or severity of all stresses combined. See also TSD, Appendix D. In addition, providing an allowable frequency for exceeding the criterion recognizes that it is not generally possible to assure that criteria are never exceeded. (TSD, page 36.)

Based on the available data, today's rule requires that the acute criterion for a pollutant be exceeded no more than once in three years on the average. EPA is also requiring that the chronic criterion for a pollutant be exceeded no more than once in three years on the average. EPA acknowledges that States may develop allowable frequencies that differ from these allowable frequencies, so long as they are scientifically supportable, but believes that these allowable frequencies are protective of the designated uses where EPA is promulgating criteria.

The use of aquatic life criteria for developing water quality-based effluent limits in permits requires the permitting official to use an appropriate wasteload allocation model. (TSD, Appendix D–6.) As discussed above, there are generally two methods for determining design flows, the hydrologically-based method and the biologically-based method.

The biologically-based method directly uses the averaging periods and frequencies specified in the aquatic life criteria for determining design flows. (TSD, Appendix. D–8.) Because the biologically-based method calculates the design flow directly from the duration and allowable frequency, it most accurately provides the allowed number of excursions. The hydrologically based method applies the CMC at a design flow equal to or equivalent to the 1Q10 design flow (i.e., the lowest one-day flow with an average recurrence frequency of once in ten years), and applies the CCC at the 7Q10 design flow (i.e., the lowest average seven consecutive day flow with a recurrence frequency of once in ten years).

EPA established a three year allowable frequency in the NTR. In settlement of the litigation on the NTR, EPA stated that it was in the midst of conducting, sponsoring, or planning research aimed at addressing scientific issues related to the basis for and application of water quality criteria and mentioned the issue of allowable frequency. See Partial Settlement Agreement in *American Forest and Paper Ass'n, Inc. et al.* v. *U.S. EPA* (Consolidated Case No. 93–0694 (RMU) D.D.C. To that end, EPA is reevaluating issues raised about allowable frequency as part of its work in revising the 1985 Guidelines.

EPA recognizes that additional data concerning (a) the probable frequency of lethal events for an assemblage of taxa covering a range of sensitivities to pollutants, (b) the probable frequency of sublethal effects for such taxa, (c) the differing effects of lethal and sublethal events in reducing populations of such taxa, and (d) the time needed to replace organisms lost as a result of toxicity, may lead to further refinement of the allowable frequency value. EPA has not yet completed this work. Until this work is complete, EPA believes that where EPA promulgates criteria, the three year allowable frequency represents a value in the reasonable range for this parameter.

3. Implementation

Once the applicable designated uses and water quality criteria for a water body are determined, under the National Pollutant Discharge Elimination System (NPDES) program discharges to the water body must be characterized and the permitting authority must determine the need for permit limits. If a discharge causes, has the reasonable potential to cause, or contributes to an excursion of a numeric or narrative water quality criteria, the permitting authority must develop permit limits as necessary to meet water quality standards. These permit limits are water quality-based effluent limitations or WQBELs. The terms ''cause,'' ''reasonable potential to cause,'' and ''contribute to'' are the terms in the NPDES regulations for conditions under which water quality-based permit limits are required. See 40 CFR 122.44(d)(1).

Since the publication of the proposed CTR, the State of California adopted procedures which detail how water quality criteria will be implemented through NPDES permits, waste discharge requirements, and other regulatory approaches. These procedures entitled, *Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California* were adopted on March 2, 2000. Once these procedures are submitted for review under CWA section 303(c), EPA will review them as they relate to water quality standards, and approve or disapprove them.

Several commenters understood the language in the preamble to the proposed rule regarding implementation

to mean that site-specific criteria, variances, and other actions would be prohibited or severely limited by the CTR. Site-specific criteria, variances and other actions modifying criteria are neither prohibited nor limited by the CTR. The State, if it so chooses, still can make these changes to its water quality standards, subject to EPA approval. However, with this Federal rule in effect, the State cannot implement any modifications that are less stringent than the CTR without an amendment to the CTR to reflect these modifications. EPA will make every effort to expeditiously accommodate Federal rulemaking of appropriate modifications to California's water quality standards. In the preamble to the proposed CTR, and here today, EPA is emphasizing that these efforts to amend the CTR on a case-by-case basis will generally increase the time before a modification can be implemented.

4. Wet Weather Flows

EPA has for a longtime maintained that CWA section 301(b)(1)(C) applies to NPDES permits for discharges from municipal separate storm sewer systems. Recently, the U.S. Court of Appeals for the Ninth Circuit upheld NPDES permits issued by EPA for five Arizona municipal separate storm sewer systems and addressed this issue specifically. *Defenders of Wildlife, et al.* v. *Browner,* No. 98–71080 (9th Cir., October 1999). The Court held that the CWA does not require ''strict compliance'' with State water quality standards for municipal storm sewer permits under section 301(b)(1)(C), but that at the same time, the CWA does give EPA discretion to incorporate appropriate water quality-based effluent limitations under another provision, CWA section 402(p)(3)(B)(iii).

The Court based its decision on the structure of section 402(p)(3), which contains distinct language for discharges of industrial storm water and municipal storm water. In section 402(p)(3)(A), Congress requires that ''dischargers associated with industrial activity shall meet all applicable provisions of [section 402] and section [301].'' 33 U.S.C. section 1342(p)(3)(A). The Court noted, therefore, that by incorporation, industrial storm water discharges need to achieve ''any more stringent limitation, including those necessary to meet water quality standards * * *'' The Court explained that industrial storm water discharges ''must comply strictly with State water quality standards'' but that Congress chose not to include a similar provision for municipal storm sewer discharges, including instead a requirement for controls to reduce pollutants to the maximum extent practicable or MEP standard in section 402(p)(3)(B). Reading the two related sections together, the Court concluded that section 402(p)(3)(B)(iii) does not require ''strict compliance'' by municipal storm sewer discharges according to section 301(b)(1)(C). At the same time, however, the Court found that the language in CWA section 402(p)(3)(B)(iii) which states that permits for discharges from municipal storm sewers shall require ''such other provisions as the Administrator of the state determines appropriate for the control of such pollutants'' provides EPA with discretion to incorporate provisions lending to ultimate compliance with water quality standards.

EPA believes that compliance with water quality standards through the use of Best Management Practices (BMPs) is appropriate. EPA articulated its position on the use of BMPs in storm water permits in the policy memorandum entitled, ''Interim Permitting Approach for Water Quality-Based Effluent Limitations In Storm Water Permits'' which was signed by the Assistant Administrator for Water, Robert Perciasepe on August 1, 1996 (61 FR 43761, August 9, 1996). A copy of this memorandum is contained in the administrative record for today's rule. The policy affirms the use of BMPs as a means to attain water quality standards in municipal storm water permits, and embraces BMPs as an interim permitting approach.

The interim permitting approach uses BMPs in first-round storm water permits, and expanded or better-tailored BMPs in subsequent permits, where necessary, to provide for the attainment of water quality standards. In cases where adequate information exists to develop more specific conditions or limitations to meet water quality standards, these conditions or limitations are to be incorporated into storm water permits, as necessary and appropriate.

This interim permitting approach, however, only applies to EPA. EPA encourages the State to adopt a similar policy for municipal storm water permits. This interim permitting approach provides time, where necessary, to more fully assess the range of issues and possible options for the control of storm water discharges for the protection of water quality. More information on this issue is included in the response to comment document in response to specific storm water issues raised by commenters.

5. Schedules of Compliance

A compliance schedule refers to an enforceable sequence of interim requirements in a permit leading to ultimate compliance with water quality-based effluent limitations or WQBELs in accordance with the CWA. The authorizing compliance schedule provision authorizes, but does not require, the permit issuing authority in the State of California to include such compliance schedules in permits under appropriate circumstances. The State of California is authorized to administer the National Pollutant Discharge Elimination System (NPDES) program and may exercise its discretion when deciding if a compliance schedule is justified because of the technical or financial (or other) infeasibility of immediate compliance. An authorizing compliance schedule provision is included in today's rule because of the potential for existing dischargers to have new or more stringent effluent limitations for which immediate compliance would not be possible or practicable.

New and Existing Dischargers: The provision allows compliance schedules only for an ''existing discharger'' which is defined as any discharger which is not a ''new California discharger.'' A ''new California discharger'' includes ''any building, structure, facility, or installation from which there is, or may be, a 'discharge of pollutants', the construction of which commences after the effective date of this regulation.'' These definitions are modeled after the existing 40 CFR 122.2 definitions for parallel terms, but with a cut-off date modified to reflect this rule. Only ''new California dischargers'' are required to comply immediately upon commencement of discharge with effluent limitations derived from the criteria in this rule. For ''existing dischargers'' whose permits are reissued or modified to contain new or more stringent limitations based upon certain water quality requirements, the permit could allow up to five years, or up to the length of a permit, to comply with such limitations. The provision applies to new or more stringent effluent limitations based on the criteria in this EPA rule.

EPA has included ''increasing dischargers'' within the category of ''existing dischargers'' since ''increasing dischargers'' are existing facilities with a change—an increase—in their discharge. Such facilities may include those with seasonal variations. ''Increasing dischargers'' will already have treatment systems in place for their current discharge, thus, they have less

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opportunity than a new discharger does to design and build a new treatment system which will meet new water quality-based requirements for their changed discharge. Allowing existing facilities with an increasing discharge a compliance schedule will avoid placing the discharger at a competitive disadvantage vis-a-vis other existing dischargers who are eligible for compliance schedules.

Today's rule does not prohibit the use of a short-term ''shake down period'' for new California dischargers as is provided for new sources or new dischargers in 40 CFR 122.29(d)(4). These regulations require that the owner or operator of (1) a new source; (2) a new discharger (as defined in 40 CFR 122.2) which commenced discharge after August 13, 1979; or (3) a recommencing discharger shall install and implement all pollution control equipment to meet the conditions of the permit before discharging. The facility must also meet all permit conditions in the shortest feasible time (not to exceed 90 days). This shake-down period is not a compliance schedule. This approach may be used to address violations which may occur during a new facility's start-up, especially where permit limits are water quality-based and biological treatment is involved.

The burden of proof to show the necessity of a compliance schedule is on the discharger, and the discharger must request approval from the permit issuing authority for a schedule of compliance. The discharger should submit a description of the minimum required actions or evaluations that must be undertaken in order to comply with the new or more restrictive discharge limits. Dates of completion for the required actions or evaluations should be included, and the proposed schedule should reflect the shortest practicable time to complete all minimum required actions.

Duration of Compliance Schedules: Today's rule provides that compliance schedules may provide for up to five years to meet new or more stringent effluent limitations in those limited circumstances where the permittee can demonstrate to the permit authority that an extended schedule is warranted. EPA's regulations at 122.47 require compliance with standards as soon as possible. This means that permit authorities should not allow compliance schedules where the permittee fails to demonstrate their necessity. This provision should not be considered a default compliance schedule duration for existing facilities.

In instances where dischargers wish to conduct toxicological studies, analyze results, and adopt and implement new or revised water quality-based effluent limitations, EPA believes that five years is sufficient time within which to complete this process. See the preamble to the proposed rule.

Under this rule, where a schedule of compliance exceeds one year, interim requirements are to be specified and interim progress reports are to be submitted at least annually to the permit issuing authority, in at least one-year time intervals.

The rule allows all compliance schedules to extend up to a maximum duration of five years, which is the maximum term of any NPDES permit. See 40 CFR 122.46. The discharger's opportunity to obtain a compliance schedule occurs when the existing permit for that discharge is issued, reissued or modified to contain more stringent limits based on the water quality criteria in today's rule. Such compliance schedules, however, cannot be extended to any indefinite point of time in the future because the compliance schedule provision in this rule will sunset on May 18, 2005. The sunset applies to the authorizing provision in today's rule (40 CFR 131.38(e)), not to individual schedules of compliance included in specific NPDES permits. Delays in reissuing expired permits (including those which continue in effect under applicable NPDES regulations) cannot indefinitely extend the period of time during which a compliance schedule is in effect. This would occur where the permit authority includes the single maximum five-year compliance schedule in a permit that is reissued just before the compliance schedule provision sunsets (having been previously issued without WQBELS using the rule's criteria on the eve of the effective date of this rule). Instead, the effect of the sunset provision is to limit the longest time period for compliance to ten years after the effective date of this rule.

EPA recognizes that where a permit is modified during the permit term, and the permittee needs the full five years to comply, the five-year schedule may extend beyond the term of the modified permit. In such cases, the rule allows for the modified permit to contain a compliance schedule with an interim limit by the end of the permit term. When the permit is reissued, the permit authority may extend the compliance schedule in the next permit, provided that, taking into account the amount of time allowed under the previous permit, the entire compliance schedule contained in the permit shall not exceed five years. Final permit limits and compliance dates will be included in the record for the permit. Final compliance dates must occur within five years from the date of permit issuance, reissuance, or modification, unless additional or less time is provided for by law.

EPA would prefer that the State adopt an authorizing compliance schedule provision but recognizes that the State may not be able to complete this action for some time after promulgation of the CTR. Thus, EPA has chosen to promulgate the rule with a sunset provision which states that the authorizing compliance schedule provision will cease or sunset on May 18, 2005. However, if the State Board adopts, and EPA approves, a statewide authorizing compliance schedule provision significantly prior to May 18, 2005, EPA will act to stay the authorizing compliance schedule provision in today's rule. Additionally, if a Regional Board adopts, and the State Board adopts and EPA approves, a Regional Board authorizing compliance schedule provision, EPA will act to stay today's provision for the appropriate or corresponding geographic region in California. At that time, the State Board's or Regional Board's authorizing compliance schedule provision will govern the ability of the State regulatory entity to allow a discharger to include a compliance schedule in a discharger's NPDES permit.

Antibacksliding: EPA wishes to address the potential concern over antibacksliding where revised permit limits based on new information are the result of the completion of additional studies. The Agency's interpretation of the CWA is that the antibacksliding requirements of section 402(o) of the CWA do not apply to revisions to effluent limitations made before the scheduled date of compliance for those limitations.

State Compliance Schedule Provisions: EPA supports the State in adopting a statewide provision independent of or as part of the effort to readopt statewide water quality control plans, or in adopting individual basin-wide compliance schedule provisions through its nine Regional Water Quality Control Boards (RWQCBs). The State and RWQCBs have broad discretion to adopt a provision, including discretion on reasonable lengths of time for final compliance with WQBELs. EPA recognizes that practical time frames within which to set interim goals may be necessary to achieve meaningful, long-term improvements in water quality in California.

At this time, two RWQCBs have adopted an authorizing compliance schedule provision as an amendment to

their respective Basin Plans during the Boards' last triennial review process. The Basin Plans have been adopted by the State and have come to EPA for approval. Thus, the Basin Plans' provisions are effective for the respective Basins. If and when EPA approves of either Regional Basin Plan, EPA will expeditiously act to amend the CTR, staying its compliance schedule provision, for the appropriate geographic region.

6. Changes From Proposed Rule

A few changes were made in the final rule from the proposal both as a result of the Agency's consideration of issues raised in public comments and Endangered Species Act consultation with the U.S. Fish and Wildlife Service (FWS) and U.S. National Marine Fisheries Service (NMFS). The important changes include: reserving the mercury aquatic life criteria; reserving the selenium freshwater acute aquatic life criterion; reserving the chloroform human health criteria; and adding a sunset provision to the authorizing compliance schedule provision. EPA also clarified that the CTR will not replace priority toxic pollutant criteria which were adopted by the San Francisco Regional Water Quality Control Board in its 1986 Basin Plan, adopted by the State Board, and approved by EPA; specifying the harmonic mean for human health criteria for non-carcinogens and adding a provision which explicitly allows the State to adopt and implement an alternative averaging period, frequency, and design flow for a criterion after opportunity for public comment.

The first two changes, the reservation of mercury criteria and selenium criterion, are discussed in more detail below in Section L., The Endangered Species Act (ESA). The selenium criterion is also discussed in more detail above in Section E., Derivation of Criteria, in subsection 2.b., Freshwater Acute Selenium Criterion. EPA has also decided to reserve a decision on numeric criteria for chloroform and therefore not promulgate chloroform criteria in the final rule. As part of a large-scale regulation promulgated in December l998 under the Safe Drinking Water Act, EPA published a health-based goal for chloroform (the maximum contaminant level goal or MCLG) of zero, see 63 FR 69390, Dec. 16, 1998. EPA provided new data and analyses concerning chloroform for public review and comment, including a different, mode of action approach for estimating the cancer risk, 63 FR 15674, March 31, 1998, but did not reach a conclusion on how to use that new information in establishing the final MCLG, pending further review by the Science Advisory Board. EPA has now concluded that any further actions on water quality criteria should take into account the new data and analysis as reviewed by the SAB. This decision is consistent with a recent federal court decision vacating the MCLG for chloroform (*Chlorine Chemistry Council* v. *EPA,* No. 98–1627 (DC Cir., Mar. 31,2000)). EPA intends to reassess the human health 304(a) criteria recommendation for chloroform. For these reasons, EPA has decided to reserve a decision on numeric criteria for chloroform in the CTR and not promulgate water quality criteria as proposed. Permitting authorities in California should continue to rely on existing narrative criteria to establish effluent limitations as necessary for chloroform.

The sunset provision for the authorizing compliance schedule provision has been added to ease the transition from a Federal provision to the State's provision that was adopted in March 2000 as part of its' new statewide implementation plan. The sunset provision is discussed in more detail in Section G.5 of today's preamble. The CTR matrix at 40 CFR 131.38(b)(1) makes it explicit that the rule does not supplant priority toxic pollutant criteria which were adopted by the San Francisco Regional Water Quality Control Board in its 1986 Basin Plan, adopted by the State Board, and approved by EPA. This change is discussed more fully in Section D.4. of today's preamble. EPA modified the design flow for implementing human health criteria for non-carcinogens from a 30Q5 to a harmonic mean. Human health criteria for non-carcinogens are based on an RfD, which is an acceptable daily exposure over a lifetime. EPA matched the criteria for protection over a human lifetime with the longest stream flow averaging period, i.e., the harmonic mean. Lastly, the CTR now contains language which is intended to make it easier for the State to adopt and implement an alternative averaging period, frequency and related design flow, for situations where the default parameters are inappropriate. This language is found at 40 CFR 131.38(c)(2)(iv).

H. Economic Analysis

This final rule establishes ambient water quality criteria which, by themselves, do not directly impose economic impacts (see section K). These criteria combined with the State-adopted designated uses for inland surface waters, enclosed bays and estuaries, and implementation policies, will establish water quality standards. Until the State implements these water quality standards, there will be no effect of this rule on any entity. The State will implement these criteria by ensuring that NPDES permits result in discharges that will meet these criteria. In so doing, the State will have considerable discretion.

EPA has analyzed the indirect potential costs and benefits of this rule. In order to estimate the indirect costs and benefits of the rule, an appropriate baseline must be established. The baseline is the starting point for measuring incremental costs and benefits of a regulation. The baseline is established by assessing what would occur in the absence of the regulation. At present, State Basin Plans contain a narrative water quality criterion stating that all waters shall be maintained free of toxic substances in concentrations that produce detrimental physiological responses in human, plant, animal, or aquatic life. EPA's regulation at 40 CFR 122.44(d)(1)(vi) requires that where a discharge causes or has the reasonable potential to cause an excursion above a narrative criterion within a State water quality standard, the permitting authority must establish effluent limits but may determine limits using a number of options. These options include establishing ''effluent limits on a case-by-case basis, using EPA's water quality criteria published under section 304(a) of the CWA, supplemented where necessary by other relevant information'' (40 CFR 122.44(d)(1)(vi)(B)). Thus, to the extent that the State is implementing its narrative criteria by applying the CWA section 304(a) criteria, this rule does not impose any incremental costs because the criteria in this rule are identical to the CWA section 304(a) criteria. Alternatively, to the extent that the State is implementing its narrative criteria on a ''case-by-case basis'' using ''other relevant information'' in its permits this rule may impose incremental indirect costs because the criteria in these permits may not be based on CWA 304(a) criteria. Both of these approaches to establishing effluent limits are in full compliance with the CWA.

Because a specific basis for effluent limits in all existing permits in California is not known, it is not possible to determine a precise estimate of the indirect costs of this rule. The incremental costs of the rule may be as low as zero, or as high as $61 million. The high estimate of costs is based on the possibility that most of the effluent limits now in effect are not based on 304(a) criteria. EPA evaluated these

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indirect costs using two different approaches. The first approach uses existing discharge data and makes assumptions about future State NPDES permit limits. Actual discharge levels are usually lower than the level set by current NPDES permit limits. This approach, representing the low-end scenario, also assumes that some of the discretionary mechanisms that would enhance flexibility (*e.g.,* site specific criteria, mixing zones) would be granted by the State. The second approach uses a sample of existing permit limits and assumes that dischargers are actually discharging at the levels contained in their permits and makes assumptions about limits statewide that would be required under the rule. This approach, representing the high-end scenario, also assumes that none of the discretionary mechanisms that would enhance flexibility (*e.g.,* site specific criteria, mixing zones) would be granted by the State. These two approaches recognize that the State has significant flexibility and discretion in how it chooses to implement standards within the NPDES permit program, the EA by necessity includes many assumptions about how the State will implement the water quality standards. These assumptions are based on a combination of EPA guidance and current permit conditions for the facilities examined in this analysis. To account for the uncertainty of EPA's implementation assumptions, this analysis estimates a wide range of costs and benefits. By completing the EA, EPA intends to inform the public about how entities might be potentially affected by State implementation of water quality standards in the NPDES permit program. The costs and benefits sections that follow summarize the methodology and results of the analysis.

1. Costs

EPA assessed the potential compliance costs that facilities may incur to meet permit limits based on the criteria in today's rule. The analysis focused on direct compliance costs such as capital costs and operation and maintenance costs (O&M) for end-of-pipe pollution control, indirect source controls, pollution prevention, monitoring, and costs of pursuing alternative methods of compliance.

The population of facilities with NPDES permits that discharge into California's enclosed bays, estuaries and inland surface waters includes 184 major dischargers and 1,057 minor dischargers. Of the 184 major facilities, 128 are publicly owned treatment works (POTWs) and 56 are industrial facilities. Approximately 2,144 indirect dischargers designated as significant industrial users discharge wastewater to those POTWs. In the EA for the proposed CTR, EPA used a three-phased process to select a sample of facilities to represent California dischargers potentially affected by the State's implementation of permit limits based on the criteria contained in this rule.

The first phase consisted of choosing three case study areas for which data was thought to exist. The three case studies with a total of 5 facilities included: the South San Francisco Bay (the San Jose/Santa Clara Water Pollution Control Plant and Sunnyvale Water Pollution Control Plant); the Sacramento River (the Sacramento Regional Wastewater Treatment Plant); and the Santa Ana River (the City of Riverside Water Quality Control Plant and the City of Colton Municipal Wastewater Treatment Facility). The second phase consisted of selecting five additional major industrial dischargers to complement the case-study POTWs.

The third phase involved selecting 10 additional facilities to improve the basis for extrapolating the costs of the selected sample facilities to the entire population of potentially affected dischargers. The additional 10 facilities were selected such that the group examined: (1) Was divided between major POTWs and major industrial discharger categories in proportion to the numbers of facilities in the State; (2) gave greater proportionate representation to major facilities than minor facilities based on a presumption that the majority of compliance costs would be incurred by major facilities; (3) gave a proportionate representation to each of four principal conventional treatment processes typically used by facilities in specified industries in California; and (4) was representative of the proportionate facilities located within the different California Regional Water Quality Control Boards. Within these constraints, facilities were selected at random to complete the sample.

In the EA for today's final rule, EPA primarily used the same sample as the EA for the proposed rule with some modifications. EPA increased the number of minor POTWs and minor industrial facilities in the sample. EPA randomly selected four new minor POTW facilities and five new minor industrial facilities to add to the sample. The number of sample facilities selected in each area under the jurisdiction of a Regional Water Quality Control Board was roughly proportional to the universe of facilities in each area.

For those facilities that were projected to exceed permit limits based on the criteria, EPA estimated the incremental costs of compliance. Using a decision matrix or flow chart, costs were developed for two different scenarios—a ''low-end'' cost scenario and a ''high-end'' cost scenario—to account for a range of regulatory flexibility available to the State when implementing permit limits based on the water quality criteria. The assumptions for baseline loadings also vary over the two scenarios. The low-end scenario generally assumed that facilities were discharging at the maximum effluent concentrations taken from actual monitoring data, while the high-end scenario generally assumed that facilities were discharging at their current effluent limits. The decision matrix specified assumptions used for selection of control options, such as optimization of existing treatment processes and operations, in-plant pollutant minimization and prevention, and end-of-pipe treatment.

The annualized potential costs that direct and indirect dischargers may incur as a result of State implementation of permit limits based on water quality standards using today's criteria are estimated to be between $33.5 million and $61 million. EPA believes that the costs incurred as a result of State implementation of these permit limits will approach the low-end of the cost range. Costs are unlikely to reach the high-end of the range because State authorities are likely to choose implementation options that provide some degree of flexibility or relief to point source dischargers. Furthermore, cost estimates for both scenarios, but especially for the high-end scenario, may be overstated because the analysis tended to use conservative assumptions in calculating these permit limits and in establishing baseline loadings. The baseline loadings for the high-end were based on current effluent limits rather than actual pollutant discharge data. Most facilities discharge pollutants in concentrations well below current effluent limits. In addition, both the high-end and low-end cost estimates in the EA may be slightly overstated since potential costs incurred to reduce chloroform discharges were included in these estimates. EPA made a decision to reserve the chloroform human health criteria after the EA was completed.

Under the low-end cost scenario, major industrial facilities and POTWs would incur about 27 percent of the potential costs, indirect dischargers would incur about 70 percent of the potential costs, while minor dischargers would incur about 3 percent. Of the major direct dischargers, POTWs would incur the largest share of projected costs (87 percent). However, distributed

among 128 major POTWs in the State, the average cost per plant would be $61,000 per year. Chemical and petroleum industries would incur the highest cost of the industrial categories (5.6 percent of the annual costs, with an annual average of $25,200 per plant). About 57 percent of the low-end costs would be associated with pollution prevention activities, while nearly 38 percent would be associated with pursuing alternative methods of compliance under the regulations.

Under the high-end cost scenario, major industrial facilities and POTWs would incur about 94 percent of the potential costs, indirect dischargers would incur about 17 percent of the potential costs, while minor dischargers would incur about 5 percent. Among the major, direct dischargers, two categories would incur the majority of potential costs—major POTWs (82 percent), Chemical/Petroleum Products (9 percent). The average annual per plant cost for different industry categories would ranges from zero to $324,000. The two highest average cost categories would be major POTWs ($324,000 per year) and Chemical/Petroleum Products ($221,264 per year). The shift in proportion of potential costs between direct and indirect dischargers is due to the assumption that more direct dischargers would use end-of-pipe treatment under the high-end scenario. Thus, a smaller proportion of indirect dischargers would be impacted under the high-end scenario, since some municipalities are projected to add end-of-pipe treatment which would reduce the need for controls from indirect discharges. Over 91 percent of the annual costs are for waste minimization and treatment optimization costs. Waste minimization would represent nearly 84% of the total annual costs. Capital and operation and maintenance costs would make up less than 9 percent of annual costs.

Cost-Effectiveness: Cost-effectiveness is estimated in terms of the cost of reducing the loadings of toxic pollutants from point sources. The cost-effectiveness is derived by dividing the projected annual costs of implementing permit limits based on water quality standards using today's criteria by the toxicity-weighted pounds (pound-equivalents) of pollutants removed. Pound-equivalents are calculated by multiplying pounds of each pollutant removed by the toxic weight (based on the toxicity of copper) for that pollutant.

Based on this analysis, State implementation of permit limits based on today's criteria would be responsible for the reduction of about 1.1 million to 2.7 million toxic pound-equivalents per year, or 15 to 50 percent of the toxic-weighted baseline loadings for the high- and low-end scenarios, respectively. The cost-effectiveness of the scenarios would range from $22 (high-end scenario) to $31 (low-end scenario) per pound-equivalent.

2. Benefits

The benefits analysis is intended to provide insight into both the types and potential magnitude of the economic benefits expected as a result of implementation of water quality standards based on today's criteria. To the extent feasible, empirical estimates of the potential magnitude of the benefits were developed and then compared to the estimated costs of implementing water quality standards based on today's criteria.

To perform a benefits analysis, the types or categories of benefits that apply need to be defined. EPA relied on a set of benefits categories that typically apply to changes in the water resource environment. Benefits were categorized as either use benefits or passive (nonuse) benefits depending on whether or not they involve direct use of, or contact with, the resource. The most prominent use benefit categories are those related to recreational fishing, boating, and swimming. Another use benefit category of significance is human health risk reduction. Human health risk reductions can be realized through actions that reduce human exposure to contaminants such as exposure through the consumption of fish containing elevated levels of pollutants. Passive use benefits are those improvements in environmental quality that are valued by individuals apart from any use of the resource in question.

Benefits estimates were derived in this study using an approach in which benefits of discrete large-scale changes in water quality beyond present day conditions were estimated wherever feasible. A share of those benefits was then apportioned to implementation of water quality standards based on today's criteria. The apportionment estimate was based on a three-stage process:

First, EPA assessed current total loadings from all sources that are contributing to the toxics-related water quality problems observed in the State. This defines the overall magnitude of loadings. Second, the share of total loadings that are attributable to sources that would be controlled through implementation of water quality standards based on today's criteria was estimated. Since this analysis was designed to focus only on those controls imposed on point sources, this stage of the process entailed estimating the portion of total loadings originating from point sources. Third, the percentage reduction in loadings expected due to implementation of today's criteria was estimated and then multiplied by the share of point source loadings to calculate the portion of benefits that could be attributed to implementation of water quality standards based on today's criteria.

Total monetized annual benefits were estimated in the range of $6.9 to $74.7 million. By category, annual benefits would be $1.3 to $4.6 million for avoided cancer risk, $2.2 to $15.2 million for recreational angling, and $3.4 to $54.9 million for passive use benefits.

There are numerous categories of potential or likely benefits that have been omitted from the quantified and monetized benefit estimates. In terms of potential magnitudes of benefit, the following are likely to be significant contributors to the underestimation of the monetized values presented above:

- Improvements in water-related (in-stream and near stream) recreation apart from fishing. The omission of potential motorized and nonmotorized boating, swimming, picnicking, and related in-stream and stream-side recreational activities from the benefits estimates could contribute to an appreciable underestimation of total benefits. Such recreational activities have been shown in empirical research to be highly valued, and even modest changes in participation and or user values could lead to sizable benefits statewide. Some of these activities can be closely associated with water quality attributes (notably, swimming). Other recreational activities may be less directly related to the water quality improvements, but might nonetheless increase due to their association with fishing, swimming, or other activities in which the participants might engage.
- Improvements in consumptive and nonconsumptive land-based recreation, such as hunting and wildlife observation. Improvements in aquatic habitats may lead (via food chain and related ecologic benefit mechanisms) to healthier, larger, and more diverse populations of avian and terrestrial species, such as waterfowl, eagles, and otters. Improvements in the populations for these species could manifest as improved hunting and wildlife viewing opportunities, which might in turn increase participation and user day values for such activities. Although the scope of the benefits analysis has not allowed a quantitative assessment of these values at either pre- or post-rule

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conditions, it is conceivable that these benefits could be appreciable.

• Improvements in human health resulting from reduction of non-cancer risk. EPA estimated that implementation of water quality standards based on the criteria would result in a reduction of mercury concentrations in fish tissue and, thus, a reduction in the hazard from consumption of mercury contaminated fish. However, EPA was unable to monetize benefits due to reduced non-cancer health effects.

• Human health benefits for saltwater anglers outside of San Francisco Bay were not estimated. The number of saltwater anglers outside of San Francisco Bay is estimated to be 673,000 (based on Huppert, 1989, and U.S. FWS, 1993). The omission of other saltwater anglers may cause human health benefits to be underestimated. In addition, benefit estimates in the EA may be slightly overstated since potential benefits from reductions in chloroform discharges were included in these estimates. EPA made a decision to reserve the chloroform human health criteria after the EA was completed.

EPA received a number of comments which requested the Agency use the cost-benefit analysis in the EA as a factor in setting water quality criteria. EPA does not use the EA as a basis in determining protective water quality criteria. EPA's current regulations at 40 CFR 131.11 state that the criteria must be based on sound scientific rationale and must protect the designated use. From the outset of the water quality standards program, EPA has explained that while economic factors may be considered in designating uses, they may not be used to justify criteria that are not protective of those uses. 44 FR 25223–226, April 30, 1979. See e.g. *Mississippi Commission on Natural Resources* v. *Costle,* 625 F. 2d 1269, 1277 (5th Cir. 1980). EPA reiterated this interpretation of the CWA and its implementing regulations in discussing section 304(a) recommended criteria guidance stating that ''they are based solely on data and scientific judgments on the relationship between pollutant concentrations and environmental and human health effects and do not reflect consideration of economic impacts or the technological feasibility of meeting the chemical concentrations in ambient water.'' 63 FR 36742 and 36762, July 7, 1998.

I. Executive Order 12866, Regulatory Planning and Review

Under Executive Order 12866 (58 FR 51735, October 4, 1993), the Agency must determine whether the regulatory action is ''significant'' and therefore subject to Office of Management and Budget (OMB) review and the requirements of the Executive Order. The Order defines ''significant regulatory action'' as one that is likely to result in a rule that may:

(1) Have an annual effect on the economy of $100 million or more or adversely affect in a material way the economy, a sector of the economy, productivity, competition, jobs, the environment, public health or safety, or State, local, or tribal governments or communities;

(2) Create a serious inconsistency or otherwise interfere with an action taken or planned by another Agency;

(3) Materially alter the budgetary impact of entitlements, grants, user fees, or loan programs or the rights and obligations of recipients thereof; or

(4) Raise novel legal or policy issues arising out of legal mandates, the President's priorities, or the principles set forth in the Executive Order.

It has been determined that this rule is not a ''significant regulatory action'' under the terms of Executive Order 12866 and is therefore not subject to OMB review.

J. Unfunded Mandates Reform Act of 1995

Title II of the Unfunded Mandates Reform Act of 1995 (UMRA), Public Law 104–4, establishes requirements for Federal agencies to assess the effects of their regulatory actions on State, local, and tribal governments and the private sector. Under section 202 of the UMRA, EPA generally must prepare a written statement, including a cost-benefit analysis, for proposed and final rules with ''Federal mandates'' that may result in expenditures to State, local, and tribal governments, in the aggregate, or to the private sector, of $100 million or more in any one year. Before promulgating any regulation for which a written statement is needed, section 205 of the UMRA generally requires EPA to identify and consider a reasonable number of regulatory alternatives and adopt the least costly, most cost-effective or least burdensome alternative that achieves the objectives of the rule. The provisions of section 205 do not apply when they are inconsistent with applicable law. Moreover, section 205 allows an Agency to adopt an alternative other than the least costly, most cost-effective or least burdensome alternative if the Administrator publishes with the final rule an explanation why that alternative was not adopted. Before EPA establishes any regulatory requirements that may significantly or uniquely affect small governments, including tribal governments, it must have developed under section 203 of the UMRA a small government Agency plan. The plan must provide for notifying potentially affected small governments, enabling officials of the affected small governments to have meaningful and timely input in the development of regulatory proposals with significant Federal intergovernmental mandates, and EPA informing, educating, and advising small governments on compliance with the regulatory requirements.

Today's rule contains no Federal mandates (under the regulatory provisions of Title II of the Unfunded Mandates Reform Act (UMRA)) for State, local, or tribal governments or the private sector. Today's rule imposes no enforceable duty on any State, local or Tribal governments or the private sector; rather, the CTR promulgates ambient water quality criteria which, when combined with State-adopted uses, will create water quality standards for those water bodies with adopted uses. The State will then use these resulting water quality standards in implementing its existing water quality control programs. Thus, today's rule is not subject to the requirements of sections 202 and 205 of the UMRA.

EPA has determined that this rule contains no regulatory requirements that might significantly or uniquely affect small governments. This rule establishes ambient water quality criteria which, by themselves do not directly impact any entity. The State will implement these criteria by ensuring that NPDES permits result in discharges that will meet these criteria. In so doing, the State will have considerable discretion. Until the State implements these water quality standards, there will be no effect of this rule on any entity. Thus, today's rule is not subject to the requirements of section 203 of UMRA.

K. Regulatory Flexibility Act

The Regulatory Flexibility Act generally requires Federal agencies to prepare a regulatory flexibility analysis of any rule subject to notice and comment rulemaking requirements under the Administrative Procedure Act or any other statute unless the Agency certifies that the rule will not have a significant economic impact of a substantial number of small entities. Small entities include small businesses, small organizations, and small governmental jurisdictions. For purposes of assessing the impacts of today's rule on small entities, small entity is defined as: (1) A small business according to RFA default definitions for small businesses (based on SBA size

standards); (2) a small governmental jurisdiction that is a government of a city, county, town, school district or special district with a population of less than 50,000; and (3) a small organization that is any not-for-profit enterprise which is independently owned and operated and is not dominant in its field.

After considering the economic impacts of today's final rule on small entities, I certify that this action will not have a significant economic impact on a substantial number of small entities. This final rule will not impose any requirements on small entities.

Under the CWA water quality standards program, States must adopt water quality standards for their waters that must be submitted to EPA for approval. If the Agency disapproves a State standard and the State does not adopt appropriate revisions to address EPA's disapproval, EPA must promulgate standards consistent with the statutory requirements. EPA has authority to promulgate criteria or standards in any case where the Administrator determines that a revised or new standard is necessary to meet the requirements of the Act. These State standards (or EPA-promulgated standards) are implemented through various water quality control programs including the National Pollutant Discharge Elimination System (NPDES) program that limits discharges to navigable waters except in compliance with an EPA permit or permit issued under an approved State NPDES program. The CWA requires that all NPDES permits must include any limits on discharges that are necessary to meet State water quality standards.

Thus, under the CWA, EPA's promulgation of water quality criteria or standards establishes standards that the State, in turn, implements through the NPDES permit process. The State has considerable discretion in deciding how to meet the water quality standards and in developing discharge limits as needed to meet the standards. In circumstances where there is more than one discharger to a water body that is subject to water quality standards or criteria, a State also has discretion in deciding on the appropriate limits for the different dischargers. While the State's implementation of federally-promulgated water quality criteria or standards may result indirectly in new or revised discharge limits for small entities, the criteria or standards themselves do not apply to any discharger, including small entities.

Today's rule, as explained above, does not itself establish any requirements that are applicable to small entities. As a result of EPA's action here, the State of California will need to ensure that permits it issues include limits as necessary to meet the water quality standards established by the criteria in today's rule. In so doing, the State will have a number of discretionary choices associated with permit writing. While California's implementation of today's rule may ultimately result in some new or revised permit conditions for some dischargers, including small entities, EPA's action today does not impose any of these as yet unknown requirements on small entities.

The RFA requires analysis of the economic impact of a rule only on the small entities subject to the rule's requirements. Courts have consistently held that the RFA imposes no obligation on an Agency to prepare a small entity analysis of the effect of a rule on entities not regulated by the rule. *Motor & Equip. Mrfrs. Ass'n* v. *Nichols,* 142 F.3d 449, 467 & n.18 (D.C. Cir. 1998)(quoting *United States Distribution Companies* v. *FERC,* 88 F.3d 1105, 1170 (D.C. Cir. 1996); see also *American Trucking Association, Inc.* v. *EPA,* 175 F.3d 1027 (D.C. Cir. 1999). This final rule will have a direct effect only on the State of California which is not a small entity under the RFA. Thus, individual dischargers, including small entities, are not directly subject to the requirements of the rule. Moreover, because of California's discretion in implementing these standards, EPA cannot assess the extent to which the promulgation of this rule may subsequently affect any dischargers, including small entities. Consequently, certification under section 605(b) is appropriate. *State of Michigan, et al.* v. *U.S. Environmental Protection Agency,* No. 98–1497 (D.C. Cir. Mar. 3, 2000), slip op. at 41–42.

L. Paperwork Reduction Act

This action requires no new or additional information collection, reporting, or record keeping subject to the Paperwork Reduction Act, 44 U.S.C. 3501 *et seq.*

M. Endangered Species Act

Pursuant to section 7(a) of the Endangered Species Act (ESA), EPA has consulted with the U.S. Fish and Wildlife Service and the U.S. National Marine Fisheries Service (collectively, the Services) concerning EPA's rulemaking action for the State of California. EPA initiated informal consultation in early 1994, and completed formal consultation in April 2000. As a result of the consultation, EPA modified some of the provisions in the final rule.

As part of the consultation process, EPA submitted to the Services a Biological Evaluation for their review in October of 1997. This evaluation found that the proposed CTR was not likely to jeopardize the continued existence of any Federally listed species or result in the destruction or adverse modification of designated critical habitat. In April of 1998, the Services sent EPA a draft Biological Opinion which tentatively found that EPA's proposed rule would jeopardize the continued existence of several Federally listed species and result in the destruction or have adverse effect on designated critical habitat. After lengthy discussions with the Services, EPA agreed to several changes in the final rule and the Services in turn issued a final Biological Opinion finding that EPA's action would not likely jeopardize the continued existence of any Federally listed species or result in the destruction or adverse modification of designated critical habitat. EPA's Biological Evaluation and the Services' final Biological Opinion are contained in the administrative record for today's rule.

In order to ensure the continued protection of Federally listed threatened and endangered species and to protect their critical habitat, EPA agreed to reserve the aquatic life criteria for mercury and the acute freshwater aquatic life criterion for selenium. The Services believe that EPA's proposed criteria are not sufficiently protective of Federally listed species and should not be promulgated. EPA agreed that it would reevaluate these criteria in light of the Services concerns before promulgating them for the State of California. Other commitments made by EPA are described in a letter to the Services dated December 16, 1999; this letter is contained in the administrative record for today's rule.

N. Congressional Review Act

The Congressional Review Act, 5 U.S.C. 801 *et seq.*, as added by the Small Business Regulatory Enforcement Fairness Act of 1996, generally provides that before a rule may take effect, the Agency promulgating the rule must submit a rule report, which includes a copy of the rule, to each House of the Congress and to the Comptroller General of the United States. EPA will submit a report containing this rule and other required information to the U.S. Senate, the U.S. House of Representatives, and the Comptroller General of the United States prior to publication of the rule in the **Federal Register**. A major rule cannot take effect until 60 days after it is published in the **Federal Register**. This rule is not a major rule as defined

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by 5 U.S.C. 804(2). This rule will be effective May 18, 2000.

O. Executive Order 13084, Consultation and Coordination With Indian Tribal Governments

Under Executive Order 13084, EPA may not issue a regulation that is not required by statute, that significantly or uniquely affects the communities of Indian tribal governments, and that imposes substantial direct compliance costs on those communities, unless the Federal government provides the funds necessary to pay the direct compliance costs incurred by the tribal governments, or EPA consults with those governments. If EPA complies by consulting, Executive Order 13084 requires EPA to provide to the Office of Management and Budget, in a separately identified section of the preamble to the rule, a description of the extent of EPA's prior consultation with representatives of affected tribal governments, a summary of the nature of their concerns, and a statement supporting the need to issue the regulation. In addition, Executive Order 13084 requires EPA to develop an effective process permitting elected officials and other representatives of Indian tribal governments ''to provide meaningful and timely input in the development of regulatory policies on matters that significantly or uniquely affect their communities.''

Today's rule does not significantly or uniquely affect the communities of Indian tribal governments nor does it impose substantial direct compliance cots on them. Today's rule will only address priority toxic pollutant water quality criteria for the State of California and does not apply to waters in Indian country. Accordingly, the requirements of section 3(b) of Executive Order 13084 do not apply to this rule.

P. National Technology Transfer and Advancement Act

Section 12(d) of the National Technology Transfer and Advancement Act of 1995 (''NTTAA''), Public Law No. 104–113, section 12(d) (15 U.S.C. 272 note) directs EPA to use voluntary consensus standards in its regulatory activities unless to do so would be inconsistent with applicable law or otherwise impractical. Voluntary consensus standards are technical standards (e.g., materials specifications, test methods, sampling procedures, and business practices) that are developed or adopted by voluntary consensus standards bodies. The NTTAA directs EPA to provide Congress, through OMB, explanations when the Agency decides not to use available and applicable voluntary consensus standards.

This final rule does not involve technical standards. Therefore, EPA did not consider the use of any voluntary consensus standards.

Q. Executive Order 13132 on Federalism

Executive Order 13132, entitled ''Federalism'' (64 FR 43255, August 10, 1999), requires EPA to develop an accountable process to ensure ''meaningful and timely input by State and local officials in the development of regulatory policies that have federalism implications.'' ''Policies that have federalism implications'' is defined in the Executive Order to include regulations that have ''substantial direct effects on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government.''

Under section 6 of Executive Order 13132, EPA may not issue a regulation that has federalism implications, that imposes substantial direct compliance costs, and that is not required by statute, unless the Federal government provides the funds necessary to pay the direct compliance costs incurred by State and local governments, or EPA consults with State and local officials early in the process of developing the proposed regulation. EPA also may not issue a regulation that has federalism implications and that preempts State law, unless the Agency consults with State and local officials early in the process of developing the proposed regulation.

This final rule does not have federalism implications. It will not have substantial direct effects on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government, as specified in Executive Order 13132. The rule does not affect the nature of the relationship between EPA and States generally, for the rule only applies to water bodies in California. Further, the rule will not substantially affect the relationship of EPA and the State of California, or the distribution of power or responsibilities between EPA and the State. The rule does not alter the State's authority to issue NPDES permits or the State's considerable discretion in implementing these criteria. The rule simply implements Clean Water Act section 303(c)(2)(B) requiring numeric ambient water quality criteria for which EPA has issued section 304(a) recommended criteria in a manner that is consistent with previous regulatory guidance that the Agency has issued to implement CWA section 303(c)(2)(B). Further, this rule does not preclude the State from adopting water quality standards that meet the requirements of the CWA. Thus, the requirements of section 6 of the Executive Order do not apply to this rule.

Although section 6 of Executive Order 13132 does not apply to this rule, EPA did consult with State and local government representatives in developing this rule. EPA and the State reached an agreement that to best utilize its respective resources, EPA would promulgate water quality criteria and the State would concurrently work on a plan to implement the criteria. Since the proposal of this rule, EPA has kept State officials fully informed of changes to the proposal. EPA has continued to invite comment from the State on these changes. EPA believes that the final CTR incorporates comments from State officials and staff.

R. Executive Order 13045 on Protection of Children From Environmental Health Risks and Safety Risks

Executive Order 13045: ''Protection of Children from Environmental Health Risks and Safety Risks'' (62 FR 19885, April 23, 1997) applies to any rule that: (1) Is determined to be ''economically significant'' as defined under Executive Order 12866, and (2) concerns an environmental health or safety risk that EPA has reason to believe may have a disproportionate effect on children. If the regulatory action meets both criteria, the Agency must evaluate the environmental health or safety effects of the planned rule on children, and explain why the planned regulation is preferable to other potentially effective and reasonably feasible alternatives considered by the Agency.

While this final rule is not subject to the Executive Order because it is not economically significant as defined in Executive Order 12866, we nonetheless have reason to believe that the environmental health or safety risk addressed by this action may have a disproportionate effect on children. As a matter of EPA policy, we therefore have assessed the environmental health or safety effects of ambient water quality criteria on children. The results of this assessment are contained in section F.3., Human Health Criteria.

List of Subjects in 40 CFR Part 131

Environmental protection, Indians—lands, Intergovernmental relations, Reporting and recordkeeping requirements, Water pollution control.

Dated: April 27, 2000.

Carol Browner,

Administrator.

For the reasons set out in the preamble, part 131 of chapter I of title 40 of the Code of Federal Regulations is amended as follows:

PART 131—WATER QUALITY STANDARDS

1. The authority citation for part 131 continues to read as follows:

Authority: 33 U.S.C. 1251 *et seq.*

Subpart D—[Amended]

2. Section 131.38 is added to subpart D to read as follows:

§ 131.38 Establishment of Numeric Criteria for Priority Toxic Pollutants for the State of California.

(a) *Scope.* This section promulgates criteria for priority toxic pollutants in the State of California for inland surface waters and enclosed bays and estuaries. This section also contains a compliance schedule provision.

(b)(1) Criteria for Priority Toxic Pollutants in the State of California as described in the following table:

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A		B Freshwater		C Saltwater		D Human Health (10^{-6} risk for carcinogens) For consumption of:	
# Compound	CAS Number	Criterion Maximum Conc. [d] B1	Criterion Continuous Conc. [d] B2	Criterion Maximum Conc. [d] C1	Criterion Continuous Conc. [d] C2	Water & Organisms (μg/L) D1	Organisms Only (μg/L) D2
1. Antimony	7440360					14 a,s	4300 a,t
2. Arsenic [b]	7440382	340 i,m,w	150 i,m,w	69 i,m	36 i,m		
3. Beryllium	7440417					n	n
4. Cadmium [b]	7440439	4.3 e,i,m,w,x	2.2 e,i,m,w	42 i,m	9.3 i,m	n	n
5a. Chromium (III)	16065831	550 e,i,m,o	180 e,i,m,o			n	n
5b. Chromium (VI) [b]	18540299	16 i,m,w	11 i,m,w	1100 i,m	50 i,m	n	n
6. Copper [b]	7440508	13 e,i,m,w,x	9.0 e,i,m,w	4.8 i,m	3.1 i,m	1300	
7. Lead [b]	7439921	65 e,i,m	2.5 e,i,m	210 i,m	8.1 i,m	n	n
8. Mercury [b]	7439976	[Reserved]	[Reserved]	[Reserved]	[Reserved]	0.050 a	0.051 a
9. Nickel [b]	7440020	470 e,i,m,w	52 e,i,m,w	74 i,m	8.2 i,m	610 a	4600 a
10. Selenium [b]	7782492	[Reserved] p	5.0 q	290 i,m	71 i,m	n	n
11. Silver [b]	7440224	3.4 e,i,m		1.9 i,m			
12. Thallium	7440280					1.7 a,s	6.3 a,t
13. Zinc [b]	7440666	120 e,i,m,w,x	120 e,i,m,w	90 i,m	81 i,m		
14. Cyanide [b]	57125	22 o	5.2 o	1 r	1 r	700 a	220,000 a,j
15. Asbestos	1332214					7,000,000 fibers/L k,s	
16. 2,3,7,8-TCDD (Dioxin)	1746016					0.000000013 c	0.000000014 c
17. Acrolein	107028					320 s	780 t
18. Acrylonitrile	107131					0.059 a,c,s	0.66 a,c,t
19. Benzene	71432					1.2 a,c	71 a,c
20. Bromoform	75252					4.3 a,c	360 a,c
21. Carbon Tetrachloride	56235					0.25 a,c,s	4.4 a,c,t
22. Chlorobenzene	108907					680 a,s	21,000 a,j,t
23. Chlorodibromomethane	124481					0.401 a,c	34 a,c
24. Chloroethane	75003						
25. 2-Chloroethylvinyl Ether	110758						

26. Chloroform	67663					[Reserved]	[Reserved]
27. Dichlorobromomethane	75274					0.56 a,c	46 a,c
28. 1,1-Dichloroethane	75343						
29. 1,2-Dichloroethane	107062					0.38 a,c,s	99 a,c,t
30. 1,1-Dichloroethylene	75354					0.057 a,c,s	3.2 a,c,t
31. 1,2-Dichloropropane	78875					0.52 a	39 a
32. 1,3-Dichloropropylene	542756					10 a,s	1,700 a,t
33. Ethylbenzene	100414					3,100 a,s	29,000 a,t
34. Methyl Bromide	74839					48 a	4,000 a
35. Methyl Chloride	74873					n	n
36. Methylene Chloride	75092					4.7 a,c	1,600 a,c
37. 1,1,2,2-Tetrachloroethane	79345					0.17 a,c,s	11 a,c,t
38. Tetrachloroethylene	127184					0.8 c,s	8.85 c,t
39. Toluene	108883					6,800 a	200,000 a
40. 1,2-Trans-Dichloroethylene	156605					700 a	140,000 a
41. 1,1,1-Trichloroethane	71556					n	n
42. 1,1,2-Trichloroethane	79005					0.60 a,c,s	42 a,c,t
43. Trichloroethylene	79016					2.7 c,s	81 c,t
44. Vinyl Chloride	75014					2 c,s	525 c,t
45. 2-Chlorophenol	95578					120 a	400 a
46. 2,4-Dichlorophenol	120832					93 a,s	790 a,t
47. 2,4-Dimethylphenol	105679					540 a	2,300 a
48. 2-Methyl-4,6-Dinitrophenol	534521					13.4 s	765 t
49. 2,4-Dinitrophenol	51285					70 a,s	14,000 a,t
50. 2-Nitrophenol	88755						
51. 4-Nitrophenol	100027						
52. 3-Methyl-4-Chlorophenol	59507						
53. Pentachlorophenol	87865	19 f,w	15 f,w	13	7.9	0.28 a,c	8.2 a,c,j
54. Phenol	108952					21,000 a	4,600,000 a,j,t
55. 2,4,6-Trichlorophenol	88062					2.1 a,c	6.5 a,c
56. Acenaphthene	83329					1,200 a	2,700 a
57. Acenaphthylene	208968						
58. Anthracene	120127					9,600 a	110,000 a

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59. Benzidine	92875					0.00012 a,c,s	0.00054 a,c,t
60. Benzo(a)Anthracene	56553					0.0044 a,c	0.049 a,c
61. Benzo(a)Pyrene	50328					0.0044 a,c	0.049 a,c
62. Benzo(b)Fluoranthene	205992					0.0044 a,c	0.049 a,c
63. Benzo(ghi)Perylene	191242						
64. Benzo(k)Fluoranthene	207089					0.0044 a,c	0.049 a,c
65. Bis(2-Chloroethoxy)Methane	111911						
66. Bis(2-Chloroethyl)Ether	111444					0.031 a,c,s	1.4 a,c,t
67. Bis(2-Chloroisopropyl)Ether	39638329					1,400 a	170,000 a,t
68. Bis(2-Ethylhexyl)Phthalate	117817					1.8 a,c,s	5.9 a,c,t
69. 4-Bromophenyl Phenyl Ether	101553						
70. Butylbenzyl Phthalate	85687					3,000 a	5,200 a
71. 2-Chloronaphthalene	91587					1,700 a	4,300 a
72. 4-Chlorophenyl Phenyl Ether	7005723						
73. Chrysene	218019					0.0044 a,c	0.049 a,c
74. Dibenzo(a,h)Anthracene	53703					0.0044 a,c	0.049 a,c
75. 1,2 Dichlorobenzene	95501					2,700 a	17,000 a
76. 1,3 Dichlorobenzene	541731					400	2,600
77. 1,4 Dichlorobenzene	106467					400	2,600
78. 3,3'-Dichlorobenzidine	91941					0.04 a,c,s	0.077 a,c,t
79. Diethyl Phthalate	84662					23,000 a,s	120,000 a,t
80. Dimethyl Phthalate	131113					313,000 s	2,900,000 t
81. Di-n-Butyl Phthalate	84742					2,700 a,s	12,000 a,t
82. 2,4-Dinitrotoluene	121142					0.11 c,s	9.1 c,t
83. 2,6-Dinitrotoluene	606202						
84 Di-n-Octyl Phthalate	117840						
85. 1,2-Diphenylhydrazine	122667					0.040 a,c,s	0.54 a,c,t
86. Fluoranthene	206440					300 a	370 a
87. Fluorene	86737					1,300 a	14,000 a
88. Hexachlorobenzene	118741					0.00075 a,c	0.00077 a,c
89. Hexachlorobutadiene	87683					0.44 a,c,s	50 a,c,t
90. Hexachlorocyclopentadiene	77474					240 a,s	17,000 a,j,t
91. Hexachloroethane	67721					1.9 a,c,s	8.9 a,c,t

92. Indeno(1,2,3-cd) Pyrene	193395					0.0044 a,c	0.049 a,c
93. Isophorone	78591					8.4 c,s	600 c,t
94. Naphthalene	91203						
95. Nitrobenzene	98953					17 a,s	1,900 a,j,t
96. N-Nitrosodimethylamine	62759					0.00069 a,c,s	8.1 a,c,t
97. N-Nitrosodi-n-Propylamine	621647					0.005 a	1.4 a
98. N-Nitrosodiphenylamine	86306					5.0 a,c,s	16 a,c,t
99. Phenanthrene	85018						
100. Pyrene	129000					960 a	11,000 a
101. 1,2,4-Trichlorobenzene	120821						
102. Aldrin	309002	3 g		1.3 g		0.00013 a,c	0.00014 a,c
103. alpha-BHC	319846					0.0039 a,c	0.013 a,c
104. beta-BHC	319857					0.014 a,c	0.046 a,c
105. gamma-BHC	58899	0.95 w		0.16 g		0.019 c	0.063 c
106. delta-BHC	319868						
107. Chlordane	57749	2.4 g	0.0043 g	0.09 g	0.004 g	0.00057 a,c	0.00059 a,c
108. 4,4'-DDT	50293	1.1 g	0.001 g	0.13 g	0.001 g	0.00059 a,c	0.00059 a,c
109. 4,4'-DDE	72559					0.00059 a,c	0.00059 a,c
110. 4,4'-DDD	72548					0.00083 a,c	0.00084 a,c
111. Dieldrin	60571	0.24 w	0.056 w	0.71 g	0.0019 g	0.00014 a,c	0.00014 a,c
112. alpha-Endosulfan	959988	0.22 g	0.056 g	0.034 g	0.0087 g	110 a	240 a
113. beta-Endosulfan	33213659	0.22 g	0.056 g	0.034 g	0.0087 g	110 a	240 a
114. Endosulfan Sulfate	1031078					110 a	240 a
115. Endrin	72208	0.086 w	0.036 w	0.037 g	0.0023 g	0.76 a	0.81 a,j
116. Endrin Aldehyde	7421934					0.76 a	0.81 a,j
117. Heptachlor	76448	0.52 g	0.0038 g	0.053 g	0.0036 g	0.00021 a,c	0.00021 a,c
118. Heptachlor Epoxide	1024573	0.52 g	0.0038 g	0.053 g	0.0036 g	0.00010 a,c	0.00011 a,c
119-125. Polychlorinated biphenyls (PCBs)			0.014 u		0.03 u	0.00017 c,v	0.00017 c,v
126. Toxaphene	8001352	0.73	0.0002	0.21	0.0002	0.00073 a,c	0.00075 a,c
Total Number of Criteria [h]		22	21	22	20	92	90

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Footnotes to Table in Parargraph (b)(1):

a. Criteria revised to reflect the Agency q1* or RfD, as contained in the Integrated Risk Information System (IRIS) as of October 1, 1996. The fish tissue bioconcentration factor (BCF) from the 1980 documents was retained in each case.

b. Criteria apply to California waters except for those waters subject to objectives in Tables III–2A and III–2B of the San Francisco Regional Water Quality Control Board's (SFRWQCB) 1986 Basin Plan, that were adopted by the SFRWQCB and the State Water Resources Control Board, approved by EPA, and which continue to apply.

c. Criteria are based on carcinogenicity of 10 (-6) risk.

d. Criteria Maximum Concentration (CMC) equals the highest concentration of a pollutant to which aquatic life can be exposed for a short period of time without deleterious effects. Criteria Continuous Concentration (CCC) equals the highest concentration of a pollutant to which aquatic life can be exposed for an extended period of time (4 days) without deleterious effects. ug/L equals micrograms per liter.

e. Freshwater aquatic life criteria for metals are expressed as a function of total hardness (mg/L) in the water body. The equations are provided in matrix at paragraph (b)(2) of this section. Values displayed above in the matrix correspond to a total hardness of 100 mg/l.

f. Freshwater aquatic life criteria for pentachlorophenol are expressed as a function of pH, and are calculated as follows: Values displayed above in the matrix correspond to a pH of 7.8. CMC = $\exp(1.005(pH) - 4.869)$. CCC = $\exp(1.005(pH) - 5.134)$.

g. This criterion is based on 304(a) aquatic life criterion issued in 1980, and was issued in one of the following documents: Aldrin/Dieldrin (EPA 440/5–80–019), Chlordane (EPA 440/5–80–027), DDT (EPA 440/5–80–038), Endosulfan (EPA 440/5–80–046), Endrin (EPA 440/5–80–047), Heptachlor (440/5–80–052), Hexachlorocyclohexane (EPA 440/5–80–054), Silver (EPA 440/5–80–071). The Minimum Data Requirements and derivation procedures were different in the 1980 Guidelines than in the 1985 Guidelines. For example, a ''CMC'' derived using the 1980 Guidelines was derived to be used as an instantaneous maximum. If assessment is to be done using an averaging period, the values given should be divided by 2 to obtain a value that is more comparable to a CMC derived using the 1985 Guidelines.

h. These totals simply sum the criteria in each column. For aquatic life, there are 23 priority toxic pollutants with some type of freshwater or saltwater, acute or chronic criteria. For human health, there are 92 priority toxic pollutants with either ''water + organism'' or ''organism only'' criteria. Note that these totals count chromium as one pollutant even though EPA has developed criteria based on two valence states. In the matrix, EPA has assigned numbers 5a and 5b to the criteria for chromium to reflect the fact that the list of 126 priority pollutants includes only a single listing for chromium.

i. Criteria for these metals are expressed as a function of the water-effect ratio, WER, as defined in paragraph (c) of this section. CMC = column B1 or C1 value x WER; CCC = column B2 or C2 value x WER.

j. No criterion for protection of human health from consumption of aquatic organisms (excluding water) was presented in the 1980 criteria document or in the 1986 Quality Criteria for Water. Nevertheless, sufficient information was presented in the 1980 document to allow a calculation of a criterion, even though the results of such a calculation were not shown in the document.

k. The CWA 304(a) criterion for asbestos is the MCL.

l. [Reserved]

m. These freshwater and saltwater criteria for metals are expressed in terms of the dissolved fraction of the metal in the water column. Criterion values were calculated by using EPA's Clean Water Act 304(a) guidance values (described in the total recoverable fraction) and then applying the conversion factors in § 131.36(b)(1) and (2).

n. EPA is not promulgating human health criteria for these contaminants. However, permit authorities should address these contaminants in NPDES permit actions using the State's existing narrative criteria for toxics.

o. These criteria were promulgated for specific waters in California in the National Toxics Rule (''NTR''), at § 131.36. The specific waters to which the NTR criteria apply include: Waters of the State defined as bays or estuaries and waters of the State defined as inland, i.e., all surface waters of the State not ocean waters. These waters specifically include the San Francisco Bay upstream to and including Suisun Bay and the Sacramento-San Joaquin Delta. This section does not apply instead of the NTR for this criterion.

p. A criterion of 20 ug/l was promulgated for specific waters in California in the NTR and was promulgated in the total recoverable form. The specific waters to which the NTR criterion applies include: Waters of the San Francisco Bay upstream to and including Suisun Bay and the Sacramento-San Joaquin Delta; and waters of Salt Slough, Mud Slough (north) and the San Joaquin River, Sack Dam to the mouth of the Merced River. This section does not apply instead of the NTR for this criterion. The State of California adopted and EPA approved a site specific criterion for the San Joaquin River, mouth of Merced to Vernalis; therefore, this section does not apply to these waters.

q. This criterion is expressed in the total recoverable form. This criterion was promulgated for specific waters in California in the NTR and was promulgated in the total recoverable form. The specific waters to which the NTR criterion applies include: Waters of the San Francisco Bay upstream to and including Suisun Bay and the Sacramento-San Joaquin Delta; and waters of Salt Slough, Mud Slough (north) and the San Joaquin River, Sack Dam to Vernalis. This criterion does not apply instead of the NTR for these waters. This criterion applies to additional waters of the United States in the State of California pursuant to 40 CFR 131.38(c). The State of California adopted and EPA approved a site-specific criterion for the Grassland Water District, San Luis National Wildlife Refuge, and the Los Banos State Wildlife Refuge; therefore, this criterion does not apply to these waters.

r. These criteria were promulgated for specific waters in California in the NTR. The specific waters to which the NTR criteria apply include: Waters of the State defined as bays or estuaries including the San Francisco Bay upstream to and including Suisun Bay and the Sacramento-San Joaquin Delta. This section does not apply instead of the NTR for these criteria.

s. These criteria were promulgated for specific waters in California in the NTR. The specific waters to which the NTR criteria apply include: Waters of the Sacramento-San Joaquin Delta and waters of the State defined as inland (*i.e.,* all surface waters of the State not bays or estuaries or ocean) that include a MUN use designation. This section does not apply instead of the NTR for these criteria.

t. These criteria were promulgated for specific waters in California in the NTR. The specific waters to which the NTR criteria apply include: Waters of the State defined as bays and estuaries including San Francisco Bay upstream to and including Suisun Bay and the Sacramento-San Joaquin Delta; and waters of the State defined as inland (i.e., all surface waters of the State not bays or estuaries or ocean) without a MUN use designation. This section does not apply instead of the NTR for these criteria.

u. PCBs are a class of chemicals which include aroclors 1242, 1254, 1221, 1232, 1248, 1260, and 1016, CAS numbers 53469219, 11097691, 11104282, 11141165, 12672296, 11096825, and 12674112, respectively. The aquatic life criteria apply to the sum of this set of seven aroclors.

v. This criterion applies to total PCBs, e.g., the sum of all congener or isomer or homolog or aroclor analyses.

w. This criterion has been recalculated pursuant to the 1995 Updates: Water Quality Criteria Documents for the Protection of Aquatic Life in Ambient Water, Office of Water, EPA–820–B–96–001, September 1996. See also Great Lakes Water Quality Initiative Criteria Documents for the Protection of Aquatic Life in Ambient Water, Office of Water, EPA–80–B–95–004, March 1995.

x. The State of California has adopted and EPA has approved site specific criteria for the Sacramento River (and tributaries) above Hamilton City; therefore, these criteria do not apply to these waters.

General Notes to Table in Paragraph (b)(1)

1. The table in this paragraph (b)(1) lists all of EPA's priority toxic pollutants whether or not criteria guidance are available. Blank spaces indicate the absence of national section 304(a) criteria guidance. Because of variations in chemical nomenclature systems, this listing of toxic pollutants does not duplicate the listing in Appendix A to 40 CFR Part 423–126 Priority Pollutants. EPA has added the Chemical Abstracts Service (CAS) registry numbers, which provide a unique identification for each chemical.

2. The following chemicals have organoleptic-based criteria recommendations that are not included on this chart: zinc, 3-methyl-4-chlorophenol.

3. Freshwater and saltwater aquatic life criteria apply as specified in paragraph (c)(3) of this section.

(2) Factors for Calculating Metals Criteria. Final CMC and CCC values should be rounded to two significant figures.

(i) $CMC = WER \times (Acute\ Conversion\ Factor) \times (\exp\{m_A[\ln(hardness)]+b_A\})$

(ii) $CCC = WER \times (Acute\ Conversion\ Factor) \times (\exp\{m_C[\ln(hardness)]+b_C\})$

(iii) Table 1 to paragraph (b)(2) of this section:

Metal	m_A	b_A	m_C	b_C
Cadmium	1.128	−3.6867	0.7852	−2.715
Copper	0.9422	−1.700	0.8545	−1.702
Chromium (III)	0.8190	3.688	0.8190	1.561
Lead	1.273	−1.460	1.273	−4.705
Nickel	0.8460	2.255	0.8460	0.0584
Silver	1.72	−6.52		
Zinc	0.8473	0.884	0.8473	0.884

Note to Table 1: The term ''exp'' represents the base e exponential function.

(iv) Table 2 to paragraph (b)(2) of this section:

Metal	Conversion factor (CF) for freshwater acute criteria	CF for freshwater chronic criteria	CF for saltwater acute criteria	CF [a] for saltwater chronic criteria
Antimony	([d])	([d])	([d])	([d])
Arsenic	1.000	1.000	1.000	1.000
Beryllium	([d])	([d])	([d])	([d])
Cadmium	[b] 0.944	[b] 0.909	0.994	0.994
Chromium (III)	0.316	0.860	([d])	([d])
Chromium (VI)	0.982	0.962	0.993	0.993
Copper	0.960	0.960	0.83	0.83
Lead	[b] 0.791	[b] 0.791	0.951	0.951
Mercury	.....	.....	.....	.....
Nickel	0.998	0.997	0.990	0.990
Selenium	.....	([c])	0.998	0.998
Silver	0.85	([d])	0.85	([d])
Thallium	([d])	([d])	([d])	([d])
Zinc	0.978	0.986	0.946	0.946

Footnotes to Table 2 of Paragraph (b)(2):

[a] Conversion Factors for chronic marine criteria are not currently available. Conversion Factors for acute marine criteria have been used for both acute and chronic marine criteria.

[b] Conversion Factors for these pollutants in freshwater are hardness dependent. CFs are based on a hardness of 100 mg/l as calcium carbonate ($CaCO_3$). Other hardness can be used; CFs should be recalculated using the equations in table 3 to paragraph (b)(2) of this section.

[c] Bioaccumulative compound and inappropriate to adjust to percent dissolved.

[d] EPA has not published an aquatic life criterion value.

Note to Table 2 of Paragraph (b)(2): The term ''Conversion Factor'' represents the recommended conversion factor for converting a metal criterion expressed as the total recoverable fraction in the water column to a criterion expressed as the dissolved fraction in the water column. See ''Office of Water Policy and Technical Guidance on Interpretation and Implementation of Aquatic Life Metals Criteria'', October 1, 1993, by Martha G. Prothro, Acting Assistant Administrator for Water available from Water Resource Center, USEPA, Mailcode RC4100, M Street SW, Washington, DC, 20460 and the note to § 131.36(b)(1).

(v) Table 3 to paragraph (b)(2) of this section:

	Acute	Chronic
Cadmium	CF=1.136672—[(ln {hardness}) (0.041838)]	CF = 1.101672—[(ln {hardness})(0.041838)]
Lead	CF=1.46203—[(ln {hardness})(0.145712)]	CF = 1.46203—[(ln {hardness})(0.145712)]

(c) *Applicability.* (1) The criteria in paragraph (b) of this section apply to the State's designated uses cited in paragraph (d) of this section and apply concurrently with any criteria adopted by the State, except when State regulations contain criteria which are more stringent for a particular parameter and use, or except as provided in footnotes p, q, and x to the table in paragraph (b)(1) of this section.

(2) The criteria established in this section are subject to the State's general rules of applicability in the same way and to the same extent as are other Federally-adopted and State-adopted numeric toxics criteria when applied to the same use classifications including mixing zones, and low flow values below which numeric standards can be exceeded in flowing fresh waters.

(i) For all waters with mixing zone regulations or implementation procedures, the criteria apply at the appropriate locations within or at the boundary of the mixing zones; otherwise the criteria apply throughout the water body including at the point of discharge into the water body.

(ii) The State shall not use a low flow value below which numeric standards can be exceeded that is less stringent than the flows in Table 4 to paragraph (c)(2) of this section for streams and rivers.

(iii) Table 4 to paragraph (c)(2) of this section:

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Criteria	Design flow
Aquatic Life Acute Criteria (CMC).	1 Q 10 or 1 B 3
Aquatic Life Chronic Criteria (CCC).	7 Q 10 or 4 B 3
Human Health Criteria.	Harmonic Mean Flow

Note to Table 4 of Paragraph (c)(2): 1. CMC (Criteria Maximum Concentration) is the water quality criteria to protect against acute effects in aquatic life and is the highest instream concentration of a priority toxic pollutant consisting of a short-term average not to be exceeded more than once every three years on the average.

2. CCC (Continuous Criteria Concentration) is the water quality criteria to protect against chronic effects in aquatic life and is the highest in stream concentration of a priority toxic pollutant consisting of a 4-day average not to be exceeded more than once every three years on the average.

3. 1 Q 10 is the lowest one day flow with an average recurrence frequency of once in 10 years determined hydrologically.

4. 1 B 3 is biologically based and indicates an allowable exceedence of once every 3 years. It is determined by EPA's computerized method (DFLOW model).

5. 7 Q 10 is the lowest average 7 consecutive day low flow with an average recurrence frequency of once in 10 years determined hydrologically.

6. 4 B 3 is biologically based and indicates an allowable exceedence for 4 consecutive days once every 3 years. It is determined by EPA's computerized method (DFLOW model).

(iv) If the State does not have such a low flow value below which numeric standards do not apply, then the criteria included in paragraph (d) of this section apply at all flows.

(v) If the CMC short-term averaging period, the CCC four-day averaging period, or once in three-year frequency is inappropriate for a criterion or the site to which a criterion applies, the State may apply to EPA for approval of an alternative averaging period, frequency, and related design flow. The State must submit to EPA the bases for any alternative averaging period, frequency, and related design flow. Before approving any change, EPA will publish for public comment, a document proposing the change.

(3) The freshwater and saltwater aquatic life criteria in the matrix in paragraph (b)(1) of this section apply as follows:

(i) For waters in which the salinity is equal to or less than 1 part per thousand 95% or more of the time, the applicable criteria are the freshwater criteria in Column B;

(ii) For waters in which the salinity is equal to or greater than 10 parts per thousand 95% or more of the time, the applicable criteria are the saltwater criteria in Column C except for selenium in the San Francisco Bay estuary where the applicable criteria are the freshwater criteria in Column B (refer to footnotes p and q to the table in paragraph (b)(1) of this section); and

(iii) For waters in which the salinity is between 1 and 10 parts per thousand as defined in paragraphs (c)(3)(i) and (ii) of this section, the applicable criteria are the more stringent of the freshwater or saltwater criteria. However, the Regional Administrator may approve the use of the alternative freshwater or saltwater criteria if scientifically defensible information and data demonstrate that on a site-specific basis the biology of the water body is dominated by freshwater aquatic life and that freshwater criteria are more appropriate; or conversely, the biology of the water body is dominated by saltwater aquatic life and that saltwater criteria are more appropriate. Before approving any change, EPA will publish for public comment a document proposing the change.

(4) *Application of metals criteria.* (i) For purposes of calculating freshwater aquatic life criteria for metals from the equations in paragraph (b)(2) of this section, for waters with a hardness of 400 mg/l or less as calcium carbonate, the actual ambient hardness of the surface water shall be used in those equations. For waters with a hardness of over 400 mg/l as calcium carbonate, a hardness of 400 mg/l as calcium carbonate shall be used with a default Water-Effect Ratio (WER) of 1, or the actual hardness of the ambient surface water shall be used with a WER. The same provisions apply for calculating the metals criteria for the comparisons provided for in paragraph (c)(3)(iii) of this section.

(ii) The hardness values used shall be consistent with the design discharge conditions established in paragraph (c)(2) of this section for design flows and mixing zones.

(iii) The criteria for metals (compounds #1—#13 in the table in paragraph (b)(1) of this section) are expressed as dissolved except where otherwise noted. For purposes of calculating aquatic life criteria for metals from the equations in footnote i to the table in paragraph (b)(1) of this section and the equations in paragraph (b)(2) of this section, the water effect ratio is generally computed as a specific pollutant's acute or chronic toxicity value measured in water from the site covered by the standard, divided by the respective acute or chronic toxicity value in laboratory dilution water. To use a water effect ratio other than the default of 1, the WER must be determined as set forth in Interim Guidance on Determination and Use of Water Effect Ratios, U.S. EPA Office of Water, EPA–823–B–94–001, February 1994, or alternatively, other scientifically defensible methods adopted by the State as part of its water quality standards program and approved by EPA. For calculation of criteria using site-specific values for both the hardness and the water effect ratio, the hardness used in the equations in paragraph (b)(2) of this section must be determined as required in paragraph (c)(4)(ii) of this section. Water hardness must be calculated from the measured calcium and magnesium ions present, and the ratio of calcium to magnesium should be approximately the same in standard laboratory toxicity testing water as in the site water.

(d)(1) Except as specified in paragraph (d)(3) of this section, all waters assigned any aquatic life or human health use classifications in the Water Quality Control Plans for the various Basins of the State (''Basin Plans'') adopted by the California State Water Resources Control Board (''SWRCB''), except for ocean waters covered by the Water Quality Control Plan for Ocean Waters of California (''Ocean Plan'') adopted by the SWRCB with resolution Number 90–27 on March 22, 1990, are subject to the criteria in paragraph (d)(2) of this section, without exception. These criteria apply to waters identified in the Basin Plans. More particularly, these criteria apply to waters identified in the Basin Plan chapters designating beneficial uses for waters within the region. Although the State has adopted several use designations for each of these waters, for purposes of this action, the specific standards to be applied in paragraph (d)(2) of this section are based on the presence in all waters of some aquatic life designation and the presence or absence of the MUN use designation (municipal and domestic supply). (See Basin Plans for more detailed use definitions.)

(2) The criteria from the table in paragraph (b)(1) of this section apply to the water and use classifications defined in paragraph (d)(1) of this section as follows:

Water and use classification	Applicable criteria
(i) All inland waters of the United States or enclosed bays and estuaries that are waters of the United States that include a MUN use designation.	(A) Columns B1 and B2—all pollutants (B) Columns C1 and C2—all pollutants (C) Column D1—all pollutants
(ii) All inland waters of the United States or enclosed bays and estuaries that are waters of the United States that do not include a MUN use designation.	(A) Columns B1 and B2—all pollutants (B) Columns C1 and C2—all pollutants (C) Column D2—all pollutants

(3) Nothing in this section is intended to apply instead of specific criteria, including specific criteria for the San Francisco Bay estuary, promulgated for California in the National Toxics Rule at § 131.36.

(4) The human health criteria shall be applied at the State-adopted 10 (−6) risk level.

(5) Nothing in this section applies to waters located in Indian Country.

(e)*Schedules of compliance.* (1) It is presumed that new and existing point source dischargers will promptly comply with any new or more restrictive water quality-based effluent limitations (''WQBELs'') based on the water quality criteria set forth in this section.

(2) When a permit issued on or after May 18, 2000 to a new discharger contains a WQBEL based on water quality criteria set forth in paragraph (b) of this section, the permittee shall comply with such WQBEL upon the commencement of the discharge. A new discharger is defined as any building, structure, facility, or installation from which there is or may be a ''discharge of pollutants'' (as defined in 40 CFR 122.2) to the State of California's inland surface waters or enclosed bays and estuaries, the construction of which commences after May 18, 2000.

(3) Where an existing discharger reasonably believes that it will be infeasible to promptly comply with a new or more restrictive WQBEL based on the water quality criteria set forth in this section, the discharger may request approval from the permit issuing authority for a schedule of compliance.

(4) A compliance schedule shall require compliance with WQBELs based on water quality criteria set forth in paragraph (b) of this section as soon as possible, taking into account the dischargers' technical ability to achieve compliance with such WQBEL.

(5) If the schedule of compliance exceeds one year from the date of permit issuance, reissuance or modification, the schedule shall set forth interim requirements and dates for their achievement. The dates of completion between each requirement may not exceed one year. If the time necessary for completion of any requirement is more than one year and is not readily divisible into stages for completion, the permit shall require, at a minimum, specified dates for annual submission of progress reports on the status of interim requirements.

(6) In no event shall the permit issuing authority approve a schedule of compliance for a point source discharge which exceeds five years from the date of permit issuance, reissuance, or modification, whichever is sooner. Where shorter schedules of compliance are prescribed or schedules of compliance are prohibited by law, those provisions shall govern.

(7) If a schedule of compliance exceeds the term of a permit, interim permit limits effective during the permit shall be included in the permit and addressed in the permit's fact sheet or statement of basis. The administrative record for the permit shall reflect final permit limits and final compliance dates. Final compliance dates for final permit limits, which do not occur during the term of the permit, must occur within five years from the date of issuance, reissuance or modification of the permit which initiates the compliance schedule. Where shorter schedules of compliance are prescribed or schedules of compliance are prohibited by law, those provisions shall govern.

(8) The provisions in this paragraph (e), Schedules of compliance, shall expire on May 18, 2005.

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CALIFORNIA TOXICS RULE
RESPONSE TO COMMENTS REPORT

VOLUME I

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CTR-012-001	F Endangered Species Act
CTR-013-001	I-01 Application Sec 301 vs. MEP
CTR-013-002	J-01 MS4s/CSOs/Industries Costs
CTR-013-003	J Storm Water Economics
CTR-013-004	C-28 Detection Limits
CTR-013-005	I-03 Applicability of Criteria
CTR-013-006a	I-04 Site-Specific Criteria
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CTR-013-007a	I-05 Compliance Schedules
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CTR-013-008a	R RFA/SBREFA
CTR-013-008b	J Storm Water Economics
CTR-013-009	M Re-Open Comment Period
CTR-014-001	I-01 Application Sec 301 vs. MEP
CTR-014-002	J-01 MS4s/CSOs/Industries Costs
CTR-014-003	J Storm Water Economics
CTR-014-004a	R RFA/SBREFA
CTR-014-004b	J Storm Water Economics
CTR-015-001	C-14 Fish or Water Consumption
CTR-015-002	C-13 Risk Level
CTR-015-003	T State Implementation Policy
CTR-015-004	G-05 Mixing Zones&Dilution Credit
CTR-015-005	G-07 Variances
CTR-015-006	G-02 Compliance Schedules
CTR-016-001	C-24 Site Specific Criteria
CTR-016-002	C-24 Site Specific Criteria
CTR-016-003	G-02 Compliance Schedules
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CTR-016-005	C-04b Selenium Aquatic Life
CTR-016-006	C-19 FDA Action Levels
CTR-016-007	C-01 Mercury
CTR-016-008	C-09a Dioxin Human Health
CTR-017-001	C-24 Site Specific Criteria
CTR-017-002a	C-22 Dissolved v. Ttl Recoverable
CTR-017-002b	C-24a SSC Water Effect Ratios
CTR-018-001	J Storm Water Economics
CTR-019-001a	I-01 Application Sec 301 vs. MEP
CTR-019-001b	J Storm Water Economics
CTR-019-002a	J Storm Water Economics
CTR-019-002b	S UMRA
CTR-019-003a	J Storm Water Economics
CTR-019-003b	R RFA/SBREFA
CTR-019-004a	I Stormwater/Wet Weather Flows
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CTR-020-002	C-21 Legal Concerns
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CTR-020-005	C-24a SSC Water Effect Ratios
CTR-020-006	C-24a SSC Water Effect Ratios
CTR-020-007	C-08a Arsenic Human Health
CTR-020-008	C-26 Avrging pds&Exceedence Freq.
CTR-020-009	C-26 Avrging pds&Exceedence Freq.
CTR-020-010	C-26 Avrging pds&Exceedence Freq.
CTR-020-011	C-02b Copper Aquatic Life
CTR-020-012	C-02b Copper Aquatic Life
CTR-020-013	C-05b Lead Aquatic Life
CTR-020-014	C-26 Avrging pds&Exceedence Freq.
CTR-020-015	C-26 Avrging pds&Exceedence Freq.
CTR-020-016	G-03 Design/Minimum Flows
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CTR-020-019	G-05 Mixing Zones&Dilution Credit
CTR-020-020	C-28 Detection Limits
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CTR-020-022	I-02a Applying WQBELs, Stormwater
CTR-021-001	B Comment Period
CTR-021-002a	G-04 Interim Limits
CTR-021-002b	C-24a SSC Water Effect Ratios
CTR-021-002c	C-22 Dissolved v. Ttl Recoverable
CTR-021-002d	K-01 TMDLs
CTR-021-002e	G-05 Mixing Zones&Dilution Credit
CTR-021-002f	G-02 Compliance Schedules
CTR-021-003	K Water Shed Approach
CTR-021-004	E-01g09 Affected Facilities
CTR-021-005a	C-13 Risk Level
CTR-021-005b	C-28 Detection Limits
CTR-021-005c	E-01c Executive Order 12866
CTR-021-005d	R RFA/SBREFA
CTR-021-005e	S UMRA
CTR-021-006a	J Storm Water Economics
CTR-021-006b	E-01c Executive Order 12866
CTR-021-006c	R RFA/SBREFA
CTR-021-006d	S UMRA
CTR-021-006e	I-01 Application Sec 301 vs. MEP
CTR-021-007	C-24 Site Specific Criteria
CTR-021-008	E-01g Sample Facilities
CTR-021-009	E-01h Treatment Assumptions
CTR-021-010	E-01g04 AMLs vs. MDLs
CTR-021-011	E-01e Indirect Dischargers

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CTR-021-012	E-01q Source Reduction
CTR-021-013	E-01n Detection Limits
CTR-021-014	E-01g Sample Facilities
CTR-021-015	E-01i Alternative Cost Analysis
CTR-021-016	E-01g06 Reasonable Potential
CTR-021-017	E-01b Cost Triggers
CTR-022-001	D Preamble Editorial Comments
CTR-022-002	D Preamble Editorial Comments
CTR-022-003	G-02 Compliance Schedules
CTR-022-004	D Preamble Editorial Comments
CTR-023-001	R RFA/SBREFA
CTR-024-001	I-01 Application Sec 301 vs. MEP
CTR-024-002	J-01 MS4s/CSOs/Industries Costs
CTR-024-003	J Storm Water Economics
CTR-024-004a	R RFA/SBREFA
CTR-024-004b	J Storm Water Economics
CTR-025-001a	C-16 SDWA
CTR-025-001b	C-20 Scope Prty Toxic Poll. List
CTR-025-002a	C-17a Methodologies Human Health
CTR-025-002b	C-16 SDWA
CTR-025-003a	C-17a Methodologies Human Health
CTR-025-003b	C-16 SDWA
CTR-025-003c	C-12a THMs Human Health
CTR-025-004a	C-02b Copper Aquatic Life
CTR-025-004b	C-16 SDWA
CTR-025-005	C-24b SSC Recalculation Procedure
CTR-025-006a	B Comment Period
CTR-025-006b	C-16 SDWA
CTR-026-001a	A Anti-degradation
CTR-026-001b	C-24e SSC Desgntd/Beneficial Uses
CTR-026-002a	C-17b Methodologies Aquatic Life
CTR-026-002b	C-27 Additive/Synergistic Effects
CTR-026-002c	C-29 Bioaccumulation
CTR-026-003a	C-17b Methodologies Aquatic Life
CTR-026-003b	C-17a Methodologies Human Health
CTR-026-004	C-22 Dissolved v. Ttl Recoverable
CTR-026-005	C-25 Hardness
CTR-026-006	C-24 Site Specific Criteria
CTR-026-007a	C-14 Fish or Water Consumption
CTR-026-007b	C-17a Methodologies Human Health
CTR-026-008	C-20 Scope Prty Toxic Poll. List
CTR-026-009	E-02d Passive Use Value
CTR-027-001	I-01 Application Sec 301 vs. MEP
CTR-027-002	J-01 MS4s/CSOs/Industries Costs
CTR-027-003	J Storm Water Economics
CTR-027-004	C-28 Detection Limits
CTR-027-005a	G-03 Design/Minimum Flows
CTR-027-005b	T State Implementation Policy
CTR-027-006	I-03 Applicability of Criteria
CTR-027-007a	I-04 Site-Specific Criteria
CTR-027-007b	C-24e SSC Desgntd/Beneficial Uses
CTR-027-008a	I-05 Compliance Schedules
CTR-027-008b	G-02 Compliance Schedules
CTR-027-009a	R RFA/SBREFA
CTR-027-009b	J Storm Water Economics
CTR-027-010	J Storm Water Economics
CTR-027-011	R RFA/SBREFA
CTR-027-012a	C-22 Dissolved v. Ttl Recoverable
CTR-027-012b	C-24a SSC Water Effect Ratios
CTR-027-012c	C-01 Mercury
CTR-027-012d	G-09 Translators
CTR-027-012e	G-05 Mixing Zones&Dilution Credit
CTR-027-013a	M Re-Open Comment Period
CTR-027-013b	O Offer of Assistance/Review
CTR-028-001a	R RFA/SBREFA
CTR-028-001b	J Storm Water Economics
CTR-029-001	A Anti-degradation
CTR-029-002a	C-17a Methodologies Human Health
CTR-029-002b	C-17b Methodologies Aquatic Life
CTR-029-002c	A Anti-degradation
CTR-029-002d	C-22 Dissolved v. Ttl Recoverable
CTR-029-002e	C-27 Additive/Synergistic Effects
CTR-029-002f	C-29 Bioaccumulation
CTR-029-003	C-14 Fish or Water Consumption
CTR-029-004a	E-01c02 Bnfts do not Balance Cost
CTR-029-004b	E-02e Include Omitted Benefits
CTR-030-001	G-04 Interim Limits
CTR-030-002	L Anti-Backsliding
CTR-030-003	C-08a Arsenic Human Health
CTR-030-004a	G-02 Compliance Schedules
CTR-030-004b	G-04 Interim Limits
CTR-030-004c	I Stormwater/Wet Weather Flows
CTR-030-005	C-04b Selenium Aquatic Life
CTR-030-006	C-01 Mercury
CTR-030-007	C-01 Mercury
CTR-030-008	G-09 Translators
CTR-030-009	C-28 Detection Limits
CTR-030-010	I-01 Application Sec 301 vs. MEP
CTR-030-011	C-04b Selenium Aquatic Life
CTR-030-012	C-04b Selenium Aquatic Life
CTR-030-013	C-04b Selenium Aquatic Life
CTR-030-014	C-04b Selenium Aquatic Life
CTR-030-015	C-04b Selenium Aquatic Life
CTR-030-016	C-04b Selenium Aquatic Life
CTR-031-001a	I-01 Application Sec 301 vs. MEP
CTR-031-001b	I-02 Elliott Memorandum

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CTR-031-002a	F Endangered Species Act
CTR-031-002b	C-17a Methodologies Human Health
CTR-031-002c	C-17b Methodologies Aquatic Life
CTR-031-002d	J Storm Water Economics
CTR-031-002e	V Collaborative Approach
CTR-031-003a	C-21 Legal Concerns
CTR-031-003b	I-03 Applicability of Criteria
CTR-031-004a	C-17a Methodologies Human Health
CTR-031-004b	C-17b Methodologies Aquatic Life
CTR-031-004c	I Stormwater/Wet Weather Flows
CTR-031-005a	G-02 Compliance Schedules
CTR-031-005b	I Stormwater/Wet Weather Flows
CTR-031-006a	J Storm Water Economics
CTR-031-006b	R RFA/SBREFA
CTR-031-006c	E-01c Executive Order 12866
CTR-031-007a	F Endangered Species Act
CTR-031-007b	J-04 End-of-Pipe Treatment v. BMP
CTR-031-008a	B Comment Period
CTR-031-008b	V Collaborative Approach
CTR-031-009	R RFA/SBREFA
CTR-031-010	M Re-Open Comment Period
CTR-032-001	E-01m Regulatory Relief
CTR-032-002a	G-01 Reasonable Potential
CTR-032-002b	C-22 Dissolved v. Ttl Recoverable
CTR-032-002c	G-09 Translators
CTR-032-002d	C-24a SSC Water Effect Ratios
CTR-032-002e	C-24 Site Specific Criteria
CTR-032-002f	K Water Shed Approach
CTR-032-002g	G-04 Interim Limits
CTR-032-002h	G-05 Mixing Zones&Dilution Credit
CTR-032-002i	G-02 Compliance Schedules
CTR-032-003	T State Implementation Policy
CTR-032-004	E-01m Regulatory Relief
CTR-032-005a	V Collaborative Approach
CTR-032-005b	T State Implementation Policy
CTR-032-006a	C-01 Mercury
CTR-032-006b	C-24 Site Specific Criteria
CTR-032-007	K Water Shed Approach
CTR-032-008a	E-01u Economic Consid. Task Force
CTR-032-008b	E-01c02 Bnfts do not Balance Cost
CTR-033-001	C-02b Copper Aquatic Life
CTR-033-002	C-24c SSC Santa Ana River
CTR-033-003a	C-28 Detection Limits
CTR-033-003b	E-01n Detection Limits
CTR-034-001	B Comment Period
CTR-034-002	V Collaborative Approach
CTR-034-003	E-01c01 $100M Threshold
CTR-034-004	S UMRA
CTR-034-005	R RFA/SBREFA
CTR-034-006	F Endangered Species Act
CTR-034-007	C-24d SSC Effluent Dependent Wtr
CTR-034-008	C-22 Dissolved v. Ttl Recoverable
CTR-034-009	C-24a SSC Water Effect Ratios
CTR-034-010a	C-28 Detection Limits
CTR-034-010b	C-21 Legal Concerns
CTR-034-011	K Water Shed Approach
CTR-034-012a	G-04 Interim Limits
CTR-034-012b	K-01 TMDLs
CTR-034-013	G-02 Compliance Schedules
CTR-034-014a	E-01g08 Discharger Representation
CTR-034-014b	E-01b Cost Triggers
CTR-034-014c	E-01e Indirect Dischargers
CTR-034-014d	E-01v Discharge Over Time
CTR-034-014e	J Storm Water Economics
CTR-034-015	E-02 Benefits Analysis
CTR-034-016	E-01u Economic Consid. Task Force
CTR-034-017	M Re-Open Comment Period
CTR-035-001	B Comment Period
CTR-035-002a	C-22 Dissolved v. Ttl Recoverable
CTR-035-002b	C-01 Mercury
CTR-035-002c	C-08a Arsenic Human Health
CTR-035-002d	G-05 Mixing Zones&Dilution Credit
CTR-035-002e	G-04 Interim Limits
CTR-035-002f	G-09 Translators
CTR-035-002g	K-01 TMDLs
CTR-035-002h	C-24a SSC Water Effect Ratios
CTR-035-003	K Water Shed Approach
CTR-035-004	C-13 Risk Level
CTR-035-005	C-28 Detection Limits
CTR-035-006	C-24d SSC Effluent Dependent Wtr
CTR-035-007	C-24e SSC Desgntd/Beneficial Uses
CTR-035-008a	E-01g08 Discharger Representation
CTR-035-008b	E-01e Indirect Dischargers
CTR-035-008c	E-01d Direct Dischargers
CTR-035-008d	E-01m Regulatory Relief
CTR-035-008e	E-01h Treatment Assumptions
CTR-035-008f	E-01c Executive Order 12866
CTR-035-009a	E-02f Use More Recent Data
CTR-035-009b	E-02c Overstated Benefits
CTR-035-010	E-01c Executive Order 12866
CTR-035-011a	E-01u Economic Consid. Task Force
CTR-035-011b	M Re-Open Comment Period
CTR-035-012a	C-21 Legal Concerns
CTR-035-012b	C-28 Detection Limits
CTR-035-013	D Preamble Editorial Comments
CTR-035-014	C-24 Site Specific Criteria

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CTR-035-015	D Preamble Editorial Comments
CTR-035-016	C-22 Dissolved v. Ttl Recoverable
CTR-035-017	C-18 Conversion Factors
CTR-035-018	G-09 Translators
CTR-035-019	C-24a SSC Water Effect Ratios
CTR-035-020	C-26 Avrging pds&Exceedence Freq.
CTR-035-021	C-13 Risk Level
CTR-035-022	C-14 Fish or Water Consumption
CTR-035-023	C-17c Meth.New Human Health Meth.
CTR-035-024	C-09a Dioxin Human Health
CTR-035-025	C-08a Arsenic Human Health
CTR-035-026	C-01 Mercury
CTR-035-027	C-13 Risk Level
CTR-035-028	C-26 Avrging pds&Exceedence Freq.
CTR-035-029	G-03 Design/Minimum Flows
CTR-035-030	C-15 Salinity
CTR-035-031	C-26 Avrging pds&Exceedence Freq.
CTR-035-032a	K-01 TMDLs
CTR-035-032b	K-03 Watershed/Effluent Trading
CTR-035-033	G-04 Interim Limits
CTR-035-034	G-05 Mixing Zones&Dilution Credit
CTR-035-035	G-07 Variances
CTR-035-036	I-01 Application Sec 301 vs. MEP
CTR-035-037	G-02 Compliance Schedules
CTR-035-038	C-24e SSC Desgntd/Beneficial Uses
CTR-035-039	E-01c Executive Order 12866
CTR-035-040	S UMRA
CTR-035-041	R RFA/SBREFA
CTR-035-042	F Endangered Species Act
CTR-035-043	E-01c02 Bnfts do not Balance Cost
CTR-035-044a	E-01c01 $100M Threshold
CTR-035-044b	E-01d01 Cost Estmte by Commenter
CTR-035-044c	J Storm Water Economics
CTR-035-045	E-01a03 Model 1 Weaknesses
CTR-035-046a	E-01g08 Discharger Representation
CTR-035-046b	E-01g09 Affected Facilities
CTR-035-047a	E-01b Cost Triggers
CTR-035-047b	E-01m Regulatory Relief
CTR-035-048	E-01g09 Affected Facilities
CTR-035-049	E-01e Indirect Dischargers
CTR-035-050	E-01p Risk Level Costs
CTR-035-051a	E-02g Benefits & Poll. Reduction
CTR-035-051b	E-02f Use More Recent Data
CTR-035-051c	E-02k Long-Term Contamination
CTR-035-052	E-02l Marginal Impacts/Benefits
CTR-035-053	E-02h Un-Enclose,Enclose Bay Data
CTR-035-054	E-02i Impaired Waters Assumptions
CTR-035-055	E-02d Passive Use Value
CTR-035-056a	E-01c02 Bnfts do not Balance Cost
CTR-035-056b	E-01c01 $100M Threshold
CTR-035-056c	E-01p Risk Level Costs
CTR-035-057	E-01a03 Model 1 Weaknesses
CTR-035-058	E-01a02 Cost Diff. for Eff. Limit
CTR-035-059	E-01g Sample Facilities
CTR-035-060	E-01r Economic Variances
CTR-035-061	E-01d Direct Dischargers
CTR-035-062	E-01q Source Reduction
CTR-035-063	E-01g08 Discharger Representation
CTR-035-064	E-01c02 Bnfts do not Balance Cost
CTR-035-065a	E-02k Long-Term Contamination
CTR-035-065b	E-02c Overstated Benefits
CTR-035-066	E-02g Benefits & Poll. Reduction
CTR-035-067	E-02l Marginal Impacts/Benefits
CTR-035-068	E-02c Overstated Benefits
CTR-035-069	E-02m Few Pollutant Mask Analysis
CTR-035-070	E-02h Un-Enclose,Enclose Bay Data
CTR-035-071	E-02 Benefits Analysis
CTR-035-072	E-02 Benefits Analysis
CTR-036-001	I-01 Application Sec 301 vs. MEP
CTR-036-002a	J Storm Water Economics
CTR-036-002b	E-01c Executive Order 12866
CTR-036-003a	S UMRA
CTR-036-003b	J Storm Water Economics
CTR-036-004a	J Storm Water Economics
CTR-036-004b	R RFA/SBREFA
CTR-036-005	C-21 Legal Concerns
CTR-036-006	C-28 Detection Limits
CTR-036-007a	C-26 Avrging pds&Exceedence Freq.
CTR-036-007b	G-03 Design/Minimum Flows
CTR-036-008	I Stormwater/Wet Weather Flows
CTR-036-009	C-24d SSC Effluent Dependent Wtr
CTR-036-010a	G-02 Compliance Schedules
CTR-036-010b	I Stormwater/Wet Weather Flows
CTR-036-011	K Water Shed Approach
CTR-036-012	D Preamble Editorial Comments
CTR-037-001a	C-24 Site Specific Criteria
CTR-037-001b	G-01 Reasonable Potential
CTR-037-002	C-17b Methodologies Aquatic Life
CTR-037-003a	C-17b Methodologies Aquatic Life
CTR-037-003b	C-17a Methodologies Human Health
CTR-037-004	B Comment Period
CTR-037-005	G-03 Design/Minimum Flows
CTR-037-006	C-28 Detection Limits
CTR-037-007	C-26 Avrging pds&Exceedence Freq.
CTR-037-008	I-03 Applicability of Criteria
CTR-037-009	C-26 Avrging pds&Exceedence Freq.

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CTR-037-010	C-10b PCBs Aquatic Life
CTR-038-001	B Comment Period
CTR-038-002a	C-22 Dissolved v. Ttl Recoverable
CTR-038-002b	C-24a SSC Water Effect Ratios
CTR-038-002c	C-01 Mercury
CTR-038-002d	G-04 Interim Limits
CTR-038-002e	G-05 Mixing Zones&Dilution Credit
CTR-038-002f	G-09 Translators
CTR-038-003	E-01d01 Cost Estmte by Commenter
CTR-038-004a	E-01g08 Discharger Representation
CTR-038-004b	E-01h Treatment Assumptions
CTR-038-004c	E-01m Regulatory Relief
CTR-038-004d	E-01c02 Bnfts do not Balance Cost
CTR-038-005a	E-01c Executive Order 12866
CTR-038-005b	R RFA/SBREFA
CTR-038-005c	S UMRA
CTR-038-006a	C-21 Legal Concerns
CTR-038-006b	E-01c Executive Order 12866
CTR-038-006c	R RFA/SBREFA
CTR-038-006d	S UMRA
CTR-038-007	C-24 Site Specific Criteria
CTR-038-008a	C-24 Site Specific Criteria
CTR-038-008b	E-01c Executive Order 12866
CTR-038-008c	R RFA/SBREFA
CTR-038-008d	S UMRA
CTR-038-008e	T State Implementation Policy
CTR-038-009a	C-28 Detection Limits
CTR-038-009b	E-01n Detection Limits
CTR-038-009c	R RFA/SBREFA
CTR-038-009d	S UMRA
CTR-038-010	C-30 Narrative Criteria
CTR-038-011	C-15 Salinity
CTR-038-012	G-02 Compliance Schedules
CTR-038-013	M Re-Open Comment Period
CTR-039-001	C-24 Site Specific Criteria
CTR-039-002	A Anti-degradation
CTR-039-003a	C-22 Dissolved v. Ttl Recoverable
CTR-039-003b	A Anti-degradation
CTR-039-004	C-14 Fish or Water Consumption
CTR-039-005	C-01 Mercury
CTR-039-006	C-09a Dioxin Human Health
CTR-039-007	G-02 Compliance Schedules
CTR-039-008	G-04 Interim Limits
CTR-039-009	C-24 Site Specific Criteria
CTR-040-001	O Offer of Assistance/Review
CTR-040-002a	C-24a SSC Water Effect Ratios
CTR-040-002b	C-01 Mercury
CTR-040-002c	G-09 Translators
CTR-040-002d	G-05 Mixing Zones&Dilution Credit
CTR-040-003	I-01 Application Sec 301 vs. MEP
CTR-040-004	J Storm Water Economics
CTR-040-005	I-07 Attainability of Criteria
CTR-040-006	J Storm Water Economics
CTR-040-007	J Storm Water Economics
CTR-040-008a	E-01c02 Bnfts do not Balance Cost
CTR-040-008b	E-01m Regulatory Relief
CTR-040-008c	E-02c Overstated Benefits
CTR-040-009a	R RFA/SBREFA
CTR-040-009b	S UMRA
CTR-040-009c	E-01c Executive Order 12866
CTR-040-010a	J Storm Water Economics
CTR-040-010b	R RFA/SBREFA
CTR-040-011	C-21 Legal Concerns
CTR-040-012a	E-01c Executive Order 12866
CTR-040-012b	S UMRA
CTR-040-013	R RFA/SBREFA
CTR-040-014a	I-02 Elliott Memorandum
CTR-040-014b	J Storm Water Economics
CTR-040-015a	S UMRA
CTR-040-015b	C-13 Risk Level
CTR-040-016a	C-24d SSC Effluent Dependent Wtr
CTR-040-016b	C-21 Legal Concerns
CTR-040-017	C-28 Detection Limits
CTR-040-018a	C-26 Avrging pds&Exceedence Freq.
CTR-040-018b	G-03 Design/Minimum Flows
CTR-040-018c	C-30 Narrative Criteria
CTR-040-018d	C-24e SSC Desgntd/Beneficial Uses
CTR-040-019	G-02 Compliance Schedules
CTR-040-020	E-01 Cost Analysis
CTR-040-021	O Offer of Assistance/Review
CTR-040-022	E-01 Cost Analysis
CTR-040-023	E-01 Cost Analysis
CTR-040-024	E-01g08 Discharger Representation
CTR-040-025	J-05 BMPs Inability to Comply
CTR-040-026	E-01a03 Model 1 Weaknesses
CTR-040-027	E-01g05 Effluent Data
CTR-040-028	E-01n01 Non-Detects, No Cost
CTR-040-029a	E-01q01 25% Assumption
CTR-040-029b	E-01h01 25% Reduction Assumption
CTR-040-030	E-01q Source Reduction
CTR-040-031	E-01m Regulatory Relief
CTR-040-032	E-01h Treatment Assumptions
CTR-040-033	E-01b Cost Triggers
CTR-040-034	J-01 MS4s/CSOs/Industries Costs
CTR-040-035	E-01a Baselines
CTR-040-036	E-01m Regulatory Relief

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CTR-040-037	E-01e02 No Costs for Non-SIUs
CTR-040-038	E-01h Treatment Assumptions
CTR-040-039	E-01g03 Cost Effectiveness Ratio
CTR-040-040	E-01b Cost Triggers
CTR-040-041	E-01m Regulatory Relief
CTR-040-042	E-01c02 Bnfts do not Balance Cost
CTR-040-043	E-02c Overstated Benefits
CTR-040-044	E-02g Benefits & Poll. Reduction
CTR-040-045	E-02o Analysis from Wisconsin
CTR-040-046	E-02i Impaired Waters Assumptions
CTR-040-047	E-02d Passive Use Value
CTR-040-048	K-01 TMDLs
CTR-040-049	G-07 Variances
CTR-040-050	C-24 Site Specific Criteria
CTR-040-051	G-05 Mixing Zones&Dilution Credit
CTR-040-052	E-02 Benefits Analysis
CTR-040-055	S UMRA
CTR-040-056	R RFA/SBREFA
CTR-040-056	R RFA/SBREFA
CTR-041-001	B Comment Period
CTR-041-002	C-22 Dissolved v. Ttl Recoverable
CTR-041-003a	G-09 Translators
CTR-041-003b	C-24a SSC Water Effect Ratios
CTR-041-004	C-01 Mercury
CTR-041-005	C-08a Arsenic Human Health
CTR-041-006a	G-04 Interim Limits
CTR-041-006b	G-05 Mixing Zones&Dilution Credit
CTR-041-007a	C-01 Mercury
CTR-041-007b	C-22 Dissolved v. Ttl Recoverable
CTR-041-008a	C-28 Detection Limits
CTR-041-008b	E-01n Detection Limits
CTR-041-009	E-01d01 Cost Estmte by Commenter
CTR-041-010a	E-01n Detection Limits
CTR-041-010b	E-01m Regulatory Relief
CTR-041-010c	E-01e Indirect Dischargers
CTR-041-010d	E-01g Sample Facilities
CTR-041-011	C-30 Narrative Criteria
CTR-041-012	G-02 Compliance Schedules
CTR-041-013a	E-01c Executive Order 12866
CTR-041-013b	R RFA/SBREFA
CTR-041-013c	S UMRA
CTR-041-014	C-21 Legal Concerns
CTR-041-015	E-01c Executive Order 12866
CTR-041-016	S UMRA
CTR-041-017	R RFA/SBREFA
CTR-041-018	E-01 Cost Analysis
CTR-041-019	E-01 Cost Analysis
CTR-041-020	E-01g08 Discharger Representation
CTR-041-021	J-05 BMPs Inability to Comply
CTR-041-022	E-01a03 Model 1 Weaknesses
CTR-041-023	E-01g05 Effluent Data
CTR-041-024	E-01n01 Non-Detects, No Cost
CTR-041-025a	E-01q01 25% Assumption
CTR-041-025b	E-01h01 25% Reduction Assumption
CTR-041-026	E-01q Source Reduction
CTR-041-027	E-01m Regulatory Relief
CTR-041-028	E-01h Treatment Assumptions
CTR-041-029	E-01b Cost Triggers
CTR-041-030	J-01 MS4s/CSOs/Industries Costs
CTR-041-031	E-01a Baselines
CTR-041-032	E-01m Regulatory Relief
CTR-041-033	E-01e02 No Costs for Non-SIUs
CTR-041-034	E-01h Treatment Assumptions
CTR-041-035	E-01g03 Cost Effectiveness Ratio
CTR-041-036	E-01b Cost Triggers
CTR-041-037	E-01m Regulatory Relief
CTR-041-038	E-01c02 Bnfts do not Balance Cost
CTR-041-039	E-02c Overstated Benefits
CTR-041-040	E-02g Benefits & Poll. Reduction
CTR-041-041	E-02o Analysis from Wisconsin
CTR-041-042	E-02i Impaired Waters Assumptions
CTR-041-043	E-02d Passive Use Value
CTR-041-044	K-01 TMDLs
CTR-041-045	G-07 Variances
CTR-041-046	C-24 Site Specific Criteria
CTR-041-047	G-05 Mixing Zones&Dilution Credit
CTR-041-048	E-02 Benefits Analysis
CTR-042-001	I-01 Application Sec 301 vs. MEP
CTR-042-002	J-04 End-of-Pipe Treatment v. BMP
CTR-042-003	C-28 Detection Limits
CTR-042-004	I Stormwater/Wet Weather Flows
CTR-042-005	C-24d SSC Effluent Dependent Wtr
CTR-042-006	C-22 Dissolved v. Ttl Recoverable
CTR-042-007a	C-21 Legal Concerns
CTR-042-007b	E-01c Executive Order 12866
CTR-042-007c	S UMRA
CTR-043-001	B Comment Period
CTR-043-002a	C-22 Dissolved v. Ttl Recoverable
CTR-043-002b	C-24a SSC Water Effect Ratios
CTR-043-002c	C-01 Mercury
CTR-043-002d	G-04 Interim Limits
CTR-043-002e	G-05 Mixing Zones&Dilution Credit
CTR-043-002f	G-09 Translators
CTR-043-003	E-01e02 No Costs for Non-SIUs
CTR-043-004a	E-01g Sample Facilities
CTR-043-004b	E-01h Treatment Assumptions

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CTR-043-004c	E-01m Regulatory Relief
CTR-043-004d	E-02c Overstated Benefits
CTR-043-004e	E-01c02 Bnfts do not Balance Cost
CTR-043-005a	C-21 Legal Concerns
CTR-043-005b	E-01c Executive Order 12866
CTR-043-005c	R RFA/SBREFA
CTR-043-005d	S UMRA
CTR-043-006a	C-24 Site Specific Criteria
CTR-043-006b	C-13 Risk Level
CTR-043-007	C-24d SSC Effluent Dependent Wtr
CTR-043-008	C-28 Detection Limits
CTR-043-009	C-30 Narrative Criteria
CTR-043-010	G-02 Compliance Schedules
CTR-043-011	M Re-Open Comment Period
CTR-044-001	B Comment Period
CTR-044-002	B Comment Period
CTR-044-003a	C-22 Dissolved v. Ttl Recoverable
CTR-044-003b	C-24a SSC Water Effect Ratios
CTR-044-003c	C-01 Mercury
CTR-044-003d	G-09 Translators
CTR-044-003e	G-05 Mixing Zones&Dilution Credit
CTR-044-003f	G-04 Interim Limits
CTR-044-004	E-01d01 Cost Estmte by Commenter
CTR-044-005a	E-01g08 Discharger Representation
CTR-044-005b	E-01h01 25% Reduction Assumption
CTR-044-005c	E-01m Regulatory Relief
CTR-044-005d	E-02c Overstated Benefits
CTR-044-005e	E-01c02 Bnfts do not Balance Cost
CTR-044-005f	R RFA/SBREFA
CTR-044-005g	S UMRA
CTR-044-006a	C-21 Legal Concerns
CTR-044-006b	E-01c Executive Order 12866
CTR-044-006c	R RFA/SBREFA
CTR-044-006d	S UMRA
CTR-044-007a	C-13 Risk Level
CTR-044-007b	C-24 Site Specific Criteria
CTR-044-008	C-24d SSC Effluent Dependent Wtr
CTR-044-009a	C-28 Detection Limits
CTR-044-009b	E-01c Executive Order 12866
CTR-044-009c	R RFA/SBREFA
CTR-044-009d	S UMRA
CTR-044-010	C-30 Narrative Criteria
CTR-044-011	G-02 Compliance Schedules
CTR-044-012	M Re-Open Comment Period
CTR-044-013	E-01 Cost Analysis
CTR-044-014	E-01 Cost Analysis
CTR-044-015	E-01g08 Discharger Representation
CTR-044-016	J-05 BMPs Inability to Comply
CTR-044-017	E-01a03 Model 1 Weaknesses
CTR-044-018	E-01g05 Effluent Data
CTR-044-019	E-01n01 Non-Detects, No Cost
CTR-044-020a	E-01q01 25% Assumption
CTR-044-020b	E-01h01 25% Reduction Assumption
CTR-044-021	E-01q Source Reduction
CTR-044-022	E-01m Regulatory Relief
CTR-044-023	E-01h Treatment Assumptions
CTR-044-024	E-01b Cost Triggers
CTR-044-025	J-01 MS4s/CSOs/Industries Costs
CTR-044-026	E-01a Baselines
CTR-044-027	E-01m Regulatory Relief
CTR-044-028	E-01e02 No Costs for Non-SIUs
CTR-044-029	E-01h Treatment Assumptions
CTR-044-030	E-01g03 Cost Effectiveness Ratio
CTR-044-031	E-01b Cost Triggers
CTR-044-032	E-01m Regulatory Relief
CTR-044-033	E-01c02 Bnfts do not Balance Cost
CTR-044-034	E-02c Overstated Benefits
CTR-044-035	E-02g Benefits & Poll. Reduction
CTR-044-036	E-02o Analysis from Wisconsin
CTR-044-037	E-02i Impaired Waters Assumptions
CTR-044-038	E-02d Passive Use Value
CTR-044-039	K-01 TMDLs
CTR-044-040	G-07 Variances
CTR-044-041	C-24 Site Specific Criteria
CTR-044-042	G-05 Mixing Zones&Dilution Credit
CTR-044-043	E-02 Benefits Analysis
CTR-044-044	C-21 Legal Concerns
CTR-044-045	E-01c Executive Order 12866
CTR-044-046	S UMRA
CTR-044-047	R RFA/SBREFA
CTR-045-001	B Comment Period
CTR-045-002	G-04 Interim Limits
CTR-045-003	G-02 Compliance Schedules
CTR-045-004	C-22 Dissolved v. Ttl Recoverable
CTR-045-005	C-24a SSC Water Effect Ratios
CTR-045-006	C-01 Mercury
CTR-045-007	C-08a Arsenic Human Health
CTR-045-008	G-05 Mixing Zones&Dilution Credit
CTR-045-009a	E-01g08 Discharger Representation
CTR-045-009b	E-01h Treatment Assumptions
CTR-045-009c	E-01m Regulatory Relief
CTR-045-010	E-02f Use More Recent Data
CTR-045-011	E-01n Detection Limits
CTR-045-012a	E-01d Direct Dischargers
CTR-045-012b	E-01c Executive Order 12866
CTR-045-013	E-01c01 $100M Threshold

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CTR-045-014	E-01u Economic Consid. Task Force
CTR-047-001	E-01 Cost Analysis
CTR-047-002	J-04 End-of-Pipe Treatment v. BMP
CTR-047-003	J Storm Water Economics
CTR-047-004a	J Storm Water Economics
CTR-047-004b	R RFA/SBREFA
CTR-049-001	B Comment Period
CTR-049-002	C-24a SSC Water Effect Ratios
CTR-049-003	C-13 Risk Level
CTR-049-004	C-24d SSC Effluent Dependent Wtr
CTR-049-005	C-24e SSC Desgntd/Beneficial Uses
CTR-049-006a	E-01g08 Discharger Representation
CTR-049-006b	E-01h Treatment Assumptions
CTR-049-006c	E-01m Regulatory Relief
CTR-049-007	E-01u Economic Consid. Task Force
CTR-050-001	C-21 Legal Concerns
CTR-050-002	C-21 Legal Concerns
CTR-050-003	C-21 Legal Concerns
CTR-050-004	C-21 Legal Concerns
CTR-050-005a	C-24 Site Specific Criteria
CTR-050-005b	G-07 Variances
CTR-050-006	C-13 Risk Level
CTR-050-007a	C-21 Legal Concerns
CTR-050-007b	E-01c Executive Order 12866
CTR-050-007c	R RFA/SBREFA
CTR-050-007d	S UMRA
CTR-051-001	C-24 Site Specific Criteria
CTR-051-002	C-04b Selenium Aquatic Life
CTR-051-003a	C-01 Mercury
CTR-051-003b	C-01 Mercury
CTR-052-001	B Comment Period
CTR-052-002a	C-22 Dissolved v. Ttl Recoverable
CTR-052-002b	C-01 Mercury
CTR-052-002c	G-09 Translators
CTR-052-002d	G-05 Mixing Zones&Dilution Credit
CTR-052-002e	G-04 Interim Limits
CTR-052-003a	C-13 Risk Level
CTR-052-003b	E-01 Cost Analysis
CTR-052-003c	E-02 Benefits Analysis
CTR-052-004	D Preamble Editorial Comments
CTR-052-005a	E-01i Alternative Cost Analysis
CTR-052-005b	E-01d01 Cost Estmte by Commenter
CTR-052-006	E-01d Direct Dischargers
CTR-052-007	E-02 Benefits Analysis
CTR-052-008	C-24 Site Specific Criteria
CTR-052-009	E-01i Alternative Cost Analysis
CTR-052-010	E-01d01 Cost Estmte by Commenter
CTR-052-011	E-01d Direct Dischargers
CTR-052-012	E-01g10 Toxic Pound Equivalents
CTR-052-013	B Comment Period
CTR-052-014	E-01g02 Another EA for Sample Fac
CTR-052-015	T State Implementation Policy
CTR-052-016	E-01p Risk Level Costs
CTR-052-017	C-24 Site Specific Criteria
CTR-052-018	C-28 Detection Limits
CTR-052-019	G-05 Mixing Zones&Dilution Credit
CTR-052-020	G-02 Compliance Schedules
CTR-052-021a	C-21 Legal Concerns
CTR-052-021b	E-01c Executive Order 12866
CTR-052-021c	R RFA/SBREFA
CTR-052-021d	S UMRA
CTR-052-022	M Re-Open Comment Period
CTR-053-001	M Re-Open Comment Period
CTR-053-002	C-30 Narrative Criteria
CTR-053-003a	C-01 Mercury
CTR-053-003b	C-02b Copper Aquatic Life
CTR-053-003c	C-09a Dioxin Human Health
CTR-053-004	G-02 Compliance Schedules
CTR-053-005	T State Implementation Policy
CTR-053-006	C-24 Site Specific Criteria
CTR-054-001	B Comment Period
CTR-054-002a	C-22 Dissolved v. Ttl Recoverable
CTR-054-002b	C-24a SSC Water Effect Ratios
CTR-054-003	C-01 Mercury
CTR-054-004a	G-09 Translators
CTR-054-004b	G-05 Mixing Zones&Dilution Credit
CTR-054-004c	G-04 Interim Limits
CTR-054-005	E-01d01 Cost Estmte by Commenter
CTR-054-006	E-02l Marginal Impacts/Benefits
CTR-054-007	C-13 Risk Level
CTR-054-008a	C-02b Copper Aquatic Life
CTR-054-008b	C-24 Site Specific Criteria
CTR-054-008c	E-01c Executive Order 12866
CTR-054-008d	R RFA/SBREFA
CTR-054-008e	S UMRA
CTR-054-009	C-28 Detection Limits
CTR-054-010	C-30 Narrative Criteria
CTR-054-011	C-15 Salinity
CTR-054-012	G-02 Compliance Schedules
CTR-054-013a	E-01g03 Cost Effectiveness Ratio
CTR-054-013b	E-01q01 25% Assumption
CTR-054-013c	E-01m Regulatory Relief
CTR-054-013d	E-02l Marginal Impacts/Benefits
CTR-054-014	C-21 Legal Concerns
CTR-054-015	V Collaborative Approach
CTR-054-016	M Re-Open Comment Period

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CTR-054-017	E-01 Cost Analysis
CTR-054-018	E-01 Cost Analysis
CTR-054-019	E-01g08 Discharger Representation
CTR-054-020	J-05 BMPs Inability to Comply
CTR-054-021	E-01a03 Model 1 Weaknesses
CTR-054-022	E-01g05 Effluent Data
CTR-054-023	E-01n01 Non-Detects, No Cost
CTR-054-024a	E-01q01 25% Assumption
CTR-054-024b	E-01h01 25% Reduction Assumption
CTR-054-025	E-01q Source Reduction
CTR-054-026	E-01m Regulatory Relief
CTR-054-027	E-01h Treatment Assumptions
CTR-054-028	E-01b Cost Triggers
CTR-054-029	J-01 MS4s/CSOs/Industries Costs
CTR-054-030	E-01a Baselines
CTR-054-031	E-01m Regulatory Relief
CTR-054-032	E-01e02 No Costs for Non-SIUs
CTR-054-033	E-01h Treatment Assumptions
CTR-054-034	E-01g03 Cost Effectiveness Ratio
CTR-054-035	E-01b Cost Triggers
CTR-054-036	E-01m Regulatory Relief
CTR-054-037	E-01c02 Bnfts do not Balance Cost
CTR-054-038	E-02c Overstated Benefits
CTR-054-039	E-02g Benefits & Poll. Reduction
CTR-054-040	E-02o Analysis from Wisconsin
CTR-054-041	E-02i Impaired Waters Assumptions
CTR-054-042	E-02d Passive Use Value
CTR-054-043	K-01 TMDLs
CTR-054-044	G-07 Variances
CTR-054-045	C-24 Site Specific Criteria
CTR-054-046	G-05 Mixing Zones&Dilution Credit
CTR-054-047	E-02 Benefits Analysis
CTR-054-048	C-21 Legal Concerns
CTR-054-049	E-01c Executive Order 12866
CTR-054-050	S UMRA
CTR-054-051	R RFA/SBREFA
CTR-055-001	C-13 Risk Level
CTR-055-002a	C-21 Legal Concerns
CTR-055-002b	T State Implementation Policy
CTR-055-003	E-01c Executive Order 12866
CTR-056-001	B Comment Period
CTR-056-002	G-04 Interim Limits
CTR-056-003	C-01 Mercury
CTR-056-004	C-08a Arsenic Human Health
CTR-056-005	C-22 Dissolved v. Ttl Recoverable
CTR-056-006	C-24a SSC Water Effect Ratios
CTR-056-007	G-05 Mixing Zones&Dilution Credit
CTR-056-008	G-09 Translators
CTR-056-009	C-24a SSC Water Effect Ratios
CTR-056-010	G-02 Compliance Schedules
CTR-056-011	C-24d SSC Effluent Dependent Wtr
CTR-056-012	C-13 Risk Level
CTR-056-013	C-24e SSC Desgntd/Beneficial Uses
CTR-056-014	C-28 Detection Limits
CTR-056-015a	I-01 Application Sec 301 vs. MEP
CTR-056-015b	C-24 Site Specific Criteria
CTR-056-016	E-01g03 Cost Effectiveness Ratio
CTR-056-017	E-01g03 Cost Effectiveness Ratio
CTR-056-018	E-01b Cost Triggers
CTR-056-019	E-01b Cost Triggers
CTR-056-020	E-01d01 Cost Estmte by Commenter
CTR-056-021	E-02f Use More Recent Data
CTR-056-022a	E-01e Indirect Dischargers
CTR-056-022b	S UMRA
CTR-056-023	E-01u Economic Consid. Task Force
CTR-057-001	E-01g02 Another EA for Sample Fac
CTR-057-002	B Comment Period
CTR-057-003	C-24d SSC Effluent Dependent Wtr
CTR-057-004	C-28 Detection Limits
CTR-057-005	C-13 Risk Level
CTR-057-006	C-22 Dissolved v. Ttl Recoverable
CTR-057-007	C-17a Methodologies Human Health
CTR-057-008	P Whole Effluent Toxicity
CTR-057-009	T State Implementation Policy
CTR-057-010a	K-01 TMDLs
CTR-057-010b	G-07 Variances
CTR-057-010c	C-24 Site Specific Criteria
CTR-057-011	C-24 Site Specific Criteria
CTR-058-001	C-13 Risk Level
CTR-058-002	B Comment Period
CTR-058-003	C-22 Dissolved v. Ttl Recoverable
CTR-058-004	C-15 Salinity
CTR-058-005	C-04b Selenium Aquatic Life
CTR-058-006	C-04b Selenium Aquatic Life
CTR-058-007	G-02 Compliance Schedules
CTR-058-008	G-05 Mixing Zones&Dilution Credit
CTR-058-009	C-20 Scope Prty Toxic Poll. List
CTR-058-010	C-01 Mercury
CTR-058-011	K-01 TMDLs
CTR-058-012	C-09a Dioxin Human Health
CTR-058-013	C-07b Cyanide Aquatic Life
CTR-059-001	E-01d01 Cost Estmte by Commenter
CTR-059-002a	E-01c Executive Order 12866
CTR-059-002b	R RFA/SBREFA
CTR-059-002c	S UMRA
CTR-059-003	B Comment Period

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CTR-059-004a	E-01c Executive Order 12866
CTR-059-004b	M Re-Open Comment Period
CTR-059-005	M Re-Open Comment Period
CTR-059-006a	C-28 Detection Limits
CTR-059-006b	E-01c Executive Order 12866
CTR-059-006c	S UMRA
CTR-059-007	C-08a Arsenic Human Health
CTR-059-008	C-12a THMs Human Health
CTR-059-009	C-01 Mercury
CTR-059-010	C-24d SSC Effluent Dependent Wtr
CTR-059-011	C-15 Salinity
CTR-059-012	G-04 Interim Limits
CTR-059-013	G-02 Compliance Schedules
CTR-059-014	K Water Shed Approach
CTR-059-015a	E-01c Executive Order 12866
CTR-059-015b	S UMRA
CTR-059-016	R RFA/SBREFA
CTR-059-017	F Endangered Species Act
CTR-059-018	E-01g08 Discharger Representation
CTR-059-019	E-01b Cost Triggers
CTR-059-020	E-01e01 Sunnyvale/San Jose
CTR-059-021	E-01v Discharge Over Time
CTR-059-022	E-01w Cost per Facility
CTR-059-023a	E-01g08 Discharger Representation
CTR-059-023b	J Storm Water Economics
CTR-059-024	E-01l UMRA - Economic Comments
CTR-059-025	E-02m Few Pollutant Mask Analysis
CTR-059-026	E-01 Cost Analysis
CTR-059-027	E-01i Alternative Cost Analysis
CTR-060-001	G-04 Interim Limits
CTR-060-002	G-05 Mixing Zones&Dilution Credit
CTR-060-003	L Anti-Backsliding
CTR-060-004	C-08a Arsenic Human Health
CTR-060-005	G-02 Compliance Schedules
CTR-060-006	C-24 Site Specific Criteria
CTR-060-007	C-04b Selenium Aquatic Life
CTR-060-008	C-01 Mercury
CTR-060-009	G-09 Translators
CTR-060-010	C-28 Detection Limits
CTR-060-011	I-01 Application Sec 301 vs. MEP
CTR-060-012	C-26 Avrging pds&Exceedence Freq.
CTR-060-013	C-02b Copper Aquatic Life
CTR-060-014	C-11b PAHs Aquatic Life
CTR-060-015	C-14 Fish or Water Consumption
CTR-060-016	C-13 Risk Level
CTR-060-017	E-01g08 Discharger Representation
CTR-060-018	E-01a02 Cost Diff. for Eff. Limit
CTR-060-019	E-01m03 Cost of WERs
CTR-061-001	I-09 Pesticides in Runoff
CTR-061-002	J Storm Water Economics
CTR-061-003	J Storm Water Economics
CTR-061-004	B Comment Period
CTR-061-005a	I-03 Applicability of Criteria
CTR-061-005b	C-17 Methodologies
CTR-061-006	C-20 Scope Prty Toxic Poll. List
CTR-061-007	C-30 Narrative Criteria
CTR-061-008	C-17 Methodologies
CTR-061-009	C-17 Methodologies
CTR-061-010	C-17 Methodologies
CTR-061-011	C-17 Methodologies
CTR-061-012	C-01 Mercury
CTR-061-013	C-06b Chromium Aquatic Life
CTR-061-014	C-24a SSC Water Effect Ratios
CTR-061-015	D Preamble Editorial Comments
CTR-061-016	K-03 Watershed/Effluent Trading
CTR-061-017	J Storm Water Economics
CTR-061-018	E-02c Overstated Benefits
CTR-061-019	J Storm Water Economics
CTR-061-020	G-06 NWQI
CTR-062-001	I-01 Application Sec 301 vs. MEP
CTR-062-002	J-01 MS4s/CSOs/Industries Costs
CTR-062-003	J Storm Water Economics
CTR-062-004a	J Storm Water Economics
CTR-062-004b	R RFA/SBREFA
CTR-063-001	C-03b Nickel Aquatic Life
CTR-064-001	C-02b Copper Aquatic Life
CTR-065-001	B Comment Period
CTR-065-002a	A Anti-degradation
CTR-065-002b	C-17a Methodologies Human Health
CTR-065-002c	C-17b Methodologies Aquatic Life
CTR-065-003a	C-14 Fish or Water Consumption
CTR-065-003b	C-21 Legal Concerns
CTR-065-004	C-17b Methodologies Aquatic Life
CTR-065-005	C-22 Dissolved v. Ttl Recoverable
CTR-065-006a	P Whole Effluent Toxicity
CTR-065-006b	C-20 Scope Prty Toxic Poll. List
CTR-065-007	C-02b Copper Aquatic Life
CTR-066-001	B Comment Period
CTR-066-002	G-04 Interim Limits
CTR-066-003	C-24a SSC Water Effect Ratios
CTR-066-004	G-02 Compliance Schedules
CTR-066-005	C-22 Dissolved v. Ttl Recoverable
CTR-066-006	G-09 Translators
CTR-066-007	C-24a SSC Water Effect Ratios
CTR-066-008	C-01 Mercury
CTR-066-009	C-08a Arsenic Human Health

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CTR-066-010	G-05 Mixing Zones&Dilution Credit
CTR-066-011	C-13 Risk Level
CTR-066-012	C-24e SSC Desgntd/Beneficial Uses
CTR-066-013a	E-01g08 Discharger Representation
CTR-066-013b	E-01b01 RegRelief Above Threshold
CTR-066-014	E-02f Use More Recent Data
CTR-066-015a	E-01n Detection Limits
CTR-066-015b	C-28 Detection Limits
CTR-066-016	E-01d Direct Dischargers
CTR-066-017	E-01c01 $100M Threshold
CTR-066-018	E-01u Economic Consid. Task Force
CTR-066-019	C-22 Dissolved v. Ttl Recoverable
CTR-067-001	B Comment Period
CTR-067-002	C-22 Dissolved v. Ttl Recoverable
CTR-067-003	C-28 Detection Limits
CTR-067-004a	E-01n Detection Limits
CTR-067-004b	K Water Shed Approach
CTR-067-005	G-02 Compliance Schedules
CTR-067-006a	R RFA/SBREFA
CTR-067-006b	E-01d01 Cost Estmte by Commenter
CTR-067-007	M Re-Open Comment Period
CTR-068-001	B Comment Period
CTR-069-001	B Comment Period
CTR-069-002a	J-01 MS4s/CSOs/Industries Costs
CTR-069-002b	E-01j
CTR-070-001	B Comment Period
CTR-070-002a	E-01w Cost per Facility
CTR-070-002b	E-01d01 Cost Estmte by Commenter
CTR-070-003	E-01n Detection Limits
CTR-071-001	I-01 Application Sec 301 vs. MEP
CTR-071-002	J-01 MS4s/CSOs/Industries Costs
CTR-071-003	J Storm Water Economics
CTR-071-004a	J Storm Water Economics
CTR-071-004b	R RFA/SBREFA
CTR-072-001	I-01 Application Sec 301 vs. MEP
CTR-072-002	J-01 MS4s/CSOs/Industries Costs
CTR-072-003	J Storm Water Economics
CTR-072-004a	J Storm Water Economics
CTR-072-004b	R RFA/SBREFA
CTR-073-001	I-01 Application Sec 301 vs. MEP
CTR-073-002	J-01 MS4s/CSOs/Industries Costs
CTR-073-003	J Storm Water Economics
CTR-073-004a	J Storm Water Economics
CTR-073-004b	R RFA/SBREFA
CTR-074-001	I-01 Application Sec 301 vs. MEP
CTR-074-002	J-01 MS4s/CSOs/Industries Costs
CTR-074-003	J Storm Water Economics
CTR-074-004a	J Storm Water Economics
CTR-074-004b	R RFA/SBREFA
CTR-075-001	I-01 Application Sec 301 vs. MEP
CTR-075-002	J-01 MS4s/CSOs/Industries Costs
CTR-075-003	J Storm Water Economics
CTR-075-004a	J Storm Water Economics
CTR-075-004b	R RFA/SBREFA
CTR-076-001	I-01 Application Sec 301 vs. MEP
CTR-076-002	J-01 MS4s/CSOs/Industries Costs
CTR-076-003	J Storm Water Economics
CTR-076-004a	J Storm Water Economics
CTR-076-004b	R RFA/SBREFA
CTR-077-001	C-23 Sediments/Dredged Materials
CTR-077-002	G-05 Mixing Zones&Dilution Credit
CTR-077-003	C-22 Dissolved v. Ttl Recoverable
CTR-078-001	I-01 Application Sec 301 vs. MEP
CTR-078-002	J-01 MS4s/CSOs/Industries Costs
CTR-078-003	J Storm Water Economics
CTR-078-004a	J Storm Water Economics
CTR-078-004b	R RFA/SBREFA
CTR-079-001	I-01 Application Sec 301 vs. MEP
CTR-079-002	J-01 MS4s/CSOs/Industries Costs
CTR-079-003	J Storm Water Economics
CTR-079-004a	J Storm Water Economics
CTR-079-004b	R RFA/SBREFA
CTR-080-001	J Storm Water Economics
CTR-080-002	J-04 End-of-Pipe Treatment v. BMP
CTR-081-001	B Comment Period
CTR-081-002a	G-04 Interim Limits
CTR-081-002b	C-24a SSC Water Effect Ratios
CTR-081-002c	G-02 Compliance Schedules
CTR-081-002d	C-22 Dissolved v. Ttl Recoverable
CTR-081-002e	G-09 Translators
CTR-081-002f	C-01 Mercury
CTR-081-002g	C-08a Arsenic Human Health
CTR-081-002h	G-05 Mixing Zones&Dilution Credit
CTR-081-003	C-13 Risk Level
CTR-081-004a	C-24d SSC Effluent Dependent Wtr
CTR-081-004b	C-24e SSC Desgntd/Beneficial Uses
CTR-081-005a	E-01w Cost per Facility
CTR-081-005b	E-01d Direct Dischargers
CTR-082-001	B Comment Period
CTR-082-002	G-02 Compliance Schedules
CTR-082-003	C-22 Dissolved v. Ttl Recoverable
CTR-082-004	C-13 Risk Level
CTR-082-005	C-24b SSC Recalculation Procedure
CTR-082-006	C-24e SSC Desgntd/Beneficial Uses
CTR-082-007a	E-01g08 Discharger Representation
CTR-082-007b	E-01b Cost Triggers

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CTR-082-008	E-02f Use More Recent Data
CTR-082-009a	E-01n Detection Limits
CTR-082-009b	C-28 Detection Limits
CTR-082-010	E-01d Direct Dischargers
CTR-082-011	E-01c01 $100M Threshold
CTR-082-012	E-01u Economic Consid. Task Force
CTR-083-001	B Comment Period
CTR-083-002	K Water Shed Approach
CTR-084-001	G-11 Intake Credits
CTR-084-002a	E-01c01 $100M Threshold
CTR-084-002b	S UMRA
CTR-085-001	B Comment Period
CTR-085-002	B Comment Period
CTR-085-003	G-04 Interim Limits
CTR-085-004	C-24a SSC Water Effect Ratios
CTR-085-005	G-02 Compliance Schedules
CTR-085-006	C-22 Dissolved v. Ttl Recoverable
CTR-085-007	G-09 Translators
CTR-085-008	C-24a SSC Water Effect Ratios
CTR-085-009	C-01 Mercury
CTR-085-010	C-08a Arsenic Human Health
CTR-085-011	G-05 Mixing Zones&Dilution Credit
CTR-085-012	G-04 Interim Limits
CTR-085-013	C-13 Risk Level
CTR-085-014	C-24d SSC Effluent Dependent Wtr
CTR-085-015	C-24e SSC Desgntd/Beneficial Uses
CTR-085-016a	E-01g08 Discharger Representation
CTR-085-016b	E-01b01 RegRelief Above Threshold
CTR-085-017	E-02f Use More Recent Data
CTR-085-018a	E-01n Detection Limits
CTR-085-018b	C-28 Detection Limits
CTR-085-019	E-01d Direct Dischargers
CTR-086-001a	Q Nonpoint Sources
CTR-086-001b	K-01 TMDLs
CTR-086-002	C-01 Mercury
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CTR-086-004a	G-01 Reasonable Potential
CTR-086-004b	C-22 Dissolved v. Ttl Recoverable
CTR-086-004c	G-09 Translators
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CTR-086-004g	G-04 Interim Limits
CTR-086-004h	G-05 Mixing Zones&Dilution Credit
CTR-086-004i	G-02 Compliance Schedules
CTR-086-005	T State Implementation Policy
CTR-086-006	E-01m Regulatory Relief
CTR-086-007	T State Implementation Policy
CTR-087-001	I-01 Application Sec 301 vs. MEP
CTR-087-002	I-02a Applying WQBELs, Stormwater
CTR-087-003	J-01 MS4s/CSOs/Industries Costs
CTR-089-001a	C-22 Dissolved v. Ttl Recoverable
CTR-089-001b	C-01 Mercury
CTR-089-001c	C-08a Arsenic Human Health
CTR-089-001d	G-05 Mixing Zones&Dilution Credit
CTR-089-001e	K-01 TMDLs
CTR-089-001f	G-02 Compliance Schedules
CTR-089-001g	G-09 Translators
CTR-089-002	B Comment Period
CTR-089-003	C-28 Detection Limits
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CTR-089-005	E-01d Direct Dischargers
CTR-089-006	C-24d SSC Effluent Dependent Wtr
CTR-090-001	B Comment Period
CTR-090-002a	C-17a Methodologies Human Health
CTR-090-002b	C-24a SSC Water Effect Ratios
CTR-090-002c	C-22 Dissolved v. Ttl Recoverable
CTR-090-002d	G-05 Mixing Zones&Dilution Credit
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CTR-090-002f	G-04 Interim Limits
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CTR-090-004	E-02o01 No Peer Review Reference
CTR-090-005	C-20 Scope Prty Toxic Poll. List
CTR-090-006	C-28 Detection Limits
CTR-090-007	Q Nonpoint Sources
CTR-090-008	E-02 Benefits Analysis
CTR-090-009	T State Implementation Policy
CTR-090-010a	G-01 Reasonable Potential
CTR-090-010b	K-01 TMDLs
CTR-090-011	C-28 Detection Limits
CTR-090-012a	E-01c Executive Order 12866
CTR-090-012b	S UMRA
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CTR-090-014	I-01 Application Sec 301 vs. MEP
CTR-090-015	Q Nonpoint Sources
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CTR-090-018	C-24 Site Specific Criteria
CTR-090-019	C-17a Methodologies Human Health
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CTR-090-021	I-10 CSO Policy
CTR-090-022	C-12a THMs Human Health
CTR-090-023a	K-02 Watershed Permitting
CTR-090-023b	Q Nonpoint Sources
CTR-090-024	G-02 Compliance Schedules
CTR-091-001a	C-01 Mercury

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CTR-091-001b	C-01 Mercury
CTR-091-002a	E-01 Cost Analysis
CTR-091-002b	E-02 Benefits Analysis
CTR-092-001	T State Implementation Policy
CTR-092-002	C-22 Dissolved v. Ttl Recoverable
CTR-092-003	G-09 Translators
CTR-092-004	C-24a SSC Water Effect Ratios
CTR-092-005	K-01 TMDLs
CTR-092-006	G-04 Interim Limits
CTR-092-007	G-05 Mixing Zones&Dilution Credit
CTR-092-008	G-07 Variances
CTR-092-009	G-02 Compliance Schedules
CTR-092-010	C-24 Site Specific Criteria
CTR-092-011	I-01 Application Sec 301 vs. MEP
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CTR-092-015	C-13 Risk Level
CTR-092-016a	E-01c Executive Order 12866
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CTR-092-020	E-01e Indirect Dischargers
CTR-092-021	E-01i Alternative Cost Analysis
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CTR-092-022c	E-01y Cost of Efforts to Date
CTR-092-023a	E-02e Include Omitted Benefits
CTR-092-023b	E-02l Marginal Impacts/Benefits
CTR-092-023c	E-02q Benefits to Public at Large
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CTR-095-001c	C-21 Legal Concerns
CTR-095-001d	C-14 Fish or Water Consumption
CTR-095-002a	C-01 Mercury
CTR-095-002b	C-01 Mercury
CTR-095-003	C-09a Dioxin Human Health
CTR-095-004	G-02 Compliance Schedules
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CTR-096-001b	C-17 Methodologies
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CTR-096-003a	E-01c01 $100M Threshold
CTR-096-003b	J-05 BMPs Inability to Comply
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CTR-096-005	B Comment Period
CTR-096-006	C-24d SSC Effluent Dependent Wtr
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CTR-096-008	C-13 Risk Level
CTR-096-009	E-01u Economic Consid. Task Force
CTR-097-001a	C-17a Methodologies Human Health
CTR-097-001b	C-14 Fish or Water Consumption
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CTR-098-001	C-14 Fish or Water Consumption
CTR-099-001a	C-17a Methodologies Human Health
CTR-099-001b	C-17b Methodologies Aquatic Life
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CTR-099-004	C-21 Legal Concerns
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CTR-101-001a	C-14 Fish or Water Consumption
CTR-101-001b	C-20 Scope Prty Toxic Poll. List
CTR-102-001a	C-17a Methodologies Human Health
CTR-102-001b	C-17b Methodologies Aquatic Life
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CTR-103-001	C-04b Selenium Aquatic Life
CTR-104-001	C-14 Fish or Water Consumption
CTR-104-002a	C-01 Mercury
CTR-104-002b	C-14 Fish or Water Consumption
CTR-104-003	G-02 Compliance Schedules
CTR-104-004a	C-09a Dioxin Human Health
CTR-104-004b	C-17a Methodologies Human Health
CTR-105-001a	C-20 Scope Prty Toxic Poll. List
CTR-105-001b	C-14 Fish or Water Consumption
CTR-105-002a	C-17a Methodologies Human Health
CTR-105-002b	C-21 Legal Concerns
CTR-106-001	C-14 Fish or Water Consumption
CTR-106-002a	C-01 Mercury
CTR-106-002b	C-14 Fish or Water Consumption
CTR-106-003	G-02 Compliance Schedules
CTR-106-004a	C-09a Dioxin Human Health
CTR-106-004b	C-17a Methodologies Human Health
CTR-107-001	E-01 Cost Analysis
CTR-107-002a	E-01 Cost Analysis
CTR-107-002b	G-02 Compliance Schedules
CTR-107-002c	E-01n Detection Limits
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CTR-109-002a	C-01 Mercury
CTR-109-002b	C-14 Fish or Water Consumption
CTR-109-003	C-09a Dioxin Human Health
CTR-109-004	G-02 Compliance Schedules
CTR-110-001	C-17a Methodologies Human Health
CTR-110-002	C-09a Dioxin Human Health
CTR-110-003	G-02 Compliance Schedules
CTR-111-001	E-01d01 Cost Estmte by Commenter
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CTRE-001-001b	V Collaborative Approach
CTRE-001-002	B Comment Period
CTRE-002-001	B Comment Period
CTRE-002-002	I-01 Application Sec 301 vs. MEP
CTRE-002-003	J Storm Water Economics
CTRE-002-004	I-03 Applicability of Criteria
CTRE-002-005	B Comment Period
CTRE-003-001a	B Comment Period
CTRE-003-001b	B Comment Period
CTRE-003-001c	R RFA/SBREFA
CTRE-004-001a	B Comment Period
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CTRE-008-001	B Comment Period
CTRE-009-001	B Comment Period
CTRE-010-001	B Comment Period
CTRE-011-001	B Comment Period
CTRE-012-001	B Comment Period
CTRE-013-001	B Comment Period
CTRE-014-001	B Comment Period
CTRE-015-001	B Comment Period
CTRE-016-001	B Comment Period
CTRE-017-001	B Comment Period
CTRE-018-001	B Comment Period
CTRE-019-001	B Comment Period
CTRE-020-001	B Comment Period
CTRE-021-001	B Comment Period
CTRE-022-001	B Comment Period
CTRE-023-001a	B Comment Period
CTRE-023-001b	V Collaborative Approach
CTRE-024-001	B Comment Period
CTRE-025-001	B Comment Period
CTRH-001-001a	I-01 Application Sec 301 vs. MEP
CTRH-001-001b	J Storm Water Economics
CTRH-001-002	B Comment Period
CTRH-001-003a	C-22 Dissolved v. Ttl Recoverable
CTRH-001-003b	C-24a SSC Water Effect Ratios
CTRH-001-003c	C-01 Mercury
CTRH-001-004	I-01 Application Sec 301 vs. MEP
CTRH-001-005a	J-02 RFA - Small Entity Cost
CTRH-001-005b	R RFA/SBREFA
CTRH-001-006	I-01 Application Sec 301 vs. MEP
CTRH-001-007	I-03 Applicability of Criteria
CTRH-001-008a	R RFA/SBREFA
CTRH-001-008b	J-02 RFA - Small Entity Cost
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CTRH-001-010	C-21 Legal Concerns
CTRH-001-011	G-02 Compliance Schedules
CTRH-001-012	C-09a Dioxin Human Health
CTRH-001-013	C-01 Mercury
CTRH-001-014	C-02b Copper Aquatic Life
CTRH-001-015	A Anti-degradation
CTRH-001-016	C-20 Scope Prty Toxic Poll. List
CTRH-001-017	C-21 Legal Concerns
CTRH-001-018a	C-01 Mercury
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CTRH-001-0211a	B Comment Period
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CTRH-001-022b	G-05 Mixing Zones&Dilution Credit
CTRH-001-023	E-01s 2ndary,Indirect Cost Impact
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CTRH-001-024b	G-05 Mixing Zones&Dilution Credit
CTRH-001-024c	C-22 Dissolved v. Ttl Recoverable
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CTRH-001-024e	C-17a Methodologies Human Health
CTRH-001-025	V Collaborative Approach
CTRH-001-026	C-13 Risk Level
CTRH-001-027	E-01d Direct Dischargers
CTRH-001-028	C-28 Detection Limits
CTRH-001-029	J Storm Water Economics
CTRH-001-030	V Collaborative Approach
CTRH-001-031	I-01 Application Sec 301 vs. MEP
CTRH-001-032a	C-24a SSC Water Effect Ratios
CTRH-001-032b	C-22 Dissolved v. Ttl Recoverable
CTRH-001-032c	G-05 Mixing Zones&Dilution Credit
CTRH-001-033	J Storm Water Economics
CTRH-001-034a	I-08 SWRCB Flexibility&Authority

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CTRH-001-034b	I-05 Compliance Schedules
CTRH-001-034c	G-03 Design/Minimum Flows
CTRH-001-035	B Comment Period
CTRH-001-036	B Comment Period
CTRH-001-037a	E-01c02 Bnfts do not Balance Cost
CTRH-001-037b	E-01q03 Unit Cost Assumption
CTRH-001-037c	E-01h02 Unit Cost Assumptions
CTRH-001-038	C-28 Detection Limits
CTRH-001-039a	C-24a SSC Water Effect Ratios
CTRH-001-039b	G-04 Interim Limits
CTRH-001-039c	G-02 Compliance Schedules
CTRH-001-040	I-01 Application Sec 301 vs. MEP
CTRH-001-042	J-04 End-of-Pipe Treatment v. BMP
CTRH-001-043	B Comment Period
CTRH-001-044	E-01d01 Cost Estmte by Commenter
CTRH-001-045a	B Comment Period
CTRH-001-045b	G-09 Translators
CTRH-001-046	C-13 Risk Level
CTRH-001-047	C-24 Site Specific Criteria
CTRH-001-048	C-22 Dissolved v. Ttl Recoverable
CTRH-001-049	G-09 Translators
CTRH-001-050a	C-01 Mercury
CTRH-001-050b	C-14 Fish or Water Consumption
CTRH-001-051	C-09a Dioxin Human Health
CTRH-001-052	G-02 Compliance Schedules
CTRH-001-053	C-14 Fish or Water Consumption
CTRH-001-054	J Storm Water Economics
CTRH-001-055	T State Implementation Policy
CTRH-001-056	V Collaborative Approach
CTRH-001-057a	K-03 Watershed/Effluent Trading
CTRH-001-057b	C-24a SSC Water Effect Ratios
CTRH-001-057c	G-04 Interim Limits
CTRH-001-057d	G-07 Variances
CTRH-001-057e	G-09 Translators
CTRH-001-057f	C-22 Dissolved v. Ttl Recoverable
CTRH-001-057g	G-05 Mixing Zones&Dilution Credit
CTRH-001-058	E-01g08 Discharger Representation
CTRH-001-059	C-23 Sediments/Dredged Materials
CTRH-001-060a	B Comment Period
CTRH-001-060b	J-04 End-of-Pipe Treatment v. BMP
CTRH-001-061	I-03 Applicability of Criteria
CTRH-001-062	C-01 Mercury
CTRH-001-063	C-01 Mercury
CTRH-002-001	I-01 Application Sec 301 vs. MEP
CTRH-002-002	J-04 End-of-Pipe Treatment v. BMP
CTRH-002-003	C-28 Detection Limits
CTRH-002-004	J-02 RFA - Small Entity Cost
CTRH-002-005	J Storm Water Economics
CTRH-002-006a	I Stormwater/Wet Weather Flows
CTRH-002-006b	J Storm Water Economics
CTRH-002-007	B Comment Period
CTRH-002-008	I-01 Application Sec 301 vs. MEP
CTRH-002-009	J Storm Water Economics
CTRH-002-010	B Comment Period
CTRH-002-011a	G-02 Compliance Schedules
CTRH-002-011b	G-04 Interim Limits
CTRH-002-011c	C-22 Dissolved v. Ttl Recoverable
CTRH-002-011d	K-01 TMDLs
CTRH-002-012	C-24d SSC Effluent Dependent Wtr
CTRH-002-013	C-13 Risk Level
CTRH-002-014	G-02 Compliance Schedules
CTRH-002-015	K Water Shed Approach
CTRH-002-016a	E-01c02 Bnfts do not Balance Cost
CTRH-002-016b	E-01h Treatment Assumptions
CTRH-002-017	J Storm Water Economics
CTRH-002-018	E-01y Cost of Efforts to Date
CTRH-002-019	E-01n Detection Limits
CTRH-002-020	C-24d SSC Effluent Dependent Wtr
CTRH-002-021a	B Comment Period
CTRH-002-021b	V Collaborative Approach
CTRH-002-022	E-01n Detection Limits
CTRH-002-023	C-13 Risk Level
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CTRH-002-025	I-04 Site-Specific Criteria
CTRH-002-026	I-05 Compliance Schedules
CTRH-002-027	B Comment Period

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Attachments? Y
CROSS REFERENCES G-02

Comment: The proposed implementation plan allowing compliance schedules for effluent limits to attain the criteria to be placed in permits may not pass the antidegradation test either. CBE believes EPA recognizes that permit schedules which allow continued impairment of fishing and aquatic life uses are improper (See e.g., section 1311(b)(1)(C), section 1314(l)(1)(D), section 1342(o)(1) and (3) and section 1313(d)(4)(A) of the Clean Water Act). In the alternative case, however, a schedule allowing discharge of these persistent pollutants to waters attaining the criteria will result in the accumulation of pollutants and will degrade water quality. This degradation is unnecessary as the state has accommodated important economic and social development for years while placing compliance schedules in administrative enforcement orders, and is thus impermissible under 40 CFR section 131.12(a)(2). Indeed, existing California dischargers have been made aware of the need to meet similar or more restrictive criteria since at least 1991, and further extension of time for more pollution should be done through schedules in enforcement orders. Any desire to avoid the administrative effort of continuing to prepare these enforcement orders is easily outweighed by the public interests in clean water and public participation afforded.

In sum, EPA's weaker criteria shown in Table 2 do not protect designated uses of water based on sound scientific rationale, and even if this were true for some toxics in some areas of the Bay, the weaker criteria are not necessary to allow important economic or social development. Therefore, revision of water quality standards by adopting these criteria would not meet the tests set forth by 40 CFR section 131.11(a)(1) and section 131.12 and the Clean Water Act provisions these regulations implement, Further, incorporating schedules allowing polluters to harm fishing and aquatic life in water quality standards and effluent limits is improper, and there is no legitimate need for schedules allowing degradation of water quality and restricting public participation to be in permits instead of putting them in administrative enforcement orders as is done today. Thus EPA's proposal may, by failing to provide equal protection for people of color who fish for food and unfairly restricting public participation, also conflict with the Executive Order on environmental justice and civil rights law.

Response to: CTR-002-010a

See legal response to CTR-002-009. EPA disagrees that compliance schedules will prevent antidegradation requirements from being met. First, the antidegradation policy at 40 CFR 131. 12 requires, as an absolute minimum, that existing uses (those uses established on or after November 28, 1975) must be fully protected in all waters. Secondly, the antidegradation policy allows some degradation in high quality waters (i.e., those waters whose quality exceeds levels necessary to support fishable/swimmable uses) provided that any such degradation would not reduce water quality to such levels below that needed to maintain the fishable/swimmable uses. Before allowing any degradation in

high quality waters, the State must ensure that all statutory and regulatory requirements for point sources and all cost-effective and reasonable best management practices are achieved. Furthermore, in allowing degradation to high quality waters the State must provide for public participation and intergovernmental coordination in demonstrating that the lowering of water quality is necessary for important economic and social advancements in the area that the discharge is located. Thirdly, no degradation (other than short term or temporary lowering of water quality) is allowed in waters classified as Outstanding National Resource Waters (ONRWs). ONRWs include the highest quality waters in the U. S. Additionally, the ONRW classification offers special protection for waters of "exceptional ecological significance, " i.e., those waters that are important, unique, or of ecological importance, but whose water quality, as determined by traditional parameters such as dissolved oxygen or pH, may not be particularly high.

Thus, although EPA notes that there is some degradation allowed to certain waters under the antidegradation policy, EPA believes that a compliance schedule can be complementary to the antidegradation provisions. The Agency has supported reasonable compliance schedules based on new or reviewed water quality standards adopted after July 1, 1977. A compliance schedule will accommodate the practical real world problems in meeting a new effluent limit where it is adequately justified. The whole basis for a compliance schedule is when a facility needs to invest in capitol improvements to install the additional treatment technologies necessary to meet more stringent effluent limitations. Furthermore, EPA is not aware of any specific instances where the State has either allowed any unnecessary degradation or allowed degradation to occur to a degree that is inconsistent with 40 CFR 131.12. Moreover, the commenter did not provide any analysis to demonstrate that antidegradation provisions are not being met or not being appropriately implemented in the State of California. Furthermore, although the antidegradation provisions are essential in maintaining and protecting water quality, those provisions are outside of the scope of today's rule.

Comment ID: CTR-026-001a
Comment Author: Cal. Department of Fish & Game
Document Type: State Government
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: A Anti-degradation
References:
Attachments? N
CROSS REFERENCES C-24e

Comment: 1 . DESIGNATED USES AND ANTIDEGRADATION POLICY

The DFG is concerned with the issues of "designated uses" and an "antidegradation policy" as they apply to the formation of water quality standards. It is our understanding that water quality standards are comprised of, or defined by, three components: 1) designated uses, 2) numeric water quality criteria, and 3) an antidegradation policy. The CTR is not clear on which designated uses are being identified and when they were established. The rule needs to identify what designated uses are being assigned and when these uses were or should be attained. At issue is which uses should be maintained and protected, and what the baseline should be for designating the various beneficial or designated uses for inland freshwater and bay and estuarine waters of the state. We believe that any baseline for applying the antidegradation policy should establish what the quality of the water would have been historically in the absence of human impacts. Under the Porter Cologne Act, the State's primary water quality statute, the

discharge of waste into state waters is not a right but a privilege. Since the discharge of waste is not considered a beneficial use, it should not be permitted in public waters unless it is determined that all beneficial uses, especially publicly entrusted fish and wildlife resources, are fully protected. This is especially true for wetlands throughout the State. The proposed rule is not clear as to when the baseline starts (i.e., historical vs. statutory). The DFG believes that, to the extent practicable, designated uses should be reflective of what has been realized in the past. If the CTR is utilizing a statutory date for which baseline designated uses were identified, then the CTR needs to include a justification for such a date.

With respect to antidegradation, it is not clear whether or not the proposed rule is subject to these requirements. It is our understanding that when a proposed action would allow less stringent criteria than previously proposed or adopted, and if that action would result in more loading of a particular constituent into waters of the State, then an appropriate antidegradation analysis shall be required. It is not clear what process EPA has undertaken to adequately address antidegradation issues related to the proposed new criteria. It may be that the applicability of the antidegradation policies are more pertinent with respect to site-specific criteria that may be included in the final rule. We recommend that the CTR adequately address this issue and apply the antidegradation policy where necessary.

Response to: CTR-026-001a

The scope of today's rule is to establish numeric criteria to bring California into compliance with CWA Section 303(c)(2)(B). Section 303(c)(2)(B) requires adoption of numeric criteria for priority toxic pollutants contained in CWA Section 307(a) for which EPA has issued Section 304(a) criteria guidance and where those pollutants could reasonably be expected to interfere with the designated uses of state waters. In today's action, EPA is relying on the use designations developed by the State of California, the State's existing antidegradation policy, and the criteria promulgated in this action to ensure that adequate water quality standards are in place to protect the waterbodies identified in the State's Regional Basin Plans. The adoption of criteria sufficient to protect designated uses is not an action which in and of itself results in any change in water quality. Thus, antidegradation implementation and baselines for applying the antidegradation policy are outside of the scope of today's rule.

Comment ID: CTR-029-001
Comment Author: Center for Marine Conservation
Document Type: Environmental Group
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: A Anti-degradation
References:
Attachments? N
CROSS REFERENCES

Comment: The Center for Marine Conservation (CMC) is a nationwide, nonprofit advocacy group dedicated to the conservation and enhancement of coastal and ocean life and resources. CMC submits these comments on behalf of its 16,000 members in California and over 120,000 members nationwide.

CMC applauds EPA's efforts to bring California into compliance with the Clean Water Act section 303(c)(2)(B). Implementing numeric criteria that will protect the beneficial uses of California's waters is

of great importance to the health of coastal and marine ecosystems, and so to CMC and its members. The reliance in many areas of the state on narrative criteria threatens the health of most of the state's waters, thereby impacting both human health and the health of the state's economy that relies on clean water.

While CMC strongly supports the swift adoption of an Enclosed Bays and Estuaries Plan and an Inland Surface Waters Plan that contain numeric criteria for toxic pollutants, CMC also is concerned that many of the specific criteria contained in the proposed rule are weaker than those contained in published guidance. CMC also believes that the proposed rule can better protect certain subpopulations from harm caused by consumption of contaminated fish and shellfish. Finally, CMC is concerned that the economic analysis of the proposed rule over-emphasizes costs and under-reports the many benefits of improving water quality throughout the state. These three points are reviewed below.

Use of the Majority of the State's Waters Is Threatened or Impaired by Pollution

Increasing pollution seriously jeopardizes the health of the state's waters. The most recently available data shows that pollution threatens or impairs the use of 98% of California's tidal wetlands, 93% of its bays and harbors, 90% of its estuaries, 88% of its freshwater wetlands, 79% of its lakes and reservoirs, and 74% of its rivers and streams.(*1)

Where specific toxics data are available, they demonstrate that these contaminants are particularly significant threat to the health of the state's waters. For example, use of 98% of the state's tidal wetlands, 85% of its estuaries, 72% of its freshwater wetlands, 72% of its groundwater, 68% of its bays and harbors, and 52% of its rivers and streams are threatened or impaired by toxic pollutants.(*2)

Significantly, these figures represent only water bodies whose water quality has been measured. The health of many waters in the state is unknown. For example, the water quality of only 9% of the state's rivers and streams has been assessed.(*3) Moreover, even when a water body is reported as being "monitored," it may only be tracked for one or a handful of contaminants, leaving its overall health unclear. In other words, the number of water bodies known to be contaminated is only the minimum; actual pollution problems may be far greater.

In light of these statistics, it is imperative that the state move forward swiftly in implementing strong numeric controls on the discharge of toxics into our waterways. It is unacceptable California is the only state in the nation in substantial noncompliance with Clean Water Act section 303(c)(2)(B), and CMC welcomes EPA's extensive efforts in helping California work towards compliance.

These statistics, however, also call for the strongest criteria supportable by science. The significant threats demonstrated by the statistics show that the proposed rule's move backwards from published criteria documents should be viewed with an extremely critical eye.

(*1) State Water Resources Control Board, California 305(b) Report on Water Quality, pp. 43-47 (Aug. 1996).

(*2) Id. at p. 80.

(*3) Id. at p. 2.

Response to: CTR-029-001

EPA acknowledges that the criteria in the proposed CTR appeared in some instances to be inconsistent with EPA's published criteria recommendations. EPA explained in the preamble to the proposed CTR that EPA's policy has always been to utilize the latest toxicity information in IRIS when evaluating criteria. In this regard, EPA disagrees with the commentor that the criteria in the CTR are inconsistent with published EPA guidance. Since the proposed CTR, EPA has updated its National 304(a) published criteria to include the latest IRIS toxicity values (see 63 FR 68353 published on 12/10/98 and 64 FR 19781 published on 4/22/99). The values in the final CTR are now consistent with EPA's published criteria recommendations.

Comment ID: CTR-029-002c
Comment Author: Center for Marine Conservation
Document Type: Environmental Group
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: A Anti-degradation
References:
Attachments? N
CROSS REFERENCES C-17a
C-17b
C-22
C-27
C-29

Comment: The Center for Marine Conservation (CMC) is a nationwide, nonprofit advocacy group dedicated to the conservation and enhancement of coastal and ocean life and resources. CMC submits these comments on behalf of its 16,000 members in California and over 120,000 members nationwide.

CMC applauds EPA's efforts to bring California into compliance with the Clean Water Act 303(c)(2)(B). Implementing numeric criteria that will protect the beneficial uses of California's waters is of great importance to the health of coastal and marine ecosystems, and so to CMC and its members. The reliance in many areas of the state on narrative criteria threatens the health of most of the state's waters, thereby impacting both human health and the health of the state's economy that relies on clean water.

While CMC strongly supports the swift adoption of an Enclosed Bays and Estuaries Plan and an Inland Surface Waters Plan that contain numeric criteria for toxic pollutants, CMC also is concerned that many of the specific criteria contained in the proposed rule are weaker than those contained in published guidance. CMC also believes that the proposed rule can better protect certain subpopulations from harm caused by consumption of contaminated fish and shellfish. Finally, CMC is concerned that the economic analysis of the proposed rule over-emphasizes costs and under-reports the many benefits of improving water. quality throughout the state. These three points are reviewed below.

In Light of Significant Threats to Water Quality, the Proposed Rule Should Contain the Most Stringent Criteria That Are Scientifically Defensible

Many of the criteria in the proposed rule are weaker than criteria in current published guidance. The proposed rule summarily states that the difference between the proposed, weaker criteria and the published guidance documents is "insignificant"(*4); however, in light of the current contamination

problems in California's waters today, any move backwards, particularly when spread out over the state, must be viewed as significant.

Any weakening of the criteria should be subject to close scrutiny and the most rigorous analysis, which the proposed rule itself does not do. Among other things, the criteria in the proposed rule may be under protective because additive and synergistic effects were not considered; and because the effects on wildlife, which can be particularly significant for bioaccumulative chemicals, were ignored.(*5) In addition, the proposed rule contains dissolved rather than total recoverable metals criteria, despite the fact that EPA acknowledges that total recoverable metals criteria are "scientifically defensible" and that they are more protective than dissolved metals criteria because they consider "sediment, food-chain effects and other fate-related issues," rather than simply water column impacts.(*6)

Clean Water Act section 303(c)(2)(B) mandates the development of numeric criteria that will "support such designated uses [that are adopted by the State]." The statistics available on the health of the state's waters indicates that their use already is significantly threatened or impaired by toxics. The strongest criteria supportable by science are necessary to reverse this trend and begin to restore the state's waters.

(*4) 62 Fed. Reg. 42159, 42168 (Aug. 5, 1997).

(*5) Id. at 42168.

(*6) Id. at 42172.

Response to: CTR-029-002c

See response to CTR-029-001.

Comment ID: CTR-039-002
Comment Author: San Francisco BayKeeper
Document Type: Environmental Group
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: A Anti-degradation
References:
Attachments? N
CROSS REFERENCES

Comment: EPA should defer to the State's prior technical decisions to establish metals criteria based on total recoverable metals. EPA should defer to the State's prior determinations on dioxin and mercury as well as fish consumption rates. In establishing water quality standards under the federal Clean Water Act, neither EPA nor the States can factor in the anticipated economic burden which may result from implementation of the standards. The standards must be based solely on science and the needs of the beneficial uses established for the particular waters. The only reason that the State's promulgation of many of the requisite criteria in 1991 was overturned in state court was because of a flawed economic analysis pursuant to provisions unique to state law. EPA had approved many of those final criteria as technically sound and within the State's delegated discretion. EPA should not backslide on that prior

determination at this late date but instead should be attempting to close the gap in criteria by deferring to its previous approval.

Response to: CTR-039-002

EPA believes that in promulgating the criteria in today's rule, the Agency is not backsliding on criteria that were previously approved in California. Rather, in taking this action, the Agency intends to establish numeric criteria for priority toxic pollutants as required by CWA Section 303(c)(2)(B) until such time that California can adopt such criteria sufficient to protect the designated uses of the waters that are subject to this rule. The criteria included in today's rule are largely the same criteria that were adopted by the State. However, there are some differences. For example, because the criteria included in today's rule have been updated by EPA to reflect the Agency's latest scientific recommendation, the criteria values may be different from those adopted by State in the Inland Surface Waters Plan and Enclosed Bays and Estuaries Plan. EPA notes that the State, in the future, is not precluded from adopting criteria for total recoverable metals (instead of dissolved), adopting human health criteria that are based on higher fish consumption rates, or from adopting criteria for dioxin that are based on toxicity equivalents since these provisions are viewed as risk management decisions. The basis for EPA's use of metals criteria based on dissolved rather than total recoverable is discussed in the responses CTR-026-004, CTR-039-003a, and CTR-065-005, a record document entitled "Discussion of Use of Dissolved Metals in the CTR," and elsewhere in the record for the rule.

Comment ID: CTR-039-003b
Comment Author: San Francisco BayKeeper
Document Type: Environmental Group
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: A Anti-degradation
References:
Attachments? N
CROSS REFERENCES C-22

Comment: I . APPLYING DISSOLVED METALS CRITERIA AS PROPOSED VIOLATES THE ANTIDEGRADATION POLICY FOR SAN FRANCISCO BAY AND OTHER WATERS OF THE STATE

The practical effect of EPA's decision to rely on dissolved metals criteria is to allow higher levels of total recoverable metals to be discharged from point sources into San Francisco Bay as well as other waters of the State. Since 1991, many permits in the Bay area and else where have been issued applying the State Water Resources Control Board's technically-based and EPA approved numeric criteria for numerous toxic pollutants. For at least three years, permits throughout the State were required to be issued using the duly-promulgated criteria established by the State Water Resources Control Board ("SWRCB"). After the Sacramento court vacated the criteria on economic grounds, numerous permitting decisions were made by local regional boards and their staffs applying the previously applicable standards using their best professional judgement ("BPJ") in order to assure the protection of beneficial uses. Each of the permitting decisions based directly or deferentially on the SWRCB's criteria would be more stringent than permits for the same parameters authorized by EPA's proposed rule where a discharger opts to follow the Water Effects Ratio protocol for translating the criteria into a permit limit. BayKeeper would

not anticipate that many, if any, dischargers will opt for the default WER of 1.0 Thus, for many regulated dischargers, EPA's proposal will lead to major increases in the total metals they are allowed to discharge into the Bay and other waters of the State. This massive increase in the total pollution proposed to be allowed to be discharged into the Bay and other State waters is completely inconsistent with the State's and EPA's antidegradation policies mandating that existing water quality be maintained and protected. As the State's policy sets forth:

Whenever the existing quality of water is better than the quality established in policies as of the date on which such policies become effective, such existing high quality will be maintained until it has been demonstrated to the State that any change will be consistent with maximum benefit to the people of the State, will not unreasonably affect present and anticipated beneficial use of such water and will not result in water quality less than that prescribed in the policies.

SWRCB Resolution No. 68-16. Under the federal version of the policy:

[w]here the quality of the waters exceed levels necessary to support propagation of fish, shellfish, and wildlife and recreation in and on the water, that quality shall be maintained and protected unless the State finds, after full satisfaction of the intergovernmental coordination and public participation provisions of the State's continuing planning process, that allowing lower water quality is necessary to accommodate important economic or social development.

40 C.F.R. 131.12(a)(2). The antidegradation policies apply both to permit decisions as well as decisions establishing water quality standards. See, e.g., In The Matter of the Petition of Remmon C. Fay , SWRCB Order No. WQ 86-17 (Nov. 20, 1986). In the case of EPA's proposed rule, throughout California the rule, if adopted, will allow more pollution to be discharged than is currently allowed by permits validly issued to numerous dischargers throughout the State without any consideration of the policies, including the intergovernmental coordination and public participation requirements, required by the antidegradation policies.

Of course, in addition to that procedural problem, BayKeeper is opposed to the proposed reliance on dissolved numbers, especially in the Bay area, because it will in fact allow more pollution to be discharged into the State's waters than is currently allowed today and likely will prove detrimental to beneficial uses. See Comments of Communities For A Better Environment. BayKeeper also is very concerned about the burdens and uncertainty placed on the public by the need for translators in order to apply the dissolved criteria in permit limits that must be based on total recoverable numbers. As noted above, BayKeeper does not anticipate that many dischargers will opt for EPA's proposed WER default of 1.0 BayKeeper views this proposal as an invitation for dischargers to prepare site-specific limitations based on their own studies which will frustrate the public' s ability to participate effectively in the formulation of effluent limits. Further, the proposal will present a moving target for the public to understand and will burden the resources of regional board staff to a degree that may undermine the quality of those site by site determinations.

Response to: CTR-039-003b

See response to CTR-026-004. First, EPA disagrees with the contention that the CTR will result in massive increases in the total pollution allowed in the San Francisco Bay. See response to CTR-002-003 for a detailed response to this same comment.

EPA disagrees that the dissolved criteria will violate California's or EPA's antidegradation provisions contained in 40 CFR 131.12. The use of dissolved criteria in establishing aquatic life criteria for metals

is based on EPA's determination (with widespread support and input from experts in the scientific community) that dissolved metals more accurately approximates the portion of the metals in water that is biologically available to cause toxicity to aquatic organisms.

The antidegradation policy at 40 CFR 131.12 and the State's antidegradation policy ensures full protection of existing uses (those uses established on or after November 28, 1975) and provides a means to assess the impacts of discharges to high quality waters. There is some degradation allowed to high quality waters (see response to CTR-002-010a), provided certain procedures are implemented and certain provisions are met. However, EPA does not support the notion that dissolved metals will violate the antidegradation policy. EPA contends that the use of dissolved metals will provide a greater degree of accuracy in protecting aquatic ecosystems.

Furthermore, the adoption of criteria sufficient to protect designated uses is not an action which in and of itself results in any change in water quality. The implementation of such criteria may raise antidegradation issues in specific instances in the future, but this rule does not.

Comment ID: CTR-065-002a
Comment Author: Environmental Health Coalition
Document Type: Environmental Group
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: A Anti-degradation
References:
Attachments? N
CROSS REFERENCES C-17a
C-17b

Comment: PROPOSED RULE ALLOWS SIGNIFICANT AND UNACCEPTABLE INCREASES IN TOXIC POLLUTANT CONCENTRATIONS IN BAYS AND ESTUARIES

Our initial review indicates that the proposed criteria for a number of toxic constituents are unacceptably high and will allow more pollution of bays and estuaries by several orders of magnitude. If adopted as proposed, the CTR will allow a 900% increase of dioxin, 140% increase of PCBs, 325% increase of mercury, 2760% increase of zinc, 23,000% increase of lead, and a stunning 430 million % increase for total PAH, some of the most problematic pollutants in San Diego Bay. The CTR only improves (i.e. strengthens) criteria for only 3 of 64 pollutants. This does not square with new studies that show reasons for concern about the synergistic and long-term effects of exposures to these toxic pollutants. In sum, the CTR proposes weaker criteria for 58% of the pollutants and no change for 37% of the criteria. This kind of action will not bring us closer to our goal of cleaner water containing healthier organisms in the future.

Response to: CTR-065-002a

See comment response CTR-065-002b.

Comment ID: CTRH-001-015
Comment Author: Greg Karras

Document Type: Public Hearing
State of Origin: CA
Represented Org: Comm. for Better Environ.
Document Date: 09/17/97
Subject Matter Code: A Anti-degradation
References:
Attachments? N
CROSS REFERENCES

Comment: Now, I won't go through each of the pollutants one by one here. I want to give some other speakers some time.

But to summarize on the criteria point, EPA's proposal criteria ranges from slightly less to more than a thousand percent weaker than the state's previous proposal for 37 of the 64 pollutants of concern identified by the San Francisco Estuary Project -- that's according to our preliminary analysis -- or 58 percent of these pollutants, as compared with previous EPA-approved state standards.

Time and again, when environmental standards required action to prevent pollution, and this was done right, this resulted in long-term economic benefits rather than costs.

And I have an antidegradation question here: Will EPA allow these pollutants to degrade water quality when your own economic analysis shows no evidence of widespread economic concern?

And our data show that in fact doing it right and preventing pollution could save jobs and provide long-term economic benefits, as well as environmental health benefits.

Response to: CTRH-001-015

See response to CTR-002-010a, CTR-039-003b, and CTR-002-003.

Subject Matter Code: B Comment Period

Comment ID: CTR-001-001
Comment Author: Law Offices of Alan C. Waltner
Document Type: Storm Water Auth.
State of Origin: CA
Represented Org: Almeda Cnty Clean Wtr Pgm
Document Date: 09/22/97
Subject Matter Code: B Comment Period
References:
Attachments?
CROSS REFERENCES

Comment: (*1) As you know, several storm water systems have requested additional time to comment on the proposed rule, a request in which the ACCWP has joined. Additional time is particularly important given the interdependence between the CTR and the recently proposed "Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California," ("State Implementation Policy" or "SIP") released by the SWRCB on September 12, 1997, just two weeks before the comment deadline an the CTR. The way in which the CTR is implemented is central to its effects on storm water dischargers, as discussed below. Unfortunately, the State Implementation Policy does not fully correct or moderate the critical problems created by the proposed CTR.

Response to: CTR-001-001

EPA acknowledges that many dischargers have requested a longer comment period than was provided for the proposed CTR. The proposed CTR was published in the Federal Register on August 5, 1997 and the public comment period ended on September 26, 1997. This gave the public an opportunity of 52 days (over 7 weeks) within which to review and draft comments. The document was available through the Internet at EPA's website. EPA believes that this was a reasonable and sufficient time within which to complete a thorough review and to draft and submit comments to the Agency. The proposed CTR was not substantially different from California's prior law or the National Toxics Rule; it proposed to establish water quality criteria for priority toxic pollutants in the State of California and a compliance schedule provision for permits based on the proposed criteria. These provisions were not extensive or new; similar provisions have been in existence for the State of California and elsewhere in the country for many years.

The comment period is intended to provide commenters with a chance to substantively review the merits of the proposed action. For the proposed CTR, EPA expected and received comments on the scientific sufficiency of the criteria values and their underlying derivations, and on the compliance schedule provision. Comments concerning the implementation of the criteria should have been, and were, directed to the State of California. The State had proposed an implementation plan on September 12, 1997, during the public comment period of the proposed CTR. The comment period for the proposed implementation plan ended in December of 1997. The State's plan was also available to the public through the Internet.

Many commenters requested a longer comment period for the proposed CTR, to extend the time within which to review both the proposed CTR and the State's proposed implementation plan. The comment period for the proposed CTR overlapped with the first two weeks of the comment period for the State's

proposed implementation plan. EPA believes this was a reasonable and sufficient time within which to determine and comment on any issues concerning the proposed CTR criteria and compliance schedule provision due to the State's action. Commenters had several additional weeks to thoroughly review and comment on the State's specific implementation provisions in light of the proposed CTR criteria values. Although the CTR criteria and the State's implementation plan are related, the issues for comment are distinctly different and should have been directed to the respective appropriate entity. The CTR proposed water quality criteria which are scientifically-based and do not take economics into account; implementation procedures are not necessary in order to comment on the scientific underpinnings of the proposed water quality criteria.

The CTR and the State's implementation plan were not proposed together; they are separate phases of a comprehensive water quality control plan for the State of California and as such, can be commented on in phases. Both the EPA and the State published economic analyses which looked at the economic impacts of implementation of the respective proposed regulations. EPA's analysis for the proposed rule looked at the potential economic impacts of implementation of the proposed criteria using current State implementation procedures. The State's economic analysis for its proposed plan looked at the economic impacts of specific proposed implementation procedures.

Comment ID: CTR-002-001
Comment Author: Comm. for a Better Environment
Document Type: Environmental Group
State of Origin: CA
Represented Org:
Document Date: 09/24/97
Subject Matter Code: B Comment Period
References:
Attachments? Y
CROSS REFERENCES

Comment: Dear Ms. Frankel, Regional Administrator Marcus and Administrator Browner:

CBE believes that adoption of EPA's "California Toxics Rule" as proposed might represent the biggest step backward in toxics policy for San Francisco Bay in the twenty-five year history of the Clean Water Act.

The Rule would allow far more pollution than state water quality standards criteria EPA is trying to replace for most of the toxic pollutants of concern in the Bay. It would allow levels of dioxin compounds, mercury, polycyclic aromatic hydrocarbons, and toxic metals that already harm the fishing public and aquatic life to increase. Despite EPA's admission of soaring cancer risk and other toxic threats to Bay anglers, it would fail to protect people who fish for food unless they eat only starvation rations of one-seventieth of a pound of fish per day. Its dioxin criteria deregulate sixteen of the seventeen most toxic compounds known to science. It ignores proof of mercury bioaccumulation and evidence that its weaker copper criteria allow pollution levels that wiped out aquatic populations. It then proposes a system of "permits to pollute" above even-these inadequate standards for up to ten years. Many of these problems extend state-wide beyond the Bay.

EPA's analysis in the proposed Rule ignores protection of fishing people of color who are disproportionately imperiled by toxic pollution it would allow, and evidence EPA asked us for showing

that stronger rules than EPA'S drive pollution prevention which results in economic benefits to the manufacturing base. The proposed Rule does not appear to comply with federal laws which require protection of public health, fishing and aquatic life and equal protection under the law.

The massive scope of this policy change suggests the need for maximum public involvement. Unfortunately, EPA staff report receiving only one "public" comment to date. We believe that this critically important environmental health decision is not receiving adequate public scrutiny.

Accordingly, we request that EPA extend the comment period for the Rule beyond the present September 26, 1997 deadline, revise the toxics criteria to address the concerns detailed in our enclosed comments, and require present state implementation procedures instead of allowing permit schedules which could grant "permits to pollute."

We have begun to discuss these concerns with EPA staff, and hope to continue this process with you, Regional Administrator Marcus, and Administration environment officials, in order to seek ways in which we can move forward together to solve the serious toxic pollution problems affecting people and aquatic life in San Francisco Bay and throughout California. We propose a meeting at your offices at 2 p.m. or later on Wednesday, October 1, 1997 as a next step in these discussions.

Response to: CTR-002-001

In response to the comment requesting an extension of the comment period, please refer to response to CTR-001-001. In response to the comment requesting present state implementation procedures instead of allowing permit schedules as proposed in the CTR, the State's implementation procedures were overturned by a State Courtruling in 1994. Thus, the State does not have a comprehensive set of implementation procedures. Each of the Regional Water Quality Control Boards implements water quality-based effluent limitations based on varying procedures, some of which have been formally adopted and others which have not. The Regional Boards may always implement any State adopted, federally approved water quality criteria through a State adopted, federally approved compliance schedule provision.

Comment ID: CTR-004-005
Comment Author: South Bayside System Authority
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/24/97
Subject Matter Code: B Comment Period
References:
Attachments? N
CROSS REFERENCES

Comment: As stated above, most of the SBSA's concerns with the CTR, relate to the uncertainty of how the objectives will be implemented in permits. The CTR comment period should be extended to 90 days to allow sufficient time to review the draft implementation policy recently released by the state.

SBSA appreciates the opportunity to comment on the proposed rule. Please call me at (650) 594-8411 ext. 124 if you have any questions regarding the SBSA comments or need any additional information.

Sincerely,

James B. Bewley Manager

Response to: CTR-004-005

In response to the comment requesting an extension of the comment period, please refer to response to CTR-001-001.

Comment ID: CTR-005-002
Comment Author: Novato Sanitary District
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/23/97
Subject Matter Code: B Comment Period
References:
Attachments? Y
CROSS REFERENCES

Comment: 1. The deadline for submission of comments should be extended at least 60 days. This is necessary to allow a more detailed review of the rule and its impacts on the District, especially in light of the recent release of the Draft State Policy for Implementation of Toxics Standards.

Response to: CTR-005-002

In response to the comment requesting an extension of the comment period, please refer to response to CTR-001-001.

Comment ID: CTR-007-005
Comment Author: Port of San Diego
Document Type: Port Authority
State of Origin: CA
Represented Org:
Document Date: 09/24/97
Subject Matter Code: B Comment Period
References:
Attachments? N
CROSS REFERENCES

Comment: 4. It is the District's understanding that the State Water Resources Control Board's ("SWRCB") implementation policy for the CTR will include a policy determination on which criteria will be used in mixing zones i.e. fresh or salt water. If this is indeed the case (which the District does not know because it has not yet received its copy of the implementation policy) then the District requests that the comment period be extended in order to evaluate the CTR with the SWRCB's implementation policy.

Response to: CTR-007-005

In response to the comment requesting an extension of the comment period, please refer to response to CTR-001-001.

Comment ID: CTR-021-001
Comment Author: LeBoeuf, Lamb, Green & MacRae
Document Type: Local Government
State of Origin: CA
Represented Org: City of Sunnyvale
Document Date: 09/25/97
Subject Matter Code: B Comment Period
References: Letter CTR-021 incorporates by reference letter CTR-035
Attachments? Y
CROSS REFERENCES

Comment: In particular, Sunnyvale supports CASA/Tri-TAC's request for additional time in which to evaluate the potential impacts of the CTR in conjunction with the implementation plan being proposed by the State of California (the "State Proposal"). Sunnyvale obtained the State Proposal from the Internet as soon as it became available, yet Sunnyvale has had little time to digest the massive proposal and analyze its potential impacts on the implementation of the CTR. We suggest that most other California dischargers are in the same position and we strongly urge the Agency to reconsider its unfair and probably illegal decision to provide only a few days to assess and comment on what amounts to a joint promulgation by EPA and the State.

Response to: CTR-021-001

In response to the comment requesting an extension of the comment period, please refer to response to CTR-001-001.

Comment ID: CTR-025-006a
Comment Author: Metro. Water Dist. of So. Cal.
Document Type: Water District
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: B Comment Period
References:
Attachments? Y
CROSS REFERENCES C-16

Comment: Some of the concerns noted above could be addressed through the implementation provisions of the CTR. As you know, the State Water Resources Control Board has just made available for public review the Proposed Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California (Proposed ISWP/EBEP Policy), the implementing document for the CTR. Because of the length of the document (several hundred pages) and the fact that it has only

recently become available, there has been insufficient time for thorough review. Yet, this document is crucial to understanding the practical impact of the CTR.

Metropolitan strongly requests that U.S. EPA extend the comment period on the CTR to December 10, 1997, the end of the comment period for the Proposed ISWP/EBEP Policy. This would allow drinking water suppliers and others affected by the CTR to evaluate the CTR in the context of its implementation. Without workable implementation provisions, the operational and economic impacts on drinking water suppliers could be significant and may need to be taken into account in the CTR. If the comment period is not extended, we ask that U.S. EPA fully consider the impacts of the freshwater aquatic life criteria on the operation and maintenance activities of drinking water suppliers and the effect on water reclamation activities and to modify the CTR, as necessary, so that these activities can continue to be undertaken in an economically feasible manner.

The CTR forms the backbone of the water quality regulatory process and Metropolitan urges U.S. EPA to review the proposed criteria in light of regulatory requirements of the California/Federal SDWA and the operating and maintenance requirements of drinking water suppliers. If you have any questions regarding Metropolitan's comments, please feel free to call Marcia Torobin of my staff at (213) 217-7830.

Response to: CTR-025-006a

In response to the comment requesting an extension of the comment period, please refer to response to CTR-001-001. In response to the comment concerning the CTR's impact on drinking water suppliers, EPA notes that the criteria in the CTR do not impose any cost on anybody or entity. It is only when they are implemented through the State's process that economic impacts may be felt. The CTR's criteria legally apply only to water quality-based effluent limits in NPDES permits. The State on its own accord may apply the water quality criteria in other contexts and/or in other programs, and those applications may cause economic impacts.

Comment ID: CTR-031-008a
Comment Author: Fresno Metro. Flood Ctrl Dist.
Document Type: Flood Ctrl. District
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: B Comment Period
References: Letter CTR-031 incorporates by reference letter CTR-027
Attachments? N
CROSS REFERENCES V

Comment: d. The proposed CTR and the recently released proposed State Implementation Plan must be fully integrated, internally consistent, and their combined effect thoroughly assessed. However, EPA has allowed only one week of overlap between the proposals for stakeholder review.

The EPA concedes within the proposed CTR that the criteria themselves lack substance without the corresponding implementation measures. EPA also acknowledges that the economic impact of the CTR can not be fully evaluated without consideration of the ISWP. However, the EPA can not simply abdicate its responsibility to assess the impact of its proposal, nor can it expect stakeholders to accept the

proposed CTR without full understanding of its implementation.

All stakeholders require the opportunity to evaluate the proposed CTR and Implementation Plan together as a comprehensive, cohesive body of regulation.

Response to: CTR-031-008a

In response to the comment requesting an extension of the comment period, please refer to response to CTR-001-001.

Comment ID: CTR-034-001
Comment Author: SCAP
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: B Comment Period
References: Letter CTR-034 incorporates by reference letter CTR-035
Attachments? N
CROSS REFERENCES

Comment: The Southern California Alliance of Publicly Owned Treatment Works, or SCAP, is pleased to submit comments to the Environmental Protection Agency (EPA) regarding the Proposed Rule Regarding Water Quality Criteria for Toxic Pollutants for California (known as the California Toxics Rule, or CTR) SCAP's members include 47 public agencies that provide wastewater treatment services in Southern California.(*1) Collectively, our member agencies serve over 16 million residents of Southern California. Our member agencies range in size from very small to very large, and include wastewater treatment facilities that discharge to inland surface waters, bays and estuaries, and the ocean. Most of our members are also involved in water reclamation activities. We appreciate the opportunity to comment on the proposed California Toxics Rule.

As noted in SCAP's testimony at EPA's public hearing held on September 18, 1997 in Los Angeles, we would like to request that EPA re-open the comment period on the CTR. We would, like the opportunity to more fully review the proposed rule and supporting documentation, and believe that the extra time would afford us the opportunity to develop additional meaningful comments on the proposed regulation and its potential impacts on the POTW community in southern California.

(*1) SCAP's members are located in the following counties: Santa Barbara, Ventura, Los Angeles, San Bernardino, Riverside, Orange, and San Diego

Response to: CTR-034-001

In response to the comment requesting an extension of the comment period, please refer to response to CTR-001-001.

Comment ID: CTR-035-001

Comment Author: Tri-TAC/CASA
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: B Comment Period
References:
Attachments? N
CROSS REFERENCES

Comment: We are writing on behalf of Tri-TAC and the California Association of Sanitation Agencies (CASA), which are California-based organizations comprised of members from public agencies responsible for wastewater treatment. Tri-TAC is an advisory group which includes representatives from CASA, the California Water Environment Association, and the League of California Cities. CASA is comprised of over 80 agencies responsible for the operation of publicly owned treatment works (POTWs). The constituency base for Tri-TAC and CASA encompasses most of the sewered population of California.

We have reviewed the draft rule containing proposed water quality criteria for toxic pollutants for California ("California Toxics Rule" or "CTR") that was published in the Federal Register on August 5, 1997. We have numerous specific comments on the proposed rule. Our specific comments are contained in two attachments. Attachment 1 contains our comments on specific sections of the draft regulation and the Economic Analysis. Attachment 2 is a critique of the Economic Analysis prepared by M.Cubed, a resource economics consultant to Tri-TAC, CASA, the Southern California Alliance of POTWs (SCAP), and the Bay Area Dischargers Association (BADA). We would like to highlight several priority concerns below.

First, we would like to reiterate our previous requests (see letters of July, 21, 1997 and August 12, 1997) that EPA reopen the comment period for the proposed rule in order to facilitate a more complete review by the public, and in particular, by those in the POTW community. EPA's own analysis shows that POTWs are the sector most affected by the rule (according to the Preamble. POTWs will incur 67 percent or 96 percent of costs under the low and high cost scenarios, respectively) (62 Fed. Reg. 42189). We believe that it is common practice for the Agency to provide 90 days -- or even longer -- for comment periods on proposed rules, particularly if there is no court order dictating a promulgation schedule (and we are not aware of any court decision requiring a specific schedule for promulgation of the CTR). It is our understanding, for instance, that EPA provided a 150-day comment period for the Great Lakes Initiative in 1993.

In addition, as we noted in our previous letters, we understand that EPA and the State Water Resources Control Board (SWRCB) are promulgating the criteria and Statewide Implementation Policies in a collaborative manner. We respectfully request that you provide an extension in order to facilitate a more complete review of the SWRCB's Draft Implementation Policy, which was released on September 12. Because of the impending deadline for comment on the CTR, we have not had time to conduct more than a cursory review of the SWRCB's proposal. Therefore our comments by and large do not take into account the draft Implementation Policy of the SWRCB, which may after our interpretation of some aspects of the CTR.

Further, we believe that EPA has an obligation under Section 6(a) of Executive Order 12866, which requires all federal agencies, including EPA, to provide a "meaningful opportunity to comment on any

proposed regulation, which in most cases should include a comment period of not less than 60 days." (emphasis added). While we believe that the CTR is a "significant regulatory action," the comment period requirement applies even if EPA does not agree. The Agency is also required under the Unfunded Mandates Reform Act of 1995 (2 U.S.C.A. 1511 et. seq.) to provide "meaningful and timely review" by small governments. Aside from the fact that EPA has not provided the minimum of 60 days on the proposed CTR itself, the State Water Resource Control Board did not make its proposed implementation plan (the "State Proposal") available until September 12 (with effective distribution delayed for several days), which means that the public will have a period of less than two weeks to review the State Proposal, relate its provisions to the proposed CTR and formulate comments. This is obviously an inadequate time period in which to review a package of approximately 200 pages, which contains many proposals on a variety of complex matters which could substantially alter the potential impacts of the CTR.

We believe that the State Proposal is an integral part of the CTR; this belief is supported by the dozens of references to the future exercise of regulatory authority by the State of California scattered throughout the Preamble to the CTR (see, for instance, pp. 42173, 42174, and 42185, as well as numerous references in the Economic Analysis). The EPA even concedes (at p. 42188): "A more precise measure of costs and benefits may not be known until the State adopts its implementation provisions." In short, the CTR may have many significant impacts on the regulated community, the nature of which are dependent upon the contents of the State Proposal, and yet EPA is not willing to give the affected community the time to analyze and comment meaningfully upon the EPA rule, as proposed to be implemented by the State. This is, we believe, a violation of the Executive Order and the Unfunded Mandates Reform Act. We do not believe that EPA can justify its comment deadline by the requirement of Section 303(c)(4) to promulgate the final rule within 90 days after the proposal, since EPA has already signaled its Intention to take longer than 90 days to finalize the rule. EPA thus has no obvious reason to object to allowing additional time for review of the CTR nor has EPA offered any reasonable explanation for its lack of compliance with Executive Order 12866 and the Unfunded Mandates Reform Act.

Response to: CTR-035-001

In response to the comment requesting an extension of the comment period, please refer to response to CTR-001-001. In response to the comment concerning the Great Lakes Initiative (GLI), the GLI was a much more complex rulemaking than the CTR. The GLI applied to eight states and promulgated water quality criteria and many implementation procedures. In contrast, the proposed CTR promulgated criteria for only one state and had only one implementation procedure - a compliance schedule provision. The proposed CTR was not substantially different from California's prior law or the National Toxics Rule. Although the GLI comment period may have been substantially longer, the complexity of the rule was much greater, warranting the longer time frame. EPA's usual comment period is 45 days; EPA extended this to over 50 days for the proposed CTR to ensure that a reasonable overlap of time existed with the comment period for the State's proposed implementation plan.

In response to the comment concerning Executive Order (E.O.) 12866 and the Unfunded Mandates Reform Act, each of which discusses comment periods for proposed rulemaking activities, see the preamble to the final rule. EPA believes that over 7 weeks to review and comment on this proposed straightforward and basic water quality rule was adequate, especially because this rule was not substantially different from California's prior law or the National Toxics Rule. Although E.O. 12866 states that in most cases, agencies should afford a comment period of not less than 60 days, in this case, EPA provided 52 days because it thought this period adequate (for reasons stated above) and because EPA had a statutory deadline to promulgate 90 days after proposal.

Comment ID: CTR-037-004
Comment Author: Hampton Roads Sanitation Dist.
Document Type: Sewer Authority
State of Origin: VA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: B Comment Period
References:
Attachments? N
CROSS REFERENCES

Comment: 4. EPA has not provided sufficient time to review and comment on all of the changes that it is making in various water quality criteria. Only 7 weeks were provided to comment on over 20 different criteria, when EPA is providing almost 9 weeks to comment on one criterion (TBT, Aug. 7 - Oct. 6, 1997). This magnitude of change requires at least a 180 day comment period. Therefore the comment period should be extended, at a minimum, to February 1, 1998.

Response to: CTR-037-004

In response to the comment requesting an extension of the comment period, please refer to response to CTR-001-001.

Comment ID: CTR-038-001
Comment Author: Sonoma County Water Agency
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: B Comment Period
References:
Attachments? Y
CROSS REFERENCES

Comment: 1. The deadline for submission of comments should be extended at least 60 days. This is necessary to allow a more detailed review of the rule and its impacts on the District, especially in light of the recent release of the Draft State Policy for Implementation of Toxics Standards.

Response to: CTR-038-001

In response to the comment requesting an extension of the comment period, please refer to response to CTR-001-001.

Comment ID: CTR-041-001
Comment Author: Sacramento Reg Cnty Sanit Dist
Document Type: Sewer Authority

State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: B Comment Period
References:
Attachments? N
CROSS REFERENCES

Comment: The Sacramento Regional County Sanitation District (District) appreciates the opportunity to submit these comments on the proposed California Toxics Rule (CTR). The District provides wastewater treatment service to approximately one million people in the Sacramento metropolitan area. The Sacramento Regional Wastewater Treatment Plant (SRWTP) discharges approximately 160 million gallons per day of treated wastewater to the Sacramento River.

Our response has been limited due to the limited comment period. We are also concerned about not having time to analyze the CTR with the State Water Resources Control Board's draft policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California which was released on September 12. It is essential that sufficient time is provided to conduct a detailed review of the CTR and to assess its impact on the draft implementation policy by the State. As we have previously requested, the comment period should be extended.

Response to: CTR-041-001

In response to the comment requesting an extension of the comment period, please refer to response to CTR-001-001.

Comment ID: CTR-043-001
Comment Author: City of Vacaville
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: B Comment Period
References:
Attachments? Y
CROSS REFERENCES

Comment: Our comments on the proposed CTR are as follows:

1. The deadline for submission of comments should be extended at least 60 days. This is necessary to allow a more detailed review of the rule and its impacts on the City, especially in light of the recent release of the Draft State Policy for Implementation of Toxics Standards.

Response to: CTR-043-001

In response to the comment requesting an extension of the comment period, please refer to response to CTR-001-001.

Comment ID: CTR-044-001
Comment Author: City of Woodland
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: B Comment Period
References:
Attachments? Y
CROSS REFERENCES

Comment: The City of Woodland appreciates the opportunity to submit these comments on the proposed California Toxics Rule (CTR). We would appreciate the opportunity to provide additional comments based on the draft implementation policy recently released by the State. This letter summarizes the comments based on our review to date.

Response to: CTR-044-001

In response to the comment requesting an extension of the comment period, please refer to response to CTR-001-001.

Comment ID: CTR-044-002
Comment Author: City of Woodland
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: B Comment Period
References:
Attachments? Y
CROSS REFERENCES

Comment: We have reviewed the proposed CTR and offer the following comments:

1. The deadline for submission of comments should be extended at least 60 days. This is necessary to allow a more detailed review of the rule and its impacts on the City, especially in light of the recent release of the Draft State Policy for Implementation of Toxics Standards.

Response to: CTR-044-002

In response to the comment requesting an extension of the comment period, please refer to response to CTR-001-001.

Comment ID: CTR-045-001
Comment Author: Sausalito-Marin Sanitary Dist.

Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/24/97
Subject Matter Code: B Comment Period
References:
Attachments? Y
CROSS REFERENCES

Comment: It is requested that the comment period for the California Toxics Rule (CTR) be reopened. An additional sixty days would allow for a more complete review of the impacts on the District as well as facilitating a more complete review by the public. An extension would also enable a more complete review of the State Water Resources Control Board's Draft Implementation Policy, which is not taken into account in the following comments:

Response to: CTR-045-001

In response to the comment requesting an extension of the comment period, please refer to response to CTR-001-001.

Comment ID: CTR-049-001
Comment Author: Watereuse Assoc. of California
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 09/24/97
Subject Matter Code: B Comment Period
References:
Attachments? N
CROSS REFERENCES

Comment: WateReuse believes that the designation of the relatively short comment period proposed of fifty days does not afford a comprehensive and complete public review of the rule. It is our opinion that should a decision be made to reopen and/or extend the public comment period on this subject, USEPA and the rulemaking process will benefit from the additional input of appropriate and valuable information. This would allow for, and include, a more thorough review and coordination of public comment with the lengthy Draft Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California just released by the State Water Resources Control Board (SWRCB) on September 12, 1997. We therefore would request that the comment period for the draft CTR be reopened and/or extended to reflect the weight of this proposed rule, the impact it will have on all statewide stakeholders, and the need for better coordination of comments with the just released draft state plan.

Response to: CTR-049-001

In response to the comment requesting an extension of the comment period, please refer to response to CTR-001-001.

Comment ID: CTR-052-001
Comment Author: East Bay Dischargers Authority
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: B Comment Period
References: Letter CTR-052 incorporates by reference letters CTR-035 and CTR-054
Attachments? Y
CROSS REFERENCES

Comment: The Authority acknowledges the importance of the CTR and the efforts that went into its creation. EPA has taken several years to prepare the CTR, yet has given the public only a 45 day period in which to develop comments. In addition, the State Water Resources Control Board issued its Draft Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California (Implementation Plan) on September 12, 1997. The Authority received its copy on September 16, 1997. Thus there has been less than two weeks to review both documents to determine the potential impact on the Authority, its member agencies, and the public which they serve. On July 17, 1997, requested an extension of the public comment period, and that request was denied.

In the short time available to review the CTR and the EA, it has been determined that the CTR, as currently proposed, will have tremendous economic impacts on our ratepayers. In addition, it appears that the EA is so seriously flawed from both a cost and benefit perspective, that EPA's justification for promulgating the CTR is seriouslyquestioned. The CTR and the EA briefly discuss "relief options" for dischargers that will be available through the State. We have been so preoccupied with reviewing the CTR that there has been no opportunity to properly review the Implementation Plan. In view of the cost implications, more time is needed to provide adequate review time for the Implementation Plan as it relates to the CTR and the EA. Therefore, I again repeat my request for EPA to reopen the public comment period. It should be reopened through December 10, 1997 to coincide with the comment period for the Implementation Plan.

Response to: CTR-052-001

In response to the comment requesting an extension of the comment period, please refer to response to CTR-001-001.

Comment ID: CTR-052-013
Comment Author: East Bay Dischargers Authority
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: B Comment Period
References: Letter CTR-052 incorporates by reference letters CTR-035 and CTR-054
Attachments? Y
CROSS REFERENCES

Comment: C. RECOMMENDATIONS FOR MODIFICATIONS TO THE CTR AND EA

Reopen the public comment period to coincide with the comment period for the State Implementation Plan, through at least December 10, 1997.

Response to: CTR-052-013

In response to the comment requesting an extension of the comment period, please refer to response to CTR-001-001.

Comment ID: CTR-054-001
Comment Author: Bay Area Dischargers Assoc.
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: B Comment Period
References:
Attachments? Y
CROSS REFERENCES

Comment: The comment period should be extended to 90 days. The rule is critical to California and it is essential that all parties have ample time to review it in detail and to assess its impact based on the draft implementation policy recently released by the State. There is no reason to rush the final version of the rule.

Response to: CTR-054-001

In response to the comment requesting an extension of the comment period, please refer to response to CTR-001-001.

Comment ID: CTR-056-001
Comment Author: East Bay Municipal Util. Dist.
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/22/97
Subject Matter Code: B Comment Period
References: Letter CTR-056 incorporates by reference letter CTR-054
Attachments? N
CROSS REFERENCES

Comment: First, like many other agencies submitting public comment, EBMUD requests that EPA give serious consideration to reopening the comment period for the CTR to provide affected dischargers sufficient time to conduct a thorough review of the proposed rule. This is especially of concern to the EBMUD in the context of having to also review the recently published, "Policy for Implementation of

Toxics Standards for Inland Surface Waters and Enclosed Bays, and Estuaries of California" and "Functional Equivalent Document" [September 11, 1997]. For POTWs, the only way to completely evaluate the regulatory and economic impacts of the CTR is to review both documents together. Because of the limited time in which to conduct such a review, and in recognition that EPA has provided extensions for past rulemaking (e.g. a 150-day comment period for the Great Lakes Initiative in 1993), this request is reasonable and will result in a more complete review by the public.

Response to: CTR-056-001

In response to the comment requesting an extension of the comment period, please refer to response to CTR-001-001 and CTR-035-001.

Comment ID: CTR-057-002
Comment Author: City of Los Angeles
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: B Comment Period
References:
Attachments? N
CROSS REFERENCES

Comment: We also wish to emphasize the need for additional time to review the proposed Rule in light of the State Water Resources Control Board's (SWRCB) Draft Implementation Policy for Toxics Standards, which was released for general distribution less than two weeks ago. Because these proposed plans involve complicated issues that may significantly increase our treatment costs, and because we have not had sufficient time to review the State's draft document, we may submit additional comments based on further analysis of the CTR as it relates to the SWRCB's September 12, 1997 draft document.

Response to: CTR-057-002

In response to the comment requesting an extension of the comment period, please refer to response to CTR-001-001.

Comment ID: CTR-058-002
Comment Author: Western States Petroleum Assoc
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: B Comment Period
References:
Attachments? Y
CROSS REFERENCES

Comment: We are also deeply concerned that EPA has given a relatively short comment period on this very lengthy and complex rulemaking. EPA has taken years to develop these rules. We see no reason for EPA's failure to grant an additional 30 days for comments on this important rule since the promulgation and implementation of this proposal is many months away, and considering that stakeholders have had only a few days to obtain and consider the state's implementation policy which is a parallel rulemaking.

Response to: CTR-058-002

In response to the comment requesting an extension of the comment period, please refer to response to CTR-001-001.

Comment ID: CTR-059-003
Comment Author: Los Angeles County Sanit. Dist
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: B Comment Period
References: Letter CTR-059 incorporates by reference letter CTR-035
Attachments? Y
CROSS REFERENCES

Comment: The Sanitation Districts would greatly appreciate additional time to review the proposed rule. As discussed above, the rule will clearly have significant impacts on our facilities and on the residents and businesses in our service area, as well as on numerous other POTWs and local governments in California. While EPA has minimized the significance of the rule in its analysis, the bottom line is that the rule will promulgate some 190 water quality criteria for California for about 70 different pollutants. While a few of these criteria have previously been promulgated by EPA through the 1992 National Toxics Rule (NTR), approximately 70 of them have been recalculated, modified, or added by EPA since the 1992 NTR, To adequately review these changes requires a great deal of time and effort, especially since only a few of the changes are discussed in the Preamble and many of the supporting documents cannot be readily accessed outside of EPA. Therefore, the Sanitation Districts respectfully request that EPA provide at least 30 additional days for public review and comment.

Response to: CTR-059-003

In response to the comment requesting an extension of the comment period, please refer to response to CTR-001-001. In response to the comment concerning records, a complete record of supporting documents is available at the U.S. EPA Region 9 office in San Francisco, and many of the important documents are available at the U.S. EPA Headquarters Office in Washington, D.C. The availability of these documents was published on the first page of the preamble to the proposed CTR.

Comment ID: CTR-061-004
Comment Author: G. Fred Lee & Associates
Document Type: Academia
State of Origin: CA
Represented Org:

Document Date: 09/25/97
Subject Matter Code: B Comment Period
References:
Attachments? Y
CROSS REFERENCES

Comment: While I do not know how long it would take the US EPA to conduct the required analyses of the urban stormwater runoff costs and real water quality benefits, it would seem appropriate that taking a few months to accomplish this could, in the long term, represent a time and resource savings in terms of ultimately correcting the significant technical problems that exist today in regulating urban stormwater runoff. I recommend the following:

Urban stormwater dischargers as well as other interested parties should be provided a several-month period during which a preliminary assessment of the potential costs and water quality benefits associated with having to meet CTR criteria as standards in the receiving waters for stormwater runoff of concern to the discharger, is conducted and reported to US EPA Region 9.

The US EPA should take several months to develop an amended draft CTR that provides a reliable economic analysis of costs and potential benefits covering the current regulatory approach for regulating chemical constituents urban stormwater runoff which involves a ratcheting down of BMPS to achieve the ultimate goal of only one exceedance of a water quality standard every three years in the receiving waters for stormwater runoff.

The public should be given a two-month period during which to review and comment on the adequacy of the US EPA's economic analysis of costs and benefits of achieving the currently mandated goal of using CTR criteria as standards for receiving waters for regulated urban stormwater runoff.

Adoption of this approach will send a clear signal to the public that the US EPA is finally willing to meaningfully address the heart of the urban wet-weather runoff water quality management problem. With the Agency's, for the first time, reliably developing information on costs and true water quality benefits, the public, Congress, regulators and the regulated will begin to understand the need to change how urban and highway stormwater runoff is regulated to protect the designated beneficial uses of waterbodies without significant unnecessary expenditures for chemical constituent control.

Response to: CTR-061-004

See response to CTR-013-003.

Comment ID: CTR-065-001
Comment Author: Environmental Health Coalition
Document Type: Environmental Group
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: B Comment Period
References:
Attachments? N
CROSS REFERENCES

Comment: Environmental Health Coalition (EHC) has not yet fully reviewed the proposed California Toxics Rule (CTR). We were unable to successfully download the document and therefore have not been able to conduct a full- review on the proposed rule in time to meet the comment period deadline. We request additional time to-comment but will make our comments based on limited review today.

Response to: CTR-065-001

In response to the comment requesting an extension of the comment period, please refer to response to CTR-001-001.

Comment ID: CTR-066-001
Comment Author: Delta Diablo Sanitation Dist.
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: B Comment Period
References:
Attachments? N
CROSS REFERENCES

Comment: The District has done its best to stay up-to-date on happenings surrounding the CTR and have attempted to complete our review of the proposed rulemaking. However, given the nature of this rulemaking and the companion pieces currently being pursued by the State Water Resources Control Board, it is practically impossible for us to give you anything more than preliminary comments on the CTR. Extensive work has been done by your agency to fill the void left by the litigation that overturned the State Board's rulemaking, and that has resulted in a significant period of time for both your staff and others to complete this rulemaking. It is our belief that you should allow adequate time for medium-sized agencies such as ours to be able to hire consultants or other technical professionals to assist us in this very important rulemaking. In addition, the information related to the economic analysis associated with this is difficult at best and we have not been able to hire anyone to assist us in completing our evaluation. Consequently, we would request a significant extension of either 90 or 150 days to allow us to complete our analysis. We will also be preparing our NPDES permit renewal request in the next six months and expect that many of the issues that will come out of our review of the CTR will relate directly to our activities on the permit. As a consequence, we would request that this extension in time be allowed for all agencies in the state.

The District fully supports EPA and the State Water Resources Control Board (SWRCB) program to promulgate both the criteria and statewide Implementation Policies in the collaborative manner currently being approached. However, because of the late release of the Implementation Policy by the state, we are not able to have reviewed both that policy and the CTR for conformance and detail. We have only had a short 14 days to complete this analysis and that just has not been adequate to complete the response. We believe that the state's comment period lasting until December, 1997, is far more equitable and reasonable given the substantial nature of the criteria being established. We would further request that EPA and SWRCB give serious consideration to establishing a blue ribbon technical committee to assist with this collaborative effort so that concerns and needs of the regulated community can be thoroughly considered so that there will be broad public acceptance of the results of this most important work.

Response to: CTR-066-001

In response to the comment requesting an extension of the comment period, please refer to response to CTR-001-001. In response to the comment concerning the blue ribbon technical committee, the State, during its redrafting process of the implementation plan, convened numerous task force groups with a number of different stakeholder representatives on each task force, to solicit comments and ideas concerning the issues. EPA was fully represented on each task force, and listened to all comments concerning the State's water quality control plans. EPA hopes the commenter had the opportunity to participate in these task force groups.

Comment ID: CTR-067-001
Comment Author: Ojai Valley Sanitary District
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: B Comment Period
References:
Attachments? N
CROSS REFERENCES

Comment: Having just completed such a costly time consuming project, OVSD requests that EPA extend the comment period on the CTR. Allowing an extended comment period would provide for a more thorough review of the proposed rule and supporting documentation, and allow OVSD .adequate time to develop specific comments on the rule relative to its impact on our new treatment plant and our residents. In addition, an extended comment period would allow EPA the opportunity to work more closely with the State Water Resources Control Board (SWRCB) in developing simultaneous comment periods and joint final promulgation, since EPA acknowledges that the impacts of the CTR criteria depend greatly on the State's approach to implementation. This would provide the added benefit that a more streamlined and effective CTR and Statewide Implementation Policy be developed, potentially reducing the resistance by dischargers upon promulgation and implementation. Thus, OVSD asks that EPA extend the comment period until December 10, 1997, the SWRCB's public comment deadline, or at a minimum, for 30 (thirty) days.

Response to: CTR-067-001

In response to the comment requesting an extension of the comment period, please refer to response to CTR-001-001.

Comment ID: CTR-068-001
Comment Author: California Chamber of Commerce
Document Type: Industry Assoc.
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: B Comment Period
References:

Attachments? N
CROSS REFERENCES

Comment: We find ourselves in a quandary over the timeline for commenting on this proposed rulemaking package. The Environmental Protection Agency is allowing only 50 days for public comment on a proposal whose complexity really warrants more time. A public comment period spanning the summer months further exacerbates the situation by ensuring that only a minimal staff would be available to review the proposal.

We are further concerned that our members have had virtually no time to obtain the state's proposed implementation policy, which is parallel rulemaking to this one, as it has just been released for public review. Given the potential enormous impacts of this rulemaking, it is not unreasonable to suggest extending the deadline for comments.

The California Chamber of Commerce, on behalf of its members, requests that you consider extending the deadline for comments for at least another 30 days and preferably 60 days to accommodate the business community's concerns on this important package.

Response to: CTR-068-001

In response to the comment requesting an extension of the comment period, please refer to response to CTR-001-001. In response to the comment that since the comment period spanned the summer months which exacerbated the situation since minimal staff were available, EPA had no intention of proposing during aninconvenient time period. This was the time period after which the Agency obtained it internal administrative and OMB approval to propose the rule. EPA notes that the comment period ran through September 26, 1997, a month in which most people have returned from summer vacations.

Comment ID: CTR-069-001
Comment Author: CA Bus Prop Ass & Bldg Ind Ass
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: B Comment Period
References:
Attachments? N
CROSS REFERENCES

Comment: In light of the recent release of the State Water Resources Control Board Proposed Policy for Implementation of Toxic Standards for Inland Surface Waters, Fnclosed Bays, and Estuaries of California, CBIA and CBPA request that EPA extend the comment period on its proposed rule for at least an additional 30 days in order for CBIA and CBPA to analyze the proposed rule in relation to the state's proposed implementation policy. Of primary concern to CBIA and CBPA is how the proposed rule in concert with the state's proposed implementation policy will affect the construction stormwater permit process.

Response to: CTR-069-001

In response to the comment requesting an extension of the comment period, please refer to response to CTR-001-001.

Comment ID: CTR-070-001
Comment Author: Sewerage Agency of Sthrn Marin
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/22/97
Subject Matter Code: B Comment Period
References:
Attachments? Y
CROSS REFERENCES

Comment: Request to extend comment period Initial review indicates that the proposed rule will have a significant impact on SASM. An additional 60 days is requested to allow for a complete review. Extension of the comment period will also help to facilitate a more complete review of the companion State Water Resources Control Board's Draft implementation Policy.

Response to: CTR-070-001

In response to the comment requesting an extension of the comment period, please refer to response to CTR-001-001.

Comment ID: CTR-081-001
Comment Author: West County Agency
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: B Comment Period
References:
Attachments? N
CROSS REFERENCES

Comment: * The WCA strongly requests that the comment period be extended or reopened. This is appropriate to facilitate a more complete review by the public, particularly other POTWs. In addition, our agency needs additional time to review SWRCB's State Implementation Policy before the full impact of the CTR can be estimated. It is our understanding that a 90-day comment period is common. We recommend the comment period be extended to 90 days.

Response to: CTR-081-001

In response to the comment requesting an extension of the comment period, please refer to response to CTR-001-001.

Comment ID: CTR-082-001
Comment Author: City of Burbank
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/24/97
Subject Matter Code: B Comment Period
References:
Attachments? N
CROSS REFERENCES

Comment: The subject rule has a significant impact on our facility discharge and the citizens of the City. We therefore present the following comments for your consideration to re-open the comment period for this rule in order to facilitate a more complete review by public and in particular by those in the POTW community:

* Even though the EPA is not obligated to provide more than 30 days for public comment, it has been common practice for the agency to provide comment periods of 90 days or longer for significant rules. As an example, your agency provided a 150 day comment period for Great Lakes Initiative in 1993.

* The request for extension of the comment period for this rule is really necessary and justified to facilitate a complete review of the State Water Resources Control Board's (SWRCB's) Draft Implementation Policy which was released on September 12, 1997. As the USEPA and STWRCB are simultaneously promulgating the CTR and Criteria and Statewide Implementation Policy, the POTW's did not have adequate time to review the CTR, State Implementation Policy and supporting discussion which are quite lengthy and voluminous. As a result any comments we have, by and large don't take into account the draft implementation policy.

Response to: CTR-082-001

In response to the comment requesting an extension of the comment period, please refer to response to CTR-001-001 and CTR-035-001.

Comment ID: CTR-083-001
Comment Author: Fairfield-Suisun Sewer Dist.
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: B Comment Period
References: Letter CTR-083 incorporates by reference letters CTR-035 and CTR-054
Attachments? N
CROSS REFERENCES

Comment: The District believes that Region IX has been remiss in its failure to allow sufficient time to comment on this complex regulation. By adhering to minimum legal requirements and denying

additional time for review and comment, Region IX will not benefit from a comprehensive review by affected parties that could lead to a more effective regulation.

Response to: CTR-083-001

In response to the comment requesting an extension of the comment period, please refer to response to CTR-001-001.

Comment ID: CTR-085-001
Comment Author: Camarillo Sanitary District
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/24/97
Subject Matter Code: B Comment Period
References:
Attachments? N
CROSS REFERENCES

Comment: The District is an active member of both the California Association of Sanitation Agencies (CASA) and the Southern California Alliance of Publicly Operated Treatment Works (SCAP) and vAH be reiterating several of the comments of these organizations on the California Toxics Rule, which the District fully supports:

The District requests that the EPA reopen the comment period for the proposed California Toxics Rule in order to facilitate a more complete review by the public and in particular, by those in the Publicly Operated Treatment Works (POTW) community. While the District realizes that the EPA is not obligated to provide more than 30-days for public comments, the Agency has provided comment periods of 90 days or longer for significant rules. For example, the EPA provided a 150-day comment period for the Great Lakes Initiative in 1993.

Response to: CTR-085-001

In response to the first comment requesting an extension of the comment period, please refer to response to CTR-001-001 and CTR-035-001.

Comment ID: CTR-085-002
Comment Author: Camarillo Sanitary District
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/24/97
Subject Matter Code: B Comment Period
References:
Attachments? N
CROSS REFERENCES

Comment: The District is an active member of both the California Association of Sanitation Agencies (CASA) and the Southern California Alliance of Publicly Operated Treatment Works (SCAP) and vAH be reiterating several of the comments of these organizations on the California Toxics Rule, which the District fully supports:

The District also believes that an extension of the comment period is justified to facilitate a more complete review of the State Water Resources Control Board's (SWRCB) Draft Implementation Policy, which was released on September 12, 1997. It is the District's understanding that the EPA and the SWRCB are promulgating the criteria and statewide implementation policies in a collaborative manner and the extension would allow for more complete review of and comments on the California Toxics Rule, the Implementation Policy and supporting documents.

Response to: CTR-085-002

In response to the second comment requesting an extension of the comment period, please refer to response to CTR-001-001.

Comment ID: CTR-089-002
Comment Author: Las Virgenes Mncpl Water Dist.
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/24/97
Subject Matter Code: B Comment Period
References:
Attachments? N
CROSS REFERENCES

Comment: While the draft regulations demonstrate clear progress on these and other issues, there remain some unresolved problems that could compromise our ability to serve our customers. We offer these comments in the hope of minimizing those potential impacts.

Adequacy of the 30-Day Public Comment Period

The CTR is a major revision of the regulations governing the discharge of toxic pollutants throughout the state. While not required by law, we respectfully request that the USEPA extend the draftt CTR public comment period to at least 90 days. We believe this is justified and necessary given the scope, length, and technical content of the proposed regulations. In particular, due to the limited time to review these regulations, we were unable to closely examine the proposed State Implementation Policy (SIP), which provides detailed guidance to the state's Regional Water Quality Control Boards, which must enforce these new regulations.

SUMMARY

We hope these comments will help to make the final CTR a better document and a better law. Overall, the draft CTR reflects substantial thought and effort on how best to implement the Clean Water Act's mandate of reducing pollutant discharges to the nation's receiving waters. The draft CTR clearly advances this goal, but our hope is that those agencies and parties most-directly affected by it will be

allowed additional time to review it to their satisfaction. We strongly encourage a more detailed assessment of the actual economic impacts that could result from these new regulations. The ability of public utilities to fund new projects has never been louver, and every rate increase requires sound and well-founded justification. No ratepayer should be asked to shoulder the cost of new regulations without a clear and detailed explanation of what it is going to cost, and what benefits will result. State mandated costs require state funding.

We appreciate this opportunity to comment on the draft California Toxics Rule. Please do not hesitate call myself or Dr. Randal Orton in our Resource Conservation and Public Outreach Department to tell us how we can help you further.

Response to: CTR-089-002

In response to the comment requesting an extension of the comment period, please refer to response to CTR-001-001.

Comment ID: CTR-090-001
Comment Author: C&C of SF, Public Utl. Commis.
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: B Comment Period
References: Letter CTR-090 incorporates by reference letters CTR-035 and CTR-054
Attachments? Y
CROSS REFERENCES

Comment: The proposed rule and the accompanying economic analysis contain a significant amount of highly technical and complex information. We appreciate the time and effort that went into this proposal. However, we are extremely disappointed that EPA is unwilling to allow a longer review time, especially considering the delay in releasing the State Implementation Policy. We join other who have already requested an extension of the comment period.

Response to: CTR-090-001

In response to the comment requesting an extension of the comment period, please refer to response to CTR-001-001 and CTR-035 -001.

Comment ID: CTR-094-001
Comment Author: SAIC
Document Type: Engineering Firm
State of Origin: CA
Represented Org:
Document Date: 09/30/97
Subject Matter Code: B Comment Period
References:
Attachments? N

CROSS REFERENCES

Comment: SAIC has reviewed the draft rule proposing water quality criteria for toxic pollutants for California (California Toxics Rule) that was published in the Federal Register on August 5, 1997 and believe that the breadth and complexity of the draft CFR and the accompanying economic impact analysis warrant an extension of the comment period for an additional 30 days.

SAIC is a diversified, scientific, engineering, research, and development company that provides technical and management services and products to private industry and the Federal government. SAIC was organized in 1969 to apply the techniques successfully employed in high technology areas to major national and international programs. Over the past 28 years, SAIC's team of professionals has grown from a handful to more than 22,000 employees throughout 250 locations in the United States and abroad.

SAIC is making this request to ensure that sufficient time is available to the public to coordinate the review of the CFR with an evaluation of the State of California's anticipated proposal of implementation policies for the criteria, which is scheduled to be released September 12, 1997. Providing overlapping comment periods will allow interested parties to understand the full contents and implications of the regulations, which are being partially adopted by the US EPA and partially developed by the State in 303 (c)(2)(b) of the Clean Water Act.

If you have any questions, please call me at 650-604-0924. Thank you for your consideration of our request.

Response to: CTR-094-001

In response to the comment requesting an extension of the comment period, please refer to response to CTR-001-001.

Comment ID: CTR-096-005
Comment Author: City of Modesto
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: B Comment Period
References:
Attachments? N
CROSS REFERENCES

Comment: Thank you for the opportunity to comment on the proposed California Toxics Rule. The City's comments are related to five main concepts:

5. Additional time is needed to assess the specific impacts that the proposed Rule will have on the City of Modesto system.

Specifically, the City submits the following comments:

H. Although Modesto's wastewater treatment system and storm water disposal system is not entirely

unique to most Central Valley communities, it is one of the more complex systems in the state. It is among the top 20 in size in a state with nearly 500 POTWs. In order to best evaluate the effect of The California Toxics Rule on Modesto, additional comment time is needed. Also, more time is needed to facilitate a more complete review of the State Water Resources Control Board's (SWRCB) draft implementation policy, which was released September 12, 1997. By and large, these comments do not take into account the draft implementation policy of the SWRCB.

Response to: CTR-096-005

In response to the comment requesting an extension of the comment period, please refer to response to CTR-001-001.

Comment ID: CTRE-001-001a
Comment Author: Tri-TAC/CASA
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 07/21/97
Subject Matter Code: B Comment Period
References:
Attachments? N
CROSS REFERENCES V

Comment: We are writing to you on behalf of Tri-TAC and the California Association of Sanitation Agencies regarding the forthcoming publication of the proposed Water Quality Standards for Toxic Pollutants for California ("California Toxics Rule") and release of draft state implementation policies and functional equivalent document. As you are aware, Tri-TAC and CASA have supported the decisions of the U.S. Environmental Protection Agency (EPA) and the State Water Resources Control Board (SWRCB) to eliminate duplication in state and federal water quality rulemaking activities through the pursuit of a collaborative approach. Our understanding is that, through this approach, EPA will adopt water quality criteria for toxic pollutants that will apply in California and the SWRCB will adopt implementation policies that will guide the Regional Water Quality Control Boards in the implementation of those criteria. In a later phase, the SWRCB intends to adopt state criteria that will replace the federal criteria.

We have been informed recently by EPA staff that publication of the draft California Toxics Rule is imminent and is expected to take place by the end of July. According to staff, a 50-day public comment period will be provided. We have heard from SWRCB staff that they plan to release the proposed state implementation policies and FED on September 12. We have asked each agency to provide an overlapping comment period for these draft regulations, and have been informed that the current schedule will provide about one week of overlap, assuming that both agencies release their drafts on schedule. We are quite concerned about this situation in several respects. First, we believe that a one-week overlap does not provide sufficient time for a meaningful review and comparison of the regulations (and comparative analysis of the economic impact analyses, which depend heavily on the implementation policies). We believe that a minimum of 30 days is necessary for the overlap review period, and that the slight delay that this would create for EPA is warranted and would have a negligible impact on the timing of the overall rule promulgation process. Second, we are very concerned about whether the SWRCB will meet its projected release schedule. While we believe that sufficient time has been available to prepare

the draft policies and FED, it is imperative that the SWRCB do everything possible to meet its commitment to move forward in a timely manner, and that any extension of EPA's comment period not be used to adjust the state's schedule. Third, we understand that both EPA and the SWRCB plan to hold public hearings regarding their respective proposals this fall. We believe that it is important that representatives of both agencies attend and participate in the hearings that each agency holds, and that an explanation be provided regarding both the CTR and the implementation policy.

In short, we request that EPA and the SWRCB carefully review their efforts to coordinate both the development and release of the California Toxics Rule and State implementation Policies, and specifically, we request that EPA provide a comment period sufficient to ensure that a 30-day overlap will occur with the SWRCB's release of the FED for the State Implementation Policies. More generally, we hope that both agencies will offer flexibility in the promulgation process so that the various scheduling and review needs can be met. We hope that your respective agencies will continue to move forward with a collaborative rulemaking process, and are concerned that cooperation not break down due to institutional barriers at this point in the process.

Thank you for your consideration of our comments. We would be happy to discuss these issues further at your convenience.

Response to: CTRE-001-001a

In response to the comment requesting an extension of the comment period, please refer to response to CTR-001-001. In response to the comment concerning the coordination of public hearings, the State was invited to speak about its proposed implementation plan at EPA's public hearings on the CTR. Although they did not make any formal presentation, they were available to answer questions and in fact did answer questions posed to them concerning the implementation policy.

Comment ID: CTRE-001-002
Comment Author: Tri-TAC/CASA
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 07/21/97
Subject Matter Code: B Comment Period
References:
Attachments? N
CROSS REFERENCES

Comment: I am writing on behalf of Tri-TAC and the California Association of Sanitation Auencies (CASA), which are California-based organizations comprised of members from public agencies responsible for wastewater treatment. Tri-TAC is an advisory group which includes representatives from CASA, the California Water Environment Association, and the League of California Cities. CASA is comprised of over 85 agencies responsible for the operation of publicly owned treatment works (POTWs). The constituency base for Tri-TAC and CASA encompasses most of the sewered population of California. Representatives of CASA and Tri-TAC have met with EPA staff over the past several years to discuss the development of the proposed rule, and appreciate the Agency's efforts to inform the regulated community about the pending regulation.

We have reviewed the draft rule proposing water quality criteria for toxic pollutants for California ("California Toxics Rule" or "CTR") that was published in the Federal Register on August 5, 1997 and believe that the breadth and complexity of the draft CTR and the accompanying economic impact analysis warrant an extension of the comment period for an additional 30 days. In particular, we are making this request to ensure that sufficient time is available to the public to coordinate the review of the CTR with an evaluation of the State of California's anticipated proposal of implementation policies for the criteria which is scheduled to be released September 12, 1997. Providing overlapping comment periods will allow interested parties to understand the full contents and implications of the regulations, which are being partially adopted by EPA and partially developed by the State in order to achieve full compliance with Section 303(c)(2)(b) of the Clean Water Act.

I would appreciate it if you would notify me at the above address of your decision. Thank you very much for your consideration of our request.

Response to: CTRE-001-002

In response to the comment requesting an extension of the comment period, please refer to response to CTR-001-001.

Comment ID: CTRE-002-001
Comment Author: G. Fred Lee & Associates
Document Type: Academia
State of Origin: CA
Represented Org:
Document Date: 09/18/97
Subject Matter Code: B Comment Period
References:
Attachments? N
CROSS REFERENCES

Comment: I wish to follow up on yesterday afternoon's US EPA Region 9 hearing on the draft California Toxics Rule (CTR) criteria to reinforce the comments made by a number of urban stormwater dischargers about the need to extend the deadline for receipt of written comments. I have been involved in water quality criteria development and implementation since the mid-1960s where I have worked with federal, state and local governmental agencies and/or the regulated community. I find that it would be a serious error on the part of US EPA Region 9 and US EPA headquarters to proceed with the September 26, 1997 deadline for receipt of written comments on the CTR. There are many reasons for providing at least a 30- to 45-day extension of the date by which the written comments should be received. These include the fact that it took the USEPA Region 9 several years to develop the Califoniia Toxics Rule criteria beyond when they were due. To now not grant politically important entities, such as the major urban stormwater dischargers, adequate time to develop the information that needs to be developed and that should have been developed by the US EPA Region 9 as part of promulgating the draft California Toxics Rule would, in my opinion, be viewed as extremely short-sighted on the part of US EPA Region 9 and US EPA headquarters.

Response to: CTRE-002-001

In response to the comment requesting an extension of the comment period, please refer to response to

CTR-001-001.

Comment ID: CTRE-002-005
Comment Author: G. Fred Lee & Associates
Document Type: Academia
State of Origin: CA
Represented Org:
Document Date: 09/18/97
Subject Matter Code: B Comment Period
References:
Attachments? N
CROSS REFERENCES

Comment: As I testified at yesterday's hearing, the issue of urban stormwater runoff water quality management is in chaos. This situation has been well understood for at least five years. While attempts are being made to address these issues through the US EPA headquarters' various wet weather committees, thus far the fudainental issue that was raised yesterday at the hearing by urban stormwater discharger after discharger has not been adequately addressed, i.e. ultimately having to achieve water quality standards based on CTR criteria in the receiving waters for the discharge through ever-increasingly more stringent BMPS. While the proposed CTR does not specify a time period over which the BMP ratcheting-down process will occur, there can be no doubt that this time period will be set by the courts through litigation brought by envirorunental groups who will assert that an NPDES-permitted stormwater discharger is not making adequate progress toward achieving the ultimate goal of only one violation of a water quality standard every three years for regulated constituents. Because of the uncertainty of how the courts will handle this matter, stormwater dischargers could be faced with having to achieve water quality standards in the discharge waters within five to ten years. Clearly there is need to understand the cost and benefits associated with achieving these standards as part of adopting the CTR as it is applied in regulating urban stormwater runoff water quality.

As part of my comments on the significant technical deficiencies in the CTR as drafted, I will be providing a discussion of technical back-up to these issues from the published literature. Many of my papers and reports on this topic are available from my web site (http://members.aol.com/ gfredlee/gfl.htm).

It is my recommendation that US EPA Region 9 and US EPA headquarters should postpone any adoption of the California Toxics Rule until the US EPA properly presents and discusses the potential costs and the potential benefits in terms ofreal improvements in designated beneficial uses of receiving waters that will likely accrue as the result of regulated urban stormwater discharges ultimately having to comply with water quality standards based on CTR criteria. The US EPA Region 9 should allow the starmwater dischargers tlte opportunity to provide information on the cost and benefits arising from applying these criteria to stormwater discharges as required by the Clean Water Act when it becomes clear that BMPs of the type that are readily available today win not eliminate the administrative exceedances ofwater quality standards numerically equal to the aquatic life criteria set forth in the. CTR. After allowing the urban stormwater dischargers to provide this information, the US EPA then, in turn, should develop an economic analysis that rcliably presents and discusses these issues. As I testified, this process is the necessary first step to correcting the significant chaos that now exists in the urban stormwater runoff water quality management field.

While I do not know how long it would take the US EPA to conduct the required analyses of the urban stormwater runoff costs and real water quality benefits, it would seem appropriate that taking a few months to accomplish this could in the long term represent a time and resource saving in terms of ultimately correcting the sigiifflcant technical problems that exist today in regulating urban stomlwater runoff.

I recommend the Following:

* Urban stormwater dischargers as well as other interested parties should be provided a several-month period during which preliminary assessment of the potential costs and water quality benefits associated with having to meet CTR criteria as standards in the receiving waters for stormwater runoff of concern to the discharger is conducted and reported to US EPA Region 9.

* The US EPA should take several months to develop an amended draft CTR that provides a reliable economic analysis and the potential benefits covering the current regulatory approach for regulating chemical constituents in urban stormwater runoff which involves a ratcheting down of BMPs to achieve the ultimate goal of only one exceedance of a water quality standard every three years in the receiving waters for stormwater runoff.

* The public sould be given a two-month period upon which to review and comment on the adequacy ofthe US EPA's economic analysis of costs and benefits of achieving the currently mandated goal of using CTR criteria as standards for receiving waters for regulated urban stormwater runoff.

Adoption of this approach will send a clear signal to the public that the US EPA is finally willing to meaningful address the heart of the urban wet weather problem. With the Agency for the first time reliably developing information on costs and true water quality benefits, the public, Congress, regulators and the regulated will begin to understand the need to change how urban and highway stormwater runoff is regulated to protect the designated beneficial uses of waterbodies without significant unnecessary expenditures for chemical constituent control.

If you have questions on these conunents, please contact me. I hope that those who control US EPA Region 9 activities associated with CTR development will address the highly significant deficiencies that exist now in how US EPA Region 9 and US EPA headquarters developed the draft CTR relative to urban stormwater runoff water quality issues. If I can be of assistance in this matter, please contact me.

Response to: CTRE-002-005

EPA did not include benefits or costs of controlling nonpoint sources or storm water dischargers in its estimates of benefits and costs of the CTR. EPA believes that the final rule will not have a direct effect on sources not permitted under the NPDES program (e.g., nonpoint sources) or NPDES sources not typically subject to numeric water quality-based effluent limits (e.g., wet weather discharges). Any potential indirect effect on nonpoint sources and wet weather discharges, such as runoff from farms, urban areas, and abandoned mines, and contaminated sediment, is unknown at this time. Many of the programs developed to control nonpoint sources and wet weather discharges are already in place. Costs due to these programs have already been incurred or will soon be incurred owing to existing federal, State, and local environmental programs.

EPA also acknowledges that nonpoint sources and wet weather discharges are technically difficult to model and evaluate costs because they are intermittent and highly variable. Nonpoint source and wet weather discharges also occur under different hydrologic or climatic conditions than continuous

discharges from industrial and municipal facilities, which are evaluated under critical low flow or drought conditions. Thus, evaluating agricultural nonpoint source discharges and storm water discharges and their effects on the environment is highly site-specific and data intensive.

See also response to CTR-040-004.

For analysis of the final CTR, EPA updated its Economic Analysis to reflect the most recent data and information for each sample facility and also increased the sample size for minor facilities. Based on this revised analysis, EPA estimated that minor POTWs will incur costs of approximately $5,000 per facility per year under the low cost scenario and $7,800 per facility per year under the high cost scenario. See also response to CTR-058-018.

Comment ID: CTRE-003-001a
Comment Author: Bay Planning Coalition
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 09/09/97
Subject Matter Code: B Comment Period
References:
Attachments? N
CROSS REFERENCES J
R

Comment: The Bay Planning Coalition represents approximately 200 maritime industry, shoreline businesses, local governments and Bay users along the S.F. Bay shoreline and is most significantly affected by the proposed California Toxics Rule. One of our primary interests is the economic analysis which under the EPA's model estimates a range of annual costs of $14.9 to $86.6 million.

We believe the annual costs for implementation of the Rule statewide exceed the EPA estimate range. We are particularly concerned because it appears that the economic impact analysis did not include the costs of compliance for the NPDES stormwater permit applicants. In order for us to provide EPA with sufficient detail on our economic analysis and cost projection as well as the impact of the Rule on small business under the Regtory Flexibility Act, we request an extension of time to respond. A 30-day extension from September 26 to October 27, 1997 would be acceptable. Thank you so much for your consideration.

Response to: CTRE-003-001a

In response to the comment requesting an extension of the comment period, please refer to response to CTR-001-001. In response to the comment concerning the Regulatory Flexibility Act, the proposed CTR did not itself establish any requirements that were applicable to small entities, and thus, the EPA Administrator certified that the proposed rule would not have a significant economic impact on a substantial number of small entities. The final CTR likewise did not establish any requirements that were applicable to small entities and thus, the EPA Administrator certified that the regulation would not have a significant economic impact on a substantial number of small entities. Thus, no initial regulatory flexibility analysis was conducted.

Comment ID: CTRE-003-001b
Comment Author: Bay Planning Coalition
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 09/09/97
Subject Matter Code: B Comment Period
References:
Attachments? N
CROSS REFERENCES B
R

Comment: The Bay Planning Coalition represents approximately 200 maritime industry, shoreline businesses, local governments and Bay users along the S.F. Bay shoreline and is most significantly affected by the proposed California Toxics Rule. One of our primary interests is the economic analysis which under the EPA's model estimates a range of annual costs of $14.9 to $86.6 million.

We believe the annual costs for implementation of the Rule statewide exceed the EPA estimate range. We are particularly concerned because it appears that the economic impact analysis did not include the costs of compliance for the NPDES stormwater permit applicants. In order for us to provide EPA with sufficient detail on our economic analysis and cost projection as well as the impact of the Rule on small business under the Regtory Flexibility Act, we request an extension of time to respond. A 30-day extension from September 26 to October 27, 1997 would be acceptable. Thank you so much for your consideration.

Response to: CTRE-003-001b

EPA's EA, which uses many conservative costing assumptions, indicates that the cost of the State implementing water quality standards based on the proposed criteria in the CTR is likely to be below $100 million per year. Benefits are also estimated to be below $100 million per year. These estimates indicate that the action is not "significant" under E.O. 12866, under the provision concerning annual effects on the economy.

Criteria, by themselves, do not directly impose economic impacts. Criteria are one of three parts of a water quality standard. A water quality standard is comprised of: a criterion, a designated use, and an antidegradation requirement. The CTR promulgates criteria for priority toxic pollutants. When these criteria are combined with State adopted designated uses and antidegradation requirements, water quality standards will be created. When the State implements these water quality standards, costs may be imposed. However, in the spirit of the intent of E.O. 12866, EPA prepared the EA which looks at the costs and benefits of the State's implementation of the resulting water quality standards based on the CTR criteria into the NPDES permit program.

The Unfunded Mandates Reform Act of 1995 (UMRA) in general requires federal agencies to assess the effects of their regulatory actions on State and local governments, and on the private sector. The agency must prepare a written statement including a cost-benefit analysis for actions with a "federal mandate" that may result in expenditures to State and local governments, in the aggregate, or to the private sector of $100 million or more in any one year. The CTR does not contain any federal mandate that may result in expenditures by State and local governments, or the private sector, of $100 million or more in any one

year. The CTR imposes no direct enforceable duties on the State, local or private sector; rather the rule promulgates water quality criteria which, when combined with State-adopted designated uses and antidegradation requirements, will create water quality standards. The CTR does not directly regulate or affect any entity and therefore is not subject to the requirements of UMRA.

The Regulatory Flexibility Act in general requires federal agencies to describe the impact of their regulatory actions on small entities as part of the rulemaking. If the Administrator certifies that the action will not have a significant economic impact on a substantial number small entities, the agency is not required to prepare the analysis. The Administrator certified in the proposed rule, and is certifying again today that the rule will not have a significant economic impact on a substantial number of small entities. EPA's promulgation of water quality criteria will assist the State in establishing water quality standards. The State will, in turn, implement the resulting water quality standards in its water quality regulatory programs such as the NPDES permit program. The State has discretion in deciding how to meet the water quality standards and in developing discharge limits as needed to meet those standards. While the State's implementation of water quality standards based on federally-promulgated criteria may result in new or revised discharge limits being placed on small entities, the criteria or standards themselves to not apply to any discharger, including small entities. Thus, EPA's action today does not impose any of these as yet unknown requirements on small entities.

See also response to CTR-044-045.

Comment ID: CTRE-004-001a
Comment Author: Victor Valley Wastewater Auth.
Document Type:
State of Origin: CA
Represented Org:
Document Date: 09/11/97
Subject Matter Code: B Comment Period
References:
Attachments? N
CROSS REFERENCES G-08

Comment: The Victor Valley Wastewater Reclamation Authority (VVWRA) respectfully requests that the comment period deadline be extended for the California Toxics Rule (CTR). The current comment period deadline is September 26, 1997. We request that the latter deadline be extended for at least 60 days so that we can fully evaluate the potential impact on VVWRA

The reasons for our request are as follows:

1. VVWRA discharges to the Mojave River, which is considered by the Lahontan RWQCB as an impaired waterway. Although portions of the Mojave exhibit year-round surface flow, the River directly above VVWRA does not exhibit consistent surface flow. However, the Lahontan RWQCB considers the Mojave an underflow stream, which is often considered as surface flow. Whether an underflow stream would be considered under the CTR for receiving stream dilution has yet to be determined;

2. It is difficult if not impossible to evaluate the impacts of a proposed regulation without considering the mechanism by which it will be implemented. The SWRCB is not expected to release the

implementation plan until September 12, 1997. Therefore, VVWRA takes exception to the imposition of a regulation with an undefined implementation plan;

3. Because of the latter unknowns and the complexity of the regulation V has not had sufficient time to evaluate the potential economic impacts, if any, of the proposed regulation.

Response to: CTRE-004-001a

In response to the comment requesting an extension of the comment period, please refer to response to CTR-001-001.

Comment ID: CTRE-005-001
Comment Author: Western States Petroleum Assoc
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 09/10/97
Subject Matter Code: B Comment Period
References:
Attachments? N
CROSS REFERENCES

Comment: The Western States Petroleum Association (WSPA) is a trade association, which represents a majority of the petroleum-related interests in the western United States. These interests include production, transportation, refining, and marketing of petroleum and petroleum based products. WSPA appreciates to opportunity to provide comments on the proposed rule regarding "Water Quality Criteria For Toxic Pollutants For California." Upon review, it has become clear that the limited time available for preparing meaningful comments is too short. This is a significant and complex rule development, which will impact our operations. We therefore, would like to request an additional 30 days to review the proposal and provide written comments. These concerns over timing are worsened by the anticipated September 12, 1997, release of the State of California's proposed implementation policies for the criteria. Due to their inter-relationship, it is important that interested parties be given the opportunity to review both of these proposals together.

Response to: CTRE-005-001

In response to the comment requesting an extension of the comment period, please refer to response to CTR-001-001.

Comment ID: CTRE-006-001
Comment Author: County of Los Angeles
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 08/19/97
Subject Matter Code: B Comment Period
References:

Attachments? N
CROSS REFERENCES

Comment: I am writing on behalf of the Sanitation Districts of Los Angeles County regarding the public comment period for the Proposed Rule Regarding Water Quality Criteria for Toxic Pollutants for California, which was published in the Federal Register on August 5, 1997. As noted in the Federal Register notice, the public comment period is scheduled to close on September 26, 1997. The Sanitation Districts requests that EPA extend the comment period for 30 days from that date.

We have reviewed the draft rule, and believe that its importance and complexity warrant an in-depth review, including an assessment of the rule's impacts on the seven water reclamation plants owned and operated by the Districts that will be affected by the rule. In addition, we believe that an extra 30 days is necessary to enable us to review the State of California's anticipated proposal of implementation policies for the criteria, which is not expected to be released until mid-September. As has been discussed with your staff and State Water Resources Control Board staff, we believe that a sufficient overlapping review period is necessary to fiilly implement the collaborative process embarked upon by EPA and the SWRCB last year.

Response to: CTRE-006-001

In response to the comment requesting an extension of the comment period, please refer to response to CTR-001-001.

Comment ID: CTRE-007-001
Comment Author: SCAP
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 08/11/97
Subject Matter Code: B Comment Period
References:
Attachments? N
CROSS REFERENCES

Comment: I am writing on behalf of the Souther California Alliance of Publically Owned Treatment Works (SCAP) to request an extension of the comment period for the proposed rule regarding water quality criteria for toxic pollutants for California (the California Toxics Rule) for 30 days. SCAP is a non-profit organization formed in 1992 to provide a common voice for the Southern California community of municipal nwastewater treatment agencies in expressing our interest in promotng reasonable regulations that are in the public's best interest. We have forty-six member agencias serving a combined population of over 10 million people.

CAP has reviewed the draft rule and believes that an extension of the comment period for an additional 30 days is warranted to ensure that sufficient time is available to review the changes made in the water quality criteria in the CTR from the National Toxics Rule, which was promulgated several years ago. In addition, the extension is necessary to provide sufficient overlap for a meaningful review and comparison of the proposed regulations and the State Water Resources Control Board's draft policies regarding the implementation of the CTR. We understand that the State plans to release proposed policies and draft

Functional Equivalent Document on September 12, 1997. We believe that our comments on the CTR will be more informed if there is an adequate opportunity to review the State's proposal before the close of the federal comment period. Therefore, we request that the comment period be extended until at least October 27, 1997.

Response to: CTRE-007-001

In response to the comment requesting an extension of the comment period, please refer to response to CTR-001-001. In response to the comment that additional time was necessary to review the changes in criteria values from the National Toxics Rule (NTR), EPA provided a table in the preamble to the proposed CTR which outlined all the changes in aquatic life numbers from the NTR. The text that followed explained the changes in detail. EPA believes that the comment period was sufficient time within which to review and comment on these changes from the NTR.

Comment ID: CTRE-008-001
Comment Author: Cupertino Sanitary District
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 08/18/97
Subject Matter Code: B Comment Period
References:
Attachments? N
CROSS REFERENCES

Comment: The Cupertino Sanitary District is a wastewater collection agency which transports approximately 4.5 MGD of wastewater to the San Jose/Santa Clara Water Pollution Control Plant. The San Jose/Santa Clara Water Pollution Control Plant is a regional treatment facility capable of treating 167 MGD. The staff at the plant have begun a review of the draft rule for toxic pollutants for California, as published August 5, 1997, in the Federal Register. The complexity of the document, however, and the need to compare our plant's assessment with other wastewater agencies, leads me to ask for a 30-day extension of the comment period. This additional time will allow for a concurrent evaluation of the state's implementation policies for the numeric criteria.

Thank you very much for considering this request.

Response to: CTRE-008-001

In response to the comment requesting an extension of the comment period, please refer to response to CTR-001-001.

Comment ID: CTRE-009-001
Comment Author: Dublin San Ramon Services Dist
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 08/15/97

Subject Matter Code: B Comment Period
References:
Attachments? N
CROSS REFERENCES

Comment: Dublin San Ramon Services District treats wastewater from a population of 100,000 residents of the East San Francisco Bay area. We have begun our review of the draft rule for toxic pollutants for California as published August 5, 1997, in the Federal Register. The complexity of the document, its importance to our future operation and our need to compare our assessment with other wastewater agencies leads me to ask for an extension of the comment period through say October 26, 1997, a 30 day extension. This would allow us to concurrently evaluate the state's implementation policies for the numeric criteria.

Thank you for considering this request.

Response to: CTRE-009-001

In response to the comment requesting an extension of the comment period, please refer to response to CTR-001-001.

Comment ID: CTRE-010-001
Comment Author: Moulton Niguel Water District
Document Type: Water District
State of Origin: CA
Represented Org:
Document Date: 08/15/97
Subject Matter Code: B Comment Period
References:
Attachments? N
CROSS REFERENCES

Comment: The Moulton Niguel Water District is aware that the California Toxics Rule (CTR) has been published in the Federal Register and the comment period for it is scheduled to close on September 26, 1997. Public hearings have also been scheduled for September 17 and 18 in San Francisco and Los Angeles.

We are concerned with the time allowed to review this complex issue and are requesting your office to extend the review period by 30 days. We are aware that a similar request has been made by the California Association of Sanitation Agencies (CASA) and Tri-TAC and we also support their position.

Response to: CTRE-010-001

In response to the comment requesting an extension of the comment period, please refer to response to CTR-001-001 and CTR-035-001.

Comment ID: CTRE-011-001

Comment Author: County of Orange
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 08/15/97
Subject Matter Code: B Comment Period
References:
Attachments? N
CROSS REFERENCES

Comment: The County Sanitation Districts of Orange County, California (Districts) operates the third largest wastewater agency west of the Mississippi River, having the responsibility for collecting and safely treating wastewater for 2.1 million residents and businesses in metropolitan Orange County. We are members of the California Association of Sanitation Agencies (CASA) and Tri-TAC (an advisory group for CASA, California Water Environment Association, and the League of California Cities), and through these groups we have met with EPA staff to discuss the development of the proposed rule.

We appreciate the Agency's efforts to inform the regulated community about the pending regulation, however, we believe the complexity of the draft "California Toxics Rule" that was published in the Federal Register on August 5,1997 and the accompanying economic impact analysis warrant an extension of the comment period for an additional 30 days. We are making this request to ensure that sufficient time is available to the public to coordinate the review of the "California Toxics Rule" with an evaluation of the State of California's anticipated proposal of implementation policies for the criteria, which is scheduled to be released September 12, 1997. This overlapping comment period will provide the interested parties the opportunity to understand the contents and implications of the regulations, which are being partially adopted by EPA and partially developed by the State in order to achieve full compliance with Section 303(c)(2)(b) of the Clean Water Act.

Should you have any questions regarding this request for extension, please call Nancy J. Wheatley, Director of Technical Services, or me at (714) 962-2411.

Response to: CTRE-011-001

In response to the comment requesting an extension of the comment period, please refer to response to CTR-001-001.

Comment ID: CTRE-012-001
Comment Author: CA Council Env & Econ Balance
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 09/09/97
Subject Matter Code: B Comment Period
References:
Attachments? N
CROSS REFERENCES

Comment: The California Council for Environmental and Economic Balance (CCEEB) has been advised

that the State Water Resources Control Board (SWRCB) staff is planning to release the proposed State Implementation Policies on September 12, 1997. Since the release of these policies may indeed have an effect on the proposed California Toxics Rule, the Council is concerned that there may not be sufficient time provided for comment prior to the release of these policies.

At this time, we would like to request that EPA provide a comment period of the draft California Toxics Rule sufficient to ensure that adequate time is given prior to release of the State Implementation Policies.

Furthermore, we trust that EPA and SWRCB will be flexible in the promulgation process in order that everyone's scheduling and review needs can be met.

Response to: CTRE-012-001

In response to the comment requesting an extension of the comment period, please refer to response to CTR-001-001.

Comment ID: CTRE-013-001
Comment Author: Calaveras County Water Dist.
Document Type: Water District
State of Origin: CA
Represented Org:
Document Date: 08/15/97
Subject Matter Code: B Comment Period
References:
Attachments? N
CROSS REFERENCES

Comment: Concern has been raised by various agencies in California (i.e., Tri-TAC and CASA) about the above-referenced proposed Rule which could have a sizable monetary impact on California agencies involved with wastewater treatment. Considerable more time is required to thoroughly study the proposed Rule and its economic impacts on California agencies.

As an agency involved with wastewater treatment, I hereby request that at least a 30 day extension of time be allowed for further review and comment.

Response to: CTRE-013-001

In response to the comment requesting an extension of the comment period, please refer to response to CTR-001-001.

Comment ID: CTRE-014-001
Comment Author: City of Riverside
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/03/97

Subject Matter Code: B Comment Period
References:
Attachments? N
CROSS REFERENCES

Comment: The City of Riverside is requesting a 30 day extension in the comment period for the proposed California Toxics Rule. As the City was used as a case study for the economic analysis we feel that it is our responsibility to review these documents in some detail. Further, revelations regarding the status of the Santa Ana River Use Attainability Analysis and the site specific objectives that came out of that study, require considerable evaluation and consensus building within the watershed prior to comment.

Thank you for your consideration of this matter. Should you agree with our request, we would appreciate a notice of your decision.

Response to: CTRE-014-001

In response to the comment requesting an extension of the comment period, please refer to response to CTR-001-001.

Comment ID: CTRE-015-001
Comment Author: Oro Loma Sanitary District
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 08/30/97
Subject Matter Code: B Comment Period
References:
Attachments? N
CROSS REFERENCES

Comment: Oro Loma Sanitary District is a P.O.T.W. located in Alameda County between San Leandro and Hayward. We are also a member of the California Association of Sanitation Agencies (CASA) which actively monitors legislation and regulatory rule making.

We have reviewed the draft rule proposing water quality criteria for toxic pollutants for California ("California Toxics Rule" or "CTR") that was published in the Federal Register on August 5, 1997 and believe that the breadth and complexity of the draft CTR and the accompanying economic impact analysis warrant an extension of the comment period for an additional 30 days.

We are making this request to ensure that sufficient time is available to the public to coordinate the review of the CTR with an evaluation of the State of California's anticipated proposal of implementation policies for the criteria, which is scheduled to be released September 12, 1997. Thank you for your consideration.

Response to: CTRE-015-001

In response to the comment requesting an extension of the comment period, please refer to response to CTR-001-001.

Comment ID: CTRE-016-001
Comment Author: League of California Cities
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/03/97
Subject Matter Code: B Comment Period
References:
Attachments? N
CROSS REFERENCES

Comment: On behalf of the League of California Cities, I am writing to respectfully request a 30 day extension to the comment period on the draft rule proposing water criteria for toxic pollutants for California ("California Toxics Rule" or "CTR"). That rule was published in the Federal Register on August 5 1997.

The League agrees with others who have requested an extension of the comment period that the complexity and breadth of the draft CTR, and the accompanying economic impact analysis, warrant additional time for comment. In addition, it is necessary to ensure that sufficient time is available to the public to coordinate the review of the CTR with an evaluation of the State of California's anticipated proposal of implementation policies for the criteria, which is scheduled to be released September 12, 1997. We believe that the quality of the public comment submitted will benefit by providing an overlapping time period in which interested parties can evaluate both sets of proposals.

For these reasons, the League of California Cities respectfully requests an extension of the public comment period for the draft CTR. Thank you for your careful consideration of our request.

Response to: CTRE-016-001

In response to the comment requesting an extension of the comment period, please refer to response to CTR-001-001.

Comment ID: CTRE-017-001
Comment Author: East Bay Municipal Util. Dist.
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 08/28/97
Subject Matter Code: B Comment Period
References:
Attachments? N
CROSS REFERENCES

Comment: We have reviewed the draft rule proposing water quality criteria for toxic pollutants for California ("California Toxics Rule" or "CTR") that was published in the Federal Register on August 5, 1997 and believe that the breadth and complexity of the draft CTR and the accompanying economic

impact analysis warrant an extension of the comment period for an additional 30 days. In particular, we are making this request to ensure that sufficient time is available to the public to coordinate the review of the CTR with an evaluation of the State of California's anticipated proposal of implementation policies for the criteria, which is scheduled to be released September 12, 1997. Providing overlapping comment periods will allow interested parties to understand the full contents and implications of the regulations, which are being partially adopted by the EPA and partially developed by the State in order to achieve full compliance with Section 303(c)(2)(b) of the Clean Water Act.

I would appreciate if you would notify me at the above address of your decision. Thank you very much for your consideration of our request.

Response to: CTRE-017-001

In response to the comment requesting an extension of the comment period, please refer to response to CTR-001-001.

Comment ID: CTRE-018-001
Comment Author: BASMAA
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 09/03/97
Subject Matter Code: B Comment Period
References:
Attachments? N
CROSS REFERENCES

Comment: On behalf of the Bay Area Stormwater Management Agencies Association (BASMAA), I am writing to respectfully request an extension of the comment period for the California Toxics Rule for an additional 30 days.

The Bay Area Stormwater Management Agencies Association is a consortium of the seven municipal storm water programs in the San Francisco Bay Area representing 89 agencies, including 78 cities and 5 counties. BASMAA is focused on regional challenges and opportunities to improving the quality of urban runoff to the San Francisco Bay and Delta.

BASMAA is working with its member agencies and the California Stormwater Quality Task Force to expedite its review of the proposed CTR. However, the completion of our review is complicated by the planned release on September 12 of the State Board's draft policy for implementing the numeric criteria included in the CTR. Providing more overlapping conunent periods for the CTR and the implementation policy will facilitate more coordination between storm water programs on their review and comments, likely saving a significant amount of time for both USEPA and State Board staff in the long run.

Thank you for consideration of our request, and for notifying us of your decision.

Response to: CTRE-018-001

In response to the comment requesting an extension of the comment period, please refer to response to

CTR-001-001.

Comment ID: CTRE-019-001
Comment Author: Crockett-Valona Sanitary Dist.
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 08/27/97
Subject Matter Code: B Comment Period
References:
Attachments? N
CROSS REFERENCES

Comment: I am writing in support of Tri-TAC and the California Association of Sanitation Agencies (CASA), which are California-based organizations comprised of members from public agencies responsible for wastewater treatment.

The Crockett-Valona sanitary Distrilct is attempting to obtain a copy of the California Toxics Rule so that we may properly review and comment on this important regulatory document. To do so, and with the belief that the breadth and complexity of the draft CTR and the accompanying economic impact analysis alone warrant an extension of the comment period, we request an extension of 30 days.

In particular, we are making this request to ensure that sufficient time is available to CASA and Tri-TAC to coordinate the review of the CTR with an evaluation of the State of Californials anticipated proposal of implementation policies for the criteria, which is scheduled to be released September 12. Providing overlapping comment periods will allow interested parties to understand the full contents and implications of the regulations, which are being partially adopted by EPA and partially developed by the State in order to achieve full compliance with Section 303(c)(2)(b) of the Clean Water Act.

Response to: CTRE-019-001

In response to the comment requesting an extension of the comment period, please refer to response to CTR-001-001.

Comment ID: CTRE-020-001
Comment Author: Mt. View Sanitary District
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/02/97
Subject Matter Code: B Comment Period
References:
Attachments? N
CROSS REFERENCES

Comment: I am writing on behalf of the Mt. View Sanitary District, a publicly owned treatment works

located in Martinez, California. We have reviewed the draft rule proposing water quality criteria for toxic pollutants for California("California Toxics Rule" or "CTR") that was published in the Federal Register on August 5, 1997, and believe that the breadth and complexity of the draft CTR and the accompanying economic impact analysis warrant and extension of the comment period for an additional 30 days. In particular, we are making this request to ensure that sufficient time is available to the public to coordinate the review of the CTR with an evaluation of the State of California's anticipated proposal of implementation policies for the criteria, which is scheduled to be released September 12, 1997. Providing overlapping comment periods will allow interested parties to understand the full contents and implications of the regulations, which are being partially adopted by EPA and partially developed by the State in order to achieve full compliance with Section 303(c)(2)(b) of the Clean Water Act.

I would appreciate it if you would notify me at the address on this letterhead of your decision. Thank you very much for your consideration of our request.

Response to: CTRE-020-001

In response to the comment requesting an extension of the comment period, please refer to response to CTR-001-001.

Comment ID: CTRE-021-001
Comment Author: Novato Sanitary District
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 08/18/97
Subject Matter Code: B Comment Period
References:
Attachments? N
CROSS REFERENCES

Comment: The Novato Sanitary District (District) has reviewed the draft rule proposing water quality criteria for toxic pollutants for California ("California Toxics Rule" or'CTR") that was published in the Federal Register on August 5, 1997. The District believes that the breadth and complexity of the draft CTR and the accompanying economic impact analysis warrant an extension of the comment period for an additional 30 days. In particular, we are making this request to ensure that sufficient time is available for the public to coordinate the review of the CTR with the State of California's anticipated proposal of implementation policies for the criteria, which is scheduled to be released September 12, 1997. Providing overlapping comment periods will allow interested parties to understand the full contents and implications of the regulations, which are being partially adopted by EPA and partially developed by the State in order to achieve full comoliance with Section 303(c)(2)(b) of the Clean Water Act.

Thank you very much for your consideration of our request.

Response to: CTRE-021-001

In response to the comment requesting an extension of the comment period, please refer to response to CTR-001-001.

Comment ID: CTRE-022-001
Comment Author: West County Wastewater Dist.
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 08/20/97
Subject Matter Code: B Comment Period
References:
Attachments? N
CROSS REFERENCES

Comment: On behalf of the Board of Directors of the West County Wastewater District, a public agency, it is requested that the public comment period for the draft California Toxics Rule (CTR) be extended for an additional 30 days. This request is made in order to allow for a meaningful review by California Association of Sanitation Agencies and Tri-TAC, our public agencies' representatives.

Thank you for considering our request.

Response to: CTRE-022-001

In response to the comment requesting an extension of the comment period, please refer to response to CTR-001-001 and CTR-035-001.

Comment ID: CTRE-023-001a
Comment Author: Bay Area Dischargers Assoc.
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 07/17/97
Subject Matter Code: B Comment Period
References:
Attachments? N
CROSS REFERENCES V

Comment: The Bay Area Dischargers Association (BADA) is comprised of 10 POTWs in the San Francisco Bay Area. Our five largest charter members include the Central Contra Costa Sanitary District, City and County of San Francisco, City of San Jose, East Bay Dischargers Authority, and East Bay Municipal Utility District. Together BADA agencies provide wastewater service to most of the Bay Area.

BADA requests that the U.S. EPA allow at least 90 days for public review of the proposed California Toxics Rule (CTR). We understand the proposed rule will be published in the Federal Register toward the end of this month. The reasons for our request are as follows:

1. The CTR could have a significant economic impact on California municipalities and businesses. In

order to properly assess the impacts of the proposed CTR standards, it is necessary to know how the standards are to be implemented. Yet, the proposed implementation provisions being developed by the State Water Resources Control Board will not be available until September 12, 1997. The several days of overlap are insufficient for California municipalities and businesses to assess the economic and environmental impacts of the proposed standards. At least 45 days of overlap is needed.

2. The U.S. EPA has spent more than three years developing the proposed CTR, in part because of its importance. It is therefore, reasonable to provide at least 90 days for the public to review and comment on the rule, especially considering its potential economic impact on the State and the unavailability of the implementation provisions

3. It is recommended that the EPA work closely with the SWRCB during the review period to define the implementation policy and procedures that the EPA would be likely to approve.

For these reasons, BADA urges you to issue a notice extending the review period from 45 days to 90 days.

Response to: CTRE-023-001a

In response to the comment requesting an extension of the comment period, please refer to response to CTR-001-001.

Comment ID: CTRE-024-001
Comment Author: Sacramento Reg Cnty Sanit Dist
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 07/17/97
Subject Matter Code: B Comment Period
References:
Attachments? N
CROSS REFERENCES

Comment: The Sacramento Regional County Sanitation District (District) understands that the proposed California Toxics Rule (CTR) will be published in the Federal Register at the end of this month. The District also understands that there will be a 45-day period set for public review and comment on this document. The District strongly requests that the period for review and comment be extended to a minimum of 90 days. The reasons for our request are as follows:

1. Previous studies have shown that the specific numeric values set for water quality criteria on metals such as mercury could have a major economic impact on the District. The key conclusion of these studies is that removal of mercury from the District's effluent could cost, more than $1 billion, but would only result in removing a very small percentage of the mercury being discharged to the Sacramento River from unregulated nonpoint sources in the watershed.

2. In addition, the CTR could have a significant economic impact on many California municipalities and businesses without providing any measurable water quality benefits. This statement is based on in-state studies of the attainability of the U.S. EPA recommended water quality criteria that will be incorporated

into the CTR.

3. The District believes it is necessary to know how the standards are to be implemented, in order to properly assess the impacts of the proposed CTR standards. However, the proposed implementation provisions being developed try the State Water Resources Control Board (SWRCB) will not be available until mid-September, 1997. The few days of possible overlap with a 45-day comment period are insufficient for California municipalities and businesses to assess the economic and environmental impacts of the proposed standards. In our opinion, at least 45 days of overlap are needed.

4. The U.S. EPA has spent more than three years developing the proposed CTR, in part because of its importance. The District believes it is unreasonable to provide only 45 day for the public review and comment on such an important rule, especially in light of both its significant potential economic impacts on the entire State and the unavailability of the SWRCB implementation provisions.

For these reasons, the District urges you to issue a notice extending the review period from 45 days to 90 days.

Response to: CTRE-024-001

In response to the comment requesting an extension of the comment period, please refer to response to CTR-001-001.

Comment ID: CTRE-025-001
Comment Author: East Bay Dischargers Authority
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 07/16/97
Subject Matter Code: B Comment Period
References:
Attachments? N
CROSS REFERENCES

Comment: The East Bay Dischargers Authority is a joint powers public agency providing wastewater treatment and disposal services for approximately 600,000 people in southern and eastern Almeda County, California. The Authority's members include City of San Leandro, City of Hayward, Oro Loma Sanitary District, Castro Valley Sanitary District, and Union Sanitary District.

The Authority and its member agencies have been following the process of U.S. EPA's development of the California Toxics Rule (CTR) and the State Water Resources Control Board's effort to develop implementation provisions for the CTR. We have been informed that the CTR will be published in the Federal Register late this month, and we are very dismayed by reports that there will only be a 45 day comment period. In addition, the comment period may not overlap with the release of the State Board's implementation provisions.

The Authority and its member agencies request that U.S. EPA allow at least 90 days, and preferably 120 days, for public review of the CTR. The reasons for our request include the following:

1. U.S. EPA has taken more than three years to develop the proposed CTR. It is unreasonable to provide only 45 days for the public to review and comment on the rule, especially considering the fact that the rule and its implementation could have significant economic consequences on the Authority and its member agencies.

2. In order to properly analyze the impacts of the CTR, it is imperative that the State Board's implementation provisions be examined concurrently. Yet the proposed release date of the implementation provisions is September 12, 1997. With a 45 day comment period, there is essentially no overlap, which is unacceptable from a public policy perspective.

3. An economic analysis of the CTR and the implementation provisions must be conducted concurrently. Such an analysis, by the parties most effected, must be allowed adequate time to be both accurate and meaningful. You will recall that the State Plans were invalidated in part because of a poor economic analysis by the State Board. We are skeptical that U.S. EPA and the State Board will have performed the necessary economic analyses and require adequate time to perform them ourselves.

The Authority and its member agencies believe that it is in the best interests of U.S. EPA, the State Board, the regulated community, and the public that the comment period for the CTR be extended to at least 90 days. Your consideration of this request is appreciated. Please feel free to contact me if you have any questions or need additional information.

Response to: CTRE-025-001

In response to the comment requesting an extension of the comment period, please refer to response to CTR-001-001.

Comment ID: CTRH-001-002
Comment Author: Robert Hale
Document Type: Public Hearing
State of Origin: CA
Represented Org: CA Stormwater Task Force
Document Date: 09/17/97
Subject Matter Code: B Comment Period
References:
Attachments? N
CROSS REFERENCES

Comment: That gets me to my next point. We got this thing about two weeks ago here. The task force is struggling on this. Our key people have been working on it around the clock for the last week. I'm looking at Mac Walker; he's been doing that. We really are very pressed by the shortage of the time we've got here. And other people have been asking for this, too.

I think it's only reasonable that we would get more time to look at this, time to perform economic analysis of the impact of this, and have a chance to do a little noodling. Forty-five days would be an absolute minimum extension on this thing.

We've waited a long time to get this. It wouldn't hurt us to extend it just that much longer to be able to look at the issues of this thing, rather than getting the numbers off the back of somebody's envelope.

That's really the last point.

Response to: CTRH-001-002

In response to the comment requesting an extension of the comment period, please refer to response to CTR-001-001.

Comment ID: CTRH-001-019a
Comment Author: Phil Bobel
Document Type: Public Hearing
State of Origin: CA
Represented Org: Tri-TAC
Document Date: 09/17/97
Subject Matter Code: B Comment Period
References:
Attachments? N
CROSS REFERENCES V

Comment: MR. BOBEL: Thank you, Steve.

I'm Phil Bobel. I represent Tri-TAC, an organization of sewage treatment plants, the POTWs as we call them, made up of three groups: CASA, the California Association of Sanitation Agencies; the League of Cities; and the California Water Environment Association.

And later this afternoon you're going to hear from Bob Reid who represents CASA. And our comments are essentially the same, so I'm going to not repeat and just summarize a couple things.

I was even going to say you guys had done a really good job. But in light of all the previous speakers, I deleted that part of my testimony.

I will try to be positive and constructive. I promised to do that. In describing the nature of my comments on your little form, I put that I would be constructive. So I will do that.

The first point I'd like to make is positive. I think that the coordination you're doing with the state is great. The fact that we're going to have coordination with the feds focusing on the numeric criteria, the state focus on the implementation policy, working to come up with a system that will serve us all, is a good way to use resources of both organizations.

I applaud you for that and hope you will be able to pull that off. This is different than what we've tried to do before, and it will require some creativity.

One specific thing that I think would help if we did, is to allow all of us to see both what the state is proposing and what the feds are proposing, so we need a little more time in this comment period.

We've appealed before and been told no, but I still put that on the table as a good idea for the ultimate goal of a coordinated, consolidated, as much as possible, federal and EPA approach to this thing.

If you don't do that, or even if you do do that, I think it's going to require some other kinds of creativity as

we move out of -- away from your hearing and toward a final rule.

And in that period of time, I would ask you and the state to sit down together and see what kind of a process you can use to take the comments that you'll hear from your federal regs and the comments you hear on the state plan, and put those together, hear more back from folks that are interested and come up with a package that makes sense.

You're going to need some way of going back to interested parties over a longer period of time -- communicating, coordinating -- and I would refer you to the process that the state used on their task force approach and suggest that we need something like that as we move to the future. Creativity is going to be needed.

Response to: CTRH-001-019a

In response to the comment requesting an extension of the comment period, please refer to response to CTR-001-001.

Comment ID: CTRH-001-0211a
Comment Author: Julio Guerra
Document Type: Public Hearing
State of Origin: CA
Represented Org: City of Merced
Document Date: 09/17/97
Subject Matter Code: B Comment Period
References:
Attachments? N
CROSS REFERENCES E-01d

Comment: MR. GUERRA: My name is Julio Guerra with the City of Merced. And in my capacity with the City of Merced, I function as NPDES compliance coordinator and have to directly deal with these issues .

I did serve on the Inland Surface Waters Task force as a POTW representative to the agricultural waters subgroup, and so I am somewhat familiar with the issues at hand.

The first thing I would like to say is that the high-end cost estimated in the economic analysis done in the case study that was part of the California Toxics Rule background work was $4 million a year, $13 million capital expense. Characterized in the toxics rule is that the plants, of which Merced was one, was deemed to be representative of the proportionate facilities located within the different California regional water control boards.

Now, if we are representative, then you could assume that a plant such as Merced without a heavy industrial base would be typical of a lot of plants in the state, which would lead to the conclusion that perhaps the $87 million per year figure was a projection that did not match what could actually happen.

The city of Merced discharges to an ephemeral stream. The effluent is dominated at certain times of year by agricultural waste water, and stormwater-dominated at other times of the year. We provide the only treated water to that stream.

The ephemeral stream is dammed about a half mile further down by a farmer who uses all of the -- as much of the water as he can. He has water rights to about 15 million gallons a day. We can only discharge between 4 and 5 million gallons a day to that stream.

Our operating budget is between 2 and $3 million a year. If the assumptions were all correct, and we had to -- had to expend an additional $4 million a year to meet these standards, we would be spending an awful lot of money to take care of our neighbor.

The other side of that issue is that my cursory review of the economic impact work there leads me to observe that certain interpretations of our -- the data were not properly applied. And I would be most willing to work to get a more accurate picture of it to the EPA people.

And it would really take longer than the remaining comment period to do that, and so I would also add my voice to those asking for extension of the comment period.

Response to: CTRH-001-0211a

In response to the comment requesting an extension of the comment period, please refer to response to CTR-001-001.

Comment ID: CTRH-001-0211b
Comment Author: Julio Guerra
Document Type: Public Hearing
State of Origin: CA
Represented Org: City of Merced
Document Date: 09/17/97
Subject Matter Code: B Comment Period
References:
Attachments? N
CROSS REFERENCES B

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And it would really take longer than the remaining comment period to do that, and so I would also add my voice to those asking for extension of the comment period.

Response to: CTRH-001-0211b

See response to CTR-021-008.

EPA acknowledges that evaluating the impact of each individual direct discharger to inland waters, enclosed bays, and estuaries within the State of California would be the most accurate method to determine impacts of the CTR. However, the resources that would be required to perform such an analysis for each of the over 1,241 direct dischargers are beyond the resources typically available for development of environmental regulations.

In developing the methodology for estimating the compliance costs for the proposed CTR, time and budget constraints limited EPA's costing review to a subset of the regulated community. However, EPA believes that the sample selected adequately represents the various types of direct dischargers in the State.

EPA acknowledges that minor dischargers were under sampled as compared to the major dischargers. However, by definition, under the NPDES permit program, facilities classified as minor would not be expected to discharge toxic pollutants in toxic amounts. Since the CTR addresses only toxic pollutants, EPA would not expect significant, if any, impact to minor dischargers.

In analyses of the final CTR, EPA increased the sample of minors by five randomly selected facilities to bolster its analysis. EPA estimated costs of $872 per minor facility under the low scenario, and $2,682 per minor facility under the high scenario due to the CTR.

EPA also replaced Silvergate with South Bay in the sample in order to improve the estimate of the impacts of the CTR on the electric utility industry. The draft CTR cost analysis included costs for Silvergate, but the facility had closed and the data available was over five years old. The addition of South Bay, an electric utility facility with no costs, to the sample results in a more realistic, lower overall cost estimate for the electric utility industry.

Comment ID: CTRH-001-035
Comment Author: Dave Brent
Document Type: Public Hearing
State of Origin: CA
Represented Org: CA Water Qual. Task Force
Document Date: 09/17/97
Subject Matter Code: B Comment Period
References:
Attachments? N
CROSS REFERENCES

Comment: And finally, you've heard it brought up before, but I'd like to request an extension of an additional 90 days to provide comments so that we can compare this rule with the state implementing rules which are the Inland Surface waters Plan and the Enclosed Bays and Estuaries state water plan.

Thank you.

Response to: CTRH-001-035

In response to the comment requesting an extension of the comment period, please refer to response to CTR-001-001.

Comment ID: CTRH-001-036
Comment Author: Robert Reid
Document Type: Public Hearing
State of Origin: CA
Represented Org: CASA
Document Date: 09/17/97
Subject Matter Code: B Comment Period
References:
Attachments? N
CROSS REFERENCES

Comment: I'm Robert Reid, manager of the Sanitation District of Santa Clara County. I'm here today representing CASA and to present CASA's comments.

CASA is the California Association of Sanitation Agencies and represents more than 80 publicly owned treatment works in the State of California, I'll keep my comments brief as CASA will be submitting detailed written comments prior to the close of the public comment period.

We have four main issues to which we would like to draw your attention today.

First, as has been said many times over today, because the state's Draft implementation Policy was issued only last Friday, the comment period for this proposed rule should be extended by 45 days, or at least 30 days, to allow adequate time for analysis of the proposed rule as it will be implemented by the state.

Our comments are going to focus on the contents of the CTR only and its potential impacts, without consideration for the state's implementation policy and how those may change those impacts, because we have not yet had time to really evaluate the draft implementation policy.

Response to: CTRH-001-036

In response to the comment requesting an extension of the comment period, please refer to response to CTR-001-001.

Comment ID: CTRH-001-043
Comment Author: Charles Batts
Document Type: Public Hearing
State of Origin: CA
Represented Org: Bay Area Dischargers Assc
Document Date: 09/17/97
Subject Matter Code: B Comment Period
References:
Attachments? N
CROSS REFERENCES

Comment: MR. BATTS: Thank you.

I'm Charles Batts. I am Plant Operations Department Manager at the Central Contra Costa Sanitary District, a publicly owned treatment works, and I'm here today as chairman for the Bay Area Dischargers Association, a group of the five largest municipal dischargers to the San Francisco Bay, serving approximately three and a half million people. Our goal is only to protect the environment and to provide cost-effective service for our rate payers.

We are very appreciative of the work done by EPA on the California Toxics Rule. I hope my comments today will be of help in developing regulations that will continue to protect the waters of the state, and that everyone can live with.

First, I think I need to get in line and ask as everyone else has and as I asked earlier by letter, for the period of comment to be extended to 90 days.

There is no reason to rush the final version of these rules. The impact of state plans which are already out will not be greatly impacted beyond the extent they already have been. This will allow the state plan to reflect the changes and comments or modifications that may come out of your toxics rule.

Response to: CTRH-001-043

In response to the comment requesting an extension of the comment period, please refer to response to CTR-001-001.

Comment ID: CTRH-001-045a
Comment Author: Charles Batts
Document Type: Public Hearing

State of Origin: CA
Represented Org: Bay Area Dischargers Assc
Document Date: 09/17/97
Subject Matter Code: B Comment Period
References:
Attachments? N
CROSS REFERENCES G-09

Comment: We would ask the EPA to extend the comment period to encourage further comments.

We would encourage you to look at actual agencies' calculations, that all translators be reviewed to ensure accuracy, even if special studies are required by individual dischargers.

Response to: CTRH-001-045a

In response to the comment requesting an extension of the comment period, please refer to response to CTR-001-001. In response to the request that we look at actual translators to ensure accuracy in our economic analysis, the economic analysis for the proposed rule and for the final CTR is a broad-brushed analysis. EPA neither had the time nor resources to look at individual translators for individual pollutants for each of the sample facilities used in its analysis. However, where information was available on a particular pollutant and its translator, EPA reviewed the information and considered its application where appropriate.

Comment ID: CTRH-001-060a
Comment Author: Ellen Johnck
Document Type: Public Hearing
State of Origin: CA
Represented Org: Bay Planning Coalition
Document Date: 09/17/97
Subject Matter Code: B Comment Period
References:
Attachments? N
CROSS REFERENCES J-04

Comment: Secondarily and thirdly -- these two are tied together, the whole -- all our members that comply and have to secure the stormwater permits, we have been looking at how much it would cost us to build facilities to do some kind of end-of-pipe treatment to actually meet some of these numeric criteria for stormwater.

We don't think the economic evaluation that EPA has done is valid. Basically, there are a lot of shortcomings to it, and you have already heard today some of the numbers. The actual amount of money needed to build new facilities is way beyond the $86 million estimate that you have indicated in your analysis.

And based on this very serious economic evaluation shortcoming, I am recommending that at least a 30-day time limit be provided so that you can hear from the permit applicants regarding the statement to show you what the costs really are, and we'd like some more time to do that.

Those are essentially the substance of my comments today. Thank you.

Response to: CTRH-001-060a

In response to the comment requesting an extension of the comment period, please refer to response to CTR-001-001.

Comment ID: CTRH-002-007
Comment Author: Chris Compton
Document Type: Public Hearing
State of Origin: CA
Represented Org: County of Orange
Document Date: 09/18/97
Subject Matter Code: B Comment Period
References:
Attachments? N
CROSS REFERENCES

Comment: Conclusion:

In conclusion, we believe that there are significant and fundamental issues associated with the proposed rule that require serious consideration.

We recommend an extension of the public review period for the proposed rule is requested to allow EPA, municipalities, industry, and others to further evaluate the wet weather discharge requirements of the rule and the resulting legal and economic impacts in light of the recently released Inland Surface Waters and Enclosed Bays and Estuaries plans.

Response to: CTRH-002-007

In response to the comment requesting an extension of the comment period, please refer to response to CTR-001-001. In response to the issue concerning wet weather discharge requirements, the preamble to the proposed CTR had a detailed discussion concerning application of the proposed criteria to wet weather discharges. See the discussion at 62 FR 42186. See also the discussion on wet weather flows in the preamble to the final rule. A complete discussion of wet weather flows and potential economic impacts is also included in this Response to Comments document after the specific comments concerning potential economic impacts from wet weather flows.

Comment ID: CTRH-002-010
Comment Author: Lisa Ohlund
Document Type: Public Hearing
State of Origin: CA
Represented Org: Alliance of So. CA POTWs
Document Date: 09/18/97
Subject Matter Code: B Comment Period
References:

Attachments? N
CROSS REFERENCES

Comment: MS. ONLUND: I'm Lisa Ohlund. I'm an associate with the Southern California Alliance, a Publicly Owned Treatment Works. My business address is 30290 Rancho Viejo Road, San Juan Capistrano, 92675. I am here today representing SCAP. SCAP is comprised of 47 public agencies that provide wastewater treatment services in Southern California. Collectively, our member agencies serve over 16 million residents of Southern California. We appreciate the opportunity to testify on the proposed California Toxics Rule.

Before I make any substantive comments, I would like to reiterate the request that EPA extend or reopen the comment period on this CTR for an additional 30 days. We are still reviewing the proposed rule and its potential impacts on Southern Californials POTWs, and I believe that the number of changes proposed to the national water quality criteria and the extensive documentation that accompanies and explains the rule warrants the extension of the comment period.

In addition, as we noted in our letter requesting an extension, we would also appreciate the opportunity to review the CTR in the context of the State Water Resources Board's draft Implementation Policy which was just released last Friday, which I happen to have a copy here.

We're asking for an extension until at least October 27.

Response to: CTRH-002-010

In response to the comment requesting an extension of the comment period, please refer to response to CTR-001-001.

Comment ID: CTRH-002-021a
Comment Author: Ing-Yig Cheng
Document Type: Public Hearing
State of Origin: CA
Represented Org: L.A. Bureau of Sanitation
Document Date: 09/18/97
Subject Matter Code: B Comment Period
References:
Attachments? N
CROSS REFERENCES V

Comment: As you are aware, the California Policy for Implementation of Toxics Standards for Inland Surface Water, Enclosed Bays, and Estuaries of California, the proposed policy, was issued a few days ago. EPA and State essentially had the same objective to establish water quality criteria that are implementable for the water of California. Therefore, it is necessary for regulators and dischargers alike to fully comprehend the consequences of these rules on similar issues but from perhaps a different perspective.

Consequently, we strongly urge EPA to allow for additional 30 days for you and for us to fully review both documents together. We also urge EPA and State to coordinate these two rule-making process to minimize inconsistencies that might otherwise occur, EPA is the final focal point of this concern because

the process of State's obtaining EPA approval of ISWP and EBEP will be greatly enhanced if EPA and State can work together; and without EPA's approval, State's plan will be no good. So I think it will be ideal if CTR and the State's proposed policy can be promulgated simultaneously.

Thank you again for the opportunity to address you.

Response to: CTRH-002-021a

In response to the comment requesting an extension of the comment period, please refer to response to CTR-001-001.

Comment ID: CTRH-002-027
Comment Author: Fred Jacobsen
Document Type: Public Hearing
State of Origin: CA
Represented Org: San Diego Gas & Electric
Document Date: 09/19/97
Subject Matter Code: B Comment Period
References:
Attachments? N
CROSS REFERENCES

Comment: MR. JACOBSEN: Hi, Fred Jacobsen. I'm here representing San Diego Gas & Electric. My comments, just purely process. Then I would just request that due to the volume of information that relates to the propsed rule and the fact that the State Water Board implementation policy was just released that the comment period be extended on the comment on the CTR rule for at least a minimum of 30 days. Thank you.

Response to: CTRH-002-027

In response to the comment requesting an extension of the comment period, please refer to response to CTR-001-001.

Subject Matter Code: C-01 Mercury

Comment ID: CTR-002-007a
Comment Author: Comm. for a Better Environment
Document Type: Environmental Group
State of Origin: CA
Represented Org:
Document Date: 09/24/97
Subject Matter Code: C-01 Mercury
References:
Attachments? Y
CROSS REFERENCES

Comment: Proposed mercury criteria ignore the concentration of mercury in the food chain and site specific field data in a scientifically insupportable manner. One reason EPA's criterion allows mercury to harm Bay fishing, as shown above, is that EPA's proposed "bioconcentration factor" predicts that I part per trillion (ppt) of mercury in water results in 7,374 ppt in fish eaten by the public. EPA rejected "bioaccumulation factors" from the Great Lakes which-predict that the same I ppt in water results in 27,900 to 140,000 ppt mercury in fish eaten by the public. This decision weakens the criterion drastically by ignoring mercury's most dangerous aquatic property.

EPA's rejection of data on mercury concentration in the aquatic food chain is scientifically insupportable. The fact that mercury concentrates strongly in aquatic food chains is beyond dispute. However, EPA's bioconcentration factor includes data on the "uptake and retention of a substance. from water only." EPA'S criterion thus fails to protect against human exposure to all mercury that gets into fish from the food the fish eat, which comprises most of this human mercury exposure. (The statement that EPA's "PBCFs take into account uptake from food as well as water" appears to mean food and water consumption by humans, and should not be read to obfuscate this problem.)

EPA's rationale for rejecting mercury bioaccumulation data for protection of San Francisco Bay is incorrect. The proposal states that. "Lacking the data, it is difficult to determine if the [bioaccumulation factors] used in the [Great Lakes Initiative] represent the potential for mercury bioaccumulation in surface waters in California." However, numerous high quality field measurements of San Francisco Bay water and fish eaten by the public demonstrate mercury bioaccumulation comparable with Great Lakes estimates and far greater than EPA'S "bioconcentration factor.(*3) (*16) These data are summarized in Table 7. It is unscientific to ignore high quality, consistent field data showing mercury concentration in aquatic food webs while proposing a criterion which allows harm to fishing.

(*3) San Francisco Estuary Institute, 1997. Regional monitoring program for trace substances 1995 annual report. Excerpts including pages 105, 3, and A-17 through A-24 showing the percentage of sediment bioassays (larval bivalve and Eohaustorius tests) that were toxic (less than 80% of control value) at RMP stations from 1991-1996, sampling stations, and dissolved and total metal, and PAH concentrations in San Francisco Bay waters.

(*16) California Regional Water Quality Control Board, San Francisco Bay Region, 1995. Contaminant levels in fish tissue from San Francisco Bay. Final draft report. Excerpt including data from toxic pollutant analyses of fish tissue samples from S.F. Bay. December, 1994.

Response to: CTR-002-007a

See response to CTR-002-007b on this issue.

Comment ID: CTR-002-007b
Comment Author: Comm. for a Better Environment
Document Type: Environmental Group
State of Origin: CA
Represented Org:
Document Date: 09/24/97
Subject Matter Code: C-01 Mercury
References:
Attachments? Y
CROSS REFERENCES

Comment: Proposed mercury criteria ignore the concentration of mercury in the food chain and site specific field data in a scientifically insupportable manner. One reason EPA's criterion allows mercury to harm Bay fishing, as shown above, is that EPA's proposed "bioconcentration factor" predicts that I part per trillion (ppt) of mercury in water results in 7,374 ppt in fish eaten by the public. EPA rejected "bioaccumulation factors" from the Great Lakes which-predict that the same I ppt in water results in 27,900 to 140,000 ppt mercury in fish eaten by the public. This decision weakens the criterion drastically by ignoring mercury's most dangerous aquatic property.

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(*16) California Regional Water Quality Control Board, San Francisco Bay Region, 1995. Contaminant levels in fish tissue from San Francisco Bay. Final draft report. Excerpt including data from toxic pollutant analyses of fish tissue samples from S.F. Bay. December, 1994.

Response to: CTR-002-007b

EPA acknowledges concerns expressed by the commentors about mercury bioaccumulation and the protectiveness of the mercury human health in the final rule. EPA is well aware of the adverse human health and environmental effects associated with mercury exposure and the role that bioaccumulation plays. Several reports have been published recently documenting EPA's concern for, and guidance on, protection from mercury exposure. These documents include: Mercury Study Report to Congress, (EPA-452/R-97-008); The National Survey of Mercury Contamination in Fish. Database Summary 1990-1995. September 29, 1997; 1995 Updates: Water Quality Criteria Documents for the Protection of Aquatic Life in Ambient Water, (EPA-820-B-96-001); and Final Water Quality Guidance for the Great Lakes System: Final Rule. Fed Register, 60(56):15366-15425 (March 23, 1995). As noted in these documents and many other publications, mercury bioaccumulation is a very complex process that is not fully understood. Methylmercury is the most toxic and readily bioaccumulated form, but mercury methylation and bioaccumulation varies from location to location due to biological, physical, and chemical factors that are not completely understood. Much additional research is need to characterize these factors so that accurate predictions of methylmercury bioaccumulation can be made. EPA is working to improve the body of knowledge on mercury bioaccumulation, toxicity, and risk management, which will lead to improved protective mercury criteria. For example, EPA's Office of Research and Development is sponsoring a multi-year, several million dollar, Science to Achieve Results (STAR) research grant program to specifically investigate the fate and transport of mercury in the aquatic environment. Grants and funding will be awarded to successful applicants beginning in 1999.

In addition to these research activities, EPA is reviewing the basis for the human health mercury criterion and is conducting a comprehensive review of its overall human health criteria methodology. In 1998, Congress directed the National Academy of Sciences (NAS) to review the toxicological basis for EPA's reference dose (RfD) for mercury. NAS will review toxicological data generated from studies conducted in the Faroe and Seychelles Islands and assess its appropriateness for use in the RfD derivation. This review is scheduled to begin in mid-1999 and be completed in July, 2000. EPA plans to update the National 304(a) criteria once the review is complete, and then subsequently update criteria for California.

EPA believes the 304(a) mercury criteria will also be improved once the recently proposed revisions to the Ambient Water Quality Criteria Derivation Methodology Human Health (EPA-822-B-98-005) are final and ready for use in deriving National recommended criteria. Proposed changes to the human health methodology affect both the reference dose derivation and exposure assessment applicable to mercury. As recommended by a number of commentors, the proposed revisions to the human health methodology would use bioaccumulation factors (BAFs) rather than bioconcentration factors (BCFs) or practical bioconcentration factors (PBCFs), to derive water quality criteria in the future. EPA has received public comment on the proposed revisions to the health methodology and held an external peer review workshop in May,1999. EPA believes that such peer review is essential to maintaining the scientific defensibility of its water quality criteria. Once the methodology is finalized based on reviewers' comments, new National recommended mercury criteria for human health and aquatic life can be derived, and then subsequently criteria for California can be updated.

Any revision to either a National or California mercury criterion will include an evaluation of all relevant bioaccumulation data. The data in the GLWQI is specific to the Great Lakes region and its applicability to California waters has not been finally determined. The GLWQI BAFs alone cannot be directly applied

to California because the biological, chemical, and physical factors that influence mercury bioaccumulation will be different in California when compared to the Great Lakes region. Examples of these factors include: foodchain interactions, physicochemical parameters (e.g. pH, temperature, dissolved and particulate organic matter), and size and type of watershed. Additionally, the GLWQI BAFs were developed for lakes only, whereas the waters affected by mercury in California include rivers and estuaries, for which very little data on the bioaccumulation potential of mercury is available. Virtually nothing is known about the applicability to rivers or estuaries of BAFs which are based on lake ecosystems. However, EPA is currently gathering bioaccumulation data on lentic (lakes), lotic (streams, rivers) and estuarine environments in order to assess the nature and extent of bioaccumulation in different water bodies and the application of BAFs across ecosystems. Although the bioaccumulation data cited by the commentors for San Francisco Bay and Clear Lake appear to be quality data, the development of any California-specific BAFs would require more than these few limited studies.

In summary, EPA agrees that mercury in the environment is a problem and has clearly documented its adverse effects to humans and ecological receptors. Regulatory controls are need to protect humans, wildlife, and aquatic life from exposure to mercury. However, there are a number of issues that must be considered and resolved before EPA can conduct a revision of the National 304 (a) mercury criteria and promulgate revised values for California. The dominant issues are:1) finalize the overall Ambient Water Quality Criteria Derivation Methodology for Human Health, 2) within the human health methodology, finalize the approach for deriving bioaccumulation factors, and 3) wait completion of the NAS review and subsequently revise the National human health criteria for mercury. For these reasons EPA is at this time promulgating mercury criteria of 0.05 ug/L (consumption of water and organisms) and 0.051 ug/L (consumption of organisms only) as proposed in the CTR, rather than promulgating revised criteria based on partially peer reviewed methodologies, evolving science, and incomplete understandings of the factors that affect mercury bioaccumulation. Once this comprehensive review is complete, the mercury criteria will be revised as appropriate, supported by scientifically defensible and peer reviewed methodologies and data.

Comment ID: CTR-003-009
Comment Author: City of Riverside
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/22/97
Subject Matter Code: C-01 Mercury
References:
Attachments? N
CROSS REFERENCES

Comment: 9) The use of a $200 and $500 per toxic pounds-equivalent as a upper end cost basis seems arbitrary. From our perspective, there is no reason to assume that an alternative regulatory approach to toxics compliance will or, where uses may have been previously obtained, can be made available to the City at no cost. Although we disagree with EPA guidance, it clearly states that a minimum of 1-2% of median household income must be spent prior to relief based on economics. Relief may be available for expenses above that level. Assuming a median disposable household income of $30,000 the ceiling would be $300 - $600 per year. Since households are now spending $156.60 a year, that means that costs could go up $143.40 - $443.40 per household before the EPA would consider it an economic hardship. For 110,000 households, that is an increase of $15,774,000 - $48,774,000 per year for the City of

Riverside alone. When performing an economic analysis the EPA should be consistent with its own guidance.

Response to: CTR-003-009

See response to CTR-032-004 and CTR-060-019 (Category E-01m; Regulatory Relief)

Comment ID: CTR-005-003c
Comment Author: Novato Sanitary District
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/23/97
Subject Matter Code: C-01 Mercury
References:
Attachments? Y
CROSS REFERENCES C-22
C-24a
G-09
G-05
G-04

Comment: 2. The following provisions of the rule are supported: (1) adoption of metals criteria as dissolved concentrations; (2) expression of the metals criteria as a function of the water-effect ratio; (3) adoption of the proposed new human health criterion for mercury; and (4) the Preamble discussions regarding metals translators, mixing zones, and interim permit limits.

Response to: CTR-005-003c

EPA agrees with the comment.

Comment ID: CTR-006-001a
Comment Author: Natural Resources Defense Cncl
Document Type: Environmental Group
State of Origin: CA
Represented Org:
Document Date: 09/22/97
Subject Matter Code: C-01 Mercury
References:
Attachments? Y
CROSS REFERENCES

Comment: The Natural Resources Defense Council strongly opposes the Region 9 EPA proposal to raise the allowable mercury criterion for continuous concentration in water from 0.012 parts per billion (ppb) to 0.770 ppb for aquatic life. This proposal is difficult to justify from the point of view of science and of public health. On behalf of our over 350,000 members nationwide and our over 55,000 California

members, we are writing to register our opposition to the EPA proposed rule.

Mercury is a highly poisonous metal which results in toxicity to the brain and nervous system and toxicity to human reproduction. In addition, in sediments, mercury is bio-transformed into the even more toxic form, methyl mercury, which has resulted in some of the largest epidemics of neuro-developmental poisoning known to mankind. Methyl mercury bioaccumulates in the food chain and thereby results in greatly concentrated exposures to humans, because we eat off the top of the food chain. Underestimates of the toxicity and bioaccumulation of mercury have led to major mistakes in the past. The Minamata Bay disaster in Japan was caused by a failure to predict the potency of mercury and the extent of human exposure through fish. U.S. EPA's Draft Mercury Study Report to Congress documents that children of high-end fish consumers in the U.S. may be exposed to enough mercury to cause adverse neuro-developmental effects.

In this setting it is anomalous to relax the standards for mercury contamination in California water. Furthermore, the scientific reasoning behind the Region 9 EPA decision to relax the mercury standard 60-fold is fraught with errors. NRDC's major concerns with this approach are summarized below.

*Extrapolation for the Reference Dose (RfD) should start at a NOAEL, not at a level of 10% increased risk. *An additional 10-fold safety factor should be added in deriving the RfD to account for the vulnerability of fetuses, infants, and children. *The body weight in the calculation should be for a child, not an adult male. *The Fish consumption rates for those who do eat fish should be used instead of rates for the entire population including those who do not eat fish. *Average fish consumption quantities greatly understate the risk to those who eat a lot of fish. Instead, fish consumption for the top 5% of the population should be used.' *Bioaccumulation is known to be 10 to 100 fold greater than the estimate used by EPA. *California's waters are already too polluted with mercury.

Insufficiently Protective Reference Dose

The risk assessment used the-current reference dose (RfD) from U.S. EPA's Integrated Risk Information System (IRIS) which contains several problems that make it likely to be too high to be health protective. The starting point for the extrapolation was the dose which conferred a I 0% increased risk to exposed humans. This is certainly not a No Observable Adverse Effects Level (NOAEL), and in fact, a 10% increase in risk is quite significant in scientific and public health terms. Despite the fact that the NOAEL was not used as a starting point for derivation of the RfD, only a 10-fold uncertainty factor was added to derive the RfD. This was presumably a half-log of 10 for within human variability and a half-log of 10 for lack of a two generation reproductive study. A half-log of 10 is clearly insufficient to account for the wide range of human variability. In fact, the effects of mercury on the developing nervous system and the appearance of clinical mercury toxicity at much lower doses in children make it highly likely that fetuses, infants, and children are far more than an order of magnitude more susceptible to the effects of mercury intoxication than are adults. Thus an additional factor of at least 10 should be added to account for the disproportionate susceptibility of children.

Incorrect Choice of Body Weight

The body weight used in the equation for the mercury criterion is 70 kg. This is an average adult male body weight. Average female body weight is around 60 kg and a child would weigh less than 10 kg (7.5 kg is a common choice in risk assessment). It is extremely odd to use an adult male body weight in the risk calculation when the populations of interest are pregnant women and children. It is a fact that adult males are simply at much less risk for the adverse health effects of mercury. Choice of an excessively large body weight leads to a larger predicted tolerable dose. Such a large dose might well be tolerable to

an adult male, but in the case of mercury, we are concerned with a different population at risk. Therefore the calculation should use the body weight of the lightest member of the population at risk, ie. the weight of a child, in the equation if there is any hope that the result of the calculation will provide any health protection for a child.

NRDC strongly urges Region 9 EPA to reassess the proposed standard for mercury. Recalculation of the reference dose to accommodate the known disproportionate impact of mercury on fetuses, infants, and children will require addition of at least another 10-fold safety factor. The starting point for RfD calculation should be a true NOAEL. The body weight calculation should use an average weight for a child. Fish consumption data should reflect the "high-end" consumer. Finally, the outdated and unsupportable bioaccumulation factor of 7300 should be discarded in favor of a BAF which is supported by the current science in California.

Response to: CTR-006-001a

Regarding the choice of body weight, EPA disagrees that the use of a 70 Kg body weight is inappropriate for the calculation of the mercury criterion. Although the use of a 70 kg assumption results in a slightly less stringent value, the Agency disagrees that this represents an excessively large body weight. The comment author is also incorrect in the statement that the 70 kg assumption only represents adult males. The 70 kg assumption is, in fact, based on the combined average body weights of adult males and females according to data from the Second National Health and Nutrition Examination Survey (NHANES II). These data indicate that the average body weight for adult females of childbearing age is 65 kg. EPA does not believe that an adjustment of 5 kg would result in a significant change in the mercury criterion. However, EPA is developing a revised methodology for deriving water quality criteria to protect human health and is considering different default body weight recommendations for women of childbearing age and children (see draft revisions published August 14, 1998, Federal Register, Vol. 63, No. 157). EPA is currently reviewing public comments and is awaiting the results of a peer review on the draft methodology revisions. As part of this effort, EPA also intends to consider the more recently published NHANES III data for the same gender and age categories. Until these reviews are complete, it would be inappropriate to change the 70 kg assumption used to calculate the human health criteria for mercury.

EPA disagrees that the body weight of a child should be used for the calculation of the mercury criterion. The effect of concern is a developmental effect which is caused by exposure of the female to mercury and the transmigration of the mercury into the developing fetus to cause the developmental neurotoxic effect. Thus, if the exposure to the pregnant female is reduced to a level which is not toxic to the fetus, then the fetus is protected. This is achieved by calculating a maternal exposure level that corresponds to a NOAEL for developmental effects in the fetus, and in doing so, the weight of the pregnant female is the appropriate number on which to base the calculation.

For issues concerning the derivation of the Reference Dose and safety factors, see the response to CTR-006-002a. Regarding the fish consumption rate, see the response to this issue in CTR-002-002a. Regarding the bioaccumulation issue, see the response in CTR-002-007b.

Comment ID: CTR-006-001b
Comment Author: Natural Resources Defense Cncl
Document Type: Environmental Group
State of Origin: CA

Represented Org:
Document Date: 09/22/97
Subject Matter Code: C-01 Mercury
References:
Attachments? Y
CROSS REFERENCES

Comment: Dear Ms. Frankel,

The Natural Resources Defense Council strongly opposes the Region 9 EPA proposal to raise the allowable mercury criterion for continuous concentration in water from 0.012 parts per billion (ppb) to 0.770 ppb for aquatic life. This proposal is difficult to justify from the point of view of science and of public health. On behalf of our over 350,000 members nationwide and our over 55,000 California members, we are writing to register our opposition to the EPA proposed rule.

Mercury is a highly poisonous metal which results in toxicity to the brain and nervous system and toxicity to human reproduction. In addition, in sediments, mercury is bio-transformed into the even more toxic form, methyl mercury, which has resulted in some of the largest epidemics of neuro-developmental poisoning known to mankind. Methyl mercury bioaccumulates in the food chain and thereby results in greatly concentrated exposures to humans, because we eat off the top of the food chain. Underestimates of the toxicity and bioaccumulation of mercury have led to major mistakes in the past. The Minamata Bay disaster in Japan was caused by a failure to predict the potency of mercury and the extent of human exposure through fish. U.S. EPA's Draft Mercury Study Report to Congress documents that children of high-end fish consumers in the U.S. may be exposed to enough mercury to cause adverse neuro-developmental effects.

In this setting it is anomalous to relax the standards for mercury contamination in California water. Furthermore, the scientific reasoning behind the Region 9 EPA decision to relax the mercury standard 60-fold is fraught with errors. NRDC's major concerns with this approach are summarized below.

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Response to: CTR-006-001b

With respect to the bioaccumulation factors see response to CTR-002-007b. With respect to the mercury aquatic life criteria, EPA is not promulgating these criteria in today's rule (see the preamble of today's rule for further explanation). For an explanation why EPA does not believe today's rule will worsen water quality see response to CTR-002-003.

With respect to EPA's risk assessment procedures see responses to CTR-006-001a and CTR-006-002a.

Comment ID: CTR-006-002a
Comment Author: Natural Resources Defense Cncl
Document Type: Environmental Group
State of Origin: CA
Represented Org:
Document Date: 09/22/97
Subject Matter Code: C-01 Mercury
References:
Attachments? Y
CROSS REFERENCES C-14

Comment: Dear Ms. Frankel,

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Use of Average Fish Consumption is not Health Protective

The assumption used by Region 9 EPA for fish consumption relies on the average fish and shellfish consumption in the entire general population, along with the average intake from each body of water. It is quite clear that fish consumption follows a highly skewed, or Poisson distribution in the population (see attachment from the U.S. EPA Draft Mercury Study Report to Congress, Appendix H, p. 20). Many people eat little or no fish, but a smaller, yet highly significant segment of the population eats a very large amount of fish. Surely EPA should strive just as hard to protect the health of those who eat fish frequently as it does to protect the health of those who do not eat fish.

In fact, this analysis adequately protects only those who eat little or no fish. The average which was used in the Region 9 EPA analysis appears to derive from the "per capita" data from the USDA Continuing Surveys of Food Intake by Individuals (CSF 11) from 1989-91 for males ages 15-44 years. (See attached tables from U.S. EPA Mercury, Report, Appendix H, pp. 8 & I 1). In fact, this average is highly influenced by those individuals who consume little or no fish. Non-fish-consumers, however, are not the population of interest for purposes of this analysis. Instead, if an average is to be used, it should be the average fish consumption rate for those people who do eat fish. This is substantially higher, at 53.7 g/day for males ages 15-44 years, and 41.4 g/day for females in the same age range. Furthermore, the average fish consumption will likely underestimate the fish consumption rate for the "high end" fish

consumer by many orders of magnitude. For example, in the case of females ages 15-44 years, average fish consumption (among those who do eat fish) is 41.4 g/day, while fish consumption by the top 5% of the population of these women of childbearing age is about 112 g/day, or more than double the average consumption rate.

The implications of not adequately protecting the high fish consumer are not trivial. The population of California is nearly 30 million, of whom overall 31% would be expected to be fish consumers according to the CSF II survey. This represents over 9 million people who would be at disproportionate risk. The top 5% of that population consists of nearly half a million people in California who would be expected to eat fish at nearly 10-times greater quantity than the EPA calculations would predict. 10 times greater consumption would translate into roughly 10-times greater risk from the mercury in the fish. EPA is not adequately protecting this substantial portion of the California population from mercury hazards.

NRDC strongly urges Region 9 EPA to reassess the proposed standard for mercury. Recalculation of the reference dose to accommodate the known disproportionate impact of mercury on fetuses, infants, and children will require addition of at least another 10-fold safety factor. The starting point for RfD calculation should be a true NOAEL. The body weight calculation should use an average weight for a child. Fish consumption data should reflect the "high-end" consumer. Finally, the outdated and unsupportable bioaccumulation factor of 7300 should be discarded in favor of a BAF which is supported by the current science in California.

Response to: CTR-006-002a

The commenter criticizes the current RfD on IRIS in several respects. While EPA intends to develop a revised IRIS value, once it receives recommendations from the National Academy of Sciences (see discussion in response to CTR-030-007 and CTR-002-007b), EPA strongly believes that some level of protection needs to be in place for mercury because of its toxicity to humans and aquatic life (see response to CTR-002-007b). Therefore, EPA thinks it is reasonable to keep in place the human health value based on the current RfD, which it believes is scientifically defensible based on the state of the science at the time it was derived.

The EPA disagrees with the comment that an RfD should be calculated by selecting the NOAEL and applying the appropriate safety factor in the case of mercury due to the nature of the data. The data base for mercury allow for the use of continuous human data (i.e., there are no dose groups and no NOAEL as it is defined for a controlled animal study) on the most sensitive subpopulation which is the fetus.

In regard to the methodology used to calculate the Reference Dose (RfD), the following discussion is intended to clarify why the Benchmark Dose (BMD) approach is the most appropriate method to use for the mercury data. Traditionally, when assessing the human health hazard and dose response relationship for a toxicant which produces a non-cancer effect in humans or animals following exposure, a No Observed Adverse Effect Level (NOAEL) and the Lowest Observed Adverse Effect Level (LOAEL) is selected for the critical effect from among all the available data, and a series of uncertainty factors are applied as appropriate to determine the Reference Dose. This methodology is widely used by regulatory agencies as the first step in assessing potential human health risk from exposure to the substance in question. As more refined mathematical models are developed and better scientific data on toxicants are generated, there is the opportunity to calculate a BMD which more closely approaches the true NOAEL because more of the data and the characteristics of the data are utilized in the analysis. When the data base is robust and such refinements are possible, it is incumbent upon the risk assessors to generate these more realistic estimates of human health hazard for the reasons listed below.

People often misinterpret the NOAEL that is selected from a critical study as the actual level of exposure at which no adverse effects are observed, but actually, it is only the highest level at which no adverse effects are observed in that particular study or in a group of studies. The NOAEL is a function of study design, (i.e., the number of animals tested, the number of doses, the spacing between doses, the duration of exposure, and the route of administration). If the study design has adhered to the toxicity testing guidelines and Good Laboratory Practice (GLP) requirements, the NOAEL actually represents an effect level because of the number of animals used. As the number of test animals increases and more dose levels are tested, the power of the study and its ability to detect a toxic effect increases; the data generated are more robust and the NOAEL decreases as it approaches the real value. Studies with higher power result in lower NOAELs, smaller RfDs and a greater confidence in the level of safety. Also, NOAELs are often controversial since scientific judgment is applied to reach the conclusion that what is observed at the LOAEL is really adverse in nature; and the selection of one number for the NOAEL disregards valuable information gained
from looking at the whole study and the slope of the dose response curve (There is a higher level of concern when the slope is steep because a small change in dose/exposure produces significant changes in the effects noted. Shallow slopes indicate that exposures can be increased over a broader range and the increase in the number or severity of the effects will be less dramatic). Consequently, there are many disadvantages to this methodology, but it is nevertheless frequently used due to the lack of better and more data on the toxicant under review.

However, some toxicants have presented a high level of interest to the scientific community and the regulatory programs and there exists an abundance of toxicology data (often times human data) from which to calculate risk. In these situations, it is preferable to use as much of the data as possible and to select an appropriate model for the data which allows the analyst to determine a Benchmark Dose (BMD). To do this, EPA chooses among a series of appropriate mathematical models. EPA fits each of these to the data. EPA then uses a statistical procedure to select the model that gives the best fit to the data. A BMD is a statistical lower confidence limit on the dose that produces a selected level of change in response rate in comparison to untreated control animals (e.g., 5% or 10% change in response when compared to the background response) (EPA 1995). In other words, the BMD approach selects a data point (point of departure at which there is a certain response level, in this case a 10% response level) and selects the appropriate mathematical model for the data which takes into account the slope of the dose response curve and the variability of the data. For mercury, the BMD thus represents the lower confidence limit for the dose that is estimated to produce the 10% level of change in response in the study population. The BMD thus represents the probability that 95% of the time, the dose producing the given level of response will be higher than the BMD. This approach is well suited to the data base for mercury since the human
data are continuous, i.e., there is a response associated with all exposure levels and there is no non-exposed group. The BMD approach is a newer and more robust analysis which utilizes all the data and the special characteristics of these data, and the Agency would be errant in its mission if it did not utilize state of the art methods in risk assessment to achieve its goals of public health protection. Using this methodology improves the resulting non cancer risk assessment because it uses the dose response data to select an appropriate model which does not extrapolate to doses below the experimental range. The BMD can either be less than or greater than the corresponding NOAEL, it is not restricted to one of the experimental dose levels, and it accounts more appropriately for sample size and dose-response characteristics (Crump 1984, Dourson et al. 1985, Kimmel and Gaylor 1988). In deriving an RfD using this method, the BMD is then divided by the appropriate uncertainty factors. Where the data are appropriate and lend themselves well to the use of a BMD as in the case of the type and quantity of data on mercury, the Agency would be errant in its mission of public health protection if it assessed the hazard of mercury by using the simplistic NOAEL/LOAEL approach.

In the EPA RfD calculation for mercury, an estimate of a NOAEL was used; namely the lower 95% confidence limit on a dose corresponding to a 10% effect level for all reported neurodevelopmental effects reported in a population of 81 Iraqi children reported in Marsh et al. 1987. The 10% effect level refers to the dose which produces the defined effect in 10% of the study population. A Weibull model was fit to the data as recent research suggests that it may be the best model for developmental toxicity data (Faustman et al. 1994). Other research indicates that the lower confidence limit on the dose which produces a 10% response level (i.e., the BMD) is the appropriate choice when correlated with the NOAEL for developmental effects in controlled animal studies (Allen et al. 1994a, b). In the case of the mercury RfD, the 10% effect level was determined to be the most appropriate regarding the aforementioned discussion on compariosn to background response (i.e., statistical significance) and when correlated to the NOAEL. It should be noted that the data on developmental effects in the Iraqi children are continuous with respect to dose. That is, there are no dose groups and no NOAEL as it is defined for a controlled animal study. The benchmark dose modeling procedure provides a reasonable approach to determining the exposure at which effects are observable above background.

EPA also disagrees with the comment that the adult males are at much less risk for the adverse health effects of mercury, and that the RfD should be recalculated with the addition of at least another 10 fold safety factor to accommodate the known disproportionate impact of mercury on fetuses, infants and children. In regard to the sensitivity of adult males vs fetuses, infants and children, the original RfD of 0.3 @g/kg/day was based on paresthesia in Iraqi adults exposed to methylmercury in grain. This is within a factor of three of the current RfD (0.1 @g/kg/day based on developmental neurotoxicity in the same population. According to EPA, an RfD is defined as "an estimate (with uncertainty spanning perhaps an order of magnitude)"of a daily exposure to the human population (including sensitive subgroups) that is likely to be without an appreciable risk of deleterious effect during a lifetime. Thus, by this "order of magnitude" standard, the RfD based on adult effects overlaps that based on developmental endpoints. In the most recent publications on the poisonings in Minamata, exacerbation or onset of neurological symptoms have been noted as the population has aged.

In regard to the addition of another safety factor for fetuses, infants and children, the scientific community agrees that when deriving an RfD for methylmercury using sensitive developmental neurotoxic endpoints that the data represent the effects in children and fetuses. Thus, an additional 10 fold factor would be redundant. In calculation of the RfD, a composite uncertainty factor of 10 was used to account for a number of uncertainties related to the data. First, this uncertainty factor was applied for variability in the human population, in particular, the wide variation in biological half-life of methylmercury and the variation that occurs in the hair to blood ratio for mercury. In addition, the factor accounts for lack of a two-generation reproductive study and lack of data for possible chronic manifestations of the adult effects (e.g., paresthesia that was observed during gestation). EPA also considers whether to incorporate a modifying factor to address limitations on the data used (e.g., number of animals, sex of animals). The default value of one was used for the modifying factor. Additional discussion regarding the uncertainty factor based on the Marsh et
al 1987, is excerpted from the Mercury Study Report to Congress, 1997, see "Addendum" for this information.

The fish intake rate of 6.5 gm/day is from a national, 30-day survey (the National Purchase Diary), based on an empirical distribution, where 6.5 gm/day represents the average value for the general population. Regarding the fish consumption analysis, the commenter is incorrect on several points.
First, although EPA agrees that fish consumption distributions do tend to be skewed, the Agency disagrees that they follow a Poisson distribution. Nor has the commenter demonstrated that fish consumption follows a Poisson distribution. On the contrary, numerous studies have shown that average fish consumption rates are generally approximated by log-normal distributions. This is specifically true

for the CSFII survey data that the commenter references. The commenter is also incorrect that "many people eat little or no fish." According to the National Purchase Diary (NPD), the basis of the 6.5 gm/day intake rate, 94 percent of the survey respondents stated that they eat some fish. It is not EPA's intention to specifically protect non-consumers of fish. However, survey designs generally, and the referenced CSFII survey in particular, do not allow segregating the data to isolate consumers from non-consumers. The only determination that can be made from the CSFII data is whether a respondent did or did not eat fish during the three consecutive survey days. Therefore, the extrapolation made by the commenter that only 31 percent of the population are fish consumers is incorrect. The commenter is also incorrect that the basis of the chosen intake rate is for males ages 15-44 years. The 6.5 gm/day is based on all respondents from the NPD and, therefore, is representative of males and females in the general population. Further, the "per capita" data submitted by the commenter (from the 1996 draft version of the Mercury Study Report to Congress) are based on rates that include marine species (not used in the water quality criteria derivations), in additon to the estuarine/freshwater species that do comprise the value used in deriving water quality criteria. For additonal discussion regarding the basis of the fish consumption rate, including the exclusion of marine species, see the response to this issue in CTR-002-002a.

Regarding the choice of body weight, see response to CTR-006-001a. Regarding the issues on bioaccumulation, see response to CTR-002-007b.

Comment ID: CTR-006-003
Comment Author: Natural Resources Defense Cncl
Document Type: Environmental Group
State of Origin: CA
Represented Org:
Document Date: 09/22/97
Subject Matter Code: C-01 Mercury
References:
Attachments? Y
CROSS REFERENCES

Comment: Dear Ms. Frankel,

The Natural Resources Defense Council strongly opposes the Region 9 EPA proposal to raise the allowable mercury criterion for continuous concentration in water from 0.012 parts per billion (ppb) to 0.770 ppb for aquatic life. This proposal is difficult to justify from the point of view of science and of public health. On behalf of our over 350,000 members nationwide and our over 55,000 California members, we are writing to register our opposition to the EPA proposed rule.

Mercury is a highly poisonous metal which results in toxicity to the brain and nervous system and toxicity to human reproduction. In addition, in sediments, mercury is bio-transformed into the even more toxic form, methyl mercury, which has resulted in some of the largest epidemics of neuro-developmental poisoning known to mankind. Methyl mercury bioaccumulates in the food chain and thereby results in greatly concentrated exposures to humans, because we eat off the top of the food chain. Underestimates of the toxicity and bioaccumulation of mercury have led to major mistakes in the past. The Minamata Bay disaster in Japan was caused by a failure to predict the potency of mercury and the extent of human exposure through fish. U.S. EPA's Draft Mercury Study Report to Congress documents that children of high-end fish consumers in the U.S. may be exposed to enough mercury to cause adverse

neuro-developmental effects.

In this setting it is anomalous to relax the standards for mercury contamination in California water. Furthermore, the scientific reasoning behind the Region 9 EPA decision to relax the mercury standard 60-fold is fraught with errors. NRDC's major concerns with this approach are summarized below.

*Extrapolation for the Reference Dose (RfD) should start at a NOAEL, not at a level of 10% increased risk. *An additional 10-fold safety factor should be added in deriving the RfD to account for the vulnerability of fetuses, infants, and children. *The body weight in the calculation should be for a child, not an adult male. *The Fish consumption rates for those who do eat fish should be used instead of rates for the entire population including those who do not eat fish. *Average fish consumption quantities greatly understate the risk to those who eat a lot of fish. Instead, fish consumption for the top 5% of the population should be used. *Bioaccumulation is known to be 10 to 100 fold greater than the estimate used by EPA. *California's waters are already too polluted with mercury.

The Bioconcentration Factor is Incorrect

The proposed EPA rule calculates a bioconcentration factor (BCF) in fish of 7300. Available data from the state of California indicates that this factor is wrong by between IO and I 00-fold. In the Great Lakes, mercury has been shown to accumulate with bioaccumulation factors (BAF) of 27,900 for trophic level 3 fish and 140,000 for trophic level 4 fish. Despite this evidence, EPA rejects these data for use in California and calculates a BCF more than 10-fold lower based on a model created 27 years ago. In fact, current data are available on bioaccumulation in California fish.

The San Francisco Bay Regional Monitoring Program has found BAFs of 60,000 to 200,000 in bivalves and research in California lakes has found a calculated BAF of over 500,000 fold. These data have been presented elsewhere in the rulemaking record by researchers from the University of California at Santa Cruz. Underestimating by one to two orders of magnitude the amount of bioaccumulation that will occur in the environment is a major error with potentially devastating public health implications. The potential result is that water will contain "permissible" concentrations of mercury while fish will be contaminated at levels too high for safe human consumption.

California is already Suffering from Mercury Pollution

Numerous water bodies in the state of California are already under fish advisory for mercury. These include Clear Lake, Lake Berryessa, the San Francisco Bay and Delta, Lake Herinan, Guadalupe Reservoir, Calero Reservoir, Almaden Reservoir, Guadalupe River, Guadalupe Creek, and Lake Nacimiento. In the face of this widespread environmental pollution with mercury, all incentives should be driving toward further reduction of mercury emissions and releases to water sources. By relaxing the mercury standards for water, U.S. EPA is heading in absolutely the wrong direction. Increases in allowable levels of mercury in the environment can only lead to more contaminated fish, more fish advisories, more pregnant women and children potentially exposed to this toxic metal, and more risks to public health.

NRDC strongly urges Region 9 EPA to reassess the proposed standard for mercury. Recalculation of the reference dose to accommodate the known disproportionate impact of mercury on fetuses, infants, and children will require addition of at least another 10-fold safety factor. The starting point for RfD calculation should be a true NOAEL. The body weight calculation should use an average weight for a child. Fish consumption data should reflect the "high-end" consumer. Finally, the outdated and unsupportable bioaccumulation factor of 7300 should be discarded in favor of a BAF which is supported

by the current science in California.

Response to: CTR-006-003

Regarding the commenter's statements on the Reference Dose (RfD), refer to the responses on this same issue in CTR-006-001a and CTR-006-002a. Regarding the bioaccumulation issue, see response to CTR-002-007b.

Comment ID: CTR-016-007
Comment Author: San Francisco Bay RWQCB
Document Type: State Government
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-01 Mercury
References:
Attachments? Y
CROSS REFERENCES

Comment: Comments on the Proposed Mercury Criteria

The Regional Board supports the use of the current Reference Dose from IRIS in deriving the proposed mercury criteria, but we do not agree that the proposed weighted practical average BCF is appropriate for several reasons.

First, is has been our experience that accurate models of bioaccumulative metal uptake require detailed understandings and representations of biogeochemical cycling in aquatic environments. In the absence of a much more detailed, criteria derivation method that accounts for differences between aquatic environments, the Board agrees with current EPA policy that the BAF model used in the Great Lakes Initiative is a more technically sound approach for addressing bioaccumulative substances than approaches using BCFs.

Second, we disagree with EPA's conclusion that data are lacking to determine if the Great Lakes' BAFs are appropriate for use in California. There are ample data sets for derivation of BAFs for coastal waters and the major estuary in the State, as well as detailed water column, invertebrate, and fish tissue data available for mercury in the Sacramento River watershed and reservoir systems affected and unaffected by mercury.(*1) The Board encourages EPA to conduct the same level of analysis for the State of California as it did for the Great Lakes Region using existing data. Towards that end, we have calculated BAFs for two trophic levels for the San Francisco Bay Estuary using data from the San Francisco Buy Regional Monitoring Program according to the methodology outlined in the Great Lakes Initiative. For bivalves (trophic level 3), the field-measured BAF is 23,435; for trophic level 4 fish species typically caught by local fishermen, the field-measured BAF is 144,335.(*2)

The next set of comments relates specifically to the proposed "weighted average practical BCF" method. As written, we believe this method would be appropriate if the goal were to calculate the maximum marginal increase in mercury dose that a population could receive without exceeding the RfD. In other words, this approach allows the weighted dietary average to "dilute" the effects of high levels of mercury in individual water bodies. We do not believe that such an approach is appropriate for the derivation of

criteria that will be used to determine whether mercury levels are affecting uses of individual water bodies in California. Instead, consideration should be given to protecting established beneficial uses that rely on water quality in one stream segment. Our second comment is that it is not clear why EPA is including data for open ocean levels of mercury in the derivation of criteria for inland and estuarine waters. Third, it is also not clear whether the referenced BCFs pertain to the dissolved mercury fraction, or total recoverable and if the latter, why the proposed criteria are in terms of the dissolved fraction. Nor is it clear that the data used to derive the early BCFs were obtained using the ultra clean sampling techniques necessary to obtain true water column concentrations. Improper sampling and analytical techniques would yield higher water column values and lower BCFs than the true measurements.

In summary, the Regional Board requests that EPA calculate an appropriate set of BAFs for mercury applicable to the State of California and not adopt the criteria derived using the proposed method. The proposed mercury criteria are under protective of California waters by several orders of magnitude, and the implicit public concern being protected (average diet of the state's population) is inappropriate. For example, San Francisco Bay is currently listed as a water quality limited segment due to high levels of mercury in fish tissue. The mean dissolved mercury concentration in San Francisco Bay is 0.0019 ug/I and no samples have ever exceeded EPA's proposed standard of 0.05 ug/l.

(*1) It is our understanding that extensive data sets exist for at least Clear Lake, Lake Nacimiento, Cache Creek, Walker Creek, Marsh Creek, the Sacramento River, and the New Almaden mining area. These water bodies encompass most of the types of aquatic systems where mercury levels pose water quality threats in the State.

(*2) Both of these calculations are based on high quality data sets and report wet weight tissue concentrations and dissolved mercury concentrations. Because of the time constraints for comments, they are, however, first-cut estimates using mean reported values. The derivation of a BAF for San Francisco Bay can be made much more precise by separating out location, time, specific species, deployment variables (such as size, growth, and post-deployment bioaccumulation), and available TOC using this data base.

Response to: CTR-016-007

EPA acknowledges the San Francisco Bay Regional Water Quality Board's agreement with EPA's position that a BAF model better represents bioaccumulation potential than a BCF. As noted by the commentor, the issue of mercury bioaccumulation is very complex. EPA is working to improve the knowledge base on mercury bioaccumulation and is in the process of updating its overall method for assessing bioaccumulation and deriving BAFs. EPA's National human health water quality criteria are based on national averages of fish consumption from all relevant sources, which is why the PBCF is based on a weighted average that includes open ocean data. The mercury PBCFs and criteria for human health protection are based on total mercury, not the dissolved total form. Only the freshwater and saltwater CMC and CCC are based on the dissolved inorganic form (Hg-II). For further response to the bioaccumulation issue, refer to response to CTR-002-007b.

Comment ID: CTR-020-004a
Comment Author: City of Stockton
Document Type: Local Government
State of Origin: CA
Represented Org:

Document Date: 09/24/97
Subject Matter Code: C-01 Mercury
References:
Attachments? Y
CROSS REFERENCES

Comment: II. Use of New Scientific Information

The City acknowledges and supports EPA's update of several water quality criteria including those for mercury, cadmium and arsenic. While a number of criteria were updated to reflect current scientific information, there are a few notable exceptions.

The following briefly addresses the key updates and omissions that should be addressed in the final publication of this rule.

A. Criteria that Fail to Reflect Updated Scientific Information

1. Mercury

Mercury criteria were significantly corrected, and the City supports this action. The acute criteria were changed to the dissolved form, the misclassified chronic criteria were changed from 0.012 ppb to 770 ppb, and the human health fish tissue-based criteria were raised from 12 parts per trillion ("ppt") to 50 ppt and now apply at harmonic mean flows. These corrections appear to reflect the latest available scientific information. EPA indicated that the human health criteria were based upon fish tissue contaminant levels. Because the underlying basis for the criteria is an assumed fish tissue contamination level, the human health criteria should either (1) allow for adjustment of the criteria where it is apparent that fish tissue levels are acceptable but the criteria may be exceeded or (2) specify that information on fish tissue contamination may be used as a screening tool to determine if the discharge has a reasonable potential to cause exceedance of the criteria. If the fish tissue data indicate that the existing discharge is acceptable, no limitation should be included in the permit.

Response to: CTR-020-004a

EPA acknowledges the commenter's support for the criteria reflecting the latest scientific information, notwithstanding the fact that the commenter has incorrectly referred to the previous aquatic life criterion of 12 ppt as the previous human health value. Regarding the two options that the commenter presents for human health criteria when the underlying basis is a fish tissue concentration, EPA disagrees that the first option is a plausible scenario, given the BCF-based calculation. EPA believes the reverse scenario is far more likely (i.e., when the fish tissue levels are not acceptable but the water column value is not exceeded). For the second option, EPA agrees that the use of fish tissue is more acceptable for back-calculating from fish tissue concentrations to ambient concentrations in order to determine remaining assimilative capacity.

Comment ID: CTR-020-004b
Comment Author: City of Stockton
Document Type: Local Government
State of Origin: CA
Represented Org:

Document Date: 09/24/97
Subject Matter Code: C-01 Mercury
References:
Attachments? Y
CROSS REFERENCES

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Response to: CTR-020-004b

See response to CTR-020-004a.

Comment ID: CTR-027-012c
Comment Author: California SWQTF
Document Type: Storm Water Auth.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-01 Mercury
References: Letter CTR-027 incorporates by reference letters CTR-001, CTR-036 and CTR-040
Attachments? N
CROSS REFERENCES C-22
C-24
G-09
G-05

Comment: PROVISIONS OF THE PROPOSED RULE WE SUPPORT

Not withstanding the above comments, we believe there are certain elements of the proposed rule with respect to establishing water quality standards that we can support:

* Metal criteria expressed in the dissolved fraction rather than expressed in the total recoverable fraction.

* Metal criteria that are developed as a function of the water-effect-ratio (WER).

* The current proposed human health criterion for mercury.

* The current preamble language regarding metal translators and mixing zones.

We believe the above provisions provide a more acceptable, scientific approach to the water quality-based pollution control approach. We recommend these provisions of the current rule remain as proposed.

Response to: CTR-027-012c

EPA acknowledges the commenter's support of the rule.

Comment ID: CTR-030-006
Comment Author: Utility Water Act Group
Document Type: Trade Org./Assoc.
State of Origin: DC
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-01 Mercury
References:
Attachments? Y
CROSS REFERENCES

Comment: B. The Proposed Mercury Human Health Criterion is Technically Deficient

EPA proposes a human health criterion for mercury of 50 nanograms per liter for California. 62 Fed. Reg. at 42,194. This criterion, while substantially less stringent than that applied in the Great Lakes Water Quality Rule, is technically deficient because assumptions used in developing the criterion are not scientifically defensible. For example, the Bioconcentration Factor (BCF) used in the criterion equation assumes a "steady state" relationship between mercury levels in the water column and mercury levels in fish. In fact, the California proposal's preamble states "the BCF is defined as the ratio of chemical concentration in the organism to that in the surrounding water." 62 Fed. Reg. at 42,179, col. 3. The preamble also references EPA's water quality criteria document for mercury, which stipulates that "These [BCF] calculations depend upon a number of assumptions. The basic assumption is that, on the average, the concentration of methylmercury in fish muscle is related to the concentration of total mercury in water. This might be true if (1) methylmercury on the average is a constant fraction of total mercury in water . . . " Ambient Water Quality Criteria for Mercury, EPA 440/5-80-058 (October 1980) (Mercury Criteria Document) at C-25 to C-28. However, the ratio of mercury in the water column to mercury

levels in fish is not a "steady state" but can vary by as much as a factor of 100, particularly in streams and littoral areas of larger bodies of water. This variability is described at length in the Proceedings of the Third International Conference on Mercury as a Global Pollutant, reprinted in Water, Air and Soil Pollution Journal 80 (1-4) 1995 (Proceedings of Third International Conference). The preamble to the California proposal does not address the variability of totalmercury concentrations in the water column, but acknowledges the variability in the ratio of methylmercury to total mercury concentrations in the water column, stating:

To a considerable degree the magnitude of the BAF for mercury in a given system depends on how much of the total mercury in that system is present in the methylated form. Methylation rates vary widely from one aquatic system to another for reasons that are not fully understood.

62 Fed. Reg. at 42,180, cols. 1-2. Having acknowledged that methylation rates vary widely, EPA should not employ a model which is preconditioned on the existence of constant methylation rates.

UWAG also notes the following additional questionable assumptions of the proposed criterion.

* The criterion does not adequately acknowledge fate and transport processes such as evasion and deep sediment burial, which in many aquatic systems can remove 90 percent or more of the available mercury. Although the California proposal incorporates the concept of mixing zones, mixing zones only provide for partial consideration of the fate and transport mechanisms which reduce water column concentrations of mercury. Fate and transport processes - particularly evasion - take place over several days whereas mixing is a more instantaneous process. Since fish bioaccumulate mercury over their lifespan, it is the range of mercury concentrations that fish experience over their entire life (and not the concentration at the edge of a mixing zone) which is of concern. A subcommittee of EPA's Science Advisory Board (SAB) has criticized EPA's fate and transport models for ignoring evasion. In its recent report, the Subcommittee states: "It is unfortunate that soil and water loss degradation constants were not incorporated in the model. Several recent studies have shown that (elemental) Hg production and evasion are common processes in soils and surface waters." SAB, Report of the Mercury Review Subcommittee, Executive Committee Review Draft, dated June 30, 1997, p. 30.

* The RfD is inappropriate because it is based on a chronic exposure study done in Iraq under poor field conditions. Newer and much better data are available from a number of studies, including those conducted in the Seychelles Islands. (See 11 papers presented in Neurotoxicology Vol. 16, no. 4 (1995)). These data should be evaluated and should result in a larger RfD.

* The California proposal's BCFs (*2) are not valid because they use erroneous water column concentrations and arbitrary fish concentrations. The open ocean mercury concentration of 15 ng/l apparently was taken from an outdated 1979 report by Fitzgerald. In more recent peer-reviewed literature, Fitzgerald identifies the open ocean mercury concentration as more than ten fold less than the cited values (see Proceedings of Third International Conference, particularly "Methylation and Elemental Mercury Cycling in Surface and Deep Ocean Water of the North Atlantic" by Mason, Rolfus and Fitzgerald). The 17 ng/l estuarine and 40 ng/l fresh water values are similarly off by a factor of ten.(See Proceedings of Third International Conference, particularly "Mercury Speciation in the Scheldt Estuary" by Leermakers et al., and "Mercury Concentrations in Two Great Waters" by Cleckner et al.) Moreover, the range of concentrations between water bodies is great and prompted the SAB Subcommittee to conclude that BAFs (and, presumably, BCFS) can only be derived and used on a site-specific basis. The Subcommittee similarly concluded that fish mercury concentrations between various species in a given body of water vary dramatically.

* Furthermore, the BCFs are not valid for use in the California proposal because they were developed primarily on the basis of species from the Eastern half of the United States and the Atlantic Ocean (e.g., sardines). See Mercury Criteria Document.

For all of these reasons, UWAG believes the proposed human health mercury criterion is fundamentally flawed and should be subject to rigorous reevaluation by the Agency.

(*2) The term BCF is used inconsistently in the California proposal's preamble and in the Mercury Criteria Document. In the preamble, BCF is defined as fish uptake of mercury by respiration alone and specifically excludes mercury uptake through ingestion of food. The preamble goes to considerable length to explain that uptake by both respriation and ingestion is a different process defined as bioaccumulation. The preamble explains that a criterion based on bioaccumulation is not being considered at this time but may be incorporated into future rulemakings. The preamble then explains how its bioconcentration values were taken from the Mercury Criteria Document. That document, however, uses the term "bioconcentration" in a completely different sense. Bioconcentration, as used in the Mercury Criteria Document, is actually bioaccumulation as defined in the 1997 preamble. The Mercury Criteria Document derives its bioconcentration values from actual fish levels measured in ocean and lake fish caught for commercial purposes. Consequently, those fish were exposed to mercury both from the water column and from their food sources. Bioconcentration factors (as the term is defined in the 1997 preamble) can only be obtained from fish reared in carefully constructed laboratory experiments where the diet is purposefully devoid of the naturally occurring mercury commonly found in natural forage.

Response to: CTR-030-006

EPA agrees with the commenter that considerable variability can exist in both total and methymercury concentrations in the water column. However, predicting the amount of methylmercury present for a given concentration of total mercury is very difficult. The amount of methylmercury formed is affected by numerous chemical, physical, and biological factors which are not well understood. Examples of these include: foodchain interactions; physicochemical parameters (e.g., pH, temperature, dissolved and particulate organic matter); and size and type of watershed. It is readily acknowledged that mercury is toxic, causing a variety of adverse effects to both humans, fish, and wildlife. Thus, methods are need to assess mercury exposure and effects, and to control its release to the environment. These issues are discussed in the Mercury Study Report to Congress, (EPA-452/R-97-008); The National Survey of Mercury Contamination in Fish. Database Summary 1990-1995. September 29, 1997; 1995 Updates: Water Quality Criteria Documents for the Protection of Aquatic Life in Ambient Water, (EPA-820-B-96-001); and Final Water Quality Guidance for the Great Lakes System: Final Rule. Fed Register, 60(56):15366-15425 (March 23, 1995). EPA is not aware of any method to accurately predict concentrations of methylmercury in the water column and subsequent bioaccumulation in aquatic biota, nor does the commenter suggest any method. Although there are a few fate/transport models that could be used to assess the fate of mercury in the environment, these models are still in developmental stages, have only been applied under a narrow range of environmental and biological conditions, and will require validation before they are ready for use on a broad scale. Therefore, EPA believes that the use of BCFs represents the most appropriate method at this time for use in the CTR. Furthermore, as suggested by the commenter, EPA is currently undergoing a comprehensive review of the human health mercury criteria, in addition to the overall hman health criteria derivation methodology. Once this review is complete, EPA intends to revise its National human health mercury criteria, and subsequently update California's mercury criteria. For further response to the bioaccumulation issue, refer to response to comment for

CTR-002-007b.

Regarding comments on the Reference Dose (RfD), EPA has on two occasions published RfDs for methyl mercury which have represented the Agency consensus for that time. These are described in the sections below. The original RfD of 0.3 @g/kg/day was determined in 1985. The current RfD of 0.1 @g/kg/day was established as Agency consensus in 1995, based on the study by Marsh et al. 1987. The Agency is aware of all the additional data that have become available since the calculation of the current RfD. At the time of the generation of the Mercury Study Report to Congress, it became apparent that considerable new data on the health effects of methyl mercury in humans were emerging. Among these are large studies of fish, or fish and marine mammal, consuming populations in the Seychelles and Faroes Islands. Smaller scale studies are in progress which describe effects in populations around the Great Lakes.

However, as much of this new data have either not yet been published or have not yet been subject to rigorous peer review, it was decided that it was premature for EPA to make a change in the 1995 methyl mercury RfD at this time. This decision was approved by the Science Advisory Board (SAB), a public advisory group providing extramural scientific information and advice to the Administrator and other officials of the EPA. The SAB is structured to provide balanced, expert assessment of scientific matters relating to problems facing the Agency. Their report makes the following statement.

"In general, from the standpoint of looking at human health effects and the uncertainties, the draft report is a very good document and an important step forward in terms of bringing the relevant information together into one place for the first time. The current RfD, based on the Iraqi and New Zealand data, should be retained at least until the on-going Faroes and Seychelles Islands studies have progressed much further and been subjected to the same scrutiny as has the Iraqi data."

The SAB report continues:

"Investigators conducting two new major prospective longitudinal studies--one in the Seychelles Islands the other in the Faroe Islands--have recently begun to publish findings in the literature and are expected to continue releasing their findings during the next 2-3 years. These studies have advantages over those cited in the previous paragraph in that they have much larger samples sizes, a larger number of developmental endpoints, potentially more sensitive developmental endpoints, and control a more extensive set of potential confounding influences. On the other hand, the studies have some limitations in terms of low exposures (to PCBs in the Faroes) and ethnically homogenous societies. Since only a small portion of these new data sets have been published to date and because questions have been raised about the sensitivity and appropriateness of the several statistical procedures used in the analyses, the Subcommittee concluded that it would be premature to include any data from these studies in this report until they are subjected to appropriate peer review. Because these data are so much more comprehensive and relevant to contemporary regulatory issues than the data heretofore available, once there has been adequate opportunity for peer review and debate within the scientific community, the RfD may need to be reassessed in terms of the most sensitive endpoints from these new studies."

An inter-agency process, with external involvement, will be undertaken for the purpose of reviewing these new data, their evaluations, and the evaluations of existing data. An outcome of this process will be an assessment by EPA of its RfD for methyl mercury to determine if a change is warranted.

Comment ID: CTR-030-007

Comment Author: Utility Water Act Group
Document Type: Trade Org./Assoc.
State of Origin: DC
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-01 Mercury
References:
Attachments? Y
CROSS REFERENCES

Comment: C. EPA Should Delay Promulgation of a Mercury Human Health Criterion Until SAB Subcommittee Comments

In forming a SAB subcommittee to comment on its draft Mercury Report to Congress, EPA has engaged a group of very knowledgeable scientists to assist it in understanding the fate and transport of mercury. That subcommittee has prepared draft comments and will finalize those comments within the next few months. EPA should review and evaluate the Subcommittee's final comments before promulgating mercury criteria for California.

Response to: CTR-030-007

EPA has reviewed and incorporated all of the SAB subcommittee's final comments that are possible to incorporate at this time. However, there are further analyses on mercury that are in progress. EPA has entered into an 18-month agreement with the National Academy of Sciences (NAS) to resolve outstanding issues with the mercury risk assessment. Additionally, EPA is in the process of developing methods to more accurately measure bioaccumulation, as part of the revisions to the human health methodology for deriving water quality criteria. After finalization of the methodology and completion of the NAS agreement, EPA intends to update its criterion for mercury. Until that time, EPA believes that the proposed CTR criteria value for mercury is appropriate and reflects the best available scientific information.

Comment ID: CTR-032-006a
Comment Author: Las Gallinas Val. Sanitry Dist
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-01 Mercury
References: Letter CTR-032 incorporates by reference letter CTR-035
Attachments? N
CROSS REFERENCES C-24

Comment: Mercury Criteria

The District supports the proposed revised human health criteria for mercury based on updated IRIS information. The District also supports EPA's decision (CTR P. 42180) not to apply the bioaccumulation factor (BAF) developed for the Great Lakes Initiative to the CTR mercury criteria. We agree that mercury methylation rates vary widely and are not well understood, particularly for amalgam related

mercury. We believe that adoption of a national BAF under consideration as part of the "Mercury Study Report to Congress: SAB Review Draft" is inappropriate for California, particularly for the complex San Francisco Bay system. CDA recommends that EPA direct the State to develop a site specific objective (SSO) for mercury for San Francisco Bay based on a site specific BAF and data on natural cleanup processes and methylation processes. The proposed CTR criteria should serve as interim criteria until the SSO is developed and adopted.

Response to: CTR-032-006a

EPA acknowledges the commenter's support of the rule. Regarding the recommendation for a "site-specific objective" for mercury in San Francisco Bay, EPA always advocates that states develop site-specific criteria when local data are available. However, EPA also believes that protective defaults are appropriate.

Comment ID: CTR-035-002b
Comment Author: Tri-TAC/CASA
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-01 Mercury
References:
Attachments? N
CROSS REFERENCES C-22
C-08a
G-05
G-04
G-09
K-01
C-24a

Comment: Second, we commend EPA for its inclusion in the CTR of several innovative and flexible regulatory approaches, such as metals criteria expressed as dissolved rather than total recoverable concentrations, and the revised human health criterion for mercury. In addition, in light of the issues surrounding the human health criteria for arsenic we support EPA's decision not to promulgate human health criteria at this time. With respect to implementation issues discussed in the Preamble, we support EPA's policies and guidance regarding the application of mixing zones and dilution credits. the use of interim permit limits while Total Maximum Daily Loads (TMDLs) and other special studies are being performed, and EPA's guidance to Regional Water Quality Control Boards (RWQCBs) that they may use any of the methods described in EPA's guidance document on the use of translators. We also support EPA's proposal to create a rebuttable presumption for Water Effects Ratios (WERs), allowing the RWQCBs and SWRCB to develop site-specific WERs that can be approved by EPA during the NPDES permit approval process. We believe that this approach will help facilitate the development of appropriate site-specific adjustments for metals criteria.

Response to: CTR-035-002b

EPA acknowledges the commenter's support of the rule.

Comment ID: CTR-035-026
Comment Author: Tri-TAC/CASA
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-01 Mercury
References:
Attachments? N
CROSS REFERENCES

Comment: pp. 42179-42180 -- Mercury Criteria We support EPA's promulgation of revised human health criteria for mercury based on updated IRIS information We also support EPA's decision not to apply the bioaccumulation factor (BAF) developed for the Great Lakes in the Great Lakes Initiative to the CTR mercury criteria. We agree that there is insufficient evidence at this time to substantiate whether this is an appropriate BAF for California. Further, we question whether a single BAF should be developed in the future for California, given the varied nature of the water bodies in the State -- ranging from the Bay-Delta in northern California to concrete-lined effluent-dominated streams and the saline, agricultural drainage-dominated Salton Sea in southern California -- as well as the variation in methylation rates and the amount of methylated mercury in these varied ecosystems. For these reasons, we also doubt that it is possible to derive a valid national BAF for mercury.

Response to: CTR-035-026

EPA acknowledges the comment on the Agency's choice not to use a BAF for the mercury criterion. EPA believes that the use of a BCF is most appropriate at this time for the CTR. EPA further understands the complexity surrounding the issue of bioaccumulation and is currently working on improving its methodology, including evaluating the impact that the type of water body has on bioaccumulation.

Comment ID: CTR-038-002c
Comment Author: Sonoma County Water Agency
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-01 Mercury
References:
Attachments? Y
CROSS REFERENCES C-22
C-24a
G-04
G-05
G-09

Comment: 2. The following provisions of the rule are supported (1) adoption of metals criteria as dissolved concentrations; (2) expression of the metals criteria as a function of the water-effect ratio; (3) adoption of the proposed new human health criterion for mercury; and (4) the Preamble discussions regarding metals translators, mixing zones, and interim permit limits.

Response to: CTR-038-002c

EPA acknowledges the provisions of the rule supported by the commenter.

Comment ID: CTR-039-005
Comment Author: San Francisco BayKeeper
Document Type: Environmental Group
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-01 Mercury
References:
Attachments? N
CROSS REFERENCES

Comment: III. EPA'S PROPOSED MERCURY NUMBER IS FLAWED BECAUSE IT IGNORES RELEVANT DATA REGARDING ITS POTENTIAL TO BIOACCUMULATE

EPA's proposed mercury number, in addition to using an inappropriate fish and shellfish consumption rate, also fails to factor in bioaccumulation of mercury into fish tissue. Assuming EPA is accurate in that it does not know the specific potential for mercury to bioaccumulate in waters of the State of California, it is certain that some rate of bioaccumulation is occurring. Unfortunately, EPA only applies a bioconcentration factor, ignoring the mercury that is entering fish through their own food consumption. In fact, in at least one region of the State -- the San Francisco Bay area -- there is ample data from which an accurate bioaccumulation factor can be determined. See Comments of Communities For A Better Environment. That factor is comparable to the rate of bioaccumulation observed in Great Lakes fish, which is from four times to 20 times greater than EPA's proposed bioconcentration factor.

Response to: CTR-039-005

EPA acknowledges the comments made on the use of BCFs. EPA believes that this represents the most appropriate method at this time for use in the CTR. EPA further understands the complexity surrounding the issue of bioaccumulation and is currently working on improving its methodology. Regarding the fish consumption rate, see the response to this issue in CTR-002-002a. Regarding bioaccumulation and available data from the San Francisco Bay area, see response to CTR-002-007b.

Comment ID: CTR-040-002b
Comment Author: County of Sacramento Water Div
Document Type: Storm Water Auth.
State of Origin: CA
Represented Org:
Document Date: 09/25/97

Subject Matter Code: C-01 Mercury
References: Letter CTR-040 incorporates by reference letter CTR-027
Attachments? Y
CROSS REFERENCES C-24a
G-09
G-05

Comment: PROVISIONS SUPPORTED

We support a number of provisions of the Rule, including: (1) adoption of metals criteria as dissolved concentrations; (2) expression of the metals criteria as a function of the water-effect ratio; (3) adoption of the proposed new human health criterion for mercury- and (4) the Preamble discussions regarding metals translators and mixing zones. These provisions provide a firmer scientific base for the water quality-based approach to pollution control and are a marked improvement over the old Inland Surface Waters Plan. We would urge EPA to retain these provisions in the final Rule.

Response to: CTR-040-002b

EPA acknowledges the provisions of the rule supported by the commenter.

Comment ID: CTR-041-004
Comment Author: Sacramento Reg Cnty Sanit Dist
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-01 Mercury
References:
Attachments? N
CROSS REFERENCES

Comment: Third, the District strongly supports the revised human health criteria for mercury, and EPA's recognition that bioaccumulation factors (BAF) from the Great Lakes are highly unlikely to be applicable in the diverse California environment. Consequently, the District does not believe that the proposal to develop a national BAF for mercury is scientifically sound. The use of most recently available and applicable data from EPA's resources to revise the human health criteria is the type of sound scientific procedure that should be used. Similarly, EPA's recognition that mercury methylation, the key to the magnitude of the BAF for a given system, is widely variable and not understood is also welcomed and supported. Given these statements in the proposal, however, EPA's subsequent proposal to develop a national BAF has little merit and is not supported by the District.

Response to: CTR-041-004

EPA disagrees that its effort to derive national default bioaccumulation factors for mercury are inappropriate. EPA acknowledges the complexity of mercury biogeochemical cycling and bioaccumulation in aquatic ecosystems, but believes that need to control mercury risks to humans

warrants the development of national, default human health criteria that reflect the latest science on mercury toxicity and bioaccumulation. EPA is aware of only one comprehensive model on mercury cycling and bioaccumulation that has been developed (the Mercury Cycling Model) and believes, at this time, that the model cannot be extrapolated with sufficient certainty to ecosystems that differ substantially upon which it was based (i.e., northern oligotrophic lakes). This model was specifically developed with northern oligotrophic lakes and reservoirs in mind, and EPA believes at this time it can not be extrapolated with sufficient certainty to ecosystems that differ substantially from this (e.g., streams, rivers, estuaries), and for which mercury bioaccumulation is also an important issue. This uncertainty exists partly because the model represents ecosystem dynamics rather simplistically, though more because of limitations in the science than by preference. Mercury bioaccumulation to higher order trophic levels influenced heavily by the type of food chain (i.e. benthic or pelagic based) and complexity of food chain interactions. The model must make assumptions about food chain interactions that limit the models predictive capability. Uptake and depuration of mercury in natural systems is also difficult to measure and predict, the model must make assumptions about these processes that limit its predictive capability. In order to minimize the effect that model assumptions have on predicting mercury uptake for a given application, it is necessary to have some local hydrological, physical, and biological data to calibrate the model. In most cases, such data is not available. Such limitations are common for most predictive models. Terefore, given the state of the science for the few available models, and because EPA must address mercury bioaccumulation for a broad range of aquatic ecosystems (e.g. lakes, streams, estuaries), EPA believes at this time it is most appropriate to derive BAFs for mercury. EPA is currently collecting data on bioaccumulation for all aquatic ecosystems, however, it is unclear whether BAFs will be developed separately for each type of aquatic system or if one value will be derived for application to all aquatic systems. Therefore, EPA anticipates the need to develop BAFs for mercury which have applicability to a broad range of aquatic ecosystems (rivers, lakes, estuaries). At this time, it is unclear whether BAFs will be developed separately for each type of waterbody because EPA is currently collecting and evaluating mercury bioaccumulation data.

Comment ID: CTR-041-007a
Comment Author: Sacramento Reg Cnty Sanit Dist
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-01 Mercury
References:
Attachments? N
CROSS REFERENCES C-22

Comment: 2. Additional Strong Reasons to Maintain use of Dissolved Metals and Mercury Criteria

The District also has significant economic reasons to support the use of dissolved metals and the updated mercury criteria. Previous District studies have shown that adoption of metal criterion as total recoverable would cost the District more than $50 million a year while reducing metal loads in the Sacramento River by several percent. Likewise, if old mercury criteria were adopted it would cost the District over $100 million a year while reducing mercury loads in the Sacramento River by several percent.

Response to: CTR-041-007a

EPA acknowledges the commenter's support, however the commenter did not provide enough information for EPA to comment on its cost estimate related to total recoverable criteria and the old mercury criteria.

Comment ID: CTR-043-002c
Comment Author: City of Vacaville
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: C-01 Mercury
References:
Attachments? Y
CROSS REFERENCES C-22
C-24a
G-04
G-05
G-09

Comment: 2. The following provisions of the rule are supported: (1) adoption of metals criteria as dissolved concentrations; (2) expression of the metals criteria as a function of the water-effect ratio; (3) adoption of the proposed new human health criterion for mercury; and (4) the Preamble discussions regarding metals, translators, mixing zones and interim permit limits.

Response to: CTR-043-002c

EPA acknowledges the provisions of the rule supported by the commenter.

Comment ID: CTR-044-003c
Comment Author: City of Woodland
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: C-01 Mercury
References:
Attachments? Y
CROSS REFERENCES C-22
C-24a
G-09
G-05
G-04

Comment: We have reviewed the proposed CTR and offer the following comments:

2. The following provisions of the rule are supported:

(1) adoption of metals criteria as dissolved concentrations;

(2) expression of the metals criteria as a function of the water-effect ratio;

(3) adoption of the proposed new human health criteria for mercury; and

(4) the Preamble discussions regarding metals translators, mixing zones, and interim permit limits.

Were the old human health criterion for mercury (0.012 ug/ l) to be adopted, the City would have to remove its discharge from Tule Canal and go to land disposal. The capital cost to do this would be $22.1 million and the total present worth cost would be $23.1 million (see Exhibit B, Required Capital improvements and Costs for Beryllium and Mercury). This would translate to an annual cost of $3.1 million per year (at 7% over 10 years) and would require that monthly sewer service charges be increased by more than 100%.

Response to: CTR-044-003c

EPA acknowledges the provisions of the rule supported by the commenter.

Comment ID: CTR-045-006
Comment Author: Sausalito-Marin Sanitary Dist.
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/24/97
Subject Matter Code: C-01 Mercury
References:
Attachments? Y
CROSS REFERENCES

Comment: The District supports many of the items included in the proposed CTR:

The revised human health criterion for mercury.

Response to: CTR-045-006

EPA acknowledges the commenter's support of the mercury criterion.

Comment ID: CTR-051-003a
Comment Author: Cal. RWQCB Central Valley Reg.
Document Type: State Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: C-01 Mercury
References:

Attachments? N
CROSS REFERENCES

Comment: Mercury

The proposed mercury criteria are not appropriate for California waters and could seriously undermine ongoing regulatory and watershed efforts to address regionwide mercury concerns. In the Central Valley Region, existing ambient concentrations of dissolved mercury are two orders of magnitude lower than the proposed criteria, yet there are widespread beneficial use impairments that result form elevated mercury levels in fish. There are consumer advisories in effect in the Delta, Clear Lake and Lake Berryessa because of elevated fish tissue levels of mercury. There is widespread concern about mercury bioaccumulation in fish and wildlife. Mercury cycling and transfer through the ecosystem is very complicated. More research is needed to determine which sources and forms of mercury, in California, are important in controlling how much mercury is concentrated in aquatic systems. Also, use of national orstatewide fish consumption values are inappropriate. Subsistence fishing is practiced by many of California's subpopulations. Protection of these subpopulations necessitates establishing site specific consumption estimates upon which to base a criterion. For the reasons stated above, the proposed criteria for mercury should not be adopted.

Please call me at (916)255-3087 or Jerry Bruns at (916)255-3093 if you have any questions regarding these comment.

Response to: CTR-051-003a

EPA disagrees that its program to derive national default criteria is inappropriate. EPA understands that conditions vary from state to state and can vary among different site-specific locations within a given state. However, under Section 304(a) of the Clean Water Act, EPA is required to develop, and from time to time revise, such default criteria to help protect human health and designated uses of the nation's water bodies. As such, EPA believes that the criteria program is necessary and appropriate. The State will be translating the state's narrative criteria, site-specifically, to better account for exposure to mercury. The State will also develop regulatory controls that will protect designated uses. If there is widespread beneficial use impairment, then these waterbodies will appear on EPA's 303 list for TMDL development and protective target goals for the waterbodies will be addressed as part of that process. In addition, EPA will be updating its human health water quality criteria methodology to better reflect exposures through the food chain.

Regarding the fish consumption values chosen, see response to CTR-002-002a.

Comment ID: CTR-051-003b
Comment Author: Cal. RWQCB Central Valley Reg.
Document Type: State Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: C-01 Mercury
References:
Attachments? N

CROSS REFERENCES

Comment: Mercury

The proposed mercury criteria are not appropriate for California waters and could seriously undermine ongoing regulatory and watershed efforts to address regionwide mercury concerns. In the Central Valley Region, existing ambient concentrations of dissolved mercury are two orders of magnitude lower than the proposed criteria, yet there are widespread beneficial use impairments that result form elevated mercury levels in fish. There are consumer advisories in effect in the Delta, Clear Lake and Lake Berryessa because of elevated fish tissue levels of mercury. There is widespread concern about mercury bioaccumulation in fish and wildlife. Mercury cycling and transfer through the ecosystem is very complicated. More research is needed to determine which sources and forms of mercury, in California, are important in controlling how much mercury is concentrated in aquatic systems. Also, use of national orstatewide fish consumption values are inappropriate. Subsistence fishing is practiced by many of California's subpopulations. Protection of these subpopulations necessitates establishing site specific consumption estimates upon which to base a criterion. For the reasons stated above, the proposed criteria for mercury should not be adopted.

Please call me at (916)255-3087 or Jerry Bruns at (916)255-3093 if you have any questions regarding these comment.

Response to: CTR-051-003b

See responses to CTR-002-007b and CTR-051-003a.

Comment ID: CTR-052-002b
Comment Author: East Bay Dischargers Authority
Document Type: Sewer Authority
State of Origin: SC
Represented Org:
Document Date: 09/26/97
Subject Matter Code: C-01 Mercury
References: Letter CTR-052 incorporates by reference letters CTR-035 and CTR-054
Attachments? Y
CROSS REFERENCES C-22
G-09
G-05
G-04

Comment: EPA will recall the State Water Quality Plans Task Forces that included all stakeholders, including EPA. The Authority appreciates the incorporation of many of the consensus recommendations from the Task Forces into the CTR, including:

* Adoption of the metals criteria as dissolved concentrations and the expression of the criteria as a function of the water-effect ratio

* Adoption of the proposed new human health criterion for mercury

* Preamble discussions regarding metals translators, mixing zones, and interim permit limits

Response to: CTR-052-002b

EPA acknowledges the commenter's support of the consensus recommendations.

Comment ID: CTR-053-003a
Comment Author: Heal the Bay
Document Type: Environmental Group
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: C-01 Mercury
References: Letter CTR-053 incorporates by reference letter 6 and the comments on Dioxin, copper, and the compliance schedule from letter CTR-002
Attachments? N
CROSS REFERENCES C-02b
C-09a

Comment: In spite of our lack of detailed comments for specific criteria, we have concerns regarding any weakening of California's previously developed standards, particularly those for mercury and copper. Also, we question the absence of criteria for dioxin and dioxin-like compounds. In order to ensure these issues are considered in future improvements of the Rule, we incorporate by reference the comments of the Natural Resources Defense Council regarding mercury, and the comments of Communities for a Better Environment ("CBE") regarding dioxin compounds and copper.

Response to: CTR-053-003a

With respect to the comment on mercury see responses to CTR-002-007b and 006-001b. With respect to the comments on copper and dioxin see response to CTR-002-003.

Comment ID: CTR-054-003
Comment Author: Bay Area Dischargers Assoc.
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-01 Mercury
References:
Attachments? Y
CROSS REFERENCES

Comment: BADA supports the adoption of the proposed new human health criterion for mercury. Several of the BADA agencies would have serious attainability problems with the old EPA human health criteria for mercury, whereas none have a problem with the criteria proposed in the CTR. Although we concur with environmental groups testifying at the September 17 hearing that mercury is a major

problem, there is little to be gained through more stringent regulation of point sources. Mercury levels of concern in water and tissue are largely the result of unregulated nonpoint sources, namely abandoned mines and downstream sediments. The way to address mercury is through the watershed management approach and control of nonpoint sources. BADA's support for the new mercury criteria is not meant to imply that BADA agencies are unwilling to implement reasonable source controls aimed at reducing mercury levels in our discharges or to participate in watershed management studies aimed at reducing nonpoint sources of mercury. On the contrary our agencies support and are committed to such activities.

Response to: CTR-054-003

EPA acknowledges the commenter's support of the rule and proposed mercury criterion.

Comment ID: CTR-056-003
Comment Author: East Bay Municipal Util. Dist.
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/22/97
Subject Matter Code: C-01 Mercury
References: Letter CTR-056 incorporates by reference letter CTR-054
Attachments? N
CROSS REFERENCES

Comment: Second, EBMUD would like to express to EPA it support for inclusion of:

* The revised human health criterion for mercury based on data from more current research than for the National Toxics Rule criteria,

Response to: CTR-056-003

EPA acknowledges the commenter's support of the proposed mercury criterion.

Comment ID: CTR-058-010
Comment Author: Western States Petroleum Assoc
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: C-01 Mercury
References:
Attachments? Y
CROSS REFERENCES

Comment: Mercury. WSPA concurs with EPA that mercury BAFs for a particular water body is highly dependent on the amount of organic mercury in that system. At this time WSPA supports the use of the BCFs until a more representative estimate of BASFs in pertanent water bodies in California can be

established.

Response to: CTR-058-010

EPA agrees with these comments supporting a five year compliance schedule.

Comment ID: CTR-059-009
Comment Author: Los Angeles County Sanit. Dist
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: C-01 Mercury
References: Letter CTR-059 incorporates by reference letter CTR-035
Attachments? Y
CROSS REFERENCES

Comment: Mercury Human Health Criteria

EPA has proposed human health criteria for mercury for consumption of water and organisms (0.05 ug/L) and for consumption of organisms only (0.051 ug/L). We have a number of concerns about these criteria and recommend that EPA defer adoption or revise them for the final rule.

First, we can find no basis for the range of Bioconcentration Factors (BCFs) listed in the CTR Administrative Record Matrix (ARM). The ARM lists BCFs for mercury ranging from 3,765 to 9,000. No specific references are provided in the 1986 criteria document (the "Gold Book") for mercury for the derivation of the BCFs. EPA should provide information on the scientific basis for the derivation of the BCFs used to derive the mercury criteria. The discussion in the Preamble (p. 42179) indicates that there are three different BCFs for fresh water, estuarine waters, and the open ocean. This indicates that it would be most appropriate to calculate separate criteria for each type of water (i.e. fresh, estuarine, and ocean). More to the point, the Preamble also indicates that methylation rates vary widely from one aquatic system to another, thus making it difficult to know the actual potential for bioaccumulation in surface waters in California (p. 42180). Therefore, we believe that for mercury it is necessary for EPA to derive California-specific BCFs for different types of water bodies before adopting human health criteria for mercury in the CTR. At a minimum, separate freshwater and estuarine criteria should be developed. Alternatively, EPA could defer to the State for adoption of appropriate regional or site-specific mercury criteria by RWQCBs using local fish tissue concentration data.

Response to: CTR-059-009

The scientific basis for the range of BCFs is stated in the 1980 ambient water quality criteria document for mercury (Report No. EPA 440/5-80-058), which was part of the CTR Administrative Record Matrix. EPA acknowledges the comment on the differences between types of water bodies (i.e., fresh, estuarine, and ocean) and the Agency is currently evaluating the need to develop separate BAFs for such different water body types. For further response to the bioaccumulation issue, refer to response to CTR-002-007b.

Comment ID: CTR-060-008
Comment Author: San Diego Gas and Electric
Document Type: Electric Utility
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: C-01 Mercury
References:
Attachments? N
CROSS REFERENCES

Comment: PROVISIONS SDG&E DOES NOT SUPPORT

As described in the following comments SDG&E does not support the following provisions:

Mercury human health criteria is technically deficient

The mercury human health criterion has used unrealistic assumptions in developing the criterion, including: * the Bioconcentration Factor (BCF) used in calculating the criterion assumes a steady state condition between the mercury concentrations in the water column and fish. The preamble itself acknowledges that there is significant variability in the ratio of water column to fish concentrations (see 62 Fed. Reg. at 42,180, Cols. 1-2). Consequently, EPA should not endorse the use of a single BCF for all California waters. * the BCFs were developed primarily on the basis of species from the Eastern half of the United States and the Atlantic Ocean (e.g., sardines) (See Ambient Water Quality Criteria for Mercury, EPA 440/5-80-058, October 1980) and are not valid for use in the California proposal.

EPA should delay promulgation of a mercury human health criterion until the Science Advisory Board (SAB) Subcommittee comments on EPA's report to congress on mercury

EPA has formed a SAB Subcommittee to comment on its draft Mercury Report to Congress. This Subcommittee is reviewing the fate and transport of mercury which are important factors in developing the mercury human health criterion. EPA should postpone the adoption of the proposed CTR criterion until the final report from this committee is available so that the SAB's findings can be reviewed and incorporated into the CTR criterion.

Response to: CTR-060-008

EPA acknowledges the complexity of issues associated with steady state assumptions when calculating criteria. EPA also believes that it has used appropriate assumptions based on the best methodologies currently in-place. EPA is currently working to enhance its methodology to address these complex issues. Further, once EPA develops the BAF-based human health water quality criteria, EPA will work with the State of California to adopt either that recommended value or a value that is consistent with the final methodology. For additional discussion, refer to responses on CTR-002-007b, CTR-030-007, and CTR-041-004.

Comment ID: CTR-061-012
Comment Author: G. Fred Lee & Associates

Document Type: Academia
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-01 Mercury
References:
Attachments? Y
CROSS REFERENCES

Comment: Page 42168, third column, first paragraph, states, "The mercury criteria also differ in this proposal due to the Agency's movement away from aquatic life criteria based on the Final Residue Value (FRV) procedure of the 1985 Guidance." It has been learned that the proposed CTR's apparent raising of the Hg criterion for protection from excessive bioaccumulation from the current 12 ng/L to 50 ng/L total mercury is only temporary. The regulation of Hg is under review at the national level. The Agency should have indicated to the regulated community in the proposed CTR that the total Hg criterion for prevention of bioaccumulation will likely decrease from the current 12 ng/L set forth in the "Gold Book" to about 5 ng/L. This revised Hg criterion will cause most domestic wastewater discharges to be in violation of this criterion.

Rather than trying to regulate Hg in wastewater effluents and other sources based on the exceedance of the total Hg criterion to prevent excessive Hg bioaccumulation in edible fish tissue, Hg should be regulated based on excessive Hg concentrations in fish tissue. It is technically invalid to assume, as the US EPA has been assuming and proposes to continue to assume, that there is a constant bioconcentration factor that relates the total concentration of Hg in water to excessive Hg concentrations in fish tissue. The actual bioconcentration of total Hg is highly site-specific. To require that all POTWs and other dischargers or sources of Hg have no more than 5 ng/L in the discharge will grossly over-regulate Hg from many sources.

Response to: CTR-061-012

EPA notes that this response addresses what the commenter believes will be the national criteria recommendations for mercury and human health. EPA disagrees that the proposed criterion for mercury is inappropriate. The Mercury Study Report To Congress has been published and an Agency Mercury Action Plan is being developed. EPA has also begun work to develop a new criterion for mercury that will be based on the Mercury Study Report To Congress and upcoming proposed revisions to the human health methodology. In addition, EPA is evaluating the complexity of determining the BAF and how best to express its value for criteria-setting purposes.

Comment ID: CTR-066-008
Comment Author: Delta Diablo Sanitation Dist.
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: C-01 Mercury
References:
Attachments? N
CROSS REFERENCES

Comment: Our preliminary review of the CTR finds several areas that we believe are positive changes and will enhance the rulemaking. The areas that we support as now written are as follows:

* The revised human health criterion for mercury.

Response to: CTR-066-008

EPA acknowledges the commenter's support of the proposed mercury criterion.

Comment ID: CTR-081-002f
Comment Author: West County Agency
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: C-01 Mercury
References:
Attachments? N
CROSS REFERENCES G-04
C-24a
G-02
C-22
G-09
C-08a
G-05

Comment: * There are many aspects of the CTR that we support. These include: a) Application of interim limits while special studies are perfomed. b) Approach to water effect ratios for determining site specific criteria. c) Inclusion of provision for compliance schedules. However, this should be modified to allow inclusion of compliance schedules of up to 15 years in permits if deemed appropriate by Regional Boards. d) Metals criteria expressed as dissolved rather than total recoverable concentrations. e) EPA's guidance to Regional Boards regarding use of translators. f) EPA's proposal to create a rebuttal presumption for Water Effects Ratios, g) Revised human health criteria for mercury h) Decision to not promulgate human health criteria at this time in light of issues surrounding health criteria for arsenic. i) EPA's policies regarding application of mixing zones and dilution credits.

Response to: CTR-081-002f

EPA acknowledges the commenter's support of the proposed rule.

Comment ID: CTR-085-009
Comment Author: Camarillo Sanitary District
Document Type: Sewer Authority
State of Origin: CA
Represented Org:

Document Date: 09/24/97
Subject Matter Code: C-01 Mercury
References:
Attachments? N
CROSS REFERENCES

Comment: On several aspects of the California Toxics Rule, the District is in agreement with CASA and SCAP comments:

* The revised human health criterion for mercury.

Response to: CTR-085-009

EPA acknowledges the commenter's support of the proposed mercury criterion.

Comment ID: CTR-086-002
Comment Author: EOA, Inc.
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org: California Dent
Document Date: 09/26/97
Subject Matter Code: C-01 Mercury
References: Letter CTR-086 incorporates by reference letter CTR-035
Attachments? N
CROSS REFERENCES

Comment: CDA is a strong supporter of water quality and human health protection. CDA's primary goals in commenting on the draft CTR are to request that mercury criteria be based on sound science and that mercury regulation be implemented via a watershed management, phased TNML-type approach.

CDA is particularly concerned that the CTR does not adequately assess the economic impacts on indirect dischargers nor the extent to which there will be measurable water quality benefits solely from adoption of the proposed mercury criteria for point sources.

Mercury Criteria

CDA supports the proposed revised human health criteria for mercury based on updated IRIS information. CDA also supports EPA's decision (p. 42180) not to apply the bioaccumulation factor (BAF) developed for the Great Lakes Initiative to the CTR mercury criteria. We agree that mercury methylation rates vary widely and are not well understood, particularly for amalgamrelated mercury. We believe that adoption of a national BAF under consideration as part of the "Mercury Study Report to Congress: SAB Review Draft" is inappropriate for California, particularly for the complex San Francisco Bay system. CDA recommends that EPA direct the State to develop a site specific objective (SSO) for mercury for San Francisco Bay based on a site specific BAF and data on natural cleanup processes and methylation processes. The proposed CTR criteria should serve as interim criteria until the SSO is developed and adopted.

Response to: CTR-086-002

EPA agrees with the commenter's support of the proposed mercury criterion. EPA encourages the State or Tribe to utilize site-specific information on bioaccumulation when available to calculate criteria. For additional discussion on the complexity of BAF use in the mercury criterion, refer to response on this issue in CTR-041-004.

Comment ID: CTR-089-001b
Comment Author: Las Virgenes Mncpl Water Dist.
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/24/97
Subject Matter Code: C-01 Mercury
References:
Attachments? N
CROSS REFERENCES C-22
C-08a
G-05
K-01
G-02
G-09

Comment: The draft California Toxics Rule (CTR) is clearly the product of substantial effort by USEPA staff, and we applaud this effort and its intent. On several issues of concern to public utilities, the CTR strikes a good balance between the need to promulgate standards and the need to base those standards on sound science. Examples include the use of dissolved concentrations rather than the total recoverable concentrations for metals, the deferral of human health criteria for arsenic until adequate information is available, and the revision of the human health criterion for mercury. We are also pleased with the CTR's guidance and flexibility, on mixing zones and dilution credits, total maximum daily loads (TMDLs), compliance schedules, and translators.

Response to: CTR-089-001b

EPA acknowledges the commenter's support of the proposed rule.

Comment ID: CTR-091-001a
Comment Author: Abu-Saba, Ganguli, Flegal
Document Type: Environmental Group
State of Origin: CA
Represented Org: Coastal Advocates
Document Date: 09/25/97
Subject Matter Code: C-01 Mercury
References:
Attachments? N
CROSS REFERENCES

Comment: This comment addresses the mercury criteria for continuous concentration (CCC) proposed in

40 CFR, part 13 1(*1). The proposed aquatic health and human health criteria do not protect aquatic life or humans from mercury contamination. This is demonstrated by the scientific data presented herein. That information includes published and unpublished results from scientists with established reputations in environmental research.

The aquatic life mercury CCC is proposed to be raised sixty-fold, from the National Toxics Rule standard of 0.012 micrograms per liter (ppb) to 0.770 ppb. The human health criteria is proposed to be raised four-fold, from 0.0 12 ppb to 0.050 ppb. These proposed changes have potentially devastating economic and environmental costs that must be included in the EPA's cost-benefit analysis. Water treatment costs for the metals mercury, silver, and chromium account for 30% of costs projected in the, California Toxics Rule (CTR) economic analysis.(*2) However, the long term environmental and economic cost of mercury contamination may far exceed the short term economic savings resulting from an increase in the mercury CCC. This is especially true in California, a mining state that has devoted hundreds of millions of dollars to restoration and enhancement of commercial and sport fisheries by enactment of Proposition 204.

Four specific points are substantiated by data and-literature: (1) California should maintain the National Toxics Rule standard of 0.012 ppb for protection of both aquatic life and human health; (2) The proposed increase in CCC standards do not protect against uncontrolled point-source releases; (3) The proposed criteria of 0.77 ppb (aquatic life) and 0.050 ppb (human health) were derived using assumptions about mercury bioconcentration that are not scientifically justified ; and (4) Wetlands may require even more protective measures than open waterways.

The proposed aquatic life CCC offers no protection from mercury point sources, such as the acid mine drainage shown in Figure 1. The data from San Carlos Creek, above and below the New Idria mercury mine in San Benito County, California, indicate that this mine, which was at one time the second largest producer of mercury in North America(*3), represents an uncontrolled point source mercury release(*4). Acidic water from the abandoned mine mixes with the waters of San Carlos Creek, leading to elevated mercury concentrations below the mine opening.

Figure 2 shows dissolved mercury concentrations upstream and downstream of the mine opening. The existing standard, 0.012 parts per billion (shown by the heavy, black horizontal line), distinguishes between background mercury concentrations (upstream) and point source mercury contamination (downstream). The low concentrations from the two upstream stations reflect natural ambient dissolved mercury concentrations resulting from water drainage through mercury ore deposits in that region(*5). The elevated concentrations downstream of the mine opening clearly exceed the National Toxics Rule mercury criteria. The proposed 0.77 ppb criteria, shown in Figure 3, would not distinguish between natural ambient upstream water and the contaminated water downstream from the mine.

The aquatic life CCC is more than two times greater than concentrations toxic to aquatic life. A water concentration as low as 0.3 ppb inhibits invertebrate reproduction and egg hatching success, and impairs fish physiology(*6). Although the lower human health criteria of 0.05 ppb would apply to essentially all California surface waters(*7), establishment of an aquatic life criteria above toxic effect levels sets a poor precedent for environmental protection.

The New Idria mine is but one example of mercury point source contamination within the State of California; there are many others. Mercury contamination is part of this state's mining legacy(*8). Historically, cinnabar (mercury, sulfide) was mined in California from New ldria, New Almaden, and other mines, and purified to elemental mercury (quicksilver). Thousands of tons of quicksilver were used to amalgamate gold and silver during the late 1800's. It is estimated that 0.3 to 3 kg of mercury was lost,

via volatilization and spillage, for every ton of gold recovered during this period.(*8)

Recent measurements(*9) from California lakes, including Clear Lake, Davis Creek Reservoir, and Lake Nacimiento indicate that dissolved mercury concentrations were twenty to fifty times lower than the proposed human health criteria of 0.05 ppb. However, in each lake largemouth bass contained part per million tissue mercury concentrations which exceeded the National Academy of Sciences guideline for acceptable mercury concentrations in fish.

Part per trillion mercury concentrations in water may be magnified a million-fold, to health-threatening, part per million mercury concentrations in fish. The form of mercury which is most readily bioaccumulated is methylmercury, a form of organic mercury which is produced by bacterial metabolism. Organomercury compounds are highly toxic. Karen Wetterhahn, the prominent Dartmouth researcher who was recently studying mercury toxicity, spilled two drops of dimethylmercury on her hand. Three months later she died from neuralgic damage resulting from acute mercury poisoning(*10) (Figure 5). The disaster in Minimata Bay, Japan, resulted from bacterial conversion of inorganic mercury to methylmercury, and its subsequent bioconcentration.(*11) Birth defects and infant mortality were directly linked to consumption of contaminated fish which had accumulated organomercury.

Methylmercury accumulates in proteins and lipids(*12). So at each subsequent trophic level in a food web, the tissue concentration of mercury increase(*13) . Figure 4 illustrates mercury bioconcentration in a very simple, three-tiered food chain. Methylmercury in water is bioconcentrated by plankton, at the base of the food chain.(*14) Subsequent bioconcentration occurs as plankton are consumed by filter feeders, and again as the filter feeders are consumed by higher level predators. This is a simple food chain example; bioconcentration increases with increasing food web complexity and increasing numbers of trophic levels.

Figure 4 also highlights the importance of mercury in sediments. Sediment-bound mercury can serve as an additional source to filter feeders, as these zones represent the primary location of microbially mediated mercury-methylation in aquatic systems(*15). Wetlands and marshes may be particularly susceptible to mercury pollution. These areas typically have shallow water columns and a large inputs of organic matter to the sediment, which leads to enhanced bacterial activity and subsequently greater mercury-methylation rates(*15). Further, wetlands and marshes provide breeding habitat for diverse populations of fish, birds, and reptiles, and hence, are composed of tightly knit, complex food webs. The susceptibility of these types of environments to mercury pollution has been demonstrated in the Florida Everglades, where low dissolved mercury concentrations result in high concentrations in top level predators, including panthers and sport fish(*16,17,18).

The ratio of the mercury concentration in an organism to the mercury concentration in the organism's ambient water is defined as the bioconcentration factor(*19). Assumptions about the bioconcentration factor are critical to the way the currently proposed human health criteria were derived, because the principle dose of mercury to humans is attributed to contaminated fish. So the appropriate criteria depend on the accepted value of the mercury bioconcentration factor.

Table I compares the bioconcentration factors used in the currently proposed criteria to bioconcentration factors derived from recent research. The practical bioconcentration factor of 7342.6 used in the proposed water quality standards was derived from research that is now almost two decades old. Most mercury data, particularly aqueous dissolved mercury measurements, generated prior to 1988 are suspect. Technological advances in mercury quantification and the establishment of trace metal clean sampling procedures made it possible to accurately measure environmentally relevant mercury concentrations in water(*20,21). The EPA has recently recognized the need for adequate analytical methods and trace

metal clean techniques(*22,23,24). The 1980 bioconcentration factors were derived before trace metal clean techniques for mercury analysis were established. If the dissolved mercury concentration is overestimated due to contamination, the bioconcentration factor will be underestimated.

In the Federal Register discussion of bioconcentration factors, values derived from the Great Lakes Initiative are dismissed, "because it is uncertain whether the bioaccumulation factors of 27,900 and 140,000 are appropriate for use in California at this time..."(*1). However, California field data support bioconcentration factors equal to or greater than those of the Great Lakes Initiative. In 1995, the San Francisco Bay Regional Monitoring program reported tissue concentrations in bivalves that averaged 0.2 ppm. At the same time, aqueous dissolved mercury values ranged from 0.001-0.003 ppb(*25), resulting in a bioconcentration factor between 60,000 and 200,000. In the Gill and Bruland study of mercury in California lakes(*9), tissue and dissolved mercury concentrations lead to a bioconcentration factor between 300,000 and 800,000. Clearly, the bioconcentration factor of 7342.6 used to derive the proposed mercury standard is not appropriate to California.

To summarize, the proposed human health mercury CCC (0.05 ppb) does not sufficiently safeguard human health from mercury contamination. and the proposed aquatic life mercury CCC (0.77 ppb) offers no protection to aquatic life. The aquatic life CCC does not distinguish between contaminated and uncontaminated waters, and is two times higher than published toxic effect levels for mercury(*6). Even though the human health criteria will apply in California(*1,7), the 0.77 ppb criteria for protection of aquatic life sets a dangerous national precedent. In California, mercury concentrations twenty to fifty times lower than the proposed human health criteria lead to elevated concentrations in sport-fish. The aquatic life and human health criteria are based on faulty assumptions about mercury bioconcentration factors in the environment. Using bioconcentration factors appropriate to California would result in much lower mercury water quality criteria.

We ask that Region Nine of the Environmental Protection Agency maintain the established National Toxics Rule standard of 0.012 ppb. Furthermore, we strongly suggest that adequate regulation of mercury consider microbial mercury-methylation potentials and evaluate food web complexity to develop site-specific criteria.

(*1) Water Quality Standards; Establishment of Numeric Criteria for Priority Toxic Pollutants for the State of California; Proposed Rule. U.S. Environmental Protection Agency, Region Nine; U.S. Government Printing Office: Washington D.C., 1997; Federal Register, 62, 42159-42207.

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(*3) Eckel, E.B.; Myers, W.B. In Report XLII of State Mineralogist; United States Department of the Interior, Geological Survey, 1946. Chapter 2, Quicksilver Deposits of the New ldria District San Benito and Fresno Counties, California.

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(*5) Rytuba, J. Environmental geochemistry of mercury in the Coast Range mercury belt, California. Abstract in 1997 International Society of Environmental Geochemistry meeting, Oct. 5-10, Vale CO.

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(*10) Time, 149, June 23, 1997, p. 29

(*11) Harada, M. 1995. Minimata disease: methylmercury poisoning in Japan caused by environmental pollution. Critical Reviews in Toxicology, 1997, 25, 1-24.

(*12) Huffman, D.L.; Utschig, L.M.; O'Halloran, T.V. In Mercury and its Effects on Environment and Biology; Sigel, A, ; Sigel H. Eds.; Metal Ions in Biological Systems. Vol. 34- Dekker: New York, 1997. Chapter 18, Mercury-Responsive Gene Regulation and Mercury- 199 as a Probe of Protein Structure.

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(*23) Method 1631: Mercury in Water by Oxidation, Purge and Trap, and Cold Vapor Atomic Fluorescence Spectrometry. U.S. Environmental Protection Agency, Office of Water; U.S. Government Printing Office: Washington, D.C., 1995; EPA-821-R-95-027.

(*24) Method 1669: Sampling Ambient Water for Trace Metals at EPA Water Quality Criteria Levels. U.S. Environmental Protection Agency, Office of Water; U. S. Government Printing Office: Washington, D.C., 1995; EPA-821-R-95-034.

(*25) Regional Monitoring Program 1995 Annual Report; San Francisco Estuary Institute: Richmond, California.

Response to: CTR-091-001a

Regarding the protectiveness of the mercury criteria, refer to responses in CTR-029-002b, CTR-030-007 and CTR-051-003a. EPA recognizes the significance of the accumulation of toxic chemicals, particularly bioaccumulatives, in our nation's sediments. For this reason, EPA is in the process of developing "Equilibrium Partitioning Sediment Guidelines" for use in identifying contaminated sediments which are potentially toxic to benthic organisms. These chemical guidelines are calculated based on the organic carbon content of the sediment for nonionic organic chemicals and acid volatile sulfide content for divalent cationic metals. At this time, EPA has developed guidance for the calculation of bioaccumulation factors (BAFs) for a variety of chemicals. The BAFs are used to ensure that protective levels of water column contaminants are established. BAFs are based on the freely dissolved concentration of the bioaccumulative chemical, such as mercury. The use of BAFs, particularly those calculated based on field data, will provide a mechanism to address the accumulation of chemicals in organisms at higher trophic levels in the food web. For further discussion, refer to the response to CTR-002-007b.

EPA is also currently working to enhance its methodology to address the complex BAF issues. Further, once EPA develops the BAF-based human health water quality criteria, EPA will work with the State of California to adopt either that recommended value or a value that is consistent with the final methodology. By 2003, EPA will promulgate revised criteria for California for mercury based on a BAF for the protection of human health. As part of this process, EPA will evaluate all available published information, including data originating in California.

Comment ID: CTR-091-001b
Comment Author: Abu-Saba, Ganguli, Flegal
Document Type: Environmental Group
State of Origin: CA
Represented Org: Coastal Advocates

Document Date: 09/25/97
Subject Matter Code: C-01 Mercury
References:
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(*13) Boudou, A.; Ribeyre, F. In Mercury and its Effects on Environment and Biology; Sigel, A.; Sigel H. Eds.; Metal Ions in Biological Systems. Vol. 34; Dekker: New York, 1997. Chapter 10, Mercury in the Food Web: Accumulation and Transfer Mechanisms.

(*14) Mason, R.P.; Reinfelder, J.R.; Morel, F.M.M.. Uptake, toxicity, and trophic transfer of mercury in a coastal diatom. Environ. Sci. TechnoL 1996, 30, 1835.

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(Ciconiiformes) in Southern Florida. Arch. Environ. Contam. Toxicol. 1994, 27, 299-305.

(*19) Meili M. In Mercury and its Effects on Environment and Biology; Sigel, A. ; Sigel H. Eds.; Metal Ions in Biological Systems. Vol. 34; Dekker: New York, 1997. Chapter 2, Mercury in Lakes and Rivers.

(*20) Bloom N.S.; Fitzgerald W.F., Determination of volatile mercury species at the picogram level by low temperature gas chromatography with cold-vapor fluorescence detection. Analytica Chimica Acta. 1988, 208, 151-161.

(*21) Bloom N. S. Determination of picogram levels of methylmercury by aqueous phase ethylation, followed by cryogenic gas chromatography with cold-vapor atomic fluorescence detection. Can. J. Fish. Aquat. Sci. 1989, 46, 1131-1140.

(*22) Guidance on the Documentation and Evaluation of Trace Metals Data Collected for Clean Water Act Compliance Monitoring. U. S. Environmental Protection Agency, Office of Water, Engineering and Analysis Division; U.S. Government Printing Office: Washington, D.C., 1995; EPA-821-B-95-002.

(*23) Method 1631: Mercury in Water by Oxidation, Purge and Trap, and Cold Vapor Atomic Fluorescence Spectrometry. U.S. Environmental Protection Agency, Office of Water; U.S. Government Printing Office: Washington, D.C., 1995; EPA-821-R-95-027.

(*24) Method 1669: Sampling Ambient Water for Trace Metals at EPA Water Quality Criteria Levels. U.S. Environmental Protection Agency, Office of Water; U. S. Government Printing Office: Washington, D.C., 1995; EPA-821-R-95-034.

(*25) Regional Monitoring Program 1995 Annual Report; San Francisco Estuary Institute: Richmond, California.

Response to: CTR-091-001b

EPA will address this concern as part of its mercury re-assessment -- as it relates to bioaccumulation. See responses to CTR-002-007b and CTR-091-001a.

Comment ID: CTR-095-002a
Comment Author: M. Ruth Uiswander
Document Type: Citizen
State of Origin: CA
Represented Org:
Document Date: 10/02/97
Subject Matter Code: C-01 Mercury
References:
Attachments? N
CROSS REFERENCES

Comment: Also, the rules pertaining to mercury, fail to take into account the bioaccumulation of mercury in fish tissue. Studies done in the Gr. Lakes show that bioaccumulation is 4 to 20 times greater than what the EPA estimates for California.

Response to: CTR-095-002a

Regarding the issue on mercury bioaccumulation, refer to the response to CTR-002-007b.

Comment ID: CTR-095-002b
Comment Author: M. Ruth Uiswander
Document Type: Citizen
State of Origin: CA
Represented Org:
Document Date: 10/02/97
Subject Matter Code: C-01 Mercury
References:
Attachments? N
CROSS REFERENCES

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Response to: CTR-095-002b

See response to CTR-002-007b.

Comment ID: CTR-104-002a
Comment Author: Lucy Nelson, et. al.
Document Type: Citizen
State of Origin: CA
Represented Org:
Document Date: 10/15/97
Subject Matter Code: C-01 Mercury
References:
Attachments? N
CROSS REFERENCES C-14

Comment: Proposed mercury standards fail to account for bioaccumulation of mercury in fish tissue. Mercury is amassed through their consumption of food.

Response to: CTR-104-002a

Regarding the issue on mercury bioaccumulation, refer to the response to CTR-002-007b.

Comment ID: CTR-106-002a
Comment Author: Robert Brown
Document Type: Citizen
State of Origin: CA

Represented Org:
Document Date: 10/28/97
Subject Matter Code: C-01 Mercury
References:
Attachments? N
CROSS REFERENCES C-14

Comment: Proposed mercury standards fail to account for bioaccumulation of mercury in fish tissue. Mercury is amassed through their consumption of food.

Response to: CTR-106-002a

Regarding the issue on mercury bioaccumulation, refer to the response to CTR-002-007b.

Comment ID: CTR-109-002a
Comment Author: Maggie Miller
Document Type: Citizen
State of Origin: CA
Represented Org:
Document Date: 12/01/97
Subject Matter Code: C-01 Mercury
References:
Attachments? N
CROSS REFERENCES C-14

Comment: Second, the proposed mercury standards fall to account for the bioaccumulation of mercury in fish tissue. The proposed standard ignores mercury that enters fish through their own consumption of food.

Response to: CTR-109-002a

Regarding the issue on mercury bioaccumulation, refer to the response to CTR-002-007b.

Comment ID: CTRH-001-003c
Comment Author: Robert Hale
Document Type: Public Hearing
State of Origin: CA
Represented Org: CA Stormwater Task Force
Document Date: 09/17/97
Subject Matter Code: C-01 Mercury
References:
Attachments? N
CROSS REFERENCES C-22
C-24a

Comment: In summing up -- not summing up, just as a parting shot -- I do appreciate the fact that in

working up the toxics rule here that EPA has done certain things which in fact we see as improvements in actually making the standards fit with what we think -- have come to see as perhaps the actual impacts of the stormwater part of this. And by that, I'm referring to the dissolved metals criteria and the water effect ratio in there, and the human health criteria revisions for mercury and the other -- the other items.

I appreciate some of the stuff in there, and -- with the exception of the preamble language. And you really need to get that out of there. We're going to pursue this as far as we have to.

I appreciate your hearing me.

Response to: CTRH-001-003c

EPA acknowledges the comments made and their support of the rule.

Comment ID: CTRH-001-013
Comment Author: Greg Karras
Document Type: Public Hearing
State of Origin: CA
Represented Org: Comm. for Better Environ.
Document Date: 09/17/97
Subject Matter Code: C-01 Mercury
References:
Attachments? N
CROSS REFERENCES

Comment: Issues on mercury:

Bay fisherpeople report eating more mercury-tainted fish than the state says is safe for developmental neurotoxicity. EPA proposes a weaker standard that allows these mercury pollution levels in the vast majority of the bay rather than reducing this harm.

EPA says it has itself weakened the standard because EPA doesn't know whether mercury bioaccumulates here as much as it bioaccumulates in the Great Lakes. San Francisco Bay data show that it does. Will EPA use these data?

Response to: CTRH-001-013

The commenter is incorrect regarding the proposed standard for the San Francisco Bay. The previous standard of 0.025 ug/L will remain in effect for the San Francisco Bay. The commenter is also incorrect about EPA's position regarding bioaccumulation. EPA did not suggest that it did not know if mercury bioaccumulated as much in the Bay as in the Great Lakes. Rather, EPA stated that the Great Lakes data were not appropriate for use in the Bay. EPA is evaluating available bioaccumulation data to determine its appropriateness for use in California. EPA is also currently working to enhance its methodology to address these complex issues. Further, once EPA develops the BAF-based human health water quality criteria, EPA will work with the State of California to adopt either that recommended value or a value that is consistent with the final methodology. Within the next several years, EPA or the State will promulgate revised criteria for California for mercury based on a BAF for the protection of human health. For additional discussion on mercury bioaccumulation, refer to the response to CTR-002-007b.

Comment ID: CTRH-001-018a
Comment Author: Khalil Abu-Saba
Document Type: Public Hearing
State of Origin: CA
Represented Org: UCSC
Document Date: 09/17/97
Subject Matter Code: C-01 Mercury
References:
Attachments? N
CROSS REFERENCES

Comment: MR. ABU-SABA: Good afternoon. My name is Khalil Abu-Saba. I'm a graduate student in chemistry at the University of California, Santa Cruz. I want to thank Kathleen Van Velsor of Coastal Advocates for having me here to speak today.

Today we'd like to address mercury criteria for continuous concentration as proposed in the California Toxics Rule. The facts I'll be presenting today come from the interpretations of a number of scientists of established reputation in environmental research. In the written transcript of this speech, there are 20 references giving the names of those authors, who reviewed this presentation before I submitted it.

The mercury criteria for continuous concentration is proposed to be raised from the National Toxics Rule standard of 0.012 parts per billion up to 0.770 parts per billion. That is a 60-fold increase in the mercury criteria. We will present the facts showing that allowing that level of mercury in fresh water has potentially devastating economic and environmental consequences.

We will show why mercury regulation should consider particulate as well as dissolved concentrations and why wetlands may require even more protective measures than open waterways.

Finally, we will demonstrate how the proposed standard was derived using assumptions about mercury bioconcentration that are scientifically unsound.

First, let's compare the current National Toxics Rule standard to mercury concentrations downstream from a point source. The preliminary measurements for this stream were provided by Priya Ganguli and Russ Flegal of University of California Santa Cruz and Rob Mason of the Chesapeake Bay Laboratory of the University of Maryland.

The data come from San Carlos Creek, above and below the New Idria mercury mine in San Benito County. This mine, which was at one time the second largest producer of mercury in North America, represents an uncontrolled point source mercury release.

Acidic water from the abandoned mine mixes with the waters of San Carlos Creek, leading to elevated mercury concentrations below the mine opening. The brown water you see in this slide is from metals precipitated after the acid mine drainage mixes with the clear water of San Carlos Creek.

The next graph we'll be showing you will be the part-per-billion concentrations of filtered mercury above and below the mine opening. These are filtered mercury concentrations consistent with the promulgated standard.

The point of this graph is that the existing standard, 0.012 parts per billion, shown by the heavy, black horizontal line, distinguishes between background regional processes and point source contamination. The two lowest mercury concentrations on the left are from water samples upstream of the mine opening in clear water; those concentrations represent mercury concentrations in water which could result naturally from drainage of mercury ore deposits in that region.

The concentrations downstream of the mine opening, in the brown water you just saw, clearly exceed the current National Toxics Rule standard of .012 parts per billion. In contrast, if we were to put the proposed continuous criteria concentration standard on the same scale with this graph, that standard would be two stories above our heads right now.

The next graph shows the same mercury concentrations from New ldria on scale with the proposed criteria of 0.77 parts per billion. Clearly, the proposed criteria does not distinguish between background processes and point source contamination. Mercury levels in the clear water and in the brown water are equal in the eyes of the proposed criteria.

That is the economic benefit that will be derived from raising limits on mercury in water. The citizens of California will be asked to ignore point source contamination of mercury. This is one example from within the State of California; there are many others.

Mercury contamination is part of our mining legacy in this state, we ignore it at our peril. In a 1990 publication in Environmental Science and Technology, Gary Gill and Ken Bruland show that Clear Lake, Davis Creek Reservoir, and Lake Nacimiento all had filtered mercury concentrations that were several hundred times lower than the 0.77 parts per billion proposed standard. Those lakes also had largemouth bass with part-per-million tissue mercury concentrations exceeding the National Academy of Sciences guideline for acceptable mercury concentrations in fish.

How are subpart-per-billion mercury concentrations in water magnified a million-fold to health-threatening part-per-million mercury concentrations in fish? To understand this, we have to recognize that not all mercury is created equal.

This is cinnabar or mercury sulfide. This is an example of inorganic mercury. This type of ore was mined in California at the New Idria and New Almaden mines, and roasted to make elemental mercury or quicksilver, which we're familiar with in the tip of a common thermometer.

Thousands of tons of elemental mercury were used to extract gold during the Gold Rush, distributing mercury throughout California. In the environment, bacterial action can convert inorganic mercury into organic mercury compounds, including methylmercury. The toxicity of mercury depends on its chemical form.

I didn't bring any organic mercury in today; it is too toxic to safely handle in public. I did bring in the obituary of Karen Wetterhahn. As most of you know, she was a prominent Dartmouth researcher who was studying mercury toxicity. This year, she spilled two drops of dimethylmercury on her hand. Three months later, she was dead from neurological damage resulting from acute mercury poisoning.

The disaster in Minimata Bay, Japan, resulted from bacterial conversion of inorganic mercury to methylmercury, and its subsequent bioconcentration.

Methylmercury accumulates in proteins, so at each level in a complex food web the tissue concentration

of mercury increases. This graph shows an example of mercury bioconcentration in a very simple, three-tiered food chain.

Methylmercury in water is bioconcentrated by plankton at the base of the food chain. Subsequent bioconcentration occurs as plankton are consumed by filter feeders, and again as the filter feeders are consumed by higher level predators. This is a simple food chain example; bioconcentration increases with increasing food web complexity.

This figure also highlights the importance of mercury in sediments. Sediment-bound mercury can serve as an additional source to filter feeders. Moreover, conversion of inorganic mercury to methylmercury is regulated by bacteria.

Extensive bacterial methylation occurs in sediments, which host bacterial communities. Wetlands and marshes are much more sensitive areas because intense bacterial activity leads to greater methylation rates, and because they have complex food webs.

This has already been demonstrated in the Florida Everglades, where relatively low dissolved mercury concentrations result in high concentrations in top-level predators, including panthers and sport fish.

Deriving a criteria for dissolved mercury alone and ignoring particulate mercury concentrations, bacterial metabolism, and ecosystem structure is inadequate to protecting the health of California citizens.

The magnification of mercury in water to tissue mercury can be qualified by a value referred to as bioconcentration factor. Assumptions about the bioconcentration factor are critical to the way the proposed criteria was derived because the primary source of mercury to humans is attributed to contaminated fish. So the appropriate criteria, depends on what we accept as a reasonable value for the mercury bioconcentration factor.

The bioconcentration factor of mercury is simply defined as the ratio of the mercury concentration in an organism to the mercury concentration in the organism's surrounding waters, just tissue mercury over water mercury.

In the justification of the proposed criteria, this table compares the bioconcentration factors used in the proposed criteria to bioconcentration factors developed from more recent research. The bioconcentration factor of 7,300 as used in the proposed criteria was derived from research now almost two decades old.

All mercury data and in particular water measurements generated prior to 1988 are suspect. The methods published in 1988 by Bloom and Fitzgerald, and the establishment of trace metal clean sampling procedures to avoid contamination made it possible to measure environmentally relevant concentrations of mercury in water.

The EPA has recognized in their own publications the need for adequate analytical methods and trace metal clean techniques. This is EPA method 1631, mercury in water by cold vapor atomic fluorescence spectrometry, April 1995. This is EPA method 1669, sampling ambient water for EPA water criteria levels. This method 1669 describes how to avoid contamination in trace metal analysis.

The 1980 bioconcentration factors used to derive the proposed criteria come from data generated before trace metal clean techniques were established. If you overestimate the water mercury concentration due to contamination, you will underestimate the bioconcentration factor, because the dissolved concentration appears here in the denominator.

In the Federal Register discussion of the bioconcentration factors, values derived from the Great Lakes initiative are dismissed, "because it is uncertain whether the bioaccumulation factors of 28,000 and 140,000 are appropriate for use in California at this time." That's a quote from the Federal Register.

We can compare the relevance of these bioconcentration factors by examining field data from California, as Greg Karras suggested. In 1995, the San Francisco Bay regional monitoring program reported tissue concentrations in bivalves that averaged 0.2 parts per million.

At the same time, quantifiable dissolved mercury values ranged from 0.001 to 0.003 parts per billion. If you just plug those numbers into the formula for bioconcentration factor, you get a bioconcentration factor between 60,000 and 200,000.

In the Gill and Bruland study of mercury in California lakes, tissue and dissolved mercury concentrations lead to a bioaccumulation factor between 300,000 and 800,000. Clearly, the bioconcentration factor of 7,300 used to derive the proposed standard is not appropriate to California.

To summarize, the proposed mercury standard of 0.77 parts per billion does not distinguish between contaminated and uncontaminated waters. The proposed standard is based on faulty assumptions about mercury bioconcentration in the environment.

The potential economic costs of this legislation far exceed any perceived benefits from ignoring mercury contamination. For example, one of the goals of Proposition 204 is the protection and enhancement of commercial and sport fishing in the State of California. To that end, hundreds of millions of dollars have been committed to water quality improvement and habitat restoration. A 60-fold increase in the permissible mercury limits can only hinder these goals.

We ask that Region 9 of the Environmental Protection Agency promulgating the California Toxics Rule maintain the established National Toxics Rule standard of 0.012 parts per billion. Furthermore, we strongly suggest that adequate regulation of mercury should incorporate particulate mercury concentrations and should consider the potential for bacterial activity and evaluate ecosystem complexity to develop site-specific criteria.

Response to: CTRH-001-018a

See response to CTR-002-007b.

Comment ID: CTRH-001-018b
Comment Author: Khalil Abu-Saba
Document Type: Public Hearing
State of Origin: CA
Represented Org: UCSC
Document Date: 09/17/97
Subject Matter Code: C-01 Mercury
References:
Attachments? N
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To summarize, the proposed mercury standard of 0.77 parts per billion does not distinguish between contaminated and uncontaminated waters. The proposed standard is based on faulty assumptions about mercury bioconcentration in the environment.

The potential economic costs of this legislation far exceed any perceived benefits from ignoring mercury contamination. For example, one of the goals of Proposition 204 is the protection and enhancement of commercial and sport fishing in the State of California. To that end, hundreds of millions of dollars have been committed to water quality improvement and habitat restoration. A 60-fold increase in the permissible mercury limits can only hinder these goals.

We ask that Region 9 of the Environmental Protection Agency promulgating the California Toxics Rule maintain the established National Toxics Rule standard of 0.012 parts per billion. Furthermore, we strongly suggest that adequate regulation of mercury should incorporate particulate mercury concentrations and should consider the potential for bacterial activity and evaluate ecosystem complexity to develop site-specific criteria.

Response to: CTRH-001-018b

See response to CTR-002-007b.

Comment ID: CTRH-001-050a
Comment Author: Michael Lozeau
Document Type: Public Hearing
State of Origin: CA
Represented Org: S.F. Bay/Delta Keeper
Document Date: 09/17/97
Subject Matter Code: C-01 Mercury
References:
Attachments? N
CROSS REFERENCES C-14

Comment: For mercury, certainly I would concur with the previous comments, that the number should be -- that is appropriate is accumulation factors.

Now the bioconcentration factor, in deference to this state's consumption rates that have been determined are appropriate for California, I think using the average consumption rate for everyone in the country, by definition, lops off about half of the population. It seems to me that it doesn't account for those users of the bay who are the high consumption -- high fish-consumption users, which obviously there's a number of them, and that's not reflected in that average at all.

So I think that those bioaccumulation factors are important to the mercury number base data that we have for the bay for all the reasons stated earlier, and similarly for dioxin. It seems as if EPA would like to back away on that, the criteria that is listed.

Response to: CTRH-001-050a

Regarding the comments on mercury human health toxicity, see responses to CTR-006-002a and CTR-030-007. Regarding mercury bioaccumulation, see response to CTR-002-007b.

Comment ID: CTRH-001-062
Comment Author: Fred Lee
Document Type: Public Hearing
State of Origin: CA
Represented Org:
Document Date: 09/17/97
Subject Matter Code: C-01 Mercury
References:
Attachments? N
CROSS REFERENCES

Comment: The other point I want to make, we had a discussion about mercury today and that discussion doesn't address the issues properly. That discussion focused on the number -- I think it was .77 parts per billion, and that's not a human health criteria. That is the toxicity part. That's a dissolved mercury. As related to aquatic life, that number's about right.

Response to: CTRH-001-062

EPA acknowledges the comment.

Comment ID: CTRH-001-063
Comment Author: Fred Lee
Document Type: Public Hearing
State of Origin: CA
Represented Org:
Document Date: 09/17/97
Subject Matter Code: C-01 Mercury
References:
Attachments? N
CROSS REFERENCES

Comment: In another part of the Federal Register promulgating the rule, there is a statement about -- for human health, the number is proposed to be 50 nanograms per liter -- going from 12 nanograms per liter, now the current gold book number, to 50 under these criteria. But if you go further and you ask what does that mean really? Do I think mercury is less toxic? No way.

What it's headed for is that within two to six months to a year, as state and federal rules on mercury are developed through the Science Advisory Board review, so forth, it's a pretty good chance that's going to drop, 3 to 5.

You should understand we're headed for 3 to 5 nanograms per liter for total mercury as a number to protect from excessive bioaccumulation. That's where we're headed.

I'll stop at this point.

Response to: CTRH-001-063

Regarding the comments on mercury human health toxicity, see responses to CTR-006-002a and CTR-030-007. Regarding mercury bioaccumulation, see response to CTR-002-007b.

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Subject Matter Code: C-02b Copper Aquatic Life

Comment ID: CTR-002-008
Comment Author: Comm. for a Better Environment
Document Type: Environmental Group
State of Origin: CA
Represented Org:
Document Date: 09/24/97
Subject Matter Code: C-02b Copper Aquatic Life
References:
Attachments? Y
CROSS REFERENCES

Comment: Proposed copper criteria ignore San Francisco Bay data that show damage to sensitive populations at lower dissolved copper concentrations and led the state to reject criteria that deregulate total copper in its water quality criteria. The proposed rule states that: "New data including data collected from studies for the New York/New Jersey Harbor and the San Francisco Bay indicated a need to revise the copper criteria documents to reflect a change in the saltwater" criteria. In contrast to this statement, many scientists involved in review of the San Francisco Bay study reached a very different conclusion.

Many scientists commented during the state's review that the data did not necessarily support a revised copper criterion. EPA scientists raised many questions regarding: inadequate seasonal sampling; departure from standard testing recommendations; interpretation of toxicity test endpoints and precision; interpretation of widely varying responses; failure to measure dissolved copper in key bioassays and sites; overestimation of the amount of copper producing an effect; significant problems with algal test interpretation; confusion of acute versus chronic exposure; unmeasured effects of filtration; joint toxicity of copper with other metals; multiple stresses; bioaccumulation; and, generally, how lab results will "mimic environmental reality."(*17)

Other scientists stated similar and stronger concerns, Dr. Michael Perrone commented that "there isn't a positive demonstration that dissolved copper is a good predictor" of environmental ion.(*18) The state's Department of Fish and Game also stated that "[t]otal copper can become protect unbound and available for uptake by organisms" in comments voicing many of the concerns listed above, and recommended: "Retain the existing criteria of 2.9 ug/L as total copper."(*19)

The weight of scientific opinion raised sufficient questions about how these laboratory studies "mimic environmental reality" to warrant analysis of field data. This showed species had responded to changes in Bay copper, and those bivalve shellfish and phytoplankton which are most vulnerable to copper toxicity were severely reduced in abundance although they once thrived here, and thrive in similar estuaries at dissolved copper levels of about I ug/L or less.(*1) Comparison of high quality data between estuaries further demonstrated S.F. Bay copper pollution similar to other polluted estuaries, and dissolved copper levels below 1 ug/L in unpolluted or less polluted estuaries where these copper-sensitive species thrive.(*2) There is a "reasonable probability" that copper levels in waters of the southern reach affect the ecosystem, and cutting copper pollution will likely benefit aquatic life.(*1)

Therefore, the state's review of all of this evidence led to a decision to adopt a criterion for total copper that would require reduced copper concentrations. The fundamental rationale for this was that cutting copper pollution was necessary in order to ensure the protection of aquatic life. In contrast, EPA's

proposed 3.1 ug/L dissolved copper criterion, which would not require less copper in most Bay waters as shown in Table 4, and which allows dissolved copper three times levels at which sensitive estuarine species are known to thrive, cannot ensure the protection of Bay aquatic life based on sound scientific rationale.

(*1) U.S. Geological Survey, 1992. Letter from Samuel N. Luoma, Ph.D., to Seven R. Ritchie, Executive Officer, Regional Water Quality Control Board. August 24, 1992.

(*2) Karras, 1992. Comparison of copper in waters of the southern reach of San Francisco Bay and ten other estuaries. Communities for a Better Environment (CBE). July, 1992.

(*17) USEPA, 1992. Comments on the data presented in the Hansen Report. Includes cover letter from Maria Rea, Chief, Water Quality Standards Section, to Steven R. Ritchie, Executive Officer, Regional Water Quality Control Board, San Francisco Bay Region. July 15, 1992.

(*18) California State Water Resources Control Board, 1992. Memorandum from Michael Perrone, Ph. D., to Lynn Suer, Ph.D., Regional Water Quality Control Board, re: Review of draft final report entitled "Development of site specific criteria for copper for San Francisco Bay." June 29, 1992.

(*19) California Department of Fish and Game, 1992. Conunents on the Draft Final Report Entitled "Development of site-specific criteria for copper for San Francisco Bay." Letter from John Turner, DFG, to Steven R. Ritchie, RWQCB. July 14,1992.

Response to: CTR-002-008

EPA does not agree with the commenter's comment concerning a copper criterion of 1 ug/L. This issue was raised in 1992 when the San Francisco Bay Regional Water Quality Control Board (SF RWQCB) published its site-specific copper value (based on total copper). EPA agrees with the SF RWQCB's position, which it articulated in its October 21, 1992, "Responses to Comments - Site-specific Copper Objective" for the September 25, 1992, report titled "Revised Report on Proposed Amendment to Establish a Site-Specific Objective for Copper in San Francisco Bay". The SF RWQCB noted that the ambient concentrations in South San Francisco Bay were well above the 1 ug/L in Tomales Bay and then stated that, "the observation that some organisms are more abundant in Tomales Bay where concentrations are less than 1 ug/L does not mean that 1 ug/L is needed to insure protection of these organisms in San Francisco Bay." This would be setting a criterion "based on correlation rather than controlled experimentation, and does not account for the many other factors that can affect the distribution and abundance of organisms."

EPA believes that the weight of sound scientific evidence fully supports the protectiveness of its copper criterion. EPA does not consider the commenter's interpretation of reference 17 (1992 EPA comments on the site-specific modifications of the copper criterion for San Francisco Bay) relevant to the CTR copper criterion. The subject of reference 17 was not the CTR criterion, and the information available to EPA when it formulated its 1992 comments (the commenter's reference 17) was less than the information available to EPA in formulating the criterion in this rule. In its 1995 "Ambient Water Quality Criteria - Saltwater Copper Addendum", EPA examined the data available from the San Francisco Bay studies and utilized only the data with suitable quality into its revised national criterion (which was used in the CTR).

Concerning the comment about whether dissolved copper is a good predictor of environmental ion

(reference 18), EPA does not agree that such prediction is cogent. The intent of the copper criterion in the rule is to prevent copper toxicity, not to achieve any fixed concentration of free ionic copper.

Concerning the comment that "total copper can become unbound and available", EPA notes that unbound and available copper is covered by the criterion incorporated in the rule. Thus, EPA does not believe that this a concern. See also the response to CTR-026-004 concerning dissolved v. total recoverable metals criteria.

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Comment: II. Use of New Scientific Information

The City acknowledges and supports EPA's update of several water quality criteria including those for mercury, cadmium and arsenic. While a number of criteria were updated to reflect current scientific information, there are a few notable exceptions.

The following briefly addresses the key updates and omissions that should be addressed in the final publication of this rule.

B. Outdated Science

1. Copper

The proposed copper criteria do not reflect the expected toxicity of this pollutant in the environment and will result in unnecessarily restrictive requirements throughout the state. Although required by the National Guidelines, the copper criteria fail to include an adjustment to account for binding with organic material such as that expected to occur in storm waters and in treatment plant effluents that renders this pollutant non-toxic (see enclosed article, Exhibit 5). Application of the criteria as a dissolved standard will likely result in many facilities being identified as in violation of the criteria. Few storm waters are expected to meet the acute criteria due to low hardness of such waters. The City's storm water monitoring has indicated that such waters exceed the proposed acute criteria. The typical Total Organic Copper ("TOC") level present in storm waters (8-20 mg/l) is well above the 3 mg/l value specified in EPA's Copper Criteria Document as indicative of significant organic complexing and the need to modify the criteria. Consistent with the available technical data and criteria development guidelines, the copper criteria must be modified to address organic binding as part of the criteria to avoid classifying many dischargers as toxic threats when no such threat actually exists. The following identifies the scope of concerns regarding proper application of copper criteria and the technical information that demonstrates EPA's copper criteria routinely overestimate actual aquatic life threats.

(a) Introduction

No single issue in the development and application of water quality criteria for metals is of greater importance to NPDES permittees than the accurate assessment of aquatic toxicity of copper. The infrastructure of the nation's drinking water supply depends on copper and copper alloy pipes. Along with drinking water conveyance, copper chemicals are widely used for algae control in drinking water supplies and reservoirs. Because of the intimate association between copper and the nation's water supply, it is inevitable that some form of copper will be discharged in wastewater and present in storm waters.

EPA's current approach to copper regulation assumes that the toxic form of the metal exists in biologically treated effluents and storm waters even when all scientific information confirms that it does not. This assumption causes permittees to conduct expensive studies to correct the standard to reflect the lack of environmental threat present. This approach (1) is wasteful of local resources, constituting an unauthorized, unfunded mandate; (2) penalizes small communities which have both limited budgets and access to updated scientific approaches; (3) is inconsistent with EPA's statutory mandates and guidance; and (4) violates regulatory principles outlined in the President's "Reinventing Environmental Regulation" initiative. Because EPA's approach does not reflect reality and easily implemented, less costly approaches exist to properly regulate copper discharges, this criteria should be withdrawn or, at a minimum, narrowed in its application. The following summarizes the scientific and regulatory bases for withdrawal and reconsideration of laboratory-derived numerical water quality criteria for copper to biologically treated effluents.

First, existing copper criteria are not appropriate for biologically treated effluents or situations where elevated TOC levels are known to exist (the typical case where the criteria are applied) because the database used to derive this criterion did not consider the dramatic detoxification of copper by constituents commonly present in biological waste treatment systems. Second, laboratory studies, field surveys, and water effects ratios conducted by regulatory authorities and independent researchers all confirm that copper rapidly binds ("complexes") with organic and inorganic matter (e.g., phosphates) during biological waste treatment, thus rendering copper non-bioavailable and hence non-toxic to aquatic life. Third, all field studies conducted by EPA and state agencies confirm that copper in biologically treated effluents is not toxic to sensitive species which were used to establish the federal copper criteria. This demonstrates that biologically treated effluents eliminate copper toxicity and should pose no threat to resident species instream after mixing.

Briefly, the current body of laboratory research on the detoxifying effects of organic and inorganic matter on copper, including total organic carbon, particulate matter, humic and fulvic and amino acids, explains why scientific field studies consistently show that copper in biologically treated effluents, and by extension storm waters, is not expected to be toxic to aquatic life. Current copper criteria application to treated effluents and storm waters is not appropriate or necessary to protect aquatic life. Use of acute daphnid whole effluent toxicity tests would be sufficient to regulate copper at a level of protection equivalent to the national criteria for copper and eliminate the need for expensive WER analyses.

(b) EPA Must Follow Its Guidance

EPA's national guidance for Clean Water Act Section 304(a) criteria development requires all relevant factors regarding toxicity of a pollutant to be considered in establishing water quality criteria for that pollutant.(*16) Because the current copper criteria are based on assessments of dissolved metal salts in laboratory water with little or no ability to complex copper, the commonly encountered dramatic detoxifying effect of treated effluent and other naturally existing substances present in storm waters were

not considered.

EPA guidance on implementing metals criteria expressly states that it is only the biologically available fraction of the metal that is intended to be regulated.(*17) Although recent guidance from EPA specifying that metals criteria assessed as "dissolved" may be a better approximation of the toxic fraction under some circumstances, measurements of filterable "dissolved" copper in biologically treated effluents or in storm water samples with high (greater than 5 mg/l) TOC levels are, to a certainty, not relevant to assessing the toxic fraction of copper. Such measurements erroneously assesses non-toxic filterable organo-copper complexes as "dissolved" which is the form in which the metal will be discharged from these facilities or will preferentially exist in the environment. Because the vast majority of facilities that discharge copper utilize biological treatment, it is apparent that widespread misapplication of the copper criteria may result from use of a dissolved metals approach. Similarly, storin waters typically contain TOC levels equivalent to well treated municipal effluent (5-20 mg/l TOC).

(*16) Guidelines for Deriving Numerical National Water Quality Criteria for the Protection of Aquatic Organisms and their Uses, USEPA (1985) (emphasis supplied).

(*17) Interim Guidance on Interpretation and Implementation of Aquatic Life Criteria for Metals, USEPA (May 28,1992) ("Interim Guidance").

Response to: CTR-020-011

See response to CTR-020-012.

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Comment: II. Use of New Scientific Information

The City acknowledges and supports EPA's update of several water quality criteria including those for mercury, cadmium and arsenic. While a number of criteria were updated to reflect current scientific information, there are a few notable exceptions.

The following briefly addresses the key updates and omissions that should be addressed in the final publication of this rule.

(e) Copper Criteria Development and Application

(1) Criteria Based on the Dissolved Metal Fraction Overestimate Bioavailable Copper

In 1992, the Pellston Conference of the Society for Environmental Toxicology and Chemistry recommended that water quality standards be established on the basis of bio-availability.(*18) On May 28, 1992, EPA released the Interim Guidance on Interpretation and Implementation of Aquatic Life Criteria for Metals ("Interim Guidance"), a final policy which modified all prior Section 304(a) criteria documents for metals and implemented this recommendation. In issuing its Interim Guidance, EPA acknowledged that only the biologically available fraction of metals is responsible for aquatic toxicity, and therefore is the proper focus of permit limit derivation:

The principal issue is the correlation between metals that are measured and metals that are biologically available.(*19)

In the Interim Guidance and contemporaneous correspondence, EPA acknowledged that expressing water quality criteria for metals as dissolved measurements is a conservative approach and that a state should consider further reductions in toxicity from complexing:

Alternatively, we are allowing States to apply criteria to dissolved metals only. However, we suspect that this may be a somewhat less accurate method of excluding "nontoxic" metal from regulation, because some dissolved metal exists in forms that have little toxicity (particularly copper, a pollutant of great concern to municipal dischargers)...(*20)

Following the January 1993 Annapolis Conference on the development and implementation of metals criteria, EPA modified its criteria implementation guidance to use dissolved metal (i.e., filterable through a 0.45 u membrane) concentrations in setting water quality standards "because dissolved metal more closely approximates the bioavailable fraction of metal in the water column than does total recoverable metal.(*21) Scientists at the Annapolis Conference emphasized that under certain circumstances, dissolved metal standards are conservative and may overstate the toxic fraction: "In some cases, even the dissolved concentration may overestimate the bioavailable fraction for metals that strongly complex to either inorganic or organic ligands (e.g., filterable carbon containing particles).(*22) Because the dissolved approach erroneously equates all "filterable" dissolved copper to bioavailable copper, dissolved metals measurements overstate the toxic metal fraction in biologically treated effluents.

(2) All Laboratory Studies Confirm Copper is Detoxified by Organic Substances in Sewage

The detoxifying influence of organic and inorganic complexation on copper was reported in EPA's 1984 Copper Criteria Document.(*23) Among the heavy metals, copper is particularly amenable to complexation with organic and inorganic matter to render this metal non-bioavailable and hence non-toxic to aquatic life. Aquatic organisms respond to free ionic metal and monohydroxy complexes as bioavailable forms.(*24) Rapid detoxification of copper in the presence of inorganic and organic substances occurs due to the high reactivity of this metal:

[t]he cupric ion is highly reactive and forms moderate to strong complexes with many inorganic and organic constituents of natural waters (e.g., carbonate, phosphate, amino acids and humates), and is readily sorbed onto surfaces of suspended solids.(*25)

EPA's 1984 criteria application guidance provided a criteria adjustment for hardness -- one of the many substances present in biologically treated effluents -- but omitted similar consideration of organic ligands, even though EPA recognized their greater importance in detoxifying copper:

Lind, et al., (Manuscript) measured the toxicity of copper to Daphnia pulicaria in a variety of surface

waters and found that total organic carbon (TOC) is a more important variable than hardness, with acute values varying approximately 30-fold over the range of TOC covered. Similar results were obtained with the fathead minnow. This indicates that the criteria should be adjusted upward for surface waters with TOC significantly above the 2 to 3 mg/L usually found in waters used for toxicity tests.(*26)

The scientific literature is replete with peer reviewed studies confirming that organic ligands similar to those in municipal effluents dramatically mitigate copper toxicity.(*27) Callahan, et al., concluded that most cupric salts are not readily water soluble and reported that inorganic and organic complexation and adsorption of copper reduce the level of soluble copper to very low values, even in the presence of total copper.(*28) The linear relationship between reduction in toxicity of total copper to rainbow trout with increasing concentrations of suspended organic solids was reported by Brown.(*29) This work reported that doubling the concentration of organic ligand from 4 mg/l to 8 mg/l approximately doubled the 96-hour LC50 for copper. Brown concluded:

toxicity to rainbow trout of a given total concentration of copper was quantitatively reduced in the presence of a good quality sewage effluent, of an amino acid, of humicsubstances, and of suspended organic solids.(*30)

Similar results were obtained by Sunda and Lewis, who reported complexation of 61 to 99 percent of free copper by river water containing natural organic matter at 22 mg/l.(*31) Erickson, et al., reported that copper complexed with organic ligands appears to be one-fifth as toxic as free ionic copper, and that addition of organic matter (humic substances) increased the LC50 of copper by 2.7. Morrison and Florence reported that copper toxicity to algae and Daphnia magna was decreased by sixty (60) percent in the presence of 5 mg/l fulvic acids and eliminated in the presence of 1.3 to 8 mg/l humic acid colloids.(*32) As noted previously, storm waters typically contain TOC levels in excess of these values.

The above laboratory studies conducted under conditions with relatively low levels of binding agents confirm that even when relatively high "dissolved" copper concentrations were measured, the toxicity of copper to sensitive species was greatly reduced or eliminated in the presence of organic and inorganic compounds. The amount of copper complexed in the presence of high concentrations of organic ligands in biological waste treatment systems or urban storm waters would, of course, be much greater. As the amount of ligands and other binding agents is, stoichiometrically, greatly in excess of the ionic copper for typical municipal and storm water conditions, no copper will be present in a toxic form. This fact was demonstrated by Allen and Hansen.(*33)

On the basis of over twenty years of observations and research on metal speciation chemistry and fate of metals in receiving waters and in treatment facilities, Dr. Allen concluded that virtually all copper in biologically treated effluent is non-toxic:

Following biological treatment, virtually all the copper present in a municipal treatment plant effluent would be in the form of soluble copper complexes or it would be sorbed to particulate material not removed from the effluent stream in the final clarifier. Certainly, as in any chemical equilibrium situation, there will be a finite concentration of free, ionic copper present in the effluent. However, this concentration will be very low and will not pose a toxicity risk. This is borne out by a lack of metal toxicity in treatment plant effluents when effluent monitoring studies have been conducted. As far as I know, such studies have not demonstrated that there is toxicity from metals in effluents.(*34)

Field studies of WERs have repeatedly confirmed laboratory observations and validate the total detoxification of copper by biologically treated effluents. DiToro, et al., performed WERs on the site-specific detoxification of copper in the Naugatuck River.(*35)

Very little difference in toxicity was observed between laboratory water with minimal complexing ability and river water from pristine segments. However, where river water contained treated municipal effluents, up to a twelve-fold reduction in copper toxicity was recorded, and it was concluded that the copper present in the municipal effluent was non-toxic. A 1992 summary of WERs for heavy metals compiled by Brungs showed that copper is up to 26 times less toxic in water influenced by municipal effluent.(*36) It should be noted that to have a WER significantly above one (1), the existing metal in the discharge must be complexed. The WERactually represents the excess binding capacity of the effluent.

The dramatic detoxification of copper in the presence of municipal effluent was also reported in a field study on Shayler Run by Geckler, et al.

It was suspected that the Shayler Run sewage treatment plant was discharging materials that were detoxifying copper in Shayler Run water. Bioassays, using diluent water from above and below the entrance of the effluent, indicated that copper was much less toxic in Shayler Run water below the plant. Additional toxicity tests, in which Shayler Run water was diluted with a reconstituted water similar in hardness and alkalinity, indicated that the reduction in toxicity was not due to hardness or alkalinity, but to some other detoxifying agent or agents being diluted.(*37)

The North Carolina Department of Environment, Health, and Natural Resources documented 78 cases in which total recoverable copper in effluents and in receiving waters was measured in excess of water quality criteria without observed chronic toxicity. Instream total copper ranged up to 378 ug/l. Bioassay testing was conducted using Daphnia magna, one of the most sensitive species to copper (see Exhibit 7). The Massachusetts Department of Environmental Protection confirmed the same results in their survey of 35 facilities. These documents have previously been provided to EPA as part of the public comments on the May 1995 National Toxics Rule revision. No public response to those comments was ever published. As a result of the extensive NWR analysis performed by the Connecticut Department of Envirom-nental Protection, it was demonstrated that water upstream from municipal dischargers exhibit a typical WER of three (3) while those downstream of publicly owned treatment works ("POTWs") exhibit WERs ranging from 8 to 25 (Exhibit 8). As expected, the higher WERs are associated with increased levels of municipal effluent and organic material.

The above field studies confirm the observations made by laboratory research and validate the rapid detoxification of copper in the presence of treated effluents and elevated TOC levels. Stockton is not aware of any reported instances that contraindicate copper in biologically treated effluent is non-toxic to sensitive species. Thus, it is apparent that there is no technical or environmental basis for concern regarding copper levels typically discharged by biologically treated facilities (copper ranging from 20 to 200 ppb). Nor is there any rational basis to be concerned with low level dissolved copper measurements in storm waters where TOC levels are capable of fully binding the available copper. The continued application of a dissolved criteria approach which would classify these effluents as problematic when they clearly are not is arbitrary and capricious and wastes local resources on problems that do not exist.

(3) Water Quality Criteria Must be Based on the Latest Scientific Information and the Proper Application of Science

The fundamental oversight in translating dissolved copper criteria into permit conditions is the failure to regulate only bioavailable metal. The laboratory conditions of the EPA criteria development experiments accurately reflect the maximum toxic impacts to highly sensitive species when exposed to a highly toxic dissolved, ionic form of copper in pure water having little or no complexing ability. Such conditions are

plainly unrelated to copper discharged from biological waste treatment systems. Because of the greater abundance of complexing agents present in biological treatment process, all copper in a discharge will be in a complexed and therefore non-bioavailable form. This is particularly true for effluent dominated, low dilution streams and storm waters where proper criteria application is most critical.

EPA must apply copper water quality criteria in the same manner in which they were developed. The National Guidelines prohibit application of the criteria in a manner not contemplated by that document:

Criteria must be used in a manner that is consistent with the way in which they were derived if the intended level of protection is to be provided in the real world... Concentrations, durations and frequencies specified in criteria are based on biological, ecological and toxicological data, and are designed to protect aquatic organisms and their uses from unacceptable effects.(*38)

Application of water quality standards for copper must reflect the pollutant form assessed in the criteria. The National Guidelines require revision of criteria whenever it is demonstrated that the national criteria "would probably be substantially over or under protective."(*39) As the dissolved approach has been demonstrated to be overprotective in all cases involving biologically treated effluents and elevated TOC, this procedure requires revision.

By allowing scientifically defensible biomonitoring/bioassay methods as an alternative method of developing water quality criteria and water quality-based effluent limitations, EPA would assure adequate protection of only the toxic or bioavailable fraction of copper. This approach is outlined in the most recent SETAC Conference report on proper application of metals criteria. Unlike standards expressed in terms of analytical measurements (e.g., "total recoverable" or "dissolved"), use of bioassay tests to directly evaluate the bioavailable fraction of copper is rationally related to the actual potential for aquatic life impacts to the species that drove the national criteria (ie., daphnids).

The language of EPA regulations makes it clear that the Agency's authority to develop criteria rests on the scientific accuracy by which those criteria relate to aquatic impacts:

Section 304(a) criteria are developed by EPA under authority of Section 304(a) of the Act based on the latest scientific information on the relationship that the effect of a constituent concentration has on a particular aquatic species and/or human health. 40 C.F.R. 131.3(c) (emphasis supplied).

Therefore, Agency endorsement of test methods that are known to exhibit little relationship to aquatic life protection needs exceeds the scope of the Agency's authority to develop and implement criteria.

(4) EPA Is Bound to Adhere to Published Guidance

Both the Clean Water Act and EPA's National Guidelines establish the underlying mechanism for establishing Section 304(a) criteria for metals. As previously discussed, the National Guidelines describe the various methods of justifying numerical criteria values that are protective of aquatic life uses and specify that all factors that significantly influence the toxicity of a pollutant must be taken into account. EPA's National Metals Policies all state that only the biologically available fraction is intended to be regulated. Unfortunately, a dissolved approach to copper does not meet that objective.

EPA is not free to wander from its published guidance and regulations when the result of such deviation adversely affects the substantive rights of an individual who relied on the Agency's published representations.(*40) In Massachusetts Fair Share v. Law Enforcement Assistance, 758 F.2d 708, 711-712 (D.C. Cir. 1985), the court reinforced the philosophy established in Morton v. Ruiz:

It has long been settled that a federal agency must adhere firmly to self-adopted rules by which the interests of others are regulated. This precept is rooted in the concept of fair play and in abhorrence of unjust discrimination, and its ambit is not limited to rules attaining the status of formal regulations. The Supreme Court has declared that'[w]here the rights of individuals are affected, it is incumbent upon agencies to follow their own procedures, even though the procedural requirement there spoken of had not been published in the Federal Register, and other courts have concluded similarly.

Both the CWA and EPA's published regulations require that criteria accurately reflect the latest scientific knowledge on aquatic life protection needs. See, 33 U.S.C. section 304(a). EPA's current criteria do not reflect the latest information on copper detoxification by treated effluents or in the presence of elevated TOC levels, the most common cases for applying the criteria. The continued application of current numerical copper criteria to such situations is inappropriate and unnecessary

(5) Conclusion

For all the foregoing reasons, EPA should ensure that the criteria-based water quality standard for copper is applied to the same pollutant form assessed in the Copper Criteria Document "bioavailable" or, in this case, ionic copper). Laboratory and field studies overwhelmingly support the conclusion that copper in storm waters and biologically treated effluents exists in organo-complexes and is not bioavailable. There is no information to the contrary. Current approaches to criteria development erroneously equate filterable copper to dissolved bioavailablemetal, and overstate the toxic fraction in treated effluents, wasting local and state resources on time consuming, administratively complex and expensive WER tests. Consistent with the National Guidelines and the "Reinventing Government" initiative, a less costly, more environmentally appropriate approach is required.

It is clear from the preceding discussion that the existing copper criteria requires amendment because the criteria, as implemented, are not limited to the toxic form of the metal. Since there are no approved analytical techniques to allow measurement of the toxic form of copper in state waters, EPA needs to establish a procedure to better define the toxic fraction and defer implementation of copper water quality criteria for any discharge that has demonstrated no acute toxicity to copper sensitive organisms. This approach is used by the State of North Carolina and is conceptually the same as the simplified water effect ratio approach EPA is developing. This methodology will provide significant benefit to EPA and better focus environmental resources. By establishing an objective basis to evaluate actual copper toxicity, EPA and the regulated community will better be able to define where real copper toxicity problems exist.

(*18) Benson, W.H., Alberts, J., Allen, H.E., Hunt, C.D., and Newman, M.C. "Bioavailability of Inorganic Elements." In A Mechanistic Understanding of Bioavailability: Physical Chemical Interactions, ed. J.K. Hamelink, W.H. Benson, H.L. Bergman, and P.F. Landnim. Chelsea, MI: Lewis Publishers, 1993.

(*19) Interim Guidance at 1.

(*20) Letter from LaJuana S. Wilcher, USEPA, to Congressman Hammerschmidt, dated March 13, 1992 (emphasis supplied).

(*21) Technical Guidance on Interpretation and Implementation of Aquatic Life Metals Critera, USEPA (October 1, 1993) at 2.

(*22) Implementation of Metals Criteria," USEPA Memorandum (April 1, 1993).

(*23) Ambient Water Qualiiy Criteria for Copper - 1984, USEPA/440/5-84-031 (January 1985).

(*24) Allen, Herbert E. and Bo Shi. Copper Speciation and Bioavailability: Critical Evaluation for POTW Effluent Discharges. Proceedings of the Water Environment Federation Conference on Toxic Substances in Water Environments (May, 1995) pp. 5-11

(*25) Copper Criteria Document at 2.

(*26) Copper Criteria Document at 7.

(*27) Boggs, S., D.G. Livermore, and M.G. Seitz. "Humic Macromolecules in Natural Waters." Reviews in Macromolecular Chemistry and Physics, C25, 599-657 (1985); Sposito, G. "Sorption of Trace Metals by Humic Materials in Soils and Natural Waters." CRC Critical Reviews in Environmental Control (I 6):193-299 (1986); Buffle, J.Complexation Reactions in Aquatic Systems: An Analytcal Approach. Ellis-Horwood, London(1988).

(*28) Callahan, M.A., M.W. Slimak, N.W. Gabel, I.P. May, C.F. Fowler, J.R. Freed, P. Jennings, R.L. Durfee, F.C. Whitmore, B. Maestri, W.R. Mabey, B.R. Holt and C. Gould. Water-Related Environmental Fate of 129 Priority Pollutants. USEPA 440/4-79-029a (1979).

(*29) Brown, V.M., T.L. Shaw, and D.G. Shurben. "Aspects of Water Quality and the Toxicity of Copper to Rainbow Trout." Water Research 8:797-803 (1974).

(*30) Id. at 801.

(*31) Sunda, W.G. and J.M. Lewis. "Effect of Complexation by Natural Organic Ligands on the Toxicity of Copper to a Unicellular Algae, Monochrysis lutheri." Limnology od Oceanography 23:870-876 (1978).

(*32) Morrison, G.M.P. and T.M. Florence. "Comparisons of Physiochemical Speciation Procedures with Metal Toxicity to Chlorella pyrenoidosa." Analytica Chimica Acta 209:97-109 (1988).

(*33) Allen, H.E., and Hansen, D.J. "Importance of Trace Metal Speciation to Water Quality Criteria." Draft manuscript dated January 7, 1994 (attached hereto as Exhibit 2).

(*34) Letter from Dr. Herbert E. Allen to J.C. Hall regarding speciation and bioavallability of metals, dated October 15, 1993 (attached hereto as Exhibit 6).

(*35) DiToro, D.M., J.A. Hallden, and J.L. Plafkin. "Modeling Ceriodaphnia Toxicity in the Naugatuck River: II. Copper, Hardness and Effluent Interactions." Environmental Toxicology and Chemistry 10:261-174 (1991).

(*36) Brungs, W.A. "Synopsis of Water-Effect Ratios for Heavy Metals as Derived for Site Specific Water Quality Criteria." USEPA Contract No. 68-CO-0070 (1992).

(*37) Geckler, J.R., W.B. Homing, T.M. Neiheisel, Q.H. Pickering, E.L. Robinson and C.E. Stephan. "Validity of Laboratory Tests for Predicting Copper Toxicity in Streams." USEPA 600/3-76-116 (1976)

at pp. 168-169.

(*38) National Guidelines at 14 (emphasis supplied).

(*39) National Guidelines at 18.

(*40) See Morton v. Ruiz, 415 U.S. 199, 235. In a dispute between an American Indian and the Department of Interior's Bureau of Indian Affairs ("BIA"), the Supreme Court held that where the rights of individuals are affected, it is incumbent upon agencies to follow their own procedures. This is so even where the internal procedures are possibly more rigorous than otherwise would be required.

Response to: CTR-020-012

EPA agrees that the factors discussed in the comment strongly affect the toxicity of copper, but does not agree that the criteria formulas specified in the rule do not account for these factors. The freshwater copper criterion is expressed as formula having two parameters, hardness and the water-effect ratio. The saltwater copper criterion is expressed as a formula having one parameter, the water-effect ratio.

The water-effect ratio (WER) is a generalized parameter that accounts for the difference in biological activity or toxicity of the copper in the site water versus in laboratory water. EPA agrees that the WERs typically observed in waters carrying substantial amounts of municipal effluent are generally large enough that no copper toxicity is manifested in such waters. EPA also agrees that the organic carbon content of such waters plays a key role in rendering copper nontoxic. However, EPA does not believe that the facts set forth in the comment indicate that the WER concept incorporated into the rule is incapable of satisfactorily accounting for the effects that organic carbon and other site water factors have on copper toxicity.

The rule has cited EPA's current guidance on determining water-effect ratios. However, the rule does not require that WER determinations follow only this guidance. Rather, it allows "other scientifically defensible methods adopted by the state...and approved by EPA." EPA understands the concerns raised in the comment about the resources needed to complete a WER determination pursuant to its guidance. EPA is working with states and dischargers in developing more streamlined approaches for determining WERs using fewer toxicity tests. EPA has also been funding development of a biotic ligand modeling approach, which will predict a site WER for copper using chemical measurements of hardness, alkalinity, dissolved organic carbon, and pH, thereby eliminating the need for the side-by-side site water and lab water toxicity testing of the traditional WER determination. EPA also supports conventional regression techniques for developing a relationship between site chemical parameters, such as DOC, and the WER. EPA's approval of such alternative procedures will be based on their scientific merit. With the anticipated improvements in techniques for predicting the WER from chemical measurements, EPA believes that in many cases it may be simpler to implement than the whole effluent toxicity approach advocated in the comment.

Comment ID: CTR-025-004a
Comment Author: Metro. Water Dist. of So. Cal.
Document Type: Water District
State of Origin: CA
Represented Org:
Document Date: 09/26/97

Subject Matter Code: C-02b Copper Aquatic Life
References:
Attachments? Y
CROSS REFERENCES C-16

Comment: The proposed CTR freshwater aquatic life criteria for copper are also problematical for many drinking water suppliers. Copper algaecides are a necessary element of algal control strategies for drinking water reservoirs and conveyances. Even with a comprehensive reservoir management program based on limnological principles, copper algaecides need to be part of the algal control arsenal. Algal growth, if uncontrolled, can lead to unacceptable levels of trihalomethanes (THMS) in treated water supplies, among other impacts.

The CTR proposes freshwater aquatic life criteria for copper which could severely hamper the ability of drinking water suppliers to use copper algaecides. The dosage of these algaecides which is effective for controlling algal growth could lead to periodic exceedances of the copper freshwater criteria. Yet, use of copper algaecides is sometimes necessary to protect drinking water beneficial uses, and there is currently no economically feasible alternative available. Drinking water suppliers have the difficult task of meeting conflicting requirements to protect drinking water beneficial uses while ensuring that aquatic life criteria for copper are met.

Response to: CTR-025-004a

EPA acknowledges the comment, but notes that tradeoffs between drinking water benefits and aquatic life benefits were not considered.

Comment ID: CTR-033-001
Comment Author: San Bernardino Muncpl Wtr Dept
Document Type: Water District
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-02b Copper Aquatic Life
References: Letter CTR-033 incorporates by reference letter CTR-020
Attachments? Y
CROSS REFERENCES

Comment: The application of the proposed copper criteria to municipal effluent is overly restrictive. Copper in municipal effluents have been demonstrated not to be toxic at higher levels than proposed due to the nature of the constituents in the effluent. Attached is a recent article that appeared in the Water Environment Federation Journal that highlights the rational for high copper limits in municipal effluent.

Response to: CTR-033-001

See response to CTR-020-012.

Comment ID: CTR-053-003b

Comment Author: Heal the Bay
Document Type: Environmental Group
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: C-02b Copper Aquatic Life
References: Letter CTR-053 incorporates by reference letter 6 and the comments on Dioxin, copper, and the compliance schedule from letter CTR-002
Attachments? N
CROSS REFERENCES C-01b
C-09a

Comment: In spite of our lack of detailed comments for specific criteria, we have concerns regarding any weakening of California's previously developed standards, particularly those for mercury and copper. Also, we question the absence of criteria for dioxin and dioxin-like compounds. In order to ensure these issues are considered in future improvements of the Rule, we incorporate by reference the comments of the Natural Resources Defense Council regarding mercury, and the comments of Communities for a Better Environment ("CBE") regarding dioxin compounds and copper.

Response to: CTR-053-003b

See response to CTR-002-004b.

Comment ID: CTR-054-008a
Comment Author: Bay Area Dischargers Assoc.
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-02b Copper Aquatic Life
References:
Attachments? Y
CROSS REFERENCES C-24
E-01c
R
S

Comment: Separate, scientifically defensible, reasonably achievable aquatic life criteria for copper should be adopted for San Francisco Bay, or alternatively EPA should specify in the Preamble implementation policies for copper that will result in reasonable control measures actions. To comply with the Clean Water Act and EPA regulations, EPA is required to consider specific water bodies. To fulfill the spirit of Presidential Executive Order 12866 and the requirements of the Unfunded Mandates Reform Act, EPA is required to evaluate regulatory alternatives based on an analysis of costs and benefits. Based on BADA's analysis of costs and benefits, EPA should either adopt copper criteria that are reasonably achievable or alternatively specify implementation policies that will avoid costly end-of-pipe controls. Potential implementation measures that could be specified include use of the following in calculating effluent limitations: actual dilution based on modeling studies; copper translators; probability of compliance less than 99.9%; and water-effect ratios determined for different

segments of the Bay. Unless EPA specifies these or similar implementation policies in the rule, it is possible that the CTR could result in significant costs ($12 million per year to $78 million per year) while resulting in minor environmental benefit (a 1% reduction in copper loading to the Bay). In that case, the CTR would violate the Clean Water Act, EPA regulations, Presidential Executive Order 12866, the Unfunded Mandates Reform Act and the Regulatory Flexibility Act. (see the discussion under Item 11 below.)

Response to: CTR-054-008a

See response to CTR-092-013a.

Comment ID: CTR-060-013
Comment Author: San Diego Gas and Electric
Document Type: Electric Utility
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: C-02b Copper Aquatic Life
References:
Attachments? N
CROSS REFERENCES

Comment: PROVISIONS SDG&E DOES NOT SUPPORT

As described in the following comments SDG&E does not support the following provisions:

Copper criteria

The metal criteria, including copper, are based on toxicity tests run in relatively pure water. Naturally occurring elevated ambient concentrations of suspended organic matter in bays and estuaries can significantly reduce the bioavailable portion of the metal. Since the criteria do not account for the presence of organic matter, the proposed criteria for metals, including copper, will be unnecessarily over-protective. As provided, water effects ratios (WERs) can be developed to account for this effect. However, WER studies can be very costly (see comments below regarding the economic analysis).

EPA appears to have deviated from its standard protocol in developing the copper criteria. Normally, a criteria is based upon toxicity tests of multiple species. However, the proposed criteria appear to be based upon the single species (i.e., the blue mussel) with the lowest toxicity concentration. This has resulted in a somewhat lower criteria than would have otherwise been derived. The criteria should be recalculated to be based upon the results of multiple species.

Response to: CTR-060-013

Concerning the comment on water-effect ratios, see response to CTR-020-012. EPA does not agree that it has departed from its standard protocol in deriving the saltwater copper criterion. The criteria Guidelines provide that the criterion derived to protect the fifth percentile genus is to be lowered, if necessary, to protect recreationally or commercially important species. This has been done for the saltwater copper criterion.

Comment ID: CTR-064-001
Comment Author: El Dorado Irrigation District
Document Type: Irrigation District
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-02b Copper Aquatic Life
References:
Attachments? Y
CROSS REFERENCES

Comment: The CTR proposes to establish a dissolved approach for copper with typical limits for a low flow stream ranging from 8 to 15 parts per billion (ppb). The preamble to the CTR recognizes that copper rapidly binds with organic materials and may not be toxic in municipal effluents. In fact, EPA has acknowledged in a number of forums that copper is not expected to be toxic in municipal effluents; nonetheless, the proposed CTR does not reflect this reality.

As explained by EPA criteria derivation guidelines, water quality criteria are required to reflect expected environmental impacts and are to be revised if they are determined to be significantly over or under-protective. EPA has in its possession an extensive amount of research data and field study results which demonstrate that copper is never toxic in municipal effluents. If copper is discharged to low flow streams, there is no influence of upstream water quality -and therefore, the toxicity of the copper will not be altered. The copper level in EID's discharge typically ranges from 20 to 40 ppb and has been found to be non-toxic to copper-sensitive organisms (i.e., daphnids).

The proposed copper criteria do not reflect the expected toxicity of this pollutant in the environment and will result in unnecessarily restrictive requirements throughout the state. Although required by the National Guidelines, the copper criteria fall to include an adjustment to account for binding with organic material such as that expected to occur in treatment planteffluents that renders this pollutant non-toxic (see enclosure).

Application of the criteria as a dissolved standard will likely result in many facilities being identified as in violation of the criteria. This proposed approach wastes scarce local resources, imposes an unauthorized, unfunded mandate on municipalities, penalizes small communities which have both limited budgets and access to updated scientific approaches, and is inconsistent with EPA's statutory mandates and guidance.

EPA should take one of two actions: (1) withdraw application of the copper criteria to municipalities, or (2) establish a screening level procedure which will only apply the criteria where copper-sensitive organisms indicate that copper is toxic.

We thank you for the opportunity to comment on this proposed rulemaking and look forward to EPA's reevaluation of the copper criteria as applied to municipalities.

Response to: CTR-064-001

See response to CTR-020-012.

Comment ID: CTR-065-007
Comment Author: Environmental Health Coalition
Document Type: Environmental Group
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: C-02b Copper Aquatic Life
References:
Attachments? N
CROSS REFERENCES

Comment: PROPOSED COPPER CRITERION WILL CONTRIBUTE TO DEGRADATION OF SAN DIEGO BAY

EPA's proposed 3.1 ug/L dissolved copper criterion will allow copper three times the levels at which sensitive species are known to be impacted in an areas such as San Francisco Bay. San Diego Bay is already listed as impaired for copper. This criterion is too high and will allow more degradation of our water resources.

Response to: CTR-065-007

See response to CTR-002-008.

Comment ID: CTR-092-013b
Comment Author: City of San Jose, California
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: C-02b Copper Aquatic Life
References: Letter CTR-092 incorporates by reference letter CTR-035
Attachments? Y
CROSS REFERENCES C-24a

Comment: Validity Of The Proposed Copper Criteria For South San Francisco Bay

Attachment 3 to this letter is a technical report entitled "Development of a Site-Specific Water-Effect Ratio for Copper in South San Francisco Bay", dated September 1997 and prepared by the City of San Jose Environmental Services Department.

This attachment is also incorporated as part of our comments and is being submitted for inclusion in the record for this rulemaking. Because EPA is proposing to promulgate water quality criteria for all waterbodies in the State of California, we believe that it is required toconsider site-specific data to the extent that it is available, especially, where, as in the case of the submitted data, it appears that there is a less costly/appropriately protective alternative to the proposed criteria.

Response to: CTR-092-013b

See response to CTR-092-013a.

Comment ID: CTRH-001-014
Comment Author: Greg Karras
Document Type: Public Hearing
State of Origin: CA
Represented Org: Comm. for Better Environ.
Document Date: 09/17/97
Subject Matter Code: C-02b Copper Aquatic Life
References:
Attachments? N
CROSS REFERENCES

Comment: On copper, EPA says it has weakened the copper standards to allow copper levels which, again, now violate the state standard of 4.99 in most of the bay. And EPA says this is too tight because the new data shows the quantity standard for total copper is overprotective.

But the highest dissolved copper level found in the estuaries with less copper pollution, where species that are apparently decimated by copper pollution in parts of San Francisco Bay still thrive, is three times smaller than EPA's proposal.

Our question here is, will EPA prove that its proposal will protect these species in the bay before adopting it?

Response to: CTRH-001-014

See response to CTR-002-008.

Subject Matter Code: C-03b Nickel Aquatic Life

Comment ID: CTR-063-001
Comment Author: Wilner, Cutler & Pickering
Document Type: Specific Industry
State of Origin: CA
Represented Org: Ni DI, Ni PERA, Inco U.S.
Document Date: 09/22/97
Subject Matter Code: C-03b Nickel Aquatic Life
References:
Attachments? N
CROSS REFERENCES

Comment: In this rulemaking, EPA proposes to set the freshwater acute aquatic life water quality criterion for nickel (the so-called "Criterion Maximum Concentration" or "CMC") at a level of 470 ug Ni/L, while the freshwater chronic aquatic life water quality criterion (the so-called "Criterion Continuous Concentration" or "CCC") would be set at a level of 52 ug Ni/L -in both cases expressed as the dissolved fraction of nickel in the water column corresponding to a water hardness of 106 mg/L as CaCO3- See 62 Fed. Reg. at 42169 (Table), 42194, These values are less than one-third of the CMC and CCC values that EPA has adopted for nickel in its National Toxics Rule, See 62 Fed. Reg. at 42169.

As explained in the rulemaking notice, the reason why the freshwater nickel aquatic life criteria proposed for California are so much lower than the values set forth in the National Toxics Rule is that the California values were "calculated using data published subsequent to the issuance of [the Clean Water Act section] 304(a) criteria document [for nickel]." Id. at 42168/3. In particular, eight sets of acute toxicity (LC50/EC50) data were added to the database for nickel. Seven of these eight LC50/EC50 values (adjusted to a water hardness of 50 mg/L CaCO3) ranged from 66,100 ug/L to 160,521 ug/L(*1). The eighth value, an LC50, for the snail species Physa gyrina, was 416 ug/L, more than two orders of magnitude lower than the values in the other seven studies.(*2) This value also was far below any other acute aquatic toxicity value for nickel that had been reported previously.(*3)

Since EPA calculates the CMC acute toxicity value by using the lowest four Genus Mean Acute Values for the chemical(*4), the LC50 of 416 mg/L reported for Physa gyrina replaced a Genus Mean Acute Value of 6,707 ug/L for the fathead minnow in the calculation of the CMC for nickel.(*5) This substitution of LC50 values caused the proposed California CMC for nickel to be 470 ug/L at a water hardness of 100 mg/L CaCO3, while the National Toxics Rule CMC for nickel corresponding to that water hardness is 1400 ug/L. See 62 Fed. Reg. at 42169. It also caused the proposed California CCC for nickel to be 52 ug/L at a water hardness of 100 mg/L CaCO3, compared to a National Toxics Rule CCC of 160 ug/L at that water hardness. See id. (The chronic toxicity CCC was affected by the change in acute toxicity data because, in the absence of sufficient chronic toxicity data for nickel, the CCC was derived by applying an acute to-chronic ratio to the acute toxicity data. See Nickel Criteria Document at K-1.)

The LC50 of 415 ug/L for Physa gyrina that is driving the reduction in the acute and chronic aquatic toxicity values for nickel in the California proposal is derived from a study by A.V. Nebeker, et al., "Effects of Copper, Nickel and Zinc on Three Species of Oregon Freshwater Snails, " Environmental Toxicology and Chemistry 5:807-811 (1986). For the reasons discussed below, we do not believe that data from this study (which was conducted in part to develop new test methods) should be used to calculate CMC and CCC values for nickel.

Under the methodology used by EPA to derive CMC values, "results of acute tests during which the test organisms were fed shall not be used, unless data indicate that the food did not affect the toxicity of the test material(*6). The article by Nebeker, et al. does not mention whether or not the snails were fed during testing. When a NiPERA scientist contacted the study's lead investigator in August 1993, she was informed that the investigator believed the snails had been fed. A subsequent check of the original data book for the 96-hour and 30-day Physa gyrina zinc test conducted as part of the same study disclosed that food had indeed been placed in each test container.(*7) The data book for the Physa gyrina nickel test could not be found (apparently some archived material was lost when the EPA laboratory was closed in 1985). In the absence of the data book, the study's author explained that while animals normally are not fed during acute (96-hour) tests, they may have been fed in this instance because the investigators "were developing new test methods, as well as obtaining criteria data.(*8) The authors of the study simply "have no way to verify" whether or not the snails were fed in the Physa gyrina nickel test.(*9)

In these circumstances, data from the Physa gyrina nickel test should not be used to set water quality criteria, particularly since the authors' data book clearly shows that the snails were fed in the 96-hour zinc test performed by the same investigators, in the same series of tests, in the same lab.(*10) Another reason why data from the Physa gyrina nickel study should not be used is that the loss of the primary data notebook makes it impossible to verify the experimental conditions and results of the study.

Apart from the possibility that the snails were fed, data from the test by Nebeker, et al. should be interpreted cautiously because these particular snails are very sensitive to heavy metals, especially copper.(*11) In one of the snail species tested by Nebeker (Lithoglyphus virens), the 30-day LC50 for copper was found to be <0.004 mg/L, while in a second test of the same species, 50% of the snails died at a copper concentration of 0.008 mg/L (the lowest level tested) at 96 hours.(*12) Overall, Nebeker et al. noted that the effect levels they observed were "in the lower range of those that have been reported," a result they attributed in part to the extreme softness of their test water (approximately 20 mg/L) and the resulting "higher percentage of biologically active metal species (e.g., more Cu++ in solution).(*13) It may be that exposure to low ambient levels of copper and other metals in this extremely soft test water had compromised the overall health of the snails and made them more sensitive to nickel.(*14) In the absence of positive control data (which are not reported in the article and which are not otherwise available given the loss of the primary data notebooks), one cannot determine whether the snails' health was compromised.(*15)

In sum, substantial questions exist as to whether the study by Nebeker et al. -which was conducted in part to develop new test methods -- satisfies EPA's methodological criteria for developing acute aquatic toxicity values. The possibility (indeed, likelihood) that the snails were fed during the 96-hour test, the apparent heightened sensitivity of the organisms resulting from exposure to low levels of copper in the soft water while the snails were held in culture prior to testing, and the absence of a data notebook that would make it possible to verify the experimental conditions and results all suggest that data from this study should not be used to set freshwater aquatic toxicity criteria for nickel. This is particularly true in light of the fact that the LC50 value for the only other snail species for which acute nickel toxicity data are reported (Amnicola sp.) was 12,770 ug/L (adjusted to a hardness of 50 mg/L), a value that is 30 times higher than the LC50 reported by Nebeker et al. for Physa gyrina.(*16) This striking disparity between the LC50 values for the two snail species is an additional reason for excluding the data from the Nebeker et al. study of Physa gyrina in calculating the acute water quality criterion for nickel.(*17) With those data excluded, the freshwater CMC for nickel would be 1400 ug/L (adjusted to a hardness of 100 mg/L as $CaCO_3$), and the freshwater CCC would be 160 ug/L (adjusted to a hardness of 100 mg/L as $CaCO_3$). Those values (and the corresponding water hardness equation from which they are calculated) should be adopted as the numeric freshwater aquatic life criteria for nickel in the State of California.

(*1) See 1995 Updates: Water Quality Criteria Documents for the Protection of Aquatic Life in Ambient Water - 1995 Update: Freshwater Aquatic Life Criterion for Nickel, September 1996 (hereinafter "Nickel Criteria Document") at K-3, Table KI.
(*2) See id.
(*3) See id., Table K2.
(*4) See id. at K-1.
(*5) See id. at K-5, Table K2.
(*6) See 58 Fed. Reg. 20802, 21017/2 (April 16, 1993).
(*7) Personal communication from Alan V. Nebeker to Barbara Andon, August 27, 1993 (submitted herewith as Attachment 1).
(*8) id.
(*9) Id.
(*10) There is, of course, no data to indicate whether any feeding that might have occurred affected the toxicity of the test material.
(*11) See Nebeker, et al., supra, at 807.
(*12) See id. at 808 Table 1, 809.
(*13) Id. at 810.
(*14) See id. at 81 1 ("The prior acclimation of the test species to very low copper concentrations (less than 0,003 mg/L) also may affect their sensitivity.")- cf 58 Fed. Reg. at 21016 (stating that data must be rejected if the organisms "were previously exposed to substantial concentrations of the test material or other contaminants").
(*15) Cf 58 Fed. Reg. at 21016 (stating that data must be rejected "if they are from tests that did not contain a control treatment"). Similarly, since the study was not repeated, possible anomalies in the study (such as possible miscalculations in the dosing concentrations) cannot be ruled out.
(*16) See Nickel Criteria Document at K-4, Table K2; R.L. Rehwoldt, et al., The Acute Toxicity of Some Heavy Metal Ions Toward Benthic Organisms," Bull. Environ. Contain. Toxicol. 10:291-294 (1973) (static test procedure).
(*17) Cf 58 Fed. Reg. at 21017/3 ("Acute values that appear to be questionable in comparison with other acute and chronic data for the same species and for other species in the same genus must not be used. For example, if the acute values available for a species or genus differ by more than a factor of 10, rejection of some or all of the values is probably appropriate.").

Response to: CTR-063-001

EPA does not agree that the Nebeker et al. test results should be rejected. EPA does not believe that the question of whether the snails were or were not fed is of overriding importance. Feeding of organisms is not desirable in acute tests because the material in the food may reduce the biological availability of the toxicant, thus reducing its toxicity and raising its LC50, and because feeding is generally not necessary in a short test. Feeding of organisms is necessary in chronic tests, because of their longer duration. EPA does not believe that the feeding of organisms in a either an acute or chronic test has any effect on increasing the sensitivity of organisms to the toxicant, and likewise does not believe that feeding of organisms in the Nebeker et al. test, if it had been done (which is not known), would explain the results.

EPA does not expect lab books to be retained for perpetuity and does not consider loss of the original lab books to be grounds for discarding the data.

EPA agrees that Physa gyrina appears to be significantly more sensitive than other species. EPA recognizes that in general the chemical characteristics of the lab water affect the toxicity of metals in

ways not taken into account by the hardness normalization. However, EPA does not have information indicating that the characteristics of the (very soft) lab water used in the Nebeker et al. test are so unusual as to be unrepresentative of California waters.

EPA has considered whether the organisms may have been stressed by the chemical characteristics of the lab water. However, subsequent communications with Nebeker revealed that the organisms have been successfully reproducing for years in ponds feed by the same wells that provided the lab water (Alan Nebeker memorandum to Charles Stephan, January 6, 1995). EPA can thus find no reason to believe that the control organisms were stressed.

Consequently, although Physa gyrina, as tested by Nebeker et al., is substantially more sensitive than other tested organisms, EPA has not found a good reason to reject the data. The freshwater nickel criterion in the rule is therefore unchanged for the final rule.

Comment ID: CTR-092-012a
Comment Author: City of San Jose, California
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: C-03b Nickel Aquatic Life
References: Letter CTR-092 incorporates by reference letter CTR-035
Attachments? Y
CROSS REFERENCES C-07b

Comment: Validity Of Proposed Nickel And Cyanide Criteria On A Statewide Basis

Attachment 1 to this letter is a technical report entitled "Task Report 1: Update and Recalculation of the Freshwater and Saltwater Cyanide Criteria", dated November 5, 1996 and prepared by Tetra Tech, Inc. for the City of San Jose. Attachment 2 to this letter is a technical report entitled "Final Report Recalculation of the Nickel Criteria for South San Francisco Bay", dated November 1, 1995 and prepared by Tetra Tech, Inc. for the City of San Jose. All of the attachments to this letter are incorporated as part of our comments and are being submitted for inclusion in the record for this rulemaking.

EPA has an obligation to consider the most current, scientifically defensible data in this rulemaking. EPA's obligations in this regard are particularly significant in light of its obligations under Executive Order 12866 and the Regulatory Flexibility Act (5 U.S.C.A. 601 et seq.) to consider a full range of cost effective alternatives to promulgation of the proposed Rule.

Although the title of Attachments 1 and 2 suggest that the data submitted relates only to San Francisco Bay, the data in fact relates to the entire state of California, and indicates that lessstringent cyanide and nickel criteria than are proposed by the Rule would adequately protect water quality in California. Under the Executive Order 12866 and the Regulatory Flexibility Act, EPA should include consideration of the these less stringent criteria in its Economic Analysis.

Response to: CTR-092-012a

See response to CTR-092-012b.

Subject Matter Code: C-04b Selenium Aquatic Life

Comment ID: CTR-008-001
Comment Author: San Luis&Delta-Mendota
Document Type: Water District
State of Origin: CA
Represented Org:
Document Date: 09/15/97
Subject Matter Code: C-04b Selenium Aquatic Life
References:
Attachments? N
CROSS REFERENCES

Comment: Dear Ms. Frankel:

The San Luis & Delta-Mendota Water Authority objects to the freshwater selenium criteria set forth in Environmental Protection Agency's ("EPA") proposed "Water Quality Standards: Establishment of Numeric Criteria for Priority Toxic Pollutants in the State of California" (Federal Register Vol. 62, #150, pages 42160-42208, Tuesday, August 5, 1997) on the following grounds:

1. The criteria are based on data assembled before 1987 (as reported in EPA 440/5-87-003 "Ambient Water Quality Criteria for Selenium - 1987"). Therefore, the criteria do not take account of more recent data on selenium toxicity.

2. In particular, the freshwater selenium criteria are scientifically inadequate because they fail to take account of the known interference between selenate and sulfate uptake in high sulfate waters like those in the San Joaquin Valley {see, e.g., Ogle and Knight, Arch, Environ. Contam. Toxical, 30, 274-279 (1996); Williams et al., Arch. Environ. Contam. Toxicol. 27,449-453 (1994); Hansen et al., Arch. Environ. Contam. Toxicol. 25, 72-78 (1993)]. This interference means that criteria based largely on effects observed in the low sulfate waters of Belews Lake, North Carolina, are probably overprotective for the high sulfate waters of the San Joaquin Valley. EPA itself (Federal Register Vol. 62, #150, page 42168, Tuesday, August 5, 1997) explicitly recognizes this inadequacy by stating "Chemical toxicity is often related to certain receiving water characteristics (pH, hardness, etc.) of a water body. Adoption of some criteria without consideration of these parameters could result in the criteria being overprotective."

The proposed California Toxics Rule should not be adopted without adequately addressing the difference for high-sulfate waters. The Rule should also not be adopted if it undercuts EPA's commitment to the cooperative review of appropriate long-term standards in the San Joaquin River Basin.

Response to: CTR-008-001

EPA agrees with the comment that the proposed acute freshwater criteria equation for selenium should not be promulgated, and has decided not to promulgate the proposed freshwater acute criterion, however, not for all of the reasons specified by the commenter. EPA's proposed acute criterion for the California Toxics Rule was revised in 1996 to reflect newer data supporting the additive toxicity of two predominant selenium forms (selenite and selenate) and is expressed as an equation. The acute criterion equation is designed to account for the additive toxicity of selenite and selenate in freshwater ecosystems and relies on assumptions of the relative toxicity and additivity of other forms of selenium since the

separate and combined toxicity of these other forms present in natural aquatic systems is not well defined. In 1996, the revised acute criterion underwent external peer review and was proposed for adoption under the Great Lakes Water Quality Initiative (GLI) (61 FR 58444-58449, November 14, 1996). This proposal has not yet been finalized because EPA is currently responding to public comments, which have called to attention a significant source of uncertainty in the expression of the relative toxicity of selenite and selenate in EPA's proposed acute criteria equation. Specifically, EPA is responding to the comment that the relative acute toxicity of selenite and selenate as expressed by the proposed individual CMCs (185.9 ug/L and 12.8 ug/L, respectively) is not consistent with the weight of toxicological data suggesting the opposite relative toxicity relationship and is an artifact of nuances in the selenate data set (i.e., its relatively small size combined with one extremely sensitive toxicity test result for the amphipod, Gammarus pseudolimnaeus).

EPA is currently responding to this comment by conducting additional toxicity tests on the relative toxicity of selenite and selenate to G. pseudolimnaeus and other acutely sensitive species. EPA is also updating its acute toxicity database with newer information, including newer data on the potential sulfate dependency of acute selenium toxicity. Therefore, because additional toxicity tests may result in substantial changes in the relative acute toxicity relationship of selenite and selenate that was proposed in the GLI and subsequently in the California Toxics Rule, EPA has chosen defer promulgation of acute, freshwater criteria for selenium until after the new toxicity data have been fully evaluated and incorporated. Further, EPA will consider in its forthcoming update of selenium freshwater acute criteria newer information since 1987 on the importance of sulfate and other factors on selenium freshwater acute toxicity.

EPA disagrees with the commenter that the chronic freshwater selenium criterion of 5 ug/L should not be promulgated as proposed. First, EPA believes that its chronic criterion is scientifically defensible, because having been based on field data, it incorporates principles and effects of bioaccumulation of selenium in aquatic ecosystems which are critical for estimating a long-term (chronic) toxicological threshold for selenium. Second, EPA does acknowledge that since 1987 (the latest revision of the selenium freshwater CCC), additional data are available that might be germane to the freshwater CCC for selenium. However, unlike the acute criterion, where the new data have been collected and almost certainly will change the criterion, EPA can not predict at this time the impact of any new data on freshwater CCC. Currently, EPA is in the early stages of reviewing this data and is addressing technical issues whose impact on the CCC is not easily predicted (e.g., the impact of basing chronic toxicity thresholds on tissue residue concentrations vs. water column concentrations). To facilitate this review of the freshwater CCC, and to address many of the technical issues associated with selenium bioaccumulation and toxicity, EPA conducted a peer consultation workshop in May 1998 with selenium experts external to the Agency to ascertain the degree of scientific basis and consensus on these issues (EPA-822-R98-007).

Regarding the comment that EPA should not promulgate the CCC of 5 ug/L total recoverable selenium because it does not account for sulfate dependency, EPA disagrees. EPA disagrees with this comment because at this time, EPA believes that insufficient data exist to quantify the effect of sulfate on the chronic toxicity of selenium to aquatic life. Specifically, none of the data referenced by the commenter quantify the effect of sulfate dependency on the chronic toxicity of selenium forms to aquatic animals. Rather, they apply to the effect sulfate on selenium acute toxicity and bioaccumulation in aquatic animals, and its toxicity to algae. EPA's assertion of insufficient data on sulfate dependency of chronic toxicity is supported by the opinion of experts at EPA's 1998 peer consultation workshop who concluded: "...insufficient information exists to correlate water quality characteristics (such as sulfate, pH and TOC)" (p. 9 in EPA-822-R-98-007). Furthermore, EPA considers application of sulfate-toxicity relationships based on acute toxicity or bioaccumulation to chronic toxicity to be highly uncertain and

unreliable. This conclusion is also supported by expert option, who concluded that toxicity relationships derived from acute toxicity studies cannot be reliably extrapolated to chronic toxicity, owing to the important influence of dietary exposure on selenium chronic toxicity (p. 9 in EPA-822-R-98-007). After EPA's review of the available information and expert opinions, EPA believes that it would be premature to withdraw its proposed CCC of 5 ug/L because it does not address possible effects of sulfate on selenium chronic toxicity.

Comment ID: CTR-009-005
Comment Author: City of Thousand Oaks
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/22/97
Subject Matter Code: C-04b Selenium Aquatic Life
References:
Attachments? Y
CROSS REFERENCES

Comment: At Federal Register page 42170, EPA begins its discussion about the derivation of its proposed Selenium criterion. This criterion is essentially based on a very few site specific field situations, and is applied, generally, to all situations regardless of how dissimilar they may be to the criterion spawning field incidents. The Kesterson Slough/Belews Lake type of problems and aquatic toxicity have not been found in other waters where Selenium is present in elevated concentrations, but that lack the sediment/food-chain conditions of these particular water bodies. Recent investigators found that Selenium water column concentrations were poor predictors of aquatic toxicity, and instead, posit a rationale for sediment-based toxicity criteria that EPA should consider as part of this rulemaking. (Selenium Sediment Toxicity Thresholds and Derivation of Water Quality Criteria for Freshwater Biota of Western Streams, Van Derveer and Canton, Environmental Technology and Chemistry and Selenium Toxicity to Aquatic Life: An Argument for Sediment-Based Water Quality Criteria, Canton and Van Derveer, Environmental Toxicology and Chemistry. Copies enclosed)

Response to: CTR-009-005

EPA derived its CCC for selenium using the Belews lake data in combination with laboratory data because laboratory toxicity data have been shown to consistently underestimate selenium effect levels compared to field situations. This underestimation of adverse effect levels by laboratory toxicity data is believed to be due to the bioaccumulation of selenium in aquatic food webs and subsequent exposure in top predator fish; a phenomenon which occurs in the field but not in routine laboratory tests. EPA acknowledges the conditions at Belews Lake that may differ from those at sites to which the CCC of 5 ug/L is applied. However, as discussed in EPA's response to CTR-058-006, EPA believes that the Belews lake data are reasonably consistent with adverse effect levels observed in other types of ecosystems and are scientifically defensible. For example, Hermanutz et al. (1992) and Schultz and Hermanutz (1990) studied the effects of chronic selenium exposure in large outdoor experimental streams in Minnesota on bluegill and fathead minnow, respectively. Despite the potential effect that the different hydrology of Belews lake and the Minnesota streams might have on selenium effect levels, the two stream studies showed adverse effects at levels similar to those observed in Belews lake (i.e., 10 ug/L). Furthermore, Lemly (1993) exposed bluegill in the laboratory to combined dietary (5.1 ug/g dry weight) and waterborne (4.8 ug/L) selenium and adverse effects including significant mortality in 60

days compared to fish in equivalent warm water exposures. Thus, EPA believes that the similarity between the adverse effect levels associated with Belews lake and the stream and laboratory studies supports the notion that EPA's CCC for selenium can be reasonably applied to other aquatic ecosystems.

Regarding sediment-based criteria, EPA believes that basing the CCC on concentrations of selenium in sediments is premature at this time because of the lack of scientific consensus on this issue and because of the preliminary nature and limited scope of the studies cited by the commenter. This assertion is generally supported by the opinions of experts at EPA's May 1998 peer consultation workshop on selenium who characterize the selenium/sediment toxicity database as sparse and largely limited to observations in western streams (p. 37-38 in EPA-822-R-98-007).

Comment ID: CTR-016-005
Comment Author: San Francisco Bay RWQCB
Document Type: State Government
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-04b Selenium Aquatic Life
References:
Attachments? Y
CROSS REFERENCES

Comment: Comments on the Proposed Selenium Freshwater Acute Criteria

The Regional Board supports EPA's efforts to develop an acute criterion for selenium that takes into account the presence of several oxidation states in natural waters, and the different and additive nature of toxicity associated with these different forms. The Board also supports EPA's determination that the existing chronic aquatic life criterion should not be modified to include consideration of different chemical species and that selenium interconverts from one chemical species to another in ambient waters. There are several practical consequences associated with the proposed additive toxicity approach that we would like to address from the perspective of our experience with selenium-related environmental problems in the San Francisco Bay Region.

The first comment is that the bioaccumulative potential of different chemical forms of selenium appears to be precisely the reverse of the toxicity potentials. For example, selenite is much more easily taken up into the food chain (preliminary estimates derived here in the Region are that selenite is about 10 times more bioavailable than selenate) but the proposed toxicity-based calculation method indicates precisely the opposite--that about ten times more selenite than selenate can be in the water column without causing unacceptable effects. The proposed model may work in systems that quickly flush out selenium such as stream segments, but do not accurately reflect conditions where selenium concentrations are elevated and occasionally spike upwards towards levels where acute toxic effects may occur-in the latter, bioaccumulative problems are likely more sensitive environmental endpoints. Thus, as a practical matter, the side-by-side application of the proposed acute and existing chronic criterion could have the unanticipated effect of over regulating selenate- and underregulating selenite-related bioaccumulation problems. For this reason, we recommend not using the proposed toxicity-based approach for a new acute criterion without additional considerations.

Additional considerations that EPA could make before changing the acute criterion to address this

practical problem include (a) reviewing the chronic criterion with the intent of including information to distinguish the bioaccumulative potential (and interconversion) of different chemical forms of selenium; (b) developing an alternative method for the acute criterion that takes into account the effect of short-term increases in selenium in aquatic systems on sensitive ecological indicators such as bird reproductive effects; or (c) developing more detailed guidance on the application of the acute and chronic criteria that would distinguish between aquatic systems potentially stressed with elevated levels of selenium in the food chain and those where such stresses are not a concern and the acute criteria are appropriate indicators of short-term problems.

Response to: CTR-016-005

EPA agrees with the commenter that it would be premature to promulgate the proposed freshwater acute criteria for selenium, and has chosen to defer promulgation of freshwater acute criteria for selenium until such time EPA has completed its evaluation of additional data and response to earlier comments on the proposed CMC equation in (61 FR58444, November 14, 1996. For additional detail on why EPA has chosen to defer promulgation of the freshwater CMC equation, see EPA's response to CTR-008-001.

Comment ID: CTR-030-005
Comment Author: Utility Water Act Group
Document Type: Trade Org./Assoc.
State of Origin: DC
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-04b Selenium Aquatic Life
References:
Attachments? Y
CROSS REFERENCES

Comment: II. ISSUES NEEDING CLARIFICATION OR MAJOR SUBSTANTIVE CHANGES

A. EPA's Proposed Selenium Acute Criterion is Technically Deficient

EPA's consideration of the toxicity of selenium has rapidly evolved over the last several years. In the Great Lakes Water Quality Rule (60 Fed. Reg. 15,366 (Mar. 23, 1995)), EPA proposed a selenium acute criterion that failed to consider the differing toxicities of two prevailing types of selenium, selenite and selenate. UWAG and other industry groups challenged the selenium acute criterion, and EPA eventually agreed to a remand of the criterion. The Court, however, ordered that the criterion be vacated and remanded. Following the vacatur, in November 1996 EPA proposed a new Great Lakes selenium acute criterion, adjusted to account for the selenite/selenate differences. UWAG submitted comments on the proposal, which are attached and incorporated into this comment document. (Attachment A). In the California proposal, EPA proposes to apply a selenium acute criterion that is identical to that proposed for the Great Lakes. EPA is still considering the comments it received in response to its revised acute selenium criterion for the Great Lakes - it has not taken final action on the proposal. UWAG therefore believes it would be inappropriate to promulgate the selenium acute criterion for California until the Agency has thoroughly assessed the record for the Great Lakes selenium acute criterion, and has determined appropriate final action on the Great Lakes criterion.

In commenting on the Great Lakes selenium acute criterion, UWAG raised the following points:

(1) EPA should reexamine and expand the LC50 database underlying the criteria maximum concentration (CMC) for selenate, which as currently derived is inconsistent with the vast majority of the available toxicity data for selenate and selenite;

(2) EPA should acknowledge and provide guidance for taking into account the effect of varying sulfate levels on selenium toxicity;

(3) EPA should acknowledge and provide guidance for dealing with situations where simple additivity does not occur;

(4) EPA should acknowledge and provide guidance for distinguishing between organic forms of selenium and elemental selenium, which may be found in anaerobic water under reducing conditions;

(5) EPA should provide guidance on where in the waterbody the proportions of selenate, selenite, and organo-selenium will be determined; and

(6) EPA should avoid making unfounded assumptions about the effect of potential selenium bioaccumulation on the CMC, and should delete from its final guidance or rule any discussion of unproven methodologies taking such bioaccumulation into account.

All of these arguments apply with equal force to the proposed acute selenium criterion for California. For further elaboration of each of these points, see Attachment A.

Response to: CTR-030-005

EPA agrees with the commenter that it would be premature to promulgate the proposed freshwater acute criteria for selenium, and has chosen to defer promulgation of freshwater acute criteria for selenium until such time EPA has completed its evaluation of additional data and response to earlier comments on the proposed CMC equation in (61 FR58444, November 14, 1996. For additional detail on why EPA has chosen to defer promulgation of the freshwater CMC equation, see EPA's response to CTR-008-001.

Comment ID: CTR-030-011
Comment Author: Utility Water Act Group
Document Type: Trade Org./Assoc.
State of Origin: DC
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-04b Selenium Aquatic Life
References:
Attachments? Y
CROSS REFERENCES

Comment: Dear Mr. Morris:

On behalf of the Utility Water Act Group ("UWAG")(*1), we are writing to comment on EPA's "Proposed Selenium Criterion Maximum Concentration for the Water Quality Guidance for the Great Lakes System," published at 61 Fed. Reg. 58,444 (Nov. 14, 1996). UWAG appreciates the Agency's

decision to extend the comment period(*2) for the selenium criterion maximum concentration ("CMC"), in light of the important technical issues raised by this proposed rule.

After reviewing the proposal, UWAG has the following recommendations:

(1) EPA should re-examine and expand the LC50 database underlying the criteria maximum concentration ("CMC") for selenate, which as currently derived is inconsistent with the vast majority of the available toxicity data for selenate and selenite;

(2) EPA should acknowledge and provide guidance for taking into account the effect of varying sulfate levels on selenium toxicity;

(3) EPA should acknowledge and provide guidance for dealing with situations where simple additivity does not occur;

(4) EPA should acknowledge and provide guidance for distinguishing between organic forms of selenium and elemental selenium, which may be found in anaerobic waters under reducing conditions;

(5) EPA should provide guidance on where in the waterbody the proportions of selenate, selenite, and organo-selenium will be determined; and

(6) EPA should avoid making unfounded assumptions about the effect of potential selenium bioaccumulation on the CMC, and should delete from its final guidance or rule any discussion of unproven methodologies taking such bioaccumulation into account.

Each of these recommendations is discussed in greater detail below.

1. THE CALCULATED CMC FOR SELENATE IS INCONSISTENT WITH THE VAST MAJORITY OF THE SCIENTIFIC DATA. THUS, EPA SHOULD REEXAMINE AND EXPAND THE DATABASE UNDERLYING THE CMC FOR SELENATE BEFORE GOING FORWARD.

EPA's proposed equation for calculating a CMC for total selenium relies on CMCs for selenite and scienate that the Agency calculated in the "Ambient Water Quality Criteria for Selenium -- 1987" (EPA 440/5-87-008) (the "1987 Criteria Document") and in the "Great Lakes Water Quality Initiative Criteria Document for the Protection of Aquatic Life in Ambient Water (EPA-8200-B-95-004) (the " 1995 Criteria Document"). See 61 Fed. Reg. 58,447. The CMC for selenate, which is fourteen times lower than the CMC for selenite(*3), is particularly troublesome, given that the overwhelming weight of the toxicological evidence indicates that selenate is less toxic than selenite. See Attachment A to these comments. This is apparent both from the data cited in EPA's 1987 Criteria Document and from numerous published papers in which a given researcher compared selenate and selenite toxicity in paired tests. Looking at the entire EPA database for selenate and selenite for all species where there are LC, values for both oxidation states, Gammarus pseiidolimnaeus is the only genus with a selenite LC50, to selenate LC50, ratio of less than one (1). While the ratio for Gammarus is 0.024, the range of ratios for all other genera range from 1.46 (for Daphnia) to 5.53 (for A. hypnorum (snail)).

A review of the CMC for selenate indicates that this anomalous result is caused by a combination of three factors: (1) the inclusion in the LC50, database for selenate of a Genus Mean Acute Value ("GMAV") of 0.065 mg/l for Gammarus pseudolimnaeus; (2) the fact that the database for selenate is relatively sparse (consisting of only eight GMAVS); and (3) the application of EPA's standard statistical technique for calculating CMCS, which produces results that are highly conservative in situations where

data are sparse and there is a substantial gap between the most sensitive species and the next most sensitive species.

UWAG believes that this combination of factors has lead EPA to derive a CMC for selenate that is inconsistent with the vast majority of comparative toxicity data. As two of the peer reviewers who commented on the July 1996, Draft Addendum to the 1987 Water Quality Criteria Document for Selenium (the "Draft Addendum") noted, this result appears questionable at best. See Adams, W.J., "Review of Selenium Water Quality Criteria: Revised" at p. 9 (undated) ("Adams Comments") (Attachment B to these comments); and DeGraeve, G.M., and McIntyre, D.O., "Review of The 'Freshwater CMC for Selenium: Addendum to Ambient Water Quality Criteria for Selenite -- 1987'" at p. 2 (Aug. 16, 1996) (Attachment C to these comments).

For example, Dr. Adams noted that another freshwater amphipod, Hyalella azteca, followed the expected pattern of toxicity and was more sensitive to seleaite than selenate. Adams Comments at 9. As Dr. Adams notes, one would expect selenate to be less toxic than selenite, because selenate is more chemically stable and less likely to be metabolized as organo-selenium. Id.

Several technical concerns with the two studies of Gammarus pseudolimnaeus by Brooke, et al., on which the GMAV is based, could have affected the accuracy of the results. First, Brooke et al. did not report the background concentrations of likely contaminants in the City of Superior water used in the tests. Thus, it is not possible to assess whether such contaminants may have affected the test results.

Second, the researchers do not report the actual concentration of selenate (or selenite) during or after the test. Instead, they appear to have made the assumption that no conversion occurred. Such assumptions are inappropriate, as evidenced by EPA's protocol for the Water Effects Ratio procedure, which requires that both the total recoverable and dissolved forms of the metal be measured at the start and end of any static exposure test. U.S. EPA, 1994 Interim Guidance on Determination and Use of Water Effect Ratios for Metals, EPA-823-B-94-001, pp. 55-56.

Third, UWAG questions the propriety of the researchers' decision to prepare their own reference standard solution, which they apparently used both to calibrate their measurement instruments and to prepare the test dilutions. Such a procedure is not standard, and could lead to biased results.

In sum, EPA should not blindly use the Brooke, et al., data for Gammarus without further verification, nor should it apply the standard criteria derivation procedure to the available data without first considering the suitability of that procedure in light of the inconsistency between the result obtained and the overwhelming weight of the available evidence. UWAG understands that EPA has commissioned additional acute toxicity tests of three species -- Gammarus pseudolittviaeus, Daphnia magna, and Ceriodaphnia dubia -- with both selenate and selenite. UWAG applauds this effort. We urge the Agency to forego taking any final action on issuance of a selenium CMC for the Great Lakes until those tests are complete and have been subject to review and comment.

(*1) UWAG is a voluntary, ad hoc, non-profit, unincorporated group of seventy-three electric utility systems, which own and operate over fifty percent of the nation's total generating capacity. The Edison Electric Institute, the American Public Power Association, and the National Rural Electric Cooperative Association also are UWAG members.

(*2) 61 Fed. Reg. 66,007 (Dec. 16, 1996).

(*3) EPA appears to have reversed the CMCs for selenate and selenite in the discussion at 61 Fed. Reg. 58,446, col. 2 (Section B. 1.3.a. and b. of the proposal). In other places in the notice (e.g., 61 Fed. Reg. 58,445, col. 2), EPA correctly states that the calculated CMC for selenite is 185.9 ug/l and the CMC for scienate is 12.82 ug/l.

Response to: CTR-030-011

For reasons specified in the response to CTR-008-001, EPA agrees with the comment that the acute toxicity database for selenate should be reexamined prior to promulgating the proposed acute criterion for selenium. As described in the response to CTR-008-001, EPA is not promulgating its proposed freshwater acute criterion for selenium and is conducting additional acute toxicity tests on Gammarus pseudolimnaeus and two species of daphnids to confirm the relative toxicity of selenite and selenate.

Comment ID: CTR-030-012
Comment Author: Utility Water Act Group
Document Type: Trade Org./Assoc.
State of Origin: DC
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-04b Selenium Aquatic Life
References:
Attachments? Y
CROSS REFERENCES

Comment: Dear Mr. Morris:

On behalf of the Utility Water Act Group ("UWAG")(*1), we are writing to comment on EPA's "Proposed Selenium Criterion Maximum Concentration for the Water Quality Guidance for the Great Lakes System," published at 61 Fed. Reg. 58,444 (Nov. 14, 1996). UWAG appreciates the Agency's decision to extend the comment period(*2) for the selenium criterion maximum concentration ("CMC"), in light of the important technical issues raised by this proposed rule.

After reviewing the proposal, UWAG has the following recommendations:

(1) EPA should re-examine and expand the LC50, database underlying the criteria maximum concentration ("CMC") for selenate, which as currently derived is inconsistent with the vast majority of the available toxicity data for selenate and selenite;

(2) EPA should acknowledge and provide guidance for taking into account the effect of varying sulfate levels on selenium toxicity;

(3) EPA should acknowledge and provide guidance for dealing with situations where simple additivity does not occur;

(4) EPA should acknowledge and provide guidance for distinguishing between organic forms of selenium and elemental selenium, which may be found in anaerobic waters under reducing conditions;

(5) EPA should provide guidance on where in the waterbody the proportions of selenate, selenite, and

organo-selenium will be determined; and

(6) EPA should avoid making unfounded assumptions about the effect of potential selenium bioaccumulation on the CMC, and should delete from its final guidance or rule any discussion of unproven methodologies taking such bioaccumulation into account.

Each of these recommendations is discussed in greater detail below.

II. EPA SHOULD ACKNOWLEDGE AND PROVIDE GUIDANCE ON TAKING INTO ACCOUNT THE MODERATING EFFECTS OF SULFATE LEVELS ON SELENIUM TOXICITY.

The available evidence suggests that the toxicity of selenium to certain taxa decreases as sulfate concentrations increase. This relationship may be expected, because sulfur and selenium are chemically similar and follow many of the same physical, chemical, and biological pathways. Stadtman, T.C., 1974. Selenium Biochemistry. Scietice. 183:915-922. Thus, sulfur seems to directly compete with selenium at the molecular level.

For example, the relationship between sulfate concentrations and selenate toxicity was examined in a paper by Ogle and Knight (1996). The authors compiled all of the published data from acute toxicity tests on Daphnia magna in which sulfate was measured. They found a highly significant correlation (r-square value = 0.84) using untransformed data.(*4) This strong correlation clearly indicates that the toxicity of selenate decreases as the concentration of sulfur increases.

In its proposed addenda to the 1987 Criteria Document, EPA acknowledges that sulfate may decrease the toxicity of selenate and selenite.(*5) But UWAG believes that this issue specifically warrants more prominent discussion in the preamble to any final rule published by EPA. UWAG urges EPA to advise states, as part of this rulemaking, to consider the potential mitigating effects of sulfate on selenium toxicity, and to take those effects into account when establishing their own criteria.

In both the Draft Addendum and the September 1996 Addendum,(*6) EPA also says that the Water Effects Ratio ("WER") procedure for deriving site-specific criteria can be used to derive appropriate criteria in situations where sulfate levels affect selenium toxicity. While UWAG agrees that such a procedure could be an appropriate mechanism for taking into account the moderating effects of sulfate, it is not clear how EPA anticipates the WER procedure would be applied.

For example, would it be applied to develop site-specific CMCs for selenate and selenite respectively, which could then be used in EPA's equation? Or does EPA expect that the WER procedures would somehow be applied to examine the effect of sulfate on the toxicity of the mixture of several selenium forms? If the latter, it is not clear how the procedure would work, since application of the WER typically involves comparison of the toxicity of a given pollutant in source waters with toxicity exhibited in the laboratory tests on which the generic criterion is based. Because EPA's proposed selenium CMC is based not on toxicity tests of mixtures, but instead on an equation that relies on calculated CMCs based on laboratory tests of two distinct selenium oxidation states, EPA should explain how the WER should be applied in this situation.

(*1) UWAG is a voluntary, ad hoc, non-profit, unincorporated group of seventy-three electric utility systems, which own and operate over fifty percent of the nation's total generating capacity. The Edison Electric Institute, the American Public Power Association, and the National Rural Electric Cooperative Association also are UWAG members.

(*2) 61 Fed. Reg. 66,007 (Dec. 16, 1996).

(*4) An even higher correlation would be expected if the data were log-transformed (the procedure EPA uses when examining the relationship between metal hardness and acute toxicity).

(*5) Draft Addendum at p. 3-6; U.S. EPA, "The Freshwater CMC for Selenate: Addendum to Ambient Water Quality Criteria for Selenium -- 1987" (Sept. 30, 1996) ("September 1996 Addendum") at p. 6.

(*6) See July 1996 Draft Addendum at p. 3-6; September 1996 Draft Addendum at p.6.

Response to: CTR-030-012

For the reasons specified in the response to CTR-008-001, EPA is not promulgating its proposed freshwater acute criteria for selenium. EPA is currently generating and evaluating additional toxicity data (including those that evaluate sulfate dependency of acute toxicity) to facilitate its review of the acute criterion for selenium.

Comment ID: CTR-030-013
Comment Author: Utility Water Act Group
Document Type: Trade Org./Assoc.
State of Origin: DC
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-04b Selenium Aquatic Life
References:
Attachments? Y
CROSS REFERENCES

Comment: Dear Mr. Morris:

On behalf of the Utility Water Act Group ("UWAG")(*1), we are writing to comment on EPA's "Proposed Selenium Criterion Maximum Concentration for the Water Quality Guidance for the Great Lakes System," published at 61 Fed. Reg. 58,444 (Nov. 14, 1996). UWAG appreciates the Agency's decision to extend the comment period(*2) for the selenium criterion maximum concentration ("CMC"), in light of the important technical issues raised by this proposed rule.

After reviewing the proposal, UWAG has the following recommendations:

(1) EPA should re-examine and expand the LC50 database underlying the criteria maximum concentration ("CMC") for selenate, which as currently derived is inconsistent with the vast majority of the available toxicity data for selenate and selenite;

(2) EPA should acknowledge and provide guidance for taking into account the effect of varying sulfate levels on selenium toxicity;

(3) EPA should acknowledge and provide guidance for dealing with situations where simple additivity does not occur;

(4) EPA should acknowledge and provide guidance for distinguishing between organic forms of selenium and elemental selenium, which may be found in anaerobic waters under reducing conditions;

(5) EPA should provide guidance on where in the waterbody the proportions of selenate, selenite, and organo-selenium will be determined; and

(6) EPA should avoid making unfounded assumptions about the effect of potential selenium bioaccumulation on the CMC, and should delete from its final guidance or rule any discussion of unproven methodologies taking such bioaccumulation into account.

Each of these recommendations is discussed in greater detail below.

III. EPA SHOULD ACKNOWLEDGE AND PROVIDE GUIDANCE FOR DEALING WITH SITUATIONS WHERE SIMPLE ADDITIVITY DOES NOT OCCUR

EPA has not provided any guidance to the states on how to determine whether something less (or greater) than simple additivity might be occurring. While EPA notes in the September 1996 Addendum at p. 6 that the WER procedure might be used to account for "possible deviations from additivity," it does not explain how the WER could be used to accomplish this. For the reasons discussed above, it is not clear how the WER would be adapted for use in this context, where effects of a mixture under actual instream conditions are being compared to effects of separate metal oxidation states in laboratory tests.

UWAG believes that EPA has an obligation both to provide a more reasoned basis for its assumption that simple additivity occurs, and to explain what and how available procedures may be used to develop defensible criteria in situations where such additivity may not be occurring.

(*1) UWAG is a voluntary, ad hoc, non-profit, unincorporated group of seventy-three electric utility systems, which own and operate over fifty percent of the nation's total generating capacity. The Edison Electric Institute, the American Public Power Association, and the National Rural Electric Cooperative Association also are UWAG members.

(*2) 61 Fed. Reg. 66,007 (Dec. 16, 1996).

Response to: CTR-030-013

For the reasons specified in the response to CTR-008-001, EPA is not promulgating its proposed freshwater acute criteria for selenium.

Comment ID: CTR-030-014
Comment Author: Utility Water Act Group
Document Type: Trade Org./Assoc.
State of Origin: DC
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-04b Selenium Aquatic Life
References:

Attachments? Y
CROSS REFERENCES

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On behalf of the Utility Water Act Group ("UWAG")(*1), we are writing to comment on EPA's "Proposed Selenium Criterion Maximum Concentration for the Water Quality Guidance for the Great Lakes System," published at 61 Fed. Reg. 58,444 (Nov. 14, 1996). UWAG appreciates the Agency's decision to extend the comment period(*2) for the selenium criterion maximum concentration ("CMC"), in light of the important technical issues raised by this proposed rule.

After reviewing the proposal, UWAG has the following recommendations:

(1) EPA should re-examine and expand the LC50 database underlying the criteria maximum concentration ("CMC") for selenate, which as currently derived is inconsistent with the vast majority of the available toxicity data for selenate and selenite;

(2) EPA should acknowledge and provide guidance for taking into account the effect of varying sulfate levels on selenium toxicity;

(3) EPA should acknowledge and provide guidance for dealing with situations where simple additivity does not occur;

(4) EPA should acknowledge and provide guidance for distinguishing between organic forms of selenium and elemental selenium, which may be found in anaerobic waters under reducing conditions;

(5) EPA should provide guidance on where in the waterbody the proportions of selenate, selenite, and organo-selenium will be determined; and

(6) EPA should avoid making unfounded assumptions about the effect of potential selenium bioaccumulation on the CMC, and should delete from its final guidance or rule any discussion of unproven methodologies taking such bioaccumulation into account.

Each of these recommendations is discussed in greater detail below.

IV. EPA SHOULD ACKNOWLEDGE AND PROVIDE GUIDANCE FOR DISTINGUISHING BETWEEN ORGANIC FORMS OF SELENIUM AND ELEMENTAL SELENIUM.

EPA proposes to employ an equation for calculating a CMC for total selenium, in part to address the potential toxicity of certain organo-selenium forms, which EPA says may be more toxic than selenate or selenite. EPA proposes to "assume that half of the measured or derived concentration of 'other' selenium forms is as toxic as selenate and half is as toxic as selenite." 61 Fed. Reg. 58,446. This proposal is troubling because it suggests that EPA may intend to allow states to "derive" organo-selenium concentrations by (1) measuring total selenium, selenate, and selenite; (2) subtracting the amount of selenite and selenate from the amount of total selenium; and (3) assuming that the difference is all organo-selenium, which EPA assumes is always at least as toxic as selenite or selenate.

Yet recent reviews of selenium cycling data show that some of that "other" selenium is likely to be elemental selenium, especially in anaerobic waters under reducing conditions. Maier, K.J. and A.W.

Knight. 1994: Ecotoxicity of selenium in freshwater systems. Reviews of Environmental Contamination and Toxicology. 134:31-48. Because of its insolubility and affinity for anoxic sediments, elemental selenium is far less bioavailable and, hence, less toxic than other selenium forms.

EPA's assumptions regarding the toxicity of organo-selenium forms clearly are based on a very limited amount of data on certain organic selenium forms. EPA has no data showing that either elemental selenium, or organic forms of selenium other than those for which data are provided in the proposal, are as or more toxic than selenite or selenate. Thus, EPA should specify that only measured amounts of the organic selenium forms for which it has sufficient toxicity data are to be included in the calculation. Equally important, EPA should specify that elemental selenium should be excluded from the calculation.

(*1) UWAG is a voluntary, ad hoc, non-profit, unincorporated group of seventy-three electric utility systems, which own and operate over fifty percent of the nation's total generating capacity. The Edison Electric Institute, the American Public Power Association, and the National Rural Electric Cooperative Association also are UWAG members.

(*2) 61 Fed. Reg. 66,007 (Dec. 16, 1996).

Response to: CTR-030-014

For the reasons specified in the response to CTR-008-001, EPA is not promulgating its proposed freshwater acute criteria for selenium.

Comment ID: CTR-030-015
Comment Author: Utility Water Act Group
Document Type: Trade Org./Assoc.
State of Origin: DC
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-04b Selenium Aquatic Life
References:
Attachments? Y
CROSS REFERENCES

Comment: Dear Mr. Morris:

On behalf of the Utility Water Act Group ("UWAG")(*1), we are writing to comment on EPA's "Proposed Selenium Criterion Maximum Concentration for the Water Quality Guidance for the Great Lakes System," published at 61 Fed. Reg. 58,444 (Nov. 14, 1996). UWAG appreciates the Agency's decision to extend the comment period(*2) for the selenium criterion maximum concentration ("CMC"), in light of the important technical issues raised by this proposed rule.

After reviewing the proposal, UWAG has the following recommendations:

(1) EPA should re-examine and expand the LC50 database underlying the criteria maximum concentration ("CMC") for selenate, which as currently derived is inconsistent with the vast majority of the available toxicity data for selenate and selenite;

(2) EPA should acknowledge and provide guidance for taking into account the effect of varying sulfate levels on selenium toxicity;

(3) EPA should acknowledge and provide guidance for dealing with situations where simple additivity does not occur;

(4) EPA should acknowledge and provide guidance for distinguishing between organic forms of selenium and elemental selenium, which may be found in anaerobic waters under reducing conditions;

(5) EPA should provide guidance on where in the waterbody the proportions of selenate, selenite, and organo-selenium will be determined; and

(6) EPA should avoid making unfounded assumptions about the effect of potential selenium bioaccumulation on the CMC, and should delete from its final guidance or rule any discussion of unproven methodologies taking such bioaccumulation into account.

Each of these recommendations is discussed in greater detail below.

V. EPA SHOULD CLARIFY THAT THE PROPORTION OF SELENITE, SELENATE, AND ORGANO-SELENIUM FORMS ARE TO BE DETERMINED INSTREAM, UNDER FULLY MIXED CONDITIONS.

EPA's proposal does not specifically discuss where in the waterbody the determination should be made as to the relative amounts of selenite, selenate, and organo-selenium present. Because water quality criteria are designed to protect aquatic organisms from plausible exposures instream,(*7) it seems logical that states would make this determination under fully mixed instream conditions(*8).

While the proposal does not discuss this point, on p. 58,448 it refers to deriving the acute criteria for selenium "depending on the relative proportions of the various forms of selenium in a facility's discharge." EPA has provided no explanation or support for making the determination on a discharge-by-discharge basis, nor would such an approach be consistent with the purpose of EPA's water quality criteria. Moreover, such an approach appears inconsistent with EPA's statements about the potential for chemical conversion of different selenium forms in ambient waters and the effects of water chemistry on various selenium forms. See 61 Fed. Reg. 58,446. Thus, an approach which requires determination of relative proportions instream, under the exposure conditions that are likely to occur, would seem the more technically sound and logically consistent approach in most cases.

(*1) UWAG is a voluntary, ad hoc, non-profit, unincorporated group of seventy-three electric utility systems, which own and operate over fifty percent of the nation's total generating capacity. The Edison Electric Institute, the American Public Power Association, and the National Rural Electric Cooperative Association also are UWAG members.

(*2) 61 Fed. Reg. 66,007 (Dec. 16, 1996).

(*7) See, e.g., U.S. EPA, Guidelines for Deriving Numerical National Water Quality Criteria for the Protection of Aquatic Organisms and Their Uses (1985).

(*8) UWAG recognizes that, in some cases, the concentrations of various selenium forms instream may

be so low as to make accurate analysis infeasible. In such cases, it may be more appropriate to allow for testing of the different selenium forms at the discharge point, as long as factors that are likely to affect selenium chemistry instream are taken into account.

Response to: CTR-030-015

For the reasons specified in the response to CTR-008-001, EPA is not promulgating its proposed freshwater acute criteria for selenium. When EPA finalizes its freshwater acute criterion for selenium, EPA will consider providing additional guidance on the determination of the fractions of total selenium that exist in various forms.

Comment ID: CTR-030-016
Comment Author: Utility Water Act Group
Document Type: Trade Org./Assoc.
State of Origin: DC
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-04b Selenium Aquatic Life
References:
Attachments? Y
CROSS REFERENCES

Comment: Dear Mr. Morris:

On behalf of the Utility Water Act Group ("UWAG")(*1), we are writing to comment on EPA's "Proposed Selenium Criterion Maximum Concentration for the Water Quality Guidance for the Great Lakes System," published at 61 Fed. Reg. 58,444 (Nov. 14, 1996). UWAG appreciates the Agency's decision to extend the comment period(*2) for the selenium criterion maximum concentration ("CMC"), in light of the important technical issues raised by this proposed rule.

After reviewing the proposal, UWAG has the following recommendations:

(1) EPA should re-examine and expand the LC50 database underlying the criteria maximum concentration ("CMC") for selenate, which as currently derived is inconsistent with the vast majority of the available toxicity data for selenate and selenite;

(2) EPA should acknowledge and provide guidance for taking into account the effect of varying sulfate levels on selenium toxicity;

(3) EPA should acknowledge and provide guidance for dealing with situations where simple additivity does not occur;

(4) EPA should acknowledge and provide guidance for distinguishing between organic forms of selenium and elemental selenium, which may be found in anaerobic waters under reducing conditions;

(5) EPA should provide guidance on where in the waterbody the proportions of selenate, selenite, and organo-selenium will be determined; and

(6) EPA should avoid making unfounded assumptions about the effect of potential selenium bioaccumulation on the CMC, and should delete from its final guidance or rule any discussion of unproven methodologies taking such bioaccumulation into account.

Each of these recommendations is discussed in greater detail below.

VI. EPA'S ASSUMPTIONS REGARDING THE POTENTIAL EFFECTS OF SELENIUM "BODY BURDENS" ON THE ACUTE TOXICITY OF SELENIUM ARE NOT SUPPORTED BY SOUND SCIENCE, AND SHOULD BE DELETED FROM ANY FINAL RULE OR ADDENDUM EPA ULTIMATELY ISSUES.

In its proposal, EPA says that it is not proposing to amend the 304(a) criteria document for acute or chronic selenium embodied in the EPA document entitled "Ambient Water Quality Criteria for Selenium -- 1987" (EPA 440/5-87-0008). 61 Fed. Reg. 58,445, col. 1. Thus, EPA says, it does not intend to respond to any comments on that document. Yet on the same page, EPA also says that it is proposing to incorporate into the 1987 Criteria Document an addendum(*9) reflecting its new proposed approach for calculating a selenium CMC. 61 Fed. Reg. 58,445, col. 3. UWAG believes that EPA should clarify whether or not it intends by this rulemaking to affect the national criteria guidance document. If so, EPA should provide potentially interested persons appropriate notice and an opportunity to conunent on the implications of applying this approach beyond the Great Lakes.

UWAG agrees with EPA's decision not to go forward with any proposal based on the theory, set forth in the Draft Addendum and the September 1996 Addendum, that fish exposed to organic selenium may carry a "body burden" that makes them more sensitive to acute selenium exposure. We agree that there are no hard data Co support this theory and, thus, reliance on it would be indefensible. Although elevated bioaccumulation of selenium occurring as a result of long-term exposure has been associated with reproductive impairment and mortality in some environments, EPA has provided no technical support for the notion that a certain level of selenium "body burden" predisposes an aquatic organism to greater, or lesser, sensitivity to acute exposures.

Furthermore, even if there were some theoretical or experimental basis for the hypothesis that a "body burden" of selenium increases an organism's sensitivity to acute effects, there is no rational basis for its application to a Great Lake. Great Lakes waters typically contain undetectable concentrations of selenium. Low background concentrations, combined with the enormous size of the Great Lakes and the migratory nature of Great Lakes fish, do no provide the same opportunity for bioaccumulation which might theoretically exist in small, well-mixed water bodies. This premise is confirmed by actual selenium levels in Great Lakes fish, which do not contain elevated concentrations of selenium (Schmitt and Brumbaugh, 1990).(*10) A "body burden" model is therefore particularly inappropriate for the Great Lakes.

In the same vein, we agree with EPA's decision not to propose Guidance implementing an unsupported theory that pollutants should be placed in one of three categories, based on their potential to bioconcentrate and bioaccumulate, and that this potential be taken into account in deriving criteria. The theories contained in this section of the Addendum amount to pure speculation, supported by little or no empirical data. The relationship between body burdens and toxic effects is very controversial, and there is no scientific consensus that bioaccumulation per se results in adverse effects (e.g., Chapman, 1996).(*11) For example, Reash et al. (1996)(*12) showed that bluegills exposed to water selenium concentration, much higher than EPA's criterion continuous concentration ("CCC") of 5 ILglf resulted in elevated bioaccumulation of seleaium but these "body burdens" did not cause mortality or reproductive impairment in the population. Moreover, the presence of additional pollutants which contribute to the

entire "body burden" of pollutants in an organism makes the relationship between tissue levels of one pollutant and adverse effects quite unclear. Heinz (1996) sununarized these concerns when discussing the significance of selenium residues in birds:

Selenium's ability to interact with other enviroru-nental contaminants, especially other elements, also sometimes complicates an interpretation of toxic thresholds in tissues of birds . . . the reader needs to be aware that such interactions exist."

In summary, EPA's theory that a "body burden" of selenium could increase an organism's sensitivity to acute selenium exposure is interesting scientifically, but EPA currently has no mechanism to link the two processes. Furthermore, this concept makes little sense froi-ii an exposure viewpoint. Bioaccumulation occurs over a much longer period in an organism's life cycle relative to acute effects. Hence, UWAG strongly recommends that EPA keep the distinctions between acute and chronic exposure/effect unambiguous. Therefore, UWAG urges EPA to delete this discussion from any guidance or Addendum it issues for any selenium CMC.

(*1) UWAG is a voluntary, ad hoc, non-profit, unincorporated group of seventy-three electric utility systems, which own and operate over fifty percent of the nation's total generating capacity. The Edison Electric Institute, the American Public Power Association, and the National Rural Electric Cooperative Association also are UWAG members.

(*2) 61 Fed. Reg. 66,007 (Dec. 16, 1996).

(*9) It is not clear whether the September 1996 Addendum to which EPA refers is a draft or final document. If it is not a draft, then EPA's use of that document in its current form would appear to run contrary to the Agency's statements that the sections of the Addendum dealing with "body burden" and BAF/BCF issues are not being proposed for comment and will not be included in either the Great Lakes Guidance or the addendum to the criteria document. See 61 Fed. Reg. 58445, cot. 1, 58446, col. 2. For the sake of clarity, EPA should provide the public with the specific version of any addendum that itproposes to apply in any context.

(*10) Schmitt, C.J., and W.G. Brumbaugh. 1990. National contaminant biomonitoring program: concentrations of arsenic, cadmium, copper, lead, mercury, selenium, and zinc in U.S. freshwater fish. Archives of Environmental Contamination and Toxicology 19:731-747.

(*11) Chapman, P.M. 1996. Is bioaccumulation useful for predicting impacts? Paper presented at 1996 meeting of the Society of Environmental Toxicology and Chemistry, Washington, D. C.

(*12) Reash, R.J., T. Lohner, K.V. Wood, and R. Leville. 1996, Selenium in fish inhabiting a fly asli receiving stream: implications for national water quality criteria, Paper presented at 1996 meeting of the Society of Environmental Toxicology and Chemistry, Washington, D. C.

(*13) Heinz, G. H. 1996. Selenium in birds. pp. 447-458 in W.N. Beyer, G. H. Heinz, and A.W. Redmond -- Norwood (eds), Environmental Contaminants in Wildlife: Interpreting Tissue Concentrations. SETAC Special Publication Series. Lewis Publishers, New York. 494 pp.

Response to: CTR-030-016

For the reasons specified in the response to CTR-008-001, EPA is not promulgating its proposed

freshwater acute criteria for selenium.

Comment ID: CTR-051-002
Comment Author: Cal. RWQCB Central Valley Reg.
Document Type: State Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: C-04b Selenium Aquatic Life
References:
Attachments? N
CROSS REFERENCES

Comment: Selenium

In 1996, the Regional Board amended the Water Quality Control Plan for the Sacramento River and San Joaquin River Basins, updating the selenium control program in the San Joaquin River watershed. The amendment contains water quality objectives and an implementation timetable for the San Joaquin River and numerous water bodies in the Grassland area. It was finalized earlier this year and has been forwarded to US EPA for approval. If approval of the 1996 amendments is not obtained before promulgation of the final Toxics Rule, the current federally recognized objectives will remain in place indefinitely. This will unnecessarily complicate a control program that is already complex in nature. Therefore, US EPA is urged to approve the 1996 amendment and recognize it as the appropriate selenium control effort for the affected water bodies.

Response to: CTR-051-002

The commenter expressed concerns that the selenium control program and implementation timetable contained in the 1996 amendments to the Water Quality Control Plan for the Sacramento River and San Joaquin River Basins (Basin Plan) would be overriden by the CTR. The commenter also expressed concerns regarding the selenium criteria contained in the CTR and the potential for complications that could result from having state and federal criteria for the same waterbodies. EPA disagrees with these concerns.

First, it should be noted that already there are federal selenium criteria in place for parts of San Joaquin River, Salt Slough, Mud Slough (north), etc. These criteria were promulgated as part of the NTR on December 22, 1992. (57 Fed.Reg. 60848,60921, December 22, 1992.) The current CTR action does not change the NTR standards for those waters.

For the other named waterbodies subject to the 1996 Basin Plan amendments (Appendix 40), EPA is promulgating selenium criteria as part of the CTR. EPA has not yet approved the 1996 amendments, and in the absence of EPA-approved, site-specific criteria, EPA must promulgate criteria for toxic pollutants, including selenium, to meet the requirements of CWA section 303(c)(2)(B).

As with other site-specific criteria, if EPA approves the State's site-specific criteria for selenium for San Joaquin River, Salt Slough, Mud Slough (north), etc., EPA can undertake rulemaking to stay the the applicable selenium criteria in the CTR as well as the NTR. In the meantime, where site-specific criteria have already been adopted by the State in accordance with State law, but not yet acted upon by EPA,

such State-adopted criteria are in effect under State law. If those criteria are more stringent than applicable federal (CTR or NTR) criteria, those would be the controlling criteria for CWA purposes even without a stay of the applicable CTR (federal) criteria and would thus be implementable by the State. (This would not be affected by the so-called "Alaska Rule" which EPA proposed July 9, 1999, 64 Fed.Reg. 37072. See p. 37076.) This is the case with the site-specific criteria for selenium adopted by the State for the San Joaquin River, Salt Slough, Mud Slough (north), etc. Since the State must use the most stringent criteria in effect for its water quality programs, the 1996 Basin Plan site-specific selenium criteria remain in effect notwithstanding the CTR and NTR fresh water aquatic life criteria for selenium. Moreover, the selenium control program and implementation timetable will continue to apply to the State's site-specific criteria.

Comment ID: CTR-058-005
Comment Author: Western States Petroleum Assoc
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: C-04b Selenium Aquatic Life
References:
Attachments? Y
CROSS REFERENCES

Comment: 4. Acute Selenium Criteria. EPA's assumption that the toxicities of all forms of selenium are additive is not adequately supported.

In the Great Lakes Initiative rulemaking, at pp 61 FR 58444 and 58446, EPA states that new data indicate that all forms of selenium are additive, and therefore takes that conclusion into account in setting the CMC for selenium without any further discussion.

The basis provided by EPA to support this conclusion consists of studies reported by Hamilton and Buhl (1990) and Maier et al. (1993) [at p. 61 FR 58446]. Interestingly, these reports more accurately suggest that mixtures of different selenium forms may not always reflect "additive" effects in the classic sense where the effect of two chemicals is equal to the sum of the effects of the individual chemicals applied alone. Instead, these two studies suggest that the combined effect can be substantially less than or somewhat greater than the "simple additivity" which EPA assumes and on which it bases its proposed equation. Moreover, the 1987 criteria document data do not support the additivity assumption made by EPA.

EPA should either abandon its stated assumption or provide a scientifically defensible explanation for basing its assumption upon the two studies cited as authority.

Response to: CTR-058-005

For the reasons specified in the response to CTR-008-001, EPA is not promulgating its proposed freshwater acute criteria for selenium. Therefore, this comment is no longer applicable to the final rule. During its review of the acute criterion, EPA will be generating additional data on the additive toxicity of different selenium forms to sensitive aquatic organisms.

Comment ID: CTR-058-006
Comment Author: Western States Petroleum Assoc
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: C-04b Selenium Aquatic Life
References:
Attachments? Y
CROSS REFERENCES

Comment: 5. Chronic Selenium Criterion, SF Bay. WSPA does not support the choice of a freshwater criterion for SF Bay, Suisun Bay, San Pablo Bay and adjacent waters.

The proposed rule makes no attempt to defend the choice of a 5 ug/L freshwater criterion for selenium in these marine waters. This approach is arguably arbitrary and capricious. EPA says, more or less, we set this site-specific criterion in these waters in a previous rulemaking and we won't change. EPA should defend the choice of a criterion based on freshwater data for these waters, and stakeholders should be allowed to comment on the basis for this approach once they can see and evaluate EPA's attempt to justify it.

Furthermore, we dispute the 5 ug/L freshwater chronic criterion, which we understand to be based on the anomalous data of the Belews Lake, North Carolina study. We know of no other study where such a low threshold of concern was supported and challenge the Agency to cite any. Belews Lake is a lake with a very little flushing which arguably will not model many or most of the reaches of water in California to which EPA wants this criterion to apply (specifically, river reaches as well as the San Francisco/San Pablo/Suisun Bay system). We do not know what sort of mechanisms may occur in Belews Lake to convert selenium from one form to a more toxic form. We do not know if this transformation takes several steps. Additionally, we do not know whether these mechanisms would occur in the more common well-flushed reaches to which EPA seeks to apply the criterion here in California. EPA should justify both the value of 5 ug/L and the use of a freshwater criterion in marine waters.

Response to: CTR-058-006

EPA promulgated the freshwater CCC of 5 ug/l for San Francisco Bay, Suisun Bay, San Pablo Bay, and adjacent waters as part of the National Toxics Rule [NTR](57 FR 60848-60921, December 22, 1992). EPA disagrees that this approach is arbitrary and capricious. EPA explained its rationale for this decision in response to comments for the NTR (57 FR 60898, December 22, 1992). The purpose of today's rule is to promulgate criteria that fill the gap created when previous State criteria were invalidated as a result of State litigation. The rule is not intended to change or supersede any criteria previously promulgated for California in the NTR, as amended (Administrative Stay of Federal Water Quality Criteria for Metals and Interim Final Rule, Water Quality Standards; Establishment of Numeric Criteria for Priority Toxic Pollutants; States' Compliance-Revision of Metals Criteria, 60 FR 22228, May 4, 1995). The freshwater CCC for selenium is re-printed in the text of the CTR for the convenience of the user.

EPA disagrees with the commenter that the Belews Lake data are "anomalous" and are therefore not appropriate for application to California waters. The selenium effects data of Belews lake are supported

by other more recent data indicating adverse effects on aquatic organisms at comparable levels. For example, in a year-long study of selenium effects on aquatic life in outdoor experimental streams, Hermanutz et al. (1992) report statistically significant reductions in adult bluegill survival during the final 98-d exposure period to 10 ug/L selenium (introduced as sodium selenite) and complete mortality at 30 ug/L during the same exposure period. Hermanutz et al. (1992) also report statistically significant reductions in embryo hatch and higher incidence of developmental abnormalities at 10 ug/L and 30 ug/L compared to controls. This level (10 ug/L) is the same as that associated with unacceptable effects in the Belews lake study upon which the freshwater CCC is based. A chronic test conducted by Schultz and Hermanutz (1990) on the effect of selenium on fathead minnow in the same outdoor experimental streams is also consistent with results from the Belews Lake data. Specifically, Schultz and Hermanutz (1990) report statistically significant differences in the incidence of developmental abnormalities (lordosis and edema) in larvae from fish exposed in 10 ug/L streams compared to controls. In a laboratory study, Lemly (1993) exposed bluegill exposed to combined dietary (5.1 ug/g dry weight) and 4.8 ug/L waterborne selenium and reported that a combination of elevated selenium and low temperature resulted in reduced feeding, depletion of body lipids and significant mortality in 60 days (termed winter stress syndrome) compared to fish in equivalent warm water exposures.

The Belews lake data and supporting studies used to derive the freshwater CCC for selenium indicate that adverse effects on bluegill occurred at about 10 ug/L (as was also observed in experimental streams by Hermanutz et al., 1992) and that bluegill were unaffected at concentrations of 5 ug/L or below. Therefore, EPA believes that the similarity between the adverse effect levels associated with Belews lake and those of Hermanutz et al. (1992), Schultz and Hermanutz (1990), and Lemly (1993), which involved very different exposure systems, demonstrates that the Belews lake data are not "anomalous" as the commenter stated and can be reasonably extrapolated to other types of waterbodies. Finally, EPA notes that because these and other new data have become available since EPA's publication of the aquatic life criteria for selenium in 1987, EPA is currently reviewing this new data for potentially revising as appropriate its 304(a) criteria for selenium.

References:

Lemly, A.D. 1993. Metabolic stress during winter increases the toxicity of selenium to fish. Aquatic Toxicology, 27:133-158.

Hermanutz, R.O., K.N. Allen, T.H. Roush and S.F. Hedtke. 1992. Effects of elevated selenium concentrations on bluegills, Lepomus macrochirus, in outdoor experimental streams. Environ. Toxicol. Chem. 11(2):217-224.

Schultz, R. and R. Hermanutz. 1990. Transfer of toxic concentrations of selenium from parent to progeny in the fathead minnow (Pimephales promelas). Bull. Environ. Contam. Toxicol. 45:568-573.

Comment ID: CTR-060-007
Comment Author: San Diego Gas and Electric
Document Type: Electric Utility
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: C-04b Selenium Aquatic Life
References:
Attachments? N

CROSS REFERENCES

Comment: PROVISIONS SDG&E DOES NOT SUPPORT

As described in the following comments SDG&E does not support the following provisions:

Selenium acute criteria is technically deficient

This rule proposes to adopt the proposed revised Great Lakes acute selenium criterion. EPA has yet to respond to comments submitted on this criterion during a previous comment period. Until such time as EPA reviews and responds to the comments submitted previously on this proposed criterion, it would be premature for EPA to adopt the criterion as proposed in the CTR.

Response to: CTR-060-007

EPA agrees with the comment that it should not promulgate its proposed acute freshwater criterion for selenium until after it completes its response to comments on a previous proposal that relies on the same criterion. For additional reasons specified in the response to CTR-008-001, EPA is not promulgating its proposed freshwater acute criteria for selenium.

Comment ID: CTR-103-001
Comment Author: Fish and Wildlife Service
Document Type: Federal Government
State of Origin: CA
Represented Org:
Document Date: 10/10/97
Subject Matter Code: C-04b Selenium Aquatic Life
References:
Attachments? N
CROSS REFERENCES

Comment: The U.S. Environmental Protection Agency (EPA.) recently received a letter, directed to your attention, from Daniel G.Nelson (Executive Director of the San Luis & Delta-Mendota Water Authority) dated September 15, 1997. Mr. Nelson's letter presented an objection to proposed freshwater selenium criteria recently announced by EPA (California Toxics Rule; Federal Register Vol. 62 (150):42160-42208, August 5, 1997). Mr. Nelson asserts in his letter that the proposed "... freshwater selenium criteria are scientifically inadequate because they fail to take account of the known interference between selenate and sulfate uptake in high sulfate waters like those in the San Joaquin Valley...." Mr. Nelson then requests that EPA delay adoption of proposed water-quality criteria for selenium, pending review of the sulfate-interference issue.

The U.S. Fish and Wildlife Service (Service) recently reviewed our copy of Mr. Nelson's letter and does not see a scientifically substantive basis for justifying the delay and further review that Mr. Nelson requests. Sulfate-interference does not appreciably affect selenium bioaccumulation in real-world envirorunents and that has been known for at least 60 years.

Dr. Joseph Skorupa, of my environmental contaminants staff, has recently reviewed the issue of sulfate-interference and its relevance to establishment of freshwater selenium criteria and has concluded

that fish and wildlife toxicity thresholds for waterborne selenium are not sulfate dependent (Skorupa, in press). Mr. Nelson supports his view that sulfate-interactions should be an important regulatory consideration by citing recent laboratory bench studies (Hansen et al. 1993; Williams et al. 1994; Ogle and Knight 1996). Such studies often suffer from the so-called lab-to-field-dilemma (Landis and Yu 1995:28) because they are very simplified and environmentally unrealistic and cannot be extrapolated to the real world. The authors of the studies that Mr. Nelson cites are clearly aware of this important dilemma.

For example, Hansen et al. (1993:77) wrote:

"Thus, at this time, it does not appear that we have sufficient evidence to justify the consideration of sulfate as a factor in the regulation of Se in aquatic environments.

Williams et al. (1994:452) wrote:

"At present, there is little information available that allows us to assess how relevant this study's conclusions will be in natural waters containing a complex assemblage of selenium species.

Ogle and Knight (1996:278) reported that in the region of 5 ug/L waterborne selenium (the critical threshold region recognized in the California Toxics Rule):

"...the differences [in selenium bioaccumulation and toxicity] between extremely different sulfate concentrations are not significant.....

There is a clear record of highly relevant field data supporting Hansen et al.'s and Williams et al.'s cautions against extrapolation of their lab results. Field data show that simplistic selenate-sulfate lab bench results do not extrapolate well to real environments (Skorupa, in press). Realworld data unanimously support the conclusion that toxicity thresholds for seleniun are notsulfate dependent. In the absence of any new field data to the contrary, the objection raised in Mr. Nelson's letter must be viewed as inapplicable..

The findings of Dr. Skorupa's review can be summarized as follows:

As early as the 1930's (e.g., Hurd-Karrer 1937, 1938) competitive uptake interactions between selenate and sulfate had already been confirmed experimentally. In the same era it had also already been demonstrated that sulfate-interference did not apply to any form of environmental selenium other than selenate, and that the field significance of sulfate-interference was negligible. Sixty years ago, Beath (1937) concluded that the "...sulfur-selenium antagonism theory has not been found generally applicable tofarm and range practices [for ameliorating selenium toxicity to range animals] of the Rocky Mountain region." Thus, although recent experiments cited by Mr. Nelson (Hansen et al. 1993; Williams et al. 1994; Ogle and Knight 1996) provide useful information corroborating earlier work, it is inaccurate for Mr. Nelson to suggest that recent studies provide any fundamentally new conceptual insights not already known by 1987 when EPA derived the 5 ug/L chronic criterion for selenium.

Twenty years ago, Birkner (1978) came to essentially the same conclusion for aquatic habitats that Beath (1937) had reported for open range habitats. Birkner surveyed 30 freshwater sites in Colorado and Wyoming for waterborne, sediment, and foodchain selenium content. The sites that Birkner surveyed included levels of dissolved sulfate that ranged from 5-9,611 mg/L. Statistical analyses of his data led Birkner to conclude that levels of dissolved sulfate did not influence the level to which selenium is bioaccumulated by aquatic organisms.

The lack of sulfate dependency for selenium bioaccumulation in the real world was affirmed once again in the late 1980's and early 1990's. This time the Service collected eggs of waterbirds from agricultural evaporation ponds in California that varied in dissolved sulfate concentrations from 2,000-100,000 mg/L. Selenium concentrations in the bird eggs, which are directly related to the contamination of aquatic foodchains at each sampling site, were strongly predictable from waterborne concentrations of selenium regardless of variable sulfate concentrations that spanned three orders of maagnitude (Skorupa, in press). The Service's failure to find a sulfate-interference effect for bioaccumulation of selenium in bird eggs, was corroborated by studies of aquatic invertebrates (the food supply for birds) at the same sites by the California Department of Water Resources (John Shelton, unpubl. data). Combining Birkner's (1978) results with,the results from California evaporation ponds, no sulfate-interference effect could be detected in the real world for dissolved sulfate concentrations spanning from 5-100,000mg/L! Furthermore,the field-verified toxic threshold point of 3-4 ug/L waterborne selenium for birds at the high-sulfate ponds in California showed excellent correspondence with the field-verified toxic threshold point of 2-5 ug/L for fish residing in the low-sulfate waters of Belews Lake, North Carolina (Skorupa, in press).

Finally, a comprehensive review of the best documented case studies of selenium poisoning in nature revealed that 7 of 12 real-world toxic episodes occurred at sites with high-sulfate waters (Skorupa, in press). This rich body of real-world data on selenium toxicity to fish and wildlife affirmatively, and unequivocally, supported the conclusion that toxic thresholds for selenium arenot sulfate dependent.

Why are simple laboratory bench studies contradicted by field data? Bench studies confirm that high-sulfate waters can reduce bioaccumulation of selenate, but not eliminate it. Thus, even in the face of high concentrations of dissolved sulfate, over time, functionally significant amounts of waterborne selenate are nonetheless taken up by biota and transformed to other forms of environmental selenium that are not subject to sulfate-interference. Those other forms of selenium are far more bioaccumulative than selenate, are free of any interference from sulfate and, over time, come to dominate the bioaccumulation process (e.g., Besser et al. 1989). Recent 48-hr-96-hr lab bench experiments are simply too short in duration and too simple in design to mimic this progression from selenate-dominated water to a complex mixture of multiple chemical species of selenium that characterizes the ecotoxicology of selenium in the real world.

For example, drainage water in the San Joaquin Valley of California was found to contain selenium as selenate, selenite, and selenomethionine (Se-Meth) in a ratio of approximately 18:3:1 (Besser et al. 1989). Bioconcentration factors for periphyton, however, showed a reverse ratio of about 1:6:120 (Besser et al. 1989). Thus, the approximate ratio of selenium uptake from selenate, selenite, and Se-Meth would be 18:18:120. Therefore, only about 11 percent (18/156) of bioaccumulated selenium in the periphyton would be taken up directly from the inventory of dissolved selenate. Under these circumstances, even if a sulfate-interference effect as high as 50 percent were occurring it would have only about a 5 percent (0.5 x 0. 11) inhibitory impact on overall bioaccumulation of selenium. At toxic threshold exposures in the region of 2-5 ug/L waterborne selenium, a 5 percent effect would be very negligible in absolute terms. Even this example probably overestimates the contribution of selenate to bioaccumulation of selenium because it does not account for the cumulative loading of predominantly non-selenate species of selenium into aquatic sediments, which is another major bioaccumulation pathway that further devalues the relative importance of dissolved selenate selenimn. It is quite plausible that in real aquatic environments even where concentrations of dissolved sulfate are low, only a minute proportion of selenium bioaccumulation is due to direct uptake of selenate selenium.

Much of the technical information presented in this letter was also presented to the scientific consultants

retained b the San Luis & Delta-Mendota Water Authority during a meeting with Dr. Skorupa on July 19, 1995. If Mr. Nelson possesses fundamentally new data that are unequivocally relevant to the real-world, by all means the data should be evaluated by EPA. The studies that Mr. Nelson cites in his letter do not, however, constitute such data.

Questions regarding this letter may be directed to Drs. Joseph Skorupa or Steven Schwarzbach by contacting them at (916)-979-2110.

Response to: CTR-103-001

EPA agrees with the commenter that by itself, the current state of the science on the sulfate dependent toxicity of various selenium forms is not adequate justification to delay promulgation of freshwater selenium criteria in the CTR. However, EPA has chosen not to promulgate acute freshwater criteria for selenium for the reasons stated in EPA's response to CTR-008-001. EPA has chosen to proceed with promulgation of the freshwater CCC for selenium for the reasons stated in EPA's response to CTR-008-001. EPA will consider additional data on sulfate dependency of selenium toxicity, including those cited by the commenter, during its review of freshwater selenium aquatic life criteria.

Subject Matter Code: C-05b Lead Aquatic Life

Comment ID: CTR-020-013
Comment Author: City of Stockton
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/24/97
Subject Matter Code: C-05b Lead Aquatic Life
References:
Attachments? Y
CROSS REFERENCES

Comment: II. Use of New Scientific Information

The City acknowledges and supports EPA's update of several water quality criteria including those for mercury, cadmium and arsenic. While a number of criteria were updated to reflect current scientific information, there are a few notable exceptions.

The following briefly addresses the key updates and omissions that should be addressed in the final publication of this rule.

2. Lead

The 1984 lead criteria establishes very stringent chronic criteria due to an artifact of EPA's criteria calculation procedure - where inadequate data are available, a lower criteria is calculated. Thus, even where it is apparent that less restrictive criteria should be developed, the calculation procedures produce a lower criteria. This anomaly of criteria calculation could have been rectified by updating the criteria to add additional organisms that were tested since the 1984 Lead Criteria Document was published. Unfortunately, EPA failed to update the lead chronic water quality criteria which would have increased the chronic value from about 1.5 ppb to 15 ppb. This update has been acknowledged by EPA Duluth representatives in a number of public forums as acceptable, and it was approved for the Delaware River Basin Commission, a quasi-federal entity in 1996 (Exhibit 9). EPA's failure to update the lead database for the CTR is arbitrary and capricious and needs to be corrected

(a) The Technical Basis for EPA's Lead Criteria is Flawed

EPA criteria for lead were first published in 1980 and revised in 1984. The database from which the criteria were derived is very limited. EPA assessed only ten freshwater species and eleven saltwater species. Consequently, the data used to develop the lead criteria do not meet the minimum data requirements set forth in EPA's guidelines. (*41) In addition, the analytical methodology (acid soluble metal) used to assess lead concentration in the toxicity tests used to develop the criteria was a rigorous digestion that measured non-toxic, as well as toxic, forms of the metal.

Because the tests used to develop the lead criteria measured non-toxic forms of metal, and lead salts tend to form carbonates and precipitate readily from solution, the criteria overestimated the toxic fraction of lead. Thus, the lead criteria are very conservative. In addition, statistical deficiencies in the underlying data base render the lead criteria significantly more uncertain thanother criteria derived using the requisite data. As a result, some states have deferred adoption of EPA's lead criteria; others have adopted

more appropriate lead standards that are scientifically supported. North Carolina, for example, adopted a 25 ug/l lead standard (as total recoverable) because:

We believe that a standard based on an acid-soluble equivalent value of 1.3 ug/l Pb is extremely and unnecessarily overly protective, especially when considering the vast differences in Pb concentration that can be measured from the same sample, as shown by EPA's data. Since these values can vary as much as 50-75 fold for Pb according to EPA's data, implementing a standard of 25 ug/l measured as total recoverable metal which is less than 20 times higher than the acid-soluble criterion of 1.3 ug/l) is sufficiently conservative and technically sound... (*42)

The geometric mean for water effect ratios reported for lead using C. dubia and fathead minnows are consistently greater than five (5), which confirms a reduction in lead toxicity in natural waters by a factor of five relative to laboratory water of minimal complexing ability. (*43) This is not surprising since lead is readily complexed by inorganic and organic ligands in natural waters. (*44) Pagenkopf reported that relatively low concentrations of humic acids readily detoxify lead:

If there is 1 mg/liter humic acid (HA) in the water with an effective gram formula weight of 1000, a sizable amount of lead could be complexed. With these conditions the HA concentration would be 10E-6M, and if the 108 stability constant were applicable, essentially all of the humic acid would complex PbE+2. This would raise the total nontoxic species concentration and in fact could cause a shift from apparent toxicity to nontoxicity. (*45)

Given the abundance of complexing agents in biologically treated effluents and storm waters, a dissolved lead standard based on EPA's criteria is overly conservative.

(b) Conclusions With Respect to Lead

EPA should withdraw the proposed lead standard as unnecessarily restrictive and recalculate the criteria to reflect the additional studies conducted since the criteria were issued. Given the prevalence of lead in virtually all municipal effluents and storm waters, a minor change in the lead criteria will significantly affect treatment requirements. EPA should not apply the lead chronic criteria to storm waters where elevated TOC levels are prevalent and will detoxify the metal present.

(*41) See National Guidelines.

(*42) Letter from North Carolina DEHNR to EPA Region IV (January 23, 1990) (Exhibit 7).

(*43) See, Hall, Scott, et al. "The Use of Stream Side Macrocosms in the Evaluation of Copper, Lead and Zinc Effects on Acidic Stream Biota in Support of Deriving Site-Specific Water Quality Criteria." See also, Brungs, W. A. et al. "Synopsis of Water-Effects Ratios for Heavy Metals as Derived for Site-Specific Water Quality Criteria" (March 1992).

(*44) EPA Lead Criteria Document at 3.

(*45) Pagenkopf, Gordon K. "Metal Ion Speciation and Toxicity in Aquatic Systems, in Concepts in Metal Ion Toxicity." G.K Pagenkopf, H. Sigel, eds., at 113.

Response to: CTR-020-013

Although EPA agrees that the freshwater lead data set is less diverse by one taxon than the Aquatic Guidelines call for, EPA is retaining the criteria in the rule. EPA does not believe that the decreased taxonomic diversity in the data set is by itself a substantial shortcoming that would invalidate the criterion.

The comment about statistical deficiencies is not sufficiently specific for EPA to be able to identify to what the comment refers.

EPA is addressing the issue on bioavailability of different forms of lead (that is, the presence of "non-toxic" forms of lead) through expressing the criterion as dissolved lead and as function of a site-specific Water-Effect Ratio.

Subject Matter Code: C-06b Chromium Aquatic Life

Comment ID: CTR-061-013
Comment Author: G. Fred Lee & Associates
Document Type: Academia
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-06b Chromium Aquatic Life
References:
Attachments? Y
CROSS REFERENCES

Comment: Page 42168, third column, near the bottom, states, "However, EPA believes that it is appropriate to propose criteria in this rule based on the most recent data." Following that statement is a table (located on the bottom of page 42168 and top of 42169) in which the proposed freshwater criteria (CMC) for Cr VI is 16 ug/L. That table also lists the CCC for Cr VI as 11 ug/L. I have reviewed the literature on Cr VI toxicity (see attached "Chromium Speciation: Key to Reliable Control of Chromium Toxicity to Aquatic Life ") and find that 11 ug/L will not protect zooplankton from toxicity. There is substantial reliable data in the literature which show that Cr VI is toxic to zooplankton at 0.5 ug/L. This situation should have been discussed in the proposed CTR so regulatory agencies, the regulated community and the public learn that an 11 ug/L Cr VI criterion will not prevent zooplankton toxicity and could thereby violate the narrative toxicity standard of no discharge of toxic chemicals in toxic amounts. The CTR should also discuss the fact that in many ambient water systems Cr III (which is allowed to be discharged at 50 ug/L) can convert to Cr VI resulting in concentrations of Cr VI above those that are known to be toxic to zooplankton.

Response to: CTR-061-013

EPA does not agree that the 11 ug/L criterion will not protect zooplankton from toxicity. EPA believes its criterion for chromium is adequately protective. EPA has examined the quotation appearing in the submitted document "Chromium Speciation: Key to Reliable Control of Chromium Toxicity to Aquatic Life". EPA believes that the comment's Elnabarawy et al. (1986) citation refers to those authors' data published in Environmental Toxicology and Chemistry (Vol 5, pp. 393-398), and has examined that reference.

This material dealt with additional toxicity testing data rather than the data EPA used to derive the criterion. The material does not have data on previously untested species. Consequently, even if EPA were to include the Elnabarawy et al. (1986) data, then the results would be averaged with other study results for the same species, in order to obtain new Genus Mean Acute Values and Acute-Chronic Ratios, and recalculate the CMC and CCC.

Furthermore, even if the Elnabarawy et al. (1986) data were acceptable and included in a new criteria derivation, under no circumstances would EPA's criteria derivation procedure allow setting the criterion to the lowest test result (0.5 ug/L) among replicate tests. The averaging of test results prevents the criteria from being unnecessarily influenced by experimental errors. Consequently, even if EPA were to update the criterion for this rule, it cannot be predicted whether the entire body of new data (as opposed to the lowest test results therein) would cause the criterion to go up or down, or leave it essentially unchanged.

An additional problem is that there is doubt as to whether EPA could judge the Elnabarawy (1986) data to be acceptable. Although all or nearly all treatment concentrations for Ceriodaphnia reticulata and Daphnia magna had reproductive success that was statistically significantly lower than the control response, essentially all treatments had the same response, only slightly lower than the control, despite 100 fold differences in concentration.

Data from Elnabarawy et al. (1986)

	Average number of young per adult			Adult survival percentage		
Cr (VI) ug/L	D.magna	D.pulex	C.reticulata	D.magna	D.pulex	C.reticulata
Control	85	53	23	100	100	100
0.5	76	44	16*	100	100	100
1.5	69*	44	16*	100	80	100
5.0	71*	45	16*	100	80	100
15.0	71*	45	14*	60	80	100
50.0	47*	42	14*	0*	50	100

* Significantly different from control, p less than or equal to 0.05.

The expected behavior for this experiment would be a sigmoidal concentration-response curve (in this case a backwards "S" shape) with the low concentrations displaying similar responses to the control, and the higher concentrations with more or less progressively lower reproductive or survival success. The character of Elnabarawy et al. (1986) data suggest that the somewhat depressed reproductive success for D. magna between 0.5 and 15.0 ug/L and for C. reticulata between 0.5 and 50.0 ug/L may not due to chromium.

Consequently, EPA cannot accept the comment's contention that new evidence has demonstrated that the CCC specified in the rule, 11 ug/L, would not adequately protect aquatic life uses.

With regard to the conversion of chromium (III) to chromium (VI), EPA does not agree that the rule, in setting forth criteria concentrations, needs any provision for interconversion of oxidation states. EPA believes that site-specific fate considerations are best handled during the waste load allocation or permitting processes, not during the state-wide standards setting process.

Finally it should be noted that in analyzing the toxicity tests underlying the CMC and CCC for chromium (III), EPA assumed that none of the chromium (III) was converted to chromium (VI). To the degree (if any) that chromium (III) was oxidizing to chromium (VI) in the underlying toxicity tests, the chromium (III) criterion would already account for that degree of conversion.

Subject Matter Code: C-07b Cyanide Aquatic Life

Comment ID: CTR-058-013
Comment Author: Western States Petroleum Assoc
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: C-07b Cyanide Aquatic Life
References:
Attachments? Y
CROSS REFERENCES

Comment: Marine Cyanide Criteria. In 1996 WSPA submitted to the Washington Department of Ecology three reports in support of developing site-specific water quality criteria for cyanide. These reports were:

* Acute Toxicity of Cyanide to Two Species of West Coast Crabs, Cancer productus and Cancer gracilis;

* Literature Review of Cyanide Toxicity Data * Range and Distribution of Cancer branneri

These studies support an acute criterion of 9.4 ug/L and a chronic criterion of 1.5 ug/L using the EPA calculation procedures with data for C. irroratus being replaced by the Genus Mean Acute Value for four West Coast Cancer species. An acute to chronic ratio of 6.458 was used based on a recommendation by Mark Hicks of the Department of Ecology.

WSPA incorporates these studies into the record by reference (we will transmit the studies under separate cover) and urges EPA to review these data and support site specific marine cyanide criteria of 9.4 ug/L and 1.5 ug/L for California as well.

Response to: CTR-058-013

EPA agrees with incorporating the data generated for Cancer magister, C. oregonensis, C. productus, and C. gracilis into the data set underlying the cyanide saltwater criterion. The data for all tested species in genus Cancer are then as follows:

C. magister: LC50s 51.24 & 91.5 ug/L; SMAV 68.47 ug/L
C. oregonensis: LC50s 111.3 & 154.1 ug/L; SMAV 131.0 ug/L
C. productus: LC50 219 ug/L; SMAV 219 ug/L
C. gracilis: LC50 153 & 135 ug/L; SMAV 143.7 ug/L
C. irroratus: LC50s 4.2 & 5.7 ug/L; SMAV 4.893 ug/L

Within a genus, such as Cancer, in situations where toxicity data are available for some of the species, but not all of the species found in a state, data on tested resident species and data on tested non-resident species are both used to represent the untested species, when calculating site- or state-specific standards.

In contrast, for the State of Washington, where all resident Cancer species were tested (that is, C. magister, C. oregonensis, C. productus, and C. gracilis), EPA agreed that the GMAV for Cancer could be

recalculated after excluding C. irroratus, because (a) C. irroratus did not occur in Washington, and (b) it could not represent any untested Cancer species in that state since all resident Cancer species had been tested.

However, EPA has no data on the occurrence of Cancer species in California. Nor did the commenter submit any such data. As a result, EPA is unable to make the determination that C. irroratus could not represent any untested Cancer species occurring in California. That is, with the information available, EPA is not able to determine whether some Cancer species other than the above five occurs in California. If such Cancer untested species did occur in California, then C. irroratus would be considered as likely as any of the others above to represent the sensitivity of the untested Cancer species, and would thus not be deleted from the data set. Consequently, for this rule, the cyanide criterion was determined by considering all five of the above species.

The SMAV for C. irroratus is more than an order of magnitude less that the LC50 for any other species in the genus Cancer. The tests on C. irroratus were flow-through, measured tests at 20 degrees C. The tests on the other Cancer species were renewal, measured tests at 10 degrees C. EPA has not found any persuasive reason to believe the C. irroratus data to be in error. The observed difference between C. irroratus and the other Cancer species may be due to (a) genuine biological differences among species (although such large differences within a genus are not common), (b) reproducible differences stemming from different experimental conditions (flow-through test at 20degrees C versus renewal test at 10 degrees C), or (c) non-reproducible experimental variation.

The Aquatic Life Guidelines (the procedures EPA uses to derive criteria) discuss the situation where there are large differences among species in a genus. The Guidelines caution against taking a geometric mean of SMAVs when the values differ by more than a factor of 10, but do not precisely indicate what should be done in such cases. Generally, for other criteria included in the rule, when the SMAVs differed by more than a factor of 5, the GMAV was set equal to the lowest SMAV. When that is done for Cancer, the GMAV remains at 4.893 ug/L. The CMC and CCC thus remain unchanged from the proposed rule, both having the value of 1.0 ug/L.

Comment ID: CTR-092-012b
Comment Author: City of San Jose, California
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: C-07b Cyanide Aquatic Life
References: Letter CTR-092 incorporates by reference letter CTR-035
Attachments? Y
CROSS REFERENCES C-03b

Comment: Validity Of Proposed Nickel And Cyanide Criteria On A Statewide Basis

Attachment 1 to this letter is a technical report entitled "Task Report 1: Update and Recalculation of the Freshwater and Saltwater Cyanide Criteria", dated November 5, 1996 and prepared by Tetra Tech, Inc. for the City of San Jose. Attachment 2 to this letter is a technical report entitled "Final Report Recalculation of the Nickel Criteria for South San Francisco Bay", dated November 1, 1995 and prepared

by Tetra Tech, Inc. for the City of San Jose. All of the attachments to this letter are incorporated as part of our comments and are being submitted for inclusion in the record for this rulemaking.

EPA has an obligation to consider the most current, scientifically defensible data in this rulemaking. EPA's obligations in this regard are particularly significant in light of its obligations under Executive Order 12866 and the Regulatory Flexibility Act (5 U.S.C.A. 601 et seq.) to consider a full range of cost effective alternatives to promulgation of the proposed Rule.

Although the title of Attachments 1 and 2 suggest that the data submitted relates only to San Francisco Bay, the data in fact relates to the entire state of California, and indicates that lessstringent cyanide and nickel criteria than are proposed by the Rule would adequately protect water quality in California. Under the Executive Order 12866 and the Regulatory Flexibility Act, EPA should include consideration of the these less stringent criteria in its Economic Analysis.

Response to: CTR-092-012b

EPA does not agree that the nickel and cyanide site-specific criteria developed for South San Francisco Bay necessarily apply to the entire State of California. EPA has examined the two reports ("Final Report: Recalculation of the Nickel Criteria for South San Francisco Bay" and "Update and Recalculation of the Freshwater and Saltwater Cyanide Criteria") referenced in the comment, and could not find evidence that the analysis contained therein applies to or was intended to apply to the entire state. EPA is not claiming that it has evidence that the San Francisco Bay analysis is not valid in other parts of the state. However, because the comment provided no information to support its assertion that the cited data relate to the entire state, and because EPA has no information of its own to determine the occurrence of species in the state, EPA is not able to conclude that the South Bay analysis applies state wide. To adjust the nickel and cyanide criteria statewide, EPA would need a statewide analysis of the type done for South San Francisco Bay. These site-specific studies must first be reviewed and approved by State authorities; they may then come to approval. If approved, EPA would rescind the criteria for nickel and/or cyanide in the CTR for the South San Francisco Bay.

With respect to the commenter's suggestion that these studies should be considered in any costing analysis for the CTR under Executive Order (E.O.)12866 and the Regulatory Flexibility Act, EPA does not agree. EPA has made clear elsewhere in the record of the rule that these criteria are health-based and are not based on cost-benefit balancing. The E.O. 12866 is supplemental information that shows the indirect costs and benefits of CTR criteria; it is an indication of the magnitude of the costs and benefits of the resulting water quality standards implemented through the NPDES permit program. With respect to the RFA, EPA addresses this issue in the preamble to the final rule and elsewhere in the final record for the final rule.

[The remaining parts of the response were written by Region 9 and are not shown here because I do not have an electronic version of them. All issues with that portion of the response deal with regional matters outside the purview of the national program.]

Subject Matter Code: C-08a Arsenic Human Health

Comment ID: CTR-020-007
Comment Author: City of Stockton
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/24/97
Subject Matter Code: C-08a Arsenic Human Health
References:
Attachments? Y
CROSS REFERENCES

Comment: II. Use of New Scientific Information The City acknowledges and supports EPA's update of several water quality criteria including those for mercury, cadmium and arsenic. While a number of criteria were updated to reflect current scientific information, there are a few notable exceptions. The following briefly addresses the key updates and omissions that should be addressed in the final publication of this rule.

3. Arsenic

Arsenic human health criteria have been deleted as not being based on reliable scientific information. (This action followed a petition for rulemaking to amend the NTR for Alaska.) In the preamble, EPA tries to promote use of a 5 ppb human health criteria which was never adopted by the state. The number routinely approved by the Agency for other states is 50 ppb. Based upon the Agency's recent discussion of the current scientific information regarding arsenic addressed in the modification of the National Toxics Rule for Alaska (62 Fed. Reg. 27707-27710), EPA should clarify that the 50 ppb drinking water objective is acceptable to meet all Clean Water Act requirements.

Response to: CTR-020-007

In the final rule, EPA is not promulgating human health criteria for arsenic. As stated in the preamble, EPA made the decision not to promulgate human health criteria in light of number of issues and uncertainties that have arisen concerning the effects of arsenic on human health. A discussion of these issues are contained in a document entitled "Issues Related to Health Risk of Arsenic" that is contained in the administrative record for this rule. EPA is currently completing a review of the risk assessment for arsenic in an effort to resolve these concerns.

Although the State did not adopt a human health criterion for arsenic, California has previously expressed its scientific and policy position by recommending the use of 5 ppb in providing human health protection. This value has been utilized by the State in implementing its narrative criteria. EPA expects that the State will continue to implement its narrative criteria to ensure that protections are in place for arsenic.

As the commenter noted, many states have adopted human health criteria for arsenic based on the maximum contaminant levels (MCL) under the Safe Drinking Water Act. In addition, many States have arsenic criteria in place that are based on EPA's existing Section 304(a) criteria guidance. As stated in EPA's December 12, 1988 guidance to states on complying with CWA Section 303(c)(2)(B) and in the Agency's policy on the use of Section 304(a) criteria and MCLs (published at 45 FR 79320, November

28, 1980), EPA encourages the use of MCLs for the protection of public water supplies. However, where fish consumption is an important activity in a waterbody, EPA recommends the use of the Section 304(a) criteria. EPA does not believe that any further clarification is needed.

Comment ID: CTR-030-003
Comment Author: Utility Water Act Group
Document Type: Trade Org./Assoc.
State of Origin: DC
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-08a Arsenic Human Health
References:
Attachments? Y
CROSS REFERENCES

Comment: C. EPA is Correct to Delay Promulgation of Human Health Criteria for Arsenic

Given the numerous uncertainties involved in developing scientifically defensible human health criteria for arsenic, UWAG supports EPA's decision to delay promulgation of such criteria in theCalifornia water quality standards. As noted in the preamble, those uncertainties include: (1) arsenic exposure evaluations, (2) metabolism and detoxification processes, (3) analytical methods, and (4) effects at low doses. 62 Fed.Reg. at 42,179, col. 1. EPA has prudently decided to await resolution of these uncertainties before promulgating additional arsenic human health criteria.

Response to: CTR-030-003

EPA acknowledges the numerous comments that support the Agency's decision not to promulgate human health criteria for arsenic in today's rule.

Comment ID: CTR-035-002c
Comment Author: Tri-TAC/CASA
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-08a Arsenic Human Health
References:
Attachments? N
CROSS REFERENCES C-22
C-01a
G-05
G-04
G-09
K-01
C-24a

Comment: Second, we commend EPA for its inclusion in the CTR of several innovative and flexible

regulatory approaches, such as metals criteria expressed as dissolved rather than total recoverable concentrations, and the revised human health criterion for mercury. In addition, in light of the issues surrounding the human health criteria for arsenic we support EPA's decision not to promulgate human health criteria at this time. With respect to implementation issues discussed in the Preamble, we support EPA's policies and guidance regarding the application of mixing zones and dilution credits. the use of interim permit limits while Total Maximum Daily Loads (TMDLs) and other special studies are being performed, and EPA's guidance to Regional Water Quality Control Boards (RWQCBs) that they may use any of the methods described in EPA's guidance document on the use of translators. We also support EPA's proposal to create a rebuttable presumption for Water Effects Ratios (WERs), allowing the RWQCBs and SWRCB to develop site-specific WERs that can be approved by EPA during the NPDES permit approval process. We believe that this approach will help facilitate the development of appropriate site-specific adjustments for metals criteria.

Response to: CTR-035-002c

See response to CTR-030-003.

Comment ID: CTR-035-025
Comment Author: Tri-TAC/CASA
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-08a Arsenic Human Health
References:
Attachments? N
CROSS REFERENCES

Comment: p. 42179 - Arsenic Human Health Criteria We support EPA's decision not to promulgate human health criteria for arsenic at this time. However, in light of the scientific uncertainties identified by EPA, we strongly recommend that EPA remove from the Preamble the recommendation that State permitting authorities use 5 ug/l in evaluating and interpreting the narrative water quality criteria, since EPA's own scientific judgment is that there is an insufficient basis for setting valid human health criteria at this time. Instead, as an interim measure, EPA should recommend that the maximum contaminant level (MCL) for arsenic of 50 ug/l be used by permit writers, as has been approved as the human health criterion for the State of Alaska.

Response to: CTR-035-025

See response to CTR-030-003 and CTR-020-007.

Comment ID: CTR-041-005
Comment Author: Sacramento Reg Cnty Sanit Dist
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97

Subject Matter Code: C-08a Arsenic Human Health
References:
Attachments? N
CROSS REFERENCES

Comment: Fourth, for arsenic, the District strongly supports EPA's recognition that human health criteria should not be proposed at this time. The District is aware of the confusion in issues and the uncertainties that have developed concerning the measurement of the health effects of arsenic, and consequently the District supports the Agency's review of risk assessments for arsenic before promulgating criteria in any more states. In light of this reasoning, the District recommends that EPA withdraw its final sentence in this discussion recommending that permitting authorities in California refer to the State's criterion level of 5 ug/l in interpreting and evaluating narrative water quality criteria.

Response to: CTR-041-005

See response to CTR-030-003 and CTR-020-007.

Comment ID: CTR-045-007
Comment Author: Sausalito-Marin Sanitary Dist.
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/24/97
Subject Matter Code: C-08a Arsenic Human Health
References:
Attachments? Y
CROSS REFERENCES

Comment: The District supports many of the items included in the proposed CTR:

EPA's decision not to promulgate human health criteria at this time in light of the issues surrounding human health criteria for arsenic.

Response to: CTR-045-007

See response to CTR-030-003.

Comment ID: CTR-056-004
Comment Author: East Bay Municipal Util. Dist.
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/22/97
Subject Matter Code: C-08a Arsenic Human Health
References: Letter CTR-056 incorporates by reference letter CTR-054
Attachments? N

CROSS REFERENCES

Comment: Second, EBMUD would like to express to EPA it support for inclusion of:

* The decision NOT to promulgate human health criteria at this time for arsenic in light of uncertainty surrounding the human health effects of this element,

Response to: CTR-056-004

See response to CTR-030-003.

Comment ID: CTR-059-007
Comment Author: Los Angeles County Sanit. Dist
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: C-08a Arsenic Human Health
References: Letter CTR-059 incorporates by reference letter CTR-035
Attachments? Y
CROSS REFERENCES

Comment: Arsenic Human Health Criteria

We support EPA's decision not to promulgate human health criteria for arsenic at this time in light of the scientific uncertainties regarding the risks posed by arsenic in water. EPA currently has two different human health values for arsenic in water: 0.018 ug/L for the ambient water criterion and 5 0 ug/L for the drinking water maximum contaminant level (MCL). In its own decision document for arsenic(*2), EPA states that "Having two very different criteria for arsenic (0.018 ug/L ambient water v 50 ug/L in drinking water) to protect human health drinking water exposures is very confusing to the public. These different values have been difficult to explain, defend, and implement in EPA and State Programs." Based on this discussion, we strongly recommend that EPA remove from the Preamble the recommendation that State permitting authorities use 5 ug/l in evaluating and interpreting the narrative water quality criteria. Instead, as an interim measure, EPA should recommend that the MCL for arsenic of 50 ug/l be used by permit writers, as has been approved by EPA as the human health criterion for the State of Alaska.(*3)

(*2) U.S. Environmental Protection Agency, Decision Document for Arsenic. I.A.9.c Issues Related to Health Risk of Arsenic (no date).

(*3) 62 Federal Register 27707-27710 (May 21, 1997).

Response to: CTR-059-007

See response to CTR-030-003 and CTR-020-007.

Comment ID: CTR-060-004
Comment Author: San Diego Gas and Electric
Document Type: Electric Utility
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: C-08a Arsenic Human Health
References:
Attachments? N
CROSS REFERENCES

Comment: PROVISIONS SDG&E SUPPORTS

EPA has included in the proposed CTR provisions which are reasonable and with which SDG&E supports. These include:

Delay of arsenic human health criteria

The preamble states that EPA has decided to not propose human health criteria for arsenic in this rule due to a number of issues and uncertainties concerning the health effects of arsenic (see 62 Fed. Reg. at 42179, Col. 1). SDG&E supports this decision because it is important to base criteria upon sound science. Adoption of the criteria should be delayed until the referenced issues and uncertainties are resolved.

Response to: CTR-060-004

See response to CTR-030-003.

Comment ID: CTR-066-009
Comment Author: Delta Diablo Sanitation Dist.
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: C-08a Arsenic Human Health
References:
Attachments? N
CROSS REFERENCES

Comment: Our preliminary review of the CTR finds several areas that we believe are positive changes and will enhance the rulemaking. The areas that we support as now written are as follows:

* The decision not to promulgate human health criteria at this time in light of the issues surrounding the human health criteria for arsenic.

Response to: CTR-066-009

See response to CTR-030-003.

Comment ID: CTR-081-002g
Comment Author: West County Agency
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: C-08a Arsenic Human Health
References:
Attachments? N
CROSS REFERENCES G-04
C-24a
G-02
C-22
G-09
C-01a
G-05

Comment: * There are many aspects of the CTR that we support. These include: a) Application of interim limits while special studies are perfomed. b) Approach to water effect ratios for determining site specific criteria. c) Inclusion of provision for compliance schedules. However, this should be modified to allow inclusion of compliance schedules of up to 15 years in permits if deemed appropriate by Regional Boards. d) Metals criteria expressed as dissolved rather than total recoverable concentrations. e) EPA's guidance to Regional Boards regarding use of translators. f) EPA's proposal to create a rebuttal presumption for Water Effects Ratios, g) Revised human health criteria for mercury h) Decision to not promulgate human health criteria at this time in light of issues surrounding health criteria for arsenic. i) EPA's policies regarding application of mixing zones and dilution credits.

Response to: CTR-081-002g

See cross references in categories C-24a, G-02, C-22, G-09, C-01a, G-05.

See response to CTR-030-003.

Comment ID: CTR-085-010
Comment Author: Camarillo Sanitary District
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/24/97
Subject Matter Code: C-08a Arsenic Human Health
References:
Attachments? N
CROSS REFERENCES

Comment: On several aspects of the California Toxics Rule, the District is in agreement with CASA and SCAP comments:

* The EPA's decision not to promulgate human health criteria at this time in light of the issues surrounding the human health criteria for arsenic.

Response to: CTR-085-010

See response to CTR-030-003.

Comment ID: CTR-089-001c
Comment Author: Las Virgenes Mncpl Water Dist.
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/24/97
Subject Matter Code: C-08a Arsenic Human Health
References:
Attachments? N
CROSS REFERENCES C-22
C-01a
G-05
K-01
G-02
G-09

Comment: The draft California Toxics Rule (CTR) is clearly the product of substantial effort by USEPA staff, and we applaud this effort and its intent. On several issues of concern to public utilities, the CTR strikes a good balance between the need to promulgate standards and the need to base those standards on sound science. Examples include the use of dissolved concentrations rather than the total recoverable concentrations for metals, the deferral of human health criteria for arsenic until adequate information is available, and the revision of the human health criterion for mercury. We are also pleased with the CTR's guidance and flexibility, on mixing zones and dilution credits, total maximum daily loads (TMDLs), compliance schedules, and translators.

Response to: CTR-089-001c

See cross references in categories C-01a, G-05, K-01.

See response to CTR-030-003.

Subject Matter Code: C-09a Dioxin Human Health

Comment ID: CTR-002-006
Comment Author: Comm. for a Better Environment
Document Type: Environmental Group
State of Origin: CA
Represented Org:
Document Date: 09/24/97
Subject Matter Code: C-09a Dioxin Human Health
References:
Attachments? Y
CROSS REFERENCES

Comment: EPA unscientifically rejects criteria for 16 dioxin-like chemicals that impair San Francisco Bay. The 16 dioxin compounds that are not controlled by EPA's proposed criteria cause 80% of dioxin-like toxicity in San Francisco Bay fish tests supporting the human health advisory noted above.(*20) Subtracting all 2,3,7,8-TCDD toxicity does not change these dioxin-like toxicity estimates enough to reverse the conclusions which support this advisory.(*20) (*16) Thus, these 16 compounds impair fishing uses in San Francisco Bay. A criterion which includes the 16 dioxins developed by the state was approved in EPA's prior technical review, and the discussion in EPA's proposal shows that EPA still believes this criterion is scientifically defensible. Therefore, EPA's rejection of a criterion it believes is scientifically sound renders EPA's refusal to include criteria needed to protect San Francisco Bay fishing from these 16 dioxin-like chemicals without any valid scientific support.

(*16) California Regional Water Quality Control Board, San Francisco Bay Region, 1995. Contaminant levels in fish tissue from San Francisco Bay. Final draft report. Excerpt including data from toxic pollutant analyses of fish tissue samples from S.F. Bay. December, 1994.

(*20) Comparison of dioxin-like toxicity equivalents in San Francisco Bay fish tissue: 2,3,7,8-TCDD v. seventeen 2,3,7,8-substituted dioxins and furans. Table using data from Attachment 16, and analysis by CBE.

Response to: CTR-002-006

A commenter suggests that the Agency not include dioxin (2,3,7,8-TCDD) in this rule, pending completion of its ongoing reassessment of risks associated with exposure to dioxin and related compounds. In a contrary view, other commenters suggest that the Agency promulgate criteria not only for dioxin, but for related compounds--to include toxicity equivalent factors (TEFs) for– polychlorinated dibenzo-p-dioxins, polychlorinated dibenzofurans and co-planar polychlorinated biphenyls (PCBs). TEFs evaluate these related compounds as equivalent concentrations of 2,3,7,8-TCDD and are used as a method for capturing the total dose associated with environmental exposure to mixtures of dioxin and dioxin-like compounds.

In response to the first comment, EPA disagrees. EPA still views dioxin as an extremely serious health threat and, therefore, does not wish to delay further establishment of an ambient water quality criterion for California subject to this rule.

In order to base its regulatory decisions on the best available science, EPA periodically updates its

scientific assessment of the risk associated with exposure to environmental toxicants. In September of 1991 EPA's Office of Research and Development (ORD) began such a reassessment on the toxicology and exposure science of dioxin and related compounds. The scope of this reassessment effort has been much broader than previous dioxin assessments. Included in the dioxin reassessment effort are the identification and characterization of: dioxin sources; dioxin environmental fate and transport; pathways of human exposure; levels of and trends in human exposure; full assessment of cancer, and non-cancer toxic effects; development of quantitative dose response relationships for all the effects; and the characterization of risks posed by dioxin exposure. Once completed after a final, upcoming peer review, the reassessment will serve as the principal scientific and technical basis for EPA's future dioxin risk management policies and programs.

When the reassessment began, the Administrator of EPA directed that Agency actions move forward without change in substance or timing until the reassessment is completed (Memorandum of William K. Reilly, September 11, 1991 "Dioxin Regulatory Program"). This direction has not changed. EPA continues to rely upon its 1985 assessment and the cancer slope factor it describes as the technical basis for policy and regulation; this is the assessment of dioxin in place as of September 11, 1991.

Consistent with this direction, EPA knows of no compelling reason not to include dioxin in the rule at this time. Instead, EPA believes it is an appropriate public health step to apply the current dioxin criteria in this rule and consider the merits of revising the criterion applicable in this rule (and to all other states covered by the National Toxic Rule) once the entire dioxin reassessment is complete and EPA revises its dioxin criteria. In the National Toxics Rule, EPA noted that a number of factors (as discussed below) may change but that the resulting criterion might remain the same. These concerns were reflected in EPA's response to comments in the National Toxics Rule. "It is too early in the process of scientific reassessment to support major changes in either the substance or timing of regulatory decisions related to dioxin." 57 Fed. Reg. 60884. EPA notes further that this approach, with respect to the National Toxics Rule, was upheld by the U.S. District Court for the District of Columbia in American Forest & Paper Assn, Inc. v. U.S. Environmental Protection Agency, No. 93-cv-0694 slip op. at 14-16 (D. D.C. 1996); 1996 U.S. Dist. LEXIS 13230. Based on information currently available to the Agency, the dioxin limit promulgated today for 2,3,7,8- tetraclorodibenzo[p]dioxin remains in the range of scientific defensibility.

EPA has provided a leadership role in the adoption and application of TEFs and is generally supportive of their use for risk assessment and risk management. However, the expansion of water quality criteria to include the full range of dioxin-like compounds is only one of many issues that needs to be addressed in revising water quality criteria. From an EPA perspective, the public is best served by having all these factors considered simultaneously. For this full review of the dioxin Water Quality Criteria to be well founded in science, it needs the benefit of a completed, peer reviewed, reassessment. Reexamining the cancer slope factor for 2,3,7,8- tetraclorodibenzo[p]dioxin and TEFs are among many issues important to future water quality criteria, but are not the only issues. The reassessment also includes coverage of reproductive, developmental, neurotoxic and other effects as well as fundamental questions as to the mode of action by which dioxin causes all of its effects. These will be considered in a thorough revision of water quality criteria. Interim adjustments based on only some parts of the toxicology or quantitative assessment would not support coherence in the scientific work or policy development that underlie Agency action. There are a number of outstanding issues that could result in modification of the water quality criteria, including: expanding the criteria to all dioxin-like compounds; adopting a new cancer slope factor; considering non-cancer effects as well as cancer effects; taking into account background levels and exposure; adjusting fish consumption patterns; adjusting bioconcentration and bioavailability factors; and adopting new TEF values. Some of these factors could lead to strengthening the water quality criteria while others might support relaxation. It is presently unknown what the net effect of all these factors may have on revised dioxin criteria. EPA continues to believe that waiting for the final

peer review reassessment to be completed so that all of these issues can be addressed simultaneously, is preferable to a sequence of incremental revision to the criteria based on only a few of these concerns. Thus, until EPA completes this reassessment, when EPA promulgates water quality criteria for a State, EPA will not use this approach.

For the reasons discussed above, the Agency is promulgating an ambient water quality standard only for 2,3,7,8-TCDD. This action is consistent with Section 303(c)(2)(B) and the National Toxics Rule (57 Federal Register 60863-60864, December 22, 1992) based on EPA's 1984 Ambient Water Quality Criteria Document for Dioxin. California, however, may adopt criteria for other related compounds.

See also response to CTR-002-003 (Category C-24; Site-Specific Criteria).

Comment ID: CTR-016-008
Comment Author: San Francisco Bay RWQCB
Document Type: State Government
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-09a Dioxin Human Health
References:
Attachments? Y
CROSS REFERENCES

Comment: Comments on the Proposed Dioxin Criteria

In the preamble, EPA states its support for California's use of Toxicity Equivalents (TEQ) in setting NPDES permit limits, yet proposes standards for only one type of dioxin. We have found that appropriate water quality protection requires consideration of all congeners because it is only through congener "fingerprints" that distinctions can be made between atmospheric deposition and wastewater sources. Most dioxins and furans are released to the environment through air emissions. In addition, EPA should also provide guidance for determining permit compliance for discharges dominated by higher chlorinated congeners given the slim data base that established the equivalent factors for these higher chlorinated congeners. Below are the reasons for these recommendations.

EPA is proposing standards for 2,3,7,8-tetrachlorinated dibenzo-p-dioxin (TCDD) that are consistent with the NTR and that are based on the 1984 criteria. The TEQ concept uses toxicity equivalency factors (TEF) to convert mixtures of polychlorinated dibenzo-p-dioxins and dibenzofurans (PCDD/PCDF) to equivalent concentrations of 2,3,7,8-TCDD.

EPA states in the preamble:

"...The concept of TEQ and the use of the I-TEFs/89, as outlined in EPA's 1989 Interim Procedures, provided valuable guidance in using the 2,3,7,8-TCDD water quality criteria in setting National Pollutant Discharge Elimination System (NPDES) water quality-based permit limits that are protective of human health for dioxin and dioxin-like compounds."

Discharge data from our region, which we have shared with EPA, show that applying this statement strictly would raise significant permit compliance issues for many wastewater point sources. Guidance

on an implementation strategy for dioxin is needed. We believe it is appropriate for EPA to provide this guidance because they have a broad multimedia understanding of the current state of knowledge about the major sources and fate of PCDD/PCDF.

Based on an extensive review of local and international scientific data, we have found that the major sources of dioxins to the environment are from emissions to air. However, the ultimate sink for PCDD/PCDF is the aquatic sediment. As a result, aquatic indicators such as fish tissue may show a problem regardless of the significance or insignificance of current wastewater point sources in that area.

In the San Francisco Bay area, we find that most of the PCDD/PCDF enters surface waters from storm water runoff. Another significant portion may come from direct deposition of PCDD/PCDF onto the bay surface from the ambient air. The sources to storm water are most likely from emissions to air and reservoir sources.

Considering this, control of the air emissions sources rather than controls through the NPDES permit program would appear to us to have the most impact on water quality. Of course, in certain areas where there is a significant point source such as paper and pulp mills, it may be prudent to control that source because of potential impacts on the local area.

In any case, because of the significance of air emission sources, EPA should provide an implementation strategy for regulating PCDD/PCDF using the TEQ approach.

On the issue of uncertainty of TEFs, we believe that, as part of the California Toxic Rule, EPA should provide guidance for determining permit compliance on samples dominated by hepta- and octa-CDDs and CDFs. We believe this is necessary because of the uncertainty of the TEF values for these congeners, and because of the dominance of these congeners in many of the discharge samples in our region.

According to EPA's 1989 Interim Procedures document, the data base for the TEFs for hepta- and octa-CDDs and CDFs are very slim. For octa-CDD and CDF specifically, EPA acknowledged in the document that the TEFs reflect the results of a single experiment. Permit violations triggered by TEFs that are based on a very slim data base concerns us. This concern is compounded by the fact that discharge and storm water sample data from our region show hepta- and octa-CDDs and CDFs account for 20 to 100% of the total TEQ of the samples.

Response to: CTR-016-008

See response to CTR-002-006.

Comment ID: CTR-035-024
Comment Author: Tri-TAC/CASA
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-09a Dioxin Human Health
References:
Attachments? N

CROSS REFERENCES

Comment: p. 42178 -- 2,3,7,8-TCDD (Dioxin) Criteria We recommend that EPA not adopt criteria for dioxin at this time for the following reasons. First, we recommend that EPA is still completing the dioxin reassessment, and, similar to EPA's decision regarding the human health criteria for arsenic, we believe that EPA should defer adoption of the criteria at this time. Second, as pointed out elsewhere in these comments, we believe that there are fundamental problems in EPA's adopting criteria that are below detection limits and for which compliance costs cannot be properly determined. Third, use of dioxin has been banned, and therefore traditional control methods are unlikely to succeed in achieving meaningful reductions in dioxin levels in the ambient environment. Therefore, we urge EPA and the State to instead focus watershed management efforts on developing strategies for addressing dioxin issues (where dioxin is demonstrated to be causing water quality use impairment).

Response to: CTR-035-024

See response to CTR-002-006.

Comment ID: CTR-039-006
Comment Author: San Francisco BayKeeper
Document Type: Environmental Group
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-09a Dioxin Human Health
References:
Attachments? N
CROSS REFERENCES

Comment: IV. EPA MUST LOWER THE PROPOSED 2,3,7,8 TCDD DIOXIN NUMBER IN ORDER TO ACCOUNT FOR THE ADDITIVE TOXICITY OF 16 OTHER DIOXIN CONGENERS

BayKeeper believes that the only appropriate water quality standard for dioxin is zero. That being said, the State of California's 1991 criteria for dioxin included all 17 dioxin compounds. EPA's rule purposes to establish a criteria for only one of those congeners - 2,3,7,8-TCDD. The State's 1991 rule applied toxicity equivalency factors ("TEFs") promoted but not promulgated by EPA in the proposed rule. The toxicity equivalency concept takes into account the additive toxicity of the congeners on each other and, as EPA appears to acknowledge, more likely protects human health for dioxin and dioxin-like compounds. Unfortunately, EPA once again defers to a non-existent state process to fill in the regulatory gap for the other 16 dioxin compounds. As is clear from the State of California's recently proposed implementation plan for EPA's proposed criteria, the State is not proposing to take EPA up on its offer to make the dioxin criteria truly protective by applying TEFs after the fact. Assuming that EPA insists on attempting to protect people from dioxin by only regulating one of the congeners, at a minimum, in order to account for the toxicity of 2,3,1,8-TCDD where a mixture of dioxins is present, EPA should reduce the proposed criteria of .014 pg/L to .0014 pg/L to account for additional toxicity resulting from the presence of other dioxins and consistent with the State's prior technical decision on dioxin.

Response to: CTR-039-006

See response to CTR-002-006.

Comment ID: CTR-053-003c
Comment Author: Heal the Bay
Document Type: Environmental Group
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: C-09a Dioxin Human Health
References: Letter CTR-053 incorporates by reference letter 6 and the comments on Dioxin, copper, and the compliance schedule from letter CTR-002
Attachments? N
CROSS REFERENCES C-01b
C-02b

Comment: In spite of our lack of detailed comments for specific criteria, we have concerns regarding any weakening of California's previously developed standards, particularly those for mercury and copper. Also, we question the absence of criteria for dioxin and dioxin-like compounds. In order to ensure these issues are considered in future improvements of the Rule, we incorporate by reference the comments of the Natural Resources Defense Council regarding mercury, and the comments of Communities for a Better Environment ("CBE") regarding dioxin compounds and copper.

Response to: CTR-053-003c

See response to CTR-002-006.

Comment ID: CTR-058-012
Comment Author: Western States Petroleum Assoc
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: C-09a Dioxin Human Health
References:
Attachments? Y
CROSS REFERENCES

Comment: 2,3,7,8-TCDD ("dioxin"). EPA has proposed a criterion for 2,3,7,8-TCDD ("dioxin') and is encouraging the state to implement the TEQ approach in implementing this criterion. WSPA does not agree with the TEQ approach entirely and strongly urges EPA and the state to wait until EPA and EPA's Science Advisory Board complete the re-evaluation of the health risk assessment of dioxin and its congeners. EPA may find that some congeners, especially the more highly substituted congeners which seem to be ubiquitous in the environment, are not as toxic as originally perceived. Until EPA's studies are complete, EPA and the state should regulate 2,3,7,8-TCDD based on the criteria set by EPA for this compound in the proposed rule.

Response to: CTR-058-012

See response to CTR-002-006.

Comment ID: CTR-095-003
Comment Author: M. Ruth Uiswander
Document Type: Citizen
State of Origin: CA
Represented Org:
Document Date: 10/02/97
Subject Matter Code: C-09a Dioxin Human Health
References:
Attachments? N
CROSS REFERENCES

Comment: Dioxin is only regulated in one compound. Ca. used to have standards for all 17 dioxin compounds. The proposed new standard for only one Dioxin compounded is .014 parts per billion. It should be at least .0014 ppb; OR BETTER: ZERO!

Response to: CTR-095-003

See response to CTR-002-006.

Comment ID: CTR-097-003
Comment Author: Mark Shaw
Document Type: Citizen
State of Origin: CA
Represented Org:
Document Date: 10/03/97
Subject Matter Code: C-09a Dioxin Human Health
References:
Attachments? N
CROSS REFERENCES

Comment: In addition the proposed standards apply to only one dioxin compound, and that proposed standard is O.014 parts per billion. A more appropriate standard for dioxin - ALL dioxin compounds- is zero parts per billion.

Response to: CTR-097-003

See response to CTR-002-006.

Comment ID: CTR-104-004a
Comment Author: Lucy Nelson, et. al.
Document Type: Citizen
State of Origin: CA

Represented Org:
Document Date: 10/15/97
Subject Matter Code: C-09a Dioxin Human Health
References:
Attachments? N
CROSS REFERENCES C-17a

Comment: Increasing the limits on toxins means that we postpone the goals of the Clean Water Act to make U.S. water "fishable and swimmable". Any progress made will not be expanded toward making our waters cleaner and mediocre programs will be introduced which do not improve the condition of our state's water quality. More protective standards must be created which will consider all 17 toxic pollutants of concern.

Response to: CTR-104-004a

See response to CTR-002-006.

Comment ID: CTR-106-004a
Comment Author: Robert Brown
Document Type: Citizen
State of Origin: CA
Represented Org:
Document Date: 10/28/97
Subject Matter Code: C-09a Dioxin Human Health
References:
Attachments? N
CROSS REFERENCES C-17a

Comment: Increasing the limits on toxins means that we postpone the goals of the Clean Water Act to make U.S. water "fishable and swimmable". Any progress made will not be expanded toward making our waters cleaner and mediocre programs will be introduced which do not improve the condition of our state's water quality. More protective standards must be created which will consider all 17 toxic pollutants of concern.

Response to: CTR-106-004a

See response to CTR-002-006.

Comment ID: CTR-109-003
Comment Author: Maggie Miller
Document Type: Citizen
State of Origin: CA
Represented Org:
Document Date: 12/01/97
Subject Matter Code: C-09a Dioxin Human Health
References:

Attachments? N
CROSS REFERENCES

Comment: Third, California used to have standards for all 17 dioxin compounds. The proposed new standard applies only to one, and that proposed standard is severely inadequate.

Response to: CTR-109-003

See response to CTR-002-006.

Comment ID: CTR-110-002
Comment Author: Judith A. Brown
Document Type: Citizen
State of Origin: CA
Represented Org:
Document Date: 12/02/97
Subject Matter Code: C-09a Dioxin Human Health
References:
Attachments? N
CROSS REFERENCES

Comment: Please consider standards for all seventeen dioxin compounds, not just one.

Response to: CTR-110-002

See response to CTR-002-006.

Comment ID: CTRH-001-012
Comment Author: Greg Karras
Document Type: Public Hearing
State of Origin: CA
Represented Org: Comm. for Better Environ.
Document Date: 09/17/97
Subject Matter Code: C-09a Dioxin Human Health
References:
Attachments? N
CROSS REFERENCES

Comment: On dioxin, despite proof that there are 17 dioxin compounds which harm the fishing public, EPA proposes a standard for only one of these compounds. EPA then says that it encourages the state to use the states previous scientifically correct standards for all 17 dioxins, instead of using the one EPA proposes, which deregulates 16 of the 17 most toxic chemicals known to science.

Our question here is, why does EPA think the state will have the courage to do the right thing about dioxin if EPA doesn't?

Response to: CTRH-001-012

See response to CTR-002-006.

Comment ID: CTRH-001-051
Comment Author: Michael Lozeau
Document Type: Public Hearing
State of Origin: CA
Represented Org: S.F. Bay/Delta Keeper
Document Date: 09/17/97
Subject Matter Code: C-09a Dioxin Human Health
References:
Attachments? N
CROSS REFERENCES

Comment: The toxicity equivalents notion is sort of held up as a good idea, and all states should go about doing that. It seems to me a simple step to say that the state has to do it. Just make those other 16 congeners --

And, of course, Baykeeper has signed on and there are a number of groups in the Bay Area that have signed on to the statewide notion of a zero dioxin standard anywhere possible. And I think that would be certainly the most practical place to put a zero discharge standard, would be in the standards themselves.

And to the extent there's other issues related to the particular permits, then we would obviously raise those at the time the permits came up. So we would propose a zero number for dioxin and all the congeners at this point.

Response to: CTRH-001-051

See response to CTR-002-006.

Subject Matter Code: C-10b PCBs Aquatic Life

Comment ID: CTR-037-010
Comment Author: Hampton Roads Sanitation Dist.
Document Type: Sewer Authority
State of Origin: VA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-10b PCBs Aquatic Life
References:
Attachments? N
CROSS REFERENCES

Comment: 10. EPA has modified the PCB criteria from an approach where each aroclor has its own criteria to one where a single criterion applies to the sum of all aroclors. However, the new criterion does not represent the sum of the criteria for the aroclors. This, in effect, results in a much more stringent PCB criterion because an effluent previously could discharge several aroclors at concentrations which were not detrimental to biota but now those same concentrations add up to a sum which is greater than the new criterion. The 1995 Update document does not address why this change is made, and justification could not be located in the proposed rule. Such changes must be technically and scientifically defensible and necessary to protect and support designated uses. EPA should provide data and logic supporting the new approach and illustrate why it is now necessary to protect aquatic organisms.

Response to: CTR-037-010

The Agency agrees that the presentation of the aquatic life criteria for polychlorinated biphenyls (PCB) in the criteria matrix for this proposal differ from that in the NTR as amended; for this final rule, aquatic life criteria are expressed as the sum of aroclors (1242, 1254, 1221, 1232, 1248, 1260 and 1016, CAS numbers 53469219, 11097691, 11104282, 11141165, 12672296, 11096825 and 12674112, respectively) while for the NTR, as amended, the criteria limits are expressed for each of seven different aroclors. The Agency agrees that a criterion based on the sum of several aroclors may be more stringent than a criterion where each of several individual aroclors has a concentration limit. For example, a criterion of 0.014 ug/L applying to the sum of seven aroclors is more stringent than each of seven aroclors having a concentration limit of 0.014 ug/L.

The Agency does not agree that justification for a criterion based on the sum of aroclors could not be located in the proposed rule. Page 42168 of the Preamble states: "The presentation of the polychlorinated biphenyls (PCB) criteria in the criteria matrix for this proposal differ from that in the NTR, as amended: for this proposal, the criteria are expressed as a total of all aroclors, while for the NTR, as amended, the criteria are expressed for each aroclor." The aquatic life criteria proposed in the CTR were based on the criteria contained in the 1980 criteria document entitled, Ambient Water Quality Criteria for Polychlorinated Biphenyls, (EPA 440/5-80-068, October 1980) which was included in the Record for the proposed rule. This criteria document explains the derivation of aquatic life criteria based on total PCBs. Therefore, a criteria based on the sum of aroclors is comparable with the aquatic life criteria presented in the 1980 criteria document.

Subject Matter Code: C-11b PAHs Aquatic Life

Comment ID: CTR-060-014
Comment Author: San Diego Gas and Electric
Document Type: Electric Utility
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: C-11b PAHs Aquatic Life
References:
Attachments? N
CROSS REFERENCES

Comment: PROVISIONS SDG&E DOES NOT SUPPORT

As described in the following comments SDG&E does not support the following provisions:

PAHs criteria

EPA's proposed criteria for high molecular weight (HMW) carcinogenic PAHs (e.g., Benzo (a) Anthracene, Benzo (a) Pyrene, Benzo (b) Fluoranthene, Benzo (k) Fluoranthene, Chrysene, Dibenzo (a,h) Anthracene, Indeno (1,2,3-cd) Pyrene) used a number of assumptions which have made the resulting criteria overly conservative. Following is a discussion of these factors.

* PAHs are highly hydrophobic molecules and consequently bind to available suspended organic matter. Currently accepted methods for measuring concentrations of PAHs in water neglect the binding of such hydrophobic compounds to suspended organic matter(*1). The dissolved fraction (DOM) of this suspended material passes through a 0.45um filter and the organic extraction required for analysis of PAHs insures that both DOM-bound and free PAH will be reported. Since only the free PAH is bioavailable, this results in the proposed criteria being unnecessarily overprotective. The PAH criteria should account for the bio-availability of PAHs, as they do for the bio-availability of metals (e.g., dissolved criteria vs. total recoverable, translators, WERs).

* The simple use of octanol-water partition coefficients or fugacity modeling show that these HMW PAHs are only vanishingly soluble in seawater and to reach the proposed criteria values would have to originate from a large well-mixed source. For instance, assuming the HMW PAHs has a log octanol/carbon partition coefficient (log Koc) of 5.0, the sediment source would have to be 4.9 ppm in order to be the source for the proposed water quality criterion of 0.049 ppb. While there may be sites where this level has been reported for total PAHs, the highest values for a single HMW PAH reported at a very contaminated site was 2.3 ppb of benzo(a)pyrene(*2). Since the source of HMW PAHs in fish is unlikely to be the water column, the back-calculation of human health standards to water standards makes little sense.

* The fish consumption rate of 6.5 g/day used is not representative of fish consumption within the State of California, and overestimates exposure. This value is reported by the EPA to represent an estimate of average consumption of fish and shellfish from estuarine and fresh waters by the U.S. population(*3) . The draft EPA Exposure Factors Handbook (*4)(EFH) summarizes studies on the intake of fish and shellfish, and includes study results for Northern and Southern California from the National Marine Fisheries Service. While this data is compiled for fish from marine habitats, other data summarized in

Table 10-8 of the draft EFH suggests that the percentage of the population consuming and the mean daily fish intakes are higher for fish from marine habitats than for freshwater/estuarine habitats. The mean daily intake of marine finfish for anglers was 2.0 g/day for both Northern and Southern California, and the intake was 0.2 or 0.3 g/day on a per capita basis in the coastal population. The value of 2.0 g/day would be a more reasonable consumption rate and should be sufficiently health-protective of the more highly exposed sub-population of the state, because this intake is restricted to the angler population, which may reasonably be expected to consume their own catch and to represent a greater exposed population than the entire population of the state. The intake rate from this database is more up-to-date and is geographically representative. The criteria should be recalculated using the California fish intake rate.

* The use of a single, deterministic value of the BCF for each chemical is a gross oversimplification, and is likely to overestimate exposure. Some of the issues that should be considered in the selection of BCF values to use in the analysis are listed below:

* Most BCFs are reported for whole body samples, whereas the edible portion of the fish is typically only a fillet (muscle, skin, and adipose tissue). For example, in a study of the uptake and distribution benzo(a)pyrene in Northern Pike, less than 3% of the total accumulation of benzo(a)pyrene was located in the edible portion of the fish. The use of whole body BCFs in general overestimates the concentration of the chemical in the edible portion of the fish.(*5)

* BCFs have been shown to vary widely depending upon the fish species. Fish species with a higher content of lipids tend to bioconcentrate lipophilic substances to a greater degree than less oily, leaner fish from the same environment. In addition, fish species which lack or have a reduced capacity for metabolic elimination of a chemical tend to bioconcentrate chemicals to a greater degree. For example, the BCF for benzo(a)pyrene in snails is 82,000, while the BCF for benzo(a)pyrene in bluegill is 2,600.(*6) Creel studies should be utilized to select fish species caught and consumed by recreational fishers in California, and the appropriate BCFs selected to represent the regional fish populations ingested.

* Because of their low solubility and high affinity for organic carbon, PAHs in aquatic systems are primarily found sorbed to particles that are either settled to the bottom or are suspended in the water column.(*7) The sediments can be major sinks for PAHS. The concept of estimating concentrations in fish from water concentrations and BCF factors neglects the potentially very significant contribution of uptake from sediments into benthic organisms and subsequent ingestion by higher trophic levels.

* The presence of particulate organic material (POM) and dissolved organic material (DOM) may exhibit a significant effect on the BCF measured. For example, the BCF for benzo(a)pyrene in bluegills decreases from 2,600 to 220 in the presence of 20 mg/L DOM.(*8) Because the amount of organic materials in the waterbody may vary depending upon the freshwater or estuarine habitat, the BCFs should reflect the organic material in the freshwater and estuarine water bodies in California.

* Several studies by NOAA and others have shown that HMW PAHs do not bioaccumulate in fish tissue even under very polluted environmental conditions.(*9) This is because they either pass through the gut unchanged,(*10) or are extensively metabolized(*11) and excreted.(*12) Metabolism occurs in several tissues, but primarily in the liver and gut. Metabolism that occurs in the gut reduces the amount of PAH that is available for distribution within the fish flesh.

* There is a wide range of published BCFs for HMW PAHs. This is because a number of different methods and assumptions were used to deduce these values. Most laboratory studies derived BCFs

during short-term exposures to environmentally irrelevant high concentrations of PAHs, while field studies assumed that the only source of PAHs was the water column. In short-term high level exposures, the fish does not reach equilibrium and metabolic capacities are overwhelmed. The inability of fish to clear these PAHs results in apparently high BCFS. However, as discussed above, high levels of HMW PAHs do not occur even at very polluted sites.

* The use of BAF values in future evaluations is suggested in the proposed Water Quality Standards document. With regard to carcinogenic PAHs, extensive metabolism of the compounds by high-trophic-level consumers such as predatory fish has been demonstrated, therefore food chain biomagnification of these compounds does not appear to be significant, and the use of a BAF does not result in the conservatism that a BCF does.

* The EPA uses the oral slope factor for benzo(a)pyrene as the toxicity criteria for the other carcinogenic PAHs. While it is our understanding that the EPA does not have a national standard for assigning cancer potencies to different PAHs, both the EPA Region IX(*13) and the California EPA(*14) have policies which result in the assignment of toxicity equivalence factors to the carcinogenic PAHs. In general, the other carcinogenic PAHs are less potent than benzo(a)pyrene (i.e. the toxicity equivalence factors are less than one). Because the proposed Water Quality Standards are specific to California, the toxicity criteria used in the derivation should at a minimum reflect either current California EPA or EPA Region IX policies.

* The EPA should consider the use of probabilistic approaches to determine numeric water quality standards related to fish ingestion. The wide variability and relatively high uncertainty in the essential exposure parameters related to the intake rates, species of fish consumed, bioconcentration factors, and human sub-populations are ideally suited to a non-deterministic approach, and the expansion of studies which report distributional data should make a probabilistic approach feasible.

(*1) Readman, J.W., et al. 1982. Aquatic distribution and heterotrothic degradation of polycyclic aromatic hydrocarbons (PAH) in the Tamar Estuary. Estuar. Coast. Shelf Sci. 14: 369-389.

(*2) Krahn, M..M. et al. 1986. Associations between metabolites of aromatic compounds in bile and the occurrence of hepatic lesions in English sole (Parophys vetulus) from Puget Sound, Washington. Arch. Env. Contam. Toxicol. 15: 6167.

(*3) U.S. EPA, 1989. Assessing Human Health Risks from Chemically Contaminated Fish and Shellfish. Office of Water Regulations and Standards. EPA-503/8-89-002.

(*4) U.S. EPA, 1996. Exposure Factors Handbook. EPA/600/P-95/002Ba. Office of Research and Development.

(*5) Balk, L.; Meijer, J.; DePierre, J.W.; Appelgren, L.E. 1984. Toxicology and Applied Pharmacology, 74, 430-449.

(*6) ATSDR, 1997. Agency for Toxic Substances Disease Registry. Toxicological Profiles on CD-ROM. Lewis Publishers, Boca Raton, Florida.

(*7) ATSDR, 1997. Agency for Toxic Substances Disease Registry. Toxicological Profiles on CD-ROM. Lewis Publishers, Boca Raton, Florida.

(*8) ATSDR, 1997. Agency for Toxic Substances Disease Registry. Toxicological Profiles on CD-ROM. Lewis Publishers, Boca Raton, Florida.

(*9) Krahn, M.M. et al. 1986. Associations between metabolites of aromatic compounds in bile and the occurrence of hepatic lesions in English sole (Parophys vetulus) from Puget Sound, Washington. Arch. Env. Contam. Toxicol. 15: 6167.

(*10) Niimi, A.J. and G.P Doorkhran. 1989. Dietary absorption efficiencies and elimination rates of polycyclic aromatic hydrocarbons (PAHS) in rainbow trout (Salmo gairdneri). Env. Toxicol. Chem. 8: 719-722.

(*11) VanVeld,P.A.etal. 1988. Induction of monooxygenase activity in the intestine of spot (Leiostomusxanthurus), a marine teleost, by dietary aromatic hydrocarbons. Drug Metab. Disposition l6: 659-65; and Stegeman, J.J. 1978.

(*12) Krahn, M.M. et al. 1992. Mass spectrometric analysis for aromatic compounds in bile of fish sampled after the Exxon Valdez oil spill. Env. Sci. Technol. 26: 116-126.

(*13) U.S. EPA Region IX, 1993. Memo from Gerald Hiatt, Senior Risk Assessment Advisor at USEPA Region IX, to Richard Becker, Chief of Human and Ecological Risk at California EPA. Subject: EPA national and regional policies on assessment of cancer risks from exposure to mixtures of PAHs. May 25, 1993.

(*14) Califomia EPA, 1994. California Environmental Protection Agency Criteha for Carcinogens. November 1, 1994.

Response to: CTR-060-014

1. In response to the comment that EPA's proposed criteria for PAHs are overly conservative because they are not based on the freely dissolved fraction in water, EPA disagrees. While EPA agrees that the freely dissolved fraction of PAHs is the most bioavailable fraction for uptake by aquatic organisms, EPA believes that it would be premature to place in the final rule a criterion that is based on bioaccumulation factors normalized to the freely dissolved fraction because EPA has not yet completed peer review of its proposed national methodology for taking this approach. Until EPA completes the peer review of its national methodology for development of bioaccumulation factors, EPA believes it is most appropriate to base the criterion on the BCF, as is consistent with the NTR and EPA's current national recommended section 304(a) criteria. With respect to PAHs, EPA disagrees that its BCF of 30 necessarily results in an overly conservative criterion. Specifically, this BCF was derived from a study by Lu et al. (1977) and was measured in a model aquatic ecosystem environment containing multiple species at different trophic levels (e.g., algae, zooplankton, mosquito larvae, fish). Therefore, it is likely that some organic carbon was present in the study and that some sorption of the PAH compound (benzo-alpha-pyrene) onto dissolved and particulate carbon occurred thereby reducing the bioavailability of some portion of the PAH compound present. Further, since sufficient information is not presented in the Lu et al. study to estimate the freely dissolved fraction of the PAH compound, there is no basis for assuming that the bioavailability in the Lu et al. study was greater than waters in California generally.

EPA acknowledges that its revised national human health methodology would seek to develop water quality criteria for PAHs that are based on BAFs that consider the freely dissolved fraction in water (see 63 Fed. Reg. 43,756-43828; August 14, 1998, specifically pp. 43806-43823). However, this methodology has not been finalized and is currently undergoing external scientific peer review. EPA believes that

scientific peer review is essential to maintaining the scientific defensibility of its water quality criteria. In the aforementioned notice, EPA described its proposed methodology for appropriately determining bioaccumulation factors that are used to derive a criterion. As proposed, this would entail a two-step process: (1) calculation of a baseline BAF for organisms at each relevant trophic level from available field, laboratory, or model-derived bioaccumulation data, and (2) conversion of the trophic level-specific baseline BAFs to AWQC BAFs that reflect factors affecting bioavailability at the sites to which the AWQC is being applied. These factors include lipid content of consumed aquatic organisms and the organic carbon content (i.e., dissolved and particulate organic carbon) of waters applicable to the AWQC. In addition, EPA's proposed methodology includes guidance on selection of octanol-water partition coefficients (Kow), which are integral to several aspects of the methodology.

Although strong similarities exist between EPA's proposed national human health methodology (which includes the bioaccumulation methodology) and the 1995 methodology established under the Great Lakes Water Quality Initiative, all of the elements of EPA's proposed national bioaccumulation methodology require scientific peer review since it would be applied in a much broader scope than the GLWQI methodology (i.e., the national methodology applies to estuaries, lakes, streams, rivers throughout the United States whereas the GLWQI methodology applies just to waters of the Great Lakes region). In addition, the proposed national bioaccumulation methodology contains substantive changes since the 1995 publication of the GLWQI methodology (e.g., new guidance on selecting Kow values, revised estimates of food chain multipliers, additional guidance for the use of field data, revised default assumptions on lipid content of consumed aquatic organisms and particulate and dissolved organic carbon).

At the time of this rulemaking, EPA did not have sufficient time to adapt the GLWQI methodology in order to develop National or California-specific BAF estimates for the 304(a) criteria being promulgated, and also have these modifications peer reviewed. After the peer review process on the revised national methodology is complete, EPA plans to update its National 304(a) criteria on a periodic basis. As National 304(a) criteria are updated, EPA will evaluate the need to promulgate revisions to criteria in the CTR. Given that California is the only state with no numeric human health criterion in place for PAHs, and given that EPA has not completed a national methodology for developing BAFs on a freely dissolved basis, EPA believes it is most appropriate to promulgate the PAH criterion using the BCF that is consistent with the NTR and its most current national 304(a) recommendations.

2. In response to the comment that back calculation of human health criteria makes little sense because the source of PAHs in fish is not likely to be the water column, EPA disagrees that expressing human health criteria in the form of ambient water column concentrations is inappropriate for hydrophobic chemicals such as PAHs. For highly hydrophobic chemicals (i.e., log Kow > 6), EPA agrees that it is often the case that the concentrations in the water column are much lower than those in other environmental compartments such as sediment or food. EPA also acknowledges that the contribution of chemicals in food and sediment-based organisms to overall chemical uptake in higher trophic level organisms such as fish can be substantial, compared to the water column. However, EPA believes that expressing human health criteria in terms of concentrations in the water column concentrations is valid because environmental compartments in aquatic ecosystems (water, organisms, sediments) are all interconnected and therefore, concentrations of contaminants within these compartments are continuously being exchanged as a result of ongoing and competing chemical and biological partitioning processes. At equilibrium, contaminant concentrations within these environmental compartments are expected to be closely correlated, which is consistent with chemical equilibrium partitioning theory (i.e., higher water column concentrations would be correlated with higher sediment and prey concentrations). Thus, valid expressions of human health criteria can in theory be made for various environmental compartments (water, organisms, sediments). The Agency's choice of the water column for expressing

human health criteria largely reflects the need to use chemical criteria for determining acceptable chemical loadings to the water column and because more advanced implementation procedures are available for relating water column concentrations to chemical loadings, as compared to other compartments such as sediments and fish tissue.

3. In response to the comment concerning fish consumption, EPA disagrees with the comment regarding the consumption rate. For additional discussion of this issue, refer to the response to CTR-002-002a concerning fish consumption.

4. EPA disagrees with the comment that because lipid content in finfish is generally higher on a whole body basis compared to edible portions (e.g., fillet), the use of whole-body BCFs to calculate EPA's ambient water quality criteria significantly overestimates the concentration of the chemical in the edible portion of the fish and by implication is overly conservative. EPA disagrees with this comment because for lipophilic compounds such as PAHs, each BCF used in calculation of a human health ambient water quality criterion is first normalized to the lipid content of the tissue in which the residue was measured (45 FR 79346-79348). For example, BCFs determined from whole body residues are adjusted for the lipid content measured in the whole body, and BCFs determined from fish fillet residues are adjusted for the lipid content measured in the fish fillet. EPA performs this lipid normalization because it is widely recognized that accumulation of lipophilic chemicals is generally proportional to lipid content (Mackay 1982; Connolly and Pederson, 1988; Thomann, 1989) and this adjustment makes BCFs determined for different tissues and species comparable. Because of this proportionality with lipid content, steady-state BCFs for lipophilic compounds can be extrapolated from one tissue to another so long as they are expressed on a percent lipid basis. Once the average of the individual lipid normalized, BCFs are determined, this average, lipid normalized BCF is then adjusted to reflect the lipid content in the edible portions of aquatic organisms consumed by humans, which is 3.0% based on the EPA's 1980 Human Health Water Quality Criteria Methodology (45 FR 79318). In this way, the final BCF used to determine the human health water quality criterion reflects the chemical accumulation expected in the edible portions of consumed aquatic organisms. EPA further notes that for non-lipophilic compounds such as metals where lipid normalization does not apply, BCFs determined from only the edible portions are used in criteria calculations, per EPA's 1980 methodology.

References:

Connolly, J. and C. Pedersen. 1988. A Thermodynamic-based Evaluation of Organic Chemical Accumulation in Aquatic Organisms. Environ. Sci. Technol. 22: 99-103.

Mackay, D. 1982. Correlation of Bioconcentration Factors. Environ. Sci. Technol. 16: 274-278.

Thomann, R.V. 1989. Bioaccumulation Model of Organic Chemical Distribution in Aquatic Food Chains. Environ. Sci. Technol. 23: 699-707.

5. In response to the comment that EPA's BCFs for PAHs are oversimplified and overly conservative because BCFs have been shown to vary widely depending on fish species and therefore, BCFs should only be used from organisms consumed by recreational fishers in California, EPA disagrees. EPA agrees that BCFs from specific organisms caught and consumed in California, if available and appropriately weighted by consumption data, would allow for derivation of BCFs that would be most tailored to the California situation. However, EPA believes that the use of BCFs in its 304(a) criteria are still appropriate to California because they were selected and derived to reflect accumulation in aquatic organisms consumed throughout the United States, including those consumed in California. While EPA agrees that BCFs can vary depending on the species due to a variety of factors (e.g., lipid content of the

organism, differences in chemical metabolism, bioavailability differences, duration of exposure), EPA has taken a number of steps in its determination of BCFs for its 304(a) criteria to limit this variability. For example, EPA in its 1980 criteria guidance recommends that individual BCFs be adjusted for lipid content and be based on steady-state conditions (typically > 28 days) in order to reduce variability in BCF estimates. Furthermore, in its calculation of human health criteria, the final BCF used is adjusted for the consumption-weighted lipid content based on the variety of aquatic organisms consumed throughout the United States. In its more recent Great Lakes Water Quality Initiative guidance (60 FR 15366) and in its proposed national human health criteria guidance (63 FR 43,756), EPA also recommends BAFs and BCFs also be adjusted based on the freely dissolved fraction of the contaminant in water and be determined separately for organisms of different trophic levels as further means for reducing variability. However, until EPA's national methodology for deriving human health water quality has undergone scientific peer review and is made final, the human health criteria for PAHs in the final CTR represent the most recent 304(a) criteria available and are based on the most current national human health criteria methodology. With respect to BCFs for PAHs, EPA used a bioconcentration factor of 30 for mosquito fish from Lu et al. (1977) which was measured from a 33-day exposure in a model aquatic ecosystem environment. EPA believes that this value is appropriate because it is believed to more closely approximate steady-state conditions compared to other, more variable BCF values which were based on much shorter exposure periods (e.g., 3-days) and because it accounts for the effects of metabolism which is known to be important for PAHs.

6. In response to the comment that the BCF neglects potential uptake from sediments for PAHs into benthic organisms and subsequent ingestion by higher organisms, EPA agrees that in general, standard laboratory-based BCFs involving water-only exposures ignore the potential uptake of contaminants from sediment-dwelling organisms (and other prey species). For some chemicals (e.g., high log Kow chemicals that are not readily metabolized), omission of exposure via the aquatic food web can underestimate exposure and bioaccumulation. For this and other reasons, EPA relies on bioaccumulation factors (BAFs), which incorporate multiple routes of exposure, for determining human health water quality criteria under the Great Lakes Water Quality Initiative Guidance (60 FR 15366). EPA is also in the process of adopting this general BAF approach in its proposed revisions to its 1980 National guidance for determining human health water quality criteria (63 FR 43,756). However, because the Great Lakes BAFs rely on a number of considerations and assumptions that are specific to the Great Lakes (i.e., lipid content of aquatic species consumed in the Great Lakes region, freely dissolved fraction in the Great Lakes, food chain multipliers specific to the Great Lakes ecosystem), they cannot be directly applied to national 304(a) criteria or other areas without adjustment and significant additional analyses to develop appropriate BAFs. As stated earlier, EPA is in the process of updating its national methodology which is undergoing scientific peer review and is developing national, default BAFs. Until such time as EPA revises its national methodology, the human health criteria for PAHs in the CTR represent the most recent 304(a) criteria available and are based on the most current national methodology.

With respect to EPA's PAH criteria, EPA used a bioconcentration factor of 30 for mosquito fish from Lu et al. (1977). This BCF was measured from a 33-day exposure period in a model aquatic ecosystem environment using a model food chain that included benthic organisms. Therefore, while the model ecosystem used by Lu et al (1977) may not completely replicate the exposure conditions of typical field situations, EPA believes that it does not ignore potential exposure via benthic organisms and disagrees with the comment.

7. In response to the comment that DOM (dissolved organic matter) may exhibit a significant effect on the BCF for PAHs, EPA agrees with the commenter that DOM (what EPA calls dissolved organic carbon or DOC) can influence the freely dissolved fraction of PAHs and other nonpolar organic chemicals. As stated above, EPA agrees that the freely dissolved fraction of PAHs is the most bioavailable fraction for

uptake by aquatic organisms. However, EPA believes that it would be premature to place in the final rule a criterion that is based on bioaccumulation factors normalized to the freely dissolved fraction in water because EPA has not yet completed peer review of its proposed national methodology for taking this approach. Until EPA completes the peer review of its national methodology for development of bioaccumulation factors, EPA believes it is most appropriate to base the criterion on the BCF, as is consistent with the NTR and EPA's current national recommended section 304(a) criteria.

Although EPA based its bioaccumulation factors (BAFs) on the freely dissolved fraction for the Great Lakes Water Quality Initiative (GLWQI) rulemaking, EPA did not have sufficient time to adapt the GLWQI methodology in order to develop National or California-specific BAF estimates for the human health criteria being promulgated, and also have these modifications peer reviewed. After the peer review process on the revised national methodology is complete, EPA plans to update its National 304(a) criteria on a periodic basis. As National 304(a) criteria are updated, EPA will evaluate the need to promulgate revisions to the CTR. Thus, given that California is the only state with no numeric human health criterion in place for PAHs, and given that EPA has not completed a national methodology for developing BAFs on a freely dissolved basis, EPA believes it is most appropriate to promulgate the PAH criterion using the BCF that is consistent with the NTR and its most current national 304(a) recommendations.

With respect to the BCF used to derive the PAH criteria, EPA's BCF was derived from a study by Lu et al. (1977) which was measured in a model aquatic ecosystem environment containing multiple species at different trophic levels (e.g., algae, zooplankton, mosquito larvae, fish). Therefore, it is likely that some organic carbon was present in the study and that some sorption of the PAH compound (benzo-alpha-pyrene) onto dissolved and particulate carbon occurred thereby reducing the bioavailability of some portion of the PAH compound present. Further, since sufficient information is not presented in the Lu et al. study to estimate the freely dissolved fraction of the PAH compound, EPA cannot determine the extent to which the freely dissolved fraction associated with the Lu et al. (1977) study would be systematically higher or lower than sites in California to which the criteria would apply.

8. In response to the comment EPA's PAH criteria are overly simplified and overestimates exposure because metabolism of PAHs and other factors indicate that some PAHs do not bioaccumulate extensively in fish, EPA disagrees. EPA agrees that some PAHs are known to metabolize rapidly in fish which results in much lower residues than would be predicted by the octanol-water coefficient (Kow). For this very reason, EPA chose not to rely on Kow-based estimates of bioconcentration for deriving the proposed human health water quality criteria for PAHs. Instead, EPA based the proposed criterion for PAHs on a bioconcentration factor of 30 determined for mosquito fish from Lu et al. (1977). This BCF was measured from a 33-day exposure in a model aquatic ecosystem environment and incorporates the effects of metabolism by organisms at various trophic levels. Thus, EPA believes that its BCF is appropriate for PAHs and is not overly conservative because it takes into account the effects of metabolism.

9. Another comment was made that EPA's BCF for PAH is oversimplified and overestimates exposure because: (1) a wide range of BCFs exists for high molecular weight PAHs, (2) different methods are used to determine BCFs, (3) BCFs are used from exposure durations that are too short, (4) use of field BCF studies only assumes that water is the exposure source, (5) BCF studies involve high exposure concentrations. While EPA agrees that BCFs can vary depending on the species due to a variety of factors (e.g., lipid content of organism, differences in chemical metabolism, bioavailability differences, duration of exposure), EPA has taken a number of steps in its determination of BCFs for its 304(a) criteria to limit this variability and disagrees with this comment. For example, EPA in its 1980 criteria guidance recommends that individual BCFs be adjusted for lipid content and be based on steady-state

conditions (typically > 28 days) in order to reduce variability in BCF estimates. Furthermore, in its calculation of human health criteria, the final BCF used is adjusted for the consumption-weighted lipid content based on the variety of aquatic organisms consumed throughout the United States. EPA also recommends that exposure concentrations be below levels that are cause overt toxicity to the test organisms. In its more recent Great Lakes Water Quality Initiative guidance (60 FR 15366) and in its proposed national human health criteria guidance (63 FR 43,756), EPA also recommends BCFs and bioaccumulation factors (BAFs) also be adjusted based on the freely dissolved fraction of the contaminant in water and be determined separately for organisms of different trophic levels as further means for reducing variability. However, until EPA's national methodology for deriving human health water quality has undergone scientific peer review and is made final, the human health criteria for PAHs in the CTR represent the most recent 304(a) criteria available and are based on the most current national human health criteria methodology. Therefore, EPA believes BCFs derived using its existing 1980 national methodology and BAFs resulting from its forthcoming revised national methodology are not oversimplified and do not result in overly conservative estimates of chemical accumulation.

With respect to BCFs for PAHs, EPA used a bioconcentration factor of 30 for mosquito fish from Lu et al. (1977) which was measured from a 33-day exposure period in a model aquatic ecosystem environment. This value was chosen for the BCF because it is believed to more closely approximate steady-state conditions compared to other, more variable BCF values which were based on much shorter exposure periods (e.g., 3-days) and accounts for the effects of metabolism which is known to be important for PAHs. Therefore, EPA disagrees that this BCF is oversimplified or results in an overestimation of PAH accumulation.

EPA disagrees that BCFs based on field data are inappropriate because they assume that chemical exposure result from only from water. On the contrary, such field-measured BCFs (now called BAFs) reflect uptake from multiple exposure routes (water, diet, sediment) but merely reference the accumulation to the water concentration. EPA believes that expressing human health criteria in terms of concentrations in the water column concentrations is valid because environmental compartments in aquatic ecosystems (water, organisms, sediments) are all interconnected and therefore, concentrations of contaminants within these compartments are continuously being exchanged as a result of ongoing and competing chemical and biological partitioning processes. At equilibrium, contaminant concentrations within these environmental compartments are expected to be closely correlated, which is consistent with chemical equilibrium partitioning theory (i.e., higher water column concentrations would be correlated with higher sediment and prey concentrations). Thus, valid expressions of human health criteria can in theory be made for various environmental compartments (water, organisms, sediments). The Agency's choice of the water column for expressing human health criteria largely reflects the need to use chemical criteria for determining acceptable chemical loadings to the water column and because more advanced implementation procedures are available for relating water column concentrations to chemical loadings, as compared to other compartments such as sediments and fish tissue.

10. Regarding the comment that BAFs should be used for further bioaccumulation evaluations in water quality criteria documents with particular reference to PAHs, EPA agrees. As discussed previously, EPA is in the process of revising its national human health methodology and has proposed a methodology that would develop water quality criteria for PAHs that are based on BAFs (see 63 Fed. Reg. 43,756-43828; August 14, 1998, specifically pp. 43806-43823). However, this methodology has not been finalized and is currently undergoing external scientific peer review. EPA believes that scientific peer review is essential to maintaining the scientific defensibility of its water quality criteria. When this methodology is made final, EPA will develop revised 304(a) criteria for chemicals, including PAHs, that are based on BAFs rather than BCFs. EPA notes that with respect to the BCF used in deriving the proposed PAH criteria, this BCF was similar to a BAF because it was measured in a model aquatic ecosystem

environment that contained organisms at different trophic levels.

11. The proposed PAH water quality standards for California are part of a Clean Water Act (CWA) Section 303promulgation that EPA has undertaken. For this promulgation, EPA utilizes published IRIS cancer slope factors and utilizes published guidance documents and adopted Agency policies. As such, the commenter is correct that EPA does not have an established policy on assigning cancer potencies based on TEFs to the various PAH chemicals. However, the State of California can endeavor to establish subsequent standards based on their own current policy. EPA would most likely approve such a decision during the Agency's triennial review of State standards, as long as the standard was scientifically defensible and was consistent with CWA requirements.

12. EPA agrees with the commenter that probabilistic approaches can be a viable option for addressing uncertainty and variability in the development of ambient human health water quality criteria, provided sufficient data are available from which to estimate statistical properties of input distributions (e.g., mean, standard deviation, type of distribution) and the methods are scientifically defensible. However, in many situations, insufficient data are available to estimate the necessary statistical properties of input distributions with sufficient confidence to provide meaningful results. Furthermore, it is highly unlikely that scientifically defensible input distributions could be used for all input parameters for all criteria in the CTR. It should be noted that EPA's criteria methodology does not preclude States and Tribes from using probabilistic approaches for criteria determinations, provided such approaches produce criteria which are scientifically defensible and achieve an appropriate level of protection. However, EPA does not consider the use of probabilistic modeling approach to be a prerequisite for deriving scientifically defensible criteria. EPA has demonstrated and continues to believe that scientifically defensible water quality criteria can be produced based on point estimates of toxicity and exposure parameters provided the estimates are based on reasonable and appropriate assumptions (i.e., worst case assumptions for all input parameters would probably not be reasonable because they would probably correspond to a highly unlikely or nonexistent risk scenario). EPA's criteria are not based on worst case assumptions but rather are based on assumptions that reflect different levels of conservatism depending on the input parameter. Together, these input parameters result in criteria that the Agency believes achieves an appropriate level of protection for its national 304(a) criteria and are appropriate for promulgation in California.

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Comment: II. Use of New Scientific Information

The City acknowledges and supports EPA's update of several water quality criteria including those for mercury, cadmium and arsenic. While a number of criteria were updated to reflect current scientific information, there are a few notable exceptions.

The following briefly addresses the key updates and omissions that should be addressed in the final publication of this rule.

7. Adoption of More Stringent Requirements for Maximum Containment Levels ("MCLs") is Inappropriate

A number of the water quality-based criteria establish water ingestion-related requirements more stringent than tap water criteria. This leads to the anomalous result that ingestion of effluent is regulated more stringently than ingestion of tap water. An example of this problem is bromodichloromethane ("BDCM") and dibromochloromethane ("DBCM") which are two types of halomethanes formed by chlorination of effluents. EPA studies recognize that tap water contains higher levels of these constituents, but their presence is tolerated due to the beneficial effects of chlorine on killing bacteria. The CTR would regulate these pollutants in surface waters at one-tenth the level present in tap water.

EPA policies recognize that this is not a reasonable result and that application of the MCL should be considered protective in such instances (see, 62 Fed. Reg. 27709). Consistent with recent EPA action to delete the arsenic criteria from the CTR the Agency should delete the water ingestion-related requirements for BDCM and DBCM. Such action is even more appropriate for these pollutants as they are volatile and very shortlived in the environment. Thus, the discharge of these pollutants by publicly owned treatment works presents no actual threat of drinking water contamination.

Response to: CTR-020-018

EPA disagrees with commenter. EPA believes that discharges can meet both the requirements of the Safe Drinking Water Act (SDWA) and the Clean Water Act (CWA) after the CTR is promulgated. EPA believes that any final limits for THMs would be feasible to meet because it is unlikely that a discharger would receive criteria end-of-pipe limits due to the dilution in the receiving stream, as well as other factors taken into account, when translating a criterion into a water quality criteria-based effluent limit. EPA acknowledges that water quality criteria may be more stringent than drinking water MCLs and believes that this is appropriate (refer to response on this same issue in CTR-025-002a and

CTR-025-003a). Under the CWA, water quality criteria are required to protect the designated use, without respect to economic factors. Under the SDWA, EPA may take into account cost or availability of treatment technology in setting an MCL. As expressed by the commenter, the presence of the two trihalomethanes mentioned is a matter of balancing the potential for chemical risk associated with the formation of these chlorine byproducts and the beneficial effects of chlorine reducing microbial risk. Although EPA has stated that MCLs may be considered protective in the absence of water quality criteria, the Agency recommends the development of water quality criteria since the methodology specifically accounts for fish ingestion route exposure. Because water quality criteria take into account exposure to fish as well as water, they may be more stringent. Other factors that may also account for stringency differences are discussed in the response to CTR-025-002a. Concerning volatility, EPA does not disregard chemicals simply because they are volatile. Many chemicals may be somewhat volatile or short-lived, but may present health risks due to the frequency of discharge, biomagnification, or other factors.

Comment ID: CTR-025-003c
Comment Author: Metro. Water Dist. of So. Cal.
Document Type: Water District
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: C-12a THMs Human Health
References:
Attachments? Y
CROSS REFERENCES C-17a
C-16

Comment: Human health water quality criteria for a number of other priority pollutants are at levels significantly below the corresponding California SDWA MCL. While Metropolitan favors a margin of safety between human health-water quality criteria and the SDWA MCL, significant differences between these two regulatory requirements can create problems in the course of maintenance of drinking water facilities.

For example, water utilities need to periodically "de-water" their lines as part of routine maintenance. The de-watering of distribution lines transporting treating drinking water results in discharges containing trihalomethanes (THMs). The CTR proposes human health criteria for each of the four compounds comprising the THM classification. The total limit under the CTR for THMs as a group is 11 ug/L, sigficantly below the California SDWA MCL of 100 ug/L as well as the proposed level of 80 ug/L for Stage 1 of the Disinfection/Disinfectant By-Products Rule. Thus, the discharge of water that meets California SDWA standards could potentially violate CTR human health criteria if that water is discharged to a source of drinking water supply. Metropolitan requests that EPA establish CTR human health criteria for THMs consistent with the California SDWA MCLs for THMS.

Response to: CTR-025-003c

EPA acknowledges that water quality criteria may be more stringent than drinking water MCLs and believes that this is appropriate (refer to response on this same issue in CTR-025-002a and CTR-025-003a).

Comment ID: CTR-059-008
Comment Author: Los Angeles County Sanit. Dist
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: C-12a THMs Human Health
References: Letter CTR-059 incorporates by reference letter CTR-035
Attachments? Y
CROSS REFERENCES

Comment: Due to the time constraints of the comment period, we have focused our review and comments primarily on those criteria that we anticipate may cause compliance issues for one or more of the Sanitation Districts' WRPs (see below). Based on our initial review of the proposed rule, the Sanitation Districts recommend that adoption of some of the criteria be deferred. As explained in the attached comments, we believe that there are significant scientific issues regarding the human health criteria for several trihalomethanes that call into question the accuracy and appropriateness of the proposed criteria. In addition, we reconunend that EPA defer adoption of those criteria that are below detection limits and that have not been demonstrated to be adversely affecting water quality or the attaimnent of designated uses on a water body-specific basis in California. In addition, we recommend that EPA not adopt criteria for effluent dependent waters, unless they have been adjusted to reflect the characteristics of this type of water body.

Trihalomethanes Human Health Criteria

EPA has proposed human health criteria for consumption of water and organisms for four of the Trihalomethanes (THMs): bromofom (4.3 ug/L), Chlorodibromomethane (0.41 ug/L), Chloroform (5.7 ug/L), and Dichlorobromomethane (0.56 ug/L). We have a number of concerns about these criteria and recommend that EPA defer the adoption of these criteria or consider utilizing either the current or proposed drinking water standards in lieu of the proposed criteria.

First we can find no basis for the Bioconcentration Factor (BCF) fisted in the CTR Administrative Record Matrix (ARM), or in any of EPA's supporting documentation for the CTF, The ARM lists the BCF for chloroform as 3.75; the other three compounds have been assigned the sarne BCF "based on chloroform." We have been unable to determine the origins of the 3.75 BCF. The Administrative Record Matrix refers back to the 1980 Water Quality Criteria Document (WQCD).(*4) On page C-39 of the WQCD, EPA notes that

"Approximately 1 percent of the chloroform exposure results from the consumption of aquatic organisms which exhibit an average bioconcentration potential of 3.75-fold. The remaining 99 percent of chloroform exposure results from drinking water."

No further reference is provided for the derivation of the 3.75 bioconcentration factor.

Second, we do not believe that the four THMs bioaccumulate in fish tissue, EPA has established a policy for setting hunan health criteria in the Great Lakes Initiative whereby chemicals with half-lives less than eight weeks in water columns, sediments or biota are not bioaccumulative chemicals of concern (BCCs). Literature on chloroform indicates that it is non-persistent in water, with a half-life of less than two

days.(*5) Based on this finding, chloroform should not be considered as a BCC. This conclusion is supported by other information in the literature which shows that the THMs do not bioaccumulate in fish.(*6)(*7)(*8) Thus, the BCF of 3.75 used by EPA in calculating criteria for these four THMs is not a documented nor reasonable assumption for calculating human health criteria.

Third, similar to the situation with arsenic, EPA has different human health values for drinking water and for ambient water. The current drinking water MCL for the THMs is 100 ug/L with a proposed MCL of 80 ug/L. The proposed MCL was recently endorsed by EPA's Microbial/Disinfection By-Products Federal Advisory Committee as part of an Agreement in Principle, and will form the basis for the 1998 Enhanced Surface Water Treatment Rule. We believe that the application of the CTR criteria is inappropriate and potentially wasteful of the status resources if it causes POTWs to invest in treatment merely for treatment's sake. Thus, we recommend that EPA defer the adoption of these criteria or consider utilizing either the existing or proposed MCL in setting the human health criteria for the THMs in the CTR.

(*4) U.S. Environmental Protection Agency, Ambient Water Quality Criteria for Chloroform (EPA 440/5-80-033, October 1980).

(*5) Information obtained from University of Virginia, Office of Recycling and Environmental Information.

(*6) Oliver, B.G. and A.J. Niimi. "Bioconcentration Factors of Some Halogenated Organics for Rainbow Trout: Limitations in Their Use for Prediction of Environmental Residues." Environ. Sci Technol. 1985, 19,842-849.

(*7) Young, D.R., R.W. Gossett, R.B. Baird, D.A. Brown, P.A. Taylor and M.J. Miille. "Wastewater Inputs and Marine Bioaccumulation of Priority Pollutant Organics Off Southern California." Chapter 60 In Water Chlorination Environmental Impact and Health Effects. Ann Arbor Science Publishers, Inc., Ann Arbor Michigan, 1983.

(*8) Scott, G.I. "Physiological Effects of Chlorine-Produced Oxidants, Dechlorinated Effluents and Trihalomethanes on Marine Invertebrates." Chapter 57 In Water Chlorination Environmental Impact and Health Effects. Ann Arbor Science Publishers, Inc., Ann Arbor Michigan, 1983.

Response to: CTR-059-008

EPA acknowledges that water quality criteria may be more stringent than drinking water MCLs and believes that this is appropriate (refer to responses on this same issue in CTR-025-002a and CTR-025-003a). See also response to CTR-020-018. Regarding detection limit issues, refer to the response on effluent-dependent waters in CTR-034-007 and CTR 036-009.

The commenter is incorrect regarding the lack of documentation on the BCF for chloroform. The basis of the value of 3.75 is explained in the very document that the commenter claims it is lacking from. Using a documented BCF of 6 and an average lipid content of 4.8 percent from bluegills, EPA used a lipid adjustment factor based on the weighted average lipid percentage of 3 for the same freshwater and estuarine species that represent the fish consumption rate of 6.5 gm/day. Refer to text in EPA 440/5-80-033, October 1980, pp. C-3 and C-4).

However, EPA has decided to reserve the numeric criteria for chloroform in the final rule. EPA is

revisiting the cancer risk assessment for chloroform (see section G.6. of the preamble).

Comment ID: CTR-089-004
Comment Author: Las Virgenes Mncpl Water Dist.
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/24/97
Subject Matter Code: C-12a THMs Human Health
References:
Attachments? N
CROSS REFERENCES

Comment: While the draft regulations demonstrate clear progress on these and other issues, there remain some unresolved problems that could compromise our ability to serve our customers. We offer these comments in the hope of minimizing those potential impacts.

Disinfection By-Products

Sanitation utilities may not be able to meet the proposed criteria for trihalomethanes (chloroform, dichlorobromomethane, chlorodibromomethane), which appear to be more stringent than those adopted for drinking water standards. Some consideration should be given to dischargers who must, by law, disinfect their effluent discharges, as the most widely-used disinfection method (oxidation by chlorine) unavoidably produces trihalomethanes. In addition, chlorine is an integral treatment process additive for control of filamentous algae in our activated sludge process and for operational control of our tertiary filtration process -- we simply must use this chemical to optimize process performance.

The proposed criteria imply a potentially enormous investment in alternative disinfection methods, or equally-expensive post-disinfection removal using carbon adsorption or air-stripping towers. Our preliminary estimate is that compliance with the proposed criteria for trihalomethanes would cost our served communities over $650,000 per year. Furthermore, the benefits of these expenditures are unclear, since neither drinking water supplies nor consumptive uses such as fishing are important uses of the receiving,waters.

Response to: CTR-089-004

EPA acknowledges that water quality criteria may be more stringent than drinking water MCLs and believes that this is appropriate (refer to response on this same issue in CTR-025-002a and CTR-025-003a). See also response to CTR-020-018.

Comment ID: CTR-090-022
Comment Author: C&C of SF, Public Utl. Commis.
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-12a THMs Human Health

References: Letter CTR-090 incorporates by reference letters CTR-035 and CTR-054
Attachments? Y
CROSS REFERENCES

Comment: Trihalomethanes (THM) - The current California Department of Health services criterion for Total THMs, is 100ug/L to be reduced to 80 ug/L in 1998. Chloroform is the dominant THM in drinking water and is a disinfection byproduct and is typically found in drinking water in the range of 34-45 ug/l. The proposed value under the CTR is 5.7 ug/L, which is two orders of magnitude below the chronic toxicity criterion and one order of magnitude below the California DHS standard for drinking water promulgated under the auspices of the Safe Drinking Water Act. Such a restrictive criterion will inhibit municipal water supply agencies in operation and maintenance of their water supply system. EPA needs to explain the rationale for such a restrictive criterion for THM.

Response to: CTR-090-022

EPA acknowledges that water quality criteria may be more stringent than drinking water MCLs and believes that this is appropriate (refer to response on this same issue in CTR-025-002a and CTR-025-003a). See also response to CTR-020-018. However, EPA has decided to reserve the numeric criteria for chloroform in the final rule. EPA is revisiting the cancer risk assessment for chloroform (see section G.6. of the preamble).

Subject Matter Code: C-13 Risk Level

Comment ID: CTR-003-003
Comment Author: City of Riverside
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/22/97
Subject Matter Code: C-13 Risk Level
References:
Attachments? N
CROSS REFERENCES

Comment: 3) We do not agree with the use of the 10'-6 risk level proposed here. As is noted in the proposed rule, a significant uncertainty factor ranging from 10 to 10,000 is used to set human health criteria. We can understand the use of these factors but the public should understand that they may be paying to protect to the 10'-10 or one in ten billion risk level. We suggest that the risk level used be tied to the certainty of risk. For example, where uncertainty factors range from 1 - 10, use 10E-6; 11 - 100, 10E-5 101 - 10,000, 10E-4 risk level. Another option would be to promulgate a range from which the permit writer may choose depending on the site specific nature of the waters and the needs of the effected individuals. At a minimum the EPA should promulgate at a factor of 10E-5 and allow the regional boards to set more stringent criteria if warranted. We all need to keep in mind that lower limits mean higher costs and higher costs here mean fewer resources available elsewhere. Even with the best of intentions, we may be sacrificing hundreds in an attempt to save one. For example, an increase in sewer rates reduces the discretionary money normally used for the purchase of food and medical services with potentially significant impacts on the poor.

Response to: CTR-003-003

See also response to Comment CTR-058-001.

The comment author suggests that the rule provide variable risk levels dependent on the uncertainty factor used in calculating national criteria guidance. It is suggested that higher risk levels be allowed for parameters having criteria based on a higher uncertainty factor. This suggestion runs counter to EPA policy that greater protection be provided when uncertainty concerning the adequacy of protection is greatest.

This author also suggests giving individual permit writers the authority/responsibility to choose the risk level on a site specific basis for each permit. This approach, along with the above suggestion, would result in risk levels that vary both on a parameter specific basis and a site specific basis. This approach may result in selective inadequate protection for highly exposed populations and even for the general population. EPA would support, in this case, an approach that includes scientifically valid site-specific criteria.

If the State has a scientific basis, and wants to adopt more or less protective site-specific criteria, it is within the State's discretion to do so (See response to CTR-058-001), but this rule is a reasonable attempt to protect all of California's waters.

EPA cannot respond specifically to the author's assertion of higher costs for sewer ratepayers because it

is provided without supporting evidence. EPA's Economic Analysis indicates that a change in the risk level from 10-5 to 10-6 would cause only a negligible increase in compliance costs for the State as a whole based on a sample of California facilities (Economic Analysis of the California Toxics Rule, P. A-2). Due to limited resources, EPA was not able to estimate potential costs for every facility in the State. In any case, water quality criteria must be based on that which is necessary to protect human health and the environment and must be scientifically based. Under, the Clean Water Act, this requirement overrides consideration of economic impacts.

Comment ID: CTR-005-007
Comment Author: Novato Sanitary District
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/23/97
Subject Matter Code: C-13 Risk Level
References:
Attachments? Y
CROSS REFERENCES

Comment: 6. Human health criteria for carcinogens should be adopted at a 10E-5 risk level. Based on the analyses performed by other Bay Area POT\ft, the District is concerned that organics monitoring of its effluent will identify human health criteria that cannot be achieved without dilution well beyond 1 0: 1 (e.g., aldrin, PAHS, heptachlor). At a 10E-6 risk level, the District would be forced to add activated carbon at a significant cost or possibly go to land disposal at an enormous cost. The benefits would be nil because the District is such a small contributor to the Bay and generally, according to the results of the Regional Monitoring Program, these criteria are not exceeded in the Bay.

Response to: CTR-005-007

EPA disagrees with this comment.

The comment author suggests that the rule should provide for a higher allowable risk level because monitoring indicates that current effluent concentration for certain pollutants exceed the levels provided at a risk level of 10-6 leading to enormous treatment/disposal costs. In the first place, the comment author has not provided specific data or evidence that shows any additional treatment will be needed. Secondly, EPA cannot justify reducingprotection to California's population across the State based on an assertion of a need for additional treatment and consequent added costs. Other federal and State processes such as site-specific criteria that lessen the need for pollutant removal and TMDLs that shift the need for pollutant load removal to other sources of that pollutant may be scientifically justified and could facilitate moving toward less costly treatment alternatives, should additional treatment be indicated; however, it is essential that beneficial uses remain fully protected.

In addition, the commentor notes that the criteria are not exceeded in the Bay. The State permit authority must show that the discharge of organics have reasonable potential to cause or contribute to an exceedence of water quality criteria in order to establish effluent limits. If no reasonable potential is established, the facility will not incur any costs for the control of organics.

Comment ID: CTR-011-001a
Comment Author: City of Simi Valley
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/24/97
Subject Matter Code: C-13 Risk Level
References: Letter CTR-011 incorporates by reference letters CTR-027 and CTR-034
Attachments? Y
CROSS REFERENCES C-24
E-01d

Comment: The City of Simi Valley discharges approximately 10 million gallons per day (mgd) of tertiarytreated wastewater (as well as municipal storm water) to the Arroyo Simi, an effluent dependent water body. Through much of the year, Arroyo Simi is dry several miles downstream from the City. The Arroyo Simi Characterization Report, completed by the City in 1995, concluded that the arroyo does not support a significant fishery, and observed only arroyo chub, mosquito fish and blunt-nosed minnow in the stream. Although designated as a potential municipal water supply in the Basin Plan, the arroyo waters are not used for municipal purposes. Effluent monitoring are limited, but available data indicate that the City's discharge may have a reasonable potential to exceed the proposed aquatic life criteria for several metals and the proposed human health criteria for several carcinogens.

Since Simi Valley is largely a residential community with supporting commercial development and little industry, and since the City already has an effective pretreatment program, it is unlikely that pollution prevention efforts would effectively reduce the problematic constituents. More likely, the City would be faced with end-of-pipe treatment controls such as lime precipitation and carbon adsorption to achieve the proposed criteria. The costs would undoubtedly be significant and the benefits relatively minor.

Under these circumstances, it appears reasonable to adopt criteria for Arroyo Simi, and similar effluent dependent waters, that are reasonably achievable without costly end-of-pipe controls and that reflect the actual use of the water (i.e., generally such waters are used for fishing or drinking). One way to address this issue, consistent with the requirements of the Clean Water Act, would be to adopt specific human health criteria for Arroyo Simi and other effluent dependent streams based on a cancer risk coefficient of 10E-5 or in some cases 10E-4. Based on the limited data collected by the City, risk levels of 10E-4 would have to be adopted for dioxins, aldrin, alpha-BHC and 4,4,-DDD (see Table 1). Risk levels of 10E-5 would be sufficient for chloroform and endoslfan 11 (Id.).

Response to: CTR-011-001a

EPA disagrees with this comment.

See also responses to CTR-058-001 and CTR-005-007.

When EPA promulgates a rule, it follows national policy and what it understands to be the policy of the state in selecting a risk level for the general population. (See response to comment CTR-058-001) EPA would not use a higher general risk level for specific pollutants unless it had data showing that consumption of those pollutants is less than the general consumption levels EPA uses along with the general risk level of 10-6.

The commenter suggests determining criteria by assessing what the condition of the effluent is, without assuming application of what it deems as costly controls, by applying a different risk level for various pollutants for the same waterbody. In other words, the commenter proposed that site specific human health criteria be adopted for their receiving water based on individual pollutant effluent data. Site specific criteria are the prerogative of the State and are generically recognized in this rule; however, effluent data cannot serve as sufficient justification for criteria.

The State could remove a use designation pursuant to its own regulations as long as it is not an existing use. Justification for the use removal or replacement would need to be developed as provided for in 40 CFR Part 131. This action would require a Use Attainability Analysis and would need to assure that full protection of existing uses and other designated beneficial uses of the waterbody is provided.

EPA cannot respond specifically to the commentor's assertion that it would incur costs for end-of-pipe costs for sewer ratepayers because it is provided without supporting data. EPA's Economic Analysis indicates that a change in the risk level from 10-5 to 10-6 would cause only a negligible increase in compliance costs for the State as a whole based on a sampling of facilities (Economic Analysis of the California Toxics Rule, P. A-2). Due to limited resources, EPA was not able to estimate potential costs for every facility in the State. In any case, water quality criteria must be based on that which is necessary to protect human health and the environment and must be scientifically based. Under, the Clean Water Act, this requirement overrides consideration of economic impacts.

Comment ID: CTR-015-002
Comment Author: Eastern Municipal Water Dist.
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/23/97
Subject Matter Code: C-13 Risk Level
References:
Attachments? N
CROSS REFERENCES

Comment: Cancer Risk Level (FR p.42181, Preamble section E.3.f.)

The Agency requests comment on the adoption of a 10E-5 risk level for carcinogenic pollutants rather than a 10E-6 risk level. The Agency should be aware of an analysis conducted by the State Water Resources Control Board ("State Board") as part of the Functional Equivalent Document, or environmental impact review, for the Inland Surface Waters Plan in March, 1992. The analysis compared inland discharger's ability to attain objectives at both risk levels. Effluent data from 23 inland dischargers for the period of 1989 to 1991 were used. Thirty-nine constituents (mostly organic compounds) were examined. Although the State Board selected the 10E-6 level, differences in attainability were shown and described.

In the Agency's Economic Analysis of July, 1997 for this Rule, there was a comparison of costs between the two risk levels in Section 4. It is stated on p. 4-17 that there was a lack of data for organic pollutants and, for those facilities with data, most of these pollutants were found below detection limits. It is not certain, then, how many constituents were examined for the risk level economic analysis. Also, fewer dischargers were examined by the Agency than by the State Board in its previous studies. However, in

Section 10 (p. 10-2), it was concluded by the Agency that there were minimal cost differences between the two risk levels.

Obviously, the 10E-5 risk level would be more attainable and less costly than the 10E-6 risk level. It is probable, from our review so far, that the Agency has underestimated the cost differences. A more thorough cost/benefit analysis, i.e., a comparison done at a greater level of detail such as the State Board had done for attainability, is needed for the Agency's Rule before a risk level is suggested or adopted.

Response to: CTR-015-002

EPA disagrees with this comment.

See response to CTR-058-001.

In regard to the comment about the results of the economic analysis which compared the potential costs of a 10-5 and 10-6 risk level, EPA believes that its methodology is sound. EPA examined recent monitoring data for eachsample facility. The fact that some facilities have a lack of data or that many of the organic pollutants that were monitored were measured below the detection limit does not necessarily mean that these facilities would not be able to comply with WQBELs based on a 10-6 risk level Even if facilities expand monitoring efforts or if detection limits are improved, the commenter has provided no evidence that compliance costs would significantly increase. EPA included as many sample facilities it could to project statewide costs taking into account time and resource constraints.

Comment ID: CTR-021-005a
Comment Author: LeBoeuf, Lamb, Green & MacRae
Document Type: Local Government
State of Origin: CA
Represented Org: City of Sunnyvale
Document Date: 09/25/97
Subject Matter Code: C-13 Risk Level
References: Letter CTR-021 incorporates by reference letter CTR-035
Attachments? Y
CROSS REFERENCES C-28
E-01c
R
S

Comment: It is with a sense of reluctance that Sunnyvale joins in CASA/Tri-TAC's adverse comments ont eh CTR and teh EA, and Sunnyvale does so in a spirit of constructive criticism and with an expectation that the Agency will make the necessary adjustments in its approach towards the CTR before the final rule is promulgated. In addition, in the same spirit and with the same expectation, Sunnyvale would like to make the following points on its own behalf:

2. Obligation to Assess Alternative Cancer Risk Levels for Human Health-Based Criteria. Sunnyvale is gravely concerned that EPA has used the wrong approach in proposing to establish human health criteria for organic pollutants, particularly those pollutants for which the proposed criteria are below the method level of detection ("MDL"). Sunnyvale recommends that EPA should thoroughly assess all of the potential impacts, including costs and benefits, of the 10E-4 and 10E-5 risk levels before proposing the

human health-based criteria. As pointed out in the EOA Letter, there is a significant potential for advancing technology to lower the MDL for many pollutants to the point where laboratory equipment is able to measure some or all of the organic compounds for which EPA is proposing to establish criteria at the new level. It is intuitively obvious that the costs of attaining criteria set at the 10E-6 level will be significantly greater than attainment of a 10E-5 or 10E-4 level, particularly where, as pointed out in the EOA Letter, the only available method of treatment is granular activated carbon. Sunnyvale is concerned that the EA does not adequately address the potential for these costs, and, consequently, does not take these potential costs into account in determining whether to exercise its flexibility in choosing whether to use a 10-4 , 10-5 or 10-6 cancer risk level as the basis for its CTR promulgation.

EPA is required by Executive Order 12866, the Regulatory Flexibility Act and the Unfunded Mandates Reform Act to identify and analyze alternatives to a proposed rule. We cannot understand, therefore, why EPA has done such a cursory analysis in the preamble to the CTR and the EA of the alternatives to the use of the most stringent (10E-6) risk level for establishing criteria for human health effects of pollutants, particularly organic pollutants. EPA cannot base its selection of the 10E-6 level based upon previous regulatory pronouncements by the State of California. Any new determination by the State will be subject to the analytical requirements of Section 13241 of the Porter-Cologne Act and by review by the Office of Administrative Law. Thus, it is not a foregone conclusion that the State will ultimately select the 10E-6 level. EPA has its own legal requirements to fulfill. Accordingly, we ask that EPA not promulgate the final human health criteria for the pollutants of concern unless and until it has adequately analyzed the costs and other implications of the various alternatives to the 10E-6 level.

In conclusion, we are entirely supportive of many of EPA's inovative approaches towards development of the CTR, particularly as regards the toxic metals. However, we believe that EPA has needlessly failed to comply with many of its legal obligations, particularly as regards the development of human health-based criteria on cancer risk levels of organic pollutants. We urge the Agency to reconsider its position in the matters covered by this letter (as amplified by the EOA Letter) and the CASA/Tri-TAC letter. Sunnyvale pledges its continued participation in place-based watershed management planning in the South Bay, its cooperation with the Agency in making a success of the WPI, and to an ongoing effort by the Agency and others to reach water quality goals in the South Bay. We thank you for the opportunity to comment on the proposed CTR.

Response to: CTR-021-005a

EPA disagrees with this comment.

See response to Comment CTR-058-001 and CTR-011-001a.

In regard to the comment about the results of the economic analysis which compared the potential costs of a 10-5 and 10-6 risk level, EPA believes that its methodology is sound. The fact that many of the organic pollutants that were monitored were measured below the detection limit does not necessarily mean that these facilities would not be able to comply with WQBELs based on a 10-6 risk level. Even if detection limits are improved, compliance could not be determined until the results of using the new monitoring method was completed.

Comment ID: CTR-035-004
Comment Author: Tri-TAC/CASA
Document Type: Trade Org./Assoc.

State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-13 Risk Level
References:
Attachments? N
CROSS REFERENCES

Comment: [INDENT]- EPA should select human health criteria for carcinogens based on the 10E-5 or 10E-4 risk levels instead of the 10E-6 level. This approach would be consistent with other EPA regulatory actions such as the Great Lakes Initiative for which EPA used the 10E-5 risk level in setting the criteria, or the national drinking water program where maximum contaminant levels are commonly developed with a risk level of 10E-4 to 10E-5. Moreover, EPA should acknowledge that there is considerable uncertainty and variability in the risk assessment process. The criteria are calculated using a model that assumes low dose linearity. When using this kind of model, the calculation of risk to several significant figures at any given low dose gives the illusion of knowledge and precision that are not really there. Thus, the actual risk to the exposed population associated with a risk level of 10E-4 may be virtually indistinguishable from a risk level of 10E-6, yet the socioeconomic impacts associated with complying with criteria promulgated using the 10E-6 risk level can be significant. Thus, EPA should reconsider the risk level used in calculating criteria in the CTR and should select a lower risk level.

Response to: CTR-035-004

EPA disagrees with this comment.

See response to CTR-058-001.

The fact that maximum contaminant levels in the drinking water program are sometimes developed with a risk level in the range of 10-4 to 10-5 is not a factor in setting ambient water quality criteria. Under the Safe Drinking Water Act, MCLs are set taking best available technology into account, while under the Clean Water Act, water quality criteria are set solely based on human health or aquatic protection.

Comment ID: CTR-035-021
Comment Author: Tri-TAC/CASA
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-13 Risk Level
References:
Attachments? N
CROSS REFERENCES

Comment: pp. 42175-42176 -- Reference Doses (RfDs) For non-carcinogenic human health criteria, EPA divides a "no observed effect" dose in animal studies by an uncertainty factor, which ranges from 10 to 10,000 based on various factors such as whether the data are being extrapolated from animals to humans. In addition, a modifying factor greater than 0 and less than 1O is applied to reflect the professional judgment of toxicologists. The use of such large uncertainty factors indicates that there is a large margin

of safety in the criteria, and some flexibility in the application of these factors. We recommend that EPA consider using this flexibility, for instance, to develop criteria appropriate to effluent dependent waters. In many cases, little or no fish consumption occurs and no direct use of the water for drinking water supplies may occur in effluent dependent waters; therefore the risk of human exposure is small, and it would be appropriate to use lower uncertainty and modifying factors in promulgating criteria for these water bodies.

Response to: CTR-035-021

EPA disagrees with this comment.

See response to CTR-058-001.

The comment author recommends that EPA develop criteria appropriate to effluent dependent waters. In the CTR, EPA has applied criteria on the basis of State adopted beneficial uses. As the State has not used a beneficial use category that distinguishes effluent dependent waters, there are no waters to assign a separate set of criteria. The CTR does not preclude the State from developing a special beneficial use category for effluent dependent waters should it choose that course of action. (See EPA Region 9's Interim Final "Guidance for Modifying Water Quality Standards and Protecting Effluent-Dependent Ecosystems", June 17, 1992, for guidance.)

Comment ID: CTR-035-027
Comment Author: Tri-TAC/CASA
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-13 Risk Level
References:
Attachments? N
CROSS REFERENCES

Comment: p. 42181 -- Risk Factors for Carcinogens EPA has calculated the human health criteria for carcinogens in the proposed CTR using a 10E-6 risk level, but invites comment on whether the criteria for carcinogens should instead be calculated using a risk level of 10E-5. We recommend that EPA consider a range of risk levels between 10E-4 and 10E-6, which we understand to be consistent with EPA's policy of allowing States to use risk levels in the range of 10E-4 to 10E-6 when adopting criteria for carcinogenic priority pollutants in water quality standards (U.S., EPA, 1994b). We do not agree with EPA's proposition to adopt a 10E-6 risk level based upon previous regulatory decisions by the State. Any new determination by the State will be subject to the legal requirements of Section 13241 of the Porter-Cologne Act and by review by the Office of Administrative Law. Thus, it is not a foregone conclusion that the State will ultimately select the 10E-6 level. Moreover, EPA should acknowledge that there is considerable uncertainty and variability in the risk assessment process. The criteria are calculated using a model that assumes low dose linearity. When using this kind of model, the calculation of risk to several significant figures at any given low dose gives the illusion of knowledge and precision that are not really there. Thus, the actual risk to the exposed population associated with a risk level of 10E-4 may be virtually indistinguishable from a risk level of 10E-6, yet the socioeconomic impacts associated with complying with criteria promulgated using the 10E-6 risk level can be significant. EPA

should therefore revise its alternative analysis for the 10E-5 risk level evaluated for the cost analysis, and reassess its conclusions. We believe this re-analysis to be necessary for EPA to adequately comply with the requirements of Executive Order 12866, the Regulatory Flexibility Act and the Unfunded Mandates Reform Act to identify and analyze alternatives to a proposed rule.

Response to: CTR-035-027

EPA disagrees with this comment.

See response to CTR-058-001. In that response EPA explained that protection of the general population at the 10-6 risk level was necessary to assure that those segments of the California population that are more highly exposed are protected at a 10-4 risk level.

EPA is unable to respond to the generic comment that "...the actual risk to the exposed population associated with a risk level of 10E-4 may be virtually indistinguishable from a risk level of 10E-6,..." when using a linear cancer risk model. The commenter has provided no supporting evidence for this assertion.

Comment ID: CTR-040-015b
Comment Author: County of Sacramento Water Div
Document Type: Storm Water Auth.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-13 Risk Level
References: Letter CTR-040 incorporates by reference letter CTR-027
Attachments? Y
CROSS REFERENCES S

Comment: RECOMMENDED MODIFICATIONS

To address our concerns, we recommend the following modifications which do not undermine the toxic pollutant control actions envisioned in EPA's economic analysis (e.g., BMPs for stormwater and source control). In fact, some of these recommendations would provide incentives for greater movement toward achieving the water quality criteria than would occur under the Rule as it is currently proposed.

II. Recommendation: Adopt human health criteria for PAHs at a 10 (-4) risk level and human health criteria for other carcinogens at risk levels that are generally achieved by municipal wastewater and stormwater dischargers.

* As previously stated, the Sacramento Stormwater Management Program would have to expend on the order of $260 million per year to treat stormwater, and this may not achieve the proposed criteria for PAHS, which is based on a 10 (-6) cancer risk level.

* Under the Unfunded Mandates Reform Act, EPA must adopt the least cost alternative for complying with the CWA, unless the Administrator explains in the final rule why the least cost alternative is not adopted. As indicated in the Preamble, risk levels of 10 (-5) and 10 (-4) are acceptable under the CWA.

* Therefore, pursuant to the spirit of the Unfunded Mandates Reform Act, EPA should adopt the PAH criteria at a 10 (-4) risk level. The same should be true for other carcinogens that present attainability problems for dischargers. Most carcinogenic constituents are not readily controllable through source control or BMPs and would generally require end-of-pipe controls to achieve significant reduction. The benefits associated with additional reduction of carcinogenic constituents are not expected to be measurable since, as acknowledged in the economic analysis,point sources are relatively minor sources of these constituents.

Response to: CTR-040-015b

See responses to CTR-058-001 and 011-001a.

Concerning comments CTR-043-006b and CTR-044-007a, the statements that neither Old Alamo Creek nor Tule Canal are "heavily fished" is not relevant to the health issue, i.e., are the people who do fish highly exposed because they are high consumers? The commentors have not provided sufficient information to evaluate either question.

The comment that the carcinogens that are asserted to be compliance problems for these two dischargers are not identified in EPA's economic analysis as a significant contributor to baseline cancer risks for recreational anglers consuming freshwater fish in California may merely reflect a lack of information on these pollutants in sample locations that were selected for the benefits analysis. The fact that no baseline risks were found for the purposes of the analysis does not mean that the risk from these pollutants do not exist anywhere in California or should not be prevented.

Comment ID: CTR-043-006b
Comment Author: City of Vacaville
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: C-13 Risk Level
References:
Attachments? Y
CROSS REFERENCES C-24

Comment: 6. EPA should adopt separate, site-specific human health criteria for Old Alamo Creek based on a 10 (-4) risk level. As previously indicated the City would have to construct costly end-of-pipe controls to comply with the human health criteria for several carcinogens. The subject criteria are based on a cancer risk level of 10 (-6). These controls would not produce a commensurate environmental benefit. At a 10 (-4) risk level, the City's discharge would not cause an in-stream exceedance of these criteria. The City does not believe Old Alamo Creek is heavily fished and therefore criteria based on a 10 (-4) risk level would likely provide greater protection than indicated by the risk level. The City notes that none of these carcinogens were identified in EPA's economic analysis as a significant contributor to baseline cancer risks for recreational anglers consuming freshwater fish in California (see Exhibit 8-9 in EPA's economic analysis).

Response to: CTR-043-006b

See responses to CTR-058-001 and 011-001a.

Concerning comments CTR-043-006b and CTR-044-007a, the statements that neither Old Alamo Creek nor Tule Canal are "heavily fished" is not relevant to the health issue, i.e., are the people who do fish highly exposed because they are high consumers? The commentors have not provided sufficient information to evaluate either question.

The comment that the carcinogens that are asserted to be compliance problems for these two dischargers are not identified in EPA's economic analysis as a significant contributor to baseline cancer risks for recreational anglers consuming freshwater fish in California may merely reflect a lack of information on these pollutants in sample locations that were selected for the benefits analysis. The fact that no baseline risks were found for the purposes of the analysis does not mean that the risk from these pollutants do not exist anywhere in California or should not be prevented.

Comment ID: CTR-044-007a
Comment Author: City of Woodland
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: C-13 Risk Level
References:
Attachments? Y
CROSS REFERENCES C-24

Comment: We have reviewed the proposed CTR and offer the following comments:

6. EPA should adopt separate, site-specific human health criteria for Tule Canal based on a 10 (-4) risk level. Based on effluent sampling, the City would have to construct costly end-of-pipe controls to comply with criteria for aldrin (and perhaps other carcinogens) based on a 10 (-6) risk level. These controls would not produce a commensurate environmental benefit. At a 10 (-4) risk level, the City's discharge would not cause an in-stream exceedance of these criteria in Tule Canal. The City does not believe Tule Canal is heavily fished and therefore criteria based on a 10 (-4) risk level would likely provide greater protection than indicated by the risk level. The City notes that aldrin was not identified in EPA's economic analysis as a significant contributor to baseline cancer risks for recreational anglers consuming freshwater fish in California (see Exhibit 8-9 in EPA's economic analysis).

Response to: CTR-044-007a

See responses to CTR-058-001 and 011-001a.

Concerning comments CTR-043-006b and CTR-044-007a, the statements that neither Old Alamo Creek nor Tule Canal are "heavily fished" is not relevant to the health issue, i.e., are the people who do fish highly exposed because they are high consumers? The commentors have not provided sufficient information to evaluate either question.

The comment that the carcinogens that are asserted to be compliance problems for these two dischargers

are not identified in EPA's economic analysis as a significant contributor to baseline cancer risks for recreational anglers consuming freshwater fish in California may merely reflect a lack of information on these pollutants in sample locations that were selected for the benefits analysis. The fact that no baseline risks were found for the purposes of the analysis does not mean that the risk from these pollutants do not exist anywhere in California or should not be prevented.

Comment ID: CTR-049-003
Comment Author: Watereuse Assoc. of California
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 09/24/97
Subject Matter Code: C-13 Risk Level
References:
Attachments? N
CROSS REFERENCES

Comment: With respect to other criteria proposed for adoption in the draft CTR, we recommend that USEPA:

1 . Adopt human health criteria for carcinogens which are based on the 10E-5 or 10E-4 risk levels instead of the 10E-6 level. (Based on all the conservative assumptions included in the calculation of the criteria, there is significant uncertainty in the numbers, which may translate to negligible risk in using the lower risk levels. This draft CTR should factor in this uncertainty into the risk assessment along with population exposure when calculating risk and appropriate human health criteria);

Response to: CTR-049-003

EPA disagrees with this comment.

See response to CTR-058-001.

Comment ID: CTR-050-006
Comment Author: Sonnenschein Nath & Rosenthal
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org: American Petrol
Document Date: 09/26/97
Subject Matter Code: C-13 Risk Level
References:
Attachments? N
CROSS REFERENCES

Comment: III. The Acceptable Risk Level Should be greater than 10E-6.

EPA has proposed that the criteria for carcinogens should be based on an acceptable risk level of 10E-6.

However, the Agency has also, at the request of the State of California, requested comment on an alternative risk level of 1OE-5. (62 Fed. Reg. at 42181). The 10E-5 figure is recognized and utilized by EPA in various Clean Water Act guidance documents as well as in other Agency programs: Moreover, in the most comprehensive development and implementation of water quality standards that the Agency has ever conducted - the Great Lakes Initiative (GLI) -EPA used this risk level in setting the criteria. Also, every State in Region 5 has followed the EPA policy and used 10E-5 as the acceptable risk level in setting water quality standards as part of their GLI rules. EPA should continue that policy in this rulemaking.

Response to: CTR-050-006

EPA disagrees with this comment.

See response to CTR-058-001.

Comment ID: CTR-052-003a
Comment Author: East Bay Dischargers Authority
Document Type: Sewer Authority
State of Origin: SC
Represented Org:
Document Date: 09/26/97
Subject Matter Code: C-13 Risk Level
References: Letter CTR-052 incorporates by reference letters CTR-035 and CTR-054
Attachments? Y
CROSS REFERENCES E-01
E-02

Comment: However, the Authority is greatly disappointed that EPA chose not to follow the consensus recommendations for many of the most significant issues, including the methodology used for the EA and the choice of using the most conservative carcinogenicity factor for organic pollutants.

Response to: CTR-052-003a

EPA disagrees with this comment.

See response to CTR-058-001.

The risk level chosen for the CTR is not "the most conservative carcinogenicity factor for organic pollutants."

Comment ID: CTR-054-007
Comment Author: Bay Area Dischargers Assoc.
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-13 Risk Level

References:
Attachments? Y
CROSS REFERENCES

Comment: Human health criteria for carcinogens should be adopted at a 10 (-5) risk level at least for San Francisco Bay waters. BADA's attainability analyses shows that adoption of criteria for carcinogens based on a 10 (-6) risk level would result in significant costs without improving the present level of compliance in Bay waters. At a 10 (-6) risk level, two BADA agencies could be faced with adding carbon adsorption facilities at a total annual costs of $56 million per year (to achieve effluent limitations for aldrin, heptachlor and several PAHS). At a 10 (-5) risk level, carbon adsorption facilities would be unnecessary at these BADA agency plants. The cost savings would be significant, and the present high level of compliance would remain unchanged.

Response to: CTR-054-007

EPA disagrees with this comment.

See response to CTR-058-001.

Comment ID: CTR-055-001
Comment Author: USS-POSCO Industries
Document Type: Specific Industry
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: C-13 Risk Level
References:
Attachments? Y
CROSS REFERENCES

Comment: UPI requests the EPA use a Cancer Risk Level at 10E-5 (1 in 100,000) in the subject regulation.

The U.S. Environmental Protection Agency (EPA) and the State of California (State) have requested comment on the adoption of a 1OE-5 carcinogenic risk factor (page 42181) in lieu of the proposed 10E-6 factor. The EPA criteria documents for priority toxic pollutants do not recommend a specific carcinogenic risk factor, but rather a range of risk factors is recommended. The EPA is proposing a California rule that meets Clean Water Act (CWA) section 304(a) minimum. Since a 10E-5 carcinogenic risk factor meets CWA criteria as determined by the EPA, a 10E-5 carcinogenic risk factor is appropriate for the subject Section 131.38. The State should have the authority to use a 10E-5 carcinogenic level. The State needs the option of developing regulatory standards to protect the people and the environment in California in a manner which considers local conditions within the state.

For the above reasons, UPI requests the EPA promulgate a 10E-5 carcinogenic risk factor (1 in 100,000) in the subject regulation.

Response to: CTR-055-001

EPA disagrees with this comment.

See response to CTR-058-001.

Comment ID: CTR-056-012
Comment Author: East Bay Municipal Util. Dist.
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/22/97
Subject Matter Code: C-13 Risk Level
References: Letter CTR-056 incorporates by reference letter CTR-054
Attachments? N
CROSS REFERENCES

Comment: Third, regarding the criteria being proposed for adoption in the draft CTR, EBMUD recommends that EPA should:

* Select human health criteria for carcinogens based on the 10E-5 or more appropriate risk level instead of the 10E-6 level being proposed. Based upon the conservative risk assumptions included in the calculation of criteria, there is sufficient uncertainty in the numbers to permit the use of a less restrictive value than 10E-6. EBMUD believes that by using the "one in a million" risk assumption an undue attainability burden is being placed on dischargers to meet ultra-low water quality criteria for very little gain in risk reduction. EPA should factor the uncertainty of the numbers into the risk assessment along with the population exposure when calculating risk and appropriate human health criteria.

Response to: CTR-056-012

EPA disagrees with this comment.

See response to CTR-058-001. For an additional response, see also the response to CTR-003-003.

Comment ID: CTR-057-005
Comment Author: City of Los Angeles
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: C-13 Risk Level
References:
Attachments? N
CROSS REFERENCES

Comment: Risk Level

The EPA is strongly encouraged to consider the use of the 10E-5 carcinogenic human health risk

criterion as a baseline for all priority-pollutant criteria that can be adjusted as appropriate when conditions merit a change. The 10E-6 criterion, which itself already appears to serve as such a baseline, is too problematic for this purpose in view of the number of priority constituents which represent immediate compliance problems under the proposed Rule. The attached tables compare our chances for compliance with the proposed Rule under the two factors for our three facilities. We believe that the problems associated with the 10E-6 factor primarily reflect a difficulty with criteria compliance rather than an indication of environmental impact.

In addition, we believe that cost-benefit ratios of mitigation efforts based on a 10E-5 risk factor are considerably more justifiable than 10E-6 in view of the diminishing returns most POTWs would experience in terms of net environmental cost-benefit. For example, years of toxicity testing of Tillman effluent has not established any relationship between effluent lindane and/or DDT levels and aquatic survivability, yet further reduction of these pollutants below currently-observed levels does not justify the enormous required treatment costs. By comparison, the cost effectiveness of best-management practices for non-point sources is attractive, but the trade-off in terms of immediate benefit is a significant limitation- These observations imply that the 10E-5 risk factor should also be applicable on a constituent-specific basis, and we urge the EPA to consider this application as well.

Another factor to consider in setting the risk criterion involves pollutant source-controllability. For example, DDT is a banned pesticide that is ubiquitous in the environment and also a pass-through pollutant in conventional treatment processes what purpose does a 10E-6 factor serve when it cannot be controlled by either point or non-point sources? If treated, where and how are the wastes disposed? The provenance and ultimate fate of such pollutants should be considered as part of a more holistic approach to their control, and the establishment of overly-stringent risk criteria does not accomplish that.

Response to: CTR-057-005

EPA disagrees with this comment.

See response to CTR-058-001.

The comment author cites "years of toxicity testing of Tillman effluent" as evidence that effluent levels of lindane and/or DDT do not need to be further reduced . However, this comment overlooks the fact that these two pollutants are highly bioaccumulative, and standard toxicity tests, because of their short duration, do not account for most bioaccumulation. Thus, if anything, a 10-6 risk level is particularly appropriate for bioaccumulative pollutants.

EPA disagrees that a factor to consider in setting of risk criterion should involve pollutant source controllability. First, the commenter has provided no evidence supporting the assertion that either point or nonpoint sources cannot be controlled. EPA also disagrees that it should set criteria for pollutants that are difficult to control (which have been banned but remain persistent in the environment) at a higher risk level than other pollutants. The Clean Water Act requires that criteria be protective of designated uses. While EPA has discretion in setting risk levels appropriate to protect uses, EPA believes that it is appropriate to base the risk level on nationally appropriate risk levels and the risk level established by the State for the general population. (See the response to Comment CTR-058-001.) By doing so, EPA will be providing an acceptable measure of protection to all exposed subpopulations. If it is not feasible to attain a designated use due to human caused conditions or if sources of pollution prevent the attainment of the use and cannot be remedied, EPA regulations allow the State to remove the designated use if it is not an existing use. This approach allows for regulatory relief where attainment is infeasible while avoiding the lowering of water quality protection to people who live in areas where it may be feasible to

attain the criteria at a risk level of 10-6.

Comment ID: CTR-058-001
Comment Author: Western States Petroleum Assoc
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: C-13 Risk Level
References:
Attachments? Y
CROSS REFERENCES

Comment: We appreciate the care that EPA has given to this proposal and especially the attempt to base the proposal on good science. Although there are significant improvements in the proposal, there are several issues of concern to WSPA. We are especially concerned that EPA has chosen to base the proposal on a human health risk level of 1x10E-6 while other environmental management programs administered by EPA or by California regulatory agencies have based decisions on risk levels of 1x10E-5 and above. EPA has not justified this overly cautious and potentially expensive approach. Our comments are included in the attachment to this letter.

1. Acceptable Risk Levels. WSPA opposes use of a 1x10E-6 risk level as a trigger level for regulatory action.

EPA has historically considered health risks above 1x10E-6 to be adequately protective of human health (see, e.g., 40 CFR 42176 in this rulemaking and review articles by Travis et al., Environ. Science Tech. 21(5): 415-420, 1987 and Rodricks et al., Toxicol. Pharmacol. 7: 307-320, 1987). Yet, "EPA is proposing criteria that protect at an incremental cancer risk level of one in a million (1x10E-6) for all priority toxic pollutants regulated as carcinogens" [62 FR 42181, subpart f]. EPA apparently bases this decision on what it believes to be the state's historical policy, although adequate justification for the target risk level selected is not provided.

EPA is overlooking an overwhelming consensus of state and national-level policy which indicates that, in reality a target risk level of 1x10E-6 is not commonly applied in developing regulatory levels. For example, in the most comprehensive rulemaking on development and implementation of water quality standards that EPA has ever conducted -- the Great Lakes Initiative -- EPA used a target risk level of 1x10E-5 in setting the criteria. Also, every state in Region V has followed EPA policy and used 1x10E-5 as the acceptable risk level in setting water quality standards as part of their GLI rules.

EPA's National Contingency Plan codifies 1x10E-4 to 1x10E-6 as the target acceptable risk range for evaluating hazardous waste sites under CERCLA. EPA has selected and promulgated a single risk level of 1x10E-5 in the Hazardous Waste Management System Toxicity Characteristics Revisions [55FR 11798-11863]. In so doing, EPA notes that "The chosen risk level of 10E-5 is at the midpoint of the reference risk range for carcinogens (10E-4 to 10E-6) generally used to evaluate CERCLA actions.". EPNs benzene waste NESHAPs used 10E-5 and drinking water MCLs are commonly associated with acceptable risk levels that exceed 1x10E-6. OSHA's recently proposed procedures for developing risk-based Permissible Exposure Limits (PELs) are based on acceptable risk levels of 1x10E-3 to 1x10E-4.

In California, state agencies commonly rely on target risk levels above 1x10E-6 for setting regulatory action levels. Cal-EPA, including the DTSC, the SWRCB and the RWQCBs routinely set cleanup levels for remediation projects based on a target risk of 1x10E-5 The air quality management districts charged with administering the California Air Toxics "Hot Spots" Program under AB2588 commonly rely on a 1x10E-5 target risk level for risk management purposes. California's proposed revision to the hazardous waste classification system is also similarly based on a 1x10E-5 risk level. California's Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65) established a no significant risk level of 1x10E-5 for evaluating potential exposures of the general population to carcinogenic chemicals.

Reliance on a single target risk level of 1x10E-6 for setting water quality criteria is now mostly an historical artifact. In reality, even when the Food and Drug Administration originally proposed that a 1x10E-6 target risk level be used to set safety standards in the 1970s, this level was clearly meant to be a de minimis level representing risks that are so small as to be of negligible concern. In the interest of responsible public policy, EPA's target risk level should reflect an enlightened understanding of the uncertainty and variability inherent in the risk assessment process gained since that time. In addition, given that the background cancer risk in the U.S. is now about 30%, EPA should recognize that a risk level of 0.30001, or for that matter 0.3001, is virtually indistinguishable from a risk level of 0.300001. By contrast, the socioeconomic impacts associated with the overly conservative reliance on a 1x10E-6 risk level could be staggering.

Response to: CTR-058-001

EPA disagrees with this comment.

EPA's section 304(a) criteria guidance documents for priority toxic pollutants that are based on carcinogenicity present concentrations for upper bound risk levels of 1 excess cancer per 100,000 people (10-5), per 1,000,000 people (10-6), and per 10,000,000 people (10-7). However, the criteria documents do not recommend a particular risk level as EPA policy. EPA uses a 10-6 risk level in establishing human health criteria guidance because it believes that a 10-6 risk level is an appropriate level of risk for the general population. This risk level is used by a majority of states and Tribes.

Subpopulations within a state may exist, such as subsistence anglers who as a result of greater exposure to a contaminant, are at greater risk than the assumed 70 kilogram person eating 6.5 grams per day of maximally contaminated fish and shellfish and drinking 2.0 liters per day of drinking water with pollutant levels meeting the water quality criteria.

When EPA promulgates criteria as regulations, EPA generally follows the policies of the affected state. In this case, California has articulated a policy choice of 10-6 for the general population. By establishing rules at the 10-6 risk level, EPA applies a risk management policy which ensures protection for all exposed population groups (Draft Water Quality Criteria Methodology: Human Health, EPA 822-Z-98-001,August 1998, Appendix II, page 72). EPA acknowledges that at any given risk level for the general population, those segments of the population that are more highly exposed face a higher relative risk. For example, if fish are contaminated at a level permitted by criteria derived on the basis of a risk level of 10-6, individuals consuming up to 10 times the assumed fish consumption rate would still be protected at a 10-5 risk level. Similarly individuals consuming 100 times the general population rate would be protected at a 10-4 risk level. EPA therefore believes that protection at the 10-6 risk level is a reasonable risk management decision protective of designated uses under the CWA. While outside the scope of this rule, EPA notes that states and Tribes, however, have the discretion to adopt water quality criteria that result in a higher risk level (e.g., 10-5). EPA expects to approve such criteria if the state or

Tribe has identified the most highly exposed subpopulation within the state or Tribe, demonstrates the chosen risk level is adequately protective of the most highly exposed subpopulation, and has completed all necessary public participation.

This demonstration has not happened in California. Further, the information that is available on highly exposed subpopulations in California supports the need to protect the general population at the 10-6 level. California has cited the Santa Monica Bay Seafood Consumption Study as providing the best available dataset for estimating consumption of sport fish and shellfish in California for either marine or freshwater sources (Chemicals in Fish Report No. 1: Consumption of Fish and Shellfish in California and the United States, Final Draft Report, July 1997). Consumption rates of 21g/day, 50 g/day,107 g/day, and 161 g/day for the median, mean, 90th, and 95th percentile rates, respectively, were determined from this study. Additional consumption of commercial species in the range of approximately 8 to 42 g/day would further increase those values. Clearly the consumption rates for the most highly exposed subpopulation within the State exceeds 10 times the 6.5 g/day rates used in the CTR. Therefore, use of a risk level of 10-5 to protect the general population would not be sufficient to protect the most highly exposed population in California at a 10-4 risk level. On the other hand, even the most highly exposed subpopulations cited in the California study do not have consumption rates approaching 100 times the 6.5 g/day rate used in the CTR. The use of the 10-6 risk level to protect median level consumers does not subject these subpopulations to risk levels as high as 10-4.

EPA believes it would be reasonable to conclude that carcinogens that bioaccumulate, particularly given the exposure of fishermen to such carcinogens, may justify site-specific criteria that result in more protective risk level than 10-6 for the average fish consumer. EPA has generally supported such decisions when adequate data are available. In this rulemaking, EPA has adopted a reasonable risk level to protect all of California's inland waters and enclosed bays and estuaries for consumption of fish and drinking water.

EPA believes its decision to establish a 10-6 risk level for the CTR is also consistent with EPA's policy in the NTR and GLI to select the risk level that reflect the policies or preferences of Clean Water Act programs in the affected states. CA adopted standards for priority toxic pollutants for its ocean waters in 1990 using a 10-6 risk level to protect human health (California Ocean Plan, 1990). In April 1991, and again in November 1992, CA adopted standards for its inland waters and enclosed bays and estuaries in its ISWP and EBEP using a 1x10-6 risk level. To be consistent with CA's WQS, EPA used a 10-6 risk level for CA in the NTR at 57 FR 60867/3. CA has continued using a 10-6 risk level to protect human health for its standards that were not withdrawn with the ISWP and EBEP. The most recent expression of risk level preference is contained in the Draft Functional Equivalent Document, Amendment of the Water Quality Control Plan for Ocean Waters of California, October 1998, where staff recommended maintaining a consistent risk level of 10-6 for the human health standards that they were proposing to revise. See also the discussion in responses to CTR-002-002a and CTR-002-005a.

The citation of programs that occasionally allow a risk level as high as 10-4 under specific circumstances does not prove to be inconsistent with protection of the general population at the 10-6 level recognizing that more highly exposed sub-populations such as ethnic or economically disadvantaged populations may face an excess risk level approaching 10-4.

There are several differences between the guidelines for the derivation of human health criteria contained in the Great Lakes Water Quality Guidance (the Guidance) and the California Toxics Rule (CTR) that make a 10-5 risk factor appropriate for the Guidance, but not for the CTR. These differences result in criteria developed using the 10-5 risk factor in the Guidance being at least as stringent as criteria derived under the CTR using a 10-6 risk factor. The relevant aspects of the Guidance include:

* targeting of sensitive subgroups of the population, such as people who routinely eat fish caught in the Great Lakes, in assessing risk (the CTR targets the population in general)

* use of fish consumption rates that are considerably higher (because of the targeted subgroup) than fish consumption rates for the CTR

* use of bioaccumulation factors rather than bioconcentration factors in estimating exposure, considerably increasing the dose of carcinogens to sensitive subgroups

* use of additivity of effects of mixtures of both carcinogenic and noncarcinogenic pollutants.

This combination of factors increase the calculated carcinogenic risk substantially under the Guidance (the combination would generally be more than one order of magnitude), making a lower overall risk factor acceptable. The Guidance risk factor provides, in fact, criteria with at least the same level of protection against carcinogens as criteria derived with a higher risk factor using the CTR. A lower risk factor for the CTR would not be appropriate absent concomitant changes in the derivation procedures that provide equivalent risk protection.

Remediation efforts and OSHA PELs were cited by the comment author as activities allowing risk levels higher than 10-6. These activities are site-specific and have far less impact beyond a very local area as contrasted to WQS which, in combination with existing California WQS providing protection of the general population at the 10-6 level, will provide consistent protection to the statewide population. [See the reference to HHM Notice above].

EPA disagrees that reliance on a 10-6 target risk level for setting water quality criteria is now mostly a historical artifact. The Food Quality Protection Act of 1996 (FQPA) amended the Federal Food, Drug, and Cosmetic Act to prohibit EPA from issuing tolerances for pesticide residues in or on food unless the agency determined that there is "reasonable certainty" that the residues will result in "no harm." The legislative history of FQPA indicated Congressional support for EPA's view that reasonable certainty of no harm would be met when a non-threshold risk is below a 10-6 level.

EPA believes that comparing the "background cancer risk in the U.S." (an aggregate risk combining the effect of all causes of cancer) with the excess cancer risk from a single toxic pollutant in water is not appropriate because they are not comparable measures. The comment author's argument does not lend support for raising the risk level specified in this rulemaking. The purpose of the CWA is to protect waters (in this case for the various human uses) irrespective of the cancer risk derived from other sources.

Finally, EPA is unable to respond to the author's assertion of "staggering" socioeconomic impacts because it is provided without supporting evidence (see response to CTR-005-007). EPA's Economic Analysis indicates that lowering the risk level from 10-5 to 10-6 would cause only a negligible increase in compliance costs (Economic Analysis of the California Toxics Rule, p. A-2). In any case, under the Clean Water Act, EPA must establish scientifically based criteria that protect designated uses. This requirement overrides any consideration of socioeconomic impacts. The Clean Water Act does allow consideration of socioeconomic impacts in decisions to remove a designated use which is not an existing use.

Comment ID: CTR-060-016
Comment Author: San Diego Gas and Electric
Document Type: Electric Utility
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: C-13 Risk Level
References:
Attachments? N
CROSS REFERENCES

Comment: PROVISIONS SDG&E DOES NOT SUPPORT

As described in the following comments SDG&E does not support the following provisions:

* Health risk factor - The preamble to the rule (see 62 Fed. Reg. at 42,181, Col. 3) states that the cancer risk level used to calculate the criteria is 1 excess cancer case per 1,000,000 people. The State of California voters approved an initiative in 1986 "The Safe Drinking Water andToxic Enforcement Act of 1986" ("Prop. 65") to address concerns over exposures to toxic chemicals. Prop. 65 defines the "no significant risk" level as follows:

"For chemicals assessed in accordance with this section, the risk level which represents no significant risk shall be one which is calculated to result in one excess case of cancer in an exposed population of 100,000, assuming lifetime exposure at the level in question,...".(*15)

The criteria proposed in the rule should be recalculated to reflect a one excess case of cancer in an exposed population of 100,000 risk factor, which would be consistent with an existing risk factor which is acceptable to the voters in the State of California.

(*15) Subsection 12703 (b) at CCR Title 22, Division 2, Part 2, Subdivision 1, Chapter 3, Article 7.

Response to: CTR-060-016

EPA disagrees with these comments.

See response to CTR-058-001.

Comment ID: CTR-066-011
Comment Author: Delta Diablo Sanitation Dist.
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: C-13 Risk Level
References:
Attachments? N
CROSS REFERENCES

Comment: The areas with which we find concerns and the requested changes include the following:

* With respect to the criteria proposed for adoption in the draft CTR, we believe EPA should select human health criteria for carcinogens based on the 10E-5 or 10E-4 risk levels instead of the 10E-6 level. Based on all the conservative assumptions embedded in the calculation of the criteria, there is significant uncertainty in the numbers, which may translate to negligible risk in using the lower risk levels. EPA should factor this uncertainty into the risk assessment along with population exposure when calculating risk and appropriate human health criteria.

Response to: CTR-066-011

EPA disagrees with this comment.

See response to CTR-058-001.

Comment ID: CTR-081-003
Comment Author: West County Agency
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: C-13 Risk Level
References:
Attachments? N
CROSS REFERENCES

Comment: * EPA should select human health criteria on levels other than the 10E-6 level, based on the conservative assumptions included in the calculation of the criteria.

Response to: CTR-081-003

EPA disagrees with this comment.

See response to CTR-058-001.

Comment ID: CTR-082-004
Comment Author: City of Burbank
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/24/97
Subject Matter Code: C-13 Risk Level
References:
Attachments? N
CROSS REFERENCES

Comment: The subject rule has a significant impact on our facility discharge and the citizens of the City. We therefore present the following comments for your consideration to re-open the comment period for this rule in order to facilitate a more complete review by public and in particular by those in the POTW community:

* Recommend USEPA use human health criteria for carcinogens based on the 10(*-5) or 10(*-4) instead of the 10(*-6) level. It is important to note that all conservative assumptions included in the calculation of the EPA proposed criteria there is a significant uncertainty in the numbers, which may translate to negligible risk in using the lower risk levels. EPA should factor in this uncertainty into the risk amount along with population exposure when calculating risk and appropriate human factor.

Response to: CTR-082-004

EPA disagrees with this comment.

See response to CTR-058-001.

Comment ID: CTR-085-013
Comment Author: Camarillo Sanitary District
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/24/97
Subject Matter Code: C-13 Risk Level
References:
Attachments? N
CROSS REFERENCES

Comment: The District supports the following positions of CASA and SCAP where changes need to be made in the proposed California Toxics Rule:

* With respect to the criteria proposed for adoption in the draft California Toxics Rule, the EPA should select human health criteria for carcinogens based on the 10E-5 or 10E-4 risk level instead of the 10E-6 level. Based on all the conservative assumptions included in the calculations of the criteria, there is significant uncertainty in the number, witch may translate to negligible risk in using the lower risk levels. The EPA should factor this uncertainty into the risk assessment, along with population exposure, when calculating risk and appropriate human health criteria.

Response to: CTR-085-013

EPA disagrees with this comment.

See response to CTR-058-001.

Comment ID: CTR-090-013

Comment Author: C&C of SF, Public Utl. Commis.
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-13 Risk Level
References: Letter CTR-090 incorporates by reference letters CTR-035 and CTR-054
Attachments? Y
CROSS REFERENCES

Comment: 2. The Cancer Potency Risk Factor Should Be 10E-5 EPA should not assume that 10E-6 is California's preferred risk level for estuarine and inland surface waters. The action adopting that risk level was invalidated by the courts specifically on the grounds that the SWRCB did not follow the required procedures of the Water Code section 13241. In fact, the State of California and the voters of California have made a clear policy statement about cancer risk factors when they enacted in 1986, the Safe Drinking Water and Toxic Enforcement Act, known as Proposition 65. This Proposition established significant restrictions on the use of toxicants based on a cancer risk level of 10E-5. This voter approved cancer risk is far more valid and should be the guide to the EPA for the criteria.

The use of the 10E-6 as a risk level for human health will cause some constituents to be to considered problem pollutants when in fact no problem exists based on site specific data and bioaccumulation data. This high level of risk compounds the very conservative assumptions and other safety factors already within the formula for the criteria.

We urge the EPA to revise the cancer risk level to 10-5. Until such time that a source of problem toxicants are better identified, interim CRFs of less than 10E-5 would be appropriate for some carcinogens (more discussion in the detailed comments)

Response to: CTR-090-013

EPA disagrees with this comment.

See response to CTR-058-001.

Comment ID: CTR-092-015
Comment Author: City of San Jose, California
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: C-13 Risk Level
References: Letter CTR-092 incorporates by reference letter CTR-035
Attachments? Y
CROSS REFERENCES

Comment: We want to highlight our technical concern with one aspect of the Economic analysis in the text of this letter - EPA's proposal to protect at an incremental cancer risk level of one in one million (10E-6) for all priority toxic pollutants regulated as carcinogens. The CTR states that "EPA recommends

that states consider minimum risk levels in the range of 10E-4 to 10E-6 for carcinogenic priority pollutants to protect public health and welfare." The City supports EPA's policy of allowing States the flexibility to use a range of cancer risk levels in their derivation ofcriteria for carcinogenic priority pollutants, however the City believes that the EPA has the same obligation in promulgating the CTR. The City recommends that risk levels be determined dependent upon the degree of scientific uncertainty inherent with the appropriate criterion. Stringency of risk levels should be established based upon the degree of significance, that assumptions and uncertainties drive the criterion derivation process.

Response to: CTR-092-015

EPA disagrees with this comment.

See response to CTR-058-001.

Comment ID: CTR-096-008
Comment Author: City of Modesto
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-13 Risk Level
References:
Attachments? N
CROSS REFERENCES

Comment: Thank you for the opportunity to comment on the proposed California Toxics Rule. The City's comments are related to five main concepts:

Specifically, the City submits he following comments:

G. Further, with respect to the criteria proposed in the draft CTR, EPA should select human health criteria for carcinogens based on 10E-5 or 10E-4 risk levels instead of the 10E-6 level. Based on all the conservative assumptions included in the calculation of the criteria, there is significant uncertainty in the numbers, which may translate to negligible risk in using the lower risk levels. EPA should factor this uncertainty into the risk assessment along with population exposure when calculating risk and appropriate human health criteria.

Response to: CTR-096-008

EPA disagrees with this comment.

See response to CTR-058-001.

Comment ID: CTRH-001-026
Comment Author: Michelle Pla
Document Type: Public Hearing
State of Origin: CA

Represented Org: S.F. Public Utilities Com
Document Date: 09/17/97
Subject Matter Code: C-13 Risk Level
References:
Attachments? N
CROSS REFERENCES

Comment: In your proposed rule you said that 10 to the minus 6 is the appropriate cancer risk factor, but you're asking for comments on the 10 to the minus -- to the -- 10 to the minus 5. And I would like to point out that although the state originally in their guidelines for effluents had 10 to the minus 6, that was one of the grounds for the court case which overthrew that, those plans, in that they did not do a thorough analysis. The 10 to the minus 6, we will be giving you more information in written comments why we believe that 10 to the minus 5 is an appropriate risk level.

Response to: CTRH-001-026

EPA disagrees with this comment.

See response to CTR-058-001.

Comment ID: CTRH-001-046
Comment Author: Charles Batts
Document Type: Public Hearing
State of Origin: CA
Represented Org: Bay Area Dischargers Assc
Document Date: 09/17/97
Subject Matter Code: C-13 Risk Level
References:
Attachments? N
CROSS REFERENCES

Comment: We would ask you to review scientific carcinogenic criteria with concern for special pathways that disclose how carcinogenics in aquatic runoff and wastewater interact with human health.

Presently the risk factor of 10 to the minus 6 is heaped on an already overly conservative criteria. The use of 10 to the minus 4 or 10 to the minus 5 have been incorporated by EPA in many other risk analysis plans that they've done, including the Safe Drinking Water Act and the Great Lakes Initiative,

Also in this area, greater study should be done to look at individual organic compounds to see what the cost/benefit ratio is and see if there is a way for removal of these specific organic compounds by source control or pollution prevention techniques.

Response to: CTRH-001-046

EPA disagrees with this comment.

See response to CTR-058-001.

Comment ID: CTRH-002-013
Comment Author: Lisa Ohlund
Document Type: Public Hearing
State of Origin: CA
Represented Org: Alliance of So. CA POTWs
Document Date: 09/18/97
Subject Matter Code: C-13 Risk Level
References:
Attachments? N
CROSS REFERENCES

Comment: We'd like to see the EPA reexamine risk level for carcinogens in the human health criteria, taking into consideration the actual change in risk to the exposed population for each constituent and balancing that with the potential cost of compliance.

Response to: CTRH-002-013

EPA disagrees with this comment.

See response to CTR-058-001.

Comment ID: CTRH-002-023
Comment Author: John Behjan
Document Type: Public Hearing
State of Origin: CA
Represented Org: City of Simi Valley
Document Date: 09/19/97
Subject Matter Code: C-13 Risk Level
References:
Attachments? N
CROSS REFERENCES

Comment: MR. BEHJAN: Good afternoon. My name is John Behjan, B-e-h-j-a-n. My business address is 500 West Los Angeles Avenue, Simi Valley, California 93065.

Basically, I want to go over the CTR's proposed numerical objective for human health risk -- human health criteria which is based on human health risk assessment of 10(-6). That is basically for the cases that are consumable water for fish.

The previous speaker mentioned about waterways and this is where I'm coming from. We recommend EPA's consideration of another factor than the 10(-6). EPA does provide that, the flexibility. And this is a very appropriate application, perhaps in for -- because that would reduce the objectives more -- make them more difficult than for a lot of fish in Southern California who are discharging it into water.

Thank you.

Response to: CTRH-002-023

EPA disagrees with this comment.

See response to CTR-058-001.

Subject Matter Code: C-14 Fish or Water Consumption

Comment ID: CTR-002-002a
Comment Author: Comm. for a Better Environment
Document Type: Environmental Group
State of Origin: CA
Represented Org:
Document Date: 09/24/97
Subject Matter Code: C-14 Fish or Water Consumption
References:
Attachments? Y
CROSS REFERENCES C-17a

Comment: I. TOXIC POLLUTANTS THREATEN PUBLIC HEALTH AND SAN FRANCISCO BAY.

Toxic pollution causes harm in San Francisco Bay. Species of bivalve shellfish, plankton and phytoplankton that are especially vulnerable to toxic trace elements such as copper are decimated in its southern reach though they thrive in comparable estuaries with less metals pollution.(*1) (*2) Mounting evidence suggests its sediment is toxic to some aquatic life.(*3) Extensive research strongly suggests that PCBs and PAHs released to the Bay negatively effect reproduction in starry flounder. (*4) Reproductive effects are also correlated with PCBs in Bay cormorant eggs, Bay harbor seals have PCBs levels twice those associated with immunotoxicity and a disease epidemic that decimated a European population of this species.(*5) Health advisories are in effect because dioxin, PCBS, mercury, chlordane, DDT, dieldrin, and selenium contaminate Bay food resources eaten by the public.(*6) (*7)

Public health threats from toxics in the food chain are of particular concern. A recent count found approximately 270,000 fishing licenses were issued to Bay Area residents. Surveys by CBESAFER!, the Save San Francisco Bay Association, and the Asian Pacific Environmental Network show that many people fish the Bay regularly to supplement their families' diet, that some people eat up to a maximum of a pound of fish per day, and that the majority of those who eat their catch regularly are people of color. [See attachment (*8)] A pound of fish per day is about 480 oz./month, sixty times the 8 oz./month "safety" cutoff for cancer and slow learning in the state's advisory.(*6)

In addition to these severe environmental health and justice problems, pollutant monitoring of the Bay is far from comprehensive, and undetected problems are likely. Indeed, EPA acknowledged that designated uses of the Bay are threatened or impaired by toxic pollutants when it named the Bay as a "toxic hot spot" under Section 304(l) of the Clean Water Act.(*9)

(*1) U.S. Geological Survey, 1992. Letter from Samuel N. Luoma, Ph.D., to Seven R. Ritchie, Executive Officer, Regional Water Quality Control Board. August 24, 1992.

(*2) Karras, 1992. Comparison of copper in waters of the southern reach of San Francisco Bay and ten other estuaries. Communities for a Better Environment (CBE). July, 1992.

(*3) San Francisco Estuary Institute, 1997. Regional monitoring program for trace substances 1995 annual report. Excerpts including pages 105, 3, and A-17 through A-24 showing the percentage of sediment bioassays (larval bivalve and Eohaustorius tests) that were toxic (less than 80% of control

value) at RMP stations from 1991-1996, sampling stations, and dissolved and total metal, and PAH concentrations in San Francisco Bay waters.

(*4) Spies et al., (2 papers), 1988: Effects of organic contaminants on reproduction of the starry flounder Platichthys stellatus in San Francisco Bay, I., Hepatic contamination and mixed-function oxidase (MFO) activity during the reproductive season. Marine Biology 98: 181-189; and II. Reproductive success of fish captured in San Francisco Bay and spawned in the laboratory. Marine Biology 98: 191-200. Excerpt including abstracts.

(*5) Kopec and Harvey, 1995, Toxic pollutants, health indices, and population dynamics of harbor seals in San Francisco Bay, 1989-1992. Moss Landing Marine Laboratories Technical Publication 96-4. ISSN 1088-2413. October, 1995. Excerpt regarding PCBs levels as compared to European seals in which a disease epidemic and population crash was observed.

(*6) Cal. EPA, 1994. Health advisory on catching and eating fish, interim sport fish advisory for San Francisco Bay. December, 1994.

(*7) California Department of Health Services, 1994. Health Warnings, Contained in the 1994 California Hunting Regulations for Resident and Migratory Game Birds issues by the state's Fish and Game Conunission, Sacramento, Calif. Excerpt including health warning for selenium.

(*8) Previously unpublished data froma 1993-4 survey of 500 anglers using South and Central San Francisco Bay by conununities for a Better Environment-SAFER!; Save San Francisco Bay Association, 1995 (excerpt); West, 1992; West et al., 1992; Peterson et al., 1994; and USEPA, 1994.(excerpt of a draft report discussing and citing work by EPA, Wolfe and Walker (1987), Svensson (1991) and others. Includes analysis of the evidence..

(*9) EPA, 1990. Decision of the United States Environmental Protection Agency on listing under section 304(l) of the Clean Water Act regarding the state of California. Excerpt including pages listing San Francisco Bay waters as a "toxic hot spot."

Response to: CTR-002-002a

See response to CTR-001-002.

EPA acknowledges the impacts of pollution in the San Francisco Bay. EPA believes that the intake rate of 6.5 grams/day is adequately protective of the general population of fish consumers over the course of a lifetime. The fish intake rate of 6.5 gm/day is from a national, 30-day survey - the National Purchase Diary (NPD), based on an empirical distribution, where 6.5 gm/day represents the average value for the general population. According to the NPD, which was based on over 25,000 individual respondents, 94 percent of the survey respondents reported that they ate fish. Therefore, EPA believes that 6.5 gm/day is an appropriate basis for characterizing the general population. EPA understands that fish intake patterns vary and that there are population groups that consume significantly greater amounts than the overall population.

For this regulation, the promulgated criteria were derived using a 10-6 risk level, which the Agency believes reflects an appropriate risk for the general population and ensures protection for all exposed population groups. EPA also considers that the goal is satisfied if the general population will be adequately protected by human health criteria when the criteria are met in ambient water. EPA acknowledges that at any given risk level for the general population, those segments of the population

that are more highly exposed face a higher relative risk. For example, if fish are contaminated at a level permitted by criteria derived on the basis of a risk level of 10-6, individuals consuming up to 10 times the assumed fish consumption rate would be protected at a 10-5 risk level. Similarly, individuals consuming up to 100 times the assumed rate would still be protected at a 10-4 risk level. Consistent with this, a criterion based on 6.5 gm/day at a risk level of 10-6 would protect those who consumed 650 gm/day at a 10-4 risk level.

EPA has advocated State and Tribal flexibility to develop criteria, on a site-specific basis, that provides additional protection appropriate for highly exposed populations. EPA has not found that such a demonstration has been made for specific waterbodies covered by the CTR that warrants a change or re-proposal of the CTR criteria at this time. EPA understands that highly exposed populations may be widely distributed geographically throughout a given State and Tribal area. Thus, if the State or Tribe determines that a highly exposed population would not be adequately protected by criteria based on the general population, EPA recommends that the State/Tribe adopt more stringent criteria. Furthermore, EPA recommends that States and Tribes ensure that the most highly exposed populations not exceed a risk level of 10-4.

It should also be understood when comparing the fish intake assumption of 6.5 grams/day used to develop these criteria with other studies, including the studies referenced by the commenter (such as the surveys by "CBESAFER!", the Save San Francisco Bay Association, etc.), that the 6.5 gm/day value reflects consumption of fresh/estuarine species only and does not include marine species. It is the fresh/estuarine species that apply to the development of water quality criteria for the waters covered under this rule. Specifically, the CTR's ambient water quality criteria are applicable to inland waters and estuaries. The CTR does not apply to ocean waters that are covered by California's Ocean Plan. The commenter needs to separate out marine species before any comparisons between studies can be appropriately made. EPA's water quality criteria program policy has historically been to evaluate fish intake from fresh and estuarine species only, based on knowledge of life-cycles of the species including relevant information from the National Marine Fisheries Service. The purpose is to include those species that are anticipated to be potentially exposed to pollutants in fresh and estuarine waterbodies, based on this life-cycle information [for further discussion on this policy, see the Ambient Water Quality Criteria Derivation Methodology Human Health Technical Support Document, Final Draft (EPA-822-B-98-005)].

EPA is developing a revised methodology for deriving water quality criteria to protect human health and is updating its recommendations for estimating fish consumption, including evaluating the most recent survey data (see draft revisions published August 14, 1998, Federal Register, Vol. 63, No. 157). EPA is currently reviewing public comments and is awaiting the results of a peer review on the draft methodology revisions. However, until the methodology is finalized, EPA believes that the current methodology is scientifically defensible.

Comment ID: CTR-002-005a
Comment Author: Comm. for a Better Environment
Document Type: Environmental Group
State of Origin: CA
Represented Org:
Document Date: 09/24/97
Subject Matter Code: C-14 Fish or Water Consumption
References:
Attachments? Y

CROSS REFERENCES C-21

Comment: C. Criteria for the pollutants of most concern do not provide equal protection for people of color and are not supportable by science.

EPA cannot show that its weaker proposed criteria will protect fishing and aquatic life from dioxin-like compounds, mercury, and copper. Further, EPA's proposal to allow greater health risks for subsistence fishers fails to provide equal protection under the law and is contrary to the President's Executive Order on Environmental Justice.

The proposed criteria provide unequal protection for people of color who fish for food. EPA admits in the proposal that: "There may be subpopulations within a state, such as subsistence anglers who as a result of greater exposure to a contaminant, are at greater risk than the hypothetical 70 kilogram person eating 6.5 grams per day of maximally contaminated fish.. ." Indeed, ample data show that some people exercise their fishing rights to "use" Bay waters by eating up to a pound (450 grams) per day of fish from San Francisco Bay, and most of them are people of color.(*8) EPA's discussion then goes on to admit that it is proposing to provide less protection for these subsistence anglers: "[I]ndividuals that ingest ten times more of a carcinogenic pollutant than is assumed in derivation of the criteria at a [one excess cancer in a million] risk level will be protected to a [one in 100,000] level, which EPA has historically considered to be adequately protective." However, people who eat a pound per day eat seventy times more, and pages 8- 11 and 8-12 of EPA's economic analysis admit people eat 16 times more, than the 6.5 grams (1/70th of a pound) of Bay fish per day assumed in EPA's criteria. EPA's own calculations show present cancer threats of nearly 1 in 1,000 for some Bay anglers at these higher consumption levels. Thus, EPA itself predicts that its proposal will result in lesser, inadequate protection for people of color who rely on Bay-caught fish for food.

(*8) Previously unpublished data from a 1993-4 survey of 500 anglers using South and Central San Francisco Bay by Conununities for a Better Environment-SAFER!; Save San Francisco Bay Association, 1995 (excerpt); West, 1992; West et al., 1992; Peterson et al., 1994; and USEPA, 1994. (excerpt of a draft report discussing and citing work by EPA, Wolfe and Walker (1987), Svensson (1991) and others. Includes analysis of the evidence.

Response to: CTR-002-005a

EPA believes that this rule is consistent with the terms of the Executive Order (E.O.) on Environmental Justice. EPA rejects the notion that the rule is, in any respect, discriminatory against persons or populations because of their race, color, or national origin. The final rule establishes criteria that are designed to ensure protection of the public, including highly exposed populations. While some groups and individuals, including some low income and minority persons and populations, may face a greater risk of adverse health effects than the general population due to their particular fish consumption patterns, EPA believes that these groups will nonetheless receive a level of public health protection within the range that EPA has long considered to be appropriate in its environmental programs (e.g., 10-4 to 10-6 incremental cancer risk). Obviously, as long as there is variability in fish consumption patterns among various segments of the population, it would be impossible for EPA to ensure that all groups would face identical risk from consuming fish. Therefore, EPA has sought to ensure that, after attainment of water quality criteria in ambient waters, no group is subject to increase cancer risks greater than the risk range that the EPA has long considered protective. EPA disagrees that individuals who consume up to a pound of fish per day would face a 10-3 cancer risk. Given that the basis of the criteria

are a 6.5 gm/day assumption at a 10-6 risk level, individuals who consume a pound of fish per day would be protected within the established acceptable range of 10-4 to 10-6, consistent throughout current EPA program office guidance and regulatory actions. See also the discussion in response to CTR-002-002a.

Comment ID: CTR-006-002b
Comment Author: Natural Resources Defense Cncl
Document Type: Environmental Group
State of Origin: CA
Represented Org:
Document Date: 09/22/97
Subject Matter Code: C-14 Fish or Water Consumption
References:
Attachments? Y
CROSS REFERENCES C-01a

Comment: Dear Ms. Frankel,

The Natural Resources Defense Council strongly opposes the Region 9 EPA proposal to raise the allowable mercury criterion for continuous concentration in water from 0.012 parts per billion (ppb) to 0.770 ppb for aquatic life. This proposal is difficult to justify from the point of view of science and of public health. On behalf of our over 350,000 members nationwide and our over 55,000 California members, we are writing to register our opposition to the EPA proposed rule.

Mercury is a highly poisonous metal which results in toxicity to the brain and nervous system and toxicity to human reproduction. In addition, in sediments, mercury is bio-transformed into the even more toxic form, methyl mercury, which has resulted in some of the largest epidemics of neuro-developmental poisoning known to mankind. Methyl mercury bioaccumulates in the food chain and thereby results in greatly concentrated exposures to humans, because we eat off the top of the food chain. Underestimates of the toxicity and bioaccumulation of mercury have led to major mistakes in the past. The Minamata Bay disaster in Japan was caused by a failure to predict the potency of mercury and the extent of human exposure through fish. U.S. EPA's Draft Mercury Study Report to Congress documents that children of high-end fish consumers in the U.S. may be exposed to enough mercury to cause adverse neuro-developmental effects.

In this setting it is anomalous to relax the standards for mercury contamination in California water. Furthermore, the scientific reasoning behind the Region 9 EPA decision to relax the mercury standard 60-fold is fraught with errors. NRDC's major concerns with this approach are summarized below.

*Extrapolation for the Reference Dose (RfD) should start at a NOAEL, not at a level of 10% increased risk. *An additional 10-fold safety factor should be added in deriving the RfD to account for the vulnerability of fetuses, infants, and children. *The body weight in the calculation should be for a child, not an adult male. *The Fish consumption rates for those who do eat fish should be used instead of rates for the entire population including those who do not eat fish. *Average fish consumption quantities greatly understate the risk to those who eat a lot of fish. Instead, fish consumption for the top 5% of the population should be used. *Bioaccumulation is known to be 10 to 100 fold greater than the estimate used by EPA. *California's waters are already too polluted with mercury.

Use of Average Fish Consumption is not Health Protective

The assumption used by Region 9 EPA for fish consumption relies on the average fish and shellfish consumption in the entire general population, along with the average intake from each body of water. It is quite clear that fish consumption follows a highly skewed, or Poisson distribution in the population (see attachment from the U.S. EPA Draft Mercury Study Report to Congress, Appendix H, p. 20). Many people eat little or no fish, but a smaller, yet highly significant segment of the population eats a very large amount of fish. Surely EPA should strive just as hard to protect the health of those who eat fish frequently as it does to protect the health of those who do not eat fish.

In fact, this analysis adequately protects only those who eat little or no fish. The average whichwas used in the Region 9 EPA analysis appears to derive from the "per capita" data from the USDA Continuing Surveys of Food Intake by Individuals (CSF 11) from 1989-91 for males ages 15-44 years. (See attached tables from U.S. EPA Mercury, Report, Appendix H, pp. 8 & I 1). In fact, this average is highly influenced by those individuals who consume little or no fish. Non-fish-consumers, however, are not the population of interest for purposes of this analysis. Instead, if an average is to be used, it should be the average fish consumption rate for those people who do eat fish. This is substantially higher, at 53.7 g/day for males ages 15-44 years, and 41.4 g/day for females in the same age range. Furthermore, the average fish consumption will likely underestimate the fish consumption rate for the "high end" fish consumer by many orders of magnitude. For example, in the case of females ages 15-44 years, average fish consumption (among those who do eat fish) is 41.4 g/day, while fish consumption by the top 5% of the population of these women of childbearing age is about 112 g/day, or more than double the average consumption rate.

The implications of not adequately protecting the high fish consumer are not trivial. The population of California is nearly 30 million, of whom overall 31% would be expected to be fish consumers according to the CSF II survey. This represents over 9 million people who would be at disproportionate risk. The top 5% of that population consists of nearly half a million people in California who would be expected to eat fish at nearly 10-times greater quantity than the EPA calculations would predict. 10 times greater consumption would translate into roughly 10-times greater risk from the mercury in the fish. EPA is not adequately protecting this substantial portion of the California population from mercury hazards.

NRDC strongly urges Region 9 EPA to reassess the proposed standard for mercury. Recalculation of the reference dose to accommodate the known disproportionate impact of mercury on fetuses, infants, and children will require addition of at least another 10-fold safety factor. The starting point for RfD calculation should be a true NOAEL. The body weight calculation should use an average weight for a child. Fish consumption data should reflect the "high-end" consumer. Finally, the outdated and unsupportable bioaccumulation factor of 7300 should be discarded in favor of a BAF which is supported by the current science in California.

Response to: CTR-006-002b

Regarding the issues on mercury health effects, derivation of the RfD, and basis of the fish intake assumption (including discussion of the CSFII survey), see response to CTR-006-002a. For additonal discussion regarding the basis of the fish consumption rate, see the response to this issue in CTR-002-002a. Regarding the choice of body weight, see response to CTR-006-001a. Regarding the issues on bioaccumulation, see response to CTR-002-007b.

Comment ID: CTR-010-002

Comment Author: Save San Francisco Bay Assoc.
Document Type: Environmental Group
State of Origin: CA
Represented Org:
Document Date: 09/24/97
Subject Matter Code: C-14 Fish or Water Consumption
References:
Attachments? Y
CROSS REFERENCES

Comment: The Bay is already highly polluted, as is evidenced by the adverse impacts on beneficial uses, particularly fish consumption. The State's Bay Protection and Toxic Cleanup Program has identified numerous probable toxic hot spot locations in the San Francisco and Santa Monica Bays, and confirmed hot spots in San Diego Bay. As bad as San Francisco Bay water quality already is, EPA's Toxics Rule proposal will make current conditions seem pristine compared to what lays ahead if this proposal is enacted.

Response to: CTR-010-002

Regarding the site-specific contamination issues, see response to CTR-002-003.

Comment ID: CTR-015-001
Comment Author: Eastern Municipal Water Dist.
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/23/97
Subject Matter Code: C-14 Fish or Water Consumption
References:
Attachments? N
CROSS REFERENCES

Comment: Dear Ms. Frankel:

Eastern Municipal Water District ("District") provides potable and reclaimed water and sewer service to an area of 555 square miles in western Riverside County in Southern California. The District has five regional water reclamation facilities in Moreno Valley, Hemet/San Jacinto, Perris Valley, Temecula Valley and Sun City with a total available capacity of 49 million gallons per day. There are 77,000 fresh water customers and 122,000 sewer connections. The District has a National Pollutant Discharge Elimination System ("NPDES") permit to discharge effluent, which could be combined from all five facilities, to Temescal Creek in the Santa Ana River Basin.

Submitted herewith are comments from the District on the Proposed Rule referenced above, appearing in the August 5 Federal Register, also called the California Toxics Rule ("Rule") . Several District staff have participated in the State Water Quality Planning Process since 1990. It has been complicated and frustrating, especially in light of attempting to obtain NPDES permits while the state was developing plans. Generally, the District is pleased that your agency ("Agency") is bringing some closure to the

issue by promulgating criteria. We do have some recommendations and concerns, however, which we present for your consideration.

Human Health Criteria (FR p. 42178, Preamble section E.3.)

Regarding fish and shellfish consumption rates, which are an important factor in calculating these water quality criteria, the District supports the Agency's use of 6.5 grams/day. What is of concern is the Agency's statement, "EPA supports the State's use of any appropriate higher state-specific fish and shellfish consumption rates in its readoption of criteria in its statewide plans." The discussion centers on the adopted California Ocean Plan's use of 23 grams/day, which was based on a California Department of Health Services memorandum of 1989. It is important to note that this exposure value was based on ocean fish consumption, whereas the Agency's value is based on non-marine fish consumption.

If a high consumption rate is used, the water quality criterion is lower or more stringent. This would become an additional burden for inland dischargers such as our District. For inland waters, and for any developed inland surface water quality criteria, we would like the Agency to recognize that lower consumption rates could also be used. The following shows the mean consumption rates of fish which are representative of California freshwater fisheries. These rates were taken from the Agency's Exposure Factors Handbook of 1989.

Bluegills	--O.089	grams/day	Carp	--O.016	grams/day	Catfish	--O.292	grams/day
Perch	--O.062	grams/day	Sunfish	--O.020	grams/day	Trout	--O.294	grams/day

Generally, the District hopes that appropriate consumption rates are used and desires that site-specific studies be conducted before different rates are selected. We would like to summarize the Agency's own procedures for developing data upon which to base alternative consumption rates, from the Exposure Factors Handbook, 1989, p. 2-39:

1. Interview local recreational fishermen in the affected area and obtain actual consumption rates. Local surveys can provide the most accurate data for exposure assessment purposes.

2. Obtain productivity data for the area and divide total catch data by the number of recreational fishermen in the area.

3. Estimate what portion of fish consumed in the local area is caught in the local area. Apply the diet fraction to the 50th and 90th percentile consumption rates.

4. Develop exposure scenarios assuming a number of fish meals eaten in the area per year, applying a meal size in the range of 100 to 200 grams/meal.

The Agency should encourage the state to conduct, at a minimum, studies in the manner described above for the following situations: lakes and reservoirs, inland surface streams, effluent-dominated streams, and ephemeral and-intermittent streams.

Response to: CTR-015-001

EPA acknowledges the commenters support of the 6.5 gm/day fish intake assumption. EPA also generally agrees that the rate should be indicative of consumption of freshwater and estuarine species only (see additional discussion on the fish intake rate assumptions in response to CTR-002-002a). However, the commenter has expressed concern over the use of California's Ocean Plan fish consumption

rate as a potential "additional burden" for inland dischargers. The commenter appears to support this concern by providing six species-specific intake rates "representative of California freshwater fisheries." EPA believes that this comparison is not appropriate. First, the State of California has both an Inland Surface Waters Plan and an Enclosed Bays and Estuaries Plan that would be more relevant to inland dischargers. Second, the commenter has chosen only several species of fish from a much larger tabulated list in the original 1989 Exposure Factors Handbook (revised in 1995). The table presents consumption data from a study conducted approximately 20 years ago for fish consumers in the United States. EPA believes that this is not necessarily representative of California-specific consumption patterns. EPA has long supported the States' use of local site- or State-specific data over EPA's default values to better reflect the variability of local or regional consumption patterns, when adequate data are available. EPA has published guidance on how to conduct such surveys. The Agency's most recent document is Guidance for Conducting Fish and Wildlife Consumption Surveys (EPA-823-B-98-007).

Comment ID: CTR-026-007a
Comment Author: Cal. Department of Fish & Game
Document Type: State Government
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-14 Fish or Water Consumption
References:
Attachments? N
CROSS REFERENCES C-17a

Comment: 7. HUMAN HEALTH CRITERIA

As you are aware the Department of Fish and Game is the trustee for the natural resources of the State and, as such we are not in an appropriate position to address human health issues. However, we would like to take this opportunity to make EPA aware of our concerns in two areas. The first issue deals with one component of the formula that was used to derive the human health criteria. Obviously, the human health criteria takes into account fish consumption rates, as well as what portion of the fish is consumed. The CTR indicates that the consumption rate utilized was 6.5 grams per day of fish tissue. This consumption rate, at least for the portion of the population that are subsistence fishermen, appears to be very low. If the human health criteria is to be adequately protective, this consumption rate should be revisited and a new rate developed to better protect these fishermen. Our second comment deals with the proposal to base criteria on fish tissue as opposed to water concentration. The DFG does not have a position with respect to this approach except to point out that compliance monitoring for fish tissue criteria may impact resources. This approach would mean an increased number of fish being collected for monitoring purposes which may impact fish resources. It may also impact the DFG's fiscal resources since we regulate scientific collection activity under which fish monitoring would fall.

Response to: CTR-026-007a

Regarding the fish consumption rate, see the response to this issue in CTR-002-002a. Regarding the comments on collecting fish for compliance monitoring and its impact on the Department of Fish and Game's (DFG) resources, the commenter has misunderstood EPA's reference to elevated fish tissue levels. The CTR criteria values are for ambient water quality criteria - that is, the numerical values represent water concentrations. EPA does not intend to add, through the CTR, the collection of fish for

monitoring purposes. Therefore, the DFG should not expect to have any additional workload for collecting or analyzing fish, nor should the DFG anticipate any loss to fisheries resources as a result of the CTR.

Comment ID: CTR-029-003
Comment Author: Center for Marine Conservation
Document Type: Environmental Group
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-14 Fish or Water Consumption
References:
Attachments? N
CROSS REFERENCES

Comment: The Center for Marine Conservation (CMC) is a nationwide, nonprofit advocacy group dedicated to the conservation and enhancement of coastal and ocean life and resources. CMC submits these comments on behalf of its 16,000 members in California and over 120,000 members nationwide.

CMC applauds EPA's efforts to bring California into compliance with the Clean Water Act 303(c)(2)(B). Implementing numeric criteria that will protect the beneficial uses of California's waters is of great importance to the health of coastal and marine ecosystems, and so to CMC and its members. The reliance in many areas of the state on narrative criteria threatens the health of most of the state's waters, thereby impacting both human health and the health of the state's economy that relies on clean water.

While CMC strongly supports the swift adoption of an Enclosed Bays and Estuaries Plan and an Inland Surface Waters Plan that contain numeric criteria for toxic pollutants, CMC also is concerned that many of the specific criteria contained in the proposed rule are weaker than those contained in published guidance. CMC also believes that the proposed rule can better protect certain subpopulations from harm caused by consumption of contaminated fish and shellfish. Finally, CMC is concerned that the economic analysis of the proposed rule over-emphasizes costs and under-reports the many benefits of improving water. quality throughout the state. These three points are reviewed below.

Fish Consumption Figures Should Be Recalculated to Protect Exposed Subpopulations Adequately

For purposes of establishing human health criteria, the proposed rule assumes the consumption of 6.5 grams of fish and shellfish per day by an average adult with a body weight of 70 kilograms.(*7) These two figures should be adjusted to better protect subpopulations exposed to contaminated fish and shellfish, particularly mercury contaminated fish and shellfish.

First, the 6.5 grams per day figure simply averages fish consumption over all of the population without accounting for the fact that much of the population either does not eat fish at all or relies on fish for much of their daily diet. A simple average thus underprotects much of the more significantly exposed population. Moreover, this figure is inconsistent with the Ocean Plan's estimate of 23 grams of fish and shellfish ingested per day. At a minimum, the analysis should be revised to use this more conservative figure.

Second, the use of a 70-kilogram man significantly underprotects children and pregnant women, who are most at risk from eating fish and shellfish contaminated with toxics. The proposed rule justifies this figure by claiming that "[p]ersons of smaller body weight are expected to ingest less ... so the dose per kilogram of body weight is generally expected to be roughly comparable." In fact, growing children and pregnant women often eat as much or more than many 70-kilogram adults, and so the calculated "safe" dose will be far too high for their body size. We urge EPA to base the human health criteria on a child 's weight in order to better protect this most vulnerable group of people.

(*7) Id. at 42176.

Response to: CTR-029-003

Regarding the protectiveness of the proposed criteria, see response to CTR-029-002a. With respect to EPA's estimation of costs and benefits, see response to CTR-029-004a.

EPA disagrees with the commenter that the fish consumption rate is based on "the fact that much of the population does not eat fish" - the opposite is true (see discussion on this same issue in the response to CTR-002-002a). Also, the commenter has advocated the use of 23 gm/day from the State of California's Ocean Plan estimate. This Plan, which is the State's undertaking, and the fish intake estimate is based on consumption relevant to marine species of fish and is, therefore, not an appropriate comparison to the estimate of 6.5 gm/day, which is based on fresh/estuarine species only. EPA acknowledges that there are population groups who consume greater amounts of fish than the overall population. However, EPA believes that its assumption of 6.5 gm/day is adequately protective. These issues are discussed in the response to CTR-002-002a. Regarding the body weight assumption, EPA believes that 70 kg is an appropriate body weight because it represents a reasonable measurement for adults and most of the criteria are based on chronic health effects [i.e., Reference Doses (RfDs) based on exposure over the course of a lifetime] for which the adult population is most appropriate. EPA acknowledges that where the RfD is based on health effects in children, the exposure parameters, including the body weight assumption, should be adjusted for a child. Such assumptions may be used on a chemical-by-chemical basis in calculating criteria. However, for this rule EPA believes it has made appropriate assumptions with the chemicals being regulated. For a specific discussion on this issue related to the mercury criterion, see the response to CTR-006-001a.

Comment ID: CTR-035-022
Comment Author: Tri-TAC/CASA
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-14 Fish or Water Consumption
References:
Attachments? N
CROSS REFERENCES

Comment: p. 42176 & 42178 - Fish Consumption Rates In general, we support EPA's use of a fish consumption rate of 6.5 g/day in the CTR criteria. However, it may be more accurate to develop rates based on freshwater fish/shellfish consumption and marine/estuarine fish/shellfish consumption. While

EPA says on p. 42176 that the State may want to develop site-specific criteria where warranted, the Preamble also states on p. 42178 that EPA "supports the State's use of any appropriate higher state-specific fish and shellfish consumption rates in its readoption of criteria in its statewide plans." (emphasis added) We believe that the latter statement should be consistent with the previous statement, and that site-specific criteria should be developed using local fish and shellfish consumption rates where warranted, regardless of whether they are higher or lower than the national average consumption rate. For instance, in recalculating human health criteria for effluent dependent waters where fish consumption is a designated use, EPA or the State should consider using 1.72 g/day (see 62 Fed. Reg. 42179). We believe that this freshwater consumption rate may even be high, based on the following mean consumption rates of fish that are representative of California's freshwater fisheries (U.S. EPA, 1990b):

Bluegills 0.089 grams/day Carp 0.016 grams/day Catfish 0.292 grams/day Perch 0.062 grams/day Sunfish 0.020 grams/day Trout 0.294 grams/day

Response to: CTR-035-022

EPA disagrees that the two referenced statements regarding criteria development and fish intake rates are inconsistent. If a State determined, based on adequate data, that its population did in fact consume less fish than EPA's default value, EPA would support the State's use of that value. However, the commenter has presented values from only several species of fish from a much larger tabulated list in the original 1989 Exposure Factors Handbook (revised in 1995) and suggested that they are appropriate for a site-specific criterion. EPA disagrees with this rationale. The table actually presents consumption data from a study conducted for fish consumers in the United States. EPA believes that this is not necessarily representative of California-specific consumption patterns. The point of allowing such flexibility with site-specific criteria is that data are available for that particular site, which the commenter has not demonstrated. Further, EPA disagrees that the use of 1.72 gm/day would protect the general population of California. See additional discussion on protecting the general population in response to CTR-002-002a.

Comment ID: CTR-039-004
Comment Author: San Francisco BayKeeper
Document Type: Environmental Group
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-14 Fish or Water Consumption
References:
Attachments? N
CROSS REFERENCES

Comment: On behalf of San Francisco BayKeeper, its Stockton-based DeltaKeeper project, San Diego BayKeeper and Santa Monica BayKeeper (hereinafter "BayKeepeer"), I am submitting these comments for consideration in finalizing EPA's proposed rule establishing water quality criteria for priority toxic pollutants for the waters of the State of California. The need for numeric criteria for priority toxic pollutants was identified by Congress ten years ago when, in October, 1987, it enacted amendments to the Clean Water Act mandating that States issue such criteria by not later than October 18, 1990. The State of California adopted a portion of the mandated criteria in April, 1991, which, in large part, EPA approved. However, even that partial compliance was thwarted by the Sacramento Superior Court's

overly broad decision vacating the State's decision based solely on a flawed economic analysis purportedly required by State law.

Now, seven years later, although appreciative of the complexity of the task required by Congress, BayKeeper is deeply concerned that EPA's proposed rule to cure the State's violation will undermine permit limits promulgated throughout the Bay area and other regions, allowing more pollution to be discharged to San Francisco Bay and other state waters in violation of the State and EPA's antidegradation policies. BayKeeper also is very concerned that EPA is promulgating criteria for mercury, dioxin and 13 other pollutants which are based on drastic underestimates of the quantity of fish consumed by recreational and subsistence anglers throughout the State of California. BayKeeper also believes that at this late date, the proposal to allow compliance schedules which could delay for up to ten years compliance with permit effluent limitations based upon the proposed criteria is inappropriate given the already seven year delay suffered by California's aquatic ecosystems and the people who depend upon the health of those systems for food and recreation.

II. MANY RECREATIONAL AND SUBSISTENCE ANGLERS EAT MORE THAN 6.5 GRAMS OF FISH PER DAY.

According to EPA's "Economic Analysis of the Proposed California Water Quality Toxics Rule," (July 1997), anglers throughout the State who eat on average 107.1 grams/day of fish from California's waters (about 10% of the people fishing), after the proposed rule is enacted, will still be confronted with a lifetime cancer risk of from 6.65 x 10E-4 to 9.26 x 10E-4. Economic Analysis at 8-15. That correlates

roughly to a 1000 times greater chance of those anglers getting cancer than the 1 x E10-6 risk established by the State or an increased cancer risk of approximately I cancer death per 1,000 people. 107 grams is about a quarter of a pound. Surveys in the San Francisco Bay area have found that many anglers eat up to a pound (450 grams) per day of fish, increasing the risk even beyond that documented in the Economic Analysis. There is no reason to assume that subsistence anglers throughout the State are not consuming fish at a similar rate. In calculating criteria for mercury, dioxin, PCBs and other contaminants, EPA "assumes" a consumption rate of 6.5 grams per day. That number purports to be "equivalent to the average per-capita consumption rate of all (contaminated and non-contaminated) freshwater and estuarine fish and shellfish for the U.S. population." 62 Fed. Reg. at 42176. Congress' directive that the "solution to pollution is not dilution" should apply even more forcefully to human health impacts. EPA should not be allowed to dilute the health effects of fish consumption in California by averaging it into the fish consumption rates of the entire country nor should EPA dilute the effects of contaminated fish on those people who choose or need to use the Nation's waters more than others -- recreational and subsistence anglers -- by lumping their consumption rates in with the general populations.

Despite the fact that EPA has acknowledged in its Economic Analysis that it is well-documented that a significant subpopulation of people eat considerable amounts of fish, the proposed rule chooses to ignore this fact, couching it as a mere possibility which the State should address if it chooses to. See 62 Fed. Reg. 42176 ("[t]here may ... be circumstances where site specific numeric criteria are more stringent than the statewide criteria are necessary to adequately protect highly exposed subpopulations [like subsistence anglers'). Of course, the whole rationale for EPA to be issuing the proposed rule is inaction by the State of California. The notion that certain critical determinations involving direct human health impacts should be left to a crippled process is arbitrary and does not accomplish what Congress set out to do in establishing Section 303(c)(2)(B) back in 1987.

Perhaps the greatest irony of EPA's methodology in selecting a consumption rate is apparent if one considers that, as our waters become more and more deteriorated from toxic contaminants and people become more and more aware of that contamination, they are likely to eat less and less fish, driving down the national fish consumption average and, under EPA's way of calculating, allowing more pollution to be discharged. EPA must set a consumption level that protects the most sensitive users and renders California's waters truly "fishable" not "fishable if you want torisk getting cancer."

Response to: CTR-039-004

EPA believes its estimate of consumption level for the general population is reasonable and its selection of risk level for the general population affords adequate protection for all populations. For water quality criteria established in the CTR, individuals consuming 107.1 gm/day would be protected at approximately a 10^{-5} risk level and that individuals consuming up to a pound a day would still be protected at a 10^{-4} level. For a more detailed discussion on this same issue see the response to CTR-002-002a.

EPA acknowledges that the commenter drew its lifetime cancer risk estimates for people who eat an average of 107.1 gm/day of fish of 6.7×10^{-4} to 9.3×10^{-4} from the benefits portion of EPA's Economic Analysis (EA). However, the post rule cancer risk estimates in EPA's EA were calculated conservatively and are likely overstated for two reasons.

First, the benefits portion of the EA only accounts for risk reduction that occurs from reducing point source discharges. Thus, the post rule risk estimate in the EA is only a partial accounting of the potential reductions in fish contamination that will eventually result from implementation of the CTR. The reason for this is that EPA only accounted for costs of the rule to NPDES dischargers. In order to fairly compare costs with benefits, the benefits only included estimates of risk reductions that would take place due to increased controls on NPDES dischargers. However, in actuality, the standards established in the CTR apply to the waterbodies (i.e., inland

surface waters and enclosed bays and estuaries). As controls on other sources are implemented, perhaps as a matter of state law, (*e.g.*, remediation of contaminated sediments; best management practices to control non point sources and runoff from agricultural land), EPA expects that in the future the CTR criteria will be attained in the waterbodies and concentrations of pollutants in fish tissue will decline further.

Second, the baseline and post-regulatory risk estimate in the benefits portion of the EA was calculated by adding together all of the individual excess lifetime cancer risks for all of the chemicals identified in fish tissue data collected throughout the State. This assumes that an individual is eating fish contaminated with all of the chemicals identified in the study. To the extent that not all fish contain all contaminants at the assumed concentrations, both baseline and post-regulatory cancer risk estimates in the EA may be overstated. While this approach is appropriate for analytical purposes in the economic analysis' benefits assessment, agency scientists who establish ambient water quality criteria do not believe that the science demonstrates that individual risks can simply be added together for purposes of criteria development.

The commenter, in its discussion, also states that the consumption rate accounts for both contaminated and non-contaminated fresh/estuarine fish and shellfish. Although there are many circumstances relevant to fish consumption and contamination patterns, in an effort to be protective of populations that do consume most or all of their fish from a given water body, the equation to derive criteria does not subtract any of the consumption rate - that is, there is no discounting for non-contamination. This assumption helps to ensure that people can safely consume fish from waters designated for fishing and to derive allowable levels of toxics that are adequately protective of human health under the Clean Water Act.

EPA believes that its criteria are adequately protective. States have the flexibility to be more protective if they believe it is appropriate. However, with this rule, EPA is only promulgating criteria. That is, antidegradation policies are not affected by this action. Regulated entities must still comply with existing State antidegradation policies and procedures. Also, compliance schedules are a fact-specific, facility-specific determination. All stakeholders will have an opportunity to review the facts and comment on the appropriateness of a compliance schedule for any given situation as part of the public noticing of the draft NPDES permit. With respect to the comments regarding the length of the compliance schedule, see response to comment CTR-002-010b.

Comment ID: CTR-060-015
Comment Author: San Diego Gas and Electric
Document Type: Electric Utility
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: C-14 Fish or Water Consumption
References:
Attachments? N
CROSS REFERENCES

Comment: PROVISIONS SDG&E DOES NOT SUPPORT

As described in the following comments SDG&E does not support the following provisions:

* The fish consumption rate of 6.5 g/day used is not representative of fish consumption within the State of California, and overestimates exposure. This value is reported by the EPA to represent an estimate of average consumption of fish and shellfish from estuarine and fresh waters by the U.S. population(*3) . The draft EPA

Exposure Factors Handbook (*4)(EFH) summarizes studies on the intake of fish and shellfish, and includes study results for Northern and Southern California from the National Marine Fisheries Service. While this data is compiled for fish from marine habitats, other data summarized in Table 10-8 of the draft EFH suggests that the percentage of the population consuming and the mean daily fish intakes are higher for fish from marine habitats than for freshwater/estuarine habitats. The mean daily intake of marine finfish for anglers was 2.0 g/day for both Northern and Southern California, and the intake was 0.2 or 0.3 g/day on a per capita basis in the coastal population. The value of 2.0 g/day would be a more reasonable consumption rate and should be sufficiently health-protective of the more highly exposed sub-population of the state, because this intake is restricted to the angler population, which may reasonably be expected to consume their own catch and to represent a greater exposed population than the entire population of the state. The intake rate from this database is more up-to-date and is geographically representative. The criteria should be recalculated using the California fish intake rate.

General human health criteria issues

* Fish consumption rate - See the above discussion for PAHs regarding the over estimation of fish consumption rates used in the human health criteria.

(*3) U.S. EPA, 1989. Assessing Human Health Risks from Chemically Contaminated Fish and Shellfish. Office of Water Regulations and Standards. EPA-503/8-89-002.

(*4)U.S. EPA, 1996. Exposure Factors Handbook. EPA/600/P-95/002Ba. Office of Research and Development.

Response to: CTR-060-015

EPA disagrees with the commenter. EPA believes that the 6.5 grams/day fish intake estimate is adequately protective of the general population of fish consumers over the course of a lifetime and is appropriate for this rule. The commenter suggests that EPA use an intake value based on marine finfish consumption of 2.0 gm/day. However, it is the fresh/estuarine species of finfish and shellfish that apply to the development of water quality criteria for the waters covered under this rule. Specifically, EPA's ambient water quality criteria are applicable to inland waters and estuaries. Further, EPA is aware of other studies that indicate higher consumption rates than suggested by the commenter. For further discussion on the basis of EPA's estimate, refer to the response for CTR-002-002a.

Comment ID: CTR-065-003a
Comment Author: Environmental Health Coalition
Document Type: Environmental Group
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: C-14 Fish or Water Consumption
References:
Attachments? N
CROSS REFERENCES C-21

Comment: HUMAN HEALTH CRITERIA

EHC is very concerned about the use of 6.5 grams per day of fish tissue as a basis upon which to derive human health criteria. This is not adequate to protect the many thousands of subsistence fishers of California coastal waters. We trust EPA is not in the business of protecting "most of the people, most of the time" as is the indicated goal for marine organisms elsewhere in the CTR (see comments below).

We refer you to a study conducted by the Save San Francisco Bay Association that concluded that fishers of San Francisco Bay consumed 81grams per day in the week prior to the survey with consumption rates as high as 450 grams/day... This element of the CTR must be recalculated at a higher rate of consumption and with a healthy safety margin to accommodate for synergistic and cumulative effects. Further, the Save San Francisco study showed that heads and skin were frequently consumed, the health criteria must reflect these actual eating patterns and practices as well and reflect the cultural diversity of users of the Bays. Since many subsistence fishers are people of color, adoption of this rule could violate the President's Order on Environmental Justice b exposing these populations to increased and undue environmental health risks.

Response to: CTR-065-003a

EPA acknowledges that there are population groups that consume greater amounts of fish than the overall population. However, EPA believes that the intake rate of 6.5 grams/day is adequately protective of the general population of fish consumers over the course of a lifetime. EPA has reviewed the materials submitted by the commenter from the Save San Francisco Bay Association and, as is discussed in CTR-002-002a, the commenter needs to separate out those species defined as marine from the referenced tables (e.g., shark, ray, cod, halibut, mackerel, marine salmon) in order to appropriately compare fish intake rates that are relevant to the development of the CTR criteria. Other issues on the fish consumption rate are also discussed in the response to CTR-002-002a. Regarding the comment on the President's Executive Order on Environmental Justice, see the response to CTR-002-005a.

Comment ID: CTR-095-001d
Comment Author: M. Ruth Uiswander
Document Type: Citizen
State of Origin: CA
Represented Org:
Document Date: 10/02/97
Subject Matter Code: C-14 Fish or Water Consumption
References:
Attachments? N
CROSS REFERENCES C-20
C-17a
C-21

Comment: In regard to the numeric water quality standards criteria for California surface water, they have been revealed by environmental groups to be insufficiently protective and environmentally unjust. The proposed new rules assume fish ingestion of 6.5 grams per day. In reality, consumption of fish in some communities can be as high as 1 pound per day. This level of consumption is especially likely among subsistence fishers.

Please prevent toxic pollution in California's bays by making more protective standards that consider all toxic pollutants and consider the fish consumption habits of subsistence anglers.

Response to: CTR-095-001d

See responses to CTR-002-002a, CTR-002-005a and the response to CTR-058-001 (Subject Matter Code C-13, Risk Level).

Comment ID: CTR-097-001b
Comment Author: Mark Shaw
Document Type: Citizen
State of Origin: CA
Represented Org:
Document Date: 10/03/97
Subject Matter Code: C-14 Fish or Water Consumption
References:
Attachments? N
CROSS REFERENCES C-17a

Comment: I am writing to urge you to more stringent - and more protective - water quality standards for California surface water. The proposed standards are too weak and discriminatory in their effects.

Lastly, the proposed standards are discriminatory in their effects in that they assume consumption of only 6.5 grams of fish per day per person. Many poorer communties catch and eat fish for subsistence - as much as a pound per day per person (more than sixty what the EPA estimates!) placing them at greater risk. The standards should be set to protect everybody, including those who happen to be poor and/or eat a significant amount of fish.

Please set the standards to protect us all and move us closer to the goals of the Clean Water Act, that our waters be safely fishable and swimmable.

Response to: CTR-097-001b

See responses to CTR-002-002a, CTR-002-005a and the response for Subject Matter Code C-13, Risk Level.

Comment ID: CTR-098-001
Comment Author: Elena Goldstein
Document Type: Citizen
State of Origin: CA
Represented Org:
Document Date: 10/02/97
Subject Matter Code: C-14 Fish or Water Consumption
References:
Attachments? N
CROSS REFERENCES

Comment: I am writing to urge you to work towards the prevention of toxic pollution in the bavs of California. It is evident that more protectiive standards are needed to protect those who fish and those who consume the

fish. Not to do so would be completely irresponsible. Turning a deaf ear to the situation or bending to pressure from business interests would, I suggest, also be immoral.

Response to: CTR-098-001

See responses to CTR-002-002a and CTR-002-005a.

Comment ID: CTR-099-002
Comment Author: Emil A. Lawton, Ph.D.
Document Type: Citizen
State of Origin: CA
Represented Org:
Document Date: 10/03/97
Subject Matter Code: C-14 Fish or Water Consumption
References:
Attachments? N
CROSS REFERENCES

Comment: First, the 6.5 grams per day must be out in left field. Your staff must have divided the total consumption by the population. It ignored that some people do not eat fish, some eat very little and others eat fish regularly. Subsistence fishers are the obvious case in point, but what about so many of us who have eschewed red meat for a contemporary healthy diet of fish and fowl. We eat about I/3 LB three times a week. This comes to about 61 grams a day, almost an order of magnitude larger than you baseline case.

Response to: CTR-099-002

EPA acknowledges that there are population groups that consume greater amounts of fish than the overall population. However, EPA believes that the intake rate of 6.5 grams/day is adequately protective of the general population of fish consumers over the course of a lifetime. For a more detailed discussion on this issue, see response to CTR-002-002a.

Comment ID: CTR-101-001a
Comment Author: Cheesemans' Ecology/Brd Safari
Document Type: Environmental Group
State of Origin: CA
Represented Org:
Document Date: 10/06/97
Subject Matter Code: C-14 Fish or Water Consumption
References:
Attachments? N
CROSS REFERENCES C-20

Comment: We would like to thank the EPA for accepting comments on its proposed numeric water quality standards criteria for California surface water. We urge the prevention of toxic pollution in California's bays by creating more protective standards that consider all toxic pollutants of concern and that address the consumption habits of subsistence fishers, as well as "average" fish consumers.

Response to: CTR-101-001a

Regarding fish consumption, refer to the response to CTR-002-002a.

Comment ID: CTR-102-002
Comment Author: Bryan Gordon
Document Type: Citizen
State of Origin: CA
Represented Org:
Document Date: 10/10/97
Subject Matter Code: C-14 Fish or Water Consumption
References:
Attachments? N
CROSS REFERENCES

Comment: California EPA should not be satisfied that our state's water quality standards are adequate if they only protect the segment of the population that does not have regular or frequent contact with the water or aquatic organisms. Water quality standards should ensure that the state's waterways are pure enough to protect that segment of the population that includes subsistence fish consumers.

Since the Clean Water Act has the goal of making our Nation's waterways "fishable and "swimable", any water quality standards that do not protect the health of that segment of the population that consumes more fish than the prescribed 6.5 grams per day is simply flawed.

Response to: CTR-102-002

See response to CTR-002-002a.

Comment ID: CTR-104-001
Comment Author: Lucy Nelson, et. al.
Document Type: Citizen
State of Origin: CA
Represented Org:
Document Date: 10/15/97
Subject Matter Code: C-14 Fish or Water Consumption
References:
Attachments? N
CROSS REFERENCES

Comment: It has been proven that unacceptable amounts of such toxins as mercury, cioxin and 13 other pollutants are in our state's surface waters. In establishing standards for these toxins, proposed new rules assume fish consumption at 6.5 grams per day. But in certain communities where subsistence anglers eat fish more often, it can amount to one pound daily. Even at 1/4 pound daily, the proposed standards would mean a cancer risk 1000 times higher than current state law states as "acceptable".

We should address the consumption habits of subsistence fishers, as well as the average fish consumer from the general public.

Thank you for your immediate attention to the above.

Response to: CTR-104-001

EPA disagrees with the commenter that persons consuming a quarter pound of fish per day would experience a cancer risk 1,000 times higher than the basis of the CTR. EPA believes that individuals consuming this amount would be protected at approximately a 10-5 risk level and that idividuals consuming up to a pound a day would still be protected at a 10-4 risk level. For a more detailed discussion on this issue, see response to CTR-002-002a.

Comment ID: CTR-104-002b
Comment Author: Lucy Nelson, et. al.
Document Type: Citizen
State of Origin: CA
Represented Org:
Document Date: 10/15/97
Subject Matter Code: C-14 Fish or Water Consumption
References:
Attachments? N
CROSS REFERENCES C-01a

Comment: Proposed mercury standards fail to account for bioaccumulation of mercury in fish tissue. Mercury is amassed through their consumption of food.

Response to: CTR-104-002b

Regarding the issue on mercury bioaccumulation, see response to CTR-002-007b.

Comment ID: CTR-105-001b
Comment Author: Heather Catherine Park Tausig
Document Type: Citizen
State of Origin: CA
Represented Org:
Document Date: 10/13/97
Subject Matter Code: C-14 Fish or Water Consumption
References:
Attachments? N
CROSS REFERENCES C-20

Comment: I understand that the EPA is currently accepting comments on its proposed numeric water quality standards criteria for California surface water. I am writing to urge the EPA support the prevention of toxic pollution in California's bays by creating more protective standards that consider all toxic pollutants of concern and that address the consumption habits of subsistence fishers, as well as "average" fish consumers.

Response to: CTR-105-001b

Regarding the fish consumption issue, refer to response to CTR-002-002a.

Comment ID: CTR-106-001
Comment Author: Robert Brown
Document Type: Citizen
State of Origin: CA
Represented Org:
Document Date: 10/28/97
Subject Matter Code: C-14 Fish or Water Consumption
References:
Attachments? N
CROSS REFERENCES

Comment: It has been proven that unacceptable amounts of such toxins as mercury, cioxin and 13 other pollutants are in our state's surface waters. In establishing standards for these toxins, proposed new rules assume fish consumption at 6.5 grams per day. But in certain communities where subsistence anglers eat fish more often, it can amount to one pound daily. Even at 1/4 pound daily, the proposed standards would mean a cancer risk 1000 times higher than current state law states as "acceptable".

We should address the consumption habits of subsistence fishers, as well as the average fish consumer from the general public.

Thank you for your immediate attention to the above.

Response to: CTR-106-001

See response to CTR-104-001.

Comment ID: CTR-106-002b
Comment Author: Robert Brown
Document Type: Citizen
State of Origin: CA
Represented Org:
Document Date: 10/28/97
Subject Matter Code: C-14 Fish or Water Consumption
References:
Attachments? N
CROSS REFERENCES C-01a

Comment: Proposed mercury standards fail to account for bioaccumulation of mercury in fish tissue. Mercury is amassed through their consumption of food.

Response to: CTR-106-002b

Regarding the issue on mercury bioaccumulation, see response to CTR-002-007b.

Comment ID: CTR-109-001a
Comment Author: Maggie Miller
Document Type: Citizen
State of Origin: CA
Represented Org:
Document Date: 12/01/97
Subject Matter Code: C-14 Fish or Water Consumption
References:
Attachments? N
CROSS REFERENCES C-20

Comment: The new water quality standards the EPA is proposing for California surface waters disturbs me greatly. There are several problems with the proposed rules. First in establishing standards for mercury, dioxin, PCBs, and other contaminants, the proposed new rules assume fish consumption at 6.5 grams per day yet consumption of fish in certain communities can be as high as one pound per day, over 60 times more than estimated by the EPA. Please don't underestimate fish consumption by people of different races and cultures.

Please prevent the toxic pollution of California waters by creating more protective standards that consider all toxic pollutants and all consumers of fish. Thank you.

Response to: CTR-109-001a

EPA acknowledges that there are population groups that consume greater amounts of fish than the overall population. However, EPA believes that the intake rate of 6.5 grams/day is adequately protective of the general population of fish consumers over the course of a lifetime. For a more detailed discussion on this issue, see responses to CTR-002-002a and CTR-002-005a.

Comment ID: CTR-109-002b
Comment Author: Maggie Miller
Document Type: Citizen
State of Origin: CA
Represented Org:
Document Date: 12/01/97
Subject Matter Code: C-14 Fish or Water Consumption
References:
Attachments? N
CROSS REFERENCES C-01a

Comment: Second, the proposed mercury standards fall to account for the bioaccumulation of mercury in fish tissue. The proposed standard ignores mercury that enters fish through their own consumption of food.

Response to: CTR-109-002b

Regarding the issue on mercury bioaccumulation, see response to CTR-002-007b.

Comment ID: CTRH-001-050b
Comment Author: Michael Lozeau
Document Type: Public Hearing
State of Origin: CA
Represented Org: S.F. Bay/Delta Keeper
Document Date: 09/17/97
Subject Matter Code: C-14 Fish or Water Consumption
References:
Attachments? N
CROSS REFERENCES C-1a

Comment: For mercury, certainly I would concur with the previous comments, that the number should be -- that is appropriate is accumulation factors.

Now the bioconcentration factor, in deference to this state's consumption rates that have been determined are appropriate for California, I think using the average consumption rate for everyone in the country, by definition, lops off about half of the population. It seems to me that it doesn't account for those users of the bay who are the high consumption -- high fish-consumption users, which obviously there's a number of them, and that's not reflected in that average at all.

So I think that those bioaccumulation factors are important to the mercury number base data that we have for the bay for all the reasons stated earlier, and similarly for dioxin. It seems as if EPA would like to back away on that, the criteria that is listed.

Response to: CTRH-001-050b

Regarding the issue on the fish consumption rate, see response to CTR-002-002a. Regarding the issue on mercury bioaccumulation, see response to CTR-002-007b.

Comment ID: CTRH-001-053
Comment Author: Michael Lozeau
Document Type: Public Hearing
State of Origin: CA
Represented Org: S.F. Bay/Delta Keeper
Document Date: 09/17/97
Subject Matter Code: C-14 Fish or Water Consumption
References:
Attachments? N
CROSS REFERENCES

Comment: I already mentioned average consumption rate, but 6.5 grams is just not realistic. I have people out fishing every day at -- my office is on the end of a pier in San Francisco, and every day there are at least five or six people fishing off that pier, the same people every day, and some of them are great at it. They throw that line in and get six or seven fish every day, and I'm sure they're eating them.

I can't actually communicate with them very well -- one of them, I can. And people who eat a lot of fish, consuming fish regularly from the bay, 6.5 is really not a realistic number to protect the most sensitive part of the population.

And EPA is doing air rules related to asthma, geared for the most sensitive part of the population, but you get to the water rules and we're looking at very little -- the average for the whole country, even including Montana or Idaho, where -- I don't even know whether fish consumption goes down in the middle of the country, but I have to imagine that in the coastal states it's much higher.

So the average has nothing to do with the most sensitive population. so that should be taken into account. That would adjust some numbers pretty drastically.

Response to: CTRH-001-053

See responses to CTR-002-002a and CTR-002-005a.

Subject Matter Code: C-15 Salinity

Comment ID: CTR-016-004
Comment Author: San Francisco Bay RWQCB
Document Type: State Government
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-15 Salinity
References:
Attachments? Y
CROSS REFERENCES

Comment: Proposed Application of Saltwater and Freshwater Criteria

In the proposed California Toxics Rule, EPA is proposing to use the definitions in 40 CFR 131.38(c)(3) to determine when saltwater and freshwater criteria should apply to water bodies. The proposal is to use the lower of the freshwater and saltwater criteria when salinities are between less than 1 ppt 95% of the time and greater than 10 ppt 95% of the time. In the 1995 Basin Plan amendments, the Regional Board included a different application procedure. Like EPA, the Regional Board uses the lower of the freshwater and saltwater objectives for estuarine waters, but defines estuarine water as having salinities between less than 5 ppt 75% of the time and greater than 5 ppt 75% of the time, or "tidally influenced fresh waters that support estuarine beneficial uses." The Regional Board elected to use a combination of biological indicators (estuarine beneficial uses) and salinity measurements to define estuarine areas because of the difficulty of accurately depicting estuarine zones using salinity measurements without extensive data spanning channel depth and width, and variability with tides, seasons, and riverine flows.

The Regional Board's definition of how salt and freshwater objectives/ standards will be applied in estuarine waters was part of the 1995 Basin Plan amendments (p. 4-13, first column--attached). Those amendments have been formally approved by all of the appropriate state agencies and have been submitted to EPA for final approval.

We recommend that EPA add a provision to the proposed rulemaking that indicates the primary decision for whether waters are classified as estuarine should be based on the presence of estuarine organisms for any significant period of time and the secondary decision based on salinity measurements. In addition, we request that EPA specifically exclude the proposed federal definition of estuarine waters for implementation of federally promulgated standards within the San Francisco Bay Region (or formally approve the 1995 Basin Plan amendments and indicate that Basin Plan provisions take precedence over provisions in this proposed rule).

Response to: CTR-016-004

Comment ID: CTR-035-030
Comment Author: Tri-TAC/CASA
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 09/25/97

Subject Matter Code: C-15 Salinity
References:
Attachments? N
CROSS REFERENCES

Comment: pp. 42183-42184 -- Applicability of Freshwater or Saltwater Aquatic Life Criteria in Estuarine Environments The proposed regulation includes a provision for estuarine waters where the salinity is between 1 and 10 parts per thousand, whereby the more stringent of the freshwater and saltwater criteria would apply unless EPA approves the application of the freshwater or saltwater criteria based on a biological assessment. We challenge the basis for the following rationale put forth in the Preamble: "In the brackish water transition zones of estuaries, there generally will be a mix of freshwater and saltwater species. Generally, therefore, it is reasonable for the more stringent of the freshwater or saltwater criteria to apply." We find this conclusion to be questionable; it is equally possible that the saltwater or freshwater species that occur in brackish environments may be more tolerant rather than more sensitive. We recommend that EPA include these procedures for determining appropriate criteria for those instances where salinity is between 1 and 1O parts per thousand as guidance in the Preamble, rather than placing them in the rule itself.

Response to: CTR-035-030

Comment ID: CTR-038-011
Comment Author: Sonoma County Water Agency
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-15 Salinity
References:
Attachments? Y
CROSS REFERENCES

Comment: 10. EPA should allow permit authorities flexibility in establishing saltwater criteria where the salinity is between 1 and 10 parts per thousand. The proposed rule states that for these salinities the more restrictive of the salt and freshwater criteria should apply. This is unnecessary and has the effect of preempting the permit authority's flexibility to apply the most appropriate criteria in any given circumstance. In preempting the permit authority's flexibility, it conflicts with numerous statements in the Preamble and the economic analysis, which point to the considerable flexibility the State has in implementing the criteria.

Response to: CTR-038-011

Comment ID: CTR-054-011
Comment Author: Bay Area Dischargers Assoc.
Document Type: Sewer Authority
State of Origin: CA
Represented Org:

Document Date: 09/25/97
Subject Matter Code: C-15 Salinity
References:
Attachments? Y
CROSS REFERENCES

Comment: EPA should allow permit authorities flexibility in establishing saltwater criteria where the salinity is between 1 and 10 parts per thousand. The rule states that for these salinities the more restrictive of the salt and freshwater criteria should apply. This is unnecessary and has the effect of preempting the permit authority's flexibility to apply the most appropriate criteria in any given circumstance. In preempting the permit authority's flexibility, it conflicts with numerous statements in the Preamble and the economic analysis, which point to the considerable flexibility the State has in implementing the criteria.

Response to: CTR-054-011

Comment ID: CTR-058-004
Comment Author: Western States Petroleum Assoc
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: C-15 Salinity
References:
Attachments? Y
CROSS REFERENCES

Comment: 3. Freshwater/saltwater. WSPA supports giving permit writers and other regulators flexibility when selecting the appropriate criteria when waters may not be clearly salty or clearly fresh.

EPA proposes to require using the more stringent of freshwater or saltwater criteria when the receiving water is neither >10 ppt salinity 95% of the time (i.e., clearly salty) nor <1 ppt salinity 95% of the time (i.e., clearly fresh). This approach is needlessly inflexible. Permit writers and others should be allowed to judge which criterion is appropriate.

For example, there may be many cases when the freshwater criterion is lower, but the receiving water is salty enough that no freshwater aquatic life could survive. Thus, a freshwater criterion to protect species that are not there is invalid, inappropriate, and potentially wasteful of the state's resources if it causes point sources to invest in treatment merely for treatment's sake. Conversely, a saltwater criterion might be the lower value in a receiving water which is never salty enough to support marine life. A similar argument applies.

Lastly, it will probably be common to find receiving waters which may support both marine and freshwater organisms and in such cases the permit writer would use the more restrictive criterion. Each receiving water should be evaluated based on the facts and the permit writer should be allowed to exercise their professional judgment.

EPA trusts permit writers to select different criteria based on seasonal concerns. There is no reason not

to allow them to select the appropriate criteria I in the'case of ambiguous salinity as well.

Response to: CTR-058-004

Comment ID: CTR-059-011
Comment Author: Los Angeles County Sanit. Dist
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: C-15 Salinity
References: Letter CTR-059 incorporates by reference letter CTR-035
Attachments? Y
CROSS REFERENCES

Comment: Applicability of Freshwater/Saltwater Criteria in Estuarine Environments

We disagree with EPA's proposal in the Preamble to apply the more stringent of the freshwater and saltwater criteria when waters are in an intermediate salinity range or when salinity fluctuates diurnally due to tidal action. We believe a more valid approach is for the State to approve the choice of criteria based on a biological assessment. There may be many cases when the freshwater criterion is lower, but the receiving water is salty enough so that no freshwater aquatic life could survive there. Under this scenario, the application of a freshwater criterion to protect species that are not present is inappropriate and a waste of resources should it trigger the need for additional control efforts. A similar argument applies in cases where a saltwater criterion is used for a receiving water which is never salty enough to support marine life. Each receiving water should be evaluated based on the facts and the permit writer should be allowed to exercise his professional judgment in selecting the appropriate criteria and establishing water quality-based effluent limits. We recommend that EPA delete this provision from the Preamble, and if necessary develop guidance on determining appropriate criteria for those instances where salinity is between 1 and 10 parts per thousand.

Response to: CTR-059-011

Subject Matter Code: C-16 SDWA

Comment ID: CTR-025-001a
Comment Author: Metro. Water Dist. of So. Cal.
Document Type: Water District
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: C-16 SDWA
References:
Attachments? Y
CROSS REFERENCES C-20

Comment: Proposed California Toxic Rule

The Metropolitan Water District of Southern California (Metropolitan) appreciates this opportunity to comment on the U.S. Environmental Protection Agency's (U.S.EPA) proposed California Toxics Rule(CTR). Metropolitan, through its 27 member agencies, supplies nearly 60% of the drinking water used by approximately 16 million people living in the six-county region of Southern California. Our sources of supply are surface waters from Northern California and the Colorado River.

The water quality criteria proposed in the CTR are of critical importance to Metropolitan and other drinking water suppliers. These criteria create the basis for source water protection activities which are the first line of defense for ensuring a safe drinking water supply. Further, the criteria help protect aquatic species, including the unique aquatic resources of the Bay-Delta. The health of the Bay-Delta ecosystem and waters tributary to the Delta is linked to the amount of water available for export and thus directly affects water supply reliability of the exporting water agencies such as Metropolitan. Lastly, the CTR criteria affect the ability of water suppliers to operate and maintain their facilities.

Metropolitan recognizes that the CTR is only required to address the Clean Water Act's "priority pollutants". We note, however, that many of the drinking water contaminants regulated under the Federal and/or California Safe Drinking Water Acts (SDWA) are not among the priority pollutants. Table I lists the drinking water chemical constituents regulated under the California SDWA which are not priority pollutants. (The California SDWA regulates a broader set of contaminants than the Federal SDWA and provides the appropriate regulatory comparison since the CTR pertains solely to California.) Drinking water beneficial, uses cannot be fully protected without water quality criteria for all California SDWA regulated contaminants. Metropolitan requests that U.S. EPA consider including human health criteria for the contaminants listed in Table I as part of the CTR.

Response to: CTR-025-001a

The scope of today's rule is to establish numeric criteria to bring California into compliance with CWA Section 303(c)(2)(B). Section 303(c)(2)(B) requires adoption of numeric criteria for priority toxic pollutants contained in CWA Section 307(a) for which EPA has issued Section 304(a) criteria guidance the discharge or presence of which could reasonably be expected to interfere with the designated uses of state waters. The promulgation of pollutants that are not identified as priority toxic pollutants (i.e, those pollutants that are not contained in the CWA Section 307(a) list) are outside of the scope of today's rule.

While EPA agrees that there may be other pollutants that adversely impact environmental protection,

EPA notes that states do have the authority to develop and adopt criteria for pollutants that are not contained on the 307(a) list in order to protect the designated uses of their waters. The Water Quality Standards Regulation (see 40 CFR 131) requires all states, including California, to adopt criteria that provide sufficient coverage to protect the designated uses of their waters. Furthermore, where a state has not adopted sufficient coverage of numeric criteria to protect the designated uses, the state may utilize its narrative criteria to derive criteria for pollutants to supplement the numeric criteria.

Comment ID: CTR-025-002b
Comment Author: Metro. Water Dist. of So. Cal.
Document Type: Water District
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: C-16 SDWA
References:
Attachments? Y
CROSS REFERENCES C-17a

Comment: For California SDWA regulated contaminants which are also priority pollutants, the human health water quality criteria proposed under the CTR and existing California SDWA primary Maximum Contaminant Levels (MCLs) are not always consistent. While CTR criteria apply to source waters and drinking water MCLs apply to finished drinking water, Metropolitan urges that U.S. EPA ensure greater consistency between these regulatory levels.

Table 2 identifies the priority pollutants which have California SDWA primary MCLs and for which the CTR either does not establish any human health criteria or the CTR human health criteria exceed the California SDWA primary MCL. Metropolitan requests that U.S. EPA set the CTR human health criteria for the contaminants in Table 2 at levels not to exceed the California SDWA MCL.

Response to: CTR-025-002b

When multiple criteria apply to a waterbody, the most stringent criterion governs. For instances where California has adopted an MCL as a water quality standard that is more stringent than criteria contained in the final CTR, the MCL would provide the basis for protecting the drinking water use.

Comment ID: CTR-025-003b
Comment Author: Metro. Water Dist. of So. Cal.
Document Type: Water District
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: C-16 SDWA
References:
Attachments? Y
CROSS REFERENCES C-17a
C-12a

Comment: Human health water quality criteria for a number of other priority pollutants are at levels significantly below the corresponding California SDWA MCL. While Metropolitan favors a margin of safety between human health-water quality criteria and the SDWA MCL, significant differences between these two regulatory requirements can create problems in the course of maintenance of drinking water facilities.

For example, water utilities need to periodically "de-water" their lines as part of routine maintenance. The de-watering of distribution lines transporting treating drinking water results in discharges containing trihalomethanes (THMs). The CTR proposes human health criteria for each of the four compounds comprising the THM classification. The total limit under the CTR for THMs as a group is 11 ug/L, significantly below the California SDWA MCL of 100 ug/L as well as the proposed level of 80 ug/L for Stage 1 of the Disinfection/Disinfectant By-Products Rule. Thus, the discharge of water that meets California SDWA standards could potentially violate CTR human health criteria if that water is discharged to a source of drinking water supply. Metropolitan requests that EPA establish CTR human health criteria for THMs consistent with the California SDWA MCLs for THMS.

Response to: CTR-025-003b

See response to CTR-025-003b.

Comment ID: CTR-025-004b
Comment Author: Metro. Water Dist. of So. Cal.
Document Type: Water District
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: C-16 SDWA
References:
Attachments? Y
CROSS REFERENCES C-02b

Comment: The proposed CTR freshwater aquatic life criteria for copper are also problematical for many drinking water suppliers. Copper algaecides are a necessary element of algal control strategies for drinking water reservoirs and conveyances. Even with a comprehensive reservoir management program based on immunological principles, copper algaecides need to be part of the algal control arsenal. Algal growth, if uncontrolled, can lead to unacceptable levels of trihalomethanes (THMS) in treated water supplies, among other impacts.

The CTR proposes freshwater aquatic life criteria for copper which could severely hamper the ability of drinking water suppliers to use copper algaecides. The dosage of these algaecides which is effective for controlling algal growth could lead to periodic exceedances of the copper freshwater criteria. Yet, use of copper algaecides is sometimes necessary to protect drinking water beneficial uses, and there is currently no economically feasible alternative available. Drinking water suppliers have the difficult task of meeting conflicting requirements to protect drinking water beneficial uses while ensuring that aquatic life criteria for copper are met.

Response to: CTR-025-004b

See responses to CTR-020-018 and CTR-025-002a.

EPA believes that discharges can meet both the requirements of the Safe Drinking Water Act (SDWA) and the Clean Water Act (CWA) after the CTR is promulgated. EPA believes that any final limits for copper would be feasible to meet because it is unlikely that a discharger would receive criteria end-of-pipe limits due to the dilution available in the receiving stream, as well as other factors taken into account, when translating a criterion into a water quality criteria-based effluent limit. EPA acknowledges that controlling trihalomethanes is important, but does not believe it is incompatible with protecting aquatic life in the stream. EPA is including the freshwater copper criteria in today's rule to ensure adequate protection of aquatic organisms in California. EPA also notes that there are some flexibilities and regulatory relief mechanisms that California may exercise to assist dischargers in meeting their permit limits for the criteria included in today's rule. (See preamble discussion on E.O. 12866).

Comment ID: CTR-025-006b
Comment Author: Metro. Water Dist. of So. Cal.
Document Type: Water District
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: C-16 SDWA
References:
Attachments? Y
CROSS REFERENCES B

Comment: Some of the concerns noted above could be addressed through the implementation provisions of the CTR. As you know, the State Water Resources Control Board has just made available for public review the Proposed Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California (Proposed ISWP/EBEP Policy), the implementing document for the CTR. Because of the length of the document (several hundred pages) and the fact that it has only recently become available, there has been insufficient time for thorough review. Yet, this document is crucial to understanding the practical impact of the CTR.

Metropolitan strongly requests that U.S. EPA extend the comment period on the CTR to December 10, 1997, the end of the comment period for the Proposed ISWP/EBEP Policy. This would allow drinking water suppliers and others affected by the CTR to evaluate the CTR in the context of its implementation. Without workable implementation provisions, the operational and economic impacts on drinking water suppliers could be significant and may need to be taken into account in the CTR. If the comment period is not extended, we ask that U.S. EPA fully consider the impacts of the freshwater aquatic life criteria on the operation and maintenance activities of drinking water suppliers and the effect on water reclamation activities and to modify the CTR, as necessary, so that these activities can continue to be undertaken in an economically feasible manner.

The CTR forms the backbone of the water quality regulatory process and Metropolitan urges U.S. EPA to review the proposed criteria in light of regulatory requirements of the California/Federal SDWA and the operating and maintenance requirements of drinking water suppliers. If you have any questions regarding Metropolitan's comments, please feel free to call Marcia Torobin of my staff at (213) 217-7830.

Response to: CTR-025-006b

See responses to CTR-025-002b, CTR-025-004b.

Subject Matter Code: C-17 Methodologies

Comment ID: CTR-061-005b
Comment Author: G. Fred Lee & Associates
Document Type: Academia
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-17 Methodologies
References:
Attachments? Y
CROSS REFERENCES I-03

Comment: Additional Comments

Presented below are some specific comments on statements made in the proposed CTR Federal Register.

Page 42160, third column, near the bottom, municipal stormwater dischargers should be added to the list of NPDES dischargers who have an interest in this rule. If anything, they probably will be affected more than any other entity.

Page 42161, third column, first paragraph, states,

"Numeric criteria for toxic pollutants allow the State and EPA to evaluate the adequacy of existing and potential control measures to protect aquatic ecosystems and human health. Numeric criteria also provide a more precise basis for deriving water quality-based effluent limitations in National Pollutant Discharge Elimination System (NPDES) permits to control toxic pollutant discharges."

That statement is somewhat unreliable and misleading.

While it is bureaucratically simpler for regulatory agencies to numerically compare concentrations found in an effluent or in ambient waters with a chemical concentration-based water quality criterion, the claim made in the quoted statement is not necessarily true. In fact, rarely is the exceedance of numeric criteria a reliable basis for assessing the impacts of constituents on human health or the environment. While it may be more precise, it can be highly inaccurate. This is one of the areas that needs to be corrected by the US EPA where biological effects-based approaches are used, rather than chemical-based approaches for regulating such impacts as aquatic life toxicity for potentially toxic constituents.

Response to: CTR-061-005b

EPA agrees that storm water dischargers may be affected by this rule. EPA does not agree that application of numeric criteria, after adjustment by the site-specific water-effect ratio provided by the rule, would rarely be reliable. Also see response to CTR-020-006.

In addition, EPA believes that for the regulated community, the chemical-specific approach offers the advantage of allowing the permittee to focus immediately on a single contaminant for the purposes of designing effluent treatment. In contrast, whole effluent toxicity often leads to a facility conducting fairly extensive investigations to identify the cause of adverse effects on the tested organisms and to

develop an effective approach to reducing the effects.

Comment ID: CTR-061-008
Comment Author: G. Fred Lee & Associates
Document Type: Academia
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-17 Methodologies
References:
Attachments? Y
CROSS REFERENCES

Comment: Page 42162, third column, last paragraph, states,

"The forward to that guidance noted EPA's two-fold water quality based approach to controlling toxic pollutants: chemical specific numeric criteria and biological testing in whole effluent or ambient waters to comply with narrative 'no toxics in toxic amounts' standards. "

That statement was published in 1983 in the US EPA Water Quality Standards Handbook. While the significant technical deficiencies of this two-fold approach have been known now for over 15 years, the Agency has still not addressed the over-regulation that occurs from trying to use chemical concentration-based criteria to regulate biological impacts associated with aquatic life toxicity and excessive bioaccumulation of hazardous chemicals in aquatic life tissue.

Response to: CTR-061-008

EPA does not agree. EPA believes that the rule's provision for site-specific adjustments to criteria addresses the problem of unnecessarily stringent chemical criteria. See response to CTR-061-005b. With respect to bioaccumulative chemical risks, EPA believes that the best way to monitor bioaccumulative chemicals is to measure the concentration in the portions or tissues of aquatic biota that are consumed by humans and wildlife.

Comment ID: CTR-061-009
Comment Author: G. Fred Lee & Associates
Document Type: Academia
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-17 Methodologies
References:
Attachments? Y
CROSS REFERENCES

Comment: Page 42163, first column, last paragraph, states,

"Congress was frustrated that states were not using the numerous CWA section 304(a) criteria guidance that EPA had and was continuing to develop, to assist states in controlling the discharge of priority toxic pollutants. "

The reason the states were not adopting those criteria was that the criteria as implemented tend to over-regulate. The criteria do not properly consider how chemical constituents impact beneficial uses. The US EPA's adjustments of the criteria do not properly incorporate the aqueous environmental chemistry of the constituents in developing site-specific criteria. Basically, there is still a significant problem with how the US EPA developed criteria relative to how they are implemented at the state and local level. I was involved as a US EPA invited peer-reviewer of the criteria development approach, as well as several criterion documents that became part of the "Gold Book" criteria. I am, therefore, familiar with this topic area and know that it was never the intent of those who helped develop those criteria to have them mechanically implemented, as is being done today, into discharge limits. This leads to significant over-regulation and significant waste of public and private funds in construction of unnecessary treatment works beyond those that would be needed to protect the designated beneficial uses of a waterbody.

One of the fundamental problems that exist today is the US EPA's Independent Applicability Policy. That Policy was adopted without public review in the early 1990s. It establishes that chemical-specific criteria must be met, even if appropriately conducted biological assessments of toxicity, bioaccumulation, etc. show that the chemical-specific criteria are technically invalid for the particular situation of concern. This is a fundamentally flawed approach that should be terminated. This issue has been discussed in a paper, "Independent Applicability of Chemical and Biological Criteria/standards and Effluent Toxicity Testing" (Lee and Jones-Lee, 1995). While the US EPA criteria and standards group in Washington, D.C. has indicated that it is proposing to change the Independent Applicability Policy, the proposed changes as discussed thus far are not adequate to eliminate the fundamentally technically flawed aspects. The purpose of water quality criteria and standards is to protect designated beneficial uses, which for aquatic life means to prevent toxicity as might be measured by the kinds of tests that were used to establish the criteria. It is inappropriate to require achieving chemical-specific criteria as they currently exist, in waters in which there is no toxicity; that Independent Applicability Policy is obviously fundamentally flawed and should not be perpetuated.

Response to: CTR-061-009

EPA does not agree that the criteria, when adjusted for site-specific factors as provided by the rule, do not properly consider how chemical constituents impact beneficial uses. In setting criteria, EPA considers the scientific evidence of the toxicity of a pollutant. EPA stands behind the judgements made in its derivation of the criteria, and believes these judgements are reasonable.

The independent application policy is outside the scope of this rule. Nevertheless, independent application means that in stream biological monitoring and ambient or effluent toxicity testing can be used in a scientifically sound procedure for site-specific modification of the chemical criteria, but may not be used as a rationale simply to suspend implementation of the criteria.

Comment ID: CTR-061-010
Comment Author: G. Fred Lee & Associates
Document Type: Academia
State of Origin: CA

Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-17 Methodologies
References:
Attachments? Y
CROSS REFERENCES

Comment: Page 42168, first column, first paragraph, states,

"EPA's guidelines are designed to derive criteria that protect aquatic communities by protecting most of the species and their uses most of the time, but not necessarily all of the species all of the time (1985 Guidelines, page 1). EPA 's 1985 Guidelines attempt to provide a reasonable and adequate amount of protection with only a small possibility of substantial overprotection or underprotection. "

While the statement is appropriate for under-protection for the regulated chemicals, it is inappropriate for over-protection. Many of the water quality criteria tend to grossly over-protect based on the way they are implemented. This applies even to metals implemented as salt species.

Response to: CTR-061-010

EPA does not believe that the rule's provisions tend to grossly over-protect. The rule includes some provisions to modify criteria concentrations, averaging periods, and allowable exceedance frequencies to avoid either over- or under-protection.

Comment ID: CTR-061-011
Comment Author: G. Fred Lee & Associates
Document Type: Academia
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-17 Methodologies
References:
Attachments? Y
CROSS REFERENCES

Comment: Page 42168, first column, first paragraph, the statement, "The approach EPA is using is believed to be as well balanced as possible, given the state of the science." is inappropriate. The US EPA has still not graduated to the level of science that was present as part of the National Academies of Science and Engineering "Blue Book" "Water Quality Criteria" which focused on directly measuring toxicity of chemicals rather than trying to estimate toxicity through chemical-specific criteria.

Response to: CTR-061-011

EPA stands behind its technical assumptions made in the derivation of its criteria, and believes the resulting criteria are reasonable. EPA believes the calculation of water quality criteria for aquatic life based on toxicity data for aquatic species is appropriate. Congress further endorsed this approach in the 1987 amendments that added section 303(c)(2)(B) to the CWA.

EPA does not believe that chemical-specific criteria are inconsistent with the 1972 Blue Book approach. The Blue Book recommended numerous chemical-specific criteria, where available toxicity data were sufficient to support them.

Comment ID: CTR-096-001b
Comment Author: City of Modesto
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-17 Methodologies
References:
Attachments? N
CROSS REFERENCES I-03

Comment: Thank you for the opportunity to comment on the proposed California Toxics Rule. The City's comments are related to five main concepts:

1. The numerical standards are ambiguous or incomplete to address the variety of operating conditions under which discharges to waters of the United State occur.

Specifically, the City submits the following comments:

A. California's receiving waters have a very wide diversity of hydraulic and environmental conditions. The numerical standards do not take into account the wide range of rainfall patterns, storm durations, irrigation flows and power generation flows that are the current aquatic habitat. California's rivers are highly regulated, highly managed. The proposed regulations neither address this variety, nor provide a means by which numerical standards can be readily developed to address such variety.

B. The California Toxic Rule presents new water quality standards for the State of California. This rule presents water quality standards for all water bodies within the state. Water quality standards as presented in this rule would apply to all environmental conditions (dry and wet weather). During wet weather, conditions in the receiving streams can be extremely variable due to the quality and quantity of stormwater. Treatment plants generally have hydraulic capacity to process twice the average dry weather flow received. Water quality standards were developed based on dry weather conditions. Therefore, numerical water quality standards should not need to be achieved during storm events. If water quality standards need to be achieved during storm conditions, it is suggested that new standards be developed to account for the changes in environmental conditions.

Response to: CTR-096-001b

The criteria specified in the rule are adequate across California because they are designed to apply under all environmental conditions. EPA does not agree that its criteria concentrations were based on dry-weather conditions. Most of concentrations are based on laboratory toxicity tests. EPA agrees that its numerical exceedance frequency and design flow specifications are based on dry-weather conditions. Nevertheless, the rule provides for alternative development of averaging periods and exceedance frequencies, thereby allowing the extension of their applicability to wet-weather conditions. In addition, the Rule provides for site-specific modifications of criteria concentrations, to account for a site's water

quality characteristics.

The criteria specified in the rule are adequate across California because they are designed to apply under all environmental conditions. EPA does not agree that its criteria concentrations were based on dry-weather conditions. Most of concentrations are based on laboratory toxicity tests. EPA agrees that its numerical exceedance frequency and design flow specifications are based on dry-weather conditions. Nevertheless, the rule provides for alternative development of averaging periods and exceedance frequencies, thereby allowing the extension of their applicability to wet-weather conditions. In addition, the Rule provides for site-specific modifications of criteria concentrations, to account for a site's water quality
characteristics.

Subject Matter Code: C-17a Methodologies Human Health

Comment ID: CTR-002-002b
Comment Author: Comm. for a Better Environment
Document Type: Environmental Group
State of Origin: CA
Represented Org:
Document Date: 09/24/97
Subject Matter Code: C-17a Methodologies Human Health
References:
Attachments? Y
CROSS REFERENCES C-14

Comment: I. TOXIC POLLUTANTS THREATEN PUBLIC HEALTH AND SAN FRANCISCO BAY.

Toxic pollution causes harm in San Francisco Bay. Species of bivalve shellfish, plankton and phytoplankton that are especially vulnerable to toxic trace elements such as copper are decimated in its southern reach though they thrive in comparable estuaries with less metals pollution. (*1) (*2) Mounting evidence suggests its sediment is toxic to some aquatic life.(*3) Extensive research strongly suggests that PCBs and PAHs released to the Bay negatively effect reproduction in starry flounder. (*4) Reproductive effects are also correlated with PCBs in Bay cormorant eggs, Bay harbor seals have PCBs levels twice those associated with immunotoxicity and a disease epidemic that decimated a European population of this species.(*5) Health advisories are in effect because dioxin, PCBS, mercury, chlordane, DDT, dieldrin, and selenium contaminate Bay food resources eaten by the public (*6) (*7)

Public health threats from toxics in the food chain are of particular concern. A recent count found approximately 270,000 fishing licenses were issued to Bay Area residents. Surveys by CBESAFER!, the Save San Francisco Bay Association, and the Asian Pacific Environmental Network show that many people fish the Bay regularly to supplement their families' diet, that some people eat up to a maximum of a pound of fish per day, and that the majority of those who eat their catch regularly are people of color. [See attachment (*8)] A pound of fish per day is about 480 oz./month, sixty times the 8 oz./month "safety" cutoff for cancer and slow learning in the state's advisory.(*6)

In addition to these severe environmental health and justice problems, pollutant monitoring of the Bay is far from comprehensive, and undetected problems are likely. Indeed, EPA acknowledged that designated uses of the Bay are threatened or impaired by toxic pollutants when it named the Bay as a "toxic hot spot" under Section 304(l) of the Clean Water Act.(*9)

(*1) U.S. Geological Survey, 1992. Letter from Samuel N. Luoma, Ph.D., to Seven R. Ritchie, Executive Officer, Regional Water Quality Control Board. August 24, 1992.

(*2) Karras, 1992. Comparison of copper in waters of the southern reach of San Francisco Bay and ten other estuaries. Communities for a Better Environment (CBE). July, 1992.

(*3) San Francisco Estuary Institute, 1997. Regional monitoring program for trace substances 1995 annual report. Excerpts including pages 105, 3, and A-17 through A-24 showing the percentage of sediment bioassays (larval bivalve and Eohaustorius tests) that were toxic (less than 80% of control

value) at RMP stations from 1991-1996, sampling stations, and dissolved and total metal, and PAH concentrations in San Francisco Bay waters.

(*4) Spies et al., (2 papers), 1988: Effects of organic contaminants on reproduction of the starry flounder Platichthys stellatus in San Francisco Bay, I., Hepatic contamination and mixed-function oxidase (MFO) activity during the reproductive season. Marine Biology 98: 181-189; and II. Reproductive success of fish captured in San Francisco Bay and spawned in the laboratory. Marine Biology 98: 191-200. Excerpt including abstracts.

(*5) Kopec and Harvey, 1995, Toxic pollutants, health indices, and population dynamics of harbor seals in San Francisco Bay, 1989-1992. Moss Landing Marine Laboratories Technical Publication 96-4. ISSN 1088-2413. October, 1995. Excerpt regarding PCBs levels as compared to European seals in which a disease epidemic and population crash was observed.

(*6) Cal. EPA, 1994. Health advisory on catching and eating fish, interim sport fish advisory for San Francisco Bay. December, 1994.

(*7) California Department of Health Services, 1994. Health Warnings, Contained in the 1994 California Hunting Regulations for Resident and Migratory Game Birds issues by the state's Fish and Game Commission, Sacramento, Calif. Excerpt including health warning for selenium.

(*8) Previously unpublished data from a 1993-4 survey of 500 anglers using South and Central San Francisco Bay by Communities for a Better Environment-SAFER!; Save San Francisco Bay Association, 1995 (excerpt); West, 1992; West et al., 1992; Peterson et al., 1994; and USEPA, 1994.(excerpt of a draft report discussing and citing work by EPA, Wolfe and Walker (1987), Svensson (1991) and others. Includes analysis of the evidence..

(*9) EPA, 1990. Decision of the United States Environmental Protection Agency on listing under section 304(l) of the Clean Water Act regarding the state of California. Excerpt including pages listing San Francisco Bay waters as a "toxic hot spot."

Response to: CTR-002-002b

EPA acknowledges the impacts of pollution in the San Francisco Bay. Regarding the issue of fish consumption, refer to response to CTR-002-002a on this same issue.

Comment ID: CTR-002-004a
Comment Author: Comm. for a Better Environment
Document Type: Environmental Group
State of Origin: CA
Represented Org:
Document Date: 09/24/97
Subject Matter Code: C-17a Methodologies Human Health
References:
Attachments? Y
CROSS REFERENCES C-17b

Comment: B. The criteria do not control pollution that harms fishing, and aquatic life.

Adoption of EPA's proposed criteria values will result in less control of toxic pollutants that exceed state criteria values in large parts of San Francisco Bay. Examples of this problem are shown in tables 3 through 6 for mercury, copper, nickel and PAH measured in 1995 at monitoring stations shown on a map of San Francisco Bay (Figure 1). The EPA-proposed criteria would allow:

- mercury violations triggered by state criteria values through much of the northern reach of the Bay. EPA-proposed criteria trigger violations only at the Petaluma river mouth and in South Bay. Bay-wide, 8 of 15 state criteria-triggered violations (53%) are allowed by EPA criteria.

- copper violations triggered by state criteria (4.9 ug/L total) throughout the northern reach of the Bay. EPA'S 3.1 ug/L dissolved value triggers violations only in the Petaluma river and in' South Bay. Bay-wide, 15 of 25 state-triggered violations (60%) are allowed by EPA criteria,

- nickel violations triggered by state criteria throughout most of the northern and southern reaches of the Bay. EPA's 8.2 ug/L dissolved value triggers violations at the Petaluma river mouth and one South Bay slough. Bay-wide, 20 of the 22 water quality standards violations (91 %) triggered by the 7.1 ug/L criterion are allowed by EPA criteria.

- PAH violations triggered by state criteria at Coyote Creek and the Petaluma River mouth, EPA-proposed criteria trigger 4 violations for benzo(a)pyrene and indeno(1,2,3-cd)pyrene while state criteria trigger 40 violations for these compounds and 6 other PAHS.

Though EPA criteria do not control mercury except at the Petaluma River and in South Bay, a state human health advisory cites mercury contamination,(*6) and demonstrates that mercury restricts fishing uses Bay-wide. A severe threat and possible harm to aquatic life of the Bay's entire southern reach is evidenced by reduced abundance of all species known to be most vulnerable to copper toxicity, while these same species thrive in otherwise similar estuaries with less copper and nickel pollution.(*1) (*2) EPA criteria do not control copper and nickel in most of this area. Nor do EPA criteria control PAHs which -- with PCBs -- cause toxic effects in starry flounder in Central Bay.(*4)

Further, EPA'S proposed criteria include no criteria for 16 dioxin compounds that are included in the state dioxin criterion for TCDD equivalents.(*10) (*21) These 16 compounds are 6 dibenzo-paradioxins chlorinated in the 2,3,7, and 8 positions (except for 2,3,7,8-TCDD which is included in the EPA criterion), and 10 dibenzofurans chlorinated in the 2,3,7 and 8 positions. Under the state criteria, these 16 compounds and 2,3,7,8-TCDD are assigned toxicity equivalence factors as discussed in the proposed rule. Under the state criterion all these compounds are limited: if only 2,3,7,8-TCDD is present it cannot exceed 0.014 pg/L; if only OCDD is present it cannot exceed 14 pg/L; and if a mixture of dioxins is present the sum of their toxicities cannot exceed 0.014 pg/L. By failing to use toxicity equivalents and then failing to propose separate criteria for these 16 compounds, EPA is essentially deregulating 16 of the most toxic chemicals known to science even though these dioxins harm fishing uses, as shown by the health advisory discussed above. (*6)

The EPA criteria do not control toxics that threaten and harm the Bay, fishing and public health.

(*1) U.S. Geological Survey, 1992. Letter from Samuel N. Luoma, Ph.D., to Seven R. Ritchie, Executive Officer, Regional Water Quality Control Board. August 24, 1992.

(*2) Karras, 1992. Comparison of copper in waters of the southern reach of San Francisco Bay and ten

other estuaries. Communities for a Better Environment (CBE). July, 1992.

(*4) Spies et al., (2 papers), 1988: Effects of organic contaminants on reproduction of the starry flounder Platichthys stellatus in San Francisco Bay, I., Hepatic contamination and mixed-function oxidase (MFO) activity during the reproductive season. Marine Biology 98: 181-189; and II. Reproductive success of fish captured in San Francisco Bay and spawned in the laboratory. Marine Biology 98: 191-200. Excerpt including abstracts.

(*6) Cal. EPA, 1994. Health advisory on catching and eating fish, interim sport fish advisory for San Francisco Bay. December, 1994.

(*10) California State Water Resources Control Board, 1991. California Enclosed Bays and Estuaries Plan; water quality control plan for enclosed bays and estuaries in California. 91-13WQ. April, 1991. Excerpt including adopted water quality criteria and definition of terms.

(*21) California State Water Resources Control Board, 1997. Staff technical report, Division of Water Quality, Petitions of CBE, San Francisco BayKeeper, and Tosco Corporation for review of Order No. 95-138 of the San Francisco Bay Regional Water Quality Control Board. Office of Chief Counsel [OCC File Nos. A-983 and A-983(A)].

Response to: CTR-002-004a

See response to CTR-002-004b.

Comment ID: CTR-025-002a
Comment Author: Metro. Water Dist. of So. Cal.
Document Type: Water District
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: C-17a Methodologies Human Health
References:
Attachments? Y
CROSS REFERENCES C-16

Comment: For California SDWA regulated contaminants which are also priority pollutants, the human health water quality criteria proposed under the CTR and existing California SDWA primary Maximum Contaminant Levels (MCLs) are not always consistent. While CTR criteria apply to source waters and drinking water MCLs apply to finished drinking water, Metropolitan urges that U.S. EPA ensure greater consistency between these regulatory levels.

Table 2 identifies the priority pollutants which have California SDWA primary MCLs and for which the CTR either does not establish any human health criteria or the CTR human health criteria exceed the California SDWA primary MCL. Metropolitan requests that U.S. EPA set the CTR human health criteria for the contaminants in Table 2 at levels not to exceed the California SDWA MCL.

Response to: CTR-025-002a

With respect to the issue of pollutants where the MCL is more stringent than the CTR criterion, EPA has determined that the CTR criteria are appropriate. As background, the Agency agrees with the commenter that the SDWA Maximum Contaminant Levels (MCLs) and the ambient water quality criteria are not always consistent. There are several reasons why this may be the case. First, while water quality criteria are health-based values only, MCLs take into account availability of treatment technologies and associated costs, and the availability of analytical methods. Second, the methodologies between the two programs differ in numerous ways, including the way that carcinogens are handled, the selection of the risk level, the approach to accounting for exposure, and the fact that water quality criteria specifically account for fish exposure. Third, there are differences associated with the fact that the information that each criterion is based on at the time of development also varies. That is, criteria developed at different times for the same chemical may be based on different exposure data and/or toxicity studies. The MCLs also apply to the chemical concentration in public water supply distributed tap water, whereas water quality criteria are used to develop State standards which are then used with water transport models to derive permit limits for point source discharges. For a more detailed discussion on the reasons for differences between these two methodologies, refer to the Notice of Draft Revisions to the Methodology for Deriving Ambient Water Quality Criteria for the Protection of Human Health (Federal Register, Vol. 63, No. 157, August 14, 1998). See also 63 FR 36742, 36775-36777 (July 7, 1998).

The Agency believes that for a given pollutant, the drinking water component of a water quality criterion should be consistent with the Maximum Contaminant Level Goal (MCLG) and is working to foster greater consistency between these two programs. Specifically, the Agency is currently revising the water quality criteria human health methodology, referenced above. Once finalized, EPA will revisit the methodology for deriving MCLGs, again, with a focus toward greater consistency.

The following policy is that recommended in the draft EPA methodology revisions when either water quality criteria have not been established or when the water quality criteria exceed MCL values. Although the use of MCLs is acceptable in the absence of 304(a) criteria, EPA is recommending that MCLs only be used when they are numerically the same as the MCLG and only when the sole concern is the protection of public water supply sources and not the protection of the CWA section 101(a) goal regarding fish consumption (e.g., where the chemically toxic form in water is not the form found in fish tissue and, therefore, fish ingestion exposure is not an issue of concern). Where consideration of available treatment technology, costs, or availability of analytical methodologies has resulted in MCLs that are less protective than MCLGs or water quality criteria, States and Tribes should consider using MCLGs and/or the health-based water quality criteria to protect water uses. Where fish consumption is an existing or potential activity, States and Tribes should ensure that their adopted human health criteria adequately address this exposure route. When fish consumption is a use, EPA recommends development of water quality criteria due to the fact that fish consumption and bioaccumulation are explicitly addressed. In all cases, water quality criteria should be set to ensure that all routes of exposure have been considered. EPA believes if water monitored at existing drinking water intakes has concentrations at or below MCLGs, then the water could be considered to meet a designated use under the CWA as a drinking water supply. In situations where a 304(a)criterion was less protective than an MCL, it is permissible to use the MCL as the criterion for segments designated as drinking water supplies. For carcinogens where the MCLG is equal to zero, States are encouraged to base water quality criteria at the drinking water intake on an acceptable cancer risk level (i.e., a level within the range of 10-4 to 10-6), to promote pollution prevention and anti-degradation.

The commenter has provided a short list indicating where some of the proposed CTR human health criteria are less stringent than the California MCLs. In some cases, the listed MCL has been developed by the State of California only - that is, there is no EPA national SDWA MCL (e.g., 1,3-dichloropropene, nickel). In some cases, California's MCL is more stringent than EPA's national SDWA MCL (e.g.,

benzene, vinyl chloride). However, where MCLs are more stringent than the CTR criteria, EPA has chosen not to revise the CTR number to make it the same as the MCL because the CTR criteria are adequate to protect the designated use.

As stated above, EPA is in the process of revising its water quality criteria human health methodology. EPA is currently reviewing public comments and is awaiting the results of a peer review on the published draft revisions. Again, as part of this effort, EPA intends to foster greater consistency between its drinking water and surface water programs, where appropriate.

Comment ID: CTR-025-003a
Comment Author: Metro. Water Dist. of So. Cal.
Document Type: Water District
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: C-17a Methodologies Human Health
References:
Attachments? Y
CROSS REFERENCES C-16
C-12a

Comment: Human health water quality criteria for a number of other priority pollutants are at levels significantly below the corresponding California SDWA MCL. While Metropolitan favors a margin of safety between human health-water quality criteria and the SDWA MCL, significant differences between these two regulatory requirements can create problems in the course of maintenance of drinking water facilities.

For example, water utilities need to periodically "de-water" their lines as part of routine maintenance. The de-watering of distribution lines transporting treating drinking water results in discharges containing trihalomethanes (THMs). The CTR proposes human health criteria for each of the four compounds comprising the THM classification. The total limit under the CTR for THMs as a group is 11 ug/L, significantly below the California SDWA MCL of 100 ug/L as well as the proposed level of 80 ug/L for Stage 1 of the Disinfection/Disinfectant By-Products Rule. Thus, the discharge of water that meets California SDWA standards could potentially violate CTR human health criteria if that water is discharged to a source of drinking water supply. Metropolitan requests that EPA establish CTR human health criteria for THMs consistent with the California SDWA MCLs for THMS.

Response to: CTR-025-003a

In general, EPA believes it is appropriate that water quality criteria are at levels below MCLs in consideration of the Agency's goals of pollution prevention. That is, ambient waters should not be contaminated to a level where the burden of achieving health objectives is shifted away from those responsible for pollutant discharges and placed on downstream users to bear the costs of upgraded or supplemental water treatment. However, there are numerous reasons why a water quality criterion may not be the same as an MCL. This is discussed in the response to CTR-025-002a.

Regarding the issue of the proposed human health criteria for trihalomethanes (THMs), the commenter has made an inappropriate comparison between the values in the CTR and the Stage I

Disinfection/Disinfectant By-Product (DDBP) Rule. The commenter has attempted to add the separate values proposed in the CTR for each individual THM and compare that total to the DDBP value, which represents total THMs. These values cannot be compared directly because the basis for their derivation is significantly different. The THM values in the CTR are based on four separate cancer potency factor values (i.e., q1* values) and a chosen acceptable cancer risk level (specifically, a 10-6 risk level), which were then both used in the water quality criteria equation (which includes factors for body weight, water ingestion, fish consumption, and bioconcentration) to derive the individual criteria values. The DDBP Rule that determined the MCL for total THMs - a composite value for all four THMs combined - was based on a weight-of-evidence approach that considered the available toxicological data, known epidemiological information on the incidence of disease associated with chlorinated drinking water (i.e., morbidity rates), information on the relative proportions and uncertainties in the composition of total THMs (including regional and seasonal variation, as well as other variables and their uncertainties) and technological feasibility. The MCLs were the output of an extensive "regulatory negotiation" between EPA and stakeholders. The approach used in the DDBP Rule is vastly different from the ambient water quality criteria calculations used for the CTR. Additionally, the water quality criteria derivations are health-based values only, whereas the MCLs include consideration of economic and feasibility issues, as was the case with the DDBP regulatory negotiation.

Regarding the commenter's concern for the periodic "dewatering" of utility lines, refer to the response to CTR-020-018.

Comment ID: CTR-026-003b
Comment Author: Cal. Department of Fish & Game
Document Type: State Government
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-17a Methodologies Human Health
References:
Attachments? N
CROSS REFERENCES C-17b

Comment: 3 . TOXICITY DATABASE USED TO DEVELOP CRITERIA

The CTR indicates that the criteria being proposed are based upon a review of the most recent literature and toxicity data bases. The DFG is concerned that the databases utilized by EPA may not be as comprehensive as they could be with respect to inclusion of toxicity studies on a wide variety indigenous species found in State waters. Furthermore, data included in such databases such as EPA's AQUIRE have been found, in some instances, to be less than acceptable. Obviously we would like to see the criteria based on the most recent and scientifically sound toxicity data available. The DFG believes that it would be beneficial to describe in more detail the literature and databases utilized by EPA in development of the proposed criteria.

Also a discussion on appropriate and acceptable methodologies for data collection needs to be provided. It is not only important that the databases utilized by EPA be as comprehensive as possible, with respect to the inclusion of toxicity studies on a wide variety of indigenous species found in State waters. It is also important to know how the data was developed so that it won't be misinterpreted. For example, DFG would prefer using data that was derived from sampling whole organisms rather than edible filets if

we were looking at bioaccumulation, biomagnification, or other types of food chain issues. Most predators don't limit their diet to only the edible portions of a prey organism. Sampling only the edible portions of an organism could lead to faulty conclusions.

Finally, with regards to the development of chronic toxicity standards or criteria based on a straight percentage of the determined acute toxicity level, we would like to participate in any process that attempts to establish chronic levels in that manner.

Response to: CTR-026-003b

Regarding the comment on comprehensive evaluation of toxicity data, refer to the response to CTR-026-003a. Regarding the comment on sampling, edible portions are relevant when deriving human health criteria. Therefore, the practice of sampling edible filets is appropriate. The commenter's statement on the use of whole organisms because "most predators don't limit their diet to only the edible portions of a prey organism" is not relevant because the aquatic life criteria derivation process does not rely on the use of BCFs.

Comment ID: CTR-026-007b
Comment Author: Cal. Department of Fish & Game
Document Type: State Government
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-17a Methodologies Human Health
References:
Attachments? N
CROSS REFERENCES C-14

Comment: 7. HUMAN HEALTH CRITERIA

As you are aware the Department of Fish and Game is the trustee for the natural resources of the State and, as such we are not in an appropriate position to address human health issues. However, we would like to take this opportunity to make EPA aware of our concerns in two areas. The first issue deals with one component of the formula that was used to derive the human health criteria. Obviously, the human health criteria takes into account fish consumption rates, as well as what portion of the fish is consumed. The CTR indicates that the consumption rate utilized was 6.5 grams per day of fish tissue. This consumption rate, at least for the portion of the population that are subsistence fishermen, appears to be very low. If the human health criteria is to be adequately protective, this consumption rate should be revisited and a new rate developed to better protect these fishermen. Our second comment deals with the proposal to base criteria on fish tissue as opposed to water concentration. The DFG does not have a position with respect to this approach except to point out that compliance monitoring for fish tissue criteria may impact resources. This approach would mean an increased number of fish being collected for monitoring purposes which may impact fish resources. It may also impact the DFG's fiscal resources since we regulate scientific collection activity under which fish monitoring would fall.

Response to: CTR-026-007b

Regarding the issue of fish consumption, refer to the response to CTR-002-002a on this same issue.

Regarding the issue of basing the criteria on fish tissue versus water column concentrations, refer to the response to CTR-020-004b on this same issue.

Comment ID: CTR-029-002a
Comment Author: Center for Marine Conservation
Document Type: Environmental Group
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-17a Methodologies Human Health
References:
Attachments? N
CROSS REFERENCES C-17b
A
C-22
C-27
C-29

Comment: The Center for Marine Conservation (CMC) is a nationwide, nonprofit advocacy group dedicated to the conservation and enhancement of coastal and ocean life and resources. CMC submits these comments on behalf of its 16,000 members in California and over 120,000 members nationwide.

CMC applauds EPA's efforts to bring California into compliance with the Clean Water Act 303(c)(2)(B). Implementing numeric criteria that will protect the beneficial uses of California's waters is of great importance to the health of coastal and marine ecosystems, and so to CMC and its members. The reliance in many areas of the state on narrative criteria threatens the health of most of the state's waters, thereby impacting both human health and the health of the state's economy that relies on clean water.

While CMC strongly supports the swift adoption of an Enclosed Bays and Estuaries Plan and an Inland Surface Waters Plan that contain numeric criteria for toxic pollutants, CMC also is concerned that many of the specific criteria contained in the proposed rule are weaker than those contained in published guidance. CMC also believes that the proposed rule can better protect certain subpopulations from harm caused by consumption of contaminated fish and shellfish. Finally, CMC is concerned that the economic analysis of the proposed rule over-emphasizes costs and under-reports the many benefits of improving water. quality throughout the state. These three points are reviewed below.

In Light of Significant Threats to Water Quality, the Proposed Rule Should Contain the Most Stringent Criteria That Are Scientifically Defensible

Many of the criteria in the proposed rule are weaker than criteria in current published guidance. The proposed rule summarily states that the difference between the proposed, weaker criteria and the published guidance documents is "insignificant"(*4); however, in light of the current contamination problems in California's waters today, any move backwards, particularly when spread out over the state, must be viewed as significant.

Any weakening of the criteria should be subject to close scrutiny and the most rigorous analysis, which the proposed rule itself does not do. Among other things, the criteria in the proposed rule may be under protective because additive and synergistic effects were not considered; and because the effects on

wildlife, which can be particularly significant for bioaccumulative chemicals, were ignored.(*5) In addition, the proposed rule contains dissolved rather than total recoverable metals criteria, despite the fact that EPA acknowledges that total recoverable metals criteria are "scientifically defensible" and that they are more protective than dissolved metals criteria because they consider "sediment, food-chain effects and other fate-related issues," rather than simply water column impacts.(*6)

Clean Water Act section 303(c)(2)(B) mandates the development of numeric criteria that will "support such designated uses [that are adopted by the State]." The statistics available on the health of the state's waters indicates that their use already is significantly threatened or impaired by toxics. The strongest. criteria supportable by science are necessary to reverse this trend and begin to restore the state's waters.

(*4) 62 Fed. Reg. 42159, 42168 (Aug. 5, 1997).

(*5) Id. at 42168.

(*6) Id. at 42172.

Response to: CTR-029-002a

Regarding the evaluation and protectiveness of the proposed criteria, the commenter states that many of the criteria in the proposed rule "are weaker than those contained in published guidance." However, EPA has updated its national criteria guidance from that previously published. The values proposed in the CTR are a part of that update and, therefore, there is now consistency with all criteria values [see 63 FR 68353-68364 (December 10, 1998)]. Regarding the issue of fish consumption, refer to the response to CTR-002-002a on this same issue.

Comment ID: CTR-031-002b
Comment Author: Fresno Metro. Flood Ctrl Dist.
Document Type: Flood Ctrl. District
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-17a Methodologies Human Health
References: Letter CTR-031 incorporates by reference letter CTR-027
Attachments? N
CROSS REFERENCES F
C-17b
J
V

Comment: 2. Since the preamble implies that CTR criteria may be applied in NPDES permits for municipal storm water dischargers as numeric effluent limitations, the proposed rule is flawed with regard to: a) setting attainable, scientifically valid criteria in a manner consistent with state and federal regulatory approaches; b) assessing the potential economic impact on the public served by municipal storm water dischargers; c) assessing environmental impacts pursuant to the National Environmental Policy Act and the Endangered Species Act; and d) providing for the coordinated review and evaluation of the proposed CTR in conjunction with the proposed State Implementation Plan. y

Response to: CTR-031-002b

With respect to comments about municipal stormwater discharges see response to CTR-013-003 (Category J; Stormwater Economics).

With respect to comments about the Endangered Species Act see response to CTR-031-002e (Category V; Collaborative Approach).

With respect to the comment about coordination with the State Implementation Plan see response to CTR-031-008b (Category V; Collaborative Approach).

Comment ID: CTR-031-004a
Comment Author: Fresno Metro. Flood Ctrl Dist.
Document Type: Flood Ctrl. District
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-17a Methodologies Human Health
References: Letter CTR-031 incorporates by reference letter CTR-027
Attachments? N
CROSS REFERENCES C-17b
I

Comment: If the proposed rule is carefully and sufficiently modified to affirm a commitment by EPA to effect only its Congressional authorization as established by CWA section 402(p), then EPA's failure to assess municipal storm water dischargers" ability to attain the proposed standards and associated economic and environmental impacts may be set aside at this time. However, if EPA persists in maintaining the CTR as drafted in this regard, the ambiguities presented in the preamble demand serious consideration and analyses as follows.

a. Many of the criteria are not attainable or scientifically valid with regard to municipal stormwater dischargers, nor is the proposed approach consistent with an appropriate delegation of authority to the State.

ii. Scientific Defensibility of Standards

Municipal storm water discharges require a uniquely different scientific as well as regulatory approach. The episodic nature of storm flow events; the huge variances in flow volume, rate, timing, concentrations, and loads; the variability in receiving waters; and organism tolerance for and recovery f rom episodic exposure need to be taken into account in developing standards.

In a July 1992 memorandum addressing a Combined Sewer Overflow/Wet Weather workshop, Tudor Davies, Director of EPA's Office of Science and Technology wrote: "Changes being considered in the aquatic criteria development methodology to enhance the scientific defensibility of the criteria would be applicable to both constant and to wet weather discharges. One such change undergoing consideration is a change in the duration and frequency of exposure assumptions to make criterion more toxicologically realistic.

EPA has begun this work and is apparently nearing completion. With EPA's own Science and Technology office recognizing the inadequacy of the current approach to setting criteria relative to wet weather discharges, it must be concluded any attempt to apply the CTR criteria to municipal stormwater system discharges is ill-founded and likely inconsistent with the CWA.

Response to: CTR-031-004a

See response to CTR-031-004c.

Comment ID: CTR-037-003b
Comment Author: Hampton Roads Sanitation Dist.
Document Type: Sewer Authority
State of Origin: VA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-17a Methodologies Human Health
References:
Attachments? N
CROSS REFERENCES C-17b

Comment: 3. EPA has deleted data from several databases without indicating the reason for the deletions. This introduces the same problem as that described in #2 above, and results in variability in how water quality criteria are developed. Additionally, stakeholders need to know why data is deleted so that these decision criteria can be used in the development of defensible site-specific criteria. EPA should provide their reasoning for deleting data that was once believed acceptable so that this same reasoning can be used to update current criteria and to develop new sound criteria.

Response to: CTR-037-003b

See response to CTR-037-003a (Category C-17b; Methodologies Aquatic Life).

Comment ID: CTR-057-007
Comment Author: City of Los Angeles
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: C-17a Methodologies Human Health
References:
Attachments? N
CROSS REFERENCES

Comment: Organics

In proposing criteria for toxic organic compounds, we urge the EPA to include considerations of net environmental benefit. We see a potential for stringent pollutant limits as a means of influencing

replacements in the service area by other, equally toxic constituents. We have seen this occur to varying extent for chromium, selenium, zinc and molybdenum, and feel that similar instances involving trace organics can occur as well. We support the EPA's intention to evaluate receiving-water background concentrations and provide credit as appropriate.

Response to: CTR-057-007

"Net environmental benefit" is not an appropriate concept for establishing ambient water quality criteria. Ambient water quality criteria, as articulated in CWA Section 304, are supposed to characterize "all identifiable effects" from individual pollutants. See response to CTR-042-007a (Category C-21; Legal Issues). Ambient water quality criteria define the maximum pollutant concentrations allowable in order to maintain a specific designated use. The concept of "net environmental benefit" can be incorporated into other aspects of water quality standards if a State or Tribe so chooses. Designated uses, variances, and antidegradation all allow for the balancing of water quality goals with community priorities. For example, a community may choose to downgrade the designated use for a waterbody to address exceedances of specific chemical criteria because remediation of contaminated sediments (in this case, the source of loading to the water column) through dredging would cause more harm to the biological community through habitat destruction although the chemical concentrations for individual pollutants would decrease as a result. The CTR does not affect California's flexibility with respect to designated uses, variances, and antidegradation.

Comment ID: CTR-065-002b
Comment Author: Environmental Health Coalition
Document Type: Environmental Group
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: C-17a Methodologies Human Health
References:
Attachments? N
CROSS REFERENCES A
C-17b

Comment: PROPOSED RULE ALLOWS SIGNIFICANT AND UNACCEPTABLE INCREASES IN TOXIC POLLUTANT CONCENTRATIONS IN BAYS AND ESTUARIES

Our initial review indicates that the proposed criteria for a number of toxic constituents are unacceptably high and will allow more pollution of bays and estuaries by several orders of magnitude. If adopted as proposed, the CTR will allow a 900% increase of dioxin, 140% increase of PCBS, 325% increase of mercury, 2760% increase of zinc, 23,000% increase of lead, and a stunning 430 million % increase for total PAH, some of the most problematic pollutants in San Diego Bay. The CTR only improves (i.e. strengthens) criteria for only 3 of 64 pollutants. This does not square with new studies that show reasons for concern about the synergistic and long-term effects of exposures to these toxic pollutants. In sum, the CTR proposes weaker criteria for 58% of the pollutants and no change for 37% of the criteria. This kind of action will not bring us closer to our goal of cleaner water containing healthier organisms in the future.

Response to: CTR-065-002b

See response to CTR-002-003 (Category C-24; Site-Specific Criteria).

Comment ID: CTR-090-002a
Comment Author: C&C of SF, Public Utl. Commis.
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-17a Methodologies Human Health
References: Letter CTR-090 incorporates by reference letters CTR-035 and CTR-054
Attachments? Y
CROSS REFERENCES C-24a
C-22
G-05
G-02
G-04

Comment: There are many features of the proposed rule which we strongly endorse, specifically:

* the use of the latest IRIS values for human health criteria, it is essential that the criteria be based on the latest scientific and environmental information;

* recognition that the dissolved fraction of metals, rather than the total recoverable, better reflect the aquatic toxicity of metals;

* recognition that for certain metals (e.g. copper and zinc) ambient water chemistry is critical in determining toxicity thereby endorsing the Water Effects Ratio;

* recognition and strong endorsement of the multi-tiered mixing zones for acute, chronic and human health effects; and

* recognition of interim limits and compliance schedules as appropriate implementation strategies,

Response to: CTR-090-002a

EPA agrees with the comment and its endorsement of the rule.

Comment ID: CTR-090-019
Comment Author: C&C of SF, Public Utl. Commis.
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-17a Methodologies Human Health
References: Letter CTR-090 incorporates by reference letters CTR-035 and CTR-054
Attachments? Y
CROSS REFERENCES

Comment: Human health criteria - p 42175 - Human Health Criteria - These criteria are based on a hypothetical series of events. Each link in the series must be present for the presumed risk to occur at the levels used to set the criteria. The links assumed to be present in the criteria include: (1) Non-degradation in the receiving water - Some regulated pollutants (various PAHs) rapidly break down in receiving waters.

(2) Continued presence in the receiving water at the level of discharge or at the calculated dilution level - Implementation plans and policies give no dilution credit or use very conservative dilution assumptions. As implemented in California, none of the dilution equations take into account far-field effect-, nor the time-averaging effects which in reality typically reduce concentrations to far below those assumed in the risk assessment. The result is as if we assumed that the human endpoint on the risk assessment only ate fish which lived within a few feet of the outfall.

(3) Bioaccumulation in fish or other higher organisms; non-degradation in these organisms - The bioaccumulation assumptions are based on the worst case bioaccumulation encountered in the scientific literature rather than the bioaccumulation actually taking place in commercial species in the waters in question- Not infrequently, tissue samples from food species indicate that less Bioaccumulation is taking place. Another complicating factor is that bioaccumulation factors are derived from steady-state conditions, whereas municipal discharges of chlorinated hydrocarbon carcinogens are usually episodic. Use of steady-state derived water concentration to tissue concentration relationships is especially problematic for wet-weather discharges, as these have durations measured in hours to days, whereas bioconcentration in mature (i.e. legal sized) fish occurs over weeks to months.

(4) Pervasive contamination - Ongoing consumption by humans of contaminated fish (or shellfish) with the level of contamination.

(5) Necessary safety factors - Assumed carcinogenicity or toxicity to humans at 10 or 100 times the frequency experienced by test animals. These safety factors are necessary but their overall effect is to significantly decrease the likely impact of the pollutant (i.e., shift a 10E-6 risk to 10E-7 or 10E-8). EPA's Cancer potency factors are based on an upper bound, i.e. 95 % percentile estimate of the slope.

(6) Non-threshold effects - Carcinogenicity is assumed to have no threshold mechanisms, i.e., there is no low level below which the human body can safely detoxify the carcinogen.

While the use of this chain of events and these assumptions are necessary to identify potential problems, the cumulative uncertainty creates too speculative a result to use for decisions regarding significant expenditures for remedial projects. Better sources of risk information are available, specifically, tissue samples from the organisms presumed to be carrying the risk to humans. What we propose is a three step process prior to controls being mandated for dischargers:

1. numerical criteria to identify potential risks. 2. site specific tissue samples of edible species to identify actual bioaccumulation (as has been done in San Francisco Bay with PCBs and other chemicals). 3. source assessment to determine if prospective controls on point sources provide meaningful reductions.

This approach is within EPA's mandate to set criteria and implement a permit program which meets the goals of the CWA.

San Francisco proposes that the designation of an appropriate level(s) be left to the state in its implementation documents.

Response to: CTR-090-019

EPA disagrees with the commenter that "... bioaccumulation assumptions are based on the worst case bioaccumulation encounter in the scientific literature ...". EPA has and will continue to use the best available science in the selection of the bioaccumulation data for the development of ambient water quality criteria. In the process of selecting bioaccumulation data, all published data are carefully evaluated and bioaccumulation factors are determined using all possible methods. The bioaccumulation data selected in this process for use in the development of water quality criteria represents the best synthesis and consensus of all available scientific information. The commenter also states that "... tissue samples from food species indicate that less bioaccumulation is taking place." However, no supporting information was provided nor were citations from the scientific literature provided. EPA disagrees with the commenter. EPA has and will continue to use the best available science in the selection of the bioaccumulation data for the development of ambient water quality criteria. The commenter further suggests that bioaccumulation factors developed using long term average concentrations in fish and the water are inappropriate for developing ambient water quality criteria for persistent bioaccumulative chemicals. EPA disagrees with the commenter. For human health, EPA uses lifetime consumption rates in setting acceptable doses/exposures for bioaccumulative chemicals and to be consistent with the dose/exposure basis, bioaccumulation factors must be developed using long term average concentrations as well. Regarding the commenter's statements on the chemical degradation of various PAHs, refer to the response to CTR-060-014.

Regarding the commenter's statements on risk assumptions, EPA uses risk methods consistent with published risk assessment guidelines that are available in both EPA reports and peer reviewed literature [e.g., Guidelines for Mutagenicity Assessment (Federal Register, Vol. 51, September 24, 1986), Final Guidelines for Developmental Toxicity Risk Assessment (Federal Register, Vol. 56, December 5, 1991), Integrated Risk Information System (IRIS) - On-line]. EPA acknowledges the commenter's proposed three-step process. When EPA promulgates criteria, it uses CWA Section 304(a) criteria guidance. EPA does not perform site-specific risk assessments; the Agency relies on protective assessments that apply to the nation as a whole. This is consistent with EPA's approach to the National Toxics Rule (NTR), of which this CTR is a part. A State or Tribe has the flexibility to utilize site-specific data when available in its assessments and decision-making process.

Comment ID: CTR-095-001b
Comment Author: M. Ruth Uiswander
Document Type: Citizen
State of Origin: CA
Represented Org:
Document Date: 10/02/97
Subject Matter Code: C-17a Methodologies Human Health
References:
Attachments? N
CROSS REFERENCES C-20
C-21
C-14

Comment: In regard to the numeric water quality standards criteria for California surface water, they have been revealed by environmental groups to be insufficiently protective and environmentally unjust. The proposed new rules assume fish ingestion of 6.5 grams per day. In reality, consumption of fish in some communities can be as high as 1 pound per day. This level of consumption is especially likely among subsistence fishers.

Please prevent toxic pollution in California's bays by making more protective standards that consider all toxic pollutants and consider the fish consumption habits of subsistence anglers.

Response to: CTR-095-001b

Regarding the issue of fish consumption, refer to the response to CTR-002-002a on this same issue.

Comment ID: CTR-097-001a
Comment Author: Mark Shaw
Document Type: Citizen
State of Origin: CA
Represented Org:
Document Date: 10/03/97
Subject Matter Code: C-17a Methodologies Human Health
References:
Attachments? N
CROSS REFERENCES C-14

Comment: I am writing to urge you to more stringent - and more protective - water quality standards for California surface water. The proposed standards are too weak and discriminatory in their effects.

Lastly, the proposed standards are discriminatory in their effects in that they assume consumption of only 6.5 grams of fish per day per person. Many poorer communities catch and eat fish for subsistence - as much as a pound per day per person (more than sixty what the EPA estimates!) placing them at greater risk. The standards should be set to protect everybody, including those who happen to be poor and/or eat a significant amount of fish.

Please set the standards to protect us all and move us closer to the goals of the Clean Water Act, that our waters be safely fishable and swimmable.

Response to: CTR-097-001a

Regarding the issue of fish consumption, refer to the response to CTR-002-002a on this same issue.

Comment ID: CTR-099-001a
Comment Author: Emil A. Lawton, Ph.D.
Document Type: Citizen
State of Origin: CA
Represented Org:
Document Date: 10/03/97
Subject Matter Code: C-17a Methodologies Human Health

References:
Attachments? N
CROSS REFERENCES C-17b

Comment: This letter is to comment on the water quality standards for California surface water. It is my strongly held opinion that the proposed standards do not meet the minimum legal requirements of protecting health, let alone other aspects of the environment. The numbers should be adjusted to lower MAC's by roughly an order of magnitude.

Response to: CTR-099-001a

EPA disagrees. EPA believes that the criteria are fully protective of aquatic life and human health. The comment offers no evidence that the criteria are not protective.

Comment ID: CTR-102-001a
Comment Author: Bryan Gordon
Document Type: Citizen
State of Origin: CA
Represented Org:
Document Date: 10/10/97
Subject Matter Code: C-17a Methodologies Human Health
References:
Attachments? N
CROSS REFERENCES C-17b

Comment: Please ensure that the Federal water quality standards provide the maximum protection for people as well as the animals that inhabit our state's waterways.

Thank you for protecting America's waterways and the Americans and American animals that come into contact with them.

Response to: CTR-102-001a

EPA acknowledges the comment.

Comment ID: CTR-104-004b
Comment Author: Lucy Nelson, et. al.
Document Type: Citizen
State of Origin: CA
Represented Org:
Document Date: 10/15/97
Subject Matter Code: C-17a Methodologies Human Health
References:
Attachments? N
CROSS REFERENCES C-09a

Comment: Increasing the limits on toxins means that we postpone the goals of the Clean Water Act to make U.S. water "fishable and swimmable". Any progress made will not be expanded toward making our waters cleaner and mediocre programs will be introduced which do not improve the condition of our state's water quality. More protective standards must be created which will consider all 17 toxic pollutants of concern.

Response to: CTR-104-004b

See response to CTR-016-008.

Comment ID: CTR-105-002a
Comment Author: Heather Catherine Park Tausig
Document Type: Citizen
State of Origin: CA
Represented Org:
Document Date: 10/13/97
Subject Matter Code: C-17a Methodologies Human Health
References:
Attachments? N
CROSS REFERENCES C-21

Comment: The maximum levels proposed for mercury, dioxin, and thirteen other pollutants have been identified by respected environmental advocacy groups as (1) insufficiently protective, and (2) environmentally unjust, potentially increasing the cancer risks for subsistence fishers, who are, in large part, people of color.

The standards must be established at a level that makes California waters truly "fishable," and not just "fishable if you don't object to cancer."

Thank you for your consideration.

Response to: CTR-105-002a

See response to CTRH-001-010 (Category C-21; Legal Concerns).

Comment ID: CTR-106-004b
Comment Author: Robert Brown
Document Type: Citizen
State of Origin: CA
Represented Org:
Document Date: 10/28/97
Subject Matter Code: C-17a Methodologies Human Health
References:
Attachments? N
CROSS REFERENCES C-09a

Comment: Increasing the limits on toxins means that we postpone the goals of the Clean Water Act to make U.S. water "fishable and swimmable". Any progress made will not be expanded toward making our waters cleaner and mediocre programs will be introduced which do not improve the condition of our state's water quality. More protective standards must be created which will consider all 17 toxic pollutants of concern.

Response to: CTR-106-004b

See response to CTR-016-008.

Comment ID: CTR-110-001
Comment Author: Judith A. Brown
Document Type: Citizen
State of Origin: CA
Represented Org:
Document Date: 12/02/97
Subject Matter Code: C-17a Methodologies Human Health
References:
Attachments? N
CROSS REFERENCES

Comment: I have recently been reading about some proposed new quality standards for pollutants of California surface waters. I feel very concerned about these proposed standards, as they appear to be more lenient toward pollutants than the existing regulations. I believe very strongly that our surface water is of serious concern to the millions of Californians who use this water every day. In particular, to children and elderly who are more vulnerable to toxins. There is growing evidence that water pollutants lead to cancer and other serious illnesses. I urge you to create more protective standards for our water. The people of this country are being exposed to potentially serious harm by toxicities in our water supply and I hope that more stringent standards can and will be implemented.

Thank you for allowing me to express my concern.

Response to: CTR-110-001

See response to CTR-002-003 (Category C-24; Site-Specific Criteria).

Comment ID: CTRH-001-024e
Comment Author: Michelle Pla
Document Type: Public Hearing
State of Origin: CA
Represented Org: S.F. Public Utilities Com
Document Date: 09/17/97
Subject Matter Code: C-17a Methodologies Human Health
References:
Attachments? N
CROSS REFERENCES g-02
g-05

c-22
c-24a

Comment: MS. PLA: My name is Michelle Pla. I'm with the Public Utilities Commission, City and County of San Francisco.

I made the comment on my card that I also said that I would try to be constructive, and so I'm going to follow my mentor here, Phil Bobel, and say that there are some things in this rule that we're very pleased to see.

We're very pleased to see use of the latest scientific information, particularly the use of latest IRIS, I-R-I-S, numbers-for human health. We're very pleased that you're using dissolved versus total recoverable form for the metals.

We're very pleased to see recognition of the water effects ratios. We're pleased to see recognition for a multi-tiered mixing zone for acute and chronic human health effects and hope that the state pays particular attention to that.

We do have a problem with the way you've described compliance schedules and hope to be working strictly by the state on that as well. We think that the five-year system is fairly shortsighted, and -we can't even do FMDSLs in five years.

Response to: CTRH-001-024e

EPA acknowledges the commenter's support for the aspects of the rule mentioned in the comment. With respect to compliance schedules, see response to CTR-002-010b (Category G-02; Compliance Schedules).

Subject Matter Code: C-17b Methodologies Aquatic Life

Comment ID: CTR-002-004b
Comment Author: Comm. for a Better Environment
Document Type: Environmental Group
State of Origin: CA
Represented Org:
Document Date: 09/24/97
Subject Matter Code: C-17b Methodologies Aquatic Life
References:
Attachments? Y
CROSS REFERENCES C-17a

Comment: B. The criteria do not control pollution that harms fishing, and aquatic life.

Adoption of EPA's proposed criteria values will result in less control of toxic pollutants that exceed state criteria values in large parts of San Francisco Bay. Examples of this problem are shown in tables 3 through 6 for mercury, copper, nickel and PAH measured in 1995 at monitoring stations shown on a map of San Francisco Bay (Figure 1). The EPA-proposed criteria would allow:

- mercury violations triggered by state criteria values through much of the northern reach of the Bay. EPA-proposed criteria trigger violations only at the Petaluma river mouth and in South Bay). Bay-wide, 8 of 15 state criteria-triggered violations (53%) are allowed by EPA criteria.

- copper violations triggered by state criteria (4.9 ug/L total) throughout the northern reach of the Bay. EPA'S 3.1 ug/L dissolved value triggers violations only in the Petaluma river and in' South Bay. Bay-wide, 15 of 25 state-triggered violations (60%) are allowed by EPA criteria,

- nickel violations triggered by state criteria throughout most of the northern and southernreaches of the Bay. EPA's 8.2 ug/L dissolved value triggers violations at the Petaluma river mouth and one South Bay slough. Bay-wide, 20 of the 22 water quality standards violations (91%) triggered by the 7.1 ug/L criterion are allowed by EPA criteria,

- PAH violations triggered by state criteria at Coyote Creek and the Petaluma River mouth, EPA-proposed criteria trigger 4 violations for benzo(a)pyrene and indeno(1,2,3-cd)pyrene while state criteria trigger 40 violations for these compounds and 6 other PAHS.

Though EPA criteria do not control mercury except at the Petaluma River and in South Bay, a state human health advisory cites mercury contamination,(*6) and demonstrates that mercury restricts fishing uses Bay-wide. A severe threat and possible harm to aquatic life of the Bay's entire southern reach is evidenced by reduced abundance of all species known to be most vulnerable to copper toxicity, while these same species thrive in otherwise similar estuaries with less copper and nickel pollution.(*1) (*2) EPA criteria do not control copper and nickel in most of this area. Nor do EPA criteria control PAHs which -- with PCBs -- cause toxic effects in starry flounder in Central Bay.(*4)

Further, EPA'S proposed criteria include no criteria for 16 dioxin compounds that are included in the state dioxin criterion for TCDD equivalents.(*10) (*21) These 16 compounds are 6 dibenzo-paradioxins chlorinated in the 2,3,7, and 8 positions (except for 2,3,7,8-TCDD which is included in the EPA criterion), and 10 dibenzofurans chlorinated in the 2,3,7 and 8 positions. Under the state criteria, these 16

compounds and 2,3,7,8-TCDD are assigned toxicity equivalence factors as discussed in the proposed rule. Under the state criterion all these compounds are limited: if only 2,3,7,8-TCDD is present it cannot exceed 0.014 pg/L; if only OCDD is present it cannot exceed 14 pg/L; and if a mixture of dioxins is present the sum of their toxicities cannot exceed 0.014 pg/L. By failing to use toxicity equivalents and then failing to propose separate criteria for these 16 compounds, EPA is essentially deregulating 16 of the most toxic chemicals known to science even though these dioxins harm fishing uses, as shown by the health advisory discussed above. (*6)

The EPA criteria do not control toxics that threaten and harm the Bay, fishing and public health.

(*1) U.S. Geological Survey, 1992. Letter from Samuel N. Luoma, Ph.D., to Seven R. Ritchie, Executive Officer, Regional Water Quality Control Board. August 24, 1992.
(*2) Karras, 1992. Comparison of copper in waters of the southern reach of San Francisco Bay and ten other estuaries. Communities for a Better Environment (CBE). July, 1992.
(*4) Spies et al., (2 papers), 1988: Effects of organic contaminants on reproduction of the starry flounder Platichthys stellatus in San Francisco Bay, I., Hepatic contamination and mixed-function oxidase (MFO) activity during the reproductive season. Marine Biology 98: 181-189; and II. Reproductive success of fish captured in San Francisco Bay and spawned in the laboratory. Marine Biology 98: 191-200. Excerpt including abstracts.
(*6) Cal. EPA, 1994. Health advisory on catching and eating fish, interim sport fish advisory for San Francisco Bay. December, 1994.
(*10) California State Water Resources Control Board, 1991. California Enclosed Bays and Estuaries Plan; water quality control plan for enclosed bays and estuaries in California. 91-13WQ. April, 1991. Excerpt including adopted water quality criteria and definition of terms.
(*21) California State Water Resources Control Board, 1997. Staff technical report, Division of Water Quality, Petitions of CBE, San Francisco BayKeeper, and Tosco Corporation for review of Order No. 95-138 of the San Francisco Bay Regional Water Quality Control Board. Office of Chief Counsel [OCC File Nos. A-983 and A-983(A)].

Response to: CTR-002-004b

EPA disagrees with the comment. EPA sets its criteria values at concentrations that will protect aquatic life or human health, based on the evaluation of the toxicity of the pollutants. Aquatic life criteria are expected to protect at least 95 percent of all genera, based on prediction from measured toxicological values. EPA's approach is a longstanding policy; EPA has used this approach to deriving aquatic life criteria since 1980. Criteria concentrations are not selected either to match existing concentrations in particular California waterbodies, or match criteria concentrations previously used by the state.

EPA does not believe that the information provided by the comment can be used reasonably to evaluate whether criteria concentrations protect aquatic life uses. Whether EPA's criteria are higher or lower than criteria previously used by the state are not germane to whether EPA's criteria protect aquatic life uses.

The observations that certain aquatic taxa are impaired in South Bay cannot validly be interpreted to indicate whether EPA's criteria are or are not protective. The cause or causes of impairment in South Bay are in fact not known. The concentrations of many contaminants are correlated with each other and with other occurrence of other stresses. Because of the presence of so many confounding factors, the information on South Bay cannot be used to derive criteria or to judge their validity.

EPA did not derive its criteria concentrations by considering whether the existing concentrations in

particular California waterbodies would or would not attain criteria concentrations. Rather EPA derived its criteria from toxicity data indicating that concentrations that are necessary to protect aquatic life. The comment offers no definitive toxicological or ecological evidence that the criteria are not protective.

The preamble discusses why the only dioxin compound included in the rule is 2,3,7,8-TCDD, which is the only dioxin compound that is a priority pollutant.

Comment ID: CTR-026-002a
Comment Author: Cal. Department of Fish & Game
Document Type: State Government
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-17b Methodologies Aquatic Life
References:
Attachments? N
CROSS REFERENCES C-27; C-29

Comment: 2. PARTIAL PROTECTION BY THE PROPOSED AQUATIC LIFE CRITERIA (FRESHWATER OR SALTWATER)

On page 42168, the proposed rule includes the following language: "EPA's guidelines are designed to derive criteria that protect aquatic communities by protecting most of the species and their uses most of the time." The CTR goes on to state that this approach results in only a "small possibility" of substantial overprotection or underprotection. Obviously, it is underprotection that is of concern to the DFG. The DFG has very serious concerns that criteria are being proposed that protect "most" of the species "most" of the time. We are aware of the protocols that require a minimum of eight specified families be used to develop criteria and that it may be difficult to determine criteria that are one hundred percent protective; however, this does not preclude the real possibility that certain designated uses and aquatic organisms will not be maintained, and or protected, as a result of the proposed criteria. The DFG is also concerned that criteria and protocols developed for specific constituents do not take into account the additive or synergistic effects that contaminant combination may have on aquatic organisms. Another factor that needs to be considered is bioaccumulation, as well as the effect this may have on organisms at higher trophic levels.

As trustee of all the fish and wildlife resources in the State, it is our agency's responsibility to ensure appropriate protection of all fish and wildlife resources, not just "most", and this includes adequate water quality standards. Due to our concerns and the very real possibility of underprotection to aquatic organisms and designated uses, the DFG believes that it may be appropriate to derive the criteria as proposed, and subsequently develop some additional safety factors for inclusion. It is our understanding that this approach was used in the formulation of water quality objectives for protection of aquatic organisms in the California Ocean Plan. In the short term, the safety factor could possibly be realized by the development of a comprehensive biological monitoring program to determine whether the proposed criteria are indeed fully protective.

Response to: CTR-026-002a

EPA disagrees with the comment. EPA believes that incorporating the type of safety factor requested in

the comment would be arbitrary and would be difficult to defend scientifically. In particular EPA does not believe such a safety factor could be defended as being necessary for the protection of aquatic life. The commenter provides no data demonstrating that the criteria do not protect aquatic life.

The phrase "most of the species...most of the time" generally means a high percentage of species, a very high percentage of time. Aquatic life criteria are expected to protect at least 95 percent of all genera, based on prediction from measured toxicological values. In most streams, the duration and frequency goals result in attainment of criteria more than 99 percent of time. Past application of aquatic life criteria indicate that this level of protection will protect all aquatic life uses of a waterbody. Considering the variability of natural stresses on all species in a waterbody, EPA can find no basis in data or analysis for a concern that its goals for criteria concentrations and attainment time would not protect aquatic life uses. Because EPA's aquatic life criteria are derived using an appropriately conservative methodology, there is no need to develop the safety factors suggested by the comment.

See response to CTR-026-002b for discussion of the additive or synergistic concerns.

Comment ID: CTR-026-003a
Comment Author: Cal. Department of Fish & Game
Document Type: State Government
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-17b Methodologies Aquatic Life
References:
Attachments? N
CROSS REFERENCES C-17a

Comment: 3 . TOXICITY DATABASE USED TO DEVELOP CRITERIA

The CTR indicates that the criteria being proposed are based upon a review of the most recent literature and toxicity data bases. The DFG is concerned that the databases utilized by EPA may not be as comprehensive as they could be with respect to inclusion of toxicity studies on a wide variety indigenous species found in State waters. Furthermore, data included in such databases such as EPA's AQUIRE have been found, in some instances, to be less than acceptable. Obviously we would like to see the criteria based on the most recent and scientifically sound toxicity data available. The DFG believes that it would be beneficial to describe in more detail the literature and databases utilized by EPA in development of the proposed criteria.

Also a discussion on appropriate and acceptable methodologies for data collection needs to be provided. It is not only important that the databases utilized by EPA be as comprehensive as possible, with respect to the inclusion of toxicity studies on a wide variety of indigenous species found in State waters. It is also important to know how the data was developed so that it won't be misinterpreted. For example, DFG would prefer using data that was derived from sampling whole organisms rather than edible filets if we were looking at bioaccumulation, biomagnification, or other types of food chain issues. Most predators don't limit their diet to only the edible portions of a prey organism. Sampling only the edible portions of an organism could lead to faulty conclusions.

Finally, with regards to the development of chronic toxicity standards or criteria based on a straight

percentage of the determined acute toxicity level, we would like to participate in any process that attempts to establish chronic levels in that manner.

Response to: CTR-026-003a

The derivation of each aquatic life criteria concentration is explained in detail in the criteria documents and in the 1995 update document, all of which were publicly available. This information was not repeated in the preamble of the proposed rule.

EPA does not agree with the comment about the comprehensiveness of the toxicity database. At the time the criterion document for each pollutant was developed, a comprehensive search of the literature was performed. The comment has offered no literature citations that EPA missed. Regarding the comment on the database AQUIRE, this database was never intended to include only the data that EPA would use for criteria development. EPA agrees that for purposes of developing criteria, some of the data in AQUIRE is "less than acceptable." However, EPA would not and has not used such data in development of the rule's criteria.

Bioaccumulation factors developed from data on edible portions of aquatic organisms have been used in criteria designed to prevent the edible portions of fish or shellfish from exceeding FDA action levels, and to prevent human health risks.

EPA encourages the commenter to participate in State adoption of water quality objectives, which after approval, would supersede these federal criteria.

Comment ID: CTR-029-002b
Comment Author: Center for Marine Conservation
Document Type: Environmental Group
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-17b Methodologies Aquatic Life
References:
Attachments? N
CROSS REFERENCES C-17a; A; C-22; C-27; C-29

Comment: The Center for Marine Conservation (CMC) is a nationwide, nonprofit advocacy group dedicated to the conservation and enhancement of coastal and ocean life and resources. CMC submits these comments on behalf of its 16,000 members in California and over 120,000 members nationwide.

CMC applauds EPA's efforts to bring California into compliance with the Clean Water Act 303(c)(2)(B). Implementing numeric criteria that will protect the beneficial uses of California's waters is of great importance to the health of coastal and marine ecosystems, and so to CMC and its members. The reliance in many areas of the state on narrative criteria threatens the health of most of the state's waters, thereby impacting both human health and the health of the state's economy that relies on clean water.

While CMC strongly supports the swift adoption of an Enclosed Bays and Estuaries Plan and an Inland Surface Waters Plan that contain numeric criteria for toxic pollutants, CMC also is concerned that many of the specific criteria contained in the proposed rule are weaker than those contained in published

guidance. CMC also believes that the proposed rule can better protect certain subpopulations from harm caused by consumption of contaminated fish and shellfish. Finally, CMC is concerned that the economic analysis of the proposed rule over-emphasizes costs and under-reports the many benefits of improving water. quality throughout the state. These three points are reviewed below.

In Light of Significant Threats to Water Quality, the Proposed Rule Should Contain the Most Stringent Criteria That Are Scientifically Defensible

Many of the criteria in the proposed rule are weaker than criteria in current published guidance. The proposed rule summarily states that the difference between the proposed, weaker criteria and the published guidance documents is "insignificant"(*4); however, in light of the current contamination problems in California's waters today, any move backwards, particularly when spread out over the state, must be viewed as significant.

Any weakening of the criteria should be subject to close scrutiny and the most rigorous analysis, which the proposed rule itself does not do. Among other things, the criteria in the proposed rule may be underprotective because additive and synergistic effects were not considered; and because the effects on wildlife, which can be particularly significant for bioaccumulative chemicals, were ignored.(*5) In addition, the proposed rule contains dissolved rather than total recoverable metals criteria, despite the fact that EPA acknowledges that total recoverable metals criteria are "scientifically defensible" and that they are more protective than dissolved metals criteria because they consider "sediment, food-chain effects and other fate-related issues," rather than simply water column impacts.(*6)

Clean Water Act section 303(c)(2)(B) mandates the development of numeric criteria that will "support such designated uses [that are adopted by the State]." The statistics available on the health of the state's waters indicates that their use already is significantly threatened or impaired by toxics. The strongest criteria supportable by science are necessary to reverse this trend and begin to restore the state's waters.

(*4) 62 Fed. Reg. 42159, 42168 (Aug. 5, 1997).
(*5) Id. at 42168.
(*6) Id. at 42172.

Response to: CTR-029-002b

EPA disagrees with the comment, with respect to incorporation of weaker criteria. EPA incorporated its latest criteria values into the proposed and final rule. EPA believes that these criteria are fully protective, and are the most scientifically defensible available at this time. The commenter offers no evidence that these criteria are not protective.

EPA disagrees with the assertion that "EPA acknowledges that total recoverable metals criteria...consider sediment, food-chain effects and other fate-related issues." The preamble to the proposed rule (62 FR 42172) has no such acknowledgment. Total recoverable metals criteria do not consider sediment, food-chain, or fate. Rather, EPA has acknowledged that a state may consider such factors in risk management decisions affecting water quality programs and standards. See also response to CTR-26-004.

See response to CTR-026-002b regarding additive or synergistic issues.

Comment ID: CTR-031-002c
Comment Author: Fresno Metro. Flood Ctrl Dist.
Document Type: Flood Ctrl. District
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-17b Methodologies Aquatic Life
References: Letter CTR-031 incorporates by reference letter CTR-027
Attachments? N
CROSS REFERENCES F; C-17a; J; V

Comment: 2. Since the preamble implies that CTR criteria may be applied in NPDES permits for municipal storm water dischargers as numeric effluent limitations, the proposed rule is flawed with regard to: a) setting attainable, scientifically valid criteria in a manner consistent with state and federal regulatory approaches; b) assessing the potential economic impact on the public served by municipal storm water dischargers; c) assessing environmental impacts pursuant to the National Environmental Policy Act and the Endangered Species Act; and d) providing for the coordinated review and evaluation of the proposed CTR in conjunction with the proposed State Implementation Plan.

Response to: CTR-031-002c

EPA disagrees with item a). The commenter offers no evidence to support this alleged flaw.

Comment ID: CTR-031-004b
Comment Author: Fresno Metro. Flood Ctrl Dist.
Document Type: Flood Ctrl. District
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-17b Methodologies Aquatic Life
References: Letter CTR-031 incorporates by reference letter CTR-027
Attachments? N
CROSS REFERENCES C-17a; I

Comment: If the proposed rule is carefully and sufficiently modified to affirm a commitment by EPA to effect only its Congressional authorization as established by CWA section 402(p), then EPA's failure to assess municipal storm water dischargers" ability to attain the proposed standards and associated economic and environmental impacts may be set aside at this time. However, if EPA persists in maintaining the CTR as drafted in this regard, the ambiguities presented in the preamble demand serious consideration and analyses as follows.

a. Many of the criteria are not attainable or scientifically valid with regard to municipal stormwater dischargers, nor is the proposed approach consistent with an appropriate delegation of authority to the State.

ii. Scientific Defensibility of Standards

Municipal storm water discharges require a uniquely different scientific as well as regulatory approach.

The episodic nature of storm flow events; the huge variances in flow volume, rate, timing, concentrations, and loads; the variability in receiving waters; and organism tolerance for and recovery from episodic exposure need to be taken into account in developing standards.

In a July 1992 memorandum addressing a Combined Sewer Overflow/Wet Weather workshop, Tudor Davies, Director of EPA's Office of Science and Technology wrote: "Changes being considered in the aquatic criteria development methodology to enhance the scientific defensibility of the criteria would be applicable to both constant and to wet weather discharges. One such change undergoing consideration is a change in the duration and frequency of exposure assumptions to make criterion more toxicologically realistic.

EPA has begun this work and is apparently nearing completion. With EPA's own Science and Technology office recognizing the inadequacy of the current approach to setting criteria relative to wet weather discharges, it must be concluded any attempt to apply the CTR criteria to municipal stormwater system discharges is ill-founded and likely inconsistent with the CWA.

Response to: CTR-031-004b

EPA agrees that the specified numeric criteria concentrations, chronic averaging period, and allowable frequency may not be completely appropriate for every possible application of each criterion. For this reason, the proposed and final rules incorporate provisions for the Water-Effect Ratio for modifying the criteria concentrations for site-water conditions. The final rule also incorporates a provision that the State of California, with EPA approval, after public notice and comment, may use alternative, scientifically defensible, averaging periods and allowable frequencies. When the numeric values are coupled with these provisions, EPA believes that the rule provides criteria that are fully applicable to all types of discharges, including storm water where appropriate.

Comment ID: CTR-037-002
Comment Author: Hampton Roads Sanitation Dist.
Document Type: Sewer Authority
State of Origin: VA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-17b Methodologies Aquatic Life
References:
Attachments? N
CROSS REFERENCES

Comment: 2. EPA has used its 1985 Guidelines to develop the criteria designed to protect aquatic life and its uses proposed in this rule. However, EPA has used new decision criteria in this rule that are not part of the 1985 Guidelines or any addendum of the Guidelines. Examples include the use of test results where measured concentrations were reported rather than for tests where concentrations were not reported, regardless of whether the test was flow through; and the use of the lowest SMAV or SMCV as the GMAV or GMCV when SMAVs or SMCVs varied by more than a factor of five within a genus. EPA should not be "making the rules up as they go" and should be amending the Guidelines as changes are necessary. Changes to the methods used to develop criteria must be made public in an organized fashion to facilitate consistent development of criteria across the country. EPA may find that if these new decision criteria were applied to all criteria that they too would change. Changes to the Guidelines

without formal documentation introduces too much variability into the water quality criteria program and does not insure that all regulatory agencies will acknowledge and implement the changes. EPA should follow the Guidelines that they have developed until new methods are available.

Response to: CTR-037-002

EPA agrees that the derivation of some of the criteria for the rule used certain decision criteria that were not part of the 1985 Guidelines. These included a preference for results from flow-through tests with measured concentrations, and setting the GMAV at the lowest SMAV where SMAVs differ by more than a factor of five. These decision criteria are used in the derivation of the GLI criteria, although they are also not part of the GLI Guidelines (40 CFR 132). EPA believes that the preference for flow-through measured tests is reasonable because the toxicant exposure has greater certainty in such tests. Provided that experimental variability had little to do with accounting for observed differences in SMAVs, then setting the GMAV equal to the lowest SMAV might likewise be reasonable, if the intent were to protect all tested species within the genus in such situations. These changes do not constitute changes to the national Guidelines. EPA believes that it is not bound by the 1985 Guidelines where there is a reasonable scientific basis for deviating from the Guidelines.

Comment ID: CTR-037-003a
Comment Author: Hampton Roads Sanitation Dist.
Document Type: Sewer Authority
State of Origin: VA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-17b Methodologies Aquatic Life
References:
Attachments? N
CROSS REFERENCES C-17a

Comment: 3. EPA has deleted data from several databases without indicating the reason for the deletions. This introduces the same problem as that described in #2 above, and results in variability in how water quality criteria are developed. Additionally, stakeholders need to know why data is deleted so that these decision criteria can be used in the development of defensible site-specific criteria. EPA should provide their reasoning for deleting data that was once believed acceptable so that this same reasoning can be used to update current criteria and to develop new sound criteria.

Response to: CTR-037-003a

EPA disagrees. The commenter did not identify particular data that were at issue. EPA believes that the derivation of criteria was fully explained in the 1995 Updates and in the original criteria documents, both of which were included in the public record for the proposed rule.

Comment ID: CTR-065-002c
Comment Author: Environmental Health Coalition
Document Type: Environmental Group
State of Origin: CA
Represented Org:

Document Date: 09/26/97
Subject Matter Code: C-17b Methodologies Aquatic Life
References:
Attachments? N
CROSS REFERENCES A; C-17a

Comment: PROPOSED RULE ALLOWS SIGNIFICANT AND UNACCEPTABLE INCREASES IN TOXIC POLLUTANT CONCENTRATIONS IN BAYS AND ESTUARIES

Our initial review indicates that the proposed criteria for a number of toxic constituents are unacceptably high and will allow more pollution of bays and estuaries by several orders of magnitude. If adopted as proposed, the CTR will allow a 900% increase of dioxin, 140% increase of PCBS, 325% increase of mercury, 2760% increase of zinc, 23,000% increase of lead, and a stunning 430 million % increase for total PAH, some of the most problematic pollutants in San Diego Bay. The CTR only improves (i.e. strengthens) criteria for only 3 of 64 pollutants. This does not square with new studies that show reasons for concern about the synergistic and long-term effects of exposures to these toxic pollutants. In sum, the CTR proposes weaker criteria for 58% of the pollutants and no change for 37% of the criteria. This kind of action will not bring us closer to our goal of cleaner water containing healthier organisms in the future.

Response to: CTR-065-002c

EPA disagrees. EPA did not derive its criteria concentrations with the intent of matching existing concentrations in particular California waterbodies. EPA derived its criteria based on toxicity data indicating concentrations that are necessary to protect aquatic life. In most waterbodies having impairment of aquatic life, there are particular pollutants or other factors that are causing a stress. The concentrations of all other contaminants not causing stress are below their criteria. The comment's observation that existing concentrations are below the criteria in some waterbodies does not provide a reasonable basis for setting or judging a criterion intended to be necessary for the protection of aquatic life.

Comment ID: CTR-065-004
Comment Author: Environmental Health Coalition
Document Type: Environmental Group
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: C-17b Methodologies Aquatic Life
References:
Attachments? N
CROSS REFERENCES

Comment: EHC DOES NOT SUPPORT THE "MOST OF THE SPECIES, MOST OF THE TIME" TEST

EHC is VERY concerned about the EPA.proposing criteria to protect "most of the species and their uses most of the time". This is tantamount to condoning and facilitating marine life destruction through regulation. It is a terrible policy and should be abandoned. We are allowing polluting industries and dischargers. to bombard our marine resources with pollutants that result in multiple chemical exposures

of which we know very little of the, cumulative and synergistic effects.

Further, what is the EPA's definition of "most"? Is it 99.99%, 75% or 51%? Will estuarine environments survive standards that could be argued need only protect half of the organisms? This is completely unacceptable. EPA promulgated standards should be protective of all the living creatures 'in and' near the waters of the state. If we err, let us err on the side of protection. Although there is much that is unknown about impacts of multiple pollutants on marine organisms, one thing is for sure: once the damage is done it is hard to undo. One look at DDT- and PCB contamination in California waters should serve as an adequate reminder.

Discharging known, toxic pollutants into the marine environment is not a right, it is a privilege. The privilege should be granted only when the discharge does not harm the marine environment. Instead of trying to closely walk the ever unknowable line of exact protection, EPA should propose standards that assure complete protection so that bays, oceans, and inland waters containing all of their species, all of the time can be passed to the next generation.

Response to: CTR-065-004

Comment ID: CTR-099-001b
Comment Author: Emil A. Lawton, Ph.D.
Document Type: Citizen
State of Origin: CA
Represented Org:
Document Date: 10/03/97
Subject Matter Code: C-17b Methodologies Aquatic Life
References:
Attachments? N
CROSS REFERENCES C-17a

Comment: This letter is to comment on the water quality standards for California surface water. It is my stronly held opinion that the proposed standards do not meet the minimum legal requirements of protecting health, let alone other aspects of the environment. The numbers should be adjusted to lower MAC's by roughly an order of magnitude.

Response to: CTR-099-001b

EPA disagrees. EPA believes that is the criteria are fully protective of designated aquatic life uses. The commenter offers no evidence that the criteria are not protective.

EPA agrees that with the comment that a criterion that would protect only half of all the aquatic organisms would be unacceptable. However, EPA finds no evidence, within the comment or elsewhere, indicating that its criteria yield so little protection.

EPA criteria are derived such that they would be expected to protect at least 95 percent of the genera, based on prediction from measured toxicological values, a very high percentage (usually more than 99 percent) of the time. This very high level of protection is sufficient to protect aquatic life uses.

Comment ID: CTR-102-001b
Comment Author: Bryan Gordon
Document Type: Citizen
State of Origin: CA
Represented Org:
Document Date: 10/10/97
Subject Matter Code: C-17b Methodologies Aquatic Life
References:
Attachments? N
CROSS REFERENCES C-17a

Comment: Please ensure that the Federal water quality standards provide the maximum protection for people as well as the animals that inhabit our state's waterways.

Thank you for protecting America's waterways and the Americans and American animals that come into contact with them.

Response to: CTR-102-001b

EPA acknowledges the comment.

Subject Matter Code: C-17c Meth.New Human Health Meth.

Comment ID: CTR-035-023
Comment Author: Tri-TAC/CASA
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-17c Meth.New Human Health Meth.
References:
Attachments? N
CROSS REFERENCES

Comment: p. 42177 --New Human Health Criteria Methodology Please clarify when the new human health criteria methodology will be available, when EPA will be promulgating revised criteria as a result of the new methodology, and how those will be incorporated into the CTR and ultimately into permits. Will the criteria being adopted in this rule automatically be updated, or will EPA update them through subsequent rulemakings? If it is EPA's intent to modify the criteria in the CTR without undertaking a full rulemaking process, then those changes must be analyzed now, including an analysis of the costs and benefits of the different criteria. Also, please clarify whether, if specific criteria are changed within 5 years of adoption of the CTR, it is EPA's intent that compliance schedules already placed into permits would be extended if necessary to meet lower criteria?

Response to: CTR-035-023

Any changes to the CTR as a result of the new human health criteria methodology would be done through rulemaking to stay, withdraw, or amend the CTR. The draft revisions to the methodology for deriving ambient water quality criteria for the protection of human health were published in the Federal Register on August 14, 1998. A 120-day public comment period closed on December 14, 1998. The draft methodology revisions are available at the U.S. EPA National Center for Environmental Publications and Information (NCEPI), 11029 Kenwood Road, Cincinnati, OH 45242 or (513) 489-8190. They also may be downloaded from the EPA Office of Science and Technology's internet site (http://www.epa.gov/OST/humanhealth).

The most recent Federal action establishes the Agency's current water quality criteria. To date, the most recent Federal recalculation of 304(a) criteria occurred in the CTR. These 22 CTR criteria, plus the previously published 78 criteria, are the Agency's recommended human health criteria. As such, they will continue to be used as the basis for Agency decisions, both regulatory and nonregulatory, until EPA revises and reissues chemical-specific criteria. For example, EPA intends to use these criteria: (1) as guidance to States and Tribes for use in establishing water quality standards; (2) as the basis for EPA promulgation of water quality standards; (3) in establishing NPDES water quality-based permit limits, where the criteria have been adopted by a State or Tribe or promulgated by EPA; and (4) for all other purposes of Section 304(a) criteria under the Act.

EPA views the criteria program as constantly evolving. When the AWQC Methodology Revisions are final, any chemical-specific 304(a) criteria published using the revised methodology will be considered the Agency's most current recommended 304(a) criteria. EPA notes revisions of existing 304(a) criteria prior to the finalization of the revised methodology may be undertaken and are not precluded. Until such time as EPA re-evaluates a chemical, subjects the criteria to appropriate peer review, and subsequently

publishes revised chemical-specific 304(a) criteria, the existing recommended 304(a) criteria remain in effect.

States and Tribes have three options when adopting water quality criteria for which EPA has published 304(a) criteria. They can establish numerical values based on 304(a) criteria, 304(a) criteria modified to reflect site specific conditions, or other scientifically defensible methods. When States or Tribes revise their water quality criteria to correct deficiencies identified in a Federal promulgation, EPA will assess the scientific defensibility of the criteria in terms of the Agency's most recent recommended water quality criteria. Once new or revised 304(a) criteria are published by EPA, the Agency expects States and Tribes to adopt new or revised water quality criteria into their water quality standards consistent with the three options discussed above. EPA emphasizes it will be reviewing State and Tribal water quality standards to assess the need for new or revised water quality criteria. EPA believes five years from the date of publication of new or revised 304(a) criteria is a reasonable time frame by which States and Tribes should take action. This period is intended to accommodate those States and Tribes which have begun a triennial review and wish to complete the actions they have underway, deferring initiating adoption of new or revised water quality criteria until the next triennial review.

Subject Matter Code: C-18 Conversion Factors

Comment ID: CTR-035-017
Comment Author: Tri-TAC/CASA
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-18 Conversion Factors
References:
Attachments? N
CROSS REFERENCES

Comment: p. 42172 -- Acute/Chronic Saltwater Conversion Factors for Metals We question the validity of the assumption that acute saltwater conversion factors for metals can be substituted for chronic. EPA should further explain and document the basis for substituting acute saltwater conversion factors for chronic saltwater conversion factors.

Response to: CTR-035-017

Because EPA's previous criteria guidance had been expressed as total recoverable metal rather than dissolved, EPA developed conversion factors that account for the possible presence of particulate metal in the laboratory toxicity tests used to develop the total recoverable criteria. EPA has used the best data available to it for estimating the percentage of dissolved metal in the toxicity test waters which support the derivation of its criteria. The commenter provides no evidence that the application of saltwater acute conversion factors to saltwater chronic criteria is inappropriate. Nor does the commenter offer an alternative solution. EPA believes its assumptions regarding chronic conversion factors are reasonable; EPA believes that using dissolved metals criteria for water quality standards better approximates the bioavailable metals in the water column and better approximates metals toxicity than do criteria based on total recoverable metal. Based on the close similarity between the measured conversion factors for freshwater acute and chronic toxicity tests, and absent any other information to the contrary, it is reasonable to expect that saltwater acute and chronic conversion factors would be similar to each other.

Subject Matter Code: C-19 FDA Action Levels

Comment ID: CTR-016-006
Comment Author: San Francisco Bay RWQCB
Document Type: State Government
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-19 FDA Action Levels
References:
Attachments? Y
CROSS REFERENCES

Comment: Calculation of Final Residual Values Based on FDA Action Levels

The Regional Board agrees with EPA's assessment that it is inappropriate to use FDA Action Levels to develop criteria intended to be protective of aquatic life; at the same time, we question the appropriateness of using Action Levels as the basis for criteria intended to be protective of human health. In 1991, Board staff reviewed all historical Federal Register documents pertaining to the Action Levels dating back to the early '60s. In that review, we found that the majority of Action Levels FDA was using in 1991 were derived from studies conducted by pesticide manufacturers in the '60s. These studies characterized the expected residual level of pesticides in meat and poultry following application of pesticides on grain according to manufacturer's specifications. The implicit presumption on FDA's part was that the marginal health risks posed by pesticide residues were negligible compared to the benefits associated with pesticide-aided food production. We sincerely hope that the FDA has revised its methodology for deriving Action Levels since 1991, but do not believe that a predetermined percentage of food on the market is an acceptable factor to include in the derivation of environmentally protective criteria. Based on our findings, we encourage EPA not to use any Action Level until it has passed a level of technical review comparable to other risk-based federal environmental criteria.

Response to: CTR-016-006

None of EPA's Section 304(a) human health criteria, including the criteria that are being promulgated in today's rulemaking, are derived using FDA action levels.

Subject Matter Code: C-20 Scope Prty Toxic Poll. List

Comment ID: CTR-025-001b
Comment Author: Metro. Water Dist. of So. Cal.
Document Type: Water District
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: C-20 Scope Prty Toxic Poll. List
References:
Attachments? Y
CROSS REFERENCES C-16

Comment: Proposed California Toxic Rule

The Metropolitan Water District of Southern California (Metropolitan) appreciates this opportunity to comment on the U.S. Environmental Protection Agency's (U.S.EPA) proposed California Toxics Rule(CTR). Metropolitan, through its 27 member agencies, supplies nearly 60% of the drinking water used by approximately 16 million people living in the six-county region of Southern California. Our sources of supply are surface waters from Northern California and the Colorado River.

The water quality criteria proposed in the CTR are of critical importance to Metropolitan and other drinking water suppliers. These criteria create the basis for source water protection activities which are the first line of defense for ensuring a safe drinking water supply. Further, the criteria help protect aquatic species, including the unique aquatic resources of the Bay-Delta. The health of the Bay-Delta ecosystem and waters tributary to the Delta is linked to the amount of water available for export and thus directly affects water supply reliability of the exporting water agencies such as Metropolitan. Lastly, the CTR criteria affect the ability of water suppliers to operate and maintain their facilities.

Metropolitan recognizes that the CTR is only required to address the Clean Water Act's "priority pollutants". We note, however, that many of the drinking water contaminants regulated under the Federal and/or California Safe Drinking Water Acts (SDWA) are not among the priority pollutants. Table 1 lists the drinking water chemical constituents regulated under the California SDWA which are not priority pollutants. (The California SDWA regulates a broader set of contaminants than the Federal SDWA and provides the appropriate regulatory comparison since the CTR pertains solely to California.) Drinking water beneficial, uses cannot be fully protected without water quality criteria for all California SDWA regulated contaminants. Metropolitan requests that U.S. EPA consider including human health criteria for the contaminants listed in Table 1 as part of the CTR.

Response to: CTR-025-001b

The scope of today's rule is to establish numeric criteria to bring California into compliance with CWA Section 303(c)(2)(B). Section 303(c)(2)(B) requires adoption of numeric criteria for priority toxic pollutants contained in CWA Section 307(a) for which EPA has issued Section 304(a) criteria guidance the discharge or presence of which could reasonably be expected to interfere with the designated uses of state waters. The promulgation of pollutants that are not identified as priority toxic pollutants (i.e, those pollutants that are not contained in the CWA Section 307(a) list) are outside of the scope of today's rule.

Comment ID: CTR-026-008
Comment Author: Cal. Department of Fish & Game
Document Type: State Government
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-20 Scope Prty Toxic Poll. List
References:
Attachments? N
CROSS REFERENCES

Comment: 8. ADDITIONAL CRITERIA

The proposed rule would establish freshwater aquatic organism acute criteria for 24 constituents, freshwater aquatic organism chronic criteria for 28 constituents, saltwater aquatic organism acute criteria for 23 constituents, and saltwater aquatic organism chronic criteria for 27 constituents. The DFG agrees that establishment of criteria for these constituents will go a long way towards protecting fish and wildlife resources. However, we also believe that criteria for additional constituents would further strengthen the proposed rule. To this end, the DFG recommends that acute and chronic toxicity criteria be established for chlorine and ammonia. As a starting point, the EPA 1986 Gold Book has fresh and saltwater criteria guidance developed for both constituents. With respect to acute and chronic toxicity, the CTR should develop criteria similar to that which exists in the California Ocean Plan. From an overall toxicity standpoint, setting acute and chronic criteria would better address the additive or synergistic effects that individual constituent criteria fail to take into account.

Response to: CTR-026-008

The scope of today's rule is to establish numeric criteria to bring California into compliance with CWA Section 303(c)(2)(B). Section 303(c)(2)(B) requires adoption of numeric criteria for priority toxic pollutants contained in CWA Section 307(a) for which EPA has issued Section 304(a) criteria guidance and where those pollutants could reasonably be expected to interfere with the designated uses of state waters. Neither ammonia nor chlorine are identified as priority toxic pollutants in CWA Section 307(a) and are thus outside of the scope of today's rule. This is consistent with EPA's action in the National Toxics Rule 57 FR 60848 (Dec 22, 1992). See p. 60852, col. 2; 60856-60859.

EPA, however, recognizes the detrimental impacts of ammonia, chlorine, and other toxins on aquatic ecosystems, and encourages states, including California, to adopt criteria for these and other pollutants so that the designated uses of state waters can be fully protected (the CWA and Water Quality Standards Regulation requires states to adopt water quality standards, which includes water quality criteria, sufficient to protect the designated uses of their waters). States may also use their narrative criteria to prevent toxic effects caused by pollutants, such as ammonia and chlorine, in instances where a state does not have numeric criteria in place or to supplement their numeric criteria.

Comment ID: CTR-058-009
Comment Author: Western States Petroleum Assoc
Document Type: Trade Org./Assoc.
State of Origin: CA

Represented Org:
Document Date: 09/26/97
Subject Matter Code: C-20 Scope Prty Toxic Poll. List
References:
Attachments? Y
CROSS REFERENCES

Comment: MTBE. WSPA supports EPA's decision not to set criteria based on secondary or organo-leptic considerations and to remain focused on setting criteria to protect human health and aquatic life.

Given the controversy surrounding use of MTBE, particularly in California, WSPA supports an open, objective and comprehensive scientific discussion of the issues and possible solutions. In fact, WSPA is supporting (with EPA and API) a detailed study of ambient aquatic toxicity data on MTBE in surface waters, with a goal to agree on appropriate water quality criteria to protect aquatic life. It is appropriate to allow this study to run its course, at which time EPA and the states can examine the data and set criteria based on sound science.

Other stakeholders may raise concerns about the carcinogenicity of MTBE. However, EPA (the agency charged with deciding whether MTBE is a carcinogen) has not taken an official position on this issue. The data which suggest that it might be (e.g., Belpoggi et al.) provide, at best, only weak evidence and are highly controversial from a methodological standpoint. It is imperative that EPA carefully review the evidence and decide the matter in an appropriate forum. Certainly, this rulemaking is not the appropriate forum.

In the interim, water quality officials are already well-empowered to address concerns of taste and odor when needed. Establishing an MTBE criterion in this rulemaking will not enhance protection of drinking water supplies.

Response to: CTR-058-009

The scope of today's rule is to establish numeric criteria to bring California into compliance with CWA Section 303(c)(2)(B). Section 303(c)(2)(B) requires adoption of numeric criteria for priority toxic pollutants contained in CWA Section 307(a) for which EPA has issued Section 304(a) criteria guidance and the discharge or presence of which could reasonably be expected to interfere with the designated uses of state waters. MTBE is not identified as a priority toxic pollutant in CWA Section 307(a) and is thus outside of the scope of today's rule. Additionally, EPA acknowledges the support for the Agency in not promulgating criteria that are based on organoleptic considerations. This is consistent with the NTR. See 57 FR 60873.

Comment ID: CTR-061-006
Comment Author: G. Fred Lee & Associates
Document Type: Academia
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-20 Scope Prty Toxic Poll. List
References:

Attachments? Y
CROSS REFERENCES

Comment: Page 42162, second column, near the top, does not provide a reliable discussion about how the Priority Pollutant list was developed. It was a court-ordered consent decree that was not internally peer-reviewed by the US EPA, or reviewed by the technical community or the public concerned with these issues. The Priority Pollutant list as promulgated and implemented has proven to be a significant detriment to proper water pollution control efforts in the US since it focuses resources on a number of chemicals that have limited significance to public health and the environment and allows regulatory agencies, dischargers, etc. to ignore the vast arena of hazardous or detrimental chemicals that exist in various types of wastes and point and non-point source stormwater runoff that can and, in some instances, do cause real water quality impacts.

Response to: CTR-061-006

EPA believes that the derivation of the Section 307(a) priority toxic pollutant list is outside of the scope of today's rule. Additionally, EPA disagrees that the current Section 307(a) list of priority toxic pollutants is a detriment to water pollution control. The Agency believes that the establishment of criteria for priority toxics pollutants represents significant progress in controlling the discharge of toxins to the nation's waters and will result in many improvements in protecting water resources and in achieving the fishable/swimmable goals of the Clean Water Act. EPA maintains that the control of toxic pollutants in ambient waters is fundamental in a number of Clean Water Act programs, including permitting programs, protection of contaminant levels in fish and shellfish, improvements in marine, coastal, and inland surface water quality, contamination of sediments, pollution prevention, and in ecological protection.

While EPA agrees that there may be other chemicals that adversely impact environmental protection, EPA notes that states do have the authority to develop and adopt criteria for pollutants that are not contained on the 307(a) list in order to protect the designated uses of their waters. The Water Quality Standards Regulation (see 40 CFR 131) requires all states, including California, to adopt criteria that will provide sufficient coverage to protect the designated uses of their waters. Furthermore, where a state has not adopted sufficient coverage of numeric criteria to protect the designated uses, the state may utilize its narrative criteria to derive criteria for pollutants to supplement the numeric criteria.

Comment ID: CTR-065-006b
Comment Author: Environmental Health Coalition
Document Type: Environmental Group
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: C-20 Scope Prty Toxic Poll. List
References:
Attachments? N
CROSS REFERENCES P

Comment: TOXICITY TESTING

EHC strongly supports inclusion of acute and chronic toxicity tests. However, it is very important that

chlorine and ammonia be added to the list of constituents.

Response to: CTR-065-006b

The scope of today's rule is to establish numeric criteria to bring California into compliance with CWA Section 303(c)(2)(B). Section 303(c)(2)(B) requires adoption of numeric criteria for priority toxic pollutants contained in CWA Section 307(a) for which EPA has issued Section 304(a) criteria guidance and where those pollutants could reasonably be expected to interfere with the designated uses of state waters. Neither ammonia nor chlorine are identified as priority toxic pollutants in CWA Section 307(a) and are thus outside of the scope of today's rule. This is consistent with EPA's action in the National Toxics Rule 57 FR 60848 (Dec 22, 1992). See p. 60852, col. 2; 60856-60859.

EPA, however, recognizes the detrimental impacts of ammonia, chlorine, and other toxins on aquatic ecosystems, and encourages states, including California, to adopt criteria for these and other pollutants so that the designated uses of state waters can be fully protected (the CWA and Water Quality Standards Regulation requires states to adopt water quality standards, which includes water quality criteria, sufficient to protect the designated uses of their waters). States may also use their narrative criteria to prevent toxic effects caused by pollutants, such as ammonia and chlorine, in instances where a state does not have numeric criteria in place or to supplement their numeric criteria.

Comment ID: CTR-090-005
Comment Author: C&C of SF, Public Utl. Commis.
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-20 Scope Prty Toxic Poll. List
References: Letter CTR-090 incorporates by reference letters CTR-035 and CTR-054
Attachments? Y
CROSS REFERENCES

Comment: Major Concerns About the Proposed Criteria and Rule

1. The Proposal is Based on Poor Data and Will Not Result in Better Water Quality for California. We stated that our own attainability analysis and that of BADA show that San Francisco,) will be impacted by this rule. Unfortunately, due to the short time for review, the poor quality of data and basis for statements and assumptions in the proposal and the problem with detection limits we cannot specifically say what will be the cost to Sari Francisco. One analysis tell us it could be $2.3 million per year annualized costs and another analysis tells us it could be much more. We strongly recommend major revision to the proposal and the economic analysis before final promulgation for the following reasons:

The criteria includes many toxicants which are not known to cause problems in the waters; many are banned substances. On the other hand, substances which are known to be problems and which are being released in large amounts are not included in the proposed criteria;

Response to: CTR-090-005

EPA believes that the derivation of the Section 307(a) priority toxic pollutant list is outside of the scope

of today's rule. Furthermore, EPA disagrees that the criteria promulgated in today's rule are not to known to cause problems in ambient waters. See response to CTR-061-006. The criteria are based on laboratory studies showing harm to human health or aquatic life. Further, because permit limits are incorporated into NPDES permits only for constituents having a reasonable potential to exceed water quality standards, a discharger does not receive a limit in its permit unless the discharge contains the pollutant. Thus existence of criteria does not translate into unnecessary permit limits.

Comment ID: CTR-090-016
Comment Author: C&C of SF, Public Utl. Commis.
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-20 Scope Prty Toxic Poll. List
References: Letter CTR-090 incorporates by reference letters CTR-035 and CTR-054
Attachments? Y
CROSS REFERENCES

Comment: Outdated priority pollutant list - p 42162. B. Statutory and Regulatory Background (paragraphs 3,4) - As noted in the preamble, the 1978 priority pollutant list has not been updated since January 1981. This has several important implications for this rule-making:

1. The absence of criteria for significant toxicants - Chemical usage changes over time. New chemical intermediates and products are continually being developed and brought to market. Pesticides, in particular, have a relatively short commercial existence. Of the approximately eighteen pesticides and metabolites on the priority pollutant list, all but two are now banned or significantly restricted. Newer, or otherwise non-listed, pesticides are not covered by the CTR even though there is evidence of their presence in surface waters and adverse impacts. The Pollutant Policy Document (SWRCB, May 1990 final draft) noted that the San Joaquin drains an agricultural area which may receive as much as 23 million kilograms of pesticides annually. In the river, it noted that, "Consistently detected are 2,4-D, atrazine, simazine, dacthal and diazinon." Yet this proposed rule contains criteria for none of these pesticides. Of particular importance is diazinon. Approximately 2,000,000 pounds are sold annually in California with about half going to agriculture and half to residential users. Monitoring by Alameda County has tied it to toxicity in some county creeks. Diazinon appears in all of Palo Alto's creeks at levels that -may be of concern (Fish and Game recommends 80 ppt to protect aquatic life and Palo Alto has detected it at up to 400 ppt.).

Although this pesticide is subject to hydrolysis and eventually breaks down, the process may take four to six months. More significantly, the U.S. Geological Survey has tracked pulses of this pesticide down the San Joaquin and Sacramento and into San Francisco Bay. During the USGS study, water samples from the San Joaquin were toxic for 12 consecutive days to the water flee, Ceriodaphia dubia. (USGS, Water Fact Sheet, Diazinon Concentrations in the Sacramento and San Joaquin Rivers and San Francisco Bay, California, February 1993, K. Kuivila, 1993). The USGS report noted that other pesticides (chlorpyrifos, methidathion, and carbaryl) were also routinely detected in the samples and may have contributed to the toxicity. These other pesticides also do not have EPA criteria.

The Central Valley Regional Water Quality Control Board has detected diazinon, chlorpyrifos, fonofos, and carbaryl at concentrations toxic to Ceriodaphnia. In fact, the principal conclusion of their two and

half year study was that a 43 mile stretch of the San Joaquin River was toxic to Ceriodaphnia about half the time (Insecticide Concentrations and Invertebrate Bioassay Mortality in Agricultural Return Water from the San Joaquin Basin, CVRWQCB, December 1995). Other chemicals, methyl tertiary butyl ether (WBE), for example, a fuel additive, and related compounds are now showing up in California drinking water supply reservoirs and appear to be persistent

These unregulated toxicants are may be a significant water quality problem in California surface waters yet EPA has not found it appropriate to issue criteria for them. The excuse for inaction for all of these constituents cannot be that they have only recently appeared or have not been evaluated. Although MTBE is relatively new, in 1973, the National Academy of Sciences issued a guideline for diazinon of 9 ppt for the protection of aquatic life. More recently the California Department of Pesticide Regulation proposed quantitative response limits (QRLS) for diazinon, chlorpyrifos, and methidathion.

The CALFED program is proposing to spend a billion dollars over the next 20 years for water course and riparian habitat enhancements in the Delta. This effort will be undermined unless steps are taken to reduce toxicity from agricultural drainage.

The Clean Water Act in Section 303(c)(4) allows the Administrator to issue a standard in any case where it is necessary to meet the requirements of the Act. If there ever was an obvious, overwhelming need for standards, this is it. EPA needs to work with the State and agricultural interests to develop effective programs to control the release of pesticides to the inland surface waters and Bays and Estuaries of California

Response to: CTR-090-016

See response to CTR-090-005.

Comment ID: CTR-090-017
Comment Author: C&C of SF, Public Utl. Commis.
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-20 Scope Prty Toxic Poll. List
References: Letter CTR-090 incorporates by reference letters CTR-035 and CTR-054
Attachments? Y
CROSS REFERENCES

Comment: 2. Criteria for no longer relevant toxicants - Listing chemicals which no longer have relevance to water quality is not as serious as omitting chemicals which are important. Listing irrelevant toxicants does, however, waste resources since these chemicals are routinely placed in NPDES permits with both effluent limits and mandated monitoring regardless of whether they have ever been detected. The result is permits with impressive lists of priority pollutants which give the false impression that they are comprehensive and therefore protective of the receiving waters.

For each chemical included in this rule-making EPA should demonstrate that the chemical is present either in effluents or receiving waters at concentrations which cause or have the reasonable Potential to cause, or contribute to an excursion above any criteria published by EPA under Section 304. The

adoption of irrelevant criteria is not "necessary to support such, designated uses," 303(c)(2)(B), and therefore can be omitted.

The information on which toxicants are present should be readily available since EPA receives the NPDES monitoring reports and state water quality assessments. By limiting the rule-making to real constituents of concern, we can - begin to focus on those toxic chemicals which are damaging the biota or threatening human health.

Response to: CTR-090-017

See response to CTR-090-005.

Comment ID: CTR-095-001a
Comment Author: M. Ruth Uiswander
Document Type: Citizen
State of Origin: CA
Represented Org:
Document Date: 10/02/97
Subject Matter Code: C-20 Scope Prty Toxic Poll. List
References:
Attachments? N
CROSS REFERENCES C-17a; C-21; C-14

Comment: In regard to the numeric water quality standards criteria for California surface water, they have been revealed by environmental groups to be insufficiently protective and environmentally unjust. The proposed new rules assume fish ingestion of 6.5 grams per day. In reality, consumption of fish in some communities can be as high as 1 pound per day. This level of consumption is especially likely among subsistence fishers.

Please prevent toxic pollution in California's bays by making more protective standards that consider all toxic pollutants and consider the fish consumption habits of subsistence anglers.

Response to: CTR-095-001a

See response to CTR-061-006. With respect to fish consumption see responses to CTR-002-002a and CTR-002-005a (Category C-14; Fish or Water Consumption).

Comment ID: CTR-100-001
Comment Author: Michael A. McBride
Document Type: Citizen
State of Origin: CA
Represented Org:
Document Date: 10/04/97
Subject Matter Code: C-20 Scope Prty Toxic Poll. List
References:
Attachments? N
CROSS REFERENCES

Comment: Great progress has been made in the last twenty years to clean our polluted streams, rivers and oceans. Please keep the pressure on the polluters by creating more protective standards that consider all toxic pollutants of concern. Thank you for your time and please let me know your thoughts.

Response to: CTR-100-001

See response to CTR-061-006.

Comment ID: CTR-101-001b
Comment Author: Cheesemans' Ecology/Brd Safari
Document Type: Environmental Group
State of Origin: CA
Represented Org:
Document Date: 10/06/97
Subject Matter Code: C-20 Scope Prty Toxic Poll. List
References:
Attachments? N
CROSS REFERENCES C-14

Comment: We would like to thank the EPA for accepting comments on its proposed numeric water quality standards criteria for California surface water. We urge the prevention of toxic pollution in California's bays by creating more protective standards that consider all toxic pollutants of concern and that address the consumption habits of subsistence fishers, as well as "average" fish consumers.

Response to: CTR-101-001b

See response to CTR-061-006. With respect to fish consumption, see response to CTR-109-001a (Category C-14; Fish or Water Consumption).

Comment ID: CTR-105-001a
Comment Author: Heather Catherine Park Tausig
Document Type: Citizen
State of Origin: CA
Represented Org:
Document Date: 10/13/97
Subject Matter Code: C-20 Scope Prty Toxic Poll. List
References:
Attachments? N
CROSS REFERENCES C-14

Comment: I understand that the EPA is currently accepting comments on its proposed numeric water quality standards criteria for California surface water. I am writing to urge the EPA support the prevention of toxic pollution in California's bays by creating more protective standards that consider all toxic pollutants of concern and that address the consumption habits of subsistence fishers, as well as "average" fish consumers.

Response to: CTR-105-001a

See response to CTR-061-006. With respect to fish consumption, see response to CTR-109-001a (Category C-14; Fish or Water Consumption).

Comment ID: CTR-109-001b
Comment Author: Maggie Miller
Document Type: Citizen
State of Origin: CA
Represented Org:
Document Date: 12/01/97
Subject Matter Code: C-20 Scope Prty Toxic Poll. List
References:
Attachments? N
CROSS REFERENCES C-14

Comment: The new water quality standards the EPA is proposing for California surface waters disturbs me greatly. There are several problems with the proposed rules. First, in establishing standards for mercury, dioxin, PCBs, and other contaminants, the proposed new rules assume fish consumption at 6.5 grams per day yet consumption of fish in certain communities can be as high as one pound per day, over 60 times more than estimated by the EPA. Please don't underestimate fish consumption by people of different races and cultures.

Please prevent the toxic pollution of California waters by creating more protective standards that consider all toxic pollutants and all consumers of fish. Thank you.

Response to: CTR-109-001b

See response to CTR-061-006. With respect to fish consumption, see response to CTR-109-001a (Category C-14; Fish or Water Consumption).

Comment ID: CTRH-001-016
Comment Author: Greg Karras
Document Type: Public Hearing
State of Origin: CA
Represented Org: Comm. for Better Environ.
Document Date: 09/17/97
Subject Matter Code: C-20 Scope Prty Toxic Poll. List
References:
Attachments? N
CROSS REFERENCES

Comment: As you know -- you should know -- EPA approved methyl tert-butyl ether, MTBE, a gasoline additive, creating the fastest-growing chemical market in the world, without any analysis of water quality effects. In addition to evidence of widespread groundwater and drinking water contamination, MTBE has been found many of our state's surface waters.

Will EPA not propose a criterion for MTBE? Why did they not propose one in this rule?

Response to: CTRH-001-016

See response to CTR-058-009.

Subject Matter Code: C-21 Legal Concerns

Comment ID: CTR-002-005b
Comment Author: Comm. for a Better Environment
Document Type: Environmental Group
State of Origin: CA
Represented Org:
Document Date: 09/24/97
Subject Matter Code: C-21 Legal Concerns
References:
Attachments? Y
CROSS REFERENCES C-14

Comment: C. Criteria for the pollutants of most concern do not provide equal protection for people of color and are not supportable by science.

EPA cannot show that its weaker proposed criteria will protect fishing and aquatic life from dioxin-like compounds, mercury, and copper. Further, EPA's proposal to allow greater health risks for subsistence fishers fails to provide equal protection under the law and is contrary to the President's Executive Order on Environmental Justice.

The proposed criteria provide unequal protection for people of color who fish for food. EPA admits in the proposal that: "There may be subpopulations within a state, such as subsistence anglers who as a result of greater exposure to a contaminant, are at greater risk than the hypothetical 70 kilogram person eating 6.5 grams per day of maximally contaminated fish.. ." Indeed, ample data show that some people exercise their fishing rights to "use" Bay waters byeating up to a pound (450 grams) per day of fish from San Francisco Bay, and most of them are people of color.(*8) EPA's discussion then goes on to admit that it is proposing to provide less protection for these subsistence anglers: "[I]ndividuals that ingest ten times more of a carcinogenic pollutant than is assumed in derivation of the criteria at a [one excess cancer in a million] risk level will be protected to a [one in 100,000] level, which EPA has historically considered to be adequately protective." However, people who eat a pound per day eat seventy times more, and pages 8- 11 and 8-12 of EPA's economic analysis admit people eat 16 times more, than the 6.5 grams (1/70th of a pound) of Bay fish per day assumed in EPA's criteria. EPA's own calculations show present cancer threats of nearly 1 in 1,000 for some Bay anglers at these higher consumption levels. Thus, EPA itself predicts that its proposal will result in lesser, inadequate protection for people of color who rely on Bay-caught fish for food.

(*8) Previously unpublished data from a 1993-4 survey of 500 anglers using South and Central San Francisco Bay by Communities for a Better Environment-SAFER!; Save San Francisco Bay Association, 1995 (excerpt); West, 1992; West et al., 1992; Peterson et al., 1994; and USEPA, 1994.(excerpt of a draft report discussing and citing work by EPA, Wolfe and Walker (1987), Svensson (1991) and others. Includes analysis of the evidence..

Response to: CTR-002-005b

See response to CTR-002-005a (Category C-14; Fish and Water Consumption).

Comment ID: CTR-002-009
Comment Author: Comm. for a Better Environment
Document Type: Environmental Group
State of Origin: CA
Represented Org:
Document Date: 09/24/97
Subject Matter Code: C-21 Legal Concerns
References:
Attachments? Y
CROSS REFERENCES

Comment: D. EPA's proposals fail to meet federal laws and regulations.

Proposed criteria would revise water quality standards contrary to law and regulations. Pursuant to 40 CFR section 131.22(c) revised water quality criteria must protect existing uses under 40 CFR section 131.12 (a)(1), and shall support the most sensitive designated use of Bay waters based on sound scientific rationale, under 40 CFR section 131.11(a)(1). However, EPA criteria for pollutants shown in Table 2 above do not meet these tests, as shown by sections II A, B, and C of these comments.

Inappropriate rejection of scientifically sound criteria for 16 dioxin compounds accumulation, and mercury and copper field data results in criteria which allow pollutant levels shown to threaten or harm aquatic life and the fishing public. Human health criteria do not protect people who eat up to a pound of Bay fish per day because EPA assumes people eat only 6.5 grams of these fish per day. In this crucial analysis, protecting the most sensitive use must mean protecting people who eat as much as a pound of fish per day (seventy times more than 6.5 grams), and more often than not are people of color fishing for food as well as recreation.(*8) The criteria do not protect designated uses of Bay waters for fishing and propagation of aquatic life- based on sound science.

Even if EPA argues that some of the pollutants for which it proposes weaker criteria attain levels necessary to achieve water quality standards and protect fishing, aquatic life and wildlife, under 40 CFR 131.12(a)(2) EPA cannot allow water quality to be degraded because this is not "necessary to accommodate important economic or social development." At EPA's request, CBE has supplied evidence showing that long-term economic benefits to the manufacturing base resulted from pollution prevention measures driven by the implementation of state criteria more stringent than EPA's proposal with zero dilution effluent limits. The economy of this area, Silicon Valley, grew substantially at the same time and this growth was led by the industries involved in this effort. Although we are concerned that EPA seems to have arbitrarily rejected evidence that the most "stringent" criteria implementation resulted in economic benefit rather than cost, we trust EPA will agree there is no evidence that weakening these criteria is needed for economic or social reasons.

(*8) Previously unpublished data from a 1993-4 survey of 500 anglers using South and Central San Francisco Bay by Conununities for a Better Environment-SAFER!; Save San Francisco Bay Association, 1995 (excerpt); West, 1992; West et al., 1992; Peterson et al., 1994; and USEPA, 1994.(excerpt of a draft report discussing and citing work by EPA, Wolfe and Walker (1987), Svensson (1991) and others. Includes analysis of the evidence..

Response to: CTR-002-009

EPA disagrees with this comment. The CTR criteria are based on sound science and are protective of the most sensitive uses of waters in California, in compliance with 40 CFR 131.11(a)(1) and 131.22(c). The criteria are based on the uses which the State itself has designated: the CTR does not adopt or modify any use designations. The scientific bases for the CTR criteria are set forth in The California Toxics Rule Administrative Record Matrix.

As to some of the CTR criteria which this commenter claims will allow increases in pollution of San Francisco Bay, this commenter's concerns are no longer applicable. EPA's decision to not promulgate final CTR criteria for those waters where there are EPA-approved San Francisco Basin Plan criteria in effect addresses those CTR criteria which this commenter compares unfavorably to existing Bay Basin Plan criteria. (See response to CTR-016-001.)

As to those CTR criteria which the commenter compares unfavorably with ISWP and EBEP criteria, see response to CTR-002-003.

The commenter's implication that adoption of the CTR violates anti-degradation provisions in EPA's regulations is misplaced. In the first place, it is not appropriate to compare CTR criteria with California's ISWP and EBEP criteria for purposes of determining whether degradation of water quality may result from adoption of the CTR. The California criteria do not exist for purposes of making such a comparison, since the ISWP and EBEP were rescinded in 1994. Secondly, the adoption of criteria sufficient to protect designated uses is not an action which in and of itself results in any change in water quality. The implementation of such criteria may raise anti-degradation issues in specific instances in the future, but this rulemaking does not.

With respect to the commenter's concern about certain people eating more fish than 6.5 grams/day, see response to CTR-002-005a (Category C-14; Fish and Water Consumption).

Comment ID: CTR-005-006a
Comment Author: Novato Sanitary District
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/23/97
Subject Matter Code: C-21 Legal Concerns
References:
Attachments? Y
CROSS REFERENCES S; R

Comment: 5. The proposed rule is inconsistent with applicable Federal law and regulations. In proposing a single set of criteria for all estuaries, the rule is inconsistent with the Clean Water Act and EPA's water quality standards regulations. The Clean Water Act requires that water quality standards be established taking into consideration their use and value for public water supplies, propagation of fish and wildlife, recreational purposes, and also taking into consideration their use and value for navigation (See CWA section 303(c)(2)(A)). Consistent with this, EPA regulations require that water quality standards be based on identification of where toxic pollutants may be adversely affecting water quality or the attainment of the designated water use or where the levels of toxic pollutants are at a level to warrant concern. For those identified waters, states must adopt criteria for such toxic pollutants applicable to sufficient to protect the designated use"(See 40 CFR 131.1 1 (a)(2)).

Clearly the intent of both the Act and EPA regulations is that water quality standards be tailored to the characteristics of the waters in question. In failing to properly evaluate the rule's economic impacts and in failing to adequately consider regulatory alternatives, the rule is inconsistent with Presidential Executive Order 12866 and the Unfunded Mandates Reform Act. In failing to properly consider the impacts on small entities, the rule is inconsistent with the Regulatory Flexibility Act.

Response to: CTR-005-006a

See responses to CTR-036-005, CTR 035-012a, and CTR 005-007a.

With respect to EPA's compliance with E.O. 12866, the Unfunded Mandates Reform Act, and the Regulatory Flexibility Act, see the preamble to the final rule, EPA's economic analysis conducted pursuant to the order, and the record for the rule. EPA notes that the water quality criteria only have an impact when the permit authority finds that a discharge has the reasonable potential to violate water quality standards. EPA based its economic analysis on two scenarios, a high end scenario and a low end scenario. The high end established baseline concentrations as being equal to existing permit limits, whether or not the pollutant was detected in the effluent. This provides and upper bound because most facilities typically discharge below their permit limit. The low end scenario is based on actual data about what pollutants are present in the effluent and the actual concentrations of the dischargers in the effluent.

Comment ID: CTR-005-008b
Comment Author: Novato Sanitary District
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/23/97
Subject Matter Code: C-21 Legal Concerns
References:
Attachments? Y
CROSS REFERENCES C-24

Comment: 7. Separate, scientifically defensible, reasonably achievable aquatic life criteria for copper should be adopted for San Pablo Bay in the vicinity of the District's discharge, or alternatively EPA should state in the Preamble that the Regional Board should: (1) allow a dilution credit for the District based on modeling studies; and (2) apply metals translator determined based on EPA procedures from the results of the Regional Monitoring Program. To comply with the Clean Water Act and EPA regulations, EPA should consider specific water bodies. To fulfill the spirit of Presidential Executive Order 12866 and the requirements of the Unfunded Mandates Reform Act and the Regulatory Flexibility Act, EPA should evaluate regulatory alternatives based on an analysis of costs and benefits. Based on the analysis of costs and benefits performed by the District (see Attachment 1), EPA should either adopt the criteria that is currently achieved, or alternatively specify implementation criteria that will allow the current discharge to continue. The District has performed dilution studies (see Attachment 2) and performed reasonable potential analyses using dilution and metals translators (see Attachments 3 and 4). These show that with the use of these implementation provisions, the proposed criteria can be achieved in-stream. Without EPA specifying that dilution studies and metals translators should be utilized in the District's case, it is possible that the CTR could impose enormous costs on the District (and the small entities it serves) without providing any environmental benefit. In that case, the CTR would be

inconsistent with the Clean Water Act, EPA regulations, Presidential Executive Order 12866, the Unfunded Mandates Reform Act and the Regulatory Flexibility Act.

Response to: CTR-005-008b

See response to CTR-005-008a (Category C-24; Site-Specific Criteria).

Comment ID: CTR-007-004
Comment Author: Port of San Diego
Document Type: Port Authority
State of Origin: CA
Represented Org:
Document Date: 09/24/97
Subject Matter Code: C-21 Legal Concerns
References:
Attachments? N
CROSS REFERENCES

Comment: 3. The District requests that in the Final CTR, a provision be placed in the rule that grants a waiver to the water quality criteria or that the approach is shifted to a risk based approach where an agency or responsible party engages in cleanup or remediation activities.

Response to: CTR-007-004

EPA disagrees with this comment. The CTR does not include implementation provisions because this rule's intent is to implement section 303(c)(2)(B) of the CWA for California. EPA believes that implementation of these provisions is appropriately left to the state. To the extent that this commenter is proposing implementation provisions that are consistent with CWA requirements, such provisions may be considered by the State for inclusion in its implementation plan. 40 CFR 131.11. See also response to CTR 042-007a. Further, designation of uses is primarily left to the states. In this rule, EPA is simply establishing criteria necessary to protect the designated uses. Use designation may consider economics. If a state wishes to designate a use that is not a CWA section 101(a) use, the state must conduct a use attainability analysis to determine that the use is not attainable.

Comment ID: CTR-010-003
Comment Author: Save San Francisco Bay Assoc.
Document Type: Environmental Group
State of Origin: CA
Represented Org:
Document Date: 09/24/97
Subject Matter Code: C-21 Legal Concerns
References:
Attachments? Y
CROSS REFERENCES

Comment: EPA's proposal also does not comply with the federal Clean Water Act and is certain to stir up

a hornet's nest of protest if moved forward. The proposals also restrict the ability of the public and concerned agencies from involvement in ensuring standards are complied with. U.S. environmental policy is often hamstrung by the short-term, corporate bottom line influence to the detriment of the vast majority. Ultimately such short-sightedness will result in not only a continued worsening quality of life for the general public, but also in a loss of economic competiveness to those industries and countries able to profit from pollution prevention.

Though the mission of the U.S. EPA is to protect the environment, the California Toxics Rule harms the environment. The proposed criteria should be revised before being adopted. We would welcome the opportunity to discuss these issues with you, along with other concerned parties. We would also appreciate a response to this letter.

Response to: CTR-010-003

EPA disagrees with this comment.

First, concerning the ability of the public and concerned agencies to be involved in ensuring that standards are complied with, EPA reaffirms that the CTR is an adoption of criteria, and it does not include implementation provisions. The State is responsible for the application of CTR criteria to point and non-point sources. The State is currently developing a plan for implementation of the CTR criteria, following its own public participation requirements (Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California, September 11, 1997). Furthermore, as the State applies CTR criteria in specific actions that it will take in the future, such as issuing discharge permits, the public can pursue applicable participation opportunities as they arise. The commenter has not explained how the rule will impair the ability of the public and concerned agencies to ensure standards are complied with.

Secondly, EPA cannot respond specifically to the comment regarding the influence of "the short-term, corporate bottom line" on federal environmental policy, as there is no support for this conclusory statement. Although Executive Order 12866 and the Unfunded Mandates Reform Act require EPA to estimate the costs of certain rules (rules deemed "significant under the E.O., and rules that require "Federal mandates" that may result in expenditures in excess of 100 million/year under UMRA, the E.O. and UMRA do not override applicable law. Under the CWA, economics or cost benefit analysis is not a basis for adopting water quality criteria. See CWA section 303(c), 40 CFR 131.11. See response to CTR-042-007a. For a discussion of the Regulatory Flexibility Act, see the preamble to the final rule. The CTR fully complies with all of these requirements.

Comment ID: CTR-020-002
Comment Author: City of Stockton
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/24/97
Subject Matter Code: C-21 Legal Concerns
References:
Attachments? Y
CROSS REFERENCES

Comment: 1. General Comments

A. Applicability of the Rule is Overly Broad

The CTR applies the various water quality criteria to "all waters of the United States" regardless of the actual aquatic life or beneficial uses present. EPA specifically disclaimed any need to individually assess hydrologic unit needs as mandated by the Porter-Cologne Act and the court decision overturning the Inland Surface Waters Plan ("ISWP"). In effect, this means that the CTR will be applied in an overly broad manner, particularly with respect to storm water discharges, as the criteria designed for high quality wann and cold water fisheries will be applied to storm water ditches which the Agency may classify as intermittent streams pursuant to the Regional Water Quality Control Board's (the "Regional Board") "tributary policy" (i.e., tributaries are presumed to contain the same uses as designated main streams). Such water bodies are dry other than during precipitation events and cannot maintain sensitive aquatic life uses. These water bodies have not been classified for specific use protection, and approved Basin Plans allow consideration of site-specific factors in determining actual use protection needs.

EPA's Guidelines for Deriving Numerical National Water Quality Criteria for the Protection of Aquatic Organisms and their Uses (1985) ("National Guidelines") specify that criteria must be applied in the manner in which they were derived to provide reasonable and appropriate protection. Federal water quality regulations (40 CFR Part 131) also specify that water quality criteria must be necessary to protect the beneficial uses. Thus, EPA lacks authority to establish water quality criteria that are more restrictive than necessary to ensure that actual uses will be protected. The Agency's attempt to apply stringent water quality criteria to water bodies that either have no reasonable likelihood of maintaining sensitive aquatic life or have not been classified by the state to protect such uses is arbitrary and capricious. In addition, application of stringent human health ingestion-based and fish tissue criteria to receiving waters that lack a potable water supply use or that cannot support a game fishery is clearly not consistent with the National Guidelines and is unnecessarily restrictive. Similarly, pursuant to the Porter-Cologne Act and applicable case law, EPA may not enact requirements that would otherwise be unlawful under California law.

As the Porter-Cologne Act would not allow such action (i.e., overly broad use designations) on the part of the State's Water Quality Control Boards, EPA needs to restrict the application of the CTR to circumstances where the water quality criteria are reasonably applicable. Thus, the proposed criteria for aquatic life should only be applied to perennial streams and not to intermittent watercourses that primarily exist during rainfall events. Human health criteria that include a water ingestion component should only be applied to water bodies that have a demonstrated capability to provide potable water, and application of the criteria should be at the water intake (which would allow for loss of pollutant in the environment and documented pollutant reduction achieved by the water treatment facility). Applying the ingestion-based criteria at appropriate water intake points will help to avoid the assumption that surface waters are consumed without treatment, as such an assumption is not lawful under the Safe Drinking Water Act.

Response to: CTR-020-002

EPA disagrees with this comment. EPA must adopt criteria in accordance with the requirements of the CWA. As a federal agency, EPA is not subject to the requirements of the Porter-Cologne Act, which is State law, nor to the State court decision which overturned the ISWP and EBEP.

Regarding the failure to individually assess the needs of hydrologic units, such an undertaking would amount to adoption of site-specific criteria. It is beyond the scope of the CTR to adopt site-specific

criteria for individual pollutants and/or water bodies, based on localized information and data. As explained in the preamble to the proposed CTR, and further discussed in the response to CTR-003-006, et al., EPA will work with the State to approve acceptable State-adopted criteria (including site-specific criteria) and to stay the CTR where such State criteria are in effect.

EPA further disagrees that the CTR criteria will be applied "in an overly broad manner," based on EPA'sfailure to consider the actual uses of specific water bodies. The CTR does not modify or adopt any uses for any waters. Rather, the CTR adopts criteria for waters of the United States in California to protect aquatic life and human health uses already designated by the State. It is not arbitrary or capricious for EPA to rely on uses designated by the State in accordance with its own laws. Commenters may seek to have the State modify or eliminate uses for particular water bodies; however, EPA cautions that the State is subject to the requirements of 40 CFR 131.10 if it undertakes to do so.

Finally, EPA disagrees that it lacks authority "to establish water quality criteria that are more restrictive than necessary to ensure that actual uses will be protected." (Emphasis added.) The term "actual uses" is an undefined term, but the commenter clearly uses it to describe uses that differ from designated uses. EPA has the authority as well as the legal obligation to adopt criteria which protect the designated uses, however, even if such uses require a greater level of protection than existing uses. 40 CFR 131.5(a)(2); 131.6(c); 131.11(a). If an existing use (as defined in CWA regulations) is less sensitive than the designated use, then the appropriate initial response is not to adopt less stringent criteria to protect the less sensitive use. That would not be allowed unless the designated use itself had been modified. The State may undertake to modify designated uses, including, in some instances, downgrading some uses, in accordance with 40 CFR 131.10, but no such action has been taken which would affect the adoption of the final CTR.

Comment ID: CTR-031-003a
Comment Author: Fresno Metro. Flood Ctrl Dist.
Document Type: Flood Ctrl. District
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-21 Legal Concerns
References: Letter CTR-031 incorporates by reference letter CTR-027
Attachments? N
CROSS REFERENCES I-03

Comment: If the proposed rule is carefully and sufficiently modified to affirm a commitment by EPA to effect only its Congressional authorization as established by CWA section 402(p), then EPA's failure to assess municipal storm water dischargers" ability to attain the proposed standards and associated economic and environmental impacts may be set aside at this time. However, if EPA persists in maintaining the CTR as drafted in this regard, the ambiguities presented in the preamble demand serious consideration and analyses as follows.

a. Many of the criteria are not attainable or scientifically valid with regard to municipal storm water dischargers, nor is the proposed approach consistent with an appropriate delegation of authority to the State.

i. Attainability of Standards

The statutory premise of the CWA is to provide water quality for protection and propagation of aquatic life, wildlife, and recreation wherever attainable. The CWA therefore establishes a reality test in that objectives must be attainable.

The proposed CTR criteria can not be attained by municipal storm water dischargers. The District treats through detention and retention all but 1% of its urban runoff on an annual average basis. Nonetheless, its urban runoff discharges, after detention, would exceed proposed dissolved copper, lead, and zinc criteria. Concentrations would need to be reduced by 67%-95% to meet the proposed chronic criteria. No storm water best management practices, including conventional end-of-pipe storm water treatment facilities (i.e., detention systems), are believed to be able to achieve these levels of reductions for these constituents.

Response to: CTR-031-003a

EPA disagrees with this comment. There is no authority for revising the proposed CTR criteria based on the considerations cited in this comment. Water quality criteria adopted pursuant to CWA section 303 must be based on sound science and must protect the designated uses of the water bodies to which they apply. 40 CFR 131.11. There is no provision for EPA to consider the attainability or the scientific validity of the criteria with regard to specific dischargers or class of dischargers in adopting ambient water quality criteria in the CTR. Attainability issues may be considered in accordance with CWA section 303 in designating or modifying uses for those water bodies; however, the CTR does not undertake to modify or adopt any uses for waters in California. Scientific validity of criteria is based on ambient conditions, not on dischargers. The scientific bases for the CTR criteria are set forth in The California Toxics Rule Administrative Record Matrix.

In raising the question of storm water dischargers' ability to attain CTR standards, this comment apparently relies on language in CWA section 402(p) which requires storm water dischargers to reduce pollutants only to the maximum extent practicable (MEP). MEP, however, is a point source permitting standard; it does not apply to the adoption of ambient water quality criteria. Moreover, EPA has interpreted the MEP standard as applying only to technology-based permit requirements. It does not affect the requirement of CWA section 301(b)(1)(C) that CWA permits include limitations necessary to meet water quality standards. Memorandum from E. Donald Elliot, Assistant Administrator and General Counsel, to Nancy J. Marvel, Region 9, dated January 9. 1991.

Comment ID: CTR-034-010b
Comment Author: SCAP
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-21 Legal Concerns
References: Letter CTR-034 incorporates by reference letter CTR-035
Attachments? N
CROSS REFERENCES C-28

Comment: * SCAP recommends that EPA defer adoption of criteria contained in the draft CTR which are typically below detection limits. While we understand EPA's rationale for setting criteria that may

not be detectable based on EPA's determination of the criteria needed to adequately protect aquatic life and human health, we believe that EPA has not fulfilled its duties under the Clean Water Act, Unfunded Mandates Act, and E.O. 12866. In accordance with federal water quality standards regulations, EPA is required to review water quality data and information on discharges to specific water bodies where toxic pollutants may be adversely affecting water quality or the attainment of the designated water use or where the levels of toxic pollutants are at a level to warrant concern and must adopt criteria for such toxic pollutants applicable to the water body sufficient to protect the designated use (see 40 CFR section 131.11). Thus, if the pollutant has not been detected, there is no basis for determining whether the chemical is adversely affecting water quality or the attainment of designated uses.

Further, EPA cannot make an accurate determination of the costs and benefits of promulgating CTR criteria for those criteria that are below detection levels. It is quite likely that detection limits for some substances will improve in the near future, and dischargers previously projecting full attainment will no longer be able to comply. For instance, a SCAP member agency was issued an NPDES permit in the early 1990s containing effluent limits for a number of toxic pollutants. In this agency's case, lindane was not being detected at the time of permit issuance (and the detection level was higher than the permit limit). Yet, in the following years, the detection level dropped and this agency began to experience exceedences of the permit limit. Lindane cannot be readily controlled at the source by normal industrial waste source control methods because it is in widespread use by consumers. Therefore, the only reliable option for the POTW to come into compliance may be to add end-of-pipe treatment, a very expensive proposition. This scenario is likely to happen again with many of the criteria being proposed in the CTR. The potential compliance costs could be high, yet the Economic Analysis for the draft CTR could not estimate such costs. For all of the above reasons, EPA should defer adoption of these criteria until they can be detected and EPA can more fully determine the potential economic impacts of promulgation of the CTR. Instead, we recommend that a watershed approach be used to address these pollutants (see below).

Response to: CTR-034-010b

EPA disagrees with the commenter that it should defer promulgating water quality criteria below detection limits or that such promulgation is in any way inconsistent with the CWA, UMRA, or E.O. 12866. EPA's water quality standards regulation at 40 CFR 131.11 requires that criteria be adopted by the States at concentrations necessary to protect the designated use. Given this requirement, consideration of analytical detectibility is not an appropriate factor to consider when calculating water quality criteria to protect designated uses since they are not related to actual environmental impacts. As EPA stated in the preamble to the National Toxics Rule, 57 FR 60876, col. 1, this has been the Agency's longstanding position. See also 57 FR 60870. EPA's criteria are based on scientific information about a pollutant's toxic effects, without regard to analytical methods or techniques. The criteria are based on the concentrations that either cause toxic effects to aquatic life or to human health. EPA's criteria development methods for aquatic life are generally based on laboratory analyses with sensitive aquatic life. The results from these tests are analyzed by mathematical procedures outlined in EPA's criteria guidelines. EPA's human health criteria are developed from protocols generally using toxicity studies on laboratory animals such as mice and rats. Thus, because the criteria are based on data showing toxic effects, EPA does not believe that the analytical detection limit should determine the basis for the criteria.

The water quality standards established in this rule are not self implementing; they will be applied by the State in developing total maximum daily loads, wasteload allocations to point sources, (which may be used to develop NPDES permit limits) and load allocations to nonpoint sources. The sensitivity of analytical methods is relevant for determining compliance with water-quality based permit limits. The permit authority, here the State of California, establishes the analytical methodology to be used for

determining compliance with the permit limit. EPA has issued guidance on how constituents with water quality criteria below the sensitivity of official analytical methods (i.e., those listed in 40 CFR Part 136) are established in permits. See Strategy for the Regulation of Discharges of PHDDs and PHDFs from Pulp and Paper Mills to Waters of the United States, memorandum from the Assistant Administrator for Water to the Regional Water Management Division Directors and NPDES State Directors, May 21, 1990. This guidance presents a model for addressing toxic pollutants which have criteria recommendations less than current detection limits and it is applicable to other criteria as well. The guidance explains that standard analytical methods may be used for determining compliance with permit limits but not for establishing water quality criteria or permit limits. Also, EPA's Great Lakes Guidance Procedure 8 specifies that where the water quality-based effluent limit is lower than the pollutant's quantification level, the quantification level is the method for determining compliance with the limit. This approach is mandated by the CWA, which requires that permit contain WQBELs as necessary to achieve standards. (CWA section 301). Neither EPA nor the States are authorized to set WQBELs at higher levels simply because of technical difficulties in measuring compliance. See NRDC. v. EPA, 859 F.2d 156, 208 (D.C. Cir. 1988)("Congress did not intend to tie compliance with water quality-based effluent limitations to the capabilities of any given level of technology."] It should also be noted that by the time criteria are converted into permit limitations after calculating total maximum daily loads, waste load allocations and load allocations, the actual permit limit may be in the range of standard analytical methods cited by EPA in 40 CFR Part 136.

EPA also establishes water quality criteria for many chemicals of concern because they biomagnify in the tissue and organs of fish (e.g., mercury and PCBs) to levels that can adversely effect aquatic life, wildlife and human health. Fish tissue information can be used to determine if the water body is attaining water quality standards even when the water quality criteria and instream pollutant concentrations are below detectable levels. For chemicals that are not highly bioaccumulative but have criteria below detectable levels, fate and transport (mass balance) models can be used to predict instream pollutant concentrations and attainment of water quality criteria and designated uses. This information with other field observed data showing stress or adverse effects on the biological community serve as an earlier warning to the public that water quality is being degraded and steps must be taken if the designated use for the water body is to be protected and maintained.

The decision to maintain a designated use or to downgrade the water body to a lower use designation is a place-based decision that must rest solely in the hands of the local community, elected officials and other stakeholders that use the water resource affected by such decisions. Therefore, the importance of adopting statewide numeric water quality criteria to protect designated uses (e.g., fishable, swimmable) is not predicated on costs or benefits but on the public's "right-to-know" and participate in decision-making affecting their water resources. Congress understood this and in CWA sections 303 and 304 preserved the public's right-to-know about the condition and safety of the waters they use for food, drinking, recreation and commerce. See responses to CTR-036-005 and CTR-O42-007a.

With respect to EPA's compliance with UMRA and E.O. 12866, see the preamble to the final rule andEPA's Regulatory Impact Analysis conducted for the rule. Although analytical detection limits may improve in the future, EPA has reasonably estimated the costs of the rule in the regulatory impact analysis based on the best available data about how permit limits might change under the final rule. EPA evaluated the costs of attaining permit limits derived from CTR criteria but maintains that the costs associated with attaining effluent limits that are less than detectable levels are speculative and EPA's methods may tend to overstate costs. Nevertheless, EPA estimated costs under a high scenario using assumptions about how much pollutant reduction would be required even when it had "no" effluent data indicating the presence of the pollutant in the discharge or that the control strategy was actually necessary.

EPA's estimates of costs include control technology costs for pollutant reduction that would be required to reduce pollutant levels to the MDL as well as pollutant minimization programs to reduce the pollutant level to below the MDL. EPA's estimates reflect the goal of reducing all potential sources of the pollutant necessary to maintain the final effluent quality discharged to the receiving water to a level at or below the permit limit. The costs for pollutant minimization programs include both capital and O&M costs to find sources and implement reduction control strategies. EPA estimated these costs both for direct municipal and industrial dischargers as well as for indirect discharges to publicly owned treatment works (POTWs). Thus, EPA accounted for all anticipated costs to the extent feasible, even in situations were potential "hidden" pollutant loads may exist below detectable levels.

The issue of potential hidden loads raised by commenters on the CTR is not new. In 1994, EPA evaluated a sample of nine POTWs in the Great Lakes Basin using super-clean and high-resolution analytical methods (many of which were experimental) to determine whether, in fact, there was a substantial hidden pollutant load of bioaccumulative chemicals of concern (BCC). This study was undertaken because the regulated community in the basin raised concerns regarding the potential presence of mercury and other BCCs just below current Part 136 methods and the associated costs to remove these potential hidden loads. EPA assumed BCCs to be ubiquitous in the Great Lakes Basin at major POTWs because of the historical widespread use of these chemicals and well documented problems in the basin. Therefore, EPA concentrated its sampling efforts on POTWs which have less control of the potential sources of BCCs being discharged to their collection system than industrial dischargers.

In this study, EPA found the infrequent presence of BCCs (38 detections in 477 observations, approximately 8%) in POTW effluents. Of BCC's detected, mercury was detected at each of the POTWs (either as total mercury or methyl mercury). The concentrations of mercury found in POTW effluents were above EPA's most stringent ambient water quality criterion for the Great Lakes Basin in five of the nine samples taken. Where effluent concentrations exceeded the ambient criterion, however, they did so by small amounts, indicating that pollutant minimization programs (PMPs) would more than likely control mercury discharges to the levels required to comply with permit limits. The results of the study, when extrapolated to the universe of 316 POTWs in the Great Lakes Basin, indicates that the median concentration of mercury in all effluents is 0.99 ppt, the 75th percentile is 5.14 ppt, and the 95th percentile is 55.0 ppt.

These results indicate substantial compliance with permit limits significantly more stringent than those expected from CTR-based criteria and would not indicate substantial additional costs if the facilities were required to demonstrate compliance through analytical methods with lower MDLs. Furthermore, the study demonstrates that hidden pollutant loads do not exist at the levels once thought even for highly contaminated areas. This information is important when evaluating the economic analysis for the CTR because it indicates that the estimated costs at the high end of the cost range for the CTR, which accounts for controlling hidden pollutant loads were no effluent data exists may never materialize should analytical methods improve in the future.

EPA has also identified a number of locations where pollutant minimization programs have either been highly effective in reducing pollutant loads or have been implemented but have had inadequate time to determine results. For example, the Inland Empire Utilities Agency, serving the Chino Basin with three POTWs, has successfully reduced lindane in its effluents to permit limits through education of health authorities and pet service providers on effective alternatives to lindane-based products for lice and flea control. A similar program is being implemented at a facility in Arizona. The Western Lake Superior Sanitary District's (WLSSD) efforts to reduce mercury levels in their effluent include diverting

incinerator scrubber water; implementing external source identification studies and subsequent control programs at a pulp and paper mill, dental facilities, and medical facilities and laboratories; and conducting extensive public education and outreach, including mercury collection under a bounty program. As of 1996, WLSSD had successfully reduced mercury concentrations at their waste water treatment plant by more than 74% from 1990 dry sludge levels (from 4.50 ppm to 1.15 ppm) and by more than 97% from 1990 effluent levels (from 0.58 ppb to 0.015 ppb). The following are some additional examples of pollution prevention activities undertaken by facilities in the State of California:

* Replaced a sewer running through an arsenic-contaminated Superfund site (City of Palo Alto, California Regional Water Quality Control Plant).

* Allowed diversion of residential graywater containing mercury for use as on-site irrigation (City of Palo Alto, California Regional Water Quality Control Plant).

* Developed BMPs with medical facilities/offices about the use of mercury, handling of mercury-containing wastes, management of mercury-containing reagents, prevention and response for mercury spills, nonmercury analytical methodologies, and nonmercury-containing equipment (City of Palo Alto, California Regional Water Quality Control Plant).

* Educated pharmacists on mercury-containing products (City of Palo Alto, California Regional Water Quality Control Plant).

* Developed BMPs addressing mercury-containing equipment and reagent handling in laboratories (City of Palo Alto, California Regional Water Quality Control Plant).

* Published and distributed a BMP booklet to local pottery studios, schools, and art supply stores (City of Palo Alto, California Regional Water Quality Control Plant).

* Reduced the local discharge limit for nickel (applicable primarily to metal finishers) (City of Palo Alto, California Regional Water Quality Control Plant).

* Educated photo processors and medical and dental offices processing x-rays on silver use and disposal (City of Palo Alto, California Regional Water Quality Control Plant).

As a final point, EPA does not wish to delay or defer any further having ambient criteria for toxics as required under section 303(c)(2)(B) of the CWA. California is the only state in the nation without such numeric limits and it is important in order to meet the requirements of the CWA to bring California into compliance with the CWA by promulgation of this rule.

Comment ID: CTR-035-012a
Comment Author: Tri-TAC/CASA
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-21 Legal Concerns
References:
Attachments? N

CROSS REFERENCES C-28

Comment: 1. Comments on Proposed Rule A. General Comments p. 42166-67 --Legal Basis

EPA argues that:

EPA does not believe that it is necessary to support the criteria proposed today on a pollutant-specific, water body-by-water-body basis. For EPA to undertake an effort to conduct research and studies of each stream segment or water body across the State of California to demonstrate that for each toxic pollutant for which EPA has issued CWA section 304(a) criteria guidance there is a 'discharge or presence' of that pollutant which could reasonably 'be expected to interfere with' the designated use would impose an enormous administrative burden and would be contrary to the statutory directive for swift action manifested by the 1987 addition of section 303(c)(2)(B) to the CWA.

Contrary to EPA's argument, we believe that the requirement in Section 303 of the CWA that States adopt water quality standards where there is a discharge or presence of toxic pollutants in the affected waters which could reasonably expected to interfere with designated uses, applies to EPA. EPA's claim that such a review would impose an "enormous administrative burden" is not compelling, since States, in their adoption of water quality standards, must perform this pollutant specific review of each stream segment under the express terms of Section 303(c)(2)(B). EPA's own regulations require that, in promulgating water quality standards for a State, EPA is subject to "the same policies, procedures, analyses, and public participation requirements established for States in these regulations" (40 CFR section 131.22). The regulations require States to "review water quality data and information on discharges to specific water bodies where toxic pollutants may be adversely affecting water quality or the attainment of the designated water use or where the levels of toxic pollutants are at a level to warrant concern and must adopt criteria for such toxic pollutants applicable to the water body sufficient to protect the designated use"(40 CFR section 131.11)(emphasis added). Thus, the regulations regarding the adoption of water quality standards do not suggest that States adopt uniform water quality standards for every water body merely because there may be a large amount of work required to determine the appropriate water quality standards for each water body. We especially believe this issue to be pertinent to pollutants for which the proposed CTR criteria are below detection levels. We therefore recommend that EPA defer the adoption of criteria for constituents which are below detection limits until such time as data are available demonstrating that particular toxic pollutants are being discharged to specific water bodies at levels to warrant concern. The pollutants in this category include the following: aldrin, alpha-BHC, beta-BHC, chlordane, 4,4'-DDD, 4,4'-DDT, 4,4'-DDE, dieldrin, 2,3,7,8-TCDD (dioxin), endosulfan I, endosulfan II, endrin, endrin aldehyde, heptachlor, heptachlor epoxide, toxaphene, PCB-1016, PCB-1221, PCB-1232, PCB-1242, PCB-1248, PCB-1254, PCB-1260, hexachlorobenzene, n-nitrosodi-n-propylamine, pentachlorophenol, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoroanthene, benzo(k)fluoroanthene, chaysene, dibenzo(a,h)anthracene, and indeno(1,2,3-cd)pyrene. EPA, upon determining that promulgation of a 303(c)(2)(B) criterion is necessary, should promulgate the criterion on a water body-specific basis. Also, EPA would need to conduct an economic impact analysis at that time. Finally, as with the CTR, EPA must pursue adoption of these criteria through a rulemaking process, allowing opportunities for public review and comment in accordance with the Clean Water Act and Administrative Procedures Act.

Response to: CTR-035-012a

EPA disagrees with the commenter. See response to CTR-036-005. In addition to the response outlined above, the commenter cites EPA regulations at 40 CFR 131.11 and 131.22 arguing that the regulation

constrains how EPA may implement CWA section 303(c)(2)(B) . The regulation cited by the commenter with respect to toxics control, 131.11, however, was part of the 1983 water quality standards regulations (48 Fed. Reg. 51400, Nov. 8, 1983), which preceded by several years enactment of CWA section 303(c)(2)(B) as part of the 1987 Amendments to the CWA. EPA did not amend the regulations after enactment of section 303(c)(2)(B), but instead issued guidance interpreting how the provision couldbe implemented by states consistently with the statute. Availability of the guidance was published in the Federal Register at 54 Fed. Reg. 346 (Jan. 5, 1989) and discussed at length in the preamble to the final National Toxics Rule at 57 Fed. Reg. 60848, 60853 (Dec. 22, 1992). In this guidance, EPA stated that states could implement CWA section 303(c)(2)(B) in three different ways, as specified by its 1989 Program Guidance for Implementing Section 303(c)(2)(B):

Option 1. Adopt statewide numeric criteria in State Water Quality Standards for all section 307(a) toxic pollutants for which EPA has developed criteria guidance, regardless of whether the pollutants are known to be present.

Option 2. Adopt chemical-specific numeric criteria for priority toxic pollutants that are the subject of EPA section 304(a) criteria guidance, where the State determines based on available information that the pollutants are present or discharged and can reasonably be expected to interfere with designated uses.

Option 3.Adopt a procedure to be applied to a narrative water quality standard provision prohibiting toxicity in the receiving waters. Such procedures would be used by the State in calculating derived numeric criteria which must be used for all purposes under section 303(c) of the CWA.

In this rule, EPA has adopted the first approach. In addition, EPA has gathered information on the presence of toxic pollutants in the waters of the State to the extent possible, but does not believe it is necessary to demonstrate impairment of the water before applying ambient criteria to the water for the reasons stated in See response to CTR-036-005. However, because EPA has chosen an approach consistent to the guidance it gave the states, EPA has applied the same requirement of scientific defensibility it would require of states, and because EPA has allowed for public comment on the rule, EPA has applied the same policies, procedure, analyses and public participation requirements it established for States in Part 131.

Finally, with respect to detection levels, see responses to CTR-034-010b; CTR-005-009; CTR011-002; CTR-013-004; CTR-020-020; CTR-021-005b; CTR-027-004; CTR-030-009; CTR033-003a; CTR-034-010a; CTR-035-005; CTR-035-012b.

Comment ID: CTR-036-005
Comment Author: County of Orange
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-21 Legal Concerns
References: Letter CTR-036 incorporates by reference letters CTR-013, CTR-018, CTR-031, CTR-034 and CTR-040
Attachments? N
CROSS REFERENCES

Comment: Authority for EPA to Adopt Statewide Criteria

Contrary to what EPA asserts, it cannot promulgate statewide water quality criteria for priority toxic pollutants without considering whether the discharge or presence of such pollutants will interfere with the specific designated uses of those California waters that are covered by the criteria. Under Section 303(c)(4)(B) of the CWA, EPA is permitted to "promptly prepare and publish proposed regulations setting forth a revised or new water quality standard for the navigable waters involved in any case where [EPA] determines that a revised or new standard is necessary to meet the requirements of [the CWA]." 33 U.S.C. section 1313(c)(4)B). However, a water quality standard consists of both "the designated uses of the navigable waters involved" and the "water quality criteria for such waters based upon such uses." 33 U.S.C. section 1313(c)(2)(A).

Here, EPA has proposed water quality criteria for California waters, not water quality standards. More importantly, EPA has failed to develop such criteria "based upon" the designated uses of these waters. EPA has not determined whether these criteria pollutants are present in all California waters. EPA attempts to argue that there is evidence in the record indicating the presence of priority toxic pollutants throughout the waters of the States, yet EPA admits that the evidence is "not necessarily complete (62 Fed. Reg. 42160, 72167) nor has EPA determined whether the discharge or presence of these pollutants "could reasonably be expected to interfere with" the designated uses of such waters, as is required under CWA Section 303(c)(2)(B). See 33 U.S.C. section 1313(c)(2)(B).

EPA argues that it would be an "enormous administrative burden" for it to determine on a "water body-by-water body basis" whether the discharge or presence of the priority toxic pollutants could reasonably be expected to interfere with the designated use of affected waters. [62 Fed. Reg. 42160, 42166]. EPA further asserts that interpreting Sections 303(c)(2)(B) and (c)(4) to require it to perform "such a cumbersome pollutant specific effort on each stream bed" in California would render Section 303(c) meaningless [Id. at 42167]. Finally, EPA claims that based on the statutory language, purpose and legislative history of Section 303(c), it is empowered to act swiftly and promptly when it determines that new or revised standards are necessary to comply with the CWA, and thus it may disregard the strictures of CWA Section 303(c)(2)(B). Id.

Unfortunately, these arguments ignore the plain meaning of Section 303(c). EPA must (1) promulgate water quality standards, not water quality criteria, when it determines that such standards are necessary to meet the requirements of the CWA, and (2) develop these water quality standards taking into account the designated uses of the waters to which such standards are being applied. 33 U.S.C. sections 1313(c)(2), (4).

Moreover, the call to prompt action contained in section 3043(c)(4) cannot be read in a way that transforms the remaining provisions of Section 303(c) into mere surplusage. Despite EPA's assertion that the "numerous deadlines" imposed by Section 303(c) require it to ignore the demands of Section 303(c)(2)(B), there in fact is no specific time frame within which EPA must promulgate a new or revised water quality standard when it acts pursuant to section 303(c)(4). Thus, the requirements that EPA act "promptly" govern the manner, not the time frame, in which it must act.

Nor can the legislative history of Section 303(c) be used to ignore the express language and plain meaning of section 303(c)(2)(B). When a statute is plain and unambiguous on its face there is no need to look to legislative history as a guide to its meaning [Tennessee Valley Authority v. Hill, 437 U.S. 153 (1978)]. The requirement of Section 303(c)(2)(B) to determine whether the "discharge or presence" of priority toxic pollutants "could reasonably be expected to interfere with" the designated uses of affected waters is not ambiguous, even juxtaposed with the requirement that EPA act "promptly". Congress may

have wanted EPA to act promptly, but it equally wanted EPA to act within the constraints of Section 303(c).

In short, Congress's supposed quest for swift action is not enough to ignore the plain language of Section 303(c). Legislative history may be considered where the plain meaning of statute produces an absurd result, but it may not be considered where it merely produces a "cumbersome" one.

Response to: CTR-036-005

EPA disagrees with the comment. EPA interprets section 303(c)(4)(B) to give EPA authority to act if the State fails to act by promulgate ambient water quality criteria pursuant to section 303(c)(2)(B) for water bodies with either human health or aquatic life uses designated by the state for pollutants for which EPA has issued national section 304(a) recommended criteria guidance. As EPA has reiterated throughout the rulemaking record, EPA's strong preference would have been for the state to take the lead in promulgating these criteria. Pursuant to section 303(c)(4)(B), the State's failure to take such action after its standards were invalidated in state court constitutes a failure to meet the requirements of the Act under CWA section 303(c)(2)(B). Further, EPA is acting consistent with its authority because as explained below, the criteria in the rule are ambient criteria that define attainment of the designated uses, and they will result in additional controls on dischargers only where necessary to protect the designated uses.

EPA disagrees with the comment that it has somehow violated the CWA by promulgating water quality criteria instead of "water quality standards." EPA's regulations explain that there are three components to water quality standards, designated uses; water quality criteria to protect those uses, and an antidegradation policy. See 40 CFR Part 131.6. In the rule, EPA is promulgating one component of water quality standards because this is what the state has failed to do. The CWA's reference to water quality standards, a broader authority encompassing designated uses, criteria to protect those uses and an antidegradation policy, does not preclude EPA from issuing one component of standards, water quality criteria.

EPA disagrees that it has failed to develop such criteria "based upon" the designated uses of such waters. The criteria in the rule are based on protection of human health (either through ingestion of drinking water or drinking water and organisms) or aquatic life (saltwater or freshwater) which relate directly to the uses designated by the State of California for the waterbody. The State has designated the waters covered by this rule for a number of uses related to recreation, drinking water and aquatic life. The State always retains the discretion to change the designated uses of the State, as long as it meets the criteria set forth in 40 CFR 131.10. These criteria define what is necessary to protect the designated use. In essence, EPA's interpretation of section 303(c)(2)(B) of the CWA means that if the discharge or presence of the pollutant exceeds the criteria values, the discharge or presence of the pollutant would interfere with the designated uses of the waterbody.

As these are ambient criteria, they do not in and of themselves require control of a discharge. The ambient criteria are implemented in two ways -- to point sources through NPDES permits for direct dischargers (that may be based on wasteload allocations in impaired waters) or pretreatment standards for indirect discharges (both of which are enforceable limits) and through load allocations for non-point sources (which are not enforceable under the Clean Water Act, but which represent the portion of a receiving waters receiving capacity attributable to a non-point source that would attain applicable water quality standards). Under the NPDES regulations, the ambient criteria promulgated in the rule are applied in NPDES permits as effluent limitation control only if the uncontrolled discharge of a particular pollutant has a "reasonable potential" to exceed applicable water quality criteria. EPA defines

"reasonable potential" in its regulations as where a discharge is projected or calculated to cause an excursion above a water quality standard based on a number of factors including, as a minimum, the four factors listed in 40 CFR 122.44(d)(1)(ii). Absent that determination, the criteria in and of themselves have no impact. Thus, EPA's promulgation of criteria for all water bodies in California that currently have no numeric criteria for toxic pollutants criteria for protecting the designated use ensures a safety net that does not impose any needless burden or costs on any dischargers. (EPA made this point in describing its guidance implementing section 303(c)(2)(B), 57 Fed. Reg. 60853 col. 1 (Dec. 22, 1992)). If EPA were to interpret section 303(c)(2)(B) to compel it to prove conclusively that all of the priority pollutants are present in all California waters, this would impose a huge resource burden on EPA with no substantive benefit in terms of environmental protection. In fact, if EPA were not to have perfect information upon which to base a determination that current discharges are impairing designated uses, EPA might overlook a waterbody that needs criteria as a basis for controlling discharges. In essence, establishment of these ambient criteria is necessary to establish the benchmark against which the permit authority can make the reasonable potential determination. The commenter's argument that EPA needs to do a more site specific evaluation of whether the discharge of the pollutant "could reasonably interfere" ignores that criteria are not only used to remediate where there is impairment but to prevent it from happening in the first place.

The comment further criticizes EPA's interpretation of the statutory language calling for the states to act within three years of the Act (which was enacted in 1987) coupled with that language in CWA section 303(c)(4) stating that EPA is to act "promptly" does not support EPA's approach to cover all waterbodies. EPA, however, believes that the time frames envisioned by Congress, to put in place ambient criteria for toxic pollutants where EPA had issued recommend criteria under section 304(a) of the CWA for those pollutants, are reasonably considered when interpreting what Congress intended EPA to do. Congress, by linking section 303(c)(2)(B) to the triennial review period, gave states a chance to comply with section 303(c)(2)(B) on their own. To interpret the combination of subsections (c)(2)(B) and (c)(4) as requiring monitoring and analysis to demonstrate impairment before establishing ambient standards would be counter to Congress' goal of putting in place the ambient standards as the foundation for toxics control. Another reason EPA believes that its approach is appropriate is that section 303 establishes a regime whereby EPA's role is one of overseer of the national program, with states taking the primary role for standards. The State of California is better positioned to make local site-specific determinations than is EPA and EPA believes that it is more appropriate to issue state-wide criteria and then to allow the State if it so chooses to establish and submit for approval water quality standards that are based on site-specific considerations. Finally the reference in section 303(c)(2)(B) to section 304(a) criteria suggests that section 304(a) serve as "default" criteria, that once EPA had issued its national section 304(a) criteria recommendations, states were to adopt numeric criteria for those pollutants based on the 304(a) criteria, unless they had other scientifically defensible criteria. Here, California is the only state without such numeric criteria. EPA also notes that this rule follows the approach EPA took nationally in promulgating the National Toxics Rule for states that had failed to comply with CWA section 303(c)(2)(B). 57 Fed. Reg. (Dec. 22, 1992). EPA incorporates the rationale for EPA's action used in the NTR as expressed in the preamble into this final rule.

As the Supreme Court has stated, if a statute is silent or ambiguous on a specific question, a reviewing court must defer to any reasonable construction of that statute by the administering agency. Chevron, U.S.A. v. NRDC, 467 U.S. 837, 843 (1984). Under Chevron, a reviewing court must determine "whether the agency's answer [to the ambiguous question] is based on a permissible construction of the statute." Id. The agency's construction need not be the one the court itself would adopt or the one the court feels would best implement congressional policy. It need only be a reasonable construction of the statutory question at issue. Id. At 844-45. Here, to recognize Congress' desire for timely establishment of numeric criteria for toxics and recognizing that these criteria do not have a regulatory impact unless

reasonable potential for exceeding the criteria is found in a permit-specific context, EPA believes that its approach to implementing section 303(c)(2)(B) is a reasonable construction of the statute.

Comment ID: CTR-038-006a
Comment Author: Sonoma County Water Agency
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-21 Legal Concerns
References:
Attachments? Y
CROSS REFERENCES E-01c; R; S

Comment: 5. The proposed rule is inconsistent with applicable Federal law and regulations. In proposing a single set of criteria for all estuaries, the rule is inconsistent with the Clean Water Act and EPA's water quality standards regulations. The Clean Water Act requires that water quality standards be established taking into consideration their use and value for public water supplies, propagation of fish and wildlife, and recreational purposes (see CWA section 303(c)(2)(A)). Consistent with this, EPA regulations require that water quality standards be based on identification of "specific water bodies where toxic pollutants may be adversely affecting water quality or the attainment of the designated water use or where the levels of toxic pollutants are at a level to warrant concern..." For those identified waters, "states must adopt criteria for such toxic pollutants applicable to the water body sufficient to protect the designated use" (See 40 CFR 131.11(a)(2)). Clearly the intent of both the Clean Water Act and EPA regulations is that water quality standards be tailored to the characteristics of the waters in question. In failing to properly evaluate the rule's economic impacts and in failing to adequately consider regulatory alternatives, the rule is inconsistent with Presidential Executive Order 12866 and the Unfunded Mandates Reform Act. Moreover, in failing to properly consider the impacts on small entities, such as the District and the small communities it serves, the rule is inconsistent with the Regulatory Flexibility Act.

Response to: CTR-038-006a

EPA disagrees with the comment. See responses to CTR-035-012a and CTR-036-005. For a discussion of how the rule complies with the E.O. 12866, the Unfunded Mandates Reform Act and the Regulatory Flexibility Act, see the preamble to the final rule.

Comment ID: CTR-040-011
Comment Author: County of Sacramento Water Div
Document Type: Storm Water Auth.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-21 Legal Concerns
References: Letter CTR-040 incorporates by reference letter CTR-027
Attachments? Y
CROSS REFERENCES

Comment: MAJOR CONCERNS

We do, however, have fundamental concerns with the Rule as it is presently proposed and its supporting economic analysis. We believe the Rule can be modified in a manner that will be responsive to our concerns while at the same time being consistent with applicable Federal law and regulations. Our major concerns are presented here and are followed by our recommended modifications.

III. Concern: The proposed Rule violates applicable Federal law and regulations

* In proposing a single set of criteria for all fresh waters, the Rule is inconsistent with the CWA and EPA's water quality standard regulations because it has not been determined that these criteria are necessary to avoid interference with designated uses (See Attachment B). The CWA requires that standards be established taking into consideration their use and value, and EPA regulations require consideration of specific water bodies where toxics may be adversely affecting water quality or uses.

Response to: CTR-040-011

EPA disagrees with the comment. See responses to CTR-035-012a and CTR-036-005.

Comment ID: CTR-040-016b
Comment Author: County of Sacramento Water Div
Document Type: Storm Water Auth.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-21 Legal Concerns
References: Letter CTR-040 incorporates by reference letter CTR-027
Attachments? Y
CROSS REFERENCES C-24d

Comment: RECOMMENDED MODIFICATIONS

To address our concerns, we recommend the following modifications which do not undermine the toxic pollutant control actions envisioned in EPA's economic analysis (e.g., BMPs for stormwater and source control). In fact, some of these recommendations would provide incentives for greater movement toward achieving the water quality criteria than would occur under the Rule as it is currently proposed.

III. Recommendation: Adopt separate, scientifically defensible, reasonably achievable aquatic life criteria for effluent-dominated/effluent-dependent streams.

Available discharge data for effluent-dominated streams in Sacramento indicate that a number of the proposed criteria are not presently being achieved and cannot be achieved with implementation of BMPs or other reasonable controls (See Attachment A). This is also true for many municipal stormwater programs in California.

* The application of the proposed statewide criteria to effluent-dominated waters would force the Sacramento Stormwater Management Program, and other stormwater programs, to remove these discharges, essentially drying up the waters for most of the year. The costs would be significant and the

benefits assessed in EPA's economic analysis (enhanced fishing, passive benefits, and reduced cancer risk) would be zero. The removal of these discharges would likely be detrimental rather than beneficial. The effluent-dependent aquatic and riparian habitat, which previously supported aquatic life and wildlife, would no longer exist.

* Effluent-dominated and effluent-dependent water bodies, which are common in California, require separate and distinct water quality criteria. Such a move is common sense and would be in accordance with the spirit (if not the letter) of Presidential Executive Order 12866 and the Unfunded Mandates Reform Act.

* Additionally, the CWA requires that water quality standards be established taking into consideration their use and value for public water supplies, propagation of fish and wildlife, recreational purposes, and also taking into consideration their use and value for navigation (See CWA section 303(c)(2)(A)). Consistent with this statutory mandate, EPA regulations require that water quality standards be based on identification of specific water bodies where toxic pollutants may be adversely affecting water quality or the attainment of the designated water use, or where the levels of toxic pollutants are at a level to warrant concern and must adopt criteria for such toxic pollutants applicable to the water body sufficient to protect the designated use. Clearly the intent of both the CWA and EPA regulations is that water quality standards be tailored to the characteristics of the waters in question, rather than based on the "one-size-fits-all" approach used in the proposed Rule. This is not the cumbersome task suggested by the Preamble, at least with respect to developing criteria appropriate for effluent-dependent waters. But, even if it were a cumbersome task, the difficulty of complying with the law is not an excuse for noncompliance.

* EPA could fulfill its obligation under the CWA and EPA regulations with respect to effluent-dominated waters simply by proposing criteria for these waters that are generally achievable by present stormwater discharges. Then, using the more stringent statewide criteria as a tracer, control measures and BMPs could be implemented to reduce the discharge of problematic pollutants to the MEP.

Response to: CTR-040-016b

EPA disagrees with this comment. Adoption of aquatic life criteria for effluent-dominated and effluent-dependent waters, based on local information and data, is beyond the scope of the CTR. EPA supports State adoption of such site-specific criteria, however, and intends to stay the CTR after approving any such State-adopted criteria (see response to CTR-003-006, et al.), but EPA cannot undertake to adopt such criteria itself. Even if EPA were to include site-specific criteria in the CTR, such criteria could not be based on considerations as to whether or not they were "reasonably achievable" by dischargers, as proposed in this comment. Water quality criteria must be based on sound scientific rationale and must protect designated uses. Their attainability is not a basis for selecting appropriate criteria. 40 CFR 131.11(a).

The costs (reasonableness) of attainability, which cannot justify adopting criteria that do not protect uses already designated, may be taken into consideration in the designation or modification of uses for individual waterbodies. 40 CFR 131.10. For this reason, EPA believes that this commenter's concerns are misplaced. The suggestion that EPA adopt "separate and distinct water quality criteria" for effluent-dominated and effluent-dependent waters, "tailored to the characteristics of the waters in question," and "reasonably achievable" by dischargers, could be best addressed, initially, through adoption or modification of designated uses. This is also beyond the scope of the CTR, the purpose of which is to adopt numeric toxic pollutant criteria for those waters in California, with designated uses already in place, where there are currently no criteria for these pollutants in effect. The CTR does not

undertake to designate any uses for waters in California or modify any uses already designated by the State.

Also, See responses to CTR-035-012a and CTR-036-005. For a discussion of how the rule complies with the E.O. 12866, the Unfunded Mandates Reform Act and the Regulatory Flexibility Act, see the preamble to the final rule.

See also response to CTR-040-016a.

Comment ID: CTR-041-014
Comment Author: Sacramento Reg Cnty Sanit Dist
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-21 Legal Concerns
References:
Attachments? N
CROSS REFERENCES

Comment: 1. The California Toxics Rule is inconsistent with the Clean Water Act and EPA's water quality standards regulations.

a. EPA Failed to Adopt Criteria on a Case-by-Case, Pollutant-by-Pollutant Basis.

Section 303 of the Clean Water Act (CWA) requires that whenever a State adopts water quality standards, it "shall adopt criteria for all toxic pollutants listed pursuant to section 1317(a)(1) of this title for which criteria have been published under section 1314(a) of this title, the discharge or presence of which in the affected waters could reasonably be expected to interfere with those designated uses adopted by the State, as necessary to support such designated uses." 33 U.S.C. section 1313(c)(2)(B). In other words, criteria only need to be developed where there is a "discharge or presence" of toxic pollutants in the affected waters, which could reasonably be expected to interfere with those designated uses" adopted by the State.(*1) Thus, a water body and pollutant specific determination must be made before criteria are adopted as part of a water quality standard.

In its Preamble to the CTR, EPA stated that:

EPA does not believe that it is necessary to support the criteria proposed today on a pollutant specific, water body-by-water-body basis. For EPA to undertake an effort to conduct research and studies of each stream segment or water body across the State of California to demonstrate that for each toxic pollutant for which EPA has issued CWA 304(a) criteria guidance there is a "discharge or presence" of that pollutant which could reasonably "be expected to interfere with" the designated use would impose an enormous administrative burden and would be contrary to the statutory directive for swift action manifested by the 1987 addition of section 303(c)(2)(B) of the CWA. 62 Fed. Reg. 42166.

...Thus, to interpret CWA section 303(c)(2)(B) and (c)(4) to require such a cumbersome pollutant specific effort on each stream segment would essentially render section 303(c)(2)(B) meaningless. The provision and its legislative background indicate that the Administrator's determination to invoke her

303(c)(4)(B) authority can be met by a generic finding of inaction by the State without the need to develop pollutant specific data for individual stream segments.

This determination is supported by information in the rulemaking record showing the discharge or presence of priority toxic pollutants throughout the State. While this data is not necessarily complete, it constitutes a strong record supporting the need for numeric criteria for priority toxic pollutants with section 304(a) criteria guidance where the State does not have numeric criteria. 62 Fed. Reg. 42167.

Thus, EPA basically states that it is not necessary for it to make the statutorily-required findings of "discharge or presence" or reasonable expectation of interference with designated uses because it would be a great administrative burden and because swift action is required.

EPA supports its contention that swift action is required by citing the statutory framework and purpose of section 303, and the CWA's legislative history. "In adding section 303(c)(2)(B) to the CWA, Congress understood the existing requirements in section 303(c)(1) for triennial water quality standards review and submissions and in section 303(c)(4)(B) for promulgation. CWA section 303(c) includes numerous deadlines and section 303(c)(4) directs the Administrator to 'act promptly' where the Administrator determines that a revised or new standard is necessary to meet the requirements of the Act. Congress, by linking section 303(c)(2)(B) to the section 303(c)(1) three-year review period, gave States a last chance to correct this deficiency on their own. The legislative history of the provision demonstrates that chief Senate sponsors, including Senators Stafford, Chaffee and others wanted the provision to eliminate State and EPA delays and force quick action." 62 Fed. Reg. 42,167. Thus, EPA rests its entire argument regarding the need for swift action on the existence of the word "promptly" in the section of the statute related to the Administrator's duty to promulgate standards in the absence of approved State standards. It is unclear how EPA can argue that it has acted "promptly" thus far to adopt these new standards since it has been over three years since the State standards were overturned. Arguably, the additional extra time it would have taken to make the statutorily required findings would not have been substantial, and would probably result in less impact on dischargers.

EPA's other argument that such a "cumbersome pollutant specific effort on each stream segment" would "impose an enormous administrative burden" is not compelling. States, in their adoption of water quality standards, must perform this "cumbersome pollutant specific effort on each stream segment" under the express terms of section 303 (c)(2)(B). Therefore, it logically follows that EPA, in promulgating the standards for California, stands in the State's shoes and should be subject to the same requirements imposed upon the State. (*2) Furthermore, EPA's reasoning that it is not required to do something merely because it is "cumbersome" may be subject to a legal challenge that such a determination is "arbitrary and capricious" under the Administrative Procedures Act (5 U-S.C. section 701 et seq.).

(*1) See also 4O C.F.R. part 131.11 (a)(2) ("States must review water quality data and information on discharges to identify specific water bodies where toxic pollutants may be, adversely affecting water quality or the attainment of the designated water use or where the levels of toxic pollutants are at a level to warrant concern and must adopt criteria for such toxic pollutants applicable to the water body sufficient to protect the designated use.")

(*2) See accord 40 C.F.R. 131.24(c) regarding EPA promulgation of water quality standards ("In promulgating water quality standards, the Administrator is subject to the same policies, procedures, analyses, and public participation requirement established for States. . .").

Response to: CTR-041-014

EPA disagrees with the comment. See responses to CTR-035-012a and CTR-036-005.

Comment ID: CTR-042-007a
Comment Author: Cal. Dept. of Transportation
SDocument Type: State Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: C-21 Legal Concerns
References:
Attachments? Y
CROSS REFERENCES E-01c; S

Comment: 7. The CTR may violate the Administrative Procedures Act, the and Executive Order (E.O.) Unfunded Mandates Reform Act No. 12866.

In the Preamble to the CTR, EPA repeatedly claims that the CTR will not result in expenditures of more than $100 million per year and, therefore, the statutory requirements of the UMRA and E.O. 12866 are not triggered.(*1) Caltrans' annual costs alone and only in Los Angeles will exceed the $100 million annual figure, even assuming the lowest level of treatment. Therefore, EPA's cost assumptions are challengeable as being arbitrary and capricious and in violation of the Administrative Procedures Act.(*2)

Request: Caltrans requests that EPA reconsider its cost estimates based on the comments received during the public comment period.

Caltrans would like to thank EPA for the opportunity to provide comments on this proposed regulation. It is hoped that EPA will consider and address Caltrans' comments in the final version of the CTR. Should you have any questions concerning our comments on the CTR, please feel free to address these questions to Marcia Arrant at (916) 657-5381.

(*1) See CTR, 62 Fed. Reg. at 42,188, and at 42,191 ("EPA has determined that this rule does not contain a federal mandate that may result in expenditures by State, local and tribal governments, in the aggregate, or by the private sector, of $100 million or more in any one year.")
(*2) See American Iron and Steel Institute v. EPA, 1997 WL 297251 (D.C. Cir., 1497)(the court found that EPA had arbitrarily failed to adequately address cost-justification for its elimination of mixing zones. EPA had estimated the total cost of elimination mixing zones for bioaccumulative chemicals of concern (BCCS) from all dischargers to the Great Lakes at $200,000, without even acknowledging a comment estimating the cost to one town for removal of mercury from its sewage discharge would be approximately $300,000).

Response to: CTR-042-007a

For a discussion of how the rule complies with the E.O. 12866, the Unfunded Mandates Reform Act, see the preamble to the final rule, and EPA's economic analysis for the final rule. For an evaluation of Caltrans' analysis of costs associated with storm water discharges, see response to CTR-040-004 (Category J; Stormwater Economics).

The commenter cited the decision reviewing EPA's Great Lakes' Initiative with respect to eliminating mixing zones for bioaccumulative pollutants of concern. EPA views this decision as remanding the matter to the agency for a failure to respond adequately to a comment as required under the Administrative Procedure Act. The decision did not address or reverse EPA's longstanding interpretation of the CWA that its ambient based water quality criteria must be set at levels necessary to protect the designated use (either aquatic life or human health, or both). The elimination of the mixing zone in the GLI was not a water quality criterion. It was a specific requirement that would have imposed criteria as end-of-pipe effluent limitations for bioaccumulative pollutants where feasible. EPA's current regulations at 40 CFR.131.11 state that criteria must be based on sound scientific rationale and must containsufficient parameters to protect the designated use. Further, such criteria shall be based on EPA's section 304(a) criteria recommendations, EPA's 304(a) criteria recommendations modified to reflect site-specific conditions, or other scientifically defensible methods. From the outset of the water quality standards program, EPA has explained that while economic factors may be considered in designating uses, scientific and technical factors must justify criteria to meet those uses. 44 Fed. Reg. 25,223, -24, 25 (April 30, 1979). When criteria cannot be attained due to economic factors, the state may consider whether a change or "downgrade" the use designation for the waterbody would be appropriate. Id. at 25,224. See. e.g., Mississippi Comm. on Natural Resources v. Costle, 625 F.2d 1269, 1277 (5th Cir. 1980), where the Court addressed whether EPA's action disapproving the state's water quality criterion for dissolved oxygen was arbitrary and capricious because EPA failed to consider economic factors. In affirming EPA's disapproval, the Court stated that

Nevertheless, we are convinced that EPA's construction is correct. See E.I. du Pont de Nemours & Co. v. Train, 430 U.S. 112, at 134-35. Congress itself separated use and criteria and stated that 'the water quality criteria for such waters [shall be] based on such uses. 33 U.S.C. Section 1313(c)(2)(1976). The statute requires EPA to develop criteria 'reflecting the latest scientific knowledge." Id. Section 1314(a)(1)(emphasis added). "The interpretation that criteria were based exclusively on scientific data predates the 1972 amendments. Water Quality Criteria vii (1968). Furthermore, when Congress wanted economics to be considered, it explicitly required it. See Sections 1311(b)(2)(A), 1312(b), 1314(b)(1976).

EPA reiterated this interpretation of the CWA and its implementing regulations in discussing section 304(a) recommended criteria guidance stating that they "are based solely on data and scientific judgments on the relationship between pollutant concentrations and environmental and human health effects" and "do not reflect consideration of economic impacts or the technological feasibility of meeting the chemical concentrations in ambient water." 63 FR 36,742, 36,762 col. 3 (July 7, 1998).

Comment ID: CTR-043-005a
Comment Author: City of Vacaville
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: C-21 Legal Concerns
References:
Attachments? Y
CROSS REFERENCES E-01c; R; S

Comment: 5. The proposed rule is inconsistent with applicable Federal law and regulations.

In proposing a single set of criteria for all estuaries, the rule is inconsistent with the Clean Water Act and EPA's water quality standards regulations. The Clean Water Act requires that water quality standards be established taking into consideration their use and value for public water supplies, propagation of fish and wildlife, recreational purposes (see CWA section 303(c)(2)(A)). Consistent with this, EPA regulations require that water quality standards be based on identification of "specific water bodies where toxic pollutants may be adversely affecting water quality or the attainment of the designated water use or where the levels of toxic pollutants are at a level to warrant concern..." For those identified waters,"states must adopt criteria for such toxic pollutants applicable to the water body sufficient to protect the designated use"(See 40 CFR 131.1 I (a)(2)). Clearly the intent of both the Act and EPA regulations is that water quality standards be tailored to the characteristics of the waters in question. In failing to properly evaluate the rule's economic impacts and in failing to adequately consider regulatory alternatives, the rule is inconsistent with Presidential Executive Order 12866 and the Unfunded Mandates Reform Act. Moreover, in failing to properly consider the impacts on small entities, the rule is inconsistent with the Regulatory Flexibility Act.

Response to: CTR-043-005a

See responses to CTR-035-012a and CTR-036-005. For a discussion of how the rule complies with the E.O. 12866, the Unfunded Mandates Reform Act, see the preamble to the final rule, and EPA's economic analysis for the final rule.

Comment ID: CTR-044-006a
Comment Author: City of Woodland
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: C-21 Legal Concerns
References:
Attachments? Y
CROSS REFERENCES E-01c; R; S

Comment: We have reviewed the proposed CTR and offer the following comments:

5. The proposed rule is inconsistent with applicable Federal law and regulations.

In proposing a single set of criteria for all estuaries, the rule is inconsistent with the Clean Water Act and EPA's water quality standards regulations. The Clean Water Act requires that water quality standards be established taking into consideration their use and value for public water supplies, propagation of fish and wildlife, recreational purposes (see CWA section 303(c)(2)(A)). Consistent with this, EPA regulations require that water quality standards be based on identification of "specific water bodies where toxic pollutants may be adversely affecting water quality or the attainment of the designated water use or where the levels of toxic pollutants are at a level to warrant concern..." For those identified waters, "states must adopt criteria for such toxic pollutants applicable to the water body sufficient to protect the designated use"(See 40 CFR 131.11 (a)(2)) (see Exhibit G). Clearly the intent of both the Act and EPA regulations is that water quality standards be tailored to the characteristics of the waters in question. In

failing to properly evaluate the rule's economic impacts and in failing to adequately consider regulatory alternatives, the rule is inconsistent with Presidential Executive Order 12866 and the Unfunded Mandates Reform Act (Id.). Moreover, in failing to properly consider the impacts on small entities, such as the City, the rule is inconsistent with the Regulatory Flexibility Act (Id.).

Response to: CTR-044-006a

See responses to CTR-035-012a and CTR-036-005. For a discussion of how the rule complies with the E.O. 12866, the Unfunded Mandates Reform Act, see the preamble to the final rule.

Comment ID: CTR-044-044
Comment Author: City of Woodland
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: C-21 Legal Concerns
References: Letter CTR-040 incorporates by reference letter CTR-027
Attachments? Y
CROSS REFERENCES

Comment: LEGAL ANALYSIS OF THE PROPOSED CALIFORNIA TOXICS RULE

1. The California Toxics Rule is inconsistent with the Clean Water Act and EPA's water quality standards regulations.

a. EPA Failed to Adopt Criteria on a Case-by-Case, Pollutant-by-Pollutant Basis.

Section 303 of the Clem Water Act (CWA) requires that whenever a State adopts water quality standards, it "shall adopt criteria for all toxic pollutants listed pursuant to section 1317(a)(1) of this title for which criteria have been published under section 1314(a) of this title, the discharge or presence of which in the affected waters could reasonably be expected to interfere with those designated uses adopted by the State, as necessary to support such designated uses." 33 U.S.C. section 1313(c)(2)(B). In other words, criteria only need to be developed where there is a "discharge or presence" of toxic pollutants in the affected waters, which could "reasonably be expected to interfere with those designated uses" adopted by the State.(*1) Thus, a water body and pollutant specific determination must be made before criteria are adopted as part of a water quality standard.

In its Preamble to the CTR, EPA stated that:

EPA does-not believe that it is necessary to support the criteria proposed today on a pollutant specific, water body-by-water-body basis. For EPA to undertake an effort to conduct research and studies of each stream segment or water body across the State of California to demonstrate that for each toxic pollutant for which EPA has issued CWA 304(a) criteria guidance there is a "discharge or presence" of that pollutant which could reasonably "be expected to interfere with" the designated use would impose an enormous administrative burden and would be contrary to the statutory directive for swift action manifested by the 1987 addition of section 303(c)(2)(B) of the CWA. 62 Fed. Reg. 42166.

Thus, to interpret CWA section 303(c)(2)(B) and (c)(4) to require such a cumbersome pollutant specific effort on each stream segment would essentially render section 303(c)(2)(B) meaningless. The provision and its legislative background indicate that the Administrator's determination to invoke her 303(c)(4)(B) authority can be met by a generic finding of inaction by the State without the need to develop pollutant specific data for individual stream segments. This determination is supported by information in the rulemaking record showing the discharge or presence of priority toxic pollutants throughout the State. While this data is not necessarily complete, it constitutes a strong record supporting the need for numeric criteria for priority toxic pollutants with section 304(a) criteria guidance where the State does not have numeric criteria. 62 Fed. Reg. 42167.

Thus, EPA basically states that it is not necessary for it to make the statutorily-required findings of "discharge or presence" or reasonable expectation of interference with designated uses because it would be a great administrative burden and because swift action is required.

EPA supports its contention that swift action is required by citing the statutory framework and purpose of section 303, and the CWA's legislative history. "In adding section 303(c)(2)(B) to the CWA, Congress understood the existing requirements in section 303(c)(1) for triennial water quality standards review and submissions and in section 303(c)(4)(B) for promulgation. CWA section 303(c) includes numerous deadlines and section 303(c)(4) directs the Administrator to act promptly where the Administrator determines that a revised or new standard is necessary to meet the requirements of the Act. Congress, by linking section 303(c)(2)(B) to the section 303(c)(1) three-year review period, gave States a last chance to correct this deficiency on their own. The legislative history of the provision demonstrates that chief Senate sponsors, including Senators Stafford, Chaffee and others wanted the provision to eliminate State and EPA delays and force quick action." 62 Fed. Reg. 42,167. Thus, EPA rests its entire argument regarding the need for swift action on the existence of the word "promptly" in the section of the statute related to the Administrator's duty to promulgate standards in the absence of approved State standards. It is unclear how EPA can argue that it has acted "promptly" thus far to adopt these new standards since it has been over three years since the State standards were overturned. Arguably, the additional extra time it would have taken to make the statutorily required findings would not have been substantial, and would probably result in less impact on dischargers.

EPA's other argument that such a "cumbersome pollutant specific effort on each stream segment" would "impose an enormous administrative burden" is not compelling. States, in their adoption of water quality standards, must perform this "cumbersome pollutant specific effort on each stream segment" under the express terms of section 303 (c)(2)(B). Therefore, it logically follows that EPA, in promulgating the standards for California, stands in the State's shoes and should be subject to the same requirements imposed upon the State. (*2) Furthermore, EPA's reasoning that it is not required to do something merely because it is "cumbersome" may be subject to a legal challenge that such a determination is "arbitrary and capricious" under the Administrative Procedures Act (5 U.S.C. section 701 et seq.).

(*1) See also 4O C.F.R. section 131.11 (a)(2) ("States must review water quality data and information on discharges to identify specific water bodies where toxic pollutants may be, adversely affecting water quality or the attainment of the designated water use or where the levels of toxic pollutants are at a level to warrant concern and must adopt criteria for such toxic pollutants applicable to the water body sufficient to protect the designated use.")

(*2) See accord 40 C.F.R. 131.241(c) regarding EPA promulgation of water quality standards ("In promulgating water quality standards, the Administrator is subject to the same policies, procedures, analyses, and public participation requirement established for States. . .").

Response to: CTR-044-044

Comment ID: CTR-050-001
Comment Author: Sonnenschein Nath & Rosenthal
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org: American Petrol
Document Date: 09/26/97
Subject Matter Code: C-21 Legal Concerns
References:
Attachments? N
CROSS REFERENCES

Comment: On behalf of the American Petroleum Institute (API), we are submitting the following comments on U.S. EPA's proposal to establish water quality criteria for toxic pollutants for the State of California (62 Fed. Reg. at 42160, Aug. 5, 1997). API is a national trade association representing 300 companies with operations in all facets of the petroleum industry

(exploration, production, refining, and marketing. API has member companies in California as well as member companies in the Midwestern states currently implementing the Great Lakes Initiative. API member companies have experience with many of aspects of the proposed rule which are quite similar to the Great Lakes Initiative.

Many of API's members own and operate facilities in the State of California that discharge wastewater pursuant to NPDES permits. Those facilities will likely be issued new permit limits based on the criteria set forth in the EPA rule, once that rule is issued in final form. Therefore, API has a strong interest in the EPA proposal. Based on its review, API believes that the proposal has substantial legal flaws. Those flaws are described below.

1. EPA is Not Authorized to Impose the Proposed Criteria on a State-wide Basis.

EPA has proposed to impose the new criteria on all-waters in the State of California. EPA claims that it has the authority to impose state-wide criteria because the State's water quality control plans, which contain water quality criteria, have been invalidated by a court. Therefore, according to EPA, the State has not met its obligations under section 303(c)(2)(B) of the Clean Water Act, which requires the State to issue water quality criteria for toxics, "the discharge or presence of which in the affected waters could reasonably be expected to interfere with those designated uses adopted by the State, as necessary to support such designated uses." Because the State has not taken that action, EPA claims that it must promulgate standards for the State, under section 303(c)(4)(B) of the Act, which requires EPA to act when it determines that "a revised or new standard is necessary to meet the requirements of the Act." (62 Fed. Reg. at 42165).

EPA's position that it may impose state-wide criteria is squarely inconsistent with the plain language and intent of the Clean Water Act. First, Section 303(c)(2)(b) requires that the state must establish criteria for toxics, the discharge or presence of which in the affected waters could reasonably be expected to interfere with those designated uses adopted by the state as necessary to support such designated uses by requiring that criteria be established for certain toxics, i.e., those which interfere with the designated uses of specified waters, i.e., affected waters, it is clear that Congress intended that criteria be set on a

pollutant specific and stream-specific basis, not according to state geographic boundaries. Uses are designated for particular water bodies. Thus, EPA's position that it need not make any specific findings at all nullifies the clear statutory language of section 303(c)(2)(b) and violates a cardinal principle of statutory construction that each and every word of a provision be given effect.

Response to: CTR-050-001

See responses to CTR-035-012a and CTR-036-005. Further, EPA's interpretation does give effect to each word in CWA section 303(c)(2)(B) because the phrase "discharge or presence of which in the affected waters could reasonably be expect to interfere with those designated uses adopted by the State, as necessary to support such designated uses" reasonably could be interpreted to mean that if the pollutant were discharged, it could interfere with the designated uses. As explained in the above cited comment responses, this is a reasonable interpretation of the CWA given the time frames set forth by Congress and given the practical reality that no water quality based effluent limit must be included in a particular permit unless the State makes a "reasonable potential" determination for a given discharge.

Comment ID: CTR-050-002
Comment Author: Sonnenschein Nath & Rosenthal
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org: American Petrol
Document Date: 09/26/97
Subject Matter Code: C-21 Legal Concerns
References:
Attachments? N
CROSS REFERENCES

Comment: On behalf of the American Petroleum Institute (API), we are submitting the following comments on U.S. EPA's proposal to establish water quality criteria for toxic pollutants for the State of California (62 Fed. Reg. at 42160, Aug. 5, 1997). API is a national trade association representing 300 companies with operations in all facets of the petroleum industry

(exploration, production, refining, and marketing. API has member companies in California as well as member companies in the Midwestern states currently implementing the Great Lakes Initiative. API member companies have experience with many of aspects of the proposed rule which are quite similar to the Great Lakes Initiative.

Many of API's members own and operate facilities in the State of California that discharge wastewater pursuant to NPDES permits. Those facilities will likely be issued new permit limits based on the criteria set forth in the EPA rule, once that rule is issued in final form. Therefore, API has a strong interest in the EPA proposal. Based on its review, API believes that the proposal has substantial legal flaws. Those flaws are described below.

Second, EPA concedes that it has not made the factual findings to support state-wide application of the proposed standards, i.e., that a particular standard for a particular pollutant on a particular stream is "necessary to meet the requirements of the Act." (62 Fed. Reg. at 42166-42167) In fact, EPA states that its data concerning "discharge or presence" of toxics is "not necessarily complete." (62 Fed. Reg. at 42167) Perhaps, it is this acknowledged lack of supporting data that compels EPA to ignore the language

of section 303(c)(2)(b), which so plainly contradicts the concept of a state-wide applicability of toxic criteria.

Response to: CTR-050-002

See responses to CTR-035-012a and CTR-036-005.

Comment ID: CTR-050-003
Comment Author: Sonnenschein Nath & Rosenthal
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org: American Petrol
Document Date: 09/26/97
Subject Matter Code: C-21 Legal Concerns
References:
Attachments? N
CROSS REFERENCES

Comment: On behalf of the American Petroleum Institute (API), we are submitting the following comments on U.S. EPA's proposal to establish water quality criteria for toxic pollutants for the State of California (62 Fed. Reg. at 42160, Aug. 5, 1997). API is a national trade association representing 300 companies with operations in all facets of the petroleum industry

(exploration, production, refining, and marketing. API has member companies in California as well as member companies in the Midwestern states currently implementing the Great Lakes Initiative. API member companies have experience with many of aspects of the proposed rule which are quite similar to the Great Lakes Initiative.

Many of API's members own and operate facilities in the State of California that discharge wastewater pursuant to NPDES permits. Those facilities will likely be issued new permit limits based on the criteria set forth in the EPA rule, once that rule is issued in final form. Therefore, API has a strong interest in the EPA proposal. Based on its review, API believes that the proposal has substantial legal flaws. Those flaws are described below.

Third, EPA's claim that it does not have to make pollutant and stream-specific determinations because Congress wanted it to take "quick action" (62 Fed. Reg. at 42167), is not supported by the pertinent statutory provisions which contain no deadlines at all. Section 303(c)(4)(B) merely directs the Agency to act to promptly" and has no explicit connection to section 303(c)(2)(B), which contains the State's obligations to issue criteria for toxicities.

If Congress had wanted to establish a connection between the two statutory provisions, and authorize EPA to take "quick action" to issue state-wide criteria if the State has not acted, Congress could easily have inserted appropriate language in either section 303(c)(2)(B), section 303(c)(4)(B), or both. Congress did not insert such language. Thus, Congress did not authorize the Agency to make an "end run" around the explicit provisions of the statute by issuing state-wide criteria without stream-specific or pollutant-specific findings that such criteria are necessary.

Response to: CTR-050-003

See responses to CTR-035-012a and CTR-036-005.

Comment ID: CTR-050-004
Comment Author: Sonnenschein Nath & Rosenthal
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org: American Petrol
Document Date: 09/26/97
Subject Matter Code: C-21 Legal Concerns
References:
Attachments? N
CROSS REFERENCES

Comment: On behalf of the American Petroleum Institute (API), we are submitting the following comments on U.S. EPA's proposal to establish water quality criteria for toxic pollutants for the State of California (62 Fed. Reg. at 42160, Aug. 5, 1997). API is a national trade association representing 300 companies with operations in all facets of the petroleum industry

(exploration, production, refining, and marketing. API has member companies in California as well as member companies in the Midwestern states currently implementing the Great Lakes Initiative. API member companies have experience with many of aspects of the proposed rule which are quite similar to the Great Lakes Initiative.

Many of API's members own and operate facilities in the State of California that discharge wastewater pursuant to NPDES permits. Those facilities will likely be issued new permit limits based on the criteria set forth in the EPA rule, once that rule is issued in final form. Therefore, API has a strong interest in the EPA proposal. Based on its review, API believes that the proposal has substantial legal flaws. Those flaws are described below.

Finally, EPA imposition of state-wide standards is not "necessary to meet the requirements of the Act," as required by Section 303(c)(4)(B). In discussing the potential economic impacts of the proposal, EPA points out that if it did not issue a rule, the State could use its narrative water quality criteria to impose permit limits for toxicities. (62 Fed. Reg. at 42187) EPA fails to recognize that if the state were allowed to use its criteria in this manner, there would be no need for EPA to usurp state authority and federally impose statewide criteria.

For the reasons cited above, EPA's action to propose toxic criteria in the State of California is without legal authority and should be withdrawn.

Response to: CTR-050-004

See responses to CTR-035-012a and CTR-036-005. EPA is promulgating numeric criteria here even though the state could use its narrative to develop water quality based effluent limits in order to meet the requirements of CWA section 303(c)(2)(B). Section 303(c)(2)(B) of the CWA was enacted in 1987 in response to Congress' impatience with the progress in implementation of water quality controls for toxic pollutants for which EPA has national section 304(a) recommended criteria guidance. In enacting section 303(c)(2)(B), Congress required states to adopt numeric criteria. In light of California's failure to have such criteria, EPA's promulgation is implementing Congressional intent.

Comment ID: CTR-050-007a
Comment Author: Sonnenschein Nath & Rosenthal
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org: American Petrol
Document Date: 09/26/97
Subject Matter Code: C-21 Legal Concerns
References:
Attachments? N
CROSS REFERENCES E-01c; R; S

Comment: IV. EPA Has Not Complied With Applicable Regulatory Review Requirements. There are several significant statutes and executive orders that require EPA to undertake analyses of the costs and benefits of its regulations, and to submit the regulations and analyses to other governmental bodies, including the Office of Management and Budget (OMB) and Congress. Those authorities include the Regulatory Flexibility Act, the Small Business Regulatory Enforcement and Fairness Act (SBREFA), the Unfunded Mandates Reform Act, the Congressional Review Act, and Executive Order 12866 (Regulatory Planning and Review). EPA apparently believes that it does not need to comply with any of those requirements for this rulemaking. (62 Fed. Reg. at 42188-42191). API believes that EPA is required to meet those obligations for the proposed criteria, and that the Agency's rationale for avoiding this responsibility has no legal basis.

EPA supports its decision not to comply with the regulatory review statutes by stating that the proposed criteria "by themselves, do not directly impose economic impacts." (62 Fed. Reg. at 42188). EPA admits that when those criteria are combined with the designated uses that have been adopted by the State, and implemented in permit limits, "there may be a cost to some dischargers." (62 Fed. Reg. at 42188) could be substantial; the Agency itself estimates that the compliance cost could be between $15 and $87 million per year.(62 Fed. Reg. at 42189). (That does not include indirect costs to the economy, which would surely put this rule above the $100 million impact threshold specified in several of the regulatory review statutes listed above.) EPA cannot ignore those costs by creating its own interpretation of those statutes in which only "direct" impacts need be considered. There is no support in the statutory language or legislative history for such a reading, and EPA has cited no such support in its Federal Register notice.

There is another problem with EPA's rationale for avoiding regulatory review: if EPA were right that "indirect" impacts do not trigger those reviews, the impacts of this rulemaking are not really "indirect." Those impacts emerge clearly once the proposed criteria are combined with the State's designated uses. Those designations have already been established, so there is nothing uncertain or indefinite about that aspect of the water quality standards. Then, once the standards are completed, the State must implement those standards through permit limits. While there are some decisions that the State must make in determining the proper permit limits, which can influence the size of the compliance costs, EPA can readily determine a range of possible costs. In fact, the Agency has already done so, resulting in the $15 - $87 million cost range discussed above. While those costs may not be fixed with certainty, they are certainly "direct economic impacts". Therefore, even if the Agency were correct in looking at only "direct" impacts, this rulemaking poses such impacts, and EPA must comply with the statutory requirements to conduct and submit cost and benefit analyses of its proposed criteria.

V. CONCLUSION

As explained above, EPA's proposal to issue water quality criteria for toxicities in the State of California suffers from serious legal flaws. API urges the Agency to reconsider its intended course of action in light of the issues raised in these and other public comments. If you have any questions regarding these comments, or would like any additional information, please call Theresa Pugh at 202/682-8036.

Response to: CTR-050-007a

EPA disagrees with the comment. EPA has explained its compliance with E.0. 12866, the Regulatory Flexibility Act (as amended), and the Unfunded Mandates Reform Act in the preamble to the final rule.

With respect to the Regulatory Flexibility Act (RFA), and as stated in the preamble to the proposed and final rules, the RFA requires agencies to assess the economic impact of a rule only on small entities that are subject to the requirements of the rule. Today's rule does not impose any impacts on small entities.

The Regulatory Flexibility Act generally requires federal agencies to prepare a regulatory flexibility analysis (RFA) that describes the impact of a rule on small entities (small businesses, small organizations and small governmental jurisdictions) whenever an agency promulgates a final rule under section 553 of the Administrative Procedure Act, 5 U.S.C. Section 553. 5 U.S.C. Section 604. Under section 605(b) of the Regulatory Flexibility Act, however, if the head of an agency certifies that a rule will not have a significant economic impact on a substantial number of small entities, the statute does not require the agency to prepare an RFA. Pursuant to section 605(b), the Administrator is today certifying that this rule will not have a significant economic impact on a substantial number of small entities for the reasons explained below. Consequently, EPA has not prepared an RFA.

The RFA requires analysis of the economic impact of a rule only on the small entities subject to the rules' requirements. See United States Distribution Companies v. FERC, 88 F.3d 1105, 1170 (D.C. Cir. 1996). ("[N]o [regulatory flexibility] analysis is necessary when an agency determines that the rule will not have a significant economic impact on a substantial number of small entities that are subject to the requirements of the rule," United Distribution at 1170, quoting Mid-Tex Elec. Co-op v. FERC, 773 F.2d 327, 342 (D.C. Cir. 1985) (emphasis added by United Distribution court).) Thus, the RFA requires that any regulatory flexibility analysis prepared for a final rule must include estimates of "the number of small entities to which a rule will apply." 5 U.S.C. Section 604(a)(3). The analysis must also include a description of the recordkeeping, reporting and compliance requirements of the rule, including an estimate of the classes of small entities "which will be subject to the requirements." 5 U.S.C. Section 604(a)(4). In light of these provisions, courts have consistently interpreted the RFA to impose no obligation on an agency to conduct a small entity impact analysis on entities it does not regulate. Motor & Equip. Mfrs. Ass'n v. Nichols, 142 F.3d 449, 467 & n.18 (D.C. Cir. 1998).

The U.S. Court of Appeals for the District of Columbia Circuit recently reaffirmed its conclusion that the RFA does not require an agency to prepare an assessment of the economic impact of a rule on small entities that are not directly affected by a rule. American Trucking Association, Inc. v. U.S. Environmental Protection Agency, (D.C. Cir. 1999). In that case, the court determined that EPA was not required to prepare a regulatory flexibility analysis of the economic impact of a rule on small entities when it promulgated air quality standards under the Clean Air Act. There, EPA had certified that the rule would not have a significant impact on small entities because the air standard did not directly impose requirements on small entities and consequently they were not subject to the rule. Under the Clean Air Act, states regulate small entities through state implementation plans that they are required to develop under the Act. States have broad discretion in determining how to achieve compliance with the standards and may choose to avoid imposing any of the burden of complying with the standards on small entities.

The CTR presents a situation very similar to that described in the American Trucking case. It establishes no requirements that are directly applicable to small entities, and so the agency is not required to conduct a regulatory flexibility analysis under the RFA. (See United States Distribution Companies v. FERC, 88 F.3d 1105, 1170 (D.C. Cir. 1996). The Agency is therefore certifying that today's rule will not have a significant economic impact on a substantial number of small entities, within the meaning of the RFA.

Under the CWA water quality standards program, states must adopt water quality standards for their waters that must be submitted to EPA for approval. If the Agency disapproves a state standard and the state does not adopt appropriate revisions to address EPA's disapproval, EPA must promulgate standards consistent with the statutory requirements. EPA has authority to promulgate criteria or standards in any case where the Administrator determines that a revised or new standard is necessary to meet the requirements of the Act. These state standards (or EPA-promulgated standards) are implemented through various water quality control programs including the National Pollutant Discharge Elimination System (NPDES) program that limits discharges to navigable waters except in compliance with an EPA permit or permit issued under an approved state program. The CWA requires that all NPDES permits must include any limits on discharges that are necessary to meet state water quality standards.

Thus, under the CWA, EPA's promulgation of water quality criteria or standards establishes standards that the state, in turn, implements through the NPDES permit process. The state has considerable discretion in deciding how to meet the water quality standards and in developing discharge limits as needed to meet the standards. In circumstances where there is more than one discharger to a water body that is subject to water quality standards or criteria, a state also has discretion in deciding on the appropriate limits for the different dischargers. While the state's implementation of federally-promulgated water quality criteria or standards may result indirectly in new or revised discharge limits for small entities, the criteria or standards themselves do not apply to any discharger, including small entities.

EPA recognizes that it has undertaken an economic analysis pursuant to E.O. 12866 for this rule. This analysis, however, makes numerous assumptions and does not necessarily predict how the state will implement the criteria. Thus, the economic analysis represents EPA's best estimate of the implementation costs of the rule given the broad flexibility the state has in implementing the criteria.

The CTR, as explained above, does not itself establish any requirements that are applicable to small entities. As a result of EPA's action here, the State of California will need to ensure that permits it issues comply with the water quality standards established by the criteria in today's rule. In so doing, the State will have a number of discretionary choices associated with permit writing. While California's implementation of today's rule may ultimately result in some new or revised permit conditions for some dischargers, including small entities, EPA's action today does not impose any of these as yet unknown requirements on small entities.

Although the statute does not require EPA to prepare a regulatory flexibility analysis when it promulgates water quality criteria which will establish water quality standards for California, EPA has prepared an assessment of potential economic impact. This evaluation focuses on State and local implementation procedures related to the NPDES permit program. This evaluation is included in a document entitled, Implementation Analysis of Ambient Water Quality Criteria for Priority Toxic Pollutants in California which is part of the administrative record for this rulemaking. This document looks at the many implementation procedures of the NPDES permit program that the State implements to control pollutants from point source discharges. The procedures discussed in the document include: methods to calculate water quality-based effluent limits; mixing zones; site-specific translators for

metals criteria; compliance schedules; effluent trading; water-effect ratios; variances; designated use reclassification; and site-specific criteria. Each of these implementation procedures may have an effect on how water quality standards, based on the criteria in today's rule, will impact NPDES permit holders. Many of these procedures will lessen impacts on regulated entities.

The document also looks at implementation procedures used in the pretreatment program to control pollutant discharges from dischargers that do not discharge directly but introduce pollutants to publicly owned treatment works (POTWs). These dischargers include retail, commercial, and small industrial facilities that discharge to publicly owned treatment works (POTWs). Local entities have significant flexibility to implement their pretreatment programs. These procedures include: methods to calculate local limits (allocation of pollutants); methods of pollution prevention for various specific sources; pretreatment pollutant trading; methods of low cost pollutant reductions; technical assistance to move toward or achieve zero-discharge; cost accounting to drive down levels of discharges; and a few of the regulatory relief options discussed in the direct discharger section, e.g., compliance schedules.

The discussion illustrates the significant amount of flexibility available to the State and local agencies when implementing the NPDES permit program and pretreatment program and emphasizes that appropriate use of the available implementation tools can greatly affect the impact to many direct and indirect dischargers.

EPA recognizes that it has undertaken an economic analysis pursuant to E.O. 12866 for this rule. This analysis, however, makes numerous assumptions and does not necessarily predict how the state will implement the criteria. Thus, the economic analysis represents EPA's best estimate of the costs of the rule given the broad flexibility the state has in implementing the criteria.

Comment ID: CTR-052-021a
Comment Author: East Bay Dischargers Authority
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: C-21 Legal Concerns
References: Letter CTR-052 incorporates by reference letters CTR-035 and CTR-054
Attachments? Y
CROSS REFERENCES E-01c; R; S

Comment: C. RECOMMENDATIONS FOR MODIFICATIONS TO THE CTR AND EA

EPA should revise the proposed rule and economics analysis such that they are consistent with applicable Federal law and regulations. In proposing a single set of criteria for all estuaries, the rule is inconsistent with the Clean Water Act and EPA's water quality standards regulations. In failing to properly evaluate the rule's economic impacts and in failing to adequately consider alternative criteria for San Francisco Bay Area waters, the rule is inconsistent with Presidential Executive Order 12866 and the Unfunded Mandates Reform Act. In failing to properly consider the impacts on small entities, the rule is inconsistent with the Regulatory Flexibility Act. Specific citations for these inconsistencies are contained in comments from BADA and CASA/Tri-TAC.

Response to: CTR-052-021a

See responses to CTR-035-012a and CTR-036-005. EPA has explained its compliance with E.0. 12866, the Regulatory Flexibility Act (as amended), and the Unfunded mandates Reform Act in the preamble to the final rule.

Comment ID: CTR-054-014
Comment Author: Bay Area Dischargers Assoc.
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-21 Legal Concerns
References:
Attachments? Y
CROSS REFERENCES

Comment: The proposed rule is inconsistent with applicable Federal law and regulations. In proposing a single set of criteria for all estuaries, the rule is inconsistent with the Clean Water Act and EPA's water quality standards regulations (see Attachment 4). In failing to properly evaluate the rule's economic impacts and in failing to adequately consider alternative criteria for San Francisco Bay Area waters, the rule is inconsistent with Presidential Executive Order 12866 and the Unfunded Mandates Reform Act. In failing to properly consider the impacts on small entities (Id.), the rule is inconsistent with the Regulatory Flexibility Act (Id.).

Response to: CTR-054-014

See responses to CTR-035-012a and CTR-036-005. EPA has explained its compliance with E.0. 12866, the Regulatory Flexibility Act (as amended), and the Unfunded mandates Reform Act in the preamble to the final rule.

Comment ID: CTR-054-048
Comment Author: Bay Area Dischargers Associati
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-21 Legal Concerns
References: Letter CTR-040 incorporates by reference letter CTR-027
Attachments? Y
CROSS REFERENCES

Comment: LEGAL ANALYSIS OF THE PROPOSED CALIFORNIA TOXICS RULE

1. The California Toxics Rule is inconsistent with the Clean Water Act and EPA's water quality standards regulations.

a. EPA Failed to Adopt Criteria on a Case-by-Case, Pollutant-by-Pollutant Basis.

Section 303 of the Clem Water Act (CWA) requires that whenever a State adopts water quality standards, it "shall adopt criteria for all toxic pollutants listed pursuant to section 1317(a)(1) of this title for which criteria have been published under section 1314(a) of this title, the discharge or presence of which in the affected waters could reasonably be expected to interfere with those designated uses adopted by the State, as necessary to support such designated uses." 33 U.S.C. section 1313(c)(2)(B). In other words, criteria only need to be developed where there is a "discharge or presence" of toxic pollutants in the affected waters, which could "reasonably be expected to interfere with those designated uses" adopted by the State.(*1) Thus, a water body and pollutant specific determination must be made before criteria are adopted as part of a water quality standard.

In its Preamble to the CTR, EPA stated that:

EPA does-not believe that it is necessary to support the criteria proposed today on a pollutant specific, water body-by-water-body basis. For EPA to undertake an effort to conduct research and studies of each stream segment or water body across the State of California to demonstrate that for each toxic pollutant for which EPA has issued CWA 304(a) criteria guidance there is a "discharge or presence" of that pollutant which could reasonably "be expected to interfere with" the designated use would impose an enormous administrative burden and would be contrary to the statutory directive for swift action manifested by the 1987 addition of section 303(c)(2)(B) of the CWA. 62 Fed. Reg. 42166.

Thus, to interpret CWA section 303(c)(2)(B) and (c)(4) to require such a cumbersome pollutant specific effort on each stream segment would essentially render section 303(c)(2)(B) meaningless. The provision and its legislative background indicate that the Administrator's determination to invoke her 303(c)(4)(B) authority can be met by a generic finding of inaction by the State without the need to develop pollutant specific data for individual stream segments. This determination is supported by information in the rulemaking record showing the discharge or presence of priority toxic pollutants throughout the State. While this data is not necessarily complete, it constitutes a strong record supporting the need for numeric criteria for priority toxic pollutants with section 304(a) criteria guidance where the State does not have numeric criteria. 62 Fed. Reg. 42167.

Thus, EPA basically states that it is not necessary for it to make the statutorily-required findings of "discharge or presence" or reasonable expectation of interference with designated uses because it would be a great administrative burden and because swift action is required.

EPA supports its contention that swift action is required by citing the statutory framework and purpose of section 303, and the CWA's legislative history. "In adding section 303(c)(2)(B) to the CWA, Congress understood the existing requirements in section 303(c)(1) for triennial water quality standards review and submissions and in section 303(c)(4)(B) for promulgation. CWA section 303(c) includes numerous deadlines and section 303(c)(4) directs the Administrator to act promptly where the Administrator determines that a revised or new standard is necessary to meet the requirements of the Act. Congress, by linking section 303(c)(2)(B) to the section 303(c)(1) three-year review period, gave States a last chance to correct this deficiency on their own. The legislative history of the provision demonstrates that chief Senate sponsors, including Senators Stafford, Chaffee and others wanted the provision to eliminate State and EPA delays and force quick action." 62 Fed. Reg. 42,167. Thus, EPA rests its entire argument regarding the need for swift action on the existence of the word "promptly" in the section of the statute related to the Administrator's duty to promulgate standards in the absence of approved State standards. It is unclear how EPA can argue that it has acted "promptly" thus far to adopt these new standards since it has been over three years since the State standards were overturned. Arguably, the additional extra time it would have taken to make the statutorily required findings would not have been substantial, and would

probably result in less impact on dischargers.

EPA's other argument that such a "cumbersome pollutant specific effort on each stream segment" would "impose an enormous administrative burden" is not compelling. States, in their adoption of water quality standards, must perform this "cumbersome pollutant specific effort on each stream segment" under the express terms of section 303 (c)(2)(B). Therefore, it logically follows that EPA, in promulgating the standards for California, stands in the State's shoes and should be subject to the same requirements imposed upon the State. (*2) Furthermore, EPA's reasoning that it is not required to do something merely because it is "cumbersome" may be subject to a legal challenge that such a determination is "arbitrary and capricious" under the Administrative Procedures Act (5 U.S.C. section 701 et seq.).

(*1) See also 4O C.F.R. section 131.11 (a)(2) ("States must review water quality data and information on discharges to identify specific water bodies where toxic pollutants may be, adversely affecting water quality or the attainment of the designated water use or where the levels of toxic pollutants are at a level to warrant concern and must adopt criteria for such toxic pollutants applicable to the water body sufficient to protect the designated use.")
(*2) See accord 40 C.F.R. 131.241(c) regarding EPA promulgation of water quality standards ("In promulgating water quality standards, the Administrator is subject to the same policies, procedures, analyses, and public participation requirement established for States. . .").

Response to: CTR-054-048

EPA disagrees with the comment. See responses to CTR-035-012a and CTR-036-005.

Comment ID: CTR-055-002a
Comment Author: USS-POSCO Industries
Document Type: Specific Industry
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: C-21 Legal Concerns
References:
Attachments? Y
CROSS REFERENCES T

Comment: Waste Load Allocation (WLA) is a flawed concept and UPI requests the EPA promulgate conditions for exemption as part of the requirement for compliance with such allocations.

The implementation of CWA Section 303(c)(2)(B) as discussed beginning on page 42184 causes numerous obstacles, both financial and technological, to facilities such as UPI. Our facility will be subject to water quality-based effluent limitations (WQBELs). Therefore, total maximum daily loads (TMDL) and WLAs will be utilized as future discharge permit criteria.

State Task Force recommendations also recognize that the TMDL process can be significantly labor and data intensive. UPI concurs that the TMDL process is significantly labor and data intensive. During the five year period from 1989 through 1993 UPI spent close to a million dollars ($1,000,000) on the studies of point source wasteload performance at its facility. The study was initiated to verify the efficacy of our

waste water treatment system in removing chemical process constituents that were added to the water from the river (Delta) during use of the water as process water. Chain-of-custody and laboratory results for this study were documented in our required monthly self monitoring reports to the RWQCB.

The above study of efficacy of wastewater treatment prior to discharge is summarized in the following attached tables which show averages for three month periods over five full years.

Table 9. Summary of Discharge 001 Gross Mass Loading, lb/day Table 10. Summary of Discharge 001 Net Mass Loading, lb/day Table 11. Summary of Discharge 001 Net Concentrations, ug/l

Each table is shown in two sections. Section A shows the tabulation of results for cadmium (Cd), total chromium (Cr, total), hexavalent chromium (CrE+6), copper (Cu), total iron (Fe, total), dissolved iron (Fe, dissolved), lead (Pb), nickel (Ni) and zinc (Zn). Section B shows the tabulation of results for arsenic (As), mercury (Hg), selenium (Se), silver (Ag), tin (Sn), cyanide, phenolics, polyaromatic hydrocarbons (PAHs), naphthalene, and tetrachloroethylene. All analyses were done using approved standard procedures to determine the total concentration of each chemical. All results that were reported at minimum detection level (MDL) are included in the averages at one half of the reported MDL.

The attached tables illustrate the following: The gross lb/day discharge loadings (Table 9) show certain trends of improvement, eg, CrE+6, for which the process sources had been controlled. Note that since completion of the study compliance samples for CrE+6 during the most recent two year period have been reported at less than MDL. Other decreases, such as shown for Cd, Hg and Pb, are the result of improved analytical test procedures.

The net discharge lb/day loadings (Table 10) and net discharge ug/l concentrations (Table 11) show many results that are at or below zero discharge for many constituents. Other net discharge ug/l concentrations are significantly below the applicable MDLs, which also indicates that the net concentration is essentially zero. This indicates that chemical control for most chemicals is essentially 100% complete and that no process constituents are contained in the permitted discharge, except as noted below.

Exceptions to the above are Cr, Sn, and phenolics for which the net results are significantly above zero.

The above study shows the substantial effort and expenditure that was required to verify performance with respect to chemicals of concern (COCs) for a specific source category (and for several additional chemicals that were added to the COC list). The list of COCs is being expanded to 126 in the proposed regulations, more than six times as large a list as was evaluated in our performance study.

While the use of the Waste Load Allocation (WLA) principle may sound good, it is only good if properly administered. Two criterion should be considered to make the use of WLAs practicable and administratively feasible for both the agencies and the dischargers.:

* The COCs applicable to WLA discharge compliance should be identified by the Administrator for each source category, per Title 33, Section 1316(b)(1).

* Each NPDES Permit Applicant shall analyze and report on chemical listed on the standard permit application every five years to verify which if any discharge chemicals are subject to WLA discharge compliances.

For the above reasons, UPI requests the EPA add the following to the end of Section 131.38(e)(1) of part

131 of Title 40:

"New and existing point source dischargers shall be considered to be in compliance with such WQBELs except for (i) any WQBEL constituent that is identified for the source category pursuant to Section 1316(b)(1) of Title 33, or (ii) any WQBEL constituent which may cause an increase in the receiving water due to such discharge as determined from information contained in the standard required permit application."

Response to: CTR-055-002a

EPA disagrees with this comment. See response to CTR-055-002b (Category T; State Implementation Policy).

Comment ID: CTR-065-003b
Comment Author: Environmental Health Coalition
Document Type: Environmental Group
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: C-21 Legal Concerns
References:
Attachments? N
CROSS REFERENCES C-14

Comment: HUMAN HEALTH CRITERIA

EHC is very concerned about the use of 6.5 grams per day of fish tissue as a basis upon which to derive human health criteria. This is not adequate to protect the many thousands of subsistence fishers of California coastal waters. We trust EPA is not in the business of protecting "most of the people, most of the time" as is the indicated goal for marine organisms elsewhere in the CTR (see comments below).

We refer you to a study conducted by the Save San Francisco Bay Association that concluded that fishers of San Francisco Bay consumed 81grams per day in the week prior to the survey with consumption rates as high as 450 grams/day... This element of the CTR must be recalculated at a higher rate of consumption and with a healthy safety margin to accommodate for synergistic and cumulative effects. Further, the Save San Francisco study showed that heads and skin were frequently consumed, the health criteria must reflect these actual eating patterns and practices as well and reflect the cultural diversity of users of the Bays. Since many subsistence fishers are people of color, adoption of this rule could violate the President's Order on Environmental Justice b exposing these populations to increased and undue environmental health risks.

Response to: CTR-065-003b

See response to CTR-065-003a (Category C-14; Fish and Water Consumption).

Comment ID: CTR-095-001c
Comment Author: M. Ruth Uiswander

Document Type: Citizen
State of Origin: CA
Represented Org:
Document Date: 10/02/97
Subject Matter Code: C-21 Legal Concerns
References:
Attachments? N
CROSS REFERENCES C-20; C-17a; C-14

Comment: In regard to the numeric water quality standards criteria for California surface water, they have been revealed by environmental groups to be insufficiently protective and environmentally unjust. The proposed new rules assume fish ingestion of 6.5 grams per day. In reality, consumption of fish in some communities can be as high as 1 pound per day. This level of consumption is especially likely among subsistence fishers.

Please prevent toxic pollution in California's bays by making more protective standards that consider all toxic pollutants and consider the fish consumption habits of subsistence anglers.

Response to: CTR-095-001c

See responses to CTR-002-002a, CTR-002-005a, and CTR-058-001 (Subject Matter Code C-13, Risk Level).

Comment ID: CTR-099-004
Comment Author: Emil A. Lawton, Ph.D.
Document Type: Citizen
State of Origin: CA
Represented Org:
Document Date: 10/03/97
Subject Matter Code: C-21 Legal Concerns
References:
Attachments? N
CROSS REFERENCES

Comment: Finally, the timing must be strictly political, since 17 years of delay is unconscionable. Since you advisors must have found it difficult to understand the scientific literature, may I recommend a scientifically accurate book that is accessible to the non-scientist that may explain the dangers and the need for bold action by the EPA. It is Living Downstream - An Ecologist Looks at Cancer and the Environment by Sandra Steingraber, Addison Wesley, NY, 1997.

Response to: CTR-099-004

EPA disagrees with this comment. EPA began work on the CTR in 1994, and only after the State rescinded its ISWP and EBEP. The complexities of this rulemaking have prolonged the CTR process, but EPA is pleased to now be issuing final water quality criteria for toxic pollutants in the State of California.

Comment ID: CTR-105-002b
Comment Author: Heather Catherine Park Tausig
Document Type: Citizen
State of Origin: CA
Represented Org:
Document Date: 10/13/97
Subject Matter Code: C-21 Legal Concerns
References:
Attachments? N
CROSS REFERENCES C-17a

Comment: The maximum levels proposed for mercury, dioxin, and thirteen other pollutants have been identified by respected environmental advocacy groups as (1) insufficiently protective, and (2) environmentally unjust, potentially increasing the cancer risks for subsistence fishers, who are, in large part, people of color.

The standards must be established at a level that makes California waters truly "fishable," and not just "fishable if you don't object to cancer."

Thank you for your consideration.

Response to: CTR-105-002b

See response to CTRH-001-010.

Comment ID: CTRH-001-010
Comment Author: Greg Karras
Document Type: Public Hearing
State of Origin: CA
Represented Org: Comm. for Better Environ.
Document Date: 09/17/97
Subject Matter Code: C-21 Legal Concerns
References:
Attachments? N
CROSS REFERENCES

Comment: MR. KARRAS: I'm Greg Karras, K-A-R-R-A-S. I'm with Communities for a Better Environment; I'm a senior scientist.

CBE is a multiracial environmental health and justice organization with 20,000 California members, most of them in the Bay Area. We work with communities imperiled by urban pollution. I represent people who depend upon the environmental health of San Francisco Bay, including people who fish the bay for food.

CBE has worked to clean up the bay for years. We helped EPA establish the first National Estuary Conference and served on the management committee of the San Francisco Estuary Project and signed its consensus plan to protect and restore the bay. We participated in the development of every numeric toxins standard promulgated for the bay, with the possible exception of one adopted by EPA for selenium

in 1992.

We used these standards to leverage toxic prevention that cut toxics of the bay by tons, while netting economic benefits to the manufacturing base and jobs at more than a hundred Bay Area industrial plants. We submitted these data for your work on this proposed rule and we've done a preliminary analysis of the proposal that resulted.

It looks to us as a preliminary matter that EPA's proposed rule today could reverse a decade of environmental policy progress in San Francisco Bay and represent the biggest step backward ever taken for the bay's toxics policies in 25 years under the Clean Water Act. This conclusion is alarming, and this conclusion is surprising.

We hope to find out that we're wrong about that preliminary conclusion. Accordingly, before we make a final judgment, which I understand we need to make by next Friday to submit written comments, I ask that you give CBE and our members, which are the public, important information by answering now or as soon as possible some of our most pressing questions.

On environmental justice, EPA says in its preamble to the proposal that it is EPA's intention to calculate cancer criteria in a way that will provide less protection from cancer for people who rely on locally caught fish for food than it does the average person.

EPA then goes on to say this might still provide adequate protection. However, low-income people of color who fish San Francisco Bay for food are eating up to 60 times more contaminated fish than the state health advisory says is quote, unquote, safe.

And I also note that in Exhibit 8A of your economic analysis, EPA, you say that the hazard from peaks in the mercury and from dioxin in fish consumed in San Francisco Bay exceeds what you consider to be a significant level.

So our first question is simply is EPA proposing to provide the poor --

I should mention, we know from surveys done by several entities in the bay that the vast majority of people who fish the bay and use it for food, rely on it for food, most of them are low-income people and we can determine for sure that the majority are people of color.

So the question is, is EPA proposing to provide poor people and people of color unequal protection under the law?

Response to: CTRH-001-010

See responses to CTR-002-002a and CTR-002-005a (Category C-14; Fish Consumption).

Comment ID: CTRH-001-017
Comment Author: Greg Karras
Document Type: Public Hearing
State of Origin: CA
Represented Org: Comm. for Better Environ.
Document Date: 09/17/97

Subject Matter Code: C-21 Legal Concerns
References:
Attachments? N
CROSS REFERENCES

Comment: Finally, this is a daytime hearing. I think the record will show that the vast majority of people who attended this hearing are environmental professionals, and the vast majority of those are people who represent regulated interests and the discharge interests.

The people who are most directly impacted in terms of their health, their livelihood, their ability to work when they're sick, their ability to raise children who don't have slow learning, their rights to fish a clean bay, are not here.

My final question --

And I think it's obvious why many of them are not here. Many of these folks are lower-income people of color, immigrant people, people who are working people, who have the kinds of jobs where it's very difficult for them to ask the boss for time off to attend a hearing of EPA to address fish contamination held at 1:00 p.m. on a Wednesday in the middle of the week.

Will EPA hold a public hearing in the evening on a fishing pier on San Francisco Bay before your proposal is adopted?

Those conclude my questions.

I, again, am serious about getting answers to these now, today, in this hearing or as soon as possible, so that we could make sure that we are as correct as possible in our comments which we will be submitting into the record in writing.

Thank you.

Response to: CTRH-001-017

EPA was unable to hold a public hearing in the evening on the rule. EPA operates during normal business hours. Nevertheless, EPA's intent here is not discriminatory, but rather an administrative necessity in terms of its own staffing, and support mechanisms for its operations. As always, people may submit written comments to EPA if they cannot attend a public hearing.

Subject Matter Code: C-22 Dissolved v. Ttl Recoverable

Comment ID: CTR-004-004c
Comment Author: South Bayside System Authority
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/24/97
Subject Matter Code: C-22 Dissolved v. Ttl Recoverable
References:
Attachments? N
CROSS REFERENCES G-05
C-24a
C-09

Comment: Despite the problems addressed above there are provisions of the CTR that SBSA supports, including:

* EPA's policies and guidance regarding the use of mixing zones and dilution

* Use of water effects ratios (WERs) for determining site specific criteria

* Inclusion of metals criteria expressed as dissolved rather than total recoverable

* Allowing permit writers the use of any of the methods in EPA's guidance document on the use of translators

Response to: CTR-004-004c

EPA acknowledges the commenter's support.

Comment ID: CTR-005-003a
Comment Author: Novato Sanitary District
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/23/97
Subject Matter Code: C-22 Dissolved v. Ttl Recoverable
References:
Attachments? Y
CROSS REFERENCES C-24a
C-01a
G-09
G-05
G-04

Comment: 2. The following provisions of the rule are supported: (1) adoption of metals criteria as

dissolved concentrations; (2) expression of the metals criteria as a function of the water-effect ratio; (3) adoption of the proposed new human health criterion for mercury; and (4) the Preamble discussions regarding metals translators, mixing zones, and interim permit limits.

Response to: CTR-005-003a

EPA acknowledges the commenter's support.

Comment ID: CTR-007-001
Comment Author: Port of San Diego
Document Type: Port Authority
State of Origin: CA
Represented Org:
Document Date: 09/24/97
Subject Matter Code: C-22 Dissolved v. Ttl Recoverable
References:
Attachments? N
CROSS REFERENCES

Comment: The San Diego Unified Port District ("District") supports the general shift from a "Total Recoverables" criterion to a "dissolved" detection method. The District does, however, have a number of concerns with the proposed rule.

Response to: CTR-007-001

EPA acknowledges the commenter's support.

Comment ID: CTR-017-002a
Comment Author: Santa Ana River Discharger Ass
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-22 Dissolved v. Ttl Recoverable
References:
Attachments? Y
CROSS REFERENCES C-24a

Comment: Because the California Toxics Rule uses the same approach as the UAA in setting water quality objectives for cadmium and copper, SARDA strongly supports the CTR objectives for those metals. We also agree with EPA's written statements acknowledging the binding character of organic carbon and the role it plays in rendering heavy metals non-toxic. We enthusiastically endorse the agency's decision to include Water Effects Ratio as a formal factor to be considered when formulating water quality objectives. It will do much to adjust national criteria to local conditions.

Response to: CTR-017-002a

EPA acknowledges the commenter's support.

Comment ID: CTR-021-002c
Comment Author: LeBoeuf, Lamb, Green & MacRae
Document Type: Local Government
State of Origin: CA
Represented Org: City of Sunnyvale
Document Date: 09/25/97
Subject Matter Code: C-22 Dissolved v. Ttl Recoverable
References: Letter CTR-021 incorporates by reference letter CTR-035
Attachments? Y
CROSS REFERENCES G-04
C-24a
K-01
G-05
G-02

Comment: Sunnyvale is very supportive of many fine concepts advanced in the proposed CTR, and we join with CASA/Tri-TAC in complimenting the Agency on its proposed positions with regard to such matters as: (a) the use of interim effluent limitations in NPDES permits during the pendency of TMDL and other special studies; (b) the allowance of water effects ratios in adjusting the criteria for metals without the necessity for additional rulemaking to establish site-specific objectives; © the use of the dissolved state for the metals criteria; (d) the use of cooperative, intergovernmental, and stakeholder-involved approaches towards the development of TMDLs;(e) the allowance of dilution for both chronic and acute pollutants; and (f) the allowance of compliance schedules in NPDES permits.

Response to: CTR-021-002c

EPA acknowledges the commenter's support.

Comment ID: CTR-026-004
Comment Author: Cal. Department of Fish & Game
Document Type: State Government
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-22 Dissolved v. Ttl Recoverable
References:
Attachments? N
CROSS REFERENCES

Comment: 4. DISSOLVED V.S. TOTAL RECOVERABLE METALS CRITERIA

The proposed CTR promulgates the metals criteria as dissolved concentrations instead of the historic use of total recoverable concentrations. The DFG has argued against the use of dissolved concentrations as we believe that they do not rally protect aquatic resources. Chemical constituents of natural waters

affect the biota as essential nutrients and as potential toxicants. These interactions are directly dependent on the chemical speciation of the constituents. While it is generally recognized that only the free concentrations of metals are the toxic component, most laboratories do not have the capability to determine the speciation of the metal. Use of only the dissolved fraction to determine criteria promotes the theory that metals adsorbed to sediments or suspended solids are not biologically available. Additionally, not all species of metal which are detected in the dissolved fraction are biologically available.

Metal complexes in natural waters can be classified into three groups: ion pairs, inorganic complexes, and organic complexes. Complex formation is a reversible reaction of two dissolved species to form a third specie. Free metal ions in solutions are really aquo complexes, the water itself is a ligand that binds metals, and every complexation reaction in water is effectively aligand-exchange reaction. The reaction of a metal with a ligand can be of an electrostatic or covalent nature or both. Speciation tells the fate of metals in the environment (mineral, redox, or bioavailable).

Particulate material is chemically defined as that material retained on a 0.2 u filter. The dissolved fraction is that portion smaller than 5 rim in size, and the colloidal fraction is between 5.0 um and 0.2 um in size. The EPA definition of particulate material is that material retained on a 0.45 um filter. Therefore, inorganic and organic complexed material will be contained in the dissolved fraction. A large portion of the dissolved nickel in south San Francisco Bay is organically complexed (not bioavailable) and remains in the water column for longer than the resident time of the water mass. Currently, most laboratories that will be affected by the proposed change from total recoverable concentrations will not be able to speciate out the free ions from the inorganic ligands and determine the true toxic concentrations of the metal. For example, at a 10E-9 concentration, free copper becomes toxic to aquatic organisms. A single laboratory using the same analytical method, but different analytical conditions, can have different detection windows which provide different speciation information.

Metals retained in the particulate fraction are available to aquatic organisms during the chemical processes of desorption from suspended particles, resuspension via wind mixing and tidal currents, and interstitial-water transport, In addition, the biological processes of ingestion of sediment or suspended solids (e.g., filter feeders, zooplankton, etc.), direct contact transport, and bioaccumulation through the food chain, provide organisms bioavailable metals which are currently retained in the particulate fraction. Average concentrations of particulates are 0.01 ppm in the deep ocean, 10-400 ppm in San Francisco Bay, 50,000 ppm in turbid estuaries, and up to 80 percent in riverine systems. Metals bound to humic acids (freshwater systems) readily dissociate and do not bind for any length of time. In San Francisco Bay, the various forms of selenium are not in equilibrium (surface sediment, water column) and the routes of exposure are additive.

Since the measurement of metals as total recoverable includes that portion associated with sediments or suspended solids, it provides a more accurate (although conservative) descriptor of metal availability in its toxic form. As previously discussed, metals associated with the particulate fraction are available to aquatic organisms through biological and chemical mechanisms. It is now known that metals associated with particulates do not remain permanently associated with the sediments, but rather are transformed into the free ions and become bioavailable. Therefore, the DFG urge the establishment of metal criteria as a total recoverable measurement, at least for the purpose of developing statewide numeric criteria for priority toxic pollutants.

Response to: CTR-026-004

EPA disagrees with the commenter. EPA believes that the scientific evidence indicates that

particulate-bound metals do not contribute toxicity when suspended in the water column, and do not increase in bioavailability if or when settled into sediment. Consequently, EPA believes that to incorporate total recoverable metal criteria into the rule would be an ineffective use of federal, state, and local resources EPA notes that two expert workshops, one in Annapolis in 1993 (58 FR 32131, June 8, 1993) and one in Pensacola in 1996 (Bergman, H.L. and E.J. Dorward-King (eds.), Reassessment of Metals Criteria for Aquatic Life Protection. SETAC Press. Pensacola, FL.. 1997) were held to discuss this issue. Both workshops recommended that EPA express its criteria as dissolved metal. EPA has found the expert workshop recommendations, with their supporting rationale, to be persuasive.

EPA does not believe that the factual material cited in the comment supports the contention that criteria should be expressed as total recoverable. The information provided in the comment merely indicates that metals exist in both dissolved and particulate forms, and that one can conceive of some potential exposure routes involving particulate metals. However, none of the information provided by the comment suggests that particulate potential exposure routes are in fact actually significant when compared to dissolved metals exposure. Consequently, EPA does not believe that any of the information presented in the comment counterbalances the information provided by the above mentioned workshops, supporting use of dissolved metals criteria.

EPA nevertheless agrees with the comment that not all dissolved metal is bioavailable. For this reason, EPA included the Water-Effect-Ratio (WER) in the equation for criteria in the rule to account for varying site-specific toxicity.

Comment ID: CTR-027-012a
Comment Author: California SWQTF
Document Type: Storm Water Auth.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-22 Dissolved v. Ttl Recoverable
References: Letter CTR-027 incorporates by reference letters CTR-001, CTR-036 and CTR-040
Attachments? N
CROSS REFERENCES C-24a
C-01a
G-09
G-05

Comment: PROVISIONS OF THE PROPOSED RULE WE SUPPORT

Not withstanding the above comments, we believe there are certain elements of the proposed rule with respect to establishing water quality standards that we can support:

* Metal criteria expressed in the dissolved fraction rather than expressed in the total recoverable fraction.

* Metal criteria that are developed as a function of the water-effect-ratio (WER).

* The current proposed human health criterion for mercury.

* The current preamble language regarding metal translators and mixing zones.

We believe the above provisions provide a more acceptable, scientific approach to the water quality-based pollution control approach. We recommend these provisions of the current rule remain as proposed.

Response to: CTR-027-012a

EPA acknowledges the commenter's support.

Comment ID: CTR-029-002d
Comment Author: Center for Marine Conservation
Document Type: Environmental Group
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-22 Dissolved v. Ttl Recoverable
References:
Attachments? N
CROSS REFERENCES C-17a
C-17b
A
C-27
C-29

Comment: The Center for Marine Conservation (CMC) is a nationwide, nonprofit advocacy group dedicated to the conservation and enhancement of coastal and ocean life and resources. CMC submits these comments on behalf of its 16,000 members in California and over 120,000 members nationwide.

CMC applauds EPA's efforts to bring California into compliance with the Clean Water Act 303(c)(2)(B). Implementing numeric criteria that will protect the beneficial uses of California's waters is of great importance to the health of coastal and marine ecosystems, and so to CMC and its members. The reliance in many areas of the state on narrative criteria threatens the health of most of the state's waters, thereby impacting both human health and the health of the state's economy that relies on clean water.

While CMC strongly supports the swift adoption of an Enclosed Bays and Estuaries Plan and an Inland Surface Waters Plan that contain numeric criteria for toxic pollutants, CMC also is concerned that many of the specific criteria contained in the proposed rule are weaker than those contained in published guidance. CMC also believes that the proposed rule can better protect certain subpopulations from harm caused by consumption of contaminated fish and shellfish. Finally, CMC is concerned that the economic analysis of the proposed rule over-emphasizes costs and under-reports the many benefits of improving water. quality throughout the state. These three points are reviewed below.

In Light of Significant Threats to Water Quality, the Proposed Rule Should Contain the Most Stringent Criteria That Are Scientifically Defensible

Many of the criteria in the proposed rule are weaker than criteria in current published guidance. The proposed rule summarily states that the difference between the proposed, weaker criteria and the

published guidance documents is "insignificant"(*4); however, in light of the current contamination problems in California's waters today, any move backwards, particularly when spread out over the state, must be viewed as significant.

Any weakening of the criteria should be subject to close scrutiny and the most rigorous analysis, which the proposed rule itself does not do. Among other things, the criteria in the proposed rule may be under protective because additive and synergistic effects were not considered; and because the effects on wildlife, which can be particularly significant for bioaccumulative chemicals, were ignored.(*5) In addition, the proposed rule contains dissolved rather than total recoverable metals criteria, despite the fact that EPA acknowledges that total recoverable metals criteria are "scientifically defensible" and that they are more protective than dissolved metals criteria because they consider "sediment, food-chain effects and other fate-related issues," rather than simply water column impacts.(*6)

Clean Water Act section 303(c)(2)(B) mandates the development of numeric criteria that will "support such designated uses [that are adopted by the State]." The statistics available on the health of the state's waters indicates that their use already is significantly threatened or impaired by toxics. The strongest criteria supportable by science are necessary to reverse this trend and begin to restore the state's waters.

(*4) 62 Fed. Reg. 42159, 42168 (Aug. 5, 1997).

(*5) Id. at 42168.

(*6) Id. at 42172.

Response to: CTR-029-002d

See response to CTR-029-002b.

Comment ID: CTR-032-002b
Comment Author: Las Gallinas Val. Sanitry Dist
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-22 Dissolved v. Ttl Recoverable
References: Letter CTR-032 incorporates by reference letter CTR-035
Attachments? N
CROSS REFERENCES G-01
G-09
C-24a
C-24
K
G-04
G-05
G-02

Comment: Regulatory Flexibility and Relief

The District supports EPA's use of "sound science" and current data in developing the proposed criteria in the California Toxics Rule (CTR). The District strongly supports language in the Preamble that references and endorses recommendations of the State Task Forces including use in permitting of:

* reasonable potential analyses * dissolved metals criteria * translators * water effects ratios * site specific objectives * innovative TMDL processes such as effluent trading * performance based interim limits * chronic and acute mixing zones, and * compliance schedules in NPDES permits.

Response to: CTR-032-002b

EPA acknowledges the commenter's support.

Comment ID: CTR-034-008
Comment Author: SCAP
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-22 Dissolved v. Ttl Recoverable
References: Letter CTR-034 incorporates by reference letter CTR-035
Attachments? N
CROSS REFERENCES

Comment: * SCAP supports EPA's proposed adoption of criteria for metals expressed as the dissolved fraction rather than as total recoverable metals. We recommend that EPA provide guidance to the State in the Preamble to the CTR stating that the State should also use the dissolved form for metals unless it has been demonstrated that the total recoverable form is necessary to protect aquatic resources found in particular water bodies.

Response to: CTR-034-008

EPA acknowledges the commenter's support for the use of dissolved metals. However, EPA disagrees that it should provide guidance indicating that the State should also use the dissolved form of metals. EPA believes that a state can decide to use a more stringent approach.

Comment ID: CTR-035-002a
Comment Author: Tri-TAC/CASA
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-22 Dissolved v. Ttl Recoverable
References:
Attachments? N
CROSS REFERENCES C-01a
C-08a

G-05
G-04
G-09
K-01
C-24a

Comment: Second, we commend EPA for its inclusion in the CTR of several innovative and flexible regulatory approaches, such as metals criteria expressed as dissolved rather than total recoverable concentrations, and the revised human health criterion for mercury. In addition, in light of the issues surrounding the human health criteria for arsenic we support EPA's decision not to promulgate human health criteria at this time. With respect to implementation issues discussed in the Preamble, we support EPA's policies and guidance regarding the application of mixing zones and dilution credits. the use of interim permit limits while Total Maximum Daily Loads (TMDLs) and other special studies are being performed, and EPA's guidance to Regional Water Quality Control Boards (RWQCBs) that they may use any of the methods described in EPA's guidance document on the use of translators. We also support EPA's proposal to create a rebuttable presumption for Water Effects Ratios (WERs), allowing the RWQCBs and SWRCB to develop site-specific WERs that can be approved by EPA during the NPDES permit approval process. We believe that this approach will help facilitate the development of appropriate site-specific adjustments for metals criteria.

Response to: CTR-035-002a

EPA agrees with the comment and acknowledges the commenter's support.

Comment ID: CTR-035-016
Comment Author: Tri-TAC/CASA
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-22 Dissolved v. Ttl Recoverable
References:
Attachments? N
CROSS REFERENCES

Comment: pp. 42171-42173 -- Dissolved Metals Criteria We support EPA's policy regarding the expression of criteria for metals as the dissolved fraction, rather than as total recoverable metals. We believe that the dissolved fraction more closely approximates the fraction that is bioavailable, and that metals criteria expressed as total recoverable are usually overprotective. We request that EPA include guidance to the State in the Preamble such that, if the State wishes to adopt metals criteria in the total recoverable form, the State must demonstrate, for the particular water bodies, why the total recoverable form is necessary to protect the aquatic resources.

Response to: CTR-035-016

See response to CTR-034-008.

Comment ID: CTR-038-002a
Comment Author: Sonoma County Water Agency
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-22 Dissolved v. Ttl Recoverable
References:
Attachments? Y
CROSS REFERENCES C-24a
C-01a
G-04
G-05
G-09

Comment: 2. The following provisions of the rule are supported (1) adoption of metals criteria as dissolved concentrations; (2) expression of the metals criteria as a function of the water-effect ratio; (3) adoption of the proposed new human health criterion for mercury; and (4) the Preamble discussions regarding metals translators, mixing zones, and interim permit limits.

Response to: CTR-038-002a

EPA acknowledges the commenter's support.

Comment ID: CTR-039-003a
Comment Author: San Francisco BayKeeper
Document Type: Environmental Group
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-22 Dissolved v. Ttl Recoverable
References:
Attachments? N
CROSS REFERENCES A

Comment: I . APPLYING DISSOLVED METALS CRITERIA AS PROPOSED VIOLATES THE ANTIDEGRADATION POLICY FOR SAN FRANCISCO BAY AND OTHER WATERS OF THE STATE

The practical effect of EPA's decision to rely on dissolved metals criteria is to allow higher levels of total recoverable metals to be discharged from point sources into San Francisco Bay as well as other waters of the State. Since 1991, many permits in the Bay area and else where have been issued applying the State Water Resources Control Board's technically-based and EPA approved numeric criteria for numerous toxic pollutants. For at least three years, permits throughout the State were required to be issued using the duly-promulgated criteria established by the State Water Resources Control Board ("SWRCB"). After the Sacramento court vacated the criteria on economic grounds, numerous permitting decisions were made by local regional boards and their staffs applying the previously applicable standards using

their best professional judgement ("BPJ") in order to assure the protection of beneficial uses. Each of the permitting decisions based directly or deferentially on the SWRCB's criteria would be more stringent than permits for the same parameters authorized by EPA's proposed rule where a discharger opts to follow the Water Effects Ratio protocol for translating the criteria into a permit limit. BayKeeper would not anticipate that many, if any, dischargers will opt for the default WER of 1.0. Thus, for many regulated dischargers, EPA's proposal will lead to major increases in the total metals they are allowed to discharge into the Bay and other waters of the State. This massive increase in the total pollution proposed to be allowed to be discharged into the Bay and other State waters is completely inconsistent with the State's and EPA's antidegradation policies mandating that existing water quality be maintained and protected. As the State's policy sets forth:

Whenever the existing quality of water is better than the quality established in policies as of the date on which such policies become effective, such existing high quality will be maintained until it has been demonstrated to the State that any change will be consistent with maximum benefit to the people of the State, will not unreasonably affect present and anticipated beneficial use of such water and will not result in water quality less than that prescribed in the policies.

SWRCB Resolution No. 68-16. Under the federal version of the policy:

[w]here the quality of the waters exceed levels necessary to support propagation of fish, shellfish, and wildlife and recreation in and on the water, that quality shall be maintained and protected unless the State finds, after full satisfaction of the intergovernmental coordination and public participation provisions of the State's continuing planning process, that allowing lower water quality is necessary to accommodate important economic or social development.

40 C.F.R. 131.12(a)(2). The antidegradation policies apply both to permit decisions as well as decisions establishing water quality standards. See, e.g., In The Matter of the Petition of Remmon C. Fay, SWRCB Order No. WQ 86-17 (Nov. 20, 1986). In the case of EPA's proposed rule, throughout California the rule, if adopted, will allow more pollution to be discharged than is currently allowed by permits validly issued to numerous dischargers throughout the State without any consideration of the policies, including the intergovernmental coordination and public participation requirements, required by the antidegradation policies.

Of course, in addition to that procedural problem, BayKeeper is opposed to the proposed reliance on dissolved numbers, especially in the Bay area, because it will in fact allow more pollution to be discharged into the State's waters than is currently allowed today and likely will prove detrimental to beneficial uses. See Comments of Communities For A Better Environment. BayKeeper also is very concerned about the burdens and uncertainty placed on the public by the need for translators in order to apply the dissolved criteria in permit limits that must be based on total recoverable numbers. As noted above, BayKeeper does not anticipate that many dischargers will opt for EPA's proposed WER default of 1.0 BayKeeper views this proposal as an invitation for dischargers to prepare site-specific limitations based on their own studies which will frustrate the public' s ability to participate effectively in the formulation of effluent limits. Further, the proposal will present a moving target for the public to understand and will burden the resources of regional board staff to a degree that may undermine the quality of those site by site determinations.

Response to: CTR-039-003a

EPA does not agree that the criteria adopted by the rule in any way violate antidegradation policies. State and federal antidegradation requirements must still be met. EPA believes that the commenter may

have confused antidegradation concerns with anti-backsliding concerns. Anti-backsliding is a permit issue, not a water quality standards regulatory issue.

EPA also does not agree that use of dissolved metals will prove detrimental to beneficial uses. The commenter provides no evidence to support its assertion, and EPA is not aware of such evidence. EPA acknowledges that the complexity of metals criteria application, which stems from the problem that the same concentration of a metal yields different toxicity in different waters, makes it more difficult for non-experts to understand and participate in the formulation of effluent limits. However, EPA believes that incorporation of the dissolved provision and the water-effect ratio provision is necessary for defense of the scientific validity of most of the metals criteria.

Comment ID: CTR-041-002
Comment Author: Sacramento Reg Cnty Sanit Dist
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-22 Dissolved v. Ttl Recoverable
References:
Attachments? N
CROSS REFERENCES

Comment: The District's comments on the proposed CTR are as follows:

1. Items Generally Supported by the District

The District supports a number of the provisions of the proposed rule. That support, however, varies from strong in some cases to a level of grave reservations in other cases. First, the District strongly supports the use of dissolved metals criteria rather than the use of total recoverable metals criteria. The continued use of the dissolved metals approach is a prime example of making a good recommendation based not only on the most recent sound scientific data, but also on the results of both intense national public input and court decisions.

Response to: CTR-041-002

EPA acknowledges the commenter's support.

Comment ID: CTR-041-007b
Comment Author: Sacramento Reg Cnty Sanit Dist
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-22 Dissolved v. Ttl Recoverable
References:
Attachments? N
CROSS REFERENCES C-01a

Comment: 2. Additional Strong Reasons to Maintain use of Dissolved Metals and Mercury Criteria

The District also has significant economic reasons to support the use of dissolved metals and the updated mercury criteria. Previous District studies have shown that adoption of metal criterion as total recoverable would cost the District more than $50 million a year while reducing metal loads in the Sacramento River by several percent. Likewise, if old mercury criteria were adopted it would cost the District over $100 million a year while reducing mercury loads in the Sacramento River by several percent.

Response to: CTR-041-007b

EPA acknowledges the commenter's support.

Comment ID: CTR-042-006
Comment Author: Cal. Dept. of Transportation
Document Type: State Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: C-22 Dissolved v. Ttl Recoverable
References:
Attachments? Y
CROSS REFERENCES

Comment: 6. The CTR should maintain many of the proposed provisions relating to metals criteria.

Caltrans supports the EPA's decision to include metals criteria expressed as dissolved instead of total recoverable; the development of metals criteria as a function of the Water Effect Ratio (WER); the current proposed human health criterion for mercury; and the use of metals translators and mixing zones. Caltrans is of the opinion that these provisions reflect a more sound scientific approach to regulating metals.

Request: Caltrans requests that the provisions described in the preceding paragraph be maintained in the final draft of the CTR.

Response to: CTR-042-006

EPA agrees with the comment and has maintained the provisions.

Comment ID: CTR-043-002a
Comment Author: City of Vacaville
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97

Subject Matter Code: C-22 Dissolved v. Ttl Recoverable
References:
Attachments? Y
CROSS REFERENCES C-24a
C-01a
G-04
G-05
G-09

Comment: 2. The following provisions of the rule are supported: (1) adoption of metals criteria as dissolved concentrations; (2) expression of the metals criteria as a function of the water-effect ratio; (3) adoption of the proposed new human health criterion for mercury; and (4) the Preamble discussions regarding metals, translators, mixing zones and interim permit limits.

Response to: CTR-043-002a

EPA acknowledges the commenter's support.

Comment ID: CTR-044-003a
Comment Author: City of Woodland
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: C-22 Dissolved v. Ttl Recoverable
References:
Attachments? Y
CROSS REFERENCES C-24a
C-01a
G-09
G-05
G-04

Comment: We have reviewed the proposed CTR and offer the following comments:

2. The following provisions of the rule are supported:

(1) adoption of metals criteria as dissolved concentrations;

(2) expression of the metals criteria as a function of the water-effect ratio;

(3) adoption of the proposed new human health criteria for mercury; and

(4) the Preamble discussions regarding metals translators, mixing zones, and interim permit limits.

Were the old human health criterion for mercury (0.012 ug/ l) to be adopted, the City would have to remove its discharge from Tule Canal and go to land disposal. The capital cost to do this would be $22.1 million and the total present worth cost would be $23.1 million (see Exhibit B, Required Capital

improvements and Costs for Beryllium and Mercury). This would translate to an annual cost of $3.1 million per year (at 7% over 10 years) and would require that monthly sewer service charges be increased by more than 100%.

Response to: CTR-044-003a

EPA acknowledges the commenter's support.

Comment ID: CTR-045-004
Comment Author: Sausalito-Marin Sanitary Dist.
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/24/97
Subject Matter Code: C-22 Dissolved v. Ttl Recoverable
References:
Attachments? Y
CROSS REFERENCES

Comment: The District supports many of the items included in the proposed CTR:

The inclusion of metals criteria expressed as dissolved rather than total recoverable concentrations.

Response to: CTR-045-004

EPA acknowledges the commenter's support.

Comment ID: CTR-052-002a
Comment Author: East Bay Dischargers Authority
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: C-22 Dissolved v. Ttl Recoverable
References: Letter CTR-052 incorporates by reference letters CTR-035 and CTR-054
Attachments? Y
CROSS REFERENCES C-01a
G-09
G-05
G-04

Comment: EPA will recall the State Water Quality Plans Task Forces that included all stakeholders, including EPA. The Authority appreciates the incorporation of many of the consensus recommendations from the Task Forces into the CTR, including:

* Adoption of the metals criteria as dissolved concentrations and the expression of the criteria as a

function of the water-effect ratio

* Adoption of the proposed new human health criterion for mercury

* Preamble discussions regarding metals translators, mixing zones, and interim permit limits

Response to: CTR-052-002a

EPA acknowledges the commenter's support.

Comment ID: CTR-054-002a
Comment Author: Bay Area Dischargers Assoc.
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-22 Dissolved v. Ttl Recoverable
References:
Attachments? Y
CROSS REFERENCES C-24a

Comment: BADA supports adoption of the metals criteria as dissolved concentrations and the expression of the criteria as a function of the water-effect ratio. These changes place the metals criteria on a firmer scientific base than the old State Plans. Moreover, previous BADA studies have shown that adoption of the copper criterion as total recoverable could cost Bay Area POTWs several billion dollars while reducing copper loads to the Bay by only several percent (see Attachment 1). Further, building the water-effect ratio into the criteria will lessen the administrative burden on all parties when it becomes necessary to pursue the development of such a ratio. For these reasons, it would not be in the public interest nor consistent with Presidential Order 12866 or the Unfunded Mandates Reform Act to adopt the metals criteria as total recoverable concentrations or to require approval of a site-specific objective whenever a water-effect ratio is developed.

Response to: CTR-054-002a

EPA acknowledges the commenter's support for the use of dissolved metals criteria.

Comment ID: CTR-056-005
Comment Author: East Bay Municipal Util. Dist.
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/22/97
Subject Matter Code: C-22 Dissolved v. Ttl Recoverable
References: Letter CTR-056 incorporates by reference letter CTR-054
Attachments? N

CROSS REFERENCES

Comment: Second, EBMUD would like to express to EPA it support for inclusion of:

* Metals criteria expressed as dissolved rather than total recoverable concentrations,

Response to: CTR-056-005

EPA acknowledges the commenter's support.

Comment ID: CTR-057-006
Comment Author: City of Los Angeles
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: C-22 Dissolved v. Ttl Recoverable
References:
Attachments? N
CROSS REFERENCES

Comment: Metals

We support the EPA's intention to adopt metals criteria that are based on dissolved, rather than total recoverable, fractions in the water column. This provision clears up an issue that seemed straight forward but intractable only a few years ago. This provision will also allow the State to make decisions regarding the use of dissolved or total recoverable on a waterbody-specific basis, which we view as appropriate. The City also supports the proposed Rule with respect to applications of the water effect ratio and metal-translator provision (metal-specific partitioning), even though we do not see an immediate application of the latter with respect to our facilities.

Response to: CTR-057-006

EPA acknowledges the commenter's support.

Comment ID: CTR-058-003
Comment Author: Western States Petroleum Assoc
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: C-22 Dissolved v. Ttl Recoverable
References:
Attachments? Y
CROSS REFERENCES

Comment: 2. Dissolved Criteria for Metals. WSPA supports the use of metals criteria based on the dissolved species.

EPA has reviewed the science in this area carefully over the past several years and rightly concluded that dissolved species best reflect the bioavailability of heavy metals in the aquatic environment. That is, metals species which are not available or reactive to aquatic life should not be regulated as toxics. This proposed rule is consistent with EPA's thorough review of this issue.

WSPA believes that EPA will follow this approach in assessing whether waters of the state meet water quality standards based on these criteria. That is, the waters should be judged based on the presence of dissolved or bioavailable metals, not total metals.

Response to: CTR-058-003

EPA agrees with the commenter and acknowledges its support.

Comment ID: CTR-065-005
Comment Author: Environmental Health Coalition
Document Type: Environmental Group
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: C-22 Dissolved v. Ttl Recoverable
References:
Attachments? N
CROSS REFERENCES

Comment: [INDENT]USE OF DISSOLVED CONCENTRATIONS OF METALS WILL UNDERESTIMATE IMPACTS

EHC does not support the use of dissolved concentrations for metals criteria as it will lead to significant underestimation of levels of contamination. Metals in sediments can be bioavailable or could become bioavailable in the future. EHC recommends the use of total recoverable metals as the appropriate basis for metals.

Response to: CTR-065-005

EPA does not agree. See response to CTR-026-004. EPA does not know of any scientific evidence that indicates that metals loading at the criteria levels would eventually or ultimately yield sediment contamination problems. In addition, EPA does not believe that use of total recoverable metals criteria is an effective or appropriate method for protecting sediments from contamination. Instead of basing metals criteria on total recoverable measurements, EPA is proceeding with the development of Equilibrium Partitioning Sediment Guidelines (ESGs) in order to protect sediments, the contamination of which would generally be related to elevated historical loads rather than to the loads allowed after implementation of this rule. EPA has not found the use of total metal concentrations in sediment to be useful or reliable for expressing ESGs. Rather, EPA has used a measure of the sediment's metal enrichment compared against its metal binding (or detoxifying) capacity. EPA's ESGs ensure that there will not be bioavailable metals by determining that the total extractable metal does not exceed total acid

sulfide concentration in the sediment. The ESGs protect against chronic toxicity to benthic organisms from metals in sediment, and can include effects from exposure through pore water and exposure from ingesting sediment.

Comment ID: CTR-066-005
Comment Author: Delta Diablo Sanitation Dist.
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: C-22 Dissolved v. Ttl Recoverable
References:
Attachments? N
CROSS REFERENCES

Comment: Our preliminary review of the CTR finds several areas that we believe are positive changes and will enhance the rulemaking. The areas that we support as now written are as follows:

* The inclusion of metals criteria expressed as dissolved rather than total recoverable concentrations.

Response to: CTR-066-005

EPA acknowledges the commenter's support.

Comment ID: CTR-066-019
Comment Author: Delta Diablo Sanitation Dist.
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: C-22 Dissolved v. Ttl Recoverable
References:
Attachments? N
CROSS REFERENCES

Comment: * The proposed metals limits appear to conflict with our current NPDES permit. This will raise questions of our ability to meet the less stringent standards proposed in the CTR. We assume that these new criteria are more scientifically based than four years ago when we negotiated our NPDES permit. Added treatment will surely be required for the four areas of concern we see in the CTR.

Response to: CTR-066-019

EPA acknowledges the concerns about whether the Sanitation District can attain the criteria without added treatment; however, the commenter does not provide EPA with any evidence to support its contentions.

Comment ID: CTR-067-002
Comment Author: Ojai Valley Sanitary District
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: C-22 Dissolved v. Ttl Recoverable
References:
Attachments? N
CROSS REFERENCES

Comment: * OVSD supports EPA's proposed adoption of criteria for metals expressed as the dissolved fraction rather than as total recoverable metals. OVSD recommends that EPA provide guidance to the State in the Preamble to the CTR stating that the State should also use the dissolved form for metals unless it has been demonstrated that the total recoverable form is necessary to protect aquatic resources in a particular water body. This is extremely important because OVSD's current NPDES permit specifies limits for total recoverable metals.

Response to: CTR-067-002

See response to CTR-034-008. Note also that permit limits, per 40 CFR 122.45, must still be expressed in terms of total recoverable metal. When derived from a receiving-water dissolved criterion, total recoverable permit limits are calculated by accounting for the fraction of effluent metal that is or becomes dissolved after discharge.

Comment ID: CTR-077-003
Comment Author: Bay Planning Coalition
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: C-22 Dissolved v. Ttl Recoverable
References:
Attachments? N
CROSS REFERENCES

Comment: Dissolved Criteria for Metals

We support the approach that waters should be judged based on the presence of dissolved or bioavailable metals, not total metals, and therefore agree with EPA's conclusion that metals species which are not available or reactive to aquatic life should not be regulated as toxics. We support the use of this approach in assessing whether waters of the state meet water quality standards based on these dissolved species criteria.

Thank you for your consideration of our comments. We look forward to working with EPA and the state in conjunction with the implementation phase of the California Toxics Rule to ensure a well balanced,

feasible and scientifically sound water quality program.

Response to: CTR-077-003

EPA agrees with the commenter.

Comment ID: CTR-081-002d
Comment Author: West County Agency
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: C-22 Dissolved v. Ttl Recoverable
References:
Attachments? N
CROSS REFERENCES G-04
C-24a
G-02
G-09
C-01a
C-08a
G-05

Comment: * There are many aspects of the CTR that we support. These include: a) Application of interim limits while special studies are performed. b) Approach to water effect ratios for determining site specific criteria. c) Inclusion of provision for compliance schedules. However, this should be modified to allow inclusion of compliance schedules of up to 15 years in permits if deemed appropriate by Regional Boards. d) Metals criteria expressed as dissolved rather than total recoverable concentrations. e) EPA's guidance to Regional Boards regarding use of translators. f) EPA's proposal to create a rebuttal presumption for Water Effects Ratios, g) Revised human health criteria for mercury h) Decision to not promulgate human health criteria at this time in light of issues surrounding health criteria for arsenic. I) EPA's policies regarding application of mixing zones and dilution credits.

Response to: CTR-081-002d

EPA acknowledges the commenter's support with respect to dissolved metals.

Comment ID: CTR-082-003
Comment Author: City of Burbank
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/24/97
Subject Matter Code: C-22 Dissolved v. Ttl Recoverable
References:
Attachments? N
CROSS REFERENCES

Comment: The subject rule has a significant impact on our facility discharge and the citizens of the City. We therefore present the following comments for your consideration to re-open the comment period for this rule in order to facilitate a more complete review by public and in particular by those in the POTW community:

* Metals criteria be expressed as dissolved fraction rather than total recoverable concentrations.

Response to: CTR-082-003

EPA acknowledges the commenter's support.

Comment ID: CTR-085-006
Comment Author: Camarillo Sanitary District
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/24/97
Subject Matter Code: C-22 Dissolved v. Ttl Recoverable
References:
Attachments? N
CROSS REFERENCES

Comment: On several aspects of the California Toxics Rule, the District is in agreement with CASA and SCAP comments:

* Inclusion of metals criteria expressed as dissolved rather than total recoverable concentrations.

Response to: CTR-085-006

EPA acknowledges the commenter's support.

Comment ID: CTR-086-004b
Comment Author: EOA, Inc.
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org: California Dent
Document Date: 09/26/97
Subject Matter Code: C-22 Dissolved v. Ttl Recoverable
References: Letter CTR-086 incorporates by reference letter CTR-035
Attachments? N
CROSS REFERENCES G-01
G-09
C-24a
C-24
K-03

G-04
G-05
G-02

Comment: Regulatory Flexibility and Relief

CDA supports language in the CTR Preamble that references and endorses recommendations of the State Task Forces including in part the use of.

* reasonable potential analyses * dissolved metals criteria * translators * water effects ratios * site specific objectives * innovative TMDL processes such as effluent trading * performance based interim limits * chronic and acute mixing zones, and * compliance schedules in NPDES permits.

Response to: CTR-086-004b

EPA acknowledges the commenter's support.

Comment ID: CTR-089-001a
Comment Author: Las Virgenes Mncpl Water Dist.
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/24/97
Subject Matter Code: C-22 Dissolved v. Ttl Recoverable
References:
Attachments? N
CROSS REFERENCES C-01a
C-08a
G-05
K-01
G-02
G-09

Comment: The draft California Toxics Rule (CTR) is clearly the product of substantial effort by USEPA staff, and we applaud this effort and its intent. On several issues of concern to public utilities, the CTR strikes a good balance between the need to promulgate standards and the need to base those standards on sound science. Examples include the use of dissolved concentrations rather than the total recoverable concentrations for metals, the deferral of human health criteria for arsenic until adequate information is available, and the revision of the human health criterion for mercury. We are also pleased with the CTR's guidance and flexibility, on mixing zones and dilution credits, total maximum daily loads (TMDLs), compliance schedules, and translators.

Response to: CTR-089-001a

EPA acknowledges the commenter's support with respect to metals.

Comment ID: CTR-090-002c
Comment Author: C&C of SF, Public Utl. Commis.
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-22 Dissolved v. Ttl Recoverable
References: Letter CTR-090 incorporates by reference letters CTR-035 and CTR-054
Attachments? Y
CROSS REFERENCES C-17a
C-24a
G-05
G-02
G-04

Comment: There are many features of the proposed rule which we strongly endorse, specifically:

* the use of the latest IRIS values for human health criteria, it is essential that the criteria be based on the latest scientific and environmental information;

* recognition that the dissolved fraction of metals, rather than the total recoverable, better reflect the aquatic toxicity of metals;

* recognition that for certain metals (e.g. copper and zinc) ambient water chemistry is critical in determining toxicity thereby endorsing the Water Effects Ratio;

* recognition and strong endorsement of the multi-tiered mixing zones for acute, chronic and human health effects; and

* recognition of interim limits and compliance schedules as appropriate implementation strategies,

Response to: CTR-090-002c

EPA acknowledges the commenter's support with respect to metals.

Comment ID: CTR-092-002
Comment Author: City of San Jose, California
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: C-22 Dissolved v. Ttl Recoverable
References: Letter CTR-092 incorporates by reference letter CTR-035
Attachments? Y
CROSS REFERENCES

Comment: Dissolved Metals Criteria

The City supports the promulgation of dissolved concentration criteria for priority pollutant metals. Dissolved metal more closely approximates the bioavailable fraction, and thus toxicity, of metal in the water column than does total recoverable metal. The City believes there may be specific instances whereby risk management decisions (sediment resuspension, bioconcentration, food web issues) could result in scientifically defensible criteria based upon the total recoverable fraction. The City recommends, that any such decision be established with relevant data, sound science, peer review, and involve active public participation.

Response to: CTR-092-002

EPA agrees with the comment.

Comment ID: CTRH-001-003a
Comment Author: Robert Hale
Document Type: Public Hearing
State of Origin: CA
Represented Org: CA Stormwater Task Force
Document Date: 09/17/97
Subject Matter Code: C-22 Dissolved v. Ttl Recoverable
References:
Attachments? N
CROSS REFERENCES C-24a
C-1a

Comment: In summing up -- not summing up, just as a parting shot -- I do appreciate the fact that in working up the toxics rule here that EPA has done certain things which in fact we see as improvements in actually making the standards fit with what we think -- have come to see as perhaps the actual impacts of the stormwater part of this. And by that, I'm referring to the dissolved metals criteria and the water effect ratio in there, and the human health criteria revisions for mercury and the other -- the other items.

I appreciate some of the stuff in there, and -- with the exception of the preamble language. And you really need to get that out of there. We're going to pursue this as far as we have to.

I appreciate your hearing me.

Response to: CTRH-001-003a

EPA acknowledges the commenter's support.

Comment ID: CTRH-001-024c
Comment Author: Michelle Pla
Document Type: Public Hearing
State of Origin: CA
Represented Org: S.F. Public Utilities Com
Document Date: 09/17/97
Subject Matter Code: C-22 Dissolved v. Ttl Recoverable

References:
Attachments? N
CROSS REFERENCES g-02
g-05
c-24a
c-17a

Comment: MS. PLA: My name is Michelle Pla. I'm with the Public Utilities Commission, City and County of San Francisco.

I made the comment on my card that I also said that I would try to be constructive, and so I'm going to follow my mentor here, Phil Bobel, and say that there are some things in this rule that we're very pleased to see.

We're very pleased to see use of the latest scientific information, particularly the use of latest IRIS, I-R-I-S, numbers-for human health. We're very pleased that you're using dissolved versus total recoverable form for the metals.

We're very pleased to see recognition of the water effects ratios. We're pleased to see recognition for a multi-tiered mixing zone for acute and chronic human health effects and hope that the state pays particular attention to that.

We do have a problem with the way you've described compliance schedules and hope to be working strictly by the state on that as well. We think that the five-year system is fairly shortsighted, and -we can't even do FMDSLs in five years.

Response to: CTRH-001-024c

EPA acknowledges the commenter's support with respect to metals.

Comment ID: CTRH-001-032b
Comment Author: Dave Brent
Document Type: Public Hearing
State of Origin: CA
Represented Org: CA Water Qual. Task Force
Document Date: 09/17/97
Subject Matter Code: C-22 Dissolved v. Ttl Recoverable
References:
Attachments? N
CROSS REFERENCES c-24a
g-5

Comment: I would like to take this time to note that I think it contains some important elements that we agree with and believe are reflective of the impact. These include the uses of dissolved metals and the provisions which will enable the state to use mixing zones and water effects ratios and establish site-specific objectives.

Response to: CTRH-001-032b

EPA acknowledges the commenter's support with respect to metals.

Comment ID: CTRH-001-048
Comment Author: Michael Lozeau
Document Type: Public Hearing
State of Origin: CA
Represented Org: S.F. Bay/Delta Keeper
Document Date: 09/17/97
Subject Matter Code: C-22 Dissolved v. Ttl Recoverable
References:
Attachments? N
CROSS REFERENCES

Comment: Particularly in regards to the Bay Area, we are concerned with the EPA's reliance on dissolved numbers, on using a dissolved number for the criteria, and believe that total recoverable would be a more appropriate standard to use.

Total recoverable as proposed, from our initial review, it seems to us that we're going to end up with a lot of existing dischargers that will in fact be allowed to discharge more into the bay, where most, or at least first blush looking at it, most of the metals detected in the bay are present in the dissolved stage, probably attached to sediment, which are a large amount of what's in the bay. It seems that these sediments will disattach themselves and then become dissolved some day.

It seems to me this doesn't take a look at the whole picture, and that is basically carving it off. And it seems to me that the process that led to that wasn't one that was available to all of us to discuss.

It was driven by a case in D.C. and some policy decisions made in Washington, D.C., where here all the permits, of course, are total recoverable units. All of the standards to date that have -- that exist or have been proposed are total recoverable.

Response to: CTRH-001-048

See responses to CTR-039-003a, CTR-065-005, and CTR-026-004.

Comment ID: CTRH-001-057f
Comment Author: Dave Tucker
Document Type: Public Hearing
State of Origin: CA
Represented Org: San Jose Env. Serv. Dept.
Document Date: 09/17/97
Subject Matter Code: C-22 Dissolved v. Ttl Recoverable
References:
Attachments? N
CROSS REFERENCES K-03
C-24a

G-04
G-07
G-09
G-05

Comment: Some of the flexibility that the City highly supports is the water effect ratio investigations to adjust statewide criteria to site-specific conditions; the interim limits concept while special studies are being conducted by the dischargers and other entities; a variance procedure to allow dischargers to achieve progress toward effluent limit attainment without violating applicable water quality standards; dissolved criteria for metals to reflect the toxicological conditions; translators to adjust dissolved criteria to total permit limitations; trading programs to attain and maintain water quality; and a mixing zone that reflects true instream pollutant conditions and that protects beneficial uses.

Response to: CTRH-001-057f

EPA acknowledges the commentor's support with respect to metals.

Comment ID: CTRH-002-011c
Comment Author: Lisa Ohlund
Document Type: Public Hearing
State of Origin: CA
Represented Org: Alliance of So. CA POTWs
Document Date: 09/18/97
Subject Matter Code: C-22 Dissolved v. Ttl Recoverable
References:
Attachments? N
CROSS REFERENCES G-02
G-04
K-01

Comment: Now, I'd briefly like to touch on several issues of importance to SCAP members. In addition, we will be submitting written comments before the close of the public comment period.

I'd like to begin by mentioning our support for several provisions included in the draft CTR, and those include the provision authorizing the use of compliance schedules -- although we don't necessarily agree with the time period -- the expression of metals criteria as dissolved rather than totally recoverable, and discussion in the preamble supporting the use of interim limits in permits, while the total maximum daily loads and other special studies are being performed.

Response to: CTRH-002-011c

EPA acknowledges the commentor's support with respect to metals.

Subject Matter Code: C-23 Sediments/Dredged Materials

Comment ID: CTR-007-002
Comment Author: Port of San Diego
Document Type: Port Authority
State of Origin: CA
Represented Org:
Document Date: 09/24/97
Subject Matter Code: C-23 Sediments/Dredged Materials
References:
Attachments? N
CROSS REFERENCES

Comment: 1. It is the District's understanding that where sediments exceed the CTR's water quality criteria, the sediment could not be put to a beneficial use after dredging. If this is indeed the case, the District would request that some allowance be given to allow dredged sediments to be put to beneficial use.

Response to: CTR-007-002

The purpose of this rule is to establish numeric criteria for those navigable waters in California that do not have water quality criteria for priority toxic pollutants in place and for which EPA has issued section 304 (a) criteria guidance. Specific implementation procedures regarding the disposal and application of dredged sediments are beyond the scope of the rule. The final CTR does not impact California's ability to designate specific uses, including sub-category of uses that allow for disposal of dredged sediments (e.g., artificial wetlands).

Furthermore, EPA notes that through the state 401 certification process, California would determine whether or not disposal of sediments in a particular instance is consistent with the ambient criteria established in the CTR. In addition, any existing State guidelines for approving beneficial reuse of dredged sediments remain in effect.

Comment ID: CTR-077-001
Comment Author: Bay Planning Coalition
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: C-23 Sediments/Dredged Materials
References:
Attachments? N
CROSS REFERENCES

Comment: A substantial portion of the membership of the Coalition represent the maritime industry which consists of the six public port authorities and one private port, several vessel carriers, dredging contractor companies, maritime trade unions, shippers, and pilots. The industry is dependent on a safe and navigable waterway system maintained by regular dredging so essential to sustain the Bay as an

international center for trade and commerce.

Dredging applicants must apply for permit approval to dredge and dispose of channel sediment from the federal and state dredging regulatory agencies and are required to evaluate the dredged material to be disposed using a suite of chemical, physical and biological tests. The tests we conduct are very expensive. Due to the high cost, uncertainty and inconclusivity of the test results, essential navigation dredging is often delayed at tremendous expense to the Bay public at large.

Numeric Standards for Pollutants as Applied to Dredged Sediment Physical and Chemical Tests

Our primary concern is what effect will the new water quality standards have on the number of and cost for the sediment physical and chemical tests required for dredging permit approval. Will the Toxics Rule standards alter the current protocol contained in jointly signed Public Notice 93-2 entitled, "Testing Guidelines for Dredged Material Disposal at San Francisco Bay Sites"? We have asked the Sediment Management Unit of EPA and the Dredging Regulatory Unit at the S. F. Bay Regional Water Quality Control Board for an assessment of the effect of the Toxics Rule on the current dredging protocol, and we are waiting for a response from them.

We acknowledge that it is the combined results from all tests for dredging (chemical, physical, and biological) which comprise the overall evaluation of potential sediment toxicity and hence acceptability for discharge at unrestricted or restricted disposal sites. In fact the Testing Guidelines indicate that it is the bioassay responses, as indicators of potential toxicity, that will determine the effect of a proposed discharge of dredged material on the receiving aquatic ecosystem, and that the chemistry standards will not be used as pass/fail standards. However, the Guidelines state in the Response to Comments section that, "however, depending on the contaminants of concern and other factors, elevated chemistry could independently indicate the need for more that the routine Tier II testing..." Thus if the water quality standards become more restrictive, then dredging applicants may have to spend more money to conduct more tests.

Further, we are uncertain as to the environmental relevancy of potential lower water quality standards as they may be applied to dredging discharges because there are often false-positive test results between the chemical and biological tests.

Response to: CTR-077-001

See response to CTR-007-002.

The final CTR does not trigger any additional testing of dredged material. The results of any existing testing requirements may be compared to criteria contained in the CTR, but the CTR itself does not address when sediments need to be tested or specify what constituents need to be tested for.

Even under the 404 guidelines, failing WQC does not in itself trigger any additional testing requirements. The process of evaluating dredged material for proposed open water disposal first involves bulk sediment chemistry analysis (required under 404 guidelines for several purposes) and comparison to any applicable numeric criteria (assuming 100% solubility). To evaluate whether or not narrative criteria (e.g., "no toxics in toxic amounts") are met, the elutriate is subjected to standard bioassays (following allowable dilution) regardless of whether or not there are applicable numeric criteria. In the rare instance that the chemistry is projected to exceed a numeric criterion and an elutriate bioassay is passed, additional elutriate chemistry may be required to confirm the numeric criterion failure. But the need for additional chemical evaluation is independent of the criteria used to compare the results. EPA believes there is no

reason to expect more frequent false positives when comparing elutriate chemistry results to CTR criteria than the criteria previously adopted by California.

Furthermore, EPA notes that through the state 401 certification process, California would determine whether or not disposal of sediments in a particular instance is consistent with the ambient criteria established in the CTR. In addition, any existing State guidelines for approving beneficial reuse of dredged sediments remain in effect.

Comment ID: CTRH-001-021
Comment Author: Jim McGrath
Document Type: Public Hearing
State of Origin: CA
Represented Org: Port of Oakland
Document Date: 09/17/97
Subject Matter Code: C-23 Sediments/Dredged Materials
References:
Attachments? N
CROSS REFERENCES

Comment: MR. McGRATH: Good afternoon. My name is Jim McGrath, Environmental Manager for the Port of Oakland. I'm going to testify about a fairly narrow application of the CTR, one not considered and one I think you need to.

The Port of Oakland has built a facility for removal of dredge material from the marine environment. At completion of dredging of about 1 million cubic yards of contaminated sediment, it's pumped into that facility and dried.

The facility has been constructed as a series of ponds, which physically settle the material but do not provide for treatment. The removals in that facility have ranged about 99.98 percent removal or a little better, depending on how it's being operated.

I think the bottom line for it is the permits in terms of the CTR. The standards that were used for discharge from this facility were those of the basin regional board at the time -- in effect at the time. This rule is dangerous due to the limits contained in the CTR, and the nature of the CTR would prevent that operation.

Our discharge limit is 20 parts per million. The CTR would lower that to 3.1 parts per billion. That cannot be met settling fine grain dredge material, clean or dirty, without treatment.

Thus the application of this rule might prevent not only the Galbraith operation, which is intended to and is effectively removing material presently from the marine environment, but could also prevent beneficial use of dredge material that involved a return discharge to the bay. That includes such projects by the Environmental Protection Agency as Sonoma Baylands, already built, and other projects under consideration.

Now, how does that come about? I think the problem is that the rule has been developed under a conceptual mode of input-output. Stuff comes into the bay; it goes out of the bay.

The real world and the real physics is a little more complicated than that. This gets stored in sediment. We dredge -- we in the maritime industry dredge a small amount of what is stored by the dynamic of the contaminant movement in the water column to the sediment bed and back again. That's substantially more complicated than that. Worse than that, the blinders have been put on by the input-output concept, and the thinking is one of a steady state of input-output.

And the rule doesn't contemplate transient impact due to cleanups of some sort and we're particularly concerned about -- that sediment cleanups and resource enhancement don't fit into the conceptual model used to come up with this rule.

So that's the problem. There is -- there are many different ways to deal with that problem. The waiver or variance process could be expanded to allow special consideration of cleanups or resource enhancement projects. You could apply the risk based on overall project management. I'm sure there are opportunities beyond that.

I want to propose a hypothetical problem in the rule: that a literal application would require for sediment cleanups, physical treatment. Under the Clean Water Act, the standard on dredge material is practicability, and you've got two different regulatory approaches.

If you're talking about cleanup of the sediment in the marine environment, feasibility is an element. And I can tell you from experience, very little contaminated sediment will be dredged if physical treatment rather than settling is going to be required.

Response to: CTRH-001-021

See response to CTR-007-002.

Comment ID: CTRH-001-059
Comment Author: Ellen Johnck
Document Type: Public Hearing
State of Origin: CA
Represented Org: Bay Planning Coalition
Document Date: 09/17/97
Subject Matter Code: C-23 Sediments/Dredged Materials
References:
Attachments? N
CROSS REFERENCES

Comment: I'm Ellen Johnck, director of the Bay Planning Coalition, a San Francisco Bay planning coalition organization, a membership organization of about 200 members that reflect the maritime industry, shoreline business and industry, several small and large property owners, recreational use and local governments and many counties and cities.

I am here today because I want EPA to understand the far-reaching effect of this particular California Toxics Rule on the broad range of recreational, commercial and environmental uses and users here in the estuary.

One of the major things that we have seen with this California Toxics Rule is that it affects our

international commerce and our trade, which is totally dependent on the navigation channel. We have to dredge about 4 to 5 million cubic yards of material each year from the channel in order to support the Bay's trade and economy.

What this rule will affect will be our terrific program that was initiated in the last several years to try to expand the reuse of dredge material for environmentalpurposes.

In corroborating Mr. McGrath's statements for the Port of Oakland, we discovered that our whole program to restore wetlands of the bay with dredge material actually will not be able to happen because of discharge limits, because the standard could not be met.

And we frankly think that the Environmental Protection Agency needs to look at the whole numeric criteria and how it was devised. It really is not as scientific as that could be, as we look at interaction with the Bay and the properties of the metals attached to it as sediment, therefore, making these metals not necessarily available and having an environmental effect.

So I think my point, number one, is that this -- and I really don't think EPA wants to deter the environment reuse of dredge material -- it will be exceeding the numeric criteria particularly for copper and will deter the environmental reuse of dredge material.

Response to: CTRH-001-059

See response to CTR-007-002.

Subject Matter Code: C-24 Site Specific Criteria

Comment ID: CTR-002-003
Comment Author: Comm. for a Better Environment
Document Type: Environmental Group
State of Origin: CA
Represented Org:
Document Date: 09/24/97
Subject Matter Code: C-24 Site Specific Criteria
References:
Attachments? Y
CROSS REFERENCES

Comment: II. THE EPA PROPOSALS WILL NOT PROTECT FISHING AND OTHER USES OF SAN FRANCISCO BAY WATERS OR PROVIDE EQUAL PROTECTION FOR PEOPLE OF COLOR.

A. The criteria allow more pollution than prior technically-based criteria.

The proposed criteria would replace criteria found to be scientifically sound by the State Water Resources Control Board staff, adopted by the state, and approved by EPA, for San Francisco Bay in the 1991 California Bays and Estuaries Plan,(*10) the 1986 San Francisco Bay Basin Plan,(*11) and the Basin Plan amendment adopting the 1992 Site Specific Copper Objective for San Francisco Bay.(*12) Table I compares the lowest concentration criteria for the 64 toxic pollutants identified by the San Francisco Estuary Project as "pollutants of concern" for the Bay.(*13) The EPA criteria proposal:

*weakens environmental health protection for 37 of these 64 toxic pollutants (58%). It allows greater ambient water concentrations for 30 pollutants, includes new extremely liberal criteria for 4 of the 64 pollutants, and fails to replace previous state criteria for 3 pollutants,

*makes no change for 24 of these 64 pollutants (37%). It includes equivalent criteria for 6 pollutants, and includes no criteria for 18 pollutants which had no state-adopted criteria.

*improves criteria for only 3 of the 64 pollutants (5%). It includes new restrictive criteria for 2 pollutants, and proposes a criterion allowing 200,000 instead of 300,000 ug/L toluene.

The magnitude of increased pollutant concentrations allowed in Bay waters by EPA'S proposal is estimated in Table 2. The first column in this table lists all the toxic pollutants for which EPA proposes more liberal criteria than those adopted by California for the Bay. Footnotes to this column further describe these pollutants. For example: dioxin includes 17 dioxin-like compounds included in the state criterion and current permit limits; and PAH includes the sum of 13 polycyclic aromatic hydrocarbons included in the state's PAH criterion and 8 of these compounds for which EPA proposes criteria.

The second column in Table 2 shows the lowest concentration criteria adopted by California for these pollutants in the Bay, with footnotes indicating the source of these criteria and whether they address human health or aquatic life. The third column shows the corresponding lowest concentration criteria for these pollutants proposed by EPA. Where the EPA-proposed criteria are expressed differently from the state criteria for a pollutant, calculations that more accurately compare the criteria are shown in footnote j to this column. These calculations fall into three general cases:

*Dioxin comparisons - California's dioxin criterion applies to 17 internationally recognized dioxin-like compounds, while EPA's proposal
applies to I only, 2,3,7,8-TCDD. EPA'S chief dioxin scientist and other international experts estimate that the other dioxins account for about 90% of environmental dioxin toxicity.(*14) Thus, EPA's criteria value was multiplied by 10 to estimate the toxicity from California criteria dioxins at EPA's 2,3,7,8-TCDD value of 1,4 pg/IOOL. New data may change the 90% estimate, but not the finding that EPA's proposal is weaker.

*PAH comparisons - California's PAH criterion sums the amounts of 13 compounds, while EPA proposes individual criteria for only 8 of these 13 compounds. EPA criteria values for these 8 compounds were summed for comparison to California's 13-compound criterion. This approach underestimates the amount of PAH allowed by EPA's criteria by assuming a value of zero for each of the 5 compounds which lack EPA-proposed criteria.

*Total versus dissolved metals comparisons - California metals criteria are expressed as total metal while EPA's proposals are often expressed as dissolved metal. Ultra-clean measurements of Bay waters in 1989,(*15) and 1995 (arsenic and chromium)(*3) indicate that total concentrations are often much greater than dissolved concentrations for the same metal, For example, in 5% of Bay samples total copper is at least 3.5 times dissolved copper. At these times dissolved copper levels equal to EPA's 3.1 ug/L criterion correspond to total copper levels of 10.8 ug/L or greater. Ratios for other metals based on this 5% (95th percentile) analysis, which is used by EPA to prevent excursions above criteria more than once in 3 years, are shown in footnote (*j). Analysis of additional data may alter these ratios, but will not change the conclusion that EPA'S proposed dissolved criteria will allow greater water concentrations than total metal criteria.

The estimated magnitude of increased pollutant concentrations allowed in Bay waters by EPA's proposed criteria is shown in the right-hand column of Table 2. EPA's proposal allows 430 million percent more PAH, 23,600% more lead, 3,900% more 1,4-dichlorobenzene, 910% more silver, 900% more dioxin, 630% more chlordane, 340% more DDT, 325% more mercury, 140% more PCBs and 120% more copper in the Bay as compared to state-adopted criteria, based on these estimates. Review of Table 2 also shows that allowable Bay water concentrations would double or more for 18 toxic pollutants in all.

In sum, comparison with the state criteria that would be replaced indicates that EPA's proposed criteria allow increased toxic pollution of San Francisco Bay by at least 37 toxic pollutants representing 58% of the pollutants of concern identified by the San Francisco Estuary Project, allow pollution to increase by about 1,000% or more for extremely toxic pollutants such as dioxin and PAH, and allow pollution to double or worse for 18 toxics including nearly all pollutants known to be of greatest concern in the Bay.

None of the state criteria which the EPA proposals are compared to were set aside because they are scientifically invalid, Rather, some of these criteria, which were adopted in the 1991 Bays and Estuaries Plan, were set aside by a state court on procedural grounds only,(*12) and still form the basis for permit limits written by the state for the Bay.(*21) EPA's proposed criteria allow toxic pollutant concentrations greater than those found by the state to be scientifically appropriate for protection of aquatic life and public health.

(*3) San Francisco Estuary Institute, 1997. Regional monitoring program for trace substances 1995 annual report. Excerpts including pages 105, 3, and A-17 through A-24 showing the percentage of sediment bioassays (larval bivalve and Eohaustorius tests) that were toxic (less than 80% of control value) at RMP stations from 1991-1996, sampling stations, and dissolved and total metal, and PAH

concentrations in San Francisco Bay waters.
(*10) California State Water Resources Control Board, 1991. California Enclosed Bays and Estuaries Plan; water quality control plan for enclosed bays and estuaries in California. 91-13WQ. April, 1991. Excerpt including adopted water quality criteria and definition of terms.
(*11) California Regional Water Quality Control Board, San Francisco Bay Region, 1986. Water Quality Control Plan, San Francisco Bay Region (2). December, 1986. Excerpt including adopted water quality criteria (objectives) for toxic pollutants in the Bay, and segmentation scheme.
(*12) California Regional Water Quality Control Board, San Francisco Bay Region, 1992. Resolution No. 92-128, adopting an amendment to the water quality control plan and requesting approval from theState Water Resources Control Board. October 21, 1992; and State Water Resources Control Board Workshop Session, April 6 and 7, 1994. Consolidation of the amendments to the water quality control plan for the San Francisco Bay basin regarding a site-specific water quality objective and plan of implementation for copper and addressing nickel. Excerpts including site specific water quality criterion for total copper in San Francisco Bay, and showing that the State Water Resources Control Board staff found "the technical aspects of the site-specific copper objective are valid."
(*13) San Francisco Estuary Project, 1992. State of the estuary, a report on conditions and problems in the San Francisco Bay/Sacramento-San Joaquin Delta estuary. Prepared under cooperative agreement #CE-009486-02 with the U.S. Environmental Protection Agency, by the Association of Bay Area Governments, Oakland, CA. June, 1992. Excerpt including Table 18 (page 163): Pollutants of concern in the Bay/Delta estuary.
(*14) Presentation by Dr. William Farland, EPA, at the May 7, 1997 Workshop on dioxins held by the Regional Water Quality Control Board, San Francisco Bay Region in the Hearing Room of the 'BART headquarters building, Oakland, CA. Excerpt from the RWQCB's tape of the workshop discussing toxicity equivalents data from mechanistic, laboratory and field analyses.
(*15) Flegal et al., 1990. Trace element cycles in the San Francisco Bay estuary: results from a preliminary study in 1989-1990. Final report to the State Water Resources Control Board. Institute of Marine Sciences, U.C. Santa Cruz. Excerpt showing dissolved and total metal concentrations measured in San Francisco Bay waters.
(*21) California State Water Resources Control Board, 1997. Staff technical report, Division of Water Quality, Petitions of CBE, San Francisco BayKeeper, and Tosco Corporation for review of Order No. 95-138 of the San Francisco Bay Regional Water Quality Control Board. Office of Chief Counsel [OCC File Nos. A-983 and A-983(A)].

Response to: CTR-002-003

Overall, EPA disagrees with this comment, which alleges that the CTR "weakens environmental health" for 37 of 64 "pollutants of concern."

Much of the premise for this comment is flawed, because it compares CTR ambient criteria with State and San Francisco Bay Regional Board criteria which are not in effect. The 1991 California Enclosed Bays and Estuaries Plan (EBEP) was rescinded by the State Water Resources Control Board. [Note: California's 1991 Inland Surface Water Plan (ISWP) was rescinded at the same time. Since this comment does not compare CTR criteria to ISWP criteria, however, this response does not address the ISWP.] The State Board returned the 1992 site-specific copper objective for San Francisco Bay to the Regional Board, and it has never taken effect. EPA is now promulgating the CTR to put criteria in place in California where currently there are no applicable EPA-approved criteria in effect, including where criteria were affected by these State actions. The CTR criteria do not revise or replace those State

criteria, because those criteria simply do not exist for CWA purposes.

The commenter also compares CTR criteria to criteria in the 1986 San Francisco Bay Basin Plan. For waters where the criteria that were included in the 1986 amendments to the Water Quality Control Plan for the San Francisco Bay Region (the Basin Plan) and were approved by EPA are still in effect under the 1995 Basin Plan amendments, EPA is not promulgating CTR criteria. The 1986 criteria will therefore remain in effect for those waters. (See response to CTR-016-001.) For those criteria, the commenter's concerns have been addressed.

Another flaw in this comment is that CTR criteria are evaluated for 64 "pollutants of concern" which were identified by the San Francisco Estuary Project. While most of these pollutants are priority pollutants subject to the requirements of CWA section 303(c)(2)(B), 17 are not. The CTR is limited to the promulgation of numeric water quality criteria for priority pollutants, to fully implement section 303(c)(2)(B) in California. It is beyond the scope of the CTR to include other pollutants, even if they are pollutants of concern for the Bay. The commenter may seek to have the State, through its Regional Board, address the possibility of adopting or revising criteria for those non-priority pollutants through its triennial review process, but that approach would not affect the CTR.

With those general observations, EPA responds as follows to the following specific concerns included in this comment:

A. The CTR allows "greater ambient water concentrations" for 30 pollutants

The commenter's discussion of this concern is confusing because only 24 specific pollutants are identified by the commenter (in its Table 2) for this concern, and footnotes for 6 of these indicate that these 6 actually represent enough additional pollutants to make the total number of individual pollutants greater than 30. EPA is responding, therefore, based on the 24 pollutants identified in Table 2.

EPA is "promulgating around" several of these pollutants for those waters of San Francisco Bay where State-adopted, EPA-approved criteria from the 1986 Basin Plan remain in effect, as discussed above. For those waters of San Francisco Bay where EPA is promulgating these 24 criteria, however, EPA agrees that 10 of the 24 CTR criteria in Table 2 (all of the Table 2 criteria, with the exception of nine metals, DDT, endrin, endosulfan, PAHs and dioxins, which are discussed below) would allow greater ambient concentrations than the EBEP criteria would have allowed if it was presently in effect. These CTR criteria, however, are based on sound science, which supports a finding that these criteria are fully protective of the designated uses listed in the CTR. For some criteria, the CTR criteria are based on additional scientific data developed not only since those State criteria were first proposed, but in some cases since the National Toxics Rule (NTR) was adopted by EPA in 1992. The new data further supports the conclusion that the CTR criteria are fully protective of designated uses listed in the CTR. The scientific bases for all of the CTR criteria are set forth in the California Toxics Rule Administrative Record Matrix. See also, National Recommended Water Quality Criteria, 63 Fed.Reg. 68354, December 10, 1998, as corrected, 64 Fed.Reg. 19781, April 22, 1999.

EPA disagrees with the commenter's contention that the CTR will allow increased concentrations of metals in San Francisco Bay. First, EPA notes that the CTR does not include criteria for most metals in much of the San Francisco Bay. Most of the metals criteria in the 1986 Basin Plan (which includes all of the commenter's nine metals, except copper), that were approved by EPA, remain in effect, therefore ambient concentrations for those metals criteria are not affected by the CTR. EPA is, however, promulgating metals criteria for the South Bay (below Dumbarton Bridge) and a saltwater aquatic life copper criterion for waters of the Bay with salinities greater than 5 ppt, because there are no comparable

Basin Plan criteria for those pollutants presently in effect. Since the CTR does include these metals criteria for these waters of San Francisco Bay, EPA has considered the commenter's comparison of ambient concentrations for pollutants in the Bay, which the commenter predicts will result from application of the different metals criteria, and EPA disagrees with those comparisons.

The commenter has compared CTR metals criteria, which are expressed as dissolved metals, with EBEP and copper site-specific criteria, which were expressed as total recoverable metals, by performing a calculation (the "5% analysis") on the CTR metals criteria prior to comparing them with EBEP metals criteria. This is not a recognized basis for comparison between dissolved and total recoverable metals criteria, however, and it is not adequately explained or supported. EPA therefore cannot accept the results of this analysis, which yields greatly exaggerated concentrations of the CTR metals criteria. EPA does not propose an alternative basis for a general comparison between dissolved and total recoverable metals, because the relationship between the two forms of metal varies depending on site-specific and time-specific conditions (which the State must address through the use of translators when implementing the criteria). Instead, EPA relies on sound scientific information which supports the conclusion that the CTR dissolved metals criteria are themselves protective of the designated uses that they are adopted to protect (see the California Toxics Rule Administrative Record Matrix). See also, National Recommended Water Quality Criteria, 63 Fed.Reg. 68354, December 10, 1998, as corrected, 64 Fed.Reg. 19781, April 22, 1999.

EPA also disagrees with the commenter's comparison between CTR criteria and four other EBEP criteria. The commenter compared sums of individual CTR criteria concentrations and compared them with "single" EBEP criteria. The four single EBEP criteria, however, represent four pollutant groups that the State created by combining individual pollutants into groups under the four pollutant names. (The EBEP groups are "DDT", "Endrin", "Endosulfan" and "PAHs".) The CTR, on the other hand, includes individual pollutants without grouping them. The commenter added the concentrations for individual CTR criteria for each of the 4 EBEP criteria groups and compared the sums with the single concentrations for each of the 4 EBEP criteria. This approach resulted in some very questionable comparisons.

For the DDT group, the CTR human health criteria for DDT, DDE and DDD are 0.59 ng/L, 0.59 ng/L and 0.83 ng/L, respectively. The sum of these criteria would be 2.01 (rounded to 2) ng/L, not 2.6 ng/L as the commenter contends. For the PAH group, the sum of the CTR's eight individual criteria would be 392 ng/L, not 135,000,000 ng/L as the commenter contends. For the Endrin group, the commenter has ignored applicable CTR aquatic life criteria. These aquatic life criteria are significantly more stringent than the CTR human health criteria which the commenter used as the sole basis for comparison. Had the commenter compared the EBEP human health criterion for Endrin to the sum of the appropriate CTR criteria for Endrin and Endrin Aldehyde (using the CTR's chronic saltwater aquatic life number for Eldrin and the human health fish consumption number for Endrin Aldehyde), the figures would have shown the CTR to be equivalent to the EBEP criterion, not less stringent.

Notwithstanding these errors, the commenter's approach is simply not a basis for revising the CTR criteria for pollutants in these four groups. As stated above, the comparisons are made to State criteria which are no longer in effect. The CTR is promulgated to put criteria in place where there presently are no State-adopted EPA-approved criteria in effect. The CTR is promulgated to meet the requirements of CWA section 303(c)(2)(B), which requires adoption of numeric criteria only for those toxic pollutants listed pursuant to section 307(a)(1) for which EPA has already adopted section 304(a) criteria. EPA has adopted section 304(a) criteria for the individual pollutants, not for the pollutant groups. As stated in the preamble to the proposed CTR and in response to CTR-016-002, EPA will work with the State to approve acceptable State-adopted criteria and intends to stay the CTR when EPA approves such criteria.

The commenter includes a further concern regarding polynuclear aromatic hydrocarbons (PAHs), which is one of these four pollutant groups. The commenter alleges that the CTR includes criteria for eight of the 13 PAHs which are included in the single EBEP criterion for PAHs, and omits the other five. This is not entirely correct. (Even if it were correct, it would not alter the fact that comparing the sum of eight PAHs to a single PAH criterion is invalid.) Of the five pollutants which the commenter alleges are omitted from the CTR, two are, in fact, included in the CTR, but under slightly different names. (Benzo(a)Anthracene (CAS number 56553) and benzo(b)Flouranthene (CAS number 205992) replace the EBEP's 1,2-benzanthracene and 3,4-benzoflouranthene, respectively. The CTR and the EBEP used different naming conventions, but the pollutants are the same chemicals.) It is true, however, that the CTR does not include numeric criteria for three of the 13 PAHs. As discussed in part C and D, below, acenaphthylene, phenanthrene and benz(ghi)perylene are no longer considered carcinogens, and EPA has not developed criteria levels for these toxic pollutants as non-carcinogens. In the absence of such guidance, numeric criteria for these three pollutants are not included in the CTR. [Note: benzo(ghi)Perylene (CAS number 191242) also is the same as one of the EBEP's PAHs (1,12-benzoperylene), but with a different name.] The CTR is consistent with the NTR (40 CFR 131.36 (b)(1)) in regard to all of the PAHs.

It should be further noted that for much of San Francisco Bay, the applicable Basin Plan includes a single criterion for PAHs comparable to the EBEP PAHs criterion, which EPA has previously approved. To the extent that the Basin Plan criterion may be more stringent than the CTR objectives for individual PAHs, it would take precedence over the CTR criteria as a basis for controlling PAHs in the part of the Bay where it applies.

The remaining pollutant among the 24 is "dioxin". The commenter has multiplied the single CTR dioxin criterion by 10 before comparing it with the single EBEP dioxin criterion. The commenter multiplied the CTR criterion for 2,3,7,8-TCDD "to account for...16 other dioxins" before comparing it with the EBEP criterion for "TCDD equivalents". The commenter then concluded that EPA was allowing a 900% increase in "dioxin". EPA disagrees with the 900% figure, because the relationship between this figure and the 16 other dioxins is unexplained. EPA does agree that the CTR could allow for greater concentrations of all dioxins and dioxin-like compounds in San Francisco Bay than the EBEP's dioxin criterion might have allowed, but does not agree that this is inevitable.

The EBEP's single dioxin criterion ("TCDD Equivalents") represented the sum of 17 dioxins and dioxin-like compounds. The CTR, on the other hand, includes a single dioxin criterion for a single dioxin compound (2,3,7,8-TCDD). The numeric values for the two criteria (the ambient concentration limits allowed by the two criteria) are the same.

EPA notes that 2,3,7,8-TCDD is the only EBEPdioxin compound included on the CWA section 307(a)(1) list. It is also the only 307(a)(1)-listed dioxin for which there is a CWA section 304(a) criterion. The CTR is promulgated to meet the requirements of CWA section 303(c)(2)(B), which requires adoption of numeric criteria only for those toxic pollutants listed pursuant to section 307(a)(1) for which EPA has already adopted section 304(a) criteria. EPA is therefore not required to include criteria for any dioxin compound other than 2,3,7,8-TCDD in the CTR. For California waters, if designated or beneficial uses may be impaired by the discharge of other dioxin or dioxin-like compounds, numeric water quality-based effluent limits may be included in NPDES permits through the use of the narrative criterion. EPA strongly encourages the State to adopt either the same national/international convention of toxicity equivalence (TEQ) to account for the presence of other dioxins, furans and other dioxin-like compounds, which the State adopted in its EBEP, or a more recent, comprehensive convention. EPA believes that the State should apply this recognized method for regulating dioxin compounds and believes that this would

address the commenter's concerns.

The EBEP relied on the TEQ convention's nationally/internationally consistent set of toxicity equivalence factors (TEFs) as multipliers for the 17 dioxins, to convert them to the single TCDD Equivalents criterion. Thus, the EBEP's TCDD Equivalents criterion results from the same calculations that EPA believes should be applied to the CTR's 2,3,7,8,-TCDD criterion.

If the State of California did not apply the TEQ convention to the CTR criterion to account for the presence of other dioxins, furans and other dioxin-like compounds, it is possible that, under the CTR, the total concentrations of alldioxin and dioxin-like compounds in the Bay could allowably exceed the EBEP concentration limit even though 2,3,7,8-TCDD by itself does not exceed that limit. For this reason, EPA strongly encourages the State to limit these other compounds through the application of TEQ,.

If the TEQ convention were adopted, and TEF applied to the CTR criterion, the commenter's comparison between the CTR and the EBEP numbers could reasonably conclude that there was no difference between the two. (Alternatively, the commenter might have concluded that the CTR was more inclusive than the EBEP. The commenter refers to 17 dioxin compounds which are included in the EBEP's criterion for TCDD equivalents. The CTR's 2,3,7,8-TCDD criterion is intended to include all dioxins and dioxin-like compounds for which there are TEFs, which are far more than 17.) As long as California applies the national/international TEQ/TEF conventions to implementation of the 2,3,7,8-TCDD criterion in the CTR, as it applied them to implementation of the TCDD Equivalents criterion in the EBEP, then greater concentrations of dioxins will not be allowed to be discharged under the CTR.

B. The CTR includes" new, extremely liberal criteria" for 4 pollutants

This part of the comment is very vague. It appears from the context of this concern, however, that "extremely liberal" means something less than "allows greater ambient water concentrations", for which the preceding group of criteria is criticized. For these four pollutants, the commenter does not allege that the CTR criteria are unprotective of the designated uses. In fact, the CTR criteria for these pollutants (acenapthene, ethylbenzene, antimony and hexachlorobutadiene) are based on recent, sound science which supports the determination that the criteria are protective of the designated uses (see the California Toxics Rule Administrative Record Matrix). See also, National Recommended Water Quality Criteria, 63 Fed.Reg. 68354, December 10, 1998, as corrected, 64 Fed.Reg. 19781, April 22, 1999.

C. The CTR "fails to replace previous state criteria" for 3 pollutants

Of these 3 criteria, one (tributyltin) is not a priority pollutant. This pollutant, as discussed above, is therefore beyond the scope of the CTR, regardless of whether the State had previously adopted statewide criteria for it.

For the other two pollutants (acenaphthylene and phenanthrene), both EPA and the State have previously included human health criteria based on carcinogenicity in proposed or final water quality standards. EPA included such criteria in the 1991 proposed NTR (56 Fed.Reg. 58442-58443), and California adopted them in the 1991 EBEP (EBEP, Table 2 and Appendix 1). However, in the 1992 final NTR, EPA deleted these criteria, having found that there was inadequate toxicity data to assess their carcinogenic potential and that any criteria for these pollutants should therefore be based on

non-carcinogenic effects. Since there were no reference doses to calculate non-carcinogenic criteria for these pollutants, no numeric criteria were included for them in the final NTR. (57 Fed.Reg. 60868, 60887.) There has been no change from this position since 1992, and they are therefore not included in the CTR.

D. The CTR "includes no criteria for 18 pollutants which had no state-adopted criteria"

Of these 18 pollutants, identified in Table 2 of this comment, only two are priority pollutants. The other 16 are beyond the scope of the CTR.

Of the two pollutants which are priority pollutants, benz(ghi)perylene was withdrawn from the final NTR and is therefore not included in the CTR for the same reasons discussed in Part C, above, for acenaphthylene and phenanthrene. For naphthalene, EPA has not published 304(a) criteria. CWA section 303(c)(2)(B), which the CTR is implementing in California, requires that numeric water quality criteria be adopted only for those priority pollutants for which 304(a) criteria have been published, therefore naphtalene is beyond the scope of the CTR.

Comment ID: CTR-003-006
Comment Author: City of Riverside
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/22/97
Subject Matter Code: C-24 Site Specific Criteria
References:
Attachments? N
CROSS REFERENCES

Comment: 6) In the forward to the rule the suggestion is made that no new SSOs will be approved by USEPA after the rule is promulgated due to lack of resources and the level of effort necessary for such action. Although we appreciate your candor, we do not believe that that is an appropriate response given the potential waste of public and private funds to comply with inappropriate standards.

Response to: CTR-003-006

EPA disagrees with this comment. We believe that the commenter misunderstood the cautionary language that was part of the proposed rule. The CTR does not preclude state adoption of criteria after the CTR has been promulgated. As EPA stated in the preamble to the proposed CTR, when the State has completed its own process, and EPA approves the State's new or revised criteria, EPA intends to stay the CTR. Similarly, if the State adopts site-specific criteria (including site-specific Basin Plan criteria adopted by Regional Boards which have completed the State review and adoption process), and EPA has approved them based on their individual merits, EPA intends to stay that portion of the CTR that applies more general criteria to the specific site. Each individual stay on a site-specific basis would require federal rulemaking on a case-by-case basis, and generally require more detailed effort on the Agency's part than a statewide stay.

Moreover, it is possible that State-adopted criteria could become effective for CWA purposes within the State even prior to EPA approval or rulemaking, although this would change if a rule that EPA has

recently proposed is promulgated as proposed. The "Alaska Rule," 64 Fed.Reg. 37072, July 9,1999. Until the Alaska Rule goes final, the State could adopt new or revised standards which are more stringent than the CTR, and those standards would be effective for CWA purposes within the state without any EPA action. Moreover, prior to a final Alaska Rule, the State could adopt statewide standards, and if EPA approved those standards and stayed the CTR based on them, then subsequent site-specific criteria would apply within the State when adopted by the State without requiring additional EPA approval or rulemaking. If the Alaska Rule becomes final as proposed, however, regardless of whether the CTR has been stayed, only state-adopted criteria which are more stringent than the otherwise applicable standards could be applied within the State, prior to EPA approval of those standards.

Comment ID: CTR-004-008
Comment Author: South Bayside System Authority
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/24/97
Subject Matter Code: C-24 Site Specific Criteria
References:
Attachments? N
CROSS REFERENCES

Comment: Available Regulatory Relief under the California Toxics Rule

The Preamble to the California Toxics Rule (CTR), and the rules accompanying Economic Analysis (EA), place a great deal of emphasis on the ability of dischargers to use alternative regulatory approaches to comply with CTR criteria if the cost of treatment technology was prohibitively expensive. For example, the EA assumes that, if the estimated annualized cost for removing a pollutant exceeded a cost trigger,(*1) "dischargers would explore the use of alternative regulatory approaches to comply with CTR-based effluent limits." EA at. pg. 4 (emphasis added). Based on this assumption, no treatment cost was estimated for the facility. (*2)

The types of alternative regulatory approaches assumed available for dischargers in California include phased total maximum daily loads (TMDLs), water quality standard variances, site-specific criteria, change in designated use, and alternative mixing zones. EA at pg. 4-5. The following sections will discuss each of EPA's proposed methods for regulatory relief and explain whether or not these methods can truly be used to provide relief from the CTR-based permit limits as anticipated by EPA. It should be noted that the actual language of the rule itself does riot mention any of the methods of regulatory relief. Therefore, this analysis will be based solely upon the language contained in the Preamble to the CTR.

Site-Specific Criteria

Another one of the avenues of potential regulatory relief discussed in the Preamble to the CTR is the adoption of site-specific water quality criteria. The Preamble provides that the "State has the discretion to develop site-specific criteria when appropriate e.g., when statewide criteria appear over or under protective of designated uses. The Preamble goes on to explain the site-specific criteria adoption process as follows:

Periodically, the State through its RWQCBs will adopt site-specific criteria for priority toxic pollutants

within respective Basin Plans. These criteria are intended to be effective throughout the Basin or throughout a designated water body. Under California law, these criteria must be publicly reviewed and approved by the RWQCB, the SWRCB, and the State's Office of Administrative Law (OAL). Once this adoption process is complete, the criteria become State law. These criteria must be submitted to the EPA Regional Administrator for review and approval under CWA section 303. These criteria are usually submitted to EPA as part of a RWQCB Basin Plan Amendment, after the Amendment has been adopted tinder the State's process and has become State law. CTR Preamble at pg. 42165.

The Preamble explains that the State of California has recently reviewed and updated all of its RWQCB Basin Plans. All of these Basin Plans, some of which contain site-specific criteria, have completed the State review and adoption process and have been submitted to EPA for review and approval. The key to whether or not these site-specific criteria will provide regulatory relief is when the EPA approval/disapproval occurs. Three different timing scenarios and results are possible:

1 . If EPA approves any State-adopted site-specific criteria before promulgation of the final CTR is published, then the EPA Administrator may make a finding, in that final rule that it will be unnecessary to promulgate criteria for the approved site-specific pollutants and associated water bodies.

2. If EPA disapproves any State-adopted site-specific criteria, the proposed statewide criteria contained in the CTR would apply for those pollutants and associated water bodies instead of the site-specific criteria.

3. However, if EPA promulgates statewide federal criteria as proposed in the CTR, prior to a decision on any State-adopted site-specific criteria, the more stringent of the two criteria would be used for water quality programs. Both federal and State water quality programs must be satisfied, and applications of the more stringent of the two criteria would satisfy both. CTR preamble at pg. 42165.

Thus, the only way less stringent site specific criteria can be used for regulatory relief is if those criteria are approved by EPA prior to the publication of the final CTR. Otherwise, either the CTR or the more stringent of the two (CTR vs. site-specific) criteria apply.

One final note regarding site-specific criteria is that the Preamble to the CTR restricts the ability to use native aquatic life as a way to set site-specific criteria. Instead of allowing a discharger to substitute local species from the receiving waters into which it discharges, the Preamble only allows a discharger to supplement the eight specified families of aquatic life required for criteria development with the addition of native species.(*9) It is doubtful whether this requirement will aid dischargers who are seeking regulatory relief.

(*1) This cost trigger is $200 per toxic pounds-equivalent for a facility under the low-end scenario, and $500 per toxic pounds-equivalent for a category of dischargers under the high-end scenario, See EA at pg. 4.

(*2) In addition, pollutant load I reductions word not calculated or credited for any pollutant for which an alternative regulatory approach was pursued. Id.

(*9) "A minimum data set of eight specified families is required for criteria development (details are given in the 1985 Guidelines, page 22). 'f he eight specific families are intended to be representative of a wide spectrum of aquatic life. For this reason it is not necessary that the specific organisms tested be actually present in the water body. States may develop site-specific criteria using native species, provided that the broad spectrum represented by the eight families is maintained. All aquatic organisms and their common uses are meant to be considered, but not necessarily protected, if relevant data are

available." CTR Preamble at pg. 42168.

Response to: CTR-004-008

EPA disagrees with this comment. Regarding this commenter's discussion as to how the CTR may relate to State-adopted site-specific criteria, See response to CTR-016-002.

EPA disagrees with the part of this comment which suggests that the preamble to the proposed CTR restricts the use of native aquatic species in setting site-specific criteria. The commenter correctly quotes the preamble to the proposed CTR, however it appears that there must be a misunderstanding on the commenter's part regarding the quoted language. The commenter mistakenly assumes that native species may only be used to "supplement", rather than to "substitute" for species identified by EPA. It has been EPA's consistent position, however, that states may use native species rather than species identified by EPA, provided they do so within the framework of EPA's guidance (which requires the use of a broad spectrum of species, represented by eight families of species), in setting ambient water quality criteria. See Water Quality Standards Handbook: Second Edition (U.S. EPA-823-B-94-005a, August 1994), Chapter 3 (esp section 3.7); "Summary of Revisions to Guidelines for Deriving Numerical National Water Quality Criteria for the Protection of Aquatic Organisms and Their Uses" (50 Fed.Reg. 30792, July 29, 1985).

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Comment Author: Novato Sanitary District
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/23/97
Subject Matter Code: C-24 Site Specific Criteria
References:
Attachments? Y
CROSS REFERENCES C-21

Comment: 7. Separate, scientifically defensible, reasonably achievable aquatic life criteria for copper should be adopted for San Pablo Bay in the vicinity of the District's discharge, or alternatively EPA should state in the Preamble that the Regional Board should: (1) allow a dilution credit for the District based on modeling studies; and (2) apply metals translator determined based on EPA procedures from the results of the Regional Monitoring Program. To comply with the Clean Water Act and EPA regulations, EPA should consider specific water bodies. To fulfill the spirit of Presidential Executive Order 12866 and the requirements of the Unfunded Mandates Reform Act and the Regulatory Flexibility Act, EPA should evaluate regulatory alternatives based on an analysis of costs and benefits. Based on the analysis of costs and benefits performed by the District (see Attachment 1), EPA should either adopt the criteria that is currently achieved, or alternatively specify implementation criteria that will allow the current discharge to continue. The District has performed dilution studies (see Attachment 2) and performed reasonable potential analyses using dilution and metals translators (see Attachments 3 and 4). These show that with the use of these implementation provisions, the proposed criteria can be achieved in-stream. Without EPA specifying that dilution studies and metals translators should be utilized in the District's case, it is possible that the CTR could impose enormous costs on the District (and the small entities it serves) without providing any environmental benefit. In that case, the CTR would be inconsistent with the Clean Water Act, EPA regulations, Presidential Executive Order 12866, the

Unfunded Mandates Reform Act and the Regulatory Flexibility Act.

Response to: CTR-005-008a

EPA disagrees with the commenter's request that EPA either adopt site-specific copper criteria for San Pablo Bay or state in the preamble that the Regional Board should allow dilution credit and application of a metal translator for the commenter's discharge.

In support of its request for the adoption of "scientifically defensible, reasonably achievable aquatic life criteria for copper" (emphasis added), the commenter has submitted its own analysis of costs and benefits. EPA has conducted an analysis of costs and benefits for this rule pursuant to Executive Order 12866 (see discussion in preamble to final rule); however, the criteria themselves are not based on economic considerations. In accordance with 40 CFR 131.11, criteria must be based on sound scientific rationale and must protect the designated use. There is no provision for EPA to consider the attainability or the scientific validity of the criteria with regard to specific dischargers or class of dischargers in adopting ambient water quality criteria in the CTR. Economic factors may be considered in designating uses (40 CFR 131.10); however, they may not be used to justify criteria which are not protective of those uses.

That being said, it should nevertheless be understood that EPA does support State adoption of site-specific criteria. As explained in the preamble to the proposed CTR, and further discussed in the response to CTR-016-002, EPA will work with the State to approve acceptable State-adopted criteria (including site-specific criteria) and intends to stay the CTR when EPA has approved such State criteria. In the meantime, in the absence of such criteria for aquatic life for copper in waters of San Francisco Bay, with salinity greater than 5 ppt, EPA is promulgating criteria based on EPA's section 304(a) national marine water copper aquatic life criterion, which is consistent with the requirements of the CWA. (40 CFR Section 131.11(b).) See also responses to CTR-016-001 and -002.

Regarding the suggestion that EPA specify the use of dilution and metals translators for this discharger, EPA disagrees. With the exception of compliance schedules, the CTR does not include implementation provisions; the CTR is promulgated to add numeric criteria for toxic pollutants where they did not exist. The State may address these issues in a separate implementation plan, which it is currently developing. ("Policy for implementation of Toxics Standards for Inland surface Waters, Enclosed Bays and Estuaries of California", released for public comment, September 11, 1997.)

Finally, regarding the commenter's assertion that the CTR could be inconsistent with Executive Order 12866, the Regulatory Flexibility Act and the Unfunded Mandates Reform Act see the discussion of EPA's compliance with these requirements in the preamble to the final rule.

Comment ID: CTR-008-002
Comment Author: San Luis&Delta-Mendota
Document Type: Water District
State of Origin: CA
Represented Org:
Document Date: 09/15/97
Subject Matter Code: C-24 Site Specific Criteria
References:
Attachments? N

CROSS REFERENCES

Comment: The San Luis & Delta-Mendota Water Authority has entered into a Use Agreement with the Bureau of Reclamation for discharge of drainage water through a portion of the San Luis Drain to the San Joaquin River. A consensus letter to the Central Valley Regional Water Quality Control Board signed November 3, 1995, discussed the selenium water quality objectives in the San Joaquin River, Mud Slough, Salt Slough and wetland channels. The letter states "Please note that the parties have not reached a consensus on the appropriate long-term water quality objectives. However, the parties have committed to participate in a cooperative review process by which to evaluate any new scientific information relative to the subject." This letter was signed by the San Luis & Delta-Mendota Water Authority, the U.S. Bureau of Reclamation, the U.S. Environmental Protection Agency, and the U.S. Fish and Wildlife Service.

The proposed California Toxics Rule should not be adopted without adequately addressing the difference for high-sulfate waters. The Rule should also not be adopted if it undercuts EPA's commitment to the cooperative review of appropriate long-term standards in the San Joaquin River Basin.

Response to: CTR-008-002

EPA disagrees with this comment. Concerning future review of standards in the San Joaquin River Basin, that course of action is in no way precluded by the CTR. As explained in the preamble to the proposed CTR, and further discussed in the response to CTR-016-002, EPA will work with the State to approve acceptable State-adopted criteria (including site-specific criteria) and to stay the CTR where such State criteria are in effect. In the case of the San Joaquin River basin, EPA is committed to cooperative review of site-specific standards. Moreover, where site-specific criteria have already been adopted by the State in accordance with State law, but not yet acted upon by EPA, and those criteria are more stringent than applicable CTR criteria, those are the controlling criteria for CWA purposes within the State even without a stay of the applicable CTR criteria and are thus implementable by the State. (This would not be affected by the "Alaska Rule" which EPA proposed July 9, 1999, 64 Fed.Reg. 37072. See p. 37076.) This is the case with the selenium criterion adopted by the Central Valley Regional Board for Mud and Salt Sloughs and some adjacent basin waters in the Board's 1996 Basin Plan amendment. Since the State must use the most stringent criteria in effect for its water quality programs, the State may use this site-specific selenium criterion notwithstanding the CTR selenium criterion, thus the commenter's concerns should have no practical effect.

EPA has reviewed the information provided concerning the effect of high-sulfate waters on the toxicity of selenium to the extent it applies in the referenced waters. EPA concludes, based on information provided by the U.S. Fish and Wildlife Service (FWS), that this comment provides no basis for changing the numeric selenium criteria contained in the CTR. The letter of October 10, 1997, from Wayne S. White, Field Supervisor, FWS, to Diane Frankel, EPA, responds to the information provided with this comment. (The FWS letter is itself included as a comment on the proposed CTR in the administrative record.) In summary, the FWS letter says that most of the references relied on by this commenter suffer from an inability to transfer laboratory results to the field. They are based on the real but simplified interference between selenate and sulfate. They use relatively high levels of sulfate which are not unrealistic in themselves; however, the reduction in selenium bioaccumulation from selenate that they measure is not elimination of bioaccumulation from that form of selenium. Also, the results apply only to the selenate form of selenium. The other forms of selenium are far more bioaccumulative than selenate, are free of any interference from sulfate and, over time, come to dominate the bioaccumulation process.

Comment ID: CTR-009-003
Comment Author: City of Thousand Oaks
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/22/97
Subject Matter Code: C-24 Site Specific Criteria
References:
Attachments? Y
CROSS REFERENCES

Comment: The City is concerned that any site specific objectives have to be implemented through federal rulemaking. The EPA was quite explicit in advising both the State and the regulated community not to expect prompt response from EPA on such requests. The State has a number of watershed projects underway in conjunction with EPA. The expressed lack of potential to ever see the implementation of site-specific requirements based upon the most representative and expansive scientific database for a given watershed have a chilling effect on these efforts. This would beextremely unfortunate because EPA's goal of "place-based" management approaches will suffer a significant set-back in California. Millions of dollars spent on good science to develop the most cost-effective local water quality solutions, may be for naught. This is an unintended negative outcome that the Agency surely does not desire. The City recommends that the final CTR Rule explicitly provide that site specific objectives and requirements for criteria included in the rule can be accomplished through Basin Plan Amendments approved by SWRCB and EPA. Given the sheer size and diversity of California's watersheds and receiving waters, the most effective way to implement appropriate water quality controls is through watershed-specific characterizations implemented by the Regional Boards. Without the ability to affect site-specific objectives in this manner, its tool is undermined if not negated.

Response to: CTR-009-003

EPA disagrees with this comment. We believe that the commenter misunderstood the cautionary language that was part of the proposed rule. The CTR does not preclude state adoption of criteria after the CTR has been promulgated. As EPA stated in the preamble to the proposed CTR, when the State has completed its own process, and EPA approves the State's new or revised criteria, EPA intends to stay the CTR. Similarly, if the State adopts site-specific criteria (including site-specific Basin Plan criteria adopted by Regional Boards which have completed the State review and adoption process), and EPA has approved them based on their individual merits, EPA intends to stay that portion of the CTR that applies more general criteria to the specific site. Each individual stay on a site-specific basis would require federal rulemaking on a case-by-case basis, and generally require more detailed effort on the Agency's part than a statewide stay.

Moreover, it is possible that State-adopted criteria could become effective for CWA purposes within the State even prior to EPA approval or rulemaking, although this would change if a rule that EPA has recently proposed is promulgated as proposed. The "Alaska Rule," 64 Fed.Reg. 37072, July 9,1999. Until the Alaska Rule goes final, the State could adopt new or revised standards which are more stringent than the CTR, and those standards would be effective for CWA purposes within the state without any EPA action. Moreover, prior to a final Alaska Rule, the State could adopt statewide standards, and if EPA approved those standards and stayed the CTR based on them, then subsequent site-specific criteria would apply within the State when adopted by the State without requiring additional EPA approval or

rulemaking. If the Alaska Rule becomes final as proposed, however, regardless of whether the CTR has been stayed, only state-adopted criteria which are more stringent than the otherwise applicable standards could be applied within the State, prior to EPA approval of those standards.

EPA further disagrees with any suggestion that the State itself could, in the future, modify CTR criteria. State adoption of site-specific criteria (including site-specific criteria adopted by the Regional Board which have completed the State adoption process) is a separate State action, under State law, which does not modify federal criteria. It would be up to EPA to modify the CTR to "make way" for the State's criteria, once those criteria have been approved by EPA. As discussed above, if the State were to adopt criteria that were more stringent than applicable CTR criteria, those criteria could be effective for CWA purposes within the State under State law, prior to EPA approval of such criteria or modification of the CTR.

Comment ID: CTR-009-006a
Comment Author: City of Thousand Oaks
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/22/97
Subject Matter Code: C-24 Site Specific Criteria
References:
Attachments? Y
CROSS REFERENCES G-02

Comment: With respect to the provisions in the proposed rule regarding compliance schedules and site-specific objective development and approval/implementation, the City requests verification that these, and all provisions, in the proposed rule apply only to those constituents for which this rule proposes criteria.

Response to: CTR-009-006a

EPA agrees with this comment. The implementation measures contained in the CTR apply to the criteria contained in the rule.

Comment ID: CTR-010-001
Comment Author: Save San Francisco Bay Assoc.
Document Type: Environmental Group
State of Origin: CA
Represented Org:
Document Date: 09/24/97
Subject Matter Code: C-24 Site Specific Criteria
References:
Attachments? Y
CROSS REFERENCES

Comment: EPA's proposed California Toxics Rule is extremely disturbing because it significantly

weakens standards for numerous pollutants of concern in San Francisco Bay. Standards for more than half of the pollutants of concern identified by the S.F. Estuary Project will be weakened, including dioxin, PCB, mercury, PAHs, and chlordane. These pollutants were found in elevated levels in Bay fish by the S.F. Regional Water Board's study on contaminants in fish and resulted in the fish consumption advisory put out by Cal-EPA. Research conducted by Save S.F. Bay Association found people eating two to three times the amount of Bay fish considered safe. EPA's proposal will make this situation much worse and result in higher exposure levels to thousands of people. Moreover, pollution levels for a number of other pollutants will significantly increase, such as lead, copper, zinc, fluoranthene, and many others.

Response to: CTR-010-001

EPA disagrees with this comment. See response to CTR-002-003, which responds in detail to specific concerns regarding pollutant increases in San Francisco Bay, CTR-016-002, which discusses San Francisco Bay Basin Plan criteria which will not be superceded by the final CTR, and CTR-002-002a, which responds to specific concerns regarding fish consumption.

Comment ID: CTR-011-001b
Comment Author: City of Simi Valley
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/24/97
Subject Matter Code: C-24 Site Specific Criteria
References: Letter CTR-011 incorporates by reference letters CTR-027 and CTR-034
Attachments? Y
CROSS REFERENCES C-13
E-01d

Comment: The City of Simi Valley discharges approximately 10 million gallons per day (mgd) of tertiarytreated wastewater (as well as municipal storm water) to the Arroyo Simi, an effluent dependent water body. Through much of the year, Arroyo Simi is dry several miles downstream from the City. The Arroyo Simi Characterization Report, completed by the City in 1995, concluded that the arroyo does not support a significant fishery, and observed only arroyo chub, mosquito fish and blunt-nosed minnow in the stream. Although designated as a potential municipal water supply in the Basin Plan, the arroyo waters are not used for municipal purposes. Effluent monitoring are limited, but available data indicate that the City's discharge may have a reasonable potential to exceed the proposed aquatic life criteria for several metals and the proposed human health criteria for several carcinogens.

Since Simi Valley is largely a residential community with supporting commercial development and little industry, and since the City already has an effective pretreatment program, it is unlikely that pollution prevention efforts would effectively reduce the problematic constituents. More likely, the City would be faced with end-of-pipe treatment controls such as lime precipitation and carbon adsorption to achieve the proposed criteria. The costs would undoubtedly be significant and the benefits relatively minor.

Under these circumstances, it appears reasonable to adopt criteria for Arroyo Simi, and similar effluent dependent waters, that are reasonably achievable without costly end-of-pipe controls and that reflect the actual use of the water (i.e., generally such waters are used for fishing or drinking). One way to address

this issue, consistent with the requirements of the Clean Water Act, would be to adopt specific human health criteria for Arroyo Simi and other effluent dependent streams based on a cancer risk coefficient of 10E-5 or in some cases 10E-4. Based on the limited data collected by the City, risk levels of 10E-4 would have to be adopted for dioxins, aldrin, alpha-BHC and 4,4,-DDD (see Table 1). Risk levels of 10E-5 would be sufficient for chloroform and endoslfan 11 (Id.).

Response to: CTR-011-001b

EPA disagrees that it must or should establish separate criteria for effluent dependent waters in this rule. In establishing water quality criteria for California, EPA is implementing section 303(c)(2)(B) of the CWA which requires adoption of criteria for all toxic pollutants for which EPA has issued criteria guidance and for which the discharge of such pollutants could reasonably be expected to interfere with the designated uses adopted by the state. EPA based the criteria contained in the CTR on its most recent national criteria guidance, which are designed to derive criteria that will be protective of aquatic life and human health. As long as a waterbody currently has a designated use for the protection of aquatic life and/or human health, application of the national 304(a) criteria are appropriate for fulfilling section 303(c)(2)(B). The CTR itself does not adopt uses or modify any uses previously adopted by the State. EPA presumes that the State has designated appropriate uses for its waters. Proposals to revise State-adopted uses must be brought to the State pursuant to its procedures for review of its water quality standards.

That being said, it should nevertheless be understood that EPA does support State adoption os site-specific criteria. As explained in the preamble to the proposed CTR, and further discussed in response to CTR-016-002, EPA will work with the State to approve acceptable State-adopted criteria (including site-specific criteria) and to stay the CTR where EPA has approved such State criteria.

With respect to risk level applicable to human health criteria when, as here, EPA establishes a water quality standard, EPA intends in its discretion to use a risk level of 1 x 10-6, although the State may in its discretion choose another risk level for protection of human health, if the State has appropriately consulted the public. As discussed in responses to CTR-011-0001a and CTR-058-001 (Category C-13; Risk Level), EPA follows the risk-level policies of the affected state, when promulgating criteria as regulations.

Comment ID: CTR-016-001
Comment Author: San Francisco Bay RWQCB
Document Type: State Government
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-24 Site Specific Criteria
References:
Attachments? Y
CROSS REFERENCES

Comment: Existing State Standards for the San Francisco Bay Region Previously Approved by US EPA

US EPA has asked people commenting on the proposed California Toxics Rule to identify any state-adopted numerical objectives that are still in effect following the decision in the Water Quality

Control Cases, Judicial Council Coordination Proceeding No. JC2610. The San Francisco Bay Regional Board was not a party to that lawsuit. Accordingly, there are several numerical objectives for toxic substances contained in the Water Quality Control Plan for the San Francisco Bay Region (Basin Plan) that remain valid following the court ruling. They were adopted after a full public review process in 1986 and subsequently approved by US EPA in 1987. These objectives are contained in Tables 3-3 and 3-4 of the Basin Plan and are reproduced in an attachment to this letter.

Staff have reviewed these objectives and have determined that many are identical to those proposed in the California Toxics Rule except that the Region's existing standards are expressed as total recoverable and not in the dissolved form. Of those objectives that are not identical, ambient levels of arsenic, lead, and zinc are so far below both existing and proposed standards that the Regional Board does not consider modifying the values a priority. Levels of copper, nickel, mercury, and PAHs, however, are of greater concern in the Region.

In reviewing both the proposed and past US EPA criteria, we have consistently found that site-specific objectives are preferable to more generalized objectives for the complex, dynamic hydrogeological and biogeochemical systems in the San Francisco Bay Estuary. Generalized national criteria development processes seek to minimize the uncertainty of laboratory-based predictions (as in the selection of dissolved criteria) yet do not attempt to reduce any of the environmental uncertainties that arise when laboratory results are extrapolated to extremely complex and variable field conditions. As a result, some of the proposed national criteria are seriously under protective of beneficial uses in San Francisco Bay, while others are overprotective and will ultimately cause compliance problems for dischargers under the existing implementation policies contained in our Basin Plan.

As you are aware, the Regional Board has been working to develop objectives appropriate for San Francisco Bay for copper and nickel since 1988 and is in the process of conducting similar technical analyses for mercury, dioxins, and PAHS. Our technical assessment of the proposed selenium, mercury, and dioxin criteria is presented in greater detail below. The goal of this undertaking is to develop site-specific objectives and pollutant-specific implementation policies for San Francisco Bay.

Because EPA's proposed criteria do not consistently incorporate the most current environmental information, and, in particular do not reflect the complex conditions in the Estuary, we feel it is more appropriate to retain the existing numerical objectives in the Basin Plan and to update them through our regional planning process.

Accordingly, we ask that EPA revise the proposed rule and exclude the existing fresh and salt water pollutant objectives listed in the attachment for waters within the San Francisco Bay Region (as defined in the California Water Code). This exclusion would amend the table on "Water and use classification and Applicable Criteria" to read:

All waters within the San Francisco Bay Region that include a MUN use designation:

* -assigned all criteria in Columns B1 and B2-for all pollutants except for arsenic, chromium (VI), copper, mercury, nickel, silver, and zinc

* -and all criteria in Columns C1 and C2-for all pollutants except for arsenic, cadmium, chromium (VI), lead, mercury, nickel, silver, and zinc

* -and Column D-1-all pollutants

and

All waters within the San Francisco Bay Region that do not include a MUN use designation:

* assigned all criteria in Columns B1 and B2-for all pollutants except for arsenic, chromium (VI), copper, mercury, nickel, silver, and zinc

* and all criteria in Columns C1 and C2-for all pollutants except for arsenic, cadmium, chromium (VI), lead, mercury, nickel, silver, and zinc

* and Column D-2 - all pollutants

It should be noted that this recommended action will result in two saltwater standards for PAHs; one will be a 24-hour average value of 15.0 ppb (the existing objective), the other will be the chronic human health-based federal standard.

Response to: CTR-016-001

EPA has reviewed this comment, as well as the Water Quality Control Plan for the San Francisco Bay Region (Basin Plan), and its amendments, including the 1995 Basin Plan, which the comment addresses. As EPA explained in the preamble to the proposed CTR, EPA intended to amend the text of the final rule to provide that CTR criteria would not apply where there is a site-specific State criterion in effect, approved by EPA, which the State or others identify in comments on the proposed CTR. (62 Fed.Reg. 42165.) This comment has identified such criteria. Based on our review, and discussions with the San Francisco Bay RWQCB, we have determined that those standards for the San Francisco Bay Region for priority toxic substances contained in Tables 3-3 and 3-4 of the 1995 Basin Plan (Tables III-2A and B of the 1986 Basin Plan), are the same as those adopted by the State in 1986 and approved by EPA in 1987, and they remain in effect for those waters of San Francisco Bay where they are presently in effect following final promulgation of the CTR. EPA believes that these are still appropriate criteria values. CTR criteria will therefore not apply to those parameters and waters covered by these San Francisco Bay Region Basin Plan WQS. National Toxics Rule (NTR) criteria for cyanide (40 CFR 131.36(d)(10)) will also continue to apply since the CTR does not supercede the NTR, as it applies in California.

EPA furthermore disagrees that CTR should exclude any of the pollutants proposed in this comment for all waters of San Francisco Bay that have the listed use designations. There are waters of San Francisco Bay (waters of the South Bay below Dumbarton Bridge) for which the criteria addressed in this comment are simply not in effect under the 1995 Basin Plan. CTR criteria are therefore adopted for these waters, and there is no conflict among criteria, since the CTR is filling a gap, not superceding State criteria.

The CTR also applies to any estuarine waters of San Francisco Bay which became subject to different criteria in 1995 when the San Francisco Regional Board eliminated the previously-approved geographic boundary between waters subject to freshwater and saltwater criteria and instead adopted methods for determining, on a salinity basis, where freshwater and saltwater criteria would be applied in San Francisco Bay. Because EPA has not approved the 1995 Basin Plan amendments, and since the 1986 Basin Plan criteria which EPA did approve no longer apply to those waters, EPA adopting CTR criteria for those waters is necessary to implement CWA section 303(c)(2)(B). It is expected, however, that few permits will be affected by this application of CTR criteria.

EPA disagrees that the CTR should exclude all of the pollutant criteria as proposed in this comment. It is beyond the scope of this rule to pick and choose among the CTR criteria which shall apply to waters of

San Francisco Bay on any basis other than whether or not they are subject to an EPA-approved State-adopted criterion, as described above. (For example, under the 1995 Basin Plan, there is currently no criterion for copper in waters of San Francisco Bay with salinity greater than 5 ppt, and EPA therefore will adopt CTR saltwater copper criteria for those San Francisco Bay waters.) Thus, regarding the various pollutants specifically addressed by this commenter, EPA will identify, in the footnotes to section 131.38(b)(1), those criteria which do not supercede EPA-approved San Francisco Bay Region Basin Plan criteria which are presently in effect.

Comment ID: CTR-016-002
Comment Author: San Francisco Bay RWQCB
Document Type: State Government
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-24 Site Specific Criteria
References:
Attachments? Y
CROSS REFERENCES

Comment: Development of New Standards by Regional Boards - Clarification of Federal Rulemaking

It is very clear in the proposed rule that it is EPA's intention to promulgate federal standards only where there is an absence of state standards, and that when the state has completed its own process, that EPA intends to stay the proposed rule. At the same time, however, the proposed rule contains the following cautionary language:

"If this proposed rule is still in effect, as with the State adoption of site-specific criteria, EPA would have to undertake rulemaking to make necessary changes to this rule .... EPA, however, cautions California and the public that promulgation of this federal rule removes most of the flexibility available to the State for modifying its standards on a discharger-specific or stream-specific basis. For example, variances and site-specific criteria development are actions sometimes adopted by states. These are optional policies under terms of the federal water quality standards regulation. Except for the water-effect ratio procedure for certain metals, EPA has not incorporated either optional policy, in general, in this proposed rulemaking, that is, EPA has not generally authorized State modifications of federal water quality standards. Each of these types of modifications will, in general, require federal rulemaking on a case-by-case basis to change the federal rule. Because of the time consuming nature of reviewing such requests, limited federal resources, and the need for the Agency to move into other priority program areas in establishing environmental controls, EPA alerts California and the public that a prompt Agency response it unlikely. The best course of action, if such provisions are desired, is for the State to adopt its own standards and take advantage, if it so chooses, of the flexibility offered by these optional provisions."

We interpret this language to mean that EPA is not authorizing a modification of the federal standards as part of this rulemaking (except through use of WERs). However, this language suggests that EPA also believes itself to be unable to state standards developed by Regional Boards in a timely manner. We must point out that the site-specific objectives setting process carried out by the Regional Boards in the State of California is not a "modification" of federal standards, but a complete, state standard setting process. Furthermore, the Regional Boards are required and authorized under the CWA and state law to

review and, as appropriate, consider modification of the promulgated standards as they apply to specific water bodies within each region as part of the triennial review process. In both cases, we feel very strongly that EPA is obligated to review state standards developed at the regional level in a timely manner. We also believe that EPA's intent to stay federal standards when the statewide objective setting process is complete should apply equally to state standards adopted by the Regional Boards.

Accordingly, we are asking that EPA specifically clarify its intent with respect to state standards developed by Regional Boards. In addition, we strongly recommend that EPA revise the proposed rulemaking to include a description of conditions under which EPA may initiate a stay of federal standards as part of this rulemaking, thereby alleviating the administrative burden of conducting federal rulemaking changes every time a new state standard is developed and approved.

Response to: CTR-016-002

EPA disagrees with this comment. We believe that the commenter misunderstood the cautionary language that waspart of the proposed rule. The CTR does not preclude state adoption of criteria after the CTR has been promulgated. As EPA stated in the preamble to the proposed CTR, when the State has completed its own process, and EPA approves the State's new or revised criteria, EPA intends to stay the CTR. Similarly, if the State adopts site-specific criteria (including site-specific Basin Plan criteria adopted by Regional Boards which have completed the State review and adoption process), and EPA has approved them based on their individual merits, EPA intends to stay that portion of the CTR that applies more general criteria to the specific site. Each individual stay on a site-specific basis would require federal rulemaking on a case-by-case basis, and generally require more detailed effort on the Agency's part than a statewide stay.

Moreover, it is possible that State-adopted criteria could become effective for CWA purposes within the State even prior to EPA approval or rulemaking, although this would change if a rule that EPA has recently proposed is promulgated as proposed. The "Alaska Rule," 64 Fed.Reg. 37072, July 9,1999. Until the Alaska Rule goes final, the State could adopt new or revised standards which are more stringent than the CTR, and those standards would be effective for CWA purposes within the state without any EPA action. Moreover, prior to a final Alaska Rule, the State could adopt statewide standards, and if EPA approved those standards and stayed the CTR based on them, then subsequent site-specific criteria would apply within the State when adopted by the State without requiring additional EPA approval or rulemaking. If the Alaska Rule becomes final as proposed, however, regardless of whether the CTR has been stayed, only state-adopted criteria which are more stringent than the otherwise applicable standards could be applied within the State, prior to EPA approval of those standards.

EPA notes that State-adopted criteria (including site-specific criteria) which are less stringent that CTR criteria may be approved by EPA and result in a stay of the CTR if such criteria are based on sound scientific rationale which ensures that designated uses will be protected.

EPA also disagrees with the suggestion that EPA include provisions in this CTR rule to allow EPA to use direct final rulemaking if it stays the CTR, or site-specific portions of the CTR, in the future. Since EPA cannot at this time predict what State criteria would replace CTR criteria when such stays are issued, EPA cannot predict whether such federal rulemakings might appropriately be adopted as direct final rules. Whether EPA meets the criteria for using direct final rulemaking in this context is a decision EPA will make when it undertakes such rulemaking.

Comment ID: CTR-017-001
Comment Author: Santa Ana River Discharger Ass
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-24 Site Specific Criteria
References:
Attachments? Y
CROSS REFERENCES

Comment: Thank you for the opportunity to provide comments on the recently promulgated California Toxics Rule. The members of the Santa Ana River Dischargers Association (SARDA) are especially appreciative of EPA's effort to review the site-specific water quality objectives (SSOs) proposed for our watershed.

The SSOs for cadmium, copper, lead and ammonia were developed jointly by state and federal regulators in 1992-93. During this period, the Regional Water Quality Control Board - Santa Ana Region held several public hearings to review the merits of the proposed SSOs. As part of the formal procedures to amend the Santa Ana River Basin Plan, the Regional Board received several documents providing scientific evidence that the SSOs would fully protect all designated beneficial uses including aquatic life.

EPA has received several copies of the final report for the Santa Ana River Use-Attainability Analysis. As direct participants in the design and methodology of the study, EPA received draft and final versions of all work papers and reports. In addition, another complete copy of the documents were submitted to the agency as part of the administrative record supporting the State Board decision to approve basin plan amendments adopting the SSOs.

Because the previous copies were submitted nearly four years ago, we believe it would be helpful to submit a new copy for the record. It is our sincere hope that these documents will facilitate EPA's review of the proposed SSOs.

Enclosed are the respective volumes which comprise the UAA Final Report. There are many other pages of written materials supporting the adoption of site-specific water quality objectives previously submitted to EPA and included in the State of California's formal administrative record on the basin plan amendments. If EPA desires additional copies of any of the other documents, SARDA would be pleased to re-submit them as well.

The SSOs proposed for the Santa Ana River are nearly identical to the water quality objectives EPA set forth in the California Toxics Rule. We in SARDA were pleased that EPA's scientists concur in the conclusion that water quality objectives based on dissolved metal concentrationswould fully protect the Santa Ana River. If anything, it appears that the SSOs proposed within the UAA Final Report were conservative. Since then, EPA has sponsored new scientific research which corroborates the original UAA recommendations.

Because the California Toxics Rule uses the same approach as the UAA in setting water quality objectives for cadmium and copper, SARDA strongly supports the CTR objectives for those metals. We also agree with EPA's written statements acknowledging the binding character of organic carbon and the role it plays in rendering heavy metals non-toxic. We enthusiastically endorse the agency's decision to

include Water Effects Ratio as a formal factor to be considered when formulating water quality objectives. It will do much to adjust national criteria to local conditions.

Unlike copper and cadmium, the SSO for lead was based on EPA's "Most-Sensitive Species Methods." As such, SARDA believes that it is more appropriate to adopt the UAA-SSO rather than the CTR formula when setting water quality objectives for lead in the Santa Ana River. Therefore, we urge the agency to join the State Water Resources Control Board in approving the SSO for lead.

Since the UAA was completed, and the basin plan amended, the SARDA agencies have diligently implemented the final recommendations. When chlorine and ammonia were found to be contributing to toxicity in the river, dischargers constructed new facilities to significantly reduce the concentration of these pollutants. Today, SARDA members routinely pass their whole effluent toxicity tests. Annual instream bioassessments, conducted voluntarily by SARDA, consistently demonstrate that our effluent quality fully supports the designated beneficial use.

SARDA is also pleased to report that the concentrations of heavy metals remain well below permitted levels and are often significantly less than historical averages. The fear that SSOs would license widespread increases in pollution never came to pass.

We believe the Santa Ana River UAA was successful in developing more appropriate site-specific objectives as a result of EPA's direct participation in designing, conducting and reviewing the scientific inquiry. The other SARDA agencies join me in thanking EPA's staff for the considerable time and expertise they contributed to this extraordinary effort.

If EPA requires any additional materials, or wishes to discuss the documentation submitted in support of the proposed SSOs, please call me at (909) 797-5119. All of the SARDA agencies are prepared to assist in any way we can. Thank you again for the opportunity to comment on the California Toxics Rule.

Sincerely,

Chairman Santa Ana River Dischargers Association

Response to: CTR-017-001

EPA is pleased to hear the story of success in reducing the toxicity in the Santa Ana River. EPA also appreciates the strong support for the CTR criteria for cadmium and copper, which, as the commenter points out, are nearly identical to the SSOs adopted by the State for the Santa Ana River.

Concerning the site-specific criterion for lead in the Santa Ana River that has been adopted by the State, EPA appreciates the commenter's support of the site-specific criterion over the CTR criterion for protection of fresh water aquatic life. However, EPA has not yet approved this site-specific criterion, and in the absence of EPA-approved State-adopted site-specific criteria, EPA must promulgate CTR criteria to meet the requirements of CWA section 303(c)(2)(B). Nevertheless, where site-specific criteria have already been adopted by the State in accordance with State law, but not yet acted upon by EPA, and those criteria are more stringent than applicable CTR criteria, those are the controlling criteria for CWA purposes within the State even without a stay of the applicable CTR criteria and are thus implementable by the State. (This would not be affected by the "Alaska Rule" which EPA proposed July 9, 1999, 64 Fed.Reg. 37072. See p. 37076.) This is the case with the site-specific criterion for lead adopted by the State for the Santa Ana River. Since the State must use the most stringent criteria in effect for its water quality programs, the State may use this site-specific lead criterion notwithstanding the CTR fresh water

aquatic life criterion for lead, thus the commenter's concerns should have no practical effect.

Comment ID: CTR-020-003
Comment Author: City of Stockton
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/24/97
Subject Matter Code: C-24 Site Specific Criteria
References:
Attachments? Y
CROSS REFERENCES

Comment: B. Site-Specific Modifications

EPA has indicated that it will not allow the state to approve site-specific modifications of the federal criteria regardless of the merit of the situation. The only notable exception is EPA's indication that amendment of these criteria may only be accomplished by a petition for rulemaking which amends the CTR. EPA's self-imposed limitation on CTR modification exacerbates the overly broad nature of the rule and arbitrarily inflicts wasteful expenditures of local resources on meeting objectives that have no actual environmental or public health need. The Agency is authorizing limited waivers to criteria compliance where it can be demonstrated that factors listed in 40 C.F.R. section 131.10(g) apply (e.g., natural conditions prevent attainment of uses). However, these waivers are very limited in scope, are rarely approved, and are not expected to provide relief to the typical circumstances that justify less restrictive criteria (e.g., exposure and organism sensitive assumptions are not relevant, warranting criteria recalculation).

The failure of EPA to build appropriate flexibility into the CTR is contrary to Presidential directives contained in the "Reinventing Environmental Regulation" issued in March 1995. By arbitrarily restricting the ability to modify criteria site-specifically (as outlined in detail in EPA's Water Quality Standards Handbook), EPA will maximize the economic impacts of this rulemaking rather than minimize the costs as required by applicable Executive Office directives and underlying regulatory provisions.

There is no legal or technical basis for restricting the modification of the Section 304(a) criteria. EPA has often referred to the ability to modify federal criteria as the means for ensuring that the criteria are appropriately applied. Similar to the "upset defense" that EPA was directed to include in nationwide effluent guidance to ensure that those requirements were not applied to inappropriate operational conditions, the Agency must grant the State of California the ability to modify the criteria for cause so that the criteria are not applied inappropriately. If this authority is not included in the rule, application of the CTR will clearly be overly broad and will exceed EPA's authority to establish appropriate water quality criteria.

Response to: CTR-020-003

EPA disagrees with this comment. We believe that the commenter misunderstood the cautionary language that was part of the proposed rule. The CTR does not preclude state adoption of criteria after the CTR has been promulgated. As EPA stated in the preamble to the proposed CTR, when the State has completed its own process, and EPA approves the State's new or revised criteria, EPA intends to stay the

CTR. Similarly, if the State adopts site-specific criteria (including site-specific Basin Plan criteria adopted by Regional Boards which have completed the State review and adoption process), and EPA has approved them based on their individual merits, EPA intends to stay that portion of the CTR that applies more general criteria to the specific site. Each individual stay on a site-specific basis would require federal rulemaking on a case-by-case basis, and generally require more detailed effort on the Agency's part than a statewide stay.

Moreover, it is possible that State-adopted criteria could become effective for CWA purposes within the State even prior to EPA approval or rulemaking, although this would change if a rule that EPA has recently proposed is promulgated as proposed. The "Alaska Rule," 64 Fed.Reg. 37072, July 9,1999. Until the Alaska Rule goes final, the State could adopt new or revised standards which are more stringent than the CTR, and those standards would be effective for CWA purposes within the state without any EPA action. Moreover, prior to a final Alaska Rule, the State could adopt statewide standards, and if EPA approved those standards and stayed the CTR based on them, then subsequent site-specific criteria would apply within the State when adopted by the State without requiring additional EPA approval or rulemaking. If the Alaska Rule becomes final as proposed, however, regardless of whether the CTR has been stayed, only state-adopted criteria which are more stringent than the otherwise applicable standards could be applied within the State, prior to EPA approval of those standards.

EPA further disagrees with any suggestion that the State itself could, in the future, modify CTR criteria. State adoption of site-specific criteria (including site-specific criteria adopted by the Regional Board which have completed the State adoption process) is a separate State action, under State law, which does not modify federal criteria. It would be up to EPA to modify the CTR to "make way" for the State's criteria, once those criteria have been approved by EPA. As discussed above, if the State were to adopt criteria that were more stringent than applicable CTR criteria, those criteria could be effective for CWA purposes within the State under State law, prior to EPA approval of such criteria or modification of the CTR.

With respect to EPA's compliance with applicable Executive Office directives see the preamble to the final rule.

Comment ID: CTR-021-007
Comment Author: LeBoeuf, Lamb, Green & MacRae
Document Type: Local Government
State of Origin: CA
Represented Org: City of Sunnyvale
Document Date: 09/25/97
Subject Matter Code: C-24 Site Specific Criteria
References: Letter CTR-021 incorporates by reference letter CTR-035
Attachments? Y
CROSS REFERENCES

Comment: It is with a sense of reluctance that Sunnyvale joins in CASA/Tri-TAC's adverse comments on the CTR and the EA, and Sunnyvale does so in a spirit of constructive criticism and with an expectation that the Agency will make the necessary adjustments in its approach towards the CTR before the final rule is promulgated. In addition, in the same spirit and with the same expectation, Sunnyvale would like to make the following points on its own behalf:

4. Need for Expedited Approval of Site-Specific objectives. Sunnyvale is dismayed by the seemingly intransigent position taken by EPA in the preamble to the CTR to the effect that EPA is unlikely to act expeditiously to stay the application of CTR-based criteria with regard to water bodies in California which are covered by future site-specific objectives adopted by California water pollution control agencies and approved by EPA once the CTR becomes a final rule. The Agency's position is inconsistent with its otherwise reasonable and laudable support for local water quality planning efforts. It seems to Sunnyvale that EPA should reward a local planning effort which has complied with all EPA guidance and has produced site-specific water quality objectives which are more appropriate to the affected water body than the state and nationwide criteria in the CTR. What is the reason for EPA's attitude?

EPA has in the past threatened to delay approving state adopted site-specific objectives once a federal promulgation is in place. These threats are generally made when EPA is attempting to urge a state or states to develop state criteria in order to avoid a federal promulgation. However, the principal policy reason to take this position disappears as soon as the statutorily-required criteria have been put in place by EPA. Thereafter, EPA should show support for California's efforts to make appropriate adjustments in EPA's CTR criteria, especially where the adverse impacts of the CTR are being mitigated by the regulatory relief afforded by the State's efforts.

If EPA is concerned about the resources required to go through notice-and-comment rulemaking before it can stay the effect of the CTR, then Sunnyvale urges EPA to seek means to simplify and streamline the EPA rulemaking process. We urge the Agency to apply the lessons learned in the Agency's implementation of the air program in this situation. A proposal by EPA in the final CTR to go directly to final rulemaking to stay the effect of particular CTR criteria would be justified where, in the future, the State and the Agency have complied with the exhaustive EPA guidance on development of scientifically-justifiable site specific water quality objectives. A simple notice of final rulemaking should be amply sufficient to comply with the requirements of the Administrative Procedures Act. We urge the Agency to use the creative resources of the office of General Counsel to explore the merits of this suggestion.

Unless EPA is able to act expeditiously to approve newly-developed site specific criteria, the Agency could be the bottleneck in implementing some highly desirable place-based watershed management planning. Please reconsider your position in this matter in the final rulemaking on the CTR.

Response to: CTR-021-007

EPA disagrees with this comment. We believe that the commenter misunderstood the cautionary language that was part of the proposed rule. The CTR does not preclude state adoption of criteria after the CTR has been promulgated. As EPA stated in the preamble to the proposed CTR, when the State has completed its own process, and EPA approves the State's new or revised criteria, EPA intends to stay the CTR. Similarly, if the State adopts site-specific criteria (including site-specific Basin Plan criteria adopted by Regional Boards which have completed the State review and adoption process), and EPA has approved them based on their individual merits, EPA intends to stay that portion of the CTR that applies more general criteria to the specific site. Each individual stay on a site-specific basis would require federal rulemaking on a case-by-case basis, and generally require more detailed effort on the Agency's part than a statewide stay.

Moreover, it is possible that State-adopted criteria could become effective for CWA purposes within the State even prior to EPA approval or rulemaking, although this would change if a rule that EPA has recently proposed is promulgated as proposed. The "Alaska Rule," 64 Fed.Reg. 37072, July 9,1999. Until the Alaska Rule goes final, the State could adopt new or revised standards which are more stringent

than the CTR, and those standards would be effective for CWA purposes within the state without any EPA action. Moreover, prior to a final Alaska Rule, the State could adopt statewide standards, and if EPA approved those standards and stayed the CTR based on them, then subsequent site-specific criteria would apply within the State when adopted by the State without requiring additional EPA approval or rulemaking. If the Alaska Rule becomes final as proposed, however, regardless of whether the CTR has been stayed, only state-adopted criteria which are more stringent than the otherwise applicable standards could be applied within the State, prior to EPA approval of those standards.

EPA also disagrees with the suggestion that EPA include provisions in this CTR rule to allow EPA to use directfinal rulemaking if it stays the CTR, or site-specific portions of the CTR, in the future. Since EPA cannot at this time predict what State criteria would replace CTR criteria when such stays are issued, EPA cannot predict whether such federal rulemakings might appropriately be adopted as direct final rules. Whether EPA meets the criteria for using direct final rulemaking in this context is a decision EPA will make when it undertakes such rulemaking.

Comment ID: CTR-026-006
Comment Author: Cal. Department of Fish & Game
Document Type: State Government
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-24 Site Specific Criteria
References:
Attachments? N
CROSS REFERENCES

Comment: 6. SITE SPECIFIC CRITERIA

The DFG does not object to the development of site-specific criteria provided that they are developed utilizing sound scientific methodologies. The proposed rule indicates that EPA will be reviewing several of the existing site-specific criteria already established in various Basin Plans throughout the State to determine consistency with the proposed rule. The DFG is very interested in participating in the development of site-specific criteria and request that we be included in reviewing any new site-specific proposals or revisiting existing criteria, if that is deemed necessary.

Response to: CTR-026-006

EPA has reviewed and approved some site-specific criteria already established in various Basin Plans throughout the State. The relationship between the CTR and site-specific criteria for the Sacramento River; the San Joaquin River; and the Grassland Water District, San Luis National Wildlife Refuge, and Los Banos State Wildlife Refuge are described in the preamble to the proposed CTR. (62 Fed.Reg. 42165-42166.) For the San Francisco Bay Region, see the response to CTR-016-001. EPA has not acted on any State-adopted site- specific criteria since the proposed CTR was published.

The comment author suggests that the California DFG participate in the development of any new and revised site-specific criteria. We agree with that comment and assume that California's normal process will provide for that participation.

Comment ID: CTR-032-002e
Comment Author: Las Gallinas Val. Sanitry Dist
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-24 Site Specific Criteria
References: Letter CTR-032 incorporates by reference letter CTR-035
Attachments? N
CROSS REFERENCES G-01; C-22; G-09; C-24a; K; G-04; G-05; G-02

Comment: Regulatory Flexibility and Relief

The District supports EPA's use of "sound science" and current data in developing the proposed criteria in the California Toxics Rule (CTR). The District strongly supports language in the Preamble that references and endorses recommendations of the State Task Forces including use in permitting of:

* reasonable potential analyses * dissolved metals criteria * translators * water effects ratios * site specific objectives * innovative TMDL processes such as effluent trading * performance based interim limits * chronic and acute mixing zones, and * compliance schedules in NPDES permits.

Response to: CTR-032-002e

EPA appreciates this comment which provides general support for the CTR process and for EPA's ongoing efforts to support State water quality standards development.

Comment ID: CTR-032-006b
Comment Author: Las Gallinas Val. Sanitry Dist
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-24 Site Specific Criteria
References: Letter CTR-032 incorporates by reference letter CTR-035
Attachments? N
CROSS REFERENCES C-01a

Comment: Mercury Criteria

The District supports the proposed revised human health criteria for mercury based on updated IRIS information. The District also supports EPA's decision (CTR P. 42180) not to apply the bioaccumulation factor (BAF) developed for the Great Lakes Initiative to the CTR mercury criteria. We agree that mercury methylation rates vary widely and are not well understood, particularly for amalgam related mercury. We believe that adoption of a national BAF under consideration as part of the "Mercury Study Report to Congress: SAB Review Draft" is inappropriate for California, particularly for the complex San Francisco Bay system. CDA recommends that EPA direct the State to develop a site specific objective

(SSO) for mercury for San Francisco Bay based on a site specific BAF and data on natural cleanup processes and methylation processes. The proposed CTR criteria should serve as interim criteria until the SSO is developed and adopted.

Response to: CTR-032-006b

EPA appreciates the support by this commenter of the human health criteria for mercury contained in the CTR. To the extent that this commenter goes further and comments on the criteria that might result in the future from EPA's Report to Congress on Mercury (December, 1997), EPA disagrees. EPA does not find it appropriate at this time to direct the State to develop site-specific criteria for mercury for San Francisco Bay (or any other specific waterbody), especially if the purpose is to forestall the application of national criteria that are not yet even defined. That decision is wholly within State authority, however; should they choose to develop site-specific criteria, these criteria would be subject to EPA review and approval based on their individual scientific validity.

Comment ID: CTR-035-014
Comment Author: Tri-TAC/CASA
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-24 Site Specific Criteria
References:
Attachments? N
CROSS REFERENCES

Comment: B. Criteria

pp. 42165-42166 -- Site-Specific Criteria We support the process described in the Preamble, whereby the State through its Regional Water Quality Control Boards (RWQCBs) may adopt site-specific criteria as amendments to Basin Plans, which are then subject to approval by the State Water Resources Control Board (SWRCB)and the State's Office of Administrative Law. We strongly urge EPA to make timely determinations for all site-specific criteria currently under review to ensure that appropriate action is taken by EPA before the CTR becomes a final regulation, as well as to conduct timely reviews for those site-specific criteria that may be submitted for approval in the future. We suggest that it is possible to simplify the regulatory process for staying the effect of the final CTR as regards any pollutant for which a site-specific objective has been developed by the State and approved by EPA. If EPA were to state in the final rule that it proposes to approve without further notice and comment any site-specific objective which has gone through the State and EPA approval process, we see no need for additional notice and comment before EPA publishes notice of final rulemaking to modify the CTR. This process is similar to the so-called "parallel processing" procedure used by EPA's air program with respect to the approval of amendments to State Implementation Plans.

We do, however, object to the statement in the Preamble regarding the adoption of site-specificcriteria after the CTR becomes final:

However, if EPA promulgates statewide federal criteria as proposed in this rule, prior to a decision on any State-adopted site-specific criteria, the more stringent of the two criteria would be used for water

quality program. Both federal and State water quality programs must be satisfied, and application of the more stringent of the two criteria would satisfy both.

Based on EPA's own guidance, we do not believe that it is necessary for EPA to select the more stringent of the two criteria, if the site-specific criteria is less stringent but has been developed in a scientifically defensible manner (EPA, 1994b). In addition, this policy directly contradicts the assumption made in the draft Economic Analysis that an "alternative regulatory approach" would be pursued, including the use of site-specific criteria. A discharger would not pursue the development of site-specific criteria as a regulatory relief option, as was assumed in the Economic Analysis for the CTR, if EPA's policy is to approve only more stringent site-specific criteria. EPA's policy would expressly prohibit site-specific objectives from providing any relief from compliance costs. We therefore recommend that EPA include a policy in the CTR indicating that the Agency will approve site-specific criteria submitted by the State that are scientifically defensible, even if they are less stringent than CTR criteria, particularly if they are necessary to avoid excessive compliance costs.

Response to: CTR-035-014

EPA disagrees with this comment. We believe that the commenter misunderstood the cautionary language that was part of the proposed rule. The CTR does not preclude state adoption of criteria after the CTR has been promulgated. As EPA stated in the preamble to the proposed CTR, when the State has completed its own process, and EPA approves the State's new or revised criteria, EPA intends to stay the CTR. Similarly, if the State adopts site-specific criteria (including site-specific Basin Plan criteria adopted by Regional Boards which have completed the State review and adoption process), and EPA has approved them based on their individual merits, EPA intends to stay that portion of the CTR that applies more general criteria to the specific site. Each individual stay on a site-specific basis would require federal rulemaking on a case-by-case basis, and generally require more detailed effort on the Agency's part than a statewide stay.

Moreover, it is possible that State-adopted criteria could become effective for CWA purposes within the State even prior to EPA approval or rulemaking, although this would change if a rule that EPA has recently proposed is promulgated as proposed. The "Alaska Rule," 64 Fed.Reg. 37072, July 9,1999. Until the Alaska Rule goes final, the State could adopt new or revised standards which are more stringent than the CTR, and those standards would be effective for CWA purposes within the state without any EPA action. Moreover, prior to a final Alaska Rule, the State could adopt statewide standards, and if EPA approved those standards and stayed the CTR based on them, then subsequent site-specific criteria would apply within the State when adopted by the State without requiring additional EPA approval or rulemaking. If the Alaska Rule becomes final as proposed, however, regardless of whether the CTR has been stayed, only state-adopted criteria which are more stringent than the otherwise applicable standards could be applied within the State, prior to EPA approval of those standards.

EPA further disagrees with any suggestion that the State itself could, in the future, modify CTR criteria. State adoption of site-specific criteria (including site-specific criteria adopted by the Regional Board which have completed the State adoption process) is a separate State action, under State law, which does not modify federal criteria. It would be up to EPA to modify the CTR to "make way" for the State's criteria, once those criteria have been approved by EPA. As discussed above, if the State were to adopt criteria that were more stringent than applicable CTR criteria, those criteria could be effective for CWA purposes within the State under State law, prior to EPA approval of such criteria or modification of the CTR.

EPA notes that State-adopted criteria (including site-specific criteria) which are less stringent that CTR

criteria may be approved by EPA and result in a stay of the CTR if such criteria are based on sound scientific rationale which ensures that designated uses will be protected.

EPA also disagrees with the suggestion that EPA include provisions in this CTR rule to allow EPA to use direct final rulemaking if it stays the CTR, or site-specific portions of the CTR, in the future. Since EPA cannot at this time predict what State criteria would replace CTR criteria when such stays are issued, EPA cannot predict whether such federal rulemakings might appropriately be adopted as direct final rules. Whether EPA meets the criteria for using direct final rulemaking in this context is a decision EPA will make when it undertakes such rulemaking.

This commenter also urged EPA to act, prior to finalizing the CTR, to approve or disapprove any State-adopted site-specific criteria which had been submitted to EPA but EPA had not yet acted upon. This has not been possible, due to the focus of resources on the CTR itself. However, EPA reiterates that any criterion adopted by the State, and currently in effect under State law, which is more stringent than the comparable CTR criterion, could be used for water quality programs within the State without any stay of the CTR.

Comment ID: CTR-037-001a
Comment Author: Hampton Roads Sanitation Dist.
Document Type: Sewer Authority
State of Origin: VA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-24 Site Specific Criteria
References:
Attachments? N
CROSS REFERENCES G-01

Comment: 1. The rule proposes that the more stringent of site-specific and national criteria be used in determining reasonable potential to exceed water quality standards and in development of limits where site-specific criteria have not yet been established. This proposal ignores the scientific basis of a site-specific criterion and that such a criterion is specifically more relevant and appropriate than a national criterion if derived correctly. EPA has acknowledged that national criteria can be more stringent than necessary to protect designated uses because they are designed to protect a wide variety of surface waters, and that a site-specific criterion can be sufficiently protective while being less stringent than a national criterion (Water Effect Ratio Guidance, 1994). This rule is arbitrarily dismissing the use of site-specific criteria which may be more technically defensible than national criteria, while being protective.

Response to: CTR-037-001a

EPA disagrees with this comment. EPA notes that State-adopted criteria (including site-specific criteria) which are less stringent that CTR criteria may be approved by EPA and result in a stay of the CTR if such criteria are based on sound scientific rationale which ensures that designated uses will be protected. The CTR does not preclude state adoption of criteria, including criteria which may be less stringent than CTR criteria. State-adopted criteria(including site-specific criteria) which are less stringent that CTR criteria may be approved by EPA and result in a stay of the CTR if such criteria are based on sound scientific rationale which ensures that designated uses will be protected.

To the extent that this commenter is concerned that the CTR criteria supercede existing State-adopted site-specific criteria which are less stringent than CTR criteria and have not been approved by EPA, EPA agrees that this is the effect of adoption of the CTR, but disagrees that this provides a basis for "promulgating around" such unapproved site-specific criteria. Because EPA has not completed it evaluation of these criteria and EPA needs to have criteria in place to implement section 303(c)(2)(B), EPA has chosen to put in place criteria based on EPA's national section 304(a) criteria recommendations to most efficiently ensure protection for all California waters. EPA will then complete its review of site-specific criteria. To do otherwise would risk that coverage did not occur for some waters should EPA not find the site-specific value to be scientifically defensible. However, as stated in the preamble to the proposed CTR, EPA will make a determination on all State-adopted site-specific criteria which have been submitted to EPA for review. When EPA approves any new or revised State criteria, EPA intends to stay the CTR. It was not possible for EPA to make determinations on pending site-specific criteria prior to the final CTR.

Comment ID: CTR-038-007
Comment Author: Sonoma County Water Agency
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-24 Site Specific Criteria
References:
Attachments? Y
CROSS REFERENCES

Comment: 6. Separate, site-specific human health criteria for carcinogens should be adopted for Schell Slough based on a 10 (-4) risk level and for Second Napa Slough based on a 10 (-5) risk level. Based on effluent sampling performed by the District, the District would be unable to comply with criteria for numerous carcinogens based on a 10 (-6) risk level (alpha-BHC, gamma-BHC, bromodichloromethane, indeno(1,2,3-cd)pyrene, chlordane, and 4,4'-DDT) without costly end-of-pipe controls. These controls would not produce a commensurate environmental benefit. At a 10 (-4) risk level, the District's discharge would not cause an in-stream exceedance of these criteria in Schell Slough, and at a 10 (-5) risk level, the discharge would not cause an in-stream exceedance in Second Napa Slough. The District does not believe these sloughs are heavily fished and therefore criteria based on 10 (-4) and 10 (-5) risk levels would likely provide greater protection than indicated by the risk levels. The District notes that none of these constituents were identified in EPA's economic analysis as significant contributors to baseline cancer risks for recreational anglers consuming San Francisco Bay fish (see Exhibit 8-7 in EPA's economic analysis).

Response to: CTR-038-007

EPA disagrees that it must or should establish separate, site-specific criteria in this rule for receiving waters where dischargers may be unable to meet the CTR criteria. In accordance with 40 CFR 131.11, criteria must be based on sound scientific rationale and must protect the designated use. There is no provision for EPA to consider the attainability or the scientific validity of the criteria with regard to specific dischargers or class of dischargers in adopting ambient water quality criteria in the CTR. Economic factors may be considered in designating uses (40 CFR 131.10); however, they may not be used to justify criteria which are not protective of those uses. The CTR itself does not adopt uses or

modify any uses previously adopted by the State. EPA presumes that the State has designated appropriate uses for its waters. Proposals to revise State-adopted uses must be brought to the State pursuant to its procedures for review of its water quality standards.

That being said, it should nevertheless be understood that EPA does support State adoption of site-specific criteria. As explained in the preamble to the proposed CTR, and further discussed in response to CTR-016-002, EPA will work with the State to approve acceptable State-adopted criteria (including site-specific criteria) and to stay the CTR where EPA has approved such State criteria.

With respect to risk level applicable to human health criteria when, as here, EPA establishes a water quality standard, EPA intends in its discretion to use a risk level of 1 x 10-6, although the State may in its discretion choose another risk level for protection of human health, if the State has appropriately consulted the public. As discussed in responses to CTR-011-0001a and CTR-058-001 (Category C-13; Risk Level), EPA follows the risk-level policies of the affected state, when promulgating criteria as regulations.

The comment that the carcinogens that are asserted to be compliance problems are not identified in EPA's economic analysis as a significant contributor to baseline cancer risks for recreational anglers consuming San Francisco Bay fish may merely reflect a lack of information on these pollutants in sample locations that were selected for the benefits analysis. The fact that no baseline risks were found for the purposes of the analysis does not necessarily mean that the risk from these pollutants do not exist anywhere in the Bay or should not be prevented.

Comment ID: CTR-038-008a
Comment Author: Sonoma County Water Agency
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-24 Site Specific Criteria
References:
Attachments? Y
CROSS REFERENCES E-01c; R; S; T

Comment: 7. Separate, sites-specific aquatic life criteria for copper and human health criteria for mercury should be adopted for Schell Slough, or alternatively EPA should specify implementation procedures for these criteria that will preclude unreasonable controls such as end-of-pipe treatment. To comply with the Clean Water Act and EPA regulations, EPA should consider specific water bodies. To fulfill the spirit of Presidential Executive Order 12866 and the requirements of the Unfunded Mandates Reform Act and the Regulatory Flexibility Act, EPA should evaluate regulatory alternatives based on an analysis of costs and benefits. Based on the assessment of costs and benefits described in "3" above, EPA should either adopt the criteria that is currently achieved, or alternatively specify implementation procedures that would allow the current discharge to continue (e.g., allowable Mixing zones and averaging periods and, for copper, a translator and water-effect ratio). Again, the District is amenable to continuing to address these constituents through pollution prevention measures and to assessing the actual impacts of these constituents in Schell Slough. Without EPA specifying such implementation procedures in the CTR, it is possible that the CTR could impose significant costs on the District (and the other small communities its serves) without providing a commensurate environmental benefit. In that

case, the CTR would be inconsistent with the Clean Water Act, EPA regulations, Presidential Executive Order 12866, the Unfunded Mandates Reform Act and the Regulatory Flexibility Act.

Response to: CTR-038-008a

EPA disagrees with this commenter's suggestion that separate, site-specific criteria for copper and mercury be adopted for Schell Slough, based on considerations of costs and benefits. EPA has conducted an analysis of costs and benefits for this rule pursuant to Executive Order 12866; however, the criteria themselves are not based on economic considerations. In accordance with 40 CFR 131.11, criteria must be based on sound scientific rationale and must protect the designated use. There is no provision for EPA to consider the attainability or the scientificvalidity of the criteria with regard to specific dischargers or class of dischargers in adopting ambient water quality criteria in the CTR. Economic factors may be considered in designating uses (40 CFR 131.10); however, they may not be used to justify criteria which are not protective of those uses.

That being said, it should nevertheless be understood that EPA does support the State's adoption of site-specific criteria. As explained in the preamble to the proposed CTR, and further discussed in response to CTR-016-002, EPA will work with the State to approve acceptable State-adopted criteria (including site-specific criteria) and to stay the CTR when EPA has approved such State criteria.

This commenter further suggests that EPA specify implementation procedures for certain criteria as an alternative to the proposed site-specific criteria. The CTR was not intended to include implementation provisions. The CTR is promulgated to add numeric criteria for priority toxic pollutants where they did not exist. To the extent that this commenter is proposing implementation provisions that are not inconsistent with CWA requirements, such provisions may be considered by the State for inclusion in its implementation plan (Draft Policy for Implementation of Toxics Standards for Inland Surface Waters and Enclosed Bays and Estuaries of California, September 11, 1997).

Finally, regarding the commenter's assertion that the CTR could be inconsistent with Executive Order 12866, the Regulatory Flexibility Act and the Unfunded Mandates Reform Act without further revision (such as suggested by the commenter), see the discussion of EPA's compliance with these requirements in the preamble to the final rule.

Comment ID: CTR-039-001
Comment Author: San Francisco BayKeeper
Document Type: Environmental Group
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-24 Site Specific Criteria
References:
Attachments? N
CROSS REFERENCES

Comment: As EPA notes in the preamble to the rule, "adoption of water quality standards is primarily theresponsibility of the states." 62 Fed. Reg. at 42166. In exercising that responsibility, the States have considerable discretion in applying the scientific and technical data available to them. A pervasive concern with the proposed rule is a lack of consistency by EPA in according appropriate deference to the

State of California's prior decisions, already approved by EPA. Where convenient, the proposed rule relies on the State's previous efforts, including for example the State's preference that health risks be based upon a 10-6 risk level and the novel notion of interim permit limits. However, as regards the rule's most important feature and indeed the only raison d'etre for the rule - the numeric criteria - EPA almost completely abandons the State's prior technical determinations on the numeric criteria appropriate for California where the State' s prior decision was more protective of the environment and human health then the currently proposed criteria. This is true for EPA's decision to go from total recoverable metals criteria to dissolved metals criteria, a proposal that is inconsistent with the State's prior approved decision and which will result in significant increases in total pollutants allowed to be discharged into San Francisco Bay and elsewhere in the State. The State's prior decisions also were abandoned for dioxin and mercury, including failing to consider all of the dioxin congeners, failing to consider the bioaccumulation of mercury (a well-documented characteristic of that potent toxic pollutant) and failing to consider the higher rates of fish consumption found in California and in discrete populations of subsistence and recreational anglers.

Response to: CTR-039-001

EPA disagrees with the suggestion that EPA should have deferred to the State's prior WQS decisions, previously approved by EPA. To the extent that the commenter is referring to criteria in the Inland Surface Waters Plan (ISWP) and the Enclosed Bays and Estuaries Plan (EBEP), EPA responds that those were considered along with all of the other scientific information that makes up the record for this rule. However, those statewide plans are no longer in effect, and EPA is not bound by them. EPA adopts criteria based on sound scientific rationale, which protect the designated uses of waters of the United States in California. Additional scientific information has become available for some pollutants since California adopted the ISWP and EBEP in 1991, which forms the basis for adopting CTR criteria which differ from some of the criteria previously adopted for the same waterbodies.

EPA further disagrees with passing statements in this comment criticizing EPA's use of dissolved rather than total recoverable metals, failure to consider all dioxin congeners, failure to consider bioaccumulation of mercury and failure to consider higher rates of fish consumption in California. For a detailed discussion of the points made regarding dioxin, see response to CTR-002-003 and CTR-002-006. Regarding EPA's use of dissolved rather than total recoverable metals see response to CTR-026-004. Regarding bioaccumulative properties of mercury, see CTR-002-007b. Regarding rates of fish consumption, see response to CTR-002-002a and the preamble of the final rule.

To the extent that this comment is referring to site-specific criteria for San Francisco Bay, EPA is revising the final CTR to ensure that EPA-approved State-adopted site-specific criteria shall remain in effect and not be superceded by CTR criteria for the same pollutants for those waters of the Bay where such site-specific criteria are currently in effect. See response to CTR-016-001.

Comment ID: CTR-039-009
Comment Author: San Francisco BayKeeper
Document Type: Environmental Group
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-24 Site Specific Criteria
References:

Attachments? N
CROSS REFERENCES

Comment: VII. EPA CAN ADJUST ITS PROPOSED RULE TO REFLECT REGIONAL CONDITIONS AND PROTECT USES IN SPECIFIC REGIONS

As EPA notes in the preamble, when it considered the State's 1991 criteria, it approved the proposed criteria for selenium for everywhere in the State except San Francisco Bay and the Delta. 62 Fed. Reg. at 42164. There is no reason that EPA cannot adjust its proposed to rule to reflect the available scientific data that may only be available in certain regions of the State, including for example, data relating to mercury bioaccumulation in San Francisco Bay fish. The concept of treating dischargers from different areas fairly should not be applied so as to punish those regional ecosystems where agencies have been more proactive in collecting necessary data. Rather, dischargers should be treated equally stringently where data from one region indicates that uses are threatened by a particular pollutant throughout the State.

CONCLUSION

In conclusion, BayKeeper is very concerned with the proposed rule. The State obviously must have numeric criteria for toxic pollutants. Great strides have been made, especially in the San Francisco Bay area, to reduce the mass of toxic pollutants entering the Bay. The proposed criteria likely will bring to a halt the most innovative programs to reduce toxic pollution. Instead of promoting innovation and driving dischargers' ability to achieve, some day, the penultimate goal of the Clean Water Act to eliminate all discharges of pollution to the Nation's waters, the proposed rule will only perpetuate mediocre toxic pollution control efforts and fail to reverse the ecological damage from toxic contamination, including dangerous levels of contaminants in fish already observed in Bay fish and the continuing decline of aquatic ecosystems around the State.

BayKeeper appreciates this opportunity to express our views on the proposed rule. If you have any questions, please feel free to call me at 1-800--KEEP-BAY.

Response to: CTR-039-009

EPA disagrees with this comment. In 1991, when EPA took action on the first phase of the Enclosed Bays and Estuaries Plan (EBEP), EPA did not disapprove the salt water aquatic life criterion for selenium. Instead, EPA made it clear that use of that criterion in permits issued for the San Francisco Bay and Delta would be unacceptable. This was consistent with the EBEP provision which stated that more stringent objectives and control measures could be applied by the Regional Boards in some estuarine waters. (Letter of November 6, 1991, to W. Don Maughan, Chairman, State Water Resources Control Board, from Daniel W. McGovern Regional Administrator, EPA RegionIX.) In December 1992, EPA adopted freshwater aquatic life criterion for the San Francisco Bay Estuary as part of the National Toxics Rule (NTR) because the San Francisco Bay Regional board had not itself specified that it would apply the freshwater criterion, consistent with EPA's November 6, 1991 letter. (57 Fed. Reg. 60898.) This was not the promulgation of a site-specific criterion for the San Francisco Bay and Delta, however. Although the freshwater criterion was the same as the freshwater selenium criterion in the Inland Surface Water Plan (ISWP), it was also EPA's national fresh water selenium criterion. As explained in the Preamble to the final NTR (Id.), EPA simply was unable adopt site-specific criteria as part of the NTR. The same is true of the CTR.

As noted in footnotes to the CTR selenium criterion, the CTR does not supercede that provision of the NTR (40 CFR 131.36(d)(10)).

Regarding general concerns included in this comment regarding the effect of the CTR on criteria developed for San Francisco Bay, see responses to CTR-016-001 and CTR-002-003.

Comment ID: CTR-040-050
Comment Author: County of Sacramento Water Div
Document Type: Storm Water Auth.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-24 Site Specific Criteria
References: Letter CTR-040 incorporates by reference letter CTR-027
Attachments? Y
CROSS REFERENCES

Comment: The Preamble to the California Toxics Rule (CTR), and the rules accompanying Economic Analysis (EA), place a great deal of emphasis on the ability of dischargers to use alternative regulatory approaches to comply with CTR criteria if the cost of treatment technology was prohibitively expensive. For example, the EA assumes that, if the estimated annualized cost for removing a pollutant exceeded a cost trigger,(*1) "dischargers would explore the use of alternative regulatory approaches to comply with CTR-based effluent limits." EA at.pg. 4 (emphasis added). Based on this assumption, no treatment cost was estimated for the facility.(*2)

The types of alternative regulatory approaches assumed available for dischargers in California include phased total maximum daily loads (TMDLs), water quality standard variances, site-specific criteria, change in designated use, and alternative mixing zones. EA at pg. 4-5. The following sections will discuss each of EPA's proposed methods for regulatory relief and explain whether or not these methods can truly be used to provide relief from the CTR-based permit limits as anticipated by EPA. It should be noted that the actual language of the rule itself does not mention any of the methods of regulatory relief. Therefore, this analysis will be based solely upon the language contained in the Preamble to the CTR.

Site Specific Criteria

Another one of the avenues of potential regulatory relief discussed in the Preamble to the CTR is the adoption of site-specific water quality criteria. The Preamble, provides that the "State has the discretion to develop site-specific criteria when appropriate e.g., when statewide criteria appear over- or under-protective of designated uses. The Preamble goes on to explain the site-specific criteria adoption process as follows:

Periodically, the State through its RWQCBs will adopt site-specific criteria for priority toxic pollutants within respective Basin Plans. These criteria are intended to be effective throughout the Basin or throughout a designated water body. Under California law, these criteria must be publicly reviewed and approved by the RWQCB, the SWRCB, and the State's Office of Administrative Law (OAL). Once this adoption process is complete, the criteria become State law. These criteria must be submitted to the EPA Regional Administrator for review and approval under CWA section 303. These criteria are usually submitted to EPA as part of a RWQCB Basin Plan Amendment, after the Amendment has been adopted

under the State's process and has become State law. CTR Preamble at pg. 42165.

The Preamble explains that the State of California has recently reviewed and updated all of its RWQCB Basin Plans. All of these Basin Plans, some of which contain site-specific criteria, have completed the State review and adoption process and have been submitted to EPA for review and approval. The key to whether or not these site-specific criteria will provide regulatory relief is when the EPA approval/disapproval occurs. Three different timing scenarios and results are possible:

1. If EPA approves any State-adopted site-specific criteria before promulgation of the final CTR is published, then the EPA Administrator may make a finding in that final rule that it will be unnecessary to promulgate criteria for the approved site-specific pollutants and associated water bodies.

2. EPA disapproves any State-adopted site-specific criteria, the proposed statewide criteria contained in the CTR would apply for those pollutants and associated water bodies instead of the site-specific criteria.

3. However, if EPA promulgates statewide federal criteria as proposed in the CTR, prior to a decision on any State-adopted site-specific criteria, the more stringent of the two criteria would be used for water quality programs. Both federal and State water quality programs must be satisfied, and application of the more stringent of the two criteria would satisfy both. CTR Preamble at pg. 42165.

Thus, the only way less stringent site specific criteria can be used for regulatory relief is if those criteria are approved by EPA prior to the publication of the final CTR. otherwise, either the CTR or the more stringent of the two (CTR vs. site-specific) criteria apply.

One final note regarding site-specific criteria is that the Preamble to the CTR restricts the ability to use native aquatic life as a way to set site-specific criteria. Instead of allowing a discharger to substitute local species from the receiving waters into which it discharges, the Preamble only allows a discharger to supplement the eight specified families of aquatic life required for criteria development with the addition of native species.(*9) It is doubtful whether this requirement will aid dischargers who are seeking regulatory relief.

(*1) This coat trigger is $200 per toxic pounds-equivalent for a facility under the low-end scenario, and $500 per toxic pounds-equivalent for a category of dischargers under the high-end scenario. See EA at pg. 4.

(*2) In addition, pollutant load reductions were not calculated or credited for any pollutant for which an alternative regulatory approach was pursued. Id.

(*9) "A minimum data set of eight specified facilities is required for criteria development (details are given in the 1985 Guidelines, page 22). The eight specific families are intended to be representative of a wide spectrum of aquatic life. For this reason it is not necessary that the specific organisms tested be actually present in the water body. States may develop site-specific criteria unsing native species, provided that the broad spectrum represented be the eight families is maintained. All aquatic organisms and their common uses are meant to be considered, but not necessarily protected, if relevant data are available." CTR Preamble at pg. 42168.

Response to: CTR-040-050

EPA disagrees with this comment. See response to CTR-004-008.

Comment ID: CTR-041-046
Comment Author: Sacramento Reg Cnty Sanit Dist
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-24 Site Specific Criteria
References:
Attachments? N
CROSS REFERENCES

Comment: The Preamble to the California Toxics Rule (CTR), and the rules accompanying Economic Analysis (EA), place a great deal of emphasis on the ability of dischargers to use alternative regulatory approaches to comply with CTR criteria if the cost of treatment technology was prohibitively expensive. For example, the EA assumes that, if the estimated annualized cost for removing a pollutant exceeded a cost trigger,(*1) "dischargers would explore the use of alternative regulatory approaches to comply with CTR-based effluent limits." EA at.pg. 4(emphasis added). Based on this assumption, no treatment cost was estimated for the facility.(*2)

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Periodically, the State through its RWQCBs will adopt site-specific criteria for priority toxic pollutants within respective Basin Plans. These criteria are intended to be effective throughout the Basin or throughout a designated water body. Under California law, these criteria must be publicly reviewed and approved by the RWQCB, the SWRCB, and the State's Office of Administrative Law (OAL). Once this adoption process is complete. the criteria become State law. These criteria must be submitted to the EPA Regional Administrator for review and approval under CWA section 303. These criteria are usually submitted to EPA as part of a RWQCB Basin Plan Amendment, after the Amendment has been adopted under the State's process and has become State law. CTR Preamble at pg. 42165.

The Preamble explains that the State of California has recently reviewed and updated all of its RWQCB Basin Plans. All of these Basin Plans, some of which contain site-specific criteria, have completed the State review and adoption process and have been submitted to EPA for review and approval. The key to whether or not these site-specific criteria will provide regulatory relief is when the EPA approval/disapproval occurs. Three different timing scenarios and results are possible:

1. If EPA approves any State-adopted site-specific criteria before promulgation of the final CTR is published, then the EPA Administrator may make a finding in that final rule that it will be unnecessary to promulgate criteria for the approved site-specific pollutants and associated water bodies. 2. EPA disapproves any State-adopted site-specific criteria, the proposed statewide criteria contained in the CTR would apply for those pollutants and associated water bodies instead of the site-specific criteria. 3. However, if EPA promulgates statewide federal criteria as proposed in the CTR, prior to a decision on any State-adopted site-specific criteria, the more stringent of the two criteria would be used for water quality programs. Both federal and State water quality programs must be satisfied, and application of the more stringent of the two criteria would satisfy both. CTR Preamble at pg. 42165.

Thus, the only way less stringent site specific criteria can be used for regulatory relief is if those criteria are approved by EPA prior to the publication of the final CTR. Otherwise, either the CTR or the more stringent of the two (CTR vs. site-specific) criteria apply.

One final note regarding site-specific criteria is that the Preamble to the CTR restricts the ability to use native aquatic life as a way to set site-specific criteria. Instead of allowing a discharger to substitute local species from the receiving waters into which it discharges, the Preamble only allows a discharger to supplement the eight specified families of aquatic life required for criteria development with the addition of native species.(*9) It is doubtful whether this requirement will aid dischargers who are seeking regulatory relief.

(*1) This coat trigger is $200 per toxic pounds-equivalent for a facility under the low-end scenario, and $500 per toxic pounds-equivalent for a category of dischargers under the high-end scenario. See EA at pg. 4.

(*2) In addition, pollutant load reductions were not calculated or credited for any pollutant for which an alternative regulatory approach was pursued. Id.

(*9) "A minimum data set of eight specified facilities is required for criteria development (details are given in the 1985 Guidelines, page 22). The eight specific families are intended to be representative of a wide spectrum of aquatic life. For this reason it is not necessary that the specific organisms tested be actually present in the water body. States may develop site-specific criteria using native species, provided that the broad spectrum represented be the eight families is maintained. All aquatic organisms and their common uses are meant to be considered, but not necessarily protected, if relevant data are available." CTR Preamble at pg. 42168.

Response to: CTR-041-046

EPA disagrees with this comment. See response to CTR-004-008.

Comment ID: CTR-043-006a
Comment Author: City of Vacaville
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: C-24 Site Specific Criteria
References:

Attachments? Y
CROSS REFERENCES C-13

Comment: 6. EPA should adopt separate, site-specific human health criteria for Old Alamo Creek based on a 10 (-4) risk level. As previously indicated the City would have to construct costly end-of-pipe controls to comply with the human health criteria for several carcinogens. The subject criteria are based on a cancer risk level of 10 (-6). These controls would not produce a commensurate environmental benefit. At a 10 (-4) risk level, the City's discharge would not cause an in-stream exceedance of these criteria. The City does not believe Old Alamo Creek is heavily fished and therefore criteria based on a 10 (-4) risk level would likely provide greater protection than indicated by the risk level. The City notes that none of these carcinogens were identified in EPA's economic analysis as a significant contributor to baseline cancer risks for recreational anglers consuming freshwater fish in California (see Exhibit 8-9 in EPA's economic analysis).

Response to: CTR-043-006a

EPA disagrees with this commenter's suggestion that separate, site-specific human health criteria be adopted for Old Alamo Creek, based on considerations of costs and benefits. EPA has conducted an analysis of costs and benefits for this rule pursuant to Executive Order 12866 (see discussion in preamble to final rule); however, the criteria themselves are not based on economic considerations. In accordance with 40 CFR 131.11, criteria must be based on sound scientific rationale and must protect the designated use. There is no provision for EPA to consider the attainability or the scientific validity of the criteria with regard to specific dischargers or class of dischargers in adopting ambient water quality criteria in the CTR. Economic factors may be considered in designating uses (40 CFR 131.10); however, they may not be used to justify criteria which are not protective of those uses.

That being said, it should nevertheless be understood that EPA does support the State's adoption of site-specific criteria. As explained in the preamble to the proposed CTR, and further discussed in response to CTR-016-002, EPA will work with the State to approve acceptable State-adopted criteria (including site-specific criteria) and to stay the CTR when EPA has approved such State criteria.

With respect to risk level applicable to human health criteria when, as here, EPA establishes a water quality standard, EPA intends in its discretion to use a risk level of 1 x 10-6, although the State may in its discretion choose another risk level for protection of human health, if the State has appropriately consulted the public. As discussed in responses to CTR-011-001a and CTR-058-001 (Category C-13; Risk Level), EPA follows the risk-level policies of the affected state, when promulgating criteria as regulations.

See also response to CTR-043-006b.

Comment ID: CTR-044-007b
Comment Author: City of Woodland
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: C-24 Site Specific Criteria
References:

Attachments? Y
CROSS REFERENCES C-13

Comment: We have reviewed the proposed CTR and offer the following comments:

6. EPA should adopt separate, site-specific human health criteria for Tule Canal based on a 10 (-4) risk level. Based on effluent sampling, the City would have to construct costly end-of-pipe controls to comply with criteria for aldrin (and perhaps other carcinogens) based on a 10 (-6) risk level. These controls would not produce a commensurate environmental benefit. At a 10 (-4) risk level, the City's discharge would not cause an in-stream exceedance of these criteria in Tule Canal. The City does not believe Tule Canal is heavily fished and therefore criteria based on a 10 (-4) risk level would likely provide greater protection than indicated by the risk level. The City notes that aldrin was not identified in EPA's economic analysis as a significant contributor to baseline cancer risks for recreational anglers consuming freshwater fish in California (see Exhibit 8-9 in EPA's economic analysis).

Response to: CTR-044-007b

EPA disagrees with this commenter's suggestion that separate, site-specific human health criteria be adopted for Tule Canal, based on considerations of costs and benefits. EPA has conducted an analysis of costs and benefits for this rule pursuant to Executive Order 12866 (see discussion in preamble to final rule); however, the criteria themselves are not based on economic considerations. In accordance with 40 CFR 131.11, criteria must be basedon sound scientific rationale and must protect the designated use. There is no provision for EPA to consider the attainability or the scientific validity of the criteria with regard to specific dischargers or class of dischargers in adopting ambient water quality criteria in the CTR. Economic factors may be considered in designating uses (40 CFR 131.10); however, they may not be used to justify criteria which are not protective of those uses.

That being said, it should nevertheless be understood that EPA does support the State's adoption of site-specific criteria. As explained in the preamble to the proposed CTR, and further discussed in response to CTR-016-002, EPA will work with the State to approve acceptable State-adopted criteria (including site-specific criteria) and to stay the CTR when EPA has approved such State criteria.

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See also response to CTR-044-007a.

Comment ID: CTR-044-041
Comment Author: City of Woodland
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97

Subject Matter Code: C-24 Site Specific Criteria
References:
Attachments? N
CROSS REFERENCES

Comment: The Preamble to the California Toxics Rule (CTR), and the rules accompanying Economic Analysis (EA), place a great deal of emphasis on the ability of dischargers to use alternative regulatory approaches to comply with CTR criteria if the cost of treatment technology was prohibitively expensive. For example, the EA assumes that, if the estimated annualized cost for removing a pollutant exceeded a cost trigger,(*1) "dischargers would explore the use of alternative regulatory approaches to comply with CTR-based effluent limits." EA at.pg. 4(emphasis added). Based on this assumption, no treatment cost was estimated for the facility.(*2)

The types of alternative regulatory approaches assumed available for dischargers in California include phased total maximum daily loads (TMDLs), water quality standard variances, site-specific criteria, change in designated use, and alternative mixing zones. EA at pg. 4-5. The following sections will discuss each of EPA's proposed methods for regulatory relief and explain whether or not these methods can truly be used to provide relief from the CTR-based permit limits as anticipated by EPA. It should be noted that the actual language of the rule itself doesnot mention any of the methods of regulatory relief. Therefore, this analysis will be based solely upon the language contained in the Preamble to the CTR.

Site Specific Criteria

Another one of the avenues of potential regulatory relief discussed in the Preamble to the CTR is the adoption of site-specific water quality criteria. The Preamble, provides that the "State has the discretion to develop site-specific criteria when appropriate e.g., when statewide criteria appear over- or under-protective of designated uses. The Preamble goes on to explain the site-specific criteria adoption process as follows:

Periodically, the State through its RWQCBs will adopt site-specific criteria for priority toxic pollutants within respective Basin Plans. These criteria are intended to be effective throughout the Basin or throughout a designated water body. Under California law, these criteria must be publicly reviewed and approved by the RWQCB, the SWRCB, and the State's Office of Administrative Law (OAL). Once this adoption process is complete. the criteria become State law. These criteria must be submitted to the EPA Regional Administrator for review and approval under CWA section 303. These criteria are usually submitted to EPA as part of a RWQCB Basin Plan Amendment, after the Amendment has been adopted under the State's process and has become State law. CTR Preamble at pg. 42165.

The Preamble explains that the State of California has recently reviewed and updated all of its RWQCB Basin Plans. All of these Basin Plans, some of which contain site-specific criteria, have completed the State review and adoption process and have been submitted to EPA for review and approval. The key to whether or not these site-specific criteria will provide regulatory relief is when the EPA approval/disapproval occurs. Three different timing scenarios and results are possible:

1. If EPA approves any State-adopted site-specific criteria before promulgation of the final CTR is published, then the EPA Administrator may make a finding in that final rule that it will be unnecessary to promulgate criteria for the approved site-specific pollutants and associated water bodies. 2. EPA disapproves any State-adopted site-specific criteria, the proposed statewide criteria contained in the CTR would apply for those pollutants and associated water bodies instead of the site-specific criteria. 3.

However, if EPA promulgates statewide federal criteria as proposed in the CTR, prior to a decision on any State-adopted site-specific criteria, the more stringent of the two criteria would be used for water quality programs. Both federal and State water quality programs must be satisfied, and application of the more stringent of the two criteria would satisfy both. CTR Preamble at pg. 42165.

Thus, the only way less stringent site specific criteria can be used for regulatory relief is if those criteria are approved by EPA prior to the publication of the final CTR. Otherwise, either the CTR or the more stringent of the two (CTR vs. site-specific) criteria apply.

One final note regarding site-specific criteria is that the Preamble to the CTR restricts the ability to use native aquatic life as a way to set site-specific criteria. Instead of allowing a discharger to substitute local species from the receiving waters into which it discharges, the Preamble only allows a discharger to supplement the eight specified families of aquatic life required for criteria development with the addition of native species.(*9) It is doubtful whether this requirement will aid dischargers who are seeking regulatory relief.

(*1) This coat trigger is $200 per toxic pounds-equivalent for a facility under the low-end scenario, and $500 per toxic pounds-equivalent for a category of dischargers under the high-end scenario. See EA at pg. 4.

(*2) In addition, pollutant load reductions were not calculated or credited for any pollutant for which an alternative regulatory approach was pursued. Id.

(*9) "A minimum data set of eight specified facilities is required for criteria development (details are given in the 1985 Guidelines, page 22). The eight specific families are intended to be representative of a wide spectrum of aquatic life. For this reason it is not necessary that the specific organisms tested be actually present in the water body. States may develop site-specific criteria using native species, provided that the broad spectrum represented be the eight families is maintained. All aquatic organisms and their common uses are meant to be considered, but not necessarily protected, if relevant data are available." CTR Preamble at pg. 42168.

Response to: CTR-044-041

Comment ID: CTR-050-005a
Comment Author: Sonnenschein Nath & Rosenthal
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org: American Petrol
Document Date: 09/26/97
Subject Matter Code: C-24 Site Specific Criteria
References:
Attachments? N
CROSS REFERENCES G-07

Comment: II. EPA Should Allow Variances and Site-Specific modifications.

Beyond the issue of whether EPA has the authority to issue the proposed rule, there are other significant problems with the proposal. For example, the Agency has made the inexplicable decision not to include provisions that would allow for issuance of variances or site-specific modifications to the criteria. This is

despite the Agency's recognition that a variance procedure is an "important procedure to assist the State in effectively implementing water quality standards." (62 Fed. Reg. at 42185). EPA gives absolutely no explanation for its decision not to allow use of this procedure. Moreover, the Agency concedes that "promulgation of this federal rule removes most of the flexibility available to the State for modifying its standards on a discharger-specific or stream-specific basis. " Instead, an applicant would have to ask EPA to begin a "federal rulemaking on a case-by-case basis to change the federal rule." (62 Fed. Reg. at 42186) EPA makes it quite clear that applicants should not expect any relief from that avenue, because the Agency simply has more important things to do:

Because of the time consuming nature of reviewing such requests, limited federal resources, and the need for the Agency to move into other priority program areas in establishing environmental controls, EPA alerts California and the public that a prompt Agency response is unlikely.

Despite this cavalier dismissal of the need for actually acting on variance and site criteria applications, the Agency does not hesitate to mention those mechanisms in its economic analysis as being available to moderate the impact of the proposed rule. The Agency specifically mentions variances and site-specific criteria when it states that "these implementation procedures can have an effect on how water quality standards, based on today's proposed rule, will impact NPDES permit holders." (62 Fed. Reg. at 42192). In fact, that statement is clearly false, given EPA's decision not to include variance or site-specific criteria procedures in the proposed rule. The Agency should reconsider that decision and insert those provisions.

Response to: CTR-050-005a

EPA disagrees with this comment. We believe that the commenter misunderstood the cautionary language that was part of the proposed rule. The CTR does not preclude the issuance of variances from CTR criteria or future state adoption of site-specific criteria.

Variances would modify applicable CTR criteria for individual dischargers. Site-specific criteria would modify CTR criteria for individual waterbodies. Since the State lacks authority to modify federally promulgated CTR criteria itself (See response to CTR-035-014), EPA must approve individual variances and site-specific criteria and stay the applicable CTR criteria to allow these State modification actions to take effect under the CWA. (As stated in the preamble to the proposed CTR, the State must also adopt a variance policy, and EPA must approve the policy, before the State may issue variances to individual dischargers.) EPA stated in the proposed CTR preamble that when the State has completed its own process for modifying criteria, and EPA approves the State's new or revised criteria, EPA does intend to stay the CTR.

Because there is uncertainty as to how the State will implement CTR criteria in individual permits, EPA's economic analysis of the CTR included a wide range of estimated costs and benefits. The analysis was not based on any certainty that variances and site-specific modifications of criteria would be available to every permittee; on the other hand, the analysis assumed that the State was likely to choose implementation provisions that provide some degree of flexibility or relief to point source dischargers. For a discussion of the approach taken in the economics analysis, see the preamble to the final rule.

Comment ID: CTR-051-001
Comment Author: Cal. RWQCB Central Valley Reg.
Document Type: State Government

State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: C-24 Site Specific Criteria
References:
Attachments? N
CROSS REFERENCES

Comment: We have reviewed the proposed California Toxics Rule. We have comments about several of the proposed provisions in the Toxics Rule. Many of our concerns are similar to those detailed in the September 25 letter from the Saii, Francisco Bay Regional Water Quality Control Board.

Site Specific Objectives

We are concerned that the language in the proposed Toxics Rule would hamper future Regional Board efforts to establish site specific objectives. EPA cautions California and the public that promulgation of this federal rule removes most of the flexibility available to the State for modifying its standards on a discharger-specific or stream-specific basis. Also, EPA states that they may be unable to review state developed standards in a timely manner. However, the Regional Boards are required and authorized under the Clean Water Act and state law to review and, as appropriate, consider modification of promulgated standards as they apply to specific water bodies within each region as part of the triennial review process. We suggest that the language in the proposed Toxics Rule be amended to encourage, rather than discourage, development of site specific objectives.

Response to: CTR-051-001

EPA disagrees with this comment. We believe that the commenter misunderstood the cautionary language that was part of the proposed rule. The CTR does not preclude state adoption of criteria after the CTR has been promulgated. As EPA stated in the preamble to the proposed CTR, when the State has completed its own process, and EPA approves the State's new or revised criteria, EPA intends to stay the CTR. Similarly, if the State adopts site-specific criteria (including site-specific Basin Plan criteria adopted by Regional Boards which have completed the State review and adoption process), and EPA has approved them based on their individual merits, EPA intends to stay that portion of the CTR that applies more general criteria to the specific site. Each individual stay on a site-specific basis would require federal rulemaking on a case-by-case basis, and generally require more detailed effort on the Agency's part than a statewide stay.

Moreover, it is possible that State-adopted criteria could become effective for CWA purposes within the State even prior to EPA approval or rulemaking, although this would change if a rule that EPA has recently proposed is promulgated as proposed. The "Alaska Rule," 64 Fed.Reg. 37072, July 9,1999. Until the Alaska Rule goes final, the State could adopt new or revised standards which are more stringent than the CTR, and those standards would be effective for CWA purposes within the state without any EPA action. Moreover, prior to a final Alaska Rule, the State could adopt statewide standards, and if EPA approved those standards and stayed the CTR based on them, then subsequent site-specific criteria would apply within the State when adopted by the State without requiring additional EPA approval or rulemaking. If the Alaska Rule becomes final as proposed, however, regardless of whether the CTR has been stayed, only state-adopted criteria which are more stringent than the otherwise applicable standards could be applied within the State, prior to EPA approval of those standards.

Comment ID: CTR-052-008
Comment Author: East Bay Dischargers Authority
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: C-24 Site Specific Criteria
References: Letter CTR-052 incorporates by reference letters CTR-035 and CTR-054
Attachments? Y
CROSS REFERENCES

Comment: EPA should have considered the CTR specifically as it applies to San Francisco Bay. As noted previously, implementation of the CTR and full compliance by Bay Area POTWs will result in a reduction of between 1-10% of the toxic load on San Francisco Bay. Since 90-99% of the toxic load will still be present from such sources as non-point, riverine, agricultural drainage, acid mines, atmospheric deposition, etc., it is reasonable to conclude that full compliance by POTWs will result in no significant improvement to the Bay. In other words, the benefits will actually approach zero. Annual costs for Bay Area POTWs will range from $130,000,000 to $185,000,000 or more. Such an expenditure for essentially no benefit is clearly not in the best interests of the public or the environment. It is, therefore, reasonable to conclude that in its current form, the CTR should exempt San Francisco Bay, or at least exempt POTWs discharging to the Bay. EPA should acknowledge that Bay Area POTWs have had NPDES permits with effluent limitations for toxic pollutants for many years. Exempting POTWs from the CTR would not have any impact on current standards.

Response to: CTR-052-008

EPA disagrees with this comment. EPA did consider the CTR specifically as it applies to San Francisco Bay, and has modified the CTR accordingly. (See response to CTR-016-001.)

EPA acknowledges that a number of Bay Area POTWs have NPDES permits with effluent limitations for toxic pollutants; however, that information does not serve as justification for exempting the Bay, or certain dischargers to the Bay, from the CTR, where it applies. Water quality standards are developed to protect the designated uses of the waters of the United States, and the standards contained in the CTR are EPA's view of the standards necessary to protect designated uses.. The CTR applies to all sources of toxics discharged to water of the Bay (except where EPA-approved San Francisco Bay Basin Plan criteria apply), not merely to publicly owned treatment works (POTWs). These ambient WQS can also assist in the reduction of pollution from non-point sources, through the TMDL process.

For a discussion of EPA's economic analysis for the CTR in general, see the preamble to the final rule.

Comment ID: CTR-052-017
Comment Author: East Bay Dischargers Authority
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: C-24 Site Specific Criteria

References: Letter CTR-052 incorporates by reference letters CTR-035 and CTR-054
Attachments? Y
CROSS REFERENCES

Comment: C. RECOMMENDATIONS FOR MODIFICATIONS TO THE CTR AND EA

Specify in the Preamble that EPA would support a scientifically defensible, reasonably achievable site specific objective (SSO) for copper for San Francisco Bay. The analysis by Larry Walker used data from the San Francisco Bay Regional Monitoring Plan and concludes that a translator of 1.6 should be used to result in a total recoverable concentration of 5.0 ug/L. Note that this value compares favorably with the existing SSO of 4.9 ug/L. Most of the copper attainability issues, including the Authority's, would be resolved by this approach.

Response to: CTR-052-017

EPA disagrees that EPA should specifically express support for a "scientifically defensible, reasonably achievable" (emphasis added) site-specific criterion for copper in San Francisco Bay, using a translator of 1.6. This comment confuses the adoption of appropriate copper criteria with the approval of a translator to implement such criteria. Translators are implementation mechanisms which are not included in the CTR, but may be adopted by the State.

Regarding the achievability of any criterion for any particular discharger, there is no provision for EPA to consider the attainability or the scientific validity of the criteria with regard to specific dischargers or class of dischargers in adopting ambient water quality criteria in the CTR. In accordance with 40 CFR 131.11, criteria must be based on sound scientific rationale and must protect the designated use. Economic factors may be considered in designating uses (40 CFR 131.10); however, they may not be used to justify criteria which are not protective of those uses.

That being said, it should nevertheless be understood that EPA supports State adoption of site-specific criteria. As explained in the preamble to the proposed CTR, and further discussed in the response to CTR-016-002, EPA will work with the State to approve acceptable State-adopted criteria (including site-specific criteria) and intends to stay the CTR where such State criteria are in effect. In the meantime, in the absence of such criteria for aquatic life for copper in waters of San Francisco Bay, with salinity greater than 5 ppt, EPA is promulgating criteria based on EPA's section 304(a) national marine water copper aquatic life criterion, which is consistent with the requirements of the CWA. (40 CFR Section 131.11(b).) See also responses to CTR-016-001 and CTR-016-002.

Comment ID: CTR-053-006
Comment Author: Heal the Bay
Document Type: Environmental Group
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: C-24 Site Specific Criteria
References: Letter CTR-053 incorporates by reference letter 6 and the comments on Dioxin, copper, and the compliance schedule from letter CTR-002
Attachments? N
CROSS REFERENCES

Comment: Heal the Bay expects EPA to continue their participation and leadership in this process, and to be supportive of any State effort to adopt more stringent numeric criteria for specific pollutants. Thank you for your consideration of these comments.

Response to: CTR-053-006

EPA appreciates this comment which provides general support for the CTR process and for EPA's ongoing effortsto support State water quality standards development.

Comment ID: CTR-054-008b
Comment Author: Bay Area Dischargers Assoc.
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-24 Site Specific Criteria
References:
Attachments? Y
CROSS REFERENCES C-02b; E-01c; R; S

Comment: Separate, scientifically defensible, reasonably achievable aquatic life criteria for copper should be adopted for San Francisco Bay, or alternatively EPA should specify in the Preamble implementation policies for copper that will result in reasonable control measures actions. To comply with the Clean Water Act and EPA regulations, EPA is required to consider specific water bodies. To fulfill the spirit of Presidential Executive Order 12866 and the requirements of the Unfunded Mandates Reform Act, EPA is required to evaluate regulatory alternatives based on an analysis of costs and benefits. Based on BADA's analysis of costs and benefits, EPA should either adopt copper criteria that are reasonably achievable or alternatively specify implementation policies that will avoid costly end-of-pipe controls. Potential implementation measures that could be specified include use of the following in calculating effluent limitations: actual dilution based on modeling studies; copper translators; probability of compliance less than 99.9%; and water-effect ratios determined for different segments of the Bay. Unless EPA specifies these or similar implementation policies in the rule, it is possible that the CTR could result in significant costs ($12 million per year to $78 million per year) while resulting in minor environmental benefit (a 1% reduction in copper loading to the Bay). In that case, the CTR would violate the Clean Water Act, EPA regulations, Presidential Executive Order 12866, the Unfunded Mandates Reform Act and the Regulatory Flexibility Act. (see the discussion under Item 11 below.)

Response to: CTR-054-008b

EPA disagrees with the commenter's request that EPA either adopt site-specific copper criteria for San Francisco Bay or, in the CTR preamble, specify the use of certain implementation policies for copper.

In support of its request for the adoption of "scientifically defensible, reasonably achievable aquatic life criteria for copper" (emphasis added), the commenter cites its own analysis of costs and benefits. EPA has conducted an analysis of costs and benefits for this rule pursuant to Executive Order 12866 (see discussion in preamble to final rule); however, the criteria themselves are not based on economic

considerations. In accordance with 40 CFR 131.11, criteria must be based on sound scientific rationale and must protect the designated use. There is no provision for EPA to consider the attainability or the scientific validity of the criteria with regard to specific dischargers or class of dischargers in adopting ambient water quality criteria in the CTR. Economic factors may be considered in designating uses (40 CFR 131.10); however, they may not be used to justify criteria which are not protective of those uses.

That being said, it should nevertheless be understood that EPA supports the adoption of site-specific criteria by the State. As explained in the preamble to the proposed CTR, and further discussed in the response to CTR-016-002, EPA will work with the State to approve acceptable State-adopted criteria (including site-specific criteria) and intends to stay the CTR when EPA has approved such State criteria. In the meantime, in the absence of such criteria for aquatic life for copper in waters of San Francisco Bay, with salinity greater than 5 ppt, EPA is promulgating criteria based on EPA's section 304(a) national marine water copper aquatic life criterion, which is consistent with the requirements of the CWA. (40 CFR Section 131.11(b).) See also responses to CTR-016-001 and CTR 016 -002.

Regarding the suggestion that EPA specify the use of dilution, metals translators and water effect ratios, or similar implementation provisions, EPA disagrees. With the exception of compliance schedules, the CTR does not include implementation provisions; the CTR is promulgated to add numeric criteria for toxic pollutants where they did not exist. The State may address these issues in a separate implementation plan, which it is currently developing. ("Policy for implementation of Toxics Standards for Inland surface Waters, Enclosed Bays and Estuaries of California", released for public comment, September 11, 1997.)

Finally, regarding the commenter's assertion that the CTR could be inconsistent with Executive Order 12866, the Regulatory Flexibility Act and the Unfunded Mandates Reform Act without further revision (such as suggested by the commenter), see the discussion of EPA's compliance with these requirements in the preamble to the final rule.

See also response to CTR-054-008c.

Comment ID: CTR-054-045
Comment Author: Bay Area Dischargers Associati
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-24 Site Specific Criteria
References:
Attachments? N
CROSS REFERENCES

Comment: The Preamble to the California Toxics Rule (CTR), and the rules accompanying Economic Analysis (EA), place a great deal of emphasis on the ability of dischargers to use alternative regulatory approaches to comply with CTR criteria if the cost of treatment technology was prohibitively expensive. For example, the EA assumes that, if the estimated annualized cost for removing a pollutant exceeded a cost trigger,(*1) "dischargers would explore the use of alternative regulatory approaches to comply with CTR-based effluent limits." EA at.pg. 4(emphasis added). Based on this assumption, no treatment cost was estimated for the facility.(*2)

The types of alternative regulatory approaches assumed available for dischargers in California include phased total maximum daily loads (TMDLs), water quality standard variances, site-specific criteria, change in designated use, and alternative mixing zones. EA at pg. 4-5. The following sections will discuss each of EPA's proposed methods for regulatory relief and explain whether or not these methods can truly be used to provide relief from the CTR-based permit limits as anticipated by EPA. It should be noted that the actual language of the rule itself doesnot mention any of the methods of regulatory relief. Therefore, this analysis will be based solely upon the language contained in the Preamble to the CTR.

Site Specific Criteria

Another one of the avenues of potential regulatory relief discussed in the Preamble to the CTR is the adoption of site-specific water quality criteria. The Preamble, provides that the "State has the discretion to develop site-specific criteria when appropriate e.g., when statewide criteria appear over- or under-protective of designated uses. The Preamble goes on to explain the site-specific criteria adoption process as follows:

Periodically, the State through its RWQCBs will adopt site-specific criteria for priority toxic pollutants within respective Basin Plans. These criteria are intended to be effective throughout the Basin or throughout a designated water body. Under California law, these criteria must be publicly reviewed and approved by the RWQCB, the SWRCB, and the State's Office of Administrative Law (OAL). Once this adoption process is complete. the criteria become State law. These criteria must be submitted to the EPA Regional Administrator for review and approval under CWA section 303. These criteria are usually submitted to EPA as part of a RWQCB Basin Plan Amendment, after the Amendment has been adopted under the State's process and has become State law. CTR Preamble at pg. 42165.

The Preamble explains that the State of California has recently reviewed and updated all of its RWQCB Basin Plans. All of these Basin Plans, some of which contain site-specific criteria, have completed the State review and adoption process and have been submitted to EPA for review and approval. The key to whether or not these site-specific criteria will provide regulatory relief is when the EPA approval/disapproval occurs. Three different timing scenarios and results are possible:

1. If EPA approves any State-adopted site-specific criteria before promulgation of the final CTR is published, then the EPA Administrator may make a finding in that final rule that it will be unnecessary to promulgate criteria for the approved site-specific pollutants and associated water bodies. 2. EPA disapproves any State-adopted site-specific criteria, the proposed statewide criteria contained in the CTR would apply for those pollutants and associated water bodies instead of the site-specific criteria. 3. However, if EPA promulgates statewide federal criteria as proposed in the CTR, prior to a decision on any State-adopted site-specific criteria, the more stringent of the two criteria would be used for water quality programs. Both federal and State water quality programs must be satisfied, and application of the more stringent of the two criteria would satisfy both. CTR Preamble at pg. 42165.

Thus, the only way less stringent site specific criteria can be used for regulatory relief is if those criteria are approved by EPA prior to the publication of the final CTR. Otherwise, either the CTR or the more stringent of the two (CTR vs. site-specific) criteria apply.

One final note regarding site-specific criteria is that the Preamble to the CTR restricts the ability to use native aquatic life as a way to set site-specific criteria. Instead of allowing a discharger to substitute local species from the receiving waters into which it discharges, the Preamble only allows a discharger to supplement the eight specified families of aquatic life required for criteria development with the addition

of native species.(*9) It is doubtful whether this requirement will aid dischargers who are seeking regulatory relief.

(*1) This coat trigger is $200 per toxic pounds-equivalent for a facility under the low-end scenario, and $500 per toxic pounds-equivalent for a category of dischargers under the high-end scenario. See EA at pg. 4.
(*2) In addition, pollutant load reductions were not calculated or credited for any pollutant for which an alternative regulatory approach was pursued. Id.
(*9) "A minimum data set of eight specified facilities is required for criteria development (details are given in the 1985 Guidelines, page 22). The eight specific families are intended to be representative of a wide spectrum of aquatic life. For this reason it is not necessary that the specific organisms tested be actually present in the water body. States may develop site-specific criteria using native species, provided that the broad spectrum represented be the eight families is maintained. All aquatic organisms and their common uses are meant to be considered, but not necessarily protected, if relevant data are available." CTR Preamble at pg. 42168.

Response to: CTR-054-045

Comment ID: CTR-056-015b
Comment Author: East Bay Municipal Util. Dist.
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/22/97
Subject Matter Code: C-24 Site Specific Criteria
References: Letter CTR-056 incorporates by reference letter CTR-054
Attachments? N
CROSS REFERENCES I-01

Comment: Third, regarding the criteria being proposed for adoption in the draft CTR, EBMUD recommends that EPA should:

* Should clearly recognize within the CTR that the existing, approved Basin Plan for the San Francisco Bay includes requirements specifically designed to address wet weather overflows and grants provisions for exemptions where an inordinate burden would be placed on the discharger relative to the beneficial uses protected. It should also be acknowledged through inclusion in the CTR that the requirements and applicable exemptions previously justified and approved by EPA and the State should not be affected by the proposed rule.

Response to: CTR-056-015b

EPA disagrees that the CTR must specifically acknowledge implementation provisions in the San Francisco Bay Basin Plan which are designed to address wet weather overflows. EPA also disagrees with any suggestion that such provisions be included in the CTR itself. The CTR is promulgated to add numeric criteria for priority toxic pollutants where they did not exist. The CTR does not modify existing Basin Plan implementation provisions, which remain in effect if they were duly adopted under State law,

although the application of Basin Plan compliance schedule provisions may be affected by the compliance schedule provisions in the CTR. (EPA notes, however, that wet weather implementation provisions, which were adopted in the San Francisco Bay Regional Board 1995 Basin Plan amendments, have not been approved by EPA.) Although the State cannot use implementation provisions such as variances to modify federal standards, EPA intends to stay applicable CTR criteria if the State adopts its own criteria and EPA has approved them. (See response to CTR-016-002.) EPA is also working with the State and other stakeholders to address issues related to water quality-based permitting inmunicipal stormwater permits.

See also the response to CTR-016-001.

Comment ID: CTR-057-010c
Comment Author: City of Los Angeles
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: C-24 Site Specific Criteria
References:
Attachments? N
CROSS REFERENCES K-01
G-07

Comment: Implementation

Although the proposed Rule discusses implementation issues such as TMDLs, variances, SSOs, and interim permits, it lacks evidence of support for any of these provisions. We believe that this will have the effect of reducing the State's confidence or perceived authority in granting any of these provisions to individual POTWs. For example, Page 42186 of the CTR lists six criteria that must be used by the State to determine the non-attainability of a water quality standard; we are doubtful that any of these criteria would be strictly applicable to our facilities with respect to lindane and DDT. We believe CTR variance criteria should include economic considerations for specific discharger implementation efforts. Unless the EPA provides more support for these provisions, we fear that the State will either not grant us a legitimate variance or will waiver in its commitment to act at all.

Response to: CTR-057-010c

EPA disagrees that the CTR should revise the variance criteria or provide more support for implementation provisions. The CTR is promulgated to add numeric criteria for toxic pollutants in waters of the U.S. in California where they did not exist. The CTR does not modify existing requirements of 40 CFR Part 131, which applies nationally. Those requirements limit the use of variances to six grounds (the six "criteria" referred to by the commenter), which are merely reiterated in the Preamble to the proposed CTR. (62 Fed.Reg. 42186.) The CTR also does not include its own variance provisions. However, the CTR does not modify existing State implementation provisions (including those in Basin Plans), which remain in effect if they were duly adopted under State law (although the application of Basin Plan compliance schedule provisions may be affected by the compliance schedule provisions in the CTR).

Given the scope of the CTR, the economic considerations proposed by the commenter are not relevant. Under the CWA, EPA cannot base numeric values for ambient water quality criteria on economic considerations, therefore EPA cannot "include economic considerations for specific discharger implementation efforts" in this rule. The State may address the implementation issues identified by the commenter, taking economic considerations into account as consistent with the CWA, in the separate implementation plan, which it is currently developing. EPA notes, however, that use of State implementation provisions such as SSOs and variances would require federal rulemaking to modify CTR criteria affected by such actions. See also the responses to CTR-016-002, and CTR-056-015b.

Comment ID: CTR-057-011
Comment Author: City of Los Angeles
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: C-24 Site Specific Criteria
References:
Attachments? N
CROSS REFERENCES

Comment: Similarly, the proposed Rule provides little support with respect to site-specific objectives. It is not clear, for instance, if a POTW could apply for an SSO once the Rule has been promulgated. The State's Site-Specific Objectives Task Force was adamant that SSOs should be an integral part of a priority-pollutant control plan, yet this philosophy is nowhere in evidence in the CTR, In view of this, we believe that the proposed Rule should specify EPA's intentions to review State-approved SSOs without setting deadlines for SSO submittals. This would allow SSOs to be triggered as needed by events not experienced or anticipated at the present time. We therefore recommend that the EPA add statements into the CTR that provide needed direction for the States in issuing decisions dealing with this any similar implementation options.

Response to: CTR-057-011

EPA disagrees with this comment. We believe that the commenter misunderstood the cautionary language that was part of the proposed rule. The CTR does not preclude state adoption of criteria after the CTR has been promulgated. As EPA stated in the preamble to the proposed CTR, when the State has completed its own process, and EPA approves the State's new or revised criteria, EPA intends to stay the CTR. Similarly, if the State adopts site-specific criteria (including site-specific Basin Plan criteria adopted by Regional Boards which have completed the State review and adoption process), and EPA has approved them based on their individual merits, EPA intends to stay that portion of the CTR that applies more general criteria to the specific site. Each individual stay on a site-specific basis would require federal rulemaking on a case-by-case basis, and generally require more detailed effort on the Agency's part than a statewide stay.

Moreover, it is possible that State-adopted criteria could become effective for CWA purposes within the State even prior to EPA approval or rulemaking, although this would change if a rule that EPA has recently proposed is promulgated as proposed. The "Alaska Rule," 64 Fed.Reg. 37072, July 9,1999. Until the Alaska Rule goes final, the State could adopt new or revised standards which are more stringent than the CTR, and those standards would be effective for CWA purposes within the state without any

EPA action. Moreover, prior to a final Alaska Rule, the State could adopt statewide standards, and if EPA approved those standards and stayed the CTR based on them, then subsequent site-specific criteria would apply within the State when adopted by the State without requiring additional EPA approval or rulemaking. If the Alaska Rule becomes final as proposed, however, regardless of whether the CTR has been stayed, only state-adopted criteria which are more stringent than the otherwise applicable standards could be applied within the State, prior to EPA approval of those standards.

Comment ID: CTR-060-006
Comment Author: San Diego Gas and Electric
Document Type: Electric Utility
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: C-24 Site Specific Criteria
References:
Attachments? N
CROSS REFERENCES

Comment: PROVISIONS SDG&E DOES NOT SUPPORT

As described in the following comments SDG&E does not support the following provisions:

Site specific water quality criteria

The preamble states that, "EPA ... cautions California and the public that promulgation of this federal rule removes most of the flexibility available to the State for modifying its standards on a discharger specific or stream-specific basis" and that, "EPA has not incorporated either ... [variance or site-specific criteria development procedures] in this proposed rulemaking, that EPA has not generally authorized State modifications of federal water quality standards" determining that "these types of modifications will, in general, require federal rulemaking on a case by case basis..." (see 62 Fed. Reg. at 42186, Cols. 2 and 3). Otherwise, the federal criteria must be used over a state approved site-specific criteria where it is the more stringent and promulgated before state approval. (see 62 Fed. Reg. at 42165, Col. 3).

However, EPA clarifies that the proposal criteria are not based on a "pollutant-specific, waterbody-by-water body" evaluations. (see 62 Fed. Reg. at 42166, Col. 3 and at 42617, Col. 1). Analysis was conducted, generally speaking, utilizing eight specific families to represent a wide spectrum of aquatic life and which are not necessarily present in water bodies subject to the proposed criteria. (see 62 Fed. Reg. at 42168, Col. 2). Indeed, EPA acknowledges that the proposed criteria rely upon "several individual factors which make the criteria somewhat overprotective or underprotective.' (see 62 Fed. Reg. at 42168, Col. 1).

The proposed rule should incorporate policy and procedures by which site-specific criteria approved by the state (after rule promulgation) may be approved by EPA, though the criteria may be less stringent than in the proposed rule. In addition, the proposed rule should not preclude California from adopting water quality criteria utilizing pollutant-specific, water-body specific or other scientifically sound factors which are less stringent than those in the proposed rule (e.g., beyond WERs) which will prevail when the proposed rule is stayed and ultimately extinguished. Otherwise discharges may be subject to unnecessarily stringent and overprotective effluent limits combined with the application of the

anti-backsliding rule.

Response to: CTR-060-006

EPA disagrees with this comment. We believe that the commenter misunderstood the cautionary language that was part of the proposed rule. The CTR does not preclude state adoption of criteria after the CTR has been promulgated. As EPA stated in the preamble to the proposed CTR, when the State has completed its own process, and EPAapproves the State's new or revised criteria, EPA intends to stay the CTR. Similarly, if the State adopts site-specific criteria (including site-specific Basin Plan criteria adopted by Regional Boards which have completed the State review and adoption process), and EPA has approved them based on their individual merits, EPA intends to stay that portion of the CTR that applies more general criteria to the specific site. Each individual stay on a site-specific basis would require federal rulemaking on a case-by-case basis, and generally require more detailed effort on the Agency's part than a statewide stay.

Moreover, it is possible that State-adopted criteria could become effective for CWA purposes within the State even prior to EPA approval or rulemaking, although this would change if a rule that EPA has recently proposed is promulgated as proposed. The "Alaska Rule," 64 Fed.Reg. 37072, July 9,1999. Until the Alaska Rule goes final, the State could adopt new or revised standards which are more stringent than the CTR, and those standards would be effective for CWA purposes within the state without any EPA action. Moreover, prior to a final Alaska Rule, the State could adopt statewide standards, and if EPA approved those standards and stayed the CTR based on them, then subsequent site-specific criteria would apply within the State when adopted by the State without requiring additional EPA approval or rulemaking. If the Alaska Rule becomes final as proposed, however, regardless of whether the CTR has been stayed, only state-adopted criteria which are more stringent than the otherwise applicable standards could be applied within the State, prior to EPA approval of those standards.

EPA notes that State-adopted criteria (including site-specific criteria) which are less stringent that CTR criteria may be approved by EPA and result in a stay of the CTR if such criteria are based on sound scientific rationale which ensures that designated uses will be protected.

Comment ID: CTR-086-004e
Comment Author: EOA, Inc.
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org: California Dent
Document Date: 09/26/97
Subject Matter Code: C-24 Site Specific Criteria
References: Letter CTR-086 incorporates by reference letter CTR-035
Attachments? N
CROSS REFERENCES G-01; C-22; G-09; C-24a; K-03; G-04; G-05; G-02

Comment: Regulatory Flexibility and Relief

CDA supports language in the CTR Preamble that references and endorses recommendations of the State Task Forces including in part the use of.

* reasonable potential analyses * dissolved metals criteria * translators * water effects ratios * site

specific objectives * innovative TMDL processes such as effluent trading * performance based interim limits * chronic and acute mixing zones, and * compliance schedules in NPDES permits.

Response to: CTR-086-004e

EPA appreciates this commenter's support for EPA's ongoing efforts to support State water quality standards development.

Comment ID: CTR-090-018
Comment Author: C&C of SF, Public Utl. Commis.
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-24 Site Specific Criteria
References: Letter CTR-090 incorporates by reference letters CTR-035 and CTR-054
Attachments? Y
CROSS REFERENCES

Comment: Site-specific criteria - p 42165. State-Adopted Site-Specific Criteria with EPA Approval - This section requests information on previously adopted site-specific criteria. The Basin Plan for the San Francisco Bay Area includes such criteria in narrative form in Chapter 4 (page 4-15, Wet Weather Overflows) in order to implement the Combined Sewer Overflow Control Policy (50 FR 18688).

Response to: CTR-090-018

EPA disagrees with any suggestion that narrative wet weather overflow provisions in the San Francisco Bay Basin Plan be addressed by the CTR. The CTR is promulgated to add numeric criteria for priority toxic pollutants where they did not exist. The CTR does not modify existing Basin Plan implementation provisions, or other narrative Basin Plan provisions, which remain in effect if they were duly adopted under State law. (EPA notes, however, that such provisions, which were adopted in the San Francisco Bay Regional Board 1995 Basin Plan amendments, have not been approved by EPA.)

In inviting commenters to identify existing State site-specific criteria (page 42165 of the preamble to the proposed CTR, 62 Fed.Reg.42160) EPA intended to seek identification only of numeric site-specific criteria. EPA regrets any misunderstanding which omission of the term "numeric" may have caused, but believes that the preamble to the proposed rule clearly explained the scope of the CTR, such that it would be clear that the CTR would not withhold promulgation of numeric criteria in favor of State narrative provisions, nor would the CTR incorporate existing State narrative criteria provisions.

Comment ID: CTR-092-010
Comment Author: City of San Jose, California
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: C-24 Site Specific Criteria

References: Letter CTR-092 incorporates by reference letter CTR-035
Attachments? Y
CROSS REFERENCES

Comment: State Adoption of Site Specific Criteria

The preamble recognizes that the State has the discretion to develop site-specific criteria when appropriate for example, when statewide criteria appear over or underprotective of designated uses. Under California law, site specific criteria are adopted as amendments to regional Basin Plans, which are then reviewed by the State Water Resources Control Board (SWRCB) and the Office of Administrative Law. These criteria are then submitted to the, EPA Regional Administrator for review and approval under Clean Water Act Section 303. The City recommends that EPA formally adopt a policy in the CTR to continue and support this regulatory process, specifically during the interim period as the State develops its statewide water quality framework. The City also requests that EPA Region IX conduct prompt reviews of all currently submitted site-specific data, together with timely reviews of site-specific data submitted with these comments and any site-specific data submitted in the future. The City has attached its recently completed site-specific water quality investigation for copper in South San Francisco Bay for formal review by Region IX and inclusion in the record of this rulemaking (Attachment 3).

The City also urges EPA to revise language in the preamble limiting the use of the site-specific criteria process after federal promulgation and prior to a decision on any State adopted site-specific criteria. We also urge EPA to revise the statement that the more stringent of the two criteria would be used for water quality programs, in the event of two promulgations. Such language severely limits this regulatory approach, and State flexibility in the development of scientifically defensible site-specific criteria. The City reiterates its recommendation that EPA develop a viable policy which supports site-specific criteria development, that ensures EPA's continued review and oversight process, and that emphasizes scientific defensibility and not the stringency of the value produced.

Response to: CTR-092-010

0EPA disagrees with this comment. We believe that the commenter misunderstood the cautionary language that was part of the proposed rule. The CTR does not preclude state adoption of criteria after the CTR has been promulgated. As EPA stated in the preamble to the proposed CTR, when the State has completed its own process, and EPA approves the State's new or revised criteria, EPA intends to stay the CTR. Similarly, if the State adopts site-specific criteria (including site-specific Basin Plan criteria adopted by Regional Boards which have completedthe State review and adoption process), and EPA has approved them based on their individual merits, EPA intends to stay that portion of the CTR that applies more general criteria to the specific site. Each individual stay on a site-specific basis would require federal rulemaking on a case-by-case basis, and generally require more detailed effort on the Agency's part than a statewide stay.

Moreover, it is possible that State-adopted criteria could become effective for CWA purposes within the State even prior to EPA approval or rulemaking, although this would change if a rule that EPA has recently proposed is promulgated as proposed. The "Alaska Rule," 64 Fed.Reg. 37072, July 9,1999. Until the Alaska Rule goes final, the State could adopt new or revised standards which are more stringent than the CTR, and those standards would be effective for CWA purposes within the state without any EPA action. Moreover, prior to a final Alaska Rule, the State could adopt statewide standards, and if EPA approved those standards and stayed the CTR based on them, then subsequent site-specific criteria

would apply within the State when adopted by the State without requiring additional EPA approval or rulemaking. If the Alaska Rule becomes final as proposed, however, regardless of whether the CTR has been stayed, only state-adopted criteria which are more stringent than the otherwise applicable standards could be applied within the State, prior to EPA approval of those standards.

EPA notes that State-adopted criteria (including site-specific criteria) which are less stringent that CTR criteria may be approved by EPA and result in a stay of the CTR if such criteria are based on sound scientific rationale which ensures that designated uses will be protected.

This commenter also urged EPA to act, prior to finalizing the CTR, to approve or disapprove any State-adopted site-specific criteria which had been submitted to EPA but EPA had not yet acted upon. This has not been possible, due to the focus of resources on the CTR itself. However, in the final CTR, EPA has made revisions to ensure that EPA-approved State-adopted site-specific criteria shall remain in effect and not be superceded by CTR criteria for the same pollutants for those waters of the Bay where such site-specific criteria are currently in effect. See response to CTR-016-001.

Comment ID: CTRH-001-047
Comment Author: Michael Lozeau
Document Type: Public Hearing
State of Origin: CA
Represented Org: S.F. Bay/Delta Keeper
Document Date: 09/17/97
Subject Matter Code: C-24 Site Specific Criteria
References:
Attachments? N
CROSS REFERENCES

Comment: MR. LOZEAU: I'm Michael Lozeau. I'm the executive director of San Francisco Baykeeper and Deltakeeper.

I've done a preliminary review of the rule. But with that in mind, I'm just going to list all our current concerns. I'll start with the simplest perhaps and work my way towards the more complicated ones.

The first thing I noticed in the rule is there's some deference to regional boards, regional board standards that have been issued and approved by EPA. But there's no full listing in the proposed rule, and there's a suggestion that the burden is on the board to come forward and remind EPA of the standards it's already looked at and approved.

I would urge EPA to be proactive about that, so that representatives from regional boards, from all nine regional boards, don't have to make sure that they remind you of the standards that already exist before you perhaps wipe them out with this new rule, especially in the Bay Area where we have a number of standards which have been applied and do exist, which I think would be more appropriate certainly for the Bay Area than a statewide standard.

Response to: CTRH-001-047

EPA believes that it has addressed this comment, particularly with regards to San Francisco Bay. (See responses to CTR-016-001 and CTR 016-002.) EPA approved, State-adopted site-specific criteria for

waterbodies other than San Francisco Bay were not identified in response to the proposed rule, and EPA was unable to obtain a comprehensive listing of such other criteria. For these reasons, EPA has not "promulgated around" any site-specific criteria other than those in San Francisco Bay identified in the final CTR and those discussed in the preamble to the proposed CTR (62 Fed.Reg. 42165-42166), which are also identified in the final CTR. This is consistent with the approach set forth in the Preamble to the proposed CTR. (62 Fed.Reg. 42165.)

Subject Matter Code: C-24a SSC Water Effect Ratios

Comment ID: CTR-003-001
Comment Author: City of Riverside
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/22/97
Subject Matter Code: C-24a SSC Water Effect Ratios
References:
Attachments? N
CROSS REFERENCES

Comment: 1) The placement of the WER in the equation for the calculation of criteria is an excellent idea which, given affordable implementation methods, should better tailor the criteria to the site. We would, however, appreciate clearer definition as to how this is to be implemented. Will the EPA approve WER study plans and results or is the State the lead agency? Do WER's need to be placed in basin plans or is this similar to total to dissolved ratios which are permitting issues versus objective setting issues?

Response to: CTR-003-001

The rule promulgates a default WER of 1. The rule states that if other than a WER of 1 will be used, it must be developed in accordance with EPA's WER guidance or the State's methodology, after that methodology has been adopted as part of the State's water quality planning process and approved by EPA. WERs developed under one of these processes are not subject to further EPA review and approval.

WERs may be used on a water body basis for a particular pollutant or as part of a permit for an individual discharger for a specific pollutant. EPA encourages the State (and dischargers) to develop and use WERs on a water body basis, since this approach is technically sound, and efficient use of resources, and allowable for the NPDES permitting authority. WERs developed on a water body basis should be included and adopted in the appropriate Regional Water Quality Control Board Basin Plan. WERs that are developed on a permit basis are subject to the NPDES permit approval process.

Comment ID: CTR-004-004b
Comment Author: South Bayside System Authority
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/24/97
Subject Matter Code: C-24a SSC Water Effect Ratios
References:
Attachments? N
CROSS REFERENCES G-05
C-22
C-09

Comment: Despite the problems addressed above there are provisions of the CTR that SBSA supports,

including:

* EPA's policies and guidance regarding the use of mixing zones and dilution

* Use of water effects ratios (WERs) for determining site specific criteria

* Inclusion of metals criteria expressed as dissolved rather than total recoverable

* Allowing permit writers the use of any of the methods in EPA's guidance document on the use of translators

Response to: CTR-004-004b

EPA acknowledges the commenter's support.

Comment ID: CTR-005-003b
Comment Author: Novato Sanitary District
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/23/97
Subject Matter Code: C-24a SSC Water Effect Ratios
References:
Attachments? Y
CROSS REFERENCES C-22
C-01a
G-09
G-05
G-04

Comment: 2. The following provisions of the rule are supported: (1) adoption of metals criteria as dissolved concentrations; (2) expression of the metals criteria as a function of the water-effect ratio; (3) adoption of the proposed new human health criterion for mercury; and (4) the Preamble discussions regarding metals translators, mixing zones, and interim permit limits.

Response to: CTR-005-003b

EPA acknowledges the commenter's support.

Comment ID: CTR-017-002b
Comment Author: Santa Ana River Discharger Ass
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-24a SSC Water Effect Ratios
References:

Attachments? Y
CROSS REFERENCES C-22

Comment: Because the California Toxics Rule uses the same approach as the UAA in setting water quality objectives for cadmium and copper, SARDA strongly supports the CTR objectives for those metals. We also agree with EPA's written statements acknowledging the binding character of organic carbon and the role it plays in rendering heavy metals non-toxic. We enthusiastically endorse the agency's decision to include Water Effects Ratio as a formal factor to be considered when formulating water quality objectives. It will do much to adjust national criteria to local conditions.

Response to: CTR-017-002b

EPA acknowledges the commenter's support.

Comment ID: CTR-020-005
Comment Author: City of Stockton
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/24/97
Subject Matter Code: C-24a SSC Water Effect Ratios
References:
Attachments? Y
CROSS REFERENCES

Comment: II. Use of New Scientific Information

The City acknowledges and supports EPA's update of several water quality criteria including those for mercury, cadmium and arsenic. While a number of criteria were updated to reflect current scientific information, there are a few notable exceptions. The following briefly addresses the key updates and omissions that should be addressed in the final publication of this rule.

2. Water Effects Ratio The preamble explains that the intent of the metals criteria is to control the bioavailable fraction of the metal. Because there is no reliable analytical procedure to measure the bioavailable fraction, most acute and chronic metals criteria are now applied as dissolved criteria and a water effects ratio ("WER") is included as part of the criteria to properly adjust the analytical measurement to reflect the bioavailable fraction. Contrary to the statement that the metals criteria are only intended to address bioavailable metals, the preamble states that acceptance of a WER study is discretionary. This is inappropriate and must be amended in the final rule publication. EPA should not be suggesting that Regional Boards may ignore relevant scientific information.

EPA has also dictated use of the Agency's Interim Guidance on the Determination and Use of Water-Effect Ratios (the "WER Guidance") which is very conservative and costly to follow. Moreover, WER guidance is not designed to address short term events such as storm water discharges. Given that the duration of the tests required to be used greatly exceeds the duration of storm water events, it is apparent that the WER guidance should not be applied to these conditions without considerable modification. The recent Society for Environmental Toxicology and Chemistry ("SETAC") evaluation of EPA metals criteria and implementation policies (entitled "Reassessment of Metals Criteria for Aquatic

Life Protection" [1996]) recommends that whole effluent bioassays using metal sensitive organisms be used to determine the appropriateness of applying EPA's metal criteria to derive stringent effluent limitations. The use of complex and expensive WER tests is not necessary as the use of metal sensitive organisms (such as daphnids), which were originally used to calculate EPA's criteria, will reliably assess whether or not the metals present in the sample are in a bioavailable form. Senior EPA officials were involved in preparing the SETAC recommendation, and the publication is intended to reflect to consensus of the nationally recognized experts on this subject. The Agency has in the past relied upon these same experts in updating the EPA's metals criteria (e.g., the January 1993, EPA-sponsored scientific workshop on the development and implementation of metals criteria in Annapolis, Maryland [the "Annapolis Conference"]).

Because of the excessive cost and time necessary to conduct detailed WER tests in accordance with EPA's published guidance, more simplified and appropriate procedures need to be established. The metals criteria should include a screening procedure which will allow the use of metal sensitive organisms to assess whether or not the metal is in a bioavailable form. If the metal is not bioavailable, then the permitting authority should not establish limitations based upon EPA's criteria.

Response to: CTR-020-005

EPA does not mean to suggest in its language concerning WERs, that California Regional Water Quality Control Boards ignore relevant scientific information. Rather, EPA's intent is simply to clarify that the State has the authority to approve or disapprove site-specific determinations of WER values, derived with methodology approved by EPA.

Additionally, EPA does not mean to suggest that the Agency's "Interim Guidance on the Determination and Use of Water-Effect Ratios" is the only available methodology for determining WERS, as discussed further in the response to CTR-020-006. See also the response to CTR-003-001 for discussion of the general approach for implementation. The commenter wants a simpler EPA WER guidance but does not suggest how to do this and why it would be scientifically defensible.

Comment ID: CTR-020-006
Comment Author: City of Stockton
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/24/97
Subject Matter Code: C-24a SSC Water Effect Ratios
References:
Attachments? Y
CROSS REFERENCES

Comment: II. Use of New Scientific Information The City acknowledges and support EPA's update of several water quality criteria including those for mercury, cadmium and arsenic. Whle a number of criteria were updated to reflect current scientific information, there are a few notable exceptions. The following briefly addresses the key updates and omission that should be addressed in the final publication of this rule.

(a) Water Effect Ratio Approach is Mathematically Flawed

As part of the CTR, EPA has required that the Agency's February 22, 1994 water effects ratio procedure be used to appropriately adjust the dissolved metals criteria to reflect the bioavailable fraction. See, WER Guidance. Since the issuance of that document, EPA has prepared an internal evaluation of the reasonableness of the WER Guidance (Delos: "Probabilistic Analysis of the Level of Protection Provided by the Interim Guidance on Determination of Water Effect Ratios" [March 1994]). That analysis found:

...the Guidance procedures tend to produce a lower WER than the unbiased WER... the option favored in the February 22 cover memo to the Guidance is particularly biased (by a factor of 2-4)...

Thus, it is apparent that EPA is aware that the published WER Guidance is flawed and will lead to calculation of unnecessarily restrictive limitations under the most common circumstances where the procedure is applied (low dilution receiving waters). Given this information, it is clearly inappropriate for EPA to mandate the use of the 1994 WER Guidance as the basis for determining all WERs under the CTR.

In addition to those issues identified in EPA's internal review, the procedures outlined in the WER Guidance contain a major, conceptual, technical error that will lead to routine miscalculation of the WER. This error was first brought to EPA's attention in September 1992 by Dr. Herb Allen, one of the nation's leading experts on metals speciation (Exhibit 1).

The basic technical oversight of the WER Guidance is that organometallic complexing manifests itself as a non-linear titration, not a linear ratio. This mode of action was verified decades ago by many researchers. On behalf of EPA, DiToro also verified this phenomenon during EPA's sediment criteria research, and it is the underlying principle in using acid volatile sulfide levels as the indicator of when metals may exhibit toxicity. As discussed in Dr. Allen's most recent analysis (Exhibit 2), metals will not exhibit toxicity where the amount of binding sites is stoichiometrically in excess of the available metal. This is demonstrated by Figure 6 contained in Exhibit 2 for a range of ligand concentrations. Both the acute and chronic criteria will be increased by a specific fixed amount, not a ratio. Thus, the proper way to account for metals inactivation measured by a WER procedure is arithmetically, not multiplicatively.

The error in the appropriate adjustment to the criteria increases as the LC50 used to calculate the WER becomes increasingly greater than the chronic criteria that is being adjusted by the WER. Given that the chronic criteria is always less than the LC50 used to adjust the criteria, EPA's WER procedure will always produce an inappropriately low adjustment factor. The following examples illustrate the magnitude of the error that may occur by using a multiplicative rather than additive approach. The first example is typical of EPA's copper criteria. Where the laboratory derived LC50 is 20 ug/l and the effluent influenced LC50 is 60 ug/l, a WER of three (3) would be calculated. These same data verify that a 40 ug/l copper binding capacity is exhibited by the effluent influenced sample.

Under EPA's procedure, a chronic criteria adjustment to 18 ug/l would occur (assuming 6 ug/l chronic criteria) although the actual chronic endpoint is 46 ug/l based on the titration effect. Thus, EPA's approach is in error by a factor of 2.55 or 155 percent. The criteria calculation error becomes even more dramatic as the acute/chronic ("A/C") ratio is increased. For pollutants such as lead with a high A/C ratio (about 50), the error would easily be a factor of 50 because acute tests are used to calculate the WER. The solution to the problem is straightforward: EPA should inform the public that the binding capability of the mixture should be determined arithmetically (one may geometrically average the results consistent with the acute and chronic criteria development) and add this to the chronic test result to produce the proper instream criteria.

Finally, the WER Guidance is in error in its expensive requirement that WERs be conducted for a series of dilutions under the concern that the WER may decrease more rapidly than the dilution increases. As demonstrated by Dr. Allen in Figure 3, Exhibit 2, organometallic binding is not linear. Binding does not decrease more rapidly or even as rapidly as dilution even for binding agents with relatively low stability constants. Thus, if the pollutant is demonstrated to be non-toxic at low dilution, one may fully expect the pollutant to remain non-toxic as dilution increases. Recognition of this phenomenon can greatly simplify the WER procedures and reduce the exorbitant costs of running all the tests outlined in the WER Guidance.

Based upon these and other concerns, the proposed rule should delete the requirement to utilize the WER Guidance for all WER analyses. As requested and supported by the available technical information, the CTR should allow for use of simplified approached to adjusting the proposed metals criteria.

Response to: CTR-020-006

EPA disagrees that it has mandated or required the of use of the Agency's "Interim Guidance on the Determination and Use of Water-Effect Ratios". As an alternative to following this guidance the rule specifically provides the option of using "other scientifically defensible methods adopted by the State as part of its water quality standards program and approved by EPA."

The commenter recommends use of what could be called a "water-effect difference" (WED), although this particular terminology is not used in the comment. If the test species exhibited effects at concentrations near the criterion, the WED would yield the same result as the WER. If the test species exhibited effects at concentrations significantly above than the criterion, then the WED would yield a different result than the WER. Under certain conditions (e.g., metals interacting with strong binding agents), the WED calculation will yield an accurate result, while the WER will yield an over-protective result. Under other conditions (e.g., metals interacting with weak ligands) the WED will yield an under-protective result, while the WER will yield an accurate result. Analysis of the behavior of EPA's current guidance indicates that it often tends to yield conservative results.

With regard to the issue of the complexity and expense involved in of the WER procedure, EPA has been cooperating with states and dischargers who are experimenting with simplified procedures that yield the essential information using fewer samples ([Date] letter from Evelyn S. MacKnight, EPA Region 3, to James Newbold, Pennsylvania Dept. of Environ. Protection). Furthermore, EPA is developing a biotic ligand modeling approach that will determine the appropriate site-specific criteria adjustment solely from site-specific chemical measurements. Because the state of the science is moving forward in this area, EPA has provided for the use of alternative procedures, and anticipates that future developments will yield procedural improvements approvable under the rule. EPA believes that the current guidance on WERs yields dependable results, but that the upcoming biotic ligand model will simultaneously improve the accuracy of site-specific criteria adjustments (eliminating the above described WER versus WED issue) and simplify their derivation. EPA thus believes that the rule's provisions, coupled with its ongoing scientific development efforts, are directly responsive to the issues raised in the comment.

Comment ID: CTR-021-002b
Comment Author: LeBoeuf, Lamb, Green & MacRae
Document Type: Local Government
State of Origin: CA
Represented Org: City of Sunnyvale

Document Date: 09/25/97
Subject Matter Code: C-24a SSC Water Effect Ratios
References: Letter CTR-021 incorporates by reference letter CTR-035
Attachments? Y
CROSS REFERENCES G-04
C-22
K-01
G-05
G-02

Comment: Sunnyvale is very supportive of many fine concepts advanced in the proposed CTR, and we join with CASA/Tri-TAC in complimenting the Agency on its proposed positions with regard to such matters as: (a) the use of interim effluent limitations in NPDES permits during the pendency of TMDL and other special studies; (b) the allowance of water effects ratios in adjusting the criteria for metals without the necessity for additional rulemaking to establish site-specific objectives; (c) the use of the dissolved state for the metals criteria; (d) the use of cooperative, intergovernmental, and stakeholder-involved approaches towards the development of TMDLs;(e) the allowance of dilution for both chronic and acute pollutants; and (f) the allowance of compliance schedules in NPDES permits.

Response to: CTR-021-002b

EPA acknowledges the commenter's support.

Comment ID: CTR-027-012b
Comment Author: California SWQTF
Document Type: Storm Water Auth.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-24a SSC Water Effect Ratios
References: Letter CTR-027 incorporates by reference letters CTR-001, CTR-036 and CTR-040
Attachments? N
CROSS REFERENCES C-22
C-01a
G-09
G-05

Comment: PROVISIONS OF THE PROPOSED RULE WE SUPPORT

Not withstanding the above comments, we believe there are certain elements of the proposed rule with respect to establishing water quality standards that we can support:

* Metal criteria expressed in the dissolved fraction rather than expressed in the total recoverable fraction.

* Metal criteria that are developed as a function of the water-effect-ratio (WER).

* The current proposed human health criterion for mercury.

* The current preamble language regarding metal translators and mixing zones.

We believe the above provisions provide a more acceptable, scientific approach to the water quality-based pollution control approach. We recommend these provisions of the current rule remain as proposed.

Response to: CTR-027-012b

EPA acknowledges the commenter's support.

Comment ID: CTR-032-002d
Comment Author: Las Gallinas Val. Sanitry Dist
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-24a SSC Water Effect Ratios
References: Letter CTR-032 incorporates by reference letter CTR-035
Attachments? N
CROSS REFERENCES G-01
C-22
G-09
C-24
K
G-04
G-05
G-02

Comment: Regulatory Flexibility and Relief

The District supports EPA's use of "sound science" and current data in developing the proposed criteria in the California Toxics Rule (CTR). The District strongly supports language in the Preamble that references and endorses recommendations of the State Task Forces including use in permitting of:

* reasonable potential analyses * dissolved metals criteria * translators * water effects ratios * site specific objectives * innovative TMDL processes such as effluent trading * performance based interim limits * chronic and acute mixing zones, and * compliance schedules in NPDES permits.

Response to: CTR-032-002d

EPA acknowledges the commenter's support.

Comment ID: CTR-034-009
Comment Author: SCAP
Document Type: Trade Org./Assoc.
State of Origin: CA

Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-24a SSC Water Effect Ratios
References: Letter CTR-034 incorporates by reference letter CTR-035
Attachments? N
CROSS REFERENCES

Comment: * SCAP also supports EPA's proposal to include in the proposed rule a default water effects ratio (WER) value of 1.0 unless a site-specific WER is developed, and EPA's policy of allowing the approval of site-specific WERs without a formal rulemaking process to modify the CTR. We also agree with EPA'S policy to allow the development of site-specific WERs in accordance with EPA's technical guidance on WERs or using other scientifically defensible methods.

Response to: CTR-034-009

EPA acknowledges the commenter's support.

Comment ID: CTR-035-002h
Comment Author: Tri-TAC/CASA
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-24a SSC Water Effect Ratios
References:
Attachments? N
CROSS REFERENCES C-22
C-01a
C-08a
G-05
G-04
G-09
K-01

Comment: Second, we commend EPA for its inclusion in the CTR of several innovative and flexible regulatory approaches, such as metals criteria expressed as dissolved rather than total recoverable concentrations, and the revised human health criterion for mercury. In addition, in light of the issues surrounding the human health criteria for arsenic we support EPA's decision not to promulgate human health criteria at this time. With respect to implementation issues discussed in the Preamble, we support EPA's policies and guidance regarding the application of mixing zones and dilution credits. the use of interim permit limits while Total Maximum Daily Loads (TMDLs) and other special studies are being performed, and EPA's guidance to Regional Water Quality Control Boards (RWQCBs) that they may use any of the methods described in EPA's guidance document on the use of translators. We also support EPA's proposal to create a rebuttable presumption for Water Effects Ratios (WERs), allowing the RWQCBs and SWRCB to develop site-specific WERs that can be approved by EPA during the NPDES permit approval process. We believe that this approach will help facilitate the development of appropriate site-specific adjustments for metals criteria.

Response to: CTR-035-002h

EPA acknowledges the commenter's support.

Comment ID: CTR-035-019
Comment Author: Tri-TAC/CASA
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-24a SSC Water Effect Ratios
References:
Attachments? N
CROSS REFERENCES

Comment: pp. 42173-42174 - Application of metals Criteria (Water Effect Ratios) We support EPA's proposal to allow the development of site-specific WERs as set forth in EPA's WER guidance or determined by another scientifically defensible method. We also support the application of the WER on a watershed or water body basis to the extent that it is a technically sound and cost-effective approach. However, we would note that there may be instances where a "site" should be defined to be only a portion of a water body or watershed (e.g. the entire San Francisco Bay should not be considered a single "site"). We strongly endorse the inclusion in the proposed rule of a provision, such as was included in the National Toxics Rule, to create a rebuttable presumption of a default WER value of 1.0, unless a site-specific WER is determined. We understand that to mean that an EPA rulemaking process to adopt site-specific WERs would not be required, and that instead, EPA is "pre-authorizing" the use of correctly applied water effect ratios that are approved by the State. (EPA would still have the opportunity to review each WER through the normal NPDES permit approval process.)

Response to: CTR-035-019

EPA agrees with the commenter's discussion. EPA would approve the methodology. The state would approve the WERs derived in accord with the methodology.

Comment ID: CTR-038-002b
Comment Author: Sonoma County Water Agency
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-24a SSC Water Effect Ratios
References:
Attachments? Y
CROSS REFERENCES C-22
C-01a
G-04
G-05
G-09

Comment: 2. The following provisions of the rule are supported (1) adoption of metals criteria as dissolved concentrations; (2) expression of the metals criteria as a function of the water-effect ratio; (3) adoption of the proposed new human health criterion for mercury; and (4) the Preamble discussions regarding metals translators, mixing zones, and interim permit limits.

Response to: CTR-038-002b

EPA acknowledges the commenter's support.

Comment ID: CTR-040-002a
Comment Author: County of Sacramento Water Div
Document Type: Storm Water Auth.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-24a SSC Water Effect Ratios
References: Letter CTR-040 incorporates by reference letter CTR-027
Attachments? Y
CROSS REFERENCES C-01a
G-09
G-05

Comment: PROVISIONS SUPPORTED

We support a number of provisions of the Rule, including: (1) adoption of metals criteria as dissolved concentrations; (2) expression of the metals criteria as a function of the water-effect ratio; (3) adoption of the proposed new human health criterion for mercury- and (4) the Preamble discussions regarding metals translators and mixing zones. These provisions provide a firmer scientific base for the water quality-based approach to pollution control and are a marked improvement over the old Inland Surface Waters Plan. We would urge EPA to retain these provisions in the final Rule.

Response to: CTR-040-002a

EPA acknowledges the commenter's support.

Comment ID: CTR-041-003b
Comment Author: Sacramento Reg Cnty Sanit Dist
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-24a SSC Water Effect Ratios
References:
Attachments? N
CROSS REFERENCES G-09

Comment: Second, the District supports with reservations EPA's proposals on two subjects directly related to dissolved metals criteria, i.e. the proposed guidance on both (1) translators to convert from dissolved metals criteria to total recoverable permit limits and (2) the water-effect ratio (WER) as the method to compare the bioavailability and toxicity of a pollutant in receiving waters and in laboratory waters. Both of these two proposals must be implemented on a site-specific basis using local data, not statewide or watershed-wide data. Translators, however, should be developed whenever a discharger is willing to conduct studies in accordance with EPA-approved methods. The proposed procedure for a default value of 1.0 for a WER should mean that when a site-specific WER is to be determined, an additional EPA rulemaking process would not be required. Instead, this rule should pre-authorize the use of correctly applied WERs that are approved by the State.

Response to: CTR-041-003b

EPA agrees with the comments on translators. EPA does not agree with the comment that WERs cannot be derived on a statewide or watershed-wide basis. Some states have found it useful to pool data from several sites (hydrologically noncontiguous) and project WER values to sites having similar water quality characteristics. Because most pollution control decisions are insensitive to uncertainties in the WER estimation (that is, a range of different possible WER values will yield the same decision), it can be efficient to reserve WER derivations with the greatest site-specificity for those situations where the decision is most sensitive to uncertainties. See also the response to CTR-003-001 for discussion of the general approach for implementing WERs.

Comment ID: CTR-043-002b
Comment Author: City of Vacaville
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: C-24a SSC Water Effect Ratios
References:
Attachments? Y
CROSS REFERENCES C-22
C-01a
G-04
G-05
G-09

Comment: 2. The following provisions of the rule are supported: (1) adoption of metals criteria as dissolved concentrations; (2) expression of the metals criteria as a function of the water-effect ratio; (3) adoption of the proposed new human health criterion for mercury; and (4) the Preamble discussions regarding metals, translators, mixing zones and interim permit limits.

Response to: CTR-043-002b

EPA acknowledges the commenter's comment.

Comment ID: CTR-044-003b
Comment Author: City of Woodland
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: C-24a SSC Water Effect Ratios
References:
Attachments? Y
CROSS REFERENCES C-22
C-01a
G-09
G-05
G-04

Comment: We have reviewed the proposed CTR and offer the following comments:

2. The following provisions of the rule are supported:

(1) adoption of metals criteria as dissolved concentrations;

(2) expression of the metals criteria as a function of the water-effect ratio;

(3) adoption of the proposed new human health criteria for mercury; and

(4) the Preamble discussions regarding metals translators, mixing zones, and interim permit limits.

Were the old human health criterion for mercury (0.012 ug/ l) to be adopted, the City would have to remove its discharge from Tule Canal and go to land disposal. The capital cost to do this would be $22.1 million and the total present worth cost would be $23.1 million (see Exhibit B, Required Capital improvements and Costs for Beryllium and Mercury). This would translate to an annual cost of $3.1 million per year (at 7% over 10 years) and would require that monthly sewer service charges be increased by more than 100%.

Response to: CTR-044-003b

EPA acknowledges the commenter's comment.

Comment ID: CTR-045-005
Comment Author: Sausalito-Marin Sanitary Dist.
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/24/97
Subject Matter Code: C-24a SSC Water Effect Ratios
References:
Attachments? Y
CROSS REFERENCES

Comment: The District supports many of the items included in the proposed CTR:

EPA's proposal to create a rebuttable presumption for Water Effects Ratios (WER) allowing RWQCBs and the SWRCB to develop site-specific WERs that can be approved by EPA during the NPDES permit approval process.

Response to: CTR-045-005

EPA acknowledges the commenter's support.

Comment ID: CTR-049-002
Comment Author: Watereuse Assoc. of California
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 09/24/97
Subject Matter Code: C-24a SSC Water Effect Ratios
References:
Attachments? N
CROSS REFERENCES

Comment: We applaud and support USEPA's creation in the draft CTR of a rebuttable presumption for Water Effects Ratios (WERs), allowing the Regional Water Quality Control Boards and the State Water Quality Control Board to develop site-specific WERs that can be approved by USEPA during the NPDES permit approval process. WateReuse believes that this flexible approach would help facilitate the development of appropriate site-specific adjustments for metals criteria.

Response to: CTR-049-002

EPA acknowledges the commenter's support.

Comment ID: CTR-054-002b
Comment Author: Bay Area Dischargers Assoc.
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-24a SSC Water Effect Ratios
References:
Attachments? Y
CROSS REFERENCES C-22

Comment: BADA supports adoption of the metals criteria as dissolved concentrations and the expression of the criteria as a function of the water-effect ratio. These changes place the metals criteria on a firmer

scientific base than the old State Plans. Moreover, previous BADA studies have shown that adoption of the copper criterion as total recoverable could cost Bay Area POTWs several billion dollars while reducing copper loads to the Bay by only several percent (see Attachment 1). Further, building the water-effect ratio into the criteria will lessen the administrative burden on all parties when it becomes necessary to pursue the development of such a ratio. For these reasons, it would not be in the public interest nor consistent with Presidential Order 12866 or the Unfunded Mandates Reform Act to adopt the metals criteria as total recoverable concentrations or to require approval of a site-specific objective whenever a water-effect ratio is developed.

Response to: CTR-054-002b

See response to comment number CTR-003-001.

Comment ID: CTR-056-006
Comment Author: East Bay Municipal Util. Dist.
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/22/97
Subject Matter Code: C-24a SSC Water Effect Ratios
References: Letter CTR-056 incorporates by reference letter CTR-054
Attachments? N
CROSS REFERENCES

Comment: Second, EBMUD would like to express to EPA it support for inclusion of:

* EPA's approach to water effects ratios for determining site specific criteria,

Response to: CTR-056-006

EPA acknowledges the commenter's support.

Comment ID: CTR-056-009
Comment Author: East Bay Municipal Util. Dist.
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/22/97
Subject Matter Code: C-24a SSC Water Effect Ratios
References: Letter CTR-056 incorporates by reference letter CTR-054
Attachments? N
CROSS REFERENCES

Comment: Second, EBMUD would like to express to EPA it support for inclusion of:

* EPA's proposal to create a rebuttable presumption for Water Effects Ratios (WERs) which permit the

RWQCBs and the SWRCB to develop site-specific WERs that can be approved by EPA during the NPDES permit approval process. This approach should lead to the development of appropriate site-specific adjustments for metals criteria, and

Response to: CTR-056-009

EPA acknowledges the commenter's support.

Comment ID: CTR-061-014
Comment Author: G. Fred Lee & Associates
Document Type: Academia
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-24a SSC Water Effect Ratios
References:
Attachments? Y
CROSS REFERENCES

Comment: Page 42173, third column, first two paragraphs, discuss the water effects ratio approach for adjusting national criteria. This approach does not adequately or reliably incorporate aquatic chemistry into water quality criteria adjustment. The approach tends to over-regulate because of the failure to equilibrate between the chemical forms in ambient waters and those in the test system. The statement in the third paragraph, "This approach is technically sound, an efficient use of resources... " is not appropriate since it leads to over-regulation of chemical constituents in wastewater and stormwater runoff. Enclosed is a summary report "Regulating Copper in San Francisco Bay: Importance of Appropriate Use of Aquatic Chemistry and Toxicology, " (1997) on the over-regulation of Cu in San Francisco Bay that developed due to the inability of the water effects ratio to develop site-specific criteria that properly reflect the toxicity of Cu in San Francisco Bay waters.

Response to: CTR-061-014

EPA does not agree with the commenter that a reasonably accurate water-effect ratio cannot be derived, either using current guidance or using other scientifically sound procedures allowed by the rule. See response to CTR-020-006.

Comment ID: CTR-066-003
Comment Author: Delta Diablo Sanitation Dist.
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: C-24a SSC Water Effect Ratios
References:
Attachments? N
CROSS REFERENCES

Comment: Our preliminary review of the CTR finds several areas that we believe are positive changes and will enhance the rulemaking. The areas that we support as now written are as follows:

* The water effects ratios philosophy for determining site-specific criteria.

Response to: CTR-066-003

EPA acknowledges the commenter's support.

Comment ID: CTR-066-007
Comment Author: Delta Diablo Sanitation Dist.
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: C-24a SSC Water Effect Ratios
References:
Attachments? N
CROSS REFERENCES

Comment: Our preliminary review ofthe CTR finds several areas that we believe are positive changes and will enhance the rulemaking. The areas that we support as now written are as follows:

* The proposal to create a rebuttable presumption for Water Effects Ratios (WERs), allowing the RWQCBs and SWRCB to develop site-specific WERs that can be approved by the EPA during the NPDES permit approval process. This approach will help facilitate the development of appropriate site-specific adjustments for metals criteria.

Response to: CTR-066-007

EPA acknowledges the commenter's support.

Comment ID: CTR-081-002b
Comment Author: West County Agency
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: C-24a SSC Water Effect Ratios
References:
Attachments? N
CROSS REFERENCES G-04
G-02
C-22
G-09
C-01a
C-08a

G-05

Comment: * There are many aspects of the CTR that we support. These include: a) Application of interim limits while special studies are perfomed. b) Approach to water effect ratios for determining site specific criteria. c) Inclusion of provision for compliance schedules. However, this should be modified to allow inclusion of compliance schedules of up to 15 years in permits if deemed appropriate by Regional Boards. d) Metals criteria expressed as dissolved rather than total recoverable concentrations. e) EPA's guidance to Regional Boards regarding use of translators. f) EPA's proposal to create a rebuttal presumption for Water Effects Ratios, g) Revised human health criteria for mercury h) Decision to not promulgate human health criteria at this time in light of issues surrounding health criteria for arsenic. i) EPA's policies regarding application of mixing zones and dilution credits.

Response to: CTR-081-002b

EPA acknowledges the commenter's support.

Comment ID: CTR-085-004
Comment Author: Camarillo Sanitary District
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/24/97
Subject Matter Code: C-24a SSC Water Effect Ratios
References:
Attachments? N
CROSS REFERENCES

Comment: On several aspects of the California Toxics Rule, the District is in agreement with CASA and SCAP comments:

* The EPA's approach to water effect's ratios for determining the site-specific criteria.

Response to: CTR-085-004

EPA acknowledges the commenter's support.

Comment ID: CTR-085-008
Comment Author: Camarillo Sanitary District
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/24/97
Subject Matter Code: C-24a SSC Water Effect Ratios
References:
Attachments? N
CROSS REFERENCES

Comment: On several aspects of the California Toxics Rule, the District is in agreement with CASA and SCAP comments:

* The EPA's proposal to create a rebuttable presumption for Water Effects Ratios (WER) allowing the RWQCB and the SWRCB to develop site-specific WER that can be approved by the EPA during the NPDES permit approval process. This approach will help facilitate the development of appropriate site-specific adjustments for metal's criteria.

Response to: CTR-085-008

EPA acknowledges the commenter's support.

Comment ID: CTR-086-004d
Comment Author: EOA, Inc.
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org: California Dent
Document Date: 09/26/97
Subject Matter Code: C-24a SSC Water Effect Ratios
References: Letter CTR-086 incorporates by reference letter CTR-035
Attachments? N
CROSS REFERENCES G-01
C-22
G-09
C-24
K-03
G-04
G-05
G-02

Comment: Regulatory Flexibility and Relief

CDA supports language in the CTR Preamble that references and endorses recommendations of the State Task Forces including in part the use of.

* reasonable potential analyses * dissolved metals criteria * translators * water effects ratios * site specific objectives * innovative TMDL processes such as effluent trading * performance based interim limits * chronic and acute mixing zones, and * compliance schedules in NPDES permits.

Response to: CTR-086-004d

EPA acknowledges the commenter's support.

Comment ID: CTR-090-002b
Comment Author: C&C of SF, Public Utl. Commis.
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-24a SSC Water Effect Ratios
References: Letter CTR-090 incorporates by reference letters CTR-035 and CTR-054
Attachments? Y
CROSS REFERENCES C-17a
C-22
G-05
G-02
G-04

Comment: There are many features of the proposed rule which we strongly endorse, specifically:

* the use of the latest IRIS values for human health criteria, it is essential that the criteria be based on the latest scientific and environmental information;

* recognition that the dissolved fraction of metals, rather than the total recoverable, better reflect the aquatic toxicity of metals;

* recognition that for certain metals (e.g. copper and zinc) ambient water chemistry is critical in determining toxicity thereby endorsing the Water Effects Ratio;

* recognition and strong endorsement of the multi-tiered mixing zones for acute, chronic and human health effects; and

* recognition of interim limits and compliance schedules as appropriate implementation strategies,

Response to: CTR-090-002b

EPA acknowledges the commenter's support.

Comment ID: CTR-092-004
Comment Author: City of San Jose, California
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: C-24a SSC Water Effect Ratios
References: Letter CTR-092 incorporates by reference letter CTR-035
Attachments? Y
CROSS REFERENCES

Comment: Application of Metals Criteria

The City supports EPA's proposal to provide for the adjustment of metals criteria through the application of the water-effects-ratio (WER) procedure to ensure that such criteria are appropriate for chemical conditions present in the water body. The City agrees with EPA that ideally, the WER process should be applied on a watershed or water body basis in California. However, the City does have sincere concerns with how a watershed and/or waterbody is defined. The City wishes to be on record that a significant body of sci ' entific information supports the contention that San Francisco Bay South of the Dumbarton Bridge (South San Francisco Bay) constitutes a distinct waterbody for purposes of the WER process. Furthermore, the City recommends that the Rule be revised to allow use of the WER procedure to develop site-specific criteria, without requiring a formal rulemaking process.

Response to: CTR-092-004

EPA recognizes the concerns expressed, but believes that the commenter's concerns may be unfounded. The CTR does not define or restrict the boundaries of any California site, or impede the appropriate definition of such boundaries. The rule also does not require or intend to require that the adoption of site-specific WERs go through a formal rulemaking. See the response to CTR-003-001.

Comment ID: CTR-092-013a
Comment Author: City of San Jose, California
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: C-24a SSC Water Effect Ratios
References: Letter CTR-092 incorporates by reference letter CTR-035
Attachments? Y
CROSS REFERENCES C-02b

Comment: Validity Of The Proposed Copper Criteria For South San Francisco Bay

Attachment 3 to this letter is a technical report entitled "Development of a Site-Specific Water-Effect Ratio for Copper in South San Francisco Bay", dated September 1997 and prepared by the City of San Jose Environmental Services Department.

This attachment is also incorporated as part of our comments and is being submitted for inclusion in the record for this rulemaking. Because EPA is proposing to promulgate water quality criteria for all waterbodies in the State of California, we believe that it is required toconsider site-specific data to the extent that it is available, especially, where, as in the case of the submitted data, it appears that there is a less costly/appropriately protective alternative to the proposed criteria.

Response to: CTR-092-013a

EPA disagrees with the commenter. EPA cannot efficiently include all site-specific data in its rulemaking process. Furthermore, EPA does not believe that it is either technically or administratively advantageous or efficient for the rule to specify particular site boundaries or WERs within such boundaries. Nevertheless, because it is necessary to provide for the use of site-specific data collected either before or after promulgation, the rule expresses the criteria in terms of WER values, which like

water hardness, are specified subsequent to the rulemaking. Thus, the rule has a provision allowing the the state to consider the data cited by the commenter in this context. See the response to CTR-003-001 for discussion of the general approach for implementation.

Comment ID: CTRH-001-003b
Comment Author: Robert Hale
Document Type: Public Hearing
State of Origin: CA
Represented Org: CA Stormwater Task Force
Document Date: 09/17/97
Subject Matter Code: C-24a SSC Water Effect Ratios
References:
Attachments? N
CROSS REFERENCES C-22
C-1a

Comment: In summing up -- not summing up, just as a parting shot -- I do appreciate the fact that in working up the toxics rule here that EPA has done certain things which in fact we see as improvements in actually making the standards fit with what we think -- have come to see as perhaps the actual impacts of the stormwater part of this. And by that, I'm referring to the dissolved metals criteria and the water effect ratio in there, and the human health criteria revisions for mercury and the other -- the other items.

I appreciate some of the stuff in there, and -- with the exception of the preamble language. And you really need to get that out of there. We're going to pursue this as far as we have to.

I appreciate your hearing me.

Response to: CTRH-001-003b

EPA acknowledges the commenter's support.

Comment ID: CTRH-001-024d
Comment Author: Michelle Pla
Document Type: Public Hearing
State of Origin: CA
Represented Org: S.F. Public Utilities Com
Document Date: 09/17/97
Subject Matter Code: C-24a SSC Water Effect Ratios
References:
Attachments? N
CROSS REFERENCES g-02
g-05
c-22
c-17a

Comment: MS. PLA: My name is Michelle Pla. I'm with the Public Utilities Commission, City and County of San Francisco.

I made the comment on my card that I also said that I would try to be constructive, and so I'm going to follow my mentor here, Phil Bobel, and say that there are some things in this rule that we're very pleased to see.

We're very pleased to see use of the latest scientific information, particularly the use of latest IRIS, I-R-I-S, numbers-for human health. We're very pleased that you're using dissolved versus total recoverable form for the metals.

We're very pleased to see recognition of the water effects ratios. We're pleased to see recognition for a multi-tiered mixing zone for acute and chronic human health effects and hope that the state pays particular attention to that.

We do have a problem with the way you've described compliance schedules and hope to be working strictly by the state on that as well. We think that the five-year system is fairly shortsighted, and -we can't even do FMDSLs in five years.

Response to: CTRH-001-024d

EPA acknowledges the commenter's support.

Comment ID: CTRH-001-032a
Comment Author: Dave Brent
Document Type: Public Hearing
State of Origin: CA
Represented Org: CA Water Qual. Task Force
Document Date: 09/17/97
Subject Matter Code: C-24a SSC Water Effect Ratios
References:
Attachments? N
CROSS REFERENCES c-22
g-5

Comment: I would like to take this time to note that I think it contains some important elements that we agree with and believe are reflective of the impact. These include the uses of dissolved metals and the provisions which will enable the state to use mixing zones and water effects ratios and establish site-specific objectives.

Response to: CTRH-001-032a

EPA acknowledges the commenter's support.

Comment ID: CTRH-001-039a
Comment Author: Robert Reid
Document Type: Public Hearing

State of Origin: CA
Represented Org: CASA
Document Date: 09/17/97
Subject Matter Code: C-24a SSC Water Effect Ratios
References:
Attachments? N
CROSS REFERENCES G-04
G-02

Comment: I've been saving the good news for last.

Fourth, and by no means last in priority for CASA, we wish to register our support for several parts of the preamble to the CTR.

We support application of interim limits in NPDES permits while TMDLs and other special studies are being performed.

We also support EPA's approach to water effects ratios for determining site-specific criteria.

We also support the inclusion of a provision allowing the compliance schedules in permits in the rule, although we recommend that it be modified to allow the regional boards to include compliance schedules of up to 15 years in permits, if they deem it appropriate.

Thank you for the opportunity to present our views. As I said earlier, we will be submitting detailed comments on the proposed rule by the end of the comment period, which hopefully will be extended in response to our and others' requests.

Response to: CTRH-001-039a

EPA acknowledges the commenter's support.

Comment ID: CTRH-001-057b
Comment Author: Dave Tucker
Document Type: Public Hearing
State of Origin: CA
Represented Org: San Jose Env. Serv. Dept.
Document Date: 09/17/97
Subject Matter Code: C-24a SSC Water Effect Ratios
References:
Attachments? N
CROSS REFERENCES K-03
G-04
G-07
G-09
C-22
G-05

Comment: Some of the flexibility that the City highly supports is the water effect ratio investigations to adjust statewide criteria to site-specific conditions; the interim limits concept while special studies are being conducted by the dischargers and other entities; a variance procedure to allow dischargers to achieve progress toward effluent limit attainment without violating applicable water quality standards; dissolved criteria for metals to reflect the toxicological conditions; translators to adjust dissolved criteria to total permit limitations; trading programs to attain and maintain water quality; and a mixing zone that reflects true instream pollutant conditions and that protects beneficial uses.

Response to: CTRH-001-057b

EPA acknowledges the commenter's support.

Subject Matter Code: C-24b SSC Recalculation Procedure

Comment ID: CTR-009-004
Comment Author: City of Thousand Oaks
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/22/97
Subject Matter Code: C-24b SSC Recalculation Procedure
References:
Attachments? Y
CROSS REFERENCES

Comment: At Federal Register, Page 42168, third column, EPA provides that "States may develop site-specific criteria using native species, provided that the broad spectrum represented by the eight families is maintained." In California, as in other arid and semi-arid western states, there are unique aquatic habitats that by their inherent physical chemical and hydrologic nature, are naturally very limited in species diversity as well as density. It would seem that in such cases, what is important and relevant is that the site-specific criteria be most representative of the specific waters and its natural constraints, not that criteria reflect the broad spectrum of species that do not and can not inhabit these waters. The City recommends that the requirement to maintain the eight families broad spectrum be deleted and replaced with a requirement that the site-specific criteria be based upon native species representative of the specific waters in question. In a similar situation, an EPA Administrative Law Judge found that:

"...a proposed test must be reasonably related to determining whether the discharge could lead to real world toxic effects. The Clean Water Act objective to prohibit the discharge of toxic pollutants in toxic amounts concerns toxicity in the receiving waters of the United States, not the laboratory tank."

In the Matter of Metropolitan - Dade County, Miami - Dade Wastewater Authority, NPDES Permit No. Fl, Oct., 1996. Certainly, this precept also applies when establishing a water quality criterion that is intended to protect a specific receiving water. That is, to be relevant to the site-specific waters, the criterion upon which discharge permit limitations are to be developed must be based upon species that are representative of the specific waters. The broad spectrum criteria make sense and are reasonable when applied state-wide. But application of broad spectrum criteria to a site-specific situation would seem to be the antithesis of site-specific water quality controls by definition.

Response to: CTR-009-004

In the CTR, EPA is not promulgating a site-specific criteria methodology. EPA's statement on page 42168 column 2 (not 3) is meant to provide guidance on the derivation of site-specific criteria.

EPA agrees with the general concern that its guidance might be incorrectly interpreted to mean that a site-specific taxonomic data set should have more diversity than the site actually has. EPA does not intend for its guidance to be interpreted in this manner.

Nevertheless, because the Rule does not provide for the Recalculation Procedure, the CTR criteria would continue to apply even if California adopted a Recalculation-based site-specific criterion, unless EPA amended the rule not to apply at that site.

Comment ID: CTR-025-005
Comment Author: Metro. Water Dist. of So. Cal.
Document Type: Water District
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: C-24b SSC Recalculation Procedure
References:
Attachments? Y
CROSS REFERENCES

Comment: The CTR freshwater aquatic life criteria, in general, may not be appropriate for effluent-dominated water bodies and ephemeral streams. Some of these water bodies and the aquatic communities they support exist primarily because of discharges of reclaimed wastewater. Such water bodies are used to transport reclaimed water discharges to a downstream use area and/or are used for the disposal of surplus reclaimed water which occurs when demand is temporarily less than supply. The CTR freshwater aquatic life criteria may create requirements for reclaimed wastewater dischargers which are not economically feasible to meet and could affect the viability of reclamation activities. In Southern California, water reclamation is vital to ensuring a reliable regional water supply.

Response to: CTR-025-005

The commenter here recommends that different uses be adopted for certain waters in California. Designated uses are outside the scope of this rule. EPA has not attempted to determine the beneficial uses or the attainability of designated uses for California in this rule. This rule is to provide criteria for toxic pollutants for California based on the uses established by the State. EPA's criteria will protect these uses.

Comment ID: CTR-082-005
Comment Author: City of Burbank
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/24/97
Subject Matter Code: C-24b SSC Recalculation Procedure
References:
Attachments? N
CROSS REFERENCES

Comment: The subject rule has a significant impact on our facility discharge and the citizens of the City. We therefore present the following comments for your consideration to re-open the comment period for this rule in order to facilitate a more complete review by public and in particular by those in the POTW community:

* Propose that USEPA should accept separate significantly defensible reasonably achievable aquatic life criteria for streams and creeks that are dominated all or part of the year by discharges from anthropogenic

sources, such as POTWs (i.e., effluent dependent waters).

Response to: CTR-082-005

EPA does not agree. EPA has not developed separate criteria for effluent-dependent waters because these waters have designated uses for human health and/or aquatic life that correspond to the criteria in the rule. However, the State may consider, and EPA encourages, such criteria developments as part of the State's Phase II of the ISWP/EBWP readoption or as part of its RWQCB Basin Plan updates. In the meantime, EPA's criteria will protect all beneficial uses assigned to each inland surface water and enclosed bay and estuary.

Subject Matter Code: C-24c SSC Santa Ana River

Comment ID: CTR-033-002
Comment Author: San Bernardino Muncpl Wtr Dept
Document Type: Water District
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-24c SSC Santa Ana River
References: Letter CTR-033 incorporates by reference letter CTR-020
Attachments? Y
CROSS REFERENCES

Comment: We support the deletion of site specific objectives for cadmium and copper set for in the 1995 Water Quality Control Plan for the Santa Ana River Basin. We believe the site specific objective for lead in the plan is appropriate and should be approved by the U. S. Environmental Protection Agency. This recommendation is premised on the Santa Ana Regional Water Quality Control Board amending the Basin plan to incorporate revised correction factors and recalculations for this metal based upon the most current U.S. EPA guidance and criteria documents.

Response to: CTR-033-002

We agree with the commenter's support of the Regional Water Quality Control Board, Santa Ana River Basin, and its request that we promulgate water quality standards for cadmium and copper in place of the site-specific standards contained in the 1995 Water Quality Control Plan for portions of the Santa Ana River Basin. The final CTR will continue to reflect that position as expressed in the proposed CTR.

EPA also appreciates the commentor's support of the site-specific criterion for lead in portions of the Santa Ana River Basin which the State has adopted and submitted to EPA for approval. However, EPA has not yet approved this site-specific criterion, and in the absence of EPA-approved State-adopted site-specific criteria, EPA must promulgate CTR criteria to meet the requirements of CWA section 303(c)(2)(B). Nevertheless, where site-specific criteria have already been adopted by the State in accordance with State law, but not yet acted upon by EPA, and those criteria are more stringent than applicable CTR criteria, those are the controlling criteria for CWA purposes even without a stay of the applicable CTR criteria and are thus implementable by the State. (This would not be affected by the "Alaska Rule" which EPA proposed July 9, 1999, 64 Fed.Reg. 37072. See p. 37076.) This is the case with the site-specific criterion for lead adopted by the State for certain waters in the Santa Ana River Basin. Since the State must use the most stringent criteria in effect for its water quality programs, the State may use this site-specific lead criterion notwithstanding the CTR fresh water aquatic life criterion for lead, thus the commenter's concerns should have no practical effect.

Subject Matter Code: C-24d SSC Effluent Dependent Wtr

Comment ID: CTR-034-007
Comment Author: SCAP
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-24d SSC Effluent Dependent Wtr
References: Letter CTR-034 incorporates by reference letter CTR-035
Attachments? N
CROSS REFERENCES

Comment: CRITERIA

* SCAP recommends that EPA adopt separate criteria for water bodies in California that are dependent for all or part of the year on flows from wastewater treatment plants (known as "effluent dependent waters" or EDWs). SCAP believes that there are appropriate ways to modify aquatic life and human health criteria to tailor them to the unique conditions of the EDWs in the arid environment found throughout most of southern California. Potential methods include adjustment of the uncertainty and/or modifying factors used to calculate reference doses (RfDs) for noncarcinogenic human of 10E-4 health criteria, use or 10E-5 risk levels (instead of 10E-6) for carcinogenic human health criteria, adjustment of bioconcentration factors for human health criteria, and the use of site-specific water effects ratios for aquatic life criteria. Further comments regarding these methods are included in Attachment 1.

Response to: CTR-034-007

EPA disagrees that it must or should establish separate criteria for effluent dependent waters in this rule. In establishing water quality criteria for California, EPA is implementing section 303(c)(2)(B) of the CWA which requires adoption of criteria for all toxic pollutants for which EPA has issued criteria guidance and for which the discharge of such pollutants could reasonably be expected to interfere with the designated uses adopted by the state. EPA based the criteria contained in the CTR on its most recent national criteria guidance, which are designed to derive criteria that will be protective of aquatic life and human health. As long as a waterbody currently has a designated use for the protection of aquatic life and/or human health, application of the national 304(a) criteria are appropriate for fulfilling section 303(c)(2)(B). As a policy matter, EPA believes that the CTR, a massive undertaking in and of itself, is an essential first step toward reinstating a strong water quality program in California. Under the Clean Water Act, EPA has no obligation to develop such site-specific criteria or the data upon which such site-specific criteria would be based. If, however, the State wishes to develop site-specific criteria or to change the uses of the waterbody -- pursuant to the regulations at 40 CFR Part 131, and "Region 9's Interim Final Guidance for Modifying and Protecting Effluent-Dependent Ecosystems," EPA would consider and possibly approve such a site specific criterion or such a revision to designated uses.

With respect to risk level applicable to human health criteria when, as here, EPA establishes a water quality standard, EPA intends in its discretion to use a risk level of 1 x 10-6, although the state may in its discretion choose another risk level for protection of human health. If the State has appropriately consulted the public.

With respect to adjustment of bioconcentration factors, the commenter did not explain how or why

bioconcentration factors should be adjusted.

Further, EPA believes that the proposed CTR embodies a number of features that will facilitate the site-specific application of criteria when they are implemented by the state in the future. In proposing an equation rather than a single number for the metals listed in the table in proposed Section 131.38(b)(2) with variables including hardness and water effect ratios (WERs), and in the discussion on the application of metals criteria contained in Section 131.38(c)(4), EPA considers the proposed aquatic life criteria to be highly adjustable to or reflective of site-specific conditions characteristic of EDWs. The inclusion of WERs in these criteria embodies one method of developing water quality objectives for EDWs described in the "Report of the Effluent-Dependent Waters Task Force for Consideration of Issues Related to the Inland Surface Waters Plan" (State Water Resources Control Board, October 1995), which was a broad-based effort to address the specific characteristics of EDWs statewide (see also response to comment number CTR-057-003 below). Another method contained in that report which has been included in the proposed criteria is the use of dissolved metals in lieu of total recoverable metals. Finally, the aquatic life criteria for pentachlorophenol are expressed as a function of pH, allowing for adjustment of the numeric objectives on a site-specific basis.

Furthermore, the above-mentioned report at no point suggests that the resource-intensive task it describes of developing site-specific criteria for EDWs should be carried out by EPA. Rather, on numerous occasions the report recommends that the State or Regional Boards should perform that function. EPA agrees that the appropriate forum for addressing the recommendation in this comment is in subsequent water quality standards revisions carried out by the State, in the adoption of Basin Plans, or in implementation of these criteria in discharge permits or nonpoint source controls.

Potential methods for adjusting criteria for EDWs, with the exception of the inclusion of water effect ratios (WERs) as an optional component of determining appropriate metals criteria, should be applied in the context of State or Regional Board water quality standards-setting actions. EPA's action in promulgating statewide criteria is to reduce risks to all exposed populations, including especially sensitive subpopulations. However, site-specific criteria may be developed subsequently by the State where warranted to provide necessary additional protection, or otherwise to adjust the level of protection as appropriate to reflect site-specific conditions following a Section 304 standards-setting process including the opportunity for public involvement. As described above, EPA has included WERs in the proposed metals criteria listed in the table in Section 131.38(b)(2) for protection of aquatic life.

Comment ID: CTR-035-006
Comment Author: Tri-TAC/CASA
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-24d SSC Effluent Dependent Wtr
References:
Attachments? N
CROSS REFERENCES

Comment: EPA should adopt separate, scientifically defensible aquatic life criteria for streams and creeks that are dominated all or part of the year by discharges from anthropogenic sources, such as POTWs (i.e. effluent-dependent waters).

Response to: CTR-035-006

See response to CTR-034-007.

Comment ID: CTR-036-009
Comment Author: County of Orange
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-24d SSC Effluent Dependent Wtr
References: Letter CTR-036 incorporates by reference letters CTR-013, CTR-018, CTR-031, CTR-034 and CTR-040
Attachments? N
CROSS REFERENCES

Comment: We are concerned that the proposed rule would be equally applicable to effluent-dominated water bodies, particularly in the arid West. In these water bodies habitat is often fully or seasonally dependent on existing discharges and removal, due to redirection and treatment, could result in habitat loss.

Response to: CTR-036-009

For purposes of this rulemaking, EPA is presuming that the State has adequately determined the designated uses for its waters. EPA is merely adding criteria for priority toxic pollutants on a statewide basis sufficient to protect the State's designated uses. EPA believes that a use attainability analysis would provide appropriate means for resolving potential tradeoffs between maintaining discharges to support habitat and meeting stringent effluent standards in a particular waterbody. The results of such an analysis may determine whether site-specific modifications to criteria appropriate. EPA believes that the best forum for conducting these special studies and site-specific analyses is in the context of the statewide revisions of water quality standards and policies for their implementation, undertaken triennially by the State, or in the revision of regional Basin Plans. To assist with these analyses, EPA Region 9 has issued "Guidance for Modifying Water Quality Standards and Protecting Effluent-Dependent Ecosystems," (Interim Final, June 1992). This guidance introduces the "Ecological Benefit Comparison" approach with particular attention to application to EDWs. If it can be demonstrated that using an effluent to maintain riparian and aquatic habitats constitutes a net ecological benefit over removal of the effluent, the guidance describes the circumstances under which a designated but not existing use can be modified or removed. Such an approach may be applied both to aquatic life and to human consumption uses. As was recommended by the Report of the EDWs Task Force, convened by the State in 1995, Statewide plan and regional Basin Plan modifications are the preferred regulatory pathways for conducting and adopting such analyses.

Comment ID: CTR-040-016a
Comment Author: County of Sacramento Water Div
Document Type: Storm Water Auth.
State of Origin: CA
Represented Org:

Document Date: 09/25/97
Subject Matter Code: C-24d SSC Effluent Dependent Wtr
References: Letter CTR-040 incorporates by reference letter CTR-027
Attachments? Y
CROSS REFERENCES C-21

Comment: RECOMMENDED MODIFICATIONS

To address our concerns, we recommend the following modifications which do not undermine the toxic pollutant control actions envisioned in EPA's economic analysis (e.g., BMPs for stormwater and source control). In fact, some of these recommendations would provide incentives for greater movement toward achieving the water quality criteria than would occur under the Rule as it is currently proposed.

III. Recommendation: Adopt separate, scientifically defensible, reasonably achievable aquatic life criteria for effluent-dominated/effluent-dependent streams.

* Available discharge data for effluent-dominated streams in Sacramento indicate that a number of the proposed criteria are not presently being achieved and cannot be achieved with implementation of BMPs or other reasonable controls (See Attachment A). This is also true for many municipal stormwater programs in California.

* The application of the proposed statewide criteria to effluent-dominated waters would force the Sacramento Stormwater Management Program, and other stormwater programs, to remove these discharges, essentially drying up the waters for most of the year. The costs would be significant and the benefits assessed in EPA's economic analysis (enhanced fishing, passive benefits, and reduced cancer risk) would be zero. The removal of these discharges would likely be detrimental rather than beneficial. The effluent-dependent aquatic and riparian habitat, which previously supported aquatic life and wildlife, would no longer exist.

* Effluent-dominated and effluent-dependent water bodies, which are common in California, require separate and distinct water quality criteria. Such a move is common sense and would be in accordance with the spirit (if not the letter) of Presidential Executive Order 12866 and the Unfunded Mandates Reform Act.

* Additionally, the CWA requires that water quality standards be established taking into consideration their use and value for public water supplies, propagation of fish and wildlife, recreational purposes, and also taking into consideration their use and value for navigation (See CWA section 303(c)(2)(A)). Consistent with this statutory mandate, EPA regulations require that water quality standards be based on identification of specific water bodies where toxic pollutants may be adversely affecting water quality or the attainment of the designated water use, or where the levels of toxic pollutants are at a level to warrant concern and must adopt criteria for such toxic pollutants applicable to the water body sufficient to protect the designated use. Clearly the intent of both the CWA and EPA regulations is that water quality standards be tailored to the characteristics of the waters in question, rather than based on the "one-size-fits-all" approach used in the proposed Rule. This is not the cumbersome task suggested by the Preamble, at least with respect to developing criteria appropriate for effluent-dependent waters. But, even if it were a cumbersome task, the difficulty of complying with the law is not an excuse for noncompliance.

* EPA could fulfill its obligation under the CWA and EPA regulations with respect to

effluent-dominated waters simply by proposing criteria for these waters that are generally achievable by present stormwater discharges. Then, using the more stringent statewide criteria as a tracer, control measures and BMPs could be implemented to reduce the discharge of problematic pollutants to the MEP.

Response to: CTR-040-016a

Regarding the first and third recommendations under part III, see the response to CTR-034-007.

Regarding the second recommendation under part III; with respect to the comment about removal of discharges see the response to comment number CTR-036-009 above. Further, with respect to comments that compliance with water quality criteria would incur costs that exceed benefits, EPA believes Sacramento County's has overestimated its incremental expense resulting from implementation of the CTR (for further detail see the response to comment in Section J, "Stormwater Economics," Issue 1). In any case, the Clean Water Act requires the states, or EPA to establish criteria that are protective of the designated uses, regardless of costs. This means that EPA must develop scientifically-based criteria that are protective of designated uses. In existing state water quality standards, however, the designated uses are not refined as suggested in Region 9's Guidance for Modifying and Protecting Effluent Dependent Ecosystems to suggest a use that would have different criteria. Until that is done, EPA is establishing criteria that protect the current designated use.

Regarding the fourth recommendation under part III, see the response to comment number CTR-034-007.

Regarding the fifth recommendation under part III, the Clean Water Act requires EPA to establish criteria that will be protective of designated uses. Establishing criteria for waters based on controls dischargers can currently achieve in their discharges may not ensure that criteria are protective of designated uses.

Comment ID: CTR-042-005
Comment Author: Cal. Dept. of Transportation
Document Type: State Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: C-24d SSC Effluent Dependent Wtr
References:
Attachments? Y
CROSS REFERENCES

Comment: 5. The CTR should address effluent dominated waterbodies.

The CTR, as currently proposed, does not recognize that many of the waterbodies in the state are classified as "effluent dominated." In many areas of the state, particularly in Southern California, storm water and wastewater discharges are the primary or only source of water to urban creeks and waterways. To meet CTR criteria on discharges to these waterbodies, zero discharge or advanced treatment technologies may be required. The cost to accomplish this would be substantial and the benefit would be marginal, if not negative. A negative benefit would be realized if the removal of storm water and wastewater discharges to these waterbodies causes damage to the aquatic organisms and wildlife that are supported by and rely upon these effluent dependent waterbodies.

Request: Caltrans requests that the CTR be amended to include separate and distinct water quality criteria for effluent dominated or storm water runoff dependent waterbodies.

Response to: CTR-042-005

Concerning the first paragraph of comment 5, see the response to comment number CTR-036-009 and 040-16a above.

Concerning the second paragraph of comment 5, see the response to comment number CTR-034-007 above.

Comment ID: CTR-043-007
Comment Author: City of Vacaville
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: C-24d SSC Effluent Dependent Wtr
References:
Attachments? Y
CROSS REFERENCES

Comment: 7. EPA should adopt separate, scientifically defensible, reasonably achievable aquatic life criteria for streams and creeks that are dominated all or part of the year by discharges from anthropogenic sources. The application of the proposed statewide criteria to waters dominated by discharges from anthropogenic sources would force point source dischargers to remove their discharges, in many cases drying up the waters for most of the year. The costs would be significant and the benefits, at least the benefits assessed in EPA's economic analysis (enhanced fishing, reduced cancer risk, and passive benefits), would be negligible. In fact, the removal of these discharges could be detrimental rather than beneficial. The aquatic and riparian habitat, which previously supported aquatic life and wildlife, would no longer exist. This common type of water body (i.e., effluent dependent waters) demands separate and distinct water quality criteria by any reasonable yardstick, including common sense and the spirit (if not the letter) of Presidential Executive Order 12866 and the Unfunded Mandates Reform Act. Additionally, as previously stated, EPA regulations require that water quality standards be based on identification of specific water bodies where toxic pollutants may be adversely affecting water quality or the attainment of the designated water use or where the levels of toxic pollutants are at a level to warrant concern and must adopt criteria for such toxic pollutants Applicable to the water body sufficient to protect the designated use." Clearly the intent of these regulations is that water quality standards be tailored to the characteristics of the waters in question, rather than the "one-size-fits-all" approach in the proposed rule. This is not the cumbersome task suggested by the Preamble at least with respect to developing criteria appropriate for effluent dependent waters. But, even if it were a cumbersome task, the difficulty of complying with the law is not an excuse for noncompliance. EPA could fulfill its obligation under the Act and EPA regulations with respect to effluent dependent waters simply by proposing criteria for these waters that are presently achievable by municipal wastewater and stormwater discharges and then using the more stringent statewide criteria as a trigger for development and implementation of controls that will reduce the discharge of problematic pollutants to the maximum extent practical.

Response to: CTR-043-007

See responses to CTR-034-007, CTR-036-009, and CTR-040-016a. See also the responses to comment in the Legal Concerns Category (C-21) including CTR-005-006a, CTR-036-009, CTR-038-006a, and the record for this rule for a discussion about why this rule applies to all waters that do not have water quality criteria for toxic pollutants.

With respect to EPA's compliance with Executive Order (E.O.) 12866, the Regulatory Flexibility Act (RFA), and the Unfunded Mandates Reform Act (UMRA), see the preamble to the final rule.

Comment ID: CTR-044-008
Comment Author: City of Woodland
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: C-24d SSC Effluent Dependent Wtr
References:
Attachments? Y
CROSS REFERENCES

Comment: We have reviewed the proposed CTR and offer the following comments:

7. EPA should adopt separate, scientifically defensible, reasonably achievable aquatic life criteria for streams and creeks that are dominated all or part of the year by discharges from anthropogenic sources. The application of the proposed statewide criteria to waters dominated by discharges from anthropogenic sources--would force point source dischargers to remove their discharges, in many cases drying up the waters for most of the year. The costs would be significant and the benefits, at least the benefits assessed in EPA's economic analysis (enhanced fishing) reduced cancer risk, and passive benefits), would be negligible. In fact, the removal of these discharges could be detrimental rather than beneficial. The aquatic and riparian habitat, which previously supported aquatic life and wildlife, would no longer exist. This common type of water body (i.e., effluent dependent waters) demands separate and distinct water quality criteria by any reasonable yardstick, including common sense and the spirit (if not the letter) of Presidential Executive Order 12866 and the Unfunded Mandates Reform Act. Additionally, as previously stated, EPA regulations require that water quality standards be based on identification of specific water bodies where toxic pollutants may be adversely affecting water quality or the attainment of the designated water use or where the levels of toxic pollutants are at a level to warrant concern and must adopt criteria for such toxic pollutants applicable to the water body sufficient to protect the designated use." Clearly the intent of these regulations is that water quality standards be tailored to the characteristics of the waters in question, rather than the "one-size-fits-all" approach in the proposed rule. This is not the cumbersome task suggested by the Preamble at least with respect to developing criteria appropriate for effluent dependent waters. Bur, even if it were a cumbersome task, the difficulty of complying with the law is not an excuse for noncompliance. EPA could fulfill its obligation under the Act and EPA regulations with respect to effluent dependent waters simply by proposing criteria for these waters that are presently achievable by municipal wastewater and stormwater discharges and then using the more stringent statewide criteria as a trigger for development and implementation of controls that will reduce the discharge of problematic pollutants to the maximum extent practical.

Response to: CTR-044-008

See responses to CTR-034-007, CTR-036-009, CTR-040-016a, and CTR-043-007.

Comment ID: CTR-049-004
Comment Author: Watereuse Assoc. of California
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 09/24/97
Subject Matter Code: C-24d SSC Effluent Dependent Wtr
References:
Attachments? N
CROSS REFERENCES

Comment: With respect to other criteria proposed for adoption in the draft CTR, we recommend that USEPA:

2. Adopt separate, scientifically defensible, and achievable aquatic life criteria for streams and creeks that are dominated all or part of the year by discharges from recycled water;

Response to: CTR-049-004

See response to CTR-034-007.

Comment ID: CTR-056-011
Comment Author: East Bay Municipal Util. Dist.
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/22/97
Subject Matter Code: C-24d SSC Effluent Dependent Wtr
References: Letter CTR-056 incorporates by reference letter CTR-054
Attachments? N
CROSS REFERENCES

Comment: Third, regarding the criteria being proposed for adoption in the draft CTR, EBMUD recommends that EPA should:

* Evaluate and adopt separate, scientifically defensible, reasonably achievable aquatic life criteria for streams and creeks that are dominated all or part of the year by dischargers from anthropogenic sources such as POTWs (i.e. effluent-dependant waters).

Response to: CTR-056-011

See response to CTR-034-007.

Comment ID: CTR-057-003
Comment Author: City of Los Angeles
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: C-24d SSC Effluent Dependent Wtr
References:
Attachments? N
CROSS REFERENCES

Comment: Effluent-Dependent Water Bodies

On Page 42164, the proposed Rule states that the EPA disapproved the deferral of water quality objectives in the ISWP for effluent dominated streams (Category "a") and agricultural drainage on the basis of imprecise and overly broad definitions. Since the ISWP was invalidated, the issue of effluent-dependent water bodies (EDW) was analyzed in detail via the State's Public Advisory Task Force process. Through our participation on the EDW Task Force (which included representatives from the EPA), we can confidently state that the issue has since been much better defined and that there is a full consensus that these water bodies need to be recognized in the establishment of water quality criteria.

In developing its list of non-compliant water bodies under the 303(d) provision, the State in essence acknowledged that EDWs are problematic simply because they support beneficial uses that would not otherwise exist without the flows of point and non-point discharges. This situation is compounded by the fact that all waters of the State, regardless of provenance, are classified as potential sources of domestic water supply; again, this is a potential benefit that would not otherwise be possible without effluent discharges, and this benefit should be recognized in the proposed Rule.

From this, we conclude that the proposed Rule is not complete because it does not recognize the importance of EDWs as was conclusively demonstrated by the EDW Task Force. . The EDW concept should not be abandoned, and we strongly urge the EPA to replace its statements on Page 42164 with a brief acknowledgment of the findings and recommendations of the EDW Task Force. We believe that this will provide additional impetus for the State to incorporate EPA-approved EDW provisions in its own plan.

Response to: CTR-057-003

EPA participated in the EDW Task Force with other stakeholders representing the industrial, municipal, storm water, agricultural, environmental, water supply, public health and regulatory sectors. The goal of the Task Force was to develop recommendations for the State Water Resources Control Board (SWRCB) regarding how to provide reasonable protection for appropriate beneficial uses of EDWs. After considering the complexities of the analyses necessary to characterize and determine appropriate water quality objectives for EDWs, the Task Force recommended the following two-step approach to regulating them. The first step is to modify the present designated beneficial uses such that they more accurately reflect actual uses. The second step is to adopt water quality objectives appropriate for each use designation. The needs for developing this approach would be: to define EDWs in the new State plans, to define EDW-specific use categories, to define and categorize all EDWs by use categories in the State, and to adopt appropriate water quality objectives for EDWs. While emphasizing again that this work should be done within the context of either SWRCB or Regional Board standards-setting actions, EPA

acknowledges and agrees with the recommended approach. EPA further notes that the Task Force report also recommends that the SWRCB should develop technical evaluation criteria for a number of the steps identified above, and that the SWRCB should consider convening a technical advisory committee to address these issues. Until the recommended technical evaluation criteria are established and implemented, EPA considers that criteria should be adopted on a statewide basis.

See also response to comment number CTR-034-007 above.

Comment ID: CTR-059-010
Comment Author: Los Angeles County Sanit. Dist
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: C-24d SSC Effluent Dependent Wtr
References: Letter CTR-059 incorporates by reference letter CTR-035
Attachments? Y
CROSS REFERENCES

Comment: Due to the time constraints of the comment period, we have focused our review and comments primarily on those criteria that we anticipate may cause compliance issues for one or more of the Sanitation Districts' WRPs (see below). Based on our initial review of the proposed rule, the Sanitation Districts recommend that adoption of some of the criteria be deferred. As explained in the attached comments, we believe that there are significant scientific issues regarding the human health criteria for several trihalomethanes that call into question the accuracy and appropriateness of the proposed criteria. In addition, we reconunend that EPA defer adoption of those criteria that are below detection limits and that have not been demonstrated to be adversely affecting water quality or the attaimnent of designated uses on a water body-specific basis in California. In addition, we recommend that EPA not adopt criteria for effluent dependent waters, unless they have been adjusted to reflect the characteristics of this type of water body.

Criteria for Effluent Dependent Waters

As discussed above, the water quality standards regulations (specifically, 40 CFR section 131.11) requires EPA to examine the specific water bodies and uses to be protected before adopting criteria in water quality standards. As EPA is aware, streams and washes in and areas have unique characteristics, and in many locations in southern California, POTW discharges have transformed ephemeral streams into what are essentially perennial streams. These are often referred to as "effluent dependent waters" or EDWs. The impact of this has been to create new riparian habitats that provide valuable ecological benefits. However, this has also raised many questions regarding what water quality standards should be applied to EDWs. For instance, since the use of treated wastewater for drinking water is restricted by the Department of Health Services, it is questionable whether the municipal drinking water designated use (MUN) is appropriate for EDWS. LACSD believes that, based on the requirements of the water quality standards regulations, that EPA has not demonstrated that the proposed CTR criteria are appropriate for EDWs, and that a more appropriate course of action would be for EPA to adopt separate criteria for water bodies in California that are dependent for all or part of the year on flows from wastewater treatment plants.

Appropriate ways to modify aquatic life and human health criteria for EDWs could include adjustment of the uncertainty and/or modifying factors used to calculate reference doses (RfDs) for noncarcinogenic human health criteria, use of 10E-4 or 10E-5 risk levels (instead of 10E-6) for carcinogenic human health criteria, adjustment of bioconcentration factors for hwnan health criteria, the use of site-specific water effects ratios for aquatic life criteria, and the adjustment of the low flow values, frequency of exceedence and/or criteria averaging periods used in deriving or applying the criteria. As an agency that owns and operates numerous treatment plants that discharge into EDWs, and that has a substantial base of knowledge regarding the quality of the effluent and the conditions in the ambient environment in the vicinity of these discharges, we would be pleased to work with EPA to craft water quality criteria for toxic pollutants that are appropriate for EDWs in southern California.

Response to: CTR-059-010

In response to the recommendation that EPA not adopt criteria for effluent dependent waters unless they have been adjusted to reflect the characteristics of this type of water body, see the response to comment number CTR-034-007.

Concerning the comment that water quality standards regulations require EPA to examine specific water bodies and their uses before adopting criteria for them, see response to comment number CTR-040-016a. Concerning what designated uses are appropriate for EDWs, see response to CTR-036-009. See also responses to comment CTR-005-006a, CTR-036-005, and CTR-038-006a in the Legal Concerns Category (C-21). For purposes of this rulemaking, EPA is presuming that the State has adequately determined the designated uses for its waters. EPA is promulgating criteria for priority toxic pollutants on a statewide basis sufficient to protect the State's designated uses.

Concerning appropriate ways to modify aquatic life and human health criteria for EDWs, with the exception of application of water effect ratios (WERs), EPA considers that the methods suggested should be applied in the context of State or Regional Board water quality standards-setting actions. EPA's action in promulgating statewide criteria is to reduce risks to all exposed populations, including especially sensitive subpopulations. However, site-specific criteria may be developed subsequently by the State where warranted to provide necessary additional protection, or otherwise to adjust the level of protection as appropriate to reflect site-specific conditions following a Section 304 standards-setting process including the opportunity for public involvement. As described above, EPA has included WERs in the proposed metals criteria listed in the table in Section 131.38(b)(2) for protection of aquatic life.

With respect to adjusting frequency of exceedence and/or criteria averaging periods, EPA refers the commenter to Appendix D of EPA's "Technical Support Document For Water Quality-Based Toxics Control" (EPA/505/2-90-001, March 1991), in particular to the discussion entitled "Considerations for Proposing Site-Specific Increases or Decreases in the Averaging Frequency of Allowed Excursions." Although more frequent than once-in-three-years excursions might be acceptable in certain situations, where, for example, areas of refuge for aquatic organisms are available or for certain lower-order streams, the converse may also be true depending on the size of the drainage and the persistence of the pollutant in question. As stated previously, EPA considers it inappropriate for EPA to develop site-specific criteria for California EDWs. The averaging periods of EPA proposed criteria for toxics are based on data from nation-wide laboratory toxicity tests. The once-in-three-years frequency of exceedence is based on field data. With the concurrence of EPA, States may adopt site-specific criteria, including potentially different averaging periods and frequencies of allowed excursions, for individual or appropriate categories of water bodies. The kinds of data necessary to justify adoption of such criteria may be determined by reviewing the studies referenced in Appendix D of the Technical Support Document and following procedures described in Chapter 3 of EPA's Water Quality Standards Handbook

(EPA-823-94-005a, August 1994

With regard to the adjustment of low-flow values (although this issue concerns implementation of proposed criteria, and is thus also more appropriate for the State to consider), the once-in-ten-year seven-day average low flow design condition (7Q10) has historical precedent and is part of many States' water quality standards. In addition, this value approximates the same degree of protection as the three-year return interval of the proposed acute and chronic criteria. Given the state of the science, and the limitations of available data, EPA as a matter of policy takes the position that it should assure adequate protection and takes a conservative approach to establishing water quality criteria. This policy is also consistent with and recognizes historic program practices and procedures used by both the Agency and the States in implementing the water quality standards and related implementation programs. (Guidelines for Developing or Revising Water Quality Standards, April 1973, p.7.)

Comment ID: CTR-081-004a
Comment Author: West County Agency
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: C-24d SSC Effluent Dependent Wtr
References:
Attachments? N
CROSS REFERENCES C-24e

Comment: * EPA should consider adopting separate, scientifically defensible and reasonably achievable aquatic life criteria for waters that are effluent-dependent for all or part of the year. In addition, the aquatic life criteria should be applied to those waters identified in the Basin Plans instead of "all waters. "

Response to: CTR-081-004a

Concerning the issue of adopting separate aquatic life criteria for effluent-dependent waters, see the response to CTR-034-007.

Concerning the issue of application of those criteria to waters identified in the Basin Plans, EPA considers that, withrespect to protection of aquatic life, the proposed CTR criteria apply to all waters in the State of California except for those covered by the NTR, as amended or those covered by an EPA approved site-specific criterion or basin plan objective. If the aquatic life use designation is considered inappropriate, it may be removed only where a use attainability analysis is conducted and approved, as described further in response to CTR-036-009.

Comment ID: CTR-085-014
Comment Author: Camarillo Sanitary District
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/24/97

Subject Matter Code: C-24d SSC Effluent Dependent Wtr
References:
Attachments? N
CROSS REFERENCES

Comment: The District supports the following positions of CASA and SCAP where changes need to be made in the proposed California Toxics Rule:

* The EPA should adopt separate, scientifically defensible, reasonably achievable aquatic life criteria for streams and creeks that are dominated all or part of the year by discharges from anthropogenic sources, such as POTW's (i.e., effluent dependent waters).

Response to: CTR-085-014

See response to CTR-034-007.

Comment ID: CTR-089-006
Comment Author: Las Virgenes Mncpl Water Dist.
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/24/97
Subject Matter Code: C-24d SSC Effluent Dependent Wtr
References:
Attachments? N
CROSS REFERENCES

Comment: While the draft regulations demonstrate clear progress on these and other issues, there remain some unresolved problems that could compromise our ability to serve our customers. We offer these comments in the hope of minimizing those potential impacts.

Incorporation of the Inland Surface Water Plan Task Force Recommendations

A final issue is whether the draft CTR gave adequate consideration of the recommendations of the state's Inland Surface Water Plan (ISWP) Task Force. The ISWP Task Force was created specifically to address the court-mandated need for multiple-stakeholder input in the state's implementation of the Clean Water Act. The ISWP Task Force included at least two groups (Toxics task force and Effluent Dependent Waterbody task force) specifically charged with making recommendations for the adoption of toxics criteria in the state's inland waters.

The absence of any criteria for toxics in effluent,-dependent waterbodies causes us to wonder how the draft CTR incorporated the recommendations of the ISWP task force. The issue here is that criteria that are too strict may cause dischargers to seek alternative disposal options, which could result in stream wildlife impacts greater than those resulting from substandard water. This issue is paramount in the state's arid regions, where the availability of water of any quality can dictate whether aquatic life exists at all. The rebuttal position that dischargers should be forced to treat the water anyway ignores the fact that, if treated to these standards, the water becomes valuable for other uses such as recycling, which dischargers are legally-entitled to pursue. Indeed, state water policy is to encourage water recycling

efforts specifically to offset the need to import water from the state's less arid regions and the Colorado River Basin.

Response to: CTR-089-006

See the response to CTR-034-007. Concerning incorporation of the Inland Surface Water Plan Task Force Recommendations, see also response to CTR-057-003.

Comment ID: CTR-096-006
Comment Author: City of Modesto
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-24d SSC Effluent Dependent Wtr
References:
Attachments? N
CROSS REFERENCES

Comment: Thank you for the opportunity to comment on the proposed California Toxics Rule. The City's comments are related to five main concepts:

Specifically, the City submits the following comments:

C. EPA should adopt separate scientifically based aquatic life criteria for rivers that maybe dominated all or part of the year by discharges from anthropogenic sources, such at POTWs (i.e. effluent-dependent waters).

Response to: CTR-096-006

See response to CTR-034-007.

Comment ID: CTRH-002-012
Comment Author: Lisa Ohlund
Document Type: Public Hearing
State of Origin: CA
Represented Org: Alliance of So. CA POTWs
Document Date: 09/18/97
Subject Matter Code: C-24d SSC Effluent Dependent Wtr
References:
Attachments? N
CROSS REFERENCES

Comment: However, there are several areas in which we would like to request the EPA make changes. For example, we'd like to see EPA adopting separate aquatic life criteria for streams and creeks in arid areas that are dependent for most or all of their flows on discharges from wastewater treatment facilities.

Response to: CTRH-002-012

See response to CTR-034-007.

Comment ID: CTRH-002-020
Comment Author: Ing-Yig Cheng
Document Type: Public Hearing
State of Origin: CA
Represented Org: L.A. Bureau of Sanitation
Document Date: 09/18/97
Subject Matter Code: C-24d SSC Effluent Dependent Wtr
References:
Attachments? N
CROSS REFERENCES

Comment: The final issue that I would like to present concerns the need for recognition in the CTR for effluent dependent waters. Many POTWs in Southern California discharge to waterways that would otherwise be nonexistent during the dry seasons. This has allowed for the establishment of aquatic habitats and other beneficial uses in those waterways. Since it is not an isolated concern, this issue needs to be recognized. If CTR rule-making is limiting itself to establishing a conservative water quality criteria that assures protection of all waters regardless of its condition, then a mechanism needs to be provided in CTR to deal with the EDS issues. EPA cannot simply deny us the designation of Categories A, B and C in the old Inland Surface Water Plan; instead, this issue must be addressed.

Response to: CTRH-002-020

Concerning the first part of this comment see the response to CTR-036-009 above.

Concerning the comment that a mechanism needs to be provided in CTR to deal with the EDW issues, EPA considers that by incorporating variables of hardness, water effect ratios and pH as appropriate into the proposed CTR criteria as described further in response to CTR-034-007 above, it has provided such a mechanism. Beyond such adjustments, criteria would have to be further revised by means of a use attainability or other site-specific analysis, which should be conducted at the State or local level as described in response to the fourth recommendation in CTR-040-016a, above.

Concerning the comment that EPA cannot simply deny California the designation of Categories (a), (b) and (c) in the old Inland Surface Waters Plan: EPA's action in only partially approving California's Inland Surface Waters and Enclosed Bays and Estuaries Plans was to conclude that deferral of adoption of toxics criteria for categories (a) and (b) and the exemption from coverage of category (c) were inconsistent with CWA section 303(c)(2)(B). EPA would be willing, pursuant to its Guidance for Modifying and Protecting Effluent Dependent Ecosystems, to consider application of alternate uses that would lead to less stringent criteria. Thus, EPA did not "deny ... the designation" of EDWs, as is alleged in this comment, as much as disapprove the deferral and exemption of these waters from having any criteria for toxics.

Subject Matter Code: C-24e SSC Desgntd/Beneficial Uses

Comment ID: CTR-013-006b
Comment Author: County of Los Angeles
Document Type: Storm Water Auth.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-24e SSC Desgntd/Beneficial Uses
References: Letter CTR-013 incorporates by reference letter CTR-027
Attachments? N
CROSS REFERENCES I-04

Comment: In addition, we would like to emphasize the following concerns which greatly impact the Los Angeles County Stormwater Program:

6. The proposed criteria will apply to all inland surface waters and enclosed bays and estuaries, regardless of the designated or attainable uses for a water body. This is of particular concern for waters that only have flows during wet weather events or that are point source effluent dominated water bodies. Blanket application of water quality criteria to all waters without designated uses is inconsistent with Federal and State water quality laws. Water quality standards are made up of two components--designated uses and the appropriate criterion to ensure the designated use can be achieved. Assigning criteria to a water body without first considering the designated uses is inappropriate and could result in over restrictive, unnecessary permit limits potentially resulting in significant compliance costs to a discharger.

It is common in California for urban stormwater runoff discharges to be the primary or only source of waters to urban creeks and waterways, that is, there would be little or no flow during most of the year were it not for urban stormwater or other point source discharges. Given the potential compliance problems for stormwater discharges forcertain constituents (even after a fully implemented BMP program), a municipality could be forced to remove stormwater discharges from the creek. The costs would be significant and the benefit little, if any. In fact, the removal of these discharges would be environmentally damaging to aquatic life and wildlife that were supported by the effluent/runoff dependent waters.

Therefore, the proposed rule should be revised to avoid blanket application of the proposed criteria to all surface waters and to require appropriate beneficial and attainable uses of all waters be determined prior to imposing water quality criteria in the water body. The rule should also be revised to implement separate and distinct water quality criteria for water bodies that are primarily effluent or runoff-dependent.

Response to: CTR-013-006b

As discussed in the preamble, the purpose of today's rule is to establish numeric criteria for those navigable waters in California that do not have criteria for priority toxic pollutants in place. The State has in place specific use designations that were duly adopted by the State through its Regional Water Quality Control Board's Basin Plans which include aquatic life, human health and other uses to be protected in particular waterbodies. Thus, EPA, in this rulemaking, is not revising those use designations established by the State.

Furthermore, EPA encourages the commenter to work with the State in its review and adoption of the Basin Plans to refine those use designations that the commenter believe might be inappropriate. Such review could encompass a use attainability analysis to determine if the designated uses need to be changed to reflect uses that are no longer attainable, provided that the existing uses (those uses established on or after November 28, 1975) are still protected. A use attainability analysis is an assessment of physical, chemical, biological and economic factors that affect the attainment of a use.

Comment ID: CTR-020-017
Comment Author: City of Stockton
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/24/97
Subject Matter Code: C-24e SSC Desgntd/Beneficial Uses
References:
Attachments? Y
CROSS REFERENCES

Comment: II. Use of New Scientific Information

The City acknowledges and supports EPA's update of several water quality criteria including those for mercury, cadmium and arsenic. While a number of criteria were updated to reflect current scientific information, there are a few notable exceptions.

The following briefly addresses the key updates and omissions that should be addressed in the final publication of this rule.

6. Human Health Criteria Application

These stringent criteria, which are based upon the assumption that two liters of water is consumed per day, are specified to apply to all surface waters with a MUN designation. This is a default designation for many waters in the various Basin Plans and means that ditches and other water bodies that clearly have no actual or extremely limited drinking water use potential will be regulated more stringently than tap water for many pollutants. This is an overly broad application of the federal criteria and is unnecessary to ensure appropriate public health protection. EPA should revise the rule to specify that consumption-based criteria will only apply to waters in the vicinity of water intakes which will allow for consideration of fate and transport of pollutants before determining that a potential public health threat exists. Likewise, fish consumption-based criteria should only apply where the Department of Fish & Game determines that there is a reasonable likelihood of the presence of a game fishery. If such a fishery is not present, there will be no human exposure to the pollutants justifying implementation of stringent point or non-point controls.

Response to: CTR-020-017

EPA disagrees that the application of the human health criteria in waters that have a MUN designation is unnecessary to protect public health in California. EPA believes that the application of the human health criteria that considers exposure from both fish and drinking water consumption in waters that have a

MUN designation is appropriate and consistent with State practices and regulatory requirements (Section 131.11 of the Water Quality Standards Regulation requires the adoption of criteria to protect the uses of state waters). The State assigns the MUN designation to waters that are potential or actual drinking water supplies. Since EPA has no intention of changing the uses designated by California in this rulemaking. EPA encourages the commenter to work with the State in its review and adoption of the Basin Plans to refine or modify those use designations that the commenter believe might be inappropriate.

Comment ID: CTR-026-001b
Comment Author: Cal. Department of Fish & Game
Document Type: State Government
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-24e SSC Desgntd/Beneficial Uses
References:
Attachments? N
CROSS REFERENCES A

Comment: 1 . DESIGNATED USES AND ANTIDEGRADATION POLICY

The DFG is concerned with the issues of "designated uses" and an "antidegradation policy" as they apply to the formation of water quality standards. It is our understanding that water quality standards are comprised of, or defined by, three components: 1) designated uses, 2) numeric water quality criteria, and 3) an antidegradation policy. The CTR is not clear on which designated uses are being identified and when they were established. The rule needs to identify what designated uses are being assigned and when these uses were or should be attained. At issue is which uses should be maintained and protected, and what the baseline should be for designating the various beneficial or designated uses for inland freshwater and bay and estuarine waters of the state. We believe that any baseline for applying the antidegradation policy should establish what the quality of the water would have been historically in the absence of human impacts. Under the Porter Cologne Act, the State's primary water quality statute, the dischargeof waste into state waters is not a right but a privilege. Since the discharge of waste is not considered a beneficial use, it should not be permitted in public waters unless it is determined that all beneficial uses, especially publicly entrusted fish and wildlife resources, are fully protected. This is especially true for wetlands throughout the State. The proposed rule is not clear as to when the baseline starts (i.e., historical vs. statutory). The DFG believes that, to the extent practicable, designated uses should be reflective of what has been realized in the past. If the CTR is utilizing a statutory date for which baseline designated uses were identified, then the CTR needs to include a justification for such a date.

With respect to antidegradation, it is not clear whether or not the proposed rule is subject to these requirements. It is our understanding that when a proposed action would allow less stringent criteria than previously proposed or adopted, and if that action would result in more loading of a particular constituent into waters of the State, then an appropriate antidegradation analysis shall be required. It is not clear what process EPA has undertaken to adequately address antidegradation issues related to the proposed new criteria. It may be that the applicability of the antidegradation policies are more pertinent with respect to site-specific criteria that may be included in the final rule. We recommend that the CTR adequately address this issue and apply the antidegradation policy where necessary.

Response to: CTR-026-001b

See response to CTR-013-006b. For a response to antidegradation issues, see response to CTR-026-001a.

The purpose of this rule is to establish numeric criteria for those waters identified in the State's Basin Plans that were duly adopted by California's Regional Water Quality Control Boards that do not have water quality criteria for priority toxic pollutants in place. These Plans have specific use designations for waterbodies that were duly adopted by the State through its Regional WaterQuality Control Boards' basin plans that identify aquatic life and human health uses to be protected in particular waterbodies. EPA, in this rulemaking, is not revising or establishing the use designations for waters contained in the State's Basin Plans. The review of those uses designations established by the State are outside of the scope of today's rule. Furthermore, EPA does not believe that an evaluation of the use designations or a discussion on the dates those uses were assigned is within the scope of this rulemaking action. However, EPA does note that in today's rule and in the proposed rule (see 40 CFR 131.36(d)(1) through (d)(3)), the Agency identifies the water use classifications that are subject to this Federal rule.

Comment ID: CTR-027-007b
Comment Author: California SWQTF
Document Type: Storm Water Auth.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-24e SSC Desgntd/Beneficial Uses
References: Letter CTR-027 incorporates by reference letters CTR-001, CTR-036 and CTR-040
Attachments? N
CROSS REFERENCES I-04

Comment: 7. The proposed criteria will apply to all inland surface waters and enclosed bays and estuaries regardless of the designated or attainable uses for a water body. This is of particular concern for waters that only have flows during wet weather events, or that are point source effluent dominated water bodies. Blanket application of water quality criteria to all waters without designated uses is inconsistent with federal and state water quality laws. Water quality standards are made up of two components - designated uses and the appropriate criteria to ensure the designated use can be achieved. Assigning criteria to a water body without first considering the designated uses is inappropriate and could result in overly restrictive, or unnecessary permit limits, potentially resulting in significant compliance costs to a discharger.

It is common in California for urban stormwater runoff discharges to be the primary or only source of waters to urban creeks and waterways; that is, there would be little or no flow during most of the year were it not for man's activities. Given the potential compliance problems for stormwater discharges for certain constituents (even after a fully implemented BMP program) a municipality could be forced to remove stormwater discharges from the receiving water. The costs would be significant and the benefit little, if any. In fact, the removal of these discharges would be environmentally damaging to aquatic life and wildlife that were supported by the effluent/runoff dependent waters.

Recommendation: The proposed rule should be revised to avoid blanket application of the proposed criteria to all surface waters, and to require appropriate beneficial and attainable uses of all waters be determined prior to imposing water quality criteria in the water body. The rule should also be revised to

implement separate and distinct water quality criteria for water bodies that are primarily effluent or runoff dependent waters. An example of such flexibility is the use of a less stringent cancer risk factor such as 10E-4 or 10E-5 for the human health criteria for effluent dominated streams.

Response to: CTR-027-007b

See response to CTR-027-007a.

Comment ID: CTR-035-007
Comment Author: Tri-TAC/CASA
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-24e SSC Desgntd/Beneficial Uses
References:
Attachments? N
CROSS REFERENCES

Comment: EPA should apply the aquatic life criteria only to those waters identified in Regional Water Quality Control Plans ("Basin Plans") as having full aquatic life use designations, rather than to "all waters," in the same way that the human health criteria for water and organisms are applied only to those waters designated in Basin Plans with the municipal drinking water supply, beneficial use ("MUN" use).

Response to: CTR-035-007

See response to CTR-081-004b.

Comment ID: CTR-035-038
Comment Author: Tri-TAC/CASA
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-24e SSC Desgntd/Beneficial Uses
References:
Attachments? N
CROSS REFERENCES

Comment: p. 42207 -- Beneficial Use Designations (Applicability of Criteria) We are concerned about what appear to be overly broad statements in the proposed regulation regarding the applicability of the criteria. We recommend that EPA remove the following statement contained in section 131.38(d)(1) of the regulation: "Although the State has adopted several use designations for each of these waters, for purposes of this action, the specific standards to be applied in paragraph (d)(2) of this section are based on the presence in all waters of some aquatic life designation and the presence or absence of the MUN use designation (municipal and domestic supply)" (62 Fed. Reg. 42207) (emphasis added). We also

request that EPA delete from the regulation the statement that begins this paragraph, which states that "Except as specified in paragraph (d)(3) of this section, all waters assigned any aquatic or human health use classifications in the Water Quality Control Plans for the various Basins of the State... are subject to the criteria in paragraph (d)(2) of this section, without exception." We recommend that EPA modify the applicability of the rule to reflect its full evaluation of those specific water bodies where each pollutant is found to be "adversely affecting water quality or the attainment of the designated water use or where the levels of toxic pollutants are at a level to warrant concern" (40 CFR section 131.11) (see comments on p. 1-2).

Further, we believe that, contrary to EPA's assertion on p. 42168 of the Preamble that the aquatic life criteria are applicable to all waters of the U.S., the freshwater aquatic life criteria may be inappropriate for application to streams and creeks that are dependent on flows for all or part of the year on discharges from anthropogenic sources, such as POTWs. We request that EPA establish separate, scientifically defensible aquatic life criteria for such water bodies. Several of our comments above have suggested ways that may be appropriate to modify certain types of criteria. Until this issue is addressed, we oppose the application of the criteria contained in the proposed CTR to effluent-dependent waters in the State of California.

Response to: CTR-035-038

See response to CTR-036-005.

Comment ID: CTR-040-018d
Comment Author: County of Sacramento Water Div
Document Type: Storm Water Auth.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-24e SSC Desgntd/Beneficial Uses
References: Letter CTR-040 incorporates by reference letter CTR-027
Attachments? Y
CROSS REFERENCES C-26;G-03; C-30

Comment: V. Recommendation: Delete all provisions in the Rule that preempt the States flexibility in permitting. The Rule provides specific direction on the adoption of averaging periods, low flow values, effluent limitations for criteria not being adopted as a part of the Rule, and that the aquatic life criteria be applied to all waters irrespective of designated use, etc..

* The Preamble and the Rule's economic analysis make a point that the State has considerable flexibility in establishing permit limitations. In making, that point, EPA implies that the State may implement the criteria in a manner that would have little or no adverse economic impact on dischargers.

* However, the Rule contains a number of implementation provisions that are not required under Section 303(c)(2)(B), but serve to preempt the State's flexibility. These provisions include, but are not necessarily limited to the adoption of averaging periods and low flow values, directives regarding the establishment of effluent limitations for criteria that are not being adopted as a part of the Rule, and application of the aquatic life criteria to all waters irrespective of the designated use.

* Not only does EPA not have a duty to adopt these provisions, but also the provisions are more restrictive than those required by the CWA or EPA regulations, They clearly restrict the State's flexibility. In fact, other states have adopted, and EPA has approved, implementation provisions (e.g., averaging periods and low flow values) which are less restrictive.

* For these reasons, EPA should remove all such implementation provisions from the Rule.

Response to: CTR-040-018d

See response to CTR-081-004b.

Comment ID: CTR-049-005
Comment Author: Watereuse Assoc. of California
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 09/24/97
Subject Matter Code: C-24e SSC Desgntd/Beneficial Uses
References:
Attachments? N
CROSS REFERENCES

Comment: With respect to other criteria proposed for adoption in the draft CTR, we recommend that USEPA:

3. Apply the aquatic life criteria to those waters identified in Regional Water Quality Control Plans ("Basin Plans") as having aquatic life uses, rather than to "all waters;" and

Response to: CTR-049-005

See response to CTR-081-004b.

Comment ID: CTR-056-013
Comment Author: East Bay Municipal Util. Dist.
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/22/97
Subject Matter Code: C-24e SSC Desgntd/Beneficial Uses
References: Letter CTR-056 incorporates by reference letter CTR-054
Attachments? N
CROSS REFERENCES

Comment: Third, regarding the criteria being proposed for adoption in the draft CTR, EBMUD recommends that EPA should:

* Apply aquatic life criteria to those waters identified in the Regional Water Quality Control Plans (i.e., Basin Plans) as having aquatic life uses, in lieu of adopting criteria for "all waters" of the State.

Response to: CTR-056-013

See response to CTR-081-004b.

Comment ID: CTR-066-012
Comment Author: Delta Diablo Sanitation Dist.
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: C-24e SSC Desgntd/Beneficial Uses
References:
Attachments? N
CROSS REFERENCES

Comment: The areas with which we find concerns and the requesed changes include the following:

* EPA should apply the aquatic life criteria to those waters identified in Regional Water Quality Control Plans ("Basin Plans") as having aquatic life uses, rather than to "all waters."

Response to: CTR-066-012

See response to CTR-081-004b.

Comment ID: CTR-081-004b
Comment Author: West County Agency
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: C-24e SSC Desgntd/Beneficial Uses
References:
Attachments? N
CROSS REFERENCES C-24d

Comment: * EPA should consider adopting separate, scientifically defensible and reasonably achievable aquatic life criteria for waters that are effluent-dependent for all or part of the year. In addition, the aquatic life criteria should be applied to those waters identified in the Basin Plans instead of "all waters."

Response to: CTR-081-004b

Today's rule applies to those navigable waters in California that do not have numeric criteria for priority toxic pollutants in place. This encompasses waters of the U.S. for which the State has duly adopted use

designations through its Regional Water Quality Control Plans, including those waters that are effluent and flow dependent streams. The criteria in this rule are based generally on EPA's national criteria guidance which are applicable and appropriate for all waters of the U.S. However, if a state finds that the ambient water quality criteria for a waterbody are inappropriate, then EPA's Water Quality Standards Regulation provide for a use attainability analysis and establishment of appropriate use designations.

For waters of the U.S. which have human health uses designated in the Regional Board's Basin Plans, aquatic life is present and fish or other aquatic organisms are being caught and consumed. Therefore aquatic life criteria and human health criteria based on the consumption of fish are applied to those waters except where the State has conducted and EPA has approved a use attainability analysis to remove or modify the aquatic life use or fish consumption use. Furthermore, for waters with a MUN designation, human health criteria that considers exposure from water and fish are applied to those waters. These approaches are consistent with EPA's Water Quality Standards Regulation (40 CFR Part 131) which requires States to include uses identified in Section 101(a) of the Clean Water Act, where attainable, and to establish criteria to protect those use designations.

Comment ID: CTR-082-006
Comment Author: City of Burbank
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/24/97
Subject Matter Code: C-24e SSC Desgntd/Beneficial Uses
References:
Attachments? N
CROSS REFERENCES

Comment: The subject rule has a significant impact on our facility discharge and the citizens of the City. We therefore present the following comments for your consideration to re-open the comment period for this rule in order to facilitate a more complete review by public and in particular by those in the POTW community:

* USEPA should consider application of the aquatic criteria to be limited to those waters identified in the Regional Water Quality Control plans (Basin Plans) as having aquatic life uses rather than to "all waters."

Response to: CTR-082-006

See response to CTR-081-004b.

Comment ID: CTR-085-015
Comment Author: Camarillo Sanitary District
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/24/97
Subject Matter Code: C-24e SSC Desgntd/Beneficial Uses

References:
Attachments? N
CROSS REFERENCES

Comment: The District supports the following positions of CASA and SCAP where changes need to be made in the proposed California Toxics Rule:

* The EPA should apply the aquatic life criteria to those waters identified in Regional Water Control Plans ("Basin Plans") as having aquatic life use, rather than to "all waters."

Response to: CTR-085-015

See response to CTR-081-004b.

Comment ID: CTR-096-007
Comment Author: City of Modesto
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-24e SSC Desgntd/Beneficial Uses
References:
Attachments? N
CROSS REFERENCES

Comment: Thank you for the opportunity to comment on the proposed California Toxics Rule. The City's comments are related to five main concepts:

Specifically, the City submits the following comments:

D. EPA should apply the aquatic life criteria to those waters identified in Regional Water Quality Control Plans ("Basin Plans") as having aquatic life uses, rather than to "all waters".

Response to: CTR-096-007

See response to CTR-081-004b.

Subject Matter Code: C-25 Hardness

Comment ID: CTR-026-005
Comment Author: Cal. Department of Fish & Game
Document Type: State Government
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-25 Hardness
References:
Attachments? N
CROSS REFERENCES

Comment: 6. TOTAL HARDNESS DEPENDENT FRESHWATER METALS CRITERIA

The DFG does not object to the development of freshwater metals criteria that take into account the effect of total hardness on metals toxicity, with the exception of the comments on criteria development stated above. The DFG does recommend, though, that the proposed rule clarify the tables (page 42169) that reflect this approach. The tables may be viewed as the specific criteria rather than examples of metals criteria based on the total hardness value of 100 mg/l CaCO[subs]3.

Response to: CTR-026-005

EPA acknowledges the commenter's concern that the hardness-dependent metals criteria may be incorrectly misconstrued as single fixed values, particularly since fixed numbers and hardness-dependent numbers appear in the same table. However, footnote "e" of the table explains the hardness dependency. EPA does not know of a better manner in which to present this information, and the commenter did not offer an alternative as to how to make the information clearer to the a casual reader.

Subject Matter Code: C-26 Avrging pds&Exceedence Freq.

Comment ID: CTR-003-002
Comment Author: City of Riverside
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/22/97
Subject Matter Code: C-26 Avrging pds&Exceedence Freq.
References:
Attachments? N
CROSS REFERENCES

Comment: 2) We agree with commentors who argued that a 4-day average period and a once in three year exceedance frequency is unnecessarily restrictive for chronic criteria exceedances. In fact, it would seem reasonable to assume that isolated exceedances of chronic criteria would have no discernable long term effect on a water body. Further, so long as acute criteria are not also exceeded, a rapid recovery period would seem likely, What case studies and/or laboratory results does EPA have to support this finding? Also, what data is EPA relying on for the three year excursion frequency for acute failures? Based on the evidence of recent major environmental calamities, aquatic systems appear to right themselves very quickly after initial cleanup, typically within one year.

Response to: CTR-003-002

See response to CTR-020-014.

Comment ID: CTR-009-007
Comment Author: City of Thousand Oaks
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/22/97
Subject Matter Code: C-26 Avrging pds&Exceedence Freq.
References:
Attachments? Y
CROSS REFERENCES

Comment: The rule states that the CMC "equals the highest concentration of a pollutant to which aquatic life can be exposed for a short period of time without deleterious effects." What is a "short period of time" defined as? This definition, as it stands, is vague to the point it will require, and be subject to, various interpretations by different entities and individuals. It puts the regulated community in the position of having to make independent judgments as to what the proscribed activity is, case-by-case. This is inappropriate, and will lead to unnecessary conflict. The City recommends that EPA define "short period of time" more precisely, and present the scientific basis for such definition in the final rule.

Response to: CTR-009-007

EPA does not agree that it is necessary to further define "short period of time" within the rule. The reason that it is not numerically specified is that the appropriate averaging period varies from pollutant to pollutant, and is not as well defined as, nor is as important as, the criteria concentrations, which are numerically specified in the rule. EPA is deferring to the State implementation procedures for the application of acute averaging periods into NPDES permit limit calculations, because these implementation procedures primarily involve mixing zone policies, which are at State responsibility, and are not part of this rule.

Comment ID: CTR-020-008
Comment Author: City of Stockton
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/24/97
Subject Matter Code: C-26 Avrging pds&Exceedence Freq.
References:
Attachments? Y
CROSS REFERENCES

Comment: II. Use of New Scientific Information The City acknowledges and supports the EPA's update of several water quality criteria including those for mercury, cadmium and arsenic. While a number of criteria were updated to reflect current scientific information, there are a few notable exceptions. The following briefly addresses the key updates and omissions that should be addressed in the final publication of this rule.

4. Averaging Period for Acute Criteria

The proposed rule does not establish a specific averaging period for acute criteria, apparently abandoning the published criteria recommendation that acute criteria should be applied as one hour averages. EPA now states that the exposure time should be "short." While Stockton concurs that a one hour averaging period is not supported by the underlying data and is inconsistent with the permit development procedures in EPA's 1991 Technical Support Document for Water Quality-based Toxics Control ("TSD"), the failure to explain why EPA is no longer recommending a one hour averaging period will lead to confusion and misapplication of the criteria. At a minimum, EPA should explain that "short" means at least 24 hours so that inconsistencies in permitting do not occur.

Thus, the final CTR should discuss the technical basis for this change and identify the acceptable exposure period.

Response to: CTR-020-008

EPA does not agree. The appropriate acute averaging period is not necessarily greater or equal to 24 hours for each of the pollutants. See response to CTR-009-007.

Comment ID: CTR-020-009
Comment Author: City of Stockton
Document Type: Local Government

State of Origin: CA
Represented Org:
Document Date: 09/24/97
Subject Matter Code: C-26 Avrging pds&Exceedence Freq.
References:
Attachments? Y
CROSS REFERENCES

Comment: II. Use of New Scientific Information The City acknowledges and supports EPA's update of several water qulaity criteria including those for mercury, cadmium and arsenic. While a number of criteria were updated to reflect current scientific information, there are a few notable exceptions. The following briefly addresses the key updates and omissions that should be addressed.

(a) EPA's Characterization of Metals as Fast Acting Toxicants is Erroneous

Water quality criteria established pursuant to Section 304(a) of the CWA classify pollutants as acute, chronic, or human health-based depending on the pollutant's mode of toxicological activity. The classification of a pollutant significantly affects the manner in which criteria are applied and effluent limitations are derived. Many factors affect the proper translation of water quality criteria into NPDES permit limits, including modeling, permit averaging periods, low flow return frequency, mixing zones, and assumptions made in the modeling process. In addition, criteria require appropriate "duration" and "frequency of exposure" factors which are directly related to the time required for exposure to a pollutant to elicit a biological response (e.g., mortality). Any arbitrary reduction of the allowable exposure period (or the acceptable return frequency) establishes more stringent criteria than necessary to ensure use protection.

EPA's proposed acute averaging period recommendation (short) has a substantial effect on mixing zone calculations. This policy assumes that short term exposures to concentrations slightly in excess of the acute criteria can produce mortality to swimming or drifting organisms (ie., the "fast acting toxicant assumption"). If 24-48 hour exposures are acceptable, the acceptable and protective mixing zones would increase substantially. This reduces the costs of compliance and the need to construct expensive diffusers except in situations where true acute toxicity concerns exist.

The CWA section 304(a) criteria and EPA's 1991 TSD establish EPA's position on criteria application. As more ftilly set forth below, EPA's assumption that all heavy metals are "fast acting toxicants" is not supported by EPA's recently completed research which was expressly intended to evaluate this issue as part of the February 15, 1995 National Toxics Rule settlement. EPA has recently acknowledged this fact with respect to copper in its Marine Copper Criteria published on April 14, 1995. Consistent with its CWA section 304 mandate, EPA must modify all metals criteria to accurately reflect the latest infon-nation regarding the toxicological rate of action for metals. To do otherwise is arbitrary and capricious, and EPA must provide the public with the results of the recent scientific research about characteristics of each pollutant and their proper averaging period.

Response to: CTR-020-009

EPA does not agree. EPA has not assumed that all toxicants are fast-acting for purposes of applying the CMC to define permit limits. The provisions of the rule were specifically designed not to incorporate such an assumption. EPA is deferring to the State implementation procedures for the application of acute averaging periods into NPDES permit limit calculations.

Comment ID: CTR-020-010
Comment Author: City of Stockton
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/24/97
Subject Matter Code: C-26 Avrging pds&Exceedence Freq.
References:
Attachments? Y
CROSS REFERENCES

Comment: II. Use of New Scientific Information The City acknowledges and supports EPA's update of several water quality criteria including those for mercury, cadmium and arsenic. While a number of criteria were updated to reflect current scientific information, there are a few notable exceptions. The following briefly addresses the key updates and omissions that should be addressed in the final publication of this rule.

(1) Short (One Hour) Acute Averaging Period for Metals is Unnecessarily Restrictive and Without Any Technical Basis

The chronology of EPA's one hour averaging period illustrates a continued adherence to the outdated "fast acting toxicant" assumption that is unsupported. As the following discussion shows, the Agency has acknowledged a dearth of scientific support for the one hour assumption through repeated Freedom of Information Act ("FOIA") requests. Recently EPA released the analytical data underlying its time/toxicity assumptions for metals which confirm metals are not "fast acting."

Acute criteria are generally developed based on 48-96 hour exposures.(*1) In establishing its criteria, EPA arbitrarily reduced "acute" exposures to one hour without any supporting data and continues to assert that the one hour or short acute averaging period is appropriate. Actually, acute criteria underwent two transformations. EPA initially determined the 96 hour no effect concentration to establish the numeric criteria; it then arbitrarily reduced the allowable exposure period from 96 hours to one hour without a corresponding adjustment to the numeric criteria or a determination that this additional adjustment was necessary.

(2) Initial Agency Research on Issue

EPA has been in the process of reconsidering the historically recommended one hour acute averaging period for over eight years. In October 1989, the Agency completed an internal report specifying that existing averaging periods for acute and chronic criteria may be unduly restrictive and that more reasonable approaches may be implemented.(*2)

In response to comments on EPA's 1991 TSD, the Agency admitted that:

The one hour acute averaging period was derived primarily from the data on response time for toxicity to ainmonia, a "fast acting toxicant."(*3)

Research performed by Mancini (1983), cited in the 1991 TSD, verifies EPA's assumption is incorrect.(*4) Erickson (1989) noted that for fathead minnows, copper LC50s increase gradually by a

factor of two (2) between the 96 hour and 12 hour exposure durations. LC50s were ten-fold higher at two to three hours than at 96 hours.(*5) This is hardly a "fast acting" toxicant. Research by Brown (1974) indicated that a one hour exposure of rainbow trout to copper elicited no acute response at twenty times 96-hour LC50 concentrations.(*6)

(3) EPA Commits to Reevaluate the Fast Acting Toxicant Assumption

At the January 1993 Annapolis Conference, EPA and academic scientists, including state regulatory officials, called on the Agency to assess whether overly conservative assumptions are leading to permit limitations which can be orders of magnitude more stringent than needed to protect aquatic life uses. EPA identified several high priority research goals, including the accurate assessment of toxicological kinetics of metals and committed to address whether metals are, in fact, "fast acting" toxicants.(*7)

At a public meeting of EPA's Criteria Review Committee in June 1993, the Science Advisory Board presented copper mortality data that confirmed copper concentrations many orders of magnitude higher than current acute criteria would be required to elicit mortality within a one hour exposure time (Exhibit 3). EPA stated its intention was to utilize such time/mortality studies to derive an appropriate criteria averaging period:

The Committee tentatively intends to incorporate the use of a kinetic model of toxicity into the Guidelines. This model allows more rigorous use of data from toxicity tests, and should better represent the effects of time-varying concentrations occurring in ambient applications... The data on the time course of mortality would yield a rate coefficient indicating how quickly mortality occurs. This rate coefficient would replace the current averaging period.(*8)

Unfortunately, EPA revealed a lack of urgency in addressing the toxicological speed of action issue for metals, leaving many dischargers exposed to unnecessarily stringent requirements. An October 27, 1993 letter from the Assistant Administrator for Water stated:

"...the analysis is not yet complete. Once completed, we will circulate it for public review... Completion, of course, is dependent on available resources, particularly in light of competing statutory and court-ordered mandates."(*9)

Ironically, EPA in the same letter disclosed that the one hour averaging period for metals is a "default value" without any technical basis:

"EPA does not have any specific data on metals discharged near or above criteria levels showing acute impacts in one which is expected to be protective for both fast-acting and slower toxicants."(*10)

In early 1994, EPA asserted it was actively addressing the recommendations made at the Annapolis Conference that toxicant speed of action be revised, and in correspondence to the Pennsylvania League of Cities and Municipalities, the Agency asserted that data analyses were underway at that time:

"You have raised several questions concerning the speed of action of toxic effects of metals. We agree that this issue warrants further investigation. Our plan is to definitively address the issue with a new criteria methodology which will explicitly incorporate data with regard to speed of action on a pollutant-by-pollutant basis. Our present policy is to make a single, conservative assumption on speed of action for all pollutants, in the absence of appropriate data and methodologies to do the pollutant-by-pollutant analysis. We are investigating whether we have sufficient information to issue interim guidance now, modifying this policy on speed of action for some pollutants or classes of

pollutants."(*11)

(4) Results of AnaIysis Confirm Metals Are Not Fast Acting

In a February 28, 1994 response to a FOIA request, EPA acknowledged that data pertaining to toxicity/time relationships for metals are available and that preliminary analyses of available data indicate that the one hour period is unnecessarily conservative:

...the averaging period for copper, zinc, and lead would be about 1 day, while cadmium and arsenite would have an averaging period of about 2.5 days.

... for the above metals [copper, zinc, lead, cadmium, and arsenite] their action can be "fast" in the sense that a short exposure can be lethal, but only at somewhat higher concentrations than those which are lethal for exposures of a day or longer. Even the more fast-acting of the above metals would not require an averaging period as short as a few hours, but a major fraction of a day or longer.(*12)

In an August 22, 1994 letter to Rep. Robert Borski, EPA's Assistant Administrator for Water asserted that the Agency was diligently pursuing completion of studies to better define the toxicological speed of action for metals.

"Consistent with the recommendations from this group, EPA hopes to improve our water quality based approach and better characterize the conservative and nonconservative assumptions associated with the methodology. This would include the guidance addressing fast- and slow-acting metals in the Spring of 1995."(*13)

In September 1994, the EPA Aquatic Life Guidelines Committee met to address issues concerning the derivation of aquatic life criteria, including potential modifications to earlier assumptions related to the speed of action:

"Whereas the 1985 Guidelines use only the survival results at the end of 48- or 96-hour tests, the new framework would also use survival counts taken at various times throughout the tests. These data would be evaluated within the framework of a kinetic-based toxicity model (Mancini, 1983; Erickson, et al., 1989), intended to consider the speed at which effects appear in different individuals and different concentrations."(*14)

From the most recent Agency information available, it is apparent that EPA has completed the studies and re-evaluations of criteria development data necessary to derive appropriate averaging periods for metals. EPA has indicated to at least one state that studies of the toxicological kinetics of metals have been completed and that the Agency has concluded that a 24 hour acute averaging period is protective of aquatic life uses based on those studies, as follows:

"The NJDEP has discussed criteria durations with Charles Delos, Ecological Risk Assessment Branch, Health and Ecological Criteria Division, USEPA, Washington, D.C. Our understanding is that the recent reevaluation of "fast acting" toxicants has been completed for cadmium, chromium, copper, lead, mercury, nickel, silver and zinc. The results of that reevaluation indicate that an acute criteria duration of 24 hours would be protective for these metals."(*15)

EPA acknowledged that a 24 hour acute averaging period is appropriate for copper in its April 14, 1995 Ambient Water Quality Criteria for Copper - Saltwater Copper Addendum. This conclusion was consistent with the evaluation presented by Erickson in 1993 and the subsequent letter to the New Jersey

DEP.

(5) Conclusion

Based on the data provided by EPA pursuant to FOIA, there is no scientific basis to assume all pollutants, particularly metals, are "fast acting" toxicants and that the time period necessary to ensure avoidance of acute impacts is "short." In newly issued marine criteria, the Agency acknowledged that a 24 hour averaging period is appropriate for copper (one of the fastest acting metals) and thus should similarly modify criteria application procedures for other metals to be consistent with the available data. The continued application of a one hour or short averaging period for metals in the CTR is scientifically flawed, inconsistent with the available data, and arbitrary and capricious. EPA should re-propose the CTR with the metals acute averaging periods changed from one hour to 24 hours consistent with the research and EPA's conclusions on the marine copper criteria. To the degree that data are available regarding other constituents, the appropriate acute averaging period should be specified for these criteria. If no information is available and the criteria are based upon 96 hour no effect results, the applicable averaging period should not be less than 24 hours, which constitutes a significant margin of safety given the data available in the record and the 96 hour exposure duration used to establish the acute criteria.

(*1) See, USEPA's Ambient Water Quality Criteria for Copper (1984); Ambient Water Quality Criteria for Cadmium (1984); Ambient Water Quality Criteria for Lead (1984); and Ambient Water Qualily Criteria for Zinc (1997).

(*2) Report on the Feasibility of Predicting the Effects of Fluctuating Concentrations on Aquatic Organisms and Possible Application to Water Quality Criteria USEPA ORD (September 21, 1989).

(*3) EPA's Technical Support Document Responsiveness Summary (1991) at 8.

(*4) Mancini, J. A Method for Calculating Effects on Aquatic Organisms of Time Varying Concentrations. 17 Water Res. 1355-1362 (1983).

(*5) Erickson, R., Kleiner, C., Flandt, J., Highland, T. Report on the Feasibility of Predicting the Effects of Fluctuating Concentrations on Aquatic Organisms and Possible Application to Water Quality Criteria. USEPA Duluth Laboratory (September 1989).

(*6) Brown, V.M., et al. Aspects of Water Quality and the Toxicity of Copper to Rainbow Water Research, Vol. 8, p. 797-803 (1974).

(*7) Memorandum from Martha G. Prothro, USEPA, dated April 1, 1993.

(*8) Aquatic Life Guidelines Status Report No. 3 (June 16, 1993).

(*9) Letter from Robert Perciasepe, USEPA, to Congressman Tim Holden, dated October 25, 1994.

(*10) Id. See also, February 22, 1994 letter and ten attachments from C. Delos (EPA) to Jay Himes (Pennsylvania League of Cities and Municipalities) in response to a FOIA request (attached in part hereto as Exhibit 4).

(*11) Letter from Robert Perciasepe, USEPA, to Jay Himes, Pennsylvania League of Cities and Municipalities, dated March 30, 1994.

(*12) Memorandum from Russell Erickson, USEPA, to Charles Delos, USEPA, in response to FOIA request, dated February 28, 1993.

(*13) Letter from Robert Perciasepe, USEPA, to Congressman Robert A. Borski, dated August 22, 1994.

(*14) Delos, C. "Possible Revisions to EPA's Procedure for Deriving Aquatic Life Criteria." Presented at Water Environment Federation (October, 1994), cited in correspondence dated August 17, 1994 as expressing the Aquatic Life Guidelines Committee's views on criteria revision.

(*15) Letter from Lewis J. Nagy, Assistant Commissioner, Policy and Planning, New Jersey Department of Environmental Protection, to Robert Perciasepe, USEPA, dated May 5, 1995.

Response to: CTR-020-010

EPA does not agree that a "short period of time" equals one hour. In consideration of the developments described in the comment, the one-hour averaging period that EPA had previously specified for the CMC, for example in the 1991 TSD, was not incorporated into the rule. See also responses to CTR-020-009 and CTR-009-007.

Comment ID: CTR-020-014
Comment Author: City of Stockton
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/24/97
Subject Matter Code: C-26 Avrging pds&Exceedence Freq.
References:
Attachments? Y
CROSS REFERENCES

Comment: II. Use of New Scientific Information

The City acknowledges and supports EPA's update of several water quality criteria including those for mercury, cadmium and arsenic. While a number of criteria were updated to reflect current scientific information, there are a few notable exceptions.

The following briefly addresses the key updates and omissions that should be addressed in the final publication of this rule.

3. Chronic Criteria Averaging Periods

Chronic criteria averaging periods have not been updated despite a commitment by EPA to reevaluate this factor as part of the NTR settlement. EPA acknowledges that the chronic criteria are based primarily upon 28 day or longer tests. The chronic criteria are set at the continuous exposure, no effect level. There is no clear rationale why the continuous-safe exposure period was reduced to four days. This affects the selection of design flow used to apply the criteria (7/Q/10 vs. 30/Q/5) and the manner in which the chronic criteria may be applied to wet weather flows. Given EPA's conclusion that these

criteria establish long term no effect exposure levels, continued use of a four day averaging period is unduly restrictive and inconsistent with EPA's regulatory mandate to only establish criteria and implementing procedures that are "necessary" to protect aquatic life uses (40 C.F.R. section 131.2)

(a) Continued Recommendation of Four Day Averaging Is Inconsistent with the National Guidelines

The National Guidelines and EPA's 1991 TSD recognize that the federally recommended return frequency and low flow (7/Q/10) for applying chronic criteria were based on studies of ecosystems recovering from high exposures (spills) causing acute stress. The application of acute criteria to stringent low flows and use of acute bioassay tests has addressed that concern and prevents acute stress from occurring more frequently than once in ten years. Therefore, it is no longer rational to conclude that minor chronic stress needs to be regulated as rigorously as avoidance of acute stresses (which was one of the underlying purpose of the reduced averaging period and return frequency policy). To a certainty, there is no information in EPA's record showing that exceeding chronic criteria levels over a four day period once in three years has ever been associated with discernible adverse impacts. To the opposite, field studies reported in the 1991 TSD indicate that chronic criteria are very conservative and that longer term exposures which allow four day averages well above the chronic value do not result in adverse impacts on beneficial uses when applied on a once in three year exceedance frequency.

The preamble to the CTR speculates that it is necessary to utilize a four day averaging period to reflect the shorter life span of certain organisms. The only organisms with such short life spans are insects that reproduce rapidly and abundantly. The conservative three year return frequency is not related to the time period necessary for insects to recover from minor chronic stress. This value was based on fish re-population which occurs much more slowly. Accordingly, there is no apparent technical relationship between the underlying basis for the acceptable return frequency and the need to add further conservatism to the chronic averaging period. As the return frequency was based on fish populations, the acceptable averaging period should also reflect that type of organism. Clearly, a thirty day averaging period, consistent with the duration of the chronic tests, should be acceptable and ftilly protective of beneficial uses.

EPA's latest research, which was released pursuant to FOIA requests, indicates that for chronic criteria, a two to five percent exceedance frequency (versus 0.4 percent) should not result in adverse use impacts and would be acceptable. Moreover, as noted above, all research on the standards to permits process confirms that the existing procedures add an additional "level of protection" to conservatively developed criteria. Given this information, EPA should update its chronic criteria application procedures to at least reflect those found approvable - chronic criteria thirty day averaging for Maryland and Colorado

Response to: CTR-020-014

The final rule has been modified to allow the state, with EPA approval subsequent to public comment, to use alternate values for the chronic averaging period and for the exceedance frequency. EPA is certain that the four-day chronic averaging period and three-year return interval provide, at a minimum, a very high degree of protection, as explained in the 1991 Technical Support Document for Water Quality-based Toxics Control. Nevertheless, to allow consideration of current and future developments in the science underlying these parameters, the rule incorporates the flexibility of allowing the State to use of alternate values, with EPA approval, following public comment on any change.

Comment ID: CTR-020-015

Comment Author: City of Stockton
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/24/97
Subject Matter Code: C-26 Avrging pds&Exceedence Freq.
References:
Attachments? Y
CROSS REFERENCES

Comment: II. Use of New Scientific Information

The City acknowledges and supports EPA's update of several water quality criteria including those for mercury, cadmium and arsenic. While a number of criteria were updated to reflect current scientific information, there are a few notable exceptions.

The following briefly addresses the key updates and omissions that should be addressed in the final publication of this rule.

4. Statistical Modeling

The proposed rule specifies the exceedance frequency (once in three years) and averaging period and list a number of return flows that may be used to ensure that the specified return frequency is not exceeded. The preamble also discusses the availability of alternate modeling approaches to more directly demonstrate that criteria compliance will occur as intended, such as statistical or probabilistic modeling. However, the CTR itself fails to specify that statistical modeling may be used to apply the criteria. This should be clarified in the final rule.

Response to: CTR-020-015

EPA favors the use of statistical and dynamic modeling and does not intend for the rule to preclude such modeling. In implementing the rule's criteria, the state may employ either steady state design flows or statistical or dynamic modeling.

Comment ID: CTR-035-020
Comment Author: Tri-TAC/CASA
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-26 Avrging pds&Exceedence Freq.
References:
Attachments? N
CROSS REFERENCES

Comment: p. 42174 --Chronic Averaging Period In general, we believe that EPA's proposed use of 4-day averaging periods for chronic (CCC) averaging periods is too short. The averaging period of four days recommended in EPA guidance is much shorter than the toxicity tests upon which the chronic criteria are

based, which is typically 20-30 days. This has the effect of incorporating an additional level of conservatism that has been estimated to be equivalent to a safety factor of two (Delos, 1990). Therefore, EPA should adopt longer averaging periods for chronic criteria for some constituents (for instance, for those metals for which the scientific studies show that metals do not act as fast as the criteria averaging periods would indicate). We recommend that EPA review the toxicity tests used and establish averaging periods that match the effects duration, even if they are different for different criteria. In addition, EPA should provide that any NPDES permits issued after the CTR is finalized should be subject to a reopener to allow for the insertion of a different averaging period in effluent limitations if the ongoing EPA analysis of the chronic design conditions as part of the revisions to the 1985 guidelines (referenced on p. 42174) leads to longer averaging periods.

Response to: CTR-035-020

EPA does not agree that a 4-day chronic averaging period is always too short. This averaging period is primarily based on the shortest duration in which effects appear in the Ceriodaphnia 7-day chronic test. However, EPA agrees that the 4-day chronic averaging period may not be appropriate for all pollutants, and has modified the final rule to allow use of alternate averaging periods. See also responses to CTR-020-014 and CTR-060-012.

Comment ID: CTR-035-028
Comment Author: Tri-TAC/CASA
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-26 Avrging pds&Exceedence Freq.
References:
Attachments? N
CROSS REFERENCES

Comment: p. 42182 -- Averaging Period for Acute Criteria (CMCs) EPA should identify a specific duration for acute (CMC) criteria beyond the current description of "short term" and provide an explanation of this choice. We believe that in many cases (e.g. metals) recent data suggest that the constituents are not as fast-acting as once-believed and that 24-hours is a more appropriate acute averaging period than the 1-hour averaging period previously used. Therefore, we recommend that EPA adjust the acute averaging periods to reflect such information.

Response to: CTR-035-028

See responses to CTR-009-007, CTR-020-010, and CTR-020-014.

Comment ID: CTR-035-031
Comment Author: Tri-TAC/CASA
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 09/25/97

Subject Matter Code: C-26 Avrging pds&Exceedence Freq.
References:
Attachments? N
CROSS REFERENCES

Comment: p. 42184 -- Frequency of exceedence We believe that adoption in the regulation of the proposed exceedence frequency, once in three years for acute and chronic criteria, should be deferred until EPA completes its review of this issue. As EPA points out, there are numerous scientific issues being reexamined. For streams in and areas, for instance, EPA should consider that annual flooding and scouring may occur, as well as droughts (leading to no flow during the dry season), and the natural communities adapted to these environments may be capable of recovering from such major disturbances in a year or less. Since EPA does not include any evidence in this rulemaking to support the application of this allowable frequency in California, we recommend that EPA not formalize this policy in the CTR.

Response to: CTR-035-031

See response to CTR-020-014.

Comment ID: CTR-036-007a
Comment Author: County of Orange
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-26 Avrging pds&Exceedence Freq.
References: Letter CTR-036 incorporates by reference letters CTR-013, CTR-018, CTR-031, CTR-034 and CTR-040
Attachments? N
CROSS REFERENCES G-03

Comment: We are concerned that EPA has preempted the State's flexibility by establishing averaging periods for applying acute and chronic aquatic life criteria and for establishing low flow conditions that must be used in developing limits based on the proposed criteria. We recommend that such implementation issues remain within State authority.

Response to: CTR-036-007a

See response to CTR-020-009.

Comment ID: CTR-037-007
Comment Author: Hampton Roads Sanitation Dist.
Document Type: Sewer Authority
State of Origin: VA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-26 Avrging pds&Exceedence Freq.

References:
Attachments? N
CROSS REFERENCES

Comment: 7. EPA is requiring, by rule, that the averaging period for the CMC be 1 hour. However, EPA is also working towards new methods to calculate water quality criteria which acknowledge that the CMC averaging period should probably be closer to 24 hours. This is not being acknowledged in the rule even though the Agency has released this information at various meetings. The one hour averaging period for the CMC is overly stringent and should not be adopted by rule. The averaging period for the CMC being proposed is not technically defensible and arbitrary, therefore it should be removed from the rule until EPA finalizes its study of the issue.

Response to: CTR-037-007

See responses to CTR-020-010 and CTR-020-009.

Comment ID: CTR-037-009
Comment Author: Hampton Roads Sanitation Dist.
Document Type: Sewer Authority
State of Origin: VA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-26 Avrging pds&Exceedence Freq.
References:
Attachments? N
CROSS REFERENCES

Comment: 9. EPA is requiring that criteria not be exceeded more than once every three years, on average, EPA, however, is ignoring the fact that this exceedance rate is based on catastrophic events and that minor exceedances require much less time for biological communities to reach their pre-exceedance conditions. This rule is adopting a requirement which often-times will be overly protective with little or no environmental benefit. The basis of the three year exceedance requirement has been acknowledged by EPA's Aquatic Life Criteria Work Group as conservative and unnecessary when exceedances are minor. The rule must be modified to accommodate minor exceedances if justified scientifically. EPA must technically justify the exceedance frequency that it is requiring by rule to insure that resources will not be expended needlessly by permittees.

Response to: CTR-037-009

See response to CTR-020-014.

Comment ID: CTR-040-018a
Comment Author: County of Sacramento Water Div
Document Type: Storm Water Auth.
State of Origin: CA
Represented Org:

Document Date: 09/25/97
Subject Matter Code: C-26 Avrging pds&Exceedence Freq.
References: Letter CTR-040 incorporates by reference letter CTR-027
Attachments? Y
CROSS REFERENCES G-03
C-30
C-24e

Comment: V. Recommendation: Delete all provisions in the Rule that preempt the States flexibility in permitting. The Rule provides specific direction on the adoption of averaging periods, low flow values, effluent limitations for criteria not being adopted as a part of the Rule, and that the aquatic life criteria be applied to all waters irrespective of designated use, etc..

* The Preamble and the Rule's economic analysis make a point that the State has considerable flexibility in establishing permit limitations. In making, that point, EPA implies that the State may implement the criteria in a manner that would have little or no adverse economic impact on dischargers.

* However, the Rule contains a number of implementation provisions that are not required under Section 303(c)(2)(B), but serve to preempt the State's flexibility. These provisions include, but are not necessarily limited to the adoption of averaging periods and low flow values, directives regarding the establishment of effluent limitations for criteria that are not being adopted as a part of the Rule, and application of the aquatic life criteria to all waters irrespective of the designated use.

* Not only does EPA not have a duty to adopt these provisions, but also the provisions are more restrictive than those required by the CWA or EPA regulations, They clearly restrict the State's flexibility. In fact, other states have adopted, and EPA has approved, implementation provisions (e.g., averaging periods and low flow values) which are less restrictive.

* For these reasons, EPA should remove all such implementation provisions from the Rule.

Response to: CTR-040-018a

EPA does not agree that the averaging periods and low flow values apply to the criteria other than those adopted by this rule. They do not to apply to other State criteria. However, EPA agrees that other averaging periods and exceedence frequencies may be appropriate for the criteria concentrations included in this rule, and has provided for such in the final rule. See response to CTR-020-014.

Comment ID: CTR-060-012
Comment Author: San Diego Gas and Electric
Document Type: Electric Utility
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: C-26 Avrging pds&Exceedence Freq.
References:
Attachments? N
CROSS REFERENCES

Comment: PROVISIONS SDG&E DOES NOT SUPPORT

As described in the following comments SDG&E does not support the following provisions:

Over-conservativeness of chronic aquatic criteria due to averaging period

The preamble to the rule (see 62 Fed. Reg. at 42,174, Col. 2) states that most of the toxicity tests used to calculate the chronic criteria were conducted over a 28 day period. However, even though the preamble (see 62 Fed. Reg. at 42,174, Col. 1) acknowledges that "...aquatic organisms can generally tolerate higher concentrations of pollutants over shorter periods of time", EPA proposes in this rule to set the chronic averaging period to 4 days. Consequently, concentrations from longer term (i.e., 28-days) tests, which would generally result in lower concentrations which are considered toxic, are being implemented as 4-day average criteria, even though criteria developed from toxicity tests conducted over a 4-day period would generally result in criteria which are higher. This approach results in criteria that are more restrictive than necessary to protect the state's beneficial uses. The criteria should either: 1) be restated as 28-day average criteria; or 2) be recalculated as criteria representative of 4-day average tests.

Response to: CTR-060-012

The averaging period is shorter than the toxicity tests on which the criterion is based because (a) exposure concentrations in the toxicity tests are nearly constant, (b) exposure concentrations in the field, over the duration of the averaging period, can be rather variable, and (c) variable concentrations yield greater toxicity than a constant concentration equal to the mean of the variable concentrations. Consequently, if the laboratory toxicity tests had employed variable concentrations, the reported effect concentrations (as the mean over the test duration) would be lower than if the test employed constant concentrations. To account for this phenomenon, the criteria averaging period is shorter than the tests on which the criterion is based. Note, however, that EPA is employing flexibility into the rule in order to provide for advances in the state of the science in setting averaging periods. See the response to CTR-020-014.

Subject Matter Code: C-27 Additive/Synergistic Effects

Comment ID: CTR-026-002b
Comment Author: Cal. Department of Fish & Game
Document Type: State Government
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-27 Additive/Synergistic Effects
References:
Attachments? N
CROSS REFERENCES C-17b
C-29

Comment: 2. PARTIAL PROTECTION BY THE PROPOSED AQUATIC LIFE CRITERIA (FRESHWATER OR SALTWATER)

On page 42168, the proposed rule includes the following language: "EPA's guidelines are designed to derive criteria that protect aquatic communities by protecting most of the species and their uses most of the time." The CTR goes on to state that this approach results in only a "small possibility" of substantial overprotection or underprotection. Obviously, it is underprotection that is of concern to the DFG. The DFG has very serious concerns that criteria are being proposed that protect "most" of the species "most" of the time. We are aware of the protocols that require a minimum of eight specified families be used to develop criteria and that it may be difficult to determine criteria that are one hundred percent protective; however, this does not preclude the real possibility that certain designated uses and aquatic organisms will not be maintained, and or protected, as a result of the proposed criteria. The DFG is also concerned that criteria and protocols developed for specific constituents do not take into account the additive or synergistic effects that contaminant combination may have on aquatic organisms. Another factor that needs to be considered is bioaccumulation, as well as the effect this may have on organisms at higher trophic levels.

As trustee of all the fish and wildlife resources in the State, it is our agency's responsibility to ensure appropriate protection of all fish and wildlife resources, not just "most", and this includes adequate water quality standards. Due to our concerns and the very real possibility of underprotection to aquatic organisms and designated uses, the DFG believes that it may be appropriate to derive the criteria as proposed, and subsequently develop some additional safety factors for inclusion. It is our understanding that this approach was used in the formulation of water quality objectives for protection of aquatic organisms in the California Ocean Plan. In the short term , the safety factor could possibly be realized by the development of a comprehensivebiological monitoring program to determine whether the proposed criteria are indeed fully protective.

Response to: CTR-026-002b

EPA agrees that the numeric values of those criteria that are not expressed as formulas do not account for additive or synergistic effects. However, EPA does not agree that this would mean that the criteria are not sufficient to protect the designated use. EPA has examined the potential for additivity. Data available to EPA suggest that in real world situations, additivity is usually not a significant issue, because most of the toxic stress is usually attributable to a single pollutant, even in systems receiving complex mixtures of discharges from large metropolitan areas.

To illustrate this, consider some 50 samples that EPA collected throughout New York Harbor, an large area extending from the Hudson River to New York Bight, and receiving a large volume of wastewater and runoff from a highly diverse set of discharges, representing a wide range of municipal, industrial, and agricultural activities. Six metals, Ag, Cd, Cu, Ni, Pb, and Zn were measured using clean techniques. For each sample, the toxic equivalents of each metal were calculated as the metal concentration divided by the its criterion. Assuming perfect additivity of toxicity, the toxic equivalents in each sample were added together to obtain the total toxic equivalents. One metal consistently dominated the toxic equivalents in each sample. On average, the combined toxic equivalents of all six metals was only 10 percent greater than the toxic equivalent of the dominant single metal. Among the 50 samples, the maximum ratio of the combined toxic equivalents to the dominant single toxic equivalent was only 19 percent greater than the single dominant toxic equivalent. Consequently, even assuming perfect additivity, the combined contribution of the other metals was minor compared to the contribution of the dominant toxicant.

The comment provides no data indicating that additivity or synergism are in reality significant problems. Nevertheless, the rule's provisions are capable of handling such problems if they exist. First, criteria expressed as formulas with hardness account for the effects of hardness (or lack thereof) and of parameters covarying with hardness. Second, the rule's provision for the water-effect ratio represents the current best technique for adjusting for unknown additive, synergistic, or antagonistic effects, if they exist. Consequently, EPA believes that its criteria are fully protective. Also see response to CTR-026-002a.

Nevertheless, as the commenter represents the State of California, EPA notes that to allay its concerns, if any remain, the State may adopt its own standards more stringent than those promulgated here by EPA.

Comment ID: CTR-029-002e
Comment Author: Center for Marine Conservation
Document Type: Environmental Group
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-27 Additive/Synergistic Effects
References:
Attachments? N
CROSS REFERENCES C-17a
C-17b
A
C-22
C-29

Comment: The Center for Marine Conservation (CMC) is a nationwide, nonprofit advocacy group dedicated to the conservation and enhancement of coastal and ocean life and resources. CMC submits these comments on behalf of its 16,000 members in California and over 120,000 members nationwide.

CMC applauds EPA's efforts to bring California into compliance with the Clean Water Act 303(c)(2)(B). Implementing numeric criteria that will protect the beneficial uses of California's waters is of great importance to the health of coastal and marine ecosystems, and so to CMC and its members. The

reliance in many areas of the state on narrative criteria threatens the health of most of the state's waters, thereby impacting both human health and the health of the state's economy that relies on clean water.

While CMC strongly supports the swift adoption of an Enclosed Bays and Estuaries Plan and an Inland Surface Waters Plan that contain numeric criteria for toxic pollutants, CMC also is concerned that many of the specific criteria contained in the proposed rule are weaker than those contained in published guidance. CMC also believes that the proposed rule can better protect certain subpopulations from harm caused by consumption of contaminated fish and shellfish. Finally, CMC is concerned that the economic analysis of the proposed rule over-emphasizes costs and under-reports the many benefits of improving water. quality throughout the state. These three points are reviewed below.

In Light of Significant Threats to Water Quality, the Proposed Rule Should Contain the Most Stringent Criteria That Are Scientifically Defensible

Many of the criteria in the proposed rule are weaker than criteria in current published guidance. The proposed rule summarily states that the difference between the proposed, weaker criteria and the published guidance documents is "insignificant"(*4); however, in light of the current contamination problems in California's waters today, any move backwards, particularly when spread out over the state, must be viewed as significant.

Any weakening of the criteria should be subject to close scrutiny and the most rigorous analysis, which the proposed rule itself does not do. Among other things, the criteria in the proposed rule may be underprotective because additive and synergistic effects were not considered; and because the effects on wildlife, which can be particularly significant for bioaccumulative chemicals, were ignored.(*5) In addition, the proposed rule contains dissolved rather than total recoverable metals criteria, despite the fact that EPA acknowledges that total recoverable metals criteria are "scientifically defensible" and that they are more protective than dissolved metals criteria because they consider "sediment, food-chain effects and other fate-related issues," rather than simply water column impacts.(*6)

Clean Water Act section 303(c)(2)(B) mandates the development of numeric criteria that will "support such designated uses [that are adopted by the State]." The statistics available on the health of the state's waters indicates that their use already is significantly threatened or impaired by toxics. The strongest criteria supportable by science are necessary to reverse this trend and begin to restore the state's waters.

(*4) 62 Fed. Reg. 42159, 42168 (Aug. 5, 1997).

(*5) Id. at 42168.

(*6) Id. at 42172.

Response to: CTR-029-002e

See response to CTR-026-002b.

Subject Matter Code: C-28 Detection Limits

Comment ID: CTR-005-009
Comment Author: Novato Sanitary District
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/23/97
Subject Matter Code: C-28 Detection Limits
References:
Attachments? Y
CROSS REFERENCES

Comment: 8. EPA should not adopt criteria for any pollutant where the method detection limit exceeds the objective and there is insufficient detectable, reliable data to determine if the pollutant could reasonably be expected to interfere with designated uses. The proposed rule includes criteria for a number of constituents where there is insufficient data to determine whether the discharge of such pollutants could reasonably be expected to interfere with the designated uses. EPA has chosen to promulgate criteria for these constituents even though section 303 (c)(2)(B) of the Clean Water Act requires States to adopt numeric criteria only for constituents "...the discharge or presence of which in the affected waters could reasonably be expected to interfere with those designated uses adopted by the State, as necessary to support such designated uses."

Clearly, this "play-it-safe" approach goes beyond the requirements of the Clean Water Act and is therefore unnecessary. By taking this approach, however, EPA is unable to fulfill its duty (under Presidential Order 12866, the Unfunded Mandates Reform Act), and the Regulatory Flexibility Act) to assess the costs, benefits, and impacts of the rule on local government and small entities. While this may be the "safe" approach for EPA, it places dischargers throughout the State at risk. As analytical detection limits improve down the road, dischargers may find they are unable to achieve the criteria without costly end-of-pipe controls. But, by then, it will be too late for EPA to evaluate the costs and benefits of the criteria and alternative criteria. For these reasons, EPA should not adopt criteria for those constituents. If EPA does not do this, it should evaluate the costs and benefits of the criteria, as well as alternative criteria, using worst case assumptions (i.e., assume that discharge levels and ambient levels are at the detection limits).

Response to: CTR-005-009

See response to CTR 034-010b and CTR-060-010

EPA disagrees that the Agency should exclude those criteria that are below the method detection limits from this rule. EPA's water quality standards regulation at 40 CFR 131.11 requires that criteria be adopted by the States at concentrations necessary to protect the designated use. Given this requirement, consideration of analytical detectability is not an appropriate factor to consider when calculating water quality criteria to protect designated uses since they are not related to actual environmental impacts. In consideration of both statutory (CWA Section 303(c)) and regulatory (the Water Quality Standards Regulation at 40 CFR 131.11) requirements that water quality standards, which includes water quality criteria, must be protective of the designated uses of waterbodies, EPA has determined that such consideration of analytical detection limit is not an appropriate factor to consider in developing the water quality criteria component of water quality standards since the detection limits are not related to actual

environmental impacts. This has been EPA's longstanding position since the inception of the water quality standards program in 1965 (see also EPA's discussion on this issue in the National Toxics Rule at 57 FR 60876, 57 FR 60870).

EPA's methodology for deriving aquatic life criteria are primarily based on laboratory bioassays with sensitive aquatic organisms. The results from these tests are analyzed by mathematical procedures outlined in EPA's aquatic life criteria methodology guidelines. EPA's human health criteria are based on protocols generally using toxicity studies performed on laboratory animals such as rats and mice. Thus, EPA's aquatic life and human health criteria are based solely on health effects without regard to chemical analytical methods or techniques. Deleterious effects can occur to both humans and aquatic organisms at concentrations that are below the analytical detection levels.

As previously noted, EPA's Water Quality Standards Regulation requires that criteria be adopted at concentrations that are necessary to protect designated uses. The criteria promulgated today meet that requirement while EPA's policy with respect to regulatory compliance, which is discussed below, takes analytical sensitivity and precision into consideration.

In the preamble of the proposed rule, EPA referenced the Agency's 1990 guidance (Strategy for the Regulation of Discharges of PHDDs and PHDFs from Pulp and Paper Mills to Waters of the united States, memorandum from the Assistant Administrator for Water to the Regional Water Management Division Directors and NPDES State Directors) on how water quality based effluent limits for constituents with water quality criteria that are below the sensitivity of official analytical methods can be established. However, EPA acknowledges that in more recent guidance than that cited in the preamble to the proposed rule the Agency recommends use of the Minimum Level (ML) rather than the Method Detection Limit (MDL) for reporting sample results to assess compliance with a water quality based effluent limitation (WQBEL). See Technical Support Document for Water Quality-based Toxics Control, U.S. EPA Office of Water, EPA/505/2-90-001 (March 1991) at page111. The ML, also called the quantification level, is the level at which the entire analytical system gives recognizable mass spectra and acceptable calibration points, i.e., the point at which the method can reliably quantify the amount of pollutant in the sample. More recently, in the Final Great Lakes Water Quality Guidance (see 50 FR 15424, March 23, 1995), EPA included a provision which allowed permitting authorities to utilize the minimum level (ML) for the method specified in the permit to monitor the amount of pollutant in an effluent down to the quantification level. States can use their own procedures to average and otherwise account for monitoring data, e.g., quantifying results below the ML. These results are then used to assess compliance with the WQBEL. See 40 CFR Part 132, Appendix F, Procedure 8.B.

Further, EPA notes that the purpose of today's rule is to establish ambient water quality criteria for priority toxic pollutants in California. Implementation of the criteria, including compliance with water quality based effluent limitations in permits are outside the scope of today's rule. However, the State of California, in its draft implementation procedures for the criteria included in today's rule (entitled "Draft Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California," September 11, 1997) has proposed provisions to address this issue. The State has elected the utilize the minimum levels in determining compliance with WQBELs.

EPA disagrees that there is insufficient data to support the inclusion of priority toxic pollutants in today's rule. In EPA's December 12, 1988 guidance to States on complying with CWA Section 303(c)(2)(B) (Notice of Availability published at 54 FR 346, January 5, 1989), EPA noted that at a minimum, States should adopt criteria for a pollutant if that pollutant was currently present or could potentially be present in State waters the future. EPA's guidance highlighted the Agency's position that any information indicating that a pollutant was discharged or present in a waterbody is justification that a pollutant could

be reasonably expected to interfere with the designated uses, and therefore would need to be included in a State's water quality standards regulation. EPA has determined that adequate information exists in the rulemaking record to show that the priority toxic pollutants in today's rule can be reasonably expected to interfere with the designated uses of waters in California. Moreover, since these criteria are ambient criteria, they do not in and of themselves require control of a discharge. Only where a discharge has a reasonable potential to exceed the water quality criterion would an effluent limit for that pollutant be placed in an NPDES permit. See Response to CTR-003-010b and CTR-036-005.

In promulgating today's rulemaking, EPA is complying with the same Section 303(c)(2)(B) guidance issued to the States. Thus, the lack of widespread monitoring data or data that does not meet analytical detection limitations is not a sufficient basis for excluding numeric criteria for priority toxics from today's rule. As EPA previously stated, consideration of analytical detection limits is not appropriate in establishing criteria. EPA also notes that the commenters did not submit any analyses or information to support the assertion that the coverage of priority toxic pollutants included in today's rule is based on insufficient or reliable data. In addition, EPA further notes that the priority toxic pollutants included in today's rule are the same priority toxic pollutants that the State of California had previously adopted in the Inland Surface Waters Plan and Enclosed Bays and Estuaries Plan to comply with CWA Section 303(c)(2)(B). Thus, the inclusion of the numeric criteria for priority toxic pollutants in today's rule is justified.

EPA disagree with the commenter's assertion that the Agency, by including criteria that are below detection limits, cannot comply with statutory requirements of UMRA, RFA and Executive Order 12866. (See Sections G, I, and J of the preamble for EPA's analysis of this rule's compliance with thesestatutes and the executive order, respectively). EPA notes that the criteria included in today's rule establish ambient water quality criteria in California to comply with CWA Section 303(c)(2)(B) to protect the designated uses of the State's waterbodies. As EPA noted in the responses to comments raised on establishing criteria below detection limits, EPA's policy with respect to regulatory compliance for the criteria takes analytical sensitivity into account.

Comment ID: CTR-011-002
Comment Author: City of Simi Valley
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/24/97
Subject Matter Code: C-28 Detection Limits
References: Letter CTR-011 incorporates by reference letters CTR-027 and CTR-034
Attachments? Y
CROSS REFERENCES

Comment: It is not possible to determine what risk levels would be needed to preclude end-of-pipe treatment for other human health criteria because in most cases the method detection limits exceed the criteria (see Table 2). The City recommends that EPA delay adoption of criteria for these constituents until sufficient detected data is available to assess attainability and perform the economic analysis required by Presidential Order 12866 and the Unfunded Mandates Reform Act. We understand that Section 303 (c)(2)(B) of the Clean Water Act does not require EPA to adopt criteria for constituents that could reasonably be expected to interfere with designated uses. In the absence of data on certain constituents, EPA could easily defend a position not to adopt criteria for those constituents.

Response to: CTR-011-002

See response to CTR-005-009.

Comment ID: CTR-013-004
Comment Author: County of Los Angeles
Document Type: Storm Water Auth.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-28 Detection Limits
References: Letter CTR-013 incorporates by reference letter CTR-027

Attachments? N
CROSS REFERENCES

Comment: In addition, we would like to emphasize the following concerns which greatly impact the Los Angeles County Stormwater Program:

4. The proposed rule adopts criteria for pollutants where the method detection limit exceeds the criteria, and there is insufficient detectable, reliable data to determine if the pollutant could reasonably be expected to interfere with designated uses. The proposed rule contains many criteria in which the criteria are less than current acceptable laboratory detection limit. In other words, if a stormwater sample indicated a non-detect value in its stormwater discharge for certain pollutants, it cannot be determined if the proposed criteria were exceeded or if exceeded, what would be the reductions and costs necessary to achieve compliance.

If the proposed rule is adopted with these criteria, the discharger may find that they are in violation of the criteria, as laboratory techniques are improved in the future. By that time, the discharger has no recourse to require the USEPA to evaluate the cost and benefit of the criteria or alternative criteria. Furthermore, in that event, the discharger may face enforcement action and costly end-of-pipe controls.

We recommend that the USEPA not adopt criteria for any pollutant where the method detection limit exceeds the criteria and there is insufficient detectable, reliable data to determine if the pollutant could reasonably be expected to interfere with designated uses.

Response to: CTR-013-004

See response to CTR-005-009.

Comment ID: CTR-020-020
Comment Author: City of Stockton
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/24/97
Subject Matter Code: C-28 Detection Limits

References:
Attachments? Y
CROSS REFERENCES

Comment: IV. Compliance / Detection Level

The rule specifies that limits may be set below the detection level for a pollutant but that compliance will be determined upon detection level for the pollutant. Thus, a non-detect will be considered in compliance with a permit limitation. The City concurs with the position that a non-detect reading should be considered in compliance with a limitation that is set below the reliable detection level.

Response to: CTR-020-020

See response to CTR-005-009.

Comment ID: CTR-021-005b
Comment Author: LeBoeuf, Lamb, Green & MacRae
Document Type: Local Government
State of Origin: CA
Represented Org: City of Sunnyvale
Document Date: 09/25/97
Subject Matter Code: C-28 Detection Limits
References: Letter CTR-021 incorporates by reference letter CTR-035
Attachments? Y
CROSS REFERENCES C-13
E-01c
R
S

Comment: It is with a sense of reluctance that Sunnyvale joins in CASA/Tri-TAC's adverse comments on the CTR and the EA, and Sunnyvale does so in a spirit of constructive criticism and with an expectation that the Agency will make the necessary adjustments in its approach towards the CTR before the final rule is promulgated. In additon, in the same spirit and with the same expectation, Sunnyvale would like to make the following points on its own behalf:

2. Obligation to Assess Alternative Cancer Risk Levels for Human Health-Based Criteria. Sunnyvale is gravely concerned that EPA has used the wrong approach in proposing to establish human health criteria for organic pollutants, particularly those pollutants for which the proposed criteria are below the method level of detection ("MDL"). Sunnyvale recommends that EPA should thoroughly assess all of the potential impacts, including costs and benefits, of the 10E-4 and 10E-5 risk levels before proposing the human health-based criteria. As pointed out in the EOA Letter, there is a significant potential for advancing technology to lower the MDL for many pollutants to the point where laboratory equipment is able to measure some or all of the organic compounds for which EPA is proposing to establish criteria at the new level. It is intuitively obvious that the costs of attaining criteria set at the 10E-6 level will be significantly greater than attainment of a 10E-5 or 10E-4 level, particularly where, as pointed out in the EOA Letter, the only available method of treatment is granular activated carbon. Sunnyvale is concerned that the EA does not adequately address the potential for these costs, and, consequently, does not take these potential costs into account in determining whether to exercise its flexibility in choosing whether to

use a 10-4 , 10-5 or 10-6 cancer risk level as the basis for its CTR promulgation.

EPA is required by Executive Order 12866, the Regulatory Flexibility Act and the Unfunded Mandates Reform Act to identify and analyze alternatives to a proposed rule. We cannot understand, therefore, why EPA has done such a cursory analysis in the preamble to the CTR and the EA of the alternatives to the use of the most stringent (10E-6) risk level for establishing criteria for human health effects of pollutants, particularly organic pollutants. EPA cannot base its selection of the 10E-6 level based upon previous regulatory pronouncements by the State of California. Any new determination by the State will be subject to the analytical requirements of Section 13241 of the Porter-Cologne Act and by review by the Office of Administrative Law. Thus, it is not a foregone conclusion that the State will ultimately select the 10E-6 level. EPA has its own legal requirements to fulfill. Accordingly, we ask that EPA not promulgate the final human health criteria for the pollutants of concern unless and until it has adequately analyzed the costs and other implications of the various alternatives to the 10E-6 level.

In conclusion, we are entirely supportive of many of EPA's innovative approaches towards development of the CTR, particularly as regards the toxic metals. However, we believe that EPA has needlessly failed to comply with many of is legal obligations, particularly as regards the development of human health-based criteria on cancer risk levels of organic pollutants. We urge the Agency to reconsider its position in the matters covered by this letter (as amplified by the EOA Letter) and the CASA/Tri-TAC letter. Sunnyvale pledges its continued participation in place-based watershed management planning in the South Bay, its cooperation with the Agency in making a success of the WPI, and to an ongoing effort by the Agency and others to reach water quality goals in the South Bay. We thank you for the opportunity to comment on the proposed CTR.

Response to: CTR-021-005b

See response to CTR-005-009.

Comment ID: CTR-027-004
Comment Author: California SWQTF
Document Type: Storm Water Auth.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-28 Detection Limits
References: Letter CTR-027 incorporates by reference letters CTR-001, CTR-036 and CTR-040
Attachments? N
CROSS REFERENCES

Comment: 4. The proposed rule adopts criteria for pollutants where the method detection limit exceeds the criteria, and there is insufficient detectable, reliable data to determine if the pollutant could reasonably be expected to interfere with designated uses. The proposed rule contains criteria for many pollutants in which the criteria are less than acceptable laboratory detection limits (e.g. N-Nitrosodi-n-propylamine has an analytical detection limit of 0.5 ppb and the proposed human health criteria of 0.005 ppb). Thus, if a stormwater agency notes a non-detect value in its stormwater discharge for N-Nitrosodi-n-propylamine, it cannot determine if the proposed criterion was exceeded.

Section 303(c)(2)(B) notes that States must adopt numeric criteria for constituents when "...the discharge

or presence of which in the affected waters could reasonably be expected to interfere with those designated uses adopted by the State, as necessary to support such designated uses." However, the proposed rule includes criteria for a number of constituents where there are insufficient detected data to determine whether the discharge of such pollutant could reasonably be expected to interfere with the designated uses. Furthermore, one cannot determine the reduction and costs necessary to achieve compliance.

If the proposed rule is adopted with these criteria, the discharger may find that they are in violation of the criteria as laboratory techniques are improved in the future. By that time the discharger has no recourse to require USEPA to evaluate the cost and benefit of the criteria or alternative criteria. Moreover, in that event, the discharger may face enforcement action and costly end-of-pipe controls.

Recommendation: USEPA should not adopt criteria for any pollutant where the method detection limit exceeds the criteria and there is insufficient detectable, reliable data to determine if the pollutant could reasonably be expected to interfere with designated uses.

Response to: CTR-027-004

See response to CTR-005-009.

Comment ID: CTR-030-009
Comment Author: Utility Water Act Group
Document Type: Trade Org./Assoc.
State of Origin: DC
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-28 Detection Limits
References:
Attachments? Y
CROSS REFERENCES

Comment: E. EPA Needs to Clarify its Quantification Discussion and Delete References to the 1990 Dioxin Strategy

EPA states that "the use of analytical detection limits are [sic] appropriate for determining compliance" with the NPDES permit limits. 62 Fed. Reg, at 42,183, col. 3. The use of the term "detection" in that statement, rather than "quantification," may create concision and UWAG urges EPA to use the latter term. Over the past few years, EPA has consistently stated that, for determining compliance with WQBELs calculated at a level below the quantification level, the quantification level will serve as the compliance level. Use of the detection level in that context is entirely inappropriate. Measurements above the detection level, but below the quantification level, are sufficiently reliable to establish the mere presence - but not the amount - of a pollutant in a wastewater sample. Such measurements, therefore, cannot serve as the basis of compliance. Not only has EPA adopted that conclusion,(*3) but the U.S. Court of Appeals for the District of Columbia Circuit just ruled on that very issue by holding:

A standard with which compliance cannot be assessed - and it is agreed that compliance with an effluent limitation set below the level of quantification simply cannot be assessed - is no standard at all for purposes of due process.

American Iron and Steel Institute v. U.S. EPA, 115 F.3d 979, 994 (1997) (AISI).

In addition, EPA's references to its 1990 dioxin strategy document, "Strategy for the Regulation of Discharges of PHDDs and PHDFs from Pulp and Paper Mills to Waters of the U.S." (Dioxin Strategy), are troubling. As described below, the Dioxin Strategy contains two significant flaws and thus citation to it may cause confusion in the regulated community. First, the Dioxin Strategy consistently references detection limits, rather than quantification levels. The above discussion explains UWAG's concerns with that approach.

The second major flaw of the Dioxin Strategy is its approval of the application of WQBELs to internal plant waste streams. The Dioxin Strategy states:

Where final, end-of-pipe effluent limitations are determined to be impractical or infeasible to measure, permitting authorities can, in accordance with the requirements of 40 CFR 122.45(h), establish limitations for internal plant waste streams from bleached plant processes.

Dioxin Strategy, p. 20.

As recently clarified by the AISI Court, the Clean Water Act provides no authority for the establishment of anything other than end-of-pipe WQBELS. In AISI, the petitioners challenged EPA's Great Lakes Water Quality Rule, including its requirement that each permit establish a pollutant minimization program (with effluent limitations for internal plant waste streams containing the pollutant) for each pollutant with an end-of-pipe limitation below the level of quantification. Although the Court agreed with EPA that the Clean Water Act allows monitoring of discharges from internal sources, it concluded that EPA could not impose a "point-source WQBEL upon a facility's internal waste streams." 115 F.3d at 996. Thus, the Dioxin Strategy's suggestion that it is appropriate to impose internal waste stream WQBELs is contradicted by the AISI Court.

For the reasons set forth in this subsection, UWAG requests that EPA remove all references to the Dioxin Strategy from the California Water Quality Standards rulemaking. UWAG encourages EPA to reference instead its "Questions and Answers on the Great Lakes Water Quality Guidance-Set 2", dated March 20, 1996 (GLI Q&A-2). In the GLI Q&A-2, the Agency explicitly allowed states to specify - directly within NPDES permits -- that analytical results below the level of quantification may be deemed to be in compliance with the established daily maximum WQBEL, and that zero may be used in lieu of measurements below the quantification level for averaging purposes in evaluating compliance with monthly average WQBELS. GLI Q&A-2, p. 28.

(*3) EPA's official position is that "[q]uantification of measurements below the [quantification level]. . . are [sic] not acceptable. . . . " 61 Fed. Reg. 3412 (col. 1) (Jan. 31, 1996).

Response to: CTR-030-009

See response to CTR-005-009.

Comment ID: CTR-033-003a
Comment Author: San Bernardino Muncpl Wtr Dept

Document Type: Water District
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-28 Detection Limits
References: Letter CTR-033 incorporates by reference letter CTR-020
Attachments? Y
CROSS REFERENCES E-01n

Comment: Experiments to determine whether a chemical is carcinogenic are performed (on animals) with high concentrations to produce statistically significant results within the time frame of the experiment. The numbers are then extrapolated to determine an estimated "safe" concentration for human populations. All of the factors in the extrapolation process use conservative assumptions (one in a million risk, bioaccumulation potential, carcinogenic potential, etc.) which builds in and multiplies safety factors. For 39 of the constituents in the CTR, the extrapolated criteria levels are below current levels of detection.

The EPA recognizes this as the proposed rule states: "EPA is aware that the criteria proposed today for some of the priority toxic pollutants are at concentrations less than EPA's current analytical detection limits. Analytical detection limits have never been an acceptable basis for setting water quality criteria since they are not related to actual environmental impacts. The environmental impacts of a pollutant are based on a scientific determination, not a measuring technique that is subject to change. Setting the criteria at levels that reflect adequate protection tends to be a forcing mechanism to improve analytical detection methods. See 1985 Guidelines p. 21. As the methods improve, limits closer to the actual criteria necessary to protect aquatic life and human health become measurable. The Agency does not believe it is appropriate to propose or promulgate criteria that are not sufficiently protective." The rule goes on to add, "the use of detection limits are appropriate for determining compliance with National Pollutant Discharge Elimination System (NPDES) permit limits."

Since the criteria are established on high dosage results that cannot be substantiated at low levels due to statistical significance and inability to see beyond detection limits, the values are predictions. Questions that come to mind are, what would this procedure determine for fat-soluble vitamins A, D and K? In high doses, these vitamins are harmful, though in low dosages, valuable. For constituents below detection, these determinations cannot be scientifically verified by analyses, only mathematically generated based on worst case assumptions. Although caution is warranted when establishing criteria, future unforeseen levels and effects cannot be predicted.

While the EPA believes that compliance determinations are based on detection limits, to assume no cost in the economic analysis for values that are below detection is not a valid assumption. As noted above, the detection limits will be forced to lower levels, and therefore become moving compliance targets without additional economic review should detection's begin to occur.

In summary, the detection levels should serve as the criteria with a "<" designator. The criteria for the affected constituents should be reviewed on a regular basis to reflect current approved analytical techniques, with lower levels promulgated after appropriate economic evaluations.

Response to: CTR-033-003a

See response to CTR-005-009.

Comment ID: CTR-034-010a
Comment Author: SCAP
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-28 Detection Limits
References: Letter CTR-034 incorporates by reference letter CTR-035
Attachments? N
CROSS REFERENCES C-21

Comment: * SCAP recommends that EPA defer adoption of criteria contained in the draft CTR which are typically below detection limits. While we understand EPA's rationale for setting criteria that may not be detectable based on EPA's determination of the criteria needed to adequately protect aquatic life and human health, we believe that EPA has not fulfilled its duties under the Clean Water Act, Unfunded Mandates Act, and E.O. 12866. In accordance with federal water quality standards regulations, EPA is required to review water quality data and information on discharges to specific water bodies where toxic pollutants may be adversely affecting water quality or the attainment of the designated water use or where the levels of toxic pollutants are at a level to warrant concern and must adopt criteria for such toxic pollutants applicable to the water body sufficient to protect the designated use (see 40 CFR section 131.11). Thus, if the pollutant has not been detected, there is no basis for determining whether the chemical is adversely affecting water quality or the attainment of designated uses.

Further, EPA cannot make an accurate determination of the costs and benefits of promulgating CTR criteria for those criteria that are below detection levels. It is quite likely that detection limits for some substances will improve in the near future, and dischargers previously projecting full attainment will no longer be able to comply. For instance, a SCAP member agency was issued an NPDES permit in the early 1990s containing effluent limits for a number of toxic pollutants. In this agency's case, lindane was not being detected at the time of permit issuance (and the detection level was higher than the permit limit). Yet, in the following years, the detection level dropped and this agency began to experience exceedences of the permit limit. Lindane cannot be readily controlled at the source by normal industrial waste source control methods because it is in widespread use by consumers. Therefore, the only reliable option for the POTW to come into compliance may be to add end-of-pipe treatment, a very expensive proposition. This scenario is likely to happen again with many of the criteria being proposed in the CTR. The potential compliance costs could be high, yet the Economic Analysis for the draft CTR could not estimate such costs. For all of the above reasons, EPA should defer adoption of these criteria until they can be detected and EPA can more fully determine the potential economic impacts of promulgation of the CTR. Instead, we recommend that a watershed approach be used to address these pollutants (see below).

Response to: CTR-034-010a

See response to CTR-005-009.

Comment ID: CTR-035-005
Comment Author: Tri-TAC/CASA
Document Type: Trade Org./Assoc.
State of Origin: CA

Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-28 Detection Limits
References:
Attachments? N
CROSS REFERENCES

Comment: EPA should defer adoption of criteria for any pollutant where the method detection limit exceeds the objective and there are insufficient reliable data to determine if the pollutant could reasonably be expected to interfere with attainment of designated uses. We believe that because of the inability to detect these substances and the lack of monitoring information indicating water quality use impairment, that EPA has not fulfilled its obligations under the Clean Water Act to conduct a water body-specific analysis of the need to promulgate criteria, nor has EPA fulfilled its obligations under the Unfunded Mandates Act and Executive Order 12866 to analyze the costs and benefits of proposed criteria that cannot be detected or for which insufficient monitoring data are available. We believe that the costs to comply with criteria for organic pollutants that are currently below detection levels could amount to as much as $630 million per year for the POTW sector.

Response to: CTR-035-005

Comment ID: CTR-035-012b
Comment Author: Tri-TAC/CASA
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-28 Detection Limits
References:
Attachments? N
CROSS REFERENCES C-21

Comment: 1. Comments on Proposed Rule A. General Comments p. 42166-67 --Legal Basis

EPA argues that:

EPA does not believe that it is necessary to support the criteria proposed today on a pollutant-specific, water body-by-water-body basis. For EPA to undertake an effort to conduct research and studies of each stream segment or water body across the State of California to demonstrate that for each toxic pollutant for which EPA has issued CWA section 304(a) criteria guidance there is a 'discharge or presence' of that pollutant which could reasonably 'be expected to interfere with' the designated use would impose an enormous administrative burden and would be contrary to the statutory directive for swift action manifested by the 1987 addition of section 303(c)(2)(B) to the CWA.

Contrary to EPA's argument, we believe that the requirement in Section 303 of the CWA that States adopt water quality standards where there is a discharge or presence of toxic pollutants in the affected waters which could reasonably expected to interfere with designated uses, applies to EPA. EPA's claim that such a review would impose an "enormous administrative burden" is not compelling, since States, in their adoption of water quality standards, must perform this pollutant specific review of each stream

segment under the express terms of Section 303(c)(2)(B). EPA's own regulations require that, in promulgating water quality standards for a State, EPA is subject to "the same policies, procedures, analyses, and public participation requirements established for States in these regulations" (40 CFR section 131.22). The regulations require States to "review water quality data and information on discharges to specific water bodies where toxic pollutants may be adversely affecting water quality or the attainment of the designated water use or where the levels of toxic pollutants are at a level to warrant concern and must adopt criteria for such toxic pollutants applicable to the water body sufficient to protect the designated use"(40 CFR section 131.11)(emphasis added). Thus, the regulations regarding the adoption of water quality standards do not suggest that States adopt uniform water quality standards for every water body merely because there may be a large amount of work required to determine the appropriate water quality standards for each water body. We especially believe this issue to be pertinent to pollutants for which the proposed CTR criteria are below detection levels. We therefore recommend that EPA defer the adoption of criteria for constituents which are below detection limits until such time as data are available demonstrating that particular toxic pollutants are being discharged to specific water bodies at levels to warrant concern. The pollutants in this category include the following: aldrin, alpha-BHC, beta-BHC, chlordane, 4,4'-DDD, 4,4'-DDT, 4,4'-DDE, dieldrin, 2,3,7,8-TCDD (dioxin), endosulfan I, endosulfan II, endrin, endrin aldehyde, heptachlor, heptachlor epoxide, toxaphene, PCB-1016, PCB-1221, PCB-1232, PCB-1242, PCB-1248, PCB-1254, PCB-1260, hexachlorobenzene, n-nitrosodi-n-propylamine, pentachlorophenol, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoroanthene, benzo(k)fluoroanthene, chaysene, dibenzo(a,h)anthracene, and indeno(1,2,3-cd)pyrene. EPA, upon determining that promulgation of a 303(c)(2)(B) criterion is necessary, should promulgate the criterion on a water body-specific basis. Also, EPA would need to conduct an economic impact analysis at that time. Finally, as with the CTR, EPA must pursue adoption of these criteria through a rulemaking process, allowing opportunities for public review and comment in accordance with the Clean Water Act and Administrative Procedures Act.

Response to: CTR-035-012b

See response to CTR-005-009.

Comment ID: CTR-036-006
Comment Author: County of Orange
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-28 Detection Limits
References: Letter CTR-036 incorporates by reference letters CTR-013, CTR-018, CTR-031, CTR-034 and CTR-040
Attachments? N
CROSS REFERENCES

Comment: Appropriateness of the Technical Criteria in the CTR

The proposed rule includes a number of technical elements that are of concern.

We are concerned that the proposed rule contains criteria that have concentrations lower than current acceptable laboratory detection limits. We recommend that no criteria be adopted which are below the

detection limits and that no criteria be adopted when insufficient reliable data exists to determine that the pollutant could reasonably be expected to interfere with designated uses.

Response to: CTR-036-006

See response to CTR-005-009.

Comment ID: CTR-037-006
Comment Author: Hampton Roads Sanitation Dist.
Document Type: Sewer Authority
State of Origin: VA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-28 Detection Limits
References:
Attachments? N
CROSS REFERENCES

Comment: 6. EPA states that analytical detection limits are appropriate for determining compliance with NPDES permit limits, which directly conflicts with the Agency's most recent guidance which recommends that MLs be used to determine compliance. This statement completely ignores the issues of analytical variability and uncertainty in data at the MDL and between the MDL and the ML, even though all parties are in consensus that values of high uncertainty should not be used to make compliance decisions. This may be a typographical error, but it needs to be addressed. Furthermore, EPA must consider the analytical limitations of currently approved procedures when adopting criteria, Compliance with criteria can not be determined readily if sufficiently-sensitive approved procedures are not available.

Response to: CTR-037-006

See response to CTR-005-009.

Comment ID: CTR-038-009a
Comment Author: Sonoma County Water Agency
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-28 Detection Limits
References:
Attachments? Y
CROSS REFERENCES E-01n
R
S

Comment: 8. EPA should not adopt criteria for any pollutant where the method detection limit exceeds the objective and there is insufficient detectable, reliable data to determine if the pollutant could

reasonably be expected to interfere with designated uses. The proposed rule includes criteria for a number of constituents where there is insufficient data to determine whether the discharge of such pollutants could reasonably be expected to interfere with the designated uses. EPA has chosen to promulgate criteria for these constituents even though section 303 (c)(2)(B) of the Clean Water Act requires States to adopt numeric criteria only for constituents "...the discharge or presence of which in the affected waters could reasonably be expected to interfere with those designated uses adopted by the State, as necessary to support such designated uses." Clearly, this "play-it-safe" approach goes beyond the requirements of the Clean Water Act and is therefore unnecessary. By taking this approach, however, EPA is unable to fulfill its duty (under Presidential Order 12866, the Unfunded Mandates Reform Act, and the Regulatory Flexibility Act) to assess the costs, benefits, and impacts of the rule on local government and small entities. While this may be the conservative approach for EPA, it places dischargers throughout the State at risk. As analytical detection limits improve, dischargers may find they are unable to achieve the criteria without costly end-of-pipe controls. But, by then, it will be too late for EPA to evaluate the costs and benefits of the criteria and alternative criteria. For these reasons, EPA must not adopt criteria for those constituents. If EPA does adopt criteria for those constituents, EPA must evaluate the costs and benefits of the criteria, as well as alternative criteria, using worst case assumptions (i.e., assume that discharge levels and ambient levels are at the detection limits). With respect to the District's discharge and Schell Slough and Second Napa Slough, the criteria in this category include, but are not necessarily limited to, the following : benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoroanthene, benzo(k)fluoroanthene, chrysene, dibenzo(a,h)anthracene, aldrin, 4,4'-DDD, 4,4'-DDE, dieldrin, endosulfan I, endosulfan II, endosulfan sulfate, heptachlor, heptachlor epoxide, toxaphene, PCB-1016, OCB-1221, PCB-1232, PCB-1242, PCB-1248, PCB-1254, PCB-1260, and hexachlorobenzene (see Table 3).

Response to: CTR-038-009a

See response to CTR-005-009.

Comment ID: CTR-040-017
Comment Author: County of Sacramento Water Div
Document Type: Storm Water Auth.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-28 Detection Limits
References: Letter CTR-040 incorporates by reference letter CTR-027
Attachments? Y
CROSS REFERENCES

Comment: IV. Recommendation: Do not adopt criteria for any pollutant where the method detection limit exceeds the water quality objective and for which there is insufficient detectable, reliable data to determine if the pollutant could reasonably be expected to interfere with designated uses.

* The proposed Rule includes criteria for a number of constituents where there is insufficient data to determine whether the discharge of such pollutants could reasonably be expected to interfere with the designated uses. EPA has chosen to promulgate criteria for these constituents even though section 303(c)(2)(B) of the CWA requires states to adopt numeric criteria only for constituents "...the discharge or presence of which in the affected waters could reasonably be expected to interfere with those

designated uses adopted by the State, as necessary to support such designated uses." Clearly, this "play-it-safe" approach goes beyond the requirements of the CWA and is therefore unnecessary.

* By taking this approach, however, EPA is unable to fulfill its duty under Presidential Executive Order 12866, the Unfunded Mandates Reform Act, and the Regulatory Flexibility Act to assess the costs, benefits, and impacts of the Rule on local governments and other entities.

* While this may be the "safe" approach for EPA, it places dischargers throughout the State at risk. As analytical detection limits improve, dischargers may find they are unable to achieve the criteria without costly end-of-pipe controls. But, by then, it will be too late for EPA to evaluate the costs and benefits of the criteria and alternative criteria.

* For these reasons, EPA must set aside the "play-it-safe" approach and not adopt criteria for those constituents.

* If EPA does not do this, it must evaluate the costs and benefits of the criteria for these constituents, as well as alternative criteria, using, worst case assumptions (discharge levels and ambient levels are at the detection limits).

Response to: CTR-040-017

See response to CTR-005-009.

Comment ID: CTR-041-008a
Comment Author: Sacramento Reg Cnty Sanit Dist
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-28 Detection Limits
References:
Attachments? N
CROSS REFERENCES E-01n

Comment: 3. Recommend Against Adopting Criteria with Insufficient Detectable Data

The District strongly recommends that the EPA not adopt criteria where the method detection limit exceeds the objective and there is insufficient detectable, reliable data to determine if the pollutant could reasonably be expected to interfere with designated uses. The proposed rule includes criteria for a number of constituents where there is insufficient data to determine whether the discharge of such pollutants could reasonably be expected to interfere with the designated uses. EPA has chosen to promulgate criteria for these constituents even though section 303 c(2)(B) of the Clean Water Act requires States to adopt numeric criteria only for constituents "...the discharge or presence of which in the affected waters could reasonably be expected to interfere with those designated uses adopted by the State, as necessary to support such designated uses." EPA has chosen a "safe approach" which clearly goes beyond the Clean Water Act and is clearly unnecessary. This approach does not allow EPA to fulfill its duty (under Presidential Order 12866, the Unfunded Mandates Reform Act and the Regulatory Flexibility Act) to assess the costs, benefits, and impacts of the rule on local government and small

entities. While this may be the safe approach for EPA, it places dischargers throughout the State at risk.

As analytical detection limits improve, dischargers may find they are unable to achieve the criteria without costly end-of-pipe controls. But, by then, it will be too late for EPA to evaluate the costs and benefits of the criteria and alternative criteria. For these reasons, EPA should not adopt criteria for those constituents. If EPA does adopt these criteria, EPA should, prior to that, evaluate the costs and benefits of the criteria, as well as alternative criteria, using worst case assumptions (i.e., assume that discharge and ambient levels are at the detection limits). The criteria in this category include the following: Aldrin, Alpha-BHC, Beta-BHC, Chlordane, 4,4'-DDD, 4,4'-DDT, 4,4'-DDE, Dieldrin, Endosulfan I, Endosulfan II, Endrin, Endrin Aldehyde, Heptachlor, Heptachlor Epoxide, Toxaphene, PCB- 1016, PCB-1221, PCB-1232, PCB-1242, PCB-1248, PCB-1254, PCB-1260, Hexachlorobenzene, N-Nitrosodipropylamine, Pentachlorophenol, Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoroanthene, Benzo(k)fluoroanthene, Chrysene, Dibenzo(a,h)anthracene, and Indeno(1,2,3-cd)pyrene.

Response to: CTR-041-008a

See response to CTR-005-009.

Comment ID: CTR-042-003
Comment Author: Cal. Dept. of Transportation
Document Type: State Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: C-28 Detection Limits
References:
Attachments? Y
CROSS REFERENCES

Comment: 3. The CTR fails to adequately address non-detected pollutants.

In numerous instances, the CTR adopts water quality criteria for pollutants that exceed the method detection limit. In these cases, insufficient data exists to determine if these pollutants will interfere with designated beneficial uses. Without such data, EPA is unable to demonstrate that there is a "discharge or presence of which in the affected waters could reasonably be expected to interfere with those designated uses adopted by the State" that would require the adoption of water quality standards to support such designated uses. See CWA section 303(c)(2)(B).

Furthermore, without such data, dischargers are unable to determine the controls necessary to meet the CTR criteria. As detection limits are lowered over time through the implementation of new laboratory techniques, dischargers may find that they are in violation of the criteria, are subject to enforcement actions and citizen suits, and must install costly end-of-pipe treatment technologies. This scenario can be avoided if EPA delays the adoption of all criteria that exceed currently available method detection limits.

Request: Caltrans requests that EPA delay the adoption of all CTR water quality criteria that exceed currently available method detection limits until such time that there exists sufficient, detectable, reliable data to determine if the pollutant could reasonably be expected to interfere with designated beneficial uses.

Response to: CTR-042-003

See response to CTR-005-009.

Comment ID: CTR-043-008
Comment Author: City of Vacaville
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: C-28 Detection Limits
References:
Attachments? Y
CROSS REFERENCES

Comment: 8. EPA should not adopt criteria for any pollutant where the method detection limit exceeds the objective and there is insufficient detectable, reliable data to determine if the pollutant could reasonably be expected to interfere with designated uses. The proposed rule includes criteria for a number of constituents where there is insufficient data to determine whether the discharge of such pollutants could reasonably be expected to interfere with the designated uses. EPA has chosen to promulgate criteria for these constituents even though section 303 (c)(2)(B) of the Clean Water Act requires States to adopt numeric criteria only for constituents "...the discharge or presence of which in the affected waters could reasonably be expected to interfere with those designated uses adopted by the State, as necessary to support such designated uses." Clearly, this approach goes beyond the requirements of the Clean Water Act and is therefore unnecessary. Additionally, this approach does not allow EPA to fulfill its duty (under Presidential Order 12866, the Unfunded Mandates Reform Act, and the Regulatory Flexibility Act) to assess the costs, benefits, and impacts of the rule on local government and small entities. While this may be the conservative approach for EPA, it places dischargers throughout the State at risk. As analytical detection limits improve, dischargers may find they are unable to achieve the criteria without costly end-of-pipe controls. But, by then, it will be too late for EPA to evaluate the costs and benefits of the criteria and consider alternative criteria. For these reasons, EPA should not adopt criteria for those constituents. If EPA does adopt criteria for those constituents, EPA should evaluate the costs and benefits of the criteria, as well as alternative criteria, using worst case assumptions (i.e., assume that discharge levels and ambient levels are at the detection limits).

Response to: CTR-043-008

See response to CTR-005-009.

Comment ID: CTR-044-009a
Comment Author: City of Woodland
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: C-28 Detection Limits
References:

Attachments? Y
CROSS REFERENCES E-01c
R
S

Comment: We have reviewed the proposed CTR and offer the following comments:

8. EPA should not adopt criteria for any pollutant where the method detection limit exceeds the objective and there is insufficient detectable, reliable data to determine if the pollutant could reasonably be expected to interfere with designated uses. The proposed rule includes criteria for a number of constituents where there is insufficient data to determine whether the discharge of such pollutants could reasonably be expected to interfere with the designated uses. EPA has chosen to promulgate criteria for these constituents even though section 303 (c)(2)(B) of the Clean Water Act requires States to adopt numeric criteria only for constituents "... the discharge or presence of which in the affected waters could reasonably be expected to interfere with those designated uses adopted by the State, as necessary to support such designated uses." Clearly, this approach goes beyond the requirements of the Clean Water Act and is therefore unnecessary. Additionally, this approach does not allow EPA to fulfill its duty (under Presidential Order 12866, the Unfunded Mandates Reform Act, and the Regulatory Flexibility Act) to assess the costs, benefits, and impacts of the rule on local government and small entities. While this may be the conservative approach for EPA, it places dischargers throughout the State at risk. As analytical detection limits improve, dischargers may find they are unable to achieve the criteria without costly end-of-pipe controls. But, by then, it will be too late for EPA to evaluate the costs and benefits of the criteria-and-consider alternative criteria. For these reasons, EPA should not adopt criteria for those constituents. If EPA does adopt criteria for those constituents, EPA should evaluate the costs and benefits of toxic criteria, as well as alternative criteria, using worst case assumptions (i.e., assume that discharge levels and ambient levels are at the detection limits).

Response to: CTR-044-009a

See response to CTR-005-009.

Comment ID: CTR-052-018
Comment Author: East Bay Dischargers Authority
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: C-28 Detection Limits
References: Letter CTR-052 incorporates by reference letters CTR-035 and CTR-054
Attachments? Y
CROSS REFERENCES

Comment: C. RECOMMENDATIONS FOR MODIFICATIONS TO THE CTR AND EA

Do not adopt criteria for any pollutant where the method detection limit exceeds the objective. As noted in the second paragraph of B.1, above, attainability issues will likely occur in the future as technology develops lower detection limits. There is no reason to adopt criteria for toxicants than cannot be properly measured. Once proper MDLs exist, each item can be reevaluated and the CTR (or the State Plans) can

be amended. Regulatory agencies must first determine if any of these toxicants are present in the water body to determine if an objective is warranted. The toxicants that should be removed from the CTR include the following: TCDD and equivalents, Hexachlorobenzene, Aldrin, Chlordane, 4,4'-DDT, 4,4'-DDE, 4,4'-DDD, Dieldrin, Endrin, Heptachlor Epoxide, Polychlorinated biphenyls (PCBs), and Toxaphene. There may be other toxicants where MDL is an issue for other POTWS.

Response to: CTR-052-018

See response to CTR-005-009.

Comment ID: CTR-054-009
Comment Author: Bay Area Dischargers Assoc.
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-28 Detection Limits
References:
Attachments? Y
CROSS REFERENCES

Comment: EPA should not adopt criteria for any pollutant where the method detection limit exceeds the objective and there is insufficient detectable, reliable data to determine if the pollutant could reasonably be expected to interfere with designated uses. The proposed rule includes criteria for a number of constituents where there is insufficient data to determine whether the discharge of such pollutants could reasonably be expected to interfere with the designated uses. EPA has chosen to promulgate criteria for these constituents even though section 303 (c)(2)(B) of the Clean Water Act requires States to adopt numeric criteria only for constituents "...the discharge or presence of which in the affected waters could reasonably be expected to interfere with those designated uses adopted by the State, as necessary to support such designated uses." Clearly, this "play-it-safe" approach goes beyond the requirements of the Clean Water Act and is therefore unnecessary. Moreover, this approach does not allow EPA to fulfill its duty (under Presidential Order 12866, the Unfunded Mandates Reform Act, and the Regulatory Flexibility Act) to assess the costs, benefits, and impacts of the rule on local government and small entities. While this may be the safe approach for EPA, it places dischargers throughout the State at risk. As analytical detection limits improve, dischargers may find they are unable to achieve the criteria without costly end-of-pipe controls. But, by then, it will be too late for EPA to evaluate the costs and benefits of the criteria and alternative criteria. For these reasons, EPA should not adopt criteria for those constituents. If EPA does adopt these criteria, EPA should, prior to that, evaluate the costs and benefits of the criteria, as well as alternative criteria, using worst case assumptions (i.e., assume that discharge levels and ambient levels are at the detection limits). The criteria in this category include the following: Aldrin, Alpha-BHC, Beta-BHC, Chlordane, 4,4'-DDD, 4,4'-DDT, 4,4'-DDE, Dieldrin, Endosulfan I, Endosulfan II, Endrin, Endrin Aldehyde, Heptachlor, Heptachlor Epoxide, Toxaphene, PCB-1016, PCB-1221, PCB-1232, PCB-1242, PCB-1248, PCB-1254, PCB-1260, TCCD equivalents Hexachlorobenzene, N-Nitroso-di-propylamine, Pentachlorophenol, Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoroanthene, Benzo(k)fluoroanthene, Chrysene, Dibenzo(a,h)anthracene, and Indeno(1,2,3-cd)pyrene (see Attachment 2).

Response to: CTR-054-009

See response to CTR-005-009.

Comment ID: CTR-056-014
Comment Author: East Bay Municipal Util. Dist.
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/22/97
Subject Matter Code: C-28 Detection Limits
References: Letter CTR-056 incorporates by reference letter CTR-054
Attachments? N
CROSS REFERENCES

Comment: Third, regarding the criteria being proposed for adoption in the draft CTR, EBMUD recommends that EPA should:

* NOT adopt criteria for any pollutant where the method detection limits (MDLs) for EPA required analytical procedures defined in 40CFR 136 exceeds the objective. In these cases there is insufficient detectable data to reliably determine if the pollutant of concern could reasonably be expected to interfere with attainment of designated uses. Furthermore, there is no assurance that technological advancements or improved methodology would permit MDLs to be further reduced before interim permit limits became final.

Response to: CTR-056-014

See response to CTR-005-009.

Comment ID: CTR-057-004
Comment Author: City of Los Angeles
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: C-28 Detection Limits
References:
Attachments? N
CROSS REFERENCES

Comment: Analytical Detection Limits

At the time the ISWP was undergoing public review, the City's analytical detection capabilities for trace organics were also being improved. For example, the detection limit for lindane (y-hexachlorocyclohexane) was lowered from 20 ng/L in 1989 to the present detection level of 4 ng/L. At the detection limit of 20 ng/L, the practical quantitation limit (PQL) was 100 ng/L, and lindane had not yet been detected in Tillman effluent. After the new NPDES permit was issued in 1991, the effluent limit for lindane was set at 19 ng/L. With the improvement in the lindane detection limit to 4 ng/L and

the PQL at 20 ng/L, the Tillman plant began to detect lindane consistently at levels of about 30 ng/L for the past 6 years. The plant thus unknowingly inherited a lindane compliance problem. Since the ISWP did not contain a provision for this situation to be addressed, the plant began to experience chronic lindane violations that continue to this day. As described previously in our comments on the EA, the probable cost for treating lindane was estimated to be approximately $40 million per year.

This unanticipated problem, driven by improvements made in analytical methods, should likewise be anticipated in the CTR for criteria that are proposed to be set below PQLs. One possible approach would be to designate these criteria as "target numeric criteria" that would serve as placeholders until such time that improvements to detection levels (which can always be assumed to be achievable) are realized. Practical criteria could be established in the interim based on current method detection levels, which would be adjusted downward to eventually reach the target criteria levels.

Another strong justification for setting appropriate detection limit-specific criteria is based on contingency economic considerations. When "hard" criteria are set below PQLs, no compliance problem at the level between the criteria and the PQLs can be identified and taken into consideration by the EA. The EPA's economic analysis is thus inherently flawed from this point of view, because detection limits effectively represent a level of ignorance (or lack of data) that the EA does not now address.

Response to: CTR-057-004

See response to CTR-005-009.

Comment ID: CTR-059-006a
Comment Author: Los Angeles County Sanit. Dist
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: C-28 Detection Limits
References: Letter CTR-059 incorporates by reference letter CTR-035
Attachments? Y
CROSS REFERENCES E-01c
S

Comment: Due to the time constraints of the comment period, we have focused our review and comments primarily on those criteria that we anticipate may cause compliance issues for one or more of the Sanitation Districts' WRPs (see below). Based on our initial review of the proposed rule, the Sanitation Districts recommend that adoption of some of the criteria be deferred. As explained in the attached comments, we believe that there are significant scientific issues regarding the human health criteria for several trihalomethanes that call into question the accuracy and appropriateness of the proposed criteria. In addition, we recommend that EPA defer adoption of those criteria that are below detection limits and that have not been demonstrated to be adversely affecting water quality or the attainment of designated uses on a water body-specific basis in California. In addition, we recommend that EPA not adopt criteria for effluent dependent waters, unless they have been adjusted to reflect the characteristics of this type of water body.

Criteria Below Detection Limits

We believe that there are fundamental problems with EPA's decision to adopt criteria that are below detection limits. This issue relates to EPA's statutory and regulatory obligations in establishing water quality criteria; namely, that EPA is subject to the same policies, procedures, analyses, and public participation requirements as States pursuant to 40 CFR section 131. These regulations require States to "review water quality data and information on discharges to specific water bodies where toxic pollutants may be adversely affecting water quality or the attainment of the designated water use or where the levels of toxic pollutants are at a level to warrant concern and must adopt criteria for such toxic pollutants applicable to the water body sufficient to protect the designated use." (40 CFR section 131.11) For criteria where the method detection limit exceeds the objective, there are inadequate data to determine if the pollutant could reasonably be expected to interfere with attainment of designated uses. We believe that because of the inability to detect these substances and the lack of monitoring information indicating water quality use impairment EPA has not been able to fulfill its obligations to conduct a water body-specific analysis of the need to promulgate criteria.(*1)

(*1)U.S. Environmental Protection Agency, Economic Analysis of the Proposed California Water Quality Toxics Rule, Office of Water (EPA-820-B-96-001, July 1997), p. 8-18.

Second, EPA has not fulfilled its obligations under the Unfunded Mandates Reform Act and Executive Order 12866 to analyze the costs and benefits of promulgating proposed criteria which cannot be detected or for which insufficient monitoring data are available.

Given these deficiencies, we recommend that EPA defer the adoption of criteria for constituents which are below detection limits until such time as EPA has demonstrated that the levels of toxic pollutants being discharged are at a level to warrant concern. As an alternative, EPA could defer to the State for promulgation of criteria for such compounds on a water body-specific basis as part of the State's continuous water quality planning process.

Response to: CTR-059-006a

See response to CTR-005-009.

Comment ID: CTR-060-010
Comment Author: San Diego Gas and Electric
Document Type: Electric Utility
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: C-28 Detection Limits
References:
Attachments? N
CROSS REFERENCES

Comment: PROVISIONS SDG&E DOES NOT SUPPORT

As described in the following comments SDG&E does not support the following provisions:

EPA needs to clarify its quantification discussion

The preamble to the rule (see 62 Fed. Reg. at 42,183, Col. 3) states that "EPA does believe, however, that the use of analytical detection limits are appropriate for determining compliance with National Pollutant Discharge Elimination System (NPDES) permit limits." SDG&E believes that the use of detection limits for this purpose is inappropriate. First, analytical results that are above the detection limit, but less than the quantitation limit only establish the presence of a analyte, not the actual concentration of the pollutant in the sample. Therefore, results below the quantitation limit do not provide a reliable value for determining compliance with a permit limit. Second, the document ("Strategy for the Regulation of Discharges of PHDDs and PHDFs from Pulp and Paper Mills to Waters of the U.S.") (the "Dioxin Strategy") that is referenced as the basis for using the detection limit for compliance determinations is from May 21, 1990. The Agency has expressed significant changes in its position since that time. For instance, EPA's guidance document dated March 20, 1996 ("Questions and Answers on the Great Lakes Water Quality Guidance-Set 2"; p. 28.) allows states to specify that analytical results below the level of quantification may be deemed to be in compliance with the established water quality-based effluent limitation. Additionally, a U.S. Court of Appeals for the District of Columbia Circuit ruling in 1997 held that:

A standard with which compliance cannot be assessed - and it is agreed that compliance with an effluent limitation set below the level of quantification simply cannot be assessed - is no standard at all for purposes of due process.

American Iron and Steel Institute v. U.S.EPA, 115 F.3d 979, 994 (1997) (AISI).

Rather than reference the Dioxin Strategy, EPA should reference its "Questions and Answers on the Great Lakes Water Quality Guidance-Set 2', dated March 20, 1996.

Response to: CTR-060-010

See response to CTR-005-009.

Comment ID: CTR-066-015b
Comment Author: Delta Diablo Sanitation Dist.
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: C-28 Detection Limits
References:
Attachments? N
CROSS REFERENCES E-01n

Comment: The areas with which we find concerns and the requested changes include the following:

A further problem with the analysis relates to the establishment of criteria that are below analytical detection. Our District finds 34 separate criteria that fall into this category. Lacking this credible data, it was not possible to conduct cost-benefit analyses or determine that any set of control measures would or could lead to compliance. This fundamental inability to utilize established rulemaking procedures mandates further work prior to the promulgation of the criteria.

Response to: CTR-066-015b

See response to CTR-005-009.

Comment ID: CTR-067-003
Comment Author: Ojai Valley Sanitary District
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: C-28 Detection Limits
References:
Attachments? N
CROSS REFERENCES

Comment: * OVSD recommends that EPA defer adoption of criteria contained in the draft CTR, which are typically below achievable detection limits. OVSD understands that EPA's rationale for setting criteria below achievable limits is based on EPA's determination of the criteria needed to adequately protect aquatic life and human health. However, if a pollutant has never been detected in OVSD's treatment plant receiving water, there is no basis for determining whether the chemical is adversely affecting water quality or the attainment of designated uses.

Response to: CTR-067-003

See response to CTR-005-009.

Comment ID: CTR-082-009b
Comment Author: City of Burbank
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/24/97
Subject Matter Code: C-28 Detection Limits
References:
Attachments? N
CROSS REFERENCES E-01n

Comment: The subject rule has a significant impact on our facility discharge and the citizens of the City. We therefore present the following comments for your consideration to re-open the comment period for this rule in order to facilitate a more complete review by public and in particular by those in the POTW community:

* A further problem with the analysis relates to the establishment of criteria that are below analytical detection. Lacking credible data, it was not possible to conduct cost-benefit analyses or determine that any set of control measures would or could lead to compliance. This fundamental inability to utilize established rulemaking procedures mandates further work prior to the promulgation of the criteria.

Response to: CTR-082-009b

See response to CTR-005-009.

Comment ID: CTR-085-018b
Comment Author: Camarillo Sanitary District
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/24/97
Subject Matter Code: C-28 Detection Limits
References:
Attachments? N
CROSS REFERENCES E-01n

Comment: The District supports the following positions of CASA and SCAP where changes need to be made in the proposed California Toxics Rule:

* A further problem with the economic analysis relates to the establishment of criteria that are below analytical detection. Lacking credible data, it was not possible to conduct cost analysis or determine that any set of control measures would or could lead to compliance. This fundamental inability to utilize established rule making procedures mandates further work to the promulgation of the criteria.

Response to: CTR-085-018b

See response to CTR-005-009.

Comment ID: CTR-089-003
Comment Author: Las Virgenes Mncpl Water Dist.
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/24/97
Subject Matter Code: C-28 Detection Limits
References:
Attachments? N
CROSS REFERENCES

Comment: While the draft regulations demonstrate clear progress on these and other issues, there remain some unresolved problems that could compromise our ability to serve our customers. We offer these comments in the hope of minimizing those potential impacts.

Analytical Detection Limits

Criteria for nine pollutants(*1) appear to have been set at levels lower than we can detect in either our laboratory or by commercial laboratories in our region, including those used by the Los Angeles

Regional Water Quality Control Board (RWQCB). While we consistently do not find these pollutants in our discharge, our detection capabilities are limited by the methods available to us for regular monitoring. Some of the proposed limits are so low that our equipment and analytical methods are incapable of detecting them, whether they are present or not. Thus, regardless of the quality of our discharge, there is no practical way to demonstrate compliance with the proposed limits for these nine pollutants.

The Los Angeles RWQCB, which must enforce these limits, is aware of this shortcoming, which applies to both the CTR and the closely-related National Toxics Rule (NTR). Recognizing the "catch-22" inherent to the proposed criteria, they have proposed an alternative, administrative method of compliance. While this alternative will allow us to comply with the CTR in a purely administrative sense, the. fact remains that we cannot actually demonstrate that our discharge meets the proposed criteria for these nine pollutants. This makes our district, the RWQCB and even the USEPA vulnerable to third-party lawsuits and creates a potential for negative public perception and bad press. As recent experience has shown(*2), advocates for public health and the environment are notoriously unforgiving of "administrative compliance". It is also unclear to us whether the administrative remedy proposed by the RWQCB is consistent with the State Implementation Policy for the CTR. This is something we could not determine in the 30 days provided to review the CTR.

(*1) Cadmium, copper, lead, mercury, selenium, silver, chloroform, chlorobromo-methane and dichlorobromomethane

(*2) During the public debates over the reauthorization of the Safe drinking Water Act, the Natural Resources Defense Council aired a number of television and press stories on the safety of public drinking water supplies, based in large part on selective interpretations of NPDES permit conditions and violations. The adoption of pollutant limits that cannot be verified exposes a vary large portion of the water and wastewater industry to allegations of health and environmental risks that can neither be proven or denied.

Response to: CTR-089-003

See response to CTR-005-009.

Comment ID: CTR-090-006
Comment Author: C&C of SF, Public Utl. Commis.
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-28 Detection Limits
References: Letter CTR-090 incorporates by reference letters CTR-035 and CTR-054
Attachments? Y
CROSS REFERENCES

Comment: Major Concerns About the Proposed Criteria and Rule

1. The Proposal is Based on Poor Data and Will Not Result in Better Water Quality for California. We

stated that our own attainability analysis and that of BADA show that San Francisco,) will be impacted by this rule. Unfortunately, due to the short time for review, the poor quality of data and basis for statements and assumptions in the proposal and the problem with detection limits we cannot specifically say what will be the cost to Sari Francisco. One analysis tell us it could be $2.3 million per year annualized costs and another analysis tells us it could be much more. We strongly recommend major revision to the proposal and the economic analysis before final promulgation for the following reasons:

For many of the pollutants the detection limit is above the proposed criteria and there is insufficient water quality data to determine if the constituent could reasonably be expected to interfere with designated uses;

Response to: CTR-090-006

See response to CTR-005-009.

Comment ID: CTR-090-011
Comment Author: C&C of SF, Public Utl. Commis.
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-28 Detection Limits
References: Letter CTR-090 incorporates by reference letters CTR-035 and CTR-054
Attachments? Y
CROSS REFERENCES

Comment: We recommend that EPA:

3. Not adopt criteria for any pollutants where the method detection limit exceeds the objective. Instead these can be trigger points or temporary limits. (see more discussion in attachments)

If these changes cannot be made in the rule, the rule should not be promulgated.

Response to: CTR-090-011

See responses to CTR-004-002 (Category E-01; Cost Analysis) and CTR-034-10b (Category C-21; Legal Concerns).

Comment ID: CTRH-001-020
Comment Author: Phil Bobel
Document Type: Public Hearing
State of Origin: CA
Represented Org: Tri-TAC
Document Date: 09/17/97
Subject Matter Code: C-28 Detection Limits
References:
Attachments? N

CROSS REFERENCES

Comment: The second point I'll make is about the numeric criteria themselves. There's a number of reasons that we will amplify on in the written comments why we don't believe all of those should be finalized as proposed.

And the example I'd like to deal with here is the group that are below the detection level, where you're proposing a criteria that's substantially below the current detection limit. Dioxin is an example; there are others.

It would be easy to say, and we will say, that because of that situation you weren't able to do an analysis -- an economic analysis, an attainable analysis. You weren't able to tell what impact this would actually have in the real world, because all of the standard setting was below where you had data.

And so how could you possibly know whether or not the standard could be achieved, when it would be achieved, or how much it would cost, or if it could be achieved? We believe that to be a pretty fundamental shortcoming of this whole business, when you're in that area below detection limits.

But there's even a more fundamental thing I'd like the EPA to think about for those pollutants. And that is: Just how are we going to proceed? Even if you manage to get your standard finalized as proposed, what would the next step be, where you've got a standard that's below the detection limits where we can take the normal next steps?

So I think we need more creativity in this area as well. It's an area where we're going to have to all put our heads together and say, "How do we approach the set of pollutants where the level of interest -- the levels at which we're interested in the pollutant is so very low?" Maybe there is some fundamentally different approach we need to take here, and maybe now is a good time to stop, brainstorm about it, do some creative thinking.

I don't think the old -- the TMDR translated to permit limits, that's not the future for those kind of pollutants. It ain't going to work. So now would be a good time to slow down, do some rethinking of how to go about proceeding on those.

So with those two points, I'll stop and thank you for your time.

(Five-minute recess in proceedings.)

Response to: CTRH-001-020

See response to CTR-005-009.

Comment ID: CTRH-001-028
Comment Author: Michelle Pla
Document Type: Public Hearing
State of Origin: CA
Represented Org: S.F. Public Utilities Com
Document Date: 09/17/97
Subject Matter Code: C-28 Detection Limits

References:
Attachments? N
CROSS REFERENCES

Comment: I think Phil had mentioned taking a look at the numeric criteria and things regarding the ones below detection limits. I would agree with that comment. And I think we need to again think outside the box about how we can deal with those issues.

Response to: CTRH-001-028

See response to CTR-005-009.

Comment ID: CTRH-001-038
Comment Author: Robert Reid
Document Type: Public Hearing
State of Origin: CA
Represented Org: CASA
Document Date: 09/17/97
Subject Matter Code: C-28 Detection Limits
References:
Attachments? N
CROSS REFERENCES

Comment: Third point, the basis for adopting a number of the specific criteria, we believe, is inadequate. These criteria fall into several categories. An example of one of these is the establishment of criteria that are below analytic detection limits, mentioned before, as was done for dioxin and a number of other parameters.

Lacking credible data it was not possible to conduct cost-benefit analysis or to determine that any set of control measures would or could lead to compliance. This fundamental inability to utilize established rulemaking procedures mandates further work prior to the establishment of criteria.

Response to: CTRH-001-038

See response to CTR-005-009.

Comment ID: CTRH-002-003
Comment Author: Chris Compton
Document Type: Public Hearing
State of Origin: CA
Represented Org: County of Orange
Document Date: 09/18/97
Subject Matter Code: C-28 Detection Limits
References:
Attachments? N
CROSS REFERENCES

Comment: Are the criteria appropriate?

We're concerned that the proposed rule contains criteria that have concentrations lower than the current acceptable laboratory detection limits. We recommend that no criteria be adopted which are below the method detection limits and that no criteria be adopted when insufficient reliable data exists to determine that pollutant could reasonably be expected to interfere with designated uses.

Response to: CTRH-002-003

See response to CTR-005-009.

Subject Matter Code: C-29 Bioaccumulation

Comment ID: CTR-026-002c
Comment Author: Cal. Department of Fish & Game
Document Type: State Government
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-29 Bioaccumulation
References:
Attachments? N
CROSS REFERENCES C-17b
C-27

Comment: 2. PARTIAL PROTECTION BY THE PROPOSED AQUATIC LIFE CRITERIA (FRESHWATER OR SALTWATER)

On page 42168, the proposed rule includes the following language: "EPA's guidelines are designed to derive criteria that protect aquatic communities by protecting most of the species and their uses most of the time." The CTR goes on to state that this approach results in only a "small possibility" of substantial overprotection or underprotection. Obviously, it is underprotection that is of concern to the DFG. The DFG has very serious concerns that criteria are being proposed that protect "most" of the species "most" of the time. We are aware of the protocols that require a minimum of eight specified families be used to develop criteria and that it may be difficult to determine criteria that are one hundred percent protective; however, this does not preclude the real possibility that certain designated uses and aquatic organisms will not be maintained, and or protected, as a result of the proposed criteria. The DFG is also concerned that criteria and protocols developed for specific constituents do not take into account the additive or synergistic effects that contaminant combination may have on aquatic organisms. Another factor that needs to be considered is bioaccumulation, as well as the effect this may have on organisms at higher trophic levels.

As trustee of all the fish and wildlife resources in the State, it is our agency's responsibility to ensure appropriate protection of all fish and wildlife resources, not just "most", and this includes adequate water quality standards. Due to our concerns and the very real possibility of underprotection to aquatic organisms and designated uses, the DFG believes that it may be appropriate to derive the criteria as proposed, and subsequently develop some additional safety factors for inclusion. It is our understanding that this approach was used in the formulation of water quality objectives for protection of aquatic organisms in the California Ocean Plan. In the short term , the safety factor could possibly be realized by the development of a comprehensivebiological monitoring program to determine whether the proposed criteria are indeed fully protective.

Response to: CTR-026-002c

The commentor is correct in stating that the values EPA is promulgating the California Toxics Rule for the protection of aquatic life are designed to protect most species most of the time. EPA understands the commentor's concern that this does not ensure protection of every species and that for some specific constituents additivity, synergism, and food web accumulation may not be considered. These limitations are a factor of the state of the science in modeling, aquatic toxicology, and chemistry rather than an

oversight by the Agency. In fact, the Agency's strategic planning and goals for the next five to ten years is to move towards criteria and guidance that address these very issues.

If the State believes there are critical species or designated uses that will not be protected by the proposed values, then a site specific criterion can be derived using the species recalculation procedure and the new criterion adopted.

With regards to the approach, the commentor suggests to increase the conservatism of the values by establishing safety factors, this is within the purview of the State. A State may always adopt a scientifically defensible value more stringent than that established by EPA. EPA has not used safety factors in promulgating these criteria, however, because EPA's methodology for deriving aquatic life criteria already incorporates rigorous data analysis procedures, including an extrapolation procedure, designed to protect a very high percentage of species, and to protect nearly all individuals even in species more sensitive than nearly all other species. This yields criteria that are adequately protective of the aquatic life uses designated by the state. Though they have limitations of their own, EPA is very supportive of States establishing biomonitoring programs. Comprehensive biomonitoring programs provide information about the health of aquatic systems that simply cannot be obtained through toxicity testing and chemistry.

Comment ID: CTR-029-002f
Comment Author: Center for Marine Conservation
Document Type: Environmental Group
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-29 Bioaccumulation
References:
Attachments? N
CROSS REFERENCES C-17a
C-17b
A
C-22
C-27

Comment: The Center for Marine Conservation (CMC) is a nationwide, nonprofit advocacy group dedicated to the conservation and enhancement of coastal and ocean life and resources. CMC submits these comments on behalf of its 16,000 members in California and over 120,000 members nationwide.

CMC applauds EPA's efforts to bring California into compliance with the Clean Water Act 303(c)(2)(B). Implementing numeric criteria that will protect the beneficial uses of California's waters is of great importance to the health of coastal and marine ecosystems, and so to CMC and its members. The reliance in many areas of the state on narrative criteria threatens the health of most of the state's waters, thereby impacting both human health and the health of the state's economy that relies on clean water.

While CMC strongly supports the swift adoption of an Enclosed Bays and Estuaries Plan and an Inland Surface Waters Plan that contain numeric criteria for toxic pollutants, CMC also is concerned that many of the specific criteria contained in the proposed rule are weaker than those contained in published guidance. CMC also believes that the proposed rule can better protect certain subpopulations from harm

caused by consumption of contaminated fish and shellfish. Finally, CMC is concerned that the economic analysis of the proposed rule over-emphasizes costs and under-reports the many benefits of improving water. quality throughout the state. These three points are reviewed below.

In Light of Significant Threats to Water Quality, the Proposed Rule Should Contain the Most Stringent Criteria That Are Scientifically Defensible

Many of the criteria in the proposed rule are weaker than criteria in current published guidance. The proposed rule summarily states that the difference between the proposed, weaker criteria and the published guidance documents is "insignificant"(*4); however, in light of the current contamination problems in California's waters today, any move backwards, particularly when spread out over the state, must be viewed as significant.

Any weakening of the criteria should be subject to close scrutiny and the most rigorous analysis, which the proposed rule itself does not do. Among other things, the criteria in the proposed rule may be underprotective because additive and synergistic effects were not considered; and because the effects on wildlife, which can be particularly significant for bioaccumulative chemicals, were ignored.(*5) In addition, the proposed rule contains dissolved rather than total recoverable metals criteria, despite the fact that EPA acknowledges that total recoverable metals criteria are "scientifically defensible" and that they are more protective than dissolved metals criteria because they consider "sediment, food-chain effects and other fate-related issues," rather than simply water column impacts.(*6)

Clean Water Act section 303(c)(2)(B) mandates the development of numeric criteria that will "support such designated uses [that are adopted by the State]." The statistics available on the health of the state's waters indicates that their use already is significantly threatened or impaired by toxics. The strongest criteria supportable by science are necessary to reverse this trend and begin to restore the state's waters.

(*4) 62 Fed. Reg. 42159, 42168 (Aug. 5, 1997).

(*5) Id. at 42168.

(*6) Id. at 42172.

Response to: CTR-029-002f

Economic Analysis: I can't respond to this, not my bailiwick.

As the commentor states, the specific numbers proposed in the rule are not necessarily the same as those in existing criteria documents. The Agency disagrees with the commentor's suggestion that because they are different they are less protective. The Agency believes the values proposed in the rule are sufficiently stringent to protect the designated uses of the waters of California. The proposed values meet the aquatic life criteria derivation requirements and have undergone Agency review and public comment.

EPA understands the commentor's concern that this does not ensure protection of every species and that for some specific constituents additivity, synergism, and bioaccumulation may not be considered. These limitations are a factor of the state of the science in modeling, aquatic toxicology, and chemistry rather than an oversight by the Agency. In fact, the Agency's strategic planning and goals for the next five to ten years is to move towards criteria and guidance that address these very issues.

The metals criteria proposed in the rule are for the dissolved concentration rather than the total recoverable concentration. This is consistent with Agency policy and scientific investigations that the dissolved form of metals is that which most closely reflects the bioavailable fraction of metals in the water column. From modeling and research that has been conducted it is understood that if the dissolved criterion is met in the water column then there should not be metal toxicity in the sediment because the sediment interstitial water cannot contain more metal than the overlying water column (Ankley et al., 1996). This does not preclude small amounts of bioaccumulation of metal but to date we have not been able to demonstrate that the bioaccumulation translates into any toxic effect on higher level consumers (Lee et al., 1998; Hare et al, 1994; Hansen et al., 1996). In other words, the data so far indicates that increased body burden does not translate into increased toxicity.

The dissolved concentration must be translated into a permit limitation which is based on total recoverable. This ensures that acceptable total mass loadings are not exceeded and to ensure that the potential transformation of pollutants in effluents upon entering and mixing with the receiving water are accounted for.. In the very near future, the Agency will be publishing sediment guidelines for metals. These guidelines will compliment the water column values to ensure metals are holistically assessed and addressed.

Ankley, G. T., D. M. Di Toro, et al. (1996). "Technical basis and proposal for deriving sediment quality criteria for metals." Environ. Tox. Chem.15(12): 2056-2066.

Hansen, D.J., J.D. Mahony, W.J. Berry, S. Benyi, J. Corbin, S. Pratt and M.B. Able. 1996. Chronic effect of cadmium in sediments on colonization by benthic marine organisms: An evaluation of the role of interstitial cadmium and acid volatile sulfide in biological availability. Environ. Toxicol. Chem 15:2136-2137.

Hare, L., R. Carignan and M.A. Huerta-Diaz. 1994. A field experimental study of metal toxicity and accumulation by benthic invertebrates; implication for the acid volatile sulfide (AVS) model. Limnol. Oceanogr. 39:1653-1668.

Lee, B.-G., H.-S. Jeon, S.N. Luoma, J.-S. Yi, C.-H. Koh. 1998. Effects of AVS (Acid Volatile Sulfide) on the bioaccumulation of Cd, Ni, and Zn in bivalves and polychaetes. Abstract: 19th Annual Meeting of the Society of Environmental Toxicology and Chemistry. Charlotte, NC.

Comment ID: CTR-097-002
Comment Author: Mark Shaw
Document Type: Citizen
State of Origin: CA
Represented Org:
Document Date: 10/03/97
Subject Matter Code: C-29 Bioaccumulation
References:
Attachments? N
CROSS REFERENCES

Comment: The standards are too weak in that they fail to adequately account for the bioaccumulation of mercury in fish tissue. Studies of the Great Lakes indicate that such biaccumulation is four to twenty

times greater than what the EPA projects for California.

Response to: CTR-097-002

The agency disagrees that the proposed criteria fail to adequately account for the bioaccumulation of mercury in fish tissue. The 1980 hg criterion, which is being used nationally until a new national HH criterion is derived, does use what is in effect a BAF (practical bioconcentration factors: PBCF) to account for biomagnification. As stated in the Preamble, the HH criterion is based on an average of "practical bioconcentration factors" for mercury as described in Ambient Water Quality Criteria for Mercury (EPA 440/5-80-058; Pages C-100-101). Because these PCBFs are derived from average mercury residues from commonly consumed aquatic organisms exposed in various water bodies (lakes, rivers, estuaries, oceans) and overall average total mercury concentrations in water, they incorporate potential mercury uptake indirectly from the food chain and directly from water.

Under Section 304 (a) of the Clean Water Act, EPA is required to establish National recommended water quality criteria. As such, the criteria must be applicable across all regions of the United States and, though considered protective of aquatic organisms, are based on central tendencies rather than solely site or State-specific data. However, if the State believe there are critical species or designated uses that may not be sufficiently protected by the National-based promulgated values, a site-specific criterion can be derived using appropriate data and adopted.

Please refer to the response for CTR-002-076 for additional discussion regarding bioaccumulation.

Comment ID: CTR-099-003
Comment Author: Emil A. Lawton, Ph.D.
Document Type: Citizen
State of Origin: CA
Represented Org:
Document Date: 10/03/97
Subject Matter Code: C-29 Bioaccumulation
References:
Attachments? N
CROSS REFERENCES

Comment: Then, too, the levels for dioxin and mercury are materials that bioaccumulate. You should know that each consumption up the food chain biomagnifies by a factor of 10. Where are your scientists?

Response to: CTR-099-003

See response to CTR-097-002.

Subject Matter Code: C-30 Narrative Criteria

Comment ID: CTR-038-010
Comment Author: Sonoma County Water Agency
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-30 Narrative Criteria
References:
Attachments? Y
CROSS REFERENCES

Comment: 9. EPA should delete recommendations that permit authorities utilize EPA or other criteria that have not been adopted as a part of the CTR as a basis for permit limits under the narrative toxicity criteria for toxics. The Preamble in E.3.b and the rule in footnote n to the criteria listed in 131.38(b)(2) recommend that the permitting authority base permit limits on criteria that are not being adopted as a part of the rule. This is not only unnecessary and inappropriate, but, in essence, it effectively constitutes adoption of those non-CTR criteria without considering costs and benefits or otherwise complying with Federal law and regulations.

Response to: CTR-038-010

EPA is requiring nothing in the CTR in the language cited by the commenter. For pollutants for which no criteria are promulgated as part of this rule, EPA is simply restating that according to existing law under the CWA, not affected by this rule, that permit writers are required to implement the narrative criteria, and that for arsenic, EPA recommends, but does not require, that permit writers may use the value California established for arsenic. EPA is not promulgating a criterion for arsenic in today's rule pending a review of the risk assessment for arsenic. Because the rule is simply restating what is required under existing law, these statements are not a cost of the CTR, but of prior existing law under the CWA and its implementing regulations.

Comment ID: CTR-040-018c
Comment Author: County of Sacramento Water Div
Document Type: Storm Water Auth.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-30 Narrative Criteria
References: Letter CTR-040 incorporates by reference letter CTR-027
Attachments? Y
CROSS REFERENCES C-26
G-03
C-24e

Comment: V. Recommendation: Delete all provisions in the Rule that preempt the States flexibility in permitting. The Rule provides specific direction on the adoption of averaging periods, low flow values,

effluent limitations for criteria not being adopted as a part of the Rule, and that the aquatic life criteria be applied to all waters irrespective of designated use, etc..

* The Preamble and the Rule's economic analysis make a point that the State has considerable flexibility in establishing permit limitations. In making, that point, EPA implies that the State may implement the criteria in a manner that would have little or no adverse economic impact on dischargers.

* However, the Rule contains a number of implementation provisions that are not required under Section 303(c)(2)(B), but serve to preempt the State's flexibility. These provisions include, but are not necessarily limited to the adoption of averaging periods and low flow values, directives regarding the establishment of effluent limitations for criteria that are not being adopted as a part of the Rule, and application of the aquatic life criteria to all waters irrespective of the designated use.

* Not only does EPA not have a duty to adopt these provisions, but also the provisions are more restrictive than those required by the CWA or EPA regulations, They clearly restrict the State's flexibility. In fact, other states have adopted, and EPA has approved, implementation provisions (e.g., averaging periods and low flow values) which are less restrictive.

* For these reasons, EPA should remove all such implementation provisions from the Rule.

Response to: CTR-040-018c

EPA has adopted recommendations for averaging periods and low flow values because these are intrinsic to ensuring that the numeric values are protective of the designated use. These factors are part of the ambient condition necessary, see preamble to the proposed CTR and Technical Support Document for Water Quality Based Toxics Control, U.S. EPA 1991, Section 2.3, and Appendix D.

The commenter asserts, but does not provide examples of situations where EPA has approved averaging periods and low flow values that are less restrictive than those incorporated into the final rule. Without specific examples provided, it is difficult for EPA to analyze any distinctions between these situations and the current rule. As a general matter, however, EPA uses the averaging period and low flow value when it promulgates criteria as representing EPA's best scientific judgement about these factors given all the uncertainties in deriving these factors. See Technical Support Document for Water Quality Based Toxics Control, U.S. EPA 1991, Section 2.3, and Appendix D. If a particular state elected to vary from EPA's recommendations, EPA would evaluate the basis presented and the particular facts of a given situation, and might render a different judgement. The commenter provided no specific critiques of the values used or information upon which EPA should base a decision to adjust these factors, and thus EPA has not changed them in response to comment.

Comment ID: CTR-041-011
Comment Author: Sacramento Reg Cnty Sanit Dist
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-30 Narrative Criteria
References:
Attachments? N

CROSS REFERENCES

Comment: 6. Permit Authorities' Utilization of Criteria Not Adopted as Part of CTR

EPA should delete recommendations that permit authorities utilize EPA or other criteria that have not been adopted as part of the CTR as a basis for permit limits under the narrative toxicity criteria for toxics. The Preamble in E.3.b and the rule in footnote n to the criteria listed in 131.38(b)(2) recommend that the permitting authority base permit limits on criteria that are not being adopted as a part of the rule. This is not only unnecessary and inappropriate, but, in essence, it constitutes adoption of those non-CTR criteria without considering costs and benefits or otherwise complying with Federal law and regulations.

Response to: CTR-041-011

See response to CTR-038-010.

Comment ID: CTR-043-009
Comment Author: City of Vacaville
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: C-30 Narrative Criteria
References:
Attachments? Y
CROSS REFERENCES

Comment: 9. EPA should delete recommendations that permit authorities utilize EPA or other criteria that have not been adopted as a part of the CTR as a basis for permit limits under the narrative toxicity criteria for toxics. The Preamble in E.3.b and the rule in footnote n to the criteria listed in 131.38(b)(2) recommend that the permitting authority base permit limits on criteria that are not being adopted as a part of the rule. This is not only unnecessary and inappropriate, but, in essence, it constitutes adoption of those non-CTR criteria without considering costs and benefits and without complying with applicable Federal laws and regulations.

Response to: CTR-043-009

See response to CTR-038-010.

Comment ID: CTR-044-010
Comment Author: City of Woodland
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: C-30 Narrative Criteria
References:

Attachments? Y
CROSS REFERENCES

Comment: We have reviewed the proposed CTR and offer the following comments:

9. EPA should delete recommendations that permit authorities utilize EPA or other criteria that have not been adopted as a part of the CTR as a basis for permit limits under the narrative toxicity criteria for toxics. The Preamble in E.3.b and the rule in footnote n to the criteria listed in 131.38(b)(2) recommend that the permitting authority base permit limits on criteria that are not being adopted as a part of the rule. This is not only unnecessary and inappropriate, but, in essence, it constitutes adoption of those non-CTR criteria without considering costs and benefits and without complying with applicable Federal laws and regulations.

Response to: CTR-044-010

See response to CTR-038-010.

Comment ID: CTR-053-002
Comment Author: Heal the Bay
Document Type: Environmental Group
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: C-30 Narrative Criteria
References: Letter CTR-053 incorporates by reference letter 6 and the comments on Dioxin, copper, and the compliance schedule from letter CTR-002
Attachments? N
CROSS REFERENCES

Comment: One of Heal the Bay's principle activities is providing comments on NPDES permits for inland, bay and estuary discharges. For years, we have relied on narrative standards and the regional Basin Plan requirements as tools to ensure that inland, bay and estuary discharges were not impacting the beneficial uses of the receiving waters. These tools have proven inadequate for achieving the desired goal of beneficial use protection. This is why numeric criteria, like those in the proposed California Toxics Rule, are so important. The primary obstacle to implementation of the State's ISW/EB&E Plan is the requirement for the State to perform an analysis under the California Environmental Quality Act ("CEQA") for any numeric criteria adopted that is more stringent than Federal criteria. The SWRCB does not have the resources to perform these analysis for the numeric criteria recommended by the task force groups. Therefore, to move implementation of the plans forward, it was agreed that EPA would revise the California Toxics Rule and, simultaneously, the State would develop the implementation policy for the ISW/EB&E Plans. We support this effort because we strongly believe that these plans must be implemented sooner, rather than later, in order to improve impaired water quality throughout California. Therefore, we agree with the California Toxics Rule as it is proposed and do not include detailed comment on the specific criteria for individual pollutants.

Response to: CTR-053-002

EPA appreciates the commenter's support of the proposed rule.

Comment ID: CTR-054-010
Comment Author: Bay Area Dischargers Assoc.
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-30 Narrative Criteria
References:
Attachments? Y
CROSS REFERENCES

Comment: EPA should delete recommendations that permit authorities utilize EPA or other criteria that have not been adopted as a part of the CTR as a basis for permit limits under the narrative toxicity criteria for toxics. The Preamble in E.3.b and the rule in footnote n to the criteria listed in 131.38(b)(2) recommend that the permitting authority base permit limits on criteria that are not being adopted as a part of the rule. This is not only unnecessary and inappropriate, but, in essence, it constitutes adoption of those non-CTR criteria without considering costs and benefits or otherwise complying with Federal law and regulations.

Response to: CTR-054-010

See response to CTR-038-010.

Comment ID: CTR-061-007
Comment Author: G. Fred Lee & Associates
Document Type: Academia
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: C-30 Narrative Criteria
References:
Attachments? Y
CROSS REFERENCES

Comment: Page 42162, third column, first full paragraph, states,

"Criteria documents, along with any more recent scientific data and information, may be used to interpret a state's narrative criterion pursuant to 40 CFR 122.44(d)(1)(vi), and serve to establish State and EPA permit discharge limits pursuant to CWA section 301(b)(1)(c) which requires NPDES permits to contain limitations required to implement any applicable water quality standard established in the CWA."

This approach is technically invalid since it tends to over-regulate many of the chemical constituents for which water quality criteria exist and ignores the unregulated or under-regulated constituents.

Response to: CTR-061-007

See response to CTR-038-010.

Subject Matter Code: D Preamble Editorial Comments

Comment ID: CTR-022-001
Comment Author: SWRCB
Document Type: State Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: D Preamble Editorial Comments
References:
Attachments? N
CROSS REFERENCES

Comment: Thank you for the opportunity to comment on the U.S. Environmental Protection Agency's (U.S. EPA) proposed California Toxic Rule (CTR). The State Water Resources Control Board (SWRCB) staff would like to recognize U.S. EPA's tremendous effort in producing the CTR. The SWCB staff are providing you with the following comments:

Page 42160: "Entities discharging pollutants to waters of the United States in California could be indirectly affected by this rulemaking....." Because the Clean Water Act requires that all NPDES permits include limits on discharges that are necessary to meet water quality standards, it appears that entities, such as industry and municipal discharges, could be directly affected by this rulemaking.

Response to: CTR-022-001

EPA disagrees with the commenter that the proposed CTR will directly impact municipal and industrial dischargers. The CTR promulgates water quality criteria which, by themselves, do not impact anyone. It is only when the State of California implements the water quality criteria through its water quality programs that impacts may occur. Different implementation methods can have significantly different impacts. Therefore, EPA's statement that the rule may indirectly impact entities discharging to waters of the U.S. in California is correct.

Comment ID: CTR-022-002
Comment Author: SWRCB
Document Type: State Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: D Preamble Editorial Comments
References:
Attachments? N
CROSS REFERENCES

Comment: Thank you for the opportunity to comment on the U.S. Environmental Protection Agency's (U.S. EPA) proposed California Toxic Rule (CTR). The State Water Resources Control Board (SWRCB) staff would like to recognize U.S. EPA's tremendous effort in producing the CTR. The SWRCB staff are providing you with the following comments:

Page 42163: 3rd column under C. State of California Actions ...last paragraph... "...the Inland Surface Water Plan (ISWP), the Enclosed Bay and Estuary Plan..." should be edited to read ... the Inland Surface Waters Plan (ISWP), the Enclosed Bays and Estuaries Plan.

Response to: CTR-022-002

EPA agrees with the commenter that the name of the State of California's implementation plans, which were invalidated by a State Court ruling, are the "Inland Surface Waters Plan" and the "Enclosed Bays and Estuaries Plan." EPA has made this correction in the preamble to the final rule.

Comment ID: CTR-022-004
Comment Author: SWRCB
Document Type: State Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: D Preamble Editorial Comments
References:
Attachments? N
CROSS REFERENCES

Comment: Thank you for the opportunity to comment on the U.S. Environmental Protection Agency's (U.S. EPA) proposed California Toxic Rule (CTR). The State Water Resources Control Board (SWRCB) staff would like to recognize U.S. EPA's tremendous effort in producing the CTR. The SWRCB staff are providing you with the following comments:

Page 42207: Proposed rule, Section 131.38(d)(1): Please note that the basin plans, in general, identify waters subject to water quality standards in the chapters on beneficial uses. Many basin plans do not specify water quality objectives for the priority toxic pollutants.

Please reword the second and third sentences of this subsection to read:

"These criteria apply to waters identified in the Basin Plans. More particularly, these criteria apply to waters identified in the Basin Plan chapters designating beneficial uses for waters within the region."

Response to: CTR-022-004

EPA agrees with the commenter that the second and third sentences in section 131.38(d)(1) of the rule may be confusing. We have considered your suggestion and modified the language accordingly.

Comment ID: CTR-035-013
Comment Author: Tri-TAC/CASA
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:

Document Date: 09/25/97
Subject Matter Code: D Preamble Editorial Comments
References:
Attachments? N
CROSS REFERENCES

Comment: p. 42167 -- No Undue or Inappropriate Burden on the State of California or Its Dischargers

The preamble states that "Today's proposed rule would not impose any undue or inappropriate burden on the State of California or its dischargers." We must disagree with this statement. While EPA's intent with this statement is perhaps to compare California to other States where water quality criteria for toxic pollutants have already been adopted, EPA's own analysis determines that the rule will cost from $15 to 87 million per year to implement which we believe to be a significant underestimate due to numerous uncertainties regarding whole categories of dischargers (i.e. nonpoint sources) and policies for implementation of the rule. Thus, it is both inaccurate and inappropriate for EPA to make the judgement that the rule will not impose an undue or inappropriate burden on the State or its dischargers.

Response to: CTR-035-013

EPA acknowledges the comment concerning the statement in the preamble that the CTR will not impose any undue or inappropriate burden on the State of California and its dischargers. EPA disagrees with the commenter that the statement in the preamble is inappropriate and inaccurate. The CTR promulgates water quality criteria for California that are required by the Clean Water Act under section 303(C)(2)(b), and that had been previously adopted by the State of California and approved by EPA. The State's criteria were rescinded after a State Court found that they had not been adopted in compliance with State law. Every other state in the nation, except California, is in substantial compliance with section 303(C)(2)(b) of the Clean Water Act. Thus, imposing these criteria on the State of California merely puts the State back into the position that it had been in, and into the same position as all other states in the nation. Thus, the criteria do not impose any undue or inappropriate burden.

With respect to the comment that the economic analysis for the proposed rule indicated that the rule would cost between 15 and 87 million dollars per year to implement, EPA acknowledges that the economic analysis indicates that some cost will be associated with how the State implements the CTR criteria into the NPDES permit program. Benefits, however, will also accrue. These costs are not significant pursuant to the language in Executive Order 12866, under which the economic analysis was completed. (See the discussion of costs and benefits in the preamble to the final rule under Executive Order 12866.)

Comment ID: CTR-035-015
Comment Author: Tri-TAC/CASA
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: D Preamble Editorial Comments
References:
Attachments? N
CROSS REFERENCES

Comment: pp. 42167-42181 -- Revised / Updated 304(a) Criteria

Please provide a table in the Preamble containing each criterion, indicating each parameter that has been changed since the promulgation in 1992 of the National Toxics Rule, references stating what documents or sources contain the pertinent information and when the changes were made, and directions for obtaining the documentation. This table should incorporate the information in the California Toxics Rule Administrative Record Matrix for human health criteria.

Response to: CTR-035-015

EPA acknowledges the comment that EPA provide a table in the preamble containing each criterion indicating how each had been changed since the National Toxics Rule, including references, documents, sources of information, when any changes were made, and directions for obtaining the information. For the aquatic life criteria, this information was provided in the preamble to the proposed rule and in the Administrative Record, and is again provided in the preamble to the final rule and in the Administrative Record. The preambles discuss and thoroughly explains all significant changes in aquatic life criteria from the National Toxics Rule. The Administrative Record contains all of the water quality criteria documents which explain how each aquatic life criterion was calculated, as well as the document entitled "The 1995 Updates: Water Quality Criteria Documents for the Protection of Aquatic Life in Ambient Water," dated September 1996. This document explains the basis of several recently updated aquatic life criteria.

The preamble also discusses and thoroughly explains several significant changes in human health criteria from the National Toxics Rule. The Administrative Record contains a document entitled The California Toxics Rule Administrative Record Matrix which contains information on the basis of each human health criterion promulgated in the CTR.

The information the commenter is requesting is contained in the preambles and the Administrative Record.

Comment ID: CTR-036-012
Comment Author: County of Orange
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: D Preamble Editorial Comments
References: Letter CTR-036 incorporates by reference letters CTR-013, CTR-018, CTR-031, CTR-034 and CTR-040
Attachments? N
CROSS REFERENCES

Comment: Equitable Considerations in Proposing the CTR

EPA's promulgation of the California Toxics Rule is unwarranted since California was in the process of revising the Inland Surface Waters Plan and the Enclosed Bays and Estuaries Plan that were overturned by the Superior Court in 1994. California and its water resources would be better served and better

protected by allowing the State Water Board to continue developing its statewide water quality plans unburdened by the strictures of the proposed rule.

EPA's purpose to 'help restore equity among the states; 62 Fed. Reg. 42161, also appears unfounded since the proposed rule differs in a number of ways from the criteria in the National Toxics Rule.

Response to: CTR-036-012

EPA disagrees with the comment that the CTR is unwarranted since California is in the process of revising its statewide plans, and that the State's water resources would be better served by allowing the State to continue its plans unburdened by the strictures of the proposed rule. The State's plans are not being revised; the State's plans are being completely redrafted and repromulgated by the State in compliance with State law, which the State failed to do when it adopted its plans in 1991. Thus, currently the State does not have any statewide plans in place for surface waters or enclosed bays and estuaries to revise. The rescinded plans contained, and thus the State currently lacks, both a comprehensive set of water quality objectives for priority toxic pollutants, as required by the Clean Water Act section 303(C)(2)(b), and implementation plans to implement the resulting water quality standards.

The CTR does not burden the State in any way. The State is intending to readopt its plans in two phases: the first phase will be implementation procedures and the second phase will include water quality objectives for priority toxic pollutants. In fact, the CTR will help restore a comprehensive water quality program to the State of California sooner than the completion of the two phases of the State's plans, since the State will soon complete phase one of its readoption, and EPA has completed its promulgation of the CTR. The CTR, which will create numeric water quality standards, and phase one of the State's plans, which will create implementation, will allow the State to effectively implement numeric water quality standards for priority toxic pollutants for inland surface waters and enclosed bays and estuaries as soon as the State completes phase one of its repromulgation.

When the State completes phase two, the readoption of its water quality objectives, EPA will stay the CTR after its review and approval of the statewide plan. Thus, the CTR does not hinder the State in any way, and in fact helps the State by allowing it to implement numeric water quality standards for toxic pollutants sooner than if EPA had not promulgated the CTR.

The commenter also noted that it appeared that EPA's stated purpose in the preamble to the proposed CTR, that the CTR would restore equity among the states, was unfounded because the proposed rule differed from the National Toxics Rule. EPA disagrees with this comment. The National Toxics Rule applied to several states that were not in substantial compliance with the Clean Water Act at 303(C)(2)(b) at that time. When it was promulgated, all states except those in the National Toxics Rule were in substantial compliance with the Clean Water Act water quality provisions. The State of California was required to rescind its water quality control plans after the finalization of the National Toxics Rule; thus, California became the only state in the nation that was in substantial noncompliance. Thus, the CTR restores equity among the states by restoring numeric water quality standards for toxics to California, as all other states in the nation.

The commenter also noted that the CTR differed in a number of substantial ways from the National Toxics Rule. EPA disagrees with this comment. The criteria in the CTR reflect updated information and do not substantially differ from the criteria in the National Toxics Rule. The CTR criteria reflect EPA's most recent water quality criteria guidance issued under Clean Water Act section 304(a). The preamble discusses these changes in detail. In addition, the Clean Water Act requires states to update their water

quality criteria every three years, and incorporate EPA's most recent 304(a) criteria guidance where appropriate (where a state has not adopted and/or EPA has not approved, different, scientifically-based water quality criteria). Thus, the states are required to incorporate these updates into their own water quality program

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Comment ID: CTR-052-004
Comment Author: East Bay Dischargers Authority
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: D Preamble Editorial Comments
References: Letter CTR-052 incorporates by reference letters CTR-035 and CTR-054
Attachments? Y
CROSS REFERENCES

Comment: 1 . EPA has greatly understated the potential impacts of the CTR to the extent that statements in the preamble are completely misleading. On page 42160-1 of the Federal Register, EPA states:

"Potentially Affected Entities: Citizens concerned with water quality in California may be interested in this rulemaking. Entities discharging pollutants to waters of the United States in California could be indirectly affected by this rulemaking since water quality criteria are used to create water quality standards which in turn are used in developing National Pollutant Discharge Elimination System (NPDES) permit limits. Categories and entities which may ultimately be indirectly affected include:

CATEGORY --- Examples of potentially indirectly affected entities
---------- INDUSTRY --- Industries discharging pollutants to surface waters in California.

MUNICIPALITIES --- Publicly-owned treatment works discharging pollutants to surface waters in California.

This table is not intended to be exhaustive, but rather provides a guide for readers regarding NPDES regulated entities likely to be indirectly affected by this action. This table lists the types of entities that EPA is now aware could potentially be indirectly affected by this action." (emphasis added)

Based on the analysis prepared by BADA, CASA, and Tri-TAC, EPA's own acknowledgement that the CTR is primarily directed toward NPDES permit holders, the above statement is extremely misleading. EPA should be more forthcoming with information that is published in the Federal Register. If the CTR is promulgated in its current form, then the Authority recommends that the above statement be amended to read as follows:

"Affected Entities: Citizens concerned with water quality in California may be interested in this rulemaking. Entities discharging pollutants to waters of the United States in California will be directly affected by this rulemaking since water quality criteria are used to create water quality standards which in turn are used in developing National Pollutant Discharge Elimination System (NPDES) permit limits; Categories and entities which will be directly affected include:

CATEGORY --- Examples of directly affected entities ---------- INDUSTRY --- Industries discharging pollutants to surface waters in California.

MUNICIPALITIES --- Publicly-owned treatment works discharging pollutants to surface waters in California.

OTHER INDUSTRIES AND COMMERCIAL ESTABLISHMENTS --- Industries and commercial establishments discharging pollutants to publicly-owned treatment works.

MEMBERS OF THE PUBLIC --- Members of the public that pay fees to publicly-owned treatment works for wastewater collection and treatment services and/or buy products produced by the entities described as "Industry" or "Other industries and commercial establishments", above.

This table provides a guide for readers regarding NPDES regulated entities that will be directly affected by this action. This table lists the types of entities that EPA is aware will be directly affected by this action."

Response to: CTR-052-004

In response to the comment that the CTR preamble is misleading when it states that municipalities and industries may be indirectly impacted by the rule, see response to CTR-022-001.

Comment ID: CTR-061-015
Comment Author: G. Fred Lee & Associates
Document Type: Academia
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: D Preamble Editorial Comments
References:
Attachments? Y
CROSS REFERENCES

Comment: Page 42182, second column, first paragraph, uses the term "valence states" for the two forms of Cr. A more appropriate term is "oxidation state" for elements with different numbers ofelectrons in their outer shell. In chemistry, "valence" as a number has a number of different meanings which are not the same as those used in this context.

Response to: CTR-061-015

EPA disagrees with the comment that it has used the term "valance state" incorrectly with respect to its references to Chromium, and that the correct term should be "oxidation state." EPA believes the terms are interchangeable as used in this context; both terms refer to the ability of an atom to combine with other atoms.

Subject Matter Code: E-01 Cost Analysis

Comment ID: CTR-040-020
Comment Author: County of Sacramento Water Div
Document Type: Storm Water Auth.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-01 Cost Analysis
References: Letter CTR-040 incorporates by reference letter CTR-027
Attachments? Y
CROSS REFERENCES M Re-Open Comment Period

Comment: THE RULE SHOULD BE RE-PROPOSED

The above concerns are fundamental and the recommended modifications necessary to comply with applicable laws and regulations are substantial. For these reasons, we recommend that EPA modify the Rule to account for these and other comments and then re-propose the Rule.

Response to: CTR-040-020

For analysis of the final CTR, EPA updated its Economic Analysis to reflect the most recent data and information for each sample facility and also increased the sample size for minor facilities. Based on this revised analysis, EPA estimated that minor POTWs will incur costs of approximately $5,000 per facility per year under the low cost scenario and $7,800 per facility per year under the high cost scenario. See also response to CTR-058-018.

In response to the comment requesting that EPA re-propose and re-open the public comment period, please refer to response to CTR-005-010.

Comment ID: CTR-040-022
Comment Author: County of Sacramento Water Div
Document Type: Storm Water Auth.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-01 Cost Analysis
References: Letter CTR-040 incorporates by reference letter CTR-027
Attachments? Y
CROSS REFERENCES

Comment: Overall Conclusions

When EPA concludes that the costs and benefits of the CTR are of similar magnitude, EPA is comparing apples with oranges.

* The costs are based on the estimated costs of point source controls, which would be required as a

result of the CTR.

* The benefits are based on the assumption that nonpoint source controls, which would not be required as a result of the CTR, will be implemented (nonpoint sources are not regulated under the Clean Water Act).

The Economic Analysis is based on procedures and assumptions that greatly understate costs and benefits.

Based on estimates prepared by municipal wastewater and stormwater organizations, the costs of the CTR could be as high as $8 billion annually, almost two orders of magnitude greater than the high-end costs estimated by EPA ($85 million annually).

Based on case study analyses of benefits by municipal wastewater and stormwater organizations, the benefits of the CTR could be immeasurable and possibly even negative (For example, the CTR could force the removal of treated wastewater and stormwater from effluent dependent waters and thereby destroy the aquatic and riparian habitat created by the discharges). In large part, the absence of benefits is due to the fact (which EPA acknowledges in its analysis) that point sources are minor sources of toxic pollutants, and the fact that the major sources (i.e., the nonpoint sources) are not regulated under the Clean Water Act or the CTR.

EPA inappropriately compares costs for reducing pollutants that would be reduced as a result of the CTR (e.g., metals) with the benefits derived from the reduction of pollutants that will not be controlled as a result of the CTR (e.g., DDT).

EPA should prepare a new economic analysis using the following approach:

* Compare costs for point sources controls with benefits that will result from implementation of those controls using representative case studies.

* Compare costs and benefits on a pollutant-by-pollutant basis.

Response to: CTR-040-022

See responses to CTR-041-018, CTR-054-013a, CTR-040-042, CTR-035-057, CTR-056-018, CTR-021-008, and CTR-021-006b.

Comment ID: CTR-040-023
Comment Author: County of Sacramento Water Div
Document Type: Storm Water Auth.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-01 Cost Analysis
References: Letter CTR-040 incorporates by reference letter CTR-027
Attachments? Y
CROSS REFERENCES

Comment: Review of EPA's Analysis of Potential Costs

EPA incorrectly asserts that the water quality criteria in the CTR will not directly impose economic impacts. In fact, the CWA requires that NPDES permits contain effluent limits necessary to achieve water quality criteria, and EPA regulations and guidelines (as well as the CTR) specify the methods that must be used to calculate effluent limits. Although the State has some flexibility, the flexibility is limited. The CTR will impose impacts.

Response to: CTR-040-023

See responses to CTR-009-008a, CTR-021-005c, and CTR-056-018.

Comment ID: CTR-041-018
Comment Author: Sacramento Reg Cnty Sanit Dist
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-01 Cost Analysis
References:
Attachments? N
CROSS REFERENCES

Comment: Overall Conclusions

When EPA concludes that the costs and benefits of the CTR are of similar magnitude, EPA is comparing apples with oranges.

* The costs are based on the estimated costs of point source controls, which would be required as a result of the CTR.

* The benefits are based on the assumption that nonpoint source controls, which would not be required as a result of the CTR will be implemented (nonpoint sources are not regulated under the Clean Water Act).

The Economic Analysis is based on procedures and assumptions that greatly understate costs and overstate benefits.

Based on estimates prepared by municipal wastewater and stormwater organizations, the costs of the CTR could be as high as $8 billion annually, almost two orders of magnitude greater than the high-end costs estimated by EPA ($85 million annually).

Based on case study analyses of benefits by municipal wastewater and stormwater organization, the benefits of the CTR could be immeasurable and possibly even negative (For example, the CTR could force the removal of treated wastewater and stormwater from effluent dependent waters and thereby destroy the aquatic and riparian habitat created by the discharges). In large part, the absence of benefits is due to the fact (which EPA acknowledges in its analysis) that point sources are minor sources of toxic pollutants, and the fact that the major sources (i.e., the nonpoint sources) are not regulated under the

Clean Water Act or the CTR.

EPA inappropriately compares costs for reducing pollutants that would be reduced as a result of the CTR (e.g., metals) with the benefits derived from the reduction of pollutants that will not be controlled as a result of the CTR (e.g., DDT).

EPA should prepare a new economic analysis using the following approach:

* Compare costs for point sources controls with benefits that will result from implementation of those controls using representative case studies.

* Compare costs and benefits on a pollutant-by-pollutant basis.

Response to: CTR-041-018

See responses to CTR-054-013a, CTR-040-042, CTR-035-057, CTR-056-018, and CTR-021-008.

Although the standards established by the CTR apply to all sources, EPA's analysis examined only the portion of benefits expected to be achieved by controlling point sources. EPA estimated the point source share of benefits based on data and information on the relative contribution of all sources to toxic loadings in California waters. Although point sources may account for only a small portion of the load in some waters, they may account for relatively larger portions at some sites, and point source controls will contribute to meeting standards in the water bodies.

Comment ID: CTR-041-019
Comment Author: Sacramento Reg Cnty Sanit Dist
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-01 Cost Analysis
References:
Attachments? N
CROSS REFERENCES

Comment: Review of EPA's Analysis of Potential Costs

EPA incorrectly asserts that the water quality criteria in the CTR will not directly impose economic impacts. In fact, the CWA requires that NPDES permits contain effluent limits necessary to achieve water quality criteria, and EPA regulations and guidelines (as well as the CTR) specify the methods that must be used to calculate effluent limits. Although the State has some flexibility, the flexibility is limited. The CTR will impose impacts.

Response to: CTR-041-019

See responses to CTR-009-008a, CTR-021-005c, CTR-056-018, and the preamble to the final rule.

Comment ID: CTR-044-013
Comment Author: City of Woodland
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: E-01 Cost Analysis
References:
Attachments? N
CROSS REFERENCES

Comment: Overall Conclusions

When EPA concludes that the costs and benefits of the CTR are of similar magnitude, EPA is comparing apples with oranges.

* The costs are based on the estimated costs of point source controls, which would be required as a result of the CTR.

* The benefits are based on the assumption that nonpoint source controls, which would not be required as a result of the CTR will be implemented (nonpoint sources are not regulated under the Clean Water Act).

The Economic Analysis is based an procedures and assumptions that greatly understate costs and overstate benefits.

Based on estimates prepared by municipal wastewater and stormwater organizations, the costs of the CTR could be as high as $8 billion annually, almost two orders of magnitude greater than the high-end costs estimated by EPA ($85 million annually).

Based on case study analyses of benefits by municipal wastewater and stormwater organization, the benefits of the CTR could be immeasurable and possibly even negative (For example, the CTR could force the removal of treated wastewater and stormwater from effluent dependent waters and thereby destroy the aquatic and riparian habitat created by the discharges). In large part, the absence of benefits is due to the fact (which EPA acknowledges in its analysis) that point sources are minor sources of toxic pollutants, and the fact that the major sources (i.e., the nonpoint sources) are not regulated under the Clean Water Act or the CTR.

EPA inappropriately compares costs for reducing pollutants that would be reduced as a result of the CTR (e.g., metals) with the benefits derived from the reduction of pollutants that will not be controlled as a result of the CTR (e.g., DDT).

EPA should prepare a new economic analysis using the following approach:

* Compare costs for point sources controls with benefits that will result from implementation of those controls using representative case studies.

* Compare costs and benefits on a pollutant-by-pollutant basis.

Response to: CTR-044-013

See responses to CTR-041-018, CTR-054-013a, CTR-040-042, CTR-035-057, CTR-056-018, CTR-021-008, and CTR-021-006b.

Comment ID: CTR-044-014
Comment Author: City of Woodland
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: E-01 Cost Analysis
References:
Attachments? N
CROSS REFERENCES

Comment: Review of EPA's Analysis of Potential Costs

EPA incorrectly asserts that the water quality criteria in the CTR will not directly impose economic impacts. In fact, the CWA requires that NPDES permits contain effluent limits necessary to achieve water quality criteria, and EPA regulations and guidelines (as well as the CTR) specify the methods that must be used to calculate effluent limits. Although the State has some flexibility, the flexibility is limited. The CTR will impose impacts.

Response to: CTR-044-014

See responses to CTR-009-008a, CTR-021-005c, and CTR-056-018.

Comment ID: CTR-047-001
Comment Author: City of Santa Fe Springs
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/24/97
Subject Matter Code: E-01 Cost Analysis
References: Letter CTR-047 incorporates by reference letters CTR-013 and CTR-027.
Attachments? N
CROSS REFERENCES

Comment: In addition, we would like to emphasize the following key issues on the California Toxic Rule (CTR), which are of major impact to our storm water program:

1 . The application of water quality standards to calculate water quality-based effluent limits for NPDES permits for municipal storm water discharges. As proposed by the USEPA, the numeric water quality standards in the California Toxics Rule will be used to calculate water quality-based effluent limitations for all NPDES permits issued by the State. We believe that this position is inconsistent with the plain

language used by Congress in incorporating the "maximum extent practicable" standard for municipal separate storm sewers systems (MS4s) into section 410(p) (3) (B) of the Clean Water Act. We recommend that the USEPA modify the Preamble to clarify that MS4s are not required to comply with water quality standards.

Response to: CTR-047-001

EPA's criteria for priority toxic pollutants were developed to protect beneficial designated uses. The criteria are independent of considerations about different categories of dischargers. In implementing water quality standards, the State has some degree of flexibility in establishing NPDES permit requirements or best management practices that would be appropriate for small municipal separate storm sewer systems.

Comment ID: CTR-052-003b
Comment Author: East Bay Dischargers Authority
Document Type: Sewer Authority
State of Origin: SC
Represented Org:
Document Date: 09/26/97
Subject Matter Code: E-01 Cost Analysis
References: Letter CTR-052 incorporates by reference letters CTR-035 and CTR-054
Attachments? Y
CROSS REFERENCES C-13
E-02

Comment: However, the Authority is greatly disappointed that EPA chose not to follow the consensus recommendations for many of the most significant issues, including the methodology used for the EA and the choice of using the most conservative carcinogenicity factor for organic pollutants.

Response to: CTR-052-003b

While EPA agrees that the methodology recommended by the State Task Force on Economic Considerations may be one adequate method for the State to calculate the costs and benefits of State adoption and implementation of water quality standards, EPA did not use this method for its own Economic Analysis (EA) for the following reasons:

* EPA's primary responsibility in developing the EA is that it meets the requirements of Executive Order 12866. For program consistency, EPA chose to model the methodology of the EA after the Regulatory Impact Analysis of the Great Lakes Water Quality Guidance which successfully underwent the full Executive Order 12866 process.

* EPA had already established its own methodology and began work on the EA nearly one year before the Task Force began meeting. In light of the substantial resources that EPA already used in its preparation of the EA, EPA could not fundamentally switch the methodology in the middle of the project due to the limited resources that could be spent on the EA. In addition, many task force members acknowledged that the consensus recommendation was a very resource intensive method and it was uncertain whether adequate data currently existed to bring this methodology to completion. EPA did not have the resources nor the data to perform this type of analysis in the time available.

* The State Task Force recommended a methodology, for future analysis by the State, that would gather ambient data to determine waters that were impaired by toxics, and then determine what actions needed to be taken by point and non-point sources to meet new water quality criteria. EPA determined that this methodology may be appropriate for future State analysis, but was not appropriate for EPA's Economic Analysis since EAs under the CWA typically estimate only costs that EPA can implement under the Clean Water Act. Therefore, EPA's EA only calculates potential costs and benefits due to controls on NPDES point sources (excluding wet-weather discharges). EPA believes it may be more appropriate for the State to estimate potential impacts on non-point sources since it has the sole authority for implementing any controls required by non-point sources.

EPA does not agree that its decision to use a 10-6 risk level for carcinogenic pollutants conflicts with any of the State Task Force consensus recommendations. EPA does not observe in the Final Task Force Report, an explicit consensus recommendation of any specific risk level for carcinogenic pollutants.

Comment ID: CTR-054-017
Comment Author: Bay Area Dischargers Associati
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-01 Cost Analysis
References:
Attachments? N
CROSS REFERENCES

Comment: Overall Conclusions

When EPA concludes that the costs and benefits of the CTR are of similar magnitude, EPA is comparing apples with oranges.

* The costs are based on the estimated costs of point source controls, which would be required as a result of the CTR.

* The benefits are based on the assumption that nonpoint source controls, which would not be required as a result of the CTR will be implemented (nonpoint sources are not regulated under the Clean Water Act).

The Economic Analysis is based an procedures and assumptions that greatly understate costs and overstate benefits.

Based on estimates prepared by municipal wastewater and stormwater organizations, the costs of the CTR could be as high as $8 billion annually, almost two orders of magnitude greater than the high-end costs estimated by EPA ($85 million annually).

Based on case study analyses of benefits by municipal wastewater and stormwater organization, the benefits of the CTR could be immeasurable and possibly even negative (For example, the CTR could force the removal of treated wastewater and stormwater from effluent dependent waters and thereby

destroy the aquatic and riparian habitat created by the discharges). In large part, the absence of benefits is due to the fact (which EPA acknowledges in its analysis) that point sources are minor sources of toxic pollutants, and the fact that the major sources (i.e., the nonpoint sources) are not regulated under the Clean Water Act or the CTR.

EPA inappropriately compares costs for reducing pollutants that would be reduced as a result of the CTR (e.g., metals) with the benefits derived from the reduction of pollutants that will not be controlled as a result of the CTR (e.g., DDT).

EPA should prepare a new economic analysis using the following approach:

* Compare costs for point sources controls with benefits that will result from implementation of those controls using representative case studies.

* Compare costs and benefits on a pollutant-by-pollutant basis.

Response to: CTR-054-017

See responses to CTR-041-018, CTR-054-013a, CTR-040-042, CTR-035-057, CTR-056-018, CTR-021-008, and CTR-021-006b.

Comment ID: CTR-054-018
Comment Author: Bay Area Dischargers Associati
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-01 Cost Analysis
References:
Attachments? N
CROSS REFERENCES

Comment: Review of EPA's Analysis of Potential Costs

EPA incorrectly asserts that the water quality criteria in the CTR will not directly impose economic impacts. In fact, the CWA requires that NPDES permits contain effluent limits necessary to achieve water quality criteria, and EPA regulations and guidelines (as well as the CTR) specify the methods that must be used to calculate effluent limits. Although the State has some flexibility, the flexibility is limited. The CTR will impose impacts.

Response to: CTR-054-018

See responses to CTR-009-008a, CTR-021-005c, and CTR-056-018.

Comment ID: CTR-059-026
Comment Author: Los Angeles County Sanit. Dist
Document Type: Sewer Authority

State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: E-01 Cost Analysis
References: Letter CTR-059 incorporates by reference letter CTR-035

Attachments? Y
CROSS REFERENCES E-01g08

Comment: Based on these and other issues discussed in the comments submitted by Tri-TAC & CASA, we strongly urge EPA to revise its Economic Analysis, and recommend that EPA and the SWRCB work together with stakeholders to craft a revised approach that is mutually acceptable. We would be pleased to assist in such an effort.

Response to: CTR-059-026

See response to CTR-034-016.

Comment ID: CTR-091-002a
Comment Author: Abu-Saba, Ganguli, Flegal
Document Type: Environmental Group
State of Origin: CA
Represented Org: Coastal Advocates
Document Date: 09/25/97
Subject Matter Code: E-01 Cost Analysis
References:
Attachments? N
CROSS REFERENCES E-02

Comment: This comment addresses the mercury criteria for continuous concentration (CCC) proposed in 40 CFR, part 131(*1). The proposed aquatic health and human health criteria do not protect aquatic life or humans from mercury contamination. This is demonstrated by the scientific data presented herein. That information includes published and unpublished results from scientists with established reputations in environmental research.

The aquatic life mercury CCC is proposed to be raised sixty-fold, from the National Toxics Rule standard of 0.012 micrograms per liter (ppb) to 0.770 ppb. The human health criteria is proposed to be raised four-fold, from 0.0 12 ppb to 0.050 ppb. These proposed changes have potentially devastating economic and environmental costs that must be included in the EPA's cost-benefit analysis. Water treatment costs for the metals mercury, silver, and chromium account for 30% of costs projected in the, California Toxics Rule (CTR) economic analysis. However, the long term environmental and economic cost of mercury contamination may far exceed the short term economic savings resulting from an increase in the mercury CCC. This is especially true in California, a mining state that has devoted hundreds of millions of dollars to restoration and enhancement of commercial and sport fisheries by enactment of Proposition 204.

The potential long-term economic and environmental costs of this proposed legislation far exceed any short-term benefits gained by raising the mandatory action level for mercury contamination. A stated goal of the recently passed Proposition 204 legislation is the protection and enhancement of commercial

and sport fishing in the State of California. To that end, hundreds of millions of dollars have been committed to water quality improvement and fish habitat restoration. Increasing the permissible mercury limits will not only hinder those goals, but will likely cause irreversible damage to the environment well into the foreseeable future.

(*1) Water Quality Standards; Establishment of Numeric Criteria for Priority Toxic Pollutants for the State of California; Proposed Rule. U.S. Environmental Protection Agency, Region Nine; U.S. Government Printing Office: Washington D.C., 1997; Federal Register, 62, 42159-42207.

Response to: CTR-091-002a

The aquatic life criteria have been updated using EPA's peer-reviewed and accepted aquatic life methodology. The previous 304(a) criteria guidance value was based on an FDA action level for humans, not on aquatic life protection. As such, the previous criteria are not as appropriate to use as the updated criteria proposed in the CTR. The revised criteria are less stringent than the previous criteria. The human health criteria proposed in the CTR have also been updated using the risk reference dose for methylmercury. The previous 304(a) criteria guidance values were based on the risk reference dose for mercury. The revised human health criteria in the CTR are more stringent than the previous human health criteria guidance.

All water quality standards are comprised of three parts: a designated use, criterion, and an antidegradation requirement. The CTR only proposes criteria. The State of California has adopted designated uses for its water bodies (called beneficial uses) in the Regional Water Board Basin Plans. The State has also adopted antidegradation provisions in each of the Regional Board Basin Plans. These provisions require that water quality in a waterbody cannot be degraded (with narrow exceptions as discussed at 40 CFR 131.12(a) (2) which allow a lowering of water quality if the State finds that it is necessary to accommodate important economic or social development). Thus, if a waterbody has achieved a certain level of cleanliness or is in a pristine condition, discharges are not allowed to degrade the water quality. Therefore, no environmental "cost" or degradation will be incurred as a result of any new or revised water quality criteria in the CTR that may be less stringent than a previously adopted objective or a criteria guidance value. Environmental benefits that have been gained in California fisheries or anywhere else cannot be destroyed.

Comment ID: CTR-107-001
Comment Author: Brian E. Hill
Document Type: Citizen
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: E-01 Cost Analysis
References:
Attachments? Y
CROSS REFERENCES

Comment: This letter is in regards to the U.S. Environmental Protection Agency (EPA) proposing water quality standards for priority toxic pollutants in California. This is referred to as the California Toxics Rule (CTR). Due to the fact that I work in the Water Pollution Control Industry, I am following this

issue very closely. However, this letter is coming from a concerned tax payer.

As you may already know, under provisions of the Clean Water Act every state is required to have water quality standards for priority toxic pollutants. In 1994 California's version of that provision was overturned in State court due to a violation in the implementation of the rule. Subsequently, the U.S. EPA has proposed a rule in order to bring California into compliance. The criteria proposed by the U.S. EPA are extremely stringent and could cost California taxpayers hundreds of millions of dollars.

Response to: CTR-107-001

Although EPA promulgated specific criteria for the State of California under the CTR, EPA promulgated ambient water quality criteria for the entire United States, including California, under the National Toxics Rule (NTR), and the costs of the NTR are borne by dischargers in all NTR States. The [document name] compares the NTR to the CTR and demonstrates that the CTR criteria are rarely, if ever, more stringent than the NTR criteria. Thus, dischargers face a "level playing field" across California and NTR States. See also response to CTR-021-005c.

Comment ID: CTR-107-002a
Comment Author: Brian E. Hill
Document Type: Citizen
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: E-01 Cost Analysis
References:
Attachments? Y
CROSS REFERENCES G-02
E-01n

Comment: On September 17, I attended a hearing on the proposed CTR at the EPA's regional office in San Francisco. Here are some key issues from the testimony at that hearing:

* Some of the limits are below normal detection limits, therefore agencies have no background data in order to perform accurate attainability analysis.

* The cost of implementation by the EPA is grossly underestimated. The economic analysis shows a maximum implementation cost of $87 million. If preliminary estimates by publicly owned treatment works (POTW) are correct, implementation of the CTR will far exceed the $100 million provision of the Porter-Cologne Act. If this is the case, feasibility of implementation will be in jeopardy. The City of Merced, CA estimates that their additional cost would be $4 million annually. Merced has a very small treatment facility.

* Robert Reid, speaking on behalf of California Association of Sanitation Agencies (CASA), said that four San Francisco Plants estimate their total implementation costs to be $160 million annually.

* Charles Batts of Bay Area Dischargers Authority (BADA) estimated five BADA POTWs costs to be $12 million per year to meet the strict limit on copper and $56 million per year to meet the organics limit.

* The Regional Water Quality Control Board testified that San Francisco discharges twenty percent of the four percent discharged into the San Francisco Bay by POTWs, noting that POTWs are only a minor part of the volume discharged into the Bay. Thus, the reduction to the prescribed limits would cause a negligible decrease in the total mass of pollutants discharged.

* The City of Sacramento projects a $200 million annual cost will be required to meet the copper limit.

All of the testimony at the hearing echoed these concerns. I am sure that you have access to a transcript. The Clean Water Act has been and is instrumental in cleaning up our rivers, lakes, bay and estuaries. We can continue on this steady path by setting gradual attainable limits and through increased public education. Limits on pollutants should continue to get stricter, but this has to occur on a gradual curve that will not place an unreasonable burden on the individual taxpayer.

Response to: CTR-107-002a

Regarding limits being below detection levels see response to CTR-035-064.

EPA disagrees that costs are underestimated. For further discussion, see responses to CTR-040-039 and CTR-035-011a. EPA also disagrees with the $4 million annual cost estimate for Merced, the $160 million annual estimate for the four San Francisco plants, the BADA POTW cost estimates, and the $200 million cost estimate for copper for the City of Sacramento,however, no supporting data were provided for EPA to be able to evaluate these cost estimates. EPA evaluated the City of Merced facility as one of its sample facilities and estimated costs for Merced to range from $140,000 to $590,000 annually. EPA believes that pollution prevention and process optimization would be sufficient for Merced to ensure compliance with CTR-based limits. EPA also evaluated Sacramento as another sample facility and did not estimate reasonable potential for copper. EPA's cost estimate for Sacramento for the control of lead and mercury ranged from $90,000 to $320,000 annually for pollution prevention and process optimization.

EPA disagrees with the commenter that the decrease in the mass of pollutants discharged to San Francisco Bay would be negligible (as the San Francisco POTW represents only 20% of the 4% that POTWs contribute to the total mass discharged). Commercial and industrial facilities will also be required to meet CTR-based effluent limits which may result in additional reductions in mass discharges. EPA is promulgating the CTR criteria in order to protect human health and the aquatic environment which will benefit from pollutant reductions as is described in the Economic Analysis of the final CTR.

See also responses to CTR-041-018, CTR-038-003, CTR-056-018, CTR-021-005c, and CTR-021-010.

Subject Matter Code: E-01a Baselines

Comment ID: CTR-040-035
Comment Author: County of Sacramento Water Div
Document Type: Storm Water Auth.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-01a Baselines
References: Letter CTR-040 incorporates by reference letter CTR-027
Attachments? Y

CROSS REFERENCES

Comment: In its high-end cost scenario, EPA accepted existing permit limits as a baseline even if those permit limits were based on the old State Plans. In fact, permit limits based on the illegal State Plans are themselves illegal and do not constitute an appropriate baseline.

Response to: CTR-040-035

See response to CTR-040-026.

Comment ID: CTR-041-031
Comment Author: Sacramento Reg Cnty Sanit Dist
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-01a Baselines
References:
Attachments? N
CROSS REFERENCES

Comment: In its high-end cost scenario, EPA accepted existing permit limits as a baseline even if those permit limits were based on the old State Plans. In fact, permit limits based on the illegal State Plans are themselves illegal and do not constitute an appropriate baseline.

Response to: CTR-041-031

See response to CTR-040-026.

Comment ID: CTR-044-026
Comment Author: City of Woodland
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: E-01a Baselines
References:
Attachments? N
CROSS REFERENCES

Comment: In its high-end cost scenario, EPA accepted existing permit limits as a baseline even if those permit limits were based on the old State Plans. In fact, permit limits based on the illegal State Plans are themselves illegal and do not constitute an appropriate baseline.

Response to: CTR-044-026

See response to CTR-040-026.

Comment ID: CTR-054-030
Comment Author: Bay Area Dischargers Associati
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-01a Baselines
References:
Attachments? N
CROSS REFERENCES

Comment: In its high-end cost scenario, EPA accepted existing permit limits as a baseline even if those permit limits were based on the old State Plans. In fact, permit limits based on the illegal State Plans are themselves illegal and do not constitute an appropriate baseline.

Response to: CTR-054-030

See response to CTR-040-026.

Comment ID: CTR-092-017
Comment Author: City of San Jose, California
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: E-01a Baselines
References: Letter CTR-092 incorporates by reference letter CTR-035
Attachments? Y
CROSS REFERENCES

Comment: Comment #1: Application of the Analysis to San Jose

The derivation of the baseline cost models utilized in the Economic Analysis is detailed and complex. One element of Model 2, the benchmarks for the Low End and High End Cost Scenarios, can be extracted and highlighted as problematic for San Jose. Briefly, the cost of implementation of the CTR is measured by variation, at the low end, between current effluent concentrations and the concentrations which might be allowed by the CTR; and at the high end, by the difference between current permit limits and limits which might be allowed by the CTR.

The high end benchmark assumes that POTW's are already in compliance with their NPDES permit limits so that costs of "new" regulations, e.g. the CTR, can be segmented from "old" regulations, or existing permit compliance costs. In cases where a POTW is not in permit compliance on a particular element, the Model 2 high end benchmark assumes that there is no cost incurred due to federal implementation of the California Toxics Rule. This implies that any costs incurred in meeting the CTR

are really costs of getting into compliance with State regulation.

Questions for EPA on Comment #1

Q. 1 - 1) Did EPA undertake any sensitivity analysis to measure the impact of the high end assumptions on the $87 million high end cost estimate for overall CTR implementation? What if, for analytic purposes, the high end assumption was modified such that costs of attaining permit compliance (for all POTW's who are not in compliance on some element) was considered as a proxy for Rule implementation costs -- what increment of cost would be added to the $87 million estimate?

Q. 1-2) Under the existing assumptions, what share of the $87 million high end cost was attributable to the San Jose/Santa Clara POTW? What was San Jose/Santa Clara's contribution to the low end cost?

Q. 1-3) What would San Jose/Santa Clara POTW contribution be to the modified high end case, under the assumptions stated in Q. 1 - 1, above?

Response to: CTR-092-017

The methodology used to analyze each facility was described in detail in the cost report, Economic Analysis (EA), and technical support document that accompanies the record for the final rule. Following the public comment period for the proposed rule, EPA conducted a revised analysis of the potential costs and benefits of the rule (high scenario costs are estimated to be $61 million). EPA used the same methodology for estimating costs for the final rule but developed a completely updated data set for each of the sample facilities. The updated data represent the most recent three years of data available from public sources for each facility. EPA also considered any data submitted during the public comment period. Therefore, EPA's revised analysis should reflect representative information for each facility. The revised analysis of costs is again presented in detail in the EA and technical support document for the final CTR.

EPA did not estimate the costs for facilities to come into compliance with existing permit limits (see response to CTR-092-019). EPA does not agree with the commenter that this would be a suitable proxy for CTR implementation costs because ensuring compliance with existing permit limits represents costs that facilities would incur regardless of the CTR. Such an estimate would double count those costs attributable to existing state regulations and existing permit limits, instead of accounting for only those costs attributable to the CTR. See response to CTR-092-019.

Nonetheless, if San Jose's costs were evaluated as the commenter suggests (i.e., the cost of attaining permit compliance is used as a proxy for CTR implementation costs), there would be no change from EPA's current cost estimate. Twenty-one of 25 observations for copper are below the CTR-based limitand the existing permit limit. The maximum effluent concentration exceeds the existing permit limit, however, no costs other than pollution prevention costs estimated under EPA's high scenario would be incurred to ensure compliance with the CTR-based limit.

Subject Matter Code: E-01a Baselines

Comment ID: CTR-040-035
Comment Author: County of Sacramento Water Div
Document Type: Storm Water Auth.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-01a Baselines
References: Letter CTR-040 incorporates by reference letter CTR-027
Attachments? Y
CROSS REFERENCES

Comment: In its high-end cost scenario, EPA accepted existing permit limits as a baseline even if those permit limits were based on the old State Plans. In fact, permit limits based on the illegal State Plans are themselves illegal and do not constitute an appropriate baseline.

Response to: CTR-040-035

See response to CTR-040-026.

Comment ID: CTR-041-031
Comment Author: Sacramento Reg Cnty Sanit Dist
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-01a Baselines
References:
Attachments? N
CROSS REFERENCES

Comment: In its high-end cost scenario, EPA accepted existing permit limits as a baseline even if those permit limits were based on the old State Plans. In fact, permit limits based on the illegal State Plans are themselves illegal and do not constitute an appropriate baseline.

Response to: CTR-041-031

See response to CTR-040-026.

Comment ID: CTR-044-026
Comment Author: City of Woodland
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97

Subject Matter Code: E-01a Baselines
References:
Attachments? N
CROSS REFERENCES

Comment: In its high-end cost scenario, EPA accepted existing permit limits as a baseline even if those permit limits were based on the old State Plans. In fact, permit limits based on the illegal State Plans are themselves illegal and do not constitute an appropriate baseline.

Response to: CTR-044-026

See response to CTR-040-026.

Comment ID: CTR-054-030
Comment Author: Bay Area Dischargers Associati
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-01a Baselines
References:
Attachments? N
CROSS REFERENCES

Comment: In its high-end cost scenario, EPA accepted existing permit limits as a baseline even if those permit limits were based on the old State Plans. In fact, permit limits based on the illegal State Plans are themselves illegal and do not constitute an appropriate baseline.

Response to: CTR-054-030

See response to CTR-040-026.

Comment ID: CTR-092-017
Comment Author: City of San Jose, California
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: E-01a Baselines
References: Letter CTR-092 incorporates by reference letter CTR-035
Attachments? Y
CROSS REFERENCES

Comment: Comment #1: Application of the Analysis to San Jose

The derivation of the baseline cost models utilized in the Economic Analysis is detailed and complex.

One element of Model 2, the benchmarks for the Low End and High End Cost Scenarios, can be extracted and highlighted as problematic for San Jose. Briefly, the cost of implementation of the CTR is measured by variation, at the low end, between current effluent concentrations and the concentrations which might be allowed by the CTR; and at the high end, by the difference between current permit limits and limits which might be allowed by the CTR.

The high end benchmark assumes that POTW's are already in compliance with their NPDES permit limits so that costs of "new" regulations, e.g. the CTR, can be segmented from "old" regulations, or existing permit compliance costs. In cases where a POTW is not in permit compliance on a particular element, the Model 2 high end benchmark assumes that there is no cost incurred due to federal implementation of the California Toxics Rule. This implies that any costs incurred in meeting the CTR are really costs of getting into compliance with State regulation.

Questions for EPA on Comment #1

Q. 1 - 1) Did EPA undertake any sensitivity analysis to measure the impact of the high end assumptions on the $87 million high end cost estimate for overall CTR implementation? What if, for analytic purposes, the high end assumption was modified such that costs of attaining permit compliance (for all POTW's who are not in compliance on some element) was considered as a proxy for Rule implementation costs -- what increment of cost would be added to the $87 million estimate?

Q. 1-2) Under the existing assumptions, what share of the $87 million high end cost was attributable to the San Jose/Santa Clara POTW? What was San Jose/Santa Clara's contribution to the low end cost?

Q. 1-3) What would San Jose/Santa Clara POTW contribution be to the modified high end case, under the assumptions stated in Q. 1 - 1, above?

Response to: CTR-092-017

The methodology used to analyze each facility was described in detail in the cost report, Economic Analysis (EA), and technical support document that accompanies the record for the final rule. Following the public comment period for the proposed rule, EPA conducted a revised analysis of the potential costs and benefits of the rule (high scenario costs are estimated to be $61 million). EPA used the same methodology for estimating costs for the final rule but developed a completely updated data set for each of the sample facilities. The updated data represent the most recent three years of data available from public sources for each facility. EPA also considered any data submitted during the public comment period. Therefore, EPA's revised analysis should reflect representative information for each facility. The revised analysis of costs is again presented in detail in the EA and technical support document for the final CTR.

EPA did not estimate the costs for facilities to come into compliance with existing permit limits (see response to CTR-092-019). EPA does not agree with the commenter that this would be a suitable proxy for CTR implementation costs because ensuring compliance with existing permit limits represents costs that facilities would incur regardless of the CTR. Such an estimate would double count those costs attributable to existing state regulations and existing permit limits, instead of accounting for only those costs attributable to the CTR. See response to CTR-092-019.

Nonetheless, if San Jose's costs were evaluated as the commenter suggests (i.e., the cost of attaining permit compliance is used as a proxy for CTR implementation costs), there would be no change from EPA's current cost estimate. Twenty-one of 25 observations for copper are below the CTR-based

limitand the existing permit limit. The maximum effluent concentration exceeds the existing permit limit, however, no costs other than pollution prevention costs estimated under EPA's high scenario would be incurred to ensure compliance with the CTR-based limit.

Subject Matter Code: E-01a02 Cost Diff. for Eff. Limit

Comment ID: CTR-035-058
Comment Author: Tri-TAC/CASA
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-01a02 Cost Diff. for Eff. Limit
References:
Attachments? N
CROSS REFERENCES

Comment: Weaknesses in Cost Analysis

The report's cost estimates exhibit a number of significant weaknesses, as follows:

* Omission of other 'baseline" costs may act to artificially reduce USEPA's estimates.

USEPA's baseline adjustment (U.S. EPA, 1997a, page 5-7) implies that the costs associated with meeting existing requirements which are currently not being met should be excluded from the analysis. However, to the extent that these costs are higher than the report's cost limit triggers (e.g., $200/$500), both costs and the benefits associated with them should be eliminated in the analysis. That is, USEPA's assumption that dischargers will not be required to undertake improvements above a certain expense level should be carried through the entire analysis to be consistent. Alternatively, if existing requirements must be met prior to rule compliance, these costs should be estimated and reported.

Response to: CTR-035-058

EPA's economic analysis measures the potential incremental costs and benefits of the rulemaking relative to compliance with current requirements. It is not appropriate for EPA to estimate costs and benefits associated with compliance with current requirements. To the extent that costs were eliminated from the analysis, benefits (loading reductions) were also eliminated from the analysis. That is, EPA did not count benefits without counting the costs of achieving those benefits.

Comment ID: CTR-060-018
Comment Author: San Diego Gas and Electric
Document Type: Electric Utility
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: E-01a02 Cost Diff. for Eff. Limit
References:
Attachments? N
CROSS REFERENCES

Comment: PROVISIONS SDG&E DOES NOT SUPPORT

As described in the following comments SDG&E does not support the following provisions:

Economic Analysis is deficient

Secondly, it was not clear from the analysis what monitoring data and/or effluent limits were evaluated in comparison to EPA's baseline (i.e., in-plant wastestreams or once-through cooling water or combined discharge of all wastestreams) and what specific methods of compliance modifications were used to estimate compliance costs. If the wastestream evaluated was the gross combined discharge, the estimated costs are potentially severely underestimated. Once through cooling water contains ambient concentrations of pollutants when it is drawn from the source water body. If these same pollutants are the reason why the discharge does not comply with the new criteria, and the plant would have to treat the once-through cooling water to achieve compliance, the costs would be in the hundreds of million of dollars in capital costs to construct the treatment facilities necessary to comply at each power plant.

Response to: CTR-060-018

The analysis of the two sample electric utilities (Pacific Gas and Electric, Hunter's Point and San Diego Gas and Electric, South Bay) does not indicate that ambient water used for cooling would need to be treated because of the CTR. For instance, influent monitoring reports for the Hunter's Point facility indicate that all metals were consistently reported below detection levels with the exception of zinc that was detected, however, not at concentrations of concern. EPA believes that the source of pollutants in electric utilities is low volume waste such as from lubricating and metal cleaning processes. These operations generate low flow, high concentration effluents that are discharged together with cooling waters. In cases of infrequent non-compliance, as with copper at Hunter's Point, process optimization is sufficient to ensure compliance. In cases of more severe non-compliance, waste stream separation and treatment may be recommended.

Subject Matter Code: E-01a03 Model 1 Weaknesses

Comment ID: CTR-035-045
Comment Author: Tri-TAC/CASA
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-01a03 Model 1 Weaknesses
References:
Attachments? N
CROSS REFERENCES

Comment: B. Cost Analysis p. 2-1 (U.S. EPA, 1997b) - Model I Baseline in Cost Analysis

Model I assumes that, in the absence of the CTR, the State would, pursuant to the NPDES regulations rely on the narrative standards in Basin Plans to establish numeric water quality-based effluent limits in permits. EPA thereby contends that permit limits adopted under Model I could be based on the latest EPA 304(a) criteria. Under this scenario, EPA believes that permit limits would be "nearly identical" to those that would result from implementation of the CTR criteria, and that "the costs and benefits of the CTR would be negligible since implementation of permits under the CTR would not differ significantly from how the State may implement permits under current law." We believe this to be a flawed analysis, and that EPA must delete or modify the Model I baseline. EPA's suggestion that EPA's action has no impacts is equivocal: either EPA is taking an action in proposing the rule or it is not. If it is not taking an action, then it need not propose a rule. If it is taking an action, then this action must have implications. In any case, we believe the analysis is flawed. Under federal regulations (40 CFR section 122.44(d)(iv)), in the absence of the CTR, State permit writers could utilize many more documents than just the 304(a) criteria when adopting permit limits based on narrative standards. These sources of information could easily result in effluent limits that are more or less stringent than the CTR-proposed criteria. Thus, the Model I baseline is fundamentally flawed.

Response to: CTR-035-045

See responses to CTR-035-058 and CTR-021-005c.

EPA believes that the use of 304(a) criteria provides a reasonable estimate of current regulatory requirements because the criteria represent its national recommendations. Additionally, if permit writers deviate from the criteria, they must have a basis for doing so. For example, using field data to modify the criteria on a site-specific basis would require an amendment to the rule.

Comment ID: CTR-035-057
Comment Author: Tri-TAC/CASA
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-01a03 Model 1 Weaknesses
References:

Attachments? N
CROSS REFERENCES

Comment: Weaknesses in Cost Analysis

The report's cost estimates exhibit a number of significant weaknesses, as follows:

* The assertion that a plausible alternative baseline (i.e., "Model I ") would indicate "no impacts" from the USEPA's rule is weak:

-- Either USEPA is taking an action in proposing the rule, or it is not. If it is not taking an action, then it need not propose a rule. If it is taking an action, then this action must have implications.

-- By definition the baseline cannot be some mythical state action that would occur if USEPA did nothing. The baseline, as described further in the Rule, is current regulation, which at this point reflects no state action in this area. If and when the state issues a regulation, the USEPA Rule can be compared with the state rule to determine benefit and cost differences.

-- The color of money stays the same whether federal or state governments take action. That is, affected parties are indifferent as to who is "scored" with water quality costs.(*5)

-- If there are potentially no costs, there are likewise potentially no benefits, an outcome which is not provided equal credence in the Analysis.

USEPA's Model I approach in this rule is the opposite of the tactic it took in proposing the 1994 State Implementation Plan (SIP) to meet air quality requirements. In Its analysis of this action USEPA provided estimates of SIP costs in the face of no state action, despite the fact that California was required to meet federal air quality standards.

(*5) However, whether the federal or state government is deemed responsible for rule costs may have important legal implications (e.g., different requirements for economic analyses).

Response to: CTR-035-057

See response CTR-040-026.

EPA believes that the potential benefits of the rule are reasonably similar to the potential costs. EPA also notes that, as described in the EA, the estimate of benefits may be underestimated as a result of omitted benefit categories while the estimate of costs was based on assumptions that tend to overstate costs. For example, reductions in noncancer health effects are omitted because there are currently few means of linking consumption of toxic contaminants by humans with cases of systemic effects (as opposed to cancer effects, for which dose-response curves have been estimated). Other omitted benefit categories include instream and near stream recreational activities other than fishing (e.g., boating, swimming, picnicking, and related activities). EPA believes other recreation benefits may be appreciable because these activities have been shown in empirical research to be highly valued, and even modest changes in participation or user values could lead to sizable benefits statewide. Some of these activities can be closely associated with water quality attributes (e.g., swimming) and others might increase due to their association with fishing, swimming, or other activities in which the participants might engage.

EPA recognizes that the benefits of the rule will not occur immediately, and has estimated lags in the realization of benefits. However, EPA believes that the standards established by the CTR can be achieved through point source controls and will result in attaining designated uses of the water bodies, and that the estimated benefits are illustrative of the types and potential benefits to be achieved from attaining these uses.

Comment ID: CTR-040-026
Comment Author: County of Sacramento Water Div
Document Type: Storm Water Auth.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-01a03 Model 1 Weaknesses
References: Letter CTR-040 incorporates by reference letter CTR-027
Attachments? Y
CROSS REFERENCES

Comment: EPA's Model 1 Scenario erroneously assumes that without the CTR, implementation of the States narrative criterion "would likely result in permit limits that are nearly identical to those that would result from implementation of the CTR criteria." On the contrary, this is highly unlikely based on: (1) the Water Code requirements to consider economics in establishing objectives and adopting permits; (2) the court decision that threw out the same EPA criteria because the State failed to consider economics and other factors by the Water Code; and (3) most basin plans do not contain language that authorizes direct utilization of the criteria in implementing the narrative toxicity objective. In fact, EPA's assertion, quoted above, is contradicted a few paragraphs later: "...since the plans were revoked, permit writers no longer use the criteria contained in the plans." (see page ES-2). In fact, in the three years since the State Plans were rescinded, very few permits have been issued with limits based on EPA criteria.

Response to: CTR-040-026

EPA disagrees with the comment. EPA believes that in the absence of the CTR, implementation of the state narrative criterion would likely result in permit limits nearly identical to those that would result from implementation of the CTR criteria. While it is true that EPA acknowledged in the EA that new effluent limits are not likely to be based on the criteria contained in the old Inland Surface Waters Plan and Enclosed Bays and Estuaries Plan since these plans were withdrawn by the State, EPA has observed that, in several recently issued permits, the State has developed new effluent limits based on EPA recommended 304(a) criteria. EPA's 304(a) criteria are nearly identical to the CTR criteria. Therefore, EPA believes that its statement about the State's use of narrative criteria does not contradict itself as the commenter asserts.

Comment ID: CTR-041-022
Comment Author: Sacramento Reg Cnty Sanit Dist
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97

Subject Matter Code: E-01a03 Model 1 Weaknesses
References:
Attachments? N
CROSS REFERENCES

Comment: EPA's Model 1 Scenario erroneously assumes that without the CTR, implementation of the States narrative criterion "would likely result in permit limits that are nearly identical to those that would result from implementation of the CTR criteria." On the contrary, this is highly unlikely based on: (1) the Water Code requirements to consider economics in establishing objectives and adopting permits; (2) the court decision that threw out the same EPA criteria because the State failed to consider economics and other factors by the Water Code; and (3) most basin plans do not contain language that authorizes direct utilization of the criteria in implementing the narrative toxicity objective. In fact, EPA's assertion, quoted above, is contradicted a few paragraphs later: "...since the plans were revoked, permit writers no longer use the criteria contained in the plans." (see page ES-2). In fact, in the three years since the State Plans were rescinded, very few permits have been issued with limits based on EPA criteria.

Response to: CTR-041-022

See response to CTR-040-026, CTR-035-045, CTR-035-058, and CTR-021-005c.

Comment ID: CTR-044-017
Comment Author: City of Woodland
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: E-01a03 Model 1 Weaknesses
References:
Attachments? N
CROSS REFERENCES

Comment: EPA's Model 1 Scenario erroneously assumes that without the CTR, implementation of the States narrative criterion "would likely result in permit limits that are nearly identical to those that would result from implementation of the CTR criteria." On the contrary, this is highly unlikely based on: (1) the Water Code requirements to consider economics in establishing objectives and adopting permits; (2) the court decision that threw out the same EPA criteria because the State failed to consider economics and other factors by the Water Code; and (3) most basin plans do not contain language that authorizes direct utilization of the criteria in implementing the narrative toxicity objective. In fact, EPA's assertion, quoted above, is contradicted a few paragraphs later: "...since the plans were revoked, permit writers no longer use the criteria contained in the plans." (see page ES-2). In fact, in the three years since the State Plans were rescinded, very few permits have been issued with limits based on EPA criteria.

Response to: CTR-044-017

See responses to CTR-040-026 and CTR-035-045.

Comment ID: CTR-054-021
Comment Author: Bay Area Dischargers Associati
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-01a03 Model 1 Weaknesses
References:
Attachments? N
CROSS REFERENCES

Comment: EPA's Model 1 Scenario erroneously assumes that without the CTR, implementation of the States narrative criterion "would likely result in permit limits that are nearly identical to those that would result from implementation of the CTR criteria." On the contrary, this is highly unlikely based on: (1) the Water Code requirements to consider economics in establishing objectives and adopting permits; (2) the court decision that threw out the same EPA criteria because the State failed to consider economics and other factors by the Water Code; and (3) most basin plans do not contain language that authorizes direct utilization of the criteria in implementing the narrative toxicity objective. In fact, EPA's assertion, quoted above, is contradicted a few paragraphs later: "...since the plans were revoked, permit writers no longer use the criteria contained in the plans." (see page ES-2). In fact, in the three years since the State Plans were rescinded, very few permits have been issued with limits based on EPA criteria.

Response to: CTR-054-021

See response to CTR-040-026.

Subject Matter Code: E-01b Cost Triggers

Comment ID: CTR-021-017
Comment Author: LeBoeuf, Lamb, Green & MacRae
Document Type: Local Government
State of Origin: CA
Represented Org: City of Sunnyvale
Document Date: 09/25/97
Subject Matter Code: E-01b Cost Triggers
References: Letter CTR-021 incorporates by reference letter CTR-035
Attachments? Y
CROSS REFERENCES

Comment: Several fundamental problems exist with the analysis that was conducted in Section 2 "Methodology" of the "Analysis of Potential Costs Related to the Implementation of the California Water Quality Toxics Rule" document. Given flaws in the methodology, the results presented in Appendices I-B, II-B, and IIIB are misleading at best and in some cases incorrect. The following is a summary our comments regarding the methodology used and the results presented.

METHODOLOGY

* Page 2- 10 states: "For any pollutant for which a limit for a toxic pollutant existed in the current NPDES permit for a sample facility, it was assumed that a reasonable potential existed to exceed a CTR based limit and the pollutant was included for further analysis." This is an unreasonable assumption because many local regulators have been resistant to exclude pollutants with no reasonable potential to exceed the permit limit from NPDES permits. In other words, it is very common to find pollutants regulated in NPDES permits which either have not been detected or have been detected in levels significantly below the permit limits. Therefore, assuming that a reasonable potential to exceed the permit limit exists simply because a toxic pollutant is listed in the NPDES permit, is an incorrect assumption. Further, the propagation of this error leads to incorrect economic implications.

Based on the TSD and properly computed effluent limits, a reasonable potential analysis first needs to be conducted for each toxic pollutant to determine a maximum projected effluent quality, and that value then needs to be compared to the CTR based limit to determine if there is a reasonable potential for the limit to be exceeded. If there is a potential for the limit to be exceeded, economic estimates may then be made. In the analysis that was conducted, a reasonable potential to exceed the effluent limit was assumed for each constituent with an effluent limit in the NPDES permit, and potential costs were computed based on the difference between the current and future effluent limits regardless of plant performance. Clearly, this is a flawed, incorrect, and misleading approach,

* WLA[subs]a and WLA[subs]c are based on theoretical partitioning factors. These may or may not be representative of the conditions noted in site specific water bodies. A translator study, conducted specifically for the City of Sunnyvale demonstrates that the relationship between the partition if coefficient and TSS is not nearly as strong as that between the translator and ln(TSS) (the natural logarithm of TSS). WLA would be better computed using a site specific translator, wherever data are available. City of Sunnyvale calculations following guidance described in EPA 823-B-96-007 (The Metals Translator: Guidance for Calculating a total Recoverable Permit Limit from a Dissolved Criterion), demonstrate that significantly different results may be obtained from those presented in Exhibit 2-8 when site specific data are used;

* Another variable which significantly affects the values used to convert from dissolved criteria to total criteria is TSS. The TSS value used to compute the partitioning factor found in Exhibit 2-8 is 15 mg/L, which is lower than any data observed by the City of Sunnyvale between September 1989 and February 1991. Those data indicate that a more representative although still conservative value would be approximately 35 mg/L;

* Summary statistics of the dataset used are needed for each constituent (mean, standard deviation, and coefficient of variation). Further, the full datasets used for the analysis should be included as an appendix so that data trends may be inspected. Typically, as was the case with Sunnyvale but ignored in this analysis, metals concentrations decreased as source control measures have been implemented.

* Identification and exclusion of statistical outliers from the analysis is a critical step which is not addressed in Section 2 "Methodology". Since, the reasonable potential analysis estimates the projected maximum concentration for each constituent on the maximum observed value in the given dataset, identification and exclusion of outliers from the analyses must be considered.

* Table I-B-4 (and II-B-4, and III-B-4) should show the following columns: Reasonable Potential Analysis Projected Maximum Concentration; CTR based WQBEL; Flag; Maximum Observed Concentration; Flag. This structure would make the analyses much clearer. The determination of constituents of potential concern should then be conducted as follows: compute the projected maximum projected concentration for each pollutant, compute conservative estimates of CTR based limits (based on standard translators and TSS values), and compare the CTR based limit to the projected maximum reasonable potential value and the maximum observed concentrations. Constituents of potential concern will be those whose projected maximum concentrations are greater than the CTR based WQBEL.

Further, it needs to be noted that care must be taken to compare the projected maximum concentration with the correct (MDL or AML) CTR limit to determine if a reasonable potential exists to exceed the limit. This will primarily be a function of monitoring frequency. However, it appears that this step was overlooked in the preliminary analyses presented in Appendices I-B, II-B, and III-B. The analyses in those appendices (refer to Table I-B-4) compares the existing limit ("existing high end") to the CTR average monthly limit ("CTR"), and then bases economic extrapolation on that comparison. For example, the current daily limit for silver, 2.3 mg/L is compared to the computed average monthly CTR limit of 1.76 mg/L, and the conclusion is drawn that the City will need to decrease the amount of silver in the effluent. A more reasonable comparison would have been to compare the projected maximum concentration to the proposed CTR daily maximum limit.

* LTAs were computed using the 95%ile for chronic WLAs and the 99%ile for acute WLAs, without an explanation for the apparent disparity. Since in many cases the chronic WLA is lower than the acute WLA, the resultant CTR derived permit limits are based on the 95%ile rather than the 99%ile (e.g. a lower limit than would have been obtained if the 99%ile values were used). In order to determine if a reasonable potential exists for a pollutant to exceed a given permit limitation, consistency is necessary. It is suggested that all computations (reasonable potential analysis and CTR based WQBEL) be based on the same standard, so that the implications of the ensuing comparisons are clear. Further, a 99%ile standard is recommended to more fully account for the lognormal nature of pollutant concentrations in treated water.

* It is stated that "Costs were estimated for any pollutant for which either effluent concentrations or existing permit limitations were greater than the CTR-based WQBEL". As noted above, this analysis should be conducted only on pollutants with a reasonable potential to exceed the CTR-based WQBEL

otherwise economic computations will solely be based on the difference between old and new limits without any consideration to plant performance.

* Finally, high end scenario costs are "Based on the difference between an existing permit limit and the WQBELS". It cannot be overemphasized this is unreasonable, because there may be no reasonable potential to exceed this limit. This methodology implies that simply because an effluent limit is in an NPDES permit, a reasonable potential exists to exceed that limit, which is fundamentally incorrect.

Response to: CTR-021-017

* EPA disagrees with Sunnyvale's comment that it is unreasonable to assume that reasonable potential exists for a pollutant when it has a permit limit in its existing NPDES permit. First, EPA determines whether there is reasonable potential to exceed water quality criteria, not permit limits. Second, EPA acknowledges that the Regional Boards may base the decision to assign reasonable potential on methodologies other than those selected from the Technical Support Document for Water Quality-based Toxics Control (U.S. EPA, 1991). For example, EPA is aware that current permitting practices of some Regional Boards in the State of California include assigning permit limits to pollutants identified in the fish tissue report or pollutants included in the 303(d) list of impaired receiving water bodies. EPA incorporated the presumptions of these particular methodologies by assigning reasonable potential in the high scenario when a permit limit exists.

* Sunnyvale stated that EPA incorrectly based high scenario costs on the difference between an existing permit limit and the CTR-based effluent limit when there may be no reasonable potential to exceed the limit. EPA stands by its methodology to assign reasonable potential in the high scenario because of the existence of a permit limit (see above). EPA's methodology would, if anything, overstate potentialcompliance costs in the high scenario because it assumes that the discharger discharges the pollutant at concentrations of concern and that measures may need to be taken to control the pollutant. That is, EPA's methodology may result in estimates of compliance costs that will not be incurred.

* Sunnyvale also indicated that in the draft analysis, potential costs were computed based on the difference between the current and future effluent limits, regardless of plant performance. This statement is incorrect. Where data are available, cost decisions in the high and low scenarios are based on plant performance. However, in the absence of data, EPA's methodology tends to err on the side of estimating higher costs. EPA's rationale for its cost estimates for Sunnyvale is presented in Appendix B of the Technical Support Document for the final Economic Analysis.

* EPA agrees that site-specific translators for metals would better represent the conditions of site-specific water bodies. Therefore, EPA used site-specific translators in its final Economic Analysis whenever they were available. For example, EPA used a copper site-specific translator of 2.6 for Sunnyvale.

* In the final Economic Analysis, EPA does not use a total suspended solids (TSS) value of 35 mg/L for Sunnyvale. EPA instead used a TSS default value of 15 mg/L, which generally provides a more stringent limit for TSS dependent pollutants than using a TSS value of 35 mg/L. Regardless, TSS does not have an effect on the costs estimated for this particular facility because the two metals with reasonable potential (copper and silver) have metals translators which are not dependent on TSS. EPA used a site-specific translator for copper (2.6) and a default translator value (2) for silver because theoretical partitioning coefficients were not available.

* Sunnyvale requested that summary statistics of the data be presented in the analysis and that effluent

monitoring data be included as an appendix. Presently, the Technical Support Document for the Economic Analysis of the CTR does not include these data. However, the effluent data are publicly available and may be obtained from the Permit Compliance System Database (PCS).

* The revised Economic Analysis does not have a methodology to exclude outliers from the sample during reasonable potential and permit limit derivation. As a result, effluent variability may be greater than what it would be when outliers are extracted from the data set. A greater variability is reflected in larger projected effluent qualities (i.e., greater probability of receiving reasonable potential) and more stringent effluent limits, and, therefore, may result in higher costs. Thus, using all data points for the analysis may result in more conservative (i.e., higher) cost estimates. In addition, in order to fit data to a statistical distribution and to identify outliers, a large enough sample (e.g., greater than 20 observations) is required to ensure accuracy. EPA did not have large data sets for most of the sample facilities in the analysis. Despite this, EPA did try to consider outliers and outdated data by using both a cost decision matrix and best professional judgement to estimate costs. However, because of limited data and conservative assumptions, EPA's estimates may tend to overstate cost impacts.

* Sunnyvale proposed analyzing reasonable potential by comparing the projected effluent quality to the projected CTR-based limit. EPA considers this comparison unnecessary because, in the low scenario, EPA's estimate of reasonable potential is already based on projected effluent quality. EPA's reasonable potential approach compares projected effluent quality against water quality criteria, instead of projected CTR-based limits as recommended by Sunnyvale. Because CTR-based limits for metals are expressed as total concentrations and water quality criteria are dissolved, it is likely that Sunnyvale's methodology will result in fewer pollutants with reasonable potential and smaller costs than EPA's approach. EPA's reasonable potential methodology is based on the Technical Support Document for Water Quality-based Toxics Control (U.S. EPA, 1991) and EPA recognizes that its costing methodology may be moreconservative (i.e., erring on the side of higher costs) than other methodologies that could have been used, such as the one suggested by Sunnyvale.

* Please see response to CTR-021-012 regarding the use of the average monthly limit instead of the maximum daily limit to estimate projected compliance costs. Sunnyvale also has suggested estimating compliance costs by comparing the projected effluent quality to the projected CTR daily maximum limit. EPA does not believe that this comparison would be useful for the analysis, because, in addition to the explanation provided in the response to CTR-021-012, the Agency believes that the use of limited data and statistical procedures to determine compliance is an overly conservative approach. EPA would not use such an approach to establish compliance with water quality based limits or criteria (see CTR-040-004) and greater uncertainty would be introduced into the analysis by estimating costs based on statistically projected values rather than actually measured effluent data.

* Sunnyvale indicated that long-term averages (LTA) were computed using a 95% probability basis for chronic waste load allocations (WLA) and a 99% probability basis for the acute WLAs. This statement is incorrect. Acute and chronic LTAs both were calculated using a 99% probability basis. The probability basis selected for the analysis is provided in Section 5.5.4, Probability Basis (page 110), of the Technical Support Document for Water Quality-based Toxics Control (U.S. EPA, 1991). As indicated in that section, when a permitting authority does not have specific guidance for selection of the probability basis, LTAs are calculated using a 99th percentile level for both chronic and acute LTAs.

* Sunnyvale stated that since, in many cases, the chronic WLA is lower than the acute WLA, the resultant CTR-derived permit limit is based on the 95 percent probability rather than the 99% probability (i.e., a lower limit than would have been obtained if the 99% probability values were used). EPA believes that Sunnyvale has misunderstood the methodology used to derive permit limits. The average

monthly limit (AML) and the maximum daily limit (MDL) both are based on the most stringent (i.e., smaller) of the human health and the aquatic life acute and chronic LTAs. The AML is calculated by multiplying the smallest LTA times a multiplying factor that will result in a concentration that is the 95 th percentile level of a lognormal distribution with an upper bound equal to the chronic WLA. The MDL, on the other hand, is obtained by multiplying the smallest LTA times a multiplying factor that will result in a concentration that is the 99 th percentile level of a lognormal distribution and is less than the acute WLA. In other words, the MDL is greater than the AML mainly because it is calculated to be greater than 99% of the effluent concentrations while the AML is calculated to be greater than only 95% of the effluent concentrations. Refer to Table 5-2, Calculation of Permit Limits (page 103), of the Technical Support Document for Water Quality-based Toxics Control (U.S. EPA, 1991) for a list of multiplying factors at different probability levels. Note that the number of samples per month (n) is also used to calculate the AML.

* Sunnyvale requested that all computations (i.e., multipliers) be based on the same percentile levels in order to maintain consistency. As indicated above, the revised economic analysis of the final CTR uses the 99th percentile level to calculate LTAs. In addition, maximum daily limits (MDL) are also based on the 99th percentile level. The average monthly limits (AML), however, cannot be calculated using the same percentile level because this may result in effluent limits that are not protective of water quality. In particular, when the minimum LTA is the LTA based on chronic criteria, the resulting AML would be equal to the WLA based on chronic criteria. While individual exceedances of the AML are permitted, the WLA should never be exceeded; thus an AML calculated using the same percentile level as the MDL would not ensure compliance with chronic aquatic life criteria.

* Sunnyvale suggested that the projected effluent quality value be based on a 99% confidence level anda 99% probability basis. EPA revised its analysis to calculate projected effluent quality values using these confidence level and probability basis values.

See also responses to CTR-052-003b and CTR-092-017.

Comment ID: CTR-034-014b
Comment Author: SCAP
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-01b Cost Triggers
References: Letter CTR-034 incorporates by reference letter CTR-035
Attachments? N
CROSS REFERENCES E-01g08
E-01e
E-01v
J

Comment: * In general, we are pleased that EPA prepared an analysis of the economic impacts of the proposed CTR, and that a major portion of EPA's work focused on determining the potential impacts on POTWs. However, we believe that this analysis is based on improper assumptions and inaccurate cost estimates, resulting in unconvincing conclusions. Detailed comments can be found in Attachment 2. A few of the areas of concern are listed below:

* Small facilities appear to be under represented in EPA's sample of POTWS, especially for minor dischargers.

* The cost triggers used as regulatory relief thresholds are unrealistic, and are not consistent with EPA regulations and policies.

* The assumptions used to determine cost estimates for indirect dischargers appear to omit a large proportion of potentially affected industries.

* The Economic Analysis does not take into account projected population and industrial growth over time, which may influence effluent quality and quantity. Statewide, the population is projected to grow by nearly 50% by 2020.

* The use of average cost estimates masks economic impacts on individual dischargers, which may be particularly acute for small communities.

* The economic Analysis ignores the costs that may be incurred by stormwater dischargers and nonpoint sources to reduce loadings so that CTR criteria may be met in ambient waters.

Response to: CTR-034-014b

See responses to CTR-032-004 CTR-035-061, CTR-021-006b, CTR-040-037, CTR-059-018, and CTR-035-048.

Comment ID: CTR-035-047a
Comment Author: Tri-TAC/CASA
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-01b Cost Triggers
References:
Attachments? N
CROSS REFERENCES E-01m

Comment: pp. 2-24 - 2-32 (U.S. EPA, 1997b) - Cost Triggers for Alternative Regulatory Approaches The use of the $200 and $500 cost thresholds significantly skewed potential costs downwards by assuming that when those cost thresholds are reached, regulatory relief options would be pursued successfully, despite the fact that dischargers have absolutely no guarantees that such options will be successful, In the Preamble, in fact, EPA indicates that options such as variances and site-specific criteria will rarely, if ever, be granted. In addition, POTW experiences to date in California suggest that it is unlikely that such options will be successful. Thus, the basic premise of the analytic approach used to determine costs needs to be reconsidered. Incidentally, we also believe that the costs attributed to such activities were seriously underestimated. Information we are familiar with suggests that many of the regulatory alternatives EPA examined can cost up to several million dollars (per pollutant) (e.g. TMDLs, UAAs). Thus, we suggest that in the future when calculating the costs for such activities, EPA should use a range where $200,000/pollutant is the low end scenario and $2,000,000/pollutant is the high end scenario.

Response to: CTR-035-047a

See response to CTR-032-004.

Comment ID: CTR-040-033
Comment Author: County of Sacramento Water Div
Document Type: Storm Water Auth.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-01b Cost Triggers
References: Letter CTR-040 incorporates by reference letter CTR-027
Attachments? Y
CROSS REFERENCES

Comment: Although EPA goes to great length to label its cost analysis as "conservative" the analysis is anything but conservative:

* It is not conservative to assume that if the cost per toxic pound equivalent removed is greater than a certain threshold, the discharger would receive regulatory relief and therefore incur no treatment cost. (It is difficult to understand how EPA could rationalize basing the estimate of CTR costs on the assumption that there would be relief from the CTR if the costs were too high, especially when the CTR itself does not provide for such relief.)

Response to: CTR-040-033

See response to CTR-032-004.

Comment ID: CTR-040-040
Comment Author: County of Sacramento Water Div
Document Type: Storm Water Auth.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-01b Cost Triggers
References: Letter CTR-040 incorporates by reference letter CTR-027
Attachments? Y
CROSS REFERENCES

Comment: EPA's cost analysis relies on an unofficial yard stick for feasibility and regulatory relief ($200 to $500 per toxic pound equivalent removed) that is different and considerably lower than the official yard stick for feasibility that is set forth in EPA's affordability guidelines. EPA uses its affordability guidelines in considering many forms of regulatory relief (e.g., dedesignation of uses). EPA's affordability guidelines set a much higher threshold. For example under these guidelines, reverse osmosis has shown to be affordable at several large POTWs.

Response to: CTR-040-040

See response to CTR-032-004.

Comment ID: CTR-041-029
Comment Author: Sacramento Reg Cnty Sanit Dist
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-01b Cost Triggers
References:
Attachments? N
CROSS REFERENCES

Comment: Although EPA goes to great length to label its cost analysis as "conservative" the analysis is anything but conservative:

* It is not conservative to assume that, if the cost per toxic pound equivalent removed is greater than a certain threshold, the discharger would receive regulatory relief and therefore incur no treatment cost. (It is difficult to understand how EPA could rationalize basing the estimate of CTR costs on the assumption that there would be relief from the CTR if the costs were too high, especially when the CTR itself does not provide for such relief.)

Response to: CTR-041-029

See response to CTR-032-004.

Comment ID: CTR-041-036
Comment Author: Sacramento Reg Cnty Sanit Dist
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-01b Cost Triggers
References:
Attachments? N
CROSS REFERENCES

Comment: EPA's cost analysis relies on an unofficial yard stick for feasibility and regulatory relief ($200 to $500 per toxic pound equivalent removed) that is different and considerably lower than the official yard stick for feasibility that is set forth in EPA's affordability guidelines. EPA uses its affordability guidelines in considering many forms of regulatory relief (e.g., dedesignation of uses). EPA's affordability guidelines set a much higher threshold. For example under these guidelines, reverse osmosis has shown to be affordable at several large POTWs.

Response to: CTR-041-036

See response to CTR-032-004.

Comment ID: CTR-044-024
Comment Author: City of Woodland
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: E-01b Cost Triggers
References:
Attachments? N
CROSS REFERENCES

Comment: Although EPA goes to great length to label its cost analysis as "conservative" the analysis is anything but conservative:

* It is not conservative to assume that, if the cost per toxic pound equivalent removed is greater than a certain threshold, the discharger would receive regulatory relief and therefore incur no treatment cost. (It is difficult to understand how EPA could rationalize basing the estimate of CTR costs on the assumption that there would be relief from the CTR if the costs were too high, especially when the CTR itself does not provide for such relief.)

Response to: CTR-044-024

See response to CTR-032-004.

Comment ID: CTR-044-031
Comment Author: City of Woodland
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: E-01b Cost Triggers
References:
Attachments? N
CROSS REFERENCES

Comment: EPA's cost analysis relies on an unofficial yard stick for feasibility and regulatory relief ($200 to $500 per toxic pound equivalent removed) that is different and considerably lower than the official yard stick for feasibility that is set forth in EPA's affordability guidelines. EPA uses its affordability guidelines in considering many forms of regulatory relief (e.g., dedesignation of uses). EPA's affordability guidelines set a much higher threshold. For example under these guidelines, reverse osmosis has shown to be affordable at several large POTWs.

Response to: CTR-044-031

See responses to CTR-032-004 and CTR-045-012b.

Comment ID: CTR-054-028
Comment Author: Bay Area Dischargers Associati
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-01b Cost Triggers
References:
Attachments? N
CROSS REFERENCES

Comment: Although EPA goes to great length to label its cost analysis as "conservative" the analysis is anything but conservative:

* It is not conservative to assume that, if the cost per toxic pound equivalent removed is greater than a certain threshold, the discharger would receive regulatory relief and therefore incur no treatment cost. (It is difficult to understand how EPA could rationalize basing the estimate of CTR costs on the assumption that there would be relief from the CTR if the costs were too high, especially when the CTR itself does not provide for such relief.)

Response to: CTR-054-028

See response to CTR-032-004.

Comment ID: CTR-054-035
Comment Author: Bay Area Dischargers Associati
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-01b Cost Triggers
References:
Attachments? N
CROSS REFERENCES

Comment: EPA's cost analysis relies on an unofficial yard stick for feasibility and regulatory relief ($200 to $500 per toxic pound equivalent removed) that is different and considerably lower than the official yard stick for feasibility that is set forth in EPA's affordability guidelines. EPA uses its affordability guidelines in considering many forms of regulatory relief (e.g., dedesignation of uses). EPA's affordability guidelines set a much higher threshold. For example under these guidelines, reverse osmosis has shown to be affordable at several large POTWs.

Response to: CTR-054-035

See response to CTR-032-004.

Comment ID: CTR-056-018
Comment Author: East Bay Municipal Util. Dist.
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/22/97
Subject Matter Code: E-01b Cost Triggers
References: Letter CTR-056 incorporates by reference letter CTR-054
Attachments? N
CROSS REFERENCES

Comment: Finally, EBMUD has serious concerns about the accuracy of EPA's draft, Economic Analysis, particularly as it pertains to the cost and benefits estimates found in the draft CTR. We believe that the costs of the CTR are significantly underestimated and the benefits are inflated. On the cost side, there are several "flaws" which should be reevaluated:

* The use of assumptions which would tend to underestimate cost.

Response to: CTR-056-018

Based in part on the comments received by EPA on the costs estimated for the proposed CTR, EPA collected new data and information for each of the sample facilities. As a result, EPA revised its estimates of costs and benefits for the final CTR.

A direct comparison of the monetized annual (steady-state) benefits of the CTR and annualized costs shows benefits and costs to be generally commensurate given the uncertainty in the analysis and that several categories of benefits are unmonetized. The low estimate of monetized benefits is $8.7 million per year and the high estimate is $40.8 million per year. Annualized costs are $33.5 million under the low scenario and $61.9 million under the high scenario.

Discounted benefits are lower than discounted costs. However, the assumption that capital is replaced every 10 years likely overstates costs. At the same time, benefits may be understated because some categories are not monetized and full benefits may be realized sooner than 10 or 20 years. Thus, EPA expects that the present value of benefits and costs is more commensurate than shown.

Comment ID: CTR-056-019
Comment Author: East Bay Municipal Util. Dist.
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/22/97
Subject Matter Code: E-01b Cost Triggers
References: Letter CTR-056 incorporates by reference letter CTR-054

Attachments? N
CROSS REFERENCES

Comment: Finally, EBMUD has serious concerns about the accuracy of EPA's draft, Economic Analysis, particularly as it pertains to the cost and benefits estimates found in the draft CTR. We believe that the costs of the CTR are significantly underestimated and the benefits are inflated. On the cost side, there are several "flaws" which should be reevaluated:

* Assuming that regulatory relief measures will be granted, despite the fact that they are not automatically granted through triggers included as part of the proposed CTR, and using this as the basis for removing costs which exceed threshold values.

Response to: CTR-056-019

See response to CTR-032-004.

Comment ID: CTR-059-019
Comment Author: Los Angeles County Sanit. Dist
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: E-01b Cost Triggers
References: Letter CTR-059 incorporates by reference letter CTR-035

Attachments? Y
CROSS REFERENCES

Comment: Economic Analysis

The Sanitation Districts commends EPA for preparing an analysis of the economic impacts of the proposed CTR, and for selecting POTWs for half of the case studies. We believe that EPA is correct in thinking that POTWs are likely to experience major impacts as a result of the promulgation of the CTR. However, we believe that this analysis is based on improper assumptions and inaccurate cost estimates, resulting in unconvincing conclusions. Our own attainability and cost analysis indicates that there are indeed fundamental flaws in the cost analysis. A few of the areas of concern are listed below:

* The cost triggers used as regulatory relief thresholds are unrealistic, and are not consistent with EPA regulations and policies.

Response to: CTR-059-019

See response to CTR-032-004.

Comment ID: CTR-082-007b
Comment Author: City of Burbank

Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/24/97
Subject Matter Code: E-01b Cost Triggers
References:
Attachments? N
CROSS REFERENCES E-01g08

Comment: The subject rule has a significant impact on our facility discharge and the citizens of the City. We therefore present the following comments for your consideration to re-open the comment period for this rule in order to facilitate a more complete review by public and in particular by those in the POTW community:

* The draft economic analysis seems to have serious flaws. It under-estimates the cost of the draft CTR and overstates the benefits. In the cost analysis USEPA should re-evaluate the representativeness of samples used and the omission of impacts on many factors that contribute to loadings, and hence, can be expected to have to reduce their loadings (e.g., small indirect dischargers, municipal and industrial stormwater dischargers, agricultural activities, and other nonpoint sources); the incorporation of numerous assumptions that underestimate costs, and the assumption to artificially remove costs that exceed threshold values by assuming that regulatory relief measures will be granted, despite the fact that they are not automatically granted through triggers included as part of the proposed regulation.

Response to: CTR-082-007b

See response to CTR-032-004.

Subject Matter Code: E-01b01 RegRelief Above Threshold

Comment ID: CTR-066-013b
Comment Author: Delta Diablo Sanitation Dist.
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: E-01b01 RegRelief Above Threshold
References:
Attachments? N
CROSS REFERENCES E-01g08

Comment: The areas with which we find concerns and the requested changes include the following:

* The draft Economic Analysis has, from our short review, some serious flaws. It underestimates the costs of the draft to implement the CTR and overestimates the benefits. For the cost analysis, EPA should re-evaluate the representativeness of the sample used; the omission of impacts on many sectors that contribute to loadings and, therefore, can be expected to have to reduce their loadings (e.g., small indirect dischargers, municipal and industrial stormwater dischargers, agricultural activities, and other nonpoint sources); the incorporation of numerous assumptions that underestimate costs; and your assumption that artificially removes costs that exceed threshold values be assuming that regulatory relief measures will be granted, despite the fact that they are not automatically granted through triggers included as part of the proposed regulation.

Response to: CTR-066-013b

See response to CTR-032-004.

Comment ID: CTR-085-016b
Comment Author: Camarillo Sanitary District
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/24/97
Subject Matter Code: E-01b01 RegRelief Above Threshold
References:
Attachments? N
CROSS REFERENCES E-01g08

Comment: The District supports the following positions of CASA and SCAP where changes need to be made in the proposed California Toxics Rule:

* The District agrees with CASA and SCAP that the economic analysis has serious flaws. It underestimates the costs of the draft California Toxics Rule and overestimates the benefits. For the cost analysis, the EPA should evaluate the representativeness of the sample used; the omission of impacts on many sectors that contribute to loadings and hence, can be expected to reduce their loadings (i.e., small

indirect dischargers, municipal and industrial stormwater dischargers, agricultural activities and other non-point sources); the incorporation of numerous assumptions that under estimates the costs; and the assumption to artificially remove costs that exceed threshold values by assuming that regulatory relief measures will be granted, despite the fact that they are not automatically granted through triggers included as part of the proposed regulation.

Response to: CTR-085-016b

See response to CTR-032-004.

Comment ID: CTR-092-022b
Comment Author: City of San Jose, California
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: E-01b01 RegRelief Above Threshold
References: Letter CTR-092 incorporates by reference letter CTR-035
Attachments? Y
CROSS REFERENCES E-01c
E-01y

Comment: Comment #6: General Cost Analysis Concerns

The City of San Jose has several generalized concerns about the costs utilized in the Economic Analysis, which raise questions regarding the validity of that analysis, as follows:

Q.6-1) We believe the real point of undertaking the CTR is to assure water quality throughout State that protects beneficial uses. How can the existing Economic Analysis be sufficient if it does not address the cost of meeting the CTR standards from all sources of discharge? Especially given the amount and cost of aggressive intervention in reducing point source pollution undertaken in California to date?

Q.6-2) Throughout the text of the CTR and within the Economic Analysis, EPA refers repeatedly to the assumption that the State will provide regulatory relief to mitigate severe cost impacts engendered by the CTR. What happens to EPA's cost benefit analysis if even one of those assumptions of regulatory relief is not implemented by the State? While we support EPA's attempt to indicate available regulatory options for the State, local level governments and POTW's have little past experience on which to rationalize acceptance of such assumptions.

Q.6-3) EPA has not estimated the cost to local governments/POTW's/indirect dischargers of securing regulatory relief, nor has that cost been incorporated into the estimate of the CTR impact. How would EPA estimate the cost of securing regulatory relief and how would that additional cost affect the Economic Analysis? Especially since very costly studies may be required in order to qualify for regulatory relief.

Q.6-4) The preamble to the CTR discusses the linkage between the CTR and the National Toxics Rule, and EPA's intent to create a level playing field by setting the CTR standards within the National Toxics Rule Framework. There does not seem to have been a similar attempt to analytically level the playing

field vis a vis implementation costs, however, as no indexing or calibration has been undertaken to account for the cumulative costs of efforts to date (see also Q. 4-3), cost equivalency data is rooted in experience outside California, and simple average costs are used to represent widely variable ranges. How would the CTR cost/benefit relationship be affected by adjusting for California's significant previous efforts on water quality control mechanisms and California cost data?

Response to: CTR-092-022b

See responses to CTR-032-004, CTR-060-019, CTR-004-003, CTR-035-048, and CTR-092-022a.

Subject Matter Code: E-01c Executive Order 12866

Comment ID: CTR-021-005c
Comment Author: LeBoeuf, Lamb, Green & MacRae
Document Type: Local Government
State of Origin: CA
Represented Org: City of Sunnyvale
Document Date: 09/25/97
Subject Matter Code: E-01c Executive Order 12866
References: Letter CTR-021 incorporates by reference letter CTR-035
Attachments? Y
CROSS REFERENCES C-13
C-28
R
S

Comment: It is with a sense of reluctance that Sunnyvale joins in CASA/Tri-TAC's adverse comments on the CTR and the EA, and Sunnyvale does so in a spirit of constructive criticism and with an expectation that the Agency will make the necessary adjustments in its approach towards the CTR before the final rule is promulgated. In addition, in the same spirit and with the same expectation, Sunnyvale would like to make the following points on its own behalf:

2. Obligation to Assess Alternative Cancer Risk Levels for Human Health-Based Criteria. Sunnyvale is gravely concerned that EPA has used the wrong approach in proposing to establish human health criteria for organic pollutants, particularly those pollutants for which the proposed criteria are below the method level of detection ("MDL"). Sunnyvale recommends that EPA should thoroughly assess all of the potential impacts, including costs and benefits, of the 10E-4 and 10E-5 risk levels before proposing the human health-based criteria. As pointed out in the EOA Letter, there is a significant potential for advancing technology to lower the MDL for many pollutants to the point where laboratory equipment is able to measure some or all of the organic compounds for which EPA is proposing to establish criteria at the new level. It is intuitively obvious that the costs of attaining criteria set at the 10E-6 level will be significantly greater than attainment of a 10E-5 or 10E-4 level, particularly where, as pointed out in the EOA Letter, the only available method of treatment is granular activated carbon. Sunnyvale is concerned that the EA does not adequately address the potential for these costs, and, consequently, does not take these potential costs into account in determining whether to exercise its flexibility in choosing whether to use a 10-4 , 10-5 or 10-6 cancer risk level as the basis for its CTR promulgation.

EPA is required by Executive Order 12866, the Regulatory Flexibility Act and the Unfunded Mandates Reform Act to identify and analyze alternatives to a proposed rule. We cannot understand, therefore, why EPA has done such a cursory analysis in the preamble to the CTR and the EA of the alternatives to the use of the most stringent (10E-6) risk level for establishing criteria for human health effects of pollutants, particularly organic pollutants. EPA cannot base its selection of the 10E-6 level based upon previous regulatory pronouncements by the State of California. Any new determination by the State will be subject to the analytical requirements of Section 13241 of the Porter-Cologne Act and by review by the Office of Administrative Law. Thus, it is not a foregone conclusion that the State will ultimately select the 10E-6 level. EPA has its own legal requirements to fulfill. Accordingly, we ask that EPA not promulgate the final human health criteria for the pollutants of concern unless and until it has adequately analyzed the costs and other implications of the various alternatives to the 10E-6 level.

In conclusion, we are entirely supportive of many of EPA's innovative approaches towards development of the CTR, particularly as regards the toxic metals. However, we believe that EPA has needlesly failed to comply with many of its legal obligations, particularly as regards the development of human health-based criteria on cancer risk levels of organic pollutants. We urge the Agency to reconsider its position in the matters covered by this letter (as amplified by the EOA Letter) and the CASA/Tri-TAC letter. Sunnyvale pledges its continued participation in place-based watershed management planning in the South Bay, its cooperation with the Agency in making a success of the WPI, and to an ongoing effort by the Agency and others to reach water qulaity goals in the South Bay. We thank you for the opportunity to comment on the proposed CTR.

Response to: CTR-021-005c

With respect to the Regulatory Flexibility Act (RFA), and as stated in the preamble to the proposed and final rules, the RFA requires agencies to assess the economic impact of a rule only on small entities that are subject to the requirements of the rule. Today's rule does not impose any impacts on small entities.

Under the CWA, states have the primary responsibility for implementing water quality standards. [See e.g., Scott v. City of Hammond, Ind., 741 F.2d 992, 994 (7th Cir. 1984).] Unlike technology-based effluent limitations guidelines which are required to be implemented into NPDES permits, 40 CFR 122. 44(a), and for which EPA conducts regulatory flexibility analyses if the RFA standard is met, states have considerable discretion in developing effluent limits for point sources as necessary to meet water quality standards.

Water quality standards consist of three elements: designated uses, which establish water quality goals for water bodies in the State (which may take into account economic considerations), water quality criteria sufficient to protect those uses (based on science without regard to cost), and an antidegradation policy to maintain water quality. 40 CFR 131.6. Water quality criteria are ambient levels or concentrations or narrative statements representing conditions necessary to protect a designated use. 40 CFR 131.3(b). Once EPA establishes water quality criteria, the end to be achieved, the State has considerable flexibility in determining the means to achieve those ends in NPDES permits, TMDLs and other water quality programs. This flexibility means that while the State's implementation of federally-promulgated water quality criteria may result in new or revised discharge limits being placed on small entities, the criteria themselves apply to water bodies, not to any dischargers, including small entities.

In issuing a permit limit, there are various mechanisms a state may use including: mixing zones, pollutant loading allocations, effluent trading, and water-effect ratios. The State also has the ability to adopt variances, designated use reclassification, and site-specific criteria if appropriate and necessary. Each of these authorities may be applied by the State when it issues an NPDES permit. In addition, the State may have authority to control water quality in other ways independent of the CWA NPDES program, such as establishing controls over non-point sources, water quantity, zoning, best management practices (such as tree planting to lower temperature and runoff or fish ladders to improve fish spawning). These mechanisms, if successful, may affect the need for or substance of a water-quality based effluent limit. Thus, because it is the State that issues the permit and because the State in implementing the criteria may apply any or all of the above authorities, these criteria alone, in and of themselves, do not impact any small entity.

Consistent with this statutorily-mandated division of responsibilities between the states and the federal government under the CWA, EPA in the CTR has set state-wide ambient criteria for toxic pollutants, but has left to the State the primary responsibility for determining how to regulate point source dischargers

and non-point source dischargers tomeet the standards. Thus, EPA's certification of the CTR under section 605(b) of the RFA is consistent with (and a direct consequence of) the design of the CWA.

Further, attempting to apply the RFA analysis to water quality criteria setting does not make sense. Most importantly, this is because water quality criteria apply to the waterbody and must protect the designated use. As such, tailoring water quality criteria to vary depending on the size of a discharging entity is not possible. See Response to Comment CTR 042-007a. Also, because water quality criteria do not apply to small entities, and because states are free to adopt whatever mix of control measures they deem necessary, it is unclear to what extent states will seek discharge reductions from small entities. Finally, the water quality criteria themselves contain no regulatory or informational requirements applicable to small entities and thus cannot be tailored to fit the scale of those entities.

EPA recognizes that it has undertaken an economic analysis pursuant to E.O. 12866 for this rule. This analysis, however, makes numerous assumptions and does not necessarily predict how the state will implement the criteria. Thus, the economic analysis represents EPA's best estimate of the costs of the rule and given the broad flexibility the state has in implementing the criteria, the costs may even be lower. In addition to this analysis, EPA did an analysis of state and local implementation procedures that may have an impact on NPDES permit holders and indirect dischargers, entitled Implementation Analysis of Ambient Water Quality Criteria for Priority Toxic Pollutants in California. These analyses constitute an analysis equivalent to a regulatory flexibility analysis.

EPA believes that CTR criteria by themselves do not directly impose economic impacts. As a result, EPA believes that the rule is not significant within the meaning of Executive Order 12866. Criteria are one of three parts of a water quality standard. A water quality standard is comprised of: a criterion, a designated use, and an antidegradation requirement. The CTR promulgates criteria for priority toxic pollutants. When these criteria are combined with State adopted designated uses and antidegradation requirements, water quality standards will be created. When the State implements these water quality standards, costs may be imposed based on many yet unknown factors including the community's decision that such costs are reasonable and appropriate to protect designated uses. Nevertheless, in the spirit of the intent of E.O. 12866, EPA prepared the EA which looks at the potential costs and benefits of the State's implementation of the resulting water quality standards based on the CTR criteria into the NPDES permit program.

EPA disagrees with the commenter's assertion that EPA may not have complied with Executive Order 12866. EPA fully complied with Section 6(a)(3)(a) of the Executive Order which requires each agency to provide OMB with a list of its planned regulatory actions, indicating those which the agency believes are significant regulatory actions.

EPA categorized the CTR as "not significant" and submitted to OMB, a draft copy of the proposed CTR along with a draft economic analysis. After review of this material, OMB agreed with EPA's determination that the proposed rule was not significant within the meaning of the Executive Order, and waived its 90-day review period for the proposed CTR. EPA performed an economic analysis even though this type of analysis is only required for significant regulatory actions within the scope of section (3)(f)(1) of the Executive Order. Therefore, even though EPA categorized the proposed CTR as "not significant", EPA fulfilled the Executive Order requirements as if it were a significant rule.

For further discussion of how today's rule complies with Executive Order 12866, the Unfunded Mandates Act, and the Regulatory Flexibility Act, see the preamble to the final rule and EPA's economic analysis of the final rule.

Comment ID: CTR-021-006b
Comment Author: LeBoeuf, Lamb, Green & MacRae
Document Type: Local Government
State of Origin: CA
Represented Org: City of Sunnyvale
Document Date: 09/25/97
Subject Matter Code: E-01c Executive Order 12866
References: Letter CTR-021 incorporates by reference letter CTR-035
Attachments? Y
CROSS REFERENCES J
R
S
I-01

Comment: It is with a sense of reluctance that Sunnyvale joins in CASA/Tri-TAC's adverse comments on the CTR and the EA, and Sunnyvale does so in a spirit of constructive criticism and with an expectation that the Agency will make the necessary adjustments in its approach towards the CTR before the final rule is promulgated. In addition, in the same spirit and with the same expectation, Sunnyvale would like to make the following points on its own behalf:

3. Failure to Address Important Stormwater-Related Issues. In addition to its POTW, Sunnyvale is the owner of a system of storm drains which contribute wet weather flows to the South Bay. We are concerned that the EA entirely neglects the potential impacts of the proposed CTR on the storm drains. The EA entirely omits any meaningful analysis of the costs of bringing storm drains into compliance with the proposed CTR, thereby significantly understating the overall costs of the CTR. We believe that this omission is violative of the Agency's legal obligations under the authorities cited in the preceding paragraph.

In addition, we join in the comments being filed by the various other operators of stormwater collection systems to the effect that EPA has overstated the legal requirements for storm drains to comply with numerical criteria.

Response to: CTR-021-006b

EPA did not include benefits or costs of controlling nonpoint sources or storm water dischargers in its estimates of benefits and costs of the CTR. EPA believes that the final rule will not have a direct effect on sources not permitted under the NPDES program (e.g., nonpoint sources) or NPDES sources not typically subject to numeric water quality-based effluent limits (e.g., wet weather discharges) beyond those already being implemented under current state programs. The CTR language allows (consistent with EPA's policy) the practice of applying maximum extent practicable (MEP) to MS4 permits, along with BMPs as effluent limits to meet water quality standards where infeasible or insufficient information exists to develop water quality-based effluent limits. Any potential indirect effect on nonpoint sources and wet weather discharges, such as runoff from farms, urban areas, and abandoned mines, and contaminated sediment, is unknown at this time. Many of the programs developed to control nonpoint sources and wet weather discharges are already in place in the State of California. Costs due to these programs have already been incurred or will soon be incurred owing to existing federal, State, and local environmental programs. EPA evaluated the comments and analyses submitted by commenters providing costs for controlling nonpoint sources and none of these comments provided a definitive argument that

storm water dischargers cannot achieve compliance with the proposed water quality criteria or that compliance would result in widespread economic impact or hardship.

EPA also acknowledges that nonpoint sources and wet weather discharges are technically difficult to model and evaluate costs because they are intermittent and highly variable. Nonpoint source and wet weather discharges also occur under different hydrologic or climatic conditions than continuous discharges from industrial and municipal facilities, which are evaluated under critical low flow or drought conditions. Thus, evaluating agricultural nonpoint source discharges and storm water discharges and their effects on the environment is highly site-specific and data intensive.

See also response to CTR-040-004.

Comment ID: CTR-031-006c
Comment Author: Fresno Metro. Flood Ctrl Dist.
Document Type: Flood Ctrl. District
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-01c Executive Order 12866
References: Letter CTR-031 incorporates by reference letter CTR-027
Attachments? N
CROSS REFERENCES J
R

Comment: b. If the CTR as proposed in the current draft is applied to municipal storm water dischargers so as to require numeric effluent limitations in municipal stormwater permits, the cost to the public will be phenomenal. In the economic analysis of the CTR, EPA failed to consider these costs, and failed to consider the costs to industrial storm water dischargers as well.

The District Is urban storm water drainage system captures through retention 90% of its annual average runoff, and discharges 90% after detention (1% is directly discharged without treatment). The system cost in 1997 dollars is estimated at $500 million.

The only option available to the District to mitigate violations of the proposed criteria would be to expand system storage to capture 100% of average annual runoff. Increasing system storage by 20,000 acre feet (estimated additional storage required for average years), at the current cost of $11,000-$20,00 per acre foot of storage, would result in a capital expenditure of $220,000,000 to $400,000,000.

Even with this exorbitant investment, in approximately half of the rain seasons storage would be exceeded, and 100% of the discharges would be expected to exceed the dissolved metals criteria noted above.

Smaller cities (under 50,000) in California are currently subject to NPDES municipal storm water discharge permits, and many more will be included upon implementation of the Stormwater Phase II program. EPA's failure to assess economic impacts on small cities would appear to be contrary to the requirements of the Federal Regulatory Flexibility Act.

The District includes in its constituency industrial businesses. The District serves these businesses and

assists in the oversight of their pollution prevention and storm water permit compliance efforts. Regardless of EPA' s approach to applying the CTR to municipal storm water permits, industrial storm water dischargers are directly and seriously affected by application of the CTR. EPA's failure to assess these economic impacts on our communities is short-sighted and a breach of good public policy.

Response to: CTR-031-006c

See responses to CTR-021-006b and CTR-040-026. For discussion of the applicability of the Regulatory Flexibility Act to this rule, see the preamble to the final rule.

Comment ID: CTR-035-008f
Comment Author: Tri-TAC/CASA
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-01c Executive Order 12866
References:
Attachments? N
CROSS REFERENCES E-01g08
E-01e
E-01d
E-01m
E-01h

Comment: Finally, we have serious concerns about the accuracy of the draft Economic Analysis and the estimates of the costs and benefits of the draft CTR (see detailed comments in Attachments I and 2). Our primary concerns related to the cost analysis include 1) that the case studies on which the cost analysis is based do not adequately represent the actual population of POTWs in California; 2) the omission of costs that could be incurred by many sectors that contribute to overall loadings, and, hence, can be expected to have to reduce their loadings (e.g., non-SIU indirect dischargers, municipal and industrial stormwater dischargers, agricultural activities, and other nonpoint sources of CTR-regulated pollutants); 3) the use of numerous assumptions that underestimate costs; and 4) the capricious removal of costs that exceed threshold values by assuming that regulatory relief measures will be granted, despite the lack of any proposed regulatory relief trigger in the proposed regulation.

To illustrate the degree of underestimation of costs for the POTW sector alone, we looked at potential compliance costs for the POTW sector. We found that the potential costs for 23 major POTWS. on an annualized basis, may reach $400 million. We believe that this analysis demonstrates that the potential cost consequences of compliance with effluent limits based on the proposed CTR criteria would easily exceed the $ 100 million annual cost threshold, especially when the costs of all 313 POTWs in the State are estimated. Thus, we believe that EPA must conclude that the proposed CTR could have significant economic impacts on local governments.

Response to: CTR-035-008f

See response to CTR-021-005c, CTR-032-004, CTR-040-039, CTR-021-006b, CTR-040-037, and CTR-059-018.

Comment ID: CTR-035-010
Comment Author: Tri-TAC/CASA
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-01c Executive Order 12866
References:
Attachments? N
CROSS REFERENCES

Comment: In summary, we believe that, contrary to EPA's conclusion, the proposed regulation is a significant regulatory action pursuant to Executive Order 12866 and the Unfunded Mandates Reform Act. The CTR may well impose costs that exceed $100 million per year on the regulated community, the majority of which are local public agencies, and this will have a significant impact on local governments. By another measure, by promulgating 190 new criteria for California (for about 70 different pollutants), of which 70 (37%) have been recalculated, modified, or added by EPA since the 1992 promulgation of the National Toxics Rule, the CTR certainly is a "significant regulatory action,"(*1) Further, the Agency fails to make a "reasoned determination that the benefits of the intended regulation justify its costs," as required by Executive Order 12866 or a determination that the Agency selected "the least costly, most cost-effective or least burdensome alternative" as required under the Unfunded Mandates Reform Act. Hence, in our estimation, EPA must completely overhaul the Economic Analysis, and it must be reviewed by the Office of Management and Budget because the CTR is a significant regulatory action.

(*1) These numbers include aquatic life and human health criteria that were promulgated for California in the 1992 NTR but which have been modified or recalculated and are being reproposed in the CTR.

Response to: CTR-035-010

See response to CTR-021-005c.

For a discussion of the Agency's compliance with UMRA and Executive Order (EO) 12866, see the preamble to the final rule. Although EPA was not required to conduct a regulatory impact assessment, EPA chose to conduct one. EPA believes that its analysis has shown that the benefits of the rule justify the costs. However, under the Clean Water Act, water quality criteria are not established based on costs but are based on sound science to protect designated uses of the waters. Further, such criteria are to be based on EPA's section 304(a) criteria recommendations, EPA's 304(a) criteria recommendations modified to reflect site-specific conditions, or other scientifically defensible methods. From the outset of the national water quality standards program, EPA has explained that while economic factors may be considered in designating uses, scientific and technical factors must justify criteria to meet those uses. Also see response to CTR-042-007a.

Comment ID: CTR-035-039
Comment Author: Tri-TAC/CASA
Document Type: Trade Org./Assoc.
State of Origin: CA

Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-01c Executive Order 12866
References:
Attachments? N
CROSS REFERENCES

Comment: II. Compliance with Federal Executive Orders and Statutes pp. 42188-42190 -- Executive Order 12866, Regulatory Planning and Review EPA claims that it is not subject to certain requirements of the Executive Order because the Administrator has determined that the CTR is not a "significant regulatory action" within the meaning of Section 3(f)(1) of the E.O. We believe that EPA was incorrect in making this determination, for the following reasons: (1) the annual costs of the CTR will be far in excess of the $ 100 million threshold (see additional discussion below); (2) the CTR will without question materially adversely affect state and local governments; and (3) the CTR is likely to have a material adverse effect on one or more sectors of the economy, with a prime example being Silicon Valley, the heart of America's high technology industry, which happens to be located around the southern portion of San Francisco Bay. EPA itself identifies three sectors that will bear most of the projected costs of implementing the proposed rule. POTWs, chemical and petroleum industries, and metals and transportation equipment (collectively, these three sectors represent 93% and 97% of the annual costs under the low and high cost scenarios, respectively) (U.S. EPA, 1997b, pp. 3-3 and 3-7). We also believe that the proposed CTR is significantly different from rules that have been promulgated previously, including the National Toxics Rule ("NTR") (40 CFR 131.36) and the Great Lakes Initiative ("GLI") (60 Fed. Reg. 15366). While both of these previous rules promulgated water quality criteria for toxic pollutants, many of the criteria included in the CTR have been recalculated since the NTR was -promulgated in 1992 (70, or 37%, have been modified, recalculated, or added), the GLI served a somewhat different purpose than does the CTR (i.e. compliance with the Great Lakes Critical Programs Act of 1990), and, most importantly, those rules did not apply to California.(*2) Therefore, the economic analyses for those rules did not include an analysis of the economic impacts on California.

We believe that EPA also failed to fulfill its obligations under E.O. 12866, as follows: EPA did not seriously explore available regulatory alternatives, including the option of not regulating; EPA did not make a "reasoned determination that the benefits of the intended regulation justify its costs;" and EPA did not take into account the cost of cumulative regulations. In particular, we believe that for pollutants where the criteria are below commonly found laboratory detection levels, EPA did not fulfill its obligation to analyze the potential costs and benefits of the promulgation of these criteria. Because of this lack of compliance with the requirements of E.O. 12866, EPA should select the alternative of not regulating them at this time. As our ability to detect specific chemicals improves, then EPA may proceed with promulgation, provided all legal responsibilities are met. For all of the above-stated reasons, we believe that EPA must revise the CTR, and its economic analysis of the CTR, to comply with E.O. 12866.

(*2) With the exception of the NTR, which partially applied to California. However, the proposed CTR by definition does not duplicate the criteria in the NTR which already apply to California, unless revised criteria are being proposed.

Response to: CTR-035-039

Executive Order (EO) 12866 does not negate the Clean Water Act requirement that States have numeric

criteria for toxic pollutants for which EPA has issued 304(a) guidance. Within EO 12866 there are caveats to the application of the EO including section 1(a): "unless a statute requires another regulatory approach," and section 1(b): "to the extent permitted by law and where applicable."

See responses to CTR-021-005c and CTR-042-007a and the preamble to the final rule for discussions relating to the rule's compliance with EO 12866.

Comment ID: CTR-036-002b
Comment Author: County of Orange
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-01c Executive Order 12866
References: Letter CTR-036 incorporates by reference letters CTR-013, CTR-018, CTR-031, CTR-034 and CTR-040
Attachments? N
CROSS REFERENCES J

Comment: Cost to Implement the Proposed Rule

The inclusion of municipal stormwater discharges under the proposed rule renders the economic analysis invalid, noting municipal studies that show that stormwater discharges cannot comply with all of the proposed criteria with anything short of major national or regional product substitutions, or end-of-pipe treatment:

The Fresno Metropolitan Flood Control District conducted an attainability analysis on stormwater discharges from its urbanized area detention basins. The analysis showed that even with pollutant reductions in the basins, the proposed criteria would not be met.

The Sacramento Stormwater Program conducted an attainability analysis and found that even with an aggressive BMP program the urbanized area would not achieve certain of the water quality criteria, and that the cost of treatment would be on the order of $2 billion.

A preliminary attainability analysis conducted by Orange County, based on a limited dataset, indicates similar findings to Fresno and Sacramento in spite of the implementation of a significant BMP program over a multi-year period (see Attachment 2).

A nationwide attainability study, conducted by American Public Works Association in 1992, estimated capital costs and annual operations costs to be $406,734,900,000 and $542,036,700,000. Significantly, these estimates omitted the costs associated with engineering, administration, permitting and land acquisition.

Even if end-of-pipe treatment were to be implemented for all urban stormwater, the contribution of toxic pollutants from this source is so minor (less than 3% according to the economic analysis) that they could not be justified by the marginal water quality benefits achieved. Clearly a rule that is known from the outset to inevitably result in massive expenditures which provide little water quality benefit or inevitable municipal noncompliance is not appropriate for California.

The rulemaking process of the federal government is obligated to fully explore the economic implications of the proposed regulatory action through compliance with Executive Order 12866, the Unfunded Mandates Report Act, of 1995 (the "Reform Act"), and the Regulatory Flexibility Act (the "RFA"). In its economic analysis EPA appears to have understated costs and circumvented these requirements resulting in a lack of disclosure of the true impacts of the Rule.

Executive Order 12866 requires any "significant" federal regulatory action to be referred to the Office of Management and Budget for review before it can be approved. In this context a "significant" action includes one which will "have an annual effect on the economy of $100 million or more or adversely affect in a material way the economy". Though admitting that there "may be a cost to some dischargers" to comply with water quality standards which will be derived from these toxics criteria, EPA nonetheless argues that the proposed rule is not a significant action because it "establishes ambient water quality criteria which. by themselves, do not directly impose economic impacts." [62 Fed. Reg. 42188].

First nothing in E.O. 12866 indicates that only actions with direct economic impacts are to be considered by OMB. Second, for EPA to ignore the link between the toxics criteria contained in the proposed rule and the obligations they impose is unfounded.

In short, EPA cannot have it both ways. It cannot indicate that stormwater discharges are subject to the proposed toxics rule and then turn a blind eye toward the costs associated with implementation of this rule. The costs of the proposed rule are direct and significant, greatly exceeding the annual $100 million threshold, and therefore the rule must be submitted to OMB for review.

Response to: CTR-036-002b

See response to CTR-021-005c, CTR- 021-006b and preamble to the final rule.

Comment ID: CTR-038-005a
Comment Author: Sonoma County Water Agency
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-01c Executive Order 12866
References:
Attachments? Y
CROSS REFERENCES R
S

Comment: A further consequence of the flawed economic analysis is the conclusion that the CTR is not a major rule (i.e., one which will result in excess of $100 million per year expenditure) subject to Presidential Executive order 12866 and the Unfunded Mandates Reform Act or a rule that affects small entities protected under the Regulatory Reform Act. The District, for example, is a small community having a population of under 50,000 and, in addition, serves several small towns and communities (Sonoma, Glen Ellen, Boyes Hot Springs and Agua Caliente) that would be greatly impacted by the proposed rule.

Response to: CTR-038-005a

See response to CTR-021-005c.

Comment ID: CTR-038-006b
Comment Author: Sonoma County Water Agency
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-01c Executive Order 12866
References:
Attachments? Y
CROSS REFERENCES C-21
R
S

Comment: 5. The proposed rule is inconsistent with applicable Federal law and regulations. In proposing a single set of criteria for all estuaries, the rule is inconsistent with the Clean Water Act and EPA's water quality standards regulations. The Clean Water Act requires that water quality standards be established taking into consideration their use and value for public water supplies, propagation of fish and wildlife, and recreational purposes (see CWA section 303(c)(2)(A)). Consistent with this, EPA regulations require that water quality standards be based on identification of "specific water bodies where toxic pollutants may be adversely affecting water quality or the attainment of the designated water use or where the levels of toxic pollutants are at a level to warrant concern..." For those identified waters, "states must adopt criteria for such toxic pollutants applicable to the water body sufficient to protect the designated use" (See 40 CFR 131.11(a)(2)). Clearly the intent of both the Clean Water Act and EPA regulations is that water quality standards be tailored to the characteristics of the waters in question. In failing to properly evaluate the rule's economic impacts and in failing to adequately consider regulatory alternatives, the rule is inconsistent with Presidential Executive Order 12866 and the Unfunded Mandates Reform Act. Moreover, in failing to properly consider the impacts on small entities, such as the District and the small communities it serves, the rule is inconsistent with the Regulatory Flexibility Act.

Response to: CTR-038-006b

See responses to CTR-021-005c, CTR-036-005, and the preamble to the final rule.

Comment ID: CTR-038-008b
Comment Author: Sonoma County Water Agency
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-01c Executive Order 12866
References:
Attachments? Y
CROSS REFERENCES C-24

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Comment: 7. Separate, sites-specific aquatic life criteria for copper and human health criteria for mercury should be adopted for Schell Slough, or alternatively EPA should specify implementation procedures for these criteria that will preclude unreasonable controls such as end-of-pipe treatment. To comply with the Clean Water Act and EPA regulations, EPA should consider specific water bodies. To fulfill the spirit of Presidential Executive Order 12866 and the requirements of the Unfunded Mandates Reform Act and the Regulatory Flexibility Act, EPA should evaluate regulatory alternatives based on an analysis of costs and benefits. Based on the assessment of costs and benefits described in "3" above, EPA should either adopt the criteria that is currently achieved, or alternatively specify implementation procedures that would allow the current discharge to continue (e.g., allowable Mixing zones and averaging periods and, for copper, a translator and water-effect ratio). Again, the District is amenable to continuing to address these constituents through pollution prevention measures and to assessing the actual impacts of these constituents in Schell Slough. Without EPA specifying such implementation procedures in the CTR, it is possible that the CTR could impose significant costs on the District (and the other small communities its serves) without providing a commensurate environmental benefit. In that case, the CTR would be inconsistent with the Clean Water Act, EPA regulations, Presidential Executive Order 12866, the Unfunded Mandates Reform Act and the Regulatory Flexibility Act.

Response to: CTR-038-008b

See response to CTR-021-005c, the preamble of the final rule.

Comment ID: CTR-040-009c
Comment Author: County of Sacramento Water Div
Document Type: Storm Water Auth.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-01c Executive Order 12866
References: Letter CTR-040 incorporates by reference letter CTR-027
Attachments? Y
CROSS REFERENCES R
S

Comment: MAJOR CONCERNS

We do, however, have fundamental concerns with the Rule as it is presently proposed and its supporting economic analysis. We believe the Rule can be modified in a manner that will be responsive to our concerns while at the same time being consistent with applicable Federal law and regulations. Our major concerns are presented here and are followed by our recommended modifications.

II. Concern: The economic analysis upon which the Rule is based is seriously flawed.

* A consequence of the cost/benefit analysis of the Rule are several erroneous conclusions, namely that: (1) this is not a "significant regulatory action" or a major rule (i.e., one which will result in excess of

$100 million annual expenditure) subject to the requirements contained in Presidential Executive Order 12866 and the Unfunded Mandates Reform Act; and (2) this is not a rule that will have a significant economic impact on a substantial number of small entities protected under the Regulatory Flexibility Act.

Response to: CTR-040-009c

See response to CTR-021-005c.

Comment ID: CTR-040-012a
Comment Author: County of Sacramento Water Div
Document Type: Storm Water Auth.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-01c Executive Order 12866
References: Letter CTR-040 incorporates by reference letter CTR-027
Attachments? Y
CROSS REFERENCES S

Comment: MAJOR CONCERNS

We do, however, have fundamental concerns with the Rule as it is presently proposed and its supporting economic analysis. We believe the Rule can be modified in a manner that will be responsive to our concerns while at the same time being consistent with applicable Federal law and regulations. Our major concerns are presented here and are followed by our recommended modifications.

III. Concern: The proposed Rule violates applicable Federal law and regulations

* In failing to properly evaluate the Rule's impacts and in failing to adequately consider regulatory alternatives, the Rule is inconsistent with Presidential Executive Order 12866 and the Unfunded Mandates Reform Act (See Attachment B).

Response to: CTR-040-012a

See response to CTR-021-005c.

Comment ID: CTR-041-013a
Comment Author: Sacramento Reg Cnty Sanit Dist
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-01c Executive Order 12866
References:
Attachments? N
CROSS REFERENCES R
S

Comment: 8. The proposed Rule is Inconsistent with Applicable Federal Law and Regulations

The proposed rule is inconsistent with applicable Federal law and regulations. In proposing a single set of criteria for all estuaries, the rule is inconsistent with the Clean Water Act and EPA's water quality standards regulations. (See attached Legal Analysis of the Proposed California Toxics Rule) to properly evaluate the rule's economic impacts and in failing to adequately consider alternative criteria for San Francisco Bay Area waters, the rule is inconsistent with Presidential Executive Order 12866 and the Unfunded Mandates Reform Act (Id). In failing to properly consider the impacts on small entities, the rule is inconsistent with the Regulatory Flexibility Act (Id).

Thank you for the opportunity to provide comments on this important new rule. Please call if you have any questions regarding our letter.

Response to: CTR-041-013a

See responses to CTR-021-005c and CTR-036-005.

Comment ID: CTR-041-015
Comment Author: Sacramento Reg Cnty Sanit Dist
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-01c Executive Order 12866
References:
Attachments? N
CROSS REFERENCES

Comment: 2. The California Toxics Rule is inconsistent with Executive Order 12866 and the Unfunded Mandates Reform Act.

a. Executive Order 12866

Executive Order (E.O.) No. 12866 was decreed by President Clinton on September 30, 1993. This Order governs review of agency regulations and sets standards that federal agencies should use in planning, drafting, and reviewing regulations. E.O. 12866 requires agencies to:

- Assess all of the costs and benefits of available regulatory alternative, including the alternative of not regulating;

- Propose or adopt a regulation only upon a reasoned determination that the benefits of the intended regulation justify its costs;

- specify performance objectives, rather than specify the behavior or manner of compliance, to the extent feasible;

- Tailor its regulations to impose the least burden on society, taking into account, among other things,

the cost of cumulative regulations;

- Afford the public a meaningful opportunity to comment on any proposed regulation, which in most cases should include a comment Period of not less than 60 days;

- Explore and, where appropriate, use consensual mechanisms for developing regulations, including negotiated rulemaking.

EPA contends that the CTR is not a "significant regulatory action" requiring an economic analysis under the terms of E.O. 12866.(*3) This contention by EPA is erroneous since BADA's attainability analysis shows that the cost to BADA alone may exceed the $100 million cut-off for determining whether a rule is a "significant regulatory action."

Furthermore, the standard for becoming a "significant-regulatory action" is, among other things, that the proposed rule is likely to have annual effect on the economy of $ 100 million or more, OR adversely affect in a material way the economy, the environment, or local governments. Thus, EPA should not be able to allege that this is not a "significant regulatory action" because the CTR will be likely to adversely affect the economy and local governments even if the $100 million cut-off were not met.

Moreover, EPA failed to seriously explore available regulatory alternatives, including an option of not regulating; did not make a "reasoned determination that the benefits of the intended regulation justify its costs;" did not allow a 60-day comment period; and did not seriously take into account the cost of cumulative regulations.

(*3) See 62 Fed. Reg. 42,188 (Aug, 5,1997)("It has been determined that this rule is not a "significant regulatory action" under the terms of Executive Order (E.O.) 12866 and is therefore not subject to OMB review").

Response to: CTR-041-015

See responses to CTR-021-005c, CTR-001-001, and CTR-035-001.

Comment ID: CTR-042-007b
Comment Author: Cal. Dept. of Transportation
Document Type: State Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: E-01c Executive Order 12866
References:
Attachments? Y
CROSS REFERENCES C-21
S

Comment: 7. The CTR may violate the Administrative Procedures Act, the and Unfunded Mandates Reform Act (UMRA) Executive Order (E.O.) No. 12866.

In the Preamble to the CTR, EPA repeatedly claims that the CTR will not result in expenditures of more than $100 million per year and, therefore, the statutory requirements of the UMRA and E.O. 12866 are not triggered.(*1) Caltrans' annual costs alone and only in Los Angeles will exceed the $100 million annual figure, even assuming the lowest level of treatment. Therefore, EPA's cost assumptions are challengeable as being arbitrary and capricious and in violation of the Administrative Procedures Act.(*2)

Request: Caltrans requests that EPA reconsider its cost estimates based on the comments received during the public comment period.

Caltrans would like to thank EPA for the opportunity to provide comments on this proposed regulation. It is hoped that EPA will consider and address Caltrans' comments in the final version of the CTR. Should you have any questions concerning our comments on the CTR, please feel free to address these questions to Marcia Arrant at (916) 657-5381.

(*1) See CTR, 62 Fed. Reg. at 42,188, and at 42,191 ("EPA has determined that this rule does not contain a federal mandate that may result in expenditures by State, local and tribal governments, in the aggregate, or by the private sector, of $100 million or more in any one year.")

(*2) See American Iron and Steel Institute v. EPA, 1997 WL 297251 (D.C. Cir., 1997)(the court found that EPA had arbitrarily failed to adequately address cost-justification for its elimination of mixing zones. EPA had estimated the total cost of elimination mixing zones for bioaccumulative chemicals of concern (BCCS) from all dischargers to the Great Lakes at $200,000, without even acknowledging a comment estimating the cost to one town for removal of mercury from its sewage discharge would be approximately $300,000).

Response to: CTR-042-007b

With respect to the commenter's criticism of the GLI decision, see CTR-042-007a. See CTR-021-005c for an explanation of how the Economic Analysis for the final CTR complies with EO 12866 and UMRA.

Cost estimates provided in the California Department of Transportation (Caltrans) analysis of compliance with the CTR may mix best management practices (BMPs) implementation costs to comply with local storm water permits with new compliance costs resulting from the CTR. EPA's Economic Analysis only evaluates the incremental impact of the water quality standards for toxics compared to the baseline program to avoid a double counting of costs (and benefits). For a detailed discussion of Caltrans' comments, see CTR-040-004.

Comment ID: CTR-043-005b
Comment Author: City of Vacaville
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: E-01c Executive Order 12866
References:

Attachments? Y
CROSS REFERENCES C-21
R
S

Comment: 5. The proposed rule is inconsistent with applicable Federal law and regulations.

In proposing a single set of criteria for all estuaries, the rule is inconsistent with the Clean Water Act and EPA's water quality standards regulations. The Clean Water Act requires that water quality standards be established taking into consideration their use and value for public water supplies, propagation of fish and wildlife, recreational purposes (see CWA section 303(c)(2)(A)). Consistent with this, EPA regulations require that water quality standards be based on identification of "specific water bodies where toxic pollutants may be adversely affecting water quality or the attainment of the designated water use or where the levels of toxic pollutants are at a level to warrant concern..." For those identified waters,"states must adopt criteria for such toxic pollutants applicable to the water body sufficient to protect the designated use"(See 40 CFR 131.1 I (a)(2)). Clearly the intent of both the Act and EPA regulations is that water quality standards be tailored to the characteristics of the waters in question. In failing to properly evaluate the rule's economic impacts and in failing to adequately consider regulatory alternatives, the rule is inconsistent with Presidential Executive Order 12866 and the Unfunded Mandates Reform Act. Moreover, in failing to properly consider the impacts on small entities, the rule is inconsistent with the Regulatory Flexibility Act.

Response to: CTR-043-005b

See responses to CTR-021-005c and CTR-036-005, and the preamble to the final rule.

Comment ID: CTR-044-006b
Comment Author: City of Woodland
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: E-01c Executive Order 12866
References:
Attachments? Y
CROSS REFERENCES C-21
R
S

Comment: We have reviewed the proposed CTR and offer the following comments:

5. The proposed rule is inconsistent with applicable Federal law and regulations.

In proposing a single set of criteria for all estuaries, the rule is inconsistent with the Clean Water Act and EPA's water quality standards regulations. The Clean Water Act requires that water quality standards be established taking into consideration their use and value for public water supplies, propagation of fish and wildlife, recreational purposes (see CWA section 303(c)(2)(A)). Consistent with this, EPA regulations require that water quality standards be based on identification of "specific water bodies where

toxic pollutants may be adversely affecting water quality or the attainment of the designated water use or where the levels of toxic pollutants are at a level to warrant concern..." For those identified waters, "states must adopt criteria for such toxic pollutants applicable to the water body sufficient to protect the designated use"(See 40 CFR 131.11 (a)(2)) (see Exhibit G). Clearly the intent of both the Act and EPA regulations is that water quality standards be tailored to the characteristics of the waters in question. In failing to properly evaluate the rule's economic impacts and in failing to adequately consider regulatory alternatives, the rule is inconsistent with Presidential Executive Order 12866 and the Unfunded Mandates Reform Act (Id.). Moreover, in failing to properly consider the impacts on small entities, such as the City, the rule is inconsistent with the Regulatory Flexibility Act (Id.).

Response to: CTR-044-006b

See responses to CTR-021-005c, CTR-036-005, and the preamble to the final rule.

The NOAA data included five bays (San Diego, Humboldt, Monterey, Santa Monica, and San Pedro), two of which are actually covered by the CTR (San Diego and Humboldt). EPA assumed that the data for the nonenclosed bays generally will be applicable to enclosed bays. If EPA had excluded those bays not covered by the rule, the attribution assumption for point sources would actually be higher (see EA, Chapter 7). For example, for urban bays, the toxic-weighted average contribution of point sources is higher for the enclosed bay covered by the rule (San Diego Bay; 91%) compared to the nonenclosed bays (Santa Monica and San Pedro, at 88% and 83%, respectively). EPA employed toxicity-weighting to estimate relative source contribution because the toxicity of the discharge, more than volume, will influence its impact on receiving waters. The California 1996 303(d) report lists both point and nonpoint sources as probable sources of pollution for Santa Monica Bay. The list of pollutants and stressors for Santa Monica Bay includes metals, DDT, and PCBs.

Comment ID: CTR-044-009b
Comment Author: City of Woodland
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: E-01c Executive Order 12866
References:
Attachments? Y
CROSS REFERENCES C-28
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S

Comment: We have reviewed the proposed CTR and offer the following comments:

8. EPA should not adopt criteria for any pollutant where the method detection limit exceeds the objective and there is insufficient detectable, reliable data to determine if the pollutant could reasonably be expected to interfere with designated uses. The proposed rule includes criteria for a number of constituents where there is insufficient data to determine whether the discharge of such pollutants could reasonably be expected to interfere with the designated uses. EPA has chosen to promulgate criteria for these constituents even though section 303 (c)(2)(B) of the Clean Water Act requires States to adopt numeric criteria only for constituents "... the discharge or presence of which in the affected waters could

reasonably be expected to interfere with those designated uses adopted by the State, as necessary to support such designated uses." Clearly, this approach goes beyond the requirements of the Clean Water Act and is therefore unnecessary. Additionally, this approach does not allow EPA to fulfill its duty (under Presidential Order 12866, the Unfunded Mandates Reform Act, and the Regulatory Flexibility Act) to assess the costs, benefits, and impacts of the rule on local government and small entities. While this may be the conservative approach for EPA, it places dischargers throughout the State at risk. As analytical detection limits improve, dischargers may find they are unable to achieve the criteria without costly end-of-pipe controls. But, by then, it will be too late for EPA to evaluate the costs and benefits of the criteria-and-consider alternative criteria. For these reasons, EPA should not adopt criteria for those constituents. If EPA does adopt criteria for those constituents, EPA should evaluate the costs and benefits of toxic criteria, as well as alternative criteria, using worst case assumptions (i.e., assume that discharge levels and ambient levels are at the detection limits).

Response to: CTR-044-009b

See responses CTR-044-033, CTR-021-005c, CTR-004-002, CTR-005-009, and CTR-035-064.

EPA defined toxic-impaired waters as waters rated medium or poor quality for at least one or more toxic pollutant or group of pollutants. EPA acknowledged that this definition may result in an overestimate of toxic-impairment (EA Chapter 8). However, the rating of these waters corresponds to EPA's categories of 'not fully supporting' and 'partially supporting' designated uses. The existence of waters not supporting and only partially supporting designated uses is indicative of the need for and benefits associated with pollution controls.

Comment ID: CTR-044-045
Comment Author: City of Woodland
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: E-01c Executive Order 12866
References: Letter CTR-040 incorporates by reference letter CTR-027
Attachments? Y
CROSS REFERENCES B Comment Period

Comment: 2. The California Toxics Rule is inconsistent with Executive Order 12866 and the Unfunded Mandates Reform Act.

a. Executive Order 12866

Executive Order (E.O.) No. 12866 was decreed by President Clinton on September 30, 1993. This Order governs review of agency regulations and sets standards, that federal agencies should use in planning, drafting, and reviewing regulations. E.O. 12866 requires agencies to:

- Assess all of the costs and benefits of available regulatory alternatives, including the alternative of not regulating;

- Propose or adopt a regulation only upon a reasoned determination that the benefits of the intended

regulation justify its costs;

- Specify performance objectives, rather than specify the behavior or manner of compliance, to the extent feasible;

- Tailor its regulations to impose the least burden on society, taking into account, among other things, the cost of cumulative regulations;

- Afford the public a meaningful opportunity to comment on any proposed regulation, which in most cases should include a comment period of not less than 60 days;

- Explore and, where appropriate, use consensual mechanisms for developing regulations, including negotiated rulemaking.

EPA contends that the CTR is not a "significant regulatory action" requiring an economic analysis under the terms of E.O. 12866. This contention by EPA is erroneous since the standard for becoming a "significant-regulatory action" is that the proposed rule is likely to have annual effect on the economy of $100 million or more, OR adversely affect in a material way the economy, the environment, or local governments. Thus, EPA should not be able to allege that this is not a "significant regulatory action" because the CTR will be likely to adversely affect the economy and local governments even if the $100 million cut-off were not met.

Moreover, EPA failed to seriously explore available regulatory alternatives, including an option of not regulating; did not make a "reasoned determination that the benefits of the intended regulation justify its costs;" did not allow a 60-day comment periods, and did not seriously take into account the cost of cumulative regulations.

Response to: CTR-044-045

See responses to CTR-021-005c and the preamble to the final rule.

Comment ID: CTR-045-012b
Comment Author: Sausalito-Marin Sanitary Dist.
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/24/97
Subject Matter Code: E-01c Executive Order 12866
References:
Attachments? Y
CROSS REFERENCES E-01d

Comment: Based on our analysis of the impact of the proposed CTR, we will need to utilize reverse osmosis to meet the proposed CTR limits for copper. Based on this modification, we estimate that our potential annualized costs for compliance will be approximately $900,000. These costs are significantly higher than EPA's estimated costs per plant of $27,000 per year to $480,000 per year. Thus, we strongly believe that the draft Economic Analysis significantly underestimates the potential statewide costs associated with adoption of the CTR and should be revised.

Response to: CTR-045-012b

EPA received a number of comments regarding the ability of existing treatment technologies to meet CTR-based WQBELs for a wide variety of pollutants. The CTR, consistent with the Clean Water Act (CWA) and the National Pollutant Discharge Elimination System (NPDES) program, does not direct facilities on how to comply with permit requirements. Therefore, each regulated facility can consider a variety of options to comply with permit requirements. In estimating compliance costs, EPA selected control options for the sample facilities by taking into consideration treatment feasibility and cost.

In an effort to ensure consistency in estimating the general types of controls that would be necessary for a sample facility to comply with the final CTR, as well as to integrate into the cost analysis the alternatives available through CWA and NPDES permit programs, EPA developed and utilized a decision matrix. The underlying assumption of the decision matrix is that a facility will examine least-cost alternatives prior to incurring the expense and potential liabilities associated with constructing end-of-pipe treatment facilities. Additionally, for the low scenario only, EPA assumes that where current treatability data indicate that end-of-pipe treatment cannot achieve the WQBEL, a regulatory alternative measure, such as phased total maximum daily loads/water quality assessments, site-specific criteria modifications, standards variances, etc., will be utilized.

Under the decision matrix, EPA considered costs for minor treatment plant operation and facility changes first. Where it was not technically feasible to simply adjust existing operations, waste minimization/pollution prevention controls were considered; however, these controls were selected only where they were considered feasible based on EPA's understanding of the processes at a facility. In general, detailed treatment and manufacturing process information is not available in NPDES permit files. Therefore, EPA's assessment of feasibility was primarily based upon best professional judgement using general knowledge of industrial and municipal operations. If waste minimization was deemed not feasible to reduce pollutant levels to those needed to comply with the final Guidance criteria, EPA considered a combination of waste minimization/pollution prevention and simple treatment. If these relatively low-cost controls could not achieve the CTR-based WQBELs, then, finally, EPA assigned costs for end-of-pipe treatment.

It should be noted that under the low scenario, EPA provided one additional cost assumption. Before assuming that treatment would be installed by the facility, EPA first considered whether or not the treatment had been shown to achieve the requisite effluent concentration, and evaluated the relationship between the cost of adding the treatment versus other types of remedies or controls. If EPA concluded that treatment was not technically feasible, or that other remedies or controls would be more feasible than installing end-of-pipe treatment, EPA assumed that a facility would alternatively pursue regulatoryoptions for relief from the WQBEL. When EPA assumed that facilities would pursue a regulatory alternative, no end-of-pipe treatment cost was estimated for a facility; however, a nominal cost for efforts to reduce the pollutant using best available control methodologies was included. Where regulatory alternatives were utilized, EPA did not take credit for any load reduction for any pollutant for which regulatory alternatives were assumed. Finally, EPA estimated and included the typical cost to facilities pursuing alternatives to CTR-based WQBELs. These costs may include activities such as additional monitoring, performing special studies, etc., to support facilities' requests for alternatives to CTR-based WQBEL.

EPA's revised per plant cost estimates are $61,000 to $325,000 per year for POTWs for the low and high cost scenarios in its Economic Analysis of the final CTR. These costs are based on analyzing a sample of facilities and extrapolating to the whole universe of POTWs. Because these values represent averages for the universe of facilities throughout the state, it is possible that costs may be higher for some facilities

and that others may have very low or zero costs.

Given Sausalito-Marin City Sanitary District's (SMCSD) effluent concentration of 22 ug/L and the proposed CTR limit provided in the comment of 15.3 ug/L, a 30.4% loading reduction would be required. Since SMCSD does not provide other details of its current operations, it is not possible for EPA to evaluate whether reverse osmosis is the only feasible option which would ensure compliance with the CTR-based limit. However where sample facilities commented that they would need to install reverse osmosis and provided data to that effect, EPA's analysis of that data found that reverse osmosis would not be necessary.

Comment ID: CTR-050-007b
Comment Author: Sonnenschein Nath & Rosenthal
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org: American Petrol
Document Date: 09/26/97
Subject Matter Code: E-01c Executive Order 12866
References:
Attachments? N
CROSS REFERENCES C-21
R
S

Comment: IV. EPA Has Not Complied With Applicable Regulatory Review Requirements. There are several significant statutes and executive orders that require EPA to undertake analyses of the costs and benefits of its regulations, and to submit the regulations and analyses to other governmental bodies, including the Office of Management and Budget (OMB) and Congress. Those authorities include the Regulatory Flexibility Act, the Small Business Regulatory Enforcement and Fairness Act (SBREFA), the Unfunded Mandates Reform Act, the Congressional Review Act, and Executive Order 12866 (Regulatory Planning and Review). EPA apparently believes that it does not need to comply with any of those requirements for this rulemaking. (62 Fed. Reg. at 42188-42191). API believes that EPA is required to meet those obligations for the proposed criteria, and that the Agency's rationale for avoiding this responsibility has no legal basis.

EPA supports its decision not to comply with the regulatory review statutes by stating that the proposed criteria "by themselves, do not directly impose economic impacts." (62 Fed. Reg. at 42188). EPA admits that when those criteria are combined with the designated uses that have been adopted by the State, and implemented in permit limits, "there may be a cost to some dischargers." (62 Fed. Reg. at 42188) could be substantial; the Agency itself estimates that the compliance cost could be between $15 and $87 million per year.(62 Fed. Reg. at 42189). (That does not include indirect costs to the economy, which would surely put this rule above the $100 million impact threshold specified in several of the regulatory review statutes listed above.) EPA cannot ignore those costs by creating its own interpretation of those statutes in which only "direct" impacts need be considered. There is no support in the statutory language or legislative history for such a reading, and EPA has cited no such support in its Federal Register notice.

There is another problem with EPA's rationale for avoiding regulatory review: if EPA were right that "indirect" impacts do not trigger those reviews, the impacts of this rulemaking are not really "indirect."

Those impacts emerge clearly once the proposed criteria are combined with the State's designated uses. Those designations have already been established, so there is nothing uncertain or indefinite about that aspect of the water quality standards. Then, once the standards are completed, the State must implement those standards through permit limits. While there are some decisions that the State must make in determining the proper permit limits, which can influence the size of the compliance costs, EPA can readily determine a range of possible costs. In fact, the Agency has already done so, resulting in the $15 - $87 million cost range discussed above. While those costs may not be fixed with certainty, they are certainly "direct economic impacts". Therefore, even if the Agency were correct in looking at only "direct" impacts, this rulemaking poses such impacts, and EPA must comply with the statutory requirements to conduct and submit cost and benefit analyses of its proposed criteria.

V. CONCLUSION

As explained above, EPA's proposal to issue water quality criteria for toxicities in the State of California suffers from serious legal flaws. API urges the Agency to reconsider its intended course of action in light of the issues raised in these and other public comments. If you have any questions regarding these comments, or would like any additional information, please call Theresa Pugh at 202/682-8036.

Response to: CTR-050-007b

See responses to CTR-050-007a, CTR-021-005c, and the preamble to the final rule.

Comment ID: CTR-052-021b
Comment Author: East Bay Dischargers Authority
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: E-01c Executive Order 12866
References: Letter CTR-052 incorporates by reference letters CTR-035 and CTR-054
Attachments? Y
CROSS REFERENCES C-21
R
S

Comment: C. RECOMMENDATIONS FOR MODIFICATIONS TO THE CTR AND EA

EPA should revise the proposed rule and economics analysis such that they are consistent with applicable Federal law and regulations. In proposing a single set of criteria for all estuaries, the rule is inconsistent with the Clean Water Act and EPA's water quality standards regulations. In failing to properly evaluate the rule's economic impacts and in failing to adequately consider alternative criteria for San Francisco Bay Area waters, the rule is inconsistent with Presidential Executive Order 12866 and the Unfunded Mandates Reform Act. In failing to properly consider the impacts on small entities, the rule is inconsistent with the Regulatory Flexibility Act. Specific citations for these inconsistencies are contained in comments from BADA and CASA/Tri-TAC.

Response to: CTR-052-021b

See responses to CTR-009-008a and CTR-021-005c.

Comment ID: CTR-054-008c
Comment Author: Bay Area Dischargers Assoc.
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-01c Executive Order 12866
References:
Attachments? Y
CROSS REFERENCES C-02b
C-24
R
S

Comment: Separate, scientifically defensible, reasonably achievable aquatic life criteria for copper should be adopted for San Francisco Bay, or alternatively EPA should specify in the Preamble implementation policies for copper that will result in reasonable control measures actions. To comply with the Clean Water Act and EPA regulations, EPA is required to consider specific water bodies. To fulfill the spirit of Presidential Executive Order 12866 and the requirements of the Unfunded Mandates Reform Act, EPA is required to evaluate regulatory alternatives based on an analysis of costs and benefits. Based on BADA's analysis of costs and benefits, EPA should either adopt copper criteria that are reasonably achievable or alternatively specify implementation policies that will avoid costly end-of-pipe controls. Potential implementation measures that could be specified include use of the following in calculating effluent limitations: actual dilution based on modeling studies; copper translators; probability of compliance less than 99.9%; and water-effect ratios determined for different segments of the Bay. Unless EPA specifies these or similar implementation policies in the rule, it is possible that the CTR could result in significant costs ($12 million per year to $78 million per year) while resulting in minor environmental benefit (a 1% reduction in copper loading to the Bay). In that case, the CTR would violate the Clean Water Act, EPA regulations, Presidential Executive Order 12866, the Unfunded Mandates Reform Act and the Regulatory Flexibility Act. (see the discussion under Item 11 below.)

Response to: CTR-054-008c

See responses CTR-054-013a, CTR-021-005c, CTR-056-018, CTR-042-007a, and the preamble to the final rule.

Comment ID: CTR-054-049
Comment Author: Bay Area Dischargers Associati
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-01c Executive Order 12866
References: Letter CTR-040 incorporates by reference letter CTR-027

Attachments? Y
CROSS REFERENCES B Comment Period

Comment: 2. The California Toxics Rule is inconsistent with Executive Order 12866 and the Unfunded Mandates Reform Act.

a. Executive Order 12866

Executive Order (E.O.) No. 12866 was decreed by President Clinton on September 30, 1993. This Order governs review of agency regulations and sets standards, that federal agencies should use in planning, drafting, and reviewing regulations. E.O. 12866 requires agencies to:

- Assess all of the costs and benefits of available regulatory alternatives, including the alternative of not regulating;

- Propose or adopt a regulation only upon a reasoned determination that the benefits of the intended regulation justify its costs;

- Specify performance objectives, rather than specify the behavior or manner of compliance, to the extent feasible;

- Tailor its regulations to impose the least burden on society, taking into account, among other things, the cost of cumulative regulations;

- Afford the public a meaningful opportunity to comment on any proposed regulation, which in most cases should include a comment period of not less than 60 days;

- Explore and, where appropriate, use consensual mechanisms for developing regulations, including negotiated rulemaking.

EPA contends that the CTR is not a "significant regulatory action" requiring an economic analysis under the terms of E.O. 12866. This contention by EPA is erroneous since the standard for becoming a "significant-regulatory action" is that the proposed rule is likely to have annual effect on the economy of $100 million or more, OR adversely affect in a material way the economy, the environment, or local governments. Thus, EPA should not be able to allege that this is not a "significant regulatory action" because the CTR will be likely to adversely affect the economy and local governments even if the $100 million cut-off were not met.

Moreover, EPA failed to seriously explore available regulatory alternatives, including an option of not regulating; did not make a "reasoned determination that the benefits of the intended regulation justify its costs;" did not allow a 60-day comment periods, and did not seriously take into account the cost of cumulative regulations.

Response to: CTR-054-049

See response to CTR-021-005c.

Comment ID: CTR-055-003

Comment Author: USS-POSCO Industries
Document Type: Specific Industry
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: E-01c Executive Order 12866
References:
Attachments? Y
CROSS REFERENCES

Comment: UPI requests Office of Management and Budget (OMB) review of the subject reputation in accord with Executive Order (E.O.) 12866.

The EPA has not fully considered the impact and cost of Waste Load Allocation (WLA) for industrial facilities and for publicly owned treatment works (POTWs), even though the EPA supports the State Task Force conclusion which recognized that the development of Total Maximum Daily Load (TMDL) criteria was "significantly labor and data intensive" and that a "collaborative effort by....stockholders, could distribute work and associated costs". Costs were not properly determined for this significant effort or for the even larger compliance effort required for dischargers.

UPI has considered technologies and costs for compliance with the proposed regulation, recognizing that total maximum daily loads (TMDLs) would apply for a number of water quality-based effluent limitations (WQBELS) likely to be applicable to the receiving water at our facility.

UPI has determined that the only assured means of compliance with the proposed regulation is by use of equipment and operating methods that would eliminate discharge. Technologies for control are difficult, but appear to be feasible. The installed cost of such facilities at a plant such as ours which began operation early this century and contains numerous old installations was estimated at more that $25,000,000 when it was evaluated about five years ago. Such a cost for our facility when extended over just a few of the 56 major industrial facilities and 128 POTWs identified in California by the EPA would mandate OMB review of the subject regulation.

Response to: CTR-055-003

See response to CTR-021-005c. EPA disagrees with the commenter's statement that TMDLs would result in significant compliance costs. The use of TMDLs in developing permit limits would only reduce the cost impacts on facilities evaluated under the CTR because costs would not be borne solely by the point source dischargers. If EPA were to evaluate implementation costs using the TMDL process, it would allocate load reductions between point and nonpoint sources to take advantage of the most cost-effective mix of controls possible. EPA's current costing approach is conservative, erring towards higher costs by assuming that point sources would bear the cost burden alone. With a TMDL process, the result would be a more cost-effective mix between nonpoint and point source dischargers which could conceivably reduce the incremental impact on point source dischargers once current nonpoint source control programs are fully implemented.

Comment ID: CTR-059-002a
Comment Author: Los Angeles County Sanit. Dist
Document Type: Sewer Authority

State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: E-01c Executive Order 12866
References: Letter CTR-059 incorporates by reference letter CTR-035
Attachments? Y
CROSS REFERENCES R
S

Comment: The Sanitation Districts disagree with EPA's assertions that the CTR is not a significant regulatory action under Executive Order 12866 or the Unfunded Mandates Reform Act, and that EPA is not required to comply with the Regulatory Flexibility Act because the CTR establishes no requirements applicable to small entities. We believe the potential costs for POTWs to comply with the CTR criteria would far exceed the $ 100 million threshold, based on the fact that we estimate that the potential costs for seven Sanitation Districts' facilities to comply with the CTR to be nearly $150 million per year. Clearly, many of the 304 other POTWs in the State will also incur costs, as, will other NPDES permittees, indirect dischargers, stormwater dischargers, and nonpoint sources. Thus, EPA's cost figure of $15 - $87 million per year is simply not a credible estimate. Also, it is quite clear that the CTR is likely to adversely affect local governments, including over 40 small communities located in our service area, and that it is significantly different from other federal regulations previously promulgated in California. We believe that EPA has not complied with the mandates of Executive Order 12866, the Unfunded Mandates Reform Act and the Regulatory Flexibility Act. Accordingly, EPA must revise the economic analysis and it must be reviewed by the Office of Management and Budget and then EPA must select the most cost-effective and least burdensome regulatory alternative.

Response to: CTR-059-002a

EPA disagrees with LACSD's $150 million cost estimate, however EPA is not able to evaluate LACSD's estimate because LACSD does not provide monitoring data or any other details with which EPA can perform it's own analysis or evaluate LACSD's methodology. Based on EPA's analysis, costs to POTWs for the entire state range from $7.8 million to $41.6 million, much less than LACSD's $150 million cost estimate. See response to CTR-021-005c and the preamble for a discussion of how EPA's economic analysis meets the requirements of EO 12866, the UMRA, and the RFA.

Comment ID: CTR-059-004a
Comment Author: Los Angeles County Sanit. Dist
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: E-01c Executive Order 12866
References: Letter CTR-059 incorporates by reference letter CTR-035
Attachments? Y
CROSS REFERENCES M

Comment: As others have commented, we also encourage EPA to build on its efforts over the past year to coordinate with the State Water Resource Control Board (SWRCB). In particular, we recommend that in the future the two agencies take such steps as the use of simultaneous comment periods, joint preparation

of the economic analysis, and joint final promulgation, much as the "CAL-FED" agencies are doing. Simultaneous comment periods would greatly facifitate review by the public. Development of a joint economic analysis would greatly reduce the time and resources expended by the two regulatory agencies, as well as by stakeholders. Most importantly, EPA and the SWRCB should adopt the CTR and the State's Implementation Policy at the same time. This will eliminate uncertainties for permit writers and the regulated community as to how the CTR should be implemented, and encourage greater statewide consistency in the implementation of the CTR.

Response to: CTR-059-004a

See responses to CTR-034-016.

Comment ID: CTR-059-006b
Comment Author: Los Angeles County Sanit. Dist
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: E-01c Executive Order 12866
References: Letter CTR-059 incorporates by reference letter CTR-035
Attachments? Y
CROSS REFERENCES C-28
S

Comment: Due to the time constraints of the comment period, we have focused our review and comments primarily on those criteria that we anticipate may cause compliance issues for one or more of the Sanitation Districts' WRPs (see below). Based on our initial review of the proposed rule, the Sanitation Districts recommend that adoption of some of the criteria be deferred. As explained in the attached comments, we believe that there are significant scientific issues regarding the human health criteria for several trihalomethanes that call into question the accuracy and appropriateness of the proposed criteria. In addition, we reconunend that EPA defer adoption of those criteria that are below detection limits and that have not been demonstrated to be adversely affecting water quality or the attaimnent of designated uses on a water body-specific basis in California. In addition, we recommend that EPA not adopt criteria for effluent dependent waters, unless they have been adjusted to reflect the characteristics of this type of water body.

Criteria Below Detection Limits

We believe that there are fundamental problems with EPA's decision to adopt criteria that are below detection limits. This issue relates to EPA's statutory and regulatory obligations in establishing water quality criteria; namely, that EPA is subject to the same policies, procedures, analyses, and public participation requirements as States pursuant to 40 CFR section 131. These regulations require States to "review water quality data and information on discharges to specific water bodies where toxic pollutants may be adversely affecting water quality or the attainment of the designated water use or where the levels of toxic pollutants are at a level to warrant concern and must adopt criteria for such toxic pollutants applicable to the water body sufficient to protect the designated use." (40 CFR section 131.11) For criteria where the method detection limit exceeds the objective, there are inadequate data to determine if the pollutant could reasonably be expected to interfere with attainment of designated uses. We believe

that because of the inability to detect these substances and the lack of monitoring information indicating water quality use impairment EPA has not been able to fulfill its obligations to conduct a water body-specific analysis of the need to promulgate criteria.(*1)

(*1)U.S. Environmental Protection Agency, Economic Analysis of the Proposed California Water Quality Toxics Rule, Office of Water (EPA-820-B-96-001, July 1997), p. 8-18.

Second, EPA has not fulfilled its obligations under the Unfunded Mandates Reform Act and Executive Order 12866 to analyze the costs and benefits of promulgating proposed criteria which cannot be detected or for which insufficient monitoring data are available.

Given these deficiencies, we recommend that EPA defer the adoption of criteria for constituents which are below detection limits until such time as EPA has demonstrated that the levels of toxic pollutants being discharged are at a level to warrant concern. As an alternative, EPA could defer to the State for promulgation of criteria for such compounds on a water body-specific basis as part of the State's continuous water quality planning process.

Response to: CTR-059-006b

See responses to CTR-021-005c and CTR-005-009.

Comment ID: CTR-059-015a
Comment Author: Los Angeles County Sanit. Dist
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: E-01c Executive Order 12866
References: Letter CTR-059 incorporates by reference letter CTR-035

Attachments? Y
CROSS REFERENCES S

Comment: Executive, Order 12866 and Unfunded Mandates Reform Act

The Sanitation Districts disagree with EPA's assertion that the CTR is not a significant regulatory action under Executive Order 12866 or the Unfunded Mandates Reform Act. We believe that the potential costs for POTWs to comply with the CTR criteria could far exceed the $ 100 million threshold, based on the fact that we estimate that the potential costs of seven Sanitation Districts' facilities to comply with the CTR could be nearly $150 million per year. Clearly, many of the 304 other POTWs in the State will also incur costs, as will other NPDES permittees, indirect dischargers, stormwater dischargers, and nonpoint sources. Thus, EPA's cost figure of $15 - $87 million per year is simply not a credible estimate. Also, it is quite clear that the CTR is likely to adversely affect local governments, and that it is significantly different from other federal regulations previously promulgated in California. Therefore, we believe that EPA has not complied with the mandates of E.O. 12866 and the Unfunded Mandates Reform Act, and that the economic analysis must be revised, and EPA must select the most cost-effective and least burdensome regulatory alternative. In addition, the Office of Management and Budget should review the economic analysis and the rule before it is promulgated, as required by Section 6 of E.O. 12866.

Response to: CTR-059-015a

See responses to CTR-021-005c and CTR-059-002a.

Comment ID: CTR-090-012a
Comment Author: C&C of SF, Public Utl. Commis.
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-01c Executive Order 12866
References: Letter CTR-090 incorporates by reference letters CTR-035 and CTR-054
Attachments? Y
CROSS REFERENCES S

Comment: The PUC is aware that the Clean Water Act does not require and in fact does not allow for economic considerations in meeting water quality requirements. However, other policies and regulatory mandates (Executive Order 12866 and the Unfunded Mandates Reform Act) require that we disclose to the public the cost of meeting water quality requirements. There is no doubt that there will be costs that California must bear to produce water quality. We must assure the public that the costs will produce benefits. We are not confident that this proposed rule can do that.

Response to: CTR-090-012a

See response to CTR-021-005c.

Comment ID: CTR-092-016a
Comment Author: City of San Jose, California
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: E-01c Executive Order 12866
References: Letter CTR-092 incorporates by reference letter CTR-035
Attachments? Y
CROSS REFERENCES R
S

Comment: Introductory Comment

EPA states in the Executive Summary (page ES-2) to the Economic Analysis that:

"EPA did not calculate costs for any program for which it does not have enforceable authority ... (nor) for NPDES sources which are not typically subject to numeric WQBELs....."

From a national policy perspective, this narrowing, of the focus of the Economic Analysis may be a

justifiable approach to cost benefit analysis. Local government, however, is not able to disregard the potential cost effects of the CTR on urban and agricultural runoff. Those potential costs will have to be defrayed with proceeds from the same pool of local rate payers responsible for paying for point source pollutant removal programs. In California, those ratepayers have made clear both their support for environmental protection and their reluctance to pay more than is necessary for that protection. A narrow definition of those costs included in the CTR Economic Analysis continues the pattern of fragmenting responsibility and authority for the protection of waterways, which in turn hinders creation and implementation of holistic strategies which would best serve the environment at least cost.

Questions for EPA on the Introductory Comment

Q.-1) If not EPA, who has the responsibility to define the aggregated costs of all water quality-related regulations?

Q.-2) San Jose's reading of federal policy initiatives (which include, but are not limited to, the Regulatory Flexibility Act, Executive Order 12866, and the Unfunded Mandates Reform Act) indicates that EPA is empowered to analyze the economic impact of federal regulations in a way that addresses both aggregated cost impacts as well as the fiscal reality of local level government. Why was this not accounted for in the current analysis?

Response to: CTR-092-016a

See response to CTR-021-005c.

Comment ID: CTR-092-022a
Comment Author: City of San Jose, California
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: E-01c Executive Order 12866
References: Letter CTR-092 incorporates by reference letter CTR-035
Attachments? Y
CROSS REFERENCES E-01b01
E-01y

Comment: Comment #6: General Cost Analysis Concerns

The City of San Jose has several generalized concerns about the costs utilized in the Economic Analysis, which raise questions regarding the validity of that analysis, as follows:

Q.6-1) We believe the real point of undertaking the CTR is to assure water quality throughout the State that protects beneficial uses. How can the existing Economic Analysis be sufficient if it does not address the cost of meeting the CTR standards from all sources of discharge? Especially given the amount and cost of aggressive intervention in reducing point source pollution undertaken in California to date?

Q.6-2) Throughout the text of the CTR and within the Economic Analysis, EPA refers repeatedly to the assumption that the State will provide regulatory relief to mitigate severe cost impacts engendered by the CTR. What happens to EPA's cost benefit analysis if even one of those assumptions of regulatory relief is not implemented by the State? While we support EPA's attempt to indicate available regulatory options for the State, local level governments and POTW's have little past experience on which to rationalize acceptance of such assumptions.

Q.6-3) EPA has not estimated the cost to local governments/POTW's/indirect dischargers of securing regulatory relief, nor has that cost been incorporated into the estimate of the CTR impact. How would EPA estimate the cost of securing regulatory relief and how would that additional cost affect the Economic Analysis? Especially since very costly studies may be required in order to qualify for regulatory relief.

Q.6-4) The preamble to the CTR discusses the linkage between the CTR and the National Toxics Rule, and EPA's intent to create a level playing field by setting the CTR standards within the National Toxics Rule Framework. There does not seem to have been a similar attempt to analytically level the playing field vis a vis implementation costs, however, as no indexing or calibration has been undertaken to account for the cumulative costs of efforts to date (see also Q. 4-3), cost equivalency data is rooted in experience outside California, and simple average costs are used to represent widely variable ranges. How would the CTR cost/benefit relationship be affected by adjusting for California's significant previous efforts on water quality control mechanisms and California cost data?

Response to: CTR-092-022a

See responses to CTR-032-004, CTR-060-019, CTR-004-003. amd CTR-035-048.

Because implementation is the responsibility of the state, EPA does not control, nor does it know, what the cost impacts of implementing the CTR will be.

Subject Matter Code: E-01c01 $100M Threshold

Comment ID: CTR-034-003
Comment Author: SCAP
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-01c01 $100M Threshold
References: Letter CTR-034 incorporates by reference letter CTR-035
Attachments? N
CROSS REFERENCES

Comment: LEGAL ISSUES - Executive Order 12866, Unfunded Mandates Reform Act, Regulatory Flexibility Act

* SCAP disagrees with EPA's assertion that the CTR is not a significant regulatory action under Executive Order 12866. We believe that the potential costs of complying with NPDES permit limits based on the CTR criteria alone could far exceed the $100 million threshold. The CTR can also be considered a significant rule because it will "materially affect" one or more sectors of the economy, it will adversely affect local governments, and it is significantly different from other federal regulations previously promulgated in California.

Response to: CTR-034-003

See response to CTR-021-005c.

Comment ID: CTR-035-044a
Comment Author: Tri-TAC/CASA
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-01c01 $100M Threshold
References:
Attachments? N
CROSS REFERENCES E-01d01
J

Comment: pp. 42188-42189 - Potential Costs Do Not Meet the $100 Million Threshold Under E 0. 12866 (also see discussion above) As noted on p. 42188, one component of the definition of a "significant regulatory action" is that the rule may have an annual effect on the economy of $100 million or more. EPA states on p.42189 that "the annualized potential costs that direct and indirect dischargers may incur as a result of State implementation of permit limits based on water quality standards using today's proposed criteria are estimated to be between $15 million and $87 million." We believe that this range significantly underestimates the potential costs that may be realized from the implementation of this rule. This belief is based on the numerous assumptions used by EPA that would have served to underestimate

potential costs, including assumptions about regulatory flexibility that are clearly contradicted in the Preamble to the rule itself. These issues are further enumerated in Attachment 2, which contains an analysis prepared by the environmental economics firm, M. Cubed. Furthermore, we strongly believe that EPA has a duty to look at a full range of potential costs that may be incurred, and not just to look at the costs under optimistic assumptions. This duty is especially acute in light of the uncertainties of how the CTR will be implemented by the State.

We examined the potential costs for the POTW sector to determine the reasonableness of EPA's cost estimates. Our preliminary analysis indicates that for 23 major POTWs the annualized costs could reach $400 million.(*3) This estimate includes the cost to construct and operate end-of-pipe treatment processes where these would be necessary to achieve projected effluent limits. Unlike the EPA cost estimates, we have assumed that regulatory relief options may not be available, and that, based on the pollutants causing compliance problems, pollution prevention and treatment plant optimization might not be sufficient to reliably achieve compliance. Thus, we feel that this estimate reflects a more accurate depiction of the potential POTW "high-end" compliance costs that could result from the draft CTR. Based on this analysis, we believe that EPA should re-analyze the potential costs for POTWs to meet water quality-based effluent limits based on the criteria in the CTR.

As noted on p. ES-2 of the Economic Analysis (U.S. EPA, 1997a), EPA estimated only the costs to point sources, and did not estimate the potential costs for compliance for nonpoint source dischargers, despite the fact that the majority of water bodies in California are impaired due to nonpoint source discharges (SWRCB, 1996). In addition, EPA failed to estimate the costs of compliance for wet weather dischargers, such as municipal and industrial stormwater dischargers. These omissions also lead us to believe that the potential total costs of the rule are far greater than $100 million. EPA must correct these deficiencies and redo the Economic Analysis.

(*3) Backup information for these cost estimates is available upon request.

Response to: CTR-035-044a

See response to CTR-021-005c.

Comment ID: CTR-035-056b
Comment Author: Tri-TAC/CASA
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-01c01 $100M Threshold
References:
Attachments? N
CROSS REFERENCES E-01c02
E-01p

Comment: Introduction

On behalf of CASA and Tri-TAC, M.Cubed reviewed the U.S. Environmental Protection Agency 's

(USEPA) Economic Analysis (Analysis), as well as the report's underlying benefit and cost data and analyses. M.Cubed's overall reaction is that policy makers and the regulated community can place little confidence in either the benefit or cost analyses -- the uncertainties and broad assumptions contained in these analyses largely undermines their findings. Based on the information provided by USEPA, M.Cubed's judgement is that the proposed California Toxics Rule (Rule) will result in multi-million dollar annual costs -- and have substantial impacts on individual publicly-owned treatment works (POTWS) and dischargers -- and may result in no noticeable benefits to public health or the environment. A critique of specific weaknesses in the cost and benefit analyses is provided below.

Weaknesses in Overall Report Findings

The Analysis' overall findings exhibit a number of flaws, as follows:

USEPA's estimates indicate that Rule costs outweigh benefits, both on an annualized and present value basis. USEPA's claim that comparison "...of both annualized benefits and costs and discounted benefits and costs indicates that the monetized benefits of the CTR are of the same general magnitude as the costs" is simply not true (U.S. EPA, 1997a, page 9-2). For example, using USEPA's comparison of a twenty-year phase-in of benefits at a 3 percent discount rate against a ten-year phase-in of costs at a 7 percent discount rate, or benefits of between approximately $20 to $600 million against costs of about $180 million to $1 billion (setting aside the significant weaknesses in the analysis; differences in the probabilities of low or high outcomes; and questions over the appropriate discount rate to apply)(*2) indicates a low cost scenario which is nine times higher than the estimated benefits, and a high cost scenario which is almost twice as high as benefits.(*3)

Executive Order 12866, which requires the economic review, defines "significant regulatory action" as one that is likely to "adversely affect ... a sector of the economy." Yet, although the USEPA finds that two sectors will incur the majority of the regulatory costs POTWs and chemical/petroleum products -- it provides no analysis of whether or not these costs are "significant" to these sectors. Likewise, USEPA does not examine the potential costs or their implications to small businesses (e.g., health care providers; automobile repair shops), small communities, or non-significant industrial users (SIUs) in general (i.e., industries that are regulated by POTWs through local ordinances, rather than under federal rules)

USEPA's conclusion that the use of different risk levels would not significantly influencecompliance costs is not supported by its data. Based on USEPA's own data, use of a 10E-5 risk level for carcinogens would induce a 25 percent cost savings relative to a 10E-6 risk level under the low cost scenario, with a 3 percent change in pollutant loadings.(*4)

(*2) Noticeable benefits seem unlikely to emerge in the near term, if at all, due to the persistence of existing contaminants in the environment, while costs will be incur-red over one to two decades. Use of a lower discount rate for benefits would reflect the greater value future generations may place on environmental amenities, an assumption which is open to debate.

(*3) The large differences between benefits and costs is mirrored by the wide range in estimated pollution reduction. Under USEPA's low scenario, only.63 million toxic pounds- equivalent are expected to be reduced under the rule, compared to a high scenario reduction of 7 million pounds equivalent. That is, reductions under the high scenario are eleven times higher than under the low scenario.

(*4) Under the high cost scenario cost reductions are less than I percent, with a 7 percent change in pollutant loadings.

Response to: CTR-035-056b

See response to CTR-021-005c.

Comment ID: CTR-045-013
Comment Author: Sausalito-Marin Sanitary Dist.
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/24/97
Subject Matter Code: E-01c01 $100M Threshold
References:
Attachments? Y
CROSS REFERENCES

Comment: The proposed regulation is a significant regulatory action because it may well impose costs that are greater than $100 million per year on the regulated community, the majority of which are local public agencies. Regardless of the dollar amount, it is likely to adversely affect in a material way the economy, the environment, or local governments.

Response to: CTR-045-013

See response to CTR-021-005c.

Comment ID: CTR-066-017
Comment Author: Delta Diablo Sanitation Dist.
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: E-01c01 $100M Threshold
References:
Attachments? N
CROSS REFERENCES

Comment: The areas with which we find concerns and the requested changes include the following:

* The proposed CTR is a significant regulatory action because it will impose costs that are greater than $100 million per year on the regulated community, the majority of which are local public agencies. Regardless of the dollar amount, it is likely to adversely affect in a material way the economy, the environment, or local governments.

Response to: CTR-066-017

See response to CTR-021-005c.

Comment ID: CTR-082-011
Comment Author: City of Burbank
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/24/97
Subject Matter Code: E-01c01 $100M Threshold
References:
Attachments? N
CROSS REFERENCES

Comment: The subject rule has a significant impact on our facility discharge and the citizens of the City. We therefore present the following comments for your consideration to re-open the comment period for this rule in order to facilitate a more complete review by public and in particular by those in the POTW community:

* It should be noted that proposed regulation is a significant regulatory action, because it may well impose costs that are greater than $100,000,000 per year on the regulated community. Regardless of the dollar amount, it is likely to adversely affect in a material way the economic environment a local government.

Response to: CTR-082-011

See response to CTR-021-005c.

Comment ID: CTR-084-002a
Comment Author: City of Redding
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: E-01c01 $100M Threshold
References:
Attachments? N
CROSS REFERENCES S

Comment: ISSUES OF CONCERN

The Unfunded Mandates Act of 1995, 62 FR 42191. The City of Redding disagrees with the conclusion that the proposed rule does not result in expenditures by state or local governments in aggregate of $100 million or more in any one year. The strict water quality criteria in the proposed rule would directly cause the state to adopt more stringent standards for dischargers, which would then require the local dischargers to implement exorbitant and costly measures against our users.

Regarding unfunded mandates, the City of Redding believes that the state and local governments would have no alternative in implementing this federal rule than to enforce exorbitant and costly measures

against our users. Therefore, the proposed rule would directly cause significant burden and costs to state and local governments.

Response to: CTR-084-002a

See response to CTR-021-005c.

Comment ID: CTR-096-003a
Comment Author: City of Modesto
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-01c01 $100M Threshold
References:
Attachments? N
CROSS REFERENCES J-05

Comment: Thank you for the opportunity to comment on the proposed California Toxics Rule. The City's comments are related to five main concepts:

3. The cost implications of these numerical standards are estimated to exceed $100 million to the City of Modesto alone, thereby triggering the President's Executive Order 12866 requiring a more detailed and comprehensive cost-benefit assessment of these proposed standards.

Specifically, the City submits the following comments:

E. Under the proposed rule, Best Management Practices (BMPS) are recommended for compliance with the California Toxic Rule. BMPs may include a variety of processes. Each of these processes may have an associated construction and operation cost. For the City of Modesto, due to the design of the wastewater and stormwater collection systems, it may cost between $25 million to $50 million to construct acceptable BMPS. Existing BMPs may not reduce the pollutant level below that listed in the proposed CRT. Therefore, it is our opinion that construction costs presented in the California Toxic Rule are significantly under estimated. Constructed treatment facilities for wastewater and storm water, beyond BMPS, could exceed $1 00 million for Modesto alone. In addition, annual operation and maintenance costs for BMPs and treatment facilities exceed $1,000,000.

In summary, the proposed regulation is significant because it may well impose costs that are greater than $100 million per year on the regulated community, the majority of which are local public agencies. Regardless of the dollar amount, it is likely to adversely affect, in a material way, the economy, the environment, and local governments.

Thank you in advance for consideration of my comments on the CTR.

Response to: CTR-096-003a

See response to CTR-021-005c.

Subject Matter Code: E-01c02 Bnfts do not Balance Cost

Comment ID: CTR-005-005
Comment Author: Novato Sanitary District
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/23/97
Subject Matter Code: E-01c02 Bnfts do not Balance Cost
References:
Attachments? Y
CROSS REFERENCES

Comment: 4. The economic analysis is seriously flawed. The major flaws include: (1) failing to do an appropriate sampling of dischargers having little or no dilution; (2) assuming in the high-end cost scenario that a 25% reduction could be achieved through source control and an additional 25% achieved through treatment plant optimization without capital improvements; (3) constraining estimates of potential costs through key assumptions, including the assumption that regulatory relief from the rule would be granted if costs were in excess of certain thresholds; and (4) exaggerating estimates of potential benefits by assuming an end (i.e., achievement of the proposed water quality criteria) that will not result from the rule. The result of these flaws is that potential costs are greatly understated and potential benefits are greatly overstated.

The District's analysis demonstrates that actual costs may be an order of magnitude greater than EPA's $500/lb threshold and the benefits may be nil. A further consequence of the flawed economic analysis is the conclusion that the CTR is not a major rule (i.e., one which will result in excess of $100 million per year expenditure) subject to Presidential Executive order 12866 and the Unfunded Mandates Reform Act or a rule that affects small entities protected under the Regulatory Reform Act. For example, the District serves the City of Novato which has a population under 50,000 and would be greatly impacted by the proposed rule.

Response to: CTR-005-005

See responses to CTR-005-004, CTR-054-013a, CTR-021-005c, CTR-040-029a, and CTR-042-007a.

The standards established in the CTR apply to certain California waterbodies. EPA currently only applies water quality based effluent limits to point sources, and thus the estimate of post-regulation cost reflects only the potential impact of controls on point sources. EPA's benefits analysis is based on an assumption that other controls may also be required of other sources in the future (e.g., under state of law for non-point sources). As controls on other sources are implemented (e.g., remediation of contaminated sediments; best management practices to control storm water discharges, EPA expects that concentrations in fish tissue will decline further and that the standards established by the CTR to protect human health can be achieved.

EPA also believes that the risk reducing impact of the regulation on point sources may not be fully illustrated by EPA's analysis which is based on only a small sample of point source dischargers. Baseline risk levels are based on actual fish tissue concentrations, post-regulation risk levels are estimated by examining the potential for reducing loadings at a sample of facilities. Pollutants responsible for much of the baseline health risk at specific sites, such as popular fishing areas in San

Francisco Bay, may be found in point source effluents, however, the facilities discharging these pollutants may not be included in the sample and, thus, EPA's analysis may underestimate the risk reduction impact on point sources.

Comment ID: CTR-029-004a
Comment Author: Center for Marine Conservation
Document Type: Environmental Group
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-01c02 Bnfts do not Balance Cost
References:
Attachments? N
CROSS REFERENCES E-02e

Comment: The Center for Marine Conservation (CMC) is a nationwide, nonprofit advocacy group dedicated to the conservation and enhancement of coastal and ocean life and resources. CMC submits these comments on behalf of its 16,000 members in California and over 120,000 members nationwide.

CMC applauds EPA's efforts to bring California into compliance with the Clean Water Act 303(c)(2)(B). Implementing numeric criteria that will protect the beneficial uses of California's waters is of great importance to the health of coastal and marine ecosystems, and so to CMC and its members. The reliance in many areas of the state on narrative criteria threatens the health of most of the state's waters, thereby impacting both human health and the health of the state's economy that relies on clean water.

While CMC strongly supports the swift adoption of an Enclosed Bays and Estuaries Plan and an Inland Surface Waters Plan that contain numeric criteria for toxic pollutants, CMC also is concerned that many of the specific criteria contained in the proposed rule are weaker than those contained in published guidance. CMC also believes that the proposed rule can better protect certain subpopulations from harm caused by consumption of contaminated fish and shellfish. Finally, CMC is concerned that the economic analysis of the proposed rule over-emphasizes costs and under-reports the many benefits of improving water. quality throughout the state. These three points are reviewed below.

The Proposed Rule's Economic Analysis Over-Emphasizes Costs and Under reports the Benefits of Improving Water Quality Throughout the State

By EPA's own admission, the proposed rule's economic analysis over-reports costs and under-reports benefits. Specifically, the proposed rule states that "cost estimates for both scenarios, but especially for the high-end scenario, may be overstated because the analysis tended to use conservative assumptions."(*8) Conversely, "numerous categories of potential or likely benefits have been omitted" from the analysis, and these omitted benefits "are likely to be significant contributors" to an "appreciable underestimation" of the overall benefits of the rule.(*9) Categories left out of the benefits analysis include improvements in water-related, non-fishing recreation, improvements in land recreation, and improvements in human health resulting from reducing non-cancer risk."(*10)

CMC believes it is possible to quantify many of these omitted benefits to obtain a more accurate picture of the importance of this rule. For example, a recent Santa Monica Bay Restoration Project Study found that people swimming close to storm drains face a 50% increase in their risk of contracting a variety of

non-cancer ills such as gastroenteritis and ear and other infections. At a minimum, EPA's analysis could capture the benefits of improved water quality in terms of avoided sick days and avoided medical costs for such users.

CMC also believes that the economics analysis should consider other categories of benefits not mentioned at all in the proposed rule. For example, Governor Wilson's March 1997 planning document, California's Ocean Resources: An Agenda for the Future, finds that industries that depend on healthy coastal and ocean waters contribute $17.3 billion to the state's economy each year and support 370,000 jobs. The majority of this total, $10 billion, is from tourism, which is not mentioned in the proposed rule but which could benefit greatly from improved water quality. Such omitted benefits should be examined in order to have a more balanced economic analysis.

The adequacy of the proposed rule's economic analysis is important to the long-term implementation of the rule. As reported by EPA, "[t]he allegation that the State did not sufficiently consider economics when adopting Water quality objectives ... was an important issue in the litigation" that resulted in the rescission of the Enclosed Bays and Estuaries Plan and the Inland Surface Waters Plan.(*11) Moreover, an accurate description of the benefits of the proposed rule is critical to obtaining funding and public support for swift implementation of the numeric criteria. CMC thus requests that the benefits analysis be updated where possible to parallel the acknowledged "conservative" approach used in estimating the costs of the proposed rule.

(*8) Id. at 42189.

(*9) Id. at 42190.

(*10) Id.

(*11) Id. at 42165.

Response to: CTR-029-004a

The benefits of water quality improvements are highly site specific and difficult to monetize due to limitations in benefits methodology and accurate data on society's values for these improvements. For example, there are currently few means of linking consumption of toxic contaminants by humans with cases of systemic effects (as opposed to cancer effects, for which dose-response curves have been estimated). As another example, the contingent valuation (CV) is the only method for estimating passive use values, and CV surveys require substantial resources to conduct. As a result, there is limited data and information with which to estimate the benefits of the proposed rule. Since these values are not known, a parallel conservative approach is not possible. EPA presented the information on the limitations of the analysis (e.g., costs may be overstated and benefits may be understated) to assist decision makers in evaluating the results.

Illnesses contracted from swimming, such as those evaluated in the study of storm water drains in Santa Monica Bay, typically result from exposure to pathogens that will not be regulated under the CTR. Noncancer effects from the toxic pollutants that will be reduced by the rule are difficult to quantify because of a lack of information on the link between concentrations in the environment and potential cases of systemic effects.

EPA's analysis does not cover all benefit categories as the commenter notes, however, the evaluation of

all categories of benefits in a constructive manner is beyond the scope of this analysis, thus EPA has done the best possible analysis given the time and budget constraints. EPA believes that had all the benefit categories been fully evaluated, the monetized benefits for this rule would have increased significantly. However, secondary benefits (e.g., tourism) or economic impacts embody the successive rounds of spending in an economy that result from the primary benefits of a regulation. These secondary benefits (or impacts) are estimated based on the analysis of data on interindustry linkages within a region. Although these impacts may be of relevance to policy makers, the inclusion of secondary benefits may be inappropriate. This is because under conditions of reasonably full employment, the resources placed into support services (or diverted from complying entities) would be diverted from (or redirected toward) other productive purposes (i.e., net jobs would not be created or lost for otherwise unemployed individuals but, rather, workers would be drawn to or away from other jobs). Thus, these secondary impacts represent a transfer or redistribution of resources rather than changes in real economic activity.

Comment ID: CTR-032-008b
Comment Author: Las Gallinas Val. Sanitry Dist
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-01c02 Bnfts do not Balance Cost
References: Letter CTR-032 incorporates by reference letter CTR-035
Attachments? N
CROSS REFERENCES E-01u

Comment: Economic Analysis

The District supports CASA/Tri-TAC's conclusions that the Economic Analysis has significant technical weaknesses, is based on a large number of assumptions and minimal empirical data, and that it almost certainly understates costs and overestimates benefits. There is a critical need for a sound economic analysis. We also agree with their recommendation that EPA and the SWRCB undertake a collaborative process with interested members of the public to revise the Economic Analysis based on guidelines in the Economic Considerations Task Force Report.

Response to: CTR-032-008b

See responses to CTR-056-018 and CTR-092-017.

Comment ID: CTR-035-043
Comment Author: Tri-TAC/CASA
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-01c02 Bnfts do not Balance Cost
References:
Attachments? N
CROSS REFERENCES

Comment: III. Economic Analysis A. General Comments p. 9-2 (U.S. EPA, 1997a) - EPA Finds that Benefits Are of Same General Magnitude as Costs

Whether the monetized benefits and costs are compared on an annualized basis, or on a total, discounted basis, we disagree with EPA's conclusion that the benefits are of the same magnitude as the costs. When looked at in terms of a twenty-year phase-in of benefits at a 3 percent discount rate and a ten-year phase-in of costs at a 7 percent discount rate, in the low cost scenario, the costs are nine times higher than the benefits; in the high cost scenario, the costs are nearly twice as high as the benefits. Thus, we think that EPA should disclose in its conclusions and inthe summary contained in the Preamble to the CTR that the costs appear to outweigh the benefits. Thus, as discussed above, we believe EPA has to demonstrate that the benefits outweigh the costs, as required under E.O. 12866.

Response to: CTR-035-043

See responses to CTR-021-005c, CTR-032-004, CTR-004-003, CTR-040-039, and CTR-021-006b.

Comment ID: CTR-035-056a
Comment Author: Tri-TAC/CASA
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-01c02 Bnfts do not Balance Cost
References:
Attachments? N
CROSS REFERENCES E-01c01
E-01p

Comment: Introduction

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Weaknesses in Overall Report Findings

The Analysis' overall findings exhibit a number of flaws, as follows:

USEPA's estimates indicate that Rule costs outweigh benefits, both on an annualized and present value basis. USEPA's claim that comparison "...of both annualized benefits and costs and discounted benefits and costs indicates that the monetized benefits of the CTR are of the same general magnitude as the

costs" is simply not true (U.S. EPA, 1997a, page 9-2). For example, using USEPA's comparison of a twenty-year phase-in of benefits at a 3 percent discount rate against a ten-year phase-in of costs at a 7 percent discount rate, or benefits of between approximately $20 to $600 million against costs of about $180 million to $1 billion (setting aside the significant weaknesses in the analysis; differences in the probabilities of low or high outcomes; and questions over the appropriate discount rate to apply)(*2) indicates a low cost scenario which is nine times higher than the estimated benefits, and a high cost scenario which is almost twice as high as benefits.(*3)

Executive Order 12866, which requires the economic review, defines "significant regulatory action" as one that is likely to "adversely affect ... a sector of the economy." Yet, although the USEPA finds that two sectors will incur the majority of the regulatory costs - POTWs and chemical/petroleum products -- it provides no analysis of whether or not these costs are "significant" to these sectors. Likewise, USEPA does not examine the potential costs or their implications to small businesses (e.g., health care providers; automobile repair shops), small communities, or non-significant industrial users (SIUs) in general (i.e., industries that are regulated by POTWs through local ordinances, rather than under federal rules)

USEPA's conclusion that the use of different risk levels would not significantly influence compliance costs is not supported by its data. Based on USEPA's own data, use of a 10E-5 risk level for carcinogens would induce a 25 percent cost savings relative to a 10E-6 risk level under the low cost scenario, with a 3 percent change in pollutant loadings.(*4)

(*2) Noticeable benefits seem unlikely to emerge in the near term, if at all, due to the persistence of existing contaminants in the environment, while costs will be incur-red over one to two decades. Use of a lower discount rate for benefits would reflect the greater value future generations may place on environmental amenities, an assumption which is open to debate.

(*3) The large differences between benefits and costs is mirrored by the wide range in estimated pollution reduction. Under USEPA's low scenario, only.63 million toxic pounds- equivalent are expected to be reduced under the rule, compared to a high scenario reduction of 7 million pounds equivalent. That is, reductions under the high scenario are eleven times higher than under the low scenario.

(*4) Under the high cost scenario cost reductions are less than 1 percent, with a 7 percent change in pollutant loadings.

Response to: CTR-035-056a

EPA disagrees with the commenter's claim that costs outweight benefits. In the Economic Analysis of the final CTR, EPA estimates that benefits may range from $6.9 million to $74.7 million per year and costs may range from $33.5 million to $61.0 million per year. EPA believes that benefits are underestimated due to EPA's inability to monetize all categories of benefits. See also responses to CTR-056-018, CTR-029-004b, and CTR-035-057.

Regarding the issue of whether the CTR imposes significant costs on the chemical/petroleum product andPOTW industries, see the response to CTR-042-007a. Based on 40 CFR.131.11, EPA is supposed to base current criteria on sound science and the criteria must contain sufficient parameters to protect the designated uses. From the outset of the national water quality standards program, EPA has explained that while economic factors may be considered in designating uses, scientific and technical factors must form the basis for the criteria to meet those uses. However, in the spirit of EO 12866, EPA has evaluated the cost impact of the CTR on the regulated community.

EPA disagrees with the commenter that the use of different risk levels significantly influences compliance costs. Under EPA's revised low scenario, there is a 3% difference in costs and under the high scenario, there is a 10% difference in costs between the alternative 10E-5 risk level scenario and the CTR-based 10E-6 risk level scenario. Cost increments should be compared to benefits increments, not loading reductions, for a more realistic evaluation of the impact of risk levels. EPA believes that monetized benefits might be commensurate with the cost increase resulting from the lower risk level and EPA believes that costs may be overstated in the high scenario.

See also response to CTR-021-005c.

Comment ID: CTR-035-064
Comment Author: Tri-TAC/CASA
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-01c02 Bnfts do not Balance Cost
References:
Attachments? N
CROSS REFERENCES

Comment: Weakness in cost analysis The report cost estimates exhibit a number of significant weaknesses, as follows:

* Although USEPA claims that its estimates most likely overstate potential costs, the Analysis isbased on a large number of assumptions that could act to understate rule related expenditures. Table One identifies some of these assumptions.

Table One Other Major Technical Assumptions Which Could Significantly Impact the Cost Analysis

Assumption / Potential Impact on Analysis

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"If all monitoring data reported for a facility were reported as below analytical detection levels, even if the reported detection limit was above EPA-approved analytical detection levels, it was assumed that no reasonable potential existed to exceed CTR-based WQBELS." (U.S. EPA, 1997b, page 2-13)

RWQCB's permitting policies could undermine this assumption, thereby inducing greater impacts than assumed in the analysis (e.g., lindane in the City of Los Angeles).

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The low-cost scenario assumes "no cost" after costs exceed $200 per toxic pounds equivalent; high-cost threshold is assumed to be $500 per toxic pounds.

If relief not given, costs would be substantially higher. Relief is estimated to cost $200,000 per facility,

despite a potential range of $20,000-$1,000,000 per pollutant. Since "the facility ultimately must achieve the CTR based WQBEL" (U.S.EPA, 1997b, page 2-31) under this method costs should properly be extended to the future (e.g, discounted). Relief provision isn't balanced with benefit reductions.

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USEPA claims that "minor dischargers are not expected to incur significant impacts as a result of State implementation of CTR water quality criteria." (US, EPA, 1997b, page ES-1).

This statement appears to be based on a sample of three minor dischargers, an insufficient sample to reflect the entire population of these dischargers.

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Between 10 to 30 percent of indirect dischargers could be affected by pretreatment requirements.

This percentage is based on a Great Lakes study, with no reason to believe similar patterns exist in California, Although pre-treatment costs are very industry-specific, USEPA's data is solely based on two California cases: Compliance period may not allow for optimal use of pretreatment; optimization; or end-of-pipe treatments.

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Assumes that costs are incremental (e.g., that rule compliance would result in distinct investment from past or future behavior).

Could require the need to reorganize capital or operating expenditures, resulting in higher costs. The costs of existing unmet standards should be considered.

"...assumed that all sludges generated would be nonhazardous..that sludge would be disposed of in municipal landfills..."

"...potential costs associated with storing and transporting sludge were not considered." (U.S. EPA, 1997b, page 2-35)

Average per-facility process "optimization" costs were assumed to be $100,000, and to be fully effective in obtaining targeted reductions.

This is an optimistic assumption.

Depreciation and the cost of capital where not included in the O&M costs. Financing assumed to be available.

Some (small) POTWs may have difficulty obtaining lowcost financing, particularly as a result of

Proposition 218.

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"...detailed treatment and manufacturing process information was not available in the NPDES permit files, ...the assessment of feasibility was based primarily upon best professional judgement using general knowledge of industrial and municipal operations." (U.S.EPA, 1997b, page 2-30)

Use of generalized knowledge may act to under- or over-estimate file costs to specific POTWs and dischargers.

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Technical assumptions in the case studies (e.g., treatment of process waters; optimization) merit engineering review.

Examination of case-specific costs could result in different estimates.

Response to: CTR-035-064

See also responses to CTR-032-004, CTR-040-024, CTR-040-029a, CTR-040-036, CTR-059-018, and CTR-060-019.

EPA acknowledges that as permit limits are established below analytical detection levels, ambient water quality background data also may be below analytical detection levels, which may make analysis of use attainability more difficult. However, in accordance with the procedures recommended in Water Quality Standards Handbook, Second Edition (U.S. EPA 1994), analysis of use attainability encompasses evaluating physical and biological indicators as well as the ability to meet water quality criteria.

The commenter's statement that, under EPA's analysis, no reasonable potential is assigned to pollutants with projected effluent limits below detection levels is inaccurate. In EPA's high scenario, pollutants with projected CTR-based limits below detection levels are assigned reasonable potential and analyzed for potential compliance costs if they have an existing NPDES permit limit. The fact that a Regional Board assigns a permit limit to a pollutant reported below detection level indicates that the Board may require further controls to ensure compliance. In the Economic Analysis, EPA estimates that facilities would implement pollution prevention or waste minimization programs in order to achieve compliance with limits below method detection levels.

For the City of Los Angeles POTW, EPA determined reasonable potential to exceed water qualitycriteria for lindane because a (1991) permit limit exists and discharge data show reasonable potential to exceed CTR criteria. EPA did not estimate compliance costs, however, because the existing permit limit is as stringent as the projected CTR-based permit limit.

Comment ID: CTR-038-004d
Comment Author: Sonoma County Water Agency
Document Type: Sewer Authority
State of Origin: CA
Represented Org:

Document Date: 09/25/97
Subject Matter Code: E-01c02 Bnfts do not Balance Cost
References:
Attachments? Y
CROSS REFERENCES E-01g08
E-01h
E-01m

Comment: 4. The economic analysis is seriously flawed. The major flaws include: (1) failing to do an appropriate sampling of dischargers having little or no dilution; (2) assuming in the high-end cost scenario that a 25% reduction could be achieved through source control and an additional 25% achieved through treatment plant optimization without capital improvements; (3) constraining estimates of potential costs through key assumptions, including the assumption that regulatory relief from the rule would be granted if costs were in excess of certain thresholds; and (4) exaggerating estimates of potential benefits by assuming an end (i.e., achievement of the proposed water quality criteria) that will not result from the rule. The result of these flaws is that potential costs are greatly understated and potential benefits are greatly overstated. The District's analysis demonstrates that actual costs may be an order of magnitude greater than EPA's $500/lb threshold and that the benefits are very small.

Response to: CTR-038-004d

See responses to CTR-054-013a, CTR-032-004, CTR-021-008, and CTR-040-029a.

Comment ID: CTR-040-008a
Comment Author: County of Sacramento Water Div
Document Type: Storm Water Auth.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-01c02 Bnfts do not Balance Cost
References: Letter CTR-040 incorporates by reference letter CTR-027
Attachments? Y
CROSS REFERENCES E-01m
E-02c

Comment: MAJOR CONCERNS

We do, however, have fundamental concerns with the Rule as it is presently proposed and its supporting economic analysis. We believe the Rule can be modified in a manner that will be responsive to our concerns while at the same time being consistent with applicable Federal law and regulations. Our major concerns are presented here and are followed by our recommended modifications.

II. Concern: The economic analysis upon which the Rule is based is seriously flawed.

* Estimates of potential costs are severely constrained due to certain assumptions including the assumption that regulatory relief from the Rule will be granted if costs are in excess of certain thresholds.

* Estimates of potential benefits are exaggerated by assuming, that the proposed water quality criteria

will actually be achieved in receiving water bodies. This will not result from the implementation of the Rule because the Rule is only addressing permitted discharges to the receiving water bodies.

* The result of these flaws is that potential costs are greatly understated and potential benefits are greatly overstated.

Response to: CTR-040-008a

See responses to CTR-054-013a, CTR-032-004, and CTR-056-018.

Comment ID: CTR-040-042
Comment Author: County of Sacramento Water Div
Document Type: Storm Water Auth.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-01c02 Bnfts do not Balance Cost
References: Letter CTR-040 incorporates by reference letter CTR-027
Attachments? Y
CROSS REFERENCES

Comment: EPA improperly lumps all criteria together in estimating costs and benefits. The result is that the pollutant reductions that form the basis for most of the costs (chromium, mercury, silver and toluene) are not generally the same pollutants that form the basis for most of the benefits (DDT, PCBs, mercury and dioxin). The cost-benefit analysis should be done on a pollutant-by-pollutant basis and it should be done on the basis of the pollutants that will be reduced as a result of the CTR.

Response to: CTR-040-042

For a discussion of the estimation of benefits and costs for individual pollutants see response to CTR-044-033.

To calculate potential human health risk reduction benefits, EPA first calculated baseline risk levels using actual contaminant concentrations found in fish tissue. EPA then multiplied the baseline risk levels by the estimated reduction in loadings expected to result from the implementation of point source controls and by the relative contribution of point source loadings to total loadings. For DDT, EPA estimated a 68.8% reduction in point source loadings under the high end cost estimate and a 0% reduction in point source loadings under the low end cost estimate. EPA's estimate of human health benefits reflects these estimated reductions. For example, potential cancer-related benefits to recreational anglers range from $0 to $4.2 million for freshwater resources and total $0 for San Francisco Bay.
In addition, the risk reducing impact of the regulation on point sources may not be fully illustrated by EPA's analysis which reflects only a sample of point source dischargers. That is, although baseline risk levels are based on actual fish tissue concentrations, post-regulation risk levels are estimated by examining the potential for reducing loadings at a sample of facilities. Pollutants responsible for much of the baseline health risk at specific sites, such as popular fishing areas in San Francisco Bay, may be found in point source effluents, however, the facilities discharging these pollutants may not be included in the sample.

Comment ID: CTR-041-038
Comment Author: Sacramento Reg Cnty Sanit Dist
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-01c02 Bnfts do not Balance Cost
References:
Attachments? N
CROSS REFERENCES

Comment: EPA improperly lumps all criteria together in estimating costs and benefits. The result is that the pollutant reductions that form the basis for most of the costs (chromium, mercury, silver and toluene) are not generally the same pollutants that form the basis for most of the benefits (DDT, PCBs, mercury and dioxin). The cost-benefit analysis should be done on a pollutant-by-pollutant basis and it should be done on the basis of the pollutants that will be reduced as a result of the CTR.

Response to: CTR-041-038

See responses to CTR-040-042 and CTR-044-033.

Comment ID: CTR-043-004e
Comment Author: City of Vacaville
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: E-01c02 Bnfts do not Balance Cost
References:
Attachments? Y
CROSS REFERENCES E-01g
E-01h
E-01m
E-02c

Comment: 4. EPA's Economic Analysis is seriously flawed. The major flaws include:

(1) failing to do an appropriate sampling of small dischargers having little or no dilution;

(2) assuming in the high-end cost scenario that a 25% reduction could be achieved through source control and an additional 25% achieved through treatment plant optimization without capital improvements;

(3) constraining estimates of potential costs through key assumptions, including the assumption that regulatory relief from the rule would be granted if costs were in excess of certain thresholds; and

(4) exaggerating estimates of potential benefits by assuming an end (i.e., achievement of the proposed

water quality criteria) that will not result from the rule.

The result of these flaws is that potential costs are greatly understated and potential benefits are greatly overstated. Moreover, the flawed economic analysis has lead to the erroneous conclusion that the CTR is not a "significant regulatory action" or major rule subject to Presidential Executive Order 12866 and the Unfunded Mandates Reform Act or a rule that affects small entities protected under the Regulatory Flexibility Act.

Response to: CTR-043-004e

See responses to CTR-054-013a, CTR-021-005c, CTR-032-004, CTR-021-008, CTR-040-029a, CTR-056-018, and CTR-059-018.

Comment ID: CTR-044-005e
Comment Author: City of Woodland
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: E-01c02 Bnfts do not Balance Cost
References:
Attachments? Y
CROSS REFERENCES E-01g08
E-01h01
E-01m
E-02c
R
S

Comment: We have reviewed the proposed CTR and offer the following comments:

4. EPA's Economic Analysis is seriously flawed. The major flaws include:

(1) failing to do an appropriate sampling of small dischargers having little or no dilution; (2) assuming in the high-end cost scenario that a 25% reduction could be achieved through source control and an additional 25% achieved through treatment plant optimization without capital improvements; (3) constraining estimates of potential costs through key assumptions, including the assumption that regulatory relief from the rule would be granted if costs were in excess of certain thresholds; and (4) exaggerating estimates of potential benefits by assuming an end (i.e., achievement of the proposed water quality criteria) that will not result from the rule. Additional concerns with the economic analysis are presented in Exhibit F. The result of these flaws is that potential costs are greatly understated and potential benefits are greatly overstated. Moreover, the flawed economic analysis has lead to the erroneous conclusion that the CTR is not a "significant regulatory action" or major rule subject to Presidential Executive Order 12866 and the Unfunded Mandates Reform Act or a rule that affects small entities protected under the Regulatory Flexibility Act. The City, for example, is a small community having a population of under 50,000 and would be greatly impacted by the proposed rule.

Response to: CTR-044-005e

See responses to CTR-054-013a, CTR-021-005c, CTR-032-004, CTR-021-008, and CTR-040-029a.

Comment ID: CTR-044-033
Comment Author: City of Woodland
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: E-01c02 Bnfts do not Balance Cost
References:
Attachments? N
CROSS REFERENCES

Comment: EPA improperly lumps all criteria together in estimating costs and benefits. The result is that the pollutant reductions that form the basis for most of the costs (chromium, mercury, silver and toluene) are not generally the same pollutants that form the basis for most of the benefits (DDT, PCBs, mercury and dioxin). The cost-benefit analysis should be done on a pollutant-by-pollutant basis and it should be done on the basis of the pollutants that will be reduced as a result of the CTR.

Response to: CTR-044-033

See response to CTR-054-013a.

Although a small subset of toxic pollutants are responsible for cancer risk reduction benefits, EPA anticipates ecosystem-wide benefits (e.g., noncancer risk reductions, ecologic benefits) from controlling a range of toxic pollutants. EPA did estimate human health benefits on a pollutant-specific basis. For other benefit categories, EPA estimated potential benefits based on toxic-weighted loading reductions to account for the different toxicities of the pollutants.

EPA recognizes the persistence of some of the substances addressed by the CTR (e.g., DDT and PCBs) and the impact of this persistence on the realization of benefits. In the EA (Chapter 9), EPA accounted for this lag by assuming 10- and 20-year phase-in periods for benefits in its comparison of present value benefits and costs.

In addition, EPA believes that point source controls can factor into pollutant reduction scenarios, although the cost-effectiveness of point and nonpoint source controls are likely to be highly site specific. Potential "hidden" loads (contaminant concentrations which are not currently measured because they are below detection levels) from point sources may also be occurring and may increase the potential benefits of point source controls. In addition, point source loadings reductions will reduce future sediment contamination and, thereby, reduce the need for costly site-specific sediment remediation in the future. Therefore, the CTR can be viewed as both reducing current environmental risks (yielding benefits) by reducing current loadings, and reducing future environmental cleanup costs.

Comment ID: CTR-054-037
Comment Author: Bay Area Dischargers Associati
Document Type: Sewer Authority
State of Origin: CA

Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-01c02 Bnfts do not Balance Cost
References:
Attachments? N
CROSS REFERENCES

Comment: EPA improperly lumps all criteria together in estimating costs and benefits. The result is that the pollutant reductions that form the basis for most of the costs (chromium, mercury, silver and toluene) are not generally the same pollutants that form the basis for most of the benefits (DDT, PCBs, mercury and dioxin). The cost-benefit analysis should be done on a pollutant-by-pollutant basis and it should be done on the basis of the pollutants that will be reduced as a result of the CTR.

Response to: CTR-054-037

See responses to CTR-040-042 and CTR-044-033.

Comment ID: CTRH-001-037a
Comment Author: Robert Reid
Document Type: Public Hearing
State of Origin: CA
Represented Org: CASA
Document Date: 09/17/97
Subject Matter Code: E-01c02 Bnfts do not Balance Cost
References:
Attachments? N
CROSS REFERENCES E-01q03
E-01h02

Comment: Second, the interaction between the CTR and the state's implementation policy is particularly important given our second concern, which is namely that the EPA's economic evaluation underestimates the costs and overestimates the benefits of implementing this rule.

Our concern about the cost estimates is based on the fact that the cost analysis appears to undervalue the magnitude of difficulty dischargers will have complying with permits issued based on this rule.

We are also concerned that the cost estimates for various compliance activities such as source control and treatment process optimization made in the case studies are overly optimistic and not reflective of the true actions that will need to be taken to insure compliance.

Overall, we are concerned that the expenditures that may be necessary for many POTWS to comply with the CTR will be large, these costs may not be matched by commensurate benefits, and that EPA has not analyzed whether point source controls are in fact a cost-effective way to achieve water quality standards.

Our preliminary analysis for just five agencies in the Bay Area to comply with the proposed standard for copper alone could amount to more than $60 million per year -- 60 million. This number would be far higher if calculated for every pollutant listed in the CTR for the entire POTW industry in California.

Since this estimate would undoubtedly exceed the high end of the range contained in EPA's analysis, we believe it is necessary for EPA to redo the economic analysis to fully comply with its legal responsibilities.

In addition, revised economic analysis is necessary to provide a sound basis for the State to use in its analysis of the economic impacts of the implementation policy.

Response to: CTRH-001-037a

See responses to CTR-041-018, CTR-035-057, CTR-056-018, CTR-004-003, and CTR-040-039.

Comment ID: CTRH-002-016a
Comment Author: Lisa Ohlund
Document Type: Public Hearing
State of Origin: CA
Represented Org: Alliance of So. CA POTWs
Document Date: 09/18/97
Subject Matter Code: E-01c02 Bnfts do not Balance Cost
References:
Attachments? N
CROSS REFERENCES E-01h

Comment: And finally, I'd like to comment on the analysis of the economic impact of the CTR. We believe that the analysis does not portray a reasonable picture of what the potential costs and benefits may result from the promulgation of this CTR. In our opinion, the cost analysis contains many flawed assumptions that result in severe underestimation of the total potential costs, and we're particularly concerned about the use of process optimization and how it was relied upon.

Likewise, the benefits, while admittedly difficult to estimate, appear tenuous at best. The bottom line is that we are concerned that this analysis does not properly reveal that the CTR can lead to requirements for large expenditures by POTWs in Southern California with questionable benefits to the environment. We recommend that EPA carefully redo its economic analysis to portray a more accurate picture of the potential costs and benefits.

Thank you again for this opportunity. We look forward to submitting our comments in writing.

Response to: CTRH-002-016a

See responses CTR-054-013a, CTR-035-057, CTR-056-018, and CTR-004-003.

Subject Matter Code: E-01d Direct Dischargers

Comment ID: CTR-011-001c
Comment Author: City of Simi Valley
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/24/97
Subject Matter Code: E-01d Direct Dischargers
References: Letter CTR-011 incorporates by reference letters CTR-027 and CTR-034
Attachments? Y
CROSS REFERENCES C-13
C-24

Comment: The City of Simi Valley discharges approximately 10 million gallons per day (mgd) of tertiarytreated wastewater (as well as municipal storm water) to the Arroyo Simi, an effluent dependent water body. Through much of the year, Arroyo Simi is dry several miles downstream from the City. The Arroyo Simi Characterization Report, completed by the City in 1995, concluded that the arroyo does not support a significant fishery, and observed only arroyo chub, mosquito fish and blunt-nosed minnow in the stream. Although designated as a potential municipal water supply in the Basin Plan, the arroyo waters are not used for municipal purposes. Effluent monitoring are limited, but available data indicate that the City's discharge may have a reasonable potential to exceed the proposed aquatic life criteria for several metals and the proposed human health criteria for several carcinogens.

Since Simi Valley is largely a residential community with supporting commercial development and little industry, and since the City already has an effective pretreatment program, it is unlikely that pollution prevention efforts would effectively reduce the problematic constituents. More likely, the City would be faced with end-of-pipe treatment controls such as lime precipitation and carbon adsorption to achieve the proposed criteria. The costs would undoubtedly be significant and the benefits relatively minor.

Under these circumstances, it appears reasonable to adopt criteria for Arroyo Simi, and similar effluent dependent waters, that are reasonably achievable without costly end-of-pipe controls and that reflect the actual use of the water (i.e., generally such waters are used for fishing or drinking). One way to address this issue, consistent with the requirements of the Clean Water Act, would be to adopt specific human health criteria for Arroyo Simi and other effluent dependent streams based on a cancer risk coefficient of 10E-5 or in some cases 10E-4. Based on the limited data collected by the City, risk levels of 10E-4 would have to be adopted for dioxins, aldrin, alpha-BHC and 4,4,-DDD (see Table 1). Risk levels of 10E-5 would be sufficient for chloroform and endoslfan 11 (Id.).

Response to: CTR-011-001c

See responses to CTR-004-003, CTR-021-008, and CTR-056-018.

Comment ID: CTR-035-008c
Comment Author: Tri-TAC/CASA
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:

Document Date: 09/25/97
Subject Matter Code: E-01d Direct Dischargers
References:
Attachments? N
CROSS REFERENCES E-01g08
E-01e
E-01m
E-01h
E-01c

Comment: Finally, we have serious concerns about the accuracy of the draft Economic Analysis and the estimates of the costs and benefits of the draft CTR (see detailed comments in Attachments I and 2). Our primary concerns related to the cost analysis include 1) that the case studies on which the cost analysis is based do not adequately represent the actual population of POTWs in California; 2) the omission of costs that could be incurred by many sectors that contribute to overall loadings, and, hence, can be expected to have to reduce their loadings (e.g., non-SIU indirect dischargers, municipal and industrial stormwater dischargers, agricultural activities, and other nonpoint sources of CTR-regulated pollutants); 3) the use of numerous assumptions that underestimate costs; and 4) the capricious removal of costs that exceed threshold values by assuming that regulatory relief measures will be granted, despite the lack of any proposed regulatory relief trigger in the proposed regulation.

To illustrate the degree of underestimation of costs for the POTW sector alone, we looked at potential compliance costs for the POTW sector. We found that the potential costs for 23 major POTWS. on an annualized basis, may reach $400 million. We believe that this analysis demonstrates that the potential cost consequences of compliance with effluent limits based on the proposed CTR criteria would easily exceed the $ 100 million annual cost threshold, especially when the costs of all 313 POTWs in the State are estimated. Thus, we believe that EPA must conclude that the proposed CTR could have significant economic impacts on local governments.

Response to: CTR-035-008c

See responses to CTR-021-005c, CTR-032-004, CTR-040-039, CTR-021-006b, CTR-040-037, and CTR-059-018.

Comment ID: CTR-035-061
Comment Author: Tri-TAC/CASA
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-01d Direct Dischargers
References:
Attachments? N
CROSS REFERENCES

Comment: Weaknesses in Cost Analysis The report's cost estimates exhibit a number of significant weaknesses, as follows:

* The Analysis does not account for changes in discharges over time. Changes in the volume and characteristics of discharges resulting from demographic,(*9) economic, and policy trends are ignored in the analysis. For example, existing economic conditions may lead to greater discharge volumes; electric industry restructuring in California may induce different operating patterns among the state's generators (e.g., Hunter's Point), and air quality rules may alter petroleum refining processes (e.g., reformulated gasoline). These impacts may be region- (e.g,, Silicon Valley) or industry-specific.

(*9) For example, the state may add another six million Californians between 1996 and 2005. See Center for Continuing Study of the California Economy, California County Projections, 1997 Edition.

Response to: CTR-035-061

EPA estimated annual (steady-state) benefits and annualized costs as well as 20- and 30-year streams of benefits and costs to account for the differences in the time frame for experiencing benefits and costs (i.e., up-front capital cost and a phase-in of benefits). EPA did not forecast economic, demographic, or policy changes across these time periods. Such a forecast would involve a great deal of uncertainty. However, EPA does not foresee changes in these variables negatively impacting the anticipated ratio of benefits and costs. Rather, EPA believes that future increases in population and economic activity will most likely increase the benefits of achieving standards for toxic pollutants in California waters compared to the cost of controls.

Comment ID: CTR-045-012a
Comment Author: Sausalito-Marin Sanitary Dist.
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/24/97
Subject Matter Code: E-01d Direct Dischargers
References:
Attachments? Y
CROSS REFERENCES E-01c

Comment: Based on our analysis of the impact of the proposed CTR, we will need to utilize reverse osmosis to meet the proposed CTR limits for copper. Based on this modification, we estimate that our potential annualized costs for compliance will be approximately $900,000. These costs are significantly higher than EPA's estimated costs per plant of $27,000 per year to $480,000 per year. Thus, we strongly believe that the draft Economic Analysis significantly underestimates the potential statewide costs associated with adoption of the CTR and should be revised.

Response to: CTR-045-012a

See responses to CTR-056-018 and CTR-045-012b.

Comment ID: CTR-052-006
Comment Author: East Bay Dischargers Authority
Document Type: Sewer Authority

State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: E-01d Direct Dischargers
References: Letter CTR-052 incorporates by reference letters CTR-035 and CTR-054
Attachments? Y
CROSS REFERENCES

Comment: EPA has greatly underestimated the costs of compliance in the EA. Information developed by CASA and Tri-TAC for just 23 POTWs indicates that annualized costs for those facilities may reach $400,000,000. These are the 23 plants that have had the opportunity to fullyreview their effluent data. Using this cost data, and extrapolating it for all affected California POTWs leads to a potential cost ranging from $570,000,000 to $995,000,000, depending on the assumptions used.

Response to: CTR-052-006

EPA disagrees with the $400 million cost estimate, however, neither EBDA nor CASA/Tri-TAC provide any details of the CASA/Tri-TAC analysis (e.g., names of the 23 major POTWs, the pollutants assigned costs, and cost estimation methodology), thus EPA cannot evaluate the $400 million cost estimate. In CASA/Tri-TAC's comment, Attachment 1 notes that CASA "assumed that regulatory relief options may not be available, and that, based on the pollutants causing compliance problems, pollution prevention and treatment plant optimization might not be sufficient to reliably achieve compliance." However, CASA/Tri-TAC did not provide any data substantiating this assumption. EPA's cost estimate in the Economic Analysis (EA) of the final CTR for all California POTWs affected by this rule ranges from $7.8 million to $41.6 million in the low and high cost scenarios, respectively. EPA stands by it's cost estimates provided in the EA of the final CTR which is based on available permit, permit application, and effluent monitoring data evaluated using a cost decision methodology which allowed for a case-by-case evaluation of costs for a sample set of facilities.

See also response to CTR-040-039.

Comment ID: CTR-052-011
Comment Author: East Bay Dischargers Authority
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: E-01d Direct Dischargers
References: Letter CTR-052 incorporates by reference letters CTR-035 and CTR-054
Attachments? Y
CROSS REFERENCES

Comment: Impact on East Bay Dischargers Authority Ratepayers

The Authority and its member agencies serve approximately 700,000 people in southern and eastern Alameda County. Using an annualized cost of $44,257,000 results in an annual cost of $63.22 per person per year. Using an average of 3.25 persons per household results in an annual cost of $205.48 per household per year. Current sewer rates for Authority agencies are as low as $113 per year. Compliance

with the CTR would result in a new sewer rate of $318.48, or an increase of 282%. Clearly, the costs do not justify the benefits.

Response to: CTR-052-011

EPA disagrees with the $44 million annualized cost estimate for Alameda County, however, EBDA does not provide any details of how this cost was estimated (e.g., pollutants requiring reductions, pollutant concentrations, treatments required), thus EPA could not evaluate the cost estimate. EPA's cost estimate in the economic analysis of the final CTR for all California POTWs ranges from $7.8 million to $41.6 million annually in the low and high cost scenarios, respectively. EPA stands by it's cost estimates provided in the EA of the final CTR which is based on available permit, permit application, and effluent monitoring data evaluated using a cost decision methodology which allowed for a case-by-case evaluation of costs for a sample set of facilities.

See also responses to CTR-056-018 and CTR-005-004.

Comment ID: CTR-066-016
Comment Author: Delta Diablo Sanitation Dist.
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: E-01d Direct Dischargers
References:
Attachments? N
CROSS REFERENCES

Comment: The areas with which we find concerns and the requested changes include the following:

* Based on our very preliminary analysis of the impacts of the proposed CTR, we will need to add at a minimum reverse osmosis treatment at the regional plant to meet the rulemaking. Based on this modification, we estimate that our potential annualized costs for compliance will be $10,250,000. These costs are significantly higher than EPA's estimated costs per plant of $27,000 per year to $480,000 per year. Based upon this finding, we strongly believe that the draft Economic Analysis significantly underestimates the potential statewide costs associated with adoption of the CTR and should be revised.

Response to: CTR-066-016

See responses to CTR-056-018 and CTR-045-012b.

Comment ID: CTR-081-005b
Comment Author: West County Agency
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: E-01d Direct Dischargers

References:
Attachments? N
CROSS REFERENCES E-01d

Comment: * Based on the comments at the hearing of September 17, and our own estimates, the EPA's economic analysis has serious flaws and does not reflect the full costs for implementation of the CTR. The comments of the California Association of Sanitation Agencies should be given significant weight in this regard.

* For example, the WCA plants will not be able to meet the new criteria for copper, lead, and nickel, as well as some organics. This is true even after maximizing source control, pollution prevention, and process control improvements. Both our plants would need additional "end-of-pipe" treatment, such as reverse osmosis.

* Based on our analysis of the proposed CTR, we will need to implement reverse osmosis in order to meet the requirements of the proposed CTR. Based on this, we estimate that our potential annualized costs for compliance will be $11,220,000. These costs are significantly higher than EPA's estimated costs per plant of $27,000 to $480,000 per year. Thus, we believe strongly that the draft Economic Analysis significantly underestimates the potential statewide costs associated with adoption of the CTR and should be revised.

Response to: CTR-081-005b

EPA disagrees that its Economic Analysis (EA) underestimates costs. West County Agency does not provide the details of their $11.2 million cost estimate, thus EPA cannot evaluate its validity or conduct its own analysis. Based on EPA's sample of 14 POTWs in California, EPA predicts that the state-wide cost impact on POTWs would range from $7.8 million to $41.6 million per year. See the EA for details on the EPA's methodology and costs.

See responses to CTR-056-018, CTR-004-003, and CTR-045-012b.

Comment ID: CTR-082-010
Comment Author: City of Burbank
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/24/97
Subject Matter Code: E-01d Direct Dischargers
References:
Attachments? N
CROSS REFERENCES

Comment: The subject rule has a significant impact on our facility discharge and the citizens of the City. We therefore present the following comments for your consideration to re-open the comment period for this rule in order to facilitate a more complete review by public and in particular by those in the POTW community:

* Based on our analysis the impact of the USEPA proposed CTR will need significant in-plant

modifications, changes in effluent disinfection practices, and possibly incorporating nitrification and de-nitrification processes to fully comply with the proposed CTR. Based on these modifications, we estimate that our potential annualized costs for compliance will be around $5,900,000. These costs are significantly higher than USEPA's estimated costs per plant of $27,000 to $480,000 per year. Therefore we strongly believe that the draft economic analysis significantly underestimates the potential statewide costs associated with adopting the CTR and should be revised.

Response to: CTR-082-010

See responses to CTR-056-018 and CTR-045-012b.

Comment ID: CTR-085-019
Comment Author: Camarillo Sanitary District
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/24/97
Subject Matter Code: E-01d Direct Dischargers
References:
Attachments? N
CROSS REFERENCES E-01n

Comment: The District supports the following positions of CASA and SCAP where changes need to be made in the proposed California Toxics Rule:

Based on the District's analysis of the impact of the proposed California Toxies Rule, the District will need to add reverse osmosis to existing treatment processes to meet the proposed California Toxics Rule. Based on this modification, it is estimated that our potential annual costs for compliance will be $2.97 million, including retirement of capital. This cost is significantly higher than the EPA's estimated costs per plant of $27,000 per year to $480,000 per year. Thus we strongly believe that the draft economic analysis significantly underestimates the potential costs associated with adoption of the California Toxics Rule and should be revised.

Response to: CTR-085-019

See responses to CTR-056-018 and CTR-045-012b.

Comment ID: CTR-089-005
Comment Author: Las Virgenes Mncpl Water Dist.
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/24/97
Subject Matter Code: E-01d Direct Dischargers
References:
Attachments? N
CROSS REFERENCES

Comment: While the draft regulations demonstrate clear progress on these and other issues, there remain some unresolved problems that could compromise our ability to serve our customers. We offer these comments in the hope of minimizing those potential impacts.

Adequacy of the Economic Analysis

We are, quite frankly, astounded that the draft CTR asserts negligable economic impacts as a result of the proposed regulations. Even a cursory examination of the criteria contained in the draft CTR suggest economic impacts well-beyond those assumed by the US EPA's economic model. These include over $650,000 in estimated annualized costs to abandon existing chlorine disinfection facilities and replace them with some other disinfection method such as ultra-violet radiation or ozone, or the addition of GAC filters or air-stripping towers. Each of these modifications may create new and additional compliance problems with other state and federal regulatory requirements and standards, with unknown costs to mitigate them. Clearly the potential magnitude of these economic impacts argues against the use of a generalized model for estimating statewide impacts.

SUMMARY

We hope these comments will help to make the final CTR a better document and a better law. Overall, the draft CTR reflects substantial thought and effort on how best to implement the Clean Water Act's mandate of reducing pollutant discharges to the nation's receiving waters. The draft CTR clearly advances this goal, but our hope is that those agencies and parties most-directly affected by it will be allowed additional time to review it to their satisfaction. We strongly encourage a more detailed assessment of the actual economic impacts that could result from these new regulations. The ability of public utilities to fund new projects has never been lower, and every rate increase requires sound and well-founded justification. No ratepayer should be asked to shoulder the cost of new regulations without a clear and detailed explanation of what it is going to cost, and what benefits will result. State mandated costs require state funding.

We appreciate this opportunity to comment on the draft California Toxics Rule. Please do not hesitate call myself or Dr. Randal Orton in our Resource Conservation and Public Outreach Department to tell us how we can help you further.

Response to: CTR-089-005

EPA disagrees with the $650,000 cost estimate to install a new disinfection method or additional treatment that will control chlorination/disinfection byproducts (DBPs) as EPA did not estimate that any sample facilities would need to install new equipment in order to ensure compliance with CTR-based effluent limits for DBPs. Of the 27 sample facilities examined, EPA assigned costs to 7 facilities for process optimization and to 4 facilities for pollution prevention efforts to control DBPs. EPA's estimated costs for process optimization for the sample facilities range from $25,000 to $230,000 depending on the size of the facility. Estimates for pollution prevention included costs for other, non-disinfection related pollutants and ranged from $50,000 to $2 million.

See response to CTR-035-061 and CTR-003-013.

Comment ID: CTRH-001-027
Comment Author: Michelle Pla
Document Type: Public Hearing
State of Origin: CA
Represented Org: S.F. Public Utilities Com
Document Date: 09/17/97
Subject Matter Code: E-01d Direct Dischargers
References:
Attachments? N
CROSS REFERENCES

Comment: We're very concerned about the economic analysis. We understand that you can -- this is based on federal orders, executive order and some legislation, in that this is not the normal thing that you do, but we're really concerned that there are some really real significant flaws here.

I'm also very concerned that there's some real misleading of the people of California of what it's going to cost the water bodies in the state to meet these levels. And to say that you think it's going to be 84 million a year is entirely misleading.

It really concerns me that people are going to glom on that number, say, "Gee, this isn't going to cost us much," if you believe that economic analysis. There's very few sources of pollution which you address with the $84 million. It is not looking at the sources and not looking at actually getting those water bodies to those levels. So I would really recommend that you be really careful about those numbers.

Put yourself in my situation. We know in San Francisco that we're going to have a problem meeting aldrin peaks (phonetic) and the dioxin.

We think -- we don't have exact numbers on this right now, but we think that if we have to go to a worst-case scenario -- in other words, if we cannot meet those numbers with source control, we cannot meet those numbers by alternatives, we'll have to -- have to go to carbon or something like this. That could cost $100 million in -- up to 100 million in coastal costs, and $1 million in O & M a year.

Now, I'm going to go to my board of supervisors and say, "Please allow me to pass a bond issue so that I can meet these discharge requirements for discharge to the San Francisco Bay." We're not talking about the Pacific ocean now, just the bay.

And they say to me, "If we give you that money to build those facilities, will the people that fish in the San Francisco Bay, that live in San Francisco, be able to eat the fish?"

And I'm going to say no. I can't guarantee that, because we're a minor source. We're less than 20 percent of 4 percent of the total sources of discharge to San Francisco Bay.

So I think you need to be careful about how you throw these numbers around, because it's going to put us in a position of never being able to do anything either.

You need to think about this economic analysis, because I don't think it's real. And I don't think the benefits that you've shown either are very real, and we'll make more extensive comments in our written form on that.

Response to: CTRH-001-027

See responses to CTR-054-013a, CTR-035-057, and CTR-038-003.

Subject Matter Code: E-01d01 Cost Estmte by Commenter

Comment ID: CTR-005-004
Comment Author: Novato Sanitary District
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/23/97
Subject Matter Code: E-01d01 Cost Estmte by Commenter
References:
Attachments? Y
CROSS REFERENCES

Comment: 3. The proposed rule could cost the District between $2.7 and $7.1 million per year without providing significant benefits. The current Basin Plan for San Francisco Bay does not allow dilution for shallow water dischargers. A review of the Draft Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California, September 12, 1997, indicates that the draft policy would allow the current Basin Plan dilution policy to continue. Under the zero dilution policy and other historic permitting practices of the San Francisco Bay Regional Board (e.g., the Board has not considered translators in establishing permit limits), the District would be unable to comply with the proposed copper criteria for aquatic life protection (CMC and CCC), the proposed nickel criterion for aquatic life protection (CCC), and the proposed human health criterion for mercury.

The District, in 1996, made a thorough analysis of the costs and benefits of complying with the proposed copper criterion of 3.1 ug/I dissolved copper and the 4.9 ug/l site-specific objective developed by the Regional Board staff. That analysis indicated that the least costly alternative to comply with these objectives would be to construct a deep water outfall at a capital cost of $28 million and a total annual cost of $2.7 million. This would have the effect of doubling our current sewer service charges. The deep water outfall would not reduce the mass of copper discharged to the Bay. The sole benefit would be to achieve the copper criterion in the immediate vicinity of the outfall (the area affected is on the order of 0.6 acres).

The next most cost-effective alternatives were to go to land disposal or reverse osmosis treatment, both of which would have a total annual cost of $7.1 million. These alternatives would reduce the mass of copper discharged to San Pablo Bay by only 0. 16%. The cost per toxic pound equivalent removed for the deep water outfall is infinite, since no copper would be removed. If one were to assume that the copper discharged to deep water is removed, the cost per toxic pound equivalent removed would be $8,470/lb. For the alternatives that actually remove copper from the Bay, the cost per toxic pound equivalentremoved would be $22,300/lb for land disposal and $28,500/lb for reverse osmosis. The detailed report containing this analysis is presented in Attachment 1.

In conclusion, the adoption of the proposed copper criteria for San Pablo Bay could, under the high-end cost scenario of State implementation, result in very high costs without providing any significant water quality benefit. The District would concur that the low-end cost scenario could be zero (i.e., if the Regional Board were to allow a dilution credit and metals translators).

Response to: CTR-005-004

The Novato Sanitary District estimate is out of the range of the costs EPA estimated for the same

industrial category and within the same range of discharge flow. However, the information submitted by the District is not sufficient to compare the facility with sample facilities of the same industrial category and flow range because existing permit limits for copper, nickel and mercury are not indicated in the comment supporting documentation. However, review of the NPDES permit issued in 1992, which was to expire in 1997, indicates that final effluent limits for copper, nickel and mercury are 2.9 ug/L, 8.3 ug/L, and 0.03 ug/L, respectively. Even though Novato was not a sample facility evaluated by EPA, it appears that these limits are likely to be more stringent than CTR-based limits that would be calculated for this facility using standard U.S. EPA implementation procedures such as those EPA assumed for the CTR EA. In the case of nickel, for example, the most stringent CTR criterion (dissolved) is 8.2 ug/L and a metal translator would be used to convert this criterion to total. Consequently, the CTR-based criterion would likely be less stringent than the existing limit and no costs would be attributed to the rule. In the case of mercury, the 1992 limit of 0.03 ug/L is already more stringent than a projected CTR-based limit of 0.05 ug/L.

If a facility chooses to calculate permit limits with consideration of metal translators or water effect ratios, the facility will not likely need to implement high cost alternatives such as deep water outfall, land disposal, or reverse osmosis. Moreover, U.S. EPA is aware that the use of metal translators to implement water quality criteria for metals does not constitute a regulatory relief alternative under the proposed Inland Surface Waters Policy. In practice, the use of metals translators may be a standard step for the calculation of effluent limits in the State of California and consistent with EPA's policy concerning the implementation of dissolved water quality criteria.

EPA did not calculate a per household cost as part of the CTR analysis. By dividing the POTW portion of the revised high-end cost estimate ($41.6 million) by the State's current estimated number of households in California (11.1 million) results in an estimated cost of $3.75 per household per year. It is unknown, however, whether all of the costs incurred by POTWs would be passed directly on to households. Nonetheless, EPA believes that $3.75 per year is not an unreasonable rate increase to protect the waters of the State of California.

See also responses to CTR-005-001 and CTR-040-031.

Comment ID: CTR-035-044b
Comment Author: Tri-TAC/CASA
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-01d01 Cost Estmte by Commenter
References:
Attachments? N
CROSS REFERENCES E-01c01
J

Comment: pp. 42188-42189 - Potential Costs Do Not Meet the $100 Million Threshold Under E 0. 12866 (also see discussion above) As noted on p. 42188, one component of the definition of a "significant regulatory action" is that the rule may have an annual effect on the economy of $100 million or more. EPA states on p.42189 that "the annualized potential costs that direct and indirect dischargers may incur as a result of State implementation of permit limits based on water quality standards using today's

proposed criteria are estimated to be between $15 million and $87 million." We believe that this range significantly underestimates the potential costs that may be realized from the implementation of this rule. This belief is based on the numerous assumptions used by EPA that would have served to underestimate potential costs, including assumptions about regulatory flexibility that are clearly contradicted in the Preamble to the rule itself. These issues are further enumerated in Attachment 2, which contains an analysis prepared by the environmental economics firm, M. Cubed. Furthermore, we strongly believe that EPA has a duty to look at a full range of potential costs that may be incurred, and not just to look at the costs under optimistic assumptions. This duty is especially acute in light of the uncertainties of how the CTR will be implemented by the State.

We examined the potential costs for the POTW sector to determine the reasonableness of EPA's cost estimates. Our preliminary analysis indicates that for 23 major POTWs the annualized costs could reach $400 million.(*3) This estimate includes the cost to construct and operate end-of-pipe treatment processes where these would be necessary to achieve projected effluent limits. Unlike the EPA cost estimates, we have assumed that regulatory relief options may not be available, and that, based on the pollutants causing compliance problems, pollution prevention and treatment plant optimization might not be sufficient to reliably achieve compliance. Thus, we feel that this estimate reflects a more accurate depiction of the potential POTW "high-end" compliance costs that could result from the draft CTR. Based on this analysis, we believe that EPA should re-analyze the potential costs for POTWs to meet water quality-based effluent limits based on the criteria in the CTR.

As noted on p. ES-2 of the Economic Analysis (U.S. EPA, 1997a), EPA estimated only the costs to point sources, and did not estimate the potential costs for compliance for nonpoint source dischargers, despite the fact that the majority of water bodies in California are impaired due to nonpoint source discharges (SWRCB, 1996). In addition, EPA failed to estimate the costs of compliance for wet weather dischargers, such as municipal and industrial stormwater dischargers. These omissions also lead us to believe that the potential total costs of the rule are far greater than $100 million. EPA must correct these deficiencies and redo the Economic Analysis.

(*3) Backup information for these cost estimates is available upon request.

Response to: CTR-035-044b

See responses to CTR-021-005c, CTR-032-004, CTR-004-003, CTR-040-039, and CTR-021-006b.

Comment ID: CTR-038-003
Comment Author: Sonoma County Water Agency
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-01d01 Cost Estmte by Commenter
References:
Attachments? Y
CROSS REFERENCES

Comment: As background, the Sonoma Valley County Sanitation District (District) provides secondary

treatment of wastewater from the towns and communities of Sonoma, Glen Ellen, Boyes, Hot Springs and Aqua Caliente. These are small residential communities with supporting commercial development and only two significant industrial users, a winery and a State hospital. The plant serves a combined population of approximately 26,000, has a capacity of 3.0 million gallons per day (mgd). Between November 1 and April 30 of each year, the plant discharges effluent to the upper end of Schell Slough. During the remainder of the year the effluent is reclaimed for agricultural irrigation. Schell Slough extends approximately 5 miles downstream from the discharge before it terminates at its confluence with Second Napa Slough. Approximately 5.7 miles of waterways connects the Schell Slough system / Second Napa Slough confluence to both the Napa River and San Pablo Bay.

Under the Basin Plan dilution policy, the treatment plant discharge to Schell Slough does not receive a dilution credit, and as a result receiving water criteria are applied directly as effluent limitations in our permit. The District has conducted a dilution analysis using a model of Schell Slough and downstream waters (see attachment). The analysis found that during periods of low natural runoff, the discharge receives a 1:1 dilution about 3 miles downstream and a 10:1 dilution shortly after entering Second Napa Slough 5 miles downstream.

The District has implemented a pollution prevention program. As a result of a corrosion control program implemented by our agency, copper levels in the plant effluent have been reduced from over 40 ug/l several years ago to between 10 and 20 ug/l today. Based on studies conducted by the Novato Sanitary District, which has the same water supply and similar effluent copper levels, it can be concluded that the remaining copper levels in the Sonoma plant effluent are largely the result of corrosion of copper pipes in local households and businesses. Thus, there are no feasible pollution prevention measures that can be taken to bring about further source reduction of copper.

The District has recently conducted an effluent monitoring program to assess compliance with EPA-recommended water quality criteria, using clean sampling techniques and appropriate QA/QC. We are conscious of the difficulty of analyzing for certain constituents and have taken precautions to ensure that we get accurate results. For example, in the case of mercury, we are using ultra clean sampling techniques and sending our samples to Frontier GeoScience, the recognized national expert in mercury analysis. This sampling program has identified several significant attainability problems with respect to the proposed CTR criteria.

3. The proposed rule could cost the District approximately $7 million per year without providing commensurate environmental benefits. The current Basin Plan for San Francisco Bay does not allow dilution for shallow water dischargers. A review of the Draft Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California, September 12, 1997, indicates that the draft policy would allow the current Basin Plan dilution policy to continue. Under the zero dilution policy and other historic permitting practices of the San Francisco Bay Regional Board (e.g., the Board has not considered translators in establishing permit limits), the District would be unable to comply with the proposed aquatic life criteria for copper (CMC and CCC) and the proposed human health criteria for mercury, alpha-BHC, gamma-BHC (lindane) and bromodichloro-methane (see Table 1). Based on constituents detected in 1 or 2 of the 6 samples, one PAH (indeno (1,2,3-cd)pyrene) and several pesticides (chlordane, 4,4'-DDT, and endrin) may also present attainability problems (see Table 2). To achieve the CTR criteria for these constituents would require reductions of greater than 80% for copper and reductions of between 49% and 75% for mercury, and between 83% and 98% for alpha-BHC and gamma BHC. Such reductions would require tertiary lime precipitation and reverse osmosis for mercury and copper and carbon adsorption for the organics. The costs of these facilities for a 3.0 mgd plant would be on the order of $7 million per year ($5 million per year for lime precipitation and reverse osmosis and $2 million per year for carbon adsorption)(see Table 4).(*1) This compares to the present

District budget for all functions of approximately $5 million per year. These costs would have no measurable benefit on San Francisco Bay proper because the District's discharge constitutes such a small portion (less than 1%) of the municipal discharge to the Bay and according to the EPA economic analysis, point source discharges contribute only 1% to 11% of the total toxic loading to the Bay. Thus, the District contributes between 0.01% and 0.1% of the toxic pollutant load to the Bay. The sole benefit of the costly end-of-pipe facilities necessary to achieve compliance with the CTR criteria would be to achieve the criteria in Schell Slough, before it enters Second Napa Slough. The District is willing to pursue source control and other reasonable measures to reduce the discharge of these constituents, but the costs necessary to achieve the proposed CTR criteria in-stream do not appear commensurate with the benefits. Although the District has not calculated the cost per toxic pound equivalent that would be removed by such facilities, the cost would likely exceed by an order of magnitude the $200 - $500 cost triggers for regulatory relief, which EPA used in its economic analysis.

(*1) The District's current permit contains a number of effluent limits based on the old State Plans. However, those effluent limits are not legally enforceable in that they were based on water quality . plans that were determined by the court to be illegal. For that reason, it would be inappropriate for EPA to assume that adoption of criteria similar to those in the old State Plans would have no effect on the District.

Response to: CTR-038-003

The Sonoma Valley County Sanitation District (District) stated that the CTR could cost the District approximately $7 million per year without providing commensurate environmental benefits. This estimate is based on the assumption that projected CTR-based permit limits would be derived using historic Regional Board permitting practices, which do not provide dilution and do not use metal translators to derive permit limits. The District estimated that tertiary lime precipitation and reverse osmosis would be required for mercury and copper, and that carbon adsorption would be required for organic constituents such as alpha-BHC, gamma-BHC (lindane), bromodichloromethane, indeno (1,2,3-cd)pyrene, chlordane, 4,4'-DDT, and endrin.

The documentation the District provided, however, is not sufficient for EPA to determine whether the District's estimate is consistent with EPA's estimates for sample facilities of the same industrial category and flow range. In particular, the District would need to provide facility engineering data, existing permit limits, and effluent data for the pollutants of concern. The documentation submitted by the District provides only maximum effluent concentrations. EPA is aware, for example, that other dischargers to San Francisco Bay tributaries (e.g., Novato District) have been assigned copper and mercury NPDES limits that are more stringent than projected CTR-based effluent limits (see response to CTR-005-001). When existing effluent limits are as stringent or more stringent than projected CTR-based limits, no costs are attributed to the CTR because the State has the authority under the Clean Water Act to implement water quality standards in a more stringent manner than is required under federal regulations and guidance.

EPA also noted that the District's analysis was based on effluent data that were reported between November 1996 and April 1997 (6 months) and comprise only six observations per pollutant. These effluent data are limited and may not reflect typical discharge conditions. A drought during a particular year, for example, may induce people to use more pesticides; thus impacting effluent quality. Such may be the case in the use of alpha-BHC and gamma-BHC (lindane) which were detected in the effluent at concentrations greater than the projected CTR-based limits. Estimates based on effluent data collected over three consecutive years would be more appropriate in establishing the most effective compliance

strategy. Despite the limited information submitted with the District's comment, EPA believes that the District's estimate is based on implementation assumptions that are different from EPA's assumptions which follow the Technical Support Document for Water Quality-based Toxics Control (EPA, 1991). If the District is analyzed using EPA's methodology and implementation procedures, the facility's potential compliance costs will most likely be insignificant.

With respect to the District's comment that it is not feasible to implement pollution prevention measures for further source reduction of copper, EPA acknowledges that source reduction alternatives may, indeed, not be feasible for all dischargers and pollutants. In the case of copper, for example, the information submitted by the District suggests that its most cost-effective compliance strategy would be to develop a site-specific metal translator and a water-effect ratio. According to the CTR, these two implementationoptions are acceptable and would not result in significant costs. However, significant costs that result from nonstandard implementation practices should not be attributed to the CTR as is done in the District's analysis.

EPA disagrees with the District's assumption that tertiary lime precipitation and reverse osmosis would be necessary for mercury compliance. The District indicated that the facility receives discharges from a State hospital. EPA has information on mercury levels form hospitals, clinical laboratories, and medical waste incinerators which indicates that hospital facilities discharge mercury at levels up to 15 ppb (EPA compiled two documents which are available in the record for this rule: Overview of Pollution Prevention Approaches at POTWs and Pollution Prevention at POTWs, Resources List). There are some potential other sources which could also be addressed with pollution prevention programs to assure a facility would be in compliance with projected CTR-based limits. Based on EPA's costing methodology, pollution prevention is assumed sufficient for compliance when a pollutant is reported below method detection levels and the projected effluent limit is below method detection levels.

The District also indicated that four organic constituents, indeno(1,2,3-cd)pyrene, chlordane, 4,4'-DDT, and endrin were detected in one or two samples at concentrations greater than projected CTR-based limits. Based on EPA's costing methodology, one or two exceeding values out of six total observations would not be conclusive enough to assume treatment costs. Because the available data is not sufficient to justify addition of treatment, and because the District does not indicate having pursued any source reduction efforts for organic constituents (i.e., no information is provided in the comment), EPA estimates that pollution prevention would be a reasonable pollution control strategy for organic constituents. Examples of the successes of POTWs awareness and education campaigns regarding the use and discharge of products containing toxic substances are presented in EPA's Overview of Pollution Prevention Approaches at POTWs and Pollution Prevention at POTWs Resource List, which are available in the record for this rulemaking.

EPA also noted that the District's $7 million annual cost estimate was based on capital costs that are considerably higher than those estimated by EPA. EPA's costs are based on those found in the Treatability Manual Volume IV, Cost Estimating (U.S. EPA, 1980) and adjusted to current dollars using an Engineering News Record index of 1.9. The District indicated that the total capital costs for a reverse osmosis and chemical precipitation system would be $18.9 million compared to EPA's estimate of $5.7 million. EPA believes that its capital cost estimates are reasonable.

Finally, EPA disagrees with the District's statement that compliance costs for point source dischargers will not have measurable benefits on San Francisco Bay because of the relatively small toxic load contribution compared with nonpoint sources. EPA believes that controls on point source dischargers will contribute to attaining standards in the water body. As controls on nonpoint sources are also implemented, the water quality standards can be achieved. However, should the State determine through

a total maximum daily load (TMDL) allocation that controls on nonpoint sources are a more cost-effective approach to achieving standards, the State can redistribute the allocations through the TMDL process. Also note that it is the toxicity of the discharge that is important. That is, even a small discharge can result in increased risks, sediment contamination, and toxics loading.

See also responses to CTR-032-004, CTR-056-018, CTR-045-012b, CTR-040-026, and CTR-040-031.

Comment ID: CTR-041-009
Comment Author: Sacramento Reg Cnty Sanit Dist
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-01d01 Cost Estmte by Commenter
References:
Attachments? N
CROSS REFERENCES

Comment: 4. Critique of SRCSD Case Study

General

The findings of the Sacramento case study are summarized in Appendix I-C.

The summary analysis flags three pollutants: mercury, aldrin and alpha-BHC as having a reasonable potential to exceed projected CTR-based WQBELs. Projections are then performed to determine a compliance cost related to achieving reductions necessary to comply with the CTR - based limits. This is accomplished by establishing a pound-equivalent reduction needed for each pollutant and relating this to estimated costs (taken from the " . . Great Lakes Water Quality Guidance (April, 1993)). From this a cost-effectiveness ratio is established. For Sacramento, the data used results in a fairly low (favorable) cost-effectiveness ($1.30/annual toxic load equivalent).

A review of the Sacramento case revealed significant problems with the data and assumptions used to derive the cost-effectiveness ratio. These have resulted in a gross underestimate of the ratio and bring to question the validity of the entire analysis. The main problems were use of questionable data without qualification and unsubstantiated assumptions in the cost to achieve compliance. The following details the concerns specific to each pollutant identified.

Mercury

In the analysis a pound-equivalent for mercury was determined using the following:

Regional Plant design flow of 181 mgd. Maximum single effluent mercury concentration of 0.360 ppb. Toxic Weight factor of 500

The total mercury discharge loading is then calculated by applying the design flow of the Regional Treatment Plant and the maximum effluent mercury concentration. It is further assumed this maximum value occurs on a daily basis resulting in a calculated 198 pounds mercury per year (or 99,177 pound

equivalents). This method severely overstates the amount of mercury potentially discharged or even existing in the system. A more appropriate method would be to use the mean concentration to calculate toxic-pound equivalence Further, the 0.360 ppb value has previously been identified as an outlier.

Aldrin and Alpha BHC

The use of either of these compounds in the analysis is questionable based on a qualified review of the data.

The compound alpha-BHC has never been detected in all effluent testing performed. Due to the use of different analytical laboratories over the years, the laboratory detection level has varied. However, through 1996 only 1 case out of 41 samples had a detection level above the listed CTR-based limit. It was this one case that was used to perform the pound-equivalent evaluation and cost analysis for reduction for the Sacramento case study. However, based on sampling it is doubtful as to whether this pollutant is present in the plant wastestreams, since the results of testing using low-level detection limits has demonstrated nondetects significantly below the CTR-based limit. A similar case is made for Aldrin which has been detected only once in the effluent in all testing performed.

The case study applied the highest detection levels for each compound to determine the pound-equivalent reduction necessary to achieve compliance. Once again this grossly overestimates the amount of pollutants in the system. Further, it is stated in the case study that these compounds will be controlled through pollution prevention/waste minimization and a cost of $400,000 assigned for both pollutants. The overstated pound-equivalent coupled with the unsubstainated cost for control yields a relatively low cost-effectiveness ratio. However, it should be noted that both these compounds have been banned for at least a decade and therefore do not lend themselves to the techniques of pollution prevention since there is no identified point source.

Response to: CTR-041-009

See response to CTR-004-003.

EPA calculated pollutant loading reductions for each facility by calculating the difference between the baseline effluent concentration and the projected CTR-based effluent limitation. The approach for calculating the load reductions, therefore, varied depending on the costing scenarios.

For the low scenario, the following assumptions were used: No reduction was assumed if the difference between the baseline value and the CTR limitation was negative. If the existing effluent concentration was above the MDL but the CTR-based limit was below the MDL, the CTR-based limit, or one-half of the MDL (whichever produces a smaller load reduction) was used for the CTR-based effluent limitation. If the maximum reported effluent concentration exceeded the existing permit limit, high scenario assumptions were employed.

For the high scenario, the following assumptions were used: If all effluent data for a pollutant were reported below detection levels, the method detection level (MDL) was used as the maximum observed concentration. If the maximum observed concentration was below the CTR-based limitation, no loading reductions were considered. If the difference between the baseline value (existing permit limit or effluent concentration) and the CTR limitation was negative, zero reduction was assumed. If both the CTR-based WQBEL and the existing permit limit were below the analytical MDL, one-half of the difference between the existing permit limit and the CTR-based limit was used to estimate the pollutant load reduction. If the existing permit limit (or effluent concentration in the absence of a permit limit)

was above the MDL, but the CTR limit was below the MDL, the CTR-based limit, or one-half of the MDL (whichever produced a smaller load reduction) was used for calculating pollutant load reductions.

To determine the reduction in loadings, EPA converted the difference between the most stringent existing permit limit (or the maximum reported effluent concentration) and the most stringent CTR-based effluentlimit (concentration) to pounds per year by multiplying this difference by the facility's average daily flow rate (design flow rate for municipal dischargers). EPA calculated annual pollutant loading reductions for each of the pollutants analyzed at each sample facility for which costs were estimated. The average load reduction then was calculated across sample facilities within each discharge category and extrapolated to the universe of facilities by multiplying the average load reduction by the total number of facilities in the category (EPA extrapolated facility specific costs similarly).

As indicated above, where pollutant monitoring data indicate detectable quantities of a pollutant, EPA used maximum effluent concentrations to estimate both pollutant loading and potential costs. Under this scenario, the methodology may result in overstating pollutant loadings and benefits. However, the assumption will also overstate compliance costs to reduce pollutant discharge concentrations. EPA chooses to err on the side of overstating costs to ensure that all potential costs are counted. EPA disagrees with the commenter's opinion that pollution prevention is not an appropriate treatment for these pollutants merely because they have been banned for some time. Lingering stockpiles or residential use of banned substances may still be releasing these pollutants into the environment and an aggressive pollution prevention program including source controls and public education should be successful in controlling these substances.

One exception, however, occurs under the low scenario. Where the Agency assumed that a facility would pursue regulatory relief, rather than end-of-pipe treatment, no load reduction is credited to the facility, while a nominal cost is incurred to pursue the regulatory relief. In other words, costs increase with no concurrent benefits.

Comment ID: CTR-044-004
Comment Author: City of Woodland
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: E-01d01 Cost Estmte by Commenter
References:
Attachments? Y
CROSS REFERENCES

Comment: As background, the City of Woodland is a small community with a population of 43,250. We operate a 6.0 million gallon per day (mgd) secondary treatment plant which discharges to Tule Canal, a constructed agricultural drain located within the Yolo Bypass. Tule Canal is an effluent dependent water body. Except for periods when the Sacramento River overflows into the bypass, Tule Canal flows are dependent upon agricultural drainage and the plant effluent. During most of the year, canal flows are dominated by agricultural drainage.

In 1994, the City conducted an effluent and receiving water quality assessment. The purpose of the assessment was to characterize toxic pollutant levels in the plant effluent and the receiving water,

determine effluent dilution, and assess whether the discharge, had a reasonable potential to cause or contribute to an exceedance of either existing or potential water quality objectives for toxic pollutants. The toxic pollutant sampling was conducted using clean sampling techniques and proper QA/QC. In 1996, a supplementary sampling monitoring program was conducted to gather additional data on several of the toxic pollutants of concern. Based on the combined results of the 1994 and 1996 monitoring programs, the City concluded that there may be a reasonable potential for exceedance of several existing and potential toxic pollutant objectives (including aldrin). In that same year, the City developed a water quality compliance strategy to address the problematic toxic pollutants (see Exhibit A).

We have reviewed the proposed CTR and offer the following comments:

3. The proposed rule could cost the City approximately $1.3 million annually without providing commensurate environmental benefits. The Regional Board does not allow the City a dilution credit and therefore we would have to achieve the aldrin criteria (and possibly other criteria) in our undiluted effluent. This would require that maximum observed aldrin levels (0.01 ug/l) be reduced by 98.6% (to 0.00014 ug/l). A reduction of this magnitude is not feasible through pollution prevention because only 4% of the aldrin has been identified as coming from industrial sources. Residential sources account for 55% and other unidentified sources account for 41 % (see Exhibit C). The least costly alternative for achieving an effluent limitation based on the aldrin criteria would be to remove the discharge from Tule Canal and construct a 7-mile outfall to the Sacramento River (where significant dilution exists). This would have a total present worth cost of $9.4 million (see Exhibit A, Tables 5 and 6). This would translate to an annual cost of $1.3 million per year (at 7% over 10 years) and would require about a 50% increase in monthly sewer service charges. This substantial cost would not produce measurable benefit on Tule Canal in that the canal is dominated by agricultural drainage, which contains pesticides and other toxic pollutants. For example, Tule Canal mercury levels upstream of the plant discharge have been measured at levels of 0.15 ug/l, three times the proposed CTR criterion for mercury (see Exhibit A, page 5). Irrespective of this, the City has developed a source control strategy for aldrin and other pollutants of concern (see Exhibit D). A major element of the strategy is the implementation of a pesticides outreach program, now underway (see Exhibit E).

Response to: CTR-044-004

EPA disagrees with the City of Woodland that a $9.4 million construction project would be required to ensure compliance with the CTR-based limit for aldrin because pollution prevention cannot feasibly ensure compliance with the CTR-based limit. The City of Woodland's own analysis of aldrin effluent monitoring data (Larry Walker Associates, WPCF Water Quality Compliance Strategy, Task 14.4, November 1996) states that "significant uncertainty exists as to the actual amounts present." Aldrin was detected above the detection level of 0.006 ug/L only twice out of 13 data points (0.0063 ug/L and 0.01 ug/L). Since sampling data for aldrin are limited and generally reflect that aldrin is not detected, EPA would assign pollution prevention to ensure that aldrin levels remain below detection levels and in compliance with the CTR-based limit. Woodland's current pollution prevention program involves education and outreach, methods which can be successful in reducing residential and miscellaneous inputs of aldrin to the system. However, if Woodland's public education and outreach program does not produce the desired result, Woodland may need to better identify miscellaneous sources (41% of aldrin sources based on the Larry Walker report) for source control or other pollution prevention measures in order to control aldrin levels.

See responses to CTR-056-018 and CTR-021-008.

EPA acknowledges that it was unable to monetize all categories of potential benefits from the rule. EPA

provided a qualitative description of the expected benefits and those unmonetized benefits that may contribute most substantially to total benefits in the final Economic Analysis of the CTR.

Comment ID: CTR-052-005b
Comment Author: East Bay Dischargers Authority
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: E-01d01 Cost Estmte by Commenter
References: Letter CTR-052 incorporates by reference letters CTR-035 and CTR-054
Attachments? Y
CROSS REFERENCES E-01i

Comment: EPA has greatly understated the potential attainability problems associated with the CTR. This also includes numerous erroneous assumptions made in the EA, such as those described by BADA, CASA/Tri-TAC, and M.Cubed. Larry Walker Associates prepared an Attainability Analysis for the BADA agencies, copy attached. That analysis concluded that BADA agencies will not be able to comply with effluent standards for copper, nickel, pesticides (Aldrin and Heptachlor), and PAHs [Benzo(a)Pyrene, Dibenzo(a,h)Anthracene, and lndeno(1,2,3-cd)Pyrene]. Removals ranging from approximately 20% to nearly 90% will be required. Without major revisions to the CTR, the cost for compliance will be more than $130,000,000 annually. These costs represent only the BADA agencies. Actual costs for all POTW dischargers to San Francisco Bay would be at least an additional 40%, bringing the total annual cost for San Francisco Bay ratepayers to more than $185,000,000 on a strictly flow proportional basis. Since the non-BADA POTWs are significantly smaller, capital costs would actually increase due to loss of economy of scale. Therefore, actual costs for San Francisco Bay could easily exceed $200,000,000 per year - all for the sole purpose of removing between 1-10% of the "Estimated Share of Toxic Loadings Attributable to Point Source."(*1)

(*1) United States Environmental Protection Agency, Office of Water 4301, EPA-820-B-96-001, July 1997, Economic Analysis of the Proposed California Water Quality Toxics Rule, Executive Summary, Page ES-10, Exhibit ES-3. Estimated Share of Toxic Loadings to California Surface Waters Attributable to Point Sources.

Response to: CTR-052-005b

See responses to CTR-040-039 and CTR-052-005a.

Comment ID: CTR-052-010
Comment Author: East Bay Dischargers Authority
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: E-01d01 Cost Estmte by Commenter

References: Letter CTR-052 incorporates by reference letters CTR-035 and CTR-054
Attachments? Y
CROSS REFERENCES

Comment: Cost Estimates for East Bay Dischargers Authority Compliance with the CTR

The following table summarizes the costs for compliance with the CTR. The costs are based on data and methodology used in the EA.

Pollutant	Remedy	Capital Cost ($M)	Annual O&M ($M)	Annualized Costs ($M)
copper	pollution prevention	NA	NA	0.057
organics	carbon adsorption	116.4	19.4	44.2
TOTAL		116.4	19.4	44.26

Response to: CTR-052-010

See responses to CTR-032-004 and CTR-060-019.

Comment ID: CTR-054-005
Comment Author: Bay Area Dischargers Assoc.
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-01d01 Cost Estmte by Commenter
References:
Attachments? Y
CROSS REFERENCES

Comment: The proposed CTR contains several criteria that could result in annual costs for BADA agencies alone of between $68 million and $134 million per year. BADA has conducted an attainability analysis based on effluent data collected by BADA agencies over the past several years, ambient data collect as a part of the Regional Monitoring Program, and the current Basin Plan dilution policies. Both the effluent and ambient data were collected using clean sampling techniques and analyzed using proper QA/QC procedures. An initial review of the State Implementation Policy indicates that the policy would not result in any loosening of the current Basin Plan dilution policy and, in fact, could result in a more restrictive policy.(*1) BADA's attainability analysis also assumed that an additional 10% reduction in problematic pollutants could be achieved through pollution prevention. The CTR economic analysis assumed a 10% to 25% reduction through pollution prevention, but BADA agencies have been implementing pollution prevention for years and would not expect significant additional reductions beyond those already achieved. All BADA agencies have extensive public education and pollution prevention programs and several have won national awards for their source control programs. BADA's analysis assumed that the Regional Board would accept and utilize metals translators developed in

accordance with EPA procedures. BADA used the RMP ambient data to develop the metals translators. BADA's analysis assumed lime precipitation would be utilized where metals removal was necessary and carbon absorption would be utilized where organics removal was necessary. BADA evaluated two lime precipitation scenarios, the addition of lime to primary tanks as EPA assumed in its economic analysis and tertiary lime treatment. BADA evaluated the cost of tertiary lime treatment because we believe EPA's assumption regarding the efficacy and cost of primary lime addition to be overly optimistic. BADA does not believe it is possible to achieve the low effluent values required to comply with the copper criteria through addition of lime to the primaries. Further, BADA believes EPA was incorrect in assuming that lime could be added to primaries without significant capital cost. Adding lime to primaries, at a minimum, would greatly increase the amount of sludge produced, thereby necessitating additional sludge handling and processing facilities. For these reasons, consultants have generally recommended tertiary lime treatment to achieve the effluent copper levels required to achieve the proposed criteria. Finally, BADA's analysis used 1996 costs, amortized at 7% interest over ten years, just as EPA did in its analysis. In estimating the cost of lime addition to the primaries, BADA used EPA's costs for lime treatment. The results of BADA's attainability analysis are presented in Attachment 2. The analysis shows that after pollution prevention all five BADA agencies would have problems complying with one or more of the proposed criteria. Three agencies would have problems with dissolved copper criteria for protection of aquatic life and two agencies would have problems with carcinogen criteria for protection of human health (aldrin, PAHs, or heptachlor). The estimated annual cost to achieve compliance varies between $68 million and $134 million per year depending on the assumption regarding lime treatment. The lower cost was based on EPA's assumption that lime could be added to the primaries to achieve the effluent limits without any capital cost. The higher cost was based on the assumption that tertiary lime treatment would be necessary to achieve the effluent limits. The lower costs include $12 million per year for lime treatment to achieve the copper effluent limitations and $56 million per year for carbon absorption treatment to achieve the effluent limitations based on carcinogens. The higher costs include $78 million per year for lime treatment and $56 million per year for carbon absorption treatment. Again, this is not a worst case scenario in that BADA assumed translators would be allowed (even though the Regional Board has not made it a practice to accept translators) and assumed continuation of the present dilution policy (even though the Draft State Implementation Policy would allow the Regional Board to deny dilution credits for deepwater dischargers).

(*1) For example, on page 13, the Draft Implementation Policy states: "The RWQCB shall consider denying or significantly limiting a mixing zone and dilution credit if the discharge contains pollutants that are carcinogenic, mutagenic, teratogenic, persistent, bioccumulative, or attractive to aquatic organisms." Literally all POTW discharges contain pollutants such as mercury that are bioccumulative and materials such as chloroform that are carcinogenic. Thus, the Draft Implementation Policy would allow the San Francisco Bay Regional Board to eliminate the 10: 1 dilution credit currently afforded to deep water dischargers.

Response to: CTR-054-005

EPA disagrees with BADA's cost estimates. EPA estimated costs to POTWs for the entire state of from $7.8 million to $41.6 million annually compared to BADA's estimate of $68 million to $134 million annually. As BADA points out in its comment, EPA uses a different standard when assigning pollution prevention costs (see response to CTR-004-003 for a discussion of EPA's methodology for applying pollution prevention costs). EPA's analysis assumes that facilities will try to meet CTR-based limits using the least cost option and, for loading reductions between 10% and 25%, EPA believes that pollution prevention or process optimization are the more likely options over end-of-pipe treatment.

In EPA's economic analysis for the final CTR, it assigned both lime addition to primary tanks and tertiary lime treatment based on individual facilities' existing treatment, CTR-based limits, and required loading reductions (see the response to CTR-040-032). EPA did consider sludge disposal where relevant and estimated residuals removal costs for those facilities.

The differences in load reductions (and thus the treatments considered necessary to meet CTR-based limits) between BADA and EPA's analyses result from different baselines in the two analyses. BADA uses a 99.9% probability estimate for metals and the maximum observed concentration for organics as its baseline to estimate loading reductions. EPA uses the existing NPDES permit limit or, in the absence of an existing limit, the maximum effluent concentration to estimate loading reductions which are then considered when assigning costs to reach the necessary load reductions.

EPA did not assign costs mechanically based on unrealistic guidelines and statistical procedures to predict worst-case effluent quality as a means for determining compliance as was done in the BADA analysis. EPA's cost decision matrix allowed for the consideration of the available data in the context of detection limits, facility processes, and potential irregularities in plant operations which might result in abnormally high data. EPA believes that it's methodology is more accurate in its evaluation of data and its estimation of costs than the BADA methodology.

See also responses to CTR-054-013a, CTR-021-008, CTR-040-029a, CTR-056-018, and CTR-040-031.

Comment ID: CTR-056-020
Comment Author: East Bay Municipal Util. Dist.
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/22/97
Subject Matter Code: E-01d01 Cost Estmte by Commenter
References: Letter CTR-056 incorporates by reference letter CTR-054
Attachments? N
CROSS REFERENCES

Comment: Given the limited time available to respond to the proposed CTR, an attainability assessment for one pollutant, copper, as the primary pollutant of concern for EBMUD was conducted (it should be noted that the District also has concerns over organic pollutants where detection limits are greater than the proposed criteria). The analysis was conducted and is presented as percentage reductions necessary to reach three levels of probability for achieving 4-day average limits:

* 95% Probability would require a 0 to 7% copper reduction. The District believes that such reductions could be achieved within 0 to 5 years by continued focus on pollution prevention measures. Current costs for pretreatment are approximately $570,000/year, and the cost of pollution prevention approximately $546,000/year.

* 99% and 99.9% Probability would require up to a 19% and 30% reduction respectively; this could only be attained through advanced treatment facilities beyond that which presently exists.

Since 1974, influent copper loadings have been reduced from 318 kg/day to 17 kg/day in 1996 (i.e.

94.7%). Pollution Prevention efforts since 1988 have resulted in a 39% reduction from 28 kg/day to 17 kg/day. In 1996 wastewater treatment resulted in a further reduction to an average effluent discharge of 5.2 kg/day. To reduce the discharge of copper by an additional 30% from 5.2 kg/day to 3.64 kg/day would result in a capital cost of $42 million and an annual O&M cost of $5 million per year. This is based on the assumption of having to treat approximately 30% of the plant flow (i.e. 22 MGD) to remove copper using the lime precipitation process. This estimate compares closely with an independent estimate of $39.2 million capital cost and $4.6 million per year operating cost performed at EBMUD's request by the consulting firm of Larry Walker & Associates.

If the EBMUD information is an example, there can be no doubt that the $15 to $87 million per year EPA cost estimate, which is supposed to have included debt service on capital investments, is a gross understatement of the true costs statewide.

Response to: CTR-056-020

See response to CTR-004-003.

Comment ID: CTR-059-001
Comment Author: Los Angeles County Sanit. Dist
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: E-01d01 Cost Estmte by Commenter
References: Letter CTR-059 incorporates by reference letter CTR-035
Attachments? Y
CROSS REFERENCES

Comment: Historical monitoring data for the seven water WRPs have shown that plant effluent concentrations will not reliably meet the proposed CTR criteria for mercury, lindane and four trihalomethanes (bromoform, chlorodibromomethane, chloroform and dichlorobromomethane). Our preliminary evaluation of the feasibility of employing source control or pollution prevention as the principal compliance strategy indicates that these options are likely to yield only very small reductions in loadings for these pollutants. Thus, to ensure reliable compliance with the CTR, reverse osmosis (RO) at the Sanitation Districts' seven WRPs would be necessary. The preliminary cost estimate for providing RO at each of the seven WRPs is significant. The total annualized cost is approximately $148 million. To put this into perspective, the addition of RO treatment would double or triple the single family home sewer system rates for the areas serviced by these facilities.

Response to: CTR-059-001

EPA is not able to evaluate LACSD's assessment that reverse osmosis (RO) is required at each of the WRPs which are not in compliance with the CTR-based limits because LACSD does not provide monitoring data or any other details with which EPA can perform an analysis. Thus, EPA disagrees with LACSD's $148 million cost estimate for the WRPs. EPA estimates that costs to POTWs for the entire state will range from $7.8 million to $41.6 million. See responses to CTR-045-012b, CTR-004-003, and CTR-005-004.

Comment ID: CTR-067-006b
Comment Author: Ojai Valley Sanitary District
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: E-01d01 Cost Estmte by Commenter
References:
Attachments? N
CROSS REFERENCES R

Comment: * The EPA should reevaluate their determination under the Regulatory Flexibility Act that the rule will not have a significant economic impact on a substantial number of small entities. OVSD would be classified as a small entity, serving a population of 25,000, and would be significantly affected by the CTR. OVSD would have to further treat our effluent with reverse osmosis in order to comply with proposed CTR criteria, specifically for copper, nickel, zinc, lindane, and trihalomethanes; modifications to the existing plant would result in estimated increased annualized costs of $1.98 million. These costs are significantly higher than EPA's estimated costs per plant of $27,000 to $480,000 per year. In addition, EPA must consider that OVSD's contingent of small businesses potentially will be affected by the proposed rule through increased regulation of their discharges, increased sewer discharge fees, or product bans. Thus we strongly believe that the EPA's Economic Analysis significantly underestimates the potential statewide costs associated with adoption of the CTR and should be revised.

Response to: CTR-067-006b

See responses to CTR-021-005c, CTR-056-018, and CTR-045-012b.

Comment ID: CTR-070-002b
Comment Author: Sewerage Agency of Sthrn Marin
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/22/97
Subject Matter Code: E-01d01 Cost Estmte by Commenter
References:
Attachments? Y
CROSS REFERENCES E-01w

Comment: Economic analysis The attached table shows that implementation of the proposed limits will result in the reduction of SASM's copper limit from 37 ug/l to 12 ug/I. It is expected that reverse osmosis will be the most economical method to reach this level and that the cost of this operation will be approximately $550,000 per year. This equates to a 30% increase in SASM's budget. This cost is also higher than EPA's estimated costs of $27,000 to $480,000 per plant per year. It appears that the Economic Analysis underestimates the potential statewide cost and should be revised.

Response to: CTR-070-002b

See responses to CTR-045-012b and CTR-070-002a.

Comment ID: CTR-111-001
Comment Author: City of Los Angeles
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 02/19/98
Subject Matter Code: E-01d01 Cost Estmte by Commenter
References:
Attachments? Y
CROSS REFERENCES

Comment: As discussed in the February 12, 1998 telephone conversation between Mr. Mitchell of your office and William Straub of my staff, enclosed for your information and use is a copy of an April 1992 report summarizing anticipated compliance efforts and costs that the City compiled in response to the State Water Resources Control Board's 1991 adoption of the Inland Surface Waters (ISWP). Although the compliance costs were estimated specifically for our DC Tillman Water Reclamation plant in Van Nuys, we believe that per-MGD unit costs are valid for our Los Angeles-Glendale Water Reclamation Plant as well (the estimated costs are summarized on Pages 11 and 12 of the report's Executive Summary).

As indicated in our oral and written comments (September 18, 1997 public hearing and September 26, 1997 letter), the proposed California Toxics Rule's July 1997 Economic Analysis (EA), based in part on the Tillman facility as a case study, misrepresented the true compliance cost impact to the City. The EA, in effect, compared the proposed criteria to the waste discharge requirements of the Tillman plant's existing NPDES permit and concluded that the cost impact would be minimal. However, the plant's 1991 permit was based on the ISWP, which itself anticipated the criteria contained in the proposed Rule. The Tillman plant was the only POTW in the region to be repermitted using these criteria; because of mounting POTW discontent following ISWP adoption, (which ultimately led to the invalidation of the ISWP in 1994), all other POTW permits were renewed using Basin Plan objectives, PQLs and National Toxics Rule criteria. The 1991 Tillman NPDES permit renewal resulted in immediate compliance problems for the plant, and for this reason we believe that the EA cost figures should consider the cost impacts of the proposed Rule from a pre-1991 point of view. The enclosed report approaches these costs from that perspective.

Updated cost estimates for the City's Tillman and Los Angeles-Glendale reclamation plants were recently prepared by the Bureau's Industrial Waste Management Division in response to the release of the proposed Rule. These include:

* Process optimization. Operational modifications to the Tillman and Los Angeles-Glendale plants necessitated by the proposed Rule involve capital costs in the range of millions of dollars and annual O&M costs between $50,000 to $200,000 per plant.

* Pollution Prevention/Waste Optimization. Based on past outreach programs and pollution prevention studies, the proposed Rule would cost about $500,000. In view of the present industrial discharger compliance rate (better than 95%), this effort might have only a marginal beneficial impact.

* Pretreatment Program. Based on studies conducted in the early 1990's, the cost of each pollutant requiring local limits development is about $15,000. Tables I and 2 (attached) summarize constituents which would be problematic under the proposed Rule. The cost of new local limits development for these pollutants would exceed $250,000.

The EA also did not include actual costs incurred by the City resulting from compliance studies required by the Los Angeles Regional Water Quality Control Board. These included:

* A numerical chronic toxicity limitation that resulted in 5 years of toxicity testing costing in excess of $200,000 (other POTWs in the area were granted narrative toxicity limits);

* Industrial source-controllability studies costing $110,000 for methylene chloride, lindane and other pesticides that were determined to be of domestic origin and therefore not controllable by the plant;

* Numerous and ongoing efforts on the part of the Bureau of Sanitation to obtain relief from the Los Angeles Regional Water Quality Control Board based on plant performance data demonstrating that ISWP-based limits were neither equitable nor achievable. We would greatly appreciate your consideration of these costs and the estimated costs contained in the enclosed report with respect to EA revision. If you should have any questions, or wish to discuss actual compliance costs incurred since 1991 in greater detail, please contact William Straub at (213) 485-1820.

Response to: CTR-111-001

See response to CTR-040-026.

Comment ID: CTRH-001-044
Comment Author: Charles Batts
Document Type: Public Hearing
State of Origin: CA
Represented Org: Bay Area Dischargers Assc
Document Date: 09/17/97
Subject Matter Code: E-01d01 Cost Estmte by Commenter
References:
Attachments? N
CROSS REFERENCES

Comment: I don't want to go into what's presented in writing, but as a discharger, our first evaluative criteria of this rule was attainability.

Our analysis is based on the information from our member agencies, and it indicates that the ability of publicly owned treatment works to meet all the criteria is seriously questionable.

For the record, all the dischargers in BADA have extensive public education programs. We have pollution prevention programs. We have award-winning source control programs.

We base our analysis on using actual data that we filed with NPDES permits over the last two years and current regulatory criteria. All the agencies would have attainability problems.

Three agencies would have problems with dissolved copper, three agencies with the organic/carcinogenic compounds. And in fact, we believe as the detection limit approaches permit limits, that all agencies would violate the carcinogenic requirement.

At present, there is no data on these constituents in the environment, in the receiving waters, or in our influents. Most of the data is nondetectable, because of the limits of detection.

It assumes that pollution prevention can identify and control these organic compounds at below parts per trillion. That is highly speculative.

Despite the assumption made in the plan of regulatory relief, treatment has been the method used to remove pollutants from our waste water effluent. If the agencies have to remove copper by relying on lime precipitation, using EPA's own numbers which contain no capital cost for handling the solid material and sludge generated, which is no minor problem, would require considerable capital cost. It would cost our agencies on a yearly basis $12 million.

To remove the organics that is required, it would require probably using technology like powdered activated carbon, and based on EPA estimates for this process, the cost to those agencies, just the three, would be $56 million a year.

We believe that other of our agencies would probably be added as detection limits and the reporting limits are lowered, since MLs would offer only temporary relief, until the detection limits show that these organics are pervasive in the environment.

So just this attainability cost -- based on data of the last two years for five agencies serving three and a half million people in the Bay Area, the cost is $68 million a year. That approaches the maximum cost projected for the state.

If we look at the projected benefits of the increased treatment and cost to our taxpayers, with point dischargers being less than 10 percent of the loading, and the lack of looking at the benefits analysis, we tend to lead people to believe that waters would meet these criteria based on just control of point sources. Actual or passive, one has to wonder what the benefits really are to the public.

If BADA agencies increase treatment to remove copper, for example, an additional 2,400 pounds of copper would be removed per year. That's about a 1 percent benefit to San Francisco. Since there is no data on carcinogenics we are talking about parts per trillion here -- the benefits become even more specious.

This analysis has not factored in more restrictive ambient background concentrations, water effect ratios, water hardness, et cetera. The hope of holding out ambiguous regulatory relief as a method of avoiding treatment costs does not seem consistent with the general trend of regulations, despite the mood of Congress or the public in general.

BADA agencies appreciate the work of EPA staff on the California Toxics Rule. We are willing to provide further data or case studies, if needed, to improve this document.

We have already, and will in the future, optimize and improve the treatment operations, increase pollution prevention and participate in studies to better define the course of action that should be taken to improve the environment and human health.

I thank you for letting me comment.

Response to: CTRH-001-044

See responses to CTR-054-013a, CTR-045-011, CTR-032-004, CTR-056-018, CTR-004-003, CTR-040-039, CTR-040-032, CTR-035-064, and CTR-029-015.

EPA acknowledged that increased angling activity at sites experiencing reductions in toxic contaminants may reflect a shift in activity from substitute sites rather than a net increase. Because EPA could not account for substitute sites in this analysis, EPA estimated lower bound benefits of $0 (i.e., assuming no net increases in activity; see Chapter 8 of EA).

Subject Matter Code: E-01e Indirect Dischargers

Comment ID: CTR-021-011
Comment Author: LeBoeuf, Lamb, Green & MacRae
Document Type: Local Government
State of Origin: CA
Represented Org: City of Sunnyvale
Document Date: 09/25/97
Subject Matter Code: E-01e Indirect Dischargers
References: Letter CTR-021 incorporates by reference letter CTR-035
Attachments? Y
CROSS REFERENCES

Comment: The CTR Inappropriately Extrapolates the Results of Copper and Nickel Industrial Mass Audits to Project the Measures, Cost and Feasibility of Compliance with Organics Limits

The CTR cites the mass audit studies conducted by Sunnyvale and San Jose for copper and nickel as the basis for the estimated $61,526 cost per significant industrial user (indirect discharger) affected by new permit limits. It is a significant extrapolation, if not distortion, to use the results of those studies to project pollution prevention and waste minimization costs for other constituents, particularly trace organics. Those studies did not address organics and there is minimal basis for assuming that the types of measures recommended to address copper and nickel, and therefore costs, and the number of affected industries (CTR assumes 10-30% of total SIUs) bears any relationship to the costs and numbers of organics from local sanitary sewer dischargers. The measures identified in the mass audits were also the easiest and most cost-effective to implement. In the instances where there were additional potential control measures identified, they were considerably more expensive. EPA ignores non-SIUs which may represent up to as much as 75% of POTW regulated industries.

Response to: CTR-021-011

See the response to CTR-040-037.

EPA disagrees with the commentor's assertion that the costs for San Jose and Sunnyvale cannot be used to extrapolate costs to indirect users at other POTWs. The procedures for identifying indirect sources contributing specific pollutants to POTWs and developing and implementing a source control plan to minimize these discharges are similar for all types of pollutants. Additionally, similar to San Jose and Sunnyvale, metals were the primary pollutants of concern for POTWs evaluated in the cost analysis. Apart from these studies, EPA has no data upon which to establish facility-level compliance costs for indirect dischargers. To account for this uncertainty, EPA has revised its assumption regarding the percentages of indirect dischargers that may incur these costs. The percentage of facilities that may incur these costs was revised from the initial estimate of from 10% to 30% to a new estimate of from 30% to 70%. EPA believes that these new estimates are highly conservative (i.e. tend to overestimate costs).

Average per facility investment costs for industrial participants were estimated using the mass audit studies for copper and nickel pollution prevention projects with paybacks of less than five years. The average cost per indirect discharger was estimated to be $61,526 or $15,000 per year at an interest rate of 7 percent and over a period of five years. The total annual costs to the indirect discharger population in California then were estimated by multiplying the annualized cost ($15,000) by the total number of potentially affected indirect dischargers.

Under the MAS, the pounds removed by the pollution prevention projects with paybacks of less than five years were 560 pounds per year for copper and 148 pounds per year for nickel. Since neither San Jose nor Sunnyvale required nickel reductions under the water quality criteria in the final CTR, EPA did not consider pounds removed. Both San Jose and Sunnyvale did require copper reductions under the high-end cost analysis. For San Jose, copper reductions required to comply with the WQBEL equaled approximately 746 non-toxic-weighted pounds per year, however, for Sunnyvale, required reductions equaled 87 pounds per year. Thus, the MAS indicates that copper reductions would be adequate to meet Sunnyvale's required loading reductions, however, they would not be adquate to meet San Jose's required loading reductions.

EPA estimated the costs for POTWs to implement waste minimization/pollution prevention programs which included capital costs for source controls for indirect dischargers. This double counting of costs associated with waste minimization/pollution prevention will cover any new or additional pollutant reduction that is required of a POTW or indirect discharger to meet the WQBEL. The double counting may be more than enough as 90% reduction is not necessary under the rule, even in San Jose's case. Only a small additional redcution is required, thus, this additional capital could be used to reduce the copper load with controls at indirect dischargers.

Comment ID: CTR-034-014c
Comment Author: SCAP
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-01e Indirect Dischargers
References: Letter CTR-034 incorporates by reference letter CTR-035
Attachments? N
CROSS REFERENCES E-01g08
E-01b
E-01v
J

Comment: * In general, we are pleased that EPA prepared an analysis of the economic impacts of the proposed CTR, and that a major portion of EPA's work focused on determining the potential impacts on POTWs. However, we believe that this analysis is based on improper assumptions and inaccurate cost estimates, resulting in unconvincing conclusions. Detailed comments can be found in Attachment 2. A few of the areas of concern are listed below:

* Small facilities appear to be under represented in EPA's sample of POTWS, especially for minor dischargers.

* The cost triggers used as regulatory relief thresholds are unrealistic, and are not consistent with EPA regulations and policies.

* The assumptions used to determine cost estimates for indirect dischargers appear to omit a large proportion of potentially affected industries.

* The Economic Analysis does not take into account projected population and industrial growth over time, which may influence effluent quality and quantity. Statewide, the population is projected to grow by nearly 50% by 2020.

* The use of average cost estimates masks economic impacts on individual dischargers, which may be particularly acute for small communities.

* The economic Analysis ignores the costs that may be incurred by stormwater dischargers and nonpoint sources to reduce loadings so that CTR criteria may be met in ambient waters.

Response to: CTR-034-014c

See responses to CTR-032-004, CTR-035-061, CTR-021-006b, CTR-040-037, CTR-059-018, and CTR-035-048.

Comment ID: CTR-035-008b
Comment Author: Tri-TAC/CASA
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-01e Indirect Dischargers
References:
Attachments? N
CROSS REFERENCES E-01g08
E-01d
E-01m
E-01h
E-01c

Comment: Finally, we have serious concerns about the accuracy of the draft Economic Analysis and the estimates of the costs and benefits of the draft CTR (see detailed comments in Attachments I and 2). Our primary concerns related to the cost analysis include 1) that the case studies on which the cost analysis is based do not adequately represent the actual population of POTWs in California; 2) the omission of costs that could be incurred by many sectors that contribute to overall loadings, and, hence, can be expected to have to reduce their loadings (e.g., non-SIU indirect dischargers, municipal and industrial stormwater dischargers, agricultural activities, and other nonpoint sources of CTR-regulated pollutants); 3) the use of numerous assumptions that underestimate costs; and 4) the capricious removal of costs that exceed threshold values by assuming that regulatory relief measures will be granted, despite the lack of any proposed regulatory relief trigger in the proposed regulation.

To illustrate the degree of underestimation of costs for the POTW sector alone, we looked at potential compliance costs for the POTW sector. We found that the potential costs for 23 major POTWS. on an annualized basis, may reach $400 million. We believe that this analysis demonstrates that the potential cost consequences of compliance with effluent limits based on the proposed CTR criteria would easily exceed the $ 100 million annual cost threshold, especially when the costs of all 313 POTWs in the State are estimated. Thus, we believe that EPA must conclude that the proposed CTR could have significant economic impacts on local governments.

Response to: CTR-035-008b

See responses to CTR-021-005c, CTR-032-004, CTR-040-039, CTR-021-006b, CTR-040-037, and CTR-059-018.

Comment ID: CTR-035-049
Comment Author: Tri-TAC/CASA
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-01e Indirect Dischargers
References:
Attachments? N
CROSS REFERENCES

Comment: pp. 2-38 - 2-39 (US EPA, 1997b) -- Cost Estimates for Indirect Dischargers By only including Significant Industrial Users (SIUs), EPA drastically underestimated the costs to indirect dischargers to POTWs, and thus to many of the industries of the State. EPA ignores non-SIUs, which may amount to as many as two-thirds of the permitted industries discharging to a POTW. EPA also does not take into account the businesses that POTWs might have to start regulating, such as dentists for source control of mercury, auto repair shops for metals, and veterinarians for pesticides used for flea control (e.g. lindane, diazinon), which could cumulatively number in the thousands. EPA also used assumptions about indirect dischargers based on an analysis of compliance costs for the Great Lakes Initiative, which showed that between 8 and 44 percent of indirect dischargers could be affected by new permit limits on POTWS. EPA used a range of 10 to 30 percent, based on that analysis. EPA appears to have done no analysis of California industries see what the distribution is by SIC code, and then determined what adjustments might be necessary to use a comparison to the Great Lakes States industrial base. Without this, there is simply no evidence that the assumptions used have anyvalidity for the California economy. For instance, at least in some parts of California, a higher proportion of industries are indirect dischargers than is the case elsewhere in the country. Additionally, to estimate individual indirect discharger costs, EPA used figures based on studies in San Jose and Sunnyvale. EPA provides no rationale for extrapolating from a single area and a few limited types of industries to the wide range industries in California, which may have very different products, treatment processes, and waste streams. To do a credible cost analysis, EPA must thoroughly examine the impacts of the CTR on indirect dischargers in California.

Response to: CTR-035-049

See responses to CTR-021-011 and CTR-040-037.

Comment ID: CTR-041-010c
Comment Author: Sacramento Reg Cnty Sanit Dist
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-01e Indirect Dischargers

References:
Attachments? N
CROSS REFERENCES E-01n
E-01m
E-01g

Comment: 5. Concerns Regarding Economic Analysis

The District also has several significant concerns with the Economic Analysis that was performed for the proposed rule. Concerns about the cost estimates made for both the District and the state are presented here. (See attached Review of EPA's Economic Analysis of the Proposed California Water Quality Toxics Rule.) Overall, the District believes that problems with the Economic Analysis are serious enough that is should be redone. As stated above in our analysis of assumed costs at the SRWTP, the use of questionable data without qualification combined with unsubstantiated assumptions regarding costs to achieve compliance resulted in a gross underestimate in the cost-effectiveness ratio. The District's first concern is that if the types of problems found in our Case Study are widespread in other studies, the complete analysis is suspect.

In addition to the analysis of the District's facilities, there are several other points which have been used by EPA to lead to a potentially serious understatement of actual costs. The key assumptions involved are that: 1) no costs would occur if either no monitoring data presently exists or if that data is below analytical detection levels; 2) no treatment costs would occur whenever EPA's initial estimates showed high costs, due to successful regulatory relief; 3) no costs are included for nonpoint sources such as municipal stormwater management systems; and 4) no costs are included for indirect dischargers to the District's system that are not large enough to be considered a Significant Industrial User (SIU).

Regarding the first assumption, the District has found that there is pressure from many sides, including the Safe Drinking Water Act, to both increase the number of constituents being monitored and to lower detection levels to meet numeric criteria set by EPA and the state. To assume that monitoring of these new constituents will not lead to any treatment cost increases is simply unrealistic. Similarly, the second assumption about absolute success in every pursuit of regulatory relief is also overly optimistic. There are no guarantees that pursuit of regulatory relief will be successful in any situation, and EPA indicates elsewhere in the preamble that options such as variances and site-specific criteria will rarely, if ever, be granted.

The third and fourth key assumptions ignore present dominating trends and facts, i.e. that. prevention and control of pollutants at their sources, including very small indirect dischargers, storm runoff, and other nonpoint sources are now the major focus of EPA's wastewater programs nationally. While we agree that these management steps should be taken, there will be significant costs attached to the implementation of these steps that cannot be ignored.

Combined with concerns the District has heard from other sources such as the California Association of Sanitation Agencies (CASA), it appears that EPA has failed to make "a reasoned determination that the benefits of the intended regulation justify its costs." Therefore the District believes that the Agency is obligated to redo the draft Economic Analysis.

Response to: CTR-041-010c

See responses to CTR-032-004, CTR-021-006b, CTR-040-037, and CTR-003-011.

Comment ID: CTR-056-022a
Comment Author: East Bay Municipal Util. Dist.
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/22/97
Subject Matter Code: E-01e Indirect Dischargers
References: Letter CTR-056 incorporates by reference letter CTR-054
Attachments? N
CROSS REFERENCES S

Comment: EBMUD perceives there to be a significant overall economic impact resulting from CTR, contrary to the conclusions reached by EPA. Because the cost may exceed $100 million annually on the regulated community (the majority of which are publicly owned agencies), it appears that pursuant to Executive Order 12,866 and the Unfunded Mandates Reform Act, the CTR can be considered a significant regulatory action which is likely to adversely affect the economy of many regions of the State, the environment and/or local governments. EBMUD is also of the opinion that EPA failed to make a, "...reasoned determination that the benefits of the intended regulation justify its costs," and is obligated to redo the draft Economic Analysis and submit it for review by the Office of Management and Budget.

Response to: CTR-056-022a

See response to CTR-021-005c.

Comment ID: CTR-092-020
Comment Author: City of San Jose, California
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: E-01e Indirect Dischargers
References: Letter CTR-092 incorporates by reference letter CTR-035
Attachments? Y
CROSS REFERENCES

Comment: Comment #4: Policy Assumptions re Indirect Dischargers

On page 2-38 of the Analysis of Potential Costs it states:

"...it was assumed that many POTW's will select the option of controlling discharges to their collection system as a cost-effective means to comply with permit limits".

Questions for EPA on Comment #4:

The specifics of San Jose/Santa Clara's copper limit and permit performance, as detailed below, raise

several global economic analysis methodological questions. For example, in the case

a) substantial, costly, pollution prevention and pre-treatment programs are already in place for most Indirect Dischargers; b) the emphasis on point sources has reduced influent concentrations to the Plant to levels where there is no longer a significant correlation of influent concentrations to effluent concentrations; c) 90% of copper is routinely removed from the influent at the San Jose/Santa Clara POTW, making further source control only marginally effective; and d) the POTW's wastewater effluent can be proven to be very close to CTR criteria. on average; yet e) portions of the receiving waters do not meet the suggested criteria, it seems capricious and arbitrary to assume that POTW's will opt to make Indirect Dischargers responsible for additional costs, as the source of the bulk of the copper is clearly not from the Indirect Dischargers, and the attainment of the CTR criteria in the receiving water will not occur by asking these sources to make further reductions.

Q.4-1) How many of the Indirect Dischargers are operating in a POTW environment where EPA's assumption would be appropriate? How many are not?

Q.4-2) How would the EPA estimates of POTW costs vs. Indirect Dischargers cost change if this assumption about cost effectiveness were changed?

Q.4-3) With respect to costs, have any measures been employed in this analysis to recognize cumulative costs of efforts undertaken to date? To identify where dischargers (indirect or direct) are on the scale of operating economies? To identify if point source pollution reduction efforts have been successful, thus spending additional monies will be only minimally productive?

Response to: CTR-092-020

The City of San Jose (San Jose) challenges the economic analysis methodology based on its particular experience in the control of toxic substances. In particular, San Jose states that because major pollution prevention efforts have already been conducted at the San Jose/Santa Clara POTW, pollution prevention is not expected to be a successful alternative for compliance with the projected CTR-based copper limit. EPA disagrees with San Jose's statement and addresses specific concerns in the following paragraphs.

San Jose indicates that although San Jose/Santa Clara facility's copper effluent concentration can be shown to be very close to the CTR-based limit, portions of the receiving water do not meet the suggested standard. EPA agrees with San Jose that the San Jose/Santa Clara facility's copper effluent concentrations are reported most often in compliance with the projected CTR-based limit, thus, estimated compliance costs are not sizable. EPA considers, however, San Jose's statement regarding some portions of the receiving water not being in compliance to be vague. If portions of the receiving water would not meet water quality standards when the San Jose/Santa Clara discharge is in compliance with its CTR-based permit limit, then a TMDL may need to be developed for the water body to ensure water quality protection. If the TMDL shows that water quality standards violations are caused by neighboring sources, then these sources would need to be controlled and related costs would not be attributed to the San Jose/Santa Clara facility.

San Jose states that it seems capricious and arbitrary to assume that POTWs will opt to make indirect dischargers responsible for pollution control costs when this may not be the case. EPA believes that San Jose's statement is inaccurate. The EPA's Economic Analysis estimates a statewide cost and is based on assumptions that apply to the majority of dischargers. If an individual facility, such as San Jose, believes that further controls on indirect dischargers are not necessary, then this specific situation would need to be addressed by the facility in a different manner. In order to account for this situation, EPA

assumed in its economic analysis that 30% of indirect dischargers would be impacted in the high scenario and 70% of indirect dischargers would be impacted in the low scenario which reflects that a greater proportion of the implementation costs would fall on POTWs under the high scenario. Nonetheless, EPA believes that the largest portion of toxic constituents received by POTWs are from indirect dischargers, thus pollution prevention, including source control efforts, will be able to ensure compliance with projected CTR-based limits.

Regarding San Jose's question about how many indirect dischargers would be targeted to reduce toxic discharges to POTWs (Q.4-1), EPA did not have adequate information to evaluate all individual indirect dischargers as part of its economic analysis, thus EPA is not able to give numerical estimates of the exact number of indirect dischargers discharging to POTWs that will be affected by this rule. However, to compensate for data limitations, EPA increased its estimate of indirect dischargers affected by the CTR from 10% to 30% used in the proposal to 30 to 70% used in the economic analysis for the final rule. EPA believes that this assumption dramatically overstates the number of dischargers affected by the CTR, but has done so to ensure that costs remain conservative, i.e., erring on the side of higher costs.

San Jose's second question (Q.4-2) is incomplete and, thus, EPA cannot prepare a response. San Jose is asking how costs would change if the assumptions used to estimate indirect costs were different, however San Jose does not indicate what the new assumptions would be. There are numerous other assumptions which could be employed to estimate indirect costs, however EPA cannot address them all and feels thatthe methodology used in the Economic Analysis was reasonable.

In response to San Jose's third question (Q.4-3), EPA did consider documented pollution prevention efforts implemented by the sample facilities in its evaluation and estimation of costs. However, having a successfully implemented pollution prevention program does not automatically disqualify a facility from being assigned pollution prevention costs in EPA's economic analysis. In the case of San Jose, effluent concentrations for copper and silver are reported below projected CTR-based effluent limits for all except one data point. Under this high compliance rate, addition of treatment is not justified, and EPA estimates that the facility would implement a pollution prevention program to ensure continued compliance (e.g., by addressing intermittent discharges). In addition, it should be noted that a pollution prevention program implemented to achieve an existing limit, although successful, may not necessarily comprise the same activities and level of effort as a program that would be implemented to ensure compliance with a new and more stringent limit (i.e., a CTR-based effluent limit).

See also response to CTR-004-003.

Subject Matter Code: E-01e01 Sunnyvale/San Jose

Comment ID: CTR-059-020
Comment Author: Los Angeles County Sanit. Dist
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: E-01e01 Sunnyvale/San Jose
References: Letter CTR-059 incorporates by reference letter CTR-035
Attachments? Y
CROSS REFERENCES

Comment: Economic Analysis

The Sanitation Districts commends EPA for preparing an analysis of the economic impacts of the proposed CTR, and for selecting POTWs for half of the case studies. We believe that EPA is correct in thinking that POTWs are likely to experience major impacts as a result of the promulgation of the CTR. However, we believe that this analysis is based on improper assumptions and inaccurate cost estimates, resulting in unconvincing conclusions. Our own attainability and cost analysis indicates that there are indeed fundamental flaws in the cost analysis. A few of the areas of concern are listed below:

* The assumptions used to determine cost estimates for indirect dischargers, such as only considering significant industrial users (SlUs), assuming that only 10 to 30 percent of the SlUs would be required to implement control measures, and estimating that the average cost per indirect discharger would be just $15,000 per year, appear to omit a large proportion of potentially affected industries and drastically underestimate potential costs.

Response to: CTR-059-020

See responses to CTR-021-011 and CTR-040-037.

Comment ID: CTR-092-018
Comment Author: City of San Jose, California
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: E-01e01 Sunnyvale/San Jose
References: Letter CTR-092 incorporates by reference letter CTR-035
Attachments? Y
CROSS REFERENCES

Comment: Comment #2: Estimation of Costs for Indirect Dischargers

[Re: Page 4-9 of the Economic Analysis; also Page 2-38 of the "Analysis of Potential Costs Related to the Implementation of the California Water Quality Toxics Rule"]

The methodology for estimating costs of implementing the CTR for all the Indirect Dischargers in the state relies on data from the October 1994 Mass Audit Studies (MAS) prepared by indirect dischargers for the San Jose/Santa Clara and Sunnyvale POTW'S. The pages cited above state that "...the average cost per indirect discharger was estimated to be $61,526 or $15,000 per year..."; the former figure being a raw project cost, and the latter, an annualized payment, assuming 5 year amortization at a 7% interest.

Our review of the San Jose/Santa Clara (only)-related MAS data, as tallied in the October 1994 report, presents a very different "average" picture. Specifically, the average per facility project cost figure which can be documented is $135,017 for both copper and nickel projects. Using the same financing assumptions as EPA, that raw cost would generate an annualized cost per facility of more than $30,000 per year.

We believe that these findings cast serious doubt on how the data were interpreted and then utilized for the estimate of costs to Indirect Dischargers. The City has further strong concerns about the validity of using data for projects related to only two priority pollutants (copper and nickel) to represent costs, statewide, for the multitude of pollutants which Indirect Dischargers (and the City) may now be faced with compliance on, given implementation of the CTR.

Of further concern is that the range of project costs for San Jose/Santa Clara Indirect Dischargers is from $2,940 to $928,100 per facility for copper removal projects and $500 to $543,565 per facility for nickel removal projects. Use of a single average cost to represent these widely variable ranges substantially obscures the real cost impacts on the local level and on individual businesses.

Questions for EPA on Comment #2:

Q.2- 1) Based on the San Jose/Santa Clara MAS data which was given to EPA, as cited above, how could the inclusion of Sunnyvale data with San Jose/Santa Clara MAS data bring the average raw cost per facility down from approximately $135,000 to just over $61,500?

Q.2-2) Given the MAS data cited above, it seems unreasonable to allow an average figure to serve as a proxy for costs for Indirect Dischargers statewide. Did EPA undertake some sensitivity analysis to explain the impact of a widely variable range of potential project costs and how that would affect costs to individual Indirect Dischargers as well as costs to the group of Indirect Dischargers?

Q.2-3) How did EPA test for the validity of using data focused on the costs of removing only two priority pollutants by the Indirect Dischargers in one Northern California subregion to represent Indirect Dischargers, with all possible combinations of pollutants as priorities, throughout the State?

Q.2-4) Did EPA determine that the number of pounds of pollutants removed under the five year payback scenario would be sufficient to meet the CTR standards? If not, then perhaps that scenario should be tested, as it may be necessary for the Indirect Dischargers to move to the next level of removal projects analysis (the 90% removal scenario). The per pound costs of doing so can be shown to increase by a factor of over 30 times, which will have a substantial effect on the per facility cost of meeting the CTR and, therefore, change the conclusions of the current analysis.

Response to: CTR-092-018

See responses to CTR-021-011 and CTR-035-048.

Subject Matter Code: E-01e02 No Costs for Non-SIUs

Comment ID: CTR-040-037
Comment Author: County of Sacramento Water Div
Document Type: Storm Water Auth.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-01e02 No Costs for Non-SIUs
References: Letter CTR-040 incorporates by reference letter CTR-027
Attachments? Y
CROSS REFERENCES

Comment: EPA's estimates for indirect dischargers is confined to "significant industrial users" (SIUs) and ignores small industrial and commercial establishments that can be sources of toxic pollutants (e.g., vehicle service businesses, printers, dentists, etc.). In most cases, where toxic pollutants exist at levels of concern in effluent, they are not the result of SIU discharges; they are from either residential or commercial sources.

Response to: CTR-040-037

Since non-SIUs are typically not the focus of POTW regulatory programs, the Agency has assumed that the costs to control discharges from non-SIUs will be born primarily by the POTW. EPA's consideration of non-SIUs, therefore, is built into the waste minimization costs allocated to POTWs. For example, the waste minimization costs assumed for POTWs include components such as source identification, outreach and training, and source reduction strategies. These measures have been used successfully by POTWs to reduce discharges of specific pollutants from non-SIUs (e.g., mercury, silver) without imposing costly end-of-pipe treatment.

Comment ID: CTR-041-033
Comment Author: Sacramento Reg Cnty Sanit Dist
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-01e02 No Costs for Non-SIUs
References:
Attachments? N
CROSS REFERENCES

Comment: EPA's estimates for indirect dischargers is confined to "significant industrial users" (SIUs) and ignores small industrial and commercial establishments that can be sources of toxic pollutants (e.g., vehicle service businesses printers, dentists, etc.). In most cases, where toxic pollutants exist at levels of concern in effluent, they are not the result of SIU discharges; they are from either residential or commercial sources.

Response to: CTR-041-033

See response to CTR-040-037.

Comment ID: CTR-043-003
Comment Author: City of Vacaville
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: E-01e02 No Costs for Non-SIUs
References:
Attachments? Y
CROSS REFERENCES

Comment: As background, the City of Vacaville owns and operates two wastewater treatment plants. The Easterly Plant has a capacity of 10 million gallons per day (mgd) and discharges to Old Alamo Creek, an effluent-dependent stream with little or no natural flow during much of the year. The Gibson Canyon Creek Plant has a capacity of 1.4 mgd and discharges to a small creek with the same name. The City has reviewed the proposed CTR with respect to its potential impact on the Easterly Plant. Because the Gibson Canyon Creek Plant serves two industrial dischargers, the City did not evaluate it with respect to the proposed CTR. Additionally, due to the City's population (< 100,000) stormwater has not been monitored for toxic pollutants. However, based on the Easterly Plant review, the City is concerned about the potential impact of the proposed rule on the City's municipal wastewater and on future stormwater operations.

Since 1993, the City has conducted an effluent and receiving water quality assessment with respect to the Easterly Plant. The purpose of the assessment was to characterize toxic pollutant levels in the plant effluent and the receiving water and to determine whether the discharge had a reasonable potential to cause or contribute to an exceedance of either existing or potential water quality objectives for toxic pollutants. The results of this assessment have formed the basis for the City's review of the proposed CTR.

3. The proposed rule could cost the City approximately $4.2 million annually without providing commensurate environmental benefits. The Regional Board does not allow the City a dilution credit and therefore we would have to achieve the CTR criteria in our undiluted effluent. A review of our effluent data indicates we would be unable to attain effluents based on the human health criteria for three carcinogens -- gamma-BHC, chloroform, and dibromochloromethane (see Attachment). The reductions in effluent levels necessary to achieve these criteria vary between 27% for gamma-BHC to 88% for dibromochloromethane. These types of reductions would not be achievable through pollution prevention. Thus, end-of-pipe treatment would be required, most likely carbon adsorption. Using EPA's estimate of costs for a 10 mgd carbon adsorption facility for the City of Merced case study, the capital cost of the facility would be $10.7 million and the annual cost would be $4.2 million (7%, 10 years). It is questionable whether this substantial cost would bring about much benefit in an effluent-dependent stream.

Response to: CTR-043-003

See responses to CTR-021-008, CTR-056-018, CTR-004-003, and CTR-021-008.

Comment ID: CTR-044-028
Comment Author: City of Woodland
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: E-01e02 No Costs for Non-SIUs
References:
Attachments? N
CROSS REFERENCES

Comment: EPA's estimates for indirect dischargers is confined to "significant industrial users" (SIUs) and ignores small industrial and commercial establishments that can be sources of toxic pollutants (e.g., vehicle service businesses printers, dentists, etc.). In most cases, where toxic pollutants exist at levels of concern in effluent, they are not the result of SIU discharges; they are from either residential or commercial sources.

Response to: CTR-044-028

See response to CTR-040-037.

Comment ID: CTR-054-032
Comment Author: Bay Area Dischargers Associati
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-01e02 No Costs for Non-SIUs
References:
Attachments? N
CROSS REFERENCES

Comment: EPA's estimates for indirect dischargers is confined to "significant industrial users" (SIUs) and ignores small industrial and commercial establishments that can be sources of toxic pollutants (e.g., vehicle service businesses printers, dentists, etc.). In most cases, where toxic pollutants exist at levels of concern in effluent, they are not the result of SIU discharges; they are from either residential or commercial sources.

Response to: CTR-054-032

See response to CTR-040-037.

Subject Matter Code: E-01e03 No Savings from Poll. Red

Comment ID: CTR-092-019
Comment Author: City of San Jose, California
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: E-01e03 No Savings from Poll. Red
References: Letter CTR-092 incorporates by reference letter CTR-035
Attachments? Y
CROSS REFERENCES

Comment: Comment #3: Net Costs of MAS Projects

The EPA document entitled "Analysis of Potential Costs Related to the Implementation of the California Water Quality Toxics Rule" describes the agency's interpretation of the Mass Audit study information provided by the City of San Jose for use in preparing the CTR. On page 2-39 of that document it states that:

"The studies concluded that substantial discounted net savings could accrue to their indirect industrial dischargers by implementing pollution reduction projects for which the payback period is five years or less."

Questions for EPA on Comment #3:

Q.3- 1) Isn't this statement appropriate only if the indirect discharger(s) accepts the analyst's financing and business operation assumptions, i.e. that project costs were annualized and then offset by annual operating savings? Even then would there be net savings before project costs were completely offset in approximately five years?

Q.3-2) For those dischargers who chose to pay for pollution reduction projects from current operating monies, isn't the time gap between cost offset and accumulated operating savings even longer? Is there not also the additional, (uncalculated) cost of the opportunity cost of business capital?

Q-3-3) San Jose's findings were that, for the aggregate of MAS dischargers, on an undiscounted, per pound of pollutant removed basis, there were net costs for the copper removal projects, not net savings, which effectively lengthened the payback period. How were these findings incorporated into this analysis?

Q.3-4 San Jose further found that the per pound savings (again undiscounted) for the nickel removal projects would hardly be considered substantial for most large indirect dischargers. How did EPA define "substantial"?

Response to: CTR-092-019

EPA's analysis does not include the costs of coming into compliance with existing permit limits as part of CTR compliance costs because these costs will be incurred regardless of the implementation of the CTR. In EPA's revised economic analysis of the final CTR, San Jose's high-end and low-end costs are

estimated to be $300,000 per year and $57,000 per year, respectively. The extrapolated costs attributed to San Jose in the high and low scenarios are $750,000 and $140,000, respectively, or 1.2% and 0.5% of the total projected annual costs.

For sites included in the San Jose mass audit study (MAS) that reported a payback of 5 years or less, the MAS reports aggregate total costs (over 5 years or less) for copper projects of $2.5 million compared to an annual operating cost savings of $1.7 million, resulting in an average overall payback period of 1.5 years. The MAS also reports aggregate total costs for nickel projects of $1.7 million versus an annual operating cost savings of $2.3 million for an average overall payback period of 0.75 years (MAS, 1994). The MAS does not consider alternate financing or accounting practices. In using the San Jose MAS costs, EPA did not consider that any savings would be realized and financed the entire costs at seven percent over the five years. Factoring in the operating cost savings would have resulted in lower costs over this same period.

EPA believes that the O&M savings for the nickel removal projects for most large indirect dischargers are too speculative and specific to dischargers in the South Bay area to apply to other POTWs throughout California, thus EPA discounted the savings component to add a measure of conservatism when estimating costs to the indirect discharger population.

Reference: City of San Jose, San Jose/Santa Clara Water Pollution Control Plant, 1994. Industrial Mass Audit Studies Summary Report.

CALIFORNIA TOXICS RULE
RESPONSE TO COMMENTS REPORT

VOLUME II

December 1999

Prepared by:

U.S. Environmental Protection Agency
Office of Science and Technology
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Washington, D.C. 20460

and

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Region 9
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Subject Matter Code: E-01g Sample Facilities

Comment ID: CTR-021-008
Comment Author: LeBoeuf, Lamb, Green & MacRae
Document Type: Local Government
State of Origin: CA
Represented Org: City of Sunnyvale
Document Date: 09/25/97
Subject Matter Code: E-01g Sample Facilities
References: Letter CTR-021 incorporates by reference letter CTR-035
Attachments? Y
CROSS REFERENCES

Comment: EOA submits the following comments on the Draft California Toxics Rule on behalf of the City of Sunnyvale. Sunnyvale owns and operates a 29.5 mgd advanced secondary municipal wastewater treatment plant that discharges into the extreme South San Francisco Bay. Sunnyvale has had in place for several years comprehensive source control, pollution prevention, and waste minimization programs.

The San Francisco Bay Regional Water Quality Control Board (RWQCB) considers Sunnyvale a shallow water discharger and does not allow dilution credit in calculating effluent limits. As such Sunnyvale faces considerable difficulties in complying with end-of-the-pipe limits for copper and potentially several toxic organics that have proposed criteria lower than the analytical detection limit.

One of the key items contained in the CTR that directly impacts Sunnyvale is the effluent limit attainability analysis and cost of compliance for Sunnyvale contained in the Analysis of Economic Costs Technical Support Document and Appendix. The methodology is flawed, a number of assumptions (including basic facts) are incorrect and thus lead to erroneous results. Reliance on an incorrect analysis of the City of Sunnyvale WPCP and then extrapolation of this analysis to other California dischargers will lead to other erroneous and misleading results and conclusions.

The EPA Sunnyvale Case Study Did Not Follow EPA's TSD and Did Not Use Current Available Effluent Data and thus Contains Erroneous Conclusions

Attachment no. 1 to this memo contains a detailed analysis of deficiencies in EPA's analysis of the Sunnyvale Case Study, specifically an evaluation of Sunnyvale's compliance with calculated CTR based effluent limits (Analysis of Potential Costs TSD Appendices I-B, 11-B, II I-B). It is not clear why EPA did not employ a more straight-forward 1991 TSD based approach (Chapters 3 and 5) starting with a reasonable potential analysis based on actual data followed by effluent limit calculation. Some of the fundamental assumptions behind the approach used are flawed, leading to erroneous conclusions, some overly conservative, some not.

For example from Table I-B-4, silver was reported to be a problem since the calculated CTR limit (1.76 ug/L) was less than the current limit (2.3 ug/L) , even though the maximum historic effluent value (1.6 ug/L) was less than either limit. The CTR analysis also appears to be confusion over effluent limit averaging periods since the CTR limit of 1.76 ug/L is derived from a one day maximum toxicity based criterion yet the limit is described as a monthly average limit. Current NPDES permits in the San Francisco Bay Region do not have monthly average limits for silver. The CTR should explain how the proposed 3.8 ug/L daily maximum limit is considered protective of aquatic life.

Response to: CTR-021-008

To estimate costs related to implementation of the CTR, EPA selected a sample of point source dischargers for evaluation to represent the universe of point source dischargers to inland waters, enclosed bays, and estuaries. As described in SAIC and Jones and Stokes Associates (1997), this sample was selected based on a number of factors, including type of facility, geographic location, etc. Available dilution was not considered in selecting a sample.

However, dilution factors used to calculate water quality-based effluent limits (WQBELs) were based on the dilution allowed within the current waste discharge requirements for each sample facility. Of the 20 sample facilities, only four were provided with dilution factors; WQBELs for the remaining facilities were based on a dilution of zero. When this sample is extrapolated to the universe, over 94% of point source dischargers are estimated to not be allowed dilution. EPA believes that this is a highly conservative estimate that will likely overestimate potential costs.

Reference: SAIC and Jones and Stokes Associates, Inc. 1997. Analysis of Potential Costs Related to the Implementation of the California Toxics Rule. Prepared for U.S. EPA, Office of Science and Technology and U.S. EPA Region IX, May 5.

Comment ID: CTR-021-014
Comment Author: LeBoeuf, Lamb, Green & MacRae
Document Type: Local Government
State of Origin: CA
Represented Org: City of Sunnyvale
Document Date: 09/25/97
Subject Matter Code: E-01g Sample Facilities
References: Letter CTR-021 incorporates by reference letter CTR-035
Attachments? Y
CROSS REFERENCES

Comment: Attachment 1 - Comments on "Sunnyvale Facility Summary" Appendices

ANALYSES-

As discussed in the above memo, a fundamental methodological assumption was incorrect causing bias in the ensuing technical and economic analyses. Therefore, detailed comment on the results are for the most part inappropriate. In addition, the entire analyses conducted for the City of Sunnyvale apparently utilized a dataset containing effluent data from 1991 through 1993 when more appropriate recent data (1994-1996) should have been used. However, as an illustration of how the results are biased, the following points are presented:

Appendix I-B:

Appendix I-B states that "The existing permit limits and/or the maximum reported concentrations of silver, endrin, pentachlorophenol, 1,2-dichlorobenzene, chlorodibromomethane, and toluene are less stringent than the projected CTR-based limits (see Table I-B-4)". The following discussion addresses each of those constituents:

* Silver: The CTR based average monthly limit is 1.76 mg/L and the maximum daily limit is 3.8 mg/L. The current daily maximum limit is 2.3 mg/L. Based on a reasonable potential analysis (Attachment - 2) of plant performance data from 1994 through 1996, the projected maximum concentration is lower than the CTR based average monthly limit.

* 1,2-dichlorobenzene, and toluene: The CTR based average monthly limit for each of these constituents decreased below the current effluent limit, therefore they were cited as requiring additional removal for compliance. However the City's reasonable potential analysis of plant performance data from 1993 through 1996 indicates that there is no reasonable potential to exceed the CTR based limit (i.e. values were orders of magnitude below the proposed limits).

* Endrin and Pentachlorophenol: The CTR based average monthly limit for pentachlorophenol decreased from 8.2 mg/L to 7.4 mg/L, triggering its inclusion in the CTR evaluation. During the time period of 1993 through 1996, 16 samples were analyzed at a detection limit of 10 mg/L, all of which were reported below detectable levels. Endrin was never detected in the effluent, but the available detection limits were above the CTR based effluent limit.

* Chlorodibromomethane: Currently, THMs are regulated for the City of Sunnyvale at a level of 480 mg/L as an average monthly limit for Total THMs. A reasonable potential analysis of plant performance data from 1993 through 1996 indicates that there is a reasonable potential to exceed the CTR based limit of 34 mg/L.

* Copper should have been flagged as a pollutant with reasonable potential to exceed the limit. A reasonable potential analysis of plant performance data will show that there is areasonable potential for copper to exceed the maximum daily CTR based limit of 9.27 mg/L and the average monthly limit of 5.55 mg/L. The analysis summarized in Table I-B-3, only compares the proposed site specific objective of a maximum daily limit of 4.9 mg/L to the CTR based average monthly limit of 5.55 mg/L.

* Dichlorobromomethane: This is similar to chlorodibromomethane in that a reasonable potential analysis will demonstrate that there is a reasonable potential for this constituent to exceed the CTR based average monthly limit.

Appendix II-B:

Appendix II-B states that "The existing permit limits and/or the maximum reported concentrations of silver, endrin, pentachlorophenol, and 1,2-dichlorobenzene, are less stringent than the projected CTR based limits (see Table II-B-4)". Refer to the discussion above for an interpretation of effluent concentrations for each of these pollutants.

Response to: CTR-021-014

Sunnyvale stated that the technical and economical analysis is biased because of an incorrect fundamental assumption and because the effluent data used for Sunnyvale (1991-1993) were not recent. Since Sunnyvale has disagreed with many of the methodological assumptions used for the analysis, it is difficult to determine to which specific assumption Sunnyvale is referring. Sunnyvale also raised questions regarding issues such as assigning reasonable potential in the high scenario based on existence of permit limits and the use of the projected average monthly limit to assess compliance. EPA's responses to these questions follow.

* EPA's revised Economic Analysis included the use of effluent data that were reported between January 1995 and December 1997. These were the most recent data available at the time the analysis

was completed.

* Analysis of silver effluent data indicate that this pollutant does not have reasonable potential to exceed a CTR-based limit. Thus, no compliance costs are necessary in the low scenario. However, pollution control costs are necessary in the high scenario because the existing permit limit is less stringent than the projected CTR-based limit. As indicated in the Economic Analysis, EPA determines reasonable potential to exceed CTR-based limits in the high scenario if a pollutant has an existing permit limit or if the projected effluent quality based on the facility effluent data is greater than CTR-based limits. EPA recognizes that this is a conservative assumption that may overstate costs in the high scenario if a pollutant is limited in a permit but is not actually present in the effluent.

* 1,2-dichlorobenzene and toluene do not have reasonable potential to exceed water quality criteria andthus no associated compliance costs in the low scenario of the revised Economic Analysis. However, reasonable potential and compliance costs are assigned in the high scenario because existing permit limits for these pollutants are less stringent than the projected CTR-based limits. The rationale behind this assumption is the same as for silver (see above).

* Endrin is not listed as a pollutant of concern in the revised Economic Analysis. In the low scenario, reasonable potential is not assigned because, as Sunnyvale also indicated, the pollutant is consistently reported below detection levels. In the high scenario, no costs are assigned because the existing limit is as stringent as the projected CTR-based limit. Sunnyvale indicated that although endrin was detected in the effluent, the detection level is greater than the projected CTR-based effluent limit suggesting that controls may be necessary. However, since the existing permit limit is as stringent as the CTR-based projected limit, any compliance costs are attributable to the existing limit and not the CTR.

* In the revised Economic Analysis, pentachlorophenol is assigned compliance costs in the high scenario and not in the low scenario. This is because the existing permit limit is less stringent than the projected CTR-based limit and all available effluent data are below detection levels. As shown in the cost decision matrix presented in the Economic Analysis, EPA assumes that addition of treatment is not justified when effluent data are inconclusive or limited.

* No pollution control costs are estimated for chlorodibromomethane and dichlorobromomethane in the revised Economic Analysis. The existing NPDES permit does not include limits for these constituents. In addition, no recent effluent monitoring data (1995 to 1997) were available. Although, Sunnyvale indicated that it had completed reasonable potential analyses for chlorodibromomethane and dichlorobromomethane, it did not provide these analyses to EPA.

* Please see the response to CTR-021-004 for a detailed discussion of EPA's response to the issues the commenter raises regarding copper.

* In the revised Economic Analysis, the reduced risk level scenario for silver, endrin, pentachlorophenol, and 1,2-dichlorobenzene (Appendix II-B) is identical to the base scenario. Thus, the above responses are also applicable to the Appendix II-B comments Sunnyvale submitted.

Comment ID: CTR-035-059
Comment Author: Tri-TAC/CASA
Document Type: Trade Org./Assoc.
State of Origin: CA

Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-01g Sample Facilities
References:
Attachments? N
CROSS REFERENCES

Comment: Weaknesses in Cost Analysis

The report's cost estimates exhibit a number of significant weaknesses, as follows:

* No evidence is presented that the selected case studies reflect the overall population of affected parties. Although a stratified sample approach appears to reflect sound basis from which to estimate costs, USEPA provides no explanation as to how the case study areas were selected- no evidence that the impacted population is statistically "normal"(*6) and no informationindicating that the sample size is sufficient to make generalizations (e.g., 7 percent of the major POTW NPDES permittees; 1 percent of the minor NPDES permmittees). Likewise the analysis points to significant diversity in how Regional Water Quality Boards treat permits, with potentially concomitant cost implications. Excluding a few high-cost parties from the sample, and ignoring regional Board behavior, could falsely indicate that total Rule costs are less than $100 million a year.

An alternative sampling approach could focus on the presence and distribution of affected pollutants, rather than the impacted entities. Since costs to control metals and mercury are estimated to account for almost 60 percent of total annual costs,(*7) examination of the presence of these pollutants in different state regions could provide a basis for alternative cost estimates.(*8) Or, to account for different regional water quality conditions and Regional Board behavior, sampling could be done by water body.

(*6) In fact, the provided data implies that a handful of dischargers may be responsible for the great majority of costs.

(*7) This estimate in itself may be suspect, as organics may account for a larger proportion of the contaminants than indicated by USEPA.

(*8) This approach would require a great deal more information about existing pollutant characteristics and distribution. However, such knowledge would seem to be a critical precursor to rule development.

Response to: CTR-035-059

See responses to CTR-021-005c and CTR-059-018.

Comment ID: CTR-041-010d
Comment Author: Sacramento Reg Cnty Sanit Dist
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-01g Sample Facilities

References:
Attachments? N
CROSS REFERENCES E-01n
E-01m
E-01e

Comment: 5. Concerns Regarding Economic Analysis

The District also has several significant concerns with the Economic Analysis that was performed for the proposed rule. Concerns about the cost estimates made for both the District and the state are presented here. (See attached Review of EPA's Economic Analysis of the Proposed California Water Quality Toxics Rule.) Overall, the District believes that problems with the Economic Analysis are serious enough that is should be redone. As stated above in our analysis of assumed costs at the SRWTP, the use of questionable data without qualification combined with unsubstantiated assumptions regarding costs to achieve compliance resulted in a gross underestimate in the cost-effectiveness ratio. The District's first concern is that if the types of problems found in our Case Study are widespread in other studies, the complete analysis is suspect.

In addition to the analysis of the District's facilities, there are several other points which have been used by EPA to lead to a potentially serious understatement of actual costs. The key assumptions involved are that: 1) no costs would occur if either no monitoring data presently exists or if that data is below analytical detection levels; 2) no treatment costs would occur whenever EPA's initial estimates showed high costs, due to successful regulatory relief; 3) no costs are included for nonpoint sources such as municipal stormwater management systems; and 4) no costs are included for indirect dischargers to the District's system that are not large enough to be considered a Significant Industrial User (SIU).

Regarding the first assumption, the District has found that there is pressure from many sides, including the Safe Drinking Water Act, to both increase the number of constituents being monitored and to lower detection levels to meet numeric criteria set by EPA and the state. To assume that monitoring of these new constituents will not lead to any treatment cost increases is simply unrealistic. Similarly, the second assumption about absolute success in every pursuit of regulatory relief is also overly optimistic. There are no guarantees that pursuit of regulatory relief will be successful in any situation, and EPA indicates elsewhere in the preamble that options such as variances and site-specific criteria will rarely, if ever, be granted.

The third and fourth key assumptions ignore present dominating trends and facts, i.e. that. prevention and control of pollutants at their sources, including very small indirect dischargers, storm runoff, and other nonpoint sources are now the major focus of EPA's wastewater programs nationally. While we agree that these management steps should be taken, there will be significant costs attached to the implementation of these steps that cannot be ignored.

Combined with concerns the District has heard from other sources such as the California Association of Sanitation Agencies (CASA), it appears that EPA has failed to make "a reasoned determination that the benefits of the intended regulation justify its costs." Therefore the District believes that the Agency is obligated to redo the draft Economic Analysis.

Response to: CTR-041-010d

See responses to CTR-032-004, CTR-021-006b, CTR-040-037, and CTR-003-011.

Comment ID: CTR-043-004a
Comment Author: City of Vacaville
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: E-01g Sample Facilities
References:
Attachments? Y
CROSS REFERENCES E-01h
E-01m
E-02c
E-01c02

Comment: 4. EPA's Economic Analysis is seriously flawed. The major flaws include:

(1) failing to do an appropriate sampling of small dischargers having little or no dilution;

(2) assuming in the high-end cost scenario that a 25% reduction could be achieved through source control and an additional 25% achieved through treatment plant optimization without capital improvements;

(3) constraining estimates of potential costs through key assumptions, including the assumption that regulatory relief from the rule would be granted if costs were in excess of certain thresholds; and

(4) exaggerating estimates of potential benefits by assuming an end (i.e., achievement of the proposed water quality criteria) that will not result from the rule.

The result of these flaws is that potential costs are greatly understated and potential benefits are greatly overstated. Moreover, the flawed economic analysis has lead to the erroneous conclusion that the CTR is not a "significant regulatory action" or major rule subject to Presidential Executive Order 12866 and the Unfunded Mandates Reform Act or a rule that affects small entities protected under the Regulatory Flexibility Act.

Response to: CTR-043-004a

See responses to CTR-054-013a, CTR-021-005c, CTR-032-004, CTR-021-008, CTR-040-029a, CTR-056-018, and CTR-059-018.

Comment ID: CTR-092-014
Comment Author: City of San Jose, California
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: E-01g Sample Facilities
References: Letter CTR-092 incorporates by reference letter CTR-035
Attachments? Y

CROSS REFERENCES

Comment: EPA's Economic Analysis

Attachment 4 to this letter, are detailed comments by the City on EPA's Economic Analysis of the costs and benefits that are anticipated from adoption of the CTR. This attachment is also incorporated as part of our comments and is being submitted for inclusion in the record for this rulemaking.

Although the City initially supported a waiver of OMB review of the CTR, we are very concerned with the number of uncertainties and erroneous assumptions contained in the Economic Analysis. We are particularly concerned with EPA's interpretation of the San Jose/Santa Clara facility data as it relates to the cost and attainability of limits based on the proposed copper and nickel criteria. We are also extremely concerned with the use of this data to draw conclusions about costs and compliance with for other pollutants or other facilities. Finally, we are also concerned that the State may attempt to use or rely on the Economic Analysis in promulgating its implementation plan.

We understand the difficulty of performing such an analysis, but we also believe that the importance of a complete, thorough and supportable Economic Analysis cannot be overstated. As discussed in more detail in Attachment 4, the Economic Analysis does not fully account for all costs and the benefits, nor does the Analysis accurately calculate and analyze the costs and benefits that are presented. As indicated above, EPA's conclusions about costs and benefits cannot be validated at this time due to uncertainties about State implementation of the Rule.

Response to: CTR-092-014

See responses to CTR-021-011 and CTR-040-037.

Subject Matter Code: E-01g01 Low or Zero Dilution

Comment ID: CTR-108-001
Comment Author: City of Los Angeles
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 10/31/97
Subject Matter Code: E-01g01 Low or Zero Dilution
References:
Attachments? Y
CROSS REFERENCES

Comment: On behalf of Dr. Ing Yih Cheng, I am sending you copies of tables which described the constituents of concern with respect to CTR at Los Angeles-Glendale Water Reclamation Plant, Terminal Island Wastewater Treatment Plant, and Donald C. Tillman Water Reclamation Plant. Detailed information regarding the concern constituents at each plant will be forwarded to you sometimes next week.

If you have any questions regarding these tables please call me at (310)524-1171.

Response to: CTR-108-001

See response to CTR-092-017.

Subject Matter Code: E-01g02 Another EA for Sample Fac

Comment ID: CTR-052-014
Comment Author: East Bay Dischargers Authority
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: E-01g02 Another EA for Sample Fac
References: Letter CTR-052 incorporates by reference letters CTR-035 and CTR-054
Attachments? Y
CROSS REFERENCES

Comment: C. RECOMMENDATIONS FOR MODIFICATIONS TO THE CTR AND EA

Revise the Economics Analysis. The EA should be revised to incorporate the updated and more representative cost data provided by POTWs. The benefits analysis should also be revised using the methodology recommended by M.Cubed and others. EPA should use data more representative of California, rather than relying on questionable data from a Ph.D. dissertation. The EA should also include sub-sections specific for San Francisco Bay and effluent dependent water bodies.

Response to: CTR-052-014

See response to CTR-021-008.

To update its analysis for the final CTR, and in response to comments, EPA collected the most recent publicly available data for all facilities included in the cost analysis, including permits, fact sheets, permit applications, and discharge monitoring data. Data submitted as a part of the public comments were also reviewed and considered.

Comment ID: CTR-057-001
Comment Author: City of Los Angeles
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: E-01g02 Another EA for Sample Fac
References:
Attachments? N
CROSS REFERENCES

Comment: Thank you for the opportunity to submit comments on the proposed California Toxics Rule (CTR). As we indicated in our oral comments at the September 18, 1997 public meeting, the City of Los Angeles is primarily concerned about the adequacy of your agency's cost/benefit analysis (particularly with respect to the Tillman Water Reclamation Plant case study). Although we highlight this issue in the following comments, we have a number of additional concerns regarding other important matters raised by the proposed Rule that are also presented. We strongly urge the EPA to consider these comments and

recommendations, especially with regard to revision of the economic analysis.

Overview of Affected Facilities

The City owns and operates three treatment facilities that would be impacted by the proposed Rule:

DC Tillman Water-Reclamation Plant. This 80-MGD facility is located in Van Nuys and provides tertiary-treated reclaimed water that is essential for current and planned reuse projects (irrigation, recreation and wildlife habitat) and aquatic wildlife support (via discharges to natural portions of the Los Angeles River). A major water reclamation project (East Valley Water Recycling Project), currently under construction, will deliver up to 30 MGD of flow to groundwater recharge basins and industrial users in the San Fernando Valley. The plant's service area comprises a population of approximately 1 million people.

Los Angeles-Glendale Water Reclamation Plant. This 20-MGD capacity plant (partly owned by the City of Glendale) supplies tertiary-treated reclaimed water for several industrial and irrigation uses, while discharges to the Los Angeles River support natural portions of the Los Angeles River. The plant's service area includes portions of the cities of Los Angeles and Glendale, comprising a total served population of approximately 250,000 people.

Terminal Island Treatment Plant. This 30-MGD facility, located in San Pedro was recently upgraded to tertiary capability via the addition of deep-bed effluent filters. This plant is the site of a major water reclamation project which will ultimately supply advanced-treated (microfiltration/reverse osmosis) effluent to nearby oil refineries and support industries. The plant serves a population of about 300,000 people.

The combined annual operation and maintenance cost of these facilities is approximately $15 million. As the City is also expanding its Hyperion Treatment Plant to full-secondary capability, the incurred costs of this and other capital-improvement efforts have severely restricted the City's ability to invest in additional projects without placing additional financial burdens on rate payers in the City. Consequently, the benefits (as well as the costs) of the CTR as identified in the EPA's economic analysis were examined closely.

Comments

While the CTR proposes criteria and provisions having a broad range of impacts to POTWS, we have identified a number of issues that we are primarily concerned with. These are discussed individually in the following statements.

Economic Analysis

In view of the substantial capital and O&M investment that the City's treatment facilities represent, our primary concern of course is the proposed Rule's Economic Analysis (EA) and the misleading impression it makes with respect to the Rule's probable cost. Overall, we believe that the CTR presents the EA as a conclusive statement of cost based on two model approaches, of which neither represents an accurate assessment of the true costs to POTWs. The first model provides what is essentially a "no cost" scenario, while the second approach results in a high-end amortized cost of only $86.6 million per year State-wide. This number (rounded to $100 million) and the methods utilized in its derivation is highly suspect as a basis for the Office of Management and Budget's declaration that the Rule will not significantly impact State dischargers. The figure was based for the most part on the EPA's investigations of several case

studies in which detailed cost analyses were conducted for POTWs deemed to be "problematic;" that is, treatment facilities whose performance histories indicated the possibility that the proposed Rule would have significant cost impacts.

These case studies included our Tillman facility, which since 1991 has undergone a uniquely painful experience with respect to NPDES compliance as a direct result of priority-pollutant rule promulgation. As you are likely aware, the plant's NPDES permit was renewed in September 1991 shortly after the State's adoption of the Inland Surface Waters Plan (ISWP), which itself imposed priority-pollutant criteria identical with or similar to those included in the proposed Rule. To our knowledge, our plant was the only one in the region that suffered the fate of having to comply with a water quality control plan that was subsequently invalidated by the State Superior Court.

Following the ISWP's April 1991 adoption and renewal of the NPDES permit, our plant immediately experienced compliance difficulties with respect to chronic toxicity, copper, lindane, DDT, methylene chloride, and numerous other trace organic compounds. In April 1992, we completed a 6-month study investigating the probable cost of ISWP compliance for the Tillman facility. In view of the staggeringly high costs we identified (see following summary), we initiated ongoing and costly efforts to identify and implement industrial source controls; from this, we reduced methylene chloride down to compliance levels but we determined that many of the problem constituents are not source-controllable. Consequently, in 1993 we initiated a process with the Los Angeles Regional Water Quality Control Board to obtain relief in the form of a modification of the NPDES permit. Since that time, and even in view of the 1995 invalidation of the ISWP, we have been unsuccessful in negotiating what we feel are justified revisions to the NPDES permit.

EPA's cost estimates in the Tillman EA take none of this into account. The EPA instead treats the plant's NPDES as a compliance baseline from which comparisons with the CTR are made. As a result, it was a foregone conclusion that the EPA would not find any significant cost impacts to the plant due to the proposed Rule, as the Rule's criteria are already effectively contained in the plant's NPDES permit! Our 1992 cost estimates (see attached summary sheets) translate into an annual amortization and O&M cost of approximately $36 million. An updated estimate ($40 million) conducted on the basis of the proposed Rule confirms the magnitude of these costs.

When we described this situation at the September 18 public meeting, we were advised by the national EPA representative to seek variances for problem constituents. While these variances can alleviate Tillman's non-compliance issue, this approach does not address the compliance cost underestimation issue. In view of this, we believe that the EA is fundamentally flawed from the Tillman plant's perspective and therefore in need of substantial revision. Furthermore, this is not a moot point given the fact that the State intends to adopt a revised version of the ISWP, as it is our belief that EPA recognition of the probable true costs of CTR compliance would have a major effect on ISWP implementation provisions. We believe that a more objective assessment of the CTR's cost impact would also provide a more realistic evaluation of the Rule's environmental benefits, which by comparison appear to be overestimated in the EA.

The City therefore respectfully requests the EPA to revise the economic assessment and to amend the Tillman EA to reflect the true cost of compliance. Given the somewhat unfortunate timing of the proposed Rule with the State's own Draft Implementation Policy (which we have only begun to analyze), we further request that the EPA consider working in collaboration with the State and the public members of the State's Economic Considerations Task Force to develop mutually agreed-upon approaches needed to revise the EA.

Miscellaneous comments:

* The EA refers to a 10-year amortization schedule (Pages 4-2 and 9-3), but Exhibit 9-2 (the cost benefit comparison) refers to equipment purchases at 1 and 16 years (a 15-year amortization schedule).

* The statements in the last row of Exhibit 8-21 casts considerable doubt on the overall adequacy of the EA with respect to benefits.

* The EA avoids the issue of cross-media pollutant transfer and the associated costs. Spent activated carbon and reverse-osmosis brine are wastes representing real disposal problems.

Response to: CTR-057-001

See responses to CTR-021-005c, CTR-040-026, CTR-021-004, and CTR-054-033.

EPA corrected this discrepancy in its revised analysis.

Subject Matter Code: E-01g03 Cost Effectiveness Ratio

Comment ID: CTR-040-039
Comment Author: County of Sacramento Water Div
Document Type: Storm Water Auth.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-01g03 Cost Effectiveness Ratio
References: Letter CTR-040 incorporates by reference letter CTR-027
Attachments? Y
CROSS REFERENCES

Comment: EPA's estimate of cost-effectiveness ($8 - $12 per toxic pound equivalent) is considerably lower than the estimates prepared by others. The Bay Area Dischargers Association and the Novato Sanitary District calculated unit costs for copper removal to be in excess of several thousand dollars per toxic pound equivalent removed.

Response to: CTR-040-039

In response to comments received by EPA on the economic analysis that accompanied the proposed CTR, EPA collected additional data for the sample facilities. EPA also revised its estimate of potential compliance costs attributable to the CTR.

EPA's low estimate of total annualized costs of the final CTR is $33.5 million per year and its high estimate is $61.0 million per year. The low and high estimates vary based on whether effluent data or permit limits are used to assess the need for additional controls. They also vary based on whether or not alternative regulatory approaches, such as phased total maximum daily loads/water quality assessments, site-specific criteria modifications, standards variances, metals translators, etc., are considered under certain circumstances. EPA believes that its estimates of costs and benefits are sound.

EPA believes that several general observations can be made regarding studies submitted by commenters and how they differ from the EPA cost study for the final CTR. Many commenters assumed that the mere presence of a pollutant would result in costs to comply with a CTR-based WQBEL. It should be noted that the presence of a pollutant in an ambient inland water, enclosed bay, or estuary does not require permitting authorities to establish a WQBEL for that pollutant. The establishment of a permit limit is appropriate only where the permitting authority determines that a pollutant is likely to be present, and that the pollutant concentration has a "reasonable potential" to cause or contribute to an exceedance of the applicable water quality standard. Where the pollutant is not likely to be present, or is not present at levels that have reasonable potential to cause or contribute to a water quality standard exceedance, a WQBEL may not be necessary.

The majority of cost estimates provided by commenters include the costs for the addition of end-of-pipe treatment to achieve proposed CTR-based WQBELs. This was particularly the case when WQBELs were expected to be below analytical detection levels. EPA disagrees that end-of-pipe treatment is necessary to achieve CTR-based WQBELs in all cases. As discussed in SAIC (1995), there are documented cases where waste minimization or source control techniques have been used to comply with existing permit limits established below detection levels. Other examples include the Western Lake Superior Sanitary District (WLSSD), who after evaluating the costs involved to meet more stringent WQBELs for mercury

with end-of-pipe treatment, concluded that pollution prevention techniques were the preferable control strategy. As a result, WLSSD published a guide designed to "assist wastewater treatment plant staff with creating and implementing their own mercury reduction projects." As a result of the efforts of WLSSD, effluent mercury levels were found to decrease from 0.58 parts per billion (ppb) to 0.015 ppb.

Although waste minimization or source controls are not always applicable, EPA assumes in its low estimate of costs that a facility would first evaluate whether process changes or modifications are feasible, prior to incurring costs for adding treatment.

In addition, many commenters assumed that compliance would be based on the WQBEL, regardless of whether it is below the analytical method detection level (MDL). This is not consistent with current practice. Instead, the State may use the "minimum level" (ML) (as defined in 40 CFR Part 136) as the required compliance point where a permit limit is established at a value below the MDL. The ML is a value at which the limited parameter can be accurately quantified, and is always greater than or equal to the MDL. To ensure that its cost estimates were conservative (i.e., erring on the side of higher costs), EPA used the MDL as the compliance level. Although EPA used the pollutant MDL for costing purposes, the Agency acknowledges that estimating treatment costs for WQBELs below the MDL is speculative and likely unrealistic.

Finally, many of the commenters included costs related to installation of treatment for storm water discharges. As further described in the responses to CTR-021-008 and CTR-040-004, EPA believes that the final CTR will not significant affect the current storm water program being implemented by the State, which includes the requirement to develop best management practices to control pollutants in storm water discharges. As such, EPA believes that inclusion of end-of-pipe treatment costs for storm water are inappropriate.

Reference: SAIC. 1995. Assessment of Compliance Costs Resulting from Implementation of the Final Great Lakes Water Quality Guidance. Prepared for U.S. EPA, Office of Science and Technology, March 13.

Comment ID: CTR-041-035
Comment Author: Sacramento Reg Cnty Sanit Dist
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-01g03 Cost Effectiveness Ratio
References:
Attachments? N
CROSS REFERENCES

Comment: EPA's estimate of cost-effectiveness ($8 - $12 per toxic pound equivalent) is considerably lower than the estimates prepared by others. The Bay Area Dischargers Association and the Novato Sanitary District calculated unit costs for copper removal to be in excess of several thousand dollars per toxic pound equivalent removed.

Response to: CTR-041-035

See response to CTR-040-039.

Comment ID: CTR-044-030
Comment Author: City of Woodland
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: E-01g03 Cost Effectiveness Ratio
References:
Attachments? N
CROSS REFERENCES

Comment: EPA's estimate of cost-effectiveness ($8 - $12 per toxic pound equivalent) is considerably lower than the estimates prepared by others. The Bay Area Dischargers Association and the Novato Sanitary District calculated unit costs for copper removal to be in excess of several thousand dollars per toxic pound equivalent removed.

Response to: CTR-044-030

See response to CTR-040-039.

Comment ID: CTR-054-013a
Comment Author: Bay Area Dischargers Assoc.
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-01g03 Cost Effectiveness Ratio
References:
Attachments? Y
CROSS REFERENCES E-01q01
E-01m
E-02l

Comment: The economic analysis is seriously flawed. The major flaws include: (1) failing to do an appropriate sampling of dischargers; (2) assuming in the high-end cost scenario that a 25% reduction could be achieved through source control and an additional 25% achieved through treatment plant optimization without capital improvements; (3) constraining estimates of potential costs through key assumptions, including the assumption that regulatory relief from the rule would be granted if costs were in excess of certain thresholds; and (4) exaggerating estimates of potential benefits by assuming an end (i.e., achievement of the proposed water quality criteria) that will not result from the rule (see Attachment 3). The result of these flaws is that potential costs are greatly understated and potential benefits are greatly overstated. BADA's analysis shows that its member agencies alone could be faced with costs in excess of $100 million per year to achieve effluent limits based on the copper, PAH, heptachlor and aldrin criteria. BADA's analysis also indicates that the benefits associated with this

expenditure will be difficult to measure. Copper loadings will be reduced by 1% and the level of compliance for PAH's and heptachlor will remain unchanged at its present high level. Certainly these benefits will not measurably improve the fishing experience or measure the number of fisherman in the Bay, significantly reduce the cancer cases, or improve property values or other nonuse benefits, as estimated in EPA's economic analysis. A further consequence of the flawed economic analysis is the conclusion that the CTR is not a major rule (i.e., one which will result in excess of $100 million per year expenditure) subject to Presidential Executive order 12866 and the Unfunded Mandates Reform Act or a rule that affects small entities protected under the Regulatory Reform Act. BADA agencies provide service to a number of small communities with populations under 50,000 people that could be greatly impacted by the proposed rule.

Response to: CTR-054-013a

EPA believes that the sample of dischargers selected adequately represents the various types of direct dischargers in the state. EPA would have considered any and all information submitted by a discharger that did not think it was adequately represented by the sample facilities.

See responses to CTr-021-008, CTR-059-018, CTR-040-029a, CTR-032-004, CTR-056-018, and CTR-021-005c.

The commenter is referring to the estimate of total potential benefits in the analysis of benefits document. In EPA's EA for the proposed (and final) rule, only the portion of benefits expected to be achieved by implementing controls on point source dischargers are counted. EPA recognizes that the proposed standards will not be achieved in some cases by controlling point sources alone. EPA's assumptions regarding the attribution of benefits to the rule are described in the EA for the proposed rule in Chapter 7.

EPA's analysis presents only the portion of the total potential benefits that can be achieved by controlling point sources. EPA expects additional benefits will accrue as a result of controlling other sources. EPA has no reason to believe that the standards established by the CTR cannot be achieved.

EPA believes that controls on point source dischargers will, in many cases, contribute to attaining standards in a given water body. As controls on other sources are also implemented, the water quality standards can be achieved. However, the total maximum daily load (TMDL) process is provided to address cost-ineffectiveness as it pertains to point or nonpoint sources. For example, if controls on nonpoint sources are a more cost-effective approach to achieving standards, the State can redistribute the load allocations through the TMDL process.

EPA did not include values for water- and land-related benefits other than fishing, but noted that potential benefits may be underestimated because these benefit categories are not included. As described in the EA (See Chapter 8), EPA believes that these benefits may be appreciable because such recreational activities (e.g., boating, swimming, picnicking, and related activities) have been shown in empirical research to be highly valued, and even modest changes in participation or user values could lead to sizable benefits statewide. Some of these activities can be closely associated with water quality attributes (e.g., swimming) and others might increase due to their association with fishing, swimming, or other activities in which the participants might engage.

Comment ID: CTR-054-034
Comment Author: Bay Area Dischargers Associati

Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-01g03 Cost Effectiveness Ratio
References:
Attachments? N
CROSS REFERENCES

Comment: EPA's estimate of cost-effectiveness ($8 - $12 per toxic pound equivalent) is considerably lower than the estimates prepared by others. The Bay Area Dischargers Association and the Novato Sanitary District calculated unit costs for copper removal to be in excess of several thousand dollars per toxic pound equivalent removed.

Response to: CTR-054-034

See response to CTR-040-039.

Comment ID: CTR-056-016
Comment Author: East Bay Municipal Util. Dist.
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/22/97
Subject Matter Code: E-01g03 Cost Effectiveness Ratio
References: Letter CTR-056 incorporates by reference letter CTR-054
Attachments? N
CROSS REFERENCES

Comment: Finally, EBMUD has serious concerns about the accuracy of EPA's draft, Economic Analysis, particularly as it pertains to the cost and benefits estimates found in the draft CTR. We believe that the costs of the CTR are significantly underestimated and the benefits are inflated. On the cost side, there are several "flaws" which should be reevaluated:

* The representativeness of the sample used is questionable and should be reconsidered.

Response to: CTR-056-016

See responses to CTR-056-018 and CTR-059-018.

Comment ID: CTR-056-017
Comment Author: East Bay Municipal Util. Dist.
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/22/97

Subject Matter Code: E-01g03 Cost Effectiveness Ratio
References: Letter CTR-056 incorporates by reference letter CTR-054
Attachments? N
CROSS REFERENCES

Comment: Finally, EBMUD has serious concerns about the accuracy of EPA's draft, Economic Analysis, particularly as it pertains to the cost and benefits estimates found in the draft CTR. We believe that the costs of the CTR are significantly underestimated and the benefits are inflated. On the cost side, there are several "flaws" which should be reevaluated:

* The omission of those impacts on those "dischargers" which contribute to loading such as: small indirect dischargers, municipal and industrial stormwater dischargers, agricultural activities and non-point sources, and therefore would be expected to reduce their loading.

Response to: CTR-056-017

See responses to CTR-056-018, CTR-021-006b, and CTR-040-037.

Subject Matter Code: E-01g04 AMLs vs. MDLs

Comment ID: CTR-021-010
Comment Author: LeBoeuf, Lamb, Green & MacRae
Document Type: Local Government
State of Origin: CA
Represented Org: City of Sunnyvale
Document Date: 09/25/97
Subject Matter Code: E-01g04 AMLs vs. MDLs
References: Letter CTR-021 incorporates by reference letter CTR-035
Attachments? Y
CROSS REFERENCES

Comment: The CTR Analysis Incorrectly Evaluates Permit Compliance By Using an Average Monthly Effluent Limit Rather than the California Regional Board's Maximum Effluent Limit

The EPA analysis assumes that the limit to be achieved, either 4.9 or the potential CTR limit of 5.55 ug/L is a monthly average limit. The current state NPDES permit cites the limit as a 1-day average limit, based on the San Francisco Basin Plan's 1-hour marine water quality objective.

Sunnyvale's 1994-1996 weekly effluent copper data (155 data points) had a mean of 4.3 ug/L, but a maximum of 9 ug/L, a 99%tile of 8.9 ug/L and a 95%tile of 7.0 ug/L.

The CTR economic analysis (Appendix Table I-B-3) calculated average monthly limits (AML) of 5.5 ug/L and maximum daily limits (MDL) of 9.27 ug/L for copper. EPA needs to specify if the State is currently in error in its interpretation and implementation of effluent limits in this manner. Furthermore, the CTR should clarify if this means that it is acceptable for States to calculate and include monthly average (30-day) limits in NPDES permits based on the proposed CCC criteria and the TSD based methodology used in the economic analysis (and similarly daily average limits based on the proposed CMC criteria).

Based on current State permits the economic analysis must be corrected since the threshold for determining whether or not additional measures would be required to comply with the CTR is based on a comparison with average, not maximum values. As noted above, unless EPA is redefining the chronic averaging period as monthly instead of 4-day (or 1-day), Sunnyvale can not achieve a 4.9 or 5.5 ug/L copper effluent limit (WPCP effluent is above this limit approximately 30-40% of the time). Other dischargers to San Francisco Bay that aren't allowed dilution credit face the same compliance problem and will require additional treatment to meet a 1 or 4-day limit in that range. Therefore, extrapolation of the CTR analysis to other dischargers is not appropriate an d will lead to erroneous results and misleading conclusions.

Response to: CTR-021-010

This comment refers to Sunnyvale's previous one-day average copper limit. The previous permit limit was based on the underlying national criteria (saltwater) in effect at that time [2.9 ug/L for both the chronic aquatic life (CCC) and acute aquatic life (CMC)]. The State was not in error in implementing the above criteria as a one-day average limit. In the CTR, the saltwater copper CMC has been revised to 4.8 ug/L dissolved and the CCC has been revised to 3.1 ug/L dissolved. The revised CCC should not be implemented directly as a one-day average. EPA recommends that the State calculate both average

monthly limits and maximum daily limits based on the chronic and acute criteria using the U.S. EPA Technical Support Document (TSD) approach (1991). Therefore, EPA used the TSD approach in the Economic Analysis to estimate facility compliance with CTR-based WQBELs.

Reference: U.S. EPA. 1991. Technical Support Document for Water Quality-based Toxics Control. EPA/505/2-90-001

Subject Matter Code: E-01g05 Effluent Data

Comment ID: CTR-040-027
Comment Author: County of Sacramento Water Div
Document Type: Storm Water Auth.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-01g05 Effluent Data
References: Letter CTR-040 incorporates by reference letter CTR-027
Attachments? Y
CROSS REFERENCES

Comment: Although EPA goes to great length to label its cost analysis as "conservative" the analysis is anything but conservative:

* It is not conservative to assume that if a discharger has no effluent data that the discharger will not incur costs as a result of the CTR.

Response to: CTR-040-027

If a discharger had no effluent data, EPA did not automatically assume that the discharger would have no costs as a result of the CTR. When effluent data was available, however, EPA used the method in EPA's Technical Support Document for Water Quality-based Toxics Control (1991) to determine reasonable potential and then followed the methodology (i.e., the cost-decision matrix) described in the Economic Analysis (EA) of the final CTR to estimate costs. In the abscence of data under the high scenario, reasonable potential was assumed if the discharger had an existing permit limit for a pollutant and EPA then estimated costs using the methodology described in the EA. See also response to CTR-003-011.

Comment ID: CTR-041-023
Comment Author: Sacramento Reg Cnty Sanit Dist
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-01g05 Effluent Data
References:
Attachments? N
CROSS REFERENCES

Comment: Although EPA goes to great length to label its cost analysis as "conservative" the analysis is anything but conservative:

* It is not conservative to assume that if a discharger has no effluent data that the discharger will not incur costs as a result of the CTR.

Response to: CTR-041-023

See response to CTR-003-011.

Comment ID: CTR-044-018
Comment Author: City of Woodland
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: E-01g05 Effluent Data
References:
Attachments? N
CROSS REFERENCES

Comment: Although EPA goes to great length to label its cost analysis as "conservative" the analysis is anything but conservative:

* It is not conservative to assume that if a discharger has no effluent data that the discharger will not incur costs as a result of the CTR.

Response to: CTR-044-018

See response to CTR-003-011.

Comment ID: CTR-054-022
Comment Author: Bay Area Dischargers Associati
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-01g05 Effluent Data
References:
Attachments? N
CROSS REFERENCES

Comment: Although EPA goes to great length to label its cost analysis as "conservative" the analysis is anything but conservative:

* It is not conservative to assume that if a discharger has no effluent data that the discharger will not incur costs as a result of the CTR.

Response to: CTR-054-022

See response to CTR-003-011.

Comment ID: CTR-093-001

Comment Author: City of Merced
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 10/02/97
Subject Matter Code: E-01g05 Effluent Data
References:
Attachments? Y
CROSS REFERENCES

Comment: Pursuant to our conversations following the California Toxics Rule (CTR) hearing of 17 September, find enclosed 1994, 1995, and 1996 data from priority pollutant monitoring at the City of Merced Wastewater Treatment Facility. It is our understanding that the information will be utilized to refine the economic impact analysis from the City of Merced Case Study.

One qualification we submit regarding the enclosed data is that cyanide, dutifully reported as having been detected in POTW effluent in 1994 and 1995, was likely not actually present. It has been demonstrated that nitrogen interference during cyanide analysis of chlorinated samples will often result in falsely positive results. To prevent this, EPA has approved a sulfamic acid scrubbing procedure to counter the interference. That procedure was not practiced by our analyzing laboratories until 1996. No contributor of cyanide has been identified in Merced, and, it has never been detected either at the influent or primary effluent of our plant. The sulfamic acid scrubbing procedure was incorporated in the analytical procedures during 1996, and there have been no detections of cyanide in POTW effluent since.

If there are any questions please do not hesitate to contact me at (209) 385-8693.

Response to: CTR-093-001

EPA has removed cyanide from its economic analysis for the final CTR because EPA's analysis of existing data and facility information resulted in no determinations of reasonable potential for cyanide.

Subject Matter Code: E-01g06 Reasonable Potential

Comment ID: CTR-021-016
Comment Author: LeBoeuf, Lamb, Green & MacRae
Document Type: Local Government
State of Origin: CA
Represented Org: City of Sunnyvale
Document Date: 09/25/97
Subject Matter Code: E-01g06 Reasonable Potential
References: Letter CTR-021 incorporates by reference letter CTR-035
Attachments? Y
CROSS REFERENCES

Comment: Appendix Ill-B states that "The existing permit limits and/or the maximum reported concentrations of copper, nickel, silver, endrin, 1,2-cichlorobenzene, chlorobenzene, chlorodichloromethane, and toluene are less stringent than the projected CTR-based limits".

* Copper: A reasonable potential analysis of plant performance data indicates that there is a reasonable potential under these grossly conservative and misleading assumptions to exceed both the CTR based maximum daily limit and the average monthly limit.

* Nickel, silver, and zinc: A reasonable potential analysis of plant performance data indicates that under these grossly conservative and misleading assumptions there is no reasonable potential to exceed the CTR based maximum daily limit. However, if the projected maximum concentrations are compared to the CTR based average monthly limit, there is a reasonable potential for the effluent concentrations to exceed these limits.

* Organic compounds: See notes for Appendix I-B above.

Response to: CTR-021-016

EPA revised its EA including the use of more recent data. In the revised EA, nickel, silver, and zinc have reasonable potential in the high-end scenario because the facility has existing permit limits, however no load reductions are estimated for these pollutants in either the low- or high-end scenarios.

See also responses to CTR-052-014 and CTR-021-017.

Subject Matter Code: E-01g08 Discharger Representation

Comment ID: CTR-034-014a
Comment Author: SCAP
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-01g08 Discharger Representation
References: Letter CTR-034 incorporates by reference letter CTR-035
Attachments? N
CROSS REFERENCES E-01b
E-01e
E-01v
J

Comment: * In general, we are pleased that EPA prepared an analysis of the economic impacts of the proposed CTR, and that a major portion of EPA's work focused on determining the potential impacts on POTWs. However, we believe that this analysis is based on improper assumptions and inaccurate cost estimates, resulting in unconvincing conclusions. Detailed comments can be found in Attachment 2. A few of the areas of concern are listed below:

* Small facilities appear to be under represented in EPA's sample of POTWS, especially for minor dischargers.

* The cost triggers used as regulatory relief thresholds are unrealistic, and are not consistent with EPA regulations and policies.

* The assumptions used to determine cost estimates for indirect dischargers appear to omit a large proportion of potentially affected industries.

* The Economic Analysis does not take into account projected population and industrial growth over time, which may influence effluent quality and quantity. Statewide, the population is projected to grow by nearly 50% by 2020.

* The use of average cost estimates masks economic impacts on individual dischargers, which may be particularly acute for small communities.

* The economic Analysis ignores the costs that may be incurred by stormwater dischargers and nonpoint sources to reduce loadings so that CTR criteria may be met in ambient waters.

Response to: CTR-034-014a

See responses to CTR-032-004, CTR-035-061, CTR-021-006b, CTR-040-037, CTR-059-018, and CTR-035-048.

Comment ID: CTR-035-008a
Comment Author: Tri-TAC/CASA

Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-01g08 Discharger Representation
References:
Attachments? N
CROSS REFERENCES E-01e
E-01d
E-01m
E-01h
E-01c

Comment: Finally, we have serious concerns about the accuracy of the draft Economic Analysis and the estimates of the costs and benefits of the draft CTR (see detailed comments in Attachments I and 2). Our primary concerns related to the cost analysis include 1) that the case studies on which the cost analysis is based do not adequately represent the actual population of POTWs in California; 2) the omission of costs that could be incurred by many sectors that contribute to overall loadings, and, hence, can be expected to have to reduce their loadings (e.g., non-SIU indirect dischargers, municipal and industrial stormwater dischargers, agricultural activities, and other nonpoint sources of CTR-regulated pollutants); 3) the use of numerous assumptions that underestimate costs; and 4) the capricious removal of costs that exceed threshold values by assuming that regulatory relief measures will be granted, despite the lack of any proposed regulatory relief trigger in the proposed regulation.

To illustrate the degree of underestimation of costs for the POTW sector alone, we looked at potential compliance costs for the POTW sector. We found that the potential costs for 23 major POTWS. on an annualized basis, may reach $400 million. We believe that this analysis demonstrates that the potential cost consequences of compliance with effluent limits based on the proposed CTR criteria would easily exceed the $ 100 million annual cost threshold, especially when the costs of all 313 POTWs in the State are estimated. Thus, we believe that EPA must conclude that the proposed CTR could have significant economic impacts on local governments.

Response to: CTR-035-008a

See responses to CTR-021-005c, CTR-032-004, CTR-040-039, CTR-021-006b, CTR-040-037, and CTR-059-018.

Comment ID: CTR-035-046a
Comment Author: Tri-TAC/CASA
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-01g08 Discharger Representation
References:
Attachments? N
CROSS REFERENCES E-01g09

Comment: pp. 2-4 - 2-9 (U.S. EPA, 1997b) -- Sampling Strategy In general terms, we support EPA's methodology of stratified sampling to determine costs, although it is not clear whether the POTW sample was stratified appropriately. We believe that inadequate evidence is presented that the sample of case studies reflects the overall population of POTWs, and that extrapolation based on the sample would truly reflect total POTW costs. Little explanation is provided as to how the case study facilities were selected, and little evidence is presented demonstrating the validity of extrapolating from the small sample to the impacted population of POTWs. In particular, we believe that minor facilities were under-represented, and that it is invalid to assure that none of the 185 minor POTWs will incur any costs. We also believe that larger samples of facilities from 0-10 MGD and from 10-100 MGD also would be necessary to obtain valid estimates of POTW costs. In addition, by assuming that existing facilities that contain effluent limits for toxic pollutants were representative facilities and using them as the basis for extrapolation to the universe of potentially affected facilities, EPA may have failed to include a major category of costs. By ignoring the costs of those facilities meeting their current permit limits, EPA is assuming that the facilities they are extrapolating to have similar current permit limits, which was not demonstrated to be the case. Therefore, EPA should reexamine the use of this assumption in the analysis of POTW costs.

Response to: CTR-035-046a

EPA believes that the sample facilities adequately represent the universe of facilities in California. Facilities within the sample demonstrate both compliance and non-compliance with projected CTR limits and, although the sample may not exactly represent the actual proportion of facilities not in compliance with limits, EPA believes that the overall economic analysis uses conservative cost estimation techniques which actually overstate costs. See also response to CTR-059-018.

Comment ID: CTR-035-063
Comment Author: Tri-TAC/CASA
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-01g08 Discharger Representation
References:
Attachments? N
CROSS REFERENCES

Comment: Weaknesses in Cost Analysis The report's cost estimates exhibit a number of significant weaknesses, as follows:

* Potential impacts on non-point sources merit greater attention than given them in the Analysis. Since non-point sources (e.g., mining/mine tailings; agricultural drainage/runoff; urban runoff/stormwater) are responsible for the great majority of potentially harmful discharges, they will almost certainly be affected by the proposed Rule. Likewise, these sources must be addressed if the benefits estimated by USEPA are to be obtained. Greater examination of these costs would be no more speculative than many of the benefit estimates shown in the report.

Response to: CTR-035-063

See response to CTR-021-006b.

Comment ID: CTR-038-004a
Comment Author: Sonoma County Water Agency
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-01g08 Discharger Representation
References:
Attachments? Y
CROSS REFERENCES E-01h
E-01m
E-01c02

Comment: 4. The economic analysis is seriously flawed. The major flaws include: (1) failing to do an appropriate sampling of dischargers having little or no dilution; (2) assuming in the high-end cost scenario that a 25% reduction could be achieved through source control and an additional 25% achieved through treatment plant optimization without capital improvements; (3) constraining estimates of potential costs through key assumptions, including the assumption that regulatory relief from the rule would be granted if costs were in excess of certain thresholds; and (4) exaggerating estimates of potential benefits by assuming an end (i.e., achievement of the proposed water quality criteria) that will not result from the rule. The result of these flaws is that potential costs are greatly understated and potential benefits are greatly overstated. The District's analysis demonstrates that actual costs may be an order of magnitude greater than EPA's $500/lb threshold and that the benefits are very small.

Response to: CTR-038-004a

See responses to CTR-054-013a, CTR-032-004, CTR-021-008, CTR-040-029a, and CTR-056-018.

Comment ID: CTR-040-024
Comment Author: County of Sacramento Water Div
Document Type: Storm Water Auth.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-01g08 Discharger Representation
References: Letter CTR-040 incorporates by reference letter CTR-027
Attachments? Y
CROSS REFERENCES

Comment: EPA erroneously assumes that minor POTW dischargers (i.e., those with a permitted flow of less than 1.0 mgd) will not incur significant impacts as a result of the CTR.

Response to: CTR-040-024

For analysis of the final CTR, EPA updated its Economic Analysis to reflect the most recent data and information for each sample facility and also increased the sample size for minor facilities. Based on this revised analysis, EPA estimated that minor POTWs will incur costs of approximately $5,000 per facility per year under the low cost scenario and $7,800 per facility per year under the high cost scenario. See also response to CTR-058-018.

Comment ID: CTR-041-020
Comment Author: Sacramento Reg Cnty Sanit Dist
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-01g08 Discharger Representation
References:
Attachments? N
CROSS REFERENCES

Comment: EPA erroneously assumes that minor POTW dischargers (i.e., those with a permitted flow of less than 1.0 mgd) will not incur significant impacts as a result of the CTR.

Response to: CTR-041-020

See responses to CTR-059-018 and CTR-040-024.

Comment ID: CTR-044-005a
Comment Author: City of Woodland
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: E-01g08 Discharger Representation
References:
Attachments? Y
CROSS REFERENCES E-01h01
E-01m
E-02c
E-01c02
R
S

Comment: We have reviewed the proposed CTR and offer the following comments:

4. EPA's Economic Analysis is seriously flawed. The major flaws include:

(1) failing to do an appropriate sampling of small dischargers having little or no dilution; (2) assuming in the high-end cost scenario that a 25% reduction could be achieved through source control and an

additional 25% achieved through treatment plant optimization without capital improvements; (3) constraining estimates of potential costs through key assumptions, including the assumption that regulatory relief from the rule would be granted if costs were in excess of certain thresholds; and (4) exaggerating estimates of potential benefits by assuming an end (i.e., achievement of the proposed water quality criteria) that will not result from the rule. Additional concerns with the economic analysis are presented in Exhibit F. The result of these flaws is that potential costs are greatly understated and potential benefits are greatly overstated. Moreover, the flawed economic analysis has lead to the erroneous conclusion that the CTR is not a "significant regulatory action" or major rule subject to Presidential Executive Order 12866 and the Unfunded Mandates Reform Act or a rule that affects small entities protected under the Regulatory Flexibility Act. The City, for example, is a small community having a population of under 50,000 and would be greatly impacted by the proposed rule.

Response to: CTR-044-005a

See responses CTR-054-013a, CTR-021-005c, CTR-032-004, CTR-021-008, CTR-040-029a, CTR-056-018, CTR-059-018, and CTR-035-046a.

Comment ID: CTR-044-015
Comment Author: City of Woodland
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: E-01g08 Discharger Representation
References:
Attachments? N
CROSS REFERENCES

Comment: EPA erroneously assumes that minor POTW dischargers (i.e., those with a permitted flow of less than 1.0 mgd) will not incur significant impacts as a result of the CTR.

Response to: CTR-044-015

See response to CTR-040-024.

Comment ID: CTR-045-009a
Comment Author: Sausalito-Marin Sanitary Dist.
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/24/97
Subject Matter Code: E-01g08 Discharger Representation
References:
Attachments? Y
CROSS REFERENCES E-01h
E-01m

Comment: The draft Economic Analysis has serious flaws. It underestimates the costs of the draft CTR and overestimates the benefits. For the cost analysis, EPA should reevaluate the representativeness of the sample used; the omission of impacts on many sectors that contribute to loadings, and hence, can be expected to have to reduce their loadings (e.g., small indirect dischargers, municipal and industrial stormwater dischargers, agricultural activities, and other nonpoint sources); the incorporation of numerous assumptions that underestimate costs; and the assumption to artificially remove costs that exceed threshold values by assuming that regulatory relief measures will be granted, despite the fact that they are not automatically granted through triggers included as part of the proposed regulation.

Response to: CTR-045-009a

See responses to CTR-032-004, CTR-056-018, CTR-021-006b, and CTR-059-018.

Comment ID: CTR-049-006a
Comment Author: Watereuse Assoc. of California
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 09/24/97
Subject Matter Code: E-01g08 Discharger Representation
References:
Attachments? N
CROSS REFERENCES E-01h
E-01m

Comment: With respect to other criteria proposed for adoption in the draft CTR, we recommend that USEPA:

4. Review and correct existing flaws in the current "Economic Analysis."

With respect to the Economic Analysis conducted by USEPA, we are concerned that it underestimates the cost of the proposed CTR rule while overestimating its benefits. We suggest that USEPA re-evaluate (1) the representativeness of the sample used; (2) the omission of impacts on many sectors that contribute to loadings; (3) the incorporation of a variety of assumptions that underestimate costs; and (4) the assumption to artificially remove costs that exceed threshold values by incorrectly assuming that regulatory relief measures will be granted. For the benefits analysis, USEPA should utilize more California-specific and recent information. A further problem with the analysis relates to the establishment of criteria that are below analytical detection. Lacking credible data, it was not possible to conduct cost-benefit analyses or determine that any set of control measures would or could lead to compliance. This fundamental inability to utilize established rulemaking procedures requires, in our opinion, further work prior to the promulgation of the criteria.

Response to: CTR-049-006a

See responses CTR-045-011, CTR-032-004, CTR-056-018, CTR-021-006b, CTR-059-018, and CTR-052-014.

Comment ID: CTR-054-019
Comment Author: Bay Area Dischargers Associati
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-01g08 Discharger Representation
References:
Attachments? N
CROSS REFERENCES

Comment: EPA erroneously assumes that minor POTW dischargers (i.e., those with a permitted flow of less than 1.0 mgd) will not incur significant impacts as a result of the CTR.

Response to: CTR-054-019

See responses to CTR-059-018 and CTR-040-024.

Comment ID: CTR-059-018
Comment Author: Los Angeles County Sanit. Dist
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: E-01g08 Discharger Representation
References: Letter CTR-059 incorporates by reference letter CTR-035

Attachments? Y
CROSS REFERENCES

Comment: Economic Analysis

The Sanitation districts commends EPA for preparing an analysis of the economic impacts of the proposed CTR, and for selecting POTWs for half of the case studies. We believe that EPA is correct in thinking that POTWs are likely to experience major impacts as a result of the promulgation of the CTR. However, we believe that this analysis is based on improper assumptions and inaccurate cost estimates, resulting in unconvincing conclusions. Our own attainability and cost analysis indicates that there are indeed fundamental flaws in the cost analysis. A few of the areas of concern are listed below:

* Small facilities appear to be under-represented in EPA's sample of POTWs, especially for minor dischargers.

Response to: CTR-059-018

EPA acknowledges that evaluating the impact of each individual direct discharger to inland waters, enclosed bays, and estuaries within the State of California would be the most accurate method to determine impacts of the CTR. However, the resources that would be required to perform such an analysis for each of the over 1,241 direct dischargers are beyond the resources typically available for

development of environmental regulations. EPA would have considered well-documented information submitted in comments.

In developing the methodology for estimating the compliance costs for the proposed CTR, time and budget constraints limited EPA's costing review to a subset of the regulated community. However, EPA believes that the sample selected adequately represents the various types of direct dischargers in the State.

EPA acknowledges that minor dischargers were under sampled as compared to the major dischargers. However, by definition, under the NPDES permit program, facilities classified as minor would not be expected to discharge toxic pollutants in toxic amounts. Since the CTR addresses only toxic pollutants, EPA would not expect significant, if any, impact to minor dischargers.

In analyses of the final CTR, EPA increased the sample of minors by five randomly selected facilities to bolster its analysis. EPA estimated costs of $872 per minor facility under the low scenario, and $2,682 per minor facility under the high scenario due to the CTR.

EPA also replaced Silvergate with South Bay in the sample in order to improve the estimate of the impacts of the CTR on the electric utility industry. The draft CTR cost analysis included costs for Silvergate, but the facility had closed and the data available were over five years old. The addition of South Bay, an electric utility facility with no costs, to the sample results in a more realistic, lower overall cost estimate for the electric utility industry.

Comment ID: CTR-059-023a
Comment Author: Los Angeles County Sanit. Dist
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: E-01g08 Discharger Representation
References: Letter CTR-059 incorporates by reference letter CTR-035

Attachments? Y
CROSS REFERENCES J

Comment: Economic Analysis

The Sanitation Districts commends EPA for preparing an analysis of the economic impacts of the proposed CTR, and for selecting POTWs for half of the case studies. We believe that EPA is correct in thinking that POTWs are likely to experience major impacts as a result of the promulgation of the CTR. However, we believe that this analysis is based on improper assumptions and inaccurate cost estimates, resulting in unconvincing conclusions. Our own attainability and cost analysis indicates that there are indeed fundamental flaws in the cost analysis. A few of the areas of concern are listed below:

* The Economic Analysis ignores the costs that may be incurred by stormwater dischargers and nonpoint sources to reduce loadings so that CTR criteria may be met in ambient waters.

Response to: CTR-059-023a

See response to CTR-021-006b.

Comment ID: CTR-060-017
Comment Author: San Diego Gas and Electric
Document Type: Electric Utility
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: E-01g08 Discharger Representation
References:
Attachments? N
CROSS REFERENCES

Comment: PROVISIONS SDG&E DOES NOT SUPPORT

As described in the following comments SDG&E does not support the following provisions:

Economic Analysis is deficient

EPA's economic analysis evaluated a number of discharger categories to estimate the potential costs associated with the adoption of these criteria. One discharger category was electric utilities which evaluated the costs to power plants. EPA's analysis of the electric utility category was deficient for at least two reasons. First, the analysis included two relatively small power plants. Specifically, the assessment included Pacific Gas & Electric's Hunter Point Power Plant (HPPP) and SDG&E's Silver Gate Power Plant (SGPP). Both the HPPP and SGPP are relatively small plants (generating capacities are approximately 396 MW and 230 MW, respectively). The SGPP is no longer in operation and its NPDES permit was rescinded in 1995. In fact, the economic analysis did not evaluate costs to the SGPP because it had not operated for several years. Both PG&E and SDG&E have plants affected by this rule which are larger (e.g., Pittsburgh at 2,060 MW and South Bay Power Plant at 709 MW). Consequently, the cost estimates for the entire category were based on only one small facility representing one water body and are therefore not likely to be representative of the actual costs that will be incurred by electric utilities.

Response to: CTR-060-017

See response to CTR-059-018.

Comment ID: CTR-066-013a
Comment Author: Delta Diablo Sanitation Dist.
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: E-01g08 Discharger Representation
References:
Attachments? N
CROSS REFERENCES E-01b01

Comment: The areas with which we find concerns and the requested changes include the following:

* The draft Economic Analysis has, from our short review, some serious flaws. It underestimates the costs of the draft to implement the CTR and overestimates the benefits. For the cost analysis, EPA should re-evaluate the representativeness of the sample used; the omission of impacts on many sectors that contribute to loadings and, therefore, can be expected to have to reduce their loadings (e.g., small indirect dischargers, municipal and industrial stormwater dischargers, agricultural activities, and other nonpoint sources); the incorporation of numerous assumptions that underestimate costs; and your assumption that artificially removes costs that exceed threshold values be assuming that regulatory relief measures will be granted, despite the fact that they are not automatically granted through triggers included as part of the proposed regulation.

Response to: CTR-066-013a

See responses to CTR-032-004, CTR-056-018, CTR-021-006b, and CTR-059-018.

Comment ID: CTR-082-007a
Comment Author: City of Burbank
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/24/97
Subject Matter Code: E-01g08 Discharger Representation
References:
Attachments? N
CROSS REFERENCES E-01b
B Comment Period

Comment: The subject rule has a significant impact on our facility discharge and the citizens of the City. We therefore present the following comments for your consideration to re-open the comment period for this rule in order to facilitate a more complete review by public and in particular by those in the POTW community:

* The draft economic analysis seems to have serious flaws. It under-estimates the cost of the draft CTR and overstates the benefits. In the cost analysis USEPA should re-evaluate the representativeness of samples used and the omission of impacts on many factors that contribute to loadings, and hence, can be expected to have to reduce their loadings (e.g., small indirect dischargers, municipal and industrial stormwater dischargers, agricultural activities, and other nonpoint sources); the incorporation of numerous assumptions that underestimate costs, and the assumption to artificially remove costs that exceed threshold values by assuming that regulatory relief measures will be granted, despite the fact that they are not automatically granted through triggers included as part of the proposed regulation.

Response to: CTR-082-007a

See responses to CTR-032-004, CTR-056-018, CTR-021-006b, and CTR-059-018.

Comment ID: CTR-085-016a
Comment Author: Camarillo Sanitary District
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/24/97
Subject Matter Code: E-01g08 Discharger Representation
References:
Attachments? N
CROSS REFERENCES E-01b01

Comment: The District supports the following positions of CASA and SCAP where changes need to be made in the proposed California Toxics Rule:

* The District agrees with CASA and SCAP that the economic analysis has serious flaws. It underestimates the costs of the draft California Toxics Rule and overestimates the benefits. For the cost analysis, the EPA should evaluate the representativeness of the sample used; the omission of impacts on many sectors that contribute to loadings and hence, can be expected to reduce their loadings (i.e., small indirect dischargers, municipal and industrial stormwater dischargers, agricultural activities and other non-point sources); the incorporation of numerous assumptions that under estimates the costs; and the assumption to artificially remove costs that exceed threshold values by assuming that regulatory relief measures will be granted, despite the fact that they are not automatically granted through triggers included as part of the proposed regulation.

Response to: CTR-085-016a

See responses to CTR-032-004, CTR-056-018, CTR-021-006b, and CTR-059-018.

Comment ID: CTRH-001-058
Comment Author: Dave Tucker
Document Type: Public Hearing
State of Origin: CA
Represented Org: San Jose Env. Serv. Dept.
Document Date: 09/17/97
Subject Matter Code: E-01g08 Discharger Representation
References:
Attachments? N
CROSS REFERENCES

Comment: There are some things that we do have some concerns with, and that is the uncertainties and assumptions made in the economic analysis.

Although the City strongly believes that California needs certainty in its water quality program process as well as implementation, we are concerned about the potential precedents being set by some uncertainties and assumptions in the federal economic analysis of cost and benefits.

Although the City supported the OMB waiver in order to expedite the standards program promulgation process in California, we are very concerned with what may be potential faults in the federal analysis that

could be carried over to the state planning process.

There are differences between the federal and state acceptance processes. Where the state process requires a much more in-depth analysis of cost incurred by any state water quality planning process, the City believes greater attention should be placed upon nonpoint source control program costs, potential costs that could be incurred to meet criteria now set below detectability, as well as any hidden costs that may be associated with some of the uncertainties and assumptions in the federal financial analysis.

Again, the City will provide much greater detail in its written comments by the end of next week. We thank you for the opportunity to comment and look forward to working with you in the future.

Thank you.

Response to: CTRH-001-058

See responses to CTR-045-011, CTR-02-006b, CTR-021-004, and CTR-004-002.

Subject Matter Code: E-01g09 Affected Facilities

Comment ID: CTR-021-004
Comment Author: LeBoeuf, Lamb, Green & MacRae
Document Type: Local Government
State of Origin: CA
Represented Org: City of Sunnyvale
Document Date: 09/25/97
Subject Matter Code: E-01g09 Affected Facilities
References: Letter CTR-021 incorporates by reference letter CTR-035
Attachments? Y
CROSS REFERENCES

Comment: It is with a sense of reluctance that Sunnyvale joins in CASA/Tri-TAC's adverse comments on the CTR and the EA, and Sunnyvale does so in a spirit of constructive criticism and with an expectation that the Agency will make the necessary adjustments in its approach towards the CTR before the final rule is promulgated. In addition, in the same spirit and with the same expectation, Sunnyvale would like to make the following points on its own behalf:

1. The Inadequacies of the EA. Sunnyvale is gravely concerned that the EA has significantly missed the mark in assessing Sunnyvale's potential costs to comply with the criteria in the CTR. As pointed out in greater detail in the EOA Letter, the methodology used in the EA is fraught with analytical errors and unfounded assumptions, leading to many unanswered questions regarding the costs which Sunnyvale may face in coming into compliance with CTR-based effluent limitations. Accordingly, Sunnyvale urges EPA in the strongest terms not to use Sunnyvale as a representative facility to extrapolate cost information to the remainder of California until the EA is re-done. Use of the EA analysis at this point will result in erroneous, unfounded and misleading results which would be a disservice to EPA's ethical and legal obligations.

We are particularly concerned about the EA's unsupported assumption that Sunnyvale can easily close the gap between current discharge levels for copper and the CTR level for that metal merely by more stringent application of source controls. Sunnyvale already has one of the most stringent source control programs in the U.S., developed after years of careful analysis and in cooperation with the Regional Water Quality Control Board and representatives of a vigorous and concerned environmental community. The available effluent improvements from this avenue have long ago been achieved. The misplaced assumption in the EA tends to grossly and arbitrarily understate costs associated with compliance, particularly the potential for requiring reverse osmosis as the only availablemeans of achieving concentration levels seemingly mandated by the proposed CTR.

Further, we strongly urge EPA to make clear that the overall methodology and approach used in the EA is neither appropriate nor legally sufficient for use by the State of California in promulgating its implementation plan or in promulgating State criteria for the pollutants addressed in the CTR. The gross inadequacies in the EA, which are depicted in the CASA/Tri-TAC letter, could not withstand judicial scrutiny under California's Porter-Cologne Act.

Response to: CTR-021-004

The City of Sunnyvale states that its present source control program is one of the most stringent in the country and that reverse osmosis would be required for compliance with a CTR-based effluent limit for

copper. EPA's revised cost analysis for Sunnyvale indicates that the facility is in compliance with the CTR-based effluent limit for copper and that the addition of reverse osmosis is not justified. As indicated in the Technical Support Document for the Economic Analysis of the Final CTR, the City of Sunnyvale reported one discharge observation for copper between January 1995 and December 1997 above the projected effluent limit for copper (8.03 ug/L). This single exceedance was 8.4 ug/L which is only 4% above the CTR-based permit limit. EPA believes that this violation frequency and the magnitude of the violation do not justify addition of reverse osmosis. Moreover, the projected pollutant loading reduction would likely have minimum pollution control costs. These costs would be associated with controlling discharges of copper using pollution prevention, or by optimizing existing processes (e.g., individual units performance under peak flows or critical conditions) at the POTW.

Note that EPA calculated the projected effluent limit for the City of Sunnyvale using a metal translator factor of 2.6 and a saltwater dissolved criterion of 3.1 ug/L. Additionally, the projected limit used was adjusted using statistical methods to account for effluent variability and different averaging periods. The resulting effluent limit is comparable to the copper limit established in the 1998 NPDES permit issued to the facility (8.6 ug/L).

The State is not required to use the EPA's Economic Analysis (EA) in promulgating its proposed implementation plan. While EPA and the State have worked very closely to gather the data necessary to develop their respective economic analyses, the State's economic analysis for its proposed implementation plan is different than EPA's. The State tailored the information gathered and reported in the EPA's EA to reflect the specific proposed policies in the State plan.

Although EPA disagrees with commenters that claim that EPA's EA is inappropriate for use by the State, EPA does believe that the State is under no obligation to use EPA's EA and may choose alternative methodologies for its economic analysis in support of State water quality policy or regulation.

See responses to CTR-021-017 and CTR-035-011a.

Comment ID: CTR-035-046b
Comment Author: Tri-TAC/CASA
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-01g09 Affected Facilities
References:
Attachments? N
CROSS REFERENCES E-01g08

Comment: pp. 2-4 - 2-9 (U.S. EPA, 1997b) -- Sampling Strategy In general terms, we support EPA's methodology of stratified sampling to determine costs, although it is not clear whether the POTW sample was stratified appropriately. We believe that inadequate evidence is presented that the sample of case studies reflects the overall population of POTWs, and that extrapolation based on the sample would truly reflect total POTW costs. Little explanation is provided as to how the case study facilities were selected, and little evidence is presented demonstrating the validity of extrapolating from the small sample to the impacted population of POTWs. In particular, we believe that minor facilities were under-represented, and that it is invalid to assure that none of the 185 minor POTWs will incur any costs. We also believe

that larger samples of facilities from 0-10 MGD and from 10-100 MGD also would be necessary to obtain valid estimates of POTW costs. In addition, by assuming that existing facilities that contain effluent limits for toxic pollutants were representative facilities and using them as the basis for extrapolation to the universe of potentially affected facilities, EPA may have failed to include a major category of costs. By ignoring the costs of those facilities meeting their current permit limits, EPA is assuming that the facilities they are extrapolating to have similar current permit limits, which was not demonstrated to be the case. Therefore, EPA should reexamine the use of this assumption in the analysis of POTW costs.

Response to: CTR-035-046b

See responses to CTR-059-018 and CTR-040-024.

Comment ID: CTR-035-048
Comment Author: Tri-TAC/CASA
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-01g09 Affected Facilities
References:
Attachments? N
CROSS REFERENCES

Comment: pp. 2-36 - 2-37 (U.S. EPA, 1997b) -- Use of Average Cost Estimates for Extrapolation EPA's use of average costs to estimate individual POTW costs masks a significant range in expenditures, indicating that some communities will be much more significantly impacted than others. By using averages for extrapolation rather than the full range, total cost estimates are likely to be severely underestimated.

Response to: CTR-035-048

EPA selected sample facilities in order to represent different industry categories, but also various facility sizes with different flow magnitudes. For example, EPA analyzed POTW facilities which fell into three flow categories representing facilities serving very large, medium, and small communities. Costs were averaged for the sample facilities within each flow category for an industry type and then extrapolated to the universe of facilities which matched the industry type and the range in flow for that flow category. Thus, costs calculated for facilities operating in very large communities would not be applied to facilities serving very small communities. See also response to CTR-059-018.

Subject Matter Code: E-01g10 Toxic Pound Equivalents

Comment ID: CTR-052-012
Comment Author: East Bay Dischargers Authority
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: E-01g10 Toxic Pound Equivalents
References: Letter CTR-052 incorporates by reference letters CTR-035 and CTR-054
Attachments? Y
CROSS REFERENCES

Comment: Cost per Toxic Pound Removed

Removal of copper by pollution prevention methods would be marginally cost effective. Pollution prevention of 10% of the Authority's annual copper load would result in a removal of 262 pounds per year from the Bay. Using the toxic weight factor from the EA, 0.47 results in a removal of 123 toxic pounds. Using the annual cost of $56,952 from the Larry Walker analysis results in a removal cost of $462 per pound. This approaches the high end of $500 per pound cited by EPA.

Removal of organics would not be cost effective. No toxic weights are listed for the PAHS, so this analysis is only for Heptachlor, which has a toxic weight of 4,100. Assuming that carbon adsorption removes 95% of the Heptachlor, and using the maximum recorded value of 0.018 ug/L results in the following:

(0.95)(0.018 ug/L)(4,100)(65 MGD)(365 days/year)(8.34 lbs/gal)(1 mg/l000 ug)=

13,872 toxic pounds per year

Using the annualized cost for carbon adsorption of $44,200,000 per year results in a removal cost of $3,186 per toxic pound. This figure is 6-16 times the threshold cost range cited by EPA of $200-$500 per toxic pound. In actual practice, the costs would even be higher since much of the data is non-detect with MDLs as low as 0.007 ug/L.

Response to: CTR-052-012

See response to CTR-004-003.

Subject Matter Code: E-01h Treatment Assumptions

Comment ID: CTR-003-011
Comment Author: City of Riverside
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/22/97
Subject Matter Code: E-01h Treatment Assumptions
References:
Attachments? N
CROSS REFERENCES

Comment: 11) What justification does the EPA have for assuming that, "If all monitoring data reported for a facility were reported as below analytical detection levels, even if the reported detection limit was above EPA approved analytical method detection levels, it was assumed that no reasonable potential existed to exceed CTR-based WQBELs".? Can permit holders make the same assumption to assess reasonable potential when applying for new permits?

Response to: CTR-003-011

The NPDES permit regulations in 40 CFR 122.44(d) and 123.25 require that WQBELs be derived for toxic pollutants that are discharged at a level that has a reasonable potential to exceed water quality standards. EPA believes that the approach used to determine reasonable potential to exceed CTR-based effluent limitations in its economic analysis was reasonable. This is particularly the case for the high cost scenario. Under this scenario, when any pollutant for which a limit for a toxic pollutant already existed in the current NPDES permit for a sample facility, it was assumed that a reasonable potential existed to exceed a CTR-based limit and the pollutant was included for further analysis. For pollutants that were not limited in the existing permit for a sample facility, but were detected in the effluent (as reported in the permit application, or as a result of special monitoring conditions contained in the NPDES permit), an analysis was conducted to determine if a reasonable potential existed to exceed CTR-based limits using the method recommended in EPA's Technical Support Document for Water Quality-based Toxics Control (1991). If all monitoring data reported for a facility were reported as below analytical detection levels, even if the reported detection limit was above EPA-approved analytical method detection levels, EPA assumed that no reasonable potential existed to exceed CTR-based WQBELs. Although EPA acknowledged in its economic analysis that this assumption could underestimate the impact of implementing the CTR, it most likely reflects the actual procedures that would be used by the State Regional Water Quality Control Boards (RWQCBs) because the discharger would not be subject to enforcement at any level below quantifiable analytical detection levels.

In estimating potential costs associated with the final rule, EPA also made an effort to ensure that all relevant and current information related to the possible presence of a pollutant in a sample facility discharge was collected. Specifically, all current information and data (including permits, fact sheets, permit applications, and other relevant discharge information) were updated and verified for each sample facility. In addition, each of the State RWQCBs were contacted to provide comments and additional information as necessary to ensure accurate reflection of current permit requirements and discharge conditions. Finally, permit and monitoring data submitted as a part of the public comments were reviewed and considered.

Reference: U.S. EPA. 1991. Technical Support Document for Water Quality-based Toxics Control. EPA/505/2-90-001

Comment ID: CTR-003-013
Comment Author: City of Riverside
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/22/97
Subject Matter Code: E-01h Treatment Assumptions
References:
Attachments? N
CROSS REFERENCES

Comment: 13) The City has reviewed those sections of the economic impact report which dealt directly with it's treatment plant. Although we have not had the time to address directly the cost impacts, we can comment on the assumptions that were used. EPA finds that we may have problems meeting metals objectives and suggests that they can be solved by chemically assisted clarification and additional pollution prevention/ waste minimization controls. It should be noted that the City has used both of these techniques for many years. With minor exceptions for waste minimization, it is unlikely that further reductions can be attained by either method. Waste minimization is cited as the answer to potential problems with chloroform. EPA needs to be aware that chloroform is a byproduct of the wastewater treatment process where chlorine disinfection is involved. Waste minimization will not help. It would be more appropriate to assume that the disinfection process would need to change to ultra violet or a similar non-chlorinated method. Capital costs would likely range around three to four million dollars with operating costs near one million dollars per year.

Response to: CTR-003-013

See response to CTR-004-003.

EPA agrees that chloroform is most likely a disinfection by-product (DBP) in wastewater treatment plants that use chlorination as the means for disinfection and that UV is an alternative technology that eliminates the presence of chloroform in the effluent. However, it should be noted that process optimization in the chlorination units is a viable and relatively low-cost pollution control alternative that can be used to reduce the discharge of chloroform and other DBPs (Truax, 1992; U.S. EPA, 1992; U.S. EPA, 1990) to levels in compliance with projected CTR-based limits. Process optimization is used to control DBPs in the final economic analysis of the CTR.

References:

Truax, Dennis D. 1992. "Optimization of Wastewater Treatment Plant Systems". Water Environment Research. 64(4): 400-02.

U.S. EPA. 1992. Standardized Costs for Water Supply Distribution Systems. Gummerman, R., Burris, B., and Burris D. EPA 600/R-92/009. Cincinnati, OH.

U.S. EPA. 1990. Optimized Water Treatment Plant Performance with the Composite Correction

Program. Summary Report. EPA 600/8-90/017. Cincinnati, OH.

Comment ID: CTR-021-009
Comment Author: LeBoeuf, Lamb, Green & MacRae
Document Type: Local Government
State of Origin: CA
Represented Org: City of Sunnyvale
Document Date: 09/25/97
Subject Matter Code: E-01h Treatment Assumptions
References: Letter CTR-021 incorporates by reference letter CTR-035
Attachments? Y
CROSS REFERENCES

Comment: The Estimated CTR Plant Optimization Compliance Costs for Sunnyvale are Under Estimated by One to Two Orders of Magnitude (10 to 100 times low)

The projected average cost per POTW under the high-end scenario of $480,000 per year (p. 4-12) is low by a factor of 10 to 100 based on Sunnyvale's situation and analysis (as cited in Appendix I-B-11). There is no support provided for the key assumption that "many of the sample facilities already possessed treatment processes that could be enhanced potentially to achieve CTR-based effluent limits" and "Therefore increased O&M was assumed adequate to comply with CTR-based effluent limits (as opposed to installing new treatment equipment). (p. 4-13).

Secondary treatment facilities with dual media filtration, such as Sunnyvale, are not specifically designed for metals or toxic organics removal. The removals that occur are an incidental function of the secondary biological treatment and solids separation processes. It is not technically possible to "dial-in" an additional 10-25% as has been assumed, particularly for facilities such a Sunnyvale, that already have low influent concentrations due to past implementation extensive source control, pollution prevention, and waste minimization measures. The presumption regarding plant optimization apparently mistakenly assumes that percent removal is a linear function instead of an asymptotic one. It is much more difficult to remove an additional 10-25% when the effluent contains only 5-10 ug/l versus say 20-50 ug/L when more of the copper is likely particulate (associated with solids) versus soluble and more amenable to removal through potential chemical addition to enhance solids removal.

Sunnyvale already achieves 85-90% metals removal and the majority of metals remaining are in the dissolved form. This information was submitted to EPA, as input for the Case Study, in an EOA September 23, 1996 memo (incorporated herein by reference). As stated in that memo, the low-end treatment option (high lime treatment) with an annual cost of $9.8 million, was not guaranteed to consistently achieve a 4.9 ug/L copper effluent limit. Only the reverse osmosis based treatment option, at $42.1 million per year could likely produce effluent in the 4.9 ug/L copper range, since this is a maximum limit (i.e. never to be exceeded) not an average limit as incorrectly assumed in the CTR (see below). EPA need to provide, in the CTR, the specific plant performance data, apparently from the RREL Treatability Database, that supports the contention that minor levels ($100,000) of plant optimization can achieve the proposed low part per billion metals concentrations.

Response to: CTR-021-009

See responses to CTR-021-017 and CTR-004-003.

Comment ID: CTR-035-008e
Comment Author: Tri-TAC/CASA
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-01h Treatment Assumptions
References:
Attachments? N
CROSS REFERENCES E-01g08
E-01e
E-01d
E-01m
E-01c

Comment: Finally, we have serious concerns about the accuracy of the draft Economic Analysis and the estimates of the costs and benefits of the draft CTR (see detailed comments in Attachments I and 2). Our primary concerns related to the cost analysis include 1) that the case studies on which the cost analysis is based do not adequately represent the actual population of POTWs in California; 2) the omission of costs that could be incurred by many sectors that contribute to overall loadings, and, hence, can be expected to have to reduce their loadings (e.g., non-SIU indirect dischargers, municipal and industrial stormwater dischargers, agricultural activities, and other nonpoint sources of CTR-regulated pollutants); 3) the use of numerous assumptions that underestimate costs; and 4) the capricious removal of costs that exceed threshold values by assuming that regulatory relief measures will be granted, despite the lack of any proposed regulatory relief trigger in the proposed regulation.

To illustrate the degree of underestimation of costs for the POTW sector alone, we looked at potential compliance costs for the POTW sector. We found that the potential costs for 23 major POTWS. on an annualized basis, may reach $400 million. We believe that this analysis demonstrates that the potential cost consequences of compliance with effluent limits based on the proposed CTR criteria would easily exceed the $ 100 million annual cost threshold, especially when the costs of all 313 POTWs in the State are estimated. Thus, we believe that EPA must conclude that the proposed CTR could have significant economic impacts on local governments.

Response to: CTR-035-008e

See responses to CTR-021-005c, CTR-032-004, CTR-040-039, CTR-021-006b, CTR-040-037, and CTR-059-018.

Comment ID: CTR-038-004b
Comment Author: Sonoma County Water Agency
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-01h Treatment Assumptions
References:

Attachments? Y
CROSS REFERENCES E-01g08
E-01m
E-01c02

Comment: 4. The economic analysis is seriously flawed. The major flaws include: (1) failing to do an appropriate sampling of dischargers having little or no dilution; (2) assuming in the high-end cost scenario that a 25% reduction could be achieved through source control and an additional 25% achieved through treatment plant optimization without capital improvements; (3) constraining estimates of potential costs through key assumptions, including the assumption that regulatory relief from the rule would be granted if costs were in excess of certain thresholds; and (4) exaggerating estimates of potential benefits by assuming an end (i.e., achievement of the proposed water quality criteria) that will not result from the rule. The result of these flaws is that potential costs are greatly understated and potential benefits are greatly overstated. The District's analysis demonstrates that actual costs may be an order of magnitude greater than EPA's $500/lb threshold and that the benefits are very small.

Response to: CTR-038-004b

See responses to CTR-054-013a, CTR-032-004, CTR-021-008, CTR-040-029a, and CTR-056-018.

Comment ID: CTR-040-032
Comment Author: County of Sacramento Water Div
Document Type: Storm Water Auth.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-01h Treatment Assumptions
References: Letter CTR-040 incorporates by reference letter CTR-027
Attachments? Y
CROSS REFERENCES

Comment: Although EPA goes to great length to label its cost analysis as "conservative" the analysis is anything but conservative:

* It is not conservative to assume that effluent metals levels can be reduced to the low levels necessary to ensure compliance without any capital costs, by adding lime to existing primary tanks.

Response to: CTR-040-032

The U.S. EPA Treatability Database indicates that chemical precipitation with addition of lime is a technology capable of removing metals at the concentrations and loading reductions required. For example, several treatment plants have reached concentrations of 7.7 ug/L for copper based on a pilot study (CTR-based level for copper is 8.03 ug/L) and 0.46 ug/L for silver (CTR-based level for silver is 1.51 ug/L) (U.S.EPA RREL). Some of the sample facilities already have a clarification system in place, therefore, only capital costs for the lime feeding and conveying system need to be considered. For facilities without clarifiers, the capital cost of a primary clarifier is also included in EPA's cost estimates. EPA's cost estimates are based on EPA's Treatability Manual (1980) and are adjusted for inflation.

References: U.S. EPA. 1980. Treatability Manual, Volume IV, Cost Estimating. U.S. EPA Risk Reduction Engineering Laboratory (RREL). Cincinnati, Ohio. Treatability Database.

Comment ID: CTR-040-038
Comment Author: County of Sacramento Water Div
Document Type: Storm Water Auth.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-01h Treatment Assumptions
References: Letter CTR-040 incorporates by reference letter CTR-027
Attachments? Y
CROSS REFERENCES

Comment: EPA may have greatly underestimated the cost of metals removal. EPA assumed that significant metals reductions could be achieved without any capital costs by adding lime to existing primary sedimentation tanks. But, this would increase the amount of primary sludge produced (as much as 5 times at high lime dosages) and could therefore necessitate additional sludge handling costs. Further, there is no evidence that addition of lime to the primary sediment tanks could achieve the low effluent levels required to achieve some of the metals criteria (e.g., the saltwater copper criteria). Most engineers who have addressed this issue have assumed that tertiary lime treatment would be necessary. In the Bay Area Dischargers Association analysis, tertiary limetreatment was six times the cost of primary lime addition.

Response to: CTR-040-038

See response to CTR-040-032.

Comment ID: CTR-041-028
Comment Author: Sacramento Reg Cnty Sanit Dist
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-01h Treatment Assumptions
References:
Attachments? N
CROSS REFERENCES

Comment: Although EPA goes to great length to label its cost analysis as "conservative" the analysis is anything but conservative:

* It is not conservative to assume that effluent metals levels can be reduced to the low levels necessary to ensure compliance without any capital costs, by adding lime to existing primary tanks.

Response to: CTR-041-028

See response to CTR-040-032.

Comment ID: CTR-041-034
Comment Author: Sacramento Reg Cnty Sanit Dist
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-01h Treatment Assumptions
References:
Attachments? N
CROSS REFERENCES

Comment: EPA may have greatly underestimated the cost of metals removal. EPA assumed that significant metals reductions could be achieved without any capital costs by adding lime to existing primary sedimentation tanks. But, this would increase the amount of primary sludge produced (as much as 5 times at high lime dosages) and could therefore necessitate additional sludge handling costs. Further, there is no evidence that addition of lime to the primary sediment tanks could achieve the low effluent levels required to achieve some of the metals criteria (e.g., the saltwater copper criteria). Most engineers who have addressed this issue have assumed that tertiary lime treatment would be necessary. In the Bay Area Dischargers Association analysis, tertiary lime treatment was six times the cost of primary lime addition.

Response to: CTR-041-034

EPA assigned separate costs for residuals removal (including sludge) where it was appropriate. EPA did not add any residuals removal costs to Sacramento Regional Wastewater Treatment Plant in association with the process optimization study that was assigned in EPA's cost estimate for the facility. EPA disagrees that lime addition cannot meet the CTR-based limits; see response to CTR-040-032.

Comment ID: CTR-043-004b
Comment Author: City of Vacaville
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: E-01h Treatment Assumptions
References:
Attachments? Y
CROSS REFERENCES E-01g
E-01m
E-02c
E-01c02

Comment: 4. EPA's Economic Analysis is seriously flawed. The major flaws include:

(1) failing to do an appropriate sampling of small dischargers having little or no dilution;

(2) assuming in the high-end cost scenario that a 25% reduction could be achieved through source control and an additional 25% achieved through treatment plant optimization without capital improvements;

(3) constraining estimates of potential costs through key assumptions, including the assumption that regulatory relief from the rule would be granted if costs were in excess of certain thresholds; and

(4) exaggerating estimates of potential benefits by assuming an end (i.e., achievement of the proposed water quality criteria) that will not result from the rule.

The result of these flaws is that potential costs are greatly understated and potential benefits are greatly overstated. Moreover, the flawed economic analysis has lead to the erroneous conclusion that the CTR is not a "significant regulatory action" or major rule subject to Presidential Executive Order 12866 and the Unfunded Mandates Reform Act or a rule that affects small entities protected under the Regulatory Flexibility Act.

Response to: CTR-043-004b

See responses to CTR-054-013a, CTR-021-005c, CTR-032-004, CTR-021-008, CTR-040-029a, CTR-056-018, and CTR-059-018.

Comment ID: CTR-044-023
Comment Author: City of Woodland
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: E-01h Treatment Assumptions
References:
Attachments? N
CROSS REFERENCES

Comment: Although EPA goes to great length to label its cost analysis as "conservative" the analysis is anything but conservative:

* It is not conservative to assume that effluent metals levels can be reduced to the low levels necessary to ensure compliance without any capital costs, by adding lime to existing primary tanks.

Response to: CTR-044-023

See response to CTR-040-032.

Comment ID: CTR-044-029
Comment Author: City of Woodland
Document Type: Local Government
State of Origin: CA

Represented Org:
Document Date: 09/26/97
Subject Matter Code: E-01h Treatment Assumptions
References:
Attachments? N
CROSS REFERENCES

Comment: EPA may have greatly underestimated the cost of metals removal. EPA assumed that significant metals reductions could be achieved without any capital costs by adding lime to existing primary sedimentation tanks. But, this would increase the amount of primary sludge produced (as much as 5 times at high lime dosages) and could therefore necessitate additional sludge handling costs. Further, there is no evidence that addition of lime to the primary sediment tanks could achieve the low effluent levels required to achieve some of the metals criteria (e.g., the saltwater copper criteria). Most engineers who have addressed this issue have assumed that tertiary lime treatment would be necessary. In the Bay Area Dischargers Association analysis, tertiary lime treatment was six times the cost of primary lime addition.

Response to: CTR-044-029

See response to CTR-040-032.

Comment ID: CTR-045-009b
Comment Author: Sausalito-Marin Sanitary Dist.
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/24/97
Subject Matter Code: E-01h Treatment Assumptions
References:
Attachments? Y
CROSS REFERENCES E-01g08
E-01m

Comment: The draft Economic Analysis has serious flaws. It underestimates the costs of the draft CTR and overestimates the benefits. For the cost analysis, EPA should reevaluate the representativeness of the sample used; the omission of impacts on many sectors that contribute to loadings, and hence, can be expected to have to reduce their loadings (e.g., small indirect dischargers, municipal and industrial stormwater dischargers, agricultural activities, and other nonpoint sources); the incorporation of numerous assumptions that underestimate costs; and the assumption to artificially remove costs that exceed threshold values by assuming that regulatory relief measures will be granted, despite the fact that they are not automatically granted through triggers included as part of the proposed regulation.

Response to: CTR-045-009b

See responses to CTR-032-004, CTR-056-018, CTR-021-006b, and CTR-059-018.

Comment ID: CTR-049-006b
Comment Author: Watereuse Assoc. of California
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 09/24/97
Subject Matter Code: E-01h Treatment Assumptions
References:
Attachments? N
CROSS REFERENCES E-01g08
E-01m

Comment: With respect to other criteria proposed for adoption in the draft CTR, we recommend that USEPA:

4. Review and correct existing flaws in the current "Economic Analysis."

With respect to the Economic Analysis conducted by USEPA, we are concerned that it underestimates the cost of the proposed CTR rule while overestimating its benefits. We suggest that USEPA re-evaluate (1) the representativeness of the sample used; (2) the omission of impacts on many sectors that contribute to loadings; (3) the incorporation of a variety of assumptions that underestimate costs; and (4) the assumption to artificially remove costs that exceed threshold values by incorrectly assuming that regulatory relief measures will be granted. For the benefits analysis, USEPA should utilize more California-specific and recent information. A further problem with the analysis relates to the establishment of criteria that are below analytical detection. Lacking credible data, it was not possible to conduct cost-benefit analyses or determine that any set of control measures would or could lead to compliance. This fundamental inability to utilize established rulemaking procedures requires, in our opinion, further work prior to the promulgation of the criteria.

Response to: CTR-049-006b

See responses CTR-045-011, CTR-032-004, CTR-056-018, CTR-021-006b, CTR-059-018, and CTR-052-014.

Comment ID: CTR-054-027
Comment Author: Bay Area Dischargers Associati
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-01h Treatment Assumptions
References:
Attachments? N
CROSS REFERENCES

Comment: Although EPA goes to great length to label its cost analysis as "conservative" the analysis is anything but conservative:

* It is not conservative to assume that effluent metals levels can be reduced to the low levels necessary to ensure compliance without any capital costs, by adding lime to existing primary tanks.

Response to: CTR-054-027

See response to CTR-040-032.

Comment ID: CTR-054-033
Comment Author: Bay Area Dischargers Associati
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-01h Treatment Assumptions
References:
Attachments? N
CROSS REFERENCES

Comment: EPA may have greatly underestimated the cost of metals removal. EPA assumed that significant metals reductions could be achieved without any capital costs by adding lime to existing primary sedimentation tanks. But, this would increase the amount of primary sludge produced (as much as 5 times at high lime dosages) and could therefore necessitate additional sludge handling costs. Further, there is no evidence that addition of lime to the primary sediment tanks could achieve the low effluent levels required to achieve some of the metals criteria (e.g., the saltwater copper criteria). Most engineers who have addressed this issue have assumed that tertiary lime treatment would be necessary. In the Bay Area Dischargers Association analysis, tertiary lime treatment was six times the cost of primary lime addition.

Response to: CTR-054-033

See response CTR-040-032.

In estimating compliance costs for facilities, EPA included costs associated with solid waste disposal costs as part of operation and maintenance costs for sample facilities.

Comment ID: CTR-086-003
Comment Author: EOA, Inc.
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org: California Dent
Document Date: 09/26/97
Subject Matter Code: E-01h Treatment Assumptions
References: Letter CTR-086 incorporates by reference letter CTR-035
Attachments? N
CROSS REFERENCES

Comment: CDA is a strong supporter of water quality and human health protection. CDA's primary goals in commenting on the draft CTR are to request that mercury criteria be based on sound science and that mercury regulation be implemented via a watershed management, phased TMDL-type approach.

CDA is particularly concerned that the CTR does not adequately assess the economic impacts on indirect dischargers nor the extent to which there will be measurable water quality benefits solely from adoption of the proposed mercury criteria for point sources.

Economic Analysis

CDA supports CASA/Tri-TAC's conclusions that the Economic Analysis has significant technical weaknesses, is based on a large number of assumptions and minimal empirical data, and that it understates costs and overestimates benefits. The analysis found that mercury reductions of 80.4% and 51.7% would be required under the high-end and low-end scenarios, respectively. The economic analysis needs to evaluate costs and feasibility of attainability based on actual treatment plant mercury removal performance data with associated detection limits. It also needs to evaluate costs under the scenario that dilution credit would be eliminated when calculating effluent limits for bioaccumulative constituents of concern, such as mercury, for deepwater dischargers within or capable of impacting mercury nonattaininent areas.

Response to: CTR-086-003

EPA did examine detailed treatment information and pollutant removal performance data at the sample facilities to evaluate the feasibility and potential costs of meeting CTR-based WQBELs. EPA estimated that seven facilities would incur costs to meet the CTR-based effluent limits for mercury. When this information was limited, the assessment of pollutant removal feasibility was also based upon the reviewing engineer's best professional judgement using general knowledge of industrial and municipal operations.

Dilution factors used to calculate water quality based effluent limits were based on the dilution allowed within the current waste discharge requirements for each sample facility. Of the 20 sample facilities, only four were provided with dilution factors. WQBELs for the remaining facilities were based on a dilution of zero. When this sample is extrapolated to the universe, over 94% of point source dischargers are estimated to not be allowed dilution. EPA believes that this is a highly conservative estimate that will likely overestimate potential costs.

Comment ID: CTRH-002-016b
Comment Author: Lisa Ohlund
Document Type: Public Hearing
State of Origin: CA
Represented Org: Alliance of So. CA POTWs
Document Date: 09/18/97
Subject Matter Code: E-01h Treatment Assumptions
References:
Attachments? N
CROSS REFERENCES E-01c2

Comment: And finally, I'd like to comment on the analysis of the economic impact of the CTR. We

believe that the analysis does not portray a reasonable picture of what the potential costs and benefits may result from the promulgation of this CTR. In our opinion, the cost analysis contains many flawed assumptions that result in severe underestimation of the total potential costs, and we're particularly concerned about the use of process optimization and how it was relied upon.

Likewise, the benefits, while admittedly difficult to estimate, appear tenuous at best. The bottom line is that we are concerned that this analysis does not properly reveal that the CTR can lead to requirements for large expenditures by POTWs in Southern California with questionable benefits to the environment. We recommend that EPA carefully redo its economic analysis to portray a more accurate picture of the potential costs and benefits.

Thank you again for this opportunity. We look forward to submitting our comments in writing.

Response to: CTRH-002-016b

See responses CTR-054-013a, CTR-035-057, CTR-056-018, and CTR-004-003.

Subject Matter Code: E-01h01 25% Reduction Assumption

Comment ID: CTR-040-029b
Comment Author: County of Sacramento Water Div
Document Type: Storm Water Auth.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-01h01 25% Reduction Assumption
References: Letter CTR-040 incorporates by reference letter CTR-027
Attachments? Y
CROSS REFERENCES E-01q01

Comment: Although EPA goes to great length to label its cost analysis as "conservative" the analysis is anything but conservative:

* It is not conservative to assume that POTWs can achieve a 25% reduction through source control and an additional 25% reduction through treatment plant optimization.

Response to: CTR-040-029b

See response to CTR-040-029a.

Comment ID: CTR-041-025b
Comment Author: Sacramento Reg Cnty Sanit Dist
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-01h01 25% Reduction Assumption
References:
Attachments? N
CROSS REFERENCES E-01q01

Comment: Although EPA goes to great length to label its cost analysis as "conservative" the analysis is anything but conservative:

* It is not conservative to assume that POTWs can achieve a 25% reduction through source control and an additional 25% reduction through treatment plant optimization.

Response to: CTR-041-025b

See response to CTR-040-029a.

Comment ID: CTR-044-005b
Comment Author: City of Woodland

Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: E-01h01 25% Reduction Assumption
References:
Attachments? Y
CROSS REFERENCES E-01g08
E-01m
E-02c
E-01c02
R
S

Comment: We have reviewed the proposed CTR and offer the following comments:

4. EPA's Economic Analysis is seriously flawed. The major flaws include:

(1) failing to do an appropriate sampling of small dischargers having little or no dilution; (2) assuming in the high-end cost scenario that a 25% reduction could be achieved through source control and an additional 25% achieved through treatment plant optimization without capital improvements; (3) constraining estimates of potential costs through key assumptions, including the assumption that regulatory relief from the rule would be granted if costs were in excess of certain thresholds; and (4) exaggerating estimates of potential benefits by assuming an end (i.e., achievement of the proposed water quality criteria) that will not result from the rule. Additional concerns with the economic analysis are presented in Exhibit F. The result of these flaws is that potential costs are greatly understated and potential benefits are greatly overstated. Moreover, the flawed economic analysis has lead to the erroneous conclusion that the CTR is not a "significant regulatory action" or major rule subject to Presidential Executive Order 12866 and the Unfunded Mandates Reform Act or a rule that affects small entities protected under the Regulatory Flexibility Act. The City, for example, is a small community having a population of under 50,000 and would be greatly impacted by the proposed rule.

Response to: CTR-044-005b

See responses to CTR-054-013a, CTR-021-005c, CTR-032-004, CTR-040-029a, and CTR-056-018.

Comment ID: CTR-044-020b
Comment Author: City of Woodland
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: E-01h01 25% Reduction Assumption
References:
Attachments? N
CROSS REFERENCES E-01q01

Comment: Although EPA goes to great length to label its cost analysis as "conservative" the analysis is

anything but conservative:

* It is not conservative to assume that POTWs can achieve a 25% reduction through source control and an additional 25% reduction through treatment plant optimization.

Response to: CTR-044-020b

See response to CTR-040-029a.

Comment ID: CTR-054-024b
Comment Author: Bay Area Dischargers Associati
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-01h01 25% Reduction Assumption
References:
Attachments? N
CROSS REFERENCES E-01q01

Comment: Although EPA goes to great length to label its cost analysis as "conservative" the analysis is anything but conservative:

* It is not conservative to assume that POTWs can achieve a 25% reduction through source control and an additional 25% reduction through treatment plant optimization.

Response to: CTR-054-024b

See response to CTR-040-029a.

Subject Matter Code: E-01h02 Unit Cost Assumptions

Comment ID: CTRH-001-037c
Comment Author: Robert Reid
Document Type: Public Hearing
State of Origin: CA
Represented Org: CASA
Document Date: 09/17/97
Subject Matter Code: E-01h02 Unit Cost Assumptions
References:
Attachments? N
CROSS REFERENCES E-01c02
E-01q03

Comment: Second, the interaction between the CTR and the state's implementation policy is particularly important given our second concern, which is namely that the EPA's economic evaluation underestimates the costs and overestimates the benefits of implementing this rule.

Our concern about the cost estimates is based on the fact that the cost analysis appears to undervalue the magnitude of difficulty dischargers will have complying with permits issued based on this rule.

We are also concerned that the cost estimates for various compliance activities such as source control and treatment process optimization made in the case studies are overly optimistic and not reflective of the true actions that will need to be taken to insure compliance.

Overall, we are concerned that the expenditures that may be necessary for many POTWS to comply with the CTR will be large, these costs may not be matched by commensurate benefits, and that EPA has not analyzed whether point source controls are in fact a cost-effective way to achieve water quality standards.

Our preliminary analysis for just five agencies in the Bay Area to comply with the proposed standard for copper alone could amount to more than $60 million per year -- 60 million. This number would be far higher if calculated for every pollutant listed in the CTR for the entire POTW industry in California.

Since this estimate would undoubtedly exceed the high end of the range contained in EPA's analysis, we believe it is necessary for EPA to redo the economic analysis to fully comply with its legal responsibilities.

In addition, revised economic analysis is necessary to provide a sound basis for the State to use in its analysis of the economic impacts of the implementation policy.

Response to: CTRH-001-037c

See responses to CTR-041-018, CTR-035-057, CTR-056-018, CTR-004-003, and CTR-040-039.

Subject Matter Code: E-01i Alternative Cost Analysis

Comment ID: CTR-003-012
Comment Author: City of Riverside
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/22/97
Subject Matter Code: E-01i Alternative Cost Analysis
References:
Attachments? N
CROSS REFERENCES

Comment: 12) The cost analysis suggests that there is little difference between the cost of using a risk level of 10E-6 versus 10E-5. The reason for that is in all likelihood the fact that many of these criteria are below the detection level at both risk levels. Under the assumptions used their would be no cost to either scenario.

Response to: CTR-003-012

As part of its revised cost analysis, EPA estimated the changes in estimated costs and pollutant load reductions based on the lower risk level of 10-5. Under the low scenario, costs decrease by $1.1 million, approximately 11% less than the costs based on the higher risk level. Under the high scenario, annual costs decrease by $5.8 million, also an 11% decrease from the costs based on a 10-6 risk level. Pollutant load reductions attributable to use of a lower risk level are estimated to decrease by approximately 4% and 1% under the low and high scenarios, respectively. The relatively low sensitivity of costs to the change in risk level primarily is related to the fact that most of the potential costs related to implementing the CTR are being driven by metals. Changes in risk levels for carcinogens primarily affect organic pollutants.

Comment ID: CTR-021-015
Comment Author: LeBoeuf, Lamb, Green & MacRae
Document Type: Local Government
State of Origin: CA
Represented Org: City of Sunnyvale
Document Date: 09/25/97
Subject Matter Code: E-01i Alternative Cost Analysis
References: Letter CTR-021 incorporates by reference letter CTR-035
Attachments? Y
CROSS REFERENCES

Comment: Appendix III-B:

The analysis conducted in Appendix III-B is essentially the same as that shown in the previous appendices, except that it is assumed that the dissolved criteria converts directly to a total criteria (translator =I). The implication of this is methodological assumption that 100% of the total pollutants discharged in the effluent are in dissolved form. Results from this appendix represent an absolute worst

case, are misleading and inappropriate. It has been shown that the assumptions used to generate the analysis in Appendix I-B (TSS, translator values, and 95%tile values for chronic WLAs) are already highly conservative.

Response to: CTR-021-015

The criteria for metals in the proposed rule are expressed in the dissolved form. Permitting regulations, however, require that permit limits be set in terms of total recoverable metals concentrations. Therefore, permit writers must "translate" dissolved criteria to derive total recoverable permit limits which can be done through a variety of methods. The preferred methodology employs site-specific information to derive the translator. However, since not all site-specific information was available, the base case analysis used a second method, the theoretical partitioning relationship, to estimate the translator. According to recent EPA guidance on translators, this method usually tends to overstate the stringency of the derived permit limit compared to the site-specific method, although it will sometimes understate the stringency (U.S. EPA, 1996). A third method is to simply use the total recoverable criteria that are derived by dividing the dissolved criteria by the conversion factor. This method is very conservative and will, in nearly all cases, result in more stringent permit limits compared to the site-specific method.

EPA performed a sensitivity analysis to estimate the effect of the use of total recoverable criteria on CTR-based WQBELs, total costs, and load reductions. CTR-based WQBELs are calculated using the same methods described in Chapter 4 of EPA's Economic Analysis, except that total recoverable criteria are used in place of dissolved criteria for metals. The analysis shows that a significant increase in costs can be expected by using total recoverable criteria, as compared to the costs of the theoretical partitioning approach used in the base case analysis. Potential annual costs under the low scenario are $62.4 million per year, an approximately two-fold increase over the estimates in the low base case analysis. Under the high scenario, total costs are estimated to be nearly $325 million per year, over five times the cost estimates in the base case analysis. Potential load reductions are estimated to increase by approximately 14% over the low base case scenario, and by nearly 7% under the high scenario. Using conversion factors as translators would result in significantly higher costs per toxic pound-equivalent removed than the base case analysis. The cost-effectiveness of the low scenario is $50 per toxic pound-equivalent removed compared to $31 per toxic pound-equivalent removed in the base case analysis. The cost-effectiveness of the high scenario is $111 per toxic pound-equivalent removed compared to $22 per toxic pound-equivalent removed in the base case analysis.

Although the cost effectiveness for this translator sensitivity analysis is reasonable, EPA believes that the costs estimated from this analysis greatly overstate true costs. EPA expects that in cases where a facility may incur substantial economic impacts due to an effluent limit for a metal, there will be strong incentives for the facility or the state to develop site-specific data, which will result in more realistic translators, thus reducing potential economic impacts. EPA believes that the cost estimates developed using the theoretical partitioning approach in the base case are more realistic than the cost estimates from this sensitivity analysis.

Reference: U.S. EPA. 1996. The Metals Translator: Guidance for Calculation of a Total Recoverable Permit Limit From a Dissolved Criteria.

Comment ID: CTR-052-005a
Comment Author: East Bay Dischargers Authority
Document Type: Sewer Authority

State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: E-01i Alternative Cost Analysis
References: Letter CTR-052 incorporates by reference letters CTR-035 and CTR-054
Attachments? Y
CROSS REFERENCES E-01d01

Comment: EPA has greatly understated the potential attainability problems associated with the CTR. This also includes numerous erroneous assumptions made in the EA, such as those described by BADA, CASA/Tri-TAC, and M.Cubed. Larry Walker Associates prepared an Attainability Analysis for the BADA agencies, copy attached. That analysis concluded that BADA agencies will not be able to comply with effluent standards for copper, nickel, pesticides (Aldrin and Heptachlor), and PAHs [Benzo(a)Pyrene, Dibenzo(a,h)Anthracene, and lndeno(1,2,3-cd)Pyrene]. Removals ranging from approximately 20% to nearly 90% will be required. Without major revisions to the CTR, the cost for compliance will be more than $130,000,000 annually. These costs represent only the BADA agencies. Actual costs for all POTW dischargers to San Francisco Bay would be at least an additional 40%, bringing the total annual cost for San Francisco Bay ratepayers to more than $185,000,000 on a strictly flow proportional basis. Since the non-BADA POTWs are significantly smaller, capital costs would actually increase due to loss of economy of scale. Therefore, actual costs for San Francisco Bay could easily exceed $200,000,000 per year - all for the sole purpose of removing between 1-10% of the "Estimated Share of Toxic Loadings Attributable to Point Source."(*1)

(*1)United States Environmental Protection Agency, Office of Water 4301, EPA-820-B-96-001, July 1997, Economic Analysis of the Proposed California Water Quality Toxics Rule, Executive Summary, Page ES-10, Exhibit ES-3. Estimated Share of Toxic Loadings to California Surface Waters Attributable to Point Sources.

Response to: CTR-052-005a

EPA disagrees with the annual compliance cost estimate of $130 million taken from an attainability analysis performed for BADA. This figure represents the higher of two estimates presented in the BADA analysis and corresponds to the use of tertiary lime addition. The lower cost estimate ($68 million) presented in the analysis is based on lime addition to primary tanks. The attainability analysis also uses the costs for the City of Merced from EPA's economic analysis of the proposed CTR as a basis for estimating carbon adsorption costs.

In EPA's revised economic analysis, EPA no longer estimates that the City of Merced will need to add costly granular activated carbon (a cost of $4.2 million annually) to comply with CTR-based limits. EPA's revised analysis indicates that pollution prevention and process optimization (a cost of $594,000 annually) should be sufficient to ensure compliance with CTR-based limits. If EPA's revised cost estimate were used, the BADA cost estimates would be significantly lower because $56 million of both estimates is based on the old Merced cost estimate.

The BADA analysis also provides an estimate of costs for San Jose, one of the sample facilities in EPA's detailed cost analysis. The BADA analysis estimates costs of $7.75 million to $54.07 million for copper reductions (nickel reductions are included in the pollution prevention costs for copper). BADA

estimated a 54% reduction for copper and a 5% reduction for nickel. EPA's analysis contained a 17% required reduction for copper and none for nickel with estimated annual costs of approximately $300,000 for pollution prevention under the high cost scenario.

The differences in load reductions between BADA and EPA's analyses result from the different baselines in the two analyses. BADA uses a 99.9% probability estimate for metals and the maximum observed concentration for organics as its baseline to estimate loading reductions. EPA uses the existing NPDES permit limit or, in the absence of an existing limit, the maximum effluent concentration to estimateloading reductions which are then considered when assigning costs to reach the necessary load reductions.

BADA's analysis assumed pollution prevention costs for reductions of up to 10%, whereas EPA considered pollution prevention an option for reductions of up to 25%. EPA believes that a 25% loading reduction is a more realistic cap for pollution prevention efforts than 10%. EPA's analysis assumes that facilities will try to meet CTR-based limits using the least cost option and, for loading reductions between 10% and 25%, EPA believes that pollution prevention or process optimization are the more likely options over end-of-pipe treatment.

EPA did not assign costs mechanically based on unrealistic guidelines and statistical procedures to predict worst-case effluent quality as a means for determining compliance as was done in the BADA analysis. EPA's cost decision matrix allows for the consideration of the available monitoring and permit data in the context of detection limits, facility processes, and potential irregularities in plant operations which might result in abnormally high data. EPA believes that its methodology is more appropriate for assessing data and estimating costs than that used by BADA.

See also response to CTR-040-039.

Comment ID: CTR-052-009
Comment Author: East Bay Dischargers Authority
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: E-01i Alternative Cost Analysis
References: Letter CTR-052 incorporates by reference letters CTR-035 and CTR-054
Attachments? Y
CROSS REFERENCES

Comment: IMPACTS ON THE AUTHORITY AND ITS MEMBER AGENCIES

Attainability Analysis. The Attainability analysis performed by Larry Walker Associates and Authority staff concludes that the Authority will not be able to comply with effluent limitations for copper, heptachlor, Dibenzo(a,h)Anthracene, and possibly Benzo(a)Anthracene. The following table summarizes compliance issues and solutions.

Pollutant % Removal Required Remedy ---------- ----------
------ Copper 8-9 Pollution Prevention Heptachlor
88 Carbon Adsorption Dibenzo(a,h)Anthracene 30 Carbon Adsorption

Benzo(a)Anthracene 10 Pollution Prevention?

In addition, it is unknown whether future compliance issues would arise for numerous pollutants where the current Method Detection Limits (MDL) are above the anticipated effluent limitations. As noted previously, EPA's assumption that non-detect data equals compliance, and therefore, no costs is not justified. Only POTWs with the most resources have real data or many pesticides and PAHS. Smaller facilities tend to have nothing but non-detect data. Since the Authority and other BADA agencies have detected these pollutants, it is reasonable to assume that other agencies would if they used lower detection limits. Therefore, it is logical to assume that once technology provides lower detection limits, other compliance issues will arise.

Response to: CTR-052-009

See responses to CTR-003-011 and CTR-004-002.

Comment ID: CTR-059-027
Comment Author: Los Angeles County Sanit. Dist
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: E-01i Alternative Cost Analysis
References: Letter CTR-059 incorporates by reference letter CTR-035

Attachments? Y
CROSS REFERENCES E-01g08

Comment: Attainability Analysis

Based on our review of the CTR, at least seven of the Sanitation Districts' Water Reclamation Plants (WRPS) would be affected by the proposed rule. They include the Pomona WRP (15 MGD(*1)), the Whittier Narrows (15 WRP), the San Jose Creek WRP (100 MGD), the Los Coyotes WRP (37.5 MGD), the Long Beach WRP (25 MGD), the Saugus WRP (6.5 MGD) and the Valencia WRP (12.6 MGD). The seven WRPs treat mainly residential and commercial waste, with less than 10% of the influent coming from industrial sources. On an annual basis, over 38% of the reclaimed water is reused for applications including groundwater recharge, landscape irrigation and industrial uses. The remainder is discharged to inland surface waters that are effluent dependent water bodies. The existing and potential designated uses of the receiving waters are diverse and include groundwater recharge, water recreation, warm fresh water habitat, wildlife habitat; commercial and sport fishing; wildlife habitat; rare, threatened or endangered species; and spawning, reproduction, and early development.

A preliminary review of historical monitoring data has shown that plant effluent concentrations of mercury, lindane and four trihalomethanes (bromoform, chlorodibromomethane, chloroform and dichlorobromomethane) frequently exceed the proposed CTR criteria at each of the seven plants. Further evaluations were conducted to determine if loading reductions could be achieved through source control or pollution prevention options and/or treatment.

Source Control and Pollution Prevention Options

The Sanitation Districts' industrial waste pretreatment program was established to ensure that all treatment facilities are able to comply with waste discharge requirements; to protect the public and the environment; and to protect personnel and facilities from potentially harmful industrial wastes. To achieve these objectives, a systemwide pretreatment program was created in 1972. The program presently regulates an extensive and varied industrial base consisting of 3,300 industries, of which 1,335 are Significant Industrial Users (SIUs).

For the CTR constituents of concern, our review has shown that there is very little potential for achieving additional reductions in pollutant loadings through source control or pollution prevention. In the case of mercury, we estimate that only 4% of the influent mercury loadings are from industrial sources. Thus, reductions of the mercury industrial contribution to meet the proposed CTR criteria would be ineffective. The same is true for other POTWs in California. For example, a 1997 study(*2) conducted for the City of Palo Alto demonstrated that the primary sources of mercury to the Palo Alto Regional Water Quality Control Plant were from residents (46%), the water supply (22%), dentists (9%), permitted industries (4%), storm water inflow (3%), employee-related human waste (30%), Stanford University (30%) and other sources (1%). None of the regulated dischargers in the Palo Alto service area used mercury in any manufacturing process. In addition, a study conducted for the Central Contra Costa Sanitary District, which serves an estimated population of 236,200, showed that over 11 pounds per year of mercury were discharged by residential sources including human waste, laundry greywater, thermometers, contact lens solution, household products and food waste. Since residential contributions of mercury are so significant, there are very limited options for control other than educational outreach programs and/or implementation of best management practices, which may have limited effectiveness yet can be costly to develop and implement.

In the case of lindane, pollution prevention is also not feasible. The primary sources of lindane can be traced to consumer products such as flea shampoos for pets and human lice shampoo. Traditional methods of source control such as permitting or the application of best management practices would not be practical or effective. The only viable source control alternative would be a ban on constuner products that use lindane as an active agent. This approach would require the cooperation of federal and state agencies, and the manufacturers of the commercial products. Since these products have a legitimate use for public health protection, some substitute product would need to be provided. Presumably, EPA would need to determine if replacements for lindane were more or less environmentally friendly in terms of overall water quality protection,

Trihalomedwes (THMs) are another example of where source control is not feasible option. Current maximum contaniinant levels allow for chloroform, bromoform, chlorodibromomethane and dichlorobromomethane concentrations up to 100 ug/L in drinking water that is used upstream and discharged to POTWs. The average concentration of THMs in the influent to the Sanitation Districts' water reclamation plants ranges from 2 ug/L to 10 mg/L, well below the drinking water standard, yet above the proposed CTR criteria. We believe that the drinking water supply accounts for almost the entire loading. Since local water supplies are in compliance with drinking water standards, no further source control options are viable.

Based on this assessment, it is apparent that EPA drastically underestimated the costs of the CTR by assuming that in many cases compliance could be achieved through source reduction or pollution prevention. EPA's assertion that 10 to 25 percent reductions in current discharge levels is "insignificant," and would be fully addressed by low-cost waste reduction strategies clearly does not take into consideration the fact that much of the priority pollutant loading to POTWs comes from residential and commercial sources rather than industrial sources.(*4) The former are considerably more diverse and

numerous, and not easily controlled.

Since it is unlikely that source control or pollution prevention measures by themselves will ensure compliance with the CTR, advanced treatment at the Sanitation Districts' seven WRPs would be required. Our preliminary evaluation of viable treatment options indicates that reverse osmosis (RO) would be needed to remove the constituents of concern. Although other forms of advanced treatment such as air stripping and/or carbon adsorption could be used to reduce lindane and trihalomethane concentrations in the treated wastewater to acceptable levels, they would be ineffective for treating mercury. Thus, RO was selected based on its ability to effectively treat mercury, lindane and the trihalomethanes.

The preliminary cost estimate for providing RO treatment at each of the seven WRPs is significant. For exwnple, just the estimated capital investment (including construction, engineering and administrative costs) alone exceeds $470 million collectively for the seven plants.(*5) When amortized over IO years at a 7% interest rate, the capital investment is approximately $68 million per year. After including the estimated annual operation and maintenance costs of approximately $79 million, the total annualized cost for RO treatment at the seven WRPs is approximately $148 million. To put this estimated cost into perspective, the addition of RO treatment would double the single family home service charge rate for the Sanitation Districts' Joint Outfall System (JOS) service area and triple the service charge rate for the Santa Clarita Valley Joint Sewerage System (SCVJSS) service area.(*6)

Further investigation into the amount of wastewater requiring treatment at each facility and the optimal combination of treatment will be performed in an effort to fine tune the cost estimates. It is likely that if RO treatment is added, only a portion of each plant's wastewater flow would be treated and subsequently blended with non-RO treated wastewater to meet the proposed limits. Itis also possible that the optimum advance treatment system may include carbon adsorption, air stripping and RO. For the two WRPs in the SCVJSS, additional costs will be incurred for providing facilities for brine disposal associated with the RO treatment process. Preliminary cost estimates indicate that the capital costs for a brine line would be $45 million, corresponding to an amortized cost of $6.4 million per year over I 0 years at a 7% interest rate. Further work is nee" to refine these and the other estimates. Although the cost estimates presented are somewhat preliminary, they are believed to accurately represent the order of magnitude of cost for the Sanitation Districts to achieve attainment with the proposed CTR criteria.

(*1) Design capacities are indicated for each plant.

(*2) EIP Associates. Mercury Source Identification. August 1997.

(*3) Larry Walker Associates. Residential Metals Study. May 1994.

(*4) U.S. General Accounting Office, "Water Pollution: Nonindustrial Wastewater Pollution Can Be Better Managed" (GAO/RCED-92-40, December 1991), Ch. 2. Treatment Options and Costs

(*5) The RO costs estimates (including capital and operation and maintenance) are based on information obtained from Orange County's Water Factory 21 facility and the 1982 Orange and Los Angeles Counties Water Reuse Study Facilities Plan.

(*6) The treatment figures represent the total population and number of businesses actually served by the seven WRPs. However, it should be noted that the plants service separate treatment systems. Five of the WRPs are part of the Joint Outfall System (JOS), which serves a total of 5 million people and over 3,300 permitted industries. Because the rates for these plants are calculated based on the costs for the entire

system, which includes the Joint Water Pollution Control Plant, increases in rates due to installation of new treatment systems would be home by all users of the JOS. This would, of course, result in lower costs on a sewage unit basis (i.e., per household), although far more people would experience rate increases. The remaining two WRPs provide treatment for the Santa Clarita area, which has a significantly lower population than the JOS. The service charge rates for this area are 57% higher that those of the JOS, so any rate increases would have a disproportionately high impact on those communities.

Response to: CTR-059-027

LACSD dismisses pollution prevention as "costly to develop and implement" in favor of reverse osmosis, a very expensive treatment technology. EPA disagrees that pollution prevention cannot be effective in reducing pollutant loadings from sources other than industrial sources. EPA compiled two documents, Overview of Pollution Prevention Approaches at POTWs and Pollution Prevention at POTWs, a Resource List (available in the record for this rulemaking), which identify successful programs to reduce mercury and lindane through public education and source controls. EPA believes that facilities will employ lower-cost alternatives such as pollution prevention before resorting to expensive additional treatment processes to achieve CTR-based limits, such as reverse osmosis. The trihalomethanes that occur in concentrations above CTR-based criteria but below drinking water standards are disinfection byproducts and may be manageable through process optimization (see response to CTR-003-013).

See responses to CTR-040-029a, CTR-056-018, CTR-004-003, CTR-045-012b, CTR-005-004, CTR-054-033, and 059-001.

Comment ID: CTR-092-021
Comment Author: City of San Jose, California
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: E-01i Alternative Cost Analysis
References: Letter CTR-092 incorporates by reference letter CTR-035
Attachments? Y
CROSS REFERENCES

Comment: Comment #5: Related Issues on Policy Assumptions

(Re: Page I-A-11 of the "Technical Support Document (Appendices)" for the "Analysis of Potential Costs Related to Implementation of the California Water Quality Toxics Rule)

The page cited above presents an Alternative Analysis for the City of San Jose with regard to the discharge quality of the San Jose/Santa Clara POTW effluent compared to that which would be permissible under the CTR for copper. The text states:

"Note that for the exception of outlying values, the average concentrations are low and within the range of the potential CTR limits."

It is precisely those outlying values which cause the San Jose/Santa Clara POTW to be in noncompliance

with its NPDES permit. It seems circular at best for EPA to take specific note of the very factors which create non-compliance with the permit and then assume them away and determine that San Jose/Santa Clara will have no cost of meeting the CTR copper criteria because our costs are really those of complying with the permit standard -- which does not except outlying values.

The cited text further states that "To achieve these reductions, the City is assumed to prefer an aggressive pollution prevention program by targeting specific industries and focusing on commercial dischargers." Note that this has already been undertaken and is insufficient, to allow compliance with expected permit limits.

Questions for EPA on Comment #5:

Q.5-1) As alluded to earlier in the comment regarding application of the analysis to San Jose, we are concerned that the assumptions incorporated in the Model #2 high end scenario understate the actual costs of meeting the CTR. Does EPA support the exclusion of outlying values in the State's calculation of compliance? How would the high end costs change were San Jose/Santa Clara to be considered in compliance, thus incremental costs would analytically accrue to the CTR?

Q.5-2) What evidence brought EPA to the conclusion that the City would "prefer an aggressive ... focusing on commercial dischargers"? How would changing that assumption affect the costs of implementing the CTR?

Response to: CTR-092-021

EPA disagrees with the commenter that the high scenario understates costs. EPA believes that the high scenario actually overstates costs because the high scenario is based on existing permit limits and not effluent data. If effluent data is actually below the existing limit, as it is for San Jose, then compliance costs may be overstated. EPA does not support the exclusion of outlying values in assessing compliance. In fact, EPA considers all data including outliers when it is estimating treatment requirements. However EPA does not include the costs for facilities to come into compliance with existing permit limits because these costs would be incurred even without the CTR. EPA estimated costs for San Jose to move from compliance with existing permit limits to the CTR-based limits, thus the high scenario cost estimate for San Jose would not change if San Jose were considered in compliance.

EPA's revised cost analysis for San Jose no longer mentions an "aggressive pollution prevention program." Under the revised cost analysis, the required reductions are low (17% for copper, 0% for silver, and 2% for chloroform). Thus, EPA assigned pollution prevention for the metals and process optimization for chloroform to ensure compliance with CTR-based limits. EPA's revised cost estimates for San Jose are $296,000 under the high scenario and $57,000 under the low scenario.

See also response to CTR-092-019.

Subject Matter Code: E-01j

Comment ID: CTR-069-002b
Comment Author: CA Bus Prop Ass & Bldg Ind Ass
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: E-01j
References:
Attachments? N
CROSS REFERENCES J-01

Comment: Additionally, CBIA and CBPA are concerned with the findings in the "Economic Analysis of the Proposed California Water Quality Toxics Rule." The acknowledgment by EPA in the economic analysis that "the water quality criteria in this rule may also have an indirect effect on sources not permitted under the NPDES program or not subject to numeric water quality-based effluent Emits is extremely troublesome. Sources not permitted under the NPDES program include nonpoint sources and wet weather discharges such as runoff from farms and urban areas. The economic analysis continues by stating that "any potential effect on these sources is unknown at this time" and that "the State may ask or require these sources to implement best management practices or participate in a comprehensive watershed management approach. Since the economic analysis only focuses on the costs to point source dischargers and not non-point discharges, CBIA and CBPA believe that the potential economic impact of the proposed rule is greater than identified in the economic analysis.

We thank you for your consideration of these comments.

Response to: CTR-069-002b

See response to CTR-021-006b.

Subject Matter Code: E-01l UMRA - Economic Comments

Comment ID: CTR-059-024
Comment Author: Los Angeles County Sanit. Dist
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: E-01l UMRA - Economic Comments
References: Letter CTR-059 incorporates by reference letter CTR-035

Attachments? Y
CROSS REFERENCES E-01g08

Comment: Economic Analysis

The Sanitation Districts commends EPA for preparing an analysis of the economic impacts of the proposed CTR, and for selecting POTWs for half of the case studies. We believe that EPA is correct in thinking that POTWs are likely to experience major impacts as a result of the promulgation of the CTR. However, we believe that this analysis is based on improper assumptions and inaccurate cost estimates, resulting in unconvincing conclusions. Our own attainability and cost analysis indicates that there are indeed fundamental flaws in the cost analysis. A few of the areas of concern are listed below:

* The Economic Analysis presents a very weak analysis of potential benefits, which is based on limited information about ambient water quality conditions. Due to this weakness, combined with the paucity of information in the literature regarding the benefits from marginal improvements in water quality, the benefits analysis does a poor job of evaluating the marginal benefits that would result from the implementation of the CTR.

Response to: CTR-059-024

See response to CTR-003-010.

Subject Matter Code: E-01m Regulatory Relief

Comment ID: CTR-003-007
Comment Author: City of Riverside
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/22/97
Subject Matter Code: E-01m Regulatory Relief
References:
Attachments? N
CROSS REFERENCES

Comment: 7) The economic analysis assumes that where the proposed criteria cannot be economically met, the EPA or State will take some action such as setting new criteria which will result in no cost to the discharger. This is totally inappropriate. First there is no assurance that relief can or will be given. At a minimum, studies will have to be performed to support a proposed action. The cost of such studies can and historically have been significant, ranging from hundreds of thousands to millions of dollars per study. These costs are borne by the effected communities not the EPA or State. Most importantly, the EPAs position that once promulgated, they do not have the resources to modify this rule in a timely manner, is in contradiction to this assumption.

Response to: CTR-003-007

See responses to CTR-032-004 and CTR-060-019.

Note also that, because there is no assurance that specific dischargers will receive regulatory relief, EPA estimated potential compliance costs under the assumption that none of the facilities with significant costs would be allowed alternative regulatory approaches (i.e., the high scenario).

Comment ID: CTR-032-001
Comment Author: Las Gallinas Val. Sanitry Dist
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-01m Regulatory Relief
References: Letter CTR-032 incorporates by reference letter CTR-035
Attachments? N
CROSS REFERENCES

Comment: Las Gallinas Valley Sanitary District (District) submits the following comments on the proposed California Toxics Rule. The District owns and operates a 2.9 mgd advanced secondary municipal wastewater treatment plant that discharges into northern San Francisco Bay. The San Francisco Bay Regional Water Quality Control Board (RWQCB) considers the District a shallow water discharger and does not allow dilution credit in calculating effluent limits. As such, the District faces considerable difficulties in complying with end-of-the-pipe limits for copper, mercury and potentially

several toxic organics that have proposed objectives lower than the currently available analytical detection limits.

The District has had in place for several years, comprehensive source control, pollution prevention and waste minimization programs similar to those of much larger dischargers. While we continue to look for ways to improve our programs, we believe that we have passed the point of diminishing returns and that there is not a significant potential for additional pollutant removal via these mechanisms. The vast majority of copper loading, as in the case of most Bay area shallow water dischargers, is from the potable water supply and corrosion of residential copper plumbing. Plant optimization is being investigated but to date also does not appear to promise more than marginal increases in particulate copper removal, at moderate to significant costs.

Therefore, contrary to the conclusions of the CTR economic analysis, we do not believe that implementation of additional pollution prevention measures and/or plant optimization are viable mechanisms for the District to achieve current or proposed CTR criteria. Regulatory relief, as we have requested during our NPDES permit renewal process, is required.

Response to: CTR-032-001

The Las Gallinas Valley Sanitary District (District) did not provide enough information for EPA to analyze whether pollution control measures and/or process optimization would be viable mechanisms for compliance with CTR-based limits. In particular, the facility would need to provide facility engineering data and existing permit limit information and effluent data for copper and mercury. Such specific data are required to determine how the economic analysis assumptions and methodology (e.g., cost decision matrix) would apply to this particular facility. Despite this, review of the comment letter suggests that the District presently is not in compliance with existing effluent limits for copper and mercury and that regulatory relief already has been requested for these constituents. Information submitted by the Novato Sanitary District, another wastewater treatment plant discharging to northern San Francisco Bay and classified as a shallow water discharger, indicates that the present effluent limits for copper and mercury are 2.9 ug/L and 0.03 ug/L. As indicated in the response to CTR-005-001, these limits are likely to be more stringent than permit limits calculated using CTR criteria and EPA's methodology (e.g., which uses dissolved criteria and metals translators). Although the information submitted by the District is not sufficient to fully evaluate their comments, EPA believes that it is likely that the CTR would not result insignificant costs because existing discharge limits seem to be more stringent than CTR-based limits. Nonetheless, the decision to grant regulatory relief is not a federal responsibility, but a place-based decision that must rest solely in the hands of the local community, elected officials, and other stakeholders that use the water resource affected by such decisions.

See also response to CTR-004-003.

Comment ID: CTR-032-004
Comment Author: Las Gallinas Val. Sanitry Dist
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-01m Regulatory Relief
References: Letter CTR-032 incorporates by reference letter CTR-035

Attachments? N
CROSS REFERENCES

Comment: The use of the $200 and $500 per toxic-pound equivalent of pollutant removed cost thresholds significantly skewed potential costs downward by assuming that when those cost thresholds are reached, regulatory relief options would be pursued successfully. The CTR should include an evaluation of costs assuming regulatory relief is not made available. While the District supports the various regulatory relief options referenced, such as site specific objectives and watershed based phased TMDLs, dischargers have absolutely no guarantees that such regulatory relief will indeed be provided. Furthermore, regulatory relief conveys a negative connotation to these actions; most are more accurately viewed as "sound science", actions that should be taken anyway in pursuit of more technically defensible objectives and limits that will fully protect water quality.

Response to: CTR-032-004

As described in the EA that accompanied the proposed CTR (SAIC and Jones and Stokes Associates, 1997), EPA assumed that regulatory alternatives such as phased total maximum daily loads/water quality assessments, site-specific criteria modifications, standards variances, metals translators, etc., are considered under certain circumstances. Specifically, under the low-end scenario, regulatory alternatives were assumed necessary if the cost for a sample facility exceeded $200 per toxic pounds-equivalent (in practice, regulatory relief mechanisms are available even when costs are below $200 per toxic pounds-equvalent).

EPA assumes that a facility, when faced with the challenge of meeting water quality-based effluent limitations (WQBELs) based on CTR criteria, will select the most cost-effective controls, including regulatory alternatives. In fact, this has been the case in California, where several major POTWs have performed studies in pursuit of regulatory alternatives such as metals translators and site-specific criteria, rather than install costly controls to comply with WQBELs. EPA acknowledges that the actual cost-effectiveness value will vary by facility depending upon many factors, including the characteristics and volume of discharge, the receiving water, etc. However, EPA disagrees that the cost trigger is unrealistic, as these avenues of regulatory relief do exist and are employed to implement the water quality standards program.

Nonetheless, in the high-end estimate developed for the cost analysis accompanying the final CTR, no cost trigger was used and, thus, EPA's high-end cost estimate did not include the use of a regulatory alternative for any sample facility.

Reference: SAIC and Jones and Stokes Associates, Inc. 1997. Analysis of Potential Costs Related to the Implementation of the California Toxics Rule. Prepared for U.S. EPA, Office of Science and Technology and U.S. EPA Region IX, May 5.

Comment ID: CTR-035-008d
Comment Author: Tri-TAC/CASA
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-01m Regulatory Relief

References:
Attachments? N
CROSS REFERENCES E-01g08
E-01e
E-01d
E-01h
E-01c

Comment: Finally, we have serious concerns about the accuracy of the draft Economic Analysis and the estimates of the costs and benefits of the draft CTR (see detailed comments in Attachments I and 2). Our primary concerns related to the cost analysis include 1) that the case studies on which the cost analysis is based do not adequately represent the actual population of POTWs in California; 2) the omission of costs that could be incurred by many sectors that contribute to overall loadings, and, hence, can be expected to have to reduce their loadings (e.g., non-SIU indirect dischargers, municipal and industrial stormwater dischargers, agricultural activities, and other nonpoint sources of CTR-regulated pollutants); 3) the use of numerous assumptions that underestimate costs; and 4) the capricious removal of costs that exceed threshold values by assuming that regulatory relief measures will be granted, despite the lack of any proposed regulatory relief trigger in the proposed regulation.

To illustrate the degree of underestimation of costs for the POTW sector alone, we looked at potential compliance costs for the POTW sector. We found that the potential costs for 23 major POTWS. on an annualized basis, may reach $400 million. We believe that this analysis demonstrates that the potential cost consequences of compliance with effluent limits based on the proposed CTR criteria would easily exceed the $ 100 million annual cost threshold, especially when the costs of all 313 POTWs in the State are estimated. Thus, we believe that EPA must conclude that the proposed CTR could have significant economic impacts on local governments.

Response to: CTR-035-008d

See responses to CTR-021-005c, CTR-032-004, CTR-040-039, CTR-021-006b, CTR-040-037, and CTR-059-018.

Comment ID: CTR-035-047b
Comment Author: Tri-TAC/CASA
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-01m Regulatory Relief
References:
Attachments? N
CROSS REFERENCES E-01b

Comment: pp. 2-24 - 2-32 (U.S. EPA, 1997b) - Cost Triggers for Alternative Regulatory Approaches The use of the $200 and $500 cost thresholds significantly skewed potential costs downwards by assuming that when those cost thresholds are reached, regulatory relief options would be pursued successfully, despite the fact that dischargers have absolutely no guarantees that such options will be successful, In the Preamble, in fact, EPA indicates that options such as variances and site-specific criteria will rarely, if

ever, be granted. In addition, POTW experiences to date in California suggest that it is unlikely that such options will be successful. Thus, the basic premise of the analytic approach used to determine costs needs to be reconsidered. Incidentally, we also believe that the costs attributed to such activities were seriously underestimated. Information we are familiar with suggests that many of the regulatory alternatives EPA examined can cost up to several million dollars (per pollutant) (e.g. TMDLs, UAAs). Thus, we suggest that in the future when calculating the costs for such activities, EPA should use a range where $200,000/pollutant is the low end scenario and $2,000,000/pollutant is the high end scenario.

Response to: CTR-035-047b

See responses to CTR-032-004 and CTR-060-019.

Comment ID: CTR-038-004c
Comment Author: Sonoma County Water Agency
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-01m Regulatory Relief
References:
Attachments? Y
CROSS REFERENCES E-01g08
E-01h
E-01c02

Comment: 4. The economic analysis is seriously flawed. The major flaws include: (1) failing to do an appropriate sampling of dischargers having little or no dilution; (2) assuming in the high-end cost scenario that a 25% reduction could be achieved through source control and an additional 25% achieved through treatment plant optimization without capital improvements; (3) constraining estimates of potential costs through key assumptions, including the assumption that regulatory relief from the rule would be granted if costs were in excess of certain thresholds; and (4) exaggerating estimates of potential benefits by assuming an end (i.e., achievement of the proposed water quality criteria) that will not result from the rule. The result of these flaws is that potential costs are greatly understated and potential benefits are greatly overstated. The District's analysis demonstrates that actual costs may be an order of magnitude greater than EPA's $500/lb threshold and that the benefits are very small.

Response to: CTR-038-004c

See responses to CTR-054-013a, CTR-032-004, CTR-021-008, CTR-040-029a, and CTR-056-018.

Comment ID: CTR-040-008b
Comment Author: County of Sacramento Water Div
Document Type: Storm Water Auth.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-01m Regulatory Relief

References: Letter CTR-040 incorporates by reference letter CTR-027
Attachments? Y
CROSS REFERENCES E-01c02
E-02c

Comment: MAJOR CONCERNS

We do, however, have fundamental concerns with the Rule as it is presently proposed and its supporting economic analysis. We believe the Rule can be modified in a manner that will be responsive to our concerns while at the same time being consistent with applicable Federal law and regulations. Our major concerns are presented here and are followed by our recommended modifications.

II. Concern: The economic analysis upon which the Rule is based is seriously flawed.

* Estimates of potential costs are severely constrained due to certain assumptions including the assumption that regulatory relief from the Rule will be granted if costs are in excess of certain thresholds.

* Estimates of potential benefits are exaggerated by assuming, that the proposed water quality criteria will actually be achieved in receiving water bodies. This will not result from the implementation of the Rule because the Rule is only addressing permitted discharges to the receiving water bodies.

* The result of these flaws is that potential costs are greatly understated and potential benefits are greatly overstated.

Response to: CTR-040-008b

See responses to CTR-054-013a, CTR-032-004, and CTR-056-018.

Comment ID: CTR-040-031
Comment Author: County of Sacramento Water Div
Document Type: Storm Water Auth.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-01m Regulatory Relief
References: Letter CTR-040 incorporates by reference letter CTR-027
Attachments? Y
CROSS REFERENCES

Comment: Although EPA goes to great length to label its cost analysis as "conservative" the analysis is anything but conservative:

* It is not conservative to assume that permit authorities will accept metals translators when there is no history of such acceptance in California.

Response to: CTR-040-031

EPA disagrees. The State has used metals translators in the Santa Ana River in a case in which it

adopted site-specific dissolved criteria for metals. Since the CTR would establish dissolved metals criteria on a statewide basis, EPA expects that the State will accept appropriate translator studies to convert from dissolved criteria to total recoverable permit limits. The State indicated that it would accept the use of defensible translator studies in its Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California (September 11, 1997, p. 10).

Comment ID: CTR-040-036
Comment Author: County of Sacramento Water Div
Document Type: Storm Water Auth.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-01m Regulatory Relief
References: Letter CTR-040 incorporates by reference letter CTR-027
Attachments? Y
CROSS REFERENCES

Comment: EPA's assumption that dischargers would pursue source control, treatment plant optimization, and regulatory relief prior to constructing end-of-pipe facilities conflicts with the 5-year maximum compliance schedule allowed by the CTR. In most cases (e.g., in the Merced POTW case study) it would take 5 years to plan, design, obtain approvals, arrange financing, and construct end-of-pipe facilities. A discharger could not pursue such non-structural controls and still be assured to meeting a 5-year compliance schedule.

Response to: CTR-040-036

EPA's compliance schedule in the final rule would allow the State flexibility in establishing compliance schedules for dischargers. EPA amended the final CTR to include a provision whereupon the compliance schedule provision will sunset in five years or when the State adopts its own compliance schedule provision in the State Implementation Policy and, if EPA approves the schedule, EPA will then act to stay the EPA compliance schedule provision for the CTR. This change to the CTR will give the State discretion to develop an appropriate compliance schedule policy for California.

Comment ID: CTR-040-041
Comment Author: County of Sacramento Water Div
Document Type: Storm Water Auth.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-01m Regulatory Relief
References: Letter CTR-040 incorporates by reference letter CTR-027
Attachments? Y
CROSS REFERENCES

Comment: Many of the types of regulatory relief identified as possible in the analysis (and in the Preamble to the CTR) do not really constitute relief and/or are not available to dischargers under the

CTR (see Attachment B-1).

Response to: CTR-040-041

See response to CTR-032-004.

Comment ID: CTR-041-010b
Comment Author: Sacramento Reg Cnty Sanit Dist
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-01m Regulatory Relief
References:
Attachments? N
CROSS REFERENCES E-01n
E-01e
E-01g

Comment: 5. Concerns Regarding Economic Analysis

The District also has several significant concerns with the Economic Analysis that was performed for the proposed rule. Concerns about the cost estimates made for both the District and the state are presented here. (See attached Review of EPA's Economic Analysis of the Proposed California Water Quality Toxics Rule.) Overall, the District believes that problems with the Economic Analysis are serious enough that is should be redone. As stated above in our analysis of assumed costs at the SRWTP, the use of questionable data without qualification combined with unsubstantiated assumptions regarding costs to achieve compliance resulted in a gross underestimate in the cost-effectiveness ratio. The District's first concern is that if the types of problems found in our Case Study are widespread in other studies, the complete analysis is suspect.

In addition to the analysis of the District's facilities, there are several other points which have been used by EPA to lead to a potentially serious understatement of actual costs. The key assumptions involved are that: 1) no costs would occur if either no monitoring data presently exists or if that data is below analytical detection levels; 2) no treatment costs would occur whenever EPA's initial estimates showed high costs, due to successful regulatory relief; 3) no costs are included for nonpoint sources such as municipal stormwater management systems; and 4) no costs are included for indirect dischargers to the District's system that are not large enough to be considered a Significant Industrial User (SIU).

Regarding the first assumption, the District has found that there is pressure from many sides, including the Safe Drinking Water Act, to both increase the number of constituents being monitored and to lower detection levels to meet numeric criteria set by EPA and the state. To assume that monitoring of these new constituents will not lead to any treatment cost increases is simply unrealistic. Similarly, the second assumption about absolute success in every pursuit of regulatory relief is also overly optimistic. There are no guarantees that pursuit of regulatory relief will be successful in any situation, and EPA indicates elsewhere in the preamble that options such as variances and site-specific criteria will rarely, if ever, be granted.

The third and fourth key assumptions ignore present dominating trends and facts, i.e. that. prevention and control of pollutants at their sources, including very small indirect dischargers, storm runoff, and other nonpoint sources are now the major focus of EPA's wastewater programs nationally. While we agree that these management steps should be taken, there will be significant costs attached to the implementation of these steps that cannot be ignored.

Combined with concerns the District has heard from other sources such as the California Association of Sanitation Agencies (CASA), it appears that EPA has failed to make "a reasoned determination that the benefits of the intended regulation justify its costs." Therefore the District believes that the Agency is obligated to redo the draft Economic Analysis.

Response to: CTR-041-010b

See responses to CTR-032-004, CTR-021-006b, CTR-040-037, and CTR-003-011.

Comment ID: CTR-041-027
Comment Author: Sacramento Reg Cnty Sanit Dist
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-01m Regulatory Relief
References:
Attachments? N
CROSS REFERENCES

Comment: Although EPA goes to great length to label its cost analysis as "conservative" the analysis is anything but conservative:

* It is not conservative to assume that permit authorities will accept metals translators when there is no history of such acceptance in California.

Response to: CTR-041-027

See response to CTR-040-031.

Comment ID: CTR-041-032
Comment Author: Sacramento Reg Cnty Sanit Dist
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-01m Regulatory Relief
References:
Attachments? N
CROSS REFERENCES

Comment: EPA's assumption that dischargers would pursue source control, treatment plant optimization, and regulatory relief prior to constructing end-of-pipe facilities conflicts with the 5-year maximum compliance schedule allowed by the CTR. In most cases (e.g., in the Merced POTW case study) it would take 5 years to plan, design, obtain approvals, arrange financing, and construct end-of-pipe facilities. A discharger could not pursue such non-structural controls and still be assured to meeting a 5-year compliance schedule.

Response to: CTR-041-032

See responses to CTR-040-036 and CTR-032-004.

Comment ID: CTR-041-037
Comment Author: Sacramento Reg Cnty Sanit Dist
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-01m Regulatory Relief
References:
Attachments? N
CROSS REFERENCES

Comment: Many of the types of regulatory relief identified as possible in the analysis (and in the Preamble to the CTR) do not really constitute relief and/or are not available to dischargers under the CTR (see Attachment 3-1).

Response to: CTR-041-037

See responses to CTR-032-004 and CTR-060-019.

Comment ID: CTR-043-004c
Comment Author: City of Vacaville
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: E-01m Regulatory Relief
References:
Attachments? Y
CROSS REFERENCES E-01g
E-01h
E-02c
E-01c02

Comment: 4. EPA's Economic Analysis is seriously flawed. The major flaws include:

(1) failing to do an appropriate sampling of small dischargers having little or no dilution;

(2) assuming in the high-end cost scenario that a 25% reduction could be achieved through source control and an additional 25% achieved through treatment plant optimization without capital improvements;

(3) constraining estimates of potential costs through key assumptions, including the assumption that regulatory relief from the rule would be granted if costs were in excess of certain thresholds; and

(4) exaggerating estimates of potential benefits by assuming an end (i.e., achievement of the proposed water quality criteria) that will not result from the rule.

The result of these flaws is that potential costs are greatly understated and potential benefits are greatly overstated. Moreover, the flawed economic analysis has lead to the erroneous conclusion that the CTR is not a "significant regulatory action" or major rule subject to Presidential Executive Order 12866 and the Unfunded Mandates Reform Act or a rule that affects small entities protected under the Regulatory Flexibility Act.

Response to: CTR-043-004c

See responses to CTR-054-013a, CTR-021-005c, CTR-032-004, CTR-021-008, CTR-040-029a, and CTR-056-018.

Comment ID: CTR-044-005c
Comment Author: City of Woodland
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: E-01m Regulatory Relief
References:
Attachments? Y
CROSS REFERENCES E-01g08
E-01h01
E-02c
E-01c02
R
S

Comment: We have reviewed the proposed CTR and offer the following comments:

4. EPA's Economic Analysis is seriously flawed. The major flaws include:

(1) failing to do an appropriate sampling of small dischargers having little or no dilution; (2) assuming in the high-end cost scenario that a 25% reduction could be achieved through source control and an additional 25% achieved through treatment plant optimization without capital improvements; (3) constraining estimates of potential costs through key assumptions, including the assumption that regulatory relief from the rule would be granted if costs were in excess of certain thresholds; and (4) exaggerating estimates of potential benefits by assuming an end (i.e., achievement of the proposed water

quality criteria) that will not result from the rule. Additional concerns with the economic analysis are presented in Exhibit F. The result of these flaws is that potential costs are greatly understated and potential benefits are greatly overstated. Moreover, the flawed economic analysis has lead to the erroneous conclusion that the CTR is not a "significant regulatory action" or major rule subject to Presidential Executive Order 12866 and the Unfunded Mandates Reform Act or a rule that affects small entities protected under the Regulatory Flexibility Act. The City, for example, is a small community having a population of under 50,000 and would be greatly impacted by the proposed rule.

Response to: CTR-044-005c

See responses to CTR-054-013a, CTR-021-005c, CTR-032-004, CTR-021-008, CTR-040-029a, and CTR-056-018.

Comment ID: CTR-044-022
Comment Author: City of Woodland
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: E-01m Regulatory Relief
References:
Attachments? N
CROSS REFERENCES

Comment: Although EPA goes to great length to label its cost analysis as "conservative" the analysis is anything but conservative:

* It is not conservative to assume that permit authorities will accept metals translators when there is no history of such acceptance in California.

Response to: CTR-044-022

See response to CTR-040-031.

Comment ID: CTR-044-027
Comment Author: City of Woodland
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: E-01m Regulatory Relief
References:
Attachments? N
CROSS REFERENCES

Comment: EPA's assumption that dischargers would pursue source control, treatment plant optimization,

and regulatory relief prior to constructing end-of-pipe facilities conflicts with the 5-year maximum compliance schedule allowed by the CTR. In most cases (e.g., in the Merced POTW case study) it would take 5 years to plan, design, obtain approvals, arrange financing, and construct end-of-pipe facilities. A discharger could not pursue such non-structural controls and still be assured to meeting a 5-year compliance schedule.

Response to: CTR-044-027

See response to CTR-040-036.

Comment ID: CTR-044-032
Comment Author: City of Woodland
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: E-01m Regulatory Relief
References:
Attachments? N
CROSS REFERENCES

Comment: Many of the types of regulatory relief identified as possible in the analysis (and in the Preamble to the CTR) do not really constitute relief and/or are not available to dischargers under the CTR (see Attachment 3-1).

Response to: CTR-044-032

See responses to CTR-032-004 and CTR-060-019.

Comment ID: CTR-045-009c
Comment Author: Sausalito-Marin Sanitary Dist.
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/24/97
Subject Matter Code: E-01m Regulatory Relief
References:
Attachments? Y
CROSS REFERENCES E-01g08
E-01h

Comment: The draft Economic Analysis has serious flaws. It underestimates the costs of the draft CTR and overestimates the benefits. For the cost analysis, EPA should reevaluate the representativeness of the sample used; the omission of impacts on many sectors that contribute to loadings, and hence, can be expected to have to reduce their loadings (e.g., small indirect dischargers, municipal and industrial stormwater dischargers, agricultural activities, and other nonpoint sources); the incorporation of

numerous assumptions that underestimate costs; and the assumption to artificially remove costs that exceed threshold values by assuming that regulatory relief measures will be granted, despite the fact that they are not automatically granted through triggers included as part of the proposed regulation.

Response to: CTR-045-009c

See responses to CTR-032-004, CTR-056-018, CTR-021-006b, and CTR-059-018.

Comment ID: CTR-049-006c
Comment Author: Watereuse Assoc. of California
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 09/24/97
Subject Matter Code: E-01m Regulatory Relief
References:
Attachments? N
CROSS REFERENCES E-01g08
E-01h

Comment: With respect to other criteria proposed for adoption in the draft CTR, we recommend that USEPA:

4. Review and correct existing flaws in the current "Economic Analysis."

With respect to the Economic Analysis conducted by USEPA, we are concerned that it underestimates the cost of the proposed CTR rule while overestimating its benefits. We suggest that USEPA re-evaluate (1) the representativeness of the sample used; (2) the omission of impacts on many sectors that contribute to loadings; (3) the incorporation of a variety of assumptions that underestimate costs; and (4) the assumption to artificially remove costs that exceed threshold values by incorrectly assuming that regulatory relief measures will be granted. For the benefits analysis, USEPA should utilize more California-specific and recent information. A further problem with the analysis relates to the establishment of criteria that are below analytical detection. Lacking credible data, it was not possible to conduct cost-benefit analyses or determine that any set of control measures would or could lead to compliance. This fundamental inability to utilize established rulemaking procedures requires, in our opinion, further work prior to the promulgation of the criteria.

Response to: CTR-049-006c

See responses CTR- 045-011, CTR-032-004, CTR-056-018, CTR-021-006b, CTR-059-018, and CTR-052-014.

Comment ID: CTR-054-013c
Comment Author: Bay Area Dischargers Assoc.
Document Type: Sewer Authority
State of Origin: CA
Represented Org:

Document Date: 09/25/97
Subject Matter Code: E-01m Regulatory Relief
References:
Attachments? Y
CROSS REFERENCES E-01g03
E-01q01
E-02l

Comment: The economic analysis is seriously flawed. The major flaws include: (1) failing to do an appropriate sampling of dischargers; (2) assuming in the high-end cost scenario that a 25% reduction could be achieved through source control and an additional 25% achieved through treatment plant optimization without capital improvements; (3) constraining estimates of potential costs through key assumptions, including the assumption that regulatory relief from the rule would be granted if costs were in excess of certain thresholds; and (4) exaggerating estimates of potential benefits by assuming an end (i.e., achievement of the proposed water quality criteria) that will not result from the rule (see Attachment 3). The result of these flaws is that potential costs are greatly understated and potential benefits are greatly overstated. BADA's analysis shows that its member agencies alone could be faced with costs in excess of $100 million per year to achieve effluent limits based on the copper, PAH, heptachlor and aldrin criteria. BADA's analysis also indicates that the benefits associated with this expenditure will be difficult to measure. Copper loadings will be reduced by 1% and the level of compliance for PAH's and heptachlor will remain unchanged at its present high level. Certainly these benefits will not measurably improve the fishing experience or measure the number of fisherman in the Bay, significantly reduce the cancer cases, or improve property values or other nonuse benefits, as estimated in EPA's economic analysis. A further consequence of the flawed economic analysis is the conclusion that the CTR is not a major rule (i.e., one which will result in excess of $100 million per year expenditure) subject to Presidential Executive order 12866 and the Unfunded Mandates Reform Act or a rule that affects small entities protected under the Regulatory Reform Act. BADA agencies provide service to a number of small communities with populations under 50,000 people that could be greatly impacted by the proposed rule.

Response to: CTR-054-013c

See responses to CTR-054-013a, CTR-021-005c, CTR-032-004, CTR-021-008, CTR-040-029a, CTR-056-018, and CTR-059-018.

Comment ID: CTR-054-026
Comment Author: Bay Area Dischargers Associati
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-01m Regulatory Relief
References:
Attachments? N
CROSS REFERENCES

Comment: Although EPA goes to great length to label its cost analysis as "conservative" the analysis is anything but conservative:

* It is not conservative to assume that permit authorities will accept metals translators when there is no history of such acceptance in California.

Response to: CTR-054-026

See response to CTR-040-031.

Comment ID: CTR-054-031
Comment Author: Bay Area Dischargers Associati
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-01m Regulatory Relief
References:
Attachments? N
CROSS REFERENCES

Comment: EPA's assumption that dischargers would pursue source control, treatment plant optimization, and regulatory relief prior to constructing end-of-pipe facilities conflicts with the 5-year maximum compliance schedule allowed by the CTR. In most cases (e.g., in the Merced POTW case study) it would take 5 years to plan, design, obtain approvals, arrange financing, and construct end-of-pipe facilities. A discharger could not pursue such non-structural controls and still be assured to meeting a 5-year compliance schedule.

Response to: CTR-054-031

See response to CTR-040-036.

Comment ID: CTR-054-036
Comment Author: Bay Area Dischargers Associati
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-01m Regulatory Relief
References:
Attachments? N
CROSS REFERENCES

Comment: Many of the types of regulatory relief identified as possible in the analysis (and in the Preamble to the CTR) do not really constitute relief and/or are not available to dischargers under the CTR (see Attachment 3-1).

Response to: CTR-054-036

See response to CTR-032-004.

Comment ID: CTR-086-006
Comment Author: EOA, Inc.
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org: California Dent
Document Date: 09/26/97
Subject Matter Code: E-01m Regulatory Relief
References: Letter CTR-086 incorporates by reference letter CTR-035
Attachments? N
CROSS REFERENCES

Comment: The use of the $200 and $500 per toxic pound-equivalent cost thresholds significantly skewed potential costs downward by assuming that when those cost thresholds are reached regulatory relief options would be pursued successfully. The CTR should include an evaluation of costs assuming regulatory relief is not made available. While CDA supports the various regulatory relief options referenced, such as site specific objectives and watershed based phased TMDLS, dischargers, and by inference indirect dischargers, have absolutely no guarantees that such regulatory relief will indeed be provided. Furthermore, regulatory relief conveys a negative connotation to these actions; most are more accurately viewed as "sound science", actions that should be taken anyway in pursuit of more technically defensible objectives and limits that will fully protect water quality.

Response to: CTR-086-006

See response to CTR-032-004.

Subject Matter Code: E-01m02 Success in Reg. Relief

Comment ID: CTR-090-003
Comment Author: C&C of SF, Public Utl. Commis.
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-01m02 Success in Reg. Relief
References: Letter CTR-090 incorporates by reference letters CTR-035 and CTR-054
Attachments? Y
CROSS REFERENCES

Comment: Major Concerns About the Proposed Criteria and Rule

1. The Proposal is Based on Poor Data and Will Not Result in Better Water Quality for California. We stated that our own attainability analysis and that of BADA show that San Francisco,) will be impacted by this rule. Unfortunately, due to the short time for review, the poor quality of data and basis for statements and assumptions in the proposal and the problem with detection limits we cannot specifically say what will be the cost to Sari Francisco. One analysis tell us it could be $2.3 million per year annualized costs and another analysis tells us it could be much more. We strongly recommend major revision to the proposal and the economic analysis before final promulgation for the following reasons:

* The costs section of the economic analysis is extremely flawed; if this rule is adopted and the State Implementation Policy does not allow for regulatory relief the cost of compliance to point sources dischargers will be orders of magnitude more than the amount stated in the proposed rule.

Response to: CTR-090-003

See responses to CTR-032-004 and CTR-056-018.

Subject Matter Code: E-01m03 Cost of WERs

Comment ID: CTR-060-019
Comment Author: San Diego Gas and Electric
Document Type: Electric Utility
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: E-01m03 Cost of WERs
References:
Attachments? N
CROSS REFERENCES

Comment: PROVISIONS SDG&E DOES NOT SUPPORT

As described in the following comments SDG&E does not support the following provisions:

Economic Analysis is deficient

Additionally, the metals criteria are expressed as the dissolved concentration of the metal andhave been derived from toxicity tests conducted in laboratory water that is relatively pure. Many bays and estuaries, especially back bays and estuaries contain significant concentrations of suspended organic matter. Ambient levels of organic matter can bind much of the bioavailable portion of the metal and reduce the overall toxicity due to the metal. To account for this effect, the rule allows for the use of water effects ratios (WERs) (in addition to translators) in calculating water quality based effluent limits. This may be a viable option for some dischargers to achieve compliance with the proposed criteria. However, the cost to establish a WER could be significant. EPRI(*16) has estimated that the typical costs for a basic WER study for an acute metal criterion could range from $20,000 to $50,000. To develop a WER for a chronic criterion or to address spatial or seasonal variability can substantially increase the costs. It is not clear whether the economic analysis reflects the cost to the regulated community of having to develop WERs that will effectively increase the water quality based effluent limits. This cost should be added into the economic analysis.

(*16) Implementation Manual for the Water-Effect Ratio (WER)", EPRI Report No. TR-107144, November, 1996, page 3-5.

Response to: CTR-060-019

Based upon estimates provided in SAIC (1995), the Assessment of Compliance Costs Resulting from Implementation of the Final Great Lakes Water Quality Guidance, the typical cost to facilities pursuing alternative regulatory approaches to CTR-based WQBELs is $200,000 per pollutant. The $200,000 per pollutant cost represents the mid-range of costs for a number of alternative regulatory approaches and was usd for the economic analysis of the CTR. EPA Regional Offices and States estimate that alternative approaches range from $20,000 for criteria modifications to $1,000,000 per pollutant for phased-TMDLs. These costs reflect costs associated with additional monitoring, performing special studies, and other activities, to support requests from facilities for relief from the CTR-based WQBEL. EPA estimates that the cost of calculating water-effects ratio (WER) is comparable to this typical cost.

Reference: SAIC. 1995. Assessment of Compliance Costs Resulting from Implementation of the Final Great Lakes Water Quality Guidance. Prepared for U.S. EPA, Office of Science and Technology, March 13.

Subject Matter Code: E-01n Detection Limits

Comment ID: CTR-003-008
Comment Author: City of Riverside
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/22/97
Subject Matter Code: E-01n Detection Limits
References:
Attachments? N
CROSS REFERENCES

Comment: 8) USEPA has assumed in both it's low and high end cost scenario that if monitoring data for potential chemical constituents were reported as below detection limits then there would be no cost of compliance for these constituents. The City of Riverside has 35 constituents from the list of proposed criteria, applicable to its receiving water use designations, whose limits and effluent concentrations are below analytical detection levels in our matrix. The potential cost for the City to remove even one of these constituents , should it be detected as technology improves, could exceed the projected costs of this rule for the entire state. Given that this is the case for most if not all POTWs in the State, it does not seem appropriate to implement standards for which the ability to comply is not and cannot be known. The constituents of concern at our plant are: cadmium, chromium (VI), copper, lead, mercury, selenium, silver, thallium, asbestos, dioxin, acrylonitrile, benzidine, benzo(a) anthracene, benzo(a) pyrene, benzo(b) fluoranthene, benzo (k) fluorenthene, chrysene, dibenzo (a,h) anthracene, (3,3) dichlorobenzidine, 1,2-diphenylhydrazine, hexachlorobenzene, indeno (1,2,3-cd) pyrene, aldrin, alpha-BHC, chlordane, 4,4'-DDT, 4,4'-DDE, 4,4'-DDD, dieldrin, endrin, heptachlor, heptachlor epoxide, PCBS, toxaphene. The compliance status of several other constituents would be in question if the human health criteria for consumption of "Water and Organisms" is used versus organisms only. Given the extremely low levels at which many of the criteria are set and unless the EPA is proposing a nation wide product ban, it is quite likely that one or more of these chemicals will show up in a POTW effluent at levels above the standards. The EPA should either remove from consideration criteria for which compliance cannot be determined or assume that it is being exceeded for the purpose of the economic analysis.

Response to: CTR-003-008

See responses to CTR-003-011 and CTR-004-002.

Comment ID: CTR-004-002
Comment Author: South Bayside System Authority
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/24/97
Subject Matter Code: E-01n Detection Limits
References:
Attachments? N
CROSS REFERENCES

Comment: SBSA has a comprehensive effluent monitoring program for metals and organics. Since the inception of the SBSA Pretreatment Program in 1975 and the operation of advanced treatment technology in 1982 there has been a significant reduction in influent and effluent pollutant loading. The more recent Pollution Prevention Program has also contributed to reduced pollutant loading. Even with the substantial reductions achieved in the past there will be severe attainability problems resulting specifically from the adoption of the proposed CTR criteria. Monitoring data from January 1996 through August 1997 shows noncompliance with six (6) metals; copper, lead, mercury, nickel, silver, and zinc. For samples from 1993 to the present there are nine (9) organics and twenty-two (22) pesticides that have proposed objectives below detection limits. There is no mechanism to assess the ability or cost of achieving compliance with these limits.

Response to: CTR-004-002

In recent years, many States have promulgated water quality criteria for various toxic pollutants that are more restrictive than the level of analytical detection. Implementation of these existing water quality criteria by many States do take into account the ability to detect the pollutant in the waste stream. For example, some States determine compliance with limits established below method detection limits (MDL) based on the minimum level (ML), where available. When a promulgated ML is not available, compliance with that limit may be based on the MDL or the practicable quantitation level (PQL).

To ensure that its cost estimates were conservative (i.e., erring on the side of higher costs), EPA used the MDL as the compliance level. Although EPA based compliance determination on the MDL, the Agency acknowledges that estimating treatment costs for WQBELs below the MDL is speculative and likely unrealistic.

However, EPA does believe that aggressive pollutant prevention/waste minimization practices, combined with conventional end-of-pipe treatment, can effectively reduce all detectable amounts of particular pollutants of concern from the discharge, resulting in compliance with WQBELs below detection levels. EPA agrees that some facilities will want to ensure compliance with WQBELs below detection levels through the use of additional or enhanced end-of-pipe treatment. EPA believes that appropriate costswere included in the cost analysis by including costs for both pollution prevention/waste minimization techniques (such as material substitution, process modification, and/or recycling, reuse, or treatment of internal waste streams) and end-of-pipe treatment. Where the pollutant is present at detectable levels, and where the facility implements control measures directed specifically at eliminating these pollutants, the controls will likely result in reduction of the pollutant to below the level of detection. Because there is no evidence that reductions cannot reach a level in compliance with WQBELs, EPA has no reason to believe that its assumption of compliance is not reasonable. EPA compiled two documents, Overview of Pollution Prevention Approaches at POTWs and Pollution Prevention at POTWs, a Resource List (available in the record for this rulemaking), which identify successful programs to reduce mercury and lindane through public education and source controls. See also response to CTR-034-010b.

Comment ID: CTR-021-013
Comment Author: LeBoeuf, Lamb, Green & MacRae
Document Type: Local Government
State of Origin: CA
Represented Org: City of Sunnyvale

Document Date: 09/25/97
Subject Matter Code: E-01n Detection Limits
References: Letter CTR-021 incorporates by reference letter CTR-035
Attachments? Y
CROSS REFERENCES

Comment: The CTR Analysis of POTW Compliance with Organics is Based on the Flawed Assumption that Analytical Detection Limits Will Not Improve and thus POTW Plants that Currently Meet the Proposed Organic Effluent because Effluent Monitoring Results are Less than the Detection Limit will Meet the Limits into the Future

A significant number of organic compounds contained in the CTR have detection limits greater than the proposed criteria. For example, endrin and pentachlorophenol are the two cited in the Sunnyvale economic analysis. A significant and potentially costly incorrect assumption of the "Analysis of Potential Costs ... " document was that if all values were reported as below the detection limit, there would be no costs attributable to implementing the CTR. This dismisses a very likely scenario, namely that analytical detection limits will improve over time and that some of these organics may then be detected in the effluent.

If this occurs, POTWs will most likely be facing installation of Granular Activated Carbon (GAC) for low level organics removal, as was recommended for the City of Merced in the CTR Economic Analysis appendix. There are no assurances that the proposed pollution prevention and waste minimization measures would be effective in reducing levels to the extent required. Reverse osmosis (RO) is not extremely effective at removing many of these organics to these low levels so even if Sunnyvale had installed RO for trace metals removal, it would still be facing use of GAC for organics compliance. This would cost approximately $12 million/year for the 29.5 mgd Sunnyvale plant based on the over $4 million/year estimate for the 10 mgd Merced plant.

Response to: CTR-021-013

See responses to CTR-004-003, CTR-003-011, and CTR-004-002.

Comment ID: CTR-033-003b
Comment Author: San Bernardino Muncpl Wtr Dept
Document Type: Water District
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-01n Detection Limits
References: Letter CTR-033 incorporates by reference letter CTR-020
Attachments? Y
CROSS REFERENCES C-28

Comment: Experiments to determine whether a chemical is carcinogenic are performed (on animals) with high concentrations to produce statistically significant results within the time frame of the experiment. The numbers are then extrapolated to determine an estimated "safe" concentration for human populations. All of the factors in the extrapolation process use conservative assumptions (one in a million risk, bioaccumulation potential, carcinogenic potential, etc.) which builds in and multiplies safety

factors. For 39 of the constituents in the CTR, the extrapolated criteria levels are below current levels of detection.

The EPA recognizes this as the proposed rule states: "EPA is aware that the criteria proposed today for some of the priority toxic pollutants are at concentrations less than EPA's current analytical detection limits. Analytical detection limits have never been an acceptable basis for setting water quality criteria since they are not related to actual environmental impacts. The environmental impacts of a pollutant are based on a scientific determination, not a measuring technique that is subject to change. Setting the criteria at levels that reflect adequate protection tends to be a forcing mechanism to improve analytical detection methods. See 1985 Guidelines p. 21. As the methods improve, limits closer to the actual criteria necessary to protect aquatic life and human health become measurable. The Agency does not believe it is appropriate to propose or promulgate criteria that are not sufficiently protective." The rule goes on to add, "the use of detection limits are appropriate for determining compliance with National Pollutant Discharge Elimination System (NPDES) permit limits."

Since the criteria are established on high dosage results that cannot be substantiated at low levels due to statistical significance and inability to see beyond detection limits, the values are predictions. Questions that come to mind are, what would this procedure determine for fat-soluble vitamins A, D and K? In high doses, these vitamins are harmful, though in low dosages, valuable. For constituents below detection, these determinations cannot be scientifically verified by analyses, only mathematically generated based on worst case assumptions. Although caution is warranted when establishing criteria, future unforeseen levels and effects cannot be predicted.

While the EPA believes that compliance determinations are based on detection limits, to assume no cost in the economic analysis for values that are below detection is not a valid assumption. As noted above, the detection limits will be forced to lower levels, and therefore become moving compliance targets without additional economic review should detection's begin to occur.

In summary, the detection levels should serve as the criteria with a "<" designator. The criteria for the affected constituents should be reviewed on a regular basis to reflect current approved analytical techniques, with lower levels promulgated after appropriate economic evaluations.

Response to: CTR-033-003b

See responses to CTR-004-002 and CTR-005-009.

Comment ID: CTR-038-009b
Comment Author: Sonoma County Water Agency
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-01n Detection Limits
References:
Attachments? Y
CROSS REFERENCES C-28
R
S

Comment: 8. EPA should not adopt criteria for any pollutant where the method detection limit exceeds the objective and there is insufficient detectable, reliable data to determine if the pollutant could reasonably be expected to interfere with designated uses. The proposed rule includes criteria for a number of constituents where there is insufficient data to determine whether the discharge of such pollutants could reasonably be expected to interfere with the designated uses. EPA has chosen to promulgate criteria for these constituents even though section 303 (c)(2)(B) of the Clean Water Act requires States to adopt numeric criteria only for constituents "...the discharge or presence of which in the affected waters could reasonably be expected to interfere with those designated uses adopted by the State, as necessary to support such designated uses." Clearly, this "play-it-safe" approach goes beyond the requirements of the Clean Water Act and is therefore unnecessary. By taking this approach, however, EPA is unable to fulfill its duty (under Presidential Order 12866, the Unfunded Mandates Reform Act, and the Regulatory Flexibility Act) to assess the costs, benefits, and impacts of the rule on local government and small entities. While this may be the conservative approach for EPA, it places dischargers throughout the State at risk. As analytical detection limits improve, dischargers may find they are unable to achieve the criteria without costly end-of-pipe controls. But, by then, it will be too late for EPA to evaluate the costs and benefits of the criteria and alternative criteria. For these reasons, EPA must not adopt criteria for those constituents. If EPA does adopt criteria for those constituents, EPA must evaluate the costs and benefits of the criteria, as well as alternative criteria, using worst case assumptions (i.e., assume that discharge levels and ambient levels are at the detection limits). With respect to the District's discharge and Schell Slough and Second Napa Slough, the criteria in this category include, but are not necessarily limited to, the following : benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoroanthene, benzo(k)fluoroanthene, chrysene, dibenzo(a,h)anthracene, aldrin, 4,4'-DDD, 4,4'-DDE, dieldrin, endosulfan I, endosulfan II, endosulfan sulfate, heptachlor, heptachlor epoxide, toxaphene, PCB-1016, OCB-1221, PCB-1232, PCB-1242, PCB-1248, PCB-1254, PCB-1260, and hexachlorobenzene (see Table 3).

Response to: CTR-038-009b

See responses to CTR-021-005c and CTR-004-002.

Comment ID: CTR-041-008b
Comment Author: Sacramento Reg Cnty Sanit Dist
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-01n Detection Limits
References:
Attachments? N
CROSS REFERENCES C-28

Comment: 3. Recommend Against Adopting Criteria with Insufficient Detectable Data

The District strongly recommends that the EPA not adopt criteria where the method detection limit exceeds the objective and there is insufficient detectable, reliable data to determine if the pollutant could reasonably be expected to interfere with designated uses. The proposed rule includes criteria for a number of constituents where there is insufficient data to determine whether the discharge of such

pollutants could reasonably be expected to interfere with the designated uses. EPA has chosen to promulgate criteria for these constituents even though section 303 c(2)(B) of the Clean Water Act requires States to adopt numeric criteria only for constituents "...the discharge or presence of which in the affected waters could reasonably be expected to interfere with those designated uses adopted by the State, as necessary to support such designated uses." EPA has chosen a "safe approach" which clearly goes beyond the Clean Water Act and is clearly unnecessary. This approach does not allow EPA to fulfill its duty (under Presidential Order 12866, the Unfunded Mandates Reform Act and the Regulatory Flexibility Act) to assess the costs, benefits, and impacts of the rule on local government and small entities. While this may be the safe approach for EPA, it places dischargers throughout the State at risk.

As analytical detection limits improve, dischargers may find they are unable to achieve the criteria without costly end-of-pipe controls. But, by then, it will be too late for EPA to evaluate the costs and benefits of the criteria and alternative criteria. For these reasons, EPA should not adopt criteria for those constituents. If EPA does adopt these criteria, EPA should, prior to that, evaluate the costs and benefits of the criteria, as well as alternative criteria, using worst case assumptions (i.e., assume that discharge and ambient levels are at the detection limits). The criteria in this category include the following: Aldrin, Alpha-BHC, Beta-BHC, Chlordane, 4,4'-DDD, 4,4'-DDT, 4,4'-DDE, Dieldrin, Endosulfan I, Endosulfan II, Endrin, Endrin Aldehyde, Heptachlor, Heptachlor Epoxide, Toxaphene, PCB- 1016, PCB-1221, PCB-1232, PCB-1242, PCB-1248, PCB-1254, PCB-1260, Hexachlorobenzene, N-Nitrosodipropylamine, Pentachlorophenol, Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoroanthene, Benzo(k)fluoroanthene, Chrysene, Dibenzo(a,h)anthracene, and Indeno(1,2,3-cd)pyrene.

Response to: CTR-041-008b

See response to CTR-004-002 and CTR-005-009.

Comment ID: CTR-041-010a
Comment Author: Sacramento Reg Cnty Sanit Dist
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-01n Detection Limits
References:
Attachments? N
CROSS REFERENCES E-01m
E-01e
E-01g

Comment: 5. Concerns Regarding Economic Analysis

The District also has several significant concerns with the Economic Analysis that was performed for the proposed rule. Concerns about the cost estimates made for both the District and the state are presented here. (See attached Review of EPA's Economic Analysis of the Proposed California Water Quality Toxics Rule.) Overall, the District believes that problems with the Economic Analysis are serious enough that is should be redone. As stated above in our analysis of assumed costs at the SRWTP, the use of questionable data without qualification combined with unsubstantiated assumptions regarding costs to achieve compliance resulted in a gross underestimate in the cost-effectiveness ratio. The District's first

concern is that if the types of problems found in our Case Study are widespread in other studies, the complete analysis is suspect.

In addition to the analysis of the District's facilities, there are several other points which have been used by EPA to lead to a potentially serious understatement of actual costs. The key assumptions involved are that: 1) no costs would occur if either no monitoring data presently exists or if that data is below analytical detection levels; 2) no treatment costs would occur whenever EPA's initial estimates showed high costs, due to successful regulatory relief; 3) no costs are included for nonpoint sources such as municipal stormwater management systems; and 4) no costs are included for indirect dischargers to the District's system that are not large enough to be considered a Significant Industrial User (SIU).

Regarding the first assumption, the District has found that there is pressure from many sides, including the Safe Drinking Water Act, to both increase the number of constituents being monitored and to lower detection levels to meet numeric criteria set by EPA and the state. To assume that monitoring of these new constituents will not lead to any treatment cost increases is simply unrealistic. Similarly, the second assumption about absolute success in every pursuit of regulatory relief is also overly optimistic. There are no guarantees that pursuit of regulatory relief will be successful in any situation, and EPA indicates elsewhere in the preamble that options such as variances and site-specific criteria will rarely, if ever, be granted.

The third and fourth key assumptions ignore present dominating trends and facts, i.e. that. prevention and control of pollutants at their sources, including very small indirect dischargers, storm runoff, and other nonpoint sources are now the major focus of EPA's wastewater programs nationally. While we agree that these management steps should be taken, there will be significant costs attached to the implementation of these steps that cannot be ignored.

Combined with concerns the District has heard from other sources such as the California Association of Sanitation Agencies (CASA), it appears that EPA has failed to make "a reasoned determination that the benefits of the intended regulation justify its costs." Therefore the District believes that the Agency is obligated to redo the draft Economic Analysis.

Response to: CTR-041-010a

See responses to CTR-032-004, CTR-021-006b, CTR-040-037, and CTR-003-011.

If pressure from the Safe Drinking Water Act results in increases in monitoring of constituents or lowering of detection levels, any associated costs should not be attributed to this rule but would be attributed to actions taken under drinking water regulations. To account for those costs under this rule would be double counting because a cost analysis of drinking water rules would already have accounted for those costs. From the outset of the national water quality standards program, EPA has explained that while economic factors may be considered in designating uses, scientific and technical factors must justify the criteria to meet those uses. Additionally, with regard to benefits justifying costs, Executive Order 12866 states in section 1(b) that this is limited "to the extent permitted by law and where applicable." See also response to 042-007a.

Comment ID: CTR-045-011
Comment Author: Sausalito-Marin Sanitary Dist.
Document Type: Sewer Authority

State of Origin: CA
Represented Org:
Document Date: 09/24/97
Subject Matter Code: E-01n Detection Limits
References:
Attachments? Y
CROSS REFERENCES

Comment: Several criteria are below current analytical detection. It was therefore not possible to conduct cost-benefit analyses or determine that any set of control measures would or could lead to compliance.

Response to: CTR-045-011

EPA acknowledges the limitations of detection levels for certain bioaccumulative pollutants. However, indirect dischargers to municipal treatment plants often have detectable levels of these pollutants. Similarly, within industrial plants, discharges are often detectable prior to treatment. Once detectable sources are identified, mass balance methods can be used to determine if the facility is discharging at concentrations that exceed instream water quality standards. Fish tissue concentrations can also be used as an indicator that discharges may be causing an exceedance of standards.

Comment ID: CTR-066-015a
Comment Author: Delta Diablo Sanitation Dist.
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: E-01n Detection Limits
References:
Attachments? N
CROSS REFERENCES C-28

Comment: The areas with which we find concerns and the requested changes include the following:

A further problem with the analysis relates to the establishment of criteria that are below analytical detection. Our District finds 34 separate criteria that fall into this category. Lacking this credible data, it was not possible to conduct cost-benefit analyses or determine that any set of control measures would or could lead to compliance. This fundamental inability to utilize established rulemaking procedures mandates further work prior to the promulgation of the criteria.

Response to: CTR-066-015a

See response to CTR-045-011.

Comment ID: CTR-067-004a
Comment Author: Ojai Valley Sanitary District

Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: E-01n Detection Limits
References:
Attachments? N
CROSS REFERENCES K

Comment: * In addition, EPA cannot make an accurate determination of the costs and benefits of promulgating CTR criteria for those criteria that are below achievable detection limits. Because detection limits for some pollutants will most likely improve in the near future, dischargers who are reporting regulatory compliance with current detection limits may not be in compliance when lower detection limits are achievable. OVSD (and likely other dischargers as well) have historically been required to report pollutant results with little regard to the detection limit achieved by the contract laboratory conducting the testing. This may have led to EPA's grossly under estimating the cost impact of the CTR. Detection limits of many priority pollutants identified in the CTR are actually lower than those achieved during recent special testing of OVSD's effluent to identify low pollutant levels. Therefore, the potential compliance costs to our commercial and residential dischargers could be significant, yet the Economic Analysis for the draft CTR could not estimate such costs. As a more reasonable alternative, OVSD recommends that a watershed approach be used to address these pollutants. OVSD's receiving water (the Ventura River) is currently managed using the watershed approach.

Response to: CTR-067-004a

EPA recognizes that regulation of point source discharges alone cannot address all existing or future environmental problems from pollutants in inland surface waters, enclosed bays, and estuaries in California. For example, in addition to discharges from point sources, toxic pollutants are also potentially contributed from other sources such as industrial and municipal emissions to the air, resuspension of pollutants from contaminated sediments, urban and agricultural runoff, hazardous waste and Superfund sites, municipal landfills, and spills. Restoration and maintenance of a healthy ecosystem will require significant efforts in many of these areas.

EPA believes that in certain parts of California, nonpoint sources and other diffuse sources of pollution are responsible for significant amounts of the loadings of some pollutants of concern. Where such continuing contribution of toxic pollutants by these sources occurs, increased controls by point sources may not lead to cost-effective environmental improvement.

EPA encourages all States and Tribes to implement water quality protection programs on a watershed basis. EPA's Watershed Protection Approach is based on the assumption that water quality and ecosystem problems are most efficiently managed at the watershed level rather than an individual water body or discharger level. However, the decision to regulate at the watershed level rests with the State and will be dependent upon many site-specific factors applicable to the watershed (e.g., number andtypes of pollutant sources).

EPA also recommends that States and Tribes establish total maximum daily loads (TMDLs) when dealing with difficult environmental problems, for example, persistent, ubiquitous pollutants and water quality impacts resulting in large part from nonpoint sources and lack of data and scientific uncertainty. Wasteload and load allocations recommended by a TMDL may be based on a reasonable expectation that

water quality standards will be met in a reasonable period of time after appropriate controls are put in place. When there is a reasonable expectation that standards will be achieved in a reasonable period of time, TMDLs may schedule implementation activities, including collecting performance data, that would result in a more cost-effective control strategy and lower costs than the methodology used to estimate compliance costs for the CTR.

See also response to CTR-004-002.

Comment ID: CTR-070-003
Comment Author: Sewerage Agency of Sthrn Marin
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/22/97
Subject Matter Code: E-01n Detection Limits
References:
Attachments? Y
CROSS REFERENCES

Comment: Other impacts Significant impacts may also result from dramatic reductions in discharge limits for PAH'S. Calculated discharge limits for SASM are an order of magnitude lower than the detection limits currently used for SASM effluent.

Response to: CTR-070-003

While it is true that SASM's estimates indicate significant required loading reductions (86% to 91%) based on current and projected effluent limits, the maximum effluent concentration is below detection levels indicating that the pollutants have never been detected. SASM does not provide detailed effluent data or describe existing treatment processes, thus EPA cannot estimate CTR-based limits for this facility nor assess whether additional treatment is required or pollution prevention or process optimization would be sufficient to ensure compliance with CTR-based limits. Because the pollutants have never been detected, EPA would most likely estimate zero costs under its low scenario and, under its high scenario, would probably include costs for pollution prevention or process optimization (depending on the facts relevant for the particular facility) for these pollutants as a result of the CTR.

Comment ID: CTR-082-009a
Comment Author: City of Burbank
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/24/97
Subject Matter Code: E-01n Detection Limits
References:
Attachments? N
CROSS REFERENCES C-28
B Comment Period

Comment: The subject rule has a significant impact on our facility discharge and the citizens of the City. We therefore present the following comments for your consideration to re-open the comment period for this rule in order to facilitate a more complete review by public and in particular by those in the POTW community:

* A further problem with the analysis relates to the establishment of criteria that are below analytical detection. Lacking credible data, it was not possible to conduct cost-benefit analyses or determine that any set of control measures would or could lead to compliance. This fundamental inability to utilize established rulemaking procedures mandates further work prior to the promulgation of the criteria.

Response to: CTR-082-009a

See responses to CTR-045-011 and CTR-005-009.

Comment ID: CTR-085-018a
Comment Author: Camarillo Sanitary District
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/24/97
Subject Matter Code: E-01n Detection Limits
References:
Attachments? N
CROSS REFERENCES C-28

Comment: The District supports the following positions of CASA and SCAP where changes need to be made in the proposed California Toxics Rule:

* A further problem with the economic analysis relates to the establishment of criteria that are below analytical detection. Lacking credible data, it was not possible to conduct cost analysis or determine that any set of control measures would or could lead to compliance. This fundamental inability to utilize established rule making procedures mandates further work to the promulgation of the criteria.

Response to: CTR-085-018a

See response to CTR-045-011.

Comment ID: CTR-107-002c
Comment Author: Brian E. Hill
Document Type: Citizen
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: E-01n Detection Limits
References:
Attachments? Y
CROSS REFERENCES E-01

G-02

Comment: OnSeptember 17, I attended a hearing on the proposed CTR at the EPA's regional office in San Francisco. Here are some key issues from the testimony at that hearing:

* Some of the limits are below normal detection limits, therefore agencies have no background data in order to perform accurate attainability analysis.

* The cost of implementation by the EPA is grossly underestimated. The economic analysis shows at maximum implementation cost of $87 million. If preliminary estimates by publicly owned treatment works (POTW) art correct, implementation of the CTR will far exceed the $100 million provision of the Porter-Cologne Act. If this is the case, feasibility of implementation will be in jeopardy. The City of Merced, CA estimates that their additional cost would be $4 million annually. Merced has a very small treatment facility.

* Robert Reid, speaking on behalf of California Association of Sanitation Agencies(CASA), said that four San Francisco Plants estimate their total implementation costs to be $160 million annually.

* Charles Batts of Bay Area Dischargers Authority (BADA) estimated five BADA POTWs costs to be $12 million per year to meet the strict limit on copper and $56 million per year to meet the organics limit.

* The Regional Water Quality Control Board testified that San Francisco discharges twenty percent of the four percent discharged into the San Francisco Bay by POTWS, noting that POTWs are only a minor part of the volume discharged into the Bay. Thus, the reduction to the prescribed limits would cause a negligible decrease in the total mass of pollutants discharged.

* The City of Sacramento projects a $200 million annual cost will be required to meet the copper limit.

All of the testimony at the hearing echoed these concerns. I am sure that you have access to a transcript. The Clean Water Act has been and is instrumental in cleaning up our rivers, lakes, bay and estuaries. We can continue on this steady path by setting gradual attainable limits and through increased public education. Limits on pollutants should continue to get stricter, but this has to occur on a gradual curve that will not place an unreasonable burden on the individual taxpayer.

Response to: CTR-107-002c

See responses to CTR-107-002a, CTR-041-018, CTR-038-003, CTR-056-018, CTR-021-010, CTR-021-005c, CTR-040-039, CTR-035-011a, and CTR-035-064.

Comment ID: CTRH-002-019
Comment Author: Ing-Yig Cheng
Document Type: Public Hearing
State of Origin: CA
Represented Org: L.A. Bureau of Sanitation
Document Date: 09/18/97
Subject Matter Code: E-01n Detection Limits
References:
Attachments? N

CROSS REFERENCES

Comment: Another point we would like to make with respect to the economic analysis deals with the fact that this analysis ignores a potential cause related to compliance for criteria that are being set at below-method detection limits. Again, using Tillman as a case study, the limit on lindane was specified at 19 parts per trillion in the Inland Surface Water Plan. And at the time of promulgation of ISWP, no lindane was detected in the Tillman effluent. However, soon after the new permit was issued, better analytical methods for lindane became available, and subsequently we found Tillman to be consistently in non-compliance. Since that time, Tillman has had lindane concentrations of around 30 parts or so in excess of the permit limit of 19, and the cost for lindane compliance was an unexpected factor that we were forced to address because of better detection limits of lindane, not because Inland Surface Water Plan did not address the issue.

So I think on -- on the other hand that, you know, we can say that no economic analysis could be or need to be performed when the only data available are non-detects. But this issue is real and we are experiencing that. EPA minimally must provide a mechanism to incorporate this scenario into the economic process as they occur.

Response to: CTRH-002-019

See responses to CTR-045-011 and CTR-035-064.

Comment ID: CTRH-002-022
Comment Author: Ing-Yig Cheng
Document Type: Public Hearing
State of Origin: CA
Represented Org: L.A. Bureau of Sanitation
Document Date: 09/18/97
Subject Matter Code: E-01n Detection Limits
References:
Attachments? N
CROSS REFERENCES

Comment: MS. FRANKEL: I have just one question. If I could ask you -- I missed the first thing that you had mentioned. You said that you were putting in some treatment to comply with the existing permit?

DR. CHENG: In the case of lindane, we would have to go to really drastic measures. And no, we have not. We are still in noncompliance. And while we were contemplating on project to deal with the lindane case back in 1994, that was about the time that Inland Surface Water Plan was rescinded, and therefore we were basically taking the approach "wait and see what happens" without spending hundreds of millions of dollars. I think -- I believe the figure was $200 million to go through our own whatever necessary to remove lindane.

I might as well mention, at that time methylene chloride is a similar case. But the City in good faith effort pursue all avenues, and actually we were able to bring the methylene chloride issue to compliance through very aggressive retreatment program. So we're very proud of that, and that supports the EPA's program in source control and a lot of other things.

But we believe, in our case, that the case of lindane, we have exhausted all of the industrial potential dischargers and it comes to perhaps home use, head lice treatment, doing shampoo, that type of thing. And since 1992 we have entertained request with state consumer product affair regulations to see if they could do something about it. But these are the type of things that are beyond our capabilities other than putting in real expensive treatment. And I hope you understand why we are so concerned with the detection limits and making the need to be provided as these things will occur because scientists are going to make progress and we're going to find where we didn't think there was a problem.

MR. MORRIS: The other comment you made is that the cost when the limit is below the quantitation level - -

DR. CHENG: Yes.

MR. MORRIS: -- and the analysis does to a certain extent look at those types of costs. In the high-end scenario, it is a limit-to-limit analysis. So if you look at the WQBEL for PCBS, let's say, the typical WQBEL for PCBs is the quantitation level; the WQBEL for the CTR will be below the quantitation level. In those, if there was a difference between those two limits which are below the quantitation level, we would cost the treatment to give the current statement to ours. So there is an element in there that deals with WQBELs below quantitation.

We've done similar type analysis for other rule-making; but you've got to understand that, when you do those, they're highly speculative because a lot of times you don't really know if it's there or not. And when we do these types of regulations in other parts of the country, a lot of times the dischargers and the municipalities say the same thing. We've all got this pollutant. You can't quite see it because it's right below the detection level.

What we've done in the past when we go out in the field and try to find these pollutants, they don't really exist. So I guess what I'm saying to do is that when we spend a lot of money going out to try to identify whether or not you have it, the likelihood is it's like mercury which is fairly ubiquitous. What we're finding is they're down under a part per billion for dischargers.

DR. CHENG: Thank you. I understand what you're saying and I highly respect your economic analysis because I'm an economist. However, maybe I have not made the case real clear.

The case about lindane is real clear. Back in 1991, I believe our detection limit was about 200 parts per trillion. Nobody had detected anything using the bestmethod. Criteria was set at 19 for the highest WP, but it's just such a coincidence that my labs were getting better, using capillary pollens and all these other things, and better control of even the gas chromatograph injection techniques; but now we go below 19 and all of a sudden we found out that we are about 30. It's real. It's generating permit violations every month just about. So I can recall only maybe a handful of months throughout the six- or seven-year period that we were not exceeding the 19.

So while I can appreciate that there are case histories where it's just a big worry that the sky might fall, in this case the sky has fallen. And so I would like to just make it clear that I have not gone through your analysis to fully understand about WQBEL and how you do it, but perhaps one practitioner's point of view, the cost that we assess to comply with lindane, for example, is in the hundreds of million of dollars, and because the only technology based on what we know was based on something like reverse osmosis, is that something that through the economic analysis will be washed out?

MR. MORRIS: If in our analysis we have a permit limit for that pollutant and the state's permit limit and you're violating that limit, we would not take the hit for you getting into compliance with your current state permit limit.

DR. CHENG: I understand EPA's approach and EPA's policy. However, it does behoove us to recognize that it is an unfair situation. The legal basis for Inland Surface Water Plan is not there. And can we not -- Looking at the books I see it.

MR. MORRIS: I think that in your particular case, if you truly have this problem and you're truly looking at the kind of economic impacts that you say you're going to RO, or whatever you need to get to this limit, I would apply for a variance. I would continue to aggressively implement and apply for a variance and lay the facts on the table and, let's say, look at them, make a decision. But I think that requires going public, putting the data on the table, showing them what you've done, showing that its -- you can't find the source, it's ubiquitous, and there is no way you can take it out other than going to plant treatment. But the public has to review the facts and make a decision.

DR. CHENG: I appreciate very much your suggestion indeed, since the City of L.A. has been basically trying its best to address all pollution concerns. We are confident that it is -- We are concerned that it's got to be addressed one way or another.

Response to: CTRH-002-022

See responses to CTR-045-011, CTR-032-004, CTR-060-019, CTR-040-026, and CTR-035-064.

EPA agrees that benefits are likely to be highly site specific. However, sites likely to experience a disproportionate share of the benefits are also likely to incur a disproportionate share of the costs.

In addition, once water quality standards are in place, sites that are currently less impacted by toxic pollutants may experience cost savings by preventing future cleanup costs. That is, it may be more cost-effective to prevent toxic pollutants from entering surface waters than to clean up and remediate the impacts once toxic pollutants are released. However, should the State determine through a total maximum daily load (TMDL) allocation that controls on nonpoint sources are a more cost-effective approach to achieving standards, the State can redistribute the allocations through the TMDL process.

The range of estimated benefits in part reflects the range in loadings reductions that may result from point source controls given the flexibility in State implementation procedures. The decision as to which implementation procedures will be employed, and therefore what costs and benefits will result, will be made by state and local entities for specific locations.

Subject Matter Code: E-01n01 Non-Detects, No Cost

Comment ID: CTR-040-028
Comment Author: County of Sacramento Water Div
Document Type: Storm Water Auth.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-01n01 Non-Detects, No Cost
References: Letter CTR-040 incorporates by reference letter CTR-027
Attachments? Y
CROSS REFERENCES

Comment: Although EPA goes to great length to label its cost analysis as "conservative" the analysis is anything but conservative:

* It is not conservative to assume that if monitoring data was available but all values were reported as below analytical detection levels, that the discharger will not incur costs as a result of the CTR.

Response to: CTR-040-028

If a discharger had no effluent data, EPA did not automatically assume that the discharger would have no costs as a result of the CTR. When effluent data was available, however, EPA used the method in EPA's Technical Support Document for Water Quality-based Toxics Control (1991) to determine reasonable potential and then followed the methodology (i.e., the cost-decision matrix) described in the Economic Analysis (EA) of the final CTR to estimate costs. In the abscence of data under the high scenario, reasonable potential was assumed if the discharger had an existing permit limit for a pollutant and EPA then estimated costs using the methodology described in the EA. See also response to CTR-003-011.

Comment ID: CTR-041-024
Comment Author: Sacramento Reg Cnty Sanit Dist
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-01n01 Non-Detects, No Cost
References:
Attachments? N
CROSS REFERENCES

Comment: Although EPA goes to great length to label its cost analysis as "conservative" the analysis is anything but conservative:

* It is not conservative to assume that if monitoring data was available but all values were reported as below analytical detection levels, that the discharger will not incur costs as a result of the CTR.

Response to: CTR-041-024

See response to CTR-003-011 and CTR-005-009.

Comment ID: CTR-044-019
Comment Author: City of Woodland
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: E-01n01 Non-Detects, No Cost
References:
Attachments? N
CROSS REFERENCES

Comment: Although EPA goes to great length to label its cost analysis as "conservative" the analysis is anything but conservative:

* It is not conservative to assume that if monitoring data was available but all values were reported as below analytical detection levels, that the discharger will not incur costs as a result of the CTR.

Response to: CTR-044-019

See response to CTR-003-011.

Comment ID: CTR-054-023
Comment Author: Bay Area Dischargers Associati
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-01n01 Non-Detects, No Cost
References:
Attachments? N
CROSS REFERENCES

Comment: Although EPA goes to great length to label its cost analysis as "conservative" the analysis is anything but conservative:

* It is not conservative to assume that if monitoring data was available but all values were reported as below analytical detection levels, that the discharger will not incur costs as a result of the CTR.

Response to: CTR-054-023

See response to CTR-003-011.

Subject Matter Code: E-01o Background Levels

Comment ID: CTR-003-010
Comment Author: City of Riverside
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/22/97
Subject Matter Code: E-01o Background Levels
References:
Attachments? N
CROSS REFERENCES

Comment: 10) In general we were impressed by the level of effort used in the economic analysis. However the paucity of data at levels sensitive enough to characterize the compliance status of the waters and the underlying assumptions used in their place, completely overshadowed it's finer points. For example, the use of zero for the ambient receiving water background concentration in the absence of reported numbers is not appropriate for chemicals typically found in the environment but may be appropriate for exotic chemicals if their use is non-existent in the area. Given the extremes in potential costs involved here, it would have been appropriate to run the analysis once under the assumption that it is zero and again assuming that it equals the detection level for that chemical.

Response to: CTR-003-010

For analysis of the final CTR, EPA collected the most recent publicly available data and information for each of the sample facilities including permits fact sheets, permit applications and monitoring data. Data submitted as a part of the public comments were also reviewed and considered. However, because only four of the sample facilities are allowed dilution, EPA applied the CTR criteria directly as effluent limits for most of the sample facilities (i.e., since no dilution was provided, background data did not affect the stringency of the effluent limit).

Subject Matter Code: E-01p Risk Level Costs

Comment ID: CTR-035-050
Comment Author: Tri-TAC/CASA
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-01p Risk Level Costs
References:
Attachments? N
CROSS REFERENCES

Comment: pp. 5-1 - 5-2 (U.S. EPA, 1997b) -- Analysis of 10E-5 Risk Level for Carcinogens We disagree with EPA's conclusion that "the changes in estimated costs and pollutant load reductions based on the lower risk level of 10E-5 are minimal." In fact, under the low cost scenario, the analysis shows that there would be >25 percent cost savings, with only a 3 percent lowering in pollutant reductions. We believe that analysis demonstrates that it is probably cost-effective to lower the risk level for carcinogens. However, given the equivocal results for the high cost scenario, we recommend that EPA re-analyze the impacts of modifying the risk level, and look not only at the attainability and cost analysis, but analyze the actual change in risk levels that would result, given the uncertainty factors that are built into the criteria. Based on all of the conservative assumptions included in the calculation of the criteria, there is significant uncertainty in the numbers, which may translate to negligible risk from using lower risk levels. EPA should factor this uncertainty into the risk assessment, along with population exposure, when evaluating risk levels for the human health criteria.

Response to: CTR-035-050

See response to CTR-003-011.

Comment ID: CTR-035-056c
Comment Author: Tri-TAC/CASA
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-01p Risk Level Costs
References:
Attachments? N
CROSS REFERENCES E-01c02
E-01c01

Comment: Introduction

On behalf of CASA and Tri-TAC, M.Cubed reviewed the U.S. Environmental Protection Agency 's (USEPA) Economic Analysis (Analysis), as well as the report's underlying benefit and cost data and analyses. M.Cubed's overall reaction is that policy makers and the regulated community can place little

confidence in either the benefit or cost analyses -- the uncertainties and broad assumptions contained in these analyses largely undermines their findings. Based on the information provided by USEPA, M.Cubed's judgement is that the proposed California Toxics Rule (Rule) will result in multi-million dollar annual costs -- and have substantial impacts on individual publicly-owned treatment works (POTWS) and dischargers -- and may result in no noticeable benefits to public health or the environment. A critique of specific weaknesses in the cost and benefit analyses is provided below.

Weaknesses in Overall Report Findings

The Analysis' overall findings exhibit a number of flaws, as follows:

USEPA's estimates indicate that Rule costs outweigh benefits, both on an annualized and present value basis. USEPA's claim that comparison "...of both annualized benefits and costs and discounted benefits and costs indicates that the monetized benefits of the CTR are of the same general magnitude as the costs" is simply not true (U.S. EPA, 1997a, page 9-2). For example, using USEPA's comparison of a twenty-year phase-in of benefits at a 3 percent discount rate against a ten-year phase-in of costs at a 7 percent discount rate, or benefits of between approximately $20 to $600 million against costs of about $180 million to $1 billion (setting aside the significant weaknesses in the analysis; differences in the probabilities of low or high outcomes; and questions over the appropriate discount rate to apply)(*2) indicates a low cost scenario which is nine times higher than the estimated benefits, and a high cost scenario which is almost twice as high as benefits.(*3)

Executive Order 12866, which requires the economic review, defines "significant regulatory action" as one that is likely to "adversely affect ... a sector of the economy." Yet, although the USEPA finds that two sectors will incur the majority of the regulatory costs -POTWs and chemical/petroleum products -- it provides no analysis of whether or not these costs are "significant" to these sectors. Likewise, USEPA does not examine the potential costs or their implications to small businesses (e.g., health care providers; automobile repair shops), small communities, or non-significant industrial users (SIUs) in general (i.e., industries that are regulated by POTWs through local ordinances, rather than under federal rules)

USEPA's conclusion that the use of different risk levels would not significantly influencecompliance costs is not supported by its data. Based on USEPA's own data, use of a 10E-5 risk level for carcinogens would induce a 25 percent cost savings relative to a 10E-6 risk level under the low cost scenario, with a 3 percent change in pollutant loadings.(*4)

(*2) Noticeable benefits seem unlikely to emerge in the near term, if at all, due to the persistence of existing contaminants in the environment, while costs will be incur-red over one to two decades. Use of a lower discount rate for benefits would reflect the greater value future generations may place on environmental amenities, an assumption which is open to debate.

(*3) The large differences between benefits and costs is mirrored by the wide range in estimated pollution reduction. Under USEPA's low scenario, only.63 million toxic pounds- equivalent are expected to be reduced under the rule, compared to a high scenario reduction of 7 million pounds equivalent. That is, reductions under the high scenario are eleven times higher than under the low scenario.

(*4) Under the high cost scenario cost reductions are less than I percent, with a 7 percent change in pollutant loadings.

Response to: CTR-035-056c

See responses to CTR-021-005c, CTR-056-018, and CTR-003-012.

Comment ID: CTR-052-016
Comment Author: East Bay Dischargers Authority
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: E-01p Risk Level Costs
References: Letter CTR-052 incorporates by reference letters CTR-035 and CTR-054
Attachments? Y
CROSS REFERENCES

Comment: C. RECOMMENDATIONS FOR MODIFICATIONS TO THE CTR AND EA

Specify carcinogenicity risk factor of 10E-5 . EPA should acknowledge that a significant portion of the attainability, cost, and benefit issues can be addressed by the simple modification of the carcinogenicity risk factor. EPA should clearly state that the criteria are based on a risk factor of 10E-5, and strongly urge its use by the State in its Implementation Plan. As noted in the analysis by Larry Walker Associates, Authority and BADA attainability and cost issues are essentially resolved if the criteria are based on a risk factor of 10E-5. In addition, existing permit limits and high level of compliance remain in place.

Response to: CTR-052-016

See response to CTR-003-012.

Subject Matter Code: E-01q Source Reduction

Comment ID: CTR-004-003
Comment Author: South Bayside System Authority
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/24/97
Subject Matter Code: E-01q Source Reduction
References:
Attachments? N
CROSS REFERENCES

Comment: Industrial source control and pollution prevention activities cannot be relied on to achieve the reductions that may be needed. The Sources of Pollutants of Concern and Waste Minimization Plan study, conducted by SBSA in 1992, identified that most of the pollutants of concern are not from industrial or commercial users. Complete elimination of industrial and commercial discharges would not resolve the compliance problems. The conceptual cost estimate for metals and organics removal treatment (reverse osmosis) technology at SBSA is around $18 million dollars per year.

Response to: CTR-004-003

EPA agrees that pollution prevention may not be applicable or effective in all circumstances. Before estimating costs for the final Great Lakes Water Quality Guidance, which was used as the basis of pollution prevention cost estimates for the CTR, EPA attempted to collect additional data related to the cost and effectiveness of pollution prevention techniques for the pollutants being regulated under the final Guidance. The result of these efforts, which generally constituted an extensive review of the EPA Pollution Prevention Information Clearinghouse (PPIC), indicated that limited documentation was available regarding the effectiveness of pollution prevention to remove many of the pollutants included in the CTR. The limited information did, however, suggest that facilities could eliminate toxic constituents from their operations using pollution prevention techniques such as raw materials substitution and process modifications (EPA, 1992; EPA, 1994).

In estimating costs for the CTR, EPA used a decision matrix for purposes of estimating the types of controls and costs associated with these controls to avoid unjustified use of waste minimization/pollution prevention techniques to achieve CTR water quality-based effluent limits (WQBELs). Under the decision matrix, waste minimization/pollution prevention was considered only after consideration of modifying existing treatment systems to achieve CTR-based WQBELs. Further, waste minimization/pollution prevention controls were considered when the production process or source generating the pollutant was amenable to pollution prevention techniques, and when addition of treatment was not justifiable. Three cases where EPA assumed that the addition of treatment would not be justified are detailed below.

1. Existing discharge data indicate that the pollutant is most often in compliance with projected CTR-based effluent limits. The reported maximum effluent concentration or existing permit limit does not reflect standard discharge levels. For instance, treatment costs were not assigned to pollutants reported above detection levels only once in three years. A pollutant was considered most often in compliance with projected limits if sufficient data were available and approximately 80% or more of the observations were already in compliance with the projected permit limit.

2. Discharge monitoring data are inconclusive to assume treatment costs. It was assumed that a facility would not add treatment without having sound proof that it was needed. Treatment was not selected if discharge monitoring data were not available or very limited (i.e., 1 or 2 data points), discharge data were not recent (i.e., previous to 1993) or did not reflect existing operating conditions, in particular when operating practices described in a recently re-issued permit indicated the decrease in the discharge of pollutants.

3. The pollutant loading reduction is insignificant in terms of percentage load reduction (i.e., 10-25%).

As an alternative to the use of waste minimization/pollution prevention, EPA also considered the use of the flexibility provided through the National water quality standards and NPDES programs (i.e., alternative regulatory approaches such as phased total maximum daily loads/water quality assessments, site-specific criteria modifications, standards variances, metals translators, etc.) as a control alternative in estimating costs for the CTR. However, the use of alternative regulatory approaches was limited to only those facilities under the low-end scenario where the estimated cost was disproportionately high as compared to the resulting estimated pollutant reduction.

References:

U.S. EPA. 1992. Pollution Prevention Options in Metal Fabricated Products Industries; A Bibliographic Report. EPA/560/8-92/001A. Washington, DC. Pages 20 - 23.

U.S. EPA. 1994. 33/50 Program Company Profiles: Reduction Highlights. EPA-745-K-94-017. Washington, DC. Pages 2, 4, and 7.

Comment ID: CTR-021-012
Comment Author: LeBoeuf, Lamb, Green & MacRae
Document Type: Local Government
State of Origin: CA
Represented Org: City of Sunnyvale
Document Date: 09/25/97
Subject Matter Code: E-01q Source Reduction
References: Letter CTR-021 incorporates by reference letter CTR-035
Attachments? Y
CROSS REFERENCES

Comment: The CTR Incorrectly Extrapolates Assumptions Regarding the Effectiveness of the City's Source Control Program Regarding Metals Control Measures that Leads to Erroneous Conclusions Regarding Compliance with Projected CTR Effluent Limits

CTR Appendix I-B-1 1 refers to Sunnyvale's 1994 Local Limits Compliance Strategy report relative to an alternative analysis of copper compliance. The appendix asserts thatimplementation of the City's recommended pollution prevention and source control activities "is believed to be sufficient to the 4.9 ug/L limit" and that costs to achieve a 5.5 ug/L CTR limit would range from $400,000 to $2,000,000. The City's reports do not support this conclusion, but rather indicate that the WPCP would probably not attain the limits. It is important to note that since the 1994 report, the City has fully implemented the copper control measures recommended in that report and the effluent quality is above the 4.9 or 5.5 ug/l

level 30-40% of the time. As described elsewhere in this memo, the CTR authors continue to confuse compliance with a non-existent monthly average limit with the actual daily maximum limit which cannot be exceeded on any day.

The majority of copper now entering the treatment plant is from the local water supply, from corrosion of residential copper plumbing. This is not a source that is under the control of the City although the City has worked with the water purveyors to help optimize their corrosion control efforts. This CTR appendix needs to be corrected to reflect Sunnyvale has implemented the "reasonable control measures" and there is no basis for assuming that further pollution control measures will achieve copper compliance.

Response to: CTR-021-012

EPA's revised Economic Analysis of the CTR does not include the alternative analysis for copper compliance that was presented in the draft version (Appendix I-B-1 of the Technical Support Documentdated May 5, 1997). Therefore, Sunnyvale's comments regarding the feasibility of this cost estimate are no longer applicable. In it's revised cost analysis, EPA used dissolved water quality criteria for copper and assumed that the criteria would be implemented using metals translators (EPA used a site specific translator of 2.6 for copper). Effluent quality data for copper indicate that the facility is in compliance with CTR criteria (only one effluent data point collected between 1995 and 1997 was above the CTR-based limit). Thus, EPA concluded that a pollution prevention program was sufficient to ensure compliance with the CTR-based limit and estimated costs for this program.

In addition, Sunnyvale asserted that EPA confused compliance with a nonexistent monthly average limit with the actual daily maximum limit. The methodology EPA used to derive permit limits for the draft and final economic analyses of the CTR establishes that for each pollutant assumed to have reasonable potential, a maximum daily limit and an average monthly limit are calculated. This is a standard NPDES permitting requirement and is detailed in the Technical Support Document for Water Quality-based Toxics Control (U.S. EPA, 1991). For the final Economic Analysis, EPA used the average monthly limit as the projected CTR-based limit because it is the most stringent limitation imposed on this facility. EPA estimated pollution control costs based on individual violations of the average monthly limit, as if the average monthly limit was a maximum daily limit. As a result of these assumptions, EPA's estimates are more conservative than those based on maximum daily limits.

EPA recommends referring to Box 5-2, "Calculating Permit Limits Based on Two-Value Wasteload Allocation," (page 100) of the Technical Support Document for Water Quality-based Toxics Control, for a step by step explanation of EPA's methodology.

See also the response to CTR-021-017.

Comment ID: CTR-035-062
Comment Author: Tri-TAC/CASA
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-01q Source Reduction
References:
Attachments? N

CROSS REFERENCES

Comment: Weaknessesin Cost Analysis The report's cost estimates exhibit a number of significant weaknesses, as follows:

* The Analysis assumes a very loose and highly effective trigger for use of low-cost waste minimization/pollution prevention techniques. USEPA asserts that 10 to 25 percent reductions in current discharge levels is "insignificant," and would be fully addressed by low-cost waste reduction strategies.(*10) Little data is provided to support this assertion. Individual POTWs and dischargers may already be implementing all feasible low cost techniques; or these techniques may be insufficient to obtain the necessary reductions. As indicated by USEPA itself, "...without process-specific information, it is unknown if waste minimization is technically feasible." (U.S. EPA, 1997b, page 2-33).

(*10) It is equally plausible that it will be extremely expensive to obtain an additional one to ten pounds per day of reductions, such as may be required in the City of San Jose.

Response to: CTR-035-062

See response to CTR-004-003.

Comment ID: CTR-040-030
Comment Author: County of Sacramento Water Div
Document Type: Storm Water Auth.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-01q Source Reduction
References: Letter CTR-040 incorporates by reference letter CTR-027
Attachments? Y
CROSS REFERENCES

Comment: Although EPA goes to great length to label its cost analysis as "conservative" the analysis is anything but conservative:

* It is not conservative to assume that if a constituent only occasionally exceeds a calculated effluent limit,that the effluent limit can be achieved through source control even if the required reduction is on the order of 90% to 99% (as was done in the analysis of mercury and aldrin for the Sacramento POTW case study).

Response to: CTR-040-030

The results of the final CTR cost analysis indicate that aldrin is no longer a pollutant of concern for the Sacramento POTW. These results support the draft analysis in that no major costs should be associated with aldrin removal. No reasonable potential to exceed was concluded because no permit limit exists for aldrin and because the constituent was recorded consistently below detection levels during the last three years of monitoring (twenty-one observations).

Mercury criteria are 0.05 ug/l for freshwater and 0.05 ug/l for saltwater. In analysis of the final CTR, the required reduction for mercury is 72%. EPA still assumes that pollution prevention/waste minimization will be sufficient to comply with CTR limits. Forty-nine observations were made at the discharge from 1994 to 1997, and only three observations were recorded slightly above the proposed CTR limit. Since the facility is capable of complying with the proposed limit 95% of the time, EPA expects that the facility would find more cost-effective methods to comply with the CTR limit, and not incur the expense of adding treatment process units. See also response to CTR-004-003.

Comment ID: CTR-041-026
Comment Author: Sacramento Reg Cnty Sanit Dist
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-01q Source Reduction
References:
Attachments? N
CROSS REFERENCES

Comment: Although EPA goes to great length to label its cost analysis as "conservative" the analysis is anything but conservative:

* It is not conservative to assume that if a constituent only occasionally exceeds a calculated effluent limit, that the effluent limit can be achieved through source control even if the required reduction is on the order of 90% to 99% (as was done in the analysis of mercury and aldrin for the Sacramento POTW case study).

Response to: CTR-041-026

See response to CTR-040-030.

Comment ID: CTR-044-021
Comment Author: City of Woodland
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: E-01q Source Reduction
References:
Attachments? N
CROSS REFERENCES

Comment: Although EPA goes to great length to label its cost analysis as "conservative" the analysis is anything but conservative:

* It is not conservative to assume that if a constituent only occasionally exceeds a calculated effluent

limit, that the effluent limit can be achieved through source control even if the required reduction is on the order of 90% to 99% (as was done in the analysis of mercury and aldrin for the Sacramento POTW case study).

Response to: CTR-044-021

See response to CTR-040-030.

Comment ID: CTR-054-025
Comment Author: Bay Area Dischargers Associati
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-01q Source Reduction
References:
Attachments? N
CROSS REFERENCES

Comment: Although EPA goes to great length to label its cost analysis as "conservative" the analysis is anything but conservative:

* It is not conservative to assume that if a constituent only occasionally exceeds a calculated effluent limit, that the effluent limit can be achieved through source control even if the required reduction is on the order of 90% to 99% (as was done in the analysis of mercury and aldrin for the Sacramento POTW case study).

Response to: CTR-054-025

See response to CTR-040-030.

Subject Matter Code: E-01q01 25% Assumption

Comment ID: CTR-040-029a
Comment Author: County of Sacramento Water Div
Document Type: Storm Water Auth.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-01q01 25% Assumption
References: Letter CTR-040 incorporates by reference letter CTR-027
Attachments? Y
CROSS REFERENCES E-01h01

Comment: Although EPA goes to great length to label its cost analysis as "conservative" the analysis is anything but conservative:

* It is not conservative to assume that POTWs can achieve a 25% reduction through source control and an additional 25% reduction through treatment plant optimization.

Response to: CTR-040-029a

EPA acknowledges that the effectiveness of source controls and process optimization techniques will vary from facility-to-facility, and will depend upon many factors, including for example, the volume of discharge, the type of manufacturing process used, and the inputs to the production process. However, EPA believes that, on average, assuming that reductions of less than 25% can be controlled by the use of source controls or process optimization is reasonable. EPA considered minor, low-cost modifications or adjustments of existing treatment feasible if the literature indicated that the existing treatment process could achieve the revised WQBEL and if the additional pollutant reduction was relatively small (e.g., 10% to 25% of current discharge levels). EPA assumes that prior to incurring capital expenditures, most facilities will evaluate low-cost alternatives for pollutant reduction.

It should be noted that in the analysis of costs for the Economic Analysis for the final CTR, EPA performed a literature search to verify the costs associated with treatment process optimization. As a result of this effort, EPA revised upward its estimate of process optimization costs to a range of $60,000 to $233,000 depending upon the general type of treatment processes being used at a facility and the volume of discharge. These estimates include costs for performing a process optimization study, as well as process modifications.

See also response to CTR-004-003.

Comment ID: CTR-041-025a
Comment Author: Sacramento Reg Cnty Sanit Dist
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-01q01 25% Assumption
References:

Attachments? N
CROSS REFERENCES E-01h01

Comment: Although EPA goes to great length to label its cost analysis as "conservative" the analysis is anything but conservative:

* It is not conservative to assume that POTWs can achieve a 25% reduction through source control and an additional 25% reduction through treatment plant optimization.

Response to: CTR-041-025a

See response to CTR-040-029a.

Comment ID: CTR-044-020a
Comment Author: City of Woodland
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: E-01q01 25% Assumption
References:
Attachments? N
CROSS REFERENCES E-01h01

Comment: Although EPA goes to great length to label its cost analysis as "conservative" the analysis is anything but conservative:

* It is not conservative to assume that POTWs can achieve a 25% reduction through source control and an additional 25% reduction through treatment plant optimization.

Response to: CTR-044-020a

See response to CTR-040-029a.

Comment ID: CTR-054-013b
Comment Author: Bay Area Dischargers Assoc.
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-01q01 25% Assumption
References:
Attachments? Y
CROSS REFERENCES E-01g03
E-01m
E-02l

Comment: The economic analysis is seriously flawed. The major flaws include: (1) failing to do an appropriate sampling of dischargers; (2) assuming in the high-end cost scenario that a 25% reduction could be achieved through source control and an additional 25% achieved through treatment plant optimization without capital improvements; (3) constraining estimates of potential costs through key assumptions, including the assumption that regulatory relief from the rule would be granted if costs were in excess of certain thresholds; and (4) exaggerating estimates of potential benefits by assuming an end (i.e., achievement of the proposed water quality criteria) that will not result from the rule (see Attachment 3). The result of these flaws is that potential costs are greatly understated and potential benefits are greatly overstated. BADA's analysis shows that its member agencies alone could be faced with costs in excess of $100 million per year to achieve effluent limits based on the copper, PAH, heptachlor and aldrin criteria. BADA's analysis also indicates that the benefits associated with this expenditure will be difficult to measure. Copper loadings will be reduced by 1% and the level of compliance for PAH's and heptachlor will remain unchanged at its present high level. Certainly these benefits will not measurably improve the fishing experience or measure the number of fisherman in the Bay, significantly reduce the cancer cases, or improve property values or other nonuse benefits, as estimated in EPA's economic analysis. A further consequence of the flawed economic analysis is the conclusion that the CTR is not a major rule (i.e., one which will result in excess of $100 million per year expenditure) subject to Presidential Executive order 12866 and the Unfunded Mandates Reform Act or a rule that affects small entities protected under the Regulatory Reform Act. BADA agencies provide service to a number of small communities with populations under 50,000 people that could be greatly impacted by the proposed rule.

Response to: CTR-054-013b

See responses to CTR-021-008, CTR-040-029a, CTR-032-004, CTR-054-013a, CTR-056-018, CTR-021-005c, and CTR-059-018.

Comment ID: CTR-054-024a
Comment Author: Bay Area Dischargers Associati
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-01q01 25% Assumption
References:
Attachments? N
CROSS REFERENCES E-01h01

Comment: Although EPA goes to great length to label its cost analysis as "conservative" the analysis is anything but conservative:

* It is not conservative to assume that POTWs can achieve a 25% reduction through source control and an additional 25% reduction through treatment plant optimization.

Response to: CTR-054-024a

See response to CTR-040-029a.

Subject Matter Code: E-01q03 Unit Cost Assumption

Comment ID: CTRH-001-037b
Comment Author: Robert Reid
Document Type: Public Hearing
State of Origin: CA
Represented Org: CASA
Document Date: 09/17/97
Subject Matter Code: E-01q03 Unit Cost Assumption
References:
Attachments? N
CROSS REFERENCES E-01c02
E-01h02

Comment: Second, the interaction between the CTR and the state's implementation policy is particularly important given our second concern, which is namely that the EPA's economic evaluation underestimates the costs and overestimates the benefits of implementing this rule.

Our concern about the cost estimates is based on the fact that the cost analysis appears to undervalue the magnitude of difficulty dischargers will have complying with permits issued based on this rule.

We are also concerned that the cost estimates for various compliance activities such as source control and treatment process optimization made in the case studies are overly optimistic and not reflective of the true actions that will need to be taken to insure compliance.

Overall, we are concerned that the expenditures that may be necessary for many POTWS to comply with the CTR will be large, these costs may not be matched by commensurate benefits, and that EPA has not analyzed whether point source controls are in fact a cost-effective way to achieve water quality standards.

Our preliminary analysis for just five agencies in the Bay Area to comply with the proposed standard for copper alone could amount to more than $60 million per year -- 60 million. This number would be far higher if calculated for every pollutant listed in the CTR for the entire POTW industry in California.

Since this estimate would undoubtedly exceed the high end of the range contained in EPA's analysis, we believe it is necessary for EPA to redo the economic analysis to fully comply with its legal responsibilities.

In addition, revised economic analysis is necessary to provide a sound basis for the State to use in its analysis of the economic impacts of the implementation policy.

Response to: CTRH-001-037b

See responses to CTR-041-018, CTR-035-057, CTR-056-018, CTR-004-003, and CTR-040-039.

Subject Matter Code: E-01r Economic Variances

Comment ID: CTR-035-060
Comment Author: Tri-TAC/CASA
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-01r Economic Variances
References:
Attachments? N
CROSS REFERENCES

Comment: Weaknesses in Cost Analysis The report's cost estimates exhibit a number of significant weaknesses, as follows:

* USEPA's use of averages to estimate individual POTW costs may mask significant expense variations. For example, some facilities may experience the great majority of total costs, while others may face less significant expenses. Likewise, the Analysis does not address costs associated with maintaining reliable water quality levels in the face of time or weather-related variations in discharges, such as peak loading.

Response to: CTR-035-060

See responses to CTR-035-061 and CTR-035-048.

Subject Matter Code: E-01s 2ndary,Indirect Cost Impact

Comment ID: CTR-009-008a
Comment Author: City of Thousand Oaks
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/22/97
Subject Matter Code: E-01s 2ndary,Indirect Cost Impact
References:
Attachments? Y
CROSS REFERENCES E-02o
E-02c

Comment: The City does not agree with the economic analysis. It is incomplete and misrepresents the actual costs and benefits. The analysis does not include costs of expensive AWT to meet more stringent limits based upon the proposed criteria. It does not include the first second, and third order costs to the community, individuals and businesses, of the economic dislocations resulting from huge capital costs, especially for small and economically distressed communities, that divert scarce resources from other priorities or out of the area. It does not include cost impact assessments to low and fixed-income households - ignoring the economic aspects of environmental justice. The benefits assessments make vast unsupported assumptions about the benefits of reductions in constituent concentrations that are barely, if even, measurable, and assigns unrealistic contingent valuations to these assumed benefits. The cost analyses does not follow EPA's own economic assessment guidance (which, itself, is fatally flawed). These points were brought up during the Task Force meetings in 1995 and 1996, but were dismissed outright by EPA. The City hereby raises these issues for the formal record.

The City of Thousand Oaks appreciates the opportunity to comment on the proposed California Toxics Rule.

Sincerely,

Donald H. Nelson Public Works Director

Response to: CTR-009-008a

EPA's own economic assessment guidance (Interim Economic Guidance for Water Quality Standards, EPA-823-B-95-002, March 1995) is intended to assist States and applicants in understanding the economic factors that may be considered, and the types of tests that can be used to determine if a designated use cannot be attained, if a variance can be granted, or if degradation of high-quality water is warranted. In order to remove a designated use or obtain a variance, or if degradation of high-quality water is warranted, the state or discharger must demonstrate that attaining the designated use would result in substantial and widespread economic and social impacts. Although EPA is responsible for approving a State's water quality standards, the State is responsible for interpreting the circumstances of each case and determining where there are substantial and widespread economic and social impacts, or where important social and economic development would be precluded.

Estimating the economic impact of the CTR in California requires a detailed econometric model of the region's economy. EPA did not conduct such an analysis of the rule and the Clean Water Act does not

require such a analysis (see CTR-042-007a). However, for a similar toxics rule in the Great Lakes Basin, an econometric analysis was performed independent of the regulatory impact analysis for the Council of Great Lakes Governors (The Great Lakes Water Quality Initiative: Cost Effective Measures to Enhance Environmental Quality and Regional Competitiveness. DRI/McGraw-Hill, San Francisco, California, July 1993). This analysis showed a minimal impact of the rule on the region's economy for a worst case scenario, a scenario with costs far exceeding those estimated by EPA. Manufacturing output was estimated to fall by between 0.008% and 0.337% over a range of four scenarios evaluated, while personal income loss was estimated at between 0.002% and 0.094% for these scenarios. As a result, the study authors concluded that the impact of the rule on the region's economy would be "nearly imperceptible." Thus, similar controls on toxic pollutants have been shown to be affordable in other regions of the country.

EPA agrees that the contingent valuation method (CVM) elicits an individual's stated willingness to pay or accept compensation. The benefit-cost comparisons in EAs are prepared to inform the public and policy makers. Thus, the strengths and weaknesses of all aspects of the EA, including methodologies for estimating benefits, need to be made clear so that readers are aware of the limits and uncertainties. However, a 1993 Blue Ribbon Panel convened by the National Oceanic and Atmospheric Administration (NOAA) evaluated CVM and found it to be an appropriate methodology for measuring values. It is also the only method accepted by the U.S. Department of the Interior (DOI) to estimate nonuse values and has withstood Federal Court review for its use in litigation contexts.

Additionally, much of the criticism of CVM is conceptual rather than based on empirical research. Where CVM can be compared to other research techniques (e.g., use values estimated by the travel cost methodology or the hedonic price method), CVM is shown to yield similar values (see Brookshire et al., 1982 and Smith et al., 1986). Additionally, in several field experiments, actual purchase decisions were compared to hypothetical purchase decisions (Bishop and Heberlein, 1978 and Dickie et al., 1987). In all of these studies, hypothetical behavior was sufficiently predictive of actual behavior that researchers concluded meaningful values could be obtained for benefit-cost analysis or damage assessment.

Bishop, R.C. and T.A. Heberlein. 1978. Measuring values of extra-market goods: Are indirect measures biased? American Journal of Agricultural Economics 61(5): 926-930.

Brookshire, D., M. Thayer, W.D. Schulze, and R. d'Arge. 1982. Valuing public goods: A comparison of the survey and hedonic approaches. American Economic Review 72(1): 165-177.

Comment ID: CTRH-001-023
Comment Author: Julio Guerra
Document Type: Public Hearing
State of Origin: CA
Represented Org: City of Merced
Document Date: 09/17/97
Subject Matter Code: E-01s 2ndary,Indirect Cost Impact
References:
Attachments? N
CROSS REFERENCES

Comment: And one final point that I would like to make is that the management of the City of Merced is really looking hard at ending our discharge to surface waters because of the uncertainties of how much it

is going to cost in enforcement liability with the California Toxics Rule.

If that would happen, we would be doing a disservice to a thriving ecosystem. And I believe that the economic impact of people having to cease discharges because of the regulations should be taken into account as part the economic analysis.

Thank you.

Response to: CTRH-001-023

See response to CTR-021-008.

Subject Matter Code: E-01u Economic Consid. Task Force

Comment ID: CTR-032-008a
Comment Author: Las Gallinas Val. Sanitry Dist
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-01u Economic Consid. Task Force
References: Letter CTR-032 incorporates by reference letter CTR-035
Attachments? N
CROSS REFERENCES E-01c02

Comment: Economic Analysis

The District supports CASA/Tri-TAC's conclusions that the Economic Analysis has significant technical weaknesses, is based on a large number of assumptions and minimal empirical data, and that it almost certainly understates costs and overestimates benefits. There is a critical need for a sound economic analysis. We also agree with their recommendation that EPA and the SWRCB undertake a collaborative process with interested members of the public to revise the Economic Analysis based on guidelines in the Economic Considerations Task Force Report.

Response to: CTR-032-008a

See responses to CTR-056-018 and CTR-034-016.

Comment ID: CTR-034-016
Comment Author: SCAP
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-01u Economic Consid. Task Force
References: Letter CTR-034 incorporates by reference letter CTR-035
Attachments? N
CROSS REFERENCES

Comment: * Based on these and other issues discussed in the attachments, we strongly urge EPA to revise its Economic Analysis, and recommend that EPA and the SWRCB work together with stakeholders to craft a revised approach that is mutually acceptable. We would be pleased to assist in such an effort.

Response to: CTR-034-016

EPA has worked very closely with the State to develop the results of the Economic Analysis (EA). The Agency considered all comments and information regarding the EA that accompanied the proposed CTR and revised the EA, as appropriate. In the post proposal process, EPA also met with stakeholders, as

requested, to discuss their concerns regarding the EA and made revisions, where necessary. EPA did not want to alter the EA methodology without another round of public comment which likely would have resulted in enormous additional costs and more delays. This was not justifiable given that the methodology was sound and the criteria are science, and not economically, based.

Comment ID: CTR-035-011a
Comment Author: Tri-TAC/CASA
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-01u Economic Consid. Task Force
References:
Attachments? N
CROSS REFERENCES M
B Comment Period

Comment: EPA's Economic Analysis is important not only for EPA's rulemaking, but for the SWRCB's promulgation of the State's Implementation Policy. Without significant improvements, we do not believe that EPA's Economic Analysis would comply with the requirements of the state Porter-Cologne Act if used by the SWRCB to support the State Proposal. We propose that EPA and the SWRCB undertake a collaborative process with interested members of the public to revise the Economic Analysis, based on methodologies and assumptions Jointly agreed 91 upon. Such a process was recommended by the Economic Considerations Task Force convened by the SWRCB in 1995, based on the process used in the Bay-Delta process. Guidelines for embarking on a collaborative process were proposed in the Task Force Report (SWRCB, 1995, Section VIII). We believe that this process could result in a mutually acceptable and defensible analysis that both EPA and the SWRCB could use to satisfy their respective rulemaking requirements for economic analysis.

Based on the extensiveness of the modifications we believe EPA should make to both the proposed rule and the accompanying Economic Analysis, we request that EPA re-propose the rule for public review and comment before publishing the CTR as a final rule.

Response to: CTR-035-011a

See responses to CTR-021-004 and CTR-034-016.

The EA is part of a Federal action that is not subject to the requirements of the Porter-Cologne Act. The State, in the development of its Implementation Plan, is solely responsible for compliance with the requirements of the Porter-Cologne Act and other relevant State statutes. EPA is unable to comment on whether or not the State's future actions will withstand potential judicial review. However, EPA stands by its economic analysis as being an appropriate estimate of the costs likely to be incurred by California facilities as a result of implementation of the CTR.

Comment ID: CTR-045-014
Comment Author: Sausalito-Marin Sanitary Dist.
Document Type: Sewer Authority

State of Origin: CA
Represented Org:
Document Date: 09/24/97
Subject Matter Code: E-01u Economic Consid. Task Force
References:
Attachments? Y
CROSS REFERENCES

Comment: EPA and SWRCB should undertake a collaborative process with interested members of the public to revise the Economic Analysis, based on methodologies and assumptions jointly agreed upon, similar to the process recommended by the SWRCB's Economic Considerations Task Force.

Response to: CTR-045-014

See responses to CTR-021-004 and CTR-034-016.

Comment ID: CTR-049-007
Comment Author: Watereuse Assoc. of California
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 09/24/97
Subject Matter Code: E-01u Economic Consid. Task Force
References:
Attachments? N
CROSS REFERENCES

Comment: The accuracy of the Economic Analysis as contained in the CTR is extremely important. As such, we encourage the USEPA and the SWRCB to undertake a collaborative process with interested members of the public to revise the existing Economic Analysis to be based on methodologies and assumptions which are jointly agreed upon.

We respectfully submit these comments to the draft CTR for your consideration. If you should have any questions about WateReuse or the remarks contained in this correspondence, please feel free to contact me at (916) 442-2746 or our Executive Director Peter MacLaggan at (619) 523-4661. Thank you for your continued support of recycled water.

Response to: CTR-049-007

See responses to CTR-021-004 and CTR-034-016.

Comment ID: CTR-056-023
Comment Author: East Bay Municipal Util. Dist.
Document Type: Sewer Authority
State of Origin: CA
Represented Org:

Document Date: 09/22/97
Subject Matter Code: E-01u Economic Consid. Task Force
References: Letter CTR-056 incorporates by reference letter CTR-054
Attachments? N
CROSS REFERENCES

Comment: Because of the importance of the Economic Analysis, EBMUD and many other public agencies affected by the CTR believe that EPA and the SWRCB should adhere to the recommendation of the SWRCB's Economic Considerations Task Force convened by the SWRCB in 1995, and use a collaborative process in cooperation with interested members of the public to revise the Economic Analysis based on methodologies and assumptions jointly agreed upon. We believe that such a process will result in a mutually acceptable and defensible analysis that can satisfy the respective rulemaking requirements for an economic analysis.

Response to: CTR-056-023

See responses to CTR-021-004 and CTR-034-016.

Comment ID: CTR-066-018
Comment Author: Delta Diablo Sanitation Dist.
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: E-01u Economic Consid. Task Force
References:
Attachments? N
CROSS REFERENCES

Comment: The areas with which we find concerns and the requested changes include the following:

* Because of the importance of the Economic Analysis, EPA and the SWRCB should undertake a collaborative process with interested members of the regulated community and public to revise the analysis, based on methodologies and assumptions jointly agreed upon, similar to the process recommended by the SWRCB's Economic Considerations Task Force.

Response to: CTR-066-018

See responses to CTR-021-004 and CTR-034-016.

Comment ID: CTR-082-012
Comment Author: City of Burbank
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/24/97

Subject Matter Code: E-01u Economic Consid. Task Force
References:
Attachments? N
CROSS REFERENCES

Comment: The subject rule has a significant impact on our facility discharge and the citizens of the City. We therefore present the following comments for your consideration to re-open the comment period for this rule in order to facilitate a more complete review by public and in particular by those in the POTW community:

* Because of the importance of the economic analysis USEPA and SWRCB should undertake a collaborative process with interested members of the public to revise the economic analysis based on the methodologies and assumptions jointly agreed upon similar to the process recommended by the SWRCB's Economic Consideration Task Force.

Response to: CTR-082-012

See responses to CTR-021-004 and CTR-034-016.

Comment ID: CTR-096-009
Comment Author: City of Modesto
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-01u Economic Consid. Task Force
References:
Attachments? N
CROSS REFERENCES

Comment: Thank you for the opportunity to comment on the proposed California Toxics Rule. The City's comments are related to five main concepts:

Specifically, the City submits the following comments:

I. Lastly, because of the importance of the economic analysis, EPA and the SWRCB should undertake a collaboration process with interested members of the public to revise the Economic Analysis, based on methodologies and assumptions jointly agreed upon, similar to the process recommended by the SWRCB's Economic Considerations Task Force.

Response to: CTR-096-009

See responses to CTR-021-004 and CTR-034-016.

Subject Matter Code: E-01v Discharge Over Time

Comment ID: CTR-034-014d
Comment Author: SCAP
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-01v Discharge Over Time
References: Letter CTR-034 incorporates by reference letter CTR-035
Attachments? N
CROSS REFERENCES E-01g08
E-01b
E-01e
J

Comment: * In general, we are pleased that EPA prepared an analysis of the economic impacts of the proposed CTR, and that a major portion of EPA's work focused on determining the potential impacts on POTWs. However, we believe that this analysis is based on improper assumptions and inaccurate cost estimates, resulting in unconvincing conclusions. Detailed comments can be found in Attachment 2. A few of the areas of concern are listed below:

* Small facilities appear to be under represented in EPA's sample of POTWS, especially for minor dischargers.

* The cost triggers used as regulatory relief thresholds are unrealistic, and are not consistent with EPA regulations and policies.

* The assumptions used to determine cost estimates for indirect dischargers appear to omit a large proportion of potentially affected industries.

* The Economic Analysis does not take into account projected population and industrial growth over time, which may influence effluent quality and quantity. Statewide, the population is projected to grow by nearly 50% by 2020.

* The use of average cost estimates masks economic impacts on individual dischargers, which may be particularly acute for small communities.

* The economic Analysis ignores the costs that may be incurred by stormwater dischargers and nonpoint sources to reduce loadings so that CTR criteria may be met in ambient waters.

Response to: CTR-034-014d

See responses to CTR-032-004, CTR-035-061, CTR-021-006b, CTR-040-037, CTR-059-018, and CTR-035-048.

Comment ID: CTR-059-021
Comment Author: Los Angeles County Sanit. Dist

Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: E-01v Discharge Over Time
References: Letter CTR-059 incorporates by reference letter CTR-035

Attachments? Y
CROSS REFERENCES

Comment: Economic Analysis

The Sanitation Districts commends EPA for preparing an analysis of the economic impacts of the proposed CTR, and for selecting POTWs for half of the case studies. We believe that EPA is correct in thinking that POTWs are likely to experience major impacts as a result of the promulgation of the CTR. However, we believe that this analysis is based on improper assumptions and inaccurate cost estimates, resulting in unconvincing conclusions. Our own attainability and cost analysis indicates that there are indeed fundamental flaws in the cost analysis. A few of the areas of concern are listed below:

* The Economic Analysis does not take into account projected population and industrial growth over time, which may influence effluent quality and quantity. For example, in Los Angeles County the population is projected to grow to nearly 13 million (36%) by 2020.

Response to: CTR-059-021

See response to CTR-035-061.

Subject Matter Code: E-01w Cost per Facility

Comment ID: CTR-005-001
Comment Author: Novato Sanitary District
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/23/97
Subject Matter Code: E-01w Cost per Facility
References:
Attachments? Y
CROSS REFERENCES

Comment: Dear Ms. Frankel:

The Novato Sanitary District (District) thanks you for the opportunity to comment on the proposed California Toxics Rule (CTR). Unfortunately, we had insufficient time to analyze all aspects of the rule and the supporting economic analysis. This letter summarizes the comments based on our review to date.

As background, the District has two tertiary treatment plants (each with secondary treatment plus nitrification and filtration) which discharge through a common outfall to the shallow waters of San Pablo Bay. As a shallow water discharger, we are not allowed a dilution credit under the current Basin Plan and receiving water criteria are generally incorporated directly into our permit as effluent limits. The District has a population of approximately 57,000 and is basically residential in nature with supporting commercial development. We have no significant industrial dischargers to our system. We have established an aggressive pollution prevention program targeted primarily at copper (corrosion control and vehicle services control programs), and as a result our effluent copper levels have been reduced significantly (from over 50 ug/l several years ago to generally between 10 and 20 ug/l.

Sampling of residential and commercial discharges to our sewer system has established that influent copper levels are equivalent to residential copper levels and that 87% of the copper loading is attributable to tap water (the result of corrosion of copper pipes). The local water agency has already implemented a corrosion control project. Pursuant to the District's request, the agency has increased the pH beyond that required by the lead and copper rule to achieve maximum potential reduction of corrosivity. Our effluent monitoring has for several years employed clean sampling techniques and appropriate QA/QC. In the case of mercury, for example, we have been using Frontier GeoScience, the recognized expert in mercury analysis.

The District has evaluated low-cost alternatives for improving copper removals at the least efficient of our two treatment plants and concluded that addition of chemicals without significant capital improvements would not be effective. The District has further determined that significantimprovement in copper removals (although far less than needed to achieve compliance) would require capital improvements of $2.8 million and total annual costs of $480,000.

Response to: CTR-005-001

The Navato Sanitary District states that capital improvements of $2.8 million total and annual costs of $480,000 would be required for the District to achieve significant copper removal at one of its wastewater treatment plant facilities. Moreover, the district indicates that this investment will not be

sufficient to achieve compliance levels.

Review of the information submitted by the District is not sufficient to determine if the costs estimated by the District are consistent with the estimates obtained for sample facilities of the same industrial category and flow range. The existing permit limit for copper is not indicated in the documentation submitted by the District. Review of the NPDES Permit issued in 1992, which was to expire in 1997, indicates that a final copper permit limit of 2.9 ug/L was to become effective in April 11, 1996. This limit is more stringent than a limit calculated using CTR criteria for a facility with the characteristics of the Novato Sanitary District. Therefore, if the 1992 final permit limit were used to assess existing (baseline) conditions, it is unlikely that the Novato Sanitary District would show any cost as a result of the CTR.

Additionally, the cost estimates submitted by the District seem to be based on compliance with an estimated permit limit of 2.9 ug/L. These costs are included in the amendment request for the copper effluent limit submitted by the District to the California Regional Water Quality Control Board on January 31, 1996. A CTR-based permit limit for a facility with the characteristics of the Novato Sanitary District facility would use a 3.1 ug/L dissolved criteria for copper. Metal translators could also be used to derive permit limits and, if desired, the facility could complete a water effect ratios study which may result in a less stringent limit. For example, based on studies completed by the Regional Board and the City of San Jose (a San Francisco Bay discharger), water effect ratios for the Bay range between 1.7 and 3. Additionally, a metal translator of 3.2 could be calculated based on the U.S. EPA theoretical partitioning coefficient and an assumed total suspended solids (TSS) concentration of 20 mg/L. The resulting permit using CTR criteria and accepted implementation procedures would result in a limit of 16.8 ug/L for copper in comparison to the 2.9 ug/l limit the District used for its cost estimates.

Based on the above considerations, EPA does not believe the District cost estimates are comparable withthe estimates obtained for the economic analysis of the CTR.

Comment ID: CTR-059-022
Comment Author: Los Angeles County Sanit. Dist
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: E-01w Cost per Facility
References: Letter CTR-059 incorporates by reference letter CTR-035

Attachments? Y
CROSS REFERENCES

Comment: Economic Analysis

The Sanitation Districts commends EPA for preparing an analysis of the economic impacts of the proposed CTR, and for selecting POTWs for half of the case studies. We believe that EPA is correct in thinking that POTWs are likely to experience major impacts as a result of the promulgation of the CTR. However, we believe that this analysis is based on improper assumptions and inaccurate cost estimates, resulting in unconvincing conclusions. Our own attainability and cost analysis indicates that there are indeed fundamental flaws in the cost analysis. A few of the areas of concern are listed below:

* The use of average cost estimates masks economic impacts on individual dischargers.

Response to: CTR-059-022

See response to CTR-035-048.

Comment ID: CTR-070-002a
Comment Author: Sewerage Agency of Sthrn Marin
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/22/97
Subject Matter Code: E-01w Cost per Facility
References:
Attachments? Y
CROSS REFERENCES E-01d01

Comment: Economic analysis The attached table shows that implementation of the proposed limits will result in the reduction of SASM's copper limit from 37 ug/l to 12 ug/l. It is expected that reverse osmosis will be the most economical method to reach this level and that the cost of this operation will be approximately $550,000 per year. This equates to a 30% increase in SASM's budget. This cost is also higher than EPA's estimated costs of $27,000 to $480,000 per plant per year. It appears that the Economic Analysis underestimates the potential statewide cost and should be revised.

Response to: CTR-070-002a

SASM does not describe their existing treatment processes or provide detailed effluent data, thus EPA is not able to estimate a CTR-based effluent limit or evaluate whether process optimization is a viable alternative to reverse osmosis for controlling copper concentrations. EPA estimated that process optimization would be sufficient for the City of Colton (a secondary treatment wastewater sample facility with 9.9 MGD) to meet its estimated CTR-based limit for copper which require a loading reduction of less than 25%. EPA revised its cost estimates for the final CTR and now estimates that per facility costs for POTWs range from $61,000 to $325,000.

See response to CTR-045-012b.

Comment ID: CTR-081-005a
Comment Author: West County Agency
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: E-01w Cost per Facility
References:
Attachments? N
CROSS REFERENCES E-01d

Comment: * Based on the comments at the hearing of September 17, and our own estimates, the EPA's economic analysis has serious flaws and does not reflect the full costs for implementation of the CTR. The comments of the California Association of Sanitation Agencies should be given significant weight in this regard.

* For example, the WCA plants will not be able to meet the new criteria for copper, lead, and nickel, as well as some organics. This is true even after maximizing source control, pollution prevention, and process control improvements. Both our plants would need additional "end-of-pipe" treatment, such as reverse osmosis.

* Based on our analysis of the proposed CTR, we will need to implement reverse osmosis in order to meet the requirements of the proposed CTR. Based on this, we estimate that our potential annualized costs for compliance will be $11,220,000. These costs are significantly higher than EPA's estimated costs per plant of $27,000 to $480,000 per year. Thus, we believe strongly that the draft Economic Analysis significantly underestimates the potential statewide costs associated with adoption of the CTR and should be revised.

Response to: CTR-081-005a

EPA disagrees that its Economic Analysis (EA) underestimates costs. West County Agency does not provide the details of their $11.2 million cost estimate, thus EPA cannot evaluate its validity or conduct its own analysis. Based on EPA's sample of 14 POTWs in California, EPA predicts that the state-wide cost impact on POTWs would range from $7.8 million to $41.6 million per year. See the EA for details on the EPA's methodology and costs.

See responses to CTR-056-018, CTR-004-003, and CTR-045-012b.

Subject Matter Code: E-01y Cost of Efforts to Date

Comment ID: CTR-092-022c
Comment Author: City of San Jose, California
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: E-01y Cost of Efforts to Date
References: Letter CTR-092 incorporates by reference letter CTR-035
Attachments? Y
CROSS REFERENCES E-01c
E-01b01

Comment: Comment #6: General Cost Analysis Concerns

The City of San Jose has several generalized concerns about the costs utilized in the Economic Analysis, which raise questions regarding the validity of that analysis, as follows:

Q.6-1) We believe the real point of undertaking the CTR is to assure water quality throughout State that protects beneficial uses. How can the existing Economic Analysis be sufficient if it does not address the cost of meeting the CTR standards from all sources of discharge? Especially given the amount and cost of aggressive intervention in reducing point source pollution undertaken in California to date?

Q.6-2) Throughout the text of the CTR and within the Economic Analysis, EPA refers repeatedly to the assumption that the State will provide regulatory relief to mitigate severe cost impacts engendered by the CTR. What happens to EPA's cost benefit analysis if even one of those assumptions of regulatory relief is not implemented by the State? While we support EPA's attempt to indicate available regulatory options for the State, local level governments and POTW's have little past experience on which to rationalize acceptance of such assumptions.

Q.6-3) EPA has not estimated the cost to local governments/POTW's/indirect dischargers of securing regulatory relief, nor has that cost been incorporated into the estimate of the CTR impact. How would EPA estimate the cost of securing regulatory relief and how would that additional cost affect the Economic Analysis? Especially since very costly studies may be required in order to qualify for regulatory relief.

Q.6-4) The preamble to the CTR discusses the linkage between the CTR and the National Toxics Rule, and EPA's intent to create a level playing field by setting the CTR standards within the National Toxics Rule Framework. There does not seem to have been a similar attempt to analytically level the playing field vis a vis implementation costs, however, as no indexing or calibration has been undertaken to account for the cumulative costs of efforts to date (see also Q. 4-3), cost equivalency data is rooted in experience outside California, and simple average costs are used to represent widely variable ranges. How would the CTR cost/benefit relationship be affected by adjusting for California's significant previous efforts on water quality control mechanisms and California cost data?

Response to: CTR-092-022c

See responses to CTR-032-004, CTR-060-019, CTR-004-003, CTR-035-048, and CTR-092-022a.

Comment ID: CTRH-002-018
Comment Author: Ing-Yig Cheng
Document Type: Public Hearing
State of Origin: CA
Represented Org: L.A. Bureau of Sanitation
Document Date: 09/18/97
Subject Matter Code: E-01y Cost of Efforts to Date
References:
Attachments? N
CROSS REFERENCES

Comment: DR. CHENG: Hi. My name is Ing-Yih Cheng. I'm here today representing the City of Los Angeles, Department of Public Works, Bureau of Sanitation. City of Los Angeles has three treatment plans that are being affected by CTR. They are Tillman Water Reclamation Plant, Los Angeles-Glendale Water Reclamation Plant, and the Terminal Island Treatment Plant. We appreciate the opportunity to testify on the proposed CTR. We have three issues to briefly address because of time limitations, and a more detailed written comment will be forthcoming.

The first and foremost issue concerns with the economic analysis that you have performed on the Tillman plant. When the State Inland Surface Water Plan came out in 1991, the City conducted probable cause assessment for the Tillman plant. The study was completed in April 1992 after a new ISWP-based NPDES permit had been issued. A comparison between this detailed study and EPA economic analysis showed that your economic analysis underestimated the cost required for compliance by orders of magnitude. And the reason for this is because EPA's EA compared CTR to essentially ISWP requirements, since the NPDES permit limits reflect ISWP limits criteria. This is inherently unfair because it ignores treatment costs for those constituents that we are yet to be in full compliance with. We have discussed this matter with our attorney who has advised us to exhaust all legal remedies and hold EPA to the requirement that it prepare a legally defendable economic analysis. We will be glad to make details of our cost estimates available to you, if you like. And on the basis of this comment for one plant alone, we object to EPA's finding that CTR is not a significant rulemaking.

Response to: CTRH-002-018

See responses CTR-021-005c and CTR-035-058.

Subject Matter Code: E-02 Benefits Analysis

Comment ID: CTR-034-015
Comment Author: SCAP
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-02 Benefits Analysis
References: Letter CTR-034 incorporates by reference letter CTR-035
Attachments? N
CROSS REFERENCES

Comment: * The Economic Analysis presents a very weak analysis of potential benefits, which is based on limited information about ambient water quality conditions. Due to this weakness, combined with the paucity of information in the literature regarding the benefits from marginal improvements in water quality, the benefits analysis does a poor job of evaluating the marginal benefits that would result from the implementation of the CTR.

* The Economic Analysis suggests that reductions attributable to point source reductions may be de minimis. For instance, most of the public health benefits appear to be associated with a small number of contaminants, most of which are not discharged in significant quantities by point source dischargers. Cancer risks, for example are dominated by four contaminants, two of which - DDT and PCBs - are probably more the result of historic loadings than due to ongoing point source inputs.

Response to: CTR-034-015

Water quality improvements often involve thresholds such as action levels for fish consumption advisories. However, water quality regulations often contribute only a portion of the improvement needed to surpass a threshold. Although individuals may (or may not) have a willingness to pay for incremental steps toward crossing a threshold, when the threshold is surpassed (e.g., fish consumption advisories are lifted), every action that contributed to the effort should be allocated a portion of the benefits. This was accomplished for the CTR by allocating a portion of the total toxic-free benefits (proportional to the reduction in loadings) to the implementation of point source controls under the CTR.

EPA analyzed potential reductions for over forty toxic pollutants that may be discharged by point sources. EPA expects that reductions in these toxics will lead to a variety of benefits including ecological, health, and recreational benefits. Although certain health risks such as cancer are indeed dominated by only a few toxic contaminants that may not be greatly reduced by point source controls, reductions of these toxics are, nevertheless, expected to yield reductions in cancer cases as well as systemic health risks. EPA expects the annual reduction in cancer cases among recreational anglers after implementation of the CTR to range from 0.0 to 0.1 for San Francisco Bay and 0.0 to 0.8 for freshwater resources. EPA also analyzed the post-CTR hazard quotients (HQ) for systemic risks among recreational anglers with high consumption rates. The HQ for PCBs may be reduced from 11.31 to 5.44 for San Francisco Bay anglers and from 7.02 to 3.28 for freshwater anglers.

Comment ID: CTR-035-071
Comment Author: Tri-TAC/CASA

Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-02 Benefits Analysis
References:
Attachments? N
CROSS REFERENCES

Comment: * As indicated in Table Two, much of the benefit estimates are based on little or no empirical data.

Table Two Benefit Areas with Little or No Empirical Foundation Variable/Issue Empirical Evidence

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"Water quality conditions in many State waters have not been fully assessed, and assessments of waters that have been evaluated often do not contain monitoring data that is extensive or detailed enough to determine whether the waterbody meets all of the proposed criteria." (U.S. EPA, 1997d, page 1-5)

In many cases there is limited information about water quality conditions, and as a result the need for, and benefits associated with, pollution reductions is substantially unknown.

****

"EPA found no available studies of the value to California anglers of reducing toxic contamination in surface waters." (U.S. EPA, 1997a, page ES-12).

Fishing-related benefits are based on a single out of-state report which estimated "...the value of reducing toxic contaminants in a popular boat fishery that has experienced widespread and highly publicized contamination and fish consumption advisories" (U.S. EPA, 1997a, page 8-17). This analysis most likely bears little or no relation to California conditions, and should not be used as the sole basis for benefits estimation.

****

Assumes that the proposed rules will result in "appreciable" increases in water- and land-related recreation apart from fishing.

No evidence is presented that boaters, swimmers, hunters or others will increase their use of California's resources because of a marginal change in pollutant load.

****

Assumes the rule would likely engender some "passive use" benefits.

Passive use benefits estimates are based on a 13-year old analysis which may bear little relevance to the Rule. The supporting data for this benefit category is so poor as to forgo any quantification of it.

****

Uses effluent concentration data from the Sacramento County POTW to analyze freshwater resources.

"...may not be representative of effluent from other facilities" (U.S. EPA, 1997a, page 7-6).

****

Assumes San Francisco Bay discharges have not changed over the last decade.

The Analysis is based on ten-year old data which may not be representative of current conditions.

****

"Reductions in toxics may contribute to improved conditions for the successful recovery of federal and State threatened and endangered species..."

No evidence is provided supporting this claim.

****

Assumes relative point/non-point source contribution to particular contaminants based on limited data.

"None of the data sources ... definitely estimates the relative point source contribution of PCBS, dioxin, pesticides, or mercury..." (U.S. EPA, 1997d, page 7-32).

****

Response to: CTR-035-071

EPA defined toxic-impaired waters as waters rated medium or poor quality for at least one or more toxic pollutant or group of pollutants. EPA acknowledged that this definition may result in an overestimate of toxic-impairment (EA Chapter 8). However, the rating of these waters corresponds to EPA's categories of 'not fully supporting' and 'partially supporting' designated uses. The existence of waters not supporting and only partially supporting designated uses is indicative of the need for and benefits associated with pollution controls.

EPA considers Lyke's scenario (waters completely free of contaminants that may threaten human health) to be similar to a scenario in which all California waters meet the water quality standards established by the CTR. EPA has no information to show that these standards cannot be achieved. Thus, EPA used Lyke's results to estimate the total potential benefits of achieving standards. However, since point source controls alone may not be sufficient to achieve the standards throughout California, EPA allocated only a portion of the total benefits to the CTR.

EPA agrees that the study site for Lyke's research is substantially different from California waters. However, EPA's search of the literature indicated that there is no similar research for California or other more similar waters. Therefore, EPA applied Lyke's results to provide decisionmakers with information on the types and potential magnitude of the benefits from water quality improvements, rather than leaving this important benefit category unmonetized. EPA has no information to determine whether California residents may value toxic-free waters more or less than Wisconsin residents.

In addition, EPA believes that Lyke's scenario does not capture another component of potential value to current anglers that may result as reduced levels of toxic pollutants result in healthier sport fish populations. Lyke's survey asked anglers to consider a fishery that is free of contaminants that may threaten human health. However, fish are more sensitive than humans to some classes of toxic pollutants and fish populations may increase as contamination is reduced. To the extent that reducing toxic contamination results in a more satisfying angling experience in terms of increasing catch rates, achieving water quality standards may result in an increase in value to current anglers beyond that associated with reducing human health concerns.

EPA did not include values for water- and land-related benefits other than fishing, but noted that potential benefits may be underestimated because these benefit categories are not included. As described in the EA (Chapter 8), EPA believes that these benefits may be appreciable because such recreational activities (e.g., boating, swimming, picnicking, and related activities) have been shown in empirical research to be highly valued, and even modest changes in participation or user values could lead to sizable benefits statewide. Some of these activities can be closely associated with water quality attributes (e.g., swimming) and others might increase due to their association with fishing, swimming, or other activities in which the
participants might engage.

As described in the EA (Chapter 8), research provides empirical evidence of the passive use values associated with improved water quality and fisheries. Research also indicates that these values are at least half as great as recreational values, such that if they are potentially applicable to a policy action, providing a rough approximation is preferable, with proper caveats, to omitting them from the analysis of benefits and costs. EPA believes that the studies used to calculate the ratio of passive use to use value are applicable to the CTR (see also comment and response CTR-026-009). Therefore, EPA applies a ratio of 0.5 to obtain an estimate of passive use values for households with active recreational anglers. Based on a review of the literature, EPA believes that non-angling household do indeed have a passive use value. To determine a lower-bound estimate of passive use values for non-angling households, EPA assumed that the value may be 30% of the value for angling households. For analysis of the final CTR, EPA revised the upper-bound estimate assuming that the passive use value of non-angling households may be 90% of those for angling households. This revision is based on a study by Loomis et al. (1991), who estimated the benefits of improved fishery, wetland, and waterfowl resources in the San Joaquin Valley to users and nonusers residing in California.

By multiplying a ratio of passive use to use value by recreational fishing values, which EPA apportioned to reflect the relative contribution of point sources, EPA also accounted for attribution in its estimate of passive use values.

For the EA that accompanied the proposal, EPA conducted an extensive search of the literature for more recent data or information related to the relative contributions of various sources to water quality impairments. In the EA accompanying the proposal, EPA solicited additional data, however, none was received. In revising the EA for the final rulemaking, EPA conducted an additional extensive search of the literature and research efforts at California universities for relevant information. EPA has incorporated any new information into the revised EA for the final rule.

EPA provided a qualitative description of the potential impacts of toxics on ecological resources and the potential benefits from reducing toxic loadings to the state's water resources (see Chapter 6 of the EA that accompanied the proposed rule). As stated in that chapter, EPA performed a qualitative assessment of the ecologic benefits of the proposed rule (IEC, 1996), rather than a contaminant-specific quantitative

assessment of the magnitude and extent of benefits accruing for each affected aquatic system. However, without performing a complete quantitative analysis, EPA concluded that potential ecologic benefits from implementation of the CTR may include:

* Reductions in toxics loadings are expected to contribute to improved conditions for California fish spawning and/or migration in bays/harbors and estuaries, lakes, rivers and streams, and saline lakes.

* Reductions in bioaccumulative chemicals of concern that may currently affect fish and wildlife throughout the state, including selenium, mercury, PCBs, dioxins, and chlorinated pesticides.

* Reductions in toxics may contribute to improved conditions for the successful recovery of federal and State threatened and endangered species, such as the delta smelt, desert pupfish, California brown pelican, bald eagle, California clapper rail, California tiger salamander, and western snowy plover.

* Reductions in toxics may reduce adverse toxics-related impacts on aquatic and terrestrial wildlife in two important areas of California: the San Francisco Bay watershed and the Central Valley (see Case Studies in [U.S. EPA, 1997]).

* Reductions in the concentrations of both selenium and pesticides in the waters that feed the Salton Sea may contribute to improved conditions for the restoration and maintenance of currently declining populations of wildlife, including threatened and endangered species such as the California brown pelican, peregrine falcon, bald eagle, Yuma clapper rail, and desert pupfish (see Case Studies in [U.S. EPA, 1997]).

* Improved water quality and associated improvements in survival, growth, and reproductive capacity of aquaticand aquatic-dependent organisms may contribute to the increased stability, resilience, and overall health of numerous ecosystems throughout California, and may contribute to protecting, restoring, and maintaining California's ecological diversity.

EPA used ranges to address the uncertainty in the relative point source contribution of different contaminants. These ranges were based on toxic-weighted pollutant loads so that the results could not be driven by pollutants with little impact on the environment or public health. EPA also solicited additional or updated data and information on this issue in the EA but did not receive any. In revising the EA for the final rulemaking, EPA conducted an additional extensive search of the literature and research efforts at California universities for relevant information. EPA has incorporated any new information into the revised EA for the final rule.

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Comment Author: Tri-TAC/CASA
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-02 Benefits Analysis
References:
Attachments? N
CROSS REFERENCES

Comment: * Likewise, as indicated in Table Three, the benefits analysis is based on a number of assumptions which may act to overstate benefits.

Table Three Other Major Technical Assumptions Which Could Affect Benefits Estimates

Assumptions Potential Impact on Analysis

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"The benefits estimates in this report represent the total benefits expected to occur once water quality control programs have been fully implemented by California and water quality criteria have been achieved for toxic pollutants." (U.S. EPA, 1997d, page 1-8)

Cost analysis explicitly includes exemptions (cost thresholds) to rule attainment. Likewise, non-point sources are excluded. Both of these factors indicate that water quality criteria will not be achieved, and certainly not at the estimated cost.

****

Assumes anglers are aware of toxic contamination in waters that have no fish consumption advisories.

No empirical evidence provided on behavioral responses, if any, to actual or perceived public health concerns.

****

Assumes "potential benefits for all California waters affected by toxics, not just those waters under fishing consumption advisories" (U.S. EPA, 1997a, page 8-17).

May overstate benefits related to point source reductions, as most of the fishing contaminants are related to non-point sources.

****

Assumes little substitution among fishing sites.

Estimates of the value of increased fishing participation most likely overstates angler behavior as a result of substitution between fishing sites.

****

Assumes one-to-one benefit from reduction in toxics.

Other factors (e.g., habitat alteration) may pose more serious threats to the environment, and partially negate rule benefits. For example, complete reductions in point source pollution is meaningless if the water body's habitat has been substantially disturbed by development.

****

Response to: CTR-035-072

The commenter is referring to the estimate of total potential benefits in the analysis of benefits document. In EPA's EA for the proposed (and final) rule, only the portion of benefits expected to be achieved by implementing controls on point source dischargers are counted. EPA recognizes that the proposed standards will not be achieved in some cases by controlling point sources alone. EPA's assumptions regarding the attribution of benefits to the rule are described in the EA for the proposed rule in Chapter 7.

EPA's analysis presents only the portion of the total potential benefits that can be achieved by controlling point sources. EPA expects additional benefits will accrue as a result of controlling other sources. EPA has no reason to believe that the standards established by the CTR cannot be achieved.

EPA acknowledges that applying Lyke's results to all California waters affected by toxics may overstate potential benefits (see EA Chapter 8). Anglers may or may not be aware of toxic contamination in the absence of fish consumption advisories. EPA acknowledges the limitations in the application of Lyke's research. However, EPA chose this approach to provide illustration of the potential magnitude of recreational angling values rather than leave this important benefit category unmonetized.

In addition, EPA believes that Lyke's scenario does not capture another component of potential value to current anglers that may result as reduced levels of toxic pollutants result in healthier sport fish populations. Lyke's survey asked anglers to consider a fishery that is free of contaminants that may threaten human health. However, fish are more sensitive than humans to some classes of toxic pollutants and fish populations may increase as contamination is reduced. To the extent that reducing toxic contamination results in a more satisfying angling experience in terms of increasing catch rates, achieving water quality standards may result in an increase in value to current anglers beyond that associated with reducing human health concerns.

EPA first applied Lyke's research in its analysis of the potential benefits of the Great Lakes Water Quality Guidance. Calculation of the range of results is explained in U.S. EPA (1993). Lyke estimated the Wisconsin Great Lakes open water sport fishery to be worth between $339 and $424 per licensed angler, resulting in an estimated consumer surplus associated with the fishery of between $66.6 million and $83.3 million annually. Lyke obtained values for a contaminant-free fishery ranging from $7.4 million to $26.1 million per year, with the range in results attributable to whether a linear or constant elasticity of scale functional form is used in the estimation. These results reflect between 11.1% and 31.3% of the value of the fishery under current conditions, which is the range of values EPA used in analysis of the CTR.

EPA acknowledges that Lyke-based benefits represent a substantial portion of total benefits and supports these benefits estimates. (See also comment and response to CTR-035-009a.)

U.S. EPA, 1993. Regulatory Impact Analysis of the Proposed Great Lakes Water Quality Guidance. Final Report, April 15.

Behavioral responses to public health concerns and pollution have been documented in the literature. For example, as shown in the table below, anglers in the Great Lakes region report taking fewer fishing trips, changing fishing locations, and changing cooking methods in response to fish consumption advisories. EPA revised it's analysis to include this information.

References

Fiore, B.J., H.A. Anderson, L.P. Hanrahan, L.J. Olson, and W.C. Sonzogni. 1989. Sport Fish Consumption and Body Burden Levels of Chlorinated Hydrocarbons: A Study of Wisconsin Anglers.

Archives of Environmental Health. 44(2):82-88.

Knuth, B.A. and N.A. Connelly, and M.Z. Shapiro. 1993. Angler Attitudes and Behavior Associated with OhioRiver Health Advisories. Prepared by the Human Dimensions Behavior Research Unit of the Department of Natural Resources of the New York State College of Agriculture and Life Sciences. HDRU Series No. 93-6. July. 163 pp.

Knuth, B.A. and N.A. Connelly. 1992. Is New York's Health Advisory on Fish Consumption Making a Difference? Coastlines. 22(4):4-5.

Silverman, W.M. 1990. Michigan's Sport Fish Consumption Advisory: A Study in Risk Communication. Thesis. University of Michigan, Ann Arbor. May. 103 pp.

Vena, J.E. 1992. Risk Perception, Reproductive Health Risk and Consumption of Contaminated Fish in a Cohort of New York State Anglers. Research Program in Occupational and Environmental Health, State University of New York at Buffalo. 67 pp.

West, P.C., J.M. Fly, R. Marans, F. Larkin, and D. Rosenblatt. 1993. 1991-92 Michigan Sport Anglers Fish Consumption Study. Executive Summary. University of Michigan, Natural Resource Sociology Lab. Technical Report #6. Ann Arbor, Michigan.

Behavioral Responses of Anglers to Fish Consumption Advisories

Study	Location	Reported Behavioral Response
Fiore et al. (1989)	Lake Michigan and Green Bay, Wisconsin	57% Reported changing fishing habits and/or fish consumption
Knuth, Connelly, and Shapiro (1993)	Ohio River	37% Took fewer trips
		26% Changed fishing locations
		26% Changed species sought
		22% Changed cleaning methods
		17% Changed size of fish consumed
		13% Changed cooking methods
Vena (1992)	Lake Ontario, New York	53% Ate less fish
		31% Changed preparation methods
		30% Changed fishing locations
		20% Changed species sought
		16% No longer ate fish
		16% Took fewer trips
Silverman (1990)	Lake St. Clair	56% Ate less fish
	Detroit River	56% Changed cleaning methods
	Lake Erie	41% Ate smaller fish
		31% Changed fishing locations
		31% Ate different species

		28% Changed cooking methods 21% Fished for different species 10% Took fewer fishing trips
Knuth and Connelly (1992)	New York	70% Ate less fish 40% Cooked fish differently 17% No longer ate sport caught fish
West et al. (1993)	Michigan	86% Cooked fish differently (Great Lakes anglers) 80% Ate less fish (Great Lakes anglers) 75% Cleaned fish differently 46% Ate less fish (overall) 27% Cooked fish differently (overall)

Although the standards established by the CTR apply to the waterbody (i.e., inland surface waters and enclosed bays and estuaries) EPA's analysis examined only the portion of benefits expected to be achieved by controlling point sources. EPA estimated the point source share of benefits based on data and information on the relative contribution of all sources to toxic loadings in California waters. Although point sources may account for only a small portion of the load in some waters, they may account for relatively larger portions at some sites, and point source controls will contribute to meeting standards in the water bodies.

EPA acknowledged that increased angling activity at sites experiencing reductions in toxic contaminants may reflect a shift in activity from substitute sites rather than a net increase. Because EPA could not account for substitute sites in this analysis, EPA estimated lower bound benefits of $0 (i.e., assuming no net increases in activity; see EA, Chapter 8).

EPA believes that where appropriate habitat, species, and other conditions exist, yet waters are impaired by toxic pollutants, the standards established by the CTR will result in attaining designated uses. At sites where designated uses are also impaired by factors such as habitat alteration, exotic species, or inadequate flows, these conditions may have to be corrected to fully attain the use. Notwithstanding, even if a receiving water does not fully attain its use because of other factors, this does not justify further degrading the water body by failing to reduce loadings of toxic pollutants.

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Comment Author: County of Sacramento Water Div
Document Type: Storm Water Auth.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-02 Benefits Analysis
References: Letter CTR-040 incorporates by reference letter CTR-027
Attachments? Y

CROSS REFERENCES

Comment: ATTACHMENT: 3 - 2 A Criteria Review of: "Discrete Choice Models to Value Changes in Environmental Quality: A Great Lakes Case Study"(*1)

Introduction This dissertation is primarily concerned with examining economic models of natural resource valuation. Specifically, two models were examined, the travel cost method and the contingent valuation method. The main purpose of this dissertation was to apply these probabilistic choice models to a new data set and examine their performance against one another. In this study, the main use of contingent valuation modeling is to provide alternative value estimates for comparison to the values produced by the travel cost model. The data set examined consisted of two sets of surveys completed by a total of 513 anglers in Wisconsin. One set of surveys examined Wisconsin anglers who fished for trout and salmon in the Great Lakes (274 respondents), while the second set examined those who fished for trout and salmon in inland waters other than the Great Lakes (239 respondents). The primary concern of this critique lies in the application of some of Lyke's findings to the benefits analysis of EPA's California Toxics Rule(*2). Specifically, EPA uses Lyke's results in calculating the potential benefits accrued by California fisheries attributable to the implementation of the California Toxics Rule.

The Models Two models are used in analyzing the data. The first is the travel cost model which links travel costs and fishing success to angler decisions of where to fish. The second model is from a class of questioning methods known as contingent valuation. The travel model estimates non-market value from observable behavior (e.g. distance traveled to fishing sites) while the contingent valuation method simply measures attitudes (the willingness to pay to use a fishing site) not economic behavior per se. This critique is primarily concerned with the contingent valuation questions found in the surveys. These questions measured respondents valuation of their fishing experience (a valuation of the fishery) in relation to toxic contamination. The responses to these questions provide the basis for EPAs valuation of the improved fishing experience for California anglers after implementation of the California Toxics Rule.

Sample Design Data The contingent valuation model data are taken from two mail surveys of anglers who held fishing licenses in 1988 and fished in 1989. This study only examined the behavior and views of anglers who fish for trout and salmon. Millions of trout and salmon are planted in Wisconsin waters annually and catching them is a popular pastime. However, most of these fish are hatchery raised and as such represent a major expense for the state fisheries agency. To help defray these costs, the state requires a special trout and salmon stamp on the licenses of anglers who catch these fish. This added cost might deter some anglers, who then would not be in the "angler population" examined in this study. Also, since anglers who fish primarily for trout and salmon are willing to pay more to catch these prized gamefish, they may be more conscientious in returning questionnaires that "typical" anglers. Both these factors may cause overestimates of fisheries value in this study. This critique is primarily concerned with the data provided by Wisconsin anglers who were identified as having fished the Great Lakes for trout and salmon in 1989. This set consisted of 274 useable questionnaires (out of a possible 368 anglers).

Results Contingent valuation results were generated from responses to direct questions about the value of a given resource (in this case the Great Lakes sport fisheries). The contingent valuation models are applied to value the Wisconsin Great Lakes sport fisheries under current conditions as well as for hypothetial scenarios where contaminants are removed from the fishery and where native lake trout populations are rehabilitated. There is no travel cost model alternative to measuring these values. Lyke determined that the current value (in 1989 dollars) of the Great Lakes Fishery was $339.43/angler/year (with a standard error of $53.17). The value of a hypothetically "contaminant free" fishery to anglers

was $377.18/angler/year (with a standard error of $64.60). These values can be found in Table 15 (pg. 169) of Lyke's dissertation. It appears that EPA uses these values to estimate the potential increase in value to California fisheries with the implementation of the California Toxics Rule. EPA estimates an 11.1 percent to 31.3 percent in value to fisheries following the application of the California Toxics Rule and the subsequent elimination of toxicants from affected waterbodies. These estimated increases appear to be drawn from the values presented by Lyke. There is an 11.1 percent increase in worth when the mean value of current conditions are compared to the mean value of the hypothetical "contaminant free" conditions. There is a 31.8 percent increase in worth when the lower end (mean value minus the standard error) of the value for current conditions is compared to the mean value of the "contaminant free" conditions.

Conclusions:

1.) There is a lack of data on the value anglers in California place upon reducing toxic contamination to fisheries, so EPA used the increase in values produced by Lyke's model. However, the increases in value which Lyke shows are based on the responses of 274 individual anglers to only two contingent valuation questions in a mail survey containing a total of 64 questions. This is clearly a very small sample of the population of Wisconsin anglers and may have caused some bias in the analysis. This was probably a representative sample of anglers but not a random sample of anglers.

2.) Only anglers who fished for trout and salmon in the Wisconsin Great Lakes were surveyed. These anglers may not be representative of the typical Wisconsin Great Lakes angler, and this data does not show any valuation for any fishery other than trout and salmon.

3.) It is not clear how EPA derived the upper limit of their potential increase in fisheries value (31.3 percent). It is possible that EPA used the "contaminant free" mean ($377. 18/angler/year) and compared that to the low end value (mean minus the standard error) of the value of the fishery under current conditions ($286.26/angler/year), yielding an increase in value of 31.8 percent. Another portion of Lyke's analysis actually shows "contaminant free" fisheries to be valued lower than the current "contaminated" fishery. Inland fishing anglers who fish for trout and salmon were less willing to pay for a contaminant free fishery. The mean value of the inland fishery under current conditions ($720.12/angler/year) compared to the mean value of a "contaminant free" inland fishery ($597.42/angler/year) yields a loss in value of 17 percent.

4.) There is no evidence than any portion of Lyke's dissertation has undergone peer review outside the University of Wisconsin-Madison. An extensive literature search found no peer reviewed journal publications by the author. Without proper peer review, its methods and conclusions must remain in doubt.

5.) The degree and extent to which individual Great Lakes fishing sites and fisheries are contaminated by toxicants was not considered in this study. Therefore, it is unclear how well the study's findings can be applied to "contaminated" fisheries in California.

6.) Contingent valuation measures the attitudes of anglers, not their behavior. More specifically, it measures an anglers stated willingness to pay or compensate, not the actual behavior of paying or compensating.

(*1) Lyke, Audrey J., Dissertation submitted to the Graduate School of the University of Wisconsin-Madison, 1993.

(*2) U.S. EPA Analysis of the Potential Benefits Related to Implementation of the California Toxics Rule. June 1997.

Response to: CTR-040-052

EPA acknowledges that Lyke's study has not been published in a peer reviewed journal and that she obtained some inconsistent results. EPA applied Lyke's research to illustrate the types and potential magnitude of the benefits from water quality improvements. EPA conducted an extensive search of the literature for additional studies that provide indication of the potential magnitude of the benefits from reducing concentrations of toxic pollutants in California surface waters. The results of EPA's search are described in the EA that accompanies the final rule.

EPA acknowledges that applying Lyke's results to all California waters affected by toxics may overstate potential benefits (see EA p. 8-17). Anglers may or may not be aware of toxic contamination in the absence of fish consumption advisories. EPA acknowledges the limitations in the application of Lyke's research. However, EPA chose this approach to provide illustration of the potential magnitude of recreational angling values rather than leave this important benefit category unmonetized.

In addition, EPA believes that Lyke's scenario does not capture another component of potential value to current anglers that may result as reduced levels of toxic pollutants result in healthier sport fish populations. Lyke's survey asked anglers to consider a fishery that is free of contaminants that may threaten human health. However, fish are more sensitive than humans to some classes of toxic pollutants and fish populations may increase as contamination is reduced. To the extent that reducing toxic contamination results in a more satisfying angling experience in terms of increasing catch rates, achieving water quality standards may result in an increase in value to current anglers beyond that associated with reducing human health concerns.

EPA first applied Lyke's research in its analysis of the potential benefits of the Great Lakes Water Quality Guidance. Calculation of the range of results is explained in U.S. EPA (1993). Lyke estimated the Wisconsin Great Lakes open water sport fishery to be worth between $339 and $424 per licensed angler, resulting in an estimated consumer surplus associated with the fishery of between $66.6 million and $83.3 million annually. Lyke obtained values for a contaminant-free fishery ranging from $7.4 million to $26.1 million per year, with the range in results attributable to whether a linear or constant elasticity of scale functional form is used in the estimation. These results reflect between 11.1% and 31.3% of the value of the fishery under current conditions, which is the range of values EPA used in analysis of the CTR.

EPA acknowledges that Lyke-based benefits represent a substantial portion of total benefits and supports these benefits estimates. (See also comment and response to Issue 3.)

U.S. EPA, 1993. Regulatory Impact Analysis of the Proposed Great Lakes Water Quality Guidance. Final Report, April 15.

EPA considers Lyke's scenario (waters completely free of contaminants that may threaten human health) to be similar to a scenario in which all California waters meet the water quality standards established by the CTR. EPA has no information to show that these standards cannot be achieved. Thus, EPA used Lyke's results to estimate the total potential benefits of achieving standards. However, since point source controls alone may not be sufficient to achieve the standards throughout California, EPA allocated only a portion of the total benefits to the CTR.

EPA agrees that the study site for Lyke's research is substantially different from California waters. However, EPA's search of the literature indicated that there is no similar research for California or other more similar waters. Therefore, EPA applied Lyke's results to provide decisionmakers with information on the types and potential magnitude of the benefits from water quality improvements, rather than leaving this important benefit category unmonetized. EPA has no information to determine whether California residents may value toxic-free waters more or less than Wisconsin residents.

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EPA agrees that the contingent valuation method (CVM) elicits an individual's stated willingness to pay or accept compensation. The benefit-cost comparisons in EAs are prepared to inform the public and policy makers. Thus, the strengths and weaknesses of all aspects of the EA, including methodologies for estimating benefits, need to be made clear so that readers are aware of the limits and uncertainties. However, a 1993 Blue Ribbon Panel convened by the National Oceanic and Atmospheric Administration (NOAA) evaluated CVM and found it to be an appropriate methodology for measuring values. It is also the only method accepted by the U.S. Department of the Interior (DOI) to estimate nonuse values and has withstood Federal Court review for its use in litigation contexts.

Additionally, much of the criticism of CVM is conceptual rather than based on empirical research. Where CVM can be compared to other research techniques (e.g., use values estimated by the travel cost methodology or the hedonic price method), CVM is shown to yield similar values (see Brookshire et al., 1982 and Smith et al., 1986). Additionally, in several field experiments, actual purchase decisions were compared to hypothetical purchase decisions (Bishop and Heberlein, 1978 and Dickie et al., 1987). In all of these studies, hypothetical behavior was sufficiently predictive of actual behavior that researchers concluded meaningful values could be obtained for benefit-cost analysis or damage assessment.

Bishop, R.C. and T.A. Heberlein. 1978. Measuring values of extra-market goods: Are indirect measures biased? American Journal of Agricultural Economics 61(5): 926-930.

Brookshire, D., M. Thayer, W.D. Schulze, and R. d'Arge. 1982. Valuing public goods: A comparison of the survey and hedonic approaches. American Economic Review 72(1): 165-177.

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Comment Author: Sacramento Reg Cnty Sanit Dist
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
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References:

Attachments? N
CROSS REFERENCES

Comment: ATTACHMENT: B - 2 A Criteria Review of: "Discrete Choice Models to Value Changes in Environmental Quality: A Great Lakes Case Study"(*1)

Introduction This dissertation is primarily concerned with examining economic models of natural resource valution. Specifically, two models were examined, the travel cost method and the contingent valuation method. The main purpose of this dissertation was to apply these probabilistic choice models to a new data set and examine their performance against one another. In this study, the main use of contingent valuation modeling is to provide alternative value estimates for comparison to the values produced by the travel cost model. The data set examined consisted of two sets of surveys completed by a total of 513 anglers in Wisconsin. One set of surveys examined Wisconsin anglers who fished for trout and salmon in the Great Lakes (274 respondents), while the second set examined those who fished for trout and salmon in inland waters other than the great lakes (239 respondents). The primary concern of this critique lies in the application of some of Lyke's findings to the benefits analysis of EPA's California Toxics Rule(*2). Specifically, EPA uses Lyke's results in calculating the potential benefits accrued by California fisheries attributable to the implementation of the California Toxics Rule.

The Models Two models are used in analyzing the data. The first is the travel cost model which links travel costs and fishing success to angler decisions of where to fish. The second model is from a class of questioning methods known as contingent valuation. The travel model estimates non-market value from observable behavior (e.g. distance traveled to fishing sites) while the contingent valuation method simply measures attitudes (the willingness to pay to use a fishing site) not economic behavior per se. This critique is primarily concerned with the contingent valuation questions found in the surveys. These questions measured respondents valuation of their fishing experience (a valuation of the fishery) in relation to toxic contamination. The responses to these questions provide the basis for EPAs valuation of the improved fishing experience for California anglers after implementation of the California Toxics Rule.

Sample Design Data The continent valuation model data are taken from two mail surveys of anglers who held fishing licenses in 1988 and fished in 1989. This study only examined the behavior and views of anglers who fish for trout and salmon. Millions of trout and salmon are planted in Wisconsin waters annually and catching them is a popular pastime. However, most of these fish are hatchery raised and as such represent a major expense for the state fees agency. To help defray these costs, the state requires a special trout and salmon stamp on the licenses of anglers who catch these fish. This added cost might deter some anglers, who then would not be in the "angler population" examined in this study. Also, since anglers who fish primarily for trout and salmon are willing to pay more to catch these prized gamefish, they may be more conscientious in returning questionnaires than "typical" anglers. Both these factors may cause overestimates of fisheries value in this study. This critique is primarily concerned with the data provided by Wisconsin anglers who were identified as having fished the Great Lakes for trout and salmon in 1989. This set consisted of 274 useable questionnaires (out of a possible 368 anglers).

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Conclusions:

1.) There is a lack of data on the value anglers in California place upon reducing toxic contamination to fisheries, so EPA used the increase in values produced by Lyke's model. However, the increases in value which Lyke shows are based on the responses of 274 individual anglers to only two contingent valuation questions in a mail survey containing a total of 64 questions. This is clearly a very small sample of the population of Wisconsin anglers and may have caused some bias in the analysis. This was probably a representative sample of anglers but not a random sample of anglers.

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5.) The degree and extent to which individual Great Lakes fishing sites and fisheries are contaminated by toxicants was not considered in this study. Therefore, it is unclear how well the study's findings can be applied to "contaminated" fisheries in California.

6.) Contingent valuation measures the attitudes of anglers, not their behavior. More specifically, it measures an anglers stated willingness to pay or compensate, not the actual behavior of paying or compensating.

(*1) Lyke, Audrey J., Dissertation submitted to the Graduate School of the University of

Wisconsin-Madison, 1993.

(*2) U.S. EPA Analysis of the Potential Benefits Related to Implementation of the California Toxics Rule. June 1997.

Response to: CTR-041-048

EPA acknowledges that Lyke's study has not been published in a peer reviewed journal and that she obtained some inconsistent results. EPA applied Lyke's research to illustrate the types and potential magnitude of the benefits from water quality improvements. EPA conducted an extensive search of the literature for additional studies that provide indication of the potential magnitude of the benefits from reducing concentrations of toxic pollutants in California surface waters. The results of EPA's search are described in the EA that accompanies the final rule.

EPA acknowledges that applying Lyke's results to all California waters affected by toxics may overstate potential benefits (see EA Chapter 8). Anglers may or may not be aware of toxic contamination in the absence of fish consumption advisories. EPA acknowledges the limitations in the application of Lyke's research. However, EPA chose this approach to provide illustration of the potential magnitude of recreational angling values rather than leave this important benefit category unmonetized.

In addition, EPA believes that Lyke's scenario does not capture another component of potential value to current anglers that may result as reduced levels of toxic pollutants result in healthier sport fish populations. Lyke's survey asked anglers to consider a fishery that is free of contaminants that may threaten human health. However, fish are more sensitive than humans to some classes of toxic pollutants and fish populations may increase as contamination is reduced. To the extent that reducing toxic contamination results in a more satisfying angling experience in terms of increasing catch rates, achieving water quality standards may result in an increase in value to current anglers beyond that associated with reducing human health concerns.

EPA first applied Lyke's research in its analysis of the potential benefits of the Great Lakes Water Quality Guidance. Calculation of the range of results is explained in U.S. EPA (1993). Lyke estimated the Wisconsin Great Lakes open water sport fishery to be worth between $339 and $424 per licensed angler, resulting in an estimated consumer surplus associated with the fishery of between $66.6 million and $83.3 million annually. Lyke obtained values for a contaminant-free fishery ranging from $7.4 million to $26.1 million per year, with the range in results attributable to whether a linear or constant elasticity of scale functional form is used in the estimation. These results reflect between 11.1% and 31.3% of the value of the fishery under current conditions, which is the range of values EPA used in analysis of the CTR.

EPA acknowledges that Lyke-based benefits represent a substantial portion of total benefits and supports these benefits estimates. (See also comment and response to CTR-035-009a.)

EPA considers Lyke's scenario (waters completely free of contaminants that may threaten human health) to be similar to a scenario in which all California waters meet the water quality standards established by the CTR. EPA has no information to show that these standards cannot be achieved. Thus, EPA used Lyke's results to estimate the total potential benefits of achieving standards. However, since point source controls alone may not be sufficient to achieve the standards throughout California, EPA allocated only a portion of the total benefits to the CTR.

EPA agrees that the study site for Lyke's research is substantially different from California waters.

However, EPA's search of the literature indicated that there is no similar research for California or other more similar waters. Therefore, EPA applied Lyke's results to provide decisionmakers with information on the types and potential magnitude of the benefits from water quality improvements, rather than leaving this important benefit category unmonetized. EPA has no information to determine whether California residents may value toxic-free waters more or less than Wisconsin residents.

EPA agrees that the contingent valuation method (CVM) elicits an individual's stated willingness to pay or accept compensation. The benefit-cost comparisons in EAs are prepared to inform the public and policy makers. Thus, the strengths and weaknesses of all aspects of the EA, including methodologies for estimating benefits, need to be made clear so that readers are aware of the limits and uncertainties. However, a 1993 Blue Ribbon Panel convened by the National Oceanic and Atmospheric Administration (NOAA) evaluated CVM and found it to be an appropriate methodology for measuring values. It is also the only method accepted by the U.S. Department of the Interior (DOI) to estimate nonuse values and has withstood Federal Court review for its use in litigation contexts.

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Bishop, R.C. and T.A. Heberlein. 1978. Measuring values of extra-market goods: Are indirect measures biased? American Journal of Agricultural Economics 61(5): 926-930.

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U.S. EPA, 1993. Regulatory Impact Analysis of the Proposed Great Lakes Water Quality Guidance. Final Report, April 15.

Comment ID: CTR-044-043
Comment Author: City of Woodland
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: E-02 Benefits Analysis
References:
Attachments? N
CROSS REFERENCES

Comment: ATTACHMENT: 3 - 2 A Criteria Review of: "Discrete Choice Models to Value Changes in Environmental Quality: A Great Lakes Case Study"(*1)

Introduction This dissertation is primarily concerned with examining economic models of natural

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(*1) Lyke, Audrey J., Dissertation submitted to the Graduate School of the University of Wisconsin-Madison, 1993.

(*2) U.S. EPA Analysis of the Potential Benefits Related to Implementation of the California Toxics Rule. June 1997.

Response to: CTR-044-043

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obtained some inconsistent results. EPA applied Lyke's research to illustrate the types and potential magnitude of the benefits from water quality improvements. EPA conducted an extensive search of the literature for additional studies that provide indication of the potential magnitude of the benefits from reducing concentrations of toxic pollutants in California surface waters. The results of EPA's search are described in the EA that accompanies the final rule.

EPA acknowledges that applying Lyke's results to all California waters affected by toxics may overstate potential benefits (see EA p. 8-17). Anglers may or may not be aware of toxic contamination in the absence of fish consumption advisories. EPA acknowledges the limitations in the application of Lyke's research. However, EPA chose this approach to provide illustration of the potential magnitude of recreational angling values rather than leave this important benefit category unmonetized.

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U.S. EPA, 1993. Regulatory Impact Analysis of the Proposed Great Lakes Water Quality Guidance. Final Report, April 15.

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Brookshire, D., M. Thayer, W.D. Schulze, and R. d'Arge. 1982. Valuing public goods: A comparison of the survey and hedonic approaches. American Economic Review 72(1): 165-177.

Comment ID: CTR-052-003c
Comment Author: East Bay Dischargers Authority
Document Type: Sewer Authority
State of Origin: SC
Represented Org:
Document Date: 09/26/97
Subject Matter Code: E-02 Benefits Analysis
References: Letter CTR-052 incorporates by reference letters CTR-035 and CTR-054
Attachments? Y
CROSS REFERENCES C-13
E-01

Comment: However, the Authority is greatly disappointed that EPA chose not to follow the consensus recommendations for many of the most significant issues, including the methodology used for the EA and the choice of using the most conservative carcinogenicity factor for organic pollutants.

Response to: CTR-052-003c

While EPA agrees that the methodology recommended by the State Task Force on Economic Considerations may be one adequate method for the State to calculate the costs and benefits of State adoption and implementation of water quality standards, EPA never agreed that it would use this method for its own Economic Analysis (EA) for the following reasons:

* EPA's primary responsibility in developing the EA is that it meets the requirements of Executive Order 12866. For program consistency, EPA chose to model the methodology of the EA after the Regulatory Impact Analysis of the Great Lakes Water Quality Guidance which successfully underwent the full Executive Order 12866 process.

* EPA had already established its own methodology and began work on the EA nearly one year before the Task Force began meeting. EPA could not abruptly switch the methodology in the middle of the project due to the limited resources that could be spent on the EA. In addition, many task force members acknowledged that the consensus recommendation was a very resource intensive method and it was uncertain whether adequate data currently existed to bring this methodology to completion. EPA did not have the resources nor the data to perform this type of analysis in the time available.

* The State Task Force recommended a methodology, for future analysis by the State, that would gather ambient data to determine waters that were impaired by toxics, and then determine what actions needed to be taken by point and non-point sources to meet new water quality criteria. EPA determined that this methodology may be appropriate for future State analysis, but was not appropriate for EPA's Economic Analysis since EAs under the CWA typically estimate only costs that EPA can enforce under the Clean Water Act. Therefore, EPA's EA only calculates potential costs and benefits due to controls on NPDES point sources (excluding wet-weather discharges). EPA believes it may be more appropriate for the State to estimate potential impacts on non-point sources since it has the sole authority for enforcing any controls required by non-point sources.

EPA does not agree that its decision to use a 10-6 risk level for carcinogenic pollutants conflicts with any of the State Task Force consensus recommendations. EPA does not observe in the Final Task Force Report, an explicit consensus recommendation of any specific risk level for carcinogenic pollutants.

Comment ID: CTR-052-007
Comment Author: East Bay Dischargers Authority
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: E-02 Benefits Analysis
References: Letter CTR-052 incorporates by reference letters CTR-035 and CTR-054
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Comment: EPA has greatly overstated the cost to benefit ratio. The EA concludes that the costs and benefits are nearly equal, which implies a cost to benefit ratio approaching unity, i.e. costs divided by benefits is about 1. The critique prepared by M.Cubed indicates that this is quite faulty, in that costs range from two to nine times the benefits as developed by EPA. Others have noted that the benefits are

also very questionable. Using the costs from No. 3, above, and EPA's high-end benefits, results in costs that are anywhere from 4.6 to 11 times the benefits. No rational person would ever spend that kind of money for such little benefit.

Response to: CTR-052-007

EPA believes that the potential benefits of the rule are reasonably similar to the potential costs. EPA also notes that, as described in the EA, the estimate of benefits may be underestimated as a result of omitted benefit categories while the estimate of costs was based on assumptions that tend to overstate costs. For example, reductions in noncancer health effects are omitted because there are currently few means of linking consumption of toxic contaminants by humans with cases of systemic effects (as opposed to cancer effects, for which dose-response curves have been estimated). Other omitted benefit categories include instream and near stream recreational activities other than fishing (e.g., boating, swimming, picnicking, and related activities). EPA believes other recreation benefits may be appreciable because these activities have been shown in empirical research to be highly valued, and even modest changes in participation or user values could lead to sizable benefits statewide. Some of these activities can be closely associated with water quality attributes (e.g., swimming) and others might increase due to their association with fishing, swimming, or other activities in which the participants might engage.

Comment ID: CTR-054-047
Comment Author: Bay Area Dischargers Associati
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-02 Benefits Analysis
References:
Attachments? N
CROSS REFERENCES

Comment: ATTACHMENT: 3 - 2 A Criteria Review of: "Discrete Choice Models to Value Changes in Environmental Quality: A Great Lakes Case Study"(*1)

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Conclusions:

1.) There is a lack of data on the value anglers in California place upon reducing toxic contamination to fisheries, so EPA used the increase in values produced by Lyke's model. However, the increases in value which Lyke shows are based on the responses of 274 individual anglers to only two contingent valuation questions in a mail survey containing a total of 64 questions. This is clearly a very small sample of the population of Wisconsin anglers and may have caused some bias in the analysis. This was probably a representative sample of anglers but not a random sample of anglers.

2.) Only anglers who fished for trout and salmon in the Wisconsin Great Lakes were surveyed. These

anglers may not be representative of the typical Wisconsin Great Lakes angler, and this data does not show any valuation for any fishery other than trout and salmon.

3.) It is not clear how EPA derived the upper limit of their potential increase in fisheries value (31.3 percent). It is possible that EPA used the "contaminant free" mean ($377. 18/angler/year) and compared that to the low end value (mean minus the standard error) of the value of the fishery under current conditions ($286.26/angler/year), yielding an increase in value of 31.8 percent. Another portion of Lyke's analysis actually shows "contaminant free" fisheries to be valued lower than the current "contaminated" fishery. Inland fishing anglers who fish for trout and salmon were less willing to pay for a contaminant free fishery. The mean value of the inland fishery under current conditions ($720.12/angler/year) compared to the mean value of a "contaminant free" inland fishery ($597.42/angler/year) yields a loss in value of 17 percent.

4.) There is no evidence than any portion of Lyke's dissertation has undergone peer review outside the University of Wisconsin-Madison. An extensive literature search found no peer reviewed journal publications by the author. Without proper peer review, its methods and conclusions must remain in doubt.

5.) The degree and extent to which individual Great Lakes fishing sites and fisheries are contaminated by toxicants was not considered in this study. Therefore, it is unclear how well the study's findings can be applied to "contaminated" fisheries in California.

6.) Contingent valuation measures the attitudes of anglers, not their behavior. More specifically, it measures an anglers stated willingness to pay or compensate, not the actual behavior of paying or compensating.

(*1) Lyke, Audrey J., Dissertation submitted to the Graduate School of the University of Wisconsin-Madison, 1993.

(*2) U.S. EPA Analysis of the Potential Benefits Related to Implementation of the California Toxics Rule. June 1997.

Response to: CTR-054-047

EPA acknowledges that Lyke's study has not been published in a peer reviewed journal and that she obtained some inconsistent results. EPA applied Lyke's research to illustrate the types and potential magnitude of the benefits from water quality improvements. EPA conducted an extensive search of the literature for additional studies that provide indication of the potential magnitude of the benefits from reducing concentrations of toxic pollutants in California surface waters. The results of EPA's search are described in the EA that accompanies the final rule.

EPA acknowledges that applying Lyke's results to all California waters affected by toxics may overstate potential benefits (see EA p. 8-17). Anglers may or may not be aware of toxic contamination in the absence of fish consumption advisories. EPA acknowledges the limitations in the application of Lyke's research. However, EPA chose this approach to provide illustration of the potential magnitude of recreational angling values rather than leave this important benefit category unmonetized.

In addition, EPA believes that Lyke's scenario does not capture another component of potential value to current anglers that may result as reduced levels of toxic pollutants result in healthier sport fish

populations. Lyke's survey asked anglers to consider a fishery that is free of contaminants that may threaten human health. However, fish are more sensitive than humans to some classes of toxic pollutants and fish populations may increase as contamination is reduced. To the extent that reducing toxic contamination results in a more satisfying angling experience in terms of increasing catch rates, achieving water quality standards may result in an increase in value to current anglers beyond that associated with reducing human health concerns.

EPA first applied Lyke's research in its analysis of the potential benefits of the Great Lakes Water Quality Guidance. Calculation of the range of results is explained in U.S. EPA (1993). Lyke estimated the Wisconsin Great Lakes open water sport fishery to be worth between $339 and $424 per licensed angler, resulting in an estimated consumer surplus associated with the fishery of between $66.6 million and $83.3 million annually. Lyke obtained values for a contaminant-free fishery ranging from $7.4 million to $26.1 million per year, with the range in results attributable to whether a linear or constant elasticity of scale functional form is used in the estimation. These results reflect between 11.1% and 31.3% of the value of the fishery under current conditions, which is the range of values EPA used in analysis of the CTR.

EPA acknowledges that Lyke-based benefits represent a substantial portion of total benefits and supports these benefits estimates. (See also comment and response to Issue 3.)

U.S. EPA, 1993. Regulatory Impact Analysis of the Proposed Great Lakes Water Quality Guidance. Final Report, April 15.

EPA considers Lyke's scenario (waters completely free of contaminants that may threaten human health) to be similar to a scenario in which all California waters meet the water quality standards established by the CTR. EPA has no information to show that these standards cannot be achieved. Thus, EPA used Lyke's results to estimate the total potential benefits of achieving standards. However, since point source controls alone may not be sufficient to achieve the standards throughout California, EPA allocated only a portion of the total benefits to the CTR.

EPA agrees that the study site for Lyke's research is substantially different from California waters. However, EPA's search of the literature indicated that there is no similar research for California or other more similar waters. Therefore, EPA applied Lyke's results to provide decisionmakers with information on the types and potential magnitude of the benefits from water quality improvements, rather than leaving this important benefit category unmonetized. EPA has no information to determine whether California residents may value toxic-free waters more or less than Wisconsin residents.

In addition, EPA believes that Lyke's scenario does not capture another component of potential value to current anglers that may result as reduced levels of toxic pollutants result in healthier sport fish populations. Lyke's survey asked anglers to consider a fishery that is free of contaminants that may threaten human health. However, fish are more sensitive than humans to some classes of toxic pollutants and fish populations may increase as contamination is reduced. To the extent that reducing toxic contamination results in a more satisfying angling experience in terms of increasing catch rates, achieving water quality standards may result in an increase in value to current anglers beyond that associated with reducing human health concerns.

EPA agrees that the contingent valuation method (CVM) elicits an individual's stated willingness to pay or accept compensation. The benefit-cost comparisons in EAs are prepared to inform the public and policy makers. Thus, the strengths and weaknesses of all aspects of the EA, including methodologies for estimating benefits, need to be made clear so that readers are aware of the limits and uncertainties.

However, a 1993 Blue Ribbon Panel convened by the National Oceanic and Atmospheric Administration (NOAA) evaluated CVM and found it to be an appropriate methodology for measuring values. It is also the only method accepted by the U.S. Department of the Interior (DOI) to estimate nonuse values and has withstood Federal Court review for its use in litigation contexts.

Additionally, much of the criticism of CVM is conceptual rather than based on empirical research. Where CVM can be compared to other research techniques (e.g., use values estimated by the travel cost methodology or the hedonic price method), CVM is shown to yield similar values (see Brookshire et al., 1982 and Smith et al., 1986). Additionally, in several field experiments, actual purchase decisions were compared to hypothetical purchase decisions (Bishop and Heberlein, 1978 and Dickie et al., 1987). In all of these studies, hypothetical behavior was sufficiently predictive of actual behavior that researchers concluded meaningful values could be obtained for benefit-cost analysis or damage assessment.

Bishop, R.C. and T.A. Heberlein. 1978. Measuring values of extra-market goods: Are indirect measures biased? American Journal of Agricultural Economics 61(5): 926-930.

Brookshire, D., M. Thayer, W.D. Schulze, and R. d'Arge. 1982. Valuing public goods: A comparison of the survey and hedonic approaches. American Economic Review 72(1): 165-177.

Comment ID: CTR-090-008
Comment Author: C&C of SF, Public Utl. Commis.
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-02 Benefits Analysis
References: Letter CTR-090 incorporates by reference letters CTR-035 and CTR-054
Attachments? Y
CROSS REFERENCES

Comment: Major Concerns About the Proposed Criteria and Rule

1. The Proposal is Based on Poor Data and Will Not Result in Better Water Quality for California. We stated that our own attainability analysis and that of BADA show that San Francisco,) will be impacted by this rule. Unfortunately, due to the short time for review, the poor quality of data and basis for statements and assumptions in the proposal and the problem with detection limits we cannot specifically say what will be the cost to Sari Francisco. One analysis tell us it could be $2.3 million per year annualized costs and another analysis tells us it could be much more. We strongly recommend major revision to the proposal and the economic analysis before final promulgation for the following reasons:

The propose rule will cost more than EPA estimates, will not be applicable to those discharges that are of most concern and which interfere with the designated uses and therefore the rule will produce less benefits than EPA estimates.

Response to: CTR-090-008

Although the standards established by the CTR apply to all sources, EPA's analysis examined only the portion of benefits expected to be achieved by controlling point sources. EPA estimated the point source

share of benefits based on data and information on the relative contribution of all sources to toxic loadings in California waters. Although point sources may account for only a small portion of the load in some waters, they may account for relatively larger portions at some sites, and point source controls will contribute to meeting standards in the water bodies.

Comment ID: CTR-091-002b
Comment Author: Abu-Saba, Ganguli, Flegal
Document Type: Environmental Group
State of Origin: CA
Represented Org: Coastal Advocates
Document Date: 09/25/97
Subject Matter Code: E-02 Benefits Analysis
References:
Attachments? N
CROSS REFERENCES E-01

Comment: This comment addresses the mercury criteria for continuous concentration (CCC) proposed in 40 CFR, part 131(*1). The proposed aquatic health and human health criteria do not protect aquatic life or humans from mercury contamination. This is demonstrated by the scientific data presented herein. That information includes published and unpublished results from scientists with established reputations in environmental research.

The aquatic life mercury CCC is proposed to be raised sixty-fold, from the National Toxics Rule standard of 0.012 micrograms per liter (ppb) to 0.770 ppb. The human health criteria is proposed to be raised four-fold, from 0.0 12 ppb to 0.050 ppb. These proposed changes have potentially devastating economic and environmental costs that must be included in the EPA's cost-benefit analysis. Water treatment costs for the metals mercury, silver, and chromium account for 30% of costs projected in the, California Toxics Rule (CTR) economic analysis. However, the long term environmental and economic cost of mercury contamination may far exceed the short term economic savings resulting from an increase in the mercury CCC. This is especially true in California, a mining state that has devoted hundreds of millions of dollars to restoration and enhancement of commercial and sport fisheries by enactment of Proposition 204.

The potential long-term economic and environmental costs of this proposed legislation far exceed any short-term benefits gained by raising the mandatory action level for mercury contamination. A stated goal of the recently passed Proposition 204 legislation is the protection and enhancement of commercial and sport fishing in the State of California. To that end, hundreds of millions of dollars have been committed to water quality improvement and fish habitat restoration. Increasing the permissible mercury limits will not only hinder those goals, but will likely cause irreversible damage to the environment well into the foreseeable future.

(*1) Water Quality Standards; Establishment of Numeric Criteria for Priority Toxic Pollutants for the State of California; Proposed Rule. U.S. Environmental Protection Agency, Region Nine; U.S. Government Printing Office: Washington D.C., 1997; Federal Register, 62, 42159-42207.

Response to: CTR-091-002b

The aquatic life criteria have been updated using EPA's peer-reviewed and accepted aquatic life

methodology. The previous 304(a) criteria guidance value was based on an FDA action level for humans, not on aquatic life protection. As such, the previous criteria are not as appropriate to use as the updated criteria proposed in the CTR. The revised criteria are less stringent than the previous criteria.

The human health criteria proposed in the CTR have also been updated using the risk reference dose for methylmercury. The previous 304(a) criteria guidance values were based on the risk reference does for mercury. The revised human health criteria in the CTR are more stringent than the previous human health criteria guidance.

All water quality standards are comprised of three parts: a designated use, and criterion, and an antidegradation policy. The CTR only proposes criteria. The State of California has adopted designated uses for its water bodies (called beneficial uses) in the Regional Water Board Basin Plans. The State has also adopted antidegradation provisions in each of the Regional Board Basin Plans. These provisions require that water quality in a waterbody cannot be degraded (with narrow exceptions as discussed at 40 CFR 131.12(a) (2) which allow a lowering of water quality if the State finds that it is necessary to accommodate important economic or social development). Thus, if a waterbody has achieved a certain level of cleanliness or is in a pristine condition, discharges are not allowed to degrade the water quality. Therefore, no environmental "cost" or degradation will be incurred as a result of any new or revised water quality criteria in the CTR that may be less stringent than a previously adopted objective or a criteria guidance value. Environmental benefits that have been gained in California fisheries or anywhere else cannot be destroyed.

See response to CTR-002-007b.

Subject Matter Code: E-02c Overstated Benefits

Comment ID: CTR-009-008b
Comment Author: City of Thousand Oaks
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/22/97
Subject Matter Code: E-02c Overstated Benefits
References:
Attachments? Y
CROSS REFERENCES E-02o
E-01s

Comment: The City does not agree with the economic analysis. It is incomplete and misrepresents the actual costs and benefits. The analysis does not include costs of expensive AWT to meet more stringent limits based upon the proposed criteria. It does not include the first second, and third order costs to the community, individuals and businesses, of the economic dislocations resulting from huge capital costs, especially for small and economically distressed communities, that divert scarce resources from other priorities or out of the area. It does not include cost impact assessments to low and fixed-income households - ignoring the economic aspects of environmental justice. The benefits assessments make vast unsupported assumptions about the benefits of reductions in constituent concentrations that are barely, if even, measurable, and assigns unrealistic contingent valuations to these assumed benefits. The cost analyses does not follow EPA's own economic assessment guidance (which, itself, is fatally flawed). These points were brought up during the Task Force meetings in 1995 and 1996, but were dismissed outright by EPA. The City hereby raises these issues for the formal record.

The City of Thousand Oaks appreciates the opportunity to comment on the proposed California Toxics Rule.

Sincerely,

Donald H. Nelson Public Works Director

Response to: CTR-009-008b

EPA's own economic assessment guidance (Interim Economic Guidance for Water Quality Standards, EPA-823-B-95-002, March 1995) is intended to assist States and applicants in understanding the economic factors that may be considered, and the types of tests that can be used to determine if a designated use cannot be attained, if a variance can be granted, or if degradation of high-quality water is warranted. In order to remove a designated use or obtain a variance, or if degradation of high-quality water is warranted, the state or discharger must demonstrate that attaining the designated use would result in substantial and widespread economic and social impacts. Although EPA is responsible for approving a State's water quality standards, the State is responsible for interpreting the circumstances of each case and determining where there are substantial and widespread economic and social impacts, or where important social and economic development would be precluded.

Estimating the economic impact of the CTR in California requires a detailed econometric model of the region's economy. EPA did not conduct such an analysis of the rule. However, for a similar toxics rule in

the Great Lakes Basin, an econometric analysis was performed independent of the regulatory impact analysis for the Council of Great Lakes Governors (The Great Lakes Water Quality Initiative: Cost Effective Measures to Enhance Environmental Quality and Regional Competitiveness. DRI/McGraw-Hill, San Francisco, California, July 1993). This analysis showed a minimal impact of the rule on the region's economy for a worst case scenario, a scenario with costs far exceeding those estimated by EPA. Manufacturing output was estimated to fall by between 0.008% and 0.337% over a range of four scenarios evaluated, while personal income loss was estimated at between 0.002% and 0.094% for these scenarios. As a result, the study authors concluded that the impact of the rule on the region's economy would be "nearly imperceptible." Thus, similar controls on toxic pollutants have been shown to be affordable in other regions of the country.

Comment ID: CTR-035-009b
Comment Author: Tri-TAC/CASA
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-02c Overstated Benefits
References:
Attachments? N
CROSS REFERENCES E-02f

Comment: We also question the estimates of the benefits derived in the draft Economic Analysis, and believe that more recent information specific to California should be collected and used. In particular, for most of the benefits, estimates are based on a comparison with waters which are completely free of contaminants or unimpaired, which is unrealistic. There is also little evaluation of the marginal benefits of the proposed rule (i.e. the benefits that would be realized as a result of marginal changes in contamination levels). While presumably achievement of the full reductions necessary to meet the CTR criteria in ambient waters is EPA's goal, EPA itself acknowledges that few of the benefits of the CTR are likely to be realized through point source controls, and the Agency fails to demonstrate how the water quality criteria promulgated by the CTR will be achieved.

Response to: CTR-035-009b

EPA considers Lyke's scenario (waters completely free of contaminants that may threaten human health) to be similar to a scenario in which all California waters meet the water quality standards established by the CTR. EPA has no information to show that these standards cannot be achieved. Thus, EPA used Lyke's results to estimate the total potential benefits of achieving standards. However, since point source controls alone may not be sufficient to achieve the standards throughout California, EPA allocated only a portion of the total benefits to the CTR.

EPA agrees that the study site for Lyke's research is substantially different from California waters. However, EPA's search of the literature indicated that there is no similar research for California or other more similar waters. Therefore, EPA applied Lyke's results to provide decisionmakers with information on the types and potential magnitude of the benefits from water quality improvements, rather than leaving this important benefit category unmonetized. EPA has no information to determine whether California residents may value toxic-free waters more or less than Wisconsin residents.

In addition, EPA believes that Lyke's scenario does not capture another component of potential value to current anglers that may result as reduced levels of toxic pollutants result in healthier sport fish populations. Lyke's survey asked anglers to consider a fishery that is free of contaminants that may threaten human health. However, fish are more sensitive than humans to some classes of toxic pollutants and fish populations may increase as contamination is reduced. To the extent that reducing toxic contamination results in a more satisfying angling experience in terms of increasing catch rates, achieving water quality standards may result in an increase in value to current anglers beyond that associated with reducing human health concerns.

Water quality improvements often involve thresholds such as action levels for fish consumption advisories. However, water quality regulations often contribute only a portion of the improvement needed to surpass a threshold. Although individuals may (or may not) have a willingness to pay for incremental steps toward crossing a threshold, when the threshold is surpassed (e.g., fish consumption advisories are lifted), every action that contributed to the effort should be allocated a portion of the benefits. This was accomplished for the CTR by allocating a portion of the total toxic-free benefits (proportional to the reduction in loadings) to the implementation of point source controls under the CTR.

EPA's analysis presents only the portion of the total potential benefits that can be achieved by controlling point sources. EPA expects additional benefits will accrue as a result of controlling other sources. EPA has no reason to believe that the standards established by the CTR cannot be achieved.

Comment ID: CTR-035-065b
Comment Author: Tri-TAC/CASA
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-02c Overstated Benefits
References:
Attachments? N
CROSS REFERENCES E-02k

Comment: Weaknesses in Benefits Analysis

USEPA's benefits analysis is even weaker than its cost evaluation. For example:

* Although there is evidence that the Rule could result in no benefits in the near-term due to long-term environmental persistence of existing contamination, the Analysis does a poor job of highlighting this potential outcome. For example, there is some likelihood that benefits could truly be zero, while under no circumstances will Rule implementation be costless. Likewise, USEPA's use of ranges to express potential benefit values may mislead readers into believing that the estimated high benefits are as likely to be achieved as the low benefits, when in fact the probability that different benefit levels will actually be achieved varies greatly from low to high.

Response to: CTR-035-065b

The range of estimated benefits in part reflects the range in loadings reductions that may result from point source controls given the flexibility in State implementation procedures. The decision as to which

implementation procedures will be employed, and therefore what costs and benefits will result, will be made by state and local entities for specific locations.

Comment ID: CTR-035-068
Comment Author: Tri-TAC/CASA
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-02c Overstated Benefits
References:
Attachments? N
CROSS REFERENCES

Comment: * Most of the benefits estimates are based on a comparison with waters which are "completely unimpaired", "contaminant free," or "completely free of pollutants that may threaten human health." Even if point source reductions are fully obtained, California's waters will remain polluted from non-point sources and contaminants already in the environment for the foreseeable future. In fact, it is unlikely that most state waters will ever be completely unimpaired, and the use and non-use values associated with complete purity may be considerably higher than the more likely outcome of long-term small-scale contamination.

Response to: CTR-035-068

Although the standards established by the CTR apply to all sources, EPA's analysis examined only the portion of benefits expected to be achieved by controlling point sources. EPA estimated the point source share of benefits based on data and information on the relative contribution of all sources to toxic loadings in California waters. Although point sources may account for only a small portion of the load in some waters, they may account for relatively larger portions at some sites, and point source controls will contribute to meeting standards in the water bodies.

EPA's analysis presents only the portion of the total potential benefits that can be achieved by controlling point sources. EPA expects additional benefits will accrue as a result of controlling other sources. EPA has no reason to believe that the standards established by the CTR cannot be achieved.

Comment ID: CTR-040-008c
Comment Author: County of Sacramento Water Div
Document Type: Storm Water Auth.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-02c Overstated Benefits
References: Letter CTR-040 incorporates by reference letter CTR-027
Attachments? Y
CROSS REFERENCES E-01c02
E-01m

Comment: MAJOR CONCERNS

We do, however, have fundamental concerns with the Rule as it is presently proposed and its supporting economic analysis. We believe the Rule can be modified in a manner that will be responsive to our concerns while at the same time being consistent with applicable Federal law and regulations. Our major concerns are presented here and are followed by our recommended modifications.

II. Concern: The economic analysis upon which the Rule is based is seriously flawed.

* Estimates of potential costs are severely constrained due to certain assumptions including the assumption that regulatory relief from the Rule will be granted if costs are in excess of certain thresholds.

* Estimates of potential benefits are exaggerated by assuming, that the proposed water quality criteria will actually be achieved in receiving water bodies. This will not result from the implementation of the Rule because the Rule is only addressing permitted discharges to the receiving water bodies.

* The result of these flaws is that potential costs are greatly understated and potential benefits are greatly overstated.

Response to: CTR-040-008c

EPA's analysis presents only the portion of the total potential benefits that can be achieved by controlling point sources. EPA expects additional benefits will accrue as a result of controlling other sources. EPA has no reason to believe that the standards established by the CTR cannot be achieved.

EPA does not believe that estimates of potential costs are constrained due to assumptions regarding regulatory relief from the Rule. Although EPA considered an industry category cost threshold under the low cost scenario, beyond which a facility was assumed to pursue regulatory relief, no such assumption was used for the high cost scenario. That is, under the high scenario all necessary pollutant reductions were assumed to be achieved through either treatment or a waste control program (e.g. waste minimization pollution prevention).

Comment ID: CTR-040-043
Comment Author: County of Sacramento Water Div
Document Type: Storm Water Auth.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-02c Overstated Benefits
References: Letter CTR-040 incorporates by reference letter CTR-027
Attachments? Y
CROSS REFERENCES

Comment: Review of EPA's Analysis of Potential Benefits

The benefits analysis overstates benefits by assuming an end (i.e., achievement of the water quality criteria) that will not result from the CTR. The CTR will impact point sources, which EPA acknowledges are only a small portion of the toxic pollutant load (3% of the load to freshwater and 1%-11% of the load

to San Francisco Bay). The major sources of toxic pollutants, nonpoint sources, are not regulated under the Clean Water Act or the CTR.

Response to: CTR-040-043

EPA's analysis presents only the portion of the total potential benefits that can be achieved by controlling point sources. EPA expects additional benefits will accrue as a result of controlling other sources. EPA has no reason to believe that the standards established by the CTR cannot be achieved.

Although the standards established by the CTR apply to the waterbody (i.e., inland surface waters and enclosed bays and estuaries), EPA's analysis examined only the portion of benefits expected to be achieved by controlling point sources. EPA estimated the point source share of benefits based on data and information on the relative contribution of all sources to toxic loadings in California waters. Although point sources may account for only a small portion of the load in some waters, they may account for relatively larger portions at some sites, and point source controls will contribute to meeting standards in the water bodies.

Comment ID: CTR-041-039
Comment Author: Sacramento Reg Cnty Sanit Dist
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-02c Overstated Benefits
References:
Attachments? N
CROSS REFERENCES

Comment: Review of EPA's Analysis of Potential Benefits

The benefits analysis overstates benefits by assuming an end (i.e., achievement of the water quality criteria) that will not result from the CTR. The CTR will impact point sources, which EPA acknowledges are only a small portion of the toxic pollutant load (3% of the load to freshwater and 1 %-11% of the load to San Francisco Bay). The major sources of toxic pollutants, nonpoint sources, are not regulated under the Clean Water Act or the CTR.

Response to: CTR-041-039

Although the standards established by the CTR apply to all sources, EPA's analysis examined only the portion of benefits expected to be achieved by controlling point sources. EPA estimated the point source share of benefits based on data and information on the relative contribution of all sources to toxic loadings in California waters. Although point sources may account for only a small portion of the load in some waters, they may account for relatively larger portions at some sites, and point source controls will contribute to meeting standards in the water bodies.

EPA's analysis presents only the portion of the total potential benefits that can be achieved by controlling point sources. EPA expects additional benefits will accrue as a result of controlling other sources. EPA has no reason to believe that the standards established by the CTR cannot be achieved.

Comment ID: CTR-043-004d
Comment Author: City of Vacaville
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: E-02c Overstated Benefits
References:
Attachments? Y
CROSS REFERENCES E-01g
E-01h
E-01m
E-01c02

Comment: 4. EPA's Economic Analysis is seriously flawed. The major flaws include:

(1) failing to do an appropriate sampling of small dischargers having little or no dilution;

(2) assuming in the high-end cost scenario that a 25% reduction could be achieved through source control and an additional 25% achieved through treatment plant optimization without capital improvements;

(3) constraining estimates of potential costs through key assumptions, including the assumption that regulatory relief from the rule would be granted if costs were in excess of certain thresholds; and

(4) exaggerating estimates of potential benefits by assuming an end (i.e., achievement of the proposed water quality criteria) that will not result from the rule.

The result of these flaws is that potential costs are greatly understated and potential benefits are greatly overstated. Moreover, the flawed economic analysis has lead to the erroneous conclusion that the CTR is not a "significant regulatory action" or major rule subject to Presidential Executive Order 12866 and the Unfunded Mandates Reform Act or a rule that affects small entities protected under the Regulatory Flexibility Act.

Response to: CTR-043-004d

EPA's analysis presents only the portion of the total potential benefits that can be achieved by controlling point sources. EPA expects additional benefits will accrue as a result of controlling other sources. EPA has no reason to believe that the standards established by the CTR cannot be achieved.

EPA does not believe that estimates of potential costs are constrained due to assumptions regarding regulatory relief from the Rule. Although EPA considered an industry category cost threshold under the low cost scenario, beyond which a facility was assumed to pursue regulatory relief, no such assumption was used for the high cost scenario. That is, under the high scenario all necessary pollutant reductions were assumed to be achieved through either treatment or a waste control program (e.g. waste minimization pollution prevention).

EPA's EA, which uses many conservative costing assumptions, indicates that the cost of the State implementing water quality standards based on the proposed criteria in the CTR is likely to be below

$100 million per year. Benefits are also estimated to be below $100 million per year. These estimates indicate that the action is not "significant" under E.O. 12866, under the provision concerning annual effects on the economy.

Criteria, by themselves, do not directly impose economic impacts. Criteria are one of three parts of a water quality standard. A water quality standard is comprised of: a criterion, a designated use, and an antidegradation policy. California currently has a narrative criterion stating that there shall be no toxic in toxic amounts. Pursuant to this narrative criterion, which are the basis for this rule. Under this scenario, the rule would have no costs. Under the second scenario, assumes that without this rule, the current permit conditions for point sources would continue in the future. Under this second scenario, EPA assessed a range of potential costs that would be incurred for point sources to meet these criteria - the low end being based on current effluent concentrations, the high end being based on current permit limits. [Pursuant to this analysis, it has been determined that this is not a significant regulatory action subject to OMB review.] See the preamble for the final rule.

The Unfunded Mandates Reform Act of 1995 (UMRA) in general requires federal agencies to assess the effects of their regulatory actions on State and local governments, and on the private sector. The agency must prepare a written statement including a cost-benefit analysis for actions with a "federal mandate" that may result in expenditures to State and local governments, in the aggregate, or to the private sector of $100 million or more in any one year. The CTR does not contain any federal mandate that may result in expenditures by State and local governments, or the private sector, of $100 million or more in any one year. The CTR imposes no direct enforceable duties on the State, local or private sector; rather the rule promulgates water quality criteria which, when combined with State-adopted designated uses and antidegradation requirements, will create water quality standards. The CTR does not directly regulate or affect any entity and therefore is not subject to the requirements of UMRA. See the preamble to the final rule.

See also response to CTR-050-007a.

Comment ID: CTR-044-005d
Comment Author: City of Woodland
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: E-02c Overstated Benefits
References:
Attachments? Y
CROSS REFERENCES E-01g08
E-01h01
E-01m
E-01c02
R
S

Comment: We have reviewed the proposed CTR and offer the following comments:

4. EPA's Economic Analysis is seriously flawed. The major flaws include:

(1) failing to do an appropriate sampling of small dischargers having little or no dilution; (2) assuming in the high-end cost scenario that a 25% reduction could be achieved through source control and an additional 25% achieved through treatment plant optimization without capital improvements; (3) constraining estimates of potential costs through key assumptions, including the assumption that regulatory relief from the rule would be granted if costs were in excess of certain thresholds; and (4) exaggerating estimates of potential benefits by assuming an end (i.e., achievement of the proposed water quality criteria) that will not result from the rule. Additional concerns with the economic analysis are presented in Exhibit F. The result of these flaws is that potential costs are greatly understated and potential benefits are greatly overstated. Moreover, the flawed economic analysis has lead to the erroneous conclusion that the CTR is not a "significant regulatory action" or major rule subject to Presidential Executive Order 12866 and the Unfunded Mandates Reform Act or a rule that affects small entities protected under the Regulatory Flexibility Act. The City, for example, is a small community having a population of under 50,000 and would be greatly impacted by the proposed rule.

Response to: CTR-044-005d

EPA's analysis presents only the portion of the total potential benefits that can be achieved by controlling point sources. EPA expects additional benefits will accrue as a result of controlling other sources. EPA has no reason to believe that the standards established by the CTR cannot be achieved.

EPA does not believe that estimates of potential costs are constrained due to assumptions regarding regulatory relief from the Rule. Although EPA considered an industry category cost threshold under the low cost scenario, beyond which a facility was assumed to pursue regulatory relief, no such assumption was used for the high cost scenario. That is, under the high scenario all necessary pollutant reductions were assumed to be achieved through either treatment or a waste control program (e.g. waste minimization pollution prevention).

EPA's EA, which uses many conservative costing assumptions, indicates that the cost of the State implementing water quality standards based on the proposed criteria in the CTR is likely to be below $100 million per year. Benefits are also estimated to be below $100 million per year. These estimates indicate that the action is not "significant" under E.O. 12866, under the provision concerning annual effects on the economy.

California currently has a narrative criterion stating that there shall be no toxic in toxic amounts. Pursuant to this narrative criterion, which are the basis for this rule. Under this scenario, the rule would have no costs. Under the second scenario, assumes that without this rule, the current permit conditions for point sources would continue in the future. Under this second scenario, EPA assessed a range of potential costs that would be incurred for point sources to meet these criteria - the low end being based on current effluent concentrations, the high end being based on current permit limits. [Pursuant to this analysis, it has been determined that this is not a significant regulatory action subject to OMB review.] See the preamble for the final rule.

The Unfunded Mandates Reform Act of 1995 (UMRA) in general requires federal agencies to assess the effects of their regulatory actions on State and local governments, and on the private sector. The agency must prepare a written statement including a cost-benefit analysis for actions with a "federal mandate" that may result in expenditures to State and local governments, in the aggregate, or to the private sector of $100 million or more in any one year. The CTR does not contain any federal mandate that may result in expenditures by State and local governments, or the private sector, of $100 million or more in any one year. The CTR imposes no direct enforceable duties on the State, local or private sector; rather the rule

promulgates water quality criteria which, when combined with State-adopted designated uses and antidegradation requirements, will create water quality standards. The CTR does not directly regulate or affect any entity and therefore is not subject to the requirements of UMRA. See preamble to the final rule.

See also the response to CTR-050-007a.

Comment ID: CTR-044-034
Comment Author: City of Woodland
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: E-02c Overstated Benefits
References:
Attachments? N
CROSS REFERENCES

Comment: Review of EPA's Analysis of Potential Benefits

The benefits analysis overstates benefits by assuming an end (i.e., achievement of the water quality criteria) that will not result from the CTR. The CTR will impact point sources, which EPA acknowledges are only a small portion of the toxic pollutant load (3% of the load to freshwater and 1 %-11% of the load to San Francisco Bay). The major sources of toxic pollutants, nonpoint sources, are not regulated under the Clean Water Act or the CTR.

Response to: CTR-044-034

Although the standards established by the CTR apply to all sources, EPA's analysis examined only the portion of benefits expected to be achieved by controlling point sources. EPA estimated the point source share of benefits based on data and information on the relative contribution of all sources to toxic loadings in California waters. Although point sources may account for only a small portion of the load in some waters, they may account for relatively larger portions at some sites, and point source controls will contribute to meeting standards in the water bodies.

EPA's analysis presents only the portion of the total potential benefits that can be achieved by controlling point sources. EPA expects additional benefits will accrue as a result of controlling other sources. EPA has no reason to believe that the standards established by the CTR cannot be achieved.

Comment ID: CTR-054-038
Comment Author: Bay Area Dischargers Associati
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-02c Overstated Benefits
References:

Attachments? N
CROSS REFERENCES

Comment: Review of EPA's Analysis of Potential Benefits

The benefits analysis overstates benefits by assuming an end (i.e., achievement of the water quality criteria) that will not result from the CTR. The CTR will impact point sources, which EPA acknowledges are only a small portion of the toxic pollutant load (3% of the load to freshwater and 1 %-11% of the load to San Francisco Bay). The major sources of toxic pollutants, nonpoint sources, are not regulated under the Clean Water Act or the CTR.

Response to: CTR-054-038

Although the standards established by the CTR apply to all sources, EPA's analysis examined only the portion of benefits expected to be achieved by controlling point sources. EPA estimated the point source share of benefits based on data and information on the relative contribution of all sources to toxic loadings in California waters. Although point sources may account for only a small portion of the load in some waters, they may account for relatively larger portions at some sites, and point source controls will contribute to meeting standards in the water bodies.

EPA's analysis presents only the portion of the total potential benefits that can be achieved by controlling point sources. EPA expects additional benefits will accrue as a result of controlling other sources. EPA has no reason to believe that the standards established by the CTR cannot be achieved.

Comment ID: CTR-061-018
Comment Author: G. Fred Lee & Associates
Document Type: Academia
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-02c Overstated Benefits
References:
Attachments? Y
CROSS REFERENCES

Comment: Page 42190, bottom of the first and all of the second and third columns, discuss benefits. This discussion on the benefits of achieving these criteria is superficial, at best. There is no way to reliably estimate the improvement in the real water quality - beneficial uses arising from the adoption of these criteria since the database needed to relate the exceedances of the criteria to real water quality use-impairments does not exist. Many of the exceedances that are now occurring are "administrative" exceedances related to overly protective approaches dictated by the US EPA that have been and will likely continue to be used in implementing the criteria into discharge limits.

Response to: CTR-061-018

EPA defined toxic-impaired waters as waters rated medium or poor quality for at least one or more toxic pollutant or group of pollutants. EPA acknowledged that this definition may result in an overestimate of toxic-impairment (EA Chapter 8). However, the rating of these waters corresponds to EPA's categories of

'not fully supporting' and 'partially supporting' designated uses. The existence of waters not supporting and only partially supporting designated uses is indicative of the need for and benefits associated with pollution controls.

Subject Matter Code: E-02d Passive Use Value

Comment ID: CTR-026-009
Comment Author: Cal. Department of Fish & Game
Document Type: State Government
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-02d Passive Use Value
References:
Attachments? N
CROSS REFERENCES

Comment: 9. ECONOMIC ANALYSIS

The document entitled "Economic Analysis of the Proposed California Water Quality Toxics Rule" examines in large part the benefits and costs of changes in water quality due to point source dischargers implementation actions using the CTR-based water quality standards. This comment addresses the approach to quantifying benefits know as "passive use values" held by the public. We believe that a "rule of thumb" ratio of 50% or 0.5 for passive use values to active use values is overly conservative and leads to a significant understatement of the potential benefits of water quality improvements.

The CDFG has recently hired Dr. John Loomis (Colorado State University, Fort Collins) to establish such a passive use to active use value ratio, for small scale changes in the quality and/or quantity of natural resources and the services they provide to the public. Dr. Loomis conducts a comprehensive review of the resource economics literature and provided a conservative estimate of 1.43 versus the 0.50 used in the Economic Analysis performed for the CTR. We believe that should the US EPA attempt to quantify passive use benefits of the CTR, that a more appropriate use value ratio (or rule of thumb) is 1.43 rather than the 0.5 currently used in the analysis.

Response to: CTR-026-009

EPA reviewed the recent review by Dr. John Loomis referenced by the commenter (Loomis, 1997). Dr. Loomis conducted this review for application to the California Type A Model for simplified damage assessments under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980.

Dr. Loomis compiled studies from several previous reviews, including Fisher and Raucher (1984), Bishop et al. (1993), and Brown (1993). Each study used different approaches for calculating the ratio of passive use to use values, including comparison of use and passive use values, relying on respondents to prorate their willingness to pay between use and passive use components, and obtaining values when respondents are asked to assume active use is zero. Dr. Loomis notes that the prorating approach can yield higher estimates of the ratio than other approaches. He calculated his ratio of 1.43 by averaging across ratios calculated by all methods employed, after excluding outliers (three studies showing ratios of greater than 6) and studies involving unique resources or endangered species (studies involving bald eagles, grizzly bears, whooping cranes, and Mono Lake were not deemed appropriate for application to small oil spills).

As described in the EA accompanying the proposed CTR, in applying a rule of thumb such as the ratio of

passive use to use values, it is important to consider the extent to which the primary research efforts have evaluated resources and changes in resource conditions that are reasonably comparable to the CTR (see Chapter 8 EA). EPA considered the studies evaluated by Fisher and Raucher (1984) and which indicated a ratio of 0.5 more applicable to the CTR than studies indicating potentially higher ratios. For example, a study by Sanders et al. (1990) indicated a ratio of approximately 1.8 or 1.9, however, the results are based on the value of preserving several free-flowing river segments in Colorado from the development of dams and other major, irreversible hydrological modifications.

Dr. Loomis' review also includes studies that value environmental changes substantially different from those expected under the CTR. For example, a study by Haefele, et al (1992) estimates the total value of forest quality in high elevation spruce forests. This study contributes ratios of 10.74 and 6.7 to Dr. Loomis' review. A study by King et al (1988) , which contributed a ratio of 7.57, estimated the value of a herd of desert bighorn sheep. In addition, Dr. Loomis excluded studies of unique resources and endangered species (e.g., bald eagles) because of a lack of applicability to small oil spills; unique resources and endangered species are of relevance to the CTR.

Dr. Loomis' review of the ratio EPA applied to estimate passive use benefits for the CTR indicates that this ratio may be conservatively estimated. However, for the CTR, EPA used a less conservative application of the ratio compared to previous applications. That is, the selected ratio is typically multiplied by use values (e.g., recreational angling values for the CTR, nonconsumptive use values for the CERCLA Type A Model) to estimate passive use values. This application may be conservative because, in effect, passive use values are only being counted for resource users. To include passive use values for nonusers in its analysis of benefits for the CTR, EPA estimated passive use values for nonangling California households.

References

Bishop, R. M. Welsh, and S. Press. 1993. The CERCLA Type-A Natural Resource Damage Assessment Model for the Great Lakes Environment. Vol. 1, Draft.

Brown, T. 1993. Measuring Non-use Values: A Comparison of Recent Contingent Valuation Studies, in Benefits and Cost Transfers in Natural Resource Planning, Sixth Interim Report, J.C. Bergstrom, Compiler. Department of Agricultural and Applied Economics, University of Georgia, Athens, Georgia.

Fisher, A. and R. Raucher. 1984. Intrinsic Benefits of Improved Water Quality: Conceptual and Empirical Perspectives, Advances in Micro-Economics, V.K. Smith and A.D. Witte, eds. Vol. 3, JAI Press, Greenwich, CT.

Haefele, M., R.Kramer, and T. Holmes. 1992. Estimating the Total Value of Forest Quality in High Elevation Spruce Forests, in The Economic Value of Wilderness: Proceedings of the conference. GTR SE-78, Southern Forest Experiment Station. U.S. Forest Service, Asheville, NC.

King, D.A. , D.J. Flynn, and W.W. Shaw. 1988. Total and Existence Values of a Herd of Desert Bighorn Sheep. Benefits and Costs in Natural Resource Planning, Interim Report. Western Regional Research Publication W-133.

Loomis, J. 1997. Calculation of Nonuse Value Ratios and Documentation for the California Type A Model. Department of Agricultural and Resource Economics, Colorado State University, Fort Collins, CO.

Sanders, L.D., R.G. Walsh, and J.B. Loomis. 1990. "Toward Empirical Estimation of the Total Value of Protecting Rivers." Water Resources Research. 26(7):1345-1357.

Comment ID: CTR-035-055
Comment Author: Tri-TAC/CASA
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-02d Passive Use Value
References:
Attachments? N
CROSS REFERENCES

Comment: pp. 8-24 - 8-27 (U.S. EPA, 1997a) -- Passive Use Benefits The Economic Analysis assumes that a substantial portion of the benefits would accrue from passive use benefits (about 60% for the low end estimate and 70% for the high end estimate). We believe that, based on the number and type of assumptions required, and the reliance on studies of other types of passive use benefits (e.g. avoidance of mining activities or building a dam), these estimates are extremely tenuous. None of the studies cited examined the marginal benefits of incremental improvements in concentrations of toxic pollutants, nor were any of the studies based in California. Furthermore, it does not appear that EPA apportioned the passive use benefits attributable to improvements in water quality that will occur as a result of the CTR, as was done for other benefit categories. We recommend that the inclusion of quantitative estimates be reconsidered for passive use benefits, and, at most, only that portion representing the benefits attributable to the CTR be included.

Response to: CTR-035-055

As described in the EA (Chapter 8), research provides empirical evidence of the passive use values associated with improved water quality and fisheries. Research also indicates that these values are at least half as great as recreational values, such that if they are potentially applicable to a policy action, providing a rough approximation is preferable, with proper caveats, to omitting them from the analysis of benefits and costs. EPA believes that the studies used to calculate the ratio of passive use to use value are applicable to the CTR (see also comment and response CTR-026-009).

Therefore, EPA applies a ratio of .5 to obtain an estimate of passive use values for those households that have active recreational anglers. Based on a review of the literature, EPA believes that non-angling household do indeed have a passive use value. To determine a lower-bound estimate of passive use values for non-angling households, EPA assumed that the value may be 30% of the value for angling households. For analysis of the final CTR, EPA revised the upper-bound estimate assuming that the passive use value of non-angling households may be 90% of those for angling households. This revision is based on a study by Loomis et al. (1991), who estimated the benefits of improved fishery, wetland, and waterfowl resources in the San Joaquin Valley to users and nonusers residing in California.

By multiplying a ratio of passive use to use value by recreational fishing values, which EPA apportioned to reflect the relative contribution of point sources, EPA also accounted for attribution in its estimate of passive use values.

Comment ID: CTR-040-047
Comment Author: County of Sacramento Water Div
Document Type: Storm Water Auth.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-02d Passive Use Value
References: Letter CTR-040 incorporates by reference letter CTR-027
Attachments? Y
CROSS REFERENCES

Comment: EPA's estimate of passive use benefits ($36.3 million annually under the high-end scenario and 70% of the total estimated benefits) is erroneous. First, it is based on an unsupported assumption that non-use values (e.g., property values) are depressed in California because of pollution. Second, it is based on the assumption that the water quality criteria will be achieved as a result of the CTR, which as previously stated, is not the case.

Response to: CTR-040-047

As described in the EA (Chapter 8), research provides empirical evidence of the passive use values associated with improved water quality and fisheries. EPA believes that these studies are applicable to the CTR. EPA also believes that its assessment of toxic impairment of California, based on data and information compiled by the State Water Resource Control Boards, is reasonably accurate.

EPA's analysis presents only the portion of the total potential benefits that can be achieved by controlling point sources. EPA expects additional benefits will accrue as a result of the State's actions that may control other sources. EPA has no reason to believe that the standards established by the CTR cannot be achieved.

Comment ID: CTR-041-043
Comment Author: Sacramento Reg Cnty Sanit Dist
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-02d Passive Use Value
References:
Attachments? N
CROSS REFERENCES

Comment: EPA's estimate of passive use benefits ($36.3 million annually under the high-end scenario and 70% of the total estimated benefits) is erroneous. First, it is based on an unsupported assumption that non-use values (e.g., property values) are depressed in California because of pollution. Second, it is based on the assumption that the water quality criteria will be achieved as a result of the CTR, which as previously stated, is not the case.

Response to: CTR-041-043

As described in the EA (Chapter 8), research provides empirical evidence of the passive use values associated with improved water quality and fisheries. EPA believes that these studies are applicable to the CTR. EPA also believes that its assessment of toxic impairment of California, based on data and information compiled by the State Water Resource Control Boards, is reasonably accurate.

EPA's analysis presents only the portion of the total potential benefits that can be achieved by controlling point sources. EPA expects additional benefits will accrue as a result of the State's actions that may control other sources. EPA has no reason to believe that the standards established by the CTR cannot be achieved.

Comment ID: CTR-044-038
Comment Author: City of Woodland
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: E-02d Passive Use Value
References:
Attachments? N
CROSS REFERENCES

Comment: EPA's estimate of passive use benefits ($36.3 million annually under the high-end scenario and 70% of the total estimated benefits) is erroneous. First, it is based on an unsupported assumption that non-use values (e.g., property values) are depressed in California because of pollution. Second, it is based on the assumption that the water quality criteria will be achieved as a result of the CTR, which as previously stated, is not the case.

Response to: CTR-044-038

As described in the EA (p. 8-22), research provides empirical evidence of the passive use values associated with improved water quality and fisheries. EPA believes that these studies are applicable to the CTR. EPA also believes that its assessment of toxic impairment of California, based on data and information compiled by the State Water Resource Control Boards, is reasonably accurate.

EPA's analysis presents only the portion of the total potential benefits that can be achieved by controlling point sources. EPA expects additional benefits will accrue as a result of controlling other sources. EPA has no reason to believe that the standards established by the CTR cannot be achieved.

Comment ID: CTR-054-042
Comment Author: Bay Area Dischargers Associati
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-02d Passive Use Value

References:
Attachments? N
CROSS REFERENCES

Comment: EPA's estimate of passive use benefits ($36.3 million annually under the high-end scenario and 70% of the total estimated benefits) is erroneous. First, it is based on an unsupported assumption that non-use values (e.g., property values) are depressed in California because of pollution. Second, it is based on the assumption that the water quality criteria will be achieved as a result of the CTR, which as previously stated, is not the case.

Response to: CTR-054-042

As described in the EA (p. 8-22), research provides empirical evidence of the passive use values associated with improved water quality and fisheries. EPA believes that these studies are applicable to the CTR. EPA also believes that its assessment of toxic impairment of California, based on data and information compiled by the State Water Resource Control Boards, is reasonably accurate.

EPA's analysis presents only the portion of the total potential benefits that can be achieved by controlling point sources. EPA expects additional benefits will accrue as a result of controlling other sources. EPA has no reason to believe that the standards established by the CTR cannot be achieved.

Subject Matter Code: E-02e Include Omitted Benefits

Comment ID: CTR-029-004b
Comment Author: Center for Marine Conservation
Document Type: Environmental Group
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-02e Include Omitted Benefits
References:
Attachments? N
CROSS REFERENCES E-01c02

Comment: The Center for Marine Conservation (CMC) is a nationwide, nonprofit advocacy group dedicated to the conservation and enhancement of coastal and ocean life and resources. CMC submits these comments on behalf of its 16,000 members in California and over 120,000 members nationwide.

CMC applauds EPA's efforts to bring California into compliance with the Clean Water Act 303(c)(2)(B). Implementing numeric criteria that will protect the beneficial uses of California's waters is of great importance to the health of coastal and marine ecosystems, and so to CMC and its members. The reliance in many areas of the state on narrative criteria threatens the health of most of the state's waters, thereby impacting both human health and the health of the state's economy that relies on clean water.

While CMC strongly supports the swift adoption of an Enclosed Bays and Estuaries Plan and an Inland Surface Waters Plan that contain numeric criteria for toxic pollutants, CMC also is concerned that many of the specific criteria contained in the proposed rule are weaker than those contained in published guidance. CMC also believes that the proposed rule can better protect certain subpopulations from harm caused by consumption of contaminated fish and shellfish. Finally, CMC is concerned that the economic analysis of the proposed rule over-emphasizes costs and under-reports the many benefits of improving water. quality throughout the state. These three points are reviewed below.

The Proposed Rule's Economic Analysis Over-Emphasizes Costs and Under reports the Benefits of Improving Water Quality Throughout the State

By EPA's own admission, the proposed rule's economic analysis over-reports costs and under-reports benefits. Specifically, the proposed rule states that "cost estimates for both scenarios, but especially for the high-end scenario, may be overstated because the analysis tended to use conservative assumptions."(*8) Conversely, "numerous categories of potential or likely benefits have been omitted" from the analysis, and these omitted benefits "are likely to be significant contributors" to an "appreciable underestimation" of the overall benefits of the rule.(*9) Categories left out of the benefits analysis include improvements in water-related, non-fishing recreation, improvements in land recreation, and improvements in human health resulting from reducing non-cancer risk."(*10)

CMC believes it is possible to quantify many of these omitted benefits to obtain a more accurate picture of the importance of this rule. For example, a recent Santa Monica Bay Restoration Project Study found that people swimming close to storm drains face a 50% increase in their risk of contracting a variety of non-cancer ills such as gastroenteritis and ear and other infections. At a minimum, EPA's analysis could capture the benefits of improved water quality in terms of avoided sick days and avoided medical costs for such users.

CMC also believes that the economics analysis should consider other categories of benefits not mentioned at all in the proposed rule. For example, Governor Wilson's March 1997 planning document, California's Ocean Resources: An Agenda for the Future, finds that industries that depend on healthy coastal and ocean waters contribute $17.3 billion to the state's economy each year and support 370,000 jobs. The majority of this total, $10 billion, is from tourism, which is not mentioned in the proposed rule but which could benefit greatly from improved water quality. Such omitted benefits should be examined in order to have a more balanced economic analysis.

The adequacy of the proposed rule's economic analysis is important to the long-term implementation of the rule. As reported by EPA, "[t]he allegation that the State did not sufficiently consider economics when adopting Water quality objectives ... was an important issue in the litigation" that resulted in the rescission of the Enclosed Bays and Estuaries Plan and the Inland Surface Waters Plan.(*11) Moreover, an accurate description of the benefits of the proposed rule is critical to obtaining funding and public support for swift implementation of the numeric criteria. CMC thus requests that the benefits analysis be updated where possible to parallel the acknowledged "conservative" approach used in estimating the costs of the proposed rule.

(*8) Id. at 42189.

(*9) Id. at 42190.

(*10) Id.

(*11) Id. at 42165.

Response to: CTR-029-004b

EPA acknowledges that it was unable to monetize all categories of potential benefits from the rule. EPA provided a qualitative description of the expected benefits and those unmonetized benefits that may contribute most substantially to total benefits.

Illnesses contracted from swimming, such as those evaluated in the study of storm water drains in Santa Monica Bay, typically result from exposure to pathogens that will not be regulated under the CTR. Noncancer effects from the toxic pollutants that will be reduced by the rule are difficult to quantify because of a lack of information on the link between concentrations in the environment and potential cases of systemic effects.

Secondary benefits (e.g., tourism) or economic impacts embody the successive rounds of spending in an economy that result from the primary benefits of a regulation. These secondary benefits (or impacts) are estimated based on the analysis of data on interindustry linkages within a region. Although these impacts may be of relevance to policymakers, the inclusion of secondary benefits may be inappropriate. This is because under conditions of reasonably full employment, the resources placed into support services (or diverted from complying entities) would be diverted from (or redirected toward) other productive purposes (i.e., net jobs would not be created or lost for otherwise unemployed individuals but, rather, workers would be drawn to or away from other jobs). Thus, these secondary impacts represent a transfer or redistribution of resources rather than changes in real economic activity.

The benefits of water quality improvements are highly site specific and difficult to monetize due to

limitations in benefits methodology and accurate data on society's values for these improvements. For example, there are currently few means of linking consumption of toxic contaminants by humans with cases of systemic effects (as opposed to cancer effects, for which dose-response curves have been estimated). As another example, the contingent valuation (CV) is the only method for estimating passive use values, and CV surveys require substantial resources to conduct. As a result, there is limited data and information with which to estimate the benefits of the proposed rule. Since these values are not known, a parallel conservative approach is not possible. EPA presented the information on the limitations of the analysis (e.g., costs may be overstated and benefits may be understated) to assist decisionmakers in evaluating the results.

Comment ID: CTR-092-023a
Comment Author: City of San Jose, California
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: E-02e Include Omitted Benefits
References: Letter CTR-092 incorporates by reference letter CTR-035
Attachments? Y
CROSS REFERENCES E-02l
E-02q

Comment: Comment #7: General Benefit Analysis Concerns

The benefit analysis undertaken by EPA uses old, out-of-state data which does not appear applicable to California. A major concern with this analysis is that the benefit recipients are only a subset of those impacted by the costs. Another is that the benefits accrue to the public at large; costs, on the other hand, to the extent that CTR-implementation costs are borne by Indirect Dischargers (as assumed by EPA in the copper situation) accrue to businesses.

Further, the benefit measurements of "angling day" are only useful if they represent a net increase in fishing activity -- if all that improving waterway quality does is create additional sites where safe fishing can occur, without increasing the overall amount of fishing that occurs, there is no net gain, there is only substitution between comparable sites. The value of benefits which occur because of substitution between fishing sites must be subtracted from the value which occurs from increased fishing. This has not been done in the EPA analysis, thus benefits are overstated.

Further, no stratification is evident to account for importation of out-of-state fishers -- including benefit value of attracting new anglers from other states to California fishing sites is irrelevant to an analysis of costs/benefits of implementing the CTR for California.

Questions for EPA on Comment #7:

Q.7 - 1) If the concerns stated above were appropriately addressed, what would be the impact on EPA's benefits analysis? Our concern relates to the need to examine levels of regulation in comparison to benefits obtained, i.e. cost-effectiveness.

Q.7 - 2) Executive Order 12866, in recognition that quantification of benefits is very difficult, is quite

explicit about addressing qualitative benefits wherever possible why wasn't that done in this analysis?

Response to: CTR-092-023a

EPA was not able to locate more relevant or more recent data or research for the analysis. EPA solicited relevant data and information in the EA and proposal. In addition, in response to comments, EPA conducted an extensive search of the literature for any additional recent, California-specific data or information applicable to the benefits analysis. EPA reviewed and evaluated all data and information submissions, and the results of the literature search, and revised the EA and CTR as appropriate prior to promulgating the final rule.

Although it is true that the direct costs of the regulation are borne by municipal and industrial dischargers while the benefits accrue to the public at large, it is also true that in generating the discharges, the benefits (cost savings) accrued to businesses and municipalities while the costs (decreased utility associated with water resources) were borne by the public. Ultimately, benefits and costs are borne throughout society (e.g., costs are borne directly by municipal and industrial dischargers but indirectly by the public who pays for their products and services).

EPA acknowledged that increased angling activity at sites experiencing reductions in toxic contaminants may reflect a shift in activity from substitute sites rather than a net increase. Because EPA could not account for substitute sites in this analysis, EPA estimated lower bound benefits of $0 (i.e., assuming no net increases in activity; see EA, Chapter 8).

EPA's estimate of the relevant angling population is based on resident California anglers (see Analysis of the Potential Benefits Related to Implementation of the California Toxics Rule, Draft, December 20, 1996, pp. 3-23, 3-35 to 3-36).

EPA revised its economic analysis in response to comments and to reflect any new data or changes to the proposal.

(EPA revised.....already part of text)....The estimated cost-effectiveness of the rule is expected to range from $22/lb-eq to $31/lb-eq. EPA expects the total annual, monetized benefits from implementation of the CTR to range from $8.7 to $40.8 million dollars.

Chapter 6 of the EA (Qualitative Assessment of Potential Ecological Benefits) provides a qualitative discussion of potential ecological benefits. EPA also provided a qualitative discussion of important benefit categories that it was not able to quantify or monetize (see the EA that accompanied the proposed rule, Chapter 8).

Subject Matter Code: E-02f Use More Recent Data

Comment ID: CTR-035-009a
Comment Author: Tri-TAC/CASA
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-02f Use More Recent Data
References:
Attachments? N
CROSS REFERENCES E-02c

Comment: We also question the estimates of the benefits derived in the draft Economic Analysis, and believe that more recent information specific to California should be collected and used. In particular, for most of the benefits, estimates are based on a comparison with waters which are completely free of contaminants or unimpaired, which is unrealistic. There is also little evaluation of the marginal benefits of the proposed rule (i.e. the benefits that would be realized as a result of marginal changes in contamination levels). While presumably achievement of the full reductions necessary to meet the CTR criteria in ambient waters is EPA's goal, EPA itself acknowledges that few of the benefits of the CTR are likely to be realized through point source controls, and the Agency fails to demonstrate how the water quality criteria promulgated by the CTR will be achieved.

Response to: CTR-035-009a

EPA considers Lyke's scenario (waters completely free of contaminants that may threaten human health) to be similar to a scenario in which all California waters meet the water quality standards established by the CTR. EPA has no information to show that these standards cannot be achieved. Thus, EPA used Lyke's results to estimate the total potential benefits of achieving standards. However, since point source controls alone may not be sufficient to achieve the standards throughout California, EPA allocated only a portion of the total benefits to the CTR.

EPA agrees that the study site for Lyke's research is substantially different from California waters. However, EPA's search of the literature indicated that there is no similar research for California or other more similar waters. Therefore, EPA applied Lyke's results to provide decisionmakers with information on the types and potential magnitude of the benefits from water quality improvements, rather than leaving this important benefit category unmonetized. EPA has no information to determine whether California residents may value toxic-free waters more or less than Wisconsin residents.

In addition, EPA believes that Lyke's scenario does not capture another component of potential value to current anglers that may result as reduced levels of toxic pollutants result in healthier sport fish populations. Lyke's survey asked anglers to consider a fishery that is free of contaminants that may threaten human health. However, fish are more sensitive than humans to some classes of toxic pollutants and fish populations may increase as contamination is reduced. To the extent that reducing toxic contamination results in a more satisfying angling experience in terms of increasing catch rates, achieving water quality standards may result in an increase in value to current anglers beyond that associated with reducing human health concerns.

Water quality improvements often involve thresholds such as action levels for fish consumption

advisories. However, water quality regulations often contribute only a portion of the improvement needed to surpass a threshold. Although individuals may (or may not) have a willingness to pay for incremental steps toward crossing a threshold, when the threshold is surpassed (e.g., fish consumption advisories are lifted), every action that contributed to the effort should be allocated a portion of the benefits. This was accomplished for the CTR by allocating a portion of the total toxic-free benefits (proportional to the reduction in loadings) to the implementation of point source controls under the CTR.

EPA's analysis presents only the portion of the total potential benefits that can be achieved by controlling point sources. EPA expects additional benefits will accrue as a result of controlling other sources. EPA has no reason to believe that the standards established by the CTR cannot be achieved.

Comment ID: CTR-035-051b
Comment Author: Tri-TAC/CASA
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-02f Use More Recent Data
References:
Attachments? N
CROSS REFERENCES E-02g
E-02k

Comment: C. Benefits Analysis pp. 5-7 - 5-8 (U.S. EPA, 1997a) -- Attribution of Benefits to the Control of Point Sources

We applaud EPA's effort to analyze and report the proportion of the total benefits that might accrue due to the implementation of controls on point source NPDES dischargers in the benefits analysis (although we believe that this apportionment should have been carried through to the estimates of passive use benefits). We believe that it is appropriate to state the benefits that can be attributed to the estimated expenditures. We recognize, however, that there are many limitations in this approach, and that better data are needed. For instance, the pollutant loadings data used in this analysis were old and outdated (specifically, the Davis and NOAA studies contained data that are 10-15 years old). We urge EPA to update these studies with more recent data for the final Economic Analysis.

We believe that the benefits analysis illustrates that, in many instances, point source controls will not produce significant benefits. For instance, this is illustrated by the fact that the projected health benefits of the CTR in reducing both cancer and baseline systemic risks are minimal (see pp, 8-11 - 8-16, (U.S. EPA, 1997a)). Another example is illustrated by an examination of those water bodies for which fish consumption advisories have been issued. For those included on the State's 303(d) list, except for San Francisco Bay, the causes of impairment are largely listed by the SWRCB as nonpoint sources, including mining or resource extraction, agricultural drainage or runoff, urban stormwater runoff, or other unspecified nonpoint sources (SWRCB, 1996).

In addition, the analysis of benefits should highlight more clearly the fact that there may be little or no benefits in the near-term due to long-term environmental persistence of existing contamination. As EPA itself acknowledges on p. 5-8 (U.S. EPA, 1997a), "historical loads may, in some instances, be the predominant source of toxics-related water quality problems. In such instances, efforts to control current

discharges may be of relatively limited effectiveness and value." It is well-documented that some substances, such as DDT and PCBs, which have been banned for two or more decades, still persist in the environment; thus, the likelihood of the CTR substantially reducing loadings and producing benefits is minimal.

Response to: CTR-035-051b

As described in the EA (Chapter 8), research provides empirical evidence of the passive use values associated with improved water quality and fisheries. Research also indicates that these values are at least half as great as recreational values, such that if they are potentially applicable to a policy action, providing a rough approximation is preferable, with proper caveats, to omitting them from the analysis of benefits and costs. EPA believes that the studies used to calculate the ratio of passive use to use value are applicable to the CTR (see also comment and response CTR-029-009).

Therefore, EPA applies a ratio of .5 to obtain an estimate of passive use values for those households that have active recreational anglers. Based on a review of the literature, on studies that estimate resource values fo users and non-users (see the revised economic analysis), EPA believes that non-angling household do indeed have a passive use value. To determine a lower-bound estimate of passive use values for non-angling households, EPA assumed that the value may be 30% of the value for angling households. For analysis of the final CTR, EPA revised the upper-bound estimate assuming that the passive use value of non-angling households may be 90% of those for angling households. This revision is based on a study by Loomis et al. (1991), who estimated the benefits of improved fishery, wetland, and waterfowl resources in the San Joaquin Valley to users and nonusers residing in California.

By multiplying a ratio of passive use to use value by recreational fishing values, which EPA apportioned to reflect the relative contribution of point sources, EPA also accounted for attribution in its estimate of passive use values.

For the EA that accompanied the proposal, EPA conducted an extensive search of the literature for more recent data or information related to the relative contributions of various sources to water quality impairments. In the EA accompanying the proposal, EPA solicited additional data, however, none was received. In revising the EA for the final rulemaking, EPA conducted an additional extensive search of the literature and research efforts at California universities for relevant information. EPA has incorporated any new information into the revised EA for the final rule.

The standards established in the CTR apply to all waterbodies. EPA currently only applies water quality based effluent limits to point sources, and thus the estimate of post-regulation risk levels reflect only the potential impact of controls on point sources. However, controls will also be required of other sources in the future. As controls on other sources are implemented (e.g., remediation of contaminated sediments; best management practices to control storm water discharges and runoff from agricultural land), EPA expects that concentrations in fish tissue will decline further and that the standards established by the CTR to protect human health can be achieved.

EPA also believes that the risk reducing impact of the regulation on point sources may not be fully illustrated by EPA's analysis which reflects only a small sample of point source dischargers. That is, although baseline risk levels are based on actual fish tissue concentrations, post-regulation risk levels are estimated by examining the potential for reducing loadings at a sample of facilities. Pollutants responsible for much of the baseline health risk at specific sites, such as popular fishing areas in San Francisco Bay, may be found in point sources effluents, however, the facilities discharging these pollutants may not be included in the sample.

Although the standards established by the CTR apply to all sources, EPA's analysis examined only the portion of benefits expected to be achieved by controlling point sources. EPA estimated the point source share of benefits based on data and information on the relative contribution of all sources to toxic loadings in California waters. Although point sources may account for only a small portion of the load in some waters, they may account for relatively larger portions at some sites, and point source controls will contribute to meeting standards in the water bodies.

EPA recognizes the persistence of some of the substances addressed by the CTR (e.g., DDT and PCBs) and the impact of this persistence on the realization of benefits. In the EA (Chapter 9), EPA accounted for this lag by assuming 10- and 20-year phase-in periods for benefits in its comparison of present value benefits and costs.

In addition, EPA believes that point source controls can factor into pollutant reduction scenarios, although the cost-effectiveness of point and nonpoint source controls are likely to be highly site specific. Potential "hidden" loads (contaminant concentrations which are not currently measured because they are below detection levels) from point sources may also be occurring and may increase the potential benefits of point source controls. In addition, point source loadings reductions will reduce future sediment contamination and, thereby, reduce the need for costly site-specific sediment remediation in the future. Therefore, the CTR can be viewed as both reducing current environmental risks (yielding benefits) by reducing current loadings, and reducing future environmental cleanup costs.

Comment ID: CTR-045-010
Comment Author: Sausalito-Marin Sanitary Dist.
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/24/97
Subject Matter Code: E-02f Use More Recent Data
References:
Attachments? Y
CROSS REFERENCES

Comment: For the benefits analysis, EPA should utilize more California-specific and recent information.

Response to: CTR-045-010

EPA was not able to locate more relevant or more recent data or research for the analysis. EPA solicited relevant data and information in the EA and proposal. In addition, in response to comments, EPA conducted an extensive search of the literature for any additional recent, California-specific data or information applicable to the benefits analysis. EPA reviewed and evaluated all data and information submissions, and the results of the literature search, and revised the EA and CTR as appropriate prior to promulgating the final rule.

Comment ID: CTR-056-021
Comment Author: East Bay Municipal Util. Dist.

Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/22/97
Subject Matter Code: E-02f Use More Recent Data
References: Letter CTR-056 incorporates by reference letter CTR-054
Attachments? N
CROSS REFERENCES

Comment: Regarding the benefits analysis, EPA should use more recent information and information specific to the state of California to develop their assessment of the value of the benefits resulting from the implementation of the CTR. We believe that by considering these two factors alone, the benefit value is more likely to be on the low side of the $1.5 to $51.7 million/year estimate provided by EPA. Also, a consideration which was not included as an adverse side-effect of enhancing beneficial uses of inland surface waters and enclosed bays and estuaries is the increased pollutant loading along the margins of the water body linked to increased recreational activities (e.g. increased pollution associated with recreational boating).

Response to: CTR-056-021

EPA was not able to locate more relevant or more recent data or research for the analysis. EPA solicited relevant data and information in the EA and proposal. In addition, in response to comments, EPA conducted an extensive search of the literature for any additional recent, California-specific data or information applicable to the benefits analysis. EPA reviewed and evaluated all data and information submissions, and the results of the literature search, and revised the EA and CTR as appropriate prior to promulgating the final rule.

EPA believes that the environmental impacts of the pollutants regulated by the CTR far exceed those associated with recreational boating, and that pollutants generated by boating are already regulated to ensure minimal impacts on water resources.

Comment ID: CTR-066-014
Comment Author: Delta Diablo Sanitation Dist.
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: E-02f Use More Recent Data
References:
Attachments? N
CROSS REFERENCES

Comment: The areas with which we find concerns and the requested changes include the following:

* With regard to the benefits analysis, we believe EPA should utilize more California-specific and recent information.

Response to: CTR-066-014

EPA was not able to locate more relevant or more recent data or research for the analysis. EPA solicited relevant data and information in the EA and proposal. In addition, in response to comments, EPA conducted an extensive search of the literature for any additional recent, California-specific data or information applicable to the benefits analysis. EPA reviewed and evaluated all data and information submissions, and the results of the literature search, and revised the EA and CTR as appropriate prior to promulgating the final rule.

Comment ID: CTR-082-008
Comment Author: City of Burbank
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/24/97
Subject Matter Code: E-02f Use More Recent Data
References:
Attachments? N
CROSS REFERENCES

Comment: The subject rule has a significant impact on our facility discharge and the citizens of the City. We therefore present the following comments for your consideration to re-open the comment period for this rule in order to facilitate a more complete review by public and in particular by those in the POTW community:

* For the benefits analysis, EPA should utilize more California-specific and recent information.

Response to: CTR-082-008

EPA was not able to locate more relevant or more recent data or research for the analysis. EPA solicited relevant data and information in the EA and proposal. In addition, in response to comments, EPA conducted an extensive search of the literature for any additional recent, California-specific data or information applicable to the benefits analysis. EPA reviewed and evaluated all data and information submissions, and the results of the literature search, and revised the EA and CTR as appropriate prior to promulgating the final rule.

Comment ID: CTR-085-017
Comment Author: Camarillo Sanitary District
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/24/97
Subject Matter Code: E-02f Use More Recent Data
References:
Attachments? N
CROSS REFERENCES

Comment: The District supports the following positions of CASA and SCAP where changes need to be

made in the proposed California Toxics Rule:

* For the benefit analysis, the EPA should utilize more California-specific and recent information.

Response to: CTR-085-017

EPA was not able to locate more relevant or more recent data or research for the analysis. EPA solicited relevant data and information in the EA and proposal. In addition, in response to comments, EPA conducted an extensive search of the literature for any additional recent, California-specific data or information applicable to the benefits analysis. EPA reviewed and evaluated all data and information submissions, and the results of the literature search, and revised the EA and CTR as appropriate prior to promulgating the final rule.

Subject Matter Code: E-02g Benefits & Poll. Reduction

Comment ID: CTR-035-051a
Comment Author: Tri-TAC/CASA
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-02g Benefits & Poll. Reduction
References:
Attachments? N
CROSS REFERENCES E-02f
E-02k

Comment: C. Benefits Analysis pp. 5-7 - 5-8 (U.S. EPA, 1997a) -- Attribution of Benefits to the Control of Point Sources

We applaud EPA's effort to analyze and report the proportion of the total benefits that might accrue due to the implementation of controls on point source NPDES dischargers in the benefits analysis (although we believe that this apportionment should have been carried through to the estimates of passive use benefits). We believe that it is appropriate to state the benefits that can be attributed to the estimated expenditures. We recognize, however, that there are many limitations in this approach, and that better data are needed. For instance, the pollutant loadings data used in this analysis were old and outdated (specifically, the Davis and NOAA studies contained data that are 10-15 years old). We urge EPA to update these studies with more recent data for the final Economic Analysis.

We believe that the benefits analysis illustrates that, in many instances, point source controls will not produce significant benefits. For instance, this is illustrated by the fact that the projected health benefits of the CTR in reducing both cancer and baseline systemic risks are minimal (see pp, 8-11 - 8-16, (U.S. EPA, 1997a)). Another example is illustrated by an examination of those water bodies for which fish consumption advisories have been issued. For those included on the State's 303(d) list, except for San Francisco Bay, the causes of impairment are largely listed by the SWRCB as nonpoint sources, including mining or resource extraction, agricultural drainage or runoff, urban stormwater runoff, or other unspecified nonpoint sources (SWRCB, 1996).

In addition, the analysis of benefits should highlight more clearly the fact that there may be little or no benefits in the near-term due to long-term environmental persistence of existing contamination. As EPA itself acknowledges on p. 5-8 (U.S. EPA, 1997a), "historical loads may, in some instances, be the predominant source of toxics-related water quality problems. In such instances, efforts to control current discharges may be of relatively limited effectiveness and value." It is well-documented that some substances, such as DDT and PCBs, which have been banned for two or more decades, still persist in the environment; thus, the likelihood of the CTR substantially reducing loadings and producing benefits is minimal.

Response to: CTR-035-051a

As described in the EA (Chapter 8), research provides empirical evidence of the passive use values associated with improved water quality and fisheries. Research also indicates that these values are at least half as great as recreational values, such that if they are potentially applicable to a policy action,

providing a rough approximation is preferable, with proper caveats, to omitting them from the analysis of benefits and costs. EPA believes that the studies used to calculate the ratio of passive use to use value are applicable to the CTR (see also comment and response CTR-026-009).

Therefore, EPA applies a ratio of .5 to obtain an estimate of passive use values for those households that have active recreational anglers. Based on a review of the literature, EPA believes that non-angling household do indeed have a passive use value. To determine a lower-bound estimate of passive use values for non-angling households, EPA assumed that the value may be 30% of the value for angling households. For analysis of the final CTR, EPA revised the upper-bound estimate assuming that the passive use value of non-angling households may be 90% of those for angling households. This revision is based on a study by Loomis et al. (1991), who estimated the benefits of improved fishery, wetland, and waterfowl resources in the San Joaquin Valley to users and nonusers residing in California.

By multiplying a ratio of passive use to use value by recreational fishing values, which EPA apportioned to reflect the relative contribution of point sources, EPA also accounted for attribution in its estimate of passive use values.

For the EA that accompanied the proposal, EPA conducted an extensive search of the literature for more recent data or information related to the relative contributions of various sources to water quality impairments. In the EA accompanying the proposal, EPA solicited additional data, however, none was received. In revising the EA for the final rulemaking, EPA conducted an additional extensive search of the literature and research efforts at California universities for relevant information. EPA has incorporated any new information into the revised EA for the final rule.

The standards established in the CTR apply to all California inland surface waters and enclosed bays and estuaries. EPA currently only applies water quality based effluent limits to point sources, and thus the estimate of post-regulation risk levels reflect only the potential impact of controls on point sources. However, controls will also be required of other sources in the future. As controls on other sources are implemented (e.g., remediation of contaminated sediments; best management practices to control storm water discharges and runoff from agricultural land), EPA expects that concentrations in fish tissue will decline further and that the standards established by the CTR to protect human health can be achieved.

EPA also believes that the risk reducing impact of the regulation on point sources may not be fully illustrated by EPA's analysis which reflects only a small sample of point source dischargers. That is, although baseline risk levels are based on actual fish tissue concentrations, post-regulation risk levels are estimated by examining the potential for reducing loadings at a sample of facilities. Pollutants responsible for much of the baseline health risk at specific sites, such as popular fishing areas in San Francisco Bay, may be found in point sources effluents, however, the facilities discharging these pollutants may not be included in the sample.

Although the standards established by the CTR apply to all sources, EPA's analysis examined only the portion of benefits expected to be achieved by controlling point sources. EPA estimated the point source share of benefits based on data and information on the relative contribution of all sources to toxic loadings in California waters. Although point sources may account for only a small portion of the load in some waters, they may account for relatively larger portions at some sites, and point source controls will contribute to meeting standards in the water bodies.

EPA recognizes the persistence of some of the substances addressed by the CTR (e.g., DDT and PCBs) and the impact of this persistence on the realization of benefits. In the EA (Chapter 9), EPA accounted for this lag by assuming 10- and 20-year phase-in periods for benefits in its comparison of present value

benefits and costs.

In addition, EPA believes that point source controls can factor into pollutant reduction scenarios, although the cost-effectiveness of point and nonpoint source controls are likely to be highly site specific. Potential "hidden" loads (contaminant concentrations which are not currently measured because they are below detection levels) from point sources may also be occurring and may increase the potential benefits of point source controls. In addition, point source loadings reductions will reduce future sediment contamination and, thereby, reduce the need for costly site-specific sediment remediation in the future. Therefore, the CTR can be viewed as both reducing current environmental risks (yielding benefits) by reducing current loadings, and reducing future environmental cleanup costs.

Comment ID: CTR-035-066
Comment Author: Tri-TAC/CASA
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-02g Benefits & Poll. Reduction
References:
Attachments? N
CROSS REFERENCES

Comment: * The Analysis suggests that the proposed reductions in point source discharges may not result in any benefits. As indicated by USEPA, "...the estimates presented here do not make direct causal links between point source controls and the stated benefits..."

Response to: CTR-035-066

EPA recognizes that the benefits of the rule will not occur immediately, and has estimated lags in the realization of benefits. However, EPA believes that the standards established by the CTR can be achieved through point source controls and will result in attaining designated uses of the water bodies, and that the estimated benefits are illustrative of the types and potential benefits to be achieved from attaining these uses.

Comment ID: CTR-040-044
Comment Author: County of Sacramento Water Div
Document Type: Storm Water Auth.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-02g Benefits & Poll. Reduction
References: Letter CTR-040 incorporates by reference letter CTR-027
Attachments? Y
CROSS REFERENCES

Comment: EPA's estimate of reduced cancer benefits ($5.3 million annually under the high-end scenario)

is suspect because the analysis does not show that the pollutant upon which the benefits are based (DDT) will be reduced (or sufficiently reduced) as a result of the CTR to lead to the estimated reduction in cancer cases.

Response to: CTR-040-044

To calculate potential human health risk reduction benefits, EPA first calculated baseline risk levels using actual contaminant concentrations found in fish tissue. EPA then multiplied the baseline risk levels by the estimated reduction in loadings expected to result from the implementation of point source controls and by the relative contribution of point source loadings to total loadings. For DDT, EPA estimated a 68.8% reduction in point source loadings under the high end cost estimate and a 0% reduction in point source loadings under the low end cost estimate. EPA's estimate of human health benefits reflects these estimated reductions. For example, potential cancer-related benefits to recreational anglers range from $0 to $4.2 million for freshwater resources and total $0 for San Francisco Bay.

In addition, the risk reducing impact of the regulation on point sources may not be fully illustrated by EPA's analysis which reflects only a small sample of point source dischargers. That is, although baseline risk levels are based on actual fish tissue concentrations, post-regulation risk levels are estimated by examining the potential for reducing loadings at a sample of facilities. Pollutants responsible for much of the baseline health risk at specific sites, such as popular fishing areas in San Francisco Bay, may be found in point source effluents, however, the facilities discharging these pollutants may not be included in the sample.

Comment ID: CTR-041-040
Comment Author: Sacramento Reg Cnty Sanit Dist
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-02g Benefits & Poll. Reduction
References:
Attachments? N
CROSS REFERENCES

Comment: EPA's estimate of reduced cancer benefits ($5.3 million annually under the high-end scenario) is suspect because the analysis does not show that the pollutant upon which the benefits are based (DDT) will be reduced (or sufficiently reduced) as a result of the CTR to lead to the estimated reduction in cancer cases.

Response to: CTR-041-040

To calculate potential human health risk reduction benefits, EPA first calculated baseline risk levels using actual contaminant concentrations found in fish tissue. EPA then multiplied the baseline risk levels by the estimated reduction in loadings expected to result from the implementation of point source controls and by the relative contribution of point source loadings to total loadings. For DDT, EPA estimated a 68.8% reduction in point source loadings under the high end cost estimate and a 0% reduction in point source loadings under the low end cost estimate. EPA's estimate of human health benefits reflects these estimated reductions. For example, potential cancer-related benefits to recreational

anglers range from $0 to $4.2 million for freshwater resources and total $0 for San Francisco Bay.

In addition, the risk reducing impact of the regulation on point sources may not be fully illustrated by EPA's analysis which reflects only a small sample of point source dischargers. That is, although baseline risk levels are based on actual fish tissue concentrations, post-regulation risk levels are estimated by examining the potential for reducing loadings at a sample of facilities. Pollutants responsible for much of the baseline health risk at specific sites, such as popular fishing areas in San Francisco Bay, may be found in point source effluents, however, the facilities discharging these pollutants may not be included in the sample.

Comment ID: CTR-044-035
Comment Author: City of Woodland
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: E-02g Benefits & Poll. Reduction
References:
Attachments? N
CROSS REFERENCES

Comment: EPA's estimate of reduced cancer benefits ($5.3 million annually under the high-end scenario) is suspect because the analysis does not show that the pollutant upon which the benefits are based (DDT) will be reduced (or sufficiently reduced) as a result of the CTR to lead to the estimated reduction in cancer cases.

Response to: CTR-044-035

To calculate potential human health risk reduction benefits, EPA first calculated baseline risk levels using actual contaminant concentrations found in fish tissue. EPA then multiplied the baseline risk levels by the estimated reduction in loadings expected to result from the implementation of point source controls and by the relative contribution of point source loadings to total loadings. For DDT, EPA estimated a 68.8% reduction in point source loadings under the high end cost estimate and a 0% reduction in point source loadings under the low end cost estimate. EPA's estimate of human health benefits reflects these estimated reductions. For example, potential cancer-related benefits to recreational anglers range from $0 to $5.3 million for freshwater resources and total $0 for San Francisco Bay.

In addition, the risk reducing impact of the regulation on point sources may not be fully illustrated by EPA's analysis which reflects only a small sample of point source dischargers. That is, although baseline risk levels are based on actual fish tissue concentrations, post-regulation risk levels are estimated by examining the potential for reducing loadings at a sample of facilities. Pollutants responsible for much of the baseline health risk at specific sites, such as popular fishing areas in San Francisco Bay, may be found in point source effluents, however, the facilities discharging these pollutants may not be included in the sample.

Comment ID: CTR-054-039
Comment Author: Bay Area Dischargers Associati

Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-02g Benefits & Poll. Reduction
References:
Attachments? N
CROSS REFERENCES

Comment: EPA's estimate of reduced cancer benefits ($5.3 million annually under the high-end scenario) is suspect because the analysis does not show that the pollutant upon which the benefits are based (DDT) will be reduced (or sufficiently reduced) as a result of the CTR to lead to the estimated reduction in cancer cases.

Response to: CTR-054-039

To calculate potential human health risk reduction benefits, EPA first calculated baseline risk levels using actual contaminant concentrations found in fish tissue. EPA then multiplied the baseline risk levels by the estimated reduction in loadings expected to result from the implementation of point source controls and by the relative contribution of point source loadings to total loadings. For DDT, EPA estimated a 68.8% reduction in point source loadings under the high end cost estimate and a 0% reduction in point source loadings under the low end cost estimate. EPA's estimate of human health benefits reflects these estimated reductions. For example, potential cancer-related benefits to recreational anglers range from $0 to $5.3 million for freshwater resources and total $0 for San Francisco Bay.

In addition, the risk reducing impact of the regulation on point sources may not be fully illustrated by EPA's analysis which reflects only a small sample of point source dischargers. That is, although baseline risk levels are based on actual fish tissue concentrations, post-regulation risk levels are estimated by examining the potential for reducing loadings at a sample of facilities. Pollutants responsible for much of the baseline health risk at specific sites, such as popular fishing areas in San Francisco Bay, may be found in point source effluents, however, the facilities discharging these pollutants may not be included in the sample.

Subject Matter Code: E-02h Un-Enclose,Enclose Bay Data

Comment ID: CTR-035-053
Comment Author: Tri-TAC/CASA
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-02h Un-Enclose,Enclose Bay Data
References:
Attachments? N
CROSS REFERENCES

Comment: pp. 7-12 - 7-14 (U.S. EPA, 1997c) -- Extrapolation from Non-Enclosed Bays to Enclosed Bays

EPA assumed that the data from the 1988 NOAA study on 5 bays (San Diego, Humboldt, Monterey, Santa Monica, and San Pedro) could be readily extrapolated for enclosed bays. We believe that there are serious flaws in this approach, and that the data for the non-enclosed bays should be removed from the data set. We are most familiar with Santa Monica Bay, which has been heavily studied, including several specialized studies since that time. The basic problem with including data such as that for Santa Monica Bay in the data set is that the mass loading data are undoubtedly dominated by data for 2 large ocean discharge POTWs (each greater than or equal to 350 MGD), which would likely not be allowed to discharge into enclosed bays, thus skewing the assumptions towards a greater influence from POTWs on these bays than really occurs. If EPA examines the SWRCB's 1996 303(d) list, information is provided for many of these water bodies indicating what types of discharges are the likely sources of the pollution problems, which we believe will confirm this.

Response to: CTR-035-053

The NOAA data included five bays (San Diego, Humboldt, Monterey, Santa Monica, and San Pedro), two of which are actually covered by the CTR (San Diego and Humboldt). EPA assumed that the data for the nonenclosed bays generally will be applicable to enclosed bays. If EPA had excluded those bays not covered by the rule, the attribution assumption for point sources would actually be higher (see EA, p. 7-4). For example, for urban bays, the toxic-weighted average contribution of point sources is higher for the enclosed bay covered by the rule (San Diego Bay; 91%) compared to the nonenclosed bays (Santa Monica and San Pedro, at 88% and 83%, respectively). EPA employed toxicity-weighting to estimate relative source contribution because the toxicity of the discharge, more than volume, will influence its impact on receiving waters. The California 1996 303(d) report lists both point and nonpoint sources as probable sources of pollution for Santa Monica Bay. The list of pollutants and stressors for Santa Monica Bay includes metals, DDT, and PCBs.

Comment ID: CTR-035-070
Comment Author: Tri-TAC/CASA
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 09/25/97

Subject Matter Code: E-02h Un-Enclose,Enclose Bay Data
References:
Attachments? N
CROSS REFERENCES

Comment: * Even more than the cost analysis, benefits would appear to be site-specific. Uses of water bodies varies considerable, as does the contribution of point, non-point, and natural sources to toxic contamination. As a result, there is likely a mismatch between the total estimated benefits, and the distribution of these benefits throughout the state, as well as the costs of obtaining water body-specific benefits (e.g., costs could be disproportionately felt in areas with little benefit).

For example, USEPA's assumptions about urban bays other than San Francisco are based on a National Oceanic and Atmospheric Administration (NOAA) report that examined five bays: Humboldt, Monterey, San Diego, San Pedro, and Santa Monica, of which only Humboldt and San Diego are covered by the Rule. USEPA assumption that the data for the non-enclosed bays is generally applicable to enclosed bays may not be supportable as a result of differences in dilution factors and the contribution of non-point sources.

Response to: CTR-035-070

EPA agrees that benefits are likely to be highly site specific. However, sites likely to experience a disproportionate share of the benefits are also likely to incur a disproportionate share of the costs.

In addition, once water quality standards are in place, sites that are currently less impacted by toxic pollutants may experience cost savings by preventing future cleanup costs. That is, it may be more cost-effective to prevent toxic pollutants from entering surface waters than to clean up and remediate the impacts once toxic pollutants are released. However, should the State determine through a total maximum daily load (TMDL) allocation that controls on nonpoint sources are a more cost-effective approach to achieving standards, the State can redistribute the allocations through the TMDL process.

The NOAA data included five bays (San Diego, Humboldt, Monterey, Santa Monica, and San Pedro), two of which are actually covered by the CTR (San Diego and Humboldt). EPA assumed that the data for the nonenclosed bays generally will be applicable to enclosed bays. If EPA had excluded those bays not covered by the rule, the attribution assumption for point sources would actually be higher (see EA, p. 7-4). For example, for urban bays, the toxic-weighted average contribution of point sources is higher for the enclosed bay covered by the rule (San Diego Bay; 91%) compared to the nonenclosed bays (Santa Monica and San Pedro, at 88% and 83%, respectively). EPA employed toxicity-weighting to estimate relative source contribution because the toxicity of the discharge, more than volume, will influence its impact on receiving waters. The California 1996 303(d) report lists both point and nonpoint sources as probable sources of pollution for Santa Monica Bay. The list of pollutants and stressors for Santa Monica Bay includes metals, DDT, and PCBs.

Subject Matter Code: E-02i Impaired Waters Assumptions

Comment ID: CTR-035-054
Comment Author: Tri-TAC/CASA
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-02i Impaired Waters Assumptions
References:
Attachments? N
CROSS REFERENCES

Comment: p. 8-18 (U.S. EPA, 1997a) --Assumptions Regarding Impaired Waters EPA explains on p. 8-18 how it extrapolated from the State's 305(b) Report to create estimates for all waters. We believe that EPA should have consulted the SWRCB to determine the general locations of unassessed/unmonitored waters so that logical assumptions could be made. Assumptions about water quality conditions would be very different, for instance, if they are mostly Central Valley agricultural drains than if they are streams in the Sierra Nevada or northern California mountains.

Response to: CTR-035-054

EPA did consult with SWRCB staff concerning appropriate assumptions about unassessed waters. The SWRCB considered EPA's assumptions reasonable for estimating the extent of toxic impairment in unassessed waters.

Comment ID: CTR-040-046
Comment Author: County of Sacramento Water Div
Document Type: Storm Water Auth.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-02i Impaired Waters Assumptions
References: Letter CTR-040 incorporates by reference letter CTR-027
Attachments? Y
CROSS REFERENCES

Comment: The value of recreational angling was multiplied by 50% to obtain $4.3 million annually for passive use benefits. The Wisconsin study, therefore, was the basis for $12.9 million, or 2.5% of the $51.7 million in total benefits.

EPA's estimate of increased angler participation ($1 .5 million annually under the high-end scenario) is based on the unsupported assumption that reducing pollution causes more people to fish. It is just as likely that it does not.

Response to: CTR-040-046

EPA acknowledges that applying Lyke's results to all California waters affected by toxics may overstate potential benefits (see EA Chapter 8). Anglers may or may not be aware of toxic contamination in the absence of fish consumption advisories. EPA acknowledges the limitations in the application of Lyke's research. However, EPA chose this approach to provide illustration of the potential magnitude of recreational angling values rather than leave this important benefit category unmonetized.

In addition, EPA believes that Lyke's scenario does not capture another component of potential value to current anglers that may result as reduced levels of toxic pollutants result in healthier sport fish populations. Lyke's survey asked anglers to consider a fishery that is free of contaminants that may threaten human health. However, fish are more sensitive than humans to some classes of toxic pollutants and fish populations may increase as contamination is reduced. To the extent that reducing toxic contamination results in a more satisfying angling experience in terms of increasing catch rates, achieving water quality standards may result in an increase in value to current anglers beyond that associated with reducing human health concerns.

EPA first applied Lyke's research in its analysis of the potential benefits of the Great Lakes Water Quality Guidance. Calculation of the range of results is explained in U.S. EPA (1993). Lyke estimated the Wisconsin Great Lakes open water sport fishery to be worth between $339 and $424 per licensed angler, resulting in an estimated consumer surplus associated with the fishery of between $66.6 million and $83.3 million annually. Lyke obtained values for a contaminant-free fishery ranging from $7.4 million to $26.1 million per year, with the range in results attributable to whether a linear or constant elasticity of scale functional form is used in the estimation. These results reflect between 11.1% and 31.3% of the value of the fishery under current conditions, which is the range of values EPA used in analysis of the CTR.

EPA acknowledges that Lyke-based benefits represent a substantial portion of total benefits and supports these benefits estimates. (See also comment and response to CTR-035-009a.)

U.S. EPA, 1993. Regulatory Impact Analysis of the Proposed Great Lakes Water Quality Guidance. Final Report, April 15.

EPA estimated the percentage of California waters impaired by toxic pollutants based on water quality assessments developed by the State Water Resources Control Boards. EPA defined toxic-impaired waters as those rated medium or poor for one or more toxic pollutants or group of pollutants. Research (e.g., Lyke, 1993) indicates that the recreational value of water resources may be substantially enhanced by reducing toxic contamination.

Comment ID: CTR-041-042
Comment Author: Sacramento Reg Cnty Sanit Dist
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-02i Impaired Waters Assumptions
References:
Attachments? N
CROSS REFERENCES

Comment: The value of recreational angling was multiplied by 50% to obtain $4.3 million annually for passive use benefits. The Wisconsin study, therefore, was the basis for $12.9 million, or 2.5% of the $51.7 million in total benefits.

EPA's estimate of increased angler participation ($1.5 million annually under the high-end scenario) is based on the unsupported assumption that reducing pollution causes more people to fish. It is just as likely that it does not.

Response to: CTR-041-042

EPA acknowledges that applying Lyke's results to all California waters affected by toxics may overstate potential benefits (see EA Chapter 8). Anglers may or may not be aware of toxic contamination in the absence of fish consumption advisories. EPA acknowledges the limitations in the application of Lyke's research. However, EPA chose this approach to provide illustration of the potential magnitude of recreational angling values rather than leave this important benefit category unmonetized.

In addition, EPA believes that Lyke's scenario does not capture another component of potential value to current anglers that may result as reduced levels of toxic pollutants result in healthier sport fish populations. Lyke's survey asked anglers to consider a fishery that is free of contaminants that may threaten human health. However, fish are more sensitive than humans to some classes of toxic pollutants and fish populations may increase as contamination is reduced. To the extent that reducing toxic contamination results in a more satisfying angling experience in terms of increasing catch rates, achieving water quality standards may result in an increase in value to current anglers beyond that associated with reducing human health concerns.

EPA first applied Lyke's research in its analysis of the potential benefits of the Great Lakes Water Quality Guidance. Calculation of the range of results is explained in U.S. EPA (1993). Lyke estimated the Wisconsin Great Lakes open water sport fishery to be worth between $339 and $424 per licensed angler, resulting in an estimated consumer surplus associated with the fishery of between $66.6 million and $83.3 million annually. Lyke obtained values for a contaminant-free fishery ranging from $7.4 million to $26.1 million per year, with the range in results attributable to whether a linear or constant elasticity of scale functional form is used in the estimation. These results reflect between 11.1% and 31.3% of the value of the fishery under current conditions, which is the range of values EPA used in analysis of the CTR.

EPA acknowledges that Lyke-based benefits represent a substantial portion of total benefits and supports these benefits estimates. (See also comment and response to CTR-035-009a.)

U.S. EPA, 1993. Regulatory Impact Analysis of the Proposed Great Lakes Water Quality Guidance. Final Report, April 15.

EPA estimated the percentage of California waters impaired by toxic pollutants based on water quality assessments developed by the State Water Resources Control Boards. EPA defined toxic-impaired waters as those rated medium or poor for one or more toxic pollutants or group of pollutants. Research (e.g., Lyke, 1993) indicates that the recreational value of water resources may be substantially enhanced by reducing toxic contamination.

Comment ID: CTR-044-037

Comment Author: City of Woodland
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: E-02i Impaired Waters Assumptions
References:
Attachments? N
CROSS REFERENCES

Comment: The value of recreational angling was multiplied by 50% to obtain $4.3 million annually for passive use benefits. The Wisconsin study, therefore, was the basis for $12.9 million, or 2.5% of the $51.7 million in total benefits.

EPA's estimate of increased angler participation ($1.5 million annually under the high-end scenario) is based on the unsupported assumption that reducing pollution causes more people to fish. It is just as likely that it does not.

Response to: CTR-044-037

EPA acknowledges that applying Lyke's results to all California waters affected by toxics may overstate potential benefits (see EA p. 8-17). Anglers may or may not be aware of toxic contamination in the absence of fish consumption advisories. EPA acknowledges the limitations in the application of Lyke's research. However, EPA chose this approach to provide illustration of the potential magnitude of recreational angling values rather than leave this important benefit category unmonetized.

In addition, EPA believes that Lyke's scenario does not capture another component of potential value to current anglers that may result as reduced levels of toxic pollutants result in healthier sport fish populations. Lyke's survey asked anglers to consider a fishery that is free of contaminants that may threaten human health. However, fish are more sensitive than humans to some classes of toxic pollutants and fish populations may increase as contamination is reduced. To the extent that reducing toxic contamination results in a more satisfying angling experience in terms of increasing catch rates, achieving water quality standards may result in an increase in value to current anglers beyond that associated with reducing human health concerns.

EPA first applied Lyke's research in its analysis of the potential benefits of the Great Lakes Water Quality Guidance. Calculation of the range of results is explained in U.S. EPA (1993). Lyke estimated the Wisconsin Great Lakes open water sport fishery to be worth between $339 and $424 per licensed angler, resulting in an estimated consumer surplus associated with the fishery of between $66.6 million and $83.3 million annually. Lyke obtained values for a contaminant-free fishery ranging from $7.4 million to $26.1 million per year, with the range in results attributable to whether a linear or constant elasticity of scale functional form is used in the estimation. These results reflect between 11.1% and 31.3% of the value of the fishery under current conditions, which is the range of values EPA used in analysis of the CTR.

EPA acknowledges that Lyke-based benefits represent a substantial portion of total benefits and supports these benefits estimates. (See also comment and response to Issue 3.)

U.S. EPA, 1993. Regulatory Impact Analysis of the Proposed Great Lakes Water Quality Guidance. Final

Report, April 15.

EPA estimated the percentage of California waters impaired by toxic pollutants based on water quality assessments developed by the State Water Resources Control Boards. EPA defined toxic-impaired waters as those rated medium or poor for one or more toxic pollutants or group of pollutants. Research (e.g., Lyke, 1993) indicates that the recreational value of water resources may be substantially enhanced by reducing toxic contamination.

Comment ID: CTR-054-041
Comment Author: Bay Area Dischargers Associati
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-02i Impaired Waters Assumptions
References:
Attachments? N
CROSS REFERENCES

Comment: The value of recreational angling was multiplied by 50% to obtain $4.3 million annually for passive use benefits. The Wisconsin study, therefore, was the basis for $12.9 million, or 2.5% of the $51.7 million in total benefits.

EPA's estimate of increased angler participation ($1.5 million annually under the high-end scenario) is based on the unsupported assumption that reducing pollution causes more people to fish. It is just as likely that it does not.

Response to: CTR-054-041

EPA acknowledges that applying Lyke's results to all California waters affected by toxics may overstate potential benefits (see EA p. 8-17). Anglers may or may not be aware of toxic contamination in the absence of fish consumption advisories. EPA acknowledges the limitations in the application of Lyke's research. However, EPA chose this approach to provide illustration of the potential magnitude of recreational angling values rather than leave this important benefit category unmonetized.

In addition, EPA believes that Lyke's scenario does not capture another component of potential value to current anglers that may result as reduced levels of toxic pollutants result in healthier sport fish populations. Lyke's survey asked anglers to consider a fishery that is free of contaminants that may threaten human health. However, fish are more sensitive than humans to some classes of toxic pollutants and fish populations may increase as contamination is reduced. To the extent that reducing toxic contamination results in a more satisfying angling experience in terms of increasing catch rates, achieving water quality standards may result in an increase in value to current anglers beyond that associated with reducing human health concerns.

EPA first applied Lyke's research in its analysis of the potential benefits of the Great Lakes Water Quality Guidance. Calculation of the range of results is explained in U.S. EPA (1993). Lyke estimated the Wisconsin Great Lakes open water sport fishery to be worth between $339 and $424 per licensed angler, resulting in an estimated consumer surplus associated with the fishery of between $66.6 million

and $83.3 million annually. Lyke obtained values for a contaminant-free fishery ranging from $7.4 million to $26.1 million per year, with the range in results attributable to whether a linear or constant elasticity of scale functional form is used in the estimation. These results reflect between 11.1% and 31.3% of the value of the fishery under current conditions, which is the range of values EPA used in analysis of the CTR.

EPA acknowledges that Lyke-based benefits represent a substantial portion of total benefits and supports these benefits estimates. (See also comment and response to Issue 3.)

U.S. EPA, 1993. Regulatory Impact Analysis of the Proposed Great Lakes Water Quality Guidance. Final Report, April 15.

EPA estimated the percentage of California waters impaired by toxic pollutants based on water quality assessments developed by the State Water Resources Control Boards. EPA defined toxic-impaired waters as those rated medium or poor for one or more toxic pollutants or group of pollutants. Research (e.g., Lyke, 1993) indicates that the recreational value of water resources may be substantially enhanced by reducing toxic contamination.

Subject Matter Code: E-02k Long-Term Contamination

Comment ID: CTR-035-051c
Comment Author: Tri-TAC/CASA
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-02k Long-Term Contamination
References:
Attachments? N
CROSS REFERENCES E-02g
E-02f

Comment: C. Benefits Analysis pp. 5-7 - 5-8 (U.S. EPA, 1997a) -- Attribution of Benefits to the Control of Point Sources

We applaud EPA's effort to analyze and report the proportion of the total benefits that might accrue due to the implementation of controls on point source NPDES dischargers in the benefits analysis (although we believe that this apportionment should have been carried through to the estimates of passive use benefits). We believe that it is appropriate to state the benefits that can be attributed to the estimated expenditures. We recognize, however, that there are many limitations in this approach, and that better data are needed. For instance, the pollutant loadings data used in this analysis were old and outdated (specifically, the Davis and NOAA studies contained data that are 10-15 years old). We urge EPA to update these studies with more recent data for the final Economic Analysis.

We believe that the benefits analysis illustrates that, in many instances, point source controls will not produce significant benefits. For instance, this is illustrated by the fact that the projected health benefits of the CTR in reducing both cancer and baseline systemic risks are minimal (see pp, 8-11 - 8-16, (U.S. EPA, 1997a)). Another example is illustrated by an examination of those water bodies for which fish consumption advisories have been issued. For those included on the State's 303(d) list, except for San Francisco Bay, the causes of impairment are largely listed by the SWRCB as nonpoint sources, including mining or resource extraction, agricultural drainage or runoff, urban stormwater runoff, or other unspecified nonpoint sources (SWRCB, 1996).

In addition, the analysis of benefits should highlight more clearly the fact that there may be little or no benefits in the near-term due to long-term environmental persistence of existing contamination. As EPA itself acknowledges on p. 5-8 (U.S. EPA, 1997a), "historical loads may, in some instances, be the predominant source of toxics-related water quality problems. In such instances, efforts to control current discharges may be of relatively limited effectiveness and value." It is well-documented that some substances, such as DDT and PCBs, which have been banned for two or more decades, still persist in the environment; thus, the likelihood of the CTR substantially reducing loadings and producing benefits is minimal.

Response to: CTR-035-051c

As described in the EA (Chapter 8), research provides empirical evidence of the passive use values associated with improved water quality and fisheries. Research also indicates that these values are at least half as great as recreational values, such that if they are potentially applicable to a policy action,

providing a rough approximation is preferable, with proper caveats, to omitting them from the analysis of benefits and costs. EPA believes that the studies used to calculate the ratio of passive use to use value are applicable to the CTR (see also comment and response CTR-026-009).

Therefore, EPA applies a ratio of .5 to obtain an estimate of passive use values for those households that have active recreational anglers. Based on a review of the literature, EPA believes that non-angling household do indeed have a passive use value. To determine a lower-bound estimate of passive use values for non-angling households, EPA assumed that the value may be 30% of the value for angling households. For analysis of the final CTR, EPA revised the upper-bound estimate assuming that the passive use value of non-angling households may be 90% of those for angling households. This revision is based on a study by Loomis et al. (1991), who estimated the benefits of improved fishery, wetland, and waterfowl resources in the San Joaquin Valley to users and nonusers residing in California.

By multiplying a ratio of passive use to use value by recreational fishing values, which EPA apportioned to reflect the relative contribution of point sources, EPA also accounted for attribution in its estimate of passive use values.

For the EA that accompanied the proposal, EPA conducted an extensive search of the literature for more recent data or information related to the relative contributions of various sources to water quality impairments. In the EA accompanying the proposal, EPA solicited additional data, however, none was received. In revising the EA for the final rulemaking, EPA conducted an additional extensive search of the literature and research efforts at California universities for relevant information. EPA has incorporated any new information into the revised EA for the final rule.

Although the standards established by the CTR apply to all sources, EPA's analysis examined only the portion of benefits expected to be achieved by controlling point sources. EPA estimated the point source share of benefits based on data and information on the relative contribution of all sources to toxic loadings in California waters. Although point sources may account for only a small portion of the load in some waters, they may account for relatively larger portions at some sites, and point source controls will contribute to meeting standards in the water bodies.

EPA recognizes the persistence of some of the substances addressed by the CTR (e.g., DDT and PCBs) and the impact of this persistence on the realization of benefits. In the EA (Chapter 9), EPA accounted for this lag by assuming 10- and 20-year phase-in periods for benefits in its comparison of present value benefits and costs.

In addition, EPA believes that point source controls can factor into pollutant reduction scenarios, although the cost-effectiveness of point and nonpoint source controls are likely to be highly site specific. Potential "hidden" loads (contaminant concentrations which are not currently measured because they are below detection levels) from point sources may also be occurring and may increase the potential benefits of point source controls. In addition, point source loadings reductions will reduce future sediment contamination and, thereby, reduce the need for costly site-specific sediment remediation in the future. Therefore, the CTR can be viewed as both reducing current environmental risks (yielding benefits) by reducing current loadings, and reducing future environmental cleanup costs.

Comment ID: CTR-035-065a
Comment Author: Tri-TAC/CASA
Document Type: Trade Org./Assoc.

State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-02k Long-Term Contamination
References:
Attachments? N
CROSS REFERENCES E-02c

Comment: Weaknesses in Benefits Analysis

USEPA's benefits analysis is even weaker than its cost evaluation. For example:

* Although there is evidence that the Rule could result in no benefits in the near-term due to long-term environmental persistence of existing contamination, the Analysis does a poor job of highlighting this potential outcome. For example, there is some likelihood that benefits could truly be zero, while under no circumstances will Rule implementation be costless. Likewise, USEPA's use of ranges to express potential benefit values may mislead readers into believing that the estimated high benefits are as likely to be achieved as the low benefits, when in fact the probability that different benefit levels will actually be achieved varies greatly from low to high.

Response to: CTR-035-065a

The range of estimated benefits in part reflects the range in loadings reductions that may result from point source controls given the flexibility in State implementation procedures. The decision as to which implementation procedures will be employed, and therefore what costs and benefits will result, will be made by state and local entities for specific locations.

Subject Matter Code: E-02l Marginal Impacts/Benefits

Comment ID: CTR-035-052
Comment Author: Tri-TAC/CASA
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-02l Marginal Impacts/Benefits
References:
Attachments? N
CROSS REFERENCES

Comment: pp. 6-1 - 6-12 (U.S. EPA, 1997a) -- Assessment of Potential Ecological Benefits

EPA should state in the Economic Analysis that there may not be a one-to-one relationship between benefits and reductions in toxic pollutants, due to the fact that factors such as habitat alteration, competition from invasive exotic species, inadequate flows, hydrologic modification, channelization, and other disturbances, may pose serious threats to ecological resources, and may undermine or partially negate the benefits of the rule.

Response to: CTR-035-052

EPA acknowledges that Lyke's study has not been published in a peer reviewed journal and that she obtained some inconsistent results. EPA applied Lyke's research to illustrate the types and potential magnitude of the benefits from water quality improvements. EPA conducted an extensive search of the literature for additional studies that provide indication of the potential magnitude of the benefits from reducing concentrations of toxic pollutants in California surface waters. The results of EPA's search are described in the EA that accompanies the final rule.

EPA acknowledges that applying Lyke's results to all California waters affected by toxics may overstate potential benefits (see EA Chapter 8). Anglers may or may not be aware of toxic contamination in the absence of fish consumption advisories. EPA acknowledges the limitations in the application of Lyke's research. However, EPA chose this approach to provide illustration of the potential magnitude of recreational angling values rather than leave this important benefit category unmonetized.

In addition, EPA believes that Lyke's scenario does not capture another component of potential value to current anglers that may result as reduced levels of toxic pollutants result in healthier sport fish populations. Lyke's survey asked anglers to consider a fishery that is free of contaminants that may threaten human health. However, fish are more sensitive than humans to some classes of toxic pollutants and fish populations may increase as contamination is reduced. To the extent that reducing toxic contamination results in a more satisfying angling experience in terms of increasing catch rates, achieving water quality standards may result in an increase in value to current anglers beyond that associated with reducing human health concerns.

EPA first applied Lyke's research in its analysis of the potential benefits of the Great Lakes Water Quality Guidance. Calculation of the range of results is explained in U.S. EPA (1993). Lyke estimated the Wisconsin Great Lakes open water sport fishery to be worth between $339 and $424 per licensed angler, resulting in an estimated consumer surplus associated with the fishery of between $66.6 million

and $83.3 million annually. Lyke obtained values for a contaminant-free fishery ranging from $7.4 million to $26.1 million per year, with the range in results attributable to whether a linear or constant elasticity of scale functional form is used in the estimation. These results reflect between 11.1% and 31.3% of the value of the fishery under current conditions, which is the range of values EPA used in analysis of the CTR.

EPA acknowledges that Lyke-based benefits represent a substantial portion of total benefits and supports these benefits estimates. (See also comment and response to CTR-035-009a.)

U.S. EPA, 1993. Regulatory Impact Analysis of the Proposed Great Lakes Water Quality Guidance. Final Report, April 15.

EPA considers Lyke's scenario (waters completely free of contaminants that may threaten human health) to be similar to a scenario in which all California waters meet the water quality standards established by the CTR. EPA has no information to show that these standards cannot be achieved. Thus, EPA used Lyke's results to estimate the total potential benefits of achieving standards. However, since point source controls alone may not be sufficient to achieve the standards throughout California, EPA allocated only a portion of the total benefits to the CTR.

EPA agrees that the study site for Lyke's research is substantially different from California waters. However, EPA's search of the literature indicated that there is no similar research for California or other more similar waters. Therefore, EPA applied Lyke's results to provide decisionmakers with information on the types and potential magnitude of the benefits from water quality improvements, rather than leaving this important benefit category unmonetized. EPA has no information to determine whether California residents may value toxic-free waters more or less than Wisconsin residents.

In addition, EPA believes that Lyke's scenario does not capture another component of potential value to current anglers that may result as reduced levels of toxic pollutants result in healthier sport fish populations. Lyke's survey asked anglers to consider a fishery that is free of contaminants that may threaten human health. However, fish are more sensitive than humans to some classes of toxic pollutants and fish populations may increase as contamination is reduced. To the extent that reducing toxic contamination results in a more satisfying angling experience in terms of increasing catch rates, achieving water quality standards may result in an increase in value to current anglers beyond that associated with reducing human health concerns.

EPA agrees that the contingent valuation method (CVM) elicits an individual's stated willingness to pay or accept compensation. The benefit-cost comparisons in EAs are prepared to inform the public and policy makers. Thus, the strengths and weaknesses of all aspects of the EA, including methodologies for estimating benefits, need to be made clear so that readers are aware of the limits and uncertainties. However, a 1993 Blue Ribbon Panel convened by the National Oceanic and Atmospheric Administration (NOAA) evaluated CVM and found it to be an appropriate methodology for measuring values. It is also the only method accepted by the U.S. Department of the Interior (DOI) to estimate nonuse values and has withstood Federal Court review for its use in litigation contexts.

Additionally, much of the criticism of CVM is conceptual rather than based on empirical research. Where CVM can be compared to other research techniques (e.g., use values estimated by the travel cost methodology or the hedonic price method), CVM is shown to yield similar values (see Brookshire et al., 1982 and Smith et al., 1986). Additionally, in several field experiments, actual purchase decisions were compared to hypothetical purchase decisions (Bishop and Heberlein, 1978 and Dickie et al., 1987). In all of these studies, hypothetical behavior was sufficiently predictive of actual behavior that researchers

concluded meaningful values could be obtained for benefit-cost analysis or damage assessment.

Bishop, R.C. and T.A. Heberlein. 1978. Measuring values of extra-market goods: Are indirect measures biased? American Journal of Agricultural Economics 61(5): 926-930.

Brookshire, D., M. Thayer, W.D. Schulze, and R. d'Arge. 1982. Valuing public goods: A comparison of the survey and hedonic approaches. American Economic Review 72(1): 165-177.

Comment ID: CTR-035-067
Comment Author: Tri-TAC/CASA
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-02l Marginal Impacts/Benefits
References:
Attachments? N
CROSS REFERENCES

Comment: * The benefits analysis does a poor job of evaluating the marginal impacts of the proposed rule. For example, "...even low contaminant concentrations in water, sediment, or diet may impair fitness, produce adverse-physiological effects that lead to death, or lower long-term survivability in the wild." Likewise, related to environmental benefits:

-- Only a qualitative description of ecologic benefits is provided because of.. (4) uncertainty regarding the extent to which the CTR will result in toxics loading reductions significant enough (relative to the contribution of historical and ongoing point and nonpoint loadings) to generate changes in ambient concentration and ecosystem health (U.S.EPA, 1997a, page 6-10).

Benefits are unlikely to be linear, but rather related to threshold changes in the environment.

Response to: CTR-035-067

EPA provided a qualitative description of benefits to supplement its quantitative analysis, acknowledging that even low concentrations of toxics in water, sediment, or diet may impair fitness or produce adverse physiological effects that can lead to death or lower long-term survivability in the wild (see EA Chapter 6).

Comment ID: CTR-054-006
Comment Author: Bay Area Dischargers Assoc.
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-02l Marginal Impacts/Benefits
References:
Attachments? Y

CROSS REFERENCES

Comment: The benefits accruing from these costs would be minimal. The addition of lime treatment at three BADA agency plants to remove copper would have the effect of reducing copper loads to the Bay by 2,400 lbs/year (see Attachment 2). To put this in perspective, this is about 1 % of the total copper load to the Bay based on the Regional Board's 1993 Copper Wasteload Allocation. The cost per toxic pound equivalent removed would be between $2,300/lb and $14,800/lb, the former based on EPA's assumption regarding the cost and effectiveness of primary lime addition and the latter based on the assumption that tertiary lime treatment would be necessary. Further, the RMP has generally shown that the dissolved copper criteria is generally achieved in the Bay, with the exception of occasional exceedances in the extreme South Bay and the Petaluma River. Of 216 measurements made over 9 RMP sampling events, only about 10% of the samples exceeded the proposed criteria, with the highest single value recorded being 5.93 ug/l. Loading data is unavailable for the organics, but the RMP data show that there were no exceedances at any station for heptachlor and one of the problematic PAHs and that the other two problematic PAHs were exceeded in less than 3% of the samples. Like copper, the PAH exceedances occurred in the South Bay and the Petaluma River. Hence, reduction of PAHs in the one deep water discharger with attainability problems would not change the current level of compliance. The RMP did not analyze for aldrin. EPA's economic analysis based benefits estimates on improved fishing experience and increased angler participation, reduced cancer risks, and nonuse values associated with compliance with all water quality standards. A 1% reduction in copper loading to the Bay would not trigger any of these benefits, nor would controls that do not result in any change in the present level of compliance in Bay waters of PAHs and heptachlor criteria. Irrespective of the fact that the RMP-measured level of compliance with the subject PAHs is 97% and with heptachlor is 100%, EPA's cancer risk analysis identifies heptachlor as contributing 0.1% to the baseline cancer risks for anglers consuming Bay fish and does not list any PAH (see Economic Analysis Exhibit 8-7). In conclusion, adoption of the proposed criteria, while potentially imposing considerable costs on BADA agencies, would have very little beneficial impact on the Bay. Copper loading would be reduced by 1% and PAH compliance would remain unchanged at 97% to 100%.

Response to: CTR-054-006

As part of its revised cost analysis, EPA estimated the changes in estimated costs and pollutant load reductions based on the lower risk level of 10-5. Under the low scenario, costs decrease by $1.1 million, approximately 11% less than the costs based on the higher risk level. Under the high scenario, annual costs decrease by $5.8 million, also an 11% decrease from the costs based on a 10-6 risk level. Pollutant load reductions attributable to use of a lower risk level are estimated to decrease by approximately 4% and 1% under the low and high scenarios, respectively. The relatively low sensitivity of costs to the change in risk level primarily is related to the fact that most of the potential costs related to implementing the CTR are being driven by metals. Changes in risk levels for carcinogens primarily affect organic pollutants.

EPA believes that controls on point source dischargers will, in many cases, contribute to attaining standards in a given water body. As controls on other sources are also implemented, the water quality standards can be achieved. However, the total maximum daily load (TMDL) process is provided to address cost-ineffectiveness as it pertains to point or nonpoint sources. For example, if controls on nonpoint sources are a more cost-effective approach to achieving standards, the State can redistribute the load allocations through the TMDL process.

EPA recognizes that the benefits of the rule will not occur immediately, and has estimated lags in the

realization of benefits. However, EPA believes that the standards established by the CTR can be achieved through point source controls and will result in attaining designated uses of the water bodies, and that the estimated benefits are illustrative of the types and potential benefits to be achieved from attaining these uses.

The U.S. EPA Treatability Database indicates that chemical precipitation with addition of lime is a technology capable of removing metals at the concentrations and loading reductions required. For example, several treatment plants have reached concentrations of 7.7 ug/L for copper based on a pilot study (CTR-based level for copper is 8.03 ug/L) and 0.46 ug/L for silver (CTR-based level for silver is 1.51 ug/L) (U.S.EPA RREL). Some of the sample facilities already have a clarification system in place, therefore, only capital costs for the lime feeding and conveying system need to be considered. For facilities without clarifiers, the capital cost of a primary clarifier is also included in EPA's cost estimates. EPA's cost estimates are based on EPA's Treatability Manual (1980) and are adjusted for inflation.

References: U.S. EPA. 1980. Treatability Manual, Volume IV, Cost Estimating. U.S. EPA Risk Reduction Engineering Laboratory (RREL). Cincinnati, Ohio. Treatability Database.

Comment ID: CTR-054-013d
Comment Author: Bay Area Dischargers Assoc.
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-02l Marginal Impacts/Benefits
References:
Attachments? Y
CROSS REFERENCES E-01g03
E-01q01
E-01m

Comment: The economic analysis is seriously flawed. The major flaws include: (1) failing to do an appropriate sampling of dischargers; (2) assuming in the high-end cost scenario that a 25% reduction could be achieved through source control and an additional 25% achieved through treatment plant optimization without capital improvements; (3) constraining estimates of potential costs through key assumptions, including the assumption that regulatory relief from the rule would be granted if costs were in excess of certain thresholds; and (4) exaggerating estimates of potential benefits by assuming an end (i.e., achievement of the proposed water quality criteria) that will not result from the rule (see Attachment 3). The result of these flaws is that potential costs are greatly understated and potential benefits are greatly overstated. BADA's analysis shows that its member agencies alone could be faced with costs in excess of $100 million per year to achieve effluent limits based on the copper, PAH, heptachlor and aldrin criteria. BADA's analysis also indicates that the benefits associated with this expenditure will be difficult to measure. Copper loadings will be reduced by 1% and the level of compliance for PAH's and heptachlor will remain unchanged at its present high level. Certainly these benefits will not measurably improve the fishing experience or measure the number of fisherman in the Bay, significantly reduce the cancer cases, or improve property values or other nonuse benefits, as estimated in EPA's economic analysis. A further consequence of the flawed economic analysis is the conclusion that the CTR is not a major rule (i.e., one which will result in excess of $100 million per year expenditure) subject to Presidential Executive order 12866 and the Unfunded Mandates Reform Act or a

rule that affects small entities protected under the Regulatory Reform Act. BADA agencies provide service to a number of small communities with populations under 50,000 people that could be greatly impacted by the proposed rule.

Response to: CTR-054-013d

EPA's analysis presents only the portion of the total potential benefits that can be achieved by controlling point sources. EPA expects additional benefits will accrue as a result of controlling other sources. EPA has no reason to believe that the standards established by the CTR cannot be achieved.

EPA considers Lyke's scenario (waters completely free of contaminants that may threaten human health) to be similar to a scenario in which all California waters meet the water quality standards established by the CTR. EPA has no information to show that these standards cannot be achieved. Thus, EPA used Lyke's results to estimate the total potential benefits of achieving standards. However, since point source controls alone may not be sufficient to achieve the standards throughout California, EPA allocated only a portion of the total benefits to the CTR.

EPA agrees that the study site for Lyke's research is substantially different from California waters. However, EPA's search of the literature indicated that there is no similar research for California or other more similar waters. Therefore, EPA applied Lyke's results to provide decisionmakers with information on the types and potential magnitude of the benefits from water quality improvements, rather than leaving this important benefit category unmonetized. EPA has no information to determine whether California residents may value toxic-free waters more or less than Wisconsin residents.

In addition, EPA believes that Lyke's scenario does not capture another component of potential value to current anglers that may result as reduced levels of toxic pollutants result in healthier sport fish populations. Lyke's survey asked anglers to consider a fishery that is free of contaminants that may threaten human health. However, fish are more sensitive than humans to some classes of toxic pollutants and fish populations may increase as contamination is reduced. To the extent that reducing toxic contamination results in a more satisfying angling experience in terms of increasing catch rates, achieving water quality standards may result in an increase in value to current anglers beyond that associated with reducing human health concerns.

Comment ID: CTR-092-023b
Comment Author: City of San Jose, California
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: E-02l Marginal Impacts/Benefits
References: Letter CTR-092 incorporates by reference letter CTR-035
Attachments? Y
CROSS REFERENCES E-02e
E-02q

Comment: Comment #7: General Benefit Analysis Concerns

The benefit analysis undertaken by EPA uses old, out-of-state data which does not appear applicable to

California. A major concern with this analysis is that the benefit recipients are only a subset of those impacted by the costs. Another is that the benefits accrue to the public at large; costs, on the other hand, to the extent that CTR-implementation costs are borne by Indirect Dischargers (as assumed by EPA in the copper situation) accrue to businesses.

Further, the benefit measurements of "angling day" are only useful if they represent a net increase in fishing activity -- if all that improving waterway quality does is create additional sites where safe fishing can occur, without increasing the overall amount of fishing that occurs, there is no net gain, there is only substitution between comparable sites. The value of benefits which occur because of substitution between fishing sites must be subtracted from the value which occurs from increased fishing. This has not been done in the EPA analysis, thus benefits are overstated.

Further, no stratification is evident to account for importation of out-of-state fishers -- including benefit value of attracting new anglers from other states to California fishing sites is irrelevant to an analysis of costs/benefits of implementing the CTR for California.

Questions for EPA on Comment #7:

Q.7 - 1) If the concerns stated above were appropriately addressed, what would be the impact on EPA's benefits analysis? Our concern relates to the need to examine levels of regulation in comparison to benefits obtained, i.e. cost-effectiveness.

Q.7 - 2) Executive Order 12866, in recognition that quantification of benefits is very difficult, is quite explicit about addressing qualitative benefits wherever possible why wasn't that done in this analysis?

Response to: CTR-092-023b

EPA was not able to locate more relevant or more recent data or research for the analysis. EPA solicited relevant data and information in the EA and proposal. In addition, in response to comments, EPA conducted an extensive search of the literature for any additional recent, California-specific data or information applicable to the benefits analysis. EPA reviewed and evaluated all data and information submissions, and the results of the literature search, and revised the EA and CTR as appropriate prior to promulgating the final rule.

Although it is true that the direct costs of the regulation are borne by municipal and industrial dischargers while the benefits accrue to the public at large, it is also true that in generating the discharges, the benefits (cost savings) accrued to businesses and municipalities while the costs (decreased utility associated with water resources) were borne by the public. Ultimately, benefits and costs are borne throughout society (e.g., costs are borne directly by municipal and industrial dischargers but indirectly by the public who pays for their products and services).

EPA acknowledged that increased angling activity at sites experiencing reductions in toxic contaminants may reflect a shift in activity from substitute sites rather than a net increase. Because EPA could not account for substitute sites in this analysis, EPA estimated lower bound benefits of $0 (i.e., assuming no net increases in activity; see EA, Chapter 8).

EPA's estimate of the relevant angling population is based on resident California anglers (see Analysis of the Potential Benefits Related to Implementation of the California Toxics Rule, Draft, December 20, 1996, pp. 3-23, 3-35 to 3-36).

EPA revised its economic analysis in response to comments and to reflect any new data or changes to the proposal. The estimated cost-effectiveness of the rule is expected to range from $22/lb-eq to $31/lb-eq. EPA expects the total annual, monetized benefits from implementation of the CTR to range from $8.7 to $40.8 million dollars.

Chapter 6 of the EA (Qualitative Assessment of Potential Ecological Benefits) provides a qualitative discussion of potential ecological benefits. EPA also provided a qualitative discussion of important benefit categories that it was not able to quantify or monetize (see the EA that accompanied the proposed rule, Chapter 8).

Subject Matter Code: E-02m Few Pollutant Mask Analysis

Comment ID: CTR-035-069
Comment Author: Tri-TAC/CASA
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-02m Few Pollutant Mask Analysis
References:
Attachments? N
CROSS REFERENCES

Comment: * Most of the public health benefits appear to be associated with a small number of contaminants, acting to mask the benefit cost analysis. For example, cancer risks are dominated by four contaminants, two of which -- DDT and PCBs -- may be substantially unrelated to ongoing point sources. In other words, while costs are associated with reductions in a wide range of toxic materials, benefits may be derived from a small subset of these toxins, most of which are primarily related to non-point sources or historical contamination.

Response to: CTR-035-069

EPA analyzed potential reductions for over forty toxic pollutants that may be discharged by point sources. EPA expects that reductions in these toxics will lead to a variety of benefits including ecological, health, and recreational benefits. Although certain health risks such as cancer are indeed dominated by only a few toxic contaminants that may not be greatly reduced by point source controls, reductions of these toxics are, nevertheless, expected to yield reductions in cancer cases as well as systemic health risks. EPA expects the annual reduction in cancer cases among recreational anglers after implementation of the CTR to range from 0.0 to 0.1 for San Francisco Bay and 0.0 to 0.8 for freshwater resources. EPA also analyzed the post-CTR hazard quotients (HQ) for systemic risks among recreational anglers with high consumption rates. The HQ for PCBs may be reduced from 11.31 to 5.44 for San Francisco Bay anglers and from 7.02 to 3.28 for freshwater anglers.

Comment ID: CTR-059-025
Comment Author: Los Angeles County Sanit. Dist
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: E-02m Few Pollutant Mask Analysis
References: Letter CTR-059 incorporates by reference letter CTR-035

Attachments? Y
CROSS REFERENCES E-01g08

Comment: Economic Analysis

The Sanitation Districts commends EPA for preparing an analysis of the economic impacts of the proposed CTR, and for selecting POTWs for half of the case studies. We believe that EPA is correct in thinking that POTWs are likely to experience major impacts as a result of the promulgation of the CTR. However, we believe that this analysis is based on improper assumptions and inaccurate cost estimates, resulting in unconvincing conclusions. Our own attainability and cost analysis indicates that there are indeed fundamental flaws in the cost analysis. A few of the areas of concern are listed below:

* The Economic Analysis suggests that reductions attributable to point source reductions may be de minimis. For instance, most of the public health benefits appear to be associated with a small number of contaminants, most of which are not discharged in significant quantities by point source dischargers. Cancer risks, for example, are dominated by four contaminants, two of which -- DDT and PCBs -- are mainly the result of historic discharges rather than due to ongoing point source inputs.

Response to: CTR-059-025

EPA analyzed potential reductions for over forty toxic pollutants that may be discharged by point sources. EPA expects that reductions in these toxics will lead to a variety of benefits including ecological, health, and recreational benefits. Although certain health risks such as cancer are indeed dominated by only a few toxic contaminants that may not be greatly reduced by point source controls, reductions of these toxics are, nevertheless, expected to yield reductions in cancer cases as well as systemic health risks. EPA expects the annual reduction in cancer cases among recreational anglers after implementation of the CTR to range from 0.0 to 0.1 for San Francisco Bay and 0.0 to 0.8 for freshwater resources. EPA also analyzed the post-CTR hazard quotients (HQ) for systemic risks among recreational anglers with high consumption rates. The HQ for PCBs may be reduced from 11.31 to 5.44 for San Francisco Bay anglers and from 7.02 to 3.28 for freshwater anglers.

Subject Matter Code: E-02o Analysis from Wisconsin

Comment ID: CTR-009-008c
Comment Author: City of Thousand Oaks
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/22/97
Subject Matter Code: E-02o Analysis from Wisconsin
References:
Attachments? Y
CROSS REFERENCES E-02c
E-01s

Comment: The City does not agree with the economic analysis. It is incomplete and misrepresents the actual costs and benefits. The analysis does not include costs of expensive AWT to meet more stringent limits based upon the proposed criteria. It does not include the first second, and third order costs to the community, individuals and businesses, of the economic dislocations resulting from huge capital costs, especially for small and economically distressed communities, that divert scarce resources from other priorities or out of the area. It does not include cost impact assessments to low and fixed-income households - ignoring the economic aspects of environmental justice. The benefits assessments make vast unsupported assumptions about the benefits of reductions in constituent concentrations that are barely, if even, measurable, and assigns unrealistic contingent valuations to these assumed benefits. The cost analyses does not follow EPA's own economic assessment guidance (which, itself, is fatally flawed). These points were brought up during the Task Force meetings in 1995 and 1996, but were dismissed outright by EPA. The City hereby raises these issues for the formal record.

The City of Thousand Oaks appreciates the opportunity to comment on the proposed California Toxics Rule.

Sincerely,

Donald H. Nelson Public Works Director

Response to: CTR-009-008c

EPA's own economic assessment guidance (Interim Economic Guidance for Water Quality Standards, EPA-823-B-95-002, March 1995) is intended to assist States and applicants in understanding the economic factors that may be considered, and the types of tests that can be used to determine if a designated use cannot be attained, if a variance can be granted, or if degradation of high-quality water is warranted. In order to remove a designated use or obtain a variance, or if degradation of high-quality water is warranted, the state or discharger must demonstrate that attaining the designated use would result in substantial and widespread economic and social impacts. Although EPA is responsible for approving a State's water quality standards, the State is responsible for interpreting the circumstances of each case and determining where there are substantial and widespread economic and social impacts, or where important social and economic development would be precluded.

Estimating the economic impact of the CTR in California requires a detailed econometric model of the region's economy. EPA did not conduct such an analysis of the rule. However, for a similar toxics rule in

the Great Lakes Basin, an econometric analysis was performed independent of the regulatory impact analysis for the Council of Great Lakes Governors (The Great Lakes Water Quality Initiative: Cost Effective Measures to Enhance Environmental Quality and Regional Competitiveness. DRI/McGraw-Hill, San Francisco, California, July 1993). This analysis showed a minimal impact of the rule on the region's economy for a worst case scenario, a scenario with costs far exceeding those estimated by EPA. Manufacturing output was estimated to fall by between 0.008% and 0.337% over a range of four scenarios evaluated, while personal income loss was estimated at between 0.002% and 0.094% for these scenarios. As a result, the study authors concluded that the impact of the rule on the region's economy would be "nearly imperceptible." Thus, similar controls on toxic pollutants have been shown to be affordable in other regions of the country. In addition, all of the United States, with exception of California, has implemented CWA section (c)(2)(3).

Comment ID: CTR-040-045
Comment Author: County of Sacramento Water Div
Document Type: Storm Water Auth.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-02o Analysis from Wisconsin
References: Letter CTR-040 incorporates by reference letter CTR-027
Attachments? Y
CROSS REFERENCES

Comment: EPA's estimate of increased value of recreational angling ($8.6 million annually under the high-end scenario) is highly suspect:

* It is based on a Ph.D. dissertation that does not appear to have been subjected to outside peer review (no paper has been found in a peer-reviewed journal). The primary focus of the dissertation was the evaluation, using Wisconsin anglers, of a travel cost model to value changes in environmental quality. A secondary purpose as to evaluate a contingent valuation model todetermine the increased value of fishing in pollutant-free waters. The dissertation was based on two surveys of Wisconsin anglers, one set of anglers who fished for trout and salmon in the Great Lakes and another set who fished for the same fish in inland waters. The surveys contained 64 questions, only two of which addressed the increased value of recreational angling in pollutant-free water, There were 274 respondents to the Great Lakes survey and 239 respondents to the inland waters survey. (see Attachment B-2)

* EPA seems to have selectively used the dissertation. For example, EPA used the results of the Great Lakes survey (which showed an 11.1% increase in value based on mean values) but did not use the inland waters survey (which actually showed a reduction in value with pollutant-free water). This of course raises questions about the validity of the survey and the values present in the dissertation. Further, in estimating the high-end benefits, EPA appears to have used the pollutant-free mean value and compared that to the low-end polluted water value (mean value minus the standard error). It is not clear why EPA would have done this.

* This approach assumes that the current value of recreational angling in California is impaired as a result of pollution. That may be the case in some waters of the State, but it is certainly not the case in the vast majority of the State's waters.

* This approach also assumes that the CTR will result in pollutant-free water, which, as stated previously, is not the case.

Response to: CTR-040-045

EPA acknowledges that Lyke's study has not been published in a peer reviewed journal and that she obtained some inconsistent results. EPA applied Lyke's research to illustrate the types and potential magnitude of the benefits from water quality improvements. EPA conducted an extensive search of the literature for additional studies that provide indication of the potential magnitude of the benefits from reducing concentrations of toxic pollutants in California surface waters. The results of EPA's search are described in the EA that accompanies the final rule.

EPA estimated the percentage of California waters impaired by toxic pollutants based on water quality assessments developed by the State Water Resources Control Boards. EPA defined toxic-impaired waters as those rated medium or poor for one or more toxic pollutants or group of pollutants. Research (e.g., Lyke, 1993) indicates that the recreational value of water resources may be substantially enhanced by reducing toxic contamination.

EPA's analysis presents only the portion of the total potential benefits that can be achieved by controlling point sources. EPA expects additional benefits will accrue as a result of the States's actions that may control other sources. EPA has no reason to believe that the standards established by the CTR cannot be achieved.

Comment ID: CTR-041-041
Comment Author: Sacramento Reg Cnty Sanit Dist
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-02o Analysis from Wisconsin
References:
Attachments? N
CROSS REFERENCES

Comment: EPA's estimate of increased value of recreational angling ($8.6 million annually under the high-end scenario) is highly suspect:

* It is based on a Ph.D. dissertation that does not appear to have been subjected to outside peer review (no paper has been found in a peer-reviewed journal). The primary focus of the dissertation was the evaluation, using Wisconsin anglers, of a travel cost model to value changes in environmental quality. A secondary purpose as to evaluate a contingent valuation model to determine the increased value of fishing in pollutant-free waters. The dissertation was based on two surveys of Wisconsin anglers, one set of anglers who fished for trout and salmon in the Great Lakes and another set who fished for the same fish in inland waters. The surveys contained 64 questions, only two of which addressed the increased value of recreational angling in pollutant-free water, There were 274 respondents to the Great Lakes survey and 239 respondents to the inland waters survey. (see Attachment 3-2)

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Lakes survey (which showed an 11.1 % increase in value based on mean values) but did not use the inland waters survey (which actually showed a reduction in value with pollutant-free water). This of course raises questions about the validity of the survey and the values present in the dissertation. Further, in estimating the high-end benefits, EPA appears to have used the pollutant-free mean value and compared that to the low-end polluted water value (mean value minus the standard error). It is not clear why EPA would have done this.

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* This approach also assumes that the CTR will result in pollutant-free water, which, as stated previously, is not the case.

Response to: CTR-041-041

EPA acknowledges that Lyke's study has not been published in a peer reviewed journal and that she obtained some inconsistent results. EPA applied Lyke's research to illustrate the types and potential magnitude of the benefits from water quality improvements. EPA conducted an extensive search of the literature for additional studies that provide indication of the potential magnitude of the benefits from reducing concentrations of toxic pollutants in California surface waters. The results of EPA's search are described in the EA that accompanies the final rule.

EPA estimated the percentage of California waters impaired by toxic pollutants based on water quality assessments developed by the State Water Resources Control Boards. EPA defined toxic-impaired waters as those rated medium or poor for one or more toxic pollutants or group of pollutants. Research (e.g., Lyke, 1993) indicates that the recreational value of water resources may be substantially enhanced by reducing toxic contamination.

EPA's analysis presents only the portion of the total potential benefits that can be achieved by controlling point sources. EPA expects additional benefits will accrue as a result of the State's action that may control other sources. EPA has no reason to believe that the standards established by the CTR cannot be achieved.

Comment ID: CTR-044-036
Comment Author: City of Woodland
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: E-02o Analysis from Wisconsin
References:
Attachments? N
CROSS REFERENCES

Comment: EPA's estimate of increased value of recreational angling ($8.6 million annually under the high-end scenario) is highly suspect:

* It is based on a Ph.D. dissertation that does not appear to have been subjected to outside peer review (no paper has been found in a peer-reviewed journal). The primary focus of the dissertation was the evaluation, using Wisconsin anglers, of a travel cost model to value changes in environmental quality. A secondary purpose as to evaluate a contingent valuation model to determine the increased value of fishing in pollutant-free waters. The dissertation was based on two surveys of Wisconsin anglers, one set of anglers who fished for trout and salmon in the Great Lakes and another set who fished for the same fish in inland waters. The surveys contained 64 questions, only two of which addressed the increased value of recreational angling in pollutant-free water, There were 274 respondents to the Great Lakes survey and 239 respondents to the inland waters survey. (see Attachment 3-2)

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* This approach also assumes that the CTR will result in pollutant-free water, which, as stated previously, is not the case.

Response to: CTR-044-036

EPA acknowledges that Lyke's study has not been published in a peer reviewed journal and that she obtained some inconsistent results. EPA applied Lyke's research to illustrate the types and potential magnitude of the benefits from water quality improvements. EPA conducted an extensive search of the literature for additional studies that provide indication of the potential magnitude of the benefits from reducing concentrations of toxic pollutants in California surface waters. The results of EPA's search are described in the EA that accompanies the final rule.

EPA estimated the percentage of California waters impaired by toxic pollutants based on water quality assessments developed by the State Water Resources Control Boards. EPA defined toxic-impaired waters as those rated medium or poor for one or more toxic pollutants or group of pollutants. Research (e.g., Lyke, 1993) indicates that the recreational value of water resources may be substantially enhanced by reducing toxic contamination.

EPA's analysis presents only the portion of the total potential benefits that can be achieved by controlling point sources. EPA expects additional benefits will accrue as a result of controlling other sources. EPA has no reason to believe that the standards established by the CTR cannot be achieved.

Comment ID: CTR-054-040
Comment Author: Bay Area Dischargers Associati
Document Type: Sewer Authority
State of Origin: CA

Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-02o Analysis from Wisconsin
References:
Attachments? N
CROSS REFERENCES

Comment: EPA's estimate of increased value of recreational angling ($8.6 million annually under the high-end scenario) is highly suspect:

* It is based on a Ph.D. dissertation that does not appear to have been subjected to outside peer review (no paper has been found in a peer-reviewed journal). The primary focus of the dissertation was the evaluation, using Wisconsin anglers, of a travel cost model to value changes in environmental quality. A secondary purpose as to evaluate a contingent valuation model to determine the increased value of fishing in pollutant-free waters. The dissertation was based on two surveys of Wisconsin anglers, one set of anglers who fished for trout and salmon in the Great Lakes and another set who fished for the same fish in inland waters. The surveys contained 64 questions, only two of which addressed the increased value of recreational angling in pollutant-free water, There were 274 respondents to the Great Lakes survey and 239 respondents to the inland waters survey. (see Attachment 3-2)

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* This approach also assumes that the CTR will result in pollutant-free water, which, as stated previously, is not the case.

Response to: CTR-054-040

EPA acknowledges that Lyke's study has not been published in a peer reviewed journal and that she obtained some inconsistent results. EPA applied Lyke's research to illustrate the types and potential magnitude of the benefits from water quality improvements. EPA conducted an extensive search of the literature for additional studies that provide indication of the potential magnitude of the benefits from reducing concentrations of toxic pollutants in California surface waters. The results of EPA's search are described in the EA that accompanies the final rule.

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EPA's analysis presents only the portion of the total potential benefits that can be achieved by controlling point sources. EPA expects additional benefits will accrue as a result of controlling other sources. EPA has no reason to believe that the standards established by the CTR cannot be achieved.

Subject Matter Code: E-02o01 No Peer Review Reference

Comment ID: CTR-090-004
Comment Author: C&C of SF, Public Utl. Commis.
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: E-02o01 No Peer Review Reference
References: Letter CTR-090 incorporates by reference letters CTR-035 and CTR-054
Attachments? Y
CROSS REFERENCES

Comment: Major Concerns About the Proposed Criteria and Rule

1. The Proposal is Based on Poor Data and Will Not Result in Better Water Quality for California. We stated that our own attainability analysis and that of BADA show that San Francisco,) will be impacted by this rule. Unfortunately, due to the short time for review, the poor quality of data and basis for statements and assumptions in the proposal and the problem with detection limits we cannot specifically say what will be the cost to Sari Francisco. One analysis tell us it could be $2.3 million per year annualized costs and another analysis tells us it could be much more. We strongly recommend major revision to the proposal and the economic analysis before final promulgation for the following reasons:

The benefits section of the economic analysis is extremely flawed; the data used to develop the benefits section is highly questionable, some of which has not been peer reviewed (see BADA comments);

Response to: CTR-090-004

EPA acknowledges that Lyke's study has not been published in a peer reviewed journal and that she obtained some inconsistent results. EPA applied Lyke's research to illustrate the types and potential magnitude of the benefits from water quality improvements. EPA conducted an extensive search of the literature for additional studies that provide indication of the potential magnitude of the benefits from reducing concentrations of toxic pollutants in California surface waters. The results of EPA's search are described in the EA that accompanies the final rule.

Subject Matter Code: E-02q Benefits to Public at Large

Comment ID: CTR-092-023c
Comment Author: City of San Jose, California
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: E-02q Benefits to Public at Large
References: Letter CTR-092 incorporates by reference letter CTR-035
Attachments? Y
CROSS REFERENCES E-02e
E-02l

Comment: Comment #7: General Benefit Analysis Concerns

The benefit analysis undertaken by EPA uses old, out-of-state data which does not appear applicable to California. A major concern with this analysis is that the benefit recipients are only a subset of those impacted by the costs. Another is that the benefits accrue to the public at large; costs, on the other hand, to the extent that CTR-implementation costs are borne by Indirect Dischargers (as assumed by EPA in the copper situation) accrue to businesses.

Further, the benefit measurements of "angling day" are only useful if they represent a net increase in fishing activity -- if all that improving waterway quality does is create additional sites where safe fishing can occur, without increasing the overall amount of fishing that occurs, there is no net gain, there is only substitution between comparable sites. The value of benefits which occur because of substitution between fishing sites must be subtracted from the value which occurs from increased fishing. This has not been done in the EPA analysis, thus benefits are overstated.

Further, no stratification is evident to account for importation of out-of-state fishers -- including benefit value of attracting new anglers from other states to California fishing sites is irrelevant to an analysis of costs/benefits of implementing the CTR for California.

Questions for EPA on Comment #7:

Q.7 - 1) If the concerns stated above were appropriately addressed, what would be the impact on EPA's benefits analysis? Our concern relates to the need to examine levels of regulation in comparison to benefits obtained, i.e. cost-effectiveness.

Q.7 - 2) Executive Order 12866, in recognition that quantification of benefits is very difficult, is quite explicit about addressing qualitative benefits wherever possible why wasn't that done in this analysis?

Response to: CTR-092-023c

EPA was not able to locate more relevant or more recent data or research for the analysis. EPA solicited relevant data and information in the EA and proposal. In addition, in response to comments, EPA conducted an extensive search of the literature for any additional recent, California-specific data or information applicable to the benefits analysis. EPA reviewed and evaluated all data and information submissions, and the results of the literature search, and revised the EA and CTR as appropriate prior to

promulgating the final rule.

Although it is true that the direct costs of the regulation are borne by municipal and industrial dischargers while the benefits accrue to the public at large, it is also true that in generating the discharges, the benefits (cost savings) accrued to businesses and municipalities while the costs (decreased utility associated with water resources) were borne by the public. Ultimately, benefits and costs are borne throughout society (e.g., costs are borne directly by municipal and industrial dischargers but indirectly by the public who pays for their products and services).

EPA acknowledged that increased angling activity at sites experiencing reductions in toxic contaminants may reflect a shift in activity from substitute sites rather than a net increase. Because EPA could not account for substitute sites in this analysis, EPA estimated lower bound benefits of $0 (i.e., assuming no net increases in activity; see EA, Chapter 8).

EPA's estimate of the relevant angling population is based on resident California anglers (see Analysis of the Potential Benefits Related to Implementation of the California Toxics Rule, Draft, December 20, 1996, pp. 3-23, 3-35 to 3-36).

EPA revised its economic analysis in response to comments and to reflect any new data or changes to the proposal.

(EPA revised.....already part of text)....The estimated cost-effectiveness of the rule is expected to range from $22/lb-eq to $31/lb-eq. EPA expects the total annual, monetized benefits from implementation of the CTR to range from $8.7 to $40.8 million dollars.

Chapter 6 of the EA (Qualitative Assessment of Potential Ecological Benefits) provides a qualitative discussion of potential ecological benefits. EPA also provided a qualitative discussion of important benefit categories that it was not able to quantify or monetize (see the EA that accompanied the proposed rule, Chapter 8).

Subject Matter Code: F Endangered Species Act

Comment ID: CTR-001-009a
Comment Author: Law Offices of Alan C. Waltner
Document Type: Storm Water Auth.
State of Origin: CA
Represented Org: Almeda Cnty Clean Wtr Pgm
Document Date: 09/22/97
Subject Matter Code: F Endangered Species Act
References:
Attachments? N
CROSS REFERENCES J-06

Comment: THE PROPOSAL VIOLATES THE NATIONAL ENVIRONMENTAL POLICY ACT AND ENDANGERED SPECIES ACT, AND WOULD USURP THE ROLE OF CONGRESS AND THE STATE AND REGIONAL BOARDS

Major environmental impacts of controls could also be foreseen if the water quality standards of the proposed CTR were to apply as numeric effluent limitations or wasteload allocations. This would result in the requirement to prepare an EIS in connection with the proposed rule. (*13) In effect, substantial end-of-pipe treatment facilities on the same order of magnitude as existing POTWs in the Bay Area could be necessary.

Given the scale and location of the facilities that would be required, significant wetland, endangered species and other environmental impacts could occur. EPA must fully evaluate these impacts of the proposed rule before the rule is promulgated. (*14)

A more expansive application of the WQS also would usurp the basin planning process to the extent that the regional boards have included textual discussions of how ambient water quality criteria are to be implemented, particularly with respect to MS4s. The San Francisco Basin Plan states generally that WQS are to be addressed by MS4s through escalating BMPS. EPA has not taken action to disapprove the San Francisco Basin Plan and cannot implicitly repeal portions of that plan through inconsistent preamble language in the currently proposed rule.

Congress has already addressed this significant public policy question and the agency cannot shed its Congressional leash and arrogate legislative power. This is particularly true given the massive expenditures of public funds that could be implicated under at least the more expansive view of what EPA has proposed. We elect our representatives in Congress to balance these major questions, such as the matter of whether local funds should be siphoned from schools, police, infrastructure, etc., to fund storm water controls at the scale necessary to meet WQS regardless of cost. Congress has determined in Section 402(p) that MS4s need only adopt controls to reduce pollutants in storm water to the maximum extent practicable, and to effectively prohibit non-storm water discharges to the storm water system, rather than being subjected to infeasible or exorbitantly expensive numeric effluent limitations.(*15)

(*13) To the extent that the CTR will force development of end of-pipe treatment systems, promulgation of the CTR will represent a major federal action significantly affecting the quality of the human environment under the National Environmental Policy Act, triggering the requirement to develop an

environmental impact statement to support the rule.

(*14) Commenters have been limited in their ability to present specific information on the question of endangered species, wetland and other environmental impacts given the short comment period on the proposal and EPA's refusal to extend that comment period.

(*15) In Sections 402(p)(5) and (6)f Congress also directed that the approach to meeting water quality standards should MEP-level controls on major dischargers fall short would be to study and expand the scope of the program to include additional dischargers. No mention is made of subjecting major MS4s to more stringent controls. In fact, the regulations are expressly required to target stormwater discharges, other than those discharges described in paragraph (2) [major MS4S], to be regulated to protect water quality - 33 U.S.C. section 1342(p)(6) (Emphasis added).

Response to: CTR-001-009a

With respect to compliance with NEPA, section 511(c) of the Clean Water Act excludes this rulemaking from the requirements of NEPA. The comment also assumes that stormwater discharges subject to numeric effluent limitations will have to be treated by new end-of-pipe facilities. As explained in the response to Storm Water Economics Comments (Category J, Comment CTR-040-004), EPA believes that implementation of criteria as applied to wet-weather discharges will not require the construction of end-of-pipe facilities.

The purpose of the CTR is to fill the current gaps in water quality criteria in inland surface waters and enclosed bays and estuaries. Any existing provisions in a State Basin Plan that have been approved by the State and EPA would not be negated by the preamble discussion in the CTR.

Regarding the application of MEP under section 402(p) of the CWA see response to CTR-040-004.

See also response to CTR-001-009b (Category J-06; Stormwater Economics).

Comment ID: CTR-012-001
Comment Author: Fish and Wildlife Service
Document Type: Federal Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: F Endangered Species Act
References:
Attachments? N
CROSS REFERENCES

Comment: This is in response to the Environmental Protection Agency's (EPA) August 5, 1997, publication of the Water Quality Standards; Establishment of Numeric Criteria for Priority Toxic Pollutants for the State of California; Proposed Rule (Proposed Rule) (Federal Register Vol. 62, No. 150, pages 42159-42208). The Fish and Wildlife Service (Service) provides the following comments specific to EPA's statutory obligations pursuant to section 7 of the Endangered Species Act of 1973, as amended (Act).

Section L of the Proposed Rule states that consultation pursuant to section 7 of the Act will occur. Section 7 of the Act directs that Federal agencies prepare a biological assessment for a proposed action that may affect a listed species, however, to date the Service has not received a biological assessment on the Proposed Rule. The Service has specific concerns regarding selenium, mercury, dissolved metals and PCP and their effects on listed species. Preliminary review indicates that adverse impacts to listed species may occur, therefore, we anticipate that the EPA will formally consult with the Service regarding this proposed rule making process, and will wait until formal section 7 consultation has been completed before finalizing the proposed rule.

The Service looks forward to the opportunity to work with you and our staff on this consultation and appreciates the efforts to date to evaluate the effects of the proposed action on listed species. If you have any questions regarding this response please contact Ms. Maria Boroja at (916) 979-2749.

Response to: CTR-012-001

The US Fish and Wildlife Service (FWS) and US National Marine Fisheries Service initiated formal consultation in a letter to EPA dated November 28, 1997, after reviewing the biological evaluation that EPA submitted to them on October 27, 1997. These documents and others pertaining to the formal consultation process are part of the administrative record of the CTR. EPA completed this process [in October 1999].

Comment ID: CTR-031-002a
Comment Author: Fresno Metro. Flood Ctrl Dist.
Document Type: Flood Ctrl. District
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: F Endangered Species Act
References: Letter CTR-031 incorporates by reference letter CTR-027
Attachments? N
CROSS REFERENCES C-17a
C-17b
J
V

Comment: 2. Since the preamble implies that CTR criteria may be applied in NPDES permits for municipal storm water dischargers as numeric effluent limitations, the proposed rule is flawed with regard to: a) setting attainable, scientifically valid criteria in a manner consistent with state and federal regulatory approaches; b) assessing the potential economic impact on the public served by municipal storm water dischargers; c) assessing environmental impacts pursuant to the National Environmental Policy Act and the Endangered Species Act; and d) providing for the coordinated review and evaluation of the proposed CTR in conjunction with the proposed State Implementation Plan.

Response to: CTR-031-002a

With respect to comments about storm water dischargers, see response to comment CTR-013-003 (Category J; Stormwater Economics).

With respect to comments about NEPA and ESA, see response to CTR-031-002e (Category V; Collaborative Approach). With respect to the comment about coordination with the State Implementation Plan, see response to CTR-031-008b (Category V; Collaborative Approach).

Comment ID: CTR-031-007a
Comment Author: Fresno Metro. Flood Ctrl Dist.
Document Type: Flood Ctrl. District
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: F Endangered Species Act
References: Letter CTR-031 incorporates by reference letter CTR-027
Attachments? N
CROSS REFERENCES J-04

Comment: C. If the CTR as proposed in the current draft is applied to municipal storm water dischargers as numeric effluent limitations, new end-of -pipe facilities will result. The impact of these facilities on the environment in general, and endangered species in particular, must therefore be specifically reviewed pursuant to the National Environmental Policy Act and Endangered Species Act.

End-of-pipe facilities would be required for municipal storm water dischargers in their attempt to meet the subject criteria. Storm water facilities must be located in the lowest topographic areas, which contain many of our most valuable and already diminished wetland habitats. This readily foreseeable environmental consequence of the CTR, if directly applied to municipal storm water dischargers, should not be ignored.

Response to: CTR-031-007a

With respect to ESA, EPA has completed consultation as required by Section 7 of the ESA. With respect to compliance with NEPA, section 511(c) of the Clean Water Act excludes this rulemaking from the requirements of NEPA. The comment also assumes that stormwater discharges subject to numeric effluent limitations will have to be treated by new end-of-pipe facilities. As explained in the response to Storm Water Economics Comments (Category J, CTR-040-004), EPA believes that implementation of criteria as applied to wet-weather discharges will not require the construction of end-of-pipe facilities.

Comment ID: CTR-034-006
Comment Author: SCAP
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: F Endangered Species Act
References: Letter CTR-034 incorporates by reference letter CTR-035
Attachments? N
CROSS REFERENCES

Comment: LEGAL ISSUES -- Executive Order 12866, Unfunded Mandates Reform Act, Regulatory Flexibility Act

* SCAP requests that EPA publish in the Federal Register for public review and comment a full discussion of the CTR criteria and implementation provisions that could be affected through the Endangered Species Act Section 7 consultation process with the U.S. Fish and Wildlife service and National Marine Fisheries Service. Additionally, prior to finalizing the CTR, EPA should provide an opportunity for the public to comment on the Biological Evaluation, Biological Opinion, including Reasonable and Prudent Alternatives, and EPA's proposed decisions regarding the Biological Opinion.

Response to: CTR-034-006

The administrative record for the CTR contains documents concerning the ESA consultation. The record contains EPA's biological evaluation and the FWS's and NMFS's biological opinion. The Services' biological opinion is not subject to public comment, rather EPA's proposed rule is subject to comment. Persons wishing to comment on how the rule would affect threatened and endangered species had adequate opportunity to do so during the comment period.

Comment ID: CTR-035-042
Comment Author: Tri-TAC/CASA
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: F Endangered Species Act
References:
Attachments? N
CROSS REFERENCES

Comment: p. 42192 of preamble & pp. 5-42 - 5-52 (U.S. EPA, 1997c) - The Endangered Species Act EPA should provide a full discussion in the Preamble of the criteria and implementation provisions that could be affected through the consultation process with the U.S. Fish and Wildlife Service and National Marine Fisheries Service. In addition, EPA should provide an opportunity for public comment on the Biological Evaluation, Biological Opinion, including any Reasonable and Prudent Alternatives, and EPA's proposed decisions regarding the Biological Opinion, before the CTR is finalized, This will allow in parties to provide information to EPA that may be relevant to Agency decision making about the impacts of the CTR on threatened and endangered species.

Response to: CTR-035-042

See response to CTR-034-006.

Comment ID: CTR-059-017
Comment Author: Los Angeles County Sanit. Dist
Document Type: Sewer Authority
State of Origin: CA
Represented Org:

Document Date: 09/26/97
Subject Matter Code: F Endangered Species Act
References: Letter CTR-059 incorporates by reference letter CTR-035

Attachments? Y
CROSS REFERENCES

Comment: Endangered Species Act

LACSD requests that EPA publish in the Federal Register for public review and comment a full discussion of the CTR criteria and implementation provisions that could be affected through the Endangered Species Act Section 7 consultation process with the U.S. Fish and Wildlife Service and National Marine Fisheries Service. Additionally, prior to finalizing the CTR, EPA should provide an opportunity for the public to comment on the Biological Evaluation, Biological Opinion, including Reasonable and Prudent Alternatives, and EPA's proposed decisions regarding the Biological Opinion.

Response to: CTR-059-017

See response to CTR-034-006.

Comment ID: CTRH-001-009b
Comment Author: Doug Harrison
Document Type: Public Hearing
State of Origin: CA
Represented Org: Fresno Met. Flood Control
Document Date: 09/17/97
Subject Matter Code: F Endangered Species Act
References:
Attachments? N
CROSS REFERENCES J-6

Comment: Lastly, it's been fairly well documented by EPA testimony before the Congress and by other state stakeholders' concerns about the end-of-pipe mandate, because the end-of-pipe facilities that must be constructed in effect create substantial damage to the riparian and other waters of the U.S. that are of primary concern to us.

With that potential, then certainly NEPA and the Endangered Species Act would require an evaluation of the impact associated with a rule causing or leading to those impacts. And again, the current rule does not consider that nor any of the cost or other impacts related to stormwater programs.

So there is a huge consistency or inconsistency problem that we think must be corrected for the rule to be consistent with the statutes and with your executive orders.

Thank you.

Response to: CTRH-001-009b

With respect to ESA, EPA has completed consultation as required by Section 7 of the ESA. With respect to compliance with NEPA, section 511(c) of the Clean Water Act excludes this rulemaking from the requirements of NEPA. The comment also assumes that stormwater discharges subject to numeric effluent limitations will have to be treated by new end-of-pipe facilities. As explained in the response to Storm Water Economics Comments (Category J, CTR-040-004), EPA believes that implementation of criteria as applied to wet-weather discharges will not require the construction of end-of-pipe facilities.

Subject Matter Code: G-01 Reasonable Potential

Comment ID: CTR-032-002a
Comment Author: Las Gallinas Val. Sanitry Dist
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: G-01 Reasonable Potential
References: Letter CTR-032 incorporates by reference letter CTR-035
Attachments? N
CROSS REFERENCES C-22
G-09
C-24a
C-24
K
G-04
G-05
G-02

Comment: Regulatory Flexibility and Relief

The District supports EPA's use of "sound science" and current data in developing the proposed criteria in the California Toxics Rule (CTR). The District strongly supports language in the Preamble that references and endorses recommendations of the State Task Forces including use in permitting of:

* reasonable potential analyses * dissolved metals criteria * translators * water effects ratios * site specific objectives * innovative TMDL processes such as effluent trading * performance based interim limits * chronic and acute mixing zones, and * compliance schedules in NPDES permits.

Response to: CTR-032-002a

EPA appreciates the commenter's support for the preamble language on State implementation. However, EPA wishes to clarify that for reasonable potential analysis, the CTR preamble did not explicitly recommend any specific method of calculating reasonable potential including those methods chosen by the State Task Force. The State of California as the implementing authority has the discretion to choose any method that meets the requirements of the Clean Water Act. EPA does support the State's consideration of State Task Force recommendations in selecting implementation procedures including reasonable potential methodology.

Comment ID: CTR-037-001b
Comment Author: Hampton Roads Sanitation Dist.
Document Type: Sewer Authority
State of Origin: VA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: G-01 Reasonable Potential
References:

Attachments? N
CROSS REFERENCES C-24

Comment: 1. The rule proposes that the more stringent of site-specific and national criteria be used in determining reasonable potential to exceed water quality standards and in development of limits where site-specific criteria have not yet been established. This proposal ignores the scientific basis of a site-specific criterion and that such a criterion is specifically more relevant and appropriate than a national criterion if derived correctly. EPA has acknowledged that national criteria can be more stringent than necessary to protect designated uses because they are designed to protect a wide variety of surface waters, and that a site-specific criterion can be sufficiently protective while being less stringent than a national criterion (Water Effect Ratio Guidance, 1994). This rule is arbitrarily dismissing the use of site-specific criteria which may be more technically defensible than national criteria, while being protective.

Response to: CTR-037-001b

The proposed rule does not by its own terms dictate whether a particular site-specific criterion or a national criterion should be used in a reasonable potential analysis. The reasonable potential analysis to determine whether a discharger needs a water quality-based effluent limit is based on the criterion that applies to the waterbody. EPA agrees that when an approved state site-specific criterion applies to a particular pollutant for a specific waterbody and EPA determines that it need not adopt a criterion for that pollutant and site in the final rule, the State site-specific criterion should be the criterion upon which the reasonable potential analysis is based.

If EPA promulgates statewide federal criteria before a decision to approve a State-adopted site-specific criteria, the more stringent of the two criteria would be used for water quality programs. Both federal and State water quality programs must be satisfied, and application of the more stringent of the two criteria would satisfy both. The CTR does not preclude future State adoption of site-specific criteria. However, a state-adopted site-specific criterion would become the sole criterion upon which a reasonable potential analysis is based only after EPA approves the criterion and also stays or withdraws the corresponding CTR criterion to the specific site.

Comment ID: CTR-086-004a
Comment Author: EOA, Inc.
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org: California Dent
Document Date: 09/26/97
Subject Matter Code: G-01 Reasonable Potential
References: Letter CTR-086 incorporates by reference letter CTR-035
Attachments? N
CROSS REFERENCES C-22
G-09
C-24a
C-24
K-03
G-04
G-05
G-02

Comment: Regulatory Flexibility and Relief

CDA supports language in the CTR Preamble that references and endorses recommendations of the State Task Forces including in part the use of.

* reasonable potential analyses * dissolved metals criteria * translators * water effects ratios * site specific objectives * innovative TMDL processes such as effluent trading * performance based interim limits * chronic and acute mixing zones, and * compliance schedules in NPDES permits.

Response to: CTR-086-004a

EPA appreciates the commenter's support for the preamble language on State implementation. However, EPA wishes to clarify that for reasonable potential analysis, the CTR preamble did not explicitly recommend any specific method of calculating reasonable potential including those methods chosen by the State Task Force. The State of California as the implementing authority has the discretion to choose any method that meets the requirements of the Clean Water Act. EPA does support the State's consideration of State Task Force recommendations in selecting implementation procedures including reasonable potential methodology.

Comment ID: CTR-090-010a
Comment Author: C&C of SF, Public Utl. Commis.
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: G-01 Reasonable Potential
References: Letter CTR-090 incorporates by reference letters CTR-035 and CTR-054
Attachments? Y
CROSS REFERENCES K-01

Comment: We recommend that EPA:

2. Include in the rule an implementation proposal which states that before a criteria is put into a permit there must first be: an assessment that the pollutant could reasonably interfere with the designated uses of the water; a comprehensive TMDL is done which includes all sources of pollutants to the water body; and a reasonable potential analysis is completed for point source dischargers. Only then, after all of these analyses are completed by the state or EPA should the criteria be converted to a permit limit with the appropriate implementation factors.

Response to: CTR-090-010a

The implementation procedures suggested by the commenter are beyond the scope of this rule. Implementation of water quality standards through various regulatory and non-regulatory tools is primarily a State responsibility.

Generally, a permit limit that implements a criterion for a pollutant will only be considered when it has already been determined that limiting the level of the pollutant is necessary to protect the designated use.

This determination occurs during the standard-setting process. EPA agrees that when multiple sources (point and nonpoint) impact a waterbody, a comprehensive TMDL is the preferred regulatory tool under the CWA for determining how best to achieve any necessary load reduction to the waterbody so as to attain water quality standards. When a TMDL has been conducted, the wasteload allocation (WLA) in the TMDL for a discharger would be basis for developing water quality-based effluent limits. When the TMDL includes a WLA for a discharger, a separate reasonable potential analysis to determine whether or not a WQBEL is needed would in most cases be redundant (although in rare cases, it may be that the level of the pollutant in the discharger's effluent is so much less than the level allowed by a WLA/WQBEL that even under worst case conditions the effluent would not exceed the WQBEL; in these cases, permitting authority would have the discretion not to include a limit.).

As recognized in the preamble to the proposed rule, the TMDL process "can be significantly labor and data intensive." 62 FR at 42185. Delaying WQBELs until TMDLs are completed would be inconsistent with the Clean Water Act and would unnecessarily delay attainment of water quality goals. The CWA requires imposition ofWQBELs whenever technology-based limits are insufficient to attain water quality standards [301(b)(1)(C) and 402], whether or not a TMDL has been completed for that pollutant. Under federal regulations, permitting authorities must analyze whether a discharger would cause or have the reasonable potential to cause or contribute to an exceedance of water quality standards [Section 122.44(d)(1)(i) , and if so, impose a WQBEL that derives from and implements the standard [Section 122.44(d)(1)(vii)]. Permitting authorities need to consider a number of factors related to the characteristics of the effluent and receiving water (including other sources that influence the background levels of pollutants in the receiving water) in making these determinations. [see, e.g., Section 122.44(d)(1)(ii)].

Subject Matter Code: G-02 Compliance Schedules

Comment ID: CTR-002-010b
Comment Author: Comm. for a Better Environment
Document Type: Environmental Group
State of Origin: CA
Represented Org:
Document Date: 09/24/97
Subject Matter Code: G-02 Compliance Schedules
References:
Attachments? Y
CROSS REFERENCES A

Comment: The proposed implementation plan allowing compliance schedules for effluent limits to attain the criteria to be placed in permits may not pass the antidegradation test either. CBE believes EPA recognizes that permit schedules which allow continued impairment of fishing and aquatic life uses are improper (See e.g., section 1311(b)(1)(C), section 1314(l)(1)(D), section 1342(o)(1) and (3) and section 1313(d)(4)(A) of the Clean Water Act). In the alternative case, however, a schedule allowing discharge of these persistent pollutants to waters attaining the criteria will result in the accumulation of pollutants and will degrade water quality. This degradation is unnecessary as the state has accommodated important economic and social development for years while placing compliance schedules in administrative enforcement orders, and is thus impermissible under 40 CFR section 131.12(a)(2). Indeed, existing California dischargers have been made aware of the need to meet similar or more restrictive criteria since at least 1991, and further extension of time for more pollution should be done through schedules in enforcement orders. Any desire to avoid the administrative effort of continuing to prepare these enforcement orders is easily outweighed by the public interests in clean water and public participation afforded.

In sum, EPA'S. weaker criteria shown in Table 2 do not protect designated uses of water based on sound scientific rationale, and even if this were true for some toxics in some areas of the Bay, the weaker criteria are not necessary to allow important economic or social development. Therefore, revision of water quality standards by adopting these criteria would not meet the tests set forth by 40 CFR section 131.11(a)(1) and section 131.12 and the Clean Water Act provisions these regulations implement, Further, incorporating schedules allowing polluters to harm fishing and aquatic life in water quality standards and effluent limits is improper, and there is no legitimate need for schedules allowing degradation of water quality and restricting public participation to be in permits instead of putting them in administrative enforcement orders as is done today. Thus EPA's proposal may, by failing to provide equal protection for people of color who fish for food and unfairly restricting public participation, also conflict with the Executive Order on environmental justice and civil rights law.

Response to: CTR-002-010b

The Clean Water Act authorizes the use of compliance schedules for meeting water quality standards. Section 303(e), governing the continuing planning process for water quality standards, states that the Administrator shall approve continuing planning processes that have, among other things, effluent limitations and schedules of compliance. See CWA section 303(e)(3)(A) and (F). Congress recognized the practical need for compliance schedules to allow dischargers the time necessary to install treatment to comply with effluent limitations. Other portions of the CWA contemplate that some time is practically necessary in order to allow dischargers time to meet new effluent limits, e.g. section 304(l), providing for

three years to meet water quality based limits in waters that are impaired, and section 301(b)(2), relating to technology-based limits. EPA's implementing regulations also contemplate schedules of compliance. See 40 CFR Section 130.5(1) and (6) which provide that each state must describe the process for developing effluent limitations and schedules of compliance and for establishing and assuring adequate implementation of new or revised water quality standards, including schedules of compliance.

The Environmental Appeals Board has held that an NPDES permit could not contain a compliance schedule unless the State explicitly authorizes such a compliance schedule in state law or regulation. See Star-Kist Caribe, Inc. (NPDES Appeal No. 88-5, May 26, 1992; Earlier Order, April 16, 1990). This holding clearly recognizes that compliance schedules are authorized under the Clean Water Act as part of the state's water quality standards. Further, EPA notes that because parties may challenge particular effluent limitations in particular permit proceedings, they may comment on specific proposed permits and then challenge such permits if they believe that EPA's granting of additional time in a particular context is arbitrary and capricious.

The question at issue in authorizing a compliance schedule is how long is reasonably necessary to meet the water-quality based effluent limit contained in a permit. As is consistent with the Great Lakes Guidance, EPA is authorizing five years as the outside limit for a compliance schedule, but expects permit authorities to use shorter compliance schedules wherever possible, or not to use compliance schedules where they are not necessary. Thus authorizing a compliance schedule does not mean each discharger will be allowed up to that amount of time; rather the permit authority will need to make a judgment about what is technically feasible for the dischargers to come into compliance. Further, recognizing that permit reissuance depends on where in the permit cycle the dischargers is, the rule provides that, in effect, the discharger may have up to ten years from the effective date of the rule to come into compliance with permit limits.

The regulated community commented that the compliance schedule was too short, while some environmental commenters argued that there should be no compliance schedule at all. Here, EPA balanced the prior existing compliance schedule time applied by the State of California, which for the Inland Surface Waters Plan and Enclosed Bays and Estuaries Plan was up to ten years and concerns from some dischargers that meeting the limits will take at least five years with EPA's view that the criteria be met as expeditiously as possible.

EPA believes that more than three years may be needed in some circumstances for a variety of reasons. EPA is concerned that in some cases, dischargers may need to implement new state-of-the art treatment technologies or pollution prevention programs. Also, evaluation, design and implementation of facility-wide comprehensive pollution prevention strategies involving product substitution, process line changes may require more than three years. Further, as discussed in the preamble to the proposed rule, the technical and administrative process of modifying and implementing revised requirements for numerous industrial users at POTWs, as well as planning budgeting and undertaking new construction to change treatment processes at a municipal treatment works may take more than three years. 62 Fed. Reg. 42187 (Aug. 5, 1997). Thus, EPA finds that a compliance schedule of five years is reasonable for the CTR.

EPA further notes that its permit regulations allow the use of interim limitations in conjunction with a compliance schedule or other mechanism such as a variance. 40 CFR 122.47.

With respect to comments suggesting that EPA's criteria do not protect designated uses see response to CTR-002-003 (Category C-24; Site-Specific Criteria). With respect to the comment that the CTR may degrade water quality in violation of antidegradation policy see CTR-002-010a (Category A;

Antidegradation) and CTR-039-004 (Category C-14;Fish/Water Consumption).

With respect to comments concerning environmental justice see response to CTR-002-005a (Category C-14; Fish/Water Consumption).

Comment ID: CTR-009-002
Comment Author: City of Thousand Oaks
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/22/97
Subject Matter Code: G-02 Compliance Schedules
References:
Attachments? Y
CROSS REFERENCES

Comment: The City concurs with the five year compliance schedule and variance provisions, and the EPA's recommendation that the State include such provisions in its water quality standards regulations as broadly and flexibly as the law allows.

Response to: CTR-009-002

EPA appreciates these comments providing support of EPA's positions on compliance schedules and variances.

Comment ID: CTR-009-006b
Comment Author: City of Thousand Oaks
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/22/97
Subject Matter Code: G-02 Compliance Schedules
References:
Attachments? Y
CROSS REFERENCES C-24

Comment: With respect to the provisions in the proposed rule regarding compliance schedules and site-specific objective development and approval implementation, the City requests verification that these, and all provisions, in the proposed rule apply only to those constituents for which this rule proposes criteria.

Response to: CTR-009-006b

The compliance schedule allowance only applies to pollutants listed in the CTR. This rule does not address site-specific criteria development.

Comment ID: CTR-013-007b
Comment Author: County of Los Angeles
Document Type: Storm Water Auth.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: G-02 Compliance Schedules
References: Letter CTR-013 incorporates by reference letter CTR-027

Attachments? N
CROSS REFERENCES I-05

Comment: In addition, we would like to emphasize the following concerns which greatly impact the Los Angeles County Stormwater Program:

7. The proposed rule provides only a five-year compliance schedule to achieve compliance with the proposed water quality criteria. Again, setting aside the issue of whether water quality standards actually apply to municipal stormwater discharges, municipal stormwater programs are long-term, BMP-based programs. Because of this, it will take many years for a municipality to realize any water quality benefits in the receiving waters. The preamble to the proposed rule addresses all wet weather discharges together in one discussion. Municipal stormwater programs should be discussed and treated separately from all other wet weather and point source discharges. These are unique programs and cannot be placed in a "one-size fits all" regulatory program. The proposed rule needs to account for the nature of stormwater discharges by allowing more time for the MS4 long-term, BMP, source control program approach to take place for controlling pollutants in stormwater discharges.

We recommend that the rule be revised to provide a longer compliance schedule and to provide more flexible regulatory relief for MS4 dischargers who have fully complied with the MEP discharge standards but cannot achieve compliance within the established compliance schedule. At a minimum, the CTR should follow the recommendation of the State Task Force on the Inland Surface Water Plan to provide a 15-year compliance schedule.

Response to: CTR-013-007b

EPA is unwilling to extend the compliance period beyond five years because it has not received specific information indicating under what specific circumstances more than five years would be necessary to meet permit limits. Some municipalities supported the five year compliance schedule, while others argued that it was not sufficiently long. With respect to municipal stormwater discharges, permits are expected to require implementation of BMPs as the effluent limitations and that these BMPs are feasible within five years. Compliance schedules relate to what is necessary to meet the requirements of a particular permit limitation and EPA believes that meeting these limits is feasible within five years.

EPA supports the State in adopting a statewide provision independent of or as part of the current effort to readopt statewide water quality control plans, or in adopting individual basin-wide compliance schedule provisions through its nine Regional Water Quality Control Boards (RWQCBs). The State and RWQCBs have broad discretion to adopt a provision, including discretion on reasonable lengths of time for final compliance with WQBELs. EPA recognizes that practical time frames within which to set interim goals may be necessary to achieve meaningful, long-term improvements in water quality in

California.

EPA would prefer that the State authorize a compliance schedule provision but recognizes that it may not be able to complete this action for some time after promulgation of the CTR. Thus, EPA has chosen to promulgate the rule with a sunset provision which states that the authorizing compliance schedule provision will cease or sunset on September 30, 2004, or in approximately five years. However, if the State Board adopts, and EPA approves, a statewide authorizing compliance schedule provision prior to that time, EPA will expeditiously act to stay the authorizing compliance schedule provision in today's rule. Additionally, if a Regional Board adopts, and the State Board adopts and EPA approves, a Regional Board authorizing compliance schedule provision, EPA will act to stay today's provision for the appropriate or corresponding geographic region in California. At that time, the State Board's or Regional Board's authorizing compliance schedule provision will govern the ability of the State regulatory entity to allow a discharger to include a compliance schedule in a discharger's NPDES permit.

At this time, two RWQCBs have adopted an authorizing compliance schedule provision as an amendment to their respective Basin Plans during the Boards' last triennial review process. The Basin Plans have been adopted by the State and have come to EPA for approval. Thus, the Basin Plans' provisions are effective for the respective Basins. If and when EPA approves of either Regional Basin Plan, EPA will expeditiously act to amend the CTR, staying its compliance schedule provision, for the appropriate geographic region.

Comment ID: CTR-015-006
Comment Author: Eastern Municipal Water Dist.
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/23/97
Subject Matter Code: G-02 Compliance Schedules
References:
Attachments? N
CROSS REFERENCES

Comment: Schedules of Compliance (FR p. 42187, Preamble section F.5.)

It is mentioned that one Regional Board has adopted an authorizing compliance schedule provision in its Basin Plan and that, if the Agency includes a authorizing compliance schedule provision in this Rule, that Regional Board's provision will be recognized and effective. How would other Regional Boards get similar provisions into their Basin Plans, and what is the State Board's function, after this Rule is finalized? This discussion is confusing, as California state law already authorizes the use of schedules of compliance (Porter-Cologne Water Quality Act, Article 4, section 13263(c); California Code of Regulations, Title 23, Division 3, Chapter 91 section 2235.2). The discussion implies that, if the Agency does not include an authorizing compliance schedule provision in this Rule, that compliance schedules would not be allowed, which could impact the State Board's existing general authority and associated policies.

Response to: CTR-015-006

The CTR pre-empts any state law unless the state law is more stringent (Clean Water Act, Section 510).

The compliance schedule allowance in the CTR will be applicable wherever the CTR applies. If a Basin Plan includes a criteria (objective) for pollutant to which the CTR either does not apply or is less stringent, that Basin Plan must allow for compliance schedules in order for a compliance schedule to be included in the permit.

EPA would prefer that the State authorize a compliance schedule provision but recognizes that it may not be able to complete this action for some time after promulgation of the CTR. Thus, EPA has chosen to promulgate the rule with a sunset provision which states that the authorizing compliance schedule provision will cease or sunset on September 30, 2004, or in approximately five years. However, if the State Board adopts, and EPA approves, a statewide authorizing compliance schedule provision prior to that time, EPA will expeditiously act to stay the authorizing compliance schedule provision in today's rule. Additionally, if a Regional Board adopts, and the State Board adopts and EPA approves, a Regional Board authorizing compliance schedule provision, EPA will act to stay today's provision for the appropriate or corresponding geographic region in California. At that time, the State Board's or Regional Board's authorizing compliance schedule provision will govern the ability of the State regulatory entity to allow a discharger to include a compliance schedule in a discharger's NPDES permit.

At this time, two RWQCBs have adopted an authorizing compliance schedule provision as an amendment to their respective Basin Plans during the Boards' last triennial review process. The Basin Plans have been adopted by the State and have come to EPA for approval. Thus, the Basin Plans' provisions are effective for the respective Basins. If and when EPA approves of either Regional Basin Plan, EPA will expeditiously act to amend the CTR, staying its compliance schedule provision, for the appropriate geographic region.

Comment ID: CTR-016-003
Comment Author: San Francisco Bay RWQCB
Document Type: State Government
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: G-02 Compliance Schedules
References:
Attachments? Y
CROSS REFERENCES

Comment: State Compliance Schedule Provisions

We support the inclusion of compliance schedule provisions and would like EPA to clarify the statement that "any appropriately adopted Basin Plan amendment concerning a compliance schedule would also be effective for the Basin." In 1995, our Basin Plan was formally amended to include a compliance schedule provision (p. 4-14, (f)--see attached). The state review and approval process of those amendments has been completed and we have submitted the amendments to EPA for approval.

Our interpretation is that the regional compliance schedule provisions adopted in Basin Plans would take precedence over any compliance schedule provisions promulgated in the final rule by EPA and that EPA will either formally approve our Basin Plan prior to final rulemaking, or amend the proposed rule such that state-adopted compliance schedule provisions automatically take precedence at the time the final step in the approval process has been completed.

Response to: CTR-016-003

See response to CTR-015-006.

Comment ID: CTR-020-021
Comment Author: City of Stockton
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/24/97
Subject Matter Code: G-02 Compliance Schedules
References:
Attachments? Y
CROSS REFERENCES

Comment: V. Schedules of Compliance

The CTR specifies that schedules of compliance are authorized, but only if the Basin Plan specifically allows the inclusion of schedules in permits. While the City generally agrees that schedules of compliance should be available for new requirements, we disagree that the authority for schedules of compliance must be specifically stated in a Basin Plan. The Porter-Cologne Act itself authorizes schedules of compliance and pursuant to the decision in the Star-kist Caribe, Inc., NPDES Appeal No. 88-5 (may 26, 1992), such authorization is sufficient to allow a schedule of compliance. Stockton agrees that a schedule of at least five years should be allowed. For complex pollution situations such as those related to storm waters, a longer period of compliance should be allowed because the available methods for pollution reduction will take much longer to implement and assess. As EPA allows up to twenty years for compliance for combined sewer overflows (a similar wet weather problem), a twenty-year period should be specified for storm waters.

Response to: CTR-020-021

See response to CTR-015-006.

Comment ID: CTR-021-002f
Comment Author: LeBoeuf, Lamb, Green & MacRae
Document Type: Local Government
State of Origin: CA
Represented Org: City of Sunnyvale
Document Date: 09/25/97
Subject Matter Code: G-02 Compliance Schedules
References: Letter CTR-021 incorporates by reference letter CTR-035
Attachments? Y
CROSS REFERENCES G-04
C-24a
C-22
K-01
G-05

Comment: Sunnyvale is very supportive of many fine concepts advanced in the proposed CTR, and we join with CASA/Tri-TAC in complimenting the Agency on its proposed positions with regard to such matters as: (a) the use of interim effluent limitations in NPDES permits during the pendency of TMDL and other special studies; (b) the allowance of water effects ratios in adjusting the criteria for metals without the necessity for additional rulemaking to establish site-specific objectives; (c) the use of the dissolved state for the metals criteria; (d) the use of cooperative, intergovernmental, and stakeholder-involved approaches towards the development of TMDLs;(e) the allowance of dilution for both chronic and acute pollutants; and (f) the allowance of compliance schedules in NPDES permits.

Response to: CTR-021-002f

EPA appreciates these comments providing support for EPA's allowance of compliance schedules in NPDES permits.

Comment ID: CTR-022-003
Comment Author: SWRCB
Document Type: State Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: G-02 Compliance Schedules
References:
Attachments? N
CROSS REFERENCES

Comment: Thank you for the opportunity to comment on the U.S. Environmental Protection Agency's (U.S. EPA) proposed California Toxic Rule (CTR). The State Water Resources Control Board (SWRCB) staff would like to recognize U.S. EPA's tremendous effort in producing the CTR. The SWRCB staff are providing you with the following comments:

Pages 42188 and 42208: State Compliance Schedule Provisions: The preamble indicates, if the CTR is adopted with compliance schedule provisions, any appropriately adopted basin plan provision authorizing compliance schedules would also be effective for the basin. We support this approach; however, it is not reflected in the wording of proposed Section 131.38(e).

In fact, at least two Regional Water Quality Control Boards have included compliance schedule provisions in their basin plans. These provisions allow compliance schedules of up to ten years in permits. In this respect the basin plan provisions are less stringent than the proposed rule. While the proposed rule states that "...where shorter schedules of compliance are prescribed or schedules of compliance are prohibited by law, those provisions shall govern", the rule does not clarify that existing basin plan provisions authorizing longer schedules are also effective.

Response to: CTR-022-003

See responses to CTR-013-007b and CTR-015-006.

Comment ID: CTR-027-008b
Comment Author: California SWQTF
Document Type: Storm Water Auth.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: G-02 Compliance Schedules
References: Letter CTR-027 incorporates by reference letters CTR-001, CTR-036 and CTR-040
Attachments? N
CROSS REFERENCES I-05

Comment: 8. The proposed rule provides only a five-year compliance schedule to achieve compliance with the proposed water quality criteria. Again setting aside the issue of whether water quality standards actually apply to municipal stormwater discharges, municipal stormwater programs are long term BMP based programs. The proposed rule fails to recognize this, addressing all wet weather discharges together in one discussion. Municipal stormwater programs should be discussed and treated separately from all other wet weather and point source discharges. These are unique programs and cannot be placed in a "one-size fits all" regulatory program. The proposed rule needs to account for the nature of stormwater discharges by allowing more time for the MS4 long-term, BMP, source control program approach to take place for controlling pollutants in stormwater discharges.

The compliance schedule in the proposed rule discourages a watershed approach to improving water quality. The development and implementation of a watershed plan requires many years and many stakeholder involvements. However, the short compliance schedule in the CTR would actually encourage the discharger to forgo the watershed approach and address its toxicity issues separately and more expeditiously.

Recommendation: The rule should allow the State to establish compliance schedules. Short of this flexibility, the rule should be revised to provide a longer compliance schedule and to provide more flexible regulatory relief for MS4 dischargers who have fully complied with the MEP discharge standards but cannot achieve WQBELs compliance within the established compliance schedule. At a minimum, the CTR should follow the recommendation of the State Task Force on the Inland Surface Water Plan to provide a 15-year compliance schedule. Also provisions should be made for a longer compliance schedule when dischargers use a watershed approach to control toxic pollutants.

Response to: CTR-027-008b

See response to CTR-013-007b.

Further, in response to comments that EPA adopt a 15-year compliance schedule in order to accommodate schedules for developing TMDLS, EPA disagrees. The schedule for developing TMDLs is not relevant to compliance schedules; they are two totally separate issues. Compliance schedules address how long it will take in terms of technical or financial feasibility to meet an effluent limit established in an NPDES permit; they do not affect when the permit is issued. Moreover, while states may be adopting schedules for adopting TMDLs that extend up to 15 years, NPDES permits continue to be issued, even if this means they are issued before the TMDL is established for a particular waterbody. To do otherwise would be to stop the NPDES program until TMDLs are established. With regard to a situation in which a TMDL or watershed management program for the waterbody are scheduled for completion after the original compliance schedule has lapsed and justifiable delays in meeting WQBELs

arise, the discharger may apply for a variance from the water quality standard if the State develops an authorizing variance provision and the discharger meets the conditions set forth under 40 CFR 131.10(g).

The outside limit of ten years from the effective date of the rule means that dischargers whose permit is not renewed until the end of the ten year time frame will not be able to obtain a compliance schedule. EPA believes that this provision is nevertheless fair and reasonable for several reasons. First, based on the State's Implementation Plan [Reg. 9 put in correct title], EPA expects that the State will be able to reissue permits before the expiration of the ten year periods. Even if the State cannot do this, EPA thinks that ten years notice gives dischargers sufficient time to plan for meeting water quality based effluent limits, particularly given that the rest of the country has been subject since at least 1992 to such water quality standards either under state law or the National Toxics Rule ("NTR"). EPA promulgated the NTR for all states that did not have adequate criteria for toxic pollutants for which EPA had issued CWA section 304(a) criteria guidance.) Dischargers may also have sufficient notice because the State issued to many dischargers NPDES permits based on either the State's Inland Surface Waters Plan and Enclosed Bays and Estuaries Plan or narrative criteria similar to criteria in today's rule. Further, EPA also does not want to create an incentive for dischargers to have their permits re-issued later rather than sooner. Given the concern to have a level playing field among California dischargers, and those across the country who have all been subject to water quality criteria at least since 1992, EPA believes it is reasonable to cut off the compliance schedule for every discharger by ten years after the effective date of the rule.

Comment ID: CTR-030-004a
Comment Author: Utility Water Act Group
Document Type: Trade Org./Assoc.
State of Origin: DC
Represented Org:
Document Date: 09/25/97
Subject Matter Code: G-02 Compliance Schedules
References:
Attachments? Y
CROSS REFERENCES G-04
I

Comment: D. EPA's Endorsement of Five-Year Compliance Schedules and Interim Permit Limits for Modifications is Appropriate

UWAG strongly supports EPA's recognition that modifications necessary to comply with new or more stringent effluent limitations may necessitate the use of five-year compliance schedules. 62 Fed. Reg. at 42,187, col. 3. UWAG believes, however, that in certain circumstances a longer compliance schedule may be appropriate. Steam electric facilities that need retrofits to meet water quality-based effluent limits (WQBELS) often require extensive engineering design and testing prior to the actual retrofit. Additionally, nuclear facilities must ensure that any design changes are compatible with Nuclear Regulatory Commission regulations. Therefore, the availability of five-year compliance schedules is certainly well-justified. Further, EPA should consider whether longer compliance schedules should be available, at least in some limited circumstances.

Additionally, UWAG strongly supports EPA's approval of interim permit limits for use in permit modifications. This flexibility will allow dischargers to stay in compliance while necessary process or

design changes are carried out.

Response to: CTR-030-004a

EPA appreciates these comments providing support for its compliance schedule provisions. With respect to EPA's decision on compliance schedule length see response to CTR-002-010b.

Comment ID: CTR-031-005a
Comment Author: Fresno Metro. Flood Ctrl Dist.
Document Type: Flood Ctrl. District
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: G-02 Compliance Schedules
References: Letter CTR-031 incorporates by reference letter CTR-027
Attachments? N
CROSS REFERENCES I

Comment: If the proposed rule is carefully and sufficiently modified to affirm a commitment by EPA to effect only its Congressional authorization as established by CWA section 402(p), then EPA's failure to assess municipal storm water dischargers" ability to attain the proposed standards and associated economic and environmental impacts may be set aside at this time. However, if EPA persists in maintaining the CTR as drafted in this regard, the ambiguities presented in the preamble demand serious consideration and analyses as follows.

a. Many of the criteria are not attainable or scientifically valid with regard to municipal stormwater dischargers, nor is the proposed approach consistent with an appropriate delegation of authority to the State.

iii. State Flexibility and Authority

The CTR states, "The criteria established in this section are subject to the State's general rules of applicability in the same way and to the same extent as are other Federally-adopted and State-adopted numeric toxics criteria when applied to the same use classifications..." p. 42206

This language supports State Water Resources Control Board decisions and the San Francisco Basin Plan which have made it clear that municipal storm water dischargers need to address water quality standards only through the implementation, and escalation as necessary, of best management practices. As noted previously, the language of this section must be better supported in the preamble.

Notwithstanding the above statement on page 42206, the CTR actually diminishes state flexibility in implementing the rule and is inconsistent with state compliance schedules. The CTR mandates implementation limits on the state and implies a 5-year limit on compliance.

A five-year compliance schedule for municipal storm water dischargers is entirely inconsistent with the State's, EPA'S, and Phase II stakeholder's understanding of the unique challenges of storm water permitting. The draft Phase II regulation submitted to OMB includes a comprehensive reevaluation of storm water programs after two permit terms, and recommends no added best management practices or

changes in the Phase II program until such evaluation and research are completed.

Response to: CTR-031-005a

See response to CTR-013-007b.

Comment ID: CTR-032-002i
Comment Author: Las Gallinas Val. Sanitry Dist
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: G-02 Compliance Schedules
References: Letter CTR-032 incorporates by reference letter CTR-035
Attachments? N
CROSS REFERENCES G-01
C-22
G-09
C-24a
C-24
K
G-04
G-02

Comment: Regulatory Flexibility and Relief

The District supports EPA's use of "sound science" and current data in developing the proposed criteria in the California Toxics Rule (CTR). The District strongly supports language in the Preamble that references and endorses recommendations of the State Task Forces including use in permitting of:

* reasonable potential analyses * dissolved metals criteria * translators * water effects ratios * site specific objectives * innovative TMDL processes such as effluent trading * performance based interim limits * chronic and acute mixing zones, and * compliance schedules in NPDES permits.

Response to: CTR-032-002i

EPA appreciates these comments providing support for its compliance schedule provisions.

Comment ID: CTR-034-013
Comment Author: SCAP
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: G-02 Compliance Schedules
References: Letter CTR-034 incorporates by reference letter CTR-035
Attachments? N

CROSS REFERENCES

Comment: * SCAP endorses the inclusion in the draft CTR of a provision authorizing the use of compliance schedules in NPDES permits. We agree with the rationale for its inclusion, since immediate and full compliance by dischargers simply is not always possible or practicable. We strongly urge EPA, however, to consider modifying this provision to authorize the issuance of permits containing compliance schedules of up to 15 years. While schedules that long need not always be granted, we believe that including the authority in the CTR would allow greater flexibility in crafting control strategies as EPA and the State implement watershed-based approaches, and would foster greater opportunities to pursue pollution prevention avenues before moving to extreme measures, such as advanced end-of-pipe treatment.

Response to: CTR-034-013

See response to CTR-027-008b.

Comment ID: CTR-035-037
Comment Author: Tri-TAC/CASA
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: G-02 Compliance Schedules
References:
Attachments? N
CROSS REFERENCES

Comment: pp. 42187-42188 -- Schedules of Compliance We support the inclusion in the CTR of a provision authorizing the use of compliance schedules in permits, as authorized by the Clean Water Act. We agree with EPA's statement in the Preamble explaining the need for compliance schedule authorization, "because of the potential for existing dischargers to have new or more stringent effluent limitations, under the final rule, for which immediate compliance would not be possible or practicable." However, periods of time longer than 5 years may sometimes be necessary and appropriate. Consistent with the 1990 Starkist-Caribe Order, EPA has full authority to promulgate a compliance schedule provision, and there is no limitation in the Clean Water Act on the length of such a provision (U.S. EPA, 1990a). Therefore, based on the consensus recommendation of the Permitting and Compliance Issues Task Force, we urge EPA to allow up to 15 years for water quality standards to be met and to include a provision in the regulation stating that compliance schedules in NPDES permits for achievement of final effluent limitations based on the water quality criteria being promulgated may not extend beyond the compliance deadline for the standards (SWRCB, 1995, Part VI). The 5-year time frame assumes that a rapid response through source control, treatment plant operational changes, and/or major structural improvements is possible. However, once a decision is made to proceed with a project, planning, financing, design and construction can take more than 5 years. Further, we believe that a longer time frame may be suitable in cases where TMDLs are necessary and/or a watershed management program is underway but not complete. In such cases, it may make more sense for dischargers to pursue actions other than end-of-pipe treatment, such as monitoring, pollution prevention programs, water-effect ratio studies, investigation of pollutant trading opportunities, etc. (We also would like to point out that, in such cases, interim limits may be more appropriate than final effluent limits with compliance schedules.) This

is particularly true for pollutants which are not easily controlled (short of adding advanced treatment) through traditional industrial waste controls, and which must be reduced through new and innovative means (for instance, public education programs, installation of BMPs, etc.). A 15-year time frame is also consistent, we believe, with the guidance to EPA Regions issued by Assistant Administrator for Water Robert Perciasepe in August 1997, which directs States to submit schedules for developing TMDLs for all listed waters over an 8 to 13 year time period (U.S. EPA, 1997d). As this time frame does not include the implementation of measures to comply with Waste Load Allocations and Load Allocations to be developed through the TMDL process, we believe that even the 15-year time frame is optimistic for meeting water quality standards in all impaired water bodies, especially given the small number initiated in California to date and the large number of water bodies listed as impaired on California's 303(d) list.(*1)

(*1) 386 water bodies were listed by the state of California on the 303(d) list as of 1996 (SWRCB, 1996). Many of these water bodies were listed for multiple pollutants or stressors.

Response to: CTR-035-037

See response to CTR-027-008b.

Comment ID: CTR-036-010a
Comment Author: County of Orange
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: G-02 Compliance Schedules
References: Letter CTR-036 incorporates by reference letters CTR-013, CTR-018, CTR-031, CTR-034 and CTR-040
Attachments? N
CROSS REFERENCES I

Comment: We are concerned that the five-year compliance period for stormwater discharges to meet the criteria is untenable. The linkage between the application of best management practices and water quality benefits is long term and will thus be hard to demonstrate. Even in a direct product substitution situation, such as the removal of leaded gasoline from fuels, data from Orange County shows a very slow and long-term reduction in lead concentrations in our water bodies over multiple years.

Response to: CTR-036-010a

See response to CTR-013-007b.

Comment ID: CTR-038-012
Comment Author: Sonoma County Water Agency
Document Type: Sewer Authority
State of Origin: CA
Represented Org:

Document Date: 09/25/97
Subject Matter Code: G-02 Compliance Schedules
References:
Attachments? Y
CROSS REFERENCES

Comment: 11. EPA should provide for a compliance schedule of 15 years, consistent with the recommendation of the State Plan Public Task Forces, where dischargers with potential compliance problems are pursing watershed management and other reasonable activities. The Preamble discusses a number of reasonable and responsible actions that a discharger might pursue to address toxic pollutants including, but not limited to: monitoring of sources, discharges and ambient waters; development of best management practices; development of pollution prevention programs; optimizing treatment plant operations for toxics removal; dilution studies; translator studies; water-effect ratio studies; risk assessments; TMDL studies; investigation of pollutant trading opportunities; and conduct of watershed management studies. On the other hand, the proposed rule states that dischargers should generally be able to comply with the rule within 3 years and, at most, will be allowed a maximum of 5 years from the issuance of a permit to comply. These are obviously conflicting principles. Where dischargers are pursuing reasonable and responsible actions, such as those previously listed, the CTR should allow permit authorities to defer placement of final effluent limits based on CTR criteria in permits, and instead provide for interim permit limits consistent with the recommendations of the State Plan Public Task Forces. Also, consistent with the Task Force recommendations, the CTR should allow up to 15 years from the date of the rule to achieve compliance rather than the 10 years allowed in the proposed CTR. Such a provision would have the result of encouraging dischargers to participate in activities, such as watershed management, that will further the goals of the Clean Water Act, The presently proposed rule would have the effect of discouraging such activities.

Response to: CTR-038-012

See responses to CTR-013-07b and CTR-027-008b.

Comment ID: CTR-039-007
Comment Author: San Francisco BayKeeper
Document Type: Environmental Group
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: G-02 Compliance Schedules
References:
Attachments? N
CROSS REFERENCES

Comment: On behalf of San Francisco BayKeeper, its Stockton-based DeltaKeeper project, San Diego BayKeeper and Santa Monica BayKeeper (hereinafter "BayKeepeer"), I am submitting these comments for consideration in finalizing EPA's proposed rule establishing water quality criteria for priority toxic pollutants for the waters of the State of California. The need for numeric criteria for priority toxic pollutants was identified by Congress ten years ago when, in October, 1987, it enacted amendments to the Clean Water Act mandating that States issue such criteria by not later than October 18, 1990. The State of California adopted a portion of the mandated criteria in April, 1991, which, in large part, EPA

approved. However, even that partial compliance was thwarted by the Sacramento Superior Court's overly broad decision vacating the State's decision based solely on a flawed economic analysis purportedly required by State law.

Now, seven years later, although appreciative of the complexity of the task required by Congress, BayKeeper is deeply concerned that EPA's proposed rule to cure the State's violation will undermine permit limits promulgated throughout the Bay area and other regions, allowing more pollution to be discharged to San Francisco Bay and other state waters in violation of the State and EPA's antidegradation policies. BayKeeper also is very concerned that EPA is promulgating criteria for mercury, dioxin and 13 other pollutants which are based on drastic underestimates of the quantity of fish consumed by recreational and subsistence anglers throughout the State of California. BayKeeper also believes that at this late date, the proposal to allow compliance schedules which could delay for up to ten years compliance with permit effluent limitations based upon the proposed criteria is inappropriate given the already seven year delay suffered by California's aquatic ecosystems and the people who depend upon the health of those systems for food and recreation.

V. EPA SHOULD NOT INCLUDE AUTHORITY FOR COMPLIANCE SCHEDULES IN ITS PROPOSED CRITERIA

As noted above, the proposed criteria, good or bad, are now seven years late. However, the State did have some criteria established for a three year period between 1991 and 1994. Thus, the regulated community has had ample notice of the criteria to come. indeed, a significant number of dischargers have been subject to permits based on approved criteria for upwards of five years. There is no scientific reason for EPA to perpetuate the delay and cause the State's aquatic ecosystems to further suffer toxic contamination that Congress mandated be addressed by October of 1990. Compliance schedules would be inconsistent with Congress' mandate. Moreover, compliance schedules would not be fair to those dischargers who already have been required to comply with the State's criteria issued in 1991. EPA should strike the compliance schedule authority from the proposed rule and leave the question of the need for compliance schedules to the State.

Response to: CTR-039-007

With respect to EPA's decision to include a compliance schedule, see response to CTR-002-010b. With respect to the relationship between EPA's compliance schedule and State adopted compliance schedules, see response to CTR-015-006. With respect to the comment that the CTR may degrade water quality in violation of antidegradation policy, see responses to CTR-002-010a (Category A; Antidegradation) and CTR-039-004 (Category C-14; Fish/Water Consumption). With respect to the comments on fish consumption, see response to CTR-002-002a (Category C-14; Fish/Water Consumption).

Comment ID: CTR-040-019
Comment Author: County of Sacramento Water Div
Document Type: Storm Water Auth.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: G-02 Compliance Schedules
References: Letter CTR-040 incorporates by reference letter CTR-027
Attachments? Y

CROSS REFERENCES

Comment: VI. Recommendation: Provide for a compliance schedule of 15 years, consistent with the recommendation of the State Plan Public Task Forces, where dischargers with potential compliance problems are pursuing watershed management and other reasonable actions.

* The Preamble discusses a number of reasonable and responsible actions that a discharger might pursue to address toxic pollutants including, but not limited to: monitoring of sources, discharges and ambient waters; development of best management practices; development of pollution prevention programs; optimizing treatment plant operations for toxics removal; dilution studies; translator studies, water-effect ratio studies; risk assessments; TMDL studies; investigation of pollutant trading opportunities; and watershed management studies.

* On the other hand, the proposed Rule states that dischargers should generally be able to comply with the Rule within 3 years and, at most, will be allowed a maximum of 5 years from the issuance of a permit to comply. These are obviously conflicting principles.

* Where dischargers are pursuing reasonable and responsible actions, such as those previously listed, the Rule should allow permit authorities to defer placement of effluent limits based on Rule criteria in permits, and instead provide for interim permit limits consistent with the recommendations of the State Plan Public Task Forces.

* Also, consistent with the State Plan Public Task Force's recommendations, the Rule should allow up to 15 years from the date of its promulgation to achieve compliance rather than the 10 years currently proposed. Such a provision would have the result of encouraging dischargers to participate in activities, such as watershed management and development of TMDLs, that will further the goals of the CWA. (In other documents, EPA has acknowledged that the TMDL process may take 8 - 13 years). The Rule, as it is presently proposed, will have the effect of discouraging such activities.

Response to: CTR-040-019

See response to CTR-027-008b.

Comment ID: CTR-041-012
Comment Author: Sacramento Reg Cnty Sanit Dist
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: G-02 Compliance Schedules
References:
Attachments? N
CROSS REFERENCES

Comment: 7. EPA Should Provide a Compliance Schedule of Fifteen Years

EPA should provide for a compliance schedule of fifteen years, consistent with the recommendation of the State Plan Public Task Forces, where dischargers with potential compliance problems are pursuing

watershed management and other reasonable activities. The Preamble discusses a number of reasonable and responsible actions that a discharger might pursue to address toxic pollutants including, but not limited to; monitoring of sources, discharges and ambient waters; development of best management practices; development of pollution prevention programs; optimizing treatment plant operations for toxics removal; dilution studies, translator studies; water-effect ratio studies, risk assessments; TMDL studies; investigation of pollutant trading opportunities; and conduct of watershed management studies. On the other hand, the proposed rule states that dischargers should generally be able to comply with the rule within three years and, at most, will be allowed a maximum of five years from the issuance of a permit to comply. These are obviously conflicting principles. Where dischargers are pursuing reasonable and responsible actions, such as those previously listed, the CTR should allow permit authorities to defer placement of final effluent limits based on CTR, criteria in permits, and instead provide for interim permit limits consistent with the recommendations of the State Plan Public Task Forces. Also, consistent with the Task Force recommendations, the CTR should allow up to fifteen years from the date of the rule to achieve compliance rather than the five years allowed in the proposed CTR. Such a provision would have the result of encouraging dischargers to participate in activities, such as watershed management, that will further the goals of the Act. The presently proposed rules will have the effect of discouraging such activities.

Response to: CTR-041-012

See response to CTR-027-008b.

Comment ID: CTR-043-010
Comment Author: City of Vacaville
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: G-02 Compliance Schedules
References:
Attachments? Y
CROSS REFERENCES

Comment: 10. EPA should provide for a compliance schedule of 15 years, consistent with the recommendation of the State Plan Public Task Forces. The Preamble discusses a number of reasonable and responsible actions that a discharger might pursue to address toxic pollutants including, but not limited to: monitoring of sources, discharges and ambient waters; development of best management practices; development of pollution prevention programs; optimizing treatment plant operations for toxics removal; dilution studies; translator studies; water-effect ratio studies; risk assessments; TMDL studies; investigation of pollutant trading opportunities; and conduct of watershed management studies. On the other hand, the proposed rule states that dischargers should generally be able to comply with the rule within 3 years and, at most, will be allowed a maximum of 5 years from the issuance of a permit to comply. These are obviously conflicting principles. Where dischargers are pursuing reasonable and responsible actions, such as those previously listed, the CTR should allow permit authorities to defer placement of final effluent limits based on CTR criteria in permits, and instead provide for interim permit limits consistent with the recommendations of the State Plan Public Task Forces. Also, consistent with the Task Force recommendations, the CTR should allow up to 15 years from the date of the rule to achieve compliance rather than the 5 years allowed in the proposed CTR. Such a provision would have

the result of encouraging dischargers to participate in activities, such as watershed management, that will further the goals of the Act. The presently proposed rule would have the effect of discouraging such activities.

Response to: CTR-043-010

See response to CTR-027-008b.

Comment ID: CTR-044-011
Comment Author: City of Woodland
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: G-02 Compliance Schedules
References:
Attachments? Y
CROSS REFERENCES

Comment: We have reviewed the proposed CTR and offer the following comments:

10. EPA should provide for a compliance schedule of 15 years, consistent with recommendation of the State Plan Public Task Forces. The Preamble discusses a number of reasonable and responsible actions that a discharger might pursue to address toxic pollutants including, but not limited to: monitoring of sources, discharges and ambient waters; development of best management practices; development of pollution prevention programs; optimizing treatment plant operations for toxics removal; dilution studies; translator studies; water-effect ratio studies; risk assessments; TMDL studies; investigation of pollutant trading opportunities; and conduct of watershed management studies. On the other hand, the proposed rule, states that dischargers should generally be able to comply with the rule within 3 years and, at most, will be allowed a maximum of 5 years from the issuance of a permit to comply. These are obviously conflicting principles. Where dischargers are pursuing reasonable and responsible actions, such as those previously listed, the CTR should allow permit authorities to defer placement of final effluent limits based on CTR criteria in permits, and instead provide for interim permit limits consistent with the recommendations of the State Plan Public Task Forces. Also, consistent with the Task Force recommendations, the CTR should allow up to 15 years from the date of the rule to achieve compliance rather than the 5 years allowed in the proposed CTR. Such a provision would have the result of encouraging dischargers to participate in activities, such as watershed management, that will further the goals of the Act. The presently proposed rule would have the effect of discouraging such activities.

Response to: CTR-044-011

See response to CTR-027-008b.

Comment ID: CTR-045-003
Comment Author: Sausalito-Marin Sanitary Dist.
Document Type: Sewer Authority
State of Origin: CA

Represented Org:
Document Date: 09/24/97
Subject Matter Code: G-02 Compliance Schedules
References:
Attachments? Y
CROSS REFERENCES

Comment: The District supports many of the items included in the proposed CTR:

The inclusion of a provision to allow compliance schedules in permits. It is suggested that this provision be modified to allow Regional Water Quality Control Boards (RWQCBS) to include compliance schedules of up to 15 years in permits, if they deem it appropriate.

Response to: CTR-045-003

See response to CTR-027-008b.

Comment ID: CTR-052-020
Comment Author: East Bay Dischargers Authority
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: G-02 Compliance Schedules
References: Letter CTR-052 incorporates by reference letters CTR-035 and CTR-054
Attachments? Y
CROSS REFERENCES

Comment: C. RECOMMENDATIONS FOR MODIFICATIONS TO THE CTR AND EA

EPA should provide for compliance schedules of up to 15 years. This would be consistent with the consensus recommendation of the State Plan Public Task Forces, and allow dischargers the necessary flexibility to develop cost effective solutions prior to considering end-of-pipe treatment options.

Response to: CTR-052-020

See response to CTR-027-008b.

Comment ID: CTR-053-004
Comment Author: Heal the Bay
Document Type: Environmental Group
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: G-02 Compliance Schedules
References: Letter CTR-053 incorporates by reference letter 6 and the comments on Dioxin, copper, and

the compliance schedule from letter CTR-002
Attachments? N
CROSS REFERENCES

Comment: We also agree with the concerns of our colleagues regarding the allowance of compliance schedules in permits to meet the California Toxics Rule. Compliance schedules are required in enforcement orders for any exceedance of numeric criteria. We, therefore, agree with and incorporate by reference CBE's comments on compliance schedules.

Response to: CTR-053-004

See response to CTR-002-010b.

Comment ID: CTR-054-012
Comment Author: Bay Area Dischargers Assoc.
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: G-02 Compliance Schedules
References:
Attachments? Y
CROSS REFERENCES

Comment: EPA should provide for a compliance schedule of 15 years, consistent with the recommendation of the State Plan Public Task Forces, where dischargers with potential compliance problems are pursing watershed management and other reasonable activities. The Preamble discusses a number of reasonable and responsible actions that a discharger might pursue to address toxic pollutants including, but not limited to: monitoring of sources, discharges and ambient waters; development of best management practices; development of pollution prevention programs; optimizing treatment plant operations for toxics removal; dilution studies; translator studies; water-effect ratio studies; risk assessments; TMDL studies; investigation of pollutant trading opportunities; and conduct of watershed management studies. On the other hand, the proposed rule states that dischargers should generally be able to comply with the rule within 3 years and, at most, will be allowed a maximum of 5 years from the issuance of a permit to comply. These are obviously conflicting principles. Where dischargers are pursuing reasonable and responsible actions, such as those previously listed, the CTR should allow permit authorities to defer placement of final effluent limits based on CTR criteria in permits, and instead provide for interim permit limits consistent with the recommendations of the State Plan Public Task Forces. Consistent with the Task Force recommendations, the CTR should allow up to 15 years from the date of the rule to achieve compliance rather than the 5 years allowed in the proposed CTR. Such a provision would have the result of encouraging dischargers to participate in activities, such as watershed management, that will further the goals of the Act. The presently proposed rules will have the effect of discouraging such activities.

Response to: CTR-054-012

See response to CTR-027-008b.

Comment ID: CTR-056-010
Comment Author: East Bay Municipal Util. Dist.
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/22/97
Subject Matter Code: G-02 Compliance Schedules
References: Letter CTR-056 incorporates by reference letter CTR-054
Attachments? N
CROSS REFERENCES

Comment: Second, EBMUD would like to express to EPA it support for inclusion of:

* The inclusion in the rule of a provision allowing compliance schedules in NPDES permits (although this provision should be modified to enable RWQCBs to include compliance schedules of up to 15 years in permits if it is determined to be appropriate).

Response to: CTR-056-010

See response to CTR-027-008b.

Comment ID: CTR-058-007
Comment Author: Western States Petroleum Assoc
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: G-02 Compliance Schedules
References:
Attachments? Y
CROSS REFERENCES

Comment: Compliance Schedules. WSPA supports EPA's recognition of the need for granting appropriate but flexible compliance schedules, with timeframes up to and including five years. This is especially true in cases when treatment technology is not available and must be developed to deal with a specific pollutant which has not been regulated in the permit previously.

WSPA members have detailed and intimate personal experience with the struggle and timeframe needed to come into compliance with highly restrictive and challenging water-quality based effluent limitations (WQBELs). WPSA and the SFRWQCB have collaborated on the detailed studies (which include studies of the significant secondary impacts) needed to meet the very stringent selenium limits set for Bay Area refineries. Selenium is a contaminant which typically occurs in refinery wastewaters at concentrations much less than 0.5 mg/L (roughly the practical level for heavy metal treatment technology when our studies begin). Its chemistry is very complex and was not well understood when industry began its studies.

The timeframe for the selenium studies and compliance schedule is as follows:

1. 3rd quarter 1992: WSPA members begin meeting to develop technology to meet RWQCB refinery selenium limits. Studies begin approximately the end of 1992.

2. 2nd quarter 1993: WSPA invites the RWQCB to participate in the selenium studies. Annual interim reports to RWQCB are made.

3. 3rd quarter 1995. The consolidated WSPA technology studies are completed and reported to the RWQCB.

4. 1995/1996. Individual refineries pilot the technology(ies) of their choice.

5. July 31, 1998: compliance deadline for new limits; meanwhile interim limits apply.

RWQCB staff participated in our assessment and development of available technology options. One of the primary reasons for the technology studies was to pursue alternatives to the iron coprecipitation process because this process generates vast quantities of potentially "toxic" solid waste (using California definitions). In addition to the WSPA coordinated studies, two refineries actively pursued other promising technologies specific to their facilities. These technologies were ultimately dropped due to technical deficiencies. Evaluating the alternatives took time and was a valuable part of the study even though, in the end, they did not workable results. In any case, the refineries still anticipate meeting the compliance deadline. We think the regulatory community would agree with us that even given the significant resources devoted to assessing the efficacy and appropriateness of various technologies, these studies take time to do well. However, to address complex and difficult WQBELS, this anecdote illustrates the need for permit writers to have the flexibility to work with dischargers on compliance schedules which in some cases may be very lengthy.

The use of compliance schedules is amply supported by existing regulations and practice, and makes for a practical approach to achieving the goals of the Act.

Response to: CTR-058-007

Comment ID: CTR-059-013
Comment Author: Los Angeles County Sanit. Dist
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: G-02 Compliance Schedules
References: Letter CTR-059 incorporates by reference letter CTR-035
Attachments? Y
CROSS REFERENCES

Comment: The Sanitation Districts supports the inclusion in the draft CTR of a provision authorizing the use of compliance schedules in NPDES permits. We agree with the rationale for its inclusion, since immediate and full compliance by dischargers simply is not generally possible or practicable. We strongly urge EPA, however, to consider modifying this provision to authorize the issuance of permits

containing compliance schedules of up to 15 years. We believe that including the authority in the CTR would foster greater opportunities to pursue pollution prevention avenues before moving to extreme measures, such as advanced end-of-pipe treatment. The ability to allow longer compliance schedules is especially critical, we believe, to the success of watershed management projects and the development of TMDLs (especially phased TMDLs).

Response to: CTR-059-013

See response to CTR-027-008b.

Comment ID: CTR-060-005
Comment Author: San Diego Gas and Electric
Document Type: Electric Utility
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: G-02 Compliance Schedules
References:
Attachments? N
CROSS REFERENCES

Comment: PROVISIONS SDG&E DOES NOT SUPPORT

As described in the following comments SDG&E does not support the following provisions:

Compliance Periods No Longer than 5 Years

The preamble and rule describe the use of compliance schedules by existing dischargers where they find that they cannot immediately comply with a new more restrictive water quality based effluent limit (see 62 Fed. Reg. at 42187, Col. 1-3; and 62 Fed. Reg. at 42208, Col. 1-3). SDG&E supports the use of compliance schedules. However, the preamble and rule limit the term of compliance schedules to five years from the issuance of the new effluent limit. This duration may not be adequate where a TMDLA/VLA/LA process is necessary or may not accommodate the time needed to investigate alternative compliance methods, develop and obtain approval of site specific criteria, design and engineer necessary modifications to the facility and to obtain necessary financing. The SWRCB's Task Forces' Final Report ("Reports of the Public Advisory Task Forces to the State Water Resources Control Board Regarding the Development of the Inland Surface Waters Plan and the Enclosed Bays and Estuaries Plan"; October, 1995) recommended the use of compliance periods up to 15 years. SDG&E recommends that the rule be modified to allow for up to 15 year durations for compliance schedules.

Response to: CTR-060-005

See response to CTR-027-008b.

Comment ID: CTR-066-004
Comment Author: Delta Diablo Sanitation Dist.
Document Type: Sewer Authority

State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: G-02 Compliance Schedules
References:
Attachments? N
CROSS REFERENCES

Comment: Our preliminary review of the CTR finds several areas that we believe are positive changes and will enhance the rulemaking. The areas that we support as now written are as follows:

* The inclusion of a provision allowing compliance schedules in permits in the rule, although the provision should be modified to allow the Regional Water Quality Control Boards (RWQCBs) to include compliance schedules of up to 15 years in permits if they deem it appropriate.

Response to: CTR-066-004

See response to CTR-027-008b.

Comment ID: CTR-067-005
Comment Author: Ojai Valley Sanitary District
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: G-02 Compliance Schedules
References:
Attachments? N
CROSS REFERENCES

Comment: * Having just completed an eight (8) year, twenty-eight (28) million dollar project to meet more stringent effluent limits, OVSD strongly endorses the inclusion in the draft CTR of a provision authorizing compliance schedules of up to 15 (fifteen) years in NPDES permits. Tremendous effort and time are required for a POTW to sample for and identify potential pollutants, negotiate the permit(s) with the applicable regulatory agencies, perform the necessary environmental studies to determine the impact of the pollutant(s) observed, identify potential solutions/mitigation measures and their costs, and then to design and build additional treatment facilities. Although 15 (fifteen) years may not always need to be granted, allowing the flexibility of extended compliance schedules would be very beneficial to OVSD (and other POTWs) and the Regional Water Quality Control Boards. This is true not only for the reasons stated above, but also because extended compliance schedules would allow time for the development and implementation of the relatively new watershed-based management approach.

Response to: CTR-067-005

See response to CTR-027-008b.

Comment ID: CTR-081-002c
Comment Author: West County Agency
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: G-02 Compliance Schedules
References:
Attachments? N
CROSS REFERENCES G-04
C-24a
C-22
G-09
C-01a
C-08a
G-05

Comment: * There are many aspects of the CTR that we support. These include: a) Application of interim limits while special studies are performed. b) Approach to water effect ratios for determining site specific criteria. c) Inclusion of provision for compliance schedules. However, this should be modified to allow inclusion of compliance schedules of up to 15 years in permits if deemed appropriate by Regional Boards. d) Metals criteria expressed as dissolved rather than total recoverable concentrations. e) EPA's guidance to Regional Boards regarding use of translators. f) EPA's proposal to create a rebuttal presumption for Water Effects Ratios, g) Revised human health criteria for mercury h) Decision to not promulgate human health criteria at this time in light of issues surrounding health criteria for arsenic. i) EPA's policies regarding application of mixing zones and dilution credits.

Response to: CTR-081-002c

See response to CTR-027-008b.

Comment ID: CTR-082-002
Comment Author: City of Burbank
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/24/97
Subject Matter Code: G-02 Compliance Schedules
References:
Attachments? N
CROSS REFERENCES

Comment: The subject rule has a significant impact on our facility discharge and the citizens of the City. We therefore present the following comments for your consideration to re-open the comment period for this rule in order to facilitate a more complete review by public and in particular by those in the POTW community:

* The inclusion of a provision allowing compliance schedules in permits in the rule, should be modified

to allow the Regional Water Quality Control Board's (RWQCB's) to include compliance schedule of up to 15 years if they deem it is appropriate.

Response to: CTR-082-002

See response to CTR-027-008b.

Comment ID: CTR-085-005
Comment Author: Camarillo Sanitary District
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/24/97
Subject Matter Code: G-02 Compliance Schedules
References:
Attachments? N
CROSS REFERENCES

Comment: On several aspects of the California Toxics Rule, the District is in agreement with CASA and SCAP comments:

* The inclusion of a provision allowing compliance schedules in permits in the rule although the provisions should be modified to allow the Regional Water Quality Control Boards (RWQCB) to include compliance schedules of up to 15 years in permits if they deem it appropriate.

Response to: CTR-085-005

See response to CTR-027-008b.

Comment ID: CTR-086-004i
Comment Author: EOA, Inc.
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org: California Dent
Document Date: 09/26/97
Subject Matter Code: G-02 Compliance Schedules
References: Letter CTR-086 incorporates by reference letter CTR-035
Attachments? N
CROSS REFERENCES G-01
C-22
G-09
C-24a
C-24
K-03
G-04
G-05

Comment: Regulatory Flexibility and Relief

CDA supports language in the CTR Preamble that references and endorses recommendations of the State Task Forces including in part the use of.

* reasonable potential analyses * dissolved metals criteria * translators * water effects ratios * site specific objectives * innovative TMDL processes such as effluent trading * performance based interim limits * chronic and acute mixing zones, and * compliance schedules in NPDES permits.

Response to: CTR-086-004i

See response to CTR-027-008b.

Comment ID: CTR-089-001f
Comment Author: Las Virgenes Mncpl Water Dist.
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/24/97
Subject Matter Code: G-02 Compliance Schedules
References:
Attachments? N
CROSS REFERENCES C-22
C-01a
C-08a
G-05
K-01
G-09

Comment: The draft California Toxics Rule (CTR) is clearly the product of substantial effort by USEPA staff, and we applaud this effort and its intent. On several issues of concern to public utilities, the CTR strikes a good balance between the need to promulgate standards and the need to base those standards on sound science. Examples include the use of dissolved concentrations rather than the total recoverable concentrations for metals, the deferral of human health criteria for arsenic until adequate information is available, and the revision of the human health criterion for mercury. We are also pleased with the CTR's guidance and flexibility, on mixing zones and dilution credits, total maximum daily loads (TMDLs), compliance schedules, and translators.

Response to: CTR-089-001f

EPA appreciates these comments for providing support for EPA's allowance of compliance schedules in NPDES permits.

Comment ID: CTR-090-002e
Comment Author: C&C of SF, Public Utl. Commis.
Document Type: Local Government
State of Origin: CA

Represented Org:
Document Date: 09/25/97
Subject Matter Code: G-02 Compliance Schedules
References: Letter CTR-090 incorporates by reference letters CTR-035 and CTR-054
Attachments? Y
CROSS REFERENCES C-17a
C-24a
C-22
G-05
G-04

Comment: There are many features of the proposed rule which we strongly endorse, specifically:

* the use of the latest IRIS values for human health criteria, it is essential that the criteria be based on the latest scientific and environmental information;

* recognition that the dissolved fraction of metals, rather than the total recoverable, better reflect the aquatic toxicity of metals;

* recognition that for certain metals (e.g. copper and zinc) ambient water chemistry is critical in determining toxicity thereby endorsing the Water Effects Ratio;

* recognition and strong endorsement of the multi-tiered mixing zones for acute, chronic and human health effects; and

* recognition of interim limits and compliance schedules as appropriate implementation strategies,

Response to: CTR-090-002e

See response to CTR-027-008b.

Comment ID: CTR-090-024
Comment Author: C&C of SF, Public Utl. Commis.
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: G-02 Compliance Schedules
References: Letter CTR-090 incorporates by reference letters CTR-035 and CTR-054
Attachments? Y
CROSS REFERENCES

Comment: Compliance Schedules -- The PUC supports the use of compliance schedules as part of the NPDES permit process, however, we oppose establishing any ceiling in the CTR for the duration of such schedules. If water shed based solutions are to be implemented, these will require a much as a 10 to 15 years to begin to show significant results. it would be most unwise to burden small contributors of toxicants with large expenses, until such time as the efficacy of water shed approaches can be established in the specific water sheds.

Even in cases where there is a clear and immediate indication that a POTW will have to undertake significant process upgrading to achieve CTR based WQBEL effluent limitations, the five year period for compliance is simply unrealistic. It would be difficult for a municipality or regional sanitation agency to arrange financing, plan and undertake CEQA procedures, design, construct and run process shake down within five years for any major wastewater project.

Rather than incorporate a compliance schedule ceiling in the CTR, the CTR should simply state that compliance schedules can be established by the RWQCBs on a case by case basis.

Response to: CTR-090-024

See response to CTR-027-008b. With respect to the relationship between EPA's compliance schedule and State adopted compliance schedules see response to CTR-015-006.

Comment ID: CTR-092-009
Comment Author: City of San Jose, California
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: G-02 Compliance Schedules
References: Letter CTR-092 incorporates by reference letter CTR-035
Attachments? Y
CROSS REFERENCES

Comment: Schedules of Compliance

The City endorses compliance schedules as an interim sequence of events which lead to compliance with water quality-based effluent limitations. The City further supports the authorizing compliance schedule provision contained in the CTR but advocates a period of 15 years to comply with such limitations. The 15 year time period is consistent with 1997 guidance issued by Assistant Administrator Robert Perciasepe regarding the development of TMDLs over an 8 to 13 year timeframe.

Response to: CTR-092-009

See response to CTR-027-008b.

Comment ID: CTR-095-004
Comment Author: M. Ruth Uiswander
Document Type: Citizen
State of Origin: CA
Represented Org:
Document Date: 10/02/97
Subject Matter Code: G-02 Compliance Schedules
References:
Attachments? N

CROSS REFERENCES

Comment: Also, it is unconscionable to postpone compliance with the new proposals for up to 10 years. This is unacceptable. Facts must be faced and prevention measures to taken now. Cancer is epidemic! We must act!

Response to: CTR-095-004

See response to CTR-002-010b.

Comment ID: CTR-104-003
Comment Author: Lucy Nelson, et. al.
Document Type: Citizen
State of Origin: CA
Represented Org:
Document Date: 10/15/97
Subject Matter Code: G-02 Compliance Schedules
References:
Attachments? N
CROSS REFERENCES

Comment: "Compliance schedules" could postpone compliance for up to 10 years. There has already been a 7 year delay in reaching this proposal stage, so further procrastination is completely unacceptable.

Response to: CTR-104-003

See response to CTR-002-010b.

Comment ID: CTR-106-003
Comment Author: Robert Brown
Document Type: Citizen
State of Origin: CA
Represented Org:
Document Date: 10/28/97
Subject Matter Code: G-02 Compliance Schedules
References:
Attachments? N
CROSS REFERENCES

Comment: "Compliance schedules" could postpone compliance for up to 10 years. There has already been a 7 year delay in reaching this proposal stage, so further procrastination is completely unacceptable.

Response to: CTR-106-003

See response to CTR-002-010b.

Comment ID: CTR-107-002b
Comment Author: Brian E. Hill
Document Type: Citizen
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: G-02 Compliance Schedules
References:
Attachments? Y
CROSS REFERENCES E-01
E-01n

Comment: On September 17, I attended a hearing on the proposed CTR at the EPA's regional office in San Francisco. Here are some key issues from the testimony at that hearing:

* Some of the limits are below normal detection limits, therefore agencies have no background data in order to perform accurate attainability analysis.

* The cost of implementation by the EPA is grossly underestimated. The economic analysis shows at maximum implementation cost of $87 million. If preliminary estimates by publicly owned treatment works (POTW) art correct, implementation of the CTR will far exceed the $100 million provision of the Porter-Cologne Act. If this is the case, feasibility of implementation will be in jeopardy. The City of Merced, CA estimates that their additional cost would be $4 million annually. Merced has a very small treatment facility.

* Robert Reid, speaking on behalf of California Association of Sanitation Agencies(CASA), said that four San Francisco Plants estimate their total implementation costs to be $160 million annually.

* Charles Batts of Bay Area Dischargers Authority (BADA) estimated five BADA POTWs costs to be $12 million per year to meet the strict limit on copper and $56 million per year to meet the organics limit.

* The Regional Water Quality Control Board testified that San Francisco discharges twenty percent of the four percent discharged into the San Francisco Bay by POTWS, noting that POTWs are only a minor part of the volume discharged into the Bay. Thus, the reduction to the prescribed limits would cause a negligible decrease in the total mass of pollutants discharged.

* The City of Sacramento projects a $200 million annual cost will be required to meet the copper limit.

All of the testimony at the hearing echoed these concerns. I am sure that you have access to a transcript. The Clean Water Act has been and is instrumental in cleaning up our rivers, lakes, bay and estuaries. We can continue on this steady path by setting gradual attainable limits and through increased public education. Limits on pollutants should continue to get stricter, but this has to occur on a gradual curve that will not place an unreasonable burden on the individual taxpayer.

Response to: CTR-107-002b

See response to CTR-107-002a.

Comment ID: CTR-109-004
Comment Author: Maggie Miller
Document Type: Citizen
State of Origin: CA
Represented Org:
Document Date: 12/01/97
Subject Matter Code: G-02 Compliance Schedules
References:
Attachments? N
CROSS REFERENCES

Comment: Fourth, the proposed new rule also contemplates "compliance schedules" could postpone up to ten years compliance with the proposed new rule.

Response to: CTR-109-004

See response to CTR-002-010b.

Comment ID: CTR-110-003
Comment Author: Judith A. Brown
Document Type: Citizen
State of Origin: CA
Represented Org:
Document Date: 12/02/97
Subject Matter Code: G-02 Compliance Schedules
References:
Attachments? N
CROSS REFERENCES

Comment: Also, anti-pollutant compliance schedules need to be immediate and continuing, not ten years from now.

Response to: CTR-110-003

See response to CTR-002-010b.

Comment ID: CTRH-001-011
Comment Author: Greg Karras
Document Type: Public Hearing
State of Origin: CA
Represented Org: Comm. for Better Environ.
Document Date: 09/17/97
Subject Matter Code: G-02 Compliance Schedules
References:
Attachments? N

CROSS REFERENCES

Comment: Next, compliance schedule.

EPA appears to be saying that it is only allowing state authorities to decide whether to put compliance schedules in permits which grant permission to pollute over the established criteria for up to 10 years.

However, we know that when the Unocal refinery here sued and paid the state authorities for permission to dump excess selenium for five years, EPA joined CBE, the City of San Francisco, the City of Richmond and others in court to support the public's right to protect our bay and protect our health.

Our question here is, has EPA waffled in its commitment to support our rights to be involved in a meaningful way in enforcement of water quality standards to protect our health?

Response to: CTRH-001-011

See response to CTR-002-010b.

Comment ID: CTRH-001-024a
Comment Author: Michelle Pla
Document Type: Public Hearing
State of Origin: CA
Represented Org: S.F. Public Utilities Com
Document Date: 09/17/97
Subject Matter Code: G-02 Compliance Schedules
References:
Attachments? N
CROSS REFERENCES g-05
c-22
c-24a
c-17a

Comment: MS. PLA: My name is Michelle Pla. I'm with the Public Utilities Commission, City and County of San Francisco.

I made the comment on my card that I also said that I would try to be constructive, and so I'm going to follow my mentor here, Phil Bobel, and say that there are some things in this rule that we're very pleased to see.

We're very pleased to see use of the latest scientific information, particularly the use of latest IRIS, I-R-I-S, numbers-for human health. We're very pleased that you're using dissolved versus total recoverable form for the metals.

We're very pleased to see recognition of the water effects ratios. We're pleased to see recognition for a multi-tiered mixing zone for acute and chronic human health effects and hope that the state pays particular attention to that.

We do have a problem with the way you've described compliance schedules and hope to be working strictly by the state on that as well. We think that the five-year system is fairly shortsighted, and -we can't even do FMDSLs in five years.

Response to: CTRH-001-024a

See response to CTR-027-008b.

Comment ID: CTRH-001-039c
Comment Author: Robert Reid
Document Type: Public Hearing
State of Origin: CA
Represented Org: CASA
Document Date: 09/17/97
Subject Matter Code: G-02 Compliance Schedules
References:
Attachments? N
CROSS REFERENCES C-24a
G-04

Comment: I've been saving the good news for last.

Fourth, and by no means last in priority for CASA, we wish to register our support for several parts of the preamble to the CTR.

We support application of interim limits in NPDES permits while TMDLs and other special studies are being performed.

We also support EPA's approach to water effects ratios for determining site-specific criteria.

We also support the inclusion of a provision allowing the compliance schedules in permits in the rule, although we recommend that it be modified to allow the regional boards to include compliance schedules of up to 15 years in permits, if they deem it appropriate.

Thank you for the opportunity to present our views. As I said earlier, we will be submitting detailed comments on the proposed rule by the end of the comment period, which hopefully will be extended in response to our and others' requests.

Response to: CTRH-001-039c

See response to CTR-027-008b.

Comment ID: CTRH-001-052
Comment Author: Michael Lozeau
Document Type: Public Hearing
State of Origin: CA
Represented Org: S.F. Bay/Delta Keeper

Document Date: 09/17/97
Subject Matter Code: G-02 Compliance Schedules
References:
Attachments? N
CROSS REFERENCES

Comment: The compliance schedules, I would definitely question the need. There was a question reflected earlier, whether we need compliance schedules authorized by this federal rule.

It seems to me that EPA is trying to fix an absence of criteria. We have been waiting a long time for these criteria. They were supposed to be in place in -- it was '93, I think. The deadline, technically speaking, is about four years behind, and will probably be five by the time it's done.

To have another ten years before we actually see any results is a little frustrating, so I for one don't think compliance schedules, whether the agencies, for better or worse -- and with some help from the dischargers, they have not been able to issue the criteria required by federal law. And I guess the uncertainty of that delay should go to the benefit of the bay and all the waters of the state. So on compliance schedules, I think at this point they are a little bit too late, especially in the standards.

That's not to say in particular instances that the individual boards can't figure out ways of using enforcement authority to devise rational schedules where people for whatever reason have not been able to adjust the facilities to meet new standards.

But in the standards themselves, I think history shows that is not something that's going to cripple the various industries and dischargers, that it can be adjusted through enforcement processes.

Response to: CTRH-001-052

See response to CTR-002-010b.

Comment ID: CTRH-002-011a
Comment Author: Lisa Ohlund
Document Type: Public Hearing
State of Origin: CA
Represented Org: Alliance of So. CA POTWs
Document Date: 09/18/97
Subject Matter Code: G-02 Compliance Schedules
References:
Attachments? N
CROSS REFERENCES G-04
C-22
K-01

Comment: Now, I'd briefly like to touch on several issues of importance to SCAP members. In addition, we will be submitting written comments before the close of the public comment period.

I'd like to begin by mentioning our support for several provisions included in the draft CTR, and those include the provision authorizing the use of compliance schedules -- although we don't necessarily agree

with the time period -- the expression of metals criteria as dissolved rather than totally recoverable, and discussion in the preamble supporting the use of interim limits in permits, while the total maximum daily loads and other special studies are being performed.

Response to: CTRH-002-011a

See response to CTR-027-008b.

Comment ID: CTRH-002-014
Comment Author: Lisa Ohlund
Document Type: Public Hearing
State of Origin: CA
Represented Org: Alliance of So. CA POTWs
Document Date: 09/18/97
Subject Matter Code: G-02 Compliance Schedules
References:
Attachments? N
CROSS REFERENCES

Comment: And on compliance schedule time frames, we'd like to see that those are consistent with the State's proposal.

Response to: CTRH-002-014

See response to CTR-015-006.

Subject Matter Code: G-03 Design/Minimum Flows

Comment ID: CTR-003-004
Comment Author: City of Riverside
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/22/97
Subject Matter Code: G-03 Design/Minimum Flows
References:
Attachments? N
CROSS REFERENCES

Comment: 4) The use of the "harmonic mean flow" adds yet another level of conservatism to the standard setting process. As the response to the toxin is assumed linear with respect to concentration and additive over time, the use of this statistic seems inappropriate and overprotective.

Response to: CTR-003-004

EPA disagrees that the use of the harmonic mean flow is inappropriate and overprotective. Carcinogens, unlike non-carcinogens, do not have a threshold concentration where effects are only observed above certain concentrations. Exposure to carcinogens is best estimated by determining lifetime average exposure because carcinogens, as illustrated by the supporting toxicity data in the criteria documents, show a linear relationship of dose versus response. In other words, as exposure increases over time, a greater incidence of effects are observed. This means that exposure is cumulative over time. The human health criteria for carcinogens are based on the assumption of average exposure over a seventy year period (life expectancy assumption). The harmonic mean is the running average of all the flow data on record for a particular stream. EPA believes that averaging the entire flow record best approximates lifetime exposure. Thus, the Agency recommends the harmonic mean flow for determining long term exposure estimates when using steady-state modeling. EPA also notes that the final CTR does allow alternative flows to be used where supported by data and approved by EPA after EPA publishes for public comment a notice proposing such a change (40 CFR 131.38(d)(1)(iv)) . Appropriate dynamic modeling is one such alternative that EPA would approve. The final CTR maintains the harmonic mean flow as the design flow for human health criteria for carcinogens. EPA also notes the commentor did not provide an alternative to the harmonic mean flow.

Further discussion on the basis for the harmonic mean flow is contained in the Technical Support Document for Water Quality-based Toxics Control (section 4.6 and Appendix D) and in "Design Stream Flows Based on Harmonic Means," Lewis A. Rossman, Jr. of Hydraulic Engineering, Vol. 116, No. 7, July 1990.

Comment ID: CTR-020-016
Comment Author: City of Stockton
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/24/97
Subject Matter Code: G-03 Design/Minimum Flows

References:
Attachments? Y
CROSS REFERENCES

Comment: II. Use of New Scientific Information

The City acknowledges and supports EPA's update of several water quality criteria including those for mercury, cadmium and arsenic. While a number of criteria were updated to reflect current scientific information, there are a few notable exceptions.

The following briefly addresses the key updates and omissions that should be addressed in the final publication of this rule.

5. Application of Criteria at Return Flows

The rule specifies that the criteria should be applied under various design flows that properly represent the acceptable exposures that may occur in the environment. Consistent with the National Guidelines, EPA recognized that it is inappropriate and unnecessary to apply the criteria in a "never to exceed" manner. Clearly, the information underlying the selection of the return frequency of once in three years, which was conservatively derived, demonstrates that periodic exceedance of the criteria is acceptable. However, in the rule, EPA states that these flows should only be used if the Regional Board has expressly determined that water quality criteria apply only above certain flows. Absent such a statement from the Regional Board, the criteria apply at all flows and no exceedance, no matter how minor, would be allowed. This provision (which will clearly lead to overly stringent application of criteria) is arbitrary and capricious.

If EPA is to adopt criteria and implementation procedures in place of state action, that regulatory package must be complete and appropriate considering the regulation as a whole. EPA is well aware that few Regional Boards have established specific return flows because the issue is addressed on a case-by-case basis. Moreover, as no specific flow is set to apply to wet weather events, the CTR would lead to the absurd conclusion that storm waters, prior to mixing with any surface waters, must comply with stringent water quality criteria.

EPA may not knowingly establish procedures that will lead to unnecessarily restrictive application of the criteria unrelated to actual use protection needs. The final rule should specify the criteria will only be applied to flows exceeding the design stream flows specified in the rule.

Response to: CTR-020-016

EPA disagrees that the low flow provisions in this rule are arbitrary and capricious. EPA notes that under the Water Quality Standards Regulation (see 40 CFR 131.13), States may adopt discretionary policies that affect the implementation of their water quality standards. Such policies may include the establishment of low flow provisions and are subject to EPA review and approval. However, where a State has not specified low flow provisions and has determined that the application of the criteria at all flows is appropriate State policy, EPA will defer to the State's expressed policy. This approach is consistent with Section 510 of the Clean Water Act which preserves State authority to adopt provisions for its waters that are more stringent than required by EPA.

Furthermore, EPA disagrees with the commenter's assertion that if a State's criteria apply at all flows, the

criteria could never be exceeded. EPA's aquatic life criteria are based on three interrelated components which include magnitude, duration, and frequency. EPA's longstanding position is that the criteria may not be exceeded more than once every three years on the average. This recurrence frequency takes into consideration the rates of ecological recovery from severe environmental stresses. Further discussions on this issue is contained in EPA's Technical Support Document for Water Quality-based Toxics Control (Chapter 2 and Appendix D).

Comment ID: CTR-027-005a
Comment Author: California SWQTF
Document Type: Storm Water Auth.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: G-03 Design/Minimum Flows
References: Letter CTR-027 incorporates by reference letters CTR-001, CTR-036 and CTR-040
Attachments? N
CROSS REFERENCES T

Comment: 5. The proposed rule restricts the State's regulatory flexibility in permitting by establishing averaging periods and low flow conditions, and directives regarding establishing effluent limits for criteria not being adopted as part of the CTR. USEPA has preempted the State's flexibility by establishing averaging periods for applying acute and chronic aquatic life and human health criteria, and by establishing low flow conditions that must be used in developing limits based on proposed criteria. These are implementation issues that should remain with the State regulatory authority.

Recommendation: The rule should be revised to delete all provisions that preempt the State's regulatory flexibility.

Response to: CTR-027-005a

EPA disagrees that the flow provisions contained in the final rule will limit State flexibility.

First, EPA notes that the State of California may develop alternative design flows for its waters provided that those alternative flows are scientifically defensible and protective of the designated uses of State waters. Such alternative flows will be subject to EPA review, approval, and public comment. However where the State has not adopted low flow provisions, the design flows specified in today's rule shall be implemented to ensure that the criteria will be implemented appropriately to provide environmental and human health protection.

As noted in the preamble of today's rule, EPA's Technical Support Document for Water Quality-based Toxics Control (the TSD) also recommends the use of dynamic models to perform wasteload allocations. EPA is clarifying that today's rule provides the State of California with the flexibility to utilize dynamic models to implement the federal criteria. The dynamic modeling techniques, as outlined in the TSD, will allow enable the determination of wasteload allocations that will meet the criteria in today's rule.

Comment ID: CTR-035-029
Comment Author: Tri-TAC/CASA

Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: G-03 Design/Minimum Flows
References:
Attachments? N
CROSS REFERENCES

Comment: pp. 42182-42183 -- Low Flow Values for Streams and Rivers We recommend that EPA not adopt the design flow values (e.g. 1Q10 or 1B3 for aquatic life acute criteria) for the CTR criteria. The values specified are not always appropriate. For instance, EPA proposes that the harmonic mean flow be applied with human health criteria for carcinogens. In contrast, EPA's Technical Support Document (U.S. EPA, 1991) states:

"However, for situations involving seasonally variable effluent discharge rates, hold-and-release treatment systems, and effluent-dominated sites, the harmonic mean may not be appropriate, In these cases, the effluent load and downstream flow are not independent (i.e., they are correlated). Modeling techniques can calculate an average daily concentration over a long period of time are more appropriate to determine the long-term exposure in these cases." Therefore, we recommend that EPA include these values in the Preamble as guidance instead of in the rule itself.

Response to: CTR-035-029

EPA agrees that the low flow values specified in the rule may not be appropriate in all instances as noted in the Agency's Technical Support Document for Water Quality-based Toxics Control (the TSD). Furthermore, EPA noted in the proposed rule (see section 131.38(c)(2)(ii)) that the low flows would apply in waters suitable for the establishment of low flow return frequencies such as free flowing streams and rivers. However, in general, EPA supports these flows as being appropriate in a majority of situations. Additionally, as noted in the preamble of today's rule, EPA is clarifying that today's rule provides the State of California with the flexibility to utilize dynamic modeling (as an alternative to steady state modeling) in implementing the criteria contained in today's rule. Therefore, EPA will retain the design flows as proposed, as these flows will ensure adequate implementation of the criteria included in today's rule in cases where the State does not have design flows in place or where the State does not utilize dynamic modeling.

Comment ID: CTR-036-007b
Comment Author: County of Orange
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: G-03 Design/Minimum Flows
References: Letter CTR-036 incorporates by reference letters CTR-013, CTR-018, CTR-031, CTR-034 and CTR-040
Attachments? N
CROSS REFERENCES C-26

Comment: We are concerned that EPA has preempted the State's flexibility by establishing averaging periods for applying acute and chronic aquatic life criteria and for establishing low flow conditions that must be used in developing limits based on the proposed criteria. We recommend that such implementation issues remain within State authority.

Response to: CTR-036-007b

See response to CTR-027-005a.

Comment ID: CTR-037-005
Comment Author: Hampton Roads Sanitation Dist.
Document Type: Sewer Authority
State of Origin: VA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: G-03 Design/Minimum Flows
References:
Attachments? N
CROSS REFERENCES

Comment: 5. EPA is requiring, by rule, that 1Q10 and 7Q10 receiving water flows be developed to implement acute and chronic water quality standards. This will therefore eliminate any flexibility that the State wishes to use when calculating reasonable potential to exceed standards and water quality-based limits. This will also limit permittees as to the approaches that can be used when modeling mixing zones. The use of 1Q10 and 7Q10 values is arbitrary and is not related in any way to how water quality criteria are developed or protection of the environment. These statistics were adopted merely because they were already in use by other programs and were therefore easily obtained. Use of these statistics does not recognize unique qualities of California's or any other states's waters, and therefore does not preclude overly stringent regulation. EPA must justify with data why these particular flows are required to implement water quality standards and why designated uses will not be protected if these flows are not used in NPDES permitting.

Response to: CTR-037-005

See response to CTR-027-005a. EPA disagrees that the 1Q10 and 7Q10 values are arbitrary. The hydrological basis for these flows were taken directly from EPA's Technical Support Document for Water Quality-based Toxics Control (See TSD, Appendix D for further information).

Comment ID: CTR-040-018b
Comment Author: County of Sacramento Water Div
Document Type: Storm Water Auth.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: G-03 Design/Minimum Flows
References: Letter CTR-040 incorporates by reference letter CTR-027
Attachments? Y

CROSS REFERENCES C-26; C-30; C-24e

Comment: V. Recommendation: Delete all provisions in the Rule that preempt the States flexibility in permitting. The Rule provides specific direction on the adoption of averaging periods, low flow values, effluent limitations for criteria not being adopted as a part of the Rule, and that the aquatic life criteria be applied to all waters irrespective of designated use, etc..

* The Preamble and the Rule's economic analysis make a point that the State has considerable flexibility in establishing permit limitations. In making, that point, EPA implies that the State may implement the criteria in a manner that would have little or no adverse economic impact on dischargers.

* However, the Rule contains a number of implementation provisions that are not required under Section 303(c)(2)(B), but serve to preempt the State's flexibility. These provisions include, but are not necessarily limited to the adoption of averaging periods and low flow values, directives regarding the establishment of effluent limitations for criteria that are not being adopted as a part of the Rule, and application of the aquatic life criteria to all waters irrespective of the designated use.

* Not only does EPA not have a duty to adopt these provisions, but also the provisions are more restrictive than those required by the CWA or EPA regulations, They clearly restrict the State's flexibility. In fact, other states have adopted, and EPA has approved, implementation provisions (e.g., averaging periods and low flow values) which are less restrictive.

* For these reasons, EPA should remove all such implementation provisions from the Rule.

Response to: CTR-040-018b

See response to CTR-027-005a.

Comment ID: CTRH-001-034c
Comment Author: Dave Brent
Document Type: Public Hearing
State of Origin: CA
Represented Org: CA Water Qual. Task Force
Document Date: 09/17/97
Subject Matter Code: G-03 Design/Minimum Flows
References:
Attachments? N
CROSS REFERENCES I-08; I-05

Comment: Thirdly, I'd like to touch upon implementation of the rule. My understanding is that the state's Inland Surface Waters and Enclosed Bays and Estuaries Plan will address implementation of the CTR. With this in mind, the CTR should serve as an enabling rule and allow the state and the dischargers flexibility in the implementation of objectives contained in the rule.

As I touched upon earlier in my opening remarks, EPA has included some enabling provisions in this rule that we support, such as use and determination of mixing zones and water effects ratios. From the stormwater perspective, we believe other important enabling provisions must be included to allow for regional flexibility in the implementation of our stormwater programs.

For example, enabling provisions should be included to allow flexibility in establishing compliance schedules for stormwater discharges and should allow flexibility for site-specific establishment of low-flow conditions and wet weather standards, and ranges of human health criteria depending on the use of individual receiving waters.

Response to: CTRH-001-034c

See response to CTR-027-005a.

Subject Matter Code: G-04 Interim Limits

Comment ID: CTR-003-005
Comment Author: City of Riverside
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/22/97
Subject Matter Code: G-04 Interim Limits
References:
Attachments? N
CROSS REFERENCES

Comment: 5) The concept of interim permit limits is a worthy one which we hope you retain.

Response to: CTR-003-005

EPA appreciates these comments providing support for EPA's discussion of interim limits in the preamble of the proposed CTR. EPA addressed some implementation issues in the preamble to the proposed rule to illustrate the discretion available to the State in its issuance of permits and effluent limits, however, this implementation issue is outside the scope of the rule. EPA supports the State's consideration of stakeholder Task Force recommendations in developing the State's policy (Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California) regarding interim limits. However, EPA is not recommending any specific method of calculating interim limits because EPA does not intend to limit the State's discretion in implementing the Clean Water Act.

Comment ID: CTR-005-003f
Comment Author: Novato Sanitary District
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/23/97
Subject Matter Code: G-04 Interim Limits
References:
Attachments? Y
CROSS REFERENCES C-22
C-24a
C-01a
G-09
G-05

Comment: 2. The following provisions of the rule are supported: (1) adoption of metals criteria as dissolved concentrations; (2) expression of the metals criteria as a function of the water-effect ratio; (3) adoption of the proposed new human health criterion for mercury; and (4) the Preamble discussions regarding metals translators, mixing zones, and interim permit limits.

Response to: CTR-005-003f

See response to CTR-003-005.

Comment ID: CTR-021-002a
Comment Author: LeBoeuf, Lamb, Green & MacRae
Document Type: Local Government
State of Origin: CA
Represented Org: City of Sunnyvale
Document Date: 09/25/97
Subject Matter Code: G-04 Interim Limits
References: Letter CTR-021 incorporates by reference letter CTR-035
Attachments? Y
CROSS REFERENCES C-24a
C-22
K-01
G-05
G-02

Comment: Sunnyvale is very supportive of many fine concepts advanced in the proposed CTR, and we join with CASA/Tri-TAC in complimenting the Agency on its proposed positions with regard to such matters as: (a) the use of interim effluent limitations in NPDES permits during the pendency of TMDL and other special studies; (b) the allowance of water effects ratios in adjusting the criteria for metals without the necessity for additional rulemaking to establish site-specific objectives; © the use of the dissolved state for the metals criteria; (d) the use of cooperative, intergovernmental, and stakeholder-involved approaches towards the development of TMDLs;(e) the allowance of dilution for both chronic and acute pollutants; and (f) the allowance of compliance schedules in NPDES permits.

Response to: CTR-021-002a

See response to CTR-003-005.

Comment ID: CTR-030-001
Comment Author: Utility Water Act Group
Document Type: Trade Org./Assoc.
State of Origin: DC
Represented Org:
Document Date: 09/25/97
Subject Matter Code: G-04 Interim Limits
References:
Attachments? Y
CROSS REFERENCES

Comment: Comments of the Utility Water Act Group on the Proposed California Water Quality Standards

The Utility Water Act Group (UWAG)(*1) submits these comments on EPA's proposed Water Quality Standards for the State of California, published in the Federal Register on August 5, 1997. (62 Fed. Reg. 42,160) (the California proposal). UWAG is interested in the proposed regulation because: (1) UWAG member companies in California will be directly affected by the proposed changes to the California water quality standards; and (2) many of the issues raised in the proposal have national implications, particularly as they relate to general implementation of the NPDES program.

As detailed in Section I below, UWAG finds many parts of the proposal reasonable and sensible, and endorses EPA's intentions as to those parts. However, as explained in Section 11, the proposal sets forth some propositions that are erroneous or technically deficient, and others that may lead to inappropriate implications or misinterpretations.

I. ISSUES UWAG SUPPORTS

A. UWAG Approves of Interim Permit Limits When a TMDL Study is Incomplete

UWAG agrees with EPA that interim permit limits - where WQBELs have otherwise been justified - are appropriate for pollutants that are the subject of an ongoing TMDL/WLA/LA or other special study. 62 Fed. Reg. at 42,185, col. 2. UWAG also agrees that past performance and future uncertainty are appropriate factors - although not the only possibly relevant factors to consider in determining interim permit limits. UWAG wishes to emphasize, however, that permit writers must not be encouraged to impose any WQBELS, including interim WQBELS, until they have obtained sufficient and reliable data with which to conclude that the discharge has a reasonable potential of causing an excursion of water quality standards. In short, EPA should emphasize in the final rule that interim limitations are not intended to supersede the obligation of a permit writer to perform a reasonable potential determination as a prerequisite to imposing a WQBEL.

(*1) UWAG is an association of 73 individual electric utilities and three national trade associations of electric utilities, the Edison Electric Institute, the National Rural Electric Cooperative Association, and the American Public Power Association. The individual utility companies operate power plants and other facilities that generate, transmit, and distribute electricity to residential, commercial, industrial, and institutional customers. The Edison Electric Institute is the association of the nation's investor-owned electric utilities. The National Rural Electric Cooperative Association is the association of nonprofit electric cooperatives supplying central station service through generation, transmission and distribution of electricity to rural areas of the United States. The American Public Power Association is the national trade association that represents publicly owned electric utilities in the United States. UWAG's purpose is to participate on behalf of its members in EPA's rulemakings under the CWA and in litigation arising from those rulemakings.

Response to: CTR-030-001

EPA agrees that the permit writer must have a reasonable basis to conclude whether the discharger has "reasonable potential" for causing or contributing to an excursion of an objective prior to setting water quality-based effluent limits. EPA addressed some implementation issues in the preamble to the proposed rule to illustrate the discretion available to the State in its issuance of permits and effluent limits, however, this implementation issue is outside the scope of the rule.

Comment ID: CTR-030-004b
Comment Author: Utility Water Act Group
Document Type: Trade Org./Assoc.
State of Origin: DC
Represented Org:
Document Date: 09/25/97
Subject Matter Code: G-04 Interim Limits
References:
Attachments? Y
CROSS REFERENCES G-02
I

Comment: D. EPA's Endorsement of Five-Year Compliance Schedules and Interim Permit Limits for Modifications is Appropriate

UWAG strongly supports EPA's recognition that modifications necessary to comply with new or more stringent effluent limitations may necessitate the use of five-year compliance schedules. 62 Fed. Reg. at 42,187, col. 3. UWAG believes, however, that in certain circumstances a longer compliance schedule may be appropriate. Steam electric facilities that need retrofits to meet water quality-based effluent limits (WQBELS) often require extensive engineering design and testing prior to the actual retrofit. Additionally, nuclear facilities must ensure that any design changes are compatible with Nuclear Regulatory Commission regulations. Therefore, the availability of five-year compliance schedules is certainly well-justified. Further, EPA should consider whether longer compliance schedules should be available, at least in some limited circumstances.

Additionally, UWAG strongly supports EPA's approval of interim permit limits for use in permit modifications. This flexibility will allow dischargers to stay in compliance while necessary process or design changes are carried out.

Response to: CTR-030-004b

See response to CTR-003-005.

Comment ID: CTR-032-002g
Comment Author: Las Gallinas Val. Sanitry Dist
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: G-04 Interim Limits
References: Letter CTR-032 incorporates by reference letter CTR-035
Attachments? N
CROSS REFERENCES G-01
C-22
G-09
C-24a
C-24
K

G-05
G-02

Comment: Regulatory Flexibility and Relief

The District supports EPA's use of "sound science" and current data in developing the proposed criteria in the California Toxics Rule (CTR). The District strongly supports language in the Preamble that references and endorses recommendations of the State Task Forces including use in permitting of:

* reasonable potential analyses * dissolved metals criteria * translators * water effects ratios * site specific objectives * innovative TMDL processes such as effluent trading * performance based interim limits * chronic and acute mixing zones, and * compliance schedules in NPDES permits.

Response to: CTR-032-002g

See response to CTR-003-005.

Comment ID: CTR-034-012a
Comment Author: SCAP
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: G-04 Interim Limits
References: Letter CTR-034 incorporates by reference letter CTR-035
Attachments? N
CROSS REFERENCES K-01

Comment: * SCAP supports EPA's discussion in the Preamble regarding the use of interim permit limits while Total Maximum Daily Loads.(TMDLs) and other special studies are being performed. We strongly urge EPA to support the use of the SWRCB Permitting Task Force's recommended approach for deriving interim permit limits.

Response to: CTR-034-012a

See response to CTR-003-005.

Comment ID: CTR-035-002e
Comment Author: Tri-TAC/CASA
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: G-04 Interim Limits
References:
Attachments? N

CROSS REFERENCES C-22
C-01a
C-08a
G-05
G-09
K-01
C-24a

Comment: Second, we commend EPA for its inclusion in the CTR of several innovative and flexible regulatory approaches, such as metals criteria expressed as dissolved rather than total recoverable concentrations, and the revised human health criterion for mercury. In addition, in light of the issues surrounding the human health criteria for arsenic we support EPA's decision not to promulgate human health criteria at this time. With respect to implementation issues discussed in the Preamble, we support EPA's policies and guidance regarding the application of mixing zones and dilution credits. the use of interim permit limits while Total Maximum Daily Loads (TMDLs) and other special studies are being performed, and EPA's guidance to Regional Water Quality Control Boards (RWQCBs) that they may use any of the methods described in EPA's guidance document on the use of translators. We also support EPA's proposal to create a rebuttable presumption for Water Effects Ratios (WERs), allowing the RWQCBs and SWRCB to develop site-specific WERs that can be approved by EPA during the NPDES permit approval process. We believe that this approach will help facilitate the development of appropriate site-specific adjustments for metals criteria.

Response to: CTR-035-002e

See response to CTR-003-005.

Comment ID: CTR-035-033
Comment Author: Tri-TAC/CASA
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: G-04 Interim Limits
References:
Attachments? N
CROSS REFERENCES

Comment: p. 42185 -- Interim Limits We support the inclusion of the provision in the Preamble which supports the use of interim limits in NPDES permits while TMDLs and other special studies are being performed. We endorse the recommendation of the Permitting and Compliance Issues Task Force that interim effluent limits be calculated based on past performance plus future uncertainty (SWRCB 1995, Part VI). While recognizing that the State has discretion in determining how effluent limits are calculated, we recommend that EPA strengthen its statement of support for this approach by recommending its use to State permitting authorities.

Response to: CTR-035-033

See response to CTR-003-005.

Comment ID: CTR-038-002d
Comment Author: Sonoma County Water Agency
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: G-04 Interim Limits
References:
Attachments? Y
CROSS REFERENCES C-22
C-24a
C-01a
G-05
G-09

Comment: 2. The following provisions of the rule are supported (1) adoption of metals criteria as dissolved concentrations; (2) expression of the metals criteria as a function of the water-effect ratio; (3) adoption of the proposed new human health criterion for mercury; and (4) the Preamble discussions regarding metals translators, mixing zones, and interim permit limits.

Response to: CTR-038-002d

See response to CTR-003-005.

Comment ID: CTR-039-008
Comment Author: San Francisco BayKeeper
Document Type: Environmental Group
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: G-04 Interim Limits
References:
Attachments? N
CROSS REFERENCES

Comment: VI. EPA'S SUGGESTION THAT "INTERIM PERMIT LIMITS" MAY BE ACCEPTABLE IS WITHOUT AUTHORITY IN THE LAW

EPA refers to a suggestion of the State's Permitting Task Force that performance-based interim permit limits may be appropriate where a TMDL/WLA/LA is underway but not yet completed. 62 Fed. Reg. at 42185. This innovative concept has one fatal flaw --- there is no authority for such limits in the Clean Water Act. Indeed, the notion of an interim limit is inconsistent with other important features of the Act.

First, by definition, an effluent limitation must be designed to meet all applicable water quality standards. Interim limits, by definition, would not be designed to assure compliance with standards. Where a

TMDL is underway and presumably pertinent to a Proposed "interim" limit, the waterbody by definition is not meeting an applicable standard. An interim limit, by definition, is deferring the limit which would be required of the particular discharger to meet that standard.

Second, interim limits are a veiled attempt to sidestep the regulatory restrictions placed on compliance schedules. Where authorized, compliance schedules are limited to 5 years and must include interim steps if they are longer than one year. "Interim" limits is simply a way of creating a compliance schedule without the appropriate label. As a result, the proposal appears to contemplate potentially open-ended schedules with none of the limited safeguards provided by compliance schedules. In other words, an interim limit is nothing but an illegal compliance schedule. When included in conjunction with a compliance schedule, as set forth in another section of the proposed rule, BayKeeper is not concerned with the notion of an interim effluent limit (albeit, as noted above, neither is appropriate for inclusion in this proposed rule). 62 Fed. reg. 42208.

Third, the need for interim limits in order to wait for unfinished TMDLs is an extremely flimsy policy reason for creating a new genre of permit limits. Section 303(d), 33 U.S.C. section 1313(d) has required TMDLS for well over a decade. States, including California, as well as EPA simply have refused to comply with that legal obligation. Simply because the agencies have chosen to ignore Congress' mandate is not a valid reason for EPA or the State of California to undermine other sections of the Act, such as the process for establishing effluent limits and compliance schedules.

The reference to interim limits while waiting for TMDLs included in the preamble should be stricken. Should the State choose to authorize compliance schedules, that should be the only process by which a discharger can defer compliance with a water quality-based effluent limit. There is no reason that a schedule of a couple of years but not greater than 5 years would not be ample time to complete a required TMDL process.

Response to: CTR-039-008

EPA disagrees that there is no authority for interim limits in the Clean Water Act.

See response to CTR-002-010b (Category G-02; Compliance Schedules).

Comment ID: CTR-041-006a
Comment Author: Sacramento Reg Cnty Sanit Dist
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: G-04 Interim Limits
References:
Attachments? N
CROSS REFERENCES G-05

Comment: Fifth, the District supports the preamble discussion on both interim permit limits and mixing zones as valid implementation procedures. In addition, however, the District specifically endorses the State's Permitting Task Force recommendations on these two subjects: (1) that interim effluent limits be

calculated based on past performance plus future uncertainty, and (2) that the State Water Resources Control Board (SWRCB) should allow the establishment of both acute and chronic mixing zones.

Response to: CTR-041-006a

See response to CTR-003-005.

Comment ID: CTR-043-002d
Comment Author: City of Vacaville
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: G-04 Interim Limits
References:
Attachments? Y
CROSS REFERENCES C-22
C-24a
G-01a
G-05
G-09

Comment: 2. The following provisions of the rule are supported: (1) adoption of metals criteria as dissolved concentrations; (2) expression of the metals criteria as a function of the water-effect ratio; (3) adoption of the proposed new human health criterion for mercury; and (4) the Preamble discussions regarding metals, translators, mixing zones and interim permit limits.

Response to: CTR-043-002d

See response to CTR-003-005.

Comment ID: CTR-044-003f
Comment Author: City of Woodland
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: G-04 Interim Limits
References:
Attachments? Y
CROSS REFERENCES C-22
C-24a
C-01a
G-09
G-05

Comment: We have reviewed the proposed CTR and offer the following comments:

2. The following provisions of the rule are supported:

(1) adoption of metals criteria as dissolved concentrations;

(2) expression of the metals criteria as a function of the water-effect ratio;

(3) adoption of the proposed new human health criteria for mercury; and

(4) the Preamble discussions regarding metals translators, mixing zones, and interim permit limits.

Were the old human health criterion for mercury (0.012 ug/ l) to be adopted, the City would have to remove its discharge from Tule Canal and go to land disposal. The capital cost to do this would be $22.1 million and the total present worth cost would be $23.1 million (see Exhibit B, Required Capital improvements and Costs for Beryllium and Mercury). This would translate to an annual cost of $3.1 million per year (at 7% over 10 years) and would require that monthly sewer service charges be increased by more than 100%.

Response to: CTR-044-003f

See response to CTR-003-005.

With respect to the comment about the economic impact of the old criterion for mercury 0.012 ug/l, EPA has not evaluated these costs since the CTR does not promulgate a mercury criteria of 0.012 ug/l.

Comment ID: CTR-045-002
Comment Author: Sausalito-Marin Sanitary Dist.
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/24/97
Subject Matter Code: G-04 Interim Limits
References:
Attachments? Y
CROSS REFERENCES

Comment: The District supports many of the items included in the proposed CTR:

The application of interim limits in NPDES permits while Total Daily Maximum Loads (TMDLS) and other special studies are being performed.

Response to: CTR-045-002

See response to CTR-003-005.

Comment ID: CTR-052-002e

Comment Author: East Bay Dischargers Authority
Document Type: Sewer Authority
State of Origin: SC
Represented Org:
Document Date: 09/26/97
Subject Matter Code: G-04 Interim Limits
References: Letter CTR-052 incorporates by reference letters CTR-035 and CTR-054
Attachments? Y
CROSS REFERENCES C-22
C-01a
G-09
G-05

Comment: EPA will recall the State Water Quality Plans Task Forces that included all stakeholders, including EPA. The Authority appreciates the incorporation of many of the consensus recommendations from the Task Forces into the CTR, including:

* Adoption of the metals criteria as dissolved concentrations and the expression of the criteria as a function of the water-effect ratio

* Adoption of the proposed new human health criterion for mercury

* Preamble discussions regarding metals translators, mixing zones, and interim permit limits

Response to: CTR-052-002e

See response to CTR-003-005.

Comment ID: CTR-054-004c
Comment Author: Bay Area Dischargers Assoc.
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: G-04 Interim Limits
References:
Attachments? Y
CROSS REFERENCES G-09
G-05

Comment: BADA supports the Preamble discussions regarding metals translators, mixing zones, and interim permit limits. Translators and mixing zones will provide a better scientific basis for the application of the criteria and will go a long way toward protecting against the imposition of unnecessary or unreasonable controls. Interim permit limits will allow dischargers faced with potential attainability problems to pursue reasonable actions, such as pollution prevention, treatment plant optimization, pollutant trading, TMDLS, etc. prior to being faced with final effluent limitations. BADA endorses the recommendation of the State Plan Public Task Forces on the issue of interim limits.

Response to: CTR-054-004c

See response to CTR-003-005.

Comment ID: CTR-056-002
Comment Author: East Bay Municipal Util. Dist.
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/22/97
Subject Matter Code: G-04 Interim Limits
References: Letter CTR-056 incorporates by reference letter CTR-054
Attachments? N
CROSS REFERENCES

Comment: Second, EBMUD would like to express to EPA it support for inclusion of:

* The application of interim limits in NPDES permits while establishing TMDLs or conducting other special studies,

Response to: CTR-056-002

See response to CTR-003-005.

Comment ID: CTR-059-012
Comment Author: Los Angeles County Sanit. Dist
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: G-04 Interim Limits
References: Letter CTR-059 incorporates by reference letter CTR-035
Attachments? Y
CROSS REFERENCES

Comment: Interim Permit Limits

The Sanitation Districts applaud EPA on the inclusion of the provision in the Preamble which supports the use of interim limits in NPDES permits while TMDLs and other special studies are being performed. We endorse the recommendation of the SWRCB Permitting and Compliance Issues Task Force that interim effluent limits be calculated based on past performance plus future uncertainty.

Response to: CTR-059-012

See response to CTR-003-005.

Comment ID: CTR-060-001
Comment Author: San Diego Gas and Electric
Document Type: Electric Utility
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: G-04 Interim Limits
References:
Attachments? N
CROSS REFERENCES

Comment: PROVISIONS SDG&E SUPPORTS

EPA has included in the proposed CTR provisions which are reasonable and with which SDG&E supports. These include:

Interim limits

The preamble discusses the use of interim numeric limits during the time which TMDL/WLA/LA or other special studies are underway but not completed (see 62 Fed. Reg. at 42185, Col. 2). SDG&E agrees that interim limits are appropriate and supports their use. Also, interim limits should be set such that existing discharges can maintain compliance during the interim period.

Response to: CTR-060-001

See response to CTR-003-005.

Comment ID: CTR-066-002
Comment Author: Delta Diablo Sanitation Dist.
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: G-04 Interim Limits
References:
Attachments? N
CROSS REFERENCES

Comment: Our preliminary review of the CTR finds several areas that we believe are positive changes and will enhance the rulemaking. The areas that we support as now written are as follows:

* The application of interim limits in NPDES permits while TMDLs and the other special studies that are scientifically supported are being performed.

Response to: CTR-066-002

See response to CTR-003-005.

Comment ID: CTR-081-002a
Comment Author: West County Agency
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: G-04 Interim Limits
References:
Attachments? N
CROSS REFERENCES C-24a
G-02
C-22
G-09
C-01a
C-08a
G-05

Comment: * There are many aspects of the CTR that we support. These include: a) Application of interim limits while special studies are performed. b) Approach to water effect ratios for determining site specific criteria. c) Inclusion of provision for compliance schedules. However, this should be modified to allow inclusion of compliance schedules of up to 15 years in permits if deemed appropriate by Regional Boards. d) Metals criteria expressed as dissolved rather than total recoverable concentrations. e) EPA's guidance to Regional Boards regarding use of translators. f) EPA's proposal to create a rebuttal presumption for Water Effects Ratios, g) Revised human health criteria for mercury h) Decision to not promulgate human health criteria at this time in light of issues surrounding health criteria for arsenic. I) EPA's policies regarding application of mixing zones and dilution credits.

Response to: CTR-081-002a

See response to CTR-003-005.

Comment ID: CTR-085-003
Comment Author: Camarillo Sanitary District
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/24/97
Subject Matter Code: G-04 Interim Limits
References:
Attachments? N
CROSS REFERENCES

Comment: On several aspects of the California Toxics Rule, the District is in agreement with CASA and SCAP comments:

* The application of interim limits in NPDES permits while Total Maximum Daily Loads (TMDL) and other special studies are being performed.

Response to: CTR-085-003

See response to CTR-003-005.

Comment ID: CTR-085-012
Comment Author: Camarillo Sanitary District
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/24/97
Subject Matter Code: G-04 Interim Limits
References:
Attachments? N
CROSS REFERENCES

Comment: On several aspects of the California Toxics Rule, the District is in agreement with CASA and SCAP comments:

* The use of interim permit limits with Total Maximum Daily Loads and other special studies are being performed.

Response to: CTR-085-012

See response to CTR-003-005.

Comment ID: CTR-086-004g
Comment Author: EOA, Inc.
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org: California Dent
Document Date: 09/26/97
Subject Matter Code: G-04 Interim Limits
References: Letter CTR-086 incorporates by reference letter CTR-035
Attachments? N
CROSS REFERENCES G-01
C-22
G-09
C-24a
C-24
K-03
G-05
G-02

Comment: Regulatory Flexibility and Relief

CDA supports language in the CTR Preamble that references and endorses recommendations of the State Task Forces including in part the use of.

* reasonable potential analyses * dissolved metals criteria * translators * water effects ratios * site specific objectives * innovative TMDL processes such as effluent trading * performance based interim limits * chronic and acute mixing zones, and * compliance schedules in NPDES permits.

Response to: CTR-086-004g

See response to CTR-003-005.

Comment ID: CTR-090-002f
Comment Author: C&C of SF, Public Utl. Commis.
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: G-04 Interim Limits
References: Letter CTR-090 incorporates by reference letters CTR-035 and CTR-054
Attachments? Y
CROSS REFERENCES C-17a
C-24a
C-22
G-05
G-02

Comment: There are many features of the proposed rule which we strongly endorse, specifically:

* the use of the latest IRIS values for human health criteria, it is essential that the criteria be based on the latest scientific and environmental information;

* recognition that the dissolved fraction of metals, rather than the total recoverable, better reflect the aquatic toxicity of metals;

* recognition that for certain metals (e.g. copper and zinc) ambient water chemistry is critical in determining toxicity thereby endorsing the Water Effects Ratio;

* recognition and strong endorsement of the multi-tiered mixing zones for acute, chronic and human health effects; and

* recognition of interim limits and compliance schedules as appropriate implementation strategies,

Response to: CTR-090-002f

See response to CTR-003-005.

Comment ID: CTR-092-006
Comment Author: City of San Jose, California
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: G-04 Interim Limits
References: Letter CTR-092 incorporates by reference letter CTR-035
Attachments? Y
CROSS REFERENCES

Comment: Interim Limits

The City supports the concept of interim numeric permit limits when a TMD or other special investigation is underway but not yet completed. The City supports the discussion of factors applicable to the derivation of interim numeric permit limits, specifically past treatment performances, future uncertainty, receiving water body attainment and water quality. The City further encourages flexibility and innovation as illustrated by the concept of effluent "trigger concentrations".

Response to: CTR-092-006

See response to CTR-003-005.

Comment ID: CTRH-001-039b
Comment Author: Robert Reid
Document Type: Public Hearing
State of Origin: CA
Represented Org: CASA
Document Date: 09/17/97
Subject Matter Code: G-04 Interim Limits
References:
Attachments? N
CROSS REFERENCES C-24a
G-02

Comment: I've been saving the good news for last.

Fourth, and by no means last in priority for CASA, we wish to register our support for several parts of the preamble to the CTR.

We support application of interim limits in NPDES permits while TMDLs and other special studies are being performed.

We also support EPA's approach to water effects ratios for determining site-specific criteria.

We also support the inclusion of a provision allowing the compliance schedules in permits in the rule,

although we recommend that it be modified to allow the regional boards to include compliance schedules of up to 15 years in permits, if they deem it appropriate.

Thank you for the opportunity to present our views. As I said earlier, we will be submitting detailed comments on the proposed rule by the end of the comment period, which hopefully will be extended in response to our and others' requests.

Response to: CTRH-001-039b

See response to CTR-003-005.

Comment ID: CTRH-001-057c
Comment Author: Dave Tucker
Document Type: Public Hearing
State of Origin: CA
Represented Org: San Jose Env. Serv. Dept.
Document Date: 09/17/97
Subject Matter Code: G-04 Interim Limits
References:
Attachments? N
CROSS REFERENCES K-03
C-24a
G-07
G-09
C-22
G-05

Comment: Some of the flexibility that the City highly supports is the water effect ratio investigations to adjust statewide criteria to site-specific conditions; the interim limits concept while special studies are being conducted by the dischargers and other entities; a variance procedure to allow dischargers to achieve progress toward effluent limit attainment without violating applicable water quality standards; dissolved criteria for metals to reflect the toxicological conditions; translators to adjust dissolved criteria to total permit limitations; trading programs to attain and maintain water quality; and a mixing zone that reflects true instream pollutant conditions and that protects beneficial uses.

Response to: CTRH-001-057c

See response to CTR-003-005.

Comment ID: CTRH-002-011b
Comment Author: Lisa Ohlund
Document Type: Public Hearing
State of Origin: CA
Represented Org: Alliance of So. CA POTWs
Document Date: 09/18/97
Subject Matter Code: G-04 Interim Limits
References:

Attachments? N
CROSS REFERENCES G-02
C-22
K-01

Comment: Now, I'd briefly like to touch on several issues of importance to SCAP members. In addition, we will be submitting written comments before the close of the public comment period.

I'd like to begin by mentioning our support for several provisions included in the draft CTR, and those include the provision authorizing the use of compliance schedules -- although we don't necessarily agree with the time period -- the expression of metals criteria as dissolved rather than totally recoverable, and discussion in the preamble supporting the use of interim limits in permits, while the total maximum daily loads and other special studies are being performed.

Response to: CTRH-002-011b

See response to CTR-003-005.

Subject Matter Code: G-05 Mixing Zones&Dilution Credit

Comment ID: CTR-004-004a
Comment Author: South Bayside System Authority
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/24/97
Subject Matter Code: G-05 Mixing Zones&Dilution Credit
References:
Attachments? N
CROSS REFERENCES C-24a; C-22; C-09

Comment: Despite the problems addressed above there are provisions of the CTR that SBSA supports, including:

* EPA's policies and guidance regarding the use of mixing zones and dilution

* Use of water effects ratios (WERs) for determining site specific criteria

* Inclusion of metals criteria expressed as dissolved rather than total recoverable

* Allowing permit writers the use of any of the methods in EPA's guidance document on the use of translators

Response to: CTR-004-004a

See response to CTR-004-009.

Comment ID: CTR-004-009
Comment Author: South Bayside System Authority
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/24/97
Subject Matter Code: G-05 Mixing Zones&Dilution Credit
References:
Attachments? N
CROSS REFERENCES

Comment: Alternative Mixing Zones

One of the few avenues that may actually provide some regulatory relief is mixing zones. The Preamble to the CTR describes a mixing zone as a limited area or volume of water where initial dilution of a discharge takes place and where water quality standards can be exceeded. Mixing zones have been applied in the water quality standards program since its inception. The present water quality standards regulations allows states to adopt acute and chronic mixing zones as a matter of state discretion, so long

as the state's mixing zone protects the designated uses. See 40 C.F.R. section 131.13.

The Preamble recognizes that several California Regional Water Quality Control Boards have adopted mixing zone provisions in their respective Basin Plans. These mixing zone provisions can be applied to discharges to water bodies to which water quality standards based on the criteria contained in this proposed rule will apply once this mile becomes final. See CTR Preamble at pg. 42185. The problem arises for the proposal or adoption of new mixing zones where one is not currently authorized under an existing Basin Plan. The Preamble sets out numerous restrictions on the use of mixing zones, as follows:

A mixing zone should be established to ensure that the zone will riot impair the integrity of the water body as a whole, the zone will not cause lethality to passing organisms, and, considering- likely pathways of exposure, that there are no significant human health risks. For application of two-number aquatic life criteria, as proposed in this rule, there may be up to two types of mixing zones. In the zone immediately surrounding the outfall, neither the acute nor the chronic criterion is met. The acute criterion is met at the edge of this zone. In the next mixing zone, the acute, but not the chronic, criterion is met, The chronic criterion is met at the edge of the second mixing zone. However, since both aquatic life and human health criteria are proposed in today's rule, the state may establish independent mixing zone policies for each. For any particular pollutant from anyparticular discharge, the magnitude, frequency, duration and mixing zone associated with each of the type of criteria may determine which one most limits the allowable discharge. Id.

The other potential problem arises because state-adopted mixing- zones are subject to EPA review and approval . See 40 C.F.R. section 131.13. Because EPA approval is required, the question arises whether a federal rulemaking would accompany approval of mixing zones as it does with approval of state variances (which are also authorized under 40 C.F.R. section 131.13). If so, this would greatly restrict the utility of new or alternative mixing zones as an avenue for regulatory relief.

(*1) This cost trigger is $200 per toxic pounds-equivalent for a facility under the low-end scenario, and $500 per toxic pounds-equivalent for a category of dischargers under the high-end scenario, See EA at pg. 4.
(*2) In addition, pollutant load I reductions word not calculated or credited for any pollutant for which an alternative regulatory approach was pursued. Id.

Response to: CTR-004-009

Mixing zone and dilution policies and implementation procedures are used by States to establish water quality based discharge limitations that protect the integrity of a waterbody as a whole, but provide permittees a reasonable avenue of relief by allowing ambient concentrations above water quality criteria in small areas near outfalls. EPA is not promulgating a mixing zone and dilution policy for California as part of this rulemaking. This is because EPA maintains that the decision regarding whether to adopt a mixing zones and dilution policy is made at the discretion of the State (see 40 CFR 131.13). While adopting a mixing zone and dilution policy is an area of State discretion, EPA retains authority to review and approve or disapprove policies which affect the application and implementation of water quality standards.

The CTR preamble reiterates existing EPA guidance contained in the Technical Support Document for Water Quality-based Toxics Control (1991) and the Water Quality Standards Handbook (1993) regarding the use of mixing zones and dilution by States. In accordance with this guidance, allowable mixing zone characteristics should be established to ensure that: (1) mixing zones do not impair the integrity of the

water body as a whole; (2) there is no lethality to organisms passing through the mixing zone; and (3) there are no significant health risks, considering likely pathways of exposure. To assist States in establishing appropriate mixing zones and dilution policies and procedures, EPA-Headquarters has periodically issued technical guidance on this topic. National EPA guidance can be found in the Technical Support Document for Water Quality-based Toxics Control (1991), the Water Quality Standards Handbook (1983 and 1993) and Quality Criteria for Water (the "Red Book", 1976). Other sources of information and guidance include Water Quality Criteria 1972 (the "Blue Book", National Academy of Sciences). At minimum, State mixing zone and dilution policies must be consistent with the EPA water quality standards regulation which requires the protection of designated uses. EPA received a majority of comments in support of the mixing zone and dilution discussion in the CTR preamble, which includes a review of the application of mixing zones and dilution in setting allowable discharge limitations based on acute, chronic, and human health criteria using a multi-tiered approach.

As discussed previously, under EPA's water quality standards regulation, States may adopt policies authorizing the use of mixing zones and dilution in setting TMDLs and water quality based effluent limitations (see 40 CFR 131.13). Pursuant to federal regulation, the decision regarding whether to allow mixing zones and dilution is made by individual States (i.e., States may elect to allow or to prohibit mixing zones/dilution for purposes of water quality based permitting). Where a State elects to allow mixing zones and dilution, the State must include an authorizing policy in its water quality standards regulation (e.g., see Water Quality Control Plan for Ocean Waters of California, California Ocean Plan, State Water Resources Control Board, 1997). Where a mixing zone and dilution policy is not sufficiently specific for EPA to adequately evaluate its implementation, the State must also establish procedures to be followed in implementing its mixing zone and dilution policy. Such mixing zone and dilution policies and implementation procedures are subject to EPA review and approval, as new or revised water quality standards (see 40 CFR 131.13). Courts have held that EPA is not required to undertake notice and comment procedures before approving State water quality standards. City ofAlbuquerque v. Browner, 865 F. Supp. 733 (D. N.M. 1993) (The Court noted that EPA is specifically required to provide notice and take comment before issuing federal water quality standards under section 303(b) and held that '[i]f Congress wanted the agency to provide additional notice upon approving state standards, it could have included that language in Section 303(c)(1)," aff'd, 97 F.3d 415, 425, n. 15 (10th Cir. 1996), cert. denied, 1997 US LEXIS 6709 (Nov. 10, 1997). State decisions regarding the application of mixing zones and dilution to specific point source discharges are subject to EPA review through the NPDES permitting process.

EPA will continue to support the State's establishment of technically defensible mixing zone and dilution policies and implementation procedures, consistent with EPA's water quality standards regulations and guidance, and their application in setting TMDLs and water quality based effluent limitations for acute, chronic, and human heath criteria.

Therefore, since EPA will approve reasonable implementation of mixing zones, EPA believes its Economic Analysis properly included mixing zones as one of several areas of potential regulatory relief for dischargers.

Comment ID: CTR-005-003e
Comment Author: Novato Sanitary District
Document Type: Sewer Authority
State of Origin: CA
Represented Org:

Document Date: 09/23/97
Subject Matter Code: G-05 Mixing Zones&Dilution Credit
References:
Attachments? Y
CROSS REFERENCES C-22; C-24a; C-01a; G-09; G-04

Comment: 2. The following provisions of the rule are supported: (1) adoption of metals criteria as dissolved concentrations; (2) expression of the metals criteria as a function of the water-effect ratio; (3) adoption of the proposed new human health criterion for mercury; and (4) the Preamble discussions regarding metals translators, mixing zones, and interim permit limits.

Response to: CTR-005-003e

See response to CTR-004-009.

Comment ID: CTR-015-004
Comment Author: Eastern Municipal Water Dist.
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/23/97
Subject Matter Code: G-05 Mixing Zones&Dilution Credit
References:
Attachments? N
CROSS REFERENCES

Comment: Mixing Zones (FR p.42185, Preamble section F.3.)

Mixing zones are defined by states. At this time, California does not have mixing zones at any state-level plan (Note: they were in the plans that were rescinded). The Agency mentions that several Regional Boards have mixing zone provisions in Basin Plans. The Agency states that it will recognize those provisions as they are applied to the water quality criteria contained in the Rule. Will the Agency recognize mixing zones should other Regional Boards adopt provisions from this time forward, especially if the State Board does not adopt a state-wide mixing zone definition and associated provisions in a timely manner, or at all?

Response to: CTR-015-004

In the absence of a state-wide policy on mixing zones, EPA will recognize any mixing zone provision that has been adopted by the Regional Board within its basin plan consistent with State law and is approved by EPA as consistent with the Clean Water Act.

Comment ID: CTR-020-019
Comment Author: City of Stockton
Document Type: Local Government
State of Origin: CA

Represented Org:
Document Date: 09/24/97
Subject Matter Code: G-05 Mixing Zones&Dilution Credit
References:
Attachments? Y
CROSS REFERENCES

Comment: III. Mixing Zones

The CTR specifies that mixing zones are allowed on a case-by-case basis if authorized by the applicable Basin Plan and approved by the Regional Board for individual permits. In general, the rule should state that consideration of mixing should also apply to storm waters where dilution is certain to exist.

Response to: CTR-020-019

The State has discretion to allow (or deny) mixing zones in ambient waters that would apply to any NPDES discharger including storm water.

Comment ID: CTR-021-002e
Comment Author: LeBoeuf, Lamb, Green & MacRae
Document Type: Local Government
State of Origin: CA
Represented Org: City of Sunnyvale
Document Date: 09/25/97
Subject Matter Code: G-05 Mixing Zones&Dilution Credit
References: Letter CTR-021 incorporates by reference letter CTR-035
Attachments? Y
CROSS REFERENCES G-04; C-24a; C-22; K-01; G-02

Comment: Sunnyvale is very supportive of many fine concepts advanced in the proposed CTR, and we join with CASA/Tri-TAC in complimenting the Agency on its proposed positions with regard to such matters as: (a) the use of interim effluent limitations in NPDES permits during the pendency of TMDL and other special studies; (b) the allowance of water effects ratios in adjusting the criteria for metals without the necessity for additional rulemaking to establish site-specific objectives; (c) the use of the dissolved state for the metals criteria; (d) the use of cooperative, intergovernmental, and stakeholder-involved approaches towards the development of TMDLs;(e) the allowance of dilution for both chronic and acute pollutants; and (f) the allowance of compliance schedules in NPDES permits.

Response to: CTR-021-002e

See response to CTR-004-009.

Comment ID: CTR-027-012e
Comment Author: California SWQTF
Document Type: Storm Water Auth.
State of Origin: CA

Represented Org:
Document Date: 09/25/97
Subject Matter Code: G-05 Mixing Zones&Dilution Credit
References: Letter CTR-027 incorporates by reference letters CTR-001, CTR-036 and CTR-040
Attachments? N
CROSS REFERENCES C-22; C-24; C-01a; G-09

Comment: PROVISIONS OF THE PROPOSED RULE WE SUPPORT

Not withstanding the above comments, we believe there are certain elements of the proposed rule with respect to establishing water quality standards that we can support:

* Metal criteria expressed in the dissolved fraction rather than expressed in the total recoverable fraction.

* Metal criteria that are developed as a function of the water-effect-ratio (WER).

* The current proposed human health criterion for mercury.

* The current preamble language regarding metal translators and mixing zones.

We believe the above provisions provide a more acceptable, scientific approach to the water quality-based pollution control approach. We recommend these provisions of the current rule remain as proposed.

Response to: CTR-027-012e

See response to CTR-004-009.

Comment ID: CTR-032-002h
Comment Author: Las Gallinas Val. Sanitry Dist
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: G-05 Mixing Zones&Dilution Credit
References: Letter CTR-032 incorporates by reference letter CTR-035
Attachments? N
CROSS REFERENCES G-01; C-22; G-09; C-24a; C-24; K; G-04; G-02

Comment: Regulatory Flexibility and Relief

The District supports EPA's use of "sound science" and current data in developing the proposed criteria in the California Toxics Rule (CTR). The District strongly supports language in the Preamble that references and endorses recommendations of the State Task Forces including use in permitting of:

* reasonable potential analyses * dissolved metals criteria * translators * water effects ratios * site specific objectives * innovative TMDL processes such as effluent trading * performance based interim

limits * chronic and acute mixing zones, and * compliance schedules in NPDES permits.

Response to: CTR-032-002h

See response to CTR-004-009.

Comment ID: CTR-035-002d
Comment Author: Tri-TAC/CASA
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: G-05 Mixing Zones&Dilution Credit
References:
Attachments? N
CROSS REFERENCES C-22; C-01a; C-08a; G-04; G-09; K-01; C-24a

Comment: Second, we commend EPA for its inclusion in the CTR of several innovative and flexible regulatory approaches, such as metals criteria expressed as dissolved rather than total recoverable concentrations, and the revised human health criterion for mercury. In addition, in light of the issues surrounding the human health criteria for arsenic we support EPA's decision not to promulgate human health criteria at this time. With respect to implementation issues discussed in the Preamble, we support EPA's policies and guidance regarding the application of mixing zones and dilution credits. the use of interim permit limits while Total Maximum Daily Loads (TMDLs) and other special studies are being performed, and EPA's guidance to Regional Water Quality Control Boards (RWQCBs) that they may use any of the methods described in EPA's guidance document on the use of translators. We also support EPA's proposal to create a rebuttable presumption for Water Effects Ratios (WERs), allowing the RWQCBs and SWRCB to develop site-specific WERs that can be approved by EPA during the NPDES permit approval process. We believe that this approach will help facilitate the development of appropriate site-specific adjustments for metals criteria.

Response to: CTR-035-002d

See response to CTR-004-009.

Comment ID: CTR-035-034
Comment Author: Tri-TAC/CASA
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: G-05 Mixing Zones&Dilution Credit
References:
Attachments? N
CROSS REFERENCES

Comment: p. 42185 -- Mixing Zones We support the inclusion of the discussion in the Preamble which allows mixing zones for acute and chronic criteria. As EPA notes, the Permitting and Compliance Issues Task Force recommended that the SWRCB allow the establishment of both acute and chronic mixing zones. We recommend that EPA support the establishment of technically defensible mixing zones that protect beneficial uses, consistent with EPA's water quality standards regulation.

Response to: CTR-035-034

See response to CTR-004-009.

Comment ID: CTR-038-002e
Comment Author: Sonoma County Water Agency
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: G-05 Mixing Zones&Dilution Credit
References:
Attachments? Y
CROSS REFERENCES C-22; C-24a; C-01a; G-04; G-09

Comment: 2. The following provisions of the rule are supported (1) adoption of metals criteria as dissolved concentrations; (2) expression of the metals criteria as a function of the water-effect ratio; (3) adoption of the proposed new human health criterion for mercury; and (4) the Preamble discussions regarding metals translators, mixing zones, and interim permit limits.

Response to: CTR-038-002e

See response to CTR-004-009.

Comment ID: CTR-040-002d
Comment Author: County of Sacramento Water Div
Document Type: Storm Water Auth.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: G-05 Mixing Zones&Dilution Credit
References: Letter CTR-040 incorporates by reference letter CTR-027
Attachments? Y
CROSS REFERENCES C-24a; C-01a; G-09

Comment: PROVISIONS SUPPORTED

We support a number of provisions of the Rule, including: (1) adoption of metals criteria as dissolved concentrations; (2) expression of the metals criteria as a function of the water-effect ratio; (3) adoption of the proposed new human health criterion for mercury- and (4) the Preamble discussions regarding metals

translators and mixing zones. These provisions provide a firmer scientific base for the water quality-based approach to pollution control and are a marked improvement over the old Inland Surface Waters Plan. We would urge EPA to retain these provisions in the final Rule.

Response to: CTR-040-002d

See response to CTR-004-009.

Comment ID: CTR-040-051
Comment Author: County of Sacramento Water Div
Document Type: Storm Water Auth.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: G-05 Mixing Zones&Dilution Credit
References: Letter CTR-040 incorporates by reference letter CTR-027
Attachments? Y
CROSS REFERENCES

Comment: The Preamble to the California Toxics Rule (CTR), and the rules accompanying Economic Analysis (EA), place a great deal of emphasis on the ability of dischargers to use alternative regulatory approaches to comply with CTR criteria if the cost of treatment technology was prohibitively expensive. For example, the EA assumes that, if the estimated annualized cost for removing a pollutant exceeded a cost trigger,(*1) "dischargers would explore the use of alternative regulatory approaches to comply with CTR-based effluent limits." EA at.pg. 4 (emphasis added). Based on this assumption, no treatment cost was estimated for the facility.(*2)

The types of alternative regulatory approaches assumed available for dischargers in California include phased total maximum daily loads (TMDLs), water quality standard variances, site-specific criteria, change in designated use, and alternative mixing zones. EA at pg. 4-5. The following sections will discuss each of EPA's proposed methods for regulatory relief and explain whether or not these methods can truly be used to provide relief from the CTR-based permit limits as anticipated by EPA. It should be noted that the actual language of the rule itself does not mention any of the methods of regulatory relief. Therefore, this analysis will be based solely upon the language contained in the Preamble to the CTR.

Alternative Mixing Zones

One of the few avenues that may actually provide some regulatory relief is mixing zones. The Preamble to the CTR describes a mixing zone as a limited area or volume of water where initial dilution of a discharge takes place and where water quality standards can be exceeded. Mixing zones have been applied in the water quality standards program since its inception. The present water quality standards regulations allows states to adopt acute and chronic mixing zones as a matter of state discretion, so long as the state's mixing zone protects the designated uses. See 40 C.F.R. section 131.13.

The Preamble recognizes that several California Regional Water Quality Control Boards have adopted mixing zone provisions in their respective Basin Plans. These mixing zone provisions can be applied to discharges to water bodies to which water quality standards based on the criteria contained in this proposed rule will apply once this rule becomes final. See CTR Preamble at pg. 42185. The problem

arises for the proposal or adoption of new mixing zones where one is not currently authorized under an existing Basin Plan. The Preamble sets out numerous restrictions on the use of mixing zones, as follows:

A mixing zone should be established to ensure that the zone will not impair the integrity of the water body as a whole, the zone will not cause lethality to passing organisms, and, considering likely pathways of exposure, that there are no significant human health risks. For application of two-number aquatic life crime as proposed in this rule, there may be up to two types of mixing zones. In the zone immediately surrounding the outfall, neither the acute nor the chronic criterion is met. The acute criterion is met at the edge of this zone. In the next mixing zone, the acute, but not the chronic, criterion is met. The chronic criterion is met at the edge of the second mixing zone. However, since both aquatic life and human health criteria are proposed in today's rule, the State may establish independent mixing zone policies for each. For any particular pollutant from any particular discharge, the magnitude, frequency, duration and mixing zone associated with each of the type of criteria may determine which one most limits the allowable discharge. Id.

The other potential problem arises because state-adopted mixing zones are subject to EPA review and approval, See 40 C.F.R. section 131.13. Because EPA approval is required, the question arises whether a federal rulemaking would accompany approval of mixing zones as it does with approval of state variances (which are also authorized under 40 C.F.R. section 131.13). If so, this would greatly restrict the utility of new or alternative mixing zones as an avenue for regulatory relief.

(*1) This coat trigger is $200 per toxic pounds-equivalent for a facility under the low-end scenario, and $500 per toxic pounds-equivalent for a category of dischargers under the high-end scenario. See EA at pg. 4.
(*2) In addition, pollutant load reductions were not calculated or credited for any pollutant for which an alternative regulatory approach was pursued. Id.

Response to: CTR-040-051

See response to CTR-004-009.

Comment ID: CTR-041-006b
Comment Author: Sacramento Reg Cnty Sanit Dist
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: G-05 Mixing Zones&Dilution Credit
References:
Attachments? N
CROSS REFERENCES G-04

Comment: Fifth, the District supports the preamble discussion on both interim permit limits and mixing zones as valid implementation procedures. In addition, however, the District specifically endorses the State's Permitting Task Force recommendations on these two subjects: (1) that interim effluent limits be calculated based on past performance plus future uncertainty, and (2) that the State Water Resources Control Board (SWRCB) should allow the establishment of both acute and chronic mixing zones.

Response to: CTR-041-006b

See response to CTR-004-009.

Comment ID: CTR-041-047
Comment Author: Sacramento Reg Cnty Sanit Dist
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: G-05 Mixing Zones&Dilution Credit
References:
Attachments? N
CROSS REFERENCES

Comment: The Preamble to the California Toxics Rule (CTR), and the rules accompanying Economic Analysis (EA), place a great deal of emphasis on the ability of dischargers to use alternative regulatory approaches to comply with CTR criteria if the cost of treatment technology was prohibitively expensive. For example, the EA assumes that, if the estimated annualized cost for removing a pollutant exceeded a cost trigger,(*1) "dischargers would explore the use of alternative regulatory approaches to comply with CTR-based effluent limits." EA at.pg. 4(emphasis added). Based on this assumption, no treatment cost was estimated for the facility.(*2)

The types of alternative regulatory approaches assumed available for dischargers in California include phased total maximum daily loads (TMDLs), water quality standard variances, site-specific criteria, change in designated use, and alternative mixing zones. EA at pg. 4-5. The following sections will discuss each of EPA's proposed methods for regulatory relief and explain whether or not these methods can truly be used to provide relief from the CTR-based permit limits as anticipated by EPA. It should be noted that the actual language of the rule itself doesnot mention any of the methods of regulatory relief. Therefore, this analysis will be based solely upon the language contained in the Preamble to the CTR.

Alternative Mixing Zones

One of the few avenues that may actually provide some regulatory relief is mixing zones. The Preamble to the CTR describes a mixing zone as a limited area or volume of water where initial dilution of a discharge takes place and where water quality standards can be exceeded. Mixing zones have been applied in the water quality standards program since its inception. The present water quality standards regulations allows states to adopt acute and chronic mixing zones as a matter of state discretion, so long as the state's mixing zone protects the designated uses, See 40 C.F.R. section 131.13.

The Preamble recognizes that several California Regional Water Quality Control Boards have adopted mixing zone provisions in their respective Basin Plans. These mixing zone provisions can be applied to discharges to water bodies to which water quality standards based on the criteria contained in this proposed rule will apply once this rule becomes final. See CTR Preamble at pg. 42185. The problem arises for the proposal or adoption of new mixing zones where one is not currently authorized under an existing Basin Plan. The Preamble sets out numerous restrictions on the use of mixing zones, as follows:

A mixing zone should be established to ensure that the zone will not impair the integrity of the water

body as a whole, the zone will not cause lethality to passing organisms, and, considering likely pathways of exposure, that there are no significant human health risks. For application of two-number aquatic life crime as proposed in this rule, there may be up to two types of mixing zones. In the zone immediately surrounding the outfall, neither the acute nor the chronic criterion is met. The acute criterion is met at the edge of this zone. In the next mixing zone, the acute, but not the chronic, criterion is met. The chronic criterion is met at the edge of the second mixing zone. However, since both aquatic life and human health criteria are proposed in today's rule, the State may establish independent mixing zone policies for each. For any particular pollutant from any particular discharge, the magnitude, frequency, duration and mixing zone associated with each of the type of criteria may determine which one most limits the allowable discharge. Id.

The other potential problem arises because state-adopted mixing zones are subject to EPA review and approval, See 40 C.F.R. section 131,13. Because EPA approval is required, the question arises whether a federal rulemaking would accompany approval of mixing zones as it does with approval of state variances (which are also authorized under 40-C.F.R. section 131.13). If so, this would greatly restrict the utility of new or alternative mixing zones as an avenue for regulatory relief.

(*1) This coat trigger is $200 per toxic pounds-equivalent for a facility under the low-end scenario, and $500 per toxic pounds-equivalent for a category of dischargers under the high-end scenario. See EA at pg. 4.

(*2) In addition, pollutant load reductions were not calculated or credited for any pollutant for which an alternative regulatory approach was pursued. Id.

Response to: CTR-041-047

See response to CTR-004-009.

Comment ID: CTR-043-002e
Comment Author: City of Vacaville
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: G-05 Mixing Zones&Dilution Credit
References:
Attachments? Y
CROSS REFERENCES C-22; C-24a; G-01a; G-04; G-09

Comment: 2. The following provisions of the rule are supported: (1) adoption of metals criteria as dissolved concentrations; (2) expression of the metals criteria as a function of the water-effect ratio; (3) adoption of the proposed new human health criterion for mercury; and (4) the Preamble discussions regarding metals, translators, mixing zones and interim permit limits.

Response to: CTR-043-002e

See response to CTR-004-009.

Comment ID: CTR-044-003e
Comment Author: City of Woodland
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: G-05 Mixing Zones&Dilution Credit
References:
Attachments? Y
CROSS REFERENCES C-22; C-24a; C-01a; G-09; G-04

Comment: We have reviewed the proposed CTR and offer the following comments:

2. The following provisions of the rule are supported:

(1) adoption of metals criteria as dissolved concentrations;

(2) expression of the metals criteria as a function of the water-effect ratio;

(3) adoption of the proposed new human health criteria for mercury; and

(4) the Preamble discussions regarding metals translators, mixing zones, and interim permit limits.

Were the old human health criterion for mercury (0.012 ug/ l) to be adopted, the City would have to remove its discharge from Tule Canal and go to land disposal. The capital cost to do this would be $22.1 million and the total present worth cost would be $23.1 million (see Exhibit B, Required Capital improvements and Costs for Beryllium and Mercury). This would translate to an annual cost of $3.1 million per year (at 7% over 10 years) and would require that monthly sewer service charges be increased by more than 100%.

Response to: CTR-044-003e

See response to CTR-004-009.

With respect to the comment about the economic impact of the old criterion for mercury 0.012 ug/l, EPA has not evaluated these costs since the CTR does not promulgate a mercury criteria of 0.012 ug/l.

Comment ID: CTR-044-042
Comment Author: City of Woodland
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: G-05 Mixing Zones&Dilution Credit
References:
Attachments? N
CROSS REFERENCES

Comment: The Preamble to the California Toxics Rule (CTR), and the rules accompanying Economic Analysis (EA), place a great deal of emphasis on the ability of dischargers to use alternative regulatory approaches to comply with CTR criteria if the cost of treatment technology was prohibitively expensive. For example, the EA assumes that, if the estimated annualized cost for removing a pollutant exceeded a cost trigger,(*1) "dischargers would explore the use of alternative regulatory approaches to comply with CTR-based effluent limits." EA at.pg. 4(emphasis added). Based on this assumption, no treatment cost was estimated for the facility.(*2)

The types of alternative regulatory approaches assumed available for dischargers in California include phased total maximum daily loads (TMDLs), water quality standard variances, site-specific criteria, change in designated use, and alternative mixing zones. EA at pg. 4-5. The following sections will discuss each of EPA's proposed methods for regulatory relief and explain whether or not these methods can truly be used to provide relief from the CTR-based permit limits as anticipated by EPA. It should be noted that the actual language of the rule itself doesnot mention any of the methods of regulatory relief. Therefore, this analysis will be based solely upon the language contained in the Preamble to the CTR.

Alternative Mixing Zones

One of the few avenues that may actually provide some regulatory relief is mixing zones. The Preamble to the CTR describes a mixing zone as a limited area or volume of water where initial dilution of a discharge takes place and where water quality standards can be exceeded. Mixing zones have been applied in the water quality standards program since its inception. The present water quality standards regulations allows states to adopt acute and chronic mixing zones as a matter of state discretion, so long as the state's mixing zone protects the designated uses, See 40 C.F.R. section 131.13.

The Preamble recognizes that several California Regional Water Quality Control Boards have adopted mixing zone provisions in their respective Basin Plans. These mixing zone provisions can be applied to discharges to water bodies to which water quality standards based on the criteria contained in this proposed rule will apply once this rule becomes final. See CTR Preamble at pg. 42185. The problem arises for the proposal or adoption of new mixing zones where one is not currently authorized under an existing Basin Plan. The Preamble sets out numerous restrictions on the use of mixing zones, as follows:

A mixing zone should be established to ensure that the zone will not impair the integrity of the water body as a whole, the zone will not cause lethality to passing organisms, and, considering likely pathways of exposure, that there are no significant human health risks. For application of two-number aquatic life crime as proposed in this rule, there may be up to two types of mixing zones. In the zone immediately surrounding the outfall, neither the acute nor the chronic criterion is met. The acute criterion is met at the edge of this zone. In the next mixing zone, the acute, but not the chronic, criterion is met. The chronic criterion is met at the edge of the second mixing zone. However, since both aquatic life and human health criteria are proposed in today's rule, the State may establish independent mixing zone policies for each. For any particular pollutant from any particular discharge, the magnitude, frequency, duration and mixing zone associated with each of the type of criteria may determine which one most limits the allowable discharge. Id.

The other potential problem arises because state-adopted mixing zones are subject to EPA review and approval, See 40 C.F.R. section 131,13. Because EPA approval is required, the question arises whether a federal rulemaking would accompany approval of mixing zones as it does with approval of state variances (which are also authorized under 40-C.F.R. section 131.13). If so, this would greatly restrict

the utility of new or alternative mixing zones as an avenue for regulatory relief.

(*1) This coat trigger is $200 per toxic pounds-equivalent for a facility under the low-end scenario, and $500 per toxic pounds-equivalent for a category of dischargers under the high-end scenario. See EA at pg. 4.

(*2) In addition, pollutant load reductions were not calculated or credited for any pollutant for which an alternative regulatory approach was pursued. Id.

Response to: CTR-044-042

See response to CTR-004-009.

Comment ID: CTR-045-008
Comment Author: Sausalito-Marin Sanitary Dist.
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/24/97
Subject Matter Code: G-05 Mixing Zones&Dilution Credit
References:
Attachments? Y
CROSS REFERENCES

Comment: The District supports many of the items included in the proposed CTR:

EPA's policies and guidance regarding the application of mixing zones and dilution credits.

Response to: CTR-045-008

See response to CTR-004-009.

Comment ID: CTR-052-002d
Comment Author: East Bay Dischargers Authority
Document Type: Sewer Authority
State of Origin: SC
Represented Org:
Document Date: 09/26/97
Subject Matter Code: G-05 Mixing Zones&Dilution Credit
References: Letter CTR-052 incorporates by reference letters CTR-035 and CTR-054
Attachments? Y
CROSS REFERENCES C-22; C-01a; G-09; G-04

Comment: EPA will recall the State Water Quality Plans Task Forces that included all stakeholders, including EPA. The Authority appreciates the incorporation of many of the consensus recommendations

from the Task Forces into the CTR, including:

* Adoption of the metals criteria as dissolved concentrations and the expression of the criteria as a function of the water-effect ratio

* Adoption of the proposed new human health criterion for mercury

* Preamble discussions regarding metals translators, mixing zones, and interim permit limits

Response to: CTR-052-002d

See response to CTR-004-009.

Comment ID: CTR-052-019
Comment Author: East Bay Dischargers Authority
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: G-05 Mixing Zones&Dilution Credit
References: Letter CTR-052 incorporates by reference letters CTR-035 and CTR-054
Attachments? Y
CROSS REFERENCES

Comment: C. RECOMMENDATIONS FOR MODIFICATIONS TO THE CTR AND EA

EPA should mandate that the State Board continue to use defensible dilution credits. Only if documented human health and/or aquatic toxicity problems are shown to exist in specific segments of water bodies should the State and Regional Boards be allowed to consider modifications to continued use of dilution credits.

Response to: CTR-052-019

EPA does not believe that it is appropriate to mandate that the State use dilution credits or mixing zones because these decisions are most appropriately addressed at the State and local level. The State has discretion to make modifications to its mixing zone policy based on any scientific or policy grounds as long as the modifications are consistent with State and Federal law. The State is not required to limit modifications to its mixing zone policy only to those cases where human health or toxicity problems are shown to exist in specific segments of water bodies. States may always be more stringent than EPA in adopting water quality standards. See section 510 of the Clean Water Act.

Comment ID: CTR-054-004b
Comment Author: Bay Area Dischargers Assoc.
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97

Subject Matter Code: G-05 Mixing Zones&Dilution Credit
References:
Attachments? Y
CROSS REFERENCES G-09; G-04

Comment: BADA supports the Preamble discussions regarding metals translators, mixing zones, and interim permit limits. Translators and mixing zones will provide a better scientific basis for the application of the criteria and will go a long way toward protecting against the imposition of unnecessary or unreasonable controls. Interim permit limits will allow dischargers faced with potential attainability problems to pursue reasonable actions, such as pollution prevention, treatment plant optimization, pollutant trading, TMDLS, etc. prior to being faced with final effluent limitations. BADA endorses the recommendation of the State Plan Public Task Forces on the issue of interim limits.

Response to: CTR-054-004b

See response to CTR-004-009.

Comment ID: CTR-054-046
Comment Author: Bay Area Dischargers Associati
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: G-05 Mixing Zones&Dilution Credit
References:
Attachments? N
CROSS REFERENCES

Comment: The Preamble to the California Toxics Rule (CTR), and the rules accompanying Economic Analysis (EA), place a great deal of emphasis on the ability of dischargers to use alternative regulatory approaches to comply with CTR criteria if the cost of treatment technology was prohibitively expensive. For example, the EA assumes that, if the estimated annualized cost for removing a pollutant exceeded a cost trigger,(*1) "dischargers would explore the use of alternative regulatory approaches to comply with CTR-based effluent limits." EA at.pg. 4(emphasis added). Based on this assumption, no treatment cost was estimated for the facility.(*2)

The types of alternative regulatory approaches assumed available for dischargers in California include phased total maximum daily loads (TMDLs), water quality standard variances, site-specific criteria, change in designated use, and alternative mixing zones. EA at pg. 4-5. The following sections will discuss each of EPA's proposed methods for regulatory relief and explain whether or not these methods can truly be used to provide relief from the CTR-based permit limits as anticipated by EPA. It should be noted that the actual language of the rule itself doesnot mention any of the methods of regulatory relief. Therefore, this analysis will be based solely upon the language contained in the Preamble to the CTR.

Alternative Mixing Zones

One of the few avenues that may actually provide some regulatory relief is mixing zones. The Preamble to the CTR describes a mixing zone as a limited area or volume of water where initial dilution of a

discharge takes place and where water quality standards can be exceeded. Mixing zones have been applied in the water quality standards program since its inception. The present water quality standards regulations allows states to adopt acute and chronic mixing zones as a matter of state discretion, so long as the state's mixing zone protects the designated uses, See 40 C.F.R. section 131.13.

The Preamble recognizes that several California Regional Water Quality Control Boards have adopted mixing zone provisions in their respective Basin Plans. These mixing zone provisions can be applied to discharges to water bodies to which water quality standards based on the criteria contained in this proposed rule will apply once this rule becomes final. See CTR Preamble at pg. 42185. The problem arises for the proposal or adoption of new mixing zones where one is not currently authorized under an existing Basin Plan. The Preamble sets out numerous restrictions on the use of mixing zones, as follows:

A mixing zone should be established to ensure that the zone will not impair the integrity of the water body as a whole, the zone will not cause lethality to passing organisms, and, considering likely pathways of exposure, that there are no significant human health risks. For application of two-number aquatic life crime as proposed in this rule, there may be up to two types of mixing zones. In the zone immediately surrounding the outfall, neither the acute nor the chronic criterion is met. The acute criterion is met at the edge of this zone. In the next mixing zone, the acute, but not the chronic, criterion is met. The chronic criterion is met at the edge of the second mixing zone. However, since both aquatic life and human health criteria are proposed in today's rule, the State may establish independent mixing zone policies for each. For any particular pollutant from any particular discharge, the magnitude, frequency, duration and mixing zone associated with each of the type of criteria may determine which one most limits the allowable discharge. Id.

The other potential problem arises because state-adopted mixing zones are subject to EPA review and approval, See 40 C.F.R. section 131,13. Because EPA approval is required, the question arises whether a federal rulemaking would accompany approval of mixing zones as it does with approval of state variances (which are also authorized under 40-C.F.R. section 131.13). If so, this would greatly restrict the utility of new or alternative mixing zones as an avenue for regulatory relief.

(*1) This coat trigger is $200 per toxic pounds-equivalent for a facility under the low-end scenario, and $500 per toxic pounds-equivalent for a category of dischargers under the high-end scenario. See EA at pg. 4.

(*2) In addition, pollutant load reductions were not calculated or credited for any pollutant for which an alternative regulatory approach was pursued. Id.

Response to: CTR-054-046

See response to CTR-004-009.

Comment ID: CTR-056-007
Comment Author: East Bay Municipal Util. Dist.
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/22/97

Subject Matter Code: G-05 Mixing Zones&Dilution Credit
References: Letter CTR-056 incorporates by reference letter CTR-054
Attachments? N
CROSS REFERENCES

Comment: Second, EBMUD would like to express to EPA it support for inclusion of:

* EPA's policy regarding and guidance on the application of mixing zones and dilution credits,

Response to: CTR-056-007

See response to CTR-004-009.

Comment ID: CTR-058-008
Comment Author: Western States Petroleum Assoc
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: G-05 Mixing Zones&Dilution Credit
References:
Attachments? Y
CROSS REFERENCES

Comment: 7. Mixing Zones. WSPA supports EPA's recognition of the use of mixing zones.

In proposing the rule, EPA has recognized the appropriate role of mixing zones in setting and achieving WQBELS. EPA regulations, policy and guidance (e.g., the Technical Support Document for WQBELS) amply support their use in protecting receiving water.

WPSA supports the use of sound science in determining mixing zones and the actual degree of mixing achieved by today's engineered diffusers in establishing mixing zones and dilution credit. EPA should encourage states and regulators to make use of sound science, rather than arbitrary dilution factors, in establishing mixing zones. To this end WSPA supports additional EPA outreach to the states and state regulators to achieve a comfort level with using sound science and avoiding arbitrary decisions.

Response to: CTR-058-008

See response to CTR-004-009.

Comment ID: CTR-060-002
Comment Author: San Diego Gas and Electric
Document Type: Electric Utility
State of Origin: CA
Represented Org:
Document Date: 09/26/97

Subject Matter Code: G-05 Mixing Zones&Dilution Credit
References:
Attachments? N
CROSS REFERENCES

Comment: PROVISIONS SDG&E SUPPORTS

EPA has included in the proposed CTR provisions which are reasonable and with which SDG&E supports. These include:

Mixing zones

Acute and chronic mixing zones play an important role in the implementation of water quality based effluent limits. SDG&E supports EPA's inclusion of the use of mixing zones in the proposed rule (see 62 Fed. Reg. at 42206, Col. 2).

Response to: CTR-060-002

See response to CTR-004-009.

Comment ID: CTR-066-010
Comment Author: Delta Diablo Sanitation Dist.
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: G-05 Mixing Zones&Dilution Credit
References:
Attachments? N
CROSS REFERENCES

Comment: Our preliminary review of the CTR finds several areas that we believe are positive changes and will enhance the rulemaking. The areas that we support are as follows:

* EPA's policies and guidance regarding the application of mixing zones and dilution credits.

Response to: CTR-066-010

See response to CTR-004-009.

Comment ID: CTR-077-002
Comment Author: Bay Planning Coalition
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 09/26/97

Subject Matter Code: G-05 Mixing Zones&Dilution Credit
References:
Attachments? N
CROSS REFERENCES

Comment: Mixing Zone Policy

According to the Guidelines, the Mixing zone calculations as applied to dredge sediment testing are performed in accordance with the "Green Book" (EPA/Corps 1991). We support EPA's recognition of the use of mixing zones in the Toxics Rule.

Response to: CTR-077-002

See response to CTR-004-009.

Comment ID: CTR-081-002h
Comment Author: West County Agency
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: G-05 Mixing Zones&Dilution Credit
References:
Attachments? N
CROSS REFERENCES G-04; C-24a; G-02; C-22; G-09; C-01a; C-08a

Comment: * There are many aspects of the CTR that we support. These include: a) Application of interim limits while special studies are perfomed. b) Approach to water effect ratios for determining site specific criteria. c) Inclusion of provision for compliance schedules. However, this should be modified to allow inclusion of compliance schedules of up to 15 years in permits if deemed appropriate by Regional Boards. d) Metals criteria expressed as dissolved rather than total recoverable concentrations. e) EPA's guidance to Regional Boards regarding use of translators. f) EPA's proposal to create a rebuttal presumption for Water Effects Ratios, g) Revised human health criteria for mercury h) Decision to not promulgate human health criteria at this time in light of issues surrounding health criteria for arsenic. i) EPA's policies regarding application of mixing zones and dilution credits.

Response to: CTR-081-002h

See response to CTR-004-009.

Comment ID: CTR-085-011
Comment Author: Camarillo Sanitary District
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/24/97

Subject Matter Code: G-05 Mixing Zones&Dilution Credit
References:
Attachments? N
CROSS REFERENCES

Comment: On several aspects of the California Toxics Rule, the District is in agreement with CASA and SCAP comments:

* The EPA's policies and guidance regarding the application of mixing zones and dilution credits.

Response to: CTR-085-011

See response to CTR-004-009.

Comment ID: CTR-086-004h
Comment Author: EOA, Inc.
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org: California Dent
Document Date: 09/26/97
Subject Matter Code: G-05 Mixing Zones&Dilution Credit
References: Letter CTR-086 incorporates by reference letter CTR-035
Attachments? N
CROSS REFERENCES G-01; C-22; G-09; C-24a; C-24; K-03; G-04; G-02

Comment: Regulatory Flexibility and Relief

CDA supports language in the CTR Preamble that references and endorses recommendations of the State Task Forces including in part the use of.

* reasonable potential analyses * dissolved metals criteria * translators * water effects ratios * site specific objectives * innovative TMDL processes such as effluent trading * performance based interim limits * chronic and acute mixing zones, and * compliance schedules in NPDES permits.

Response to: CTR-086-004h

See response to CTR-004-009.

Comment ID: CTR-089-001d
Comment Author: Las Virgenes Mncpl Water Dist.
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/24/97
Subject Matter Code: G-05 Mixing Zones&Dilution Credit
References:

Attachments? N
CROSS REFERENCES C-22; C-01a; C-08a; K-01; G-02; G-09

Comment: The draft California Toxics Rule (CTR) is clearly the product of substantial effort by USEPA staff, and we applaud this effort and its intent. On several issues of concern to public utilities, the CTR strikes a good balance between the need to promulgate standards and the need to base those standards on sound science. Examples include the use of dissolved concentrations rather than the total recoverable concentrations for metals, the deferral of human health criteria for arsenic until adequate information is available, and the revision of the human health criterion for mercury. We are also pleased with the CTR's guidance and flexibility, on mixing zones and dilution credits, total maximum daily loads (TMDLs), compliance schedules, and translators.

Response to: CTR-089-001d

See response to CTR-004-009.

Comment ID: CTR-090-002d
Comment Author: C&C of SF, Public Utl. Commis.
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: G-05 Mixing Zones&Dilution Credit
References: Letter CTR-090 incorporates by reference letters CTR-035 and CTR-054
Attachments? Y
CROSS REFERENCES C-17a; C-24a; C-22; G-02; G-04

Comment: There are many features of the proposed rule which we strongly endorse, specifically:

* the use of the latest IRIS values for human health criteria, it is essential that the criteria be based on the latest scientific and environmental information;

* recognition that the dissolved fraction of metals, rather than the total recoverable, better reflect the aquatic toxicity of metals;

* recognition that for certain metals (e.g. copper and zinc) ambient water chemistry is critical in determining toxicity thereby endorsing the Water Effects Ratio;

* recognition and strong endorsement of the multi-tiered mixing zones for acute, chronic and human health effects; and

* recognition of interim limits and compliance schedules as appropriate implementation strategies,

Response to: CTR-090-002d

See response to CTR-004-009.

Comment ID: CTR-092-007
Comment Author: City of San Jose, California
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: G-05 Mixing Zones&Dilution Credit
References: Letter CTR-092 incorporates by reference letter CTR-035
Attachments? Y
CROSS REFERENCES

Comment: Mixing Zones

The City fully supports the discussion and allowance of mixing zones for both acute and chronic criteria in accordance with EPA's water quality standards program. The establishment of mixing zones should be allowed in those instances where designated uses remain unimpaired, where the zone does not result in lethal doses to resident organisms, and where human health aspects are adequately protected.

Response to: CTR-092-007

See response to CTR-004-009.

Comment ID: CTRH-001-022b
Comment Author: Julio Guerra
Document Type: Public Hearing
State of Origin: CA
Represented Org: City of Merced
Document Date: 09/17/97
Subject Matter Code: G-05 Mixing Zones&Dilution Credit
References:
Attachments? N
CROSS REFERENCES G-07

Comment: There are good things in here regarding the variances and the recognition of the existence of ephemeral streams. And the naturally occurring pollution, you know, has to be taken into account when it actually applies to water quality standards.

I would observe in that regard that the NPDES program recognizes that intake credits may sometimes be appropriately applied to adjust effluent limits. But in the NPDES language it states that that only can occur when you discharge into the same water body that you take the water from.

In our case, of course, we use groundwater. And, as an example, it may contain arsenic. And the arsenic isn't really removed from the water before it is discharged to surface water. We don't fit the mold of being authorized those intake credits, because we're not discharging into the same water body that we draw water from.

Response to: CTRH-001-022b

EPA recognizes that a same body of water demonstration may be more difficult for a municipality using groundwater; however, groundwater as a category is not excluded necessarily from eligibility for a same body of water determination. EPA's rationale for intake credits is based on two guiding principles: 1) the source water and receiving water are hydrologically connected; and, 2) that the pollutant would have ended up in the receiving water had the man-induced removal and reintroduction of the pollutant not occurred. If a same body of water determination cannot be made, there are other more appropriate forms of flexibility for inter-water body transfers of pollutants where the discharger is unable to comply with its new or more stringent water quality-based effluent limit, e.g., variances, compliance schedules.

Comment ID: CTRH-001-024b
Comment Author: Michelle Pla
Document Type: Public Hearing
State of Origin: CA
Represented Org: S.F. Public Utilities Com
Document Date: 09/17/97
Subject Matter Code: G-05 Mixing Zones&Dilution Credit
References:
Attachments? N
CROSS REFERENCES g-02; c-22; c-24a; c-17a

Comment: MS. PLA: My name is Michelle Pla. I'm with the Public Utilities Commission, City and County of San Francisco.

I made the comment on my card that I also said that I would try to be constructive, and so I'm going to follow my mentor here, Phil Bobel, and say that there are some things in this rule that we're very pleased to see.

We're very pleased to see use of the latest scientific information, particularly the use of latest IRIS, I-R-I-S, numbers-for human health. We're very pleased that you're using dissolved versus total recoverable form for the metals.

We're very pleased to see recognition of the water effects ratios. We're pleased to see recognition for a multi-tiered mixing zone for acute and chronic human health effects and hope that the state pays particular attention to that.

We do have a problem with the way you've described compliance schedules and hope to be working strictly by the state on that as well. We think that the five-year system is fairly shortsighted, and -we can't even do FMDSLs in five years.

Response to: CTRH-001-024b

See response to CTR-004-009.

Comment ID: CTRH-001-032c
Comment Author: Dave Brent
Document Type: Public Hearing
State of Origin: CA

Represented Org: CA Water Qual. Task Force
Document Date: 09/17/97
Subject Matter Code: G-05 Mixing Zones&Dilution Credit
References:
Attachments? N
CROSS REFERENCES C-22; C-24a

Comment: I would like to take this time to note that I think it contains some importantelements that we agree with and believe are reflective of the impact. These include the uses of dissolved metals and the provisions which will enable the state to use mixing zones and water effects ratios and establish site-specific objectives.

Response to: CTRH-001-032c

See response to CTR-004-009.

Comment ID: CTRH-001-057g
Comment Author: Dave Tucker
Document Type: Public Hearing
State of Origin: CA
Represented Org: San Jose Env. Serv. Dept.
Document Date: 09/17/97
Subject Matter Code: G-05 Mixing Zones&Dilution Credit
References:
Attachments? N
CROSS REFERENCES K-03; C-24a; G-04; G-07; G-09; C-22

Comment: Some of the flexibility that the City highly supports is the water effect ratio investigations to adjust statewide criteria to site-specific conditions; the interim limits concept while special studies are being conducted by the dischargers and other entities; a variance procedure to allow dischargers to achieve progress toward effluent limit attainment without violating applicable water quality standards; dissolved criteria for metals to reflect the toxicological conditions; translators to adjust dissolved criteria to total permit limitations; trading programs to attain and maintain water quality; and a mixing zone that reflects true instream pollutant conditions and that protects beneficial uses.

Response to: CTRH-001-057g

See response to CTR-004-009.

Subject Matter Code: G-06 NWQI

Comment ID: CTR-061-020
Comment Author: G. Fred Lee & Associates
Document Type: Academia
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: G-06 NWQI
References:
Attachments? Y
CROSS REFERENCES

Comment: National Water Quality Inventory

At the September 17,1997 hearing on the proposed CTR, the US EPA Region 9 made available on the table in the hearing room a copy of the US EPA Fact Sheet "National Water Quality Inventory: 1994 Report to Congress" (1995) evidently to try to convince the hearing participants that the adoption of the proposed CTR criteria was necessary to protect the Nation's waters from the impact of toxics that are regulated by the proposed CTR. Shortly after the release of that report to Congress, I conducted a review of the procedures used by the US EPA and the states in determining the presence of so-called "impaired" waters and found that the Agency had again used unreliable procedures for designating impaired waters. Enclosed is a copy of a report, "Unreliable Reporting of Water Quality Impairment by the US EPA's National Water Quality Inventory," Feb (1996) that I have prepared on this issue. The Agency dictates to the states that they must list as impaired any waterbody for which there is an exceedance of a water quality criterion more than once in three years. The Agency ignores the well-known fact that many of the exceedances are administrative, arising from the overly protective nature of the criteria that results from the failure of the criteria and the water effects ratio approach to properly incorporate the aquatic chemistry of the regulated constituents into assessing potential toxicity to aquatic life. The actual amount of real use-impaired waters of concern to the public is far less than that predicted by the US EPA "Fact Sheet."

Response to: CTR-061-020

First, EPA notes that the National Water Quality Inventory Reports (also referred to as the CWA Section 305(b) report) and the guidance used by States and Indian Tribes for developing these reports are outside of the scope of today's rule. The Agency will, however, take the commenter's concerns under advisement and consider those concerns expressed in the review of the Section 305(b) guidance for preparing the reports which EPA jointly develops with States and Indian Tribes.

Subject Matter Code: G-07 Variances

Comment ID: CTR-004-007
Comment Author: South Bayside System Authority
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/24/97
Subject Matter Code: G-07 Variances
References:
Attachments? N
CROSS REFERENCES

Comment: Available Regulatory Relief under the California Toxics Rule

The Preamble to the California Toxics Rule (CTR), and the rules accompanying Economic Analysis (EA), place a great deal of emphasis on the ability of dischargers to use alternative regulatory approaches to comply with CTR criteria if the cost of treatment technology was prohibitively expensive. For example, the EA assumes that, if the estimated annualized cost for removing a pollutant exceeded a cost trigger,(*1) "dischargers would explore the use of alternative regulatory approaches to comply with CTR-based effluent limits." EA at. pg. 4 (emphasis added). Based on this assumption, no treatment cost was estimated for the facility. (*2)

The types of alternative regulatory approaches assumed available for dischargers in California include phased total maximum daily loads (TMDLs), water quality standard variances, site-specific criteria, change in designated use, and alternative mixing zones. EA at pg. 4-5. The following sections will discuss each of EPA's proposed methods for regulatory relief and explain whether or not these methods can truly be used to provide relief from the CTR-based permit limits as anticipated by EPA. It should be noted that the actual language of the rule itself does riot mention any of the methods of regulatory relief. Therefore, this analysis will be based solely upon the language contained in the Preamble to the CTR.

Water Quality Standard Variances/ Designated Use Modifications

The Preamble to the CTR discusses variances as a form of regulatory relief that might be pursued by dischargers. See 62 Fed.Rec,. 42,185-6. The Preamble provides that States may adopt a statewide policy (or Regional Boards may adopt Basin-wide policies) to allow water quality standard variances for individual dischargers. The variance Policy Would allow the State or Regional Board to grant a variance to an individual permittee from a water quality standard,(*5) which is the basis of a water quality-based effluent limitation in a permit. However, there are some serious restrictions placed oil tile use of variances. The following lays out these restrictions:

* Variances are not allowed for new or recommencing dischargers.

* Variances are discharger and pollutant specific. In other words, the water quality standard variance applies only to the permittee requested the variance and only to the pollutant or pollutants specified in the variance.

* Once a variance has been approved by the State, it must be submitted to EPA for approval. - EPA will only approve variances if consistent with the substantive requirements set out at 40 CFR Part 131 for

removing a designated use.(*6)

* EPA will only approve state variances if specific provisions are included.(*7)

* EPA would have to tinder-take a federal rulemaking to make the necessary changes to this rule to allow for State-approved variances. The Preamble explains this restriction as follows:

EPA, however, cautious California and the public that promulgation of this federal rule removes most of the flexibility available to the State for modifying its standards on a discharger-specific or stream-specific basis. For example, variances and site-specific criteria development are actions sometimes adopted by states. These are optional policies under terms of the federal water quality standards regulation. Except for tire water-effect ratio procedure for certain metals, EPA has not incorporated either optional policy, in general, in this proposed rulemaking, that is, EPA has not generally authorized State modifications of federal water quality. Each of these types of modifications will, in general, require federal rulemaking on a case by case basis to change the federal rule. Because of the time consuming nature of reviewing such requests, limited federal resources, and the need for the Agency to move into other priority program areas in establishing environmental controls, EPA alerts California and the public that a prompt Agency response is unlikely. The best course of action, if such provisions are desired, is for the State to adopt its own standards and take advantage, if it so chooses, of the flexibility offered by these optional provisions.(*8)

Because of all of the restrictions placed on their use, variances are not really a viable option for regulatory relief. The only way for variances to be a viable option would be for EPA to incorporate a variance policy into the proposed rule that would authorize State modifications of federal water quality standards.

(*1) This cost trigger is $200 per toxic pounds-equivalent for a facility under the low-end scenario, and $500 per toxic pounds-equivalent for a category of dischargers under the high-end scenario, See EA at pg. 4.

(*2) In addition, pollutant load I reductions word not calculated or credited for any pollutant for which an alternative regulatory approach was pursued. Id.

(*4) EPA, Guidance for Water Quality-based Decisions: The TMDL Process, EPA Doc. No. 440/4-91-001 at pg. 20 (April 1991) (Emphasis added).

(*5) The variance would allow the permittee time to achieve reasonable progress towards attaining a specific water quality based effluent limitation, without violating CWA section 402(a)(1), which requires that NPDES permittees meet all applicable water quality standards. See 62 Fed.Reg, 42185-6. A variance does not effect the corresponding water quality standard fur the water body receiving the discharge. Variances are designed to preserve the underlying water quality standard over the long term, while providing flexibility to individual dischargers in complying with peanut limits based on the standards. When a variance is granted, the discharger is assured compliance during the term of a variance, as long as all variance conditions are met. Id.

(*6) Specifically, the State's policy must require the inclusion of a demonstration that a water quality standard is unattainable, based on one or more of the following grounds: 1. Naturally occurring pollutant concentrations prevent the attainment of the water quality standard; 2. Natural, ephemeral, intermittent or low flow conditions or water levels prevent the attainment of the water quality standard, unless these

conditions may be compensated for by the discharge of sufficient volume of effluent to enable the standard to be met without violating State water conservation requirements; 3. Human-caused conditions or sources of pollution prevent the attainment of the water quality standard and cannot be remedied, or would cause more environmental damage to correct than to leave in place; 4. Dams, diversions or other types of hydrologic modifications preclude the attainment of a water quality standard, and it is not feasible to restore the water body to its original condition or to operate such modification in a way that would result in the attainment of the standard; 5. Physical conditions related to the natural features of the water body, such as the lack of a proper substrate cover, flow, depth, pools, riffles, and the like, unrelated to chemical water quality, preclude attainment of the water quality standard; or 6. Controls more stringent than those required by CWA sections 30 1 (b) and 306 would result in substantial and widespread economic and social impact.

(*7) The required provisions are as follows: 1. The State will include each individual variance as part of its water quality standard or water quality plan; 2. The variance will include documentation that treatment more advanced than that required by CWA section 301(b) and 306 has been carefully considered, and that alternative effluent control strategies have been evaluated; 3. The underlying, more stringent criterion will be maintained and will be binding on all other dischargers; 4. The discharger who will be given a variance for one particular constituent will be required to meet the applicable criteria for other constituents; 5. The variance will be granted for a specific period of time and must be rejustified upon expiration, but at least every three years; 6. Reasonable progress will be made towards meeting the underlying standards; 7. The variance will not likely jeopardize the continued existence of any threatened or endangered species listed under Section 4 of the Endangered Species Act or result in the destruction or adverse modification of such species' critical habitat; and 8. The variance will be subjected to public notice, comment, and hearing. See CWA section 303(c)(t) and 40 CFR 131.20. The public notice should contain a clear description of the impact of the variances upon achieving the water quality standard in the water body.

(*8) See CTR Preamble at pg. 42195-6. Further guidance on variance policies is provided in EPA's 1994 Water Quality Standards Handbook, Chapters 2 and 5 (EPA 823-B-94-005a, August 1994).

Response to: CTR-004-007

EPA disagrees that variances are not a viable option for regulatory relief for dischargers. The ability of States to develop site specific criteria or to grant variances and exceptions to water quality standards are optional procedures that are available to States (See 40 CFR 131.11(b)(ii) and 131.3). It is neither a statutory nor a regulatory requirement to develop site specific criteria or to issue variances.

Since the criteria in this rule are Federal criteria that are applicable in the State, the State cannot unilaterally establish site-specific criteria or issue variances to the Federal rule. Such provisions are still available to the State, but are more cumbersome as it requires the State to meet all the regulatory requirements for developing such procedures, but then EPA would need to undertake a Federal rulemaking process on a case by case basis in order to effectuate changes to the rule in accordance with the Administrative Procedures Act. EPA emphasizes that this is a strong reason for California to act to adopt its own numeric criteria even after this Federal promulgation action is taken.

The basis for assuming that regulatory relief would be available under certain circumstances for purposes of estimating costs is explained in the economic analysis for this rule. Note that EPA's high end cost estimate assumed that no regulatory relief would be available to dischargers.
See also response to comment CTR-032-004 (Category E-01m).

Comment ID: CTR-015-005
Comment Author: Eastern Municipal Water Dist.
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/23/97
Subject Matter Code: G-07 Variances
References:
Attachments? N
CROSS REFERENCES

Comment: Variances (FR p. 42185, Preamble section F.3.)

The Agency describes the procedures and demonstrations that any state-adopted variance policy must contain, and also states that the Agency must approve the policy. Additionally, should any variance from a water quality criterion subsequently result from the state policy, it is indicated that a federal rulemaking must occur to recognize each variance from the Rule. Is this true? Agency "approval" is required, according to the Agency's Water Quality Standards Handbook (1994). If the Agency approves a state variance policy, then actions under the policy should follow the policy procedures, whether the criteria are federal or state. The last part of these statements essentially denies modifications to the water quality criteria. The Agency is effectively removing the flexibility which seems to be under the purview of the state.

Response to: CTR-015-005

See response to CTR-004-007.

Comment ID: CTR-035-035
Comment Author: Tri-TAC/CASA
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: G-07 Variances
References:
Attachments? N
CROSS REFERENCES

Comment: pp. 42185-42186 -- Variances The Preamble encourages the SWRCB to adopt a policy allowing dischargers to apply for variances, but stops short of adopting a provision in the CTR allowing variances. EPA further states that the granting of variances will require a federal rulemaking on a case-by-case basis, and that "a prompt Agency response is unlikely." As with site-specific criteria, we object, on the one hand, to EPA's assumption in the cost analysis that regulatory relief mechanisms such as variances will not only be available but will be granted to dischargers, while on the other hand EPA essentially states that it does not intend to grant variances. We believe these approaches conflict, and that EPA must resolve these inconsistencies before finalizing the CTR- Therefore, we strongly urge EPA

to include a provision in the CTR authorizing the issuance of variances. However, we recommend that EPA provide flexibility in variance procedures to allow for such things as variances without federal rulemaking requirements, and consideration of multiple discharger (or water body) variances, consistent with the policy of fostering collaborative, watershed-based solutions to water quality problems.

Response to: CTR-035-035

See response to CTR-005-009

Comment ID: CTR-040-049
Comment Author: County of Sacramento Water Div
Document Type: Storm Water Auth.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: G-07 Variances
References: Letter CTR-040 incorporates by reference letter CTR-027
Attachments? Y
CROSS REFERENCES

Comment: The Preamble to the California Toxics Rule (CTR), and the rules accompanying Economic Analysis (EA), place a great deal of emphasis on the ability of dischargers to use alternative regulatory approaches to comply with CTR criteria if the cost of treatment technology was prohibitively expensive. For example, the EA assumes that, if the estimated annualized cost for removing a pollutant exceeded a cost trigger,(*1) dischargers would explore the use of alternative regulatory approaches to comply with CTR-based effluent limits." EA at.pg. 4 (emphasis added). Based on this assumption, no treatment cost was estimated for the facility.(*2)

The types of alternative regulatory approaches assumed available for dischargers in California include phased total maximum daily loads (TMDLs), water quality standard variances, site-specific criteria, change in designated use, and alternative mixing zones. EA at pg. 4-5. The following sections will discuss each of EPA's proposed methods for regulatory relief and explain whether or not these methods can truly be used to provide relief from the CTR-based permit limits as anticipated by EPA. It should be noted that the actual language of the rule itself does not mention any of the methods of regulatory relief. Therefore, this analysis will be based solely upon the language contained in the Preamble to the CTR.

Water Quality Standard Variances/ Designated Use Modifications

The Preamble to the CTR discusses variances as a form of regulatory relief that might be pursued by dischargers. See 62 Fed. Reg. 42,185-6. The Preamble provides that States may adopt a statewide policy (or Regional Boards may adopt Basin-wide policies) to allow water quality standard variances for individual dischargers. The variance policy would allow the State or Regional Board to grant a variance to an individual permittee from a water quality standard,(*5) which is the basis of a water quality-based effluent limitation in a permit. However, there are some serious restrictions placed on the use of variances. The following lays out these restrictions:

* Variances are not allowed for new or recommencing dischargers. * Variances are discharger and pollutant specific. In other words, the

water quality standard variance applies only to the permittee requesting the variance and only to the pollutant or pollutants specified in the variance. * Once a variance has been approved by the State, it must be submitted to EPA for approval. - EPA will only approve variances if consistent with the substantive requirements set out at 40 CFR Part 131 for removing a designated use.(*6) - EPA will only approve state variances if specific provisions are included.(*7) - EPA would have to undertake a federal rulemaking to make the necessary changes to this rule to allow for State-approved variances, The Preamble explains this restriction as follows:

EPA, however, cautions California and the public that promulgation of this federal rule removes most of the flexibility available to the State for modifying it standards on a discharger-specific or stream-specific basis. For example, variances and site-specific criteria development are actions sometimes adopted by states. These are optional policies under terms of the federal water quality standards regulation. Except for the water-effect ratio procedure for certain metals, EPA has not incorporated either optional policy, in general, in this proposed rulemaking, that is, EPA has not generally authorized State modifications of federal water quality standards. Each of these types of modifications will, in general, require federal rulemaking on a case by case basis to change the federal rule. Because of the time consuming nature of reviewing such requests, limited federal resources, and the need for the Agency to move into other priority program areas in establishing environmental controls, EPA alerts California and the public that a prompt Agency response is unlikely. The best course of action, if such provisions are desired, is for the State to adopt its own standards and take advantage, if it so chooses, of the flexibility offered by these optional provisions. (*8)

Because of all of the restrictions placed on their use, variances are not really a viable option for regulatory relief. The only way for variances to be a viable option would be for EPA to incorporate a variance policy into the proposed rule that would authorize State modifications of federal water quality standards.

(*1) This coat trigger is $200 per toxic pounds-equivalent for a facility under the low-end scenario, and $500 per toxic pounds-equivalent for a category of dischargers under the high-end scenario. See EA at pg. 4.

(*2) In addition, pollutant load reductions were not calculated or credited for any pollutant for which an alternative regulatory approach was pursued. Id.

(*5) The variance would allow the permittee to achieve reasonable progress towards attaining a specific water quality-based effluent limitation, without violating CWA section 402(a)(1), which requires that NPDES permittees meet all applicable water quality standards, See 62 Fed.Reg. 42185-6. A variance does not effect the corresponding water quality for the water body receiving the discharge. Variances are designed to preserve the underlying water quality standard over the long term, while providing flexibility to individual dischargers in complying with permit limits based on the standards. When a variance is granted, the discharger is assured compliance during the term of a variance, as long as all variance conditions are met. Id.

(*6) Specifically, the State's policy must require the inclusion of a demonstration that a water quality standard is unattainable, based on one or more of the following grounds:

1. Naturally occurring pollutant concentrations prevent the attainment of the water quality standard; 2.

Natural, ephemeral, intermittent or low flow conditions or water levels prevent the attainment of the water quality standard, unless these conditions may be compensated for by the discharge of sufficient volume of effluent to enable the standard to be met without violating State water conservation requirements; 3. Human-caused conditions or sources of pollution prevent the attainment of the water quality standard and cannot be remedied, or would cause more environmental damage to correct than to leave in place; 4. Dams, diversions or other types of hydrologic modifications preclude the attainment of a water quality standard, and it is not feasable to restore the water body to its original condition or to operate such modification in a way that would result in the attainment of the standard; 5. Physical conditions related to the natural features of the water body, such as the lack of a proper substrate cover, flow, depth, pools, riffles, and the like, unrelated to chemical water quality, preclude attainment of the water quality standard; or 6. Controls more stringent than those required by CWA sections 301(b) and 306 would result in substantial and widespread economic and social impact.

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(*8) See CTR Preamble at pg. 42185-6. Further guidance on variance policies is provided in EPA's 1994 Water Quality Standards Handbook, Chapters 2 and 5 (EPA 823-B-94-005a, August 1994).

Response to: CTR-040-049

See Response to CTR-035-035.

Comment ID: CTR-041-045
Comment Author: Sacramento Reg Cnty Sanit Dist
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: G-07 Variances
References:
Attachments? N
CROSS REFERENCES

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Response to: CTR-041-045

See Response to CTR-004-007.

Comment ID: CTR-044-040
Comment Author: City of Woodland
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: G-07 Variances
References:
Attachments? N
CROSS REFERENCES

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Response to: CTR-044-040

See response to CTR-004-007.

Comment ID: CTR-050-005b
Comment Author: Sonnenschein Nath & Rosenthal
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org: American Petrol
Document Date: 09/26/97
Subject Matter Code: G-07 Variances
References:
Attachments? N
CROSS REFERENCES C-24

Comment: II. EPA Should Allow Variances and Site-Specific modifications.

Beyond the issue of whether EPA has the authority to issue the proposed rule, there are other significant problems with the proposal. For example, the Agency has made the inexplicable decision not to include provisions that would allow for issuance of variances or site-specific modifications to the criteria. This is despite the Agency's recognition that a variance procedure is an "important procedure to assist the State in effectively implementing water quality standards." (62 Fed. Reg. at 42185). EPA gives absolutely no explanation for its decision not to allow use of this procedure. Moreover, the Agency concedes that "promulgation of this federal rule removes most of the flexibility available to the State for modifying its standards on a discharger-specific or stream-specific basis. " Instead, an applicant would have to ask EPA to begin a "federal rulemaking on a case-by-case basis to change the federal rule." (62 Fed. Reg. at 42186) EPA makes it quite clear that applicants should not expect any relief from that avenue, because the Agency simply has more important things to do:

Because of the time consuming nature of reviewing such requests, limited federal resources, and the need for the Agency to move into other priority program areas in establishing environmental controls, EPA alerts California and the public that a prompt Agency response is unlikely.

Despite this cavalier dismissal of the need for actually acting on variance and site criteria applications, the Agency does not hesitate to mention those mechanisms in its economic analysis as being available to moderate the impact of the proposed rule. The Agency specifically mentions variances and site-specific criteria when it states that "these implementation procedures can have an effect on how water quality standards, based on today's proposed rule, will impact NPDES permit holders." (62 Fed. Reg. at 42192). In fact, that statement is clearly false, given EPA's decision not to include variance or site-specific criteria procedures in the proposed rule. The Agency should reconsider that decision and insert those provisions.

Response to: CTR-050-005b

See response to CTR-035-035.

Comment ID: CTR-054-044
Comment Author: Bay Area Dischargers Associati
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97

Subject Matter Code: G-07 Variances
References:
Attachments? N
CROSS REFERENCES

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(*5) The variance would allow the permittee to achieve reasonable progress towards attaining a specific water quality-based effluent limitation, without violating CWA section 402(a)(1), which requires that NPDES permittees meet all applicable water quality standards, See 62 Fed.Reg. 42185-6. A variance does not effect the corresponding water quality for the water body receiving the discharge. Variances are designed to preserve the underlying water quality standard over the long term, while providing flexibility to individual dischargers in complying with permit limits based on the standards. When a variance is granted, the discharger is assured compliance during the term of a variance, as long as all variance conditions are met. Id.

(*6) Specifically, the State's policy must require the inclusion of a demonstration that a water quality standard is unattainable, based on one or more of the following grounds:

1. Normally occurring pollutant concentrations prevent the attainment of the water quality standard; 2. Natural, ephemeral, intermittent or low flow conditions or water levels prevent the attainment of the water quality standard, unless these conditions may be compensated for by the discharge of sufficient volume of effluent to enable the standard to be met without violating State water conservation requirements; 3. Human-caused conditions or sources of pollution prevent the attainment of the water quality standard and cannot be remedied, or would cause more environmental damage to correct than to leave in place; 4. Dams, diversions or other types of hydrologic modifications preclude the attainment of a water quality standard, and it is not feasable to restore the water body to its original condition or to operate such modification in a way that would result in the attainment of the standard; 5. Physical conditions related to the natural features of the water body, such as the lack of a proper substrate cover, flow, depth, pools, riffles, and the like, unrelated to chemical water quality, preclude attainment of the

water quality standard; or 6. Controls more stringent than those required by CWA sections 301(b) and 306 would result in substantial and widespread economic and social impact.

(*7) The required provisions are as follows: 1. The State will include each individual variance as part of its water quality standard or water quality plan; 2. The variance will include documentation that treatment more advanced than that required by CWA section 301(b) and 306 has been carefully considered, and that alternative effluent control strategies have been evaluated; 3. The underlying, more stringent criterion will be maintained and will be binding on all other discharges; 4. The discharger who will be given a variance for one particular constituent will be required to meet the applicable criteria for other constituents; 5. The variance will be granted for a secific period of time and must be rejustified upon expiration, but at least every three years; 6. Reasonable progress will be made towards meeting the underlying standards; 7. The variance will not likely jeopardize the continued existence of any threatened or endangered species listed under Section 4 of the Endangered Species Act or result in the destruction or adverse modification of such species' critical habitat; and 8. The variance will be subjected to public notice, comment and hearing. See CWA section 303(c)(1) and 40 CFR 131.20. The public notice should contain a clear description of the impact of the variance upon achieving the water quality standard in the water body.

(*8) See CTR Preamble at pg. 42185-6. Further guidance on variance policies is provided in EPAs 1994 Water Quality Standards Handbook, Chapters 2 and 5 (EPA 823-B-94-005a, August 1994).

Response to: CTR-054-044

See response to CTR-004-007.

Comment ID: CTR-057-010b
Comment Author: City of Los Angeles
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: G-07 Variances
References:
Attachments? N
CROSS REFERENCES K-01; C-24

Comment: Implementation

Although the proposed Rule discusses implementation issues such as TMDLs, variances, SSOs, and interim permits, it lacks evidence of support for any of these provisions. We believe that this will have the effect of reducing the State's confidence or perceived authority in granting any of these provisions to individual POTWs. For example, Page 42186 of the CTR lists six criteria that must be used by the State to determine the non-attainability of a water quality standard; we are doubtful that any of these criteria would be strictly applicable to our facilities with respect to lindane and DDT. We believe CTR variance criteria should include economic considerations for specific discharger implementation efforts. Unless the EPA provides more support for these provisions, we fear that the State will either not grant us a legitimate variance or will waiver in its commitment to act at all.

Response to: CTR-057-010b

See response to CTR-004-007.

Furthermore, the six criteria that are used as a basis for a variance does include economic considerations (see preamble of the proposed rule 62 FR 42186, August 5, 1997 and the Water Quality Standards Regulation at 131.10(g)). The requirements for issuing a variance are the same as those for downgrading or removal of a designed use. Discussions on alternative justifications for variances are outside the scope of today's rule.

Comment ID: CTR-090-020
Comment Author: C&C of SF, Public Utl. Commis.
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: G-07 Variances
References: Letter CTR-090 incorporates by reference letters CTR-035 and CTR-054
Attachments? Y
CROSS REFERENCES

Comment: Variances This procedure described in the preamble is unduly cumbersome and unrealistic. Particular problems we see with this approach are:

Time limit - The proposed policy requires that variances be granted for not more than three years, after which they must be re-justified. This policy is not reasonable when applied to a major municipal wastewater construction program which may have a variance as an integral part of the facility planning process. Does it make sense to reanalyze a fundamental design premise every three years for a wastewater system that may have cost hundreds of millions and taken decades to construct. Although review of facility plans is appropriate in some cases, following the laborious process every three years as described in this proposal would have no benefit since there is no feasible way to instantly change a completed wastewater system.

Regulatory justification - EPA has modeled the variance procedure on the portion of the regulations established to provide for removal of a designated use. What is left out of the preamble is a justification for using this model for the additional requirements added to the procedure. Why, in the first place does EPA need to establish a variance procedure. The Clean Water Act requires the state have standards which 'shall be such as to protect the public health and welfare, enhance the quality of water and serve the purposes of this chapter." Each Basin Plan in California already has a variance policy which meet this statutory requirement and which is currently in effect. We propose that there is no need for the variance procedure in this rule-making.

Conflict with the fundamental premise of state water quality standards The major problem with the proposed variance procedure is that it is in conflict with the underlying premise upon which the standards were originally developed. The standards in California were developed to be applied to permanent dischargers such as POTWs and industrial discharges. The state explicitly recognized that the standards were inappropriate for intermittent discharges such as combined sewer overflows. Because the standards were not appropriate for CSOs, the state intended that the variance procedure be used. Taking as an

example, the Ocean Plan standards applied to the first San Francisco permits, the SWRCB made the following statement:

... it is patiently clear that it was realized it inappropriate to apply Ocean Plan standards strictly to combined waste and stormwater discharges. The record indicates further, that rather than address this problem in the 1978 Ocean Plan amendments, directly, it was decided to deal with such problems on a case-by-case basis via the exception mechanism. [Order No. WQ 79-16].

The same argument applies to stormwater discharges. Since most such discharges will violate the current standards during at least some period during the discharge, it is obvious that the intent of those developing the standards was not to apply them to intermittent discharges in the same manner as they are applied to permanent discharges. Until the standards are changed, the variance process is the only available mechanism to reconcile the standards with these discharges.

In order to minimize paperwork, and to provide more meaningful public participation, we suggest that all remaining variances be handled has part of the Basin Plan process ,(by watershed and discharger class) rather than on an individual NPDES permit basis.

We further request that all existing variances be incorporated into the CTR by reference. This could be handled by listing the currently applicable Basin Plans and adding language to the effect that "...all variances issued pursuant to these plans are incorporated into the CTR by reference." San Francisco has variances and/or site-specific discharge standards associated with its wet-weather control facilities (RWQCB(2) Order 94-149 as amended by Order 96-117, Southeast WPCP, and Order 95-039, Northpoint and Southeast Sewerage Zones).

Response to: CTR-090-020

EPA disagrees that a three year time limit for variances is unreasonable. The variance represents a change in the applicable water quality criteria. Variances are optional components of a state's water quality standards. As noted in the preamble, EPA's policy on variances is that variance are granted for a specific period of time and must be rejustified upon expiration but at least every three years. The three year rejustification is derived from the triennial review requirements of CWA Section 303. Section 303 requires States to hold hearings for the purpose of reviewing and, if necessary, revising their water quality standards.

EPA notes that the Agency is not including or establishing a variance procedure for California in this rule. Rather, the preamble of the rule explains minimum requirements for State adopted variance provisions. As previously noted, such provisions are optional policies that states in general adopt to assist in the implementation of their NPDES permit program. See response to CTR-004-007.

Comment ID: CTR-092-008
Comment Author: City of San Jose, California
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: G-07 Variances
References: Letter CTR-092 incorporates by reference letter CTR-035

Attachments? Y
CROSS REFERENCES

Comment: Variances

The City strongly supports the application of variances as an important regulatory procedure to assist the State in implementing its water quality standards program. The City further encourages the State to formally adopt a variance provision that allows variances for individual dischargers. This procedure would provide a valuable tool to allow a permittee to achieve reasonable progress toward attainment of a water quality based effluent limitation without violating applicable water quality standards.

Response to: CTR-092-008

EPA takes no position as to whether the State adopts a variance provisions in its water quality standards.

Comment ID: CTRH-001-022a
Comment Author: Julio Guerra
Document Type: Public Hearing
State of Origin: CA
Represented Org: City of Merced
Document Date: 09/17/97
Subject Matter Code: G-07 Variances
References:
Attachments? N
CROSS REFERENCES G-05

Comment: There are good things in here regarding the variances and the recognition of the existence of ephemeral streams. And the naturally occurring pollution, you know, has to be taken into account when it actually applies to water quality standards.

I would observe in that regard that the NPDES program recognizes that intake credits may sometimes be appropriately applied to adjust effluent limits. But in the NPDES language it states that that only can occur when you discharge into the same water body that you take the water from.

In our case, of course, we use groundwater. And, as an example, it may contain arsenic. And the arsenic isn't really removed from the water before it is discharged to surface water. We don't fit the mold of being authorized those intake credits, because we're not discharging into the same water body that we draw water from.

Response to: CTRH-001-022a

EPA acknowledges the commenter's support for the discussions on variances that are contained in the preamble of the rule. See response to CTR-004-007.

Comment ID: CTRH-001-057d
Comment Author: Dave Tucker

Document Type: Public Hearing
State of Origin: CA
Represented Org: San Jose Env. Serv. Dept.
Document Date: 09/17/97
Subject Matter Code: G-07 Variances
References:
Attachments? N
CROSS REFERENCES K-03; C-24a; G-04; G-09; C-22; G-05

Comment: Some of the flexibility that the City highly supports is the water effect ratio investigations to adjust statewide criteria to site-specific conditions; the interim limits concept while special studies are being conducted by the dischargers and other entities; a variance procedure to allow dischargers to achieve progress toward effluent limit attainment without violating applicable water quality standards; dissolved criteria for metals to reflect the toxicological conditions; translators to adjust dissolved criteria to total permit limitations; trading programs to attain and maintain water quality; and a mixing zone that reflects true instream pollutant conditions and that protects beneficial uses.

Response to: CTRH-001-057d

EPA acknowledges the commenter's support for variances, However, EPA is not including a variance procedure in today's rule. See response to CTR-004-007.

Subject Matter Code: G-08 State Policy

Comment ID: CTRE-004-001b
Comment Author: Victor Valley Wastewater Auth.
Document Type:
State of Origin: CA
Represented Org:
Document Date: 09/11/97
Subject Matter Code: G-08 State Policy
References:
Attachments? N
CROSS REFERENCES B

Comment: The Victor Valley Wastewater Reclamation Authority (VVWRA) respectfully requests that the comment period deadline be extended for the California Toxics Rule (CTR). The current comment period deadline is September 26, 1997. We request that the latter deadline be extended for at least 60 days so that we can fully evaluate the potential impact on VVWRA

The reasons for our request are as follows:

1. VVWRA discharges to the Mojave River, which is considered by the Lahontan RWQCB as an impaired waterway. Although portions of the Mojave exhibit year-round surface flow, the River directly above VVWRA does not exhibit consistent surface flow. However, the Lahontan RWQCB considers the Mojave an underflow stream, which is often considered as surface flow. Whether an underflow stream would be considered under the CTR for receiving stream dilution has yet to be determined;

2. It is difficult if not impossible to evaluate the impacts of a proposed regulation without considering the mechanism by which it will be implemented. The SWRCB is not expected to release the implementation plan until September 12, 1997. Therefore, VVWRA takes exception to the imposition of a regulation with an undefined implementation plan;

3. Because of the latter unknowns and the complexity of the regulation V has not had sufficient time to evaluate the potential economic impacts, if any, of the proposed regulation.

Response to: CTRE-004-001b

See response to CTR-009-001.

Subject Matter Code: G-09 Translators

Comment ID: CTR-004-004d
Comment Author: South Bayside System Authority
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/24/97
Subject Matter Code: G-09 Translators
References:
Attachments? N
CROSS REFERENCES G-05
C-24a
C-22

Comment: Despite the problems addressed above there are provisions of the CTR that SBSA supports, including:

* EPA's policies and guidance regarding the use of mixing zones and dilution

* Use of water effects ratios (WERs) for determining site specific criteria

* Inclusion of metals criteria expressed as dissolved rather than total recoverable

* Allowing permit writers the use of any of the methods in EPA's guidance document on the use of translators

Response to: CTR-004-004d

EPA appreciates the commenter's support for its discussion of metals translators in the preamble of the proposed CTR.

Comment ID: CTR-005-003d
Comment Author: Novato Sanitary District
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/23/97
Subject Matter Code: G-09 Translators
References:
Attachments? Y
CROSS REFERENCES C-22
C-24a
C-01a
G-05
G-04

Comment: 2. The following provisions of the rule are supported: (1) adoption of metals criteria as dissolved concentrations; (2) expression of the metals criteria as a function of the water-effect ratio; (3) adoption of the proposed new human health criterion for mercury; and (4) the Preamble discussions regarding metals translators, mixing zones, and interim permit limits.

Response to: CTR-005-003d

See response to CTR-004-004d.

Comment ID: CTR-027-012d
Comment Author: California SWQTF
Document Type: Storm Water Auth.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: G-09 Translators
References: Letter CTR-027 incorporates by reference letters CTR-001, CTR-036 and CTR-040
Attachments? N
CROSS REFERENCES C-22
C-24
C-01a
G-05

Comment: PROVISIONS OF THE PROPOSED RULE WE SUPPORT

Not withstanding the above comments, we believe there are certain elements of the proposed rule with respect to establishing water quality standards that we can support:

* Metal criteria expressed in the dissolved fraction rather than expressed in the total recoverable fraction.

* Metal criteria that are developed as a function of the water-effect-ratio (WER).

* The current proposed human health criterion for mercury.

* The current preamble language regarding metal translators and mixing zones.

We believe the above provisions provide a more acceptable, scientific approach to the water quality-based pollution control approach. We recommend these provisions of the current rule remain as proposed.

Response to: CTR-027-012d

See response to CTR-004-004d.

Comment ID: CTR-030-008
Comment Author: Utility Water Act Group

Document Type: Trade Org./Assoc.
State of Origin: DC
Represented Org:
Document Date: 09/25/97
Subject Matter Code: G-09 Translators
References:
Attachments? Y
CROSS REFERENCES

Comment: D. EPA's Discussion of the Chemical Translator Guidance Should be Clarified

EPA appropriately includes its recently completed Chemical Translator Guidance (The Metals Translator: Guidance for Calculating a Total Recoverable Permit Limit From a Dissolved Criterion (EPA 823-B-96-007, June 1996) (Translator Guidance) in the rulemaking record and notes the importance of having mechanisms to "translate" between dissolved metal in ambient waters and total recoverable metal in effluent. 62 Fed. Reg. at 42,173, col. 2. But EPA's discussion of only certain provisions of the Translator Guidance creates an implication that only those portions of the Translator Guidance are applicable to this rulemaking. For example, the proposal requires use of conversion factors for converting a metal criterion expressed as the total recoverable fraction in the water column to a criterion expressed as the dissolved criterion in the water column. The Translator Guidance provides greater flexibility; it states: "[A] translator is required to derive a total recoverable permit limit from a dissolved criterion" but caveats this statement with the following footnote:

As a reasonable worst case, however, it may be assumed that metal in the receiving environment would be biologically available to the same extent as during toxicity testing; and the conversion factors may be used as translators if a site-specific translator is not developed. In that case, the water quality criterion that already has been multiplied by the conversion factor would be divided by the conversion factor.

Translator Guidance, p. 5, n. 6.

Therefore, to avoid any implication that only part of the Translator Guidance is applicable to this rulemaking, UWAG requests that EPA make general reference to the translator Guidance and approve, without reservation, its entire contents.

Response to: CTR-030-008

EPA clarifies that the State in implementing its policy on translators may consider the entire contents of the guidance. EPA did not intend to imply that only a portion of the guidance could be used by the State to implement CTR criteria.

Comment ID: CTR-032-002c
Comment Author: Las Gallinas Val. Sanitry Dist
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: G-09 Translators
References: Letter CTR-032 incorporates by reference letter CTR-035

Attachments? N
CROSS REFERENCES G-01
C-22
C-24a
C-24
K
G-04
G-05
G-02

Comment: Regulatory Flexibility and Relief

The District supports EPA's use of "sound science" and current data in developing the proposed criteria in the California Toxics Rule (CTR). The District strongly supports language in the Preamble that references and endorses recommendations of the State Task Forces including use in permitting of:

* reasonable potential analyses * dissolved metals criteria * translators * water effects ratios * site specific objectives * innovative TMDL processes such as effluent trading * performance based interim limits * chronic and acute mixing zones, and * compliance schedules in NPDES permits.

Response to: CTR-032-002c

See response to CTR-004-004d.

Comment ID: CTR-035-002f
Comment Author: Tri-TAC/CASA
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: G-09 Translators
References:
Attachments? N
CROSS REFERENCES C-22
C-01a
C-08a
G-05
G-04
K-01
C-24a

Comment: Second, we commend EPA for its inclusion in the CTR of several innovative and flexible regulatory approaches, such as metals criteria expressed as dissolved rather than total recoverable concentrations, and the revised human health criterion for mercury. In addition, in light of the issues surrounding the human health criteria for arsenic we support EPA's decision not to promulgate human health criteria at this time. With respect to implementation issues discussed in the Preamble, we support EPA's policies and guidance regarding the application of mixing zones and dilution credits. the use of interim permit limits while Total Maximum Daily Loads (TMDLs) and other special studies are being

performed, and EPA's guidance to Regional Water Quality Control Boards (RWQCBs) that they may use any of the methods described in EPA's guidance document on the use of translators. We also support EPA's proposal to create a rebuttable presumption for Water Effects Ratios (WERs), allowing the RWQCBs and SWRCB to develop site-specific WERs that can be approved by EPA during the NPDES permit approval process. We believe that this approach will help facilitate the development of appropriate site-specific adjustments for metals criteria.

Response to: CTR-035-002f

See response to CTR-004-004d.

Comment ID: CTR-035-018
Comment Author: Tri-TAC/CASA
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: G-09 Translators
References:
Attachments? N
CROSS REFERENCES

Comment: p. 42173 -- Translators for Dissolved to Total Recoverable Metals Limits We support EPA's guidance to RWQCBs that they may use any of the methods described in EPA's guidance document on the use of translators (U.S. EPA, 1996b). We believe that the development of site-specific translators should be allowed in those cases where a discharger is willing to conduct the studies in accordance with EPA-approved methods. As such, we believe the recommendation that the State "adopt a statewide policy on the use of translators so that the most appropriate method or methods are used consistently within California" is unnecessary, and this recommendation should be deleted from the Preamble.

Response to: CTR-035-018

EPA believes its recommendation that the State "adopt a statewide policy on the use of translators so that the most appropriate method or methods are used within California" is useful. This recommendation does not preclude the State from allowing dischargers to conduct site-specific translator studies in accordance with EPA methods if the State so chooses within its discretion to write NPDES permits. In fact, in its proposed implementation policy, the State's expressed its acceptance of site-specific translator methods.

Comment ID: CTR-038-002f
Comment Author: Sonoma County Water Agency
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: G-09 Translators
References:

Attachments? Y
CROSS REFERENCES C-22
C-24a
C-01a
G-04
G-05

Comment: 2. The following provisions of the rule are supported (1) adoption of metals criteria as dissolved concentrations; (2) expression of the metals criteria as a function of the water-effect ratio; (3) adoption of the proposed new human health criterion for mercury; and (4) the Preamble discussions regarding metals translators, mixing zones, and interim permit limits.

Response to: CTR-038-002f

See response to CTR-004-004d.

Comment ID: CTR-040-002c
Comment Author: County of Sacramento Water Div
Document Type: Storm Water Auth.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: G-09 Translators
References: Letter CTR-040 incorporates by reference letter CTR-027
Attachments? Y
CROSS REFERENCES C-24a
C-01a
G-05

Comment: PROVISIONS SUPPORTED

We support a number of provisions of the Rule, including: (1) adoption of metals criteria as dissolved concentrations; (2) expression of the metals criteria as a function of the water-effect ratio; (3) adoption of the proposed new human health criterion for mercury- and (4) the Preamble discussions regarding metals translators and mixing zones. These provisions provide a firmer scientific base for the water quality-based approach to pollution control and are a marked improvement over the old Inland Surface Waters Plan. We would urge EPA to retain these provisions in the final Rule.

Response to: CTR-040-002c

See response to CTR-004-004d.

Comment ID: CTR-041-003a
Comment Author: Sacramento Reg Cnty Sanit Dist

Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: G-09 Translators
References:
Attachments? N
CROSS REFERENCES C-24a

Comment: Second, the District supports with reservations EPA's proposals on two subjects directly related to dissolved metals criteria, i.e. the proposed guidance on both (1) translators to convert from dissolved metals criteria to total recoverable permit limits and (2) the water-effect ratio (WER) as the method to compare the bioavailability and toxicity of a pollutant in receiving waters and in laboratory waters. Both of these two proposals must be implemented on a site-specific basis using local data, not statewide or watershed-wide data. Translators, however, should be developed whenever a discharger is willing to conduct studies in accordance with EPA-approved methods. The proposed procedure for a default value of 1.0 for a WER should mean that when a site-specific WER is to be determined, an additional EPA rulemaking process would not be required. Instead, this rule should pre-authorize the use of correctly applied WERs that are approved by the State.

Response to: CTR-041-003a

EPA agrees that translators derived using site-specific methods are generally preferable to a generic method using statewide or regional data. However, the State is the lead authority with respect to NPDES permit implementation and may choose any method that is consistent with the Clean Water Act. In its proposed implementation policy, the State expressed its acceptance of site-specific translator methods.

Comment ID: CTR-043-002f
Comment Author: City of Vacaville
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: G-09 Translators
References:
Attachments? Y
CROSS REFERENCES C-22
C-24a
G-01a
G-04
G-05

Comment: 2. The following provisions of the rule are supported: (1) adoption of metals criteria as dissolved concentrations; (2) expression of the metals criteria as a function of the water-effect ratio; (3) adoption of the proposed new human health criterion for mercury; and (4) the Preamble discussions regarding metals, translators, mixing zones and interim permit limits.

Response to: CTR-043-002f

See response to CTR-004-004d.

Comment ID: CTR-044-003d
Comment Author: City of Woodland
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: G-09 Translators
References:
Attachments? Y
CROSS REFERENCES C-22
C-24a
C-01a
G-05
G-04

Comment: We have reviewed the proposed CTR and offer the following comments:

2. The following provisions of the rule are supported:

(1) adoption of metals criteria as dissolved concentrations;

(2) expression of the metals criteria as a function of the water-effect ratio;

(3) adoption of the proposed new human health criteria for mercury; and

(4) the Preamble discussions regarding metals translators, mixing zones, and interim permit limits.

Were the old human health criterion for mercury (0.012 ug/ l) to be adopted, the City would have to remove its discharge from Tule Canal and go to land disposal. The capital cost to do this would be $22.1 million and the total present worth cost would be $23.1 million (see Exhibit B, Required Capital improvements and Costs for Beryllium and Mercury). This would translate to an annual cost of $3.1 million per year (at 7% over 10 years) and would require that monthly sewer service charges be increased by more than 100%.

Response to: CTR-044-003d

See response to CTR-004-004d.

With respect to the comment about the economic impact of the old criterion for mercury of 0.012 ug/l, EPA has not evaluated these costs since the CTR does not promulgate a mercury criteria of 0.012 ug/l.

Comment ID: CTR-052-002c
Comment Author: East Bay Dischargers Authority

Document Type: Sewer Authority
State of Origin: SC
Represented Org:
Document Date: 09/26/97
Subject Matter Code: G-09 Translators
References: Letter CTR-052 incorporates by reference letters CTR-035 and CTR-054
Attachments? Y
CROSS REFERENCES C-22
C-01a
G-05
G-04

Comment: EPA will recall the State Water Quality Plans Task Forces that included all stakeholders, including EPA. The Authority appreciates the incorporation of many of the consensus recommendations from the Task Forces into the CTR, including:

* Adoption of the metals criteria as dissolved concentrations and the expression of the criteria as a function of the water-effect ratio

* Adoption of the proposed new human health criterion for mercury

* Preamble discussions regarding metals translators, mixing zones, and interim permit limits

Response to: CTR-052-002c

See response to CTR-004-004d.

Comment ID: CTR-054-004a
Comment Author: Bay Area Dischargers Assoc.
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: G-09 Translators
References:
Attachments? Y
CROSS REFERENCES G-05
G-04

Comment: BADA supports the Preamble discussions regarding metals translators, mixing zones, and interim permit limits. Translators and mixing zones will provide a better scientific basis for the application of the criteria and will go a long way toward protecting against the imposition of unnecessary or unreasonable controls. Interim permit limits will allow dischargers faced with potential attainability problems to pursue reasonable actions, such as pollution prevention, treatment plant optimization, pollutant trading, TMDLS, etc. prior to being faced with final effluent limitations. BADA endorses the recommendation of the State Plan Public Task Forces on the issue of interim limits.

Response to: CTR-054-004a

See response to CTR-004-004d.

Comment ID: CTR-056-008
Comment Author: East Bay Municipal Util. Dist.
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/22/97
Subject Matter Code: G-09 Translators
References: Letter CTR-056 incorporates by reference letter CTR-054
Attachments? N
CROSS REFERENCES

Comment: Second, EBMUD would like to express to EPA it support for inclusion of:

* EPA's guidance to Regional Water Quality Control Boards stating that they may use any of the methods described in EPA's guidance document on the use of translators ["The Metals Translator: Guidance for Calculating a Total Recoverable Permit Limit from a Dissolved Criterion," EPA 823-B-96-007, June 1996],

Response to: CTR-056-008

See response to CTR-004-004d.

Comment ID: CTR-060-009
Comment Author: San Diego Gas and Electric
Document Type: Electric Utility
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: G-09 Translators
References:
Attachments? N
CROSS REFERENCES

Comment: PROVISIONS SDG&E DOES NOT SUPPORT

As described in the following comments SDG&E does not support the following provisions:

EPA's chemical translator guidance should be clarified

EPA describes in the preamble (see 62 Fed. Reg. at 42,173, Col. 2) the importance of permitting authorities of having the ability to translate between dissolved metals in ambient waters and total recoverable metal in effluent and refers to its Chemical Translator Guidance document "The Metals

Translator. Guidance for Calculating a Total Recoverable Permit Limit From a Dissolved Criterion"(EPA 823-B-96-007, June 1996) (the "Translator Guidance"). However, the preamble describes only certain provisions of the translator guidance document, implying that other portions may not be applicable to California. EPA should clarify the translator guidance document is applicable in its entirety to California.

Additionally, the preamble should specifically identify, as the Translator Guidance indicates in footnote No. 6 on Page 5, that, in the absence of a site-specific translator, the conversion factor should be used as the translator.

Response to: CTR-060-009

See response to CTR-030-008.

Comment ID: CTR-066-006
Comment Author: Delta Diablo Sanitation Dist.
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: G-09 Translators
References:
Attachments? N
CROSS REFERENCES

Comment: Our preliminary review of the CTR finds several areas that we believe are positive changes and will enhance the rulemaking. The areas that we support as now written are as follows:

* The guidance to RWQCBs that they may use any of the methods described in EPA's guidance document on the use of translators.

Response to: CTR-066-006

See response to CTR-004-004d.

Comment ID: CTR-081-002e
Comment Author: West County Agency
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: G-09 Translators
References:
Attachments? N
CROSS REFERENCES G-04
C-24a
G-02

C-22
C-01a
C-08a
G-05

Comment: * There are many aspects of the CTR that we support. These include: a) Application of interim limits while special studies are performed. b) Approach to water effect ratios for determining site specific criteria. c) Inclusion of provision for compliance schedules. However, this should be modified to allow inclusion of compliance schedules of up to 15 years in permits if deemed appropriate by Regional Boards. d) Metals criteria expressed as dissolved rather than total recoverable concentrations. e) EPA's guidance to Regional Boards regarding use of translators. f) EPA's proposal to create a rebuttal presumption for Water Effects Ratios, g) Revised human health criteria for mercury h) Decision to not promulgate human health criteria at this time in light of issues surrounding health criteria for arsenic. I) EPA's policies regarding application of mixing zones and dilution credits.

Response to: CTR-081-002e

See response to CTR-004-004d.

Comment ID: CTR-085-007
Comment Author: Camarillo Sanitary District
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/24/97
Subject Matter Code: G-09 Translators
References:
Attachments? N
CROSS REFERENCES

Comment: On several aspects of the California Toxics Rule, the District is in agreement with CASA and SCAP comments:

* The EPA's guidance to RWQCB's that they may use any of the methods described in the EPA's guidance document on the use of translators.

Response to: CTR-085-007

See response to CTR-004-004d.

Comment ID: CTR-086-004c
Comment Author: EOA, Inc.
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org: California Dent

Document Date: 09/26/97
Subject Matter Code: G-09 Translators
References: Letter CTR-086 incorporates by reference letter CTR-035
Attachments? N
CROSS REFERENCES G-01
C-22
C-24a
C-24
K-03
G-04
G-05
G-02

Comment: Regulatory Flexibility and Relief

CDA supports language in the CTR Preamble that references and endorses recommendations of the State Task Forces including in part the use of.

* reasonable potential analyses * dissolved metals criteria * translators * water effects ratios * site specific objectives * innovative TMDL processes such as effluent trading * performance based interim limits * chronic and acute mixing zones, and * compliance schedules in NPDES permits.

Response to: CTR-086-004c

See response to CTR-004-004d.

Comment ID: CTR-089-001g
Comment Author: Las Virgenes Mncpl Water Dist.
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/24/97
Subject Matter Code: G-09 Translators
References:
Attachments? N
CROSS REFERENCES C-22
C-01a
C-08a
G-05
K-01
G-02

Comment: The draft California Toxics Rule (CTR) is clearly the product of substantial effort by USEPA staff, and we applaud this effort and its intent. On several issues of concern to public utilities, the CTR strikes a good balance between the need to promulgate standards and the need to base those standards on sound science. Examples include the use of dissolved concentrations rather than the total recoverable concentrations for metals, the deferral of human health criteria for arsenic until adequate information is available, and the revision of the human health criterion for mercury. We are also pleased with the

CTR's guidance and flexibility, on mixing zones and dilution credits, total maximum daily loads (TMDLs), compliance schedules, and translators.

Response to: CTR-089-001g

See response to CTR-004-004d.

Comment ID: CTR-092-003
Comment Author: City of San Jose, California
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: G-09 Translators
References: Letter CTR-092 incorporates by reference letter CTR-035
Attachments? Y
CROSS REFERENCES

Comment: Translators to Convert from Dissolved Metals Criteria to Total Recoverable-Permit Limits

The City supports EPA's discussion of the metals translation process contained in "The Metals Translator, Guidance, for Calculation of a Total Recoverable Limit From a Dissolved Criterion" (EPA 823-B-96-007, June 1996). The City supports the use of EPA's translator methods by Regional Water Quality Control Boards to develop water quality-based permit limits. The Cityalso supports EPA's encouragement for the development of a statewide policy on the use of translators and for the consistency of their use statewide.

Response to: CTR-092-003

See response to CTR-004-004d.

Comment ID: CTRH-001-045b
Comment Author: Charles Batts
Document Type: Public Hearing
State of Origin: CA
Represented Org: Bay Area Dischargers Assc
Document Date: 09/17/97
Subject Matter Code: G-09 Translators
References:
Attachments? N
CROSS REFERENCES B

Comment: We would ask the EPA to extend the comment period to encourage further comments.

We would encourage you to look at actual agencies' calculations, that all translators be reviewed to ensure accuracy, even if special studies are required by individual dischargers.

Response to: CTRH-001-045b

EPA will review translator methods used by the State as a part of EPA's usual NPDES permit review process.

Comment ID: CTRH-001-049
Comment Author: Michael Lozeau
Document Type: Public Hearing
State of Origin: CA
Represented Org: S.F. Bay/Delta Keeper
Document Date: 09/17/97
Subject Matter Code: G-09 Translators
References:
Attachments? N
CROSS REFERENCES

Comment: The notion of translators is a scary one to me in terms of what that means for any given permit process. You're talking about a very complicated permit process at that point, and I don't expect certainly the dischargers to pass up that opportunity. I would expect to see a very complicated permit process for every single one of the criteria that you have proposed here, unless you include a total recoverable number.

Response to: CTRH-001-049

EPA believes translators for metals is an appropriate tool for converting from dissolved metals criteria to total recoverable permit limits. Dissolved criteria are applicable only to a subset of priority toxic pollutants and would not be applicable to all criteria in the final rule. While the use of translators may make the permit process somewhat more complex, in some cases, EPA believes this extra effort will be worthwhile and will allow the State to develop the most appropriate effluent limits for metals discharges.

EPA's basis for using dissolved metals is described in the preamble to the proposed CTR at 62 Fed. Reg. 42171 (Aug. 5, 1997), the preamble to the final rule, and in the administrative record to the final rule (PLACEHOLDER FOR DOCUMENT TITLE).

Comment ID: CTRH-001-057e
Comment Author: Dave Tucker
Document Type: Public Hearing
State of Origin: CA
Represented Org: San Jose Env. Serv. Dept.
Document Date: 09/17/97
Subject Matter Code: G-09 Translators
References:
Attachments? N
CROSS REFERENCES K-03
C-24a
G-04
G-07

C-22
G-05

Comment: Some of the flexibility that the City highly supports is the water effect ratio investigations to adjust statewide criteria to site-specific conditions; the interim limits concept while special studies are being conducted by the dischargers and other entities; a variance procedure to allow dischargers to achieve progress toward effluent limit attainment without violating applicable water quality standards; dissolved criteria for metals to reflect the toxicological conditions; translators to adjust dissolved criteria to total permit limitations; trading programs to attain and maintain water quality; and a mixing zone that reflects true instream pollutant conditions and that protects beneficial uses.

Response to: CTRH-001-057e

See response to CTR-004-004d.

Subject Matter Code: G-10 Pretreatment

Comment ID: CTR-096-004a
Comment Author: City of Modesto
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: G-10 Pretreatment
References:
Attachments? N
CROSS REFERENCES R

Comment: Thank you for the opportunity to comment on the proposed California Toxics Rule. The City's comments are related to five main concepts:

4. The environmental consequences of the necessary treatment facilities and changes in operating practices to meet these discharg5 standards is very significant and has not been addressed in promulgating the proposed rule.

Specifically, the City submits the following comments:

F. A comparison of the Water Quality Standards (WQS) used by its City during the Local Limits Study and the proposed WQS is shown in Table 1. There is a little variation in limits for cadmium, copper, nickel, and zinc as these values are dependent on receiving stream hardness. The values shown in Table I for the City were developed using a hardness of 170 mg/l as CaCO3 while the standards from the CTR are based on 100 mg/l as CaCO3. The WQS from the CTR are actually expressed as dissolved fractions. A factor of I has been used to convert from dissolved to total fractions for the comparison to take place.

Table 1

Comparison of Water Quality Standards

City Report WQS 1996 1997 ---------- ----------

Chronic Acute Chronic Acute

Arsenic, ppb 190.0 360.0 150.0 340.0 Cadmium, ppb 1.7 7.1 2.2 4.3 Chromium, ppb 10.0 15.0 11.0 16.0 Copper, ppb 19.0 29.0 9.0 13.0 Nickel, ppb 250.0 2200.0 52.0 470.0 Zinc, ppb 170.0 180.0 120.0 120.0 Mercury, ppb N/A 2.1 .77 1.4

Table 1 indicates that the City's Local Limits for arsenic, cadmium, chromium, and zinc would have little difficulty meeting the CTR. However, limits for copper, nickel and mercury may be drastically impacted. This impact in developing a stricter local limit may result in an economic hardship to many small business enterprises that currently do metal plating. These businesses may be forced to close down due to the implementation of these limits. Modesto experiences a chronic unemployment rate above 12%, and economic development is critical to this community.

Response to: CTR-096-004a

The commenter has not provided enough information to enable EPA to respond to the assertion that metal plating businesses in Modesto may endure economic hardship and be forced to close down due to implementation of the CTR.

The commenter's derivation of 1997 WQS in Table 1 appears to be based on the CTR criteria. This is a "worst case scenario" since it does not address possible adjustments (all allowable for implementation of the CTR) for dilution, hardness, and translation from dissolved criteria to total recoverable effluent limits, all of which could result in an effluent limit for the POTW that may be less stringent than the levels indicated in Table 1. In addition, the commenter did not provide information on how local limits for indirect dischargers (such as metal plating businesses) would be calculated nor any data on historical discharge levels of pollutants from metal plating businesses. Therefore, EPA cannot come to any conclusion whether the implementation of CTR water quality criteria could have an adverse economic impact on Modesto's metal plating businesses or force the businesses to close.

EPA notes that the comment regarding the stringency of proposed aquatic life mercury criteria is no longer relevant since EPA is not promulgating a final aquatic life mercury criteria in the final CTR.

Subject Matter Code: G-11 Intake Credits

Comment ID: CTR-084-001
Comment Author: City of Redding
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: G-11 Intake Credits
References:
Attachments? N
CROSS REFERENCES

Comment: ISSUES OF CONCERN

F. 3. Implementation, 62 FR 42185. Total Maximum Daily Load (TMDL's) should not be required if water quality criteria for a water body segment are exceeded due to discharges from upstream dischargers who operate with federal waivers or variances to water quality standards.

F. 3. Implementation, 62 FR 42184. The proposed California Toxics Rule (CTR) does not specifically afford municipal credits for pollutants in the intake water supply. The City of Redding is concerned about how the proposed CTR will be implemented with regard to upstream acid mine dischargers who are operating with federal waivers to water quality standards. If credits for pollutants in the intake water supply were intended, they should be specifically included in the current proposal under F. 3. Implementation, to allow public comment at this time.

BACKGROUND

Previous Task Force and Sacramento River Watershed Program discussions and recommendations to the EPA have focused on acid mine discharges (AMDs) to the Sacramento River, as sources that are largely unregulated and contribute great amounts of metals to the river. The City of Redding has annually commented in our pretreatment program reports, on the deleterious affect of upstream heavy metal discharges from Iron Mountain Mine (IMM) into the Sacramento River and the downstream City water supply.

Prior to classification as a superfund site, IMM had previously been under a NPDES permit issued by the Central Valley Regional Water Quality Control Board. A review of a fact sheet by EPA on Iron Mountain Mine Superfund Site (May 1996) indicates the IMM site: under Superfund law, requires EPA cleanup actions to comply with all federal and state environmental requirements or of applicable or relevant and appropriate requirements" (ARARs), but allows a waiver of those requirements for interim actions such as collection and treatment of IMM Slickrock Creek flows. Although the interim actions will provide an environmental improvement, they are not expected to achieve full compliance with all of these environmental requirements. The fact sheet references that the ARARs waiver for "Interim Measures" is provided for under 40 CFR 300.430 (f)(1)(ii)(C)(1) and invited comment on whether it would be appropriate to rely on a waiver of these standards on the basis of "technical impracticability" under 40CFR 300.430 (f)(1)(ii)(C)(3).

Presently and for an indefinite period of time, IMM will remain without water quality criteria (WQC) compliance requirements. Additionally, it appears that there will be no enforcement actions against IMM

for failure to comply with WQC requirements. Apparently, this will not be the case for municipalities downstream of this and other AMDs on the Sacramento River according to the proposed CTR.

Monitoring of heavy metal concentrations in the Sacramento River by the City of Redding, indicate IMM interim actions implemented to date have produced an environmental improvement; however, the Sacramento River still violates water quality criteria proposed in the CTR. The very fact that the river will continue to experience violations of the proposed water quality criteria makes continuous POTW NPDES compliance impossible during AMDs upstream excursions of these same criteria. It would be unfair and cost prohibitive to require downstream POTW's to comply with increased water quality standards, where the water body quality has been significantly degraded because of the actions or inactions of the federal and state regulators on upstream discharges.

The City of Redding discharges back into the same water source (Sacramento River) from which it receives its primary municipal intake water. Wastewater discharge compliance with the proposed WQC would be very problematic, as ambient Sacramento River concentrations of heavy metals can fluctuate widely and be higher than the proposed WQC during any given river monitoring event. In contrast to theoretical models which assume the worst case scenario occur during low river flows, the upper Sacramento River commonly experiences the highest metal concentrations during high winter flows.

Even though the City of Redding does not have NPDES permit limits for metals at the current time, we must assume it will some day. Therefore, the above issue is significant and in need of comment at this time.

SUMMARY

Federal Regulations contained within the proposed CTR prohibit the discharge of toxic constituents in toxic concentrations. Iron Mountain Mine, as a superfund site discharger to the Sacramento River, will not fall under the proposed CTR due to the federal waiver granted to them in 1996. The proposed CTR should address the issue of effluent limit adjustments based upon intake water concentrations from upstream AMDs and provide a means of implementing a fair and affordable approach to adjust or provide relief to municipalities whose sources of water are already at or above the proposed water quality criteria. The City of Redding believes it is urgent that U.S. E.P.A. include in the preparation of the final California Toxics Rule, effluent limit adjustments based upon intake water ambient concentrations due to AMDs or other upstream toxics for all applicable water bodies found within the State of California.

Therefore, we request that language be added to the proposed rule as follows, "Any discharger downstream of a water body which has been granted a federal or state variance or waiver, and whose primary source of water supply is impaired by such shall be allowed credit in their NPDES discharges by either 1) an extension of that variance or waiver to affected downstream dischargers and/or 2) allowing intake credits to affected downstream dischargers."

If you have any questions, please contact Wastewater Superintendent Stephen Craig at (916) 224-6063 or Industrial waste Supervisor Richard Elliott at (916) 224-6050.

Response to: CTR-084-001

The State has discretion to use implementation tools such as appropriate intake credits to apply to dischargers that have poor intake or receiving water which is beyond their control. Implementation of water quality standards through various regulatory and non-regulatory tools is primarily a State responsibility and is beyond the scope of the CTR. Since the proposed CTR was issued, the State

released a draft Policy for Implementation of Toxic Water Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California, September 11, 1997. The draft policy included a provision for intake water credits (See pp. V-60-V-70). EPA has provided a copy of your comments to the State Water Resources Control Board for consideration.

Subject Matter Code: H Paperwork Reduction Act

Comment ID: CTR-019-004b
Comment Author: Richards, Watson & Gershon
Document Type: Local Government
State of Origin: CA
Represented Org: Cities of Barst
Document Date: 09/25/97
Subject Matter Code: H Paperwork Reduction Act
References: Letter CTR-019 incorporates by reference letters CTR-001, CTR-013, CTR-027 and CTR-036

Attachments? N
CROSS REFERENCES I

Comment: THE PROPOSED RULE DOES NOT COMPLY WITH THE PAPERWORK REDUCTION ACT

The preamble states at page 42192 that the CTR "requires no new or additional information collection." It is difficult to believe that a rule which, unless modified, may effectively require end-of-pipe treatment of storm water discharges would not require any "additional information collection." For example, simply a demonstration that WQBEL's are infeasible requirements for either municipal storm water permits would necessarily require an significant amount of additional data collection and reporting. USEPA should have conducted a full analysis of the potential information gathering requirements of the CTR before proposing this rule.

The preamble to the proposed rule sets forth in detail the various efforts that USEPA employed to obtain public input on the CTR. However, to our knowledge, none of the cities on whose behalf we are submitting these comments, nor any of the other cities which we represent were contacted by EPA in advance of the proposed rulemaking or given a reasonable opportunity to participate.

In closing, we join in the requests made by other local governmental entities that the proposed rule be modified to exclude any application to storm water discharges to municipal separate storm sewer systems.

RICHARDS, WATSON & GERSHON 333 So. Hope Street, 38th Floor Los Angeles, California 90071

John J. Harris

Response to: CTR-019-004b

EPA disagrees with the commenter that the proposed CTR does not comply with the Paperwork Reduction Act, and that the CTR will impose new, additional requirements on storm water dischargers. The preamble states that the action requires no new or additional information collection subject to the Paperwork Reduction Act. The CTR promulgates water quality criteria for priority toxic pollutants. The State is required to implement water quality criteria through its water quality control programs, specifically through the NPDES permit program. The State implements water quality-based effluent limitations or WQBELs in NPDES permits for any pollutant for which reasonable potential exists. Thus, the CTR does not directly place any requirements on any discharger.

Reporting and monitoring requirements already exist for all NPDES dischargers, including storm water dischargers, under the NPDES regulations. The CTR does not impose any additional reporting or monitoring requirements. As noted above, the CTR promulgates criteria for toxic pollutants, and the State will use the criteria in developing water quality-based effluent limitations in NPDES permits for the pollutants where reasonable potential exists. The rule does not impose any additional reporting or monitoring burden on any discharger.

The CTR poses no direct information collection burden on the State of California. The CTR places an indirect burden for reviewing and revising the toxic pollutants that were promulgated. (See the National Toxics Rule discussion of the Paperwork Reduction Act at 57 FR 60848, Tuesday, December 22, 1992.) The general Water Quality Standards regulations Information Collection Request (ICR) estimated an average indirect burden on respondents (States) for reviewing and revising water quality criteria, and toxics criteria are merely a subset of those criteria. Thus, the CTR poses no direct burden, and any indirect burden on the State for a required triennial review has been estimated and updated in the general Water Quality Standards.

EPA acknowledges the comment concerning EPA's outreach to the public for input. In 1995, EPA sent out a newsletter to all interested parties, including all NPDES permit holders in the State of California, soliciting comments and attendance at public meetings. EPA held two public meetings on August 24, 1995 in San Francisco, where again comments were solicited from the discharger community, including storm water dischargers. In addition, EPA attended each of the State's Task Force Meetings for the development of the new statewide implementation plan; the storm water discharger community was invited to attend all of these meetings. EPA was available to the public for questions and answers on both the CTR and the State's proposed implementation. Reasonable opportunity existed for the storm water community to submit input on the CTR.

Subject Matter Code: I Stormwater/Wet Weather Flows

Comment ID: CTR-019-004a
Comment Author: Richards, Watson & Gershon
Document Type: Local Government
State of Origin: CA
Represented Org: Cities of Barst
Document Date: 09/25/97
Subject Matter Code: I Stormwater/Wet Weather Flows
References: Letter CTR-019 incorporates by reference letters CTR-001, CTR-013, CTR-027 and CTR-036

Attachments? N
CROSS REFERENCES H

Comment: THE PROPOSED RULE DOES NOT COMPLY WITH THE PAPERWORK REDUCTION ACT

The preamble states at page 42192 that the CTR "requires no new or additional information collection." It is difficult to believe that a rule which, unless modified, may effectively require end-of-pipe treatment of storm water discharges would not require any "additional information collection." For example, simply a demonstration that WQBEL's are infeasible requirements for either municipal storm water permits would necessarily require an significant amount of additional data collection and reporting. USEPA should have conducted a full analysis of the potential information gathering requirements of the CTR before proposing this rule.

The preamble to the proposed rule sets forth in detail the various efforts that USEPA employed to obtain public input on the CTR. However, to our knowledge, none of the cities on whose behalf we are submitting these comments, nor any of the other cities which we represent were contacted by EPA in advance of the proposed rulemaking or given a reasonable opportunity to participate.

In closing, we join in the requests made by other local governmental entities that the proposed rule be modified to exclude any application to storm water discharges to municipal separate storm sewer systems.

RICHARDS, WATSON & GERSHON 333 So. Hope Street, 38th Floor Los Angeles, California 90071

John J. Harris

Response to: CTR-019-004a

EPA's EA, which uses many conservative costing assumptions, indicates that the cost of the State implementing water quality standards based on the proposed criteria in the CTR is likely to be below $100 million per year. Benefits are also estimated to be below $100 million per year. These estimates indicate that the action is not "significant" under E.O. 12866, under the provision concerning annual effects on the economy.

Criteria, by themselves, do not directly impose economic impacts. Criteria are one of three parts of a water quality standard. A water quality standard is comprised of: a criterion, a designated use, and an

antidegradation requirement. The CTR promulgates criteria for priority toxic pollutants. When these criteria are combined with State adopted designated uses and antidegradation requirements, water quality standards will be created. When the State implements these water quality standards, costs may be imposed. However, in the spirit of the intent of E.O. 12866, EPA prepared the EA which looks at the costs and benefits of the State's implementation of the resulting water quality standards based on the CTR criteria into the NPDES permit program.

The Unfunded Mandates Reform Act of 1995 (UMRA) in general requires federal agencies to assess the effects of their regulatory actions on State and local governments, and on the private sector. The agency must prepare a written statement including a cost-benefit analysis for actions with a "federal mandate" that may result in expenditures to State and local governments, in the aggregate, or to the private sector of $100 million or more in any one year. The CTR does not contain any federal mandate that may result in expenditures by State and local governments, or the private sector, of $100 million or more in any one year. The CTR imposes no direct enforceable duties on the State, local or private sector; rather the rule promulgates water quality criteria which, when combined with State-adopted designated uses and antidegradation requirements, will create water quality standards. The CTR does not directly regulate or affect any entity and therefore is not subject to the requirements of UMRA.

The Regulatory Flexibility Act in general requires federal agencies to describe the impact of their regulatory actions on small entities as part of the rulemaking. If the Administrator certifies that the action will not have a significant economic impact on a substantial number small entities, the agency is not required to prepare the analysis. The Administrator certified in the proposed rule, and is certifying again today that the rule will not have a significant economic impact on a substantial number of small entities. EPA's promulgation of water quality criteria will assist the State in establishing water quality standards. The State will, in turn, implement the resulting water quality standards in its water quality regulatory programs such as the NPDES permit program. The State has discretion in deciding how to meet the water quality standards and in developing discharge limits as needed to meet those standards. While the State's implementation of water quality standards based on federally-promulgated criteria may result in new or revised discharge limits being placed on small entities, the criteria or standards themselves to not apply to any discharger, including small entities. Thus, EPA's action today does not impose any of these as yet unknown requirements on small entities.

As described in EA that accompanied the proposed CTR (SAIC and Jones and Stokes Associates, 1997), EPA assumed that regulatory alternatives such as phased total maximum daily loads/water quality assessments, site-specific criteria modifications, standards variances, metals translators, etc., are considered under certain circumstances. Specifically, under the low-end scenario, regulatory alternatives were assumed necessary if the cost for a sample facility exceeded $200 per toxic pounds-equivalent.

EPA assumes that a facility, when faced with the challenge of meeting water quality-based effluent limitations (WQBELs) based on CTR criteria, will select the most cost-effective controls, including regulatory alternatives. In fact, this has been the case in California, where several major POTWs have performed studies in pursuit of regulatory alternatives such as metals translators and site-specific criteria, rather than install costly controls to comply with WQBELs. EPA acknowledges that the actual cost-effectiveness value will vary by facility depending upon many factors, including the characteristics and volume of discharge, the receiving water, etc. However, EPA disagrees that the cost trigger is unrealistic, as it was reasonably based upon the highest reported cost-effectiveness values for industry categories subject to effluent limitations guidelines and standards.

Nonetheless, in the high-end estimate developed for the cost analysis accompanying the final CTR, no cost trigger was used and, thus, EPA's high-end cost estimate did not include the use of a regulatory

alternative for any sample facility.

Reference: SAIC and Jones and Stokes Associates, Inc. 1997. Analysis of Potential Costs Related to the Implementation of the California Toxics Rule. Prepared for U.S. EPA, Office of Science and Technology and U.S. EPA Region IX, May 5.

Comment ID: CTR-030-004c
Comment Author: Utility Water Act Group
Document Type: Trade Org./Assoc.
State of Origin: DC
Represented Org:
Document Date: 09/25/97
Subject Matter Code: I Stormwater/Wet Weather Flows
References:
Attachments? Y
CROSS REFERENCES G-02
G-04

Comment: D. EPA's Endorsement of Five-Year Compliance Schedules and Interim Permit Limits for Modifications is Appropriate

UWAG strongly supports EPA's recognition that modifications necessary to comply with new or more stringent effluent limitations may necessitate the use of five-year compliance schedules. 62 Fed. Reg. at 42,187, col. 3. UWAG believes, however, that in certain circumstances a longer compliance schedule may be appropriate. Steam electric facilities that need retrofits to meet water quality-based effluent limits (WQBELS) often require extensive engineering design and testing prior to the actual retrofit. Additionally, nuclear facilities must ensure that any design changes are compatible with Nuclear Regulatory Commission regulations. Therefore, the availability of five-year compliance schedules is certainly well-justified. Further, EPA should consider whether longer compliance schedules should be available, at least in some limited circumstances.

Additionally, UWAG strongly supports EPA's approval of interim permit limits for use in permit modifications. This flexibility will allow dischargers to stay in compliance while necessary process or design changes are carried out.

Response to: CTR-030-004c

EPA dropped its proposed five year compliance schedule from the final CTR. Based on public comments, EPA has determined that, in California, establishment of a compliance schedule is an implementation issue. Thus, the State should have discretion to establish a compliance schedule subject to EPA approval.

Comment ID: CTR-031-004c
Comment Author: Fresno Metro. Flood Ctrl Dist.
Document Type: Flood Ctrl. District
State of Origin: CA
Represented Org:

Document Date: 09/25/97
Subject Matter Code: I Stormwater/Wet Weather Flows
References: Letter CTR-031 incorporates by reference letter CTR-027
Attachments? N
CROSS REFERENCES C-17a
C-17b

Comment: If the proposed rule is carefully and sufficiently modified to affirm a commitment by EPA to effect only its Congressional authorization as established by CWA section 402(p), then EPA's failure to assess municipal storm water dischargers" ability to attain the proposed standards and associated economic and environmental impacts may be set aside at this time. However, if EPA persists in maintaining the CTR as drafted in this regard, the ambiguities presented in the preamble demand serious consideration and analyses as follows.

a. Many of the criteria are not attainable or scientifically valid with regard to municipal stormwater dischargers, nor is the proposed approach consistent with an appropriate delegation of authority to the State.

ii. Scientific Defensibility of Standards

Municipal storm water discharges require a uniquely different scientific as well as regulatory approach. The episodic nature of storm flow events; the huge variances in flow volume, rate, timing, concentrations, and loads; the variability in receiving waters; and organism tolerance for and recovery f rom episodic exposure need to be taken into account in developing standards.

In a July 1992 memorandum addressing a Combined Sewer Overflow/Wet Weather workshop, Tudor Davies, Director of EPA's Office of Science and Technology wrote: "Changes being considered in the aquatic criteria development methodology to enhance the scientific defensibility of the criteria would be applicable to both constant and to wet weather discharges. One such change undergoing consideration is a change in the duration and frequency of exposure assumptions to make criterion more toxicologically realistic.

EPA has begun this work and is apparently nearing completion. With EPA's own Science and Technology office recognizing the inadequacy of the current approach to setting criteria relative to wet weather discharges, it must be concluded any attempt to apply the CTR criteria to municipal stormwater system discharges is ill-founded and likely inconsistent with the CWA.

Response to: CTR-031-004c

EPA believes the CTR is consistent with current State and federal regulatory approaches. Regarding the comment that the CTR is not coordinated with the State Implementation Procedures, the CTR and the State Implementation Plan have been coordinated by EPA and the State in order to be made effective in a similar timeframe. In addition, EPA will review the State Implementation Policy for consistency with the Clean Water Act.

The comment regarding NEPA and ESA review assumes that stormwater discharges subject to numeric effluent limitations will have to be treated by new end-of-pipe facilities. As explained in Comment ID CTR-001-002, EPA believes that implementation of criteria as applied to wet-weather discharges will not require the construction of end-of-pipe facilities.

EPA's interim policy regarding application of the CTR to storm water dischargers is described in response to Comment ID CTR-001-002. The issue raised here is more one of how criteria are implemented for storm water dischargers and not the criteria themselves, which are developed to be protective of aquatic life and human health. In addition, the criteria are biologically based and, as such, if applied with the appropriate duration and frequency for storm water events, reflect a biologically-based approach.

Comment ID: CTR-031-005b
Comment Author: Fresno Metro. Flood Ctrl Dist.
Document Type: Flood Ctrl. District
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: I Stormwater/Wet Weather Flows
References: Letter CTR-031 incorporates by reference letter CTR-027
Attachments? N
CROSS REFERENCES G-02

Comment: If the proposed rule is carefully and sufficiently modified to affirm a commitment by EPA to effect only its Congressional authorization as established by CWA section 402(p), then EPA's failure to assess municipal storm water dischargers" ability to attain the proposed standards and associated economic and environmental impacts may be set aside at this time. However, if EPA persists in maintaining the CTR as drafted in this regard, the ambiguities presented in the preamble demand serious consideration and analyses as follows.

a. Many of the criteria are not attainable or scientifically valid with regard to municipal stormwater dischargers, nor is the proposed approach consistent with an appropriate delegation of authority to the State.

iii. State Flexibility and Authority

The CTR states, "The criteria established in this section are subject to the State's general rules of applicability in the same way and to the same extent as are other Federally-adopted and State adopted numeric toxics criteria when applied to the same use classifications..." p. 42206

[INDENT]This language supports State Water Resources Control Board decisions and the San Francisco Basin Plan which have made it clear that municipal storm water dischargers need to address water quality standards only through the implementation, and escalation as necessary, of best management practices. As noted previously, the language of this section must be better supported in the preamble.

Notwithstanding the above statement on page 42206, the CTR actually diminishes state flexibility in implementing the rule and is inconsistent with state compliance schedules. The CTR mandates implementation limits on the state and implies a 5-year limit on compliance.

A five-year compliance schedule for municipal storm water dischargers is entirely inconsistent with the State's, EPA'S, and Phase II stakeholder's understanding of the unique challenges of storm water permitting. The draft Phase II regulation submitted to OMB includes a comprehensive reevaluation of

storm water programs after two permit terms, and recommends no added best management practices or changes in the Phase II program until such evaluation and research are completed.

Response to: CTR-031-005b

See response to CTR-040-004.

EPA believes the CTR is consistent with current State and federal regulatory approaches. Regarding the comment that the CTR is not coordinated with the State Implementation Procedures, the CTR and the State Implementation Plan have been coordinated by EPA and the State in order to be made effective in a similar timeframe. In addition, EPA will review the State Implementation Policy for consistency with the Clean Water Act.

The comment regarding NEPA and ESA review assumes that stormwater discharges subject to numeric effluent limitations will have to be treated by new end-of-pipe facilities. As explained in Comment ID CTR-001-002, EPA believes that implementation of criteria as applied to wet-weather discharges will not require the construction of end-of-pipe facilities.

Comment ID: CTR-036-008
Comment Author: County of Orange
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: I Stormwater/Wet Weather Flows
References: Letter CTR-036 incorporates by reference letters CTR-013, CTR-018, CTR-031, CTR-034 and CTR-040
Attachments? N
CROSS REFERENCES

Comment: We are concerned that the proposed rule precedes actions to evaluate wet weather flows by EPA Headquarters and the establishment of an appropriate scientific approach for stormwater compliance.

Response to: CTR-036-008

EPA's interim policy regarding application of the CTR to storm water dischargers is described in response to Comment ID CTR-001-002. The issue raised here is more one of how criteria are implemented for storm water dischargers and not the criteria themselves, which are developed to be protective of aquatic life and human health. In addition, the criteria are biologically based and, as such, if applied with the appropriate duration and frequency for storm water events, reflect a biologically-based approach.

Comment ID: CTR-036-010b
Comment Author: County of Orange
Document Type: Local Government
State of Origin: CA

Represented Org:
Document Date: 09/25/97
Subject Matter Code: I Stormwater/Wet Weather Flows
References: Letter CTR-036 incorporates by reference letters CTR-013, CTR-018, CTR-031, CTR-034 and CTR-040
Attachments? N
CROSS REFERENCES G-02

Comment: We are concerned that the five-year compliance period for stormwater discharges to meet the criteria is untenable. The linkage between the application of best management practices and water quality benefits is long term and will thus be hard to demonstrate. Even in a direct product substitution situation, such as the removal of leaded gasoline from fuels, data from Orange County shows a very slow and long-term reduction in lead concentrations in our water bodies over multiple years.

Response to: CTR-036-010b

EPA dropped its proposed five year compliance schedule from the final CTR. Based on public comments, EPA has determined that, in California, establishment of a compliance schedule is an implementation issue. Thus, the State should have discretion to establish a compliance schedule subject to EPA approval.

Comment ID: CTR-042-004
Comment Author: Cal. Dept. of Transportation
Document Type: State Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: I Stormwater/Wet Weather Flows
References:
Attachments? Y
CROSS REFERENCES

Comment: 4. The CTR criteria are not appropriate for application to storm water discharges.

In addition to the fact that the CTR criteria are not applicable to municipal storm water discharges, the water quality criteria proposed in the CTR are also based on the continuous or steady flows associated with wastewater discharges. As such, these criteria may not be applicable to the intermittent flows associated with storm water discharges. It is Caltrans understanding that EPA Headquarters is currently reviewing the applicability of water quality criteria to wet weather discharges. Currently, there exists no published scientific study assessing the impacts of storm water discharges on the designated beneficial uses of receiving waters. Given the variability of storm water flows, discharge points, pollutant quantities, and quality, EPA might consider a different approach to adopting criteria that takes into consideration this variability.

Requests:

Caltrans requests that the CTR criteria not be applied to municipal storm water discharges.

Response to: CTR-042-004

See response to CTR-040-004.

Every two years, the California State Water Resources Control Board (SWRCB) submits a report on the State's water quality to the U.S. EPA pursuant to Section 305(b) of the Federal Clean Water Act. These reports present water quality assessment information compiled by California's nine Regional Water Quality Control Boards. SWRCB (1996) indicates that urban runoff and storm sewers are major and moderate sources of impairment of beneficial uses in estuaries, lakes and reservoirs, rivers and streams, and wetlands. The extent of this impairment is shown in the table below.

Sizes of Waters Impaired by Urban Runoff and Storm Sewers by Contribution to Impairment

Waterbody Type (Units)	Major^1	Moderate and Minor^2
Estuaries(Acres)	899	52,552
Lakes and Reservoirs (Acres)	120,320	7,985
Rivers and Streams (Miles)	92	1,620
Wetlands, Freshwater (Acres)	1	58,316
Wetlands, Tidal (Acres)	0	184

Source: SWRCB (1996).
1. A major contributor is a source that is either the only one responsible for nonsupport of any designated use or it predominates over other sources.
2. A moderate contributor is a source that is the only one responsible for partial support of any use, predominates over other sources of partial support, or is one of multiple sources of nonsupport that have a significant impact on designated use attainment. A minor contributor is a source that is one of multiple sources responsible for nonsupport or partial support and is judged to contribute relatively little to this nonattainment.

State Water Resources Control Board (SWRCB). 1996. California 305(b) Report on Water Quality. Prepared as Required in Clean Water Act Section 305(b). August.

Comment ID: CTRH-002-006a
Comment Author: Chris Compton
Document Type: Public Hearing
State of Origin: CA
Represented Org: County of Orange
Document Date: 09/18/97
Subject Matter Code: I Stormwater/Wet Weather Flows
References:
Attachments? N
CROSS REFERENCES J

Comment: Does the California Toxics Rule meet the legal requirements of the Clean Water Act and other federal policies and laws?

Previous municipal stormwater speakers have questioned, as we have, EPA's interpretation of Section 402(p) of the Clean Water Act. In addition, the California Toxics Rule raises significant questions regarding its conformance with other federal policies and laws including Executive Order 12866, the Unfunded Mandates Reform Act, the Regulatory Flexibility Act, and the authority for EPA to adopt blanket criteria without considering the designated uses of such waters as required under the Clean Water Act.

To give you just one example, I'd like to briefly compare the California Toxics Rule with the compliance of Executive Order 12866:

Under Executive Order 12866, any "significant" federal regulatory action must be referred to the Office of Management and Budget for review before it can be approved. In this context, a "significant" action includes one which will "have an annual effect on the economy of $100 million or more or adversely affect in a material way the economy." Though admitting that there "may be a cost to some dischargers" to comply with the water quality standards that will be derived from these toxics criteria, the EPA nonetheless argues that the proposed rule is not a significant action because it "establishes ambient water quality criteria which, by themselves, do not directly impose economic impacts."

First, nothing in Executive Order 12866 indicates that only actions with direct economic impacts are to be considered by OMB. Second, for the EPA to ignore the link between the toxics criteria in the proposed rule and the obligations being imposed is very questionable. Is EPA conceding that State and regional water boards may simply ignore these criteria when promulgating water quality standards and issuing permits? Nothing in the preamble indicates that EPA views these criteria as merely advisory.

Despite stating that Executive order 12866 is not applicable, EPA goes on to include an economic analysis which purports to demonstrate that the proposed rule will result in a net economic benefit. The problem with this analysis is that it completely ignores the enormous cost that municipalities will bear if they are forced to bring their stormwater discharges into compliance with these toxics criteria. For example, a 1990 study conducted for the Sacramento Stormwater Program estimated that it would cost nearly $2 billion to implement a treatment program to achieve the water quality criteria proposed in the former Inland Surface Water Plan. Costs to comply with the proposed toxics criteria would be similar, if not higher, than those proposed in the Inland Surface Water Plan. Ultimately, the costs of compliance may reach into the ten of billions of dollars.

In short, EPA cannot have it both ways. It cannot state that stormwater discharges are subject to the proposed toxics rule and then turn a blind eye toward the costs associated with the implementation of this rule. The costs of the proposed rules are direct and significant, and therefore the rule must be submitted to OMB for review.

We have comparable concerns with the other federal laws that I cited previously, and we will elaborate on them in our written comments.

Response to: CTRH-002-006a

As with all NPDES storm water program rules, the CTR gives operators the flexibility to implement controls and measures as they deam appropriate to achieve the goals of the rule. MS4 operators can employ professional expertise, innovation or industry standards, and their previously-demonstrated legal authoriy (MS4 application, part 2 requirement) to achieve MEP (and to pay for it, if necessary), with the goal being cost-effective compliance with the CTR. WQS are considered in the CTR, as the rule allows the State to develop site-specific criteria when appropriate (see also the response to CTR-020-001 and

CTR-040-004).

Subject Matter Code: I-01 Application Sec 301 vs. MEP

Comment ID: CTR-001-003
Comment Author: Law Offices of Alan C. Waltner
Document Type: Storm Water Auth.
State of Origin: CA
Represented Org: Almeda Cnty Clean Wtr Pgm
Document Date: 09/22/97
Subject Matter Code: I-01 Application Sec 301 vs. MEP
References:
Attachments? N
CROSS REFERENCES

Comment: SECTION 402(P) ONLY SUBJECTS MUNICIPAL SEPARATE STORM SEWER SYSTEMS TO MAXIMUM EXTENT PRACTICABLE ("MEP") LEVEL CONTROLS

The implementation approach adopted by the State and Regional Boards is compelled by Section 402(p) of the Clean Water Act, which directs that a distinction to be drawn between industrial and municipal dischargers, and subjects municipal systems only to those controls that reflect pollution reductions to the maximum extent practicable.

Section 402(p)(3)(A) of the Clean Water Act as amended in 1987 provides that:

Permits for discharges associated with industrial activity shall meet all applicable provisions of this section and section (301).

42 U.S.C. 1342(p)(3)(A) (Emphasis Added).

In contrast to Section 402(p)(3)(A), which makes industrial storm water sources subject to "section 301," Section 402(p)(3)(B) provides that MS4 discharges need only satisfy the dual requirements of: (1) effective prohibition of non-storm water discharges, and (2) controls to reduce the discharge of pollutants in storm water to the maximum extent practicable ("MEP"). 33 U.S.C. S 1342(p)(3)(B). That subsection contains no cross reference to Section 301 as is found in the industrial discharge provision.

Section 301(b)(1)(C) sets a "timetable for achievement of objectives" that directs "point sources" to achieve "any more stringent limitation, including those necessary to . . . implement any applicable water quality standard established pursuant to (the CWA (such as the CTR)]" by July 1, 1977. 42 U.S.C. S 1311(b)(1))(C). This section has been cited by EPA as a basis for imposing numeric effluent limitations exceeding MEP-level controls on municipal storm water systems.

Yet, until the addition of Section 402(p) in 1987, municipal storm water systems were not subject to a NPDES permitting requirement. To read Section 301(b)(1)(C) as applying to municipal storm water systems would necessitate the retroactive application of Section 402(p), since under that reading such systems would have been required to address water quality standards ten years before the provision was added to the Act.

An interpretation of the statute resulting in such retroactive application would be strongly disfavored in the absence of clear Congressional intent to establish such retroactivity. N.J. Singer, Sutherland on Statutory Construction, S 41.04 (Sands 5th ed. 1993) ("Sutherland") ("Retrospective operation is not

favored by the courts however, and a law will not be construed as retroactive unless the act clearly, by express language or necessary implication, indicates that the legislature intended a retroactive application.").

However, Section 402(p) avoids this problem by expressly describing the applicability of Section 301, distinguishing between industrial storm water sources (which were always subject to Sections 402 and 301 and are confirmed by the 1987 Amendments to remain subject to Section 301), and municipal storm water sources (which were not subject to Section 402 prior to the 1987 Amendments and are only subject to MEP-level controls). The applicability provisions of Section 402(p) are also accommodated directly in Section 301(b)(1)(C), which only requires the achievement of "applicable" water quality standards. (*3)

The express applicability provisions of Section 402(p) also eliminate any argument that Congress intended to make Section 402(p) retroactively applicable to municipal storm water systems, thereby requiring such systems to have achieved water quality standards ten years previously. Not only is evidence lacking of any Congressional intent to make the provision retroactive, any argument of such intent is definitively rebutted by the clear distinction in Section 402(p) between industrial and municipal storm water systems.

Under standard rules of statutory construction, the more specific provision (402(p)) prevails over the more general provision (301(b)), and the express reference to Section 301 for one category of dischargers (industrial) precludes implication of the same reference for another category of dischargers (municipal) that is specifically addressed and does not contain such a reference. (*4) In other words, while Section 402(p) arguably makes the water-quality-related provisions of Section 301 applicable to industrial discharges, the Clean Water Act establishes a distinct system for MS4s that relies on the prohibition of non-storm water discharges and escalating best management practices.

EPA in the preamble to its 1990 storm water regulations acknowledged the statutory distinction in stating that:

The Act clarified that permits for discharges associated with industrial activity must meet all of the applicable provisions of section 402 and section 301 including technology and water quality based standards. However, the new Act makes significant changes to the permit standards for discharges from municipal storm sewers . . . . The approach is tiered in that storm water discharges associated with industrial activity must comply with sections 301 and 402 of the CWA . . . but permits for discharges from municipal separate storm sewer systems must require controls to reduce the discharge of pollutants to the maximum extent practicable . . . .

55 Fed. Reg. 47992-94 (November 16, 1990).

It is therefore important that the CTR confirm the implementation provisions of the 1995 Basin Plan and corresponding State Board decisions, and conform to the distinction set forth in Section 402(p) of the Clean Water Act. There is no authority under the Act for subjecting municipal storm sewer systems to control obligations exceeding the MEP standard.

(*3) Section 301(a), by reference, also requires compliance with Section 302, which provides that where a discharge:

would interfere with the attainment or maintenance of that water quality in a specific portion of the

navigable waters which shall assure protection of public health, public water supplies, agricultural and industrial uses, and the protection and propagation of a balanced population of shellfish, fish and wildlife, and allow recreational activities in and on the water, effluent limitations (including alternative effluent control strategies) for such point source or sources shall be established which can reasonably be expected to contribute to the attainment or maintenance of such water quality.

33 U.S.C. S 1312(a). Such "alternative effluent control strategies" which "can reasonably be expected to contribute" to this goal are generally comparable in description to the MEP standard.

(*4) In any event, Section 302 expressly allows "alternative effluent control strategies" and only requires limitations "reasonably" anticipated to "contribute" to meeting objectives. Similarly, EPA's regulations for the issuance of NPDES permits simply require the "imposition of conditions [that] ensure compliance with the applicable water quality requirements of all affected States.,, 40 C.F.R. S 122.4(d). For the San Francisco Bay Area, those requirements are expressed in the 1995 Basin Plan, which explicitly states that numerical water quality objectives are infeasible and provides for the sort of escalating management practices required under the NPDES permit for the ACCWP. The approach is also contemplated by EPA's regulations which state that NPDES permits should include " - . . best management practices to control or abate the discharge of pollutants when: . . . (2) Numeric effluent limitations are infeasible . . . . I, 40 C.F.R. S 122.44(k).

Response to: CTR-001-003

This comment is outside the scope of this rule which concerns what criteria should apply to California waters. The rule is distinct from the issue of whether storm water dischargers must comply with water quality standards. The issue raised by the commenter has been addressed by EPA's storm water program in other contexts. EPA disagrees with the comments. For a discussion of EPA's evaluation of studies concerning costs associated with achieving water quality criteria for storm water discharges, see responses to CTR-013-003 and CTR-040-004. For a discussion of the scientific validity of CTR criteria with regard to WQBELs and storm water discharges, see response to CTR-031-004c.

Comment ID: CTR-001-005
Comment Author: Law Offices of Alan C. Waltner
Document Type: Storm Water Auth.
State of Origin: CA
Represented Org: Almeda Cnty Clean Wtr Pgm
Document Date: 09/22/97
Subject Matter Code: I-01 Application Sec 301 vs. MEP
References:
Attachments? N
CROSS REFERENCES

Comment: INCONSISTENT AND AMBIGUOUS LANGUAGE IN THE PREAMBLE SUGGESTING A DIFFERENT RESULT MUST BE REMOVED

Reaffirmation of the provisions in Section 402(p) that make municipal storm water systems subject only to MEP-level controls is critically important since a number of statements in the preamble are either expressly, or ambiguously, overbroad. For example, the preamble states that:

Point source and nonpoint source allocations are established so that predicted receiving water concentrations do not exceed water quality standards.

Page 42185. As discussed above, there is no authority in the Clean Water Act for imposing wasteload allocations on municipal storm water systems that require more than MEP-level controls. Likewise, the following statement could be read to impermissibly substitute numeric effluent limitations for the MEP control standard:

National Pollutant Discharge Elimination System (NPDES) permits for wet weather point source discharges must include limits necessary to implement applicable water quality standards, through application of water quality-based effluent limitations of WQBELS.

Page 42186. Other statements in the preamble are somewhat less direct but nonetheless problematic.

When these proposed federal criteria take effect, they will create legally applicable water quality standards in the State of California for inland surface waters, enclosed bays and estuaries for all purposes and programs under the CWA.

Page 42160. Similarly, the following statement at page 42162 could be read in an overbroad manner as applied to MS4 discharges:

CWA section 301(b)(1)(C) . . . requires NPDES permits to contain limitations required to implement any applicable water quality standard established in the CWA.

So long as this "implementation" occurs through adoption of MEP-level BMPs, the result may be correct, but it is correct only because 402(p) subjects MS4s to the MEP standard, rather than due to the provisions of Section 301(b)(1)(C), which only apply to industrial and not municipal storm water systems under the applicability scheme established in Section 402(p).

Likewise, the apparently broad statement at page 42184 that:

If a discharge causes, has the reasonable potential to cause, or contributes to an excursion of a numeric or narrative water quality criteria, the permitting authority must develop permit limits as necessary to meet water quality standards.

must be qualified as applied to MS4s by the distinction set forth by Congress in Section 402(p). From the same statutory language of Section 402(p) comes the corollary that wasteload allocations reflecting reductions beyond MEP do not apply to municipal storm water discharges. (*6)

Any attempt to subject MS4s to controls exceeding the MEP standard would be unauthorized, and the statements in the preamble suggesting such a result must be removed. (*7)

(*6) The limited time allowed by the proposed rule for compliance schedules also does not adequately accommodate the MEP standard, since it may not be practicable (or even possible) to meet NELs or WLAs within the deadlines allowed under the proposal. The rule should allow compliance schedules for as long as necessary to meet the requirements using MEP-level controls.

We note in this regard that the proposed State Implementation Policy would provide that:

In no event shall a schedule of compliance for point source discharges, including stormwater discharges, exceed 10 years from the date of adoption of this Policy.

Draft SIP at 17. This provision would violate both Section 402(p) of the Clean Water Act and the cost-benefit balancing provisions of the Porter Cologne Act discussed below, to the extent that compliance within ten years could not be achieved through MEP-level controls.

(*7) We recognize that there is useful language in the discussion of "Wet Weather Flows" at page 42186-87, which states:

EPA recognizes that it is commonly infeasible to express (water quality based effluent limitations or] WQBELs as numeric limits for wet weather discharges and that in such cases best management practices ("BMPs") may serve as WQBELs . . . . It is therefore anticipated that WQBELS, including those necessary to meet the criteria set forth in this proposed rule, will be expressed as BMPs in wet weather discharges, NPDES permits, when the permitting authority determines that it is infeasible to express WQBELS as numeric limits.

We agree that MS4 permits should be established on the basis of BMPS. But EPA's discussion at page 42187 still fails to implement Section 402(p) to the extent that the agency would evaluate the feasibility of "expressing" numeric WQBELS rather than "satisfying" or "meeting" WQBELS. Section 402(p) only requires MS4s to adopt controls to the MEP level. It is the practicability of controls that is central to this system, not just the practicability of writing permits. The discussion at page 42187 should therefore be modified to acknowledge directly that MS4s are only required under Section 402(p) to adopt MEP level controls, regardless of whether it would be "feasible" from an administrative standpoint to write permits containing NELs or WLAS.

Response to: CTR-001-005

EPA disagrees with the comments. See response to CTR-001-003. For a discussion of EPA's evaluation of studies concerning costs associated with achieving water quality criteria for storm water discharges, see responses to CTR-013-003 and CTR-040-004. For a discussion of the scientific validity of CTR criteria with regard to WQBELs and storm water discharges, see response to CTR-031-004c.

Comment ID: CTR-001-011
Comment Author: Law Offices of Alan C. Waltner
Document Type: Storm Water Auth.
State of Origin: CA
Represented Org: Almeda Cnty Clean Wtr Pgm
Document Date: 09/22/97
Subject Matter Code: I-01 Application Sec 301 vs. MEP
References:
Attachments? N
CROSS REFERENCES

Comment: CONCLUSION

The most fundamental concern of the ACCWP is that any decision to subject MS4 dischargers to numeric effluent limitations and/or wasteload allocations that could trigger extensive collection and

end-of-pipe treatment facilities should take place directly and openly, rather than implicitly through ambiguously drafted regulation and preamble discussion. The ACCWP believes that it is currently in full compliance with its Clean Water Act obligations, through the adoption and implementation of a Storm Water Management Plan that has won numerous awards.

Only controls to the maximum extent practicable are required under Clean Water Act Section 402(p), and the State and Regional Boards are likewise precluded from adopting draconian control measures under analogous limitations of the state Porter Cologne Act.

These are not just nettlesome roadblocks to EPA action, but instead reflect a considered determination made by the legislative branch of both the state and federal governments that resources need only be devoted to this subject to the extent practicable. Given the magnitude of the public expenditures that would be involved statewide from numeric effluent limitations and/or reductions to meet wasteload allocations more stringent than achievable from MEP-level controls, and the fact that Congress has already addressed the matter in Section 402(p), a decision of this type and magnitude cannot be made administratively.

If EPA's intention is to conform its rule to Section 402(p), it should do so clearly and cleanly and remove the conflicting statements in the proposed rule's preamble that suggest a different result.

Response to: CTR-001-011

EPA disagrees with the comments. See response to CTR-001-003. For a discussion of EPA's evaluation of studies concerning costs associated with achieving water quality criteria for storm water discharges, see responses to CTR-013-003 and CTR-040-004. For a discussion of the scientific validity of CTR criteria, see response to CTR-031-004c.

Comment ID: CTR-013-001
Comment Author: County of Los Angeles
Document Type: Storm Water Auth.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: I-01 Application Sec 301 vs. MEP
References: Letter CTR-013 incorporates by reference letter CTR-027

Attachments? N
CROSS REFERENCES

Comment: In addition, we would like to emphasize the following concerns which greatly impact the Los Angeles County Stormwater Program:

1. The application of water quality standards to calculate water quality-based effluent limits for NPDES permits for municipal stormwater discharges. As proposed by the USEPA, the numeric water quality standards in the California Toxics Rule will be used to calculate water quality-based effluent limitations for all NPDES permits issued by the State. With regard to stormwater permits, the USEPA states in the preamble that:

NPDES permits for wet weather point source discharge must include limits necessary to implement applicable water quality based standards, through application of water quality-based effluent limitations or WQBELS. When this rulemaking is complete, these (numeric) criteria will be used to determine water quality standards in California and will, therefore, be the basis of WQBELs in NPDES permits for wet weather point sources. (Page 42186)

We believe that this position is inconsistent with the plain language used by Congress in incorporating the "maximum extent practicable" standard for municipal separate storm sewer systems (MS4s) into Section 410(p) (3) (B) of the Clean Water Act. To date, we are unaware of any USEPA regulation which has taken the noted position.

The Preamble goes on to state: "It is ... anticipated that WQBELS, including those necessary to meet the criteria set forth in this proposed rule, will be expressed as BMPs in wet weather discharges' NPDES permits, when the permitting authorities determines that it is infeasible to express WQBELs as numeric limits." Although this statement is intended to soften the earlier position, the difficulty for municipalities is that even with an aggressive BMP-based program, a municipality will likely not be able to comply with the proposed water quality standards. This was found in the analysis conducted by the County of Sacramento and the Fresno Metropolitan Flood Control District. If this is the case, the permitting agency would be required to develop a permit with WQBELs that essentially require end-of-pipe treatment of stormwater and the municipalities would face significant costs for complying with the limits.

We recommend that the USEPA modify the Preamble to clarify that MS4s are not required to comply with water quality standards.

Response to: CTR-013-001

EPA disagrees with the comments. See response to CTR-001-003. For a discussion of EPA's evaluation of studies concerning costs associated with achieving water quality criteria for storm water discharges, see responses to CTR-013-003 and CTR-040-004. For a discussion of the scientific validity of CTR criteria, see response to CTR-031-004c.

Comment ID: CTR-014-001
Comment Author: City of Lakewood
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: I-01 Application Sec 301 vs. MEP
References: Letter CTR-014 incorporates by reference letters CTR-013 and CTR-027

Attachments? N
CROSS REFERENCES

Comment: In addition, we would like to emphasize the following key issues on the California Toxic Rule (CTR), which are of major impact to our stormwater program:

1. The application of water quality standards to calculate water quality-based effluent limits for NPDES permits for municipal stormwater discharges. As proposed by the USEPA, the numeric water quality

standards in the California Toxics Rule will be used to calculate water quality-based effluent limitations for all NPDES permits issued by the State. We believe that this position is inconsistent with the plain language used by Congress in incorporating the "maximum extent practicable" standard for municipal separate storm sewers systems (MS4s) into section 410 (p) (3) (B) of the Clean Water Act. We recommend that the USEPA modify the Preamble to Clarify that MS4s arc not required to comply with water quality standards.

Response to: CTR-014-001

EPA disagrees with the comments. See response to CTR-001-003. For a discussion of EPA's evaluation of studies concerning costs associated with achieving water quality criteria for storm water discharges, see responses to CTR-013-003 and CTR-040-004. For a discussion of the scientific validity of CTR criteria, see response to CTR-031-004c.

Comment ID: CTR-019-001a
Comment Author: Richards, Watson & Gershon
Document Type: Local Government
State of Origin: CA
Represented Org: Cities of Barst
Document Date: 09/26/97
Subject Matter Code: I-01 Application Sec 301 vs. MEP
References: Letter CTR-019 incorporates by reference letters CTR-001, CTR-013, CTR-027 and CTR-036

Attachments? N
CROSS REFERENCES J

Comment: We recognize that the basic purpose for the proposed rule is to establish water quality criteria for priority toxic pollutants for point source discharges. However, in proposing to extend that criteria to storm water discharges, it is clear that EPA has not fully assessed the potential impact of such an extension on local governmental agencies, nor the complete lack of feasibility of attempting to apply numeric effluent standards to discharges to municipal separate storm sewer systems ("MS4s"), or the enormous cost of such an effort which would potentially require a complete reengineering and if not reconstruction of MS4s in California to include end-of-pipe treatment.

Our comments should be considered in the proper context. The cities which we represent are acutely aware of the problems associated with pollution from... urban runoff. Their residents and businesses share a common concern to preserve and enhance the water quality of our bays, rivers, estuaries and the Pacific Ocean. Our cities are fully committed to doing what they reasonably can to achieve these objectives. Our cities have been working with staff of the State Water Resources Control Board ("SWRCB") and its Regional Water Quality Control Boards ("RWQCB's") to develop effective storm water management programs under current municipal NPDES permits which comply with state and federal law. However, the proposed rule does not appear to reflect or recognize that individual cities' fiscal and administrative resources for implementing unfunded mandates are limited. Of all governmental agencies in California involved in the process, the many small cities which we represent are the least suited to bear the brunt of the responsibility for controlling pollution from urban runoff.

The primary portion of the proposed rule that has caused concern among our cities is the statement at

pages 42186-42187 of preamble that:

"When this rulemaking is complete, these criteria will be used to determine water-quality standards in California and will therefore be the basis of WQBELs in NPDES permits for wet weather point sources. However, EPA recognizes that it is commonly infeasible to express WQBELs as numeric limits for wet weather discharges and that in such cases best management practices ("BMPs") may serve as WQBELS. (Emphasis added.)

Our concern is further heightened by the comment at page 42187 of preamble that:

"It is therefore anticipated that WQBELS, including those necessary to meet the criteria set forth in this proposed rule, will be expressed as BMPs in wet weather dischargers' NPDES permits, when the permitting authority determines that it is infeasible to express WQBELS as numeric limits." (Emphasis added.)

The comments appear to indicate that in any further municipal NPDES permitting situations, the proposed rule potentially can be interpreted to require the implementation of WQBELs unless an analysis is prepared determining the infeasibility of each of the WQBELs as numeric limits.

As applied to storm water discharges, WQBELs are almost by definition infeasible. It should also be kept in mind that it is not the cities themselves that are the sources of stormwater pollution; municipal facilities have not been identified, to our knowledge, as being significant sources of contaminated urban runoff. Rather, the sources of this type of pollution, to the extent they can be identified, appear to be primarily the result of hydrological changes brought about by urbanization. These are activities over which cities have very little practical control. Nevertheless, the cities and counties of California are bearing the full and financially unassisted responsibility of ending stormwater pollution themselves.

We agree with the comments of the County of Los Angeles and the ACCWP that EPA's effort to apply numeric effluent limits to municipal storm water discharges is in direct conflict with the plain language of Congress in adopting the "maximum extent practicable" standard for controlling pollution in storm water discharges to a MS4. The proposed rule as applied to wet weather flows is also clearly inconsistent with both the EPA Is and the SWRCB's approach of addressing this problems through the adoption of Best Management Practices ("BMP's").

As noted in the SWRCB's own Municipal Storm Water Best Management and Practices Guidebook, "the sources of storm water pollution are extensive, ill-defined and highly variable." The State Board previously determined in its order entitled "In the Matter of Petition of Natural Resources Defense Council, Inc. for Review of Waste Discharge Requirements Order No. 90-079," Order No. WQ 91-04 (May 16, 1991), that:

"We find here also that the approach of the Regional Board requiring the dischargers to implement a program of best management practices which will reduce pollutants and runoff and prohibiting non-storm water discharges, is appropriate and proper. We base our conclusion on the difficulty of establishing numeric effluent limitations which have a rational basis, the lack of technology available to treat storm water discharges at the end of the pipe, the huge expense such treatment would entail, and the level of pollutant reduction which we anticipate from the Board's regulatory program. We feel compelled to note here our agreement with the Regional Board that this permit does truly represent a massive undertaking." (Emphasis added.)

As discussed in detail in the technical comments filed in response to the proposed rule, the EPA has not

explained how the proposed numeric effluent guidelines can be achieved through the implementation of BMP's. Under the circumstances, the ultimate result of the application of the rule to storm water discharges would be end of pipe treatment controls.

However, the EPA has already recognized, as the SWRCB, that end of pipe treatment controls for storm water discharges are technically unfeasible and unreasonable. The EPA has recognized that "it was not the intent of Congress to acquire municipal permits to required end of pipe treatment technology but to implement a comprehensive stormwater management program to reduce the discharge of pollutants from municipal storm sewer systems." 55 Fed.Reg., p. 48038 (November 16, 1990).

Each of our cities strongly believe that the proposed rule must be modified to clearly state that numeric effluent guidelines do not and will not apply to discharges to the municipal separate sewer systems.

Response to: CTR-019-001a

EPA disagrees with the comments. See response to CTR-001-003. For a discussion of EPA's evaluation of studies concerning costs associated with achieving water quality criteria for storm water discharges, see responses to CTR-013-003 and CTR-040-004. For a discussion of the scientific validity of CTR criteria, see response to CTR-031-004c.

Comment ID: CTR-021-006e
Comment Author: LeBoeuf, Lamb, Green & MacRae
Document Type: Local Government
State of Origin: CA
Represented Org: City of Sunnyvale
Document Date: 09/25/97
Subject Matter Code: I-01 Application Sec 301 vs. MEP
References: Letter CTR-021 incorporates by reference letter CTR-035
Attachments? Y
CROSS REFERENCES J
E-01c
R
S

Comment: It is with a sense of reluctance that Sunnyvale joins in CASA/Tri-TAC's adverse comments on the CTR and the EA, and Sunnyvale does so in a spirit of constructive criticism and with an expectation that the Agency will make the necessary adjustments in its approach towards the CTR before the final rule is promulgated. In addition, in the same spirit and with the same expectation, Sunnyvale would like to make the following points on its own behalf:

3. Failure to Address Important Stormwater-Related Issues. In addition to its POTW, Sunnyvale is the owner of a system of storm drains which contribute wet weather flows to the South Bay. We are concerned that the EA entirely neglects the potential impacts of the proposed CTR on the storm drains. The EA entirely omits any meaningful analysis of the costs of bringing storm drains into compliance with the proposed CTR, thereby significantly understating the overall costs of the CTR. We believe that this omission is violative of the Agency's legal obligations under the authorities cited in the preceding paragraph.

In addition, we join in the comments being filed by the various other operators of stormwater collection systems to the effect that EPA has overstated the legal requirements for storm drains to comply with numerical criteria.

Response to: CTR-021-006e

EPA disagrees with the comments. See response to CTR-001-003. For a discussion of EPA's evaluation of studies concerning costs associated with achieving water quality criteria for storm water discharges, see responses to CTR-013-003 and CTR-040-004. For a discussion of the scientific validity of CTR criteria, see response to CTR-031-004c. For a discussion of the relationship between criteria, standards, effluent limitations and implementation costs, see response to CTRH-002-006a. For further discussion of how the rule complies with the E.O. 12866, the Unfunded Mandates Reform Act and the Regulatory Flexibility Act, see the preamble to the final rule.

Comment ID: CTR-024-001
Comment Author: City of Hawthorne
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: I-01 Application Sec 301 vs. MEP
References: Letter CTR-024 incorporates by reference letters CTR-013 and CTR-027
Attachments? N
CROSS REFERENCES

Comment: In addition, we would like to emphasize the following key issues on the California Toxic Rule (CTR), which are of major impact to our stormwater program:

1. The application of water quality standards to calculate water quality-based effluent limits for NPDES permits for municipal stormwater discharges. As proposed by the USEPA, the numeric water quality standards in the California Toxics Rule will be used to calculate water quality-based effluent limitations for all NPDES permits issued by the State. We believe that this position is inconsistent with the plain language used by Congress in incorporating the "maximum extent practicable" standard for municipal separate storm sewers systems (MS4s) into section 410(p) (3) (B) of the Clean Water Act. We recommend that the USEPA modify the Preamble to clarify that MS4s are not required to comply with water quality standards.

Response to: CTR-024-001

EPA disagrees with the comments. See response to CTR-001-003. For a discussion of EPA's evaluation of studies concerning costs associated with achieving water quality criteria for storm water discharges, see responses to CTR-013-003 and CTR-040-004. For a discussion of the scientific validity of CTR criteria, see response to CTR-031-004c.

Comment ID: CTR-027-001
Comment Author: California SWQTF
Document Type: Storm Water Auth.

State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: I-01 Application Sec 301 vs. MEP
References: Letter CTR-027 incorporates by reference letters CTR-001, CTR-036 and CTR-040
Attachments? N
CROSS REFERENCES

Comment: MAJOR ISSUES

1. The application of water quality standards to calculate water quality-based effluent limits for NPDES permits for municipal stormwater discharges. In the preamble to the proposed rule, US EPA suggests that the numeric water quality standards in the CTR will be used to calculate water quality-based effluent limitations for all NPDES permits issued by the State. With regard to stormwater permits, USEPA states in the preamble that:

NPDES permits for wet weather point source discharge must include limits necessary to implement applicable water quality based standards, through application of water quality-based effluent limitations or WQBELS. When this rulemaking is complete, these (numeric) criteria will be used to determine water quality standards in California and will therefore be the basis of WQBELs in NPDES permits for wet weather point sources. (Page 42186)

We believe that this position is inconsistent with the plain language used by Congress in incorporating the "maximum extent practicable" standard for municipal separate storm sewers systems (MS4s) into section 420(p)(3)(B) of the Clean Water Act. To date we are unaware of any USEPA regulation, which has taken the position in the proposed rule. Furthermore, the basis for USEPA's position is primarily the "Elliot memo". This memo is an internal memorandum and has not been subject to public or judicial review. Further discussion regarding this issue is found in the responses to the CTR by the Alameda Countywide Clean Water Program, County of Orange and County of Sacramento, which are incorporated herein by reference.

The Preamble goes on to state: "It is ....anticipated that WQBELS, including those necessary to meet the criteria set forth in this proposed rule, will be expressed as BMPs in wet weather discharges' NPDES permits, when the permitting authority determines that it is infeasible to express WQBELs as numeric limits." Although this statement appears to soften the earlier position, the difficulty for municipalities is that even with an aggressive BMP based program, a municipality will likely not be able to comply with the proposed water quality standards. We point to the analysis conducted by the County of Sacramento and the Fresno Metropolitan Flood Control District. If this is the case, the permitting agency could likely be required to develop a permit with WQBELs that essentially require end-of-pipe treatment of stormwater and the municipalities would face significant costs for complying with the limits (see following discussion regarding economic analysis).

Recommendation: USEPA should modify the Preamble statement to clarify that MS4s are only required to satisfy the MEP standard, and are not obligated to adopt controls beyond MEP-levels to achieve water quality standards.

Response to: CTR-027-001

EPA disagrees with the comments. See response to CTR-001-003. For a discussion of EPA's evaluation

of studies concerning costs associated with achieving water quality criteria for storm water discharges, see responses to CTR-013-003 and CTR-040-004. For a discussion of the scientific validity of CTR criteria, see response to CTR-031-004c.

Comment ID: CTR-030-010
Comment Author: Utility Water Act Group
Document Type: Trade Org./Assoc.
State of Origin: DC
Represented Org:
Document Date: 09/25/97
Subject Matter Code: I-01 Application Sec 301 vs. MEP
References:
Attachments? Y
CROSS REFERENCES

Comment: F. EPA Should Provide a Consistent Standard for Application of BMPs to Wet Weather Flows

UWAG applauds EPA's recognition that "it is commonly infeasible to express WQBELs as numeric limits for wet weather discharges and that in such cases best management practices (BMPS) may serve as WQBELS." 62 Fed. Reg. at 42, 186-87. But EPA also obscures the standard for determining when use of BMPs is appropriate by stating:

It is ... anticipated that WQBELS, including those necessary to meet the criteria set forth in this proposed rule, will be expressed as BMPs in wet weather discharges' NPDES permits, when the permitting authority determines that it is infeasible to express WQBELs as numeric limits.

62 Fed. Reg. at 42,187, col. 1. This statement differs from the standard EPA proposed in a recently released question and answer document (61 Fed. Reg. 57,425 (Nov. 6, 1996)) on wet weather flows. According to the question and answer document, permitting authorities may use alternative permit conditions "where numeric water quality-based effluent limitations are determined to be unnecessary or infeasible." Id. at 57,426, col. I (emphasis added). Thus, EPA has narrowed the applicability of BMPs to wet weather flows for purposes of the California proposal. If EPA wants to promote consistent treatment of wet weather flows, it should modify the proposed preamble to the California water quality standards to reflect that the permitting authority may apply BMPs or other alternative permit conditions whenever a numeric WQBEL is unnecessary or infeasible.

Furthermore, EPA should explicitly state that the permitting authority bears the burden of showing that a numeric WQBEL for a wet weather flow is feasible or necessary. Since EPA admits that such limitations are "commonly infeasible," the permittee should not bear the burden of proving numeric limits unnecessary or infeasible.

Response to: CTR-030-010

EPA disagrees with the comments. See response to CTR-001-003. For a discussion of EPA's evaluation of studies concerning costs associated with achieving water quality criteria for storm water discharges, see responses to CTR-013-003 and CTR-040-004. For a discussion of the scientific validity of CTR criteria, see response to CTR-031-004c.

Comment ID: CTR-031-001a
Comment Author: Fresno Metro. Flood Ctrl Dist.
Document Type: Flood Ctrl. District
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: I-01 Application Sec 301 vs. MEP
References: Letter CTR-031 incorporates by reference letter CTR-027
Attachments? N
CROSS REFERENCES I-02

Comment: 1. The preamble of the proposed CTR, and therefore the apparent intended application of the rule, is inconsistent with the Clean Water Act.

Several broad, ambiguous statements in the preamble of the proposed rule imply that Clean Water Act section 301 requirements apply to all dischargers, including municipal stormwater systems. These presumptions must be qualified to recognize the clear intent of Congress and plain language of the CWA, section 402(p) which clearly require municipal storm water dischargers only to adopt controls to reduce pollutants in storm water to- the maximum extent practicable and to eliminate non-storm water discharges. The section's intent is demonstrated through the application of section 301 requirements, and related application of numeric effluent limitations or wasteload allocations in NPDES permits, to industrial stormwater discharges only.

EPA is obviously aware of Congress's intent as to municipal storm water discharge requirements. EPA included in its published draft Phase I municipal storm water regulations a quote from the Congressional Record of October 16, 1986, citing that intent.

Without a clear citation of the provisions of CWA section 402(p), the preamble to the proposed rule appears to be an attempt to codify the Elliot memorandum of January 9, 1991, and to create via this rule a result not authorized by Congress.

In order to eliminate this fundamental legal flaw in the proposed CTR, and eliminate the potential for future misinterpretation and controversy, each of the following statements from the preamble (at a minimum) must be clarified and/or qualified so that they do not appear to override or retract CWA section 402(p).

"When these proposed federal criteria take effect, they will create legally applicable water quality standards ... in California ... for all purposes and programs under the CWA." [p. 42160. This statement must include recognition that for municipal storm water dischargers, the CWA objectives can be addressed through best management practices, implemented to the maximum extent practicable (MEP), as established by CWA section 402(p).]

"CWA section 301(b)(1)(C) ... requires NPDES permits to contain limitations required to implement any applicable water quality standard established in the CWA." [p. 42162. The text should note that section 301 (b) (1) (c) does not apply to municipal storm water dischargers, as established through section 402(p).]

"If a discharge causes, has the reasonable potential to cause, or contributes to an excursion of a numeric

or narrative water quality criteria, the permitting authority must develop permit limits as necessary to meet water quality standards." (P. 42184. Again, for municipal storm water dischargers, the preamble and CTR must make clear the MS4 permits must: address this CWA objective through the MEP requirement.]

"Point source and nonpoint source allocations are established so that predicted receiving water concentrations do not exceed water quality standards." [p. 42185.1; and

"[NPDES] permits for wet weather point source dischargers must include limits necessary to implement applicable water quality standards, through application of water quality-based effluent limitations or WQBELs." [p. 42186. These two statements are only correct as applied to industrial storm water dischargers; numeric effluent limitations or wasteload allocations can not be legally, reasonably, or practically applied to municipal storm water discharges.]

Response to: CTR-031-001a

EPA disagrees with the comments. See response to CTR-001-003. For a discussion of EPA's evaluation of studies concerning costs associated with achieving water quality criteria for storm water discharges, see responses to CTR-013-003 and CTR-040-004. For a discussion of the scientific validity of CTR criteria, see response to CTR-031-004c.

Comment ID: CTR-035-036
Comment Author: Tri-TAC/CASA
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: I-01 Application Sec 301 vs. MEP
References:
Attachments? N
CROSS REFERENCES

Comment: pp. 42186-42187 -- Wet Weather Flows Consistent with a recommendation by the Permitting and Compliance Issues Task Force, we recommend that EPA include language in the Preamble stating that, for permits such as stormwater permits that do not generally contain quantitative effluent limits but instead require the implementation of control measures and best management practices, compliance shall be determined based on the degree of implementation of the required control measures and the reduction of pollutants to the maximum extent practicable (SWRCB, 1995, Part VI).

Response to: CTR-035-036

EPA disagrees with the comments. See response to CTR-001-003. For a discussion of EPA's evaluation of studies concerning costs associated with achieving water quality criteria for storm water discharges, see responses to CTR-013-003 and CTR-040-004. For a discussion of the scientific validity of CTR criteria, see response to CTR-031-004c.

Comment ID: CTR-036-001

Comment Author: County of Orange
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: I-01 Application Sec 301 vs. MEP
References: Letter CTR-036 incorporates by reference letters CTR-013, CTR-018, CTR-031, CTR-034 and CTR-040
Attachments? N
CROSS REFERENCES

Comment: Applicability of Criteria to Municipal Stormwater Discharges

In the preamble to the proposed rule, EPA assumes without discussion that these criteria for priority toxic pollutants apply to municipal stormwater discharges. Specifically, the preamble states, "When this rulemaking is complete, these criteria will be used to determine water quality standards in California and will therefore be the basis of WQBELs [Water Quality-Based Effluent Limitations] in NPDES permits for wet weather point sources." [62 Fed. Reg. 431861.

We note for the record, however, that the applicability of WQBELs to municipal stormwater discharges is an issue which has not yet been resolved. Under Section 402(p)(3)(A) of the Clean Water Act ("CWA"), permits for industrial stormwater discharges must comply with the applicable provisions of the CWA concerning effluent limitations. [33 U.S.C. section 1342(p)(3)(A)]. In contrast, permits for municipal Stormwater discharges are only required to ensure reduction of the pollutant discharges "to the maximum extent possible." [33 U.S.C. section 1342(p)(3)(B)].

In the preamble, EPA acknowledges that it is "commonly infeasible" to express WQBELs as numeric limits for wet weather discharges and that in such cases best management practices (BMPs) "may serve as WQBELS." [62 Fed. Reg. 42186-871.] Implicit in that acknowledgment is the assumption that the application of WQBELs to municipal stormwater discharges remains appropriate and that numeric limits can be imposed on such discharges at some time in the future. We believe such an assumption is wrong and is directly contradicted by the plain language of Section 402(p). The distinction drawn between industrial stormwater discharges and municipal stormwater discharges under that Section are real and cannot be ignored by EPA in adopting the proposed rule.

Conclusions

The proposed California Toxics Rule in its current form has many flaws, with respect to its presumption of applicability to municipal stormwater discharges. The comments provided above indicate a need to substantially revise the rule and assure conformance with federal policies and laws. Consideration should also be given to allowing the State of California to resume control over rule promulgation. As a result, the County of Orange recommends that the rule not be adopted at this time and that discussions be initiated with municipal stormwater dischargers through the California Stormwater Task Force to resolve the many issues raised.

Response to: CTR-036-001

EPA disagrees with the comments. See response to CTR-001-003. For a discussion of EPA's evaluation of studies concerning costs associated with achieving water quality criteria for storm water discharges,

see responses to CTR-013-003 and CTR-040-004. For a discussion of the scientific validity of CTR criteria, see response to CTR-031-004c.

Comment ID: CTR-040-003
Comment Author: County of Sacramento Water Div
Document Type: Storm Water Auth.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: I-01 Application Sec 301 vs. MEP
References: Letter CTR-040 incorporates by reference letter CTR-027
Attachments? Y
CROSS REFERENCES

Comment: MAJOR CONCERNS

We do, however, have fundamental concerns with the Rule as it is presently proposed and its supporting economic analysis. We believe the Rule can be modified in a manner that will be responsive to our concerns while at the same time being consistent with applicable Federal law and regulations. Our major concerns are presented here and are followed by our recommended modifications.

1. Concern: The Rule, as presently proposed, appears to require discharges from municipal stormwater programs to meet water quality based effluent limits (WQBELs).

* Reference Section--Preamble, page 42186 of the Federal Register under "4. Wet Weather Flows." This language appears to replace the municipal stormwater BMP standard established in the Clean Water Act (CWA) section 402(p)(3)(B), that municipal stormwater programs "shall require controls to reduce the discharge of pollutants to the maximum extent practicable (MEP)..."

* Many of the urban streams in Sacramento County are effluent dominated during storm events. Thus, the flow in these urban streams is primarily stormwater. if WQBELs apply to municipal stormwater, then stormwater discharges to many county urban streams will have to meet the numeric water quality criteria proposed in the Rule.

* If the Rule intends that municipal stormwater discharges will be required to meet WQBELS, the Rule will force the Sacramento Stormwater Management Program to implement end-of-pipe treatment.

Response to: CTR-040-003

EPA disagrees with the comments. See response to CTR-001-003. For a discussion of EPA's evaluation of studies concerning costs associated with achieving water quality criteria for storm water discharges, see responses to CTR-013-003 and CTR-040-004. For a discussion of the scientific validity of CTR criteria, see response to CTR-031-004c.

Comment ID: CTR-042-001
Comment Author: Cal. Dept. of Transportation
Document Type: State Government

State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: I-01 Application Sec 301 vs. MEP
References:
Attachments? Y
CROSS REFERENCES

Comment: The California Department of Transportation (Caltrans) submits the following comments on the proposed California Toxics Rule ("CTR") relative to its status as a NPDES storm water discharge permit holder. As this proposed rule could have serious financial impacts on storm water dischargers, Caltrans welcomes the opportunity to provide comments to EPA that could decrease the impact of this rule while still affording a similar level of environmental benefit. It is our hope that you will give serious consideration to the following comments:

1. The CTR improperly applies water quality-based effluent limits to municipal storm water discharges.

The Preamble to the CTR discusses application of the rule to wet weather discharges by stating:

NPDES permits for wet weather point source discharges must include limits necessary to implement applicable water quality standards, through the application of water quality-based effluent limitations or WQBELS. Section 301(b)(1)(C) of the CWA, 33 U.S.C. 1311(b)(1)(C); see also Memorandum of E. Donald Elliot, Assistant Administrator and General Counsel, to Nancy J. Marvel, Region 9, dated January 9, 1991. When this rulemaking is complete, these criteria will be used to determine water quality standards in California and will therefore be the basis for WQBELs in NPDES permits for wet weather point sources.

62 Fed. Reg. 42,186 (Aug. 5, 1997). The position taken by EPA in this excerpt, namely that WQBELs must be applied to all wet weather discharges, is inconsistent with the plain language of the Clean Water Act ("CWA"). The CWA at section 402(p)(3)(B)(iii) specifically states that permits for discharges from municipal storm sewers "shall require controls to reduce the discharge of pollutants to the maximum extent practicable." Unlike industrial storm water dischargers, which are required to "meet all applicable provisions of this section and section 1311 of this title" (See section 402(p)(3)(A)), municipal storm water dischargers, such as Caltrans, must only reduce the discharge of pollutants to the Maximum Extent Practicable ("MEP"). The Preamble language mistakenly applies the WQBEL requirements of section 301 to municipal storm water dischargers when it is clear that Congress never intended for municipal dischargers to meet this more stringent standard.

Request: Caltrans respectfully requests that the Preamble be modified to clarify that municipal storm water discharges are not required to meet water quality standards, but must only control discharges to the MEP.

Response to: CTR-042-001

EPA disagrees with the comments. See response to CTR-001-003. For a discussion of EPA's evaluation of studies concerning costs associated with achieving water quality criteria for storm water discharges, see responses to CTR-013-003 and CTR-040-004. For a discussion of the scientific validity of CTR criteria, see response to CTR-031-004c.

Comment ID: CTR-056-015a
Comment Author: East Bay Municipal Util. Dist.
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/22/97
Subject Matter Code: I-01 Application Sec 301 vs. MEP
References: Letter CTR-056 incorporates by reference letter CTR-054
Attachments? N
CROSS REFERENCES C-24

Comment: Third, regarding the criteria being proposed for adoption in the draft CTR, EBMUD recommends that EPA should:

* Should clearly recognize within the CTR that the existing, approved Basin Plan for the San Francisco Bay includes requirements specifically designed to address wet weather overflows and grants provisions for exemptions where an inordinate burden would be placed on the discharger relative to the beneficial uses protected. It should also be acknowledged through inclusion in the CTR that the requirements and applicable exemptions previously justified and approved by EPA and the State should not be affected by the proposed rule.

Response to: CTR-056-015a

The purpose of the CTR is to fill the current gaps in water quality criteria in inland surface waters, enclosed bays, and estuaries. Any existing exemptions in a State Basin Plan that have been approved by the State and EPA would not be negated by the CTR.

Comment ID: CTR-060-011
Comment Author: San Diego Gas and Electric
Document Type: Electric Utility
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: I-01 Application Sec 301 vs. MEP
References:
Attachments? N
CROSS REFERENCES

Comment: PROVISIONS SDG&E DOES NOT SUPPORT

As described in the following comments SDG&E does not support the following provisions:

Application of effluent limits/BMPs to stormwater

The preamble (see 62 Fed. Reg. at 42,186, Col. 3) states that: 1) NPDES permits "...for wet weather point source discharges must include limits necessary to implement applicable water quality standards,

through application of water quality-based effluent limits or WQBELs"; and 2) "...these criteria will ... be the basis of WQBELs in NPDES permits for wet weather point sources". The preamble further recognizes that "it is commonly infeasible to express WQBELs as numeric limits for wet weather discharges and that in such cases best management practices (BMPS) may serve as WQBELS." (see 62 Fed. Reg. at 42,186-87). However, the standard for determining when the use of BMPs is appropriate is different from that provided in a recent Federal Register notice (see 61 Fed. Reg. 57425-29) "Questions and Answers Regarding Implementation of an Interim Permitting Approach for Water Quality-Based Effluent Limitations in Storm Water Permits" (the "Notice"). Whereas the Notice states that permitting authorities may use alternative permit conditions "where numeric water quality-based effluent limitations are determined to be unnecessary or infeasible." Id. at 57,426, col. 1 (emphasis added), the preamble to the CTR indicates that BMPs may only be used where it is determined that "...it is infeasible to express WQBELs as numeric limits."

EPA should revise the preamble to the CTR to state that BMPs or other alternative permit conditions may be utilized whenever a numeric WQBEL is unnecessary or infeasible.

Furthermore, EPA should explicitly state that the permitting authority bears the burden of showing that a numeric WQBEL for a wet weather flow is feasible or necessary. Since EPA admits that such limitations are "commonly infeasible," the permittee should not bear the burden of proving numeric limits unnecessary or infeasible.

Response to: CTR-060-011

EPA disagrees with the comments. See response to CTR-001-003. For a discussion of EPA's evaluation of studies concerning costs associated with achieving water quality criteria for storm water discharges, see responses to CTR-013-003 and CTR-040-004. For a discussion of the scientific validity of CTR criteria, see response to CTR-031-004c.

Comment ID: CTR-062-001
Comment Author: City of Downey
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/24/97
Subject Matter Code: I-01 Application Sec 301 vs. MEP
References: Letter CTR-062 incorporates by reference letters CTR-013 and CTR-027
Attachments? N
CROSS REFERENCES

Comment: In addition, we would like to emphasize the following key issues on the California Toxic Rule (CTR), which are of major impact to our stormwater program:

1 . The application of water quality standards to calculate water quality-based effluent limits for NPDES permits for municipal stormwater discharges. As proposed by the U.S. EPA, the numeric water quality standards in the California Toxics Rule will be used to calculate water quality-based effluent limitations for all NPDES permits issued by the State. We believe that this position is inconsistent with the plain language used by Congress in incorporating the "maximum extent practicable" standard for municipal separate storm sewer systems (MS4s) into section 41 0 (p) (3) (B) of the Clean Water Act. We

recommend that the U.S. EPA modify the Preamble to clarify that MS4s are not required to comply with water quality standards.

Response to: CTR-062-001

EPA disagrees with the comments. See response to CTR-001-003. For a discussion of EPA's evaluation of studies concerning costs associated with achieving water quality criteria for storm water discharges, see responses to CTR-013-003 and CTR-040-004. For a discussion of the scientific validity of CTR criteria, see response to CTR-031-004c.

Comment ID: CTR-071-001
Comment Author: City of Rosemead
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: I-01 Application Sec 301 vs. MEP
References: Letter CTR-071 incorporates by reference letter CTR-013 and CTR-027
Attachments? N
CROSS REFERENCES

Comment: In addition, we would like to emphasize the following key issues on the California Toxic Rule (CTR), which are of major impact to our stormwater program.

1 . The application of water quality standards to calculate water quality-based effluent limits for NPDES permits for municipal stormwater discharges. As proposed by the USEPA. the numeric water quality standards in the California Toxic Rule will be used to calculate water quality-based effluent limitations for all NPDES permits issued by the State. We believe that this position is inconsistent with the plain language used by Congress in incorporating the "maximum extent practicable" standard for municipal separate storm sewers systems (MS4s) into section 41 0(p) (3) (B) of the Clean Water Act. We recommend that the USEPA modify the Preamble to clarify that MS4s are not required to comply with water quality standards.

Response to: CTR-071-001

EPA disagrees with the comments. See response to CTR-001-003. For a discussion of EPA's evaluation of studies concerning costs associated with achieving water quality criteria for storm water discharges, see responses to CTR-013-003 and CTR-040-004. For a discussion of the scientific validity of CTR criteria, see response to CTR-031-004c.

Comment ID: CTR-072-001
Comment Author: City of Bell Gardens
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: I-01 Application Sec 301 vs. MEP

References: Letter CTR-072 incorporates by reference letters CTR-013 and CTR-027
Attachments? N
CROSS REFERENCES

Comment: In addition, we would like to emphasize the following key issues on the California Toxic Rule (CTR), which are of major impact to our stormwater program.

1. The application of water quality standards to calculate water quality-based effluent limits for NPDES permits for municipal stormwater discharges. As proposed by the USEPA, the numeric water quality standards in the California Toxic Rule will be used to calculate water quality-based effluent limitations for all NPDES permits issued by the State. We believe that this position is inconsistent with the plain language used by Congress in incorporating the "maximum extent practicable" standard for municipal separate storm sewers systems (MS4s) into section 41 0(p) (3) (B) of the Clean Water Act. We recommend that the USEPA modify the Preamble to clarify that MS4s are not required to comply with water quality standards.

Response to: CTR-072-001

EPA disagrees with the comments. See response to CTR-001-003. For a discussion of EPA's evaluation of studies concerning costs associated with achieving water quality criteria for storm water discharges, see responses to CTR-013-003 and CTR-040-004. For a discussion of the scientific validity of CTR criteria, see response to CTR-031-004c.

Comment ID: CTR-073-001
Comment Author: City of Paramount
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: I-01 Application Sec 301 vs. MEP
References: Letter CTR-073 incorporates by reference letters CTR-013 and CTR-027
Attachments? N
CROSS REFERENCES

Comment: In addition, we would like to emphasize the following key issues on the California Toxic Rule (CTR), which are of major impact to our stormwater program.

1. The application of water quality standards to calculate water quality-based effluent limits for NPDES permits for municipal stormwater discharges. As proposed by the USEPA, the numeric water quality standards in the California Toxic Rule will be used to calculate water quality-based effluent limitations for all NPDES permits issued by the State. We believe that this position is inconsistent with the plain language used by Congress in incorporating the "maximum extent practicable" standard for municipal separate storm sewers systems (MS4s) into section 41 0(p) (3) (B) of the Clean Water Act. We recommend that the USEPA modify the Preamble to clarify that MS4s are not required to comply with water quality standards.

Response to: CTR-073-001

EPA disagrees with the comments. See response to CTR-001-003. For a discussion of EPA's evaluation of studies concerning costs associated with achieving water quality criteria for storm water discharges, see responses to CTR-013-003 and CTR-040-004. For a discussion of the scientific validity of CTR criteria, see response to CTR-031-004c.

Comment ID: CTR-074-001
Comment Author: City of San Gabriel
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: I-01 Application Sec 301 vs. MEP
References: Letter CTR-074 incorporates by reference letters CTR-013 and CTR-027
Attachments? N
CROSS REFERENCES

Comment: In addition, we would like to emphasize the following key issues on the California Toxic Rule (CTR), which are of major impact to our stormwater program:

1. The Application of water quality standards to calculate water quality-based effluent limits for NPDES permits for municipal stormwater discharges. As proposed by the USEPA, the numeric water quality standards in the California Toxics Rule will be used to calculate water quality-based effluent limitations for all NPDES permits issued by the State. We believe that this position is inconsistent with the plain language used by Congress in incorporating the "maximum extent practicable" standard for municipal separate storm sewers systems (MS4s) into section 410 (p) (3) (B) of the Clean Water Act. We recommend that the USEPA modify the preamble to clarify that MS4s are not required to comply with water quality standards.

Response to: CTR-074-001

EPA disagrees with the comments. See response to CTR-001-003. For a discussion of EPA's evaluation of studies concerning costs associated with achieving water quality criteria for storm water discharges, see responses to CTR-013-003 and CTR-040-004. For a discussion of the scientific validity of CTR criteria, see response to CTR-031-004c.

Comment ID: CTR-075-001
Comment Author: City of El Monte
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/24/97
Subject Matter Code: I-01 Application Sec 301 vs. MEP
References: Letter CTR-075 incorporates by reference letters CTR-013 and CTR-027
Attachments? N
CROSS REFERENCES

Comment: In addition, we would like to emphasize the following key issues on the California Toxic Rule (CTR), which are of major impact to our stormwater program;

I. The application of water quality standards to calculate water quality-based effluent limits for NPDES permits for municipal stormwater discharges. As proposed by the USEPA, the numeric water quality standards in the California Toxics Rule will be used to calculate water quality-based effluent limitations for all NPDES permits issued by the State. We believe that this position is inconsistent with the plain language used by Congress in incorporating the "maximum extent practicable" standard for municipal separate storm sewers systems (MS4s) into section 410(p)(3)(B) of the Clean Water Act. We recommend that the USEPA modify the Preamble to clarify that MS4s are not required to comply with water quality standards.

Response to: CTR-075-001

EPA disagrees with the comments. See response to CTR-001-003. For a discussion of EPA's evaluation of studies concerning costs associated with achieving water quality criteria for storm water discharges, see responses to CTR-013-003 and CTR-040-004. For a discussion of the scientific validity of CTR criteria, see response to CTR-031-004c.

Comment ID: CTR-076-001
Comment Author: City of Cudahy
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: I-01 Application Sec 301 vs. MEP
References: Letter CTR-076 incorporates by reference letters CTR-013 and CTR-027
Attachments? N
CROSS REFERENCES

Comment: In addition, we would like to emphasize the following key issues on the California Toxic Rule (CTR) , which are of major impact to our stormwater program:

1. The application of water quality standards to calculate water quality-based effluent limits for NPDES permits for municipal stormwater discharges. As proposed by the USEPA, the numeric water quality standards in the California Toxics Rule will be used to calculate water quality-based effluent limitations for all NPDES permits issued by the State. We believe that this position is inconsistent with the plain language used by Congress in incorporating the maximum extent practicable standard for municipal separate storm sewers systems (MS4s) into section 410(p)(3)(B) of the Clean Water Act. We recommend that the USEPA modify the Preamble to clarify that MS4s are, not required to comply with water quality standards.

Response to: CTR-076-001

EPA disagrees with the comments. See response to CTR-001-003. For a discussion of EPA's evaluation of studies concerning costs associated with achieving water quality criteria for storm water discharges, see responses to CTR-013-003 and CTR-040-004. For a discussion of the scientific validity of CTR criteria, see response to CTR-031-004c.

Comment ID: CTR-078-001
Comment Author: City of Maywood
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: I-01 Application Sec 301 vs. MEP
References: Letter CTR-078 incorporates by reference letter CTR-013
Attachments? N
CROSS REFERENCES

Comment: In addition, we would like to emphasize the following key issues on the California Toxic Rule (CTR), which are of major impact to our stormwater program:

I. The application of water quality standards to calculate water quality-based effluent limits for NPDES permits for municipal Stormwater discharges. As proposed by the USEPA, the numeric water quality standards in the California Toxics Rule will be used to calculate water quality-based effluent limitations for all NPDES permits issued by the State. We believe that this position is inconsistent with the plain language used by Congress in incorporating the maximum extent practicable,, standard for municipal separate storm sewers systems (MS4s) into section 410(p)(3)(B) of the Clean Water Act. We recommend that the USEPA modify the Preamble to clarify that MS4s are not required to comply with water quality standards.

Response to: CTR-078-001

EPA disagrees with the comments. See response to CTR-001-003. For a discussion of EPA's evaluation of studies concerning costs associated with achieving water quality criteria for storm water discharges, see responses to CTR-013-003 and CTR-040-004. For a discussion of the scientific validity of CTR criteria, see response to CTR-031-004c.

Comment ID: CTR-079-001
Comment Author: City of Glendale
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/24/97
Subject Matter Code: I-01 Application Sec 301 vs. MEP
References: Letter CTR-079 incorporates by reference letters CTR-013 and CTR-027
Attachments? N
CROSS REFERENCES

Comment: In addition, we would like to emphasize the following key issues on the California Toxic Rule (CTR), which are of major impact to our stormwater program:

1. The application of water quality standards to calculate water quality based effluent limits for NPDES permits for municipal stormwater discharges. As proposed by the USEPA, the numeric water quality

standards in the California Toxics Rule will be used to calculate water quality-based effluent limitations for all NPDES permits issued by the State. We believe that this position is inconsistent with the plain language used by Congress in incorporating the "maximum extent practicable" standard for municipal separate storm sewers systems (MS4s) into section 410(p) (3) (B) of the Clean Water Act. We recommend that the USEPA modify the Preamble to clarify that MS4s are not required to comply with water quality standards.

Response to: CTR-079-001

EPA disagrees with the comments. See response to CTR-001-003. For a discussion of EPA's evaluation of studies concerning costs associated with achieving water quality criteria for storm water discharges, see responses to CTR-013-003 and CTR-040-004. For a discussion of the scientific validity of CTR criteria, see response to CTR-031-004c.

Comment ID: CTR-087-001
Comment Author: Morrison & Foerster LLP
Document Type: Storm Water District
State of Origin: CA
Represented Org: SCVURPPP
Document Date: 09/24/97
Subject Matter Code: I-01 Application Sec 301 vs. MEP
References: Letter CTR-087 incorporates by reference letters CTR-001 and CTR-027
Attachments? N
CROSS REFERENCES

Comment: Members of the SCVURPPP strongly endorse and fully incorporate by this reference, the comments being submitted to you on the California Toxics Rule ("CTR") by the State Storm Water Quality Task Force, the Alameda Countywide Clean Water Program, and other municipal stormwater programs located throughout California. As those comments make clear at greater length, Congress's directive in Clean Water Act section 402(p)(3)(B) requires that the Agency expressly exclude municipal stormwater permits from the scope of proposed section 131.38(e)(1). Specifically, this section of the rule should be modified to state: "It is presumed that new and existing point source dischargers except for municipal stormwater dischargers, will promptly comply with any new or more restrictive water quality-based effluent limitations ("WQBELs") based on the water quality criteria set forth in this [rule]."

As other commenters have made clear, the Agency's current position in the CTR's preamble which "presumes" that municipal stormwater discharges are subject to water quality-based effluent limitations ("WQBELs") flies in the face of the plain language used by Congress in enacting section 402(p)(3)(B) of the Clean Water Act. It also ignores the contrast that Congress drew in the statute between the NPDES permitting requirements specifically delineated for municipal stormwater discharges and those expressly made applicable to stormwater discharges "associated with industrial activities." cf. 33 U.S.C. 1342(p)(3)(B) with 33 U.S.C. 1342(p)(3)(A). While best management practices ("BOPS") are certainly more appropriate tools for permit writers to use in stormwater permits than numeric effluent limitations, when it comes to municipal stormwater permits, Congress clearly required that such permit requirements be derived from section 402(p)(3)(B)(iii)'s maximum extent practicable standard, not through WQBELs based on the type of numeric water quality standards being promulgated in the CTR.

Response to: CTR-087-001

EPA disagrees with the comments. See response to CTR-001-003. For a discussion of EPA's evaluation of studies concerning costs associated with achieving water quality criteria for storm water discharges, see responses to CTR-013-003 and CTR-040-004. For a discussion of the scientific validity of CTR criteria, see response to CTR-031-004c.

Comment ID: CTR-090-014
Comment Author: C&C of SF, Public Utl. Commis.
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: I-01 Application Sec 301 vs. MEP
References: Letter CTR-090 incorporates by reference letters CTR-035 and CTR-054
Attachments? Y
CROSS REFERENCES

Comment: Impacted Facilities - p 42160. Potentially Affected Facilities--- This list should include separate storm water systems and combined sewer systems in addition to POTWS. The preamble is vague as to whether these facilities must eventually comply with water quality criteria. If municipal wet-weather discharges must comply with strict application of the CTR, the potential infrastructure costs of compliance for metropolitan areas will be considerable. San Francisco spent $1 billion to address wet weather pollution. Assuming comparable per capita costs ($1,300 pc), and an urbanized population of 25,000,000 in California, wet weather capital costs could run over $32,000,000,000. Annual amortization costs (I = 5%) would exceed, $2,500,000,000. Even if only 5% of urbanized areas needed to use structural solutions for wet weather discharges, annual costs would be in the order of $125,000,000. It is essential that EPA decide whether it expects wet weather discharges to comply with the numerical standards and then state this assumption explicitly. EPA is doing a disservice to the public ff it maintains this dichotomy in the document: (1) an assumption in its economic analysis that storm water will not need substantial controls to meet the requirements of the rule-making, and (2) the position that this rule-making will promote the attainment of those designated uses adopted by the state.

Response to: CTR-090-014

EPA disagrees with the comments. See response to CTR-001-003. For a discussion of EPA's evaluation of studies concerning costs associated with achieving water quality criteria for storm water discharges, see responses to CTR-013-003 and CTR-040-004. For a discussion of the scientific validity of CTR criteria, see response to CTR-031-004c. For a discussion of the relationship between criteria, standards, effluent limitations and implementation costs, see response to CTRH-002-006a.

Comment ID: CTR-092-011
Comment Author: City of San Jose, California
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: I-01 Application Sec 301 vs. MEP
References: Letter CTR-092 incorporates by reference letter CTR-035

Attachments? Y
CROSS REFERENCES

Comment: Application of Rule to Municipal Stormwater Dischargers

The CTR does not clearly state how the establishment of these criteria is intended to be implemented to municipal stormwater dischargers. The City opposes to any scenario that would directly apply numerical water quality objectives to this permitted program. The Rule needs to be revised to clearly state that the criteria established by the rule will not be used to calculate numeric water quality based effluent limitations for municipal storm water dischargers.

If the Rule were to result in the imposition of numeric water quality based effluent limitations on municipal storm water dischargers, it would be inconsistent with the plain language used by Congress in incorporating the "maximum extent practicable" standard into Section 402(p)(3)(B) of the Clean Water Act. Revision of the Rule to clearly state that it will not result in the imposition of numeric water quality based effluent limits on the Municipal storm water dischargers is also necessary to conform the rule with EPA's Economic Analysis, which assumes that the Rule will have no economic impact on these dischargers. EPA's failure to assess the costs of bringing municipal storm water dischargers into compliance with numeric water quality based effluent limits would represent a substantial violation of its legal requirements under Executive Order 12866, the Unfunded Mandates Reform Act of 1995 (2 U.S.C.A. 1511 et seq.), and the Regulatory Flexibility Act (5 U.S.C.A. 601 et seq.).

Specific areas of the Rule that need to be revised to clarify application of the rule to municipal storm water dischargers are Section F4 of the preamble, relating to wet weather flows and Section 131.38(e)(1). The discussion of the "unfeasibility" of imposing numeric limits for wet weather dischargers in the preamble is not an adequate statement that numeric limits will not be imposed. Moreover, the Rule itself states that it "presumed" that new and existing point source dischargers will promptly comply with any new or more restrictive water quality based effluent limits based on the water quality criteria set forth in this section. In order to be consistent with the Economic analysis, the Rule should explicitly state that it can only be used to establish BMP's as WQBEL's for municipal stormwater dischargers.

Response to: CTR-092-011

EPA disagrees with the comments. See response to CTR-001-003. For a discussion of EPA's evaluation of studies concerning costs associated with achieving water quality criteria for storm water discharges, see responses to CTR-013-003 and CTR-040-004. For a discussion of the scientific validity of CTR criteria, see response to CTR-031-004c. For a discussion of the relationship between criteria, standards, effluent limitations and implementation costs, see response to CTRH-002-006a.

Comment ID: CTRE-002-002
Comment Author: G. Fred Lee & Associates
Document Type: Academia
State of Origin: CA
Represented Org:
Document Date: 09/18/97
Subject Matter Code: I-01 Application Sec 301 vs. MEP
References:
Attachments? N

CROSS REFERENCES

Comment: As you heard from speaker after speaker yesterday, the urban stormwater dischargers are justifiably concerned about the confusing situation that exists today where they are being informed by the US EPA that NPDES-permitted urban stormwater runoff will be subject to having to meet water quality standards (objectives) in the receiving waters for the stormwater runoff during the time of runoff and after through a process of ever-increasingly more stringent and expensive BMPS. As I testified at the hearing and as is well understood in the field, the US EPA "Gold Book" water quality criteria, including those being promulgated under the California Toxics Rule, were not designed to address short-term, episodic events of the type that routinely occur in stormwater runoff from urban areas and highways. As a result, administrative exceedances of the California Toxics Rule criteria can readily occur without any real impairment of the designated beneficial uses for the receiving waters for the stormwater runoff. By real impairment I mean an altered number, types and/or characteristics of aquatic life in the receiving waters for the runoff.

There have been a sufficient number of studies conducted now to document that it will indeed be rare that the constituents which occur in urban stormwater runoff from residential and commercial areas are in toxic, available forms for a sufficient duration in the receiving waters for the ninoff to be adverse to aquatic life. As long as the US EPA persists with its improperly developed and adopted Independent Applicability policy, where chemical criteria/standards have to be met, even if appropriately conducted studies show that the constituents of concern such as heavy metals in urban stormwater runoff, are in non-toxic, non-available forms, the urban stormwater dischargers face the situation of ultimately having to spend large amounts of public funds to achieve administrative exceedances of inappropriate criteria/standards for urban stormwater runoff with no expected improvement in the real beneficial uses of waterbodies in which the exceedances occur that are of concern to the public who must ultimately pay for the control programs.

The administrative exceedances arise from well-known, technically invalid, inappropriate approaches that were adopted by the US EPA in the 1980s for implementing the "Gold Book" criteria that the Agency under various administrations has yet to address. Even today, based on discussions at the US EPA's Multi-Regional Water Quality Criteria and Standards meeting that was held at the end of August 1997 in St. Louis, Missouri, the Agency is still unwilling to address in a meaningful way the problems in regulating urban stormwater runoff water quality. For the Agency to announce, as it did at this meeting, that wet weather issues are no longer part of the ANPRM represents a serious deficiency in the Agency's current policy that must be corrected.

Response to: CTRE-002-002

EPA disagrees with the comments. The ANPRM and the scope of section 402(p) are outside the scope of the rule. See response to CTR-001-003. For a discussion of the scientific validity of CTR criteria, see response to CTR-031-004c. For a discussion of the relationship between criteria, standards, effluent limitations and implementation costs, see response to CTRH-002-006a. For a discussion of EPA's evaluation of studies concerning costs associated with achieving water quality criteria for storm water discharges, see responses to CTR-013-003 and CTR-040-004.

Comment ID: CTRH-001-001a
Comment Author: Robert Hale
Document Type: Public Hearing

State of Origin: CA
Represented Org: CA Stormwater Task Force
Document Date: 09/17/97
Subject Matter Code: I-01 Application Sec 301 vs. MEP
References:
Attachments? N
CROSS REFERENCES J

Comment: MR. HALE: Good afternoon. My name is Robert Hale and I'm the chairman of the California Stormwater Quality Task Force which is located at 951 Turner Court, Suite 300, in Hayward.

This task force is a statewide organization representing municipal separate storm sewer systems that hold National Pollutant Discharge Elimination System, NPDES, permits to discharge stormwater.

My comments today are on behalf of the -- principally on behalf of that task force. I also am chairman of the management committee of the Alameda Countywide Clean Water Program. I will make some comments with respect to Alameda County.

As proposed by EPA, the preamble language, which is the principal point here in referring to numeric effluent limitations and water quality based effluent limitations, is clearly inconsistent with the plain language used by Congress in incorporating the maximum extent practicable standard into Section 402(p)(3)(B) of the Clean Water Act.

You may argue that this reference is only in the preamble and not in the main text of the rule; but it's my understanding, however, that the preamble itself is supposed to explain and clarify the meaning of the rule and the Clean Water Act. This proposed language would instead appear to be trying to change one of the fundamental points of the Clean Water Act.

The reason I think this point is fundamental is that the cost to society, and to our county in this case and to the states, is an important consideration. Congress considers the entirety of the tasks that the country has to do, rather than going for broke on one issue such as stormwater quality.

In short, the Congress balances the larger picture, and the language in Section 402(p)(3)(B) actually reflects that balance. I believe that Section 402(p) says what it says for a good reason. The only economically feasible means of achieving water quality standards is through best management practices.

To illustrate this point, I work in Alameda County as chairman of the Clean Water Program there, and I did some rough calculations here. We often get storms as much as 2 inches in a 24-hour period. That's several times a winter. If you had a one-day storm, as I figure it, that will work out to 5 billion gallons of runoff water.

To treat this much water, if we were driven to this sort of the extreme case by the language in the preamble -- and I'm not talking about the text of the rule so much as the language in that preamble -- if it were to drive us in this extreme case to have -- to do end-of-pipe treatment for our discharges in order to meet the standards that are there, and to keep up -- basically keep up with the storms, which often come one behind the other within a couple days, it would necessitate building dozens, perhaps more, treatment plants of substantial size and would necessitate the use or acquisition of valuable industrial properties on the margins of the bay. Which I just did a little separate figuring here; I'm figuring it costs about $3 a gallon to treat -- to secondarily treat sanitary sewage and about $4 a gallon to store it.

I estimate that a storm of this size -- to be able to handle a storm of this size would cost between 35 and $50 billion for Alameda County alone. This is for a population of l.35 million residents.

And this does not account for the acquisition of property needed to do this, assuming we could store it in facilities or properties we already own. And it also does not account for the secondary treatment. In fact, we might have some difficulty achieving the standards that are in the rule.

And there's a way you can express this getting down to the nuts and bolts of it, which I like to do. I did some rough estimates of the size of the Oakland Coliseum, and if you were to use structures the size of the Oakland Coliseum for storing this water from one of these storms, I figured it would come out to -- you'd need 50 of them to store the runoff from this one storm that I've got here.

And I know some of you might be thinking about how the A's are doing right now and this might not be a bad idea. We can, say, think about leaving an extra one there for the A's and Raiders and build 50 more of them.

But the point is, we're talking about a tremendous investment in the infrastructure here, and it's very difficult for us to keep up with.

So let's see. Just a few more points here.

So we're not really talking about upgrades to existing delivery and treatment systems. We would have to start from scratch and build pumping systems, conveyance systems, to build an entire infrastructure. The cost would be prohibitive for us in Alameda County. This is a -- sort of one of the worst-case scenarios. And I think that the economic rule -- or the economic analysis in the rule doesn't do this justice.

So --

MR. MORRIS: Have you done any modelling?

MR. HALE: This is strictly back-of-the-envelope type calculations at this point. I don't know whether or not -- what discharges the storm concentrations would result in.

The first question I have on modeling is to see what these discharges of stormwater with these effluent concentrations -- under the storm conditions if we would be -- would have a higher flow than the drought flow condition which was modeled.

When you have a storm event, the stream conditions are different, the hydrology is different, the modeling characteristics. We could work out the scenario. And it's true that when you've got a huge storm, water fires right out the bay and out the Golden Gate. We might even probably need to talk about that and work on that.

Response to: CTRH-001-001a

EPA disagrees with the comments. See response to CTR-001-003. For a discussion of EPA's evaluation of studies concerning costs associated with achieving water quality criteria for storm water discharges, see responses to CTR-013-003 and CTR-040-004. For a discussion of the scientific validity of CTR criteria with regard to WQBELs and storm water discharges, see response to CTR-031-004c. For a discussion of the relationship between criteria, standards, effluent limitations and implementation costs,

see response to CTRH-002-006a.

Comment ID: CTRH-001-004
Comment Author: Alan Waltner
Document Type: Public Hearing
State of Origin: CA
Represented Org: Almeda Cnty Clean Wtr Pgm
Document Date: 09/17/97
Subject Matter Code: I-01 Application Sec 301 vs. MEP
References:
Attachments? N
CROSS REFERENCES

Comment: MR. WALTNER: Thank you.

Good afternoon. My name is Alan Waltner and I have served as counsel to the Alameda Countywide Clean Water Program for seven years now, through the first and second rounds of NPDES permits and also the 1995 Basin Plan amendments for the San Francisco Bay area. I'll be following up on Robert Hale's comments he presented about the practical issues we're worried about.

Our concern fundamentally is a set of inconsistent statements in the preamble regarding how this rule would apply to municipal stormwater dischargers. At one point, for example, it states that alternate anticipated criteria may apply through simply best management practices, which is happening currently.

At other points in the preamble it suggests that we would have to do whatever it takes to make wasteload reductions under a waste allocation system or water-based numeric effluent limitations that would be keys to the standards. And depending on which of those interpretations you apply, the difference is significant.

Right now we're doing best management practices under the criteria of Section 402(p), that we have to do all that we can to the maximum extent practicable, and we estimate addressing pollution in stormwater for Alameda County to cost somewhere in the approximate neighborhood of 10 million a year, if I'm right.

It we had to do whatever it took, it -- by initial analysis, if we had to do whatever it took to provide a wasteload reduction that would be a proportionate share -- actually, copper mostly -- by end-of-pipe treatment of the entire stormwater flow of the county to produce the proportionate reductions, and you start coming up with figures in the range of $60 billion from Alameda County.

So it's incredibly important for us that the preamble language be clarified or -- and we think in a way that's consistent with Section 402(p), that the municipal stormwater systems only need to do appropriate MEP level controls.

Now, industrial stormwater dischargers under Section 402(p) may be subject to 301 and the numeric effluent limitations waste water quality standards. There is a clear distinction in Section 402(p) between the treatment of the industrial stormwater dischargers and the municipal stormwater dischargers. We think you need to maintain that distinction.

Now, I've noted that the regulation itself seemed to preserve the existing implementation policy of the State Water Resources Control Board. The policy of the State Water Resources Control Board simply requires implementation of BMPs to comply with 402(p) criteria. And to the extent that the rule keeps that implementation policy in place, then we're simply continuing what we're doing, the implementing of BMPs. That is something that we've already bought into and recognized we're obligated to do.

But if some of the significant statements in the preamble language were to prevail and we should have to do whatever it takes to provide proportionate wasteload reductions, it would lead to significant disruption and other legal problems that violate the description of Section 402(p) review procedures for the 1995 Basin Plan.

In that sense you would be impliedly repealing that implementation which would violate the review of the EPA subject to the 1995 Basin Plan, because it's impliedly repealing the implementation provision that we only have to do best management practices.

I think the bottom line is we're asking for EPA to clarify that Section 402(p) is what controls in this situation when applied to municipal stormwater dischargers, that we are obligated to keep pursuing maximum extent practicable controls, but that Congress has concluded there shouldn't be a requirement that we do whatever it takes, regardless of cost. And again, the costs are substantial to meet these numbers.

Thank you.

Response to: CTRH-001-004

EPA disagrees with the comments. See response to CTR-001-003. For a discussion of EPA's evaluation of studies concerning costs associated with achieving water quality criteria for storm water discharges, see responses to CTR-013-003 and CTR-040-004. For a discussion of the scientific validity of CTR criteria with regard to WQBELs and storm water discharges, see response to CTR-031-004c. For a discussion of the relationship between criteria, standards, effluent limitations and implementation costs, see response to CTRH-002-006a.

Comment ID: CTRH-001-006
Comment Author: Doug Harrison
Document Type: Public Hearing
State of Origin: CA
Represented Org: Fresno Met. Flood Control
Document Date: 09/17/97
Subject Matter Code: I-01 Application Sec 301 vs. MEP
References:
Attachments? N
CROSS REFERENCES

Comment: MR. HARRISON: Doug Harrison, General Manager of the Fresno Metro Flood Control District. I also happen to serve currently as a member of EPA's Wet Weather Advisory Committee and as liaison for FACA to the Stormwater Phase II FACA, so I've had the benefit of some additional exposure to some of these issues of concern recently.

I would endorse the comments of concern that Mr. Waltner just described. We're going to address these in written comments, but I wanted to touch verbally today on some that stand out, that flow from those concerns.

We agree with the concern that the preamble appears to try to codify the Elliott memorandum of 1991 and as to produce a result that was not intended by Congress in the 1987 Act amendments.

There are references on pages 42184, 186 and 187 of your preamble where these concerns arise, where you fail to address the clear language spelled out in the Clean Water Act that relates to municipal stormwater systems. We think for the rule to resolve this deficiency that there needs to be some clarification specifically addressed.

We believe that EPA itself is aware of the congressional intent with respect to the language in Section 402(p) as that relates to the municipal systems. In its draft stormwater regulations of October 1986, EPA included specific language that cited quite clearly the congressional intent and the understanding of that intent as it related to municipal systems and the issues around the permittings of those municipal stormwater systems.

Response to: CTRH-001-006

EPA disagrees with the comments. See response to CTR-001-003. For a discussion of EPA's evaluation of studies concerning costs associated with achieving water quality criteria for storm water discharges, see responses to CTR-013-003 and CTR-040-004. For a discussion of the scientific validity of CTR criteria with regard to WQBELs and storm water discharges, see response to CTR-031-004c. For a discussion of the relationship between criteria, standards, effluent limitations and implementation costs, see response to CTRH-002-006a.

Comment ID: CTRH-001-031
Comment Author: Dave Brent
Document Type: Public Hearing
State of Origin: CA
Represented Org: CA Water Qual. Task Force
Document Date: 09/17/97
Subject Matter Code: I-01 Application Sec 301 vs. MEP
References:
Attachments? N
CROSS REFERENCES

Comment: MR. BRENT: Good afternoon.

I thank you for this opportunity to speak on the proposed rule. I'm Dave Brent, vice chairman of the California State Water Quality Task Force and supervisor of the City of Sacramento's stormwater management facility. I've been supervisor of the City of Sacramento's Stormwater Management Program for the past six years.

My comments are representative of at least nine major metropolitan stormwater programs in California, all with active stormwater management programs through the State Water Quality Task Force. You will also be provided with comments down in Los Angeles tomorrow.

We would echo Bob Hale and Doug Harrison. I think it's important that you hear from the state water interests, the State Water Quality Task Force on stormwater and the technical elements of the CTR itself.

This said, there are four major concerns that the State Water Quality Task Force and the Sacramento Stormwater Program have with this proposed CTR.

The first concern is the discussion in the preamble that states that the municipal stormwater permits must include limits necessary to implement applicable water quality standards. This approach continues the erosion of Congress's intent in the 1987 Clean Water Act amendments as implemented in Part 402(p) of 40 CFR, that applied the MEP standard, maximum extent practicable, to municipal stormwater discharges.

While the proposed rule appears as if it may recognize this MEP standard by giving the permit writers flexibility to express effluent limits as best management practices when the permitting authority determines that it is infeasible to express numeric limits, it doesn't come out and say what the regulations clearly require, that municipal stormwater dischargers must effectively control non stormwater discharges and control the discharges of pollutants to the maximum extent practicable.

In short, we believe that the preamble should not mince words and should clearly state that stormwater -- municipal stormwater discharges are subject to MEP.

Response to: CTRH-001-031

EPA disagrees with the comments. See response to CTR-001-003. For a discussion of EPA's evaluation of studies concerning costs associated with achieving water quality criteria for storm water discharges, see responses to CTR-013-003 and CTR-040-004. For a discussion of the scientific validity of CTR criteria with regard to WQBELs and storm water discharges, see response to CTR-031-004c. For a discussion of the relationship between criteria, standards, effluent limitations and implementation costs, see response to CTRH-002-006a.

Comment ID: CTRH-001-040
Comment Author: Kathy Russick
Document Type: Public Hearing
State of Origin: CA
Represented Org: Sacremento Co. Stormwater
Document Date: 09/17/97
Subject Matter Code: I-01 Application Sec 301 vs. MEP
References:
Attachments? N
CROSS REFERENCES

Comment: MS. RUSSICK: Kathy Russick, speaking on behalf of the Sacramento County Stormwater Quality Section, who is one of four member agencies of the Sacramento Stormwater Management Program, the other agencies being the cities of Sacramento, Galt and Folsom.

And I would like to note that many of the challenges facing the Sacramento Stormwater Program which I raise here are also the same challenges facing other stormwater programs in the state.

Specifically, I will be addressing today the concern raised by these stormwater agencies that the California Toxics Rule will require municipal stormwater programs in California to meet numeric water quality limits.

The interpretation of the rule that we are -- this interpretation of the rule we are concerned with was discussed last week at a state Stormwater Quality Task Force meeting. We discussed it with a representative of the State Water Resources Control Board and he confirmed the interpretation specifically that municipal stormwater programs will have to implement ever-escalating BMPs until the numeric discharge limits are achieved.

Response to: CTRH-001-040

EPA disagrees with the comments. See response to CTR-001-003. For a discussion of the scientific validity of CTR criteria, see response to CTR-031-004c. For a discussion of the relationship between criteria, standards, effluent limitations and implementation costs, see response to CTRH-002-006a. For a discussion of EPA's evaluation of studies concerning costs associated with achieving water quality criteria for storm water discharges, see responses to CTR-013-003 and CTR-040-004.

Comment ID: CTRH-002-001
Comment Author: Chris Compton
Document Type: Public Hearing
State of Origin: CA
Represented Org: County of Orange
Document Date: 09/18/97
Subject Matter Code: I-01 Application Sec 301 vs. MEP
References:
Attachments? N
CROSS REFERENCES

Comment: My name is Chris Crompton and I'm the manager of environmental resources for the Orange County Public Facilities and Resources Department. My office address is 10852 Douglass Road, Anaheim, California.

Today I'm presenting comments on the draft California Toxics Rule on behalf of the County of Orange and the Orange County Flood District. The County of Orange is the principal permittee on municipal stormwater permits for Orange County. These permits cover stormwater discharges for the county, flood district, and 31 incorporated cities.

In the main, the County of Orange supports the comments presented on behalf of the California Stormwater Quality Task Force by Chairman Robert Hale at the public hearing in San Francisco yesterday and by other municipal speakers from Sacramento County and Fresno. The County has been an active participant in the Task Force and in the development of those comments. Today I will be presenting our general concerns regarding the California Toxics Rule as it applies to our municipal stormwater quality management program. More detailed written comments on the proposed rule are being prepared for inclusion in the public record.

Our written comments will focus on challenging a number of basic assumptions in the California Toxics

Rule. In brief, we're going to be questioning the following:

Are the criteria applicable to municipal stormwater discharges?

In the preamble to the proposed rule, EPA assumes that these criteria for priority toxic pollutants apply to municipal stormwater discharges. We note for the record, however, that the applicability of water quality based effluent limits on municipal stormwater discharges has not been resolved. The Clean Water Act only requires dischargers of municipal stormwater to reduce pollutants "to the maximum extent practicable."

As noted in the Task Force testimony yesterday, in the preamble, EPA assumes that the application of water quality based effluent limits to stormwater discharges is appropriate and that the numerical limits can be imposed on such discharges sometime in the future. We believe that this assumption is incorrect and is directly contradicted by the plain language of Section 402(p) of the Clean Water Act.

Response to: CTRH-002-001

EPA disagrees with the comments. See response to CTR-001-003. For a discussion of EPA's evaluation of studies concerning costs associated with achieving water quality criteria for storm water discharges, see responses to CTR-013-003 and CTR-040-004. For a discussion of the scientific validity of CTR criteria with regard to WQBELs and storm water discharges, see response to CTR-031-004c. For a discussion of the relationship between criteria, standards, effluent limitations and implementation costs, see response to CTRH-002-006a.

Comment ID: CTRH-002-008
Comment Author: Chris Compton
Document Type: Public Hearing
State of Origin: CA
Represented Org: County of Orange
Document Date: 09/18/97
Subject Matter Code: I-01 Application Sec 301 vs. MEP
References:
Attachments? N
CROSS REFERENCES

Comment: We recommend deletion of the staff interpretation of the applicability of water quality based effluent standards to municipal stormwater discharges presented in the preamble.

Response to: CTRH-002-008

EPA disagrees with the comments. See response to CTR-001-003. For a discussion of EPA's evaluation of studies concerning costs associated with achieving water quality criteria for storm water discharges, see responses to CTR-013-003 and CTR-040-004. For a discussion of the scientific validity of CTR criteria with regard to WQBELs and storm water discharges, see response to CTR-031-004c. For a discussion of the relationship between criteria, standards, effluent limitations and implementation costs, see response to CTRH-002-006a.

Subject Matter Code: I-02 Elliott Memorandum

Comment ID: CTR-001-006
Comment Author: Law Offices of Alan C. Waltner
Document Type: Storm Water Auth.
State of Origin: CA
Represented Org: Almeda Cnty Clean Wtr Pgm
Document Date: 09/22/97
Subject Matter Code: I-02 Elliott Memorandum
References:
Attachments? N
CROSS REFERENCES

Comment: THE ELLIOT MEMORANDUM SHOULD BE RESCINDED, RATHER THAN CODIFIED, IN THE CALIFORNIA TOXICS RULE

As support for much of the problematic language in the preamble to the CTR, EPA cites a January 9, 1991, memorandum from E. Donald Elliot to Nancy J. Marvel, Region 9 ("Elliot memorandum") which concluded that water quality based numeric effluent limitations apply to storm water discharges.

The Elliot memorandum contains a number of critical flaws and should be rescinded. Any attempt to rely on the Elliot memorandum in the proposed CTR, or to codify the Elliot memorandum, would subject the CTR to challenge based on these flaws.

The Elliot memorandum acknowledges that: "Section 402(p)(3) is clearly intended to draw a distinction between the requirements on industrial and municipal storm water discharges." Elliot memorandum at page 3. (*8) However, the memorandum derails by assuming an erroneous and contrary conclusion:

Section 402(a)(1) requires that all NPDES permits comply with the applicable provisions of section 301. This includes compliance with appropriate technology-based standards and effluent limits (sections 301(b)(1)(B), 301(b))2)). Permits must include "any more stringent limitation" necessary to meet WQS. Section 301(b)(1)(C).

Elliot memorandum at page 2. The critical flaw in this conclusion is that Section 402(p) establishes the applicability of Section 301, making Section 301 applicable only to industrial, and not municipal, storm water systems. Section 402(a) does not override, or conflict with, the applicability provisions of Section 402(p). In fact, by referring only to "applicable requirements under section 301," Section 402(a) acknowledges that not all "requirements" of Section 301 are applicable to all NPDES permits issued under Section 402. Among the limitations on such applicability are those set forth in Section 402(p).

The analysis in the Elliot memorandum also ignores a number of critical rules of statutory construction. First, as discussed above, the Elliot memorandum's reading of the statute would result in the retroactive application of Section 301(b)(1)(C) to municipal storm water systems, despite the absence of any evidence of Congressional intent to have created a retroactive system (and, in fact, despite the evidence in Section 402(p) to the contrary).

Second, the Elliot memorandum ignores the maxim that expresio unius est exclusio alterius ("to express one thing is to exclude all others"). Sutherland, supra, at S 47.23. The maxim applies to the interpretation of Section 402(p) in at least two ways. First, by making MEP-level controlsthe standard for municipal

storm water systems, other control approaches (such as water quality based effluent limitations) are excluded. Second, by making Section 301 applicable only to industrial storm water discharges, the application of Section 301 to municipal storm water discharges is excluded.

The maxim is closely related to the "plain meaning" rule. Here, Section 402(p) plainly states that MS4s are only subject to MEP-level controls. Section 402(p) does not leave open any possibility that MS4s might be subject to more stringent water quality based effluent limitations.

The Elliot memorandum also violates the plain meaning rule by applying the broad principles of the Act to override the statute's express provisions in Section 402(p). Likewise, extrinsic factors not appearing on the face of a statute cannot be used to override the express statutory language or create an ambiguity. Sutherland, supra, at Section 46.04.

The Elliot memorandum vainly seeks salvation by citing Chevron U.S.A. Inc. v. Natural Resources Defense Council, Inc., 467 U.S. 837, 842-43 (1984) ("Chevron") in support of its flawed analysis. However, only where the statute is ambiguous does the doctrine described in Chevron come into play. Yet Section 402(p) is unambiguous and exclusive in its application of MEP-level controls to MS4s.

As summarized by the D.C. Circuit in American Petroleum Inst. v. EPA, 52 F.3d 1113, 1119 (D.C. Cir. 1995):

Under the Chevron doctrine, a court reviewing an agency's interpretation of a statute it administers must first determine whether Congress has directly spoken to the precise question at issue. If the intent of Congress is clear, the review ends there for the court must give effect to the unambiguously expressed intent of Congress. Id. at 842-43. If the court determines that Congress has not directly addressed the precise issue, however, it then goes to the second step of the review to determine whether the agency's interpretation is based on a permissible construction of the statute. Id. at 843.

52 F.3d at 1117. Here, the precise issues of: (1) the control technology standard to be met by MS4s, and (2) the applicability of Section 301, have been addressed in the statute. EPA is not, as the Elliot memorandum argues, free to substitute its preferred result for the approach selected by Congress. (*9)

Rather than addressing these critical flaws in its analysis, the Elliot memorandum spends considerable time pursuing a red herring, arguing that the plain meaning of Section 402(p) (limiting MS4 control standards to the MEP level) would impliedly repeal Section 301 (which EPA argues makes all dischargers subject to more stringent water quality based effluent limitations). The Elliot memorandum argues that this would "read Section 402(p)(3)(B) as overriding 301(b)(1)(C)." Elliot memorandum at page 4. Yet Section 402(p) did not "impliedly repeal" or "override" Section 301; Section 402(p) actually confirmed the operation of Section 301 as applied to industrial storm water systems. The fact that Section 402(p) created a distinction between two categories of dischargers is perfectly ordinary. Congress routinelydelineates the applicability of statutes without resulting in "implied repeals" of the delineated provisions. EPA's argument (that making MS4s subject to water quality based effluent limitations exceeding MEP-level controls is necessary to avoid an implied repeal of Section 301) is specious.

The analysis in the Elliot memorandum is flawed and the memorandum's conclusion is only arguably correct as applied to storm water discharges associated with industrial activity. Municipal dischargers need only address water quality standards through MEP-level reductions (*10) The Elliot memorandum should not be relied upon or codified by EPA in the CTR, but instead should be expressly revoked given its demonstrated lack of merit.

(*8) The Elliot memorandum also states that:

Section 402(p) also specified the levels of control to be incorporated into storm water permits. Permits for discharges associated with industrial activity are to require compliance with all applicable provisions of Sections 301 and 402 of the CWA, i.e., all technology-based and water quality-based requirements. Section 402(p)(3)(A). By contrast, permits for discharges from municipal separate storm sewers "shall require controls to reduce the discharge of pollutants to the maximum extent practicable" ("MEP"). Section 402(p)(3)(B)(iii).

Elliot memorandum at page 2.

(*9) Moreover, the protection of the Chevron doctrine cannot be invoked without including the agency interpretation in a regulation. In Chevron, the Supreme Court found that Congress had left a gap for EPA to fill through rulemaking on the technical definition of "stationary source" under the Clean Air Act, and that EPA's regulations filling that gap were within the permissible range of discretion intended by Congress. Chevron held that where a statute includes a broad definition, the very breadth of the definition implies a delegation to the agency to fill the gap in a manner consistent with the goals and purposes of the statute. Yet the position in the Elliot memorandum has never been incorporated in a regulation; agency staff pronouncements of lesser stature are ineligible for the deference that Chevron would provide.

Finally, EPA's interpretation is inconsistent, both as between the Elliot memorandum and the Interim Permitting Policy, and even within the Elliot memorandum. In a closing footnote EPA acknowledges that:

There may be some municipal separate storm sewer systems which are unable to meet even the three-year compliance date in their permits. The Agency retains the discretion to issue an administrative order fixing a schedule for compliance if compliance is not achieved in that three-year period.

Elliot memorandum at 5. The basis for this inconsistent position contemplating discharges in excess of water quality based effluent limitations is not stated. More importantly, any deference under Chevron is limited where EPA's own interpretation has been inconsistent.

(*10) The ACCWP also objects to the indirect way in which this issue is being presented. The Elliot memorandum was issued without benefit of any public comment, and no EPA regulation has ever put forward for judicial review the positions taken in the Elliot memorandum. EPA owes it to the state and local agencies that will be affected by this rule to act in a more straightforward manner. If EPA is going to put the position taken in the Elliot memo forward as official policy binding on permit decisions, the agency should do Bo in a judicially reviewable form so that government agencies that would be affected by the positions taken in the memorandum have a fair opportunity to seek a judicial determination of the validity of that approach.

Response to: CTR-001-006

See response to CTR-040-004.

Comment ID: CTR-031-001b
Comment Author: Fresno Metro. Flood Ctrl Dist.
Document Type: Flood Ctrl. District
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: I-02 Elliott Memorandum
References: Letter CTR-031 incorporates by reference letter CTR-027
Attachments? N
CROSS REFERENCES I-01

Comment: 1. The preamble of the proposed CTR, and therefore the apparent intended application of the rule, is inconsistent with the Clean Water Act.

Several broad, ambiguous statements in the preamble of the proposed rule imply that Clean Water Act section 301 requirements apply to all dischargers, including municipal stormwater systems. These presumptions must be qualified to recognize the clear intent of Congress and plain language of the CWA, section 402(p) which clearly require municipal storm water dischargers only to adopt controls to reduce pollutants in storm water to- the maximum extent practicable and to eliminate non-storm water discharges. The section's intent is demonstrated through the application of section 301 requirements, and related application of numeric effluent limitations or wasteload allocations in NPDES permits, to industrial stormwater discharges only.

EPA is obviously aware of Congress's intent as to municipal storm water discharge requirements. EPA included in its published draft Phase I municipal storm water regulations a quote from the Congressional Record of October 16, 1986, citing that intent.

Without a clear citation of the provisions of CWA section 402(p), the preamble to the proposed rule appears to be an attempt to codify the Elliot memorandum of January 9, 1991, and to create via this rule a result not authorized by Congress.

In order to eliminate this fundamental legal flaw in the proposed CTR, and eliminate the potential for future misinterpretation and controversy, each of the following statements from the preamble (at a minimum) must be clarified and/or qualified so that they do not appear to override or retract CWA section 402(p).

"When these proposed federal criteria take effect, they will create legally applicable water quality standards ... in California ... for all purposes and programs under the CWA." [p. 42160. This statement must include recognition that for municipal storm water dischargers, the CWA objectives can be addressed through best management practices, implemented to the maximum extent practicable (MEP), as established by CWA section 402(p).]

"CWA section 301(b)(1)(C) ... requires NPDES permits to contain limitations required to implement any applicable water quality standard established in the CWA." [p. 42162. The text should note that section 301 (b) (1) (c) does not apply to municipal storm water dischargers, as established through section 402(p).]

"If a discharge causes, has the reasonable potential to cause, or contributes to an excursion of a numeric or narrative water quality criteria, the permitting authority must develop permit limits as necessary to

meet water quality standards." (P. 42184. Again, for municipal storm water dischargers, the preamble and CTR must make clear the MS4 permits must: address this CWA objective through the MEP requirement.]

"Point source and nonpoint source allocations are established so that predicted receiving water concentrations do not exceed water quality standards." [p. 42185.1; and

"[NPDES] permits for wet weather point source dischargers must include limits necessary to implement applicable water quality standards, through application of water quality-based effluent limitations or WQBELs." [p. 42186. These two statements are only correct as applied to industrial storm water dischargers; numeric effluent limitations or wasteload allocations can not be legally, reasonably, or practically applied to municipal storm water discharges.]

Response to: CTR-031-001b

See response to CTR-040-004.

Comment ID: CTR-040-014a
Comment Author: County of Sacramento Water Div
Document Type: Storm Water Auth.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: I-02 Elliott Memorandum
References: Letter CTR-040 incorporates by reference letter CTR-027
Attachments? Y
CROSS REFERENCES J

Comment: RECOMMENDED MODIFICATIONS

To address our concerns, we recommend the following modifications which do not undermine the toxic pollutant control actions envisioned in EPA's economic analysis (e.g., BMPs for stormwater and source control). In fact, some of these recommendations would provide incentives for greater movement toward achieving the water quality criteria than would occur under the Rule as it is currently proposed.

I. Recommendation: Modify the Preamble statement that indicates municipal wet weather discharges must comply with water quality standards or WQBELs (Preamble pages 42186-42187).

* It is not a requirement of the CWA or EPA that wet weather discharges must meet water quality criteria. If it were, the adverse economic impact on municipal stormwater programs would be enormous. The CWA, at best, is ambiguous on this issue; EPA regulations do not address it; and the Elliott memorandum, which appears to be the primary basis for EPA's position on this issue, is not a legitimate basis for such a position. The Elliott memorandum is an internal EPA memorandum and; therefore, is not an independent interpretation of the CWA. The Elliott memorandum does not constitute EPA policy and is based upon a false premise and an inaccurate reading of the preamble to EPA's 1988 proposed stormwater regulations. The Elliot memorandum contains other erroneous conclusions that have never been applied to municipal stormwater permits (e.g., that municipal stormwater dischargers must comply with water quality standards within three years of permit issuance).

* EPA has routinely approved municipal stormwater NPDES permits that have not included requirements to comply with water quality standards (e.g., Tulsa, OK; Greesnboro, NC; Denver, CO; Portland, OR; Cedar/Green (Seattle), WA; Sarasota County, FL; and Phoenix, AZ).

* If EPA does not modify the Preamble statement to clarify that municipal stormwater dischargers are not required to comply with these water quality standards, then EPA must include the cost of the structural controls necessary for compliance in its economic analysis and, using these costs, address the requirements of Presidential Executive Order 12866, the Unfunded Mandates Reform Act, and the Regulatory Flexibility Act.

Response to: CTR-040-014a

See response to CTR-040-004.

Subject Matter Code: I-02a Applying WQBELs, Stormwater

Comment ID: CTR-001-002
Comment Author: Law Offices of Alan C. Waltner
Document Type: Storm Water Auth.
State of Origin: CA
Represented Org: Almeda Cnty Clean Wtr Pgm
Document Date: 09/22/97
Subject Matter Code: I-02a Applying WQBELs, Stormwater
References:
Attachments? N
CROSS REFERENCES

Comment: I represent the Alameda Countywide Clean Water Program ("ACCWP") in a variety of matters regarding the ACCWP Storm Water Management Plan ("SWMP") and associated National Pollutant Discharge Elimination System ("NPDES") permit. The ACCWP is a consortium of the fourteen cities in Alameda County, the County, the Alameda County Flood Control and Water Conservation District, and Zone 7 of the Alameda County Flood Control District. Those agencies have joined together in a coordinated approach to storm water management and control, and are the co-permittees under an NPDES permit that recently was reissued by the San Francisco Bay Regional Water Quality Control Board ("RWQCB").

This letter provides comments of the ACCWP on legal issues raised by the August 5, 1997, proposed rule regarding "Water Quality Standards; Establishment of Numeric Criteria for Priority Toxic Pollutants for the State of California." 62 Fed. Reg. 42160 ("California Toxics Rule" or "CTR"). By copy of this letter to the State Water Resources Control Board ("SWRCB"), we also provide comments on the SWRCB's parallel implementation rule, proposed September 12, 1997. Comments on the scientific and technical issues raised by the proposed CTR will be submitted separately. (*1)

BACKGROUND

Local governments recognize that they have a key role in addressing the contribution of municipal storm water discharges to water quality problems and the ACCWP takes that role very seriously. During the first five years of the program, for example, ACCWP members adopted comprehensive storm water management ordinances and have undertaken a broad range of initiatives to reduce storm water pollution. This program has won numerous awards, including EPA's 1994 National Second Place Award for the Outstanding Municipal Storm Water Control Program.

However, important practical constraints are faced by municipal dischargers which, unlike most industrial sources, cannot simply cease discharging. First is the chronic problem of limited resources, which has been exacerbated by the recent passage of Proposition 218 in California constraining the fee-based revenue sources upon which the ACCWP members generally have relied.

Second, municipal discharges have limited authority over the products and activities that contribute to storm water pollution. For example, home garden care pesticides have been identified as a significant contributor to toxicity in storm water runoff, but municipalities are preempted from regulating those pesticides directly and must rely instead on public information campaigns. Similarly, copper from brake linings is also of concern, but local governments cannot direct the formulation of brake linings.

Third, there are limited opportunities for end-of-pipe storm water discharge controls, and such controls would be both costly and environmentally damaging. See, In re Citizens for a Better Environment, et al, SWRCB, WQ 91-03, at 51-52 ("Treatment techniques such as wet-detention basins also require large land areas to contain high volume, variable storm flows. These techniques therefore result in extremely high costs . . . . The impacts of holding large amounts of storm water for treatment may also pose potential adverse environmental impacts".)

Since such storm water treatment plants generally would need to be constructed at the downstream end of storm water flows, they would need to be located adjacent to the San Francisco Bay. However, many of the undeveloped sites adjacent to the Bay are constrained by wetland and endangered species concerns, as well as presenting potentially significant open space, energy, visual, odor, noise and other impacts. Given siting constraints in the substantially developed inner San Francisco Bay Area, it may not even be possible to site the substantial storm water collection, transportation, storage and treatment facilities that might be needed to produce pollutant reductions of the magnitude assumed by EPA in the proposed rule.

As a result of the constraints faced by municipal storm water systems, existing water quality criteria in the San Francisco Basin Plan historically have been implemented in the context of NPDES permits for storm water systems through escalating best management practices ("BMPs"), rather than through numeric effluent limitations ("NELs") or wasteload allocations ("WLAs"). The reason for this is that NELs and WLAs currently are infeasible for municipal separate storm sewer systems ("MS4s").

This implementation policy was first embodied in the 1986 Basin Plan, which retained considerable permitting discretion for nonpoint source controls, and did not require municipal permittees to meet numerical water quality objectives. See, In re Citizens for a Better Environment, et al, SWRCB, WQ 91-03, at ii.

The 1995 Basin Plan, at pages 4-14 and 4-15, continued and clarified this implementation policy, stating that:

Since both the sources of pollutants in stormwater discharges and the points of dischargeare diffuse, and the methods of reducing pollutants in stormwater discharges are in the development stage, water quality-based numerical effluent limitations are not feasible at this time. Instead, stormwater permits will include requirements to prevent or reduce discharges of pollutants that cause or contribute to violations of water quality objectives . . . . If this first phase does not result in attainment of water quality objectives, the Regional Board will consider permit conditions that may require implementation of additional control measures.

This implementation policy has also been recognized by the State Board, "Storm water permits for MS4s must achieve compliance with water quality objectives, but they may do so by requiring the implementation of BMPS." SWRCB Order 96-13 at 11.

The Basin Plan's approach is consistent with EPA policy, reflected in EPA's August 26, 1996, "Interim Permitting Approach for Water Quality-Based Effluent Limitations in Storm water Permits" published at 61 Fed. Reg. 43761 et seq. ("EPA Interim Permitting Policy"). The EPA Interim Permitting Policy:

uses best management practices (BMPS) in first-round storm water permits, and expanded or better-tailored BMPs in subsequent permits, where necessary, to provide for the attainment of water quality standards.

Numeric effluent limitations are not required under the EPA Interim Permitting Policy (*2)

The current NPDES permit for the ACCWP was developed under this approach, by requiring the dischargers to carry out the SWMP while providing for annual improvements through a work plan process.

Any attempt to make water quality standards for San Francisco Bay directly applicable to municipal storm water dischargers as numeric effluent limitations would conflict with these carefully considered provisions of the Basin Plan and State Board implementation policy.

(*1) As you know, several storm water systems have requested additional time to comment on the proposed rule, a request in which the ACCWP has joined. Additional time is particularly important given the interdependence between the CTR and the recently proposed "Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California," ("State Implementation Policy" or "SIP") released by the SWRCB on September 12, 1997, just two weeks before the comment deadline an the CTR. The way in which the CTR is implemented is central to its effects on storm water dischargers, as discussed below. Unfortunately, the State Implementation Policy does not fully correct or moderate the critical problems created by the proposed CTR.

(*2) See also, EPA, May 3, 1996, "Draft Language for Interim Permitting Approach for Water Quality-Based Effluent Limitations in Storm Water Permits." EPA also indicates in the draft policy that neither the statute nor EPA regulations require numeric effluent limitations in municipal storm water permits, and that BMPs can substitute for such numeric limitations.

Response to: CTR-001-002

See response to CTR-040-004.

Comment ID: CTR-001-004
Comment Author: Law Offices of Alan C. Waltner
Document Type: Storm Water Auth.
State of Origin: CA
Represented Org: Almeda Cnty Clean Wtr Pgm
Document Date: 09/22/97
Subject Matter Code: I-02a Applying WQBELs, Stormwater
References:
Attachments? N
CROSS REFERENCES

Comment: THE REGULATION SHOULD MORE CLEARLY CONFIRM THE CURRENT IMPLEMENTATION POLICY, AND CONFLICTING LANGUAGE IN THE PREAMBLE SHOULD BE REMOVED

At the outset, we note that the actual language of the proposed regulation appears to be appropriately qualified, stating that:

The criteria established in this section are subject to the State's general rules of applicability in the same way and to the same extent as are other Federally-adopted and State adopted numeric toxics criteria when

applied to the same use classifications . . . .

Page 42206, Proposed Section 131.38(c). As discussed above, State Board decisions in California and the San Francisco Basin Plan have made clear that MS4s need address WQS only through the implementation of escalating BMPS, all within the framework of the MEP standard.

Unfortunately, the recently proposed State Implementation Policy ("SIP',) is inconsistently drafted regarding this point. The state policy does, in Section 5.1, state that:

It is the intent of the SWRCB, in adopting this Policy, that the implementation of priority pollutant criteria/objectives and other requirements of this Policy through NPDES permits for storm water shall be consistent with the requirements of the existing SWRCBand RWQCB storm water program.

Draft State Implementation Policy at 5.1. In Chapter 5.1 of the Functional Equivalent Document ("FED") supporting the SIP, existing policy is correctly described as follows:

The RWQCBs have adopted NPDES storm water permits for MS4s . . . The MS4 permits require the discharger to develop and implement a Storm Water Management Plan whose goal is to reduce the discharge of pollutants to the maximum extent practicable (MEP). KEP is the performance standard specified in Section 402(p) of the Clean Water Act. Components of the storm water management plan address public education and outreach; illicit connection/illegal discharge detection and elimination; fiscal resources; monitoring; and the best management practices (BMPS) which will be utilized. To date, the efforts of the municipalities subject to MS4 permits have been focused on implementation of BMPs to reduce pollutants, rather than on treatment of storm water to remove pollutants.

FED at V-117 (Emphasis Added, Italics in Original). The FED goes on to state that:

Because of the nature of storm water discharges and the typical lack of information on which to base numeric water quality based effluent limitations, it has not been feasible for the SWRCB to establish numeric effluent limitations for storm water permits.

FED at V-118. The policy alternative selected in the proposed SIP is described as follows:

The existing NPDES storm water permits contain narrative objectives, rather than the numeric limits found in the more conventional NPDES permits. Compliance with these narrative objectives is a function of the dischargers' timely and effective implementation of the management practices and programs identified in the storm water management plan (MS4 permits) or the storm water pollution prevention plan (industrial/construction permits).

FED at V-119.

Despite this carefully drafted language in the FED, general statements included in the SIP suggest that WQS may need to be translated into NELs or WLAS, regardless of whether those NELs or WLAs can be satisfied by MEP-level controls. Draft SIP at 2, 910. This would violate the approach of Clean Water Act Section 402(p), as well as requirements of the Porter Cologne Act described below. (*5)

We request confirmation of the statements in the proposed rulemaking that MS4s only need to address WQS through the adoption of BMPs reflecting MEP-level controls, and that EPA does not intend that the state apply the proposed WQS as numeric effluent limitations or as the basis for wasteload allocations. Specifically, we request that EPA include language similar to that quoted above from the FED in the final

rule, and/or the preamble to the final rule.

(*5) The SIP at page 10 has particularly problematic language which states that:

Regardless of which method is used for deriving water quality-based effluent limitations, the calculated water quality-based effluent limitations shall be compared to the technology-based effluent limitations for the pollutant, and the most protective of the two types of limitations shall be included in the [permit].

This language could be read to suggest that NELS or WLAs could override the MEP standard of Section 402(p), which would violate both the Clean Water Act and porter Cologne Act.

Response to: CTR-001-004

See response to CTR-040-004.

Comment ID: CTR-020-001
Comment Author: City of Stockton
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/24/97
Subject Matter Code: I-02a Applying WQBELs, Stormwater
References:
Attachments? Y
CROSS REFERENCES

Comment: City of Stockton, California Comments on the Proposed "California Toxics Rule" 62 Fed. Reg. 42160-42207 (August 5, 1997)

The City of Stockton (the "City" or "Stockton") operates both wastewater and storm water facilities which discharge to waters of the United States. Consequently, the City is directly impacted by the Environmental Protection Agency's ("EPA" or the "Agency") proposed rulemaking. The following provides the City of Stockton's comments on the California Toxics Rule ("CTR" or the "rule") (62 Fed. Reg. 42160-42207).

As was the case with the prior National Toxics Rule ("NTR"), this proposal only addresses toxic pollutants listed pursuant to Section 307(a) of the Clean Water Act ("CWA") (approximately 126 pollutants). Conventional and non-conventional pollutants (such as ammonia, chlorine, iron, aluminum and color) are not addressed under this rule proposal. In addition, this proposal does not address whole effluent toxicity. The CTR addresses not only applicable water quality criteria (acute, chronic and human health) but also implementation methodologies such as the appropriate design instrearn flows to apply in developing permit limits (e.g., 7/Q/10, 30/Q/5, harmonic mean). Based upon the preamble to the proposed rule, the proposed water quality criteria will apply to both point source and non-point source discharges such as storm water. Due to the qualifying language contained in the rule, it is not apparent that criteria application will be uniform throughout the state and will depend somewhat on existing Basin Plan provisions.

Contrary to the rule preamble, the City does not believe that this regulatory proposal reflects the latest scientific information regarding proper application of the proposed criteria. Due to the expansive application of human health-related criteria to all streams designated as MUN (which is a default use designation under the Basin Plans) and the failure to allow site-specific modification to reflect actual use conditions, the potential receiving waters classified as exceeding human health criteria will be greatly exaggerated (e.g., stringent water ingestion and fish consumption-based criteria will be applied to ditches and intermittent streams). Consequently, the cost impact associated with this rule will be significantly greater than it otherwise should be.

In particular, the application of the criteria to storm water discharges will produce widespread non-compliance with the proposed criteria for common metals such as zinc, copper, and lead and will trigger the need for extensive implementation of costly technologies, unrelated to actual environmental needs. Therefore, the City respectfully submits that the CTR needs to be restricted in scope, updated to include more recent information regarding the expected impact of pollutants on the environment, and revised to allow utilization of relevant site-specific information to avoid misapplication of limited local resources. The following presents an overview of the proposed rule and identifies issues of concern from both storm water and wastewater discharge perspectives.

Response to: CTR-020-001

See response to CTR-040-004.

Comment ID: CTR-020-022
Comment Author: City of Stockton
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/24/97
Subject Matter Code: I-02a Applying WQBELs, Stormwater
References:
Attachments? Y
CROSS REFERENCES

Comment: VI. Application of Criteria to Wet Weather Flows is Inappropriate

The CTR specifically states that all toxies criteria apply to wet weather flow events and storm water discharges. EPA further states that it is unlikely that specific effluent limits will be established because such limits are "infeasible." Regardless of EPA's position concerning the ability to establish specific effluent limits, it is apparent that application of the proposed criteria to storm water discharges either through effluent limits or receiving water limits will place virtually all storm waters in violation of the CTR. Thus, municipalities and water conservation districts will be exposed to citizen suits and civil penalties under state and federal law. As a result, major expenditures of local resources would be required to eliminate violations of the proposed criteria, even where it is apparent that there is no actual environmental harm. Because the rule fails to assess the significant economic impact associated with application of the criteria to storm waters and there is no information in the record supporting that it is necessary to meet the criteria in storm waters to adequately protect the environment, the CTR should specifically exempt storm waters from the criteria application. The legal and technical basis for this request is discussed below.

Few, if any, of the EPA criteria were designed to apply to storm water-related events, The criteria assume that extended exposure to the pollutants of concern will occur, that sensitive organisms are present, and that the form of pollutant and water chemistry used to conduct the laboratory studies underlying the criteria are similar to the receiving water conditions. All of these assumptions are known to be in error for storm water discharges, as follows:

* Exposures will be intermittent, variable and generally far shorter than the exposure used to establish the acute criteria (96 hours) and certainly far less than any chronic or human health based criteria (30 days to 70 years). EPA's "fast acting toxicant" evaluations confirm that short duration exposures may often be an order of magnitude higher than longer term exposures without causing adverse impacts (see, Section II.A.4.a.1 above). Thus, direct application of the criteria (with or without a mixing zone) will produce unnecessarily restrictive requirements.

* Water chemistry in storm water is dramatically different than the typical pristine water used to assess pollutant impacts in the criteria tests (e.g., Lake Superior water). EPA has routinely acknowledged that water chemistry significantly impacts the effect of pollutants in the environment, and elevated TOC and TSS levels will significantly mitigate the toxicity of a wide range of metals and organics. (See, 62 Fed. Reg. 42175). The National Guidelines require modification of the criteria when it is apparent that the criteria will be overprotective as is the case in this circumstance.

* Sensitive organisms such as daphnids and salmonids, which often drove the criteria document calculations (e.g., metals criteria) cannot inhabit most receiving waters and certainly will not be present in intermittent streams. Turbulent high flow conditions alone would destroy fragile daphnids. Applying criteria to protect species that cannot possible exist in the receiving waters is clearly unnecessary.

* Guidance documents related to the translation of water quality criteria into permit limitations are not designed to address intermittent wet weather conditions. Criteria modification procedures mandated to apply to metals (WER Guidance) cannot be applied to short term, highly variable, intermittent exposure conditions without a major restructuring of the guidance documents.

* Permitting guidance recommended for usage with the CTR (e.g., (1991) TSD) does not have a wet weather analysis component and the statistical procedures are not applicable due to the lack of continuous discharge and infrequency of discharge conditions. The only comparable information contained in the TSD relates to mixing zones wherein the TSD states that environmental impacts cannot be properly assessed unless the time period of exposure is accurately considered due to the known dose/response relationships of various pollutants. EPA has also acknowledged that "[T]he human health risks of a substance cannot be determined with any degree of confidence unless a dose/response relationship is quantified" (62 Fed. Reg. 42175). As data on the short term dose/response is not included in the published criteria and the TSD procedures do not specify how to assess intermittent short term pollutant exposures to compare such exposures to longer term criteria, there is no objective basis upon which to apply even the acute criteria to storm water events.

Given the lack of experience of permitting authorities in properly applying water quality criteria to short term events, it is essential that EPA clarify that the proper application of criteria to wet weather events must account for the time period of exposure, the organisms present, and the different characteristics of the water in comparison to EPA laboratory studies. Absent the establishment of specific procedures to ensure that the criteria will be properly applied to the unique circumstances of storm events, EPA should not extend application of the criteria to wet weather events.

Application of metals criteria to storm water discharges will be particularly problematic as EPA is now recommending that the actual hardness of the receiving water be used and there is no assurance that dilution with receiving waters will be considered. Most of EPA's metals criteria assume that a metal becomes infinitely toxic as hardness approaches zero. This is not based on a detailed database of organism sensitivity at low hardness but is an artifact of the hardness/toxicity model that reasonably reflects the toxicity of metals under typical hardness conditions (50-200 mg/l). Storm water events, however, do not fit within the typical conditions that formed the basis of the current metals criteria.

The hardness of rain water is quite low and will result in extremely low limits if applied to storm waters. Hardness levels increase as the storm water contact time with the ground increases. However, prior to mixing with surface waters, it is not unusual to encounter hardness values in the 20 mg/l range. This produces extremely low acute and chronic criteria for a host of metals, most notable copper, zinc, and lead. For these parameters, the calculated criteria will range from less than 1 ppb to 30 ppb. Thus, application of the CTR criteria to storm waters would lead to the conclusion that most storm waters are an acute toxicity threat to the environment even though a more accurate application of the criteria would lead to an opposite conclusion for metals. This is not a minor difference in results and, unless corrected, will trigger the need for expensive biological testing to prove the obvious -- metals in storm waters are not toxic.

In addition to the concerns regarding application of metals criteria, it is apparent that there is no rational basis for applying long term human health criteria to short term storm water events. EPA should clarify that long term human health-based criteria (which assume 30 day to 70 year exposures) often based on long term bioaccumulation do not apply to short term storm water discharge events. This will prevent misapplication of the criteria that would otherwise occur under the Agency's proposal.

In summary, EPA should revise the scope of the CTR to specify that the criteria do not apply to storm water situations and that site-specific decisions on the need for reduction of pollutants in storm waters will be conducted.

Response to: CTR-020-022

See response to CTR-040-004.

Comment ID: CTR-087-002
Comment Author: Morrison & Foerster LLP
Document Type: Storm Water District
State of Origin: CA
Represented Org: SCVURPPP
Document Date: 09/24/97
Subject Matter Code: I-02a Applying WQBELs, Stormwater
References: Letter CTR-087 incorporates by reference letters CTR-001 and CTR-027
Attachments? N
CROSS REFERENCES

Comment: Moreover, the Agency's position on the application of WQBELs to municipal stormwater discharges rests on a flawed internal opinion circulated from the General Counsel's office to Region 9's legal counsel in January 1991 (the so-called "Elliot Memo") which ignores the plain language of the statute and simply assumes that Congress's clear language was ambiguous. It has never before been

endorsed by the Administrator or been subjected to public comment process or the potential for judicial review. Therefore, if EPA wishes to try to make the Elliot Memo the law through the CTR, it first needs to go to Congress to amend the Act's unambiguous NPDES permitting requirements for municipal stormwater discharges.

Response to: CTR-087-002

See response to CTR-040-004.

Subject Matter Code: I-03 Applicability of Criteria

Comment ID: CTR-007-003
Comment Author: Port of San Diego
Document Type: Port Authority
State of Origin: CA
Represented Org:
Document Date: 09/24/97
Subject Matter Code: I-03 Applicability of Criteria
References:
Attachments? N
CROSS REFERENCES

Comment: 2. Under the proposed rule, it is unclear whether Best Management Practices or the water quality criteria will be used to assess stormwater discharges.

Response to: CTR-007-003

EPA disagrees with the comments. See response to CTR-001-003. For a discussion of the scientific validity of CTR criteria with regard to WQBELs and storm water discharges, see response to CTR-031-004c. For a discussion of the relationship between criteria, standards, effluent limitations and implementation costs, see response to CTRH-002-006a. For a discussion of EPA's evaluation of studies concerning costs associated with achieving water quality criteria for storm water discharges, see responses to CTR-013-003 and CTR-040-004.

Comment ID: CTR-013-005
Comment Author: County of Los Angeles
Document Type: Storm Water Auth.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: I-03 Applicability of Criteria
References: Letter CTR-013 incorporates by reference letter CTR-027

Attachments? N
CROSS REFERENCES

Comment: In addition, we would like to emphasize the following concerns which greatly impact the Los Angeles County Stormwater Program:

5. The proposed criteria were established based on typical, steady flow wastewater discharges, and may not be applicable to wet weather flows. The USEPA in Washington is currently reviewing the applicability of present water quality criteria to wet weather discharges. Given the quantity of stormwater discharges, flow conditions in the receiving waters, the numerous discharge points, and variability in discharge quality, there is no published scientific approach for assessing the impacts of such discharges on designated uses.

We recommend that the rule not apply to MS4s until the USEPA has completed its study on the applicability of water quality criteria to MS4 discharges.

Response to: CTR-013-005

EPA disagrees with the comments. See response to CTR-001-003. For a discussion of the relationship between criteria, standards, effluent limitations and implementation costs, see response to CTRH-002-006a. For a discussion of the scientific validity of CTR criteria, see response to CTR-031-004c. For a discussion of EPA's evaluation of studies concerning costs associated with achieving water quality criteria for storm water discharges, see responses to CTR-013-003 and CTR-040-004.

Comment ID: CTR-027-006
Comment Author: California SWQTF
Document Type: Storm Water Auth.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: I-03 Applicability of Criteria
References: Letter CTR-027 incorporates by reference letters CTR-001, CTR-036 and CTR-040
Attachments? N
CROSS REFERENCES

Comment: 6. The proposed criteria were established based on typical, steady flow wastewater discharges, which may not be applicable to wet weather flows. USEPA in Washington is currently reviewing the applicability of present water quality criteria to wet weather discharges. Given the quantity of stormwater discharges, flow conditions in the receiving waters, the numerous discharge points, and variability in discharge quality, there is no published scientific approach for assessing the impacts of such discharges on designated uses.

Recommendation: The rule should not apply to MS4s until USEPA has completed its study on the applicability of water quality criteria to MS4 discharges.

Response to: CTR-027-006

EPA disagrees with the comments. See response to CTR-001-003. For a discussion of the scientific validity of CTR criteria with regard to WQBELs and storm water discharges, see response to CTR-031-004c. For a discussion of the relationship between criteria, standards, effluent limitations and implementation costs, see response to CTRH-002-006a. For a discussion of EPA's evaluation of studies concerning costs associated with achieving water quality criteria for storm water discharges, see responses to CTR-013-003 and CTR-040-004.

Comment ID: CTR-031-003b
Comment Author: Fresno Metro. Flood Ctrl Dist.
Document Type: Flood Ctrl. District
State of Origin: CA
Represented Org:

Document Date: 09/25/97
Subject Matter Code: I-03 Applicability of Criteria
References: Letter CTR-031 incorporates by reference letter CTR-027
Attachments? N
CROSS REFERENCES C-21

Comment: If the proposed rule is carefully and sufficiently modified to affirm a commitment by EPA to effect only its Congressional authorization as established by CWA section 402(p), then EPA's failure to assess municipal storm water dischargers" ability to attain the proposed standards and associated economic and environmental impacts may be set aside at this time. However, if EPA persists in maintaining the CTR as drafted in this regard, the ambiguities presented in the preamble demand serious consideration and analyses as follows.

a. Many of the criteria are not attainable or scientifically valid with regard to municipal stormwater dischargers, nor is the proposed approach consistent with an appropriate delegation of authority to the State.

i. Attainability of Standards

The statutory premise of the CWA is to provide water quality for protection and propagation of aquatic life, wildlife, and recreation wherever attainable. The CWA therefore establishes a reality test in that objectives must be attainable.

The proposed CTR criteria can not be attained by municipal storm water dischargers. The District treats through detention and retention all but 1% of its urban runoff on an annual average basis. Nonetheless, its urban runoff discharges, after detention, would exceed proposed dissolved copper, lead, and zinc criteria. Concentrations would need to be reduced by 67%-95% to meet the proposed chronic criteria. No storm water best management practices, including conventional end-of-pipe storm water treatment facilities (i.e., detention systems), are believed to be able to achieve these levels of reductions for these constituents.

Response to: CTR-031-003b

EPA disagrees with the comments. See response to CTR-001-003. For a discussion of EPA's evaluation of studies concerning costs associated with achieving water quality criteria for storm water discharges, see responses to CTR-013-003 and CTR-040-004. For a discussion of the scientific validity of CTR criteria, see response to CTR-031-004c. For a discussion of the relationship between criteria, standards, effluent limitations and implementation costs, see response to CTRH-002-006a.

Comment ID: CTR-037-008
Comment Author: Hampton Roads Sanitation Dist.
Document Type: Sewer Authority
State of Origin: VA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: I-03 Applicability of Criteria
References:
Attachments? N

CROSS REFERENCES

Comment: 8. EPA states that NPDES permits for wet weather point source discharges must include limits in order to implement water quality standards, and that the water quality criteria presented in the rule will be used to develop WQBELs in NPDES permits for these sources. EPA does not address the exposure issues associated with using surface water quality standards developed using tests lasting 2-60 or more days to draw conclusions on discharges lasting minutes to hours. WERF has conducted research recently which shows clearly that the impact due to exposure of minutes is orders of magnitude less than the impact observed following days of exposure. Use of water quality standards to regulate most stormwater discharges is overly stringent and protective, which will ultimately result in the expenditure of resources on controls which offer no benefit. EPA should be responsible for justifying the use of water quality standards with stormwater discharges with data and illustrating why they are necessary to protect and support designated uses. The use of these standards under these conditions is arbitrary, at best.

Response to: CTR-037-008

EPA disagrees with the comments. See response to CTR-001-003. For a discussion of the scientific validity of CTR criteria with regard to WQBELs and storm water discharges, see response to CTR-031-004c. For a discussion of the relationship between criteria, standards, effluent limitations and implementation costs, see response to CTRH-002-006a. For a discussion of EPA's evaluation of studies concerning costs associated with achieving water quality criteria for storm water discharges, see responses to CTR-013-003 and CTR-040-004.

Comment ID: CTR-061-005a
Comment Author: G. Fred Lee & Associates
Document Type: Academia
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: I-03 Applicability of Criteria
References:
Attachments? Y
CROSS REFERENCES C-17

Comment: Additional Comments

Presented below are some specific comments on statements made in the proposed CTR Federal Register.

Page 42160, third column, near the bottom, municipal stormwater dischargers should be added to the list of NPDES dischargers who have an interest in this rule. If anything, they probably will be affected more than any other entity.

Page 42161, third column, first paragraph, states,

"Numeric criteria for toxic pollutants allow the State and EPA to evaluate the adequacy of existing and potential control measures to protect aquatic ecosystems and human health. Numeric criteria also provide

a more precise basis for deriving water quality-based effluent limitations in National Pollutant Discharge Elimination System (NPDES) permits to control toxic pollutant discharges."

That statement is somewhat unreliable and misleading.

While it is bureaucratically simpler for regulatory agencies to numerically compare concentrations found in an effluent or in ambient waters with a chemical concentration-based water quality criterion, the claim made in the quoted statement is not necessarily true. In fact, rarely is the exceedance of numeric criteria a reliable basis for assessing the impacts of constituents on human health or the environment. While it may be more precise, it can be highly inaccurate. This is one of the areas that needs to be corrected by the US EPA where biological effects-based approaches are used, rather than chemical-based approaches for regulating such impacts as aquatic life toxicity for potentially toxic constituents.

Response to: CTR-061-005a

EPA disagrees with the comments. See response to CTR-001-003. For a discussion of the scientific validity of CTR criteria with regard to WQBELs and storm water discharges, see response to CTR-031-004c. For a discussion of the relationship between criteria, standards, effluent limitations and implementation costs, see response to CTRH-002-006a. For a discussion of EPA's evaluation of studies concerning costs associated with achieving water quality criteria for storm water discharges, see responses to CTR-013-003 and CTR-040-004.

Comment ID: CTR-096-001a
Comment Author: City of Modesto
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: I-03 Applicability of Criteria
References:
Attachments? N
CROSS REFERENCES C-17

Comment: Thank you for the opportunity to comment on the proposed California Toxics Rule. The City's comments are related to five main concepts:

1. The numerical standards are ambiguous or incomplete to address the variety of operating conditions under which discharges to waters of the United State occur.

Specifically, the City submits the following comments:

A. California's receiving waters have a very wide diversity of hydraulic and environmental conditions. The numerical standards do not take into account the wide range of rainfall patterns, storm durations, irrigation flows and power generation flows that are the current aquatic habitat. California's rivers are highly regulated, highly managed. The proposed regulations neither address this variety, nor provide a means by which numerical standards can be readily developed to address such variety.

B. The California Toxic Rule presents new water quality standards for the State of California. This rule

presents water quality standards for all water bodies within the state. Water quality standards as presented in this rule would apply to all environmental conditions (dry and wet weather). During wet weather, conditions in the receiving streams can be extremely variable due to the quality and quantity of stormwater. Treatment plants generally have hydraulic capacity to process twice the average dry weather flow received. Water quality standards were developed based on dry weather conditions. Therefore, numerical water quality standards should not need to be achieved during storm events. If water quality standards need to be achieved during storm conditions, it is suggested that new standards be developed to account for the changes in environmental conditions.

Response to: CTR-096-001a

EPA disagrees with the comments. See response to CTR-001-003. For a discussion of the scientific validity of CTR criteria with regard to WQBELs and storm water discharges, see response to CTR-031-004c. For a discussion of the relationship between criteria, standards, effluent limitations and implementation costs, see response to CTRH-002-006a. For a discussion of EPA's evaluation of studies concerning costs associated with achieving water quality criteria for storm water discharges, see responses to CTR-013-003 and CTR-040-004.

Comment ID: CTRE-002-004
Comment Author: G. Fred Lee & Associates
Document Type: Academia
State of Origin: CA
Represented Org:
Document Date: 09/18/97
Subject Matter Code: I-03 Applicability of Criteria
References:
Attachments? N
CROSS REFERENCES

Comment: As you may or should know, the urban stormwater dischargers are not claiming that there are no water quality problems associated with their discharges. It appears that there may be real water quality problems in urban stormwater discharges due to chemicals, such as the organophosphate pesticides principally known at this time, diazinon and chlorpyrifos, which the US EPA either, in the case of chlorpyrifos for which there is a water quality criterion, has failed to implement a criterion or, for diazinon, has yet failed to develop a criterion. I understand that finally after years of delay where it has been well known by the US EPA that diazinon was causing widespread aquatic life toxicity, the Agency is now beginning again to formulate a water quality criterion for this chemical.

Even with the development of these criteria, however, it does not mean that they would be enforced. The chlorpyrifos situation is a prime example of where there is well-known aquatic life toxicity in many communities' stormwater runoff, yet the Agency, including US EPA Region 9, has failed to admit publicly that there is a problem, much less act to control the problem. A situation could readily develop where stormwater dischargers are required under CTR to spend massive amounts of public funds building "50 Oakland Coliseums" just to store stormwater runoff in Alameda County from a storm magnitude that occurs more frequently than once in three years because of administrative exceedances of several CTR-regulated heavy metals in the stormwater runoff which have been repeatedly found to be in non-toxic, non-available forms, including the dissolved forms. yet could have the treated stormwater discharge to San Francisco Bay be highly toxic due to unregulated or inadequately regulated

organophosphate pesticides. This is an artifact of the inappropriate approaches used by the Agency of focusing on chemicals, rather than chemical impacts, i.e. potential toxicants rather than toxicity.

Response to: CTRE-002-004

The scope of today's rule is to establish numeric criteria to bring California into compliance with CWA Section 303(c)(2)(B): Section 303(c)(2)(B) requires adoption of numeric criteria for priority toxic pollutants contained in CWA Section 307(a) for which EPA has issued Section 304(a) criteria guidance if those pollutants could reasonably be expected to interfere with the designated uses of state waters. The promulgation, implementation, and control of pollutants that are not identified as priority toxic pollutants (i.e, those pollutants that are not contained in CWA Section 307(a)) are outside of the scope of today's rule. Diazinon and chloropyrifos, the pollutants referenced by the commenter, are not contained toxic pollutants under CWA Section 307(a) and are thus outside of the scope of this rulemaking.

However, EPA notes that the CWA and Water Quality Standards Regulation requires all states, including California, to adopt water quality standards (which includes water quality criteria) sufficient to protect the designated uses of their waters. This requirement necessitates State adoption of criteria that are not included in the CWA Section 307(a) list. In addition, states may also use their narrative criteria to prevent toxic effects caused by pollutants that are not identified as priority toxic pollutants, such as those pollutants mentioned by the commenter, in instances where a state does not have numeric criteria in place or to supplement the numeric criteria

For a discussion of the scientific validity of CTR criteria, see response to CTR-031-004c. For a discussion of the relationship between criteria, standards, effluent limitations and implementation costs, see response to CTRH-002-006a. For a discussion of EPA's evaluation of studies concerning costs associated with achieving water quality criteria for storm water discharges, see responses to CTR-013-003 and CTR-040-004. See also response to CTR-001-003.

Comment ID: CTRH-001-007
Comment Author: Doug Harrison
Document Type: Public Hearing
State of Origin: CA
Represented Org: Fresno Met. Flood Control
Document Date: 09/17/97
Subject Matter Code: I-03 Applicability of Criteria
References:
Attachments? N
CROSS REFERENCES

Comment: Even if it could be successfully argued that the CTR as drafted is applicable to the stormwater dischargers, we believe that the criteria is flawed. During one recent meeting of the Water Quality Standards Work Group of FACA, EPA headquarters staff made a presentation that reminded us of the language of the Act, which seems to establish a test of attainability -- a reality test, if you will -- that the objectives must be attainable.

We also have extensive data from the NURP program and the NPDES permits that suggest that through monitoring it was demonstrated that the criteria are not attainable, the concerns that you heard from the

two previous speakers. It is documented that episodic stormwater flows vary greatly the ability to handle -- in things like recovery times and so forth.

And I would also note a 1992 memo that was produced by Tudor Davis of the Office of Science and Technology, reporting on the CSO Wet Weather Panel that focused on some of these, and the fact that while they concluded it was not necessarily appropriate to produce a separate set of criteria just for wet weather conditions, that what the criteria did have to do is to be applied to both duration and the frequency and magnitude -- frequency and magnitude.

The EPA began this work shortly thereafter and brought to the Urban Wet Weather FACA the individual who is doing this work of application to the aquatic life criteria of these variables. The criteria analysis was to have been completed by September/October of this year.

We have to conclude that if the criteria as proposed in the current CTR proposal is in fact to be interpreted to include stormwater, that there are these inconsistencies that need to be addressed.

Certainly there's awareness at EPA of the limitations of BMP programs regarding attainment of CWA objectives and criteria.

The Phase II draft rule that is now before OMB for review provides for a complete comprehensive stormwater program evaluation in 13 years from the date of the adoption of that final rule, which is scheduled for March of '99. And that program definition included Phase I to Phase II programs, and goes on to state that there should be no additional BMPs required until that evaluation is completed.

It appears to limit flexibility -- would tend to limit state flexibility. We have concern about that, and also that it appears to limit the compliance schedule to 5 years. EPA has already cited the need to go to a 10-year evaluation after two permit terms for the entire stormwater program.

We have run models in our community FMFCD stormwater system. We capture 90 percent of all runoff in the community and keep it. It never gets to the waters of the U.S. The remaining 10 percent, we treat 90 percent of it through extensive detention.

Response to: CTRH-001-007

EPA disagrees with the comments. See response to CTR-001-003. For a discussion of the scientific validity of CTR criteria, see response to CTR-031-004c. For a discussion of the relationship between criteria, standards, effluent limitations and implementation costs, see response to CTRH-002-006a. For a discussion of EPA's evaluation of studies concerning costs associated with achieving water quality criteria for storm water discharges, see responses to CTR-013-003 and CTR-040-004.

Comment ID: CTRH-001-061
Comment Author: Fred Lee
Document Type: Public Hearing
State of Origin: CA
Represented Org:
Document Date: 09/17/97
Subject Matter Code: I-03 Applicability of Criteria
References:

Attachments? N
CROSS REFERENCES

Comment: MR. LEE: My name is Fred Lee, L-E-E.

I want to focus on one aspect of the discussions today, and that is the urban stormwater and highway stormwater runoff issues. These are of concern to me. I'm particularly concerned about this issue in applying these criteria to regulating stormwater runoff and the ultimate goal mandated by the Clean Water Act.

I have been involved in criteria and standards development since the 60s, I helped EPA develop its current approach as a peer reviewer for agencies for the so-called gold book criteria, which is still basically the approach being used today to promulgate these criteria.

There is no question, if you understand how the current criteria were developed, that they tend to significantly over regulate urban stormwater runoff. This will result in massive expenditures as we approach the goal of achieving water quality standards in stormwaters.

This is a well-known problem. Everyone knows this is a problem, but everybody says, "Well, apply BMPs for a while." And that's no man's land. what's that really mean and what's MEP mean and so forth?

When I looked at that rule, I said we really missed the boat by not discussing what it's going to cost to apply these criteria to urban stormwater as an ultimate goal where you have no measure for exceedence for five years. That's Clean Water Act requirements.

We've got to get these figures on the table and we've got to start to understand where we're heading for as a goal with respect to applying these criteria as ultimate goals for urban stormwater.

It's -- there may be situations it's 1 to 2 dollars per person per day in the regulated communities. That's the kind of cost we're talking about for achieving Clean Water Act requirements, with no more than one exceedence for constituents, as we've heard, such as copper and lead, zinc, et cetera -- 1 to 2 dollars per person.

We don't have lands to store this water in order to provide treatment, so it's -- to me, it's a matter for EPA as part of this rule to do a proper economic analysis of what it's going to cost the public actually to process ever-increasing BMPs until we get to the goal.

It's a serious mistake. We're talking about a massive bill for this country. And what are we going to get? We'll get a lot of over regulation because criteria are not applicable to this kind of situation.

We need different kind of criteria, and this has been well discussed; we understand that needs to be done obviously.

Response to: CTRH-001-061

EPA disagrees with the comments. See response to CTR-001-003. For a discussion of the scientific validity of CTR criteria, see response to CTR-031-004c. For a discussion of the relationship between criteria, standards, effluent limitations and implementation costs, see response to CTRH-002-006a. For a discussion of EPA's evaluation of studies concerning costs associated with achieving water quality

criteria for storm water discharges, see responses to CTR-013-003 and CTR-040-004.

Comment ID: CTRH-002-024
Comment Author: Gary Hildebrand
Document Type: Public Hearing
State of Origin: CA
Represented Org: L.A. Dept of Public Works
Document Date: 09/19/97
Subject Matter Code: I-03 Applicability of Criteria
References:
Attachments? N
CROSS REFERENCES

Comment: My name is Gary Hildebrand. I'm with the Los Angeles County Department of Public Works, and I'm the stormwater permit program manager for Los Angeles County. I'm here representing the principal permittee for the L.A. County Municipal Stormwater Permit Program which is the largest municipal stormwater permit program in the nation. We have over 86 permittee cities in our program. We cover over a 3,000-square-mile watershed which contains like 9 million people. We also have a 3,000-mile-plus urban storm drain network that permittees must maintain.

First, I'd like to express our support and agreement with the comments expressed at the public hearing yesterday in San Francisco by Mr. Bob Hale, the chairman of the California Stormwater Quality Task Force, and also the other municipal stormwater program representatives, both there and at the hearing today.

Then I would like to provide some additional comments that are concerned to our municipal stormwater program. First off, compliance with the proposed criteria for stormwater discharges may be impractical. The proposed criteria was established for typical steady flow point source discharges and are not applicable to the wet weather flows. Quantity of stormwater discharges, slow conditions and receding waters, the numerous discharge points and the variability in discharge quality, there is no published scientific approach to determine the compliance with water quality criteria for stormwater runoff from a municipal storm drain system. Until such an approach is accepted and published by a regulatory agency, it should not be applicable to municipal stormwater discharges.

Response to: CTRH-002-024

EPA disagrees with the comments. See response to CTR-001-003. For a discussion of the scientific validity of CTR criteria, see response to CTR-031-004c. For a discussion of the relationship between criteria, standards, effluent limitations and implementation costs, see response to CTRH-002-006a. For a discussion of EPA's evaluation of studies concerning costs associated with achieving water quality criteria for storm water discharges, see responses to CTR-013-003 and CTR-040-004.

Subject Matter Code: I-04 Site-Specific Criteria

Comment ID: CTR-013-006a
Comment Author: County of Los Angeles
Document Type: Storm Water Auth.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: I-04 Site-Specific Criteria
References: Letter CTR-013 incorporates by reference letter CTR-027

Attachments? N
CROSS REFERENCES C-24e

Comment: In addition, we would like to emphasize the following concerns which greatly impact the Los Angeles County Stormwater Program:

6. The proposed criteria will apply to all inland surface waters and enclosed bays and estuaries, regardless of the designated or attainable uses for a water body. This is of particular concern for waters that only have flows during wet weather events or that are point source effluent dominated water bodies. Blanket application of water quality criteria to all waters without designated uses is inconsistent with Federal and State water quality laws. Water quality standards are made up of two components--designated uses and the appropriate criterion to ensure the designated use can be achieved. Assigning criteria to a water body without first considering the designated uses is inappropriate and could result in over restrictive, unnecessary permit limits potentially resulting in significant compliance costs to a discharger.

It is common in California for urban stormwater runoff discharges to be the primary or only source of waters to urban creeks and waterways, that is, there would be little or no flow during most of the year were it not for urban stormwater or other point source discharges. Given the potential compliance problems for stormwater discharges forcertain constituents (even after a fully implemented BMP program), a municipality could be forced to remove stormwater discharges from the creek. The costs would be significant and the benefit little, if any. In fact, the removal of these discharges would be environmentally damaging to aquatic life and wildlife that were supported by the effluent/runoff dependent waters.

Therefore, the proposed rule should be revised to avoid blanket application of the proposed criteria to all surface waters and to require appropriate beneficial and attainable uses of all waters be determined prior to imposing water quality criteria in the water body. The rule should also be revised to implement separate and distinct water quality criteria for water bodies that are primarily effluent or runoff-dependent.

Response to: CTR-013-006a

See response to CTR-040-004.

Comment ID: CTR-027-007a
Comment Author: California SWQTF

Document Type: Storm Water Auth.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: I-04 Site-Specific Criteria
References: Letter CTR-027 incorporates by reference letters CTR-001, CTR-036 and CTR-040
Attachments? N
CROSS REFERENCES C-24e

Comment: 7. The proposed criteria will apply to all inland surface waters and enclosed bays and estuaries regardless of the designated or attainable uses for a water body. This is of particular concern for waters that only have flows during wet weather events, or that are point source effluent dominated water bodies. Blanket application of water quality criteria to all waters without designated uses is inconsistent with federal and state water quality laws. Water quality standards are made up of two components - designated uses and the appropriate criteria to ensure the designated use can be achieved. Assigning criteria to a water body without first considering the designated uses is inappropriate and could result in overly restrictive, or unnecessary permit limits, potentially resulting in significant compliance costs to a discharger.

It is common in California for urban stormwater runoff discharges to be the primary or only source of waters to urban creeks and waterways; that is, there would be little or no flow during most of the year were it not for man's activities. Given the potential compliance problems for stormwater discharges for certain constituents (even after a fully implemented BMP program) a municipality could be forced to remove stormwater discharges from the receiving water. The costs would be significant and the benefit little, if any. In fact, the removal of these discharges would be environmentally damaging to aquatic life and wildlife that were supported by the effluent/runoff dependent waters.

Recommendation: The proposed rule should be revised to avoid blanket application of the proposed criteria to all surface waters, and to require appropriate beneficial and attainable uses of all waters be determined prior to imposing water quality criteria in the water body. The rule should also be revised to implement separate and distinct water quality criteria for water bodies that are primarily effluent or runoff dependent waters. An example of such flexibility is the use of a less stringent cancer risk factor such as 10E-4 or 10E-5 for the human health criteria for effluent dominated streams.

Response to: CTR-027-007a

See response to CTR-040-004.

Comment ID: CTRH-002-025
Comment Author: Gary Hildebrand
Document Type: Public Hearing
State of Origin: CA
Represented Org: L.A. Dept of Public Works
Document Date: 09/19/97
Subject Matter Code: I-04 Site-Specific Criteria
References:
Attachments? N
CROSS REFERENCES

Comment: The next and the proposed criteria will apply to Inland Surface Waters, Enclosed Bays, and Estuaries regardless of the designatable or attainable uses for water -- this is a particular concern that only flows during wet weather events or that are dominated water bodies.

There are many situations in our area where early stormwater runoff discharges to local creeks and waterways are the primary or only source of waters. There would be flow under most of the year were it not for discharges. Given the stormwater discharges and compliance problems with certain decisions, this would be even after a fully implementing BMP program. The municipality could be forced to remove the discharge from the creek constantly without benefit. In fact, removal of these discharges could be environmentally unsound given the wildlife that are supported by the effluent and/or runoff-dependent waters.

Response to: CTRH-002-025

The commenter feels that in situations where a municipality is unable to achieve compliance with CTR in an intermittent stream, they will be forced to continuously remove the discharge from the stream. EPA does not mandate removal of runoff as part of a storm water management plan, rather the upgrading / addition of BMPs to lower pollutant loadings. Commenter is right in that wildlife may be dependent on the intermittent flows which are totally of storm water origin. But it must be noted that the flora and flauna may also be similarly imperiled by toxics contained in the storm water effluent.

Subject Matter Code: I-05 Compliance Schedules

Comment ID: CTR-013-007a
Comment Author: County of Los Angeles
Document Type: Storm Water Auth.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: I-05 Compliance Schedules
References: Letter CTR-013 incorporates by reference letter CTR-027

Attachments? N
CROSS REFERENCES G-02

Comment: In addition, we would like to emphasize the following concerns for which greatly impact the Los Angeles County Stormwater Program:

7. The proposed rule provides only a five-year compliance schedule to achieve compliance with the proposed water quality criteria. Again, setting aside the issue of whether water quality standards actually apply to municipal stormwater discharges, municipal stormwater programs are long-term, BMP-based programs. Because of this, it will take many years for a municipality to realize any water quality benefits in the receiving waters. The preamble to the proposed rule addresses all wet weather discharges together in one discussion. Municipal stormwater programs should be discussed and treated separately from all other wet weather and point source discharges. These are unique programs and cannot be placed in a "one-size fits all" regulatory program. The proposed rule needs to account for the nature of stormwater discharges by allowing more time for the MS4 long-term, BMP, source control program approach to take place for controlling pollutants in stormwater discharges.

We recommend that the rule be revised to provide a longer compliance schedule and to provide more flexible regulatory relief for MS4 dischargers who have fully complied with the MEP discharge standards but cannot achieve compliance within the established compliance schedule. At a minimum, the CTR should follow the recommendation of the State Task Force on the Inland Surface Water Plan to provide a 15-year compliance schedule.

Response to: CTR-013-007a

See response to CTR-030-004c.

Comment ID: CTR-027-008a
Comment Author: California SWQTF
Document Type: Storm Water Auth.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: I-05 Compliance Schedules
References: Letter CTR-027 incorporates by reference letters CTR-001, CTR-036 and CTR-040
Attachments? N
CROSS REFERENCES G-02

Comment: 8. The proposed rule provides only a five-year compliance schedule to achieve compliance with the proposed water quality criteria. Again setting aside the issue of whether water quality standards actually apply to municipal stormwater discharges, municipal stormwater programs are long term BMP based programs. The proposed rule fails to recognize this, addressing all wet weather discharges together in one discussion. Municipal stormwater programs should be discussed and treated separately from all other wet weather and point source discharges. These are unique programs and cannot be placed in a "one-size fits all" regulatory program. The proposed rule needs to account for the nature of stormwater discharges by allowing more time for the MS4 long-term, BMP, source control program approach to take place for controlling pollutants in stormwater discharges.

The compliance schedule in the proposed rule discourages a watershed approach to improving water quality. The development and implementation of a watershed plan requires many years and many stakeholder involvements. However, the short compliance schedule in the CTR would actually encourage the discharger to forgo the watershed approach and address its toxicity issues separately and more expeditiously.

Recommendation: The rule should allow the State to establish compliance schedules. Short of this flexibility, the rule should be revised to provide a longer compliance schedule and to provide more flexible regulatory relief for MS4 dischargers who have fully complied with the MEP discharge standards but cannot achieve WQBELs compliance within the established compliance schedule. At a minimum, the CTR should follow the recommendation of the State Task Force on the Inland Surface Water Plan to provide a 15-year compliance schedule. Also provisions should be made for a longer compliance schedule when dischargers use a watershed approach to control toxic pollutants.

Response to: CTR-027-008a

See response to CTR-030-004c.

Comment ID: CTRH-001-034b
Comment Author: Dave Brent
Document Type: Public Hearing
State of Origin: CA
Represented Org: CA Water Qual. Task Force
Document Date: 09/17/97
Subject Matter Code: I-05 Compliance Schedules
References:
Attachments? N
CROSS REFERENCES I-08
G-03

Comment: Thirdly, I'd like to touch upon implementation of the rule. My understanding is that the state's Inland Surface Waters and Enclosed Bays and Estuaries Plan will address implementation of the CTR. With this in mind, the CTR should serve as an enabling rule and allow the state and the dischargers flexibility in the implementation of objectives contained in the rule.

As I touched upon earlier in my opening remarks, EPA has included some enabling provisions in this rule that we support, such as use and determination of mixing zones and water effects ratios. From the

stormwater perspective, we believe other important enabling provisions must be included to allow for regional flexibility in the implementation of our stormwater programs.

For example, enabling provisions should be included to allow flexibility in establishing compliance schedules for stormwater discharges and should allow flexibility for site-specific establishment of low-flow conditions and wet weather standards, and ranges of human health criteria depending on the use of individual receiving waters.

Response to: CTRH-001-034b

With respect to compliance schedules see response to CTR-030-004c.

The final CTR also provides flexibility for site-specific flow conditions. EPA notes that the State of California may develop alternative design flows for its waters provided that those alternative flows are scientifically defensible and protective of the designated uses of State waters. Such alternative flows will be subject to EPA review and approval. However where the State has not adopted low flow provisions, the design flows specified in today's rule shall be implemented to ensure that the criteria will be implemented appropriately to provide environmental and human health protection.

As noted in the preamble of today's rule, EPA's Technical Support Document for Water Quality-based Toxics Control (the TSD) also recommends the use of dynamic models to perform wasteload allocations. EPA is clarifying that today's rule provides the State of California with the flexibility to utilize dynamic models in establishing low flow designs. The dynamic modeling techniques, as outlined in the TSD, will enable the determination of wasteload allocations that will meet the criteria in today's rule without using a single, worst-case concentration based on a critical condition.

EPA disagrees that it must or should establish ranges of criteria depending on the use of individual receiving waters. In establishing water quality criteria for California, EPA is implementing section 303(c)(2)(B) of the CWA which requires adoption of criteria for all priority toxic pollutants for which EPA has issued criteria guidance and for which the discharge of such pollutants could reasonably be expected to interfere with the designated uses adopted by the state. EPA based the criteria contained in the CTR on its recent national criteria guidance, which are designed to protect aquatic life and human health. As long as a waterbody currently has a designated use for the protection of aquatic life and/or human health, application of the section 304(a) criteria is appropriate for fulfilling section 303(c)(2)(B). As a policy matter, EPA believes that the CTR, a massive undertaking in and of itself, is an essential first step toward reinstating a strong water quality program in California. Under the CWA, EPA has no obligation to develop such site-specific criteria or the data upon which such site-specific criteria would be based. If, however, the State wishes to develop site-specific criteria or to change the uses of the waterbody, pursuant to the regulations at 40 CFR Part 131, EPA would consider and possibly approve such a site specific criterion.

Comment ID: CTRH-002-026
Comment Author: Gary Hildebrand
Document Type: Public Hearing
State of Origin: CA
Represented Org: L.A. Dept of Public Works
Document Date: 09/19/97
Subject Matter Code: I-05 Compliance Schedules

References:
Attachments? N
CROSS REFERENCES

Comment: The last thing, the proposed rule provides only a five-year compliance schedule for a discharger to achieve the proposed criteria. Municipal stormwater programs are long-term programs that could take many years to fully implement and to realize any water quality benefits. Limiting municipal stormwater discharges to a five-year compliance schedule is inappropriate and impracticable.

The preamble to the proposed rule addresses all wet weather discharges. This should be discussed and treated separately from all other weather and point sources charges. These are unique programs and cannot be placed in a one size-fits-all category. The proposed rule needs to account for the nature of stormwater discharges but needs to allow a longer compliance schedule to account for the long-term BMP source control program approach. The proposed rule and corresponding compliance schedule discourages a watershed approach to improving water quality. The development and implementation of a watershed plan requires many years and various involvement. However, the CTR with a short compliance schedule would actually encourage the watershed approach and address toxicity issues separately and a little more expeditiously. The CTR should follow the recommendations of the State Task Force on the Inland Surface Water Plan than propose a 15-year schedule for full compliance.

Again, we'll be following up with written comments covering our oral testimony today. Thank you.

Response to: CTRH-002-026

See response to CTR-030-004c.

Subject Matter Code: I-07 Attainability of Criteria

Comment ID: CTR-040-005
Comment Author: County of Sacramento Water Div
Document Type: Storm Water Auth.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: I-07 Attainability of Criteria
References: Letter CTR-040 incorporates by reference letter CTR-027
Attachments? Y
CROSS REFERENCES

Comment: MAJOR CONCERNS

We do, however, have fundamental concerns with the Rule as it is presently proposed and its supporting economic analysis. We believe the Rule can be modified in a manner that will be responsive to our concerns while at the same time being consistent with applicable Federal law and regulations. Our major concerns are presented here and are followed by our recommended modifications.

1. Concern: The Rule, as presently proposed, appears to require discharges from municipal stormwater programs to meet water quality based effluent limits (WQBELs).

* Attaining sufficient pollutant reduction through source control and other reasonable measures can be infeasible because many sources of pollutants are extremely difficult or impossible to control. This situation is illustrated by the Sacramento Stormwater Management Program's recent experience in evaluating sources of lead in Sacramento County. This past year the Sacramento Stormwater Program conducted an intense effort to evaluate lead, an identified high priority stormwater constituent of concern for the Program. A major part of the effort was to identify all potential sources of lead to stormwater. Approximately 50 individual sources of lead were identified. The next step was to determine which of these sources could be controlled considering the nature of the sources, practicality of controlling the sources, legal jurisdiction of the permittees, etc. Only a portion of the sources identified could be addressed through source control and BMPs. Some examples of sources that are difficult or impossible to control are: naturally occurring lead in soil, aircraft fuel (which does not come in unleaded form), automobile emissions (which still contain some lead), abrasion of road striping paint, and abrasion of tires.

Response to: CTR-040-005

See response to CTR-040-004.

Comment ID: CTR-096-002
Comment Author: City of Modesto
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: I-07 Attainability of Criteria

References:
Attachments? N
CROSS REFERENCES

Comment: Thank you for the opportunity to comment on the proposed California Toxics Rule. The City's comments are related to five main concepts:

2. Scientific data is lacking to show that impairments to waters of the United States are occurring during storm events.

Response to: CTR-096-002

Every two years, the California State Water Resources Control Board (SWRCB) submits a report on the State's water quality to the U.S. EPA pursuant to Section 305(b) of the Federal Clean Water Act. These reports present water quality assessment information compiled by California's nine Regional Water Quality Control Boards. SWRCB (1996) indicates that urban runoff and storm sewers are major and moderate sources of impairment of beneficial uses in estuaries, lakes and reservoirs, rivers and streams, and wetlands. The extent of this impairment is shown in the table below.

Sizes of Waters Impaired by Urban Runoff and Storm Sewers by Contribution to Impairment

Waterbody Type (Units)	Major^1	Moderate and Minor^2
Estuaries(Acres)	899	52,552
Lakes and Reservoirs (Acres)	120,320	7,985
Rivers and Streams (Miles)	92	1,620
Wetlands, Freshwater (Acres)	1	58,316
Wetlands, Tidal (Acres)	0	184

Source: SWRCB (1996).
1. A major contributor is a source that is either the only one responsible for nonsupport of any designated use or it predominates over other sources.
2. A moderate contributor is a source that is the only one responsible for partial support of any use, predominates over other sources of partial support, or is one of multiple sources of nonsupport that have a significant impact on designated use attainment. A minor contributor is a source that is one of multiple sources responsible for nonsupport or partial support and is judged to contribute relatively little to this nonattainment.

State Water Resources Control Board (SWRCB). 1996. California 305(b) Report on Water Quality. Prepared as Required in Clean Water Act Section 305(b). August.

Subject Matter Code: I-08 SWRCB Flexibility&Authority

Comment ID: CTR-001-010
Comment Author: Law Offices of Alan C. Waltner
Document Type: Storm Water Auth.
State of Origin: CA
Represented Org: Almeda Cnty Clean Wtr Pgm
Document Date: 09/22/97
Subject Matter Code: I-08 SWRCB Flexibility&Authority
References:
Attachments? N
CROSS REFERENCES

Comment: EPA SHOULD ADDRESS ALL OF THE FACTORS THAT THE STATE WOULD ADDRESS UNDER THE PORTER COLOGNE ACT IN ESTABLISHING AN IMPLEMENTATION POLICY FOR MS4S

In promulgating water quality standards, EPA "is subject to the same policies, procedures, analyses, and public participation requirements established for States . . . ." 40 C.F.R. Section 131.22(c). If EPA is to stand in the shoes of the State Board in this activity, it needs to address the fundamental statutory criteria for basin plan amendments, which limits the Regional Board to adopting only those objectives that "will ensure the reasonable protection of beneficial uses and the prevention of nuisance . . . [taking into account] . . . economic considerations . . . [and] the need for developing housing within the region." Water Code Section 13241.

Under state law, the definition of water quality objectives incorporates this requirement of reasonableness, by defining objectives to mean "the limits or levels of water quality constituents or characteristics which are established for the reasonable protection of beneficial uses of water or the prevention of nuisance within a specific area." Water Code Section 13050(h).

All basin plans must implement the basic policies of Water Code Section 13000, which states that "activities and factors which may affect the quality of the waters of the state shall be regulated to attain the highest water quality which is reasonable, considering all demands being made and to be made on those waters and the total values involved, beneficial and detrimental, economic and social, tangible and intangible."

At the permitting stage, water code Section 13263(a) provides for the case-by-case consideration of site specific beneficial uses and objectives in every instance: "(discharge requirements] shall take into consideration the beneficial uses to be protected, the water quality objectives reasonably required for that purpose . . . and the provisions of Section 13241."

Even if EPA considers itself exempt from the application of these provisions of the Porter Cologne Act when it adopts water quality standards for California, by including inflexible standards that do not allow for the future consideration of costs as required by Section 13241, EPA is putting the Regional and State Boards on a collision course with these requirements when future Basin Plan and permitting decisions are made. Adequate flexibility must be included in the regulation, at minimum by preserving existing basin plan and State Board implementation policies, so that these state law requirements can be satisfied when basin planning and permitting decisions are made in the future.

Response to: CTR-001-010

EPA disagrees with this comment. EPA must adopt criteria in accordance with the requirements of the CWA. The quoted regulation means that EPA will follow the same policies, procedures, analyses, and public participation requirements as it requires for states under the CWA. The regulation does not mean that the CWA's provisions are negated by state law. As EPA explained in the CTR response to CTR-042-007a, while economic factors may be considered in designating uses, they may not be used to justify criteria that are not protective of those uses. As a Federal agency, EPA is not subject to the requirements of the Porter-Cologne Act.

The CTR does not interfere with the State's discretion to develop implementation policies including basin planning activities and permitting decisions. Federal law does allow the State to consider economics in decisions regarding changes in designated uses and variances.

Comment ID: CTRH-001-034a
Comment Author: Dave Brent
Document Type: Public Hearing
State of Origin: CA
Represented Org: CA Water Qual. Task Force
Document Date: 09/17/97
Subject Matter Code: I-08 SWRCB Flexibility&Authority
References:
Attachments? N
CROSS REFERENCES I-05; G-03

Comment: Thirdly, I'd like to touch upon implementation of the rule. My understanding is that the state's Inland Surface Waters and Enclosed Bays and Estuaries Plan will address implementation of the CTR. With this in mind, the CTR should serve as an enabling rule and allow the state and the dischargers flexibility in the implementation of objectives contained in the rule.

As I touched upon earlier in my opening remarks, EPA has included some enabling provisions in this rule that we support, such as use and determination of mixing zones and water effects ratios. From the stormwater perspective, we believe other important enabling provisions must be included to allow for regional flexibility in the implementation of our stormwater programs.

For example, enabling provisions should be included to allow flexibility in establishing compliance schedules for stormwater discharges and should allow flexibility for site-specific establishment of low-flow conditions and wet weather standards, and ranges of human health criteria depending on the use of individual receiving waters.

Response to: CTRH-001-034a

See response to CTRH-001-034b.

Subject Matter Code: I-09 Pesticides in Runoff

Comment ID: CTR-061-001
Comment Author: G. Fred Lee & Associates
Document Type: Academia
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: I-09 Pesticides in Runoff
References:
Attachments? Y
CROSS REFERENCES

Comment: Please find enclosed an original and two copies, and a computer disk, of my comments on the draft "US EPA 40 CFR Part 131 Water Quality Standards for the State of California" as proposed on Tuesday, August 5, 1997. As indicated, I find significant problems with the proposed approach set forth in the draft CTR for regulating some "toxics" in California waters. I also find problems with some of the criteria in that they do not represent the information on the constituents' potential impacts on the beneficial uses of waterbodies. If adopted as proposed, the CTR will lead to massive waste of public and private funds in the construction of unnecessary treatment works for domestic and industrial wastewaters and especially urban and highway stormwater runoff, in an effort to try to meet water quality standards based on the CTR proposed criteria in discharges and ambient waters without a significant improvement of real water quality/beneficial uses of waterbodies of concern to the public who must pay for the over-regulation. The proposed CTR fails to address the most important cause of real ambient-water toxicity in California, organophosphate pesticides in urban and agricultural stormwater runoff. The Agency needs to shift its toxics control program from control of chemical constituents that in some situations can be toxic, to the control of ambient water toxicity in ambient waters.

Response to: CTR-061-001

EPA disagrees. The CTR establishes the pollutant levels in ambient waters necessary to protect beneficial designated uses. Establishing numeric criteria for ambient water bodies does not limit the discretion of the permit writer to use appropriate and flexible tools such as mixing zones or translators for dissolved metals in establishing effluent limits. In addition, if a discharger believes the CTR criterion is inappropriately restrictive or overprotective of the designated use, the discharger can request the State and EPA to approve a site-specific criterion or to downgrade the designated use.

Subject Matter Code: I-10 CSO Policy

Comment ID: CTR-090-021
Comment Author: C&C of SF, Public Utl. Commis.
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: I-10 CSO Policy
References: Letter CTR-090 incorporates by reference letters CTR-035 and CTR-054
Attachments? Y
CROSS REFERENCES

Comment: Wet weather flows - p 42186 - This section needs to be rewritten to incorporate the policy for combined sewer systems as described in EPA's Combined Sewer Overflow Control Policy. The policy includes two specific approaches for assessing compliance with water quality standards and these are not addressed in this rule-making.

Response to: CTR-090-021

See response to CTR-040-004.

Subject Matter Code: J Storm Water Economics

Comment ID: CTR-001-007
Comment Author: Law Offices of Alan C. Waltner
Document Type: Storm Water Auth.
State of Origin: CA
Represented Org: Almeda Cnty Clean Wtr Pgm
Document Date: 09/22/97
Subject Matter Code: J Storm Water Economics
References:
Attachments? N
CROSS REFERENCES

Comment: SIGNIFICANT ECONOMIC IMPACTS WOULD RESULT FROM THE APPLICATION OF WATER QUALITY STANDARDS AS NUMERIC EFFLUENT LIMITATIONS OR WASTELOAD ALLOCATIONS

If EPA intends that the WQS have a more direct effect on the permitting for MS4s, the implications are significant. in particular, the economic analysis supporting the proposed CTR would be dramatically incomplete. Massive expenditures would be required if storm water systems essentially were required to meet the same numerically based treatment standards as being considered for POTWs. The expenditures that would result from such an approach are being addressed in more detail in other MS4 comments, and will not be repeated here.

However, we note that the economic impact analysis that EPA prepared to support the proposed rule assumes that the regulation would have no economic impact on MS4s. (*11) If MS4s are subjected to NELs or WLAs as a result of the rule, significant economic impacts would result. Even if water quality based effluent limitations are based on BMPS, they would have an economic impact if they represent controls more extensive than the maximum extent practicable criteria of Section 402(p). EPA's economic analysis also provides no basis for estimating the costs to MS4s, since the "representative" dischargers analyzed in the economic analysis do not include any storm water systems. The economic analysis does not include these costs and it would be arbitrary to adopt a rule that would have these implications without considering those costs. (*12)

(*11) Likewise, the economic analysis supporting the State Implementation Policy excluded consideration of the costs to municipal storm water systems, on the theory that "the proposed Policy does not impose new regulatory requirements and, therefore, no additional costs are anticipated (i.e., . . . storm water . . .)" SIP at VIII-33. Elsewhere the SIP urges that: "The SWRCB is making no changes in the existing storm water program at the SWRCB and RWQCB. For these reasons, this cost analysis did not consider the storm water proposed Policy issue." Id. at VIII-43. These municipal costs were excluded even though the benefits calculations assumed that the proposed water quality standards would be achieved and that, with respect to San Francisco Bay, the share of toxic loadings attributable to nonpoint sources is estimated to range from 90% to 99% of the total. SIP at VIII-25. It is fundamental that "you can't get something for nothing" and the conflicting assumptions in the SIP, which parallel assumptions in the economic analysis of the CTR, are simply arbitrary.

(*12) Also, since EPA stands in the shoes of the state in adopting these criteria the action would violate the cost balancing elements of the Porter Cologne Act, as discussed below. At minimum, to the extent

that the rule creates an inflexible obligation to implement the criteria with respect to MS4s without complying with Porter Cologne Act requirements, it would set the State and Regional Boards on a collision course with those requirements at the Basin Plan and NPDES permitting phases.

Response to: CTR-001-007

EPA did not ascribe benefits or costs of controlling storm water discharges in the proposed or final Economic Analysis. EPA believes that many storm water dischargers can avoid violation of water quality standards through application of best management practices that are already required by current storm water permits. This conclusion is supported by EPA's analysis of the data submitted by several commenters (see response to CTR-040-004). EPA articulated its position on the use of BMPs in storm water permits in the Interim Permitting Approach for Water Quality Based Effluent Limitations in Storm Water Permits (61 FR 43761, August 19, 1996).

The commenter claims that even with the application of current BMPs, its storm water dischargers would still violate water quality standards due to the CTR criteria. The commenter appears to assume that the storm water discharge would be subject to numeric water quality based effluent limits which would be equivalent to the criteria values and applied as effluent limits never to be exceeded, or calculated in the same manner that effluent limits are calculated for other point sources, such as POTWs. The commenter then appears to assume that such WQBELs would then require the construction of very costly end-of-pipe controls.

EPA contends that neither scenario is valid with regards to developing WQBELs for storm water discharges or establishing compliance with WQBELs. EPA acknowledges that wet weather discharges are technically difficult to model and evaluate financially, because they are intermittent and highly variable. Wet weather discharges also occur under more diverse hydrologic or climatic conditions than continuous discharges from industrial or municipal facilities, which are evaluated under critical low flow or drought conditions. If the EPA had enough data to completely characterize all the conditions and do the necessary modelling, WQBELs would be developed using dynamic models to account for the intermittent loadings and exposures from the storm water discharges. In the absence of this data, EPA will continue to advocate the use of BMPs, as discussed in the CTR preamble. Therefore, EPA believes there is inadequate information at the current time to conclude whether the CTR will have any cost impact on storm water dischargers. Until that information is available, it is premature to project that storm water dischargers would be subject to strict numeric WQBELs and would incur any costs beyond those for which they are already legally responsible under the Clean Water Act. EPA will continue to work with the State to implement storm water permits that comply with water quality standards with an emphasis on pollution prevention and best management practices rather than costly end-of-pipe controls.

See also response to CTR-040-004.

EPA disagrees that the CTR must meet the requirements of the Porter Cologne Act. As a Federal agency, EPA is not subject to the requirements of the Porter-Cologne Act, which is State law. See also response to CTR-020-002 (Category C-21; Legal Issues).

Comment ID: CTR-013-003
Comment Author: County of Los Angeles
Document Type: Storm Water Auth.
State of Origin: CA

Represented Org:
Document Date: 09/25/97
Subject Matter Code: J Storm Water Economics
References: Letter CTR-013 incorporates by reference letter CTR-027

Attachments? N
CROSS REFERENCES

Comment: In addition, we would like to emphasize the following concerns which greatly impact the Los Angeles County Stormwater Program:

3. The economic analysis used by The USEPA is flawed and inadequately addresses the impacts of the CTR on the stormwater-regulated community. Again, setting aside the issue of WQBELS for MS4s, the economic analysis is inadequate. Under Executive Order 12866, the USEPA must determine whether the CTR is "significant" and subject to OMB review. One of the criteria in assessing whether a proposed regulation is significant is to determine if it has an adverse affect resulting in an annual cost of $100 million or more. To address this criterion, the USEPA estimated the cost and benefit of the proposed regulations. Based on this analysis, the USEPA determined that the CTR was not a "significant regulatory action."

In its economic analysis, the USEPA's entire focus of the compliance cost was on the point sources which included Public-Owned Treatment Works (POTWs), industrial treatment facilities, and industrial users discharging to POTWS. A major omission in the USEPA analysis is the cost for the stormwater program to comply with the proposed criteria.

In its analysis, the USEPA appears to assume that a BMP program will lead to compliance and that there is no associated cost for a BMP Program (over and above what an MS4 has in place already). This assumption appears to be applied to both municipal and industrial stormwater interests. We point to studies conducted by the County of Sacramento and Fresno Metropolitan Flood Control district which show this to be incorrect, i.e., a BMP program cannot comply with the proposed criteria. Furthermore, these studies show that the cost for a BMP program is significant and would increase substantially if an MS4 was required to construct end-of-pipe treatment for compliance.

It may be argued that an MS4 would seek regulatory relief from the criteria before incurring the cost of end-of-pipe treatment. While this is probably a reasonable assumption, the economic analysis failed to address the cost for either treatment, BMP program, or regulatory relief for MS4s. As a result, the overall cost for compliance is significantly underestimated. By assigning zero cost to the MS4s for compliance, the cost benefit analysis is severely flawed.

We recommend that the USEPA not implement the proposed criteria to MS4 discharges without an adequate economic analysis addressing the true impacts to MS4 dischargers is conducted and assessed.

Response to: CTR-013-003

EPA disagrees with the comment that its economic analysis is flawed or incomplete.

EPA did not include benefits or costs of controlling storm water discharges in the proposed or final Economic Analysis. EPA believes that many storm water dischargers can avoid violation of water quality standards through application of best management practices that are already required by current

storm water permits. This conclusion is supported by EPA's analysis of the data submitted by several commenters (see response to CTR-040-004). EPA articulated its position on the use of BMPs in storm water permits in the Interim Permitting Approach for Water Quality Based Effluent Limitations in Storm Water Permits (61 FR 43761, August 19, 1996).

The commenter claims that even with the application of current BMPs, its storm water dischargers would still violate water quality standards due to the CTR criteria. The commenter appears to assume that the storm water discharge would be subject to numeric water quality based effluent limits which would be equivalent to the criteria values and applied as effluent limits never to be exceeded, or calculated in the same manner that effluent limits are calculated for other point sources, such as POTWs. The commenter then appears to assume that such WQBELs would then require the construction of very costly end-of-pipe controls.

EPA contends that neither scenario is valid with regards to developing WQBELs for storm water discharges or establishing compliance with WQBELs. EPA acknowledges that wet weather discharges are technically difficult to model and evaluate financially, because they are intermittent and highly variable. Wet weather discharges also occur under more diverse hydrologic or climatic conditions than continuous discharges from industrial or municipal facilities, which are evaluated under critical low flow or drought conditions. If the EPA had enough data to completely characterize all the conditions and do the necessary modelling, WQBELs would be developed using dynamic models to account for the intermittent loadings and exposures from the storm water discharges. In the absence of this data, EPA will continue to advocate the use of BMPs, as discussed in the CTR preamble. Therefore, EPA believes there is inadequate information at the current time to conclude whether the CTR will have any cost impact on storm water dischargers. Until that information is available, it is premature to project that storm water dischargers would be subject to strict numeric WQBELs and would incur any costs beyond those for which they are already legally responsible under the Clean Water Act. EPA will continue to work with the State to implement storm water permits that comply with water quality standards with an emphasis on pollution prevention and best management practices rather than costly end-of-pipe controls.

With respect to the studies conducted by the County of Sacramento and Fresno Metropolitan Flood district see response to CTR-040-004.

Comment ID: CTR-013-008b
Comment Author: County of Los Angeles
Document Type: Storm Water Auth.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: J Storm Water Economics
References: Letter CTR-013 incorporates by reference letter CTR-027

Attachments? N
CROSS REFERENCES R

Comment: In addition, we would like to emphasize the following concerns which greatly impact the Los Angeles County Stormwater Program:

8. The proposed rule applies to all current and future MS4 dischargers, including small communities.

The small communities will be significantly impacted by the proposed rule. In Los Angeles County, 77 of the 85 co-permittee cities are communities with a population of less than 100,000. Many of the larger municipalities in California have conducted stormwater discharge characterization studies. These studies have shown that there are common pollutants associated with stormwater discharges from urbanized areas that could result in compliance problems with the proposed criteria. Most small communities have not conducted discharge characterization studies, however, it is reasonable to assume that discharges from small communities would also contain these same pollutants. This would result in a smaller community being faced with the same compliance issues as large and medium municipalities, however, the cost to comply could be more significant and prohibitive for smaller communities.

The Regulatory Flexibility Act requires the USEPA to conduct an analysis on the economic impact the proposed rule may have on small entities unless the USEPA certifies that the rule will not affect a significant number of small entities. In the preamble to the proposed rule(*2), it indicates that there are no small entities to be impacted by the rule and, therefore, the USEPA did not need to complete an analysis required under the Act. The USEPA neglected to address small MS4 communities in California that are currently subject to a MS4 permits, and those smaller communities that may be impacted through Phase II. The USEPA should have conducted an analysis on the economic impacts to smaller communities.

Therefore, unless the preamble is modified to indicate that MS4s are not required to comply with water quality standards, the proposed rule should not be applied to smaller MS4 communities until the USEPA has complied with the requirements of the Regulatory Flexibility Act.

(*2) Federal Register, August 5, 1997, Vol. 62, No. 150, Page 42191

Response to: CTR-013-008b

See response to CTR-001-008b and the preamble to the final rule.

Comment ID: CTR-014-003
Comment Author: City of Lakewood
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: J Storm Water Economics
References: Letter CTR-014 incorporates by reference letters CTR-013 and CTR-027

Attachments? N
CROSS REFERENCES

Comment: 3. The economic analysis used by the USEPA is flawed and inadequately addresses the impacts of the CTR on the stormwater-regulated community. The USEPA's economic analysis focused entirely on the compliance cost of point sources, which included Public Owned Treatment Works (POTWs), industrial treatment facilities, and industrial users discharging to POTWs. A major omission in the USEPA analysis is the cost for the stormwater program to comply with the proposed criteria.

In its analysis, the USEPA appears to assume that a BMP program will lead to compliance and that there is no associated cost for a BMP Program (over and above what an MS4 has in place already). Studies conducted by the County of Sacramento and Fresno Metropolitan Flood Control district shows this to be incorrect, i.e., a BMP program cannot comply with the proposed criteria. Furthermore, these studies show that the cost for a BMP program is significant and would increase substantially if an MS4 was required to construct end-of-pipe treatment for compliance. The USEPA should not implement the proposed criteria to MS4 discharges until such time as an adequate economic analysis addressing the true impacts to MS4 dischargers is conducted and assessed.

Response to: CTR-014-003

See response to CTR-013-003.

Comment ID: CTR-014-004b
Comment Author: City of Lakewood
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: J Storm Water Economics
References: Letter CTR-014 incorporates by reference letters CTR-013 and CTR-027

Attachments? N
CROSS REFERENCES R

Comment: 4. The proposed rule applies to all current and future MS4 dischargers, including small communities. These small communities will be significantly impacted by the proposed rule. In California, there are many small communities that are currently co-permittees to MS4 permits. Many of the larger municipalities in California have conducted stormwater discharge characterization studies. These studies have shown that there are common pollutants associated with stormwater discharges from urbanized areas that could result in compliance problems with the proposed criteria. Most small communities have not conducted discharge characterization studies; however, it is reasonable to assume that discharges from small communities would also contain these same pollutants. This would result in a smaller community being faced with the same compliance issues as large and medium municipalities; however, the cost to comply could be more significant and prohibitive for smaller communities.

The Regulatory Flexibility Act requires the USEPA to conduct an analysis on the economic impact the proposed rule may have on small entities, unless the USEPA certifies that the rule will not affect a significant number of small entities. In the preamble to the proposed rule(*1) it indicates that there are no small entities to be impacted by the rule, and, therefore, the USEPA did not need to complete an analysis required under the Act. The USEPA neglected to address small MS4 communities in California that are currently subject to a MS4 permits, and those smaller communities that may be impacted through Phase 11. The USEPA should have conducted an analysis on the economic impacts to smaller communities.

Unless the preamble is modified to indicate that MS4s are not required to comply with water quality standards, the proposed rule should not be applied to smaller MS4 communities until the USEPA has complied with the requirements of the Regulatory Flexibility Act.

Thank you for this opportunity to comment on the proposed CTR. Respectfully,

Lisa Ann Rapp Director of Public Works

(*1) Federal Register, August 5, 1997, Vol. 62, No. 150, Page 42191

Response to: CTR-014-004b

See response to CTR-013-008b.

Comment ID: CTR-018-001
Comment Author: Ventura Countywide SWQMP
Document Type: Storm Water Auth.
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: J Storm Water Economics
References:
Attachments? N
CROSS REFERENCES

Comment: I would like to take this opportunity to submit in writing the specific concerns of the municipal stormwater program in Ventura County that I expressed on September 18, 1997 at the Public Hearings on the subject proposed rule.

In August of 1994, a countywide municipal NPDES permit was issued to the Ventura County Flood Control District, the County of Ventura and the ten cities in Ventura County. We are now entering the fourth year of our permit term.

At the time the eleven municipalities in Ventura County applied for the stormwater permit, only three were actually required to do so. The other eight entered the program voluntarily. In reality, five of these co-permittees would not even be required to be covered under Phase II, since their populations range from 8 to 30,000.

The Ventura Countywide Stormwater Quality Management Program was formulated to achieve compliance with the maximum extent practicable discharge standard through the use of Best Management Practices (BMPs). While the primary goal and driving force of the program is to achieve compliance with water quality standards, the economic and technological feasibility of achieving all of the proposed criteria is not practical given the diverse nature of an urbanized area, the number of discharge points and the numerous sources of pollutants for urban runoff.

Under our monitoring program, we have collected urban runoff water quality data for the past four years. The attainability analysis-using this data has indicated that even if a BMP program was fully implemented at exorbitant expense, we may not be able to achieve compliance with proposed criteria for copper, lead, zinc, thallium, nickel, and silver.

The alternative to BMP implementation would be to collect and treat stormwater discharges. Stormwater regulations make it clear that municipal stormwater permits are to implement programs to address the sources of pollutants, not to provide end of pipe treatment.

Although the cost of compliance with this rule will significantly impact all communities, the cost could be even more significant and prohibitive for the smaller ones that have made a proactive choice to apply for permit coverage. Currently, in Ventura County, we are spending approximately $5.00 per capita to implement a BMP based program. Yet the economic analysis concludes that the maximum cost of implementing the California Toxics Rule in California, for all dischargers, will be approximately $2.50 to $3.00 per person. We believe that the economic analysis for the proposed rule has not accurately evaluated the financial impact to municipalities, particularly the smaller ones.

Thank you for the opportunity to provide comments to the proposed rule. If you have any questions or would like to discuss these comments further, feel free to call me at (805)654-2040,

Response to: CTR-018-001

See responses to CTR-013-003 and CTR-040-004.

Comment ID: CTR-019-001b
Comment Author: Richards, Watson & Gershon
Document Type: Local Government
State of Origin: CA
Represented Org: Cities of Barst
Document Date: 09/26/97
Subject Matter Code: J Storm Water Economics
References: Letter CTR-019 incorporates by reference letters CTR-001, CTR-013, CTR-027 and CTR-036

Attachments? N
CROSS REFERENCES I-01

Comment: We recognize that the basic purpose for the proposed rule is to establish water quality criteria for priority toxic pollutants for point source discharges. However, in proposing to extend that criteria to storm water discharges, it is clear that EPA has not fully assessed the potential impact of such an extension on local governmental agencies, nor the complete lack of feasibility of attempting to apply numeric effluent standards to discharges to municipal separate storm sewer systems ("MS4s"), or the enormous cost of such an effort which would potentially require a complete reengineering and if not reconstruction of MS4s in California to include end-of-pipe treatment.

Our comments should be considered in the proper context. The cities which we represent are acutely aware of the problems associated with pollution from... urban runoff. Their residents and businesses share a common concern to preserve and enhance the water quality of our bays, rivers, estuaries and the Pacific Ocean. Our cities are fully committed to doing what they reasonably can to achieve these objectives. Our cities have been working with staff of the State Water Resources Control Board ("SWRCB") and its Regional Water Quality Control Boards ("RWQCB's") to develop effective storm water management programs under current municipal NPDES permits which comply with state and federal law. However, the proposed rule does not appear to reflect or recognize that individual cities'

fiscal and administrative resources for implementing unfunded mandates are limited. Of all governmental agencies in California involved in the process, the many small cities which we represent are the least suited to bear the brunt of the responsibility for controlling pollution from urban runoff.

The primary portion of the proposed rule that has caused concern among our cities is the statement at pages 42186-42187 of preamble that:

"When this rulemaking is complete, these criteria will be used to determine water-quality standards in California and will therefore be the basis of WQBELs in NPDES permits for wet weather point sources. However, EPA recognizes that it is commonly infeasible to express WQBELs as numeric limits for wet weather discharges and that in such cases best management practices ("BMPs") may serve as WQBELS. (Emphasis added.)

Our concern is further heightened by the comment at page 42187 of preamble that:

"It is therefore anticipated that WQBELS, including those necessary to meet the criteria set forth in this proposed rule, will be expressed as BMPs in wet weather dischargers' NPDES permits, when the permitting authority determines that it is infeasible to express WQBELS as numeric limits." (Emphasis added.)

The comments appear to indicate that in any further municipal NPDES permitting situations, the proposed rule potentially can be interpreted to require the implementation of WQBELs unless an analysis is prepared determining the infeasibility of each of the WQBELs as numeric limits.

As applied to storm water discharges, WQBELs are almost by definition infeasible. It should also be kept in mind that it is not the cities themselves that are the sources of stormwater pollution; municipal facilities have not been identified, to our knowledge, as being significant sources of contaminated urban runoff. Rather, the sources of this type of pollution, to the extent they can be identified, appear to be primarily the result of hydrological changes brought about by urbanization. These are activities over which cities have very little practical control. Nevertheless, the cities and counties of California are bearing the full and financially unassisted responsibility of ending stormwater pollution themselves.

We agree with the comments of the County of Los Angeles and the ACCWP that EPA's effort to apply numeric effluent limits to municipal storm water discharges is in direct conflict with the plain language of Congress in adopting the "maximum extent practicable" standard for controlling pollution in storm water discharges to a MS4. The proposed rule as applied to wet weather flows is also clearly inconsistent with both the EPA Is and the SWRCB's approach of addressing this problems through the adoption of Best Management Practices ("BMP's").

As noted in the SWRCB's own Municipal Storm Water Best Management and Practices Guidebook, "the sources of storm water pollution are extensive, ill-defined and highly variable." The State Board previously determined in its order entitled "In the Matter of Petition of Natural Resources Defense Council, Inc. for Review of Waste Discharge Requirements Order No. 90-079," Order No. WQ 91-04 (May 16, 1991), that:

"We find here also that the approach of the Regional Board requiring the dischargers to implement a program of best management practices which will reduce pollutants and runoff and prohibiting non-storm water discharges, is appropriate and proper. We base our conclusion on the difficulty of establishing numeric effluent limitations which have a rational basis, the lack of technology available to treat storm water discharges at the end of the pipe, the huge expense such treatment would entail, and the level of

pollutant reduction which we anticipate from the Board's regulatory program. We feel compelled to note here our agreement with the Regional Board that this permit does truly represent a massive undertaking." (Emphasis added.)

As discussed in detail in the technical comments filed in response to the proposed rule, the EPA has not explained how the proposed numeric effluent guidelines can be achieved through the implementation of BMP's. Under the circumstances, the ultimate result of the application of the rule to storm water discharges would be end of pipe treatment controls.

However, the EPA has already recognized, as the SWRCB, that end of pipe treatment controls for storm water discharges are technically unfeasible and unreasonable. The EPA has recognized that "it was not the intent of Congress to acquire municipal permits to required end of pipe treatment technology but to implement a comprehensive stormwater management program to reduce the discharge of pollutants from municipal storm sewer systems." 55 Fed.Reg., p. 48038 (November 16, 1990).

Each of our cities strongly believe that the proposed rule must be modified to clearly state that numeric effluent guidelines do not and will not apply to discharges to the municipal separate sewer systems.

Response to: CTR-019-001b

See response to CTR-040-004.

Comment ID: CTR-019-002a
Comment Author: Richards, Watson & Gershon
Document Type: Local Government
State of Origin: CA
Represented Org: Cities of Barst
Document Date: 09/26/97
Subject Matter Code: J Storm Water Economics
References: Letter CTR-019 incorporates by reference letters CTR-001, CTR-013, CTR-027 and CTR-036

Attachments? N
CROSS REFERENCES S

Comment: UNFUNDED MANDATED PROGRAMS

One of the express purposes of the Unfunded Mandates Reform Act of 1995 is "to end the imposition, in the absence of full consideration of Congress of Federal mandates on State, local and tribal governments without adequate Federal funding, in a manner that may displace other essential State, local and tribal governmental priorities." 2 U.S.C. section 1501(2). The proposed rule in its current form seems to have been drafted without regard to its fiscal impact on cities. The rule could require treatment of storm water discharges, despite the fact that no funding mechanism, nor any assistance, financial or otherwise, is being provided to the cities by either USEPA or the State of California. If the USEPA wishes to impose these treatment programs, it needs to provide funds to pay for their implementation.

We believe that USEPA's analysis under the Unfunded Mandates Reform Act of 1995 that the CTR will not result in an expenditure in the aggregate of more than $100,000,000.00 a year is wrong. As pointed

by other local government entities which have submitted comments, the USEPA appears to assume that a BMP program will lead to compliance with numeric effluent guidelines and that there will be no associated additional costs for the BMP program. However, the economic analysis does not appear to analyze the potential cost of end of pipe treatment controls and analyze in any sort of detail what sort of BMP's would be necessary to achieve numeric effluent guidelines for the toxic pollutants. The economic analysis itself acknowledges that under its existing NPDES stormwater permit, the cities and counties of the Los Angeles area plan to spend $15,000,000 annually on public education in a program to curb illegal dumping. That cost estimate was based upon the analysis by the SWRCB of the 1990 permit. The actual costs of implementing all of the programs under the 1990 permit have been considerably more. For example, the cost estimates prepared by the San Gabriel Valley COG in connection with the LA. County permit, estimated implementation costs at $8.98 per person per year. The City of Long Beach estimated that it was already spending, as of early 1996, $12.4 million a year and that the estimated costs of implementing the programs under the current permit adopted in July 1996 would be another $3.4 million or about $16.1 million total. That number extrapolated to approximately $38.35 per person per year. The comparative cost numbers prepared by the Santa Monica Bay Restoration Project in connection with the existing Los Angeles permit estimated an average cost of dedicated stormwater program funding of $3.34 a month per household or approximately $13.36 per person per year. Using that number as a base, a city with a population of approximately $40,000 people can expect to spend $500,000 a year under its current stormwater programs. Extrapolating those numbers over the State of California, it is quite clear that the costs of implementing the existing stormwater program are in the hundred of millions of dollars a year.

Considering these economic analyses, it is quite clear that the financial impact of requiring end of pipe treatment controls or other means to achieve numeric effluent guidelines would quite easily exceed $100 million a year.

The foregoing numbers, of course, do not include potential increased costs to residents, business and industry complying with the discharge prohibitions and other requirements under the City's current municipal permits nor does the EPA's economic analysis calculate the potential costs to regulated dischargers, that is, business and industries required to either obtain an individual NPDES stormwater permit or who are covered under a general permit by filing a notice of intent.

Necessarily, the expenditure of such large amounts of money is an important public policy question, particularly in a situation where neither the State of California nor the federal government has been willing to provide any meaningful source of funds to local agencies to carry out these programs.

Response to: CTR-019-002a

See response to CTR-013-003.

With respect to EPA's compliance with UMRA see the preamble to the final rule.

Comment ID: CTR-019-003a
Comment Author: Richards, Watson & Gershon
Document Type: Local Government
State of Origin: CA
Represented Org: Cities of Barst
Document Date: 09/26/97

Subject Matter Code: J Storm Water Economics
References: Letter CTR-019 incorporates by reference letters CTR-001, CTR-013, CTR-027 and CTR-036

Attachments? N
CROSS REFERENCES R

Comment: THE PROPOSED RULE DOES NOT COMPLY WITH THE REGULATORY FLEXIBILITY ACT

USEPA's analysis under the Regulatory Flexibility Act and Executive Order No. 12866 that the CTR will not affect a significant number of small entities is simply wrong. Most of the cities which we represent have populations of less than 20,000; many have less than 10,000. As noted by the County of Los Angeles, 77 of the co-permittee cities have populations of less than 100,000. Many of these cities are primarily residential and with limited tax revenues. Nevertheless the proposed CTR would impose the same financial requirements on these cities as would be imposed on larger entities. These cities do not receive funds from either the State of California or the federal government for their storm water programs or other urban runoff control measures.

Response to: CTR-019-003a

EPA believes it properly described the potential impact of the implementation of the CTR on storm water discharges in the preamble to the proposed CTR and in its Economic Analysis (for further discussion see responses to CTR-013-003 and CTR-040-004). EPA believes it is in full compliance with its legal obligations under Executive Order 12866 (see response to CTRH-002-006a; Category I: Stormwater/Wet Weather Flows), the Regulatory Flexibility Act (see response to CTR-013-008b).

Comment ID: CTR-021-006a
Comment Author: LeBoeuf, Lamb, Green & MacRae
Document Type: Local Government
State of Origin: CA
Represented Org: City of Sunnyva
Document Date: 09/25/97
Subject Matter Code: J Storm Water Economics
References: Letter CTR-021 incorporates by reference letter CTR-035
Attachments? Y
CROSS REFERENCES E-01c
R
S
I-01

Comment: It is with a sense of reluctance that Sunnyvale joins in CASA/Tri-TAC's adverse comments on the CTR and the EA, and Sunnyvale does so in a spirit of constructive criticism and with an expectation that the Agency will make the necessary adjustments in its approach towards the CTR before the final rule is promulgated. In addition, in the same spirit and with the same expectation, Sunnyvale would like to make the following points on its own behalf:

3. Failure to Address Important Stormwater-Related Issues. In addition to its POTW, Sunnyvale is the

owner of a system of storm drains which contribute wet weather flows to the South Bay. We are concerned that the EA entirely neglects the potential impacts of the proposed CTR on the storm drains. The EA entirely omits any meaningful analysis of the costs of bringing storm drains into compliance with the proposed CTR, thereby significantly understating the overall costs of the CTR. We believe that this omission is violative of the Agency's legal obligations under the authorities cited in the preceding paragraph.

In addition, we join in the comments being filed by the various other operators of stormwater collection systems to the effect that EPA has overstated the legal requirements for storm drains to comply with numerical criteria.

Response to: CTR-021-006a

EPA believes it properly described the potential impact of the implementation of the CTR on storm water dischargers in the preamble to the proposed CTR and in its Economic Analysis (for further discussion see responses to CTR-013-003 and CTR-040-004). EPA believes it is in full compliance with its legal obligations under Executive Order 12866 (see response to CTRH-002-006a; Category I: Stormwater/Wet Weather Flows), the Regulatory Flexibility Act (see response to CTR-013-008b), and the Unfunded Mandates Act (see preamble to the final rule).

Comment ID: CTR-024-003
Comment Author: City of Hawthorne
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: J Storm Water Economics
References: Letter CTR-024 incorporates by reference letters CTR-013 and CTR-027
Attachments? N
CROSS REFERENCES

Comment: 3. The economic analysis used by The USEPA is flawed and inadequately addresses the impacts of the CTR on the stormwater-regulated community. The USEPA Is economic analysis focused entirely on the compliance cost of point sources, which included Public Owned Treatment Works (POTWs), industrial treatment facilities, and industrial users discharging to POTWs. A major omission in the USEPA analysis is the cost for the stormwater program to comply with the proposed criteria.

In its analysis, the USEPA appears to assume that a BMP program will lead to compliance and that there is no associated cost for a BMP Program (over and above what an MS4 has in place already). Studies conducted by the County of Sacramento and Fresno Metropolitan Flood Control district shows this to be incorrect, i.e., a BMP program cannot comply with the proposed criteria. Furthermore, these studies show that the cost of a BMP program is significant and would increase substantially if an MS4 was required to construct end-of-pipe treatment for compliance. The USEPA should not implement the proposed criteria to MS4 discharges until such time as an adequate economic analysis addressing the true impacts to MS4 dischargers is conducted and assessed.

Response to: CTR-024-003

See response to CTR-013-003.

Comment ID: CTR-024-004b
Comment Author: City of Hawthorne
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: J Storm Water Economics
References: Letter CTR-024 incorporates by reference letters CTR-013 and CTR-027
Attachments? N
CROSS REFERENCES R

Comment: 4. The proposed rule applies to all current and future MS4 dischargers, including small communities. The small communities will be significantly impacted by the proposed rule. In California, there are many small communities that are currently co-permittees to MS4 permits. Many of the larger municipalities in California have conducted stormwater discharge characterization studies. These studies have shown that there are common pollutants associated with stormwater discharges from urbanized areas that could result in compliance problems with the proposed criteria. Most small communities have not conducted discharge characterization studies; however, it is reasonable to assume that discharges from small communities would also contain these same pollutants. This would result in a smaller community being faced with the same compliance issues as large and medium municipalities; however, the cost to comply could be more significant and prohibitive for smaller communities.

The Regulatory Flexibility Act requires the USEPA to conduct an analysis on the economic impact the proposed rule may have on small entities, unless the USEPA certifies that the rule will not affect a significant number of small entities. In the preamble to the proposed rule(*1), it indicates that there are no small entities to be impacted by the rule, and therefore, the USEPA did not need to complete an analysis required under the Act. The USEPA neglected to address small MS4 communities in California that are currently subject to a MS4 permits, and those smaller communities that may be impacted through Phase II. The USEPA should have conducted an analysis on the economic impacts to smaller communities.

Unless the preamble is modified to indicate that MS4s are not required to comply with water quality standards, the proposed rule should not be applied to smaller MS4 communities until the USEPA has complied with the requirements of the Regulatory Flexibility Act.

(*1) Federal Register, August 5, 1997, Vol. 62, No. 150, page 42191

Response to: CTR-024-004b

See response to CTR-013-008b.

Comment ID: CTR-027-003
Comment Author: California SWQTF
Document Type: Storm Water Auth.

State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: J Storm Water Economics
References: Letter CTR-027 incorporates by reference letters CTR-001, CTR-036 and CTR-040
Attachments? N
CROSS REFERENCES

Comment: 3. The economic analysis used by USEPA is flawed and inadequately addresses the impacts of the CTR on the stormwater-regulated community. Again setting aside the issue of WQBELs for MS4s, the economic analysis is inadequate. Under Executive Order 12866 USEPA must determine whether the CTR is "significant" and subject to OMB review. One of the criteria in assessing whether a proposed regulation is significant is to determine if it has an adverse effect resulting in an annual cost of $100 million or more. To address this criterion USEPA estimated the cost and benefit of the proposed regulations. Based on this analysis USEPA determined that the CTR was not a "significant regulatory action".

USEPA used two different economic models in assessing the CTR. The model that proved more applicable consisted of an analysis that focused on direct compliance costs (such as capital costs and O&M for end-of-pipe control, indirect source control, (e.g. pretreatment programs) pollution prevention, monitoring and costs for pursuing alternative methods of compliance). However, the entire focus of the compliance cost was on the point sources with individual NPDES permits, which included Public Owned Treatment Works (POTWs), industrial treatment facilities, and industrial users discharging to POTWS. A major omission in USEPA's analysis is the cost for the stormwater program to comply with the proposed criteria.

In its analysis USEPA appears to assume that a BMP program will lead to compliance and that there is no associated cost for a BMP program (over and above what an MS4 has in place already). This assumption appears to be applied to both municipal and industrial stormwater interests. We point to studies conducted by the County of Sacramento and Fresno Metropolitan Flood Control District which show this to be incorrect, i.e. an aggressive BMP program cannot comply with the proposed criteria. Furthermore, these studies show that the cost for an aggressive BMP program is significant and would increase much more substantially if an MS4 was required to construct end-of-pipe treatment for compliance.

It may be argued that an MS4 would seek regulatory relief from the criteria before incurring the cost of end-of-pipe treatment. Even assuming such relief would be forthcoming, the economic analysis failed to address the cost for treatment, or for a BMP program, or for seeking regulatory relief for MS4s. As a result the overall cost for compliance is significantly underestimated. By assigning zero cost to the MS4s for compliance, the cost benefit analysis is severely flawed.

Recommendation: USEPA should not implement the proposed criteria until such time an adequate economic analysis addressing the true impacts to MS4 dischargers is conducted and assessed.

Response to: CTR-027-003

See response to CTR-013-003.

Comment ID: CTR-027-009b

Comment Author: California SWQTF
Document Type: Storm Water Auth.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: J Storm Water Economics
References: Letter CTR-027 incorporates by reference letters CTR-001, CTR-036 and CTR-040
Attachments? N
CROSS REFERENCES R

Comment: 9. The proposed rule applies to all current and future MS4 dischargers, including small communities. The small communities will be significantly impacted by the proposed rule. In California, there are many small communities that are currently co-permittees to MS4 permits. Many of the larger municipalities in California have conducted stormwater discharge characterization studies. These studies have shown that there are common pollutants associated with stormwater discharges from urbanized areas that could result in compliance problems if the proposed criteria are adopted. While most small communities have not conducted discharge characterization studies; it is reasonable to assume that discharges from small communities would also contain these same pollutants. This would result in a smaller community being faced with the same compliance issues as large and medium municipalities; however, the cost to comply could be more significant and prohibitive for smaller communities.

The Regulatory Flexibility Act requires USEPA to conduct an analysis on the economic impact the proposed rule may have on small entities, unless EPA certifies that the rule will not affect a significant number of small entities. In the preamble to the proposed rule (*3), USEPA indicates that no small entities are impacted by the rule, and, therefore, USEPA did not need to complete an analysis required under the Act. USEPA neglected to address small MS4 communities in California that are currently subject to a MS4 permits, and those smaller communities that may be impacted through Phase II. USEPA should have conducted an analysis on the economic impacts to smaller communities.

Recommendation: Unless the preamble is modified to indicate that MS4s are not required to comply with water quality standards, the proposed rule should not be promulgated until USEPA has complied with the requirements of the Regulatory Flexibility Act.

(*3) Federal Register, August 5, 1997, Vol. 62, No. 150, page 42191

Response to: CTR-027-009b

See response to CTR-013-008b.

Comment ID: CTR-027-010
Comment Author: California SWQTF
Document Type: Storm Water Auth.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: J Storm Water Economics
References: Letter CTR-027 incorporates by reference letters CTR-001, CTR-036 and CTR-040
Attachments? N

CROSS REFERENCES

Comment: 10. The proposed rule failed to address the economic impacts it may have on industrial stormwater dischargers. Industrial stormwater dischargers that are currently regulated by a stormwater permit, and all future industrial dischargers that will come into the program under Phase II will be required to comply with the proposed criteria. Cost of compliance with the proposed criteria for certain industries may be prohibitive, yet USEPA did not address this potential impact in its economic analysis. In addition many of these industries are small entities that should be addressed under the Regulatory Flexibility Act.

Recommendation: The proposed rule should not be promulgated until USEPA conducts an adequate economic analysis that addresses the economic impact the rule may have on industrial stormwater dischargers, including the impact to small industries.

Response to: CTR-027-010

EPA believes it that it has conducted an adequate analysis which addresses industrial stormwater dischargers and that the CTR must be promulgated under the Clean Water Act. For further discussion see responses to CTR-013-003 and CTR-013-008b.

Comment ID: CTR-028-001b
Comment Author: City of Folsom
Document Type: Storm Water Auth.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: J Storm Water Economics
References: Letter CTR-028 incorporates by reference letter CTR-040
Attachments? N
CROSS REFERENCES R

Comment: The City is a small community with a population of less than 50,000. We volunteered to participate in the Sacramento Stormwater Management Program as a co-permittee on the NPDES permit because we understood that it was a BMP-based program aimed at reducing the discharge of pollutants to the maximum extent practicable. We are very concerned with the CTR's Preamble statement that municipal stormwater agencies must comply with effluent limitations based on water quality criteria. As the County has stated in its comments, this will result in enormous costs without producing significant environmental benefits.

We are also concerned that the EPA Administrator has certified that the CTR will have no effect on small entities such as the City. Based on the estimated compliance costs prepared by the County and the statewide estimates prepared by the California Storm Water Quality Task Force, the CTR will have significant economic effects on small communities throughout the State. For example, our proportional share of the countywide costs to comply with effluent limitations, based on the proposed water quality criteria, could be over $10 million per year.

We urge EPA to reconsider its position that municipal stormwater discharges must comply with water quality standards. EPA should remove the Preamble statement or clarify that municipal stormwater

discharges are only required to reduce the discharge of pollutants to the maximum extent practicable.

Alternatively, EPA must revise its economic analysis to include the costs to municipal stormwater agencies and the EPA Administrator must withdraw her certification and, pursuant to the requirements of the Regulatory Flexibility Act, assess the economic impacts of the CTR on small entities.

Response to: CTR-028-001b

See response to Comment CTR-013-003, CTR-013-008b, and CTR-040-004.

Comment ID: CTR-031-002d
Comment Author: Fresno Metro. Flood Ctrl Dist.
Document Type: Flood Ctrl. District
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: J Storm Water Economics
References: Letter CTR-031 incorporates by reference letter CTR-027
Attachments? N
CROSS REFERENCES F
C-17a
C-17b
V

Comment: 2. Since the preamble implies that CTR criteria may be applied in NPDES permits for municipal storm water dischargers as numeric effluent limitations, the proposed rule is flawed with regard to: a) setting attainable, scientifically valid criteria in a manner consistent with state and federal regulatory approaches; b) assessing the potential economic impact on the public served by municipal storm water dischargers; c) assessing environmental impacts pursuant to the National Environmental Policy Act and the Endangered Species Act; and d) providing for the coordinated review and evaluation of the proposed CTR in conjunction with the proposed State Implementation Plan.

Response to: CTR-031-002d

See response to CTR-013-003.

With respect to comments about the Endangered Species Act see response to CTR-031-002e (Category V; Collaborative Approach). With respect to the comment about coordination with the State Implementation Plan see response to CTR-031-008b (Category V; Collaborative Approach).

Comment ID: CTR-031-006a
Comment Author: Fresno Metro. Flood Ctrl Dist.
Document Type: Flood Ctrl. District
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: J Storm Water Economics

References: Letter CTR-031 incorporates by reference letter CTR-027
Attachments? N
CROSS REFERENCES R
E-01c

Comment: b. If the CTR as proposed in the current draft is applied to municipal storm water dischargers so as to require numeric effluent limitations in municipal stormwater permits, the cost to the public will be phenomenal. In the economic analysis of the CTR, EPA failed to consider these costs, and failed to consider the costs to industrial storm water dischargers as well.

The District Is urban storm water drainage system captures through retention 90% of its annual average runoff, and discharges 90% after detention (1% is directly discharged without treatment). The system cost in 1997 dollars is estimated at $500 million.

The only option available to the District to mitigate violations of the proposed criteria would be to expand system storage to capture 100% of average annual runoff. Increasing system storage by 20,000 acre feet (estimated additional storage required for average years), at the current cost of $11,000-$20,00 per acre foot of storage, would result in a capital expenditure of $220,000,000 to $400,000,000.

Even with this exorbitant investment, in approximately half of the rain seasons storage would be exceeded, and 100% of the discharges would be expected to exceed the dissolved metals criteria noted above.

Smaller cities (under 50,000) in California are currently subject to NPDES municipal storm water discharge permits, and many more will be included upon implementation of the Stormwater Phase II program. EPA's failure to assess economic impacts on small cities would appear to be contrary to the requirements of the Federal Regulatory Flexibility Act.

The District includes in its constituency industrial businesses. The District serves these businesses and assists in the oversight of their pollution prevention and storm water permit compliance efforts. Regardless of EPA' s approach to applying the CTR to municipal storm water permits, industrial storm water dischargers are directly and seriously affected by application of the CTR. EPA's failure to assess these economic impacts on our communities is short-sighted and a breach of good public policy.

Response to: CTR-031-006a

With respect to the commenter's estimate of its stormwater costs see response to CTR-040-004. With respect to EPA's compliance with the Regulatory Flexibility Act see response to CTR-013-008b.

Comment ID: CTR-034-014e
Comment Author: SCAP
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: J Storm Water Economics
References: Letter CTR-034 incorporates by reference letter CTR-035
Attachments? N

CROSS REFERENCES E-01g08
E-01b
E-01e
E-01v

Comment: * In general, we are pleased that EPA prepared an analysis of the economic impacts of the proposed CTR, and that a major portion of EPA's work focused on determining the potential impacts on POTWs. However, we believe that this analysis is based on improper assumptions and inaccurate cost estimates, resulting in unconvincing conclusions. Detailed comments can be found in Attachment 2. A few of the areas of concern are listed below:

* Small facilities appear to be under represented in EPA's sample of POTWS, especially for minor dischargers.

* The cost triggers used as regulatory relief thresholds are unrealistic, and are not consistent with EPA regulations and policies.

* The assumptions used to determine cost estimates for indirect dischargers appear to omit a large proportion of potentially affected industries.

* The Economic Analysis does not take into account projected population and industrial growth over time, which may influence effluent quality and quantity. Statewide, the population is projected to grow by nearly 50% by 2020.

* The use of average cost estimates masks economic impacts on individual dischargers, which may be particularly acute for small communities.

* The economic Analysis ignores the costs that may be incurred by stormwater dischargers and nonpoint sources to reduce loadings so that CTR criteria may be met in ambient waters.

Response to: CTR-034-014e

For analysis of the final CTR, EPA updated its Economic Analysis to reflect the most recent data and information for each sample facility and also increased the sample size for minor facilities. Based on this revised analysis, EPA estimated that minor POTWs will incur costs of approximately $5,000 per facility per year under the low cost scenario and $7,800 per facility per year under the high cost scenario.

EPA acknowledges that evaluating the impact of each individual direct discharger to inland waters, enclosed bays, and estuaries within the State of California would be the most accurate method to determine impacts of the CTR. However, the resources that would be required to perform such an analysis for each of the over 1,241 direct dischargers are beyond the resources typically available for development of environmental regulations. Therefore, in developing the methodology for estimating the compliance costs for the proposed CTR, time and budget constraints limited EPA's costing review to a subset of the regulated community. However, EPA believes that the sample selected adequately represents the various types of direct dischargers in the State.

EPA acknowledges that minor dischargers were sampled less frequently as compared to the major dischargers. However, by definition, under the NPDES permit program, facilities classified as minor would not be expected to discharge toxic pollutants in toxic amounts. Since the CTR addresses only

toxic pollutants, EPA would not expect significant, if any, impact to minor dischargers.

In analyses of the final CTR, EPA increased the sample of minors by five randomly selected facilities to bolster its analysis. EPA estimated costs of $872 per minor facility under the low scenario, and $2,682 per minor facility under the high scenario due to the CTR.

EPA also replaced Silvergate with South Bay in the sample in order to improve the estimate of the impacts of the CTR on the electric utility industry. The draft CTR cost analysis included costs for Silvergate, but the facility had closed and the data available was over five years old. The addition of South Bay, an electric utility facility with no costs, to the sample results in a more realistic, lower overall cost estimate for the electric utility industry.

As described in EA that accompanied the proposed CTR (SAIC and Jones and Stokes Associates, 1997), EPA assumed that regulatory alternatives such as phased total maximum daily loads/water quality assessments, site-specific criteria modifications, standards variances, metals translators, etc., are considered under certain circumstances. Specifically, under the low-end scenario, regulatory alternatives were assumed necessary if the cost for a sample facility exceeded $200 per toxic pounds-equivalent.

EPA assumes that a facility, when faced with the challenge of meeting water quality-based effluent limitations (WQBELs) based on CTR criteria, will select the most cost-effective controls, including regulatory alternatives. In fact, this has been the case in California, where several major POTWs have performed studies in pursuit of regulatory alternatives such as metals translators and site-specific criteria, rather than install costly controls to comply with WQBELs. EPA acknowledges that the actual cost-effectiveness value will vary by facility depending upon many factors, including the characteristics and volume of discharge, the receiving water, etc. However, EPA disagrees that the cost trigger is unrealistic, as it was reasonably based upon the highest reported cost-effectiveness values for industry categories subject to effluent limitations guidelines and standards.

Nonetheless, in the high-end estimate developed for the cost analysis accompanying the final CTR, no cost trigger was used and, thus, EPA's high-end cost estimate did not include the use of a regulatory alternative for any sample facility.

Reference: SAIC and Jones and Stokes Associates, Inc. 1997. Analysis of Potential Costs Related to the Implementation of the California Toxics Rule. Prepared for U.S. EPA, Office of Science and Technology and U.S. EPA Region IX, May 5.

EPA disagrees with the commenter's assertion that the costs for San Jose and Sunnyvale cannot be used to extrapolate costs to indirect users at other POTWs. The procedures for identifying indirect sources contributing specific pollutants to POTWs and developing and implementing a source control plan to minimize these discharges are similar for all types of pollutants. Additionally, similar to San Jose and Sunnyvale, metals were the primary pollutants of concern for POTWs evaluated in the cost analysis. Apart from these studies, EPA has no data upon which to establish facility-level compliance costs for indirect dischargers. To account for this uncertainty, EPA has revised its assumption regarding the percentages of indirect dischargers that may incur these costs. The percentage of facilities that may incur these costs was revised from the initial estimate of from 10% to 30% to a new estimate of from 30% to 70%. EPA believes that these new estimates are highly conservative (i.e. tend to overestimate costs).

Average per facility investment costs for industrial participants were estimated using the mass audit studies for copper and nickel pollution prevention projects with paybacks of less than five years. The average cost per indirect discharger was estimated to be $61,526 or $15,000 per year at an interest rate of

7 percent and over a period of five years. The total annual costs to the indirect discharger population in California then were estimated by multiplying the annualized cost ($15,000) by the total number of potentially affected indirect dischargers.

Under the MAS, the pounds removed by the pollution prevention projects with paybacks of less than five years were 560 pounds per year for copper and 148 pounds per year for nickel. Since neither San Jose nor Sunnyvale required nickel reductions, EPA did not consider pounds removed. Both San Jose and Sunnyvale did require copper reductions under the high-end cost analysis. For San Jose, required reductions equaled approximately 746 non-toxic-weighted pounds per year, however, for Sunnyvale, required reductions equaled 87 pounds per year. Since the industrial facilities to which the MAS results were applied are not as large as the San Jose facility (160 million gallons per day) whose reduction requirements exceed the MAS results, EPA estimated that load reductions from implementing the pollution prevention projects would be adequate.

EPA estimated annual (steady state) benefits and annualized costs. EPA also compared, 20- and 30-years streams of benefits and costs to account for differences in the schedule for experiencing benefits and costs (up-front capital cost and a phase-in of benefits). EPA did not forecast economic, demographic, or policy changes over these time periods. However, EPA does not expect changes in these variables to negatively impact the anticipated ratio of benefits and costs. Instead, EPA believes that increased population and economic activity in the future would likely increase the benefits of achieving standards for toxic pollutants in California waters compared to the cost of controls.

EPA selected sample facilities in order to represent different industry categories, but also various facility sizes with different flow magnitudes. For example, EPA analyzed POTW facilities which fell into three flow categories representing facilities serving very large, medium, and small communities. Costs were averaged for the sample facilities within each flow category for an industry type and then extrapolated to the universe of facilities which matched the industry type and the range in flow for that flow category. Thus, costs calculated for facilities operating in very large communities would not be applied to facilities serving very small communities.

EPA did not include benefits or costs of controlling nonpoint sources or storm water dischargers in its estimates of benefits and costs of the CTR. EPA believes that the final rule will not have a direct effect on sources not permitted under the NPDES program (e.g., nonpoint sources) or NPDES sources not typically subject to numeric water quality-based effluent limits (e.g., wet weather discharges). Any potential indirect effect on nonpoint sources and wet weather discharges, such as runoff from farms, urban areas, and abandoned mines, and contaminated sediment, is either unknown at this time or not a result of this rule. Many of the programs developed to control nonpoint sources and wet weather discharges are already in place. Costs due to these programs have already been incurred or will soon be incurred owing to existing federal, State, and local environmental programs that are distinct from the CTR.

EPA also acknowledges that nonpoint sources and wet weather discharges are technically difficult to model and evaluate costs because they are intermittent and highly variable. Nonpoint source and wet weather discharges also occur under different hydrologic or climatic conditions than continuous discharges from industrial and municipal facilities, which are evaluated under critical low flow or drought conditions. Thus, evaluating agricultural nonpoint source discharges and storm water discharges and their effects on the environment is highly site-specific and data intensive. Until this information is available, it is premature to project that the sources would incur any costs beyond those for which they are already responsible under current regulations of the Clean Water Act.

See also responses to CTR-013-003 and CTR-040-004.

Comment ID: CTR-035-044c
Comment Author: Tri-TAC/CASA
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: J Storm Water Economics
References:
Attachments? N
CROSS REFERENCES E-01c01
E-01d01

Comment: pp. 42188-42189 - Potential Costs Do Not Meet the $100 Million Threshold Under E 0. 12866 (also see discussion above) As noted on p. 42188, one component of the definition of a "significant regulatory action" is that the rule may have an annual effect on the economy of $100 million or more. EPA states on p.42189 that "the annualized potential costs that direct and indirect dischargers may incur as a result of State implementation of permit limits based on water quality standards using today's proposed criteria are estimated to be between $15 million and $87 million." We believe that this range significantly underestimates the potential costs that may be realized from the implementation of this rule. This belief is based on the numerous assumptions used by EPA that would have served to underestimate potential costs, including assumptions about regulatory flexibility that are clearly contradicted in the Preamble to the rule itself. These issues are further enumerated in Attachment 2, which contains an analysis prepared by the environmental economics firm, M. Cubed. Furthermore, we strongly believe that EPA has a duty to look at a full range of potential costs that may be incurred, and not just to look at the costs under optimistic assumptions. This duty is especially acute in light of the uncertainties of how the CTR will be implemented by the State.

We examined the potential costs for the POTW sector to determine the reasonableness of EPA's cost estimates. Our preliminary analysis indicates that for 23 major POTWs the annualized costs could reach $400 million.(*3) This estimate includes the cost to construct and operate end-of-pipe treatment processes where these would be necessary to achieve projected effluent limits. Unlike the EPA cost estimates, we have assumed that regulatory relief options may not be available, and that, based on the pollutants causing compliance problems, pollution prevention and treatment plant optimization might not be sufficient to reliably achieve compliance. Thus, we feel that this estimate reflects a more accurate depiction of the potential POTW "high-end" compliance costs that could result from the draft CTR. Based on this analysis, we believe that EPA should re-analyze the potential costs for POTWs to meet water quality-based effluent limits based on the criteria in the CTR.

As noted on p. ES-2 of the Economic Analysis (U.S. EPA, 1997a), EPA estimated only the costs to point sources, and did not estimate the potential costs for compliance for nonpoint source dischargers, despite the fact that the majority of water bodies in California are impaired due to nonpoint source discharges (SWRCB, 1996). In addition, EPA failed to estimate the costs of compliance for wet weather dischargers, such as municipal and industrial stormwater dischargers. These omissions also lead us to believe that the potential total costs of the rule are far greater than $100 million. EPA must correct these deficiencies and redo the Economic Analysis.

(*3) Backup information for these cost estimates is available upon request.

Response to: CTR-035-044c

In response to comments received by EPA on the economic analysis that accompanied the proposed CTR, EPA collected additional data for the sample facilities. EPA also revised its estimate of potential compliance costs attributable to the CTR.

EPA's low estimate of total annualized costs of the final CTR is $33.5 million per year and its high estimate is $61.0 million per year. The low and high estimates vary based on whether effluent data or permit limits are used to assess the need for additional controls. They also vary based on whether or not alternative regulatory approaches, such as phased total maximum daily loads/water quality assessments, site-specific criteria modifications, standards variances, metals translators, etc., are considered under certain circumstances. EPA believes that its estimates of costs and benefits are sound.

EPA believes that several general observations can be made regarding studies submitted by commenters and how they differ from the EPA cost study for the final CTR. Many commenters assumed that the mere presence of a pollutant would result in costs to comply with a CTR-based WQBEL. It should be noted that the presence of a pollutant in an ambient inland water, enclosed bay, or estuary does not require permitting authorities to establish a WQBEL for that pollutant. The establishment of a permit limit is appropriate only where the permitting authority determines that a pollutant is likely to be present, and that the pollutant concentration has a "reasonable potential" to cause or contribute to an exceedance of the applicable water quality standard. Where the pollutant is not likely to be present, or is not present at levels that have reasonable potential to cause or contribute to a water quality standard exceedance, a WQBEL may not be necessary.

The majority of cost estimates provided by commenters include the costs for the addition of end-of-pipe treatment to achieve proposed CTR-based WQBELs. This was particularly the case when WQBELs were expected to be below analytical detection levels. EPA disagrees that end-of-pipe treatment is necessary to achieve CTR-based WQBELs in all cases. As discussed in SAIC (1995), there are documented cases where waste minimization or source control techniques have been used to comply with existing permit limits established below detection levels. Other examples include the Western Lake Superior Sanitary District (WLSSD), who after evaluating the costs involved to meet more stringent WQBELs for mercury with end-of-pipe treatment, concluded that pollution prevention techniques were the preferable control strategy. As a result, WLSSD published a guide designed to "assist wastewater treatment plant staff with creating and implementing their own mercury reduction projects." As a result of the efforts of WLSSD, effluent mercury levels were found to decrease from 0.58 parts per billion (ppb) to 0.015 ppb.

Although waste minimization or source controls are not always applicable, EPA assumes in its low estimate of costs that a facility would first evaluate whether process changes or modifications are feasible, prior to incurring costs for adding treatment.

In addition, many commenters assumed that compliance would be based on the WQBEL, regardless of whether it is below the analytical method detection level (MDL). This is not consistent with current practice. Instead, the State may use the "minimum level" (ML) (as defined in 40 CFR Part 136) as the required compliance point where a permit limit is established at a value below the MDL. The ML is a value at which the limited parameter can be accurately quantified, and is always greater than or equal to the MDL. To ensure that its cost estimates were conservative (i.e., erring on the side of higher costs),

EPA used the MDL as the compliance level. Although EPA used the pollutant MDL for costing purposes, the Agency acknowledges that estimating treatment costs for WQBELs below the MDL is speculative and likely unrealistic.

Finally, many of the commenters included costs related to installation of treatment for storm water discharges. As further described in the responses to CTR-021-008, CTR-013-003 and CTR-040-004, EPA believes that the final CTR will not significantly affect the current storm water program being implemented by the State, which includes the requirement to develop best management practices to control pollutants in storm water discharges. As such, EPA believes that inclusion of end-of-pipe treatment costs for storm water are inappropriate.

With respect to EPA's analysis of nonpoint source dischargers see response to CTR-034-014e.

Reference: SAIC. 1995. Assessment of Compliance Costs Resulting from Implementation of the Final Great Lakes Water Quality Guidance. Prepared for U.S. EPA, Office of Science and Technology, March 13.

Comment ID: CTR-036-002a
Comment Author: County of Orange
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: J Storm Water Economics
References: Letter CTR-036 incorporates by reference letters CTR-013, CTR-018, CTR-031, CTR-034 and CTR-040
Attachments? N
CROSS REFERENCES E-01c

Comment: Cost to Implement the Proposed Rule

The inclusion of municipal stormwater discharges under the proposed rule renders the economic analysis invalid, noting municipal studies that show that stormwater discharges cannot comply with all of the proposed criteria with anything short of major national or regional product substitutions, or end-of-pipe treatment:

The Fresno Metropolitan Flood Control District conducted an attainability analysis on stormwater discharges from its urbanized area detention basins. The analysis showed that even with pollutant reductions in the basins, the proposed criteria would not be met.

The Sacramento Stormwater Program conducted an attainability analysis and found that even with an aggressive BMP program the urbanized area would not achieve certain of the water quality criteria, and that the cost of treatment would be on the order of $2 billion.

A preliminary attainability analysis conducted by Orange County, based on a limited dataset, indicates similar findings to Fresno and Sacramento in spite of the implementation of a significant BMP program over a multi-year period (see Attachment 2).

A nationwide attainability study, conducted by American Public Works Association in 1992, estimated capital costs and annual operations costs to be $406,734,900,000 and $542,036,700,000. Significantly, these estimates omitted the costs associated with engineering, administration, permitting and land acquisition.

Even if end-of-pipe treatment were to be implemented for all urban stormwater, the contribution of toxic pollutants from this source is so minor (less than 3% according to the economic analysis) that they could not be justified by the marginal water quality benefits achieved. Clearly a rule that is known from the outset to inevitably result in massive expenditures which provide little water quality benefit or inevitable municipal noncompliance is not appropriate for California.

The rulemaking process of the federal government is obligated to fully explore the economic implications of the proposed regulatory action through compliance with Executive Order 12866, the Unfunded Mandates Report Act, of 1995 (the "Reform Act"), and the Regulatory Flexibility Act (the "RFA"). In its economic analysis EPA appears to have understated costs and circumvented these requirements resulting in a lack of disclosure of the true impacts of the Rule.

Executive Order 12866 requires any "significant" federal regulatory action to be referred to the Office of Management and Budget for review before it can be approved. In this context a "significant" action includes one which will "have an annual effect on the economy of $100 million or more or adversely affect in a material way the economy". Though admitting that there "may be a cost to some dischargers" to comply with water quality standards which will be derived from these toxics criteria, EPA nonetheless argues that the proposed rule is not a significant action because it "establishes ambient water quality criteria which. by themselves, do not directly impose economic impacts." [62 Fed. Reg. 42188].

First nothing in E.O. 12866 indicates that only actions with direct economic impacts are to be considered by OMB. Second, for EPA to ignore the link between the toxics criteria contained in the proposed rule and the obligations they impose is unfounded.

In short, EPA cannot have it both ways. It cannot indicate that stormwater discharges are subject to the proposed toxics rule and then turn a blind eye toward the costs associated with implementation of this rule. The costs of the proposed rule are direct and significant, greatly exceeding the annual % 100 million threshold, and therefore the rule must be submitted to OMB for review.

Response to: CTR-036-002a

EPA believes it properly described the potential impact of the implementation of the CTR on storm drains in the preamble to the proposed CTR and in its Economic Analysis (for further discussion see response to CTR-013-003). With respect to the analyses by the Fresno Metropolitan Flood District and the Sacramento Stormwater program see response to CTR-040-004. EPA believes it is in full compliance with its legal obligations under Executive Order 12866 (see response to CTRH-002-006a; Category I: Stormwater/Wet Weather Flows), the Regulatory Flexibility Act (see the preamble to today's rule, response to CTR-013-008b, and CTR-050-007a), and the Unfunded Mandates Act (see the preamble to today's rule and response to CTR-036-006a).

Comment ID: CTR-036-003b
Comment Author: County of Orange
Document Type: Local Government

State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: J Storm Water Economics
References: Letter CTR-036 incorporates by reference letters CTR-013, CTR-018, CTR-031, CTR-034 and CTR-040
Attachments? N
CROSS REFERENCES S

Comment: EPA also has failed to meet its obligations under the Unfunded Mandates Reform Act of 1995 (the "Reform Act"). As with E.O. 12866, the Reform Act requires federal agencies to assess the effects of their regulatory actions on state, local and tribal governments, and on the private sector [U.S.C. section 1531]. Among other things, the Reform Act requires the preparation of a cost-benefit analysis and the examination of a range of alternatives, whenever the proposed action may result in expenditures in excess of $100 million [2 U.S.C. sections 1532, 1535]. In addition, the Reform Act contains a number of specific requirements where an action may significantly or uniquely impact small governments [2 U.S.C. section 1533].

EPA asserts again that it does not have to comply with the Reform Act because the proposed rule "imposes no direct enforceable duties on the State or any local government or on the private sector." [62 Fed. Reg 42160, 42191]. For the reasons discussed earlier, this assertion is without merit. As EPA acknowledges, these criteria will serve as the basis for any water quality standards promulgated by the State, which in turn will be binding on. local government and private industry. Unless EPA is prepared to view these criteria as being optional, it therefore cannot in good conscience state that they do not create an enforceable duty. Given this, EPA must comply with the mandates of the Reform Act

Response to: CTR-036-003b

With respect to EPA's compliance with UMRA see response to CTR-036-006a (Category S:UMRA) and the preamble to the final rule.

Comment ID: CTR-036-004a
Comment Author: County of Orange
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: J Storm Water Economics
References: Letter CTR-036 incorporates by reference letters CTR-013, CTR-018, CTR-031, CTR-034 and CTR-040
Attachments? N
CROSS REFERENCES R

Comment: Finally, EPA has not met its duties under the Regulatory Flexibility Act (the "RFA"). Under the RFA, federal agencies are required to conduct an initial regulatory flexibility analysis ("IRFA") describing the impact of a proposed regulatory action on small entities. Once more relying on the claim that the proposed rule does not establish criteria that are directly applicable to small entities, EPA states that the mandates of RFA do not apply [62 Fed. Reg. 41160, 42191-92].

This position is contrary to both the letter and the spirit of the RFA. The fact that the toxics criteria contained in the proposed rule must be translated into water quality standards and, in turn, NPDES permit effluent limitations, does not negate the fact that the burden of complying and implementing such toxics criteria ultimately will be borne by individual municipalities and business entities. As noted above, the costs to municipalities alone could run into billion of dollars placing a severe strain on their budgets and forcing them to divert funds currently allocated to other important municipal services, including public safety.

Moreover, EPA's statement that "California will have a number of discretionary choices associated with permit writing" is disingenuous and ironic in light of EPA's rationale for issuing the proposed rule. The toxics criteria will necessarily narrow the State's discretion in issuing NPDES permits and in establishing effluent limits for such permits. If EPA had meant for the State to have any serious discretion, it would not be promulgating these criteria in the first place.

Response to: CTR-036-004a

The purpose of the CTR is to fill the current gaps in water quality criteria in inland surface waters, enclosed bays, and estuaries. EPA disagrees that the State will not have substantial discretion in issuing NPDES permits under the rule. The CTR establishes pollutant levels necessary to protect designated uses. Establishing numeric criteria in the CTR does not limit the discretion of permit writers to use appropriate and flexible tools such as mixing zones or translators for dissolved metals criteria in establishing effluent limits. In addition, if a discharger believes the CTR criterion is inappropriately overprotective of the designated use, the discharger can request the State and EPA to approve a site-specific criterion or to downgrade the designated use.

Comment ID: CTR-040-004
Comment Author: County of Sacramento Water Div
Document Type: Storm Water Auth.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: J Storm Water Economics
References: Letter CTR-040 incorporates by reference letter CTR-027
Attachments? Y
CROSS REFERENCES

Comment: MAJOR CONCERNS

We do, however, have fundamental concerns with the Rule as it is presently proposed and its supporting economic analysis. We believe the Rule can be modified in a manner that will be responsive to our concerns while at the same time being consistent with applicable Federal law and regulations. Our major concerns are presented here and are followed by our recommended modifications.

1. Concern: The Rule, as presently proposed, appears to require discharges from municipal stormwater programs to meet water quality based effluent limits (WQBELs).

* The enclosed attainability analysis (See Attachment A) demonstrates that implementation of an

aggressive BMP-based program will cost on the order of $20 million per year. And, despite the implementation of ever escalating BMPs, the Sacramento Stormwater Management Program will not achieve several of the proposed aquatic life criteria (for copper, lead, and zinc) and human health criteria (for PAHs).

Response to: CTR-040-004

EPA disagrees with the commenter's interpretation of the language regarding wet weather discharges in the proposed CTR, and has clarified the language in the section of the CTR that discusses the applicability of the rule to wet weather discharges. EPA believes that the CTR language allows the practice of applying maximum extent practicable (MEP) to MS4 permits, along with best management practices (BMPs) as effluent limits to meet water quality standards where infeasible or insufficient information exists to develop WQBELs.

Section 402(p)(3)(B) requires municipal separate storm water systems to 1) prohibit non-storm water discharges, and 2) reduce the discharge of pollutants in storm water to MEP. The Agency has purposely not defined MEP to allow municipalities flexibility in designing pollution control measures. MEP is a dynamic performance standard which requires the municipality to demonstrate permit compliance in many ways including the use of BMPs, proper maintenance of their BMPs, and ongoing assessment of BMP performance in reducing pollutant discharges. EPA has determined that, where sufficient information does not exist on which to base WQBELs, or where infeasible, the use of BMPs is consistent with the requirement that municipal storm water programs require controls to reduce the discharge of pollutants to MEP in order to attain and maintain water quality standards.

EPA articulated its position on the use of BMPs in storm water permits in the Interim Permitting Approach For Water Quality-Based Effluent Limitations In Storm Water Permits signed by the Assistant Administrator for Water, Robert Perciasepe on August 1, 1996 (61 FR 43761, August 19, 1996). The policy focuses on the question of the applicability of WQBELs to MS4 permits, and whether or not numeric effluent limitations are required, or could be represented by other control mechanisms such as BMPs. The policy affirms the use of best management practices as a means to attain water quality standards in storm water permits. The policy reads as follows:

In response to recent questions regarding the type of water quality-based effluent limitations that are most appropriate for National Pollutant Discharge Elimination System (NPDES) storm water permits, the Environmental Protection Agency (EPA) is adopting an interim permitting approach for regulating wet weather storm water discharges. Due to the nature of storm water discharges, and the typical lack of information on which to base numeric water quality-based effluent limitations (expressed as concentration and mass), EPA will use an interim permitting approach for NPDES storm water permits.

The interim permitting approach uses best management practices (BMPs) in first-round storm water permits, and expanded or better-tailored BMPs in subsequent permits, where necessary, to provide for the attainment of water quality standards. In cases where adequate information exists to develop more specific conditions or limitations to meet water quality standards, these conditions or limitations are to be incorporated into storm water permits, as necessary and appropriate.

This interim permitting approach is not intended to affect those storm water permits that already include appropriately derived numeric water quality-based effluent limitations. Since the policy only applies to water quality-based effluent limitations, it is not intended to affect technology-based limitations, such as those based on effluent guidelines or the permit writer's best professional judgement, that are incorporated into storm water permits.

Each storm water permit should include a coordinated and cost-effective monitoring program to gather necessary information to determine the extent to which the permit provides for attainment of applicable water quality standards and to determine the appropriate conditions or limitations for subsequent permits. Such a monitoring program may include ambient monitoring, receiving water assessment, discharge monitoring (as needed), or a combination of monitoring procedures designed to gather necessary information.

This interim permitting approach applies only to EPA; however, EPA also encourages authorized States and Tribes to adopt similar policies for storm water permits. This interim permitting approach provides time, where necessary, to more fully assess the range of issues and possible options for the control of storm water discharges for the protection of water quality. This interim permitting approach may be modified as a result of the ongoing Urban Wet Weather Flows Federal Advisory Committee policy dialogue on this subject.

EPA also reviewed the attached report entitled "Technical Report Assessing the Attainability of Water Quality Criteria Proposed in the California Toxics Rule," a report prepared for Sacramento County Stormwater Management Program by Larry Walker Associates (LWA). In response, EPA has the following concerns and comments regarding various aspects of the report and its conclusions.

General Limitations of the Analysis

* LWA do not provide the raw data upon which they base their conclusions regarding potential compliance problems with the proposed CTR water quality criteria. Without the raw data, EPA could not fully assess the validity of the analysis.

* The data may not be representative of the storm water discharges to the American and Sacramento Rivers. Most samples were collected for first-flush events, usually one hour or less in duration. As a result, the in stream exposure period is probably one hour at most, which corresponds to the exposure period for acute criteria, not chronic criteria as used in the LWA analysis.

* LWA report that applying BMPs to storm water would not result in attainment of criteria as proposed in the CTR. However, LWA focus on the most stringent (and unlikely) scenario for attainability of criteria (i.e., applying chronic criteria with no allowance for dilution). According to LWA's own analysis, BMPs would nearly achieve compliance under the scenario of applying acute criteria and dilution factors to storm water flows. If mathematical errors in LWA's Table's 11 and 12 are corrected, the analysis demonstrates compliance with acute criteria for even the 99.91 percentile values of copper, lead, and zinc in the Sacramento River, and for lead in the American River, with no additional treatment.

* The analysis also may not be reflective of the compliance scenario for other California waters. The metals criteria are based on a low hardness value for the American River (25 mg/l as $CaCO_3$). This hardness value is lower than any of the hardness values observed for the economic analysis of sample facilities throughout California. As a result, the criteria for the American River are very stringent (i.e., criteria become more stringent with lower hardness) compared to criteria for California waters in general.

* LWA compare the concentration of the dissolved fraction of metals in the discharge to the instream criterion values expressed as dissolved metals to assess compliance. This approach may be overly stringent because it does not account for the partitioning of dissolved metals present in the discharge to suspended solids present in receiving waters (particularly during a storm event when suspended solids are elevated). Thus, less dissolved metals may be available in the water column than LWA's analysis

would estimate. In addition, this is not the approach that is used to determine compliance under the NPDES program. The NPDES regulations require all permit limits for metals to be expressed in terms of "total recoverable metals" [40 CFR 122.45]. In order to determine whether a discharge would meet NPDES permit limits developed to protect water quality, the instream criteria should not be used directly, but should be converted to a water quality-based effluent limit (WQBEL) using the EPA standards-to-permits procedures. The development of WQBELs expressed as total recoverable metals accounts for the partitioning of dissolved metals (present in the discharge) to suspended solids that are present in the receiving water. EPA used this approach in its cost evaluations.

* Cost estimates provided in the LWA analysis for complying with the CTR appear to mix BMP implementation costs to comply with Sacramento's storm water permit with new compliance costs resulting from the CTR. EPA's economic analysis only evaluates the incremental impact of the water quality standards for toxics compared to the baseline program to avoid a double counting of costs (and benefits).

Specific Data and Sampling Issues

* LWA calculated average event mean concentrations (AEMC) to represent the entire urbanized drainage area of Sacramento County. Samples were combined to calculate AEMCs (based on contributions of 95% commercial/residential and 5% industrial) utilizing three sampling locations. Although LWA indicate that both grab and composite samples were collected to estimate the AEMCs, as well as annual loadings, it is unclear how the different sample types were used. According to the EPA's Guidance Manual For The Preparation of Part 2 of the NPDES Permit Applications for Discharges From Municipal Separate Storm Sewer Systems (EPA 833-B-92-002), an event mean concentration (EMC) is determined from analyses of flow-weighted composite samples. In order to qualify as a valid sample, the storm event must be sampled for at least three hours, or for the entire storm if the event lasts less than three hours. Of great importance in such derivations is consistency in methodology, i.e., the first method employed must always be employed to ensure that results can be compared. LWA do not provide any information to confirm the consistency of sampling procedures.

* LWA completed a discharge characterization project (DCP) for storm water discharges in 1996 (not included as part of commenter's submission). LWA state that the DCP evaluated all urban runoff monitoring data available. However, it is not clear whether the data set used for the DCP was the same as that analyzed for the current report, or whether it was more extensive. LWA state that the DCP used "statistical modeling" (unnamed methodology) to "characterize and estimate" mass loadings. They also state that data on heavy metals, conventional and non-conventional pollutants were "updated for 1996/1997 data. However, they do not report which procedures governed the "update," whether the data sets were consistent, or under what circumstances they were sampled and analyzed. EPA believes that this lack of information makes it impossible to evaluate the methodologies used to extrapolate the data set and draw conclusions as to its appropriateness in demonstrating nonattainability of toxic criteria. In addition, LWA cite a "robust statistical method" for deciding whether to use detection limit values for nondetect data. This method is not described.

* It appears from Charts 1 through 5 presented in the report, that LWA use a limited data set (not included as part of commenter's submission) for each of the pollutants of concern, and use statistical projections to predict "worst case" (i.e., 95th, 99th, and 99.91th percentiles) discharge values. These predicted discharge concentrations are then used to assess whether instream criteria would be met. This is an extremely conservative approach that would not be used by EPA to establish compliance with water quality-based effluent limits or water quality criteria. To assess the potential for metals and organics to exceed aquatic life and human health criteria during intermittent, high flow, storm water episodes, a

complex dynamic modeling effort would be required. This procedure is highly data intensive, and is beyond the scope of this costing analysis; nevertheless, it should have been employed in the LWA analysis to accurately determine the potential for exceedances of criteria. The generalized technical approach for assessing compliance with the applicable criteria is described in EPA's Technical Support Document for Water Quality-Based Toxics Control (March 1991). For typical point sources, this is performed by developing wasteload allocations (using steady-state models, under low flow conditions) and developing WQBELs based on these wasteload allocations. The process of developing wasteload allocations and WQBELs that would be protective of applicable criteria during storm events is significantly more difficult, and is not described in current EPA guidance. The EPA Center for Exposure Assessment Modeling (CEAM), located at the National Exposure Research Laboratory in Athens, Georgia, maintains and distributes environmental simulation models and databases for urban and rural nonpoint sources. Information on dynamic models and their use for storm water modeling can be obtained through CEAM.

Cost Methodology Issues

* It is unclear why Tables 7 and 7a were included in the analysis. These tables appear to present costs associated with the implementation of the BMPs required by the current Sacramento MS4 permit. They are, therefore, distinct from any incremental attainment costs associated with treatment of storm water due to water quality criteria. The potential costs resulting from the alternative of collecting and treating all storm water prior to discharge are summarized in Figure C, however, no details, explanatory notes, or assumptions are presented in support of this estimate.

* Figure B states that capital costs range from $160 to $187 million. However, EPA notes that only the higher value is presented in the summary. The choice to use only the higher value is not explained. It appears that the difference in the values results from the assumed level of engineering and other costs (50% of capital costs, as opposed to 30%, see Table 7). Other published sources have traditionally used a percentage more consistent with the lower of the two values referenced in Table 7 (see, for example, Estimating Costs for the Economic Benefits of RCRA Noncompliance, U.S. EPA, March 1997, page 1-4, where the percentage increase due to engineering and inspection, contractor's overhead and profit, and contingency is 35%).

Other Methodological Issues

* LWA do not clearly state what proportion of the County's runoff enters the American River versus the Sacramento River. LWA base their presentation largely on discharges to the American River which has a two-fold lower hardness concentration, resulting in the most stringent metals criteria. As noted above, a hardness value of 25 mg/l (as $CaCO_3$) is on the very low end of the range for receiving waters considered in the CTR analysis.

* LWA focus their presentation on the "no dilution" scenario. However, both the American and Sacramento Rivers provide substantial dilution (reducing runoff concentrations by 51% and 86%, respectively). The analysis developed in the LWA report summarizes the results of this evaluation in Tables 11 and 12. In presenting the data, the LWA evaluation incorrectly calculates the dilution provided by the Sacramento River. When correctly calculated, the analysis indicates that the acute criteria for all of the metals would be met at the 99.91 percentile value in the Sacramento River. In addition the acute criterion for lead would be met for the American Rivers. Furthermore, compliance with copper and zinc criteria would practically be achieved assuming dilution and implementation of BMPs (i.e., 70% reduction of copper and zinc by BMPs). In their assessment of instream mixing, the LWA analysis used ambient background pollutant concentrations presented in Tables 11 and 12. While

all other values are indicated as "dissolved" concentrations, no such note is provided for the background data. If these values are expressed as total metals it would overestimate the background load and thus underestimate the available assimilative capacity of the stream.

* Similarly, the LWA does not account for in-stream dilution in its evaluation of the potential for PAH compounds and pentachlorophenol to exceed human health criteria. In its evaluation, LWA again projects worst case (i.e., 95th, 99th, and 99.91th percentile) storm water concentration values and compares these values directly to ambient human health criteria. This approach significantly overestimates the potential for exceeding these criteria. Human health criteria are developed assuming a lifetime exposure to the pollutant at a daily ingestion rate of 2 liters of drinking water and ingestion of an assumed mass of aquatic organisms. To account for such long term exposures, EPA permitting procedures recommend using typical stream flows (e.g., harmonic mean) in developing wasteload allocations. The calculated wasteload allocations are also assumed to represent long-term averages (i.e., average monthly permit limits) rather than maximum daily values. Depending on the available dilution, this approach generally results in WQBELs much higher (i.e., less stringent) than the actual criterion values. Based on LWA projections, it appears that even a small allowance for dilution would resolve the compliance concerns or pentachlorophenol. The potential for compliance concerns identified by LWA for PAH compounds could only be accurately determined based on the results of the dynamic modeling assessment previously discussed.

* In calculating the allowable discharge concentration (Ce) for lead and zinc, LWA used detection level values for ambient background concentrations even though no lead or zinc were measured. Since background concentrations may actually be significantly lower than the detection level, this may result in an overly stringent Ce (and thus more costly to achieve).

Comments from the Fresno Metropolitan Flood Control District (Fresno) and the California Department of Transportation (Caltrans)

EPA also reviewed comments submitted by the Fresno Metropolitan Flood Control District (Fresno) and the California Department of Transportation (Caltrans) on the CTR provisions relating to storm water. In response, EPA has the following concerns and comments regarding various aspects of the submissions and their conclusions. Some of these issues are addressed in the above review of LWA's submission and are so referenced.

General Limitations of the Analysis

* Neither Fresno nor Caltrans provide the raw data upon which they base their conclusions regarding potential compliance problems with the proposed CTR water quality criteria. Without the raw data, EPA could not fully assess the validity of the analysis.

* Caltrans' data came from eight storm events at three urban freeway sites in the Los Angeles area, but the sampling methodology is not specified (i.e., first flush, peak, outfall, street, etc.). The data may not be representative of the storm water discharges for all Caltrans facilities. Fresno does not specify the sampling methodology nor the number of sites or storm events sampled.

* Fresno reports that applying BMPs (including end-of-pipe) to storm water would not result in attainment of criteria as proposed in the CTR. However, Fresno presents a stringent (and unlikely) scenario for attainability of criteria (i.e., applying chronic criteria).

* Caltrans reports that applying source reduction and nonstructural BMPs will not provide the reduction

necessary to meet the criteria. End-of-pipe treatment would be required. Although acute criteria are used in this analysis, no data or estimates are provided to demonstrate that BMPs would not result in reductions needed to comply with properly developed WQBELs.

* The analysis also may not be reflective of the compliance scenario for other California waters.

* Fresno and Caltrans compare the concentration of the dissolved fraction of metals in the discharge to the instream criterion values expressed as dissolved metals to assess compliance. See the response to LWA for EPA's discussion of the problems with this approach.

* Cost estimates provided in the Fresno and Caltrans analysis for complying with the CTR may mix BMP implementation costs to comply with local storm water permits with new compliance costs resulting from the CTR. EPA's economic analysis only evaluates the incremental impact of the water quality standards for toxics compared to the baseline program to avoid a double counting of costs (and benefits).

Specific Data and Sampling Issues

* Caltrans specifies that consistent procedures were used at all three sampling sites, but it does not specify the exact methodology (i.e., sampling duration, first flush, etc.). Of great importance in data analysis is consistency in methodology, i.e., the first method employed must always be employed to ensure that results can be compared.

Fresno does not describe its sampling procedures or methodology.

* Caltrans uses a limited data set (not included as part of commenter's submission) for each of the pollutants of concern, and uses statistical projections to predict "worst case" (i.e., 99.91th percentile) discharge values. These predicted discharge concentrations are then used to assess whether in stream criteria would be met. This is an extremely conservative approach that would not be used to establish compliance with water quality-based effluent limits or water quality criteria because compliance is based on measured values and not on statistically derived worst case values.

Summary and Recommendations

The LWA report was based on storm water data collected at outfalls discharging to the American and Sacramento Rivers. The report did not provide the raw data, nor did it provide detailed information on how these data were collected. The primary scenario described in the report (i.e., comparing projected worse case discharge concentrations directly to chronic aquatic life and human health criteria with no allowance for dilution) is highly conservative in comparison with the water quality-based permitting and compliance procedures that would be implemented by EPA. The LWA analysis also did not consider the equilibrium partitioning of dissolved and total metals that may occur instream during a storm event. An ancillary analysis summarized in the LWA report compared the maximum projected discharge concentrations (99.91 percentile values) of copper, lead, and zinc to the acute aquatic life criteria accounting for dilution. If errors are corrected in the LWA spreadsheet, the LWA data indicate that there would be no compliance problems for these parameters in the Sacramento River, and that BMPs would likely result in compliance in the American River. While the LWA analysis provides information that could be useful in determining "reasonable potential" for possible WQBEL development, the approach is not consistent with water quality-based permitting procedures or EPA's approach to compliance assessment.

To accurately determine whether additional treatment would be necessary to control storm water discharges to the American and Sacramento Rivers, EPA would conduct a comprehensive modeling effort to develop appropriate WQBELs. The WQBELs (for organics and total metals), would be developed using dynamic models to account for the intermittent loadings and exposures from the storm water discharges. EPA recognizes that the determination of appropriate WQBELs for storm water outfalls is a difficult modeling effort that requires intensive data collection and verification. The LWA report has not utilized this approach, and the necessary level of effort is not within the scope of the agency's CTR analysis.

In summary, the CTR language allows (consistent with EPA's policy) the practice of applying MEP to MS4 permits, along with BMPs as effluent limits to meet water quality standards where infeasible or insufficient information exists to develop WQBELs. Neither the LWA report, nor the Fresno and Caltrans comments, provide a definitive argument that storm water dischargers cannot achieve compliance with the proposed water quality criteria or that compliance would result in widespread economic impact or hardship. Although none of the three comment submissions discussed above provide the raw data used for their analyses for EPA to fully assess the validity of the analyses, their methodology does not assess compliance with WQBELs as would be developed by EPA. In particular, the assessments do not account for dilution or the partitioning of dissolved metals to suspended solids present in the receiving waters. LWA and Caltrans also do not apply the appropriate criteria in assessing compliance and use statistical projections to predict "worst case" discharge concentrations, an approach that would not be used to establish compliance with WQBELs or water quality criteria. In addition, LWA's estimated costs do not accurately portray the incremental expense to Sacramento County resulting from implementation of the CTR, that is, the costs attributable to the CTR criteria that are over and above the cost of implementing the current storm water program.

Comment ID: CTR-040-006
Comment Author: County of Sacramento Water Div
Document Type: Storm Water Auth.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: J Storm Water Economics
References: Letter CTR-040 incorporates by reference letter CTR-027
Attachments? Y
CROSS REFERENCES

Comment: MAJOR CONCERNS

We do, however, have fundamental concerns with the Rule as it is presently proposed and its supporting economic analysis. We believe the Rule can be modified in a manner that will be responsive to our concerns while at the same time being consistent with applicable Federal law and regulations. Our major concerns are presented here and are followed by our recommended modifications.

1. Concern: The Rule, as presently proposed, appears to require discharges from municipal stormwater programs to meet water quality based effluent limits (WQBELs).

* In order to achieve WQBELS, it will be necessary to intercept all of the urban runoff from the Sacramento metropolitan area (including that discharged to urban streams and the American River),

transport it to an area near the Sacramento River for equalizing storage and subsequent end-of-pipe treatment, and then discharge it to the Sacramento River (See Attachment A), The capital cost of this structural control program is estimated to be on the order of $2.5 billion. Amortizing that cost over a 20-year period, at 7% interest and including annual operation and maintenance costs, the total annual cost to bring Sacramento urban stormwater into compliance with the proposed criteria is on the order of $260 million per year.

* Even this enormously expensive end-of-pipe treatment will not guarantee achievement of the proposed criteria (e.g., PAH removals of 99% may not be achievable with the proposed end-of-pipe treatment which formed the basis of the cost estimate).

Further, as indicated in the attainability analysis provided in Attachment A, this $260 million per year program may not result in any net environmental benefits. Extensive ambient river monitoring over the past five years has shown that copper, lead, and zinc levels in the American and Sacramento Rivers generally comply with the proposed criteria and are not significantly impacted by stormwater discharges (PAH data are not available). On the other hand, the removal of stormwater discharges from the urban streams would likely have a negative environmental impact. It would lead to destruction of the aquatic and riparian habitat which currently exists. Thus, this $260 million per year program would not lead to any of the types of benefits that formed the basis of EPA's benefits analysis, including fishing use benefits, reduced cancer benefits, or passive benefits. In this case, the cost is $260 million per year and there may be no net environmental benefits. Therefore, pursuant to Presidential Executive Order 12866 and the Unfunded Mandates Reform Act, -EPA should consider alternative criteria for copper, lead, zinc and PAHs for those waters in the Sacramento area.

Response to: CTR-040-006

See response to CTR-040-004.

Comment ID: CTR-040-007
Comment Author: County of Sacramento Water Div
Document Type: Storm Water Auth.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: J Storm Water Economics
References: Letter CTR-040 incorporates by reference letter CTR-027
Attachments? Y
CROSS REFERENCES

Comment: MAJOR CONCERNS

We do, however, have fundamental concerns with the Rule as it is presently proposed and its supporting economic analysis. We believe the Rule can be modified in a manner that will be responsive to our concerns while at the same time being consistent with applicable Federal law and regulations. Our major concerns are presented here and are followed by our recommended modifications.

II. Concern: The economic analysis upon which the Rule is based is seriously flawed.

* Consideration of any costs to urban stormwater dischargers is not included in the analysis.

Response to: CTR-040-007

See response to CTR-013-003.

Comment ID: CTR-040-010a
Comment Author: County of Sacramento Water Div
Document Type: Storm Water Auth.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: J Storm Water Economics
References: Letter CTR-040 incorporates by reference letter CTR-027
Attachments? Y
CROSS REFERENCES R

Comment: MAJOR CONCERNS

We do, however, have fundamental concerns with the Rule as it is presently proposed and its supporting economic analysis. We believe the Rule can be modified in a manner that will be responsive to our concerns while at the same time being consistent with applicable Federal law and regulations. Our major concerns are presented here and are followed by our recommended modifications.

* The cities of Folsom and Galt, co-permittees in our stormwater program, both have populations less than 50,000. Their costs associated with complying with the effluent limitations proposed in the Rule would be significant (on the order of $10 million annually for each city). Therefore, the EPA Administrator's certification that the Rule would have no effect on small entities, pursuant to the requirements of the Regulatory Flexibility Act, is incorrect.

Response to: CTR-040-010a

See response to CTR-013-008b.

Comment ID: CTR-040-014b
Comment Author: County of Sacramento Water Div
Document Type: Storm Water Auth.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: J Storm Water Economics
References: Letter CTR-040 incorporates by reference letter CTR-027
Attachments? Y
CROSS REFERENCES I-02

Comment: RECOMMENDED MODIFICATIONS

To address our concerns, we recommend the following modifications which do not undermine the toxic pollutant control actions envisioned in EPA's economic analysis (e.g., BMPs for stormwater and source control). In fact, some of these recommendations would provide incentives for greater movement toward achieving the water quality criteria than would occur under the Rule as it is currently proposed.

I. Recommendation: Modify the Preamble statement that indicates municipal wet weather discharges must comply with water quality standards or WQBELs (Preamble pages 42186-42187).

* It is not a requirement of the CWA or EPA that wet weather discharges must meet water quality criteria. If it were, the adverse economic impact on municipal stormwater programs would be enormous. The CWA, at best, is ambiguous on this issue; EPA regulations do not address it; and the Elliott memorandum, which appears to be the primary basis for EPA's position on this issue, is not a legitimate basis for such a position. The Elliott memorandum is an internal EPA memorandum and; therefore, is not an independent interpretation of the CWA. The Elliott memorandum does not constitute EPA policy and is based upon a false premise and an inaccurate reading of the preamble to EPA's 1988 proposed stormwater regulations. The Elliot memorandum contains other erroneous conclusions that have never been applied to municipal stormwater permits (e.g., that municipal stormwater dischargers must comply with water quality standards within three years of permit issuance).

* EPA has routinely approved municipal stormwater NPDES permits that have not included requirements to comply with water quality standards (e.g., Tulsa, OK; Greesnboro, NC; Denver, CO; Portland, OR; Cedar/Green (Seattle), WA; Sarasota County, FL; and Phoenix, AZ).

* If EPA does not modify the Preamble statement to clarify that municipal stormwater dischargers are not required to comply with these water quality standards, then EPA must include the cost of the structural controls necessary for compliance in its economic analysis and, using these costs, address the requirements of Presidential Executive Order 12866, the Unfunded Mandates Reform Act, and the Regulatory Flexibility Act.

Response to: CTR-040-014b

EPA believes the applicability of water quality standards to storm water discharges is outside the scope of the rule. See response to CTR-001-003. With respect to the comment about potential costs to municipal storm water dischargers see responses to CTR-040-004 and CTR-021-006a.

Comment ID: CTR-047-003
Comment Author: City of Santa Fe Springs
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/24/97
Subject Matter Code: J Storm Water Economics
References: Letter CTR-047 incorporates by reference letters CTR-013 and CTR-027.
Attachments? N
CROSS REFERENCES

Comment: In addition, we would like to emphasize the following key issues on the California Toxic Rule (CTR), which are of major impact to our storm water program:

3. In its analysis, the USEPA appears to assume that a BMP program will lead to compliance and that there is no associated cost for a BMP Program (over and above what an MS4 has in place already). Studies conducted by the County of Sacramento and Fresno Metropolitan Flood Control District shows this to be incorrect, i.e., a BMP program cannot comply with the proposed criteria. Furthermore, these studies show that the cost for a BMP program is significant and would increase substantially if an MS4 was required to construct end-of-pipe treatment for compliance. The USEPA should not implement the proposed criteria to MS4 discharges until such time as an adequate economic analysis addressing the true impacts to MS4 dischargers is conducted and assessed.

Response to: CTR-047-003

See response to CTR-013-003.

Comment ID: CTR-047-004a
Comment Author: City of Santa Fe Springs
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/24/97
Subject Matter Code: J Storm Water Economics
References: Letter CTR-047 incorporates by reference letters CTR-013 and CTR-027.
Attachments? N
CROSS REFERENCES R

Comment: In addition, we would like to emphasize the following key issues on the California Toxic Rule (CTR), which are of major impact to our storm water program:

4. The proposed rule applies to all current and future MS4 dischargers, including small communities. The small communities will be significantly by the proposed rule. In California, there are many small communities that are currently co-permittee to MS4 permits. Many of the larger municipalities in California have conducted storm water discharge characterization studies. These studies have shown that there are common pollutants associated with storm-water discharges from urbanized areas that could result in compliance problems with the proposed criteria . Most small communities have not conducted discharge characterization studies; however, it is reasonable to assume that discharges from small communities would also contain these same pollutants. This would result in a smaller community being faced with the same compliance issues as large and medium municipalities; however, the cost to comply could be more significant and prohibitive for smaller communities.

The Regulatory Flexibility Act requires the USEPA to conduct an analysis on the economic impact the proposed rule may have on small entities, unless the USEPA certifies that the rule will not affect a significant number of small entities. In the preamble to the proposed rule, it indicates that there are no small entities to be impacted by the rule, and, therefore, the USEPA did not need to complete an analysis required under the Act. The USEPA neglected to address small MS4 communities in California that are currently subject to MS4 permits, and those smaller communities that may be impacted through Phase II. The USEPA should have conducted an analysis on the economic impacts to smaller communities.

Unless the preamble is modified to indicate that MS4s are not required to comply with water quality standards, the proposed rule should not be applied to smaller MS4 communities until the USEPA has complied with the requirements of the Regulatory Flexibility Act.

Response to: CTR-047-004a

See response to CTR-013-008b.

Comment ID: CTR-059-023b
Comment Author: Los Angeles County Sanit. Dist
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: J Storm Water Economics
References: Letter CTR-059 incorporates by reference letter CTR-035

Attachments? Y
CROSS REFERENCES E-01g08

Comment: Economic Analysis

The Sanitation Districts commends EPA for preparing an analysis of the economic impacts of the proposed CTR, and for selecting POTWs for half of the case studies. We believe that EPA is correct in thinking that POTWs are likely to experience major impacts as a result of the promulgation of the CTR. However, we believe that this analysis is based on improper assumptions and inaccurate cost estimates, resulting in unconvincing conclusions. Our own attainability and cost analysis indicates that there are indeed fundamental flaws in the cost analysis. A few of the areas of concern are listed below:

* The Economic Analysis ignores the costs that may be incurred by stormwater dischargers and nonpoint sources to reduce loadings so that CTR criteria may be met in ambient waters.

Response to: CTR-059-023b

See response to CTR-013-003.

Comment ID: CTR-061-002
Comment Author: G. Fred Lee & Associates
Document Type: Academia
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: J Storm Water Economics
References:
Attachments? Y
CROSS REFERENCES

Comment: By far, the greatest deficiency with the CTR is the US EPA's failure to include a properly conducted economic analysis associated with the application of these criteria into standards governing the regulation of urban area and highway stormwater runoff-associated constituents. The application of these criteria to this situation will result in significant unnecessary expenditures for chemical constituent control in an effort to try to achieve the criteria values when implemented as standards for receiving waters for urban area and highway stormwater runoff.

Response to: CTR-061-002

See response to CTR-013-003.

Comment ID: CTR-061-003
Comment Author: G. Fred Lee & Associates
Document Type: Academia
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: J Storm Water Economics
References:
Attachments? Y
CROSS REFERENCES

Comment: Overall Comments The California Toxics Rule (CTR), as proposed, is significantly deficient in providing an economic analysis that includes information on the cost, and an assessment of the water quality benefits, of ultimately having to meet state water quality standards based on CTR proposed criteria in the receiving waters for urban area and highway stormwater runoff. Without this information, the public, regulatory agencies and the regulated community cannot understand the significant technical deficiencies that exist in the US EPA CTR proposed rulemaking. The CTR should not be finalized until this information has been developed and provided to the public for review and comment. Urban stormwater discharge representative-speaker after speaker at the September 17, 1997 hearing on the proposed CTR was justifiably concerned about the confusing situation that exists today; they are being informed by the US EPA that NPDES-permitted urban stormwater runoff will be subject to meeting water quality standards (objectives) in the receiving waters for the stormwater runoff during the time of runoff and after through a process of ever-increasingly stringent and expensive BMPS.

As I testified at the September 17, 1997 hearing, it is well-understood in the stormwater runoff water quality management field that the US EPA "Gold Book" water quality criteria, including those being promulgated under the California Toxics Rule, are not designed to address short-term, episodic discharges of chemical constituents of the type that routinely occur in stormwater runoff from urban areas and highways. As a result, "administrative" exceedances of the proposed California Toxics Rule criteria can readily occur without any real impairment of the designated beneficial uses of the receiving waters for the stormwater runoff. By real impairment of aquatic life-related beneficial uses I mean alteration of the number, types and/or characteristics of desirable forms of aquatic life in the receiving waters for the runoff, that are of concern to the public who must ultimately pay for the control of chemical constituents in the stormwater runoff.

There has been a sufficient number of studies conducted on the characteristics of urban and highway

stormwater runoff to document that it will indeed be rare that the constituents present in urban stormwater runoff from residential and commercial areas are in toxic, available forms for a sufficient duration and magnitude in the receiving waters for the runoff to be adverse to aquatic life. As long as the US EPA persists with its improperly developed and adopted Independent Applicability Policy (by which chemical criteria/standards have to be met even if appropriately conducted studies show that the constituents of concern, such as heavy metals in urban stormwater runoff, are in non-toxic, unavailable forms) urban stormwater runoff water quality managers face ultimately having to spend large amounts of public funds to avoid "administrative" exceedances of inappropriate criteria/standards for urban stormwater runoff, with no expected improvement in the real beneficial uses of the waterbodies that are of concern to the public who must ultimately pay for the control programs.

Problems with "administrative" exceedances arise from what are well-known to be technically invalid and inappropriate approaches adopted by the US EPA in the 1980s for implementing the "Gold Book" criteria, that the Agency under various administrations has yet to address. These issues are discussed in the attached papers and in references provided therein. Even today, based on discussions at the US EPA's Multi-Regional Water Quality Criteria and Standards meeting that was held at the end of August 1997 in St. Louis, Missouri, the Agency is still unwilling to address in a meaningful way the problems in regulating urban stormwater runoff water quality. For the Agency to announce, as it did at that meeting, that wet-weather water quality management issues are no longer part of the ANPRM for water quality standards, represents a serious deficiency in the Agency's current policy that must be corrected if the public is to be protected from wasting large amounts of funds constructing structural BMPs to work toward achieving CTR-based water quality standards in the receiving/discharge waters for urban stormwater runoff.

As was pointed out by several speakers at the CTR hearing held on September 17, 1997, the US EPA Region 9 and US EPA headquarters made a significant error in developing the California Toxics Rule where those responsible chose to ignore the massive costs that regulated urban stormwater dischargers will ultimately have to bear as part of implementing the California Toxics Rule. I believe that if this matter were taken to the courts, the urban dischargers could force US EPA Region 9/Washington, D.C. to do a proper economic analysis of the cost of ultimately having to achieve water quality standards (objectives) based on CTR criteria. The fact that there is some ill-defined period of time during which the standards/criteria can be met through BMPS does not change the ultimate cost that will have to be borne by the public. It is my assessment that these costs will be on the order of at least $1 to $2 per person per day forever for the regulated communities.

Several of the urban stormwater dischargers who testified at the September 17, 1997 hearing reported that their preliminary cost estimates were even greater than those that I projected since not only would they have to construct and operate large treatment works to capture, store and treat urban stormwater runoff so that no more than one exceedance of a criterion/standard occurs every three years, but also they would have to acquire land near waterbodies where such treatment works could be developed. Representatives of Alameda County estimated that more than 50 facilities each the size of the Oakland Coliseum would have to be constructed to store the stormwater runoff from a two-inch, one-day storm. The construction of such facilities in near shore areas of Alameda County on San Francisco Bay might be justified if there were reason to believe that they would solve real, significant water quality use-impairments of San Francisco Bay occurring due to urban stormwater runoff-derived constituents that exceed proposed CTR criteria for protection of aquatic life. However, the fact is that after extensive study, none of the heavy metals in Bay Area urban stormwater discharges has been found to be in toxic, available forms that are causing real water quality use-impairments. Basically, the expenditures of dollars per person per day for the regulated community-dwellers that are now dictated by the Clean Water Act and the US EPA's Independent Applicability Policy arise from the US EPA's failing to address

the obvious, significant problems with the application of the "Gold Book" and now proposed CTR criteria to urban stormwater runoff-associated constituents.

I have found that the urban stormwater runoff water quality managers are not claiming that there are no water quality problems associated with their stormwater discharges. It appears that there may be real water quality problems in urban stormwater discharges due to chemicals such as the organophosphate pesticides (e.g., diazinon and chlorpyrifos) for which the US EPA has either failed to develop a criterion (diazinon) or has failed to implement an existing criterion (chlorpyrifos). I understand that finally, after years of delay during which it has been well-known by the US EPA that diazinon was causing widespread aquatic life toxicity, the Agency is now beginning again to formulate a water quality criterion for this chemical. Additional summary information on the organophosphate pesticide issue is presented in the attached paper, "Diazinon and Chlorpyrifos as Urban Stormwater Runoff Associated Pollutants," June (1997)

It is important to understand that the development of criteria for chemicals such as diazinon does not mean that those criteria will be properly implemented or enforced. The chlorpyrifos situation is an example; chlorpyrifos has been well-known to cause aquatic life toxicity in many communities' stormwater runoff, yet the Agency, including US EPA Region 9, has failed to admit publicly that there is a problem, much less act to control the toxicity problem. Under the current regulatory approach, stormwater dischargers could be required under CTR to spend massive amounts of public funds building "50 Oakland Coliseums" just to store stormwater runoff in Alameda County from a storm magnitude that occurs more frequently than once in three years because of administrative Exceedances of several CTR-regulated heavy metals in the stormwater runoff (which have been repeatedly found to be in non-toxic, unavailable forms, including the dissolved forms), while the treated stormwater discharge to San Francisco Bay could be highly toxic due to unregulated or inadequately regulated organophosphate pesticides. This is an artifact of the inappropriate approaches used by the Agency of focusing on chemicals rather than chemical impacts, i.e., on potential toxicants rather than toxicity. While this approach is bureaucratically simple to administer, it is technically invalid and can lead to a massive waste of public funds in implementing stormwater runoff water quality management programs.

Urban stormwater runoff water quality management is in chaos. This situation has been well-understood for at least five years. While attempts are being made to address these issues through the US EPA headquarters' various wet-weather committees, thus far the fundamental issue that was raised at the September 17, 1997 hearing by urban stormwater discharger after discharger, i.e., ultimately having to achieve water quality standards based on CTR criteria in the receiving waters for the discharge through ever-increasingly stringent BMPS, has not been adequately addressed. While the proposed CTR does not specify a time period over which the BMP ratcheting-down process will occur, there can be no doubt that time period will be set by the courts through litigation brought by environmental groups who will assert that an NPDES-permitted stormwater discharger is not making adequate progress toward achieving the ultimate goal of only one violation of a water quality standard every three years for regulated constituents. Because of the uncertainty of how the courts will handle this matter, stormwater dischargers could be faced with having to achieve water quality standards in the discharge waters within five to ten years. Clearly there is need now to understand the costs and true water quality benefits associated with achieving these standards as part of adopting the CTR as it is applied to regulating urban stormwater runoff water quality.

I have published extensively on these issues. Many of my papers and reports on this topic are available from my web site (http://members.aol.com/gfredlee/gfl.htm).

It is my recommendation that US EPA Region 9 and US EPA headquarters postpone any adoption of

the California Toxics Rule until the US EPA properly presents and discusses the potential costs and the potential water quality benefits in terms of real improvements in designated beneficial uses of receiving waters that will likely accrue as the result of regulated urban stormwater discharges' ultimately having to comply with water quality standards based on CTR criteria. The US EPA Region 9 should allow the stormwater dischargers the opportunity to provide information on the costs and benefits arising from applying these criteria to stormwater discharges as required by the Clean Water Act when it becomes clear that BMPS of the type that are readily available today will not eliminate the administrative Exceedances of water quality standards numerically equal to the aquatic life criteria set forth in the CTR. After allowing the urban stormwater dischargers to provide this information, the US EPA then should develop an economic analysis that reliably presents and discusses these issues. This CTR review process is the necessary first step to correcting the significant chaos that now exists in the urban stormwater runoff water quality management field.

Response to: CTR-061-003

See response to CTR-013-003 and CTR-040-004.

Comment ID: CTR-061-017
Comment Author: G. Fred Lee & Associates
Document Type: Academia
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: J Storm Water Economics
References:
Attachments? Y
CROSS REFERENCES

Comment: Page 42186, third column, last paragraph and page 42187, first column, first paragraph discuss the application to wet-weather loads. The proposed US EPA criteria will tend to significantly over-regulate wet-weather flows such as urban area and highway stormwater runoff. It is estimated that these costs are on the order of $1 to $2 per person per day. This issue is discussed in the attached papers and in other papers on my web site.

Response to: CTR-061-017

See response to CTR-013-003.

Comment ID: CTR-061-019
Comment Author: G. Fred Lee & Associates
Document Type: Academia
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: J Storm Water Economics
References:
Attachments? Y

CROSS REFERENCES

Comment: Comments on Economic Analysis of the Proposed Water Quality Toxics Rule

Page ES-2, second paragraph, "Scope of Economic Analysis," states, "In addition, EPA does not calculate costs for NPDES sources which are not typically subject to American WQBEL's including sources required to hold NPDES permits stormwater permit and other wet weather dischargers."

This is a significant deficiency in the cost analysis which makes the CTR largely unreliable. As long as NPDES stormwater dischargers are required to work toward the goal of achieving water quality standards in the receiving waters for stormwater runoff, the cost of achieving these standards must be included in evaluating the potential economic impacts of adopting these criteria. While most NPDES wastewater discharges meet or are close to meeting these criteria at the edge of a mixing zone for the discharge, NPDES-permitted stormwater dischargers in Phase I as well as the soon-to-be-released Phase 2 are not yet even beginning to effectively comply with the requirement of meeting water quality standards in the stormwater runoff during wet-weather runoff events. While it is unknown at this time what the situation will actually be in the future with respect to compliance with water quality standards for NPDES-regulated urban and highway stormwater runoff, until there is a clear, unequivocal policy adopted that exempts urban area and highway stormwater runoff from meeting these criteria, the costs of meeting such standards must be included in a proper evaluation of the cost of implementing these criteria.

Response to: CTR-061-019

See response to CTR-013-003.

Comment ID: CTR-062-003
Comment Author: City of Downey
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/24/97
Subject Matter Code: J Storm Water Economics
References: Letter CTR-062 incorporates by reference letters CTR-013 and CTR-027
Attachments? N
CROSS REFERENCES

Comment: In addition, we would like to emphasize the following key issues on the California Toxic Rule (CTR), which are of major impact to our stormwater program:

3. The economic analysis used by the U.S. EPA is flawed and inadequately addresses the impacts of the CTR on the stormwater-regulated community. The U.S. EPA's economic analysis focused entirely on the compliance cost of point sources, which included Public Owned Treatment Works (POTWs), industrial treatment facilities, and industrial users discharging to POTWs. A major omission in the U.S. EPA analysis is the cost for the stormwater program to comply with the proposed criteria.

In its analysis, the U.S. EPA appears to assume that a BMP program will lead to compliance and that there is no associated cost for a BMP program (over and above what an MS4 has in place already).

Studies conducted by the County of Sacramento and Fresno Metropolitan Flood Control District shows this to be incorrect, i.e., a BMP program cannot comply with the proposed criteria. Furthermore, these studies show that the cost for a BMP-program is significant and would increase substantially if an MS4 was required to construct end-of-pipe treatment for compliance. The U.S. EPA should not implement the proposed criteria to MS4 discharges until such time as an adequate economic analysis addressing the true impacts to MS4 dischargers in conducted and assessed.

Response to: CTR-062-003

See response to CTR-013-003.

Comment ID: CTR-062-004a
Comment Author: City of Downey
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/24/97
Subject Matter Code: J Storm Water Economics
References: Letter CTR-062 incorporates by reference letters CTR-013 and CTR-027
Attachments? N
CROSS REFERENCES R

Comment: In addition, we would like to emphasize the following key issues on the California Toxic Rule (CTR), which are of major impact to our stormwater program:

4. The proposed rule applies to all current and future MS4 discharges, including small communities. The small communities will be significantly impacted by the proposed rule. In California, there are many small communities that are currently co-permittees to MS4 permits. Many of the larger municipalities in California have conducted stormwater discharge characterization studies. These studies have shown that there are common pollutants associated with stormwater discharges from urbanized areas that could result in compliance problems with the proposed criteria. Most small communities have not conducted discharge characterization studies; however, it is reasonable to assume that discharges from small communities would also contain these same pollutants. This would result in a smaller community being faced with the same compliance issues as large and medium municipalities; however, the cost to comply could be more significant and prohibitive for smaller communities.

The Regulatory Flexibility Act requires the U.S. EPA to conduct an analysis on the economic impact the proposed rule may have on small entities, unless the U.S. EPA certifies that the rule will not affect a significant number of small entities. In the preamble to the proposed rule, it indicates that there are no small entities to be impacted by the rule, and, therefore, the U.S. EPA did not need to complete an analysis required under the Act. The U.S. EPA neglected to address small MS4 communities in California that are currently subject to MS4 permits, and those smaller communities that may be impacted through Phase II. The U.S. EPA should have conducted an analysis on the economic impacts to smaller communities.

Unless the preamble is modified to indicate that MS4s are not required to comply with water quality standards, the proposed rule should not be applied to smaller MS4 communities until the U.S. EPA has complied with the requirements of the Regulatory Flexibility Act.

Response to: CTR-062-004a

See response to CTR-013-008b.

Comment ID: CTR-071-003
Comment Author: City of Rosemead
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: J Storm Water Economics
References: Letter CTR-071 incorporates by reference letter CTR-013 and CTR-027
Attachments? N
CROSS REFERENCES

Comment: In addition, we would like to emphasize the following key issues on the California Toxic Rule (CTR), which are of major impact to our stormwater program.

3. The economic analysis used by the USEPA is flawed and inadequately addresses the impacts of the CTR on the stormwater-regulated community. The USEPA's economic analysis focused entirely on the compliance cost of point sources, which included Public Owned Treatment Works (POTWs), industrial treatment facilities, and industrial users discharging to POTWS. A major omission in the USEPA analysis is the cost for the stormwater program to comply with the proposed criteria.

In its analysis, the USEPA appears to assume that a BMP program will lead to compliance and that there is no associated cost for a BMP Program (over and above what an MS4 has in place already). Studies conducted by the County of Sacramento and Fresno Metropolitan, Flood Control District shows this to be incorrect, i.e., a BMP program cannot comply with the proposed criteria. Furthermore, these studies show that the cost for a BMP program is significant and would increase substantially if an MS4 was required to construct end-of-pipe treatment for compliance. The USEPA should not implement the proposed criteria to MS4 discharges until such time as an adequate economic analysis addressing the true impacts to MS4 dischargers is conducted and assessed.

Response to: CTR-071-003

See also response to CTR-013-003.

Comment ID: CTR-071-004a
Comment Author: City of Rosemead
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: J Storm Water Economics
References: Letter CTR-071 incorporates by reference letter CTR-013 and CTR-027
Attachments? N
CROSS REFERENCES R

Comment: In addition, we would like to emphasize the following key issues on the California Toxic Rule (CTR), which are of major impact to our stormwater program.

4. The proposed rule applies to all current and future MS4 dischargers, including small communities. The small communities will be significantly by the proposed rule. In California, there are many small communities that are currently co-permittees to MS4 permits. Many of the larger municipalities in California have conducted stormwater discharge characterization studies. These studies have shown that there are common pollutants associated with stormwater discharges from urbanized areas that could result in compliance problems with the proposed criteria. Most small communities have not conducted discharge characterization studies; however, it is reasonable to assume that discharges from small communities would also contain these same pollutants. This would result in a smaller community being faced with the same compliance issue as large and medium municipalities; however, the cost to comply could be more significant and prohibitive for small communities.

The Regulatory Flexibility Act requires the USEPA to conduct an analysis on the economic impact the proposed rule may have on small entities, unless the USEPA certifies that the rule will not affect a significant number of small entities. In the preamble to the proposed rule it indicates that there are no small entities to be impacted by the rule, and, therefore, the USEPA did not need to complete an analysis required under the Act. The USEPA neglected to address small MS4 communities in California that are currently subject to a MS4 permits, and those smaller communities that may be impacted through Phase II. The USEPA should have conducted an analysis of the economic impacts to smaller communities.

Unless the preamble is modified to indicate that MS4s are not required to comply with water quality standards, the proposed rule should not be applied to smaller MS4 communities until the USEPA has complied with the requirements of the Regulatory Flexibility Act.

Response to: CTR-071-004a

See response to CTR-013-008b.

Comment ID: CTR-072-003
Comment Author: City of Bell Gardens
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: J Storm Water Economics
References: Letter CTR-072 incorporates by reference letters CTR-013 and CTR-027
Attachments? N
CROSS REFERENCES

Comment: In addition, we would like to emphasize the following key issues on the California Toxic Rule (CTR), which are of major impact to our stormwater program.

3. The economic analysis used by the USEPA is flawed and inadequately addresses the impacts of the CTR on the stormwater-regulated community. The USEPA's economic analysis focused entirely on the compliance cost of point sources, which included Public Owned Treatment Works (POTWs), industrial

treatment facilities, and industrial users discharging to POTWS. A major omission in the USEPA analysis is the cost for the stormwater program to comply with the proposed criteria.

In its analysis, the USEPA appears to assume that a BMP program will lead to compliance and that there is no associated cost for a BMP Program (over and above what an MS4 has in place already). Studies conducted by the County of Sacramento and Fresno Metropolitan Flood Control District shows this to be incorrect, i.e., a BMP program cannot comply with the proposed criteria. Furthermore, these studies show that the cost for a BMP program is significant and would increase substantially if an MS4 was required to construct end-of-pipe treatment for compliance. The USEPA should not implement the proposed criteria to MS4 discharges until such time as an adequate economic analysis addressing the true impacts to MS4 dischargers is conducted and assessed.

Response to: CTR-072-003

See response to CTR-013-003.

Comment ID: CTR-072-004a
Comment Author: City of Bell Gardens
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: J Storm Water Economics
References: Letter CTR-072 incorporates by reference letters CTR-013 and CTR-027
Attachments? N
CROSS REFERENCES R

Comment: In addition, we would like to emphasize the following key issues on the California Toxic Rule (CTR), which are of major impact to our stormwater program.

4. The proposed rule applies to all current and future MS4 dischargers, including small communities. The small communities will be significantly by the proposed rule. In California, there are many small communities that are currently co-permittees to MS4 permits, Many of the larger municipalities in California have conducted stormwater discharge characterization studies. These studies have shown that there are common pollutants associated with stormwater discharges from urbanized areas that could result in compliance problems with the proposed criteria. Most small communities have not conducted discharge characterization studies; however, it is reasonable to assume that discharges from small communities would also contain these same pollutants. This would result in a smaller community being faced with the same compliance issue as large and medium municipalities; however, the cost to comply could be more significant and prohibitive for small communities.

The Regulatory Flexibility Act requires the USEPA to conduct an analysis on the economic impact the proposed rule may have on small entities, unless the USEPA certifies that the rule will not affect a significant number of small entities. In the preamble to the proposed rule it indicates that there are no small entities to be impacted by the rule, and, therefore, the USEPA did not need to complete an analysis required under the Act. The USEPA neglected to address small MS4 communities in California that are currently subject to a MS4 permits, and those smaller communities that may be impacted through Phase II. The USEPA should have conducted an analysis of the economic impacts to smaller communities.

Unless the preamble is modified to indicate that MS4s are not required to comply with water quality standards, the proposed rule should not be applied to smaller MS4 communities until the USEPA has complied with the requirements of the Regulatory Flexibility Act.

Response to: CTR-072-004a

See response to CTR-013-008b.

Comment ID: CTR-073-003
Comment Author: City of Paramount
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: J Storm Water Economics
References: Letter CTR-073 incorporates by reference letters CTR-013 and CTR-027
Attachments? N
CROSS REFERENCES

Comment: In addition, we would like to emphasize the following key issues on the California Toxic Rule (CTR), which are of major impact to our stormwater program.

3. The economic analysis used by the USEPA is flawed and inadequately addresses the impacts of the CTR on the stormwater-regulated community. The USEPA's economic analysis focused entirely on the compliance cost of point sources, which included Public Owned Treatment Works (POTWs), industrial treatment facilities, and industrial users discharging to POTWS. A major omission in the USEPA analysis is the cost for the stormwater program to comply with the proposed criteria.

In its analysis, the USEPA appears to assume that a BMP program will lead to compliance and that there is no associated cost for a BMP Program (over and above what an MS4 has in place already). Studies conducted by the County of Sacramento and Fresno Metropolitan Flood Control District shows this to be incorrect, i.e., a BMP program cannot comply with the proposed criteria. Furthermore, these studies show that the cost for a BMP program is significant and would increase substantially if an MS4 was required to construct end-of-pipe treatment for compliance. The USEPA should not implement the proposed criteria to MS4 discharges until such time as an adequate economic analysis addressing the true impacts to MS4 dischargers is conducted and assessed.

Response to: CTR-073-003

See response to CTR-013-003.

Comment ID: CTR-073-004a
Comment Author: City of Paramount
Document Type: Local Government
State of Origin: CA
Represented Org:

Document Date: 09/25/97
Subject Matter Code: J Storm Water Economics
References: Letter CTR-073 incorporates by reference letters CTR-013 and CTR-027
Attachments? N
CROSS REFERENCES R

Comment: In addition, we would like to emphasize the following key issues on the California Toxic Rule (CTR), which are of major impact to our stormwater program.

4. The proposed rule applies to all current and future MS4 dischargers, including small communities. The small communities will be significantly by the proposed rule. In California, there are many small communities that are currently co-permittees to MS4 permits, Many of the larger municipalities in California have conducted stormwater discharge characterization studies. These studies have shown that there are common pollutants associated with stormwater discharges from urbanized areas that could result in compliance problems with the proposed criteria. Most small communities have not conducted discharge characterization studies; however, it is reasonable to assume that discharges from small communities would also contain these same pollutants. This would result in a smaller community being faced with the same compliance issue as large and medium municipalities; however, the cost to comply could be more significant and prohibitive for small communities.

The Regulatory Flexibility Act requires the USEPA to conduct an analysis on the economic impact the proposed rule may have on small entities, unless the USEPA certifies that the rule will not affect a significant number of small entities. In the preamble to the proposed rule it indicates that there are no small entities to be impacted by the rule, and, therefore, the USEPA did not need to complete an analysis required under the Act. The USEPA neglected to address small MS4 communities in California that are currently subject to a MS4 permits, and those smaller communities that may be impacted through Phase II. The USEPA should have conducted an analysis of the economic impacts to smaller communities.

Unless the preamble is modified to indicate that MS4s are not required to comply with water quality standards, the proposed rule should not be applied to smaller MS4 communities until the USEPA has complied with the requirements of the Regulatory Flexibility Act.

Response to: CTR-073-004a

See response to CTR-013-008b.

Comment ID: CTR-074-003
Comment Author: City of San Gabriel
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: J Storm Water Economics
References: Letter CTR-074 incorporates by reference letters CTR-013 and CTR-027
Attachments? N
CROSS REFERENCES

Comment: In addition, we would like to emphasize the following key issues on the California Toxic Rule (CTR), which are of major impact to our stormwater program:

3. The economic analysis used by the USEPA is flawed and inadequately addresses the impacts of the CTR on the stormwater-regulated community. The USEPA's economic analysis focused entirely on the compliance cost of point sources, which included Public Owned Treatment Works (POTWs), industrial treatment facilities, and industrial users discharging to POTWS. A major omission in the USEPA analysis is the cost for the stormwater program to comply with the proposed criteria.

In its analysis, the USEPA appears to assume that a BMP program will lead to compliance and that there is no associated cost for a BMP Program (over and above what an MS4 has in place already). Studies conducted by the County of Sacramento and Fresno Metropolitan Flood Control District shows this to be incorrect, i.e., a BMP program cannot comply with the proposed criteria. Furthermore, these studies show that the cost for a BMP program is significant and would increase substantially if an MS4 was required to construct end-of-pipe treatment for compliance. The USEPA should not implement the proposed criteria to MS4 discharges until such time as an adequate economic analysis addressing the true impacts to MS4 dischargers is conducted and assessed.

Response to: CTR-074-003

See response to CTR-013-003.

Comment ID: CTR-074-004a
Comment Author: City of San Gabriel
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: J Storm Water Economics
References: Letter CTR-074 incorporates by reference letters CTR-013 and CTR-027
Attachments? N
CROSS REFERENCES R

Comment: In addition, we would like to emphasize the following key issues on the California Toxic Rule (CTR), which are of major impact to our stormwater program:

4. The proposed rule applies to all current and future MS4 dischargers, including small communities. The small communities will be significantly by the proposed rule. In California, there are many small communities that are currently co-permittees to MS4 permits. Many of the larger municipalities in California have conducted stormwater discharge characterization studies. These studies have shown that there are common pollutants associated with stormwater discharges from urbanized areas that could result in compliance problems with the proposed criteria. Most small communities have not conducted discharge characterization studies; however, it is reasonable to assume that discharges from small communities would also contain these same pollutants. This would result in a smaller community being faced with the same compliance issues as large and medium municipalities; however, the cost to comply could be more significant and prohibitive for smaller communities.

The Regulatory Flexibility Act requires the USEPA to conduct an analysis on the economic impact the

proposed rule may have on small entities, unless the USEPA certifies that the rule will not affect a significant number of small entities. In the preamble to the proposed rule, it indicated that there are no small entities to be impacted by the rule, and, therefore, the USEPA did not need to complete an analysis required under the Act. The USEPA neglected to address small MS4 communities in California that are currently subject to a MS4 permits, and those smaller communities that may be impacted through Phase II. The USEPA should have conducted an analysis on the economic impacts to smaller communities.

Unless the preamble is modified to indicate that MS4s are not required to comply with water quality standards, the proposed rule should not be applied to smaller MS4 communities until the USEPA has complied with the requirements of the Regulatory Flexibility Act.

Response to: CTR-074-004a

See response to CTR-013-008b.

Comment ID: CTR-075-003
Comment Author: City of El Monte
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/24/97
Subject Matter Code: J Storm Water Economics
References: Letter CTR-075 incorporates by reference letters CTR-013 and CTR-027
Attachments? N
CROSS REFERENCES

Comment: In addition, we would like to emphasize the following key issues on the California Toxic Rule (CTR), which are of major impact to our stormwater program;

3. The economic analysis used by The USEPA is flawed and inadequately addresses the impacts of the CTR on the stormwater-related community. The USEPA's economic analysis focused entirely on the compliance cost of point sources, which included Public Owned Treatment Works(POTWs), industrial treatment facilities, and industrial users discharging to POTWS. A major omission in the USEPA analysis is the cost for the stormwater program to comply with the proposed criteria.

In its analysis, the USEPA appears to assume that a BMP program will lead to compliance and that there is no associated cost for a BMP Program (over and above what an MS4 has in place already). Studies conducted by the County of Sacramento and Fresno Metropolitan Flood Control district shows this to be incorrect, i.e., a BMP program cannot comply with the proposed criteria. Furthermore, these studies show that the cost for a BMP program is significant and would increase substantially if an MS4 was required to construct end-of-pipe treatment for compliance. The USEPA should not implement the proposed criteria to MS4 discharges until such time as an adequate economic analysis addressing the true impacts to M84 dischargers is conducted and assessed.

Response to: CTR-075-003

See response to CTR-013-003.

Comment ID: CTR-075-004a
Comment Author: City of El Monte
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/24/97
Subject Matter Code: J Storm Water Economics
References: Letter CTR-075 incorporates by reference letters CTR-013 and CTR-027
Attachments? N
CROSS REFERENCES R

Comment: In addition, we would like to emphasize the following key issues on the California Toxic Rule (CTR), which are of major impact to our stormwater program;

4. The proposed rule applies to all current and future MS4 dischargers, including small communities. The small communities will be significantly affected by the proposed rule. In California, there are many small communities that are currently co-permittees to MS4 permits. Many of the larger municipalities in California have conducted stormwater discharge characterization studies. These studies have shown that there are common pollutants associated with stormwater discharges from urbanized areas that could result in compliance problems with the proposed criteria. Most small communities have not conducted discharge characterization studies; however, it is reasonable to assume that discharges from small communities would also contain these same pollutants. This would result in a smaller community being faced with the same compliance issues as large and medium municipalities; however, the cost to comply could be more significant and prohibitive for smaller communities.

The Regulatory Flexibility Act requires the USEPA to conduct an analysis on the economic impact the proposed rule may have on small entities, unless the USEPA certifies that the rule will not affect a significant number of small entities. In the preamble to the proposed rule:, it indicates that there are no small entities to be impacted by the rule, and, therefore, the USEPA did not need to complete an analysis required under the Act. The USEPA neglected to address small MS4 communities in California that are currently subject to a MS4 permits, and those smaller communities that may be impacted through Phase II. The USEPA should have conducted an analysis on the economic impacts to smaller communities.

Unless the preamble is modified to indicate that MS4s are not required to comply with water quality standards, the proposed rule should not be applied to smaller MS4 communities until the USEPA has complied with the requirements of the Regulatory Flexibility Act.

Response to: CTR-075-004a

See response to CTR-013-008b.

Comment ID: CTR-076-003
Comment Author: City of Cudahy
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/25/97

Subject Matter Code: J Storm Water Economics
References: Letter CTR-076 incorporates by reference letters CTR-013 and CTR-027
Attachments? N
CROSS REFERENCES

Comment: In addition, we would like to emphasize the following key issues on the California Toxic Rule (CTR), which are of major impact to our stormwater program:

3. The economic analysis used by The USEPA is flawed and inadequately addresses the impacts of the CTR on the stormwater-regulated community. The USEPA's economic analysis focused entirely on the compliance cost of point sources, which included Public Owned Treatment Works (POTWs), industrial treatment facilities, and industrial users discharging to POTWs. A major omission in the USEPA analysis is the cost for the stormwater program to comply with the proposed criteria.

In its analysis, the USEPA appears to assume that a BMP program will lead to compliance and that there is no associated cost for a BMP Program (over and above what an MS4 has in place already). Studies conducted by the County of Sacramento and Fresno Metropolitan Flood Control district shows this to be incorrect, i.e., a BMP program cannot comply with the proposed criteria. Furthermore, these studies show that the cost for a BMP program is significant and would increase substantially if an MS4 was required to construct end-of-pipe treatment for compliance. The USEPA should not implement the proposed criteria to MS4 discharges until such time as an adequate economic analysis addressing the true impacts to MS4 dischargers is conducted and assessed.

Response to: CTR-076-003

See response to CTR-013-003.

Comment ID: CTR-076-004a
Comment Author: City of Cudahy
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: J Storm Water Economics
References: Letter CTR-076 incorporates by reference letters CTR-013 and CTR-027
Attachments? N
CROSS REFERENCES R

Comment: In addition, we would like to emphasize the following key issues on the California Toxic Rule (CTR), which are of major impact to our stormwater program:

4. The proposed rule applies to all current and future MS4 dischargers, including small communities. The small communities will be significantly by the proposed rule. In California, there are many small communities that are currently co-permittees to MS4 permits. Many of the larger municipalities in California have conducted stormwater discharge characterization studies. These studies have shown that there are common pollutants associated with stormwater discharge from urbanized areas that could result in compliance problems with the proposed criteria. Most small communities have not conducted discharge characterization studies; however, it is reasonable to assume that discharges from small

communities would also contain these same pollutants. This would result in a smaller community being faced with the same compliance issues as large and medium municipalities; however, the cost to comply could be more significant and prohibitive for smaller communities.

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Unless the preamble is modified to indicate that MS4s are not required to comply with water quality standards, the proposed rule should not be applied to smaller MS4 communities until the USEPA has complied with the requirements of the Regulatory Flexibility Act.

Response to: CTR-076-004a

See response to CTR-013-008b.

Comment ID: CTR-078-003
Comment Author: City of Maywood
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: J Storm Water Economics
References: Letter CTR-078 incorporates by reference letter CTR-013
Attachments? N
CROSS REFERENCES

Comment: In addition, we would like to emphasize the following key issues on the California Toxic Rule (CTR), which are of major impact to our stormwater program:

3. The economic analysis used by The USEPA is flawed and inadequately addresses the impacts of the CTR on the stormwater-regulated community. The USEPA's economic analysis focused entirely on the compliance cost of point sources, which included Public Owned Treatment Works (POTWs), industrial treatment facilities, and industrial users discharging to POTWs. A major omission in USEPA analysis is the cost for the stormwater program to comply with the proposed

In its analysis, the USEPA appears to assume that a BMP program will lead to compliance and that there is no associated cost for a BMP Program (over and above what an MS4 has in place already). Studies conducted by the County of Sacramento and Fresno Metropolitan Flood Control district shows this to be incorrect, i.e., a BMP program cannot comply with the proposed criteria. Furthermore, these studies show that the cost for a BMP program is significant and would increase substantially if an MS4 was required to construct end-of-pipe treatment for compliance. The USEPA should not implement the proposed criteria to MS4 discharges until such time as an adequate economic analysis addressing the true impacts to MS4 dischargers is conducted and assessed.

Response to: CTR-078-003

See response to CTR-013-003.

Comment ID: CTR-078-004a
Comment Author: City of Maywood
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: J Storm Water Economics
References: Letter CTR-078 incorporates by reference letter CTR-013
Attachments? N
CROSS REFERENCES R

Comment: In addition, we would like to emphasize the following key issues on the California Toxic Rule (CTR), which are of major impact to our stormwater program:

4. The proposed rule applies to all current and future MS4 dischargers, including small communities. The small communities will be significantly by the proposed rule. In California, there are many small communities that are currently co-permittees to MS4 permits. Many of the larger municipalities in California have conducted stormwater discharge characterization studies. These studied have shown that there are common pollutants associated with stormwater discharges from urbanized areas that could result in compliance problems with the proposed criteria. Most small communities have not conducted discharge characterization studies; however, it is reasonable to assume that discharges from small communities would also contain these same pollutants. This would result in a smaller community being faced with the same compliance issues as large and medium municipalities; however, the cost to comply could be more significant and prohibitive for smaller communities.

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Unless the preamble is modified to indicate that MS4s are not required to comply with water quality standards, the proposed rule should not be applied to smaller MS4 communities until the USEPA has complied with the requirements of the Regulatory Flexibility Act.

Response to: CTR-078-004a

See response to CTR-013-008b.

Comment ID: CTR-079-003
Comment Author: City of Glendale

Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/24/97
Subject Matter Code: J Storm Water Economics
References: Letter CTR-079 incorporates by reference letters CTR-013 and CTR-027
Attachments? N
CROSS REFERENCES

Comment: In addition, we would like to emphasize the following key issues on the California Toxic Rule (CTR), which are of major impact to our stormwater program:

3. The economic analysis used by the USEPA is flawed and inadequately addresses the impacts of the CTR on the stormwater regulated community. The USEPA's economic analysis focused entirely on the compliance cost of point sources, which included Public Owned Treatment Works (POTWs), industrial treatment facilities, and industrial users discharging to POTWs. A major omission in the USEPA analysis is the cost for the stormwater program to comply with the proposed criteria.

In its analysis the USEPA appears to assume that a BMP program will lead to compliance and that there is no associated cost for a BMP Program over and above what an MS4 has in place already). Studies conducted by the County of Sacramento and Fresno Metropolitan Flood Control district shows this to be incorrect, i.e., a BMP program cannot comply with the proposed criteria. Furthermore, these studies show that the cost for a BMP program is significant and would increase substantially if an MS4 was required to construct end-of-pipe treatment for compliance. The USEPA should not implement the proposed criteria to MS4 discharges until such time as an adequate economic analysis addressing the true impacts to MS4 dischargers is conducted and assessed.

Response to: CTR-079-003

See response to CTR-013-003.

Comment ID: CTR-079-004a
Comment Author: City of Glendale
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/24/97
Subject Matter Code: J Storm Water Economics
References: Letter CTR-079 incorporates by reference letters CTR-013 and CTR-027
Attachments? N
CROSS REFERENCES R

Comment: In addition, we would like to emphasize the following key issues on the California Toxic Rule (CTR), which are of major impact to our stormwater program:

4. The proposed rule applies to all current and future MS4 dischargers, including small communities. The small communities will be significantly by the proposed rule. In California, there are many small communities that are currently co-permittees to MS4 permits. Many of the larger municipalities in

California have conducted stormwater discharge characterization studies. These studies have shown that there are common pollutants associated with stormwater discharges from urbanized areas that could result in compliance problems with the proposed criteria. Most small communities have not conducted discharge characterization studies; however, it is reasonable to assume that discharges from small communities would also contain these same pollutants. This would result in a smaller community being faced with the same compliance issues as large and medium municipalities; however, the cost to comply could be more significant and prohibitive for smaller communities.

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Unless the preamble is modified to indicate that MS4s are not required to comply with water quality standards, the proposed rule should not be applied to smaller MS4 communities until the USEPA has complied with the requirements of the Regulatory Flexibility Act.

Response to: CTR-079-004a

See response to CTR-013-008b.

Comment ID: CTR-080-001
Comment Author: City of Los Angeles
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: J Storm Water Economics
References: Letter CTR-080 incorporates by reference letters CTR-013 and CTR-027
Attachments? N
CROSS REFERENCES

Comment: The City of Los Angeles is hereby transmitting its comments regarding the proposed California Toxics Rule (CTR). I would like to begin by stating that the City currently spends an average of $28 million annually on its Stormwater Management Program. The majority of Program activities are guided by the Los Angeles County Municipal Stormwater Permit, which dictates the use of Best Management Practices to control pollutants to the maximum extent practicable. We are primarily concerned with how the CTR may impact the Stormwater Management Program.

* The City recommends that a parallel economic analysis be conducted to address the impacts of the CTR on the stormwater-regulated community.

Response to: CTR-080-001

See response to CTR-013-003.

Comment ID: CTRE-002-003
Comment Author: G. Fred Lee & Associates
Document Type: Academia
State of Origin: CA
Represented Org:
Document Date: 09/18/97
Subject Matter Code: J Storm Water Economics
References:
Attachments? N
CROSS REFERENCES

Comment: As was pointed out by several speakers at the hearing yesterday, US EPA Region 9 and US EPA headquarters made a significant error in developing the California Toxics Rule where they chose to ignore the massive costs that regulated urban stormwater dischargers will ultimately have to bear as part of implementing the California Toxics Rule. From my perspective, and I do not speak for any discharger, I believe that if this matter were taken to the courts, the urban dischargers could force US EPA Region 9/Washington, D.C. to do a proper economic analysis of the cost of ultimately having to achieve water quality standards (objectives) based on CTR criteria. The fact that there is some ill-defined period of time during which the standards/criteria can be met through BMPs does not change the ultimate cost that will have to become by the public. It is my assessment that these costs will be on the order of at least $1 to $2 per person per day forever for the regulated communities.

Several of the urban stormwater dischargers who testified at yesterday's hearing reported that their preliminary cost estimates were even greater than those that I projected since not only would they have to construct and operate large treatment works to capture, store and treat urban stormwater runoff so that no more than one exceedance of a criterion/standard occurs every three years, but also they would have to acquire land near waterbodies where such treatment works could be developed. As you heard, Alameda County estimated that over 50 facilities the size of the Oakland Coliseum would have to be constructed to store the stormwater runoff from a two-inch, one-day storm. While the construction of such facilities in near shore areas of Alameda County on San Francisco Bay might be justified if there was reason to believe that they would solve real, significant water quality use impairments of San Francisco Bay that are occurring due to urban stormwater runoff-derived constituents that exceed proposed CTR criteria for protection of aquatic life, the facts are that after extensive study, none of the heavy metals in Bay Area urban stormwater discharges had been found to be in toxic, available form. Basically, the expenditures of dollars per -person per day for the regulated community dwellers that are now dictated by the Clean Water Act and the US EPA's Independent Applicability Policy arise from the US EPA failing to address the obvious, significant problems with the application of the "Gold Book" and now proposed CTR criteria to urban stormwater runoff-associated constituents.

Response to: CTRE-002-003

EPA did not include benefits or costs of controlling nonpoint sources or storm water dischargers in its estimates of benefits and costs of the CTR. EPA believes that the final rule will not have a direct effect on sources not permitted under the NPDES program (e.g., nonpoint sources) or NPDES sources not typically subject to numeric water quality-based effluent limits (e.g., wet weather discharges). Any potential indirect effect on nonpoint sources and wet weather discharges, such as runoff from farms, urban areas, and abandoned mines, and contaminated sediment, is unknown at this time. Many of the programs developed to control nonpoint sources and wet weather discharges are already in place. Costs

due to these programs have already been incurred or will soon be incurred owing to existing federal, State, and local environmental programs.

EPA also acknowledges that nonpoint sources and wet weather discharges are technically difficult to model and evaluate costs because they are intermittent and highly variable. Nonpoint source and wet weather discharges also occur under different hydrologic or climatic conditions than continuous discharges from industrial and municipal facilities, which are evaluated under critical low flow or drought conditions. Thus, evaluating agricultural nonpoint source discharges and storm water discharges and their effects on the environment is highly site-specific and data intensive.

See also response to CTR-040-004.

Comment ID: CTRH-001-001b
Comment Author: Robert Hale
Document Type: Public Hearing
State of Origin: CA
Represented Org: CA Stormwater Task Force
Document Date: 09/17/97
Subject Matter Code: J Storm Water Economics
References:
Attachments? N
CROSS REFERENCES I-1

Comment: MR. HALE: Good afternoon. My name is Robert Hale and I'm the chairman of the California Stormwater Quality Task Force which is located at 951 Turner Court, Suite 300, in Hayward.

This task force is a statewide organization representing municipal separate storm sewer systems that hold National Pollutant Discharge Elimination System, NPDES, permits to discharge stormwater.

My comments today are on behalf of the -- principally on behalf of that task force. I also am chairman of the management committee of the Alameda Countywide Clean Water Program. I will make some comments with respect to Alameda County.

As proposed by EPA, the preamble language, which is the principal point here in referring to numeric effluent limitations and water quality based effluent limitations, is clearly inconsistent with the plain language used by Congress in incorporating the maximum extent practicable standard into Section 402(p)(3)(B) of the Clean Water Act.

You may argue that this reference is only in the preamble and not in the main text of the rule; but it's my understanding, however, that the preamble itself is supposed to explain and clarify the meaning of the rule and the Clean Water Act. This proposed language would instead appear to be trying to change one of the fundamental points of the Clean Water Act.

The reason I think this point is fundamental is that the cost to society, and to our county in this case and to the states, is an important consideration. Congress considers the entirety of the tasks that the country has to do, rather than going for broke on one issue such as stormwater quality.

In short, the Congress balances the larger picture, and the language in Section 402(p)(3)(B) actually

reflects that balance. I believe that Section 402(p) says what it says for a good reason. The only economically feasible means of achieving water quality standards is through best management practices.

To illustrate this point, I work in Alameda County as chairman of the Clean Water Program there, and I did some rough calculations here. We often get storms as much as 2 inches in a 24-hour period. That's several times a winter. If you had a one-day storm, as I figure it, that will work out to 5 billion gallons of runoff water.

To treat this much water, if we were driven to this sort of the extreme case by the language in the preamble -- and I'm not talking about the text of the rule so much as the language in that preamble -- if it were to drive us in this extreme case to have -- to do end-of-pipe treatment for our discharges in order to meet the standards that are there, and to keep up -- basically keep up with the storms, which often come one behind the other within a couple days, it would necessitate building dozens, perhaps more, treatment plants of substantial size and would necessitate the use or acquisition of valuable industrial properties on the margins of the bay. Which I just did a little separate figuring here; I'm figuring it costs about $3 a gallon to treat -- to secondarily treat sanitary sewage and about $4 a gallon to store it.

I estimate that a storm of this size -- to be able to handle a storm of this size would cost between 35 and $50 billion for Alameda County alone. This is for a population of l.35 million residents.

And this does not account for the acquisition of property needed to do this, assuming we could store it in facilities or properties we already own. And it also does not account for the secondary treatment. In fact, we might have some difficulty achieving the standards that are in the rule.

And there's a way you can express this getting down to the nuts and bolts of it, which I like to do. I did some rough estimates of the size of the Oakland Coliseum, and if you were to use structures the size of the Oakland Coliseum for storing this water from one of these storms, I figured it would come out to -- you'd need 50 of them to store the runoff from this one storm that I've got here.

And I know some of you might be thinking about how the A's are doing right now and this might not be a bad idea. We can, say, think about leaving an extra one there for the A's and Raiders and build 50 more of them.

But the point is, we're talking about a tremendous investment in the infrastructure here, and it's very difficult for us to keep up with.

So let's see. Just a few more points here.

So we're not really talking about upgrades to existing delivery and treatment systems. We would have to start from scratch and build pumping systems, conveyance systems, to build an entire infrastructure. The cost would be prohibitive for us in Alameda County. This is a -- sort of one of the worst-case scenarios. And I think that the economic rule -- or the economic analysis in the rule doesn't do this justice.

So --

MR. MORRIS: Have you done any modelling?

MR. HALE: This is strictly back-of-the-envelope type calculations at this point. I don't know whether or not -- what discharges the storm concentrations would result in.

The first question I have on modeling is to see what these discharges of stormwater with these effluent concentrations -- under the storm conditions if we would be -- would have a higher flow than the drought flow condition which was modeled.

When you have a storm event, the stream conditions are different, the hydrology is different, the modeling characteristics. We could work out the scenario. And it's true that when you've got a huge storm, water fires right out the bay and out the Golden Gate. We might even probably need to talk about that and work on that.

Response to: CTRH-001-001b

EPA disagrees with the comments. See response to CTR-001-003. For a discussion of EPA's evaluation of studies concerning costs associated with achieving water quality criteria for storm water discharges, see responses to Comments CTR-013-003 and CTR-040-004. For a discussion of the scientific validity of CTR criteria, See response to CTR-031-004c.

EPA disagrees with the cost estimates provided by the commenter as EPA does not believe that storage and treatment of stormwater would be required to ensure compliance with the CTR. See response to CTR-021-006b.

Comment ID: CTRH-001-029
Comment Author: Michelle Pla
Document Type: Public Hearing
State of Origin: CA
Represented Org: S.F. Public Utilities Com
Document Date: 09/17/97
Subject Matter Code: J Storm Water Economics
References:
Attachments? N
CROSS REFERENCES

Comment: We're going to submit more responses in written comments having to do with other issues such as wet weather. I would really encourage you to listen carefully to those who have experience in building wet weather facilities.

We know it costs $4 a gallon for storage. We know the latest cost of building treatment facilities is about $3 a gallon, so those are real numbers. And so I think you do need to pay attention to the wet weather issue as well.

Response to: CTRH-001-029

See response to CTR-021-006b and CTR-001-007.

Comment ID: CTRH-001-033
Comment Author: Dave Brent
Document Type: Public Hearing
State of Origin: CA

Represented Org: CA Water Qual. Task Force
Document Date: 09/17/97
Subject Matter Code: J Storm Water Economics
References:
Attachments? N
CROSS REFERENCES

Comment: Second, we are concerned that the compliance cost for the stormwater programs to meet the objectives of the proposed rule will be significant. Already the city spends about $1.2 million to implement a program that services 400,000 people.

Unfortunately, even with the proactive stormwater programs implemented in the State of California, BMP programs will probably fall short of the water quality standard for several of the constituents included in the rule. And in cases where objectives are achieved, it will take several years.

As my counterpart and co-permittee from Sacramento County, Kathy Russick will describe, the City of Sacramento has estimated cost for compliance based on five of the constituents in the CTR: copper -- dissolved copper, dissolved lead and dissolved zinc, pentachlorophenol and PAHs.

These costs -- this study indicates that the costs will be very extreme to even come close to meeting those objectives and the objectives -- and this is from six years of monitoring data and six years of a proactive BMP program, so we are basing this on fact. And again, Kathy will elaborate on this in her discussion.

And also the analysis -- economic analysis focuses only on POTW discharges, not industrial discharges. Again, with the costs we're seeing for stormwater compliance, we feel that the analysis falls short and that EPA should revisit the economic analysis and include not only the cost for municipal stormwater programs to comply, but also the cost for the industrial stormwater programs.

Response to: CTRH-001-033

The commenter claims that BMP programs will fall short of the water quality standards for several pollutants included in the CTR. EPA disagrees with the commenter and believes that BMP programs, when properly implemented, will be sufficient to ensure compliance with CTR-based standards.

See also the response to CTR-021-006b, CTR-001-007, and the preamble to the final rule.

Comment ID: CTRH-001-054
Comment Author: Michael Lozeau
Document Type: Public Hearing
State of Origin: CA
Represented Org: S.F. Bay/Delta Keeper
Document Date: 09/17/97
Subject Matter Code: J Storm Water Economics
References:
Attachments? N
CROSS REFERENCES

Comment: In closing, in terms of some of the comments made by especially the municipal stormwater

programs, first, I'd like to just make a comment that economic analysis might be required by executive order, but it isn't required by the Clean Water Act; that standards, in fact, cannot include any kind of economic consideration in terms of coming up with a scientifically based number.

The Act mandates a scientifically based number. State level doesn't do that, but the federal level is quite clear. And you have no authority to include in your numbers an economic criteria. So I'll just remind you of that, to -- just to balance off the comments today with -- not exactly balance. At least one person said that.

And also in terms of the storm -- fears of the stormwater programs, they're quite fearful of the language in here. I would simply remind folks, 402(p) under the permits section doesn't rewrite 303D, formulate the TMDLs and load allocation requirements. It doesn't rewrite the need for permits to go beyond best available technology or whatever they need to do to meet the criteria- it doesn't rewrite 301.

So 402(p) takes a back seat effectively to a situation where you had a violation of standards in the ambient water. Those permits would by definition be subject to a particular regional board's discretion to revise them as proposed.

I don't think any realistic look at the future indicates that all the permits will be rewritten with numerical effluent limits, given the magnitude of that program. I would just put in my word of reason that there's really nothing to be afraid of. The South Bay has a stormwater program, and in Santa Clara County we have a stormwater program that looks like every other municipal stormwater program in the area.

And I think that's about it.

Response to: CTRH-001-054

EPA agrees with the commenter that criteria must be science-based and are established so as to ensure the protection of designated uses of California waters. EPA performed an Economic Analysis of the implementation of the rule to determine the potential economic impact of the CTR, not to establish standards or criteria. Also see response to CTR-042-007a.

Comment ID: CTRH-002-005
Comment Author: Chris Compton
Document Type: Public Hearing
State of Origin: CA
Represented Org: County of Orange
Document Date: 09/18/97
Subject Matter Code: J Storm Water Economics
References:
Attachments? N
CROSS REFERENCES

Comment: EPA also failed to address the impacts of the proposed rule on industrial stormwater discharges. This rule could significantly impact industries in a municipal area that is subject to stormwater permits.

Response to: CTRH-002-005

See response to CTR-021-006b and CTR-001-007.

Comment ID: CTRH-002-006b
Comment Author: Chris Compton
Document Type: Public Hearing
State of Origin: CA
Represented Org: County of Orange
Document Date: 09/18/97
Subject Matter Code: J Storm Water Economics
References:
Attachments? N
CROSS REFERENCES I

Comment: Does the California Toxics Rule meet the legal requirements of the Clean Water Act and other federal policies and laws?

Previous municipal stormwater speakers have questioned, as we have, EPA's interpretation of Section 402(p) of the Clean Water Act. In addition, the California Toxics Rule raises significant questions regarding its conformance with other federal policies and laws including Executive Order 12866, the Unfunded Mandates Reform Act, the Regulatory Flexibility Act, and the authority for EPA to adopt blanket criteria without considering the designated uses of such waters as required under the Clean Water Act.

To give you just one example, I'd like to briefly compare the California Toxics Rule with the compliance of Executive Order 12866:

Under Executive Order 12866, any "significant" federal regulatory action must be referred to the Office of Management and Budget for review before it can be approved. In this context, a "significant" action includes one which will "have an annual effect on the economy of $100 million or more or adversely affect in a material way the economy." Though admitting that there "may be a cost to some dischargers" to comply with the water quality standards that will be derived from these toxics criteria, the EPA nonetheless argues that the proposed rule is not a significant action because it "establishes ambient water quality criteria which, by themselves, do not directly impose economic impacts."

First, nothing in Executive Order 12866 indicates that only actions with direct economic impacts are to be considered by OMB. Second, for the EPA to ignore the link between the toxics criteria in the proposed rule and the obligations being imposed is very questionable. Is EPA conceding that State and regional water boards may simply ignore these criteria when promulgating water quality standards and issuing permits? Nothing in the preamble indicates that EPA views these criteria as merely advisory.

Despite stating that Executive order 12866 is not applicable, EPA goes on to include an economic analysis which purports to demonstrate that the proposed rule will result in a net economic benefit. The problem with this analysis is that it completely ignores the enormous cost that municipalities will bear if they are forced to bring their stormwater discharges into compliance with these toxics criteria. For example, a 1990 study conducted for the Sacramento Stormwater Program estimated that it would cost nearly $2 billion to implement a treatment program to achieve the water quality criteria proposed in the former Inland Surface Water Plan. Costs to comply with the proposed toxics criteria would be similar, if

not higher, than those proposed in the Inland Surface Water Plan. Ultimately, the costs of compliance may reach into the ten of billions of dollars.

In short, EPA cannot have it both ways. It cannot state that stormwater discharges are subject to the proposed toxics rule and then turn a blind eye toward the costs associated with the implementation of this rule. The costs of the proposed rules are direct and significant, and therefore the rule must be submitted to OMB for review.

We have comparable concerns with the other federal laws that I cited previously, and we will elaborate on them in our written comments.

Response to: CTRH-002-006b

See response to CTRH-002-006a.

EPA established criteria in order to comply with the requirements of the Clean Water Act. In order for such criteria to achieve their intended purpose, the implementation scheme must be such that the final results protect aquatic life and human health. EPA disagrees that designated uses are not considered. It is through the implementation of the CTR that site-specific factors of water bodies and discharging facilities (e.g., hardness, pH, stream flows, or site-specific criteria studies) are considered and designated uses are protected.

EPA disagrees with the commenter that municipalities will bear "enormous" costs to bring their stormwater discharges into compliance with the CTR criteria, however, EPA was not able to evaluate the commenter's compliance cost estimate of "tens of billions of dollars" because the commenter did not provide a methodology or any data for EPA to evaluate. Also see response to CTR-021-006b, CTR-021-005c, and the preamble to the final rule.

Comment ID: CTRH-002-009
Comment Author: Chris Compton
Document Type: Public Hearing
State of Origin: CA
Represented Org: County of Orange
Document Date: 09/18/97
Subject Matter Code: J Storm Water Economics
References:
Attachments? N
CROSS REFERENCES

Comment: We recommend that EPA conduct an economic analysis to assess the full impacts of the wet weather discharge requirements of the proposed rule and further evaluate the actual benefits of implementation of the rule.

The County of Orange encourages EPA to work cooperatively with California municipal stormwater stakeholders to resolve these issues. Through the California Stormwater Quality Task Force, the municipal stormwater dischargers have demonstrated our ability to work cooperatively with the EPA and State Water Resources Control Board to develop mutually effective solutions to facilitate implementation of the stormwater program. Such intergovernmental coordination is needed to develop a feasible

program to protect the environment.

Response to: CTRH-002-009

See responses to CTR-021-006b and CTR-034-016.

Comment ID: CTRH-002-017
Comment Author: Alex Sheydayi
Document Type: Public Hearing
State of Origin: CA
Represented Org: Ventura Co. Flood Control
Document Date: 09/18/97
Subject Matter Code: J Storm Water Economics
References:
Attachments? N
CROSS REFERENCES

Comment: MR. SHEYDAYI: Good afternoon. I'm Alex Sheydayi of the Ventura County Flood Control District, and I'm here to speak on behalf of the Ventura County Management Program.

Before I make my comments, I would also like to express my -- our program's support for the comments that were made by Mr. Crompton earlier and also by our speakers in San Francisco that spoke on behalf of the Municipal Water Quality Management Programs statewide.

Our program -- The permit for our program was issued in August of '94. And our program basically consists of 12 permittees in the flood control district which is the municipality and the municipal permittee which is the County of Ventura and ten cities in the county.

At the time that we applied for the stormwater permit, only three municipalities in the county were required to do so. The others entered the program voluntarily in order to maintain a uniform program countywide. Currently, of the 12 corporate permittees, five corporate permittees would not even be required to have permits under Phase 20 because they have populations far west than that required for Phase 20. So you can see we have very small communities that are participating in the program voluntarily.

The commission earlier stated that one of the reasons many of the corporate permittees entered the program voluntarily is to maintain a uniform program countywide. And one of the incentives for doing that was the fact that the program was a BMP-driven program to comply with the requirements of a permit to the maximum extent practicable under the Clean Water Act.

We have also recently completed a four-year monitoring program and, using the information from the monitoring program, we have attainability of the data that we have collected for our program. This attainability data indicates that even if we comply -- apply the BMP program to the maximum extent possible, the expenditure of radial funds, we would still not be able to meet the requirements of the proposed criteria for several of the metals and other constituents, which would then -- of course, our program would go into a treatment mode for stormwater discharges. We believe that this was going to be very costly for us, particularly very costly for smaller communities who don't have the base to spread the cost of such an expense over their population.

Our programs, like so many other municipal programs in California, were based on implementation of programs to address source of weakness, not to provide the treatment. Just to give you an idea of why we concur with the other speakers concerning the economic analysis and the fallacy of the economic analysis, let me just give you a very quick example of the cost that we are currently incurring. We are currently spending $5 per -- for every man, woman, and child in Ventura County to implement a BMP-based program. And yet if you'll look at the pages that were presented in the CTR of the maximum $87 million statewide, the number will be approximately two and a half to three dollars for every person in California to implement the CTR — not just the stormwater dischargers, but for all dischargers statewide. So we think that there is something wrong with this whole analysis if we are currently exceeding the cost of the assumptions made in the analysis for compliance with CTR.

We also, as I said earlier, believe that the analysis should take into consideration the size of the communities, and as Mr. Crompton mentioned earlier, most of the municipal programs in California are very small communities and the cost of applying the treatment would be very, very difficult for them to comply with.

That's the end of my comment. I thank you for the opportunity to speak.

MR. MORRIS: Are you going to submit the data and the analyses that you did that show why -- You said you have a lot of data. Are they going to --

MR. SHEYDAYI: We are not going to submit them on the comments. We are going to be submitting that data -- It's still relatively in raw form, but we will be submitting that data to the regional board with our annual report in November.

MR. MORRIS: If you could get me or send me a copy or Diane a copy of the data and how you calculated your WQBEL, your permit limit based on the new criteria, that would be useful. I'd like to see how you did that.

MR. SHEYDAYI: Okay. We'll send you whatever we can put together.

MR. MORRIS: I think there is a misconception that people have to implement the criteria for stormwater dischargers at the drought low condition and the 7QlO condition. That's not the case. When we issue a permit, you keep that limit for a stormwater discharge, you usually model the condition that occurs in. If you do it right, that gives you a model that gives you concentration in the receiving water and the duration of the exposure of that concentration, and then you'll compare that to the criterion and flood flow or rain flow or storm flow. Right? Usually you have enough to keep your WQBEL below the criteria and you don't see the effects. If you do a good model, you shouldn't have any impact.

If you look across the country, across the U.S., there are many, many states that have standards on the books, water quality standards that are far more stringent than the numbers we're promulgating or proposing to promulgate in Southern California. If you look at their standards, you won't see any black boxes on the end of those stormwater discharges. Nobody builds treatment for stormwater treatment in this country. They've been implementing standards for 15 years. California is no different.

Response to: CTRH-002-017

The costs attributable to the CTR are only those incremental costs which will be incurred to go from compliance with existing permits to compliance with more stringent CTR-based limits. EPA's revised

cost estimates from the Economic Analysis range from $33.5 million to $61.0 million annually. The commenter compares BMP costs of $5 per person to potential CTR compliance costs, however, this is not relevant because CTR costs are incremental costs and are not based on the costs of existing programs. See also responses to CTR-021-006b and CTR-035-048.

Subject Matter Code: J-01 MS4s/CSOs/Industries Costs

Comment ID: CTR-013-002
Comment Author: County of Los Angeles
Document Type: Storm Water Auth.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: J-01 MS4s/CSOs/Industries Costs
References: Letter CTR-013 incorporates by reference letter CTR-027

Attachments? N
CROSS REFERENCES

Comment: In addition, we would like to emphasize the following concerns which greatly impact the Lost Angeles County Stormwater Program:

2. The application of water quality standards to MS4 stormwater discharges would result in end-of-pipe treatment to reasonably achieve compliance and provide limited environmental benefit. Putting aside the issue of whether water quality standards apply to MS4s, the CTR as presently proposed will require stormwater agencies to incur significant costs with minimal improvement in water quality. Based on studies conducted by the County of Sacramento and the Fresno Metropolitan Flood Control District, stormwater discharges being controlled through an aggressive BMP-based program could not be certain of achieving the proposed water quality criteria. To achieve the criteria, end-of-pipe treatment would be necessary. It is reasonable to assume that other municipalities throughout California where special studies have not been conducted will not be able to meet the proposed criteria as well, thus requiring public agencies throughout California to collect and treat its stormwater discharges. This is unreasonable and is not consistent with the intent of the CWA for the following reasons:

The preamble to the Federal stormwater regulations(*2) clearly indicates that it was not the intent of Congress to require municipal permits to require end-of-pipe treatment technology but to implement a comprehensive stormwater management program to reduce the discharge of pollutants from municipal storm sewer systems.

If municipal stormwater discharges are required to comply with the proposed rule, end-of-pipe treatment or zero discharge would be the only alternatives to achieve compliance. This would result in major capital expense to construct the collection and treatment facilities. In addition, this may result in other more significant environmental impacts, such as destruction of wetlands and wildlife habitats.

We recommend that the proposed rule not apply to MS4 discharges. However, if the USEPA should continue to impose the proposed rule to MS4s, the rule should be revised to specifically address compliance issues and resolution to those issues for MS4 discharges that adequately reflect the intent of Congress when it implemented the municipal stormwater program.

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*2) Federal Register, November 16, 1990, Vol. 55, No. 222, Page 48038

Response to: CTR-013-002

See response to CTR-040-004.

Comment ID: CTR-014-002
Comment Author: City of Lakewood
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: J-01 MS4s/CSOs/Industries Costs
References: Letter CTR-014 incorporates by reference letters CTR-013 and CTR-027

Attachments? N
CROSS REFERENCES

Comment: 2. The application of water quality standards to MS4 stormwater discharges would result in end-of-pipe treatment to achieve compliance which would provide limited environmental benefit. Putting aside the issue of whether water quality standards apply to MS4s, the CTR as presently proposed will require stormwater agencies to incur significant cost with minimal improvement in water quality. Based on studies conducted by the County of Sacramento and the Fresno Metropolitan Flood Control District, stormwater discharges being controlled through an aggressive BMP-based program could not be certain of achieving the proposed water quality criteria. To achieve the criteria, end-of-pipe treatment would be necessary. It is reasonable to assume that other municipalities throughout California where special studies have not been conducted will not be able to meet the proposed criteria as well, requiring public agencies throughout California to collect and treat its stormwater discharges. This is unreasonable and is not consistent with the intent of the CWA.

Response to: CTR-014-002

See response to CTR-040-004.

Comment ID: CTR-024-002
Comment Author: City of Hawthorne
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: J-01 MS4s/CSOs/Industries Costs
References: Letter CTR-024 incorporates by reference letters CTR-013 and CTR-027
Attachments? N
CROSS REFERENCES

Comment: 2. The application of water quality standards to MS4 stormwater discharges would result in end-of-pipe treatment to reasonably achieve compliance and provide limited environmental benefit. Putting aside the issue of whether water quality standards apply to MS4s, the CTR as presently proposed will require stormwater agencies to incur significant cost with minimal improvement in water quality. Based on studies conducted by the County of Sacramento and Fresno Metropolitan Flood Control

District, stormwater discharges being controlled through aggressive BMP-based program could not be certain of achieving the proposed water quality criteria. To achieve the criteria, end-of-pipe treatment would be necessary. It is reasonable to assume that other municipalities throughout California where special studies have not been conducted will not be able to meet the proposed criteria as well, requiring public agencies throughout California to collect and treat its stormwater discharges. This is unreasonable and is not consistent with the intent of the CWA.

Response to: CTR-024-002

See response to CTR-040-004.

Comment ID: CTR-027-002
Comment Author: California SWQTF
Document Type: Storm Water Auth.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: J-01 MS4s/CSOs/Industries Costs
References: Letter CTR-027 incorporates by reference letters CTR-001, CTR-036 and CTR-040
Attachments? N
CROSS REFERENCES

Comment: 2. The application of water quality standards to MS4 stormwater discharges would result in end-of-pipe treatment to possibly achieve compliance which would only provide limited environmental benefit. Putting aside the issue of whether water quality standards apply to MS4s, the CTR as presently proposed will require stormwater agencies to incur significant costs with minimal improvement in water quality. Based on studies conducted by the County of Sacramento and the Fresno Metropolitan Flood Control District, stormwater discharges being controlled through an aggressive BMP based program could not be certain of achieving the proposed water quality criteria. To achieve the criteria, end-of pipe treatment would be necessary. Even then, certain criteria, e.g. PAHs, cannot be attained through typical treatment BMPs. In the case of Sacramento, a capital cost of $2.5 billion was required to provide treatment. The annual cost, including operation and maintenance, for such an arrangement was $444 million. It is reasonable to assume that other municipalities throughout California where special studies have not been conducted will not be able to meet the proposed criteria as well, requiring public agencies throughout California to collect and treat all stormwater discharges. This is unreasonable, and not consistent with intent of the CWA for the following reasons:

* The preamble to the Federal stormwater regulations (*1) clearly indicates that it was not the intent of Congress to require municipal permits to require end-of-pipe treatment technology, but to implement a comprehensive stormwater management program to reduce the discharge of pollutants from municipal storm sewer systems.

If municipal stormwater discharges are required to comply with the proposed rule, end-of-pipe treatment or zero discharge would be the only alternatives to achieve compliance. Extrapolating the Sacramento cost for end-of-pipe treatment to a population of $22 million (*2) results in an annual cost of $7 billion. In addition to the significant compliance costs, there are other issues that could make such alternatives infeasible.

- Fully developed communities may not have the vacant land available to construct collection and treatment facilities. Acquisition of developed land would be very expensive.

- Going to zero discharge or constructing and operating collection and treatment facilities may result in other more significant environmental impacts, such as destruction of wetlands and wildlife habitats.

- Technologies to treat not only the quantity of stormwater but to reduce toxic pollutants to low concentrations are not currently available.

* As noted in the economic analysis to the proposed rule, EPA estimates that only 3% of the total load of toxic pollutants to fresh waters of the State are from point source discharges, which include municipal stormwater discharges. Since point source discharges contribute a small percentage of the total toxic pollutant load, reducing the toxic pollutants in stormwater would result in only marginal water quality improvements in the waters the proposed criteria are intended to protect. The costs to implement a BMP based program alone to address toxic pollutants, without considering end-of-pipe treatment, are significant and not justified when compared to the marginal water quality benefits to be achieved.

Recommendation: The proposed rule should not apply to MS4 discharges. However, if USEPA should continue to impose the proposed rule to MS4s, the rule should be revised to specifically address an resolve these compliance issues, as they apply to MS4 discharges, in a manner consistent with the intent of Congress when it adopted the requirements of the municipal stormwater program.

(*1) Federal Register, November 16, 1990, Vol. 55, No. 222, page 48038.

(*2) Based on 1990 census data.

Response to: CTR-027-002

See response to CTR-040-004.

Comment ID: CTR-040-034
Comment Author: County of Sacramento Water Div
Document Type: Storm Water Auth.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: J-01 MS4s/CSOs/Industries Costs
References: Letter CTR-040 incorporates by reference letter CTR-027
Attachments? Y
CROSS REFERENCES

Comment: Although EPA goes to great length to label its cost analysis as "conservative" the analysis is anything but conservative:

* It is not conservative to assume that municipal stormwater dischargers can achieve the criteria with no-cost BMPs.

Response to: CTR-040-034

See response to CTR-013-003.

Comment ID: CTR-041-030
Comment Author: Sacramento Reg Cnty Sanit Dist
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: J-01 MS4s/CSOs/Industries Costs
References:
Attachments? N
CROSS REFERENCES

Comment: Although EPA goes to great length to label its cost analysis as "conservative" the analysis is anything but conservative:

* It is not conservative to assume that municipal stormwater dischargers can achieve the criteria with no-cost BMPs.

Response to: CTR-041-030

See response to CTR-013-003.

Comment ID: CTR-044-025
Comment Author: City of Woodland
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: J-01 MS4s/CSOs/Industries Costs
References:
Attachments? N
CROSS REFERENCES

Comment: Although EPA goes to great length to label its cost analysis as "conservative" the analysis is anything but conservative:

* It is not conservative to assume that municipal stormwater dischargers can achieve the criteria with no-cost BMPs.

Response to: CTR-044-025

See response to CTR-013-003.

Comment ID: CTR-054-029
Comment Author: Bay Area Dischargers Associati
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: J-01 MS4s/CSOs/Industries Costs
References:
Attachments? N
CROSS REFERENCES

Comment: Although EPA goes to great length to label its cost analysis as "conservative" the analysis is anything but conservative:

* It is not conservative to assume that municipal stormwater dischargers can achieve the criteria with no-cost BMPs.

Response to: CTR-054-029

See response to CTR-013-003.

Comment ID: CTR-062-002
Comment Author: City of Downey
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/24/97
Subject Matter Code: J-01 MS4s/CSOs/Industries Costs
References: Letter CTR-062 incorporates by reference letters CTR-013 and CTR-027
Attachments? N
CROSS REFERENCES

Comment: In addition, we would like to emphasize the following key issues on the California Toxic Rule (CTR), which are of major impact to our stormwater program:

2. The application of water quality standards to MS4 stormwater discharges would result in end-of-pipe treatment to reasonably achieve compliance and provide limited environmental benefit. Putting aside the issue of whether water quality standards apply to MS4s, the CTR as presently proposed will require stormwater agencies to incur significant cost with minimal improvement in water quality. Based on studies conducted by the County of Sacramento and the Fresno Metropolitan Flood Control District, stormwater discharges being controlled through an aggressive BMP-based program could not be certain of achieving the proposed water quality criteria. To achieve the criteria, end-of-pipe treatment would be necessary. It is reasonable to assume that other municipalities throughout California where special studies have not been conducted will not be able to meet the proposed criteria as well, requiring public agencies throughout California to collect and treat its stormwater discharges. This is unreasonable and is not consistent with the intent of the CWA.

Response to: CTR-062-002

See response to CTR-040-004.

Comment ID: CTR-069-002a
Comment Author: CA Bus Prop Ass & Bldg Ind Ass
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: J-01 MS4s/CSOs/Industries Costs
References:
Attachments? N
CROSS REFERENCES E-01j

Comment: Additionally, CBIA and CBPA are concerned with the findings in the "Economic Analysis of the Proposed California Water Quality Toxics Rule." The acknowledgment by EPA in the economic analysis that "the water quality criteria in this rule may also have an indirect effect on sources not permitted under the NPDES program or not subject to numeric water quality-based effluent limits is extremely troublesome. Sources not permitted under the NPDES program include nonpoint sources and wet weather discharges such as runoff from farms and urban areas. The economic analysis continues by stating that "any potential effect on these sources is unknown at this time" and that "the State may ask or require these sources to implement best management practices or participate in a comprehensive watershed management approach. Since the economic analysis only focuses on the costs to point source dischargers and not non-point discharges, CBIA and CBPA believe that the potential economic impact of the proposed rule is greater than identified in the economic analysis.

We thank you for your consideration of these comments.

Response to: CTR-069-002a

EPA did not include benefits or costs of controlling nonpoint sources or storm water dischargers in its estimates of benefits and costs of the CTR. EPA believes that the final rule will not have a direct effect on sources not permitted under the NPDES program (e.g., nonpoint sources) or NPDES sources not typically subject to numeric water quality-based effluent limits (e.g., wet weather discharges). Any potential indirect effect on nonpoint sources and wet weather discharges, such as runoff from farms, urban areas, and abandoned mines, and contaminated sediment, is unknown at this time. Many of the programs developed to control nonpoint sources and wet weather discharges are already in place. Costs due to these programs have already been incurred or will soon be incurred owing to existing federal, State, and local environmental programs.

EPA also acknowledges that nonpoint sources and wet weather discharges are technically difficult to model and evaluate costs because they are intermittent and highly variable. Nonpoint source and wet weather discharges also occur under different hydrologic or climatic conditions than continuous discharges from industrial and municipal facilities, which are evaluated under critical low flow or drought conditions. Thus, evaluating agricultural nonpoint source discharges and storm water discharges and their effects on the environment is highly site-specific and data intensive. Until this information is available, it is premature to project that the sources would incur any costs beyond those for which they

are already responsible under the current regulations of the Clean Water Act.

Comment ID: CTR-071-002
Comment Author: City of Rosemead
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: J-01 MS4s/CSOs/Industries Costs
References: Letter CTR-071 incorporates by reference letters CTR-013 and CTR-027
Attachments? N
CROSS REFERENCES

Comment: In addition, we would like to emphasize the following key issues on the California Toxic Rule (CTR), which are of major impact to our stormwater program.

2. The application of water quality standards to MS4 stormwater discharges would result in end-of-pipe treatment to reasonably achieve compliance and provide limited environmental benefit. Putting aside the issue of whether water quality standards apply to MS4s, the CTR as presently proposed will require stormwater agencies to incur significant cost with minimal improvement in water quality. Based on studies conducted by the County of Sacramento and the Fresno Metropolitan Flood Control District, stormwater discharges being controlled through an aggressive BMP-based program could not be certain of achieving the proposed water quality criteria. To achieve the criteria, end-of-pipe treatment would be necessary. It is reasonable to assume that other municipalities throughout California where special studies have not been conducted will not be able to meet the proposed criteria as well, requiring public agencies throughout California to collect and treat its stormwater discharges. This is unreasonable and is not consistent with the intent of the CWA.

Response to: CTR-071-002

See response to CTR-040-004.

Comment ID: CTR-072-002
Comment Author: City of Bell Gardens
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: J-01 MS4s/CSOs/Industries Costs
References: Letter CTR-071 incorporates by reference letters CTR-013 and CTR-027
Attachments? N
CROSS REFERENCES

Comment: In addition, we would like to emphasize the following key issues on the California Toxic Rule (CTR), which are of major impact to our stormwater program.

2. The application of water quality standards to MS4 stormwater discharges would result in end-of-pipe treatment to reasonably achieve compliance and provide limited environmental benefit. Putting aside the issue of whether water quality standards apply to MS4s, the CTR as presently proposed will require stormwater agencies to incur significant cost with minimal improvement in water quality. Based on studies conducted by the County of Sacramento and the Fresno Metropolitan Flood Control District, stormwater discharges being controlled through an aggressive BMP-based program could not be certain of achieving the proposed water quality criteria. To achieve the criteria, end-of-pipe treatment would be necessary. It is reasonable to assume that other municipalities throughout California where special studies have not been conducted will not be able to meet the proposed criteria as well, requiring public agencies throughout California to collect and treat its stormwater discharges. This is unreasonable and is not consistent with the intent of the CWA.

Response to: CTR-072-002

See response to CTR-040-004.

Comment ID: CTR-073-002
Comment Author: City of Paramount
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: J-01 MS4s/CSOs/Industries Costs
References: Letter CTR-073 incorporates by reference letters CTR-013 and CTR-027
Attachments? N
CROSS REFERENCES

Comment: In addition, we would like to emphasize the following key issues on the California Toxic Rule (CTR), which are of major impact to our stormwater program.

2. The application of water quality standards to MS4 stormwater discharges would result in end-of-pipe treatment to reasonably achieve compliance and provide limited environmental benefit. Putting aside the issue of whether water quality standards apply to MS4s, the CTR as presently proposed will require stormwater agencies to incur significant cost with minimal improvement in water quality. Based on studies conducted by the County of Sacramento and the Fresno Metropolitan Flood Control District, stormwater discharges being controlled through an aggressive BMP-based program could not be certain of achieving the proposed water quality criteria. To achieve the criteria, end-of-pipe treatment would be necessary. It is reasonable to assume that other municipalities throughout California where special studies have not been conducted will not be able to meet the proposed criteria as well, requiring public agencies throughout California to collect and treat its stormwater discharges. This is unreasonable and is not consistent with the intent of the CWA.

Response to: CTR-073-002

See response to CTR-040-004.

Comment ID: CTR-074-002

Comment Author: City of San Gabriel
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: J-01 MS4s/CSOs/Industries Costs
References: Letter CTR-074 incorporates by reference letters CTR-013 and CTR-027
Attachments? N
CROSS REFERENCES

Comment: In addition, we would like to emphasize the following key issues on the California Toxic Rule (CTR), which are of major impact to our stormwater program:

2.The application of water quality standards to MS4 stormwater discharges would result in end-of-pipe treatment to reasonably achieve compliance and provide limited environmental benefit. Putting aside the issue of whether water quality standards apply to MS4s, the CTR as presently proposed will require stormwater agencies to incur significant cost with minimal improvement in water quality. Based on studies conducted by the County of Sacramento and the Fresno Metropolitan Flood Control District, stormwater discharges being controlled through an aggressive BMP-based program could not be certain of achieving the proposed water quality criteria. To achieve the criteria, end-of-pipe treatment would be necessary. It is reasonable to assume that other municipalities throughout California where special studies have not been conducted will not be able to meet the proposed criteria as well, requiring public agencies throughout California to collect and treat its stormwater discharges. This is unreasonable and is not consistent with the intent of the CWA.

Response to: CTR-074-002

See response to CTR-040-004.

Comment ID: CTR-075-002
Comment Author: City of El Monte
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/24/97
Subject Matter Code: J-01 MS4s/CSOs/Industries Costs
References: Letter CTR-075 incorporates by reference letters CTR-013 and CTR-027
Attachments? N
CROSS REFERENCES

Comment: In addition, we would like to emphasize the following key issues on the California Toxic Rule (CTR), which are of major impact to our stormwater program;

2. The application of water quality standards to MS4 stormwater discharges would result in end-of-pipe treatment to reasonably achieve compliance and provide limited environmental benefit. Putting aside the issue of whether water quality standards apply to M84s, the CTR as presently proposed will require stormwater agencies to incur significant cost with minimal improvement in water quality. Based on studies conducted by the County of Sacramento and the Fresno Metropolitan Flood Control District,

stormwater discharges being controlled through an aggressive BMP-based program could not be certain of achieving the proposed water quality criteria. To achieve the criteria, end-of-pipe treatment would be necessary. It is reasonable to assume that other municipalities throughout California where special studies have not been conducted will not be able to meet the proposed criteria as well, requiring public agencies throughout California to collect and treat its stormwater discharges. This is unreasonable and is not consistent with the intent of the CWA.

Response to: CTR-075-002

See response to CTR-040-004.

Comment ID: CTR-076-002
Comment Author: City of Cudahy
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: J-01 MS4s/CSOs/Industries Costs
References: Letter CTR-076 incorporates by reference letters CTR-013 and CTR-027
Attachments? N
CROSS REFERENCES

Comment: In addition, we would like to emphasize the following key issues on the California Toxic Rule (CTR) , which are of major impact to our stormwater program:

2. The application of water quality standards to MS4 stormwater discharges would result in end-of-pipe treatment to reasonably achieve compliance and provide limited environmental benefit. Putting aside the issue of whether water quality standards apply to MS4s, the CTR as presently proposed will require stormwater agencies to incur significant cost with minimal improvement in water quality. Based on studies conducted by the County of Sacramento and the Fresno Metropolitan Flood Control District, stormwater discharges being controlled through an aggressive BMP-based program could not be certain of achieving the proposed water quality criteria. To achieve the criteria, end-of-pipe treatment would be necessary. It is reasonable to assume that other municipalities throughout California where special studies have not been conducted will not be able to meet the proposed criteria as well, requiring public agencies throughout California to collect and treat its stormwater discharges. This is unreasonable and is not consistent with the intent of the CWA.

Response to: CTR-076-002

See response to CTR-040-004.

Comment ID: CTR-078-002
Comment Author: City of Maywood
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/25/97

Subject Matter Code: J-01 MS4s/CSOs/Industries Costs
References: Letter CTR-078 incorporates by reference letter CTR-013
Attachments? N
CROSS REFERENCES

Comment: In addition, we would like to emphasize the following key issues on the California Toxic Rule (CTR), which are of major impact to our stormwater program:

2. The application of water quality standards to MS4 stormwater discharges would result in end-of-pipe treatment to reasonably achieve compliance and provide limited environmental benefit. Putting aside the issue of whether water quality standards apply to MS4s, the CTR as presently proposed will require stormwater agencies to incur significant cost with minimal improvement in water quality. Based on studies conducted by the County of Sacramento and the Fresno Metropolitan Flood Control District, stormwater discharges being controlled through an aggressive BMP-based program could not be certain of achieving the proposed water quality criteria. To achieve the criteria, end-of-pipe treatment would be necessary. It is reasonable to assume that other municipalities throughout California where special studies have not been conducted will not be able to meet the proposed criteria as well, requiring public agencies throughout California to collect and treat its stormwater discharges. This is unreasonable and is not consistent with the intent of the CWA.

Response to: CTR-078-002

See response to CTR-040-004.

Comment ID: CTR-079-002
Comment Author: City of Glendale
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/24/97
Subject Matter Code: J-01 MS4s/CSOs/Industries Costs
References: Letter CTR-079 incorporates by reference letters CTR-013 and CTR-027
Attachments? N
CROSS REFERENCES

Comment: In addition, we would like to emphasize the following key issues on the California Toxic Rule (CTR), which are of major impact to our stormwater program:

2. The application of water quality standards to MS4 stormwater discharges would result in end-of-pipe treatment to reasonably achieve compliance and provide limited environmental benefit. Putting aside the issue of whether water quality standards apply to MS4s, the CTR as presently proposed will require stormwater agencies to incur significant cost with minimal improvement in water quality. Based on studies conducted by the County of Sacramento and the Fresno Metropolitan Flood Control District, stormwater discharges being controlled through an aggressive BMP based program could not be certain of achieving the proposed water quality criteria. To achieve the criteria, end-of-pipe treatment would be necessary. It is reasonable to assume that other municipalities throughout California where special studies have not been conducted will not be able to meet the proposed criteria as well, requiring public agencies throughout California to collect and treat its stormwater discharges. This is unreasonable and is

not consistent with the intent of the CWA.

Response to: CTR-079-002

See response to CTR-040-004.

Comment ID: CTR-087-003
Comment Author: Morrison & Foerster LLP
Document Type: Storm Water District
State of Origin: CA
Represented Org: SCVURPPP
Document Date: 09/24/97
Subject Matter Code: J-01 MS4s/CSOs/Industries Costs
References: Letter CTR-087 incorporates by reference letters CTR-001 and CTR-027
Attachments? N
CROSS REFERENCES

Comment: Finally, even if the Elliot Memo were not incorrect (and, given the plain language of the statute, it clearly is), EPA's position that WQBELs may be applied in municipal stormwater permits requires that it conduct an economic analysis of the proposed rule's potential impact on municipal stormwater dischargers. In this regard, it makes no difference whether WQBELs are expressed as numeric effluent limitations or in the form of BMPS. For if BMPs must be calculated on the basis of the numeric criteria contained in the proposed CTR rather than on section 402(p)(3)(B)(iii)'s maximum extent practicable standard, they are likely to have significant economic consequences -- consequences the Agency has failed to even attempt to analyze in its proposal.

Members of the SCVURPPP look forward to EPA revising its proposal to address the comments contained in this letter and those offered by their fellow municipal stormwater dischargers.

Please contact me at the telephone number listed above if you have any questions concerning the matters covered by this letter or wish to discuss them further.

Response to: CTR-087-003

EPA did not include benefits or costs of controlling nonpoint sources or storm water dischargers in its estimates of benefits and costs of the CTR. EPA believes that the final rule will not have a direct effect on sources not permitted under the NPDES program (e.g., nonpoint sources) or NPDES sources not typically subject to numeric water quality-based effluent limits (e.g., wet weather discharges). Any potential indirect effect on nonpoint sources and wet weather discharges, such as runoff from farms, urban areas, and abandoned mines, and contaminated sediment, is unknown at this time. Many of the programs developed to control nonpoint sources and wet weather discharges are already in place. Costs due to these programs have already been incurred or will soon be incurred owing to existing federal, State, and local environmental programs.

EPA also acknowledges that nonpoint sources and wet weather discharges are technically difficult to model and evaluate costs because they are intermittent and highly variable. Nonpoint source and wet weather discharges also occur under different hydrologic or climatic conditions than continuous discharges from industrial and municipal facilities, which are evaluated under critical low flow or

drought conditions. Thus, evaluating agricultural nonpoint source discharges and storm water discharges and their effects on the environment is highly site-specific and data intensive.

See also response to CTR-040-004.

Subject Matter Code: J-02 RFA - Small Entity Cost

Comment ID: CTR-001-008a
Comment Author: Law Offices of Alan C. Waltner
Document Type: Storm Water Auth.
State of Origin: CA
Represented Org: Almeda Cnty Clean Wtr Pgm
Document Date: 09/22/97
Subject Matter Code: J-02 RFA - Small Entity Cost
References:
Attachments? N
CROSS REFERENCES R

Comment: EPA'S PROPOSAL VIOLATES THE REGULATORY FLEXIBILITY ACT

Several of the member agencies of the ACCWP have populations less than 50,000 (Piedmont, Emeryville, Albany) and will be significantly affected by the proposed rule if it results in the adoption of NELs or WLAs in the permit for their discharges. These "small entities" under the Regulatory Flexibility Act ("RFA") are entitled to both initial and final regulatory flexibility analyses under the RFA.

EPA's finding that a substantial number of small entities will not be significantly affected by the proposed rule is arbitrary and capricious given this demonstrated impact. A substantial number of municipalities less than 50,000 in population are currently covered by NPDES permits for their storm water discharges. In addition, EPA's upcoming Phase II storm water regulations may substantially expand the universe of small municipalities that will be subject to NPDES permits and, through those permits, to the provisions of the CTR.

Neither the ACCWP, the ACCWP's member agencies or, to our knowledge, any other storm water system that will be subject to this rule, was contacted by EPA in advance of the proposed rulemaking and given a reasonable opportunity to participate in the rulemaking as required by 5 U.S.C. section 609(a). In addition, as a "covered agency" under 5 U.S.C. section 609, EPA must process the proposed rule in accordance with the provisions of that section, including the convening of a review panel, but apparently has failed to do so.

Response to: CTR-001-008a

See response to CTR-001-008b, CTR-050-007a, and the preamble to the final rule.

Comment ID: CTRH-001-005a
Comment Author: Alan Waltner
Document Type: Public Hearing
State of Origin: CA
Represented Org: Almeda Cnty Clean Wtr Pgm
Document Date: 09/17/97
Subject Matter Code: J-02 RFA - Small Entity Cost
References:
Attachments? N
CROSS REFERENCES R

Comment: If you go beyond best management practices, you're impliedly eliminating those provisions of the 1995 Basin Plan. I think it would clearly violate the Regulatory Flexibility Act, since you haven't considered the costs of controls.

If, again, our dischargers had to do whatever it took, our members had to do whatever it took -- and in fact, several of our dischargers are small entities under the Regulatory Flexibility Act: the City of Emeryville, the City of Albany, the City of Piedmont.

The NPDES permits small entities and municipalities under 50,000 in number. If they had to do whatever it took to provide the waste allocations without consideration of the economic impact, those entities, because of the practical problems of needing 50 coliseums of storage in the Bay Area and the practical considerations that plague us -- and the only place you could put that is by the bay, where you have a serious problem with requirements under the Endangered Species Act.

To the extent you're standing in the shoes of the state in promulgating these standards, you violate the cost/benefit balances provision of the Porter Cologne Act.

Response to: CTRH-001-005a

See responses to CTR-001-008b, CTR-050-007a, CTR-035-011a, and the preamble to the final rule.

Comment ID: CTRH-001-008b
Comment Author: Doug Harrison
Document Type: Public Hearing
State of Origin: CA
Represented Org: Fresno Met. Flood Control
Document Date: 09/17/97
Subject Matter Code: J-02 RFA - Small Entity Cost
References:
Attachments? N
CROSS REFERENCES R

Comment: Looking at the results of our monitoring and your criteria, we'll have to achieve another 70 to 90 percent reduction in pollutants in order to be in compliance. That means we'd have to increase our storage volume to 20,000 acre feet just to handle average annual runoff we have underway right now.

That's a price tag of $220 million to $400 million to try to stay in compliance with the current criteria if you interpret the rule to apply to us -- 220 million. And then we can't prevent major storm events in our community, storm impacts that cause a discharge, in which case 100 percent of the discharges would exceed -- would be out of compliance, even though we were retaining 100 percent of the average annual rainfall.

We think that raises a problem with the Regulatory Flexibility Act, both in terms of the cost analysis itself and the impact that accrues to small communities, certainly with respect to the executive order. Just in our case alone the $100 million limit is in serious trouble, dealing with compliance with a five-year schedule just in our community with the possibility of $80 million per year of expense. That does not include O & M cost in that system.

Response to: CTRH-001-008b

EPA disagrees with the commenter's cost estimates, because EPA does not believe that additional storage capacity will need to be constructed to comply with the CTR. However, no details of the cost estimate were provided, thus, EPA could not evaluate the estimated cost. See also response to CTR-001-008b, CTR-040-004, and CTR-050-007a.

Comment ID: CTRH-002-004
Comment Author: Chris Compton
Document Type: Public Hearing
State of Origin: CA
Represented Org: County of Orange
Document Date: 09/18/97
Subject Matter Code: J-02 RFA - Small Entity Cost
References:
Attachments? N
CROSS REFERENCES

Comment: Is the economic analysis appropriate?

Most of the municipal stormwater permittees in Orange County are communities of less than 100,000 in population. I might add that most of the permittees in California are small communities.

Based on our monitoring data and studies conducted by others, it is reasonable to assume that stormwater discharges from these small communities would be faced with the same compliance issues as the large and medium municipalities. EPA failed to address this potential impact in its economic analysis of the proposed rule.

Response to: CTRH-002-004

See responses to CTR-001-008b, CTR-050-007a, and the preamble to the final rule.

Subject Matter Code: J-04 End-of-Pipe Treatment v. BMP

Comment ID: CTR-031-007b
Comment Author: Fresno Metro. Flood Ctrl Dist.
Document Type: Flood Ctrl. District
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: J-04 End-of-Pipe Treatment v. BMP
References: Letter CTR-031 incorporates by reference letter CTR-027
Attachments? N
CROSS REFERENCES F

Comment: C. If the CTR as proposed in the current draft is applied to municipal storm water dischargers as numeric effluent limitations, new end-of -pipe facilities will result. The impact of these facilities on the environment in general, and endangered species in particular, must therefore be specifically reviewed pursuant to the National Environmental Policy Act and Endangered Species Act.

End-of-pipe facilities would be required for municipal storm water dischargers in their attempt to meet the subject criteria. Storm water facilities must be located in the lowest topographic areas, which contain many of our most valuable and already diminished wetland habitats. This readily foreseeable environmental consequence of the CTR, if directly applied to municipal storm water dischargers, should not be ignored.

Response to: CTR-031-007b

With respect to ESA, EPA has completed consultation as required by Section 7 of the ESA. With respect to compliance with NEPA, section 511(c) of the Clean Water Act excludes this rulemaking from the requirements of NEPA. The comment also assumes that stormwater discharges subject to numeric effluent limitations will have to be treated by new end-of-pipe facilities. As explained in the response to Storm Water Economics Comments (Category J, Comment CTR-040-004), EPA believes that implementation of criteria as applied to wet-weather discharges will not require the construction of end-of-pipe facilities.

Comment ID: CTR-042-002
Comment Author: Cal. Dept. of Transportation
Document Type: State Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: J-04 End-of-Pipe Treatment v. BMP
References:
Attachments? Y
CROSS REFERENCES

Comment: 2. If municipal storm water dischargers are required to meet water quality standards, this will result in the need for installation of expensive end-of-pipe treatment.

As explained in Attachment A included with these comments, Caltrans storm water discharges will, in many instances, be unable to comply with the proposed CTR numeric water quality criteria. In fact, as shown in Attachment A, falling rainwater (which acts as a mechanism for atmospheric deposition) cannot comply with the CTR criteria. As graphically illustrated in Figures 11 and 12 of Attachment A, the concentration of pollutants in the falling rainwater is a substantial fraction of the concentration of those pollutants found in storm water runoff. This demonstrates that atmospheric deposition may be a large source of pollutants in storm water.

The conclusion contained in Attachment A further states that if Caltrans is required to comply with the water quality standards proposed in the CTR, it will be forced to install costly end-of-pipe treatment.

Application of the necessary treatment technologies statewide for all of Caltrans facilities and rights-of-way equates to an astronomical cost. These costs were not even considered in EPA's Economic Analysis for the CTR.

Requests:

* Caltrans requests that EPA clarify the language of the CTR Preamble to state that municipal storm water dischargers must only implement BMPs to reduce the discharge of pollutants to the MEP.

* If the Preamble is not adjusted as requested above, EPA must adjust the costs contained in its Economic Analysis to reflect the potential cost to Caltrans and other municipal storm water dischargers that may be required to meet water quality standards by implementing BMPs and/or advanced treatment technologies.

Response to: CTR-042-002

See response to CTR-040-004.

Comment ID: CTR-047-002
Comment Author: City of Santa Fe Springs
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/24/97
Subject Matter Code: J-04 End-of-Pipe Treatment v. BMP
References: Letter CTR-047 incorporates by reference letters CTR-013 and CTR-027.
Attachments? N
CROSS REFERENCES

Comment: In addition, we would like to emphasize the following key issues on the California Toxic Rule (CTR), which are of major impact to our storm water program:

2. The application of water quality standards to MS4 storm water discharges would result in end-of-pipe treatment to reasonably achieve compliance and provide limited environmental benefit. Putting aside the issue of whether water quality standards apply to MS4s, the CTR as presently proposed will require storm water agencies to incur significant cost with minimal improvement in water quality. Based on

studies conducted by the County of Sacramento and the Fresno Metropolitan Flood Control District, storm water discharges being controlled through an aggressive BMP-based program could not be certain of achieving the proposed water quality criteria. To achieve the criteria, end-of-pipe treatment would be necessary. It is reasonable to assume that other municipalities throughout California where special studies have not been conducted will not be able to meet the proposed criteria as well, requiring public agencies throughout California to collect and treat its storm-water discharges. This is unreasonable and is not consistent with the intent of the CWA.

Response to: CTR-047-002

See response to CTR-040-004.

Comment ID: CTR-080-002
Comment Author: City of Los Angeles
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: J-04 End-of-Pipe Treatment v. BMP
References: Letter CTR-080 incorporates by reference letters CTR-013 and CTR-027
Attachments? N
CROSS REFERENCES

Comment: The City of Los Angeles is hereby transmitting its comments regarding the proposed California Toxics Rule (CTR). I would like to begin by stating that the City currently spends an average of $28 million annually on its Stormwater Management Program. The majority of Program activities are guided by the Los Angeles County Municipal Stormwater Permit, which dictates the use of Best Management Practices to control pollutants to the maximum extent practicable. We are primarily concerned with how the CTR may impact the Stormwater Management Program.

* The City is concerned that the application of water quality standards to municipal separate storm sewers, may result in end-of-pipe treatment. There are issues regarding the feasibility and environmental benefits of such treatment.

Response to: CTR-080-002

See response to CTR-040-004.

Comment ID: CTRH-001-042
Comment Author: Kathy Russick
Document Type: Public Hearing
State of Origin: CA
Represented Org: Sacremento Co. Stormwater
Document Date: 09/17/97
Subject Matter Code: J-04 End-of-Pipe Treatment v. BMP
References:
Attachments? N

CROSS REFERENCES

Comment: As Dave Brent of the City of Sacramento mentioned already, we have evaluated the numeric limits proposed in the rule against six years of our stormwater programs' monitoring data. We have identified five constituents that will be a problem -- where we will likely have a problem in meeting the numeric discharge limits: copper, zinc, lead, PAHs and pentachlorophenol. These also show up as problem constituents for other stormwater programs in the state as well.

We evaluated the reductions that we could attain through intense BMP and source control efforts and determined that, if implemented, we still could not reduce the concentration of these constituents enough to meet the numeric limits. And this leads us inevitably to end-of-pipe treatment.

I would like to illustrate for you the obstacles that a stormwater program faces in meeting numeric limits. This past year the Sacramento Stormwater Program conducted an intense effort to evaluate specifically lead, a high-priority stormwater constituent of concern for us as well as EPA.

A major part of our effort was to identify all potential sources of lead to stormwater in Sacramento County. We identified about 50 individual sources of lead. So the next step in our effort was to determine which of these sources of lead we could actually control considering the nature of the sources, the practicality of controlling the sources, and the legal jurisdiction of our respective agencies, et cetera.

Only a portion of the sources that we identified we could address through source control and BMPs within our program. An example of some of those sources that we have no or very limited control over are: soil erosion, the natural soil erosion that just happens, not to do with construction; aircraft fuel emissions -- by the way, aircraft fuel does not come in unleaded form; automobile emissions, which still contain some lead; abrasion of road striping paint; and the abrasion of tires. These are to name a few.

Our program is now in the process of incorporating practical control measures that we did identify for lead into the various implementation elements of our program, particularly our Industrial Management Program, though we realize that we can only get at a portion of the lead sources in our stormwater.

I would like to note that we are initiating a similar source identification/source control effort for copper this year and anticipate similar results as we experienced for lead, that we will be able to address only a portion of the sources of copper in our stormwaters.

We, the Sacramento Stormwater Program, are not just throwing up our hands and giving up on controlling the problem constituents in our area. We are pursuing control measures and implementing BMPs to address those sources that we can address. And we are committed to continuing this effort.

We are implementing ever-escalating BMPs. We are striving toward maximum extent practicable in accordance with the Clean Water Act. But we have limited control over the pollution of our stormwater.

Now, after looking at lead sources in Sacramento, we are again back to end-of-pipe treatment. We're pushed to end-of-pipe treatment.

The price tag that has been estimated for end-of-pipe treatment for Sacramento County is $2 billion. That, amortized over 20 years, is $200 million per year. End-of-pipe treatment for municipal stormwater programs was never the intent of the Clean Water Act.

Plus, what would be achieved overall if we did end-of-pipe treatment in Sacramento County? The County makes up only a fraction of the Sacramento River watershed, and while we would spend $2 billion on end-of-pipe treatment, the majority of the stormwater occurring within the entire watershed would go unchecked.

In conclusion, I emphasize that the target of municipal programs should be maintained as the maximum extent practicable. If this is indeed the intent of the California Toxics Rule, then clarify that in the rule.

I would like to thank you for the opportunity to speak on behalf of Sacramento County today.

Response to: CTRH-001-042

EPA disagrees with the commenter's cost estimate of $2 billion because EPA does not believe that end-of-pipe treatment will be required to comply with the CTR. However, no details of the cost estimate were provided, thus, EPA could not evaluate the estimated cost. See also response to CTR-040-004.

Comment ID: CTRH-001-060b
Comment Author: Ellen Johnck
Document Type: Public Hearing
State of Origin: CA
Represented Org: Bay Planning Coalition
Document Date: 09/17/97
Subject Matter Code: J-04 End-of-Pipe Treatment v. BMP
References:
Attachments? N
CROSS REFERENCES B

Comment: Secondarily and thirdly -- these two are tied together, the whole -- all our members that comply and have to secure the stormwater permits, we have been looking at how much it would cost us to build facilities to do some kind of end-of-pipe treatment to actually meet some of these numeric criteria for stormwater.

We don't think the economic evaluation that EPA has done is valid. Basically, there are a lot of shortcomings to it, and you have already heard today some of the numbers. The actual amount of money needed to build new facilities is way beyond the $86 million estimate that you have indicated in your analysis.

And based on this very serious economic evaluation shortcoming, I am recommending that at least a 30-day time limit be provided so that you can hear from the permit applicants regarding the statement to show you what the costs really are, and we'd like some more time to do that.

Those are essentially the substance of my comments today. Thank you.

Response to: CTRH-001-060b

See response to CTR-040-004.

Comment ID: CTRH-002-002
Comment Author: Chris Compton
Document Type: Public Hearing
State of Origin: CA
Represented Org: County of Orange
Document Date: 09/18/97
Subject Matter Code: J-04 End-of-Pipe Treatment v. BMP
References:
Attachments? N
CROSS REFERENCES

Comment: Are the criteria attainable?

Orange County has developed and implemented a municipal stormwater quality management plan (also known as the Drainage Area Management Plan) which is applicable countywide. The Drainage Area Management Plan identifies a number of BMPs that address the major source categories of urban stormwater pollutants. These BMPs have been reviewed and approved by the respective regional water quality control boards. However, we have conducted a preliminary attainability analysis and have determined that, after considerable cost to fully implement a BMP-based program, it may not achieve compliance with proposed criteria for dissolved metals without regional or national product substitutions.

Although substantial public resources have been committed to implementation of this program, the municipal stormwater discharges in Orange County seem unlikely to attain all of the proposed criteria within the required compliance period. The alternative would be to collect and treat stormwater discharges as described in the Task Force testimony yesterday.

In addition to the capital cost, construction of these facilities would result in the displacement of jobs and housing as well as a loss of habitat. We believe that Congress intended municipal stormwater permits to implement programs to address sources of pollutants, not to provide end-of-pipe treatment to meet the numerical criteria.

Response to: CTRH-002-002

See response to CTR-040-004.

Subject Matter Code: J-05 BMPs Inability to Comply

Comment ID: CTR-040-025
Comment Author: County of Sacramento Water Div
Document Type: Storm Water Auth.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: J-05 BMPs Inability to Comply
References: Letter CTR-040 incorporates by reference letter CTR-027
Attachments? Y
CROSS REFERENCES

Comment: EPA erroneously assumes that municipal stormwater dischargers can comply with the water quality criteria with BMPs and that BMPs do not cost money. Both assumptions are incorrect as evidenced by attainability analyses performed by several municipal stormwater dischargers.

Response to: CTR-040-025

See response to CTR-040-004.

Comment ID: CTR-041-021
Comment Author: Sacramento Reg Cnty Sanit Dist
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: J-05 BMPs Inability to Comply
References:
Attachments? N
CROSS REFERENCES

Comment: EPA erroneously assumes that municipal stormwater dischargers can comply with the water quality criteria with BMPs and that BMPs do not cost money. Both assumptions are incorrect as evidenced by attainability analyses performed by several municipal stormwater dischargers.

Response to: CTR-041-021

EPA did not include benefits or costs of controlling nonpoint sources or storm water dischargers in its estimates of benefits and costs of the CTR. EPA believes that the final rule will not have a direct effect on sources not permitted under the NPDES program (e.g., nonpoint sources) or NPDES sources not typically subject to numeric water quality-based effluent limits (e.g., wet weather discharges). Any potential indirect effect on nonpoint sources and wet weather discharges, such as runoff from farms, urban areas, and abandoned mines, and contaminated sediment, is unknown at this time. Many of the programs developed to control nonpoint sources and wet weather discharges are already in place. Costs due to these programs have already been incurred or will soon be incurred owing to existing federal, State, and local environmental programs.

EPA also acknowledges that nonpoint sources and wet weather discharges are technically difficult to model and evaluate costs because they are intermittent and highly variable. Nonpoint source and wet weather discharges also occur under different hydrologic or climatic conditions than continuous discharges from industrial and municipal facilities, which are evaluated under critical low flow or drought conditions. Thus, evaluating agricultural nonpoint source discharges and storm water discharges and their effects on the environment is highly site-specific and data intensive.

See also response to CTR-040-004.

Comment ID: CTR-044-016
Comment Author: City of Woodland
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: J-05 BMPs Inability to Comply
References:
Attachments? N
CROSS REFERENCES

Comment: EPA erroneously assumes that municipal stormwater dischargers can comply with the water quality criteria with BMPs and that BMPs do not cost money. Both assumptions are incorrect as evidenced by attainability analyses performed by several municipal stormwater dischargers.

Response to: CTR-044-016

See response to CTR-040-004.

Comment ID: CTR-054-020
Comment Author: Bay Area Dischargers Associati
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: J-05 BMPs Inability to Comply
References:
Attachments? N
CROSS REFERENCES

Comment: EPA erroneously assumes that municipal stormwater dischargers can comply with the water quality criteria with BMPs and that BMPs do not cost money. Both assumptions are incorrect as evidenced by attainability analyses performed by several municipal stormwater dischargers.

Response to: CTR-054-020

EPA did not include benefits or costs of controlling nonpoint sources or storm water dischargers in its estimates of benefits and costs of the CTR. EPA believes that the final rule will not have a direct effect on sources not permitted under the NPDES program (e.g., nonpoint sources) or NPDES sources not typically subject to numeric water quality-based effluent limits (e.g., wet weather discharges). Any potential indirect effect on nonpoint sources and wet weather discharges, such as runoff from farms, urban areas, and abandoned mines, and contaminated sediment, is unknown at this time. Many of the programs developed to control nonpoint sources and wet weather discharges are already in place. Costs due to these programs have already been incurred or will soon be incurred owing to existing federal, State, and local environmental programs.

EPA also acknowledges that nonpoint sources and wet weather discharges are technically difficult to model and evaluate costs because they are intermittent and highly variable. Nonpoint source and wet weather discharges also occur under different hydrologic or climatic conditions than continuous discharges from industrial and municipal facilities, which are evaluated under critical low flow or drought conditions. Thus, evaluating agricultural nonpoint source discharges and storm water discharges and their effects on the environment is highly site-specific and data intensive.

See also response to CTR-001-002.

Comment ID: CTR-096-003b
Comment Author: City of Modesto
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: J-05 BMPs Inability to Comply
References:
Attachments? N
CROSS REFERENCES E-01c01

Comment: Thank you for the opportunity to comment on the proposed California Toxics Rule. The City's comments are related to five main concepts:

3. The cost implications of these numerical standards are estimated to exceed $100 million to the City of Modesto alone, thereby triggering the President's Executive Order 12866 requiring a more detailed and comprehensive cost-benefit assessment of these proposed standards.

Specifically, the City submits the following comments:

E. Under the proposed rule, Best Management Practices (BMPS) are recommended for compliance with the California Toxic Rule. BMPs may include a variety of processes. Each of these processes may have an associated construction and operation cost. For the City of Modesto, due to the design of the wastewater and stormwater collection systems, it may cost between $25 million to $50 million to construct acceptable BMPS. Existing BMPs may not reduce the pollutant level below that listed in the proposed CRT. Therefore, it is our opinion that construction costs presented in the California Toxic Rule are significantly under estimated. Constructed treatment facilities for wastewater and storm water, beyond BMPS, could exceed $1 00 million for Modesto alone. In addition, annual operation and maintenance costs for BMPs and treatment facilities exceed $1,000,000.

In summary, the proposed regulation is significant because it may well impose costs that are greater than $100 million per year on the regulated community, the majority of which are local public agencies. Regardless of the dollar amount, it is likely to adversely affect, in a material way, the economy, the environment, and local governments.

Thank you in advance for consideration of my comments on the CTR.

Response to: CTR-096-003b

With respect to wet-weather compliance with the CTR see response to CTR-040-004. With respect to EPA's compliance with E.O. 12866 see CTRH-002-006a (Category I; Stormwater/Wet Weather Discharges).

Subject Matter Code: J-06 NEPA

Comment ID: CTR-001-009b
Comment Author: Law Offices of Alan C. Waltner
Document Type: Storm Water Auth.
State of Origin: CA
Represented Org: Almeda Cnty Clean Wtr Pgm
Document Date: 09/22/97
Subject Matter Code: J-06 NEPA
References:
Attachments? N
CROSS REFERENCES F

Comment: THE PROPOSAL VIOLATES THE NATIONAL ENVIRONMENTAL POLICY ACT AND ENDANGERED SPECIES ACT, AND WOULD USURP THE ROLE OF CONGRESS AND THE STATE AND REGIONAL BOARDS

Major environmental impacts of controls could also be foreseen if the water quality standards of the proposed CTR were to apply as numeric effluent limitations or wasteload allocations. This would result in the requirement to prepare an EIS in connection with the proposed rule. (*13) In effect, substantial end-of-pipe treatment facilities on the same order of magnitude as existing POTWs in the Bay Area could be necessary.

Given the scale and location of the facilities that would be required, significant wetland, endangered species and other environmental impacts could occur. EPA must fully evaluate these impacts of the proposed rule before the rule is promulgated. (*14)

A more expansive application of the WQS also would usurp the basin planning process to the extent that the regional boards have included textual discussions of how ambient water quality criteria are to be implemented, particularly with respect to MS4s. The San Francisco Basin Plan states generally that WQS are to be addressed by MS4s through escalating BMPs. EPA has not taken action to disapprove the San Francisco Basin Plan and cannot implicitly repeal portions of that plan through inconsistent preamble language in the currently proposed rule.

Congress has already addressed this significant public policy question and the agency cannot shed its Congressional leash and arrogate legislative power. This is particularly true given the massive expenditures of public funds that could be implicated under at least the more expansive view of what EPA has proposed. We elect our representatives in Congress to balance these major questions, such as the matter of whether local funds should be siphoned from schools, police, infrastructure, etc., to fund storm water controls at the scale necessary to meet WQS regardless of cost. Congress has determined in Section 402(p) that MS4s need only adopt controls to reduce pollutants in storm water to the maximum extent practicable, and to effectively prohibit non-storm water discharges to the storm water system, rather than being subjected to infeasible or exorbitantly expensive numeric effluent limitations.(*15)

(*13) To the extent that the CTR will force development of end of-pipe treatment systems, promulgation of the CTR will represent a major federal action significantly affecting the quality of the human environment under the National Environmental Policy Act, triggering the requirement to develop an environmental impact statement to support the rule.

(*14) Commenters have been limited in their ability to present specific information on the question of endangered species, wetland and other environmental impacts given the short comment period on the proposal and EPA's refusal to extend that comment period.

(*15) In Sections 402(p)(5) and (6)f Congress also directed that the approach to meeting water quality standards should MEP-level controls on major dischargers fall short would be to study and expand the scope of the program to include additional dischargers. No mention is made of subjecting major MS4s to more stringent controls. In fact, the regulations are expressly required to target stormwater discharges, other than those discharges described in paragraph (2) [major MS4s], to be regulated to protect water quality - 33 U.S.C. section 1342(p)(6) (Emphasis added).

Response to: CTR-001-009b

With respect to compliance with NEPA, section 511(c) of the Clean Water Act excludes this rulemaking from the requirements of NEPA. The comment also assumes that stormwater discharges subject to numeric effluent limitations will have to be treated by new end-of-pipe facilities. As explained in the response to Storm Water Economics Comments (Category J, Comment CTR-040-004), EPA believes that implementation of criteria as applied to wet-weather discharges will not require the construction of end-of-pipe facilities.

The purpose of the CTR is to fill the current gaps in water quality criteria in inland surface waters and enclosed bays and estuaries. Any existing provisions in a State Basin Plan that have been approved by the State and EPA would not be negated by the preamble discussion in the CTR.

Regarding the application of MEP under section 402(p) of the CWA see response to CTR-040-004.

Comment ID: CTRH-001-009a
Comment Author: Doug Harrison
Document Type: Public Hearing
State of Origin: CA
Represented Org: Fresno Met. Flood Control
Document Date: 09/17/97
Subject Matter Code: J-06 NEPA
References:
Attachments? N
CROSS REFERENCES F

Comment: Lastly, it's been fairly well documented by EPA testimony before the Congress and by other state stakeholders' concerns about the end-of-pipe mandate, because the end-of-pipe facilities that must be constructed in effect create substantial damage to the riparian and other waters of the U.S. that are of primary concern to us.

With that potential, then certainly NEPA and the Endangered Species Act would require an evaluation of the impact associated with a rule causing or leading to those impacts. And again, the current rule does not consider that nor any of the cost or other impacts related to stormwater programs.

So there is a huge consistency or inconsistency problem that we think must be corrected for the rule to be consistent with the statutes and with your executive orders.

Thank you.

Response to: CTRH-001-009a

Subject Matter Code: K Watershed Approach

Comment ID: CTR-021-003
Comment Author: LeBoeuf, Lamb, Green & MacRae
Document Type: Local Government
State of Origin: CA
Represented Org: City of Sunnyvale
Document Date: 09/25/97
Subject Matter Code: K Water Shed Approach
References: Letter CTR-021 incorporates by reference letter CTR-035
Attachments? Y
CROSS REFERENCES

Comment: Sunnyvale has long been an advocate of watershed planning at the local level, and it is an enthusiastic charter participant in the Watershed Planning Initiative for the South Bay (the "WPI"). We believe that the WPI has significant potential to set the pace for "place-based" watershed management planning throughout the San Francisco Bay area, if not in California. The CTR-based criteria, particularly those for metals, will form the starting point for the water modeling which will lead to a TMDL and a wasteload allocation/load allocation for the South Bay. Accordingly, we have devoted significant time and resources to the joint efforts of our sister cities in the South Bay to work with EPA, the Regional Water Quality Control Board, affected industry, and the environmental community to make the WPI work. We believe that the WPI will be a credit to EPA's leadership and willingness to devote the considerable resources required.

In conclusion, we are entirely supportive of many of EPA's innovative approaches towards development of the CTR, particularly as regards the toxic metals. However, we believe that EPA has needlessly failed to comply with many of its legal obligations, particularly as regards the development of human health-based criteria on cancer risk levels of organic pollutants. We urge the Agency to reconsider its position in the matters covered by this letter (as amplified by the EOA Letter) and the CASA/Tri-TAC letter. Sunnyvale pledges its continued participation in place-based watershed management planning in the South Bay, its cooperation with the Agency in making a success of the WPI, and to an ongoing effort by the Agency and others to reach water quality goals in the South Bay. We thank you for the opportunity to comment on the proposed CTR.

Response to: CTR-021-003

EPA appreciates the commenter's support and significant participation in the Watershed Planning Initiative for the South Bay.

Comment ID: CTR-032-002f
Comment Author: Las Gallinas Val. Sanitry Dist
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: K Water Shed Approach
References: Letter CTR-032 incorporates by reference letter CTR-035
Attachments? N

CROSS REFERENCES G-01
C-22
G-09
C-24a
C-24
G-04
G-05
G-02

Comment: Regulatory Flexibility and Relief

The District supports EPA's use of "sound science" and current data in developing the proposed criteria in the California Toxics Rule (CTR). The District strongly supports language in the Preamble that references and endorses recommendations of the State Task Forces including use in permitting of:

* reasonable potential analyses * dissolved metals criteria * translators * water effects ratios * site specific objectives * innovative TMDL processes such as effluent trading * performance based interim limits * chronic and acute mixing zones, and * compliance schedules in NPDES permits.

Response to: CTR-032-002f

EPA appreciates the commenter's support of the preamble language concerning the State's use of innovative TMDL processes such as effluent trading.

Comment ID: CTR-032-007
Comment Author: Las Gallinas Val. Sanitry Dist
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: K Water Shed Approach
References: Letter CTR-032 incorporates by reference letter CTR-035
Attachments? N
CROSS REFERENCES

Comment: Watershed Management Based Permitting Approach

Since POTWs are only responsible for contributing 1-10% of the toxics mass loading (including copper and mercury) to San Francisco Bay (CTR P. 7-7 EA) it makes economic sense to focus limited public resources on identification of larger and potentially more cost-effective sources to control. The District strongly believes that future permits should be developed using a comprehensive watershed management based approach, consistent with various EPA guidance including the August 1997 Robert Perciasepe TMDL Policy memorandum and the San Francisco Bay Regional Board's July 1997 Watershed Management Initiative Guidance.

The District supports the watershed approach where before additional control measures are imposed on point source dischargers, other potential sources of copper and mercury in the watershed that impact the receiving water need to be identified, quantified, and evaluated as to the potential cost of control

measures. Effluent trading should be permitted and encouraged where it is demonstrated to be a more cost effective pollutant reduction technique than additional point source treatment. We support the use of interim limits with compliance schedules linked to completion of special studies, in situations such as ours where compliance with final mercury and copper limits is not feasible and additional information is required to develop technically defensible and attainable final limits.

Response to: CTR-032-007

EPA appreciates District's support of the watershed management approach and its use in developing permits. However, EPA does not agree that the watershed approach should be applied in such a manner that would preclude additional point source controls until the impact of other sources of pollutants are "... identified, quantified, and evaluated as to the potential cost of control measures." We believe that TMDL development can be an effective tool to conduct such an evaluation and that TMDLs will be a component of many effective watershed management strategies.

EPA agrees with the District that pollutant trading can be a cost effective means of attaining compliance with water quality standards. EPA believes that TMDLs can provide the necessary analytical framework to implement a trading program. EPA will continue to encourage the State to evaluate such programs and will work with the State to ensure that such programs are designed equitably and do not result in the creation of "hot" spots in the watershed (See Draft Framework for Watershed-Based Trading, U.S. EPA 1996).

Comment ID: CTR-034-011
Comment Author: SCAP
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: K Water Shed Approach
References: Letter CTR-034 incorporates by reference letter CTR-035
Attachments? N
CROSS REFERENCES

Comment: * As noted in our testimony at the September 18 public hearing, SCAP recommends that EPA describe in the Preamble the Agency's strategy for using a watershed management approach for controlling toxic pollutant inputs to the environment. This is particularly appropriate for pollutants which come primarily from nontraditional sources, are in the ambient environment primarily as a result of historical discharges (e.g. DDT, PCBs), and/or are difficult or very costly to control using end-of-pipe treatment. We believe that it is also appropriate to adopt a watershed approach for pollutants which are known to cause environmental harm - due to bioaccumulation, or other characteristics - but which are below detection levels.

Response to: CTR-034-011

EPA acknowledges the comment suggesting that it describe in the preamble the watershed management approach for controlling toxic pollutants into the environment. We believe that a detailed discussion of the watershed management approach is more appropriate in documents dedicated to the topic. Several documents already exist including EPA's Draft Framework for Watershed-Based Trading, dated May

1996, and EPA's Guidance for Water Quality-based Decisions: the TMDL Approach, dated April 1991. The preamble to the CTR contains information specific to the promulgation of the CTR. EPA appreciates the commenter's request for information and hopes that the documents listed above are informative.

Comment ID: CTR-035-003
Comment Author: Tri-TAC/CASA
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: K Water Shed Approach
References:
Attachments? N
CROSS REFERENCES

Comment: Third, with respect to the criteria proposed for adoption in the draft CTR and implementation issues discussed in the preamble to the CTR, we wish to make the following recommendations to EPA.

- Consistent with EPA's Watershed Approach Framework and NPDES Watershed Strategy, EPA should describe in the Preamble the Agency's strategy for implementing a watershed management approach to achieve the CTR criteria in California, particularly since, as EPA's Economic Analysis for the CTR found, many -- if not most of the criteria will not be achieved solely with point source controls (U.S. EPA, 1996a and 1994a).

Response to: CTR-035-003

EPA acknowledges the comment suggesting that it include and describe in the preamble its strategy for implementing a watershed approach to achieve water quality standards based on CTR criteria. Please see response to CTR-034-011. The watershed approach is a flexible approach which may vary widely between water bodies in different situations. Since the State will create and implement a watershed management approach, EPA cannot prescribe an approach or strategy for the State to achieve water quality standards based on CTR criteria for all California water bodies. Various EPA publications exist for states and dischargers to use in developing strategies best suited for particular water quality situations for specific water bodies. These publications include those the commenter noted. EPA supports the State's use of a watershed management approach to implement CTR-based water quality standards for particular water bodies and pollutants.

Comment ID: CTR-036-011
Comment Author: County of Orange
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: K Water Shed Approach
References: Letter CTR-036 incorporates by reference letters CTR-013, CTR-018, CTR-031, CTR-034 and CTR-040

Attachments? N
CROSS REFERENCES

Comment: We are concerned that the proposed rule reflects a reversal to the comrnand-and-control approach of water quality regulation and marks a policy shift away from the community-driven 'watershed' approach that EPA has been promoting. Orange County has a number of fledgling 'watershed' programs that we feel offer potential to effectively prioritize the approaches to be taken on a watershed-specific basis.

Response to: CTR-036-011

EPA disagrees with the comment that the CTR reflects a reversal to the command and control approach and marks a policy shift away from the watershed approach. The CTR merely sets into place water quality criteria for the State of California. These criteria, combined with the State-adopted beneficial uses, create water quality standards which are necessary to set bench marks for the State's water quality control programs, strategies, and approaches. The methods used to achieve the standards will continue to be through NPDES permits and other State programs, including programs which may utilize the watershed management approach. EPA continues to encourage and support the State's use of the watershed management approach to achieve water quality standards in various water quality control programs, and for appropriate situations.

Comment ID: CTR-059-014
Comment Author: Los Angeles County Sanit. Dist
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: K Water Shed Approach
References: Letter CTR-059 incorporates by reference letter CTR-035

Attachments? Y
CROSS REFERENCES

Comment: Watershed Management

The Sanitation Districts recommend that EPA describe in the Preamble the Agency's strategy for using a watershed management approach for controlling toxic pollutant inputs to the environment. This is particularly appropriate for pollutants which come primarily from nontraditional sources, are in the ambient environment primarily as a result of historical discharges (e.g. DDT, PCBs), and/or are difficult or very costly to control using end-of-pipe treatment. We also believe that a watershed approach is the appropriate way to address pollutants which are known to cause environmental harm -- due to bioaccumulation, or other characteristics -- but which are below detection levels. We particularly encourage EPA to use a flexible watershed-based approach in implementing the CTR in the types of situations described above, where a point source-oriented command-and-control strategy is not likely to be effective.

Response to: CTR-059-014

In response to the comment that EPA should describe in its preamble the watershed management approach to achieve CTR-based water quality standards, please see response to CTR-035-003.

Comment ID: CTR-067-004b
Comment Author: Ojai Valley Sanitary District
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: K Water Shed Approach
References:
Attachments? N
CROSS REFERENCES E-01n

Comment: * In addition, EPA cannot make an accurate determination of the costs and benefits of promulgating CTR criteria for those criteria that are below achievable detection limits. Because detection limits for some pollutants will most likely improve in the near future, dischargers who are reporting regulatory compliance with current detection limits may not be in compliance when lower detection limits are achievable. OVSD (and likely other dischargers as well) have historically been required to report pollutant results with little regard to the detection limit achieved by the contract laboratory conducting the testing. This may have led to EPA's grossly under estimating the cost impact of the CTR. Detection limits of many priority pollutants identified in the CTR are actually lower than those achieved during recent special testing of OVSD's effluent to identify low pollutant levels. Therefore, the potential compliance costs to our commercial and residential dischargers could be significant, yet the Economic Analysis for the draft CTR could not estimate such costs. As a more reasonable alternative, OVSD recommends that a watershed approach be used to address these pollutants. OVSD's receiving water (the Ventura River) is currently managed using the watershed approach.

Response to: CTR-067-004b

In response to the comment that EPA should use a watershed approach to address CTR-based water quality standards, please see response to CTR-035-003.

Comment ID: CTR-083-002
Comment Author: Fairfield-Suisun Sewer Dist.
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: K Water Shed Approach
References: Letter CTR-083 incorporates by reference letters CTR-035 and CTR-054
Attachments? N
CROSS REFERENCES

Comment: * The District supports EPA Headquarters' Watershed Approach Framework and NPDES Watershed Strategy. We believe the CTR should address the EPA Region IX strategy for implementing

this management approach for pollutants with attainability issues. This is particularly crucial when regulating bioaccumulative pollutants, such as mercury. Region IX's commitment to this approach will insure appropriate consideration is given to watershed management strategies by State agencies when implementing the CTR.

Response to: CTR-083-002

EPA acknowledges the commenter's support for the watershed management approach. However, in response to the comment that EPA address the watershed management approach in the CTR for pollutants with attainability problems, please see response to CTR-035-003. EPA continues to support the State's use of the watershed management approach where appropriate.

Comment ID: CTRH-002-015
Comment Author: Lisa Ohlund
Document Type: Public Hearing
State of Origin: CA
Represented Org: Alliance of So. CA POTWs
Document Date: 09/18/97
Subject Matter Code: K Water Shed Approach
References:
Attachments? N
CROSS REFERENCES

Comment: We suggest that EPA give consideration to using a watershed management approach to achieve the clean water goals for controlling toxic pollutant inputs into the environment rather than the traditional "command and control" approach, and that a strategy for doing this be included in the preamble to the rule. This is particularly appropriate for pollutants which come primarily from nontraditional sources and are difficult or very costly to control using end-of-pipe treatment.

Response to: CTRH-002-015

EPA agrees with the comment that the watershed management approach should be used for controlling toxic pollutants in certain situations. Please see response to CTR-035-003.

Subject Matter Code: K-01 TMDLs

Comment ID: CTR-004-006
Comment Author: South Bayside System Authority
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/24/97
Subject Matter Code: K-01 TMDLs
References:
Attachments? N
CROSS REFERENCES

Comment: Available Regulatory Relief under the California Toxics Rule

The Preamble to the California Toxics Rule (CTR), and the rules accompanying Economic Analysis (EA), place a great deal of emphasis on the ability of dischargers to use alternative regulatory approaches to comply with CTR criteria if the cost of treatment technology was prohibitively expensive. For example, the EA assumes that, if the estimated annualized cost for removing a pollutant exceeded a cost trigger,(*1) "dischargers would explore the use of alternative regulatory approaches to comply with CTR-based effluent limits." EA at. pg. 4 (emphasis added). Based on this assumption, no treatment cost was estimated for the facility. (*2)

The types of alternative regulatory approaches assumed available for dischargers in California include phased total maximum daily loads (TMDLs), water quality standard variances, site-specific criteria, change in designated use, and alternative mixing zones. EA at pg. 4-5. The following sections will discuss each of EPA's proposed methods for regulatory relief and explain whether or not these methods can truly be used to provide relief from the CTR-based permit limits as anticipated by EPA. It should be noted that the actual language of the rule itself does riot mention any of the methods of regulatory relief. Therefore, this analysis will be based solely upon the language contained in the Preamble to the CTR.

Total Maximum Daily Loads (TMDLS)

The majority of the discussion of TMDLs contained in the Preamble to the CTR is merely a reiteration of the requirements of the Clean Water Act (CWA) and the existing regulations. See CTR at pg. 42185-6; see accord 33 U.S.C. Section 1313(d)(1)(C) and 40 C.F.R. Section 130.7. However, the Preamble discussion also contains recommendations regarding the implementation of TMDLs that merit some review.

First, EPA recommends that, since the TMDL process can be significantly labor and data intensive, collaborative efforts to establish TMDLs on water quality limited water bodies should be pursued. EPA envisions that this collaborative effort by dischargers, the State, EPA, and other stakeholders, could distribute work and associated costs between the interested parties, as well as shorten the overall time necessary to complete the analyses. See CTR at pg. 42185-6. This language attempts to alter the current statutory and regulatory language requiring that States must perform TMDLS, which are then submitted for EPA approval. If EPA is now proposing to allow other entities or coalitions to be able to establish TMDLS, this authority must be placed in the language of the rule itself, if not in an amendment to the CWA.

Second, EPA recommends innovative alternatives to traditional "pounds per day" TMDLS. The regulations and EPA guidance reviewed regarding TMDLs did not mention whether TMDLs had to be established as "pounds per day," The regulations define of "load" as "an -amount of matter, . . that is introduced into a receiving water" (40 C.F.R. Section 130.2(c)) and discuss TMDLs in terms of either mass per time, toxicity, or other appropriate measure" (40 C.F.R. Section 130.2(I)). These definitions seem to be flexible enough to allow for EPA's recommended alternatives to "traditional pounds per day TMDLS."

A third recommendation pertained to effluent or pollutant trading. In the Preamble to the CTR, EPA encourages innovative approaches such as effluent trading as a method to attain and/or maintain water quality standards. The Preamble at page 42185 describes effluent trading as follows:

Effluent trading allows sources that can control pollutants beyond compliance with current requirements to sell or trade credits for its excess reduction to in other source unable to control its own pollutants is effectively or as efficiently. The goal of an effluent trading program is to achieve similar or improved environmental results in a more cost-effective manner than under current regulatory structures. EPA's most current policy on effluent trading is summarized in the "Policy Statement for Effluent Trading in Watersheds" which was issued in January of 1996 and which reiterates President Clinton's commitment to effluent trading as expressed in the March 16, 1995 report on "Reinventing Environmental Regulation." The Policy states that the "EPA will work cooperatively with key stakeholders to find sensible, innovative ways to meet water quality standards quicker and at less cost than traditional approaches alone." The policy outlines several different types of trades that may take place. These trades include but are not limited to the following; (1) Intra-plant trading between outfalls within one facility; (2) pretreatment trading between indirect industrial point sources that discharge to a POTW; (3) point to point source trading, point to nonpoint source trading, and nonpoint to nonpoint source trading.

The existing regulations and EPA guidance relating to TMDLs already contemplate some form of pollutant trading.(*3) However, the regulations currently do not specifically allow the degree of trading outlined in the Preamble. To clarify that this is now EPA policy, EPA should propose language to that effect within the regulatory language itself.

The final recommendation EPA makes related to TMDLs addresses the use of interim permit limits when a TMDL/WLA/LA or other special study is underway but not completed. The Preamble gives guidance on how interim limits should be calculated. EPA states that "past performance and future uncertainty can be considered as factors in determining interim permit limits; however, permitting authorities may consider other factors, particularly factors concerning the water quality of the receiving water body and the overall goal to attain the water quality standard." EPA further states that it supports innovative ideas such as using specific method for determining interim limits and "trigger" concentrations above which corrective action would be necessary. Furthermore, EPA notes that the State, as the permitting authority, has broad discretion in determining how interim permit limits should be ascertained in different situations. CTR Preamble at pg. 42184-5. This language is helpful, but it should be placed into the rule so that it has the force of law and may be utilized as such.

As a Final note regarding the use of TMDLs as a form of regulatory relief, it should be noted that theuse of less restrictive effluent limitations based on TMDLs and interim limits is limited by the TMDL process itself as well as the antibacksliding provisions of the CWA. EPA guidance recognized these facts in its TMDL guidance with the following statement:

In developing a TMDL it is important to keep in mind certain constraints on the WLA [wasteload allocation] portion that are imposed by antibacksliding regulatory provisions. The WLA will normally

result in new or more stringent water quality-based limits than those contained in a previously issued permit. In a limited number of cases, however, it is conceivable that less stringent water quality-based limits could result. In these cases, permit limits must conform to the antibacksliding provisions contained in section 402(o) of the CWA. (*4)

(*1) This cost trigger is $200 per toxic pounds-equivalent for a facility under the low-end scenario, and $500 per toxic pounds-equivalent for a category of dischargers under the high-end scenario, See EA at pg. 4.

(*2) In addition, pollutant load reductions word not calculated or credited for any pollutant for which an alternative regulatory approach was pursued. Id.

(*3) See 40 C.F.R. Section 130.2(I) ("If Best Management Practices (BMPS) or other nonpoint source pollution controls make more stringent load allocations practicable, then wasteload allocations can be made less stringent. Thus, the TMDL process provides for nonpoint source control tradeoffs."); see also EPA, Guidance for Water Quality-based Decisions: The TMDL Process, EPA Doc. No. 440/4-91-001 it pg. 51 (April 1991).

(*4) EPA, Guidance for Water Quality-based Decisions: The TMDL Process, EPA Doc. No. 440/4-91-001 at pg. 20 (April 1991) (Emphasis added)

Response to: CTR-004-006

EPA does not agree that a collaborative approach to TMDL development described in the preamble to the proposed CTR requires a change in statutory or regulatory language. Currently, the State's process for TMDL approval includes amendment of the affected Regional Board's Basin Plan, which requires approval by the State Water Resources Control Board and the Office of Administrative Law, prior to submital to EPA. The collaborative approach which EPA supports does not allow any other entity beside the State to establish TMDLs. The basis for the TMDL (e.g. the technical work) can be performed by other entities. That technical work can then be submitted by the State to EPA as part of the supporting documentation of the State-established TMDL.

EPA agrees with the commentor that current Federal regulations provide for flexibility in the manner that TMDLs are expressed. The commentor asserts that regulations do not specifically allow the degree of trading outlined in the preamble to the proposed rule. The current regulations do not prohibit the trading described in the preamble. TMDLs can provide the necessary analytical framework to ensure that trades are equitable and do not result in the creation of "hot spots".

With respect to TMDLs as a form of regulatory relief, the commentor asserts that EPA guidance indicates that little relief can occur for the waste load allocation portion of the TMDL due to anti-backsliding provisions of section 402(o) of the Clean Water Act. EPA believes that section 303(d)(4) of the Clean Water Act specifically allows for less restrictive effluent limits as long as such limits are consistent with an approved TMDL. However, these issues concerning TMDLs are outside the scope of this rule, and the rules concerning TMDLs may change.

In response to the commentor's discussion concerning the different regulatory relief approaches that EPA discusses in its Economic Analysis, please see response to CTR-032-004.

Comment ID: CTR-021-002d
Comment Author: LeBoeuf, Lamb, Green & MacRae
Document Type: Local Government
State of Origin: CA
Represented Org: City of Sunnyvale
Document Date: 09/25/97
Subject Matter Code: K-01 TMDLs
References: Letter CTR-021 incorporates by reference letter CTR-035
Attachments? Y
CROSS REFERENCES G-04; C-24a; C-22; G-05; G-02

Comment: Sunnyvale is very supportive of many fine concepts advanced in the proposed CTR, and we join with CASA/Tri-TAC in complimenting the Agency on its proposed positions with regard to such matters as: (a) the use of interim effluent limitations in NPDES permits during the pendency of TMDL and other special studies; (b) the allowance of water effects ratios in adjusting the criteria for metals without the necessity for additional rulemaking to establish site-specific objectives; (c) the use of the dissolved state for the metals criteria; (d) the use of cooperative, intergovernmental, and stakeholder-involved approaches towards the development of TMDLs;(e) the allowance of dilution for both chronic and acute pollutants; and (f) the allowance of compliance schedules in NPDES permits.

Response to: CTR-021-002d

EPA appreciates the commenter's support of EPA's preamble discussion concerning the State's use of cooperative approaches toward the development of TMDLs.

Comment ID: CTR-034-012b
Comment Author: SCAP
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: K-01 TMDLs
References: Letter CTR-034 incorporates by reference letter CTR-035
Attachments? N
CROSS REFERENCES G-04

Comment: * SCAP supports EPA's discussion in the Preamble regarding the use of interim permit limits while Total Maximum Daily Loads.(TMDLs) and other special studies are being performed. We strongly urge EPA to support the use of the SWRCB Permitting Task Force's recommended approach for deriving interim permit limits.

Response to: CTR-034-012b

EPA appreciates the commenter's support of the discussion in the preamble concerning the State's use of interim permit limits while TMDLs or other special studies are being developed. EPA supports the State's consideration of the stakeholder Task Force recommendations to help deal with these issues.

Comment ID: CTR-035-002g
Comment Author: Tri-TAC/CASA
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: K-01 TMDLs
References:
Attachments? N
CROSS REFERENCES C-22; C-01a; C-08a; G-05; G-04; G-09; C-24a

Comment: Second, we commend EPA for its inclusion in the CTR of several innovative and flexible regulatory approaches, such as metals criteria expressed as dissolved rather than total recoverable concentrations, and the revised human health criterion for mercury. In addition, in light of the issues surrounding the human health criteria for arsenic we support EPA's decision not to promulgate human health criteria at this time. With respect to implementation issues discussed in the Preamble, we support EPA's policies and guidance regarding the application of mixing zones and dilution credits. the use of interim permit limits while Total Maximum Daily Loads (TMDLs) and other special studies are being performed, and EPA's guidance to Regional Water Quality Control Boards (RWQCBs) that they may use any of the methods described in EPA's guidance document on the use of translators. We also support EPA's proposal to create a rebuttable presumption for Water Effects Ratios (WERs), allowing the RWQCBs and SWRCB to develop site-specific WERs that can be approved by EPA during the NPDES permit approval process. We believe that this approach will help facilitate the development of appropriate site-specific adjustments for metals criteria.

Response to: CTR-035-002g

EPA appreciates the commenter's support of the discussion in the preamble concerning the State's use of interim permit limits while TMDLs or other special studies are being developed.

Comment ID: CTR-035-032a
Comment Author: Tri-TAC/CASA
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: K-01 TMDLs
References:
Attachments? N
CROSS REFERENCES K-03

Comment: C. Implementation Issues pp. 42184-42185 -- Total Maximum Daily Loads (TMDLs) We agree with EPA's statements in the Preamble in support of the recommendations of the Permitting and Compliance Issues Task Force regarding the benefits of collaborative approaches to developing TMDLs. We also endorse the State's and EPA's policy to allow innovative alternatives to traditional "pounds per day" TMDLs, and suggest that EPA expand this reference in the Preamble to include the concept of "quantifiable targets," under which TMDLs could be expressed as a mass loading, a concentration, a

percent reduction, an ecosystem improvement, or a degree of implementation of a control measure (such as a best management practice) (see SWRCB, 1995, Part VI).

EPA also encourages the use of innovative approaches such as effluent trading, within the TMDL framework. While we support the concept of effluent trading, we do have concerns about how EPA intends for it to be implemented. For instance, in comments submitted to EPA on September 6, 1996 on EPA's Draft Framework for Watershed-Based Trading (May 1996), we pointed out that the proposed framework was overly prescriptive and, as a result, would likely significantly restrict watershed-based trading in California. A few of the barriers to trading we identified in the draft framework include: provisions limiting the duration of trades to the five year term of NPDES permits; limitations on the effect of trades on existing effluent limits, compliance schedules or enforcement actions; discouragement of trading for toxic pollutants; and inequitable requirements for point sources to demonstrate a "reasonable assurance" that a trade will be successful. We recommend that EPA include language in the Preamble to the CTR emphasizing a flexible approach to both TMDLs and effluent trading; that trading is voluntary for all involved parties; and that interim limits will be placed in NPDES permits while the necessary ambient data arc gathered and analytical tools are developed.

Response to: CTR-035-032a

EPA appreciates the commenter's support of the preamble discussion concerning the State's use of cooperative approaches toward the development of TMDLs and concerning the State's use of innovative alternatives to traditional "pounds per day" TMDLs. The commenter suggests that EPA expand the reference to include the concept of "quantifiable targets", under which "TMDLs could be expressed as a mass loading, a concentration, a percent reduction, an ecosystem improvement, or a degree of implementation of a control measure". Currently, TMDLs must be established to implement the applicable water quality standard and may be expressed in terms of mass per time, toxicity, or other appropriate measure (40 CFR 130.2(i)). Other appropriate measures include mass loading, concentration, or other indicators. The analysis supporting the TMDL must describe how the TMDL will result in the attainment of water quality standards; numeric targets are usually included in calculations to interpret applicable standards and provide the basis for TMDL calculations. Although implementation of control measures or best management practices (BMPs) will often be a component of the State's TMDL implementation plan, degree of BMP implementation will not suffice as a TMDL because this approach does not clearly demonstrate that water quality standards will be attained. Moreover, since the manner of BMP implementation often determines the effectiveness of the BMP (i.e. there is a high degree of uncertainty in the effectiveness of the BMP), the use of such a "quantifiable target" would require the use of a prohibitively large margin of safety and thus, may be infeasible. These issues, however, are beyond the scope of the CTR, and rules for TMDLs may change.

The commenter also recommends that EPA include language in the preamble emphasizing a flexible approach to both TMDLs and effluent trading; that trading is voluntary for all parties; and that interim limits will be placed in NPDES permits while the necessary data and analytical tools are developed. The preamble to the proposed rule summarized the available flexibility in both TMDLs and effluent trading, as well as supported the State's use of interim permit limits during the development of TMDLs. EPA agrees that effluent trading should be voluntary and believes that TMDLs can provide the analytical framework to support trades. However, as noted above, this is beyond the scope of the CTR, and rules for TMDLs may change.

Comment ID: CTR-040-048

Comment Author: County of Sacramento Water Div
Document Type: Storm Water Auth.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: K-01 TMDLs
References: Letter CTR-040 incorporates by reference letter CTR-027
Attachments? Y
CROSS REFERENCES

Comment: The Preamble to the California Toxics Rule (CTR), and the rules accompanying Economic Analysis (EA), place a great deal of emphasis on the ability of dischargers to use alternative regulatory approaches to comply with CTR criteria if the cost of treatment technology was prohibitively expensive. For example, the EA assumes that, if the estimated annualized cost for removing a pollutant exceeded a cost trigger,(*1) "dischargers would explore the use of alternative regulatory approaches to comply with CTR-based effluent limits." EA at.pg. 4 (emphasis added). Based on this assumption, no treatment cost was estimated for the facility.(*2)

The types of alternative regulatory approaches assumed available for dischargers in California include phased total maximum daily loads (TMDLs), water quality standard variances, site-specific criteria, change in designated use, and alternative mixing zones. EA at pg. 4-5. The following sections will discuss each of EPA's proposed methods for regulatory relief and explain whether or not these methods can truly be used to provide relief from the CTR-based permit limits as anticipated by EPA. It should be noted that the actual language of the rule itself does not mention any of the methods of regulatory relief. Therefore, this analysis will be based solely upon the language contained in the Preamble to the CTR.

Total Maimum Daily Loads (TMDLs)

The majority of the discussion of TMDLs contained in the Preamble to the CTR is merely a reiteration of the requirements of the Clean Water Act (CWA) and the existing regulations. See CTR at pg. 42185-6; see accord 33 U.S.C. section 1313(d)(1)(C) and 40 C.F.R. section 130.7. However, the Preamble discussion also contains recommendations regarding the implementation of TMDLs that merit some review.

First, EPA recommends that, since the TMDL process can be significantly labor and data intensive, collaborative efforts to establish TMDLs on water quality limited water bodies should be pursued. EPA envisions that this collaborative effort by dischargers, the State, EPA, and other stakeholders, could distribute work and associated costs between the interested parties, as well as shorten the overall time necessary to complete the analysis. See CTR at pg. 42185-6. This language attempts to alter the current statutory and regulatory language requiring that States must perform TMDLs, which are then submitted for EPA approval. If EPA is now proposing to allow other entities or coalitions to be able to establish TMDLs, this authority must be placed in the language of the rule itself, if not in an amendment to the CWA.

Second, EPA recommends innovative alternatives to traditional "pounds per day" TMDLs. The regulations and EPA guidance reviewed regarding TMDLs did not mention whether TMDLs had to be established as "pounds per day." The regulations define of "load" as "an amount of matter . . . that is introduced into a receiving water" (40 C.F.R. section 130.2(e)) and discuss TMDLs in terms of either mass per time, toxicity, or other appropriate measure" (40 C.F.R. section 130.2(i)). These definitions

seem to be flexible enough to allow for EPA's recommended alternatives to "traditional pounds per day TMDLs."

A third recommendation pertained to effluent or pollutant trading. In the Preamble to the CTR, EPA encourages innovative approaches such as effluent trading as a method to attain and/or maintain water quality standards. The Preamble at page 42185 describes effluent trading as follows:

Effluent trading allows sources that can control pollutants beyond compliance with current requirements to sell or trade credits for its excess reduction to another source unable to control its own pollutants as effectively or as efficiently. The goal of an effluent trading program is to achieve similar or improved environmental results in a more cost-effective manner than under current regulatory structures. EPA's most current policy on effluent trading is summarized in the "Policy Statement for Effluent Trading in Watersheds" which was issued in January of 1996 and which reiterates President Clinton's commitment to effluent trading as expressed in the March 16, 1995 report on "Reinventing Environmental Regulation." The Policy states that "EPA will work cooperatively with key stakeholders to find sensible, innovative ways to meet water quality standards quicker and at less cost than traditional approaches alone." The policy outlines several different types of trades that may take place. These trades include but are not limited to the following: (1) Intra-plant trading between outfalls within one facility; (2) pretreatment trading between indirect industrial point sources that discharge to a POTW; (3) point to point source trading, point to nonpoint source trading, and nonpoint to nonpoint source trading.

The existing regulations and EPA guidance relating to TMDLs already contemplate some form of pollutant trading.(*3) However, the regulations currently do not specifically allow the degree of trading outlined in the Preamble. To clarify that this is now EPA policy, EPA should propose language to that effect within the regulatory language itself.

The final recommendation EPA makes related to TMDLs addresses the use of interim permit limits when a TMDL/WLA/LA or other special study is underway but not completed. The Preamble gives guidance on how interim limits should be calculated. EPA states that "pastperformance and future uncertainty can be considered as factors in determining interim permit limits, however, permitting authorities may consider other factors, particularly factors concerning the water quality of the receiving water body and the overall goal to attain the water quality standard." EPA further states that it supports innovative ideas such as using specific method for determining interim limits and "trigger" concentrations above which corrective action would be necessary. Furthermore, EPA notes that the State, as the permitting authority, has broad discretion in determining how interim permit limits should be ascertained in different situations. CTR Preamble at pg. 42184-5. This language is helpful, but it should be placed into the rule so that it has the force of law and may be utilized as such.

As a final note regarding the use of TMDLs as a form of regulatory relief, it should be noted that the use of less restrictive effluent limitations based on TMDLs and interim limits is limited by the TMDL process itself as well as the antibacksliding provisions of the CWA. EPA guidance recognized these facts in its TMDL guidance with the following statement:

In developing a TMDL it is important to keep in mind certain constraints on the WLA [wasteload allocation] portion that are imposed by antibacksliding regulatory provisions. The WLA will normally result in new or more stringent water quality-based limits that those contained in a previously issued permit. In a limited number of cases, however, it is conceivable that less stringent water quality-based limits could result. In these cases, permit limits must conform to the antibacksliding provisions contained in section 402(o) of the CWA.(*4)

(*1) This coat trigger is $200 per toxic pounds-equivalent for a facility under the low-end scenario, and $500 per toxic pounds-equivalent for a category of dischargers under the high-end scenario. See EA at pg. 4.

(*2) In addition, pollutant load reductions were not calculated or credited for any pollutant for which an alternative regulatory approach was pursued. Id.

(*3) See 40 C.F.R. section 130.2(i) ("If Best Management Practices (BMPs) or other nonpoint source pollution controls make more stringent load allocations practicable, then wasteload allocations can be made less stringent. Thus, the TMDL process provides for nonpoint source control tradeoffs."); see also EPA, Guidance for Water Quality-based Decisions: The TMDL Process, EPA Doc. No. 440/4-91-001 at pg. 51 (April 1991).

(*4) EPA, Guidance for Water Quality-based Decisions: The TMDL Process, EPA Doc. No. 440/4-91-001 at pg. 20 (April 1991) (emphasis added).

Response to: CTR-040-048

In response to the commenter's discussion concerning TMDLs with respect to the collaborative approach, alternatives to traditional "pounds per day" TMDLs, effluent and/or pollutant trading, and the use of interim permit limits, see response to CTR-004-006.

Comment ID: CTR-041-044
Comment Author: Sacramento Reg Cnty Sanit Dist
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: K-01 TMDLs
References:
Attachments? N
CROSS REFERENCES

Comment: The Preamble to the California Toxics Rule (CTR), and the rules accompanying Economic Analysis (EA), place a great deal of emphasis on the ability of dischargers to use alternative regulatory approaches to comply with CTR criteria if the cost of treatment technology was prohibitively expensive. For example, the EA assumes that, if the estimated annualized cost for removing a pollutant exceeded a cost trigger,(*1) "dischargers would explore the use of alternative regulatory approaches to comply with CTR-based effluent limits. EA at.pg. 4(emphasis added). Based on this assumption, no treatment cost was estimated for the facility.(*2)

The types of alternative regulatory approaches assumed available for dischargers in California include phased total maximum daily loads (TMDLs), water quality standard variances, site-specific criteria, change in designated use, and alternative mixing zones. EA at pg. 4-5. The following sections will discuss each of EPA's proposed methods for regulatory relief and explain whether or not these methods can truly be used to provide relief from the CTR-based permit limits as anticipated by EPA. It should be noted that the actual language of the rule itself does not mention any of the methods of regulatory relief.

Therefore, this analysis will be based solely upon the language contained in the Preamble to the CTR.

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First, EPA recommends that, since the TMDL process can be significantly labor and data intensive, collaborative efforts to establish TMDLs on water quality limited water bodies should be pursued. EPA envisions that this collaborative effort by dischargers, the State, EPA, and other stakeholders, could distribute work and associated costs between the interested parties, as well as shorten the overall time necessary to complete the analysis. See CTR at pg. 42185-6. This language attempts to alter the current statutory and regulatory language requiring that States must perform TMDLs, which are then submitted for EPA approval. If EPA is now proposing to allow other entities or coalitions to be able to establish TMDLs, this authority must be placed in the language of the rule itself, if not in an amendment to the CWA.

Second, EPA recommends innovative alternatives to traditional "pounds per day" TMDLs. The regulations and EPA guidance reviewed regarding TMDLs did not mention whether TMDLs had to be established as "pounds per day." The regulations define of "load" as "an amount of matter that is introduced into a receiving water (40 C.F.R. section 130.2(e)) and discuss TMDLs in terms of either mass per time, toxicity, or other appropriate measure" (40 C.F.R. section 130.2(i)). These definitions seem to be flexible enough to allow for EPA's recommended alternatives to "traditional pounds per day TMDLs."

A third recommendation pertained to effluent or pollutant trading. In the Preamble to the CTR, EPA encourages innovative approaches such as effluent trading as a method to attain and/or maintain water quality standards. The Preamble at page 42185 describes effluent trading as follows:

Effluent trading allows sources that can control pollutants beyond compliance with current requirements to sell or trade credits for its excess reduction to another source unable to control its own pollutants as effectively or as efficiently. The goal of an effluent trading program is to achieve similar or improved environmental results in a more cost-effective manner than under current regulatory structures. EPA's most current policy on effluent trading is summarized in the "Policy Statement for Effluent Trading in Watersheds" which was issued in January of 1996 and which reiterates President Clinton's commitment to effluent trading as expressed in the March 16, 1995 report on "Reinventing Environmental Regulation." The Policy states that "EPA will work cooperatively with key stakeholders to find sensible, innovative ways to meet water quality standards quicker and at less cost than traditional approaches alone." The policy outlines several different types of trades that may take place. These trades include but are not limited to the following: (1) Intra-plant trading between outfalls within one facility; (2) pretreatment trading between indirect industrial point sources that discharge to a POTW; (3) point to point source trading, point to nonpoint source trading, and nonpoint to nonpoint source trading.

The existing regulations and EPA guidance relating to TMDLs already contemplate some form of pollutant trading.(*3) However, the regulations currently do not specifically allow the degree of trading outlined in the Preamble. To clarify that this is now EPA policy, EPA should propose language to that effect within the regulatory language itself.

The final recommendation EPA makes related to TMDLs addresses the use of interim permit limits when a TMDL/WLA/LA or other special study is underway but not completed. The Preamble gives guidance on how interim limits should be calculated. EPA states that "past performance and future uncertainty can be considered as factors in determining interim permit limits, however, permitting authorities may consider other factors, particularly factors concerning the water quality of the receiving water body and the overall goal to attain the water quality standard." EPA further states that it supports innovative ideas such as using specific method for determining interim limits and "trigger" concentrations above which corrective action would be necessary. Furthermore, EPA notes that the State, as the permitting authority, has broad discretion in determining how interim permit limits should be ascertained in different situations. CTR Preamble at pg, 42184-5. This language is helpful, but it should be placed into the rule so that it has the force of law and may be utilized as such.

As a final note regarding the use of TMDLs as a form of regulatory relief, it should be noted that the use of less restrictive effluent limitations based on TMDLs and interim limits is limited by the TMDL process itself as well as the antibacksliding provisions of the CWA. EPA guidance recognized these facts in its TMDL guidance with the following statement:

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Response to: CTR-041-044

In response to the commenter's discussion concerning TMDLs with respect to the collaborative approach, alternatives to traditional "pounds per day" TMDLs, effluent and/or pollutant trading, and the use of interim permit limits, see response to CTR-004-006.

Comment ID: CTR-044-039
Comment Author: City of Woodland
Document Type: Local Government

State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: K-01 TMDLs
References:
Attachments? N
CROSS REFERENCES

Comment: The Preamble to the California Toxics Rule (CTR), and the rules accompanying Economic Analysis (EA), place a great deal of emphasis on the ability of dischargers to use alternative regulatory approaches to comply with CTR criteria if the cost of treatment technology was prohibitively expensive. For example, the EA assumes that, if the estimated annualized cost for removing a pollutant exceeded a cost trigger,(*1) "dischargers would explore the use of alternative regulatory approaches to comply with CTR-based effluent limits. EA at.pg. 4(emphasis added). Based on this assumption, no treatment cost was estimated for the facility.(*2)

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Response to: CTR-044-039

In response to the commenter's discussion concerning TMDLs with respect to the collaborative approach, alternatives to traditional "pounds per day" TMDLs, effluent and/or pollutant trading, and the use of interim permit limits, see response to CTR-004-006.

Comment ID: CTR-054-043
Comment Author: Bay Area Dischargers Associati
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: K-01 TMDLs
References:
Attachments? N
CROSS REFERENCES

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the requirements of the Clean Water Act (CWA) and the existing regulations. See CTR at pg. 42185-6; see accord 33 U.S.C. section 1313(d)(1)(C) and 40 C.F.R. section 130.7. However, the Preamble discussion also contains recommendations regarding the implementation of TMDLs that merit some review.

First, EPA recommends that, since the TMDL process can be significantly labor and data intensive, collaborative efforts to establish TMDLs on water quality limited water bodies should be pursued. EPA envisions that this collaborative effort by dischargers, the State, EPA, and other stakeholders, could distribute work and associated costs between the interested parties, as well as shorten the overall time necessary to complete the analysis. See CTR at pg. 42185-6. This language attempts to alter the current statutory and regulatory language requiring that States must perform TMDLs, which are then submitted for EPA approval. If EPA is now proposing to allow other entities or coalitions to be able to establish TMDLs, this authority must be placed in the language of the rule itself, if not in an amendment to the CWA.

Second, EPA recommends innovative alternatives to traditional "pounds per day" TMDLs. The regulations and EPA guidance reviewed regarding TMDLs did not mention whether TMDLs had to be established as "pounds per day." The regulations define of "load" as "an amount of matter that is introduced into a receiving water (40 C.F.R. section 130.2(e)) and discuss TMDLs in terms of either mass per time, toxicity, or other appropriate measure" (40 C.F.R. section 130.2(i)). These definitions seem to be flexible enough to allow for EPA's recommended alternatives to "traditional pounds per day TMDLs."

A third recommendation pertained to effluent or pollutant trading. In the Preamble to the CTR, EPA encourages innovative approaches such as effluent trading as a method to attain and/or maintain water quality standards. The Preamble at page 42185 describes effluent trading as follows:

Effluent trading allows sources that can control pollutants beyond compliance with current requirements to sell or trade credits for its excess reduction to another source unable to control its own pollutants as effectively or as efficiently. The goal of an effluent trading program is to achieve similar or improved environmental results in a more cost-effective manner than under current regulatory structures. EPA's most current policy on effluent trading is summarized in the "Policy Statement for Effluent Trading in Watersheds" which was issued in January of 1996 and which reiterates President Clinton's commitment to effluent trading as expressed in the March 16, 1995 report on "Reinventing Environmental Regulation." The Policy states that "EPA will work cooperatively with key stakeholders to find sensible, innovative ways to meet water quality standards quicker and at less cost than traditional approaches alone." The policy outlines several different types of trades that may take place. These trades include but are not limited to the following: (1) Intra-plant trading between outfalls within one facility; (2) pretreatment trading between indirect industrial point sources that discharge to a POTW; (3) point to point source trading, point to nonpoint source trading, and nonpoint to nonpoint source trading.

The existing regulations and EPA guidance relating to TMDLs already contemplate some form of pollutant trading.(*3) However, the regulations currently do not specifically allow the degree of trading outlined in the Preamble. To clarify that this is now EPA policy, EPA should propose language to that effect within the regulatory language itself.

The final recommendation EPA makes related to TMDLs addresses the use of interim permit limits when a TMDL/WLA/LA or other special study is underway but not completed. The Preamble gives guidance on how interim limits should be calculated. EPA states that "past performance and future uncertainty can be considered as factors in determining interim permit limits, however, permitting authorities may

consider other factors, particularly factors concerning the water quality of the receiving water body and the overall goal to attain the water quality standard." EPA further states that it supports innovative ideas such as using specific method for determining interim limits and "trigger" concentrations above which corrective action would be necessary. Furthermore, EPA notes that the State, as the permitting authority, has broad discretion in determining how interim permit limits should be ascertained in different situations. CTR Preamble at pg, 42184-5. This language is helpful, but it should be placed into the rule so that it has the force of law and may be utilized as such.

As a final note regarding the use of TMDLs as a form of regulatory relief, it should be noted that the use of less restrictive effluent limitations based on TMDLs and interim limits is limited by the TMDL process itself as well as the antibacksliding provisions of the CWA. EPA guidance recognized these facts in its TMDL guidance with the following statement:

In developing a TMDL it is important to keep in mind certain constraints on the WLA [wasteload allocation] portion that are imposed by antibacksliding regulatory provisions. The WLA will normally result in new or more stringent water quality-based limits that those contained in a previously issued permit. In a limited number of cases, however, it is conceivable that less stringent water quality-based limits could result. In these cases, permit limits must conform to the antibacksliding provisions contained in section 402(o) of the CWA.(*4)

(*1) This coat trigger is $200 per toxic pounds-equivalent for a facility under the low-end scenario, and $500 per toxic pounds-equivalent for a category of dischargers under the high-end scenario. See EA at pg. 4.

(*2) In addition, pollutant load reductions were not calculated or credited for any pollutant for which an alternative regulatory approach was pursued. Id.

(*3) See 40 C.F.R. section 130.2(i) ("If Best Management Practices (BMPs) or other nonpoint source pollution controls make more stringent load allocations practicable, then wasteload allocations can be made less stringent. Thus, the TMDL process provides for nonpoint source control tradeoffs."); see also EPA, Guidance for Water Quality-based Decisions: The TMDL Process, EPA Doc. No. 440/4-91-001 at pg. 51 (April 1991).

Response to: CTR-054-043

In response to the commenter's discussion concerning TMDLs with respect to the collaborative approach, alternatives to traditional "pounds per day" TMDLs, effluent and/or pollutant trading, and the use of interim permit limits, see response to CTR-004-006.

Comment ID: CTR-057-010a
Comment Author: City of Los Angeles
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: K-01 TMDLs
References:

Attachments? N
CROSS REFERENCES G-07; C-24

Comment: Implementation

Although the proposed Rule discusses implementation issues such as TMDLs, variances, SSOs, and interim permits, it lacks evidence of support for any of these provisions. We believe that this will have the effect of reducing the State's confidence or perceived authority in granting any of these provisions to individual POTWs. For example, Page 42186 of the CTR lists six criteria that must be used by the State to determine the non-attainability of a water quality standard; we are doubtful that any of these criteria would be strictly applicable to our facilities with respect to lindane and DDT. We believe CTR variance criteria should include economic considerations for specific discharger implementation efforts. Unless the EPA provides more support for these provisions, we fear that the State will either not grant us a legitimate variance or will waiver in its commitment to act at all.

Response to: CTR-057-010a

EPA disagrees with the comment that although the preamble discusses implementation issues, it lacks evidence of support for any of them. The CTR preamble section to the proposed rule entitled "Implementation" discusses EPA's general policy on TMDLs, variances, and interim permit limits. EPA's intention for including the discussions is to clearly state that it supports the State's appropriate use of the action as an implementation tool, not to discourage the use of the action in any way. EPA does not believe that its discussion in the preamble would discourage the State in any way, and in fact would facilitate the appropriate use of the provision.

Comment ID: CTR-058-011
Comment Author: Western States Petroleum Assoc
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: K-01 TMDLs
References:
Attachments? Y
CROSS REFERENCES

Comment: TMDLs. WSPA recognizes that the law requires the state to adopt TMDLs for those waters which fail water quality standards and are listed on the 303(d) list. WSPA supports the TMDL process based on the following approach:

* Waters should only be listed after careful review of the standards and careful assessment of actual water quality. WPSA does not support the universal application of "independent applicability". In some cases independent applicability is appropriate but in many cases it is overkill and EPA should give states flexibility in applying it. * For metals and many organics, the decision to list should be based on the bioavailable (e.g., dissolved) fraction, not total. * A careful process of prioritization should be encouraged. Also, reasonable schedules for implementing TMDL programs must be established. EPA and the states should be moving expeditiously to set such schedules so that the courts do not take the decision-making process out of their hands. * Today, nearly everybody recognizes that non-point sources

rather than point sources are the major problem for most impaired waters. EPA should supply additional tools to the states for dealing with nonpoint sources, and EPA should encourage the emphasis on those sources, whether point or nonpoint, which are the major source of the problem. * Resolution of TMDLs into load and waste load allocations should be based on sound science. Allocations and permit limits should not be largely a political response to the perceived problem. * The relative impact of more stringently regulating point sources should be considered in establishing a strategy. For example, if point sources are 10% of the problem, it may be inappropriate to call for a 50% reduction in their discharges if a 5% overall reduction will have no meaningful impact-on improving the receiving water quality. WSPA believes that airborne deposition in some cases plays a significant role in water quality, and that regulating point sources in such scenarios is often unlikely to produce meaningful results. TMDLs should instead focus on situations where a real impact on receiving water quality can be made through regulation of dischargers (point or nonpoint).

Response to: CTR-058-011

The commenter, in discussing TMDLs, states that waters should only be listed under section 303(d) after a review of the water quality standards and an assessment of "actual water quality". Issues concerning TMDLs are outside the scope of the CTR, and rules concerning TMDLs may change. However, the State should regularly review applicable water quality standards, but EPA does not believe that such a review is a required as part of the decision to list a water body. With respect to the issue of "independent applicability", the statute and regulations require the State to list waters when water quality standards are not being met. In the case of numeric water quality standards, the State may be able to determine whether water quality standards are being met solely on the basis of ambient water column data. In the case of narrative standards, the State may need to consider other available physical, toxicological, and biological data.

It appears that the commenter believes that some 303(d) listing decisions have been based on "best professional judgement" with no supporting ambient data. Although professional judgment plays an important role in any water quality assessment, EPA agrees that decisions to list waters generally should be based on available physical, chemical, and biological data. The commenter and other interested stakeholders can make a substantial contribution to the collection of monitoring data to support the State's assessment of water quality.

The commenter also states that the decision to list should be based on the bioavailable (e.g. dissolved) fraction, not the total, of metals and many organics. As noted above, the State's decision to add a water body/pollutant to the 303(d) list is based on whether the applicable water quality standard is being exceeded. National guidance on 303(d) listing does not allow waters to be excluded from consideration based on the manner in which existing applicable standards are expressed or the fact that standards revisions are currently underway.

EPA agrees with the commenter that a careful process for prioritization and schedules for implementing the TMDL program should be established. The EPA- approved State guidelines for the 1998 303(d) list update provide for specific criteria to guide prioritization. The State will develop a schedule for completion of TMDLs for all 303(d) listed water bodies (see 1998 Clean Water Act 303(d) Listing Guidelines for California).

EPA agrees with the commenter that additional tools should be provided to the State to address nonpoint source pollution problems. EPA's "Clean Water Action Plan" provides a framework for coordination of Federal activities, especially as it relates to nonpoint source problems. Lastly, as noted above, TMDLs and issues concerning TMDLs are outside the scope of the CTR, and rules and policies concerning

TMDLs may change.

Comment ID: CTR-086-001b
Comment Author: EOA, Inc.
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org: California Dent
Document Date: 09/26/97
Subject Matter Code: K-01 TMDLs
References: Letter CTR-086 incorporates by reference letter CTR-035
Attachments? N
CROSS REFERENCES Q

Comment: CDA's primary concerns are with the potential for additional regulation of wastewater discharges from dental offices to POTWS. Several municipalities in the Bay Area, including the City of San Francisco, have informed CDA that dentist offices are considered a source of mercury discharges to municipal sewer systems, and under the Basin Plan will be subject to additional regulation when lower effluent limits are imposed in municipal NPDES permits. Yet, very little is known about the fate, transport, bioavailability and overall water quality impacts of amalgam related mercury.

CDA in cooperation with San Francisco, has developed a comprehensive program of pollution prevention practices (best management practices) for dental offices that has been distributed statewide and is in the process of being implemented. Yet efforts continue by municipalities in parts of the State, such as San Francisco Bay, to impose increasingly stringent and costly controls on dental offices. Within the current point source regulatory structure. POTWs that have mercury compliance problems, or perceive that they might have if the criteria become more stringent (e.g. through loss of dilution credit), are forced to continue to look "upstream" for additional sources to control, until such time, as recommended, as a more comprehensive watershed based approach is allowed.

CDA is a strong supporter of water quality and human health protection. CDA's primary goals in commenting on the draft CTR are to request that mercury criteria be based on sound science and that mercury regulation be implemented via a watershed management, phased TNML-type approach. CDA is particularly concerned that the CTR does not adequately assess the economic impacts on indirect dischargers nor the extent to which there will be measurable water quality benefits solely from adoption of the proposed mercury criteria for point sources.

Watershed Management Based Approach

Data show that there are elevated levels of mercury in San Francisco Bay waters, sediments, and some fish tissue. It is critical to have a better understanding of watershed-wide mercury inputs, fate, transport, and biogeochemical transformations affecting the San Francisco Bay food chain and human health, and the feasibility and costs of alternative control measures, before imposing potentially onerous control measures (through POTWS) on indirect dischargers, such as dentists, that may not provide measurable water quality or human health benefits.

Since POTWs are only responsible for contributing 1-10% of the toxics mass loading (including mercury) to San Francisco Bay (p. 7-7 EA) it makes economic sense to focus limited public resources on identification of larger and potentially more cost-effective sources to control. Since dentists likely

represent a very minor and declining fraction of the mercury loading to POTWs (due to implementation of BMPs and substitution of non-mercury based compounds for mercury containing dental amalgam), it makes even more public policy sense to fully evaluate and prioritizeall sources and controls before pursuing additional control measures on indirect dischargers such as dentists. This needs to be conducted on a watershed basis, consistent with various EPA guidance including the August 1997 Robert Perciasepe TMDL Policy memorandum and the San Francisco Bay Regional Board's July 1997 Watershed Management Initiative Guidance.

Response to: CTR-086-001b

In response to the comments concerning the scientific basis of the mercury criteria, the TMDL approach for mercury in San Francisco Bay, and the economic assessment of impacts on indirect dischargers, see response to CTR-086-001a. In response to the comment concerning the watershed management approach to mercury in the Bay, the State has listed mercury in San Francisco Bay on its 303(d) list and has targeted completion of a TMDL for mercury in the foreseeable future.

EPA supports the State's decision and schedule to complete a detailed TMDL for mercury for the San Francisco Bay, and EPA agrees with the commenter that it makes good public policy to evaluate and prioritize sources of and controls for mercury coming into the Bay as soon as possible.

Comment ID: CTR-089-001e
Comment Author: Las Virgenes Mncpl Water Dist.
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/24/97
Subject Matter Code: K-01 TMDLs
References:
Attachments? N
CROSS REFERENCES C-22; C-01a; C-08a; G-05; G-02; G-09

Comment: The draft California Toxics Rule (CTR) is clearly the product of substantial effort by USEPA staff, and we applaud this effort and its intent. On several issues of concern to public utilities, the CTR strikes a good balance between the need to promulgate standards and the need to base those standards on sound science. Examples include the use of dissolved concentrations rather than the total recoverable concentrations for metals, the deferral of human health criteria for arsenic until adequate information is available, and the revision of the human health criterion for mercury. We are also pleased with the CTR's guidance and flexibility, on mixing zones and dilution credits, total maximum daily loads (TMDLs), compliance schedules, and translators.

Response to: CTR-089-001e

EPA appreciates the commenter's support of EPA's preamble discussion of TMDL guidance and flexibility.

Comment ID: CTR-090-010b
Comment Author: C&C of SF, Public Utl. Commis.

Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: K-01 TMDLs
References: Letter CTR-090 incorporates by reference letters CTR-035 and CTR-054
Attachments? Y
CROSS REFERENCES G-01

Comment: We recommend that:

2. Include in the rule an implementation proposal which states that before a criteria is put into a permit there must first be: an assessment that the pollutant could reasonably interfere with the designated uses of the water; a comprehensive TMDL is done which includes all sources of pollutants to the water body; and a reasonable potential analysis is completed for point source dischargers. Only then, after all of these analyses are completed by the state or EPA should the criteria be converted to a permit limit with the appropriate implementation factors.

Response to: CTR-090-010b

EPA agrees with the commenter that a reasonable potential analysis as well as a determination that the pollutant could reasonably interfere with the designated uses of the water body before a permit limit is placed in a permit for a particular pollutant. The State completes these analyses before a permit limit is placed in a permit. EPA does not agree with the comment that a comprehensive TMDL must be completed on a particular water body for a particular pollutant before the permit limit is placed in a permit for that pollutant. The State is required to protect the beneficial uses of its waters, and thus is required to implement water quality-based effluent limits for particular pollutants which it has knowledge are contributing to preventing the achievement of beneficial uses. EPA agrees, however, that a TMDL for a pollutant may be necessary to comprehensively address a particular problem in a water body.

Comment ID: CTR-092-005
Comment Author: City of San Jose, California
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: K-01 TMDLs
References: Letter CTR-092 incorporates by reference letter CTR-035
Attachments? Y
CROSS REFERENCES

Comment: Total Maximum Daily Loads (TMDL)

The City firmly endorses language in the preamble discussing the merits of a collaborative approach toward the establishment of TMDLs on water quality limited water bodies. The City agrees that this approach could better distribute costs and resources between regulators and the regulated community, as well as shorten the time necessary to complete the modeling analysis. The City supports innovative alternatives to the traditional TMDL approach of "pounds per day" and encourages the concept of

effluent trading as a method to aftain or maintain water quality compliance. The City further encourages EPA to better define these and related programs in order to facilitate the TMDL process.

Response to: CTR-092-005

EPA appreciates the commenter's support of EPA's preamble discussions concerning the State's use of cooperative approaches toward the development of TMDLs, the State's use of innovative alternatives to the traditional "pounds per day" TMDL, and the concept of effluent trading. Additional guidance concerning these concepts can be found in EPA documents which discuss the TMDL process and the water management approach.

Comment ID: CTRH-002-011d
Comment Author: Lisa Ohlund
Document Type: Public Hearing
State of Origin: CA
Represented Org: Alliance of So. CA POTWs
Document Date: 09/18/97
Subject Matter Code: K-01 TMDLs
References:
Attachments? N
CROSS REFERENCES G-02; G-04; C-22

Comment: Now, I'd briefly like to touch on several issues of importance to SCAP members. In addition, we will be submitting written comments before the close of the public comment period.

I'd like to begin by mentioning our support for several provisions included in the draft CTR, and those include the provision authorizing the use of compliance schedules -- although we don't necessarily agree with the time period -- the expression of metals criteria as dissolved rather than totally recoverable, and discussion in the preamble supporting the use of interim limits in permits, while the total maximum daily loads and other special studies are being performed.

Response to: CTRH-002-011d

EPA appreciates the commenter's support of EPA's preamble discussion concerning the State's use of interim permit limits while TMDLs and other special studies are being completed.

Subject Matter Code: K-02 Watershed Permitting

Comment ID: CTR-090-023a
Comment Author: C&C of SF, Public Utl. Commis.
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: K-02 Watershed Permitting
References: Letter CTR-090 incorporates by reference letters CTR-035 and CTR-054
Attachments? Y
CROSS REFERENCES Q

Comment: An Alternative Strategy to Implement the CTR - The CTR will likely result in massive public and private expenditures without yielding measurable or significant environmental benefits. Costs can be significantly reduced with regulatory flexibility and the cost analysis assumes that regulatory relief will be forthcoming when costs become excessive. However, nothing in the preamble nor anything in the State's implementation plan indicates a willingness to provide regulatory relief. On the contrary, the draft rule establishes an unusually cumbersome variance procedure while theState's draft proposal sets out very conservative procedures for WQBELs and waste load allocations (WLAs).

For these reasons, we recommend a go slow approach to both promulgating and implementing the CTR for those toxicants where the best evidence indicates that non-permitted sources are the predominant sources. This approach would:

1. Use the concept of temporary standards based on liberal assumptions such as use of a CRF of 10E-4 or 10E-4.5 until such time that a) problems in tissue concentrations are established; and b) loadings are established within the watershed. 2. Require permitted sources, including storm water sources to thoroughly characterize their discharges for the watershed specific problem contaminants. 3. Require permitted sources including storm water that discharge nontrivial amounts of problem toxicants to participate in or financially support ambient monitoring programs. 4. Require permitted sources including storm water sources, to undertake all reasonable source control efforts for any problem toxicants in their discharge.

The above efforts will continue through the development of Watershed based control measures, including TMDLs where required. For complex watershed the TMDL process could be lengthy, up to 10 years or more.

Such approaches were discussed in the preamble of the Great Lakes Initiative (589 FR 72, April 16, 1993), and are further discussed in a September 10, 1997 EPA HQ draft memorandum "A Watershed Approach for the Achievement of Water Quality Objectives." (Attachment 1) The temporary limits approach would also obviate the massive administrative burdens contained in the proposed variance procedures.

Response to: CTR-090-023a

EPA disagrees with the comment that the CTR will likely result in massive public and private expenditures without yielding significant environmental benefits. The CTR establishes water quality criteria for priority toxic pollutants; these criteria, combined with State adopted beneficial uses, will

create badly needed ambient water quality standards for California's surface waters including fresh and estuarine waters. The State then must implement these standards into its various water quality control programs, including the Federally mandated NPDES permit program. EPA agrees with the comment that costs of implementation of water quality standards into the NPDES permit program may be reduced with more flexible procedures. EPA described several methods in the preamble to the CTR that are available to provide flexibility in the NPDES permit program. EPA does not agree that these methods are cumbersome. The variance procedure outlined in the preamble may be considered somewhat complex, but the procedure does provide relief to those who are willing to undertake the analyses to show its applicability to a particular situation.

EPA appreciates the detailed comment concerning an alternative strategy for implementing CTR-based water quality standards in California. However, the State has the responsibility of implementing the CTR-based standards. Thus, the alternative implementation concepts described in the comment should be considered by the State in its adoption of the statewide implementation plan. For example, the commenter suggests that temporary standards based on liberal assumptions be used until loadings are established in the watershed; that permitted sources thoroughly characterize their discharges for specific problem contaminants; that permitted sources of problem pollutants participate or financially support ambient monitoring programs, and undertake source control efforts. The commenter's suggestions should be considered by the State in its implementation of water quality standards programs.

Subject Matter Code: K-03 Watershed/Effluent Trading

Comment ID: CTR-035-032b
Comment Author: Tri-TAC/CASA
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: K-03 Watershed/Effluent Trading
References:
Attachments? N
CROSS REFERENCES K-01

Comment: pp. 42184-42185 -- Total Maximum Daily Loads (TMDLs) We agree with EPA's statements in the Preamble in support of the recommendations of the Permitting and Compliance Issues Task Force regarding the benefits of collaborative approaches to developing TMDLs. We also endorse the State's and EPA's policy to allow innovative alternatives to traditional "pounds per day" TMDLs, and suggest that EPA expand this reference in the Preamble to include the concept of "quantifiable targets," under which TMDLs could be expressed as a mass loading, a concentration, a percent reduction, an ecosystem improvement, or a degree of implementation of a control measure (such as a best management practice) (see SWRCB, 1995, Part VI).

EPA also encourages the use of innovative approaches such as effluent trading, within the TMDL framework. While we support the concept of effluent trading, we do have concerns about how EPA intends for it to be implemented. For instance, in comments submitted to EPA on September 6, 1996 on EPA's Draft Framework for Watershed-Based Trading (May 1996), we pointed out that the proposed framework was overly prescriptive and, as a result, would likely significantly restrict watershed-based trading in California. A few of the barriers to trading we identified in the draft framework include: provisions limiting the duration of trades to the five year term of NPDES permits; limitations on the effect of trades on existing effluent limits, compliance schedules or enforcement actions; discouragement of trading for toxic pollutants; and inequitable requirements for point sources to demonstrate a "reasonable assurance" that a trade will be successful. We recommend that EPA include language in the Preamble to the CTR emphasizing a flexible approach to both TMDLs and effluent trading; that trading is voluntary for all involved parties; and that interim limits will be placed in NPDES permits while the necessary ambient data arc gathered and analytical tools are developed.

Response to: CTR-035-032b

This comment was fully answered under CTR-035-032a.

Comment ID: CTR-061-016
Comment Author: G. Fred Lee & Associates
Document Type: Academia
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: K-03 Watershed/Effluent Trading
References:

Attachments? Y
CROSS REFERENCES

Comment: Page 42185, second column, first paragraph, discusses effluent trading issues. It is important in effluent trading to properly incorporate aquatic chemistry and toxicology into developing the trade arrangements. This issue is discussed in papers on my web site.

Response to: CTR-061-016

EPA agrees with the comment that it is important in effluent trading to properly incorporate aquatic chemistry and toxicology in developing trade arrangements. EPA, in its Draft Framework for Watershed-Based Trading (USEPA, May 1996), states that pollutant chemistry must be reviewed before appropriate trading arrangements can be completed. EPA contemplates that such analyses will be conducted before the State approves any effluent trading arrangements.

Comment ID: CTR-086-004f
Comment Author: EOA, Inc.
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org: California Dent
Document Date: 09/26/97
Subject Matter Code: K-03 Watershed/Effluent Trading
References: Letter CTR-086 incorporates by reference letter CTR-035
Attachments? N
CROSS REFERENCES G-01
C-22
G-09
C-24a
C-24
G-04
G-05
G-02

Comment: Regulatory Flexibility and Relief

CDA supports language in the CTR Preamble that references and endorses recommendations of the State Task Forces including in part the use of.

* reasonable potential analyses * dissolved metals criteria * translators * water effects ratios * site specific objectives * innovative TMDL processes such as effluent trading * performance based interim limits * chronic and acute mixing zones, and * compliance schedules in NPDES permits.

Response to: CTR-086-004f

EPA appreciates the commenter's support of EPA's preamble discussion concerning the State's use of innovative TMDL processes including effluent trading.

Comment ID: CTRH-001-057a
Comment Author: Dave Tucker
Document Type: Public Hearing
State of Origin: CA
Represented Org: San Jose Env. Serv. Dept.
Document Date: 09/17/97
Subject Matter Code: K-03 Watershed/Effluent Trading
References:
Attachments? N
CROSS REFERENCES C-24a
G-04
G-07
G-09
C-22
G-05

Comment: Some of the flexibility that the City highly supports is the water effect ratio investigations to adjust statewide criteria to site-specific conditions; the interim limits concept while special studies are being conducted by the dischargers and other entities; a variance procedure to allow dischargers to achieve progress toward effluent limit attainment without violating applicable water quality standards; dissolved criteria for metals to reflect the toxicological conditions; translators to adjust dissolved criteria to total permit limitations; trading programs to attain and maintain water quality; and a mixing zone that reflects true instream pollutant conditions and that protects beneficial uses.

Response to: CTRH-001-057a

EPA appreciates the commenter's support of EPA's preamble discussion concerning the State's use of effluent trading programs to attain and maintain water quality.

Subject Matter Code: L Anti-Backsliding

Comment ID: CTR-030-002
Comment Author: Utility Water Act Group
Document Type: Trade Org./Assoc.
State of Origin: DC
Represented Org:
Document Date: 09/25/97
Subject Matter Code: L Anti-Backsliding
References:
Attachments? Y
CROSS REFERENCES

Comment: B. UWAG Strongly Supports EPA's Position on the Application of Antibacksliding During Compliance Periods

UWAG applauds the Agency's decision to recognize that the antibacksliding provisions of section 402(o) of the Clean Water Act "do not apply to revisions to effluent limitations made before the scheduled date of compliance for those limitations." 62 Fed. Reg. at 42,189, col. 2. Permittees should not be subject to antibacksliding provisions until the limits in question come into force at the expiration of the compliance schedule.

Response to: CTR-030-002

EPA acknowledges this support and notes that its position regarding the application of Clean Water Act antibacksliding provisions in the CTR remains unchanged from that of the proposed rule.

Comment ID: CTR-060-003
Comment Author: San Diego Gas and Electric
Document Type: Electric Utility
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: L Anti-Backsliding
References:
Attachments? N
CROSS REFERENCES

Comment: PROVISIONS SDG&E SUPPORTS

EPA has included in the proposed CTR provisions which are reasonable and with which SDG&E supports. These include:

Anti-backsliding during interim limits

The preamble states that the anti-backsliding requirements of CWA Section 402(0) do not apply to revisions to effluent limitations made before the scheduled date of compliance for those limitations (see

62 Fed. Reg. at 42188, Col. 2). SDG&E supports EPA's interpretation.

Response to: CTR-060-003

EPA acknowledges this support and notes that its position regarding the application of Clean Water Act antibacksliding provisions in the CTR remains unchanged from that of the proposed rule.

Subject Matter Code: M Re-Open Comment Period

Comment ID: CTR-005-010
Comment Author: Novato Sanitary District
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/23/97
Subject Matter Code: M Re-Open Comment Period
References:
Attachments? Y
CROSS REFERENCES

Comment: 9. EPA should modify the CTR to reflect these and other comments and then repropose the rule. The above concerns are fundamental and the recommended modifications necessary to comply with applicable laws and regulations are substantial. For these reasons, the District recommends that EPA modify the rule to account for these and other comments and then re-propose the rule.

Again, the District appreciates the opportunity to comment on the proposed rule. Please contact me if you have any questions or if you need additional information

Sincerely,

Thomas S. Selfridge Deputy Manager-Engineer

Response to: CTR-005-010

In response to the comment to re-propose and re-open the public comment period based on the commenter's comments, EPA has responded substantively to the comments elsewhere in this comment response document. EPA has determined that none of the changes EPA has made warrants re-proposing and re-opening the comment period.

Comment ID: CTR-013-009
Comment Author: County of Los Angeles
Document Type: Storm Water Auth.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: M Re-Open Comment Period
References: Letter CTR-013 incorporates by reference letter CTR-027

Attachments? N
CROSS REFERENCES

Comment: In addition we would like to emphasize the followin concerns which greatly impact the Los Angeles County Stormwater Program:

9. The rule should not be adopted as proposed. It should be revised and then reproposed. The above comments and concerns are fundamental and the recommended modifications are necessary for MS4s to achieve compliance with the proposed water quality criteria. We recommend that the USEPA modify the rule to account for the above comments and other comments received from other MS4 dischargers and then redistribute the rule for further review and comment.

Thank you, again for this opportunity. If you have any questions, or would like to discuss these comments or issues further, please contact Gary Hildebrand at (626) 458-5948, Monday through Thursday, 7:00 a.m. to 5:30 p.m.

Response to: CTR-013-009

In response to the comment requesting that EPA re-propose and re-open the public comment period, please refer to response to CTR-005-010.

Comment ID: CTR-027-013a
Comment Author: California SWQTF
Document Type: Storm Water Auth.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: M Re-Open Comment Period
References: Letter CTR-027 incorporates by reference letters CTR-001, CTR-036 and CTR-040
Attachments? N
CROSS REFERENCES O

Comment: OFFER OF ASSISTANCE

We appreciate the opportunity to provide comments to the proposed rule. Overall, we believe the rule should not be adopted as proposed. We would recommend that USEPA modify the rule and redistribute the rule for further review and comment.

During the development of the proposed rule, USEPA failed to meet with the California Stormwater Task Force or any other California group of MS4 dischargers to discuss the propose rule. We believe such a meeting would have been very beneficial for USEPA and the MS4 dischargers. We extend an offer to meet with EPA and other interested parties to resolve the above issues, and other significant issues prior to finalizing the rule.

Thank you again for this opportunity, if you have any questions or would like to discuss these comments or issues further please contact me at (510) 670-5563.

Response to: CTR-027-013a

In response to the comment requesting that EPA re-propose and re-open the public comment period, please refer to response to CTR-005-010. EPA was receptive to stakeholder issues concerning the CTR, during its development. For example, EPA sent out a newsletter to all stakeholders inviting discussion, including the storm water interest groups, during the development of the CTR; EPA also attended all of the State task force groups concerning the State's proposed implementation plan and was available for

discussion of issues at those meetings. EPA subsequently met with several stakeholder groups during the development of the CTR. Stakeholders concerned with storm water did not approach EPA during this time. Since the time the CTR was proposed, to ensure impartiality, EPA has limited its involvement with all stakeholder groups who wish to solely discuss the CTR and its finalization. Stakeholders concerned with storm water issues have approached EPA subsequent to the CTR proposal, and EPA has met with them to discuss permit and compliance issues. EPA is available to meet with you further concerning permits and compliance issues.

Comment ID: CTR-031-010
Comment Author: Fresno Metro. Flood Ctrl Dist.
Document Type: Flood Ctrl. District
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: M Re-Open Comment Period
References: Letter CTR-031 incorporates by reference CTR-027
Attachments? N
CROSS REFERENCES

Comment: Above all, the District urges the EPA to: 1) incorporate language consistent with CWA section 402(p) into the proposed CTR, and 2) circulate the redrafted rule for further review and comment. This will also provide for review by those concerned to ensure that the proposed CTR when joined with the proposed State Plan does not lead to further inconsistencies.

Response to: CTR-031-010

In response to the comment requesting that EPA re-propose and re-open the public comment period, please refer to response to CTR-005-010.

Comment ID: CTR-034-017
Comment Author: SCAP
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: M Re-Open Comment Period
References: Letter CTR-034 incorporates by reference letter CTR-035
Attachments? N
CROSS REFERENCES

Comment: Again, we appreciate the opportunity to comment on the proposed California Toxics Rule. Due to the significant nature of the changes proposed, we request that EPA re-propose the CTR for public review and comment. Thank you for your consideration of our comments.

Response to: CTR-034-017

In response to the comment requesting that EPA re-propose and re-open the public comment period, please refer to response to CTR-005-010.

Comment ID: CTR-035-011b
Comment Author: Tri-TAC/CASA
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: M Re-Open Comment Period
References:
Attachments? N
CROSS REFERENCES E-01u

Comment: EPA's Economic Analysis is important not only for EPA's rulemaking, but for the SWRCB's promulgation of the State's Implementation Policy. Without significant improvements, we do not believe that EPA's Economic Analysis would comply with the requirements of the state Porter-Cologne Act if used by the SWRCB to support the State Proposal. We propose that EPA and the SWRCB undertake a collaborative process with interested members of the public to revise the Economic Analysis, based on methodologies and assumptions Jointly agreed 91 upon. Such a process was recommended by the Economic Considerations Task Force convened by the SWRCB in 1995, based on the process used in the Bay-Delta process. Guidelines for embarking on a collaborative process were proposed in the Task Force Report (SWRCB, 1995, Section VIII). We believe that this process could result in a mutually acceptable and defensible analysis that both EPA and the SWRCB could use to satisfy their respective rulemaking requirements for economic analysis.

Based on the extensiveness of the modifications we believe EPA should make to both the proposed rule and the accompanying Economic Analysis, we request that EPA re-propose the rule for public review and comment before publishing the CTR as a final rule.

Response to: CTR-035-011b

In response to the comment requesting that EPA re-propose and re-open the public comment period, please refer to response to CTR-005-010.

Comment ID: CTR-038-013
Comment Author: Sonoma County Water Agency
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: M Re-Open Comment Period
References:
Attachments? Y
CROSS REFERENCES

Comment: 12. EPA should modify the CTR to reflect these and other comments and then re-propose the rule. The above concerns are fundamental and the recommended modifications necessary to comply with applicable laws and regulations are substantial. For these reasons, the District recommends that EPA modify the rule to account for these and other comments and then repropose the rule.

Response to: CTR-038-013

In response to the comment requesting that EPA re-propose and re-open the public comment period, please refer to response to CTR-005-010.

Comment ID: CTR-043-011
Comment Author: City of Vacaville
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: M Re-Open Comment Period
References:
Attachments? Y
CROSS REFERENCES

Comment: 11. EPA should modify the CTR to reflect these and other comments and then repropose the rule. The above concerns are fundamental and the recommended modifications necessary to comply with applicable laws and regulations are substantial. For these reasons, the City recommends that EPA modify the rule to account for these and other comments and then repropose the rule.

Response to: CTR-043-011

In response to the comment requesting that EPA re-propose and re-open the public comment period, please refer to response to CTR-005-010.

Comment ID: CTR-044-012
Comment Author: City of Woodland
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: M Re-Open Comment Period
References:
Attachments? Y
CROSS REFERENCES

Comment: We have reviewed the proposed CTR and offer the following comments:

11. EPA should modify the CTR to reflect these and other comments and then repropose the rule. The above concerns are fundamental and the recommended modifications necessary to comply with

applicable laws and regulations are substantial. For these reasons, the City recommends that EPA modify the rule to account for these and other comments and then re-propose the rule.

Response to: CTR-044-012

In response to the comment requesting that EPA re-propose and re-open the public comment period, please refer to response to CTR-005-010.

Comment ID: CTR-052-022
Comment Author: East Bay Dischargers Authority
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: M Re-Open Comment Period
References: Letter CTR-052 incorporates by reference letters CTR-035 and CTR-054
Attachments? Y
CROSS REFERENCES

Comment: C. RECOMMENDATIONS FOR MODIFICATIONS TO THE CTR AND EA

EPA should modify the CTR and EA to reflect these and other comments and then re-propose the rule. The concerns cited by the Authority and other POTW organizations are genuine, and the recommended modifications necessary to resolve cost and attainability issues, as well as to insure EPA's compliance with applicable laws and regulations.

Response to: CTR-052-022

In response to the comment requesting that EPA re-propose and re-open the public comment period, please refer to response to CTR-005-010.

Comment ID: CTR-053-001
Comment Author: Heal the Bay
Document Type: Environmental Group
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: M Re-Open Comment Period
References: Letter CTR-053 incorporates by reference letter 6 and the comments on Dioxin, copper, and the compliance schedule from letter CTR-002
Attachments? N
CROSS REFERENCES

Comment: The State of California has been without an ISW/EB&E Plan for too long because of administrative process and litigation delays. It Is imperative for the protection and enhancement of the beneficial uses of the receiving waters of the State that these plans be implemented as soon as possible.

Response to: CTR-053-001

In response to the comment requesting that the State implement its new statewide water quality plans as soon as possible, EPA agrees with the comment. However, the State must comply with its administrative process requirements which take time. EPA believes the State is making progress and moving toward finalizing its implementation plans.

Comment ID: CTR-054-016
Comment Author: Bay Area Dischargers Assoc.
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: M Re-Open Comment Period
References:
Attachments? Y
CROSS REFERENCES

Comment: EPA should modify the CTR to reflect these and other comments and then repropose the rule. The above concerns are fundamental and the recommended modifications necessary to comply with applicable laws and regulations are substantial. For these reasons, BADA recommends that EPA modify the rule and its economic analysis to account for these and other comments and then re-propose the rule.

Response to: CTR-054-016

In response to the comment requesting that EPA re-propose and re-open the public comment period, please refer to response to CTR-005-010.

Comment ID: CTR-059-004b
Comment Author: Los Angeles County Sanit. Dist
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: M Re-Open Comment Period
References: Letter CTR-059 incorporates by reference letter CTR-035
Attachments? Y
CROSS REFERENCES E-01c

Comment: As others have commented, we also encourage EPA to build on its efforts over the past year to coordinate with the State Water Resource Control Board (SWRCB). In particular, we recommend that in the future the two agencies take such steps as the use of simultaneous comment periods, joint preparation of the economic analysis, and joint final promulgation, much as the "CAL-FED" agencies are doing. Simultaneous comment periods would greatly facifitate review by the public. Development of a joint economic analysis would greatly reduce the time and resources expended by the two regulatory agencies, as well as by stakeholders. Most importantly, EPA and the SWRCB should adopt the CTR and the

State's Implementation Policy at the same time. This will eliminate uncertainties for permit writers and the regulated community as to how the CTR should be implemented, and encourage greater statewide consistency in the implementation of the CTR.

Response to: CTR-059-004b

In response to the comment requesting that EPA re-propose and re-open the public comment period, please refer to response to CTR-005-010. In response to the comment that EPA and the State should jointly prepare an economic analysis and jointly finalize the CTR water quality criteria and the State implementation plan, EPA is proposing criteria an the State is proposing an implementation plan so that the State will have a comprehensive water quality control program in place as soon as possible. EPA and the State have coordinated on the criteria and implementation plan so that EPA believes the two phases of the program will work well together. However, it is more efficient for each agency to move forward with its part, to complete each phase as soon as possible.

Comment ID: CTR-059-005
Comment Author: Los Angeles County Sanit. Dist
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: M Re-Open Comment Period
References: Letter CTR-059 incorporates by reference letter CTR-035
Attachments? Y
CROSS REFERENCES

Comment: Finally, due to the extensive nature of the proposed changes to the rule and the economic analysis, we request that EPA re-publish the CTR and economic analysis for public comment before finalizing the regulation.

Response to: CTR-059-005

In response to the comment requesting that EPA re-propose and re-open the public comment period, please refer to response to CTR-005-010.

Comment ID: CTR-067-007
Comment Author: Ojai Valley Sanitary District
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: M Re-Open Comment Period
References:
Attachments? N
CROSS REFERENCES R

Comment: Based on these issues, OVSD strongly urges EPA to revise its Economic Analysis, and recommend that EPA and the SWRCB work together with stakeholders to develop a revised approach that is mutually acceptable. Due to the significant nature of the changes proposed, OVSD requests EPA re-propose the CTR for public review and comment. We appreciate the opportunity to comment on the proposed CTR, as well as your consideration of our comments.

Response to: CTR-067-007

In response to the comment requesting that EPA re-propose and re-open the public comment period, please refer to response to CTR-005-010. In response to the comment that EPA work together to develop a revised approach, EPA did not substantially revise the CTR and thus, re-proposal is not warranted.

Subject Matter Code: O Offer of Assistance/Review

Comment ID: CTR-027-013b
Comment Author: California SWQTF
Document Type: Storm Water Auth.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: O Offer of Assistance/Review
References: Letter CTR-027 incorporates by reference letters CTR-001, CTR-036 and CTR-040
Attachments? N
CROSS REFERENCES M

Comment: OFFER OF ASSISTANCE

We appreciate the opportunity to provide comments to the proposed rule. Overall, we believe the rule should not be adopted as proposed. We would recommend that USEPA modify the rule and redistribute the rule for further review and comment.

During the development of the proposed rule, USEPA failed to meet with the CaliforniaStormwater Task Force or any other California group of MS4 dischargers to discuss the propose rule. We believe such a meeting would have been very beneficial for USEPA and the MS4 dischargers. We extend an offer to meet with EPA and other interested parties to resolve the above issues, and other significant issues prior to finalizing the rule.

Thank you again for this opportunity, if you have any questions or would like to discuss these comments or issues further please contact me at (510) 670-5563.

Response to: CTR-027-013b

EPA did not meet with the commenter during the development of the California Toxics Rule because the commenter did not ask for a meeting to discuss the rule during this time period. EPA did hold a public meeting on August 2, 1995 which provided an opportunity for all groups, including storm water dischargers, to ask questions or express concerns about the CTR. Since the proposal and subsequent to the commenter's request to meet with EPA, EPA did meet with the California Water Quality Task Force to discuss a related issue to CTR; language in current stormwater permits regarding water quality standards. In addition, EPA held two public hearings, September 18, 1997 in San Francisco and September 19, 1997 in Los Angeles. EPA believes it does understand the concerns of the California Water Quality Task Force and MS4 dischargers as expressed through its written and verbal comments on the CTR. EPA addresses these comments elsewhere in the response to comment document for the rule.

Comment ID: CTR-040-001
Comment Author: County of Sacramento Water Div
Document Type: Storm Water Auth.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: O Offer of Assistance/Review

References: Letter CTR-040 incorporates by reference letter CTR-027
Attachments? Y
CROSS REFERENCES

Comment: OUR PROGRAM

The County is one of four agencies comprising the Sacramento Stormwater Management Program. The other three agencies are the cities of Sacramento, Folsom, and Galt. The Sacramento Stormwater Management Program began in June 1990. Since its inception, the Sacramento Stormwater Program has developed into a high quality stormwater program which is being recognized this year by EPA through its first place award to both the County and City of Sacramento in EPA's outstanding Stormwater Management Program, municipal category.

OUR INTERESTS

The comments that follow are based on our interests that the Rule, the Preamble, and the Rule's accompanying analyses accomplish the following goals:

1. Allow municipal stormwater programs to continue their focus on reduction of pollutants to the maximum extent practicable.

2. Satisfy the requirements of applicable Federal laws and regulations.

3. Provide incentives for reasonable actions to address toxic pollutants from all sources within a watershed.

We believe these interests are compatible with those of EPA and other interested par-ties, and we offer to work with all parties to craft a Rule that satisfies these interests.

Response to: CTR-040-001

EPA believes the CTR is consistent with the goals stated in the comments.

Comment ID: CTR-040-021
Comment Author: County of Sacramento Water Div
Document Type: Storm Water Auth.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: O Offer of Assistance/Review
References: Letter CTR-040 incorporates by reference letter CTR-027
Attachments? Y
CROSS REFERENCES

Comment: OFFER TO ASSIST

Again, we appreciate the opportunity to comment on the proposed Rule. We extend an offer to sit down with EPA and other interested parties to resolve these and other significant issues prior to finalizing the

Rule.

Response to: CTR-040-021

See response to CTR-040-001.

Subject Matter Code: P Whole Effluent Toxicity

Comment ID: CTR-057-008
Comment Author: City of Los Angeles
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: P Whole Effluent Toxicity
References:
Attachments? N
CROSS REFERENCES

Comment: Toxicity

While we acknowledge the need for improved sampling and testing protocols for acute and chronic toxicity, we are concerned about the extent of EPA's awareness with respect to test variability and test acceptability criteria. The effects of test organism age and health and variations in effluent quality over the testing period introduce many variables into toxicity assessment results; these variations can only be accounted for through statistical methods of data analysis. Consequently, we believe that the EPA should provide for the use of narrative toxicity criteria when site-specific conditions merit them. Similarly, the use of non-local test species should be viewed with caution since this introduces another variable into the test results. Narrative criteria can also be justified in view of the need for additional toxicity research on standard test species with respect to type of pollutant, especially chlorination by-products and ammonia.

Response to: CTR-057-008

The CTR did not propose either narrative or numeric toxicity criteria, and therefore, issues related to WET are outside the scope of this rule.

Comment ID: CTR-065-006a
Comment Author: Environmental Health Coalition
Document Type: Environmental Group
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: P Whole Effluent Toxicity
References:
Attachments? N
CROSS REFERENCES C-20

Comment: TOXICITY TESTING

EHC strongly supports inclusion of acute and chronic toxicity tests. However, it is very important that chlorine and ammonia be added to the list of constituents.

Response to: CTR-065-006a

With respect to your comment on the inclusion of acute and chronic toxicity testing, the CTR did not propose either narrative or numeric toxicity testing criteria. As required by Section 303(c)(2)(B), the CTR proposed numeric water quality criteria for priority toxic pollutants, as identified at CWA section 307(a) and for which the Agency has issued CWA section 304(a) criteria guidance. Whole effluent toxicity limits are not within the ambit of section 303(c)(2)(b) and thus are outside the scope of this action.

EPA agrees that acute and chronic toxicity testing is an important component of the water quality-based toxics control program. In EPA's water quality standards regulations, 40 CFR 131.11, EPA encourages states to adopt both numeric and narrative criteria. Narrative criteria can be the basis for limiting toxicity in waste discharges where a specific pollutant can be identified as causing or contributing to the toxicity but there are no numeric criteria in the state standards, or where toxicity cannot be traced to a particular pollutant. Section 131.11(a)(2) requires states to develop implementation procedures to explain how it will ensure the narrative toxic criteria are met.

Subject Matter Code: Q Nonpoint Sources

Comment ID: CTR-086-001a
Comment Author: EOA, Inc.
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org: California Dent
Document Date: 09/26/97
Subject Matter Code: Q Nonpoint Sources
References: Letter CTR-086 incorporates by reference letter CTR-035
Attachments? N
CROSS REFERENCES K-01

Comment: CDA's primary concerns are with the potential for additional regulation of wastewater discharges from dental offices to POTWS. Several municipalities in the Bay Area, including the City of San Francisco, have informed CDA that dentist offices are considered a source of mercury discharges to municipal sewer systems, and under the Basin Plan will be subject to additional regulation when lower effluent limits are imposed in municipal NPDES permits. Yet, very little is known about the fate, transport, bioavailability and overall water quality impacts of amalgam related mercury.

CDA in cooperation with San Francisco, has developed a comprehensive program of pollution prevention practices (best management practices) for dental offices that has been distributed statewide and is in the process of being implemented. Yet efforts continue by municipalities in parts of the State, such as San Francisco Bay, to impose increasingly stringent and costly controls on dental offices. Within the current point source regulatory structure. POTWs that have mercury compliance problems, or perceive that they might have if the criteria become more stringent (e.g. through loss of dilution credit), are forced to continue to look "upstream" for additional sources to control, until such time, as recommended, as a more comprehensive watershed based approach is allowed.

CDA is a strong supporter of water quality and human health protection. CDA's primary goals in commenting on the draft CTR are to request that mercury criteria be based on sound science and that mercury regulation be implemented via a watershed management, phased TNML-type approach. CDA is particularly concerned that the CTR does not adequately assess the economic impacts on indirect dischargers nor the extent to which there will be measurable water quality benefits solely from adoption of the proposed mercury criteria for point sources.

Watershed Management Based Approach

Data show that there are elevated levels of mercury in San Francisco Bay waters, sediments, and some fish tissue. It is critical to have a better understanding of watershed-wide mercury inputs, fate, transport, and biogeochemical transformations affecting the San Francisco Bay food chain and human health, and the feasibility and costs of alternative control measures, before imposing potentially onerous control measures (through POTWS) on indirect dischargers, such as dentists, that may not provide measurable water quality or human health benefits.

Since POTWs are only responsible for contributing 1-10% of the toxics mass loading (including mercury) to San Francisco Bay (p. 7-7 EA) it makes economic sense to focus limited public resources on identification of larger and potentially more cost-effective sources to control. Since dentists likely represent a very minor and declining fraction of the mercury loading to POTWs (due to implementation

of BMPs and substitution of non-mercury based compounds for mercury containing dental amalgam), it makes even more public policy sense to fully evaluate and prioritizeall sources and controls before pursuing additional control measures on indirect dischargers such as dentists. This needs to be conducted on a watershed basis, consistent with various EPA guidance including the August 1997 Robert Perciasepe TMDL Policy memorandum and the San Francisco Bay Regional Board's July 1997 Watershed Management Initiative Guidance.

Response to: CTR-086-001a

The commentor's concerns that the CTR would disproportionately impact dental offices makes assumptions about the implementation of the CTR. The implementation of the CTR includes issues that are outside the scope of this rule. The purpose of the CTR is to establish ambient criteria, which define the constituent concentrations that represent a quality of water that supports a particular use. EPA recognizes that both point (including indirect industrial discharges to POTWs) and nonpoint sources may contribute to exceedence of water quality criteria. While EPA encourages the State to take a watershed approach and consider the total and relative loadings from, and the most effective means of controlling, both point and nonpoint sources in developing programs to ensure that criteria are met, the purpose of the CTR is to establish the criteria themselves; not to provide, nor impose, tools for achieving the criteria. The State has primacy in developing its own implementation procedures. The State's proposed implementation procedures can be found in "Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California," September 11, 1997. The State plans to issue a final policy shortly after promulgation of the CTR.

EPA believes that the Economic Analysis does adequately address economic impacts on indirect dischargers based on the use of available data. The EA used available data from San Jose and Sunnyvale based on those cities' projections of pretreatment controls for copper and nickel from industrial sources. EPA's analysis makes reasonable estimates given the uncertainty of whether NPDES permit limits will become more stringent and how POTWs would implement controls on industrial or commercial discharges to POTWs. As stated in the EA, the States and POTWs have a great deal of discretion in implementing these criteria.

Regarding the commentor's request that mercury criteria be based on sound science see responses to category C-1.

Comment ID: CTR-090-007
Comment Author: C&C of SF, Public Utl. Commis.
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: Q Nonpoint Sources
References: Letter CTR-090 incorporates by reference letters CTR-035 and CTR-054
Attachments? Y
CROSS REFERENCES

Comment: Major Concerns About the Proposed Criteria and Rule

1. The Proposal is Based on Poor Data and Will Not Result in Better Water Quality for California. We

stated that our own attainability analysis and that of BADA show that San Francisco,) will be impacted by this rule. Unfortunately, due to the short time for review, the poor quality of data and basis for statements and assumptions in the proposal and the problem with detection limits we cannot specifically say what will be the cost to Sari Francisco. One analysis tell us it could be $2.3 million per year annualized costs and another analysis tells us it could be much more. We strongly recommend major revision to the proposal and the economic analysis before final promulgation for the following reasons:

This rule will be applied to point source dischargers with NPDES permits and all EPA and State data confirm that the major sources of many of the pollutants of concern in the major waters of California are not point discharges.

Response to: CTR-090-007

The comment claiming the CTR will have a disproportionate burden on point sources deals with implementation of the CTR which is outside the scope of this rule. The purpose of the CTR is to establish ambient criteria, which define the constituent concentrations that represent a quality of water that supports a particular use. EPA discusses the legal bases for the rule in the preamble and elsewhere in the comment response document for the rule. EPA recognizes that both point and nonpoint sources may contribute to exceedence of water quality criteria. While EPA encourages the State to take a watershed approach and consider the total and relative loadings from, and the most effective means of controlling, both point and nonpoint sources in developing programs to ensure that criteria are met, the purpose of the CTR is to establish the criteria themselves; not to provide, nor impose, tools for achieving the criteria. The State has primacy in developing its own implementation procedures. The State's proposed implementation procedures can be found in "Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California," September 11, 1997. The State plans to issue a final policy shortly after promulgation of the CTR.

Regarding the uncertainty of the costs to San Francisco, EPA agrees that economic impacts, due to the the uncertain manner in how the CTR will be implemented by on a site-specific basis, are difficult to predict. However, EPA believes its Economic Analysis provides a reasonable range of potential costs to sample facilities given the available data and the uncertainty of site-specific implementation.

Comment ID: CTR-090-015
Comment Author: C&C of SF, Public Utl. Commis.
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: Q Nonpoint Sources
References: Letter CTR-090 incorporates by reference letters CTR-035 and CTR-054
Attachments? Y
CROSS REFERENCES

Comment: Source of toxicants - Benefits from adoption of this rule may be minimal as the most serious water quality problems are caused by non-point sources not subject to WQBEL in NPDES permits. For example, the Benefits Document depicts the seven northern California water bodies that currently have DHS health advisories. These water bodies are:

1. Lake Nacimiento 2. Guadalupe and other Santa Clara County Reservoirs 3. Lake Herman 4. Lake Berryessa 5. Clear Lake 6. Kesterton National Wildlife Refuge/Grassland Area 7. San Francisco Bay

The first five areas are all areas contaminated by mercury from historical mercury mines. Between the late nineteenth century to about 1965, the central coast ranges from San Luis Obispo County north to Lake County provided 70% of the domestic production of elemental mercury. The dominant ore was cinnabar, (HgS) which was found typically in shallow deposits within serpentine and other Franciscan formation rocks. Many abandoned mercury mines with their attendant calcined waste dumps and contaminated main facilities are found throughout this area. Construction and maintenance of access roads to these mines could also mobilize considerable mercury through increased erosion.

Natural releases of mercury either through seismic or geothermal activity may be a significant portion of the mercury problem in some parts of Clear Lake. Sediment deposits dated to 8,800 years ago show mercury concentrations up to 65 mg/kg. Geothermal activity also occurs within the catchment for Lake Beryessa.

(For a good discussion of the mercury problem in the Coast Ranges, see Hood, Michael, etal, Mining Waste Study -Final Report, University of California, Berkeley, July 1, 1988, prepared for the SWRCB, pages 243, et seq. and pages 275 et seq.).

No part of this mercury problem can be attributed to either POTWs or currently active industries. Nor will anything in the CTR provide additional tools to assist in the remediation of the correctable portions of these mercury problems.

The sixth site is Kesterson Reservoir, contaminated by selenium, from surface and sub-surface agricultural drains. Again state efforts to remediate this problem are underway and will not change as a result of the CTR.

The seventh area is San Francisco Bay. Portions of the Bay have elevated levels of mercury, PCBS, dioxin and pesticides. EPA acknowledges that NPDES permitted point sources typically account for between 4 % and 1 1 % of most of the problematic toxicants.

Whether these percentages hold true for the chlorinated organic compounds is difficult to establish as many potential sources are not well characterized due to analytical problems. Nevertheless, it is unlikely that POTWs and industrial point sources are anything other thanminor contributors of the chlorinated hydrocarbon compounds of greatest concern.

The major sources for most of the problem toxicants in the Bay, are, agriculture, abandoned mines, historical contaminated sediments and both urban and nonurban runoff. These major sources will be very difficult, and in some cases impossible, to control. Therefore, even if permitted point sources achieve full compliance with the CTR, only negligible (<10%) improvement in Bay water quality will result. The CTR must address this critical issue: which toxic pollutants prevent California waters from achieving CWA goals and objectives and what isthe source of these toxicants. This assessment is necessary to determine ff EPA has met its obligations to promulgate new water quality standards necessary to meet the requirements of the Act. [CWA section 303(c)(4)]

Response to: CTR-090-015

See response to CTR-090-007 (first paragraph).

Comment ID: CTR-090-023b
Comment Author: C&C of SF, Public Utl. Commis.
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: Q Nonpoint Sources
References: Letter CTR-090 incorporates by reference letters CTR-035 and CTR-054
Attachments? Y
CROSS REFERENCES K-02

Comment: An Alternative Strategy to Implement the CTR - The CTR will likely result in massive public and private expenditures without yielding measurable or significant environmental benefits. Costs can be significantly reduced with regulatory flexibility and the cost analysis assumes that regulatory relief will be forthcoming when costs become excessive. However, nothing in the preamble nor anything in the State's implementation plan indicates a willingness to provide regulatory relief. On the contrary, the draft rule establishes an unusually cumbersome variance procedure while theState's draft proposal sets out very conservative procedures for WQBELs and waste load allocations (WLAs).

For these reasons, we recommend a go slow approach to both promulgating and implementing the CTR for those toxicants where the best evidence indicates that non-permitted sources are the predominant sources. This approach would:

1. Use the concept of temporary standards based on liberal assumptions such as use of a CRF of 10E-4 or 10E-4.5 until such time that a) problems in tissue concentrations are established; and b) loadings are established within the watershed. 2. Require permitted sources, including storm water sources to thoroughly characterize their discharges for the watershed specific problem contaminants. 3. Require permitted sources including storm water that discharge nontrivial amounts of problem toxicants to participate in or financially support ambient monitoring programs. 4. Require permitted sources including storm water sources, to undertake all reasonable source control efforts for any problem toxicants in their discharge.

The above efforts will continue through the development of Watershed based control measures, including TMDLs where required. For complex watershed the TMDL process could be lengthy, up to 10 years or more.

Such approaches were discussed in the preamble of the Great Lakes Initiative (589 FR 72, April 16, 1993), and are further discussed in a September 10, 1997 EPA HQ draft memorandum "A Watershed Approach for the Achievement of Water Quality Objectives." (Attachment 1) The temporary limits approach would also obviate the massive administrative burdens contained in the proposed variance procedures.

Response to: CTR-090-023b

See response to CTR-090-023b (first paragraph).

Subject Matter Code: R RFA/SBREFA

Comment ID: CTR-001-008b
Comment Author: Law Offices of Alan C. Waltner
Document Type: Storm Water Auth.
State of Origin: CA
Represented Org: Almeda Cnty Clean Wtr Pgm
Document Date: 09/22/97
Subject Matter Code: R RFA/SBREFA
References:
Attachments? N
CROSS REFERENCES J-02

Comment: EPA'S PROPOSAL VIOLATES THE REGULATORY FLEXIBILITY ACT

Several of the member agencies of the ACCWP have populations less than 50,000 (Piedmont, Emeryville, Albany) and will be significantly affected by the proposed rule if it results in the adoption of NELs or WLAs in the permit for their discharges. These "small entities" under the Regulatory Flexibility Act ("RFA") are entitled to both initial and final regulatory flexibility analyses under the RFA.

EPA's finding that a substantial number of small entities will not be significantly affected by the proposed rule is arbitrary and capricious given this demonstrated impact. A substantial number of municipalities less than 50,000 in population are currently covered by NPDES permits for their storm water discharges. In addition, EPA's upcoming Phase II storm water regulations maysubstantially expand the universe of small municipalities that will be subject to NPDES permits and, through those permits, to the provisions of the CTR.

Neither the ACCWP, the ACCWP's member agencies or, to our knowledge, any other storm water system that will be subject to this rule, was contacted by EPA in advance of the proposed rulemaking and given a reasonable opportunity to participate in the rulemaking as required by 5 U.S.C. section 609(a). In addition, as a "covered agency" under 5 U.S.C. section 609, EPA must process the proposed rule in accordance with the provisions of that section, including the convening of a review panel, but apparently has failed to do so.

Response to: CTR-001-008b

The Regulatory Flexibility Act generally requires federal agencies to prepare a regulatory flexibility analysis (RFA) that describes the impact of a rule on small entities (small businesses, small organizations and small governmental jurisdictions) whenever an agency promulgates a final rule under section 553 of the Administrative Procedure Act, 5 U.S.C. Section 553. 5 U.S.C. Section 604. Under section 605(b) of the Regulatory Flexibility Act, however, if the head of an agency certifies that a rule will not have a significant economic impact on a substantial number of small entities, the statute does not require the agency to prepare an RFA. Pursuant to section 605(b), the Admininstrator is today certifying that this rule will not have a significant economic impact on a substantial number of small entities for the reasons explained below. Consequently, EPA has not prepared an RFA.

The RFA requires analysis of the economic impact of a rule only on the small entities subject to the rules' requirements. See United States Distribution Companies v. FERC, 88 F.3d 1105, 1170 (D.C. Cir. 1996). ("[N]o [regulatory flexibility] analysis is necessary when an agency determines that the rule will not have

a significant economic impact on a substantial number of small entities that are subject to the requirements of the rule," United Distribution at 1170, quoting Mid-Tex Elec. Co-op v. FERC, 773 F.2d 327, 342 (D.C. Cir. 1985) (emphasis added by United Distribution court).) Thus, the RFA requires that any regulatory flexibility analysis prepared for a final rule must include estimates of "the number of small entities to which a rule will apply." 5 U.S.C. Section604(a)(3). The analysis must also include a description of the recordkeeping, reporting and compliance requirements of the rule, including an estimate of the classes of small entities "which will be subject to the requirements." 5 U.S.C. Section 604(a)(4). In light of these provisions, courts have consistently interpreted the RFA to impose no obligation on an agency to conduct a small entity impact analysis on entities it does not regulate. Motor & Equip. Mfrs. Ass'n v. Nichols, 142 F.3d 449, 467 & n.18 (D.C. Cir. 1998).

The U.S. Court of Appeals for the District of Columbia Circuit recently reaffirmed its conclusion that the RFA does not require an agency to prepare an assessment of the economic impact of a rule on small entities that are not directly affected by a rule. American Trucking Association, Inc. v. U.S. Environmental Protection Agency, (D.C. Cir. 1999). In that case, the court determined that EPA was not required to prepare a regulatory flexibility analysis of the economic impact of a rule on small entities when it promulgated air quality standards under the Clean Air Act. There, EPA had certified that the rule would not have a significant impact on small entities because the air standard did not directly impose requirements on small entities and consequently they were not subject to the rule. Under the Clean Air Act, states regulate small entities through state implementation plans that they are required to develop under the Act. States have broad discretion in determining how to achieve compliance with the standards and may choose to avoid imposing any of the burden of complying with the standards on small entities.

The CTR presents a situation very similar to that described in the American Trucking case. It establishes no requirements that are directly applicable to small entities, and so the agency is not required to conduct a regulatory flexibility analysis under the RFA. (See United States Distribution Companies v. FERC, 88 F.3d 1105, 1170 (D.C. Cir. 1996). The Agency is therefore certifying that today's rule will not have a significant economic impact on a substantial number of small entities, within the meaning of the RFA.

Under the CWA water quality standards program, states must adopt water quality standards for their waters that must be submitted to EPA for approval. If the Agency disapproves a state standard and the state does not adopt appropriate revisions to address EPA's disapproval, EPA must promulgate standards consistent with the statutory requirements. EPA has authority to promulgate criteria or standards in any case where the Administrator determines that a revised or new standard is necessary to meet the requirements of the Act. These state standards (or EPA-promulgated standards) are implemented through various water quality control programs including the National Pollutant Discharge Elimination System (NPDES) program that limits discharges to navigable waters except in compliance with an EPA permit or permit issued under an approved state program. The CWA requires that all NPDES permits must include any limits on discharges that are necessary to meet state water quality standards.

Thus, under the CWA, EPA's promulgation of water quality criteria or standards establishes standards that the state, in turn, implements through the NPDES permit process. The state has considerable discretion in deciding how to meet the water quality standards and in developing discharge limits as needed to meet the standards. In circumstances where there is more than one discharger to a water body that is subject to water quality standards or criteria, a state also has discretion in deciding on the appropriate limits for the different dischargers. While the state's implementation of federally-promulgated water quality criteria or standards may result indirectly in new or revised discharge limits for small entities, the criteria or standards themselves do not apply to any discharger, including small entities.

EPA recognizes that it has undertaken an economic analysis pursuant to E.O. 12866 for this rule. This analysis, however, makes numerous assumptions and does not necessarily predict how the state will implement the criteria. Thus, the economic analysis represents EPA's best estimate of the implementation costs of the rule given the broad flexibility the state has in implementing the criteria.

The CTR, as explained above, does not itself establish any requirements that are applicable to small entities. As a result of EPA's action here, the State of California will need to ensure that permits it issues comply with the water quality standards established by the criteria in today's rule. In so doing, the State will have a number of discretionary choices associated with permit writing. While California's implementation of today's rule may ultimately result in some new or revised permit conditions for some dischargers, including small entities, EPA's action today does not impose any of these as yet unknown requirements on small entities.

Although the statute does not require EPA to prepare a regulatory flexibility analysis when it promulgates water quality criteria which will establish water quality standards for California, EPA has prepared an assessment of potential economic impact. This evaluation focuses on State and local implementation procedures related to the NPDES permit program. This evaluation is included in a document entitled, Implementation Analysis of Ambient Water Quality Criteria for Priority Toxic Pollutants in California which is part of the administrative record for this rulemaking. This document looks at the many implementation procedures of the NPDES permit program that the State implements to control pollutants from point source discharges. The procedures discussed in the document include: methods to calculate water quality-based effluent limits; mixing zones; site-specific translators for metals criteria; compliance schedules; effluent trading; water-effect ratios; variances; designated use reclassification; and site-specific criteria. Each of these implementation procedures may have an effect on how water quality standards, based on the criteria in today's rule, will impact NPDES permit holders. Many of these procedures will lessen impacts on regulated entities.

The document also looks at implementation procedures used in the pretreatment program to control pollutant discharges from dischargers that do not discharge directly but introduce pollutants to publicly owned treatment works (POTWs). These dischargers include retail, commercial, and small industrial facilities that discharge to publicly owned treatment works (POTWs). Local entities have significant flexibility to implement their pretreatment programs. These procedures include: methods to calculate local limits (allocation of pollutants); methods of pollution prevention for various specific sources; pretreatment pollutant trading; methods of low cost pollutant reductions; technical assistance to move toward or achieve zero-discharge; cost accounting to drive down levels of discharges; and a few of the regulatory relief options discussed in the direct discharger section, e.g., compliance schedules.

The discussion illustrates the significant amount of flexibility available to the State and local agencies when implementing the NPDES permit program and pretreatment program and emphasizes that appropriate use of the available implementation tools can greatly affect the impact to many direct and indirect dischargers.

See also response to CTR-050-007a (Category C-21; Legal Concerns) and the preamble to the final rule.

Comment ID: CTR-005-006c
Comment Author: Novato Sanitary District
Document Type: Sewer Authority
State of Origin: CA

Represented Org:
Document Date: 09/23/97
Subject Matter Code: R RFA/SBREFA
References:
Attachments? Y
CROSS REFERENCES C-21; S

Comment: 5. The proposed rule is inconsistent with applicable Federal law and regulations. In proposing a single set of criteria for all estuaries, the rule is inconsistent with the Clean Water Act and EPA's water quality standards regulations. The Clean Water Act requires that water quality standards be established taking into consideration their use and value for public water supplies, propagation of fish and wildlife, recreational purposes, and also taking into consideration their use and value for navigation (See CWA section 303(c)(2)(A)). Consistent with this, EPA regulations require that water quality standards be based on identification of where toxic pollutants may be adversely affecting water quality or the attainment of the designated water use or where the levels of toxic pollutants are at a level to warrant concern. For those identified waters, states must adopt criteria for such toxic pollutants applicable to sufficient to protect the designated use"(See 40 CFR 131.1 1 (a)(2)).

Clearly the intent of both the Act and EPA regulations is that water quality standards be tailored to the characteristics of the waters in question. In failing to properly evaluate the rule's economic impacts and in failing to adequately consider regulatory alternatives, the rule is inconsistent with Presidential Executive Order 12866 and the Unfunded Mandates Reform Act. In failing to properly consider the impacts on small entities, the rule is inconsistent with the Regulatory Flexibility Act.

Response to: CTR-005-006c

With respect to EPA's decision to publish a single set of criteria in the rule, see responses to CTR-035-012a and CTR-036-005 (both responses are in Category C-21; Legal issues). For a discussion of how the rule complies with the E.O. 12866, the Unfunded Mandates Reform Act, and Regulatory Flexibility Act, see responses to CTR-001-008b, CTR-021-005c (Category E-01c; Executive Order 12866), CTR-036-003a (Category S; Unfunded Mandates Reform Act), and the preamble to the proposed rule.

Comment ID: CTR-013-008a
Comment Author: County of Los Angeles
Document Type: Storm Water Auth.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: R RFA/SBREFA
References: Letter CTR-013 incorporates by reference letter CTR-027
Attachments? N
CROSS REFERENCES J

Comment: In addition, we would like to emphasize the following concerns which greatly impact the Los Angeles County Stormwater Program:

8. The proposed rule applies to all current and future MS4 dischargers, including small communities.

The small communities will be significantly impacted by the proposed rule. In Los Angeles County, 77 of the 85 co-permittee cities are communities with a population of less than 100,000. Many of the larger municipalities in California have conducted stormwater discharge characterization studies. These studies have shown that there are common pollutants associated with stormwater discharges from urbanized areas that could result in compliance problems with the proposed criteria. Most small communities have not conducted discharge characterization studies, however, it is reasonable to assume that discharges from small communities would also contain these same pollutants. This would result in a smaller community being faced with the same compliance issues as large and medium municipalities, however, the cost to comply could be more significant and prohibitive for smaller communities.

The Regulatory Flexibility Act requires the USEPA to conduct an analysis on the economic impact the proposed rule may have on small entities unless the USEPA certifies that the rule will not affect a significant number of small entities. In the preamble to the proposed rule(*2) it indicates that there are no small entities to be impacted by the rule and, therefore, the USEPA did not need to complete an analysis required under the Act. The USEPA neglected to address small MS4 communities in California that are currently subject to a MS4 permits, and those smaller communities that may be impacted through Phase II. The USEPA should have conducted an analysis on the economic impacts to smaller communities.

Therefore, unless the preamble is modified to indicate that MS4s are not required to comply with water quality standards, the proposed rule should not be applied to smaller MS4 communities until the USEPA has complied with the requirements of the Regulatory Flexibility Act.

(*2) Federal Register, August 5, 1997, Vol. 62, No. 150, Page 42191.

Response to: CTR-013-008a

See response to CTR-001-008b and the preamble to the final rule.

Comment ID: CTR-014-004a
Comment Author: City of Lakewood
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: R RFA/SBREFA
References: Letter CTR-014 incorporates by reference letters CTR-013 and CTR-027
Attachments? N
CROSS REFERENCES J

Comment: 4. The proposed rule applies to all current and future MS4 dischargers, including small communities. These small communities will be significantly impacted by the proposed rule. In California, there are many small communities that are currently co-permittees to MS4 permits. Many of the larger municipalities in California have conducted stormwater discharge characterization studies. These studies have shown that there are common pollutants associated with stormwater discharges from urbanized areas that could result in compliance problems with the proposed criteria. Most small communities have not conducted discharge characterization studies; however, it is reasonable to assume

that discharges from small communities would also contain these same pollutants. This would result in a smaller community being faced with the same compliance issues as large and medium municipalities; however, the cost to comply could be more significant and prohibitive for smaller communities.

The Regulatory Flexibility Act requires the USEPA to conduct an analysis on the economic impact the proposed rule may have on small entities, unless the USEPA certifies that the rule will not affect a significant number of small entities. In the preamble to the proposed rule(*1), it indicates that there are no small entities to be impacted by the rule, and, therefore, the USEPA did not need to complete an analysis required under the Act. The USEPA neglected to address small MS4 communities in California that are currently subject to a MS4 permits, and those smaller communities that may be impacted through Phase II. The USEPA should have conducted an analysis on the economic impacts to smaller communities.

Unless the preamble is modified to indicate that MS4s are not required to comply with water quality standards, the proposed rule should not be applied to smaller MS4 communities until the USEPA has complied with the requirements of the Regulatory Flexibility Act.

Thank you for this opportunity to comment on the proposed CTR. Respectfully,

Lisa Ann Rapp Director of Public Works

(*1) Federal Register, August 5, 1997, Vol. 62, No. 150, Page 42191

Response to: CTR-014-004a

See response to CTR-001-008b and the preamble to the final rule.

Comment ID: CTR-019-003b
Comment Author: Richards, Watson & Gershon
Document Type: Local Government
State of Origin: CA
Represented Org: Cities of Barst
Document Date: 09/26/97
Subject Matter Code: R RFA/SBREFA
References: Letter CTR-019 incorporates by reference letters CTR-001, CTR-013, CTR-027 and CTR-036

Attachments? N
CROSS REFERENCES J

Comment: THE PROPOSED RULE DOES NOT COMPLY WITH THE REGULATORY FLEXIBILITY ACT

USEPA's analysis under the Regulatory Flexibility Act and Executive Order No. 12866 that the CTR will not affect a significant number of small entities is simply wrong. Most of the cities which we represent have populations of less than 20,000; many have less than 10,000. As noted by the County of Los Angeles, 77 of the co-permittee cities have populations of less than 100,000. Many of these cities are

primarily residential and with limited tax revenues. Nevertheless the proposed CTR would impose the same financial requirements on these cities as would be imposed on larger entities. These cities do not receive funds from either the State of California or the federal government for their storm water programs or other urban runoff control measures.

Response to: CTR-019-003b

See response to CTR-001-008b and the preamble to the final rule.

Comment ID: CTR-021-005d
Comment Author: LeBoeuf, Lamb, Green & MacRae
Document Type: Local Government
State of Origin: CA
Represented Org: City of Sunnyvale
Document Date: 09/25/97
Subject Matter Code: R RFA/SBREFA
References: Letter CTR-021 incorporates by reference letter CTR-035
Attachments? Y
CROSS REFERENCES C-13; C-28; E-01c; S

Comment: It is with a sense of reluctance that Sunnyvale joins in CASA/Tri-TAC's adverse comments on the CTR and the EA, and Sunnyvale does so in a spirit of constructive criticism and with an expectation that the Agency will make the necessary adjustments in its approach towards the CTR before the final rule is promulgated. In addition, in the same spirit and with the same expectation, Sunnyvale would like to make the following points on its own behalf:

2. Obligation to Assess Alternative Cancer Risk Levels for Human Health-Based Criteria. Sunnyvale is gravely concerned that EPA has used the wrong approach in proposing to establish human health criteria for organic pollutants, particularly those pollutants for which the proposed criteria are below the method level of detection ("MDL"). Sunnyvale recommends that EPA should thoroughly assess all of the potential impacts, including costs and benefits, of the 10E-4 and 10E-5 risk levels before proposing the human health-based criteria. As pointed out in the EOA Letter, there is a significant potential for advancing technology to lower the MDL for many pollutants to the point where laboratory equipment is able to measure some or all of the organic compounds for which EPA is proposing to establish criteria at the new level. It is intuitively obvious that the costs of attaining criteria set at the 10E-6 level will be significantly greater than attainment of a 10E-5 or 10E-4 level, particularly where, as pointed out in the EOA Letter, the only available method of treatment is granular activated carbon. Sunnyvale is concerned that the EA does not adequately address the potential for these costs, and, consequently, does not take these potential costs into account in determining whether to exercise its flexibility in choosing whether to use a 10-4 , 10-5 or 10-6 cancer risk level as the basis for its CTR promulgation.

EPA is required by Executive Order 12866, the Regulatory Flexibility Act and the Unfunded Mandates Reform Act to identify and analyze alternatives to a proposed rule. We cannot understand, therefore, why EPA has done such a cursory analysis in the preamble to the CTR and the EA of the alternatives to the use of the most stringent (10E-6) risk level for establishing criteria for human health effects of pollutants, particularly organic pollutants. EPA cannot base its selection of the 10E-6 level based upon previous regulatory pronouncements by the State of California. Any new determination by the State will be subject to the analytical requirements of Section 13241 of the Porter-Cologne Act and by review by

the Office of Administrative Law. Thus, it is not a foregone conclusion that the State will ultimately select the 10E-6 level. EPA has its own legal requirements to fulfill. Accordingly, we ask that EPA not promulgate the final human health criteria for the pollutants of concern unless and until it has adequately analyzed the costs and other implications of the various alternatives to the 10E-6 level.

In conclusion, we are entirely supportive of many of EPA's innovative approaches towards development of the CTR, particularly as regards the toxic metals. However, we believe tht EPA has needlessly failed to comply with many of its legal obligations, particularly as regards the development of human health-based criteria on cancer risk levels of organic pollutants. We urge the Agency to reconsider its position in the matters covered by this letter (as amplified by the EOA Letter) and the CASA/Tri-TAC letter. Sunnyvale pledges its continued participation in place-based watershed management planning in the South Bay, its cooperation with the Agency in making a success of the WPI, and to an ongoing effort by the Agency and others to reach water quality goals in the South Bay. We thank you for the opportunity to comment on the proposed CTR.

Response to: CTR-021-005d

For a discussion of how the rule complies with the E.O. 12866, the Unfunded Mandates Reform Act, and Regulatory Flexibility Act, see responses to CTR-001-008b, CTR-036-005c (Category E-01c; Executive Order 12866), CTR-036-003a (Category S; Unfunded Mandates Reform Act), and the preamble to the proposed rule.

With respect to detection limits see response to CTR-034-010b and CTR-060-010 (Category C-28; Detection Limits). With respect to the selection and economic analysis of risk levels for carcinogens see responses to CTR-021-005a (Category C-13; Risk Level) and CTR-021-005c (Category E-01c; Executive Order 12866).

Comment ID: CTR-021-006c
Comment Author: LeBoeuf, Lamb, Green & MacRae
Document Type: Local Government
State of Origin: CA
Represented Org: City of Sunnyvale
Document Date: 09/25/97
Subject Matter Code: R RFA/SBREFA
References: Letter CTR-021 incorporates by reference letter CTR-035
Attachments? Y
CROSS REFERENCES J; E-01c; S; I-01

Comment: It is with a sense of reluctance that Sunnyvale joins in CASA/Tri-TAC's adverse comments on the CTR and the EA, and Sunnyvale does so in a spirit of constructive criticism and with an expectaton that the Agency will make the necessary adjustments in its approach towards the CTR before the final rule is promulgated. In addition, in the same spirit and with the same expectation, Sunnyvale would like to make the following points on its own behalf:

3. Failure to Address Important Stormwater-Related Issues. In addition to its POTW, Sunnyvale is the owner of a system of storm drains which contribute wet weather flows to the South Bay. We are concerned that the EA entirely neglects the potential impacts of the proposed CTR on the storm drains. The EA entirely omits any meaningful analysis ofthe costs of bringing storm drains into compliance with

the proposed CTR, thereby significantly understating the overall costs of the CTR. We believe that this omission is violative of the Agency's legal obligations under the authorities cited in the preceding paragraph.

In addition, we join in the comments being filed by the various other operators of stormwater collection systems to the effect that EPA has overstated the legal requirements for storm drains to comply with numerical criteria.

Response to: CTR-021-006c

For a discussion of how the rule complies with the E.O. 12866, the Unfunded Mandates Reform Act, and Regulatory Flexibility Act, see responses to CTR-001-008b, CTR-036-005c (Category E-01c; Executive Order 12866), CTR-036-003a (Category S; Unfunded Mandates Reform Act), and the preamble to the proposed rule.

EPA believes it properly described the potential impact of the implementation of the CTR on storm drains in the preamble to the proposed CTR and in its Economic Analysis. For further discussion see responses to CTR-013-003 and CTR-040-004 (Category J; Stormwater Economics).

Comment ID: CTR-023-001
Comment Author: City of Los Alamitos
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: R RFA/SBREFA
References: Letter CTR-023 incorporates by reference letters CTR-027 and CTR-036
Attachments? N
CROSS REFERENCES

Comment: The City of Los Alamitos is particularly concerned that, in promulgating the California Toxics Rule, US EPA has neglected its responsibilities under the Regulatory Flexibility Act (RFA). Specifically, the proposed rule does not present any analysis of its impact on a small entity such as the City of Los Alamitos (Population - 12,425) as required by the RFA.

As a small entity regulated under the municipal stormwater permitting requirements of the Clean Water Act, the proposed rule making will have a profound impact on the City of Los Alamitos. This impact now needs to be explicitly understood before further action is taken on the California Toxics Rule.

Response to: CTR-023-001

See response to CTR-001-008b and the preamble to the final rule.

Comment ID: CTR-024-004a
Comment Author: City of Hawthorne
Document Type: Local Government
State of Origin: CA

Represented Org:
Document Date: 09/25/97
Subject Matter Code: R RFA/SBREFA
References: Letter CTR-024 incorporates by reference letters CTR-013 and CTR-027
Attachments? N
CROSS REFERENCES J

Comment: 4. The proposed rule applies to all current and future MS4 dischargers, including small communities. The small communities will be significantly impacted by the proposed rule. In California, there are many small communities that are currently co-permittees to MS4 permits. Many of the larger municipalities in California have conducted stormwater discharge characterization studies. These studies have shown that there are common pollutants associated with stormwater discharges from urbanized areas that could result in compliance problems with the proposed criteria. Most small communities have not conducted discharge characterization studies; however, it is reasonable to assume that discharges from small communities would also contain these same pollutants. This would result in a smaller community being faced with the same compliance issues as large and medium municipalities; however, the cost to comply could be more significant and prohibitive for smaller communities.

The Regulatory Flexibility Act requires the USEPA to conduct an analysis on the economic impact the proposed rule may have on small entities, unless the USEPA certifies that the rule will not affect a significant number of small entities. In the preamble to the proposed rule(*1), it indicates that there are no small entities to be impacted by the rule, and therefore, the USEPA did not need to complete an analysis required under the Act. The USEPA neglected to address small MS4 communities in California that are currently subject to a MS4 permits, and those smaller communities that may be impacted through Phase II. The USEPA should have conducted an analysis on the economic impacts to smaller communities.

Unless the preamble is modified to indicate that MS4s are not required to comply with water quality standards, the proposed rule should not be applied to smaller MS4 communities until the USEPA has complied with the requirements of the Regulatory Flexibility Act.

(*1) Federal Register, August 5, 1997, Vol. 62, No. 150, page 42191

Response to: CTR-024-004a

See response to CTR-001-008b and the preamble to the final rule.

Comment ID: CTR-027-009a
Comment Author: California SWQTF
Document Type: Storm Water Auth.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: R RFA/SBREFA
References: Letter CTR-027 incorporates by reference letters CTR-001, CTR-036 and CTR-040
Attachments? N
CROSS REFERENCES J

Comment: 9. The proposed rule applies to all current and future MS4 dischargers, including small communities. The small communities will be significantly impacted by the proposed rule. In California, there are many small communities that are currently co-permittees to MS4 permits. Many of the larger municipalities in California have conducted stormwater discharge characterization studies. These studies have shown that there are common pollutants associated with stormwater discharges from urbanized areas that could result in compliance problems if the proposed criteria are adopted. While most small communities have not conducted discharge characterization studies; it is reasonable to assume that discharges from small communities would also contain these same pollutants. This would result in a smaller community being faced with the same compliance issues as large and medium municipalities; however, the cost to comply could be more significant and prohibitive for smaller communities.

The Regulatory Flexibility Act requires USEPA to conduct an analysis on the economic impact the proposed rule may have on small entities, unless EPA certifies that the rule will not affect a significant number of small entities. In the preamble to the proposed rule (*3), USEPA indicates that no small entities are impacted by the rule, and, therefore, USEPA did not need to complete an analysis required under the Act. USEPA neglected to address small MS4 communities in California that are currently subject to a MS4 permits, and those smaller communities that may be impacted through Phase II. USEPA should have conducted an analysis on the economic impacts to smaller communities.

Recommendation: Unless the preamble is modified to indicate that MS4s are not required to comply with water quality standards, the proposed rule should not be promulgated until USEPA has complied with the requirements of the Regulatory Flexibility Act.

(*3) Federal Register, August 5, 1997, Vol. 62, No. 150, page 42191

Response to: CTR-027-009a

See responses to CTR-013-003, CTR-040-004, (Category J; Stormwater Economics), and CTR-001-008b.

Comment ID: CTR-027-011
Comment Author: California SWQTF
Document Type: Storm Water Auth.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: R RFA/SBREFA
References: Letter CTR-027 incorporates by reference letters CTR-001, CTR-036 and CTR-040
Attachments? N
CROSS REFERENCES

Comment: 11. The proposed rule appears to violate applicable Federal law and regulations. As indicated in the above comments, it appears that the proposed rule is inconsistent with the Regulatory Flexibility Act by not considering the impacts on small entities. The rule also appears to be in conflict with the Clean Water Act by proposing a single set of criteria for all fresh waters instead of adopting criteria for pollutants that could "reasonably be expected to interfere with those designated uses".(*4)

And finally as noted in our comment 3, the rule did not consider the potential cost for MS4s for either a BMP based program or a program designed to meet WQBELS. The Statewide cost for this latter effort may be as high as $7 billion per year. Further discussions are provided on these issues in the responses to the CTR by the counties of Alameda, Orange and Sacramento and are incorporated herein by reference.

(*4) Federal Register, August 5, 1997, Vol. 62, No. 150, page 42160

Response to: CTR-027-011

With respect to EPA compliance with the RFA see response to CTR-001-008b and the preamble to the final rule. With respect to the commenter's assertion that the rule is in conflict with the Clean Water Act by proposing a single set of criteria for all fresh waters see response to CTR-036-005 (Category C-21; Legal Issues). With respect to costs for stormwater dischargers, EPA disagrees. See response to CTR-013-003 (Category J; Stormwater Economics).

Comment ID: CTR-028-001a
Comment Author: City of Folsom
Document Type: Storm Water Auth.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: R RFA/SBREFA
References: Letter CTR-028 incorporates by reference letter CTR-040
Attachments? N
CROSS REFERENCES J

Comment: The City is a small community with a population of less than 50,000. We volunteered to participate in the Sacramento Stormwater Management Program as a co-permittee on the NPDES permit because we understood that it was a BMP-based program aimed at reducing the discharge of pollutants to the maximum extent practicable. We are very concerned with the CTR's Preamble statement that municipal stormwater agencies must comply with effluent limitations based on water quality criteria. As the County has stated in its comments, this will result in enormous costs without producing significant environmental benefits.

We are also concerned that the EPA Administrator has certified that the CTR will have no effect on small entities such as the City. Based on the estimated compliance costs prepared by the County and the statewide estimates prepared by the California Storm Water Quality Task Force, the CTR will have significant economic effects on small communities throughout the State. For example, our proportional share of the countywide costs to comply with effluent limitations, based on the proposed water quality criteria, could be over $10 million per year.

We urge EPA to reconsider its position that municipal stormwater discharges must comply with water quality standards. EPA should remove the Preamble statement or clarify that municipal stormwater discharges are only required to reduce the discharge of pollutants to the maximum extent practicable.

Alternatively, EPA must revise its economic analysis to include the costs to municipal stormwater agencies and the EPA Administrator must withdraw her certification and, pursuant to the requirements of the Regulatory Flexibility Act, assess the economic impacts of the CTR on small entities.

Response to: CTR-028-001a

See responses to CTR-013-003, CTR-040-004, (Category J; Stormwater Economics), and CTR-001-008b.

Comment ID: CTR-031-006b
Comment Author: Fresno Metro. Flood Ctrl Dist.
Document Type: Flood Ctrl. District
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: R RFA/SBREFA
References: Letter CTR-031 incorporates by reference letter CTR-027
Attachments? N
CROSS REFERENCES J; E-01c

Comment: b. If the CTR as proposed in the current draft is applied to municipal storm water dischargers so as to require numeric effluent limitations in municipal stormwater permits, the cost to the public will be phenomenal. In the economic analysis of the CTR, EPA failed to consider these costs, and failed to consider the costs to industrial storm water dischargers as well.

The District Is urban storm water drainage system captures through retention 90% of its annual average runoff, and discharges 90% after detention (1% is directly discharged without treatment). The system cost in 1997 dollars is estimated at $500 million.

The only option available to the District to mitigate violations of the proposed criteria would be to expand system storage to capture 100% of average annual runoff. Increasing system storage by 20,000 acre feet (estimated additional storage required for average years), at the current cost of $11,000-$20,00 per acre foot of storage, would result in a capital expenditure of $220,000,000 to $400,000,000.

Even with this exorbitant investment, in approximately half of the rain seasons storage would be exceeded, and 100% of the discharges would be expected to exceed the dissolved metals criteria noted above.

Smaller cities (under 50,000) in California are currently subject to NPDES municipal storm water discharge permits, and many more will be included upon implementation of the Stormwater Phase II program. EPA's failure to assess economic impacts on small cities would appear to be contrary to the requirements of the Federal Regulatory Flexibility Act.

The District includes in its constituency industrial businesses. The District serves these businesses and assists in the oversight of their pollution prevention and storm water permit compliance efforts. Regardless of EPA' s approach to applying the CTR to municipal storm water permits, industrial storm water dischargers are directly and seriously affected by application of the CTR. EPA's failure to assess these economic impacts on our communities is short-sighted and a breach of good public policy.

Response to: CTR-031-006b

With respect to EPA's compliance with the Regulatory Flexibility Act see response to CTR-001-008b. With respect to the commenter's estimate of its stormwater costs see response to CTR-040-004 (Category J; Stormwater Economics).

Comment ID: CTR-031-009
Comment Author: Fresno Metro. Flood Ctrl Dist.
Document Type: Flood Ctrl. District
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: R RFA/SBREFA
References: Letter CTR-031 incorporates by reference CTR-027
Attachments? N
CROSS REFERENCES

Comment: Any continuing ambiguities and inconsistencies among state and federal law, regulation, and official policy will continue to lead to legal challenges and the corresponding drain on public funds. The CTR should not be adopted as proposed. The above comments and concerns are fundamental to accomplishing consistency with the CWA and Regulatory Flexibility Act, and providing for the unique circumstances of regulating municipal storm water dischargers.

Response to: CTR-031-009

See response to CTR-001-008b.

Comment ID: CTR-034-005
Comment Author: SCAP
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: R RFA/SBREFA
References: Letter CTR-034 incorporates by reference letter CTR-035
Attachments? N
CROSS REFERENCES

Comment: LEGAL ISSUES -- Executive ORder 12866, Unfunded Mandates Reform Act, Regulatory Flexibility Act

* SCAP disagrees with EPA's determination under the Regulatory Flexibility Act that the rule will not have a significant economic impact on a substantial number of small entities. SCAP's membership includes several small entities serving a population of 50,000 or less that may be significantly affected by the CTR. In addition, all, of our members provide sewer services to all or most of the small businesses in their service areas. These businesses potentially will be affected by the proposed rule through increased

regulation of their discharges, increased sewer discharge fees, or both. EPA's conclusion appears to be based on the fact that the one minor municipal discharger that EPA studied had no effluent data for the CTR pollutants, and EPA therefore assumed that no costs would be incurred by any small municipal dischargers in the State. This reasoning is erroneous. We therefore request that EPA revise its Economic Analysis to fully examine the impact of the proposed rule on small entities, to re-analyze significant alternatives to the proposed rule (including those alternatives that would minimize any significant economic impact of the proposed rule on small entities), and to allow for meaningful involvement in the development of the rule by small entities.

Response to: CTR-034-005

EPA did not base its rationale for RFA compliance based on its assessment of the minor discharger in its Economic Analysis for the proposed CTR. With respect to the rationale for EPA's compliance with the Regulatory Flexibility Act see response to CTR-001-008b. The classification of minor and major dischargers is based on flow, not population served. EPA did include additional minor dischargers in its sample for its Final Economic Analysis in order to more accurately assess the potential cost of CTR implementation on minor dischargers throughout California.

Comment ID: CTR-035-041
Comment Author: Tri-TAC/CASA
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: R RFA/SBREFA
References:
Attachments? N
CROSS REFERENCES

Comment: pp. 42191 - 42192 -- The Regulatory Flexibility Act EPA's position that the Regulatory Flexibility Act (5 U.S.C.A. 601 et seq.) does not apply is incorrect. While EPA takes the position (p. 42192) that "the criteria or standards themselves do not apply to any discharger, including small entities," we believe that these statements are erroneous, since, as noted on p. 42182, "once an appropriate numeric criterion is selected for either aquatic life or human health protection, this facilitates the calculation of water quality-based effluent limits and/or total maximum daily loads (TMDLs) for that chemical." In fact, EPA itself oversees State issuance of these permits. EPA's reliance on the United States Distribution case cited at p. 42192 to demonstrate why the requirements of the Regulatory Flexibility Act do not apply is misplaced; that case involved the issue of whether the FERC needed to prepare a regulatory flexibility analysis ("RFA") when issuing its Order No. 636. The court determined that the RFA requirement did not apply in this case because of the statutory language exempting regulatory rulemaking where the agency determines "that the rule will not have a significant economic impact on a substantial number of small entities that are subject to the requirements of the rule. " (88 F.3d 1170) The court went on to note that the FERC did not even have authority to regulate the small entities allegedly affected by the rule. The exemption purportedly established by the United States Distribution case cannot be applied in this instance because the standards in the CTR are required by federal and state law to be implemented directly into NPDES permits, through water quality based effluent limitations calculated directly from the numerical criteria in the rule, as well as through load reductions to comply

with TMDLs derived from the standards. Under the Clean Water Act, every NPDES permit issued in California requires compliance with applicable water quality objectives and this will include those proposed in the CTR. Further, EPA has authority to apply those criteria directly, either by its review and potential veto of state-issued permits or its direct issuance of permits in cases where it has vetoed a state permit under Section 402(a) and (d) of the Clean Water Act. Accordingly, the Regulatory Flexibility Act requires EPA not only to prepare an official RFA, but to comply with the procedural requirements of Section 609(b) of the Act, including the requirement to notify and involve the Chief Counsel for Advocacy of the Small Business Administration.

Response to: CTR-035-041

See response to CTR-001-008b and the preamble to the proposed rule.

Comment ID: CTR-036-004b
Comment Author: County of Orange
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: R RFA/SBREFA
References: Letter CTR-036 incorporates by reference letters CTR-013, CTR-018, CTR-031, CTR-034 and CTR-040
Attachments? N
CROSS REFERENCES J

Comment: Finally, EPA has not met its duties under the Regulatory Flexibility Act (the "RFA"). Under the RFA, federal agencies are required to conduct an initial regulatory flexibility analysis ("IRFA") describing the impact of a proposed regulatory action on small entities. Once more relying on the claim that the proposed rule does not establish criteria that are directly applicable to small entities, EPA states that the mandates of RFA do not apply [62 Fed. Reg. 41160, 42191-92].

This position is contrary to both the letter and the spirit of the RFA. The fact that the toxics criteria contained in the proposed rule must be translated into water quality standards and, in turn, NPDES permit effluent limitations, does not negate the fact that the burden of complying and implementing such toxics criteria ultimately will be borne by individual municipalities and business entities. As noted above, the costs to municipalities alone could run into billion of dollars placing a severe strain on their budgets and forcing them to divert funds currently allocated to other important municipal services, inclusing public safety.

Moreover, EPA's statement that "California will have a number of discretionary choices associated with permit writing" is disingenuous and ironic in light of EPA's rationale for issuing the proposed rule. The toxics criteria will necessarily narrow the State's discretion in issuing NPDES permits and in establishing effluent limits for such permits. If EPA had meant for the State to have any serious discretion, it would not be promulgating these criteria in the first place.

Response to: CTR-036-004b

See response to comment CTR-036-004a (Category J; Stormwater Economics).

Comment ID: CTR-038-005b
Comment Author: Sonoma County Water Agency
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: R RFA/SBREFA
References:
Attachments? Y
CROSS REFERENCES E-01c; S

Comment: A further consequence of the flawed economic analysis is the conclusion that the CTR is not a major rule (i.e., one which will result in excess of $100 million per year expenditure) subject to Presidential Executive order 12866 and the Unfunded Mandates Reform Act or a rule that affects small entities protected under the Regulatory Reform Act. The District, for example, is a small community having a population of under 50,000 and, in addition, serves several small towns and communities (Sonoma, Glen Ellen, Boyes Hot Springs and Agua Caliente) that would be greatly impacted by the proposed rule.

Response to: CTR-038-005b

See responses to CTR-001-008b, CTR-021-005c (Category E-01c; Executive Order 12866), CTR-036-003a (Category S; Unfunded Mandates Reform Act), and the preamble to the proposed rule.

Comment ID: CTR-038-006c
Comment Author: Sonoma County Water Agency
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: R RFA/SBREFA
References:
Attachments? Y
CROSS REFERENCES C-21; E-01c; S

Comment: 5. The proposed rule is inconsistent with applicable Federal law and regulations. In proposing a single set of criteria for all estuaries, the rule is inconsistent with the Clean Water Act and EPA's water quality standards regulations. The Clean Water Act requires that water quality standards be established taking into consideration their use and value for public water supplies, propagation of fish and wildlife, and recreational purposes (see CWA section 303(c)(2)(A)). Consistent with this, EPA regulations require that water quality standards be based on identification of "specific water bodies where toxic pollutants may be adversely affecting water quality or the attainment of the designated water use or where the levels of toxic pollutants are at a level to warrant concern..." For those identified waters, "states must adopt criteria for such toxic pollutants applicable to the water body sufficient to protect the designated use" (See 40 CFR 131.11(a)(2)). Clearly the intent of both the Clean Water Act and EPA regulations is that water quality standards be tailored to the characteristics of the waters in question. In

failing to properly evaluate the rule's economic impacts and in failing to adequately consider regulatory alternatives, the rule is inconsistent with Presidential Executive Order 12866 and the Unfunded Mandates Reform Act. Moreover, in failing to properly consider the impacts on small entities, such as the District and the small communities it serves, the rule is inconsistent with the Regulatory Flexibility Act.

Response to: CTR-038-006c

With respect to EPA's decision to publish a single set of criteria in the rule, see responses to CTR-035-012a and CTR-036-005 (both responses are in Category C-21; Legal issues). For a discussion of how the rule complies with the E.O. 12866, the Unfunded Mandates Reform Act, and Regulatory Flexibility Act, see responses to CTR-001-008b, CTR-021-005c (Category E-01c; Executive Order 12866), CTR-036-003a (Category S; Unfunded Mandates Reform Act), and the preamble to the proposed rule.

Comment ID: CTR-038-008c
Comment Author: Sonoma County Water Agency
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: R RFA/SBREFA
References:
Attachments? Y
CROSS REFERENCES C-24; E-01c; S; T

Comment: 7. Separate, sites-specific aquatic life criteria for copper and human health criteria for mercury should be adopted for Schell Slough, or alternatively EPA should specify implementation procedures for these criteria that will preclude unreasonable controls such as end-of-pipe treatment. To comply with the Clean Water Act and EPA regulations, EPA should consider specific water bodies. To fulfill the spirit of Presidential Executive Order 12866 and the requirements of the Unfunded Mandates Reform Act and the Regulatory Flexibility Act, EPA should evaluate regulatory alternatives based on an analysis of costs and benefits. Based on the assessment of costs and benefits described in "3" above, EPA should either adopt the criteria that is currently achieved, or alternatively specify implementation procedures that would allow the current discharge to continue (e.g., allowable Mixing zones and averaging periods and, for copper, a translator and water-effect ratio). Again, the District is amenable to continuing to address these constituents through pollution prevention measures and to assessing the actual impacts of these constituents in Schell Slough. Without EPA specifying such implementation procedures in the CTR, it is possible that the CTR could impose significant costs on the District (and the other small communities its serves) without providing a commensurate environmental benefit. In that case, the CTR would be inconsistent with the Clean Water Act, EPA regulations, Presidential Executive Order 12866, the Unfunded Mandates Reform Act and the Regulatory Flexibility Act.

Response to: CTR-038-008c

See response to CTR-038-008a Category C-24; Site-Specific Criteria. See responses to CTR-034-010b and CTR-060-010 (Category C-28; Detection Limits). For a discussion of how the rule complies with the E.O. 12866, the Unfunded Mandates Reform Act, and Regulatory Flexibility Act, see responses to CTR-001-008b, CTR-021-005c (Category E-01c; Executive Order 12866), CTR-036-003a (Category S;

Unfunded Mandates Reform Act), and the preamble to the proposed rule.

Comment ID: CTR-038-009c
Comment Author: Sonoma County Water Agency
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: R RFA/SBREFA
References:
Attachments? Y
CROSS REFERENCES C-28; E-01n; S

Comment: 8. EPA should not adopt criteria for any pollutant where the method detection limit exceeds the objective and there is insufficient detectable, reliable data to determine if the pollutant could reasonably be expected to interfere with designated uses. The proposed rule includes criteria for a number of constituents where there is insufficient data to determine whether the discharge of such pollutants could reasonably be expected to interfere with the designated uses. EPA has chosen to promulgate criteria for these constituents even though section 303 (c)(2)(B) of the Clean Water Act requires States to adopt numeric criteria only for constituents "...the discharge or presence of which in the affected waters could reasonably be expected to interfere with those designated uses adopted by the State, as necessary to support such designated uses." Clearly, this "play-it-safe" approach goes beyond the requirements of the Clean Water Act and is therefore unnecessary. By taking this approach, however, EPA is unable to fulfill its duty (under Presidential Order 12866, the Unfunded Mandates Reform Act, and the Regulatory Flexibility Act) to assess the costs, benefits, and impacts of the rule on local government and small entities. While this may be the conservative approach for EPA, it places dischargers throughout the State at risk. As analytical detection limits improve, dischargers may find they are unable to achieve the criteria without costly end-of-pipe controls. But, by then, it will be too late for EPA to evaluate the costs and benefits of the criteria and alternative criteria. For these reasons, EPA must not adopt criteria for those constituents. If EPA does adopt criteria for those constituents, EPA must evaluate the costs and benefits of the criteria, as well as alternative criteria, using worst case assumptions (i.e., assume that discharge levels and ambient levels are at the detection limits). With respect to the District's discharge and Schell Slough and Second Napa Slough, the criteria in this category include, but are not necessarily limited to, the following : benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoroanthene, benzo(k)fluoroanthene, chrysene, dibenzo(a,h)anthracene, aldrin, 4,4'-DDD, 4,4'-DDE, dieldrin, endosulfan I, endosulfan II, endosulfan sulfate, heptachlor, heptachlor epoxide, toxaphene, PCB-1016, OCB-1221, PCB-1232, PCB-1242, PCB-1248, PCB-1254, PCB-1260, and hexachlorobenzene (see Table 3).

Response to: CTR-038-009c

See responses to CTR-034-010b and CTR-060-010 (Category C-28; Detection Limits). For a discussion of how the rule complies with the E.O. 12866, the Unfunded Mandates Reform Act, and Regulatory Flexibility Act, see responses to CTR-001-008b, CTR-021-005c (Category E-01c; Executive Order 12866), CTR-036-003a (Category S; Unfunded Mandates Reform Act), and the preamble to the proposed rule.

Comment ID: CTR-040-009a
Comment Author: County of Sacramento Water Div
Document Type: Storm Water Auth.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: R RFA/SBREFA
References: Letter CTR-040 incorporates by reference letter CTR-027
Attachments? Y
CROSS REFERENCES S; E-01c

Comment: MAJOR CONCERNS

We do, however, have fundamental concerns with the Rule as it is presently proposed and its supporting economic analysis. We believe the Rule can be modified in a manner that will be responsive to our concerns while at the same time being consistent with applicable Federal law and regulations. Our major concerns are presented here and are followed by our recommended modifications.

II. Concern: The economic analysis upon which the Rule is based is seriously flawed.

* A consequence of the cost/benefit analysis of the Rule are several erroneous conclusions, namely that: (1) this is not a "significant regulatory action" or a major rule (i.e., one which will result in excess of $100 million annual expenditure) subject to the requirements contained in Presidential Executive Order 12866 and the Unfunded Mandates Reform Act; and (2) this is not a rule that will have a significant economic impact on a substantial number of small entities protected under the Regulatory Flexibility Act.

Response to: CTR-040-009a

See responses to CTR-001-008b, CTR-021-005c (Category E-01c; Executive Order 12866), CTR-036-003a (Category S; Unfunded Mandates Reform Act), and the preamble to the proposed rule.

Comment ID: CTR-040-010b
Comment Author: County of Sacramento Water Div
Document Type: Storm Water Auth.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: R RFA/SBREFA
References: Letter CTR-040 incorporates by reference letter CTR-027
Attachments? Y
CROSS REFERENCES J

Comment: MAJOR CONCERNS

We do, however, have fundamental concerns with the Rule as it is presently proposed and its supporting economic analysis. We believe the Rule can be modified in a manner that will be responsive to our concerns while at the same time being consistent with applicable Federal law and regulations. Our major concerns are presented here and are followed by our recommended modifications.

* The cities of Folsom and Galt, co-permittees in our stormwater program, both have populations less than 50,000. Their costs associated with complying with the effluent limitations proposed in the Rule would be significant (on the order of $10 million annually for each city). Therefore, the EPA Administrator's certification that the Rule would have no effect on small entities, pursuant to the requirements of the Regulatory Flexibility Act, is incorrect.

Response to: CTR-040-010b

With respect to EPA's compliance with the Regulatory Flexibility Act see response to CTR-001-008b. With respect to the commenter's estimate of its stormwater costs see response to CTR-040-004 (Category J; Stormwater Economics).

Comment ID: CTR-040-013
Comment Author: County of Sacramento Water Div
Document Type: Storm Water Auth.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: R RFA/SBREFA
References: Letter CTR-040 incorporates by reference letter CTR-027
Attachments? Y
CROSS REFERENCES

Comment: MAJOR CONCERNS

We do, however, have fundamental concerns with the Rule as it is presently proposed and its supporting economic analysis. We believe the Rule can be modified in a manner that will be responsive to our concerns while at the same time being consistent with applicable Federal law and regulations. Our major concerns are presented here and are followed by our recommended modifications.

III. Concern: The proposed Rule violates applicable Federal law and regulations

* In failing to consider the impacts on small entities (e.g., for bringing stormwater into compliance with WQBELs based on the Rule's criteria), the Rule is inconsistent with the Regulatory Flexibility Act (See Attachment B).

Response to: CTR-040-013

See response to CTR-001-008b and the preamble to the rule.

Comment ID: CTR-040-056
Comment Author: County of Sacramento Water Div
Document Type: Storm Water Auth.
State of Origin: CA
Represented Org:
Document Date: 09/25/97

Subject Matter Code: R RFA/SBREFA
References: Letter CTR-040 incorporates by reference letter CTR-027
Attachments? Y
CROSS REFERENCES

Comment: 3. The California Toxics Rule is inconsistent with the Regulatory Flexibility Act.

The Regulatory Flexibility Act (RFA, 5 U.S.C. section 601 et seq.) requires that each federal agency, including EPA, publish in the Federal Register twice a year a regulatory flexibility agenda which contains a brief description of the subject area of any rule which the agency expects to promulgate which is likely to have a significant economic impact on a substantial number of small entities (includes municipalities with a population of less than 50,000). Because EPA contends that the CTR does not significantly or uniquely affect small entities, EPA does not believe it is required under the RFA to describe the impact of the proposed rule, which accomplish the stated objectives and which minimize any significant economic impact of the proposed rule on small entities.

The EPA Administrator has certified that the rule will not, if promulgated, have a significant economic impact on a substantial number of small entities. However, because the CTR will in fact have a significant economic impact on a substantial number of small entities, the Administrator's certification can be challenged as being arbitrary and capricious under the Administrative Procedures Act. If that challenge were successful, then the CTR could not be re-promulgated until the required final regulatory flexibility analysis has been completed by the Agency.

Furthermore, any small entity that is adversely affected or aggrieved by final CTR is entitled to judicial review of agency compliance with the requirements of the RFA. The judicial relief possible in a challenge made by a small entity is as follows:

- Remand of the rule, and - Deferred enforcement of the rule against small entities unless the courts find that continued enforcement of the rule is in the public interest.

Response to: CTR-040-056

See response to CTR-001-008b and the preamble of the final rule.

Comment ID: CTR-041-013b
Comment Author: Sacramento Reg Cnty Sanit Dist
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: R RFA/SBREFA
References:
Attachments? N
CROSS REFERENCES E-01c; S

Comment: 8. The proposed Rule is Inconsistent with Applicable Federal Law and Regulations

The proposed rule is inconsistent with applicable Federal law and regulations. In proposing a single set

of criteria for all estuaries, the rule is inconsistent with the Clean Water Act and EPA's water quality standards regulations. (See attached Legal Analysis of the Proposed California Toxics Rule) to properly evaluate the rule's economic impacts and in failing to adequately consider alternative criteria for San Francisco Bay Area waters, the rule is inconsistent with Presidential Executive Order 12866 and the Unfunded Mandates Reform Act (Id). In failing to properly consider the impacts on small entities, the rule is inconsistent with the Regulatory Flexibility Act (Id).

Thank you for the opportunity to provide comments on this important new rule. Please call if you have any questions regarding our letter.

Response to: CTR-041-013b

With respect to EPA's decision to publish a single set of criteria in the rule, see responses to CTR-035-012a and CTR-036-005 (both responses are in Category C-21; Legal issues). For a discussion of how the rule complies with the E.O. 12866, the Unfunded Mandates Reform Act, and Regulatory Flexibility Act, see responses to CTR-001-008b, CTR-021-005c (Category E-01c; Executive Order 12866), CTR-036-003a (Category S; Unfunded Mandates Reform Act), and the preamble to the proposed rule.

Comment ID: CTR-041-017
Comment Author: Sacramento Reg Cnty Sanit Dist
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: R RFA/SBREFA
References:
Attachments? N
CROSS REFERENCES

Comment: 3. The California Toxics Rule is inconsistent with the Regulatory Flexibility Act.

The Regulatory Flexibility Act (RFA, 5 U.S.C. section 601 et seq.) requires that each federal agency, including EPA, publish in the Federal Register twice a year a regulatory flexibility agenda which contains a brief description of the subject area of any rule which the agency expects to promulgate which is likely to have a significant economic impact on a substantial number of small entities (includes municipalities with a population less than 50,000) Because EPA contends that the CTR does not significantly or uniquely affect small entities, EPA does not believe it is required under the RFA to describe the impact of the proposed rule on small entities or to describe any significant alternatives to the proposed rule, which accomplish the stated objectives and which minimize any significant economic impact of the proposed rule on small entities.

The EPA Administrator has certified that the rule will not, if promulgated, have a significant economic impact on a substantial number of small entities. However, because the CTR will in fact have a significant economic impact on a substantial number of small entities, the Administrator's certification can be challenged as being arbitrary and capricious under the Administrative Procedures Act. If that challenge were successful, then the CTR could not be re-promulgated until the required final regulatory flexibility analysis has been completed by the agency.

Furthermore, any small entity that is adversely affected or aggrieved by final CTR is entitled to judicial review of agency compliance with the requirements of the RFA. The judicial relief possible in a challenge made by a small entity is as follows:

- Remand of the rule, and

- Deferred enforcement of the rule against small entities unless the court finds that continued enforcement of the rule is in the public interest.

Response to: CTR-041-017

See response to CTR-001-008b and the preamble to the final rule.

Comment ID: CTR-043-005c
Comment Author: City of Vacaville
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: R RFA/SBREFA
References:
Attachments? Y
CROSS REFERENCES C-21; E-01c; S

Comment: 5. The proposed rule is inconsistent with applicable Federal law and regulations.

In proposing a single set of criteria for all estuaries, the rule is inconsistent with the Clean Water Act and EPA's water quality standards regulations. The Clean Water Act requires that water quality standards be established taking into consideration their use and value for public water supplies, propagation of fish and wildlife, recreational purposes (see CWA section 303(c)(2)(A)). Consistent with this, EPA regulations require that water quality standards be based on identification of "specific water bodies where toxic pollutants may be adversely affecting water quality or the attainment of the designated water use or where the levels of toxic pollutants are at a level to warrant concern..." For those identified waters,"states must adopt criteria for such toxic pollutants applicable to the water body sufficient to protect the designated use"(See 40 CFR 131.1 I (a)(2)). Clearly the intent of both the Act and EPA regulations is that water quality standards be tailored to the characteristics of the waters in question. In failing to properly evaluate the rule's economic impacts and in failing to adequately consider regulatory alternatives, the rule is inconsistent with Presidential Executive Order 12866 and the Unfunded Mandates Reform Act. Moreover, in failing to properly consider the impacts on small entities, the rule is inconsistent with the Regulatory Flexibility Act.

Response to: CTR-043-005c

With respect to EPA's decision to publish a single set of criteria in the rule, see responses to CTR-035-012a and CTR-036-005 (both responses are in Category C-21; Legal issues). For a discussion of how the rule complies with the E.O. 12866, the Unfunded Mandates Reform Act, and Regulatory Flexibility Act, see responses to CTR-001-008b, CTR-021-005c (Category E-01c; Executive Order

12866), CTR-036-xxx (Category S; Unfunded Mandates Reform Act), and the preamble to the proposed rule.

Comment ID: CTR-044-005f
Comment Author: City of Woodland
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: R RFA/SBREFA
References:
Attachments? Y
CROSS REFERENCES E-01g08; E-01h01; E-01m; E-02c; E-01c02; S

Comment: We have reviewed the proposed CTR and offer the following comments:

4. EPA's Economic Analysis is seriously flawed. The major flaws include:

(1) failing to do an appropriate sampling of small dischargers having little or no dilution; (2) assuming in the high-end cost scenario that a 25% reduction could be achieved through source control and an additional 25% achieved through treatment plant optimization without capital improvements; (3) constraining estimates of potential costs through key assumptions, including the assumption that regulatory relief from the rule would be granted if costs were in excess of certain thresholds; and (4) exaggerating estimates of potential benefits by assuming an end (i.e., achievement of the proposed water quality criteria) that will not result from the rule. Additional concerns with the economic analysis are presented in Exhibit F. The result of these flaws is that potential costs are greatly understated and potential benefits are greatly overstated. Moreover, the flawed economic analysis has lead to the erroneous conclusion that the CTR is not a "significant regulatory action" or major rule subject to Presidential Executive Order 12866 and the Unfunded Mandates Reform Act or a rule that affects small entities protected under the Regulatory Flexibility Act. The City, for example, is a small community having a population of under 50,000 and would be greatly impacted by the proposed rule.

Response to: CTR-044-005f

See responses to CTR-054-013a, CTR-021-005c, CTR-032-004, CTR-021-008, CTR-040-029a, CTR-059-018 (all comments in Category E-01; CTR Cost Comments), and CTR-036-003a (Category S; UMRA).

Comment ID: CTR-044-006c
Comment Author: City of Woodland
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: R RFA/SBREFA
References:
Attachments? Y

CROSS REFERENCES C-21; E-01c; S

Comment: We have reviewed the proposed CTR and offer the following comments:

5. The proposed rule is inconsistent with applicable Federal law and regulations.

In proposing a single set of criteria for all estuaries, the rule is inconsistent with the Clean Water Act and EPA's water quality standards regulations. The Clean Water Act requires that water quality standards be established taking into consideration their use and value for public water supplies, propagation of fish and wildlife, recreational purposes (see CWA section 303(c)(2)(A)). Consistent with this, EPA regulations require that water quality standards be based on identification of "specific water bodies where toxic pollutants may be adversely affecting water quality or the attainment of the designated water use or where the levels of toxic pollutants are at a level to warrant concern..." For those identified waters, "states must adopt criteria for such toxic pollutants applicable to the water body sufficient to protect the designated use"(See 40 CFR 131.11 (a)(2)) (see Exhibit G). Clearly the intent of both the Act and EPA regulations is that water quality standards be tailored to the characteristics of the waters in question. In failing to properly evaluate the rule's economic impacts and in failing to adequately consider regulatory alternatives, the rule is inconsistent with Presidential Executive Order 12866 and the Unfunded Mandates Reform Act (Id.). Moreover, in failing to properly consider the impacts on small entities, such as the City, the rule is inconsistent with the Regulatory Flexibility Act (Id.).

Response to: CTR-044-006c

With respect to EPA's decision to publish a single set of criteria in the rule, see responses to CTR-035-012a and CTR-036-005 (both responses are in Category C-21; Legal issues). For a discussion of how the rule complies with the E.O. 12866, the Unfunded Mandates Reform Act, and Regulatory Flexibility Act, see responses to CTR-001-008b, CTR-036-005c (Category E-01c; Executive Order 12866), CTR-036-003a (Category S; Unfunded Mandates Reform Act), and the preamble to the proposed rule.

Comment ID: CTR-044-009c
Comment Author: City of Woodland
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: R RFA/SBREFA
References:
Attachments? Y
CROSS REFERENCES C-28; E-01c; S

Comment: We have reviewed the proposed CTR and offer the following comments:

8. EPA should not adopt criteria for any pollutant where the method detection limit exceeds the objective and there is insufficient detectable, reliable data to determine if the pollutant could reasonably be expected to interfere with designated uses. The proposed rule includes criteria for a number of constituents where there is insufficient data to determine whether the discharge of such pollutants could reasonably be expected to interfere with the designated uses. EPA has chosen to promulgate criteria for

these constituents even though section 303 (c)(2)(B) of the Clean Water Act requires States to adopt numeric criteria only for constituents "... the discharge or presence of which in the affected waters could reasonably be expected to interfere with those designated uses adopted by the State, as necessary to support such designated uses." Clearly, this approach goes beyond the requirements of the Clean Water Act and is therefore unnecessary. Additionally, this approach does not allow EPA to fulfill its duty (under Presidential Order 12866, the Unfunded Mandates Reform Act, and the Regulatory Flexibility Act) to assess the costs, benefits, and impacts of the rule on local government and small entities. While this may be the conservative approach for EPA, it places dischargers throughout the State at risk. As analytical detection limits improve, dischargers may find they are unable to achieve the criteria without costly end-of-pipe controls. But, by then, it will be too late for EPA to evaluate the costs and benefits of the criteria-and-consider alternative criteria. For these reasons, EPA should not adopt criteria for those constituents. If EPA does adopt criteria for those constituents, EPA should evaluate the costs and benefits of toxic criteria, as well as alternative criteria, using worst case assumptions (i.e., assume that discharge levels and ambient levels are at the detection limits).

Response to: CTR-044-009c

See responses to CTR-034-010b and CTR-060-010 (Category C-28; Detection Limits). For a discussion of how the rule complies with the E.O. 12866, the Unfunded Mandates Reform Act, and Regulatory Flexibility Act, see responses to CTR-001-008b, CTR-021-005c (Category E-01c; Executive Order 12866), CTR-036-003a (Category S; Unfunded Mandates Reform Act), and the preamble to the proposed rule.

Comment ID: CTR-044-047
Comment Author: City of Woodland
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: R RFA/SBREFA
References: Letter CTR-040 incorporates by reference letter CTR-027
Attachments? Y
CROSS REFERENCES

Comment: 3. The California Toxics Rule is inconsistent with the Regulatory Flexibility Act.

The Regulatory Flexibility Act (RFA, 5 U.S.C. section 601 et seq.) requires that each federal agency, including EPA, publish in the Federal Register twice a year a regulatory flexibility agenda which contains a brief description of the subject area of any rule which the agency expects to promulgate which is likely to have a significant economic impact on a substantial number of small entities (includes municipalities with a population less than 50,000). Because EPA contends that the CTR does not significantly or uniquely affect small entities, EPA does not believe it is required under the RFA to describe the impact of the proposed rule on small entities or to describe any significant alternatives to the proposed rule, which accomplish the stated objectives and which minimize any significant economic impact of the proposed rule on small entities.

The EPA Administrator has certified that the rule will not, if promulgated, have a significant economic impact on a substantial number of small entities. However, because the CTR will in fact have a

significant economic impact on a substantial number of small entities, the Administrator's certification can be challenged as being arbitrary and capricious under the Administrative Procedures Act. If that challenge were successful, then the CTR could not be re-promulgated until the required final regulatory flexibility analysis has been completed by the agency.

Furthermore, any small entity that is adversely affected or aggrieved by final CTR is entitled to judicial review of agency compliance with the requirements of the RFA. The judicial relief possible in a challenge made by a small entity is as follows:

- Remand of the rule, and - Deferred enforcement of the rule against small entities unless the court finds that continued enforcement of the rule is in the public interest.

Response to: CTR-044-047

See response to CTR-001-008b and the preamble to the final rule.

Comment ID: CTR-047-004b
Comment Author: City of Santa Fe Springs
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/24/97
Subject Matter Code: R RFA/SBREFA
References: Letter CTR-047 incorporates by reference letters CTR-013 and CTR-027.
Attachments? N
CROSS REFERENCES J

Comment: In addition, we would like to emphasize the following key issues on the California Toxic Rule (CTR), which are of major impact to our storm water program:

4. The proposed rule applies to all current and future MS4 dischargers, including small communities. The small communities will be significantly by the proposed rule. In California, there are many small communities that are currently co-permittee to MS4 permits. Many of the larger municipalities in California have conducted storm water discharge characterization studies. These studies have shown that there are common pollutants associated with storm-water discharges from urbanized areas that could result in compliance problems with the proposed criteria . Most small communities have not conducted discharge characterization studies; however, it is reasonable to assume that discharges from small communities would also contain these same pollutants. This would result in a smaller community being faced with the same compliance issues as large and medium municipalities; however, the cost to comply could be more significant and prohibitive for smaller communities.

The Regulatory Flexibility Act requires the USEPA to conduct an analysis on the economic impact the proposed rule may have on small entities, unless the USEPA certifies that the rule will not affect a significant number of small entities. In the preamble to the proposed rule, it indicates that there are no small entities to be impacted by the rule, and, therefore, the USEPA did not need to complete an analysis required under the Act. The USEPA neglected to address small MS4 communities in California that are currently subject to MS4 permits, and those smaller communities that may be impacted through Phase II. The USEPA should have conducted an analysis on the economic impacts to smaller communities.

Unless the preamble is modified to indicate that MS4s are not required to comply with water quality standards, the proposed rule should not be applied to smaller MS4 communities until the USEPA has complied with the requirements of the Regulatory Flexibility Act.

Response to: CTR-047-004b

See responses to CTR-013-003, CTR-040-004, (Category J; Stormwater Economics), and CTR-001-008b.

Comment ID: CTR-050-007c
Comment Author: Sonnenschein Nath & Rosenthal
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org: American Petrol
Document Date: 09/26/97
Subject Matter Code: R RFA/SBREFA
References:
Attachments? N
CROSS REFERENCES C-21; E-01c; S

Comment: IV. EPA Has Not Complied With Applicable Regulatory Review Requirements. There are several significant statutes and executive orders that require EPA to undertake analyses of the costs and benefits of its regulations, and to submit the regulations and analyses to other governmental bodies, including the Office of Management and Budget (OMB) and Congress. Those authorities include the Regulatory Flexibility Act, the Small Business Regulatory Enforcement and Fairness Act (SBREFA), the Unfunded Mandates Reform Act, the Congressional Review Act, and Executive Order 12866 (Regulatory Planning and Review). EPA apparently believes that it does not need to comply with any of those requirements for this rulemaking. (62 Fed. Reg. at 42188-42191). API believes that EPA is required to meet those obligations for the proposed criteria, and that the Agency's rationale for avoiding this responsibility has no legal basis.

EPA supports its decision not to comply with the regulatory review statutes by stating that the proposed criteria "by themselves, do not directly impose economic impacts." (62 Fed. Reg. at 42188). EPA admits that when those criteria are combined with the designated uses that have been adopted by the State, and implemented in permit limits, "there may be a cost to some dischargers." (62 Fed. Reg. at 42188) could be substantial; the Agency itself estimates that the compliance cost could be between $15 and $87 million per year.(62 Fed. Reg. at 42189). (That does not include indirect costs to the economy, which would surely put this rule above the $100 million impact threshold specified in several of the regulatory review statutes listed above.) EPA cannot ignore those costs by creating its own interpretation of those statutes in which only "direct" impacts need be considered. There is no support in the statutory language or legislative history for such a reading, and EPA has cited no such support in its Federal Register notice.

There is another problem with EPA's rationale for avoiding regulatory review: if EPA were right that "indirect" impacts do not trigger those reviews, the impacts of this rulemaking are not really "indirect." Those impacts emerge clearly once the proposed criteria are combined with the State's designated uses. Those designations have already been established, so there is nothing uncertain or indefinite about that aspect of the water quality standards. Then, once the standards are completed, the State must implement

those standards through permit limits. While there are some decisions that the State must make in determining the proper permit limits, which can influence the size of the compliance costs, EPA can readily determine a range of possible costs. In fact, the Agency has already done so, resulting in the $15 - $87 million cost range discussed above. While those costs may not be fixed with certainty, they are certainly "direct economic impacts". Therefore, even if the Agency were correct in looking at only "direct" impacts, this rulemaking poses such impacts, and EPA must comply with the statutory requirements to conduct and submit cost and benefit analyses of its proposed criteria.

V. CONCLUSION

As explained above, EPA's proposal to issue water quality criteria for toxicities in the State of California suffers from serious legal flaws. API urges the Agency to reconsider its intended course of action in light of the issues raised in these and other public comments. If you have any questions regarding these comments, or would like any additional information, please call Theresa Pugh at 202/682-8036.

Response to: CTR-050-007c

See responses to CTR-001-008b, CTR-050-007a (Category C-21; Legal Concerns), CTR-021-005c (Category E-01c; Executive Order 12866), CTR-036-003a (Category S; Unfunded Mandates Reform Act), and the preamble to the proposed rule.

Comment ID: CTR-052-021c
Comment Author: East Bay Dischargers Authority
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: R RFA/SBREFA
References: Letter CTR-052 incorporates by reference letters CTR-035 and CTR-054
Attachments? Y
CROSS REFERENCES C-21; E-01c; S

Comment: C. RECOMMENDATIONS FOR MODIFICATIONS TO THE CTR AND EA

EPA should revise the proposed rule and economics analysis such that they are consistent with applicable Federal law and regulations. In proposing a single set of criteria for all estuaries, the rule is inconsistent with the Clean Water Act and EPA's water quality standards regulations. In failing to properly evaluate the rule's economic impacts and in failing to adequately consider alternative criteria for San Francisco Bay Area waters, the rule is inconsistent with Presidential Executive Order 12866 and the Unfunded Mandates Reform Act. In failing to properly consider the impacts on small entities, the rule is inconsistent with the Regulatory Flexibility Act. Specific citations for these inconsistencies are contained in comments from BADA and CASA/Tri-TAC.

Response to: CTR-052-021c

With respect to EPA's decision to publish a single set of criteria in the rule, see responses to CTR-035-012a and CTR-036-005 (both responses are in Category C-21; Legal issues). For a discussion of how the rule complies with the E.O. 12866, the Unfunded Mandates Reform Act, and Regulatory

Flexibility Act, see response to CTR-001-008b, CTR-036-005c (Category E-01c; Executive Order 12866), CTR-036-003a (Category S; Unfunded Mandates Reform Act), and the preamble to the proposed rule.

Comment ID: CTR-054-008d
Comment Author: Bay Area Dischargers Assoc.
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: R RFA/SBREFA
References:
Attachments? Y
CROSS REFERENCES C-02b; C-24; E-01c; S

Comment: Separate, scientifically defensible, reasonably achievable aquatic life criteria for copper should be adopted for San Francisco Bay, or alternatively EPA should specify in the Preamble implementation policies for copper that will result in reasonable control measures actions. To comply with the Clean Water Act and EPA regulations, EPA is required to consider specific water bodies. To fulfill the spirit of Presidential Executive Order 12866 and the requirements of the Unfunded Mandates Reform Act, EPA is required to evaluate regulatory alternatives based on an analysis of costs and benefits. Based on BADA's analysis of costs and benefits, EPA should either adopt copper criteria that are reasonably achievable or alternatively specify implementation policies that will avoid costly end-of-pipe controls. Potential implementation measures that could be specified include use of the following in calculating effluent limitations: actual dilution based on modeling studies; copper translators; probability of compliance less than 99.9%; and water-effect ratios determined for different segments of the Bay. Unless EPA specifies these or similar implementation policies in the rule, it is possible that the CTR could result in significant costs ($12 million per year to $78 million per year) while resulting in minor environmental benefit (a 1% reduction in copper loading to the Bay). In that case, the CTR would violate the Clean Water Act, EPA regulations, Presidential Executive Order 12866, the Unfunded Mandates Reform Act and the Regulatory Flexibility Act. (see the discussion under Item 11 below.)

Response to: CTR-054-008d

See responses to CTR-054-008a (Category C-02b; Copper Aquatic Life), CTR-035-012a and CTR-036-005 (Category C-24; Legal Issues), CTR-021-005c (Category E-01c; Executive Order 12866), CTR-054-013a (Category E-01g3; Cost-Effectiveness Ratio), CTR-001-008b, CTR-036-003a (Category S; Unfunded Mandates Reform Act), and the preamble to the proposed rule.

Comment ID: CTR-054-051
Comment Author: Bay Area Dischargers Associati
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: R RFA/SBREFA

References: Letter CTR-040 incorporates by reference letter CTR-027
Attachments? Y
CROSS REFERENCES

Comment: 3. The California Toxics Rule is inconsistent with the Regulatory Flexibility Act.

The Regulatory Flexibility Act (RFA, 5 U.S.C. section 601 et seq.) requires that each federal agency, including EPA, publish in the Federal Register twice a year a regulatory flexibility agenda which contains a brief description of the subject area of any rule which the agency expects to promulgate which is likely to have a significant economic impact on a substantial number of small entities (includes municipalities with a population less than 50,000). Because EPA contends that the CTR does not significantly or uniquely affect small entities, EPA does not believe it is required under the RFA to describe the impact of the proposed rule on small entities or to describe any significant alternatives to the proposed rule, which accomplish the stated objectives and which minimize any significant economic impact of the proposed rule on small entities.

The EPA Administrator has certified that the rule will not, if promulgated, have a significant economic impact on a substantial number of small entities. However, because the CTR will in fact have a significant economic impact on a substantial number of small entities, the Administrator's certification can be challenged as being arbitrary and capricious under the Administrative Procedures Act. If that challenge were successful, then the CTR could not be re-promulgated until the required final regulatory flexibility analysis has been completed by the agency.

Furthermore, any small entity that is adversely affected or aggrieved by final CTR is entitled to judicial review of agency compliance with the requirements of the RFA. The judicial relief possible in a challenge made by a small entity is as follows:

- Remand of the rule, and - Deferred enforcement of the rule against small entities unless the court finds that continued enforcement of the rule is in the public interest.

Response to: CTR-054-051

See response to CTR-001-008b and the preamble to the final rule.

Comment ID: CTR-059-002b
Comment Author: Los Angeles County Sanit. Dist
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: R RFA/SBREFA
References: Letter CTR-059 incorporates by reference letter CTR-035
Attachments? Y
CROSS REFERENCES E-01c; S

Comment: The Sanitation Districts disagree with EPA's assertions that the CTR is not a significant regulatory action under Executive Order 12866 or the Unfunded Mandates Reform Act, and that EPA is not required to comply with the Regulatory Flexibility Act because the CTR establishes no requirements

applicable to small entities. We believe the potential costs for POTWs to comply with the CTR criteria would far exceed the $ 100 million threshold, based on the fact that we estimate that the potential costs for seven Sanitation Districts' facilities to comply with the CTR to be nearly $150 million per year. Clearly, many of the 304 other POTWs in the State will also incur costs, as, will other NPDES permittees, indirect dischargers, stormwater dischargers, and nonpoint sources. Thus, EPA's cost figure of $15 - $87 million per year is simply not a credible estimate. Also, it is quite clear that the CTR is likely to adversely affect local governments, including over 40 small communities located in our service area, and that it is significantly different from other federal regulations previously promulgated in California. We believe that EPA has not complied with the mandates of Executive Order 12866, the Unfunded Mandates Reform Act and the Regulatory Flexibility Act. Accordingly, EPA must revise the economic analysis and it must be reviewed by the Office of Management and Budget and then EPA must select the most cost-effective and least burdensome regulatory alternative.

Response to: CTR-059-002b

See responses to CTR-001-008b, CTR-021-005c (Category E-01c; Executive Order 12866), CTR-036-003a (Category S; Unfunded Mandates Reform Act), and the preamble to the proposed rule.

Comment ID: CTR-059-016
Comment Author: Los Angeles County Sanit. Dist
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: R RFA/SBREFA
References: Letter CTR-059 incorporates by reference letter CTR-035
Attachments? Y
CROSS REFERENCES

Comment: Regulatory Flexibility Act

Contrary to EPA's finding in the Preamble that the CTR "establishes no requirements applicable to small entities (p. 4219 1)," we believe that the NPDES permit requirements and TMDLs that will be based on the CTR criteria will apply to small and large entities alike, because, under Section 301 (b)(1)(C) of the Clean Water Act, EPA and States must establish effluent limitations necessary to meet water quality standards. Although the State of California is a delegated NPDES state, EPA has authority to apply the criteria directly, either by its review and potential veto of state-issued permits, or though direct issuance of permits in cases where it has disapproved a state permit under Section 402 of the Clean Water Act. As pointed out by EPA on p. 42165, the scope of the CTR is to "re-establish criteria for the remaining priority toxic pollutants to meet the requirements of section 303(c)(2)(B) of the CWA." Section 303(c)(2)(B) of the Act requires the establishment of water quality standards for toxic pollutants. Thus, EPA is establishing water quality standards, and NPDES permits subsequently issued must contain effluent limitations necessary to meet water quality standards. Thus, EPA's finding is erroneous, and the CTR will establish requirements applicable to small entities.

Of the 78 cities whose Mayors comprise the Sanitation Districts' Board of Directors, 41 are "small communities" with a population of less than 50,000 people.(*1) It is likely that some or all of these communities would be significantly affected if any or all of the Sanitation Districts' water reclamation

plants were required to install expensive treatment facilities as a result of the CTR. EPA must to comply with the requirements of the Regulatory Flexibility Act to address the impacts on small communities such as these. Most, if not all, of these communities, would also be subject to CTR compliance requirements as a result of their responsibilities as co-permittees under the Los Angeles County Municipal Storm Water NPDES Permit.

Under the requirements of the Regulatory Flexibility Act, we therefore believe that EPA is required to prepare initial and final regulatory flexibility analyses that describe the impact of the proposed rule on small entities, identify any significant alternatives to the proposed rule that accomplish the stated objectives, and describe any significant alternatives to the proposed rule that minimize any significant economic impact of the proposed rule on small entities.

(*1)These communities include Vernon, Bradbury, Industry, Irwindale, La Habra Heights, El Segundo, Rolling Hills Estates, Signal Hill, Sierra Madre, Commerce, San Marino, Palos Verdes Estates, Hawaiian Gardens, Santa Fe Springs, Artesia, Hermosa Beach, Lakewood, Lomita, La Canada Flintridge, Duarte, South El Monte, Cudahy, South Pasadena, Maywood, Lawndale, Walnut, La Veme, Temple City, Manhattan Beach, San Ditnas, Bell, West Hollywood, Monrovia, San Gabriel, La Puente, Azusa, Rancho Palos Verdes, Bell Gardens, Covina, and La Mirada.

Response to: CTR-059-016

See response to CTR-001-008b.

Comment ID: CTR-062-004b
Comment Author: City of Downey
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/24/97
Subject Matter Code: R RFA/SBREFA
References: Letter CTR-062 incorporates by reference letters CTR-013 and CTR-027
Attachments? N
CROSS REFERENCES J

Comment: In addition, we would like to emphasize the following key issues on the California Toxic Rule (CTR), which are of major impact to our stormwater program:

4. The proposed rule applies to all current and future MS4 discharges, including small communities. The small communities will be significantly impacted by the proposed rule. In California, there are many small communities that are currently co-permittees to MS4 permits. Many of the larger municipalities in California have conducted stormwater discharge characterization studies. These studies have shown that there are common pollutants associated with stormwater discharges from urbanized areas that could result in compliance problems with the proposed criteria. Most small communities have not conducted discharge characterization studies; however, it is reasonable to assume that discharges from small communities would also contain these same pollutants. This would result in a smaller community being faced with the same compliance issues as large and medium municipalities; however, the cost to comply could be more significant and prohibitive for smaller communities.

The Regulatory Flexibility Act requires the U.S. EPA to conduct an analysis on the economic impact the proposed rule may have on small entities, unless the U.S. EPA certifies that the rule will not affect a significant number of small entities. In the preamble to the proposed rule, it indicates that there are no small entities to be impacted by the rule, and, therefore, the U.S. EPA did not need to complete an analysis required under the Act. The U.S. EPA neglected to address small MS4 communities in California that are currently subject to MS4 permits, and those smaller communities that may be impacted through Phase II. The U.S. EPA should have conducted an analysis on the economic impacts to smaller communities.

Unless the preamble is modified to indicate that MS4s are not required to comply with water quality standards, the proposed rule should not be applied to smaller MS4 communities until the U.S. EPA has complied with the requirements of the Regulatory Flexibility Act.

Response to: CTR-062-004b

See responses to CTR-013-003, CTR-040-004, (Category J; Stormwater Economics), and CTR-001-008b.

Comment ID: CTR-067-006a
Comment Author: Ojai Valley Sanitary District
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: R RFA/SBREFA
References:
Attachments? N
CROSS REFERENCES E-01d01

Comment: * The EPA should reevaluate their determination under the Regulatory Flexibility Act that the rule will not have a significant economic impact on a substantial number of small entities. OVSD would be classified as a small entity, serving a population of 25,000, and would be significantly affected by the CTR. OVSD would have to further treat our effluent with reverse osmosis in order to comply with proposed CTR criteria, specifically for copper, nickel, zinc, lindane, and trihalomethanes; modifications to the existing plant would result in estimated increased annualized costs of $1.98 million. These costs are significantly higher than EPA's estimated costs per plant of $27,000 to $480,000 per year. In addition, EPA must consider that OVSD's contingent of small businesses potentially will be affected by the proposed rule through increased regulation of their discharges, increased sewer discharge fees, or product bans. Thus we strongly believe that the EPA's Economic Analysis significantly underestimates the potential statewide costs associated with adoption of the CTR and should be revised.

Response to: CTR-067-006a

See response to CTR-001-008b and CTR-045-012b (Category E-01c; Executive Order 12866).

Comment ID: CTR-071-004b

Comment Author: City of Rosemead
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: R RFA/SBREFA
References: Letter CTR-071 incorporates by reference letter CTR-013 and CTR-027
Attachments? N
CROSS REFERENCES J

Comment: In addition, we would like to emphasize the following key issues on the California Toxic Rule (CTR), which are of major impact to our stormwater program.

4. The proposed rule applies to all current and future MS4 dischargers, including small communities. The small communities will be significantly by the proposed rule. In California, there are many small communities that are currently co-permittees to MS4 permits. Many of the larger municipalities in California have conducted stormwater discharge characterization studies. These studies have shown that there are common pollutants associated with stormwater discharges from urbanized areas that could result in compliance problems with the proposed criteria. Most small communities have not conducted discharge characterization studies; however, it is reasonable to assume that discharges from small communities would also contain these same pollutants. This would result in a smaller community being faced with the same compliance issue as large and medium municipalities; however, the cost to comply could be more significant and prohibitive for small communities.

The Regulatory Flexibility Act requires the USEPA to conduct an analysis on the economic impact the proposed rule may have on small entities, unless the USEPA certifies that the rule will not affect a significant number of small entities. In the preamble to the proposed rule it indicates that there are no small entities to be impacted by the rule, and, therefore, the USEPA did not need to complete an analysis requiredunder the Act. The USEPA neglected to address small MS4 communities in California that are currently subject to a MS4 permits, and those smaller communities that may be impacted through Phase II. The USEPA should have conducted an analysis of the economic impacts to smaller communities.

Unless the preamble is modified to indicate that MS4s are not required to comply with water quality standards, the proposed rule should not be applied to smaller MS4 communities until the USEPA has complied with the requirements of the Regulatory Flexibility Act.

Response to: CTR-071-004b

See responses to CTR-013-003, CTR-040-004, (Category J; Stormwater Economics), and CTR-001-008b.

Comment ID: CTR-072-004b
Comment Author: City of Bell Gardens
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: R RFA/SBREFA

References: Letter CTR-072 incorporates by reference letters CTR-013 and CTR-027
Attachments? N
CROSS REFERENCES J

Comment: In addition, we would like to emphasize the following key issues on the California Toxic Rule (CTR), which are of major impact to our stormwate program.

4. The proposed rule applies to all current and future MS4 dischargers, including small communities. The small communities will be significantly by the proposed rule. In California, there are many small communities that are currently co-permittees to MS4 permits, Many of the larger municipalities in California have conducted stormwater discharge characterization studies. These studies have shown that there are common pollutants associated with stormwater discharges from urbanized areas that could result in compliance problems with the proposed criteria. Most small communities have not conducted discharge characterization studies; however, it is reasonable to assume that discharges from small communities would also contain these same pollutants. This would result in a smaller community being faced with the same compliance issue as large and medium municipalities; however, the cost to comply could be more significant and prohibitive for small communities.

The Regulatory Flexibility Act requires the USEPA to conduct an analysis on the economic impact the proposed rule may have on small entities, unless the USEPA certifies that the rule will not affect a significant number of small entities. In the preamble to the proposed rule it indicates that there are no small entities to be impacted by the rule, and, therefore, the USEPA did not need to complete an analysis required under the Act. The USEPA neglected to address small MS4 communities in California that are currently subject to a MS4 permits, and those smaller communities that may be impacted through Phase II. The USEPA should have conducted an analysis of the economic impacts to smaller communities.

Unless the preamble is modified to indicate that MS4s are not required to comply with water quality standards, the proposed rule should not be applied to smaller MS4 communities until the USEPA has complied with the requirements of the Regulatory Flexibility Act.

Response to: CTR-072-004b

See responses to CTR-013-003, CTR-040-004, (Category J; Stormwater Economics), and CTR-001-008b.

Comment ID: CTR-073-004b
Comment Author: City of Paramount
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: R RFA/SBREFA
References: Letter CTR-073 incorporates by reference letters CTR-013 and CTR-027
Attachments? N
CROSS REFERENCES J

Comment: In addition, we would like to emphasize the following key issues on the California Toxic Rule (CTR), which are of major impact to our stormwater program.

4. The proposed rule applies to all current and future MS4 dischargers, including small communities. The small communities will be significantly by the proposed rule. In California, there are many small communities that are currently co-permittees to MS4 permits, Many of the larger municipalities in California have conducted stormwater discharge characterization studies. These studies have shown that there are common pollutants associated with stormwater discharges from urbanized areas that could result in compliance problems with the proposed criteria. Most small communities have not conducted discharge characterization studies; however, it is reasonable to assume that discharges from small communities would also contain these same pollutants. This would result in a smaller community being faced with the same compliance issue as large and medium municipalities; however, the cost to comply could be more significant and prohibitive for small communities.

The Regulatory Flexibility Act requires the USEPA to conduct an analysis on the economic impact the proposed rule may have on small entities, unless the USEPA certifies that the rule will not affect a significant number of small entities. In the preamble to the proposed rule it indicates that there are no small entities to be impacted by the rule, and, therefore, the USEPA did not need to complete an analysis required under the Act. The USEPA neglected to address small MS4 communities in California that are currently subject to a MS4 permits, and those smaller communities that may be impacted through Phase II. The USEPA should have conducted an analysis of the economic impacts to smaller communities.

Unless the preamble is modified to indicate that MS4s are not required to comply with water quality standards, the proposed rule should not be applied to smaller MS4 communities until the USEPA has complied with the requirements of the Regulatory Flexibility Act.

Response to: CTR-073-004b

See responses to CTR-013-003, CTR-040-004, (Category J; Stormwater Economics), and CTR-001-008b.

Comment ID: CTR-074-004b
Comment Author: City of San Gabriel
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: R RFA/SBREFA
References: Letter CTR-074 incorporates by reference letters CTR-013 and CTR-027
Attachments? N
CROSS REFERENCES J

Comment: In addition, we would like to emphasize the following key issues on the California Toxic Rule (CTR), which are of major impact to our stormwater program:

4. The proposed rule applies to all current and future MS4 dischargers, including small communities. The small communities will be significantly by the proposed rule. In California, there are many small communities that are currently co-permittees to MS4 permits. Many of the larger municipalities in California have conducted stormwater discharge characterization studies. These studies have shown that there are common pollutants associated with stormwater discharges from urbanized areas that could

result in compliance problems with the proposed criteria. Most small communities have not conducted discharge characterization studies; however, it is reasonable to assume that discharges from small communities would also contain these same pollutants. This would result in a smaller community being faced with the same compliance issues as large and medium municipalities; however, the cost to comply could be more significant and prohibitive for smaller communities.

The Regulatory Flexibility Act requires the USEPA to conduct an analysis on the economic impact the proposed rule may have on small entities, unless the USEPA certifies that the rule will not affect a significant number of small entities. In the preamble to the proposed rule, it indicated that there are no small entities to be impacted by the rule, and, therefore, the USEPA did not need to complete an analysis required under the Act. The USEPA neglected to address small MS4 communities in California that are currently subject to a MS4 permits, and those smaller communities that may be impacted through Phase II. The USEPA should have conducted an analysis on the economic impacts to smaller communities.

Unless the preamble is modified to indicate that MS4s are not required to comply with water quality standards, the proposed rule should not be applied to smaller MS4 communities until the USEPA has complied with the requirements of the Regulatory Flexibility Act.

Response to: CTR-074-004b

See responses to CTR-013-003, CTR-040-004, (Category J; Stormwater Economics), and CTR-001-008b.

Comment ID: CTR-075-004b
Comment Author: City of El Monte
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/24/97
Subject Matter Code: R RFA/SBREFA
References: Letter CTR-075 incorporates by reference letters CTR-013 and CTR-027
Attachments? N
CROSS REFERENCES J

Comment: In addition, we would like to emphasize the following key issues on the California Toxic Rule (CTR), which are of major impact to our stormwater program;

4. The proposed rule applies to all current and future MS4 dischargers, including small com=nities. The small communities will be significantly affected by the proposed rule. In California, there are many small communities that are currently co-permittees to MS4 permits. Many of the larger municipalities in California have conducted stormwater discharge characterization studies. These studies have shown that there are common pollutants associated with stormwater discharges from urbanized areas that could result in compliance problems with the proposed criteria. Most small communities have not conducted discharge characterization studies; however, it is reasonable to assume that discharges from small communities would also contain these same pollutants. This would result in a smaller community being faced with the same compliance issues as large and medium municipalities; however, the cost to comply could be more significant and prohibitive for smaller communities.

The Regulatory Flexibility Act requires the USEPA to conduct an analysis on the economic impact the proposed rule may have on small entities, unless the USEPA certifies that the rule will not affect a significant number of small entities. In the preamble to the proposed rule:, it indicates that there are no small entities to be impacted by the rule, and, therefore, the USEPA did not need to complete an analysis required under the Act. The USEPA neglected to address small MS4 communities in California that are currently subject to a MS4 permits, and those smaller communities that may be impacted through Phase II. The USEPA should have conducted an analysis on the economic impacts to smaller communities.

Unless the preamble is modified to indicate that MS4s are not required to comply with water quality standards, the proposed rule should not be applied to smaller MS4 communities until the USEPA has complied with the requirements of the Regulatory Flexibility Act.

Response to: CTR-075-004b

See responses to CTR-013-003, CTR-040-004, (Category J; Stormwater Economics), and CTR-001-008b.

Comment ID: CTR-076-004b
Comment Author: City of Cudahy
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: R RFA/SBREFA
References: Letter CTR-076 incorporates by reference letters CTR-013 and CTR-027
Attachments? N
CROSS REFERENCES J

Comment: In addition, we would like to emphasize the following key issues on the California Toxic Rule (CTR), which are of major impact to our stormwater program:

4. The proposed rule applies to all current and future MS4 dischargers, including small communities. The small communities will be significantly by the proposed rule. In California, there are many small communities that are currently co-permittees to MS4 permits. Many of the larger municipalities in California have conducted stormwater discharge characterization studies. These studies have shown that there are common pollutants associated with stormwater discharge from urbanized areas that could result in compliance problems with the proposed criteria. Most small communities have not conducted discharge characterization studies; however, it is reasonable to assume that discharges from small communities would also contain these same pollutants. This would result in a smaller community being faced with the same compliance issues as large and medium municipalities; however, the cost to comply could be more significant and prohibitive for smaller communities.

The Regulatory Flexibility Act requires the USEPA to conduct an analysis on the economic impact the proposed rule may have on small entities, unless the USEPA certifies that the rule will not affect a significant number of small entities. In the preamble to the proposed rule, it indicates that there are no small entities to be impacted by the rule, and, therefore, the USEPA did not need to complete an analysis required under the Act. The USEPA neglected to address small MS4 communities in California that are currently subject to a MS4 permits, and those smaller communities that may be impacted through Phase

II. The USEPA should have conducted an analysis on the economic impacts to smaller communities.

Unless the preamble is modified to indicate that MS4s are not required to comply with water quality standards, the proposed rule should not be applied to smaller MS4 communities until the USEPA has complied with the requirements of the Regulatory Flexability Act.

Response to: CTR-076-004b

See responses to CTR-013-003, CTR-040-004, (Category J; Stormwater Economics), and CTR-001-008b.

Comment ID: CTR-078-004b
Comment Author: City of Maywood
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: R RFA/SBREFA
References: Letter CTR-078 incorporates by reference letter CTR-013
Attachments? N
CROSS REFERENCES J

Comment: In addition, we would like to emphasize the following key issues on the Calfironia Toxic Rule (CTR), which are of major impact to our stormwater program:

4. The proposed rule applies to all current and future MS4 dischargers, including small communities. The small communities will be significantly by the proposed rule. In California, there are many small communities that are currently co-permittees to MS4 permits. Many of the larger municipalities in California have conducted stormwater discharge characterization studies. These studied have shown that there are common pollutants associated with stormwater discharges from urbanized areas that could result in compliance problems with the proposed criteria. Most small communities have not conducted discharge ccharacterization studies; however, it is reasonable to assume that discharges from small communities would also contain these same pollutants. This would result in a smaller community being faced with the same compliance issues as large and medium municipalities; however, the cost to comply could be more significant and prohibitive for smaller communities.

The Regulatory Flexibility Act requires the USEPA to conduct an analysis on the economic impact the proposed rule may have on small entities, unless the USEPA certifies that the rule will not affect a significant number of small entities. In the preamble to the proposed rule, it indicates that there are no small entities to be impacted by the rule, and, therefore, the USEPA did not need to complete an analysis required under the Act. The USEPA neglected to address small MS4 communities in California that are currently subject to a MS4 permits, and those smaller communities that may be impacted through Phase II. The USEPA should have conducted an analysis on the economic impacts to smaller communities.

Unless the preamble is modified to indicate that MS4s are not required to comply with water quality standards, the proposed rule should not be applied to smaller MS4 communities until the USEPA has complied with the requirements of the Regulatory Flexibility Act.

Response to: CTR-078-004b

See responses to CTR-013-003, CTR-040-004, (Category J; Stormwater Economics), and CTR-001-008b.

Comment ID: CTR-079-004b
Comment Author: City of Glendale
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/24/97
Subject Matter Code: R RFA/SBREFA
References: Letter CTR-079 incorporates by reference letters CTR-013 and CTR-027
Attachments? N
CROSS REFERENCES J

Comment: In addition, we would like to emphasize the following key issues on the California Toxic Rule (CTR), which are of major impact to our stomrwater program:

4. The proposed rule applies to all current and future MS4 dischargers, including small communities. The small communities will be significantly by the proposed rule. In California, there are many small communities that are currently co-permittees to MS4 permits. Many of the larger municipalities in California have conducted stormwater discharge characterization studies. These studies have shown that there are common pollutants associated with stormwater discharges from urbanized areas that could result in compliance problems with the proposed criteria. Most small communities have not conducted discharge characterization studies; however, it is reasonable to assume that discharges from small communities would also contain these same pollutants. This would result in a smaller community being faced with the same compliance issues as large and medium municipalities; however, the cost to comply could be more significant and prohibitive for smaller communities.

The Regulatory Flexibility Act requires the USEPA to conduct an analysis on the economic impact the proposed rule may have on small entities, unless the USEPA certifies that the rule will not affect a significant number of small entities. In the preamble to the proposed rule, it indicates that there are no small entities to be impacted by the rule, and, therefore, the USEPA did not need to complete an analysis required under the Act. The USEPA neglected to address small MS4 communities in California that are currently subject to a MS4 permits, and those smaller communities that may be impacted through Phase II. The USEPA should have conducted an analysis on the economic impacts to smaller communities.

Unless the preamble is modified to indicate that MS4s are not required to comply with water quality standards, the proposed rule should not be applied to smaller MS4 communities until the USEPA has complied with the requirements of the Regulatory Flexibility Act.

Response to: CTR-079-004b

See responses to CTR-013-003, CTR-040-004, (Category J; Stormwater Economics), and CTR-001-008b.

Comment ID: CTR-092-016b
Comment Author: City of San Jose, California
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: R RFA/SBREFA
References: Letter CTR-092 incorporates by reference letter CTR-035
Attachments? Y
CROSS REFERENCES E-01c; S

Comment: Introductory Comment

EPA states in the Executive Summary (page ES-2) to the Economic Analysis that:

"EPA did not calculate costs for any program for which it does not have enforceable authority ... (nor) for NPDES sources which are not typically subject to numeric WQBELs....."

From a national policy perspective, this narrowing, of the focus of the Economic Analysis may be a justifiable approach to cost benefit analysis. Local government, however, is not able to disregard the potential cost effects of the CTR on urban and agricultural runoff. Those potential costs will have to be defrayed with proceeds from the same pool of local rate payers responsible for paying for point source pollutant removal programs. In California, those ratepayers have made clear both their support for environmental protection and their reluctance to pay more than is necessary for that protection. A narrow definition of those costs included in the CTR Economic Analysis continues the pattern of fragmenting responsibility and authority for the protection of waterways, which in turn hinders creation and implementation of holistic strategies which would best serve the environment at least cost.

Questions for EPA on the Introductory Comment

Q.-1) If not EPA, who has the responsibility to define the aggregated costs of all water quality-related regulations?

Q.-2) San Jose's reading of federal policy initiatives (which include, but are not limited to, the Regulatory Flexibility Act, Executive Order 12866, and the Unfunded Mandates Reform Act) indicates that EPA is empowered to analyze the economic impact of federal regulations in a way that addresses both aggregated cost impacts as well as the fiscal reality of local level government. Why was this not accounted for in the current analysis?

Response to: CTR-092-016b

See responses to CTR-001-008b, CTR-021-005c (Category E-01c; Executive Order 12866), CTR-021-006b (Category E-01c; Executive Order 12866), CTR-036-003a (Category S; Unfunded Mandates Reform Act), and the preamble to the proposed rule.

Comment ID: CTR-096-004b
Comment Author: City of Modesto
Document Type: Local Government

State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: R RFA/SBREFA
References:
Attachments? N
CROSS REFERENCES G-10

Comment: Thank you for the opportunity to comment on the proposed California Toxics Rule. The City's comments are related to five main concepts:

4. The environmental consequences of the necessary treatment facilities and changes in operating practices to meet these discharg5 standards is very significant and has not been addressed in promulgating the proposed rule.

Specifically, the City submits the following comments:

F. A comparison of the Water Quality Standards (WQS) used by its City during the Local Limits Study and the proposed WQS is shown in Table 1. There is a little variation in limits for cadmium, copper, nickel, and zinc as these values are dependent on receiving stream hardness. The values shown in Table I for the City were developed using a hardness of 170 mg/l as CaCO3 while the standards from the CTR are based on 100 mg/l as CaCO3. The WQS from the CTR are actually expressed as dissolved fractions. A factor of I has been used to convert from dissolved to total fractions for the comparison to take place.

Table 1

Comparison of Water Quality Standards

	City Report		WQS		1996		1997	
	Chronic	Acute	Chronic	Acute				
Arsenic, ppb	190.0	360.0	150.0	340.0	Cadmium, ppb	1.7	7.1	2.2
4.3	Chromium, ppb	10.0	15.0	11.0	16.0	Copper, ppb	19.0	29.0
9.0	13.0	Nickel, ppb	250.0	2200.0	52.0	470.0	Zinc, ppb	170.0
180.0	120.0	120.0	Mercury, ppb	N/A	2.1	.77	1.4	

Table 1 indicates that the City's Local Limits for arsenic, cadmium, chromium, and zinc would have little difficulty meeting the CTR. However, limits for copper, nickel and mercury may be drastically impacted. This impact in developing a stricter local limit may result in an economic hardship to many small business enterprises that currently do metal plating. These businesses may be forced to close down due to the implementation of these limits. Modesto experiences a chronic unemployment rate above 12%, and economic development is critical to this community.

Response to: CTR-096-004b

See response to CTR-096-004a (Category G-10; Pretreatment).

Comment ID: CTRE-003-001c
Comment Author: Bay Planning Coalition
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 09/09/97
Subject Matter Code: R RFA/SBREFA
References:
Attachments? N
CROSS REFERENCES B; J

Comment: The Bay Planning Coalition represents approximately 200 maritime industry, shoreline businesses, local governments and Bay users along the S.F. Bay shoreline and is most significantly affected by the proposed California Toxics Rule. One of our primary interests is the economic analysis which under the EPA's model estimates a range of annual costs of $14.9 to $86.6 million.

We believe the annual costs for implementation of the Rule statewide exceed the EPA estimate range. We are particularly concerned because it appears that the economic impact analysis did not include the costs of compliance for the NPDES stormwater permit applicants. In order for us to provide EPA with sufficient detail on our economic analysis and cost projection as well as the impact of the Rule on small business under the Regtory Flexibility Act, we request an extension of time to respond. A 30-day extension from September 26 to October 27, 1997 would be acceptable. Thank you so much for your consideration.

Response to: CTRE-003-001c

See responses to CTR-013-003, CTR-040-004, (Category J; Stormwater Economics), CTR-001-008b, and CTR-001-001 (Category B; Comment Period).

Comment ID: CTRH-001-005b
Comment Author: Alan Waltner
Document Type: Public Hearing
State of Origin: CA
Represented Org: Almeda Cnty Clean Wtr Pgm
Document Date: 09/17/97
Subject Matter Code: R RFA/SBREFA
References:
Attachments? N
CROSS REFERENCES J-2

Comment: If you go beyond best management practices, you're impliedly eliminating those provisions of the 1995 Basin Plan. I think it would clearly violate the Regulatory Flexibility Act, since you haven't considered the costs of controls.

If, again, our dischargers had to do whatever it took, our members had to do whatever it took -- and in fact, several of our dischargers are small entities under the Regulatory Flexibility Act: the City of

Emeryville, the City of Albany, the City of Piedmont.

The NPDES permits small entities and municipalities under 50,000 in number. If they had to do whatever it took to provide the waste allocations without consideration of the economic impact, those entities, because of the practical problems of needing 50 coliseums of storage in the Bay Area and the practical considerations that plague us -- and the only place you could put that is by the bay, where you have a serious problem with requirements under the Endangered Species Act.

To the extent you're standing in the shoes of the state in promulgating these standards, you violate the cost/benefit balances provision of the Porter Cologne Act.

Response to: CTRH-001-005b

With respect to EPA's compliance with the RFA see response to CTR-001-008b. With respect to stormwater costs see response to CTR-013--003 and CTR-04-004 (Category J; Stormwater Economics). With respect to commenters' assertion that EPA violated the cost/benefit provision of the Porter-Cologne Act, see response to CTR-020-002 (Category C-21; Legal Issues).

Comment ID: CTRH-001-008a
Comment Author: Doug Harrison
Document Type: Public Hearing
State of Origin: CA
Represented Org: Fresno Met. Flood Control
Document Date: 09/17/97
Subject Matter Code: R RFA/SBREFA
References:
Attachments? N
CROSS REFERENCES J-2

Comment: Looking at the results of our monitoring and your criteria, we'll have to achieve another 70 to 90 percent reduction in pollutants in order to be in compliance. That means we'd have to increase our storage volume to 20,000 acre feet just to handle average annual runoff we have underway right now.

That's a price tag of $220 million to $400 million to try to stay in compliance with the current criteria if you interpret the rule to apply to us -- 220 million. And then we can't prevent major storm events in our community, storm impacts that cause a discharge, in which case 100 percent of the discharges would exceed -- would be out of compliance, even though we were retaining 100 percent of the average annual rainfall.

We think that raises a problem with the Regulatory Flexibility Act, both in terms of the cost analysis itself and the impact that accrues to small communities, certainly with respect to the executive order. Just in our case alone the $100 million limit is in serious trouble, dealing with compliance with a five-year schedule just in our community with the possibility of $80 million per year of expense. That does not include O & M cost in that system.

Response to: CTRH-001-008a

See responses to CTR-013-003, CTR-040-004, (Category J; Stormwater Economics), CTR-021-005c

(Category E-01c; Executive Order 12866), and CTR-001-008b.

Subject Matter Code: S UMRA

Comment ID: CTR-005-006b
Comment Author: Novato Sanitary District
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/23/97
Subject Matter Code: S UMRA
References:
Attachments? Y
CROSS REFERENCES C-21; R

Comment: 5. The proposed rule is inconsistent with applicable Federal law and regulations. In proposing a single set of criteria for all estuaries, the rule is inconsistent with the Clean Water Act and EPA's water quality standards regulations. The Clean Water Act requires that water quality standards be established taking into consideration their use and value for public water supplies, propagation of fish and wildlife, recreational purposes, and also taking into consideration their use and value for navigation (See CWA section 303(c)(2)(A)). Consistent with this, EPA regulations require that water quality standards be based on identification of where toxic pollutants may be adversely affecting water quality or the attainment of the designated water use or where the levels of toxic pollutants are at a level to warrant concern. For those identified waters, states must adopt criteria for such toxic pollutants applicable to sufficient to protect the designated use"(See 40 CFR 131.1 1 (a)(2)).

Clearly the intent of both the Act and EPA regulations is that water quality standards be tailored to the characteristics of the waters in question. In failing to properly evaluate the rule's economic impacts and in failing to adequately consider regulatory alternatives, the rule is inconsistent with Presidential Executive Order 12866 and the Unfunded Mandates Reform Act. In failing to properly consider the impacts on small entities, the rule is inconsistent with the Regulatory Flexibility Act.

Response to: CTR-005-006b

With respect to EPA's decision to publish a single set of criteria in the rule, see responses to CTR-035-012a and CTR-036-005 (both responses are in Category C-21; Legal issues). For a discussion of how the rule complies with the E.O. 12866, the Unfunded Mandates Reform Act, and Regulatory Flexibility Act, see responses to CTR-001-008b (Subject R, Regulatory Flexibility Act), CTR-036-005c (Category E-01c; Executive Order 12866), CTR-036-003a, and the preamble to the proposed rule.

Comment ID: CTR-019-002b
Comment Author: Richards, Watson & Gershon
Document Type: Local Government
State of Origin: CA
Represented Org: Cities of Barst
Document Date: 09/26/97
Subject Matter Code: S UMRA
References: Letter CTR-019 incorporates by reference letters CTR-001, CTR-013, CTR-027 and CTR-036
Attachments? N

CROSS REFERENCES J

Comment: UNFUNDED MANDATED PROGRAMS

One of the express purposes of the Unfunded Mandates Reform Act of 1995 is "to end the imposition, in the absence of full consideration of Congress of Federal mandates on State, local and tribal governments without adequate Federal funding, in a manner that may displace other essential State, local and tribal governmental priorities." 2 U.S.C. section 1501(2). The proposed rule in its current form seems to have been drafted without regard to its fiscal impact on cities. The rule could require treatment of storm water discharges, despite the fact that no funding mechanism, nor any assistance, financial or otherwise, is being provided to the cities by either USEPA or the State of California. If the USEPA wishes to impose these treatment programs, it needs to provide funds to pay for their implementation.

We believe that USEPA's analysis under the Unfunded Mandates Reform Act of 1995 that the CTR will not result in an expenditure in the aggregate of more than $100,000,000.00 a year is wrong. As pointed by other local government entities which have submitted comments, the USEPA appears to assume that a BMP program will lead to compliance with numeric effluent guidelines and that there will be no associated additional costs for the BMP program. However, the economic analysis does not appear to analyze the potential cost of end of pipe treatment controls and analyze in any sort of detail what sort of BMP's would be necessary to achieve numeric effluent guidelines for the toxic pollutants. The economic analysis itself acknowledges that under its existing NPDES stormwater permit, the cities and counties of the Los Angeles area plan to spend $15,000,000 annually on public education in a program to curb illegal dumping. That cost estimate was based upon the analysis by the SWRCB of the 1990 permit. The actual costs of implementing all of the programs under the 1990 permit have been considerably more. For example, the cost estimates prepared by the San Gabriel Valley COG in connection with the LA. County permit, estimated implementation costs at $8.98 per person per year. The City of Long Beach estimated that it was already spending, as of early 1996, $12.4 million a year and that the estimated costs of implementing the programs under the current permit adopted in July 1996 would be another $3.4 million or about $16.1 million total. That number extrapolated to approximately $38.35 per person per year. The comparative cost numbers prepared by the Santa Monica Bay Restoration Project in connection with the existing Los Angeles permit estimated an average cost of dedicated stormwater program funding of $3.34 a month per household or approximately $13.36 per person per year. Using that number as a base, a city with a population of approximately $40,000 people can expect to spend $500,000 a year under its current stormwater programs. Extrapolating those numbers over the State of California, it is quite clear that the costs of implementing the existing stormwater program are in the hundred of millions of dollars a year.

Considering these economic analyses, it is quite clear that the financial impact of requiring end of pipe treatment controls or other means to achieve numeric effluent guidelines would quite easily exceed $100 million a year.

The foregoing numbers, of course, do not include potential increased costs to residents, business and industry complying with the discharge prohibitions and other requirements under the "City's current municipal permits nor does the EPA's economic analysis calculate the potential costs to regulated dischargers, that is, business and industries required to either obtain an individual NPDES stormwater permit or who are covered under a general permit by filing a notice of intent.

Necessarily, the expenditure of such large amounts of money is an important public policy question, particularly in a situation where neither the State of California nor the federal government has been

willing to provide any meaningful source of funds to local agencies to carry out these programs.

Response to: CTR-019-002b

See responses to CTR-013-003 (Category J; Stormwater Economics) and CTR-036-003a (Category S; Unfunded Mandates Reform Act).

Comment ID: CTR-021-005e
Comment Author: LeBoeuf, Lamb, Green & MacRae
Document Type: Local Government
State of Origin: CA
Represented Org: City of Sunnyvale
Document Date: 09/25/97
Subject Matter Code: S UMRA
References: Letter CTR-021 incorporates by reference letter CTR-035
Attachments? Y
CROSS REFERENCES C-13; C-28; E-01c; R

Comment: It is with a sense of reluctance that Sunnyvale joins in CASA/Tri-TAC's adverse comments on the CTR and the EA, and Sunnyvale does so in a spirit of constructive criticism and wtih an expectation that the Agency will make the necessary adjustments in its approach towards the CTR before the final rule is promulgated. In addition, in the same spirit wand with the same expectation, Sunnyvale would like to make the following points on its own behalf:

2. Obligation to Assess Alternative Cancer Risk Levels for Human Health-Based Criteria. Sunnyvale is gravely concerned that EPA has used the wrong approach in proposing to establish human health criteria for organic pollutants, particularly those pollutants for which the proposed criteria are below the method level of detection ("MDL"). Sunnyvale recommends that EPA should thoroughly assess all of the potential impacts, including costs and benefits, of the 10E-4 and 10E-5 risk levels before proposing the human health-based criteria. As pointed out in the EOA Letter, there is a significant potential for advancing technology to lower the MDL for many pollutants to the point where laboratory equipment is able to measure some or all of the organic compounds for which EPA is proposing to establish criteria at the new level. It is intuitively obvious that the costs of attaining criteria set at the 10E-6 level will be significantly greater than attainment of a 10E-5 or 10E-4 level, particularly where, as pointed out in the EOA Letter, the only available method of treatment is granular activated carbon. Sunnyvale is concerned that the EA does not adequately address the potential for these costs, and, consequently, does not take these potential costs into account in determining whether to exercise its flexibility in choosing whether to use a 10-4 , 10-5 or 10-6 cancer risk level as the basis for its CTR promulgation.

EPA is required by Executive Order 12866, the Regulatory Flexibility Act and the Unfunded Mandates Reform Act to identify and analyze alternatives to a proposed rule. We cannot understand, therefore, why EPA has done such a cursory analysis in the preamble to the CTR and the EA of the alternatives to the use of the most stringent (10E-6) risk level for establishing criteria for human health effects of pollutants, particularly organic pollutants. EPA cannot base its selection of the 10E-6 level based upon previous regulatory pronouncements by the State of California. Any new determination by the State will be subject to the analytical requirements of Section 13241 of the Porter-Cologne Act and by review by the Office of Administrative Law. Thus, it is not a foregone conclusion that the State will ultimately select the 10E-6 level. EPA has its own legal requirements to fulfill. Accordingly, we ask that EPA not

promulgate the final human health criteria for the pollutants of concern unless and until it has adequately analyzed the costs and other implications of the various alternatives to the 10E-6 level.

In conclusion, we are entirely supportive of many of EPA's innovative approaches towards development of the CTR, particularly as regards the toxic metals. Hwoever, we believe that EPA has needlessly failed to comply with many of its legal obligations, particularly as regards the development of human health-based criteria on cancer risk levels of organic pollutants. We urge the Agency to reconsider its position in the matters covered by this letter (as amplified by the EOA Letter) and the CASA/Tri-TAC letter. Sunnyvale pledges its continued participation in place-based watershed management planning in the South Bay, its cooperation with the Agency in making a success of the WPI, and to an ongoing effort by the Agency and others to reach water quality goals in the South Bay. We thank you for the opportunity to comment on the proposed CTR.

Response to: CTR-021-005e

For a discussion of how the rule complies with the E.O. 12866, the Unfunded Mandates Reform Act, and Regulatory Flexibility Act, see responses to CTR-001-008b (Category R; Regulatory Flexibility Act), CTR-036-005c (Category E-01c; Executive Order 12866), CTR-036-003a, and the preamble to the proposed rule.

With respect to detection limits see responses to CTR-034-010b and CTR-060-010 (Category C-28; Detection Limits). With respect to the selection and economic analysis of risk levels for carcinogens see responses to CTR-021-005a (Category C-13; Risk Level) and CTR-021-005c (Category E-01c; Executive Order 12866).

Comment ID: CTR-021-006d
Comment Author: LeBoeuf, Lamb, Green & MacRae
Document Type: Local Government
State of Origin: CA
Represented Org: City of Sunnyvale
Document Date: 09/25/97
Subject Matter Code: S UMRA
References: Letter CTR-021 incorporates by reference letter CTR-035
Attachments? Y
CROSS REFERENCES J; E-01c; R; I-01

Comment: It is with a sense of reluctance that Sunnyvale joins in CASA/Tri-TAC's adverse comments on the CTR and the EA, and Sunnyvale does so in a spirit of constructive criticism and with an expectation that the Agency will make the necessary adjustments in its approach towards the CTR before the final rule is promulgated. In addition, in the same spirit and with the same expectation, Sunnyvale would like to make the following points on its own behalf:

3. Failure to Address Important Stormwater-Related Issues. In addition to its POTW, Sunnyvale is the owner of a system of storm drains which contribute wet weather flows to the South Bay. We are concerned that the EA entirely neglects the potential impacts of the proposed CTR on the storm drains. The EA entirely omits any meaningful analysis ofthe costs of bringing storm drains into compliance with the proposed CTR, thereby significantly understating the overall costs of the CTR. We believe that this omission is violative of the Agency's legal obligations under the authorities cited in the preceding

paragraph.

In addition, we join in the comments being filed by the various other operators of stormwater collection systems to the effect that EPA has overstated the legal requirements for storm drains to comply with numerical criteria.

Response to: CTR-021-006d

For a discussion of how the rule complies with the E.O. 12866, the Unfunded Mandates Reform Act, and Regulatory Flexibility Act, see responses to CTR-001-008b (Category R, RFA), CTR-036-005c (Category E-01c; Executive Order 12866), CTR-036-003a, and the preamble to the proposed rule.

EPA believes it properly described the potential impact of the implementation of the CTR on storm drains in the preamble to the proposed CTR and in its Economic Analysis. For further discussion see responses to CTR-013-003 and CTR-040-004 (Category J; Stormwater Economics).

Comment ID: CTR-034-004
Comment Author: SCAP
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: S UMRA
References: Letter CTR-034 incorporates by reference letter CTR-035
Attachments? N
CROSS REFERENCES

Comment: LEGAL ISSUES - Executive Order 12866, Unfunded Mandates Reform Act, Regulatory Flexibility Act

* SCAP believes that EPA has failed in its duties under the Unfunded Mandates Reform Act to consider the cost of the proposed regulation to local governments and the regulated community and to select the most cost-effective and least burdensome regulatory alternative that achieves the objectives of the rule and is consistent with statutory requirements. Although EPA prepared an assessment of the anticipated costs and benefits of the CTR, we believe that the economic analysis failed to consider major factors contributing to potential costs and substantially overstated the anticipated benefits of the rule (see below).

Response to: CTR-034-004

See response to CTR-036-003a.

Comment ID: CTR-035-040
Comment Author: Tri-TAC/CASA
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:

Document Date: 09/25/97
Subject Matter Code: S UMRA
References:
Attachments? N
CROSS REFERENCES

Comment: p. 42191 -- The Unfunded Mandates Reform Act of 1995 All local governmental agencies, especially "small agencies" within the meaning of the Unfunded Mandates Reform Act (2 U.S.C.A. 1511 et. seq.) deserve the protections afforded by that Act. EPA's claim that the Act does not apply because "Today's proposed rule does not regulate or affect any entity" is unfounded. The claim is that the CTR may not impose costs greater than $100 million a year is without merit (see discussion below). The CTR directly impacts all NPDES holders in the State of California, as stated above. Accordingly, all of its provisions apply to the CTR, including, without limitation, the requirement found in Section 1533(a)(2) that the Agency's required small government agency plan provide for "meaningful and timely input" into the development of the CTR. As stated earlier, the failure of EPA to allow CASA/Tri-TAC members the opportunity to review the State Proposal for any longer than two weeks simply does not meet a common sense interpretation of "meaningful and timely review." EPA must comply with the Act.

Response to: CTR-035-040

See response to CTR-036-003a.

Comment ID: CTR-036-003a
Comment Author: County of Orange
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: S UMRA
References: Letter CTR-036 incorporates by reference letters CTR-013, CTR-018, CTR-031, CTR-034 and CTR-040
Attachments? N
CROSS REFERENCES J

Comment: EPA also has failed to meet its obligations under the Unfunded Mandates Reform Act of 1995 (the "Reform Act"). As with E.O. 12866, the Reform Act requires federal agencies to assess the effects of their regulatory actions on state, local and tribal governments, and on the private sector [U.S.C. section 1531]. Among other things, the Reform Act requires the preparation of a cost-benefit analysis and the examination of a range of alternatives, whenever the proposed action may result in expenditures in excess of $100 million [2 U.S.C. section 1532, 1535]. In addition, the Reform Act contains a number of specific requirements where an action may significantly or uniquely impact small governments [2 U.S.C. section 1533].

EPA asserts again that it does not have to comply with the Reform Act because the proposed rule "imposes no direct enforceable duties on the State or any local government or on the private sector." [62 Fed. Reg 42160, 42191]. For the reasons discussed earlier, this assertion is without merit. As EPA acknowledges, these criteria will serve as the basis for any water quality standards promulgated by the State, which in turn will be binding on. local government and private industry. Unless EPA is prepared

to view these criteria as being optional, it therefore cannot in good conscience state that they do not create an enforceable duty. Given this, EPA must comply with the mandates of the Reform Act

Response to: CTR-036-003a

EPA has determined that the CTR contains no federal mandates (under the regulatory provisions of title II of the Unfunded Mandates Reform Act) for State, local, and tribal governments or the private sector. The CTR imposes no direct enforceable duties on the State or any local government or on the private sector; rather, the CTR promulgates ambient water quality criteria which, when combined with State-adopted uses, will create water quality standards for those water bodies with adopted uses. The State will then use these resulting water quality standards in implementing its existing water quality control programs.

EPA recognizes that it has undertaken an economic analysis pursuant to E.O. 12866 for this rule. This analysis, however, makes numerous assumptions and does not necessarily predict how the state will implement the criteria. Thus, the economic analysis represents EPA's best estimate of the implementation costs of the rule. In any event, even if EPA were to consider the implementation costs rather than the direct costs of the rule for the purposes of UMRA compliance, EPA has determined that this rule will not result in expenditures of $100 million or more for State, local, or tribal governments, in the aggregate, or the private sector in any one year.

Comment ID: CTR-038-005c
Comment Author: Sonoma County Water Agency
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: S UMRA
References:
Attachments? Y
CROSS REFERENCES E-01c; R

Comment: A further consequence of the flawed economic analysis is the conclusion that the CTR is not a major rule (i.e., one which will result in excess of $100 million per year expenditure) subject to Presidential Executive order 12866 and the Unfunded Mandates Reform Act or a rule that affects small entities protected under the Regulatory Reform Act. The District, for example, is a small community having a population of under 50,000 and, in addition, serves several small towns and communities (Sonoma, Glen Ellen, Boyes Hot Springs and Agua Caliente) that would be greatly impacted by the proposed rule.

Response to: CTR-038-005c

See responses to CTR-001-008b (Category R; RFA), CTR-021-005c (Category E-01c; Executive Order 12866), CTR-036-003a, and the preamble to the proposed rule.

Comment ID: CTR-038-006d
Comment Author: Sonoma County Water Agency

Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: S UMRA
References:
Attachments? Y
CROSS REFERENCES C-21; E-01c; R

Comment: 5. The proposed rule is inconsistent with applicable Federal law and regulations. In proposing a single set of criteria for all estuaries, the rule is inconsistent with the Clean Water Act and EPA's water quality standards regulations. The Clean Water Act requires that water quality standards be established taking into consideration their use and value for public water supplies, propagation of fish and wildlife, and recreational purposes (see CWA section 303(c)(2)(A)). Consistent with this, EPA regulations require that water quality standards be based on identification of "specific water bodies where toxic pollutants may be adversely affecting water quality or the attainment of the designated water use or where the levels of toxic pollutants are at a level to warrant concern..." For those identified waters, "states must adopt criteria for such toxic pollutants applicable to the water body sufficient to protect the designated use" (See 40 CFR 131.11(a)(2)). Clearly the intent of both the Clean Water Act and EPA regulations is that water quality standards be tailored to the characteristics of the waters in question. In failing to properly evaluate the rule's economic impacts and in failing to adequately consider regulatory alternatives, the rule is inconsistent with Presidential Executive Order 12866 and the Unfunded Mandates Reform Act. Moreover, in failing to properly consider the impacts on small entities, such as the District and the small communities it serves, the rule is inconsistent with the Regulatory Flexibility Act.

Response to: CTR-038-006d

With respect to EPA's decision to publish a single set of criteria in the rule, see responses to CTR-035-012a and CTR-036-005 (both responses are in Category C-21; Legal issues). For a discussion of how the rule complies with the E.O. 12866, the Unfunded Mandates Reform Act, and Regulatory Flexibility Act, see responses to CTR-001-008b (Category R; RFA), CTR-021-005c (Category E-01c; Executive Order 12866), CTR-036-003a, and the preamble to the proposed rule.

Comment ID: CTR-038-008d
Comment Author: Sonoma County Water Agency
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: S UMRA
References:
Attachments? Y
CROSS REFERENCES C-24; E-01c; R; T

Comment: 7. Separate, sites-specific aquatic life criteria for copper and human health criteria for mercury should be adopted for Schell Slough, or alternatively EPA should specify implementation procedures for these criteria that will preclude unreasonable controls such as end-of-pipe treatment. To comply with the Clean Water Act and EPA regulations, EPA should consider specific water bodies. To

fulfill the spirit of Presidential Executive Order 12866 and the requirements of the Unfunded Mandates Reform Act and the Regulatory Flexibility Act, EPA should evaluate regulatory alternatives based on an analysis of costs and benefits. Based on the assessment of costs and benefits described in "3" above, EPA should either adopt the criteria that is currently achieved, or alternatively specify implementation procedures that would allow the current discharge to continue (e.g., allowable Mixing zones and averaging periods and, for copper, a translator and water-effect ratio). Again, the District is amenable to continuing to address these constituents through pollution prevention measures and to assessing the actual impacts of these constituents in Schell Slough. Without EPA specifying such implementation procedures in the CTR, it is possible that the CTR could impose significant costs on the District (and the other small communities its serves) without providing a commensurate environmental benefit. In that case, the CTR would be inconsistent with the Clean Water Act, EPA regulations, Presidential Executive Order 12866, the Unfunded Mandates Reform Act and the Regulatory Flexibility Act.

Response to: CTR-038-008d

See response to CTR-038-008a (Category C-24; Site-Specific Criteria). See response to CTR-034-010b and CTR-060-010 (Category C-28; Detection Limits). For a discussion of how the rule complies with the E.O. 12866, the Unfunded Mandates Reform Act, and Regulatory Flexibility Act, see responses to CTR-001-008b (Category R; RFA), CTR-021-005c (Category E-01c; Executive Order 12866), CTR-036-003a, and the preamble to the proposed rule.

Comment ID: CTR-038-009d
Comment Author: Sonoma County Water Agency
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: S UMRA
References:
Attachments? Y
CROSS REFERENCES C-28; E-01n; R

Comment: 8. EPA should not adopt criteria for any pollutant where the method detection limit exceeds the objective and there is insufficient detectable, reliable data to determine if the pollutant could reasonably be expected to interfere with designated uses. The proposed rule includes criteria for a number of constituents where there is insufficient data to determine whether the discharge of such pollutants could reasonably be expected to interfere with the designated uses. EPA has chosen to promulgate criteria for these constituents even though section 303 (c)(2)(B) of the Clean Water Act requires States to adopt numeric criteria only for constituents "...the discharge or presence of which in the affected waters could reasonably be expected to interfere with those designated uses adopted by the State, as necessary to support such designated uses." Clearly, this "play-it-safe" approach goes beyond the requirements of the Clean Water Act and is therefore unnecessary. By taking this approach, however, EPA is unable to fulfill its duty (under Presidential Order 12866, the Unfunded Mandates Reform Act, and the Regulatory Flexibility Act) to assess the costs, benefits, and impacts of the rule on local government and small entities. While this may be the conservative approach for EPA, it places dischargers throughout the State at risk. As analytical detection limits improve, dischargers may find they are unable to achieve the criteria without costly end-of-pipe controls. But, by then, it will be too late for EPA to evaluate the costs and benefits of the criteria and alternative criteria. For these reasons, EPA

must not adopt criteria for those constituents. If EPA does adopt criteria for those constituents, EPA must evaluate the costs and benefits of the criteria, as well as alternative criteria, using worst case assumptions (i.e., assume that discharge levels and ambient levels are at the detection limits). With respect to the District's discharge and Schell Slough and Second Napa Slough, the criteria in this category include, but are not necessarily limited to, the following : benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoroanthene, benzo(k)fluoroanthene, chrysene, dibenzo(a,h)anthracene, aldrin, 4,4'-DDD, 4,4'-DDE, dieldrin, endosulfan I, endosulfan II, endosulfan sulfate, heptachlor, heptachlor epoxide, toxaphene, PCB-1016, OCB-1221, PCB-1232, PCB-1242, PCB-1248, PCB-1254, PCB-1260, and hexachlorobenzene (see Table 3).

Response to: CTR-038-009d

See responses to CTR-034-010b and CTR-060-010 (Category C-28; Detection Limits).

For a discussion of how the rule complies with the E.O. 12866, the Unfunded Mandates Reform Act, and Regulatory Flexibility Act, see responses to CTR-001-008b (Category R; RFA), CTR-021-005c (Category E-01c; Executive Order 12866), CTR-036-003a, and the preamble to the proposed rule.

Comment ID: CTR-040-009b
Comment Author: County of Sacramento Water Div
Document Type: Storm Water Auth.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: S UMRA
References: Letter CTR-040 incorporates by reference letter CTR-027
Attachments? Y
CROSS REFERENCES R
E-01c

Comment: MAJOR CONCERNS

We do, however, have fundamental concerns with the Rule as it is presently proposed and its supporting economic analysis. We believe the Rule can be modified in a manner that will be responsive to our concerns while at the same time being consistent with applicable Federal law and regulations. Our major concerns are presented here and are followed by our recommended modifications.

II. Concern: The economic analysis upon which the Rule is based is seriously flawed.

* A consequence of the cost/benefit analysis of the Rule are several erroneous conclusions, namely that: (1) this is not a "significant regulatory action" or a major rule (i.e., one which will result in excess of $100 million annual expenditure) subject to the requirements contained in Presidential Executive Order 12866 and the Unfunded Mandates Reform Act; and (2) this is not a rule that will have a significant economic impact on a substantial number of small entities protected under the Regulatory Flexibility Act.

Response to: CTR-040-009b

See responses to CTR-001-008b (Category R; RFA), CTR-021-005c (Category E-01c; Executive Order

12866), CTR-036-003a, and the preamble to the proposed rule.

Comment ID: CTR-040-012b
Comment Author: County of Sacramento Water Div
Document Type: Storm Water Auth.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: S UMRA
References: Letter CTR-040 incorporates by reference letter CTR-027
Attachments? Y
CROSS REFERENCES E-01c

Comment: MAJOR CONCERNS

We do, however, have fundamental concerns with the Rule as it is presently proposed and its supporting economic analysis. We believe the Rule can be modified in a manner that will be responsive to our concerns while at the same time being consistent with applicable Federal law and regulations. Our major concerns are presented here and are followed by our recommended modifications.

III. Concern: The proposed Rule violates applicable Federal law and regulations

* In failing to properly evaluate the Rule's impacts and in failing to adequately consider regulatory alternatives, the Rule is inconsistent with Presidential Executive Order 12866 and the Unfunded Mandates Reform Act (See Attachment B).

Response to: CTR-040-012b

See responses to CTR-021-005c (Category E-01c; Executive Order 12866), CTR-036-003a, and the preamble to the proposed rule.

Comment ID: CTR-040-015a
Comment Author: County of Sacramento Water Div
Document Type: Storm Water Auth.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: S UMRA
References: Letter CTR-040 incorporates by reference letter CTR-027
Attachments? Y
CROSS REFERENCES C-13

Comment: RECOMMENDED MODIFICATIONS

To address our concerns, we recommend the following modifications which do not undermine the toxic pollutant control actions envisioned in EPA's economic analysis (e.g., BMPs for stormwater and source

control). In fact, some of these recommendations would provide incentives for greater movement toward achieving the water quality criteria than would occur under the Rule as it is currently proposed.

II. Recommendation: Adopt human health criteria for PAHs at a 10 (-4) risk level and human health criteria for other carcinogens at risk levels that are generally achieved by municipal wastewater and stormwater dischargers.

* As previously stated, the Sacramento Stormwater Management Program would have to expend on the order of $260 million per year to treat stormwater, and this may not achieve the proposed criteria for PAHS, which is based on a 10 (-6) cancer risk level.

* Under the Unfunded Mandates Reform Act, EPA must adopt the least cost alternative for complying with the CWA, unless the Administrator explains in the final rule why the least cost alternative is not adopted. As indicated in the Preamble, risk levels of 10 (-5) and 10 (-4) are acceptable under the CWA.

* Therefore, pursuant to the spirit of the Unfunded Mandates Reform Act, EPA should adopt the PAH criteria at a 10 (-4) risk level. The same should be true for other carcinogens that present attainability problems for dischargers. Most carcinogenic constituents are not readily controllable through source control or BMPs and would generally require end-of-pipe controls to achieve significant reduction. The benefits associated with additional reduction of carcinogenic constituents are not expected to be measurable since, as acknowledged in the economic analysis,point sources are relatively minor sources of these constituents.

Response to: CTR-040-015a

See responses to CTR-058-001 (Category C-13; Risk Level), CTR-013-003 (Category J; Stormwater Economics) and CTR-036-003a.

Comment ID: CTR-040-055
Comment Author: County of Sacramento Water Div
Document Type: Storm Water Auth.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: S UMRA
References: Letter CTR-040 incorporates by reference letter CTR-027.
Attachments? Y
CROSS REFERENCES

Comment: b. Unfunded Mandates Reform Act

Under the Unfunded Mandates Reform Act (UMRA, 2 U.S.C. section 1501 et seq.), EPA is required to consider the cost of a proposed regulation to both state and local Governments and the regulated community. EPA is required to prepare a qualitative and quantitative assessment of the anticipated costs and benefits of the Federal mandate and to select the most cost-effective and least burdensome regulatory alternative that achieves the objectives of the rule and is consistent with statutory requirements. EPA has performed an economic analysis, however, EPA contends that the cost of the CTR will not result in expenditures in the aggregate "of $100 million or more in any one year" necessary to trigger the other

requirements of the UMRA.

EPA only makes a limited analysis of alternatives and does not explicitly defend the rule's cost-effectiveness because it contends that does not apply because the $100 million cut off was not met (*3). Based on the cost research performed by the POTWs and other dischargers, EPA's contention that UMRA's requirements do not apply may be challengeable. The regulated community may also be able to demonstrate that the Administrator was abitrary and capricious by alleging the cost of implementing the CTR will not result i expenditures in the aggregate" of $100 million or more in any one year."

EPA should have considered alternatives, such as the adoption of less stringent criteria or different risk levels (e.g., 10E-4 or 10E-5), that could also achieve the objectives of the rule. These alternatives would have met both the UMRA criteria of being more cost-effective and less burdensome while still maintaining consistency with the Clean Water Act.

(*3) "EPA has determined that this rule does not contain a federal mandate that may result in expenditures by State, local, and tribal governments, in the aggregate, or by the private sector, of $100 million or more in any one year. The proposed rule imposes no direct enforceable duties on the State or any local government or on the private sector; rather, this rule proposes ambient water quality criteria which, when combined with State adopted designated uses, will create water quality standards for those water bodies with adopted uses. The State may use these resulting water quality standards in implementing its existing water quality control programs. Today's proposed rule does not directly regulate or affect any entity and, therefore, is not subject to the requirement of sections 202 and 205 of the UMRA." 62 Fed. Reg. 41,191.

Response to: CTR-040-055

See response to CTR-036-003a.

Comment ID: CTR-041-013c
Comment Author: Sacramento Reg Cnty Sanit Dist
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: S UMRA
References:
Attachments? N
CROSS REFERENCES E-01c; R

Comment: 8. The proposed Rule is Inconsistent with Applicable Federal Law and Regulations

The proposed rule is inconsistent with applicable Federal law and regulations. In proposing a single set of criteria for all estuaries, the rule is inconsistent with the Clean Water Act and EPA's water quality standards regulations. (See attached Legal Analysis of the Proposed California Toxics Rule) to properly evaluate the rule's economic impacts and in failing to adequately consider alternative criteria for San Francisco Bay Area waters, the rule is inconsistent with Presidential Executive Order 12866 and the Unfunded Mandates Reform Act (Id). In failing to properly consider the impacts on small entities, the

rule is inconsistent with the Regulatory Flexibility Act (Id).

Thank you for the opportunity to provide comments on this important new rule. Please call if you have any questions regarding our letter.

Response to: CTR-041-013c

With respect to EPA's decision to publish a single set of criteria in the rule, see responses to CTR-035-012a and CTR-036-005 (both responses are in Category C-21; Legal issues). For a discussion of how the rule complies with the E.O. 12866, the Unfunded Mandates Reform Act, and Regulatory Flexibility Act, see responses to CTR-001-008b (Category R; UMRA), CTR-021-005c (Category E-01c; Executive Order 12866), CTR-036-003a, and the preamble to the proposed rule.

Comment ID: CTR-041-016
Comment Author: Sacramento Reg Cnty Sanit Dist
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: S UMRA
References:
Attachments? N
CROSS REFERENCES

Comment: b. Unfunded Mandates Reform Act

Under the Unfunded Mandates Reform Act (UMRA, 2 U.S.C. section 1501 et seq.), EPA is required to consider the cost of a proposed regulation to both state and local Governments and the regulated community. EPA is required to prepare a qualitative and quantitative assessment of the anticipated costs and benefits of the Federal mandate and to select the most cost-effective and least burdensome regulatory alternative that achieves the objectives of the rule and is consistent with statutory requirements. EPA has performed an economic analysis, however, EPA contends that the cost of the CTR will not result in expenditures in the aggregate "of $100 million or more in any one year" necessary to trigger the other requirements of the UMRA.

EPA only makes a limited analysis of alternatives and does not explicitly defend the rule's cost-effectiveness because it contends that UMRA does not apply because the $100 million cut off was not met.(*4) Based on the cost research performed by the POTWs and other dischargers, EPA's contention that UMRA's requirements do not apply may be challengeable. Specifically, the EPA Administrator's determination that the cost of implementing the CTR will not result in expenditures in the aggregate "of $100 million or more in any one year" could be found to be arbitrary and capricious.

EPA should have considered alternatives, such as the adoption of less stringent criteria or different risk levels (e.g., 10E-4 or 10E-5), that could also achieve the objectives of the rule. These alternatives would have met both the UMRA criteria of being more cost-effective and less burdensome while still maintaining consistency with the Clean Water Act.

(*4) "EPA has determined that this rule does not contain a federal mandate that may result in expenditures by State, local, and tribal governments, in the aggregate, or by the private sector, of $100 million or more in any one year. The proposed rule imposes no direct enforceable duties on the State or any local government or on the private sector; rather, this rule proposes ambient water quality criteria which, when combined with State adopted designated uses, will create water quality standards for those water bodies with adopted uses. The State may use these resulting water quality standards in implementing its existing water quality control programs. Today's proposed rule does not directly regulate or affect any entity and, therefore, is not subject to the requirement of sections 202 and 205 of the UMRA." 62 Fed. Reg. 42,191.

Response to: CTR-041-016

See responses to CTR-058-001 (Category C-13; Risk Level) and CTR-036-003a.

Comment ID: CTR-042-007c
Comment Author: Cal. Dept. of Transportation
Document Type: State Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: S UMRA
References:
Attachments? Y
CROSS REFERENCES C-21; E-01c

Comment: 7. The CTR may violate the Administrative Procedures Act, the and Executive Order (E.O.) Unfunded Mandates Reform Act No. 12866.

In the Preamble to the CTR, EPA repeatedly claims that the CTR will not result in expenditures of more than $100 million per year and, therefore, the statutory requirements of the UMRA and E.O. 12866 are not triggered.(*1) Caltrans' annual costs alone and only in Los Angeles will exceed the $100 million annual figure, even assuming the lowest level of treatment. Therefore, EPA's cost assumptions are challengeable as being arbitrary and capricious and in violation of the Administrative Procedures Act.(*2)

Request: Caltrans requests that EPA reconsider its cost estimates based on the comments received during the public comment period.

Caltrans would like to thank EPA for the opportunity to provide comments on this proposed regulation. It is hoped that EPA will consider and address Caltrans' comments in the final version of the CTR. Should you have any questions concerning our comments on the CTR, please feel free to address these questions to Marcia Arrant at (916) 657-5381.

(*1) See CTR, 62 Fed. Reg. at 42,188, and at 42,191 ("EPA has determined that this rule does not contain a federal mandate that may result in expenditures by State, local and tribal governments, in the aggregate, or by the private sector, of $100 million or more in any one year.")

(*2) See American Iron and Steel Institute v. EPA, 1997 WL 297251 (D.C. Cir., 1497)(the court found that EPA had arbitrarily failed to adequately address cost-justification for its elimination of mixing zones. EPA had estimated the total cost of elimination mixing zones for bioaccumulative chemicals of concern (BCCS) from all dischargers to the Great Lakes at $200,000, without even acknowledging a comment estimating the cost to one town for removal of mercury from its sewage discharge would be approximately $300,000).

Response to: CTR-042-007c

See responses to CTR-036-003a, CTR-021-005c (Category E-01c; Executive Order 12866), and CTR-042-007a (Category C-21; Legal Issues).

Comment ID: CTR-043-005d
Comment Author: City of Vacaville
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: S UMRA
References:
Attachments? Y
CROSS REFERENCES C-21; E-01c; R

Comment: 5. The proposed rule is inconsistent with applicable Federal law and regulations.

In proposing a single set of criteria for all estuaries, the rule is inconsistent with the Clean Water Act and EPA's water quality standards regulations. The Clean Water Act requires that water quality standards be established taking into consideration their use and value for public water supplies, propagation of fish and wildlife, recreational purposes (see CWA section 303(c)(2)(A)). Consistent with this, EPA regulations require that water quality standards be based on identification of "specific water bodies where toxic pollutants may be adversely affecting water quality or the attainment of the designated water use or where the levels of toxic pollutants are at a level to warrant concern..." For those identified waters,"states must adopt criteria for such toxic pollutants applicable to the water body sufficient to protect the designated use"(See 40 CFR 131.1 I (a)(2)). Clearly the intent of both the Act and EPA regulations is that water quality standards be tailored to the characteristics of the waters in question. In failing to properly evaluate the rule's economic impacts and in failing to adequately consider regulatory alternatives, the rule is inconsistent with Presidential Executive Order 12866 and the Unfunded Mandates Reform Act. Moreover, in failing to properly consider the impacts on small entities, the rule is inconsistent with the Regulatory Flexibility Act.

Response to: CTR-043-005d

With respect to EPA's decision to publish a single set of criteria in the rule, see responses to CTR-035-012a and CTR-036-005 (both responses are in Category C-21; Legal issues). For a discussion of how the rule complies with the E.O. 12866, the Unfunded Mandates Reform Act, and Regulatory Flexibility Act, see responses to CTR-001-008b (Category R; RFA), CTR-021-005c (Category E-01c; Executive Order 12866), CTR-036-003a, and the preamble to the proposed rule.

Comment ID: CTR-044-005g
Comment Author: City of Woodland
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: S UMRA
References:
Attachments? Y
CROSS REFERENCES E-01g08; E-01h01; E-01m; E-02c; E-01c02; R

Comment: We have reviewed the proposed CTR and offer the following comments:

4. EPA's Economic Analysis is seriously flawed. The major flaws include:

(1) failing to do an appropriate sampling of small dischargers having little or no dilution; (2) assuming in the high-end cost scenario that a 25% reduction could be achieved through source control and an additional 25% achieved through treatment plant optimization without capital improvements; (3) constraining estimates of potential costs through key assumptions, including the assumption that regulatory relief from the rule would be granted if costs were in excess of certain thresholds; and (4) exaggerating estimates of potential benefits by assuming an end (i.e., achievement of the proposed water quality criteria) that will not result from the rule. Additional concerns with the economic analysis are presented in Exhibit F. The result of these flaws is that potential costs are greatly understated and potential benefits are greatly overstated. Moreover, the flawed economic analysis has lead to the erroneous conclusion that the CTR is not a "significant regulatory action" or major rule subject to Presidential Executive Order 12866 and the Unfunded Mandates Reform Act or a rule that affects small entities protected under the Regulatory Flexibility Act. The City, for example, is a small community having a population of under 50,000 and would be greatly impacted by the proposed rule.

Response to: CTR-044-005g

See responses to CTR-054-013a, CTR-021-005c, CTR-032-004, CTR-021-008, CTR-040-029a, CTR-059-018 (all comments in Category E-01; CTR Cost Comments), and CTR-036-003a.

Comment ID: CTR-044-006d
Comment Author: City of Woodland
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: S UMRA
References:
Attachments? Y
CROSS REFERENCES C-21
E-01c
R

Comment: We have reviewed the proposed CTR and offer the following comments:

5. The proposed rule is inconsistent with applicable Federal law and regulations.

In proposing a single set of criteria for all estuaries, the rule is inconsistent with the Clean Water Act and EPA's water quality standards regulations. The Clean Water Act requires that water quality standards be established taking into consideration their use and value for public water supplies, propagation of fish and wildlife, recreational purposes (see CWA section 303(c)(2)(A)). Consistent with this, EPA regulations require that water quality standards be based on identification of "specific water bodies where toxic pollutants may be adversely affecting water quality or the attainment of the designated water use or where the levels of toxic pollutants are at a level to warrant concern..." For those identified waters, "states must adopt criteria for such toxic pollutants applicable to the water body sufficient to protect the designated use"(See 40 CFR 131.11 (a)(2)) (see Exhibit G). Clearly the intent of both the Act and EPA regulations is that water quality standards be tailored to the characteristics of the waters in question. In failing to properly evaluate the rule's economic impacts and in failing to adequately consider regulatory alternatives, the rule is inconsistent with Presidential Executive Order 12866 and the Unfunded Mandates Reform Act (Id.). Moreover, in failing to properly consider the impacts on small entities, such as the City, the rule is inconsistent with the Regulatory Flexibility Act (Id.).

Response to: CTR-044-006d

With respect to EPA's decision to publish a single set of criteria in the rule, see responses to CTR-035-012a and CTR-036-005 (both responses are in Category C-21; Legal issues). For a discussion of how the rule complies with the E.O. 12866, the Unfunded Mandates Reform Act, and Regulatory Flexibility Act, see responses to CTR-001-008b (Category R; RFA), CTR-036-005c (Category E-01c; Executive Order 12866), CTR-036-003a, and the preamble to the proposed rule.

Comment ID: CTR-044-009d
Comment Author: City of Woodland
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: S UMRA
References:
Attachments? Y
CROSS REFERENCES C-28
E-01c
R

Comment: We have reviewed the proposed CTR and offer the following comments:

8. EPA should not adopt criteria for any pollutant where the method detection limit exceeds the objective and there is insufficient detectable, reliable data to determine if the pollutant could reasonably be expected to interfere with designated uses. The proposed rule includes criteria for a number of constituents where there is insufficient data to determine whether the discharge of such pollutants could reasonably be expected to interfere with the designated uses. EPA has chosen to promulgate criteria for these constituents even though section 303 (c)(2)(B) of the Clean Water Act requires States to adopt

numeric criteria only for constituents "... the discharge or presence of which in the affected waters could reasonably be expected to interfere with those designated uses adopted by the State, as necessary to support such designated uses." Clearly, this approach goes beyond the requirements of the Clean Water Act and is therefore unnecessary. Additionally, this approach does not allow EPA to fulfill its duty (under Presidential Order 12866, the Unfunded Mandates Reform Act, and the Regulatory Flexibility Act) to assess the costs, benefits, and impacts of the rule on local government and small entities. While this may be the conservative approach for EPA, it places dischargers throughout the State at risk. As analytical detection limits improve, dischargers may find they are unable to achieve the criteria without costly end-of-pipe controls. But, by then, it will be too late for EPA to evaluate the costs and benefits of the criteria-and-consider alternative criteria. For these reasons, EPA should not adopt criteria for those constituents. If EPA does adopt criteria for those constituents, EPA should evaluate the costs and benefits of toxic criteria, as well as alternative criteria, using worst case assumptions (i.e., assume that discharge levels and ambient levels are at the detection limits).

Response to: CTR-044-009d

See responses to CTR-034-010b and CTR-060-010 (Category C-28; Detection Limits). For a discussion of how the rule complies with the E.O. 12866, the Unfunded Mandates Reform Act, and Regulatory Flexibility Act, see responses to CTR-001-008b (Category R; RFA), CTR-021-005c (Category E-01c; Executive Order 12866), CTR-036-003a, and the preamble to the proposed rule.

Comment ID: CTR-044-046
Comment Author: City of Woodland
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: S UMRA
References: Letter CTR-040 incorporates by reference letter CTR-027
Attachments? Y
CROSS REFERENCES

Comment: b. Unfunded Mandates Reform Act

Under the Unfunded Mandates Reform Act (UMRA, 2 U.S.C. section 1501 et seq.), EPA is required to consider the cost of a proposed regulation to both state and local Governments and the regulated community. EPA is required to prepare a qualitative and quantitative assessment of theanticipated costs and benefits of the Federal mandate and to select the most cost-effective and least burdensome regulatory alternative that achieves the objectives of the rule and is consistent with statutory requirements. EPA has performed an economic analysis, however, EPA contends that the cost of the CTR will not result in expenditures in the aggregate "of $100 million or more in any one year" necessary to trigger the other requirements of the UMRA.

EPA only makes a limited analysis of alternatives and does not explicitly defend the rule's cost-effectiveness because it contends that does not apply because the $100 million cut off was not met.(*3) Based on the cost research performed by the POTWs and other dischargers, EPA's contention that UMRA's requirements do not apply may be challengeable. The regulated community may also be able to demonstrate that the Administrator was arbitrary and capricious by alleging the cost of

implementing the CTR will not result in expenditures in the aggregate "of $100 million or more in any one year."

EPA should have considered alternatives, such as the adoption of less stringent criteria or different risk levels (e. g., 10E-4 or 10E-5), that could also achieve the objectives of the rule. These alternatives would have met both the UMRA criteria of being more cost-effective and less burdensome while still maintaining consistency with the Clean Water Act.

(*3) "EPA has determined that this rule does not contain a federal mandate that may result in expenditures by State, local, and tribal governments, in the aggregate, or by the private sector, of $100 million or more in any one year. The proposed rule imposes no direct enforceable duties on the State or any local government or on the private sector; rather, this rule proposes ambient water quality criteria which, when combined with State adopted designated uses, will create water quality standards for those water bodies with adopted uses. The State may use these resulting water quality standards in implementing its existing water quality control programs. Today's proposed rule does not directly regulate or affect any entity and, therefore, is not subject to the requirement of sections 202 and 205 of the UMRA." 62 Fed. Reg. 42,191.

Response to: CTR-044-046

See responses to CTR-058-001 (Category C-13; Risk Level) and CTR-036-003a.

Comment ID: CTR-050-007d
Comment Author: Sonnenschein Nath & Rosenthal
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org: American Petrol
Document Date: 09/26/97
Subject Matter Code: S UMRA
References:
Attachments? N
CROSS REFERENCES C-21
E-01c
R

Comment: IV. EPA Has Not Complied With Applicable Regulatory Review Requirements. There are several significant statutes and executive orders that require EPA to undertake analyses of the costs and benefits of its regulations, and to submit the regulations and analyses to other governmental bodies, including the Office of Management and Budget (OMB) and Congress. Those authorities include the Regulatory Flexibility Act, the Small Business Regulatory Enforcement and Fairness Act (SBREFA), the Unfunded Mandates Reform Act, the Congressional Review Act, and Executive Order 12866 (Regulatory Planning and Review). EPA apparently believes that it does not need to comply with any of those requirements for this rulemaking. (62 Fed. Reg. at 42188-42191). API believes that EPA is required to meet those obligations for the proposed criteria, and that the Agency's rationale for avoiding this responsibility has no legal basis.

EPA supports its decision not to comply with the regulatory review statutes by stating that the proposed criteria "by themselves, do not directly impose economic impacts." (62 Fed. Reg. at 42188). EPA admits that when those criteria are combined with the designated uses that have been adopted by the State, and implemented in permit limits, "there may be a cost to some dischargers." (62 Fed. Reg. at 42188) could be substantial; the Agency itself estimates that the compliance cost could be between $15 and $87 million per year.(62 Fed. Reg. at 42189). (That does not include indirect costs to the economy, which would surely put this rule above the $100 million impact threshold specified in several of the regulatory review statutes listed above.) EPA cannot ignore those costs by creating its own interpretation of those statutes in which only "direct" impacts need be considered. There is no support in the statutory language or legislative history for such a reading, and EPA has cited no such support in its Federal Register notice.

There is another problem with EPA's rationale for avoiding regulatory review: if EPA were right that "indirect" impacts do not trigger those reviews, the impacts of this rulemaking are not really "indirect." Those impacts emerge clearly once the proposed criteria are combined with the State's designated uses. Those designations have already been established, so there is nothing uncertain or indefinite about that aspect of the water quality standards. Then, once the standards are completed, the State must implement those standards through permit limits. While there are some decisions that the State must make in determining the proper permit limits, which can influence the size of the compliance costs, EPA can readily determine a range of possible costs. In fact, the Agency has already done so, resulting in the $15 - $87 million cost range discussed above. While those costs may not be fixed with certainty, they are certainly "direct economic impacts". Therefore, even if the Agency were correct in looking at only "direct" impacts, this rulemaking poses such impacts, and EPA must comply with the statutory requirements to conduct and submit cost and benefit analyses of its proposed criteria.

V. CONCLUSION

As explained above, EPA's proposal to issue water quality criteria for toxicities in the State of California suffers from serious legal flaws. API urges the Agency to reconsider its intended course of action in light of the issues raised in these and other public comments. If you have any questions regarding these comments, or would like any additional information, please call Theresa Pugh at 202/682-8036.

Response to: CTR-050-007d

See responses to CTR-001-008b (Category R; RFA), CTR-021-005c (Category E-01c; Executive Order 12866), CTR-036-003a, and the preamble to the proposed rule.

Comment ID: CTR-052-021d
Comment Author: East Bay Dischargers Authority
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: S UMRA
References: Letter CTR-052 incorporates by reference letters CTR-035 and CTR-054
Attachments? Y
CROSS REFERENCES C-21
E-01c
R

Comment: C. RECOMMENDATIONS FOR MODIFICATIONS TO THE CTR AND EA

EPA should revise the proposed rule and economics analysis such that they are consistent with applicable Federal law and regulations. In proposing a single set of criteria for all estuaries, the rule is inconsistent with the Clean Water Act and EPA's water quality standards regulations. In failing to properly evaluate the rule's economic impacts and in failing to adequately consider alternative criteria for San Francisco Bay Area waters, the rule is inconsistent with Presidential Executive Order 12866 and the Unfunded Mandates Reform Act. In failing to properly consider the impacts on small entities, the rule is inconsistent with the Regulatory Flexibility Act. Specific citations for these inconsistencies are contained in comments from BADA and CASA/Tri-TAC.

Response to: CTR-052-021d

With respect to EPA's decision to publish a single set of criteria in the rule, see responses to CTR-035-012a and CTR-036-005 (both responses are in Category C-21; Legal issues). For a discussion of how the rule complies with the E.O. 12866, the Unfunded Mandates Reform Act, and Regulatory Flexibility Act, see response to CTR-001-008b (Category R; RFA), CTR-036-005c (Category E-01c; Executive Order 12866), CTR-036-003a, and the preamble to the proposed rule.

Comment ID: CTR-054-008e
Comment Author: Bay Area Dischargers Assoc.
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: S UMRA
References:
Attachments? Y
CROSS REFERENCES C-02b
C-24
E-01c
R

Comment: Separate, scientifically defensible, reasonably achievable aquatic life criteria for copper should be adopted for San Francisco Bay, or alternatively EPA should specify in the Preamble implementation policies for copper that will result in reasonable control measures actions. To comply with the Clean Water Act and EPA regulations, EPA is required to consider specific water bodies. To fulfill the spirit of Presidential Executive Order 12866 and the requirements of the Unfunded Mandates Reform Act, EPA is required to evaluate regulatory alternatives based on an analysis of costs and benefits. Based on BADA's analysis of costs and benefits, EPA should either adopt copper criteria that are reasonably achievable or alternatively specify implementation policies that will avoid costly end-of-pipe controls. Potential implementation measures that could be specified include use of the following in calculating effluent limitations: actual dilution based on modeling studies; copper translators; probability of compliance less than 99.9%; and water-effect ratios determined for different segments of the Bay. Unless EPA specifies these or similar implementation policies in the rule, it is possible that the CTR could result in significant costs ($12 million per year to $78 million per year) while resulting in minor environmental benefit (a 1% reduction in copper loading to the Bay). In that

case, the CTR would violate the Clean Water Act, EPA regulations, Presidential Executive Order 12866, the Unfunded Mandates Reform Act and the Regulatory Flexibility Act. (see the discussion under Item 11 below.)

Response to: CTR-054-008e

See responses to CTR-054-008a (Category C-02b; Copper Aquatic Life), CTR-035-012a and CTR-036-005 (Category C-24; Legal Issues), CTR-021-005c (Category E-01c; Executive Order 12866), CTR-054-013a (Category E-01g3; Cost-Effectiveness Ratio), CTR-001-008b, CTR-036-003a, and the preamble to the proposed rule.

Comment ID: CTR-054-050
Comment Author: Bay Area Dischargers Associati
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: S UMRA
References: Letter CTR-040 incorporates by reference letter CTR-027
Attachments? Y
CROSS REFERENCES

Comment: b. Unfunded Mandates Reform Act

Under the Unfunded Mandates Reform Act (UMRA, 2 U.S.C. section 1501 et seq.), EPA is required to consider the cost of a proposed regulation to both state and local Governments and the regulated community. EPA is required to prepare a qualitative and quantitative assessment of theanticipated costs and benefits of the Federal mandate and to select the most cost-effective and least burdensome regulatory alternative that achieves the objectives of the rule and is consistent with statutory requirements. EPA has performed an economic analysis, however, EPA contends that the cost of the CTR will not result in expenditures in the aggregate "of $100 million or more in any one year" necessary to trigger the other requirements of the UMRA.

EPA only makes a limited analysis of alternatives and does not explicitly defend the rule's cost-effectiveness because it contends that does not apply because the $100 million cut off was not met.(*3) Based on the cost research performed by the POTWs and other dischargers, EPA's contention that UMRA's requirements do not apply may be challengeable. The regulated community may also be able to demonstrate that the Administrator was arbitrary and capricious by alleging the cost of implementing the CTR will not result in expenditures in the aggregate "of $100 million or more in any one year."

EPA should have considered alternatives, such as the adoption of less stringent criteria or different risk levels (e. g., 10E-4 or 10E-5), that could also achieve the objectives of the rule. These alternatives would have met both the UMRA criteria of being more cost-effective and less burdensome while still maintaining consistency with the Clean Water Act.

(*3) "EPA has determined that this rule does not contain a federal mandate that may result in

expenditures by State, local, and tribal governments, in the aggregate, or by the private sector, of $100 million or more in any one year. The proposed rule imposes no direct enforceable duties on the State or any local government or on the private sector; rather, this rule proposes ambient water quality criteria which, when combined with State adopted designated uses, will create water quality standards for those water bodies with adopted uses. The State may use these resulting water quality standards in implementing its existing water quality control programs. Today's proposed rule does not directly regulate or affect any entity and, therefore, is not subject to the requirement of sections 202 and 205 of the UMRA." 62 Fed. Reg. 42,191.

Response to: CTR-054-050

See responses to CTR-058-001 (Category C-13; Risk Level) and CTR-036-003a.

Comment ID: CTR-056-022b
Comment Author: East Bay Municipal Util. Dist.
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/22/97
Subject Matter Code: S UMRA
References: Letter CTR-056 incorporates by reference letter CTR-054
Attachments? N
CROSS REFERENCES E-01E

Comment: EBMUD perceives there to be a significant overall economic impact resulting from CTR, contrary to the conclusions reached by EPA. Because the cost may exceed $100 million annually on the regulated community (the majority of which are publicly owned agencies), it appears that pursuant to Executive Order 12,866 and the Unfunded Mandates Reform Act, the CTR can be considered a significant regulatory action which is likely to adversely affect the economy of many regions of the State, the environment and/or local governments. EBMUD is also of the opinion that EPA failed to make a, "...reasoned determination that the benefits of the intended regulation justify its costs," and is obligated to redo the draft Economic Analysis and submit it for review by the Office of Management and Budget.

Response to: CTR-056-022b

See responses to CTR-021-005c (Category E-01c; Executive Order 12866), CTR-036-003a, and the preamble to the proposed rule.

Comment ID: CTR-059-002c
Comment Author: Los Angeles County Sanit. Dist
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: S UMRA
References: Letter CTR-059 incorporates by reference letter CTR-035

Attachments? Y
CROSS REFERENCES E-01c
R

Comment: The Sanitation Districts disagree with EPA's assertions that the CTR is not a significant regulatory action under Executive Order 12866 or the Unfunded Mandates Reform Act, and that EPA is not required to comply with the Regulatory Flexibility Act because the CTR establishes no requirements applicable to small entities. We believe the potential costs for POTWs to comply with the CTR criteria would far exceed the $ 100 million threshold, based on the fact that we estimate that the potential costs for seven Sanitation Districts' facilities to comply with the CTR to be nearly $150 million per year. Clearly, many of the 304 other POTWs in the State will also incur costs, as, will other NPDES permittees, indirect dischargers, stormwater dischargers, and nonpoint sources. Thus, EPA's cost figure of $15 - $87 million per year is simply not a credible estimate. Also, it is quite clear that the CTR is likely to adversely affect local governments, including over 40 small communities located in our service area, and that it is significantly different from other federal regulations previously promulgated in California. We believe that EPA has not complied with the mandates of Executive Order 12866, the Unfunded Mandates Reform Act and the Regulatory Flexibility Act. Accordingly, EPA must revise the economic analysis and it must be reviewed by the Office of Management and Budget and then EPA must select the most cost-effective and least burdensome regulatory alternative.

Response to: CTR-059-002c

See responses to CTR-001-008b (Category R; RFA), CTR-021-005c (Category E-01c; Executive Order 12866), CTR-036-003a, and the preamble to the proposed rule.

Comment ID: CTR-059-006c
Comment Author: Los Angeles County Sanit. Dist
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: S UMRA
References: Letter CTR-059 incorporates by reference letter CTR-035

Attachments? Y
CROSS REFERENCES C-28
E-01c

Comment: Due to the time constraints of the comment period, we have focused our review and comments primarily on those criteria that we anticipate may cause compliance issues for one or more of the Sanitation Districts' WRPs (see below). Based on our initial review of the proposed rule, the Sanitation Districts recommend that adoption of some of the criteria be deferred. As explained in the attached comments, we believe that there are significant scientific issues regarding the human health criteria for several trihalomethanes that call into question the accuracy and appropriateness of the proposed criteria. In addition, we reconunend that EPA defer adoption of those criteria that are below detection limits and that have not been demonstrated to be adversely affecting water quality or the attaimnent of designated uses on a water body-specific basis in California. In addition, we recommend that EPA not adopt criteria for effluent dependent waters, unless they have been adjusted to reflect the characteristics of this type of

water body.

Criteria Below Detection Limits

We believe that there are fundamental problems with EPA's decision to adopt criteria that are below detection limits. This issue relates to EPA's statutory and regulatory obligations in establishing water quality criteria; namely, that EPA is subject to the same policies, procedures, analyses, and public participation requirements as States pursuant to 40 CFR section 131. These regulations require States to "review water quality data and information on discharges to specific water bodies where toxic pollutants may be adversely affecting water quality or the attainment of the designated water use or where the levels of toxic pollutants are at a level to warrant concern and must adopt criteria for such toxic pollutants applicable to the water body sufficient to protect the designated use." (40 CFR section 131.11) For criteria where the method detection limit exceeds the objective, there are inadequate data to determine if the pollutant could reasonably be expected to interfere with attainment of designated uses. We believe that because of the inability to detect these substances and the lack of monitoring information indicating water quality use impairment EPA has not been able to fulfill its obligations to conduct a water body-specific analysis of the need to promulgate criteria.(*1)

(*1)U.S. Environmental Protection Agency, Economic Analysis of the Proposed California Water Quality Toxics Rule, Office of Water (EPA-820-B-96-001, July 1997), p. 8-18.

Second, EPA has not fulfilled its obligations under the Unfunded Mandates Reform Act and Executive Order 12866 to analyze the costs and benefits of promulgating proposed criteria which cannot be detected or for which insufficient monitoring data are available.

Given these deficiencies, we recommend that EPA defer the adoption of criteria for constituents which are below detection limits until such time as EPA has demonstrated that the levels of toxic pollutants being discharged are at a level to warrant concern. As an alternative, EPA could defer to the State for promulgation of criteria for such compounds on a water body-specific basis as part of the State's continuous water quality planning process.

Response to: CTR-059-006c

See responses to CTR-034-010b and CTR-060-010 (Category C-28; Detection Limits). For a discussion of how the rule complies with the E.O. 12866, the Unfunded Mandates Reform Act, and Regulatory Flexibility Act, see responses to CTR-001-008b (Category R; RFA), CTR-021-005c (Category E-01c; Executive Order 12866), CTR-036-003a, and the preamble to the proposed rule.

Comment ID: CTR-059-015b
Comment Author: Los Angeles County Sanit. Dist
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: S UMRA
References: Letter CTR-059 incorporates by reference letter CTR-035

Attachments? Y

CROSS REFERENCES E-01c

Comment: Executive, Order 12866 and Unfunded Mandates Reform Act

The Sanitation Districts disagree with EPA's assertion that the CTR is not a significant regulatory action under Executive Order 12866 or the Unfunded Mandates Reform Act. We believe that the potential costs for POTWs to comply with the CTR criteria could far exceed the $ 100 million threshold, based on the fact that we estimate that the potential costs of seven Sanitation Districts' facilities to comply with the CTR could be nearly $150 million per year. Clearly, many of the 304 other POTWs in the State will also incur costs, as will other NPDES permittees, indirect dischargers, stormwater dischargers, and nonpoint sources. Thus, EPA's cost figure of $15 - $87 million per year is simply not a credible estimate. Also, it is quite clear that the CTR is likely to adversely affect local governments, and that it is significantly different from other federal regulations previously promulgated in California. Therefore, we believe that EPA has not complied with the mandates of E.O. 12866 and the Unfunded Mandates Reform Act, and that the economic analysis must be revised, and EPA must select the most cost-effective and least burdensome regulatory alternative. In addition, the Office of Management and Budget should review the economic analysis and the rule before it is promulgated, as required by Section 6 of E.O. 12866.

Response to: CTR-059-015b

See responses to CTR-001-008b (Category R; RFA), CTR-021-005c (Category E-01c; Executive Order 12866), CTR-036-003a, and the preamble to the proposed rule.

Comment ID: CTR-084-002b
Comment Author: City of Redding
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: S UMRA
References:
Attachments? N
CROSS REFERENCES E-01c01

Comment: ISSUES OF CONCERN

The Unfunded Mandates Act of 1995, 62 FR 42191. The City of Redding disagrees with the conclusion that the proposed rule does not result in expenditures by state or local governments in aggregate of $100 million or more in any one year. The strict water quality criteria in the proposed rule would directly cause the state to adopt more stringent standards for dischargers, which would then require the local dischargers to implement exorbitant and costly measures against our users.

Regarding unfunded mandates, the City of Redding believes that the state and local governments would have no alternative in implementing this federal rule than to enforce exorbitant and costly measures against our users. Therefore, the proposed rule would directly cause significant burden and costs to state and local governments.

Response to: CTR-084-002b

See responses to CTR-021-005c (Category E-01c; Executive Order 12866), CTR-036-003a, and the preamble to the proposed rule.

Comment ID: CTR-090-012b
Comment Author: C&C of SF, Public Utl. Commis.
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: S UMRA
References: Letter CTR-090 incorporates by reference letters CTR-035 and CTR-054
Attachments? Y
CROSS REFERENCES E-01c

Comment: The PUC is aware that the Clean Water Act does not require and in fact does not allow for economic considerations in meeting water quality requirements. However, other policies and regulatory mandates (Executive Order 12866 and the Unfunded Mandates Reform Act) require that we disclose to the public the cost of meeting water quality requirements. There is no doubt that there will be costs that California must bear to produce water quality. We must assure the public that the costs will produce benefits. We are not confident that this proposed rule can do that.

Response to: CTR-090-012b

See responses to CTR-021-005c (Category E-01c; Executive Order 12866), CTR-036-003a, and the preamble to the proposed rule.

Comment ID: CTR-092-016c
Comment Author: City of San Jose, California
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: S UMRA
References: Letter CTR-092 incorporates by reference letter CTR-035
Attachments? Y
CROSS REFERENCES E-01c
R

Comment: Introductory Comment

EPA states in the Executive Summary (page ES-2) to the Economic Analysis that:

"EPA did not calculate costs for any program for which it does not have enforceable authority ... (nor) for NPDES sources which are not typically subject to numeric WQBELs....."

From a national policy perspective, this narrowing, of the focus of the Economic Analysis may be a

justifiable approach to cost benefit analysis. Local government, however, is not able to disregard the potential cost effects of the CTR on urban and agricultural runoff. Those potential costs will have to be defrayed with proceeds from the same pool of local rate payers responsible for paying for point source pollutant removal programs. In California, those ratepayers have made clear both their support for environmental protection and their reluctance to pay more than is necessary for that protection. A narrow definition of those costs included in the CTR Economic Analysis continues the pattern of fragmenting responsibility and authority for the protection of waterways, which in turn hinders creation and implementation of holistic strategies which would best serve the environment at least cost.

Questions for EPA on the Introductory Comment

Q.-1) If not EPA, who has the responsibility to define the aggregated costs of all water quality-related regulations?

Q.-2) San Jose's reading of federal policy initiatives (which include, but are not limited to, the Regulatory Flexibility Act, Executive Order 12866, and the Unfunded Mandates Reform Act) indicates that EPA is empowered to analyze the economic impact of federal regulations in a way that addresses both aggregated cost impacts as well as the fiscal reality of local level government. Why was this not accounted for in the current analysis?

Response to: CTR-092-016c

See responses to CTR-001-008b (Category R; RFA), CTR-021-005c (Category E-01c; Executive Order 12866), CTR-021-006b (Category E-01c; Executive Order 12866), CTR-036-003a, and the preamble to the proposed rule.

Subject Matter Code: T State Implementation Policy

Comment ID: CTR-004-001
Comment Author: South Bayside System Authority
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/24/97
Subject Matter Code: T State Implementation Policy
References:
Attachments? N
CROSS REFERENCES

Comment: SBSA is the regional wastewater treatment agency serving over 200,000 residents and businesses in southern San Mateo County. SBSA has a permitted capacity of 29 MGD average dry weather flow utilizing advanced treatment processes including filtration, discharging to the San Francisco Bay. While there are many concerns about various features of this regulation the main issue to SBSA is the inability to determine what the actual impacts will be due to uncertainties of how the California Toxics Rule (CTR) will be it-implemented by the state. Assumptions that the impacts will be small because of regulatory flexibility cannot be made (see Attachment A).

Response to: CTR-004-001

EPA believes that it is possible for a discharger to pursue regulatory relief which would result in a less stringent WQBEL through a TMDL, variance, site-specific criteria, or alternative mixing zone and that it properly included the possibility of these mechanisms in calculating the low-end cost in the Economic Analysis.

With respect to the comments on TMDLs, EPA's proposed rule does not alter the statutory and regulatory language requiring the states to perform TMDLs which are then submitted for EPA approval. The preamble merely acknowledges the reality that past and ongoing TMDL processes are often a collaborative effort by dischargers, the State, EPA , and other stakeholders and that EPA expects that this collaborative approach will be utilized in the future. With respect to the comments on pounds per day, pollutant trading, and interim limits, EPA believes the preamble discussion was appropriate in articulating current EPA policy but should not be put into regulatory language since these issues are related to permit implementation which is the primary responsibility of the State.

EPA disagrees with the comments on variances and site-specific criteria. EPA believes that even though these mechanisms are not specifically authorized as part of the CTR, the rule does not preclude these mechanisms from being pursued and approved by the State and EPA in the future consistent with current regulations. Therefore, for the purposes of crafting a reasonable cost analysis, the economic analysis incorporates the possibility of dischargers obtaining variances and site-specific criteria.

With respect to mixing zones, the preamble merely reiterates EPA's current policy on the proper application of mixing zones and does not restrict mixing zones any more than they were restricted in the past. EPA will review the State's new mixing zone policy for consistency with the Clean Water Act. A federal rulemaking would not have to accompany EPA approval of specific mixing zones in permits since, unlike a variance or site-specific criteria, a change in the mixing zone does not require a change in the underlying water quality standards of a specific waterbody. See also CTR-004-009 (Category G-05;

Mixing Zones and Dilution Credits).

Given the possibility that dischargers may be able to obtain permits with less stringent WQBELs based on the mechanisms discussed above, EPA calculated a low-end cost of the rule that included the costs of a discharger pursuing regulatory relief if the costs exceed a trigger of $200 per toxic-pounds equivalent removed.

EPA acknowledges that regulatory relief which would result in a less stringent WQBEL through a TMDL, variance, site-specific criteria, or alternative mixing zone may not always be available or appropriate. Therefore, in the final Economic Analysis, EPA calculated a high-end cost of the rule that did not contain any assumption of regulatory relief if the costs per toxic-pounds equivalent exceeded a specific "cost-trigger."

Given the uncertainty inherent in predicting how regulatory relief will be granted given that it will be decided by regulatory authorities on a case-by-case basis, EPA believes that its approach in the final Economic Analysis is a reasonable way of expressing the possible range of regulatory outcomes and the costs (and benefits) resulting from those outcomes.

Comment ID: CTR-007-006
Comment Author: Port of San Diego
Document Type: Port Authority
State of Origin: CA
Represented Org:
Document Date: 09/24/97
Subject Matter Code: T State Implementation Policy
References:
Attachments? N
CROSS REFERENCES

Comment: 5. The District is concerned with the apparent complexity of calculating the various water quality criteria limits. In order to reduce the number of errors likely to occur as a result ofthe calculations, the District recommends that detailed step-by-step forms be created outlining the precise calculation methods for the various priority toxic pollutants.

Thank you for this opportunity to comment on the proposed rule. Sincerely,

STUART A. FARNSWORTH Senior Environmental Planner

Response to: CTR-007-006

EPA agrees that the calculations for various water quality criteria may be complex. To assist regulatory authorities in calculating various water quality criteria, EPA has included in the "General Notes" to the proposed CTR (see 62 CFR 42160 at pp. 42205-42208) and final CTR, a section containing formulas, tables, and additional information necessary for calculating various water quality criteria proposed in the CTR.

Comment ID: CTR-009-001

Comment Author: City of Thousand Oaks
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/22/97
Subject Matter Code: T State Implementation Policy
References:
Attachments? Y
CROSS REFERENCES

Comment: Dear Ms, Frankel:

The City of Thousand Oaks has reviewed the 40 CFR Part 131 Water Quality Standards; Establishment of numeric Criteria for Priority Toxic Pollutants for the State of California; Proposed Rule as published in the Federal Register, Vol. 62, No. 150, Tuesday, August 5, 1997, and offers the following comments:

The City applauds the EPA's encouragement and endorsement of maximum flexibility applied by the State to implement these priority pollutant criteria. To that end, the City agrees with EPA that the State of California should develop and promulgate its own comprehensive water quality standards and implementation procedures, in accordance with Section 303 of the federal Clean Water Act as expeditiously as possible. The City understands the agency's lack of resources to complete the entire rulemaking task for the State, but also suggests that the EPA appreciate the lack of resources the regulated community has to comply with partial and inflexible requirements. The same "Public" is the ultimate provider of these resources. It is therefore incumbent on all layers of government to assure the value received is at least commensurate with the cost.

Response to: CTR-009-001

As recognized by the commenter, EPA has chosen to defer to the State with respect to implementation procedures. To facilitate coordination between EPA and the State on issues pertaining to implementation of CTR criteria and regulatory flexibility outlined in the CTR preamble, EPA has provided lengthy formal comment on the State's draft Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California and Functional Equivalency Document (FED), and draft supplement and draft addendum to the supplement for the FED. EPA will continue to work closely with the State on CTR implementation issues and concerns. Pursuant to Executive Order 12866, EPA did prepare an economic analysis which provides an estimate of potential costs and benefits due to the implementation of the CTR.

Comment ID: CTR-015-003
Comment Author: Eastern Municipal Water Dist.
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/23/97
Subject Matter Code: T State Implementation Policy
References:
Attachments? N
CROSS REFERENCES

Comment: Implementation Issues

It is made clear that the State Board will have the responsibility for determining implementation of the water quality criteria in the Rule and not the Agency. However, there are several implementation issues discussed in the Preamble. The relationship of the Agency to the State Board and to the Regional Water Quality Control Boards ("Regional Boards") is unclear and requires more specific explanation. Further, the Agency does not acknowledge some of the State Board's existing authority and policies, but frequently recognizes Regional Board Basin Plans.

The District supports the inclusion of any provisions that allow for state flexibility in implementation of the Rule. The Agency needs to re-examine its discussions, however, as some of them do not seem consistent with the Agency's own guidance. Finally, it is critical that the Agency work closely with the State Board on these issues. From a preliminary review of the State Board's Draft Policy for Implementation of Toxics Standards, which was just released, it is apparent that there has been no coordination on these issues. There are several inconsistencies and contradictions which should be resolved before the Rule is promulgated.

Response to: CTR-015-003

State Water Resources Control Board and Regional Water Quality Control Board authorities and policies are generally outlined and/or incorporated by reference into Basin Plans adopted by the Regional Water Quality Control Boards. To facilitate coordination between EPA and the State on issues pertaining to implementation of CTR criteria and regulatory flexibility outlined in the CTR preamble, EPA has provided lengthy formal comment on the State's draft Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California and Functional Equivalency Document (FED), and draft supplement and draft addendum to the supplement for the FED. EPA will continue to work closely with the State on CTR implementation issues and concerns.

See also CTR-015-004 (Category G-05; Mixing Zones and Dilution Credits), CTR-004-007 (Category G-07; Variances), and CTR-015-006 (Category G-02; Compliance Schedules).

Comment ID: CTR-027-005b
Comment Author: California SWQTF
Document Type: Storm Water Auth.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: T State Implementation Policy
References: Letter CTR-027 incorporates by reference letters CTR-001, CTR-036 and CTR-040
Attachments? N
CROSS REFERENCES G-03

Comment: 5. The proposed rule restricts the State's regulatory flexibility in permitting by establishing averaging periods and low flow conditions, and directives regarding establishing effluent limits for criteria not being adopted as part of the CTR. USEPA has preempted the State's flexibility by establishing averaging periods for applying acute and chronic aquatic life and human health criteria, and by establishing low flow conditions that must be used in developing limits based on proposed criteria.

These are implementation issues that should remain with the State regulatory authority.

Recommendation: The rule should be revised to delete all provisions that preempt the State's regulatory flexibility.

Response to: CTR-027-005b

EPA has adopted recommendations for averaging periods and low flow values because they are intrinsic to ensuring that the numeric values are protective of the designated use. These factors are part of the ambient condition necessary to protect the designated use, see preamble to the proposed CTR and Technical Support Document for Water Quality Based Toxics Control, U.S. EPA 1991, Section 2.3, and Appendix D. As acknowledged in the preamble, the State may develop and adopt criteria averaging periods and critical low flows that differ from EPA's recommendations, as long as they are scientifically supportable, but when EPA promulgates rules, it is using these averaging periods and flow recommendations as representing the best scientific judgement given all the uncertainties in deriving these factors.

Comment ID: CTR-032-003
Comment Author: Las Gallinas Val. Sanitry Dist
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: T State Implementation Policy
References: Letter CTR-032 incorporates by reference letter CTR-035
Attachments? N
CROSS REFERENCES

Comment: It is important that the significant efforts and accomplishments of the Task Forces not be ignored in this CTR promulgation process. The District suggests that EPA consider providing more specific guidance to the State on the need for and use of regulatory flexibility beyond its statement that "EPA supports the State's consideration of stakeholder Task Force recommendations to help in dealing with these controversial and complex issues." (CTR p.42185)

Response to: CTR-032-003

See response to CTR-009-001.

Comment ID: CTR-032-005b
Comment Author: Las Gallinas Val. Sanitry Dist
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: T State Implementation Policy
References: Letter CTR-032 incorporates by reference letter CTR-035
Attachments? N

CROSS REFERENCES V

Comment: The CTR criteria need to be specifically and directly linked in the regulations to the State's Implementation Policy. Furthermore, the CTR and the Implementation Policy need to be moved to more parallel tracks and reviewed and adopted at the same time, not in series. EPA needs to provide more specific direction to the State on how and under what conditions regulatory relief options will be pursued jointly by the State and/or Regional Boards and impacted dischargers. The concept of numeric triggers should be refined, or an equivalent threshold identified, above which specific regulatory relief options would be pursued and requirements for major treatment plant improvements held in abeyance. Without these types of commitments and the linkage of the two regulatory actions, there is no sound basis for the CTR cost estimates.

Response to: CTR-032-005b

See response to CTR-009-001 and CTR-004-001.

Comment ID: CTR-038-008e
Comment Author: Sonoma County Water Agency
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: T State Implementation Policy
References:
Attachments? Y
CROSS REFERENCES C-24
E-01c
R
S

Comment: 7. Separate, sites-specific aquatic life criteria for copper and human health criteria for mercury should be adopted for Schell Slough, or alternatively EPA should specify implementation procedures for these criteria that will preclude unreasonable controls such as end-of-pipe treatment. To comply with the Clean Water Act and EPA regulations, EPA should consider specific water bodies. To fulfill the spirit of Presidential Executive Order 12866 and the requirements of the Unfunded Mandates Reform Act and the Regulatory Flexibility Act, EPA should evaluate regulatory alternatives based on an analysis of costs and benefits. Based on the assessment of costs and benefits described in "3" above, EPA should either adopt the criteria that is currently achieved, or alternatively specify implementation procedures that would allow the current discharge to continue (e.g., allowable Mixing zones and averaging periods and, for copper, a translator and water-effect ratio). Again, the District is amenable to continuing to address these constituents through pollution prevention measures and to assessing the actual impacts of these constituents in Schell Slough. Without EPA specifying such implementation procedures in the CTR, it is possible that the CTR could impose significant costs on the District (and the other small communities its serves) without providing a commensurate environmental benefit. In that case, the CTR would be inconsistent with the Clean Water Act, EPA regulations, Presidential Executive Order 12866, the Unfunded Mandates Reform Act and the Regulatory Flexibility Act.

Response to: CTR-038-008e

See response to CTR-038-008a (Category C-24; Site-Specific Criteria).

Comment ID: CTR-052-015
Comment Author: East Bay Dischargers Authority
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: T State Implementation Policy
References: Letter CTR-052 incorporates by reference letters CTR-035 and CTR-054
Attachments? Y
CROSS REFERENCES

Comment: C. RECOMMENDATIONS FOR MODIFICATIONS TO THE CTR AND EA

Revise the CTR to address attainability and cost issues. The CTR should be revised such that EPA acknowledges the cost and benefit issues and provides specific regulatory relief where cost-effective compliance cannot be achieved.

Response to: CTR-052-015

See response to CTR-042-007a (Category C-21; Legal Concerns).

Comment ID: CTR-053-005
Comment Author: Heal the Bay
Document Type: Environmental Group
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: T State Implementation Policy
References: Letter CTR-053 incorporates by reference letter 6 and the comments on Dioxin, copper, and the compliance schedule from letter CTR-002
Attachments? N
CROSS REFERENCES

Comment: Finally, Heal the Bay will review the implementation policy issued by the State to ensure that the policy includes a process to identify: (1) those criteria pollutants that, based on the recommendations of the task force and recent scientific data, should be more stringent than the proposed California Toxics Rule; (2) the process to perform the required CEQA analysis of those criteria; and (3) the time-lines for adopting the more stringent criteria.

Response to: CTR-053-005

No response required by comment.

Comment ID: CTR-055-002b
Comment Author: USS-POSCO Industries
Document Type: Specific Industry
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: T State Implementation Policy
References:
Attachments? Y
CROSS REFERENCES C-21

Comment: Waste Load Allocation (WLA) is a flawed concept and UPI requests the EPA promulgate conditions for exemption as part of the requirement for compliance with such allocations.

The implementation of CWA Section 303(c)(2)(B) as discussed beginning on page 42184 causes numerous obstacles, both financial and technological, to facilities such as UPI. Our facility will be subject to water quality-based effluent limitations (WQBELs). Therefore, total maximum daily loads (TMDL) and WLAs will be utilized as future discharge permit criteria.

State Task Force recommendations also recognize that the TMDL process can be significantly labor and data intensive. UPI concurs that the TMDL process is significantly labor and data intensive. During the five year period from 1989 through 1993 UPI spent close to a million dollars ($1,000,000) on the studies of point source wasteload performance at its facility. The study was initiated to verify the efficacy of our waste water treatment system in removing chemical process constituents that were added to the water from the river (Delta) during use of the water as process water. Chain-of-custody and laboratory results for this study were documented in our required monthly self monitoring reports to the RWQCB.

The above study of efficacy of wastewater treatment prior to discharge is summarized in the following attached tables which show averages for three month periods over five full years.

Table 9. Summary of Discharge 001 Gross Mass Loading, lb/day Table 10. Summary of Discharge 001 Net Mass Loading, lb/day Table 11. Summary of Discharge 001 Net Concentrations, ug/l

Each table is shown in two sections. Section A shows the tabulation of results for cadmium (Cd), total chromium (Cr, total), hexavalent chromium (CrE+6), copper (Cu), total iron (Fe, total), dissolved iron (Fe, dissolved), lead (Pb), nickel (Ni) and zinc (Zn). Section B shows the tabulation of results for arsenic (As), mercury (Hg), selenium (Se), silver (Ag), tin (Sn), cyanide, phenolics, polyaromatic hydrocarbons (PAHs), naphthalene, and tetrachloroethylene. All analyses were done using approved standard procedures to determine the total concentration of each chemical. All results that were reported at minimum detection level (MDL) are included in the averages at one half of the reported MDL.

The attached tables illustrate the following: The gross lb/day discharge loadings (Table 9) show certain trends of improvement, eg, CrE+6, for which the process sources had been controlled. Note that since completion of the study compliance samples for CrE+6 during the most recent two year period have been reported at less than MDL. Other decreases, such as shown for Cd, Hg and Pb, are the result of improved analytical test procedures.

The net discharge lb/day loadings (Table 10) and net discharge ug/l concentrations (Table 11) show

many results that are at or below zero discharge for many constituents. Other net discharge ug/l concentrations are significantly below the applicable MDLs, which also indicates that the net concentration is essentially zero. This indicates that chemical control for most chemicals is essentially 100% complete and that no process constituents are contained in the permitted discharge, except as noted below.

Exceptions to the above are Cr, Sn, and phenolics for which the net results are significantly above zero.

The above study shows the substantial effort and expenditure that was required to verify performance with respect to chemicals of concern (COCs) for a specific source category (and for several additional chemicals that were added to the COC list). The list of COCs is being expanded to 126 in the proposed regulations, more than six times as large a list as was evaluated in our performance study.

While the use of the Waste Load Allocation (WLA) principle may sound good, it is only good if properly administered. Two criterion should be considered to make the use of WLAs practicable and administratively feasible for both the agencies and the dischargers.:

* The COCs applicable to WLA discharge compliance should be identified by the Administrator for each source category, per Title 33, Section 1316(b)(1).

* Each NPDES Permit Applicant shall analyze and report on chemical listed on the standard permit application every five years to verify which if any discharge chemicals are subject to WLA discharge compliances.

For the above reasons, UPI requests the EPA add the following to the end of Section 131.38(e)(1) of part 131 of Title 40:

"New and existing point source dischargers shall be considered to be in compliance with such WQBELs except for (i) any WQBEL constituent that is identified for the source category pursuant to Section 1316(b)(1) of Title 33, or (ii) any WQBEL constituent which may cause an increase in the receiving water due to such discharge as determined from information contained in the standard required permit application."

Response to: CTR-055-002b

The comment regarding wasteload allocations is outside the scope of this rule. The CTR sets criteria for pollutant levels in ambient water but does not address how wasteload reductions are to be allocated to sources of pollutants. Wasteload allocations are already addressed under current regulations and guidance. When developing effluent limitations for a NPDES permit, the permitting authority must consider effluent limitations based on both the technology available to treat the pollutants and limitations that are protective of the designated uses of the receiving water. The intent of technology based effluent limitations is to require a minimum level of treatment for industrial/municipal point sources based on currently available treatment technologies. For industrial sources, national effluent limitations guidelines are developed based on the demonstrated performance of a reasonable level of treatment that is within the economic means of specific categories of industrial facilities. However, effluent limitations guidelines are not always established for every pollutant present in an industrial discharge and, in many instances, the guidelines are established only for those pollutants which are necessary to ensure that industrial facilities will comply with the technology-based requirements of the CWA (i.e., BPT, BCT, BAT, NSPS).

NPDES permitting regulations at 40 CFR 122.44(d) require that if, after technology based effluent limitations are applied, the permitting authority projects that any point source discharger may exceed an applicable water quality criterion, then a water quality based effluent limitation for that pollutant must be imposed. In addition, Section 301(b)(1)(c) of the Clean Water Act requires that effluent limitations be established as necessary to meet water quality standards. Neither EPA nor the states are required to set water quality based effluent limits at any higher level because of technological difficulties in measuring compliance. See NRDC v. EPA, 859 F. 2d 156, 208 (D.C. Cir. 1988). Water quality based effluent limitations are usually calculated from WLAs based on TMDLs, or on WLAs estimated for a single point source using simplified water quality models. These regulations also require that all effluents be characterized by the permitting authority to determine the need for water quality based effluent limitations. (The Technical Support Document for Water Quality-based Toxics Control (1991) provides additional guidance on collecting monitoring data for establishing water quality based effluent limits.) In accordance with these regulations, when determining whether a water quality based effluent limitation is needed in a permit, the permitting authority is required to consider, at minimum: (1) existing controls on point and nonpoint sources of pollution; (2) the variability of the pollutant or pollutant parameter in the effluent; (3) the sensitivity of the species to toxicity testing; and (4) where appropriate, the dilution of the effluent in the receiving water. The permitting authority must also consider whether technology based limits are sufficient to maintain State water quality standards.

Given the requirements outlined above, EPA believes that the requested changes to the end of 40 CFR 131.38(e)(1) are not appropriate within the scope of today's rule.

Comment ID: CTR-057-009
Comment Author: City of Los Angeles
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: T State Implementation Policy
References:
Attachments? N
CROSS REFERENCES

Comment: 1995 Public Advisory Task Force Efforts

Following the State's rescission of the ISWP in 1995, eight Public Advisory Task Forces were established to deal with specific issues and problems that either arose after the plan was adopted in 1991 or were carried over from the pre-adoption public review period. These task forces were comprised of representatives from numerous public groups and agencies, including the EPA, In hindsight, it is important to note that many of the problems that were identified and addressed by the task forces review can be attributed to the similarities between the proposed Rule and the ISWP. In view of the fact that the task forces were able to achieve consensus with respect to their individual recommendations for plan revision, we believe that the EPA should acknowledge these efforts in the CTR as a means of encouraging the development of an EPA-approved State priority-pollutant plan.

Response to: CTR-057-009

See response to CTR-009-001.

Comment ID: CTR-086-005
Comment Author: EOA, Inc.
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org: California Dent
Document Date: 09/26/97
Subject Matter Code: T State Implementation Policy
References: Letter CTR-086 incorporates by reference letter CTR-035
Attachments? N
CROSS REFERENCES

Comment: It is important that the significant efforts and accomplishments of the Task Forces not be ignored in this CTR promulgation process. CDA suggests that EPA consider providing more specific guidance to the State on the need for, and use of, regulatory flexibility beyond its statement that "EPA supports the State's consideration of stakeholder Task Force recommendations to help deal with these controversial and complex issues." (p. 42185)

Response to: CTR-086-005

See response to CTR-009-001.

Comment ID: CTR-086-007
Comment Author: EOA, Inc.
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org: California Dent
Document Date: 09/26/97
Subject Matter Code: T State Implementation Policy
References: Letter CTR-086 incorporates by reference letter CTR-035
Attachments? N
CROSS REFERENCES

Comment: The CTR criteria need to be specifically and directly linked in the regulations to the State's Implementation Policy. Furthermore, the CTR and the Implementation Policy need to be moved to more parallel tracks and reviewed and adopted at the same time, not in series. EPA needs to provide more specific direction to the State on how and under what conditions regulatory relief options will be pursued jointly by the State and/or Regional Boards and impacted dischargers.

CDA appreciates the opportunity to comment on the draft CTR.

Response to: CTR-086-007

See response to CTR-009-001.

Comment ID: CTR-090-009

Comment Author: C&C of SF, Public Utl. Commis.
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: T State Implementation Policy
References: Letter CTR-090 incorporates by reference letters CTR-035 and CTR-054
Attachments? Y
CROSS REFERENCES

Comment: We recommend that EPA:

1. Incorporate in the rule, not the preamble, the implementation of the regulatory relief such as the tiered mixing zones, the use of translators, the use of the water effects ratio, interim limits and compliance schedules. Without these assurances and inclusion of these in the rule the economic analysis is useless.

Response to: CTR-090-009

EPA believes that it is not necessary to include implementation of regulatory relief such as tiered mixing zones, translators, and interim limits in today's rule since these issues are closely related to the issuance of permits which is properly deferred to the State, the permitting authority. In fact, shortly after the publication of the proposed CTR, the State's Draft Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California proposed the use mixing zones, translators, water effects ratio, interim limits, and compliance schedules as appropriate to develop discharge limits for permits.

The CTR does include a compliance schedule provision and incorporates the water effects ratio into the calculation of the water quality criteria if appropriate.

EPA disagrees with the commenter's assertion that the economic analysis is useless unless the CTR includes the implementation measures stated by the commenter. EPA believes that the economic analysis is useful since it presents a range of possible economic impacts which vary depending upon a number of assumptions about how the State could implement the rule, including the use of regulatory relief.

Comment ID: CTR-092-001
Comment Author: City of San Jose, California
Document Type: Local Government
State of Origin: CA
Represented Org:
Document Date: 09/26/97
Subject Matter Code: T State Implementation Policy
References: Letter CTR-092 incorporates by reference letter CTR-035
Attachments? Y
CROSS REFERENCES

Comment: Relationship Between the CTR and State Implementation

The City of San Jose understands the level of effort that has gone into this rulemaking process. We find much of the preamble to the Rule to encouraging and generally support the road map to implementation of the rule that is laid out in the preamble.

The preamble describes a number of potential regulatory approaches that could be used by the State to implement the criteria proposed in the CTR. Regulatory tools such as translator mechanisms, water effect ratios, site specific objectives, interim limits while performing special studies, mixing zones, compliance schedules and trading programs are all good examples of regulatory approaches that should be used, especially under conditions such as those which exist in South San Francisco Bay, where water quality has improved tremendously in the recent past, yet full attainment of water quality objectives is still not possible.

EPA's Economic Analysis makes it clear that EPA is not only supporting use of these regulatory tools by the State, but is in fact assuming that they will be used. The accuracy of this assumption is questionable at this point in time, in light of the State's historic approach to implementation. Since EPA has the responsibility to approve any of the implementation procedures that the State decides to employ, we believe it is necessary for EPA to play an active role in the implementation phase.

Although we have not had an opportunity to review and comment on the recently issued "Proposed Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays and Estuaries of California", we believe that the implementation policy presents an opportunity to resolve the uncertainly concerning whether the State will adopt reasonable, flexible approaches to implementing the criteria that would be established by the CTR. We are requesting that the uncertainties concerning State implementation be resolved before the CTR is finalized.

Response to: CTR-092-001

See response to CTR-009-001.

Comment ID: CTRH-001-055
Comment Author: Michael Lozeau
Document Type: Public Hearing
State of Origin: CA
Represented Org: S.F. Bay/Delta Keeper
Document Date: 09/17/97
Subject Matter Code: T State Implementation Policy
References:
Attachments? N
CROSS REFERENCES

Comment: I have one more thing I can hardly read here. I was just referring back to Phil Bobel, who mentioned the state's process.

I would certainly not encourage you to do what the state has tried to do for the last three years, which is a very complicated, totally burdensome task force stakeholder process, which had most of the environmental groups walking away from it for lack of resources to keep up with all of the meetings.

And that had the result of nothing, essentially no -- I guess implementation came on Friday suddenly, but

no criteria came out of that process at all, despite all those meetings. So I certainly don't encourage you to follow that.

I think a reasonably swift process here is warranted. We're already four years late, so I would certainly encourage you to finish this rule as quickly as possible, and hopefully people will be able to make intelligent comments about it.

Response to: CTRH-001-055

No response required by comment.

Subject Matter Code: V Collaborative Approach

Comment ID: CTR-031-002e
Comment Author: Fresno Metro. Flood Ctrl Dist.
Document Type: Flood Ctrl. District
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: V Collaborative Approach
References: Letter CTR-031 incorporates by reference letter CTR-027
Attachments? N
CROSS REFERENCES F
C-17a
C-17b
J

Comment: 2. Since the preamble implies that CTR criteria may be applied in NPDES permits for municipal storm water dischargers as numeric effluent limitations, the proposed rule is flawed with regard to: a) setting attainable, scientifically valid criteria in a manner consistent with state and federal regulatory approaches; b) assessing the potential economic impact on the public served by municipal storm water dischargers; c) assessing environmental impacts pursuant to the National Environmental Policy Act and the Endangered Species Act; and d) providing for the coordinated review and evaluation of the proposed CTR in conjunction with the proposed State Implementation Plan.

Response to: CTR-031-002e

EPA has coordinated the CTR schedule to coincide as closely as possible with the State's Implementation Plan. However, EPA wishes to promulgate the CTR as soon as possible. Therefore, EPA could not commit that the proposed CTR would be released at the same time as the proposed State Implementation Policy. For the same reasons, EPA cannot ensure that the final CTR will be released at the same time as the final State implementation policy. EPA and the State have made every effort to ensure that its separate actions will work well together and are consistent with one another.

With respect to ESA, EPA has completed consultation as required by Section 7 of the ESA. With respect to compliance with NEPA, section 511(c) of the Clean Water Act excludes this rulemaking from the requirements of NEPA. The comment also assumes that stormwater discharges subject to numeric effluent limitations will have to be treated by new end-of-pipe facilities. As explained in the response to Storm Water Economics Comments (Category J, Comment # 040-004), EPA believes that implementation of criteria as applied to wet-weather discharges will not require the construction of end-of-pipe facilities.

Comment ID: CTR-031-008b
Comment Author: Fresno Metro. Flood Ctrl Dist.
Document Type: Flood Ctrl. District
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: V Collaborative Approach

References: Letter CTR-031 incorporates by reference CTR-027
Attachments? N
CROSS REFERENCES B

Comment: d. The proposed CTR and the recently released proposed State Implementation Plan must be fully integrated, internally consistent, and their combined effect thoroughly assessed. However, EPA has allowed only one week of overlap between the proposals for stakeholder review.

The EPA concedes within the proposed CTR that the criteria themselves lack substance without the corresponding implementation measures. EPA also acknowledges that the economic impact of the CTR can not be fully evaluated without consideration of the ISWP. However, the EPA can not simply abdicate its responsibility to assess the impact of its proposal, nor can it expect stakeholders to accept the proposed CTR without full understanding of its implementation.

All stakeholders require the opportunity to evaluate the proposed CTR and Implementation Plan together as a comprehensive, cohesive body of regulation.

Response to: CTR-031-008b

EPA has coordinated the CTR schedule to coincide as closely as possible with the State's Implementation Plan. However, EPA must promulgate the CTR as soon as possible to comply with its statutory obligations under the Clean Water Act. Therefore, EPA could not commit that the proposed CTR would be released at the same time as the proposed State Implementation Policy. For the same reasons, EPA cannot ensure that the final CTR will be released at the same time as the final State implementation policy. EPA and the State have made every effort to ensure that its separate actions will work well together and are internally consistent.

EPA agrees that the CTR without the corresponding implementation measures would have no direct effect on permitees. However, EPA disagrees that it has abdicated its responsibility to assess the impact of the proposal. EPA has projected the potential economic impacts of the CTR using reasonable implementation measures which are either already used by the State or are recommended in EPA's Technical Support Document (TSD) EPA believes this methodology is appropriate and reasonable since EPA cannot anticipate the final State implementation measures. EPA's estimates measure the impact of the CTR combined with the implementation procedures EPA believes are reasonable for the State to adopt. If the State adopts implementation procedures that differ from EPA recommended procedures, the change in impact will be reflected in the State's economic analysis.

Comment ID: CTR-032-005a
Comment Author: Las Gallinas Val. Sanitry Dist
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: V Collaborative Approach
References: Letter CTR-032 incorporates by reference letter CTR-035
Attachments? N
CROSS REFERENCES T

Comment: The CTR criteria need to be specifically and directly linked in the regulations to the State's Implementation Policy. Furthermore, the CTR and the Implementation Policy need to be moved to more parallel tracks and reviewed and adopted at the same time, not in series. EPA needs to provide more specific direction to the State on how and under what conditions regulatory relief options will be pursued jointly by the State and/or Regional Boards and impacted dischargers. The concept of numeric triggers should be refined, or an equivalent threshold identified, above which specific regulatory relief options would be pursued and requirements for major treatment plant improvements held in abeyance. Without these types of commitments and the linkage of the two regulatory actions, there is no sound basis for the CTR cost estimates.

Response to: CTR-032-005a

See response to CTR-031-008b. With regard to providing regulatory relief, the State has discretion to what extent it will provide regulatory relief in its water quality standards program and NPDES program. EPA disagrees with the assertion that it has no sound basis for estimating costs if it does not link both regulatory actions. The numeric cost triggers in EPA's economic analysis are used to establish a lower bound of costs since EPA cannot anticipate exactly how the State will implement regulatory relief on a case-by-case basis. To provide a more conservative cost estimate, EPA did not use the numeric cost triggers for its upper bound cost estimate. In effect, the upper bound cost estimate assumes that the State will not provide any regulatory relief.

Comment ID: CTR-034-002
Comment Author: SCAP
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: V Collaborative Approach
References: Letter CTR-034 incorporates by reference letter CTR-035
Attachments? N
CROSS REFERENCES

Comment: Equally important, we also urge EPA to work more closely with the State Water Resource Control Board (SWRCB), including such steps as the use of simultaneous comment periods and joint final promulgation. This heightened level of coordination would truly enhance the effectiveness of both EPA and the State's efforts to comply with Section 303(c)(2)(B) of the Clean Water Act, since, as EPA acknowledges in numerous locations in the Preamble, the impacts of the CTR criteria depend greatly on the State's approach to implementation (see, for instance, pp. 42188 and 42191). Thus, an important reason for EPA to grant our request to reopen the comment period is to allow sufficient time to review the draft CTR in the context of the SWRCB's recently released Statewide Implementation Policy. Thus, we ask that EPA extend the comment period until December 10, 1997, the SWRCB's public comment deadline, or, at a minimum, for 30 days.

Response to: CTR-034-002

See response to CTR-031-002e. Regarding request for extension in the comment period see section on Comment Period (Category B, CTR-001-001).

Comment ID: CTR-054-015
Comment Author: Bay Area Dischargers Assoc.
Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 09/25/97
Subject Matter Code: V Collaborative Approach
References:
Attachments? Y
CROSS REFERENCES

Comment: EPA should use a collaborative approach to address the major issues raised by BADA and other commenters. The CTR is extremely important to all stakeholders, including the regulated community, the environmental community, and the regulatory agencies. The traditional rule-making approach does not lend itself to resolving the issues raised in a manner that will satisfy the various stakeholders. The State Plan Task Force experience has demonstrated that varying interests can come together and quickly reach consensus on how to address statutory and regulatory requirements in a mutually satisfactory manner. BADA would encourage EPA to use such an approach in preparing a final CTR and would offer to assist EPA is organizing such an approach.

Response to: CTR-054-015

EPA has decided that to promulgate the CTR in a timely manner it is necessary to use the traditional rule-making approach rather than a collaborative approach involving stakeholders or a regulatory negotiation approach. The EPA must promulgate CTR water quality criteria as quickly as possible to fill the gap in California that has existed for five years. In promulgating a final rule EPA has considered all written and verbal comments as well as applicable State Plan Task Force recommendations. After consideration of all comments, EPA must ultimately promulgate criteria that are protective, scientifically defensible, and meet the requirements of the Clean Water Act. EPA believes the traditional notice and comment rule-making approach is the best way of fulfilling its obligations under the Clean Water Act in the most timely manner.

Comment ID: CTRE-001-001b
Comment Author: Tri-TAC/CASA
Document Type: Trade Org./Assoc.
State of Origin: CA
Represented Org:
Document Date: 07/21/97
Subject Matter Code: V Collaborative Approach
References:
Attachments? N
CROSS REFERENCES B

Comment: We are writing to you on behalf of Tri-TAC and the California Association of Sanitation Agencies regarding the forthcoming publication of the proposed Water Quality Standards for Toxic Pollutants for California ("California Toxics Rule") and release of draft state implementation policies

and functional equivalent document. As you are aware, Tri-TAC and CASA have supported the decisions of the U.S. Environmental Protection Agency (EPA) and the State Water Resources Control Board (SWRCB) to eliminate duplication in state and federal water quality rulemaking activities through the pursuit of a collaborative approach. Our understanding is that, through this approach, EPA will adopt water quality criteria for toxic pollutants that will apply in California and the SWRCB will adopt implementation policies that will guide the Regional Water Quality Control Boards in the implementation of those criteria. In a later phase, the SWRCB intends to adopt state criteria that will replace the federal criteria.

We have been informed recently by EPA staff that publication of the draft California Toxics Rule is imminent and is expected to take place by the end of July. According to staff, a 50-day public comment period will be provided. We have heard from SWRCB staff that they plan to release the proposed state implementation policies and FED on September 12. We have asked each agency to provide an overlapping comment period for these draft regulations, and have been informed that the current schedule will provide about one week of overlap, assuming that both agencies release their drafts on schedule. We are quite concerned about this situation in several respects. First, we believe that a one-week overlap does not provide sufficient time for a meaningful review and comparison of the regulations (and comparative analysis of the economic impact analyses, which depend heavily on the implementation policies). We believe that a minimum of 30 days is necessary for the overlap review period, and that the slight delay that this would create for EPA is warranted and would have a negligible impact on the timing of the overall rule promulgation process. Second, we are very concerned about whether the SWRCB will meet its projected release schedule. While we believe that sufficient time has been available to prepare the draft policies and FED, it is imperative that the SWRCB do everything possible to meet its commitment to move forward in a timely manner, and that any extension of EPA's comment period not be used to adjust the state's schedule. Third, we understand that both EPA and the SWRCB plan to hold public hearings regarding their respective proposals this fall. We believe that it is important that representatives of both agencies attend and participate in the hearings that each agency holds, and that an explanation be provided regarding both the CTR and the implementation policy.

In short, we request that EPA and the SWRCB carefully review their efforts to coordinate both the development and release of the California Toxics Rule and State implementation Policies, and specifically, we request that EPA provide a comment period sufficient to ensure that a 30-day overlap will occur with the SWRCB's release of the FED for the State Implementation Policies. More generally, we hope that both agencies will offer flexibility in the promulgation process so that the various scheduling and review needs can be met. We hope that your respective agencies will continue to move forward with a collaborative rulemaking process, and are concerned that cooperation not break down due to institutional barriers at this point in the process.

Thank you for your consideration of our comments. We would be happy to discuss these issues further at your convenience.

Response to: CTRE-001-001b

See response to CTR-031-002e. Regarding request for extension in the comment period see section on Comment Period (Category B, CTR-001-001).

Comment ID: CTRE-023-001b
Comment Author: Bay Area Dischargers Assoc.

Document Type: Sewer Authority
State of Origin: CA
Represented Org:
Document Date: 07/17/97
Subject Matter Code: V Collaborative Approach
References:
Attachments? N
CROSS REFERENCES B

Comment: The Bay Area Dischargers Association (BADA) is comprised of 10 POTWs in the San Francisco Bay Area. Our five largest charter members include the Central Contra Costa Sanitary District, City and County of San Francisco, City of San Jose, East Bay Dischargers Authority, and East Bay Municipal Utility District. Together BADA agencies provide wastewater service to most of the Bay Area.

BADA requests that the U.S. EPA allow at least 90 days for public review of the proposed California Toxics Rule (CTR). We understand the proposed rule will be published in the Federal Register toward the end of this month. The reasons for our request are as follows:

1. The CTR could have a significant economic impact on California municipalities and businesses. In order to properly assess the impacts of the proposed CTR standards, it is necessary to know how the standards are to be implemented. Yet, the proposed implementation provisions being developed by the State Water Resources Control Board will not be available until September 12, 1997. The several days of overlap are insufficient for California municipalities and businesses to assess the economic and environmental impacts of the proposed standards. At least 45 days of overlap is needed.

2. The U.S. EPA has spent more than three years developing the proposed CTR, in part because of its importance. It is therefore, reasonable to provide at least 90 days for the public to review and comment on the rule, especially considering its potential economic impact on the State and the unavailability of the implementation provisions

3. It is recommended that the EPA work closely with the SWRCB during the review period to define the implementation policy and procedures that the EPA would be likely to approve.

For these reasons, BADA urges you to issue a notice extending the review period from 45 days to 90 days.

Response to: CTRE-023-001b

Regarding request for extension in the comment period see section on Comment Period (Category B, CTR-001-001).

EPA did review the State's proposed implementation policy and procedures. EPA provided written comments to the SWRCB on December 9, 1997. These comments and other communications with the SWRCB are likely to facilitate EPA's review of the final SWRCB implementation plan.

Comment ID: CTRH-001-019b

Comment Author: Phil Bobel
Document Type: Public Hearing
State of Origin: CA
Represented Org: Tri-TAC
Document Date: 09/17/97
Subject Matter Code: V Collaborative Approach
References:
Attachments? N
CROSS REFERENCES B

Comment: MR. BOBEL: Thank you, Steve.

I'm Phil Bobel. I represent Tri-TAC, an organization of sewage treatment plants, the POTWs as we call them, made up of three groups: CASA, the California Association of Sanitation Agencies; the League of Cities; and the California Water Environment Association.

And later this afternoon you're going to hear from Bob Reid who represents CASA. And our comments are essentially the same, so I'm going to not repeat and just summarize a couple things.

I was even going to say you guys had done a really good job. But in light of all the previous speakers, I deleted that part of my testimony.

I will try to be positive and constructive. I promised to do that. In describing the nature of my comments on your little form, I put that I would be constructive. So I will do that.

The first point I'd like to make is positive. I think that the coordination you're doing with the state is great. The fact that we're going to have coordination with the feds focusing on the numeric criteria, the state focus on the implementation policy, working to come up with a system that will serve us all, is a good way to use resources of both organizations.

I applaud you for that and hope you will be able to pull that off. This is different than what we've tried to do before, and it will require some creativity.

One specific thing that I think would help if we did, is to allow all of us to see both what the state is proposing and what the feds are proposing, so we need a little more time in this comment period.

We've appealed before and been told no, but I still put that on the table as a good idea for the ultimate goal of a coordinated, consolidated, as much as possible, federal and EPA approach to this thing.

If you don't do that, or even if you do do that, I think it's going to require some other kinds of creativity as we move out of -- away from your hearing and toward a final rule.

And in that period of time, I would ask you and the state to sit down together and see what kind of a process you can use to take the comments that you'll hear from your federal regs and the comments you hear on the state plan, and put those together, hear more back from folks that are interested and come up with a package that makes sense.

You're going to need some way of going back to interested parties over a longer period of time -- communicating, coordinating -- and I would refer you to the process that the state used on their task force

approach and suggest that we need something like that as we move to the future. Creativity is going to be needed.

Response to: CTRH-001-019b

EPA has decided that to promulgate the CTR in a timely manner it is necessary to use the traditional rule-making approach rather than a collaborative approach involving stakeholders or a regulatory negotiation approach. The EPA must promulgate CTR water quality criteria as quickly as possible to fill the gap in California that has existed for five years. In promulgating a final rule EPA has considered all written and verbal comments as well as applicable State Plan Task Force recommendations. After consideration of all comments, EPA must ultimately promulgate criteria that are protective, scientifically defensible, and meet the requirements of the Clean Water Act. EPA believes the traditional notice and comment rule-making approach is the best way of fulfilling its obligations under the Clean Water Act in the most timely manner.

EPA and the State have made every effort to ensure that its separate actions will work well together and are internally consistent.

Comment ID: CTRH-001-025
Comment Author: Michelle Pla
Document Type: Public Hearing
State of Origin: CA
Represented Org: S.F. Public Utilities Com
Document Date: 09/17/97
Subject Matter Code: V Collaborative Approach
References:
Attachments? N
CROSS REFERENCES

Comment: I also want to back up the comment that Phil made about CASA. San Francisco is a member through the League of Cities, with Tri-TAC -- San Francisco is a member of Tri-TAC through the League of Cities, and also agree that you need to be creative here.

You may he taking the approach that this is a rulemaking for you, and once you're done making the rule, you're out. But because of the fact that we've come to a different perspective with you adopting numbers and statements looking at implementation, you're going to have to do an awful lot of creative work to -- working outside of models we're used to, in order to get to something that's going to make sense for the waters of the State of California, that's going to make sense for the people fishing and eating the fish.

So I really want to back up Phil and everyone else that makes those comments. That's very critical.

Response to: CTRH-001-025

See response to CTRH-001-019b.

Comment ID: CTRH-001-030
Comment Author: Michelle Pla

Document Type: Public Hearing
State of Origin: CA
Represented Org: S.F. Public Utilities Com
Document Date: 09/17/97
Subject Matter Code: V Collaborative Approach
References:
Attachments? N
CROSS REFERENCES

Comment: I think I want to close again with there's some really great things in there. There's also some flaws. And I think we're really missing the boat if we don't try to think outside of just a regular rulemaking here and begin thinking about a watershed approach, how we're going to get to making these waters clean.

And that's got to take a collaboration between EPA and the state that we haven't probably seen before. And I know you're attempting to do that. I want to encourage you to keep working on that.

Thank you.

Response to: CTRH-001-030

See response to CTRH-001-030.

Comment ID: CTRH-001-056
Comment Author: Dave Tucker
Document Type: Public Hearing
State of Origin: CA
Represented Org: San Jose Env. Serv. Dept.
Document Date: 09/17/97
Subject Matter Code: V Collaborative Approach
References:
Attachments? N
CROSS REFERENCES

Comment: MR. TUCKER: My name is Dave Tucker and I will be delivering Lou Garcia's comments today. He stepped away for a few minutes, then reappeared, but I got overcome by this. I'll keep my comments brief.

My comments will be on behalf of the City of San Jose Environmental Services Department. We will keep our comments brief today. We will be following up with extensive written comments by the close of the comment period next week.

I'm going to discuss two topics this afternoon. One is about the things that we support highly, and that is the flexibility and innovation that is included in the program regarding water quality standards.

However, we do recommend that EPA take a more active or proactive approach to employing such flexibility during the interim period between the federal promulgation and that of the completion of the statewide process, and that EPA be an active participant, actually extending into the water quality

planning and implementation process to California as an on-line stakeholder.

Response to: CTRH-001-056

EPA did review the State's proposed implementation policy and procedures. EPA provided written comments to the SWRCB on December 9, 1997. These comments and other communications with the SWRCB are likely to facilitate EPA's review of the final SWRCB implementation plan. EPA plans to continue to be an active participant into the water quality planning and implementation process in California.

Comment ID: CTRH-002-021b
Comment Author: Ing-Yig Cheng
Document Type: Public Hearing
State of Origin: CA
Represented Org: L.A. Bureau of Sanitation
Document Date: 09/18/97
Subject Matter Code: V Collaborative Approach
References:
Attachments? N
CROSS REFERENCES B

Comment: As you are aware, the California Policy for Implementation of Toxics Standards for Inland Surface Water, Enclosed Bays, and Estuaries of California, the proposed policy, was issued a few days ago. EPA and State essentially had the same objective to establish water quality criteria that are implementable for the water of California. Therefore, it is necessary for regulators and dischargers alike to fully comprehend the consequences of these rules on similar issues but from perhaps a different perspective.

Consequently, we strongly urge EPA to allow for additional 30 days for you and for us to fully review both documents together. We also urge EPA and State to coordinate these two rule-making process to minimize inconsistencies that might otherwise occur, EPA is the final focal point of this concern because the process of State's obtaining EPA approval of ISWP and EBEP will be greatly enhanced if EPA and State can work together; and without EPA's approval, State's plan will be no good. So I think it will be ideal if CTR and the State's proposed policy can be promulgated simultaneously.

Thank you again for the opportunity to address you.

Response to: CTRH-002-021b

Regarding request for extension in the comment period see section on Comment Period (Category B, CTR-001-001).

EPA did review the State's proposed implementation policy and procedures. EPA provided written comments to the SWRCB on December 9, 1997. These comments and other communications with the SWRCB are likely to facilitate EPA's review of the final SWRCB implementation plan.

EPA has coordinated the CTR schedule to coincide as closely as possible with the State's Implementation

Plan. However, EPA must promulgate the CTR as soon as possible to comply with its statutory obligations under the Clean Water Act. Therefore, EPA could not commit that the proposed CTR would be released at the same time as the proposed State Implementation Policy. For the same reasons, EPA cannot ensure that the final CTR will be released at the same time as the final State implementation policy. EPA and the State have made every effort to ensure that its separate actions will work well together and are internally consistent.

ECONOMIC ANALYSIS OF THE CALIFORNIA TOXICS RULE

October 1999

Prepared for:

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EXECUTIVE SUMMARY

This document presents the U.S. Environmental Protection Agency's (EPA or the Agency) economic analysis of the California Toxics Rule (CTR), a regulatory action that establishes numeric water quality criteria for priority toxic pollutants necessary for the State of California to meet the requirements of the Clean Water Act (CWA).

BACKGROUND

Under the CWA, states have primary authority for establishing designated uses for water bodies and for developing water quality criteria to protect those designated uses. Under Section 303(c)(2)(B) of the CWA, whenever a state adopts new water quality standards, or reviews or revises existing water quality standards, it must adopt numeric water quality criteria for priority toxic pollutants (as defined by Section 307(a) of the CWA and for which the Agency has issued a criteria guidance document per Section 304(a) of the CWA) if the absence of such criteria could reasonably be expected to interfere with a designated use of a water body.

In April 1991, California adopted two statewide water quality control plans -- the Inland Surface Waters Plan (ISWP) and the Enclosed Bays and Estuaries Plan (EBEP) -- establishing water quality criteria for the state, in part, to comply with Section 303(c)(2)(B). In November 1991, EPA disapproved some portions of each plan. In December 1992, EPA promulgated the National Toxics Rule (NTR) (57 FR 60848, December 22, 1992) for several states that had not yet met the requirements of the CWA, including the State of California for those portions of the statewide plans that it had disapproved.

Shortly after the ISWP and EBEP were adopted, several parties filed lawsuits in State Court against the California State Water Resources Control Board (SWRCB) for not complying with state law when the two statewide water quality plans were adopted. In March of 1994, the State Court issued a final decision in a consolidated case requiring the SWRCB to rescind the two plans. The SWRCB took formal action to rescind the plans in September of 1994. Since then, the State of California has been without a complete set of water quality criteria for priority toxic pollutants because only the criteria promulgated by EPA in the 1992 NTR and criteria in existing Regional Basin Plans (issued by Regional Water Quality Control Boards) remain in effect. The CTR establishes the remaining criteria that will satisfy Section 303(c)(2)(B).

In California, the State is the National Pollutant Discharge Elimination System (NPDES) permit issuing authority. There are presently 184 major point sources of which 128 are publicly owned treatment works (POTWs) and 56 are industries that directly discharge to California's inland waters, enclosed bays, and estuaries. These major point sources may be impacted when the State implements water quality standards based on criteria in the final CTR. In addition there are 1,057 minor point source dischargers. These minor dischargers are not expected to incur significant impacts as a result of State implementation of CTR water quality criteria.

PURPOSE OF THE ANALYSIS

Under Executive Order (EO) 12866 (58 FR 51735, October 4, 1993), the Agency must determine whether a regulatory action is "significant" and therefore subject to the requirements of the EO [i.e., drafting an Economic Analysis (EA) and review by the Office of Management and Budget (OMB)]. EO 12866 defines "significant" as those actions likely to lead to a rule having an annual effect on the economy of $100 million or more, or adversely and materially affecting a sector of the economy, productivity, competition, jobs, the environment, public health or safety, or state, local, or tribal governments or communities (also known as "economically significant").

Pursuant to the terms of the order, EPA has determined that this final rule is not "significant." The CTR establishes ambient water quality criteria which, by themselves, have no impact or effect. In addition, the costs and benefits of the CTR could be negligible since implementation of permits under the CTR may not differ significantly from how the state may implement permits under current law.[1] However, EPA also acknowledges that, in the absence of the rule, current permit requirements and current effluent concentrations may continue in the future. In this case there may be a cost to some dischargers for complying with new water quality standards after those standards are translated into permit limits. Therefore, consistent with the intent of EO 12866, EPA developed this EA. EPA intends for the EA to inform the public about how entities might be affected by implementation of CTR-based water quality standards in the NPDES permit program.

The State of California has significant flexibility and discretion as to how it chooses to implement the CTR within the NPDES permit program. EPA's analysis assumes implementation procedures based on a combination of EPA guidance and current permit conditions for the facilities examined. This is appropriate because if the state does not adopt statewide implementation provisions, the CTR-based water quality standards would be implemented using existing state basin plan provisions and EPA regulations and guidance. However, a more precise measure of costs and benefits may not be known until the state adopts its implementation provisions.

This economic analysis develops revised estimates of the potential benefits and costs associated with implementing the CTR (EPA is promulgating the rule as final). EPA revised its analysis in response to comments on the EA that accompanied the proposed rule and to reflect more recent data and information to refine the analysis of benefits and costs. Wherever possible, the costs and benefits are expressed in monetary terms.

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[1] That is, the state could rely on its narrative toxicity standard and implementation of the standard using best professional judgment to set numeric water quality-based effluent limits for toxic pollutants in permits. Federal permit regulations (40 CFR 122.44(d)(1)(vi); 40 CFR 123.25) require that each permit contain effluent limits for toxic pollutants when a pollutant has reasonable potential to cause or contribute to an excursion above a state's narrative standard. The basis for such limits could include EPA's 304(a) criteria guidance or other appropriate scientific information. Therefore, this approach could result in permit limits that are nearly identical to those that would result from implementation of CTR-based numeric standards, which are also based on the latest available scientific information.

BASELINES FOR ESTIMATING BENEFITS AND COSTS

Analysis of the potential benefits and costs associated with implementing the CTR requires that a baseline be established. The baseline describes what would occur in the absence of a regulation and provides an initial starting point for measuring the incremental cost and benefit of regulatory compliance.

EPA established potential compliance costs under two scenarios of pollutant loadings from point source dischargers. For a low cost scenario, EPA established pollutant loadings based on effluent data, specifically, the maximum effluent concentration reported in the most recent three years of monitoring data. However, if this value exceeded an existing permit limit for a given pollutant (i.e., showing the facility to be out of compliance), EPA used the permit limit as the discharge concentration. As a high scenario, EPA established pollutant loadings based on effluent data or the existing permit limit if no data were available. EPA developed these scenarios to reflect the uncertainty associated with establishing existing levels of pollutants in the effluents of point source dischargers given the limitations of current analytical methods. That is, because the CTR criteria are often below current analytical detection levels, it can be difficult to determine whether a facility may face incremental costs under the rule.

Establishing a baseline for estimating potential benefits proved more difficult because EPA does not have information on water quality conditions that would result from implementation of all current regulations and programs designed to control toxic pollutants. Therefore, EPA established a water quality baseline using information on current conditions using California's Water Quality Assessment (WQA) database, a database developed and maintained by the SWRCB. The WQA database contains information on pollutants that adversely affect water quality in water bodies that have been evaluated, the sources of these pollutants, the beneficial uses impaired, and a rating of water quality. The WQA database used for the analysis was updated in 1994 and is described in detail in U.S. EPA (1996). To identify the extent to which California waters are impaired by the toxic pollutants addressed by the CTR, EPA relied on the WQA ratings of good, medium, and poor. EPA defined impaired waters for this analysis as those that are rated medium or poor for one or more toxic pollutants addressed by the CTR [although, as described in U.S. EPA (1996), an exact matching of the WQA database to the pollutants addressed by the CTR was not possible].

EPA also obtained baseline information related to potential benefits from California's Toxic Substances Monitoring Program (TSMP). The TSMP monitors the occurrence of toxic pollutants in California's waters through sampling and analysis of fish tissue and contains freshwater tissue samples collected throughout the state. Fish tissue contaminant levels also were obtained from EPA's 1992 National Study of Chemical Residues in Fish and from a 1994 study by the San Francisco RWQCB, Contaminant Levels in Fish Tissue from San Francisco Bay. These sources also are described in detail in U.S. EPA (1996).

ANALYSIS OF COSTS

The method used to estimate potential compliance costs associated with the final CTR is generally the same as that used to estimate costs of the proposed rule. However, to address comments raised during the public comment period, EPA gathered additional data and information to refine the analysis of potential costs and pollutant loading reductions. A large part of the effort was directed toward obtaining the most recent NPDES permits and effluent monitoring data. Efforts also were directed toward increasing the sample size of minor wastewater treatment plants and minor industrial facilities.

EPA's method involved developing detailed estimates of the potential impact of the CTR on a sample of point source dischargers to California's inland waters and enclosed bays and estuaries and then extrapolating these results to the universe of potentially affected facilities. The impact of the CTR will vary depending upon the procedures that will be used to implement the criteria. These procedures typically specify the methods for assessing the need for water quality based effluent limits (WQBELs) and, if WQBELs are required, the method for deriving WQBELs from applicable water quality criteria. For this analysis, EPA derived WQBELs using implementation procedures based on the methods recommended in the Technical Support Document for Water Quality-based Toxics Control (TSD) (U.S. EPA, 1991).

Where reasonable potential was determined for a pollutant at a facility, EPA calculated a projected CTR-based WQBEL in accordance with the TSD procedures. If the existing NPDES limit was more stringent that the CTR-based limit, then no cost or load reductions were assigned to the facility. However, if the CTR-based limit was more stringent than the existing NPDES permit limit, or, in the absence of a existing limit, if the CTR-based limit was more stringent than the maximum observed effluent concentration, EPA estimated the cost that the facility would likely incur to meet the more stringent limit. To estimate these costs, EPA established a decision framework to ensure consistency in selecting control options.

Changes to the Methodology

In analysis of the final CTR, EPA revised its methodology for calculating a projected effluent quality (PEQ) to address mathematical problems encountered due to limited data sets for some facilities. Based on a review of the available data, EPA determined that using one-half of the method detection level instead of "zero" for non-detects resulted in a more accurate coefficient of variation. Furthermore, if greater than 20 data points were available for a pollutant, the 99th percentile value was calculated from the data set to represent the PEQ.

Changes to the methodology also included revisions to the treatment process optimization costs and waste minimization/pollution prevention cost estimates. Because process modification costs are expressed as a range of values, the costs assigned for a facility were proportional to the flow to be treated and the loading reduction required. For waste minimization/pollution prevention, the cost for POTWs with a design flow greater than five MGD was increased from $400,000 to $2 million in the high scenario. This new cost, replacing the previous average per facility cost of $100,000, is the highest pollution prevention cost estimate derived by EPA in assessing of

compliance costs resulting from implementation of the proposed Great Lakes Water Quality Guidance (SAIC, 1993).

EPA also eliminated the use of a cost "trigger" under the high scenario. In analysis of the proposed CTR, EPA used an industrial category threshold of $500/pounds-equivalent (lb-eq) for triggering compliance through regulatory alternatives. (The low scenario used a facility-specific threshold of $200/lb-eq for triggering compliance thru regulatory alternatives.) However, for the final rule, EPA assumed that no regulatory alternatives would be available under the high scenario. In other words, all necessary pollutant reductions were assumed to be achieved through either treatment or a waste control program of some type (e.g., waste minimization, pollution prevention).

Finally, EPA revised its estimate of the number of indirect dischargers that may be affected by more stringent CTR-based WQBELs applied to POTWs. EPA estimated that there are 2,144 SIUs that discharge to POTWs located on California inland surface waters and enclosed bays and estuaries. Previously, EPA assumed that 30% of these SIUs would be impacted under the low scenario and 10% would be impacted under the high scenario. Based on comments received indicating that the number of facilities affected was understated, EPA increased these percentages to 70% for the low scenario and 30% for the high scenario. (The percentage of SIUs impacted under the low scenario is greater than under the high scenario because the low scenario relies more heavily on source controls as a low-cost control option.) However, EPA believes that these revised assumptions are unrealistic and that the original 30% and 10% estimates more closely reflect the likely impact.

Results

EPA estimates that the potential annual cost of implementing the CTR is approximately $33.5 million under the low scenario and $61.0 million under the high scenario. As shown in **Exhibit ES-1**, indirect dischargers bear most of these costs in the low scenario. Under the high scenario, direct dischargers are expected to incur most of the potential costs. However, EPA believes that the high scenario likely overstates potential costs because it reflects the use of conservative (i.e., tending to err on the high side) assumptions. Specifically, under the high scenario, EPA estimates potential costs based solely on the presence of a WQBEL in a permit (as opposed to having monitoring data to show that the pollutant is actually there) and assumes that regulatory alternatives will not be used to mitigate excessive cost impacts.

Under the low scenario, where the baseline represents existing effluent concentrations, the expected reduction in pollutant loadings resulting from implementation of the CTR is approximately 1.1 million toxic lb-eq per year, or 50% of the baseline load of 2.2 million toxic lb-eq per year. Under the high scenario, the expected reduction in pollutant loadings is approximately 2.7 million toxic lb-eq per year, or 15% of the baseline load of 18.5 million toxic lb-eq per year.

Exhibit ES-1. Summary of Potential Annualized Costs (Millions of 1998 First Quarter Dollars)

Discharger Category	Low Scenario	High Scenario
Direct Dischargers	$9.9	$50.9
Indirect Dischargers	$23.6	$10.1
Total	**$33.5**	**$61.0**

ANALYSIS OF BENEFITS

EPA developed both a qualitative assessment of benefits and a quantified and monetized assessment of benefits.

Qualitative Assessment of Benefits

Toxics reductions under the CTR may provide ecologic benefits through increased ecosystem stability, resilience, and overall health. The potential benefits are difficult to quantify because of the complexity, scale, and uncertainties of the interaction of the multitude of ecological systems and toxics to be affected by the final rule. However, because of the extensive variety, proportion, and geographic area of the affected aquatic systems, the diversity and uniqueness of California ecological resources, and the large number of toxics to be regulated under the CTR, these benefits may be substantial, including (U.S. EPA, 1997):

- Reductions in toxics loadings that lead to improved conditions for California fish spawning and/or migration in bays/harbors and estuaries, lakes, rivers, streams, and saline lakes

- Reductions in bioaccumulative chemicals of concern that currently may affect fish and wildlife throughout the state, including selenium, mercury, PCBs, dioxins, and chlorinated pesticides

- Reductions in toxics that improve conditions for the successful recovery of federal and state threatened and endangered species, such as the delta smelt, desert pupfish, California brown pelican, bald eagle, California clapper rail, California tiger salamander, and western snowy plover

- Reductions in toxics that decrease adverse toxics-related impacts on aquatic and terrestrial wildlife in two important areas of California: the San Francisco Bay watershed and the Central Valley (see case studies in U.S. EPA, 1997)

- Reductions in the concentrations of both selenium and pesticides in the waters that feed the Salton Sea that may improve conditions for the restoration and maintenance of currently declining populations of wildlife, including threatened and endangered species such as the California brown pelican, peregrine falcon,

bald eagle, Yuma clapper rail, and desert pupfish (see Case Studies in U.S. EPA, 1997)

! Improved water quality and associated improvements in survival, growth, and reproductive capacity of aquatic and aquatic-dependent organisms that will help restore and sustain California's ecological diversity.

Quantified and Monetized Assessment of Benefits

EPA's method for estimating the potential benefits of the CTR closely resembles the method used in evaluation of the proposed CTR (the results have been updated to incorporate the revised estimates of pollutant loading reductions and a slight modification to how the reductions are incorporated). EPA quantified and monetized three categories of potential benefits: (1) human health risk reductions, (2) recreational angling benefits, and (3) passive use values. However, in response to comments, EPA conducted additional searches to identify California-specific literature related to the contribution of point sources to the toxic-related water quality problems in California and the values held by California residents for reducing toxic contamination in the state's waters. EPA incorporated the results of these searches into this analysis. Also, where possible, EPA updated the data underlying the analysis.

Contribution of Point Sources to Total Toxic Loadings

EPA's method for estimating potential benefits generally involved estimating the value of eliminating toxic impairment from California waters and then determining the extent to which the potential loadings reductions associated with the CTR might contribute to that value. For this analysis, EPA assumed that there was a direct linear relationship between the estimated reduction in toxic-weighted pollutant loadings and potential benefits (although this assumption may or may not be correct). EPA also developed assumptions regarding the relative share of total toxic loadings to California waters that are attributable to point sources. These estimates are shown in **Exhibit ES-2** and represent the toxic-weighted average across the pollutants evaluated.

ES-2. Estimated Share of Total Toxic Pollutant Loadings Attributable to Point Sources for California Water Bodies

Water Body	Toxic Pollutant Loadings Attributable to Point Sources (%)
San Francisco Bay	1-10
Other bays and estuaries	42–64[1]
Freshwaters and saline lakes	3

[1] The lower-bound estimate is for nonurban bays and the upper-bound estimate is for urban bays.
Source: Based on EPA analysis of NOAA (1988a); NOAA (1988b); NOAA (1988c); Davis, et al. (1991); California RWQCB (1997); Central Valley RWQCB; and California 1994 WQA database, as originally presented in U.S. EPA (1997).

Human Health Benefits

EPA assessed the human health risks from the consumption of contaminated fish tissue, and the potential reductions in these risks for two populations of anglers: San Francisco Bay anglers and freshwater anglers in California. EPA conducted the assessment for San Francisco Bay anglers as a case study example of the health risks for anglers fishing in enclosed bays and estuaries. However, because only two other health advisories have been issued for enclosed bays and estuaries in California, this case study may represent an upper-bound estimate of baseline health risks associated with enclosed bays and estuaries.

EPA assessed baseline human health risks (cancer and systemic effects) based on reported contaminant levels in fish tissue samples collected from San Francisco Bay and freshwater fisheries throughout California. The approach used follows standard EPA methodology for estimating health risks as described in detail in U.S. EPA (1997). EPA then estimated the potential reduction in baseline risk levels that might result from implementation of the CTR, considering the relative contribution of point sources to the contamination problem.

Exhibit ES-3 presents the potential reductions in cancer risks for recreational anglers. EPA estimated reductions in statistical cancer cases for anglers with average consumption rates. The lower-bound estimate of reductions in statistical cancer cases is less than one because the lower-bound estimates of statewide loadings reductions for all carcinogens that accumulate in fish is small. Using an estimated value of a statistical life of $2.7 million to $9.6 million (American Lung Association, 1995, updated to 1998 first quarter dollars using the Consumer Price Index) and assuming that all cancers are fatal, potential human health benefits of reduced cancer cases in recreational anglers range from $0.10 million to $4.20 million per year.

Exhibit ES-3. Potential Human Health Benefits of Reducing Cancer for Recreational Anglers[1]

Water Body	Annual Reduction in Cancer Cases	Annual Monetized Benefits (millions of 1998 first quarter dollars)[1]
San Francisco Bay	0.04 - 0.05	$0.10 - $0.45
Freshwater Resources	0.44	$1.17 - $4.20

[1] Based on an average consumption rate (21.4 g/day) and a value of a statistical life of $2.7 million to $9.6 million (American Lung Association, 1995, updated to 1998 first quarter dollars using the CPI). Values based on the estimates of reductions in fish tissue concentration contamination. Note that there is currently a debate regarding the accuracy of the CPI.

Systemic (noncancer) risks are assessed by means of a hazard quotient (HQ) for each contaminant. A HQ of one or greater implies that chronic chemical exposures exceed EPA-established thresholds of toxicity, and are indicative of potential for adverse health effects. For PCBs, EPA expects the hazard quotient associated with the average consumption rate to be reduced from 2.26 to a range of 1.51-1.66 for San Francisco Bay anglers and from 1.40 to 1.01 for freshwater anglers. However, for high consumers (90th percentile), the HQ for PCBs is expected to be reduced from 11.31 to a range of 7.54-8.29 for San Francisco Bay anglers and from 7.02 to 5.04 for freshwater anglers.

EPA estimated that the HQ for mercury will be reduced for both the average and 90th percentile consumption rates, however baseline levels exceed 1.0 for high consumers only. For high fish consumers (90th percentile), EPA expects the HQ for mercury to be reduced from 3.77 to a range of 1.01-1.11 for San Francisco Bay anglers and from 3.12 to 0.90 for freshwater anglers.

Recreational Angling Benefits

In addition to health risks, concerns regarding adverse health effects from eating contaminated fish also may reduce the value of the recreational fishery because the ability to consume fish may be an important attribute of the overall fishing experience (Knuth and Connelly, 1992; Vena, 1992; FIMS and FAA, 1993; West et al., 1993). This reduction in value may occur because fewer fishing trips are taken or because the value of a trip is reduced. In addition, reduced toxic contamination may increase stability, resilience, and overall health of numerous ecosystems, which may increase catch rates as well as angling effort in California. Thus, the potential recreational benefits of the CTR may include an increase in the value of fishing experiences and an increase in participation.

Because the analysis of recreational angling value is conducted at the statewide level and does not consider numerous site-specific characteristics that will affect the level of benefits from the rule, the results are only intended to provide a rough approximation of the potential magnitude of recreational benefits. A case study approach would be required to more accurately characterize the anticipated angling benefits at any specific water body in California.

Increased Value of Existing Trips. EPA was unable to identify any studies regarding the value to California anglers of reducing toxic contamination of surface waters to help estimate the value of

an improved fishing experience. However, a 1992 study of the Wisconsin Great Lakes open water sport fishing (Lyke, 1993) does reveal the significance of the contamination problem to the anglers. Lyke estimated the value of the Great Lakes trout and salmon fishing to anglers if it were "completely free of contaminants that may threaten human health." Lyke's estimates indicate benefits of 11% to 31% of the value of the fishery.

To transfer the Lyke results, EPA first estimated the number of fishing days in California that occur in toxic-impaired waters, distinguishing between water body type (e.g., freshwater river versus saltwater). Next, EPA multiplied the number of fishing days by an average consumer surplus for the different modes of fishing to obtain a baseline value of the fishery. EPA then multiplied by Lyke's estimate of 11% to 31% to obtain the value of a "contaminant-free" fishery. Finally, EPA multiplied by the midpoint of the low and high estimates of expected reduction in loadings and the low and high assumed contribution of point sources to total loadings to obtain the portion of these benefits that may be potentially attributable to point source controls. This approach results in potential benefits of between $1.53 million and $12.99 million per year.

Value of Increased Participation. In addition to increasing the value of existing angling days, reduced toxic loadings also may increase participation levels. Toxic contamination may discourage recreational fishing participation because of concern that consumption is unsafe. Similarly, knowledge of toxic contamination alone, regardless of consumption concerns, may reduce anglers' participation at a given site. Improving water quality to achieve toxic water quality criteria may restore this lost participation.

However, estimating lost participation is difficult and a limited number of studies have estimated reductions in participation due to water quality degradation. A thorough review of the literature revealed several studies that estimate the percentage of *people* that would take fewer trips, not the percentage decrease in angling days. However, these anglers are not expected to eliminate trip-taking. Therefore, using the various study results, EPA reasonably assumed that there may be a 5% to 10% reduction in trips attributable to poor water quality. Because public knowledge of toxic contamination varies across water bodies, EPA conservatively assumed a 5% increase in angler participation in estimating the benefits from increased angling participation for all waters except San Francisco Bay. Since a fish consumption advisory was issued for the Bay in 1994, EPA assumed a 10% increase in angler participation for the Bay.

EPA estimated the value of increased angling participation by multiplying the number of toxic-affected fishing days by 5% (10% for San Francisco Bay) and then valuing these days using estimated consumer surplus values. To estimate the portion of these benefits attributable to implementation of the CTR, EPA multiplied by the midpoint of expected reduction in toxic-weighted pollutant loadings and the relative contribution of point sources to total loadings. Potential benefits due to increased participation that may be attributable to the CTR range from $0.7 million per year to $2.2 million per year.

Nonconsumptive Wildlife Recreation Values

The *1996 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation* (U.S. Department of the Interior, Fish and Wildlife Service, and U.S. Department of Commerce, Bureau of the Census, 1998) indicates that 5.96 million California residents aged 16 or older participated in wildlife watching in 1996. This participation included 17.9 million trips away from home (at least 1 mile) for the primary purpose of observing, photographing, or feeding wildlife. These estimates do not include secondary wildlife-watching activities, such as observing wildlife while pleasure driving (U.S. Department of the Interior, Fish and Wildlife Service, and U.S. Department of Commerce, Bureau of the Census, 1998). Approximately 5.7 million California residents aged 16 or older also participated in wildlife-related activities around the home, including observing, photographing, or feeding wildlife.

Research has shown that nonconsumptive wildlife recreation (viewing wildlife) is highly valued. For example, Rockel and Kealy (1991) estimate a total annual value nationwide of between $8.7 billion and $165 billion in 1980 dollars (with the range of results indicating a sensitivity of their model to functional form). Cooper and Loomis (1991) estimated the total annual value for bird viewing in California's San Joaquin Valley to be $64.7 million (in 1987 dollars), based on willingness to pay (WTP) estimates for all Californians. Cooper and Loomis found that WTP increased as the number of birds seen increased, with diminishing marginal returns evident in their results (Cooper and Loomis, 1991).

As described in the EA that accompanied the proposed rule, CTR-related improvements in aquatic habitats may lead to healthier and more diverse populations of avian and terrestrial species and may manifest in increased participation and increased user day values for wildlife viewing activities. Without specific information as to the potential magnitude of changes in wildlife populations and thus viewing opportunities that may result from the toxic pollutant loading reductions anticipated under the rule, nonconsumptive wildlife recreation values cannot be estimated. Given the high baseline value, however, these benefits may be appreciable.

Passive Use (Nonuse) Values

Individuals may value reduced toxic concentrations in California aquatic environments apart from any values associated with their direct or indirect use of the resource. These passive use (nonuse) values are difficult to estimate in the absence of carefully designed and executed contingent value surveys. "Benefits transfer" techniques, however, can be used to develop a rough approximation of the potential magnitude of these passive use values.

Fisher and Raucher (1984) conducted an extensive review of the economics literature providing empirical evidence of the use and nonuse values associated with improved water quality and/or fisheries. Their review indicated that nonuse values are estimated to be *at least* half as great as recreational values. The authors concluded that if passive use values (for example, ecologic values) are applicable to a policy action, using a 50% approximation is preferred, with proper caveats, to omitting passive use values from a benefit-cost analysis. EPA believes his research is

applicable to the CTR. Therefore, EPA estimated passive use values for the CTR as one-half of recreational fishing benefits thus estimating the amount of passive use value that recreational angling households are willing to pay, above their recreational use values, to preserve or enhance water quality. This suggests that the potential magnitude of passive use values associated with implementation of the CTR for households with recreational anglers may range from $1.1 million per year to $7.6 million per year.

EPA also estimated passive use values for nonangling households assuming that passive use values are 30% to 90% of the passive use values held by angling households. Assuming that there are 9.7 million nonangling households in California, EPA anticipates passive use benefits for nonangling households range from $2.3 million to $47.3 million per year.

Summary of Monetized Benefits

A summary of the estimated monetized benefits from implementation of the CTR is provided in **Exhibit ES-4**. Human health benefits are estimated for San Francisco Bay and statewide freshwater resources; all other benefits are estimated statewide.

Exhibit ES-4. Summary of Annual Benefits from Implementation of the CTR (Millions of 1998 First Quarter Dollars)

Benefit Category	Annual Value
Human Health (cancer risk)	
San Francisco Bay	$0.1 - $0.4
Other saltwater resources	+
Freshwater resources	$1.2 - $4.2
Recreational Angling	
Increased value of existing trips	$1.5 - $13.0
Increased participation	$0.7 - $2.2
Wildlife Viewing	+
Passive Use	
Households with recreational anglers	$1.1 - $7.6
Other households	$2.3 - $47.3
Omitted Benefits[1]	+
Total	$6.9 - $74.7

[1] Benefits not monetized include noncancer human health effects, water-related recreation apart from fishing, and consumptive and nonconsumptive land-based recreation.
+: Positive benefits expected but not monetized.

The benefits estimates are subject to a number of omissions, biases, and uncertainties. It is difficult to assess the overall impact of these factors on the estimates because the degree to which they might cause the estimates to be underestimated or overestimated cannot be predicted with accuracy. Among the key factors, however, the omission of potential benefit categories may have the most significant impact and would contribute to an underestimate of benefits. In particular, the inability to quantify and monetize the extent to which the CTR may enhance water-related recreation apart from fishing or consumptive and nonconsumptive land-based

recreation, such as picnicking and hunting, may cause an underestimate of benefits. Although the scope of the benefits analysis has not allowed a quantitative assessment of these values at either baseline or post-CTR conditions, these benefits may be appreciable.

COMPARISON OF BENEFITS AND COSTS

A direct comparison of the monetized annual (steady-state) benefits of the CTR and annualized costs shows benefits and costs to be generally commensurate given the uncertainty in the analysis and that several categories of benefits are unmonetized. As shown in **Exhibit ES-5**, the estimate of monetized benefits ranges from $6.9 million per year to $74.7 million per year. Annualized costs are $33.5 million under the low scenario and $61.0 million under the high scenario.

Exhibit ES-5. Comparison of Annual Potential Benefits and Costs of Implementing the CTR (Millions of 1998 First Quarter Dollars)

Comparison Method	Monetized Benefits	Annualized Costs	
		Low Scenario	High Scenario
Direct Annual Comparison[1]	$6.9 - $74.7	$33.5	$61.0

[1] These monetized costs and benefits are not directly comparable since several categories of benefits have not been monetized.

Because the benefits and costs associated with implementation of the CTR may be characterized by an initial outlay of capital costs and a gradual phase-in of benefits, **Exhibit ES-6** presents a present value of benefits and costs over 30 years. This method applies a present value social accounting in which the streams of future benefits and costs are discounted to their present values to reflect society's rate of time preference. EPA considered two different phase-in scenarios to account for the potential delay in realizing benefits since many of the pollutants addressed by the CTR are persistent in the environment. To the extent that benefits of reducing toxic pollutants under the CTR are realized sooner, these scenarios may result in an underestimate of the present value of benefits. EPA assumed that there is a 7% opportunity cost of capital and that capital is replaced every 10 years. Since the life of capital typically exceeds 10 years, this assumption may result in an overestimate of costs. EPA calculated the present value of the streams of benefits and costs using discount rates of 3% and 7%.

As shown in Exhibit ES-6, discounted costs fall within the range of discounted benefits under the low scenario, but discounted costs exceed discounted benefits in three of the four cases shown for the high scenario. However, the assumption that capital is replaced every 10 years likely overstates costs. At the same time, benefits may be understated because some categories are not monetized and full benefits may be realized sooner than 10 or 20 years. Thus, EPA expects that the present value of benefits and costs is more commensurate than shown.

Exhibit ES-6. Comparison of Discounted Benefits and Costs of Implementing the CTR (Millions of 1998 First Quarter Dollars)[1]

Schedule of Benefits	Benefits[2]	Costs[3]	
		Low	High
3% Discount Rate			
10-Year Phase-In of Benefits	$108-$1166	$617	$1033
20-Year Phase-In of Benefits	$82-$883	$617	$1033
7% Discount Rate			
10-Year Phase-In of Benefits	$63-$683	$421	$767
20-Year Phase-In of Benefits	$45-$480	$421	$767

[1] Present values over 30 years.
[2] Benefits are phased in proportionately over 10 and 20 years, and have their full value in the remaining years. Benefits are not directly comparable to costs since several categories of benefits have not been monetized.
[3] Reflects capital costs plus a 7% cost of capital in years 1, 11, and 21, operating and maintenance costs in years 2 through 30.

CONCLUSIONS

Comparison of annual values of benefits and costs resulting from implementation of the CTR shows estimated costs falling within the range of monetized benefits. Comparison of 30-year present values of benefits and costs also shows costs under the low scenario to fall within the range of monetized benefits although costs under the high scenario generally fall just outside this range. However, EPA believes that benefits may actually be higher than shown because some categories of potential benefits have not been quantified or monetized. EPA was not able to quantify or monetize potential improvements in water-related recreation apart from fishing, such as boating, swimming, picnicking, and related in-stream and stream-side recreational activities. EPA was also unable to quantify or monetize potential improvements in wildlife viewing. Research indicates that wildlife viewing is a highly valued activity and that California residents value reductions in toxic pollutants that may affect wildlife resources. Thus, these omissions may result in an underestimate of benefits. In addition, using a capital life of 10 years likely overestimates potential compliance costs.

1.0 INTRODUCTION

This document presents the U.S. Environmental Protection Agency's (EPA or the Agency) economic analysis of the California Toxics Rule (CTR), a regulatory action that establishes numeric water quality criteria for priority toxic pollutants necessary for the State of California to meet the requirements of the Clean Water Act (CWA).

1.1 BACKGROUND

Under the CWA (33 U.S.C. 1251 et seq.), states have primary authority for establishing designated uses for water bodies and for developing water quality criteria to protect those designated uses. Under Section 303(c)(2)(B) of the CWA, whenever a state adopts new water quality standards, or reviews or revises existing water quality standards, it must adopt numeric water quality criteria for priority toxic pollutants (as defined by Section 307(a) of the CWA and for which the Agency has issued a criteria guidance document per Section 304(a) of the CWA) if the absence of such criteria could reasonably be expected to interfere with a designated use of a water body.

In April 1991, California adopted two statewide water quality control plans, the Inland Surface Waters Plan (ISWP) and the Enclosed Bays and Estuaries Plan (EBEP) establishing water quality criteria for the state, in part, to comply with Section 303(c)(2)(B). In November 1991, EPA disapproved some portions of each plan. In December 1992, EPA promulgated the National Toxics Rule (NTR) (57 FR 60848, December 22, 1992) for several states that had not yet met the requirements of the CWA, including the State of California for those portions of the statewide plans that it had disapproved.

Shortly after the ISWP and EBEP were adopted, several parties filed lawsuits in State Court against the California State Water Resources Control Board (SWRCB) for not complying with state law when the two statewide water quality plans were adopted. In March of 1994, the State Court issued a final decision in a consolidated case requiring the SWRCB to rescind the two plans. The SWRCB took formal action to rescind the plans in September of 1994. Since then, the State of California has been without a complete set of water quality criteria for priority toxic pollutants: only the criteria promulgated by EPA in the 1992 NTR and criteria in existing Regional Basin Plans (issued by Regional Water Quality Control Boards) remain in effect. The CTR establishes the remaining criteria that will satisfy Section 303(c)(2)(B).

1.2 PURPOSE OF THE ANALYSIS

Under Executive Order (EO) 12866 (58 FR 51735, October 4, 1993), the Agency must determine whether a regulatory action is "significant" and therefore subject to the requirements of the EO [i.e., drafting an Economic Analysis (EA) and review by the Office of Management and Budget (OMB)]. EO 12866 defines "significant" as those actions likely to lead to a rule having an annual effect on the economy of $100 million or more, or adversely and materially affecting a

sector of the economy, productivity, competition, jobs, the environment, public health or safety, or state, local, or tribal governments or communities (also known as "economically significant").

Pursuant to the terms of the order, EPA has determined that the CTR is not a "significant" rule. The CTR establishes ambient water quality criteria which, by themselves, have no impact or effect. In addition, the costs and benefits of the CTR could be negligible since implementation of permits under the CTR may not differ significantly from how the state may implement permits under current law.[1] However, EPA also acknowledges that, in the absence of the rule, current permits that do not contain numeric effluent limitations for toxic pollutants and current effluent concentrations may continue in the future. In this case there may be a cost to some dischargers for complying with new water quality based effluent limitations after those standards are translated into permit limits. Therefore, consistent with the intent of EO 12866, EPA developed this EA. EPA intends for the EA to inform the public about how entities might be affected by implementation of CTR-based water quality standards in the National Pollutant Discharge Elimination System (NPDES) permit program.

The State of California has significant flexibility and discretion as to how it chooses to implement the CTR within the NPDES permit program. EPA's analysis assumes implementation procedures based on a combination of EPA guidance and current permit conditions for the facilities examined. This is appropriate because if the state does not adopt statewide implementation provisions, the CTR-based water quality standards would be implemented using existing state basin plan provisions, and EPA regulations and guidance. However, a more precise measure of costs and benefits may not be known until the state adopts its implementation provisions.

This analysis develops revised estimates of the potential benefits and costs associated with implementing the CTR. EPA revised its analysis in response to comments on the EA that accompanied the proposed rule and to reflect more recent data and information collected and used to refine the analysis of benefits and costs. These data and analyses are described in detail in the chapters that follow.

[1] That is, currently, even without this rule, the state could rely on its narrative toxicity standard and implementation of the standard using best professional judgment to set numeric water quality-based effluent limits for toxic pollutants in permits. Federal permit regulations (40 CFR 122.44(d)(1)(vi); 40 CFR 123.25) require that each permit contain effluent limits for toxic pollutants when a pollutant has reasonable potential to cause or contribute to an excursion above a state's narrative standard. The basis for such limits could include EPA's 304(a) criteria guidance or other appropriate scientific information. Therefore, this approach could result in permit limits that are nearly identical to those that would result from implementation of CTR-based numeric standards, which are also based on the latest available scientific information.

1.3 STRUCTURE OF THE REPORT

This document identifies the need for the regulation, assesses potential costs and benefits, and analyzes alternative regulatory options. Wherever possible, the costs and benefits are expressed in monetary terms. The report is organized as follows:

- **Chapter 2, Need for the Regulation**, discusses the statutory requirement for the rule and the nature of the environmental problems caused by the presence of toxic pollutants in California waters that are regulated by the rule.

- **Chapter 3, Baseline for Estimating Benefits and Costs**, describes the baseline for analysis of the potential incremental benefits and costs of the rule.

- **Chapter 4, Analysis of Costs and Cost-Effectiveness**, describes the methodology for estimating potential costs and the results of the cost analysis.

- **Chapter 5, The Benefits Associated with the CTR: Methods and Concepts**, provides a discussion of concepts applicable to the analysis of benefits.

- **Chapter 6, Qualitative Assessment of Potential Ecological Benefits**, describes the types of ecological benefits anticipated to result from state implementation of the CTR.

- **Chapter 7, Benefits Methodology Issues: Contribution of Point Sources to Toxics-Related Water Quality Problems**, describes the method used to develop estimates of the potential contribution of point sources to toxic-related water quality problems.

- **Chapter 8, Quantified and Monetized Benefits Estimates**, presents the analysis of quantified and monetized benefits resulting from state implementation of the CTR.

- **Chapter 9, Comparison of Potential Benefits to Costs**, compares the potential benefits and costs estimated in the previous chapters.

- **Chapter 10** provides references.

- **Appendix A, Alternatives Analysis,** provides estimates of the potential cost and cost-effectiveness of two alternative regulatory options considered but not selected for the CTR: a less stringent human health risk level and applying toxic metals criteria in total recoverable form.

- **Appendix B, Compliance Cost Decision Matrix,** describes the assumptions EPA used to develop a forecast of how facilities may comply with limits established under the CTR.

- **Appendix C, Detailed Cost Estimates,** provides additional details on the estimated costs.

2.0 NEED FOR THE REGULATION

This chapter discusses the statutory authority for the CTR and the environmental factors that indicate a need for water quality criteria for toxic pollutants for California inland surface waters and enclosed bays and estuaries.

2.1 STATUTORY REQUIREMENT

Section 303(c)(2)(B) of the CWA requires states to adopt numeric water quality criteria for priority toxic pollutants for which EPA has issued Section 304(a) criteria guidance and whose presence could reasonably be expected to interfere with designated uses. Priority toxic pollutants are identified in Section 307(a) of the CWA. The CTR establishes numeric water quality criteria for priority toxic pollutants for the State of California that fulfill the requirements of Section 303(c)(2)(B).

EPA is promulgating this rule to fill a gap in California water quality standards. This gap resulted when the California Superior Court for the County of Sacramento ordered the SWRCB to rescind two statewide water quality control plans for inland surface waters and enclosed bays and estuaries. These plans contained water quality criteria for priority toxic pollutants for which EPA had issued CWA Section 304(a) criteria guidance. Thus, the State of California is currently without water quality criteria for many priority toxic pollutants as required by the CWA, necessitating this action by EPA.

When these federal criteria take effect, they will be the legally applicable water quality standards in the State of California for inland surface waters and enclosed bays and estuaries. The State will use these standards for all purposes and programs under the CWA. These criteria do not change or supersede any criteria previously promulgated for the State of California in the NTR, as amended (57 FR 60848, December 22, 1992, as amended by 60 FR 22228, May 4, 1995).

2.2 AN OVERVIEW OF ENVIRONMENTAL CONCERNS

The CTR addresses important environmental problems in California water bodies. Control of toxic pollutants in surface waters is necessary to achieve the CWA's goals and objectives. Many of California's monitored river miles, lake acres, and estuarine waters have elevated levels of toxic pollutants. Recent studies of California water bodies indicate that elevated levels of toxic pollutants exist in fish tissue; these discoveries have resulted in fishing advisories or bans.

Toxic pollutants covered by the CTR impair many of California's surface water resources. For this assessment, EPA has defined "impaired" waters as those that have been assessed and rated by the State of California as having medium or poor water quality for at least one toxic water quality pollutant or groups of pollutants. EPA has further defined "impaired" as meaning at least one designated use shows some degree of impairment. Information provided in this assessment, together with other data sources, indicates that toxic pollutants or groups of pollutants adversely

affect large areas of surface water in California and their associated beneficial uses. According to U.S. EPA (1997), major impacts include the following:

- Available data suggest that over 800,000 acres of assessed bays, estuaries, lakes, and wetlands may be impaired by one or more toxic pollutants, as are over 3,700 miles of rivers. Most notably, more than two-thirds of the assessed area of both bays and saline lakes may be adversely affected by toxic pollutants.

- Inorganic pollutants such as metals and trace elements (particularly selenium) are the most significant categories of toxic pollutants affecting the water quality in assessed waters statewide. Pesticides are also associated with large areas of water quality impairment.

- On the basis of the areal extent of contamination and the uses of affected water bodies, San Francisco Bay and the Central Valley appear to be the areas most influenced by toxic contamination. In addition, toxic pollutants are responsible for impaired water quality in a high percentage of river and saline lake areas in the Colorado River Basin. These areas constitute those most extensively affected by toxic pollutants, but waters in all regions of California show some degree of impairment by toxics.

- Both point and nonpoint sources play a role in contributing to toxic pollution. Agriculture, primarily agricultural drainage, is the most frequently cited source of pollutants that impair rivers and is also frequently cited as a contributor to impaired lakes and reservoirs. Urban runoff and other nonpoint sources (e.g., deposition, spills) are most frequently cited as contributing factors to water quality problems in toxics-impaired bays. Mining also is a frequently cited source (mining operations may or may not be a point source), particularly for lakes and reservoirs, and toxic pollutants discharged by municipal wastewater treatment plants contribute to the impairment of a variety of water body types, particularly estuaries and wetlands.

- Currently, there are 12 fish consumption health advisories in waters covered by the CTR (9 inland water bodies and 3 enclosed bays and estuaries) because of high levels of contamination in fish tissue by mercury, PCBs, chlordane, dioxin, DDT, pesticides, and selenium. The advisories range from avoiding consumption of all species to limiting consumption of a few species to several meals per month. In addition, the state has four waterfowl health warnings for consuming waterfowl taken from the Grasslands area, Suisun Bay, San Pablo Bay, and San Francisco Bay based on elevated selenium levels in duck, greater and lesser scaup, and scoters.

3.0 BASELINE FOR ESTIMATING BENEFITS AND COSTS

An analysis of the potential benefits and costs associated with implementing the CTR requires that a baseline be established. The baseline describes what would occur in the absence of a regulation and provides an initial starting point for measuring the incremental cost and benefit of regulatory compliance. This chapter describes the baseline EPA established for analyzing the potential costs and benefits anticipated under the CTR. It also discusses other sources of toxic pollutants, and thus potential benefits and costs relevant to the CTR, that EPA did not address in this analysis.

3.1 POINT SOURCE DISCHARGES

The CTR establishes criteria for all designated priority toxic pollutants, except those addressed in the NTR, for California inland surface waters and enclosed bays and estuaries. EPA analyzed the potential benefits and costs for point source discharges to comply with these criteria. To do this, EPA used a sample of facilities to represent the universe of all California point source dischargers. To establish baseline permit limits, effluent concentrations, and controls, EPA obtained the most recent NPDES permit and monitoring data available for point source dischargers. Sources of monitoring data included EPA's Permit Compliance System (PCS), hard-copy Discharge Monitoring Reports (DMRs), the nine Regional Water Quality Control Boards (RWQCBs), and the sample facilities. EPA used the most recent 3-year period of data available for each facility to evaluate the potential impact of the CTR.

3.1.1 Baseline Effluent Concentration

EPA established baseline effluent concentrations for pollutants determined to have a reasonable potential to exceed the projected CTR-based limit under two scenarios. For a low scenario, EPA considered only those pollutants that had been detected in the effluent during the past 3 years. EPA then used the maximum effluent concentration reported in the most recent 3 years of monitoring data as the baseline pollutant discharge concentration. However, if this value exceeded an existing permit limit for a given pollutant, EPA used the permit limit as the baseline discharge concentration.

As a high scenario, EPA established baseline effluent concentrations as being equal to existing permit limits, whether or not the pollutant had been detected in the effluent. This typically provides an upper bound on discharge concentrations because most facilities discharge at a level below their current limit. However, if there was no permit limit for a priority pollutant, the maximum effluent concentration was used as the baseline for those pollutants found to have reasonable potential to exceed the projected CTR-based limit based on effluent data.

Thus, the low scenario provides a more likely scenario of the pollutants for which reasonable potential would be determined because it is based on actual data indicating that the pollutants are present in the effluent. In comparison, the high scenario provides an upper bound on the

pollutants for which reasonable potential could exist. That is, pollutants are included in the high scenario analysis if the facility currently has an effluent limit for the pollutants even if there are no data to indicate that they are present in the effluent. There are many more pollutants considered in the high scenario than in the low scenario. One reason for this is that California's inland surface water plan (now rescinded) required permit limits to be established for all pollutants in the plan regardless of whether or not there was effluent data indicating their presence in the effluent. As a result, many facilities, including minor facilities, have limits for pollutants not detected in their effluent.

3.1.2 Baseline Pollutant Controls

EPA established the baseline for analysis of the pollutant controls necessary to meet projected CTR-based limits using the treatment systems in place at the sample facilities as described in the facility's NPDES permit. This baseline was used even in cases in which the existing maximum effluent concentration exceeded the existing permit limit at a facility. In theory, this assumption could result in overstating the pollutant controls necessary to meet the CTR-based limits if additional treatment were required to come into compliance with existing limits. However, in practice, only small differences were observed between current limits and maximum effluent concentrations.

3.2 WATER QUALITY

One of the most challenging analytic problems faced in estimating potential benefits attributable to implementation of the CTR is the need to account for the appropriate water quality baseline. A benefits analysis, for the most part, is able to measure improvements only from current or observable conditions. However, the appropriate baseline should account for water quality as it occurs assuming all current programs and legal requirements under the CWA, and other statutes or initiatives, are met. Therefore, there is an important distinction between current conditions and the conditions that reflect full implementation of existing programs.

An empirical approach to estimating the benefits relevant strictly to the CTR would be to estimate the reductions in toxic pollutant loadings from current conditions to the CTR-relevant baseline and then from this baseline to conditions following CTR implementation. EPA estimated pollutant loadings and reductions from the CTR-relevant baseline to conditions following implementation. These estimates indicate that the CTR may have a significant impact relative to loadings at its baseline. However, there is no empirical information with which to discern how this reduction compares to the difference between current conditions and conditions that reflect full implementation of existing programs.

Because EPA does not have information on water quality conditions under the CTR-relevant baseline, EPA established a water quality baseline using information on current conditions. EPA used several sources of information in this analysis, including California's Water Quality Assessment (WQA) database, a database developed and maintained by the SWRCB. The WQA database contains information on pollutants that adversely affect water quality in water bodies

that have been evaluated, the sources of these pollutants, the beneficial uses impaired, and a rating of water quality. The WQA used for this analysis was updated in 1994. This analysis is described in detail in U.S. EPA (1997); the results are summarized briefly in Chapter 2.

To identify the extent to which California waters are impaired by the toxic pollutants addressed by the CTR, EPA relied on the WQA ratings of good, medium, and poor. Good quality waters are defined in the WQA as waters that support and enhance designated beneficial uses. Medium quality waters are those that support designated beneficial uses with occasional degradation and include waters suspected to be poor where available data are inadequate to allow a definitive conclusion. Poor waters are those that cannot reasonably be expected to support designated beneficial uses. EPA defined impaired waters for this analysis as those that are rated medium or poor for one or more toxic pollutants addressed by the CTR [although, as described in U.S. EPA (1996), an exact matching of the WQA database to the pollutants addressed by the CTR was not possible].

Another source of baseline information is California's Toxic Substances Monitoring Program (TSMP). The TSMP monitors the occurrence of toxic pollutants in California's waters through sampling and analysis of fish tissue and contains freshwater tissue samples collected throughout the state. Fish tissue contaminant levels also were obtained from EPA's 1992 National Study of Chemical Residues in Fish and from a 1994 study by the San Francisco RWQCB, Contaminant Levels in Fish Tissue from San Francisco Bay. These sources also are described in detail in U.S. EPA (1996).

3.3 COSTS AND BENEFITS NOT ANALYZED

Although in this analysis EPA focused on estimating benefits and costs from controlling point source discharges from NPDES-permitted facilities, EPA believes that a comprehensive watershed approach that addresses all significant sources of problem pollutants may present a more cost-effective compliance approach and may be necessary to achieve water quality standards. However, the total costs of actions necessary to implement a watershed approach in a given area can be adequately estimated only after an in-depth site-specific study of the water body. Therefore, the total costs estimated in this analysis may not result in full attainment of water quality standards in all California water bodies. Accordingly, the benefits estimated here include only those that may occur as a result of loadings reductions from point sources typically subject to numeric water quality-based effluent limits (WQBELs).

The state may ask or require other sources to implement best management practices (BMPs) or to participate in a comprehensive watershed management planning approach. Control strategies for wet weather discharges and nonpoint sources are an important piece of EPA and California's current overall strategy to improve water quality. Many of the programs developed to control wet-weather discharges and nonpoint sources are already in place. Costs due to these programs already have been incurred or will soon be incurred owing to existing federal, state, and local environmental programs. The categories of nonpoint sources and wet weather discharges that are likely to contribute to toxic impairment of water bodies, yet are not always subject to numeric

effluent limits, are described below. Programs to control these types of pollution that need to continue if all California waters are to ultimately meet water quality standards also are described.

3.3.1 Agricultural Runoff

Agriculture is one of the largest sources of pollutants in California. Toxic water quality problems result from the application of fertilizers and pesticides and from the discharge of used irrigation water. Pesticides and fertilizers are carried into water bodies via rain and soil erosion. Irrigation water must be drained from fields resulting in the discharge of pesticides, selenium, metals, and other trace contaminants. This irrigation drainage must be transported to holding ponds, evaporation ponds, local water bodies, or reintroduced to the local irrigation system.

As a result of existing federal and state laws, much research and time has been spent attempting to alleviate the difficult problems caused by agricultural runoff. Unlike most point source discharges, polluted runoff from agricultural lands cannot be effectively diminished by treatment systems. Instead, controls focus on reduction in the use of pesticides and changes in the use of water and land. Improvements in irrigation techniques and the reuse of drainage water on salt-tolerant plants can reduce the amount of polluted drainage. Retirement of agricultural lands that have high levels of salts is another alternative to reducing polluted drainage.

3.3.2 Inactive and Abandoned Mines

California has more than 15,000 inactive, abandoned mines. Only six major NPDES permits have been issued for mine discharges. Although 27 additional mines have been issued minor NPDES permits, the vast number of inactive and abandoned mines is not currently permitted. Acid mine drainage results in the discharge of metals such as cadmium, copper, lead, mercury, and zinc.

Technologies used to control mine discharge include prevention and treatment. Prevention may include diversion of local streams away from reactive material, covering reactive mine waste, mixing reactive waste with limestone to buffer acid, disposing of reactive mine waste underwater to eliminate reaction with air, impounding mine drainage to keep it from entering surface waters, and sealing the mine portal to flood the mine, which suppresses the formation of acid mine drainage. Treatment methods vary depending on the site and extent of pollution and involve control of the mine drainage before it enters surface waters. Treatment techniques include chemical precipitation, ion exchange, construction of wetlands, and evaporation of mine discharge in surface impoundments (California State Water Resources Control Board, 1995).

Efforts are already under way to clean up some mine sites under existing state and CWA requirements (storm water regulations) and Superfund [the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)]. However, in order to reach full compliance with water quality standards, additional assessment and treatment may be necessary for some California water bodies.

3.3.3 Urban Runoff

Urban runoff in California has been shown to be a significant contributor to water quality problems. Urban runoff is currently regulated as an NPDES point source for large towns and as a nonpoint source for medium and small towns. Most cities in California have separate systems for wastewater, which handle normal used water flows, and storm drainage, which divert storm water to prevent flooding. When rainfall picks up pollutants, such as toxic metals and pesticides that accumulate on the ground, storm water drains can carry harmful amounts of these pollutants into rivers, lakes, and bays.

Programs designed to control storm water pollution stress BMPs and also often emphasize pollution prevention (e.g., street cleaning or the reduction in use of pesticides and fertilizers) and public education. Public outreach is designed to address proper use, storage, and disposal of household chemicals, pesticides, oil, and other wastes. Efforts to control urban runoff through BMPs are also under way through both NPDES storm water permits and through nonpoint source planning. For example, under its existing NPDES storm water permit, the cities and counties of the Los Angeles area plan to spend $15 million annually on public education and a program to curb illegal dumping (California State Water Resources Control Board, 1996).

Since some of the sources discussed above are exempt from federal permitting requirements, the State of California must develop alternative strategies and controls to protect or restore water quality that is affected by these sources. The State of California established three general management approaches to address nonpoint source problems in its 1988 Nonpoint Source Management Plan, including voluntary implementation of BMPs, regulatory-based encouragement of BMPs, and waste discharge limitations. In most cases, the RWQCBs decide the mix of options that will be used to address any given nonpoint control problem.

4.0 ANALYSIS OF COSTS AND COST-EFFECTIVENESS

This chapter presents the analysis of the potential costs resulting from implementing the CTR. The method used to calculate costs is generally the same as that presented in SAIC (1997). However, EPA made some changes to the sample and the methodology in response to comments and to improve the analysis. The methodology is described in Section 4.1. Changes to the analysis since proposal of the draft CTR are explained in Section 4.2. The results of the analysis, including costs, pollutant loading reductions, and cost-effectiveness by discharger category, are presented in Section 4.3. Section 4.4 summarizes the sources of uncertainty in the cost analysis.

4.1 METHODOLOGY

As described in SAIC (1997), to estimate potential costs and pollutant loading reductions attributable to implementation of the proposed CTR, and for the final CTR, EPA developed detailed estimates for a sample of point source dischargers to California's inland waters and enclosed bays and estuaries, and then extrapolated these results to the universe of potentially affected facilities. The population of NPDES-permitted facilities that discharge into inland surface waters and enclosed bays and estuaries in California includes 184 major dischargers and 1,057 minor dischargers. EPA selected 16 major dischargers and 11 minor dischargers to represent the various discharger categories and geographic distribution of the universe of facilities.

EPA then estimated the potential impact of the CTR on these sample facilities, as described below. The impact of the CTR will vary depending upon the procedures that will be used to implement the criteria. These procedures typically specify the methods for assessing the need for WQBELs and, if WQBELs are required, the method for deriving WQBELs from applicable water quality criteria. For this analysis, EPA derived WQBELs using implementation procedures based on the methods recommended in the Technical Support Document for Water Quality-based Toxics Control (TSD) (U.S. EPA, 1991).

4.1.1 Method for Determining Reasonable Potential to Exceed CTR Water Quality Criteria

The NPDES permit regulations in 40 CFR 122.44(d) and 123.25 require that WQBELs be derived for toxic pollutants that are discharged at a level that has a reasonable potential to cause or contribute to an exceedance of water quality standards. To determine whether there is reasonable potential with respect to projected CTR-based limits, EPA followed several conventions. First, for those toxic pollutants for which limits are already established in a facility's current permit, EPA assumed that a reasonable potential existed. Second, for those pollutants with no limit in the existing permit but that were detected in the effluent (as reported in the permit application or as a result of monitoring conditions contained in the NPDES permit), EPA determined reasonable potential using the method recommended in EPA's TSD, described below. Finally, if all monitoring data for a facility were reported as below analytical detection

levels, even if the reported detection limit was above EPA-approved analytical method detection levels, EPA assumed that no reasonable potential existed to exceed CTR-based WQBELs.

Where data indicated that a pollutant was present, but no current permit limit had been developed, EPA calculated the projected effluent quality (PEQ) and compared it to projected CTR-based WQBELs for all pollutants of concern. A PEQ is an estimate of the maximum effluent pollutant concentration that is derived from actual measured values taking into account statistical uncertainty. EPA calculated a projected CTR-based WQBEL using all applicable CTR criteria (based on protection of aquatic life and human health) and compared the PEQ to the most stringent of the calculated CTR-based WQBELs. If the PEQ exceeded the projected CTR-based WQBELs, EPA concluded that there is reasonable potential to exceed a CTR-based WQBEL. Pollutants for which EPA determined reasonable potential existed were then analyzed to determine potential controls necessary to achieve the CTR-based WQBEL.

4.1.2 Method for Estimating Potential Costs

Where reasonable potential was determined for a pollutant at a facility, EPA calculated a projected CTR-based WQBEL in accordance with the TSD procedures. If the existing NPDES limit was more stringent than the CTR-based limit, then no cost or load reductions were assigned to the facility. However, if the CTR-based limit was more stringent than the existing NPDES permit limit, or, in the absence of an existing limit, if the CTR-based limit was more stringent than the maximum observed effluent concentration, EPA estimated a cost that the facility would likely incur to meet the more stringent limit.

To estimate costs, EPA performed an engineering analysis of how each sample facility could comply with the projected CTR-based effluent limits. The costs to meet the projected CTR-based limit were performed under two different costing scenarios using a “compliance cost-decision matrix,” developed to predict how a facility would likely achieve the requisite pollutant reduction. EPA developed this matrix to ensure consistency in estimating the general types of controls that would be necessary to comply with the CTR’s more stringent requirements, as well as to integrate other alternatives into the cost analysis. The matrix establishes specific rules to provide reviewing engineers with guidance in consistently selecting options. This matrix is presented in Appendix B.

Under the decision matrix, EPA first considered costs for relatively minor treatment plant operation and facility changes. EPA considered minor, low-cost modifications or adjustments of existing treatment feasible if the literature indicated that the existing treatment process could achieve the revised WQBEL and if the additional pollutant reduction was relatively small (e.g., 10% to 25% of current discharge levels).

When it was not technically feasible to simply adjust existing operations, EPA considered a control strategy of waste minimization/pollution prevention. However, EPA estimated costs for these controls only when they were considered feasible based on the reviewing engineer’s understanding of the treatment processes at a facility. The decision matrix established several

rules of thumb for this determination. These rules considered the level of pollutant reduction achievable through waste minimization/pollution prevention techniques, the appropriateness of waste minimization/pollution prevention for the specific pollutant, and knowledge of the manufacturing processes generating the pollutant of concern. In general, detailed treatment and manufacturing process information was not available in NPDES permit files; therefore, the assessment of feasibility was based primarily upon the reviewing engineer's best professional judgment using general knowledge of industrial and municipal operations.

If EPA determined that waste minimization/pollution prevention alone was not feasible to reduce pollutant levels to those needed to comply with the projected CTR-based WQBELs, EPA estimated costs for a combination of waste minimization/pollution prevention, simple treatment, and/or process optimization. If these relatively low-cost controls could not achieve the CTR-based WQBELs, EPA estimated costs for more expensive controls (e.g., end-of-pipe treatment).

Development of end-of-pipe treatment cost estimates began with a review of the existing treatment systems at each facility. EPA considered its Office of Research and Development, Risk Reduction Engineering Laboratory's "RREL Treatability Database" (Version 4.0) in determining the need for additional or supplemental treatment. The pollutant removal capabilities of the existing treatment systems and/or any proposed additional or supplemental systems were evaluated based on the following criteria: (1) the effluent levels that were being achieved currently at the facility; and (2) the levels that are documented in the EPA "RREL Treatability Database." If this analysis showed that additional treatment was needed, EPA estimated capital and operating and maintenance (O&M) costs for unit processes that would achieve compliance with the projected CTR-based effluent limits using the same documentation.

Finally, for a low cost scenario (described below), EPA considered the relationship between the cost of adding the treatment and other types of remedies or controls following the calculation of end-of-pipe treatment costs. Specifically, if the estimated annualized cost for removing a pollutant exceeded a prescribed value [expressed as dollars per pound equivalent ($/lb-eq)] for a facility, EPA assumed that a discharger would use alternative regulatory approaches to comply with CTR-based effluent limits as long as the cost of these options was less than the anticipated pollution control costs. EPA referred to the prescribed value as the "cost trigger." In these situations (this was the case for two pollutants at one sample facility), EPA estimated the cost for special studies or monitoring that may be required to pursue the regulatory alternative instead of treatment costs and did not anticipate pollutant loading reductions at the facility.

The types of alternative regulatory approaches assumed available for dischargers in California include phased total maximum daily loads (TMDLs), water quality standard variances, site-specific criteria, change in designated use, translators for metals, and alternative mixing zones. Whether these options are available to dischargers or not depends on how the State chooses to implement the CTR. EPA accounted for the potential use of such alternatives by employing the cost trigger as part of a low cost scenario. However, to ensure that costs are not underestimated if these alternatives are not available, EPA developed a high cost scenario that does not employ the cost trigger. If the State does not make alternative regulatory approaches available to

dischargers, EPA believes that the potential cost impact will lie between the low and high scenario estimates.

Cost Scenarios

Since states are not required to use the methods recommended in the TSD, implementation procedures can vary, and may result in more or less stringent WQBELs. Because of the uncertainty regarding the State of California approach to implementation at this time, EPA developed a range of costs to represent the potential range of impact of the CTR based on certain implementation assumptions. The upper and lower bounds of these cost assumptions are referred to as the "high" and "low" cost scenarios, respectively. The principal differences between these scenarios are described below.

EPA established the baseline for analysis of the pollutant controls necessary to meet projected CTR-based limits using the treatment systems in place at the sample facilities as described in the facility's NPDES permit. This baseline was used even in cases in which the existing maximum effluent concentration exceeded the existing permit limit at a facility. In theory, this assumption could result in overstating the pollutant controls necessary to meet the CTR-based limits if additional treatment were required to come into compliance with existing limits. However, in practice, only small differences were observed between current limits and maximum effluent concentrations in these cases.

Low Scenario

For a low scenario, EPA calculated baseline loadings and CTR-based WQBELs and loadings only for those pollutants that had been detected in the effluent at sample facilities for the most recent 3 years of data since 1993 and that failed the reasonable potential test.

EPA developed a low cost scenario to reflect a lower baseline loadings estimate and a more flexible State implementation approach than the high scenario. The assumptions used for the low scenario result in an estimate based on a smaller number of affected pollutants and a lower amount of incremental pollutant removals necessary to comply with CTR-based effluent limits (as compared with the high scenario). The assumptions used for the low scenario are:

- In the absence of any monitoring data, EPA assumed that no costs would be incurred, even if a permit limit exists that is less stringent than the CTR-based limit. That is, EPA assumed that if a facility is not monitoring for a pollutant, it is not likely to be present in the effluent.

- As described more fully above, if the estimated annualized cost for removal of a pollutant exceeded a cost trigger of $200 per toxic pound-equivalent, EPA assumed that dischargers would use alternative regulatory approaches (as long as the cost of such options was less than the cost of pollution control). In these situations, EPA estimated the cost for alternative approaches and did not

anticipate any pollutant loading reductions.

High Scenario

For a high scenario, EPA established baseline loadings and calculated projected CTR-based WQBELs and loadings for all pollutants for which limits had been established in existing NPDES permits (whether or not data indicated that these pollutants were present in the discharge). EPA also established baseline loadings and calculated projected CTR-based WQBELs and loadings for all other CTR regulated pollutants that were detected in the effluent and failed the reasonable potential test.

EPA developed the high cost scenario to reflect a higher baseline loadings estimate and a less-flexible state implementation approach than the low scenario. The assumptions used for the high scenario result in an estimate with a greater number of affected pollutants and a greater amount of incremental pollutant removals necessary to comply with CTR-based effluent limits compared to the low scenario. In addition, all necessary pollutant reductions were assumed to be achieved through either treatment or a waste control program (e.g., waste minimization, pollution prevention). That is, EPA did not employ the cost trigger for the high scenario.

Extrapolation of Costs

After estimating potential capital and O&M costs for each facility under the two scenarios, EPA estimated total annual costs by annualizing capital costs 7% over ten years and then adding in O&M costs. Note that this assumed ten year capital life likely overstates costs because capital equipment may last considerably longer than ten years.

EPA then extrapolated the annual costs based on the percent of the universe of regulated facilities represented by each group of sample facilities. EPA extrapolated major POTWs using three flow strata. EPA extrapolated major industrial facilities using industrial classification groupings (e.g., lumber and paper, electric utilities). Finally, EPA extrapolated minor POTWs and minor industrial facilities as separate groupings (not further distinguished by flow or industrial category).

4.1.3 Method for Estimating Pollutant Loading Reductions

EPA calculated pollutant loading reductions for each facility by calculating the difference between the baseline effluent concentration and the projected CTR-based effluent limitation.

For the low scenario the following apply:

- No reduction was assumed if the difference between the baseline value and the CTR limitation was negative.

- If the existing effluent concentration was above the MDL, but the CTR-based

limit was below the MDL, the CTR-based limit, or one-half of the MDL (whichever produces a smaller load reduction) was used for the CTR-based effluent limitation.

! If the maximum reported effluent concentration exceeded the existing permit limit, high scenario assumptions were employed.

For the high scenario the following apply:

! If all effluent data for a pollutant were reported below detection levels, the method detection level (MDL) was used as the maximum observed concentration. If the maximum observed concentration was below the CTR-based limitation, no loading reductions were considered.

! If the difference between the baseline value (existing permit limit or effluent concentration) and the CTR limitation was negative, zero reduction was assumed.

! If both the CTR-based WQBEL and the existing permit limit were below the analytical MDL, one-half of the difference between the existing permit limit and the CTR-based limit was used to estimate the pollutant load reduction.

! If the existing permit limit (or effluent concentration in the absence of a permit limit) was above the MDL, but the CTR limit was below the MDL, the CTR-based limit, or one-half of the MDL (whichever produced a smaller load reduction) was used for the CTR-based limit for calculating pollutant load reductions.

EPA estimated annual baseline pollutant loadings by multiplying the baseline value (expressed in micrograms per liter) by the average daily flow rate (in million gallons per day), or, for publicly owned treatment works (POTWs), by the design flow, a conversion factor (0.00834), and 365 days per year. Then, to determine the reduction in loadings, EPA converted the difference between the most stringent existing permit limitation (or the maximum reported effluent concentration) and the most stringent CTR-based effluent limitation (in concentration units) to pounds per year by multiplying the difference by the facility's average daily flow rate (design flow rate for municipal dischargers), a conversion factor, and 365 days per year. EPA calculated annual pollutant loading reductions for each of the pollutants analyzed at each sample facility for which costs were estimated. The average load reduction then was calculated across sample facilities within each discharge category and extrapolated to the universe of facilities by multiplying the average load reduction by the total number of facilities in the category (EPA extrapolated facility specific costs similarly).

EPA converted baseline pollutant loadings and loading reductions from actual pounds (lb) to toxic-weighted pounds-equivalent (lb-eq) using EPA chronic freshwater aquatic life criteria and toxicity values, standardized to the former chronic aquatic life criterion for copper (copper

formerly had a water quality criterion value of 5.6 ug/L). EPA human health criteria also were used in cases in which a human health criterion had been established for the consumption of fish. National water quality criteria have changed over the years, resulting in corresponding changes in toxic weights. Also, because the CTR applies to both freshwater and saltwater, two different sets of toxic weights would be required. To prevent the overstating of pollutant reductions due to the higher toxic weighting factors that would have been calculated using CTR criteria, EPA used previously calculated toxic weights shown in **Exhibit 4-1**. This approach allows for the direct comparison of the loadings reductions predicted from implementation of the CTR criteria and those loading reductions predicted in previous EPA rulemakings.

4.1.4 Method for Estimating Costs to Indirect Dischargers

Because of the uncertainty of the exact controls that POTWs would use as a result of more stringent CTR-based WQBELs, EPA assumed that many POTWs will select the option of controlling discharges to their collection system as a cost-effective means to comply with CTR-based permit limits. If POTWs were to select this method of control, the dischargers to the POTWs would be affected. Therefore, EPA estimated the potential costs to dischargers to POTWs (i.e., indirect dischargers).

EPA's estimate was based in part on information from the San Jose-Santa Clara and Sunnyvale POTWs, which discharge to South San Francisco Bay, and which already have conducted substantial work with indirect dischargers to meet current permit limits. Specifically, these POTWs were required to perform mass audit studies for copper and nickel. These studies estimated the total costs of implementing various combinations of copper and nickel reduction projects (see City of San Jose, 1994; EOA, 1994). Based on these studies, EPA estimated an average cost per significant industrial users (SIU) of $64,395, or $15,705 per year annualized at 7% over a period of 5 years. EPA then multiplied this cost by the percentage of SIUs assumed to be affected under the low and high scenarios (see Section 4.2).

Exhibit 4-1. Toxic Weights of Pollutants Analyzed

Pollutant	Toxic Weight
Antimony *	1
Arsenic	4
Cadmium	5.2
Chromium VI	35.5
Copper	0.47
Lead	1.8
Mercury	500
Nickel	0.036
Selenium	1.1
Silver	47
Thallium*	1
Zinc	0.051
1,2-Dichlorobenzene	0.011
1,2 Dichloroethane*	1
1,2 Dichloropropane*	1
1,2-Trans-Dichloroethylene*	1
1,3-Dichlorobenzene*	1
1,3-Dichloropropylene*	1
1,4-Dichlorobenzene*	1
2,4-Dinitrophenol*	1
2,4,6-Trichlorophenol	0.35
4,4'-DDD	760
4,4'-DDT	6,500
Aldrin	50
alpha-BHC	100
alpha-Endosulfan	100
Benzene	0.018
Benzo (a) Anthracene*	1
Benzo (a) Fluoranthene*	1
Benzo (k) Fluoranthene*	1
beta-BHC	100
beta-Endosulfan*	1
Bromoform*	1
Butylbenzyl-phthalate*	1
Carbon Tetrachloride*	1
Chlordane	2,300
Chlorobenzene*	1
Chlorodibromomethane*	1
Chloroform	0.0021
Dichlorobromomethane*	1
Dieldrin	57,000

Source: EPA/OST 1988 Cost-Effectiveness Criteria and Weights.
*Value was not provided in source document. A toxic weight of 1 was assumed.

4.2 SUMMARY OF CHANGES TO DRAFT ANALYSIS

To address comments raised on the draft economic analysis (SAIC, 1997), EPA gathered additional data and information to refine the analysis of potential costs and pollutant loading reductions attributable to the CTR. A large part of the effort was directed toward obtaining the most recent NPDES permits and effluent monitoring data for the sample facilities. Efforts also were directed toward increasing the sample size of minor POTWs and minor industrial facilities. EPA randomly selected four new minor POTWs and five new minor industrial facilities to add to the sample. The number of sample facilities selected in each RWQCB was roughly proportional to the universe of facilities in the region. The new sample facilities are listed in **Exhibit 4-2.**

Exhibit 4-2. New Minor Sample Facilities

POTWs	Industrial Facilities
Forestville County Sanitation District	Airline Signal Aerospace, Torrance Facility
City of Calistoga	Los Angeles County Department of Parks and Recreation, Lennox County Park
City of Biggs	Sierra Pacific Feather River Division, Mill Creek
Donner Summit Public Utility District Wastewater Treatment Plant	Great Lakes Chemical Corporation
	California Department of Fish and Game, Iron Gate Salmon Hatchery

An original minor industrial facility (Arco Station 434) was deleted from the sample, however, because it ceased operation and no effluent monitoring data were available for the analysis. As a result of the addition of the facilities listed in Exhibit 4-2, the final sample size of minor POTWs was five, and the final sample size of minor industrial facilities was six.

For the major facility sample, EPA randomly selected the San Diego Gas and Electric Facility at South Bay to replace the San Diego Gas and Electric Silvergate Facility. The Silvergate facility is no longer in operation and no effluent monitoring data were available for the analysis. Additionally, EPA removed the Mining Remedial Recovery Company (known as Alta Gold in the original sample) from the sample. The facility is a closed mine with acid mine drainage coming out of many adits disseminated around the property.

EPA also revised its methodology for calculating a PEQ to address mathematical problems encountered due to limited data sets for some facilities. In the original cost estimate, all non-detect values were assumed to be “zero” for the purposes of calculating the coefficient of variation (CV). This approach resulted in unrealistically high CV values in some instances. A high CV value results in the selection of a high PEQ multiplier and, consequently, a high PEQ value. Based on a review of the available data, EPA determined that using one-half of the method detection level, instead of “zero” for non-detects, resulted in a more accurate CV. EPA, therefore, revised the PEQ methodology to use the following:

- For calculation of the CV, half the detection level of the sample was used for effluent data reported as below the detection level.

- If greater than 20 data points were available for a pollutant, the 99th percentile value was calculated from the data set to represent the PEQ.

Changes to the cost estimation methodology included revisions to the treatment process optimization costs and waste minimization/pollution prevention cost estimates. EPA developed process optimization cost estimates to replace the previous average per facility cost of $100,000. Process modification costs are expressed as a range of values and are based on the flow and type of treatment system [e.g., $2,000 to $60,000 for optimization of biological treatment at a less than one million gallons per day (MGD) facility].

For waste minimization/pollution prevention, EPA increased the cost used in the high scenario for POTWs with a design flow of greater than 5 MGD (from $400,000 to $2,000,000). The revised cost is the highest pollution prevention cost estimate derived by EPA in assessing of compliance costs resulting from implementation of the proposed Great Lakes Water Quality Guidance (SAIC, 1993). The revised cost estimates are shown in **Exhibit 4-3**.

Exhibit 4-3. Revised Waste Minimization/Pollution Prevention Cost Estimates

Category	Low Scenario	High Scenario
POTWs with flow greater than 5 MGD	$400,000	$2,000,000
POTWs with flow less than 5 MGD	$400,000	$400,000
Minor POTWs	$50,000	$50,000
Minor Industrial Dischargers	$50,000	$50,000

Previously, when costs exceeded $500 per pounds-equivalent (lb-eq) removed for an industrial category in the high scenario, EPA assumed that regulatory alternatives to treatment would be used. For this revised analysis, the high scenario reflects the assumption that no regulatory alternatives will be available to dischargers. EPA still assumes that regulatory alternatives will be pursued under the low scenario when the cost for an individual facility exceeds $200 per lb-eq removed.

EPA also revised its assumptions regarding the number of indirect dischargers that may be affected as a result of more stringent CTR-based WQBELs at POTWs. EPA estimated that there are 2,144 SIUs that discharge to POTWs located on California inland surface waters and enclosed bays and estuaries. Previously, EPA assumed that 10% to 30% of SIUs would be impacted. Based on comments received indicating that the number of facilities affected was understated, EPA increased this range to 30% to 70%. However, EPA believes that this revised assumption is unrealistic and that the original 10% to 30% more closely reflects the likely impact. Nonetheless, EPA increased the range of affected facilities to ensure that the cost

estimates for the final rule account are conservative (i.e., err on the side of higher costs).

EPA applied the 70% estimate under the low cost scenario which reflects less use of end-of-pipe treatment and more use of source controls. EPA applied the 30% estimate under the high scenario which reflects more frequent use of end-of-pipe treatment. EPA estimated costs to indirect dischargers based on the average costs from the mass audit studies conducted by San Jose and Sunnyvale, described above (see City of San Jose, 1994; EOA, 1994). Based on these studies, EPA estimated an average cost per indirect discharger of $64,395, or $15,705 per year annualized at 7% over a period of 5 years.

4.3 RESULTS

EPA estimated the potential annual cost of implementing the CTR ranges from approximately $33.5 million to $61.0 million. As shown in **Exhibit 4-4**, indirect dischargers bear most of these costs in the low scenario. Under the high scenario, direct dischargers were expected to incur most of the potential costs. However, high costs are unlikely because EPA used conservative (i.e., tending to err on the high side) assumptions in calculating CTR-based permit limits and in establishing baseline loadings. For example, the baseline loadings for the high scenario were generally based on current effluent limits rather than actual pollutant discharge data. Most facilities discharge pollutants in concentrations below current effluent limits.

Exhibit 4-4. Summary of Potential Annualized Costs (Millions of 1998 First Quarter Dollars)

Discharger Category	Low Scenario	High Scenario
Direct Dischargers	$9.9	$50.9
Indirect Dischargers	$23.6	$10.1
Total	**$33.5**	**$61.0**

4.3.1 Low Scenario

Under the low scenario, major permitted dischargers account for the largest share of the costs (91%) compared to 9% for minor dischargers. Of the major dischargers, POTWs are expected to incur the largest share (87%) of the projected costs (see **Exhibit 4-5**). However, distributed among 128 major POTWs in the state, the average cost per plant is approximately $61,000 per year. Chemical and petroleum industries incur the highest cost of the industrial categories (5.6% of the total annual costs, with an annual average of $25,200 per plant). For minor dischargers, only POTWs are expected to incur costs (9%). The average cost per plant for minor POTWs is approximately $5,000, an amount lower than any major facility category.

Nearly 38% of the total compliance costs are for pursuing alternative regulatory approaches. EPA assumed that alternative regulatory approaches would be pursued if the total cost of treatment exceeded a trigger of $200 per pound of pollutant reduced. Annualized costs for developing and implementing waste minimization plans accounted for 57% of the remaining costs. Five pollutants (copper, mercury, tetrachloroethylene, carbon tetrachloride, and methylene chloride) account for 53% of low scenario annual costs. Fifty-five percent of annual costs were for the control of toxic organics; costs to control metals and mercury accounted for 45% of all annual costs.

Exhibit 4-5. Summary of Annual Costs by Discharger Category: Low Scenario (1998 First Quarter Dollars)

Discharger Category	Number of Plants	Total Costs	Category Cost as a Percent of Total Cost	Average Cost per Plant
Major Dischargers				
POTWs	128	$7,841,583	87.0%	$61,262
Chemicals/Petroleum Products	20	$504,016	5.6%	$25,201
Electric Utilities	13	$370,182	4.1%	$28,476
Metals and Transportation Equipment	7	$52,822	0.6%	$7,546
Miscellaneous	12	$240,171	2.7%	$20,014
Lumber and Paper	4	$0	0.0%	$0
Subtotal	**184**	**$9,008,774**	**100%**	**$48,961**
Minor Dischargers				
POTWs	185	$921,894	100%	$4,983
Industrials	872	$0	0.0%	$0
Subtotal	**1057**	**$921,894**	**100%**	**$872**
All Dischargers				
Total	**1241**	**$9,930,668**	**NA**	**$8,002**

4.3.2 High Scenario

Under the high scenario, major permitted dischargers account for 94% of the annual costs compared to 6% for minor sample facilities. For major dischargers, POTWs were expected to incur approximately 87% of the total projected annualized cost (see **Exhibit 4-6**). However, distributed among the 128 major POTWs in the state, the average cost per plant is approximately $325,000 per year. Chemical and petroleum industries incur the highest cost among the industrial categories (9% of the total estimated annual cost, and averaging just over $221,000 per plant annually). For minor facilities, the average cost per plant for POTWs is $7,800, compared to $1,600 per plant for industrial facilities.

Over 91% of the annual costs are for waste minimization and treatment process optimization costs. Waste minimization represents nearly 84% of the total annual costs. EPA assumed that waste minimization and process optimization would be pursued because the increment of pollutant removal is relatively small (i.e., less than 25% of current effluent levels) and many of the sample facilities already possess treatment processes that could be enhanced to achieve CTR-based effluent limits. Capital and operating and maintenance (O&M) costs make up less than 9% of total annual costs. Four pollutants (tetrachloroethylene, silver, copper, and mercury) resulted in 41% of the estimated high scenario annual costs. Costs to control metals and mercury accounted for more than 50% of annual costs; costs to control toxic organic pollutants accounted for slightly less than 50%.

Exhibit 4-6. Summary of Annual Costs by Discharger Category: High Scenario (1998 First Quarter Dollars)

Discharger Category	Number of Plants	Total Costs	Category Cost as a Percent of Total Cost	Average Cost per Plant
Major Dischargers				
POTWs	128	$41,599,147	86.5%	$324,993
Chemicals/Petroleum Products	20	$4,425,287	9.2%	$221,264
Electric Utilities	13	$370,182	0.8%	$28,476
Metals and Transportation Equipment	7	$351,815	0.7%	$50,259
Miscellaneous	12	$1,321,720	2.7%	$110,143
Lumber and Paper	4	$0	0.0%	$0
Subtotal	**184**	**$48,068,151**	**100%**	**$261,240**
Minor Dischargers				
POTWs	185	$1,448,691	51.1%	$7,831
Industrials	872	$1,386,377	48.9%	$1,590
Subtotal	**1057**	**$2,835,068**	**100%**	**$2,682**
All Dischargers				
Total	**1241**	**$50,903,219**	**NA**	**$41,018**

Note: Totals may not add up due to rounding.

4.4 POLLUTANT LOADING REDUCTIONS AND COST-EFFECTIVENESS

Exhibits 4-7 and **4-8** present the annual unweighted and toxic-weighted baseline pollutant loadings and loadings reductions, respectively. As shown in Exhibit 4-8, under the low scenario, where the baseline represents existing effluent concentrations, the expected reduction in pollutant loadings resulting from implementation of the criteria contained in the CTR is approximately 1.1 million toxic lb-eq per year, or 50% of the baseline load of 2.2 million toxic lb-eq per year. Under the high scenario, the expected reduction in pollutant loadings resulting from the implementation of the CTR-based WQBELs is approximately 2.7 million toxic lb-eq per year, or 15% of the baseline load of 18.5 million toxic lb-eq per year.

Exhibit 4-7. Baseline Pollutant Loadings and Reductions (Not Toxicity-Weighted, Lbs/yr)

Pollutant	Low			High		
	Existing	Reduction	% Reduction	Existing	Reduction	% Reduction
Antimony (Sb)	0	0		0	0	
Arsenic (As)	148	0	0.0%	319,804	0	0.0%
Cadmium (Cd)	82	0	0.0%	45,764	225	0.5%
Chromium VI (Cr-VI)	1,759	1,327	75.4%	102,848	14,167	13.8%
Copper (Cu)	386,839	44,675	11.5%	451,966	82,241	18.2%
Lead (Pb)	311,631	23,268	7.5%	454,881	36,765	8.1%
Mercury (Hg)	2,116	1,583	74.8%	2,477	1,627	65.7%
Nickel (Ni)	294,259	0	0.0%	1,509,107	277,120	18.4%
Selenium (Se)	152	0	0.2%	57,256	54	0.1%
Silver (Ag)	3,679	2,252	61.2%	103,751	16,479	15.9%
Thallium (Tl)	0	0		0	0	
Zinc (Zn)	468,416	0	0.0%	1,468,700	71,476	4.9%
1,2 Dichlorobenzene	0	0		14,319,172	421,101	2.9%
1,2 Dichloroethane	0	0		2	0	0.0%
1,2 Dichloropropane	0	0		2	0	0.0%
1,2-Trans-Dichloroethylene	0	0		0	0	
1,3 Dichlorobenzene	0	0		4,425,512	0	0.0%
1,3-Dichloropropylene	0	0		0	0	
1,4 Dichlorobenzene	0	0		163,541	0	0.0%
2,4-Dinitrophenol	0	0		0	0	
2,4,6 Trichlorophenol	879	756	86.0%	1,876	756	40.3%
4,4'-DDD	0	0		0	0	
4,4'-DDT	1	0	0.0%	1	0	0.0%
Aldrin	0	0	0.0%	0	0	0.0%
alpha-BHC	9	0	0.0%	27	0	0.0%
alpha-Endosulfan	0	0		5	0	0.0%
Benzene	0	0		41,957	0	0.0%
Benzo (a) Anthracene	1	0	0.0%	1	0	0.0%
Benzo (a) Fluoranthene	1	0	0.0%	1	0	0.0%
Benzo (k) Fluoranthene	17	0	0.0%	17	0	0.0%
beta-BHC	34	0	0.0%	96	0	0.0%
beta-Endosulfan	0	0		4	0	0.0%
Bromoform	0	0		924	0	0.0%
Butylbenzyl-phthalate	0	0		0	0	
Carbon Tetrachloride	5,586	3,502	62.7%	5,598	3,508	62.7%
Chlordane	0	0		0	0	0.0%
Chlorobenzene	0	0		0	0	
Chlorodibromomethane	12,532	10,296	82.2%	12,533	10,296	82.2%
Chloroform	250,555	223,085	89.0%	1,336,084	522,958	39.1%
Dichlorobromomethane	57,456	54,669	95.1%	57,786	54,679	94.6%
Dieldrin	0	0	0.0%	0	0	0.0%
Di-n-Butyl Phthalate	0	0		0	0	
Endosulfan Sulfate	0	0		0	0	
Endrin	0	0		6	0	0.0%
Endrin Aldehyde	0	0		0	0	
Fluoranthene	0	0		186,752	0	0.0%
Fluorene	0	0		0	0	
gamma-BHC	130	41	31.2%	213	41	19.1%
Heptachlor	0	0	0.0%	0	0	0.0%
Heptachlor epoxide	0	0	0.0%	0	0	0.0%
Hexachlorobenzene	0	0		291	280	96.1%
Methylene chloride	16,885	5,253	31.1%	1,453,701	5,253	0.4%
PCBs	0	0		0	0	51.9%
Pentachlorophenol	879	773	88.0%	11,583	5,510	47.6%
Phenol	0	0		767,755	0	0.0%
TCDD	0	0		0	0	0.0%
Tetrachloroethylene	6,832	4,487	65.7%	6,930	4,492	64.8%
Toluene	0	0		126,606,651	42,110,050	33.3%
Toxaphene	0	0		0	0	2.0%
Trichloroethylene	0	0		6	0	0.0%
Total Reductions	**1,820,879**	**375,967**	**20.6%**	**153,915,584**	**43,639,078**	**28.4%**

Exhibit 4-8. Toxicity-Weighted Baseline Pollutant Loadings and Reductions (Lbs-eq/yr)

Pollutant	Low			High		
	Existing	Reductions	% Reductions	Existing	Reductions	% Reduction
Antimony (Sb)	0	0		0	0	
Arsenic (As)	592	0	0.0%	1,279,218	0	0.0%
Cadmium (Cd)	424	0	0.0%	237,971	1,170	0.5%
Chromium VI (Cr-VI)	62,454	47,113	75.4%	3,651,115	502,936	13.8%
Copper (Cu)	181,814	20,997	11.5%	212,424	38,653	18.2%
Lead (Pb)	560,936	41,882	7.5%	818,785	66,178	8.1%
Mercury (Hg)	1,057,793	791,601	74.8%	1,238,464	813,467	65.7%
Nickel (Ni)	10,593	0	0.0%	54,328	9,976	18.4%
Selenium (Se)	167	0	0.2%	62,982	59	0.1%
Silver (Ag)	172,906	105,829	61.2%	4,876,297	774,534	15.9%
Thallium (Tl)	0	0		0	0	
Zinc (Zn)	23,889	0	0.0%	74,904	3,645	4.9%
1,2 Dichlorobenzene	0	0		157,511	4,632	2.9%
1,2 Dichloroethane	0	0		2	0	
1,2 Dichloropropane	0	0		2	0	
1,2-Trans-Dichloroethylene	0	0		0	0	
1,3 Dichlorobenzene	0	0		4,425,512	0	0.0%
1,3-Dichloropropylene	0	0		0	0	
1,4 Dichlorobenzene	0	0		163,541	0	0.0%
2,4-Dinitrophenol	0	0		0	0	
2,4,6 Trichlorophenol	307	264	86.0%	656	264	40.3%
4,4'-DDD	0	0		0	0	
4,4'-DDT	4,670	0	0.0%	9,720	0	0.0%
Aldrin	8	0	0.0%	17	0	0.0%
alpha-BHC	950	0	0.0%	2,686	0	0.0%
alpha-Endosulfan	0	0		500	0	0.0%
Benzene	0	0		755	0	0.0%
Benzo (a) Anthracene	1	0	0.0%	1	0	0.0%
Benzo (a) Fluoranthene	1	0	0.0%	1	0	0.0%
Benzo (k) Fluoranthene	17	0	0.0%	17	0	0.0%
beta-BHC	3,409	0	0.0%	9,553	0	0.0%
beta-Endosulfan	0	0		4	0	0.0%
Bromoform	0	0		924	0	0.0%
Butylbenzyl-phthalate	0	0		0	0	
Carbon Tetrachloride	5,586	3,502	62.7%	5,598	3,508	62.7%
Chlordane	0	0		465	0	0.0%
Chlorobenzene	0	0		0	0	
Chlorodibromomethane	12,532	10,296	82.2%	12,533	10,296	82.2%
Chloroform	526	468	89.0%	2,806	1,098	39.1%
Dichlorobromomethane	57,456	54,669	95.1%	57,786	54,679	94.6%
Dieldrin	9,717	0	0.0%	20,028	0	0.0%
Di-n-Butyl Phthalate	0	0		0	0	
Endosulfan Sulfate	0	0		0	0	
Endrin	0	0		566	0	0.0%
Endrin Aldehyde	0	0		0	0	
Fluoranthene	0	0		171,812	0	0.0%
Fluorene	0	0		0	0	
gamma-BHC	9,128	2,849	31.2%	14,925	2,849	19.1%
Heptachlor	799	0	0.0%	1,701	0	0.0%
Heptachlor epoxide	0	0	0.0%	0	0	0.0%
Hexachlorobenzene	0	0		209,741	201,623	96.1%
Methylene chloride	7	2	31.1%	610	2	0.4%
PCBs	0	0		3,001	1,557	51.9%
Pentachlorophenol	439	387	88.0%	5,792	2,755	47.6%
Phenol	0	0		21,497	0	0.0%
TCDD	0	0		16,065	0	0.0%
Tetrachloroethylene	506	332	65.7%	513	332	64.8%
Toluene	0	0		708,997	235,816	33.3%
Toxaphene	0	0		8,118	163	2.0%
Trichloroethylene	0	0		6	0	0.0%
Total Reductions	**2,177,628**	**1,080,192**	**49.6%**	**18,540,452**	**2,730,194**	**14.7%**

Exhibit 4-9 shows the 10 largest percentage toxic-weighted reductions by pollutant anticipated under the low and high scenarios. Under the low scenario, mercury is anticipated to be reduced by more than 73%; silver accounts for nearly another 10% reduction. Overall, organic removals account for just under 7% of the total reductions. The top two organics, dichlorobromomethane and chlorodibromomethane, are reduced by 5.1% and 1.0%, respectively. The small number of pollutants for which pollutant reductions were observed was partially because, under the low scenario, EPA assumed that alternative regulatory approaches would be sought for a number of pollutants and did not take credit for potential pollutant loading reductions.

Under the high scenario, just over 80% of the total projected toxic-weighted annual reductions will come from reducing metals, including mercury, while nearly 19% of expected reductions are for organic pollutants. Of the metals that will be reduced, mercury accounts for just under 30% of the total annual reductions and silver accounts for another 28%. Of the organics, toluene and hexachlorobenzene account for 8.6 and 7.4%, respectively, of the total annual reductions, while two other organic pollutants are reduced at relatively small percentages.

Exhibit 4-9. Ranking of Ten Highest Toxic-Weighted Pollutant Reductions

Low Scenario		High Scenario	
Pollutant	**Reduction as a Percent of Total**	**Pollutant**	**Reduction as a Percent of Total**
Mercury	73.3%	Mercury	29.8%
Silver	9.8%	Silver	28.4%
Dichlorobromomethane	5.1%	Chromium VI	18.4%
Chromium VI	4.4%	Toluene	8.6%
Lead	3.9%	Hexachlorobenzene	7.4%
Copper	1.9%	Lead	2.4%
Chlorodibromomethane	1.0%	Dichlorobromomethane	2.0%
Carbon tetrachloride	0.3%	Copper	1.4%
gamma-BHC	0.3%	Chlorodibromomethane	0.4%
Chloroform	<0.1%	Nickel	0.4%
Total	**100%**	**Total**	**100%**

Note: Totals are rounded.

The estimated cost-effectiveness of the rule is shown in **Exhibit 4-10** and ranges from $22 per toxic lb-eq to $31 per toxic lb-eq. In the low scenario, the highest cost-effectiveness value was observed for the electric utilities category ($43 per toxic lb-eq), while the lowest was for the chemicals and petroleum products category at $6 per toxic lb-eq. In the high scenario, the highest cost-effectiveness value was also for the metals/transportation equipment category at $223 per toxic lb-eq, while the lowest was for POTWs at $21 per toxic lb-eq. For comparison, **Exhibit 4-11** presents cost-effectiveness estimates from previous EPA rulemakings.

Exhibit 4-10. Annual Baseline Loads, Load Reductions, and Cost-Effectiveness

Category	Low Scenario			High Scenario		
	Annual Costs[1]	Loading Reductions[2]	Cost-Effective-ness[3]	Annual Costs[1]	Loading Reductions[2]	Cost-Effective-ness[3]
POTWs - Indirect Dischargers	$7.8 $23.6	0.91	$35	$41.6 $10.1	2.47	$21
Chemicals/Petroleum Products	$0.5	0.08	$6	$4.4	0.12	$36
Electric Utilities	$0.4	0.01	$43	$0.4	0.01	$43
Metals/Transport Equipment	$0.05	0.001	$38	$0.4	0.002	$223
Miscellaneous	$0.2	0.02	$10	$1.3	0.03	$38
Lumber/Paper	$0	0	NC	$0	0	NC
All Dischargers[4]	**$33.5**	**1.08**	**$31**	**$61.0**	**2.73**	**$22**

Note: Detail may not add to total due to rounding.
[1] Millions of 1998 first-quarter dollars.
[2] Millions of toxic-weighted pounds (lb-eq)
[3] $/lb-eq
[4] Including major and minor dischargers.
NC: Not calculated.

4.5 SOURCES OF UNCERTAINTY IN THE ANALYSIS

The estimates of potential compliance costs are based on assumptions to facilitate analysis and to overcome data limitations, where necessary. EPA generally designed these assumptions to be "conservative," that is, to err on the side of estimating more stringent and costly controls than would actually be required. Some of these assumptions also may tend to overstate pollutant loading reductions. **Exhibit 4-12** provides a summary of EPA's assumptions and the potential impact on the analysis of costs and benefits.

Exhibit 4-11. Estimated Incremental Cost-Effectiveness for Direct Dischargers by Industry[1] (1998 First Quarter Dollars)

Industry	Incremental Cost-Effectiveness for Selected Technology Options ($/lb-eq removed)[2]
Aluminum Forming	174.71
Battery Manufacturing	2.89
Coil Coating – Can making	14.44
Coal Mining	None
Coil Coating	70.75
Copper Forming	38.98
Electronics I	583.32
Electronics II	Not Available
Foundries	121.28
Inorganic Chemicals I	<1.45
Inorganic Chemicals II	8.67
Iron and Steel	2.89
Leather Tanning	None
Metal Finishing	17.32
Nonferrous Metals Forming	99.62
Nonferrous Metals Manufacturing I	5.77
Nonferrous Metals Manufacturing II	8.67
OCPSF	7.22[3]
Pharmaceuticals	1.45
Plastics Molding and Forming	None
Porcelain Enameling	8.67
Petroleum Refining	None
Pulp and Paper (PCB control for De-ink subcategory only)	25.99
Textile Mills	None

[1] Toxic and nonconventional pollutants only.
[2] Updated from 1981 dollars. Reflects incremental cost-effectiveness to proceed from current levels to levels represented by best available technology economically achievable.
[3] Reflects costs and removals of both air and water pollutants.
Source: EPA, 1992.

Exhibit 4-12. Biases and Uncertainties in the Analysis

Assumption	Potential Impact on Costs	Potential Impact on Benefits	Comments
Methods used to determine reasonable potential and calculate CTR-based WQBELs based on the EPA *Technical Support Document for Water Quality-based Toxics Control* (or TSD)	?	?	The TSD provides methods that account for sample size and effluent variability. If state implementation procedures are not comparable, TSD methods may over- or understate costs.
Use of 1:1 translator to convert dissolved-form criteria to total recoverable criteria for purposes of determining reasonable potential	+	+	Tends to result in more stringent effluent limits. Tends to overestimate the reasonable potential to exceed CTR-based limits.
Plant design flow used in calculating CTR-based effluent limits	+	+	Tends to overestimate the costs and pollutant loading reduction required to achieve CTR-based limits.
Zero dilution assumed in the absence of data or information related to critical low flow for the receiving water	+	+	Tends to make WQBELs more stringent. Tends to overestimate the costs and pollutant loading reductions required to achieve CTR-based limits.
Highest reported ambient receiving water concentration used to represent the background concentration when calculating CTR-based WQBELs	+	+	Using the highest reported value potentially denies the discharger use of a portion of the assimilative capacity of the receiving water. Tends to result in a greater need for treatment, and thus, potentially higher costs and pollutant loading reductions required to achieve CTR-based limits.
In the absence of ambient receiving water data, zero used as the background concentration	-	-	Assuming zero in the absence of background data potentially allows the discharger a larger portion of the assimilative capacity of the receiving water. Tends to underestimate costs and pollutant loading reductions required to achieve CTR-based limits.
Maximum pollutant effluent concentrations observed during the monitoring period used for estimating costs if CTR-based WQBELs were exceeded (low-end scenario)	+	+	Overstates the need for pollutant reductions to meet CTR-based WQBELs; tends to overestimate costs and pollutant loading reductions required to achieve CTR-based limits

Exhibit 4-12. Biases and Uncertainties in the Analysis (Continued)

Assumption	Potential Impact on Costs	Potential Impact on Benefits	Comments
Existing permit limit, or maximum pollutant effluent concentration in the absence of a permit limit, used for estimating costs if CTR-based WQBELs were exceeded (high scenario)	+	+	If facility is in compliance with effluent limits (i.e., discharging at levels below the permit limit), overstates the need for pollutant reductions to meet CTR-based WQBELs. Tends to overestimate costs and pollutant loading reductions required to achieve CTR-based limits.
Capital costs amortized over 10 years	+	0	The useful life of most equipment currently is more than 10 years. Tends to overestimate the annual costs to a facility.

\+ potentially upward bias.
\- potentially downward bias.
0 neutral bias.
? direction of bias unknown.

5.0 THE BENEFITS ASSOCIATED WITH THE CTR: METHODS AND CONCEPTS

The benefits analysis presented in this document provides insight into both the types and the magnitude of the benefits expected to arise as a result of implementing the CTR.[1] This chapter presents economics concepts and analytical issues associated with defining benefit categories and developing quantified and monetized benefits estimates. Section 5.1 describes the economic concepts used in the benefits analysis. Section 5.2 discusses the limitations of the analysis.

5.1 ECONOMIC CONCEPTS APPLICABLE TO THE BENEFITS ANALYSIS

This EA uses a conceptual foundation of "economic benefits" and assigns appropriate benefit categories to define and measure those benefits attributable to implementing the CTR. The sections below define terms used in that conceptual foundation and describe the concepts.

5.1.1 Economic Benefits

The term "economic benefits" refers to the dollar value associated with all the expected positive impacts of the CTR, that is, all CTR-related outcomes that lead to higher social welfare. The monetary value of benefits is the sum of the predicted changes in "consumer (and producer) surplus." These "surplus" measures are standard and widely accepted terms of applied welfare economics, and reflect the degree of well-being enjoyed by people given different levels of goods and prices (including those associated with environmental quality).

This conceptual foundation raises several relevant issues and potential limitations for the benefits analysis. First, the standard economic approach to estimating environmental benefits is anthropocentric—all benefit values arise from how environmental changes are perceived and valued by humans. This leads to the issue of how to define and measure "ecologic benefits" that may arise above and beyond the values humans place on environmental quality improvements (e.g., the protection and enhancement of habitat and living species). A related second point is that the benefits of all future outcomes are valued in present-day values. All future physical outcomes, near-term as well as long-term, associated with reduced pollutant loadings need to be predicted and then translated into the framework of present-day human activities and concerns.

[1] Hereafter, references to the benefits resulting from the CTR, refer to the benefits that occur after implementation of the NPDES permits program to meet water quality standards established with CTR criteria. For this analysis, compliance with the CTR is expected to occur immediately. In reality, compliance, and thus costs and benefits, will occur as permits come up for review and are changed in accordance with revised water quality standards.

5.1.2 Benefit Categories Applicable to the CTR

To develop a benefits analysis, first the types or categories of benefits that apply must be defined. In this analysis, EPA relied on a set of benefits categories that applies to changes in the water resource environment. As reflected in **Exhibit 5-1**, benefits are categorized according to direct use of, or contact with, the resource.

Exhibit 5-1. Potential Benefits of Water Quality Improvements

Use Benefits	
In-Stream	Commercial fisheries, shell fisheries, and aquaculture; navigation Recreation (fishing, boating, swimming, etc.) Subsistence fishing Human health risk reductions
Near-Stream	Water-enhanced non-contact recreation (picnicking, photography, jogging, camping, etc.) Non consumptive use (e.g., wildlife observation)
Option Value	Premium for uncertain future demand Premium for uncertain future supply
Diversionary	Industry/commercial (process and cooling waters) Agriculture/irrigation Municipal drinking water (treatment cost savings and/or human health risk reductions)
Aesthetic	Residing, working, traveling, and/or owning property near water, etc.
Passive Use Benefits	
Bequest	Intergenerational equity
Existence	Stewardship/preservation Vicarious consumption
Ecologic	Reduced mortality/morbidity for aquatic and terrestrial wildlife Improved reproductive success for aquatic and terrestrial wildlife Increased diversity of aquatic and terrestrial wildlife Improved conditions for successful recovery of threatened and endangered species Improved integrity of aquatic and aquatic-dependent ecosystems

Use Benefits

Use benefit categories include in-stream, near-stream, and diversionary uses of the impacted waters and encompass both consumptive (fishing) and nonconsumptive activities (e.g., wildlife observation). In most applications to pollutant reduction scenarios, the most prominent use benefit categories are those related to recreational fishing, boating, and swimming.

Whether recreational use benefits reflect society's prime motivation for environmental protection measures is unclear. Many benefits analyses, however, focus on recreational values because they are well understood, there is a large body of empirical research to draw upon, and the associated benefits tend to be quite large. Recreational activities have received considerable empirical attention from economic researchers over the past two decades. The research relating to

recreational fishing and similar activities generally indicates that water-based recreation is a highly valued activity in today's society.

Another use benefit category of potential significance for water quality regulations is human health risk reductions. Health risk reductions can be realized through actions that reduce human exposures to risk-posing contaminants, such as exposure through the consumption of fish or drinking water containing elevated levels of pollutants. Cost savings associated with the removal of contaminants from public drinking water supply systems is another form of a potential use benefit.

Passive Use (Nonuse) Benefits

Improved environmental quality can be valued by individuals apart from any past, present, or anticipated future use of the resource in question. Such passive or nonuse values have been categorized in several ways in the economics literature, typically embracing the concepts of existence, bequest, and stewardship. These nonuse values are associated with the purely public good aspects of environmental improvement in that the utility derived by an individual is entirely non-rival (an increase in utility derived by one individual does not reduce the welfare enjoyed by any other individual) and nonexcludable (there is no feasible way to exclude any individual from deriving utility from a nonuse aspect of an environmental improvement).[2]

Passive use values may be significant, but are difficult to quantify. Whereas human uses of a resource can be observed directly and valued with a range of technical economic techniques, passive use values can be ascertained only from asking survey respondents to reveal their values. The uncertainty in ascertaining passive use values has led to considerable debate as to whether they exist for applicable changes in environmental quality and, if so, whether they are of an appreciable magnitude relative to use values.[3] For the CTR, it is believed that passive use benefits are relevant and may be appreciable.

5.1.3 The Concept and Applicability of Ecologic Benefits

Among the relevant passive use values associated with the CTR are ecologic benefits associated with decreasing the level of toxic compounds found in California waters, sediment, and associated biota. Such ecologic benefits are likely to embody reduced risks of direct mortality, and increased reproductive success, in a range of important fish and wildlife species, as well as improved ecosystem health. The species include, but are not limited to, bald eagles, other

[2] Many direct use benefits also arise from the public good context except, for example, to the extent that recreational benefits associated with improved water quality may be impeded by lack of access (private property holdings along the shoreline) or congestion. Nonuse benefits, on the other hand, are strictly of the nature of pure public goods, as neither access nor crowding are applicable to nonuse.

[3] For example, see Chapter 7 of the Regulatory Impact Analysis of the Proposed Great Lakes Water Quality Guidance, developed for U.S. EPA, April 15, 1993.

piscivorous avian species, mammalian species that feed on fish and crustaceans, and a wide range of aquatic species such as trout and other salmonids.

Some ecologic benefits clearly will have positive impacts that will manifest as use values (e.g., recreational angling, birdwatching). But of greater relevance is the applicability of ecologic benefits under the traditional passive use categories of existence and bequest values. One way to distinguish this, suggested by some analysts, is that passive use values remain anthropocentric, whereas ecologic benefits are held completely distinct from human valuation—making them additive to nonuse values. The question then becomes one of how to assign values to ecologic benefits for the purpose of setting priorities in policymaking.

For the purposes of this EA, EPA addressed ecologic benefits in two manners. First, Chapter 6 provides a qualitative (and semi-quantitative) discussion of the physical relationships, mechanisms, and beneficial ecologic outcomes that may result from implementation of the proposed CTR. Second, for the purpose of the empirical efforts to monetize benefits, the CTR's ecologic benefits are considered to be included within passive use values and potential recreation benefits in which improved ecosystem health might be manifested.

5.2 LIMITATIONS INHERENT IN THE BENEFITS ANALYSIS

5.2.1 Causality: Linking the CTR to Beneficial Outcomes

In conducting a benefits analysis for anticipated CTR-related changes in pollutant loadings to California's waters, a chain of events must be specified and understood. As shown in **Exhibit 5-2**, this chain spans the spectrum of institutional relationships and policymaking; the technical feasibility of pollution abatement and facility-level decision-making regarding process and technology choices; the physical-chemical properties of receiving streams and their consequent linkages to biologic/ecologic responses in the aquatic environment; and human responses and values associated with these changes.

Exhibit 5-2. Chain of Events in CTR Benefits Analysis

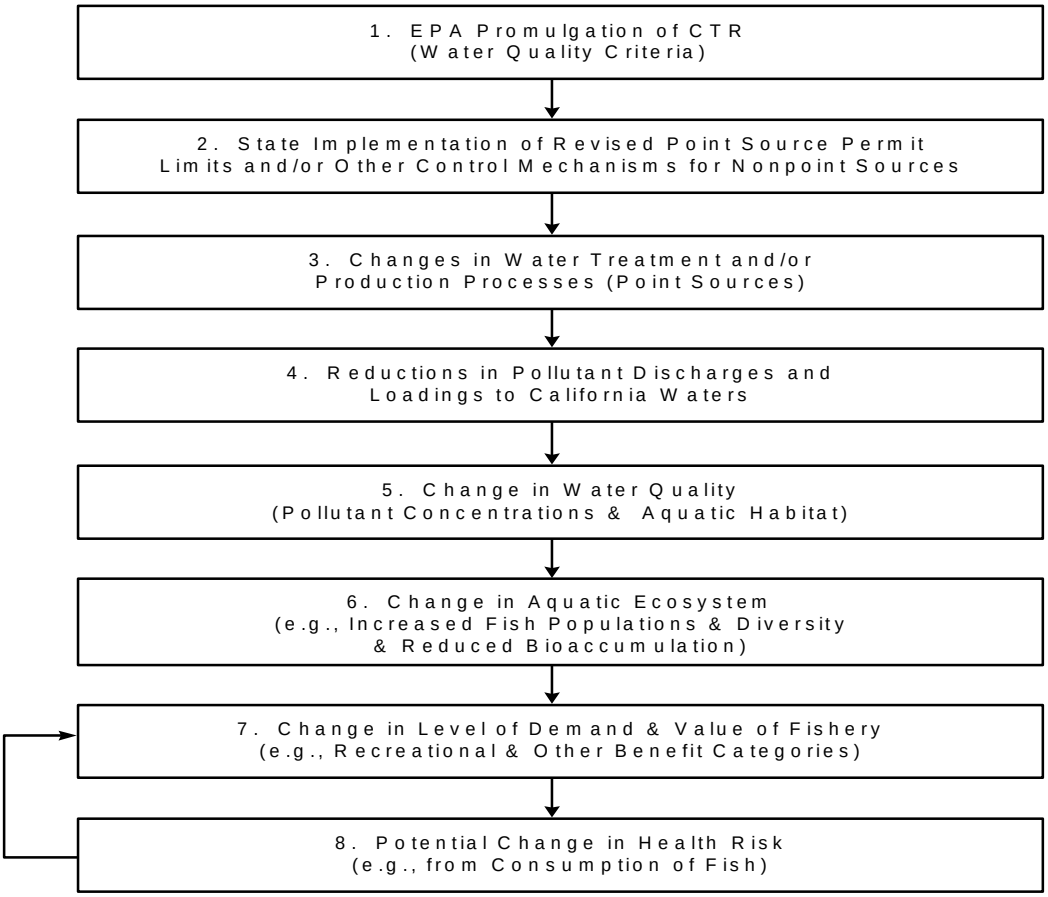

The first two steps of Exhibit 5-2 reflect the institutional aspects of implementing the CTR, through which publication of the rule's water quality criteria is ultimately linked to state efforts to control pollutant loadings. In waters not meeting the water quality criteria, state regulators must assess how to allocate the necessary pollutant loadings reductions among various point and nonpoint sources. To the extent that these loadings reductions are assigned to point source dischargers, the state's actions will be manifested in revised point source discharge permits. The costing analysis for the CTR presumes that all loadings reductions will be generated through point source controls; however, it is possible that state regulators will implement the rule such that nonpoint source control efforts may be used in addition to some portion of the point source controls assumed here.

In steps 3 and 4, the revised state permit limits ultimately result in a change in pollutant loadings

for targeted contaminants (as well as those removed incidental to the improved wastewater treatment or process changes), from an appropriately defined set of baseline loadings. The actual manner in which the loadings reductions are achieved will depend on treatment technology and process changes selected by individual facilities. These technology choices will determine the compliance costs and loadings reductions.

Next, as shown in steps 5 and 6 of Exhibit 5-2, pollutant loading reductions (from step 4) need to be converted into changes in environmental conditions such as physical/chemical parameters (in-stream pollutant concentrations) and the consequent improvement in biota (e.g., increased diversity and size of fishery populations). In lieu of detailed water quality and ecologic (e.g., fisheries) modeling, which was infeasible within the time frame and budget limits of this analysis, this benefits analysis relies on a more ad hoc characterization of the specific pollutants addressed and their links to restricted beneficial uses of the resource. These are described, in part, in Chapter 6.

Finally, in steps 7 and 8, the analysis reaches the stage at which anthropocentric benefit concepts begin to apply, such as illustrated by the link between improved fisheries and the enhanced enjoyment realized by recreational anglers. These final steps reflect the focal point of the quantitative benefits analysis presented in Chapter 8, and are defined by the benefits categories described above. But as noted below, there are several issues that inhibit the ability to accurately forecast the extent to which the CTR may generate such benefits.

5.2.2 Temporal and Spatial Issues

As noted above, it is important to recognize the analytic challenges and resulting limitations associated with estimating the benefits of reducing discharges of toxic pollutants to all California waters. An empirical benefits assessment is a difficult and uncertain undertaking under the best of circumstances. In the case of the CTR, the challenges and limitations are magnified by several important considerations, including, but not limited to the following:

- *The time path to ecosystem recovery from near-term reductions in toxic loadings.* Many of the toxic compounds relevant to the CTR are persistent in the environment; therefore, even the total elimination of additional loadings of these compounds may not immediately alter water column or fish-tissue concentrations. A significant portion of the benefits may be realized only in the relatively distant future.

- *The geographic scope of contamination and of benefit-generating activities throughout the varied watershed ecosystems of California.* Typically, the areal extent of toxic contamination is very widespread, even if it originates from a well-defined source at a specific location. Contamination becomes even further dispersed through uptake in the food chain. Thus, the benefits of reducing toxic discharges within the state's watersheds are likely to extend beyond the boundaries of the state's "impaired" waters.

The time-path issue can be addressed, in part, through the use of alternative discounting regimes in the benefits analysis. The geographic scope issue is more difficult to address empirically, other than to recognize the high probability that beneficial results of the CTR will be realized beyond the boundaries of impaired state waters.

5.2.3 Attribution of Benefits to the CTR

For this analysis, EPA had data and information to estimate large-scale changes in water quality beyond present day conditions and then attributed the CTR for its contribution to these changes. First, the current total pollutant loadings from all sources that are contributing to the toxics-related water quality problems observed in the state are assessed. This defines the overall magnitude of the loadings "problem." Second, the share of the total loadings problem that is attributable to sources that are likely to be controlled via the CTR are estimated. Since this analysis was designed to focus only on those controls imposed on point sources, this stage of the process entailed examining the portion of total loadings originating from point sources (see Chapter 7). Third, the percent reduction in point source loadings expected due to implementation of the CTR is estimated, then applied to the share of point source loadings.

For example, if the total benefits of moving from baseline water quality to having all of California's waters completely unimpaired were estimated to be $500 million per year, and point sources contributed 40% of the toxic-weighted pollutant loadings that contributed to baseline impairments, then one would estimate (absent more refined data) that perhaps $200 million of the potential water quality benefits would be attributable to the potential elimination (100% reduction) of all point source discharges. If the CTR was expected to achieve a 50% reduction in the offending point source discharges, one would then develop an estimate of $100 million as a rough approximation of CTR-related benefits.[4] Thus, total baseline pollutant loads, and anticipated loadings reductions, are used as a means to approximate roughly the share of total potential water quality benefits that may be attributed to the rule. In the example above, the CTR would be viewed as addressing 20% of the total loadings problem (reducing by 50% the 40% of total loadings due to point sources).

Yet one of the difficulties in applying the loadings-based attribution approach is obtaining and interpreting data on baseline loadings. The problem entails two significant challenges:

- *Developing reliable estimates of both ongoing point source loadings and current nonpoint source loadings.* This is difficult because nonpoint loadings come from a wide variety of sources that are difficult to measure, including atmospheric deposition and agricultural and urban runoff. Thus, nonpoint source loading estimates are probably highly imprecise and very incomplete because they likely omit sources underestimating load estimates. Even point source estimates of

[4] Forty percent of $500 million equals $200 million; 50% of this $200 million equals $100 million.

loadings are imprecise because discharged concentrations may be below detection limits (i.e., “hidden loads” may exist in discharge data).

! *Accounting for the share of the current loadings versus those attributable to historical discharges from point and nonpoint sources.* Many of the pollutants addressed by the CTR are persistent (e.g., metals) and bioaccumulative (e.g., dioxins, PCBs, and selected agricultural chemicals). Their presence in the water column, sediment, and biota of California waters may be largely due to historical discharges rather than current loadings. The degree to which historical loads contribute to present-day concentrations will vary according to many complex contaminant- and site-specific factors. However, historical loads may, in some instances, be the predominant source of toxics-related water quality problems. In such instances, efforts to control current discharges may be of relatively limited effectiveness and value.

These complicating factors are difficult to account for in the attribution analysis. Nonetheless, they need to be kept in mind when interpreting the loadings data that are available for an apportionment analysis. These issues are described in greater detail in Chapter 7.

6.0 QUALITATIVE ASSESSMENT OF POTENTIAL ECOLOGICAL BENEFITS

This chapter describes the types of ecological benefits anticipated to result from implementation of the CTR. Improvements in ambient water quality, anticipated under the rule, are expected to result in substantial ecologic benefits through improvements in ecosystem health. This chapter provides an overview of the adverse effects of toxics on California's diverse ecological systems, shows how improved ambient water quality can translate into improved ecosystem health, and qualitatively assesses the ecologic benefits anticipated under the proposed rule.

Section 6.1 gives an overview of the diversity of ecological systems in California. Section 6.2 summarizes the occurrence and ecological effects of toxics in California aquatic systems. Section 6.3 describes how CTR-related toxics reductions may result in improved ecosystem health through ecological and toxicological interactions. Section 6.4 provides a qualitative discussion of potential ecologic benefits of the proposed rule.

6.1 ECOLOGICAL DIVERSITY OF AQUATIC ENVIRONMENTS IN CALIFORNIA

California is one of the most biologically diverse areas in the world (U.S. EPA, 1997). Within its 160,000 square miles of land, and hundreds of thousands of acres and miles of estuaries, wetlands, rivers, streams, and lakes, California harbors more unique plants and animals than any other state in the nation. The diverse climates, landscapes, habitats, and migration barriers such as mountains and deserts, have led to the evolution of a large number of isolated species and varieties of animals, many of which are found only in California (Steinhert, 1994, as cited in U.S. EPA, 1997). For example, there are 46 species of amphibians, 96 species of reptiles, 563 species of birds, 190 species of mammals, 8,000 species of plants, and 30,000 species of insects recorded in the state. In addition, 63 types of freshwater fish are found only in California (Moyle, 1994, as cited in U.S. EPA, 1997). Additionally, California's aquatic systems provide important habitat for migratory species such as waterfowl.

Unfortunately, California's ecological diversity is threatened (U.S. EPA, 1997). On average, more than 20 percent of the naturally occurring species of amphibians, reptiles, birds, and mammals are classified as endangered, threatened, or of "special concern" by state and federal agencies. California has more threatened and endangered species than any other state in the United States. Many of these species exist in or are dependent on aquatic resources during all or part of their lives, and consequently may be adversely affected by toxic discharges to surface waters (U.S. EPA, 1997).

6.2 OCCURRENCE AND ECOLOGICAL EFFECTS OF TOXICS IN CALIFORNIA AQUATIC SYSTEMS

Current concentrations of toxics in California's aquatic systems may pose substantial risk to resident and migratory biota through direct and indirect pathways of exposure in the surface waters, diets, or sediments. It appears that a variety of toxics are widely distributed throughout California, which increases the likelihood that many of the resources are exposed to concentrations potentially causing adverse effects on ecological resources (U.S. EPA, 1997). Toxicity may occur with either acute (short-term) or chronic (long-term, sublethal) exposure to contaminants. Exposure to chronic, low levels of toxics found in California's aquatic environments can adversely affect the resources by causing physiological and behavioral impairments in organisms, contamination or reduction of food-web resources, and alteration of habitats. Improving ambient water quality would put the ecological and biological resources at less risk of exposure. Improved water quality through toxics reductions would also reduce the risk of disturbances to the ecological integrity and important habitats of the biological resources of California.

A key to understanding the potential benefits of the proposed rule on the ecological resources of California is a knowledge of the occurrence, exposure pathways, and effects of toxics occurring in California's aquatic systems. These factors are discussed below.

6.2.1 Occurrence of Toxics-Related Impairments

As shown in **Exhibit 6-1**, California's aquatic ecosystems in all areas of the state exhibit impaired water quality from toxics such as metals, selenium, pesticides, and priority organics such as PCBs (U.S. EPA, 1997).[1] The Analysis of the Potential Benefits Related to Implementation of the California Toxics Rule (U.S. EPA, 1997) summarizes ambient water quality impairment in California and notes the following:

- Available data suggest that over 800,000 acres of assessed bays, estuaries, lakes, and wetlands may be impaired by one or more toxic pollutants, as are over 3,700 miles of rivers. Most notably, over two-thirds of the assessed area of both bays and saline lakes may be adversely affected by toxics.

- Inorganic pollutants such as metals and trace elements (particularly selenium) are the most significant categories of toxic pollutants affecting the water quality in assessed waters statewide. Pesticides are also associated with large areas of water quality impairment.

[1] Impaired waters are defined as those that have been rated by the State of California as medium or poor for at least one toxic pollutant or group of pollutants. California's medium and poor waters correspond to U.S. EPA's categories of not fully or partially supporting designated uses. The medium and less severely impaired waters were grouped together into the partially supporting category. The remaining waters classified as poor were placed in the not fully supporting category.

- Trace elements (especially selenium) may be responsible for water quality impairment in 52% of all bays, 55% of rivers and streams assessed, and 16% of all lakes and reservoirs. In addition, trace elements may impair water quality in all saline lakes in the state.

- Based on the areal extent of contamination and the uses of affected water bodies, San Francisco Bay and the Central Valley appear to be the areas most influenced by toxic contamination. In addition, toxics are responsible for impaired water quality in a high percentage of river and saline lake areas in the Colorado River Basin. These areas constitute those most extensively affected by toxics, but waters in all regions of California show some degree of impairment by toxics.

- Both point and nonpoint sources play a role in contributing to toxic pollution. Agriculture, primarily agricultural drainage, is the most frequently cited source of pollutants that impair rivers and is also frequently cited as a contributor to the impairment of lakes and reservoirs. Urban runoff and "other" nonpoint sources (e.g., deposition and spills) are most frequently cited as contributing factors to water quality problems in toxics-impaired bays. Mining is the most frequently cited source (mining operations may or may not be a point source), particularly for lakes and reservoirs, and toxics discharged by municipal wastewater treatment plants contribute to the impairment of a variety of water body types, particularly estuaries and wetlands.

- Toxic pollutants are of concern in a large number of waters designated for the support of terrestrial and aquatic wildlife. In addition, water quality in 175,000 acres of bays/harbors, 52,000 acres of estuaries, 102,000 acres of lakes, 1,000 miles of rivers and streams, and 11,000 acres of saline lakes that support fish spawning and/or migration may be impaired by toxics.

- Toxics may contribute to impaired water quality in approximately 176,000 acres of bays or harbors, 1,856 river miles, 230,000 acres of saline lakes, and 5,000 acres of estuaries designated for the support of rare, threatened, or endangered species.

- Currently, there are 12 fish consumption health advisories in waters covered by the CTR (9 inland water bodies and 3 enclosed bays and estuaries) because of high levels of contamination in fish tissue from mercury, PCBs, chlordane, dioxin, DDT, pesticides, and selenium. Some of these tissue contaminants are also hazardous to fish and piscivorous (fish-eating) species as well.

- Currently, there are four waterfowl health warnings for consuming waterfowl taken from the Grasslands area, Suisun Bay, San Pablo Bay, and San Francisco Bay because of elevated selenium levels in waterfowl such as duck, greater and lesser scaup, and scoters. Selenium contaminant levels are also a concern for waterfowl health.

Exhibit 6-1. Summary of Baseline California Regional Water Quality Assessments[1]

Region	Areal Extent of Toxics Impairment	Pollutants of Concern	Primary Pollutant Sources	Key Water Bodies Impaired	Ecological Resources Potentially Affected
Region 1: North Coast Region	55% of bays (16,500 acres); minor impairment of other water bodies	Metals, pesticides	Mix of point sources (municipal and industrial effluent) and nonpoint sources (agriculture and urban runoff)	Arcata Bay, Humboldt Bay	Wildlife habitat; fish spawning and migration; rare and endangered species
Region 2: San Francisco Bay	Large areas impaired by toxics, including 70% of bays (200,000 acres); 60% of wetlands (57,000 acres); 39% of rivers (244 miles); 172,000 acres impaired supporting fish spawning/migration and rare and endangered species	Metals, trace elements, priority organics	Urban runoff and other nonpoint sources affect largest areas; some impairment from municipal and industrial point sources	San Francisco Bay (Lower, Central, South) Suisun Marsh	Wildlife habitat; fish spawning and migration; rare and endangered species; waterfowl; piscivorous wildlife in San Francisco Bay, Lake Herman, Guadalupe Reservoir; and other species
Region 3: Central Coast Region	47% of lakes (11,700 acres); 36% of estuaries (1,700 acres); minor impairment of rivers and bays	Metals, pesticides	Agriculture, mining, unspecified nonpoint sources	Morro Bay, Carpinteria Marsh, Elkhorn Slough	Wildlife habitat; fish migration and spawning; rare and endangered species; piscivorous wildlife in Nacimiento River
Region 4: Los Angeles Basin	Over 90% of bays and estuaries impaired (16,000 acres); minor impairment of rivers and lakes	Pesticides, priority organics, trace elements, metals	Mix of point sources (municipal treatment, “other” point sources) and nonpoint sources (agriculture, hydrological modification, and urban runoff)	Mugu Lagoon, San Gabriel River (lower), Los Angeles River (upper)	Wildlife habitat; fish migration and spawning; rare and endangered species; piscivorous wildlife in Lake Nacimiento and Los Angeles Harbor

Exhibit 6-1. Summary of Baseline California Regional Water Quality Assessments[1] (Continued)

Region	Areal Extent of Toxics Impairment	Pollutants of Concern	Primary Pollutant Sources	Key Water Bodies Impaired	Ecological Resources Potentially Affected
Region 5: Central Valley Region	Large areas impaired by toxics, including 100% of estuaries (48,000 acres); 23% of lakes (120,000 acres); 21% of rivers (1,200 miles); 48,000 acres of Delta waterways impaired for fish spawning/migration and rare and endangered species	Metals, trace elements	Agriculture, mining; smaller areas affected by municipal treatment, urban runoff, storm sewers, and other nonpoint sources	Delta Waterways, Clear Lake, American River, Feather River, Sacramento River, Grasslands, Marshes, Shasta Lake	Wildlife habitat; fish spawning and migration; rare and endangered species, piscivorous wildlife in Clear Lake, Lake Berryessa, and Grasslands area; waterfowl in Grasslands area
Region 6: Lahontan Region	34% of saline lakes (66,000 acres); 19% of lakes (36,000 acres); 13% of rivers (372 miles)	Metals, trace elements, priority organics	Naturally occurring levels of metals and trace elements; lesser areas affected by agriculture, land development, and mining	Eagle Lake, Owens River, Truckee River, Honey Lake	Wildlife habitat; fish spawning and migration; rare and endangered species
Region 7: Colorado River Basin	60% of rivers (1,400 miles) impaired; 220,000 acres of saline lake (Salton Sea) supporting rare and endangered species and wildlife	Pesticides, trace elements	Agriculture	Salton Sea	Wildlife habitat; rare and endangered species; piscivorous wildlife and waterfowl in Salton Sea
Region 8: Santa Ana River Basin	Over 90% of bays and estuaries impaired (4,000 acres); 27% of lakes (4,000 acres)	Metals, pesticides	Primarily nonpoint sources including agriculture, urban runoff, and land development	Upper Newport Bay	Wildlife habitat; fish spawning and migration; rare and endangered species
Region 9: San Diego Basin	14% of estuaries; minor impairment of other water bodies; 239 acres San Diego Bay impaired supporting fish spawning/ migration and rare and endangered species	Metals, pesticides, priority organics, trace elements	Estuaries affected by land disposal; other water bodies affected by diverse mix of point and nonpoint sources.	San Diego Bay, Tijuana River Estuary	Wildlife habitat; fish spawning and migration; rare and endangered species

[1] Based on 1994 assessment of water quality. Some key water bodies impaired by toxics have changed since that time; however, more recent data were not used in the preparation of this report due to time constraints.
Source: U.S. EPA (1997).

This summary of water quality impairment indeed reveals that a variety of aquatic and terrestrial biota are exposed to the toxics regulated by the CTR.

6.2.2 Exposure Pathways

Toxics present in California's aquatic systems can affect ecological resources through direct or indirect pathways of exposure. Direct pathways of exposure occur when natural resources come in direct contact, either singularly or in combination, with toxics in the water column, sediments, or diet. Indirect pathways of exposure occur when habitat resources (e.g., spawning beds, prey sources) have been reduced or otherwise altered by toxics. Toxics also may be bioaccumulated in aquatic organisms, making them available to terrestrial predators dependent on the aquatic food web of the contaminated system. The extent to which the organisms are adversely affected largely depends on the pathway and duration of exposure as well as the concentration and type of toxics present in the pathway.

6.2.3 Potential Effects of Toxics on Ecological Resources

Ecological resources potentially affected under state implementation include biota and ecosystem function and integrity.

Effects on Biota

Biological organisms are effective receptors for toxics in aquatic systems through the uptake, accumulation, and eventual biological disposition of contaminants. Uptake of toxics results from the following various exposure pathways, singularly or in combination: diet, water, and sediment. Accumulated toxics associated with ambient waters may concentrate in various tissues and organs of biota. The specific tissues/organs affected depend on the exposure pathways, the exposure concentrations, and the ability to metabolize or excrete the accumulated contaminants. An organism's ability to metabolize contaminants largely depends on the presence/absence and relative abundance of various enzymes necessary to transform different components into excretable compounds.

The effects of toxics on aquatic resources must be evaluated because even low contaminant concentrations in water, sediment, or diet may impair fitness, produce adverse physiological effects that lead to death, or lower long-term survivability in the wild. There is extensive documentation of the long-term, injurious effects of inorganic (e.g., heavy metals) and organic (e.g., polychlorinated biphenyls, pesticides, aromatic hydrocarbons) contaminants at relatively low concentrations to aquatic biota (Rand and Petrocelli, 1985; Hoffman et al., 1995).

Exposure to contaminants found in California's aquatic systems can affect various biological levels of organization, resulting in four identified biotic responses: lethal toxicity, sublethal

toxicity, bioaccumulation, and habitat alteration. These biotic responses provide broad categorization for a multitude of specific biotic responses **(see Exhibit 6-2)**.

Exhibit 6-2. Biological Organization Levels Associated with Responses to Toxics in Water

Biotic Response	Subcellular	Cellular	Organism	Population	Community	Ecosystem
Lethal Toxicity	✓	✓	✓	✓	✓	✓
Sublethal Toxicity	✓	✓	✓	✓	✓	✓
Bioaccumulation	✓	✓	✓	✓	✓	✓
Habitat Alteration			✓	✓	✓	✓

Lethal toxicity refers to the direct disruption of subcellular or cellular physiological activities that result in death of the organism. The death of individuals from populations can influence the future reproductive viability of populations, and in turn may influence organisms at higher trophic levels. Sublethal toxicity also involves interference of subcellular and cellular processes, but does not result in immediate death; death may occur because of impaired behavior, or impaired physiological or biochemical processes.

Bioaccumulation of contaminants found in California aquatic systems is important because the health of organisms may be affected (e.g., reducing growth or reproduction; increasing susceptibility to disease). Bioaccumulation also results in additional pathways for contaminant transfer throughout the food chain. Impaired physiology or contaminant transfer through food chains owing to bioaccumulation can have dramatic impacts on all levels of biological organization. For instance, accumulated contaminants (or metabolites of these contaminants) transferred through food webs may concentrate in food sources of piscivorous fish, which can adversely affect important recreational or commercial fisheries.

Habitat alteration includes effects on the physical and chemical environment that can result in unsuitable habitat for both resident and migratory biota at the level of the organism and the population. For example, biodegradation of organic contaminants by sediment microbes results in anoxic conditions unsuitable for benthos. The physical and chemical alteration of particular habitats can shift species composition, abundance, and diversity. Any change in species composition directly reflects altered community structure, and can alter ecosystem functions.

Toxics of particular concern in California are listed in **Exhibit 6-3**, along with their potential adverse effects on biota. In addition to the potential adverse effects of toxics discussed above, exposure to certain toxics present in California's aquatic systems, including aromatic hydrocarbons and heavy metals, can increase the rate of genetic mutations. Increased rates of genetic mutations can reduce the fitness of individuals and populations, especially in contaminated areas providing breeding or spawning habitat because there would be greater risk to embryonic life stages undergoing rapid development.

Exhibit 6-3. Overview of Adverse Effects of Toxics

Toxic of Concern	Potential Affected Ecological Resource in California	Potential Adverse Effects on Biota[1]	Reference
Arsenic	Aquatic biota Birds Mammals Water Sediment	Reduced growth and survival Impaired reproduction Impaired physiology Decreased resistance to infection Mutagenic Teratogenic Carcinogenic	Eisler (1988a)
Cadmium	Aquatic biota Birds Mammals Water Sediment	Reduced growth and survival Impaired reproduction Possible mutagen Teratogenic Carcinogenic	Eisler (1985a)
Chromium (III and VI)	Aquatic biota Birds Mammals Water Sediment	Reduced growth and survival Impaired reproduction Mutagenic Teratogenic Carcinogenic	Eisler (1986a)
Copper	Aquatic biota Birds Mammals Water Sediment	Reduced growth and survival Impaired reproduction Impaired metabolism	U.S. EPA (1985); Goyer (1991)
Dioxin	Aquatic biota Birds Mammals Water Sediment	Reduced growth and survival Impaired reproduction Compromised immunity Mutagenic Teratogenic Carcinogenic	Eisler (1986b)
Endosulfan	Aquatic biota Birds Mammals Water Sediment	Reduced growth and survival Impaired reproduction Impaired behavior Suspected mutagen	Verschueren (1983); Smith (1991)
Lead	Aquatic biota Birds Mammals Water Sediment	Reduced growth and survival Impaired reproduction Impaired development Impaired metabolism	Eisler (1988b)

Exhibit 6-3. Overview of Adverse Effects of Toxics (Continued)

Toxic of Concern	Potential Affected Ecological Resource in California	Potential Adverse Effects on Biota[1]	Reference
Mercury	Aquatic biota Birds Mammals Water Sediment	Reduced growth and survival Reduced reproduction Impaired development Impaired behavior Mutagenic Teratogenic Carcinogenic	Eisler (1987a)
Nickel	Aquatic biota Birds Mammals Water Sediment	Reduced growth and survival Reduced reproduction Carcinogenic	U.S. EPA (1980a)
Polycyclic Aromatic Hydrocarbons (PAHs)	Aquatic biota Birds Mammals Water Sediment	Reduced growth and survival Reduced reproduction Compromised immunity Mutagenic (4-7 Ringed PAHs) Teratogenic (4-7 Ringed PAHs) Carcinogenic (4-7 Ringed PAHs)	Eisler (1987b)
Polychlorinated Biphenyls (PCBs)	Aquatic biota Birds Mammals Water Sediment	Reduced growth and survival Reduced reproduction Impaired behavior Compromised immunity Mutagenic Teratogenic Carcinogenic	Eisler (1986c)
Selenium	Aquatic biota Birds Mammals Water Sediment	Reduced growth and survival Reduced reproduction Impaired behavior Impaired physiology	Eisler (1985b)
Silver	Aquatic biota Birds Mammals Water Sediment	Reduced growth and survival Reduced reproduction Impaired physiology	Goyer (1991); U.S. EPA (1980b)
Zinc	Aquatic biota Birds Mammals Water Sediment	Reduced growth and survival Impaired physiology Teratogenic to amphibians Reduced reproduction	Eisler (1993)

[1] The potential for adverse effects to ecological resources are dependent on numerous factors, including the exposure route, the exposure duration, the dose, the sensitivity of the organism, and the bioavailability of the chemical. Information in this table describes the common biological effects associated with each toxic of concern (U.S. EPA, 1997). Effects may not be present for all ecological resources listed. In addition, concentrations of these toxic compounds in California may not be high enough to result in these adverse effects on biota.

Effects on Ecosystems

In addition to adverse effects on biota, toxics also may adversely affect ecosystem function and integrity through direct and indirect effects on biota. The effects of toxics in ecosystems are complex and difficult to estimate because of the diversity of species assemblages and trophic interactions (Barron and Woodburn, 1995). For example, predators may switch to alternate prey (Eaton et al., 1985), or phytoplankton abundance may be maintained by changes in the dominant algae species (Brock et al., 1992). Also, several species may perform similar functions, with sensitive species replaced by more contaminant tolerant species. While these changes may result in overall ecosystem resistance to toxics, there could be major changes in ecosystem structure (Barron and Woodburn, 1995). Contaminant effects on ecosystem structure, however, are likely to be specific to the type and location of the water body and the toxic exposure scenario.

6.3 POTENTIAL ECOLOGIC BENEFITS OF THE RULE

As discussed in Chapter 5, ecosystems and their biological resources provide benefits through enhanced ecological services that often manifest as direct use values, passive use values and, to the extent not reflected elsewhere, ecologic benefits.

This section provides a qualitative description of potential ecologic benefits resulting from improvements in ecosystem health under the proposed rule. A qualitative description of ecologic benefits is provided because of the complexity and diversity of California aquatic systems and the diversity of ecological receptors; the multitude of contaminants and exposure conditions; the complexity of ecosystem structure and function; and uncertainty regarding the extent to which the CTR will result in toxics loading reductions significant enough to generate appreciable changes in ambient concentration and ecosystem health. However, improved water quality may provide potential benefits to the ecological resources ". . . that exist in or are dependent on more than 800,000 acres of assessed bays, estuaries, lakes, and wetlands and more than 3,700 miles of rivers that are now currently impaired by toxic pollutants" (U.S. EPA, 1997). The extent, magnitude, and nature of the ecologic benefits accruing under the CTR will depend on the specific ecosystems and toxics affected, baseline conditions, the degree and type of ambient water quality improvements, and the time horizon for improvement.

Toxics reductions under the CTR may provide ecologic benefits through increased ecosystem stability, resilience, and overall health (U.S. EPA, 1997). Benefits are difficult to quantify because of the complexity, scale, and uncertainties of the interaction of the multitude of ecological systems and toxics to be affected by the proposed rule. However, ecologic benefits from the proposed rule may be substantial because of the extensive variety, proportion, and geographic area of the affected aquatic systems, the diversity and uniqueness of California ecological resources, and the large number of toxics to be regulated under the CTR (U.S. EPA, 1997).

Without conducting a complete analysis as described above, EPA concludes that potential ecologic benefits from implementation of the CTR may include (U.S. EPA, 1997):

- Reductions in toxics loadings that lead to improved conditions for California fish spawning and/or migration in bays/harbors and estuaries, lakes, rivers, streams, and saline lakes

- Reductions in bioaccumulative chemicals of concern that currently may affect fish and wildlife throughout the state, including selenium, mercury, PCBs, dioxins, and chlorinated pesticides

- Reductions in toxics that improve conditions for the successful recovery of federal and state threatened and endangered species, such as the delta smelt, desert pupfish, California brown pelican, bald eagle, California clapper rail, California tiger salamander, and western snowy plover

- Reductions in toxics that decrease adverse toxics-related impacts on aquatic and terrestrial wildlife in two important areas of California: the San Francisco Bay watershed and the Central Valley (see case studies in U.S. EPA, 1997)

- Reductions in the concentrations of both selenium and pesticides in the waters that feed the Salton Sea that may improve conditions for the restoration and maintenance of currently declining populations of wildlife, including threatened and endangered species such as the California brown pelican, peregrine falcon, bald eagle, Yuma clapper rail, and desert pupfish (see Case Studies in U.S. EPA, 1997)

- Improved water quality and associated improvements in survival, growth, and reproductive capacity of aquatic and aquatic-dependent organisms that will help restore and sustain California's ecological diversity.

7.0 BENEFITS METHODOLOGY ISSUES: CONTRIBUTION OF POINT SOURCES TO TOXICS-RELATED WATER QUALITY PROBLEMS

Estimating the benefits of implementation of the CTR is difficult because there is limited information regarding the contribution of point sources to the toxic-related water quality problems in California. This issue of attribution has important implications for the potential benefits of point source controls. Benefits analyses of water quality regulations may be able to utilize existing literature, applied research, and data to estimate society's values for water quality improvements. Often, there are limited data with which the contribution of point source controls to these improvements can be discerned.

To estimate the potential benefits of the CTR, EPA evaluated the limited available data on loadings from various sources to California watersheds. Based on these data, EPA developed ranges of values to reflect the potential contribution of point sources to current toxic-related water quality problems in San Francisco Bay, other bays and estuaries, and freshwater. EPA then used these assumptions to estimate the benefits of the proposed rule (see Chapter 8). This chapter describes the data EPA used to develop the attribution assumptions, and the uncertainties surrounding these estimates, as presented originally in U.S. EPA (1997).

EPA solicited additional data and information on the relative contribution of point sources to toxic pollutant loadings in California waters in the EA that accompanied the proposed rule, however, commenters did not submit any new data. EPA then conducted a new literature search and contacted universities and organizations in search of additional data and studies. In general, the studies found very little detailed information and data. One study of the Santa Monica Bay watershed (California Regional Water Quality Control Board, 1997), however, contains an assessment of the relative loadings from point and nonpoint sources. As described in Section 7.2, EPA updated its analysis to incorporate this information.

7.1 SAN FRANCISCO BAY

EPA used two sources to characterize the relative contributions of point and nonpoint sources of toxic loadings in San Francisco Bay: Davis et al. (1991) and National Oceanic and Atmospheric Administration (NOAA)(1988a). Davis et al. estimated that 5,000 to 40,000 metric tons of at least 65 different pollutants are released annually into the San Francisco estuary from both point and nonpoint sources. They estimated point source loadings based on municipal (POTW) and industrial NPDES effluent monitoring data from 1984 to 1987. They estimated nonpoint source loadings using estimates of urban and nonurban runoff, riverine inputs, atmospheric deposition, oil spills, and contributions from dredging activities. Estimates of urban runoff and dredging came from Gunther et al. (1987)[1]. Estimates of nonurban runoff were based on a NOAA model that factors in sediment loss from nonurban lands and average trace metal concentrations in soil.

[1] Other studies suggest that Gunther et al. (1987) may have underestimated the contribution from dredging activities.

Riverine inputs were based on pollutants from the Sacramento and San Joaquin rivers. All pollutants transported past the cities of Sacramento and Vernalis were considered riverine input from the Sacramento and San Joaquin Rivers, respectively. The loading from the Sacramento River was based on a 1987–88 study of selenium cycling conducted by the California Department of Water Resource. The loading from the San Joaquin River was based on 1985–87 water quality data collected by the U.S. Geological Survey (USGS). Atmospheric deposition loadings were based on measurements in other parts of the United States, as reported in Gunther et al. (1987).

NOAA (1988a) estimated that approximately 22,000 metric tons of toxic substances are released annually into the San Francisco estuary. They estimated point source loadings based on municipal (POTW) and industrial effluent monitoring data. Estimates of nonpoint source loadings include urban and nonurban runoff, and riverine inputs. NOAA (1988a) estimated urban runoff by combining runoff coefficients and pollutant concentrations with:

- Estimates of total county and city urban land area and population (U.S. Bureau of Census, 1980)
- POTW wastewater and storm water conveyance and treatment data (U.S. EPA, 1982)
- Weather station and precipitation data (provided by NOAA's National Climatic Data Center)
- Information on urban land use activities (obtained from USGS's Land Use Data Analysis System).

To estimate the contribution of nonurban runoff to loadings, NOAA (1988a) examined areas where:

- Farming, silviculture, or other activities have exposed soil to wind, rain, and runoff
- Soil is most erodible
- Large amounts of chemical fertilizers and pesticides have been applied
- Sufficient runoff exists to transport pollutants.

NOAA (1988a) obtained the majority of the data for its analysis from the USGS's Land Use Data Analysis System, the U.S. Department of Agriculture's 1982 National Resource Inventory, and a study by Shacklette and Boerngen (1984). NOAA (1988a) also estimated riverine inputs from the Sacramento and San Joaquin rivers using raw USGS data in a simulation model.

Exhibit 7-1 presents the estimated contribution of point sources to toxic loadings in the San Francisco Bay based on the Davis et al. (1991) and NOAA (1988a) studies. Using these studies, EPA developed toxicity-weighted averages across the pollutants evaluated to reflect the contribution of point sources to San Francisco Bay. This resulted in an estimate of 3.4% for the NOAA data based on the median weight for the class of chlorinated hydrocarbon pesticides,[2] and a range of 1.5% to 7.1% for the Davis et al. data. In light of the uncertainties in the estimates, for the purposes of estimating the potential benefits of the point source controls of the CTR, EPA assumed that point sources contribute between 1% and 10% of total toxic loadings to San Francisco Bay.

Exhibit 7.1 Estimated Contribution of Point Sources to Toxic Pollutant Loadings in San Francisco Bay (Toxic-Weighted)

Pollutant	NOAA[1]	Davis et al.[2]
Zinc	5.2%	4.0–18.9%
Copper	5.5%	4.0–11.9%
Nickel	Not Estimated	26.4–27.6%
Lead	7.4%	2.3–8.5%
Chromium	2.6%	0.8–5.7%
Arsenic	11.4%	3.8–6.1%
Cadmium	15.6%	29.5–64.8%
Selenium	Not Estimated	28.4–28.4%
Mercury	6.9%	26.4–51.8%
Chlorinated Hydrocarbon Pesticides	51.5%	Not Estimated

[1] Toxic-weighting based on loadings from the NOAA (1988a)
[2] Source: U.S. EPA (1997); range based on data from Davis et al. (1991).

EPA's analysis is subject to a number of uncertainties and limitations. First, Davis et al. and NOAA relied on assumptions about concentrations below the detection limit to estimate pollutant loadings. However, the concentration of pollutants below the deduction limit is unknown. Second, studies do not include estimates for some point and nonpoint sources of pollutants such as "historic" loadings from contaminated sediment or point source mine drainage. Third, Davis et al. and NOAA classify riverine inputs as nonpoint sources. It is possible that a portion of these riverine inputs is attributable to point sources; however, this could not be estimated based on available data. Fourth, the data from both studies are based on discharges from the early and mid-1980s and, therefore, may not be representative of current conditions in San Francisco Bay. Finally, Davis et al. did not estimate the contribution from pollutants, other than selenium, in the Sacramento River, and did not have local data for the estimates of urban runoff and atmospheric deposition. The use of data on atmospheric deposition from other parts of the United States would tend to overestimate nonpoint source loadings (and thus underestimate point source loadings) because there are relatively fewer air sources of toxics that

[2] The weights for hydrocarbon pesticides range from 0.35 for trichlorophenol to 57,000 for dieldrin, with a median for the class of 100.

might reach the bay given the prevailing westerly winds off the ocean.

7.2 OTHER BAYS AND ESTUARIES

EPA used NOAA's National Coastal Pollutant Discharge Inventory (1988b and 1988c) to estimate the relative contribution of point sources to toxic loading in five California bays: San Diego, Humboldt, Monterey, Santa Monica, and San Pedro (**see Exhibit 7-2**)[3].

Exhibit 7-2. Estimated Contribution of Point Sources to Toxic Pollutant Loadings in Other California Bays (Toxic-Weighted)[1]

Pollutant	Nonurban Bays		Urban Bays		
	Monterey Bay	Humboldt Bay	San Diego Bay	Santa Monica Bay	San Pedro Bay
Arsenic	57.1%	32.7%	87.7%	89.9%	87.4%
Cadmium	83.8%	40.2%	100.0%	100.0%	100.0%
Chromium	15.2%	34.8%	95.2%	88.4%	87.8%
Copper	16.1%	17.0%	86.8%	89.4%	78.7%
Lead	29.9%	19.4%	41.0%	66.7%	26.9%
Mercury	75.6%	8.7%	90.1%	87.9%	81.3%
Zinc	23.7%	27.0%	80.9%	78.2%	70.6%
Chlorinated hydrocarbon pesticides	N/A	N/A	93.0%	99.1%	94.0%
Toxic-Weighted Average	**22.2%**	**33.1%**	**91.1-92.0%***	**87.9-93.3%***	**82.6-88.5%***

[1] Toxic-weighting based on loadings from NOAA, 1981-1984 (nonurban bays) and NOAA, 1988b and 1988c (urban bays). NOAA assessed the following point sources: POTWs, industrial effluents, and power plant effluent. NOAA assessed the following nonpoint sources: urban runoff, cropland runoff, forestland runoff, rangeland runoff, irrigation return flows, and upstream sources.

* Lower bound of range based on median toxic weight for pesticides (100); upper bound of range based on mean toxic weight for pesticides (5,300).

Source: U.S. EPA (1997).

EPA developed toxicity-weighted averages across the pollutants evaluated to reflect the contribution of point sources to each bay. The data showed point sources account for 23.2% and 33.1% of loadings in the nonurban bays (Monterey and Humboldt Bays, respectively), and 91.1%, 87.9%, and 82.6% in the urban bays (San Diego, Santa Monica, and San Pedro Bays, respectively).

In addition, for this revised analysis, EPA combined additional data for the Santa Monica Bay watershed (California Regional Water Quality Control Board, 1997) for seven pollutants with the NOAA data. These new data suggest that point source loadings of copper, lead, and zinc decreased between 1986 and 1992 and that, currently, nonpoint sources are the predominant

[3] Only two of these bays (San Diego and Humboldt) are enclosed bays covered by the rule. EPA assumed that the data for the non-enclosed bays generally will be applicable to enclosed bays.

contributors of lead and zinc (California Regional Water Quality Control Board, 1997)[4] . However, this additional data for copper, lead, and zinc does not change the toxic-weighted average for Santa Monica Bay. This is because mercury and chromium VI have such high toxic weights (500 and 35.5, respectively) compared to the toxic weights for arsenic, cadmium, copper, lead, and zinc (4, 5.2, 0.47, 1.8, and 0.051, respectively). As a result, the overall toxic-weighted average is more closely linked to the point source contribution of mercury and chromium-VI and is not influenced by the new data for Santa Monica Bay.

In general, the available data indicated that urban bays tend to have a greater portion of toxic loadings originating from point sources than do nonurban bays. The data also reveal that the contribution of point sources is much higher in the San Diego, Santa Monica, and San Pedro urban bays than EPA estimated for the urban San Francisco Bay. The reason for this discrepancy is not readily apparent. For urban bays, EPA averaged the mean toxic-weighted point source contributions for the three urban bays as well as the midpoint of the range of point source contribution for San Francisco Bay [(91.1 + 87.9 + 82.6 + 5.0)/4 = 66.7] to estimate that point sources account for 67% of toxic-weighted loadings to urban bays. EPA estimated that point sources account for 28% of toxic-weighted loadings to nonurban bays by averaging the mean toxic-weighted point source contributions for the two nonurban bays [(23.2 + 33.1)/2 = 28.2]. However, these percentages cannot be directly used to attribute benefits to the CTR because EPA was not able to estimate the proportion of benefits that occur in urban bays versus nonurban bays. Therefore, EPA developed a weighted average estimate of the point source contribution of toxic pollutant loadings to California bays and estuaries based on the population and land area around urban and nonurban bays.

Scaling by population implicitly assumes that benefits are proportional to the population living in different areas (e.g., that more fishing occurs in urban bays than nonurban bays) (U.S. EPA, 1997). EPA identified the relevant enclosed bays covered by the rule,[5] and obtained total population living within 10 miles of each bay.[6] The method yields an estimate of approximately 3.1 million people living near urban bays, and 275,000 people living near nonurban bays (U.S. EPA, 1997), and results in a population-weighted attribution estimate of 64%. To scale by land area surrounding the bays, EPA compiled data on total acreage of each of the urban and nonurban bays from California's WQA database (State Water Resources Control Board, 1994) (U.S. EPA, 1997). This approach yielded a land area-weighted average estimate of 42%. EPA used this

[4] The point source contributions for copper, lead, and zinc were 89.9%, 52.6%, and 75.1% respectively in 1986. In 1992, these contributions were 59.1%, 6.7%, and 40.4% (California Regional Water Quality Control Board, 1987).

[5] Urban bays include San Diego Bay, Mission Bay, Upper and Lower Newport Bay, and Los Angeles-Long Beach Harbor. Nonurban bays include Humboldt Bay, Bodega Harbor, Morro Bay, Drakes's Estero, Tomales Bay, and Carmel Bay (State Water Resources Control Board, 1991).

[6] Census tract-level population data were taken from the 1990 census and aggregated using geographic information system software.

42% to 64% range to attribute potential benefits of the implementation of the CTR in bays and estuaries. The limitations and uncertainties noted in Section 7.1 also apply to this estimated range.

7.3 FRESHWATER RESOURCES

Because of data and resource limitations, EPA could not assess the relative source contribution to specific freshwater resources in California. EPA used data for the Sacramento and San Joaquin rivers, and information on the influence of permitted mines on freshwaters, to develop a statewide estimate of the relative contribution of point sources to toxic pollutant loadings in freshwater. This estimate is based on data from the Central Valley RWQCB. The data include loadings from urban runoff, agricultural drainage, mining drainage, and industrial and municipal point sources. **Exhibit 7-3** shows the percentage of loadings attributable to point sources on each river.

Exhibit 7-3. Estimated Contribution of Point Sources to Toxic Pollutant Loadings in California Rivers (Toxic-Weighted)[1]

Pollutant	Sacramento River	San Joaquin River
Arsenic	22.3%	3.1%
Cadmium	81.6%	5.8%
Copper	72.4%	2.9%
Lead	6.1%	2.8%
Zinc	72.9%	7.2%

[1] Toxic-weighting based on loadings from Central Valley RWQCB, Mass Emission Strategy – Load Estimates.
Source: U.S. EPA (1997).

Because of the influence of permitted mine discharges on the Sacramento River, point source contributions for all pollutants are greater for the Sacramento River than for the San Joaquin River. Using a toxicity-weighted average across all five pollutants, EPA estimated that 46.3% of loadings to the Sacramento River and 3.4% of loadings to the San Joaquin River are associated with point sources.

EPA then used these estimates to develop a weighted-average contribution of point sources to toxic loadings in freshwater by using the estimate for the Sacramento River for river miles under the influence of major permitted mines and the estimate for the San Joaquin River for all other river miles. In California, there are five major mines that have NPDES permits, all of which are located in the Sacramento River watershed.[7] Therefore, EPA estimated that 0.001 percent of all lake acres and 0.05 percent of all river miles are under the influence of the five major NPDES permitted mines (Water Resources Control Board, 1996). Using the estimated point source

[7] A very small percentage of mines in California are permitted because most mines are inactive. EPA estimated river miles under the influence of mining for Lake Shasta (Alta Gold mine and Remedial Recovery), Sacramento River (Iron Mountain mine), South Feather River (Plumas Gold mine), and Pine Creek (U.S. Tungsten Corporation). This analysis does not account for multiple mines under a single permit.

contribution for the Sacramento River and the San Joaquin River, 46% and 30% respectively, EPA then calculated a weighted-average point source contribution of 3% for lakes and 3% for rivers.[8] The 3% for freshwater lakes also is applied to saline lakes.

EPA's analysis for freshwater also is subject to a number of uncertainties and limitations. First, the concentration of pollutants below the detection limit is not known. For this analysis, all samples below the detection limit were assumed to be zero. Second, only a subset of cities in the Central Valley region were incorporated in the estimate of urban runoff. Third, the use of effluent concentration data from the Sacramento County POTW may not be representative of effluent from other facilities. Finally, historic loadings in sediments may not be accounted for in the estimates.

7.4 SUMMARY

Exhibit 7-4 summarizes EPA's estimate of the relative contribution of point sources to total loadings of toxic pollutants in California waters. These estimates represent the toxic-weighted average across the pollutants evaluated. **Exhibit 7-5** summarizes the *key* uncertainties and limitations in the estimates. Because the direction and magnitude of biases generally is not known, it is difficult to assess their overall impact on the estimates.

[8] The calculation assumes a 46% point source contribution for mining impaired water bodies (0.001% of lakes and 0.05% of rivers) and a 3% contribution in other water bodies. The calculations are 0.46 × (0.001%) + 0.03 × (1-0.001%) = 3.00%; 0.46 × (0.05%) + 0.03 × (1-0.05%) = 3.02%.

Exhibit 7-4. Estimated Share of Total Toxic Pollutant Loadings Attributable to Point Sources for California Water Bodies

Water Body	Toxic Pollutant Loadings Attributable to Point Sources (%)
San Francisco Bay	1-10
Other bays and estuaries	42–64[1]
Freshwaters and saline lakes	3

[1] The lower-bound estimate is for nonurban bays and the upper-bound estimate is for urban bays.
Source: Based on EPA analysis of NOAA (1988a); NOAA (1988b); NOAA (1988c); Davis, et al. (1991); California RWQCB (1997); Central Valley RWQCB; and California 1994 WQA database, as originally presented in U.S. EPA (1997).

Exhibit 7-5. Key Uncertainties in the Analysis of Relative Point Source Contribution

Uncertainty	Relative Significance	Potential Direction of Bias on Point Source Contribution to Total Loadings		
		Overstate	Understate	Indeterminant
Generalized from limited loadings data for a small set of water bodies to the extensive system of salt and freshwater in California.	High			✔
Analysis based on a limited set of pollutants. Little information on pesticides. No information on PCBs, dioxin, and certain metals (e.g., silver).	High		✔	
"Historic" loadings not fully accounted for.	High	✔		
Studies used classify riverine inputs as nonpoint sources. Some of these loadings may have originated from point sources.	Medium		✔	
Point source contributions for San Francisco Bay are much lower than for the other urban bays.	Medium			✔

Source: Adapted from U.S. EPA (1997).

8.0 QUANTIFIED AND MONETIZED BENEFITS ESTIMATES

EPA quantified and monetized three categories of potential benefits from implementation of the CTR: (1) human health risk reductions, (2) recreational angling benefits, and (3) passive use values. These benefits estimates are presented in Sections 8.1 through 8.3. In addition, Section 8.4 describes potential categories of benefits that are expected to result from the rule but that EPA could not monetize. Section 8.5 provides a summary of the benefits estimates.

The analysis presented below resembles the analysis that accompanied the proposed CTR (the results have been updated to incorporate the revised estimates of pollutant loading reductions and a slight modification to how the reductions are incorporated). However, in response to comments on the proposed CTR and accompanying EA, EPA continued to search the literature for California-specific valuation research that may be relevant to estimating the benefits of the rule. Below, the results of three studies (Carson et al., 1994; Loomis et al., 1991; and Cooper and Loomis, 1991) are incorporated into this revised analysis. In addition, where possible, EPA updated the data underlying the analysis.

8.1 HUMAN HEALTH BENEFITS

EPA assessed the human health risks from the consumption of contaminated fish tissue, and the potential reductions in these risks expected to result from implementation of the CTR, for two populations of anglers: San Francisco Bay anglers and freshwater anglers in California.

San Francisco Bay represents one of the most important noncommercial fisheries among the bays and estuaries covered by the rule. EPA conducted the assessment for San Francisco Bay anglers as a case study example of the health risks for anglers fishing in enclosed bays and estuaries. In addition, the bay has been adversely affected by toxic pollution, as evidenced by a recently issued fish consumption advisory (FCA). This advisory is due to the concentrations of mercury, PCBs, dioxin, and pesticides in fish from the bay. Despite the issuance of the advisory in December 1994, the bay remains a popular area for anglers (U.S. EPA, 1997). However, because only two other health advisories have been issued for enclosed bays and estuaries in California, this case study may represent an upper-bound estimate of baseline health risks associated with enclosed bays and estuaries.

The freshwater resources in the state also have been adversely affected by toxic pollution. Fish consumption advisories have been issued for nine inland water bodies, including numerous reservoirs, rivers, and creeks in Santa Clara County and the Grassland Area of the Kesterson National Wildlife Refuge in Merced County. **Exhibit 8-1** summarizes the FCAs in place for inland waters and enclosed bays and estuaries in California. **Exhibit 8-2** illustrates the location of these FCAs, as well as the location of NPDES-permitted point source discharges and the density of resident fishing license sales by county.

Exhibit 8-1. Fish Consumption Health Advisories in California

Water Body/Location	Advisory for General Population		Advisory for Sensitive Populations[1]		Contaminants of Concern
	Avoid Consumption	Limit Consumption[2]	Avoid Consumption	Limit Consumption[2]	
Inland Surface Waters					
New River	All species		All species		Pesticides Biological contaminants
Clear Lake (Lake County)		1 lb per month ‣ Largemouth bass over 13" ‣ Channel catfish over 24" ‣ Crappie over 12" 2 lbs per month ‣ Largemouth bass under 13" 3 lbs per month ‣ Channel catfish under 24" ‣ Crappie under 12" ‣ White catfish 6 lbs per month ‣ Brown bullhead ‣ Sacramento blackfish 10 lbs per month ‣ Hitch	All species		Mercury
Lake Nacimiento (San Luis Obispo County)		4 meals per month ‣ Largemouth bass	Largemouth bass		Mercury
Lake Herman (Solano County)		1 lb per month ‣ Largemouth bass	Catfish		Mercury
Lake Berryessa (Napa County)		1 lb per month ‣ Largemouth bass over 15" ‣ Smallmouth bass 2 lbs per month ‣ Largemouth bass under 15" ‣ White catfish 3 lbs per month ‣ Channel catfish 10 lbs per month ‣ Rainbow trout	All fish		Mercury
Grassland Area Kesterson National Wildlife Refuge (Merced County)	Catfish	Max. of 4 oz. every 2 weeks ‣ All fish	All fish		Selenium
Salton Sea		Max. of 4 oz. every 2 weeks ‣ Croaker ‣ Sargo ‣ Tilapia ‣ Orangemouth corvina	All fish		Selenium
Bays and Estuaries[3]					
San Francisco Bay	Striped bass> 35"	Maximum of 2 meals per month ‣ All sport fish	Striped bass> 27" Shark> 24"	Maximum of 1 meal per month ‣ All sport fish	Mercury PCBs Dioxins Pesticides
Belmont Pier/Pier J (Los Angeles Harbor)		Maximum of 2 meals per month ‣ Surf perch			DDT, PCBs
Los Angeles/Long Beach Harbors (esp. Cabrillo Pier)	White croaker	Maximum of 2 meals per month ‣ Queenfish ‣ Surf perch ‣ Black croaker			DDT, PCBs

[1] California EPA defines sensitive populations as women who are pregnant, who may become pregnant, who are breast-feeding, and children under 6 years of age.
[2] California EPA defines a meal as 6 to 8 oz. (170 g to 227 g) of fish for a 154 lb (70 kg) individual. Meal size should be adjusted according to body weight (roughly 1 oz. of fish per 20 lbs of body weight).
[3] In addition to these advisories, California EPA has issued consumption warnings for the following ocean sites in Southern California that are not included within the scope of the California Toxics Rule: Newport Pier, Redondo Pier, Malibu Pier, Short Bank, Malibu/Point Dume, Point Vicente, Palos Verdes-Northwest, White's Point, Los Angeles/Long Beach Breakwater (ocean side), and Horseshoe Kelp. Detailed information on these advisories is available in the California Sport Fishing Regulations Handbook.
Source: U.S. EPA (1997).

EPA assessed baseline human health risks (cancer and systemic effects) based on reported contaminant levels in fish tissue samples collected from San Francisco Bay and freshwater fisheries throughout California. EPA then estimated the potential reduction in baseline risk levels that might result from implementation of the CTR. The approach used follows standard EPA methodology for estimating health risks as described in detail in U.S. EPA (1997).

8.1.1 Estimating the Exposed Population

EPA estimated the potentially exposed population for San Francisco Bay and for statewide freshwater resources based on information regarding recreational anglers. Consequently, this analysis does not include health risks to non-angler family members that consume fish obtained from recreational angling,[1] nor does it consider the benefits to individuals that consume commercially caught fish. EPA assumed that consumption of commercially caught fish from areas affected by implementation of the CTR would be small relative to the consumption of commercially caught fish from other locations. If there were consumption of substantial quantities of commercially caught fish from areas affected by the CTR, benefits would be underestimated.

San Francisco Bay

EPA estimated the potentially exposed angler population for the case study based on the eight counties in the immediate San Francisco Bay area. A survey of fishing activity in central and northern California reported that there are approximately 332,000 saltwater anglers in the eight counties adjacent to San Francisco Bay, and the bay is the destination for approximately 50% of the trips taken near the bay (the area north of Stinson Beach to south of Davenport) (National Marine Fisheries Service, 1987). EPA assumed that one-half of the anglers fish exclusively in the bay and one-half fish exclusively at other Pacific Ocean sites. Applying this assumption, EPA estimated that there are 166,000 anglers using San Francisco Bay.

A portion of the estimated 166,000 saltwater anglers that use San Francisco Bay also may participate in freshwater angling. The 1996 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation (U.S. Department of Interior, Fish and Wildlife Service, and U.S. Department of Commerce, Bureau of the Census, 1998) indicates that 46% of the saltwater anglers (adults and children) in California fish exclusively in saltwater and 54% fish in both saltwater and freshwater. EPA assumed that anglers that split their time spend half of their time using each resource. Therefore, of the 166,000 anglers that use San Francisco Bay for saltwater angling, EPA estimated that 76,360 anglers fish exclusively in the Bay, and the other 89,640 split their time equally between the bay and freshwater resources. Thus, EPA estimated that approximately 121,000 full-time equivalent anglers use San Francisco Bay.

[1] Approximately 45% of anglers share the catch with family members (Save San Francisco Bay Association, 1995).

EXHIBIT 8-2. DENSITY OF FISHING LICENSES IN RELATION TO THE LOCATION OF POINT SOURCE DISCHARGERS IN CALIFORNIA

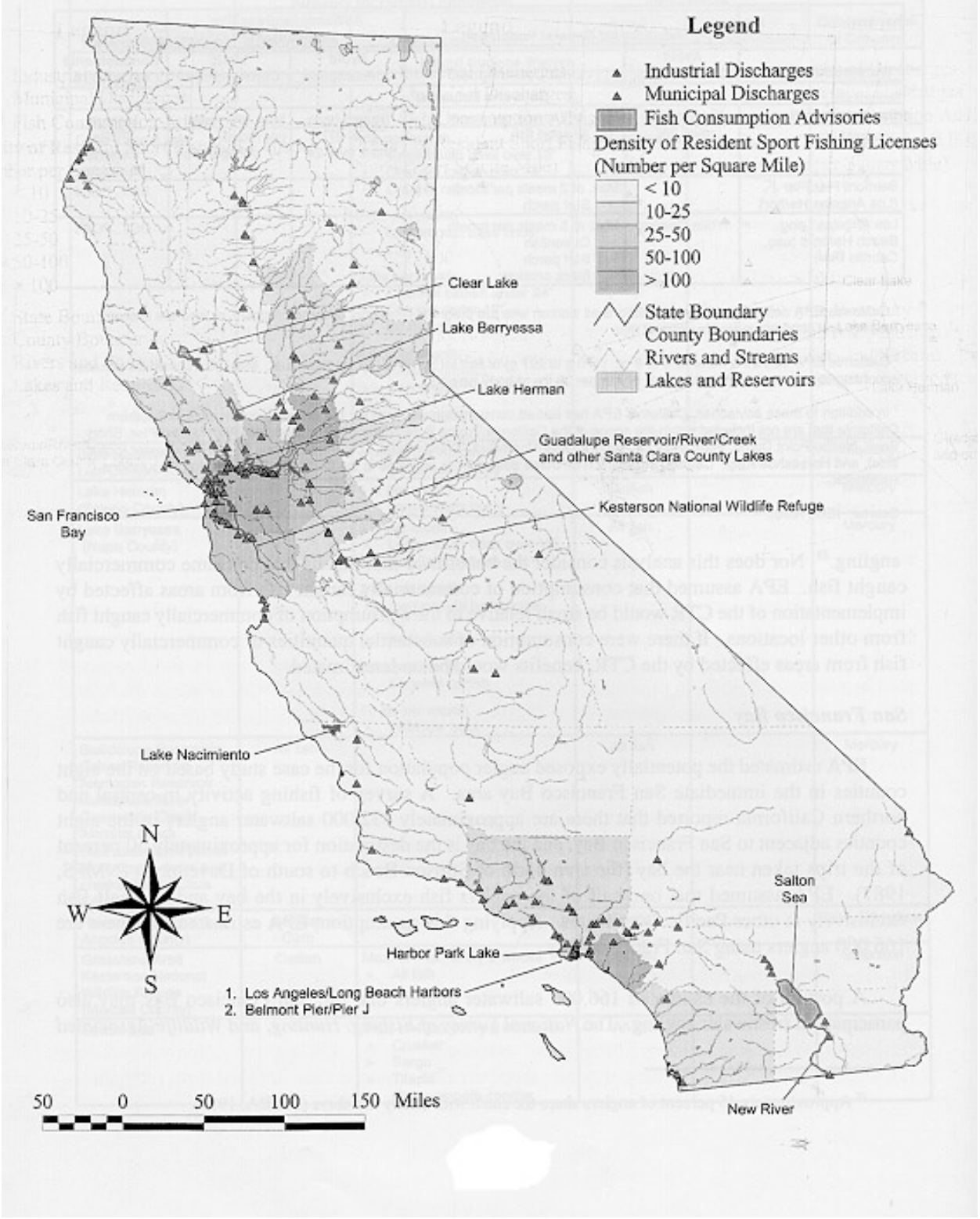

Because this estimate is based on data collected before the imposition of a FCA for San Francisco Bay, EPA adjusted the population down to account for behavioral responses of anglers to FCAs. Recent literature suggests that between 10% and 37% of anglers take fewer trips in response to FCAs (Fiore et al., 1989; Silverman 1990; Knuth et al., 1993; Knuth and Connelly, 1992; Vena, 1992; West et al., 1993). However, these anglers may not eliminate trip-taking. Therefore, EPA assumed that the FCA resulted in a 10% reduction in anglers using San Francisco Bay (This reduction was not likely to have been offset by population growth since resident fishing license sales in the eight counties adjacent to San Francisco Bay fell 22% between 1987 and 1994). EPA's adjusted estimate of full-time equivalent anglers for San Francisco Bay is 108,900.

Freshwater Resources

EPA used the 1996 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation (U.S. Department of Interior, Fish and Wildlife Service, and U.S. Department of Commerce, Bureau of the Census, 1998) and license sales reported by the California Department of Fish and Game for 1996 to estimate the number of freshwater anglers in California. The survey indicated that there were 2.7-million resident anglers in California, including adults and children. Sixty-three percent of the adult anglers fish exclusively in freshwater, 20% split their angling activity between fresh and saltwater, and the remaining 17% of anglers fish exclusively in saltwater. Assuming that children apportion their angling time in the same way as adults, EPA estimated that 1.7-million anglers fish exclusively in freshwater, and 551,000 split their time between fresh and saltwater resources. EPA assumed that anglers that split their time spend half of their time using each resource. Based on this information, EPA calculated that nearly 2-million full-time equivalent anglers use freshwater resources in California.

EPA reduced this estimate of freshwater anglers by the number of 1-day license sales in 1996 (329,730) to remove infrequent anglers from the estimate of potentially exposed anglers. This calculation uses the proportions for total angling time to apportion the number of 1-day licenses between salt and freshwater resources. Using this approach, EPA estimated a potentially exposed population of 1.7 million full-time equivalent anglers using freshwater resources in California.

8.1.2 Fish Consumption

EPA estimated fish consumption rates for both San Francisco Bay and freshwater anglers using the Santa Monica Bay Seafood Consumption Study (MBC Applied Environmental Services, 1994). For this study, the Santa Monica Bay Restoration project conducted a survey of 554 anglers fishing from beaches, piers, private boats, party boats, and charter boats to determine the level and nature of sport-caught fish consumption. This study reported a median consumption rate of 21.4 g/day and a 90th percentile consumption rate of 107.1 g/day for consuming anglers. Although these estimates were developed by interviewing only consuming anglers, EPA applied them to total anglers because they are supported by fish consumption rates for all anglers

(**Exhibit 8-3**). To the extent that the study does not accurately characterize the fish consumption of anglers using freshwater resources, it will lead to an overestimate or under estimate of risks.

Exhibit 8-3. Consumption Rates for Recreational Anglers

Study	Type of Fishery	Angler Population	Consumption Rate
U.S. EPA, 1989a	Sport-caught fish, nationally	All anglers	20 g/day
Puffer et al., 1981	Sport-caught fish from Los Angeles Bay, CA	Anglers who had creeled fish	37 g/day
MBC Applied Environmental Services, 1994	Sport-caught fish from Santa Monica Bay, CA	Anglers who consume fish	21 g/day

Source: U.S. EPA (1997).

8.1.3 Fish Tissue Contaminant Concentrations

EPA used available data (see U.S. EPA, 1997, Appendix F) to calculate the arithmetic mean of fish tissue contaminant concentrations for San Francisco Bay and for statewide freshwater resources. To determine the concentrations, EPA used one-half the MDL for samples in which contaminants were reported as non-detects (U.S. EPA, 1993).

San Francisco Bay

EPA obtained fish tissue contaminant levels from a 1994 study conducted by the San Francisco Regional Water Quality Control Board (SFRWQCB). The study included fish tissue samples from 16 sampling locations selected to provide a broad geographic coverage of the bay. The sampling survey (SFRWQCB, 1994) included fillets of white croaker, striped bass, perch, and shark. The fish tissue samples were prepared for chemical analysis according to the most common means of consumption (croaker and surf perch fillets with skin, and shark and striped bass without skin).

EPA relied on catch rates reported in the National Marine Fisheries Service Marine Recreational Fishing Statistics Survey of the Pacific Coast (1987, 1988, 1989, and 1993) (**Exhibit 8-4**) to develop species-weighted fish tissue contaminant concentrations for San Francisco Bay. The species consumption weighting factors are used to allocate the amount of fish consumed in proportion to anglers' exposure to individual fish species. EPA assumed that keep rates are comparable across the four species in the analysis. This approach was used for both San Francisco Bay and freshwater, but may not accurately reflect species-weighted fish tissue contaminant concentrations because the approach is based on the number of fish caught rather than the mass of edible fish tissue. In addition, fish tissue contaminant data for jacksmelt, a frequently caught species, was not available. However, the relatively small degree of variation in risks associated with consuming the four species that were included in the analysis suggests that the lack of data on mass consumed is unlikely to significantly overestimate or underestimate bay angler risks (U.S. EPA, 1997).

Exhibit 8-4. Species Weights for San Francisco Bay Fish Consumption

Species	Number of Fish Caught	Consumption Weighting Factors[3]
White croaker	532	43.1%
Surf perch[1]	432	35.0%
Striped bass	171	13.9%
Shark[2]	99	8.0%
Total	1,234	100.0%

[1] Includes shiner, walleye, pile, black, and rubberlip surf perch.
[2] Includes brown, smoothhound, and leopard shark.
[3] Represents the percentage of the total catch for each species. Keep rates are assumed to be comparable for the four species.
Source: National Marine Fisheries Service Marine Recreational Fishing Statistics Survey, Pacific Coast, 1987–1989 and 1993, as cited in U.S. EPA (1997).

Freshwater Resources

EPA obtained fish tissue contaminant concentration data from samples taken between 1988 and 1993 by the California Toxic Substances Monitoring Program. Despite the wide representation of freshwater bodies (224 sampling locations for metals and 170 for organics), this database may not be representative of all freshwater bodies. Sampling under this program has generally been targeted to water bodies with known or suspected water quality impairments. The sampling survey included samples of 32 different freshwater fish species, which EPA combined into five broad groups: trout, bass, catfish, panfish, and other. EPA developed species-weighted fish tissue contaminant concentrations from estimates of fishing activity and keep rates by species (**Exhibit 8-5**). The species consumption weighting factors are used to allocate the amount of fish consumed in proportion to anglers' exposures to individual fish species.

Exhibit 8-5. Species Weights for Freshwater Fish Consumption

Species	Annual Fishing Activity[1] (number of days)	Keep Rate[2]	Keep-Rate Weighted Days[3]	Consumption-Weighting Factors[4]
Trout	16,292	25%	2,660	28.0%
Bass	10,431	25%	1,541	16.2%
Catfish	3,972	80%	3,278	34.6%
Panfish	1,457	90%	1,679	17.7%
Other	5,455	25%	329	3.5%
Total	**28,987[5]**	**—**	**9,487**	**100.0%**

[1] Source: U.S. Department of Interior, Fish and Wildlife Service, and U.S. Department of Commerce, Bureau of the Census, 1998.
[2] Source: California Department of Fish and Game (1995). Keep rates for bass and trout were 20% to 25%. For purposes of this analysis EPA assumed that the keep rates for bass, trout, and "other" species were 25% (Dennis Lee, California Department of Fish and Game, personal communication, August 1995).
[3] Calculated by multiplying the annual fishing activity days for each species by the keep-rate for that species. The total keep-rate weighted days is a sum of the keep-rate weighted days for all species.
[4] Calculated by dividing the keep-rate weighted days for each species by the total keep-rate weighted days.
[5] Represents total number of fishing days per year. Does not equal the sum of individual species days because more than one species may have been caught during a single fishing day.

8.1.4 Baseline Risk Levels

EPA calculated exposure based on the assumption that each fish contained all contaminants listed at the concentrations shown in U.S. EPA (1997). **Exhibit 8-6** reports the assumed toxicity values for cancer and systemic effects. EPA used standard assumptions regarding length of residence, 70 years, and body weight, 70 kg (U.S. EPA, 1989b).

Exhibit 8-6. Toxicity Values and Contaminants Evaluated in Each Analysis

Contaminant	CSF[1] $(mg/kg\text{-}day)^{-1}$	RfD[1] (mg/kg-day)	San Francisco Bay	Freshwater Resources
Cadmium	NA	1.0×10^{-3}	✔	
Chlordane	1.3	6.0×10^{-5}	✔	✔
Copper	NA	3.7×10^{-2}	✔	✔
4,4-DDT	0.34	5.0×10^{-4}	✔	✔
Dieldrin	16.0	5.0×10^{-5}	✔	✔
Dioxin	1.50×10^{5}	NA	✔	
Endosulfan	NA	6.0×10^{-3}		✔
Endrin	NA	3.0×10^{-4}		✔
Fluoranthene	NA	4.0×10^{-2}	✔	
Fluorene	NA	4.0×10^{-2}	✔	
HCH-alpha	6.3	NA	✔	✔
HCH-beta	1.8	NA	✔	
HCH-gamma	1.3	3.0×10^{-4}	✔	✔
Heptachlor Epoxide	9.1	1.3×10^{-5}	✔	
Heptachlor	4.5	5.0×10^{-4}	✔	
Hexachlorobenzene	1.6	8.0×10^{-4}	✔	✔
Mercury	NA	1.0×10^{-4}	✔	✔
Nickel	NA	2.0×10^{-2}		✔
PCBs[2]	2.0	2.0×10^{-5}	✔	✔
Pyrene	NA	3.0×10^{-2}	✔	
Selenium	NA	5.0×10^{-3}		✔
Silver	NA	5.0×10^{-3}	✔	
Toxaphene	1.1	NA		✔
Zinc	NA	3.0×10^{-1}	✔	✔

[1] CSF = cancer slope factor; RfD = reference dose. Toxicity values obtained from U.S. EPA's Integrated Risk Information System (4th Quarter, 1996), except for the HCH-gamma and dioxin CSFs and the copper RfD, which were obtained from U.S. EPA's Health Effects Assessment Summary Table, 1994.
[2] The CSF is based on EPA's revised October 1,1996, guidance for assessment of carcinogenic human health risks associated with PCB exposure.
NA = Not applicable
Source: U.S. EPA (1997).

San Francisco Bay

Exhibit 8-7 presents estimates of baseline cancer risks for San Francisco Bay anglers. EPA estimated that the individual excess lifetime cancer risk for anglers consuming a mixed species diet at an average consumption rate is 1.8×10^{-4} and statistical excess cancer cases per year at baseline are less than 1. (Potential benefits of the CTR are calculated for the average consumption rate.) However, for anglers consuming at the 90th percentile consumption rate, the individual excess lifetime cancer risk is 9.2×10^{-4}. These risks are dominated by PCBs and dioxin, which contribute 49% and 41%, respectively, to the cancer risk for an average angler.[2]

Exhibit 8-7. Baseline Cancer Risks for Recreational Anglers Consuming San Francisco Bay Fish

Contaminant	Individual Excess Lifetime Cancer Risk		Population Cancer Risk[1] (excess cases per year)	Relative Contribution to Risk
	Average Consumption (21.4 g/day)	90th Percentile Consumption (107.1 g/day)		
PCBs[2]	9.0×10^{-5}	4.5×10^{-4}	<1	49.0%
Dioxin	7.6×10^{-5}	3.8×10^{-4}	<1	41.2%
Dieldrin	7.8×10^{-6}	3.9×10^{-5}	0	4.2%
4,4-DDT	4.9×10^{-6}	2.4×10^{-5}	0	2.6%
Chlordane	3.9×10^{-6}	2.0×10^{-5}	0	2.1%
HCH-alpha	4.8×10^{-7}	2.4×10^{-6}	0	0.3%
Heptachlor Epoxide	3.8×10^{-7}	1.9×10^{-6}	0	0.2%
HCH-beta	1.7×10^{-7}	8.5×10^{-7}	0	0.1%
Heptachlor	1.6×10^{-7}	7.7×10^{-7}	0	0.1%
HCH-gamma	9.2×10^{-8}	4.6×10^{-7}	0	<0.1%
Hexachlorobenzene	8.1×10^{-8}	4.1×10^{-7}	0	<0.1%
Total	**1.8×10^{-4}**	**9.2×10^{-4}**	**<1**	**100.0%**

[1] Based on average fish consumption (21.4 g/day).
[2] Risk is based on an estimated concentration of PCBs in fish tissue that appears to be calculated by summing Aroclor congeners for 1248, 1254, and 1260. This may result in overstating baseline risks.
Source: U.S. EPA (1997).

Systemic (noncancer) risks are assessed by means of a hazard quotient (HQ) for each contaminant. The HQ is calculated by dividing the expected exposure level (dose) by the oral reference dose (RfD), where the oral RfD indicates the level of chronic exposure below which no adverse health effects are expected. Therefore, a HQ of 1.0 or greater implies that chronic

[2] Risk based on full-time equivalent anglers. Individual baseline risks may be lower by a factor of two for anglers that spend a portion of their time fishing in less-contaminated waters such as anglers that split their fishing activity between saltwater and freshwater, as discussed in Section 8.1.1.

chemical exposures exceed EPA-established "thresholds" of toxicity, and is indicative of potential for adverse health effects. The potential for detrimental health effects increases as the HQ increases above 1.0.

Exhibit 8-8 presents estimated baseline systemic risks for San Francisco Bay anglers. EPA estimated that the HQ for PCBs is 2.3. For anglers with high consumption rates (90th percentile), EPA estimated that the HQs for PCBs, mercury, and dioxin are 11.3, 3.8, and 2.5, respectively.[3]

Exhibit 8-8. Baseline Systemic Risks for Recreational Anglers Consuming San Francisco Bay Fish

Contaminant	Hazard Quotient[1]	
	Average Consumption (21.4 g/day)	90th Percentile Consumption (107.1 g/day)
PCBs	**2.26**	**11.31**
Mercury	0.75	**3.77**
Dioxin	0.51	**2.54**
Chlordane	0.05	0.25
4,4-DDT	0.03	0.14
Dieldrin	0.01	0.05
Zinc	0.01	0.04
Heptachlor Epoxide	<0.01	0.02
Copper	<0.01	0.01
Cadmium	<0.01	<0.01
HCH-gamma	<0.01	<0.01
Silver	<0.01	<0.01
Heptachlor	<0.01	<0.01
Hexachlorobenzene	<0.01	<0.01
Fluoranthene	<0.01	<0.01
Pyrene	<0.01	<0.01
Fluorene	<0.01	<0.01

[1] Hazard quotients above one shown in bold.
Source: U.S. EPA (1997).

Freshwater Resources

Exhibit 8-9 presents estimated baseline cancer risks for California freshwater anglers. EPA estimated that the individual excess lifetime cancer risk at baseline for anglers consuming a mixed species diet at an average consumption rate is 1.5×10^{-4} and there are less than four baseline excess statistical cancer cases per year. For anglers consuming a mixed species fish diet at the 90th percentile consumption rate, EPA estimated that the individual excess lifetime cancer

[3] Risk based on full-time equivalent anglers. The baseline HQ for all contaminants except mercury are estimated to be less than one for anglers that spend a portion of their time fishing in less contaminated waters.

risk is 7.6×10^{-4}. These risks are dominated by PCBs, toxaphene, 4,4-DDT, and dieldrin, which contribute 37%, 21%, 17%, and 16%, respectively, of the cancer risk for an average angler.

Exhibit 8-9. Baseline Cancer Risks for Recreational Anglers Consuming Freshwater Fish in California

Contaminant	Individual Excess Lifetime Cancer Risk		Population Cancer Risk[1] (excess cases per year)	Relative Contribution to Risk
	Average Consumption (21.4 g/day)	90th Percentile Consumption (107.1 g/day)		
PCBs	5.6×10^{-5}	2.8×10^{-4}	2	37.0%
Toxaphene	3.2×10^{-5}	1.6×10^{-4}	1	21.2%
4,4-DDT	2.5×10^{-5}	1.3×10^{-4}	1	16.6%
Dieldrin	2.4×10^{-5}	1.2×10^{-4}	1	16.0%
Chlordane	1.1×10^{-5}	5.3×10^{-5}	<1	7.0%
HCH-alpha	2.0×10^{-6}	1.0×10^{-5}	<1	1.3%
Hexachlorobenzene	1.0×10^{-6}	5.1×10^{-6}	<1	0.7%
HCH-gamma	4.6×10^{-7}	2.3×10^{-6}	<1	0.3%
Total	**1.5×10^{-4}**	**7.6×10^{-4}**	**5**	**100.0%**

[1] Based on average fish consumption (21.4 g/day).
Source: U.S. EPA (1997).

Exhibit 8-10 presents the potential baseline systemic risks for California freshwater anglers. EPA estimated that the baseline HQ for PCBs is 1.4. For anglers with high consumption rates (90th percentile), EPA estimated that the baseline HQs for PCBs and mercury are 7.0 and 3.1, respectively.

8.1.5 Potential Risk Reductions Attributable to the Rule

To estimate the potential risk reductions attributable to the CTR, EPA assumed that fish tissue contaminant concentrations would be reduced by the expected reduction in loadings multiplied by the assumed contribution of point sources to total loadings developed in Chapter 7 (**Exhibit 8-11**). As shown in Chapter 4, EPA developed two scenarios of potential baseline pollutant loadings and reductions in loadings attributable to the rule. These scenarios reflect the uncertainty underlying the analysis of potential costs to point source dischargers that results from limited data on the presence of toxic pollutants in the effluents below detectable levels.

Exhibit 8-10. Baseline Systemic Risks for Recreational Anglers Consuming Freshwater Fish in California

Contaminant	Hazard Quotient[1]	
	Average Consumption (21.4 g/day)	90th Percentile Consumption (107.1 g/day)
PCBs	**1.40**	**7.02**
Mercury	0.62	**3.12**
4,4-DDT	0.15	0.74
Chlordane	0.14	0.68
Dieldrin	0.03	0.15
Selenium	0.02	0.12
Endrin	0.01	0.04
Endosulfan	<0.01	0.02
Zinc	<0.01	0.02
Copper	<0.01	0.01
HCH-gamma	<0.01	0.01
Nickel	<0.01	0.01
Hexachlorobenzene	<0.01	<0.01

[1] Hazard quotients above one shown in bold.
Source: U.S. EPA (1997).

In the first scenario (the low cost scenario), EPA estimated baseline pollutant loadings of 1.8 million pounds per year and a reduction of 20.6% of this baseline resulting from the CTR. On a toxicity-weighted basis, this represents baseline loadings of 2.2 million pounds-equivalent per year and a reduction of 49.6%. Under the second scenario (the high cost scenario), EPA estimated baseline pollutant loadings of 153.9 million pounds per year and a reduction of 28.4% from this baseline resulting from the CTR. On a toxicity-weighted basis, this represents baseline loadings of 18.5 million pounds-equivalent per year and a reduction of 14.7%.

The two scenarios reflect use of different assumptions regarding whether pollutants are present in the effluent of point source dischargers with the high cost scenario using permit limits to establish the presence of pollutants (and not actual effluent monitoring data). Thus, the high cost scenario establishes a larger baseline loading of toxic pollutants from point sources compared to the low cost scenario. The high cost scenario also indicates a smaller percentage reduction as a result of the CTR although this increment is larger in absolute terms compared to that resulting under the low cost scenario.

Because of the uncertainty in the analysis of baseline pollutant loadings, EPA used the midpoint between the reductions estimated under the low and high cost scenarios for estimating potential benefits. For human health risk reduction benefits, this is implemented simply as the midpoint between the low and high cost scenario results for each pollutant analyzed (the percentage reductions are the same on an unweighted or toxicity-weighted basis).

Exhibit 8-11. Estimated Reduction in Fish Tissue Contaminant Concentrations Due to Implementation of the CTR

Contaminant	Statewide Reductions in Loadings[1] (%)	Reduction in Fish Tissue Concentration (%)	
		San Francisco Bay[2]	Freshwater Resources[3]
Cadmium	0.2	0	ne
Chlordane	0	0	0
Copper	14.9	0.1 - 1.5	0.4
4,4-DDT	0	0	0
Dieldrin	0	0	0
Dioxin	0	0	ne
Endosulfan	0	ne	0
Endrin	0	ne	0
Fluoranthene	0	0	ne
Fluorene	0	0	ne
HCH-alpha	0	0	0
HCH-beta	0	0	ne
HCH-gamma	25.2	0.3 - 2.5	0.8
Heptachlor Epoxide	0	0	ne
Heptachlor	0	0	ne
Hexachlorobenzene	48.1	0.5 - 4.8	1.4
Mercury	70.3	0.7 - 7.0	2.1
Nickel	9.2	ne	0.3
PCBs	25.9	0.3 - 2.6	0.8
Selenium	0	ne	0
Silver	38.5	0.4 - 3.9	ne
Toxaphene	1.0	ne	0
Zinc	2.4	0 - 0.2	0.1

[1] Represents the midpoint of the low and high cost scenario results.
[2] Calculated by multiplying the percent reduction in point source loading by the estimated point source contribution to total loadings (1%-10%)
[3] Calculated by multiplying the percent reduction in point source loading by the estimated point source contribution to total loadings (3%).
ne= Not evaluated

Exhibits 8-12 and **8-13** present the potential reductions in cancer risks for recreational anglers. EPA estimated reductions in statistical cancer cases for anglers with average consumption rates. Using an estimated value of a statistical life of $2.5 million to $9.0 million (American Lung Association, 1995) updated to first quarter 1998 dollars[4] and assuming all cancers are fatal,

[4] 1995 dollars were updated to first quarter 1998 dollars using the Consumer Price Index (CPI) as reported in the U.S. Department of Labor (U.S. Bureau of Labor Statistics, 1998). Note that there is currently a debate regarding the accuracy of the CPI.

potential human health benefits of reduced cancer cases in recreational anglers range from $0.10 million to $4.20 million per year[5].

Exhibit 8-12. Potential Effect of Implementation of the CTR on Cancer Risks for Recreational Anglers

Contaminant	Baseline Individual Excess Lifetime Cancer Risk		Post-CTR Individual Excess Lifetime Cancer Risk[1]	
	Average Consumption (21.4 g/day)	90th Percentile Consumption (107.1 g/day)	Average Consumption (21.4 g/day)	90th Percentile Consumption (107.1 g/day)
San Francisco Bay				
Total[2]	1.84×10^{-4}	9.20×10^{-4}	$1.54 \times 10^{-4} - 1.60 \times 10^{-4}$	$7.69 \times 10^{-4} - 7.99 \times 10^{-4}$
Freshwater Resources				
Total[3]	1.51×10^{-4}	7.60×10^{-4}	1.34×10^{-4}	6.72×10^{-4}

[1] Range based on estimate of reductions in fish tissue concentration contamination (based on projected point source load reductions and the contribution of point sources to total loading).
[2] Total for 11 contaminants listed in Exhibit 8-7.
[3] Total for 8 contaminants listed in Exhibit 8-9.

Exhibit 8-13. Potential Human Health Benefits of Reducing Cancer After Implementation of the CTR to Recreational Anglers[1]

Water Body	Annual Reduction in Cancer Cases	Annual Monetized Benefits (millions of 1998 dollars)[1, 2]
San Francisco Bay	0.04 - 0.05	$0.10 - $0.45
Freshwater Resources	0.44	$1.17 - $4.20

[1] Based on an average consumption rate (21.4 g/day) and a value of a statistical life of $2.5 million to $9.0 million (American Lung Association, 1995). Values based on the estimates of reductions in fish tissue concentration contamination.
[2] Estimates are adjusted from 1995 dollars to first quarter 1998 dollars using the Consumer Price Index (CPI) as reported in the U.S. Department of Labor (U.S. Bureau of Labor Statistics, 1998). Note that there is currently a debate regarding the accuracy of the CPI.

Exhibit 8-14 presents the potential effect of the CTR on systemic risks for recreational anglers, indicating potential reductions in the hazard quotients for PCBs and mercury. For PCBs, EPA expects the hazard quotient associated with the average consumption rate to be reduced from 2.26 to a range of 1.51-1.66 for San Francisco Bay anglers and from 1.40 to 1.01 for freshwater anglers. However, for the high consumption rate (90th percentile), the HQ for PCBs is expected to be reduced from 11.31 to a range of 7.54-8.29 for San Francisco Bay anglers and from 7.02 to 5.04 for freshwater anglers.

EPA estimated that the HQ for mercury will be reduced for both the average and 90th percentile consumption rates, however baseline levels exceed 1.0 for high consumers only. For high fish consumers (90th percentile), EPA expects the HQ for mercury to be reduced from 3.77 to a range of 1.01-1.11 for San Francisco Bay anglers and from 3.12 to 0.90 for freshwater anglers.

[5] Based on the following calculation: (estimated value of a life) x (CPI factor) x (reduction in cancer cases); e.g., $2.5 million x 1.062 x 0.04 = $0.1 million.

Exhibit 8-14. Potential Effect of Implementation of the CTR on Systemic Risks for Recreational Anglers

Contaminant	Baseline Hazard Quotient[1]		Post-CTR Hazard Quotient[1,2]	
	Average Consumption (21.4 g/day)	90th Percentile Consumption (107.1 g/day)	Average Consumption (21.4 g/day)	90th Percentile Consumption (107.1 g/day)
San Francisco Bay				
PCBs	**2.26**	**11.31**	**1.51 - 1.66**	**7.54 - 8.29**
Mercury	0.75	**3.77**	0.20 - 0.22	**1.01 - 1.11**
Dioxin	0.51	**2.54**	0.51 - 0.51	**2.54 - 2.54**
Freshwater Resources				
PCBs	**1.40**	**7.02**	**1.01**	**5.04**
Mercury	0.62	**3.12**	0.18	0.90

[1] Hazard quotients above one shown in bold.
[2] Range based on estimates of reductions in fish tissue concentration contamination.

8.1.6 Uncertainties and Limitations

As described in U.S. EPA (1997), there are numerous uncertainties associated with the assessment of potential human health risks including the following:

> Risks were based on contaminant concentrations found in fish fillets or fish prepared by the most common method for the species (croaker and surf perch fillets with skin, and shark and striped bass without skin). Anglers that consume other body parts or untrimmed fillets (including the skin) face higher risks. The Santa Monica Bay Seafood Consumption Study (MBC Applied Environmental Services, 1994) reported that one-third of all anglers eat fish whole, but gutted, including nearly 50% of Asians and 44% of Hispanics.
>
> Risks were based on tissue contaminant levels measured in raw fish fillets. One study (OEHHA, 1991) found that 4,4-DDT concentrations may decrease by 20% to 80% after cooking (U.S. EPA, 1997).
>
> The assessment does not include potential health risks associated with inorganic arsenic. Arsenic in edible fish tissue is, in almost all cases, present as arsenic-containing organic compounds that are not considered a threat to human health. However, where small amounts of inorganic arsenic are present in edible fish tissue, the analysis will understate potential risks.
>
> Average fish tissue concentrations used in the assessment are calculated using one-half of the MDL for all contaminants reported at below the analytical detection level (but found present in other fish tissue samples taken from the same site).

The risk assessment did not include a separate analysis for low-income anglers. MBC Applied Environmental Services (1994) reported a median fish consumption of 32.1 g/day for anglers with incomes below $5,000, compared to 21.4 g/day for all anglers. Results at the 90th percentile consumption rate included in this analysis covers people consuming higher than average consumption.

Risk reduction based on extrapolation of loadings reduction from sample facilities may overstate or understate actual loadings reduction and actual risk reduction.

The assessment does not account for potential synergistic effects of mixtures of pollutants in fish tissue.

8.2 RECREATIONAL ANGLING BENEFITS

The above section described the potential human health benefits that may result from implementation of the CTR. Concerns regarding adverse health effects from eating contaminated fish also may reduce the value of the recreational fishery because the ability to consume fish may be an important attribute of the overall fishing experience (Knuth and Connelly, 1992; Vena, 1992; FIMS and FAA, 1993; West et al., 1993). This reduction in value may occur because fewer fishing trips are taken or because the value of a trip is reduced. In addition, as described in Chapter 6, reduced toxic contamination may increase stability, resilience, and overall health of numerous ecosystems, which may increase catch rates as well as angling effort in California. Thus, the potential recreational benefits of the CTR may include an increase in the value of fishing experiences and an increase in participation.

This section provides estimates of these two components of recreational angling value. Because the analysis is conducted at the statewide level and does not consider numerous site-specific characteristics that will affect the level of benefits from the rule, the results are only intended to provide a rough approximation of the potential magnitude of recreational benefits. A case study approach would be required to more accurately characterize the anticipated angling benefits at any specific water body in California.

8.2.1 Value of an Improved Fishing Experience

As described previously, toxic contamination is responsible for 12 fish consumption advisories currently in place throughout the state, including advisories for 4,4-DDT, chlordane, dioxin, mercury, PCBs, and selenium (see Exhibit 8-1). These advisories, and knowledge of toxic contamination in other water bodies, may affect anglers' enjoyment of the fishing experience. EPA estimated reductions in mercury and other toxic contaminants in California surface waters as a result of implementation of the CTR. Thus, the rule may reduce concentrations of toxics in fish tissue, increasing value to recreational anglers.

EPA was unable to identify any studies regarding the value to California anglers of reducing toxic contamination of surface waters. However, a 1992 study of the Wisconsin Great Lakes

open water sport fishing (Lyke, 1993) does reveal the significance of the contamination problem to the anglers. Lyke estimated the value of the Great Lakes trout and salmon fishing to anglers if it were "completely free of contaminants that may threaten human health." Lyke's estimates indicate benefits of 11% to 31% of the value of the fishery.

Lyke's work estimated the value of reducing toxic contamination in a popular boat fishery that has experienced widespread and highly publicized historical contamination and fish consumption advisories. Thus, the study results may be less applicable for many California anglers because, for example, the fish consumption advisory for San Francisco Bay was issued in 1994 and the fishing experience at many freshwater rivers and streams may differ significantly from Great Lakes trout and salmon angling. However, rather than leave an important category of potential benefits unmonetized, EPA transferred the results from the Lyke study to estimate potential recreational angling benefits of the CTR in California. EPA also considered what the research might indicate about potential benefits for all California waters affected by toxics, not just those waters under fish consumption advisories.[6]

To transfer the Lyke results, EPA first estimated the number of fishing days in California that occur in toxic-impaired waters, distinguishing between water body type (e.g., freshwater river versus saltwater). Next, EPA multiplied the number of fishing days by an average consumer surplus for the different modes of fishing to obtain a baseline value of the fishery. EPA then multiplied by Lyke's estimate of 11% to 31% to obtain the value of a "contaminant-free" fishery. Finally, EPA multiplied by the expected reduction in loadings and the assumed contribution of point sources to total loadings (developed in Chapter 7) to obtain the portion of these benefits that may be potentially attributable to point source controls. These steps are described below.

Estimating Toxic-Impaired Fishing Days

EPA developed estimates of the number of fishing days in freshwater and saltwater sources in California based on information from several sources (National Marine Fisheries Service, 1987–1989 and 1993, Huppert, 1989; U.S. Fish and Wildlife Service, 1993; EPA, 1997). EPA then analyzed the extent of toxic impairment of California waters based primarily on the State of California's WQA database (Water Resources Control Board, 1994) as described in U.S. EPA (1997) and used this information to calculate "toxic-impaired" fishing days. This approach assumes that anglers have not substituted away from contaminated waters.

It also should be noted that EPA defined "impaired" waters as those monitored and rated by the State of California as having medium or poor quality for at least one toxic pollutant or group of

[6] Transferring the Lyke (1993) research to all California waters affected by toxics, but not posing human health risk as indicated by fish consumption advisories, may overstate potential benefits.

toxic pollutants.[7] The State of California has monitored 9% of river and stream miles; 54% of lake and reservoir acreage; and an unknown percentage of bays, estuaries, and saline lakes (U.S. EPA, 1997). Of these monitored waters, the state found that 19% of river and stream miles, 19% of lake and reservoir acreage, 69% of San Francisco Bay, 51% of other California bays, 47% of estuaries, and 69% of saline lakes are "impaired" (U.S. EPA, 1997). EPA assumed for this analysis, maybe conservatively, that California has monitored 50% of bays, estuaries, and saline lakes and then that 50% of unmonitored waters were impaired similarly to monitored waters.[8] To the extent that a substantially greater proportion of waters that have not been monitored are impaired, benefits will be underestimated.

As shown in **Exhibit 8-15**, multiplying the estimated number of fishing days by the percent of monitored waters that are impaired yields estimates of the number of toxic-affected fishing days. EPA estimated a total of 6.4-million fishing days in toxic-impaired waters in California, of which 3.7 million are associated with freshwater fishing and 2.7 million are associated with saltwater fishing.

Exhibit 8-15. Baseline Fishing Days Occurring in Toxic-Impaired Waters[1] in California

	Fishing Days per Year[2]	Percent of Assessed Waters Toxic-Impaired [1,2]	Toxic-Affected Fishing Days[3]
Freshwater Fishing			
Lakes, reservoirs, and ponds	17,826,000	15%	2,673,900
Rivers and streams	10,304,000	10%	1,030,400
Subtotal	28,232,000	—	3,704,300
Saltwater Fishing			
Bays			
San Francisco Bay	750,200[3]	69%	571,638
Other California bays	2,745,800[3]	38%	1,043,404
Estuaries	2,097,600[3]	35%	734,160
Saline lakes	699,200[3]	52%	363,584
Subtotal	6,292,800	—	2,658,786
Total	**34,524,800**	**—**	**6,363,086**

[1] "Impaired" waters are defined as those assessed and rated by the State of California as medium or poor quality for at least one toxic pollutant or group of pollutants. The ratings of these waters corresponds to U.S. EPA's not fully and partially supporting categories.
[2] Based on a total of 6,992,000 total saltwater fishing days. Assumes 50% in bays (e.g., pier fishing), 30% on estuaries, and 10% on saline lakes. Remainder is open sea fishing not addressed by the rule. Estimated fishing days for San Francisco Bay based on estimated number of anglers from health risk analysis (121,000) multiplied by the average days per angler (6.2) from Huppert (1989).
[3] Calculation of toxic-affected fishing days may not be duplicated exactly due to rounding.
Source: Based on U.S. FWS (1993) and U.S. EPA (1997)

Baseline Fishery Value

[7] The California WQA database categories of medium and poor translate to the U.S. EPA categories of not fully supporting and partially supporting. The medium and less severely impaired waters were grouped together into the partially supporting category. The remaining waters classified as poor were placed in the not fully supporting category.

[8] For example, for river and stream miles, the calculation is (19% × 9%) + (19% × 91% × 50%) = 10%.

To estimate the baseline value of the estimated 6.4-million fishing days (in toxic-impaired waters), EPA reviewed the literature for recreational fishing studies that may be appropriate for valuing fishing in California. These studies, listed in **Exhibit 8-16**, suggest consumer surplus associated with freshwater fishing in the range of $25 to $35 per day. This range is consistent with that found by Walsh et al. (1988) in a national review of studies for freshwater fishing. For saltwater fishing, the study results vary more widely, and depend on the mode of fishing (e.g., charter boat, private boat, or shore fishing) and species sought. However, most of the results fall in the range of $50 to $100. This range is also consistent with the average value reported by Walsh et al. for saltwater fishing ($95 per day).

Exhibit 8-16. Studies Revealing Estimates of Consumer Surplus per Fishing Day

Study	Location/Species	Consumer Surplus Estimate ($1996)
Freshwater		
Roach, 1996	American, Feather, Sacramento, and Yuba rivers	$15.24–$36.89; preferred model specification yields $31.17–$36.37 estimate
Hay, 1988	California bass anglers	$31.17
Loomis and Cooper, 1990	Trout in Feather River	$26.69
Walsh, 1988	Average of national studies	$30.85–$40.08
Saltwater		
NOAA, 1986	Marine fishing in Southern California	Charter: $29.74–$66.24 Private: $82.46–$100.02 Shore/pier: $44.23–$84.01
Huppert, 1989	San Francisco Bay, salmon and striped bass	$70.88–$357.36
Walsh, 1988	Average of national studies	$94.89

The ranges of consumer surplus chosen by EPA, $25 to $35 for freshwater and $50 to $100 for saltwater, were adjusted from 1996 to 1998 first quarter dollars using the CPI as reported in the U.S. Department of Labor (U.S. Bureau of Labor Statistics, 1998)[9]. In 1998 dollars, the ranges are $26 to $37 for freshwater and $53 to $105 for saltwater.[10]

Multiplying toxic-impaired fishing days by the relevant range of consumer surplus per day results in estimates of the baseline value of the fishery (See **Exhibit 8-17**). EPA estimated that the baseline value of these waters in California is currently between $237.2 million and $416.2 million per year.

[9] Note that there is currently a debate regarding the accuracy of the CPI.

[10] Based on the following calculations: ($25 × 1.05 = $26); ($35 × 1.05 = $37); ($50 × 1.05 = 53); ($100 × 1.05 = $105).

Exhibit 8-17. Baseline Value of Fishing Days Occurring in Toxic-Impaired Waters in California (1998 First Quarter Dollars)

	Toxic-Affected Fishing Days	Consumer Surplus per Day	Baseline Value ($ millions)
Freshwater Fishing			
Lakes, reservoirs and ponds	2,673,900	$26-$37	$69.5-$98.9
Rivers and streams	1,030,400	$26-$37	$26.8-$38.1
Subtotal	3,704,300		$96.3-$137.1
Saltwater Fishing			
Bays			
San Francisco Bay	517,638	$53-$105	$27.4-$54.4
Other California bays	1,043,404	$53-$105	$55.3-$109.6
Estuaries	734,160	$53-$105	$38.9-$77.1
Saline lakes	363,584	$53-$105	$19.3-$38.2
Subtotal	2,658,786		$140.9-$279.2
Total	**6,363,086**		**$237.2-$416.2**

Potential Benefits Attributable to the CTR

Multiplying the baseline fishery value ($237.2 million to $416.2 million per year) by the increase in value estimated by Lyke (11% to 31%) results in potential benefits of achieving a "toxic-free" fishery of $26.1 million to $129.0 million per year. The next step is to determine the portion of these benefits that might reasonably be attributable to the CTR. EPA believes that the toxicity-weighted results may be the most meaningful for the estimation of benefits although the unweighted results are also important because the pollutants with relatively lower toxic weights can cause problems in a specific waterbody. The toxic-weighted results indicate a 49.6% reduction in pollutant loadings under the low scenario and a 14.7% reduction under the high scenario. As discussed previously, the two scenarios reflect the uncertainties associated with estimation of point source loadings of toxic pollutants. EPA believes that the midpoint between the two scenarios is a reasonable estimate of potential benefits. The midpoint of this range (32.2%) is close to the unweighted reduction in pollutant loadings under the high scenario (28%). Therefore, EPA estimated potential recreational fishing benefits based on a 32.2% reduction in pollutant loadings and assuming that this reduction is indicative of the reduction of impairment from toxics that will be experienced under the CTR.

Thus, EPA multiplied the total potential benefits by 32.2% and then by the percent of total toxic loadings attributable to point sources in California waters, as presented in Exhibit 7-4. As

presented in **Exhibit 8-18**, the approach results in potential benefits attributable to the CTR of between $1.53 million per year and $12.99 million per year.

Exhibit 8-18. Potential Recreational Angling Benefits from a "Toxic-Free" Fishery Attributable to Implementation of the CTR (Millions of 1998 First Quater Dollars/Year)

	Baseline Fishery Value	Value of "Toxic-Free" Fishery	Reduction in Toxic-Weighted Loadings Due to the CTR	Assumed Point Source Contribution to Total Loadings	Potential Benefits Attributable to the CTR
Freshwater					
Lakes, reservoirs and ponds	$69.5-$98.9	$7.6-$30.7	32.2%	3%	$0.07 - $0.30
Rivers and streams	$26.8-$38.1	$2.9-$11.8	32.2%	3%	$0.03 - $0.11
Saltwater					
San Francisco Bay	$27.4-$54.4	$3.0-$16.8	32.2%	1%–10%	$0.01 - $0.54
Other bays	$55.3-$109.6	$6.1-$34.0	32.2%	42%–64%	$0.82 - $7.00
Estuaries	$38.9-$77.1	$4.3-$23.9	32.2%	42%–64%	$0.58 - $4.92
Saline lakes	$19.3-$38.2	$2.1-$11.8	32.2%	3%	$0.02 - $0.11
Total	**$237.2-$416.2**	**$26.1-$129.0**	**—**	**—**	**$1.53 - $12.99**

8.2.2 Value of Increased Participation

In addition to increasing the value of existing angling days, reduced toxic loadings also may increase participation levels. Toxic contamination may discourage recreational fishing participation because of concern that consumption is unsafe. Similarly, knowledge of toxic contamination alone, regardless of consumption concerns, may reduce anglers' participation at a given site. Improving water quality to achieve toxic water quality criteria may restore this lost participation.

Estimating lost participation, however, is difficult for two reasons. First, little is known about how decreases in participation vary given different levels of contamination. When toxic contamination is not publicized or a fish consumption advisory is not posted, toxic-impaired waters may experience no decrease in fishing since anglers may not change their fishing patterns without knowledge of the contamination. Second, the availability of unaffected substitute sites may simply result in a shift in participation from one site to another. It is difficult, however, to account for substitute sites when estimating benefits for such a large area since the availability of substitute sites may vary greatly depending on geographical location and the economic status of the affected anglers. Participation in unaffected waters may actually decrease if participation shifts to the waters improved by implementation of the CTR. Decreased congestion at unimpaired sites will increase an angler's fishing value, however. EPA was not able to account for the effects of reduced congestion or substitute sites when estimating benefits of increased fishing participation.

Since toxic contamination in California occurs statewide, negative perceptions of California's water quality may also exist statewide. A statewide decrease in the level of toxic contamination on all water bodies may improve perceptions of water quality and thus have a positive impact on participation. In addition, as described in Chapter 6, reduced toxic contamination may increase the stability, resilience, and overall health of numerous ecosystems, resulting in higher catch rates. As a result, even if good substitute sites exist for toxic-affected sites, a minimal increase in participation may result from implementation of the CTR.

A limited number of studies have estimated reductions in participation due to water quality degradation. For example, a survey of New York State anglers (Connelly et al., 1988) found that anglers aware of fish consumption advisories took 17% fewer fishing trips. In a study of lake recreation in Wisconsin, Caulkins et al. (1986) estimated that the number of recreationalists using the site would increase by 12% to 16% as a result of general water quality improvements. Other evidence regarding the behavioral response of anglers to fish consumption advisories suggests that between 10% and 37% of anglers take fewer trips in response to fish consumption advisories (Fiore et al., 1989; Silverman, 1990; Knuth and Connelly, 1992; Knuth et al., 1993; West et al., 1993). All of these studies estimate the percentage of *people* that would take fewer trips, not the percentage decrease in angling days. However, these anglers are not expected to eliminate trip-taking, and, as a result, a 5% to 10% reduction in trips may be reasonably assumed. Because public knowledge of toxic contamination varies across water bodies, EPA conservatively assumed a 5% increase in angler participation in estimating the benefits from increased angling participation for all waters except San Francisco Bay. Since a fish consumption advisory was issued for the Bay in 1994, EPA assumed a 10% increase in angler participation for the Bay.

Potential Benefits Attributable to the CTR

EPA estimated the value of increased angling participation in a similar fashion as it estimated the value of improved fishing experiences. EPA multiplied the number of toxic-affected fishing days by 5% (10% for San Francisco Bay) to estimate the expected increase in participation and valued these days using the estimated consumer surplus values presented in Section 8.2.1. To estimate the portion of these benefits attributable to implementation of the CTR, EPA multiplied by the midpoint of expected reduction in loadings (32.2%) and the attribution assumptions developed in Chapter 7. As shown in **Exhibit 8-19**, potential benefits due to increased participation resulting from the CTR range from $0.7 million per year to $2.2 million per year (first quarter 1998 dollars).

Exhibit 8-19. Potential Benefits from Increased Angling Participation (Millions of 1998 First Quarter Dollars/Year)

	Baseline Toxic-Impaired Fishing Days	Additional Fishing Days (5% of Baseline)[1]	Consumer Surplus (per day)	Value of Additional Days	Reduction in Toxic-Weighted Loadings due to the CTR	Assumed Point Source Contribu-tion to Total Loadings	Potential Benefits Attributable to Implementation of the CTR[2]
Freshwater							
Lakes, reservoirs and ponds	2,673,900	133,695	$26–$37	$3.5-$4.9	32.2%	3%	$0.03 - $0.05
Rivers and streams	1,030,400	51,520	$26–$37	$1.3-$1.9	32.2%	3%	$0.01 - $0.02
Subtotal	3,704,300	185,215	$26–$37	$4.8-$6.9	—	—	$0.04 - $0.07
Saltwater							
San Francisco Bay	517,638	51,764	$53–$105	$2.7-$5.4	32.2%	1%–10%	$0.01 - $0.18
Other bays	1,043,404	52,170	$53–$105	$2.8-$5.5	32.2%	42%–64%	$0.37 - $1.13
Estuaries	734,160	36,708	$53–$105	$1.9-$3.9	32.2%	42%–64%	$0.26 - $0.79
Saline lakes	363,584	18,179	$53–$105	$1.0-$1.9	32.2%	3%	$0.01 - $0.02
Subtotal	2,658,786	132,939	$53–$105	$8.4-$16.7	—	—	$0.66 - $2.12
Total	**6,363,086**	**318,154**	**—**	**$13.2-$23.5**	**—**	**—**	**$0.70 - $2.18**

[1] Additional fishing days in San Francisco Bay are estimated to be 10% of the baseline.
[2] Totals may not add up due to rounding.

8.3 NONCONSUMPTIVE WILDLIFE RECREATION VALUES

The 1996 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation (U.S. Department of the Interior, Fish and Wildlife Service, and U.S. Department of Commerce, Bureau of the Census, 1998) indicates that 5.96 million California residents aged 16 or older participated in wildlife watching in 1996. This participation included 17.9 million trips away from home (at least 1 mile) for the primary purpose of observing, photographing, or feeding wildlife. These estimates do not include secondary wildlife-watching activities, such as observing wildlife while pleasure driving (U.S. Department of the Interior, Fish and Wildlife Service, and U.S. Department of Commerce, Bureau of the Census, 1998). Approximately 5.7 million California residents aged 16 or older also participated in wildlife-related activities around the home, including observing, photographing, or feeding wildlife.

Research has shown that nonconsumptive wildlife recreation (viewing wildlife) is highly valued. For example, Rockel and Kealy (1991) estimate a total annual value nationwide of between $8.7 billion and $165 billion in 1980 dollars (with the range of results indicating a sensitivity of their model to functional form). Cooper and Loomis (1991) estimated the total annual value for bird viewing in California's San Joaquin Valley to be $64.7 million (in 1987 dollars), based on willingness to pay (WTP) estimates for all Californians. Cooper and Loomis found that WTP increased as the number of birds seen increased, with diminishing marginal returns evident in their results (Cooper and Loomis, 1991).

As described in the EA that accompanied the proposed CTR, CTR-related improvements in aquatic habitats may lead to healthier and more diverse populations of avian and terrestrial species and may manifest in increased participation and increased user day values for wildlife viewing activities. Without specific information as to the potential magnitude of changes in wildlife populations and thus viewing opportunities that may result from the toxic pollutant loading reductions anticipated under the rule, nonconsumptive wildlife recreation values cannot be estimated. Given the high baseline value, however, these benefits may be appreciable.

8.4 PASSIVE USE (NONUSE) VALUES

As noted in Chapters 5 and 6, individuals may value reduced toxic concentrations in California aquatic environments apart from any values associated with their direct or indirect use of the resource. These passive use (nonuse) values are difficult to estimate in the absence of carefully designed and executed contingent value surveys. "Benefits transfer" techniques, however, can be used to develop a rough approximation of the potential magnitude of these passive use values.

8.4.1 Passive Use Values for Recreational Anglers

Fisher and Raucher (1984) conducted an extensive review of the economics literature providing empirical evidence of the use and nonuse values associated with improved water quality and/or fisheries. Their review indicated that nonuse values are estimated to be *at least* half as great as recreational values. The authors concluded that if passive use values (for example, ecologic

values) are applicable to a policy action, using a 50% approximation is preferred, with proper caveats, to omitting passive use values from a benefit-cost analysis.

Several additional research efforts conducted subsequent to the Fisher and Raucher review provide additional support for the observation that omitting passive use values leads, in most cases, to an appreciable underestimate of total benefits. In some instances, such research has been interpreted to suggest that passive use benefits might be as much as (or more than) twice the recreational use values (e.g., Sutherland and Walsh, 1985; Sanders et al., 1990).

To estimate passive use values from estimates of recreational use benefits as described above, it is important to consider the extent to which the primary research efforts have evaluated resources, and changes in resources, that are reasonably comparable to the policy-affected site and the policy-induced environmental impacts. For the CTR, the resources in question are a large share of the water resources throughout California. These waters in general have, at baseline, some degree of toxics-related impairment, and the anticipated change in conditions due to the CTR will reduce the likelihood or severity of impairment in the future.

Generally, it is appropriate to apply the studies reviewed by Fisher and Raucher to the CTR. For example, the Carson and Mitchell study estimates a nationwide value for incremental freshwater quality improvements. Thus, the use of the 0.5 rule of thumb seems appropriate to an application of the CTR.

Studies with ratios of higher passive use to recreational use values may not be as applicable to the CTR. For example, the Sanders et al. results (implying a ratio of approximately 1.8 or 1.9) are based on a study of the value of preserving several free-flowing river segments in Colorado from the development of dams and other major, irreversible hydrological modifications. Given the magnitude and direction of the environmental change evaluated, coupled with the irreversibility of such changes, one would anticipate a relatively higher ratio of existence and bequest values to direct use values than for a rule similar to the CTR.[11]

Based on the available literature and the environmental changes being considered, EPA estimated passive use values for the CTR as one-half of recreational fishing benefits. These estimates are imprecise for several reasons, including the reliance on the benefits transfer technique and the potential that the underlying primary research studies may not themselves be precise or accurate for the environmental applications to which they were directly applied. It also may be the case that this approach underestimates passive use values because the “ecosystem” benefits may not be fully embodied in the contingent valuation studies being applied, or because of potential

[11] The Sanders et al. (1990) study has similar transferability issues. This study shows passive use values that relate to option price (recreational use and option value) with a ratio of 2 or higher, where the scenario is the potential degradation of a relatively pristine resource (Flathead Lake and River) by coal mining. Given the special qualities of the resource being evaluated (high baseline quality, the largest lake in the western United States), and the direction of change being evaluated (potential pollution from coal mining), the passive use values would be expected to be higher relative to use values than would be anticipated in a CTR context (moderate improvements in water quality in a wide variety of already impaired waters).

underestimation of the applicable recreational use values (if recreational benefits are overstated, then the reverse may be true).

In addition, because some primary studies suggest passive use values may exceed one-half of recreational values, and because recreational fishing values alone are used in lieu of total potential recreational values, the use of the 0.5 ratio is conservative. Furthermore, the primary studies reviewed generally are based on separating the respondent's (household's) total willingness to pay into the two components—passive use value and recreational use value. The 0.5 ratio therefore reflects the amount of passive use value that recreational angling households are willing to pay, above their recreational use values, to preserve or enhance water quality. This rule of thumb suggests that the potential magnitude of passive use values associated with implementation of the CTR for users ranges from $1.1 million per year to $7.6 million per year.

Applying the 50% rule of thumb to the CTR is, in essence, providing a rough estimate of passive use values only for those households that have active recreational anglers. Therefore, this estimate likely provides a very conservative lower bound; it implies that only recreational anglers have passive use values. As described below, EPA developed preliminary estimates of passive use values for non-angling households.

8.4.2 Passive Use Values for Non-Angling Households

To account for the passive use values held by non-angling households, which includes other water recreators such as boaters, swimmers, and nonusers, EPA assumed that the number of angling households is equivalent to the number of licensed anglers in the State of California. EPA then subtracted the number of angling households from all households in California to obtain the number of non-angling households. Because it is likely that there is more than one angler in some households, this assumption is conservative in that it will result in a lower estimate of non-angling households and values.

As an upper-bound estimate of passive use values for non-angling households, EPA assumed that these households have a passive use value equal to that of angling households. As a lower-bound estimate, EPA assumed that all non-angling households are nonuser households, and that they hold lower passive use values than angling households. EPA did not find any literature that provides an indication of how much lower these values might be. Some studies, however, provide information on the relationship between total WTP for water quality improvements for users and nonusers.

WTP Values for Users and Nonusers

EPA found several contingent valuation studies that estimated WTP for users and nonusers of water resources (See **Exhibit 8-20**); however, most of these studies have little relevance to the CTR. Brown and Duffield (1995) estimated WTP to protect the instream flow of a single river and a group of five rivers. Olsen et al. (1991) estimated WTP to double the size of salmon and steelhead runs in the Columbia River Basin. Croke et al. (1986–1987) estimated the WTP to improve water impaired by sewer overflows in Chicago to a level acceptable for outings, boating, and fishing. While these studies show how WTP compares for users and nonusers, they do not evaluate water quality controls or improvements similar to those anticipated for the CTR.

Additionally, Bockstael et al. (1989) report WTP to raise Chesapeake Bay water quality so that it is acceptable for swimming. This study evaluated WTP for clean-up efforts devoted to reducing toxic substances, but it also addresses nutrient over-enrichment and the decline of submerged vegetation. Mean WTP to make the bay acceptable for swimming was $38 for nonusers, which is approximately 31% of the value for users ($121). Since WTP for users includes a use value, 31% likely understates the relationship between passive use values between users and nonusers

Exhibit 8-20. Relationship Between Willingness to Pay Values for Users and Nonusers[1]

Study	WTP for Improvement		Ratio of WTP (nonusers to users)
	Users	Nonusers	
Brown and Duffield (1995)			
One river	$10.18	$3.55	35%
Five rivers	$18.02	$2.02	11%
Loomis et al. (1991)[2]			
Salmon improvement	$202	$181	90%
Contamination reduction	$360	$308	86%
Wetland improvement	$286	$251	88%
Olsen et al. (1991)	$6.18	$2.21	36%
Bockstael et al. (1989)	$121	$38	31%
Croke et al. (1986–1987)	$49.63	$45.76	92%

[1] Year of dollars for the WTP values are not reported since only the ratio between nonuser and user values are compared as opposed to the values themselves.
[2] WTP for users reflects survey responses of local households. WTP for nonusers reflects survey responses of the rest of California's households.

Loomis et al. (1991) may be the most applicable study. Loomis et al. (1991) estimated the benefits to California residents near a resource (users) and nonusers of improved fishery, wetland, and waterfowl resources in the San Joaquin Valley. They used a contingent value survey to determine California households' WTP to implement three wildlife programs: wetlands habitat and wildlife maintenance and improvement, wildlife contamination control, and San Joaquin River and salmon improvement. Mean WTP to improve salmon populations was $202 for users and $181 for nonusers. Mean WTP for contamination reduction was $360 for users and $308 for nonusers. Mean WTP for wetland improvement was $286 for users $251 for nonusers.

Thus, Loomis et al. (1991) provides California-specific research suggesting that nonusers' WTP may be 85% to 90% of the WTP for users.

Lower-Bound Estimate

Due to the nature of the impairment addressed by the CTR, it is likely that improvements may be more valued by users than nonusers, who may even be unaware of the contamination. Thus, as a lower-bound estimate, EPA assumed that passive use values for non-angling households may be 30% of those for angling households. This estimate is supported by Bockstael et al. (1989) who evaluated WTP for clean-up efforts devoted to reducing toxic pollutants to improve water quality in the Chesapeake Bay.

To estimate the number of non-angling households, EPA assumed that the number of recreational angling households is equivalent to the number of licensed recreational anglers, or approximately 1.4 million (California Department of Fish and Game, 1996). Subtracting this from the total number of households in California (approximately 11.1 million; U.S. Bureau of the Census, 1995) yields approximately 9.7 million non-angling households. Assuming a passive value that is 30% of the passive value for angling households yields a range of benefits from $2.3 million to $15.8 million per year for all non-angling households.[12]

Upper-Bound Estimate

As an upper bound, EPA assumed that passive use values for non-angling households may be 90% of those for angling households. This estimate is supported by Loomis et al. (1991), who specifically surveyed California residents near a resource (users) and statewide (nonusers). Multiplying the per household annual value for angling households, the number of non-angling households in California (9.7 million), and the assumed 90% passive use value for nonusers, results in a range of benefits from $7.0 million to $47.3 million per year.[13]

The overall passive use benefits for non-angling households range from $2.3 million per year to $47.3 million per year.

[12] EPA calculated a per household value for angling households of $0.80–$5.42 per year by dividing the passive use value estimated in the previous section ($1.1–$7.6 million per year) by the estimated number of angling households (1.4 million). Thirty percent of this value yields $0.24–$1.63 per household for non-angling households.

[13] The per household value for non-angling households is $0.72 - $4.88 in this case.

8.5 TOTAL VALUE OF SIMILAR IMPROVEMENTS

An alternative to estimating the individual categories of benefits resulting from water quality improvements is to estimate a total value for all types of benefits. Carson et al. (1994) and Loomis et al. (1991) provide total values for toxic-related water quality improvements based on contingent valuation research for California households. Carson et al. (1994) estimated the total value of a program to reduce the recovery time for four species in the Southern California Bight (bald eagles, peregrine falcons, white croaker, and kelp bass) that have been adversely affected by 4,4-DDT and PCBs. The authors estimated a household WTP of $55.61 in a one-time payment for the reduced recovery time. Loomis et al. (1991) estimated annual California household WTP of $254 in the form of higher taxes for wetland habitat improvement, $313 for water contamination reduction, and $183 for salmon fishery improvement (the study notes that the benefit of all three aspects would be somewhat less than the sum of the individually estimated benefits). Given the differences between the programs valued in these studies and the CTR, benefits transfer of a per household value for the CTR would be difficult. However, the studies illustrate WTP for the toxic-related water quality improvements anticipated from the CTR.

8.6 SUMMARY OF MONETIZED BENEFITS

A summary of the estimated monetized benefits from implementation of the CTR is provided in **Exhibit 8-21**. Human health benefits are estimated for San Francisco Bay and statewide freshwater resources; all other benefits are estimated statewide.

Exhibit 8-21. Summary of Annual Benefits from Implementation of the CTR (Millions of 1998 First Quarter Dollars)

Benefit Category	Annual Value
Human Health (cancer risk)	
San Francisco Bay	$0.1 - $0.4
Other saltwater resources	+
Freshwater resources	$1.17 - $4.20
Recreational Angling	
Increased value of existing trips	$1.53 - $12.99
Increased participation	$0.70 - $2.18
Wildlife Viewing	+
Passive Use	
Households with recreational anglers	$1.12 - $7.59
Other households	$2.32 - $47.31
Omitted Benefits[1]	+
Total	**$6.94 - $74.71**

[1] Benefits not monetized include noncancer human health effects, water-related recreation apart from fishing, and consumptive and nonconsumptive land-based recreation.
+: Positive benefits expected but not monetized.

The key omissions, biases, and uncertainties associated with the benefits analysis are shown in **Exhibit 8-22**. It was difficult to assess the overall impact of the omissions, biases, and uncertainties on the benefits estimates because the degree to which they might cause the

estimates to be underestimated or overestimated cannot be predicted with accuracy. Among the key factors described in Exhibit 8-22, however, the omission of potential benefit categories may have the most significant impact and would contribute to an underestimate of benefits. Several categories of potential or likely benefits were omitted from the quantified and monetized estimates (e.g., see U.S. EPA, 1997). In terms of potential magnitudes of benefits, the following are likely to be the most significant contributors to the underestimation of the monetized values presented in Exhibit 8-21:

> Improvements in water-related (in-stream and near-stream) recreation apart from fishing. The omission of boating, swimming, picnicking, and related in-stream and stream-side recreational activities from the benefits estimates could contribute to an appreciable underestimation of total benefits. Such recreational activities have been shown in empirical research to be highly valued, and even modest changes in participation and or user values could lead to sizable benefits statewide. Some of these activities can be closely associated with water quality attributes, particularly swimming. Other recreational activities may be less directly related to the CTR-induced water quality improvements, but might nonetheless increase due to their association with fishing, swimming, or other activities in which the participants might engage.
>
> Improvements in consumptive and nonconsumptive land-based recreation, such as hunting and wildlife viewing. CTR-related improvements in aquatic habitats may lead (via food chain and related ecologic benefit mechanisms) to healthier, larger, and more diverse populations of avian and terrestrial species, such as waterfowl, eagles, and otters. Improvements in the populations for these species could manifest as improved hunting and wildlife viewing opportunities, which might in turn increase participation and user day values for such activities. Although the scope of the benefits analysis has not allowed a quantitative assessment of these values at either baseline or post CTR conditions, these benefits may be appreciable.

Exhibit 8-22. Key Omissions, Biases, and Uncertainties in the Benefits Analysis for the CTR

Omissions/Biases/Uncertainties	Direction of Impact on Benefit/Cost Estimates	Comments
The monetized estimate of benefits omits some categories (e.g., noncancer human health effects, water-related recreation apart from fishing, and consumptive and nonconsumptive land-based recreation).	(-) The omission of potential benefit categories will cause benefits to be underestimated.	The potential magnitude of these benefits may be appreciable.
Human health benefits for saltwater anglers were estimated for San Francisco Bay only.	(-) The omission of other saltwaters may cause benefits to be underestimated.	The number of anglers fishing in other bays, estuaries, and saltwater lakes is estimated to be over 0.5 million anglers (U.S. EPA, 1997).
Human health exposure was calculated based on the assumption that each fish contained all contaminants of concern at the concentrations reported in the fish tissue data.	(+) To the extent that not all fish contain all contaminants at the assumed concentrations, benefits may be overestimated.	The uncertainties in estimating fish tissue concentrations are inherent in the approach used to estimate human health benefits.
Human health risks were based on contaminant concentrations in fish fillets or, for some species, fish fillets with skin.	(-) The use of fish fillets will underestimate risks to anglers that consume other body parts or untrimmed fillets.	The Santa Monica Bay Seafood Consumption Study (MBC Applied Environmental Services, 1994) reported that one-third of all anglers eat fish whole (but gutted), including nearly 50% of Asians and 44% of Hispanics.
Human health risks were based on contaminant concentrations in raw fish fillets.	(+) The use of raw fish fillets may overestimate benefits.	OEHHA (1991) noted that DDT concentrations decreased by 20% to 80% after cooking.
Toxic-impaired waters were defined as waters rated as medium or poor quality for at least one toxic pollutant or group of pollutants. The rating of these waters corresponds to U.S. EPA's not fully and partially supporting categories.	(+) The inclusion of medium-rated waters may result in an overestimate of toxic-impaired waters.	Toxic-impaired waters provide the basis for estimating toxic-impaired fishing days and thus recreational angling and passive use benefits.
Estimation of the increased value of current angling and increased participation in recreational angling assumes that anglers have not substituted away from contaminated waters.	(+) The assumption that anglers have not substituted away from contaminated waters is likely to cause benefits to be overestimated.	It is likely that some anglers have substituted away from contaminated waters.
Overall Impact on Benefits Estimates	(?)	The overall impact on benefits is uncertain because the degree to which the omissions, biases, and uncertainties might cause the estimates to be underestimated or overestimated is unknown.

+: Potential overestimate.
−: Potential underestimate.
?: Uncertain impact.

9.0 COMPARISON OF POTENTIAL BENEFITS TO COSTS

This chapter compares the potential benefits and costs attributable to implementation of the CTR. EPA compared these estimates using two approaches: (1) a direct comparison of annualized costs to benefits, and (2) a comparison of discounted benefits and costs.

9.1 COMPARISON OF ANNUALIZED BENEFITS AND COSTS

A direct comparison of the monetized annual (steady-state) benefits of the CTR and annualized costs shows benefits and costs to be generally commensurate given the uncertainty in the analysis and that several categories of benefits are unmonetized. As shown in **Exhibit 9-1**, the estimate of monetized benefits ranges from $6.9 million per year to $74.7 million per year. Annualized costs are $33.5 million under the low scenario and $61.0 million under the high scenario.

Exhibit 9-1. Comparison of Annual Potential Benefits and Costs of Implementing the CTR (Millions of 1998 First Quarter Dollars)

Comparison Method	Monetized Benefits	Annualized Costs	
		Low Scenario	High Scenario
Direct Annual Comparison[1]	$6.9 - $74.7	$33.5	$61.0

[1] These monetized costs and benefits are not directly comparable since several categories of benefits have not been monetized.

9.2 COMPARISON OF DISCOUNTED BENEFITS AND COSTS

Because the benefits and costs associated with implementation of the CTR may be characterized by an initial outlay of capital costs and a gradual phase-in of benefits, **Exhibit 9-2** presents a present value of benefits and costs over 30 years. This method applies a present value social accounting in which the streams of future benefits and costs are discounted to their present values to reflect society's rate of time preference. EPA considered two different phase-in scenarios to account for the potential delay in realizing benefits since many of the pollutants addressed by the CTR are persistent in the environment. To the extent that benefits of reducing toxic pollutants under the CTR are realized sooner, these scenarios may result in an underestimate of the present value of benefits. EPA assumed that there is a 7% opportunity cost of capital and that capital is replaced every 10 years. Since the life of capital typically exceeds 10 years, this assumption may result in an overestimate of costs. EPA calculated the present value of the streams of benefits and costs using discount rates of 3% and 7%.

As shown in Exhibit 9-2, discounted costs fall within the range of discounted benefits under the low scenario, but discounted costs exceed discounted benefits in three of the four cases shown for the high scenario. However, the assumption that capital is replaced every 10 years likely overstates costs. At the same time, benefits may be understated because some categories are not monetized and full benefits may be realized sooner than 10 or 20 years. Thus, EPA expects that the present value of benefits and costs is more commensurate than shown.

Exhibit 9-2. Comparison of Discounted Benefits and Costs of Implementing the CTR (Millions of 1998 First Quarter Dollars)[1]

Schedule of Benefits	Benefits[2]	Costs[3]	
		Low	High
3% Discount Rate			
10-Year Phase-In of Benefits	$108 - $1166	$617	$1033
20-Year Phase-In of Benefits	$82 - $883	$617	$1033
7% Discount Rate			
10-Year Phase-In of Benefits	$63 - $683	$421	$767
20-Year Phase-In of Benefits	$45 - $480	$421	$767

[1] Present values over 30 years.
[2] Benefits are phased in proportionately over 10 and 20 years, and have their full value in the remaining years. Benefits are not directly comparable to costs since several categories of benefits have not been monetized.
[3] Reflects capital costs plus a 7% cost of capital in years 1, 11, and 21, operating and maintenance costs in years 2 through 30.

9.3 CONCLUSIONS

Comparison of annual values of benefits and costs resulting from implementation of the CTR shows estimated costs falling within the range of monetized benefits. Comparison of 30-year present values of benefits and costs also shows costs under the low scenario to fall within the range of monetized benefits although costs under the high scenario generally fall just outside this range. However, EPA believes that benefits may actually be higher than shown because some categories of potential benefits have not been quantified or monetized. EPA was not able to quantify or monetize potential improvements in water-related recreation apart from fishing, such as boating, swimming, picnicking, and related in-stream and stream-side recreational activities. EPA was also unable to quantify or monetize potential improvements in wildlife viewing. Research indicates that wildlife viewing is a highly valued activity and that California residents value reductions in toxic pollutants that may affect wildlife resources. Thus, these omissions may result in an underestimate of benefits. In addition, using a capital life of 10 years likely overestimates potential compliance costs.

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APPENDIX A. ALTERNATIVES ANALYSIS

In conducting an analysis of the potential costs to point source dischargers as a result of implementing the CTR, EPA made a variety of assumptions. To test the impact of some of these assumptions on the analysis, EPA conducted two alternative analyses. First, EPA estimated the impact on costs associated with changing the human health risk level for carcinogenic pollutants. Second, EPA estimated the impact on costs associated with changing the application of criteria for heavy metals. Sections A.1 and A.2 present the methodology and costs associated with varying the human carcinogenic risks and applying toxic metals criteria in total recoverable form, respectively.

A.1 IMPACT OF HUMAN HEALTH RISK LEVEL

According to EPA's *Water Quality Standards Handbook:* Second Edition (U.S. EPA, 1994), EPA generally regulates carcinogenic toxic pollutants based on a range of assumed risk levels. This range is established based on 1 excess cancer case per 10,000 people (10^{-4}), 1 excess cancer case per 100,000 people (10^{-5}), and 1 excess cancer case per 1,000,000 people (10^{-6}). However, EPA does not recommend a particular risk level as policy.

The State of California historically has protected at a 10^{-6} risk level for carcinogenic pollutants. The CTR follows this history and establishes human health criteria for carcinogens based on a 10^{-6} risk level. The potential costs discussed in Chapter 4 of this report are based on these criteria.

In its readoption of its statewide plans for inland surface waters and enclosed bays and estuaries, however, California may consider other risk levels for carcinogenic pollutants. Again, EPA recommends that states consider minimum risk levels in the range of 10^{-4} to 10^{-6} for carcinogenic priority toxic pollutants to protect public health and welfare. Many states base their human health protection criteria on a 10^{-5} risk level.

The purpose of this analysis is to determine the change in potential costs should the CTR criteria for human health protection from carcinogens be based on a 10^{-5} risk level.

A.1.1 Methodology

EPA used the same methods described in Chapter 4 of this report to derive potential costs related to the use of a lower risk level for carcinogens. The only modification to the methodology is that EPA adjusted the proposed CTR criteria for carcinogens to reflect a lower risk level of 10^{-5}.

A.1.2 Results

Exhibit A-1 summarizes the results of the analysis of lowering the risk level for carcinogens in the proposed CTR. As Exhibit A-1 shows, the changes in estimated costs and pollutant load

reductions based on the lower risk level of 10^{-5} are minimal. Under the low scenario, costs decrease by $1.1 million, approximately 11% less than the costs based on the higher risk level. Under the high scenario, annual costs decrease by $5.8 million, also an 11% decrease from the costs based on a 10^{-6} risk level. Pollutant load reductions attributable to use of a lower risk level are estimated to decrease by approximately 4% and 1% under the low and high scenarios, respectively.

Exhibit A-1. Comparison of Estimated Costs if CTR-Based WQBELS Are Calculated Using a Cancer Risk Level of 10^{-5}

Approach	Low Scenario		High Scenario	
	Estimated Annual Costs ($millions)	Load Reductions (10^6 lbs-eq/yr)	Estimated Annual Costs ($millions)	Load Reductions (10^6 lbs-eq/yr)
Baseline Cost Analysis (10^{-6})	$33.5	1.08	$61.0	2.73
Alternative Analysis (10^{-5})	$32.4	1.04	$55.2	2.69

Note: All costs are in first quarter 1998 dollars.

The low sensitivity to the change in risk level primarily is related to the fact that most of the potential costs related to implementing the CTR are being driven by metals. Changes in risk levels for carcinogens primarily affect organic pollutants.

A.2 IMPACT OF METAL TRANSLATORS

The criteria for metals in the proposed rule are expressed in the dissolved form. Where a site specific or theoretical "translator" is used, the use of dissolved metals criteria usually results in permit limits that are less stringent than those derived from total recoverable criteria. The dissolved criteria in the CTR are derived by multiplying the total recoverable criterion by a conversion factor. Permitting regulations, however, require that permit limits be set in terms of total recoverable metals concentrations. Therefore, permit writers must "translate" dissolved criteria to derive total recoverable permit limits which can be done through a variety of methods.

One method employs site-specific information to derive the translator. This is EPA's preferred approach since it is likely to result in the best estimate of actual in-stream partitioning relationships. However, since not all site-specific information was available, the base analysis presented in Chapter 4 used a second method, the theoretical partitioning relationship, to estimate the translator. The theoretical partitioning relationship is based on a partitioning coefficient determined empirically for each metal and, when available, the concentration of total suspended solids in the site-specific receiving water. According to recent EPA guidance on translators (The Metals Translator: Guidance for Calculation of a Total Recoverable Permit Limit From a Dissolved Criteria), this method usually tends to overstate the stringency of the derived permit limit compared to the site-specific method, although it will sometimes understate the stringency (U.S. EPA, 1996). A third method is to simply use the total recoverable criteria that are derived by dividing the dissolved criteria by the conversion factor. This method is very conservative and

will, in nearly all cases, result in more stringent permit limits compared to the site-specific method.

Although EPA encourages the use of site-specific translators, some members of the regulated community expressed concern that the state may not choose this approach to derive permit limits. Thus, EPA performed a sensitivity analysis.

A.2.1 Methodology

EPA performed a sensitivity analysis to estimate the effect of the use of total recoverable criteria on CTR-based WQBELs, total costs, and load reductions. EPA calculated CTR-based WQBELs using the same methods described in Chapter 4, except that it used total recoverable criteria in place of dissolved criteria for metals.

A.2.2 Results

The results of this analysis show that costs may be sensitive to the translator chosen by the state. **Exhibit A-2** shows the expected costs and load reductions using conversion factors as the translators.

Exhibit A-2. Comparison of Potential Costs if CTR-based WQBELS Are Calculated Using Criteria Expressed as Total Recoverable

Approach	Low Scenario			High Scenario		
	Estimated Annual Costs ($millions)	Load Reductions (10^6 lbs-eq/yr)	Cost-Effectiveness ($/lb-eq)	Estimated Annual Costs ($millions)	Load Reductions (10^6 lbs-eq/yr)	Cost-Effectiveness ($/lb-eq)
Baseline Cost Analysis	$33.5	1.08	31	$61.0	2.73	22
Alternative Analysis	$62.4	1.25	50	$325.0	2.94	111

Note: All costs are in first quarter 1998 dollars.

As Exhibit A-2 shows, a significant increase in costs can be expected, as compared to the costs of the theoretical partitioning approach used in the base analysis. Potential annual costs under the low scenario are $62.4 million per year, an approximately two-fold increase over the estimates in the low base analysis. Under the high-end scenario, total costs are estimated to be nearly $325 million per year, over five times the cost estimates in the base analysis. Potential load reductions are estimated to increase by approximately 14% over the low base-case scenario, and by nearly 7% under the high scenario. Using conversion factors as translators would result in significantly higher costs per toxic pound-equivalent removed than the base analysis. The cost-effectiveness of the new low scenario is $50 per toxic pound-equivalent removed compared to $31 per toxic pound-equivalent removed in the base analysis. The cost-effectiveness of the new high scenario is $111 per toxic pound-equivalent removed compared to $22 per toxic pound-

equivalent removed in the base analysis.

EPA believes that the costs estimated from this analysis greatly overstate true costs. EPA expects that in cases where a facility may incur substantial economic impacts due to an effluent limit for a metal, there will be strong incentives for the facility or the state to develop site-specific data, which will result in more realistic translators, thus reducing potential economic impacts. EPA believes that the cost estimates developed using the theoretical partitioning approach in the base case are more realistic than the cost estimates from this sensitivity analysis.

APPENDIX B. COMPLIANCE COST DECISION MATRIX

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I. REASONABLE POTENTIAL

1. Does the pollutant have a reasonable potential to exceed water quality criteria?

No →

No compliance costs.

↓ **Yes**

II. MODIFY/ADJUST EXISTING TREATMENT

1. Is the WQBEL for the pollutant above analytical detection levels?
2. Does the existing wastewater treatment system have the capability to treat/remove the pollutant?
3. Is the WQBEL for the pollutant greater than documented treatable levels?
4. Are modifications/adjustments to the existing wastewater treatment system feasible in light of the pollutant reduction necessary to achieve the WQBEL (i.e., is the reduction less than 10-25% of the current discharge levels)?

Yes →

Facility incurs costs to modify/adjust existing treatment system.

↓ **No**

III. WASTE MINIMIZATION/POLLUTION PREVENTION

1. Is the production process or source generating the pollutant amenable to waste minimization/pollution prevention techniques?

<u>Industrials Only</u>

2. Is the WQBEL for the pollutant above analytical detection levels?
   - If no, is the production process or pollutant source amenable to control techniques expected to reduce pollutant to below analytical detection levels (e.g., product substitution)?
3. Do any of the following conditions apply?:
   - Is the level of pollutant reduction required to meet the WQBEL insignificant (i.e., less than 10-25% of current discharge levels)?
   - Is the pollutant most often in compliance with the projected effluent limit? (i.e., 80% or more of the observations).
   - Are discharge monitoring data inconclusive to assume treatment costs? (e.g., no data exist, are limited or do not reflect existing discharge conditions).

<u>POTWs Only</u>

2. Is the WQBEL for the pollutant above analytical detection levels?
3. Do any of the following conditions apply?:
   - Is the level of pollutant reduction required to meet the WQBEL insignificant (i.e., less than 10-25% of current discharge levels)?
   - Is the pollutant most often in compliance with the projected effluent limit? (i.e., 80% or more of the observations).
   - Are discharge monitoring data inconclusive to assume treatment costs? (e.g., no data exist, are limited, old, or mostly below detection level).
4. Are increased industrial user/source controls feasible?

Yes →

Facility incurs costs to implement waste minimization/pollution prevention.

↓ **No**

IV. NEW/ADDITIONAL TREATMENT SYSTEM

1. Is the WQBEL for the pollutant above analytical detection levels?
2. Is the effluent concentration for the pollutant sufficiently documented above detection levels and above documented treatable levels?
3. Is the new/additional treatment technology feasible in light of the:
   - existing treatment process(es)?
   - production process(es)?
   - pollutant source(s)?
   - level of pollutant reductions required to achieve the WQBEL (i.e., is it greater than 10-25% of the current discharge levels)?
   - cost to add the necessary treatment? [Note: Under the low scenario, the cost trigger is $200/toxic lb-equivalent for a specific facility for a pollutant].

Yes →

Facility incurs costs to install additional end-of-pipe treatment (or in-plant treatment).

↓ **No**

V. OTHER CONTROLS

1. Is the pollutant concentration above analytical detection levels, and treatable levels; and is the WQBEL below analytical detection levels?
2. Is a combination of end-of-pipe treatment and waste minimization/pollution prevention feasible in light of the:
   - existing treatment process(es)?
   - pollutant source(s)?
   - level of pollutant reductions required to achieve the WQBEL (i.e., is it greater than 10-25% of the current discharge levels)?
   - cost to add the necessary treatment? [Note: Under the low scenario, the cost trigger is $200/toxic lb-equivalent for a specific facility for a pollutant].

Yes →

Facility incurs costs for other controls.

↓ **No**

↓	↓	↓	↓	↓
VIa. Phased TMDL	**VIb. Variances from Water Quality Standards**	**VIc. Site-Specific Criteria**	**VId. Change Designated Use**	**VIe. Alternative Mixing Zone**
1. Is the discharge to a non-attainment receiving water? 2. Are the other sources of pollutants to the receiving water known?	1. Is the pollutant naturally occurring? 2. Are there natural, ephemeral, intermittent or low flow conditions? 3. Are there human-caused conditions or sources? 4. Are dams, diversions, or other types of hydrologic modifications present? 5. Do the physical conditions related to the natural features of the water body contribute? 6. Would the controls result in substantial and widespread economic and social impact? If yes, will the discharge comply with anti-degradation requirements and cause no increased risk to human health and the environment?	1. Are local environmental conditions not reflected in criteria? 2. Are bio-accumulation factors appropriate?	1. Is the pollutant naturally occurring? 2. Are there natural, ephemeral, intermittent or low flow conditions? 3. Are there human-caused conditions or sources? 4. Are dams, diversions, or other types of hydrologic modifications present? 5. Do the physical conditions related to the natural features of the water body contribute? 6. Would the controls result in substantial and widespread economic and social impact?	1. Does the receiving water body offer a dilution ratio higher than the one presently indicated in the permit?
Facility incurs future cost to comply with TMDL.	Facility incurs costs for preparing variance request and future compliance costs when variance expires.	Facility incurs costs for preparing request for site-specific criteria.	Facility incurs costs associated with preparing a use attainability analysis.	Facility incurs costs to prepare demonstration.

APPENDIX C. DETAILED COST ESTIMATES

Costs, Low, Extrapolated

Pollutant	Total Capital	Annual Capital	Mon	O&M	Total Waste Min.	Annual Waste Min.	Total TPO	Annual TPO	Total TS	Annual TS	Total PT Study	Annual PT Study	Total LL Eval	Annual LL Eval	Total Variance	Annual Variance	Total Other	Annual Other	Totals By Poll.	Percent of Total
Antimony (Sb)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
Arsenic (As)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
Cadmium (Cd)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
Chromium VI (Cr-VI)	0	0	0	0	0	0	1,078,524	153,558	0	0	0	0	0	0	0	0	0	0	153,558	1.5%
Copper (Cu)	0	0	0	0	4,748,214	676,039	8,771,000	1,248,793	0	0	0	0	0	0	1,676,190	238,652	0	0	2,163,484	21.8%
Lead (Pb)	0	0	0	0	0	0	575,000	81,867	0	0	0	0	0	0	0	0	0	0	81,867	0.8%
Mercury (Hg)	0	0	0	0	9,000,000	1,281,398	548,952	78,158	0	0	0	0	0	0	0	0	0	0	1,359,556	13.7%
Nickel (Ni)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
Selenium (Se)	0	0	0	0	0	0	616,667	87,799	0	0	0	0	0	0	0	0	0	0	87,799	0.9%
Silver (Ag)	0	0	0	0	1,850,000	263,398	1,165,619	165,958	0	0	0	0	0	0	0	0	0	0	429,356	4.3%
Thallium (Tl)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
Zinc (Zn)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,676,190	238,652	0	0	238,652	2.4%
1,2 Dichlorobenzene	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
1,2 Dichloroethane	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
1,2 Dichloropropane	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
1,2-Trans-Dichloroethylene	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
1,3 Dichlorobenzene	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
1,3-Dichloropropylene	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
1,4 Dichlorobenzene	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
2,4-Dinitrophenol	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
2,4,6 Trichlorophenol	0	0	0	0	462,500	65,850	0	0	0	0	0	0	0	0	0	0	0	0	65,850	0.7%
4,4'-DDD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
4,4'-DDT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
Aldrin	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
alpha-BHC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
alpha-Endosulfan	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
Benzene	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
Benzo (a) Anthracene	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
Benzo (a) Fluoranthene	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
Benzo (k) Fluoranthene	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
beta-BHC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
beta-Endosulfan	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
Bromoform	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
Butylbenzyl-pthalate	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
Carbon Tetrachloride	0	0	0	0	5,533,333	787,822	0	0	0	0	0	0	0	0	0	0	0	0	787,822	7.9%
Chlordane	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
Chlorobenzene	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
Chlorodibromomethane	0	0	0	0	0	0	4,221,111	600,991	0	0	0	0	0	0	0	0	0	0	600,991	6.1%
Chloroform	0	0	0	0	0	0	4,683,611	666,841	0	0	0	0	0	0	0	0	0	0	666,841	6.7%
Dichlorobromomethane	0	0	0	0	0	0	4,683,611	666,841	0	0	0	0	0	0	0	0	0	0	666,841	6.7%
Dieldrin	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
Di-n-Butyl Phthalate	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
Endosulfan Sulfate	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
Endrin	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
Endrin Aldehyde	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
Fluoranthene	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
Fluorene	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
gamma-BHC	0	0	0	0	4,462,500	635,360	0	0	0	0	0	0	0	0	0	0	0	0	635,360	6.4%
Heptachlor	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
Heptachlor epoxide	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
Hexachlorobenzene	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
Methylene chloride	0	0	0	0	5,533,333	787,822	0	0	0	0	0	0	0	0	0	0	0	0	787,822	7.9%
PCBs	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
Pentachlorophenol	0	0	0	0	462,500	65,850	0	0	0	0	0	0	0	0	0	0	0	0	65,850	0.7%
Phenol	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
TCDD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
Tetrachloroethylene	0	0	0	0	8,000,000	1,139,020	0	0	0	0	0	0	0	0	0	0	0	0	1,139,020	11.5%
Toluene	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
Toxaphene	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
Trichloroethylene	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%

Costs, High, Extrapolated

Pollutant	Total Capital	Annual Capital	Mon	O&M	Total Waste Min.	Annual Waste Min.	Total TPO	Annual TPO	Total TS	Annual TS	Total PT Study	Annual PT Study	Total LL Eval	Annual LL Eval	Total Variance	Annual Variance	Total Other	Annual Other	Totals By Poll.	Percent of Total
Antimony (Sb)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
Arsenic (As)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
Cadmium (Cd)	0	0	0	0	7,904,762	1,125,460	0	0	0	0	0	0	0	0	0	0	0	0	1,125,460	2.2%
Chromium VI (Cr-VI)	0	0	0	0	11,854,762	1,687,851	3,312,964	471,692	0	0	0	0	0	0	0	0	0	0	2,159,543	4.2%
Copper (Cu)	4,777,143	680,158	0	418,000	27,486,310	3,913,432	749,302	106,684	0	0	0	0	0	0	0	0	0	0	5,118,273	10.1%
Lead (Pb)	0	0	0	0	11,936,508	1,699,490	958,333	136,445	0	0	0	0	0	0	0	0	0	0	1,835,935	3.6%
Mercury (Hg)	0	0	0	0	33,281,746	4,738,572	365,968	52,106	0	0	0	0	0	0	0	0	0	0	4,790,678	9.4%
Nickel (Ni)	4,777,143	680,158	0	418,000	8,521,429	1,213,260	961,298	136,867	0	0	0	0	0	0	0	0	0	0	2,448,285	4.8%
Selenium (Se)	0	0	0	0	12,163,095	1,731,751	961,298	136,867	0	0	0	0	0	0	0	0	0	0	1,868,618	3.7%
Silver (Ag)	4,777,143	680,158	0	418,000	25,279,762	3,599,269	3,678,933	523,797	0	0	0	0	0	0	0	0	0	0	5,221,224	10.3%
Thallium (Tl)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
Zinc (Zn)	4,777,143	680,158	0	418,000	698,413	99,438	0	0	0	0	0	0	0	0	0	0	0	0	1,197,596	2.4%
1,2 Dichlorobenzene	0	0	0	0	25,657,778	3,653,090	0	0	0	0	0	0	0	0	0	0	0	0	3,653,090	7.2%
1,2 Dichloroethane	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
1,2 Dichloropropane	0	0	0	0	0	0	2,470,667	351,767	0	0	0	0	0	0	0	0	0	0	351,767	
1,2-Trans-Dichloroethylene	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
1,3 Dichlorobenzene	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
1,3-Dichloropropylene	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
1,4 Dichlorobenzene	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
2,4-Dinitrophenol	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
2,4,6 Trichlorophenol	0	0	0	0	462,500	65,850	0	0	0	0	0	0	0	0	0	0	0	0	65,850	0.1%
4,4'-DDD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
4,4'-DDT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
Aldrin	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
alpha-BHC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
alpha-Endosulfan	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
Benzene	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
Benzo (a) Anthracene	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
Benzo (a) Fluoranthene	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
Benzo (k) Fluoranthene	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
beta-BHC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
beta-Endosulfan	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
Bromoform	0	0	0	0	326,786	46,527	0	0	0	0	0	0	0	0	0	0	0	0	46,527	0.1%
Butylbenzyl-pthalate	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
Carbon Tetrachloride	0	0	0	0	18,771,230	2,672,601	0	0	0	0	0	0	0	0	0	0	0	0	2,672,601	5.3%
Chlordane	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
Chlorobenzene	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
Chlorodibromomethane	0	0	0	0	0	0	5,059,206	720,317	0	0	0	0	0	0	0	0	0	0	720,317	1.4%
Chloroform	0	0	0	0	8,156,786	1,161,343	4,883,611	695,316	0	0	0	0	0	0	0	0	0	0	1,856,659	3.6%
Dichlorobromomethane	0	0	0	0	326,786	46,527	4,683,611	666,841	0	0	0	0	0	0	0	0	0	0	713,368	1.4%
Dieldrin	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
Di-n-Butyl Phthalate	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
Endosulfan Sulfate	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
Endrin	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
Endrin Aldehyde	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
Fluoranthene	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
Fluorene	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
gamma-BHC	0	0	0	0	20,462,500	2,913,400	0	0	0	0	0	0	0	0	0	0	0	0	2,913,400	5.7%
Heptachlor	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
Heptachlor epoxide	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
Hexachlorobenzene	0	0	0	0	2,213,333	315,129	0	0	0	0	0	0	0	0	0	0	0	0	315,129	0.6%
Methylene chloride	0	0	0	0	18,444,444	2,626,074	0	0	0	0	0	0	0	0	0	0	0	0	2,626,074	5.2%
PCBs	0	0	0	0	5,728,571	815,620	0	0	0	0	0	0	0	0	0	0	0	0	815,620	1.6%
Pentachlorophenol	0	0	0	0	7,675,833	1,092,866	0	0	0	0	0	0	0	0	0	0	0	0	1,092,866	2.1%
Phenol	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
TCDD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
Tetrachloroethylene	0	0	0	0	40,326,786	5,741,627	0	0	0	0	0	0	0	0	0	0	0	0	5,741,627	11.3%
Toluene	0	0	0	0	10,252,024	1,459,658	0	0	0	0	0	0	0	0	0	0	0	0	1,459,658	2.9%
Toxaphene	0	0	0	0	326,786	46,527	0	0	0	0	0	0	0	0	0	0	0	0	46,527	0.1%
Trichloroethylene	0	0	0	0	326,786	46,527	0	0	0	0	0	0	0	0	0	0	0	0	46,527	0.1%

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(3 blocks north of Union Station Metro)

RESERVATIONS: 202–523–4538

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Federal Register
Vol. 66, No. 30
Tuesday, February 13, 2001

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The Code of Federal Regulations is sold by the Superintendent of Documents. Prices of new books are listed in the first FEDERAL REGISTER issue of each week.

FEDERAL RESERVE SYSTEM

12 CFR Part 201

[Regulation A]

Extensions of Credit by Federal Reserve Banks; Change in Discount Rate

AGENCY: Board of Governors of the Federal Reserve System.

ACTION: Final rule.

SUMMARY: The Board of Governors has amended its Regulation A on Extensions of Credit by Federal Reserve Banks to reflect its approval of a decrease in the basic discount rate at each Federal Reserve Bank. The Board acted on requests submitted by the Boards of Directors of the twelve Federal Reserve Banks.

DATES: The amendments to part 201 (Regulation A) were effective January 31, 2001. The rate changes for adjustment credit were effective on the dates specified in 12 CFR 201.51.

FOR FURTHER INFORMATION CONTACT: Jennifer J. Johnson, Secretary of the Board, at (202) 452–3259, Board of Governors of the Federal Reserve System, 20th and C Streets NW., Washington, DC 20551.

SUPPLEMENTARY INFORMATION: Pursuant to the authority of sections 10(b), 13, 14, 19, et al., of the Federal Reserve Act, the Board has amended its Regulation A (12 CFR part 201) to incorporate changes in discount rates on Federal Reserve Bank extensions of credit. The discount rates are the interest rates charged to depository institutions when they borrow from their district Reserve Banks.

The ''basic discount rate'' is a fixed rate charged by Reserve Banks for adjustment credit and, at the Reserve Banks' discretion, for extended credit for up to 30 days. In decreasing the basic discount rate from 5.5 percent to 5.0 percent, the Board acted on requests submitted by the Boards of Directors of the twelve Federal Reserve Banks. The new rates were effective on the dates specified below. The 50-basis-point decrease in the discount rate was associated with a similar decrease in the federal funds rate approved by the Federal Open Market Committee and announced at the same time.

Consumer and business confidence has eroded further, exacerbated by rising energy costs that continue to drain consumer purchasing power and press on business profit margins. Partly as a consequence, retail sales and business spending on capital equipment have weakened appreciably. In response, manufacturing production has been cut back sharply, with new technologies appearing to have accelerated the response of production and demand to potential excesses in the stock of inventories and capital equipment.

Taken together, and with inflation contained, these circumstances have called for a rapid and forceful response of monetary policy. The longer-term advances in technology and accompanying gains in productivity, however, exhibit few signs of abating and these gains, along with the lower interest rates, should support growth of the economy over time.

Nonetheless, the Committee continues to believe that against the background of its long-run goals of price stability and sustainable economic growth and of the information currently available, the risks are weighted mainly toward conditions that may generate economic weakness in the foreseeable future.

Regulatory Flexibility Act Certification

Pursuant to section 605(b) of the Regulatory Flexibility Act (5 U.S.C. 605(b)), the Board certifies that the change in the basic discount rate will not have a significant adverse economic impact on a substantial number of small entities. The rule does not impose any additional requirements on entities affected by the regulation.

Administrative Procedure Act

The provisions of 5 U.S.C. 553(b) relating to notice and public participation were not followed in connection with the adoption of the amendment because the Board for good cause finds that delaying the change in the basic discount rate in order to allow notice and public comment on the change is impracticable, unnecessary, and contrary to the public interest in fostering price stability and sustainable economic growth.

The provisions of 5 U.S.C. 553(d) that prescribe 30 days prior notice of the effective date of a rule have not been followed because section 553(d) provides that such prior notice is not necessary whenever there is good cause for finding that such notice is contrary to the public interest. As previously stated, the Board determined that delaying the changes in the basic discount rate is contrary to the public interest.

List of Subjects in 12 CFR Part 201

Banks, banking, Credit, Federal Reserve System.

For the reasons set out in the preamble, 12 CFR part 201 is amended as set forth below:

PART 201—EXTENSIONS OF CREDIT BY FEDERAL RESERVE BANKS (REGULATION A)

1. The authority citation for 12 CFR part 201 continues to read as follows:

Authority: 12 U.S.C. 343 *et seq.*, 347a, 347b, 347c, 347d, 348 *et seq.*, 357, 374, 374a and 461.

2. Section 201.51 is revised to read as follows:

§ 201.51 Adjustment credit for depository institutions.

The rates for adjustment credit provided to depository institutions under § 201.3(a) are:

Federal Reserve Bank	Rate	Effective
Boston	5.0	January 31, 2001
New York	5.0	January 31, 2001.
Philadelphia	5.0	January 31, 2001.
Cleveland	5.0	January 31, 2001.

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Federal Reserve Bank	Rate	Effective
Richmond	5.0	January 31, 2001.
Atlanta	5.0	January 31, 2001.
Chicago	5.0	January 31, 2001.
St. Louis	5.0	February 1, 2001.
Minneapolis	5.0	January 31, 2001.
Kansas City	5.0	February 1, 2001.
Dallas	5.0	January 31, 2001.
San Francisco	5.0	January 31, 2001.

Dated: By order of the Board of Governors of the Federal Reserve System, February 7, 2001.

Jennifer J. Johnson,

Secretary of the Board.

[FR Doc. 01–3564 Filed 2–12–01; 8:45 am]

BILLING CODE 6210–01–P

DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Part 39

[Docket No. 2000–SW–56–AD; Amendment 39–12104; AD 2001–03–03]

RIN 2120–AA64

Airworthiness Directives; Bell Helicopter Textron, Inc. Model 214B and 214B–1 Helicopters

AGENCY: Federal Aviation Administration, DOT.

ACTION: Final rule; request for comments.

SUMMARY: This amendment adopts a new airworthiness directive (AD) for Bell Helicopter Textron, Inc. (BHTI) Model 214B and 214B–1 helicopters. This action requires, within 10 hours time-in-service (TIS), determining the hours TIS for certain main rotor outboard strap fitting assemblies and creating appropriate records. This action also requires, if any main rotor outboard strap fitting assembly (strap fitting) is determined to have 2,500 or more hours TIS or the hours TIS cannot be determined, replacing the strap fitting with an airworthy strap fitting before further flight. This action also establishes a 2,500-hour retirement life for the strap fitting and revises the Airworthiness Limitations section accordingly. This amendment is prompted by fatigue testing that indicates a fatigue crack may occur in the strap fitting with resulting failure. The actions specified in this AD are intended to prevent failure of a strap fitting, separation of a main rotor blade, and subsequent loss of control of the helicopter.

DATES: Effective February 28, 2001.

Comments for inclusion in the Rules Docket must be received on or before April 16, 2001.

ADDRESSES: Submit comments in triplicate to the Federal Aviation Administration (FAA), Office of the Regional Counsel, Southwest Region, Attention: Rules Docket No. 2000–SW–56–AD, 2601 Meacham Blvd., Room 663, Fort Worth, Texas 76137. You may also send comments electronically to the Rules Docket at the following address: 9-asw-adcomments@faa.gov.

FOR FURTHER INFORMATION CONTACT: Michael Kohner, Aviation Safety Engineer, FAA, Rotorcraft Directorate, Rotorcraft Certification Office, Fort Worth, Texas 76193–0111, telephone (817) 222–5447, fax (817) 222–5783.

SUPPLEMENTARY INFORMATION: This amendment adopts a new AD for BHTI Model 214B and 214B–1 helicopters. This action requires, within 10 hours TIS, determining the hours TIS for each strap fitting, P/N 214–010–185–107, and creating a component history card or equivalent record for each strap fitting. This action also requires that if a strap fitting has 2,500 or more hours TIS or if the hours TIS cannot be determined, replacing the strap fitting with an airworthy strap fitting before further flight. This strap fitting is structurally identical to strap fitting, P/N 214–010–189–103, which currently has a retirement life of 2,500 hours. The strap fitting has been sold for spares since approximately 1982. This amendment is prompted by fatigue testing which indicates that a fatigue crack may occur in the strap fitting leading to failure of the strap fitting if it is allowed to remain in service in excess of 2,500 hours. The actions specified in this AD are intended to prevent a failure of a strap fitting, separation of a main rotor blade, and subsequent loss of control of the helicopter.

The FAA has reviewed BHTI Alert Service Bulletin 214–00–62, dated June 2, 2000, which describes procedures for establishing a 2,500-hour airworthiness life pending formal revision of the 214B series Maintenance Manual and provides information to determine continued serviceability for strap fitting, P/N 214–010–185–107.

We have identified an unsafe condition that is likely to exist or develop on other BHTI Model 214B and 214B–1 helicopters of the same type design. Therefore, this AD is being issued to require the following for each strap fitting, P/N 214–010–185–107:

- Within 10 hours TIS, by referring to the helicopter maintenance records, create a component history card or equivalent record for each strap fitting and record the hours TIS and serial number.
- If the hours TIS cannot be determined, replace the strap fitting with an airworthy strap fitting before further flight.
- If the strap fitting has accumulated 2,500 or more hours TIS, replace it with an airworthy strap fitting before further flight.
- Continue to record the subsequent hours TIS.
- Revise the Airworthiness Limitations section of the maintenance manual by establishing a retirement life of 2,500 hours TIS for the strap fitting.

The short compliance time involved is required because the previously described critical unsafe condition can adversely affect the controllability and structural integrity of the helicopter. Therefore, replacing any strap fitting, P/N 214–010–185–107, that has 2,500 or more hours TIS or a strap fitting for which the hours TIS cannot be determined is required within 10 hours TIS, and this AD must be issued immediately.

Since a situation exists that requires the immediate adoption of this regulation, it is found that notice and opportunity for prior public comment hereon are impracticable, and that good cause exists for making this amendment effective in less than 30 days.

The FAA estimates that 11 helicopters will be affected by this proposed AD, that it will take approximately 14 work hours to replace each of the 2 strap fittings, 2 work hours to create a new component history card, and 10 work hours annually to maintain the records, and that the average labor rate is $60 per

work hour. Required parts will cost approximately $4807 per helicopter. Based on these figures, the total cost impact of the AD on U.S. operators is estimated to be $79,277 the first year assuming all strap fittings will be replaced.

Comments Invited

Although this action is in the form of a final rule that involves requirements affecting flight safety and, thus, was not preceded by notice and an opportunity for public comment, comments are invited on this rule. Interested persons are invited to comment on this rule by submitting such written data, views, or arguments as they may desire. Communications should identify the Rules Docket number and be submitted in triplicate to the address specified under the caption ''**ADDRESSES.**'' All communications received on or before the closing date for comments will be considered, and this rule may be amended in light of the comments received. Factual information that supports the commenter's ideas and suggestions is extremely helpful in evaluating the effectiveness of the AD action and determining whether additional rulemaking action would be needed.

Comments are specifically invited on the overall regulatory, economic, environmental, and energy aspects of the rule that might suggest a need to modify the rule. All comments submitted will be available in the Rules Docket for examination by interested persons. A report that summarizes each FAA-public contact concerned with the substance of this AD will be filed in the Rules Docket.

Commenters wishing the FAA to acknowledge receipt of their mailed comments submitted in response to this rule must submit a self-addressed, stamped postcard on which the following statement is made: ''Comments to Docket No. 2000–SW–56–AD.'' The postcard will be date stamped and returned to the commenter.

The regulations adopted herein will not have a substantial direct effect on the States, on the relationship between the national Government and the States, or on the distribution of power and responsibilities among the various levels of government. Therefore, it is determined that this final rule does not have federalism implications under Executive Order 13132.

The FAA has determined that this regulation is an emergency regulation that must be issued immediately to correct an unsafe condition in aircraft, and that it is not a ''significant regulatory action'' under Executive Order 12866. It has been determined further that this action involves an emergency regulation under DOT Regulatory Policies and Procedures (44 FR 11034, February 26, 1979). If it is determined that this emergency regulation otherwise would be significant under DOT Regulatory Policies and Procedures, a final regulatory evaluation will be prepared and placed in the Rules Docket. A copy of it, if filed, may be obtained from the Rules Docket at the location provided under the caption ''**ADDRESSES.**''

List of Subjects in 14 CFR Part 39

Air transportation, Aircraft, Aviation safety, Safety.

Adoption of the Amendment

Accordingly, pursuant to the authority delegated to me by the Administrator, the Federal Aviation Administration amends part 39 of the Federal Aviation Regulations (14 CFR part 39) as follows:

PART 39—AIRWORTHINESS DIRECTIVES

1. The authority citation for part 39 continues to read as follows:

Authority: 49 U.S.C. 106(g), 40113, 44701.

§ 39.13 [Amended]

2. Section 39.13 is amended by adding a new airworthiness directive to read as follows:

2001–03–03 Bell Helicopter Textron, Inc.: Amendment 39–12104. Docket No. 2000–SW–56–AD.

Applicability: Model 214B and 214B–1 helicopters, with a main rotor outboard strap fitting assembly (strap fitting), part number (P/N) 214–010–185–107, installed, certificated in any category.

Note 1: This AD applies to each helicopter identified in the preceding applicability provision, regardless of whether it has been otherwise modified, altered, or repaired in the area subject to the requirements of this AD. For helicopters that have been modified, altered, or repaired so that the performance of the requirements of this AD is affected, the owner/operator must request approval for an alternative method of compliance in accordance with paragraph (d) of this AD. The request should include an assessment of the effect of the modification, alteration, or repair on the unsafe condition addressed by this AD; and if the unsafe condition has not been eliminated, the request should include specific proposed actions to address it.

Compliance: Within 10 hours time-in-service (TIS), unless accomplished previously.

To prevent failure of a strap fitting, separation of a main rotor blade, and subsequent loss of control of the helicopter, accomplish the following:

Note 2: Bell Helicopter Textron Alert Service Bulletin 214–00–62 dated June 2, 2000, pertains to the subject of this AD.

(a) By referring to the helicopter maintenance records, create a component history card or equivalent record for each strap fitting, and record the hours TIS and serial number.

(1) If the hours TIS cannot be determined, replace the strap fitting with an airworthy strap fitting before further flight.

(2) If the strap fitting has accumulated 2,500 or more hours TIS, replace it with an airworthy strap fitting before further flight.

(b) After accomplishing paragraph (a) of this AD, continue to record the subsequent hours TIS.

(c) This AD revises the Airworthiness Limitations section of the maintenance manual by establishing a life limit of 2,500 hours TIS for the strap fitting, P/N 214–010–185–107.

(d) An alternative method of compliance or adjustment of the compliance time that provides an acceptable level of safety may be used if approved by the Manager, Rotorcraft Certification Office, Rotorcraft Directorate, FAA. Operators shall submit their requests through an FAA Principal Maintenance Inspector, who may concur or comment and then send it to the Manager, Rotorcraft Certification Office.

Note 3: Information concerning the existence of approved alternative methods of compliance with this AD, if any, may be obtained from the Rotorcraft Certification Office.

(e) Special flight permits may be issued in accordance with 14 CFR 21.197 and 21.199 to operate the helicopter to a location where the requirements of this AD can be accomplished.

(f) This amendment becomes effective on February 28, 2001.

Issued in Fort Worth, Texas, on February 1, 2001.

Eric Bries,

Acting Manager, Rotorcraft Directorate,, Aircraft Certification Service.

[FR Doc. 01–3179 Filed 2–12–01; 8:45 am]

BILLING CODE 4910–13–U

DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Part 71

[Airspace Docket No. 2001–ASW–03]

Establishment of Class E Airspace, Sugar Land, TX

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Direct final rule; request for comments.

SUMMARY: This amendment establishes Class E airspace at Sugar Land, TX. This action is prompted by a non-federal air traffic control tower that currently

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operates only during specified hours at this airport. The intended effect of this rule is to provide adequate controlled airspace for aircraft operating in the vicinity of Sugar Land Municipal/Hull Field, Sugar Land, TX. when the control tower is not operating.

DATES: Effective 0901 UTC, May 17, 2001. Comments must be received on or before March 30, 2001.

ADDRESSES: Send comments on the rule in triplicate to Manager, Airspace Branch, Air Traffic Division, Federal Aviation Administration, Southwest Region, Docket No. 2001–AWS–03, Fort Worth, TX 76193–0520. The official docket may be examined in the Office of the Regional Counsel, Southwest Region, Federal Aviation Administration, 2601 Meacham Boulevard, Room 663, Fort Worth, TX, between 9 a.m. and 3 p.m., Monday through Friday, except Federal holidays. An informal docket may also be examined during normal business hours at the Airspace Branch, Air Traffic Division, Federal Aviation Administration, Southwest Region, Room 414, Fort Worth, TX.

FOR FURTHER INFORMATION CONTACT: Donald J. Day, Airspace Branch, Air Traffic Division, Southwest Region, Federal Aviation Administration, Fort Worth, TX 76193–0520, telephone 817–222–5593.

SUPPLEMENTARY INFORMATION: This amendment to 14 CFR part 71 establishes Class E airspace at Sugar Land, TX. This action is prompted by a non-federal air traffic control tower that currently operates only during specified hours at this airport. The intended effect of this rule is to provide adequate controlled airspace for aircraft operating in the vicinity of Sugar Land Municipal/Hull Field, Sugar Land, TX. when the control tower is not operating. On March 4, 1999, a proposal to amend 14 CFR part 71 to establish Class D and Class E airspace at Sugar Land, TX, was published in the **Federal Register** (64 FR 10410). The proposal was to establish Class D and Class E airspace extending upward from the surface to and including 2,600 feet MSL, within a 4.2-mile radius of the Sugar Land Municipal/Hull Airport, Sugar Land, TX. The published notice proposed to establish Class E airspace to protect aircraft operations while the control tower was not operating. However, the necessary weather equipment was not available, therefore, the Class D airspace reverted to Class G airspace when the control tower is not in operation. Since weather equipment is necessary for Class E surface airspace, a final rule establishing only Class D airspace was published (64 FR 51208, September 22, 1999. The weather equipment is now available and operational.

Class E airspace designations are published in Paragraph 6002 of FAA Order 7600.9H, dated September 1, 2000, and effective September 16, 2000, which is incorporated by reference in 14 CFR § 71.1. The Class E airspace designation listed in this document will be published subsequently in the order.

The Direct Final Rule Procedure

The FAA anticipates that this regulation will not result in adverse or negative comment and therefore is issuing it as a direct final rule. A substantial number of previous opportunities provided to the public to comment on substantially identical actions have resulted in negligible adverse comments or objections. Unless a written adverse or negative comment, or a written notice of intent to submit an adverse or negative comment is received within the comment period, the regulation will become effective on the date specified above. After the close of the comment period, the FAA will publish a document in the **Federal Register** indicating that no adverse or negative comments were received and confirming the date on which the final rule will become effective. If the FAA does receive, within the comment period, an adverse or negative comment, or written notice of intent to submit such a comment, a document will be published in the **Federal Register**. This document may withdraw the direct final rule in whole or in part. After considering the adverse or negative comment, we may publish another direct final rule or publish a notice of proposed rulemaking with a new comment period.

Comments Invited

Although this action is in the form of a final rule, comments are invited on this rule. Interested persons are invited to comment on this rule by submitting such written data, views, or arguments as they may desire. Communications should identify the Rules Docket number and be submitted in triplicate to the address specified under the caption **ADDRESSES.** All communications received on or before the closing date for comments will be considered, and this rule may be amended or withdrawn in light of the comments received. Factual information that supports the commenter's ideas and suggestions is extremely helpful in evaluating the effectiveness of this action and determining whether additional rulemaking action is needed.

Comments are specifically invited on the overall regulatory, economic, environmental, and energy aspects of the rule that might suggest a need to modify the rule. All comments submitted will be available, both before and after the closing date for comments, in the Rules Docket for examination by interested persons. A report that summarizes each FAA-public contact concerned with the substance of this action will be filed in the Rules Docket.

Commenters wishing the FAA to acknowledge receipt of their comments submitted in response to this rule must submit a self-addressed, stamped postcard on which the following statement is made: ''Comments to Docket No. 2001–AWS–03.'' The postcard will be date stamped and returned to the commenter.

Agency Findings

The regulations adopted herein will not have substantial direct effects on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government. Therefore, it is determined that this final rule will not have federalism implications under Executive Order 13132.

Further, the FAA has determined that this regulation is noncontroversial and unlikely to result in adverse or negative comments and only involves an established body of technical regulations that require frequent and routine amendments to keep them operationally current. Therefore, I certify that this regulation (1) is not a ''significant regulatory action'' under Executive Order 12866; (2) is not a ''significant rule'' under DOT Regulatory Policies and Procedures (44 FR 11034; February 26, 1979); and (3) if promulgated, will not have a significant economic impact, positive or negative, on a substantial number of small entities under the criteria of the Regulatory Flexibility Act. Since this rule involves routine matters that will only affect air traffic procedures and air navigation, it does not warrant preparation of a Regulatory Flexibility Analysis because the anticipated impact is so minimal.

List of Subjects in 14 CFR Part 71

Airspace, Incorporation by reference, Navigation (air).

Adoption of the Amendment

Accordingly, pursuant to the authority delegated to me, the Federal Aviation Administration amends 14 CFR part 71 as follows:

PART 71—DESIGNATION OF CLASS A, CLASS B, CLASS C, CLASS D, AND CLASS E AIRSPACE AREAS; AIRWAYS; ROUTES; AND REPORTING POINTS

1. The authority citation for 14 CFR part 71 continues to read as follows:

Authority: 49 U.S.C. 106(g), 40103, 40113, 40120; E.O. 10854; 24 FR 9565, 3 CFR, 1959–1963 Comp., p. 389.

§ 71.1 [Amended]

2. The incorporation by reference in 14 CFR 71.1 of the Federal Aviation Administration Order 7400.9H, *Airspace Designations and Reporting Points,* dated September 1, 2000, and effective September 16, 2000, is amended as follows:

Paragraph 6002 Class E airspace areas extending upward from the surface of the earth.

* * * * *

ASW TX E2 Houston Sugar Land, TX [New]

Sugar Land, Sugar Land Municipal Airport/Hull Field, TX
(Lat. 29°37′20″N., long. 95°39′24″W.)
Within a 4.2-mile radius of Sugar Land Municipal/Hull Field. This Class E airspace is effective during the specific dates and times established in advance by a Notice to Airmen. The effective date and time will thereafter be continuously published in the Airport/Facility Directory.

* * * * *

Issued in Fort Worth, TX on January 25, 2001.

Robert N. Stevens,

Acting Manager, Air Traffic Division, Southwest Region.

[FR Doc. 01–3645 Filed 2–12–01; 8:45 am]

BILLING CODE 4910–13–M

DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Part 71

[Airspace Docket No. 99–ANM–10]

Modification of Class E Airspace, St. George, UT

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Final rule.

SUMMARY: This action modifies the St. George, UT, Class E airspace to accommodate airspace required for the establishment of a new Standard Instrument Approach Procedure (SIAP) to the St. George Municipal Airport, St. George, UT.

EFFECTIVE DATE: 0901 UTC, March 22, 2001.

FOR FURTHER INFORMATION CONTACT: Brian Durham, ANM–520.7, Federal Aviation Administration, Docket No. 99–ANM–10, 1601 Lind Avenue SW, Renton, Washington 98055–4056: telephone number: (425) 227–2527.

SUPPLEMENTARY INFORMATION:

History

On September 21, 2000, the FAA proposed to amend Title 14 Code of Federal Regulations, part 71 (14 CFR part 71) by modifying Class E airspace at St. George, UT, in order to accommodate a new Area Navigation (RNAV) SIAP to Runway 34 at St. George Municipal Airport, St. George, UT (65 FR 184). This amendment provides additional Class E5 airspace at St. George, UT, to meet current criteria standards associated with the SIAP. Interested parties were invited to participate in the rulemaking proceeding by submitting written comments on the proposal. No comments were received.

The Rule

This amendment to Title 14 Code of Federal Regulations, part 71 (14 CFR part 71) modifies Class E airspace at St. George, UT, in order to accommodate a new SIAP to the St. George Municipal Airport, St. George, UT. This amendment modifies Class E5 airspace at St. George, UT, to meet current criteria standards associated with the SIAP. The FAA establishes Class E airspace where necessary to contain aircraft transitioning between the terminal and enroute environments. This rule is designed to provide for the safe and efficient use of the navigable airspace and to promote safe flight operations under Instrument Flight Rules (IFR) at the St. George Municipal Airport and between the terminal and enroute transition stages.

The area will be depicted on aeronautical charts for pilot reference. The coordinates for this airspace docket are based on North American Datum 83. Class E airspace areas extending upward from 700 feet or more above the surface of the earth, are published in Paragraph 6005, of FAA Order 7400.9H dated September 1, 2000, and effective September 16, 2000, which is incorporated by reference in 14 CFR 71.1. The Class E airspace designation listed in this document will be published subsequently in the Order.

The FAA has determined that this regulation only involves an established body of technical regulations for which frequent and routine amendments are necessary to keep them operationally current. It, therefore, (1) is not a ''significant regulatory action'' under Executive Order 12866; (2) is not a ''significant rule'' under DOT Regulatory Policies and Procedures (44 FR 11034; February 26, 1979); and (3) does not warrant preparation of a Regulatory Evaluation as the anticipated impact is so minimal. Since this is a routine matter that will only affect air traffic procedures and air navigation, it is certified that this rule, will not have a significant economic impact on a substantial number of small entities under the criteria of the Regulatory Flexibility Act.

List of Subjects in 14 CFR Part 71

Airspace, Incorporation by reference, Navigation (air).

Adoption of the Amendment

In consideration of the foregoing, the Federal Aviation Administration amends 14 CFR part 71 as follows:

PART 71—DESIGNATION OF CLASS A, CLASS B, CLASS C, CLASS D, AND CLASS E AIRSPACE AREAS; AIRWAYS; ROUTES; AND REPORTING POINTS

1. The authority citation for 14 CFR part 71 continues to read as follows:

Authority: 49 U.S.C. 106(g), 40103, 40113, 40120; E.O. 10854, 24 FR 9565, 3 CFR, 1959–1963 Comp., p. 389.

§ 71.1 [Amended]

2. The incorporation by reference in 14 CFR 71.1 of the Federal Aviation Administration Order 7400.9H, Airspace Designations and Reporting Points, dated September 1, 2000, and effective September 16, 2000, is amended as follows:

Paragraph 6005 Class E airspace areas extending upward from 700 feet or more above the surface of the earth

* * * * *

ANM UT E5 St. George, UT [Revised]

St. George Municipal Airport, UT
(Lat. 37°05′26″N., long. 113°35′35″W.)
St. George VOR/DME
(Lat. 37°05′17″N., long. 113°35′31″W.)

That airspace extending upward from 700 feet above the surface within 8.3 miles northeast and 5.3 miles southwest of the St. George VOR/DME 131° and 311° radials extending from 6.1 miles northwest to 16.1 miles southeast, and within 5.9 miles each side of the St. George VOR/DME 183° radial extending from the VOR/DME to 18.2 miles south; and that airspace extending upward from 1,200 feet above the surface within the 30-mile radius of lat. 36°48′52″N., long. 113°35′37″W., extending clockwise from 256° bearing to the 076° bearing, and within 30 miles radius of lat. 36°48′53″N., long. 113°43′06″W., extending clockwise from the 076° bearing to the 166° bearing of lat. 36°48′52″N., long. 113°35′37″W., and within

30 miles radius of lat. 36°48′52″N., long. 113°29′24″W., extending counterclockwise from the 256° bearing to the 166° bearing of lat. 36°48′52″N., long. 113°35′37″W.; excluding that portion of airspace within the Colorado City, AZ, 700 and 1,200 feet Class E airspace area; that portion of airspace within the Mesquite, NV, 700 feet Class E airspace; that portion of airspace for V–235 southeast of the Mormon Mesa VORTAC that portion of airspace for V–235 northeast of the Mormon Mesa VORTAC; that portion of airspace for V–21 northeast of the Mormon Mesa VORTAC.

* * * * *

Issued in Seattle, Washington, on January 31, 2001.

Dan A. Boyle,

Assistant Manager, Air Traffic Division, Northwest Mountain Region.

[FR Doc. 01–3647 Filed 2–12–01; 8:45 am]

BILLING CODE 4910–13–M

DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Part 71

[Airspace Docket No. 01–ASO–1]

Establishment of Class E2 Airspace; Tri-City, TN

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Final rule.

SUMMARY: This action establishes Class E2 airspace at Tri-City, for the Tri-City Regional Airport. The Tri-City Airport Traffic Control Tower is a part time facility. When the control tower is closed, Atlanta Air Route Traffic Control Center (ARTCC) provides approach control service. This requires establishment of Class E2 surface area airspace.

EFFECTIVE DATE: March 13, 2001.

FOR FURTHER INFORMATION CONTACT: Wade T. Carpenter, Jr., Manager, Airspace Branch, Air Traffic Division, Federal Aviation Administration, PO Box 20636, Atlanta, Georgia 30320; telephone (404) 305–5627.

SUPPLEMENTARY INFORMATION:

History

The Tri-City Regional Airport lies within Class D airspace. The Tri-City Airport Traffic Control Tower hours of operation have changed and it is now a part time facility. When the control tower closes, Atlanta ARTCC provides approach control service for the Tri-City Regional Airport. Since the Atlanta ARTCC provides approach control service and the proper classification of airspace to accommodate aircraft conducting standard instrument approach procedures is not available, flight safety interests may be affected. Accordingly, immediate corrective action is taken herein, in the interest of flight safety, to establish Class E2 airspace in the vicinity of Tri-City Regional Airport. Therefore, I find that notice and public procedure under 5 U.S.C. 553(b) are impracticable and contrary to the public interest. Designations for Class E are published in FAA Order 7400.9H, dated September 1, 2000, and effective September 16, 2000, which is incorporated by reference in 14 CFR part 71.1. The Class E designations listed in this document will be published subsequently in the Order.

The Rule

This amendment to part 71 of the Federal Aviation Regulations (14 CFR part 71) establishes Class E2 airspace at Tri-City, TN.

The FAA has determined that this regulation only involves an established body of technical regulations for which frequent and routine amendments are necessary to keep them operationally current. It, therefore, (1) is not a ''significant regulatory action'' under Executive Order 12866; (2) is not a ''significant rule'' under DOT Regulatory Policies and Procedures (44 FR 11034; February 26, 1979); and (3) does not warrant preparation of a regulatory evaluation as the anticipated impact is so minimal. Since this is a routine matter that will only affect air traffic procedures and air navigation, it is certified that this rule will not have a significant economic impact on a substantial number of small entities under the criteria of the Regulatory Flexibility Act.

List of Subjects in 14 CFR Part 71

Airspace, Incorporation by Reference, Navigation (air).

Adoption of the Amendment

In consideration of the foregoing, the Federal Aviation Administration amends 14 CFR part 71 as follows:

PART 71—DESIGNATION OF CLASS A, CLASS B, CLASS C, CLASS D AND CLASS E AIRSPACE AREAS; AIRWAYS; ROUTES; AND REPORTING POINTS

1. The authority citiation for 14 CFR part 71 continues to read as follows:

Authority: 49 U.S.C. 106(g); 40103, 40113, 40120; EO 10854, 24 FR 9565, 3 CFR, 1959–1963 Comp., p. 389; 14 CFR 11.69.

§ 71.1 [Amended]

2. The incorporation by reference in 14 CFR 71.1 of Federal Aviation Administration Order 7400.9H, Airspace Designations and Reporting Points, dated September 1, 2000, and effective September 16, 2000, is amended as follows:

Paragraph 6002 Class E Airspace Designated as Surface Areas.

* * * * *

ASO TN E2 Tri-City, TN [New]

Tri-City Regional Airport, TN
(Lat. 36°28′30″N, long. 82°24′27″W)
Tri-City Localizer
(Lat. 36°27′44″N, long. 82°25′22″W)

Within a 4.3-mile radius of Tri-City Regional Airport and within 2 miles each side of Tri-City localizer northeast course, extending from the 4.3-mile radius of Tri-City Regional Airport to the OM. This Class E airspace area is effective during the specific days and times established in advance by a Notice to Airmen. The effective date and time will thereafter be continuously published in the Airport/Facility Directory.

* * * * *

Issued in College Park, Georgia, on January 23, 2001.

Wade T. Carpenter,

Acting Manager, Air Traffic Division, Southern Region.

[FR Doc. 01–3651 Filed 2–12–01; 8:45 am]

BILLING CODE 4910–13–M

DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Part 71

[Airspace Docket No. 98–AAL–26]

RIN 2120–AA66

Modification and Revocation of VOR and Colored Federal Airways and Jet Routes; AK

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Final rule; correction.

SUMMARY: This action corrects a final rule published in the **Federal Register** on June 6, 2000. In that rule, the legal description of Colored Federal Airway Green 8 (G–8) contained an inadvertent error that excluded the Glenallen, AK, NDB Intersection from the description of G–8. This action corrects that error.

EFFECTIVE DATE: February 13, 2001.

FOR FURTHER INFORMATION CONTACT: Ken McElroy, Airspace and Rules Division, ATA–400, Office of Air Traffic Airspace Management, Federal Aviation Administration, 800 Independence

Avenue, SW., Washington, DC 20591; telephone: (202) 267–8783.

SUPPLEMENTARY INFORMATION: On June 6, 2000, Airspace Docket No. 98–AAL–26 (65 FR 35822; FR Doc. 00–14044) was published for the modification and revocation of VOR and Colored Federal Airways, and Jet Routes in Alaska. Included in this rule was the amendment to the legal description of G–8 which omitted the Glenallen, AK, NDB Intersection. This action adds the Glenallen intersection to the legal description of G–8, thereby correcting this error.

Correction to Final Rule

Accordingly, pursuant to the authority delegated to me, the legal description for Colored Federal Airway G–8, as published in the **Federal Register** on June 6, 2000 (65 FR 35822; FR Doc. 00–14044), and incorporated by reference in 14 CFR 71.1, is corrected as follows:

§ 71.1 [Corrected]

On page 35823, correct the legal description of the G–8, to read as follows:

Paragraph 6009 (a)—Green Federal Airways

* * * * *

G–8 [Revised]

From Shemya, AK, NDB, 20 AGL , Mount Moffet, NDB, AK; 20 AGL Dutch Harbor, AK, NDB; 20 AGL INT Dutch Harbor NDB 041° and Elfee, AK, NDB 253° bearings; 20 AGL Elfee NDB; 20 AGL Saldo, AK, NDB; INT Saldo NDB 054° and Kachemak, AK, NDB 269° bearings, to Kachemak NDB. From Campbell Lake, AK, NDB; INT Campbell Lake NDB 031° and Glenallen, AK, NDB 255° bearings; Glenallen NDB; INT Glenallen NDB 052° and Nabesna, AK, NDB 252° bearings; Nabesna NDB.

* * * * *

Issued in Washington, DC, on January 23, 2001.

Reginald C. Matthews,

Manager, Airspace and Rules Division.

[FR Doc. 01–3642 Filed 2–12–01; 8:45 am]

BILLING CODE 4910–13–P

DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Part 71

[Airspace Docket No. 00–AAL–07]

RIN 2120–AA66

Revision of VOR Federal V–480 and Jet Route J–120; AK

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Final Rule

SUMMARY: This action revises Very High Frequency Omnidirectional Range (VOR) Federal Airway 480 (V–480) and Jet Route 120 (J–120) in Alaska by adding a routinely used route segment between Mt. Moffett and St. Paul Island, AK. The FAA is revising these routes for the following reasons: The conversion of this uncharted nonregulatory route to a VOR Federal airway and jet route will add additional instrument flight rules (IFR) airway and route infrastructure in Alaska; pilots will be provided with minimum en route altitudes and minimum obstruction clearance altitudes information; to establish controlled airspace, thus eliminating some of the commercial IFR operations in uncontrolled airspace; and to improve the management of air traffic operations and thereby enhance safety.

EFFECTIVE DATE: 0901 UTC, March 22, 2001.

FOR FURTHER INFORMATION CONTACT: Ken McElroy, Airspace and Rules Division, ATA–400, Office of Air Traffic Airspace Management, Federal Aviation Administration, 800 Independence Avenue, SW., Washington, DC 20591; telephone: (202) 267–8783.

SUPPLEMENTARY INFORMATION:

Background

On October 11, 2000, the FAA proposed to amend 14 CFR part 71 (part 71) to revise V–480 and J–120 (65 FR 60385). Interested parties were invited to participate in this rulemaking proceeding by submitting written comments on the proposal to the FAA. No comments were received. With the exception of editorial changes, this amendment is the same as that proposed in the notice.

The Rule

The FAA is amending part 71 to revise V–480 and J–120 in Alaska. The revision to V–480 and J–120 will add a routinely used route segment between Mt. Moffett and St. Paul Island, AK. Presently, there is an uncharted nonregulatory route segment with the same routing as this airway and jet route revision. The current route is used by air carrier and general aviation aircraft. The FAA is revising these routes for the following reasons: (1) The conversion of this uncharted nonregulatory route to a VOR Federal airway and jet route will add additional IFR airway and route infrastructure in Alaska; (2) pilots would be provided with minimum en route altitudes and minimum obstruction clearance altitude information; (3) to establish controlled airspace, thus eliminating some of the commercial IFR operations in uncontrolled airspace; and (4) to improve the management of air traffic operations and thereby enhance safety.

The FAA has determined that this regulation only involves an established body of technical regulations for which frequent and routine amendments are necessary to keep them operationally current. Therefore, this regulation: (1) Is not a ''significant regulatory action'' under Executive Order 12866; (2) is not a ''significant rule'' under DOT Regulatory Policies and Procedures (44 FR 11034; February 26, 1979); and (3) does not warrant preparation of a regulatory evaluation as the anticipated impact is so minimal. Since this is a routine matter that will only affect air traffic procedures and air navigation, it is certified that this rule, when promulgated, will not have a significant economic impact on a substantial number of small entities under the criteria of the Regulatory Flexibility Act.

Jet routes are published in paragraph 2004 and Alaskan VOR Federal airways are published in paragraph 6010(b) of FAA Order 7400.9H dated September 1, 2000, and effective September 16, 2000, which is incorporated by reference in 14 CFR 71.1. The jet route and the Alaskan VOR Federal airway listed in this document will be published subsequently in the Order.

List of Subjects in 14 CFR Part 71

Airspace, Incorporation by reference, Navigation (air).

Adoption of the Amendment

In consideration of the foregoing, the Federal Aviation Administration amends 14 CFR part 71 as follows:

PART 71—DESIGNATION OF CLASS A, CLASS B, CLASS C, CLASS D, AND CLASS E AIRSPACE AREAS; AIRWAYS; ROUTES; AND REPORTING POINTS

1. The authority citation for part 71 continues to read as follows:

Authority: 49 U.S.C. 106(g), 40103, 40113, 40120; E.O. 10854, 24 FR 9565, 3 CFR, 1959–1963 Comp., p.389.

§ 71.1 [Amended]

2. The incorporation by reference in 14 CFR 71.1 of the Federal Aviation Administration Order 7400.9H, Airspace Designations and Reporting Points, dated September 1, 2000, and effective September 16, 2000, is amended as follows:

Paragraph 2004—Jet Routes

* * * * *

011199

J–120 [Revised]

From Mt. Moffett, AK, NDB via St. Paul Island, AK, NDB; Bethel, AK; McGrath, AK; Fairbanks, AK; Fort Yukon, AK; to the Barter Island, AK, NDB.

* * * * *

Paragraph 6010(b)—Alaskan VOR Federal Airways

* * * * *

V–480 [Revised]

From Mt. Moffett, AK, NDB, 20 AGL via St. Paul Island, AK, NDB, 20 AGL, Kipnuk, AK; Bethel, AK, McGrath, AK, Nenana, AK; to Fairbanks, AK.

* * * * *

Issued in Washington, DC, on January 23, 2001.

Reginald C. Matthews,

Manager, Airspace and Rules Division.

[FR Doc. 01–3643 Filed 2–12–01; 8:45 am]

BILLING CODE 4910–13–U

DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Part 95

[Docket No. 30231; Amdt. No. 427]

IFR Altitudes; Miscellaneous Amendments

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Final rule.

SUMMARY: This amendment adopts miscellaneous amendments to the required IFR (instrument flight rules) altitudes and changeover points for certain Federal airways, jet routes, or direct routes for which a minimum or maximum en route authorized IFR altitude is prescribed. This regulatory action is needed because of changes occurring in the National Airspace System. These changes are designed to provide for the safe and efficient use of the navigable airspace under instrument conditions in the affected areas.

EFFECTIVE DATE: 0901 UTC, March 22, 2001.

FOR FURTHER INFORMATION CONTACT: Donald P. Pate, Flight Procedure Standards Branch (AMCAFS–420), Flight Technologies and Program Division, Flight Standards Service, Federal Aviation Administration, Mike Monroney Aeronautical Center, 6500 South MacArthur Blvd. Oklahoma City, OK 73169 (Mail Address: PO Box 25082 Oklahoma City, OK. 73125) telephone: (405) 954–4164.

SUPPLEMENTARY INFORMATION: This amendment to part 95 of the Federal Aviation Regulations (14 CFR part 95) amends, suspends, or revokes IFR altitudes governing the operation of all aircraft in flight over a specified route or any portion of that route, as well as the changeover points (COPs) for Federal airways, jet routes, or direct routes as prescribed in part 95.

The Rule

The specified IFR altitudes, when used in conjunction with the prescribed changeover points for those routes, ensure navigation aid coverage that is adequate for safe flight operations and free of frequency interference. The reasons and circumstances that create the need for this amendment involve matters of flight safety and operational efficiency in the National Airspace System, are related to published aeronautical charts that are essential to the user, and provide for the safe and efficient use of the navigable airspace. In addition, those various reasons or circumstances require making this amendment effective before the next scheduled charting and publication date of the flight information to assure its timely availability to the user. The effective date of this amendment reflects those considerations. In view of the close and immediate relationship between these regulatory changes and safety in air commerce, I find that notice and public procedure before adopting this amendment are impracticable and contrary to the public interest and that good cause exists for making the amendment effective in less than 30 days.

Conclusion

The FAA has determined that this regulation only involves an established body of technical regulations for which frequent and routine amendments are necessary to keep them operationally current. It, therefore—(1) is not a ''significant regulatory action'' under Executive Order 12866; (2) is not a ''significant rule'' under DOT Regulatory Policies and Procedures (44 FR 11034; February 26, 1979); and (3) does not warrant preparation of a regulatory evaluation as the anticipated impact is so minimal. For the same reason, the FAA certifies that this amendment will not have a significant economic impact on a substantial number of small entities under the criteria of the Regulatory Flexibility Act.

List of Subjects in 14 CFR Part 95

Airspace, Navigation (air).

Issued in Washington, DC on February 5, 2001.

L. Nicholas Lacey,

Director, Flight Standards Service.

Adoption of the Amendment

Accordingly, pursuant to the authority delegated to me by the Administrator, part 95 of the Federal Aviation Regulations (14 CFR part 95) is amended as follows effective at 0901 UTC.

PART 95—[AMENDED]

1. The authority citation for part 95 continues to read as follows:

Authority: 49 U.S.C. 106(g), 40103, 40106, 40113, 40114, 40120, 44502, 44514, 44719, 44721.

2. Part 95 is amended to read as follows:

REVISIONS TO IFR ALTITUDES AND CHANGEOVER POINTS

[Amendment 427 effective March 22, 2001]

From	To	MEA
Color Routes		
§ 95.4 Green Federal Airway 8 is Amended to Read in Part		
Campbell Lake, AK NDB	Glennallen, AK NDB	10200
Victor Routes-U.S.		
§ 95.6221 VOR Federal Airway 221 is Amended by Adding		
Bible Grove, IL VORTAC	Hoosier, in VORTAC	3000

REVISIONS TO IFR ALTITUDES AND CHANGEOVER POINTS—Continued

[Amendment 427 effective March 22, 2001]

From	To	MEA
§ 95.6370 VOR Federal Airway 370 is Amended to Read in Part		
Garne, CA FIX	*Palm Springs, CA VORTAC.	
W BND E BND *11600—MCA Palm Springs, CA VORTAC, W BND *6200—MCA Palm Springs, CA VORTAC, NE BND		1200 8000
§ 95.6480 VOR Federal Airway 480 is Amended by Adding		
Mount Moffett, AK NDB/DME	St. Paul Island, AK NDB/DME	5900 MAA— 17500
§ 95.6566 VOR Federal Airway 566 is Amended to Read in Part		
Alexandria, LA VORTAC *1700—MOCA	Mushe, LA FIX	*3000
Mushe, LA FIX *3000—MRA **1700—MOCA	*Wrack, LA FIX	**4000
Wrack, LA FIX *2100—MOCA	Veils, LA FIX	*3000
Veils, LA FIX *1500—MOCA	Reserve, LA VOR/DME	*2000

From	To	MEA	MAA
Jet Routes **§ 95.7120 Jet Route No. 120 is Amended by Adding**			
Mount Moffett, AK NDB/DME	St. Paul Island, AK NDB/DME	18000	45000

[FR Doc. 01–3654 Filed 2–12–01; 8:45 am]

BILLING CODE 4910–13–M

DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Part 97

[Docket No. 30229; Amdt. No. 2035]

Standard Instrument Approach Procedures; Miscellaneous Amendments

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Final rule.

SUMMARY: This amendment establishes, amends, suspends, or revokes Standard Instrument Approach Procedures (SIAPs) for operations at certain airports. These regulatory actions are needed because of the adoption of new or revised criteria, or because of changes occurring in the National Airspace System, such as the commissioning of new navigational facilities, addition of new obstacles, or changes in air traffic requirements. These changes are designed to provide safe and efficient use of the navigable airspace and to promote safe flight operations under instrument flight rules at the affected airports.

DATES: An effective date for each SIAP is specified in the amendatory provisions.

Incorporation by reference-approved by the Director of the Federal Register on December 31, 1980, and reapproved as of January 1, 1982.

ADDRESSES: Availability of matters incorporated by reference in the amendment is as follows:

For Examination—

1. FAA Rules Docket, FAA Headquarters Building, 800 Independence Avenue, SW., Washington, DC 20591;

2. The FAA Regional Office of the region in which the affected airport is located; or

3. The Flight Inspection Area Office which originated the SIAP.

For Purchase—Individual SIAP copies may be obtained from:

1. FAA Public Inquiry Center (APA–200), FAA Headquarters Building, 800 Independence Avenue, SW., Washington, DC 20591; or

2. The FAA Regional Office of the region in which the affected airport is located.

By Subscription—Copies of all SIAPs, mailed once every 2 weeks, are for sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402.

FOR FURTHER INFORMATION CONTACT: Donald P. Pate, Flight Procedure Standards Branch (AMCAFS–420), Flight Technologies and Programs Division, Flight Standards Service, Federal Aviation Administration, Mike Monroney Aeronautical Center, 6500 South MacArthur Blvd., Oklahoma City, OK 73169 (Mail Address: P.O. Box 25082, Oklahoma City, OK 73125), telephone: (405) 954–4164.

SUPPLEMENTARY INFORMATION: This amendment to part 97 of the Federal Aviation Regulations (14 CFR part 97) establishes, amends, suspends, or revokes Standard Instrument Approach Procedures (SIAPs). The complete regulatory description of each SIAP is contained in official FAA form documents which are incorporated by

reference in this amendment under 5 U.S.C. 552(a), 1 CFR part 51, and § 97.20 of the Federal Aviation Regulations (FAR). The applicable FAA Forms are identified as FAA Forms 8260–3, 8260–4, and 8260–5. Materials incorporated by reference are available for examination or purchase as stated above.

The large number of SIAPs, their complex nature, and the need for a special format make their verbatim publication in the **Federal Register** expensive and impractical. Further, airmen do not use the regulatory text of the SIAPs, but refer to their graphic depiction on charts printed by publishers of aeronautical materials. Thus, the advantages of incorporation by reference are realized and publication of the complete description of each SIAP contained in FAA form documents is unnecessary. The provisions of this amendment state the affected CFR (and FAR) sections, with the types and effective dates of the SIAPs. This amendment also identifies the airport, its location, the procedure identification and the amendment number.

The Rule

This amendment to part 97 is effective upon publication of each separate SIAP as contained in the transmittal. Some SIAP amendments may have been previously issued by the FAA in a National Flight Data Center (NFDC) Notice to Airmen (NOTAM) as an emergency action of immediate flight safety relating directly to published aeronautical charts. The circumstances which created the need for some SIAP amendments may require making them effective in less than 30 days. For the remaining SIAPs, an effective date at least 30 days after publication is provided.

Further, the SIAPs contained in this amendment are based on the criteria contained in the U.S. Standard for Terminal Instrument Procedures (TERPS). In developing these SIAPs, the TERPS criteria were applied to the conditions existing or anticipated at the affected airports. Because of the close and immediate relationship between these SIAPs and safety in air commerce, I find that notice and public procedure before adopting these SIAPs are impracticable and contrary to the public interest and, where applicable, that good cause exists for making some SIAPs effective in less than 30 days.

Conclusion

The FAA has determined that this regulation only involves an established body of technical regulations for which frequent and routine amendments are necessary to keep them operationally current. It, therefore—(1) is not a ''significant regulatory action'' under Executive Order 12866; (2) is not a ''significant rule'' under DOT Regulatory Policies and Procedures (44 FR 11034; February 26, 1979); and (3) does not warrant preparation of a regulatory evaluation ass the anticipated impact is so minimal. For the same reason, the FAA certifies that this amendment will not have a significant economic impact on a substantial number of small entities under the criteria of the Regulatory Flexibility Act.

List of Subjects in 14 CFR Part 97

Air traffic control, Airports, Navigation (air).

Issued in Washington, DC on February 2, 2001.

L. Nicholas Lacey,

Director, Flight Standards Service.

Adoption of the Amendment

Accordingly, pursuant to the authority delegated to me, part 97 of the Federal Aviation Regulations (14 CFR part 97) is amended by establishing, amending, suspending, or revoking Standard Instrument Approach Procedures, effective at 0901 UTC on the dates specified, as follows:

PART 97—STANDARD INSTRUMENT APPROACH PROCEDURES

1. The authority citation for part 97 is revised to read as follows:

Authority: 49 U.S.C. 106(g), 40103, 40113, 40120, 44701; and 14 CFR 11.49(b)(2).

2. Part 97 is amended to read as follows:

§§ 97.23, 97.25, 97.27, 97.29, 97.31, 97.33, 97.35 [Amended]

By amending: § 97.23 VOR, VOR/DME, VOR or TACAN, and VOR/DME or TACAN; § 97.25 LOC, LOC/DME, LDA, LDA/DME, SDF, SDF/DME; § 97.27 NDB, NDB/DME; § 97.29 ILS, ILS/DME, ISMLS, MLS, MLS/DME, MLS/RNAV; § 97.31 RADAR SIAPs; § 97.33 RNAV SIAPs; and § 97.35 COPTER SIAPs, identified as follows:

** * * Effective March 22, 2001*

Aniak, AK, Aniak, LOC/DME RWY 10, Amdt 3
Aniak, AK, Aniak, ILS/DME RWY 10, Amdt 7
Aniak, AK, Aniak, NDB–A, Amdt 1
Aniak, AK, Aniak, NDB/DME RWY 28, Amdt 3
Aniak, AK, Aniak, GPS RWY 10, Orig, CANCELLED
Aniak, AK, Aniak, RNAV (GPS) RWY 10, Orig
Aniak, AK, Aniak, RNAV (GPS) RWY 28, Orig
Barrow, AK, Wiley Post-Will Rogers Mem, VOR/DME RWY 24, Amdt 1
Barrow, AK, Wiley Post-Will Rogers Mem, LOC/DME BC RWY 24, Amdt 3
Barrow, AK, Wiley Post-Will Rogers Mem, GPS RWY 6, Orig, CANCELLED
Barrow, AK, Wiley Post-Will Rogers Mem, RNAV (GPS) RWY 6, Orig
Foley, AL, Foley Muni, GPS RWY 18, Orig CANCELLED
Foley, AL, Foley Muni, RNAV (GPS) RWY 18, Orig
Foley, AL, Foley Muni, GPS RWY 36, Orig, CANCELLED
Foley, AL, Foley Muni, RNAV (GPS) RWY 36, Orig
Sacramento, CA, Mather Field, ILS RWY 22L, Amdt 1
Salmon, ID, Lemhi Co, VOR/DME–B, Orig
Salmon, ID, Lemhi Co, RNAV–C, Orig
Ames, IA, Ames Muni, NDB OR GPS RWY 1, Amdt 1B
Ames, IA, Ames Muni, GPS RWY 19, Orig–A
Des Moines, IA, Des Moines Intl, NDB OR GPS RWY 31R, Amdt 19A
Spencer, IA, Spencer Muni, VOR OR GPS RWY 12, Amdt 2B
Spencer IA, Spencer Muni, NDB RWY 12, Amdt 1B
Alexandria, MN, Chandler Field, VOR RWY 22, Amdt 15
Alexandria, MN, Chandler Field, RNAV (GPS) RWY 31, Orig
Moorehead, MN, Moorhead Muni, VOR–A, Amdt 1
Moorhead, MN, Moorhead Muni, GPS RWY 30, Orig, CANCELLED
Moorhead, MN, Moorhead Muni, RNAV (GPS) RWY 30, Orig
Cape Girardeau, MO, Cape Girardeau Regional, LOC/DME BC RWY 28, Amdt 6A
Cape Girardeau, MO, Cape Girardeau Regional, NDB OR GPS RWY 10, Amdt 9A
Joplin, MO, Joplin Regional, LOC BC RWY 31, Amdt 20A
Imperial, NE, Imperial Muni, NDB RWY 31, Amdt 3
Imperial, NE, Imperial Muni, GPS RWY 31, Orig, CANCELLED
Imperial, NE, Imperial Muni, RNAV (GPS) RWY 31, Orig
Sidney, NY Sidney Muni, RNAV (GPS) RWY 7, Orig
Sidney, NY Sidney Muni, VOR/DME or GPS–B, Amdt 2B, CANCELLED
Watertown, NY, Watertown Intl, RNAV (GPS) RWY 7, Orig
Zanesville, OH, Zanesville Muni, NDB OR GPS–A, Amdt 1, CANCELLED
Perkasie, PA, Pennridge, GPS RWY 8, Orig, CANCELLED
Perkasie, PA, Pennridge, GPS RWY 26, Orig, CANCELLED
Perkasie, PA, Pennridge, RNAV (GPS) RWY 8, Orig
Perkasie, PA, Pennridge, RNAV (GPS) RWY 26, Orig
Dayton, TN, Mark Anton, GPS RWY 21, Orig, CANCELLED
Dayton, TN, Mark Anton, RNAV (GPS) RWY 21, Orig

Del Rio, TX, Del Rio Intl, LOC RWY 13, Orig
Del Rio, TX, Del Rio Intl, NDB RWY 13, Orig
Del Rio, TX, Del Rio Intl, LOC RWY 13, Amdt 4, CANCELLED
Del Rio, TX, Del Rio Intl, NDB RWY 13, Amdt 3, CANCELLED
Houston, TX, George Bush Intercontinental, ILS RWY 8, Amdt 19
Houston, TX, William P. Hobby, ILS RWY 30L, Amdt 5
Salt Lake City, UT, Salt Lake City Intl, RNAV (GPS) RWY 34L, Orig
Salt Lake City, UT, Salt Lake City Intl, RNAV (GPS) RWY 34R, Orig
Salt Lake City, UT, Salt Lake City Intl, RNAV (GPS) RWY 35, Orig

[FR Doc. 01–3655 Filed 2–12–01; 8:45 am]

BILLING CODE 4910–13–M

DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Part 97

[Docket No. 30227; Amdt. No. 2033]

Standard Instrument Approach Procedures; Miscellaneous Amendments

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Final rule.

SUMMARY: This amendment establishes, amends, suspends, or revokes Standard Instrument Approach Procedures (SIAPs) for operations at certain airports. These regulatory actions are needed because of changes occurring in the National Airspace System, such as the commissioning of new navigational facilities, addition of new obstacles, or changes in air traffic requirements. These changes are designed to provide safe and efficient use of the navigable airspace and to promote safe flight operations under instrument flight rules at the affected airports.

DATES: An effective date for each SIAP is specified in the amendatory provisions.

Incorporation by reference-approved by the Director of the Federal Register on December 31, 1980, and reapproved as of January 1, 1982.

ADDRESSES: Availability of matter incorporated by reference in the amendment is as follows:

For Examination—

1. FAA Rules Docket, FAA Headquarters Building, 800 Independence Avenue, SW., Washington, DC 20591;
2. The FAA Regional Office of the region in which affected airport is located; or
3. The Flight Inspection Area Office which originated the SIAP.

For Purchase—Individual SIAP copies may be obtained from:

1. FAA Public Inquiry Center (APA–200), FAA Headquarters Building, 800 Independence Avenue, SW., Washington, DC 20591; or
2. The FAA Regional Office of the region in which the affected airport is located.

By Subscription—Copies of all SIAPs, mailed once every 2 weeks, are for sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402.

FOR FURTHER INFORMATION CONTACT: Donald P. Pate, Flight Procedure Standards Branch (AMCAFS–420), Flight Technologies and Programs Division, Flight Standards Service, Federal Aviation Administration, Mike Monroney Aeronautical Center, 6500 South MacArthur Blvd., Oklahoma City, OK 73169 (Mail Address: P.O. Box 25082 Oklahoma City, OK 73125) telephone: (405) 954–4164.

SUPPLEMENTARY INFORMATION: This amendment to part 97 of the Federal Aviation Regulations (14 CFR part 97) establishes, amends, suspends, or revokes Standard Instrument Approach Procedures (SIAPs). The complete regulatory description on each SIAP is contained in the appropriate FAA Form 8260 and the National Flight Data Center (FDC)/Permanent (P) Notices to Airmen (NOTAM) which are incorporated by reference in the amendment under 5 U.S.C. 552(a), 1 CFR part 51, and § 97.20 of the Federal Aviation's Regulations (FAR). Materials incorporated by reference are available for examination or purchase as stated above.

The large number of SIAPs, their complex nature, and the need for a special format make their verbatim publication in the **Federal Register** expensive and impractical. Further, airmen do not use the regulatory text of the SIAPs, but refer to their graphic depiction of charts printed by publishers of aeronautical materials. Thus, the advantages of incorporation by reference are realized and publication of the complete description of each SIAP contained in FAA form documents is unnecessary. The provisions of this amendment state the affected CFR (and FAR) sections, with the types and effective dates of the SIAPs. This amendment also identifies the airport, its location, the procedure identification and the amendment number.

The Rule

This amendment to part 97 of the Federal Aviation Regulations (14 CFR part 97) establishes, amends, suspends, or revokes SIAPs. For safety and timeliness of change considerations, this amendment incorporates only specific changes contained in the content of the following PDC/P NOTAMs for each SIAP. The SIAP information in some previously designated FDC/Temporary (FDC/T) NOTAMs is of such duration as to be permanent. With conversion to FDC/P NOTAMs, the respective FDC/T NOTAMs have been canceled.

The FDC/P NOTAMs for the SIAPs contained in this amendment are based on the criteria contained in the U.S. Standard for Terminal Instrument Procedures (TERPS). In developing these chart changes to SIAPs by FDC/P NOTAMs, the TERPS criteria were applied to only these specific conditions existing at the affected airports. All SIAP amendments in this rule have been previously issued by the FAA in a National Flight Data Center (FDC) Notice of Airmen (NOTAM) as an emergency action of immediate flight safety relating directly to published aeronautical charts. The circumstances which created the need for all these SIAP amendments requires making them effective in less than 30 days.

Further, the SIAPs contained in this amendment are based on the criteria contained in the TERPS. Because of the close and immediate relationship between these SIAPs and safety in air commerce, I find that notice and public procedure before adopting these SIAPs are impracticable and contrary to the public interest and, where applicable, that good cause exists for making these SIAPs effective in less than 30 days.

Conclusion

The FAA has determined that this regulation only involves an established body of technical regulations for which frequent and routine amendments are necessary to keep them operationally current. It, therefore—(1) is not a ''significant regulatory action'' under Executive Order 12866; (2) is not a ''significant rule'' under DOT Regulatory Policies and Procedures (44 FR 11034; February 26, 1979); and (3) does not warrant preparation of a regulatory evaluation as the anticipated impact is so minimal. For the same reason, the FAA certifies that this amendment will not have a significant economic impact on a substantial number of small entities under the criteria of the Regulatory Flexibility Act.

List of Subjects in 14 CFR Part 97

Air traffic control, Airports, Navigation (air).

Issued in Washington, DC on January 19, 2001.

L. Nicholas Lacey,

Director, Flight Standards Service.

Adoption of the Amendment

Accordingly, pursuant to the authority delegated to me, part 97 of the Federal Aviation Regulations (14 CFR part 97) is amended by establishing, amending, suspending, or revoking Standard Instrument Approach Procedures, effective at 0901 UTC on the dates specified, as follows:

PART 97—STANDARD INSTRUMENT APPROACH PROCEDURES

1. The authority citation for part 97 is revised to read as follows:

Authority: 49 U.S.C. 40103, 40113, 40120, 44701; 49 U.S.C. 106(g); and 14 CFR 11.49(b)(2).

2. Part 97 is amended to read as follows:

§ 97.23, 97.25, 97.27, 97.29, 97.31, 97.33 [Amended]

By amending: § 97.23 VOR, VOR/DME, VOR or TACAN, and VOR/DME or TACAN; § 97.25 LOC, LOC/DME, LDA, LDA/DME, SDF, SDF/DME; § 97.27 NDB, NDB/DME; § 97.29 ILS, ILS/DME, ISMLS, MLS/DME, MLS/RNAV; § 97.31 RADAR SIAPs; § 97.33 RNAV SIAPs; and § COPTER SIAPS, Identified as follows:

** * * Effective Upon Publication*

FDC date	State	City	Airport	FDC number	SIAP
8/23/00	LA	NEW IBERIA	ACADIANA REGIONAL	0/0184	VOR/DME RWY 34, AMDT 1A.
2/25/00	NJ	NEWARK	NEWARK INTL	0/5494	COPTER ILS/DME RWY 22L, ORIG.
1/02/01	WI	GREEN BAY	AUSTIN STRAUBEL INTL	1/0030	RADAR–1, AMDT 9.
1/02/01	NC	ROCKY MOUNT	ROCKY MOUNT–WILSON REGIONAL.	1/0032	ILS RWY 4, AMDT 15.
1/02/01	NC	ROCKY MOUNT	ROCKY MOUNT–WILSON REGIONAL.	1/0033	NDB OR GPS RWY 4 AMDT 8.
1/02/01	FL	TAMPA	VANDENBURG	1/0037	GPS RWY 18, AMDT 1B.
1/02/01	FL	TAMPA	VANDENBURG	1/0042	GPS RWY 23, ORIG–B.
1/02/01	LA	EUNICE	EUNICE	1/0051	NDB OR GPS RWY 16, ORIG–B.
1/02/01	IL	LITCHFIELD	LITCHFIELD MUNI	1/0052	GPS RWY 9, ORIG.
1/02/01	IL	LITCHFIELD	LITCHFIELD MUNI	1/0053	GPS RWY 27, ORIG.
1/02/01	ND	PEMBINA	PEMBINA MUNI	1/0054	VOR OR GPS RWY 33, AMDT 6A.
1/02/01	LA	EUNICE	EUNICE	1/0055	VOR/DME OR GPS–A, AMDT 2.
1/03/01	NC	GREENSBORO	PIEDMONT TRIAD INTL	1/0060	VOR/DME OR GPS RWY 23, AMDT 9B.
1/03/01	AZ	PHOENIX	PHOENIX SKY HARBOR	1/0072	ILS RWY 25L, ORIG–A.
1/03/01	SD	SIOUX FALLS	JOE FOSS FIELD	1/0101	ILS RWY 21, AMDT 9.
1/03/01	SD	SIOUX FALLS	JOE FOSS FIELD	1/0102	VOR OR TACAN OR GPS RWY 15, AMDT 20.
1/03/01	OR	MEDFORD	ROGUE VALLEY INTL-MEDFORD	1/0107	ILS RWY 14, ORIG–A.
1/04/01	TX	MIDLAND	MIDLAND INTL	1/0124	VOR/DME OR TACAN RWY 34L, AMDT 9B.
1/04/01	TX	MONAHANS	ROY HURD MEMORIAL	1/0133	GPS RWY 12, ORIG–A.
1/04/01	TX	MONAHANS	ROY HURD MEMORIAL	1/0136	NDB RWY 12, ORIG.
1/04/01	TX	MONAHANS	ROY HURD MEMORIAL	1/0138	VOR/DME RWY 12, AMDT 1.
1/05/01	FL	JACKSONVILLE	JACKSONVILLE INTL	1/0168	RADAR–1, AMDT 6B.
1/08/01	OK	STILLWATER	STILLWATER REGIONAL	1/0275	VOR/DME RWY 35, ORIG–A.
1/09/01	OK	STILLWATER	STILLWATER REGIONAL	1/0287	ILS RWY 17, ORIG.
1/09/01	OK	STILLWATER	STILLWATER REGIONAL	1/0288	VOR RWY 17, AMDT 13B.
1/10/01	VI	ST. THOMAS	CYRIL E. KING, CHARLOTTE AMALIE.	1/0335	RNAV RWY 10, ORIG.
1/10/01	NJ	LAKEWOOD	LAKEWOOD	1/0336	VOR RWY 6 AMDT 5.
1/10/01	NJ	VINCENTOWN	RED LION	1/0337	VOR OR GPS–A AMDT 5A.
1/10/01	NJ	OCEAN CITY	OCEAN CITY MUNI	1/0342	GPS RWY 6 ORIG.
1/15/01	TX	MONAHANS	ROY HURD MEMORIAL	1/0393	GPS RWY 30, ORIG–A.
1/15/01	OH	MIDDLETOWN	HOOK FIELD MUNI	1/0408	LOC RWY 23, AMDT 7E.
1/15/01	OH	MIDDLETOWN	HOOK FIELD MUNI	1/0409	NDB OR GPS RWY 23, AMDT 8C.
1/15/01	LA	RESERVE	ST. JOHN THE BAPTIST	1/0414	VOR RWY 35, ORIG.
1/15/01	LA	RESERVE	ST. JOHN THE BAPTIST	1/0415	GPS RWY 17, ORIG.
1/15/01	NY	BUFFALO	BUFFALO NIAGARA INTL	1/0398	VOR/DME RNAV OR GPS RWY 23 ORIG.
1/15/01	NY	WHITE PLAINS	WESTCHESTER COUNTY	1/0385	ILS RWY 16 AMDT 22C.

[FR Doc. 01–3656 Filed 2–12–01; 8:45 am]
BILLING CODE 4910–13–M

DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Part 97

[Docket No. 30228; Amdt. No. 2034]

Standard Instrument Approach Procedures; Miscellaneous Amendments

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Final rule.

SUMMARY: This amendment establishes, amends, suspends, or revokes Standard Instrument Approach Procedures (SIAP's) for operations at certain airports. These regulatory actions are needed because of the adoption of new or revised criteria, or because of changes occurring in the National Airspace System, such as the commissioning of new navigational facilities, addition of new obstacles, or changes in air traffic requirements. These changes are designed to provide safe and efficient use of the navigable airspace and to promote safe flight operations under instrument flight rules at the affected airports.

DATES: An effective date for each SIAP is specified in the amendatory provisions.

Incorporation by reference—approved by the Director of the Federal Register on December 31, 1980, and reapproved as of January 1, 1982.

ADDRESSES: Availability of matters incorporated by reference in the amendment is as follows:

For Examination—

1. FAA Rules Docket, FAA Headquarters Building, 800 Independence Avenue, SW., Washington, DC 20591;

2. The FAA Regional Office of the region in which the affected airport is located; or

011205

3. The Flight Inspection Area Office which originated the SIAP.

For Purchase—Individual SIAP copies may be obtained from:

1. FAA Public Inquiry Center (APA–200), FAA Headquarters Building, 800 Independence Avenue, SW., Washington, DC 20591; or

2. The FAA Regional Office of the region in which the affected airport is located.

By Subscription—Copies of all SIAP's, mailed once every 2 weeks, are for sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402.

FOR FURTHER INFORMATION CONTACT: Donald P. Pate, Flight Procedure Standards Branch (AMCAFS–420), Flight Technologies and Programs Division, Flight Standards Service, Federal Aviation Administration, Mike Monroney Aeronautical Center, 6500 South MacArthur Blvd. Oklahoma City, OK 73169 (Mail Address: P.O. Box 25082 Oklahoma City, OK 73125) telephone: (405) 954–4164.

SUPPLEMENTARY INFORMATION: This amendment to part 97 of the Federal Aviation Regulations (14 CFR part 97) establishes, amends, suspends, or revokes SIAP's. The complete regulatory description of each SIAP is contained in official FAA form documents which are incorporated by reference in this amendment under 5 U.S.C. 552(a), 1 CFR part 51, and 14 CFR 97.20 of the Federal Aviation Regulations (FAR). The applicable FAA Forms are identified as FAA Form 8260–5. Materials incorporated by reference are available for examination or purchase as stated above.

The large number of SIAP's their complex nature, and the need for a special format make their verbatim publication in the **Federal Register** expensive and impractical. Further, airmen do not use the regulatory text of the SIAPs, but refer to their graphic depiction on charts printed by publishers of aeronautical materials. Thus, the advantages of incorporation by reference are realized and publication of the complete description of each SIAP contained in FAA form documents is unnecessary. The provisions of this amendment state the affected CFR sections, with the types and effective dates of the SIAPs. This amendment also identifies the airport, its location, the procedure identification and the amendment number.

The Rule

This amendment to part 97 is effective upon publication of each separate SIAP as contained in the transmittal. The SIAP's contained in this amendment are based on the criteria contained in the United States Standard for Terminal Instrument Procedures (TERPS). In developing these SIAPs, the TERPS criteria were applied to the conditions existing or anticipated at the affected airports.

The FAA has determined through testing that current non-localizer type, non-precision instrument approaches developed using the TERPS criteria can be flown by aircraft equipped with a Global Positioning System (GPS) and or Flight Management System (FMS) equipment. In consideration of the above, the applicable SIAP's will be altered to include ''or GPS or FMS'' in the title without otherwise reviewing or modifying the procedure. (Once a stand alone GPS or FMS procedure is developed, the procedure title will be altered to remove ''or GPS or FMS'' from these non-localizer, non-precision instrument approach procedure titles.)

The FAA has determined through extensive analysis that current SIAP's intended for use by Area Navigation (RNAV) equipped aircraft can be flown by aircraft utilizing various other types of navigational equipment. In consideration of the above, those SIAP's currently designated as ''RNAV'' will be redesignated as ''VOR/DME RNAV'' without otherwise reviewing or modifying the SIAP's.

Because of the close and immediate relationship between these SIAP's and safety in air commerce, I find that notice and public procedure before adopting these SIAPs are, impracticable and contrary to the public interest and, where applicable, that good cause exists for making some SIAPs effective in less than 30 days.

Conclusion

The FAA has determined that this regulation only involves an established body of technical regulations for which frequent and routine amendments are necessary to keep them operationally current. It, therefore—(1) is not a ''significant regulatory action'' under Executive Order 12866; (2) is not a ''significant rule'' under DOT Regulatory Policies and Procedures (44 FR 11034; February 26, 1979); and (3) does not warrant preparation of a regulatory evaluation as the anticipated impact is so minimal. For the same reason, the FAA certifies that this amendment will not have a significant economic impact on a substantial number of small entities under the criteria of the Regulatory Flexibility Act.

List of Subjects in 14 CFR Part 97

Air traffic control, Airports, Navigation (air).

Issued in Washington, DC on January 19, 2001.

L. Nicholas Lacey,

Director, Flight Standards Service.

Adoption of the Amendment

Accordingly, pursuant to the authority delegated to me, part 97 of the Federal Aviation Regulations (14 CFR part 97) is amended as follows:

PART 97—STANDARD INSTRUMENT APPROACH PROCEDURES

1. The authority citation for part 97 continues to read:

Authority: 49 U.S.C. 106(g), 40103, 40106, 40113–40114, 40120, 44502, 44514, 44701, 44719, 44721–44722.

§§ 97.23, 97.27, 97.33, 97.35 [Amended]

2. Amend 97.23, 97.27, 97.33 and 97.35, as appropriate, by adding, revising, or removing the following SIAP's effective at 0901 UTC on the dates specified:

** * * Effective March 22, 2001*

Gulkana, AK, Gulkana, VOR or GPS RWY 32, Amdt 6A, CANCELLED
Gulkana, AK, Gulkana, VOR RWY 32, Amdt 6A
Bastrop, LA, Bastrop/Morehouse Memorial, VOR/DME or GPS–A, Amdt 8, CANCELLED
Bastrop, LA, Bastrop/Morehouse Memorial, VOR/DME–A, Amdt 8
Covington, LA, Covington/Greater St. Tammany, VOR/DME or GPS–A, Orig, CANCELLED
Covington, LA, Covington/Greater St. Tammany, VOR/DME–A, Orig
Eunic, LA, Eunice, VOR/DME or GPS–A, Amdt 2, CANCELLED
Eunic, LA, Eunice, VOR/DME–A, Amdt 2
Lake Charles, LA Lake Charles Regional, VOR or GPS–A, Amdt 13, CANCELLED
Lake Charles, LA Lake Charles Regional, VOR–A, Amdt 13
Marksville, LA, Marksville Muni, VOR/DME or GPS–A, Amdt 3A, CANCELLED
Marksville, LA, Marksville Muni, VOR/DME–A, Amdt 3A
Minden, LA, Minden-Webster, VOR/DME or GPS–A, Amdt 4A, CANCELLED
Minden, LA, Minden-Webster, VOR/DME–A, Amdt 4A
New Roads, LA, New Roads/False River Airpark, VOR/DME or GPS–A, Amdt 3A, CANCELLED
New Roads, LA, New Roads/False River Airpark, VOR/DME–A, Amdt 3A
Rayville, LA Rayville/John H. Hooks Jr. Memorial, VOR/DME or GPS–A, Amdt 2, CANCELLED
Rayville, LA, Rayville/John H. Hooks Jr. Memorial, VOR/DME–A, Amdt 2
Sulphur, LA, Sulphur/Southland Field, VOR/DME or GPS–A, Amdt 1, CANCELLED

Sulphur, LA, Sulphur/Southland Field, VOR/DME–A, Amdt 1
Belen, NM, Belen/Alexander Muni, VOR/DME or GPS–A, Amdt 1, CANCELLED
Belen, NM, Belen/Alexander Muni, VOR/DME–A, Amdt 1
Santa Fe, NM, Santa Fe Muni, VOR/DME or GPS–A, Amdt 1, CANCELLED
Santa Fe, NM, Santa Fe Muni, VOR/DME–A, Amdt 1
Silver City, NM, Silver City/Grant County, VOR/DME or GPS–B, Amdt 3A, CANCELLED
Silver City, NM, Silver City/Grant County, VOR/DME–B, Amdt 3A
Silver City, NM, Silver City/Grant County, VOR or GPS–A, Amdt 7A, CANCELLED
Silver City, NM, Silver City/Grant County, VOR–A, Amdt 7A
Socorro, NM, Socorro Muni, VOR/DME or GPS–A, Orig-A, CANCELLED
Socorro, NM, Socorro Muni, VOR/DME–A, Orig-A
Taos, NM, Taos Muni, VOR/DME or GPS–B, Amdt 2B, CANCELLED
Taos, NM, Taos Muni, VOR/DME–B, Amdt 2B
Truth Or Consequences, NM, Truth Or Consequences Muni, VOR or GPS–A, Amdt 9A, CANCELLED
Truth Or Consequences, NM, Truth Or Consequences Muni, VOR–A, Amdt 9A
Ada, OK, Ada Muni, VOR/DME or GPS–A, Orig-B, CANCELLED
Ada, OK, Ada Muni, VOR/DME–A, Orig-B
Altus, OK, Altus Muni, VOR or GPS–A, Amdt 4, CANCELLED
Altus, OK, Altus Muni, VOR–A, Amdt 4
Blackwell, OK, Blackwell-Tonkawa Muni, VOR or GPS–A, Amdt 3, CANCELLED
Blackwell, OK, Blackwell-Tonkawa Muni, VOR–A, Admt 3
Boise City, OK, Boise City, NDB or GPS–A, Amdt 1A, CANCELLED
Boise City, OK, Boise City, NDB–A, Amdt 1A
Buffalo, OK, Buffalo Muni, NDB or GPS–A, Amdt 1, CANCELLED
Buffalo, OK, Buffalo Muni, NDB–A, Amdt 1
Chickasha, OK, Chickasha Muni, VOR/DME or GPS–A, Orig, CANCELLED
Chickasha, OK, Chickasha Muni, VOR/DME–A, Orig
Claremore, OK, Claremore Regional, VOR/DME or GPS–A, Orig, CANCELLED
Claremore, OK, Claremore Regional, VOR/DME–A, Orig
Claremore, OK, Claremore Regional, VOR/DME or GPS–B, Amdt 1, CANCELLED
Claremore, OK, Claremore Regional, VOR/DME–B, Amdt 1
Madill, OK, Madill Muni, VOR/DME or GPS–A, Amdt 3, CANCELLED
Madill, OK, Madill Muni, VOR/DME–A, Amdt 3
Oklahoma City, OK, Oklahoma City/Clarence E. Page Muni, VOR or GPS–B, Amdt 2, CANCELLED
Oklahoma City, OK, Oklahoma City/Clarence E. Page Muni, VOR–B, Amdt 2
Oklahoma City, OK, Oklahoma City/Wiley Post, VOR or GPS–A, Amdt 2A, CANCELLED
Oklahoma City, OK, Oklahoma City/Wiley Post, VOR–A, Amdt 2A
Okmulgee, OK, OKmulgee Muni, VOR or GPS–A, Orig, CANCELLED
Okmulgee, OK, Okmulgee Muni, VOR–A, Orig
Sallisaw, OK, Sallisaw Muni, NDB or GPS–A, Amdt 1, CANCELLED
Sallisaw, OK, Sallisaw Muni, NDB–A, Amdt 1
Sand Springs, OK, Sand Springs/William R. Pogue Muni, VOR or GPS–A, Amdt 2, CANCELLED
Sand Springs, OK, Sand Springs/William R. Pogue Muni, VOR–A, Amdt 2
Tulsa, OK, Tulsa/Richard Lloyd Jones Jr., VOR/DME or GPS–A, Amdt 6, CANCELLED
Tulsa, OK, Tulsa/Richard Lloyd Jones Jr., VOR/DME–A, Amdt 6
Watonga, OK, Watonga, VOR/DME or GPS–A, Amdt 2, CANCELLED
Watonga, OK, Watonga, VOR/DME–A, Amdt 2
Woodward, OK, Woodward/West Woodward, VOR/DME or GPS–A, Amdt 6, CANCELLED
Woodward, OK, Woodward/West Woodward, VOR/DME–A, Amdt 6
Abilene, TX, Abilene Regional, VOR or GPS–A, Amdt 8A, CANCELLED
Abilene, TX, Abilene Regional, VOR–A, Amdt 8A
Amarillo, TX, Amarillo/Tradewind, NDB or GPS–A, Amdt 14, CANCELLED
Amarillo, TX, Amarillo/Tradewind, NDB–A, Amdt 14
Bay City, TX, Bay City Muni, VOR/DME or GPS–A, Amdt 4A, CANCELLED
Bay City, TX, Bay City Muni, VOR/DME–A, Amdt 4A
Beaumont, TX, Beaumont Muni, VOR/DME or GPS RWY 13, Amdt 2, CANCELLED
Beaumont, TX, Beaumont Muni, VOR/DME RWY 13, Amdt 2
Breckenridge, TX, Breckenridge/Stephens County, NDB or GPS–A, Amdt 1A, CANCELLED
Breckenridge, TX, Breckenridge/Stephens County, NDB–A, Amdt 1A
Cleveland, TX, Cleveland Muni, VOR or GPS–A, Amdt 4, CANCELLED
Cleveland, TX, Cleveland Muni, VOR–A, Amdt 4
Del Rio, TX, Del Rio Intl, VOR/DME or GPS–B, Amdt 4, CANCELLED
Del Rio, TX, Del Rio Intl, VOR/DME–B, Amdt 4
Del Rio, TX, Del Rio Intl, VOR or GPS–A, Amdt 11, CANCELLED
Del Rio, TX, Del Rio Intl, VOR–A, Amdt 11
Dumas, TX, Dumas/Moore County, VOR/DME or GPS–A, Admt 6, CANCELLED
Dumas, TX, Dumas/Moore County, VOR/DME–A, Amdt 6
George West, TX, George West/Live Oak County, VOR/DME or GPS–A, Amdt 1, CANCELLED
George West, TX, George West/Live Oak County, VOR/DME–A, Admt 1
Giddings, TX, Giddings-Lee County, VOR/DME or GPS–A, Amdt 3, CANCELLED
Giddings, TX, Giddings-Lee County, VOR/DME–A, Amdt 3
Liberty, TX, Liberty Muni, VOR or GPS–A, Amdt 5, CANCELLED
Liberty, TX, Liberty Muni, VOR–A, Amdt 5
Llano, TX, Llano Muni, VOR or GPS–A, Amdt 3, CANCELLED
Llano, TX, Llano Muni, VOR–A, Admt 3
Lubbock, TX, Lubbock Intl, VOR or GPS–A, Amdt 6, CANCELLED
Lubbock, TX, Lubbock Intl, VOR–A, Amdt 6
McKinney, TX, McKinney Muni, VOR/DME or GPS–A, Orig-B, CANCELLED
McKinney, TX, McKinney Muni, VOR/DME–A, Orig-B
Mexia, TX, Mexia-Limestone County, NDB or GPS–A, Amdt 3, CANCELLED
Mexia, TX, Mexia-Limestone County, NDB–A, Amdt 3
Pampa, TX, Pampa/Perry Lefors Field, VOR/DME or GPS–A, Amdt 2A, CANCELLED
Pampa, TX, Pampa/Perry Lefors Field, VOR/DME–A, Amdt 2A
Pleasanton, TX, Pleasanton Muni, NDB or GPS–A, Amdt 5A, CANCELLED
Pleasanton, TX, Pleasanton Muni, NDB–A, Amdt 5A
Port Isabel, TX, Port Isabel-Cameron County, VOR/DME or GPS–B, Amdt 2A, CANCELLED
Port Isabel, TX, Port Isabel-Cameron County, VOR/DME–B, Amdt 2A
Port Isabel, TX, Port Isabel-Cameron County, VOR or GPS–A, Amdt 5A, CANCELLED
Port Isabel, TX, Port Isabel-Cameron County, VOR–A, Amdt 5A
San Antonio, TX, San Antonio Intl, VOR or GPS–A, Amdt 5A, CANCELLED
San Antonio, TX, San Antonio Intl, VOR–A, Amdt 5A
Sulphur Springs, TX, Sulphur Springs Muni, VOR/DME or GPS–B, Amdt 6, CANCELLED
Sulphur Springs, TX, Sulphur Springs Muni, VOR/DME–B, Amdt 6
Sulphur Springs, TX, Sulphur Springs Muni, VOR or GPS–A, Amdt 4, CANCELLED
Sulphur Springs, TX, Sulphur Springs Muni, VOR–A, Amdt 4

[FR Doc. 01–3657 Filed 2–12–01; 8:45 am]
BILLING CODE 4910–13–M

DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Part 97

[Docket No. 30230; Amdt. No. 2036]

Standard Instrument Approach Procedures; Miscellaneous Amendments

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Final rule.

SUMMARY: This amendment establishes, amends, suspends, or revokes Standard Instrument Approach Procedures (SIAPs) for operations at certain airports. These regulatory actions are needed because of changes occurring in the National Airspace System, such as the commissioning of new navigational facilities, addition of new obstacles, or changes in air traffic requirements. These changes are designed to provide safe and efficient use of the navigable airspace and to promote safe flight

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operations under instrument flight rules at the affected airports.

DATE: An effective date for each SIAP is specified in the amendatory provisions.

Incorporation by reference-approved by the Director of the Federal Register on December 31, 1980, and reapproved as of January 1, 1982.

ADDRESSES: Availability of matter incorporated by reference in the amendment is as follows:

For Examination—1. FAA Rules Docket, FAA Headquarters Building, 800 Independence Avenue, SW., Washington, DC 20591;

2. The FAA Regional Office of the region in which the affected airport is located; or

3. The Flight Inspection Area Office which originated the SIAP.

For Purchase—Individual SIAP copies may be obtained from:

1. FAA Public Inquiry Center (APA–200), FAA Headquarters Building, 800 Independence Avenue, SW., Washington, DC 20591; or

2. The FAA Regional Office of the region in which the affected airport is located.

By Subscription—Copies of all SIAPs, mailed once every 2 weeks, are for sale by the Superintendent of Documents, US Government Printing Office, Washington, DC 20402.

FOR FURTHER INFORMATION CONTACT: Donald P. Pate, Flight Procedure Standards Branch (AMCAFS–420), Flight Technologies and Programs Division, Flight Standards Service, Federal Aviation Administration, Mike Monroney Aeronautical Center, 6500 South MacArthur Blvd. Oklahoma City, OK. 73169 (Mail Address: P.O. Box 25082 Oklahoma City, OK. 73125) telephone: (405) 954–4164.

SUPPLEMENTARY INFORMATION: This amendment to part 97 of the Federal Aviation Regulations (14 CFR part 97) establishes, amends, suspends, or revokes Standard Instrument Approach Procedures (SIAPs). The complete regulatory description on each SIAP is contained in the appropriate FAA Form 8260 and the National Flight Data Center (FDC)/Permanent (P) Notices to Airmen (NOTAM) which are incorporated by reference in the amendment under 5 U.S.C. 552(a), 1 CFR part 51, and § 97.20 of the Federal Aviation's Regulations (FAR). Materials incorporated by reference are available for examination or purchase as stated above.

The large number of SIAPs, their complex nature, and the need for a special format make their verbatim publication in the **Federal Register** expensive and impractical. Further, airmen do not use the regulatory text of the SIAPs, but refer to their graphic depiction of charts printed by publishers of aeronautical materials. Thus, the advantages of incorporation by reference are realized and publication of the complete description of each SIAP contained in FAA form documents is unnecessary. The provisions of this amendment state the affected CFR (and FAR) sections, with the types and effective dates of the SIAPs. This amendment also identifies the airport, its location, the procedure identification and the amendment number.

The Rule

This amendment to part 97 of the Federal Aviation Regulations (14 CFR part 97) establishes, amends, suspends, or revokes SIAPs. For safety and timeliness of change considerations, this amendment incorporates only specific changes contained in the content of the following FDC/P NOTAMs for each SIAP. The SIAP information in some previously designated FDC/Temporary (FDC/T) NOTAMs is of such duration as to be permanent. With conversion to FDC/P NOTAMs, the respective FDC/T NOTAMs have been canceled.

The FDC/P NOTAMs for the SIAPs contained in this amendment are based on the criteria contained in the U.S. Standard for Terminal Instrument Procedures (TERPS). In developing these chart changes to SIAPs by FDC/P NOTAMs, the TERPS criteria were applied to only these specific conditions existing at the affected airports. All SIAP amendments in this rule have been previously issued by the FAA in a National Flight Data Center (FDC) Notice to Airmen (NOTAM) as an emergency action of immediate flight safety relating directly to published aeronautical charts. The circumstances which created the need for all these SIAP amendments requires making them effective in less than 30 days.

Further, the SIAPs contained in this amendment are based on the criteria contained in the TERPS. Because of the close and immediate relationship between these SIAPs and safety in air commerce, I find that notice and public procedure before adopting these SIAPs are impracticable and contrary to the public interest and, where applicable, that good cause exists for making these SIAPs effective in less than 30 days.

Conclusion

The FAA has determined that this regulation only involves an established body of technical regulations for which frequent and routine amendments are necessary to keep them operationally current. It, therefore—(1) is not a ''significant regulatory action'' under Executive Order 12866; (2) is not a ''significant rule'' under DOT Regulatory Policies and Procedures (44 FR 11034; February 26, 1979); and (3) does not warrant preparation of a regulatory evaluation as the anticipated impact is so minimal. For the same reason, the FAA certifies that this amendment will not have a significant economic impact on a substantial number of small entities under the criteria of the Regulatory Flexibility Act.

List of Subjects in 14 CFR Part 97

Air traffic control, Airports, Navigation (air).

Issued in Washington, DC on February 2, 2001.

L. Nicholas Lacey,

Director, Flight Standards Service.

Adoption of the Amendment

Accordingly, pursuant to the authority delegated to me, part 97 of the Federal Aviation Regulations (14 CFR part 97) is amended by establishing, amending, suspending, or revoking Standard Instrument Approach Procedures, effective at 0901 UTC on the dates specified, as follows:

PART 97—STANDARD INSTRUMENT APPROACH PROCEDURES

1. The authority citation for part 97 is revised to read as follows:

Authority: 49 U.S.C. 40103, 40113, 40120, 44701; 49 U.S.C. 106(g); and 14 CFR 11.49(b)(2).

2. Part 97 is amended to read as follows:

§§ 97.23, 97.25, 97.27, 97.29, 97.31, 97.33 and 97.35 [Amended]

By amending § 97.23 VOR, VOR/DME, VOR or TACAN, and VOR/DME or TACAN; § 97.25 LOC, LOC/DME, LDA, LDA/DME, SDF, SDF/DME; § 97.27 NDB, NDB/DME; § 97.29 ILS, ILS/DME, ISMLS, MLS/DME, MLS/RNAV; § 97.31 RADAR SIAPs; § 97.33 RNAV SIAPs; and § 97.35 COPTER SIAPs, Identified as follows:

Effective Upon Publication

FDC date	State	City	Airport	FDC number	SIAP
1/17/01	MO	New Madrid	County Memorial	1/0490	VOR/DME RNAV OR GPS Rwy 18, AMDT 1A
1/18/01	LA	Oakdale	Allen Parish	1/0548	NDB Rwy 35, ORIG–B
1/18/01	NE	O'Neill	The O'Neill Muni-John L. Baker Field	1/0504	VOR Rwy 13, AMDT 5A
1/19/01	MS	Meridian	Key Field	1/0580	VOR OR GPS–A, AMDT 15
1/19/01	OK	Enid	Enid Woodring Muni	1/0591	GPS Rwy 17, ORIG
1/19/01	OK	Enid	Enid Woodring Muni	1/0595	ILS Rwy 35 AMDT 4
1/19/01	OK	El Reno	El Reno Muni	1/0605	VOR/DME Rwy 35, AMDT 1A
1/19/01	OK	Tulsa	Tulsa Intl	1/0610	VOR OR TACAN Rwy 26, AMDT 22A
1/19/01	TX	Houston	May	1/0602	VOR/DME OR GPS–A, ORIG–A
1/22/01	AR	Warren	Warren Muni	1/0660	GPS Rwy 21, ORIG–A
1/22/01	OK	Enid	Enid Woodring Muni	1/0640	VOR Rwy 35, AMDT 13
1/22/01	OK	Enid	Enid Woodring Muni	1/0641	VOR Rwy 17, AMDT 12
1/22/01	OK	Enid	Enid Woodring Muni	1/0643	NDB Rwy 35, AMDT 6
1/22/01	OK	Oklahoma City	Sundance Airpark	1/0699	RNAV (GPS) Rwy 35, ORIG
1/22/01	OK	Oklahoma City	Sundance Airpark	1/0701	RNAV (GPS) Rwy 17, ORIG
1/22/01	TX	Monahans	Roy Hurd Memorial	1/0654	VOR/DME Rwy 12, AMDT 1
1/22/01	TX	Monahans	Roy Hurd Memorial	1/0662	GPS Rwy 12, ORIG–A
1/23/01	NC	Southern Pines	Moore County	1/0684	GPS Rwy 23, ORIG–A
1/23/01	NC	Asheville	Asheville Regional	1/0686	NDB OR GPS Rwy 16, AMDT 15A
1/24/01	OK	Norman	University of Oklahoma Westheimer	1/0740	VOR/DME RNAV Rwy 3, ORIG–C
1/24/01	TX	Witchita Falls	Sheppard AFB/Wichita Fall Muni	1/0741	ILS Rwy 33L, AMDT 12C
1/24/01	WI	Medford	Taylor County	1/0719	NDB OR GPS Rwy 33, AMDT 6A
1/25/01	AK	Iliamna	Iliamna	1/0857	NDB OR GPS Rwy 35, ORIG
1/25/01	FL	Lake City	Lake City	1/0783	RNAV(GPS) Rwy 10, ORIG–A
1/25/01	FL	Lake City	Lake City	1/0784	RNAV(GPS) Rwy 28, ORIG–A
1/25/01	FL	Tampa	Vandenburg	1/0816	GPS Rwy 18, AMDT 1B
1/25/01	FL	Tampa	Vandenburg	1/0818	GPS Rwy 23, ORIG–B
1/25/01	LA	Minden	Minden-Webster	1/0750	GPS Rwy 19, ORIG–A
1/25/01	MI	Howell	Livingston County	1/0802	RNAV (GPS) Rwy 13, ORIG
1/25/01	MO	St. Joseph	Rosecrans Memorial	1/0804	LOC BC Rwy 17, AMDT 8C
1/25/01	NM	Santa Fe	Santa Fe Muni	1/0862	ILS Rwy 2, AMDT 5A
1/25/01	OK	Enid	Enid Woodring Muni	1/0858	GPS Rwy 35 ORIG
1/26/01	IN	New Castle	New Castle-Henry County	1/0901	VOR OR GPS Rwy 27 AMDT 9
1/26/01	LA	Homer	Homer Muni	1/0884	GPS Rwy 30, ORIG–A
1/26/01	LA	Homer	Homer Muni	1/0885	NDB OR GPS Rwy 12, AMDT 1A
1/26/01	OH	Lebanon	Lebanon-Warren County	1/0880	RNAV (GPS) Rwy 1, ORIG–A
1/26/01	OH	Lebanon	Lebanon-Warren County	1/0881	RNAV (GPS) Rwy 19, ORIG–A
1/26/01	WI	Madison	Dane County Regional-Truax Field	1/0886	RADAR–1, AMDT 16
1/29/01	AL	Greenville	Greenville Muni	1/0983	GPS Rwy 32, ORIG
1/29/01	AL	Greenville	Greenville Muni	1/0985	GPS Rwy 14, ORIG
1/30/01	CT	Windsor Locks	Bradley Intl	1/0997	VOR OR TACAN Rwy 33 ORIG–A
1/30/01	OR	Prineville	Prineville	1/0995	NDB Rwy 10, ORIG AMDT 15A

[FR Doc. 01–3652 Filed 2–12–01; 8:45 am]
BILLING CODE 4910–13–M

DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Part 97

[Docket No. 30226; Amdt. No. 2032]

Standard Instrument Approach Procedures; Miscellaneous Amendments

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Final rule.

SUMMARY: This amendment establishes, amends, suspends, or revokes Standard Instrument Approach Procedures (SIAPs) for operations at certain airports. These regulatory actions are needed because of the adoption of new or revised criteria, or because of changes occurring in the National Airspace System, such as the commissioning of new navigational facilities, addition of new obstacles, or changes in air traffic requirements. These changes are designed to provide safe and efficient use of the navigable airspace and to promote safe flight operations under instrument flight rules at the affected airports.

DATES: An effective date for each SIAP is specified in the amendatory provisions.

Incorporation by reference—approved by the Director of the Federal Register on December 31, 1980, and reapproved as of January 1, 1982.

ADDRESSES: Availability of matters incorporated by reference in the amendment is as follows:

For Examination—1. FAA Rules Docket, FAA Headquarters Building, 800 Independence Avenue, SW., Washington, DC 20591;

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2. The FAA Regional Office of the region in which the affected airport is located; or

3. The Flight Inspection Area Office which originated the SIAP.

For Purchase—Individual SIAP copies may be obtained from:

1. FAA Public Inquiry Center (APA–200), FAA Headquarters Building, 800 Independence Avenue, SW., Washington, DC 20591; or

2. The FAA regional Office of the region in which the affected airport is located.

By Subscription—Copies of all SIAPs, mailed once every 2 weeks, are for sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402.

FOR FURTHER INFORMATION CONTACT: Donald P. Pate, Flight Procedure Standards Branch (AMCAFS–420), Flight Technologies and Programs Division, Flight Standards Service, Federal Aviation Administration, Mike Monroney Aeronautical Center, 6500 South MacArthur Blvd. Oklahoma City, OK. 73169 (Mail Address: P.O. Box 25082 Oklahoma City, OK. 73125) telephone: (405) 954–4164.

SUPPLEMENTARY INFORMATION: This amendment to part 97 of the Federal Aviation Regulations (14 CFR part 97) establishes, amends, suspends, or revokes Standard Instrument Approach Procedures (SIAPs). The complete regulatory description of each SIAP is contained in official FAA form documents which are incorporated by reference in this amendment under 5 U.S.C. 552(a), 1 CFR 51, and § 97.20 of the Federal Aviation Regulations (FAR). The applicable FAA Forms are identified as FAA Forms 8260–3, 8260–4, and 8260–5. Materials incorporated by reference are available for examination or purchase as stated above.

The large number of SIAPs, their complex nature, and the need for a special format make their verbatim publication in the **Federal Register** expensive and impractical. Further, airmen do not use the regulatory text of the SIAPs, but refer to their graphic depiction on charts printed by publishers of aeronautical materials. Thus, the advantages of incorporation by reference are realized and publication of the complete description of each SIAP contained in FAA form documents is unnecessary. The provisions of this amendment state the affected CFR (and FAR) sections, with the types and effective dates of the SIAPs. This amendment also identifies the airport, its location, the procedure identification and the amendment number.

The Rule

This amendment to part 97 is effective upon publication of each separate SIAP as contained in the transmittal. Some SIAP amendments may have been previously issued by the FAA in a National Flight Data Center (NFDC) Notice to Airmen (NOTAM) as an emergency action of immediate flight safety relating directly to published aeronautical charts. The circumstances which created the need for some SIAP amendments may require making them effective in less than 30 days. For the remaining SIAPs, an effective data at least 30 days after publication is provided.

Further, the SIAPs contained in this amendment are based on the criteria contained in the U.S. Standard for Terminal Instrument Procedures (TERPS). In developing these SIAPs, the TERPS criteria were applied to the conditions existing or anticipated at the affected airports. Because of the close and immediate relationship between these SIAPs and safety in air commerce, I find that notice and public procedure before adopting these SIAPs are impracticable and contrary to the public interest and, where applicable, that good cause exists for making some SIAPs effective in less than 30 days.

Conclusion

The FAA has determined that this regulation only involves an established body of technical regulations for which frequent and routine amendments are necessary to keep them operationally current. It, therefore—(1) is not a ''significant regulatory action'' under DOT Regulatory Policies and Procedures (44 FR 11034; February 26, 1979); and (3) does not warrant preparation of a regulatory evaluation as the anticipated impact is so minimal. For the same reason, the FAA certifies that this amendment will not have a significant economic impact on a substantial number of small entities under the criteria of the Regulatory Flexibility Act.

List of Subjects in 14 CFR Part 97

Air traffic control, Airports, Navigation (air).

Issued in Washington, DC on January 19, 2001.

L. Nicholas Lacey,

Director, Flight Standards Service.

Adoption of the Amendment

Accordingly, pursuant to the authority delegated to me, part 97 of the Federal Aviation Regulations (14 CFR part 97) is amended by establishing, amending, suspending, or revoking Standard Instrument Approach Procedures, effective at 0901 UTC on the dates specified, as follows:

PART 97—STANDARD INSTRUMENT APPROACH PROCEDURES

1. The authority citation for part 97 is revised to read as follows:

Authority: 49 U.S.C. 106(g), 40103, 40113, 40120, 44701; and 14 CFR 11.49(b)(2).

2. Part 97 is amended to read as follows:

§§ 97.23, 97.25, 97.27, 97.29, 97.31, 97.33 and 97.35 [Amended]

By amending § 97.23 VOR, VOR/DME, VOR or TACAN, and VOR/DME or TACAN; § 97.25 LOC, LOC/DME, LDA, LDA/DME, SDF, SDF/DME; § 97.27 NDB, NDB/DME; § 97.29 ILS, ILS/DME, ISMLS, MLS, MLS/DME, MLS/RNAV; § 97.31 RADAR SIAPs; § 97.33 RNAV SIAPs; and § 97.35 COPTER SIAPs, identified as follows:

** * * * Effective February 22, 2001*

Pikeville, KY, Pike County—Hatcher Field, ILS RWY 27, Orig

** * * * Pikeville, KY, Pike County—Hatcher Field, ILS RWY 27, Orig*

** * * * Effective March 22, 2001*

Palm Springs, CA, Palm Springs Intl, VOR OR GPS–B, Amdt 3
Fort Myers, FL, Southwest Florida Intl, VOR/DME OR TACAN RWY 24, Amdt 2
Fort Myers, FL, Southwest Florida Intl, NDB RWY 6, Amdt 5
Fort Myers, FL, Southwest Florida Intl, ILS RWY 6, Amdt 5
Fort Myers, FL, Southwest Florida Intl, RNAV (GPS) RWY 6, Orig
Fort Myers, FL, Southwest Florida Intl, RNAV (GPS) RWY 24, Orig
Fort Myers, FL, Southwest Florida Intl, GPS RWY 24, Orig, CANCELLED
Fort Myers, FL, Southwest Florida Intl, GPS RWY 6, Orig CANCELLED
Savannah, GA, Savannah Intl, RADAR–1, Amdt 9
Terre Haute, IN, Terre Haute Intl-Hulman Field, RADAR–1, Amdt 4
Newburyport, MA, Plum Island, VOR OR GPS RWY 10, Amdt 5, CANCELLED
Garden City, KS, Garden City Regional, VOR/DME RWY 12, Orig-A
Ardmore, OK, Ardmore Downtown Executive, VOR/DME RNAV RWY 17, Amdt 7
Columbia, SC, Columbia Metropolitan, RADAR–1, Amdt 10
Gallatin, TN, Sumner County Regional, NDB RWY 35, Amdt 1A, CANCELLED

[FR Doc. 01–3653 Filed 2–12–01; 8:45 am]

BILLING CODE 4913–13–M

DEPARTMENT OF THE TREASURY

Internal Revenue Service

26 CFR Parts 1 and 602

[TD 8940]

RIN 1545–AY73

Purchase Price Allocations in Deemed and Actual Asset Acquisitions

AGENCY: Internal Revenue Service (IRS), Treasury.

ACTION: Final regulations and removal of temporary regulations.

SUMMARY: This document contains final regulations relating to deemed and actual asset acquisitions under sections 338 and 1060. The final regulations affect sellers and buyers of corporate stock that are eligible to elect to treat the transaction as a deemed asset acquisition. The final regulations also affect sellers and buyers of assets that constitute a trade or business.

DATES: *Effective Date:* These regulations are effective March 16, 2001.

Applicability Dates: For dates of applicability of these regulations, see §§ 1.338(i)–1 and 1.1060–1(a)(2).

FOR FURTHER INFORMATION CONTACT: Richard Starke of the Office of Associate Chief Counsel (Corporate), (202) 622–7790 (not a toll-free number).

SUPPLEMENTARY INFORMATION:

Paperwork Reduction Act

The collections of information contained in these final regulations have been reviewed and approved by the Office of Management and Budget in accordance with the Paperwork Reduction Act of 1995 (44 U.S.C. 3507(d)) under the control number 1545–1658.

An agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a valid control number assigned by the Office of Management and Budget.

The collections of information in these regulations are in §§ 1.338–2(d), 1.338–2(e)(4), 1.338–5(d)(3), 1.338–10(a)(4), 1.338(h)(10)–1(d)(2), and 1.1060–1(e)(ii)(A) and (B). The collections of information are necessary to make an election to treat a sale of stock as a sale of assets, to calculate and collect the appropriate amount of tax in a deemed or actual asset acquisition, and to determine the bases of assets acquired in a deemed or actual asset acquisition.

These collections of information are required to obtain a benefit. The likely respondents and/or recordkeepers are small businesses or organizations, businesses, or other for-profit institutions, and farms.

The regulations provide that a section 338 election is made by filing Form 8023. The burden for this requirement is reflected in the burden of Form 8023. The regulations also provide that both a seller and a purchaser must each file an asset acquisition statement on Form 8594. The burden for this requirement is reflected in the burden of Form 8594. With respect to Form 8023, the IRS estimated that 201 forms would be filed each year and that each taxpayer would require 12.98 hours to comply. With respect to Form 8594, the IRS estimated that 20,000 forms would be filed each year and that each taxpayer would require 12.25 hours to comply. These estimates have been made available for public comment and no public comments have been received.

The burden for the collection of information in § 1.338–2(e)(4) is as follows:

Estimated total annual reporting/recordkeeping burden: 25 hours.

Estimated average annual burden per respondent/recordkeeper: 0.56 hours.

Estimated number of respondents/recordkeepers: 45.

Estimated annual frequency of responses: On occasion.

Comments concerning the accuracy of this burden estimate and suggestions for reducing this burden should be sent to the Internal Revenue Service, Attn: IRS Reports Clearance Officer, W:CAR:MP:FP:S:O, Washington, DC 20224, and to the Office of Management and Budget, Attn: Desk Officer for the Department of the Treasury, Office of Information and Regulatory Affairs, Washington, DC 20503.

Books or records relating to a collection of information must be retained as long as their contents may become material in the administration of any internal revenue law. Generally, tax returns and tax return information are confidential, as required by 26 U.S.C. 6103.

Background

On August 10, 1999, the IRS and the Department of Treasury (Treasury) published a notice of proposed rulemaking in the **Federal Register** (REG–107069–97, 64 FR 43462 (1999–36 I.R.B. 346)) containing proposed regulations under sections 338 and 1060 of the Internal Revenue Code of 1986. On January 7, 2000, the IRS and Treasury published temporary regulations in the **Federal Register** (REG–107069–97, 65 FR 1236 (2000–4 I.R.B. 332)) that are virtually the same as the proposed regulations published on August 10, 1999. The preamble to the temporary regulations notes that the proposed regulations generally were favorably received and that the IRS and Treasury believe that the proposed regulations provided clearer guidance and better rules than the prior regulations under sections 338 and 1060. However, the preamble also notes that the comments received warranted further consideration.

Explanation of Provisions

In general, the final regulations adopted herein are very similar to the proposed and temporary regulations in their organization and substance. However, changes have been made in several areas, largely in response to the comments received. The principal changes are discussed below, in the order in which they appear in the regulations.

Insurance Transactions

Although section 338 treats a target as having sold all its assets in the deemed asset sale, proposed § 1.338–1(a)(2) provides that other rules of law may characterize the transaction as something other than or in addition to a sale and purchase of assets. Proposed § 1.338–1(a)(2) states: ''[f]or example, if target is an insurance company for which a section 338 election is made, the deemed asset sale would be characterized and taxed as an assumption-reinsurance transaction under applicable Federal income tax law.'' Several comments urged removal of the quoted sentence in the final regulations and recommended that the treatment of transactions involving insurance companies under section 338 be reserved pending more complete analysis and guidance. The IRS and Treasury believe that generally it is appropriate to view the deemed asset sale by an insurance company as involving an assumption-reinsurance transaction and, therefore, have retained the sentence in the final regulations. The IRS and Treasury, however, intend to provide additional guidance in a separate project.

Residual Method Anti-abuse Rule

The proposed regulations include a new anti-abuse rule intended to prevent taxpayers from changing the results of applying the residual method by engaging in transactions that have a transitory economic effect with respect to the ownership or use of assets. The anti-abuse rule is intended to apply only to an asset transfer exhibiting objective characteristics suggesting the transfer was engaged in to manipulate the operation of the residual method.

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Notwithstanding the limited scope of the anti-abuse rule, several commentators suggested further limiting or eliminating the rule. After studying the comments, the IRS and Treasury continue to believe that the anti-abuse rule serves a useful purpose in protecting the operation of the residual method. Several changes have been made, however, to clarify the intended scope of the rule. Thus, the phrase ''to more than an insignificant extent'' is changed in the final regulation to ''primarily.'' This change is meant to clarify that some continuing use in its original location of an asset transferred to or from the target is permitted.

A comment requested that the final regulations elaborate further on the statement that the Commissioner has the authority to make appropriate correlative adjustments and that the final regulations include an example. The final regulations do not do so, because the nature of any correlative adjustments would depend on the particular factual circumstances in which the rule is applied. Thus, any additional guidance would provide only limited assistance. However, the final regulations state that correlative adjustments should avoid duplication or omission of any item of income, gain, loss, deduction, or basis. See § 1.338–1(c).

Closing Date Issues

Concerns have been raised about the possibility that buyers can effectuate transactions outside the ordinary course of business after acquiring target stock that, to the detriment of an unsuspecting seller, must be reported by the seller on its return, which normally covers the entire day on which the acquisition occurs. Some of these concerns derive from a reading of § 1.1502–76(b) to preclude operation of the ''next day rule'' whenever a section 338 election is made for a target. The ''next day rule'' of § 1.1502–76(b) provides that if, on the day of a group member's change in status as a member, a transaction occurs that is properly allocable to the portion of the member's day after the event resulting in the change, the member and all related persons must treat the transaction as occurring at the beginning of the following day.

Commentators have suggested that a purchaser acquiring stock of a subsidiary member of a consolidated group could, after acquiring the target stock, cause the target to sell all of its assets to another person later on the closing date and then make a unilateral section 338(g) election. It is suggested that the effect of the election is to preclude the operation of the next day rule, causing the results of the actual asset sale to fall onto the selling consolidated group's tax return. The IRS and Treasury do not believe that § 1.1502–76(b), as written, automatically precludes the operation of the next day rule in a section 338 context, but nevertheless have provided a new rule in these final regulations that requires the application of the next day rule in a section 338 context where the target engages in a transaction outside the ordinary course of business on the acquisition date after the event resulting in the qualified stock purchase (QSP). See § 1.338–1(d).

Purchase Definition

Proposed § 1.338–3(b)(2) provides rules concerning the definition of a ''purchase'' that require more than a nominal amount to be paid for the stock of the target. Several comments requested reconsideration of the proposed rule. Accordingly, in the temporary regulations, at § 1.338–3T(b)(2), a definition is given for the term *purchase of target affiliate*, while the definition of the term *purchase of target* is reserved. The final regulations include a single definition of *purchase* applicable to both targets and target affiliates, which definition generally conforms to the definition of *purchase of target affiliate* in the temporary regulations. Under this definition, stock in a target (or target affiliate) may be considered purchased if, under general principles of tax law, the purchasing corporation is considered to own stock of the target (or target affiliate) meeting the requirements of section 1504(a)(2), notwithstanding that no amount may be paid for (or allocated to) the stock.

Transactions After QSPs

Since 1995, the regulations under section 338 have provided special rules that apply, by virtue of section 338, to certain transfers of target assets following a QSP of the target's stock if a section 338 election is not made for the target. These provisions modify the normal operation of the continuity of interest requirement under section 368 and the interpretation of the term shareholder for purposes of section 368(a)(1)(D), as applied to certain taxpayers. These rules were adopted to effectuate Congressional intent, in replacing former section 334(b)(2) with section 338, that the deemed sale results provided by section 338 not be available through transactions within the purchasing group after the acquisition. In the final regulations, these rules are located at § 1.338–3(d).

The 1995 amendments did not provide any special rule to modify the application of the statutory requirements for reorganizations under section 368(a)(1)(C). However, the considerations that justify the modified application of the continuity of interest rule and the shareholder definition for ''D'' reorganizations also justify an analogous modification of the ''solely for voting stock'' requirement for post-acquisition ''C'' reorganizations. Accordingly, the final regulations provide that consideration other than voting stock issued in connection with a QSP is ignored in determining whether a subsequent transfer of assets by the target corporation to a member of its new affiliated group satisfies the solely for voting stock requirement of a ''C'' reorganization. See § 1.338–3(d)(4).

Treatment of Liabilities

The proposed regulations eliminate the prior distinction between ''modified aggregate deemed sale price'' (or MADSP) and ''aggregate deemed sale price'' (or ADSP), a distinction that appeared to have been based on the premise that the new target generally will not bear the tax liability for the deemed sale where a section 338(h)(10) election is made, but that it generally will bear the liability where a section 338 (but not section 338(h)(10)) election is made. However, these generalizations were not universally correct in either situation. Proposed §§ 1.338–4 and 1.338–5 clarify the treatment of taxes as liabilities in computing ADSP and ''adjusted grossed-up basis'' (or AGUB). Commentators asked for further clarification of the standards for taking certain taxes into account. Rather than providing more specific guidance, which would be inconsistent with the overall philosophy of deferring to general tax principles governing actual transactions, the final regulations further simplify the discussion of liabilities. Except for the fact that new target remains liable for old target's tax liabilities (see § 1.338–1(b)(3)(i)) and that a buyer's assumption of a seller's income tax liability with respect to the sale causes the consideration to ''gross up'' or ''pyramid,'' a tax liability is like any other type of liability and the status of any particular type of tax liability as a liability includible in ADSP or AGUB should be determined under general principles as applied to the facts relating to the incidence of the tax liability.

Valuation Rules

Proposed § 1.338–6(a)(2)(iii) retains a statement from prior versions of the regulations that ''[i]n certain cases the IRS may make an independent showing of the value of goodwill and going

concern value as a means of calling into question the validity of the taxpayer's valuation of other assets.'' This authority was intended to provide a means of ensuring that taxpayers do not overvalue assets in higher classes that are allocated consideration before the residual class. As a factual matter, the IRS and Treasury understand that a low (or no) allocation to goodwill and going concern value may result from causes other than a taxpayer's overvaluation of assets in higher classes. Moreover, the IRS and Treasury accept the soundness of the fundamental premise of the residual method that goodwill and going concern value are the most difficult assets to value independently and that their value should be computed as the residue after all other assets are valued. The final regulations delete the sentence about valuing goodwill and going concern value. Under the final regulations, the IRS retains the ability to challenge a taxpayer's valuation of assets in Classes I through VI, but will do so on grounds consistent with the residual method of allocation.

Top-Down Allocation

Changes to the rules for allocating purchase price to the stock and assets of lower tier subsidiaries were not proposed, although, as noted in the preamble to the proposed regulations, considerable study was given to alternative approaches. Comments were requested, but none was received, and the IRS and Treasury to date have been unable to develop a fully successful alternative. Accordingly, the final regulations continue to apply the ''top-down'' allocation system, under which the stock of a lower tier subsidiary is allocated purchase price in the general asset category (now Class V) and the deemed purchase price of its assets is in turn computed from that stock price and then allocated within the subsidiary.

In the final regulations, the scope of Class II assets described in § 1.338–6(b)(2)(ii) is modified to provide that Class II assets do not include stock of target affiliates, other than actively traded stock described in section 1504(a)(4) (certain preferred stock). Instead, stock of target affiliates is included in Class V. This would exclude target affiliate stock from Class II where the target holds an 80 percent or greater interest in the target affiliate but a minority interest in target affiliate stock of the same class is actively traded. It is not clear that the trading price for shares of a class of stock less than 20 percent of which is in the hands of the public, and which consequently may experience thinner trading volumes, necessarily is indicative of the fair market value of the 80 percent or greater majority interest.

Class III Assets

Proposed § 1.338–6(b)(2) provides that Class III assets consist of ''accounts receivable, mortgages, and credit card receivables from customers which arise in the ordinary course of business.'' Comments suggested that these categories were too limited. Under the rationales expressed in the preamble to the proposed regulations, the IRS and Treasury believe that other types of debt instruments, and even other types of assets, should be included in Class III. As revised in the final regulations, Class III assets generally consist of assets that the taxpayer marks to market at least annually and debt instruments (including receivables). However, debt instruments issued by related parties, and certain contingent payment and convertible debt instruments, are not included in Class III.

First Year Price Adjustments

Proposed § 1.338–7 provides rules for allocating the ADSP or AGUB when increases or decreases are required after the close of new target's first taxable year. For increases or decreases required before the end of new target's first taxable year, proposed § 1.338–4(b)(2)(ii) provides that ''[i]ncreases or decreases with respect to the elements of ADSP that are taken into account before the close of new target's first taxable year are taken into account for purposes of determining ADSP and the deemed sale tax consequences as if they had been taken into account at the beginning of the day after the acquisition date.'' Proposed § 1.338–5(b)(2)(ii) contains a similar rule for redeterminations of AGUB. These rules originated in predecessor versions of the regulations under section 338.

Although no commentator requested removal of these rules, one comment highlighted the difficulties posed for the seller in section 338(h)(10) transactions in applying a rule based on new target's year-end, and requested relief. After reviewing this comment, the final regulations remove the rules providing special treatment for changes in ADSP or AGUB occurring before the close of new target's first taxable year. Instead, the general rule in § 1.338–7 governs the allocation of all changes in ADSP or AGUB after the acquisition date. This change is consistent with the IRS's and Treasury's expressed intent in drafting the proposed regulations to eliminate, to the extent possible, any special accounting rules in the section 338 regulations, as it should result in treatment more consistent with that of an actual asset sale.

Like-kind Exchanges

A commentator suggested that the final regulations should apply section 1031 to old target in its deemed asset sale if the purchaser pays for target stock with property of like kind to old target's assets or with cash put in escrow for a successor to old target to designate for purchase of assets of like kind. This rule would be an exception to the requirement in § 1.338–1(a)(2) that the transaction between old target and new target must be a taxable transaction, and inconsistent with the requirement of section 338(a)(1) that target ''shall be treated as having sold all of its assets at the close of the acquisition date at fair market value * * *'' After considering the policy concerns and the administrative difficulties in creating and administering an exception for section 1031 exchanges, the IRS and Treasury have not adopted this suggestion.

S Corporations

A purchaser may agree to compensate the sellers of an S corporation target for adverse tax consequences resulting from a section 338(h)(10) election. When more than one shareholder in an S corporation sells stock in the same transaction, the different shareholders may negotiate different prices for their stock based on varying Federal and state tax liabilities they will bear as a result of the transaction. Some commentators have noted that, in other cases, different prices may be paid for control premiums or other reasons. Under section 1361(b)(1)(D), an S corporation is permitted to have only one class of stock. A potential second class of stock issue arises because the fiction of a section 338(h)(10) election is that the target sells its assets to a new target and then liquidates. Applying that fiction, if the shareholders are treated as receiving differing amounts per share in the deemed liquidation, a second class of stock could result.

Some commentators have recommended that the final regulations clarify that the payment of varying amounts per share to S corporation shareholders will not cause the S corporation to violate the single class of stock requirement. The final regulations respond to these comments by including a statement in § 1.1361–1(l)(2)(v) that the payment of varying amounts to S corporation shareholders in a transaction for which a section 338(h)(10) election is made will not cause the S corporation to violate the single class of stock requirement of

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section 1361(b)(1)(D) and § 1.1361–1(l), provided that the varying amounts are negotiated in arm's length negotiations with the purchaser.

One commentator requested clarification regarding the calculation and allocation of the purchaser's AGUB for a target that was an S corporation that owned a qualified subchapter S subsidiary (QSub), where the QSub status does not continue after the acquisition date and the QSub is treated as becoming a separate subsidiary of new target. Although the regulations require allocation of the AGUB among the target's assets held at the beginning of the day after the acquisition date, they also require results consistent with those that would occur if the parties had actually engaged in the transactions deemed to occur because of section 338(h)(10), and taking into account other transactions that actually occurred or are deemed to occur. See § 1.338(h)(10)–1(d)(9). An actual sale of the assets of the S corporation target, including the stock of the QSub, to a corporation would be treated as a sale by the S corporation of all of its assets, including those of the QSub. If the QSub status does not continue after the acquisition, the buyer would be treated as forming a new subsidiary containing the assets held by the former QSub. See § 1.1361–5(b)(3) *Example 9.* Accordingly, the AGUB for the former S corporation target would be allocated among the assets of the former QSub as though they were assets of the target, and then the target would be treated as having formed a new subsidiary containing the assets of the former QSub.

Clarification was also requested regarding the possibility of making a section 338(h)(10) election for the sale by an S corporation of stock of a QSub. As noted above, *Example 9* of § 1.1361–5(b)(3) indicates that the sale by an S corporation of all of the stock of a QSub is treated as an asset sale by the S corporation to the purchaser of the QSub stock. No further guidance is provided in these regulations. The sale of an 80 percent or greater (but less than 100 percent) interest in the stock of a QSub is not expected to be a common transaction because it generally will result in a taxable transaction with respect to all the assets of the QSub.

Forms 8023 and 8594

The current temporary regulations provide that a section 338(h)(10) election for an S corporation target must be made jointly by the purchaser and the S corporation shareholders. These regulations specifically require nonselling S corporation shareholders to consent to the election. See § 1.338(h)(10)–1T(c)(2). However, the instructions for the election form (Form 8023) do not clearly require the nonselling shareholders to sign the election form. Moreover, the prior regulations were less clear in requiring nonselling S corporation shareholders to consent to the election. Commentators have requested that the IRS recognize the validity of section 338(h)(10) elections for S corporation targets even if not signed by nonselling shareholders. The IRS will revise Form 8023 to make clear that nonselling S corporation shareholders must also sign. The IRS will recognize the validity of otherwise valid elections made on the current version of the form even if not signed by the nonselling shareholders, provided that the S corporation and all of its shareholders (including nonselling shareholders) report the tax consequences consistently with the results under section 338(h)(10). See § 1.338(i)–1(b).

The preamble to the proposed regulations indicates that the IRS and Treasury were considering requiring that the information about the allocation of ADSP and AGUB currently submitted on the election form (Form 8023) instead be submitted by the purchaser and seller(s) separately on their income tax returns. Such a change will be effectuated when Form 8023 is revised. The information about ADSP and AGUB will be reported by each party separately on Form 8594, which also will be revised. With respect to a transaction subject to a section 338 election, Form 8594 will be filed with the income tax returns of the old and new target for the tax periods including the deemed sale and purchase. Where an election under section 338(g) is made for a controlled foreign corporation (CFC), the purchaser and seller (or their U.S. shareholder(s)) will be required to submit separately, on Form 8594, information about ADSP and AGUB. The Form 8594 will be required to be attached to the last Form 5471 filed by the seller for old target, and to the first Form 5471 filed by the purchaser for new target.

Special Analyses

It has been determined that these final regulations are not a significant regulatory action as defined in Executive Order 12866. Therefore, a regulatory assessment is not required. It has been determined that a final regulatory flexibility analysis is required for the collection of information in this Treasury decision under 5 U.S.C. 604. This analysis is set forth below under the heading ''Final Regulatory Flexibility Act Analysis.'' Pursuant to section 7805(f) of the Internal Revenue Code, these final regulations will be submitted to the Chief Counsel for Advocacy of the Small Business Administration for comment on their impact on small business.

Final Regulatory Flexibility Act Analysis

This analysis is required under the Regulatory Flexibility Act (5 U.S.C. chapter 6). This regulatory action is intended to simplify and clarify the current rules relating to both deemed and actual asset acquisitions. The current rules were developed over a long period of time and have been repeatedly amended. The IRS and Treasury believe these final regulations will significantly improve the clarity of the rules relating to both deemed and actual asset acquisitions.

The major objective of these final regulations is to modify the rules for allocating purchase price in both deemed and actual asset acquisitions. In addition, these final regulations replace the general rules for electing to treat a stock sale as an asset sale.

These collections of information may affect small businesses if the stock of a corporation which is a small entity is acquired in a qualified stock purchase or if a trade or business which is also a small business is transferred in a taxable transaction. Form 8023 (on which an election to treat a stock sale as an asset sale is filed) has been submitted to and approved by the Office of Management and Budget. With respect to Form 8023, the IRS estimated that 201 forms would be filed each year and that each taxpayer would require 12.98 hours to comply. Form 8594 (on which a sale or acquisition of assets constituting a trade or business is reported) has also been submitted to and approved by the Office of Management and Budget. With respect to Form 8594, the IRS estimated that 20,000 forms would be filed each year and that each taxpayer would require 12.25 hours to comply. These estimates have been made available for public comment and no public comments have been received. The regulations do not impose new requirements on small businesses and, in fact, should lessen any difficulties associated with the existing reporting requirements by clarifying the rules associated with deemed and actual asset acquisitions.

The collections of information require taxpayers to file an election in order to treat a stock sale as an asset sale. In addition, taxpayers must file a statement regarding the amount of consideration allocated to each class of assets under

the residual method. The professional skills that would be necessary to make the election or allocate the consideration would be the same as those required to prepare a return for the small business.

Drafting Information

The principal author of these regulations is Richard Starke, Office of the Associate Chief Counsel (Corporate). However, other personnel from the IRS and Treasury Department participated extensively in their development.

List of Subjects

26 CFR Part 1

Income taxes, Reporting and recordkeeping requirements.

26 CFR Part 602

Reporting and recordkeeping requirements.

Adoption of Amendments to the Regulations

Accordingly, 26 CFR parts 1 and 602 are amended as follows:

PART 1—INCOME TAXES

Paragraph 1. The authority citation for part 1 is amended by removing the entries for Sections 1.338–6T, 1.338–7T, 1.338–10T and 1.1060–1T and by adding entries in numerical order to read in part as follows:

Authority: 26 U.S.C. 7805 * * * Section 1.338–6 also issued under 26 U.S.C. 337(d), 338, and 1502. Section 1.338–7 also issued under 26 U.S.C. 337(d), 338, and 1502., Section 1.338–10 also issued under 26 U.S.C. 337(d), 338, and 1502.* * * Section 1.1060–1 also issued under 26 U.S.C. 1060.* * *

Par. 2. In the list below, for each section indicated in the left column, remove the language in the middle column and add the language in the right column:

Section	Remove	Add
1.56(g)–1(k)(1), second sentence	of § 1.338–6T(b), if otherwise	of § 1.338–6(b), if otherwise
1.56(g)–1(k)(1), last sentence	of § 1.338–6T(c)(1) and (2) also	of § 1.338–6(c)(1) and (2) also
1.197–2(e)(1), second sentence	See § 1.1060–1T(b)(2)	See § 1.1060–1(b)(2)
1.197–2(k), *Example 6*, paragraph (i), last sentence.	See § 1.338–6T(b)	See § 1.338–6(b)
1.197–2(k), *Example 6*, paragraph (ii), second sentence.	Under §§ 1.1060–1T(c)(2) and 1.338–6T(c)(1)	Under §§ 1.1060–1(c)(2) and 1.338–6(c)(1)
1.197–2(k), *Example 6*, paragraph (ii), last sentence.	See §§ 1.1060–1T(c)(2) and 1.338–6T(b)	See §§ 1.1060–1(c)(2) and 1.338–6(b)
1.197–2(k), *Example 23*, paragraph (iv), first sentence.	(as these terms are defined as in defined in § 1.338–1(c)(13))	(as these terms are defined as in defined in § 1.338–2(c)(17))
1.338–8(h)(1), last sentence	nomenclature of § 1.338–1(b) and (c) and	nomenclature of sentence § 1.338–2(b) and (c) and
1.338–9(a), penultimate sentence	provided in § 1.338–1(c)(14),	provided in § 1.338–2(c)(18),
1.338–9(b)(1), first sentence	the deemed sale gain, as defined in § 1.338–3(b)(4),	the deemed sale tax sentence consequences, as defined in § 1.338–2(c)(7),
1.338–9(b)(1), last sentence	the deemed sale gain	the deemed sale tax consequences.
1.338–9(b)(3)(i)(B)	under § 1.338(b)–1(e)(2)	under § 1.338–5(d).
1.338–9(b)(3)(ii)	reflect deemed sale gain)	reflect deemed sale tax consequences)
1.338–9(b)(4)	under § 1.338(b)–1(e)(2),	under § 1.338–5(d),
1.338–9(f)(2), *Example 1*, paragraph (a), last sentence.	and § 1.338(b)–1(e)(2)	and § 1.338–5(d).
1.368–1(a), third sentence	(k) and 1.338–3T(c)(3)	(k) and 1.338–3(d).
1.368–1(e)(6), *Example 4*, paragraph (ii), last sentence.	see § 1.338–3T(c)(3) (which	see § 1.338–3(d) (which
1.597–2(d)(5)(iii)(B)	(see § 1.338–7T)	(see § 1.338–7)
1.597–5(c)(3)(i)	under § 1.338–6T(b), (c)(1) and (2)	under § 1.338–6(b), (c)(1) and (2).
1.597–5(d)(2)(i)	under § 1.338–6T(b), (c)(1) and (2)	under § 1.338–6(b), (c)(1) and (2).
1.921–1T(b)(1), A–1, immediately proceding the penultimate sentence.	and § 1.338–2T(d)	and § 1.338–2(d)
1.1031(d)–1T, last sentence	see § 1.1060–1T(b), (c), and (d) *Example 1*	see § 1.1060–1(b), (c), and (d) *Example 1*.
1.1031(j)–1(b)(2)(iii), penultimate sentence	in § 1.338–6T(b), to which reference is made by § 1.1060–1T(c)(2)	in § 1.338–6(b), to which reference is made by § 1.1060–1(c)(2).
1.1361–4(d), *Example 3*, third sentence	Under section 338(a) and § 1.338(h)(10)–1T(d)(3),	Under section 338(a) and § 1.338(h)(10)–1(d)(3),
1.1502–75(k)	See § 1.338(h)(10)–1T(d)(7) for	See § 1.338(h)(10)–1(d)(7) for
1.1502–76(b)(1)(ii)(A)(*1*), last sentence	See § 1.338–10T(a)(5) (deemed	See § 1.338–10(a)(5) (deemed

Par. 3. Sections 1.338–0 through 1.338–7 are added to read as follows:

§ 1.338–0 Outline of topics.

This section lists the captions contained in the regulations under section 338 as follows:

§ 1.338–1 General principles; status of old target and new target.

(a) In general.
(1) Deemed transaction.
(2) Application of other rules of law.
(3) Overview.
(b) Treatment of target under other provisions of the Internal Revenue Code.
(1) General rule for subtitle A.
(2) Exceptions for subtitle A.
(3) General rule for other provisions of the Internal Revenue Code.
(c) Anti-abuse rule.
(1) In general.
(2) Examples.
(d) Next day rule for post-closing transactions.

§ 1.338–2 Nomenclature and definitions; mechanics of the section 338 election.

(a) Scope.
(b) Nomenclature.
(c) Definitions.
(1) Acquisition date.
(2) Acquisition date assets.
(3) Affiliated group.
(4) Common parent.
(5) Consistency period.
(6) Deemed asset sale.
(7) Deemed sale tax consequences.
(8) Deemed sale return.

(9) Domestic corporation.
(10) Old target's final return.
(11) Purchasing corporation.
(12) Qualified stock purchase.
(13) Related persons.
(14) Section 338 election.
(15) Section 338(h)(10) election.
(16) Selling group.
(17) Target; old target; new target.
(18) Target affiliate.
(19) 12-month acquisition period.
(d) Time and manner of making election.
(e) Special rules for foreign corporations or DISCs.
(1) Elections by certain foreign purchasing corporations.
(i) General rule.
(ii) Qualifying foreign purchasing corporation.
(iii) Qualifying foreign target.
(iv) Triggering event.
(v) Subject to United States tax.
(2) Acquisition period.
(3) Statement of section 338 may be filed by United States shareholders in certain cases.
(4) Notice requirement for U.S. persons holding stock in foreign target.
(i) General rule.
(ii) Limitation.
(iii) Form of notice.
(iv) Timing of notice.
(v) Consequence of failure to comply.
(vi) Good faith effort to comply.

§ 1.338–3 Qualification for the section 338 election.

(a) Scope.
(b) Rules relating to qualified stock purchases.
(1) Purchasing corporation requirement.
(2) Purchase.
(3) Acquisitions of stock from related corporations.
(i) In general.
(ii) Time for testing relationship.
(iii) Cases where section 338(h)(3)(C) applies—acquisitions treated as purchases.
(iv) Examples.
(4) Acquisition date for tiered targets.
(i) Stock sold in deemed asset sale.
(ii) Examples.
(5) Effect of redemptions.
(i) General rule.
(ii) Redemptions from persons unrelated to the purchasing corporation.
(iii) Redemptions from the purchasing corporation or related persons during 12-month acquisition period.
(A) General rule.
(B) Exception for certain redemptions from related corporations.
(iv) Examples.
(c) Effect of post-acquisition events on eligibility for section 338 election.
(1) Post-acquisition elimination of target.
(2) Post-acquisition elimination of the purchasing corporation.
(d) Consequences of post-acquisition elimination of target where section 338 election not made.
(1) Scope.
(2) Continuity of interest.
(3) Control requirement.
(4) Solely for voting stock requirement.
(5) Example.

§ 1.338–4 Aggregate deemed sale price; various aspects of taxation of the deemed asset sale.

(a) Scope.
(b) Determination of ADSP.
(1) General rule.
(2) Time and amount of ADSP.
(i) Original determination.
(ii) Redetermination of ADSP.
(iii) Example.
(c) Grossed-up amount realized on the sale to the purchasing corporation of the purchasing corporation's recently purchased target stock.
(1) Determination of amount.
(2) Example.
(d) Liabilities of old target.
(1) In general.
(2) Time and amount of liabilities.
(e) Deemed sale tax consequences.
(f) Other rules apply in determining ADSP.
(g) Examples.
(h) Deemed sale of target affiliate stock.
(1) Scope.
(2) In general.
(3) Deemed sale of foreign target affiliate by a domestic target.
(4) Deemed sale producing effectively connected income.
(5) Deemed sale of insurance company target affiliate electing under section 953(d).
(6) Deemed sale of DISC target affiliate.
(7) Anti-stuffing rule.
(8) Examples.

§ 1.338–5 Adjusted grossed-up basis.

(a) Scope.
(b) Determination of AGUB.
(1) General rule.
(2) Time and amount of AGUB.
(i) Original determination.
(ii) Redetermination of AGUB.
(iii) Examples.
(c) Grossed-up basis of recently purchased stock.
(d) Basis of nonrecently purchased stock; gain recognition election.
(1) No gain recognition election.
(2) Procedure for making gain recognition election.
(3) Effect of gain recognition election.
(i) In general.
(ii) Basis amount.
(iii) Losses not recognized.
(iv) Stock subject to election.
(e) Liabilities of new target.
(1) In general.
(2) Time and amount of liabilities.
(3) Interaction with deemed sale tax consequences.
(f) Adjustments by the Internal Revenue Service.
(g) Examples.

§ 1.338–6 Allocation of ADSP and AGUB among target assets.

(a) Scope.
(1) In general.
(2) Fair market value.
(i) In general.
(ii) Transaction costs.
(iii) Internal Revenue Service authority.
(b) General rule for allocating ADSP and AGUB.
(1) Reduction in the amount of consideration for Class I assets.
(2) Other assets.
(i) In general.
(ii) Class II assets.
(iii) Class III assets.
(iv) Class IV assets.
(v) Class V assets.
(vi) Class VI assets.
(vii) Class VII assets.
(3) Other items designated by the Internal Revenue Service.
(c) Certain limitations and other rules for allocation to an asset.
(1) Allocation not to exceed fair market value.
(2) Allocation subject to other rules.
(3) Special rule for allocating AGUB when purchasing corporation has nonrecently purchased stock.
(i) Scope.
(ii) Determination of hypothetical purchase price.
(iii) Allocation of AGUB.
(4) Liabilities taken into account in determining amount realized on subsequent disposition.
(d) Examples.

§ 1.338–7 Allocation of redetermined ADSP and AGUB among target assets.

(a) Scope.
(b) Allocation of redetermined ADSP and AGUB.
(c) Special rules for ADSP.
(1) Increases or decreases in deemed sale tax consequences taxable notwithstanding old target ceases to exist.
(2) Procedure for transactions in which section 338(h)(10) is not elected.
(i) Deemed sale tax consequences included in new target's return.
(ii) Carryovers and carrybacks.
(A) Loss carryovers to new target taxable years.
(B) Loss carrybacks to taxable years of old target.
(C) Credit carryovers and carrybacks.
(3) Procedure for transactions in which section 338(h)(10) is elected.
(d) Special rules for AGUB.
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§ 1.338–1 General principles; status of old target and new target.

(a) *In general*—(1) *Deemed transaction.* Elections are available under section 338 when a purchasing corporation acquires the stock of another corporation (the target) in a qualified stock purchase. One type of election, under section 338(g), is available to the purchasing corporation. Another type of election, under section 338(h)(10), is, in more limited circumstances, available jointly to the purchasing corporation and the sellers of the stock. (Rules concerning eligibility for these elections are contained in §§ 1.338–2, 1.338–3, and 1.338(h)(10)–1.) Although target is a single corporation under corporate law, if a section 338 election is made, then two separate corporations, old target and new target, generally are considered to exist for purposes of subtitle A of the Internal Revenue Code. Old target is treated as transferring all of its assets to an unrelated person in exchange for consideration that includes the discharge of its liabilities (see § 1.1001–2(a)), and new target is treated as acquiring all of its assets from an unrelated person in exchange for consideration that includes the assumption of those liabilities. (Such transaction is, without regard to its characterization for Federal income tax purposes, referred to as the deemed asset sale and the income tax

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consequences thereof as the deemed sale tax consequences.) If a section 338(h)(10) election is made, old target is deemed to liquidate following the deemed asset sale.

(2) *Application of other rules of law.* Other rules of law apply to determine the tax consequences to the parties as if they had actually engaged in the transactions deemed to occur under section 338 and the regulations thereunder except to the extent otherwise provided in those regulations. See also § 1.338–6(c)(2). Other rules of law may characterize the transaction as something other than or in addition to a sale and purchase of assets; however, the transaction between old and new target must be a taxable transaction. For example, if target is an insurance company for which a section 338 election is made, the deemed asset sale would be characterized and taxed as an assumption-reinsurance transaction under applicable Federal income tax law. See § 1.817–4(d).

(3) *Overview.* Definitions and special nomenclature and rules for making the section 338 election are provided in § 1.338–2. Qualification for the section 338 election is addressed in § 1.338–3. The amount for which old target is treated as selling all of its assets (the aggregate deemed sale price, or ADSP) is addressed in § 1.338–4. The amount for which new target is deemed to have purchased all its assets (the adjusted grossed-up basis, or AGUB) is addressed in § 1.338–5. Section 1.338–6 addresses allocation both of ADSP among the assets old target is deemed to have sold and of AGUB among the assets new target is deemed to have purchased. Section 1.338–7 addresses allocation of ADSP or AGUB when those amounts subsequently change. Asset and stock consistency are addressed in § 1.338–8. International aspects of section 338 are covered in § 1.338–9. Rules for the filing of returns are provided in § 1.338–10. Eligibility for and treatment of section 338(h)(10) elections is addressed in § 1.338(h)(10)–1.

(b) *Treatment of target under other provisions of the Internal Revenue Code*—(1) *General rule for subtitle A.* Except as provided in this section, new target is treated as a new corporation that is unrelated to old target for purposes of subtitle A of the Internal Revenue Code. Thus—

(i) New target is not considered related to old target for purposes of section 168 and may make new elections under section 168 without taking into account the elections made by old target; and

(ii) New target may adopt, without obtaining prior approval from the Commissioner, any taxable year that meets the requirements of section 441 and any method of accounting that meets the requirements of section 446. Notwithstanding § 1.441–1T(b)(2), a new target may adopt a taxable year on or before the last day for making the election under section 338 by filing its first return for the desired taxable year on or before that date.

(2) *Exceptions for subtitle A.* New target and old target are treated as the same corporation for purposes of—

(i) The rules applicable to employee benefit plans (including those plans described in sections 79, 104, 105, 106, 125, 127, 129, 132, 137, and 220), qualified pension, profit-sharing, stock bonus and annuity plans (sections 401(a) and 403(a)), simplified employee pensions (section 408(k)), tax qualified stock option plans (sections 422 and 423), welfare benefit funds (sections 419, 419A, 512(a)(3), and 4976), and voluntary employee benefit associations (section 501(c)(9) and the regulations thereunder);

(ii) Sections 1311 through 1314 (relating to the mitigation of the effect of limitations), if a section 338(h)(10) election is not made for target;

(iii) Section 108(e)(5) (relating to the reduction of purchase money debt);

(iv) Section 45A (relating to the Indian Employment Credit), section 51 (relating to the Work Opportunity Credit), section 51A (relating to the Welfare to Work Credit), and section 1396 (relating to the Empowerment Zone Act);

(v) Sections 401(h) and 420 (relating to medical benefits for retirees);

(vi) Section 414 (relating to definitions and special rules); and

(vii) Any other provision designated in the Internal Revenue Bulletin by the Internal Revenue Service. See § 601.601(d)(2)(ii) of this chapter. See, for example, § 1.1001–3(e)(4)(i)(F) providing that an election under section 338 does not result in the substitution of a new obligor on target's debt.

(3) *General rule for other provisions of the Internal Revenue Code.* Except as provided in the regulations under section 338 or in the Internal Revenue Bulletin by the Internal Revenue Service (see § 601.601(d)(2)(ii) of this chapter), new target is treated as a continuation of old target for purposes other than subtitle A of the Internal Revenue Code. For example—

(i) New target is liable for old target's Federal income tax liabilities, including the tax liability for the deemed sale tax consequences and those tax liabilities of the other members of any consolidated group that included old target that are attributable to taxable years in which those corporations and old target joined in the same consolidated return (see § 1.1502–6(a));

(ii) Wages earned by the employees of old target are considered wages earned by such employees from new target for purposes of sections 3101 and 3111 (Federal Insurance Contributions Act) and section 3301 (Federal Unemployment Tax Act); and

(iii) Old target and new target must use the same employer identification number.

(c) *Anti-abuse rule*—(1) *In general.* The rules of this paragraph (c) apply for purposes of applying the residual method as provided for under the regulations under sections 338 and 1060. The Commissioner is authorized to treat any property (including cash) transferred by old target in connection with the transactions resulting in the application of the residual method (and not held by target at the close of the acquisition date) as, nonetheless, property of target at the close of the acquisition date if the property so transferred is, within 24 months after the deemed asset sale, owned by new target, or is owned, directly or indirectly, by a member of the affiliated group of which new target is a member and continues after the acquisition date to be held or used primarily in connection with one or more of the activities of new target. In addition, the Commissioner is authorized to treat any property (including cash) transferred to old target in connection with the transactions resulting in the application of the residual method (and held by target at the close of the acquisition date) as, nonetheless, not being property of target at the close of the acquisition date if the property so transferred is, within 24 months after the deemed asset sale, not owned by new target but owned, directly or indirectly, by a member of the affiliated group of which new target is a member, or owned by new target but held or used primarily in connection with an activity conducted, directly or indirectly, by another member of the affiliated group of which new target is a member in combination with other property retained by or acquired, directly or indirectly, from the transferor of the property (or a member of the same affiliated group) to old target. For purposes of this paragraph (c)(1), an interest in an entity is considered held or used in connection with an activity if property of the entity is so held or used. The authority of the Commissioner under this paragraph (c)(1) includes the making of any appropriate correlative adjustments (avoiding, to the extent possible, the

duplication or omission of any item of income, gain, loss, deduction, or basis).

(2) *Examples.* The following examples illustrate this paragraph (c):

Example 1. Prior to a qualified stock purchase under section 338, target transfers one of its assets to a related party. The purchasing corporation then purchases the target stock and also purchases the transferred asset from the related party. After its purchase of target, the purchasing corporation and target are members of the same affiliated group. A section 338 election is made. Under an arrangement with the purchaser, the separately transferred asset is used primarily in connection with target's activities. Applying the anti-abuse rule of this paragraph (c), the Commissioner may consider target to own the transferred asset for purposes of applying the residual method under section 338.

Example 2. T owns all the stock of T1. T1 leases intellectual property to T, which T uses in connection with its own activities. P, a purchasing corporation, wishes to buy the T–T1 chain of corporations. P, in connection with its planned purchase of the T stock, contracts to consummate a purchase of all the stock of T1 on March 1 and of all the stock of T on March 2. Section 338 elections are thereafter made for both T and T1. Immediately after the purchases, P, T and T1 are members of the same affiliated group. T continues to lease the intellectual property from T1 and that is the primary use of the intellectual property. Thus, an asset of T, the T1 stock, was removed from T's own assets prior to the qualified stock purchase of the T stock, T1's own assets are used after the deemed asset sale in connection with T's own activities, and the T1 stock is after the deemed asset sale owned by P, a member of the same affiliated group of which T is a member. Applying the anti-abuse rule of this paragraph (c), the Commissioner may, for purposes of application of the residual method under section 338 both to T and to T1, consider P to have bought only the stock of T, with T at the time of the qualified stock purchases of both T and T1 (the qualified stock purchase of T1 being triggered by the deemed sale under section 338 of T's assets) owning T1. The Commissioner accordingly would allocate consideration to T's assets as though the T1 stock were one of those assets, and then allocate consideration within T1 based on the amount allocated to the T1 stock at the T level.

(d) *Next day rule for post-closing transactions.* If a target corporation for which an election under section 338 is made engages in a transaction outside the ordinary course of business on the acquisition date after the event resulting in the qualified stock purchase of the target or a higher tier corporation, the target and all persons related thereto (either before or after the qualified stock purchase) under section 267(b) or section 707 must treat the transaction for all Federal income tax purposes as occurring at the beginning of the day following the transaction and after the deemed purchase by new target.

§ 1.338–2 Nomenclature and definitions; mechanics of the section 338 election.

(a) *Scope.* This section prescribes rules relating to elections under section 338.

(b) *Nomenclature.* For purposes of the regulations under section 338 (except as otherwise provided):

(1) T is a domestic target corporation that has only one class of stock outstanding. Old T refers to T for periods ending on or before the close of T's acquisition date; new T refers to T for subsequent periods.

(2) P is the purchasing corporation.

(3) The P group is an affiliated group of which P is a member.

(4) P1, P2, etc., are domestic corporations that are members of the P group.

(5) T1, T2, etc., are domestic corporations that are target affiliates of T. These corporations (T1, T2, etc.) have only one class of stock outstanding and may also be targets.

(6) S is a domestic corporation (unrelated to P and B) that owns T prior to the purchase of T by P. (S is referred to in cases in which it is appropriate to consider the effects of having all of the outstanding stock of T owned by a domestic corporation.)

(7) A, a U.S. citizen or resident, is an individual (unrelated to P and B) who owns T prior to the purchase of T by P. (A is referred to in cases in which it is appropriate to consider the effects of having all of the outstanding stock of T owned by an individual who is a U.S. citizen or resident. Ownership of T by A and ownership of T by S are mutually exclusive circumstances.)

(8) B, a U.S. citizen or resident, is an individual (unrelated to T, S, and A) who owns the stock of P.

(9) F, used as a prefix with the other terms in this paragraph (b), connotes foreign, rather than domestic, status. For example, FT is a foreign corporation (as defined in section 7701(a)(5)) and FA is an individual other than a U.S. citizen or resident.

(10) CFC, used as a prefix with the other terms in this paragraph (b) referring to a corporation, connotes a controlled foreign corporation (as defined in section 957, taking into account section 953(c)). A corporation identified with the prefix F may be a controlled foreign corporation. (The prefix CFC is used when the corporation's status as a controlled foreign corporation is significant.)

(c) *Definitions.* For purposes of the regulations under section 338 (except as otherwise provided):

(1) *Acquisition date.* The term *acquisition date* has the same meaning as in section 338(h)(2).

(2) *Acquisition date assets. Acquisition date assets* are the assets of the target held at the beginning of the day after the acquisition date (but see § 1.338–1(d) (regarding certain transactions on the acquisition date)).

(3) *Affiliated group.* The term *affiliated group* has the same meaning as in section 338(h)(5). Corporations are affiliated on any day they are members of the same affiliated group.

(4) *Common parent.* The term *common parent* has the same meaning as in section 1504.

(5) *Consistency period.* The *consistency period* is the period described in section 338(h)(4)(A) unless extended pursuant to § 1.338–8(j)(1).

(6) *Deemed asset sale.* The *deemed asset sale* is the transaction described in § 1.338–1(a)(1) that is deemed to occur for purposes of subtitle A of the Internal Revenue Code if a section 338 election is made.

(7) *Deemed sale tax consequences. Deemed sale tax consequences* refers to, in the aggregate, the Federal income tax consequences (generally, the income, gain, deduction, and loss) of the deemed asset sale. Deemed sale tax consequences also refers to the Federal income tax consequences of the transfer of a particular asset in the deemed asset sale.

(8) *Deemed sale return.* The *deemed sale return* is the return on which target's deemed sale tax consequences are reported that does not include any other items of target. Target files a deemed sale return when a section 338 election (but not a section 338(h)(10) election) is filed for target and target is a member of a selling group (defined in paragraph (c)(16) of this section) that files a consolidated return for the period that includes the acquisition date. See § 1.338–10. If target is an S corporation for the period that ends on the day before the acquisition date and a section 338 election (but not a section 338(h)(10) election) is filed for target, see § 1.338–10(a)(3).

(9) *Domestic corporation.* A *domestic corporation* is a corporation—

(i) That is domestic within the meaning of section 7701(a)(4) or that is treated as domestic for purposes of subtitle A of the Internal Revenue Code (e.g., to which an election under section 953(d) or 1504(d) applies); and

(ii) That is not a DISC, a corporation described in section 1248(e), or a corporation to which an election under section 936 applies.

(10) *Old target's final return. Old target's final return* is the income tax return of old target for the taxable year ending at the close of the acquisition date that includes the deemed sale tax

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consequences. However, if a deemed sale return is filed for old target, the deemed sale return is considered old target's final return.

(11) *Purchasing corporation.* The term *purchasing corporation* has the same meaning as in section 338(d)(1). The purchasing corporation may also be referred to as purchaser. Unless otherwise provided, any reference to the purchasing corporation is a reference to all members of the affiliated group of which the purchasing corporation is a member. See sections 338(h)(5) and (8). Also, unless otherwise provided, any reference to the purchasing corporation is, with respect to a deemed purchase of stock under section 338(a)(2), a reference to new target with respect to its own deemed purchase of stock in another target.

(12) *Qualified stock purchase.* The term *qualified stock purchase* has the same meaning as in section 338(d)(3).

(13) *Related persons.* Two persons are related if stock in a corporation owned by one of the persons would be attributed under section 318(a) (other than section 318(a)(4)) to the other.

(14) *Section 338 election.* A *section 338 election* is an election to apply section 338(a) to target. A section 338 election is made by filing a statement of section 338 election pursuant to paragraph (d) of this section. The form on which this statement is filed is referred to in the regulations under section 338 as the Form 8023, ''Elections Under Section 338 For Corporations Making Qualified Stock Purchases.''

(15) *Section 338(h)(10) election.* A *section 338(h)(10) election* is an election to apply section 338(h)(10) to target. A section 338(h)(10) election is made by making a joint election for target under § 1.338(h)(10)–1 on Form 8023.

(16) *Selling group.* The *selling group* is the affiliated group (as defined in section 1504) eligible to file a consolidated return that includes target for the taxable period in which the acquisition date occurs. However, a selling group is not an affiliated group of which target is the common parent on the acquisition date.

(17) *Target; old target; new target. Target* is the target corporation as defined in section 338(d)(2). *Old target* refers to target for periods ending on or before the close of target's acquisition date. *New target* refers to target for subsequent periods.

(18) *Target affiliate.* The term *target affiliate* has the same meaning as in section 338(h)(6) (applied without section 338(h)(6)(B)(i)). Thus, a corporation described in section 338(h)(6)(B)(i) is considered a target affiliate for all purposes of section 338. If a target affiliate is acquired in a qualified stock purchase, it is also a target.

(19) *12-month acquisition period.* The *12-month acquisition period* is the period described in section 338(h)(1), unless extended pursuant to § 1.338–8(j)(2).

(d) *Time and manner of making election.* The purchasing corporation makes a section 338 election for target by filing a statement of section 338 election on Form 8023 in accordance with the instructions to the form. The section 338 election must be made not later than the 15th day of the 9th month beginning after the month in which the acquisition date occurs. A section 338 election is irrevocable. See § 1.338(h)(10)–1(c)(2) for section 338(h)(10) elections.

(e) *Special rules for foreign corporations or DISCs*—(1) *Elections by certain foreign purchasing corporations*—(i) *General rule.* A qualifying foreign purchasing corporation is not required to file a statement of section 338 election for a qualifying foreign target before the earlier of 3 years after the acquisition date and the 180th day after the close of the purchasing corporation's taxable year within which a triggering event occurs.

(ii) *Qualifying foreign purchasing corporation.* A purchasing corporation is a *qualifying foreign purchasing corporation* only if, during the acquisition period of a qualifying foreign target, all the corporations in the purchasing corporation's affiliated group are foreign corporations that are not subject to United States tax.

(iii) *Qualifying foreign target.* A target is a *qualifying foreign target* only if target and its target affiliates are foreign corporations that, during target's acquisition period, are not subject to United States tax (and will not become subject to United States tax during such period because of a section 338 election). A target affiliate is taken into account for purposes of the preceding sentence only if, during target's 12-month acquisition period, it is or becomes a member of the affiliated group that includes the purchasing corporation.

(iv) *Triggering event.* A *triggering event* occurs in the taxable year of the qualifying foreign purchasing corporation in which either that corporation or any corporation in its affiliated group becomes subject to United States tax.

(v) *Subject to United States tax.* For purposes of this paragraph (e)(1), a foreign corporation is considered subject to United States tax—

(A) For the taxable year for which that corporation is required under § 1.6012–2(g) (other than § 1.6012–2(g)(2)(i)(B)(*2*)) to file a United States income tax return; or

(B) For the period during which that corporation is a controlled foreign corporation, a passive foreign investment company for which an election under section 1295 is in effect, a foreign investment company, or a foreign corporation the stock ownership of which is described in section 552(a)(2).

(2) *Acquisition period.* For purposes of this paragraph (e), the term *acquisition period* means the period beginning on the first day of the 12-month acquisition period and ending on the acquisition date.

(3) *Statement of section 338 election may be filed by United States shareholders in certain cases.* The United States shareholders (as defined in section 951(b)) of a foreign purchasing corporation that is a controlled foreign corporation (as defined in section 957 (taking into account section 953(c))) may file a statement of section 338 election on behalf of the purchasing corporation if the purchasing corporation is not required under § 1.6012–2(g) (other than § 1.6012–2(g)(2)(i)(B)(*2*)) to file a United States income tax return for its taxable year that includes the acquisition date. Form 8023 must be filed as described in the form and its instructions and also must be attached to the Form 5471, ''Information Returns Of U.S. Persons With Respect To Certain Foreign Corporations,'' filed with respect to the purchasing corporation by each United States shareholder for the purchasing corporation's taxable year that includes the acquisition date (or, if paragraph (e)(1)(i) of this section applies to the election, for the purchasing corporation's taxable year within which it becomes a controlled foreign corporation). The provisions of § 1.964–1(c) (including § 1.964–1(c)(7)) do not apply to an election made by the United States shareholders.

(4) *Notice requirement for U.S. persons holding stock in foreign target*—(i) *General rule.* If a target subject to a section 338 election was a controlled foreign corporation, a passive foreign investment company, or a foreign personal holding company at any time during the portion of its taxable year that ends on its acquisition date, the purchasing corporation must deliver written notice of the election (and a copy of Form 8023, its attachments and instructions) to—

(A) Each U.S. person (other than a member of the affiliated group of which the purchasing corporation is a member (the purchasing group member)) that, on the acquisition date of the foreign target, holds stock in the foreign target; and

(B) Each U.S. person (other than a purchasing group member) that sells stock in the foreign target to a purchasing group member during the foreign target's 12-month acquisition period.

(ii) *Limitation.* The notice requirement of this paragraph (e)(4) applies only where the section 338 election for the foreign target affects income, gain, loss, deduction, or credit of the U.S. person described in paragraph (e)(4)(i) of this section under section 551, 951, 1248, or 1293.

(iii) *Form of notice.* The notice to U.S. persons must be identified prominently as a notice of section 338 election and must—

(A) Contain the name, address, and employer identification number (if any) of, and the country (and, if relevant, the lesser political subdivision) under the laws of which are organized the purchasing corporation and the relevant target (i.e., the target the stock of which the particular U.S. person held or sold under the circumstances described in paragraph (e)(4)(i) of this section);

(B) Identify those corporations as the purchasing corporation and the foreign target, respectively; and

(C) Contain the following declaration (or a substantially similar declaration):

THIS DOCUMENT SERVES AS NOTICE OF AN ELECTION UNDER SECTION 338 FOR THE ABOVE CITED FOREIGN TARGET THE STOCK OF WHICH YOU EITHER HELD OR SOLD UNDER THE CIRCUMSTANCES DESCRIBED IN TREASURY REGULATIONS SECTION 1.338–2(e)(4). FOR POSSIBLE UNITED STATES FEDERAL INCOME TAX CONSEQUENCES UNDER SECTION 551, 951, 1248, OR 1293 OF THE INTERNAL REVENUE CODE OF 1986 THAT MAY APPLY TO YOU, SEE TREASURY REGULATIONS SECTION 1.338–9(b). YOU MAY BE REQUIRED TO ATTACH THE INFORMATION ATTACHED TO THIS NOTICE TO CERTAIN RETURNS.

(iv) *Timing of notice.* The notice required by this paragraph (e)(4) must be delivered to the U.S. person on or before the later of the 120th day after the acquisition date of the particular target or the day on which Form 8023 is filed. The notice is considered delivered on the date it is mailed to the proper address (or an address similar enough to complete delivery), unless the date it is mailed cannot be reasonably determined. The date of mailing will be determined under the rules of section 7502. For example, the date of mailing is the date of U.S. postmark or the applicable date recorded or marked by a designated delivery service.

(v) *Consequence of failure to comply.* A statement of section 338 election is not valid if timely notice is not given to one or more U.S. persons described in this paragraph (e)(4). If the form of notice fails to comply with all requirements of this paragraph (e)(4), the section 338 election is valid, but the waiver rule of § 1.338–10(b)(1) does not apply.

(vi) *Good faith effort to comply.* The purchasing corporation will be considered to have complied with this paragraph (e)(4), even though it failed to provide notice or provide timely notice to each person described in this paragraph (e)(4), if the Commissioner determines that the purchasing corporation made a good faith effort to identify and provide timely notice to those U.S. persons.

§ 1.338–3 Qualification for the section 338 election.

(a) *Scope.* This section provides rules on whether certain acquisitions of stock are qualified stock purchases and on other miscellaneous issues under section 338.

(b) *Rules relating to qualified stock purchases*—(1) *Purchasing corporation requirement.* An individual cannot make a qualified stock purchase of target. Section 338(d)(3) requires, as a condition of a qualified stock purchase, that a corporation purchase the stock of target. If an individual forms a corporation (new P) to acquire target stock, new P can make a qualified stock purchase of target if new P is considered for tax purposes to purchase the target stock. Facts that may indicate that new P does not purchase the target stock include new P's merging downstream into target, liquidating, or otherwise disposing of the purported qualified stock purchase.

(2) *Purchase.* The term *purchase* has the same meaning as in section 338(h)(3). Stock in a target (or target affiliate) may be considered purchased if, under general principles of tax law, the purchasing corporation is considered to own stock of the target (or target affiliate) meeting the requirements of section 1504(a)(2), notwithstanding that no amount may be paid for (or allocated to) the stock.

(3) *Acquisitions of stock from related corporations*—(i) *In general.* Stock acquired by a purchasing corporation from a related corporation (R) is generally not considered acquired by purchase. See section 338(h)(3)(A)(iii).

(ii) *Time for testing relationship.* For purposes of section 338(h)(3)(A)(iii), a purchasing corporation is treated as related to another person if the relationship specified in section 338(h)(3)(A)(iii) exists—

(A) In the case of a single transaction, immediately after the purchase of target stock;

(B) In the case of a series of acquisitions otherwise constituting a qualified stock purchase within the meaning of section 338(d)(3), immediately after the last acquisition in such series; and

(C) In the case of a series of transactions effected pursuant to an integrated plan to dispose of target stock, immediately after the last transaction in such series.

(iii) *Cases where section 338(h)(3)(C) applies—acquisitions treated as purchases.* If section 338(h)(3)(C) applies and the purchasing corporation is treated as acquiring stock by purchase from R, solely for purposes of determining when the stock is considered acquired, target stock acquired from R is considered to have been acquired by the purchasing corporation on the day on which the purchasing corporation is first considered to own that stock under section 318(a) (other than section 318(a)(4)).

(iv) *Examples.* The following examples illustrate this paragraph (b)(3):

Example 1. (i) S is the parent of a group of corporations that are engaged in various businesses. Prior to January 1, Year 1, S decided to discontinue its involvement in one line of business. To accomplish this, S forms a new corporation, Newco, with a nominal amount of cash. Shortly thereafter, on January 1, Year 1, S transfers all the stock of the subsidiary conducting the unwanted business (T) to Newco in exchange for 100 shares of Newco common stock and a Newco promissory note. Prior to January 1, Year 1, S and Underwriter (U) had entered into a binding agreement pursuant to which U would purchase 60 shares of Newco common stock from S and then sell those shares in an Initial Public Offering (IPO). On January 6, Year 1, the IPO closes.

(ii) Newco's acquisition of T stock is one of a series of transactions undertaken pursuant to one integrated plan. The series of transactions ends with the closing of the IPO and the transfer of all the shares of stock in accordance with the agreements. Immediately after the last transaction effected pursuant to the plan, S owns 40 percent of Newco, which does not give rise to a relationship described in section 338(h)(3)(A)(iii). See § 1.338–2(b)(3)(ii)(C). Accordingly, S and Newco are not related for purposes of section 338(h)(3)(A)(iii).

(iii) Further, because Newco's basis in the T stock is not determined by reference to S's basis in the T stock and because the transaction is not an exchange to which section 351, 354, 355, or 356 applies, Newco's acquisition of the T stock is a

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purchase within the meaning of section 338(h)(3).

Example 2. (i) On January 1 of Year 1, P purchases 75 percent in value of the R stock. On that date, R owns 4 of the 100 shares of T stock. On June 1 of Year 1, R acquires an additional 16 shares of T stock. On December 1 of Year 1, P purchases 70 shares of T stock from an unrelated person and 12 of the 20 shares of T stock held by R.

(ii) Of the 12 shares of T stock purchased by P from R on December 1 of Year 1, 3 of those shares are deemed to have been acquired by P on January 1 of Year 1, the date on which 3 of the 4 shares of T stock held by R on that date were first considered owned by P under section 318(a)(2)(C) (i.e., $4 \times .75$). The remaining 9 shares of T stock purchased by P from R on December 1 of Year 1 are deemed to have been acquired by P on June 1 of Year 1, the date on which an additional 12 of the 20 shares of T stock owned by R on that date were first considered owned by P under section 318(a)(2)(C) (i.e., $(20 \times .75) - 3$). Because stock acquisitions by P sufficient for a qualified stock purchase of T occur within a 12-month period (i.e., 3 shares constructively on January 1 of Year 1, 9 shares constructively on June 1 of Year 1, and 70 shares actually on December 1 of Year 1), a qualified stock purchase is made on December 1 of Year 1.

Example 3. (i) On February 1 of Year 1, P acquires 25 percent in value of the R stock from B (the sole shareholder of P). That R stock is not acquired by purchase. See section 338(h)(3)(A)(iii). On that date, R owns 4 of the 100 shares of T stock. On June 1 of Year 1, P purchases an additional 25 percent in value of the R stock, and on January 1 of Year 2, P purchases another 25 percent in value of the R stock. On June 1 of Year 2, R acquires an additional 16 shares of the T stock. On December 1 of Year 2, P purchases 68 shares of the T stock from an unrelated person and 12 of the 20 shares of the T stock held by R.

(ii) Of the 12 shares of the T stock purchased by P from R on December 1 of Year 2, 2 of those shares are deemed to have been acquired by P on June 1 of Year 1, the date on which 2 of the 4 shares of the T stock held by R on that date were first considered owned by P under section 318(a)(2)(C) (i.e., $4 \times .5$). For purposes of this attribution, the R stock need not be acquired by P by purchase. See section 338(h)(1). (By contrast, the acquisition of the T stock by P from R does not qualify as a purchase unless P has acquired at least 50 percent in value of the R stock by purchase. Section 338(h)(3)(C)(i).) Of the remaining 10 shares of the T stock purchased by P from R on December 1 of Year 2, 1 of those shares is deemed to have been acquired by P on January 1 of Year 2, the date on which an additional 1 share of the 4 shares of the T stock held by R on that date was first considered owned by P under section 318(a)(2)(C) (i.e., $(4 \times .75) - 2$). The remaining 9 shares of the T stock purchased by P from R on December 1 of Year 2, are deemed to have been acquired by P on June 1 of Year 2, the date on which an additional 12 shares of the T stock held by R on that date were first considered owned by P under section 318(a)(2)(C) (i.e., $(20 \times .75) - 3$). Because a qualified stock purchase of T by P is made on December 1 of Year 2 only if all 12 shares of the T stock purchased by P from R on that date are considered acquired during a 12-month period ending on that date (so that, in conjunction with the 68 shares of the T stock P purchased on that date from the unrelated person, 80 of T's 100 shares are acquired by P during a 12-month period) and because 2 of those 12 shares are considered to have been acquired by P more than 12 months before December 1 of Year 2 (i.e., on June 1 of Year 1), a qualified stock purchase is not made. (Under § 1.338–8(j)(2), for purposes of applying the consistency rules, P is treated as making a qualified stock purchase of T if, pursuant to an arrangement, P purchases T stock satisfying the requirements of section 1504(a)(2) over a period of more than 12 months.)

Example 4. Assume the same facts as in *Example 3,* except that on February 1 of Year 1, P acquires 25 percent in value of the R stock by purchase. The result is the same as in *Example 3.*

(4) *Acquisition date for tiered targets*—(i) *Stock sold in deemed asset sale.* If an election under section 338 is made for target, old target is deemed to sell target's assets and new target is deemed to acquire those assets. Under section 338(h)(3)(B), new target's deemed purchase of stock of another corporation is a purchase for purposes of section 338(d)(3) on the acquisition date of target. If new target's deemed purchase causes a qualified stock purchase of the other corporation and if a section 338 election is made for the other corporation, the acquisition date for the other corporation is the same as the acquisition date of target. However, the deemed sale and purchase of the other corporation's assets is considered to take place after the deemed sale and purchase of target's assets.

(ii) *Example.* The following example illustrates this paragraph (b)(4):

Example. A owns all of the T stock. T owns 50 of the 100 shares of X stock. The other 50 shares of X stock are owned by corporation Y, which is unrelated to A, T, or P. On January 1 of Year 1, P makes a qualified stock purchase of T from A and makes a section 338 election for T. On December 1 of Year 1, P purchases the 50 shares of X stock held by Y. A qualified stock purchase of X is made on December 1 of Year 1, because the deemed purchase of 50 shares of X stock by new T because of the section 338 election for T and the actual purchase of 50 shares of X stock by P are treated as purchases made by one corporation. Section 338(h)(8). For purposes of determining whether those purchases occur within a 12-month acquisition period as required by section 338(d)(3), T is deemed to purchase its X stock on T's acquisition date, i.e., January 1 of Year 1.

(5) *Effect of redemptions*—(i) *General rule.* Except as provided in this paragraph (b)(5), a qualified stock purchase is made on the first day on which the percentage ownership requirements of section 338(d)(3) are satisfied by reference to target stock that is both—

(A) Held on that day by the purchasing corporation; and

(B) Purchased by the purchasing corporation during the 12-month period ending on that day.

(ii) *Redemptions from persons unrelated to the purchasing corporation.* Target stock redemptions from persons unrelated to the purchasing corporation that occur during the 12-month acquisition period are taken into account as reductions in target's outstanding stock for purposes of determining whether target stock purchased by the purchasing corporation in the 12-month acquisition period satisfies the percentage ownership requirements of section 338(d)(3).

(iii) *Redemptions from the purchasing corporation or related persons during 12-month acquisition period*—(A) *General rule.* For purposes of the percentage ownership requirements of section 338(d)(3), a redemption of target stock during the 12-month acquisition period from the purchasing corporation or from any person related to the purchasing corporation is not taken into account as a reduction in target's outstanding stock.

(B) *Exception for certain redemptions from related corporations.* A redemption of target stock during the 12-month acquisition period from a corporation related to the purchasing corporation is taken into account as a reduction in target's outstanding stock to the extent that the redeemed stock would have been considered purchased by the purchasing corporation (because of section 338(h)(3)(C)) during the 12-month acquisition period if the redeemed stock had been acquired by the purchasing corporation from the related corporation on the day of the redemption. See paragraph (b)(3) of this section.

(iv) *Examples.* The following examples illustrate this paragraph (b)(5):

Example 1. QSP on stock purchase date; redemption from unrelated person during 12-month period. A owns all 100 shares of T stock. On January 1 of Year 1, P purchases 40 shares of the T stock from A. On July 1 of Year 1, T redeems 25 shares from A. On December 1 of Year 1, P purchases 20 shares of the T stock from A. P makes a qualified stock purchase of T on December 1 of Year 1, because the 60 shares of T stock purchased by P within the 12-month period ending on that date satisfy the 80-percent ownership requirements of section 338(d)(3) (i.e., 60/75 shares), determined by taking into account the redemption of 25 shares.

Example 2. QSP on stock redemption date; redemption from unrelated person during 12-month period. The facts are the same as in *Example 1,* except that P purchases 60 shares of T stock on January 1 of Year 1 and none on December 1 of Year 1. P makes a qualified stock purchase of T on July 1 of Year 1, because that is the first day on which the T stock purchased by P within the preceding 12-month period satisfies the 80-percent ownership requirements of section 338(d)(3) (i.e., 60/75 shares), determined by taking into account the redemption of 25 shares.

Example 3. Redemption from purchasing corporation not taken into account. On December 15 of Year 1, T redeems 30 percent of its stock from P. The redeemed stock was held by P for several years and constituted P's total interest in T. On December 1 of Year 2, P purchases the remaining T stock from A. P does not make a qualified stock purchase of T on December 1 of Year 2. For purposes of the 80-percent ownership requirements of section 338(d)(3), the redemption of P's T stock on December 15 of Year 1 is not taken into account as a reduction in T's outstanding stock.

Example 4. Redemption from related person taken into account. On January 1 of Year 1, P purchases 60 of the 100 shares of X stock. On that date, X owns 40 of the 100 shares of T stock. On April 1 of Year 1, T redeems X's T stock and P purchases the remaining 60 shares of T stock from an unrelated person. For purposes of the 80-percent ownership requirements of section 338(d)(3), the redemption of the T stock from X (a person related to P) is taken into account as a reduction in T's outstanding stock. If P had purchased the 40 redeemed shares from X on April 1 of Year 1, all 40 of the shares would have been considered purchased (because of section 338(h)(3)(C)(i)) during the 12-month period ending on April 1 of Year 1 (24 of the 40 shares would have been considered purchased by P on January 1 of Year 1 and the remaining 16 shares would have been considered purchased by P on April 1 of Year 1). See paragraph (b)(3) of this section. Accordingly, P makes a qualified stock purchase of T on April 1 of Year 1, because the 60 shares of T stock purchased by P on that date satisfy the 80-percent ownership requirements of section 338(d)(3) (i.e., 60/60 shares), determined by taking into account the redemption of 40 shares.

(c) *Effect of post-acquisition events on eligibility for section 338 election*—(1) *Post-acquisition elimination of target.* (i) The purchasing corporation may make an election under section 338 for target even though target is liquidated on or after the acquisition date. If target liquidates on the acquisition date, the liquidation is considered to occur on the following day and immediately after new target's deemed purchase of assets. The purchasing corporation may also make an election under section 338 for target even though target is merged into another corporation, or otherwise disposed of by the purchasing corporation provided that, under the facts and circumstances, the purchasing corporation is considered for tax purposes as the purchaser of the target stock.

(ii) The following examples illustrate this paragraph (c)(1):

Example 1. On January 1 of Year 1, P purchases 100 percent of the outstanding common stock of T. On June 1 of Year 1, P sells the T stock to an unrelated person. Assuming that P is considered for tax purposes as the purchaser of the T stock, P remains eligible, after June 1 of Year 1, to make a section 338 election for T that results in a deemed asset sale of T's assets on January 1 of Year 1.

Example 2. On January 1 of Year 1, P makes a qualified stock purchase of T. On that date, T owns the stock of T1. On March 1 of Year 1, T sells the T1 stock to an unrelated person. On April 1 of Year 1, P makes a section 338 election for T. Notwithstanding that the T1 stock was sold on March 1 of Year 1, the section 338 election for T on April 1 of Year 1 results in a qualified stock purchase by T of T1 on January 1 of Year 1. See paragraph (b)(4)(i) of this section.

(2) *Post-acquisition elimination of the purchasing corporation.* An election under section 338 may be made for target after the acquisition of assets of the purchasing corporation by another corporation in a transaction described in section 381(a), provided that the purchasing corporation is considered for tax purposes as the purchaser of the target stock. The acquiring corporation in the section 381(a) transaction may make an election under section 338 for target.

(d) *Consequences of post-acquisition elimination of target where section 338 election not made*—(1) *Scope.* The rules of this paragraph (d) apply to the transfer of target assets to the purchasing corporation (or another member of the same affiliated group as the purchasing corporation) (the transferee) following a qualified stock purchase of target stock, if the purchasing corporation does not make a section 338 election for target. Notwithstanding the rules of this paragraph (d), section 354(a) (and so much of section 356 as relates to section 354) cannot apply to any person other than the purchasing corporation or another member of the same affiliated group as the purchasing corporation unless the transfer of target assets is pursuant to a reorganization as determined without regard to this paragraph (d).

(2) *Continuity of interest.* By virtue of section 338, in determining whether the continuity of interest requirement of § 1.368–1(b) is satisfied on the transfer of assets from target to the transferee, the purchasing corporation's target stock acquired in the qualified stock purchase represents an interest on the part of a person who was an owner of the target's business enterprise prior to the transfer that can be continued in a reorganization.

(3) *Control requirement.* By virtue of section 338, the acquisition of target stock in the qualified stock purchase will not prevent the purchasing corporation from qualifying as a shareholder of the target transferor for the purpose of determining whether, immediately after the transfer of target assets, a shareholder of the transferor is in control of the corporation to which the assets are transferred within the meaning of section 368(a)(1)(D).

(4) *Solely for voting stock requirement.* By virtue of section 338, the acquisition of target stock in the qualified stock purchase for consideration other than voting stock will not prevent the subsequent transfer of target assets from satisfying the solely for voting stock requirement for purposes of determining if the transfer of target assets qualifies as a reorganization under section 368(a)(1)(C).

(5) *Example.* The following example illustrates this paragraph (d):

Example. (i) *Facts.* P, T, and X are domestic corporations. T and X each operate a trade or business. A and K, individuals unrelated to P, own 85 and 15 percent, respectively, of the stock of T. P owns all of the stock of X. The total adjusted basis of T's property exceeds the sum of T's liabilities plus the amount of liabilities to which T's property is subject. P purchases all of A's T stock for cash in a qualified stock purchase. P does not make an election under section 338(g) with respect to its acquisition of T stock. Shortly after the acquisition date, and as part of the same plan, T merges under applicable state law into X in a transaction that, but for the question of continuity of interest, satisfies all the requirements of section 368(a)(1)(A). In the merger, all of T's assets are transferred to X. P and K receive X stock in exchange for their T stock. P intends to retain the stock of X indefinitely.

(ii) *Status of transfer as a reorganization.* By virtue of section 338, for the purpose of determining whether the continuity of interest requirement of § 1.368–1(b) is satisfied, P's T stock acquired in the qualified stock purchase represents an interest on the part of a person who was an owner of T's business enterprise prior to the transfer that can be continued in a reorganization through P's continuing ownership of X. Thus, the continuity of interest requirement is satisfied and the merger of T into X is a reorganization within the meaning of section 368(a)(1)(A). Moreover, by virtue of section 338, the requirement of section 368(a)(1)(D) that a target shareholder control the transferee immediately after the transfer is satisfied because P controls X immediately after the transfer. In addition, all of T's assets are transferred to X in the merger and P and K

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receive the X stock exchanged therefor in pursuance of the plan of reorganization. Thus, the merger of T into X is also a reorganization within the meaning of section 368(a)(1)(D).

(iii) *Treatment of T and X.* Under section 361(a), T recognizes no gain or loss in the merger. Under section 362(b), X's basis in the assets received in the merger is the same as the basis of the assets in T's hands. X succeeds to and takes into account the items of T as provided in section 381.

(iv) *Treatment of P.* By virtue of section 338, the transfer of T assets to X is a reorganization. Pursuant to that reorganization, P exchanges its T stock solely for stock of X, a party to the reorganization. Because P is the purchasing corporation, section 354 applies to P's exchange of T stock for X stock in the merger of T into X. Thus, P recognizes no gain or loss on the exchange. Under section 358, P's basis in the X stock received in the exchange is the same as the basis of P's T stock exchanged therefor.

(v) *Treatment of K.* Because K is not the purchasing corporation (or an affiliate thereof), section 354 cannot apply to K's exchange of T stock for X stock in the merger of T into X unless the transfer of T's assets is pursuant to a reorganization as determined without regard to this paragraph (d). Under general principles of tax law applicable to reorganizations, the continuity of interest requirement is not satisfied because P's stock purchase and the merger of T into X are pursuant to an integrated transaction in which A, the owner of 85 percent of the stock of T, received solely cash in exchange for A's T stock. See, e.g., § 1.368–1(e)(1)(i); *Yoc Heating* v. *Commissioner,* 61 T.C. 168 (1973); *Kass* v. *Commissioner,* 60 T.C. 218 (1973), aff'd, 491 F.2d 749 (3d Cir. 1974). Thus, the requisite continuity of interest under § 1.368–1(b) is lacking and section 354 does not apply to K's exchange of T stock for X stock. K recognizes gain or loss, if any, pursuant to section 1001(c) with respect to its T stock.

§ 1.338–4 Aggregate deemed sale price; various aspects of taxation of the deemed asset sale.

(a) *Scope.* This section provides rules under section 338(a)(1) to determine the aggregate deemed sale price (ADSP) for target. ADSP is the amount for which old target is deemed to have sold all of its assets in the deemed asset sale. ADSP is allocated among target's assets in accordance with § 1.338–6 to determine the amount for which each asset is deemed to have been sold. When a subsequent increase or decrease is required under general principles of tax law with respect to an element of ADSP, the redetermined ADSP is allocated among target's assets in accordance with § 1.338–7. This § 1.338–4 also provides rules regarding the recognition of gain or loss on the deemed sale of target affiliate stock. Notwithstanding section 338(h)(6)(B)(ii), stock held by a target affiliate in a foreign corporation or in a corporation that is a DISC or that is described in section 1248(e) is not excluded from the operation of section 338.

(b) *Determination of ADSP*—(1) *General rule.* ADSP is the sum of—

(i) The grossed-up amount realized on the sale to the purchasing corporation of the purchasing corporation's recently purchased target stock (as defined in section 338(b)(6)(A)); and

(ii) The liabilities of old target.

(2) *Time and amount of ADSP*—(i) *Original determination.* ADSP is initially determined at the beginning of the day after the acquisition date of target. General principles of tax law apply in determining the timing and amount of the elements of ADSP.

(ii) *Redetermination of ADSP.* ADSP is redetermined at such time and in such amount as an increase or decrease would be required, under general principles of tax law, for the elements of ADSP. For example, ADSP is redetermined because of an increase or decrease in the amount realized for recently purchased stock or because liabilities not originally taken into account in determining ADSP are subsequently taken into account. Increases or decreases with respect to the elements of ADSP result in the reallocation of ADSP among target's assets under § 1.338–7.

(iii) *Example.* The following example illustrates this paragraph (b)(2):

Example. In Year 1, T, a manufacturer, purchases a customized delivery truck from X with purchase money indebtedness having a stated principal amount of $100,000. P acquires all of the stock of T in Year 3 for $700,000 and makes a section 338 election for T. Assume T has no liabilities other than its purchase money indebtedness to X. In Year 4, when T is neither insolvent nor in a title 11 case, T and X agree to reduce the amount of the purchase money indebtedness to $80,000. Assume further that the reduction would be a purchase price reduction under section 108(e)(5). T and X's agreement to reduce the amount of the purchase money indebtedness would not, under general principles of tax law that would apply if the deemed asset sale had actually occurred, change the amount of liabilities of old target taken into account in determining its amount realized. Accordingly, ADSP is not redetermined at the time of the reduction. See § 1.338–5(b)(2)(iii) *Example 1* for the effect on AGUB.

(c) *Grossed-up amount realized on the sale to the purchasing corporation of the purchasing corporation's recently purchased target stock*—(1) *Determination of amount.* The grossed-up amount realized on the sale to the purchasing corporation of the purchasing corporation's recently purchased target stock is an amount equal to—

(i) The amount realized on the sale to the purchasing corporation of the purchasing corporation's recently purchased target stock determined as if the selling shareholder(s) were required to use old target's accounting methods and characteristics and the installment method were not available and determined without regard to the selling costs taken into account under paragraph (c)(1)(iii) of this section;

(ii) Divided by the percentage of target stock (by value, determined on the acquisition date) attributable to that recently purchased target stock;

(iii) Less the selling costs incurred by the selling shareholders in connection with the sale to the purchasing corporation of the purchasing corporation's recently purchased target stock that reduce their amount realized on the sale of the stock (e.g., brokerage commissions and any similar costs to sell the stock).

(2) *Example.* The following example illustrates this paragraph (c):

Example. T has two classes of stock outstanding, voting common stock and preferred stock described in section 1504(a)(4). On March 1 of Year 1, P purchases 40 percent of the outstanding T stock from S1 for $500, 20 percent of the outstanding T stock from S2 for $225, and 20 percent of the outstanding T stock from S3 for $275. On that date, the fair market value of all the T voting common stock is $1,250 and the preferred stock $750. S1, S2, and S3 incur $40, $35, and $25 respectively of selling costs. S1 continues to own the remaining 20 percent of the outstanding T stock. The grossed-up amount realized on the sale to P of P's recently purchased T stock is calculated as follows: The total amount realized (without regard to selling costs) is $1,000 (500 + 225 + 275). The percentage of T stock by value on the acquisition date attributable to the recently purchased T stock is 50% (1,000/(1,250 + 750)). The selling costs are $100 (40 + 35 + 25). The grossed-up amount realized is $1,900 (1,000/.5 − 100).

(d) *Liabilities of old target*—(1) *In general.* In general, the liabilities of old target are measured as of the beginning of the day after the acquisition date. (But see § 1.338–1(d) (regarding certain transactions on the acquisition date).) In order to be taken into account in ADSP, a liability must be a liability of target that is properly taken into account in amount realized under general principles of tax law that would apply if old target had sold its assets to an unrelated person for consideration that included the discharge of its liabilities. See § 1.1001–2(a). Such liabilities may include liabilities for the tax consequences resulting from the deemed sale.

(2) *Time and amount of liabilities.* The time for taking into account liabilities of old target in determining

ADSP and the amount of the liabilities taken into account is determined as if old target had sold its assets to an unrelated person for consideration that included the discharge of the liabilities by the unrelated person. For example, if no amount of a target liability is properly taken into account in amount realized as of the beginning of the day after the acquisition date, the liability is not initially taken into account in determining ADSP (although it may be taken into account at some later date).

(e) *Deemed sale tax consequences.* Gain or loss on each asset in the deemed sale is computed by reference to the ADSP allocated to that asset. ADSP is allocated under the rules of § 1.338–6. Though deemed sale tax consequences may increase or decrease ADSP by creating or reducing a tax liability, the amount of the tax liability itself may be a function of the size of the deemed sale tax consequences. Thus, these determinations may require trial and error computations.

(f) *Other rules apply in determining ADSP.* ADSP may not be applied in such a way as to contravene other applicable rules. For example, a capital loss cannot be applied to reduce ordinary income in calculating the tax liability on the deemed sale for purposes of determining ADSP.

(g) *Examples.* The following examples illustrate this section. For purposes of the examples in this paragraph (g), unless otherwise stated, T is a calendar year taxpayer that files separate returns and that has no loss, tax credit, or other carryovers to Year 1. Depreciation for Year 1 is not taken into account. T has no liabilities other than the Federal income tax liability resulting from the deemed asset sale, and the T shareholders have no selling costs. Assume that T's tax rate for any ordinary income or net capital gain resulting from the deemed sale of assets is 34 percent and that any capital loss is offset by capital gain. On July 1 of Year 1, P purchases all of the stock of T and makes a section 338 election for T. The examples are as follows:

Example 1. One class. (i) On July 1 of Year 1, T's only asset is an item of section 1245 property with an adjusted basis to T of $50,400, a recomputed basis of $80,000, and a fair market value of $100,000. P purchases all of the T stock for $75,000, which also equals the amount realized for the stock determined as if the selling shareholder(s) were required to use old target's accounting methods and characteristics.

(ii) ADSP is determined as follows (for purposes of this section (g), G is the grossed-up amount realized on the sale to P of P's recently purchased T stock, L is T's liabilities other than T's tax liability for the deemed sale tax consequences, T_R is the applicable tax rate, and B is the adjusted basis of the asset deemed sold):

$ADSP = G + L + T_R$ " $(ADSP - B)$

$ADSP = (\$75{,}000/1) + \$0 + .34 \times (ADSP - \$50{,}400)$

$ADSP = \$75{,}000 + .34ADSP - \$17{,}136$

$.66ADSP = \$57{,}864$

$ADSP = \$87{,}672.72$

(iii) Because ADSP for T ($87,672.72) does not exceed the fair market value of T's asset ($100,000), a Class V asset, T's entire ADSP is allocated to that asset. Thus, T's deemed sale results in $37,272.72 of taxable income (consisting of $29,600 of ordinary income and $7,672.72 of capital gain).

(iv) The facts are the same as in paragraph (i) of this *Example 1,* except that on July 1 of Year 1, P purchases only 80 of the 100 shares of T stock for $60,000. The grossed-up amount realized on the sale to P of P's recently purchased T stock (G) is $75,000 ($60,000/.8). Consequently, ADSP and the deemed sale tax consequences are the same as in paragraphs (ii) and (iii) of this *Example 1.*

(v) The facts are the same as in paragraph (i) of this *Example 1,* except that T also has goodwill (a Class VII asset) with an appraised value of $10,000. The results are the same as in paragraphs (ii) and (iii) of this *Example 1.* Because ADSP does not exceed the fair market value of the Class V asset, no amount is allocated to the Class VII asset (goodwill).

Example 2. More than one class. (i) P purchases all of the T stock for $140,000, which also equals the amount realized for the stock determined as if the selling shareholder(s) were required to use old target's accounting methods and characteristics. On July 1 of Year 1, T has liabilities (not including the tax liability for the deemed sale tax consequences) of $50,000, cash (a Class I asset) of $10,000, actively traded securities (a Class II asset) with a basis of $4,000 and a fair market value of $10,000, goodwill (a Class VII asset) with a basis of $3,000, and the following Class V assets:

Asset	*Basis*	*FMV*	*Ratio of asset FMV to total Class V FMV*
Land	$5,000	$35,000	.14
Building	10,000	50,000	.20
Equipment A (Recomputed basis $80,000)	5,000	90,000	.36
Equipment B (Recomputed basis $20,000)	10,000	75,000	.30
Totals	$30,000	$250,000	1.00

(ii) ADSP exceeds $20,000. Thus, $10,000 of ADSP is allocated to the cash and $10,000 to the actively traded securities. The amount allocated to an asset (other than a Class VII asset) cannot exceed its fair market value (however, the fair market value of any property subject to nonrecourse indebtedness is treated as being not less than the amount of such indebtedness; see § 1.338–6(a)(2)). See § 1.338–6(c)(1) (relating to fair market value limitation).

(iii) The portion of ADSP allocable to the Class V assets is preliminarily determined as follows (in the formula, the amount allocated to the Class I assets is referred to as I and the amount allocated to the Class II assets as II):

$ADSP_V = (G - (I + II)) + L + T_R \times [(II - B_{II}) + (ADSP_V - B_V)]$

$ADSP_V = (\$140{,}000 - (\$10{,}000 + \$10{,}000)) + \$50{,}000 + .34 \times [(\$10{,}000 - \$4{,}000) + (ADSP_V - (\$5{,}000 + \$10{,}000 + \$5{,}000 + \$10{,}000))]$

$ADSP_V = \$161{,}840 + .34ADSP_V$

$.66\ ADSP_V = \$161{,}840$

$ADSP_V = \$245{,}212.12$

(iv) Because, under the preliminary calculations of ADSP, the amount to be allocated to the Class I, II, III, IV, V, and VI assets does not exceed their aggregate fair market value, no ADSP amount is allocated to goodwill. Accordingly, the deemed sale of the goodwill results in a capital loss of $3,000. The portion of ADSP allocable to the Class V assets is finally determined by taking into account this loss as follows:

$ADSP_V = (G - (I + II)) + L + T_R \times [(II - B_{II}) + (ADSP_V - B_V) + (ADSP_{VII} - B_{VII})]$

$ADSP_V = (\$140{,}000 - (\$10{,}000 + \$10{,}000)) + \$50{,}000 + .34 \times [(\$10{,}000 - \$4{,}000) + (ADSP_V - \$30{,}000) + (\$0 - \$3{,}000)]$

$ADSP_V = \$160{,}820 + .34ADSP_V$

$.66\ ADSP_V = \$160{,}820$

$ADSP_V = \$243{,}666.67$

(v) The allocation of $ADSP_V$ among the Class V assets is in proportion to their fair market values, as follows:

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Asset	ADSP	Gain
Land	$34,113.33	$29,113.33 (capital gain).
Building	48,733.34	38,733.34 (capital gain).
Equipment A	87,720.00	82,720.00 (75,000 ordinary income 7,720 capital gain).
Equipment B	73,100.00	63,100.00 (10,000 ordinary income 53,100 capital gain).
Totals	243,666.67	213,666.67.

Example 3. More than one class. (i) The facts are the same as in *Example 2,* except that P purchases the T stock for $150,000, rather than $140,000. The amount realized for the stock determined as if the selling shareholder(s) were required to use old target's accounting methods and characteristics is also $150,000.

(ii) As in *Example 2,* ADSP exceeds $20,000. Thus, $10,000 of ADSP is allocated to the cash and $10,000 to the actively traded securities.

(iii) The portion of ADSP allocable to the Class V assets as preliminarily determined under the formula set forth in paragraph (iii) of *Example 2* is $260,363.64. The amount allocated to the Class V assets cannot exceed their aggregate fair market value ($250,000). Thus, preliminarily, the ADSP amount allocated to Class V assets is $250,000.

(iv) Based on the preliminary allocation, the ADSP is determined as follows (in the formula, the amount allocated to the Class I assets is referred to as I, the amount allocated to the Class II assets as II, and the amount allocated to the Class V assets as V):

$ADSP = G + L + T_R \times [(II - B_{II}) + (V - B_V) + (ADSP - (I + II + V + B_{VII}))]$

$ADSP = \$150,000 + \$50,000 + .34 \times [(\$10,000 - \$4,000) + (\$250,000 - \$30,000) + (ADSP - (\$10,000 + \$10,000 + \$250,000 + \$3,000))]$

$ADSP = \$200,000 + .34ADSP - \$15,980$

$.66ADSP = \$184,020$

$ADSP = \$278,818.18$

(v) Because ADSP as determined exceeds the aggregate fair market value of the Class I, II, III, IV, V, and VI assets, the $250,000 amount preliminarily allocated to the Class V assets is appropriate. Thus, the amount of ADSP allocated to Class V assets equals their aggregate fair market value ($250,000), and the allocated ADSP amount for each Class V asset is its fair market value. Further, because there are no Class VI assets, the allocable ADSP amount for the Class VII asset (goodwill) is $8,818.18 (the excess of ADSP over the aggregate ADSP amounts for the Class I, II, III, IV, V and VI assets).

Example 4. Amount allocated to T1 stock. (i) The facts are the same as in *Example 2,* except that T owns all of the T1 stock (instead of the building), and T1's only asset is the building. The T1 stock and the building each have a fair market value of $50,000, and the building has a basis of $10,000. A section 338 election is made for T1 (as well as T), and T1 has no liabilities other than the tax liability for the deemed sale tax consequences. T is the common parent of a consolidated group filing a final consolidated return described in § 1.338–10(a)(1).

(ii) ADSP exceeds $20,000. Thus, $10,000 of ADSP is allocated to the cash and $10,000 to the actively traded securities.

(iii) Because T does not recognize any gain on the deemed sale of the T1 stock under paragraph (h)(2) of this section, appropriate adjustments must be made to reflect accurately the fair market value of the T and T1 assets in determining the allocation of ADSP among T's Class V assets (including the T1 stock). In preliminarily calculating $ADSP_V$ in this case, the T1 stock can be disregarded and, because T owns all of the T1 stock, the T1 asset can be treated as a T asset. Under this assumption, $ADSP_V$ is $243,666.67. See paragraph (iv) of *Example 2.*

(iv) Because the portion of the preliminary ADSP allocable to Class V assets ($243,666.67) does not exceed their fair market value ($250,000), no amount is allocated to Class VII assets for T. Further, this amount ($243,666.67) is allocated among T's Class V assets in proportion to their fair market values. See paragraph (v) of *Example 2.* Tentatively, $48,733.34 of this amount is allocated to the T1 stock.

(v) The amount tentatively allocated to the T1 stock, however, reflects the tax incurred on the deemed sale of the T1 asset equal to $13,169.34 ($.34\times(\$48,733.34 - \$10,000)$). Thus, the ADSP allocable to the Class V assets of T, and the ADSP allocable to the T1 stock, as preliminarily calculated, each must be reduced by $13,169.34. Consequently, these amounts, respectively, are $230,497.33 and $35,564.00. In determining ADSP for T1, the grossed-up amount realized on the deemed sale to new T of new T's recently purchased T1 stock is $35,564.00.

(vi) The facts are the same as in paragraph (i) of this *Example 4,* except that the T1 building has a $12,500 basis and a $62,500 value, all of the outstanding T1 stock has a $62,500 value, and T owns 80 percent of the T1 stock. In preliminarily calculating $ADSP_V$, the T1 stock can be disregarded but, because T owns only 80 percent of the T1 stock, only 80 percent of T1 asset basis and value should be taken into account in calculating T's ADSP. By taking into account 80 percent of these amounts, the remaining calculations and results are the same as in paragraphs (ii), (iii), (iv), and (v) of this *Example 4,* except that the grossed-up amount realized on the sale of the recently purchased T1 stock is $44,455.00 ($35,564.00/0.8).

(h) *Deemed sale of target affiliate stock*—(1) *Scope.* This paragraph (h) prescribes rules relating to the treatment of gain or loss realized on the deemed sale of stock of a target affiliate when a section 338 election (but not a section 338(h)(10) election) is made for the target affiliate. For purposes of this paragraph (h), the definition of domestic corporation in § 1.338–2(c)(9) is applied without the exclusion therein for DISCs, corporations described in section 1248(e), and corporations to which an election under section 936 applies.

(2) *In general.* Except as otherwise provided in this paragraph (h), if a section 338 election is made for target, target recognizes no gain or loss on the deemed sale of stock of a target affiliate having the same acquisition date and for which a section 338 election is made if—

(i) Target directly owns stock in the target affiliate satisfying the requirements of section 1504(a)(2);

(ii) Target and the target affiliate are members of a consolidated group filing a final consolidated return described in § 1.338–10(a)(1); or

(iii) Target and the target affiliate file a combined return under § 1.338–10(a)(4).

(3) *Deemed sale of foreign target affiliate by a domestic target.* A domestic target recognizes gain or loss on the deemed sale of stock of a foreign target affiliate. For the proper treatment of such gain or loss, see, e.g., sections 1246, 1248, 1291 *et seq.*, and 338(h)(16) and § 1.338–9.

(4) *Deemed sale producing effectively connected income.* A foreign target recognizes gain or loss on the deemed sale of stock of a foreign target affiliate to the extent that such gain or loss is effectively connected (or treated as effectively connected) with the conduct of a trade or business in the United States.

(5) *Deemed sale of insurance company target affiliate electing under section 953(d).* A domestic target recognizes gain (but not loss) on the deemed sale of stock of a target affiliate that has in effect an election under section 953(d) in an amount equal to the lesser of the gain realized or the earnings and profits described in section 953(d)(4)(B).

(6) *Deemed sale of DISC target affiliate.* A foreign or domestic target recognizes gain (but not loss) on the deemed sale of stock of a target affiliate that is a DISC or a former DISC (as defined in section 992(a)) in an amount equal to the lesser of the gain realized or the amount of accumulated DISC income determined with respect to such stock under section 995(c). Such gain is

included in gross income as a dividend as provided in sections 995(c)(2) and 996(g).

(7) *Anti-stuffing rule.* If an asset the adjusted basis of which exceeds its fair market value is contributed or transferred to a target affiliate as transferred basis property (within the meaning of section 7701(a)(43)) and a purpose of such transaction is to reduce the gain (or increase the loss) recognized on the deemed sale of such target affiliate's stock, the gain or loss recognized by target on the deemed sale of stock of the target affiliate is determined as if such asset had not been contributed or transferred.

(8) *Examples.* The following examples illustrate this paragraph (h):

Example 1. (i) P makes a qualified stock purchase of T and makes a section 338 election for T. T's sole asset, all of the T1 stock, has a basis of $50 and a fair market value of $150. T's deemed purchase of the T1 stock results in a qualified stock purchase of T1 and a section 338 election is made for T1. T1's assets have a basis of $50 and a fair market value of $150.

(ii) T realizes $100 of gain on the deemed sale of the T1 stock, but the gain is not recognized because T directly owns stock in T1 satisfying the requirements of section 1504(a)(2) and a section 338 election is made for T1.

(iii) T1 recognizes gain of $100 on the deemed sale of its assets.

Example 2. The facts are the same as in *Example 1,* except that P does not make a section 338 election for T1. Because a section 338 election is not made for T1, the $100 gain realized by T on the deemed sale of the T1 stock is recognized.

Example 3. (i) P makes a qualified stock purchase of T and makes a section 338 election for T. T owns all of the stock of T1 and T2. T's deemed purchase of the T1 and T2 stock results in a qualified stock purchase of T1 and T2 and section 338 elections are made for T1 and T2. T1 and T2 each own 50 percent of the vote and value of T3 stock. The deemed purchases by T1 and T2 of the T3 stock result in a qualified stock purchase of T3 and a section 338 election is made for T3. T is the common parent of a consolidated group and all of the deemed asset sales are reported on the T group's final consolidated return. See § 1.338–10(a)(1).

(ii) Because T, T1, T2 and T3 are members of a consolidated group filing a final consolidated return, no gain or loss is recognized by T, T1 or T2 on their respective deemed sales of target affiliate stock.

Example 4. (i) T's sole asset, all of the FT1 stock, has a basis of $25 and a fair market value of $150. FT1's sole asset, all of the FT2 stock, has a basis of $75 and a fair market value of $150. FT1 and FT2 each have $50 of accumulated earnings and profits for purposes of section 1248(c) and (d). FT2's assets have a basis of $125 and a fair market value of $150, and their sale would not generate subpart F income under section 951. The sale of the FT2 stock or assets would not generate income effectively connected with the conduct of a trade or business within the United States. FT1 does not have an election in effect under section 953(d) and neither FT1 nor FT2 is a passive foreign investment company.

(ii) P makes a qualified stock purchase of T and makes a section 338 election for T. T's deemed purchase of the FT1 stock results in a qualified stock purchase of FT1 and a section 338 election is made for FT1. Similarly, FT1's deemed purchase of the FT2 stock results in a qualified stock purchase of FT2 and a section 338 election is made for FT2.

(iii) T recognizes $125 of gain on the deemed sale of the FT1 stock under paragraph (h)(3) of this section. FT1 does not recognize $75 of gain on the deemed sale of the FT2 stock under paragraph (h)(2) of this section. FT2 recognizes $25 of gain on the deemed sale of its assets. The $125 gain T recognizes on the deemed sale of the FT1 stock is included in T's income as a dividend under section 1248, because FT1 and FT2 have sufficient earnings and profits for full recharacterization ($50 of accumulated earnings and profits in FT1, $50 of accumulated earnings and profits in FT2, and $25 of deemed sale earnings and profits in FT2). Section 1.338–9(b). For purposes of sections 901 through 908, the source and foreign tax credit limitation basket of $25 of the recharacterized gain on the deemed sale of the FT1 stock is determined under section 338(h)(16).

§ 1.338–5 Adjusted grossed-up basis.

(a) *Scope.* This section provides rules under section 338(b) to determine the adjusted grossed-up basis (AGUB) for target. AGUB is the amount for which new target is deemed to have purchased all of its assets in the deemed purchase under section 338(a)(2). AGUB is allocated among target's assets in accordance with § 1.338–6 to determine the price at which the assets are deemed to have been purchased. When a subsequent increase or decrease with respect to an element of AGUB is required under general principles of tax law, redetermined AGUB is allocated among target's assets in accordance with § 1.338–7.

(b) *Determination of AGUB*—(1) *General rule.* AGUB is the sum of—

(i) The grossed-up basis in the purchasing corporation's recently purchased target stock;

(ii) The purchasing corporation's basis in nonrecently purchased target stock; and

(iii) The liabilities of new target.

(2) *Time and amount of AGUB*—(i) *Original determination.* AGUB is initially determined at the beginning of the day after the acquisition date of target. General principles of tax law apply in determining the timing and amount of the elements of AGUB.

(ii) *Redetermination of AGUB.* AGUB is redetermined at such time and in such amount as an increase or decrease would be required, under general principles of tax law, with respect to an element of AGUB. For example, AGUB is redetermined because of an increase or decrease in the amount paid or incurred for recently purchased stock or nonrecently purchased stock or because liabilities not originally taken into account in determining AGUB are subsequently taken into account. An increase or decrease to one element of AGUB also may cause an increase or decrease to another element of AGUB. For example, if there is an increase in the amount paid or incurred for recently purchased stock after the acquisition date, any increase in the basis of nonrecently purchased stock because a gain recognition election was made is also taken into account when AGUB is redetermined. Increases or decreases with respect to the elements of AGUB result in the reallocation of AGUB among target's assets under § 1.338–7.

(iii) *Examples.* The following examples illustrate this paragraph (b)(2):

Example 1. In Year 1, T, a manufacturer, purchases a customized delivery truck from X with purchase money indebtedness having a stated principal amount of $100,000. P acquires all of the stock of T in Year 3 for $700,000 and makes a section 338 election for T. Assume T has no liabilities other than its purchase money indebtedness to X. In Year 4, when T is neither insolvent nor in a title 11 case, T and X agree to reduce the amount of the purchase money indebtedness to $80,000. Assume that the reduction would be a purchase price reduction under section 108(e)(5). T and X's agreement to reduce the amount of the purchase money indebtedness would, under general principles of tax law that would apply if the deemed asset sale had actually occurred, change the amount of liabilities of old target taken into account in determining its basis. Accordingly, AGUB is redetermined at the time of the reduction. See paragraph (e)(2) of this section. Thus the purchase price reduction affects the basis of the truck only indirectly, through the mechanism of §§ 1.338–6 and 1.338–7. See § 1.338–4(b)(2)(iii) *Example* for the effect on ADSP.

Example 2. T, an accrual basis taxpayer, is a chemical manufacturer. In Year 1, T is obligated to remediate environmental contamination at the site of one of its plants. Assume that all the events have occurred that establish the fact of the liability and the amount of the liability can be determined with reasonable accuracy but economic performance has not occurred with respect to the liability within the meaning of section 461(h). P acquires all of the stock of T in Year 1 and makes a section 338 election for T. Assume that, if a corporation unrelated to T had actually purchased T's assets and assumed T's obligation to remediate the contamination, the corporation would not satisfy the economic performance requirements until Year 5. Under section 461(h), the assumed liability would not be

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treated as incurred and taken into account in basis until that time. The incurrence of the liability in Year 5 under the economic performance rules is an increase in the amount of liabilities properly taken into account in basis and results in the redetermination of AGUB. (Respecting ADSP, compare § 1.461–4(d)(5), which provides that economic performance occurs for old T as the amount of the liability is properly taken into account in amount realized on the deemed asset sale. Thus ADSP is not redetermined when new T satisfies the economic performance requirements.)

(c) *Grossed-up basis of recently purchased stock.* The purchasing corporation's grossed-up basis of recently purchased target stock (as defined in section 338(b)(6)(A)) is an amount equal to—

(1) The purchasing corporation's basis in recently purchased target stock at the beginning of the day after the acquisition date determined without regard to the acquisition costs taken into account in paragraph (c)(3) of this section;

(2) Multiplied by a fraction, the numerator of which is 100 minus the number that is the percentage of target stock (by value, determined on the acquisition date) attributable to the purchasing corporation's nonrecently purchased target stock, and the denominator of which is the number equal to the percentage of target stock (by value, determined on the acquisition date) attributable to the purchasing corporation's recently purchased target stock;

(3) Plus the acquisition costs the purchasing corporation incurred in connection with its purchase of the recently purchased stock that are capitalized in the basis of such stock (e.g., brokerage commissions and any similar costs incurred by the purchasing corporation to acquire the stock).

(d) *Basis of nonrecently purchased stock; gain recognition election*—(1) *No gain recognition election.* In the absence of a gain recognition election under section 338(b)(3) and this section, the purchasing corporation retains its basis in the nonrecently purchased stock.

(2) *Procedure for making gain recognition election.* A gain recognition election may be made for nonrecently purchased stock of target (or a target affiliate) only if a section 338 election is made for target (or the target affiliate). The gain recognition election is made by attaching a gain recognition statement to a timely filed Form 8023 for target. The gain recognition statement must contain the information specified in the form and its instructions. The gain recognition election is irrevocable. If a section 338(h)(10) election is made for target, see § 1.338(h)(10)–1(d)(1) (providing that the purchasing corporation is automatically deemed to have made a gain recognition election for its nonrecently purchased T stock).

(3) *Effect of gain recognition election*—(i) *In general.* If the purchasing corporation makes a gain recognition election, then for all purposes of the Internal Revenue Code—

(A) The purchasing corporation is treated as if it sold on the acquisition date the nonrecently purchased target stock for the basis amount determined under paragraph (d)(3)(ii) of this section; and

(B) The purchasing corporation's basis on the acquisition date in nonrecently purchased target stock immediately following the deemed sale in paragraph (d)(3)(i)(A) of this section is the basis amount.

(ii) *Basis amount.* The basis amount is equal to the amount in paragraph (c)(1) of this section (the purchasing corporation's basis in recently purchased target stock at the beginning of the day after the acquisition date determined without regard to the acquisition costs taken into account in paragraph (c)(3) of this section) multiplied by a fraction the numerator of which is the percentage of target stock (by value, determined on the acquisition date) attributable to the purchasing corporation's nonrecently purchased target stock and the denominator of which is 100 percent minus the numerator amount. Thus, if target has a single class of outstanding stock, the purchasing corporation's basis in each share of nonrecently purchased target stock after the gain recognition election is equal to the average price per share of the purchasing corporation's recently purchased target stock.

(iii) *Losses not recognized.* Only gains (unreduced by losses) on the nonrecently purchased target stock are recognized.

(iv) *Stock subject to election.* The gain recognition election applies to—

(A) All nonrecently purchased target stock; and

(B) Any nonrecently purchased stock in a target affiliate having the same acquisition date as target if such target affiliate stock is held by the purchasing corporation on such date.

(e) *Liabilities of new target*—(1) *In general.* The liabilities of new target are the liabilities of target as of the beginning of the day after the acquisition date (but see § 1.338–1(d) (regarding certain transactions on the acquisition date)). In order to be taken into account in AGUB, a liability must be a liability of target that is properly taken into account in basis under general principles of tax law that would apply if new target had acquired its assets from an unrelated person for consideration that included discharge of the liabilities of that unrelated person. Such liabilities may include liabilities for the tax consequences resulting from the deemed sale.

(2) *Time and amount of liabilities.* The time for taking into account liabilities of old target in determining AGUB and the amount of the liabilities taken into account is determined as if new target had acquired its assets from an unrelated person for consideration that included the discharge of its liabilities.

(3) *Interaction with deemed sale tax consequences.* In general, see § 1.338–4(e). Although ADSP and AGUB are not necessarily linked, if an increase in the amount realized for recently purchased stock of target is taken into account after the acquisition date, and if the tax on the deemed sale tax consequences is a liability of target, any increase in that liability is also taken into account in redetermining AGUB.

(f) *Adjustments by the Internal Revenue Service.* In connection with the examination of a return, the Commissioner may increase (or decrease) AGUB under the authority of section 338(b)(2) and allocate such amounts to target's assets under the authority of section 338(b)(5) so that AGUB and the basis of target's assets properly reflect the cost to the purchasing corporation of its interest in target's assets. Such items may include distributions from target to the purchasing corporation, capital contributions from the purchasing corporation to target during the 12-month acquisition period, or acquisitions of target stock by the purchasing corporation after the acquisition date from minority shareholders. See also § 1.338–1(d) (regarding certain transactions on the acquisition date).

(g) *Examples.* The following examples illustrate this section. For purposes of the examples in this paragraph (g), T has no liabilities other than the tax liability for the deemed sale tax consequences, T shareholders incur no costs in selling the T stock, and P incurs no costs in acquiring the T stock. The examples are as follows:

Example 1. (i) Before July 1 of Year 1, P purchases 10 of the 100 shares of T stock for $5,000. On July 1 of Year 2, P purchases 80 shares of T stock for $60,000 and makes a section 338 election for T. As of July 1 of Year 2, T's only asset is raw land with an adjusted basis to T of $50,400 and a fair market value of $100,000. T has no loss or tax credit carryovers to Year 2. T's marginal

tax rate for any ordinary income or net capital gain resulting from the deemed asset sale is 34 percent. The 10 shares purchased before July 1 of Year 1 constitute nonrecently purchased T stock with respect to P's qualified stock purchase of T stock on July 1 of Year 2.

(ii) The ADSP formula as applied to these facts is the same as in § 1.338–4(g) *Example 1.* Accordingly, the ADSP for T is $87,672.72. The existence of nonrecently purchased T stock is irrelevant for purposes of the ADSP formula, because that formula treats P's nonrecently purchased T stock in the same manner as T stock not held by P.

(iii) The total tax liability resulting from T's deemed asset sale, as calculated under the ADSP formula, is $12,672.72.

(iv) If P does not make a gain recognition election, the AGUB of new T's assets is $85,172.72, determined as follows (In the following formula below, GRP is the grossed-up basis in P's recently purchased T stock, BNP is P's basis in nonrecently purchased T stock, L is T's liabilities, and X is P's acquisition costs for the recently purchased T stock):

AGUB = GRP + BNP + L + X
AGUB = $60,000 × [(1 − .1)/.8] + $5,000 + $12,672.72 + 0
AGUB = $85,172.72

(v) If P makes a gain recognition election, the AGUB of new T's assets is $87,672.72, determined as follows:

AGUB = $60,000 × [(1 − .1)/.8] + $60,000 × [(1 − .1)/.8] × [.1/(1 − .1)] + $12,672.72
AGUB = $87,672.72

(vi) The calculation of AGUB if P makes a gain recognition election may be simplified as follows:

AGUB = $60,000/.8 + $12,672.72
AGUB = $87,672.72

(vii) As a result of the gain recognition election, P's basis in its nonrecently purchased T stock is increased from $5,000 to $7,500 (i.e., $60,000 × [(1 − .1)/.8] × [.1/(1 − .1)]). Thus, P recognizes a gain in Year 2 with respect to its nonrecently purchased T stock of $2,500 (i.e., $7,500 − $5,000).

Example 2. On January 1 of Year 1, P purchases one-third of the T stock. On March 1 of Year 1, T distributes a dividend to all of its shareholders. On April 15 of Year 1, P purchases the remaining T stock and makes a section 338 election for T. In appropriate circumstances, the Commissioner may decrease the AGUB of T to take into account the payment of the dividend and properly reflect the fair market value of T's assets deemed purchased.

Example 3. (i) T's sole asset is a building worth $100,000. At this time, T has 100 shares of stock outstanding. On August 1 of Year 1, P purchases 10 of the 100 shares of T stock for $8,000. On June 1 of Year 2, P purchases 50 shares of T stock for $50,000. On June 15 of Year 2, P contributes a tract of land to the capital of T and receives 10 additional shares of T stock as a result of the contribution. Both the basis and fair market value of the land at that time are $10,800. On June 30 of Year 2, P purchases the remaining 40 shares of T stock for $40,000 and makes a section 338 election for T. The AGUB of T is $108,800.

(ii) To prevent the shifting of basis from the contributed property to other assets of T, the Commissioner may allocate $10,800 of the AGUB to the land, leaving $98,000 to be allocated to the building. See paragraph (f) of this section. Otherwise, applying the allocation rules of § 1.338–6 would, on these facts, result in an allocation to the recently contributed land of an amount less than its value of $10,800, with the difference being allocated to the building already held by T.

§ 1.338–6 Allocation of ADSP and AGUB among target assets.

(a) *Scope*—(1) *In general.* This section prescribes rules for allocating ADSP and AGUB among the acquisition date assets of a target for which a section 338 election is made.

(2) *Fair market value*—(i) *In general.* Generally, the fair market value of an asset is its gross fair market value (i.e., fair market value determined without regard to mortgages, liens, pledges, or other liabilities). However, for purposes of determining the amount of old target's deemed sale tax consequences, the fair market value of any property subject to a nonrecourse indebtedness will be treated as being not less than the amount of such indebtedness. (For purposes of the preceding sentence, a liability that was incurred because of the acquisition of the property is disregarded to the extent that such liability was not taken into account in determining old target's basis in such property.)

(ii) *Transaction costs.* Transaction costs are not taken into account in allocating ADSP or AGUB to assets in the deemed sale (except indirectly through their effect on the total ADSP or AGUB to be allocated).

(iii) *Internal Revenue Service authority.* In connection with the examination of a return, the Internal Revenue Service may challenge the taxpayer's determination of the fair market value of any asset by any appropriate method and take into account all factors, including any lack of adverse tax interests between the parties.

(b) *General rule for allocating ADSP and AGUB*—(1) *Reduction in the amount of consideration for Class I assets.* Both ADSP and AGUB, in the respective allocation of each, are first reduced by the amount of Class I assets. Class I assets are cash and general deposit accounts (including savings and checking accounts) other than certificates of deposit held in banks, savings and loan associations, and other depository institutions. If the amount of Class I assets exceeds AGUB, new target will immediately realize ordinary income in an amount equal to such excess. The amount of ADSP or AGUB remaining after the reduction is to be allocated to the remaining acquisition date assets.

(2) *Other assets*—(i) *In general.* Subject to the limitations and other rules of paragraph (c) of this section, ADSP and AGUB (as reduced by the amount of Class I assets) are allocated among Class II acquisition date assets of target in proportion to the fair market values of such Class II assets at such time, then among Class III assets so held in such proportion, then among Class IV assets so held in such proportion, then among Class V assets so held in such proportion, then among Class VI assets so held in such proportion, and finally to Class VII assets. If an asset is described below as includible in more than one class, then it is included in such class with the lower or lowest class number (for instance, Class III has a lower class number than Class IV).

(ii) *Class II assets.* Class II assets are actively traded personal property within the meaning of section 1092(d)(1) and § 1.1092(d)–1 (determined without regard to section 1092(d)(3)). In addition, Class II assets include certificates of deposit and foreign currency even if they are not actively traded personal property. Class II assets do not include stock of target affiliates, whether or not of a class that is actively traded, other than actively traded stock described in section 1504(a)(4). Examples of Class II assets include U.S. government securities and publicly traded stock.

(iii) *Class III assets.* Class III assets are assets that the taxpayer marks to market at least annually for Federal income tax purposes and debt instruments (including accounts receivable). However, Class III assets do not include—

(A) Debt instruments issued by persons related at the beginning of the day following the acquisition date to the target under section 267(b) or 707;

(B) Contingent debt instruments subject to § 1.1275–4, § 1.483–4, or section 988, unless the instrument is subject to the non-contingent bond method of § 1.1275–4(b) or is described in § 1.988–2(b)(2)(i)(B)(*2*); and

(C) Debt instruments convertible into the stock of the issuer or other property.

(iv) *Class IV assets.* Class IV assets are stock in trade of the taxpayer or other property of a kind that would properly be included in the inventory of taxpayer if on hand at the close of the taxable year, or property held by the taxpayer primarily for sale to customers in the ordinary course of its trade or business.

(v) *Class V assets.* Class V assets are all assets other than Class I, II, III, IV, VI, and VII assets.

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(vi) *Class VI assets.* Class VI assets are all section 197 intangibles, as defined in section 197, except goodwill and going concern value.

(vii) *Class VII assets.* Class VII assets are goodwill and going concern value (whether or not the goodwill or going concern value qualifies as a section 197 intangible).

(3) *Other items designated by the Internal Revenue Service.* Similar items may be added to any class described in this paragraph (b) by designation in the Internal Revenue Bulletin by the Internal Revenue Service (see § 601.601(d)(2) of this chapter).

(c) *Certain limitations and other rules for allocation to an asset*—(1) *Allocation not to exceed fair market value.* The amount of ADSP or AGUB allocated to an asset (other than Class VII assets) cannot exceed the fair market value of that asset at the beginning of the day after the acquisition date.

(2) *Allocation subject to other rules.* The amount of ADSP or AGUB allocated to an asset is subject to other provisions of the Internal Revenue Code or general principles of tax law in the same manner as if such asset were transferred to or acquired from an unrelated person in a sale or exchange. For example, if the deemed asset sale is a transaction described in section 1056(a) (relating to basis limitation for player contracts transferred in connection with the sale of a franchise), the amount of AGUB allocated to a contract for the services of an athlete cannot exceed the limitation imposed by that section. As another example, section 197(f)(5) applies in determining the amount of AGUB allocated to an amortizable section 197 intangible resulting from an assumption-reinsurance transaction.

(3) *Special rule for allocating AGUB when purchasing corporation has nonrecently purchased stock*—(i) *Scope.* This paragraph (c)(3) applies if at the beginning of the day after the acquisition date—

(A) The purchasing corporation holds nonrecently purchased stock for which a gain recognition election under section 338(b)(3) and § 1.338–5(d) is not made; and

(B) The hypothetical purchase price determined under paragraph (c)(3)(ii) of this section exceeds the AGUB determined under § 1.338–5(b).

(ii) *Determination of hypothetical purchase price.* Hypothetical purchase price is the AGUB that would result if a gain recognition election were made.

(iii) *Allocation of AGUB.* Subject to the limitations in paragraphs (c)(1) and (2) of this section, the portion of AGUB (after reduction by the amount of Class I assets) to be allocated to each Class II, III, IV, V, VI, and VII asset of target held at the beginning of the day after the acquisition date is determined by multiplying—

(A) The amount that would be allocated to such asset under the general rules of this section were AGUB equal to the hypothetical purchase price; by

(B) A fraction, the numerator of which is actual AGUB (after reduction by the amount of Class I assets) and the denominator of which is the hypothetical purchase price (after reduction by the amount of Class I assets).

(4) *Liabilities taken into account in determining amount realized on subsequent disposition.* In determining the amount realized on a subsequent sale or other disposition of property deemed purchased by new target, § 1.1001–2(a)(3) shall not apply to any liability that was taken into account in AGUB.

(d) *Examples.* The following examples illustrate §§ 1.338–4, 1.338–5, and this section:

Example 1. (i) T owns 90 percent of the outstanding T1 stock. P purchases 100 percent of the outstanding T stock for $2,000. There are no acquisition costs. P makes a section 338 election for T and, as a result, T1 is considered acquired in a qualified stock purchase. A section 338 election is made for T1. The grossed-up basis of the T stock is $2,000 (i.e., $2,000 + 1/1).

(ii) The liabilities of T as of the beginning of the day after the acquisition date (including the tax liability for the deemed sale tax consequences) that would, under general principles of tax law, properly be taken into account at that time, are as follows:

Liabilities (nonrecourse mortgage plus unsecured liabilities)	$700
Taxes Payable	300
Total	1,000

(iii) The AGUB of T is determined as follows:

Grossed-up basis	$2,000
Total liabilities	1,000
AGUB	3,000

(iv) Assume that ADSP is also $3,000.

(v) Assume that, at the beginning of the day after the acquisition date, T's cash and the fair market values of T's Class II, III, IV, and V assets are as follows:

Asset class	Asset	Fair market value
I	Cash	*$200
II	Portfolio of actively traded securities.	300
III	Accounts receivable	600
IV	Inventory	300
V	Building	800
V	Land	200
V	Investment in T1	450
	Total	2,850

*Amount.

(vi) Under paragraph (b)(1) of this section, the amount of ADSP and AGUB allocable to T's Class II, III, IV, and V assets is reduced by the amount of cash to $2,800, i.e., $3,000—$200. $300 of ADSP and of AGUB is then allocated to actively traded securities. $600 of ADSP and of AGUB is then allocated to accounts receivable. $300 of ADSP and of AGUB is then allocated to the inventory. Since the remaining amount of ADSP and of AGUB is $1,600 (i.e., $3,000—($200 + $300 + $600 + $300)), an amount which exceeds the sum of the fair market values of T's Class V assets, the amount of ADSP and of AGUB allocated to each Class V asset is its fair market value:

Building	$800
Land	200
Investment in T1	450
Total	1,450

(vii) T has no Class VI assets. The amount of ADSP and of AGUB allocated to T's Class VII assets (goodwill and going concern value) is $150, i.e., $1,600–$1,450.

(viii) The grossed-up basis of the T1 stock is $500, i.e., $450 × 1/.9.

(ix) The liabilities of T as of the beginning of the day after the acquisition date (including the tax liability for the deemed sale tax consequences) that would, under general principles of tax law, properly be taken into account at that time, are as follows:

General Liabilities	$100
Taxes Payable	20
Total	120

(x) The AGUB of T1 is determined as follows:

Grossed-up basis of T1 Stock	$ 500
Liabilities	120
AGUB	620

(xi) Assume that ADSP is also $620.

(xii) Assume that at the beginning of the day after the acquisition date, T1's cash and the fair market values of its Class IV and VI assets are as follows:

Asset class	Asset	Fair market value
I	Cash	*$50
IV	Inventory	200
VI	Patent	350
	Total	600

* Amount.

(xiii) The amount of ADSP and of AGUB allocable to T1's Class IV and VI assets is first reduced by the $50 of cash.

(xiv) Because the remaining amount of ADSP and of AGUB ($570) is an amount which exceeds the fair market value of T1's

only Class IV asset, the inventory, the amount allocated to the inventory is its fair market value ($200). After that, the remaining amount of ADSP and of AGUB ($370) exceeds the fair market value of T1's only Class VI asset, the patent. Thus, the amount of ADSP and of AGUB allocated to the patent is its fair market value ($350).

(xv) The amount of ADSP and of AGUB allocated to T1's Class VII assets (goodwill and going concern value) is $20, i.e., $570–$550.

Example 2. (i) Assume that the facts are the same as in *Example 1* except that P has, for five years, owned 20 percent of T's stock, which has a basis in P's hands at the beginning of the day after the acquisition date of $100, and P purchases the remaining 80 percent of T's stock for $1,600. P does not make a gain recognition election under section 338(b)(3).

(ii) Under § 1.338–5(c), the grossed-up basis of recently purchased T stock is $1,600, i.e., $1,600 × (1 − .2)/.8.

(iii) The AGUB of T is determined as follows:

Grossed-up basis of recently purchased stock as determined under § 1.338–5(c) ($1,600 × (1 − .2)/.8)	$1,600
Basis of nonrecently purchased stock	100
Liabilities	1,000
AGUB	2,700

(iv) Since P holds nonrecently purchased stock, the hypothetical purchase price of the T stock must be computed and is determined as follows:

Grossed-up basis of recently purchased stock as determined under § 1.338–5(c) ($1,600 × (1 − .2)/.8)	$1,600
Basis of nonrecently purchased stock as if the gain recognition election under § 1.338–5(d)(2) had been made ($1,600 × .2/(1 − .2))	400
Liabilities	1,000
Total	3,000

(v) Since the hypothetical purchase price ($3,000) exceeds the AGUB ($2,700) and no gain recognition election is made under section 338(b)(3), AGUB is allocated under paragraph (c)(3) of this section.

(vi) First, an AGUB amount equal to the hypothetical purchase price ($3,000) is allocated among the assets under the general rules of this section. The allocation is set forth in the column below entitled *Original Allocation.* Next, the allocation to each asset in Class II through Class VII is multiplied by a fraction having a numerator equal to the actual AGUB reduced by the amount of Class I assets ($2,700 − $200 = $2,500) and a denominator equal to the hypothetical purchase price reduced by the amount of Class I assets ($3,000 − $200 = $2,800), or 2,500/2,800. This produces the *Final Allocation:*

Class	Asset	Original allocation	Final allocation
I	Cash	$200	$200
II	Portfolio of actively traded securities	300	*268
III	Accounts receivable	600	536
IV	Inventory	300	268
V	Building	800	714
V	Land	200	178
V	Investment in T1	450	402
VII	Goodwill and going concern value	150	134
	Total	3,000	2,700

* All numbers rounded for convenience.

§ 1.338–7 Allocation of redetermined ADSP and AGUB among target assets.

(a) *Scope.* ADSP and AGUB are redetermined at such time and in such amount as an increase or decrease would be required under general principles of tax law for the elements of ADSP or AGUB. This section provides rules for allocating redetermined ADSP or AGUB.

(b) *Allocation of redetermined ADSP and AGUB.* When ADSP or AGUB is redetermined, a new allocation of ADSP or AGUB is made by allocating the redetermined ADSP or AGUB amount under the rules of § 1.338–6. If the allocation of the redetermined ADSP or AGUB amount under § 1.338–6 to a given asset is different from the original allocation to it, the difference is added to or subtracted from the original allocation to the asset, as appropriate. (See paragraph (d) of this section for new target's treatment of the amount so allocated.) Amounts allocable to an acquisition date asset (or with respect to a disposed-of acquisition date asset) are subject to all the asset allocation rules (for example, the fair market value limitation in § 1.338–6(c)(1)) as if the redetermined ADSP or AGUB were the ADSP or AGUB on the acquisition date.

(c) *Special rules for ADSP*—(1) *Increases or decreases in deemed sale tax consequences taxable notwithstanding old target ceases to exist.* To the extent general principles of tax law would require a seller in an actual asset sale to account for events relating to the sale that occur after the sale date, target must make such an accounting. Target is not precluded from realizing additional deemed sale tax consequences because the target is treated as a new corporation after the acquisition date.

(2) *Procedure for transactions in which section 338(h)(10) is not elected*—(i) *Deemed sale tax consequences included in new target's return.* If an election under section 338(h)(10) is not made, any additional deemed sale tax consequences of old target resulting from an increase or decrease in the ADSP are included in new target's income tax return for new target's taxable year in which the increase or decrease is taken into account. For example, if after the acquisition date there is an increase in the allocable ADSP of section 1245 property for which the recomputed basis (but not the adjusted basis) exceeds the portion of the ADSP allocable to that particular asset on the acquisition date, the additional gain is treated as ordinary income to the extent it does not exceed such excess amount. See paragraph (c)(2)(ii) of this section for the special treatment of old target's carryovers and carrybacks. Although included in new target's income tax return, the deemed sale tax consequences are separately accounted for as an item of old target and may not be offset by income, gain, deduction, loss, credit, or other amount of new target. The amount of tax on income of old target resulting from an increase or decrease in the ADSP is determined as if such deemed sale tax consequences had been recognized in old target's taxable year ending at the close of the acquisition date. However, because the income resulting from the increase or decrease in ADSP is reportable in new target's taxable year of the increase or decrease, not in old target's taxable year ending at the close of the acquisition date, there is not a resulting underpayment of tax in that

past taxable year of old target for purposes of calculation of interest due.

(ii) *Carryovers and carrybacks*—(A) *Loss carryovers to new target taxable years.* A net operating loss or net capital loss of old target may be carried forward to a taxable year of new target, under the principles of section 172 or 1212, as applicable, but is allowed as a deduction only to the extent of any recognized income of old target for such taxable year, as described in paragraph (c)(2)(i) of this section. For this purpose, however, taxable years of new target are not taken into account in applying the limitations in section 172(b)(1) or 1212(a)(1)(B) (or other similar limitations). In applying sections 172(b) and 1212(a)(1), only income, gain, loss, deduction, credit, and other amounts of old target are taken into account. Thus, if old target has an unexpired net operating loss at the close of its taxable year in which the deemed asset sale occurred that could be carried forward to a subsequent taxable year, such loss may be carried forward until it is absorbed by old target's income.

(B) *Loss carrybacks to taxable years of old target.* An ordinary loss or capital loss accounted for as a separate item of old target under paragraph (c)(2)(i) of this section may be carried back to a taxable year of old target under the principles of section 172 or 1212, as applicable. For this purpose, taxable years of new target are not taken into account in applying the limitations in section 172(b) or 1212(a) (or other similar limitations).

(C) *Credit carryovers and carrybacks.* The principles described in paragraphs (c)(2)(ii)(A) and (B) of this section apply to carryovers and carrybacks of amounts for purposes of determining the amount of a credit allowable under part IV, subchapter A, chapter 1 of the Internal Revenue Code. Thus, for example, credit carryovers of old target may offset only income tax attributable to items described in paragraph (c)(2)(i) of this section.

(3) *Procedure for transactions in which section 338(h)(10) is elected.* If an election under section 338(h)(10) is made, any changes in the deemed sale tax consequences caused by an increase or decrease in the ADSP are accounted for in determining the taxable income (or other amount) of the member of the selling consolidated group, the selling affiliate, or the S corporation shareholders to which such income, loss, or other amount is attributable for the taxable year in which such increase or decrease is taken into account.

(d) *Special rules for AGUB*—(1) *Effect of disposition or depreciation of acquisition date assets.* If an acquisition date asset has been disposed of, depreciated, amortized, or depleted by new target before an amount is added to the original allocation to the asset, the increased amount otherwise allocable to such asset is taken into account under general principles of tax law that apply when part of the cost of an asset not previously taken into account in basis is paid or incurred after the asset has been disposed of, depreciated, amortized, or depleted. A similar rule applies when an amount is subtracted from the original allocation to the asset. For purposes of the preceding sentence, an asset is considered to have been disposed of to the extent that its allocable portion of the decrease in AGUB would reduce its basis below zero.

(2) *Section 38 property.* Section 1.47–2(c) applies to a reduction in basis of section 38 property under this section.

(e) *Examples.* The following examples illustrate this section. Any amount described in the following examples is exclusive of interest. For rules characterizing deferred contingent payments as principal or interest, see §§ 1.483–4, 1.1274–2(g), and 1.1275–4(c). The examples are as follows:

Example 1. (i)(A) T's assets other than goodwill and going concern value, and their fair market values at the beginning of the day after the acquisition date, are as follows:

Asset class	Asset	Fair market value
V	Building	$ 100
V	Stock of X (not a target).	200
	Total	300

(B) T has no liabilities other than a contingent liability that would not be taken into account under general principles of tax law in an asset sale between unrelated parties when the buyer assumed the liability or took property subject to it.

(ii)(A) On September 1, 2000, P purchases all of the outstanding stock of T for $270 and makes a section 338 election for T. The grossed-up basis of the T stock and T's AGUB are both $270. The AGUB is ratably allocated among T's Class V assets in proportion to their fair market values as follows:

Asset	Basis
Building ($270 × 100/300)	$90
Stock ($270 × 200/300)	180
Total	270

(B) No amount is allocated to the Class VII assets. New T is a calendar year taxpayer. Assume that the X stock is a capital asset in the hands of new T.

(iii) On January 1, 2001, new T sells the X stock and uses the proceeds to purchase inventory.

(iv) Pursuant to events on June 30, 2002, the contingent liability of old T is at that time properly taken into account under general principles of tax law. The amount of the liability is $60.

(v) T's AGUB increases by $60 from $270 to $330. This $60 increase in AGUB is first allocated among T's acquisition date assets in accordance with the provisions of § 1.338–6. Because the redetermined AGUB for T ($330) exceeds the sum of the fair market values at the beginning of the day after the acquisition date of the Class V acquisition date assets ($300), AGUB allocated to those assets is limited to those fair market values under § 1.338–6(c)(1). As there are no Class VI assets, the remaining AGUB of $30 is allocated to goodwill and going concern value (Class VII assets). The amount of increase in AGUB allocated to each acquisition date asset is determined as follows:

Asset	Original AGUB	Redetermined AGUB	Increase
Building	$90	$100	$10
X Stock	180	200	20
Goodwill and going concern value	0	30	30
Total	270	330	60

(vi) Since the X stock was disposed of before the contingent liability was properly taken into account for tax purposes, no amount of the increase in AGUB attributable to such stock may be allocated to any T asset. Rather, such amount ($20) is allowed as a capital loss to T for the taxable year 2002 under the principles of *Arrowsmith* v. *Commissioner,* 344 U.S. 6 (1952). In addition, the $10 increase in AGUB allocated to the building and the $30 increase in AGUB allocated to the goodwill and going concern value are treated as basis redeterminations in 2002. See paragraph (d)(1) of this section.

Example 2. (i) On January 1, 2002, P purchases all of the outstanding stock of T and makes a section 338 election for T. Assume that ADSP and AGUB of T are both $500 and are allocated among T's acquisition date assets as follows:

Asset Class	Asset	Basis
V	Machinery	$150
V	Land	250
VII	Goodwill and going concern value.	100
	Total	500

(ii) On September 30, 2004, P filed a claim against the selling shareholders of T in a court of appropriate jurisdiction alleging fraud in the sale of the T stock.

(iii) On January 1, 2007, the former shareholders refund $140 of the purchase price to P in a settlement of the lawsuit.

Assume that, under general principles of tax law, both the seller and the buyer properly take into account such refund when paid. Assume also that the refund has no effect on the tax liability for the deemed sale tax consequences. This refund results in a decrease of T's ADSP and AGUB of $140, from $500 to $360.

(iv) The redetermined ADSP and AGUB of $360 is allocated among T's acquisition date assets. Because ADSP and AGUB do not exceed the fair market value of the Class V assets, the ADSP and AGUB amounts are allocated to the Class V assets in proportion to their fair market values at the beginning of the day after the acquisition date. Thus, $135 ($150 × ($360/($150 + $250))) is allocated to the machinery and $225 ($250 × ($360/($150 + $250))) is allocated to the land. Accordingly, the basis of the machinery is reduced by $15 ($150 original allocation—$135 redetermined allocation) and the basis of the land is reduced by $25 ($250 original allocation—$225 redetermined allocation). No amount is allocated to the Class VII assets. Accordingly, the basis of the goodwill and going concern value is reduced by $100 ($100 original allocation—$0 redetermined allocation).

(v) Assume that, as a result of deductions under section 168, the adjusted basis of the machinery immediately before the decrease in AGUB is zero. The machinery is treated as if it were disposed of before the decrease is taken into account. In 2007, T recognizes income of $15, the character of which is determined under the principles of *Arrowsmith* v. *Commissioner* and the tax benefit rule. No adjustment to the basis of T's assets is made for any tax paid on this amount. Assume also that, as a result of amortization deductions, the adjusted basis of the goodwill and going concern value immediately before the decrease in AGUB is $40. A similar adjustment to income is made in 2007 with respect to the $60 of previously amortized goodwill and going concern value.

(vi) In summary, the basis of T's acquisition date assets, as of January 1, 2007, is as follows:

Asset	Basis
Machinery	$0
Land	225
Goodwill and going concern value	0

Example 3. (i) Assume that the facts are the same as § 1.338–6(d) *Example 2* except that the recently purchased stock is acquired for $1,600 plus additional payments that are contingent upon T's future earnings. Assume that, under general principles of tax law, such later payments are properly taken into account when paid. Thus, T's AGUB, determined as of the beginning of the day after the acquisition date (after reduction by T's cash of $200), is $2,500 and is allocated among T's acquisition date assets under § 1.338–6(c)(3)(iii) as follows:

Class	Asset	Final allocation
I	Cash	$200
II	Portfolio of actively traded securities.	*268
III	Accounts receivable	536
IV	Inventory	268
V	Building	714
V	Land	178
V	Investment in T1	402
VII	Goodwill and going concern value.	134
	Total	2,700

*All numbers rounded for convenience.

(ii) At a later point in time, P pays an additional $200 for its recently purchased T stock. Assume that the additional consideration paid would not increase T's tax liability for the deemed sale tax consequences.

(iii) T's AGUB increases by $200, from $2,700 to $2,900. This $200 increase in AGUB is accounted for in accordance with the provisions of § 1.338–6(c)(3)(iii).

(iv) The hypothetical purchase price of the T stock is redetermined as follows:

Grossed-up basis of recently purchased stock as determined under § 1.338–5(c) ($1,800 × (1 − .2)/.8)	$ 1,800
Basis of nonrecently purchased stock as if the gain recognition election under § 1.338–5(d)(2) had been made ($1,800 × .2/(1 − .2))	450
Liabilities	1,000
Total	3,250

(v) Since the redetermined hypothetical purchase price ($3,250) exceeds the redetermined AGUB ($2,900) and no gain recognition election was made under section 338(b)(3), the rules of § 1.338–6(c)(3)(iii) are reapplied using the redetermined hypothetical purchase price and the redetermined AGUB.

(vi) First, an AGUB amount equal to the redetermined hypothetical purchase price ($3,250) is allocated among the assets under the general rules of § 1.338–6. The allocation is set forth in the column below entitled *Hypothetical Allocation.* Next, the allocation to each asset in Class II through Class VII is multiplied by a fraction with a numerator equal to the actual redetermined AGUB reduced by the amount of Class I assets ($2,900 − $200 = $2,700) and a denominator equal to the redetermined hypothetical purchase price reduced by the amount of Class I assets ($3,250 − $200 = $3,050), or 2,700/3,050. This produces the *Final Allocation:*

Class	Asset	Hypothetical allocation	Final allocation
I	Cash	$200	$200
II	Portfolio of actively traded securities	300	*266
III	Accounts receivable	600	531
IV	Inventory	300	266
V	Building	800	708
V	Land	200	177
V	Investment in T1	450	398
VII	Goodwill and going concern value	400	354
	Total	3,250	2900

*All numbers rounded for convenience.

(vii) As illustrated by this example, reapplying § 1.338–6(c)(3) results in a basis increase for some assets and a basis decrease for other assets. The amount of redetermined AGUB allocated to each acquisition date asset is determined as follows:

Asset	Original (c)(3) allocation	Redetermined (c)(3) allocation	Increase (decrease)
Portfolio of actively traded securities	$268	$266	$(2)
Accounts receivable	536	531	(5)
Inventory	268	266	(2)

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Asset	Original (c)(3) allocation	Redetermined (c)(3) allocation	Increase (decrease)
Building	714	708	(6)
Land	178	177	(1)
Investment in T1	402	398	(4)
Goodwill and going concern value	134	354	220
Total	2,500	2,700	200

Example 4. (i) On January 1, 2001, P purchases all of the outstanding T stock and makes a section 338 election for T. P pays $700 of cash and promises also to pay a maximum $300 of contingent consideration at various times in the future. Assume that, under general principles of tax law, such later payments are properly taken into account by P when paid. Assume also, however, that the current fair market value of the contingent payments is reasonably ascertainable. The fair market value of T's assets (other than goodwill and going concern value) as of the beginning of the following day is as follows:

Asset class	Assets	Fair market value
V	Equipment	$200
V	Non-actively traded securities.	100
V	Building	500
	Total	800

(ii) T has no liabilities. The AGUB is $700. In calculating ADSP, assume that, under § 1.1001–1, the current amount realized attributable to the contingent consideration is $200. ADSP is therefore $900 ($700 cash plus $200).

(iii) (A) The AGUB of $700 is ratably allocated among T's Class V acquisition date assets in proportion to their fair market values as follows:

Asset	Basis
Equipment ($700 × 200/800)	$175.00
Non-actively traded securities ($700 × 100/800)	87.50
Building ($700 × 500/800)	437.50
Total	700.00

(B) No amount is allocated to goodwill or going concern value.

(iv) (A) The ADSP of $900 is ratably allocated among T's Class V acquisition date assets in proportion to their fair market values as follows:

Asset	Basis
Equipment	$200
Non-actively traded securities	100
Building	500
Total	800

(B) The remaining ADSP, $100, is allocated to goodwill and going concern value (Class VII).

(v) P and T file a consolidated return for 2001 and each following year with P as the common parent of the affiliated group.

(vi) In 2004, a contingent amount of $120 is paid by P. For old T, this payment has no effect on ADSP, because the payment is accounted for as a separate transaction. We have assumed that, under general principles of tax law, the payment is properly taken into account by P at the time made. Therefore, in 2004, there is an increase in new T's AGUB of $120. The amount of the increase allocated to each acquisition date asset is determined as follows:

Asset	Original AGUB	Redetermined AGUB	Increase
Equipment	$175.00	$200.00	$25.00
Land	87.50	100.00	12.50
Building	437.50	500.00	62.50
Goodwill and going concern value	0.00	20.00	20.00
Total	700.00	820.00	120.00

§§ 1.338–0T through 1.338–7T [Removed]

Par. 4. Sections 1.338–0T through 1.338–7T are removed.

Par. 5. Section 1.338–10 is added to read as follows:

§ 1.338–10 Filing of returns.

(a) *Returns including tax liability from deemed asset sale*—(1) *In general.* Except as provided in paragraphs (a)(2) and (3) of this section, any deemed sale tax consequences are reported on the final return of old target filed for old target's taxable year that ends at the close of the acquisition date. Paragraphs (a)(2), (3) and (4) of this section do not apply to elections under section 338(h)(10). If old target is the common parent of an affiliated group, the final return may be a consolidated return (any such consolidated return must also include any deemed sale tax consequences of any members of the consolidated group that are acquired by the purchasing corporation on the same acquisition date as old target).

(2) *Old target's final taxable year otherwise included in consolidated return of selling group*—(i) *General rule.* If the selling group files a consolidated return for the period that includes the acquisition date, old target is disaffiliated from that group immediately before the deemed asset sale and must file a deemed sale return separate from the group, which includes only the deemed sale tax consequences and the carryover items specified in paragraph (a)(2)(iii) of this section. The deemed asset sale occurs at the close of the acquisition date and is the last transaction of old target and the only transaction reported on the separate return. Except as provided in § 1.338–1(d) (regarding certain transactions on the acquisition date), any transactions of old target occurring on the acquisition date other than the deemed asset sale are included in the selling group's consolidated return. A deemed sale return includes a combined deemed sale return as defined in paragraph (a)(4) of this section.

(ii) *Separate taxable year.* The deemed asset sale included in the deemed sale return under this paragraph (a)(2) occurs in a separate taxable year, except that old target's taxable year of the sale and the consolidated year of the selling group that includes the acquisition date are treated as the same year for purposes of determining the

number of years in a carryover or carryback period.

(iii) *Carryover and carryback of tax attributes.* Target's attributes may be carried over to, and carried back from, the deemed sale return under the rules applicable to a corporation that ceases to be a member of a consolidated group.

(iv) *Old target is a component member of purchasing corporation's controlled group.* For purposes of its deemed sale return, target is a component member of the controlled group of corporations including the purchasing corporation unless target is treated as an excluded member under section 1563(b)(2).

(3) *Old target is an S corporation.* If target is an S corporation for the period that ends on the day before the acquisition date and a section 338 election (but not a section 338(h)(10) election) is filed for target, old target files a return as a C corporation reflecting its activities on the acquisition date, including target's deemed sale. See section 1362(d)(2). For purposes of this return, target is a component member of the controlled group of corporations including the purchasing corporation unless target is treated as an excluded member under section 1563(b)(2).

(4) *Combined deemed sale return*—(i) *General rule.* Under section 338(h)(15), a combined deemed sale return (combined return) may be filed for all targets from a single selling consolidated group (as defined in § 1.338(h)(10)–1(b)(3)) that are acquired by the purchasing corporation on the same acquisition date and that otherwise would be required to file separate deemed sale returns. The combined return must include all such targets. For example, T and T1 may be included in a combined return if—

(A) T and T1 are directly owned subsidiaries of S;

(B) S is the common parent of a consolidated group; and

(C) P makes qualified stock purchases of T and T1 on the same acquisition date.

(ii) *Gain and loss offsets.* Gains and losses recognized on the deemed asset sales by targets included in a combined return are treated as the gains and losses of a single target. In addition, loss carryovers of a target that were not subject to the separate return limitation year restrictions (SRLY restrictions) of the consolidated return regulations while that target was a member of the selling consolidated group may be applied without limitation to the gains of other targets included in the combined return. If, however, a target has loss carryovers that were subject to the SRLY restrictions while that target was a member of the selling consolidated group, the use of those losses in the combined return continues to be subject to those restrictions, applied in the same manner as if the combined return were a consolidated return. A similar rule applies, when appropriate, to other tax attributes.

(iii) *Procedure for filing a combined return.* A combined return is made by filing a single corporation income tax return in lieu of separate deemed sale returns for all targets required to be included in the combined return. The combined return reflects the deemed asset sales of all targets required to be included in the combined return. If the targets included in the combined return constitute a single affiliated group within the meaning of section 1504(a), the income tax return is signed by an officer of the common parent of that group. Otherwise, the return must be signed by an officer of each target included in the combined return. Rules similar to the rules in § 1.1502–75(j) apply for purposes of preparing the combined return. The combined return must include an attachment prominently identified as an ''ELECTION TO FILE A COMBINED RETURN UNDER SECTION 338(h)(15).'' The attachment must—

(A) Contain the name, address, and employer identification number of each target required to be included in the combined return;

(B) Contain the following declaration (or a substantially similar declaration): EACH TARGET IDENTIFIED IN THIS ELECTION TO FILE A COMBINED RETURN CONSENTS TO THE FILING OF A COMBINED RETURN;

(C) For each target, be signed by a person who states under penalties of perjury that he or she is authorized to act on behalf of such target.

(iv) *Consequences of filing a combined return.* Each target included in a combined return is severally liable for any tax associated with the combined return. See § 1.338–1(b)(3).

(5) *Deemed sale excluded from purchasing corporation's consolidated return.* Old target may not be considered a member of any affiliated group that includes the purchasing corporation with respect to its deemed asset sale.

(6) *Due date for old target's final return*—(i) *General rule.* Old target's final return is generally due on the 15th day of the third calendar month following the month in which the acquisition date occurs. See section 6072 (time for filing income tax returns).

(ii) *Application of § 1.1502–76(c)*—(A) *In general.* Section 1.1502–76(c) applies to old target's final return if old target was a member of a selling group that did not file consolidated returns for the taxable year of the common parent that precedes the year that includes old target's acquisition date. If the selling group has not filed a consolidated return that includes old target's taxable period that ends on the acquisition date, target may, on or before the final return due date (including extensions), either—

(*1*) File a deemed sale return on the assumption that the selling group will file the consolidated return; or

(*2*) File a return for so much of old target's taxable period as ends at the close of the acquisition date on the assumption that the consolidated return will not be filed.

(B) *Deemed extension.* For purposes of applying § 1.1502–76(c)(2), an extension of time to file old target's final return is considered to be in effect until the last date for making the election under section 338.

(C) *Erroneous filing of deemed sale return.* If, under this paragraph (a)(6)(ii), target files a deemed sale return but the selling group does not file a consolidated return, target must file a substituted return for old target not later than the due date (including extensions) for the return of the common parent with which old target would have been included in the consolidated return. The substituted return is for so much of old target's taxable year as ends at the close of the acquisition date. Under § 1.1502–76(c)(2), the deemed sale return is not considered a return for purposes of section 6011 (relating to the general requirement of filing a return) if a substituted return must be filed.

(D) *Erroneous filing of return for regular tax year.* If, under this paragraph (a)(6)(ii), target files a return for so much of old target's regular taxable year as ends at the close of the acquisition date but the selling group files a consolidated return, target must file an amended return for old target not later than the due date (including extensions) for the selling group's consolidated return. (The amended return is a deemed sale return.)

(E) *Last date for payment of tax.* If either a substituted or amended final return of old target is filed under this paragraph (a)(6)(ii), the last date prescribed for payment of tax is the final return due date (as defined in paragraph (a)(6)(i) of this section).

(7) *Examples.* The following examples illustrate this paragraph (a):

Example 1. (i) S is the common parent of a consolidated group that includes T. The S group files calendar year consolidated returns. At the close of June 30 of Year 1, P makes a qualified stock purchase of T from

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S. P makes a section 338 election for T, and T's deemed asset sale occurs as of the close of T's acquisition date (June 30).

(ii) T is considered disaffiliated for purposes of reporting the deemed sale tax consequences. Accordingly, T is included in the S group's consolidated return through T's acquisition date except that the tax liability for the deemed sale tax consequences is reported in a separate deemed sale return of T. Provided that T is not treated as an excluded member under section 1563(b)(2), T is a component member of P's controlled group for the taxable year of the deemed asset sale, and the taxable income bracket amounts available in calculating tax on the deemed sale return must be limited accordingly.

(iii) If P purchased the stock of T at 10 a.m. on June 30 of Year 1, the results would be the same. See paragraph (a)(2)(i) of this section.

Example 2. The facts are the same as in *Example 1,* except that the S group does not file consolidated returns. T must file a separate return for its taxable year ending on June 30 of Year 1, which return includes the deemed asset sale.

(b) *Waiver*—(1) *Certain additions to tax.* An addition to tax or additional amount (addition) under subchapter A of chapter 68 of the Internal Revenue Code arising on or before the last day for making the election under section 338 because of circumstances that would not exist but for an election under section 338 is waived if—

(i) Under the particular statute the addition is excusable upon a showing of reasonable cause; and

(ii) Corrective action is taken on or before the last day.

(2) *Notification.* The Internal Revenue Service should be notified at the time of correction (e.g., by attaching a statement to a return that constitutes corrective action) that the waiver rule of this paragraph (b) is being asserted.

(3) *Elections or other actions required to be specified on a timely filed return*—(i) *In general.* If paragraph (b)(1) of this section applies or would apply if there were an underpayment, any election or other action that must be specified on a timely filed return for the taxable period covered by the late filed return described in paragraph (b)(1) of this section is considered timely if specified on a late-filed return filed on or before the last day for making the election under section 338.

(ii) *New target in purchasing corporation's consolidated return.* If new target is includible for its first taxable year in a consolidated return filed by the affiliated group of which the purchasing corporation is a member on or before the last day for making the election under section 338, any election or other action that must be specified in a timely filed return for new target's first taxable year (but which is not specified in the consolidated return) is considered timely if specified in an amended return filed on or before such last day, at the place where the consolidated return was filed.

(4) *Examples.* The following examples illustrate this paragraph (b):

Example 1. T is an unaffiliated corporation with a tax year ending March 31. At the close of September 20 of Year 1, P makes a qualified stock purchase of T. P does not join in filing a consolidated return. P makes a section 338 election for T on or before June 15 of Year 2, which causes T's taxable year to end as of the close of September 20 of Year 1. An income tax return for T's taxable period ending on September 20 of Year 1 was due on December 15 of Year 1. Additions to tax for failure to file a return and to pay tax shown on a return will not be imposed if T's return is filed and the tax paid on or before June 15 of Year 2. (This waiver applies even if the acquisition date coincides with the last day of T's former taxable year, i.e., March 31 of Year 2.) Interest on any underpayment of tax for old T's short taxable year ending September 20 of Year 1 runs from December 15 of Year 1. A statement indicating that the waiver rule of this paragraph is being asserted should be attached to T's return.

Example 2. Assume the same facts as in *Example 1.* Assume further that new T adopts the calendar year by filing, on or before June 15 of Year 2, its first return (for the period beginning on September 21 of Year 1 and ending on December 31 of Year 1) indicating that a calendar year is chosen. See § 1.338–1(b)(1). Any additions to tax or amounts described in this paragraph (b) that arise because of the late filing of a return for the period ending on December 31 of Year 1 are waived, because they are based on circumstances that would not exist but for the section 338 election. Notwithstanding this waiver, however, the return is still considered due March 15 of Year 2, and interest on any underpayment runs from that date.

Example 3. Assume the same facts as in *Example 2,* except that T's former taxable year ends on October 31. Although prior to the election old T had a return due on January 15 of Year 2 for its year ending October 31 of Year 1, that return need not be filed because a timely election under section 338 was made. Instead, old T must file a final return for the period ending on September 20 of Year 1, which is due on December 15 of Year 1.

§ 1.338–10T [Removed]

Par. 6. Section 1.338–10T is removed.

Par. 7. Section 1.338(h)(10)–1 is added to read as follows:

§ 1.338(h)(10)–1 Deemed asset sale and liquidation.

(a) *Scope.* This section prescribes rules for qualification for a section 338(h)(10) election and for making a section 338(h)(10) election. This section also prescribes the consequences of such election. The rules of this section are in addition to the rules of §§ 1.338–1 through 1.338–10 and, in appropriate cases, apply instead of the rules of §§ 1.338–1 through 1.338–10.

(b) *Definitions*—(1) *Consolidated target.* A *consolidated target* is a target that is a member of a consolidated group within the meaning of § 1.1502–1(h) on the acquisition date and is not the common parent of the group on that date.

(2) *Selling consolidated group.* A *selling consolidated group* is the consolidated group of which the consolidated target is a member on the acquisition date.

(3) *Selling affiliate; affiliated target.* A *selling affiliate* is a domestic corporation that owns on the acquisition date an amount of stock in a domestic target, which amount of stock is described in section 1504(a)(2), and does not join in filing a consolidated return with the target. In such case, the target is an *affiliated target.*

(4) *S corporation target.* An *S corporation target* is a target that is an S corporation immediately before the acquisition date.

(5) *S corporation shareholders. S corporation shareholders* are the S corporation target's shareholders. Unless otherwise indicated, a reference to S corporation shareholders refers both to S corporation shareholders who do and those who do not sell their target stock.

(6) *Liquidation.* Any reference in this section to a *liquidation* is treated as a reference to the transfer described in paragraph (d)(4) of this section notwithstanding its ultimate characterization for Federal income tax purposes.

(c) *Section 338(h)(10) election*—(1) *In general.* A section 338(h)(10) election may be made for T if P acquires stock meeting the requirements of section 1504(a)(2) from a selling consolidated group, a selling affiliate, or the S corporation shareholders in a qualified stock purchase.

(2) *Simultaneous joint election requirement.* A section 338(h)(10) election is made jointly by P and the selling consolidated group (or the selling affiliate or the S corporation shareholders) on Form 8023 in accordance with the instructions to the form. S corporation shareholders who do not sell their stock must also consent to the election. The section 338(h)(10) election must be made not later than the 15th day of the 9th month beginning after the month in which the acquisition date occurs.

(3) *Irrevocability.* A section 338(h)(10) election is irrevocable. If a section 338(h)(10) election is made for T, a

section 338 election is deemed made for T.

(4) *Effect of invalid election.* If a section 338(h)(10) election for T is not valid, the section 338 election for T is also not valid.

(d) *Certain consequences of section 338(h)(10) election.* For purposes of subtitle A of the Internal Revenue Code (except as provided in § 1.338–1(b)(2)), the consequences to the parties of making a section 338(h)(10) election for T are as follows:

(1) *P.* P is automatically deemed to have made a gain recognition election for its nonrecently purchased T stock, if any. The effect of a gain recognition election includes a taxable deemed sale by P on the acquisition date of any nonrecently purchased target stock. See § 1.338–5(d).

(2) *New T.* The AGUB for new T's assets is determined under § 1.338–5 and is allocated among the acquisition date assets under §§ 1.338–6 and 1.338–7. Notwithstanding paragraph (d)(4) of this section (deemed liquidation of old T), new T remains liable for the tax liabilities of old T (including the tax liability for the deemed sale tax consequences). For example, new T remains liable for the tax liabilities of the members of any consolidated group that are attributable to taxable years in which those corporations and old T joined in the same consolidated return. See § 1.1502–6(a).

(3) *Old T—deemed sale*—(i) *In general.* Old T is treated as transferring all of its assets to an unrelated person in exchange for consideration that includes the discharge of its liabilities in a single transaction at the close of the acquisition date (but before the deemed liquidation). See § 1.338–1(a) regarding the tax characterization of the deemed asset sale. Except as provided in § 1.338(h)(10)–1(d)(8) (regarding the installment method), old T recognizes all of the gain realized on the deemed transfer of its assets in consideration for the ADSP. ADSP for old T is determined under § 1.338–4 and allocated among the acquisition date assets under §§ 1.338–6 and 1.338–7. Old T realizes the deemed sale tax consequences from the deemed asset sale before the close of the acquisition date while old T is a member of the selling consolidated group (or owned by the selling affiliate or owned by the S corporation shareholders). If T is an affiliated target, or an S corporation target, the principles of §§ 1.338–2(c)(10) and 1.338–10(a)(1), (5), and (6)(i) apply to the return on which the deemed sale tax consequences are reported. When T is an S corporation target, T's S election continues in effect through the close of the acquisition date (including the time of the deemed asset sale and the deemed liquidation) notwithstanding section 1362(d)(2)(B). Also, when T is an S corporation target (but not a qualified subchapter S subsidiary), any direct and indirect subsidiaries of T which T has elected to treat as qualified subchapter S subsidiaries under section 1361(b)(3) remain qualified subchapter S subsidiaries through the close of the acquisition date.

(ii) *Tiered targets.* In the case of parent-subsidiary chains of corporations making elections under section 338(h)(10), the deemed asset sale of a parent corporation is considered to precede that of its subsidiary. See § 1.338–3(b)(4)(i).

(4) *Old T and selling consolidated group, selling affiliate, or S corporation shareholders—deemed liquidation; tax characterization*—(i) *In general.* Old T is treated as if, before the close of the acquisition date, after the deemed asset sale in paragraph (d)(3) of this section, and while old T is a member of the selling consolidated group (or owned by the selling affiliate or owned by the S corporation shareholders), it transferred all of its assets to members of the selling consolidated group, the selling affiliate, or S corporation shareholders and ceased to exist. The transfer from old T is characterized for Federal income tax purposes in the same manner as if the parties had actually engaged in the transactions deemed to occur because of this section and taking into account other transactions that actually occurred or are deemed to occur. For example, the transfer may be treated as a distribution in pursuance of a plan of reorganization, a distribution in complete cancellation or redemption of all its stock, one of a series of distributions in complete cancellation or redemption of all its stock in accordance with a plan of liquidation, or part of a circular flow of cash. In most cases, the transfer will be treated as a distribution in complete liquidation to which section 336 or 337 applies.

(ii) *Tiered targets.* In the case of parent-subsidiary chains of corporations making elections under section 338(h)(10), the deemed liquidation of a subsidiary corporation is considered to precede the deemed liquidation of its parent.

(5) *Selling consolidated group, selling affiliate, or S corporation shareholders*—(i) *In general.* If T is an S corporation target, S corporation shareholders (whether or not they sell their stock) take their pro rata share of the deemed sale tax consequences into account under section 1366 and increase or decrease their basis in T stock under section 1367. Members of the selling consolidated group, the selling affiliate, or S corporation shareholders are treated as if, after the deemed asset sale in paragraph (d)(3) of this section and before the close of the acquisition date, they received the assets transferred by old T in the transaction described in paragraph (d)(4)(i) of this section. In most cases, the transfer will be treated as a distribution in complete liquidation to which section 331 or 332 applies.

(ii) *Basis and holding period of T stock not acquired.* A member of the selling consolidated group (or the selling affiliate or an S corporation shareholder) retaining T stock is treated as acquiring the stock so retained on the day after the acquisition date for its fair market value. The holding period for the retained stock starts on the day after the acquisition date. For purposes of this paragraph, the fair market value of all of the T stock equals the grossed-up amount realized on the sale to P of P's recently purchased target stock. See § 1.338–4(c).

(iii) *T stock sale.* Members of the selling consolidated group (or the selling affiliate or S corporation shareholders) recognize no gain or loss on the sale or exchange of T stock included in the qualified stock purchase (although they may recognize gain or loss on the T stock in the deemed liquidation).

(6) *Nonselling minority shareholders other than nonselling S corporation shareholders*—(i) *In general.* This paragraph (d)(6) describes the treatment of shareholders of old T other than the following: Members of the selling consolidated group, the selling affiliate, S corporation shareholders (whether or not they sell their stock), and P. For a description of the treatment of S corporation shareholders, see paragraph (d)(5) of this section. A shareholder to which this paragraph (d)(6) applies is called a minority shareholder.

(ii) *T stock sale.* A minority shareholder recognizes gain or loss on the shareholder's sale or exchange of T stock included in the qualified stock purchase.

(iii) *T stock not acquired.* A minority shareholder does not recognize gain or loss under this section with respect to shares of T stock retained by the shareholder. The shareholder's basis and holding period for that T stock is not affected by the section 338(h)(10) election.

(7) *Consolidated return of selling consolidated group.* If P acquires T in a qualified stock purchase from a selling consolidated group—

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(i) The selling consolidated group must file a consolidated return for the taxable period that includes the acquisition date;

(ii) A consolidated return for the selling consolidated group for that period may not be withdrawn on or after the day that a section 338(h)(10) election is made for T; and

(iii) Permission to discontinue filing consolidated returns cannot be granted for, and cannot apply to, that period or any of the immediately preceding taxable periods during which consolidated returns continuously have been filed.

(8) *Availability of the section 453 installment method.* Solely for purposes of applying sections 453, 453A, and 453B, and the regulations thereunder (the installment method) to determine the consequences to old T in the deemed asset sale and to old T (and its shareholders, if relevant) in the deemed liquidation, the rules in paragraphs (d)(1) through (7) of this section are modified as follows:

(i) *In deemed asset sale.* Old T is treated as receiving in the deemed asset sale new T installment obligations, the terms of which are identical (except as to the obligor) to P installment obligations issued in exchange for recently purchased stock of T. Old T is treated as receiving in cash all other consideration in the deemed asset sale other than the assumption of, or taking subject to, old T liabilities. For example, old T is treated as receiving in cash any amounts attributable to the grossing-up of amount realized under § 1.338–4(c). The amount realized for recently purchased stock taken into account in determining ADSP is adjusted (and, thus, ADSP is redetermined) to reflect the amounts paid under an installment obligation for the stock when the total payments under the installment obligation are greater or less than the amount realized.

(ii) *In deemed liquidation.* Old T is treated as distributing in the deemed liquidation the new T installment obligations that it is treated as receiving in the deemed asset sale. The members of the selling consolidated group, the selling affiliate, or the S corporation shareholders are treated as receiving in the deemed liquidation the new T installment obligations that correspond to the P installment obligations they actually received individually in exchange for their recently purchased stock. The new T installment obligations may be recharacterized under other rules. See for example § 1.453–11(a)(2) which, in certain circumstances, treats the new T installment obligations deemed distributed by old T as if they were issued by new T in exchange for the stock in old T owned by members of the selling consolidated group, the selling affiliate, or the S corporation shareholders. The members of the selling consolidated group, the selling affiliate, or the S corporation shareholders are treated as receiving all other consideration in the deemed liquidation in cash.

(9) *Treatment consistent with an actual asset sale.* No provision in section 338(h)(10) or this section shall produce a Federal income tax result under subtitle A of the Internal Revenue Code that would not occur if the parties had actually engaged in the transactions deemed to occur because of this section and taking into account other transactions that actually occurred or are deemed to occur. See, however, § 1.338–1(b)(2) for certain exceptions to this rule.

(e) *Examples.* The following examples illustrate the provisions of this section:

Example 1. (i) S1 owns all of the T stock and T owns all of the stock of T1 and T2. S1 is the common parent of a consolidated group that includes T, T1, and T2. P makes a qualified stock purchase of all of the T stock from S1. S1 joins with P in making a section 338(h)(10) election for T and for the deemed purchase of T1. A section 338 election is not made for T2.

(ii) S1 does not recognize gain or loss on the sale of the T stock and T does not recognize gain or loss on the sale of the T1 stock because section 338(h)(10) elections are made for T and T1. Thus, for example, gain or loss realized on the sale of the T or T1 stock is not taken into account in earnings and profits. However, because a section 338 election is not made for T2, T must recognize any gain or loss realized on the deemed sale of the T2 stock. See § 1.338–4(h).

(iii) The results would be the same if S1, T, T1, and T2 are not members of any consolidated group, because S1 and T are selling affiliates.

Example 2. (i) S and T are solvent corporations. S owns all of the outstanding stock of T. S and P agree to undertake the following transaction: T will distribute half its assets to S, and S will assume half of T's liabilities. Then, P will purchase the stock of T from S. S and P will jointly make a section 338(h)(10) election with respect to the sale of T. The corporations then complete the transaction as agreed.

(ii) Under section 338(a), the assets present in T at the close of the acquisition date are deemed sold by old T to new T. Under paragraph (d)(4) of this section, the transactions described in paragraph (d) of this section are treated in the same manner as if they had actually occurred. Because S and P had agreed that, after T's actual distribution to S of part of its assets, S would sell T to P pursuant to an election under section 338(h)(10), and because paragraph (d)(4) of this section deems T subsequently to have transferred all its assets to its shareholder, T is deemed to have adopted a plan of complete liquidation under section 332. T's actual transfer of assets to S is treated as a distribution pursuant to that plan of complete liquidation.

Example 3. (i) S1 owns all of the outstanding stock of both T and S2. All three are corporations. S1 and P agree to undertake the following transaction. T will transfer substantially all of its assets and liabilities to S2, with S2 issuing no stock in exchange therefor, and retaining its other assets and liabilities. Then, P will purchase the stock of T from S1. S1 and P will jointly make a section 338(h)(10) election with respect to the sale of T. The corporations then complete the transaction as agreed.

(ii) Under section 338(a), the remaining assets present in T at the close of the acquisition date are deemed sold by old T to new T. Under paragraph (d)(4) of this section, the transactions described in this section are treated in the same manner as if they had actually occurred. Because old T transferred substantially all of its assets to S2, and is deemed to have distributed all its remaining assets and gone out of existence, the transfer of assets to S2, taking into account the related transfers, deemed and actual, qualifies as a reorganization under section 368(a)(1)(D). Section 361(c)(1) and not section 332 applies to T's deemed liquidation.

Example 4. (i) T owns two assets: an actively traded security (Class II) with a fair market value of $100 and an adjusted basis of $100, and inventory (Class IV) with a fair market value of $100 and an adjusted basis of $100. T has no liabilities. S is negotiating to sell all the stock in T to P for $100 cash and contingent consideration. Assume that under generally applicable tax accounting rules, P's adjusted basis in the T stock immediately after the purchase would be $100, because the contingent consideration is not taken into account. Thus, under the rules of § 1.338–5, AGUB would be $100. Under the allocation rules of § 1.338–6, the entire $100 would be allocated to the Class II asset, the actively traded security, and no amount would be allocated to the inventory. P, however, plans immediately to cause T to sell the inventory, but not the actively traded security, so it requests that, prior to the stock sale, S cause T to create a new subsidiary, Newco, and contribute the actively traded security to the capital of Newco. Because the stock in Newco, which would not be actively traded, is a Class V asset, under the rules of § 1.338–6 $100 of AGUB would be allocated to the inventory and no amount of AGUB would be allocated to the Newco stock. Newco's own AGUB, $0 under the rules of § 1.338–5, would be allocated to the actively traded security. When P subsequently causes T to sell the inventory, T would realize no gain or loss instead of realizing gain of $100.

(ii) Assume that, if the T stock had not itself been sold but T had instead sold both its inventory and the Newco stock to P, T would for tax purposes be deemed instead to have sold both its inventory and actively traded security directly to P, with P deemed then to have created Newco and contributed the actively traded security to the capital of Newco. Section 338, if elected, generally recharacterizes a stock sale as a deemed sale

of assets. However, paragraph (d)(9) of this section states, in general, that no provision of section 338(h)(10) or the regulations thereunder shall produce a Federal income tax result under subtitle A of the Internal Revenue Code that would not occur if the parties had actually engaged in the transactions deemed to occur by virtue of the section 338(h)(10) election, taking into account other transactions that actually occurred or are deemed to occur. Hence, the deemed sale of assets under section 338(h)(10) should be treated as one of the inventory and actively traded security themselves, not of the inventory and Newco stock. The anti-abuse rule of § 1.338–1(c) does not apply, because the substance of the deemed sale of assets is a sale of the inventory and the actively traded security themselves, not of the inventory and the Newco stock. Otherwise, the anti-abuse rule might apply.

Example 5. (i) T, a member of a selling consolidated group, has only one class of stock, all of which is owned by S1. On March 1 of Year 2, S1 sells its T stock to P for $80,000, and joins with P in making a section 338(h)(10) election for T. There are no selling costs or acquisition costs. On March 1 of Year 2, T owns land with a $50,000 basis and $75,000 fair market value and equipment with a $30,000 adjusted basis, $70,000 recomputed basis, and $60,000 fair market value. T also has a $40,000 liability. S1 pays old T's allocable share of the selling group's consolidated tax liability for Year 2 including the tax liability for the deemed sale tax consequences (a total of $13,600).

(ii) ADSP of $120,000 ($80,000 + $40,000 + 0) is allocated to each asset as follows:

Assets	Basis	FMV	Fraction	Allocable ADSP
Land	$50,000	$75,000	5/9	$66,667
Equipment	30,000	60,000	4/9	53,333
Total	80,000	135,000	1	120,000

(iii) Under paragraph (d)(3) of this section, old T has gain on the deemed sale of $40,000 (consisting of $16,667 of capital gain and $23,333 of ordinary income).

(iv) Under paragraph (d)(5)(iii) of this section, S1 recognizes no gain or loss upon its sale of the old T stock to P. S1 also recognizes no gain or loss upon the deemed liquidation of T. See paragraph (d)(4) of this section and section 332.

(v) P's basis in new T stock is P's cost for the stock, $80,000. See section 1012.

(vi) Under § 1.338–5, the AGUB for new T is $120,000, i.e., P's cost for the old T stock ($80,000) plus T's liability ($40,000). This AGUB is allocated as basis among the new T assets under §§ 1.338–6 and 1.338–7.

Example 6. (i) The facts are the same as in *Example 5,* except that S1 sells 80 percent of the old T stock to P for $64,000, rather than 100 percent of the old T stock for $80,000.

(ii) The consequences to P, T, and S1 are the same as in *Example 5,* except that:

(A) P's basis for its 80-percent interest in the new T stock is P's $64,000 cost for the stock. See section 1012.

(B) Under § 1.338–5, the AGUB for new T is $120,000 (i.e., $64,000/.8 + $40,000 + $0).

(C) Under paragraph (d)(4) of this section, S1 recognizes no gain or loss with respect to the retained stock in T. See section 332.

(D) Under paragraph (d)(5)(ii) of this section, the basis of the T stock retained by S1 is $16,000 (i.e., $120,000 − $40,000 (the ADSP amount for the old T assets over the sum of new T's liabilities immediately after the acquisition date) '' .20 (the proportion of T stock retained by S1)).

Example 7. (i) The facts are the same as in *Example 6,* except that K, a shareholder unrelated to T or P, owns the 20 percent of the T stock that is not acquired by P in the qualified stock purchase. K's basis in its T stock is $5,000.

(ii) The consequences to P, T, and S1 are the same as in *Example 6.*

(iii) Under paragraph (d)(6)(iii) of this section, K recognizes no gain or loss, and K's basis in its T stock remains at $5,000.

Example 8. (i) The facts are the same as in *Example 5,* except that the equipment is held by T1, a wholly-owned subsidiary of T, and a section 338(h)(10) election is also made for T1. The T1 stock has a fair market value of $60,000. T1 has no assets other than the equipment and no liabilities. S1 pays old T's and old T1's allocable shares of the selling group's consolidated tax liability for Year 2 including the tax liability for T and T1's deemed sale tax consequences.

(ii) ADSP for T is $120,000, allocated $66,667 to the land and $53,333 to the stock. Old T's deemed sale results in $16,667 of capital gain on its deemed sale of the land. Under paragraph (d)(5)(iii) of this section, old T does not recognize gain or loss on its deemed sale of the T1 stock. See section 332.

(iii) ADSP for T1 is $53,333 (i.e., $53,333 + $0 + $0). On the deemed sale of the equipment, T1 recognizes ordinary income of $23,333.

(iv) Under paragraph (d)(5)(iii) of this section, S1 does not recognize gain or loss upon its sale of the old T stock to P.

Example 9. (i) The facts are the same as in *Example 8,* except that P already owns 20 percent of the T stock, which is nonrecently purchased stock with a basis of $6,000, and that P purchases the remaining 80 percent of the T stock from S1 for $64,000.

(ii) The results are the same as in *Example 8,* except that under paragraph (d)(1) of this section and § 1.338–5(d), P is deemed to have made a gain recognition election for its nonrecently purchased T stock. As a result, P recognizes gain of $10,000 and its basis in the nonrecently purchased T stock is increased from $6,000 to $16,000. P's basis in all the T stock is $80,000 (i.e., $64,000 + $16,000). The computations are as follows:

(A) P's grossed-up basis for the recently purchased T stock is $64,000 (i.e., $64,000 (the basis of the recently purchased T stock) × (1 − .2)/(.8) (the fraction in section 338(b)(4))).

(B) P's basis amount for the nonrecently purchased T stock is $16,000 (i.e., $64,000 (the grossed-up basis in the recently purchased T stock) × (.2)/(1.0 − .2) (the fraction in section 338(b)(3)(B))).

(C) The gain recognized on the nonrecently purchased stock is $10,000 (i.e., $16,000 − $6,000).

Example 10. (i) T is an S corporation whose sole class of stock is owned 40 percent each by A and B and 20 percent by C. T, A, B, and C all use the cash method of accounting. A and B each has an adjusted basis of $10,000 in the stock. C has an adjusted basis of $5,000 in the stock. A, B, and C hold no installment obligations to which section 453A applies. On March 1 of Year 1, A sells its stock to P for $40,000 in cash and B sells its stock to P for a $25,000 note issued by P and real estate having a fair market value of $15,000. The $25,000 note, due in full in Year 7, is not publicly traded and bears adequate stated interest. A and B have no selling expenses. T's sole asset is real estate, which has a value of $110,000 and an adjusted basis of $35,000. Also, T's real estate is encumbered by long-outstanding purchase-money indebtedness of $10,000. The real estate does not have built-in gain subject to section 1374. A, B, and C join with P in making a section 338(h)(10) election for T.

(ii) Solely for purposes of application of sections 453, 453A, and 453B, old T is considered in its deemed asset sale to receive back from new T the $25,000 note (considered issued by new T) and $75,000 of cash (total consideration of $80,000 paid for all the stock sold, which is then divided by .80 in the grossing-up, with the resulting figure of $100,000 then reduced by the amount of the installment note). Absent an election under section 453(d), gain is reported by old T under the installment method.

(iii) In applying the installment method to old T's deemed asset sale, the contract price for old T's assets deemed sold is $100,000, the $110,000 selling price reduced by the indebtedness of $10,000 to which the assets are subject. (The $110,000 selling price is itself the sum of the $80,000 grossed-up in paragraph (ii) above to $100,000 and the $10,000 liability.) Gross profit is $75,000 ($110,000 selling price − old T's basis of $35,000). Old T's gross profit ratio is 0.75 (gross profit of $75,000 ÷ $100,000 contract price). Thus, $56,250 (0.75 × the $75,000 cash old T is deemed to receive in Year 1) is Year 1 gain attributable to the sale, and $18,750 ($75,000 − $56,250) is recovery of basis.

(iv) In its liquidation, old T is deemed to distribute the $25,000 note to B, since B actually sold the stock partly for that

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consideration. To the extent of the remaining liquidating distribution to B, it is deemed to receive, along with A and C, the balance of old T's liquidating assets in the form of cash. Under section 453(h), B, unless it makes an election under section 453(d), is not required to treat the receipt of the note as a payment for the T stock; P's payment of the $25,000 note in Year 7 to B is a payment for the T stock. Because section 453(h) applies to B, old T's deemed liquidating distribution of the note is, under section 453B(h), not treated as a taxable disposition by old T.

(v) Under section 1366, A reports 40 percent, or $22,500, of old T's $56,250 gain recognized in Year 1. Under section 1367, this increases A's $10,000 adjusted basis in the T stock to $32,500. Next, in old T's deemed liquidation, A is considered to receive $40,000 for its old T shares, causing it to recognize an additional $7,500 gain in Year 1.

(vi) Under section 1366, B reports 40 percent, or $22,500, of old T's $56,250 gain recognized in Year 1. Under section 1367, this increases B's $10,000 adjusted basis in its T stock to $32,500. Next, in old T's deemed liquidation, B is considered to receive the $25,000 note and $15,000 of other consideration. Applying section 453, including section 453(h), to the deemed liquidation, B's selling price and contract price are both $40,000. Gross profit is $7,500 ($40,000 selling price − B's basis of $32,500). B's gross profit ratio is 0.1875 (gross profit of $7,500 ÷ $40,000 contract price). Thus, $2,812.50 (0.1875 × $15,000) is Year 1 gain attributable to the deemed liquidation. In Year 7, when the $25,000 note is paid, B has $4,687.50 (0.1875 × $25,000) of additional gain.

(vii) Under section 1366, C reports 20 percent, or $11,250, of old T's $56,250 gain recognized in Year 1. Under section 1367, this increases C's $5,000 adjusted basis in its T stock to $16,250. Next, in old T's deemed liquidation, C is considered to receive $20,000 for its old T shares, causing it to recognize an additional $3,750 gain in Year 1. Finally, under paragraph (d)(5)(ii) of this section, C is considered to acquire its stock in T on the day after the acquisition date for $20,000 (fair market value = grossed-up amount realized of $100,000 × 20%). C's holding period in the stock deemed received in new T begins at that time.

(f) *Inapplicability of provisions.* The provisions of section 6043, § 1.331–1(d), and § 1.332–6 (relating to information returns and recordkeeping requirements for corporate liquidations) do not apply to the deemed liquidation of old T under paragraph (d)(4) of this section.

(g) *Required information.* The Commissioner may exercise the authority granted in section 338(h)(10)(C)(iii) to require provision of any information deemed necessary to carry out the provisions of section 338(h)(10) by requiring submission of information on any tax reporting form.

§ 1.338(h)(10)–1T [Removed]

Par. 8. Section 1.338(h)(10)–1T is removed.

Par. 9. Section 1.338(i)–1 is added to read as follows:

§ 1.338(i)–1 Effective dates.

(a) *In general.* The provisions of §§ 1.338–1 through 1.338–7, 1.338–10 and 1.338(h)(10)–1 apply to any qualified stock purchase occurring after March 15, 2001. For rules applicable to qualified stock purchases on or before March 15, 2001, see §§ 1.338–1T through 1.338–7T, 1.338–10T, 1.338(h)(10)–1T and 1.338(i)–1T in effect prior to March 16, 2001 (see 26 CFR part 1 revised April 1, 2000).

(b) *Section 338(h)(10) elections for S corporation targets.* The requirements of §§ 1.338(h)(10)–1T(c)(2) and 1.338(h)(10)–1(c)(2) that S corporation shareholders who do not sell their stock must also consent to an election under section 338(h)(10) will not invalidate an otherwise valid election made on the September 1997 revision of Form 8023, ''Elections Under Section 338 For Corporations Making Qualified Stock Purchases,'' not signed by the nonselling shareholders, provided that the S corporation and all of its shareholders (including nonselling shareholders) report the tax consequences consistently with the results under section 338(h)(10).

§ 1.338(i)–1T [Removed]

Par. 10. Section 1.338(i)–1T is removed.

Par. 11. Section 1.1060–1 is added to read as follows:

§ 1.1060–1 Special allocation rules for certain asset acquisitions.

(a) *Scope*—(1) *In general.* This section prescribes rules relating to the requirements of section 1060, which, in the case of an applicable asset acquisition, requires the transferor (the seller) and the transferee (the purchaser) each to allocate the consideration paid or received in the transaction among the assets transferred in the same manner as amounts are allocated under section 338(b)(5) (relating to the allocation of adjusted grossed-up basis among the assets of the target corporation when a section 338 election is made). In the case of an applicable asset acquisition described in paragraph (b)(1) of this section, sellers and purchasers must allocate the consideration under the residual method as described in §§ 1.338–6 and 1.338–7 in order to determine, respectively, the amount realized from, and the basis in, each of the transferred assets. For rules relating to distributions of partnership property or transfers of partnership interests which are subject to section 1060(d), see § 1.755–2T.

(2) *Effective date.* The provisions of this section apply to any asset acquisition occurring after March 15, 2001. For rules applicable to asset acquisitions on or before March 15, 2001, see § 1.1060–1T in effect prior to March 16, 2001 (see 26 CFR part 1 revised April 1, 2000).

(3) *Outline of topics.* In order to facilitate the use of this section, this paragraph (a)(3) lists the major paragraphs in this section as follows:

(a) Scope.
(1) In general.
(2) Effective date.
(3) Outline of topics.
(b) Applicable asset acquisition.
(1) In general.
(2) Assets constituting a trade or business.
(i) In general.
(ii) Goodwill or going concern value.
(iii) Factors indicating goodwill or going concern value.
(3) Examples.
(4) Asymmetrical transfers of assets.
(5) Related transactions.
(6) More than a single trade or business.
(7) Covenant entered into by the seller.
(8) Partial non-recognition exchanges.
(c) Allocation of consideration among assets under the residual method.
(1) Consideration.
(2) Allocation of consideration among assets.
(3) Certain costs.
(4) Effect of agreement between parties.
(d) Examples.
(e) Reporting requirements.
(1) Applicable asset acquisitions.
(i) In general.
(ii) Time and manner of reporting.
(A) In general.
(B) Additional reporting requirement.
(2) Transfers of interests in partnerships.

(b) *Applicable asset acquisition*—(1) *In general.* An applicable asset acquisition is any transfer, whether direct or indirect, of a group of assets if the assets transferred constitute a trade or business in the hands of either the seller or the purchaser and, except as provided in paragraph (b)(8) of this section, the purchaser's basis in the transferred assets is determined wholly by reference to the purchaser's consideration.

(2) *Assets constituting a trade or business*—(i) *In general.* For purposes of this section, a group of assets constitutes a trade or business if—

(A) The use of such assets would constitute an active trade or business under section 355; or

(B) Its character is such that goodwill or going concern value could under any circumstances attach to such group.

(ii) *Goodwill or going concern value.* Goodwill is the value of a trade or business attributable to the expectancy of continued customer patronage. This expectancy may be due to the name or reputation of a trade or business or any

other factor. Going concern value is the additional value that attaches to property because of its existence as an integral part of an ongoing business activity. Going concern value includes the value attributable to the ability of a trade or business (or a part of a trade or business) to continue functioning or generating income without interruption notwithstanding a change in ownership. It also includes the value that is attributable to the immediate use or availability of an acquired trade or business, such as, for example, the use of the revenues or net earnings that otherwise would not be received during any period if the acquired trade or business were not available or operational.

(iii) *Factors indicating goodwill or going concern value.* In making the determination in this paragraph (b)(2), all the facts and circumstances surrounding the transaction are taken into account. Whether sufficient consideration is available to allocate to goodwill or going concern value after the residual method is applied is not relevant in determining whether goodwill or going concern value could attach to a group of assets. Factors to be considered include—

(A) The presence of any intangible assets (whether or not those assets are section 197 intangibles), provided, however, that the transfer of such an asset in the absence of other assets will not be a trade or business for purposes of section 1060;

(B) The existence of an excess of the total consideration over the aggregate book value of the tangible and intangible assets purchased (other than goodwill and going concern value) as shown in the financial accounting books and records of the purchaser; and

(C) Related transactions, including lease agreements, licenses, or other similar agreements between the purchaser and seller (or managers, directors, owners, or employees of the seller) in connection with the transfer.

(3) *Examples.* The following examples illustrate paragraphs (b)(1) and (2) of this section:

Example 1. S is a high grade machine shop that manufactures microwave connectors in limited quantities. It is a successful company with a reputation within the industry and among its customers for manufacturing unique, high quality products. Its tangible assets consist primarily of ordinary machinery for working metal and plating. It has no secret formulas or patented drawings of value. P is a company that designs, manufactures, and markets electronic components. It wants to establish an immediate presence in the microwave industry, an area in which it previously has not been engaged. P is acquiring assets of a number of smaller companies and hopes that these assets will collectively allow it to offer a broad product mix. P acquires the assets of S in order to augment its product mix and to promote its presence in the microwave industry. P will not use the assets acquired from S to manufacture microwave connectors. The assets transferred are assets that constitute a trade or business in the hands of the seller. Thus, P's purchase of S's assets is an applicable asset acquisition. The fact that P will not use the assets acquired from S to continue the business of S does not affect this conclusion.

Example 2. S, a sole proprietor who operates a car wash, both leases the building housing the car wash and sells all of the car wash equipment to P. S's use of the building and the car wash equipment constitute a trade or business. P begins operating a car wash in the building it leases from S. Because the assets transferred together with the asset leased are assets which constitute a trade or business, P's purchase of S's assets is an applicable asset acquisition.

Example 3. S, a corporation, owns a retail store business in State X and conducts activities in connection with that business enterprise that meet the active trade or business requirement of section 355. P is a minority shareholder of S. S distributes to P all the assets of S used in S's retail business in State X in complete redemption of P's stock in S held by P. The distribution of S's assets in redemption of P's stock is treated as a sale or exchange under sections 302(a) and 302(b)(3), and P's basis in the assets distributed to it is determined wholly by reference to the consideration paid, the S stock. Thus, S's distribution of assets constituting a trade or business to P is an applicable asset acquisition.

Example 4. S is a manufacturing company with an internal financial bookkeeping department. P is in the business of providing a financial bookkeeping service on a contract basis. As part of an agreement for P to begin providing financial bookkeeping services to S, P agrees to buy all of the assets associated with S's internal bookkeeping operations and provide employment to any of S's bookkeeping department employees who choose to accept a position with P. In addition to selling P the assets associated with its bookkeeping operation, S will enter into a long term contract with P for bookkeeping services. Because assets transferred from S to P, along with the related contract for bookkeeping services, are a trade or business in the hands of P, the sale of the bookkeeping assets from S to P is an applicable asset acquisition.

(4) *Asymmetrical transfers of assets.* A purchaser is subject to section 1060 if—

(i) Under general principles of tax law, the seller is not treated as transferring the same assets as the purchaser is treated as acquiring;

(ii) The assets acquired by the purchaser constitute a trade or business; and

(iii) Except as provided in paragraph (b)(8) of this section, the purchaser's basis in the transferred assets is determined wholly by reference to the purchaser's consideration.

(5) *Related transactions.* Whether the assets transferred constitute a trade or business is determined by aggregating all transfers from the seller to the purchaser in a series of related transactions. Except as provided in paragraph (b)(8) of this section, all assets transferred from the seller to the purchaser in a series of related transactions are included in the group of assets among which the consideration paid or received in such series is allocated under the residual method. The principles of § 1.338–1(c) are also applied in determining which assets are included in the group of assets among which the consideration paid or received is allocated under the residual method.

(6) *More than a single trade or business.* If the assets transferred from a seller to a purchaser include more than one trade or business, then, in applying this section, all of the assets transferred (whether or not transferred in one transaction or a series of related transactions and whether or not part of a trade or business) are treated as a single trade or business.

(7) *Covenant entered into by the seller.* If, in connection with an applicable asset acquisition, the seller enters into a covenant (e.g., a covenant not to compete) with the purchaser, that covenant is treated as an asset transferred as part of a trade or business.

(8) *Partial non-recognition exchanges.* A transfer may constitute an applicable asset acquisition notwithstanding the fact that no gain or loss is recognized with respect to a portion of the group of assets transferred. All of the assets transferred, including the non-recognition assets, are taken into account in determining whether the group of assets constitutes a trade or business. The allocation of consideration under paragraph (c) of this section is done without taking into account either the non-recognition assets or the amount of money or other property that is treated as transferred in exchange for the non-recognition assets (together, the non-recognition exchange property). The basis in and gain or loss recognized with respect to the non-recognition exchange property are determined under such rules as would otherwise apply to an exchange of such property. The amount of the money and other property treated as exchanged for non-recognition assets is the amount by which the fair market value of the non-recognition assets transferred by one party exceeds the fair market value of the non-recognition assets transferred by the other (to the extent of the money

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and the fair market value of property transferred in the exchange). The money and other property that are treated as transferred in exchange for the non-recognition assets (and which are not included among the assets to which section 1060 applies) are considered to come from the following assets in the following order: first from Class I assets, then from Class II assets, then from Class III assets, then from Class IV assets, then from Class V assets, then from Class VI assets, and then from Class VII assets. For this purpose, liabilities assumed (or to which a non-recognition exchange property is subject) are treated as Class I assets. See *Example 1* in paragraph (d) of this section for an example of the application of section 1060 to a single transaction which is, in part, a non-recognition exchange.

(c) *Allocation of consideration among assets under the residual method*—(1) *Consideration.* The seller's consideration is the amount, in the aggregate, realized from selling the assets in the applicable asset acquisition under section 1001(b). The purchaser's consideration is the amount, in the aggregate, of its cost of purchasing the assets in the applicable asset acquisition that is properly taken into account in basis.

(2) *Allocation of consideration among assets.* For purposes of determining the seller's amount realized for each of the assets sold in an applicable asset acquisition, the seller allocates consideration to all the assets sold by using the residual method under §§ 1.338–6 and 1.338–7, substituting consideration for ADSP. For purposes of determining the purchaser's basis in each of the assets purchased in an applicable asset acquisition, the purchaser allocates consideration to all the assets purchased by using the residual method under §§ 1.338–6 and 1.338–7, substituting consideration for AGUB. In allocating consideration, the rules set forth in paragraphs (c)(3) and (4) of this section apply in addition to the rules in §§ 1.338–6 and 1.338–7.

(3) *Certain costs.* The seller and purchaser each adjusts the amount allocated to an individual asset to take into account the specific identifiable costs incurred in transferring that asset in connection with the applicable asset acquisition (e.g., real estate transfer costs or security interest perfection costs). Costs so allocated increase, or decrease, as appropriate, the total consideration that is allocated under the residual method. No adjustment is made to the amount allocated to an individual asset for general costs associated with the applicable asset acquisition as a whole or with groups of assets included therein (e.g., non-specific appraisal fees or accounting fees). These latter amounts are taken into account only indirectly through their effect on the total consideration to be allocated.

(4) *Effect of agreement between parties.* If, in connection with an applicable asset acquisition, the seller and purchaser agree in writing as to the allocation of any amount of consideration to, or as to the fair market value of, any of the assets, such agreement is binding on them to the extent provided in this paragraph (c)(4). Nothing in this paragraph (c)(4) restricts the Commissioner's authority to challenge the allocations or values arrived at in an allocation agreement. This paragraph (c)(4) does not apply if the parties are able to refute the allocation or valuation under the standards set forth in *Commissioner* v. *Danielson*, 378 F.2d 771 (3d Cir.), *cert. denied*, 389 U.S. 858 (1967) (a party wishing to challenge the tax consequences of an agreement as construed by the Commissioner must offer proof that, in an action between the parties to the agreement, would be admissible to alter that construction or show its unenforceability because of mistake, undue influence, fraud, duress, etc.).

(d) *Examples.* The following examples illustrate this section:

Example 1. (i) On January 1, 2001, A transfers assets X, Y, and Z to B in exchange for assets D, E, and F plus $1,000 cash.

(ii) Assume the exchange of assets constitutes an exchange of like-kind property to which section 1031 applies. Assume also that goodwill or going concern value could under any circumstances attach to each of the DEF and XYZ groups of assets and, therefore, each group constitutes a trade or business under section 1060.

(iii) Assume the fair market values of the assets and the amount of money transferred are as follows:

Asset	Fair market value
By A:	
X	$ 400
Y	400
Z	200
Total	1,000
By B:	
D	40
E	30
F	30
Cash (amount)	1,000
Total	1,100

(iv) Under paragraph (b)(8) of this section, for purposes of allocating consideration under paragraph (c) of this section, the like-kind assets exchanged and any money or other property that are treated as transferred in exchange for the like-kind property are excluded from the application of section 1060.

(v) Since assets X, Y, and Z are like-kind property, they are excluded from the application of the section 1060 allocation rules.

(vi) Since assets D, E, and F are like-kind property, they are excluded from the application of the section 1060 allocation rules. Thus, the allocation rules of section 1060 do not apply in determining B's gain or loss with respect to the disposition of assets D, E, and F, and the allocation rules of section 1060 and paragraph (c) of this section are not applied to determine A's bases of assets D, E, and F. In addition, $900 of the $1,000 cash B gave to A for A's like-kind assets (X, Y, and Z) is treated as transferred in exchange for the like-kind property in order to equalize the fair market values of the like-kind assets. Therefore, $900 of the cash is excluded from the application of the section 1060 allocation rules.

(vii) $100 of the cash is allocated under section 1060 and paragraph (c) of this section.

(viii) A received $100 that must be allocated under section 1060 and paragraph (c) of this section. Since A transferred no Class I, II, III, IV, V, or VI assets to which section 1060 applies, in determining its amount realized for the part of the exchange to which section 1031 does not apply, the $100 is allocated to Class VII assets (goodwill and going concern value).

(ix) B gave A $100 that must be allocated under section 1060 and paragraph (c) of this section. Since B received from A no Class I, II, III, IV, V, or VI assets to which section 1060 applies, the $100 consideration is allocated by B to Class VII assets (goodwill and going concern value).

Example 2. (i) On January 1, 2001, S, a sole proprietor, sells to P, a corporation, a group of assets that constitutes a trade or business under paragraph (b)(2) of this section. S, who plans to retire immediately, also executes in P's favor a covenant not to compete. P pays S $3,000 in cash and assumes $1,000 in liabilities. Thus, the total consideration is $4,000.

(ii) On the purchase date, P and S also execute a separate agreement that states that the fair market values of the Class II, Class III, Class V, and Class VI assets S sold to P are as follows:

Asset class	Asset	Fair market value
II	Actively traded securities	$500
	Total Class II	500
III	Accounts receivable	200
	Total Class III	200
V	Furniture and fixtures	800
	Building	800
	Land	200

Asset class	Asset	Fair market value
	Equipment	400
	Total Class V	2,200
VI	Covenant not to compete	900
	Total Class VI	900

(iii) P and S each allocate the consideration in the transaction among the assets transferred under paragraph (c) of this section in accordance with the agreed upon fair market values of the assets, so that $500 is allocated to Class II assets, $200 is allocated to the Class III asset, $2,200 is allocated to Class V assets, $900 is allocated to Class VI assets, and $200 ($4,000 total consideration less $3,800 allocated to assets in Classes II, III, V, and VI) is allocated to the Class VII assets (goodwill and going concern value).

(iv) In connection with the examination of P's return, the Commissioner, in determining the fair market values of the assets transferred, may disregard the parties' agreement. Assume that the Commissioner correctly determines that the fair market value of the covenant not to compete was $500. Since the allocation of consideration among Class II, III, V, and VI assets results in allocation up to the fair market value limitation, the $600 of unallocated consideration resulting from the Commissioner's redetermination of the value of the covenant not to compete is allocated to Class VII assets (goodwill and going concern value).

(e) *Reporting requirements*—(1) *Applicable asset acquisitions*—(i) *In general.* Unless otherwise excluded from this requirement by the Commissioner, the seller and the purchaser in an applicable asset acquisition each must report information concerning the amount of consideration in the transaction and its allocation among the assets transferred. They also must report information concerning subsequent adjustments to consideration.

(ii) *Time and manner of reporting*—(A) *In general.* The seller and the purchaser each must file asset acquisition statements on Form 8594, ''Asset Allocation Statement,'' with their income tax returns or returns of income for the taxable year that includes the first date assets are sold pursuant to an applicable asset acquisition. This reporting requirement applies to all asset acquisitions described in this section. For reporting requirements relating to asset acquisitions occurring before March 16, 2001, as described in paragraph (a)(2) of this section, see the temporary regulations under section 1060 in effect prior to March 16, 2001 (see 26 CFR part 1 revised April 1, 2000).

(B) *Additional reporting requirement.* When an increase or decrease in consideration is taken into account after the close of the first taxable year that includes the first date assets are sold in an applicable asset acquisition, the seller and the purchaser each must file a supplemental asset acquisition statement on Form 8594 with the income tax return or return of income for the taxable year in which the increase (or decrease) is properly taken into account.

(2) *Transfers of interests in partnerships.* For reporting requirements relating to the transfer of a partnership interest, see § 1.755–2T(c).

§ 1.1060–1T [Removed]

Par. 12. Section 1.1060–1T is removed.

Par. 13. Section 1.1361–1 is amended as follows:

1. Redesignate paragraph (l)(2)(v) as paragraph (l)(2)(vi).

2. Add a new paragraph (l)(2)(v). The addition reads as follows:

§ 1.1361–1 S corporation defined.

* * * * *

(l) * * *

(2) * * *

(v) *Special rule for section 338(h)(10) elections.* If the shareholders of an S corporation sell their stock in a transaction for which an election is made under section 338(h)(10) and § 1.338(h)(10)–1, the receipt of varying amounts per share by the shareholders will not cause the S corporation to have more than one class of stock, provided that the varying amounts are determined in arm's length negotiations with the purchaser.

* * * * *

Par. 14. Section 1.1361–4 is amended by removing the last two sentences of paragraph (b)(4) and adding three sentences to read as follows:

§ 1.1361–4 Effect of QSub election.

* * * * *

(b) * * *

(4) *Coordination with section 338 election.* * * * If an S corporation makes an election under section 338 (without a section 338(h)(10) election) with respect to a target, the target must file a final return as a C corporation reflecting the deemed sale. See § 1.338–10(a). If the target was an S corporation on the day before the acquisition date, the final return as a C corporation must reflect the activities of the target for the acquisition date, including the deemed sale. See § 1.338–10(a)(3).

* * * * *

Par. 15. Section 1.1502–76 is amended by adding a parenthetical at the end of paragraph (b)(1)(ii)(B)(3) and before the semicolon to read as follows:

§ 1.1502–76 Taxable year of members of group.

* * * * *

(b) * * *

(1) * * *

(ii) * * *

(B) * * *

(3) * * * (but see § 1.338–1(d)) * * *

* * * * *

PART 602—OMB CONTROL NUMBERS UNDER PAPERWORK REDUCTION ACT

Par. 16. The authority citation for part 602 continues to read as follows:

Authority: 26 U.S.C. 7805.

Par. 17. In § 602.101, paragraph (b) is amended by removing the entries for §§ 1.338–2T, 1.338–5T, 1.338–10T, 1.338(h)(10)–1T, and 1.1060–1T from the table and adding new entries to the table in numerical order to read as follows:

§ 602.101 OMB Control numbers.

* * * * *

(b) * * *

CFR part or section where identified and described	Current OMB control No.
* * * *	*
1.338–2	1545–1658
1.338–5	1545–1658
1.338–10	1545–1658
1.338(h)(10)–1	1545–1658
* * * *	*
1.1060–1	1545–1658
* * * *	*

Robert E. Wenzel,

Deputy Commissioner of Internal Revenue.

Approved: January 4, 2001.

Jonathan Talisman,

Assistant Secretary of the Treasury (Tax Policy).

[FR Doc. 01–981 Filed 2–12–01; 8:45 am]

BILLING CODE 4830–01–P

DEPARTMENT OF THE TREASURY

Internal Revenue Service

26 CFR Part 301

[TD 8943]

RIN 1545–AY51

Disclosure of Return Information to the Bureau of the Census

AGENCY: Internal Revenue Service (IRS), Treasury.

ACTION: Temporary regulations.

011243

SUMMARY: This document contains temporary regulations relating to additions to the list of items of information disclosed to the Bureau of the Census for use in the Longitudinal Employer-Household Dynamics (LEHD) project and the Survey of Income and Program Participation (SIPP) project. These regulations provide guidance to IRS and Social Security Administration (SSA) personnel responsible for disclosing the information. The text of the temporary regulations also serves as the text of the proposed regulations set forth in the notice of proposed rulemaking on this subject in the Proposed Rules section of this issue of the **Federal Register**.

DATES: *Effective Date:* These regulations are effective February 13, 2001.

Applicability Date: For dates of applicability, see § 301.6103(j)(1)–1T(e) of these regulations.

FOR FURTHER INFORMATION CONTACT: Stuart Murray, (202) 622–4580 (not a toll-free number).

Background

Under section 6103(j)(1), upon written request from the Secretary of Commerce, the Secretary is to furnish to the Bureau of the Census (Bureau) tax return information that is prescribed by Treasury regulations for the purpose of, but only to the extent necessary in, structuring censuses and national economic accounts and conducting related statistical activities authorized by law. Section 301.6103(j)(1)–1 of the regulations further defines such purposes by reference to 13 U.S.C. Chapter 5 and provides an itemized description of the return information authorized to be disclosed for such purposes. Section 301.6103(j)(1)–1(b)(5) of the regulations provides a list of information provided to the Social Security Administration (SSA) pursuant to Internal Revenue Code section 6103(l)(1)(A) or (5) that officers or employees of SSA may disclose to the Bureau. Periodically, the disclosure regulations are amended to reflect the changing needs of the Bureau for data for its statutorily authorized statistical activities.

This document adopts temporary regulations that authorize IRS and SSA personnel to disclose the additional items of return information that have been requested by the Secretary of Commerce for specified purposes related to the LEHD and SIPP projects.

Except for § 301.6103(j)(1)–1T(b)(2)(v) and (vi); (b)(3)(xxiii), (xxiv),(xxv), (xxvi), (xxvii) and (xxviii); and (b)(5)(iii) , (iv), and (v); the text of the temporary regulations is the same as 26 CFR 301.6103(j)(1)–1. The changes made by § 301.6103(j)(1)–1T(b)(2)(v) and (vi); (b)(3)(xxiii), (xxiv), (xxv), (xxvi), (xxvii) and (xxviii); and (b)(5)(iii), (iv), and (v); are discussed below.

Explanation of Provisions

By letter dated March 27, 2000, the Secretary of Commerce requested that additional items of return information be disclosed to the Bureau for purposes related to the Longitudinal Employer-Household Dynamics (LEHD) project. The request indicates that the Bureau is ready to begin a joint project with SSA to develop data files that contain linked information, matching selected worker and employer records for statistical research, in order to improve programs at the Bureau and SSA. The linked information will come from the Bureau's demographic and economic censuses and surveys, the Bureau's Standard Statistical Establishment List (SSEL), which includes business tax information, and SSA's administrative records. The Bureau's component of this project, the LEHD project, will enable the Bureau to conduct studies that are intended to improve the quality of the Bureau's core demographic and economic censuses and surveys, which are Bureau activities authorized under 13 U.S.C. Chapter 5.

The Bureau has specifically requested information from SSA's Master Earnings File (MEF), which contains information from IRS Form W–2 and Form 1040SE. The IRS information contained in SSA's MEF will permit the Bureau to link employee data with employer data. The Bureau has requested Social Security Numbers (SSNs) and Employer Identification Numbers (EINs) to link the employee and employer data.

The Bureau has also requested the disclosure of wages, tips, and other compensation and deferred wages from the Form W–2. The Bureau indicated that it wants this detailed earnings record information because it is provided separately for each employer of the employee; it covers all persons with wages, including nonfilers and other non-covered employees; and it provides specific information on deferred compensation, such as retirement contributions.

By letter dated August 2, 2000, the Secretary of Commerce requested additional items of information for purposes related to the Bureau's Survey of Income and Program Participation (SIPP) demographic survey. This request indicates that the Bureau and SSA want to ensure that the regulations authorize the continuation of a joint project to develop data files that contain linked information from the SIPP with information from SSA's Master Earnings File. The linkage of Census survey information on family relationships with SSA's earnings histories allows for the study and assessment of welfare and social security/retirement proposals. Specifically, the Bureau intends to improve the quality of the SIPP by adding a series of projected Primary Insurance Amounts (PIAs) to the public-use version of each available SIPP.

In order to adjust for misreported data related to earnings, employment, and pensions from the Bureau's SIPP, the Bureau also requested data from Forms W–2 and 1099R or data derived from these forms. Some of the information requested for LEHD is also requested for SIPP, such as the social security number; employer identification number; wages, tips and other compensation; and deferred wages.

As provided in the Commissioner of Internal Revenue's responses to the LEHD and SIPP requests dated September 25, 2000, and October 27, 2000, respectively, information will be furnished under these temporary regulations only for the purposes of conducting the LEHD project and/or the SIPP/SSA project as specified in the request letters and with the understanding that the information will be used strictly in accordance with the provisions of the Internal Revenue Code pertaining to confidentiality.

Special Analyses

It has been determined that this Treasury decision is not a significant regulatory action as defined in Executive Order 12866. Therefore, a regulatory assessment is not required. It also has been determined that section 553(b) of the Administrative Procedure Act (5 U.S.C. chapter 5) does not apply to these regulations, and because no notice of proposed rulemaking is required, the Regulatory Flexibility Act (5 U.S.C. chapter 6) does not apply. Pursuant to section 7805(f) of the Internal Revenue Code, these temporary regulations will be submitted to the Chief Counsel for Advocacy of the Small Business Administration for comment on their impact on small business.

Drafting Information

The principal author of these regulations is Jamie G. Bernstein, Office of the Associate Chief Counsel, Procedure & Administration (Disclosure & Privacy Law Division) Internal Revenue Service. However, other personnel from the IRS and Treasury Department participated in their development.

List of Subjects in 26 CFR Part 301

Employment taxes, Estate taxes, Excise taxes, Gift taxes, Income taxes, Penalties, Reporting and recordkeeping requirements.

Adoption of Amendments to the Regulations

Accordingly, 26 CFR Part 301 is amended as follows:

PART 301—PROCEDURE AND ADMINISTRATION

Paragraph 1. The authority citation for part 301 is amended by adding an entry in numerical order to read as follows:

Authority: 26 U.S.C. 7805 * * *

Section 301.6103(j)(1)–1T also issued under 26 U.S.C. 6103(j)(1); * * *

Par. 2. Section 301.6103(j)(1)–1T is added to read as follows:

§ 301.6103(j)(1)–1T Disclosure of return information to officers and employees of the Department of Commerce for certain statistical purposes and related activities (temporary).

(a) through (b)(2)(iv) [Reserved]. For further guidance, see § 301.6103(j)(1)–1(a) through (b)(2)(iv).

(b)(2)(v) Total Social Security Taxable Earnings;

(vi) Quarters of Social Security coverage.

(b)(3)(i) through (xxii) [Reserved]. For further guidance, see § 301.6103(j)(1)–1(b)(3)(i) through (xxii).

(xxiii) Wages, tips, and other compensation;

(xxiv) Social Security Wages;

(xxv) Deferred wages;

(xxvi) Social Security Tip Income;

(xxvii) Total Social Security Taxable Earnings;

(xxviii) Gross Distributions from Form 1099R.

(b)(4) through (b)(5)(ii) [Reserved]. For further guidance, see § 301.6103(j)(1)–1(b)(4) through (b)(5)(ii).

(b)(5)(iii) From Form W–2, and related forms and schedules—

(A) Social Security Number;

(B) Employer Identification Number;

(C) Wages, tips, and other compensation;

(D) Social Security Wages;

(E) Deferred wages.

(iv) Total Social Security Taxable Earnings.

(v) Quarters of Social Security Coverage.

* * * * *

(b)(6) through(d) [Reserved]. For further guidance, see § 301.6103(j)(1)–1(b)(6) through (d).

(e) *Effective date.* This section is applicable to the Bureau of the Census on February 13, 2001 through February 13, 2004.

Approved: January 16, 2001.

Robert E. Wenzel,

Deputy Commissioner of Internal Revenue.

Jonathan Talisman,

Assistant Secretary of the Treasury.

[FR Doc. 01–1989 Filed 2–12–01; 8:45 am]

BILLING CODE 4830–01–P

DEPARTMENT OF THE TREASURY

31 CFR Part 1

U. S. Secret Service; Privacy Act of 1974; Implementation

AGENCY: Office of the Secretary, Treasury.

ACTION: Final Rule.

SUMMARY: The Department is amending its regulations concerning the Privacy Act of 1974, Title 5 of the United States Code, Section 552a (Privacy Act) by revising the United States Secret Services Appendix D of this subpart to identify a new official responsible for administrative appeals of initial determinations refusing amendment of records made pursuant to the Privacy Act. The Department is also updating the address of the Secret Service Headquarters listed in the Appendix.

EFFECTIVE DATE: February 13, 2001.

FOR FURTHER INFORMATION CONTACT: Donna Cahill, Associate Chief Counsel, United States Secret Service, 950 H Street, NW., Suite 8300, Washington, DC 20373–5802.

SUPPLEMENTARY INFORMATION: The Secret Service is updating its current Privacy Act regulation Appendix D. The Secret Service moved its headquarters to a new location, consequently the addresses shown in the Appendix are no longer current and need to be updated to provide the proper address to the public.

The Secret Service also recognizes a need to revise paragraph 4 of Appendix D, which identifies the official responsible for reviewing administrative appeals of initial determinations refusing amendment of records. Existing regulations name the ''Assistant Secretary of the Treasury for Enforcement'' as the reviewing official. However, to be consistent with the language implementing the Freedom of Information Act (FOIA), 31 CFR part 1, subpart A, appendix D.4, published at 65 FR 40514 on June 30, 2000, the Secret Service has determined that the reviewing official should be changed to the ''Deputy Director, United States Secret Service.'' The address to which an appeal should be made by mail or delivered personally is also being changed to: ''Privacy Act Amendment Appeal, Deputy Director, United States Secret Service, 950 H Street, NW., Suite 8300, Washington, DC 20373–5802.''

These regulations are being published as a final rule because the amendment does not impose any requirements on any member of the public. This amendment is the most efficient means for the Treasury Department to implement its internal requirements for complying with the Privacy Act. Accordingly, pursuant to the administrative procedure provisions in 5 U.S.C. 553, the Department of the Treasury finds good cause that prior notice and other public procedure with respect to this rule are impracticable and unnecessary and finds good cause for making this rule effective on the date of publication in the **Federal Register**.

In accordance with Executive Order 12866, it has been determined that this final rule is not a ''significant regulatory action'' and, therefore, does not require a Regulatory Impact Analysis.

Because no notice of proposed rulemaking is required, the provisions of the Regulatory Flexibility Act (5 U.S.C. 601 *et seq.*) do not apply.

List of Subjects in 31 CFR Part 1

Privacy.

PART 1—[AMENDED]

Subpart C—Privacy Act

Part 1 of title 31 of the Code of Federal Regulations is amended as follows:

1. The authority citation for part 1 continues to read as follows:

Authority: 5 U.S.C. 301 and 31 U.S.C. 321. Subpart C also issued under 5 U.S.C. 552a.

2. Amend 31 CFR part 1, subpart C, appendix D—UNITED STATES SECRET SERVICE, paragraph 2, by removing ''Room 720, 1800 G Street NW., Washington, DC 20223,'' and adding in its place, ''Suite 3000, 950 H Street, NW., Washington, DC 20373–5802.''

3. Amend 31 CFR part 1, subpart C, appendix D—UNITED STATES SECRET SERVICE, paragraph 3, by removing ''Room 720, 1800 G Street NW., Washington, DC 20223,'' and adding in its place, ''Suite 3000, 950 H Street, NW., Washington, DC 20373–5802.''

4. Amend 31 CFR part 1, subpart C, appendix D—UNITED STATES SECRET SERVICE by revising paragraph 4 to read as follows:

* * * * *

(4) Administrative appeal of initial determinations refusing amendment of

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records. Appellate determinations, including extensions of time on appeal, with respect to records of the United States Secret Service will be made by the Deputy Director, United States Secret Service. Appeals may be mailed or delivered personally to: Privacy Act Amendment Appeal, Deputy Director, United States Secret Service, 950 H Street, NW., Suite 8300, Washington, DC 20373–5802.

* * * * *

5. Amend 31 CFR part 1, subpart C, appendix D—UNITED STATES SECRET SERVICE, paragraph 6, by removing ''Room 843, 1800 G Street NW., Washington, DC 20223,'' and adding in its place, ''Suite 8300, 950 H Street, NW., Washington, DC 20373–5802.''

Date: February 6, 2001.

W. Earl Wright, Jr.,

Chief Management and Administrative Programs Officer.

[FR Doc. 01–3634 Filed 2–12–01; 8:45 am]

BILLING CODE 4810–42–P

ENVIRONMENTAL PROTECTION AGENCY

40 CFR Part 131

[FRL –6941–1]

RIN 2040–AC44

Water Quality Standards; Establishment of Numeric Criteria for Priority Toxic Pollutants for the State of California; Correction

AGENCY: Environmental Protection Agency.

ACTION: Final Rule; correction.

SUMMARY: This document contains corrections to a final rule, *Water Quality Standards; Establishment of Numeric Criteria for Priority Toxic Pollutants for the State of California,* also know as the California Toxics Rule, which was published in the **Federal Register** on Thursday, May 18, 2000 (65 FR 31682). The California Toxics Rule promulgated numeric aquatic life and human health criteria for priority toxic pollutants and a compliance schedule provision which authorizes the State to issue schedules of compliance for new or revised National Pollutant Discharge Elimination System permit limits based on the federal criteria when certain conditions are met.

EFFECTIVE DATE: This action is effective February 13, 2001.

ADDRESSES: The administrative record for the final rule is available for public inspection at the U.S. Environmental Protection Agency, Region 9, Water Division, 75 Hawthorne Street, San Francisco, California 94105, between the hours of 8 a.m. and 4:30 p.m. For access to the administrative record, call Diane E. Fleck, P.E., Esq. at (415) 744–1997 for an appointment. A reasonable fee will be charged for photocopies.

FOR FURTHER INFORMATION CONTACT: Diane E. Fleck, P.E., Esq. or Philip Woods, U.S. Environmental Protection Agency, Region 9, Water Division, 75 Hawthorne Street, San Francisco, California 94105, (415) 744–1984 or (415) 744–1997, respectively.

SUPPLEMENTARY INFORMATION: On May 18, 2000, EPA published a final rule in the **Federal Register** titled *Water Quality Standards; Establishment of Numeric Criteria for Priority Toxic Pollutants for the State of California* (see 65 FR 31682) that contained typographical errors. These typographical errors consisted of omission of units in the column headings to a table, inadvertent placement of a zero in one of the numeric criteria values, an oversight in the correct CAS number for a pollutant, and the incorrect placement of a parameter in a formula. This action corrects those typographical errors. These corrections are all minor in nature and do not substantively alter the final rule.

Section 553 of the Administrative Procedure Act, 5 U.S.C. 553(b)(B), provides that, when an agency for good cause finds that notice and public procedure are impracticable, unnecessary or contrary to the public interest, the agency may issue a rule without providing notice and an opportunity for public comment. EPA has determined that there is good cause for making today's rule final without prior proposal and opportunity for comment because this action merely corrects typographical errors in a rule that already went through public notice and comment. Furthermore, the corrections in today's rule are all minor in nature and do not substantively alter the final rule. Thus, notice and public procedure are unnecessary. EPA finds that this constitutes good cause under 5 U.S.C. 553(b)(B).

Under Executive Order 12866 (58 FR 51735, October 4, 1993), this action is not a ''significant regulatory action'' and is therefore not subject to review by the Office of Management and Budget. Because the agency has made a ''good cause'' finding that this action is not subject to notice-and-comment requirements under the Administrative Procedure Act or any other statute, it is not subject to the regulatory flexibility provisions of the Regulatory Flexibility Act (5 U.S.C. 601 *et seq.*), or to sections 202 and 205 of the Unfunded Mandates Reform Act of 1995 (UMRA) (Pub. L. 104–4). In addition, this action does not significantly or uniquely affect small governments or impose a significant intergovernmental mandate, as described in sections 203 and 204 of UMRA. This rule also does not significantly or uniquely affect the communities of tribal governments, as specified by Executive Order 13084 (63 FR 27655, May 10, 1998). This rule will not have substantial direct effects on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government, as specified in Executive Order 13132 (64 FR 43255, August 10, 1999). This rule also is not subject to Executive Order 13045 (62 FR 19885, April 23, 1997), because it is not economically significant. This technical correction action does not involve technical standards; thus, the requirements of section 12(d) of the National Technology Transfer and Advancement Act of 1995 (15 U.S.C. 272 note) do not apply. This rule does not impose an information collection burden under the provisions of the Paperwork Reduction Act of 1995 (44 U.S.C. 3501 *et seq.*). EPA's compliance with these statutes and Executive Orders for the underlying rule is discussed in the May 18, 2000, **Federal Register** notice (65 FR 31682).

The Congressional Review Act (5 U.S.C. 801 *et seq.*), as added by the Small Business Regulatory Enforcement Fairness Act of 1996, generally provides that before a rule may take effect, the agency promulgating the rule must submit a rule report, which includes a copy of the rule, to each House of the Congress and to the Comptroller General of the United States. Section 808 allows the issuing agency to make a rule effective sooner than otherwise provided by the CRA if the agency makes a good cause finding that notice and public procedure is impracticable, unnecessary or contrary to the public interest. This determination must be supported by a brief statement. 5 U.S.C. 808(2). As stated previously, EPA has made such a good cause finding, including the reasons therefor, and established an effective date of February 13, 2001. EPA will submit a report containing this rule and other required information to the U.S. Senate, the U.S. House of Representatives, and the Comptroller General of the United States prior to publication of the rule in the **Federal Register**. This action is not

a ''major rule'' as defined by 5 U.S.C. 804(2).

List of Subjects in 40 CFR Part 131

Environmental protection, Intergovernmental relations, Reporting and recordkeeping requirements, water pollution control.

Dated: January 19, 2001.

J. Charles Fox,

Assistant Administrator, Office of Water.

For the reasons set out in the preamble, part 131 of chapter 1 of title 40 of the Code of Federal Regulations is amended as follows:

PART 131—WATER QUALITY STANDARDS

1. The authority citation for part 131 continues to read as follows:

Authority: 33 U.S.C. 1251 *et seq.*

Subpart D—[Amended]

2. Section 131.38 is amended:

a. In the table to paragraph (b)(1) under the column heading for ''B Freshwater'' by revising the column headings for ''Criterion Maximum Concentration'' and ''Criterion Continuous Concentration''.

b. In the table to paragraph (b)(1) under the column heading for ''C Saltwater'' by revising the column headings for ''Criterion Maximum Concentration'' and ''Criterion Continuous Concentration''.

c. Revising entry ''23.'' to the table in paragraph (b)(1).

d. Revising entry ''67.'' to the table in paragraph (b)(1).

e. Revising paragraph (b)(2)(ii).

The revisions read as follows:

§ 131.38 Establishment of Numeric Criteria for priority toxic pollutants for the State of California.

* * * * *

(b)(1) * * *

A		B Freshwater		C Saltwater		D Human health (10^{-6}) risk for carcinogens) For consumption of:	
# Compound	CAS number	Criterion maximum conc. (µg/L)[d] B1	Criterion continous conc. (µg/L)[d] B2	Criterion maximum conc. (µg/L)[d] C1	Criterion continious conc. (µg/L)[d] C2	Water & organisms (µg/L) D1	Organisms only (µg/L) D2
* * *		*	*		*	*	
23. Chlorodibromomethane	124481					[a,c] 0.41	[a,c] 34
* * *		*	*		*	*	
67. Bis(2-Chloroisopropyl)Ether	108601					[a] 1,400	[a,t] 170,000
* * *		*	*		*	*	

Footnotes to table in Paragraph (b)(1):

* * * * * * *

[a] Criteria revised to reflect the Agency q1* or RfD, as contained in the Integrated Risk Information System (IRIS) as of October 1, 1996. The fish tissue bioconcentration factor (BCF) from the 1980 documents was retained in each case.

[c] Criteria are based on carcinogenicity of 10^{-6} risk.

[d] Criteria Maximum Concentration (CMC) equals the highest concentration of a pollutant to which aquatic life can be exposed for a short period of time without deleterious effects. Criteria Continuous Concentration (CCC) equals the highest concentration of a pollutant to which aquatic life can be exposed for an extended period of time (4 days) without deleterious effects. µg/L equals micrograms per liter.

* * * * * * *

[t] These criteria were promulgated for specific waters in California in the NTR. The specific waters to which the NTR criteria apply include: Waters of the State defined as bays and estuaries including San Francisco Bay upstream to and including Suisun Bay and the Sacramento-San Joaquin Delta; and waters of the State defined as inland (i.e., all surface waters of the State not bays or estuaries or ocean) without a MUN use designation. This section does not apply instead of the NTR for these criteria.

* * * * *

011247

(2) * * *

(ii) CCC = WER x (Chronic Conversion Factor) x (exp{m_c[ln(hardness)]+b_c})

* * * * *

[FR Doc. 01–3617 Filed 2–12–01; 8:45 am]

BILLING CODE 6560–50–P

FEDERAL COMMUNICATIONS COMMISSION

47 CFR Parts 21, 73, and 76

[MM Docket Nos. 94–150, 92–51, and 87–154; FCC 00–438]

[RIN 3060–AF82]

Attribution Rules

AGENCY: Federal Communications Commission.

ACTION: Final rule; petition for reconsideration.

SUMMARY: This document concerns rules and policies for attributing cognizable interests in applying the broadcast multiple ownership rules, the broadcast-cable cross-ownership rule, and the cable-Multipoint Distribution Service cross-ownership rule. The intended effect of this action is to clarify and resolve issues raised in petitions for reconsideration pertaining to the application of the Commission's attribution rules.

DATES: Effective April 16, 2001. Written comments by the public on the proposed information collections are due April 16, 2001. Written comments must be submitted by the Office of Management and Budget (OMB) on the proposed information collection(s) on or before April 16, 2001.

ADDRESSES: Federal Communications Commission, 445 Twelfth Street, SW, Washington DC 20554. A copy of any comments on the information collections contained herein should be submitted to Judy Boley, Federal Communications Commission, Room 1–C804, 445 12th Street, SW, Washington, DC 20554, or via the Internet to *jboley@fcc.gov,* and the Edward C. Springer, OMB Desk Officer, Room 10236 NEOB, 725 17th Street, NW., Washington, DC 20503 or via the Internet to *edward.springer@omb.eop.gov.*

FOR FURTHER INFORMATION CONTACT: Cyndi Thomas or Mania Baghdadi, Policy and Rules Division, Mass Media Bureau, at (202) 418–2120. For additional information concerning the information collection(s) contained in this document, contact Judy Boley at 202–418–0214, or via the Internet at *jboley@fcc.gov.*

SUPPLEMENTARY INFORMATION: This is a summary of the *Memorandum Opinion and Order on Reconsideration (''MO&O'')* in MM Docket Nos. 94–150, 92–51, and 87–154, FCC 00–438, adopted on December 14, 2000, and released on January 19, 2001. The full text of this decision is available for inspection and copying during regular business hours in the FCC Reference Center, 445 Twelfth Street, SW, Room CY–A257, Washington DC, and also may be purchased from the Commission's copy contractor, International Transcription Service, (202) 857–3800, 445 Twelfth Street, SW, Room CY–B402, Washington DC. The complete text is also available under the file name fcc00438.doc on the Commission's Internet site at *www.fcc.gov.*

This MO&O contains either new or modified information collection(s) subject to the Paperwork Reduction Act of 1995 (PRA). The general public and other Federal agencies are invited to comment on the proposed information collections contained in this proceeding.

Paperwork Reduction Act

This *MO&O* contains either new or modified information collections. The Commission, therefore, as part of its continuing effort to reduce paperwork burdens, invites the general public and the Office of Management and Budget to comment on the information collections contained in this *MO&O* as required by the Paperwork Reduction Act of 1995, Public Law 104–13. Public and agency comments are due 60 days from date of publication of this *MO&O* in the **Federal Register**. Comments should address: (a) Whether the new or modified collection of information is necessary for the proper performance of the functions of the Commission, including whether the information shall have practical utility; (b) the accuracy of the Commission's burden estimates; (c) ways to enhance the quality, utility, and clarity of the information collected; and (d) ways to minimize the burden of the collection of information on the respondents, including the use of automated collection techniques or other forms of information technology.

OMB Approval Number: 3060–XXXX

Title: Reconsideration of Mass Media Attribution Rules, MM Docket Nos. 94–150, 92–51, and 87–154.

Form Nos.: FCC 301 (3060–0027), FCC 314 (3060–0031), FCC 315 (3060–0032), FCC 323 (3060–0010).

Type of Review: New collection.

Respondents: Business or other for-profit.

Number of Respondents: 1,156.

Estimated Hours Per Response: 0.75 hours respondent; 2.0 hours contract attorney.

Frequency of Response: On occasion.

Estimated Costs to Respondents: $462,400.

Estimated Total Annual Burden: 867.

Needs and Uses: Among other things, the *MO&O* eliminates the single majority shareholder exemption for broadcast stations. This action will improve the precision of the Commission's attribution rules in identifying cognizable interests for purposes of its ownership rules. The Commission will revise the instructions for the FCC 301, FCC 314, FCC 315, and FCC 323 to conform to the new policy.

Synopsis of Memorandum Opinion and Order on Reconsideration

In this *MO&O,* the Commission grants, in part, and denies, in part, five petitions seeking reconsideration of the *Report and Order (''R&O'')* (64 FR 50622, September 17, 1999) released in this proceeding on August 6, 1999. In response to one petition, the Commission provides clarification on certain issues related to the newly adopted attribution rules. In the *R&O,* the Commission, in relevant part, eliminated its cross-interest policy and adopted the new equity/debt plus (EDP) rule, retained the single majority shareholder exemption, adopted rules that make interests in certain television local marketing agreements (LMAs) or time brokerage agreements attributable for purposes of the ownership rules, and established policies for grandfathering certain newly attributable interests. Commenters seek reconsideration of issues related to these actions. In addition, on its own motion, the Commission provides guidance on several issues that the petitioners did not raise, but that pertain to application of the EDP rule.

A. The Equity/Debt Plus Rule

1. Scope of the Rule

Background. The Commission adopted the EDP rule to address the concerns raised in the *Notice of Proposed Rulemaking (''NPRM'')* (60 FR 6483, February 2, 1995) and *Further Notice of Proposed Rulemaking (''FNPRM'')* (61 FR 67275, December 20, 1996), and in the record that its attribution rules did not address some interests, including multiple business and financial relationships that conveyed significant influence such that they should be attributed. For example, network affiliates had expressed concerns that attribution exemptions had permitted networks to extend their nationwide reach by structuring nonattributable deals in which the networks effectively exert significant influence, if not control, over licensees. The EDP rule is a targeted approach that balances the Commission's goal of maximizing the precision of the attribution rules by attributing only interests that are of concern, and its goals of not unduly disrupting capital flow, affording ease of administration, and providing certainty to regulatees. Specifically, the Commission applies a two-pronged test to determine whether an interest is attributable under the EDP rule. Under the first prong, the Commission asks whether the investor is either a major program supplier or a same-market media entity subject to the broadcast ownership rules. A program supplier that supplies over 15 percent of a station's total weekly broadcast programming hours is a ''major program supplier'' under the rule. An interest holder is considered a ''same-market media entity'' where it has an existing attributable interest under the Commission's attribution rules, other than the EDP rule, in a broadcast station, newspaper, or cable system, in a given market. The second prong looks at the extent of the financial interest. Any interest the major program supplier has in a station, to which it supplies programming, will be attributable under the EDP rule if the interest, aggregating both equity and debt, exceeds 33 percent of the total asset value of the station. Similarly, any interest the media entity has in another media entity in the same market will be attributable under the EDP rule if the interest, aggregating both equity and debt holdings, exceeds 33 percent of the total asset value of the additional media entity.

Discussion. The Commission reaffirms the EDP rule as adopted in the *R&O* and declines, at this time, to allow any general exemptions to the rule. The Commission will neither limit the scope of the EDP rule to major program suppliers, nor will the Commission limit the interests attributable under the EDP rule to equity investments only. As the Commission has stated, the intent of its local broadcast ownership rules is to protect competition and program diversity in local broadcast markets. The smaller audiences and fewer advertising dollars available in small broadcast markets limit the number of viable local broadcast stations in those markets. The need to protect incumbents' broadcast signal quality from interference from nearby stations limits the number of stations in all broadcast markets. These limitations on the entry of new broadcast stations make the protection of competition and diversity in local broadcast markets particularly important objectives of the Commission's ownership rules.

The function of the Commission's attribution rules is to define which interests will be counted in applying its ownership rules. The equity/debt approach is intended to resolve the Commission's concerns that multiple nonattributable business interests could be combined to exert influence over licensees. As a result, rather than applying its EDP rule to all investments in broadcasters in a single market, the rule is limited only to those relationships that afford the interest holder the incentive and means to exert influence or control over decisions regarding the core operations of broadcast stations. As the Commission stated in the *R&O*, this targeted approach balances its goal of maximizing the precision of the attribution rules by attributing only those interests that are of concern, and its equally significant goals of not unduly disrupting capital flow and of affording ease of administrative processing and reasonable certainty to regulatees in planning their transactions.

Applying the EDP rule to same-market media entities is based, in part, on economic studies that have shown that the partial co-ownership of otherwise competing local business entities can lead to a decrease in competition between those local businesses. For example, the owner of a broadcast station that also has a significant financial interest in another local broadcast station has an incentive and may have the opportunity to decrease the level of competition between the two stations by controlling or influencing management decisionmaking of the stations' operations. In the *R&O*, the Commission noted that a same-market media entity relationship affords the interest holder the incentive and means to exert this type of influence over licensees. Specifically, the Commission found that entities with existing local media interests may have an incentive and the means to use financing or contractual arrangements to obtain a degree of horizontal integration, within a particular market, that raises concerns because of the Commission's goal of

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protecting local diversity and competition. The Commission therefore reaffirms its decision to include both same-market media entities and major program suppliers as the relationships that trigger the EDP rule.

Similarly, the Commission included debt under the EDP rule because the potential for certain creditors to exert significant influence over the core operations of a licensee, even though the creditors do not hold a direct voting or other equity interest, may undermine the diversity of voices the Commission seeks to promote. The Commission has found that, in many cases, it is no longer possible to classify investments strictly as ''equity'' or ''debt,'' and its has recognized the complexity of distinguishing debt from equity in cases where alleged debt obligations were found to be more properly characterized as equity. In the *R&O*, the Commission concluded that creditors may, through contractual rights and their ongoing right to communicate freely with the licensee, exert as much, if not more, influence or control over some corporate decisions as voting equity holders whose interests are attributable. Based on these same concerns, the Commission has found that debt interests are attributable both under its cable equity plus debt attribution rule, and also in determining eligibility for the New Entrant Bidding Credit under its competitive bidding procedures for commercial broadcast licenses. The Commission has not found that traditional *bona fide* debt by itself is attributable under its rules. The Commission does find, however, that significant debt relationships combined with other attributable interests in the same market, or a major program supplier's holding of significant debt in a licensee to which it supplies substantial amounts of programming, provide an incentive to influence or control key decisions concerning the debtor-station's operations.

Based upon the record in the *R&O*, the Commission found no reason to believe that the EDP rule would unduly curb investment in smaller, minority stations. The EDP rule does not preclude investment in any media entity, including minority and women-owned entities. In fact, the 33 percent threshold allows an investor to own up to one-third of a station's total assets without triggering the EDP rule. To help ensure that its actions do not unduly impede capital flow to broadcasting, the Commission raised the passive investor voting stock benchmark from 10 to 20 percent. As the Commission stated in the *R&O*, the function of its attribution rules is not to limit investment, but to identify influential interests over the core operations of a licensee that should be counted in applying the multiple ownership rules. The Commission's ownership rules, in turn, limit the extent of combined ownership based on its core policies of diversity and competition. Thus, if relaxation of ownership limits is warranted, those issues should be addressed through revision of the multiple and cross-ownership rules, not through redefinition of an attributable interest.

The commenter that raised the issue neither explains how the EDP rule will affect the transition to digital television or the ''spin off'' of broadcast stations, nor presents any evidence to support its concerns. In the *R&O*, the Commission stated that it would consider individual rule waivers in particular cases where substantial evidence is presented that the conversion to digital television would otherwise be unduly impeded or that a waiver would significantly expedite DTV implementation in that particular case. The Commission therefore reaffirms its decision to include debt interests in applying the EDP rule.

Asserting that the EDP rule will have inconsistent regulatory effects depending on the capitalization of broadcast companies, one commenter would quarrel with the Commission's focus on total assets. The Commission focused on total assets rather than looking at equity and debt separately because separate consideration could lead to distortions in applying the EDP rule depending on the percentage of total assets that each class of interests comprises. That the rule may advantage equity holders in entities with large debt interests does not undermine the basis of the EDP rule. As the Commission has explained, the EDP rule examines both equity and debt interests that are otherwise nonattributable to limit the ability of same market media entities and major program suppliers to circumvent the attribution rules by using those interests to gain significant influence over the licensee.

Commenters further argue that the rule is vague and overly broad, contending that the EDP rule could result in an attributable interest where no likelihood of control would exist, producing a lack of clarity in the rule that will cause problems both for licensees attempting to discern attributable interests and for the Commission attempting to administer the rule; and the Commission has not explained how an investment that is less than controlling can harm the public interest or competition in the marketplace. One commenter also asserts that the Commission has not demonstrated that the 33 percent threshold is appropriate, while another opposes adopting a more lenient threshold.

The Commission reiterates that attribution extends to relationships that permit significant influence over the core operations of a licensee, not just to investments that constitute controlling interests or that exceed 50 percent of the ownership of an entity. Shareholders with voting stock interests amounting to 5 percent or more may not have actual control over the management and operations of a licensee, but the Commission has set the voting equity benchmark at 5 percent or more because those shareholders have a realistic potential to exert significant influence or control over the licensees in which they invest. For example, a shareholder with voting stock interests that exceed the benchmark can influence the selection of board members through mechanisms such as proxy fights and, therefore, exert influence on the management of a licensee's operations.

In addition, as the Commission explained in the *R&O*, debt-holders or preferred stockholders, which do not have voting rights, might exert significant influence through contractual rights or other methods of access to a licensee. For example, an agreement entered into in conjunction with preferred stock might grant the holder the right to select the persons who will run for the board of directors. Based on its concern that multiple, substantial business interests could be combined to exert influence over licensees, the Commission determined that nonattributable interests held by major program suppliers and same-market media entities should be subject to limitation by the multiple ownership rules. Thus, the Commission's attribution rules are applicable where an interest holder has a realistic potential to affect the programming decisions or other core operating functions of a licensee.

The Commission also reaffirms the 33 percent investment threshold under the EDP rule for the reasons stated in the *R&O*. The Commission adopted the 33 percent benchmark, in part, based on its previous experience of using a 33 percent threshold in the context of applying the cross-interest policy. The Commission found it an appropriate and reasonable threshold to use in applying the EDP rule and noted that applying a 33 percent threshold had not had a disruptive effect in the context of the cross-interest policy. The Commission found that a 50 percent threshold would be inappropriately high and that the

thresholds of 25 percent or 10 percent would be too low. In exercising its broad discretion to set the threshold, the Commission was guided by its goal of attributing not only interests with the potential to control, but also those interests that convey a realistic potential to exert significant influence. The Commission reiterates, however, that while it will use this threshold in applying the EDP rule now, it may adjust the benchmark in the future, if evidence is provided that would warrant an adjustment.

One commenter asks the Commission effectively to review cases individually under the EDP rule by expanding the EDP rule to attribute any relationship that permits an entity to exert significant influence or control over the programming, management, or budgetary decisions of a licensee. The EDP rule takes into consideration an entity's participation in programming and is designed to make attributable debt or nonvoting equity interests that have the ability to influence a station's core management decisions. The Commission notes that the EDP rule may also result in attribution of interests that would otherwise be nonattributable by limiting the availability of the insulated limited partner, *bona fide* debt, and nonvoting stock attribution exemptions.

The Commission notes that in the *NPRM* in this proceeding, it invited comment on whether to adopt a case-by-case review of applications to address its concerns about whether the combination of nonattributable interests and business relationships in a particular case could create significant influence so as to warrant attribution. The Commission sought comment as to whether the burdens and uncertainty created by individual case review would be outweighed by the benefits of addressing its concerns in this area in the context of specific factual situations. Based on its review of the comments filed in response to the *NPRM*, and in response to individual cases at that time, the Commission rejected the case-by-case approach in the *FNPRM*. Instead, the Commission proposed the EDP rule as a ''balanced, specifically tailored approach that would focus the rules more precisely on those relationships that potentially permit significant influence such that they should be attributed.''

In ultimately rejecting case-by-case review and adopting the EDP rule in the *R&O,* the Commission found that the benefits of applying a rule that provides, to the greatest extent possible, regulatory certainty and eases application processing, outweighed the arguably increased accuracy that a case-by-case approach might afford. Indeed, a case-by-case approach might lead to lengthy fact-specific decisions of limited applicability and substantial processing difficulties and delays, impeding its goal of rapidly reviewing transactions and speeding new service to the public. Such a result would disserve the public interest. The Commission therefore believes that the bright-line EDP rule is superior to a case-by-case approach. Accordingly, the Commission denies the request to adopt a routine case-by-case approach to attribution. As it stated in the *R&O,* however, the Commission retains the discretion to review individual cases that present unusual issues and apply attribution on a case-by-case basis where it would serve the public interest to do so. The Commission finds that such discretion ensures a sufficient safety valve for unusual issues or cases that may arise.

Two petitioners seek general exemptions from the EDP rule. One petitioner asks the Commission to amend the EDP rule to make an exception for banks and other lending institutions, asserting that the EDP rule will detrimentally affect a lending institution's ability to invest in media companies because various arms of any big bank operate independently, and these independent groups may finance different broadcasters in the same market.

As it stated in the *R&O,* the Commission believes the EDP rule will not significantly curb investment in broadcast stations. The Commission finds no basis on which to distinguish banks or other lending institutions from other investors in media entities under the EDP rule. Under the Commission's attribution rules, commercial banks, including their venture capital subsidiaries, are treated as active investors. The Commission treats only the trust departments of banks as passive investors under its voting stock benchmark. Indeed, the EDP rule places no more restrictions on lending institutions, with respect to investment or foreclosure, than on any other type of entity interested in investing in a media entity. Similarly, the petitioner has not provided evidence that a large bank's obligation to track its investments for purposes of attribution differs from any other investor's obligation to do the same.

The petitioner cites the Right to Financial Privacy Act (RFPA), 12 U.S.C. 3401 *et seq.,* to suggest that the EDP rule might force lending institutions to disclose private borrower information in violation of financial privacy laws. Congress enacted the RFPA to provide individuals with some privacy rights in financial records that are in the hands of third parties. Among other things, the RFPA defines the conditions under which financial institutions may disclose an individual's financial records and the conditions under which government officials may access an individual's financial records. The RFPA also provides a civil cause of action for anyone injured by a violation of the act's substantive provisions. Applications for construction permits, applications for consent to assignments, as well as applications for consent to transfers of control of broadcast stations must list: (1) Each party to the application whose ownership or positional interest in the applicant is attributable; (2) that party's citizenship; (3) the basis on which the interest is considered attributable, *e.g.,* positional interest or investor attributable under the EDP rule; (4) the party's percentage of votes; and (5) the party's percentage of total assets in the station. The applications require information about the corporate or partnership structure of parties holding attributable interests and information on which the interests are deemed attributable. The applications do not inquire into the party's financial structure or amounts of loans involved in station acquisitions. Similarly, ownership reports do not require any information regarding financing or loan amounts. The petitioner does not explain how the information required in applications, or other forms, much less how the EDP rule itself, might cause lending institutions to violate privacy rights under the RFPA or any other law. In any event, if it is shown that materials filed with the Commission contain financial data that would customarily be guarded from competitors, its rules provide that the materials will not be made routinely available for public inspection.

Another petitioner asks the Commission to make certain exceptions to the EDP rule where the interest is held in a socially and economically disadvantaged small business concern (SDB). The governing statute for the Small Business Administration defines SDBs as businesses where the majority owners' race or ethnicity has impaired the owners' ability to obtain capital or credit for their businesses, and therefore impaired the businesses' ability to compete. At this time, the Commission shall defer consideration of MMTC's request to create certain exemptions for SDBs. The Commission has sponsored fact-finding studies as to whether preferences based on minority status may be justified consistent with the

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Supreme Court's decision in *Adarand Constructors* v. *Pena,* 515 U.S. 200 (1995). When the results of these studies have been evaluated, the Commission may initiate future proceedings in this area, as warranted.

2. Clarification of the Definition of ''Total Assets'' and the Requirement of Continuing Compliance

Background. The EDP rule examines whether an interest holder has more than 33 percent of the total assets of a licensee or other media entity. In the *R&O,* the Commission defined total assets as the sum of all debt plus all equity. The Commission defined debt under the EDP rule to include all liabilities, whether short-term or long-term. Equity includes common or preferred stock, whether voting or nonvoting, as well as equity held by insulated limited partners in limited partnerships. The Commission also stated that it would require parties to maintain compliance with the attribution criteria as any changes in a firm's assets occur. Where sudden, unforeseeable changes take place, the Commission stated that it would afford parties a reasonable time, generally one year, to come into compliance with any ownership restrictions made applicable as a result of the change in attributable status.

Discussion. One petitioner asks the Commission to clarify what is included in the definition of ''total assets'' under the EDP rule. Initially, the Commission clarifies that it will include all equity, in whatever manner or amount the debt or equity is held, in computing whether an interest exceeds the EDP rule's 33 percent benchmark. For example, the Commission will include stock, non-stock, partnership or any other form of equity in the calculation. The Commission will also include all short-term and long-term debt liabilities, in whatever manner or amount the debt is held, in computing whether an interest exceeds the EDP rule's 33 percent benchmark.

Rather than itemizing what is included in the definition of ''total assets,'' the Commission clarifies that, for purposes of the EDP rule, an applicant may base the valuation of a station on either the book value as defined under standard financial accounting practices, or some other value, including the fair market value, provided the valuation is reasonable. In relying upon the book value, fair market value, or other reasonable value of a station, the applicant must use the valuation relevant at the time the application or ownership report is filed. If the issue arises in connection with a transfer or assignment application or an ownership report filed after consummation of a transfer or assignment, the applicant must use the sales price of that transfer or assignment as the total asset value. The Commission finds that clarifying the definition of total assets to include the foregoing reasonable methods of valuing a station's total assets for purposes of the EDP rule will provide applicants flexibility to use the most accurate valuation of the station at the time an application or ownership report is filed. The Commission may need to review an applicant's basis for computing its valuation where petitions are filed against the application. As a result, an applicant should retain the documentation on which it computes the value of the station so that it can produce the documentation as needed.

One petitioner asks the Commission to clarify when equity and debt interests that change over time should be evaluated for purposes of the EDP rule. The Commission reaffirms that parties must maintain compliance with the attribution criteria as any changes in a firm's assets occur. As noted in the *R&O,* where sudden, unforeseeable changes take place, the Commission will afford parties a reasonable time, but no more than 12 months from the time the unforeseen change occurred, to come into compliance with any ownership restrictions made applicable as a result of the change in attributable status. The Commission further notes that the scheduled repayment of loans is clearly not an ''unforeseeable'' or sudden event.

3. Clarification of Other EDP Issues

In addition to the issues that the petitioners raise in their petitions for reconsideration, the Commission notes that certain other issues have arisen with respect to the application of the newly adopted EDP rule. While none of the petitioners formally sought clarification on these particular issues, the Commission determines that it is in the public interest and serves its goals of promoting clarity and certainty under its regulations to provide guidance, on its own motion, on four issues.

a. Options, Warrants, and Loan Guarantees. Initially, the Commission considers how to apply the EDP rule to options, warrants, and loan guarantees. *Bona fide* debt, including a guarantee for a loan, is not ordinarily attributable under its rules. In addition, options, warrants, and other nonvoting interests with the right of conversion to voting interests are not ordinarily attributable until the conversion is effected. In the *R&O,* however, the Commission explained that the EDP approach would focus on those relationships that afford the interest holder the incentive and means to exert influence over the core operations of a licensee. For example, substantial investors or creditors that do not hold a direct voting interest may have the incentive and means, through contractual arrangements with the licensee, to exert as much, if not more, influence over some corporate decisions as voting equity holders whose interests are attributable. The Commission amended its rules to provide that where a major program supplier or same-market media entity holds a substantial financial interest in a licensee exceeding 33 percent of the total assets, that interest is attributable. In addition, the Commission amended its rules making the exemption of certain contractual arrangements, including debt and unexercised options and warrants, subject to the EDP rule.

Until exercised, options and warrants do not convey the underlying interest they entail, but they do constitute assets that are sold for consideration. Accordingly, the Commission will include the amount of consideration paid for the option or warrant in determining whether the option or warrant holder's interest is attributable under the EDP rule, and it will include any security deposit or financial contribution made by a guarantor for the guarantee of a loan in determining whether the guarantor's interest is attributable under the EDP rule. As noted, the Commission wishes to establish, so far as possible, a bright-line test that avoids the uncertainty of case-by-case review, and to premise the EDP rule on whether the extent of a financial interest is significant and is coupled with a relationship between the investor and the licensee that gives the investor an incentive to exert influence. Thus, the Commission clarifies that it will add any consideration or other amounts paid for options or warrants to any other equity or debt investment the holder has in a licensee. Similarly, it will include any financial contributions made by a guarantor, including amounts placed into escrow as security for a loan guarantee or amounts otherwise made in connection with the guarantee, to any other equity or debt investments the guarantor has in a licensee. In all cases, the Commission will then divide that aggregated amount by the total asset value of the licensee to determine whether the option or warrant holder's interest exceeds the 33 percent benchmark.

b. The Multiplier Rule. The Commission also clarifies, on its own motion, that it will use a ''multiplier'' in applying the EDP rule to indirect

interests held in licensees. The Commission has traditionally used a multiplier under its attribution rules to determine the ownership interest of a party whose interest is held through intervening corporate entities. Specifically, attribution ownership interests in a broadcast licensee, cable television system, or daily newspaper that are held indirectly by a party through one or more intervening corporations are determined by successive multiplication of the ownership percentages for each link in the vertical ownership chain. Under the Commission's pass-through exception, however, a link in the ownership chain that represents a percentage interest exceeding 50 percent is treated as a 100 percent interest, when calculating the successive links in the ownership chain. The Commission also notes that in calculating the foreign ownership of a licensee or its parent under Section 310(b) of the Communications Act, as amended, it multiplies the percentage of interest held by each foreign investor in the successive links of the ownership chain, regardless of the amount of equity the foreign investor holds.

As the Commission does under its attribution rules in calculating whether an interest exceeds the voting stock benchmark in a corporation, the Commission will multiply the successive links in the vertical ownership chain of a licensee or other media entity to determine whether an indirect interest in the licensee or other media entity is attributable under the EDP rule. Specifically, the Commission will multiply the successive percentage interests, aggregating both equity and debt, in each intervening entity where a party holds an indirect interest in the licensee or other media outlet. Rather than applying the pass-through exception in determining whether an interest is attributable under the EDP rule, however, the Commission will multiply the percentage interest even where the interest in the link exceeds 50 percent.

In adopting the use of a multiplier, the Commission concluded that multiplication of successive interests would more realistically reflect a party's attenuated interest in a licensee where there are intervening corporations. The Commission established the pass-through exception to reflect the *de jure* control, rather than the *de facto* control, an entity might have over a licensee. Because the EDP rule applies not only to voting equity, but also to nonvoting equity and debt, the Commission will not employ the pass-through exemption to determine which interests are attributable under the EDP rule. The Commission made this same determination in the context of foreign ownership. Accordingly, the Commission will multiply the successive interests, aggregating both equity and debt, in each intervening entity, even where the interest exceeds 50 percent, to determine whether an indirect interest in a licensee is attributable under the EDP rule. The Commission also clarifies that it will use the multiplier not only in applying the EDP rule to corporations, but also to financial interests in partnerships, limited liability companies, or any other type of organizational form.

c. Interests in Multiple Stations. The Commission next clarifies how the EDP rule is applied where an investor holds an interest in an entity that owns several stations in one market or multiple stations in several markets. The issue of how to apply the EDP rule may arise, for example, where the investor holds a nonvoting financial interest amounting to over 33 percent of the total asset value of the entity that owns or is the licensee of the multiple stations. If the investor's interest is nonvoting stock, debt, an insulated limited liability company or limited partnership interest, the interest would not be attributable under the Commission's non-EDP attribution rules. If, however, the investor is either a major program supplier to a station owned by the multiple-station owner, or has a non-EDP attributable interest in another station in the same market in which the multiple-station owner owns a station, the issue arises whether the investor has, under the EDP rule, an attributable interest in all of the stations owned by the multiple-station owner. Such an issue might also arise in a case where a voting stock interest in the entity is non-attributable under the single majority shareholder exemption because the exemption is grandfathered, as discussed below.

The Commission clarifies that the investor in the foregoing case will not automatically hold an attributable interest under the EDP rule in all of the stations or media outlets owned by or licensed to the multiple-station owner. Rather, the investor will have an attributable interest under the EDP rule only in those stations or media outlets owned by or licensed to the multiple-station owner where the investor meets the triggering relationship prong of the EDP rule, *i.e.,* the investor is a major program supplier to a station owned by the multiple-station owner, or the investor is a same-market media entity. Specifically, an investor will have an attributable interest, under the EDP rule, in any station that is owned by or licensed to a multiple-station owner and to which the investor supplies over 15 percent of the station's total weekly broadcast programming hours. An investor will also have an attributable interest under the EDP rule in a station or media outlet owned by or licensed to the multiple station owner that is in the same market as a station or media outlet in which the investor also has an attributable interest under the Commission's non-EDP attribution rules.

d. Officers and Directors. The Commission clarifies how it will apply the EDP rule to officers and directors. In doing so, the Commission follows established precedent. Under the Commission's attribution rules, the officers and directors of a parent company of a broadcast licensee, cable television system, or daily newspaper, with an attributable interest in any subsidiary entity, are deemed to have a cognizable interest in the subsidiary. The Commission will apply the same principle under the EDP rule. Each director or officer is individually attributed with the company's full equity and debt interests for purposes of applying the EDP rule. Where an entity has a financial interest in a licensee, its officers or directors will be deemed to hold that same financial interest. The Commission will not, however, treat an officer's or director's investment in a media entity as the company's investment for the purpose of applying the EDP rule.

B. Single Majority Shareholder Exemption

Background. Under the single majority shareholder exemption from attribution, in a corporation in which a single shareholder owns more than 50 percent of the voting stock of the corporation, the interests of minority shareholders are not attributable. In the *R&O,* the Commission intended that the EDP rule would limit the availability of the single majority shareholder exemption. Thus, for example, if a minority shareholder's financial interest in a licensee amounts to over 33 percent of the licensee's total asset value and the minority shareholder is either a major program supplier to the licensee or a same-market media entity, the minority shareholder's interest would be attributable under the EDP rule, even if the licensee has a single majority shareholder. The Commission declined, in the *R&O,* to eliminate the single majority shareholder exemption for broadcast stations, while the Commission eliminated the exemption from its general cable attribution rules.

Discussion. One petitioner asks the Commission to eliminate the single majority shareholder exemption for broadcasters, arguing that it is arbitrary and capricious to eliminate the exemption for cable systems and not for broadcast stations. The Commission grants the request. In the *Cable Attribution Report and Order* (64 FR 67193, December 1, 1999), the Commission concluded that the single majority shareholder exemption should be eliminated because of its concern ''that a minority shareholder may be able to exert influence over a company even where a single majority shareholder exists.'' The Commission generally found in that proceeding no evidence that differences in ownership, financing, or management structures between the cable and broadcast industries warrant creating an attribution standard for applying the cable horizontal ownership, or other cable rules, that is different than the standard the Commission uses in applying the broadcast multiple ownership rules. Thus, the Commission sees no rational basis to distinguish between cable and broadcasting that would justify eliminating the exemption for the cable ownership rules while retaining it for the broadcast ownership rules.

In addition to resolving the apparent inconsistency that resulted from the Commission's decision to eliminate the single majority shareholder exemption in the cable context, eliminating this exemption from the broadcast attribution rules would promote one of its primary goals in this proceeding: to improve the precision of its attribution rules in identifying cognizable interests for purposes of its ownership rules. In adopting the single majority shareholder exemption in 1984, the Commission reasoned that minority interest shareholders ''would be unable to direct the affairs or activities of the licensee on the basis of their shareholdings'' where a single majority shareholder controls the corporation. The Commission therefore determined that these minority interests would not be deemed cognizable for purposes of the multiple ownership rules.

In this proceeding, as in the cable attribution rulemaking, the Commission has repeatedly stated that its attribution rules are designed to identify not only interests that enable an entity to control a company, but also interests that give an entity the potential to exert significant influence on a company's major decisions, even if the entity cannot control the company. Minority shareholders may not be able to control the affairs or activities of licensees, but, in certain circumstances, they clearly have the potential to influence a licensee's actions. Although the influence of a minority shareholder may be diminished somewhat where a single majority shareholder controls the licensee, the Commission has no reason to believe that the minority shareholder's influence is eliminated or so attenuated in such circumstances that the Commission should ignore its ownership interest for purposes of its ownership rules. Accordingly, the Commission will amend Note 2 of § 73.3555 of its rules to eliminate the single majority shareholder exemption from the broadcast attribution rules.

The Commission further concludes that the single majority shareholder exemption will no longer apply to minority interests acquired on or after the adoption date of this *MO&O.* Accordingly, any minority interests in a company with a single majority shareholder will be grandfathered if the interest was acquired before the adoption date of this *MO&O.* Grandfathering of these minority interests will be permanent until the grandfathered interest is assigned or transferred. The Commission notes, however, that grandfathered minority interests in companies with single majority shareholders remain subject to the EDP rule.

C. LMA Attribution and Filing Requirements

Background. An LMA or time brokerage agreement is a type of contract that generally involves the sale by a licensee of discrete blocks of time to a broker that then supplies the programming to fill the time and sells the commercial spot announcements to support the programming. In the *R&O,* the Commission adopted attribution rules for television LMAs. Specifically, an intra-market television LMA is *per se* attributable if the LMA involves more than 15 percent of a brokered station's weekly broadcast hours. In contrast, the Commission will not attribute television time brokerage agreements between stations in different markets, unless the agreements come under the EDP rule. Specifically, an inter-market television LMA is attributable only if the broker supplies more than 15 percent of a station's programming (*i.e.,* the broker is a major program supplier), and it has a financial investment that is more than 33 percent of the brokered station's total asset value. The Commission also decided to attribute intra-market radio LMAs for purposes of applying all of its multiple ownership rules that are applicable to radio stations, not just the radio duopoly rule, as in the past.

In the *R&O,* the Commission decided to review the issue of grandfathering existing intra-market radio LMAs on a case-by-case basis. Specifically, the Commission concluded that it would consider the issue of grandfathering radio LMAs whose attribution as of November 16, 1999, the effective date of the newly adopted rules, resulted in ownership violations. The Commission further concluded that any interest, other than intra-market radio and television LMAs, newly attributable under the rules that would result in violations of the ownership rules, would be grandfathered if the triggering interest was acquired before November 5, 1996, the date of the *FNPRM* in this proceeding. The Commission determined that grandfathering would apply only to the current holder of the attributable interest, and if the grandfathered interest was later assigned or transferred, new owners would be given one year to come into compliance with the multiple ownership rules. Non-grandfathered interests, except for non-grandfathered intra-market television LMAs, must be divested to comply with the Commission's multiple ownership rules within twelve months of the date of adoption of the *R&O.* The Commission requires the licensee that is the brokering station to file with the Commission, within 30 days of execution of a time brokerage agreement, a copy of any such agreement, redacted as necessary, that would result in the arrangement being attributed.

Discussion. One petitioner asks the Commission to deem unlawful LMAs entered into after August 6, 1999, the date the *R&O* was released, arguing that LMAs are an unlawful evasion of the ownership rules that hinder diversity and competition and are no longer necessary with adoption of the revised duopoly rule; the grandfathering plan for existing LMAs protects existing equity interests; and suggests that LMAs entered into after August 6, 1999, may have been entered into to bypass the Commission's transfer or assignment authorization requirements or to prevent a competitor from obtaining a transfer. Another petitioner urges the Commission to reject the request because the Commission has already found that the record shows that a number of television LMAs have resulted in public interest benefits.

The Commission made no finding in the *R&O* that LMAs are *per se* unlawful as of any date. The Commission's newly adopted attribution rules do not preclude parties from entering into LMAs. Rather, the Commission

amended its rules to make intra-market LMAs and some inter-market LMAs attributable for purposes of its broadcast ownership rules. Some LMAs are grandfathered, while interests in others may need to be divested. Parties may still enter into LMAs with the understanding that they may be subject to applicable ownership rules. Nothing suggests that Congress intended the Commission to deem *per se* unlawful all LMAs entered into after a certain date. Indeed, in the Conference Report on Section 202(g) of the Telecommunications Act of 1996, the conferees recognized ''the positive contributions of television LMAs.'' The Commission finds no reason to reconsider its decision that LMA interests may be attributable under its newly adopted rules, but that LMAs are not unlawful.

One petitioner also urges the Commission to require all existing LMAs, not just attributable LMAs, to be filed with the Commission. The Commission will not change the filing requirements for LMAs as adopted in the *R&O.* The attribution rules impose an affirmative obligation on licensees to determine whether a particular LMA is attributable and, if it is, to file the agreement with the Commission. Commercial radio and television licensees must also maintain copies of time brokerage agreements in their local public inspection files. As the Commission stated in the *R&O,* it believes a licensee's affirmative obligation in combination with its filing requirements will subject LMAs to sufficient scrutiny by competitors, the public, and the Commission. The Commission therefore reaffirms the requirement that brokering stations must file redacted copies of attributable LMAs with the Commission within 30 days of execution of the agreement.

D. Cross-Interest Policy

Background. The cross-interest policy has been applied to preclude individuals or entities from holding an attributable interest in one media property (broadcast station, newspaper, cable system) and having a ''meaningful'' albeit nonattributable interest in another media entity serving ''substantially the same area.'' In the *R&O,* the Commission eliminated the cross-interest policy.

Discussion. One petitioner asks the Commission to reconsider its decision to eliminate the cross-interest policy, contending that the Commission has not explained why the policy should not be retained in small and medium markets and arguing that the Commission has failed to consider the impact of its decision on diversity. The petitioner argues that repeal of the cross-interest policy may result in allowing business combinations and relationships, that were not permitted under the cross-interest policy, that are not covered by the EDP rule, and that are not addressed by other rules and remedies referenced by the Commission in its *R&O.*

The Commission declines to reconsider its decision to eliminate the cross-interest policy. Its decision in the *R&O* to eliminate the cross-interest policy was based on its judgment that the regulatory costs and chilling effects of administering the cross-interest policy and the benefits of applying clear ownership and attribution standards outweigh any risks of abuses in eliminating the policy. As the Commission noted, the cross-interest policy did not prohibit the relationships it covered outright, but required an *ad hoc* determination as to whether the relationships at interest would be permitted. The Commission determined that the public interest would be better served by administering, to the greatest extent possible, bright line tests with respect to attribution and ownership rather than case-by-case determinations, which delay processing and involve public and regulatory costs. The Commission did not base its conclusion simply on the increased certainty that a rule-based proscription provided. Rather, the Commission carefully reviewed the interests typically addressed by the cross-interest policy and included within the ambit of the new rules those interests that the Commission concluded warranted continued limitation. Most obvious among these is the consideration of nonvoting equity and debt interests under the Commission's EDP standard.

In short, the Commission's attribution tests were based on its best judgment, after a review of the record, as to what relationships should count in terms of administering the ownership rules. The ownership rules, in turn, are based on the Commission's competition and diversity analysis. The local ownership rules do take into account the nature and size of the market. Further, the Commission also retained discretion, in an appropriate case, ''to review individual cases that present unusual issues on a case-by-case basis where it would serve the public interest to conduct such a review.'' Administering regulatory procedures that are, to the greatest extent possible, clear and consistent is an important aspect of the public interest.

Procedural Matters

Authority for issuance of this *MO&O* is contained in Sections 4(i), 303(r), 403, and 405 of the Communications Act of 1934, as amended, 47 U.S.C. 154(i), 303(r), 403, and 405.

Paperwork Reduction Act Analysis. This *MO&O* contains either new or modified information collections. The Commission, therefore, as part of its continuing effort to reduce paperwork burdens, invites the general public and the Office of Management and Budget to comment on the information collections contained in this *MO&O* as required by the Paperwork Reduction Act of 1995, Public Law 104–13. Public and agency comments are due 60 days from date of publication of this *MO&O* in the **Federal Register**. Comments should address: (a) Whether the new or modified collection of information is necessary for the proper performance of the functions of the Commission, including whether the information shall have practical utility; (b) the accuracy of the Commission's burden estimates; (c) ways to enhance the quality, utility, and clarity of the information collected; and (d) ways to minimize the burden of the collection of information on the respondents, including the use of automated collection techniques or other forms of information technology. In addition to filing comments with the Secretary, a copy of any comments on the information collections in this *MO&O* should be submitted to Judy Boley, Federal Communications Commission, 445 Twelfth Street, S.W., Room 1–C804, Washington, DC 20554, or over the Internet to *jboley@fcc.gov* and to Edward Springer, OMB Desk Officer, 10236 NEOB, 725 17th Street, N.W., Washington, DC 20503 or over the Internet to *edward.springer@omb.eop.gov.*

Supplemental Final Regulatory Flexibility Analysis. As required by the Regulatory Flexibility Act (RFA), the Commission has prepared a Supplemental Final Regulatory Flexibility Analysis (Supplemental FRFA) of the possible impact on small entities of the rules adopted in the *MO&O.* The Supplemental FRFA is set forth in the *MO&O.*

Supplemental Final Regulatory Flexibility Analysis

As required by the Regulatory Flexibility Act (RFA), an Initial Regulatory Flexibility Analysis (IRFA) was incorporated in the *NPRM* and the *FNPRM* in this proceeding. The Commission sought written public comment on the proposals in the *NPRM* and *FNPRM,* including comment on the

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IRFAs. The comments received were discussed in the Final Regulatory Flexibility Analysis (FRFA) contained in the *R&O* in this proceeding. As described below, this *MO&O* grants reconsideration of one action taken in the *R&O* and provides clarification of other issues. This associated Supplemental Final Regulatory Flexibility Analysis (Supplemental FRFA) addresses the rule modifications on reconsideration and conforms to the RFA.

Need for, and Objectives of, the Memorandum Opinion and Order

The attribution rules seek to identify those interests in licensees or media entities that confer on their holders a degree of influence or control such that the holders have the potential to affect the programming decisions of licensees or other core operating functions. The attribution rules are used to implement the Commission's broadcast multiple ownership rules. The Commission's goals in this proceeding are to improve the precision of the attribution rules, avoid disruption in the flow of capital to broadcasting, afford clarity and certainty to regulatees and markets, and facilitate application processing. While its focus is on the issues of influence or control, the Commission must also tailor the attribution rules to permit arrangements where an ownership or positional interest involves minimal risk of influence to avoid unduly restricting the means by which investment capital may be made available to the broadcast industry. The rule revisions and clarifications contained in this *MO&O* meet these goals.

Summary of Significant Issues Raised by the Public

The comments in response to the IRFAs that addressed small business issues were discussed in the FRFA contained in the *R&O* in this proceeding. We received no petitions for reconsideration in direct response to that FRFA. In its petition for reconsideration, however, the Office of Communications, Inc. of United Church of Christ *et al.* (UCC) asked the Commission to eliminate the single majority shareholder exemption for broadcast stations, arguing that it is arbitrary and capricious to eliminate the exemption for cable systems and not broadcasters. Under the single majority shareholder exemption from attribution, in a corporation in which a single shareholder owns more than 50 percent of the voting stock of the corporation, the interests of minority shareholders are not attributable. The Commission grants UCC's request, finding no rational basis to distinguish between cable and broadcasting that would justify eliminating the exemption for the cable ownership rules while retaining it for the broadcast ownership rules. Any minority interest in a company with a single majority shareholder will be grandfathered if the interest was acquired before the adoption date of this *MO&O.* Grandfathered minority interests in companies with single majority shareholders, however, remain subject to the equity/debt plus (EDP) rule.

Description and Estimate of the Number of Small Entities to Which Rules Will Apply

The rules revisions contained in this *MO&O* will apply to full service television and radio licensees and permittees, potential licensees and permittees, cable services or systems, Multipoint Distribution Service, Multichannel Multipoint Distribution Service, and Instructional Television Fixed Service, and newspapers. These entities are discussed in detail in the FRFA contained in the *R&O* at Section III.

Description of Projected Reporting, Recordkeeping, and Other Compliance Requirements

The *MO&O* clarifies various aspects of the EDP rule adopted in the *R&O.* One clarification is to use the ''multiplier'' in calculating an EDP interest. Specifically, the Commission will multiply the successive percentage interests, aggregating both equity and debt, in each intervening entity where a party holds an indirect interest in the licensee or other media outlet. In calculating an EDP interest, however, the Commission will not apply the pass-through exception, which applies to indirect voting stock interests in corporations where a link in the ownership chain that represents a percentage interest exceeding 50 percent is treated as a 100 percent interest. Thus, the Commission will multiply successive interests for purposes of EDP, even where the interest exceeds 50 percent. The decision not to apply the pass-through exception is less restrictive than the traditional application of the multiplier on all entities, including small businesses.

The *MO&O* also eliminates the single majority shareholder attribution exemption. Elimination of the single majority shareholder attribution exemption does not affect grandfathered small entities. Elimination of the single majority shareholder exemption does not affect the Commission's ownership reporting requirements. The reporting requirements for non-grandfathered licensees may increase, however, because those licensees will be required to report interests that are newly attributable as a result of elimination of the exemption. Those entities are already required to file ownership reports with the Commission, so any additional cost associated with this reporting requirement is nominal.

Steps Taken to Minimize Significant Economic Impact on Small Entities, and Significant Alternatives Considered

The RFA requires an agency to describe any significant alternatives that it has considered in reaching its proposed approach, which may include the following four alternatives (among others): (1) The establishment of differing compliance or reporting requirements or timetables that take into account the resources available to small entities; (2) the clarification, consolidation, or simplification of compliance or reporting requirements under the rule for small entities; (3) the use of performance, rather than design, standards; and (4) an exemption from coverage of the rule, or any part thereof, for small entities.

Under the Commission's pass-through exception to the multiplier rule, a link in the ownership chain that represents a percentage interest exceeding 50 percent is treated as a 100 percent interest, when calculating the successive links in the ownership chain. The *MO&O* clarifies that the Commission will not apply the pass-through exception in using the multiplier to calculate interests under the EDP rule. An alternative to this decision is to apply the pass-through exception for purposes of EDP, which would make the calculation of attributable EDP interests as restrictive on all entities, including small businesses, as those calculated under the traditional application of the multiplier.

The *MO&O* eliminates the single majority shareholder attribution exemption. To minimize the disruptive effect of this attribution rule change, the *MO&O* grandfathers entities, subject to the EDP rule, relying on the single majority shareholder exemption whose interests were acquired before the adoption date of the *MO&O.* An alternative to eliminating the exemption would be to leave the rule as is. In addition to the prior decision to eliminate the exemption for cable operators, however, the Commission believes that eliminating the exemption from the broadcast attribution rules will promote one of its primary goals to improve the precision of the

Commission's attribution rules in identifying cognizable interests for purposes of the ownership rules.

Report to Congress: The Commission will send a copy of the *MO&O,* including this Supplemental FRFA, in a report to be sent to Congress pursuant to SBREFA. In addition, the Commission will send a copy of the *MO&O,* including the Supplemental FRFA, to the Chief Counsel for Advocacy of the Small Business Administration. A copy of the *MO&O* and Supplemental FRFA (or summaries thereof) will also be published in the **Federal Register**.

Ordering Clauses

The petitions for reconsideration or clarification are granted to the extent provided herein and otherwise are denied pursuant to sections 4(i), 303(r), 403, and 405 of the Communications Act of 1934, as amended, 47 U.S.C. 154(i), 303(r), 403, and 405, and § 1.429(i) of the Commission's rules, 47 CFR 1.429(i).

Sections 4(i) & (j), 303(r), 307, 308 and 309 of the Communications Act of 1934, as amended, 47 U.S.C. 154(i) & (j), 303(r), 307, 308 and 309, parts 21, 73, and 76 of the Commission's rules, 47 CFR. Parts 21, 73, 76, are amended as set forth in the *MO&O.*

The rule amendments set forth in the *MO&O* shall be effective sixty days after publication in the **Federal Register**.

The Commission's Consumer Information Bureau, Reference Information Center, shall send a copy of this *MO&O* in MM Docket Nos. 94–150, 92–51, and 87–154, including the Supplemental Final Regulatory Flexibility Analysis, to the Chief Counsel for Advocacy of the Small Business Administration.

The new or modified paperwork requirements contained in this *MO&O* (which are subject to approval by the Office of Management and Budget (OMB)) will go into effect upon OMB approval.

This proceeding is hereby terminated.

List of Subjects in

47 CFR Part 21

Multipoint distribution service.

47 CFR Part 73

Television broadcasting, Radio broadcasting.

47 CFR Part 76

Cable television service.

Federal Communications Commission.

Magalie Roman Salas,

Secretary.

Rule Changes

For the reasons set forth in the preamble, Parts 21, 73, and 76 of Chapter 1 of Title 47 of the Code of Federal Regulations are amended as follows:

PART 21—DOMESTIC PUBLIC FIXED RADIO SERVICES

1. The authority citation for part 21 continues to read as follows:

Authority: Secs. 1, 2, 4, 201–205, 208, 215, 218, 303, 307, 313, 403, 404, 410, 602, 48 Stat. as amended, 1064, 1066, 1070–1073, 1076, 1077, 1080, 1082, 1083, 1087, 1094, 1098, 1102; 47 U.S.C. 151, 154, 201–205, 208, 215, 218, 303, 307, 313, 314, 403, 404, 410, 602; 47 U.S.C. 552, 554.

2. Section 21.912 is amended by:

a. Designating Note 1 as ''Note 1 to § 21.912'';

b. Removing Note 1(b);

c. Redesignating Notes 1(c) through Notes 1(l) as Notes 1(b) to § 21.912 through Note 1(k) to § 21.912;

d. Revising newly redesignated Note 1 (c) to § 21.912 and Note 1(e) to § 21.912;

e. Revising the first and second sentence of newly redesignated Note 1(f)(2);

f. Revising newly redesignated Note 1(h)(3);

g. Revising the introductory text to newly redesignated Note 1(i), and revising redesignated Note 1(i)(2); and

h. Designating Note 2 as ''Note 2 to § 21.912''.

The revisions and deletion read as follows:

§ 21.912 Cable television company eligibility requirements and MDS/cable cross-ownership.

* * * * *

Note 1 to § 21.912: * * *

* * * * *

(c) Attribution of ownership interests in an MDS licensee or cable television system that are held indirectly by any party through one or more intervening corporations will be determined by successive multiplication of the ownership percentages for each link in the vertical ownership chain and application of the relevant attribution benchmark to the resulting product, except that wherever the ownership percentage for any link in the chain exceeds 50%, it shall not be included for purposes of this multiplication. For purposes of paragraph (i) of this note, attribution of ownership interests in an MDS licensee or cable television system that are held indirectly by any party through one or more intervening organizations will be determined by successive multiplication of the ownership percentages for each link in the vertical ownership chain and application of the relevant attribution benchmark to the resulting product, and the ownership percentage for any link in the chain that exceeds 50% shall be included for purposes of this multiplication. [For example, except for purposes of paragraph (i) of this note, if A owns 10% of company X, which owns 60% of company Y, which owns 25% of ''Licensee,'' then X's interest in ''Licensee'' would be 25% (the same as Y's interest because X's interest in Y exceeds 50%), and A's interest in ''Licensee'' would be 2.5% (0.1 x 0.25). Under the 5% attribution benchmark, X's interest in ''Licensee'' would be cognizable, while A's interest would not be cognizable. For purposes of paragraph (i) of this note, X's interest in ''Licensee'' would be 15% (0.6 x 0.25) and A's interest in ''Licensee'' would be 1.5% (0.1 x 0.6 x 0.25). Neither interest would be attributed under paragraph (i) of this note.]

* * * * *

(e) Subject to paragraph (i) of this note, holders of non-voting stock shall not be attributed an interest in the issuing entity. Subject to paragraph (i) of this note, holders of debt and instruments such as warrants, convertible debentures, options or other non-voting interests with rights of conversion to voting interests shall not be attributed unless and until conversion is effected.

(f) * * *

(2) For a licensee or system that is a limited partnership to make the certification set forth in paragraph (f)(1) of this note, it must verify that the partnership agreement or certificate of limited partnership, with respect to the particular limited partner exempt from attribution, establishes that the exempt limited partner has no material involvement, directly or indirectly, in the management or operation of the MDS or cable television activities of the partnership. For a licensee or system that is an LLC or RLLP to make the certification set forth in paragraph (f)(1) of this note, it must verify that the organizational document, with respect to the particular interest holder exempt from attribution, establishes that the exempt interest holder has no material involvement, directly or indirectly, in the management or operation of the MDS or cable television activities of the LLC or RLLP. * * *

* * * * *

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(h) * * *

(3) The sum of the interests computed under paragraph (h)(1) of this note plus the sum of the interests computed under paragraph (h)(2) of this note is equal to or exceeds 20 percent.

(i) Notwithstanding paragraphs (e) and (f) of this note, the holder of an equity or debt interest or interests in an MDS licensee or cable television system subject to the MDS/cable cross-ownership rule (''interest holder'') shall have that interest attributed if:

* * * * *

(2) The interest holder also holds an interest in an MDS licensee or cable television system that is attributable under paragraphs of this note other than this paragraph (i) and which operates in any portion of the franchise area served by that cable operator's cable system.

* * * * *

PART 73—RADIO BROADCAST SERVICES

3. The authority citation for Part 73 continues to read as follows:

Authority: 47 U.S.C. 154, 303, 334 and 336.

4. The notes following § 73.3555 are amended by:

a. Designating Note 1 as ''Note 1 to § 73.3555'';

b. Designating Note 2 as ''Note 2 to § 73.3555'';

c. In Note 2 to § 73.3555 remove paragraph (b);

d. In Note 2 to § 73.3555 paragraphs (c) through (k) are redesignated as paragraphs (b) through (j);

e. In Note 2 to 73.3555 revise newly redesignated paragraphs (c) and (e);

f. In Note 2 to § 73.3555 revise newly redesignated paragraph (f)(2);

g. In Note 2 to § 73.3555 revise newly redesignated paragraph (h)(3);

h. In Note 2 to § 73.3555 revise the introductory text to newly redesignated paragraphs (i), and (i)(2)(i);

i. Designating Note 3 as ''Note 3 to § 73.3555'';

j. Designating Note 4 as ''Note 4 to § 73.3555'';

k. Designating Note 5 as ''Note 5 to § 73.3555'';

l. Designating Note 6 as ''Note 6 to § 73.3555'';

m. Designating Note 7 as ''Note 7 to § 73.3555'';

n. Designating Note 8 as ''Note 8 to § 73.3555'';

o. Designating Note 9 as ''Note 9 to § 73.3555''; and

p. Designating Note 10 as ''Note 10 to § 73.3555''.

The revisions and deletion read as follows:

§ 73.3555 Multiple ownership.

* * * * *

Note 2 to § 73.3555: * * *

(c) Attribution of ownership interests in a broadcast licensee, cable television system or daily newspaper that are held indirectly by any party through one or more intervening corporations will be determined by successive multiplication of the ownership percentages for each link in the vertical ownership chain and application of the relevant attribution benchmark to the resulting product, except that wherever the ownership percentage for any link in the chain exceeds 50%, it shall not be included for purposes of this multiplication. For purposes of paragraph (i) of this note, attribution of ownership interests in a broadcast licensee, cable television system or daily newspaper that are held indirectly by any party through one or more intervening organizations will be determined by successive multiplication of the ownership percentages for each link in the vertical ownership chain and application of the relevant attribution benchmark to the resulting product, and the ownership percentage for any link in the chain that exceeds 50% shall be included for purposes of this multiplication. [For example, except for purposes of paragraph (i) of this note, if A owns 10% of company X, which owns 60% of company Y, which owns 25% of ''Licensee,'' then X's interest in ''Licensee'' would be 25% (the same as Y's interest because X's interest in Y exceeds 50%), and A's interest in ''Licensee'' would be 2.5% (0.1 x 0.25). Under the 5% attribution benchmark, X's interest in ''Licensee'' would be cognizable, while A's interest would not be cognizable. For purposes of paragraph (i) of this note, X's interest in ''Licensee'' would be 15% (0.6 x 0.25) and A's interest in ''Licensee'' would be 1.5% (0.1 x 0.6 x 0.25). Neither interest would be attributed under paragraph (i) of this note.]

* * * * *

(e) Subject to paragraph (i) of this note, holders of non-voting stock shall not be attributed an interest in the issuing entity. Subject to paragraph (i) of this note, holders of debt and instruments such as warrants, convertible debentures, options or other non-voting interests with rights of conversion to voting interests shall not be attributed unless and until conversion is effected.

(f) * * *

(2) For a licensee or system that is a limited partnership to make the certification set forth in paragraph (f)(1) of this note, it must verify that the partnership agreement or certificate of limited partnership, with respect to the particular limited partner exempt from attribution, establishes that the exempt limited partner has no material involvement, directly or indirectly, in the management or operation of the media activities of the partnership. For a licensee or system that is an LLC or RLLP to make the certification set forth in paragraph (f)(1) of this note, it must verify that the organizational document, with respect to the particular interest holder exempt from attribution, establishes that the exempt interest holder has no material involvement, directly or indirectly, in the management or operation of the media activities of the LLC or RLLP. * * *

* * * * *

(h) * * *

(3) The sum of the interests computed under paragraph (h)(1) of this note plus the sum of the interests computed under paragraph (h)(2) of this note is equal to or exceeds 20 percent.

(i) Notwithstanding paragraphs (e) and (f) of this note, the holder of an equity or debt interest or interests in a broadcast licensee, cable television system, daily newspaper, or other media outlet subject to the broadcast multiple ownership or cross-ownership rules (''interest holder'') shall have that interest attributed if:

* * * * *

(2)(i) The interest holder also holds an interest in a broadcast licensee, cable television system, newspaper, or other media outlet operating in the same market that is subject to the broadcast multiple ownership or cross-ownership rules and is attributable under paragraphs of this note other than this paragraph (i); or

* * * * *

5. Section 73.3613 is amended by revising the first sentence of paragraph (d) and revising paragraph (e) to read as follows:

§ 73.3613 Filing of contracts.

* * * * *

(d) *Time brokerage agreements.* Time brokerage agreements involving radio stations, where the licensee (including all parties under common control) is the brokering entity, there is a principal community contour overlap (predicted or measured 5 mV/m groundwave for AM stations and predicted 3.16 mV/m for FM stations) with the brokered station, and more than 15 percent of the time of the brokered station, on a weekly basis, is brokered by that licensee; time brokerage agreements involving television stations where licensee (including all parties under common control) is the brokering entity, the brokering and brokered stations are both licensed to the same market as

defined in the local television multiple ownership rule contained in § 73.3555(b), and more than 15 percent of the time of the brokered station, on a weekly basis, is brokered by that licensee; time brokerage agreements involving radio or television stations that would be attributable to the licensee under § 73.3555 note 2(i).
* * *

(e) The following contracts, agreements or understandings need not be filed but shall be kept at the station and made available for inspection upon request by the FCC: contracts relating to the joint sale of broadcast advertising time that do not constitute time brokerage agreements pursuant to § 73.3555 note 2(j); subchannel leasing agreements for Subsidiary Communications Authorization operation; franchise/leasing agreements for operation of telecommunications services on the TV vertical blanking interval and in the visual signal; time sales contracts with the same sponsor for 4 or more hours per day, except where the length of the events (such as athletic contests, musical programs and special events) broadcast pursuant to the contract is not under control of the station; and contracts with chief operators.

6. Section 73.3615 is amended by revising the second sentence in paragraph (a)(3)(iii)(B) to read as follows:

§ 73.3615 Ownership reports.

* * * * *

(a) * * *
(3) * * *
(iii) * * *
(B) * * * If X has a voting stockholder interest in the licensee, only those voting interests of X that are cognizable after application of the ''multiplier'' described in note 2(c) of § 73.3555 of the rules, if applicable, shall be reported. * * *

* * * * *

PART 76—MULTICHANNEL VIDEO AND CABLE TELEVISION SERVICE

7. The authority citation for Part 76 continues to read as follows:

Authority: 47 U.S.C. 151, 152, 153, 154, 301, 302, 303, 303a, 307, 308, 309, 312, 317, 325, 503, 521, 522, 531, 532, 534, 535, 536, 537, 543, 544, 544a, 545, 548, 549, 552, 554, 556, 558, 560, 561, 571, 572, 573.

8. Section 76.501 is amended by:
a. Designating Note 1 as ''Note 1 to § 76.501'';
b. Designating Note 2 as ''Note 2 to § 76.501'';
c. Designating Note 3 as ''Note 3 to § 76.501'';
d. Designating Note 4 as ''Note 4 to § 76.501'';
e. Designating Note 5 as ''Note 5 to § 76.501'';
f. Designating Note 6 as ''Note 6 to § 76.501'' and revising it.
The revision reads as follows:

§ 76.501 Cross-ownership.

* * * * *

Note 6 to § 76.501: In applying paragraph (a) of § 76.501, for purposes of paragraph note 2(i) of this section, attribution of ownership interests in an entity covered by this rule that are held indirectly by any party through one or more intervening organizations will be determined by successive multiplication of the ownership percentages for each link in the vertical ownership chain and application of the relevant attribution benchmark to the resulting product. The ownership percentage for any link in the chain that exceeds 50% shall be included. [For example, if A owns 10% of company X, which owns 60% of company Y, which owns 25% of ''Licensee,'' then X's interest in ''Licensee'' would 15% (0.6x0.25), and A's interest in ''Licensee'' would be 1.5% (0.1x0.6x0.25).]

[FR Doc. 01–3175 Filed 2–12–01; 8:45 am]
BILLING CODE 6712–01–P

FEDERAL COMMUNICATIONS COMMISSION

47 CFR Part 25

Application for Special Temporary Authorization; Correction

AGENCY: Federal Communications Commission.

ACTION: Correcting amendment.

SUMMARY: This document contains a correction to the final regulations redesignated and amended at 62 FR 5928, 5929, February 10, 1997. The regulations related to applications for special temporary authorizations contained in § 25.120(a).

EFFECTIVE DATE: February 13, 2001.

FOR FURTHER INFORMATION CONTACT: Terry D. Johnson, (202) 418–0445 (not a toll-free call).

SUPPLEMENTARY INFORMATION:

Background

The final regulations that are the subject of this correction prescribed the procedures one must follow to apply for special temporary authorization to install and/or operate new or modified equipment for earth stations.

Need for Correction

As published, § 25.120(a) contains an incomplete mailing address which could delay receipt and processing of requests for special temporary authorizations.

List of Subjects in 47 CFR Part 25

Administrative practice and procedure, Communications common carriers, Radio, Telecommunications, Television.

PART 25—SATELLITE COMMUNICATIONS

Accordingly, 47 CFR part 25 is corrected by making the following correcting amendment:

1. The authority citation for part 25 continues to read as follows:

Authority: 47 U.S.C. 151, 154(i), 154(j), 155, 225, 303(r), 309 and 325(e).

§ 25.120 Application for special temporary authorization. [Corrected]

2. In § 25.120 revise the last sentence in paragraph (a) to read as follows:

(a) * * * A copy of the request for special temporary authority also shall be forwarded to the Commission's Columbia Operations Center, 9200 Farm House Lane, Columbia, MD 21046–1609.

* * * * *

Federal Communications Commission.
Magalie Roman Salas,
Secretary.

[FR Doc. 01–3636 Filed 2–12–01; 8:45 am]
BILLING CODE 6712–01–U

FEDERAL COMMUNICATIONS COMMISSION

47 CFR Part 73

[MM Docket No. 00–39; FCC 01–24]

Broadcast Services; Radio Stations, Television Stations

AGENCY: Federal Communications Commission.

ACTION: Final rule.

SUMMARY: This document resolves a number of issues concerning the transition to digital broadcast television (DTV). Among the issues resolved in the Report and Order are: when to require election by licensees of their post-transition DTV channel; whether to require replication by DTV licensees of their NTSC Grade B service contours; whether to require enhanced service to the principal community served by DTV licensees; and how we should process mutually exclusive applications. We also address in this document a host of technical issues and determine that at this time there is no persuasive information to indicate that there is any deficiency in the 8–VSB modulation system of the DTV transmission standard that would cause us to revisit

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our decision to deny Sinclair Broadcasting Group, Inc.'s, petition and to add COFDM to the current 8–VSB DTV standard or to grant Univision Communications Inc.'s Petition for Expedited Rule Making to that same effect. We also decline to adopt technical performance standards for DTV receivers.

DATES: Effective April 16, 2001.

ADDRESSES: Federal Communications Commission, 445 12th Street, SW., Washington, DC 20554

FOR FURTHER INFORMATION CONTACT: Roger Holberg or Mania Baghdadi, Mass Media Bureau, Policy and Rules Division, (202) 418–2120 or Alan Stillwell or Bruce Franca, Office of Engineering and Technology, (202) 418–2470.

SUPPLEMENTARY INFORMATION: This is a synopsis of the *Report and Order* (''*R&O*'') in MM Docket No. 00–39, FCC 01–24, adopted January 18, 2001, and released January 19, 2001. The complete text of this document is available for inspection and copying during normal business hours in the FCC Reference Center, Room CY–A257, 445 12th Street, SW., Washington, DC and may also be purchased from the Commission's copy contractor, International Transcription Service (202) 857–3800, 445 12th Street, SW., Room CY–B402, Washington, DC. This *R&O* is also available on the Internet at the Commission's website: *http://www/fcc.gov.*

Synopsis of Report and Order

1. In this *R&O* we will impose a channel election requirement, requiring commercial television stations with two in-core channels (*i.e.,* channels 2–51) to elect their post-transition digital channel by December 31, 2003. We will resolve in a subsequent rule making both priority as to channel assignment (*e.g.,* should stations that must move to a new channel have the highest priority and get the first selection of channels that are returned) and processing issues as well as the question of whether any channels should be placed off-limits, not available for use by DTV licensees. Additionally, while full replication by DTV licensees of the NTSC service area was an important Commission objective in developing the DTV Table of Allotments and remains a key goal, we will not impose a full replication requirement. Instead, we have determined that, after December 31, 2004, whatever portion of a commercial broadcaster's NTSC Grade B contour is not replicated with its digital television signal will simply cease to be protected in the Table of Allotments. We will, however, impose a city-grade service obligation that will require licensees to encompass their communities of license with a stronger signal than that with which they had, or will have, to commence DTV operations. In this *R&O*, we also adopt DTV application cut-off procedures and address how we will resolve any mutual exclusivities that arise. We also address in the *R&O* portion of this document a host of technical issues and determine that at this time there is no persuasive information to indicate that there is any deficiency in the 8–VSB modulation system of the DTV transmission standard that would cause us to revisit our decision to deny Sinclair Broadcasting Group, Inc.'s, petition and to add COFDM to the current 8–VSB DTV standard or to grant Univision Communications Inc.'s Petition for Expedited Rule Making to that same effect. We also decline to adopt technical performance standards for DTV receivers.

I. Background

2. In the Commission's digital television proceeding (MM Docket No. 87–268) we repeatedly indicated our intent to hold periodic reviews of the progress of the conversion to digital television and to make such mid-course corrections as were necessary to ensure the success of that conversion. We commenced this, the first, periodic review, with a *Notice of Proposed Rule Making* (''*NPRM*''), adopted March 6, 2000 (65 FR 15600, March 23, 2000). In that *NPRM* we stated that the conversion is progressing and that television stations are working hard to convert to digital television. We invited comment on several issues that we considered essential to be resolved in order to ensure that progress continued and that potential sources of delay were eliminated.

II. Discussion

A. Channel Election

3. In the *NPRM*, we noted that we had decided in the DTV *Sixth Memorandum Opinion and Order* (''*6MO&O*''), 63 FR 15774, April 1, 1998, that, after the transition, DTV service would be limited to a ''core spectrum'' consisting of current television channels 2 through 51. Although some stations received transition channels out of the core, and a few had both their NTSC and DTV channels outside the core, we believe there will be sufficient spectrum so that at the end of the transition all DTV stations will be operating on core channels. Nevertheless, it now appears that there will be more out of core stations that must be accommodated with a core channel than we initially anticipated because new applicants will be allowed to convert their single NTSC channels to DTV operation and those on channels outside the core will be provided a post-transition channel inside the core. Also, as noted in the *NPRM*, the recent establishment of primary Class A TV stations may limit availability of core channels in some areas. Accordingly, the *NPRM* suggested a May 1, 2004, election date, but asked for comment on whether the election date should be earlier.

4. We have determined to mandate a December 31, 2003, election deadline for commercial television stations both their NTSC and DTV operations on in-core channels. This is more than one and a half years after the last commercial station construction deadline (*i.e.,* May 1, 2002), giving these stations ample time in which to decide which of their two core channels would be most suitable for use in digital broadcasting. Setting this channel election deadline will enable us to determine at an early date, on a market-by-market basis, what channels will be available for stations having two out-of-core channels and for other users and will assist in our clearing of this spectrum. We believe that the transition process will be sufficiently along by December 31, 2003, to allow commercial broadcasters to make an informed channel selection decision. An earlier election decision will provide commercial broadcasters with more time in which to construct the replication capability prior to our December 31, 2004, ''use or lose'' date, also being adopted herein. The choice of this election deadline for this category of stations strikes an appropriate balance between the need for stations to have a sufficient amount of time in which to gain experience in DTV operation and allowing stations that will have to move—particularly from out-of-core to in-core—to plan for the DTV channel conversion by December 31, 2006.

5. Non-commercial stations that have both their NTSC and DTV operations on in-core channels will have until the end of 2004 to elect their channels. This later deadline allows noncommercial stations to have at least a full year of experience with their DTV operation before having to choose their post-transition channels and, accordingly, accommodates the needs of public television.

6. We will resolve in future DTV periodic reviews a decision on whether and when stations with one or both of their channels out of the core will have to make an election. We presume that,

except in extraordinary circumstances, stations that have one in-core and one out-of-core channel will remain on their in-core channel after the transition. We will resolve issues relating to the particulars of the election process and procedure to later periodic reviews or publish them in Public Notices issued with sufficient time to allow for licensees to familiarize themselves with them. We will also resolve later the issue of whether any channels should be off limits. In *all* cases, including stations with both channels in-core, we reserve the right to select the final channel of operation in order to minimize interference and maximize the efficiency of broadcast allotments in the public interest. We intend to review the channel elected to ensure that its use furthers these goals.

7. Under the Community Broadcasters Protection Act of 1999 (CBPA), the Commission is prohibited from granting a Class A license to a low power television station operating on a channel within the core spectrum that includes any of the 175 additional channels that were referenced in the Commission's *6MO&O*. In the *6MO&O*, the Commission expanded the DTV core spectrum to cover, in total, channels 2–51, and we observed that this expansion would add approximately 175 additional channels to the core. The CBPA, as we noted in the *NPRM*, also requires the Commission to identify these 175 channels within 18 months of the Act's enactment. We thus invited comment as to whether, based on the new obligations imposed by this legislation, we are required to impose an earlier election date than May 1, 2004. After enactment of the CBPA, we concluded in our *R&O* establishing a Class A television service that we are currently in compliance with the requirement of section (f)(6)(B) of the CBPA that we protect the 175 channels, because these channels are now encumbered by existing NTSC or DTV allotments. (*R&O* in MM Docket No. 00–10, 65 FR 29985, May 10, 2000.) While a portion of these channels will become available for other parties once the broadcast licensees make their elections and begin to discontinue operations on one of their paired channels at the end of the DTV transition, we will have the opportunity closer to that stage to ensure that the CBPA's channel protection requirement continues to be met. In any event, we are establishing herein an election deadline for commercial stations that is earlier than that originally proposed.

B. Replication

8. We established replication as a goal in the creation of the initial DTV Table of Allotments. By this we meant that each DTV channel allotment was chosen to best allow its DTV service to match the Grade B service contour of the NTSC station with which it was paired. This approach provides important benefits to both viewers and broadcasters.

9. Thus far we have not mandated replication. We instead have allowed broadcasters to build facilities sufficient to emit a DTV signal strong enough to ensure that the predicted DTV service contour covers the community of license in order to accelerate the construction timetable and to alleviate the burdens that it placed on broadcasters. We nonetheless noted that during the first two-year review, we would consider whether to modify the build-out requirement to require a full-replication facility.

10. After considering the comments, and balancing the arguments for and against, we have decided not to require replication. We expect that DTV broadcasters will eventually choose to replicate their NTSC service areas to serve their viewers. However, we will not require such replication because we want to give broadcasters a measure of flexibility as they build their DTV facilities to collocate their antennas at common sites, thus minimizing potential local difficulties locating towers and eliminating the cost of building new towers. Some broadcast commenters have taken advantage of these measures, which we suggested in the *5R&O*, and it would be unfair to them and might delay construction to require them to change these plans, if necessary, to achieve full replication. Additionally, some licensees are not operating on their core channels and it would be inefficient to require them to construct full-replication facilities on the channel that they will soon vacate. As Joint Broadcasters point out, the migration to final DTV channels is by no means complete. To require NTSC service replication by DTV stations under these circumstances would indeed be premature, would cause excessive additional expense to both commercial and noncommercial broadcasters alike, and could delay the transition. Finally, we are not requiring replication in order that broadcasters can have more flexibility to collocate their transmitters and make other necessary adjustments. As pointed out in the comments, the use of common sites can also minimize environmental degradation.

11. While we wish to assure broadcasters a measure of flexibility in constructing their DTV facilities, we continue to want to assure that viewers do not lose service and we take seriously our mandate to speed the transition and to ensure that the spectrum is used efficiently. We have determined that the best way to accomplish this objective without imposing undue cost and delay on broadcasters, and to minimize environmental effects, is not to expressly require full replication of NTSC coverage with DTV service. However, to provide an incentive to them to do so, we will, as proposed by several commenters, and as discussed in the *NPRM*, cease to give interference protection to their unreplicated service area as of December 31, 2004. Thus, by December 31, 2004, commercial DTV licensees must either be on-the-air replicating their April 1997 NTSC Grade B service area as of that date or lose interference protection to the unreplicated portion of this service area outside the noise-limited signal contour.

12. We view this as part of a three-stage approach to the transition to DTV. The first stage will end May 1, 2002, by which time all commercial television stations must commence digital service. Noncommercial stations will have until May 1, 2003, to complete this stage. The second stage will end at the close of 2003, when channel election will be required for all commercial stations or the close of 2004, for noncommercial stations. The final stage will be occur on December 31, 2004, at which time commercial DTV licensees will lose interference protection to those portions of their NTSC service area that they do not replicate with their DTV signal. Noncommercial DTV licensees will not lose such protection until December 31, 2005.

C. City Grade Coverage

13. For the reasons we discussed in the *NPRM*, we will impose a principal community coverage requirement that is stronger than the DTV service contour requirement that we adopted as an initial obligation in the *5R&O*. Such a requirement will improve the reliability of service to the community of license. However, we recognize the broadcasters' need for flexibility and will require a set of signal strengths lower than we proposed in the *NPRM*. We believe an appropriate balance is achieved by requiring a DTV city grade contour that is 7 dB stronger than the DTV service contour values for the pertinent channel. This is significantly less burdensome than the proposed values which would have been at least 16 dB

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stronger. The values we are adopting are as follows:

Channels	Field strength (dBu)
2–6	35
7–13	43
14–69	48

The required level of service must be achieved by December 31, 2004, for commercial stations and December 31, 2005, for noncommercial stations, the same dates by which stations must either replicate their NTSC service areas or lose protection to the unreplicated areas.

14. We base the 7 dB increment on two factors relating to improving the availability of service in the city of license. First, as with NTSC TV city grade requirements, we conclude that the percent of locations receiving service should be more than the fifty percent criteria that is the standard for the NTSC Grade B service contour, as well as for the DTV service contour. Increasing the DTV service availability to the best 70 percent of the locations requires about a 4 dB increase in field strength, if all other assumed planning factors remain the same. We believe it is also appropriate to assume that locations inside a station's community of license should not require a very high-gain receiving antenna normally necessary for fringe-area reception. For NTSC TV service, the assumed antenna gain for Grade B service is five or six dB more than the assumed antenna gain for Grade A service. Where a lower-gain antenna is assumed, correspondingly stronger field strength is required for service to be provided. DTV antenna assumptions are generally that higher gain antennas will be used than have been assumed for NTSC TV reception. Conservatively, we assume that a DTV receiving antenna for use in a station's city of license can be at least 3 dB lower gain than the assumed receiving antenna for the edge of the station's service area.

15. The improved availability we are providing for is consistent with recognizing that the DTV signal is substantially different from the NTSC signal. The NTSC signal strength degrades over distance from the transmitter, with picture quality declining accordingly. In DTV there are virtually no gradations in picture quality that are dependent on signal strength. If the signal strength is above a certain threshold it will produce an excellent picture. If the signal strength does not reach that threshold, the receiver's screen will freeze or go blank. The degree to which the signal exceeds that threshold requirement does not matter; the picture quality will not change and would not change even if we were to require that the community of license be provided with a more robust signal than that currently required. The higher signal level requirement should increase the number of locations where a good signal is present.

16. We recognize that some stations have spent time and money developing solutions to their coverage issues (*e.g.*, placing the required level of signal over their community of license, avoiding co-channel and adjacent channel interference) that may result in their not being able to encompass their principal communities with the increased city-grade signal level proposed in the *NPRM*. In some of these cases interference has been reduced through collocation that may preclude licensees from being able to encompass their communities of license with the proposed signal level. We believe the less burdensome requirement we are adopting will not force many licensees to increase their power or move their antenna resulting in increased cost. The new, scaled-down requirement will continue to allow most broadcasters the flexibility they have requested in building their DTV facilities and we expect that they will construct expeditiously to assure that consumers and viewers have the benefit of a rapid transition to digital television.

17. Our enhanced principal community signal strength standard also helps prevent the migration of licensees from their community of license, thus furthering the purposes of Section 307(b) of the Communications Act. Their public interest obligations run to their communities of license. These requirements remain undiluted by our decision herein.

D. Noncommercial Stations

18. Although we did not solicit comment on this issue in the *NPRM*, and we stated that it is too early to address the needs of public television stations in converting to DTV, AAPTS/PBS request special treatment for noncommercial educational television stations. In the *5R&O* in our DTV proceeding, we noted our commitment to noncommercial educational television and acknowledged the difficulties they would face in transitioning to DTV and which would require special relief measures. In recognition of these difficulties we stated that noncommercial stations will need and warrant special relief to assist them in the transition to DTV. We continue to believe, however, that it would be premature to attempt to resolve the issues raised, or grant the type of relief sought, by AAPTS/PBS in their comments. Furthermore, we believe that it would be beyond the scope of the *NPRM* in this proceeding to do so. As we get closer to the construction and election deadlines for noncommercial educational broadcast stations we will be in a better position to determine what further relief might be required by such stations and whether the scope of that relief needs to be on an industry-wide basis or only on a station-by-station or market-by-market basis.

E. Mutually Exclusive Applications

19. In the *NPRM*, we also addressed certain issues with respect to mutually exclusive (MX) DTV applications.

20. *DTV Cut-off Procedures*. Based upon the record in this proceeding, we conclude that the fairest and most expedient method for determining cut-off protection for DTV expansion applications is to take a bifurcated approach. With respect to all currently pending DTV expansion applications, we establish cut-off protection as of the date of the adoption of this *R&O.* Therefore, all DTV expansion applications pending as of the adoption date of this *R&O* are cut off and will be protected against later-filed DTV applications. Later-filed DTV applications must protect applications in this cut-off group. We find that this approach, which received the support of the majority of the commenters, will create a definitive pool of applicants from which both the applicants and the Commission staff can begin to resolve mutual exclusivity issues. As the Joint Broadcasters and AAPTS/PBS observe, use of a single cut-off date for all pending DTV applications will minimize the number of MX situations and facilitate applicants' planning with respect to their proposals. A single cut-off date also provides a measure of fairness to all applicants that filed DTV expansion applications prior to the adoption of the *R&O* by allowing all of them to be considered as part of one cut-off group. Because most television licensees have filed their DTV expansion applications, providing cut-off protection to all pending DTV applications will adversely affect only the limited number of licensees that will be filing such DTV applications in the future. Finally, selection of the adoption date of the *R&O* as the cut-off date will prevent a possible rush of hasty and possibly defective DTV filings filed merely to preserve rights that might

occur if we were to announce a later cut-off date.

21. Fox and KM Communications, Inc., proposed that we apply first-come, first served processing to the pending DTV applications. Under their approach, all pending DTV applications would be cut-off on the day they were filed. We decline to adopt such an approach. First, we recognize that there was an extended period of time over the past several months during which we permitted DTV applications to be filed without indication that applicants needed to expedite their filings or lose out on an opportunity to expand their DTV allotments. It would be unfair to retroactively apply first-come, first served processing to those applicants, such as noncommercial and smaller market licensees, that, as permitted, followed our staggered DTV implementation schedule and waited until their later deadlines to file their applications. In addition, we find that such an approach would not achieve the expected results. We have previously found first-come, first-served processing to be a desirable method of application processing because it avoids a large number of MX applications while also providing applicants with a level of certainty that their filing will not conflict with undiscovered earlier-filed applications. However, in this case, since so many of the pending DTV applications were filed in large batches on the same day because of Commission-mandated DTV deadlines (November 1, 1999, and May 1, 2000 being the prime examples), these applications would remain MX, with the intended benefits of first-come, first-served processing not being realized.

22. As for future DTV expansion applications filed after the adoption date of this *R&O*, we will adopt the proposal in the *NPRM* and we will consider such applications cut-off as of the close of business on the day they are filed. Under this day-to-day cut-off approach, conflicting later-filed applications would have to protect the earlier-filed, cut-off application. Unlike the case with the large number of currently pending DTV applications, we find that the benefits of this type of application processing can be realized with respect to the anticipated relatively small number of future DTV applications. Adoption of day-to-day cut-off processing for new DTV expansion applications will not only help to avoid a larger number of mutually exclusive applications the processing of which could delay expediting DTV service to the public and provide certainty for future applicants, but will also encourage potential applicants to file quickly for improved facilities and thus help speed the introduction of DTV service to the public.

23. We decline to adopt a moratorium on the filing of new DTV expansion applications, as suggested by some commenters. Since many licensees filed their DTV expansion or maximization applications by May 1, 2000, the date set by the CBPA after which such applications would have to protect on new Class A television stations, we find it unlikely that a large number of additional stations will be filing DTV expansion applications. Furthermore, the procedures we adopt herein for resolving the pending MX applications will result in an expedited resolution of such.

24. *Resolving Mutually Exclusive DTV Applications.* We find that the best approach to resolving MX DTV expansion applications is to follow our existing DTV new station application procedure. First, we will continue to identify and grant all checklist, non-checklist, and maximization applications that are not predicted to create or receive impermissible levels of interference. The staff will identify via public notice those groups of MX applications that are related either by direct or indirect mutual exclusivities. The applicants will then be permitted a period of time, as discussed below, to resolve their MX situation through engineering solutions or settlement. The applications that remain MX following this settlement period would then be dismissed. We agree with those commenters that recognized that this type of private resolution of MX situations affords the parties greater flexibility than Commission imposed solutions, and avoids the burdens of costly and more time consuming regulatory proceedings. We will not adopt the proposed ''safety valve'' proposed by the Joint Broadcasters. However, in this regard we will consider on a case-by-case basis waivers of the *de minimis* interference limits (between applications) in cases of particular hardship where MX applicants demonstrate that their DTV applications were filed because they were required to relocate their proposed facilities for zoning or technical reasons.

25. Furthermore, we decline to use auctions to resolve MX DTV applications would not serve the public interest. We stated in the *NPRM* that, while we are precluded from Section 309(j) from auctioning initial DTV replacement licenses, it does not appear that a digital area-expansion application would constitute such a replacement. Some commenters, however, pointed out that many initial applications request area-expansion. Furthermore, even those DTV expansion applications that seek to modify a DTV construction permit or seek a construction permit to change an existing DTV facility could be viewed as components of the replacement of analog television service. Therefore, it would take a time consuming, case-by-case approach to determine whether individual DTV applications were subject to auction. Given the extended length of time for such analysis, the strain on staff resources, and the difficulty in making such a determination, we find that use of auctions would not be a workable solution to resolving MX DTV groups. In addition, there are other public interest reasons why we believe that auctions would not be the best method for resolving DTV mutual exclusivity. The use of auctions could encourage applicants to take steps to avoid siting their DTV facilities in proximity to the DTV facilities of other licensees in order to avoid an MX situation and possible auction. This would undermine our stated goal of encouraging the collocation of DTV facilities and sharing of facilities. Finally, we agree with the Joint Broadcasters that auctions of DTV expansion applications could be difficult to administer since they could involve ''daisy chains'' of direct and indirect MX groupings and may cause delay to the overall DTV implementation process.

26. As for the length of the settlement period, we will limit the settlement period to 90 days during which applicants must either find an engineering solution or otherwise propose a settlement that would resolve their mutual exclusivities. These settlement periods will be announced by the staff in future public notices. While we encourage applicants to utilize all means possible to resolve their mutual exclusivities, including third-party mediation if they desire, we will not permit additional time for parties using such measures. We conclude that a 90-day settlement period strikes a fair balance between permitting applicants ample time and opportunity to resolve their mutual exclusivities and expediting the processing of pending DTV expansion applications.

27. As noted above, in addition to permitting applicants in MX groups to propose engineering solutions to resolve their mutual exclusivities, we will also permit applicants to enter into settlement agreements whereby one or more applicants may agree to change their proposed facilities or dismiss their expansion application altogether in

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exchange for compensation. In an effort to provide additional flexibility and to hasten the settlement process, we will waive the provisions of 47 CFR 73.3525(a)(3) which limit the monetary settlement of pending applications to the legitimate and prudent expenses of the applicant. All other provisions of 47 CFR 73.3525 will continue to be applied to these settlements. We find that the public interest will be served by waiving the monetary limitation because it will result in the resolution of more MX DTV groups, the grant of a greater number of DTV expansion applications, and expedited DTV service to the public. We also remind DTV applicants seeking engineering solutions or settlements to resolve their MX groups, that all such engineering solutions and settlements must be submitted in writing for staff review pursuant to 47 CFR 73.623(g). As that section provides, concerning negotiated agreements on DTV interference, ''applications submitted pursuant to the provisions of this paragraph will be granted only if the Commission finds that such action is consistent with the public interest.''

28. Finally, we recognize the comments of the Joint Broadcasters that adoption of a cut-off procedure and method for resolving MX DTV applications necessarily means that we must revise our existing maximization procedures as adopted in the *Second Memorandum Opinion and Order*, 64 FR 4322, January 28, 1999 (''*2MO&O*'') in the DTV rulemaking proceeding. In that decision, we adopted a procedure whereby DTV maximization applications with power levels above 200 kilowatts would be placed on public notice and interested parties would be given 30 days to object to an expansion proposal by stating that the proposed change would impact upon their future plans to maximize their own DTV operations. The applicant and objecting party would then have 30 days to resolve the conflict and, in the event they are unable to do so, the DTV above 200 KW maximization application would be dismissed. The Joint Broadcasters are apparently concerned that, left untouched, the maximization procedures set forth in the *2MO&O* would be inconsistent with the cut-off and MX procedures we are adopting herein. We agree, and we replace the maximization procedures set forth in the *2MO&O* with our new cut-off and MX procedures. Accordingly, the temporary 200 kW cap on power increases for UHF DTV stations is no longer necessary and is removed.

29. *Application Processing/Protection Priority.* After consideration of the comments, we adopt a system of priorities similar to that proposed in the *NPRM,* and we give priority to DTV expansion applications over all NTSC applications except NTSC applications that fall into one of the following three categories: post-auction applications (*i.e.,* the long form application [FCC Form 301] filed by the winning bidder following the completion of a broadcast auction), applications proposed for grant in pending settlements, and any singleton applications cut-off from further filings. We estimate that there are approximately 20 applications in these three categories. The cut-off singleton applications remain pending for a variety of legal and technical reasons. These NTSC applications must have been accepted for filing in order to be protected from DTV expansion applications. In the future, when a party files a DTV expansion application, it must determine whether there are NTSC applications on file in any of the three above categories and provide interference protection to them. As for pending DTV expansion applications and NTSC applications, if an earlier-filed DTV expansion application conflicts with an NTSC application in one of the these three categories, we will consider these applications MX and follow our above-outlined procedures for MX applications—that is, we will require that the parties resolve their MX within 90 days or we will subsequently dismiss both applications. Additionally, we will require NTSC applications to protect facilities proposed by DTV applicants even if the DTV application was filed while the NTSC application is pending. We believe that our goal should continue to be expedited implementation of DTV service. We find that the above system of priorities will further that goal, while at the same time recognizing the need to continue to provide viable NTSC service until the DTV transition is complete and not disrupting the settled expectations of these NTSC applicants that may have relied on existing procedures in the reasonable belief that their applications would receive protection.

30. We will condition the grant of all future NTSC minor change applications on acceptance of interference from any proposed DTV facility which was filed on or before the NTSC grant date.

31. With respect to pending petitions for rule making for new or modified DTV allotments, where an *NPRM* has been adopted and the comment deadline on the petition for rule making has passed, we will consider such petitions as ''cut-off'' as of the comment deadline. In that case, if there is an earlier-filed pending DTV expansion application that conflicts with the petition, we will consider the petition and application(s) as MX and, once again, follow our above outlined procedures for MX applications. Pending DTV expansion applications that are filed after a DTV petition is cut-off on its comment deadline will have to protect the facilities proposed in the DTV petition. If the pending DTV petition has not yet been cut-off as of the adoption date of this *R&O,* then, because we will have cut off all pending DTV expansion applications, we will consider the petition and any conflicting DTV expansion applications as MX and use our above-outlined procedures to resolve them.

32. With respect to future petitions for rulemaking that are filed for new or modified DTV allotments, we will continue our current practice of providing cut-off protection to such petitions on their comment deadline. Therefore, in the future, when an interested party files a DTV expansion application, it must provide protection for any DTV rulemaking petition for which the comment deadline has passed. Also in the future, new DTV petitions will be required to protect all earlier-filed DTV expansion applications, given our newly adopted day-to-day cut-off procedure for such application.

F. Technical Issues

33. In this section, we address several comments that request action on technical issues.

34. *ATSC DTV Standard.* The Advanced Television Systems Committee (ATSC) is the organization that developed the ''ATSC DTV Standard,'' most of which we adopted as our DTV broadcast standard in the *Fourth Report and Order,* 62 FR 14006, March 25, 1997 (''*4R&O*'') in the DTV proceeding. Title 47 CFR 73.682(d) requires that broadcast DTV transmissions comply with standard ATSC Doc. A/53 dated September 9, 1995, except for its constraints on video formats. In comments, ATSC reports that, since adoption of the *4R&O,* it has made several changes to the Doc. A/53 standard including removing constraints associated with the ''program paradigm,'' updating references to the underlying MPEG standards, replacing references to obsolete ATSC standards for Electronic Program Guide and System Information with a reference to a new ATSC Doc. A/65 for Program and System Information Protocol (PSIP), and requiring a signal when colorimetry other than that defined by standard SMPTE 274M is used. The PSIP specification provides for the

transmission of system information and program guide data for broadcast DTV stations, enabling the identification of service channels and digital bit streams, and allowing receivers to generate electronic program guides. It also provides for selection through the program guide function of the type and language of closed captioning to be viewed and transmission of program ratings information to allow parents to use ''v-chip'' technology. ATSC also indicates that it is considering an increase in the maximum allowable audio bit rate.

35. ATSC urges the Commission to revise the rules to reference the latest version of the ATSC DTV Standard A/53 and to require use of the ATSC PSIP Standard A/65. ATSC further requests Commission action to assure that ''major channel numbers'' in the PSIP are used properly, the assignment of transport stream identifier (TSID) parameters is properly administered, and that closed captioning and content advisory information conforms with the PSIP Standard. ''Major channel number'' is part of the DTV bit stream specified in the PSIP standard and used to identify the terrestrial broadcast station (or cable or satellite source) providing the DTV program(s). Where a station is transmitting multiple programs, it uses ''minor channel numbers'' to distinguish among them. Within each television market, each programming source (terrestrial DTV broadcast stations as well as cable or satellite DTV channels) must have a unique ''major channel number'' so DTV receivers can be tuned to the desired stations and programs. In addition, the PSIP standard uses a ''TSID'' to uniquely identify transport streams, again to allow DTV receivers to tune between programs arriving from different sources. Finally, ATSC suggests the Commission encourage use of additional supplementary ATSC standards, including those concerning conditional access and data broadcasting.

36. In ET Docket No. 99–34, we sought comment on whether coordination committees and a national coordinator could assist in the administration of the DTV system by assigning the unique PSIP station identifier and negotiating the naming and numbering of channels among broadcasters in local markets. We continue to believe that an industry approach is generally the most appropriate means for managing the implementation of a PSIP system. However, we do recognize that the transport stream identifiers (TSIDs) must be unique to each individual television station and that there is a need to coordinate TSID assignments for stations in the border areas with our neighbors in Canada and Mexico. We therefore agree that TSID assignments should be made part of the Commission's licensing process for broadcast television stations and will begin the process to incorporate this function into that process in the near future. Until negotiations with Canada and Mexico on this matter are complete and we have modified our licensing process and records management systems, we will continue to rely on the industry to make TSID assignments.

37. *Distributed transmission and boosters.* The Merrill Weiss Group (Merrill Weiss), supported by Pappas and Penn State University, and ADC Telecommunications, urge the Commission to adopt rules for on-channel DTV boosters, including allowance for a distributed transmission system. Merrill Weiss defines distributed transmission as being similar to a cellular telephone system in that a service area is divided into a number of cells, each served by its own transmitter. Distributed transmission differs from a cellular telephone system in that all adjacent cells use the same frequency (a ''single-frequency network''). DTV boosters also retransmit the primary DTV station's same program on the same channel.

38. While we recognize the desire to initiate DTV booster operations, we believe there are fundamental issues surrounding their authorization and protection that must be addressed in a more comprehensive manner than can be accomplished based on the limited record on this issue in this proceeding. Therefore, we will defer this consideration to the rulemaking proceeding on digital LPTV and DTV translator stations that we expect to initiate within the next few months.

39. *Computer program used for application processing.* Several concerns are raised in comments about elements of the Commission's interference analysis program used in processing applications. Hammett and Edison seeks changes in the way the program treats the return of an ''Error Code 3'' message from the Longley-Rice propagation model. An ''Error Code 3'' message is given when internal Longley-Rice program calculations show parameters are out of range and that reported results are dubious or unusable. The message is returned when the calculation of the actual distance to the horizon from a given cell or transmitter location is less than 0.1 times or greater than 3 times the distance to the smooth earth horizon. Hammett and Edison also seeks a change to the program's calculation of the depression angle from a transmitting antenna to a cell and requests that the program be changed to allow use of the actual transmitting antenna elevation patterns rather than the generic pattern. AFCCE recommends that the cell size and spacing increment should be reduced as necessary to accurately depict terrain and population distribution.

40. We recognize that this is a very complicated analysis. We have found it necessary to balance ideas and recommendations for refining the program with the disruption and uncertainty that would occur when a change is made. In the case of each of these proposals, we believe that the disruption of altering the program would be more severe than warranted by the possible improvement in the accuracy of the analysis results provided by the program. In the case of the ''error code 3'' request, we note that we previously indicated that the assumption of service was appropriate where the Longley-Rice propagation model indicates that results are unreliable because it is similar to the situation where, for many purposes, all locations within an NTSC TV station's Grade B service contour are assumed to receive service. While Hammett and Edison submits the results of its study regarding the prevalence of the problem, our review of its information reveals no benefit that would warrant reversing our earlier decision.

41. We have an administrative process that relies on comparison of interference and service predictions with the analysis performed in creating the table of allotments. Recalculating the entire table would be an enormous undertaking. Additionally, reconciling calculations using a new methodology with the table calculations based on different methodology is difficult and likely to result in uncertainty in the results and contested decisions.

42. We believe the best balance of accurate interference prediction and administrative certainty can be achieved with the analytical methods that we used to develop the initial table, which is consistent with the comments of AFCCE. AFCCE recommends continuing to use the established methods of determining the grade B contour for predicting an NTSC station's service and determining a DTV service contour using the F(50,90) propagation model as the first step in predicting DTV service. AFCCE also recommends that use of Longley-Rice analysis and the relevant DTV planning factors be continued. We believe this can be best achieved by maintaining the normal processing

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analysis based on the methodology established in creating the table. However, in a special case, where one of the suggested revisions would improve the accuracy of the analysis and would make a critical difference, an application may contain a showing using an alternate analysis in support of a waiver request.

43. *Release of evaluation software.* Everist requests that the Commission immediately release all software to the public that it uses in its DTV evaluation procedures. Some of the software requested by Everist is still in a development and testing phase and we believe it would be premature and, indeed, confusing to release it to the public while it is undergoing review and revision. Software that is relied upon in processing TV and DTV applications has been, and will continue to be, made available to the public in the same way that evaluation software for other video broadcast services is made available.

44. *DTV Planning Factor—Assumed Receiving Antennas.* Hammett and Edison objects to the assumed receiving antenna pattern for NTSC reception being different from the assumed receiving antenna pattern for DTV reception in OET–69 interference calculations.

45. At this time, we do not have a basis for changing these criteria. The receiving antenna assumptions were considered in the Advisory Committee on Advanced Television Systems and were part of its recommendation to the Commission. There has been no consensus developed in the industry that changing the receiving antenna assumption is appropriate. We therefore see no merit in changing the assumed NTSC and DTV antenna patterns. Also, changing the assumptions now would alter the interference analysis methodology, which, as discussed above, could disrupt processing and create uncertainty.

46. *Change in Census Population Data.* Everist asks whether the Commission will permit updated Census Bureau population estimates to be used for service and interference calculations as they become available. As a related matter, AFCCE recommends that the geographic center instead of the population centroid of each cell be used in the Longley-Rice analysis. The effect of this change would be to make the analysis of whether a cell is served or interfered-with independent of the population data the analysis is based on (because the precise location that is considered to represent the cell would be fixed at the middle of the cell and not shifted to a location that depends on the population distribution within the cell).

47. At this time, we have not made plans to convert our processing analysis to use new census data. New census data would necessitate re-evaluation of the entire DTV table to establish ''baseline'' values against which application proposals can be measured. Again as above, additional information about population shifts can be submitted with an application where such information is crucial and decisional. Also, if, in the future, we consider using new census data, we can consider then the AFCCE recommendation concerning the use of the geographic center of each cell.

48. *Maximum power clarification.* Title 47 CFR 73.622(f)(5) provides that licensees assigned a DTV channel in the initial DTV Table of Allotments may request an increase in either Effective Radiated Power (ERP) in some direction or antenna Height Above Average Terrain (HAAT) that exceeds the initial technical facilities authorized for the allotment. Such increases are limited to maximum powers specified in paragraphs (f)(6) through (f)(8) of that section. Where specified antenna HAAT values are exceeded, the maximum ERP generally is reduced in accordance with the appropriate chart or formula in those paragraphs. Paragraph (f)(5) also allows the maximum ERP and HAAT combination to be ''up to that needed to provide the same geographic coverage area as the largest station within their market, whichever would allow the largest service area.'' AFCCE, Everist and Hammett & Edison, each requests clarification of the term ''geographical coverage of the largest station in the market'' for determining maximum power and antenna.

49. We take this opportunity to clarify this rule. First, the maximum ERP limits (1000 kW for UHF channels 14–69 in any zone; 30 kW for VHF channels 7–13 in Zone 1; 160 kW for VHF channels 7–13 in Zone 2 or 3; 10 kW for VHF channels 2–6 in Zone 1; and 45 kW for VHF channels 2–6 in Zone 2 or 3) may not be exceeded. The ''largest station'' provision applies only where the rules normally require a reduction in the maximum power because a specified antenna HAAT is exceeded. That is, it does not allow power higher than the maximum ERP to compensate for an antenna HAAT that is lower than the value specified in the rule. Second, the ''largest station'' provision is only triggered where a station in the same market is serving a larger area than could be covered with the standard maximum power and antenna height specified in 47 CFR 73.622(f). Otherwise, applicants must comply with the maximum power and antenna height in that rule section. Third, for the purpose of this rule, stations in the same DMA are considered to be in the same market. Fourth, the geographical coverage determination is based on the area within the DTV station's noise-limited contour, calculated using predicted F(50,90) field strengths as set forth in 47 CFR 73.622(e) and the procedure specified in 47 CFR 73.625(b). Under this provision an application may not request a power and antenna height combination that would result in coverage of more square kilometers of area than the largest station in the market. It is not necessary that the application specify coverage that is congruent with or encompassed by the coverage area of the largest station. Stations are not expected to shift their coverage area in order to use this provision of the maximum power rules. Finally, DTV stations are still subject to the interference protection requirements, even when availing themselves of this provision.

50. *Directional Antenna Definition and Interference Creating NTSC White Areas.* Everist seeks clarification on the definition of a non-directional and a directional transmitting antenna. He also asks about incremental creation of white or underserved areas as DTV stations are authorized based on creating *de minimis* interference to the Grade B service of NTSC TV stations.

51. In both of these matters, we believe it is appropriate to continue the NTSC TV practice. Title 47 CFR 73.625(c)(2) defines a DTV directional antenna as one ''designed or altered to produce a noncircular radiation pattern in the horizontal plane * * *.'' Title 47 CFR 73.685(e) defines an NTSC TV directional antenna as one ''designed or altered to produce a noncircular radiation pattern in the horizontal plane * * *.'' Therefore, the DTV and NTSC rules defining directional antennas are identical and the practices and policies that have been applied to NTSC directional antennas will also be applied to DTV directional antennas. With regard to white area or underserved area determinations, we note that 47 CFR 73.684(a) concerning NTSC TV station prediction of coverage specifically indicates that ''predictions of coverage made pursuant to this section shall be made without regard to interference * * *.'' Therefore, as has been the case with NTSC interference, we will not consider the effect of DTV interference on analysis of white areas or underserved areas.

52. *Closed Captioning for Digital TVs.* Motorola addresses an issue of

compatibility of DTV closed captioning with an existing digital cable closed captioning technology. Motorola is concerned that this issue could lead to a delay in the DTV transition, so it includes an analysis that it also submitted in ET Docket 99–254.

53. The *R&O* in ET Docket No. 99–254, 65 FR 58467, September 29, 2000, has addressed this matter and no further action is necessary herein.

54. *NTSC Group Delay Blanket Waiver.* Hammett & Edison requests a blanket waiver of the envelope delay requirement in 47 CFR 73.687(a)(3) for NTSC stations with upper-adjacent channel DTV assignments that combine their NTSC and DTV signals and use a common transmitting antenna.

55. We agree with Hammett and Edison that a blanket waiver is appropriate for this situation. Therefore, we authorize all NTSC TV stations with a DTV signal on the first-adjacent channel above the NTSC channel and with a common transmission line and antenna, to operate at variance with the envelope delay requirements of § 73.687(a)(3) for frequencies between 3.9 and 4.2 MHz above the visual carrier.

56. *Canadian Border Zone.* AFCCE urges the Commission to resolve Canadian border zone issues in an expeditious fashion. We believe this concern has been resolved. A Letter of Understanding with Canada was signed September 12 and 22, 2000, and announced in a Public Notice released September 29, 2000.

57. *Data Base Inconsistency.* Everist is concerned that the new Mass Media Bureau Consolidated Data Base System (CDBS) should be validated. He states that where old terrain elevation data that is inconsistent with current determination of terrain elevation, it can turn an otherwise ''checklist'' application into a ''non-checklist'' application because it will show the antenna height differing from that authorized by more than ten meters.

58. Errors and inconsistencies in the CDBS that we have discovered have been corrected and resolved. However, this is an on-going process. As for the criteria for ''checklist'' treatment, we decline to alter it at this time. We now have the capability to process ''non-checklist'' applications expeditiously (and to quickly grant those applications that do not raise interference concerns and would have been considered checklist except for failing to meet the power or HAAT limits to be defined as checklist). Thus, there is not a significant benefit to an application being designated as checklist.

59. *Sanctioning a Government-Industry Committee Similar to TASO.* AFCCE recommends that the Commission sanction the formation of a government-industry advisory committee to deal with application processing issues, as well as a ''TASO''-like committee to help resolve DTV allotment and service issues. TASO is the Television Allocations Study Organization, which was formed in the 1950s by the television broadcast and consumer electronics industries at the request of the Commission to study the technical principles that should be applied in television channel allocations. At this time, we believe it is preferable to allow current industry efforts to continue without interruption. Significant activity is underway and we do not wish to slow it down or prevent it from reaching possible resolution of the issues that are being addressed. In the future, if circumstances warrant, this matter may be revisited.

60. *Method for determining 85% criteria for extending end of the transition.* California Oregon Broadcasting, Inc. urges the Commission to consider how it will implement the 85% DTV reception criteria for extending the end of the transition beyond 2006. It is too early in the transition to initiate consideration of this matter. We expect to consider it in a future review proceeding.

61. *Biological effects of RF radiation.* Carole Lomond opposes introduction of DTV signals in any residential environment until concern over biological effects of nonionizing electromagnetic radiation is resolved. Lomond provides no evidence to warrant re-evaluating our RF exposure regulations. We therefore decline to consider this issue in the context of this DTV review proceeding.

62. *Other technical issues.* Everist requests clarifications and explanations of a number of other technical matters. We are unable to address all of these in the context of this proceeding. Many of the issues he addresses have not yet arisen in processing and in the case of others his concerns are not clearly described. As these issues come up, we will resolve them individually on a case-by-case basis. If principles emerge from this practice, we will describe them in a Public Notice.

G. DTV Transmission Standard

63. In the *NPRM,* we observed that some broadcast entities had raised concerns regarding the 8–VSB modulation system used in the ATSC DTV Standard adopted by the Commission as the transmission standard for digital broadcast television signals. We stated that while we continue to believe that NTSC service replication is achievable by DTV operations using the 8–VSB standard, we recognized that some parties within the broadcast industry had recently raised various issues with respect to this standard. In particular, we noted that the Sinclair Broadcasting Group, Inc. (Sinclair) had previously filed a Petition for Expedited Rulemaking urging that we modify the rules to permit the use of an alternative modulation method, coded orthogonal frequency division multiplexing (COFDM), in addition to the 8–VSB standard. In its petition, Sinclair argued that COFDM modulation offered easier reception with simple antennas and would enable broadcasters to provide fixed, mobile and portable video services. We dismissed Sinclair's petition, indicating that we continued to believe that NTSC service replication is achievable by DTV operations using the 8–VSB standard. However, we also indicated that we would address the concerns raised by Sinclair and others about the 8–VSB modulation standard in the context of this proceeding. In the *NPRM,* we therefore invited comment on the current status of the 8–VSB DTV standard. We specifically requested comment on the progress being made to improve indoor DTV reception under the existing transmission standard and manufacturers' efforts to implement DTV design or receiver improvements. We also asked commenting parties to submit information regarding any additional studies that may have been conducted regarding NTSC replication using the 8–VSB standard.

64. Parties primarily representing some broadcast interests express continuing concern about the ability of the 8–VSB standard to support reliable reception in areas where there is strong multipath, and submit that this deficiency must be corrected. These parties generally argue that the Commission should actively investigate both 8–VSB and COFDM and should consider a change to COFDM if that system is shown to be superior to 8–VSB. Sinclair and several others continue to argue that broadcasters should be given the option to use a COFDM system for transmitting their DTV signals. Other parties representing broadcasters, consumer electronics equipment manufacturers and consumers urge the Commission to maintain the current 8–VSB modulation standard for DTV transmissions. These commenters generally state that 8–VSB is the most suitable modulation standard for DTV service for North America and that the current concerns

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about reception in areas where there are high levels of multipath are being addressed through receiver improvements.

65. We also observe that a group of broadcasters, including many of those participating in the Joint Broadcasters comments, has recently completed a program of DTV receiver testing. The industry study, among other things, compared reception of 8–VSB and COFDM signals at a large number of locations in those markets. This study took measurements outdoors at the 30-foot antenna height assumed in the DTV planning factors and at 6-feet using simple antennas typical of indoor reception. Some actual indoor measurements were also taken. One of the objectives of the industry tests was to determine whether COFDM should be added to the current 8–VSB standard. The report on the industry 8–VSB/COFDM comparison tests (8–VSB/COFDM Report) indicates that at the 30-foot receive antenna height, 8–VSB was received at a greater percentage of sites than COFDM. This was true at all distances from the transmitter. In addition, 8–VSB performed better up to the furthest distances measured from the transmitters (55 miles). It also states that at the 6-foot receive antenna height, using a simple antenna, COFDM was successfully received at more sites than 8–VSB in Washington, while 8–VSB was successfully received at more sites in Cleveland. It notes that successful reception of either system at the 6-foot height was achieved at less than 50% of the test locations. The 8–VSB/COFDM Report further indicates that in the case of indoor measurements, the percentage of successful reception was similar for both 8–VSB and COFDM, with 8–VSB holding a slight advantage. However, successful indoor reception was achieved at only about 30% of the test locations.

66. Based on these test results, the industry has reaffirmed their endorsement of the VSB standard and concluded that there is insufficient evidence to add COFDM to the U.S. DTV broadcast standard. In this regard, on January 15, 2001, the Boards of Directors of MSTV and NAB issued the following joint resolution:

> With the support of 30 major broadcast organizations and the oversight of technical committees consisting of some 25 engineers representing all major technical viewpoints, the broadcasting industry concluded a comprehensive, objective and expedited series of studies and tests to determine whether COFDM should be added to the current 8–VSB standard.
>
> We conclude that there is insufficient evidence to add COFDM and we therefore reaffirm our endorsement of the VSB standard.
>
> We also conclude that there is an urgent need for swift and dramatic improvement in the performance of the present U.S. digital television system.
>
> We therefore will take all necessary steps to promote the rapid improvement of VSB technologies and other enhancements to digital television and direct the staffs to develop a plan and promptly submit it to the Boards.

In addition, our Office of Engineering and Technology (OET) is currently conducting field tests of 8–VSB reception in the Washington, DC and Baltimore market areas to independently assess the status of DTV receiver development. The OET study is examining the performance of early and improved models of DTV receivers with respect to multipath and coverage based on reception of the signals of the local DTV stations now operating in those markets. This study involves taking measurements at a large number of sites throughout these stations' service areas, including close-in urban, suburban, and rural areas located near the stations' predicted DTV service contour. Specific sites were also selected to ensure that measurements were taken in areas with moderate to strong multipath conditions. Measurements were taken outdoors at the 30-foot height and also at 7-feet using simple antennas typical of indoor reception. The interim results of the OET tests indicate that the current generation of DTV receivers are considerably improved over the early generation units, and in particular with regard to their ability to provide acceptable service in areas with moderate and strong, complex multipath signals. The OET test results also indicate that the 8–VSB system adequately meets our goals for DTV service replication, minimum interference, and spectrum recovery as set forth in the *6R&O.*

67. These new studies bear out the conclusions of the OET's *DTV Report* that the relative benefits of changing the DTV transmission system to COFDM are unclear and would not outweigh the costs or delays involved in making such a revision. Accordingly, based on our review of the record, the demonstrated improvements in DTV receiver performance, and the findings and recommendations of the industry, we find that there is no reason to revisit our decision to deny Sinclair's petition. Consequently we will not reopen the issue of the Commission's DTV standard.

H. DTV Receiver Performance Standards

68. In the *NPRM*, we discussed the desirability of setting receiver performance standards and recognized that some broadcasters have recommended that we address over-the-air DTV signal reception issues by setting receiver performance thresholds. We therefore requested comment on the desirability of adopting minimum performance levels and asked, if we were to adopt such requirements, how they should be structured, including timing considerations.

69. In the *6MO&O* in the DTV proceeding, we stated that we believe that competitive market forces will ensure that DTV receivers perform adequately. We noted that receiver performance involves trade-offs among many different factors and that manufacturers are in the best position to determine how these trade-offs should best be made to meet consumer demand. We further stated, however, that we would continue to monitor this area through the DTV implementation process and that we would take regulatory action if needed. As indicated above, DTV receiver manufacturers, driven by market forces, are continuing to make significant improvements in their products, particularly in the area of indoor reception and multipath signal handling capabilities. These efforts are consistent with our earlier assessment that those producing receivers are in the best position to determine how to make trade-offs in performance factors to best meet consumer needs. We therefore continue to believe that it would be undesirable to set rigid performance standards for DTV receivers at this time. We will, however, continue to monitor receiver issues throughout the transition and will take appropriate action on receiver standards if necessary.

A. Miscellaneous Issues

70. In the *NPRM*, we invited comment on any critical unresolved tower siting issues and how they affect the progress of the digital transition. We asked whether broadcasters are able to secure necessary tower locations and construction resources and whether and to what extent zoning disputes, private negotiations with tower owners, and the availability of tower construction resources affect the transition.

71. The comments generally affirm our preliminary assessment in the *NPRM* that, while some stations are facing problems with tower availability and/or local zoning issues, such problems do not seem to be widespread

at this time. The Commission intends to continue to monitor the situation to forestall and/or remedy problems through these entities, as requested by NAB.

72. Additionally, in the *NPRM* we invited comment on copy protection and cable compatibility issues. Recently, the Commission issued orders in other proceedings dealing with both issues, obviating the need for action to be taken herein. In our recent *FNPRM* in the navigation devices proceeding (*FNPRM* in CS Docket No. 97–80, 65 FR 58255, September 28, 2000), we noted that, unlike in the analog context, digital technology enables users to make an unlimited number of virtually perfect copies of digital content. However, digital technology also can enable copyright holders of digital content to prevent misuse of copy protected material through methods not previously available. In the *Declaratory Ruling* we found that some measure of anti-copying encryption technology is consistent with our navigation devices rules because it protects a gap where digital data would otherwise be available ''in the clear'' and subject to unrestricted digital copying. Accordingly, we clarified that the inclusion of some amount of copy protection within a host device does not violate the navigation devices rules. In the *NPRM*, with respect to cable compatibility, we invited comment on the extent to which a failure of industry parties to reach agreement on labeling of digital receivers would hinder the transition. Subsequently, in our recent *R&O* concerning compatibility between cable systems and consumer electronics equipment (*R&O* in PP Docket No. 00–67, 65 FR 64388, October 27, 2000) we adopted rules providing for the labeling of DTV receivers to ensure that consumers will be fully informed about the capabilities of DTV receivers to operate with cable television systems. We provided for labels with regard to three categories of DTV receivers, depending upon several characteristics. Because additional industry work is still required for design specifications for the Digital Cable Ready 3 category, we stated that the record would be kept open in PP Docket No. 00–67 in order to provide us with the option of incorporating these anticipated specifications into our rules at a later date. This labeling scheme will permit consumers to make well-informed decisions about DTV equipment purchases based on a clear understanding of receivers with different labels.

73. Additionally in that proceeding, we required the consumer electronics and cable television industries to report back to us on their progress in developing technical standards in two areas: Direct connection of DTV receivers to digital cable television systems, and the provision of tuning and program schedule information to support on-screen program guides for consumers. These two issues have been substantially, but not completely resolved in an agreement between the National Cable Television Association and the Consumer Electronics Association.

74. In sum, substantial progress has been made with respect to both copy protection and DTV receiver/cable compatibility. We see no need for further action at the present time in this proceeding with respect to these important issues and will continue to monitor and consider those issues in the foregoing separate proceedings.

III. Conclusion

1. At the outset of this proceeding we stated that the conversion to digital is progressing and television stations are working hard to convert to DTV. The comments we received in response to the *NPRM* have mostly further confirmed our initial impressions. We believe that the conversion is, indeed, making progress and that the actions we are taking, and proposing, herein will hasten this transition. Particularly, our choice of an early channel election for commercial licensees and our decision not to require replication of NTSC service should well conduce to allowing stations to make plans and purchase equipment at the earliest practicable times. We will continue to monitor the progress toward the DTV conversion and will in future reviews take those actions needed to accomplish a smooth transition by December 31, 2006.

IV. Administrative Matters

76. *Paperwork Reduction Act Analysis.* This *R&O* has been analyzed with respect to the Paperwork Reduction Act of 1995, and found to impose no new or modified reporting and recordkeeping requirements or burdens on the public.

77. *Final Regulatory Flexibility Analysis.* As required by the Regulatory Flexibility Act (RFA), the Commission has prepared the following Final Regulatory Flexibility Analysis (FRFA) of the possible impact on small entities of the rules adopted in this *R&O.*

78 As required by the Regulatory Flexibility Act (RFA), an Initial Regulatory Flexibility Analysis (IRFA) was incorporated in the NPRM. The Commission sought written public comment on several issues concerning the transition to digital television (DTV), including comment on the IRFA. This Final Regulatory Flexibility Analysis (FRFA) conforms to the RFA.

79. *Need for, and Objectives of, the R&O.* As described in the *R&O*, the nation's television system is currently engaged in the transition from analog to digital television. As part of that transition, all television broadcasters will have to file applications of various types. This might create mutual exclusivities both between DTV applicants and between DTV and analog (NTSC) applicants. The Commission will have to process those applications. The rules adopted herein are needed to, and will, govern the processing of those applications.

80. *Summary of Significant Issues Raised by Public Comments in Response to the IRFA.* No comments were filed in response to the IRFA.

81. *Description and Estimate of the Number of Small Entities To Which the Proposed Rules Will Apply.* The RFA directs agencies to provide a description of, and, where feasible, an estimate of the number of small entities that may be affected by the proposed rules, if adopted. The RFA defines the term ''small entity'' as having the same meaning as the terms ''small business,'' ''small organization,'' and ''small governmental jurisdiction. In addition, the term ''small business'' has the same meaning as the term ''small business concern'' under section 3 of the Small Business Act. A small business concern is one which: (1) is independently owned and operated; (2) is not dominant in its field of operation; and (3) satisfies any additional criteria established by the SBA.

82. Pursuant to 5 U.S.C. 601(3), the statutory definition of a small business applies ''unless an agency, after consultation with the Office of Advocacy of the [SBA] and after opportunity for public comment, establishes one or more definitions of such term which are appropriate to the activities of the agency and publishes such definition(s) in the **Federal Register**.'' A ''small organization'' is generally ''any not-for-profit enterprise which is independently owned and operated and is not dominant in its field.'' Nationwide, as of 1992, there were approximately 275,801 small organizations. ''Small governmental jurisdiction'' generally means ''governments of cities, counties, towns, townships, villages, school districts, or special districts with a population of less than 50,000.'' As of 1992, there were approximately 85,006 local governments in the United States. This number includes 38,978 counties, cities,

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and towns; of these, 37,566, or 96 percent, have populations of fewer than 50,000. The Census Bureau estimates that this ratio is approximately accurate for all governmental entities. Thus, of the 85,006 governmental entities, we estimate that 81,600 (91 percent) are small entities.

83. The SBA defines small television broadcasting stations as television broadcasting stations with $10.5 million or less in annual receipts. According to Commission staff review of the BIA Publications, Inc., Master Access Television Analyzer Database, fewer than 800 commercial TV broadcast stations (65%) subject to our proposal have revenues of less than $10.5 million dollars. We note, however, that under SBA's definition, revenues of affiliates that are not television stations should be aggregated with the television station revenues in determining whether a concern is small. Therefore, our estimate may overstate the number of small entities since the revenue figure on which it is based does not include or aggregate revenues from non-television affiliated companies. It would appear that there would be no more than 800 entities affected

84. *Description of Projected Reporting, Recordkeeping, and Other Compliance Requirements.* None. The actions taken in the *R&O* impose no reporting, recordkeeping, or other compliance requirements on television broadcast stations, large or small. Instead, this *R&O* simply alerts licensees to the procedures that the Commission will utilize in considering DTV applications and, particularly, mutually exclusive applications. Additionally, this *R&O* adopted a channel election requirement but specifically reserved the process and procedure for a future DTV periodic review. Accordingly, no reporting, recordkeeping or other compliance requirements were adopted in this *R&O* with regard to channel election.

85. *Steps Taken To Minimize Significant Impact on Small Entities, and Significant Alternatives Considered.* The RFA requires an agency to describe any significant alternatives that it has considered in reaching its proposed approach, which may include the following four alternatives (among others): (1) The establishment of differing compliance or reporting requirements or timetables that take into account the resources available to small entities; (2) the clarification, consolidation, or simplification of compliance or reporting requirements under the rule for small entities; (3) the use of performance, rather than design, standards; and (4) an exemption from coverage of the rule, or any part thereof, for small entities.

86. The processes adopted in the *R&O* are designed to be as simple and inexpensive to applicants as possible, including any small entities. The revised rules call for neither auctions nor hearings, alternatives which were considered and not adopted because of the Commission's belief that, *inter alia*, such alternatives might disadvantage small entities. The Commission declined to adopt a hearing procedure to resolve disputes because such procedures are expensive, prolonged, and likely would be precluded by section 309(j) of the Communications Act. A second alternative would have been to go to an auction system. It is our belief, however, that in this situation an auction would have both caused delay and disadvantaged smaller entities. Therefore, we declined to adopt either of these alternatives.

87. During our consideration of other possible alternatives, all steps were taken to ameliorate the impact of these rules on small entities. Instead of the hearing and auction alternatives, we adopted rules that establish in cases of mutual exclusivity, that all mutually exclusive applications will be dismissed if no voluntary resolution can be arrived at within 90 days. We believe that this provision levels the playing field, and thereby protects small entities from the economic leverage that large entities could wield in either a hearing or settlement environment.

88. *Report to Congress.* The Commission shall send a copy of the *R&O* in MM Docket No. 00–39, including this FRFA, in a report to be sent to Congress pursuant to the Congressional Review Act, *see* 5 U.S.C. 801(a)(1)(A). In addition, the Commission shall send a copy of the *R&O* in MM Docket No. 00–39, including the FRFA, to the Chief Counsel for Advocacy of the SBA. A copy of the *R&O* in MM Docket No. 00–39 and FRFA (or summaries thereof) will also be published in the **Federal Register**. *See* 5 U.S.C. 604(b).

V. Ordering Clauses

89. Accordingly, pursuant to the authority contained in 47 U.S.C. 1, 2(a), 4(i), 7 and 303, part 73 of the Commission's rules, 47 CFR part 73, is amended as set forth in this *R&O.*

90. Sinclair Broadcasting Group, Inc.'s, Petition for Reconsideration of our denial of its Petition for Expedited Rulemaking, and Univision Communications Inc.'s, Petition for Expedited Rule Making submitted November 17, 1999, are denied.

91. Pursuant to the Contract With America Advancement Act of 1996, the rule amendments set forth in ''Rule Changes,'' *infra.*, shall be effective April 16, 2001.

92. The Commission's Consumer Information Bureau, Reference Information Center, shall send a copy of this *R&O*, including the Final Regulatory Flexibility Analysis, to the Chief Counsel for Advocacy of the Small Business Administration.

List of Subjects in 47 CFR Part 73

Radio, Television.

Federal Communications Commission.

Shirley Suggs,

Chief, Publications Branch.

Rule Changes

Part 73 of Title 47 of the U.S. Code of Federal Regulations is amended to read as follows:

PART 73—RADIO BROADCAST SERVICES

1. The Authority citation for part 73 continues to read as follows:

Authority: 47 U.S.C. 154, 303, 334, 336.

2. Section 73.623 is amended by adding paragraph (h) to read as follows:

§ 73.623 DTV applications and changes to DTV allotments.

* * * * *

(h) *DTV application processing.*

(1) DTV applications pending as of January 18, 2000, are cut-off as of that date and shall be afforded the interference protection set forth in § 73.622(f) of the rules by all NTSC minor change applications and later-filed DTV applications.

(i) DTV applications pending as of January 18, 2001, must provide the requisite interference protection set forth in § 73.622(f) to:

(A) NTSC and DTV stations, construction permits and DTV allotments;

(B) Petitions for rulemaking for new DTV allotments for which a Commission announced comment period has passed prior to the filing date of the DTV application; and

(C) Earlier-filed and accepted for filing applications for new NTSC stations submitted by: post-auction winners pursuant to § 73.5005; applicants with a settlement agreement on-file with the Commission that would result in the grant of the NTSC application; and cut-off singleton applicants.

(ii) DTV applications pending as of January 18, 2001, that do not provide the interference protection set forth in

§ 73.622(f) to other DTV applications pending as of January 18, 2001, or petitions for rulemaking seeking the allotment of new DTV stations for which a Commission announced comment period has not passed, will be deemed mutually exclusive with those applications or petitions. Those applicants and petitioners will be notified by Public Notice and provided with a 90-day period of time to resolve their mutual exclusivity via engineering amendment or settlement. Those applications and petitions that remain mutually exclusive upon conclusion of the 90-day settlement period will be dismissed.

(2) DTV applications filed after January 18, 2001, shall be afforded the interference protection set forth in § 73.622(f) by all NTSC minor change applications and later-filed DTV applications. DTV applications filed after January 18, 2001, must provide the interference protection set forth in § 73.622(f) to the following:

(i) NTSC and DTV stations, construction permits and DTV allotments;

(ii) Earlier-filed DTV applications;

(iii) Petitions for rulemaking seeking the allotment of new DTV stations for which a Notice of Proposed Rulemaking has been released and the comment deadline specified therein has passed; and

(iv) Earlier-filed and accepted for filing applications for new NTSC stations submitted by: post-auction winners pursuant to § 73.5005; applicants with a settlement agreement on-file with the Commission that would result in the grant of the NTSC application; and cut-off singleton applicants.

3. Section 73.625 is amended by revising paragraph (a)(1) to read as follows:

§ 73.625 DTV coverage of principal community and antenna system.

(a) * * *

(1) The DTV transmitter location shall be chosen so that, on the basis of the effective radiated power and antenna height above average terrain employed, the following minimum F(50,90) field strength in dB above one uV/m will be provided over the entire principal community to be served:

Channels 2–6	35 dBu
Channels 7–13	43 dBu
Channels 14–69	48 dBu

* * * * *

[FR Doc. 01–3637 Filed 2–12–01; 8:45 am]

BILLING CODE 6712–01–P

011271

Proposed Rules

Federal Register

Vol. 66, No. 30

Tuesday, February 13, 2001

This section of the FEDERAL REGISTER contains notices to the public of the proposed issuance of rules and regulations. The purpose of these notices is to give interested persons an opportunity to participate in the rule making prior to the adoption of the final rules.

DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Part 71

[Airspace Docket No. 01–ASO–2]

Proposed Amendment to Class D Airspace, Valdosta Moody AFB, GA

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Notice of proposed rulemaking.

SUMMARY: This notice proposes to amend Class D airspace at Valdosta Moody AFB, GA. Beginning February 2001, the U.S. Air Force will receive the first of approximately 40 T–6 turboprop trainer aircraft at Moody AFB. When these aircraft become fully operational as student trainers, airport operations at Moody AFB will increase from approximately 39,000 operations per year to in excess of 156,000 operations per year. The training scenario required of student pilots flying the T–6 aircraft within the Visual Flight Rules (VFR) traffic pattern will necessitate an extended pattern, beyond the existing Class D airspace. This action would amend the lateral limits of the existing Class D airspace from a 5-mile radius of Moody AFB to a 7-mile radius to allow for the safe and efficient operation of these aircraft within Class D airspace.

DATES: Comments must be received on or before March 15, 2001.

ADDRESSES: Send comments on the proposal in triplicate to: Federal Aviation Administration, Docket No. 01–ASO–2, Manager, Airspace Branch, ASO–520, P.O. Box 20636, Atlanta, Georgia 30320.

The official docket may be examined in the Office of the Regional Counsel for Southern Region, Room 550, 1701 Columbia Avenue, College Park, Georgia 30337, telephone (404) 305–5586.

FOR FURTHER INFORMATION CONTACT: Wade T. Carpenter Jr., Manager, Airspace Branch, Air Traffic Division, Federal Aviation Administration, P.O. Box 20636, Atlanta, Georgia 30320; telephone (404) 305–5586.

SUPPLEMENTARY INFORMATION:

Comments Invited

Interested parties are invited to participate in this proposed rulemaking by submitting such written data, views or arguments as they may desire. Comments that provide the factual basis supporting the views and suggestions presented are particularly helpful in developing reasoned regulatory decisions on the proposal. Comments are specifically invited on the overall regulatory, aeronautical, economic, environmental, and energy-related aspects of the proposal. Communications should identify the airspace docket and be submitted in triplicate to the address listed above. Commenters wishing the FAA to acknowledge receipt of their comments on this notice must submit with those comments a self-addressed, stamped postcard on which the following statement is made: ''Comments to Airspace Docket No. 01–ASO–2.'' The postcard will be date/time stamped and returned to the commenter. All communications received before the specified closing date for comments will be considered before taking action on the proposed rule. The proposal contained in this notice may be changed in light of the comments received. All comments submitted will be available for examination in the Office of the Regional Counsel for Southern Region, Room 550, 1701 Columbia Avenue, College Park, Georgia 30337, both before and after the closing date for comments. A report summarizing each substantive public contact with FAA personnel concerned with this rulemaking will be filed in the docket.

Availability of NPRMs

Any person may obtain a copy of this Notice of Proposed Rulemaking (NPRM) by submitting a request to the Federal Aviation Administration, Manager, Airspace Branch, ASO–520, Air Traffic Division, P.O. Box 20636, Atlanta, Georgia 30320. Communications must identify the notice number of this NPRM. Persons interested in being placed on a mailing list for future NPRMs should also request a copy of Advisory Circular No. 11–2A which describes the application procedure.

The Proposal

The FAA is considering an amendment to Part 71 of the Federal Aviation Regulations (14 CFR part 71) to amend Class D airspace at Valdosta Moody AFB, GA. Class D airspace designations for airspace areas extending upward from the surface of the earth are published in Paragraph 5000 of FAA Order 7400.9H, dated September 1, 2000, and effective September 16, 2000, which is incorporated by reference in 14 CFR 71.1 The Class D airspace designation listed in this document would be published subsequently in the Order.

The FAA has determined that this proposed regulation only involves an established body of technical regulations for which frequent and routine amendments are necessary to keep them operationally current. It, therefore, (1) is not a ''significant regulatory action'' under Executive Order 12866; (2) is not a ''significant rule'' under DOT Regulatory Policies and Procedures (44 FR 11034; February 26, 1979); and (3) does not warrant preparation of a Regulatory Evaluation as the anticipated impact is so minimal. Since this is a routine matter that will only affect air traffic procedures and air navigation, it is certified that this rule, when promulgated, will not have a significant economic impact on a substantial number of small entities under the criteria of the Regulatory Flexibility Act.

List of Subjects in 14 CFR Part 71

Airspace, Incorporation by Reference, Navigation (Air).

The Proposed Amendment

In consideration of the foregoing, the Federal Aviation Administration proposes to amend 14 CFR part 71 as follows:

PART 71—DESIGNATION OF CLASS A, CLASS B, CLASS C, CLASS D, AND CLASS E AIRSPACE AREAS; AIRWAYS; ROUTES; AND REPORTING POINTS

1. The authority citation for 14 CFR part 71 continues to read as follows:

Authority: 49 U.S.C. 106(g), 40103, 40113, 40120; E.O. 10854, 24 FR 9565, 3 CFR 1959–1963 Comp., p. 389.

§ 71.1 [Amended]

2. The incorporation by reference in 14 CFR 71.1 of Federal Aviation Administration Order 7400.9H, Airspace Designations and Reporting Points, dated September 1, 2000, and effective September 16, 2000, is amended as follows:

Paragraph 5000. Class D airspace.

* * * * *

ASO GA D Valdosta Moody AFB, GA [Revised]

Valdosta, Moody AFB, GA
(Lat. 30°58′07″ N, long. 83°11′35″ W)

Tha airspace extending upward from the surface, to and including 2,700 feet MSL within a 7-mile radius of the Moody AFB. This Class D airspace area is effective during the specific dates and times established in advance by a Notice to Airmen. The effective dates and times will thereafter be continuously published in the Airport/Facility Directory.

* * * * *

Issued in College Park, Georgia, on January 30, 2001.

Wade T. Carpenter,

Acting Manager, Air Traffic Division, Southern Region.

[FR Doc. 01–3649 Filed 2–12–01; 8:45 am]

BILLING CODE 4910–13–M

DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Part 71

[Airspace Docket No. 00–ANM–24]

Proposed Modification of Class E Airspace, Jackson Hole, WY

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Notice of proposed rulemaking.

SUMMARY: This action proposes to modify the Class E airspace at Jackson Hole, WY. Newly developed approach and departure procedures at the Jackson Hole Airport has made this proposal necessary. Additional Class E 700-feet, and 1,200 feet controlled airspace, above the surface of the earth is required to contain aircraft executing the Instrument Landing System (ILS) Runway (RWY) 18 Standard Instrument Approach Procedure (SIAP) and the Geyser One and JACHO One Departure Procedures (DP) at Jackson Hole Airport. The intended effect of this proposal is to provide adequate controlled airspace for Instrument Flight Rules (IFR) operations at Jackson Hole Airport, Jackson Hole, WY.

EFFECTIVE DATES: Comments must be received on or before March 30, 2001.

ADDRESSES: Send comments on the proposal in triplicate to: Manager, Airspace Branch, ANM–520, Federal Aviation Administration, Docket No. 00–ANM–24, 1601 Lind Avenue SW., Renton, Washington 98055–4506.

An informal docket may also be examined during normal business hours in the office of the Manager, Air Traffic Division, Airspace Branch, at the address listed above.

FOR FURTHER INFORMATION CONTACT: Brian Durham, ANM–520.7, Federal Aviation Administration, Docket No. 00–ANM–24, 1601 Lind Avenue SW., Renton, Washington 98055–4056; telephone number: (425) 227–2527.

SUPPLEMENTARY INFORMATION:

Comments Invited

Interested parties are invited to participate in this proposed rulemaking by submitting such written data, views, or arguments, as they may desire. Comments that provide the factual basis supporting the views and suggestions presented are particularly helpful in developing reasoned regulatory decisions on the proposal. Comments are specifically invited on the overall regulatory, aeronautical, economic, environmental, and energy related aspects of the proposal. Communications should identify the airspace docket number and be submitted in triplicate to the address listed above. Commenters wishing the FAA to acknowledge receipt of their comments on this action must submit, with those comments, a self-addressed stamped postcard on which the following statement is made: ''Comments to Airspace Docket No. 00–ANM–24.'' The postcard will be date/time stamped and returned to the commenter. All communications received on or before the specified closing date for comments will be considered before taking action on the proposed rule. The proposal contained in this action may be changed in the light of comments received. All comments submitted will be available for examination at the address listed above both before and after the closing date for comments. A report summarizing each substantive public contact with FAA personnel concerned with this rulemaking will be filed in the docket.

Availability of NPRM's

Any person may obtain a copy of this NPRM by submitting a request to the Federal Aviation Administration, Airspace Branch, ANM–520, 1601 Lind Avenue SW., Renton, Washington 98055–4056. Communications must identify the docket number of this NPRM. Persons interested in being placed on a mailing list for future NPRM's should also request a copy of Advisory Circular No. 11–2A, which describes the application procedure.

The Proposal

The FAA is considering an amendment to Title 14 Code of Federal Regulations, part 71 (14 CFR part 71) by modifying Class E airspace at Jackson Hole, WY. Newly developed approach and departure procedures at the Jackson Hole Airport have made this proposal necessary. Additional Class E 700-feet, and 1,200-feet controlled airspace, above the surface of the earth is required to contain aircraft executing the Instrument Landing System (ILS) Runway (RWY) 18 Standard Instrument Approach Procedure (SIAP) and the Geyser One and JACHO One Departure Procedures (DP), at Jackson Hole Airport, has made this proposal necessary. The FAA establishes Class E airspace where necessary to contain aircraft transitioning between the terminal and en route environments. The intended effect of this proposal is designed to provide for the safe and efficient use of the navigable airspace. This proposal would promote safe flight operations under IFR at the Jackson Hole Airport and between the terminal and en route transition stages.

The area would be depicted on aeronautical charts for pilot reference. The coordinates for this airspace docket are based on North American Datum 83. Class E airspace areas extending upward from 700 feet or more above the surface of the earth, are published in Paragraph 6005, of FAA Order 7400.9H dated September 1, 2000, and effective September 16, 2000, which is incorporated by reference in 14 CFR 71.1. The Class E airspace designation listed in this document would be published subsequently in the Order.

The FAA has determined that this proposed regulation only involves an established body of technical regulations for which frequent and routine amendments are necessary to keep them operationally current. It, therefore, (1) is not a ''significant regulatory action'' under Executive Order 12866; (2) is not a ''significant rule'' under DOT Regulatory Policies and Procedures (44 FR 11013; February 26, 1979); and (3) does not warrant preparation of a Regulatory Evaluation as the anticipated impact is so minimal. Since this is a routine matter that will only affect air traffic procedures and air navigation, it is certified that this rule, when promulgated, will not have a significant economic impact on a

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substantial number of small entities under the criteria of the Regulatory Flexibility Act.

List of Subjects in 14 CFR Part 71

Airspace, Incorporation by reference, Navigation (air).

The Proposed Amendment

In consideration of the foregoing, the Federal Aviation Administration proposes to amend 14 CFR part 71 as follows:

PART 71—DESIGNATION OF CLASS A, CLASS B, CLASS C, CLASS D, AND CLASS E AIRSPACE AREAS; AIRWAYS; ROUTES; AND REPORTING POINTS

1. The authority citation for 14 CFR part 71 continues to read as follows:

Authority: 49 U.S.C. 106(g), 40103, 40113, 40120; E.O. 10854, 24 FR 9565, 3 CFR, 1959–1963 Comp., p. 389.

§ 71.1 [Amended]

2. The incorporation by reference in 14 CFR 71.1 of the Federal Aviation Administration Order 7400.9H, Airspace Designations and Reporting Points, dated September 1, 2000, and effective September 16, 2000, is amended as follows:

Paragraph 6005 Class E airspace areas extending upward from 700 feet or more above the surface of the earth.

* * * * *

ANM WY E5 Jackson Hole, WY [Revised]

Jackson Hole Airport, WY
(Lat. 43° 36′ 23″N., long 110°44′17″W.)
Jackson VOR/DME
(Lat. 43° 36′30″N., long. 110°44′05″W.)

That airspace extending upward from 700 feet above the surface within the 4.3-mile radius of the Jackson Hole Airport, and within 4.4 miles west and 8.3 miles east of the Jackson VOR/DME 200° radial extending from the VOR/DME to 21.4 miles south of the VOR/DME, and within 4.4 miles each side of the 020° radial from the Jackson VOR/DME extending to 17.8 miles; and that airspace extending upward from 1,200 feet above the surface within 15.2 miles west and 18.7 miles east of the Jackson VOR/DME 020° radial extending from the VOR/DME to 44.6 miles north of the VOR/DME, and that airspace west of the Jackson VOR/DME bounded on the northwest by the southeast edge of V–520 extending to 15.2 miles in an arc counterclockwise to the northwest edge of V–465, and that airspace to the south of the Jackson VOR/DME bounded on the northwest by the southeast edge of V–465, on the east by the southwest edge of V–328, on the south by the north edge of V–4 and on the west by long. 112°00′00″W; and that airspace east of the Jackson VOR/DME between the 052° radial and 155° radial extending to 33.1 miles; and excluding that airspace within Federal airways; the Big Piney, WY; the Rock Springs, WY; the Driggs, ID, Class E airspace areas.

* * * * *

Issued in Seattle, Washington, on January 31, 2001.

Daniel A. Boyle,

Assistant Manager, Air Traffic Division, Northwest Mountain Region.

[FR Doc. 01–3644 Filed 2–12–01; 8:45 am]

BILLING CODE 4910–13–M

DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Part 71

[Airspace Docket No. 00–ANM–25]

Proposed Modification of Class E Airspace, Cody, WY

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Notice of proposed rulemaking (NPRM).

SUMMARY: This action proposes to modify the Class E airspace at Cody, WY. Newly developed Area Navigation (RNAV) Standard Instrument Approach Procedure (SIAP) to Runway (RWY) 22 at the Yellowstone Regional Airport has made this proposal necessary. Additional Class E 700-feet, above the surface of the earth is required to contain aircraft executing the RNAV SIAP at Yellowstone Regional Airport. The intended effect of this proposal is to provide adequate controlled airspace for Instrument Flight Rules (IFR) operations at Yellowstone Regional Airport, Cody, WY.

DATES: Comments must be received on or before March 30, 2001.

ADDRESSES: Send comments on the proposal in triplicate to: Manager, Airspace Branch, ANM–520, Federal Aviation Administration, Docket No. 00–ANM–25, 1601 Lind Avenue SW, Renton, Washington 98055–4056.

An informal docket may also be examined during normal business hours in the office of the Manager, Air Traffic Division, Airspace Branch, at the address listed above.

FOR FURTHER INFORMATION CONTACT: Brian Durham, ANM–520.7, Federal Aviation Administration, Docket No. 00–ANM–25, 1601 Lind Avenue SW, Renton, Washington 98055–4056: telephone number: (425) 227–2527.

SUPPLEMENTARY INFORMATION:

Comments Invited

Interested parties are invited to participate in this proposed rulemaking by submitting such written data, views, or arguments, as they may desire. Comments that provide the factual basis supporting the views and suggestions presented are particularly helpful in developing reasoned regulatory decisions on the proposal. Comments are specifically invited on the overall regulatory, aeronautical, economic, environmental, and energy related aspects of the proposal. Communications should identify the airspace docket number and be submitted in triplicate to the address listed above. Commenters wishing the FAA to acknowledge receipt of their comments on this action must submit, with those comments, a self-addressed stamped postcard on which the following statement is made: ''Comments to Airspace Docket No. 00–ANM–25.'' The postcard will be date/time stamped and returned to the commenter. All communications received on or before the specified closing date for comments will be considered before taking action on the proposed rule. The proposal contained in this action may be changed in the light of comments received. All comments submitted will be available for examination at the address listed above both before and after the closing date for comments. A report summarizing each substantive public contact with FAA personnel concerned with this rulemaking will be filed in the docket.

Availability of NPRM's

Any person may obtain a copy of this NPRM by submitting a request to the Federal Aviation Administration, Airspace Branch, ANM–520, 1601 Lind Avenue SW, Renton, Washington 98055–4056. Communications must identify the docket number of the NPRM. Persons interested in being placed on a mailing list for future NPRM's should also request a copy of Advisory Circular No. 11–2A, which describes the application procedure.

The Proposal

The FAA is considering an amendment to Title 14 Code of Federal Regulations, part 71 (14 CFR part 71) by modifying Class E airspace at Cody, WY. A newly developed RNAV SIAP RWY 22 approach procedure at the Yellowstone Regional Airport has made this proposal necessary. Additional Class E 700-feet controlled airspace, above the surface of the earth is required to contain aircraft executing the RNAV SIAP RWY 22 at Yellowstone Regional Airport. The FAA establishes Class E airspace where necessary to contain aircraft transitioning between the terminal and en route environments.

The intended effect of this proposal is designed to provide for the safe and efficient use of the navigable airspace. This proposal would promote safe flight operations under IFR at the Yellowstone Regional Airport and between the terminal and en route transition stages.

The area would be depicted on aeronautical charts for pilot reference. The coordinates for this airspace docket are based on North American Datum 83. Class E airspace areas extending upward from 700 feet or more above the surface of the earth, are published in Paragraph 6005, of FAA Order 7400.9H dated September 1, 2000, and effective September 16, 2000, which is incorporated by reference in 14 CFR 71.1. The Class E airspace designation listed in this document would be published subsequently in the Order.

The FAA has determined that this proposed regulation only involves an established body of technical regulations for which frequent and routine amendments are necessary to keep them operationally current. It, therefore, (1) is not a ''significant regulatory action'' under Executive Order 12866; (2) is not a ''significant rule'' under DOT Regulatory Policies and Procedures (44 FR 11013; February 26, 1979); and (3) does not warrant preparation of a Regulatory Evaluation as the anticipated impact is so minimal. Since this is a routine matter that will only affect air traffic procedures and air navigation, it is certified that this rule, when promulgated, will not have a significant economic impact on a substantial number of small entities under the criteria of the Regulatory Flexibility Act.

List of Subjects in 14 CFR Part 71

Airspace, Incorporation by reference, Navigation (air).

The Proposed Amendment

In consideration of the foregoing, the Federal Aviation Administration proposes to amend 14 CFR part 71 as follows:

PART 71—DESIGNATION OF CLASS A, CLASS B, CLASS C, CLASS D, AND CLASS E AIRSPACE AREAS; AIRWAYS; ROUTES; AND REPORTING POINTS

1. The authority citation for 14 CFR part 71 continues to read as follows:

Authority: 49 U.S.C. 106(g), 40103, 40113, 40120; E.O. 10854, 24 FR 9565, 3 CFR, 1959–1963 Comp., p. 389.

§ 71.1 [Amended]

2. The incorporation by reference in 14 CFR 71.1 of the Federal Aviation Administration Order 7400.9H, Airspace Designations and Reporting Points, dated September 1, 2000, and effective September 16, 2000, is amended as follows:

Paragraph 6005 Class E airspace areas extending upward from 700 feet or more above the surface of the earth.

* * * * *

ANM WY E5 Cody, WY [Revised]

Cody, Yellowstone Regional Airport, WY
(Lat. 44°31′12″N., long. 109°01′27″W.)

That airspace extending upward from 700 feet above the surface within the 7-mile radius of the Yellowstone Regional Airport, and from the 020° bearing from the airport clockwise to the 120° bearing from the airport extending to 13.4-miles.

* * * * *

Issued in Seattle, Washington, on January 31, 2001.

Dan A. Boyle,

Assistant Manager, Air Traffic Division, Northwest Mountain Region.

[FR Doc. 01–3646 Filed 2–12–01; 8:45 am]

BILLING CODE 4910–13–M

DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Part 71

[Airspace Docket No. 00–ANM–22]

Proposed Revision of Class E Airspace, Poplar, MT

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Notice of proposed rulemaking (NPRM).

SUMMARY: This notice proposes to revise Class E airspace at Poplar, MT. The development of new Area Navigation (RNAV) Standard Instrument Approach Procedures (SIAP) to Runway (RWY) 27 and RWY 9 at Poplar Airport has made this proposal necessary. Class E 700 foot, and 1,200 foot controlled airspace, above the surface of the earth is required to contain aircraft executing the RNAV RWY 27 and RWY 9 SIAP to Poplar Airport. The intended effect of this proposal is to provide adequate controlled airspace for Instrument Flight Rules (IFR) operations at Poplar Airport, Poplar, MT.

DATES: Comments must be received on or before March 30, 2001.

ADDRESSES: Send comments on the proposal in triplicate to: Manager, Airspace Branch, ANM–520, Federal Aviation Administration, Docket No. 00–ANM–22, 1601 Lind Avenue SW, Renton, Washington 98055–4056.

The official docket may be examined in the Office of the Regional Counsel for the Northwest Mountain Region at the same address.

An informal docket may also be examined during normal business hours in the office of the Manager, Air Traffic Division, Airspace Branch, at the address listed above.

FOR FURTHER INFORMATION CONTACT: Brian Durham, ANM–520.7, Federal Aviation Administration, Docket No. 00–ANM–22, 1601 Lind Avenue SW, Renton, Washington 98055–4056: telephone number: (425) 227–2527.

SUPPLEMENTARY INFORMATION:

Comments Invited

Interested parties are invited to participate in this proposed rulemaking by submitting such written data, views, or arguments, as they may desire. Comments that provide the factual basis supporting the views and suggestions presented are particularly helpful in developing reasoned regulatory decisions on the proposal. Comments are specifically invited on the overall regulatory, aeronautical, economic, environmental, and energy related aspects of the proposal. Communications should identify the airspace docket number and be submitted in triplicate to the address listed above. Commenters wishing the FAA to acknowledge receipt of their comments on this notice must submit, with those comments, a self-addressed stamped postcard on which the following statement is made: ''Comments to Airspace Docket No. 00–ANM–22.'' The postcard will be date/time stamped and returned to the commenter. All communications received on or before the specified closing date for comments will be considered before taking action on the proposed rule. The proposal contained in this notice may be changed in the light of comments received. All comments submitted will be available for examination at the address listed above both before and after the closing date for comments. A report summarizing each substantive public contact with FAA personnel concerned with this rulemaking will be filed in the docket.

Availability of NPRM's

Any person may obtain a copy of this NPRM by submitting a request to the Federal Aviation Administration, Airspace Branch, ANM–520, 1601 Lind Avenue SW, Renton, Washington 98055–4056. Communications must identify the notice number of this NPRM. Persons interested in being placed on a mailing list for future NPRM's should also request a copy of

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Advisory Circular No. 11–2A, which describes the application procedure.

The Proposal

The FAA is considering an amendment to Title 14 Code of Federal Regulations, part 71 (14 CFR part 71) by revising Class C airspace at Poplar, MT. Newly developed RNAV SIAPs to RWY 27 and RWY 9 at Poplar Airport have made this proposal necessary. Controlled airspace from 700 feet, and 1,200 feet, above the surface is required to contain aircraft executing the RNAV RWY 25 SIAP. The FAA establishes Class E airspace where necessary to contain aircraft transitioning between the terminal and en route environments. The intended effect of this proposal is designed to provide for the safe and efficient use of the navigable airspace. This proposal would promote safe flight operations under IFR at the Poplar Airport and between the terminal and en route transition stages.

The area would be depicted on aeronautical charts for pilot reference. The coordinates for this airspace docket are based on North American Datum 83. Class E airspace areas extending upward from 700 feet or more above the surface of the earth, are published in Paragraph 6005, of FAA order 7400.9H dated September 1, 2000, and effective September 16, 2000, which is incorporated by reference in 14 CFR 71.1. The Class E airspace designation listed in this document would be published subsequently in the Order.

The FAA has determined that this proposed regulation only involves an established body of technical regulations for which frequent and routine amendments are necessary to keep them operationally current. It, therefore, (1) is not a ''significant regulatory action'' under Executive Order 12866; (2) is not a ''significant rule'' under DOT Regulatory Policies and Procedures (44 FR 11013; February 26, 1979); and (3) does not warrant preparation of a Regulatory Evaluation as the anticipated impact is so minimal. Since this is a routine matter that will only affect air traffic procedures and air navigation, it is certified that this rule, when promulgated, will not have a significant economic impact on a substantial number of small entities under the criteria of the Regulatory Flexibility Act.

List of Subjects in 14 CFR Part 71

Airspace, Incorporation by reference, Navigation (air).

The Proposed Amendment

In consideration of the foregoing, the Federal Aviation Administration proposes to amend 14 CFR part 71 as follows:

PART 71—DESIGNATION OF CLASS A, CLASS B, CLASS C, CLASS D, AND CLASS E AIRSPACE AREAS; AIRWAYS; ROUTES; AND REPORTING POINTS

1. The authority citation for 14 CFR part 71 continues to read as follows:

Authority: 49 U.S.C. 106(g), 40103, 40113, 40120; E.O. 10854, 24 FR 9565, 3 CFR, 1959–1963 Comp., p. 389.

§ 71.1 [Amended]

2. The incorporation by reference in 14 CFR 71.1 of the Federal Aviation Administration Order 7400.9H, Airspace Designations and Reporting Points, dated September 1, 2000, and effective September 16, 2000, is amended as follows:

Paragraph 6005 Class E airspace areas extending upward from 700 feet or more above the surface of the earth

* * * * *

ANM MT E5 Poplar, MT

Poplar Airport, MT
(Lat. 48°07′00″N., long. 105°11′17″W.)

That airspace extending upward from 700 feet above the surface within 9.1 mile radius of the Poplar, MT, airport and within 2.5 miles each side of the 285° bearing extending to 11.5 miles; and within 2.5 miles of the 105° bearing from the airport extending to 11.5 miles; and that airspace extending upward from 1,200 feet above the surface bounded by a line from lat. 47°53′25″N., long. 105°52′50″W., to lat. 48°18′00″N., long. 105°52′50″W., to lat. 48°18′00″N., long. 104°30′00″W., to lat. 47°53′25″N., long. 104°30′00″W., to the beginning; excluding that airspace within Federal Airways and the Wolf Point, MT Class E airspace.

* * * * *

Issued in Seattle, Washington, on January 30, 2001.

Daniel A. Boyle,

Assistant Manager, Air Traffic Division, Northwest Mountain Region.

[FR Doc. 01–3648 Filed 2–12–01; 8:45 am]

BILLING CODE 4910–13–M

DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Part 71

[Airspace Docket No. 00–AAL–08]

RIN 2120–AA66

Proposed Establishment of Colored Federal Airways; AK

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Notice of proposed rulemaking (NPRM).

SUMMARY: The FAA proposes to establish two colored Federal airways, Amber-5 (A–5) and Amber-6 (A–6) in Alaska. The FAA is proposing this action to improve the management of air traffic operations in Alaska and enhance safety.

DATES: Comments must be received on or before March 30, 2001.

ADDRESSES: Send comments on the proposal in triplicate to: Manager, Air Traffic Division, AAL–500, Docket No. 00–AAL–08, Federal Aviation Administration, 222 West 7th Avenue, #14, Anchorage, AK 99533.

The official docket may be examined in the Rules Docket, Office of the Chief Counsel, Room 916, 800 Independence Avenue, SW., Washington DC, weekdays, except Federal holidays, between 8:30 a.m. and 5:00 p.m.

An informal docket may also be examined during normal business hours at the office of the Regional Air Traffic Division.

FOR FURTHER INFORMATION CONTACT: Ken McElroy, Airspace and Rules Division, ATA–400, Office of Air Traffic Airspace Management, Federal Aviation Administration, 800 Independence Avenue, SW., Washington, DC 20591; telephone: (202) 267–8783.

SUPPLEMENTARY INFORMATION:

Comments Invited

Interested parties are invited to participate in this proposed rulemaking by submitting such written data, views, or arguments as they may desire. Comments that provide the factual basis supporting the views and suggestions presented are particularly helpful in developing reasoned regulatory decisions on the proposal. Comments are specifically invited on the overall regulatory, aeronautical, economic, environmental, and energy-related aspects of the proposal. Communications should identify the airspace docket number and be submitted in triplicate to the address listed above. Commenters wishing the FAA to acknowledge receipt of their comments on this notice must submit with those comments a self-addressed, stamped postcard on which the following statement is made: ''Comments to Airspace Docket No. 00–AAL–08.'' The postcard will be date/time stamped and returned to the commenter. All communications received on or before the specified closing date for comments will be considered before taking action on the proposed rule. The proposal contained

in this notice may be changed in light of comments received. All comments submitted will be available for examination in the Rules Docket both before and after the closing date for comments. A report summarizing each substantive public contact with FAA personnel concerned with this rulemaking will be filed in the docket.

Availability of NPRM's

An electronic copy of this document may be downloaded, using a modem and suitable communications software, from the FAA regulations section of the Fedworld electronic bulletin board service (telephone: 703–321–3339) or the Federal Register's electronic bulletin board service (telephone: 202–512–1661).

Internet users may reach the FAA's web page at http://www.faa.gov or the Superintendent of Document's web page at http://www.access.gpo.gov/nara for access to recently published rulemaking documents.

Any person may obtain a copy of this NPRM by submitting a request to the Federal Aviation Administration, Office of Air Traffic Airspace Management, ATA–400, 800 Independence Avenue, SW., Washington, DC 20591, or by calling (202) 267–8783. Communications must identify the notice number of the NPRM. Persons interested in being placed on a mailing list for future NPRM's should call the FAA's Office of Rulemaking, (202) 267–9677, and request a copy of Advisory Circular No. 11–2A, Notice of Proposed Rulemaking Distribution System, which describes the application procedure.

The Proposal

The FAA is proposing an amendment to 14 CFR part 71 (part 71) to establish two colored Federal airways, A–5 and A–6, in Alaska. Presently there is an uncharted nonregulatory route that uses the same routing as the proposed Colored Federal Airway, A–6. This uncharted nonregulatory route is used daily by commercial and general aviation aircraft. The FAA is proposing to convert this uncharted nonregulatory route to the Colored Federal Airways to add to the instrument flight rules (IFR) airway and route structure in Alaska.

Colored Federal Airway A–5 is being proposed as a result of a request from Northern Air Cargo to establish a low altitude route between Evansville NDB and Point Lay NDB. This change is necessary to improve the IFR airway structure that supports existing commercial services.

These routes would provide a means to establish an airway structure to support the existing commercial services in Alaska, where currently a limited airway structure exists. Additionally, adoption of these Federal airways would: (1) Provide pilots with minimum en route altitudes and minimum obstruction clearance altitudes information; (2) establish controlled airspace thus eliminating some of the commercial IFR operations in uncontrolled airspace; and (3) improve the management of air traffic operations and thereby enhance safety.

The FAA has determined that this proposed regulation only involves an established body of technical regulations for which frequent and routine amendments are necessary to keep them operationally current. Therefore, this proposed regulation: (1) is not a ''significant regulatory action'' under Executive Order 12866; (2) is not a ''significant rule'' under DOT Regulatory Policies and Procedures (44 FR 11034; February 26, 1979); and (3) does not warrant preparation of a regulatory evaluation as the anticipated impact is so minimal. Since this is a routine matter that will only affect air traffic procedures and air navigation, it is certified that this proposed rule, when promulgated, will not have a significant economic impact on a substantial number of small entities under the criteria of the Regulatory Flexibility Act.

Colored Federal airways are published in paragraph 6009 of FAA Order 7400.9H dated September 1, 2000, and effective September 16, 2000, which is incorporated by reference in 14 CFR 71.1. The colored Federal airways listed in this document would be published subsequently in the order.

List of Subjects in 14 CFR Part 71

Airspace, Incorporation by reference, Navigation (air).

The Proposed Amendment

In consideration of the foregoing, the Federal Aviation Administration proposes to amend 14 CFR part 71 as follows:

PART 71—DESIGNATION OF CLASS A, CLASS B, CLASS C, CLASS D, AND CLASS E AIRSPACE AREAS; AIRWAYS; ROUTES; AND REPORTING POINTS

1. The authority citation for part 71 continues to read as follows:

Authority: 49 U.S.C. 106(g), 40103, 40113, 40120; E.O. 10854, 24 FR 9565, 3 CFR, 1959–1963 Comp., p.389.

§ 71.1 [Amended]

2. The incorporation by reference in 14 CFR 71.1 of the FAA Order 7400.9H, Airspace Designations and Reporting Points, dated September 1, 2000, and effective September 16, 2000, is amended as follows:

Paragraph 6009(c) Amber Federal Airways

* * * * *

A–5 [New]

From Evansville, AK, NDB to Point Lay, AK, NDB.

A–6 [New]

From Evansville, AK, NDB to Ambler, AK, NDB.

* * * * *

Issued in Washington, DC, on January 23, 2001.

Reginald C. Matthews,

Manager, Airspace and Rules Division.

[FR Doc. 01–3641 Filed 2–12–01; 8:45 am]

BILLING CODE 4910–13–P

DEPARTMENT OF THE TREASURY

Internal Revenue Service

26 CFR Part 301

[REG–121109–00]

RIN 1545–AY52

Disclosure of Return Information to the Bureau of the Census

AGENCY: Internal Revenue Service (IRS), Treasury.

ACTION: Notice of proposed rulemaking by cross-reference to temporary regulations.

SUMMARY: In the Rules and Regulations section of this issue of **Federal Register**, the IRS is issuing temporary regulations relating to additions to the list of items of information disclosed to the Bureau of the Census for use in the Longitudinal Employer-Household Dynamics (LEHD) project and the Survey of Income and Program Participation (SIPP) project. These regulations provide guidance to IRS and Social Security Administration (SSA) personnel responsible for disclosing the information. The text of those temporary regulations also serves as the text of these proposed regulations.

DATES: Written and electronic comments and requests for a public hearing must be received by May 14, 2001.

ADDRESSES: Send submissions to: CC:M&SP:RU (REG–121109–00), room 5226, Internal Revenue Service, POB 7604, Ben Franklin Station, Washington, DC 20044. In the alternative, submissions may be hand-delivered between the hours of 8 a.m. and 5 p.m. to CC:M&SP:RU (REG–121109–00), Courier's Desk, Internal Revenue

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Service, 1111 Constitution Avenue, NW., Washington, DC or sent electronically, via the IRS Internet site at: http://www.irs.ustreas.gov/tax__regs/reglist.html.

FOR FURTHER INFORMATION CONTACT: Stuart Murray, (202) 622–4580 (not a toll-free number).

SUPPLEMENTARY INFORMATION:

Background

Under section 6103(j)(1), upon written request from the Secretary of Commerce, the Secretary is to furnish to the Bureau of the Census (Bureau) tax return information that is prescribed by Treasury regulations for the purpose of, but only to the extent necessary in, structuring censuses and national economic accounts and conducting related statistical activities authorized by law. Section 301.6103(j)(1)–1 of the regulations further defines such purposes by reference to 13 U.S.C. Chapter 5 and provides an itemized description of the return information authorized to be disclosed for such purposes. Section 301.6103(j)(1)–1(b)(5) of the regulations provides a list of information provided to the Social Security Administration (SSA) pursuant to Internal Revenue Code section 6103(l)(1)(A) or (5) that officers or employees of SSA may disclose to the Bureau. Periodically, the disclosure regulations are amended to reflect the changing needs of the Bureau for data for its statutorily authorized statistical activities.

This document contains proposed amendments to the regulations authorizing IRS and SSA personnel to disclose additional items of return information that have been requested by the Secretary of Commerce for specified purposes related to the LEHD and SIPP projects.

The text of the temporary regulations also serves as the text of these proposed regulations. The preamble to the temporary regulations explains the regulations.

Special Analyses

It has been determined that this notice of proposed rulemaking is not a significant regulatory action as defined in Executive Order 12866. Therefore, a regulatory assessment is not required. It also has been determined that section 553(b) of the Administrative Procedure Act (5 U.S.C. chapter 5) does not apply to these regulations, and because the regulations do not impose a collection of information on small entities, the Regulatory Flexibility Act (5 U.S.C. chapter 6) does not apply. Pursuant to section 7805(f) of the Internal Revenue Code, this notice of proposed rulemaking will be submitted to the Chief Counsel for Advocacy of the Small Business Administration for comment on its impact on small business.

Comments and Requests for a Public Hearing

Before these proposed regulations are adopted as final regulations, consideration will be given to any electronic and written comments (a signed original and eight (8) copies) that are submitted timely to the IRS. The IRS and Treasury Department specifically request comments on the clarity of the proposed regulation and how they can be made easier to understand. All comments will be available for public inspection and copying. A public hearing may be scheduled if requested in writing by a person that timely submits comments. If a public hearing is scheduled, notice of the date, time, and place for the hearing will be published in the **Federal Register**.

Drafting Information

The principal author of these regulations is Jamie G. Bernstein, Office of the Associate Chief Counsel, Procedure & Administration (Disclosure & Privacy Law Division), Internal Revenue Service. However, other personnel from the IRS and Treasury Department participated in their development.

List of Subjects in 26 CFR Part 301

Employment taxes, Estate taxes, Excise taxes, Gift taxes, Income taxes, Penalties, Reporting and recordkeeping requirements.

Proposed Amendments to the Regulations

Accordingly, 26 CFR Part 301 is proposed to be amended as follows:

PART 301—PROCEDURE AND ADMINISTRATION

Paragraph 1. The authority citation for part 301 is amended by adding an entry in numerical order to read as follows:

Authority: 26 U.S.C. 7805 * * *

Section 301.6103(j)(1)–1 also issued under 26 U.S.C. 6103(j)(1); * * *

Par. 2. Section 301.6103(j)(1)–1 is amended by:

1. Adding paragraphs (b)(2)(v) and (vi).
2. Adding paragraphs (b)(3)(xxiii), (xxiv), (xxv), (xxvi), (xxvii) and (xxviii).
3. Adding paragraphs (b)(5)(iii), (iv), and (v).
4. Revising paragraph (e).

The additions and revision read as follows:

§ 301.6103(j)(1)–1 Disclosure of return information to officers and employees of the Department of Commerce for certain statistical purposes and related activities.

* * * * *

(b) * * *

(2)(v) and (vi) [The text of proposed paragraphs (b)(2)(v) and (vi) is the same as the text of § 301.6103(j)(1)–1T(b)(2)(v) and (vi) published elsewhere in this issue of the **Federal Register**].

(3) [The text of proposed paragraphs (b)(3)(xxiii), (xxiv), (xxv), (xxvi), (xxvii) and (xxviii) is the same as the text of § 301.6103(j)(1)–1T(b)(3)(xxiii), (xxiv), (xxv), (xxvi), (xxvii) and (xxviii) published elsewhere in this issue of the **Federal Register**].

* * * * *

(5)(iii), (iv), and (v) [The text of proposed paragraphs (b)(5)(iii), (iv), and (v) is the same as the text of § 301.6103(j)(1)–T(b)(5)(iii), (iv), and (v) published elsewhere in this issue of the **Federal Register**].

* * * * *

(e) [The text of proposed paragraph (e) is the same as the text of § 301.6103(j)(1)–T(e) published elsewhere in this issue of the **Federal Register**].

Robert E. Wenzel,

Deputy Commissioner of the Internal Revenue.

[FR Doc. 01–1990 Filed 2–12–01; 8:45 am]

BILLING CODE 6830–01–P

ENVIRONMENTAL PROTECTION AGENCY

40 CFR Part 261

[FRL–6940–7]

Project XL Site-Specific Rulemaking for the Autoliv ASP Inc. Facility in Promontory, Utah

AGENCY: Environmental Protection Agency (EPA).

ACTION: Proposed rule; request for comment.

SUMMARY: The Environmental Protection Agency (EPA) is proposing in this rule to implement a project under the Project XL program that would provide site-specific regulatory flexibility under the Resource Conservation and Recovery Act (RCRA), for the Autoliv ASP Inc. (Autoliv) facility in Promontory, Utah. The principal objective of this XL Project is to explore the benefits of a more streamlined and flexible RCRA regulation of pyrotechnic hazardous wastes from the automobile airbag industry that are treated in industrial furnaces. This proposed rule would

provide regulatory flexibility to Autoliv in the form of a conditional exemption from the definition of hazardous waste. The terms of the project are defined in the Final Project Agreement (FPA) which was made available for public review and comments through a **Federal Register** notice on August 14, 2000 (65 FR 49571) and signed on September 20, 2000 by Autoliv, Box Elder County, the state of Utah, and EPA.

DATES: *Public comments:* Comments on the proposed rule must be received on or before March 6, 2001.

Public Hearing: Commenters may request a public hearing by February 20, 2001, during the public comment period. Commenters requesting a public hearing should specify the basis for their request. If EPA determines that there is sufficient reason to hold a public hearing, it will do so by February 27, 2001, during the last week of the public comment period. Requests for a public hearing should be submitted to the address below.

ADDRESSES: *Comments:* Written comments should be mailed to the RCRA Information Center Docket Clerk (5305W), U.S. Environmental Protection Agency, 1200 Pennsylvania Ave., NW., Washington, DC 20460. Please send an original and two copies of all comments, and refer to Docket Number F–2001–AUFP–FFFFF.

Request to Speak at Hearing: Requests for a hearing should be mailed to the RCRA Information Center Docket Clerk (5305G), U.S. Environmental Protection Agency, 1200 Pennsylvania Ave. NW., Washington, DC 20460. Please send an original and two copies of all comments, and refer to Docket Number F–2001–AUFP–FFFFF. A copy should also be sent to Ms. Mary Byrne at U.S. EPA Region 8 (8P–R), 999 18th Street, Suite 300, Denver, CO 80202–2466.

Viewing Project Materials: A docket containing the proposed rule, the signed FPA, supporting materials, and public comments is available for public inspection and copying at the RCRA Information Center (RIC), located at Crystal Gateway, 1235 Jefferson Davis Highway, First Floor, Arlington, Virginia. The RIC is open from 9:00 a.m. to 4:00 p.m. Monday through Friday, excluding federal holidays. The public is encouraged to phone in advance to review docket materials. Appointments can be scheduled by phoning the Docket Office at (703) 603–9230. Refer to RCRA docket number F–2001–AUFP–FFFFF. The public may copy a maximum of 100 pages from any regulatory docket at no charge. Additional copies cost 15 cents per page. Project materials are also available for review for today's action on the world wide web at http://www.epa.gov/projectxl/.

A duplicate copy of the docket is available for inspection and copying at U.S. EPA, Region 8 Library, First Floor, 999 18th Street, CO 80202–2466 during normal business hours. Persons wishing to view the duplicate docket at the Denver location are encouraged to contact Ms. Mary Byrne in advance, by telephoning (303) 312–6491.

FOR FURTHER INFORMATION CONTACT: Ms. Mary Byrne, U.S. Environmental Protection Agency, Region 8, 999 18th Street, Suite 300, Denver, CO 80202–2466. Ms. Byrne can be reached at (303) 312–6491 *or byrne.mary@epa.gov.* Further information on today's action may also be obtained on the world wide web at http://www.epa.gov/projectxl/.

SUPPLEMENTARY INFORMATION: The development and implementation of on-site treatment would be piloted at Autoliv's Promontory, Utah facility using the existing metals recovery furnace with air pollution controls instead of sending the materials off-site to be open burned. This pilot is intended to test the effectiveness of on-site treatment of automobile airbag waste pyrotechnics in Autoliv's Metals Recovery Furnace (MRF). These automobile airbag waste pyrotechnics generated on-site at the Autoliv facility, are currently regulated as reactive hazardous wastes (waste code D003).

The pilot will determine whether this approach promotes better treatment of the waste pyrotechnics than the current method of open burning. Autoliv will comply with many of the general facility standards of RCRA, and is not seeking relief from all RCRA management protections. Through this project, Autoliv intends to be able to treat waste pyrotechnics, generated on-site, without obtaining a RCRA permit from the state of Utah. A RCRA permit is normally required for thermal destruction of hazardous waste in an industrial furnace. The waste as referenced in Autoliv's Project Proposal is reactive only and does not contain significant amounts of hazardous constituents listed in 40 CFR Part 261, for more detailed information on waste composition please see http://www.epa.gov/projectxl/Autoliv/page2.htm.

This proposed rule provides a ''conditional exemption'' from the definition of hazardous waste, for the specific waste that is subject to this proposed site-specific rule. The effect of EPA granting the conditional exemption is that a RCRA permit will not be required. The waste pyrotechnics, generated on-site at the Autoliv facility, will be conditionally exempted from regulation as hazardous wastes and thus, 40 CFR Parts 262 through 270 when treated in the MRF in accordance with the provisions in this proposed site-specific rule. The facility will continue to comply with certain general RCRA conditions on facility operations, as described in this site-specific rule for the Autoliv Facility and any state of Utah regulations that grant the conditional exemption. The project signatories believe that processing pyrotechnic materials in the MRF can be both cost-effective and achieve superior environmental results as compared to open burning and this project meets the intent of Project XL.

This proposed rule will not in any way impact the provisions or applicability of any other existing or future regulations.

The deferral of specified RCRA requirements is in effect only for the five-year term of this XL project. Following review of its MRF, Autoliv would notify the state of Utah and EPA in writing of the date on which it intends to begin treating its pyrotechnic waste in the MRF. This proposed rule would become effective in Autoliv's facility only after such written notification. Section III.C.2. and IV.F.1. discuss the aspects of state implementation of this proposed rule.

The deferral of the specified RCRA requirements is conditional upon Autoliv's implementation and compliance with the conditions set forth in 40 CFR 261.4 of this proposed rule. The agreement includes specific requirements for the management of Autoliv's waste that ensure protection of human health and the environment while providing some flexibility to encourage chemical reuse and waste minimization.

The conditions set forth in this proposed rule are expected to function as an outline of the procedures that must be in place to manage waste. The proposed deferral of the hazardous waste determination is conditional on compliance with all of the requirements of the XL Project. These criteria ensure that the handling and disposal of Autoliv's waste would be protective of human health and the environment by establishing how Autoliv's waste would be treated within its Promontory facility, and in transit to the on-site waste accumulation area for Autoliv.

EPA has agreed to allow Autoliv to undertake this XL project with the requested regulatory flexibility to determine if the proposed performance-based approach would result in superior environmental performance and significant cost savings to Autoliv.

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This proposed rule, and the state actions described in Section IV.F.1. of this preamble that parallel this action, will not in any way affect the provisions or applicability of any other existing or future regulations.

EPA is soliciting comments on this proposed rule. EPA will publish responses to comments. The XL Project will enter the implementation phase after the initial stack test results have been submitted by Autoliv and reviewed by both EPA and the state of Utah to ensure adherence to the XL Project.

Outline of Today's Document

The information presented in this preamble is organized as follows:

I. Authority
II. Overview of Project XL
III. Overview of the Autoliv XL Project
A. What Autoliv Facility Will the Proposed Rule Apply?
B. What Are The Environmental Benefits of This Project?
C. What Regulatory Changes will be Necessary to Implement this Project?
1. Federal Regulatory Changes
2. State Regulatory Changes
D. Why is EPA Supporting this New Approach to Autoliv's Waste Management?
E. How Have Various Stakeholders Been Involved in this Project?
F. How Will this Project Result in Cost Savings and Paperwork Reduction?
G. How Will the Terms of This XL Project and Proposed Rule Be Enforced?
IV. Additional Information
A. How to Request a Public Hearing
B. How Does this Rule Comply With Executive Order 12866?
C. Is a Regulatory Flexibility Analysis Required?
D. Is an Information Collection Request Required for this Project Under the Paperwork Reduction Act?
E. Does This Project Trigger the Requirements of the Unfunded Mandates Reform Act?
F. RCRA & Hazardous and Solid Waste Amendments of 1984
1. Applicability of Rules in Authorized States
2. Effect on Utah Authorization
G. How Does this Rule Comply with Executive Order 13045: Protection of Children from Environmental Health Risks and Safety Risks?
H. Does this Rule Comply with Executive Order 12875: Enhancing Intergovernmental Partnerships?
I. How Does this Rule Comply with Executive Order 13084: Consultation and Coordination with Indian Tribal Governments?
J. Does this Rule Comply with the National Technology Transfer and Advancement Act of 1995 (NTTAA)?

I. Authority

EPA is publishing this proposed rule under the authority of sections of the Solid Waste Disposal Act of 1970, as amended by the Resource Conservation and Recovery Act (RCRA). (Authority: 42 U.S.C. 6905, 6912(a), 6921, 6922, 6924(y), and 6938.)

II. Overview of Project XL

Project XL—''eXcellence and Leadership''— was announced on March 16, 1995, as a central part of the National Performance Review and the EPA's effort to reinvent environmental protection. See 60 FR 27282 (May 23, 1995). Project XL provides a limited number of private and public regulated entities an opportunity to develop their own pilot projects to provide regulatory flexibility that will result in environmental protection that is superior to what would be achieved through compliance with current and reasonably anticipated future regulations. These efforts are crucial to EPA's ability to test new strategies that reduce regulatory burden and promote economic growth while achieving better environmental and public health protection. EPA intends to evaluate the results of this and other Project XL projects to determine which specific elements of the project(s), if any, should be more broadly applied to other regulated entities for the benefit of both the economy and the environment.

Under Project XL, participants in four categories; facilities, industry sectors, governmental agencies and communities—are offered the flexibility to develop common sense, cost-effective strategies that will replace or modify specific regulatory requirements, on the condition that they produce and demonstrate superior environmental performance.

The XL program is intended to allow EPA to experiment with potentially promising regulatory approaches, both to assess whether they provide benefits at the specific facility affected, and whether they should be considered for wider application. Such pilot projects allow EPA to proceed more quickly than would be possible when undertaking changes on a nationwide basis. As part of this experimentation, the EPA may try out approaches or legal interpretations that depart from or are even inconsistent with longstanding Agency practice, so long as those interpretations are within the broad range of discretion enjoyed by the Agency in interpreting statutes that it implements. The EPA may also modify rules, on a site-specific basis, that represent one of several possible policy approaches within a more general statutory directive, so long as the alternative being used is permissible under the statute.

Adoption of such alternative approaches or interpretations in the context of a given XL project does not, however, signal EPA's willingness to adopt that interpretation as a general matter, or even in the context of other XL projects. It would be inconsistent with the forward-looking nature of these pilot projects to adopt such innovative approaches prematurely on a widespread basis without first determining whether or not they are viable in practice and successful in the particular projects that embody them. In announcing the XL program, EPA expects to adopt only a limited number of carefully selected projects. These pilot projects are not intended to be a means for piecemeal revision of entire programs. Depending on the results in these projects, EPA may or may not be willing to consider adopting the alternative interpretation again, either generally or for other specific facilities.

EPA believes that adopting alternative policy approaches and interpretations, on a limited, site-specific basis and in connection with a carefully selected pilot project, is consistent with the expectations of Congress about EPA's role in implementing the environmental statutes (provided that the Agency acts within the discretion allowed by the statute). Congress' recognition that there is a need for experimentation and research, as well as ongoing re-evaluation of environmental programs, is reflected in a variety of statutory provisions, such as section 8001 of RCRA.

To participate in Project XL, applicants must develop alternative pollution reduction strategies pursuant to eight criteria: Superior environmental performance; cost savings and paperwork reduction; local stakeholder involvement and support; test of an innovative strategy; transferability; feasibility; identification of monitoring, reporting and evaluation methods; and avoidance of shifting risk burden. They must have full support of affected federal, state and tribal agencies to be selected.

For more information about the XL criteria, readers should refer to the two descriptive documents published in the **Federal Register** (60 FR 27282, May 23, 1995 and 62 FR 19872, April 23, 1997), and the December 1, 1995 Principles for Development of Project XL Final Project Agreements document. For further discussion as to how Autoliv XL project addresses the XL criteria, readers should refer to the Final Project Agreement available from the EPA RCRA docket or Region 8 library for this action (see **ADDRESSES** section of today's preamble).

The Project XL program is compartmentalized into four basic phases: the initial pre-proposal phase where the project sponsor comes up with an innovative concept that they would like to consider as an XL pilot, the second phase where the project sponsor works with EPA and interested stakeholders in developing an XL proposal, the third phase where EPA, local regulatory agencies, and other interested stakeholders review the XL proposal, the fourth phase where the project sponsor works with EPA, local regulatory agencies, and interested stakeholders in developing a Final Project Agreement (FPA) and legal mechanism. After the FPA has been signed by all designated parties, the XL pilot proceeds into the implementation phase and evaluation phase.

The FPA is a written agreement between the project sponsor and regulatory agencies. The FPA contains a detailed description of the proposed pilot project. It addresses the eight Project XL criteria, and the expectation of the Agency that this XL project will meet those criteria. The FPA identifies performance goals and indicators (monitoring schedule) which will enable Autoliv to clearly illustrate the baseline quantities. The FPA specifically addresses the manner in which the project is expected to produce superior environmental benefits. The FPA also discusses the administration of the agreement, including dispute resolution and termination. The FPA is available for review in the docket for today's action, and also is available on the world wide web at http://www.epa.gov/projectxl/.

III. Overview of the Autoliv XL Project

Autoliv is proposing to develop, evaluate and implement, an alternative to open burning of certain wastes generated at its Promontory, Utah facility.

This waste is reactive only, and contains no significant levels of hazardous constituents. These reactive hazardous wastes are presently treated through open burning at a RCRA interim status facility.

Autoliv currently operates a $3 million Metals Recovery Facility (MRF) designed to recover aluminum and steel from inflator units containing live pyrotechnic material as well as previously fired units. The MRF is capable of recovering 2000 pounds per hour of recyclable aluminum and steel from off-spec and fired commercial inflator units and their components while minimizing the waste to the environment. Autoliv's XL Project proposes to process small volumes of its waste pyrotechnic materials within the MRF rather than sending the materials to a RCRA regulated treatment, storage or disposal facility (TSDF) for open burning. The company is seeking a conditional exemption from the definition of hazardous waste for pyrotechnic materials to be processed through the MRF.

The MRF has an extensive air pollution train which is capable of capturing the particulate emissions produced by the waste pyrotechnic materials. The proposed project will demonstrate that it is feasible to utilize existing equipment to process certain hazardous wastes in a more efficient and environmentally sound manner, under a more flexible regulatory framework. With minimal modifications to the operation, Autoliv believes that it can achieve a safer, cleaner, and more effective method of treatment than the current method of open burning.

EPA anticipates that this project will provide information on how to develop alternative approaches to handling pyrotechnic waste. This information would be useful to EPA in learning more about alternative treatment approaches for airbag manufacturing wastestreams. This XL Project would include conditions for the treatment of Autoliv's wastes within Autoliv's Promontory Facility. These criteria will operate at Autoliv's Promontory facility in lieu of the requirements found at 40 CFR 261.4. The conditions are a set of measurable requirements that are similar to the current RCRA requirements. Each of the elements of the conditions is described in full in today's proposed rule and is briefly explained below.

The proposed requirements for Autoliv's XL Project include a requirement that the project include procedures to assure compliance with conditions specified in the proposed rule. The proposed conditions set forth for the treatment of Autoliv's waste have been designed to ensure that Autoliv's waste will be treated in a manner protective of human health and the environment. The requirements in the conditions include provisions which are consistent with current RCRA requirements. Autoliv is proposing that EPA explore the benefits of more streamlined and flexible RCRA regulation of pyrotechnic hazardous wastes from the automobile airbag industry that are treated in industrial furnaces. The project signatories agree that this rule can be characterized as a conditional exemption from the definition of hazardous waste.

Autoliv will comply with many of the general facility standards of RCRA, and is not seeking relief from all RCRA management protections. Through this project Autoliv intends to be able to treat its waste pyrotechnic materials on-site without obtaining a RCRA Part B permit from the State of Utah that is normally required for thermal treatment. The waste as referenced in Autoliv's Project Proposal is reactive only and does not contain significant amounts of hazardous constituents (See the Environmental Performance Summary Calculations section of the Autoliv Proposal at *http://www.epa.gov/projectxl/Autoliv/page2.htm.* for more detailed information on waste composition).

A. To What Autoliv Facility Would the Proposed Rule Apply?

This proposed rule would apply only to the Autoliv ASP Inc. (Autoliv) facility in Promontory, Utah.

B. What Are the Environmental Benefits of This Project?

This project is designed to achieve environmental results that are superior to what is currently achieved by the current RCRA regulatory system.

This project is expected to achieve superior environmental results as compared to open burning for several reasons. The major benefit to the environment will be from reduced air emissions due to the minimization of open burning of hazardous waste. The company has arranged for open burning of 183,557 lbs. of pyrotechnic material that were not able to be recovered or recycled during 1998 and 1999. The uncontrolled particulate emissions are a point of concern for all parties involved. Although open burning is an approved method for treatment of pyrotechnic wastes it does not utilize any air pollution controls. The same pyrotechnic materials, if processed at the MRF, would pass through an extensive air pollution control system rather than being emitted, thus achieving a significant reduction of air pollutants released to the environment, accomplishing superior environmental performance compared to open burning. The company projects that it can eliminate open burning of 158,000 lbs. of pyrotechnic waste material in the first year of project participation. It also estimates that a net reduction of 22,876 lbs./yr. of particulate emissions would be accomplished.

Additional environmental benefits are achievable due to the fact that certain pyrotechnic formulations contain materials (e.g., copper) that could be potentially recovered in the slag as well as in the baghouse. These materials could then be recycled back to Autoliv's

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raw material suppliers. The distinctive properties of the pyrotechnic materials enable these materials to be treated more efficiently and in a manner that creates few air emissions than open burning which precludes recycling or recovery of any kind.

The specifications governing the air bag industry are very stringent and do not allow the use of toxic materials. The major gases produced by gas generants are water, carbon dioxide, and nitrogen. The percentage of each of these gases can vary depending on the formulation but a typical analysis would be approximately 40% nitrogen, 40% water, and 20% carbon dioxide. Other gaseous and particulate (metal) compounds are present at ppm levels. These include gaseous carbon dioxide (CO), nitrogen dioxide (NO_2), nitric oxide (NO), and ammonia (NH_3), and particulate matter containing the metals copper, cobalt, boron, and aluminum. The MRF is presently permitted by Utah (DAQE–549–97) to operate 24 hours/day, 365 days/year. Actual operation is estimated to be 50 percent of the permitted production capacity. A portion of the processing capacity will be absorbed by pyrotechnic waste material. Minimal changes to the emission streams are expected because the pyrotechnic materials are also present within the recycled inflator units themselves.

C. What Regulatory Changes Will Be Necessary To Implement This Project?

1. Federal Regulatory Changes

This proposed rule would provide Autoliv with a temporary conditional exemption from 40 CFR 261.4. In order to implement this project, EPA will grant a conditional exemption from the definition of hazardous waste, for the specific waste that is subject to this rule. The effect of EPA granting the conditional exemption is that a RCRA Part B permit will not be required. The waste pyrotechnics, generated on-site at the Autoliv facility, will be exempted from regulation as a hazardous waste exempt from 40 CFR Parts 262 through 270 when treated in the MRF in accordance with the provisions in the site-specific rule. The facility will continue to comply with certain general RCRA conditions on facility operations, as described in this Project XL site-specific rule for the Autoliv facility and any State of Utah regulations that grant the conditional exemption. The project signatories believe that processing pyrotechnic materials in the MRF can be both cost-effective and achieve superior environmental results as compared to open burning.

This site-specific rule is necessary to allow for the temporary conditional exemption/deferral, and would add exclusion (b)(18) to 40 CFR 261.4 to clarify that the on-site treatment of Autoliv's wastes would be covered by a new section to 40 CFR.

2. State Regulatory Changes

The State of Utah is authorized under Section 3003 of RCRA (Sec. 6926. Authorized State Hazardous Waste Programs), to implement the federal RCRA Program. The state program operates in lieu of the federal program. The Utah hazardous waste management regulations, codified in Utah Code of Regulations contain equivalent or more stringent requirements as compared to the federal regulations. Autoliv is subject to the federal and the Utah regulations, which would include requirements that the pyrotechnic waste be handled according to the waste management provisions of RCRA. Conforming state regulatory changes or legal mechanisms need to be implemented in addition to the proposed federal changes in order for this XL Project to proceed.

D. Why Is EPA Supporting This New Approach to Autoliv's Waste Treatment?

EPA is supporting this regulatory model contained in this rule because it provides for a degree of environmental protection that is at least as protective as that which existing RCRA regulations would provide for the Autoliv's Promontory facility. The approach to be tested under this project would be to explore the efficacy of treating waste on-site in cases where there is a clear benefit to the environment for doing so. This would entail the substitution of current RCRA permitting requirements outlined in 40 CFR Parts 264 and 266 with those for interim status facilities. EPA is interested in testing and evaluating alternative approaches to regulating RCRA facilities that can achieve superior environmental performance while reducing costs and paperwork burden. Autoliv has a history of implementing waste minimization techniques and practices with control over manufacturing with emphasis on quality and waste minimization. Providing Autoliv the flexibility to dispose of waste on a regular schedule means professional resources can be redirected from reactive waste management to proactive waste management.

EPA anticipates that this proposed rule will result in a successful innovative pilot of a new on-site treatment system for Autoliv. EPA recognizes that the proposed new systems may not be appropriate or necessary for some institutions but may, at some point, depending on the results of this XL project, consider the possibility of offering it as a regulatory option.

For this pilot, Autoliv will be implementing an Environmental Reinvestment Project (ERP) that will be finalized one year from the project start date.

E. How Have Various Stakeholders Been Involved in This Project?

Stakeholder involvement during the project development stage was encouraged in several ways. The methods included communicating through the media, directly contacting interested parties and offering an educational program regarding the regulatory requirements impacted by the XL project. Stakeholders have been kept informed on the project status via mailing lists, newspaper articles, public meetings and the establishment of a website. Both local and regional stakeholders have expressed support for this project. They see this as a unique opportunity to improve the air quality in Box Elder County and surrounding communities. Participation in Project XL provides Autoliv, the Box Elder County, the Utah Division of Environmental Quality and the EPA the opportunity to explore new ways to improve the environment. The neighboring community of Howell and the surrounding area would benefit by reducing emissions associated with open burning. The highly visible nature of open burning tends to heighten awareness of the associated environmental impacts. A kickoff meeting and site tour held on June 8th, 1999 garnered stakeholder support and input for the project plan. Additional stakeholder meetings will be held as appropriate.

Stakeholders that have been active in the project and have given oral or written support are: Utah Division of Environmental Quality, Bear River Health Department, Howell City, and Box Elder County. Stakeholders have been made aware of Autoliv's intentions and the environmental benefits associated with Project XL. Autoliv will continue to provide the stakeholder group with any information regarding the project including semi-annual project updates and will encourage them to meet on a regular basis.

Copies of all comment letters, as well as EPA's response to comment letters, will be located in the rulemaking Docket (see the **ADDRESSES** section of today's preamble). As this XL project continues

to be implemented, the stakeholder involvement program would shift its focus to ensure that: (1) Stakeholders are apprised of the status of project implementation and (2) stakeholders have access to information sufficient to judge the success of this Project XL initiative. Anticipated stakeholder involvement during the term of the project will likely include other general public meetings to present periodic status reports, availability of data and other information generated. In addition to the state and federal reporting requirements of today's rulemaking, the FPA includes provisions whereby Autoliv will make copies of interim project reports available to all interested parties. A public file on this XL project has been maintained at the website *http://www.epa.gov/projectxl/* throughout project development, and Autoliv has committed to continue to update it as the project is implemented.

A detailed description of this program and the stakeholder support for this project is included in the FPA, which is available through the docket or through EPA's Project XL site on the Internet (see **ADDRESSES** section of this preamble).

F. How Will This Project Result in Cost Savings and Paperwork Reduction?

The waste treatment currently accounts for the most substantial expense for environmental, health and safety programs at Autoliv. This XL Project would result in cost savings and paperwork reduction in several key areas. These include a decrease in paperwork through a streamlined process for approval of hazardous waste treatment, elimination of paperwork related to transporting the waste off-site to a permitted facility, and a reduction in the disposal costs that the company would pay to a RCRA treatment or disposal facility. Autoliv disposed of 82,361 lbs. of pyrotechnic waste in 1998 at an incurred cost of $164,722. The pyrotechnic waste could easily have been processed in the MRF with minimal additional operating cost. Autoliv estimates that 158,000 lbs. of waste material will be generated in the year 2000. The contracted disposal fee at present time is $2.00 per pound. Through Project XL, Autoliv will save an estimated $316,000 in disposal costs in the first year. It has been estimated that issuance of a RCRA permit may take three to five years and may cost the facility $500,000. Part of Autoliv's cost savings from the XL project will be used to fund an ERP.

In addition, the following changes would be anticipated: waste pyrotechnics would no longer be transported across public roads, reducing potential liability and associated costs, and increasing public safety. The paperwork burden would be reduced because hazardous waste manifests and shipping papers would not be required or needed. Operational flexibility would allow materials to be processed more regularly, which further reduces paperwork as well as the amount of pyrotechnics stored at any given time. It is expected with this project a certain amount of paperwork associated with RCRA compliance is likely to be reduced.

G. How Will the Terms of This XL Project and Proposed Rule Be Enforced?

EPA retains its full range of enforcement options under this proposed rule. The conditional exemption of certain RCRA requirements are conditional upon Autoliv's implementation and compliance with the conditions set forth in 40 CFR 261.4 of this rule (b) (18).

If the conditions for the exemption are not met, the XL project may be terminated pursuant to the terms of the Final Project Agreement setting out the agreement of the parties to this project. The final project agreement further provides for a return to compliance with any regulations deferred under the project, and may include an agreed-upon interim compliance period.

As with all XL projects, testing alternative environmental protection strategies, the term of the Autoliv XL project is one of limited duration. This proposed rule would set the term of the XL Project at five years after the effective date of this rule. Because Project XL is a voluntary and experimental program, the FPA contains provisions that allow the project to conclude prior to the end of the five years in the event that it is desirable or necessary to do so.

During the five year project term, Autoliv will comply with the following:

(1) Autoliv will comply with the Project XL site-specific rule for the Promontory facility and the requirements specified in 40 CFR Part 262, Part 265, Subparts B, C, D, E, G, H, I, and O, and Part 268. Waste material will still be managed and stored as hazardous waste prior to treatment. Autoliv will comply with the RCRA 90-day storage requirements.

(2) All waste materials processed will be characterized and an initial stack test described in the site-specific rule will be conducted by Autoliv to evaluate the safety and the efficiency of the MRF system.

(3) The amounts of pyrotechnic wastes will be reported to EPA and the State of Utah at each periodic performance review conference conducted every six months.

(4) Due to the dynamic and ever changing nature of the air bag industry, it will be pertinent to allow for new development and provide flexibility for future materials. Emission product limitations will comply with air bag industry emissions standards listed in the Superior Environmental Performance section.

(5) The Utah Division of Air Quality under authority delegated by EPA has agreed that a separate Approval Order will be issued for the pyrotechnic waste disposal process which will serve as an amendment to the existing Approval Order which covers the current operation of processing airbag inflators and their components. No regulatory flexibility or modification of federal regulations is required for the new approval order to be issued by the Division of Air Quality.

(6) No off-site pyrotechnic wastes will be received or processed at this location and in the MRF.

(7) An MRF Operating Record, including waste feed composition, feed rates, temperatures, pressures, upset conditions, spills and releases, etc., will be maintained at the facility and made available for the State of Utah and EPA to review and copy for enforcement purposes if necessary.

(8) The State of Utah and EPA will be notified of any upset conditions, such as, spills and releases of hazardous or toxic substances at the MRF. The information will be reported orally within 24 hours from the time Autoliv becomes aware of the circumstances. A written submission to the State of Utah and EPA will be provided within five days of the time Autoliv becomes aware of the circumstances of the noncompliance. The severity and type of upset condition that would trigger the reporting threshold is described in the site-specific rule.

IV. Additional Information

A. How To Request a Public Hearing

A public hearing will be held, if requested, to provide opportunity for interested persons to make oral presentations regarding this regulation in accordance with 40 CFR Part 25. Persons wishing to make an oral presentation on the site specific rule to implement the Autoliv XL project should contact Ms. Mary Byrne of the EPA Region 8 office, at the address given in the **ADDRESSES** section of this document. Any member of the public may file a written statement before the hearing, or after the hearing, to be

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received by EPA no later than February 27, 2001. Written statements should be sent to EPA at the addresses given in the **ADDRESSES** section of this document. If a public hearing is held, a verbatim transcript of the hearing, and written statements provided at the hearing will be available for inspection and copying during normal business hours at the EPA addresses for docket inspection given in the **ADDRESSES** section of this preamble.

B. How Does This Rule Comply with Executive Order 12866?

Under Executive Order 12866 (58 FR 51735, October 4, 1993) the Agency must determine whether the regulatory action is ''significant'' and therefore subject to Office of Management and Budget (OMB) review and the requirements of the Executive Order. The Order defines ''significant regulatory action'' as one that is likely to result in a rule that may:

(1) Have an annual effect on the economy of $100 million or more or adversely affect in a material way the economy, a sector of the economy, productivity, competition, jobs, the environment, public health or safety in State, local, or tribal governments or communities;

(2) Create a serious inconsistency or otherwise interfere with an action taken or planned by another agency;

(3) Materially alter the budgetary impact of entitlement, grants, user fees, or loan programs of the rights and obligations of recipients thereof; or

(4) Raise novel legal or policy issues arising out of legal mandates, the President's priorities, or the principles set forth in the Executive Order.

Because the annualized cost of this final rule will be significantly less than $100 million and will not meet any of the other criteria specified in the Executive Order, it has been determined that this rule is not a significant regulatory action under the terms of Executive Order 12866, and is therefore not subject to OMB review.

Executive Order 12866 also encourages agencies to provide a meaningful public comment period, and suggests that in most cases the comment period should be 60 days. However, in consideration of the very limited scope of today's rulemaking and the considerable public involvement in the development of the proposed Final Project Agreement, the EPA considers 21 days to be sufficient in providing a meaningful public comment period for today's action.

C. Is a Regulatory Flexibility Analysis Required?

The Regulatory Flexibility Act (RFA), 5 U.S.C. section 601 et seq., generally requires an agency to conduct a regulatory flexibility analysis of any rule subject to notice and comment rulemaking requirements unless the agency certifies that the rule will not have a significant economic impact on a substantial number of small entities. Small entities include small businesses, small not-for-profit enterprises, and small governmental jurisdictions. This rule will not have a significant impact on a substantial number of small entities because it only affects Autoliv. Therefore, EPA has concluded that this action will not have a significant economic impact on a substantial number of small entities.

D. Is an Information Collection Request Required for this Project Under the Paperwork Reduction Act?

This action applies only to Autoliv, and therefore requires no information collection activities subject to the Paperwork Reduction Act, and therefore no information collection request (ICR) will be submitted to OMB for review in compliance with the Paperwork Reduction Act, 44 U.S.C. 3501, *et seq.*

E. Does This Project Trigger the Requirements of the Unfunded Mandates Reform Act?

Title II of the Unfunded Mandates Reform Act of 1995 (UMRA), Public Law 104–4, establishes requirements for Federal agencies to assess the effects of their regulatory actions on State, local, and tribal governments and the private sector. Under section 202 of the UMRA, EPA generally must prepare a written statement, including a cost-benefit analysis, for proposed and final rules with ''Federal mandates'' that may result in expenditures to State, local, and tribal governments, in the aggregate, or to the private sector, of $100 million or more in any one year. Before promulgating an EPA rule for which a written statement is needed, section 205 of the UMRA generally requires EPA to identify and consider a reasonable number of regulatory alternatives and adopt the least costly, most cost-effective or least burdensome alternative that achieves the objectives of the rule. The provisions of section 205 do not apply when they are inconsistent with applicable law. Moreover, section 205 allows EPA to adopt an alternative other than the least costly, most cost-effective or least burdensome alternative if the Administrator publishes with the final rule an explanation of why that alternative was not adopted. Before EPA establishes any regulatory requirements that may significantly or uniquely affect small governments, including tribal governments, it must have developed under section 203 of the UMRA a small government agency plan. The plan must provide for notifying potentially affected small governments, enabling officials of affected small governments to have meaningful and timely input in the development of EPA regulatory proposals with significant Federal intergovernmental mandates, and informing, educating, and advising small governments on compliance with the regulatory requirements.

As noted above, this rule is applicable only to the Autoliv facility in Promontory, Utah. The EPA has determined that this rule contains no regulatory requirements that might significantly or uniquely affect small governments. EPA has also determined that this rule does not contain a Federal mandate that may result in expenditures of $100 million or more for State, local, and tribal governments, in the aggregate, or the private sector in any one year. Thus, today's rule is not subject to the requirements of sections 202 and 205 of the UMRA.

F. RCRA & Hazardous and Solid Waste Amendments of 1984

1. Applicability of Rules in Authorized States

Under section 3006 of RCRA, EPA may authorize qualified states to administer and enforce the RCRA program for hazardous waste within the state. (See 40 CFR Part 271 for the standards and requirements for authorization.) States with final authorization administer their own hazardous waste programs in lieu of the federal program. Following authorization, EPA retains enforcement authority under sections 3008, 3013 and 7003 of RCRA.

After authorization, federal rules written under RCRA (non-HSWA), no longer apply in the authorized state except for those issued pursuant to the Hazardous and Solid Waste Act Amendments of 1984 (HSWA). New federal requirements imposed by those rules do not take effect in an authorized state until the state adopts the requirements as state law.

In contrast, under section 3006(g) of RCRA, new requirements and prohibitions imposed by HSWA take effect in authorized states at the same time they take effect in nonauthorized states. EPA is directed to carry out HSWA requirements and prohibitions in

authorized states until the state is granted authorization to do so.

2. Effect on Utah Authorization

This proposed rule is being promulgated pursuant to non-HSWA authority, rather than HSWA. Utah has received authority to administer most of the RCRA program; thus, authorized provisions of each state's hazardous waste program are administered in lieu of the federal program. Utah has received authority to administer hazardous waste standards for generators. As a result, this proposed rule, would not be effective in Utah until the state adopts equivalent legal mechanisms or requirements as state law. EPA may not enforce these requirements until it approves the state requirements as a revision to the authorized state program.

G. How Does This Rule Comply With Executive Order 13045: Protection of Children From Environmental Health Risks and Safety Risks?

The Executive Order 13045, ''Protection of Children from Environmental Health Risks and Safety Risks'' (62 FR 19885, April 23, 1997) applies to any rule that: (1) Is determined to be ''economically significant,'' as defined under Executive Order 12866; and (2) concerns an environmental health or safety risk that EPA has reason to believe may have a disproportionate effect on children. If the regulatory action meets both criteria, the Agency must evaluate the environmental health or safety effects of the planned rule on children, and explain why the planned regulation is preferable to other potentially effective and reasonably feasible alternatives considered by the Agency.

H. Does This Rule Comply With Executive Order 12875: Enhancing Intergovernmental Partnerships?

Under Executive Order 12875, EPA may not issue a regulation that is not required by statute and that creates a mandate upon a state, local or tribal government, unless the federal government provides the funds necessary to pay the direct compliance costs incurred by those governments. If the mandate is unfunded, EPA must provide to the Office of Management and Budget a description of the extent of EPA's prior consultation with representatives of affected State, local and tribal governments, the nature of their concerns, copies of any written communications from the governments, and a statement supporting the need to issue the regulation. In addition, Executive Order 12875 requires EPA to develop an effective process permitting elected officials and other representatives of state, local and tribal governments to provide meaningful and timely input in the development of regulatory proposals containing significant unfunded mandates.

This proposed rule does not create a mandate on state, local or tribal governments. This rule does not impose any enforceable duties on these entities. Accordingly, the requirements of section 1(a) of Executive Order 12875 do not apply to this rule.

I. How Does This Rule Comply With Executive Order 13084: Consultation and Coordination With Indian Tribal Governments?

Under Executive Order 13084, EPA may not issue a regulation that is not required by statute, that significantly or uniquely affects the communities of Indian tribal governments, and that imposes substantial direct compliance costs on those communities, unless the Federal government provides the funds necessary to pay the direct compliance costs incurred by the tribal governments. If the mandate is unfunded, EPA must provide to the Office of Management and Budget, in a separately identified section of the preamble to the rule, a description of the extent of EPA's prior consultation with representatives of affected tribal governments, a summary of the nature of their concerns, and a statement supporting the need to issue the regulation. In addition, Executive Order 13084 requires EPA to develop an effective process permitting elected and other representatives of Indian tribal governments to provide meaningful and timely input in the development of regulatory policies on matters that significantly or uniquely affect their communities. Today's rule does not significantly or uniquely affect the communities of Indian tribal governments. There are no communities of Indian tribal governments located in the vicinity of Autoliv. Accordingly, the requirements of section 3(b) of Executive Order 13084 do not apply to this rule.

J. Does This Rule Comply With the National Technology Transfer and Advancement Act?

Section 12(d) of the National Technology Transfer and Advancement Act of 1995 (''NTTAA''), Public Law 104–113, Section 12(d) (15 U.S.C. 272 note) directs EPA to use voluntary consensus standards in its regulatory activities unless to do so would be inconsistent with applicable law or otherwise impractical. Voluntary consensus standards are technical standards (e.g., materials specifications, test methods, sampling procedures, and business practices) that are developed or adopted by voluntary consensus standards bodies. The NTTAA directs EPA to provide Congress, through OMB, explanations when the Agency decides not to use available and applicable voluntary consensus standard. This proposed rulemaking does not involve technical standards. Therefore, EPA is not considering the use of any voluntary consensus standards. EPA welcomes comments on this aspect of the proposed rulemaking and, specifically, invites the public to identify potentially-applicable voluntary consensus standards and to explain why such standards should be used in this regulation.

List of Subjects in 40 CFR Part 261

Environmental protection, Hazardous waste, Waste determination.

Dated: January 19, 2001.

Carol M. Browner,

Administrator.

For the reasons set forth in the preamble, part 261 of chapter I of title 40 of the Code of Federal Regulations is proposed to be amended as follows:

PART 261—IDENTIFICATION AND LISTING OF HAZARDOUS WASTE

1. The authority citation for part 261 continues to read as follows:

Authority: 42 U.S.C. 6905, 6912(a), 6921, 6922, 6924(y), and 6938.

2. Section 261.4 is amended by adding paragraph (b)(18) to read as follows:

§ 261.4 Exclusions.

* * * * *

(b) * * *

(18) By-products resulting from the production of automobile air bag gas generants at the Autoliv ASP Inc. facility in Promontory Utah, (Autoliv) are exempt from the D003 listing, for a period of five years from [the effective date of this rule/publication date] provided that:

(i) The by-product gas generants are processed on-site in Autoliv's Metal Recovery Furnace (MRF).

(A) By-product gas generants must only be fed to the MRF when it is operating in conformance with the State of Utah, Division of Air Quality's Approval Order DAQE–549–97.

(B) Combustion gas temperature must be maintained below 400 degrees Fahrenheit at the baghouse inlet.

(ii) Prior to processing in the MRF, the by-product gas generants are managed

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in accordance with the requirements specified in 40 CFR 262.34.

(iii) The Autoliv facility and the MRF are operated and managed in accordance with the requirements of 40 CFR Part 265, Subparts B, C, D, E, G, H, I, and O.

(iv) Residues derived from the processing of by-product gas generants in the MRF are managed in accordance with the requirements specified in 40 CFR Parts 262 and 268.

(v) The following testing of the MRF's stack gas emissions is conducted:

(A) An initial test shall be conducted within 30 operating days of starting feed of by-product gas generants to the MRF. EPA may extend this deadline, at the request of Autoliv, when good cause is shown. The initial test shall consist of three duplicate runs sampling for:

(1) Particulate matter using Method 5 as specified in 40 CFR Part 60, Appendix A.

(2) The metals Aluminum, Arsenic, Barium, Beryllium, Boron, Cadmium, Chromium, Cobalt, Copper, Lead, and Nickel using Method 29 as specified in 40 CFR Part 60, Appendix A

(3) Polychlorinated di-benzo dioxins and furans using Method 23 0023A as specified in 40 CFR Part 60, Appendix A.

(4) Carbon monoxide using Method 10 as specified in 40 CFR Part 60, Appendix A.

(B) After the initial test is completed, an annual stack test (12 months from the previous initial stack test) of the MRF shall be conducted. The annual tests shall consist of three duplicate runs using Method 29 and Method 5 as specified in 40 CFR Part 60, Appendix A.

(C) Testing shall be conducted while by-product gas generants are fed to the MRF at no less than 90% of the planned maximum feed rate, and with the MRF operating parameters within normal ranges.

(D) Initial stack testing results and additional project performance data and information, including the quantity of by-product gas generants processed and the operating parameter values during the test runs, will be submitted by Autoliv to the State of Utah and EPA within 60 days of the completion of the initial stack test.

(E) Annual stack test results and additional project performance data and information, including the quantity of by-product gas generants processed and the operating parameter values during the test runs, will be submitted by Autoliv to EPA and the State of Utah within 60 days of the completion of the annual test.

(vi) Combustion gas discharged to the atmosphere from the MRF meets the following limits:

(A) Dioxin emissions do not exceed 0.4 ng per dry standard cubic meter on a toxicity equivalent quotient (TEQ) basis corrected to 7% Oxygen.

(B) Combined lead and cadmium emissions do not exceed 240 ug per dry standard cubic meter corrected to 7% Oxygen.

(C) Combined arsenic, beryllium, and chromium emissions do not exceed 97 ug per dry standard cubic meter corrected to 7% Oxygen.

(D) Particulate matter emissions do not exceed 34 mg per dry standard cubic meter corrected to 7% Oxygen.

(E) If the limits specified in paragraphs (b)(18)(vi)(A) through (D) of this section are exceeded, Autoliv shall discontinue feeding gas generants to the MRF until such time as Autoliv can demonstrate to EPA and the state of Utah satisfaction that the MRF combustion gas emissions can meet the limits specified in paragraphs (b)(18)(vi)(A) through (D) of this section

(vii) No by-product gas generants or other pyrotechnic wastes generated off-site will be received at the Autoliv facility in Promontory, Utah or processed in the MRF unless otherwise allowed by law (permit or regulation).

(viii) Autoliv will provide EPA and the state of Utah with semi-annual reports (by January 30 and July 30 of each year).

(A) The semi-annual reports will document the amounts of by-product gas generants processed during the reporting period.

(B) The semi-annual reports will provide a summary of the MRF Operating Record during the reporting period, including information on by-product gas generant composition, average feed rates, upset conditions, and spills or releases.

(ix) No significant changes are made to the operating parameter production values of Autoliv's production of air bag gas generants such that any of the constituents listed in appendix VIII of this part are introduced into the process.

(x) Autoliv reports to the EPA any noncompliance which may endanger health or the environment orally within 24 hours from the time Autoliv becomes aware of the circumstances, including:

(A) Any information of a release, discharge, fire, or explosion from the MRF, which could threaten the environment or human health.

(B) The description of the occurrence and its cause shall include:

(1) Name, address, and telephone number of the facility;

(2) Date, time, and type of incident;

(3) Name and quantity of material(s) involved;

(4) The extent of injuries, if any;

(5) An assessment of actual or potential hazards to the environment and human health, and

(6) Estimated quantity and disposition of recovered material that resulted from the incident.

(C) A written notice shall also be provided within five days of the time Autoliv becomes aware of the circumstances. The written notice shall contain a description of the non-compliance and its cause; the period of noncompliance including exact dates and times, and if the noncompliance has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance. The EPA may waive the five day written notice requirement in favor of a written report within fifteen days.

(xi) Notifications and submissions made under paragraph (b)(18) of this section shall be sent to the Regional Assistant Administrator for the Office of Partnerships and Regulatory Assistance, U.S. EPA, Region 8 and the Executive Secretary of the Utah Solid and Hazardous Waste Control Board.

* * * * *

[FR Doc. 01–3616 Filed 2–12–01; 8:45 am]

BILLING CODE 6560–50–P

DEPARTMENT OF THE INTERIOR

Bureau of Land Management

43 CFR Parts 3000, 3100, 3200, 3400, 3500, 3600, and 3800

[WO–610–4111–02–24–IA]

RIN 1004–AC64

Oil and Gas Leasing; Geothermal Resources Leasing; Coal Management; Management of Solid Minerals Other Than Coal; Mineral Materials Disposal; and Mining Claims Under the General Mining Laws

AGENCY: Bureau of Land Management, Interior.

ACTION: Proposed rule; notice of extension of public comment period.

SUMMARY: The Bureau of Land Management (BLM) is extending the public comment period on a Notice of Proposed Rule, published in the **Federal Register** on December 15, 2000 (65 FR 78440). The proposed rule would amend Bureau of Land Management (BLM) mineral resources regulations to increase fees and to impose new fees to

cover BLM's costs of processing certain documents relating to its minerals programs. The primary purpose of this rule is to charge those who benefit from these minerals programs, rather than the general public, the costs of BLM minerals documents processing. In response to public requests for additional time, BLM extends the comment period 60 days from the original comment period closing date of February 13, 2001, to the extended comment period's closing date of April 16, 2001.

DATES: Send your comments to BLM on or before April 16, 2001 to assure BLM will consider them in preparing the final rule.

ADDRESSES: Send your comments to the Bureau of Land Management Administrative Record, Room 401 LS, 1849 C Street, NW., Washington, DC 20240, or hand deliver comments to the Bureau of Land Management Administrative Record, Room 401, 1620 L Street, NW., Washington DC. For information about filing comments electronically, see the **SUPPLEMENTARY INFORMATION** section under ''Electronic access and filing address.''

FOR FURTHER INFORMATION CONTACT: For questions about fluid minerals (oil, gas, geothermal resources) call Kermit Witherbee at (202) 452–0335. For questions about solid minerals, including coal, Durga Rimal at (202) 452–0372. If you require a telecommunications device for the deaf (TDD), you may call the Federal Information Relay Service at 1–800–877–8339 between 8:00 a.m. and 4:00 p.m. Eastern time, Monday through Friday, excluding Federal holidays.

SUPPLEMENTARY INFORMATION:

Electronic Access and Filing Address

You can view an electronic version of this proposed rule at BLM's Internet home page: www.blm.gov. You can also comment via the Internet at: WOComment@wo.blm.gov. Please include ''Attention: AC64'' and your name and return address in your Internet message. If you do not receive a confirmation from our system that we have received your Internet message, contact us directly at (202) 452–5030.

Written Comments

Written comments on the proposed rule should:

A. Be specific;

B. Be confined to issues pertinent to the proposed rule;

C. Explain the reason for any recommended change; and

D. Reference the specific section or paragraph of the proposal you are addressing.

The BLM may not necessarily consider or include in the Administrative Record for the final rule comments which BLM receives after the close of the comment period (See **DATES**) or comments delivered to an address other than those listed above (See **ADDRESSES**).

You can review comments, including names, street addresses, and other contact information of respondents at this address during regular business hours (7:45 a.m. to 4:15 p.m.), Monday through Friday, except Federal holidays. If you are an individual respondent you may request confidentiality. If you request that BLM consider withholding your name, street address, and other contact information (such as: Internet address, FAX or phone number) from public review or from disclosure under the Freedom of Information Act, you must state this prominently at the beginning of your comment. BLM will honor requests for confidentiality on a case-by-case basis to the extent allowed by law. BLM will make available for public inspection in their entirety all submissions from organizations or businesses, and from individuals identifying themselves as representatives or officials of organizations or businesses.

Dated: February 6, 2001.

Piet deWilt,

Acting Assistant Secretary, Land and Minerals Management.

[FR Doc. 01–3739 Filed 2–12–01; 8:45 am]

BILLING CODE 4310–84–P

FEDERAL COMMUNICATIONS COMMISSION

47 CFR Part 73

[MM Docket No. 00–39; FCC 01–24]

Broadcast Services; Radio Stations, Television Stations

AGENCY: Federal Communications Commission.

ACTION: Proposed rule.

SUMMARY: In this document, the Commission explores the issues and concerns raised by parties regarding DTV reception capability, and we propose to require that certain types of new television sets have the capability to demodulate and decode over-the-air DTV signals by a date certain. We also seek comment on how best to implement such a requirement, including alternatives for phasing-in DTV reception capability in a manner that would minimize costs for both manufacturers and consumers. Finally, we propose to adopt labeling requirements with respect to television receivers that are not capable of receiving over-the-air broadcast television signals but, instead, are intended for use only with cable television reception.

DATES: Comments are due by April 6, 2001; reply comments are due by May 7, 2001.

ADDRESSES: Federal Communications Commission, 445 12th Street, SW., Washington, DC. 20554.

FOR FURTHER INFORMATION CONTACT: Roger Holberg, or Mania Baghdadi, Mass Media Bureau, Policy and Rules Division, (202) 418–2120 or Alan Stillwell or Bruce Franca, Office of Engineering and Technology, (202) 418–2470.

SUPPLEMENTARY INFORMATION: This is a synopsis of the *Further Notice of Proposed Rule Making (''FNPRM'')* in MM Docket No. 00–39, FCC 01–24, adopted January 18, 2001, and released January 19, 2001. The complete text of this document is available for inspection and copying during normal business hours in the FCC Reference Center, Room CY–A257, 445 12th Street, SW., Washington, DC. and may also be purchased from the Commission's copy contractor, International Transcription Service (202) 857–3800, 445 12th Street, SW., Room CY–B402, Washington, DC. The *FNPRM* is also available on the Internet at the Commission's website: *http://www.fcc.gov*.

Synopsis of Further Notice of Proposed Rule Making

I. Background

1. In the Commission's digital television proceeding (MM Docket No. 87–268) we repeatedly indicated our intent to hold periodic reviews of the progress of the conversion to digital television and to make such mid-course corrections as were necessary to ensure the success of that conversion. In the *Fifth Report and Order,* 62 FR 26966, May 16, 1997 (''5R&O''), we stated that we would conduct such a review every two years. We commenced this, the first, periodic review, with a *Notice of Proposed Rule Making (''NPRM'')*, adopted March 6, 2000 (65 FR 15600, March 23, 2000). In that *NPRM* we stated that the conversion is progressing and that television stations are working hard to convert to digital television. We invited comment on several issues that we considered essential to be resolved in order to ensure that progress

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continued and that potential sources of delay were eliminated. In a *Report and Order (''R&O'')*, also adopted January 18, 2001, in this proceeding we resolved a number of issues raised in the initial *NPRM*. We also adopted this *FNPRM* in order to solicit comment on the issues of whether and, if so, how to implement a DTV receiver requirement, whether to require labels on all DTV receivers designed for use only with a signal source other than broadcast (*e.g.,* cable, DBS, *etc.*), and whether to update our current DTV standard to reflect amendments to the ATSC DTV Standard that have been made since we substantially incorporated that standard into our rules.

II. Discussion

2. In response to the *NPRM* in this proceeding, a number of parties have argued that the Commission should require digital reception capability in all receivers, aside from particular performance thresholds. Their comments also implicated the accurate identification and marketing of receivers with various capabilities. In addition, consumer advocates have complained that any requirement that all receivers contain digital reception capability places an undue burden on consumers, and particularly low-income consumers. These comments have raised pertinent questions on which we will seek further information and comment to develop a full record on the current pertinence of such recommendations.

3. *DTV Receiver Standards—DTV Demodulation Requirement.* The NAB and the NABA submit that the Commission should adopt rules requiring every new television receiver sold to include the capability to receive DTV signals. The NAB states that this requirement is needed because market forces are not working to effect DTV receiver penetration except at an extremely slow pace. It observes that current DTV receivers are not in the marketplace in great numbers and existing sales volume of DTV receivers will not support the timely conversion and recovery of spectrum envisioned by the Commission and Congress. The NAB and the NABA argue a requirement that new TV receivers be capable of tuning DTV channels is therefore needed to push the transition along quickly. They specifically propose that the Commission require all new television receivers thirteen inches and greater in diagonal screen size to be capable of receiving all frequencies allocated by the Commission to television broadcasting, including all NTSC and all DTV channels. Although the NAB and NABA conclude the increased burden on consumers is temporary and thus acceptable, other commenters have concluded otherwise. The Consumer Federation of America (CFA) argued that a tuner requirement would place a burden on consumers, especially low-income consumers who ''may potentially be priced out of the market. * * *'' CFA also stated that ''[w]ithout more programming it is clear that there will not be a timely and complete transition to digital television. * * *''

4. The NAB argues that the Commission has authority for such action under the All Channel Receiver Act (ACRA), and that there is precedent in the all channel television receiver rules. It observes that the *Senate Report* accompanying that legislation noted three points in favor of promoting UHF receivers that are equally applicable to DTV: (1) That this is a unique situation; (2) while there will be an increased cost, it is expected that this will be substantially reduced once the benefits of mass production are fully realized; and (3) in any event, the relatively slight increase in cost will be a small price to pay for the unlocking of the * * * valuable UHF channels. The NAB submits that there are obvious parallels to DTV. It states that the DTV process is a unique transition of the entire television system to digital technology. The NAB and NABA state that while the price the public will pay to purchase an all channel receiver will initially be higher, the costs of such receivers will fall substantially as production increases. And finally, they state that the higher costs will be a small price to pay for ''unlocking'' the valuable DTV channels and, in addition, unlocking the valuable NTSC channels to be returned for public benefit and use.

5. In addition, in their reply comments CEA and Thomson argue that the ACRA does not provide the Commission authority to require DTV tuners in every set. They argue that in passing the ACRA, Congress only intended to ensure the viability of UHF broadcasting and that it did not foresee or intend to accommodate new modes of broadcasting, particularly digital broadcasting. CEA further argues that Congress explicitly considered but rejected empowering the Commission generally to set receiver standards. Thomson argues that in the DTV proceeding, the Commission itself acknowledged the ACRA's narrow scope in this area when it found that the Act does not mandate the manufacture of so-called dual-mode receivers, *i.e.,* receivers capable of receiving both analog and DTV signals.

6. As NAB, NABA and other commenters observe, DTV receivers are not yet available in the market in large quantities, and certainly not in sufficient volume to support a rapid transition to an all-digital broadcast television service. We request comment on whether a requirement to include DTV reception capability in certain new television sets could help to develop the production volumes needed to bring DTV prices down to where they are more attractive to consumers and thereby promote the more rapid development of high DTV set penetration. In particular, we seek comment on whether we should require that certain types of TV sets have the capability to demodulate and decode over-the-air DTV signals. Under such a requirement, TV sets would have to provide useable picture and sound commensurate with their video display and audio capabilities when receiving any of the recognized ATSC video formats. Such a requirement would not necessitate full HDTV capability in TV sets. For example, a TV set that had only NTSC level display capabilities would only have to be able to demodulate and decode DTV signals and present them at a standard definition display level equivalent to its NTSC capabilities. This capability would reduce reliance on analog television transmissions. We are, however, concerned about the potential impact of such a requirement on consumers, especially low-income consumers. We therefore seek comment on the initial projected costs of such a requirement as well as realistic estimates of those costs over time. We also seek comment on consumer television receiver purchasing patterns, especially those of low-income consumers.

7. We request comment on how best to implement DTV reception capability requirements, if we were to adopt them. We recognize that consumer electronics manufacturers would need time to implement such a requirement. The cost of DTV receiver components is still relatively high and it would not be economically feasible at this point to include DTV capability in smaller screen receivers, *i.e.,* 20 inches or less. In this regard, we understand the cost considerations associated with including DTV reception capability in TV sets now, and do not wish to impose undue costs on consumers or disrupt TV set pricing structure or the availability of TV receivers to consumers. One approach to minimize the impact of such a requirement would be to phase it in over time to take advantage of declining costs associated with electronics manufacturing volumes and apply the requirement initially only to

receivers with large screen sizes, *e.g.,* 32 inches and above. Such receivers are typically higher priced units where the cost of DTV components would be a smaller percentage of the cost of a receiver. Each manufacturer would be required to include DTV capability in an increasing percentage of the large screen units it markets each year. For example, in the first year of the requirements, 20 percent or some other percentage of each manufacturer's large screen models would be required to have DTV receive capability and this percentage would increase on some schedule in subsequent years. Separate set-top DTV receiver could be included in meeting the reception capability requirements. As the costs of components decrease, the requirement for DTV reception capability could be applied to more units each year by reducing the threshold screen size and by increasing the portion of units that would have to comply. We seek comment on what would be an appropriate minimum screen size for an initial requirement and the schedule for extending such requirements to other receivers. We also request comment on the cost implications of DTV reception capability requirements for both consumers and manufacturers.

8. We further request comment on whether any DTV reception capability requirements we might adopt should be based on percentages of the models marketed by each manufacturer, rather than units of production. In addition, we invite interested parties to submit other plans that would result in new TV receivers being equipped with DTV capability that would result in widespread penetration of TV receivers in households to enable the transition from analog to digital TV service consistent with the intent of Congress in 47 U.S.C. 309(j)(14), and a discussion of the likely effectiveness of such alternative plans.

9. With regard to our authority to establish requirements for DTV receiver capabilities, we observe that 47 U.S.C. 303(s), as noted above, provides the Commission with authority to require that television receivers be capable of adequately receiving all frequencies allocated by the Commission to television broadcasting. While Congress in 1962 did not anticipate the advent of digital television service, a plain language reading of this section does not limit our authority to analog television receivers, nor does it limit our authority to channels in the UHF band. Inasmuch as the frequencies allocated to television broadcasting now include those channels allotted for DTV service, 47 U.S.C. 303(s) provides the Commission with authority to require that television receivers be capable of adequately receiving those channels. Moreover, the ACRA's legislative history suggests that Congress' reasoning in enacting the statute supports such a conclusion. We seek comment on how to construct any DTV tuner requirement consistent with any relevant statutory authority, including 47 U.S.C. 303(s) and any other relevant sections of the Communications Act.

10. *Receiver Labeling.* Turning to another issue concerning digital television receivers, we observe that television receivers could be marketed that do not have the capability to receive over-the-air broadcast signals. For example, receivers intended only for use in receiving cable or direct broadcast satellite service might not include the capability to tune over-the-air broadcast television signals. While we are not aware of any such receivers that are being marketed at this time, such devices would be permissible under our rules. In this regard, the all-channel reception provisions of 47 CFR 15.117(b) would not apply to receivers that did not have any capability for receiving broadcast signals. We expect that consumers will continue to expect that all digital television receivers will be able to receive over-the-air digital broadcast signals and that manufacturers therefore will continue to equip all television receivers with this capability. If, however, manufacturers do at some point chose to produce receivers that can be used with digital cable systems but cannot receive digital broadcast signals, we believe that consumers should be so notified prior to purchase. We therefore intend to explore this question and possible Commission responses. We seek comment on whether any manufacturers are producing or plan to produce digital television receivers that can receive digital cable transmissions but are incapable of receiving digital broadcast signals off-the-air. We also seek comment on whether the Commission should require any digital television receivers that cannot receive off-the-air digital broadcast signals to carry a label informing consumers of this limitation on the receivers' functionality. Parties supporting such a labeling requirement may wish to propose labels keeping in mind our goals of ease of understanding for consumers and low cost and ease of compliance for manufacturers.

11. *Update of the DTV Standard.* As indicated above, there has been an update to the ATSC DTV Standard since 1996, when we adopted it. When we incorporated most of the ATSC DTV Standard into our rules by reference, we made reference to the version of that Standard which was the most recent iteration of the Standard at that time. Specifically, we incorporated by reference ''ATSC Digital Television Standard, 16 Sep 95.'' However, as commenters noted, this standard has been updated since we incorporated it into our rules. Accordingly, we seek comment on whether we should revise our rules to include reference the March 16, 2000, amendment to the standard. Commenters favoring revision should specify whether we should refrain from incorporating any parts of this update, as we did with regard to the eighteen video format constraints in the original ATSC DTV Standard. Additionally, we specifically do not plan on considering in regard to updating the standard comments urging us to amend the standard with regard to its 8 VSB modulation component, or to fundamentally change the standard in any other way such as, for example, by prohibiting its use of interlaced scanning, changing the audio component of the standard, or altering its frame aspect ratios.

III. Conclusion

12. At the outset of this proceeding we stated that the conversion to digital is progressing and television stations are working hard to convert to DTV. The comments we received in response to the *NPRM* have mostly further confirmed our initial impressions. We believe that the conversion is, indeed, making progress and that the actions we are taking, and proposing, herein will hasten this transition. Particularly, our choice of an early channel election for commercial licensees and our decision not to require replication of NTSC service should well conduce to allowing stations to make plans and purchase equipment at the earliest practicable times. We believe that specific receiver performance standards are neither necessary nor useful at this time but we are inclined that a mandatory phase-in of a DTV reception capability in receivers will best ensure the rapid progress of the transition at a reasonable cost to consumers. We will continue to monitor the progress toward the DTV conversion and will in future reviews take those actions needed to accomplish a smooth transition by December 31, 2006.

IV. Administrative Matters

13. *Comments and Reply Comments.* Pursuant to 47 CFR 1.415, 1.419, interested parties may file comments on or before April 6, 2001, and reply comments on or before May 7, 2001. Comments may be filed using the

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Commission's Electronic Comment Filing System (ECFS) or by filing paper copies. *See Electronic Filing of Documents in Rulemaking Proceedings*, 63 FR 24,121 (1998).

14. Comments filed through ECFS can be sent as an electronic file via the Internet to *http://www.fcc.gov/e-file/ecfs.html*. Generally, only one copy of an electronic submission must be filed. In completing the transmittal screen, commenters should include their full name, Postal Service mailing address, and the applicable docket or rulemaking number. Parties may also submit an electronic comment via e-mail. To get filing instructions for e-mail comments, commenters should send an e-mail to *ecfs@fcc.gov*, and should include the following words in the body of the message, ''get form <your e-mail address>.'' A sample form and directions will be sent in reply.

15. Parties who choose to file by paper must file an original and four copies of each filing. All filings must be sent to the Commission's Secretary, Magalie Roman Salas, Office of the Secretary, Federal Communications Commission, 445 Twelfth Street, SW., TW–A325, Washington, DC 20554.

16. Parties who choose to file paper should also submit their comments on diskette. These diskettes should be addressed to: Wanda Hardy, Paralegal Specialist, Mass Media Bureau, Policy and Rules Division, Federal Communications Commission, 445 Twelfth Street, SW., 2–C221, Washington, DC 20554. Such a submission should be on a 3.5 inch diskette formatted in an IBM compatible format using Word 97 or compatible software. The diskette should be accompanied by a cover letter and should be submitted in ''read only'' mode. The diskette should be clearly labeled with the commenter's name, proceeding (including the lead docket number in this case (MM Docket No. 00–39), type of pleading (comment or reply comment), date of submission, and the name of the electronic file on the diskette. The label should also include the following phrase ''Disk Copy—Not an Original.'' Each diskette should contain only one party's pleadings, preferably in a single electronic file. In addition, commenters must sent diskette copies to the Commission's copy contractor, International Transcription Service, Inc., 445 Twelfth Street, SW., CY–B402, Washington, DC 20554.

17. Comments and reply comments will be available for public inspection during regular business hours in the FCC Reference Center, Federal Communications Commission, 445 Twelfth Street, SW., CY–A257, Washington, DC 20554. Persons with disabilities who need assistance in the FCC Reference Center may contact Bill Cline at (202) 418–0270, (202) 418–2555 TTY, or *bcline@fcc.gov*. Comments and reply comments also will be available electronically at the Commission's Disabilities Issues Task Force web site: *www.fcc.gov/dtf*. Comments and reply comments are available electronically in ASCII text, Word 97, and Adobe Acrobat.

18. This document is available in alternative formats (computer diskette, large print, audio cassette, and Braille). Persons who need documents in such formats may contact Martha Contee at (202) 4810–0260, TTY (202) 418–2555, or *mcontee@fcc.gov*.

19. *Ex Parte Rules.* This proceeding will be treated as a ''permit-but-disclose'' proceeding, subject to the ''permit-but-disclose'' requirements under 47 CFR 1.1206(b), as revised. *Ex parte* presentations are permissible if disclosed in accordance with Commission rules, except during the Sunshine Agenda period when presentations, *ex parte* or otherwise, are generally prohibited. Persons making oral *ex parte* presentations are reminded that a memorandum summarizing a presentation must contain a summary of the substance of the presentation and not merely a listing of the subjects discussed. More than a one or two sentence description or the views and arguments presented is generally required. *See* 47 CFR 1.1206(b)(2), as revised. Additional rules pertaining to oral and written presentations are set forth in section 47 CFR 1.1206(b).

20. *Initial Regulatory Flexibility Analysis.* With respect to this *FNPRM*, an Initial Regulatory Flexibility Analysis (IRFA) is contained. As required by the Regulatory Flexibility Act, *see* 5 U.S.C. 603, the Commission has prepared an IRFA of the possible economic impact on small entities of the proposals contained in this *FNPRM*. Written public comments are requested on the IRFA. Comments on the IRFA must be filed in accordance with the same filing deadlines as comments on the *FNPRM*, and must have a distinct heading designating them as a response to the IRFA.

21. As required by the Regulatory Flexibility Act (RFA), the Commission has prepared this present Initial Regulatory Flexibility Analysis (IRFA) of the possible significant economic impact on small entities by the policies and rules proposed in this *FNPRM*. Written public comments are requested on this IRFA. Comments must be identified as responses to the IRFA and must be filed by the deadlines for comments on the *FNPRM* provided above. The Commission will send a copy of the *FNPRM*, including this IRFA, to the Chief Counsel for Advocacy of the Small Business Administration (SBA). *See* 5 U.S.C. 603(a). In addition, the *FNPRM* and the IRFA (or summaries thereof) will be published in the **Federal Register**.

22. *Need for, and Objectives of, the Proposed Rules.* Beginning in 1987, the Commission undertook to bring the most up-to-date technology to broadcast television. That resulted in several Commission decisions including those adopting a digital television (DTV) standard, DTV service rules, and a Table of DTV Allotments. The Table of DTV Allotments provides each existing television broadcaster with a second channel on which to operate a DTV station for the transition period after which one of its channels will revert to the government for use in other services. The transition deadline established by Congress is December 31, 2006. The Commission is permitted to extend that deadline on a market-by-market basis if more than 15 percent of viewers will be left without service from (1) a digital television receiver; (2) an analog television receiver equipped with a digital/analog converter; or (3) a multi-channel video provider that carries local broadcast stations. The Commission is issuing this *FNPRM* to explore whether a requirement to include DTV reception capability in new television sets would help develop the production volumes needed to bring DTV receiver prices down quickly to where they are more attractive to consumers and thereby promote the more rapid development of high DTV set penetration, enabling compliance with the statutory transition deadline.

23. *Legal Basis.* This *FNPRM* is adopted pursuant to sections 1, 2(a), 4(i), 7, and 303 of the Communications Act, 47 U.S.C. 151, 152(a), 154(i), 157, and 303.

24. *Description and Estimate of the Number of Small Entities To Which the Proposed Rules Will Apply.* The RFA directs agencies to provide a description of, and, where feasible, an estimate of the number of small entities that may be affected by the proposed rules, if adopted. The RFA defines the term ''small entity'' as having the same meaning as the terms ''small business,'' ''small organization,'' and ''small governmental jurisdiction.'' In addition, the term ''small business'' has the same meaning as the term ''small business concern'' under section 3 of the Small Business Act. A small business concern is one which: (1) Is independently

owned and operated; (2) is not dominant in its field of operation; and (3) satisfies any additional criteria established by the SBA.

25. Pursuant to 5 U.S.C. 601(3), the statutory definition of a small business applies ''unless an agency, after consultation with the Office of Advocacy of the [SBA] and after opportunity for public comment, establishes one or more definitions of such term which are appropriate to the activities of the agency and publishes such definition(s) in the **Federal Register**.'' A ''small organization'' is generally ''any not-for-profit enterprise which is independently owned and operated and is not dominant in its field.'' Nationwide, as of 1992, there were approximately 275,801 small organizations. ''Small governmental jurisdiction'' generally means ''governments of cities, counties, towns, townships, villages, school districts, or special districts with a population of less than 50,000.'' As of 1992, there were approximately 85,006 local governments in the United States. This number includes 38,978 counties, cities, and towns; of these, 37,566, or 96 percent, have populations of fewer than 50,000. The Census Bureau estimates that this ratio is approximately accurate for all governmental entities. Thus, of the 85,006 governmental entities, we estimate that 81,600 (91 percent) are small entities.

26. Rules adopted in this proceeding could apply to manufacturers of DTV receiving equipment and, particularly, television receivers. The SBA has developed a definition of small entity for manufacturers of household audio and video equipment (SIC 3651). This includes all such companies employing 750 or fewer employees. The Commission has not developed a definition of small entities applicable to manufacturers of electronic equipment used by consumers, as compared to industrial use by television licensees and related businesses. Therefore, we will utilize the SBA definition applicable to manufacturers of Household Audio and Visual Equipment. According to the SBA's regulations, a household audio and visual equipment manufacturer must have 750 or fewer employees in order to qualify as a small business concern. Census Bureau data indicate that there are 410 U.S. firms that manufacture radio and television broadcasting and communications equipment, and that 386 of these firms have fewer than 500 employees and would be classified as small entities. The remaining 24 firms have 500 or more employees; however, we are unable to determine how many of those have fewer than 750 employees and therefore, also qualify as small entities under the SBA definition. Furthermore, the Census Bureau category is very broad and specific figures are not available as to how many of these firms are exclusive manufacturers of television equipment, and particularly television receivers, for consumers or how many are independently owned and operated. We conclude that there are approximately 386 small manufacturers of television equipment for consumer/household use but, in any even, no more than 410 are small entities.

27. *Description of Projected Reporting, Recordkeeping, and Other Compliance Requirements.* At this time, we do not expect that the proposed rules would impose any additional recordkeeping or recordkeeping requirements. However, compliance may require the manufacture of some types of DTV capable receivers. While this would have an impact on manufacturers of television receivers, it will be similarly costly for both large and small manufacturers and, in any event, the cost will ultimately be borne by the consumer. We seek comment on whether others perceive a need for extensive recordkeeping.

28. *Steps Taken to Minimize Significant Impact on Small Entities, and Significant Alternatives Considered.* The RFA requires an agency to describe any significant alternatives that it has considered in reaching its proposed approach, which may include the following four alternatives (among others): (1) The establishment of differing compliance or reporting requirements or timetables that take into account the resources available to small entities; (2) the clarification, consolidation, or simplification of compliance or reporting requirements under the rule for small entities; (3) the use of performance, rather than design, standards; and (4) an exemption from coverage of the rule, or any part thereof, for small entities.

29. The *FNPRM* recognizes that if the Commission were to require DTV reception capability in new television receivers that action would pose new burdens on consumer electronics manufacturers, especially in the initial period when production volumes are relatively low. The *FNPRM* further observes that the cost considerations associated with DTV reception capability are such that it could not be economically feasible at this point in time to include DTV capability in smaller screen receivers, *i.e.,* 20 inches or less. We believe that as production increases, the price and size of the components needed for DTV reception will decline substantially, so that the incremental cost of including that capability in TV receivers will eventually become low. In addition, as the goal of this effort is to convert broadcast television service to digital operation, all television receivers will have to be able to receive DTV service at the end of the transition.

30. In order to minimize the impact of a DTV reception capability requirement on manufacturers, if the Commission were to conclude that one were needed, the *FNPRM* suggests a plan by which the requirement would first apply to receivers with large screen sizes, *i.e.,* 32 inches or larger. Larger screen receivers generally are more expensive units, so that the additional cost of manufacturing them with DTV capability would be a much lower percentage of the total cost than it would for smaller screen units. As discussed, the requirement would apply to only a small portion of larger screen receivers at first; over time the percentage of units that would have to have DTV reception capability would increase and the requirement would also be extended to smaller screen units in the same incremental manner. To minimize the impact on manufacturers, receivers would only be required to have the capability to receive and decode over-the-air DTV signals. Thus, TV sets subject to the requirement would only have to provide useable picture and sound commensurate with their video and sound capabilities when receiving any of the recognized ATSC video formats. The requirement as proposed would not mandate full HDTV capability in TV sets. We also requested comment on whether we should base a requirement on percentages of the models marketed by each manufacturer, rather than units of production. This should benefit small entities by allowing them to provide DTV capability in their larger receivers, with a higher profit margin, rather than requiring them to provide such capability across their product line including sets where the market is more price conscious and price sensitive.

31. The *FNPRM* also solicits comment on a proposal to require receiver manufacturers to label as such television sets that are not capable of receiving over-the-air DTV broadcasts but which, instead are intended for digital use only in conjunction with cable television and/or broadcast satellite reception. This proposed requirement is intended to provide the consuming public with easily understandable information concerning

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the capabilities of the receivers being purchased.

32. The principal alternatives for minimizing the impact of the transition on manufacturers include plans that would relax the schedule for the percentages of units required to comply. The *FNPRM* requests comments on this proposal and also invites interested parties to submit alternatives. The labeling proposal will be made as simple and inexpensive to comply with as possible to minimize the impact on small entity producers. Comments on how it may be made even simpler are solicited.

33. Federal Rules that May Duplicate, Overlap, or Conflict With the Proposed Rules. None.

34. *Initial Paperwork Reduction Act Analysis.* This *FNPRM* may contain either proposed or modified information collections. As part of our continuing effort to reduce paperwork burdens, we invite the general public to take this opportunity to comment on the information collections contained in this *FNPRM,* as required by the Paperwork Reduction Act of 1996. Public and agency comments are due at the same time as other comments on the *FNPRM.* Comments should address: (a) whether the proposed collection of information is necessary for the proper performance of the functions of the Commission, including whether the information shall have practical utility; (b) ways to enhance the quality, utility, and clarity of the information collected; and (c) ways to minimize the burden of the collection of information on the respondents, including the use of automated collection techniques or other forms of information technology. In addition to filing comments with the Secretary, a copy of any comments on the information collections contained herein should be submitted to Judy Boley, Federal Communications Commission, 445 Twelfth Street, SW., Room C–1804, Washington, DC 20554, or via the Internet to *jboley@fcc.gov* and to Edward C. Springer, OMB Desk Officer, 10236 NEOB, 725 17th Street, NW., Washington, DC 20503 or via the Internet to *Edward.Springer@omb.eop.gov.*

II. Ordering Clauses

35. Pursuant to the authority contained 47 U.S.C. 151, 152(a), 154(i), 157 and 303, this *FNPRM* is adopted.

36. The Commission's Consumer Information Bureau, Reference Information Center, shall send a copy of this *FNPRM,* including the Initial Regulatory Flexibility Analysis, to the Chief Counsel for Advocacy of the Small Business Administration.

Federal Communications Commission.

Shirley Suggs,

Chief, Publications Branch.

[FR Doc. 01–3638 Filed 2–12–01; 8:45 am]

BILLING CODE 6712–01–P

Notices

Federal Register
Vol. 66, No. 30
Tuesday, February 13, 2001

This section of the FEDERAL REGISTER contains documents other than rules or proposed rules that are applicable to the public. Notices of hearings and investigations, committee meetings, agency decisions and rulings, delegations of authority, filing of petitions and applications and agency statements of organization and functions are examples of documents appearing in this section.

DEPARTMENT OF AGRICULTURE

Forest Service

Bitterroot Fires 2000: Post-Fire Recovery Environmental Impact Statement

AGENCY: Forest Service, USDA.

ACTION: Notice of intent to prepare an Environmental Impact Statement.

SUMMARY: The Bitterroot National Forest experienced a fire season of historic proportions in 2000. Wildfires burned 307,000 acres on the Bitterroot National Forest and 49,000 acres on private and State lands in Ravalli County, Montana during the summer of 2000. The fires destroyed 70 homes, 2 commercial properties, and 167 outbuildings. Much of the burn occurred in the low elevation warm, dry ponderosa pine/Douglas-fir forest type which occurs along much of the wildland urban interface. Due to high fuel loads prior to the fires, these warm, dry forest types burned at severities well outside their historic range. As a result of the fires, fuel loads are expected to increase dramatically over the next several decades as thousands of fire-killed trees fall over and accumulate on the forest floor. Much of this fuel build-up will occur in the wildland urban interface, setting the stage for future fires that could threaten life, homes, improvements, and property. The Department of Agriculture, Forest Service, will prepare an Environmental Impact Statement (EIS) to reduce fuels, improve watershed and aquatic conditions, revegetate burned landscapes, and improve forest health on the Montana portion of the Bitterroot National Forest. The Record of Decision will disclose how the forest Service plans to treat fuels on an estimated 60,000 burned acres (about 20% of the burned acres on the Montana portion of the forest, excluding wilderness) using a variety of methods, including commercial timber sales, non-commercial thinning, piling, and burning, prescribed fire, and stewardship contracts. The priority areas for fuel reduction work would be the burned portion of the wildland urban interface, in warm dry forest communities, and selected areas where reforestation is proposed. The Record of Decision will also disclose how watershed and aquatic health will be improved by implementing drainage improvement measures on approximately 400 roads in the burned area. Treatments would include reconstructing existing open roads to meet Best Management Practices (BMP) standards, and decompacting, recontouring, and restoring the natural drainage pattern on certain closed roads which are not needed for future public or management access. Fisheries would be improved in the burned drainages by removing man-made barriers that currently fragment native fish populations, and adding woody debris to streams which lacked woody material prior to the fires. Tree seedlings would be planted on approximately 24,000 acres where natural regeneration is not expected to meet desired species composition and tree stocking levels. The Bitterroot National Forest Land and Resource Management Plan (Forest Plan) has a Forest-wide standard that states ''All snags that do not present an unacceptable safety risk will be retained''. The Forest Plan is proposed to be amended specifically for this project to allow cutting snags that do not represent an unacceptable safety risk. This project may require additional site-specific amendments to the Bitterroot Forest Plan. A range of alternative responsive to significant issues will be developed, including a no-action alternative.

DATES: Comments concerning the scope of this project should be received by the Sula Ranger District, Bitterroot National Forest by March 15, 2001.

ADDRESSES: Please send written comments to: Sula Ranger District, Bitterroot National Forest; Attn: Post-Fire Recovery EIS; 7338 Highway 93 South; Sula, MT 59871.

FOR FURTHER INFORMATION CONTACT: Craig Bobzien, Darby/Sula District Ranger, telephone: (406) 821–3201, or Stuart Lovejoy, Post-Fire Recovery EIS Team Leader, Sula Ranger District, 7338 Highway 93 South, Sula, MT 59871, telephone (406) 821–3201, email: *slovejoy@fs.fed.us.*

SUPPLEMENTARY INFORMATION: Public participation will be an integral component of the study process, and will be especially important at several points during the analysis. The first is during the scoping process. The Forest Service will be seeking information, comments and assistance from federal, State, County, and local agencies, individuals and organizations that may be interested in or affected by the proposed activities. The scoping process will include: (1) Identification of potential issues, (2) identification of issues to be analyzed in depth, and (3) elimination of insignificant issues or those which have been covered by a previous environmental review. Written scoping comments will be solicited through a scoping package that will be sent to the project mailing list and local newspapers. For the Forest Service to best use the scoping input, comments should be received by March 15, 2001. Preliminary issues identified for analysis in the EIS include the potential effects and relationship of the project to fire hazard reduction, water quality, fisheries and reparian areas, wildlife habitat, soil productivity, recreation, motorized access, scenery, heritage resources, sensitive plants, and benefits/costs of the proposed activities.

Based on the results of scoping and the resource conditions within the project area, alternatives (including a no-action alternative) will be developed for the draft EIS. The draft EIS is projected to be filed with the Environmental Protection Agency (EPA) in May 2001. The final EIS is anticipated in September 2001.

The comment period on the draft EIS will be 45 days from the date that the EPA publishes the notice of availability in the **Federal Register**.

At this early stage, the Forest Service believes it is important to give reviewers notice of several court ruling related to public participation in the environmental review process. First, reviewers of draft EIS's must structure their participation in the environmental review of the proposal, so that it is meaningful and alerts an agency to the reviewer's position and contentions. *Vermont Yankee Nuclear Power Corp.* v. *NRDC,* 435 U.S. 519, 553 (1978). Also, environmental objections that could have been raised at the draft EIS stage,

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but that are not raised until the completion of the final EIS, may be waived or dismissed by the court. *City of Angoon* v. *Hodel,* 803 F.2nd 1016, 1022 (9th Cir. 1986) and *Wisconsin Heritages, Inc.* v. *Harris,* 490 F. Supp. 1334, 1338 (E.D. Wis. 1980). Because of these court rulings, it is very important that those interested in this proposed action participate by the close of the 45-day comment period on the draft EIS, so that substantive comments and objections are made available to the Forest Service at a time when they can be meaningfully considered and respond to them in the final EIS.

To assist the Forest Service in identifying and considering issues and concerns of the proposed action, comments on the draft EIS should be as specific as possible. It is also helpful if comments refer to specific pages or chapters of the draft statement. Comments may address the adequacy of the draft EIS, or the merits of the alternatives formulated and discussed in the statement. Reviewers may wish to refer to the Council on Environmental Quality Regulations for implementing the procedural provisions of the National Environmental Policy Act in 40 CFR 1503.3, in addressing these points.

Permits/Authorizations: The proposed action will require one or more site-specific amendments to the Bitterroot Forest Plan. Rodd Richardson, Forest Supervisor, Bitterroot National Forest, is the responsible official for the Plan amendments.

Responsible Official: Rodd Richdardson, Forest Supervisor, Bitterroot National Forest, is the responsible official. In making the decision, the responsible official will consider the comments; responses; disclosure of environmental consequences; and applicable law, regulations, and policies. The responsible official will state the rationale for the chosen alternative in the Record of Decision.

Dated: February 2, 2001.

Rodd Richardson,

Forest Supervisor.

[FR Doc. 01–3592 Filed 2–12–01; 8:45 am]

BILLING CODE 3410–11–M

DEPARTMENT OF AGRICULTURE

Forest Service

Bar T Bar and Anderson Springs Allotment Management Plan EIS Southwestern Region, Arizona, Coconino County, Coconino National Forest

AGENCY: Forest Service, USDA.

ACTION: Notice of intent to prepare an environmental impact statement.

SUMMARY: The Coconino National Forest is planning to prepare an Environmental Impact Statement on a proposal to issue term grazing permits and develop allotment management plans for the next 10 years for the Bar T Bar and Anderson Springs Allotments, an area encompassing approximately 229,562 acres of National Forest System lands on the Blue Ridge and Mormon Lake Ranger Districts of the Coconino National Forest, Coconino County, Arizona. The purpose of the proposal is to analyze the effects of livestock grazing, coordinate livestock management with other resource needs, decrease canopy densities in pinyon-juniper and ponderosa pine vegetation types in historical grasslands, improve habitat conditions for pronghorn antelope, increase cool season plants, and to revise the allotment management plans (AMP's) for the Bar T Bar and Anderson Springs Allotments.

DATES: Comments in response to this Notice of Intent concerning the scope of the analysis should be received in writing on or before March 15, 2001.

ADDRESSES: Send written comments to USDA Forest Service, Coconino National Forest, Larry Sears, District Ranger, Mogollon Rim Center, HC 31, Box 212, Happy Jack, AZ 86024. Electronic mail may be sent to ehumphrey@fs.fed.us. See the **SUPPLEMENTARY INFORMATION** section for additional information about electronic mailing.

Responsible Official: Jim Golden, the Forest Supervisor of the Coconino National Forest, Supervisor's Office, 2323 E. Greenlaw Lane, Flagstaff AZ 86004, will decide what actions are most appropriate for Bar T Bar and Anderson Springs Allotment Management Plan EIS.

FOR FURTHER INFORMATION CONTACT: Beth Humphrey, Project Leader, (520) 477–2255.

SUPPLEMENTARY INFORMATION: The Forest Service proposes to revise the allotment management plans on the Bar T Bar and Anderson Springs Allotments on the Blue Ridge and Mormon Lake Ranger Districts.

The environmental analysis process for these allotments was initiated on January 4, 1999. The Diablo Trust, an incorporated non-profit land management collaborative team in the Flagstaff, Arizona area, developed the proposed action. The proposed action was adopted by the Forest Service to be taken through the National Environmental Policy Act procedures. An Interdisciplinary Team of Forest Service resource specialists was selected based on proposed management practices, current uses, and anticipated concerns with management of these allotments.

The proposed action proposes to issue term grazing permits on the Bar T Bar and Anderson Springs Allotments. Permitted livestock numbers would be 18,050 Head Months on the Bar T Bar Allotment and 6,036 Head Month's on the Anderson Springs Allotment. This plan focuses on the use of plant recovery and timing of grazing and rest to achieve goals, rather than setting utilization limits. Planned livestock grazing would be used to meet management objectives and to provide for maximum flexibility to meet resource needs. Collaboration between the Forest Service, the Diablo Trust, the permittees, Arizona State Lands Department, Arizona Game and Fish Department, and Coconino County is emphasized in meeting desired conditions for the area. The livestock grazing strategy on the Bar T Bar Allotment would use a combination of rest rotation and deferred rotation grazing with a season of use from approximately May through October each year. The livestock grazing strategy on the Anderson Springs Allotment would be a combination of deferred rest-rotation and time-controlled grazing from approximately June through October each year.

Grassland restoration and maintenance treatments are proposed on 63,730 acres in pinyon-juniper woodland and ponderosa pine vegetation types using a variety of treatment methods. These treatments are proposed to restore and maintain native grasslands, increase plant cover and litter, improve soil conditions, provide for wildlife movements, and increase plant diversity, especially in cool season species. Approximately 61.6 miles of new fencing, 19.8 miles of fence removal, 3.74 miles of fence reconstruction, and 8.95 miles of fence replacement are proposed which would split large pastures, provide for improved livestock distribution, provide for increased pasture rest, and increase efficiency in livestock management. Five new stock ponds are proposed, as

well as reconstriction of two existing water developments. Existing fences would be upgraded to wildlife specifications. Approximately 19.0 miles of road maintenance and reconstruction is proposed.

During the public comment period on the Proposed Action, issues were raised that resulted in the development of additional alternatives to the Proposed Action. The alternatives differ in the type of grazing strategy used, utilization levels, permitted numbers of livestock, location and type of vegetation treatments, amount and type of structural improvements, and levels of monitoring proposed. The alternatives are briefly described below.

• *No Action (Continue Current Management)*—The current livestock grazing strategy and permitted numbers would continue for the next ten years. A new 10-year term grazing permit would be issued for both allotments and a new allotment management plan would be written. No new actions would be planned.

• *No Grazing*—No livestock grazing would be allowed for the next 10-year period. Term Grazing Permits would not be issued for either allotment. No new actions would be planned.

• *Proposed Action*—The actions proposed above would be implemented.

• *Rest Rotation Grazing Strategy with Least Fencing*—The current livestock grazing strategy on the Anderson Springs Allotment would be changed to a rest-rotation system. Permitted livestock numbers would be reduced on both allotments and maximum allowable utilization levels would be reduced. No new fencing would be constructed on the Anderson Springs Allotment, and new fencing proposed on the Bar T Bar Allotment would be reduced to half that of the proposed action. A riparian pasture would be constructed around Soldier Annex Lake. Five study plots would be constructed to provide information about pronghorn antelope habitat. No road maintenance is proposed. Vegetation treatments would be modified, with approximately 50,615 acres of grassland restoration and maintenance proposed. Water developments would remain the same as proposed in the Proposed Action.

• *Modified Proposed Action (Remapping)*—The proposed action would be implemented as described above, with the following exceptions. Mapping changes resulted in a reduction in the proposed vegetation treatments to approximately 50,615 acres. A riparian pasture would be constructed around Soldier Annex Lake. Five pronghorn antelope study plots would be constructed. The livestock grazing strategy would be the same as proposed in the Proposed Action, with the same permitted livestock numbers. A range of maximum utilization levels would be set for both allotments. Fences, water developments, and road and trail maintenance would be the same as in the Proposed Action.

Decision To Be Made

The Coconino National Forest Supervisor is the Deciding Official for this project. He will decide what actions are most appropriate for managing the Bar T Bar and Anderson Springs Allotments for the next 10 years. The Forest Supervisor may select any of the management alternatives presented, or may select a management alternative that is different or includes portions of these alternatives. If a livestock grazing alternative is selected, the Forest Supervisor's decision will include the maximum permitted number of livestock for these allotments, the grazing strategy to use, and the number and type of range structural and non-structural improvements. He will also approve the monitoring plan and authorize a 10-year Term Permit for livestock grazing on this allotment.

Preliminary Issues

Issues identified previous scoping efforts included effects of the proposed action on habitat for pronghorn antelope on Anderson Mesa, concern with livestock numbers on both allotments, the use of time-controlled grazing in some areas on the Anderson Springs Allotment, and the economics of implementing the Proposed Action.

Public Involvement, Rationale, and Public Meetings

In April 1999, a scoping letter summarizing the proposed action was sent out to a mailing list of approximately 700 interested individuals. This letter invited public comment for a period of 30 days. The Proposed Action was also made available through the Diablo Trust's website and copies of the proposed action and scoping letter were placed at several locations in the Flagstaff area, as well as at the Blue Ridge District Office and Happy Jack Visitor Center. Additional public comments were received after the initial comment period and have been accepted throughout the analysis period. An open house was held on April 21, 1999 to familiarize the public with the Proposed Action and to solicit public comments. comments received during this scoping period have already been incorporated into the analysis.

While public participation in this analysis is welcome at any time, comments received within 30 days of the publication of this notice will be especially useful in the preparation of the draft and final EIS.

Electronic Access and Filing Addresses

Comments may be sent by electronic mail (e-mail) to *ehumphrey@fs.fed.us.* Please reference the Bar T Bar and Anderson Springs Allotment Management Plan EIS on the subject line. Please include your name and physical mailing address with your comments so documents pertaining to this project may be mailed to you.

Estimated Dates for Filing

The Draft EIS is expected to be filed with the Environmental Protection Agency (EPA) and to be available for public review in March 2001. At that time, EPA will publish a Notice of Availability of the draft EIS in the **Federal Register**. The comment period on the draft EIS will be 45 days from the date the EPA publishes the Notice of Availability. It is very important that those interested in the management of this area participate at that time.

The final EIS is scheduled to be completed by July 2001. In the final EIS, the Forest Service is required to respond to comments and responses received during the comment period that pertain to the environmental consequences discussed in the draft EIS and applicable laws, regulations, and policies considered in making a decision regarding the proposal.

The Reviewers Obligation To Comment

The Forest Service believes it is important to give reviewers notice at this early stage of several court rulings related to public participation in the environmental review process. First, reviewers of draft environmental impact statements must structure their participation in the environmental review of the proposal so that is meaningful and alerts an agency to the reviewer's position and contentions. *Vermont Yankee Nuclear Power Corp.* v. *NRDC,* 435 U.S. 519, 553 (1978). Also, environmental objections that could be raised at the draft environmental impact statement stage but that are not raised until after completion of the final environmental impact statement may be waived or dismissed by the courts. *Wisconsin Heritages, Inc.* v. *Harris,* 490 F. Supp. 1334, 1338 (*E.D. Wis. 1980).* Because of these court rulings, it is very important that those interested in this proposed action participate by the close of the 45-day comment period so that substantive comments and objections

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are made available to the Forest Service at a time when it can meaningfully consider them and respond to them in the final environmental impact statement.

To assist the Forest Service in identifying and considering issues and concerns on the proposed action, comments on the draft environmental impact statement should be as specific as possible. It is also helpful if comments refer to specific pages or chapters of the draft statement. Comments may also address the adequacy of the draft environmental impact statement or the merits of the alternatives formulated and discussed in the statement. Reviewers may wish to refer to the Council on Environmental Quality Regulations for implementing the procedural provisions of the national Environmental Policy Act at 40 CFR 1503.3 in addressing these points.

The Forest Service believes, at this early stage, it is important to give reviewers notice of several court rulings related to public participation in the environmental review process. To be the most helpful, comments on the draft environmental impact statement should be as specific as possible and may address the adequacy of the statement or the merits of the alternatives discussed (see Council of Environmental Quality Regulations for implementing the procedural provisions of the National Environmental Policy Act at 40 CFR 1503.3).

In addition, Federal court decisions have established that reviewers of draft environmental impact statements must structure their participation in the environmental review of the proposal so that it is meaningful and alerts an agency to the reviewers' position and contentions. *Vermont Yankee Nuclear Power Corp.* v. *NRDC,* 435 US 519, 553 (1978), Environmental objections that could have been raised at the draft stage may be waived if not raised until after completion of the final environmental impact statement. *City of Angoon* v. *Hodel,* 9th Circuit, 1986) and *Wisconsin Heritages, Inc.* v. *Harris,* 490 F. Supp.1334, 1338 (E.D. Wis. 1980). The reason for this is to ensure that substantive comments and objections are made available to the Forest Service at a time when it can meaningfully consider them in the final environmental impact statement.

To assist the Forest Service in identifying and considering issues and concerns on the proposed action, comments on the draft environmental impact statement should be as specific as possible. It is also helpful if comments refer to specific pages or chapters of the draft statement. Comments may also address the adequacy of the draft environmental impact statement or the merits of the alternatives formulated and discussed in the statement. Reviewers may wish to refer to the Council on Environmental Quality Regulations for implementing the procedural provisions of the National Environmental Policy Act at 40 CFR 1503.3 in addressing these points.

Dated: February 7, 2001.

Karyl Georgio,

Acting Forest Supervisor.

[FR Doc. 01–3591 Filed 2–12–01; 8:45 am]

BILLING CODE 3410–11–M

DEPARTMENT OF COMMERCE

Foreign-Trade Zones Board

[Docket No. 67–2000]

Foreign-Trade Zone 115—Beaumont, TX; Application for Expansion; Amendment of Application—Sun Pipe Line Facility

Notice is hereby given that the application by the Foreign-Trade Zone of Southeast Texas, Inc., grantee of Foreign-Trade Zone 115, requesting authority to expand its zone to include a petroleum terminal in Nederland (Jefferson County), Texas, (65 FR 77560, 12/12/00), has been amended to include nine petroleum product storage tanks within the tank farm area of the proposed expansion site. The nine tanks are currently part of Subzone 116B, Site 4 (Fina). This proposal would remove them from Subzone 116B and include them within Zone 115.

The application remains otherwise unchanged.

The comment period is reopened until February 21, 2001.

Dated: February 7, 2001.

Dennis Puccinelli,

Executive Secretary.

[FR Doc. 01–3639 Filed 2–12–01; 8:45 am]

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DEPARTMENT OF COMMERCE

Foreign-Trade Zones Board

[Docket 8–2001]

Foreign-Trade Zone 122—Corpus Christi, TX Application for Subzone Status International Resistive Company Plant (Resistors), Corpus Christi, Texas

An application has been submitted to the Foreign-Trade Zones Board (the Board) by the Port of Corpus Christi Authority, grantee of FTZ 122, requesting special-purpose subzone status for the electronic resistor manufacturing plant of International Resistive Company (IRC) (a subsidiary of TT Group PLC, of the United Kingdom), located in Corpus Christi, Texas. The application was submitted pursuant to the provisions of the Foreign-Trade Zones Act, as amended (19 U.S.C. 81a–81u), and the regulations of the Board (15 CFR Part 400). It was formally filed on February 6, 2001.

The IRC plant (8 acres/129,000 sq. ft./320 employees) is located 4222 South Staples Street, Corpus Christi, Texas. The facility is used to produce electronic resistors (HTSUS# 8533.29.0000, 8533.40.8000) for export and the domestic market. The production process involves design, assembly, testing, and warehousing. Components purchased from abroad (representing 50 to 65% of overall value) include: silicone adhesive, resistor leads, and copper conductors (duty rate range: 1–10%).

FTZ procedures would exempt IRC from Customs duty payments on the foreign components used in export production (1% of shipments). On its domestic sales, the company would be able to choose the duty rate that applies to finished resistors (duty free) for the foreign inputs noted above. No local inventory tax exemption is included as a proposed benefit. The application indicates that subzone status would help improve the plant's international competitiveness.

In accordance with the Board's regulations, a member of the FTZ Staff has been designated examiner to investigate the application and report to the Board.

Public comment on the application is invited from interested parties. Submissions (original and three copies) shall be addressed to the Board's Executive Secretary at the address below. The closing period for their receipt is April 16, 2001. Rebuttal comments in response to material submitted during the foregoing period may be submitted during the subsequent 15-day period (to April 30, 2001).

A copy of the application and the accompanying exhibits will be available for public inspection at each of the following locations:

Office of the Port Director, U.S. Customs Service-Corpus Christi, Room 305, 400 Mann Street, Corpus Christi, TX 78401.

Office of the Executive Secretary, Foreign-Trade Zones Board, U.S. Department of Commerce, Room 4008, 14th Street & Constitution Avenue, NW, Washington, DC 20230–0002.

Dated: February 6, 2001.

Dennis Puccinelli,

Executive Secretary.

[FR Doc. 01–3640 Filed 2–12–01; 8:45 am]

BILLING CODE 3510–DS–P

FEDERAL TRADE COMMISSION

DEPARTMENT OF COMMERCE

National Telecommunications and Information Administration

Request for Comment and Notice of Public Workshop: Electronic Signatures in Global and National Commerce Act

AGENCIES: Federal Trade Commission, and the National Telecommunications and Information Administration, Department of Commerce.

ACTION: Notice requesting public comment and academic papers and announcing public workshop.

SUMMARY: Section 105(b) of the Electronic Signatures in Global and National Commerce Act (''ESIGN'' or ''the Act''), Public Law 106–229, 114 Stat. 464 (2000), requires the Federal Trade Commission (''FTC'' or ''the Commission'') and the Secretary of Commerce to study and report to Congress on the benefits and burdens of requiring consumer consent to receive information electronically pursuant to § 101(c)(1)(C)(ii). In connection with preparing this report, the FTC and the National Telecommunications and Information Administration (''NTIA'') seek public comment and academic papers and plan to hold a public workshop to inform this study.

DATES: Written comments and papers are requested to be submitted on or before March 16, 2001. The workshop will be held on April 3, 2001, from 8:30 a.m. until 5:00 p.m., at the Federal Trade Commission, 600 Pennsylvania Avenue, NW., Washington, DC 20580.

ADDRESSES: Six hard copies of each written comment or paper should be submitted to: Secretary, Federal Trade Commission, Room H–159, 600 Pennsylvania Ave., NW., Washington, DC 20580. An additional copy of written comments should be sent to: Sallianne Fortunato, National Telecommunications and Information Administration, Room 4716, 14th Street and Constitution Avenue, NW., Washington, DC 20230. Alternatively, comments and papers may be submitted to the following email addresses: ''*esign-study@ftc.gov*'' and ''esign-study@ntia.doc.gov.'' The content of any comments or papers submitted by email should be organized in sequentially numbered paragraphs. All submissions should be captioned ''ESIGN Study-Comment P004102.''

To enable prompt review and accessibility to the public, written comments and papers also should be submitted to the FTC, if possible, in electronic form, on a 3½ inch computer disk, with a label stating the name of the person or entity submitting the comment and the name and version of the word processing program used to create the document. Programs based on DOS or Windows are preferred. Files from other operating systems should be submitted in ASCII text format. Individual members of the public filing comments need not submit multiple copies or comments in electronic form.

Written comments and papers will be available for public inspection in accordance with the Freedom of Information Act, 5 U.S.C. 552, and Commission regulations, 16 CFR 4.9, on normal business days between the hours of 8:30 a.m. and 5:00 p.m. at Room 130, Federal Trade Commission, 600 Pennsylvania Avenue, NW., Washington, DC 20580. The Commission will make this notice and, to the extent possible, all comments or papers received in electronic form in response to this notice available to the public through the Internet at the following addresses: *http://www.ftc.gov and http://www.ntia.doc.gov.*

FOR FURTHER INFORMATION: For questions about this request for comment and academic papers and notice of public workshop, contact: April Major, Attorney, Division of Marketing Practices, Bureau of Consumer Protection, Federal Trade Commission, 600 Pennsylvania Avenue, NW., Washington, DC 20580, telephone 202–326–2972; Marianne Schwanke, Attorney, Division of Marketing Practices, Bureau of Consumer Protection, Federal Trade Commission, 600 Pennsylvania Avenue, NW., Washington, DC 20580, telephone 202–326–3165; or Sallianne Fortunato, Telecom Policy Analyst, Office of Policy Analysis and Development, National Telecommunications and Information Administration (NTIA), Room 4716, U.S. Department of Commerce, 14th Street and Constitution Avenue, NW., Washington, DC 20230, telephone 202–482–1880.

SUPPLEMENTARY INFORMATION:

I. Background: Electronic Signatures in Global and National Commerce Act

On June 30, 2000, Congress enacted ESIGN to facilitate the use of electronic records and signatures in interstate or foreign commerce and to remove uncertainty about the validity of contracts entered into electronically. Under the Act, businesses that are required to provide or make available information to consumers in writing may provide consumers with that information using electronic records only if the consumer affirmatively consents in a manner that reasonably demonstrates the consumer's ability to access the electronic record. The Act requires the Secretary of Commerce and the Federal Trade Commission to study the burdens and benefits of this specific consent requirement on consumers and electronic commerce and submit a report to Congress by June 30, 2001.

II. Statutory Language Requiring a Report to Congress

The statutory language requiring the Secretary of Commerce and the Federal Trade Commission to submit a report to Congress regarding the benefits and burdens of requiring consumer consent to electronic transactions is found in § 105 (b) of ESIGN and is set forth below.

Sec. 105. Studies

* * * * *

(b) *Study of Electronic Consent.*—Within 12 months after the date of the enactment of this Act, the Secretary of Commerce and the Federal Trade Commission shall submit a report to the Congress evaluating any benefits provided to consumers by the procedure required by section 101(c)(1)(C)(ii); any burdens imposed on electronic commerce by that provision; whether the benefits outweigh the burdens; whether the absence of the procedure required by section 101(c)(1)(C)(ii) would increase the incidence of fraud directed against consumers; and suggesting any revisions to the provision deemed appropriate by the Secretary and the Commission. In conducting this evaluation, the Secretary and the Commission shall solicit comment from the general public, consumer representatives, and electronic commerce businesses.

The language of § 105(b) specifically limits its scope to § 101(c)(1)(C)(ii) which reads:

Sec. 101(c) Consumer Disclosures

(1) *Consent to Electronic Records.*—Notwithstanding subsection (a), if a statute, regulation, or other rule of law requires that information relating to a transaction or transactions in or affecting interstate or foreign commerce be provided or made available to a consumer in writing, the use of an electronic record to provide or make available (whichever is required) such information satisfies the requirement that such information be in writing if:

* * * * *

(C) the consumer—

* * * * *

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(ii) consents electronically, or confirms his or her consent electronically, in a manner that reasonably demonstrates that the consumer can access information in the electronic form that will be used to provide the information that is the subject of the consent.

* * * * *

In summary, if a statute, regulation, or other rule of law requires information relating to a transaction to be provided or made available to a consumer in writing, § 101(c) allows this information to be provided or made available electronically only if certain consumer protection conditions are met. Section 101(c)(1)(C)(ii) is one such condition and provides that the consumer must consent electronically or confirm his or her consent electronically, in a manner that reasonably demonstrates the consumer's ability to access the information.

Under § 105(b), the Federal Trade Commission and the Secretary of Commerce are tasked with submitting to Congress a report that evaluates five aspects of § 101(c)(1)(C)(ii). First, we must assess the benefits to consumers of the procedures required by § 101(c)(1)(C)(ii). Second, we are to identify any burdens imposed by these procedures. Third, we must balance the benefits and burdens and discuss whether the benefits outweigh the burdens. Fourth, we are to consider whether the absence of the consent procedure would increase consumer fraud. Finally, we are to suggest improvements or changes to the statutory language that we deem appropriate.

III. Invitation To Comment

The FTC and NTIA request that interested parties, including industry members, electronic commerce businesses, consumer representatives, law enforcement, regulatory agencies, and academics, submit written comments on any issue of fact, law, or policy that may inform the study of the procedure required by § 101(c)(1)(C)(ii). We invite comment on ESIGN generally to inform our examination of the narrower issues associated with the consumer consent procedure found in § 101(c)(1)(C)(ii). Please provide copies of any studies, surveys, research, or other empirical data referenced in responses. The questions set forth below are intended only as examples of the issues relevant to our examination. Commenters are invited to discuss any relevant issue, regardless of whether it is identified below.

General Issues

1. How does the requirement of section 101(c)(1)(C)(ii) of the ESIGN Act, that businesses allow consumers an opportunity to provide consumer consent or confirmation of consent electronically prior to providing consumers electronic versions of information, affect electronic commerce? How will electronic commerce be affected in the future by this requirement?

2. What statutory changes, if any, should be made to the ESIGN Act to assist businesses and consumers in domestic and/or international business markets in implementing and adapting to the consumer consent and consent confirmation provisions under section 101(c)(1)(C)(ii) of the Act?

3. What, if any, are the benefits and burdens to consumers and electronic commerce resulting from the affirmative consent provisions in the statute? Do any such benefits outweigh any burdens?

4. What, if any, improvements or changes should Congress make to the statutory language of section 101(c)(1)(C)(ii)?

5. Are there any additional issues that should be considered during this study?

Business Issues

6. If your business provides information electronically to consumers that is required by law to be in writing, do you request that consumers provide electronic consent or confirm their consent before the electronic information is transmitted?

7. Describe in detail the method used to obtain electronic consumer consent.

8. If you allow consumers to provide electronic consent to receive legally-required information electronically, please explain whether the electronic consent practice of your business is a result of section 101(c)(1)(C)(ii) of the ESIGN Act. Explain any other legal basis for this practice.

9. For what types of transactions do you seek electronic consumer consent or confirmation prior to sending information electronically that is required by law to be sent to consumers in writing?

10. Provide an estimate of the percentage of business transactions you conduct per month that requires the production of legally-required information to consumers in written form.

11. Does your business incur additional costs directly related to providing customers with the option of electronically consenting to or confirming the consent to receive information electronically, whether or not you provide the information pursuant to section 101(c)(1)(C)(ii)?

12. Are there burdens associated with providing information electronically to consumers that is required by law to be provided to them in written form? Are there burdens associated with allowing consumers to provide electronic consent or confirmation of consent prior to receiving the electronic information from your business pursuant to section 101(c)(1)(C)(ii)?

13. Explain any economies or benefits to your business resulting from the distribution of information electronically to consumers (e.g. storage, administrative processing), whether or not the information is provided pursuant to section 101(c)(1)(C)(ii). Are there economies or benefits related to allowing customers to provide electronic consent or confirmation of consent prior to receiving electronic information as required by ESIGN?

14. Do the benefits of providing electronic versions of information that is legally required to be provided in writing outweigh the burdens of allowing consumers an opportunity to provide electronic consent or confirmation of consent in order to receive the information?

15. Describe any feedback you have received from consumers or employees regarding the electronic consumer consent or confirmation procedures your business employs, also specifying whether the procedures are those required by ESIGN or were in place prior to ESIGN.

16. Describe the methods your business uses to verify:

A. That a consumer's consent or confirmation demonstrates the consumer's ability to access the requested information; and

B. That the electronic consents and confirmations are provided by the customers entitled to and intended to receive the electronic information.

17. What method, if any, in addition to the consent procedure in section 101(c)(1)(C)(ii) of the ESIGN Act could be employed to prevent consumer fraud? Would consumer fraud increase in the absence of the consent procedure of section 101(c)(1)(C)(ii)?

18. With regard to international business transactions, explain whether your company requests electronic consumer consent or consent confirmation prior to sending information electronically that is required to be provided to the consumer in written form. If so, explain if the method has had positive or negative consequences in international commerce.

19. If your business does not provide consumers the opportunity to receive information electronically by sending an electronic consent or consent confirmation, explain why your business does not provide this opportunity. Discuss any implementation problems.

Consumer Issues

20. As a consumer, how often do you conduct electronic transactions in which you request information electronically or agree to receive legally-required information electronically?

21. Have you obtained information electronically that was required by law to be provided to you in writing? If so, did the company or business provide an opportunity for you to provide electronic consent or confirm your consent before sending an electronic version of the information to you?

22. For an electronic transaction that provided an opportunity for you to submit electronic consent or consent confirmation before you received the information electronically, describe the effect of the process on you as a consumer. Were you made aware of any legal requirements regarding your options to receive the information in a different manner, such as on paper? If so, were you made aware of the legal requirements before you consented or confirmed your consent to receive the information in an electronic format?

23. As a consumer, what are the benefits, if any, of receiving electronic versions of information required by law to be provided in written form?

24. Explain whether the benefits of receiving electronic versions of information outweigh any burdens associated with providing electronic consent or consent confirmation prior to receiving the information.

Technology Issues

25. Are software programs that enable consumers to provide electronic consent or consent confirmation to companies readily available? Describe.

26. What technology or methods are available that would enable companies to verify that electronic consent or consent confirmation is transmitted by the specific persons entitled to receive electronic information?

27. Please explain whether additional technology is necessary to accomplish either the electronic consumer consent or company verification methods discussed in Questions 25 and 26, above.

28. Does the development of newer technologies impact the implementation of the consumer consent and consent confirmation provisions of section 101(c)(1)(C)(ii) of the ESIGN Act? If so, how.

IV. Public Workshop

Staff of the FTC and NTIA will conduct a public workshop to discuss issues raised by the comments received in response to this notice. Notification of interest in participating in the public workshop should be submitted in writing, separately from comments, to April Major, Division of Marketing Practices, Federal Trade Commission, 600 Pennsylvania Avenue, NW., Washington, DC 20580, or to Sallianne Fortunato, Telecom Policy Analyst, Office of Policy Analysis and Development, National Telecommunications and Information Administration (NTIA), Room 4716, U.S. Department of Commerce, 14th Street and Constitution Avenue, NW., Washington, DC 20230. We will select a limited number of parties from among those who submit comments to represent the significant interests affected by the issues raised in the notice. These parties will participate in an open discussion of the issues, including asking and answering questions based on their respective comments. In addition, the workshop will be open to the general public. The discussion will be transcribed and the transcription placed on the public record. The FTC and NTIA will consider the views and suggestions made during the workshop, in conjunction with the written and email comments, in formulating its report to Congress.

Parties will be selected on the basis of the following criteria:

1. The party submits a comment during the comment period.
2. During the comment period the party notifies FTC or NTIA of its interest in participating in the workshop.
3. The party's participation would promote a balance of interests being represented at the workshop.
4. The party's participation would promote the consideration and discussion of a variety of issues raised in this notice.
5. The party has expertise in activities affected by the issues raised in this notice.
6. The number of parties selected will not be so large as to inhibit effective discussion among them.
7. The party agrees to review the comments of all of the other workshop participants prior to the workshop.

The workshop will be held on April 3, 2001, from 8:30 a.m. until 5:00 p.m., at the FTC, 600 Pennsylvania Ave, NW., Washington, DC. Prior to that date, parties selected will be provided with copies of the comments from all other participants selected to participate in the workshop.

Public Participation

The workshop will be open to the public and is physically accessible to people with disabilities. To facilitate entry to the Federal Trade Commission building, please have a photo identification available and/or a U.S. Government building pass, if applicable. Any member of the public wishing to attend and requiring special services, such as sign language interpretation or other ancillary aids, should contact Sallianne Fortunato at least three (3) days prior to the meeting via the contact information provided above.

Donald S. Clark,

Secretary, Federal Trade Commission.

Kathy D. Smith,

Chief Counsel, National Telecommunications and Information Administration.

[FR Doc. 01–3609 Filed 2–12–01; 8:45 am]

BILLING CODE 6750–01–U

DEPARTMENT OF ENERGY

Environmental Management Site-Specific Advisory Board, Idaho

AGENCY: Department of Energy.

ACTION: Notice of open meeting.

SUMMARY: This notice announces a meeting of the Environmental Management Site-Specific Advisory Board (EM SSAB), Idaho. Federal Advisory Committee Act (Pub. L. 92–463, 86 Stat. 770) requires that public notice of these meeting be announced in the **Federal Register.**

DATES: Tuesday, March 20, 2001, 8:00 a.m.–6:00 p.m.; Wednesday, March 21, 2001, 8:00 a.m.–5:00 p.m.

Public participation sessions will be held on: Tuesday, March 20, 2001, 12:15–12:30 p.m, 5:45–6:00 p.m.; Wednesday, March 21, 2001, 11:45–12:00 noon, 4:05–4:20 p.m.

These times are subject to change as the meeting progresses. Please check with the meeting facilitator to confirm these times.

ADDRESSES: Doubletree Hotel Downtown, 1800 Fairfax, Boise, Idaho 83702, (208) 344–7691.

FOR FURTHER INFORMATION CONTACT: Ms. Wendy Lowe, INEEL Cab Facilitator, Jason Associates Corporation, 477 Shoup Avenue, Suite 205, Idaho Falls, ID 83402, Phone (208) 522–1662 or visit the Board's Internet home page at *http://www.ida.net/users/cab.*

SUPPLEMENTARY INFORMATION:

Purpose of the Board: The purpose of the Board is to make recommendations

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to DOE and its regulators in the areas of future use, cleanup levels, waste disposition and cleanup priorities at the INEEL.

Tentative Agenda: (Agenda topics may change up to the day of the meeting. Please contact Jason Associates for the most current agenda or visit the CAB's Internet site at *www.ida.net/users/cab).*

Presentations on the following:

- Remedial Investigation/Feasibility Study data collection in the Subsurface Disposal Area
- Groundwater plume below the Idaho Nuclear Technology and Engineering Center
- Comprehensive Facilities and Land Use Plan
- 5-Year Update to the Spent Nuclear Fuel Environmental Impact Statement Voluntary Consent Order
- Environmental Assessment for the Deactivation, Decommissioning, and Dismantlement of a portion of Building CPP–603A at Idaho Nuclear Technology and Engineering Center

Briefings on the following:

- Status of the Yucca Mountain Environmental Impact Statement

Presentation and develop recommendations on:

- Budget priorities for FY 2003 under a restricted budget
- Wildfire Environmental Assessment
- Subsurface Science Initiative and the Vadose Zone Research Roadmap

Discussion of the following:

- A Site Specific Advisory Board Workshop on Alternatives to Incineration

Public Participation: This meeting is open to the public. Written statements may be filed with the Board facilitator either before or after the meeting. Individuals who wish to make oral presentations pertaining to agenda items should contact the Board Chair at the address or telephone number listed above. Request must be received five days prior to the meeting and reasonable provision will be made to include the presentation in the agenda. The Deputy Designated Federal Officer, Jerry Bowman, Assistant Manager for Laboratory Development, Idaho Operations Office, U.S. Department of Energy, is empowered to conduct the meeting in a fashion that will facilitate the orderly conduct of business. Every individual wishing to make public comment will be provided equal time to present their comments. Additional time may be made available for public comment during the presentations.

Minutes: The minutes of this meeting will be available for public review and copying at the Freedom of Information Public Reading Room, 1E–190, Forrestal Building, 1000 Independence Avenue, SW., Washington, DC 20585 between 9:00 a.m. and 4:00 p.m., Monday through Friday except Federal holidays. Minutes will also be available by writing to Ms. Wendy Lowe, INEEL CAB Facilitator, Jason Associates Corporation, 477 Shoup Avenue, Suite 205, Idaho Falls, ID 83402 or by calling (208) 522–1662.

Issued at Washington, DC on February 8, 2001.

Rachel Samuel,

Deputy Advisory Committee Management Officer.

[FR Doc. 01–3585 Filed 2–12–01; 8:45 am]

BILLING CODE 6450–01–P

DEPARTMENT OF ENERGY

Environmental Management Site-Specific Advisory Board, Pantex

AGENCY: Department of Energy.

ACTION: Notice of open meeting.

SUMMARY: This notice announces a meeting of the Environmental Management Site-Specific Advisory Board (EM SSAB), Pantex. The Federal Advisory Committee Act (Pub. L. 92–463, 86 Stat. 770) requires that public notice of these meetings be announced in the **Federal Register.**

DATES: Tuesday, March 27, 2001, 1:00 p.m.–5:00 p.m.

ADDRESSES: Amarillo College Technical Center Campus, Room 9, James Bird Administration Building, Amarillo, Texas 79111.

FOR FURTHER INFORMATION CONTACT: Jerry S. Johnson, Assistant Area Manager, Department of Energy, Amarillo Area Office, P.O. Box 30030, Amarillo, TX 79120; phone (806) 477–3125; fax (806) 477–5896 or e-mail *jjohnson@pantex.gov.*

SUPPLEMENTARY INFORMATION:

Purpose of the Board: The purpose of the Board is to make recommendations to DOE and its regulators in the areas of environmental restoration, waste management and related activities.

Tentative Agenda:

1:00 Agenda Review/Approval of Minutes
1:15 Co-Chair Comments
1:30 Task Force/Subcommittee Reports
2:00 Ex-Officio Reports
2:15 Break
2:30 Updates-Occurrence Reports-DOE
3:00 Presentation (To Be Announced)/ 24 hour information line: (806) 372–1945
4:00 Questions
Public Question/Comments
5:00 Adjourn

Public Participation: The meeting is open to the public. Written statements may be filed with the Committee either before or after the meeting. Individuals who wish to make oral statements pertaining to agenda items should contact Jerry Johnson's office at the address or telephone number listed above. Requests must be received five days prior to the meeting and every reasonable provision will be made to accommodate the request in the agenda. The Designated Federal Officer is empowered to conduct the meeting in a fashion that will facilitate the orderly conduct of business. Each individual wishing to make public comment will be provided a maximum of five minutes to present their comments.

Minutes: Minutes of this meeting will be available for public review and copying at the Pantex Public Reading Rooms located at the Amarillo College Lynn Library and Learning Center, 2201 South Washington, Amarillo, TX phone (806) 371–5400. Hours of operation are from 7:45 a.m. to 10:00 p.m. Monday through Thursday; 7:45 a.m. to 5:00 p.m. on Friday; 8:30 a.m. to 12:00 noon on Saturday; and 2:00 p.m. to 6:00 p.m. on Sunday, except for Federal holidays. Additionally, there is a Public Reading Room located at the Carson County Public Library, 401 Main Street, Panhandle, TX phone (806) 537–3742. Hours of operation are from 9:00 a.m. to 7:00 p.m. on Monday; 9:00 a.m. to 5:00 p.m. Tuesday through Friday; and closed Saturday and Sunday as well as Federal holidays. Minutes will also be available by writing or calling Jerry S. Johnson at the address or telephone number listed above.

Issued at Washington, DC on February 8, 2001.

Rachel M. Samuel,

Deputy Advisory Committee Management Officer.

[FR Doc. 01–3586 Filed 2–12–01; 8:45 am]

BILLING CODE 6450–01–P

DEPARTMENT OF ENERGY

Environmental Management Site-Specific Advisory Board, Rocky Flats

AGENCY: Department of Energy

ACTION: Notice of open meeting.

SUMMARY: This notice announces a meeting of the Environmental Management Site-Specific Advisory Board (EM SSAB), Rocky Flats. The Federal Advisory Committee Act (Pub. L. No. 92–463, 86 Stat. 770) requires that public notice of these meeting be announced in the **Federal Register**.

DATES: Thursday, March 1, 2001, 6 p.m. to 9:30 p.m.

ADDRESSES: Jefferson County Airport Terminal Building, Mount Evans Room, 11755 Airport Way, Broomfield, CO.

FOR FURTHER INFORMATION CONTACT: Ken Korkia, Board/Staff Coordinator, Rocky Flats Citizens Advisory Board, 9035 North Wadsworth Parkway, Suite 2250, Westminster, CO, 80021; telephone (303) 420–7855; fax (303) 420–7579.

SUPPLEMENTARY INFORMATION: *Purpose of the Board:* The purpose of the Board is to make recommendations to DOE and its regulators in the areas of environmental restoration, waste management, and related activities.

Tentative Agenda

1. Quarterly update by the Defense Nuclear Facilities Safety Board.

2. Update on decontamination and decommissioning issues at Rocky Flats.

3. Recommendation(s) from the Environmental Restoration Committee.

4. Update on the EM SSAB Chairs meeting held in February.

5. Other Board business may be conducted as necessary.

Public Participation: The meeting is open to the public. Written statements may be filed with the Board either before or after the meeting. Individuals who wish to make oral statements pertaining to agenda items should contact Ken Korkia at the address or telephone number listed above. Requests must be received at least five days prior to the meeting and reasonable provisions will be made to include the presentation in the agenda. The Deputy Designated Federal Officer is empowered to conduct the meeting in a fashion that will facilitate the orderly conduct of business. Each individual wishing to make public comment will be provided a maximum of five minutes to present their comments.

Minutes: The minutes of this meeting will be available for public review and copying at the Public Reading Room located at the Office of the Rocky Flats Citizens Advisory Board, 9035 North Wadsworth Parkway, Suite 2250, Westminister, CO 80021; telephone (303) 420–7855. Hours of operations for the Public Reading Room are 9:00 a.m. to 4:00 p.m., Monday–Friday, except Federal holidays. Minutes will also be made available by writing or calling Deb Thompson at the address or telephone number listed above.

Issued at Washington, DC on February 8, 2001.

Rachel M. Samuel,

Deputy Advisory Committee Management Officer.

[FR Doc. 01–3587 Filed 2–12–01; 8:45 am]

BILLING CODE 6450–01–P

DEPARTMENT OF ENERGY

Worker Advocacy Advisory Committee Meeting

AGENCY: Department of Energy.

ACTION: Notice of open meeting.

SUMMARY: This notice announces a meeting of the Worker Advocacy Advisory Committee.

The Federal Advisory Committee Act (Pub. L. 92–463, 86 Stat. 770), requires that notice of this meeting be published in the **Federal Register**.

DATES: Thursday, March 8, 2001, 12:00 noon to 6:30 p.m. and Friday, March 9, 2001, 9:00 a.m. to 12:00 noon.

ADDRESSES: Loews L'Enfant Plaza Hotel, 480 L'Enfant Plaza, SW., Washington, DC.

FOR FURTHER INFORMATION CONTACT: Judy Keating, Executive Administrator, Worker Advocacy Advisory Committee, U.S. Department of Energy, EH–8, 1000 Independence Avenue, SW., Washington, DC 20585, Telephone Number 202–586–7551, E-mail: judy.keating@eh.doe.gov.

SUPPLEMENTARY INFORMATION:

Purpose of the Meeting: To provide advice to the Director of the Office of Worker Advocacy of the Department of Energy on plans, priorities, and strategies for assisting workers who have been diagnosed with work-related illnesses.

Tentative Agenda

Welcome and Introduction
Opening Remarks
Subcommittee Reports and Discussion
Status and Direction of DOE Worker Advocacy Efforts
Relationships with Other Federal Agencies
Public Comment
Next Steps/Path Forward

Public Participation: This two-day meeting is open to the public on a first-come, first-serve basis because of limited seating. Written statements may be filed with the committee before or after the meeting. Members of the public who wish to make oral statements pertaining to agenda items should contact Judy Keating at the address or telephone listed above. Requests to make oral statements must be made and received five days prior to the meeting; reasonable provision will be made to include the statement in the agenda. The Chair of the committee is empowered to conduct the meeting in a fashion that will facilitate the orderly conduct of business.

Minutes: The minutes of this meeting will be available for public review and copying at the Freedom of Information Reading Room, 1E–190, Forrestal Building, 1000 Independence Avenue, SW., Washington, DC, between 9 a.m. and 4 p.m., Monday through Friday, except holidays.

Issued in Washington, DC on February 8, 2001.

Rachel M. Samuel,

Deputy Advisory Committee Management Officer.

[FR Doc. 01–3584 Filed 2–12–01; 8:45 am]

BILLING CODE 6450–01–P

DEPARTMENT OF ENERGY

Federal Energy Regulatory Commission

[Docket Nos. RP01–200–000 and RP00–325–001 (Not Consolidated]

Colorado Interstate Gas Company; Notice of Technical Conference

February 7, 2001.

On December 29, 2000, Colorado Interstate Gas Company (CIG) filed revised tariff sheets in Docket No. RP01–200–000 to implement a new daily Scheduled Imbalance Penalty and a new interruptible Automatic Parking and Lending service (APAL). On January 2, 2001, CIG filed revised *pro forma* tariff sheets in Docket No. RP00–325–001 to comply with Order No. 637. Protests were filed in both dockets. On January 31, 2001 the Commission issued an order accepting and suspending the tariff sheets field in Docket No. RP01–200–000 to be effective July 1, 2001, subject to refund and subject to the outcome of a technical conference. The conference discussion was to address the proposal APAL service and daily penalty, as well as their relationship to issues raised in CIG's Order No. 637 proceeding.

Take notice that a technical conference to discuss various issues raised by CIG's filings will be held on Wednesday, February 28, 2001, at 9 a.m., in a room to be designed at the Federal Energy Regulatory Commission, 888 First Street, NE., Washington, DC 20426.

Participants should be prepared to address, consistent with the January 31 order, (1) whether existing data support an operational need for the proposed

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service and penalty, (2) how the proposals in Docket No. RP01–200 relate to CIG's Order No. 637 compliance filing, (3) how GISB nomination processes are used to balance scheduled receipts and deliveries on CIG's system, (3) how CIG uses line pack and storage inventory to accommodate imbalances, and (4) any other concerns raised by CIG's filings.

All interested persons and Staff are permitted to attend.

David P. Boergers,

Secretary.

[FR Doc. 01–3580 Filed 2–12–01; 8:45 am]

BILLING CODE 6717–01–M

DEPARTMENT OF ENERGY

Federal Energy Regulatory Commission

[Docket No. RP96–383–020]

Dominion Transmission, Inc.; Notice of Negotiated Rate

February 7, 2001.

Take notice that on January 30, 2001, Dominion Transmission, Inc. (DTI) tendered for filing tariff sheets disclosing recently negotiated rate transactions. DTI states that the tariff sheets relate to future negotiated rate transactions between DTI and Pool Operators. DTI and the Pool Operators will enter into Service Agreements under DTI's Rate Schedule IT, to become effective February 1, 2001. Under these agreements, DTI has agreed to provide certain interruptible transportation service for the Pool Operators, for delivery at Dominion's Appalachian Aggregation Points.

DTI states that copies of the filing have been served upon DTI's customers and interested state Commissions.

Any person desiring to be heard or to protest said filing should file a motion to intervene or a protest with the Federal Energy Regulatory Commission, 888 First Street, N.E., Washington, DC 20426, in accordance with Sections 385.214 or 385.211 of the Commission's Rules and Regulations. All such motions or protests must be filed in accordance with Section 154.210 of the Commission's Regulations. Protests will be considered by the Commission in determining the appropriate action to be taken, but will not serve to make protestants parties to the proceedings. Any person wishing to become a party must file a motion to intervene. Copies of this filing are on file with the Commission and are available for public inspection in the Public Reference Room. This filing may be viewed on the web at http://www.ferc.fed.us/online/rims.htm (call 202–208–2222 for assistance). Comments and protests may be filed electronically via the internet in lieu of paper. See, 18 CFR 385.2001(a)(1)(iii) and the instructions on the Commission's web site at http://www.ferc.fed.us/efi/doorbell.htm.

David P. Boergers,

Secretary.

[FR Doc. 01–3578 Filed 2–12–01; 8:45 am]

BILLING CODE 6717–01–M

DEPARTMENT OF ENERGY

Federal Energy Regulatory Commission

[Docket No. RP01–221–000]

Great Lakes Gas Transmission Limited Partnership; Notice of Transporter Report

February 7, 2001.

Take notice that on January 31, 2001, Great Lakes Gas Transmission Limited Partnership (Great Lakes) as required under Section 4.3 of Rage Schedules FT and IT of its FERC Gas Tariff, Second Revised Volume No. 1, tendered for filing its supporting calculations underlying Great Lakes' Transporter's Use percentages applicable during the six-month period from July 1, 2000 through December 31, 2000.

Great Lakes states that copies of the filing are being served upon each of Great Lakes' firm customers and the Public Service Commission of the States of Minnesota, Wisconsin, and Michigan.

Any person desiring to be heard or to protest said filing should file a motion to intervene or a protest with the Federal Energy Regulatory Commission, 888 First Street, NE., Washington, DC 20426, in accordance with Sections 305.214 or 385.211 of the Commission's Rules and Regulations. All such motions or protests must be filed on or before February 14, 2001. Protests will be considered by the Commission in determining the appropriate action to be taken, but will not serve to make protestants parties to the proceedings. Any person wishing to become a party must file a motion to intervene. Copies of this filing are on file with the Commission and are available for public inspection in the Public Reference Room. This filing may be viewed on the web at http://www.ferc.fed.us/online/rims.htm (call 202–208–2222 for assistance). Comments and protests may be filed electronically via the internet in lieu of paper. See, 18 CFR 308.2001(a)(1)(iii) and the instructions on the Commission's web site at http://www.ferc.fed.us/efi/doorbell.htm.

David P. Boergers,

Secretary.

[FR Doc. 01–3581 Filed 2–12–01; 8:45 am]

BILLING CODE 6717–01–M

DEPARTMENT OF ENERGY

Federal Energy Regulatory Commission

[Docket No. RP00–340–001]

Gulf South Pipeline Company, LP; Notice of Pro Forma Tariff

February 7, 2001.

Take notice that on February 1, 2001, Gulf South Pipeline Company, LP (Gulf South) tendered for filing pro forma tariff sheets listed on the attachment to the filing, in compliance with Order No. 637 issued in Docket Nos. RM98–10 and RM98–12 on February 9, 2000.

On June 15, 2000 Gulf South filed the pro forma tariff sheets necessary to implement Order No. 637 on its system Since June Gulf South has participated in two technical conferences and has convened three customer meetings to discuss its implementation of Order No. 637. Through the course of these discussions, certain aspects of Gulf South's original filing have been modified or eliminated and new provisions have been added. While there is agreement on certain aspects of these proposed tariff sheets, there is not universal agreement on every aspect of this filing. The pro forma tariff sheets Gulf South has submitted replace the previously filed pro forma tariff sheets and represent a just and reasonable approach to implementing Order No. 637 on this pipeline. Pursuant to the parties' agreement during these discussions, comments on this filing must be filed on or before February 15, 2001. Reply Comments must be filed on or before February 23, 2001.

Gulf South states that copies of the filing have been served upon Gulf South's customers, state commissions and other interested parties.

Any person desiring to protest said filing should file a protest with the Federal Energy Regulatory Commission, 888 First Street, NE., Washington, DC 20426, in accordance with Section 385.211 of the Commission's Rules and Regulations. All such protests must be filed on or before February 15, 2001. Protests will be considered by the Commission in determining the appropriate action to be taken, but will not serve to make protestants parties to the proceedings. Copies of this filing are

on file with the Commission and are available for public inspection in the Public Reference Room. This filing may be viewed on the web at http://www.ferc.fed.us/online/rims.htm (call 202–208–2222 for assistance). Comments and protests may be filed electronically via the internet in lieu of paper. See, 18 CFR 385.2001(a)(1)(iii) and the instructions on the Commission's web site at http://www.ferc.fed.us/efi/doorbell.htm.

David P. Boergers,

Secretary.

[FR Doc. 01–3579 Filed 2–12–01; 8:45 am]

BILLING CODE 6717–01–M

DEPARTMENT OF ENERGY

Federal Energy Regulatory Commission

[Project Nos. 2901–008 and 2902–009]

Nekoosa Packaging Corporation; Notice of Availability of Draft Environmental Assessment

February 7, 2001.

In accordance with the National Environmental Policy Act of 1969 and the Federal Energy Regulatory Commission's (Commission) regulations, 18 CFR Part 380 (Order No. 486, 52 FR 47897), the Office of Energy Projects has reviewed the application for license for the Big Island Hydroelectric Project and the Holcomb Rock Hydroelectric Project, located on the James River in Bedford and Amherst Counties, Virginia, and has prepared a Draft Environmental Assessment (DEA) for the project. No federal lands or Indian Rservations are occupied by project works or located within the project boundary.

The DEA contains the staff's analysis of the potential environmental impacts of the project and concludes that licensing the project, with appropriate environmental protective measures, would not constitute a major federal action that would significantly affect the quality of the human environment.

Copies of the DEA are available for review at the Commission's Public Reference Room, located at 888 First Street, NE, Washington, DC 20426, or by calling (202) 208–1371. The DEA may be viewed on the web at http://www.ferc.fed.us/online/rims.htm (call (202) 208–2222 for assistance).

Any comments should be filed within 30 days from the date of this notice and should be addressed to David P. Boergers, Secretary, Federal Energy Regulatory Commission, 888 First Street, NE, Washington, DC 20426. Please affix Project No. 2901–008 and Project No. 2902–009 to all comments. For further information, contact James T. Griffin at (202) 219–2799 or Monte TerHaar at (202) 219–2768.

Comments may be filed electronically via the internet in lieu of paper. See 18 CFR 385.2001(a)(1)(iii) and the instructions on the Commission's web site at http://www.ferc.fed.us/efi/doorbell.htm.

David P. Boergers,

Secretary.

[FR Doc. 01–3576 Filed 2–12–01; 8:45 am]

BILLING CODE 6717–01–M

DEPARTMENT OF ENERGY

Federal Energy Regulatory Commission

[Project No. 2720–032—Michigan/Wisconsin]

City of Norway, Michigan; Notice of Availability of Environmental Assessment

February 7, 2001.

In accordance with the National Environmental Policy Act of 1969 and the Federal Energy Regulatory Commission's (Commission) regulations, 18 CFR part 380 (Order No. 486, 52 FR 47897), the Office of Energy Projects has reviewed the application for amendment of license for the existing Sturgeon Falls Hydroelectric Project, located on the Menominee River in Dickinson County, Michigan, and Marinette County, Wisconsin, and has prepared an Environmental Assessment (EA) for the project. In the EA, the Commission staff has analyzed the potential environmental effects of the proposed license amendment and has concluded that approval of the proposed action, with staff-recommended measures, would not constitute a major Federal action significantly affecting the quality of the human environment.

Copies of the EA are available for review in the Commission's Public Reference Branch, Room 2A, located at 888 First Street, NE., Washington, DC 20426. The EA may also be viewed on the Internet at *http://www.ferc.fed.us/online/rims.htm*. Please call (202) 208–2222 for assistance.

Any comments should be filed within 30 days from the date of this notice and should be addressed to David P. Boergers, Secretary, Federal Energy Regulatory Commission, 888 First Street, NE., Washington, DC 20426. Please affix ''Sturgeon Falls Project, FERC Project No. 2720–032'' to all comments. For further information, please contact Patti Leppert at (202) 219–2767. Comments and protests may be filed electronically via the Internet in lieu of paper. See, 18 CFR 385.2001(a)(1)(iii) and the instructions on the Commission's web site at *http://www.ferc.fed.us/efi/doorbell.htm*.

David P. Boergers,

Secretary.

[FR Doc. 01–3577 Filed 2–12–01; 8:45 am]

BILLING CODE 6717–01–M

DEPARTMENT OF ENERGY

Federal Energy Regulatory Commission

Notice of Intent To File Application for a New License

February 7, 2001.

Take notice that the following notice of intent has been filed with the Commission and is available for public inspection:

a. *Type of Filing:* Notice of Intent to File an Application for New License.

b. *Project No:* 2082.

c. *Date Filed:* December 15, 2000.

d. *Submitted By:* PacifiCorp, 825 N.E. Multnomah, Suite 1500, Portland, OR 97232.

e. *Name of Project:* Klamath Hydroelectric Project.

f. *Location:* Klamath River in Oregon and California, and Fall Creek, a tributary in California. In Oregon, the Project is located in the Klamath County near the town of Klamath Falls, and in California, the Project is located in Siskiyou County, near the town of Hornbrook, California.

g. *Filed Pursuant to:* Section 15 of the Federal Power Act, 18 CFR 16.6.

h. Pursuant to Section 16.19 of the Commission's regulations, the licensee is required to make available the information described in Section 16.7 of the regulations. Such information is available from the licensee at PacifiCorp, 825 N.E. Multnomah, Suite 1500, Portland, OR 97232. Contact Todd Olson at 503–813–6657.

i. *FERC Contact:* John M. Mudre, (202) 219–1208, *John.Mudre@ferc.fed.us.*

j. *Expiration Date of Current License:* February 28, 2006.

k. *Project Description:* The proposed Klamath Project would contain six dams (five mainstream and one on a tributary), a waterway conveyance system with approximately seven miles of waterways, and seven powerhouses. The developments are: Eastside with 3.2 megawatts (MW) capacity, Westside with 600 kilowatt capacity, J.C. Boyle with 80 MW capacity, Copco No. 1 with 20 MW capacity, Copco No. 2 with 27

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MW capacity, Iron Gate with 18 MW capacity, and Fall Creek with 2.2 MW capacity.

l. The licensee states its unequivocal intent to submit an application for a new license for Project No. 2082. Pursuant to 18 CFR 16.9(b)(1) each application for a new license and any competing license applications must be filed with the Commission at least 24 months prior to the expiration of the existing license. All applications for license for this project must be filed by February 28, 2004.

A copy of the notice of intent is available for inspection and reproduction at the Commission's Public Reference Room, located at 888 First Street, NE, Room 2A, Washington, DC 20426, or by calling (202) 208–1371. The notice may be viewed on *http://www.ferc.fed.us/online/rims.htm* (call (202) 208–2222 for assistance). A copy is also available for inspection and reproduction at the address in item h above.

David P. Boergers,

Secretary.

[FR Doc. 01–3575 Filed 2–12–01; 8:45 am]

BILLING CODE 6717–01–M

DEPARTMENT OF ENERGY

Western Area Power Administration

Proposed Base Charge and Rates for Boulder Canyon Project

AGENCY: Western Area Power Administration, DOE.

ACTION: Notice of proposed base charge and rates.

SUMMARY: The Western Area Power Administration (Western) is proposing an adjustment to the base charge and rates for Boulder Canyon Project (BCP) firm power service. The current base charge and rates expire September 30, 2001. The proposed base charge and rates will provide enough revenue to pay all annual costs, including interest expense, and repay required investment within the allowable period. The rate impacts are detailed in a rate package to be provided to all interested parties. The proposed base charge and rates are scheduled to go into effect on October 1, 2001, to correspond with the start of the Federal fiscal year (FY), and will remain in effect through September 30, 2002. This **Federal Register** notice initiates the formal process for the proposed base charge and rates.

DATES: The consultation and comment period will begin today and will end May 14, 2001. A public information forum at which Western will present a detailed explanation of the proposed base charge and rates is scheduled for April 4, 2001, beginning at 10 a.m. MST, at the Desert Southwest Customer Service Regional Office. A public comment forum at which Western will receive oral and written comments is scheduled for April 25, 2001, beginning at 10 a.m. MST, at the same location.

ADDRESSES: Written comments are to be sent to: Mr. J. Tyler Carlson, Regional Manager, Desert Southwest Customer Service Region, Western Area Power Administration, P.O. Box 6457, Phoenix, AZ 85005–6457, e-mail: carlson@wapa.gov. Western should receive written comments by the end of the consultation and comment period to be assured consideration.

FOR FURTHER INFORMATION CONTACT: Mr. Maher A. Nasir, Rates Team Lead, Desert Southwest Customer Service Region, Western Area Power Administration, P.O. Box 6457, Phoenix, AZ 85005–6457, telephone (602) 352–2768, e-mail: nasir@wapa.gov.

SUPPLEMENTARY INFORMATION: The proposed base charge and rates for BCP firm power service are designed to recover an annual revenue requirement that includes the investment repayment, interest, operation and maintenance, replacements, payment to states, visitor services, and uprating payments. These annual costs are reduced by the projected revenue from water sales, visitor services, water pump energy sales, facility use charge, regulation services, miscellaneous lease, late fees, and the prior year carryover to determine the annual revenue requirement. The projected annual revenue requirement is the base charge for firm power service and is divided by 50 percent to capacity dollars and 50 percent to energy dollars. The annual energy dollars are divided by the annual energy sales and the annual capacity dollars are divided by the annual capacity sales to determine the proposed energy rate and the proposed capacity rate.

TABLE 1.—PROPOSED FIRM POWER BASE CHARGE AND RATES

Effective period	Total composite (mills/kWh)	Base charge	Energy rate (mills/kWh)	Capacity rate ($/kW-month)	Capacity energy split
10/01/2001	10.75	$51,151,389	5.54	$1.06	50/50

The Deputy Secretary of the Department of Energy (DOE) approved the existing rate formula for calculating the base charge and rates in Rate Schedule BCP–F6 for BCP firm power service on September 18, 2000 (Rate Order No. WAPA–94, 65 FR 60932, October 13, 2000), which has been submitted to the Federal Energy Regulatory Commission (FERC) for final confirmation and approval. Existing Rate Schedule BCP–F6 became effective on October 1, 2000, through September 30, 2005. Under Rate Schedule BCP–F6, on October 1, 2000, the composite rate for FY 2001 was 9.75 mills per kilowatthour (mills/kWh), the base charge was $47,788,574, the forecasted energy rate was 5.04 mills/kWh, and the forecasted capacity rate was $0.99 per kilowattmonth (kWmonth). The proposed base charge and rates for BCP firm power service for FY 2002 will result in an overall composite rate increase of approximately 9 percent on October 1, 2001, when compared with the current BCP firm power service base charge and rates under Rate Schedule BCP–F6. The increase in the proposed base charge and rates is due to higher annual costs and lower energy sales. Table 2 compares the current base charge and rates in Rate Schedule BCP–F6 and the proposed base charge and rates along with the percentage change in the base charge and rates.

TABLE 2.—COMPARISON OF CURRENT AND PROPOSED BASE CHARGE AND RATES PERCENTAGE CHANGE IN FIRM POWER SERVICE BASE CHARGE AND RATES

	Current	Proposed	% Change
Effective Period	10/01/00	10/01/01	.....
Total Composite (mills/kWh)	9.75	10.75	9
Base Charge ($)	47,788,574	51,151,389	7
Energy Rate (mills/kWh)	5.04	5.54	9
Capacity Rate ($/kWmonth)	0.99	1.06	7

Since the proposed base charge and rates constitute a major rate adjustment as defined by the procedures for public participation in general rate adjustments, as cited below, both a public information forum and a public comment forum will be held. After review of the public comments, Western will recommend the proposed base charge and rates (as amended) be approved on a final basis by the DOE Deputy Secretary.

The proposed firm power service base charge and rates for BCP are being established pursuant to the DOE Organization Act 42 U.S.C. 7101–7352; the Reclamation Act of 1902, ch. 1093, 32 Stat.388, as amended and supplemented by subsequent enactments, particularly section 9(c) the Reclamation Project Act of 1939, 43 U.S.C. 485h(c); and other acts specifically applicable to the project involved.

By Amendment No. 3 to Delegation Order No. 0204–108, published November 10, 1993 (58 FR 59716), the Secretary of Energy delegated (1) the authority to develop long-term power and transmission rates on a nonexclusive basis to Western's Administrator; and (2) the authority to confirm, approve, and place into effect on a final basis, to remand, or to disapprove such rates to FERC. In Delegation Order No. 0204–172, effective November 24, 1999, the Secretary delegated the authority to confirm, approve, and place such rates into effect on an interim basis to the Deputy Secretary. Existing DOE procedures for public participation in power rate adjustments (10 CFR part 903) became effective on September 18, 1985 (50 FR 37835).

Availability of Information

All brochures, studies, comments, letters, memorandums, or other documents made or kept by Western for developing the proposed base charge and rates are and will be made available for inspection and copying at the Desert Southwest Customer Service Regional Office, located at 615 South 43rd Avenue, Phoenix, Arizona.

Regulatory Procedural Requirements

Regulatory Flexibility Analysis

The Regulatory Flexibility Act of 1980 (5 U.S.C. 601, *et seq.*) requires Federal agencies to perform a regulatory flexibility analysis if a final rule is likely to have a significant economic impact on a substantial number of small entities and there is a legal requirement to issue a general notice of proposed rulemaking. Western has determined that this action does not require a regulatory flexibility analysis since it is a rulemaking of particular applicability involving rates or services applicable to public property.

Environmental Compliance

In compliance with the National Environmental Policy Act of 1969 (NEPA) (42 U.S.C. 4321, *et seq.*); Council On Environmental Quality Regulations (40 CFR parts 1500–1508); and DOE NEPA Regulations (10 CFR part 1021), Western has determined that this action is categorically excluded from the preparation of an environmental assessment or an environmental impact statement.

Determination Under Executive Order 12866

Western has an exemption from centralized regulatory review under Executive Order 12866; accordingly, no clearance of this notice by the Office of Management and Budget is required.

Small Business Regulatory Enforcement Fairness Act

Western has determined that this rule is exempt from congressional notification requirements under 5 U.S.C. 801 because the action is a rulemaking of particular applicability relating to rates or services and involves matters of procedure.

Dated: February 1, 2001.

Michael S. Hacskaylo,

Administrator.

[FR Doc. 01–3590 Filed 2–12–01; 8:45 am]

BILLING CODE 6450–01–P

ENVIRONMENTAL PROTECTION AGENCY

[FRL–6944–6]

Agency Information Collection Activities

AGENCY: Environmental Protection Agency (EPA).

ACTION: Notice.

SUMMARY: In compliance with the Paperwork Reduction Act (44 U.S.C. 3501 *et seq.*), this notice announces that EPA is planning to submit the following proposed and/or continuing Information Collection Requests (ICRs) to the Office of Management and Budget (OMB). Before submitting the ICRs to OMB for review and approval, EPA is soliciting comments on specific aspects of the proposed information collections as described below.

DATES: Comments must be submitted on or before April 16, 2001.

ADDRESSES: U.S. Environmental Protection Agency, 1200 Pennsylvania Avenue, NW., Mail Code 2225A, OECA/OC/AD, Washington, DC 20460. A copy of this ICR may be obtained from Stephen Howie, tel: (202) 564–4146; e-mail: howie.stephen@epa.gov.

FOR FURTHER INFORMATION CONTACT: Stephen Howie, tel: (202) 564–4146; FAX: (202) 564–0085; e-mail: howie.stephen@epa.gov.

SUPPLEMENTARY INFORMATION: *Affected Entities:* Entities potentially affected by this action are those which produce pesticides.

Title: Recordkeeping Requirements for Producers of Pesticides under section 8 of the Federal Insecticide, Fungicide, and Rodenticide Act as amended (FIFRA). ICR Number 0143.07. OMB Control Number 2070–0028. Expires 8/31/01.

Abstract: Section 8 of the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) states that the Administrator of the Environmental Protection Agency may prescribe regulations requiring producers, registrants and applicants for registration to maintain such records with respect to their operations and the

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effective enforcement of this Act as the Administrator determines are necessary for the effective enforcement of FIFRA and to make such records available for inspection and copying as specified in the statute. The regulations at 40 CFR part 169 (Books and Records of Pesticide Production and Distribution) specify the following records that producers must keep and the disposition of those records: Production data for pesticides, devices, or active ingredients (including pesticides produced pursuant to an experimental use permit); receipt by the producer of pesticides, devices, or active ingredients used in producing pesticides; delivery, moving, or holding of pesticides; inventory; domestic advertising for restricted use pesticides; guarantees; exports; disposal; human testing; and tolerance petitions. Additionally, section 8 gives the Agency inspectional authority to monitor the validity of research data (including raw data), including data developed in accordance with Good Laboratory Practice Standards, and used to support pesticide registration. The EPA or States/Indian Tribes operating under Cooperative Enforcement Agreements make use of the records required by section 8 through periodically inspecting them to help determine FIFRA compliance of those subject to the provisions of the Act. In addition, producers themselves make use of such records in order to comply with reporting requirements under FIFRA section 7 and 40 CFR 167.85. (Those reporting requirements, concerning the types and amounts of pesticides produced annually at each producing site, are addressed in the ICR entitled ''Pesticide Report for Pesticide-Producing Establishments,'' OMB Docket Number 2000–0029.)

Since most of the records required to be maintained are likely to be collected and maintained in the course of good business practice, the records are generally stored on site at either the establishment producing the pesticide or at the place of business of the person holding the registration. However, the registrant may decide to transfer records relating to disposal of pesticides and human testing to EPA for storage because of a twenty year retention requirement for the records. An Agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a currently valid OMB control number. The OMB control numbers for EPA's regulations are listed in 40 CFR part 9.

The EPA would like to solicit comments to:

(i) Evaluate whether the proposed collection of information is necessary for the proper performance of the functions of the Agency, including whether the information will have practical utility;

(ii) Evaluate the accuracy of the Agency's estimate of the burden of the proposed collection of information, including the validity of the methodology and assumptions used;

(iii) Enhance the quality, utility, and clarity of the information to be collected; and

(iv) Minimize the burden of the collection of information on those who are to respond, including through the use of appropriate automated electronic, mechanical, or other technological collection techniques or other forms of information technology, e.g., permitting electronic submission of responses.

Burden: The average annual burden to the industry over the next three years is estimated to be 2 person hours per response.

Respondents/Affected Entities: 12,336.

Estimated Number of Respondents: 12,336.

Frequency of Responses: 1.

Estimated Total Annual Hour Burden: 24,672.

There are no capital/startup costs or operating and maintenance (O&M) costs associated with this ICR since all equipment associated with this ICR is present as part of ordinary business practices.

Burden means the total time, effort, or financial resources expended by persons to generate, maintain, retain, or disclose or provide information to or for a Federal agency. This includes the time needed to review instructions; develop, acquire, install, and utilize technology and systems for the purposes of collecting, validating, and verifying information, processing and maintaining information, and disclosing and providing information; adjust the existing ways to comply with any previously applicable instructions and requirements; train personnel to be able to respond to a collection of information; search data sources; complete and review the collection of information; and transmit or otherwise disclose the information.

Dated: January 22, 2001.

Richard Colbert,

Director, Agriculture Division, Office of Compliance, Office of Enforcement and Compliance Assurance.

[FR Doc. 01–3618 Filed 2–12–01; 8:45 am]

BILLING CODE 6560–50–U

FEDERAL RESERVE SYSTEM

Formations of, Acquisitions by, and Mergers of Bank Holding Companies

The companies listed in this notice have applied to the Board for approval, pursuant to the Bank Holding Company Act of 1956 (12 U.S.C. 1841 *et seq.*) (BHC Act), Regulation Y (12 CFR Part 225), and all other applicable statutes and regulations to become a bank holding company and/or to acquire the assets or the ownership of, control of, or the power to vote shares of a bank or bank holding company and all of the banks and nonbanking companies owned by the bank holding company, including the companies listed below.

The applications listed below, as well as other related filings required by the Board, are available for immediate inspection at the Federal Reserve Bank indicated. The application also will be available for inspection at the offices of the Board of Governors. Interested persons may express their views in writing on the standards enumerated in the BHC Act (12 U.S.C. 1842(c)). If the proposal also involves the acquisition of a nonbanking company, the review also includes whether the acquisition of the nonbanking company complies with the standards in section 4 of the BHC Act (12 U.S.C. 1843). Unless otherwise noted, nonbanking activities will be conducted throughout the United States. Additional information on all bank holding companies may be obtained from the National Information Center website at www.ffiec.gov/nic/.

Unless otherwise noted, comments regarding each of these applications must be received at the Reserve Bank indicated or the offices of the Board of Governors not later than March 9, 2001.

A. Federal Reserve Bank of Atlanta (Cynthia C. Goodwin, Vice President) 104 Marietta Street, NW., Atlanta, Georgia 30303–2713:

1. ABC Bancorp, Moultrie, Georgia; to acquire 100 percent of the voting shares of Tri-County Bank, Trenton, Florida.

B. Federal Reserve Bank of Chicago (Phillip Jackson, Applications Officer) 230 South LaSalle Street, Chicago, Illinois 60690–1414:

1. AmericaUnited Bancorp, Inc., Schaumburg, Illinois; to merge with National Bancorp, Inc., Sycamore, Illinois, and thereby indirectly acquire 100 percent of the voting shares of American National Bank of DeKalb County, Sycamore, Illinois.

C. Federal Reserve Bank of Kansas City (D. Michael Manies, Assistant Vice President) 925 Grand Avenue, Kansas City, Missouri 64198–0001:

1. Astra Financial Corporation, Prairie Village, Kansas; to acquire 17.43 percent

of the voting shares of First Missouri Bancshares, Inc., Brookfield, Missouri, and thereby indirectly acquire First Missouri National Bank, Brookfield, Missouri.

Board of Governors of the Federal Reserve System, February 7, 2001.

Robert deV. Frierson,

Associate Secretary of the Board.

[FR Doc. 01–3565 Filed 2–12–01; 8:45 am]

BILLING CODE 6210–01–P

DEPARTMENT OF HEALTH AND HUMAN SERVICES

Agency for Toxic Substances and Disease Registry

[ATSDR–164]

Availability of Final Toxicological Profile for Polychlorinated Biphenyls (PCBs)

AGENCY: Agency for Toxic Substances and Disease Registry (ATSDR), Department of Health and Human Services (HHS).

ACTION: Notice of availability.

SUMMARY: This notice announces the availability of the final updated toxicological profile for polychlorinated biphenyls (PCBs) which completes the twelfth set prepared by ATSDR. The announcement of seven toxicological profiles for the twelfth set was published in the **Federal Register** on November 16, 2000 (65 FR 69309).

FOR FURTHER INFORMATION CONTACT: Ms. Franchetta Stephens, Division of Toxicology, Agency for Toxic Substances and Disease Registry, Mailstop E–29, 1600 Clifton Road, NE, Atlanta, Georgia 30333, telephone 1–(888) 422–8737 or (404) 639–6345.

SUPPLEMENTARY INFORMATION: The Superfund Amendments and Reauthorization Act (SARA) (Pub. L. 99–499) amended the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA or Superfund) (42 U.S.C. 9601 *et seq.*) by establishing certain requirements for ATSDR and the Environmental Protection Agency (EPA) regarding hazardous substances which are most commonly found at facilities on the National Priorities List (NPL). Among these statutory requirements is a mandate for the Administrator of ATSDR to prepare toxicological profiles for each substance included on the priority lists of hazardous substances. These lists identified 275 hazardous substances that ATSDR and EPA determined pose the most significant potential threat to human health. The availability of the revised list of the 275 most hazardous substances was announced in the **Federal Register** on October 21, 1999 (64 FR 56792). For prior versions of the list of substances see **Federal Register** notices dated November 17, 1997 (62 FR 61332); April 29, 1996 (61 FR 18744); April 17, 1987 (52 FR 12866); October 20, 1988 (53 FR 41280); October 26, 1989 (54 FR 43619); October 17, 1990 (55 FR 42067); October 17, 1991 (56 FR 52166); October 28, 1992 (57 FR 48801); and February 28, 1994 (59 FR 9486).

The **Federal Register** notice announcing that the draft toxicological profile for PCBs was available for public review and comment was published February 10, 1999 (64 FR 6660). After the close of the 90-day public comment period, chemical-specific comments were addressed, and where appropriate, changes were incorporated into the profile. The public comments and other data submitted in response to the **Federal Register** notice bear the docket control number ATSDR–143. This material is available for public inspection at the Division of Toxicology, Agency for Toxic Substances and Disease Registry, Building 4, Suite 2400, Executive Park Drive, Atlanta, Georgia, (not a mailing address) between 8:00 a.m. and 4:30 p.m., Monday through Friday, except legal holidays.

Availability

This notice announces the availability of the final updated toxicological profile for PCBs which completes the twelfth set prepared by ATSDR. The following toxicological profile is now available through the U.S. Department of Commerce, National Technical Information Service (NTIS), 5285 Port Royal Road, Springfield, Virginia 22161, telephone 1–800–553–6847. There is a charge for these profiles as determined by NTIS.

Toxicological profile	NTIS order No.	Cas No.
POLYCHLORINATED BIPHENYLS	PB2000–108027	001336–36–3
AROCLOR 1016		012674–11–2
AROCLOR 1221		011104–28–2
AROCLOR 1232		011141–16–5
AROCLOR 1242		053469–21–9
AROCLOR 1248		012672–29–6
AROCLOR 1254		011097–69–1
AROCLOR 1260		011096–82–5
AROCLOR 1262		037324–23–5
AROCLOR 1268		011100–14–4

Dated: January 29, 2001.

Georgi Jones,

Director, Office of Policy and External Affairs, Agency for Toxic Substances and Disease Registry.

[FR Doc. 01–2988 Filed 2–12–01; 8:45 am]

BILLING CODE 4163–70–P

DEPARTMENT OF HEALTH AND HUMAN SERVICES

Centers for Disease Control and Prevention

[60Day–01–20]

Proposed Data Collections Submitted for Public Comment and Recommendations

In compliance with the requirement of section 3506(c)(2)(A) of the Paperwork Reduction Act of 1995 for opportunity for public comment on proposed data collection projects, the Centers for Disease Control and Prevention (CDC) will publish periodic summaries of proposed projects. To request more information on the proposed projects or to obtain a copy of the data collection plans and instruments, call the CDC Reports Clearance Officer on (404) 639–7090.

Comments are invited on: (a) Whether the proposed collection of information is necessary for the proper performance of the functions of the agency, including whether the information shall have practical utility; (b) the accuracy of the

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agency's estimate of the burden of the proposed collection of information; (c) ways to enhance the quality, utility, and clarity of the information to be collected; and (d) ways to minimize the burden of the collection of information on respondents, including through the use of automated collection techniques for other forms of information technology. Send comments to Anne O'Connor, CDC Assistant Reports Clearance Officer, 1600 Clifton Road, MS–D24, Atlanta, GA 30333. Written comments should be received within 60 days of this notice.

Proposed Project

Evaluating Toolbox Training Safety Program for Construction and Mining—NEW—Centers for Disease Control and Prevention (CDC) National Institute for Occupational Safety and Health (NIOSH) is proposing to evaluate the effectiveness of various educational approaches utilizing ''toolbox'' safety training materials targeted to construction and mining industries. The mission of the National Institute for Occupational Safety and Health is to promote safety and health at work for all people through research and prevention.

In comparison to other industries, construction and mining, workers continue to have the highest rates of occupational fatalities and injuries. The Bureau of Labor Statistics estimated for 1999 that while the construction industry comprises only 6% of the workforce, they account for 20% of the fatal occupational injuries across all industry types (BLS, 1999). Similarly, though the mining industry comprises less than .5% of the workforce, this industry reflects 2% of all fatal occupational injuries (BLS, 1999).

Research on the effectiveness of safety and health training programs has revealed that training can lead to increases in worker knowledge and awareness of workplace safety practices. However, fewer evaluations of safety training effectiveness have investigated the relationship between various instructional approaches and the actual transfer of safety training information into workplace practices. Preliminary input from employees, managers, and union leaders representing construction and mining concerns revealed a desire in these industries for affordable safety training materials that can be effectively administered in short sessions on the job. Representatives from these industries reported that safety training sessions need to establish a closer connection between the safety recommendations and the background experiences and knowledge of the workers.

An instructional approach that may address these needs is often called ''toolbox'' or ''tailgate'' training. This type of training is characterized by brief (15 minute) workplace safety lessons. Despite the popularity of toolbox safety talks, research is needed to identify the most effective format for this medium. NIOSH will investigate the impact of using a narrative, case-study instructional approach versus a more typical, didactic ''learn the facts'' approach. Comparative analyses will examine differences in knowledge gain, safety attitudes and beliefs, and workplace behaviors. Findings from this research will help identify the conditions critical to effective toolbox safety training for mining and construction. The materials developed and evaluated during this study will be made available to the public at the conclusion of the evaluation.

Construction and mining companies who participate in the study will be randomly assigned to receive eight weekly toolbox safety training sessions that use either a case-study narrative or conventional instructional approach. The training sessions are designed to last fifteen minutes. The impact of these materials will be evaluated through the examination of changes in employee knowledge gains, attitudes toward safety practices, and the use of safety behaviors prior to and following their participation in the safety training program. Trainers will complete brief response cards each week. A sample of trainers will participate in structured interviews.

Findings of the study will be reported to participants and in the literature. There are no costs associated with participation in this study.

Respondents	No. of respondents	Number of responses per respondent	Avg. burden per response (in hrs.)	Total burden (in Hours)
Employees	400	2 (pretest and post-test surveys).	15/60	200
Trainers	40	8 (weekly customer feedback cards).	5/60	27
Trainers	10 (drawn from the 40 above)	1 (structured interviews)	60/60	10
Total				237

Dated: February 6, 2001.

Nancy Cheal,

Acting Associate Director for Policy, Planning, and Evaluation Centers for Disease Control and Prevention (CDC).

[FR Doc. 01–3560 Filed 2–12–01; 8:45 am]

BILLING CODE 4163–18–P

DEPARTMENT OF HEALTH AND HUMAN SERVICES

National Institutes of Health

Warren Grant Magnuson Clinical Center; Submission for OMB Review; Comment Request; Customer and Other Partners Satisfaction Surveys

SUMMARY: Under the provisions of Section 3507(a)(1)(D) of the Paperwork Reduction Act of 1995, the Warren Grant Magnuson Clinical Center (CC), the National Institutes of Health (NIH) has submitted to the Office of Management and Budget (OMB) a request for review and approval of the information collection listed below. This proposed information collection was previously published in the **Federal Register** on December 7, 2000, page 76659 and allowed 60-days for public comments. No public comments were received. The purpose of this notice is to allow an additional 30-days for public comment. The National Institutes of Health may not conduct or sponsor, and the respondent is not required to respond to, an information collection that has been extended, revised, or implemented on or after October 1, 1995, unless it displays a currently valid OMB control number.

Proposed Collection

Title: Generic Clearance for Satisfaction Surveys of Customer and Other Partners.

Type of Information Collection Request: Extension (OMB Control Number: 0925–0458). *Need and Use of Information Collection:* The information collected in these surveys will be used by Clinical Center personnel: (1) To evaluate the satisfaction of various Clinical Center customers and other partners with Clinical Center services; (2) to assist with the design of modifications of these services, based on customer input; (3) to develop new services, based on customer need; and (4) to evaluate the satisfaction of various Clinical Center customers and other partners with implemented service modifications. These surveys will almost certainly lead to quality improvement activities that will enhance and/or streamline the Clinical Center's operations. The major mechanisms by which the Clinical Center will request customer input is through surveys and focus groups. The surveys will be tailored specifically to each class of customer and to that class of customer's needs. Surveys will either be collected as written documents, as faxed documents, mailed electronically or collected by telephone from customers. Information gathered from these surveys of Clinical Center customers and other partners will be presented to, and used directly by management to enhance the services and operations of our organization. *Frequency of Response:* The participants will respond yearly. *Affected public:* Individuals and households, businesses and other for profit, small businesses and organizations. *Type of respondents:* These surveys are designed to assess the satisfaction of the Clinical Center's major internal and external customers with the services provided. These customers include, but are not limited to, the following groups of individuals: Clinical Center patients, family members of Clinical Center patients, visitors to the Clinical Center, National Institutes of Health investigators, NIH intramural collaborators, private physicians or organizations who refer patients to the Clinical Center, volunteers, vendors and collaborating commercial enterprises, small businesses, regulators, and other organizations. The annual reporting burden is as follows: *Estimated Number of Respondents:* 16,812; *Estimated Number of Responses per Respondent:* 1; *Average Burden Hours per Response:* .3168; and *Estimated Total Annual Burden Hours Requested:* 5,327.6.

TABLE 1.—BURDEN ESTIMATE

Customer	Type of survey	Estimated number to be surveyed	Expected response rate (percent)	Time to complete survey (minutes)	Estimated burden hours
Clinical Center Patients	Questionnaire/Telephone	11,100	66	20	2436.6
Family Members of Patients	Questionnaire/Post-Card	8500	38	10	533.3
Visitors to the Clinical Center	Questionnaire Post-Card	3500	15	10	87.5
Former physician employees and trainees	Electronic	650	35	10	38.2
Guest workers/Guest researchers	Electronic	950	60	22	210
Extramural collaborators	Electronic	600	30	15	45
Vendors and Collaborating Commercial Enterprises	Questionnaire/Fax-Back	9500	17	18	475
Professionals and Organizations Referring Patients	Fax Back	9000	30	28	1250
Regulators	Fax Back	85	82	19	22
Volunteers	Questionnaire	850	58	28	230
Total			n = 16,812		5,327.6

Estimated costs to the respondents consists of their time; time is estimated using a rate of $10.00 per hour for patients and the public; $30.00 for vendors, regulators, organizations and $55.00 for health care professionals. The estimated annual costs to respondents for each year for which the generic clearance extension is requested is $24,531 annually. A contract has been let with a vendor to provide assistance in survey administration. The estimated annual cost of this contract is $25,000.00. There are no capital costs to report.

Requests for Comments

Written comments and/or suggestions from the public and affected agencies are invited on one or more of the following points: (1) Whether the proposed collection of information is necessary for the proper performance of the functions of the Clinical Center and the agency, including whether the information shall have practical utility; (2) The accuracy of the agency's estimate of the burden of the proposed collection of information, including the validity of the methodology and assumptions used; (3) Ways to enhance the quality, utility, and clarity of the information to be collected and (4) Ways to minimize the burden of the collection of information on those who are to respond, including the use of automated, electronic, mechanical, or other technological collection techniques or other forms of information technology.

Direct Comments to OMB: Written comments and/or suggestions regarding the items contained in this notice, especially regarding the estimated public burden and associated response times, should be directed to the: Office of Management and Budget, Office of Regulatory Affairs, New Executive Office Building, Room 10235, Washington, DC 20503, Attention: Desk Officer for NIH. To request more information on the proposed project, or to obtain a copy of the data collection plans and instruments, contact: Dr. David K. Henderson, Deputy Director for Clinical Care, Warran G. Magnuson Clinical Center, National Institutes of Health, Building 10, Room 2C 146, 9000 Rockville Pike, Bethesda, Maryland 20892, or call non-toll free: (301) 496–3515, or e-mail your request or comments, including your address to: dhenderson@cc.nih.gov.

Comments Due Date: Comments regarding this information collection are best assured of having their full effect if received on or before March 15, 2001.

Dated: February 7, 2001.

David K. Henderson,

Deputy Director for Clinical Care, CC.

[FR Doc. 01–3602 Filed 2–12–01; 8:45 am]

BILLING CODE 4140–01–M]

011309

DEPARTMENT OF HEALTH AND HUMAN SERVICES

National Institutes of Health

Submission for OMB Review; Comment Request; Evaluation of User Satisfaction With NIH Internet Sites

SUMMARY: Under the provisions of Section 3507(a)(1)(D) of the Paperwork Reduction Act of 1995, the National Institutes of Health (NIH) has submitted to the Office of Management and Budget (OMB) a request to review and approve the information collection listed below. This proposed information collection was previously published in the **Federal Register** on March 6, 2000, in Volume 65, No. 44, pages 11787–11788, under the title ''Request for Generic Clearance to Collect Customer Survey Data Pertaining to NIH Internet Sites,'' and allowed 60 days for public comment. No public comments were received. The purpose of this notice is to allow an additional 30 days for public comment. The NIH may not conduct or sponsor, and the respondent is not required to respond to, an information collection that has been extended, revised, or implemented after October 1, 1995, unless it displays a currently valid OMB control number.

Proposed Collection

Title: Evaluation of User Satisfaction with NIH Internet Sites. *Type of Information Collection Request:* New. *Need and Use of Information Collection:* Executive Order 12862 directs agencies that provide significant services directly to the public to survey customers to determine the kind and quality of services they want and their level of satisfaction with existing services. With this submission, the NIH, Office of Communications and Public Liaison, seeks to obtain OMB's generic approval to conduct customer satisfaction surveys. Since the late 1980's, the NIH has seized the opportunity to disseminate information and materials via the Internet. Today, rapid technological changes of the WWW warrant on-going constituent and resource analysis. With survey information, the NIH is enabled to serve, and respond to, the ever-changing demand by the public. The 'public' includes individuals (such as patients, educators, students, etc.) and interested communities (such as national or local organizations/institutions) and business. Survey information will augment current Web content, delivery, and design research which is used to understand the Web user, and more specifically, the NIH user community. Primary objectives are to (1) Classify NIH Internet users; (2) summarize and better understand customer needs; and (3) quantify the effectiveness/efficiency of current tools and delivery. Overall, the Institutes, Centers, and Offices of the NIH will use the survey results to identify strengths and weaknesses in current Internet strategies. Findings will help to (1) Understand user community and how to better serve Internet users; (2) discover areas requiring improvement in either content or delivery; (3) realize how to align Web offerings with identified user need(s); and (4) explore methods to offer and deliver information with efficacy and equity. *Frequency of Response:* Annual [As needed on an on-going and, possibly, concurrent basis (by Institute, Center, or Office)]. *Affected Public:* Users of the Internet. Primarily, this is an individual at their place(s) of access including, but not limited to, home or/and work environments. *Type of Respondents:* Public users of the NIH Internet site, *www.nih.gov,* which may include organizations, medical researchers, physicians and other health care providers, librarians, students, as well as individuals of the general public. *Estimated Number of Respondents:* 104,000. *Number of Respondents Per Respondent:* 1. *Average Burden Hours Per Response:* 0.084. *Burden Hours Requested:* 8684. Total annualized cost to respondents is estimated at $116,105. There are also no capital costs, operating costs and/or maintenance costs to report.

SURVEY TITLE: WEB CUSTOMER SATISFACTION SURVEY—ANNUAL REPORTING BURDEN [1]

[Web-based; Required for FEDERAL REGISTER requests under PRA, Paperwork Reduction Act.]

Survey area	No. respondents	Frequency of response	Avg. burden per response (hours)	Burden hours
NIH Organization-wide (1 entity)	4,000			334
Overall customer satisfaction	2,000	1	0.1002	200
Specific indicator: Top-level/Entry pages	1,000	1	0.0668	67
Specific indicator: Tools and initiatives	1,000	1	0.0668	67
Individual Institute/Office	100,000			8,350
Overall customer satisfaction	50,000	1	0.1002	5,010
Specific indicator: Top-level/Entry pages	25,000	1	0.0668	1,670
Specific indicator: Tools and initiatives	25,000	1	0.0668	1,670
Total	104,000		0.084	8,684

[1] Survey research firm, MediaMetrics, indicated 1,264,000 unique visitors to NIH sites in Dec, 1999. If fully implemented, an average month would survey 8,600 users (less than 0.007 of total average unique visitors to NIH sites).

Request for Comments

Written comments and/or suggestions from the public and affected agencies are invited on one or more of the following points: (1) Whether the proposed collection of information is necessary for the proper performance of the function of the agency, including whether the information will have practical utility; (2) The accuracy of the agency's estimate of the burden of the proposed collection of information, including the validity of the methodology and assumptions used; (3) Ways to enhance the quality, utility, and clarity of the information to be collected; and (4) Ways to minimize the burden of the collection of information on those who are to respond, including the use of appropriate automated, electronic, mechanical, or other technological collection techniques or other forms of information technology.

FOR FURTHER INFORMATION CONTACT: To request additional information on the proposed collection of information contact: Dennis Rodrigues, NIH Office of Communications and Public Liaison, 9000 Rockville Pike, Bldg. 31, Rm. 2B03, Bethesda, Maryland 20892–2094,

or call non toll-free at (301) 435–2932. You may also e-mail your request to dr3p@nih.gov.

Comments Due Date

Comments regarding this information collection are best assured of having their full effect if received within 30 days of the date of this publication.

Dated: February 1, 2001.

Anne Thomas,

Assoc. Director, Office of Communications and Public Liaison, National Institutes of Health.

[FR Doc. 01–3607 Filed 2–12–01; 8:45 am]

BILLING CODE 4140–01–P

DEPARTMENT OF HEALTH AND HUMAN SERVICES

National Institutes of Health

National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK): Opportunity for Cooperative Research and Development Agreements (CRADAs) to Develop Monoclonal Antibodies and/or Other Reagents and Products for Use in Identifying the Dombrock Blood Group Carrier Molecule Aimed at Improving Blood Typing Practices Through Molecular Means

AGENCY: National Institutes of Health, Public Health Service, DHHS.

ACTION: Notice.

SUMMARY: The National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK) of the National Institutes of Health (NIH) is seeking Licensee(s) and/or proposals in the form of capability statements from potential collaborators for a Cooperative Research and Development Agreement (CRADA) to develop monoclonal antibodies and/or other reagents and products for use in identifying the Dombrock blood group carrier molecule. The U.S. government-owned technology is encompassed within U.S. Provisional Patent Application Serial No. 60/235,162, entitled ''Identification of The Dombrock Blood Group Glycoprotein as a Polymorphic Member of The ADP-Ribosyltransferase Gene Family''.

Pursuant to the Federal Technology Transfer Act of 1986 (FTTA, 15 U.S.C. 3710; and Executive Order 12591 of April 10, 1987, as amended by the National Technology Transfer and Advancement Act of 1995), the National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK) of the National Institutes of Health (NIH) of the Public Health Service (PHS) of the Department of Health and Human Services (DHHS) seeks a Cooperative Research and Development Agreement (CRADA) with a pharmaceutical or biotechnology company to develop monoclonal antibodies and/or other reagents for use in identifying the Dombrock blood group carrier molecule. The goals of the CRADA include the rapid publication of research results and timely commercialization of products or methods that may result from the research.

The potential Collaborator(s) capability statement should provide proof of expertise in blood typing practices through molecular means along with a brief commercialization plan. The NIH also will consider proposals from Collaborators with demonstrated expertise in developing kits designed to identify blood group antibodies in recipients of transfused blood or blood products.

DATES: Only written CRADA capability statements received by the NIDDK on or before March 30, 2001 will be considered during the initial design phase; confidential information must be clearly labeled. Potential Collaborators may be invited to meet with the Selection Committee at the Collaborator's expense to provide additional information. The Institute may issue an additional notice of CRADA opportunity during the design phase.

FOR FURTHER INFORMATION CONTACT: Capability statements should be submitted to Dr. Michael W. Edwards, Office of Technology Development, National Institute of Diabetes and Digestive and Kidney Diseases, National Institutes of Health, BSA Building, Suite 350 MSC 2690, 9190 Rockville Pike, Bethesda, MD 20814–3800; Tel: 301/496–7778, Fax: 301/402–0535; Email: mels@nih.gov.

SUPPLEMENTARY INFORMATION: A CRADA is an agreement designed to enable certain collaborations between Government laboratories and non-Government laboratories. It is not a grant, and is not a contract for the procurement of goods/services. The NIDDK is prohibited from transferring funds to a CRADA collaborator. Under a CRADA, NIDDK can contribute facilities, staff, materials, and expertise to the effort. The collaborator typically contributes facilities, staff, materials, expertise, and funding to the collaboration. The CRADA collaborator receives an exclusive option to negotiate an exclusive or non-exclusive license to Government intellectual property rights arising under the CRADA in a pre-determined field of use and may qualify as a co-inventor of new technology developed under the CRADA.

Identification of the 25 known human blood group molecules is of fundamental importance for the fields of erythroid cell biology and transfusion medicine. The molecular description of the ''Dombrock'' blood group system has been determined. A candidate gene was identified by in silico analyses of approximately 5000 expressed sequence tags (ESTs) from terminally differentiating human erythroid cells. Transfection experiments demonstrated specific binding of anti-Dombrock and confirmed glycosylphosphatidylinositol membrane attachment.

Currently, reagents may not be available to readily type all blood using serology. The information derived by this invention of the Dombrock blood group carrier gene can be used to type the human blood supply. The public health need is to improve the blood typing practices through molecular means and thereby prevent clinical problems associated with improperly cross-matched blood.

Capability Statements

A Selection Committee will utilize the information provided in the ''Collaborator Capability Statements'' received in response to this announcement to help in its deliberations. It is the intention of the NIDDK that all qualified Collaborators have the opportunity to provide information to the Selection Committee through their capability statements. The Capability Statement should not exceed 10 pages and should address the following selection criteria:

(1) The statement should provide specific details of the method to be utilized in the development of the monoclonal antibody to the Dombrock molecule.

(2) The statement should include a detailed plan demonstrating the ability to provide sufficient quantities of the agent in a timely manner for the duration of the study.

(3) The statement may include outline outcome measures of interest to the Collaborator. The specifics of the proposed outcome measures and the proposed support should include but not be limited to the following: monoclonal development expertise, specific funding commitment to support the advancement of scientific research, personnel services, facilities, equipment, or other resources that would contribute to the conduct of the commercial development.

(4) The statement must address willingness to promptly publish research results and ability to be bound

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by PHS intellectual property policies (see CRADA: http://ott.od.nih.gov/newpages/crada.pdf).

Licensing Information

This technology was previously advertised in the December 26, 2000 issue of the **Federal Register** as a licensing opportunity [65 FR 81532]. Briefly, the gene and its polymorphisms that result in the Dombrock blood group antigenicity, for the first time, provide a route for reliable blood typing. Products aimed at improving blood typing practices through molecular means, thereby preventing mismatched blood transfusions, can also be developed with this technology. For the sake of completeness, the licensing contact is provided here: John Rambosek; 301/496–7056, ext. 270; fax: 301/402–0220; e-mail: rambosej@od.nih.gov.

Dated: February 5, 2001.

Jack Spiegel,

Director, Division of Technology Development and Transfer, Office of Technology Transfer.

[FR Doc. 01–3603 Filed 2–12–01; 8:45 am]

BILLING CODE 4140–01–M

DEPARTMENT OF HEALTH AND HUMAN SERVICES

National Institutes of Health

Government-Owned Inventions; Availability for Licensing

AGENCY: National Institutes of Health, Public Health Service, DHHS.

ACTION: Notice.

SUMMARY: The inventions listed below are owned by agencies of the U.S. Government and are available for licensing in the U.S. in accordance with 35 U.S.C. 207 to achieve expeditious commercialization of results of federally-funded research and development. Foreign patent applications are filed on selected inventions to extend market coverage for companies and may also be available for licensing.

ADDRESSES: Licensing information and copies of the U.S. patent applications listed below may be obtained by writing to the indicated licensing contact at the Office of Technology Transfer, National Institutes of Health, 6011 Executive Boulevard, Suite 325, Rockville, Maryland 20852–3804; telephone: 301/496–7057; fax: 301/402–0220. A signed Confidential Disclosure Agreement will be required to receive copies of the patent applications.

Potentiation of Antineoplastic Agents Using Sigma 2 Ligands

Keith W. Crawford, Wayne D. Bowen (NIDDK)

DHHS Reference No. E–165–99/0 filed 11 May 2000

Licensing Contact: Catherine Joyce; 301/496–7735 ext. 244; e-mail: joycec@od.nih.gov.

The inventors have developed a therapeutic method of treating cancer through the administration of a sigma-2 receptor ligand, such as CB–184, in combination with the anti-neoplastic drugs, doxorubicin or actinomycin D. The novel combination produces marked tumor cell death at concentrations that produce little or no cytotoxicity when cells are exposed to the drugs alone. The protocol may be effective in treating tumors that are resistant to antineoplastics alone as a result of mutations of the p53 tumor suppressor gene.

Tumor Markers in Ovarian Cancer

Patrice J. Morin, Colleen D. Hough, Cheryl A. Sherman-Baust, Ellen S. Pizer (NIA)

DHHS Reference No. E–138–00/0 filed 03 Apr 2000

Licensing Contact: Catherine Joyce; 301/496–7735 ext. 244; e-mail: joycec@od.nih.gov.

This invention relates generally to the identification of ovarian tumor markers and diagnostic, prognostic and therapeutic methods for their use. The invention is based on the identification of a series of ovarian tumor marker genes that are highly expressed in ovarian epithelial tumor cells and are minimally expressed in normal ovarian epithelial cells.

Imidazoacridones With Anti-Tumor Activity

Cholody et al. (NCI)

DHHS Reference No. E–289–99/0 filed 07 March 2000

Licensing Contact: Girish Barua; 301/496–7735 ext. 263; e-mail: baruag@od.nih.gov.

The present invention relates to novel bifunctional molecules with anti-tumor activity. These agents are composed of an imidazoacridone moiety linked by a nitrogen containing aliphatic chain of various length and rigidity to another aromatic ring system capable of intercalation to DNA.

Previous studies on related symmetrical bis-imidazoacridones revealed that only one planar imidazoacridone moiety intercalates into DNA. The second aromatic moiety which is crucial for biological activity resides in DNA groove, and is believed to interact with DNA-binding proteins (most likely, transcription factors). It was hypothesized that action of bis-imidazoacridone constitute a new paradigm of how small molecules can interfere with gene transcription.

To enhance the biological activity, the inventors have developed unsymmetrical compounds in which one imidazoacridone system with relatively poor DNA-intercalating properties was replaced with much stronger intercalators, such as 3-chloro-7-methoxyacridine or naphthalimide moieties. These new compounds, especially those containing naphthalimide moiety are extremely cytotoxic against variety of tumor cells in vitro (IC50 at low nanomolar range) and kill tumor cells by inducing apoptosis. In vivo, in nude mice xenografted with human tumors, the compounds significantly inhibited growth of such tumors as colon tumor HCT116 and Colo205 as well pancreatic tumors (lines 6.03 and 10.05 freshly established from a patient).

Dated: February 6, 2001.

Jack Spiegel,

Director, Division of Technology Development and Transfer, Office of Technology Transfer, National Institutes of Health.

[FR Doc. 01–3604 Filed 2–12–01; 8:45 am]

BILLING CODE 4140–01–P

DEPARTMENT OF HEALTH AND HUMAN SERVICES

National Institutes of Health

Government-Owned Inventions; Availability for Licensing

AGENCY: National Institutes of Health, Public Health Service, DHHS.

ACTION: Notice

SUMMARY: The inventions listed below are owned by agencies of the U.S. Government and are available for licensing in the U.S. in accordance with 35 U.S.C. 207 to achieve expeditious commercialization of results of federally-funded research and development. Foreign patent applications are filed on selected inventions to extend market coverage for companies and may also be available for licensing.

ADDRESSES: Licensing information and copies of the U.S. patent applications listed below may be obtained by writing to the indicated licensing contact at the Office of Technology Transfer, National Institutes of Health, 6011 Executive Boulevard, Suite 325, Rockville, Maryland 20852–3804; telephone: 301/496–7057; fax: 301/402–0220. A signed

Confidential Disclosure Agreement will be required to receive copies of the patent applications.

Benzoylalkylindolepyridinium Compounds and Pharmaceutical Compositions Comprising Such Compounds

William G. Rice, Mingjun Huang, Robert W. Buckheit, Jr., David G, Covell, Grzegorz Czerwinski, Christopher Michejda, and Vadim Makarov (NCI)

DHHS Reference No. E–278–98/0 filed 18 Dec 2000

Licensing Contact: Sally Hu; 301/496–7056 ext. 265; e-mail: hus@od.nih.gov.

The present invention provides novel antiviral compounds active against HIV. These compounds, referred to as benzoylalkylindolepyridinium compounds (BAIPs) are effective against HIV isolates that have developed mutations rendering conventional drugs ineffective. BAIPs apparently do not require intracellular phosphorylation nor bind to the reverse transcriptase (RT) active site, which distinguishes their mechanism of action from the dideoxynucleoside (ddN) and acyclic nucleoside phosphonate (ANP) nucleoside analog drugs. ddN and ANP have proven clinically effective against limiting human immunodeficiency virus (HIV) infection, but resistance rapidly emerges due to mutations in and around the RT active site. The BAIPs also may be distinguished from non-nucleoside reverse transcriptase inhibitors (NNRTIs), in part because the BAIPs bind to a different site on the RT enzyme. The usage of NNRTIs is limited by the rapid emergence of resistant strains also. Moreover, unlike the NNRTIs, BAIPs of the present invention have been shown to be effective against HIV–1, HIV–2 and simian immunodeficiency virus (SIV) proliferation. Thus, BAIPs are broadly antiviral, non-nucleoside reverse transcriptase inhibitors (BANNRTIs).

Monoclonal Antibodies Specific for the E2 Glycoprotein of Hepatitis C Virus and Their Use in the Diagnosis, Treatment and Prevention of Hepatitis C

Darren Schofield, Suzanne U. Emerson, Robert H. Purcell, Harvey J. Alter (NIAID)

DHHS Reference No. E–017–01/0 filed 01 Dec 2000

Licensing Contact: Carol Salata; 301/496–7735 ext. 232; salatac@od.nih.gov.

Hepatitis C virus is an enveloped, single stranded RNA virus, approximately 50 nm in diameter, that has been classified as a separate genus in the Flaviviridae family. Most persons infected with hepatitis C virus develop chronic infection. These chronically infected individuals have a relatively high risk of developing chronic hepatitis, liver cirrhosis and hepatocellular carcinoma. There is currently no vaccine to prevent hepatitis C virus infection. The present invention relates to human monoclonal antibodies which exhibit immunological binding affinity for the hepatitis C virus E2 glycoprotein and are cross-reactive against different hepatitis C virus strains. These antibodies may be used in passive immunoprophylaxis for the prevention of hepatitis C virus infection and/or in passive immunotherapy for the treatment of hepatitis C.

Cell-Free Assembly of Lentiviral Capsids

Campbell et al. (NCI)

DHHS Reference No. E–287–00/0 filed 01 Dec 2000

Licensing Contact: Carol Salata; 301/496–7735 ext. 232; e-mail: salatac@od.nih.gov.

Dr. Campbell and his colleagues have discovered a novel method of assembling HIV immature capsids from recombinant purified Gag proteins in vitro. Specifically, the discovery is that the presence of certain phosphates is required for assembly of full-sized HIV capsids in vitro. Therefore, compounds which interfere with the effect of these phosphates on virus assembly or that deplete cellular pools of these phosphates, could be effective antiviral agents. This discovery then provides an in vitro screening method of identifying such potential antiviral agents. It also provides techniques for producing full-size virus-like particles in vitro. In fact, Dr. Campbell is the first to report the assembly of authentic viral capsids from full length Gag proteins in a completely defined system. Such proteins could be potentially useful as safe HIV vaccines or for delivery of nucleic acids or pharmacological agents in patients.

Sample Delivery System With Laminar Mixing for Microvolume Biosensing

Peter Schuck (ORS)

DHHS Reference No. E–143–00/0 filed 06 Nov 2000

Licensing Contact: Dale Berkley; 301/496–7735 ext. 223; e-mail: berkleyd@od.nih.gov.

The invention is a sample delivery system that comprises at least two microchannels in fluid communication with a sample chamber containing a biosensor. Biosensing for studying molecular recognition has become an important biophysical tool for biomedical research. The system aspirates a small sample volume into the system's microfluidic channels and applies a periodic oscillatory flow pattern to the sample. This prevents sample depletion in the stagnant layer across the sensor surface and results in efficient mixing of the sample during the biosensor measurement. Because the oscillatory flow pattern does not produce a net transport of the sample with time, there is a very long incubation time of the sensor surfaces with a very small sample volume. The new sample delivery system uses sample volumes of only 3 to 8 microliters, compared to the 25 to 200 microliter volumes of conventional systems, which use cuvette principles or continuous flow microfluidics. The present invention is substantially better than existing systems with respect to biosensor contact time and required sample volume.

In Vivo DNA Engineering Using the Recombination System (red) of Bacteriophage Lambda

Donald Court, Daiguan Yu, E-Chiang Lee, Nancy Jenkins, Neal Copeland (NCI)

DHHS Reference No. E–170–99/0

Licensing Contact: Peter Soukas; 301–496–7056 ext. 268; e-mail: soukasp@od.nih.gov.

Available for licensing through a Biological Materials License Agreement are several E. coli strains developed through a novel recombination system that allows for efficient chromosome engineering in E. coli using electroporated linear DNA. This technique provides for a much greater degree of accuracy and efficiency compared to current restriction endonuclease techniques for DNA engineering. The inventors' system is based on the recombination function designated red in bacteriophage lambda (λ). High recombination efficiency is obtained using a PCR-amplified donor DNA fragment with two flanking 30–40 base pairs of DNA homologous to the targeted DNA. In vivo cloning is accomplished by introducing linear plasmid vectors and linear DNA to be cloned with the segment to be cloned flanked by short homologies to the vector. The linear vector can also be used to subclone DNA segments directly from the bacterial chromosome or genomic BAC (PAC) clones by short homology mediated gap repair. The inventors have shown that when the red function is turned on for fifteen minutes, donor DNA can be recombined with a frequency 104–105 times higher than in a red off-control kept at 32 degrees C. The system is further described in Yu et al., ''An efficient

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recombination system for chromosome engineering in Escherichia coli,'' P.N.A.S. 97(11):5978–5983 (2000).

Simian-Human HAV Chimeras Encoding a Hepatitis A Virus Having a Chimeric 2C Protein

G Raychaudhuri, SU Emerson, RH Purcell (NIAID)

Serial No. 60/015,642 filed 19 Apr 1996; PCT/US97/06506 filed 18 Apr 1997; Serial No. 09/171,387 filed 24 Mar 1999

Licensing Contact: Carol Salata, 301/496–7735 ext. 232; e-mail: salatac@od.nih.gov.

The claimed invention provides nucleic acid sequences which encode hepatitis A viruses having a chimeric 2C protein. The chimeric 2C gene consists of sequences from both the human strain and the simian AGM–27 strain. The chimeric virus is a promising candidate for an attenuated hepatitis A virus vaccine which may be more economical than an inactivated vaccine, especially in underdeveloped countries where hepatitis A in endemic. Additional information on the chimeras may be found in Rayachaudhuri et al., ''Utilization of chimeras between human(HM175) and simian(AGM27) strains of hepatitis A virus to study the molecular basis of virulence,'' J. Virol. 72:7467–7474(1998).

Novel Antimalarial Compounds, Methods of Synthesis Thereof, Pharmaceutical Compositions Comprising Same, and Methods of Using Same for Treatment and Prevention of Malaria

Michael R. Boyd (NCI), Gerhard Bringmann (EM), Sven Harmsen (EM) Roland Gotz (EM), T. Ross Kelly (EM), Matthias Wenzel (EM), Guido Francois (EM), J. D. Phillipson (EM), Laurent A. Assi (EM), Christopher Schneider (EM) Serial No. 08/195,547, filed 02/14/1994, now U.S. Patent 5,639,761; Serial No. 08/843,582, filed 04/16/1997; Serial No. 08/279,261, filed 07/22/1994, now U.S. Patent 5,552,550; Serial No. 08/674,362, filed 07/01/1996, now U.S. Patent 5,763,613; Serial No. 09/001,801, filed 12/31/1997, now U.S. Patent 6,140,339; Serial No. 09/527,002, filed 03/16/2000; Serial No. 08/279,339, filed 07/22/1994, now U.S. Patent 5,571,919; Serial No. 08/363,684, filed 12/23/1994, now U.S. Patent 5,578,729; Serial No. 08/674,359, filed 07/01/1996, now U.S. Patent 5,789,594; Serial No. 08/721,084, filed 09/24/1996, now U.S. Patent 5,786,482

Licensing Contact: Peter Soukas; 301/496–7056 ext. 268; e-mail: soukasp@od.nih.gov.

According to data recently reported by the World Health Organization (WHO), the death rate from malaria exceeds one million individuals per year. The Public Health Service seeks exclusive or non-exclusive licensee(s) to develop and commercialize the technology claimed within the portfolio of U.S. patents issued and pending, and corresponding international patents issued and pending. These patents and pending applications claim an exceptionally broad universe of novel naphthylisoquinoline alkaloid compounds, and methods of total synthesis thereof. Representative examples of these compounds have been shown to have potent in vitro activity against malaria parasites, including parasites that are highly resistant to available antimalarial drugs. Representative examples have also been shown to have potent in vivo activity against malaria parasites in animal models. Pharmaceutical compositions comprising these compounds, as well as methods of using the compounds to treat or prevent a malarial infection of a host, are claimed. The relative structural simplicity of this class of compounds, and the ready synthetic access thereto, provide unprecedented opportunities for structure-activity relationship (SAR), lead-optimization and antimalarial drug development. The technology is further described in the following publications: J. Nat Prod. 1997 Jul.;60(7):677–83 and Bioorg. Med. Chem. Lett. 1998 Jul.;8(13): 1729–34.

Dated: February 2, 2001.

Jack Spiegel,

Director, Division of Technology Development and Transfer, Office of Technology Transfer, National Institutes of Health.

[FR Doc. 01–3605 Filed 2–12–01; 8:45 am]

BILLING CODE 4140–01–P

DEPARTMENT OF HEALTH AND HUMAN SERVICES

National Institutes of Health

Government-Owned Inventions; Availability for Licensing

AGENCY: National Institutes of Health, Public Health Service, DHHS.

ACTION: Notice.

SUMMARY: The inventions listed below are owned by agencies of the U.S. Government and are available for licensing in the U.S. in accordance with 35 U.S.C. 207 to achieve expeditious commercialization of results of federally-funded research and development. Foreign patent applications are filed on selected inventions to extend market coverage for companies and may also be available for licensing.

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The ImmunoChip

Matthias Lorenz (NCI)

DHHS Reference No. E–288–00/0 filed 29 Dec 2000

Licensing Contact: Richard Rodriguez; 301/496–7056 ext. 287; e-mail: rodrigur@od.nih.gov.

The inventors have established a method to select sequences from databases for the construction of custom microarrays. Using this method, an immunological relevant microarray (ImmunoChip) was constructed. The ImmunoChip is a cDNA microarray which contains more than 13,000 different murine immunological-relevant genetic probes. The ImmunoChip can be used to study gene expression of immune cells or immune infiltrating tissues and organs. Specifically, the chip could be used for immunologically related research and/or vaccine development for a variety of human diseases which would include, but not necessarily limited to, cancer, infectious diseases, autoimmune diseases and allergies.

Water Soluble Amino Acid Analogs of Aminoflavone Compounds

Kenneth M. Snader et al. (NCI)

DHHS Reference No. E–279–99/0 filed 06 Apr 2000

Licensing Contact: Girish Barua; 301/496–7735 ext. 263; e-mail: baruag@od.nih.gov.

Many potential drugs of cancer chemotherapy intended for parenteral administration have been abandoned because the active ingredient is either slightly soluble or water-insoluble. Various methods have been developed to improve water solubility of these drugs. However, these methods can be complex and have a negative impact resulting from the use of co-solvents and complexing agents. The present invention addresses these problems by providing a method of producing water-

soluble analogues of water-insoluble drugs.

In particular, the present invention describes novel analogues derived from 5-aminoflavone (TK2339) compounds. These derivatives have shown good differential activity in the NCI 60-cell line in vitro cancer drug screen with potent and selective cytotoxicity against CAKI–1 and A498 renal, MCF–7 breast, and OVCAR–5 ovarian carcinoma cell lines. In addition, these derivatives have shown in vivo activity against CAKI–1 and A498 renal carcinoma xenographs.

To overcome poor solubility of many members of the flavone class of compounds, a series of more hydrophilic, polar conjugates were prepared which are capable of forming soluble salts. These novel compounds display improved solubility in aqueous solutions over the parent compound without sacrificing potent antitumor activity. Since these compounds possess very favorable pharmaceutical properties, they have the greater potential to be useful in the treatment of human cancers.

Dated: February 2, 2001.

Jack Spiegel,

Director, Division of Technology, Development and Transfer, Office of Technology Transfer, National Institutes of Health.

[FR Doc. 01–3606 Filed 2–12–01; 8:45 am]

BILLING CODE 4140–01–P

DEPARTMENT OF HEALTH AND HUMAN SERVICES

National Institutes of Health

National Institute of Dental & Craniofacial Research; Notice of Closed Meetings

Pursuant to section 10(d) of the Federal Advisory Committee Act, as amended (5 U.S.C. Appendix 2), notice is hereby given of the following meetings.

The meetings will be closed to the public in accordance with the provisions set forth in sections 552b(c)(4) and 552b(c)(6), Title 5 U.S.C., as amended. The grant applications and the discussions could disclose confidential trade secrets or commercial property such as patentable material, and personal information concerning individuals associated with the grant applications, the disclosure of which would constitute a clearly unwarranted invasion of personal privacy.

Name of Committee: National Institute of Dental and Craniofacial Research Special Emphasis Panel 01–33, Review of R13 Grants.

Date: February 16, 2001.

Time: 11 a.m. to 1 p.m.

Agenda: To review and evaluate grant applications.

Place: 45 Center Drive, Natcher Building, Conference Room E½, Bethesda, MD 20892, (Telephone Conference Call).

Contact Person: H. George Hausch, PhD, Chief, 4500 Center Drive, Natcher Building, Rm. 4AN44F, National Institutes of Health, Bethesda, MD 20892, (301) 594–2372.

This notice is being published less than 15 days prior to the meeting due to the timing limitations imposed by the review and funding cycle.

Name of Committee: National Institute of Dental and Craniofacial Research Special Emphasis Panel 01–34, Review of training grants.

Date: February 21–22, 2001.

Time: 2 p.m. to 4 p.m.

Agenda: To review and evaluate grant applications.

Place: The Hyatt Regency Hotel, 100 Bethesda Metro Center, Bethesda, MD 20814.

Contact Person: Yujing Liu, MD, PhD, Scientific Review Administrator, National Institute of Dental & Craniofacial Res., 45 Center Drive, Natcher Building, Rm. 4AN44F, Bethesda, MD 20892, (301) 594–2372.

This notice is being published less than 15 days prior to the meeting due to the timing limitations imposed by the review and funding cycle.

Name of Committee: National Institute of Dental and Craniofacial Research Special Emphasis Panel 01–24, Review of R13 Grants.

Date: February 28, 2001.

Time: 10 a.m. to 12 p.m.

Agenda: To review and evaluate grant applications.

Place: 45 Center Drive, Bethesda, MD 20892, (Telephone Conference Call).

Contact Person: H. George Hausch, PhD, Chief, 4500 Center Drive, Natcher Building, Rm. 4AN44F, National Institutes of Health, Bethesda, MD 20892, (301) 594–2372,

This notice is being published less than 15 days prior to the meeting due to the timing limitations imposed by the review and funding cycle.

Name of Committee: National Institute of Dental and Craniofacial Research Special Emphasis Panel 01–25, Review of R01s.

Date: April 5, 2001.

Time: 2 p.m. to 4 p.m.

Agenda: To review and evaluate grant applications.

Place: 45 Center Drive, Bethesda, MD 20892, (Telephone Conference Call).

Contact Person: Yasaman Shirazi, PhD, Scientific Review Administrator, 4500 Center Drive, Natcher Building, Rm. 4AN44F, National Institute of Dental & Craniofacial Res., Bethesda, MD 20892, (301) 594–2372.

Name of Committee: National Institute of Dental and Craniofacial Research Special Emphasis Panel 01–28, Review of R44 Grants.

Date: April 6, 2001.

Time: 1 p.m. to 3 p.m.

Agenda: To review and evaluate grant applications.

Place: 45 Center Drive, Bethesda, MD 20892, (Telephone Conference Call).

Contact Person: Philip Washko, PhD, DMD, Scientific Review Administrator, 45 Center Drive, Natcher Building, Rm. 4AN44F, National Institutes of Health, Bethesda, MD 20892, (301) 594–2372.

Name of Committee: National Institute of Dental and Craniofacial Research Special Emphasis Panel 01–17, Review of R01 Grants.

Date: April 11, 2001.

Time: 1 p.m. to 3 p.m.

Agenda: To review and evaluate grant applications.

Place: 45 Center Drive, Bethesda, MD 20892, (Telephone Conference Call).

Contact Person: Philip Washko, PhD, DMD, Scientific Review Administrator, 45 Center Drive, Natcher Building, Rm. 4AN44F, National Institutes of Health, Bethesda, MD 20892, (301) 594–2372.

Name of Committee: National Institute of Dental and Craniofacial Research Special Emphasis Panel.

Date: April 24, 2001.

Time: 1 p.m. to 2:30 p.m.

Agenda: To review and evaluate grant applications.

Place: 45 Center Drive, Bethesda, MD 20892, (Telephone Conference Call).

Contact Person: Philip Washko, PhD, DMD, Scientific Review Administrator, 45 Center Drive, Natcher Building, Rm. 4AN44F, National Institutes of Health, Bethesda, MD 20892, (301) 594–2372.

(Catalogue of Federal Domestic Assistance Program Nos. 93.121, Oral Diseases and Disorders Research, National Institutes of Health, HHS)

Dated: February 6, 2001.

LaVerne Y. Stringfield,

Director, Office of Federal Advisory Committee Policy.

[FR Doc. 01–3593 Filed 2–12–01; 8:45 am]

BILLING CODE 4140–01–M

DEPARTMENT OF HEALTH AND HUMAN SERVICES

National Institutes of Health

National Institute of Dental & Craniofacial Research; Notice of Closed Meeting

Pursuant to section 10(d) of the Federal Advisory Committee Act, as amended (5 U.S.C. Appendix 2), notice is hereby given of the following meeting.

The meeting will be closed to the public in accordance with the provisions set forth in sections 552b(c)(4) and 552b(c)(6), Title 5 U.S.C., as amended. The grant applications and the discussions could disclose confidential trade secrets or commercial property such as patentable material, and personal information concerning individuals associated with the grant applications, the disclosure of which would constitute a clearly unwarranted invasion of personal privacy.

011315

Name of Committee: NIDCR Special Grants Review Committee.
Date: February 21–23, 2001.
Time: 8:30 a.m. to 5 p.m.
Agenda: To review and evaluate grant applications.
Place: The Hyatt Regency Hotel, 100 Bethesda Metro Center, Bethesda, MD 20814.
Contact Person: Yujing Liu, PhD, MD, Scientific Review Administrator, National Institute of Dental & Craniofacial Res. 45 Center Drive, Natcher Building, Rm. 4AN44F, Bethesda, MD 20892, (301) 594–2372.
This notice is being published less than 15 days prior to the meeting due to the timing limitations imposed by the review and funding cycle.

(Catalogue of Federal Domestic Assistance Program Nos. 93.121, Oral Diseases and Disorders Research, National Institutes of Health, HHS)

Dated: February 6, 2001.

LaVerne Y. Stringfield,

Director, Office of Federal Advisory Committee Policy.

[FR Doc. 01–3594 Filed 2–12–01; 8:45 am]

BILLING CODE 4140–01–M

DEPARTMENT OF HEALTH AND HUMAN SERVICES

National Institute of Health

National Institutes on Deafness and Other Communication Disorders; Notice of Closed Meeting

Pursuant to section 10(d) of the Federal Advisory Committee Act, as amended (5 U.S.C. Appendix 2), notice is hereby given of the following meeting.

The meeting will be closed to the public in accordance with the provisions set forth in sections 552b(c)(4) and 522b(c)(6), Title 5 U.S.C., as amended. The grant applications and the discussions could disclose confidential trade secrets or commercial property such as patentable material, and personal information concerning individuals associated with the grant applications, the disclosure of which would constitute a clearly unwarranted invasion of personal privacy.

Name of Committee: National Institute on Deafness and Other Communications Disorders Special Emphasis Panel.
Date: March 13, 2001.
Time: 8 a.m. to 5 p.m.
Agenda: To review and evaluate grant applications.
Place: The Virginian Suites, 1500 Arlington Blvd., Arlington, VA 22209.
Contact Person: Stanley C. Oaks, Jr., PhD, Scientific Review Branch, Division of Extramural Research, Executive Plaza South, Room 400C, 6120 Executive Blvd., Bethesda, MD 20892–7180, 301–496–8683.

(Catalogue of Federal Domestic Assistance Program Nos. 93.173, Biological Research to Deafness and Communicative Disorders, National Institutes of Health, HHS)

Dated: February 6, 2001.

LaVerne Y. Stringfield,

Director, Office of Federal Advisory Committee Policy.

[FR Doc. 01–3596 Filed 2–12–01; 8:45 am]

BILLING CODE 4140–01–M

DEPARTMENT OF HEALTH AND HUMAN SERVICES

National Institutes of Health

National Institute of Allergy and Infectious Diseases; Notice of Closed Meeting

Pursuant to section 10(d) of the Federal Advisory Committee Act, as amended (5 U.S.C. Appendix 2), notice is hereby given of the following meeting.

The meeting will be closed to the public in accordance with the provisions set forth in sections 552b(c)(4) and 552b(c)(6), Title 5 U.S.C., as amended. The contract proposals and the discussions could disclose confidential trade secrets or commercial property such as patentable material, and personal information concerning individuals associated with the contract proposals, the disclosure of which would constitute a clearly unwarranted invasion of personal privacy.

Name of Committee: National Institute of Allergy and Infectious Diseases Special Emphasis Panel.
Date: March 2, 2001.
Time: 8:30 a.m. to 3 p.m.
Agenda: To review and evaluate contract proposals.
Place: Four Points by Sheraton Bethesda, Embassy I Room, 8400 Wisconsin Avenue, Bethesda, MD 20814.
Contact Person: Edward W. Schroeder, PhD, Scientific Review Administrator, Scientific Review Program, Division of Extramural Activities, NIAID, NIH, Room 2156, 6700–B Rockledge Drive, MSC 7610, Bethesda, Md 20892–7610, 301–496–2550.

(Catalogue of Federal Domestic Assistance Program Nos. 93.855, Allergy, Immunology, and Transplantation Research; 93.856, Microbiology and Infectious Diseases Research, National Institutes of Health, HHS)

Dated: February 6, 2001.

LaVerne Y. Stringfield,

Director, Office of Federal Advisory Committee Policy.

[FR Doc. 01–3597 Filed 2–12–01; 8:45 am]

BILLING CODE 4140–01–M

DEPARTMENT OF HEALTH AND HUMAN SERVICES

National Institutes of Health

National Institute of Allergy and Infectious Diseases; Notice of Closed Meeting

Pursuant to section 10(d) of the Federal Advisory Committee Act, as amended (5 U.S.C. Appendix 2), notice is hereby given of the following meeting.

The meeting will be closed to the public in accordance with the provisions set forth in sections 552b(c)(4) and 552b(c)(6), Title 5 U.S.C., as amended. The grant applications and the discussions could disclose confidential trade secrets or commercial property such as patentable material, and personal information concerning individuals associated with the grant applications, the disclosure of which would constitute a clearly unwarranted invasion of personal privacy.

Name of Committee: National Institute of Allergy and Infectious Diseases Special Emphasis Panel.
Date: February 27, 2001.
Time: 2:15 p.m. to 3:45 p.m.
Agenda: To review and evaluate grant applications.
Place: 6700 B Rockledge Drive, Room 223, Bethesda, MD 20892, (Telephone Conference Call).
Contact Person: Nancy B. Saunders, PhD, Scientific Review Administrator, Scientific Review Program, Division of Extramural Activities, NIAID, NIH, Room 2217, 6700–B Rockledge Drive, MSC 7610, Bethesda, MD 20892–7610, 301 496–2550, ns120v@nih.gov.
This notice is being published less than 15 days prior to the meeting due to the timing limitations imposed by the review and funding cycle.

(Catalogue of Federal Domestic Assistance Program Nos. 93.855, Allergy, Immunology, and Transplantation Research; 93.856, Microbiology and Infectious Diseases Research, National Institutes of Health, HHS)

Dated: February 6, 2001.

LaVerne Y. Stringfield,

Director, Office of Federal Advisory Committee Policy.

[FR Doc. 01–3598 Filed 2–12–01; 8:45 am]

BILLING CODE 4140–01–M

DEPARTMENT OF HEALTH AND HUMAN SERVICES

National Institutes of Health

National Institute on Drug Abuse; Notice of Closed Meetings

Pursuant to section 10(d) of the Federal Advisory Committee Act, as amended (5 U.S.C. Appendix 2), notice

is hereby given of the following meetings.

The meetings will be closed to the public in accordance with the provisions set forth in sections 552b(c)(4) and 552b(c)(6), Title 5 U.S.C., as amended. The contract proposals and the discussions could disclose confidential trade secrets or commercial property such as patentable material, and personal information concerning individuals associated with the contract proposals, the disclosure of which would constitute a clearly unwarranted invasion of personal privacy.

Name of Committee: National Institute on Drug Abuse Special Emphasis Panel ''Develop Methods for Gathering Data and Completing Social Network Analysis in Drug Abuse Prevention''.

Date: February 15, 2001.

Time: 9 a.m. to 5 p.m.

Agenda: To review and evaluate contract proposals.

Place: Gaithersburg Marriott Washingtonian Center, 9751 Washingtonian Boulevard, Gaithersburg, MD 20878.

Contact Person: Lyle Furr, Contract Review Specialist, Office of Extramural Affairs, National Institute on Drug Abuse, National Institutes of Health, DHHS, 6001 Executive Boulevard, Room 3158, MSC 9547, Bethesda, MD 20892–9547, (301) 435–1439.

This notice is being published less than 15 days prior to the meeting due to the timing limitations imposed by the review and funding cycle.

Name of Committee: National Institute on Drug Abuse Special Emphasis Panel ''Prevention Training''.

Date: March 1, 2001.

Time: 9 a.m. to 5 p.m.

Agenda: To review and evaluate contract proposals.

Place: Gaithersburg Marriott Washingtonian Center, 9751 Washingtonian Boulevard, Gaithersburg, MD 20878.

Contact Person: Lyle Furr, Contract Review Specialist, Office of Extramural Affairs, National Institute on Drug Abuse, National Institutes of Health, DHHS, 6001 Executive Boulevard, Room 3158, MSC 9547, Bethesda, MD 20892–9547, (301) 435–1439.

(Catalogue of Federal Domestic Assistance Program Nos. 93.277, Drug Abuse Scientist Development Award for Clinicians, Scientist Development Awards, and Research Scientist Awards; 93.278, Drug Abuse National Research Service Awards for Research Training; 93.279, Drug Abuse Research Programs, National Institutes of Health, HHS)

Dated: February 6, 2001.

LaVerne Y. Stringfield,

Director, Office of Federal Advisory Committee Policy.

[FR Doc. 01–3599 Filed 2–12–01; 8:45 am]

BILLING CODE 4140–01–M

DEPARTMENT OF HEALTH AND HUMAN SERVICES

National Institutes of Health

National Institute on Drug Abuse; Notice of Closed Meetings

Pursuant to section 10(d) of the Federal Advisory Committee Act, as amended (5 U.S.C. Appendix 2), notice is hereby given of meetings.

The meetings will be closed to the public in accordance with the provisions set forth in section 552b(c)(4) and 552b(c)(6), Title 5 U.S.C., as amended. The grant applications and the discussions could disclose confidential trade secrets or commercial property such as patentable material, and personal information concerning individuals associated with the grant applications, the disclosure of which would constitute a clearly unwarranted invasion of personal privacy.

Name of Committee: National Institute on Drug Abuse Special Emphasis Panel Services Research on NIDA Treatment CTN.

Date: March 2, 2001.

Time: 8:30 a.m. to 2 p.m.

Agenda: To review and evaluate grant applications.

Place: Holiday Inn Georgetown, 2101 Wisconsin Avenue, NW., Washington, DC 20007.

Contact Person: Kesinee Nimit, MD, Health Scientist Administrator, Office of Extramural Affairs, National Institute on Drug Abuse, National Institutes of Health, DHHS, 6001 Executive Boulevard, Room 3158, Msc 041 9547, Bethesda, MD 20892–9547, (301) 435–1432.

Name of Committee: National Institute on Drug Abuse Special Emphasis Panel Programs Projects.

Date: March 20, 2001.

Time: 9 a.m. to 2 p.m.

Agenda: To review and evaluate grant applications and/or proposals.

Place: Bethesda Marriott Hotel, 5151 Pooks Hill Road, Bethesda, MD 20814.

Contact Person: Khursheed Asghar, PhD, Chief, Basic Sciences Review Branch, Office of Extramural Affairs, National Institute on Drug Abuse, National Institutes of Health, 6001 Executive Boulevard, Room 3158, MSC 9547, Bethesda, MD 20892–9547, (301) 443–2620.

(Catalogue of Federal Domestic Assistance Program Nos. 93.277, Drug Abuse Scientist Development Award for Clinicians, Scientist Development Awards, and Research Scientist Awards; 93.278, Drug Abuse National Research Service Awards for Research Training; 93.279, Drug Abuse Research Programs, National Institutes of Health, HHS)

Dated: February 6, 2001.

LaVerne Y. Stringfield,

Director, Office of Federal Advisory Committee Policy.

[FR Doc. 01–3600 Filed 2–12–01; 8:45 am]

BILLING CODE 4140–01–M

DEPARTMENT OF HEALTH AND HUMAN SERVICES

National Institutes of Health

National Institute on Drug Abuse; Amended Notice of Meeting

Notice is hereby given of a change in the meeting of the Treatment Research Subcommittee, February 28, 2001, 10 a.m. to February 28, 2001, 6 p.m., Embassy Suites at the Chevy Chase Pavilion, 4300 Military Road, N.W., Washington, DC, 20015 which was published in the **Federal Register** on January 26, 2001, Volume 66 FR 7923–24.

The date of this meeting has been changed to February 28–March 1, 2001. The Committee will convene from 10 a.m. to 6 p.m. on February 28, and from 8:30 a.m. to 1 p.m. on March 1. The meeting is closed to the public.

Dated: February 6, 2001.

LaVerne Y. Stringfield,

Director, Office of Federal Advisory Committee Policy.

[FR Doc. 01–3601 Filed 2–12–01; 8:45 am]

BILLING CODE 4140–01–M

DEPARTMENT OF HEALTH AND HUMAN SERVICES

National Institutes of Health

Center for Scientific Review; Notice of Closed Meetings

Pursuant to section 10(d) of the Federal Advisory Committee Act, as amended (5 U.S.C. Appendix 2), notice is hereby given of the following meetings.

The meetings will be closed to the public in accordance with the provisions set forth in sections 552b(c)(4) and 552b(c)(6), Title 5 U.S.C., as amended. The grant applications and the discussions could disclose confidential trade secrets or commercial property such as patentable material, and personal information concerning individuals associated with the grant applications, the disclosure of which would constitute a clearly unwarranted invasion of personal privacy.

Name of Committee: Center for Scientific Review Special Emphasis Panel.

Date: February 15, 2001.

Time: 12:30 p.m. to 1:30 p.m.

Agenda: To review and evaluate grant applications.

Place: Four Point Sheraton, 1201 K Street, N.W., Washington, DC 20005.

Contact Person: Priscilla B. Chen, PhD, Scientific Review Administrator, Center for Scientific Review, National Institutes of Health, 6701 Rockledge Drive, Room 4104,

011317

MSC 7814, Bethesda, MD 20892, (301) 435–1787.

This notice is being published less than 15 days prior to the meeting due to the timing limitations imposed by the review and funding cycle.

Name of Committee: Cardiovascular Sciences Integrated Review Group.

Date: February 26–27, 2001.

Time: 8 a.m. to 5 p.m.

Agenda: To review and evaluate grant applications.

Place: Double Tree Hotel, 1750 Rockville Pike, Rockville, MD 20852.

Contact Person: Gordon L. Johnson, PhD, Scientific Review Administrator, Center for Scientific Review, National Institutes of Health, 6701 Rockledge Drive, Room 4136, MSC 7802, Bethesda, MD 20892, (301) 435–1212, johnsong@csr.nih.gov.

This notice is being published less than 15 days prior to the meeting due to the timing limitations imposed by the review and funding cycle.

Name of Committee: Integrative, Functional and Cognitive Neuroscience Integrated Review Group Alcohol and Toxicology Subcommittee 3.

Date: February 26–27, 2001.

Time: 8 a.m. to 5 p.m.

Agenda: To review and evaluate grant applications.

Place: Washington Monarch Hotel, 2401 M Street, NW., Washington, DC 20037.

Contact Person: Christine Melchior, PhD, Scientific Review Administrator, Center for Scientific Review, National Institutes of Health, 6701 Rockledge Drive, Room 4102, MSC 7816, Bethesda, MD 20892, (301) 435–1713.

This notice is being published less than 15 days prior to the meeting due to the timing limitations imposed by the review and funding cycle.

Name of Committee: Cardiovascular Sciences Integrated Review Group, Cardiovascular and Renal Study Section.

Date: February 26–27, 2001.

Time: 8 a.m. to 5 p.m.

Agenda: To review and evaluate grant applications.

Place: Georgetown Suites, 1000 29th St., NW., Washington, DC 20007.

Contact Person: Russell T. Dowell, PhD, Scientific Review Administrator, Center for Scientific Review, National Institutes of Health, 6701 Rockledge Dr., Rm 2180, MSC 7818, Bethesda, MD 20892, (301) 435–1169, dowellr@csr.nih.gov.

This notice is being published less than 15 days prior to the meeting due to the timing limitations imposed by the review and funding cycle.

Name of Committee: Center for Scientific Review Special Emphasis Panel.

Date: February 26–27, 2001.

Time: 8 a.m. to 5 p.m.

Agenda: To review and evaluate grant applications.

Place: Georgetown Holiday Inn, 2101 Wisconsin Avenue, NW., Washington, DC 20007.

Contact Person: Nadarajen A. Vydelingum, PhD, Scientific Review Administrator, Special Study Section—8, Center for Scientific Review, National Institutes of Health, 6701 Rockledge Drive, MSC 7854, Rm 5122, Bethesda, MD 20892, (301) 435–1176, vydelinn@csr.nih.gov.

This notice is being published less than 15 days prior to the meeting due to the timing limitations imposed by the review and funding cycle.

Name of Committee: Center for Scientific Review Special Emphasis Panel.

Date: February 26–27, 2001.

Time: 8 a.m. to 5 p.m.

Agenda: To review and evaluate grant applications.

Place: Holiday Inn, 8120 Wisconsin Avenue, Bethesda, MD 20814.

Contact Person: Dharam S. Dhindsa, DVM, PhD, Scientific Review Administrator, Center for Scientific Review, National Institutes of Health, 6701 Rockledge Drive, Room 5126, MSC 7854, Bethesda, MD 20892, (301) 435–1174, dhindsad@csr.nih.gov

This notice is being published less than 15 days prior to the meeting due to the timing limitations imposed by the review and funding cycle.

Name of Committee: Infectious Diseases and Microbiology Integrated Review Group Experimental Virology Study Section.

Date: February 26–27, 2001.

Time: 8 a.m. to 5 p.m.

Agenda: To review and evaluate grant applications.

Place: Holiday Inn, 8120 Wisconsin Avenue, Bethesda, MD 20814.

Contact Person: Robert Freund, PhD, Scientific Review Administrator, Center for Scientific Review, National Institutes of Health, 6701 Rockledge Drive, Room 4198, MSC 7808, Bethesda, MD 20892, 301–435–1050, freundr@csr.nih.gov

This notice is being published less than 15 days prior to the meeting due to the timing limitations imposed by the review and funding cycle.

Name of Committee: Center for Scientific Review Special Emphasis Panel.

Date: February 26–27, 2001.

Time: 8 a.m. to 5 p.m.

Agenda: To review and evaluate grant applications.

Place: Embassy Suites, Chevy Chase Pavilion, 4300 Military Rd., Wisconsin at Western Ave., Washington, DC 20015.

Contact Person: Michael A. Lang, PhD, Scientific Review Administrator, Center for Scientific Review, National Institutes of Health, 6701 Rockledge Drive, Room 5210, MSC 7850, Bethesda, MD 20892, (301) 435–1265.

This notice is being published less than 15 days prior to the meeting due to the timing limitations imposed by the review and funding cycle.

Name of Committee: Center for Scientific Review Special Emphasis Panel.

Date: February 26–27, 2001.

Time: 8:30 a.m. to 4 p.m.

Agenda: To review and evaluate grant applications.

Place: The River Inn, 924 25th Street, Washington, DC 20037.

Contact Person: Gloria B. Levin, PhD, Scientific Review Administrator, Center for Scientific Review, National Institutes of Health, 6701 Rockledge Drive, Room 3166, MSC 7848, Bethesda, MD 20892, (301) 435–1017, leving@csr.nih.gov

This notice is being published less than 15 days prior to the meeting due to the timing limitations imposed by the review and funding cycle.

Name of Committee: Biophysical and Chemical Sciences Integrated Review Group Physical Biochemistry Study Section.

Date: February 26–27, 2001.

Time: 8:30 a.m. to 4 p.m.

Agenda: To review and evaluate grant applications.

Place: Double Tree Hotel, 1750 Rockville Pike, Rockville, MD 20852.

Contact Person: Gopa Rakhit, PhD, Scientific Review Administrator, Center for Scientific Review, National Institutes of Health, 6701 Rockledge Drive, Room 4154, MSC 7806, Bethesda, MD 20892, (301) 435–1721, rakhitg@csr.nih.gov

This notice is being published less than 15 days prior to the meeting due to the timing limitations imposed by the review and funding cycle.

Name of Committee: Social Sciences, Nursing, Epidemiology and Methods Integrated Review Group Nursing Research Study Section.

Date: February 26–28, 2001.

Time: 8:30 a.m. to 5 p.m.

Agenda: To review and evaluate grant applications.

Place: Holiday Inn—Silver Spring, 8777 Georgia Avenue, Silver Spring, MD 20910.

Contact Person: Gertrude McFarland, DNSC, FAAN, Scientific Review Administrator, Center for Scientific Review, National Institutes of Health, 6701 Rockledge Drive, Room 4110, MSC 7816, Bethesda, MD 20892, (301) 435–1784.

This notice is being published less than 15 days prior to the meeting due to the timing limitations imposed by the review and funding cycle.

Name of Committee: Center for Scientific Review Special Emphasis Panel.

Date: February 26–27, 2001.

Time: 8:30 a.m. to 4 p.m.

Agenda: To review and evaluate grant applications.

Place: Georgetown Holiday Inn, 2101 Wisconsin Avenue, NW., Washington, DC 20007.

Contact Person: Michael Micklin, PhD, Scientific Review Administrator, Center for Scientific Review, National Institutes of Health, 6701 Rockledge Drive, Room 3178, MSC 7848, Bethesda, MD 20892, (301) 435–1258, micklinm@csr.nih.gov

This notice is being published less than 15 days prior to the meeting due to the timing limitations imposed by the review and funding cycle.

Name of Committee: Oncological Sciences Integrated Review Group Experimental Therapeutics Subcommittee 2.

Date: February 26–28, 2001.

Time: 8:30 a.m. to 5 p.m.

Agenda: To review and evaluate grant applications.

Place: Embassy Suites, Chevy Chase Pavilion, 4300 Military Rd., Wisconsin at Western Ave., Washington, DC 20015.

Contact Person: Marcia Litwack, PhD, Scientific Review Administrator, Center for Scientific Review, National Institutes of Health, 6701 Rockledge Drive, Room 4150, MSC 7804, Bethesda, MD 20892, (301) 435–1719

This notice is being published less than 15 days prior to the meeting due to the timing limitations imposed by the review and funding cycle.

Name of Committee: Endocrinology and Reproductive Sciences Integrated Review Group Reproductive Biology Study Section.

Date: February 26–27, 2001.

Time: 8:30 a.m. to 5 p.m.

Agenda: To review and evaluate grant applications.

Place: Double Tree Hotel, 1750 Rockville Pike, Rockville, MD 20852.

Contact Person: Dennis Leszczynski, PhD, Scientific Review Administrator, Center for Scientific Review, National Institutes of Health, 6701 Rockledge Drive, Room 6170, MSC 7892, Bethesda, MD 20892, (301) 435–1044.

This notice is being published less than 15 days prior to the meeting due to the timing limitations imposed by the review and funding cycle.

Name of Committee: Center for Scientific Review Special Emphasis Panel.

Date: February 26–27, 2001.

Time: 9 a.m. to 4:30 p.m.

Agenda: To review and evaluate grant applications.

Place: Chevy Chase Holiday Inn, 5520 Wisconsin Ave., Chevy Chase, MD 20815.

Contact Person: Cheri Wiggs, PhD, Scientific Review Administrator, Center for Scientific Review, National Institutes of Health, 6701 Rockledge Drive, Room 3180, MSC 7848, Bethesda, MD 20892, (301) 435–1261.

This notice is being published less than 15 days prior to the meeting due to the timing limitations imposed by the review and funding cycle.

Name of Committee: Center for Scientific Review Special Emphasis Panel.

Date: February 26, 2001.

Time: 2 p.m. to 3 p.m.

Agenda: To review and evaluate grant applications.

Place: NIH, Rockledge 2, Bethesda, MD 20892, (Telephone Conference Call).

Contact Person: Lee Rosen, PhD, Scientific Review Administrator, Center for Scientific Review, National Institutes of Health, 6701 Rockledge Drive, Room 5116, MSC 7854, Bethesda, MD 20892, (301) 435–1171.

This notice is being published less than 15 days prior to the meeting due to the timing limitations imposed by the review and funding cycle.

Name of Committee: Pathophysiological Sciences Integrated Review Group Lung Biology and Pathology Study Section.

Date: February 27–28, 2001.

Time: 8 a.m. to 7 p.m.

Agenda: To review and evaluate grant applications.

Place: Hilton Garden Inn, Washington, DC Franklin Square, 815 14th Street, NW., Washington, DC 20005.

Contact Person: George M. Barnas, PhD, Scientific Review Administrator, Center for Scientific Review, National Institutes of Health, 6701 Rockledge Drive, Room 2180, MSC 7818, Bethesda, MD 20892, (301) 435–0696, george_barnas@nih.gov

Name of Committee: Center for Scientific Review Special Emphasis Panel.

Date: February 28, 2001.

Time: 8 a.m. to 5 p.m.

Agenda: To review and evaluate grant applications.

Place: Holiday Inn—Gaithersburg, 2 Montgomery Village Avenue, Gaithersburg, MD 20879.

Contact Person: Gopal C. Sharma, DVM, MS, PhD, Diplomate American Board of Toxicology, Scientific Review Administrator, Center for Scientific Review, National Institutes of Health, 6701 Rockledge Drive, Room 2184 MSC 7818, Bethesda, MD 20892, (301) 435–1783, sharmag@csr.nih.gov

Name of Committee: Center for Scientific Review Special Emphasis Panel.

Date: February 28, 2001.

Time: 8 a.m. to 9 a.m.

Agenda: To review and evaluate grant applications.

Place: Hilton Garden Inn, Washington, DC Franklin Square, 815 14th Street, NW., Washington, DC 20005.

Contact Person: Everett E. Sinnett, PhD, Scientific Review Administrator, Center for Scientific Review, National Institutes of Health, 6701 Rockledge Drive, Room 2178, MSC 7818, Bethesda, MD 20892, (301) 435–1016, sinnett@nih.gov

Name of Committee: Infectious Diseases and Microbiology Integrated Review Group Microbial Physiology and Genetics Subcommittee 1.

Date: February 28–March 1, 2001.

Time: 8:30 a.m. to 3 p.m.

Agenda: To review and evaluate grant applications.

Place: One Washington Circle, 1 Washington Circle, NW., Washington, DC 20037.

Contact Person: Martin L. Slater, PhD, Scientific Review Administrator, Center for Scientific Review, National Institutes of Health, 6701 Rockledge Drive, Room 4184, MSC 7808, Bethesda, MD 20892, 301 435–1149.

Name of Committee: Oncological Sciences Integrated Review Group Radiation Study Section.

Date: February 28–March 2, 2001.

Time: 8:30 a.m. to 5 p.m.

Agenda: To review and evaluate grant applications.

Place: The Watergate Hotel, 2650 Virginia Ave, NW., Washington, DC 20037.

Contact Person: Paul K. Strudler, PhD, Scientific Review Administrator, Center for Scientific Review, National Institutes of Health, 6701 Rockledge Drive, Room 4100, MSC 7804, Bethesda, MD 20892, (301) 435–1716.

Name of Committee: Center for Scientific Review Special Emphasis Panel.

Date: February 28–March 1, 2001.

Time: 6 p.m. to 6 p.m.

Agenda: To review and evaluate grant applications.

Place: Monarch Hotel, 2400 M Street, NW., Washington, DC 20037.

Contact Person: David L. Simpson, PhD, Scientific Review Administrator, Center for Scientific Review, National Institutes of Health, 6701 Rockledge Drive, Room 5192 MSC 7846, Bethesda, MD 20892, (301) 435–1278.

Name of Committee: Center for Scientific Review Special Emphasis Panel.

Date: March 1, 2001.

Time: 8 a.m. to 5 p.m.

Agenda: To review and evaluate grant applications.

Place: Holiday Inn 8120 Wisconsin Avenue, Bethesda, MD 20814.

Contact Person: Bill Bunnag, PhD, Scientific Review Administrator, Center for Scientific Review, National Institutes of Health, 6701 Rockledge Drive, Room 5124 MSC 7854, Bethesda, MD 20892–7854, (301) 435–1177, bunnagb@csr.nih.gov

Name of Committee: Cardiovascular Sciences Integrated Review Group Pharmacology Study Section.

Date: March 1–2, 2001.

Time: 8 a.m. to 5 p.m.

Agenda: To review and evaluate grant applications.

Place: Double Tree Hotel, 1750 Rockville Pike, Rockville, MD 20853.

Contact Person: Jeanne N. Ketley, PhD, Scientific Review Administrator, Center for Scientific Review, National Institutes of Health, 6701 Rockledge Drive, Room 4130 MSC 7814, Bethesda, MD 20892, (301) 435–1789.

Name of Committee: Center for Scientific Review Special Emphasis Panel.

Date: March 1–2, 2001.

Time: 8 a.m. to 6 p.m.

Agenda: To review and evaluate grant applications.

Place: Georgetown Holiday Inn, Fortune Room, 2101 Wisconsin Avenue, NW., Washington, DC 20007.

Contact Person: Syed Quadri, PhD, Scientific Review Administrator, Center for Scientific Review, National Institutes of Health, 6701 Rockledge Drive, Room 4144, MSC 7804, Bethesda, MD 20892, (301) 435–1211.

Name of Committee: Center for Scientific Review Special Emphasis Panel.

Date: March 1–2, 2001.

Time: 8 a.m. to 5 p.m.

Agenda: To review and evaluate grant applications.

Place: Grand Westin Hotel, 2350 M Street, NW., Washington, DC 20037–1417.

Contact Person: Marjam G. Behar, PhD, Scientific Review Administrator, Center for Scientific Review, National Institutes of Health, 6701 Rockledge Drive, Room 4178, MSC 7806, Bethesda, MD 20892, (301) 435–1180.

Name of Committee: Center for Scientific Review Special Emphasis Panel.

Date: March 1–2, 2001.

Time: 8:30 a.m. to 5 p.m.

Agenda: To review and evaluate grant applications.

Place: Clarion Hampshire Hotel, 1310 New Hampshire Ave, NW., Washington, DC 20036.

Contact Person: Jay Joshi, PhD, Scientific Review Administrator, Center for Scientific

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Review, National Institutes of Health, 6701 Rockledge Drive, Room 5184, MSC 7846, Bethesda, MD 20892, (301) 435–1184.

Name of Committee: Cell Development and Function Integrated Review Group Cell Development and Function 6.
Date: March 1–2, 2001.
Time: 8:30 a.m. to 5 p.m.
Agenda: To review and evaluate grant applications.
Place: Bethesda Holiday Inn, 8120 Wisconsin Avenue, Bethesda, MD 20852.
Contact Person: Richard D. Rodewald, PhD, Scientific Review Administrator, Center for Scientific Review, National Institutes of Health, Room 5142, MSC 7840, 6701 Rockledge Drive, Bethesda, MD 20892, (301) 435–1024, rodewalr@csr.nih.gov.

Name of Committee: Center for Scientific Review Special Emphasis Panel.
Date: March 1–2, 2001.
Time: 8:30 a.m. to 5 p.m.
Agenda: To review and evaluate grant applications.
Place: The Virginian Suites, 1500 Arlington Blvd., Arlington, VA 22209.
Contact Person: Karen Sirocco, PhD, Scientific Review Administrator, Center for Scientific Review, National Institutes of Health, 6701 Rockledge Drive, Room 3184, MSC 7848, Bethesda, MD 20892, 301 435–0676, siroccok@csr.nih.gov

Name of Committee: Biophysical and Chemical Sciences Integrated Review Group Bio-Organic and Natural Products Chemistry Study Section.
Date: March 1–2, 2001.
Time: 9 a.m. to 5 p.m.
Agenda: To review and evaluate grant applications.
Place: Holiday Inn—Silver Spring, 8777 Georgia Avenue, Silver Spring, MD 20910.
Contact Person: Mike Radtke, PhD, Scientific Review Administrator, Center for Scientific Review, National Institutes of Health, 6701 Rockledge Drive, Room 4176, MSC 7806, Bethesda, MD 20892, 301 435–1728, radtkem@csr.nih.gov

Name of Committee: Center for Scientific Review Special Emphasis Panel.
Date: March 2, 2001.
Time: 8 a.m. to 5 p.m.
Agenda: To review and evaluate grant applications.
Place: Holiday Inn, 8120 Wisconsin Avenue, Bethesda, MD 20814.
Contact Person: Bill Bunnag, PhD, Scientific Review Administrator, Center for Scientific Review, National Institutes of Health, 6701 Rockledge Drive, Room 5124, MSC 7854, Bethesda, MD 20892–7854, (301) 435–1177, bunnagb@csr.nih.gov

Name of Committee: Center for Scientific Review Special Emphasis Panel.
Date: March 2, 2001.
Time: 8:30 a.m. to 5 p.m.
Agenda: To review and evaluate grant applications.
Place: Bethesda Holiday Inn, 8120 Wisconsin Avenue, Bethesda, MD 20814.
Contact Person: Luigi Giacometti, PhD, Scientific Review Administrator, Center for Scientific Review, National Institutes of Health, 6701 Rockledge Drive, Room 5208, MSC 7850, Bethesda, MD 20892, (301) 435–1246.

Name of Committee: Center for Scientific Review Special Emphasis Panel.
Date: March 2, 2001.
Time: 1 p.m. to 3 p.m.
Agenda: To review and evaluate grant applications.
Place: NIH, Rockledge 2, Bethesda, MD 20892 (Telephone Conference Call).
Contact Person: Lee S. Mann, PhD, Scientific Review Administrator, Center for Scientific Review, National Institutes of Health, 6701 Rockledge Drive, Room 3186, MSC 7848, Bethesda, MD 20892, (301) 435–0677.

(Catalogue of Federal Domestic Assistance Program Nos. 93.306, Comparative Medicine, 93.306; 93.333, Clinical Research, 93.333, 93.337, 93.393–93.396, 93.837–93.844, 93.846–93.878, 93.892, 93.893, National Institutes of Health, HHS)

Dated: February 6, 2001.

LaVerne Y. Stringfield,

Director, Office of Federal Advisory Committee Policy.

[FR Doc. 01–3595 Filed 2–12–01; 8:45 am]

BILLING CODE 4140–01–M

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT

[Docket No. FR–4491–N–05]

Notice of Draft Environmental Impact Statement: City of Hartford, CT; Section 108 Loan Guarantee/BEDI Grant

AGENCY: Office of the Assistant Secretary for Community Planning and Development, HUD.

ACTION: Notice.

SUMMARY: The Department of Housing and Urban Development gives this notice to the public that the City of Hartford, Connecticut intends to prepare an Environmental Impact Statement (EIS) for the Adriaen's Landing Project. This Notice is in accordance with regulations of the Council on Environmental Quality as described in 40 CFR parts 1500–1508. Federal agencies having jurisdiction by law, special expertise, or other special interest should report their interests and indicate their readiness to aid in the EIS effort as a ''Cooperating Agency.''

A Draft EIS will be completed for the proposed action described herein. Comments relating to the Draft EIS are requested and will be accepted by the contact person listed below. When the Draft EIS is completed, a notice will be sent to individuals and groups known to have an interest in the Draft EIS and particularly in the environmental impact issues identified therein. Any person or agency interested in receiving a notice and making comment on the Draft EIS should contact the person listed below within 45 days after the publication of this Notice.

ADDRESSES: All interested agencies, groups and persons are invited to submit written comments on the within-named project and the Draft EIS to the following contact person. Such comments should be received by the office of the contact person and all comments so received will be considered prior to the preparation and distribution of the Draft EIS.

Particularly solicited is information on reports or other environmental studies planned or completed in the project area, major issues and dates which the EIS should consider and recommended mitigating measures and alternatives associated with the proposed project. Federal agencies having jurisdiction by law, special expertise or other special interest should report their interests and indicate their readiness to aid the EIS effort as a ''cooperating agency.''

FOR FURTHER INFORMATION CONTACT: Dennis J. Johnson, Contract Manager, City of Hartford, Division of Management & Budget, Office of Grants Management, Room 108, 550 Main Street, Hartford, CT, 06103. Telephone: (860) 543–8650.

SUPPLEMENTARY INFORMATION:

A: Background

The City of Hartford, acting under authority of section 104(g) of the Housing and Community Development Act of 1974 (42 U.S.C. 5304(g)) and HUD's regulations at 24 CFR part 58, in cooperation with the Capital City Economic Development Authority, the Federal Highway Administration, and other interested agencies, will prepare an Environmental Impact Statement (EIS) to analyze potential impacts of constructing a 33-acre mixed use development complex including: (1) A retail/entertainment venue of a maximum of approximately 265,000 square feet, (2) an approximately 500,000 square feet convention center, (3) an approximately 700-room convention center hotel, (4) approximately 200 to 400 residential apartments, (5) an approximately 200,000 square feet future attraction (public interactive-entertainment and education venue), (6) parking facilities representing approximately 6,000 spaces, and (7) relocation and modification of sewer, water, and other utility infrastructure and vehicular and pedestrian traffic access modifications. Adriaen's Landing will be located in downtown Hartford along the Connecticut River. The estimated cost for this project is 650 million dollars.

In 1998, the City of Hartford applied for a competitive grant allocation from DHUD for $2 million in Brownfield Economic Development Initiative (BEDI) funds for the retail/entertainment component of the Adriaen's Landing project. The application was funded and will be coupled with up to $13 million in Section 108 loan authority, $5 million of which will be specifically used in conjunction with the BEDI funds on the retail/entertainment component of the project. The remaining $8 million in Section 108 loan authority will be used for eligible activities associated with the project.

B. Need for the EIS

The project may constitute an action significantly effecting the quality of the human environment, and an Environmental Impact Statement will be prepared by the City of Hartford in cooperation with the Capital City Economic Development Authority in accordance with the National Environmental Policy Act of 1969 (42 U.S.C. 4321 *et seq.*) on such project. Responses to this notice will be used to: (1) Determine significant environmental issues; (2) identify data which the EIS should address; and (3)identify agencies and other parties which will participate in the EIS process and the basis for their involvement.

This notice is in accordance with the regulations of the Council on Environmental Quality under its rule at 40 CFR part 1500. The Draft EIS will be published and distributed on or about 15 days after the date of this publication and a copy will be on file at the City of Hartford, Division of Management and Budget, Room 108, 550 Main Street, Hartford, CT 06103 and available for public inspection, or copies may be obtained at the same address, upon request.

C. Scoping

Scoping meetings were held on April 15, 1999 and November 16, 1999 at the Betances School in Hartford. The scope of issues to be addressed in the EIS was discussed, as well as an identification of the significant issues related to the proposed Adriaen's Landing project.

This Notice shall be in effect for one year. If one year after the publication of the Notice in the **Federal Register** a draft EIS has not been filed on the project, then the Notice for that project shall be canceled. If a draft EIS is expected more than one year after the publication of this Notice, a new and updated Notice must be published.

Dated: January 31, 2001.

Richard H. Broun,

Director, Office of Community Viability.

[FR Doc. 01–3554 Filed 2–12–01; 8:45 am]

BILLING CODE 4210–29–P

DEPARTMENT OF LABOR

Employment and Training Administration

Revised Schedule of Remuneration for the UCX Program

Under section 8521(a)(2) of title 5 of the United States Code, the Secretary of Labor is required to issue from time to time a Schedule of Remuneration specifying the pay and allowances for each pay grade of members of the military services. The schedules are used to calculate the base period wages and benefits payable under the program of Unemployment Compensation for Ex-servicemembers (UCX Program).

The revised schedule published with this Notice reflects increases in military pay and allowances which were effective in January 2001.

Accordingly, the following new Schedule of Remuneration, issued pursuant to 20 CFR 614.12, applies to ''First Claims'' for UCX which are effective beginning with the first day of the first week which begins after March 31, 2001.

Pay grade	Monthly rate
(1) Commissioned Officers:	
0–10	$13,923
0–9	13,123
0–8	12,107
0–7	10,992
0–6	9,249
0–5	7,754
0–4	6,407
0–3	5,091
0–2	4,030
0–1	3,080
(2) Commissioned Officers With Over 4 Years Active Duty As An Enlisted Member Or Warrant Officer:	
0–3E	5,988
0–2E	4,894
0–1E	4,116
(3) Warrant Officers:	
W–5	6,771
W–4	5,833
W–3	4,856
W–2	4,155
W–1	3,551
(4) Enlisted Personnel:	
E–9	5,419
E–8	4,546
E–7	3,970
E–6	3,487
E–5	2,952
E–4	2,493
E–3	2,202
E–2	2,109
E–1	1,927

The publication of this new Schedule of Remuneration does not revoke any prior schedule or change the period of time any prior schedule was in effect.

Signed at Washington, D.C., on January 18, 2001.

Raymond L. Bramucci,

Assistant Secretary of Labor.

[FR Doc. 01–3610 Filed 2–12–01; 8:45 am]

BILLING CODE 4510–30–P

NATIONAL SCIENCE FOUNDATION

Special Emphasis Panel in Mathematical Sciences; Notice of Meeting

In accordance with the federal Advisory Committee Act (Pub. L. 92–463, as amended), the National Science Foundation announces the following meeting:

Name: Special Emphasis in Mathematical Sciences (1204).

Date and Time: February 22–24, 2001; 8:30 a.m. until 5 p.m.

Place: Room 120, National Science Foundation, 4201 Wilson Boulevard, Arlington, VA.

Type of Meeting: Closed.

Contact Person: Dr. Joseph P. Brennan, Program Director, National Science Foundation, 4201 Wilson Boulevard, Arlington, VA 22230. Telephone: (703) 292–4876.

Purpose of Meeting: To provide advice and recommendations concerning proposal submitted to NSF for financial support.

Agenda: To review and evaluate proposals concerning the Algebra and Number Theory, and Combinatorics Program, as part of the selection process for awards.

Reason for Closing: The proposals being reviewed include information of a proprietary or confidential nature, including technical information; financial data, such as salaries and personal information concerning individuals associated with the proposals. These matters are exempt under 5 U.S.C. 552b(c) (4) and (6) of the Government in the Sunshine Act.

Dated: February 6, 2001.

Karen J. York,

Committee Management Officer.

[FR Doc. 01–3574 Filed 2–12–01; 8:45 am]

BILLING CODE 7555–01–M

011321

NATIONAL TRANSPORTATION SAFETY BOARD

Sunshine Act Meeting

TIME AND PLACE: 9:30 a.m., Wednesday, February 21, 2001.

PLACE: NTSB Conference Center, 429 L'Enfant Plaza SW., Washington, DC 20594

STATUS: The three items are open to the public.

MATTERS TO BE CONSIDERED:

7327 Briefs of Accidents: Cessnas 172K and N79960, N89872 at Sarasota, FL on 3/9/2000 (MIA00FA103A/B) and Safety Recommendations to FAA re ATC procedures and practices.

7322 Survivability of Accidents Involving Part 121 U.S. Air Carrier Operations, 1983–1999.

7329 Hazardous Materials Accident Report: Rupture of Railroad Tank Car near Clymers, Indiana.

NEWS MEDIA CONTACT: Telephone: (202) 314–6100.

Individuals requesting specific accommodation should contact Mrs. Barbara Bush at (202) 314–6220 by Friday, February 16, 2001

FOR MORE INFORMATION CONTACT: Vicky D'Onofrio, (202) 314–6410.

Dated: February 9, 2001.

Vicky D'Onofrio,

Federal Register Liaison Officer.

[FR Doc. 01–3785 Filed 2–9–01; 3:55 pm]

BILLING CODE 7533–01–U

NUCLEAR REGULATORY COMMISSION

Sunshine Act Meeting; Notice

Agency Holding the Meeting: Nuclear Regulatory Commission.

Date: Weeks of February 12, 19, 26, March 5, 12, 19, 2001.

Place: Commissioners' Conference Room, 11555 Rockville Pike, Rockville, Maryland.

Status: Public and Closed.

Matters To Be Considered

Week of February 12, 2001

Wednesday, February 14, 2001

10:25 a.m. Affirmation Session (Public Meeting) (If needed)

Week of February 19, 2001—Tentative

Tuesday, February 20, 2001

10:25 a.m. Affirmation Session (Public Meeting) (If needed)

10:30 a.m. Briefing on Spent Fuel Pool Accident Risk at Decommissioning Plants and Rulemaking Initiatives (Public Meeting) (Contact: George Hubbard, 301–415–2870)

This meeting will be webcast live at the Web address—*www.nrc.gov/live.html.*

Week of February 26, 2001—Tentative

Monday, February 26, 2001

2:00 p.m. Meeting with the National Association of Regulatory Utility Commissioners (NARUC) (Public Meeting) (Contact: Spiros Droggitis, 301–415–2367)

This meeting will be webcast live at the Web address—*www.nrc.gov/live.html.*

Tuesday, February 27, 2001

10:25 a.m. Affirmation Session (Public Meeting) (If needed)

10:30 a.m. Briefing on Threat Environment Assessment (Closed-Ex. 1)

Week of March 5, 2001—Tentative

There are no meetings scheduled for the Week of March 5, 2001.

Week of March 12, 2001—Tentative

Monday, March 12, 2001

1:25 p.m. Affirmation Session (Public Meeting) (If needed)

1:30 p.m. Discussion of Management Issues (Closed-Ex. 2)

Week of March 19, 2001—Tentative

Thursday, March 22, 2001

10:25 a.m. Affirmation Session (Public Meeting) (If needed)

10:30 a.m. Meeting with Advisory Committee on Nuclear Waste (ACNW) (Public Meeting) (Contact: John Larkins, 301–415–7320)

This meeting will be webcast live at the Web address—*www.nrc.gov/live.html.*

* The schedule for Commission meetings is subject to change on short notice. To verify the status of meetings call (recording)—(301) 415–1292. Contact person for more information: David Louis Gamberoni (301) 415–1651.

* * * * *

The NRC Commission Meeting Schedule can be found on the Internet at:

http://www.nrc.gov/SECY/smj/schedule.htm

* * * * *

This notice is distributed by mail to several hundred subscribers; if you no longer wish to receive it, or would like to be added to the distribution, please contact the Office of the Secretary, Washington, DC 20555 (301–415–1969). In addition, distribution of this meeting notice over the Internet system is available. If you are interested in receiving this Commission meeting schedule electronically, please send an electronic message to dkw@nrc.gov.

Dated: February 8, 2001.

David Louis Gamberoni,

Technical Coordinator, Office of the Secretary.

[FR Doc. 01–3738 Filed 2–9–01; 12:37 pm]

BILLING CODE 7590–01–M

SECURITIES AND EXCHANGE COMMISSION

Proposed Collection; Comment Request

Upon Written Request, Copies Available From: Securities and Exchange Commission, Office of Filings and Information Services, Washington, DC 20549.

Extension: Rule 17a–4; SEC File No. 270–198; OMB Control No. 3235–0279.

Notice is hereby given that pursuant to the Paperwork Reduction Act of 1995 (44 U.S.C. 3501 *et seq.*), the Securities and Exchange Commission (''Commission'') is soliciting comments on the collection of information summarized below. The Commission plans to submit this existing collection of information to the Office of Management and Budget for extension and approval.

Rule 17a–4 (17 CFR 240.17a–4) requires exchange members, brokers and dealers to preserve for prescribed periods of time certain records required to be made by Rule 17a–3. In addition, Rule 17a–4 requires the preservation of records required to be made by other Commission rules and other kinds of records which firms make or receive in the ordinary course of business. These include, but are not limited to, bank statements, cancelled checks, bills receivable and payable, originals of communications, and descriptions of various transactions. Rule 17a–4 also permits broker-dealers to employ, under certain conditions, electronic storage media to maintain records required to be maintained under Rules 17a–3 and 17a–4.

These are approximately 7,525 active, registered broker-dealers. The staff estimates that the average amount of time necessary to preserve the books and records as required by Rule 17a–4 is 1.001 hours per broker-dealer per working day. Thus the staff estimates that because there are approximately 250 business day per year, the total compliance burden for 7,525 respondents is 1,883,131 hours.

The staff believes that compliance personnel would be charged with ensuring compliance with Commission regulation, including Rule 17a–4. The staff estimates that the hourly salary of a compliance manager is $82.50 per hour.[1] Based upon these numbers, the total cost of compliance for 7,525 respondents is $155,358,308 per year.[2] Despite the total burden hour decrease of 244,054 (resulting from the decrease in the number of respondents from 8,500 to 7,525), the increase in the estimated hourly salary used (from $48.08 as used in previous estimates to

[1] Securities Industry Association, Management and Professional Earnings, Table 051 (Compliance Manager) + 35% overhead (based on end-of-year 1998 figures).

[2] (1.001 hours per day × 250 days × 7,525 active, registered broker-dealer respondents) = 1,883,131 total hours per year. (1,883,131 hours × $82.50 per hour) = $155,358,308 per year.

the $82.50 obtained from the Securities Industry Association's survey of industry salaries, which was not previously available) caused the total cost of compliance to be $53,086,138 higher than the previous estimate of $102,272.170.

Written comments are invited on: (a) Whether the proposed collection of information is necessary for the proper performance of the functions of the agency, including whether the information shall have practical utility; (b) the accuracy of the agency's estimate of the burden of the proposed collection of information; (c) ways to enhance the quality, utility, and clarity of the information to be collected; and (d) ways to minimize the burden of the collection of the information on respondents, including through the use of automated collection techniques or other forms of information technology. Consideration will be given to comments and suggestions submitted in writing within 60 days of this publication.

Direct your written comments to Michael E. Bartell, Associate Executive Director, Office of Information Technology, Securities and Exchange Commission, 450 5th Street, NW., Washington, DC 20549.

Dated: February 6, 2001.

Margaret H. McFarland,

Deputy Secretary.

[FR Doc. 01–3624 Filed 2–12–01; 8:45 am]

BILLING CODE 8010–01–M

SECURITIES AND EXCHANGE COMMISSION

Issuer Delisting; Notice of Withdrawal of Application to Withdraw From Listing and Registration; (3Dshopping.com, Common Stock, No Par Value, and Warrants to Purchase Common Stock) File No. 1–15161

February 6, 2001.

On January 29, 2001, 3Dshopping.com (''Company'') filed an application with the Securities and Exchange Commission (''Commission''), pursuant to Section 12(d) of the Securities Exchange Act of 1934 (''Act'') [1] and Rule 12d2–2(d) thereunder,[2] to withdraw its Common Stock, no par value, and Warrants to Purchase Common Stock from listing and registration on the American Stock Exchange. Notice of the application was published on February 5, 2001, in the **Federal Register**, to solicit comment from interested persons.[3] On February 5, 2001, the Company withdrew its application.[4]

For the Commission, by the Division of Market Regulation, pursuant to delegated authority.[5]

Jonathan G. Katz,

Secretary.

[FR Doc. 01–3567 Filed 2–12–01; 8:45 am]

BILLING CODE 8010–01–M

[1] 15 U.S.C. 78*l*(d).

[2] 17 CFR 240.12d2–2(d).

[3] Securities Exchange Act Release No. 43902 (Jan. 30, 2001), 66 FR 8988.

[4] *See* letter from Bruce M. Schloss, Counsel to Company, to Matthew Boesch, Paralegal, Division of Market Regulation, Commission, dated February 5, 2001.

[5] 17 CFR 200.30–3(a)(1).

SECURITIES AND EXCHANGE COMMISSION

Issuer Delisting; Notice of Application to Withdraw From Listing and Registration; (Boulder Total Return Fund, Inc., Common Stock, $.01 Par Value) File No. 1–11652

February 6, 2001.

Boulder Total Return Fund, Inc., a Maryland corporation (''Company''), has filed an application with the Securities and Exchange Commission (''Commission''), pursuant to Section 12(d) of the Securities Exchange Act of 1934 (''Act'') [1] and Rule 12d2–2(d) thereunder,[2] to withdraw its Common Stock, $.01 par value (''Security''), from listing and registration on the Pacific Exchange (''PCX'').

The Security is currently listed and registered on both the PCX and the New York Stock Exchange (''NYSE''). The Company has determined to maintain the Security's listing and registration on the NYSE, but to withdraw its listing and registration on the PCX. In explaining its reasons for taking such action, the Company stated that the low volume of shares traded on the PCX does not justify the costs incurred through maintaining such listing.

The Company has stated in its application that it has complied with the rules of the PCX governing the withdrawal of a security from listing and registration by the issuer and that the PCX has in turn indicated that it will not oppose such proposed withdrawal. The Company's application shall not have any effect on the Security's continued listing and registration on the NYSE.

Any interested person may, on or before February 28, 2001, submit by letter to the Secretary of the Securities and Exchange Commission, 450 Fifth Street, NW., Washington, DC 20549–0609, facts bearing upon whether the application has been made in accordance with the rules of the PCX and what terms, if any, should be imposed by the Commission for the protection of investors. The Commission, based on the information submitted to it, will issue an order granting the application after the date mentioned above, unless the Commission determines to order a hearing on the matter.

For the Commission, by the Division of Market Regulation, pursuant to delegated authority.[3]

Jonathan G. Katz,

Secretary.

[FR Doc. 01–3568 Filed 2–12–01; 8:45 am]

BILLING CODE 8010–01–M

[1] 15 U.S.C. 78*l*(d).

[2] 17 CFR 240.12d2–2(d).

[3] 17 CFR 200.30–3(a)(1).

SECURITIES AND EXCHANGE COMMISSION

[Investment Company Act Release No. 24853; 812–12062]

Hillview Investment Trust II and Hillview Capital Advisors, LLC; Notice of Application

February 6, 2001.

AGENCY: Securities and Exchange Commission (''Commission'').

ACTION: Notice of an application under section 6(c) of the Investment Company Act of 1940 (the ''Act'') for an exemption from section 15(a) of the Act and rule 18f–2 under the Act.

Summary of Application: Applicants, Hillview Investment Trust II (the ''Trust'') and Hillview Capital Advisors, LLC (the ''Adviser'') request an order that would permit applicants to enter into and materially amend subadvisory agreements without shareholder approval.

Filing Dates: The application was filed on April 14, 2000 and amended on November 15, 2000. Applicants have agreed to file an amendment during the notice period, the substance of which is reflected in this notice.

Hearing or Notification of Hearing: An order granting the application will be issued unless the Commission orders a hearing. Interested persons may request a hearing by writing to the Commission's Secretary and serving applicants with copy of the request, personally or by mail. Hearing requests should be received by the Commission by 5:30 p.m. on March 5, 2001, and should be accompanied by proof of service on the applicants, in the form of an affidavit, or, for lawyers, a certificate of service. Hearing requests should state

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the nature of the writer's interest, the reason for the request, and the issues contested. Persons who wish to be notified of a hearing may request notification by writing to the Commission's Secretary.

ADDRESSES: Secretary, Commission, 450 Fifth Street, NW., Washington, DC 20549–0609; Applicants, c/o Joseph A. Bracken, Hillview Capital Advisors, LLC, 1055 Washington Boulevard, Stamford, Connecticut 06901.

FOR FURTHER INFORMATION CONTACT: Jean E. Minarick, Senior Counsel, at (202) 942–0527, or Christine Y. Greenlees, Branch Chief, at (202) 942–0564 (Division of Investment Management, Office of Investment Company Regulation).

SUPPLEMENTARY INFORMATION: The following is a summary of the application. The complete application may be obtained for a fee at the Commission's Public Reference Branch, 450 Fifth Street, NW., Washington, DC 20549–0102 (telephone (202) 942–8090).

Applicants' Representations

1. The Trust is a Delaware business trust registered under the Act as an open-end management investment company. The Trust is organized as a series investment company and currently has two series, Hillview Alpha Fund and Hillview International Alpha Fund (each a ''Fund'' and collectively, the ''Funds''), each of which has its own distinct investment objective and policies. The Adviser, a Delaware limited liability company, serves as investment adviser to the Funds, and is registered as an investment adviser under the Investment Advisers Act of 1940 (''Advisers Act'').[1] The Adviser is a subsidiary of Value Asset Management, Inc., a privately held financial services holding company.

2. The Trust, on behalf of each Fund, has entered into an investment advisory agreement with the Adviser (''Advisory Agreement''). The Advisory Agreement has been approved by the Trust's board of trustees (the ''Board''), including a majority of the trustees who are not ''interested persons,'' as defined in section 2(a)(19) of the Act, of the Trust or the Adviser (''Independent Trustees''), as well as each Fund's initial shareholder. Under the terms of the Advisory Agreement, the Adviser, subject to oversight by the Board, has overall supervisory responsibility for the investment program of each Fund. The Trust and the Adviser have entered into investment subadvisory agreements (''Subadvisory Agreements'') with multiple subadvisers (''Subadvisers'') for each of the Funds. Under the Subadvisory Agreements, each Subadviser, subject to general supervision by the Adviser and the Board, has discretionary authority to invest a portion of a Fund's assets allocated to it by the Adviser. Currently, Hillview Alpha Fund has five Subadvisers and Hillview International Alpha Fund has four Subadvisers. Each of the Subadvisers is registered as an investment adviser under the Advisers Act. Future Subadvisers will be registered or exempt from registration under the Advisers Act. Each fund pays the Adviser a fee based on the Fund's average daily net assets.

3. The Adviser monitors the Funds and the Subadvisers and makes recommendations to the Board regarding allocation, and reallocation, of assets between Subadvisers and is responsible for recommending the hiring, termination and replacement of Subadvisers. The Adviser recommends Subadvisers based on a number of factors used to evaluate their skills in managing assets pursuant to particular investment objectives. Each Subadviser will be paid by the Trust at a rate that has been negotiated with each Subadviser by the Adviser and approved by the Board. Applicants also state that, as a condition to the requested order, shareholders of a Fund will approve any change to a Subadvisory Agreement if such change would result in an increase in the overall management and advisory fees payable by a Fund that have been approved by the shareholders of the Fund.

4. Applicants request an order to permit the Adviser to enter into and materially amend Subadvisory Agreements without obtaining shareholder approval. The requested relief will not extend to a Subadviser that is an affiliated person, as defined in section 2(a)(3) of the Act, of the Trust or the Adviser, other than by reason of serving as a Subadviser to one or more of the Funds (''Affiliated Subadviser''). None of the current Subadvisers is an Affiliated Subadviser.

Applicants' Legal Analysis

1. Section 15(a) of the Act provides, in relevant part, that it is unlawful for any person to act as an investment adviser to a registered investment company except under a written contract that has been approved by the vote of the company's outstanding voting securities. Rule 18f–2 under the Act provides that each series or class of stock in a series company affected by a matter must approve such matter if the Act requires shareholder approval.

2. Section 6(c) of the Act provides that the Commission may exempt any person, security, or transaction or any class of persons, securities, or transactions from any provision of the Act, or from any rule thereunder, if such exemption is necessary or appropriate in the public interest and consistent with the protection of investors and the purposes fairly intended by the policy and provisions of the Act. Applicants request an exemption under section 6(c) of the Act from section 15(a) of the Act and rule 18f–2 under the Act to permit them to enter into and materially amend Subadvisory Agreements without shareholder approval.

3. Applicants assert that the shareholders are relying on the Adviser's experience to select one or more Subadvisers best suited to achieve a Fund's desired investment objectives. Applicants assert that, from the perspective of the investor, the role of the Subadvisers is comparable to that of individual portfolio managers employed by other investment advisory firms. Applicants contend that requiring shareholder approval of each Subadvisory Agreement would impose costs and unnecessary delays on the Funds, and may preclude the Adviser from acting promptly in a manner considered advisable by the Board. Applicants note that the Advisory Agreement will remain fully subject to section 15(a) of the Act and rule 18f–2 under the Act, including the requirements for shareholder approval, and that shareholders of a Fund will approve any change to a Subadvisory Agreement if such change would result in an increase in the overall management and advisory fees payable by a Fund that have been approved by the shareholders of the Fund.

Applicants' Conditions

Applicants agree that any order granting the requested relief will be subject to the following conditions:

1. Before applicants may rely on the requested order as to any Fund, the operation of the Fund in the manner described in the application will be approved by a majority of its outstanding voting securities, as defined in the Act, or by its initial shareholder, provided that, in the case of approval by

[1] The applicants request that any relief granted pursuant to the application also apply to future series of the Trust and any other registered open-end management investment companies and their series that: (a) Are advised by the Adviser or any entity controlling, controlled by, or under common control with the Adviser; (b) are managed in a manner consistent with this application, and (c) comply with the terms and conditions in the application (together, ''Future Funds''). The Trust is the only existing investment company that currently intends to rely on the requested order.

the initial shareholder, the pertinent Fund's shareholders purchase shares on the basis of a prospectus containing the disclosure contemplated by condition 2 below. Similarly, before a Future Fund may rely on the order requested in the application, the operation of the Future Fund in the manner described in the application will be approved by its initial shareholder before a public offering of shares of such Future Fund, provided that shareholders purchase shares on the basis of a prospectus containing the disclosure contemplated by condition 2 below.

2. Each Fund will disclose in its prospectus the existence, substance and effect of any order granted pursuant to the application. In addition, each Fund and any Future Fund relying on the requested order will hold themselves out to the public as employing the management structure described in the application. The prospectus with respect to each Fund and any Future Fund will prominently disclose that the Adviser has the ultimate responsibility (subject to oversight by the Board) to oversee the Subadvisers and recommend their hiring, termination, and replacement.

3. At all times, a majority of the Board will be Independent Trustees, and the nomination of new or additional Independent Trustees will be at the discretion of the then existing Independent Trustees.

4. The Adviser will not enter into a Subadvisory Agreement with any Affiliated Subadviser without that agreement, including the compensation to be paid thereunder, being approved by the shareholders of the applicable Fund.

5. When a Subadviser change is proposed for a Fund or any Future Fund with an Affiliated Subadviser, the Board, including a majority of the Independent Trustees, will make a separate finding, reflected in the Board minutes, that the change is in the best interests of the Fund or the Future Fund and its shareholders and does not involve a conflict of interest from which the Adviser or the Affiliated Subadviser derives an inappropriate advantage.

6. Within 90 days of the hiring of any new Subadviser, shareholders will be furnished all information about the new Subadviser that would be included in a proxy statement, including any change in such disclosure caused by the addition of the new Subadviser. Each Fund will meet this condition by providing shareholders with an information statement meeting the requirements of Regulation 14C, Schedule 14C and Item 22 of Schedule 14A under the Securities Exchange Act of 1934 within 90 days of the hiring of any new Subadviser.

7. The Adviser will provide general management services to each Fund, including overall supervisory responsibility for the general management and investment of each Fund's assets, and, subject to review and approval by the Board, will: (a) Set the Fund's overall investment strategies, (b) select Subadvisers, (c) when appropriate, allocate and reallocate a Fund's assets among multiple Subadvisers; (d) monitor and evaluate the performance of the Subadvisers, and (e) ensure that the Subadvisers comply with each Fund's investment objective, policies and restrictions by, among other things, implementing procedures reasonably designed to ensure compliance.

8. No trustee or officer of the Trust, or director or officer of the Adviser will own, directly or indirectly (other than through a pooled investment vehicle that is not controlled by such person), any interest in a Subadviser, except for: (a) Ownership of interests in the Adviser or any entity that controls, is controlled by, or is under common control with the Adviser; or (b) ownership of less than 1% of the outstanding securities of any class of equity or debt of a publicly traded company that is either a Subadviser or an entity that controls, is controlled by, or is under common control with a Subadviser.

9. Shareholders of a Fund will approve any change to a Subadvisory Agreement if such change would result in an increase in the overall management and advisory fees payable by the Fund that have been approved by the shareholders of the Fund.

For the Commission, by the Division of Investment Management, under delegated authority.

Margaret H. McFarland,

Deputy Secretary.

[FR Doc. 01–3566 Filed 2–12–01; 8:45 am]

BILLING CODE 8010–01–M

SECURITIES AND EXCHANGE COMMISSION

[Investment Company Act Release No. 24856; 812–12410]

Mutual Fund Select Group, et al.; Notice of Application

February 8, 2001.

AGENCY: Securities and Exchange Commission (''Commission'').

ACTION: Notice of application under section 17(b) of the Investment Company Act of 1940 (''Act'') for an exemption from section 17(a) of the Act.

Summary of Application: Applicants request an order to permit the proposed reorganization of (a) Chase Vista Select Short-Term Bond Fund (''Select Short-Term Bond Fund''), a series of Mutual Fund Select Group (''MFSG''), with and into Chase Vista Short-Term Bond Fund (''Short-Term Bond Fund''), a series of Mutual Fund Group (''MFG''), and (b) Chase Vista Bond Fund (''Bond Fund''), a series of MFG, with and into Chase Vista Select Bond Fund (''Select Bond Fund''), a series of MFSG. Because of certain affiliations, applicants may not rely on rule 17a–8 under the Act.

Applicants: MFSG, MFG, and The Chase Manhattan Bank (''Chase'').

Filing Dates: The application was filed on January 16, 2001. Applicants have agreed to file an amendment during the notice period, the substance of which is reflected in this notice.

Hearing or Notification of Hearing: An order granting the application will be issued unless the Commission orders a hearing. Interested persons may request a hearing by writing to the Commission's Secretary and serving applicants with a copy of the request, personally or by mail. Hearing requests should be received by the Commission by 5:30 p.m. on February 28, 2001, and should be accompanied by proof of service on applicants, in the form of an affidavit or, for lawyers, a certificate of service. Hearing requests should state the nature of the writer's interest, the reason for the request, and the issues contested. Persons may request notification of a hearing by writing to the Commission's Secretary.

ADDRESSES: Secretary, Commission, 450 Fifth Street, NW., Washington, DC 20549–0609. Applicants, 1211 Avenue of the Americas, 41st Floor, New York, New York, 10036.

FOR FURTHER INFORMATION CONTACT: John L. Sullivan, Senior Counsel, at (202) 942–0681, or Michael W. Mundt, Branch Chief, at (202) 942–0564 (Division of Investment Management, Office of Investment Company Regulation).

SUPPLEMENTARY INFORMATION: The following is a summary of the application. The complete application may be obtained for a fee at the Commission's Public Reference Branch, 450 Fifth Street, NW., Washington, DC 20549–0102 (tel. 202–942–8090).

Applicant's Representations

1. MFSG, a Massachusetts business trust,is registered under the Act as an open-end management investment

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company and currently offers ten series, including Select Short-Term Bond Fund and Select Bond Fund. MFG, a Massachusetts business trust, is registered under the Act as an open-end management investment company and currently offers twenty series, including Bond Fund and Select Short-Term Bond Fund. Select Short-Term Bond Fund, Select Bond Fund, Short-Term Bond Fund and Bond Fund are each a ''Fund.'' Chase serves as investment adviser, and Chase Fleming Asset Management (USA) Inc. (''CFAM''), a wholly owned subsidiary of Chase, serves as subadviser to each Fund. Chase is not currently required to register as an investment adviser pursuant to section 202(a)(11)(A) of the Investment Advisers Act of 1940 (''Advisers Act''), while CFAM is an investment adviser registered under the Advisers Act. Chase holds of record for the benefit of others, in trust, more than 5% (in come cases, more than 25%) of the total outstanding voting securities of each of the Funds.

2. On September 19, 2000 and October 24, 2000, the boards of trustees of the Funds (together, the ''Boards'') including the trustees who are not ''interested persons'' of the Funds, as defined in section 2(a)(19) of the Act (''Independent Trustees''), unanimously approved plans of reorganization (''Plans'') under which Select Short-Term Bond Fund will reorganize into Short-Term Bond Fund, and Bond Fund will reorganize into Select Bond Fund (Select Short-Term Bond Fund and Bond Fund are ''Acquired Funds,'' and Short-Term Bond Fund and Select Bond Fund are ''Acquiring Funds''). Under the Plans, each Acquiring Fund will acquire all of the assets and liabilities of the corresponding Acquired Fund in exchange for shares of the Acquiring Fund (each a ''Reorganization''). The shares of each Acquiring Fund exchanged will have an aggregate net asset value equal to the aggregate net asset value of the corresponding Acquired Fund's shares determined as of the close of regular trading on the New York Stock Exchange on the closing date of each Reorganization (each a ''Closing Date''), currently anticipated to occur as soon as practicable after the granting of the order of the Commission requested by the application. The value of the assets of each Fund will be determined according to the Fund's then-current prospectus and statement of additional information. On the Closing Date, each Acquired Fund will be liquidated by the distribution of the corresponding Acquiring Fund's shares pro rata to the shareholders of the Acquired Fund.

3. Applicants state that the in vestment objectives and policies of each Acquired Fund are identical to those of the corresponding Acquiring Fund. Select Short-Term Bond Fund currently offers shares that are not subject to sales charges or distribution fees, but are subject to shareholder servicing fees. Shareholders of Select Short-Term Bond Fund will receive shares of a class of Short-Term Bond Fund with the same sales charge and fee arrangements. Bond Fund offers three classes of shares, and Select Bond Fund currently offers only one class of shares. However, in connection with the Reorganizations, Select Bond Fund will introduce two new classes, and shareholders of Bond Fund will receive shares of Select Bond Fund subject to the same sales charges, distribution fees, and shareholder servicing fees as their current shares. For purposes of calculating deferred sales charges on certain shares, the amount of time a shareholder held shares of Bond Fund will be added to the amount of time the shareholder holds shares of Select Bond Fund. No sales charge will be imposed in connection with the Reorganizations. Chase will bear all of the costs associated with the Reorganizations.

4. Each Board, including the Independent Trustees, unanimously determined that the participation of its Fund in the respective Reorganization was in the best interests of the Fund and the shareholders, and that the interests of the shareholders of the Fund would not be diluted as a result of the Reorganization. In approving the Reorganizations, the Board of Each Acquired Fund considered various factors, including: (a) The terms of the Plan; (b) the Funds' historical, current and projected expense ratios; (c) the Funds' investment objectives and policies; and (d) the tax-free nature of the Reorganizations. The Board of each Acquiring Fund considered factors including: (a) The terms of the Plan; 9b) the potential operational and administrative efficiencies resulting from the Reorganizations, and (c) the fact that Chase would bear the expenses of the Reorganizations.

5. The Reorganizations are subject to a number of conditions, including that: (a) The shareholders of each Acquired Fund will have approved the Reorganization; (b) the Funds will have received opinions of counsel concerning the tax-free nature of each Reorganization; and (c) applicants will have received exemptive relief from the Commission to permit the Reorganization. An Acquired Fund or Acquiring Fund may terminate its Plan by written notice if certain conditions are not satisfied prior to the Closing Date. Applicants agree not to make any material changes to either Plan that affect the exemptive order without prior approval of the Commission or its staff.

6. A registration statement on Form N–14 with respect to each Reorganization, containing a proxy statement/prospectus, was filed on October 25, 2000 with the Commission and became effective on November 27, 2000. Definitive proxy materials were filed with the Commission on December 13, 2000 and first mailed to shareholders on or about December 14, 2000. The shareholders of each Acquired Fund considered and approved the Reorganizations at special meetings held on January 26, 2001.

Applicants' Legal Analysis

1. Section 17(a) of the Act, in relevant part, prohibits an affiliated person of a registered investment company, or an affiliated person of such a person, acting as principal, from selling any security to, or purchasing any security from, the company. Section 2(a)(3) of the Act defines an ''affiliated person'' of another person to include, among others: (a) Any person directly or indirectly owning, controlling, or holding with power to vote 5% or more of the outstanding voting securities of the other person; (b) any person 5% or more of whose securities are directly or indirectly owned, controlled, or held with power to vote by the other person; (c) any person directly or indirectly controlling, controlled by, or under common control with the other person; and (d) if the other person is an investment company, any investment adviser of that company.

2. Rule 17a–8 under the Act exempts from the prohibitions of section 17(a) certain mergers, consolidations, and sales of substantially all of the assets of registered investment companies that are affiliated persons, or affiliated persons of an affiliated person, solely by reason of having a common investment adviser, common directors, and/or common officers, provided that certain conditions are satisfied.

3. Applicants state that Chase holds of record for the benefit of others, in trust, more than 5% (in some cases, more than 25%) of the total outstanding voting securities of each of the Funds. Because Chase holds these securities, each Acquiring Fund and Acquired Fund may be deemed to be affiliated persons for reasons other than those set forth in rule 17a–8 and therefore unable to rely on the rule.

4. Section 17(b) of the Act provides, in relevant part, that the Commission may exempt a transaction from the provisions of section 17(a) if evidence establishes that the terms of the proposed transaction, including the consideration to be paid or received, are reasonable and fair and do not involve overreaching on the part of any person concerned, and that the proposed transaction is consistent with the policy of each registered investment company concerned and with the general purposes of the Act.

5. Applicants requests an order under section 17(b) of the Act exempting them from section 17(a) to the extent necessary to complete the Reorganizations. Applicants submit that the Reorganizations satisfy the standards of section 17(b). Applicants state that the Boards, including the Independent Trustees, unanimously found that the participation of the Acquired Funds and Acquiring Funds in the Reorganizations is in the best interest of each Fund and its shareholders and that such participation will not dilute the interests of the existing shareholders of each Fund. In addition, applicants state that the Reorganizations will be on the basis of the Funds' relative net asset values.

For the Commission, by the Division of Investment Management, under delegated authority.

Margaret H. McFarland,

Deputy Secretary.

[FR Doc. 01–3626 Filed 2–12–01; 8:45 am]

BILLING CODE 8010–01–M

SECURITIES AND EXCHANGE COMMISSION

[Investment Company Act Release No. 24855; 812–12404]

Nationwide Mutual Funds, et al.; Notice of Application

February 7, 2001.

AGENCY: Securities and Exchange Commission (''SEC'' or ''Commission'').

ACTION: Notice of an application under section 17(b) of the Investment Company Act of 1940 (the ''Act'') for an exemption from section 17(a) of the Act.

Summary of Application: Applicants request an order to permit a series of Nationwide Mutual Funds (''Nationwide'') to acquire all of the assets, net of liabilities, of a series of Principal Preservation Portfolios, Inc. (''Principal Preservation'') (the ''Reorganization''). Because of certain affiliations, applicants may not rely on rule 17a–8 under the Act.

Applicants: Nationwide, Principal Preservation, Villanova Mutual Fund Capital Trust (''VMF''), and NorthPointe Capital, LLC (''NorthPointe'').

Filing Dates: The application was filed on January 16, 2001. Applicants have agreed to file an amendment to the application during the notice period, the substance of which is reflected in this notice.

Hearing or Notification of Hearing: An order granting the application will be issued unless the Commission orders a hearing. Interested persons may request a hearing by writing to the Commission's Secretary and serving applicants with copies of the request, personally or by mail. Hearing requests should be received by the Commission by 5:30 p.m. on February 27, 2001, and should be accompanied by proof of service on Applicants, in the form of an affidavit or, for lawyers, a certificate of service. Hearing requests should state the nature of the writer's interest, the reason for the request, and the issues contested. Persons may request notification of a hearing by writing to the SEC's Secretary.

ADDRESSES: Secretary, SEC, 450 5th Street NW., Washington, DC 20549–0609. Applicants, c/o Elizabeth A. Davin, Esq., Nationwide Mutual funds, 1–35–10, One Nationwide Plaza, Columbus, Ohio 43215.

FOR FURTHER INFORMATION CONTACT: Bruce R. MacNeil, Senior Counsel, at (202) 942–0634, or Nadya B. Roytblat, Assistant Director, at (202) 942–0564 (Division of Investment Management, Office of Investment Company Regulation).

SUPPLEMENTARY INFORMATION: The following is a summary of the application. The complete application may be obtained for a fee at the SEC's Public Reference Branch, 450 Fifth Street NW., Washington, DC 20549–0102 (telephone (202) 942–8090).

Applicants' Representations

1. Nationwide, an Ohio business trust, is an open-end management investment company registered under the Act. Nationwide currently offers thirty-seven series, including Nationwide Value Opportunities Fund (the ''Acquiring Fund''). Principal Preservation, a Maryland corporation, is an open-end management investment company registered under the Act. Principal Preservation currently offers nine series including Select Value Fund (the ''Acquired Fund,'' together with the Acquired Fund, the ''Funds'').

2. VMF is an investment adviser registered under the Investment Advisers Act of 1940 (''Advisers Act'') and serves as investment adviser to the Acquiring Fund. VMF is a wholly-owned subsidiary of Villanova Capital, Inc. (''VCI''), a holding company. VCI is a subsidiary of Nationwide Financial Services. As of December 29, 2000, VMF owns approximately 13.3% of the Acquiring Fund's shares.

3. NorthPointe is an investment adviser registered under the Advisers Act and serves as investment adviser to the Acquired Fund. NorthPointe also serves as the sub-adviser of the Acquiring Fund. NorthPointe is a majority-owned subsidiary of VCI.

4. On December 12, 2000, and December 15, 2000, the board of trustees of Principal Preservation (''Principal Board''), and the board of trustees of Nationwide (''Nationwide Board'') and together with the Principal Board, the ''Boards''), respectively, including all of the trustees who are not ''interested persons,'' as defined in section 2(a)(19) of the Act (''Disinterested Trustees''), approved the agreement and plan of reorganization entered into between the Funds (''Plan''). Pursuant to the Plan, as a result of the Reorganization, the Acquiring Fund will acquire substantially all of the assets, net of liabilities, of the Acquired Fund in exchange for shares of the Acquiring Fund. The shares of the Acquiring Fund exchanged will have a total net asset value equal to the total net asset value of the Acquired Fund's shares determined as of the close of regular trading on the New York Stock Exchange on the business day preceding the day of the closing of the Reorganization (''Closing Date''). The value of the assets of the Acquired Fund will be determined according to the Acquired Fund's then-current prospectuses and statement of additional information. Contemporaneously with the distribution of the Acquiring Fund's shares pro rata to the Acquired Fund's shareholders, the Acquired Fund will satisfy its liabilities with its remaining assets and will be liquidated. Applicants anticipate the Closing Date will be on or around February 28, 2001.

5. Applicants state that the investment objectives and strategies of the Acquired Fund are similar to those of the Acquiring Fund. The Acquiring Fund has four classes of shares: Class A, Class B, Class C, and Investor Service Class. The Acquired Fund has three classes, Class A, Class B and Class C. Only Class A and Class B shares will be involved in the Reorganization. Neither the Acquiring Fund nor the Acquired Fund currently offers Class C shares, and the Acquired Fund has no Class C shares issued or outstanding. Class A

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shares of the Acquired and Acquiring Funds are subject to a front-end sales charge and a rule 12b–1 distribution fee. Class B shares are subject to a contingent deferred sales charge and a rule 12b–1 distribution fee. No sales charges will be imposed in connection with the Reorganization. For purposes of calculating the deferred sales charge, shareholders of Class B of the Acquired Fund will be deemed to have held Class B shares of the Acquiring Fund since the date the shareholders initially purchased the shares of the Acquired Fund. NorthPointe and VCI will bear the Acquiring fund's costs associated with the Reorganization and B.C. Ziegler and Company (''Ziegler''), the Acquired Fund's distributor and administrator, will bear the Acquired Fund's costs.

6. The Boards, including all of the Disinterested Trustees, determined that the Reorganization was in the best interests of each Fund and its shareholders, and that the interests of the existing shareholders of the Funds would not be diluted as a result of the Reorganization. In assessing the Reorganization, the Boards considered various factors, including: (a) The investment objectives and strategies of the Acquired Fund and the Acquiring Fund; (b) the investment advisory and other fees paid by the Acquiring Fund and the projected expense ratio of the Acquiring Fund; (c) the terms and conditions of the Plans; (d) the anticipated tax consequences of the Reorganization for the Funds and their shareholders; and (e) the benefits to Ziegler, VMF and its affiliates that could result from the Reorganization.

7. The Reorganization is subject to a number of conditions precedent, including that: (a) The parties will have complied with all material aspects of the Plan on or before the Closing Date; (b) there will have been no material adverse changes to either the Acquiring or the Acquired Fund; (c) the Funds will have received opinions of counsel concerning the tax-free nature of the Reorganization; (d) the Acquired Fund's shareholders will have approved the Plan; (e) an N–14 registration statement relating to the Reorganization will have become effective with the Commission; (f) the Acquired Fund shall have declared and paid dividends and other distributions on or before the Closing Date; and (g) applicants will have received from the Commission the exemptive relief requested by the Application.

8. The Plan may be terminated and the Reorganization abandoned at any time prior to the Closing Date by the mutual consent of the parties. In addition, the plan may be terminated by either party under certain circumstances specified in the Plan. Applicants agree not to make any material changes to the Plan without prior approval of the Commission staff.

9. A registration statement on Form N–14 and definitive proxy solicitation materials have been filed with the SEC and were mailed to the Acquired Fund's shareholders on January 23, 2001. A shareholders meeting of the Acquired Fund is scheduled for February 22, 2001.

Applicants' Legal Analysis

1. Section 17(a) of the Act, in relevant part, prohibits an affiliated person of a registered investment company, or an affiliated person of such a person, acting as principal, from selling any security to, or purchasing any security from, the company. Section 2(a)(3) of the Act defines an ''affiliated person'' of another person to include: (a) Any person directly or indirectly owning, controlling, or holding with power to vote 5% or more of the outstanding voting securities of the other person; (b) any person 5% or more of whose securities are directly or indirectly owned, controlled, or held with power to vote by the other person; (c) any person directly or indirectly controlling, controlled by, or under common control with the other person; and (d) if the other person is an investment company, any investment adviser of that company.

2. Rule 17a–8 under the Act exempts certain mergers, consolidations, and sales of substantially all of the assets of registered investment companies that are affiliated persons, or affiliated persons of an affiliated person, solely by reason of having a common investment adviser, common directors, and/or common officers, provided that certain conditions are satisfied.

3. Applicants believe that they may not rely on rule 17a–8 in connection with the Reorganization because the Funds may be deemed to be affiliated by reasons other than having a common investment adviser, common directors, and/or common officers. Applicants state that the Acquiring Fund may be deemed to be an affiliated person of VMF because VMF owns more than 5% of the outstanding voting securities of the Acquiring Fund. Additionally, VMF and NorthPointe are under the common control of VCI. Therefore, the Acquiring Fund may be deemed an ''affiliated person of an affiliated person'' of the Acquired Fund.

4. Section 17(b) of the Act provides, in relevant part, that the Commission may exempt a transaction from the provisions of section 17(a) if evidence establishes that the terms of the proposed transaction, including the consideration to be paid or received, are reasonable and fair and do not involve overreaching on the part of any person concerned, and that the proposed transaction is consistent with the policy of each registered investment company concerned and with the general purposes of the Act.

5. Applicants request an order under section 17(b) of the Act exempting them from section 17(a) to the extent necessary to complete the Reorganization. Applicants submit that the Reorganization satisfies the standards of section 17(b) of the Act. Applicants state that the terms of the Reorganization are reasonable and fair and do not involve overreaching. Applicants state that the investment objectives and strategies of the Acquired Fund are similar to those of the Acquiring Fund. Applicants also state that the Boards, including all of the Disinterested Trustees, found that the participation of the Acquired and the Acquiring Funds in the Reorganization is in the best interests of each Fund and its shareholders and that such participation will not dilute the interests of the existing shareholders of each Fund. In addition, applicants state that the Reorganization will be on the basis of the Funds' relative net asset values.

For the Commission, by the Division of Investment Management, under delegated authority.

Margaret H. McFarland,

Deputy Secretary.

[FR Doc. 01–3627 Filed 2–12–01; 8:45 am]

BILLING CODE 8010–01–M

SECURITIES AND EXCHANGE COMMISSION

[Release No. 34–43930; File No. 265–22]

Advisory Committee on Market Information

AGENCY: Securities and Exchange Commission.

ACTION: Notice of meeting of the Securities and Exchange Commission Advisory Committee on Market Information.

SUMMARY: The third meeting of the Securities and Exchange Commission Advisory Committee on Market Information (''Committee'') will be held on March 1, 2001, in the William O. Douglas Room, at the Commission's main offices, 450 Fifth Street, NW., Washington, DC, beginning at 9 a.m. The meeting will be open to the public, and the public is invited to submit written comments to the Committee.

ADDRESSES: Written comments should be submitted in triplicate and should refer to File No. 265–22. Comments should be submitted to Jonathan G. Katz, Secretary, Securities and Exchange Commission, 450 Fifth Street, NW., Washington, DC 20549–0609.

FOR FURTHER INFORMATION CONTACT: Anitra Cassas, Special Counsel, Division of Market Regulation, at 202–942–0089; Securities and Exchange Commission, 450 Fifth Street, NW., Washington, DC 20549–1001.

SUPPLEMENTARY INFORMATION: In accordance with section 10(a) of the Federal Advisory Committee Act, 5 U.S.C. App. 10a, and the regulations thereunder, the Designated Federal Official of the Committee, David S. Shillman, has ordered publication of this notice that the Committee will conduct a meeting on March 1, 2001, in the William O. Douglas Room at the Commission's main offices, 450 Fifth Street, NW., Washington, DC beginning at 9 a.m. The meeting will be open to the public. This will be the third meeting of the Committee. The purpose of this meeting will be to discuss possible ways to improve the existing model for consolidating and disseminating market information in the equities markets, and other issues relating to the public availability of market information in the equities and options markets.

Dated: February 6, 2001.

Jonathan G. Katz,

Secretary.

[FR Doc. 01–3625 Filed 2–12–01; 8:45 am]

BILLING CODE 8010–01–M

SOCIAL SECURITY ADMINISTRATION

Agency Information Collection Activities: Proposed Request and Comment Request

The Social Security Administration (SSA) publishes a list of information collection packages that will require clearance by the Office of Management and Budget (OMB) in compliance with Public Law 104–13 effective October 1, 1995, The Paperwork Reduction Act of 1995. SSA is soliciting comments on the accuracy of the agency's burden estimate; the need for the information; its practical utility; ways to enhance its quality, utility and clarity; and on ways to minimize burden on respondents, including the use of automated collection techniques or other forms of information technology.

Written comments and recommendations regarding the information collection(s) should be submitted to the SSA Reports Clearance Officer and to the OMB Desk Officer at the following addresses:

(OMB) Office of Management and Budget, Attn: Desk Officer for SSA, New Executive Office Building, Room 10230, 725 17th St., NW., Washington, DC. 20503

(SSA) Social Security Administration, DCFAM, Attn: Frederick W. Brickenkamp 1–A–21 Operations Bldg., 6401 Security Blvd., Baltimore, MD 21235

I. The information collections listed below will be submitted to OMB within 60 days from the date of this notice. Therefore, your comments should be submitted to SSA within 60 days from the date of this publication. You can obtain copies of the collection instruments by calling the SSA Reports Clearance Officer at 410–965–4145, or by writing to him at the address listed above.

1. Site Review Questionnaire for Volume Payees, SSA–637; Site Review Questionnaire for Fee-for Service Payees, SSA–638; Site Review—Beneficiary Interview Form, SSA–639—0960–NEW. Titles II and XVI of the Social Security Act provide for the payment of Social Security and Supplemental Security Income (SSI) benefits to a relative, another person, or an organization when the best interests of the beneficiary will be served. Social security regulations outline the duties and responsibilities of representative payees and require a written report accounting for these benefits.

To ensure that benefits are being used properly for beneficiaries, SSA will conduct triennial site reviews for fee-for service payees and volume payees (organizations serving 100 or more beneficiaries). The reviews include a face-to-face meeting with the payee and appropriate staff and examination/verification of a sample of beneficiary records and supporting documentation, and may include beneficiary or custodian interviews. The information gathered using forms SSA–637, SSA–638 and SSA–639 will be used to ensure compliance with representative payment policies and procedures. It will enable SSA to identify poor payee performance and initiate corrective action as appropriate. The respondents are individuals who receive a fee for service, organizations serving as representative payees for 100 or more Social Security and Supplemental Security Income beneficiaries, and beneficiaries or custodians. Following is an estimate of the annual public reporting burden:

	Volume payees	Fee-for-service payees	Beneficiaries/custodians
Number of Respondents	347	333	2,040
Frequency of Response	1	1	1
Average Burden Per Response (Minutes)	60	60	10
Estimated Annual Burden (Hours)	347	333	340

2. Earnings Record Information—0960–0505. The information on Form SSA–L3231–C1 is used by SSA to ensure that the proper person is credited with earnings reported for a minor under age 7. The respondents are businesses reporting earnings for children under age 7.

Number of Respondents: 20,000.

Frequency of Response: 1.

Average Burden Per Response: 10 minutes.

Estimated Annual Burden: 3,333 hours.

3. Employer Verification of Earnings After Death—0960–0472. The information collected on Form SSA–L4112 is used by SSA to determine whether wages reported by an employer are correct, when SSA records indicate that the wage earner is deceased. The respondents are employers who report wages for a deceased employee.

Number of Respondents: 50,000.

Frequency of Response: 1.

Average Burden Per Response: 10 minutes.

Estimated Annual Burden: 8,333 hours.

II. The information collections listed below have been submitted to OMB for clearance. Your comments on the information collections would be most useful if received by OMB and SSA within 30 days from the date of this publication. You can obtain a copy of

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the OMB clearance packages by calling the SSA Reports Clearance Officer on (410) 965–4145, or by writing to him at the address listed above.

1. Application Statement for Child's Insurance Benefits—0960–0010. Title II of the Social Security Act provides for payment of monthly benefits to the children of an insured retired, disabled or deceased worker, if certain conditions are met. The form SSA–4–BK is used by the Social Security Administration to collect information needed to determine whether the child or children are entitled to benefits. The respondents are children of the worker or individuals who complete this form on their behalf.

	Life claims	Death claims
Number of Respondents	925,000	815,000.
Frequency of Response	1	1.
Average Burden Per Response	10.5 minutes	15.5 minutes.
Estimated Annual Burden	161,875 hours	210,542 hours.

2. Request for Internet Service—Password—0960–NEW. SSA will collect and use information to establish a Password Data File. The file will be used to allow customers to conduct electronic business with the Agency. SSA will request the following information to verify the customer's identity: Name, Social Security Number, Password Request Code, Last Month Payment Amount and Director Deposit Account Number (if applicable). SSA may also ask for a shared secret created by SSA and mailed or electronically sent to the requestor. The respondents are individuals electing to conduct business with SSA in the electronic medium.

Number of Respondents: 250,000.

Frequency of Response: 1.

Average Burden Per Response: 10 minutes.

Estimated Annual Burden: 41,667 hours.

Dated: February 7, 2001.

Frederick W. Brickenkamp,

Reports Clearance Officer.

[FR Doc. 01–3583 Filed 2–12–01; 8:45 am]

BILLING CODE 4191–02–P

SOCIAL SECURITY ADMINISTRATION

Privacy Act of 1974 as Amended; Computer Matching Program (SSA/HCFA) Match Number 1094

AGENCY: Social Security Administration (SSA).

ACTION: Notice of computer matching program.

SUMMARY: In accordance with the provisions of the Privacy Act, as amended, this notice announces a computer matching program that SSA plans to conduct with the Health Care Financing Administration.

DATES: SSA will file a report of the subject matching program with the Committee on Governmental Affairs of the Senate, the Committee on Government Reform and Oversight of the House of Representatives, and the Office of Information and Regulatory Affairs, Office of Management and Budget (OMB). The matching program will be effective as indicated below.

ADDRESSES: Interested parties may comment on this notice by either telefax to (410) 966–2935 or writing to the Associate Commissioner, Office of Program Support, 2–Q–16 Operations Building, 6401 Security Boulevard, Baltimore, MD 21235–6401. All comments received will be available for public inspection at this address.

FOR FURTHER INFORMATION CONTACT: The Associate Commissioner for Program Support as shown above.

SUPPLEMENTARY INFORMATION:

A. General

The Computer Matching and Privacy Protection Act of 1988 (Public Law (Pub. L.) 100–503), amended the Privacy Act (5 U.S.C. 552a) by describing the manner in which computer matching involving Federal agencies could be performed and adding certain protections for individuals applying for and receiving Federal benefits. Section 7201 of the Omnibus Budget Reconciliation Act of 1990 (Pub. L. 101–508) further amended the Privacy Act regarding protections for such individuals. The Privacy Act, as amended, regulates the use of computer matching by Federal agencies when records in a system of records are matched with other Federal, State, or local government records.

It requires Federal agencies involved in computer matching programs to:

(1) Negotiate written agreements with the other agency or agencies participating in the matching programs;

(2) Obtain the Data Integrity Boards' approval of the match agreements;

(3) Furnish detailed reports about matching programs to Congress and OMB;

(4) Notify applicants and beneficiaries that their records are subject to matching; and

(5) Verify match findings before reducing, suspending, terminating, or denying an individual's benefits or payments.

B. SSA Computer Matches Subject to the Privacy Act

We have taken action to ensure that all of SSA's computer matching programs comply with the requirements of the Privacy Act, as amended.

Dated: November 21, 2000.

Susan M. Daniels,

Deputy Commissioner for Disability and Income Security Programs.

Notice of Computer Matching Program, Health Care Financing Administration (HCFA) With the Social Security Administration (SSA)

A. Participating Agencies

SSA and HCFA.

B. Purpose of the Matching Program

The purpose of this matching program is to establish the conditions, safeguards and procedures under which HCFA agrees to disclose Medicare non-utilization data to SSA. In some instances, if an individual has not used Medicare benefits for an extended period of time, this may indicate that the individual is deceased. SSA will use the selected data as an indicator of cases that should be reviewed to determine continued eligibility to SSA administered programs.

C. Authority for Conducting Matching Program

Sections 202 (42 U.S.C. 402) and 205(c) (42 U.S.C.405(c)) of the Social Security Act.

D. Categories of Records and Individuals Covered by the Matching Program

SSA will periodically furnish HCFA with an electronic finder file containing Title II Claim Account Number (CAN) and Title II Beneficiary Identification Code (BIC)) of beneficiaries from SSA's file of Master Beneficiary Records (SSA/OSR 60–0090) who receive Medicare.

SSA will request HCFA to match the finder file against their National Claims

History (09–70–0005) and the Health Insurance Master Record (09–70–0502) and release an electronic file to SSA containing certain identifying information on enrollees who have not used Medicare for a specified period of at least 12 consecutive months.

E. Inclusive Dates of the Match

The matching program shall become effective no sooner than 40 days after notice for the program is sent to Congress and OMB, or 30 days after publication of this notice in the **Federal Register**, whichever date is later. The matching program will continue for 18 months from the effective date and may be extended for an additional 12 months thereafter, if certain conditions are met.

[FR Doc. 01–3582 Filed 2–12–01; 8:45 am]

BILLING CODE 4191–02–P

DEPARTMENT OF TRANSPORTATION

Coast Guard

[USCG–2001–8840]

Chemical Transportation Advisory Committee

AGENCY: Coast Guard, DOT.

ACTION: Notice of meetings.

SUMMARY: The Chemical Transportation Advisory Committee (CTAC) and its Subcommittees will meet to discuss various issues relating to the marine transportation of hazardous materials in bulk. All meetings will be open to the public.

DATES: CTAC will meet on Thursday, March 8, 2001, from 9:00 a.m. to 3:30 p.m. The Subcommittees on Prevention Through People (PTP) and Hazardous Substances Response Standards will meet on Wednesday, March 7, 2001, from 8:30 a.m. to 4:00 p.m. These meetings may close early if all business is finished. Requests to make oral presentations should reach the Coast Guard on or before February 27, 2001. Requests to have a copy of written material distributed to each member of the Committee or Subcommittee should reach the Coast Guard on or before March 5, 2001.

ADDRESSES: CTAC will meet at the U.S. Department of Transportation (DOT), Nassif Building, 400 7th Street, SW., Washington, DC. CTAC will meet in rooms 6200–6204. The Subcommittees will meet at the same address, however, the PTP Subcommittee will meet in room 8440 and the Hazardous Substances Response Standards Subcommittee will meet in room 6332. Send written material and requests to make oral presentations to Commander Robert F. Corbin, Commandant (G–MSO–3), U.S. Coast Guard Headquarters, 2100 Second Street, SW., Washington, DC 20593–0001. This notice is available on the Internet at http://dms.dot.gov.

FOR FURTHER INFORMATION CONTACT: For questions on this notice, contact Commander Robert F. Corbin, Executive Director of CTAC, or Ms. Sara S. Ju, Assistant to the Executive Director, telephone 202–267–1217, fax 202–267–4570.

SUPPLEMENTARY INFORMATION: Notice of these meetings is given under the Federal Advisory Committee Act, 5 U.S.C. App. 2.

Agenda of Meetings

Chemical Transportation Advisory Committee:

(1) Introduction of Committee members and attendees.

(2) Progress Reports from the PTP and Hazardous Substances Response Standards Subcommittees.

(3) Discussion on the causes and hazards of cargo tank over-pressurization.

(4) Status of Coast Guard and International Maritime Organization (IMO) regulatory activities.

(5) Coast Guard's Crew Alertness Campaign.

(6) Open—for marine chemical transportation related issues.

Subcommittee on PTP. The agenda includes the following:

(1) Continuation of work on conducting a coarse qualitative risk assessment to identify the major potential hazards in the chemical transportation industry with relation to the human element component.

Subcommittee on Hazardous Substances Response Standards. The agenda includes the following:

(1) Continued effort of the following Subcommittee workgroup activities; Response Standards, Response Resources, and Response Training.

Procedural

All meetings are open to the public. Please note that the meetings may close early if all business is finished. At the Chairs' discretion, members of the public may make oral presentations during the meetings. If you would like to make an oral presentation at a meeting, please notify the Executive Director no later than February 27, 2001. Written material for distribution at a meeting should reach the Coast Guard no later than March 5, 2001. If you would like a copy of your material distributed to each member of the Committee or Subcommittee in advance of the meetings, please submit 25 copies to the Executive Director no later than March 5, 2001.

Information on Services for Individuals With Disabilities

For information on facilities or services for individuals with disabilities, or to request special assistance at the meetings, contact the Assistant to the Executive Director of CTAC as soon as possible.

Dated: February 5, 2001.

Joseph J. Angelo,

Director of Standards, Marine Safety and Environmental Protection.

[FR Doc. 01–3629 Filed 2–12–01; 8:45 am]

BILLING CODE 4910–15–M

DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

Notice of Intent To Rule on Request To Release Airport Property at the Gainesville Municipal Airport, Gainesville, TX

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Notice of request to release airport property.

SUMMARY: The FAA proposes to rule and invite public comment on the release of land at the Gainesville Municipal Airport under the provisions of Section 125 of the Wendell H. Ford Aviation Investment Reform Act for the 21st Century (AIR 21).

DATES: Comments must be received on or before March 9, 2001.

ADDRESSES: Comments on this application may be mailed or delivered to the FAA at the following address: Mr. Mike Nicely, Manager, Federal Aviation Administration, Southwest Region, Airports Division, Texas Airports Development Office, ASW–650, Fort Worth, Texas 761–0650.

In addition, one copy of any comments submitted to the FAA must be mailed or delivered to Mr. Mike Land, City Manager, at the following address: Mr. Mike Land, 200 South Rusk, Gainesville, Texas 76240.

FOR FURTHER INFORMATION CONTACT: Ms. Mimchi Hoang, Program Manager, Federal Aviation Administration, Texas Airports Development Office, ASW–650, 2601 Meacham Boulevard, Fort Worth, Texas 76193–0650.

The request to release property may be viewed in person at this same location.

SUPPLEMENTARY INFORMATION: The FAA invites public comment on the request

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to release property at the Gainesville Municipal Airport under the provisions of the AIR 21.

On February 2, 2001, the FAA determined that the request to release property at Gainesville Municipal Airport, submitted by the City, met the procedural requirements of the Federal Aviation Regulations, Part 155. The FAA may approve the request, in whole or in part, no later than April 2, 2001.

The following is a brief overview of the request:

The City of Gainesville requests the release of 39.45 acres of non-aeronautical airport property. The land was conveyed to the City of Gainesville by the Federal Government in a deed dated August 4, 1948 and referenced in Vol. 331, page 29 of Cooke County Deed Records. The release of the property will allow funding for maintenance, operation and development of the airport.

The estimated $217,000 sale proceeds will be deposited into the airport enterprise fund and expended within 3 years from the date of the sale.

Any person may inspect the request in person at the FAA office listed above under **FOR FURTHER INFORMATION CONTACT.**

In addition, any person may, upon request, inspect the application, notice and other documents relevant to the application in person at the City of Gainesville.

Issued in Fort Worth, Texas on February 2, 2001.

Naomi L. Saunders,

Manager, Airports Division.

[FR Doc. 01–3660 Filed 2–12–01; 8:45 am]

BILLING CODE 4910–13–M

DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

Notice of Intent To Rule on Application 01–04–I–00–PLB To Impose the Revenue from a Passenger Facility Charge (PFC) at Clinton County Airport, Plattsburgh, New York

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Notice of intent to rule on application.

SUMMARY: The FAA proposes to rule and invites public comment on the application to impose the revenue from a PFC at Clinton County Airport under the provisions of the Aviation Safety and Capacity Expansion Act of 1990 (Title IX of the Omnibus Budget Reconciliation Act of 1990) (Pub. L. 101–508) and part 158 of the Federal Aviation Regulations (14 CFR part 158).

DATES: Comments must be received on or before March 15, 2001.

ADDRESSES: Comments on this application may be mailed or delivered in triplicate to the FAA at the following address: Federal Aviation Administration, New York Airports District Office, 600 Old Country Road, Suite 446, Garden City, New York 11530.

In addition, one copy of any comments submitted to the FAA must be mailed or delivered to Mr. Ralph Hensel, Airport Manager at the following address: Clinton County Airport, 11 Airport Road, Suite 101, Plattsburgh, New York 12901.

Air carriers and foreign air carriers may submit copies of written comments previously provided to the County of Clinton under § 158.23 of part 158.

FOR FURTHER INFORMATION CONTACT: Robert Levine, Airport Engineer, New York Airports District Office, 600 Old Country Road, Garden City, New York 11530, Telephone: (516) 227–3807. The application may be reviewed in person at this same location.

SUPPLEMENTARY INFORMATION: The FAA proposes to rule and invites public comment on the application to impose the revenue from a PFC at Clinton County Airport under the provisions of the Aviation Safety and Capacity Expansion Act of 1990 (Title IX of the Omnibus Budget Reconciliation Act of 1990) (Pub. L. 101–508) and part 158 of the Federal Aviation Regulations (14 CFR part 158).

On January 30, 2001, the FAA determined that the application to impose the revenue from a PFC submitted by County of Clinton was substantially complete within the requirements of section 158.25 of part 158. The FAA will approve or disapprove the application, in whole or in part, no later than May 18, 2001.

The following is a brief overview of the application.

PFC Application No.: PFC 01–04–I–00–PLB.

Level of the proposed PFC: $3.00.

Proposed Charge Effective Date: May 1, 2001.

Proposed Charge Expiration Date: December 1, 2002.

Total Estimated PFC Revenue: $46,275.

Brief description of proposed project(s):

—On Airport Obstruction Removal (Phase I & II)

—Transient Apron Rehabilitation

Class or classes of air carriers which the public agency has requested not be required to collect PFCs: Non-Scheduled/On Demand Operators filing FAA Form 1800–31.

Any person may inspect the application in person at the FAA office listed above under **FOR FURTHER INFORMATION CONTACT** and at the FAA regional airports office located at: Federal Aviation Administration, Eastern Region, Airports Division, AEA–610, 1 Aviation Plaza, Jamaica, New York 11434–4809.

In addition, any person may, upon request, inspect the application, notice and other documents germane to the application in person at the County of Clinton.

Issued in Garden City, New York on January 30, 2001.

Philip Brito,

Manager, New York Airports District Office, Eastern Region.

[FR Doc. 01–3662 Filed 2–12–01; 8:45 am]

BILLING CODE 4910–13–M

DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

Notice of Intent To Rule on Application (01–06–C–00–MFR) To Impose and Use the Revenue From a Passenger Facility Charge (PFC) at Rogue Valley International—Medford Airport, Submitted by the Jackson County Airport Authority, Medford, Oregon

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Notice of intent to rule on application.

SUMMARY: The FAA proposes to rule and invites public comment on the application to impose and use PFC revenue at Rogue Valley International—Medford Airport under the provisions of 49 U.S.C. 40117 and Part 158 of the Federal Aviation Regulations (14 CFR part 158).

DATES: Comments must be received on or before March 15, 2001.

ADDRESSES: Comments on this application may be mailed or delivered in triplicate to the FAA at the following address: J. Wade Bryant, Manager; Seattle Airports District Office, SEA–ADO; Federal Aviation Administration; 1601 Lind Avenue SW., Suite 250, Renton, Washington 98055–4056.

In addition, one copy of any comments submitted to the FAA must be mailed or delivered to Mr. Bern E. Case, A.A.E., Director of Aviation, at the following address: Jackson County Airport Authority, 3650 Biddle Road, Medford, Oregon 97504.

Air Carriers and foreign air carriers may submit copies of written comments previously provided to Rogue Valley International—Medford Airport, under section 158.23 of part 158.

FOR FURTHER INFORMATION CONTACT: Ms. Suzanne Lee-Pang, (425) 227–2654; Seattle Airports District Office, SEA–ADO; 1601 Lind Avenue SW., Suite 250, Renton, Washington 98055–4056. The application may be reviewed in person at the same location.

SUPPLEMENTARY INFORMATION: The FAA proposes to rule and invites public comment on the application (01–06–C–00–MFR) to impose and use PFC revenue at Rogue Valley International—Medford Airport, under the provisions of 49 U.S.C. 40117 and part 158 of the Federal Aviation Regulations (14 CFR part 158).

On January 31, 2001, the FAA determined that the application to impose and use the revenue from a PFC submitted to the Jackson County Airport Authority, Rogue Valley International—Medford Airport, Medford, Oregon, was substantially complete within the requirements of § 158.25 of part 158. The FAA will approve or disapprove the application, in whole or in part, no later than May 5, 2001.

The following is a brief overview of the application.

Level of the Proposed PFC: $4.50.

Proposed Charge-Effective Date: February 1, 2003.

Proposed Charge-Expiration Date: June 1, 2003.

Total Requested for Use Approval: $271,648.

Brief Description of Proposed Project: Parallel taxiway extension; High Intensity Runway Lights (HIRL)—runway lighting replacement.

Class or classes of air carriers which the public agency has requested not be required to collect PFC's: Operations by Air Taxi/Commercial Operators when enplaning revenue passengers in limited, irregular, special service air taxi/commercial operations such as air ambulance services, student instruction, non-stop sightseeing flights that begin and end at the airport and are conducted within a 25-mile radius of the airport, and other similar limited, irregular, special service operations by such Air Taxi/Commercial Operators.

Any person may inspect the application in person at the FAA office listed above under **FOR FURTHER INFORMATION CONTACT** and at the FAA Regional Airports Office located at: Federal Aviation Administration, Northwest Mountain Region, Airports Division, ANM–600, 1601 Lind Avenue SW., Suite 315, Renton, WA 98055–4056.

In addition, any person may, upon request, inspect the application, notice and other documents germane to the application in person at the Rogue Valley International—Medford Airport.

Issued in Renton, Washington on January 31, 2001.

David A. Field,

Manager, Planning, Programming and Capacity Branch, Northwest Mountain Region.

[FR Doc. 01–3661 Filed 2–12–01; 8:45 am]

BILLING CODE 4910–13–M

DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

Notice of Intent To Rule on Application To Impose and Use a Passenger Facility Charge (PFC) at San Jose International Airport, San Jose, CA

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Notice of intent to rule on application.

SUMMARY: The FAA proposes to rule and invites public comment on the application to impose and use the revenue from a PFC at San Jose International Airport under the provisions of the Aviation Safety and Capacity Expansion Act of 1990 (Title IX of the Omnibus Budget Reconciliation Act of 1990) (Pub. L. 101–508) and Part 158 of the Federal Aviation Regulations (14 CFR Part 158).

DATES: Comments must be received on or before March 15, 2001.

ADDRESSES: Comments on this application may be mailed or delivered in triplicate to the FAA at the following address: Federal Aviation Administration, Airports Division, 15000 Aviation Blvd., Lawndale, CA 90261, or San Francisco Airports District Office, 831 Mitten Road, Room 210, Burlingame, CA 94010–1303. In addition, one copy of any comments submitted to the FAA must be mailed or delivered to Mr. Ralph G. Tonseth, Director of Aviation, city of San Jose, Airport Department, at the following address: 1732 N. First Street, San Jose, CA 95112. Air carriers and foreign air carriers may submit copies of written comments previously provided to the city of San Jose under section 158.23 of Part 158.

FOR FURTHER INFORMATION CONTACT: Marlys Vandervelde, Airports Program Analyst, San Francisco Airports District Office, 831 Mitten Road, Room 210, Burlingame, CA 94010–1303, Telephone: (650) 876–2806. The application may be reviewed in person at this same location.

SUPPLEMENTARY INFORMATION: The FAA proposes to rule and invites public comment on the application to impose and use the revenue from a PFC at San Jose International Airport under the provisions of the Aviation Safety and Capacity Expansion Act of 1990 (Title IX of the Omnibus Budget Reconciliation Act of 1990) (Pub. L. 101–508) and Part 158 of the Federal Aviation Regulations (14 CFR Part 158).

On January 19, 2001, the FAA determined that the application to impose and use a PFC submitted by the city of San Jose was substantially complete within the requirements of § 158.25 of Part 158. The FAA will approve or disapprove the application, in whole or in part, no later than April 20, 2001.

The following is a brief overview of the impose and use application No. 01–10–C–00–SJC:

Level of Proposed PFC: $4.50.

Proposed Charge Effective Date: January 1, 2005.

Proposed Charge Expiration Date: January 1, 2009.

Total Estimated PFC Revenue: $93,956,000.

Brief Description of the Proposed Projects: Runway 30R Reconstruction and Extension, Noise Attenuation within the Category II and III Eligibility Areas, and Taxiway Y Extension.

Class or classes of air carriers which the public agency has requested not be required to collect PFCs: Air Taxi/Commercial Operators (ATCO) filing FAA Form 1800–31.

Any person may inspect the application in person at the FAA office listed above under **FOR FURTHER INFORMATION CONTACT** and at the FAA Regional Airports Division located at: Federal Aviation Administration, Airports Division, 15000 Aviation Blvd., Lawndale, CA 90261. In addition, any person may, upon request, inspect the application, notice and other documents germane to the application in person at the city of San Jose.

Issued in Hawthorne, California, on January 30, 2001.

Herman C. Bliss,

Manager, Airports Division, Western-Pacific Region.

[FR Doc. 01–3659 Filed 2–12–01; 8:45 am]

BILLING CODE 4910–13–M

011333

DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

Notice of Intent To Rule on Request To Release Airport Property at the University of Oklahoma Westheimer Airport, Norman, OK

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Notice of Request to Release Airport Property.

SUMMARY: The FAA proposes to rule and invites public comment on the release of land at the University of Oklahoma Westheimer Airport under the provisions of Section 125 and 751 of the Wendell H. Ford Aviation Investment Reform Act for the 21st Century (AIR 21) and Section 352 of Public Law 106–346 (FY–2001 Department of Transportation Appropriation Act).

DATES: Comments must be received on or before March 15, 2001.

ADDRESSES: Comments on this application may be mailed or delivered to the FAA at the following address: Mr. Edward Agnew, Manager, Federal Aviation Administration, Southwest Region, Airports Division, Arkansas/Oklahoma Airports Development Office, ASW–630, Fort Worth, Texas 76193–0630.

In addition, one copy of any comments submitted to the FAA must be mailed or delivered to Mr. David L. Boren, President at the following address: The University of Oklahoma, Office of the President, 660 Parrington Oval, Evans Hall, Room 110, Norman, OK 73019.

FOR FURTHER INFORMATION CONTACT: Mr. Dave Hellen, Program Manager, Federal Aviation Administration, Oklahoma City Airports District Office, 5909 Phillip J. Rhoads Avenue, Oklahoma City, Oklahoma 73008.

The request to release property may be reviewed in person at this same location.

SUPPLEMENTARY INFORMATION: The FAA invites public comment on the request to release property at the University of Oklahoma Westheimer Airport, Norman, Oklahoma under the provisions of the AIR–21 and Pubic Law 106–346.

On January 30, 2001, the FAA determined that the request to release property at the University of Oklahoma Westheimer Airport submitted by the University of Oklahoma met the requirements of Section 751 of AIR–21 and Section 352 of Public Law 106–346. FAA may approve the request, in whole or in part, at the conclusion of the comment period.

The following is a brief overview of the request:

The University of Oklahoma requests the release of approximately 550 acres of airport property identified as ''Parcel 1'' from the terms and conditions represented in Surplus Property and Grant Agreements. The release of property will permit the University of Oklahoma to derive proceeds from the use, operation and disposal of the land to construct and establish with the National Oceanic and Atmospheric Administration and the National Weather Service a weather facility.

Any person may inspect the University's request in person at the FAA office listed above under **FOR FURTHER INFORMATION CONTACT.**

In addition, any person may, upon request, inspect the application, notice and other documents germane to the application in person by contacting the University of Oklahoma.

Issued in Fort Worth, Texas on January 30, 2001.

Joseph G. Washington,

Acting Manager, Airports Division.

[FR Doc. 01–3658 Filed 2–12–01; 8:45 am]

BILLING CODE 4910–13–M

DEPARTMENT OF TRANSPORTATION

Federal Motor Carrier Safety Administration

[Docket Nos. FMCSA–2000–7827 and FMCSA–2000–7721]

Agency Information Collection Activities Under OMB Review: OMB Control Nos. 2126–003, 2126–0018, and 2126–0019

AGENCY: Federal Motor Carrier Safety Administration, DOT.

ACTION: Notice and request for comments.

SUMMARY: The FMCSA has sent the three Information Collection Requests (ICRs) described in this notice to the Office of Management and Budget (OMB) for review and comment. The ICRs describe each information collection and its expected burden. We published two **Federal Register** notices on these information collections on September 5, 2000 (65 FR 53801; 65 FR 53802). The notices had a 60-day comment period. We are required to send ICRs to OMB under the Paperwork Reduction Act.

DATES: Please submit comments by March 15, 2001.

FOR FURTHER INFORMATION CONTACT: Mr. Larry Minor, (202) 366–4012 (for OMB No. 2126–0003), Ms. Marion Mills-Lee, (202) 358–7051 (for OMB No. 2126–0018), or Ms. Pat Wills, (202) 358–7043 (for OMB No. 2126–0019), Federal Motor Carrier Safety Administration, 400 Seventh Street, SW., Washington, DC 20590–0001. Office hours are from 7:30 a.m. to 4 p.m., e.t., Monday through Friday, except Federal holidays.

ADDRESSES: Send comments to the Office of Information and Regulatory Affairs, Office of Management and Budget, 725–17th Street, NW., Washington, DC 20593, Attention: DOT Desk Officer. We request your comments on whether the collection of information is necessary for the FMCSA to meet its goal of reducing truck crashes, including whether the information is useful to this goal; the accuracy of the estimate of the burden of the information collection; ways to enhance the quality, utility and clarity of the information collected; and ways to minimize the burden of the collection of information on respondents, including the use of automated collection techniques or other forms of information technology. OMB wants to receive comments within 30 days of publication of this notice in order to act on the ICRs quickly.

SUPPLEMENTARY INFORMATION:

1. *Title:* Inspection, Repair and Maintenance.

OMB Number: 2126–0003.

Background: Motor carriers must maintain, or require maintenance of, records documenting the inspection, repair and maintenance activities performed on their owned and leased motor vehicles. There are no prescribed forms. The records are used by the FMCSA and its representatives to verify motor carriers' compliance with the inspection, repair and maintenance standards in part 396 of the Federal Motor Carrier Safety Regulations.

Respondents: Motor carriers, commercial motor vehicle (CMV) drivers.

Estimated Total Annual Burden: 35,107,856 hours.

2. *Title:* Request for Revocation of Authority Granted.

OMB Approval Number: 2126–0018.

Background: Title 49 of the United States Code (U.S.C.) authorizes the Secretary of Transportation to promulgate regulations governing the registration of for-hire motor carriers of regulated commodities (49 U.S.C. 13902), surface freight forwarders (49 U.S.C. 13903), and property brokers (49 U.S.C. 13904). The FMCSA carries out this registration program under authority delegated by the Secretary of Transportation. Under Title 49 U.S.C. 13905, each registration is effective from

the date specified and remains in effect for such period as the Secretary of Transportation determines appropriate by regulation. Title 49 U.S.C. 13905(c) grants the Secretary the authority to amend or revoke a registration at the registrant's request. Form OCE–46 is used by transportation entities to voluntarily apply for revocation of their registration in whole or in part. The form requests the registrant's docket number, name and address, and the reasons for the revocation request.

Respondents: Motor carriers, freight forwarders, and brokers.

Average Burden per Response: 15 minutes.

Estimated Total Annual Burden: 250 hours (1,000 motor carriers × 15 minutes/60 minutes).

3. *Title:* Application for Certificate of Registration for Foreign Motor Carriers and Foreign Motor Private Carriers Under 49 U.S.C. 13902(c).

OMB Approval Number: 2126–0019.

Background: Title 49 U.S.C. 13902(c) sets forth basic licensing procedures for registering foreign motor carriers to operate across the border into the United States. Title 49 CFR 368 sets forth related regulations. The FMCSA carries out this registration program under authority delegated by the Secretary of Transportation. Foreign motor carriers use Form OP–2 to apply for registration with the FMCSA. The form requests information on the motor carrier's location, form of business, ownership and control, and proposed operations.

Respondents: Foreign motor carriers.

Average Burden per Response: 2 hours.

Estimated Total Annual Burden: 2,000 hours (1,000 motor carriers × 2 hours).

Authority: The Paperwork Reduction Act of 1995, 44 U.S.C. Chapter 35, as amended; and 49 CFR 1.73.

Issued on: February 7, 2001.

Julie Anna Cirillo,

Assistant Administrator and Chief Safety Officer.

[FR Doc. 01–3633 Filed 2–12–01; 8:45 am]

BILLING CODE 4910–EX–P

DEPARTMENT OF TRANSPORTATION

Federal Motor Carrier Safety Administration

[Docket No. FMCSA–2000–7645]

Developing and Implementing a Long-Term Strategy and Performance Plan for Improving Commercial Motor Vehicle, Operator, and Carrier Safety

AGENCY: Federal Motor Carrier Safety Administration (FMCSA), DOT.

ACTION: Notice; request for comments.

SUMMARY: To comply with section 104 of the Motor Carrier Safety Improvement Act of 1999 (MCSIA), the FMCSA developed a draft long-term strategy and performance plan for the period between fiscal years 2002 and 2009. Both the Congress and the Department of Transportation have stated long-term goals for improving commercial motor vehicle safety. This notice asks for public comment on the draft long-term plan. A copy of the plan is available electronically at *http://dmses.dot.gov/submit* by referencing the docket number at the heading of this document. It is also available electronically at *http://spp.fmcsa.dot.gov.*

DATES: You should submit your comments to this notice no later than February 28, 2001. We will consider late comments if we can within our tight deadline for action.

ADDRESSES: Mail or hand deliver comments to the U.S. Department of Transportation, Dockets Management Facility, Room PL–401, 400 Seventh Street, SW., Washington, DC 20590, or submit electronically at *http://dmses.dot.gov/submit.* Please include the docket number that appears in the heading of this document. You can examine and copy comments at the above address from 9 a.m. to 5 p.m., e.t., Monday through Friday, except Federal Holidays. If you want notification of receipt of comments, you must include a self-addressed, stamped postcard or you may print the acknowledgment page that appears after submitting comments electronically.

FOR FURTHER INFORMATION CONTACT: Mr. Bob Proferes, Chief, Strategic Planning and Program Evaluation Division, (202) 366–9220, Federal Motor Carrier Safety Administration (MC–PRS), 400 Seventh Street, SW., Washington, DC 20590–0001. Office hours are from 7:30 a.m. to 4 p.m., e.t, Monday through Friday, except Federal holidays.

SUPPLEMENTARY INFORMATION:

Electronic Access and Filing

You may submit or retrieve comments online through the Document Management System (DMS) at: *http://dmses.dot.gov/submit.* Acceptable formats include: MS Word (versions 95 to 97), MS Word for Mac (versions 6 to 8), Rich Text File (RTF), American Standard Code Information Interchange (ASCII)(TXT), Portable Document Format (PDF), and WordPerfect (versions 7 to 8). The DMS is available 24 hours each day, 365 days each year. Electronic submission and retrieval help and guidelines are available under the help section of the web site. Internet users also may find this document at *http://spp.fmcsa.dot.gov.*

Authority: 49 U.S.C. 322; 49 CFR 1.73.

Dated: February 7, 2001.

Julie Anna Cirillo,

Assistant Administrator and Chief Safety Officer.

[FR Doc. 01–3631 Filed 2–12–01; 8:45 am]

BILLING CODE 4910–EX–P

DEPARTMENT OF TRANSPORTATION

National Highway Traffic Safety Administration

[Docket No. NHTSA–99–6209; Notice 2]

American Transportation Corp., Partial Grant and Partial Denial of Application for Decision of Inconsequential Noncompliance

American Transportation Corporation (AmTran) has determined certification labels on its AmTran buses are not in full compliance with Federal Motor Vehicle Safety Standard (FMVSS) No. 120, ''Tire selection and rims for motor vehicles other than passenger cars,'' and 49 CFR part 567, ''Certification,'' and has filed an appropriate report pursuant to 49 CFR Part 573, ''Defect and Noncompliance Reports.'' AmTran has also applied to be exempted from the notification and remedy requirements of 49 U.S.C. Chapter 301—''Motor Vehicle Safety'' on the basis that the noncompliances and the failures to meet part 567 are inconsequential to motor vehicle safety.

Notice of receipt of the application was published, with a 30-day comment period, on September 27, 1999, in the **Federal Register** (64 FR 52118). NHTSA received no comments.

From October 27, 1991 through February 11, 1999, AmTran produced 1,514 buses with incorrect certification labels. AmTran states that the tire inflation pressure, as it is written on the certification label required by part 567, cannot support the weight capacity of the bus. AmTran has determined that a majority of the certification labels specify an inflation pressure that is five

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to ten pounds below the inflation pressure that is necessary to support the weight of the bus when it operates with a full load of passengers. In addition, a few certification labels specify an inflation pressure that is ten to twenty pounds below the inflation pressure that is necessary to support the weight of the bus when it operates at maximum capacity. However, if the same tires are inflated to the maximum inflation pressure that is molded on the sidewall, then the tires will support the vehicle's weight. AmTran, in effect, is asking to be excused from preparing and sending corrected certification labels to the vehicles' owners.

In addition, the information on the certification label is required to be specified in English and metric units. According to AmTran, all of the AmTran buses produced prior to February 11, 1999, have a certification label that correctly specifies the weight of the vehicle without identifying it as ''lbs.''

AmTran supports its application for inconsequential noncompliance for the certification label by stating the following:

- Most buses do not run at full GVWR or full capacity.
- When buses operate at full capacity, it is for a very short period of time.
- There have been no tire warranty claims related to low pressure.
- Most tires are inflated by charts used at maintenance areas and the certification document is not used as a guide.
- The difference between the specified tire pressure and the required tire pressure is not a safety issue in this case.

In addition, AmTran supports its application for inconsequential noncompliance for the missing units of ''lbs'' by stating the following:

- Not aware of any problems created by the missing unit identification.
- It is understood in the U.S. bus industry that the GAWR and GVWR are listed in pounds.

We have reviewed the petitioner's arguments. The purpose for the labeling requirements in FMVSS No. 120 is to provide the vehicle user with information for the safe operation of the vehicle. FMVSS No. 120 paragraph S5.3.1 specifies that the certification label on buses include the recommended cold inflation pressure for the tires such that the sum of the load ratings of the tires on each axle is appropriate for the GAWR. Part 567 specifies the content and location of the certification label. In this case, no units of measure were provided.

Of the 1,514 buses, our analysis indicates that 557 have specified a tire inflation pressure on the label that is incorrect and may not be able to handle the load. Under-inflation and overloading produces structural failure in a tire; this could cause loss of control while the vehicle is traveling on the highway. This presents a clear and distinct safety hazard. However, the remaining 957 buses, based on our analysis of supplemental data, should be able to handle the full occupant capacity loads when the vehicle tires are inflated to the recommended inflation pressures.

In consideration of the foregoing, NHTSA has decided that the applicant has not met its burden of persuasion that the noncompliance it describes is inconsequential to safety for 557 buses. Accordingly, in regards to the certification label, its application is hereby denied for 557 buses and granted for 957 buses. In addition, the replacement labels should contain the correct data in both metric and English units.

According to AmTran, the processes have been extensively reviewed, the causes of these noncompliances have been isolated, and changes in the processes have been instituted to prevent any future occurrences. In addition, the noncompliance is limited to the buses addressed in this notice, and AmTran stated that its future products will comply with the prescribed requirements.

The agency agrees with AmTran that the label on these buses whose only deficiency is the failure to provide the marking ''lbs'' for the units, and a metric conversion, is likely to achieve the safety purpose of the required label. The vehicle user will have the correct safety information in the prescribed location and format. Since petitioning the agency on this subject, AmTran has corrected its certification label process to include the prescribed format.

In consideration of the foregoing, NHTSA has decided that the applicant has met its burden of persuasion that this labeling noncompliance portion of its petition is inconsequential to motor vehicle safety. Accordingly, we grant its petition on this issue.

(49 U.S.C. 30118, 30120, delegations of authority at 49 CFR 1.50 and 501.8)

Issued on February 2, 2001.

Stephen R. Kratzke,

Associate Administrator for Safety Performance Standards.

[FR Doc. 01–3557 Filed 2–12–01; 8:45 am]

BILLING CODE 4910–59–P

DEPARTMENT OF TRANSPORTATION

National Highway Traffic Safety Administration

[Docket No. NHTSA–2001–8827; Notice 1]

Dan Hill & Associates, Inc.; Application for Temporary Exemption From Federal Motor Vehicle Safety Standard No. 224

We are asking for comments on the application by Dan Hill & Associates, Inc. (''Dan Hill''), of Norman, Oklahoma, for an exemption of one year from Motor Vehicle Safety Standard No. 224 *Rear Impact Protection.* Dan Hill asserts that compliance would cause substantial economic hardship to a manufacturer that has tried in good faith to comply with the standard.

We are publishing this notice of receipt of the application in accordance with our regulations on the subject. This action does not mean that we have made a judgment yet about the merits of the application.

Dan Hill has been the beneficiary of temporary exemptions from Standard No. 224 beginning on January 26, 1998 (see 63 FR 3784 and 64 FR 49047). The information below is based on material from Dan Hill's original and renewal applications of 1998 and 1999, and its most recent application of 2000.

Why Dan Hill Says That it Continues To Need an Exemption

Dan Hill manufactures and sells a horizontal discharge trailer (''Flow Boy'') that is used in the road construction industry to deliver asphalt and other road building materials to the construction site. The Flow Boy is designed to connect with and latch onto various paving machines (''pavers''). The Flow Boy, with its hydraulically controlled horizontal discharge system, discharges hot mix asphalt at a controlled rate into a paver which overlays the road surface with asphalt material.

Standard No. 224 requires, effective January 26, 1998, that all trailers with a GVWR of 4536 Kg or more, including Flow Boy trailers, be fitted with a rear impact guard that conforms to Standard No. 223 *Rear impact guards.* Dan Hill argued that installation of the rear impact guard will prevent the Flow Boy from connecting to the paver. Thus, Flow Boy trailers will no longer be functional. Paving contractors will be forced to use either competitors' horizontal discharge trailers that comply with Standard No. 224 or standard dump body trucks or trailers which, according to Dan Hill, have inherent limitations and safety risks. In spite of

exemptions totaling three years, Dan Hill avers that it has been unable to engineer its trailers to conform and needs a further year in which to do so. We discuss below its efforts to conform in greater detail.

Dan Hill's Reasons Why it Believes That Compliance Would Cause it Substantial Economic Hardship and That it Has Tried in Good Faith To Comply With Standard No. 224

Dan Hill is a small volume manufacturer. Its total production in the 12-month period preceding its latest petition was 151 units. In the absence of a further exemption, Dan Hill asserts that approximately 70 percent of its work force would have to be laid off. If the exemption were not renewed, Dan Hill's gross sales would decrease by $8,313,337 in 2001. Its cumulative net income after taxes for the fiscal years 1998, 1999, and 2000 was $454,556, but net income has declined in 2000 and 1999 from the year before. It projects a net loss of $291,947 for fiscal year 2001.

The **Federal Register** notices cited above contain Dan Hill's arguments of its previous good faith efforts to conform with Standard No. 224 and form the basis of our previous grants of Dan Hill's petitions. Dan Hill originally asked for a year's exemption in order to explore the feasibility of a rear impact guard that would allow the Flow Boy trailer to connect to a conventional paver. It concentrated its efforts between 1998 and 1999 in investigating the feasibility of a retractable rear impact guard, which would enable Flow Boys to continue to connect to pavers. The company has examined the various alternatives: installation of a fixed rear impact guard, redesign of pavers, installation of a removable rear impact guard, installation of a retractable rear impact guard, and installation of a ''swing-up'' style tailgate with an attached bumper. Its latest efforts to conform, from September 1999 until December 2000, involve the design of a swing-in retractable rear impact guard. A review of its design, by Tech, Inc., shows that this, too, is not feasible. Among other things, Tech, Inc., is concerned that ''the tailgate, hinges, and air cylinders will not meet the criteria of the Standard 224-plasticity requirement,'' and that ''the bumper is a potential safety hazard'' because if the gate were raised and ''a flagman or a trailer stager is in between the paver and the bumper while the gate and bumper is rising, the bumper could cause serious injury or death.'' A copy of Tech Inc.'s report has been filed in the docket as part of Dan Hill's petition. The report also indicates that the costs associated with this design may be cost prohibitive ''when trying to win business in a highly competitive, yet narrow marketplace.''

Dan Hill's Reasons Why it Believes That a Temporary Exemption Would Be in the Public Interest and Consistent With Objectives of Motor Vehicle Safety

Dan Hill believes that an exemption would be in the public interest and consistent with traffic safety objectives because, without an exemption, ''within a short time, production of the trailer will cease entirely. Jobs will be lost and a major employer in McClain County will be lost. This would mean a significant loss to many people in the state, including shareholders, lenders, employees, families, and other stakeholders.'' Dan Hill's production represents less than .05% of trailers manufactured. The amount of time actually spent on the road is limited because of the need to move the asphalt to the job site before it hardens. Nevertheless, Dan Hill has taken recent efforts to enhance the conspicuity of Flow Boy trailers by: 1. adding ''High intensity flashing safety lights; 2. Doubling the legally required amount of conspicuity taping at the rear of the trailer; 3. [adding] Safety signage; 4. [adding] Red clearance lights that normally emit light in twilight or night-time conditions; and 5. Installation of a rear under-ride protection assembly 28″ above the ground and 60″ in width.'' Finally, the location of the rear tires is such that the tires act as a buffer ''and reduce the likelihood of impact with the semi-trailer and the vehicle's windshield or interior of the vehicle significantly.''

How You May Comment on Dan Hill's Application

If you would like to comment on Dan Hill's application, please do so in writing, in duplicate, referring to the docket and notice number, and mail to: Docket Management, National Highway Traffic Safety Administration, room PL–401, 400 Seventh Street, SW, Washington, DC 20590.

We shall consider all comments received before the close of business on the date indicated below. Comments are available for examination in the docket in room PL–401 both before and after that date, between the hours of 10 a.m. and 5 p.m. To the extent possible, we also consider comments filed after the closing date. We will publish our decision on the application, pursuant to the authority indicated below.

Comment closing date: March 5, 2001.

Authority: 49 U.S.C. 30113; delegations of authority at 49 CFR 1.50 and 501.4.

Issued on February 8, 2001.

Stephen R. Kratzke,

Associate Administrator for Safety Performance Standards.

[FR Doc. 01–3663 Filed 2–12–01; 8:45 am]

BILLING CODE 4910–59–P

DEPARTMENT OF TRANSPORTATION

National Highway Traffic Safety Administration

[Docket No. NHTSA 2001–8809; Notice 1]

EGO Vehicles Inc.; Receipt of Application for Temporary Exemption From Federal Motor Vehicle Safety Standards Nos. 119 and 120

EGO Vehicles Inc. (''Ego''), a Delaware corporation located in Fairhope, Alabama, through counsel in San Francisco, California, has applied for a temporary exemption of its ''eGO'' motor driven cycle from Federal Motor Vehicle Safety Standards Nos. 119, *New Pneumatic Tires for Vehicles Other Than Passenger Cars,* and No. 120, *Tire Selection and Rims for Motor Vehicles Other Than Passenger Cars.* The basis of the application is that an exemption would make easier the development or field evaluation of a low-emission motor vehicle and would not unreasonably lower the safety level of the vehicle.

This notice of receipt of an application is published in accordance with the requirements of 49 U.S.C. 30113(b)(2) and does not represent any judgment of the agency on the merits of the application.

EGO seeks an exemption of two years from the requirements of Standards Nos. 119 and 120. Standard No. 119 establishes performance and endurance, marking, and treadwear indicators for motorcycle tires. Standard No. 120 establishes requirements for DOT-certified rims of certain sizes to ensure compatibility with DOT-certified tires of the same sizes. The eGO vehicle is not a motorcycle of conventional configuration, having a ''chassis design * * * similar to that of a large scooter, but it has handlebars, a seat and other components that make it more similar in appearance and operation to a bicycle.'' The eGO is powered by a single electric motor producing less than 2 horsepower, and is therefore a ''motor driven cycle,'' a subcategory of motorcycle under NHTSA definitions and regulations. The speed of the eGO ''is limited by its controller and drivetrain configuration to less than 20 miles per hour.''

EGO states that it has located ''many high-performance bicycle rims and tires,'' but that ''none of the

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manufacturers of these components has certified these products as compliant with FMVSS 119 or 120.'' The most similar components that EGO has located are moped tires and rims. However, the ''performance capabilities of these tires and rims are excessive given the low weight, low speed, and limited range of the eGO. Further, the dimensions of these products are not compatible with the eGO's chassis design or braking system * * *.''

EGO deems its only alternative to develop a specific tire and rim combination. However, testing ''would be an extremely high cost to bear for a manufacturer of a new and innovative low-emission vehicle that is still at an early stage of its product life.'' EGO argues that ''amortizing the cost of testing over the limited number of vehicles sold would significantly increase the cost of this low-emission vehicle, reducing the market for the product and Petitioner's ability to evaluate its performance and market potential.''

In EGO's opinion, an exemption would not unreasonably degrade the safety of the vehicle ''because Petitioner has selected the eGO's rims and tires based on stringent design criteria, considering the operating environment, gross vehicular weight, and top speed of the vehicle.'' Standard No. 119 ''seems especially inappropriate because the eGO cannot, by design, operate continuously for longer than approximately 75 minutes, or be propelled at a speed greater than 20 mph.'' The endurance test (S6.1) ''simulates conditions that would never be encountered by the operator of the vehicle simply by nature of the vehicle's design and performance restraints.'' The purpose of Standard No. 120, in EGO's view ''is to assure that a consumer will be able to purchase a tire that fits a given rim, and that any tire purchased in a given size will fit a rim of that size.'' The petitioner believes it has achieved that purpose in the tires and rims it has selected for the eGO, and it will encourage owners ''to use the replacement rims that we specify in the documentation provided with the vehicle.''

According to eGO, an exemption would be in the public interest as supporting an innovative low-cost, low-emission means of transportation. An exemption would be consistent with the objectives of traffic safety because the petitioner intends to comply with the regulations that the Consumer Product Safety Commission has promulgated for bicycles. The petitioner also points out that no tire and rim requirements are imposed by Standard No. 500, *Low-speed Vehicles,* on passenger-carrying vehicles with a slightly higher maximum speed (20 to 25 mph).

Interested persons are invited to submit comments on the application described above. Comments should refer to the docket number and the notice number, and be submitted to: Docket Management, Room PL–401, 400 Seventh Street, SW, Washington, DC 20590. It is requested but not required that 10 copies be submitted.

All comments received before the close of business on the comment closing date indicated below will be considered, and will be available for examination in the docket at the above address both before and after that date. To the extent possible, comments filed after the closing date will also be considered. Notice of final action on the application will be published in the **Federal Register** pursuant to the authority indicated below. *Comment closing date:* March 15, 2001.

(49 U.S.C. 30113; delegations of authority at 49 CFR 1.50. and 501.8)

Issued on February 8, 2001.

Stephen R. Kratzke,

Associate Administrator for Safety Performance Standards.

[FR Doc. 01–3664 Filed 2–12–01; 8:45 am]

BILLING CODE 4910–59–P

DEPARTMENT OF TRANSPORTATION

National Highway Traffic Safety Administration

[Docket No. NHTSA 2000–7705, Notice 1]

Receipt of Applications for Decision of Inconsequential Noncompliance

The following companies, Osram Sylvania Products, Inc., (Osram); Subaru of America, Inc., (Subaru); Koito Manufacturing Co., LTD. (Koito); North American Lighting, Inc. (NAL); Stanley Electric Co., LTD, (Stanley); and General Electric Company (GE) have determined that certain H1 replaceable light sources they manufactured or used in lamp assemblies did not have the ''DOT'' marking required under Federal Motor Vehicle Safety Standard (FMVSS) No. 108, ''Lamps, Reflective Devices, and Associated Equipment.''

This notice of receipt of these applications is published under 49 U.S.C. 30118 and 30120 and does not represent any agency decision or other exercise of judgment concerning the merits of the applications.

Under the requirements of S7.7(a) of FMVSS No. 108, each replaceable light source shall be marked with the symbol ''DOT.''

Pursuant to 49 U.S.C. 30118(d) and 30120(h), the above companies have petitioned for a determination that their failure to mark light sources with ''DOT'' is inconsequential to motor vehicle safety and have filed appropriate reports pursuant to 49 CFR part 573, ''Defect and Noncompliance Reports.''

Osram produced 841,283 H1 replaceable light sources without the required ''DOT '' marking. In its part 573 report, Osram stated that it was not possible to determine exactly how many light sources were used in headlamp assemblies as opposed to those which were used in fog lamp assemblies.

Between February 1999 and January 2000, NAL used 118,756 of these Osram replaceable light sources in headlamp assemblies. Subaru installed 110,784 of these NAL headlamp assemblies in model year 2000 Legacy vehicles from February 1999 through February 2000.

Stanley used 30,426 of the Osram replaceable light sources in headlamp assemblies intended for Honda Preludes produced between October 22, 1998 and January 27, 2000. Koito used 12,340 of the Osram replaceable light sources in headlamp assemblies it manufactured between June 1999 and January 2000.

A separate group of replaceable light sources with the same noncompliance was manufactured by GE. GE produced 2,490 of these between April 1, 1999 and March 23, 2000. The GE replaceable light sources are included in this notice for simplicity because the issue is identical.

All of the petitioners have indicated that the subject replaceable light sources, with the exception of the absence of the ''DOT'' marking, fully comply with all the performance and design requirements of FMVSS No. 108 and do not constitute any risk to motor vehicle safety. Osram has submitted confidential test data to show this.

Interested persons are invited to submit written data, views, and arguments on the application described above. Comments should refer to the docket number and be submitted to: U.S. Department of Transportation, Docket Management, Room PL–401, 400 Seventh Street, SW, Washington, DC, 20590. It is requested that two copies be submitted.

All comments received before the close of business on the closing date indicated below will be considered. The application and supporting materials, and all comments received after the closing date, will also be filed and will be considered to the extent possible. When the application is granted or denied, the notice will be published in the **Federal Register** pursuant to the

authority indicated below. Comment closing date: March 15, 2001.

(49 U.S.C. 301118, 301120; delegations of authority at 49 CFR 1.50 and 501.8)

Issued on: February 2, 2001.

Stephen R. Kratzke,

Associate Administrator for Safety Performance Standards.

[FR Doc. 01–3558 Filed 2–12–01; 8:45 am]

BILLING CODE 4910–59–P

DEPARTMENT OF TRANSPORTATION

National Highway Traffic Safety Administration

[Docket No. NHTSA 2001–8808, Notice 1]

Philips Lighting Company Receipt of Application for Decision of Inconsequential Noncompliance

Philips Lighting Company, Somerset, New Jersey, has determined that certain H3–55W replaceable light sources it manufactured do not have the ''DOT'' marking required under Federal Motor Vehicle Safety Standard (FMVSS) No. 108, ''Lamps, Reflective Devices, and Associated Equipment.'' The total number of light sources sold without this marking from January 1998 to December 1999 was 67,299.

This notice of receipt of an application is published under 49 U.S.C. 30118 and 30120 and does not represent any agency decision or other exercise of judgment concerning the merits of the application.

Under the requirements of S7.7(a) of FMVSS No. 108, each replaceable light source shall be marked with the symbol ''DOT.''

Pursuant to 49 U.S.C. 30118(d) and 30120(h), Philips Lighting Company has petitioned for a determination that its failure to mark light sources with ''DOT'' is inconsequential to motor vehicle safety and has filed an appropriate report pursuant to 49 CFR Part 573, ''Defect and Noncompliance Reports.''

Philips Lighting Company has indicated that the subject replaceable light source, with the exception of the absence of the ''DOT'' marking, fully complies with all the performance and design requirements of FMVSS No. 108 and does not constitute any risk to motor vehicle safety and has submitted test results to show this.

Interested persons are invited to submit written data, views, and arguments on the application described above. Comments should refer to the docket number and be submitted to: U.S. Department of Transportation, Docket Management, Room PL–401, 400 Seventh Street, SW, Washington, DC, 20590. It is requested that two copies be submitted.

All comments received before the close of business on the closing date indicated below will be considered. The application and supporting materials, and all comments received after the closing date, will also be filed and will be considered to the extent possible. When the application is granted or denied, the notice will be published in the **Federal Register** pursuant to the authority indicated below. Comment closing date: March 15, 2001.

(49 U.S.C. 301118, 301120; delegations of authority at 49 CFR 1.50 and 501.8)

Issued on: February 8, 2001.

Noble N. Bowie,

Acting Associate Administrator for Safety Performance Standards.

[FR Doc. 01–3630 Filed 2–12–01; 8:45 am]

BILLING CODE 4910–59–P

DEPARTMENT OF TRANSPORTATION

Research and Special Programs Administration

Office of Hazardous Materials Safety; Notice of Delays in Processing of Exemption Applications

AGENCY: Research and Special Programs Administration, DOT.

ACTION: List of applications delayed more than 180 days.

SUMMARY: In accordance with the requirements of 49 U.S.C. 5117(c), RSPA is publishing the following list of exemption applications that have been in process for 180 days or more. The reason(s) for delay and the expected completion date for action on each application is provided in association with each identified application.

FOR FURTHER INFORMATION CONTACT: J. Suzanne Hedgepeth, Director, Office of Hazardous Materials, Exemptions and Approvals, Research and Special Programs Administration, U.S. Department of Transportation, 400 Seventh Street, SW, Washington, DC 20590–0001, (202) 366–4535.

Key to ''Reasons for Delay''

1. Awaiting additional information from applicant.

2. Extensive public comment under review.

3. Application is technically complex and is of significant impact or precedent-setting and requires extensive analysis.

4. Staff review delayed by other priority issues or volume of exemption applications.

Meaning of Application Number Suffixes

N—New application.

M—Modification request.

PM—Party to application with modification request.

Issued in Washington, DC, on February 6, 2001.

J. Suzanne Hedgepeth,

Director, Office of Hazardous Materials, Exemptions and Approvals.

Application No.	Applicant	Reason for delay	Estimated date of completion
	New Exemption Applications		
11862–N	The BOC Group, Murray Hill, NJ	4	03/30/2001
11927–N	Alaska Marine Lines, Inc., Seattle, WA	4	03/30/2001
12142–N	Aristech Chemical Corp., Pittsburgh, PA	4	03/30/2001
12158–N	Hickson Corporation, Conley, GA	4	03/30/2001
12181–N	Aristech, Pittsburgh, PA	4	03/30/2001
12248–N	Ciba Specialty Chemicals Corp., High Point, NC	4	03/30/2001
12290–N	Savage Industries, Inc., Pottstown, PA	4	03/30/2001
12307–N	Kern County Dept. of Weights & Measures, Bakersfield, CA	4	03/30/2001
12339–N	BOC Gases, Murray Hill, NJ	4	03/30/2001
12353–N	Monson Companies, South Portland, ME	4	03/30/2001
12355–N	Union Tank Car Company, East Chicago, IN	4	03/30/2001
12381–N	Ideal Chemical & Supply Co., Memphis, TN	4	03/30/2001

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Application No.	Applicant	Reason for delay	Estimated date of completion
12406–N	Occidental Chemical Corporation, Dallas, TX	4	03/30/2001
12412–N	Great Western Chemical Company, Portland, OR	4	03/30/2001
12422–N	Connecticut Yankee Atomic Power Co., East Hampton, CT	1, 4	03/30/2001
12433–N	The Lighter Company, Inc., Miami, FL	4	03/30/2001
12434–N	Salmon Air, Salmon, ID	4	03/30/2001
12440–N	Luxfer Inc., Riverside, CA	4	02/28/2001
12454–N	Ethyl Corp., Richmond, VA	4	02/28/2001
12455–N	United States Marine Safety Association, Philadelphia, PA	4	02/28/2001
12456–N	Baker Hughes, Houston, TX	4	02/28/2001
12469–N	Department of Energy, Germantown, MD	4	03/30/2001
12473–N	Old Bridge Metals & Chemicals, Inc., Old Bridge, NJ	4	03/30/2001
12475–N	Chemetall GmbH Gesellschaft, Langlshiem, DE	4	03/30/2001
12476–N	Fisher-Rosemount Petroleum, Tulsa, OK	4	02/28/2001
12479–N	Luxfer Gas Cylinders, Riverside, CA	4	02/28/2001
12495–N	South Carolina Electric & Gas Co., Jenkinsville, SC	4	02/28/2001
12497–N	Henderson International Technologies, Inc., Richardson, TX	4	02/28/2001
12515–N	FIBA Technologies, Inc., Westboro, MA	4	02/28/2001
12516–N	Poly-Coat Systems, Inc., Houston, TX	4	03/30/2001
12518–N	Air Products & Chemicals, Inc., Allentown, PA	4	03/30/2001
12531–N	Worthington Cylinder Corporation, Columbus, OH	4	03/30/2001
	Modifications to Exemptions		
7060–M	Federal Express, Memphis, TN	4	03/30/2001
8013–M	Praxair, Inc., Danbury, CT	4	03/30/2001
8086–M	The Boeing Co (Mil Aircraft & Missiles Sys Group), Seattle, WA	4	02/28/2001
8308–M	Tradewind Enterprises, Inc., Hillsboro, OR	4	02/28/2001
8554–M	Orica USA Inc., Englewood, CO	4	02/28/2001
10656–M	Conf. of Radiation Control Program Directors, Inc., Frankfort, KY	4	02/28/2001
10672–M	Burlington Packaging, Inc., Brooklyn, NY	4	03/30/2001
11296–M	Heritage Transport, LLC, Indianapolis, IN	4	03/30/2001
11316–M	TRW Automotive, Queen Creek, AZ	4	03/30/2001
11537–M	JCI Jones Chemicals, Inc., Milford, VA	4	03/30/2001
11769–M	Great Western Chemical Company, Portland, OR	4	03/30/2001
11769–M	Great Western Chemical Company, Portland, OR	4	03/30/2001
11769–M	Hydrite Chemical Company, Brookfield, WI	4	03/30/2001
11798–M	Air Products and Chemicals, Inc., Allentown, PA	4	03/30/2001
11798–M	Anderson Development Company, Adrian, MI	4	03/30/2001
11911–M	Transfer Flow, Inc., Chico, CA	4	03/30/2001
12074–M	Van Hool NV, B–2500 Lier Koningshooikt, BG	1	02/28/2001
12130–M	FIBA Technologies, Inc., Westboro, MA	4	02/28/2001
12178–M	STC Technologies, Inc., Bethlehem, PA	1	02/28/2001

[FR Doc. 01–3556 Filed 2–12–01; 8:45 am]
BILLING CODE 4910–60–M

DEPARTMENT OF TRANSPORTATION

Surface Transportation Board

[STB Finance Docket No. 33999]

Somerset Terminal Railroad Corporation—Operation Exemption—A Line of Railroad Owned by Joseph C. Horner

Somerset Terminal Railroad Corporation (STRC), a noncarrier, has filed a notice of exemption under 49 CFR 1150.31 to operate under a perpetual, irrevocable, exclusive and assignable easement over approximately 1.25 miles of rail line owned by Joseph C. Horner. The rail line is located in the Township of Bridgewater and the Borough of Manville, Somerset County, NJ, and is part of a rail line known as the Reading Company New York Branch (also known as the Raritan Valley Connecting Track), and identified as Line Code 0326, between milepost 57.25 at Manville Yard and milepost 58.50 at a junction with New Jersey Transit's commuter line. STRC also acquired title to a railroad bridge spanning the Raritan River and connecting the properties on which its easement lies.[1]

STRC proposes to operate the line to connect with CSX Transportation, Inc. (CSXT) and Norfolk Southern Railway Company at points of intersection on the rail line. Pursuant to an agreement with Mr. Horner, STRC will replace Bridgewater Resources, Inc. (BRI), the Somerset County waste transfer station. BRI previously arranged for an independent contractor to transport the waste processed by BRI over the line for connection with CSXT. Mr. Horner will permit STRC to transport its refuse across its property and will permit STRC to move freight from other shippers bordering on the property upon which the easement exists.

The transaction was due to be consummated on or after January 29, 2001.[2]

If the notice contains false or misleading information, the exemption is void *ab initio.* Petitions to revoke the exemption under 49 U.S.C. 10502(d) may be filed at any time. The filing of a petition to revoke will not automatically stay the transaction.

An original and 10 copies of all pleadings, referring to STB Finance Docket No. 33999, must be filed with

[1] According to STRC, the line was conveyed to Mr. Horner by deed from Consolidated Rail Corporation on August 24, 1995, and was comprised of two pieces or parcels of land together with track, track materials, two switches, and the railroad bridge.

[2] STRC reported that the transaction was consummated during the year 2000. STRC's representative has been notified by Board staff that the earliest the transaction could be consummated was January 29, 2001, the effective date of the exemption (7 days after the exemption was filed).

the Surface Transportation Board, Office of the Secretary, Case Control Unit, 1925 K Street, NW., Washington, DC 20423–0001. In addition, one copy of each pleading must be served on Edward M. Fink, Esq., 51 Jamaica Street, Edison, NJ 08820.

Board decisions and notices are available on our website at *www.Stb.Dot.Gov.*

Decided: February 6, 2001.

By the Board, David M. Konschnik, Director, Office of Proceedings.

Vernon A. Williams,

Secretary.

[FR Doc. 01–3526 Filed 2–12–01; 8:45 am]

BILLING CODE 4915–00–P

DEPARTMENT OF THE TREASURY

Internal Revenue Service

Proposed Collection; Comment Request for Forms 8282 and 8283

AGENCY: Internal Revenue Service (IRS), Treasury.

ACTION: Notice and request for comments.

SUMMARY: The Department of the Treasury, as part of its continuing effort to reduce paperwork and respondent burden, invites the general public and other Federal agencies to take this opportunity to comment on proposed and/or continuing information collections, as required by the Paperwork Reduction Act of 1995, Public Law 104–13 (44 U.S.C. 3506(c)(2)(A)). Currently, the IRS is soliciting comments concerning Form 8282, Donee Information Return (Sale, Exchange or Other Disposition of Donated Property) and Form 8283, Noncash Charitable Contributions.

DATES: Written comments should be received on or before April 16, 2001 to be assured of consideration.

ADDRESSES: Direct all written comments to Garrick R. Shear, Internal Revenue Service, room 5244, 1111 Constitution Avenue NW., Washington, DC 20224.

FOR FURTHER INFORMATION CONTACT: Requests for additional information or copies of the form and instructions should be directed to Martha R. Brinson, (202) 622–3869, Internal Revenue Service, room 5244, 1111 Constitution Avenue NW., Washington, DC 20224.

SUPPLEMENTARY INFORMATION:

Title: Donee Information Return (Sale, Exchange or Other Disposition of Donated Property) (Form 8282) and Noncash Charitable Contributions (Form 8283).

OMB Number: 1545–0908.

Form Number: 8282 and 8283.

Abstract: Internal Revenue Code section 170(a)(1) and regulation section 1.170A–13(c) require donors of property valued over $5,000 to file certain information with their tax return in order to receive the charitable contribution deduction. Form 8283 is used to report the required information. Code section 6050L requires donee organizations to file an information return with IRS if they dispose of the property received within two years. Form 8282 is used for this purpose.

Current Actions: There are no changes being made to the forms at this time.

Type of Review: Extension of a currently approved collection.

Affected Public: Individuals or household and business or other for-profit organizations.

Form 8282

Estimated Number of Respondents: 1,000.

Estimated Time Per Respondent: 4 hrs., 23 min.

Estimated Total Annual Burden Hours: 4,380.

Form 8283

Estimated Number of Respondents: 1,500,000.

Estimated Time Per Respondent: 2 hr., 1 min.

Estimated Total Annual Burden Hours: 3,015,000.

The following paragraph applies to all of the collections of information covered by this notice:

An agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless the collection of information displays a valid OMB control number. Books or records relating to a collection of information must be retained as long as their contents may become material in the administration of any internal revenue law. Generally, tax returns and tax return information are confidential, as required by 26 U.S.C. 6103.

Request for Comments

Comments submitted in response to this notice will be summarized and/or included in the request for OMB approval. All comments will become a matter of public record. Comments are invited on: (a) Whether the collection of information is necessary for the proper performance of the functions of the agency, including whether the information shall have practical utility; (b) the accuracy of the agency's estimate of the burden of the collection of information; (c) ways to enhance the quality, utility, and clarity of the information to be collected; (d) ways to minimize the burden of the collection of information on respondents, including through the use of automated collection techniques or other forms of information technology; and (e) estimates of capital or start-up costs and costs of operation, maintenance, and purchase of services to provide information.

Approved: February 5, 2001.

Garrick R. Shear,

IRS Reports Clearance Officer.

[FR Doc. 01–3537 Filed 2–12–01; 8:45 am]

BILLING CODE 4830–01–P

011341

DEPARTMENT OF THE TREASURY

Office of Thrift Supervision

Submission for OMB Review; Comment Request

February 2, 2001.

The Office of Thrift Supervision (OTS) has submitted the following public information collection requirement(s) to OMB for review and clearance under the Paperwork Reduction Act of 1995, Public Law 104–13. Interested persons may obtain copies of the submission(s) by calling the OTS Clearance Officer listed. Send comments regarding this information collection to the OMB reviewer listed and to the OTS Clearance Officer, Office of Thrift Supervision, 1700 G Street, NW., Washington, D.C. 20552.

DATES: Submit written comments on or before March 15, 2001.

OMB Number: 1550–0023.

Form Number: OTS Form 1313 and 1568.

Type of Review: Regular.

Title: Thrift Financial Report.

Description: OTS collects financial data from insured savings associations, their subsidiaries, and their holding companies in order to assure their safety and soundness as depositories of the personal monies of the general public. The OTS monitors financial positions and interest-rate risk so that adverse conditions can be remedied promptly.

Respondents: Savings and Loan Associations and Savings Banks.

Estimated Number of Responses: 1,060.

Estimated Burden Hours Per Response: 136 hours.

Frequency of Response: Quarterly.

Estimated Total Reporting Burden: 143, 810 hours.

Clearance Officer: Ralph E. Maxwell, (202) 906–7740, Office of Thrift Supervision, 1700 G Street, NW., Washington, D.C. 20552.

OMB Reviewer: Alexander Hunt, (202) 395–7860, Office of Management and Budget, Room 10202, New Executive Office Building, Washington, D.C. 20503.

John E. Werner,

Director, Information & Management Services.

[FR Doc. 01–3623 Filed 2–12–01; 8:45 am]

BILLING CODE 6720–01–P

Corrections

Federal Register
Vol. 66, No. 30
Tuesday, February 13, 2001

This section of the FEDERAL REGISTER contains editorial corrections of previously published Presidential, Rule, Proposed Rule, and Notice documents. These corrections are prepared by the Office of the Federal Register. Agency prepared corrections are issued as signed documents and appear in the appropriate document categories elsewhere in the issue.

The President

3 CFR

Executive Order 13182 of December 23, 2000

Adjustments of Certain Rates of Pay

Correction

In Presidential document 00–33450 appearing on page 82879 in the issue of Friday, December 29, 2000, Section 7 should read as follows:

SEC. 7. *Effective Dates.* Schedule 8 is effective January 1, 2001. The other schedules contained herein are effective on the first day of the first applicable pay period beginning on or after January 1, 2001.

[FR Doc. C0–33450 Filed 2–12–01; 8:45 am]

BILLING CODE 1505–01–D

011343

Federal Register

Tuesday,
February 13, 2001

Part II

Environmental Protection Agency

40 CFR Parts 148, et al.

Hazardous Waste Management System; Identification and Listing of Hazardous Waste; Paint Production Wastes; Proposed Rule

011344

ENVIRONMENTAL PROTECTION AGENCY

40 CFR Parts 148, 261, 268, 271, and 302

[SWH–FRL–6940–6]

RIN 2050–AE32

Hazardous Waste Management System; Identification and Listing of Hazardous Waste; Paint Production Wastes; Land Disposal Restrictions for Newly Identified Wastes; CERCLA Hazardous Substance Designation and Reportable Quantities; Designation of n-Butyl Alcohol, Ethyl Benzene, Methyl Isobutyl Ketone, Styrene, and Xylenes as Appendix VIII Constituents; Addition of Acrylamide and Styrene to the Treatment Standards of F039; and Designation of Styrene as an Underlying Hazardous Constituent

AGENCY: Environmental Protection Agency (EPA).

ACTION: Proposed rule.

SUMMARY: The EPA proposes to amend the regulations for hazardous waste management under the Resource Conservation and Recovery Act (RCRA) by listing as hazardous certain waste solids and liquids generated from the production of paint. EPA is proposing a concentration-based listing approach for each of these wastes. Under this approach, the identified paint production wastes are hazardous if they contain any of the constituents of concern at concentrations that meet or exceed regulatory levels. Generators must determine whether their wastes are listed hazardous wastes. If their wastes are below regulatory levels for all constituents of concern, then their wastes are nonhazardous. We are also proposing a contingent management option for waste liquids. These wastes would not be subject to the listing if they are stored or treated exclusively in tanks or containers prior to discharge to a publicly owned treatment works or discharged under a Clean Water Act national pollutant discharge elimination system permit. This proposal would also add the toxic constituents n-butyl alcohol, ethyl benzene, methyl isobutyl ketone, styrene, and xylenes found in these identified wastes to the list of constituents that serves as the basis for classifying wastes as hazardous, and to establish treatment standards for the wastes. Due to the uncertainties in our assessment of the management of paint manufacturing waste liquids in surface impoundments, we are also considering an alternative proposal not to list paint manufacturing waste liquids.

If these paint production wastes are listed as hazardous waste, then they will be subject to stringent management and treatment standards under Subtitle C of RCRA. Additionally, this action proposes to designate these wastes as hazardous substances subject to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and to adjust the one pound statutory reportable quantities (RQs) for these substances. Other actions proposed in this notice would add acrylamide and styrene to the treatment standards applicable to multisource leachate and designate styrene as an underlying hazardous constituent. As a result, a single waste code would continue to be applicable to multisource landfill leachates and residues of characteristic wastes would require treatment when styrene is present above the proposed land disposal standards.

DATES: EPA will accept public comments on this proposed rule until April 16, 2001. Comments postmarked after this date will be marked ''late'' and may not be considered. Any person may request a public hearing on this proposal by filing a request with Mr. David Bussard, whose address appears below, by February 27, 2001.

ADDRESSES: If you would like to file a request for a public hearing on this proposal, please submit your request to Mr. David Bussard at: Office of Solid Waste, Hazardous Waste Identification Division (5304W), U.S. Environmental Protection Agency, 1200 Pennsylvania Avenue, NW., Washington, DC 20460, (703) 308–8880.

If you wish to comment on this proposed rule, you must send an original and two copies of the comments referencing docket number F–2001–PMLP–FFFFF to: RCRA Docket Information Center, Office of Solid Waste (5305G), U.S. Environmental Protection Agency Headquarters (EPA, HQ), 1200 Pennsylvania Avenue, NW., Washington, DC 20460. Hand deliveries of comments should be made to the RCRA Information Center (RIC) located at Crystal Gateway, First Floor, 1235 Jefferson Davis Highway, Arlington, VA. You also may submit comments electronically by sending electronic mail through the Internet to: rcradocket@epa.gov. See the beginning of the Supplementary Information section for information on how to submit your comments as well as view public comments and supporting materials.

Please do not submit any confidential business information (CBI) electronically. You must submit an original and two copies of CBI under separate cover to: RCRA CBI Document Control Officer, Office of Solid Waste (5305W), U.S. EPA, 1200 Pennsylvania Avenue, NW., Washington, DC 20460.

FOR FURTHER INFORMATION CONTACT: For general information, contact the RCRA Hotline at (800) 424–9346 or TDD (800) 553–7672 (hearing impaired). In the Washington, DC, metropolitan area, call (703) 412–9810 or TDD (703) 412–3323. For information on specific aspects of the rule, contact Ms. Patricia Cohn or Mr. David Carver of the Office of Solid Waste (5304W), U.S. Environmental Protection Agency, 1200 Pennsylvania Avenue, NW., Washington, DC 20460, (E-mail addresses and telephone numbers: cohn.patricia@epa.gov (703–308–8675); carver.david@epa.gov (703–308–8603)). For technical information on the CERCLA aspects of this rule, contact Ms. Lynn Beasley, Office of Emergency and Remedial Response, Analytical Operations and Data Quality Center (5204G), U.S. Environmental Protection Agency, 1200 Pennsylvania Avenue, NW., Washington, DC 20460, [E-mail address and telephone number: beasley.lynn@epa.gov (703–603–9086)].

SUPPLEMENTARY INFORMATION:

How Do I Submit Comments to This Proposed Rule?

We are asking prospective commenters to voluntarily submit one additional copy of their comments on labeled personal computer diskettes in ASCII (text) format or a word processing format that can be converted to ASCII (text). Specify on the disk label the word processing software and version/edition as well as the commenter's name. This will allow us to convert the comments into one of the word processing formats used by the Agency. Please use mailing envelopes designed to physically protect the submitted diskettes. We emphasize that submission of comments on diskettes is not mandatory, nor will it result in any advantage or disadvantage to any commenter.

If you submit comments electronically, identify comments in electronic format with the docket number F–2001–PMLP–FFFFF. You must submit all electronic comments as an ASCII (text) file, avoiding the use of special characters and any form of encryption.

How Can I View Supporting Documents for This Proposed Rule?

You may view either the paper or electronic form of public comments and supporting materials accompanying today's proposal. You may access the paper copies of these supporting

documents in the RIC (See **ADDRESSES** section for address). The RIC is open from 9 am to 4 pm, Monday through Friday, excluding Federal holidays. To review docket materials, we recommend that you make an appointment by calling (703) 603–9230. You may copy a maximum of 100 pages from any regulatory docket at no charge. Additional copies cost $0.15/page.

You may also view these documents electronically on the Internet: *http://www.epa.gov/epaoswer/hazwaste/id/paint.*

We will keep the official record for this action in paper form. Accordingly, we will transfer all comments received electronically into paper form and place them in the official record, which will also include all comments submitted directly in writing. The official record is the paper record maintained at the address under **ADDRESSES** at the beginning of this document.

EPA responses to comments, whether the comments are written or electronic, will be in a notice in the **Federal Register** or in a response to comments document placed in the official record for this rulemaking. We may, however, seek clarification of electronic comments that become garbled in transmission or during conversion to paper form, as discussed above.

Customer Service

How Can I Influence EPA's Thinking on this Proposed Rule?

In developing this proposal, we tried to address the concerns of all our stakeholders. Your comments will help us improve this rule. We invite you to provide views on options we propose, new data, information on how this rule may affect you, or other relevant information. We welcome your views on all aspects of this proposed rule, but we particularly request comments on the items identified at the end of each section. Your comments will be most effective if you follow the suggestions below:

- Include your name, the date, and the docket number with your comments. Remember that your comments must be submitted by the deadline specified in this notice.
- Reference your comments to specific sections of the proposal by using section titles, page numbers of the preamble, or the regulatory citations.
- Clearly label any confidential business information (CBI) submitted as part of your comments.
- Explain your views as clearly as possible and provide a summary of the reasoning you used to arrive at your conclusions as well as examples to illustrate your views where possible.
- Tell us which parts of this proposal you support, as well as those with which you disagree.
- Offer specific alternatives.
- Provide solid technical data to support your views. For example, if you estimate potential costs, explain how you arrived at your estimate.

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I. Overview

A. Who Potentially Will be Affected by This Proposed Rule?

If finalized, this regulation could potentially affect those who generate and manage certain paint production wastes. Landfill owners/operators may also be impacted. A common disposal practice for much of the paint production wastes of concern has been in solid waste landfills. This proposed listing may result in leachate from some of these landfills becoming hazardous under the derived-from rule (described further in Section V.H). However, impacts to these facilities are projected to be negligible under our proposed approach of a Clean Water Act temporary deferral. This action may also affect entities that need to respond to releases of these wastes as CERCLA hazardous substances. These potentially affected entities are described in the Economics Background Document placed in the docket in support of today's proposed rule. A summary is provided in the table below.

SUMMARY OF FACILITIES POTENTIALLY AFFECTED BY EPA'S 2000 PAINT PRODUCTION WASTE LISTING PROPOSAL

Item	SIC code	NAICS code	Industry sector name	Estimated number of U.S. relevant facilities
1	2851	325510	Paint and Coating Manufacturing	972
2	4953	562212	Solid Waste Landfill	35–48

This list of potentially affected entities may not be exhaustive. Our aim is to provide a guide for readers regarding entities likely to be regulated by this action. This action, however, may affect other entities not listed in the table. To determine whether your facility is regulated by this action, you should examine 40 CFR parts 260 and 261 carefully along with the proposed rules amending RCRA that are found at the end of this **Federal Register** notice. If you have questions regarding the applicability of this action to a particular entity, consult the person listed in the preceding section entitled **FOR FURTHER INFORMATION CONTACT**.

B. What Impact May This Proposed Rule Have?

If you are a paint manufacturer and you generate wastes described in this

proposed rule, then you would need to determine if your wastes meet these newly listed hazardous waste codes, if finalized. Your waste would become a listed hazardous waste if it contains any of the constituents of concern at a concentration equal to or greater than the hazardous concentration identified for that constituent (see Tables IV–1 and IV–2). If you determine that your wastes are hazardous under this listing, then the wastes must be stored, treated and disposed in a manner consistent with the RCRA Subtitle C hazardous waste regulations at 40 CFR parts 260–272. If your annual generation of these paint production wastes exceeds 40 metric tons of waste solids and/or 100 metric tons of waste liquids, you must also perform certain routine testing of the affected wastes and keep certain records of these wastes (as described in Section V.E) on-site.

We are proposing that generators must meet the necessary conditions to determine whether or not a waste is hazardous based on the steps described in Section V.C, of today's proposed rule. If you determine that your wastes are hazardous under this listing, then you are also subject to all applicable requirements for hazardous waste generators in 40 part CFR 262. If you were not previously a hazardous waste generator, and you determine you generate this newly-listed hazardous waste; then you must notify the EPA, according to section 3010 of RCRA, that you generate hazardous waste. Following an initial determination whether your wastes are hazardous or nonhazardous under this listing, you would have a continuing obligation to make such a determination at least on an annual basis.

C. Why Does This Proposed Rule Read Differently From Other Listing Rules?

Today's proposed hazardous waste listing determination (or ''listing determination'') preamble and regulations are written in ''readable regulations'' format. The authors tried to use active rather than passive voice, plain language, a question-and-answer format, the pronouns ''we'' for EPA and ''you'' for the owner/generator, as well as other techniques, including an acronym list (see below), to make the information in today's proposed rule easier to read and understand. This new format is part of our efforts towards regulatory reinvention. We believe that this new format will help readers understand the regulations and foster better relationships between EPA and the regulated community.

ACRONYMS

Acronym	Definition
µm	Micrometer
BDAT	Best Demonstrated Available Technology
BFI	Browning-Ferris Industries (now Allied Waste Industries Inc.)
BHP	Biodegradation, hydrolysis and photolysis
BIF	Boiler and Industrial Furnace
BRS	Biennial Reporting System
CAA	Clean Air Act
CalEPA	California Environmental Protection Agency
CARBN	Carbon Absorption
CAS	Chemical Abstract Services
CBI	Confidential Business Information
CERCLA	Comprehensive Environmental Response Compensation and Liability Act
CERCLIS	Comprehensive Environmental Response Compensation and Liability Information System
CESQG	Conditionally Exempt Small Quantity Generator
CFR	Code of Federal Regulations
CHOXD	Chemical or Electrolytic Oxidation
CMBST	Combustion
COC	Constituents of Concern
CSCL	Chemical Stressor Concentration Limit
CSF	Cancer Slope Factor
CWA	Clean Water Act
CWT	Centralized Wastewater Treatment Facility (May also be referred to as a wastewater treatment facility, or WWTF)
EDF	Environmental Defense Fund
EO	Executive Order
EP	Extraction Procedure
EPA	Environmental Protection Agency
EPACMTP	EPA's Composite Model for Leachate Migration with Transformation Products
EPCRA	Emergency Planning and Community Right-To-Know Act
FR	Federal Register
GDP	Gross Domestic Product
GNP	Gross National Product
HAP	Hazardous Air Pollutant
HEAST	Health Effects Assessment Summary Table
HQ	Hazard Quotient
HSWA	Hazardous and Solid Waste Amendments
HWIR	Hazardous Waste Identification Rule
ICR	Information Collection Request
INC	Incineration
IRIS	Integrated Risk Information System
ISCST3	Industrial Source Complex-Short Term
LDR	Land Disposal Restriction
MACT	Maximum Achievable Control Technology
mg/kg	Milligram per kilogram
mg/L	Milligram per liter
MLF	Municipal Landfill
MINTEQ	MINTEQ (model for geochemical equilibria in ground water)

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ACRONYMS—Continued

Acronym	Definition
MINTEQA2	MINTEQA2 (model for geochemical equilibria in ground water) Geochemical speciation model; originally a combination of Mineral Equilibrium Model (MINEQL) and the thermodynamic database WATEQ3
MSDS	Material Safety Data Sheet
MSW	Municipal Solid Waste
MT	Metric Ton
NAICS	North American Industrial Classification System
NAPL	Non-Aqueous Phase Liquid
NCV	National Capacity Variance
NESHAP	National Emission Standards for Hazardous Air Pollutants
NPCA	National Paint and Coatings Association
NPDES	National Pollutant Discharge Elimination System
NPL	National Priority List
NRC	National Response Center
NTTAA	National Technology Transfer and Advancement Act
OEM	Original Equipment Manufacturing
OMB	Office of Management and Budget
OSW	Office of Solid Waste
OSWER	Office of Solid Waste and Emergency Response
OSWRO	Off-Site Waste and Recovery Operations
PBT	Persistent, Bioaccumulative and Toxic
POTW	Publicly Owned Treatment Works
ppm	Parts Per Million
PRA	Paperwork Reduction Act
QA	Quality Assurance
QC	Quality Control
RCRA	Resource Conservation and Recovery Act
RFA	Regulatory Flexibility Act
RfC	Reference Concentration
RfD	Reference Dose
RFSA	Regulatory Flexibility Screening Analysis
RIC	RCRA Information Center
RODS	Record of Decision System
RQ	Reportable Quantity
RTK	Right-To-Know
SBA	Small Business Administration
SBREFA	Small Business Regulatory Enforcement Fairness Act
SIC	Standard Industry Code
SOP	Standard Operating Procedure
SPIS	Superfund Public Information System
SW–846	Test Methods for Evaluating Solid Wastes
TC	Toxicity Characteristic
TCLP	Toxicity Characteristic Leaching Procedure
TOC	Total Organic Carbon
TRI	Toxic Release Inventory
TSDF	Treatment, Storage and Disposal facility
TSDR	Toxic Substances and Disease Registry
TSS	Total Suspended Solids
UMRA	Unfunded Mandates Reform Act
USC	United States Code
USLE	Universal Soil Loss Equation
UTS	Universal Treatment Standard
VOC	Volatile Organic Compound
WETOX	Wet Air Oxidation
WMU	Waste Management Unit
WMX	WMX Technologies, Inc.

D. What Are The Statutory Authorities for This Proposed Rule?

These regulations are being proposed under the authority of sections 2002(a), 3001(b), 3001(e)(2), 3004(d)–(m), and 3007(a) of the Solid Waste Disposal Act, 42 U.S.C. 6912(a), 6921(b) and (e)(2), 6924(d)–(m), and 6927(a), as amended, most importantly by the Hazardous and Solid Waste Amendments of 1984 (HSWA). These statutes commonly are referred to as the Resource Conservation and Recovery Act (RCRA), and are codified at Volume 42 of the United States Code (U.S.C.), sections 6901 to 6992(k) (42 U.S.C. 6901–6992(k)).

Section 102(a) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), 42 U.S.C. 9602(a) is the authority under which EPA is proposing amendments to 40 CFR part 302.

II. Background

A. How Does EPA Define a Hazardous Waste?

EPA's regulations establish two ways of identifying solid wastes as hazardous under RCRA. A waste may be considered hazardous if it exhibits certain hazardous properties (''characteristics'') or if it is included on a specific list of wastes EPA has determined are hazardous (''listing'' a

waste as hazardous) because it was found to pose substantial present or potential hazards to human health or the environment. EPA's regulations in the Code of Federal Regulations (40 CFR) define four hazardous waste characteristic properties: Ignitability, corrosivity, reactivity, or toxicity (See 40 CFR 261.21–261.24). As a generator, you must determine whether or not a waste exhibits any of these characteristics by testing the waste, or by using your knowledge of the process that produced the waste (see § 262.11(c)). While you are not required to sample your waste, you will be subject to enforcement actions if you are found to be improperly managing materials that are characteristic hazardous waste.

EPA may also conduct a more specific assessment of a waste or category of wastes and ''list'' them if they meet criteria set out in 40 CFR 261.11. As described in § 261.11, we may list a waste as hazardous if it:

—Exhibits any of the characteristics noted above, i.e., ignitability, corrosivity, reactivity, or toxicity (261.11(a)(1));
—Is ''acutely'' hazardous, i.e., if they are fatal to humans or in animal studies at low doses, or otherwise capable of causing or significantly contributing to an increase in serious illness (261.11(a)(2)); or
—Is capable of posing a substantial present or potential hazard to human health or the environment when improperly managed (261.11(a)(3)).

Under the third criterion, at 40 CFR 261.11(a)(3), we may decide to list a waste as hazardous if it contains hazardous constituents identified in 40 CFR part 261, appendix VIII, and if, after considering the factors noted in this section of the regulations, we ''conclude that the waste is capable of posing a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, or disposed of, or otherwise managed.'' We place a chemical on the list of hazardous constituents on Appendix VIII only if scientific studies have shown a chemical has toxic effects on humans or other life forms. When listing a waste, we also add the hazardous constituents that serve as the basis for listing to 40 CFR part 261, appendix VII.

The regulations at 40 CFR 261.31 through 261.33 contain the various hazardous wastes the Agency has listed to date. Section 261.31 lists wastes generated from non-specific sources, known as ''F-wastes,'' and contains wastes that are usually generated by various industries or types of facilities, such as ''wastewater treatment sludges from electroplating operations'' (see code F006). Section 261.32 lists hazardous wastes generated from specific industry sources, known as ''K-wastes,'' such as ''Spent potliners from primary aluminum production'' (see code K088). Section 261.33 contains lists of commercial chemical products and other materials, known as ''P-wastes'' or ''U-wastes,'' that become hazardous wastes when they are discarded or intended to be discarded.

Today's proposed regulations would list certain paint production wastes as K-waste codes under § 261.32. We are also proposing to add constituents that serve as the basis for the proposed listings to Appendix VII as well as to add certain constituents to the list of Hazardous Constituents in Appendix VIII that are not already included.

''Derived-from'' and ''Mixture'' Rules

Residuals from the treatment, storage, or disposal of most listed hazardous wastes are also classified as hazardous wastes based on the ''derived-from'' rule (40 CFR 261.3(c)(2)(i)). For example, ash or other residuals generated from the treatment of a listed waste generally carries the original hazardous waste code and is subject to the hazardous waste regulations. Also, the ''mixture'' rule (40 CFR 261.3(a)(2)(iii) and (iv)) provides that, with certain limited exceptions, any mixture of a listed hazardous waste and a solid waste is itself a RCRA hazardous waste.

Some materials that would otherwise be classified as hazardous wastes under the rules described above are excluded from jurisdiction under RCRA if they are recycled in certain ways. The current definition of solid waste at 40 CFR 261.2 excludes from the definition of solid waste secondary materials that are used directly (*i.e.,* without reclamation) as ingredients in manufacturing processes to make new products, used directly as effective substitutes for commercial products, or returned directly to the original process from which they are generated as a substitute for raw material feedstock. (See 40 CFR 261.2(e).) As discussed in the January 4, 1985, rulemaking that promulgated this regulatory framework, these are activities which, as a general matter, resemble ongoing manufacturing operations more than conventional waste management and so are more appropriately classified as not involving solid wastes. (See 50 FR 637–640).

B. How Does EPA Regulate RCRA Hazardous Wastes?

If a waste exhibits a hazardous characteristic or is listed as a hazardous waste then it is subject to federal requirements under RCRA. These regulations affect persons who generate, transport, treat, store or dispose of such waste. Facilities that must meet hazardous waste management requirements, including the need to obtain permits to operate, commonly are referred to as ''Subtitle C'' facilities. Subtitle C is Congress' original statutory designation for that part of RCRA that directs EPA to issue regulations for hazardous wastes as may be necessary to protect human health or the environment. EPA standards and procedural regulations implementing Subtitle C are found generally at 40 CFR parts 260 through 272.

All RCRA hazardous wastes are also hazardous substances under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as defined in section 101(14)(C) of the CERCLA statute. This applies to wastes listed in §§ 261.31 through 261.33, as well as any wastes that exhibit a RCRA characteristic. Table 302.4 at 40 CFR 302.4 lists CERCLA hazardous substances along with their reportable quantities (RQs). Anyone spilling or releasing a substance at or above the RQ must report the release to the National Response Center, as required in CERCLA Section 103. In addition, Section 304 of the Emergency Planning and Community Right-to-Know Act (EPCRA) requires facilities to report the release of a CERCLA hazardous substance at or above its RQ to State and local authorities. Today's rule proposes to establish RQs for the newly listed wastes.

C. How Does EPA Regulate Solid Wastes That Are Not RCRA Hazardous Wastes?

If your waste is a solid waste but is not, or is determined not to be a listed and/or characteristic hazardous waste, then you may dispose these solid wastes at Subtitle D facilities. These facilities are approved by state and local governments and generally impose less stringent requirements on management of wastes. Subtitle D is the statutory designation for that part of RCRA that deals with disposal of solid waste. EPA regulations affecting Subtitle D facilities are found at 40 CFR parts 240 thru 247, and 255 thru 258. Regulations for Subtitle D landfills that accept municipal waste (''municipal solid waste landfills'') are in 40 CFR part 258.

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D. Overview of the Hazardous Waste Listing Determination Process for Paint Production Wastes

1. Suspension of Previous Listings

Under the Resource Conservation and Recovery Act (RCRA) of 1976, Congress directed EPA to establish a framework for RCRA's Subtitle C hazardous waste program. Congress also required EPA to propose and write timely rules identifying wastes as hazardous under Subtitle C. EPA responded by proposing Subtitle C regulations on December 12, 1978 (43 FR 58957) which established a framework for the Subtitle C program. At the same time, EPA also proposed to list wastes—including four paint production waste streams from specific (paint production) sources and two paint production waste streams from non-specific (paint application) sources—as hazardous. On July 16, 1980, EPA promulgated an interim final rule (45 FR 47832) that designated four paint production waste streams from specific sources as hazardous waste under 40 CFR 261.32:

- Solvent cleaning wastes from equipment and tank cleaning operations (K078),
- Water/caustic cleaning wastes from equipment and tank cleaning operations (K079),
- Wastewater treatment sludge (K081), and
- Emission control dust or sludge (K082).

Commenters to this rule argued that these listings were overly broad. EPA consequently re-examined the data and initial analysis on these paint production waste streams and determined that further study of these wastes was necessary before a final listing could be promulgated. On January 16, 1981, this interim final rule—identifying and listing these paint production waste streams as hazardous—was temporarily suspended (48 FR 4614).

2. Consent Decree Schedule for This Proposal

The 1984 Hazardous and Solid Waste Amendments (HSWA) to RCRA require EPA to make listing determinations for paint production wastes (see RCRA section 3001(e)(2)). In 1989, the Environmental Defense Fund (EDF) filed a lawsuit to enforce the statutory deadlines for listing decisions in RCRA section 3001(e)(2). (*EDF* v. *Browner*, D.D.C. Civ. No. 89–0598). To resolve most of the issues in the case, EDF and EPA entered into a consent decree, which has been amended several times to revise deadlines for EPA action. Paragraph 1.d (as amended) of the consent decree addresses the paint production industry:

> EPA shall promulgate a final listing determination for paint production wastes on or before March 30, 2002. This listing determination shall be proposed for public comment on or before January 28, 2001. This listing determination shall include the following wastes: solvent cleaning wastes (K078), water/caustic cleaning wastes (K079), wastewater treatment sludge (K081), and emission control dust or sludge (K082) for which listings were suspended on January 16, 1981 (46 FR 4614), and off-specification production wastes.

Today's proposal satisfies EPA's duty under paragraph 1.d to propose determinations for the specified paint production wastes.

E. Existing Regulations That Apply to This Industry

RCRA authorizes EPA to evaluate industry waste management practices and, if necessary, regulate how wastes are handled to ensure that present or potential hazards are not posed to human health and the environment. In addition to RCRA, the Clean Water Act (CWA) and Clean Air Act (CAA) provide EPA with the statutory authority to evaluate industry practices and, if necessary, regulate industry releases of pollutants to environmental media such as water and air.

Currently, there are no regulatory requirements under RCRA that specifically—identify paint production waste streams as listed hazardous waste. Paint production waste streams may, however, carry hazardous waste listing and/or characteristic codes if they are generated from the use of certain common organic solvents (spent solvent wastes F001 through F005) or if they exhibit a hazardous waste characteristic (ignitability—D001, corrosivity—D002, reactivity—D003, toxicity—D004—D043). EPA is not soliciting comment on these existing hazardous waste listings and does not intend to respond to such comments if received. As well, paint production wastes subject to today's proposal remain subject to current hazardous waste listings or characteristics that render them hazardous.

Regulatory requirements under the CWA (40 CFR part 446) specify effluent guidelines implemented through national pollutant discharge elimination system (NPDES) permits for certain paint production wastes that are discharged to navigable waters. These regulations apply to paint production wastes that originate from the production of oil-based paint where tank cleaning is performed using solvents. In addition, manufacturers who discharge wastewaters generated from paint production to a publicly owned treatment works (POTW) may be required to comply with general pretreatment requirements (40 CFR part 403) as established by the POTW. Finally, some paint manufacturers send their wastewaters to privately-owned centralized wastewater treatment facilities (CWTs) that are operated under NPDES permits. The Agency recently promulgated effluent guidelines for these facilities at 40 CFR part 437.

Under the CAA there are two types of regulatory requirements that may apply specifically to paint production wastes: National volatile organic compound (VOC) emission standards and national emission standards for hazardous air pollutants (NESHAP). VOC emission standards—which aim to reduce VOC emissions and in turn reduce ozone levels—exist for architectural coatings (40 CFR part 59, subpart D; 63 FR 48848, September 11, 1998) and automobile refinish coatings (40 CFR part 59, subpart B; 63 FR 48806, September 11, 1998). These standards specify VOC levels for categories of architectural and automobile refinish coatings.

Subpart DD in 40 CFR part 63, sets NESHAPs from off-site waste and recovery operations (OSWRO). These standards, in part, limit air releases from off-site wastewater treatment facilities (CWTs) (July 1, 1996, 61 FR 34140). Furthermore, EPA is planning to propose a MACT (Maximum Achievable Control Technology) standard for paint manufacturers (Miscellaneous Organic Chemical and Coatings Manufacturing) that would regulate hazardous air pollutant (HAP) emissions from process vents, storage tanks, transfer operations, equipment leaks, and wastewaters.[1] This would apply to wastewaters managed on-site and also if sent off-site for treatment.

F. What Industries and Wastes Are Covered in This Proposed Rule?

1. Scope of Consent Decree

Today's proposed rule applies to paint and coatings manufacturers generally categorized under subcodes 28511, 28512, and 28513 of Standard Industrial Code (SIC) 2851, or North American Industry Classification System (NAICS) 325510 (subcodes -1, -4, and -7). This includes, but is not limited to, entities who manufacture:

[1] These regulations would apply to coatings manufacturing facilities that are a major source and use, produce, or make a HAP. A major source of a HAP is located within a contiguous area and under common control and has the potential to emit greater than 9.1 Mg/yr (25 tons/yr) of any combination of HAP or 10 tons/yr of a single HAP.

paints (including undercoats, primers, finishes, sealers, enamels, refinish paints, and tinting bases), stains, varnishes (including lacquers), product finishes for original equipment manufacturing and industrial application, and coatings (including special purpose coatings and powder coatings). Products produced by this industry that are included within the scope of this proposed rule are referred to as ''paints'' and/or ''coatings.''

Today's proposal does not apply to miscellaneous allied products (paint and varnish removers, thinners for lacquers and other solvent-based paint products, pigment dispersions or putty) included under SIC subcode 28515 (NAICS 325510A) or artist paint, which is classified under SIC 3952 (NAICS 339942).

The waste streams included within the scope of today's proposal are the following paint production wastes generated by paint manufacturers: (1) Solvent cleaning wastes as waste liquids and solids generated from equipment and tank cleaning operations; (2) water and/or caustic cleaning wastes as waste liquids and solids generated from equipment and tank cleaning operations; (3) wastewater treatment sludge as waste solids generated in on-site or captive wastewater treatment processes solely or primarily for treating paint production waste liquids; (4) emission control dust or sludge as waste solids collected in a facility's particulate emission control devices such as baghouses; and (5) off-specification production wastes as waste solids.

EPA bases many of its decisions as to the scope of the industries and wastes covered in this proposal on the *EDF* v. *Browner* consent decree. Paragraph 1.d of the consent decree states:

> *Paint production wastes*—EPA shall promulgate a final listing determination for paint production wastes on or before March 30, 2002. This listing determination shall be proposed for comment on or before January 28, 2001. This listing determination shall include the following wastes: solvent cleaning wastes (K078), water/caustic cleaning wastes (K079), wastewater treatment sludge (K081), and emission control dust or sludge (K082) *for which listings were suspended on January 16, 1981 (46 FR 4614)*, and off-specification production wastes. (Emphasis added)

For solvent cleaning wastes, water/caustic cleaning wastes, wastewater treatment sludge and emission control sludge or dust, we believe that the decree requires us to address only those industries and wastes included in the paint production wastes listing that the Agency suspended on January 16, 1981. After reviewing the original rulemaking record for the suspended interim final rule, we have determined that while EPA did initially look at the entire paint and coatings SIC classification, which included miscellaneous allied products, we ultimately narrowed the scope of the suspended paint listings to exclude this category. Therefore, manufacturers of allied products and allied products production wastes are not covered by the decree. Moreover, nothing in the 1980 rulemaking record suggests that artist materials were considered in this earlier listing development work. Therefore, EPA does not interpret the decree to require assessment of solvent cleaning wastes, water/caustic cleaning wastes, wastewater treatment sludge, and emission control sludge or dust from the production of artist paint. (For more information on how EPA determined the scope of the suspended paint listings, refer to the accompanying Listing Background Document.)

Concerning ''off-specification production waste,'' we believe that the most straightforward reading of the consent decree is that this waste stream, although not part of the suspended listings, has the same scope as the other enumerated waste streams. In other words, the decree does not require us to address off-specification allied products and artist paints. Nothing in the decree suggests that either party intended the off-specification production waste stream to apply more narrowly or more broadly than the other waste streams. Thus, EPA has assessed only off-specification paint production wastes from subcodes 28511, 28512, and 28513 of Standard Industrial Code (SIC) 2851.

EPA, however, interprets the decree to exclude off-specification paint products that have been shipped out to retailers or paint users. EPA believes that these downstream entities do not engage in paint production. Consequently, EPA has not evaluated off-specification paint which a downstream entity decides to discard or send back to the manufacturer. Moreover, as explained below, EPA thinks that downstream entities can presume that unused paint products returned to a paint production facility will be legitimately reused and, thus, will not be solid wastes, even if they exhibit a hazardous waste characteristic.

2. Scope of Listing: Off-Specification Products

EPA is proposing to include within the category of off-specification paints all products which a paint manufacturer decides not to use—whether or not the paint product meets applicable product specifications. Not all of these unused products literally fail to meet product specifications; paint producers cite a variety of reasons for deciding not to sell them as originally intended. EPA believes that any unused products, whatever the reason they are unused, could present similar risks. Moreover, facilities would find it cumbersome to distinguish between off-specification products and other unused products.

EPA is proposing not to go beyond the scope of the consent decree to include within the listing off-specification paint products which retailers or users decide to discard or return to manufacturers. However, EPA is proposing to go beyond consent decree requirements to include within the scope of today's proposed listing returned, unused products once a manufacturer obtains possession or control of them. EPA believes that ''returned'' unused products could pose risks similar to those posed by unused products that never go off-site. And, as discussed above, facilities would find it cumbersome to distinguish between returned products and ''never sent'' products. EPA refers to all of these unused products that will not be sold for their original, intended use as ''off-specification'' paint products.

3. Recycling Issues

EPA notes that off-specification paint production wastes can be recycled in ways that will not be regulated as hazardous waste management. Under current regulations defining ''solid wastes,'' unused paint reused as a legitimate ingredient in the manufacture of other paint is not considered a ''waste'' and thus will not be subject to the hazardous waste regulations. EPA notes that paint manufacturers commonly reuse unused products to make new paints. EPA also understands that paint formulations are fairly exacting, making it unlikely that a manufacturer could successfully rework paint containing significant quantities of constituents that are not useful paint ingredients. Typically, this type of reuse of a commercial product (when legitimate) is not regulated as waste management, even if it involves reclamation. See 40 CFR 261.2 [2] In addition, relatively small quantities are sold for ''lower-grade'' uses; these materials are still paint products, and no aspect of this activity is regulated under RCRA Subtitle C.

EPA wants to clarify the effect of today's proposed listing on ''take-back''

[2] See also: Letter from Sylvia K. Lowrance to Mark Schultz, May 16, 1991. This letter says that returned pharmaceutical products are not considered solid wastes until a decision is made to discard them, because use/reuse is generally a viable option.

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programs in which retailers or customers return unused paint because it does not meet the customer's specifications or because it is unusable for some other reason. EPA believes, based on what it knows of the industry, that a retailer or customer returning unused paint to a paint manufacturer can presume that the paint will be legitimately used as an ingredient and that, therefore, the paint being returned is not a hazardous waste even if it exhibits a hazardous waste characteristic. EPA understands that paint manufacturers will typically take such returned paint and use it as a legitimate ingredient in the manufacture of another paint product. The retailer or user will be entitled to rely on this interpretation exempting returned paint even if the manufacturer ultimately decides to discard the unused paint rather than reuse it. EPA has previously taken the position that retailers or users of pharmaceutical products returning unused products to manufacturers are not managing wastes [3]. However, should the paint production facility determine it cannot or will not use the returned paint as an ingredient, we are proposing that the paint would then become an off-specification paint product waste that would need to be evaluated against the concentrations proposed in today's rulemaking, as well as the hazardous waste characteristics.

G. Description of The Paint and Coatings Industry

Paint and coatings manufacturers are concentrated near large metropolitan areas, with the majority of facilities located on the East Coast, and in California, Texas and the Midwest. We estimate that there are 972 paint and coatings manufacturing facilities operated in the United States by about 780 different companies (a few larger companies operate several facilities). For more information on how we estimated this universe, refer to Section II.H. Of this universe, we estimate that about 95 percent of all these companies meet the Small Business Administration definition of a small business (total company employment of fewer than 500 people, at the parent level, if a company is a subsidiary). We estimate that around 600 facilities are generating wastes that fall within the scope of this rulemaking.

The paint and coatings industry is classified by the type of paint product manufactured. Products are categorized into three main groups according to end use by the SIC classification as architectural coatings, original equipment manufacturing (OEM) product finishes, and special purpose coatings. Architectural coatings, also referred to as trade sales paints, include exterior and interior house paints, stains, varnishes, undercoats, primers, and sealers. OEM product finishes are custom formulated for application to products during the manufacturing process. This includes coatings applied to automobiles, appliances, machinery and equipment, toys and sporting goods, wood furniture and fixtures, coil coatings, electrical insulation, factory-finished wood, metal containers, paper, film and foil, and non-automotive transportation. Special purpose paints are formulated for specific applications or extreme environmental conditions (fumes, chemicals, and temperature) and include: high-performance maintenance coatings (used in refineries, public utilities, bridges, etc.); automotive refinishing; highway traffic markings; aerosol paints; and marine coatings.

Paint Production. Paints and coatings are formulated to protect and decorate surfaces as well as enhance desired surface properties such as electrical conductivity and corrosion protection. Inorganic and organic chemicals comprise raw materials—solvents, resins (or ''binders''), pigments, and additives—that are mixed in a batch process to make solvent or water-based paint according to desired end-use specifications. Batches of paint, which may range in size from 10 to 10,000 gallons, are blended in stationary and portable equipment such as mixers, blenders, sand mills, and tanks.

Paint Production Waste Generation and Management. Process equipment is cleaned regularly to avoid product contamination and to restore operational efficiency. The equipment is also cleaned during manufacturing shut downs and when a significant change in a production line occurs. Because paint is a mixture of chemicals that does not involve chemical reactions, the make-up of paint production wastes reflects chemicals used in batch production and any ancillary chemicals such as those used in cleaning process equipment. Depending on the type of paint manufactured, process equipment may be cleaned with either solvent, water, or aqueous caustic washes. These liquid cleaning wastes consist of paint solids and sludges which may contain pigments, partially or completely cured resins, and additives. Solvent cleaning wastes, as well as water and/or caustic cleaning wastes are defined by the type of cleaning reagent used, not by the material that is being removed through the cleaning process. For example, you can generate a solvent cleaning waste if you clean a wastewater tank with a solvent (or blend of solvent).

Paint manufacturing facilities may also generate waste solids and liquids included within the scope of this proposed rule when (1) emission control systems are emptied, (2) wastewaters are treated and (3) off-specification product is discarded. Airborne material is generated when dry materials, such as pigments, are loaded into processing equipment. Air hoods and exhaust fans help control the level of airborne particulate material released into the paint production areas. Material is collected in emission control systems such as baghouses. Pigments comprise a large fraction of the dry materials collected in emission control systems. Other raw materials, including additives (such as fillers) and solvents, may also be collected in emission control systems.

Water-based wastewaters are primarily generated when process equipment is cleaned. Additional sources include floor washdown and spill cleanup. The most common treatment for these wastewaters is physical-chemical. This usually involves chemical addition and gravity settling of suspended solids which generates a liquid and sludge.

As discussed above in Section II.F, ''off-specification'' paint products subject to this listing determination include any unused paint products which a paint manufacturer decides to handle in a way that is regulated as waste management. A paint may be considered off-specification for a variety of reasons. For example, it may not meet the original design specifications; it may be replaced by a new superior production; or, the product's shelf life expires. As discussed earlier, off-specification paint products may be reworked into saleable materials or discarded. Off-specification product that is discarded by a paint manufacturer is subject to this listing.

Paint manufacturers may generate some or all of these wastes. Waste generation is a function, in part, of volume and type of paint produced, degree of automation, amount of recycling, and age of facility. Treating, handling, and disposing of these wastes are costs associated with paint production activities. Paint manufacturers strive to reduce and/or eliminate waste produced which in turn reduces overall costs and improves profitability and competitiveness.

[3] Letter from David Bussard to N.G. Kraul, February 23, 1993. This letter says that off-specification paint is a non-listed commercial product and not a solid waste when reclaimed.

H. What Information Did EPA Collect and Use?

Our primary sources of data to support this proposed listing determination are a questionnaire (or ''survey'') of the paint and coatings manufacturing industry and existing literature. We conducted a survey under authority of RCRA section 3007, 42 U.S.C. 6927.[4] As part of the survey development process, we went on ten site visits to paint manufacturing facilities throughout the country.

Please note that we did not sample waste streams generated by the paint and coatings industry to support this proposed listing determination. As discussed earlier, there are about 1000 paint manufacturing facilities in the U.S. paint and coatings industry. These facilities combine raw materials (chosen from a potential universe of several thousand constituents) in batch processes to manufacture products that meet market demands for a wide variety of architectural, original equipment manufacture and product coatings, and special purpose needs. Waste streams generated at a facility (the same or different facility) may vary significantly because the type of product manufactured, as well as raw materials used, vary significantly. As a result, we did not attempt to sample paint production wastes described in this proposal because we concluded it would be impractical to conduct a data collection effort that would account for the wide variety of individual paint products produced and the potential variability in the waste characteristics. Gathering sufficient samples to evaluate all potential paint production wastes would require a large commitment of scarce Agency resources that would have been beyond the reasonable scope of this rulemaking. In addition, an advantage of the concentration-based listing approach that we have used in this proposal is that it does not rely on extensive waste sampling. Instead, we are relying on publically available sources of information as well as data collected from survey responses to characterize the constituents likely to be present and the chemical and physical properties of paint manufacturing wastes.

1. Site Visits

To develop a better understanding of industry practices and as a basis for developing the industry survey, the Agency conducted site visits at ten paint manufacturing plants located throughout the country. When selecting sites, we considered: plant production size, type of manufacturing process, Toxic Release Inventory (or ''TRI'') waste release information, and plant location. The information we obtained from these visits (other than that for which a Confidential Business Information (CBI) claim has been made and sustained) is available for public review in the docket for this rulemaking. (For more information about CBI protection, please refer to 40 CFR part 2 subpart B.)

In particular, we collected information on: (1) Types of production and volume, (2) waste management units used, (3) how each residual was managed (as hazardous or not), (4) evidence of off-spec product storage and tracking system, (5) volume of each residual generated and form and how each is stored on-site, (6) management practices for each residual for both on-site and off-site (POTWs, tanks), (7) types of constituents used at plant, (8) reuse of solvent/washwater (e.g., washwater used as ingredient in next batch), (9) pollution prevention and waste minimization practices, (10) presence or absence of solvent recovery stills on-site, (11) presence or absence of any closed loop recycling practices, (12) any appearance of unsafe operating practices or disposal practices by facility, and (13) housekeeping practices on plant floor relative to waste generation and management.

We used information collected at these on-site visits combined with additional information provided by industry representatives to develop a RCRA 3007 survey. For example, we were able to include more appropriate questions on waste management practices and to distinguish wastes that are recycled more clearly. This survey requests information on waste generation and management practices.

2. Database of Paint Manufacturing Information From Published Sources

We also created an electronic Database of Paint Manufacturing Information from Published Sources that is available in the docket. The database consists of three modules. The Raw Materials Module contains information on different categories of raw materials that are combined to make paints. The Paint Formulations Module contains information on the concentrations of different raw materials in selected paint formulations. The Bibliography of Documents Module lists the published reference materials which were used as sources for other modules in the database. These sources include technical texts, journal articles, EPA and other government studies, and publications from paint industry trade organizations.

3. The RCRA Section 3007 Survey

a. *Overview*. The purpose of the survey was to gather information about nonhazardous and hazardous waste generation and management practices in the U.S. paint and coatings manufacturing industry. Specifically, we requested information on the five waste streams of concern (as outlined in the Consent Decree obligations, See Section II.D.2), waste characteristics, and waste management practices.

In addition to determining the content of the survey, we also evaluated whether it was necessary to conduct a census of the industry in order to accurately depict this industry's current waste generation and management practices. Due to the size of the paint manufacturing industry, and in consideration of our time and resource constraints, we could not conduct a full census of all the facilities in the industry. Therefore, we surveyed a sample of the universe rather than conduct a full census. Random sampling is a widely used statistical approach to collecting representative data from a large population. To ensure that this survey would provide the best overall coverage for various industry subsets and identify all significant waste management practices throughout the industry, we used accepted statistical sampling methods to achieve a 90% probability or confidence level that our survey would find a waste management activity utilized by at least one in 20 paint manufacturing facilities within the various categories of generators we identified via our literature search (discussed below). In other words, we determined a sample size such that it would be large enough to ensure a high certainty (90% likelihood) of identifying any waste management practices with more than 5% chance of occurrence. Using a statistical stratified random-sampling scheme[5] designed to represent

[4] See **Federal Register** notices 4 FR 46375 (August 25, 1999) and 64 FR 71135 (December 20, 1999) announcing EPA's data collection request submitted to the Office of Management and Budget (OMB). A copy of the questionnaire is available in the public docket for today's proposed rule. This information collection request was approved by the OMB, Clearance Number 2050–0168 (expiration date: June 30, 2001).

[5] Stratified random sampling is a statistical procedure that first dividends the sampling population into subpopulations or strata with respect to several characteristics such that within the individual strata there is as much homogeneity as possible, and then selects samples randomly from the individual strata. This procedure improves generalizations about the whole population and, if

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paint production types, sales volumes and TRI reporting status, we selected sufficient paint manufacturing facilities from an industry database developed by Dun & Bradstreet, a company of The Dun & Bradstreet Corporation, 2000. We believe this sampling survey adequately covered the industry while reducing the burden imposed by the survey on the industry and reducing the time and money spent by the government in performing the survey.

Prior to finalizing the questionnaire, we conducted a pilot test by sending the questionnaire to three paint manufacturing facilities which were not included in the survey and modified the questionnaire based on their comments. Further, in order to assist the surveyed facilities in understanding and responding to the questionnaire, we established toll-free telephone and e-mail help lines, returned and answered their calls or messages expeditiously, and even helped some complete the questionnaire over the telephone. Note that, under RCRA section 3007, the surveyed facilities are required to provide accurate information and certify under penalty of law. However, to ensure accuracy and completeness, we conducted a quality assurance review of the information and data provided in the questionnaire responses, such as identifying data entry errors, missing data, and internal inconsistencies between answers. The review of each facility's response resulted in follow-up telephone calls and/or letters to some facilities seeking clarifications, corrections, and additional/missing data where needed. We entered data from the questionnaire responses into a database known as the Paint Residual Master Database, and conducted additional quality assurance reviews on the database. Hard copies of the questionnaire responses and a CD–ROM copy of the response database are available in the public docket for review.

We compiled and analyzed these data to develop a general assessment of the paint industry's waste generation and management practices. We also used these data for our risk assessment, economic analysis of the potential impacts of hazardous waste regulation, and Land Disposal Restrictions (LDR) and treatment and management capacity analyses.

b. *Structuring The Survey to Capture All The Wastes of Concern.* As indicated previously, the consent decree obligations require the Agency to make hazardous waste listing determinations on five types of paint production wastes. In the questionnaire, we classified these five waste streams into 20 specific residuals for more detailed waste characterization. These 20 residuals, including ten hazardous and ten nonhazardous under current Federal regulations, encompass liquid residual from solvent cleaning, sludge residual from solvent cleaning, liquid residual from wash water, sludge residual from wash water, liquid residual from caustic wash water, sludge residual from caustic wash water, sludges from wastewater treatment, emission control dust, emission control sludge, and off-specification product. As discussed later in Sections III and IV, we eventually used the detailed waste characterization information from the survey to divide the paint production waste streams of concern into waste solids and waste liquids for today's proposed listing.

c. *Identifying The Universe of Paint Manufacturing Facilities.* Initially, using a variety of industrial and business data sources described in the listing background document, we estimated that there are approximately one thousand paint manufacturing facilities of interest in the United States. We found no single, comprehensive listing of all paint manufacturing facilities. However, we identified the 1998–99 Dun & Bradstreet database as the data source that would provide the most thorough listing of paint manufacturers in the United States that was available in electronic format. We used the Dun & Bradstreet database to develop a sampling population and to stratify the sampling population into categories based on paint types and sales volumes. We also looked at the American Business Directories List of paint and allied product manufacturers and the 1999 Paint Red Book published by Cygnus Publishing, but found that they were less suitable to our needs for sampling stratification purposes. We found that there was insufficient information in the latter two databases for us to distinguish the types of paint production by facilities and whether some facilities were clearly out of scope and classify them into our desired paint production categories (architectural, OEM, etc.). The Dun & Bradstreet database includes a well defined and easily understandable breakdown of the various paint manufacturing types we used to classify them into OEM and architectural related paint categories, and eliminate those apparently of no interest to this listing determination. Specifically, each entry in the Dun & Bradstreet database is identified by an 8-digit code, with the first four being the same as SIC's and the next four proprietary to Dun & Bradstreet that represent the classifications of the facilities. The coding system used in the Dun & Bradstreet database provided the level of detail necessary to more accurately divide the paint industry into the necessary strata for our use.

d. *Constructing a Stratified Random Sample.* We stratified paint manufacturing facilities into various categories for this sampling survey because we expected we might find differences in waste generation and management practices among various types of paint producers (architectural, OEM, etc.) and by sampling the various categories we would be more likely to identify the full range of management practices. We also believed that larger facilities (with higher sales volumes) conduct more waste management activities, and smaller facilities (with lower sales volumes) tend to have more recycling or reuse efforts in order to compete in business. Furthermore, manufacturing facilities subject to the Toxic Release Inventory (TRI) [6] reporting are required to report annual releases of toxic chemicals to waste management units and environmental media. As such, we were particularly interested in SIC 2851 paint manufacturers that are listed under TRI because they would also likely provide more information on waste constituents and management practices of concern to this listing determination. Therefore, we stratified the facilities based on three categorization criteria: Paint types, sales volumes, and TRI status, as elaborated below.

In the Dun & Bradstreet database, we found a total of 1,764 facility entries identified under SIC 2851. We removed those entries that are either apparent non-paint manufacturers, or entries we determined that are outside of the scope of this listing determination, or entries we found impossible to identify for stratification purposes. In the end, we adopted the remaining 884 facilities as the sampling population for this survey.

Next, we stratified the 884 potential paint manufacturing facilities into 12 categories, based on the three categorization criteria discussed above: paint types; sales volumes (less than

properly executed, generally leads to a higher degree edition, Prentice-Hall, Inc., 1967.

[6] The Toxic Release Inventory (TRI) of routine and accidental releases of toxic chemicals to the environment reported by manufacturing facilities, established per Section 313 of the Emergency Planning and Community Right-to-Know Act of 1986. Facilities conducting the specified manufacturing operations are required to report on releases of certain toxic chemicals into the air, water, and land provided certain conditions (having ten or more full-time employees, and manufacturing or processes over 25,000 pounds of the designated chemicals, etc.) are met.

five million dollars, five to twenty million dollars, and greater than twenty million dollars, based on the Census Bureau's figures); and TRI status (whether the facility reported under TRI in 1997). These 12 categories comprise large, medium, and small facilities of the following combinations: Architectural-related production and on the TRI list; OEM-related production and on the TRI list; architectural-related production and not on the TRI list; OEM-related production and not on the TRI list. Also note that three categories contained no facilities: medium architectural-related paint production and on the TRI list, large OEM-related paint production and on the TRI list, and medium OEM-related paint production and on the TRI list.

To select a sample from the 884 sampling population for distributing the questionnaire, we developed a stratified, statistical random-sampling scheme based on the above stratification process and using the hypergeometric probability formula described in Steel and Torrie,[7] such that the sample size would represent a 90% probability of capturing a waste management practice conducted by at least one in 20 facilities (discussed above). Under these criteria, higher percentages of facilities were selected in the medium and large facility categories. All selected facilities were then randomly chosen within the various categories to avoid bias when sending questionnaires to the surveyed facilities. This sampling approach reduced the probability of including known non-paint manufacturers or manufacturers not of interest to this rulemaking in the survey, and increased the chance of capturing sufficient waste management activities. Otherwise, more of the small facilities would have been surveyed, but large manufacturing facilities and TRI generators which would likely provide more waste management information could have been left out.

We developed a statistical weight for each category of surveyed facilities to extrapolate from those facilities we actually surveyed to the larger sampling population of 884 facilities. The weight for each surveyed facility in a category represents its relationship to the total number of facilities in the category. For example, we surveyed 28 facilities from a category of 34 facilities; 63 facilities from a category of 255 facilities; 13 facilities from a category of 99 facilities, etc. As a consequence, each of the 28 facilities sampled from the category of 34 facilities represents 1.2143 facilities (34 ÷ 28 = 1.2143); each of the 63 facilities sampled from the category of 255 represents 4.0476 facilities (255 ÷ 63 = 4.0476); and each of the 13 facilities sampled from the category of 99 represents 7.6154 facilities (99 ÷ 13 = 7.6154), etc. These numbers (1.2143, 4.0476, 7.6154, etc.) are the statistical weighting values (or weights) to be applied to each facility in each of the 12 categories for analysis of the collected data (such as waste quantities). For a detailed description of our statistical methodology and stratification process, see ''Supporting Statement—Information Collection Request for Paint Manufacturing Industry Waste Survey, Part B'' which was submitted to the OMB as part of the ICR for review and approval, and the listing background document available in the public docket for this proposed rule.

e. *Conducting The Survey and Analyzing The Results.* Using this stratified random-sampling scheme, we distributed the questionnaires in February and March of 2000 to a total of 299 facilities out of the sampling population of 884 from the Dun & Bradstreet database that we identified as the potentially impacted paint manufacturing facilities in the United States.

Of the 299 questionnaires we distributed, 292 facilities responded to the questionnaires. We found that in 1998, 187 of the survey respondents manufactured paint products of interest to this listing determination. Thirty six of these 187 facilities identified themselves as paint manufacturers, but in 1998 did not generate or dispose of any of the waste residuals within the scope of the questionnaire because they recycled or reused all paint residuals as feedstock in their manufacturing processes.[8] The other 151 manufacturing facilities generated one or more of the waste residuals of concern. They provided information on their waste generation and management practices. Most of these 151 manufacturing facilities also reused their waste residuals on-site to some extent, either as feedstock in the paint production or as an ongoing cleaning solution. The remaining respondents identified themselves as either a paint sales agent, a non-paint manufacturer, a non-paint manufacturer until after 1998, no longer a paint manufacturer, or a paint-related manufacturer not under the scope of the questionnaire. Table II.H.-1 provides a summary of the number of potential paint manufacturing facilities selected from the Dun & Bradstreet database, the number of facilities surveyed, the number of facilities responded, and the number of paint manufacturing facilities of interest found, in each category of facilities.

TABLE II.H.–1.—SUMMARY OF THE NUMBERS OF POTENTIAL PAINT MANUFACTURING FACILITIES SELECTED, SURVEYED, RESPONDED AND PAINT MANUFACTURING FACILITIES FOUND

Facility category	Number of selected Dun & Bradstreet facilities in category	Number of randomly sampled facilities in category	Number of survey respondents in category	Number of within-scope paint manufacturers found in category
Large, 2851–01, and TRI	2	2	2	2
Medium, 2851–01, and TRI	0	0	0	0
Small, 2851–01, and TRI	6	6	6	6
Large, 2851–01, and non-TRI	34	28	28	17
Medium, 2851–01, and non-TRI	62	48	47	42
Small, 2851–01, and non-TRI	379	77	75	44
Large, 2851–02, and TRI	0	0	0	0
Medium, 2851–02, and TRI	0	0	0	0

[7] Steel, Robert G.D. and James H. Torrie, ''Principles and Procedures of Statistics: A Biometrical Approach,'' 1980, Second Edition, McGraw-Hill, Inc.

[8] As stated in the questionnaire instructions, facilities were not required to report on any of the residuals that are used directly without reclamation as ingredients in manufacturing processes to make new products; or used directly as effective substitutes for commercial products; or returned directly to the original process from which they are generated as a substitute for raw feed stock. These residuals are excluded from the definition of solid waste. See 40 CFR 261.2.

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TABLE II.H.–1.—SUMMARY OF THE NUMBERS OF POTENTIAL PAINT MANUFACTURING FACILITIES SELECTED, SURVEYED, RESPONDED AND PAINT MANUFACTURING FACILITIES FOUND—Continued

Facility category	Number of selected Dun & Bradstreet facilities in category	Number of randomly sampled facilities in category	Number of survey respondents in category	Number of within-scope paint manufacturers found in category
Small, 2851–02, and TRI	7	7	7	7
Large, 2851–02, and non-TRI	23	22	22	14
Medium, 2851–02, and non-TRI	47	34	34	24
Small, 2851–02, and non-TRI	324	75	71	31
Total number of facilities	884	299	292	187

We believe the Dun & Bradstreet database properly represents the paint manufacturing universe (notwithstanding the database inevitably includes some out-of-scope operations also listed under SIC 2851). We used sound, widely accepted statistical methods to construct our stratified random-sample covering the variety of paint manufacturing types, paint production wastes, and waste management practices of interest to this listing determination. Therefore, we believe the survey results are representative of the paint manufacturing facilities in the sampling population as well as the universe of paint manufacturers of interest. Furthermore, based on our sample quality review, data analysis, and intensive follow-up with survey respondents, we believe that the data collected from the 187 survey respondents are valid and reliable. Nevertheless, we specifically request data with which to evaluate our assumption that the Dun & Bradstreet database properly represents the paint manufacturing universe, as well as comments on our approach to sampling and extrapolation of sampling results.

We used survey data in three forms: (1) Direct survey responses representing only the surveyed population; (2) weighted data to extrapolate to the sampling population; and (3) data extrapolated to the universe of paint manufacturing.

We used survey responses directly when data extrapolation to the sampling population or the paint universe would not be necessary, such as the patterns of waste management practices (see Section III.D).

As previously discussed, we derived independent weighting values corresponding to the number of facilities represented by each surveyed facility in each category. If the total quantities of a certain residual generated by Category X facilities with a weight of 3.629 were 2,000 tons and by Category Y facilities with a weight of 8.8571 were 1,000 tons, and if facilities in the other categories did not report any, then the combined residual quantities generated by the entire sampling population of 884 can be calculated as 2,000 tons × 3.629 + 1,000 tons × 8.8571 = 16,115 tons. We used weighted waste quantities or volumes to represent the waste volumes sent from each facility in the sampling population to a particular management practice for input to our national risk modeling analysis. See discussions in Sections III.D and E.

Overall, 64% (*i.e.,* 187 ÷ 292) of the 292 respondents are paint manufacturing facilities of interest to this rulemaking. Proportionally, there should be 566 paint manufacturing facilities in the sampling population of 884 (from the Dun & Bradstreet database). As explained earlier, because there is no comprehensive, single listing of all paint manufacturing facilities, we relied on a number of data sources to estimate that there are 972 paint manufacturers. This estimate of 972 paint manufacturers in the universe was derived from the total number of paint manufacturing facilities of interest (187) found from the survey, by extrapolating through the percentages of SIC 2851 facilities in the Dun & Bradstreet database that are represented by the 187 facilities. For a more detailed analysis, see the listing background document in the public docket for this proposed rule.

To estimate the total waste generation by the entire population of U.S. paint manufacturers (or universe), weighted data from the survey (representing the quantities generated by the 566 paint manufacturing facilities in the sampling population, as described above) is extrapolated using a multiplier of 1.7173 (= 972 ÷ 566). For example, if the total quantities of a certain residual generated by the 566 paint manufacturing facilities in the sampling population were calculated as 16,115 tons, the universe waste quantities of this residual would become 16,115 tons × 1.7173 = 27,674 tons. We used such extrapolated universe waste quantities for our waste treatment and management capacity analysis (see Section VI.E) and economic impacts analysis (see Section IX.E). In general, these extrapolated figures appear consistent with data in the Biennial Report System (see the Economic Assessment in the docket for today's proposed rule).

f. *Meeting Our Objectives for The Survey.* We believe our statistical stratified random-sampling survey collected data are representative of the paint manufacturing industry in the United States, and that the responses provided sufficient data for our use in making this listing determination. We realize that uncertainties exist in our survey. There is uncertainty in the exact number of the U.S. paint manufacturing facilities. In addition, despite our quality assurance reviews, there could still be data source or sampling errors as in any other sampling or even census surveys. For instance, some facilities might have entered inaccurate information inadvertently. Nevertheless, we have used our best efforts to collect representative data. By employing a statistically representative stratification/categorization approach aimed at surveying all types of manufacturing facilities and their waste streams, our unequal sampling survey (higher percentages of facilities were surveyed for some categories of large and medium facilities) actually enhanced the chance of identifying the rare waste management activities practiced by the paint manufacturing industry and in turn increased survey precision. This approach is reasonable and an acceptable statistical tool to ensure the best possible coverage.

Our subsequent statistical re-analysis of the questionnaire returns indicated that we achieved satisfactory statistical probabilities for finding a waste management activity used by one in 20 facilities. The final probabilities

achieved are discussed in the listing background document in the public docket for this proposed rule. In short, the probabilities achieved for two categories of paint manufacturing facilities, 85% and 86.2%, were under 90%, while the probabilities achieved for the other categories ranged from 91.7% to 100%. More importantly, the survey successfully captured a wide variety of intermediate and final waste management practices of most interest as discussed in Section III.D. Therefore, we believe we have made a reasonable effort to identify all management practices and that we have met the objective of our sampling survey designed for this listing determination.

III. Approach Used in This Proposed Listing

A. Summary of Today's Action

In listings promulgated by EPA, we typically describe the scope of the listing in terms of the waste material and the industry or process generating the waste. However, in today's rule we are proposing to use the recently developed ''concentration-based'' approach for listing paint manufacturing wastes. This approach was originally proposed for wastes generated by the Dyes and Pigments industry (64 FR 40192 of July 23, 1999). In a concentration-based listing, a waste would be hazardous unless a determination is made that it does not contain any of the constituents of concern at or above specified levels of concern. This approach draws from the concept of the toxicity characteristic to define a hazardous waste based on concentration levels of key constituents in the wastes. We describe this concept in detail later in this notice.

We are proposing two hazardous waste listings for paint manufacturing waste solids, K179 and for liquids, K180. If you generate paint manufacturing wastes from tank and equipment cleaning operations that use solvents, water, and/or caustic; emission control dusts; wastewater treatment sludges; or off-specification product, as specified in each listing description, you would need to determine whether your waste contains any of the constituents of concern identified for each listing at a concentration equal to or greater than the hazardous concentration level set for that constituent. However, the liquid K180 is a contingent listing. If your waste liquids are managed exclusively in tanks or containers prior to discharge to a POTW or under an NPDES permit, your waste would not be subject to the listing, and you would not need to make a hazardous waste determination for those wastes. We believe that under this proposed contingent listing approach, the vast majority of waste liquids would not pose unacceptable risks and would not be subject to the listing. The approach is discussed in detail in Section IV. The proposed listing descriptions are as follows:

- K179—Paint manufacturing waste solids generated by paint manufacturing facilities that, at the point of generation, contain any of the constituents identified in paragraph (b)(6)(iii) of this section at a concentration equal to or greater than the hazardous level set for that constituent in paragraph (b)(6)(iii) of this section. Paint manufacturing waste solids are: (1) Waste solids generated from tank and equipment cleaning operations that use solvents, water and/or caustic; (2) emission control dusts or sludges; (3) wastewater treatment sludges; and (4) off-specification product. Waste solids derived from the management of K180 by paint manufacturers would also be subject to this listing. Waste liquids derived from the management of K179 by paint manufacturers are not covered by this listing, but such liquids are subject to the K180 listing. For the purposes of this listing, paint manufacturers are defined as specified in paragraph (b) of this section.
- K180—Paint manufacturing waste liquids generated by paint manufacturing facilities that, at the point of generation, contain any of the constituents identified in paragraph (b)(6)(iii) of this section at a concentration equal to or greater than the hazardous level set for that constituent in paragraph (b)(6)(iii) of this section unless the wastes are stored or treated exclusively in tanks or containers prior to discharge to a POTW or under a NPDES permit. Paint manufacturing liquids are generated from tank and equipment cleaning operations that use solvents, water, and/or caustic. Waste liquids derived from the management of K179 by paint manufacturers would also be subject to this listing. Waste solids derived from the management of K180 by paint manufacturers are not covered by this listing, but such solids are subject to the K179 listing. For the purposes of this listing, paint manufacturers are defined as specified in paragraph (b) of this section.

Due to the uncertainties in our assessment of the management of paint manufacturing waste liquids in surface impoundments, we are seriously considering an alternative proposal not to list paint manufacturing waste liquids. We describe this alternative and our reasoning for this option later in this notice (see Section IV.D). The following discussion describes the approach we are proposing if K180 is listed.

If you generate any of these paint manufacturing wastes that you currently believe are characteristically hazardous or subject to another hazardous waste listing, you would still need to determine whether your waste is a listed hazardous waste under K179 or K180 (unless as noted above you are not subject to K180 because your wastes are managed exclusively in tanks or containers and then discharged to a POTW or under an NPDES permit). We are proposing that all generators could use knowledge of the waste to make an initial determination as to whether any of the regulated constituents are present in the waste. If you determine that none of the constituents are present in your wastes at the point of generation, then you would have no further obligation for determining whether or not your wastes are K179 or K180 listed hazardous wastes (assuming the regulated constituents are in fact not present in your wastes). If you determine that any of the constituents are present in your waste, then we are proposing that you must either use a two-tiered approach (see Section V.C for description) to determine whether the constituent concentrations in your waste are below the concentration levels in the listing or assume that your wastes are hazardous at the point of generation. Under the proposed two-tiered approach, if your total projected annual generation of paint manufacturing waste solids is over 40 metric tons, and/or over 100 metric tons of paint manufacturing waste liquids, you would need to test your wastes annually to determine whether concentration levels are below the listing concentrations. If your wastes remained nonhazardous for three consecutive years of testing and you have no significant changes to your product and/or manufacturing or treatment processes, the annual testing requirement would be suspended. If you made significant changes to product and/or manufacturing or treatment processes, the annual testing requirements would be reinstated. If your projected annual waste generation is below these volumes, you would have the option of either using knowledge of the waste or testing to determine whether constituent concentrations are below the listing concentrations. If any constituent is present at or above the concentration level, then your waste is hazardous waste. We are proposing that generators with annual waste generation exceeding 40 metric tons of solids and/or 100 metric tons of liquids keep limited records on-site.

If your wastes meet the listing description, they would be subject to all applicable RCRA subtitle C hazardous waste requirements, including LDR requirements. This means that any characteristically hazardous wastes or wastes hazardous under other listing codes (for example F codes) that are determined to be hazardous under these listings would also be subject to

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treatment requirements for K179 and K180, in addition to any other applicable treatment requirements.

There are several differences in the way the ''derived from'' rule (40 CFR 261.3(c)(2)(i) would be applied to these wastes that have one or more constituents above the proposed risk-based levels. Residues from the treatment of solid K179 wastes are no long hazardous wastes if their constituent concentrations are below the concentration levels for K179. However, these treatment residues would still be subject to all LDR requirements. As explained in Section IV, liquid K180 wastes, however remain subject to the derived from rule. Also, the listing descriptions make it clear that if a liquid is generated from the onsite management of the solid K179 waste, it is no longer subject to the K179 listing, rather it is subject to the K180 listing. If a solid is generated from the onsite management of the liquid K180 waste, it is no longer subject to the K180 listing, rather, it is subject to the K179 listing. Once K179 or K180 wastes are sent offsite waste codes do not change. These provisions are discussed in Section IV.F.

B. What Is a Concentration-Based Listing?

A concentration-based listing specifies constituent-specific levels in a waste that cause the waste to become a listed hazardous waste. In this proposed rule, we identify constituents of concern likely to be present in solvent, water, and/or caustic cleaning residuals; wastewater treatment sludges; emission control dust or sludges; and off-specification products and which may pose a risk above specified concentration levels. Using risk assessment tools developed to support our hazardous waste identification program, we assessed the potential risks associated with the constituents of concern in plausible waste management scenarios. From this analysis, we developed ''listing concentrations'' for each of the constituents of concern in the waste categories listed above.

If you generate any paint manufacturing waste liquids or solids addressed by this proposed rule, including any listed or characteristically hazardous wastes, you would be required either to determine whether or not your waste is hazardous or assume that it is hazardous as generated under today's proposed K179 and K180 listings. We are proposing that you must make a determination whether your waste is a listed hazardous waste through process knowledge or by determining representative concentrations for the constituents of concern in your waste through sampling and analyses (depending on the volumes of hazardous waste and nonhazardous waste within the scope of this listing that you generate each year). You can use process knowledge to demonstrate that the constituents of concern are not present in your waste. Your waste would be a listed hazardous waste if it contains any of the constituents of concern at a concentration equal to or greater than the hazardous concentration identified for that constituent. The detailed descriptions of the steps you would be required to follow to implement the concentration-based listing are described later in this proposed rule.

C. Why Is a Concentration-Based Approach Being Used for This Listing?

Thousands of constituents, also referred to as paint raw materials or ingredients, are used in paint formulations.[9] At the same time, there are a number of chemicals that are very widely used in many different types of paints. Because paints are produced in batch processes that generally do not involve chemical reactions among the raw materials, the finished paint and wastes consist of a mixture of the different raw materials. Paint production wastes can also contain constituents used for tank cleaning and other maintenance operations. As a result, it is straightforward for a manufacturer to know what constituents are likely to be present in his wastes.

Taking these facts into account, a concentration-based approach to listing paint production wastes as hazardous has a number of advantages. We can use the approach to focus more narrowly on ingredients that are likely to be widely used in paint formulations and that are likely to pose risks to human health and the environment. A concentration-based approach allows generators to evaluate the variable wastes they generate individually for hazard, so only the truly hazardous wastes are listed. This can place less burden on paint manufacturers than a traditional listing that brings entire waste streams into the hazardous waste system, regardless of the characteristics of wastes generated by individual generators. The level of any burden reduction depends on the costs of testing and the amount and type of wastes generated by a given facility. This approach is protective because it relies on concentration levels specifically set to protect human health.

Finally, a concentration-based listing approach may provide an incentive for hazardous waste generating facilities to modify their manufacturing processes or treat their wastes. For example, if a manufacturer has a listed hazardous waste based on constituent-specific concentration levels established by EPA, he also knows that if the concentration levels are reduced below the regulatory level due to raw material substitution or process change, the waste would not be regulated as listed hazardous waste. Therefore, the generator may decide to substitute raw materials in order to generate a nonhazardous waste (assuming that the waste does not carry any other listed or characteristic hazardous waste codes). This approach encourages waste minimization and reduced use of toxic constituents, goals of both RCRA and the Pollution Prevention Act of 1990 (42 U.S.C. 13101 *et seq.*, Pub. L. 101–508, November 5, 1990).

RCRA, section 1003 states that one goal of the statute is to promote protection of human health and the environment and to conserve valuable material and energy resources by ''minimizing the generation of hazardous waste and the land disposal of hazardous waste by encouraging process substitution, materials recovery, properly conducted recycling, and reuse and treatment.'' Section 1003 further provides that it is a national policy of the United States that, whenever feasible the generation of hazardous waste is to be reduced or eliminated as expeditiously as possible.

The Pollution Prevention Act of 1990 provides a hierarchy of approaches. Pollution should be prevented or reduced; pollution that cannot be prevented should be recycled or reused in an environmentally safe manner; pollution that cannot be prevented/reduced or recycled should be treated; and disposal or release into the environment should be chosen only as a last resort. If EPA provides a concentration-based target in the listing, generators would have the regulatory and economic incentive to meet the reduced levels.

Alternatively, we could have attempted to collect more information on these specific wastes to support the traditional listing approach, i.e., without any concentration limits. However, such a data collection effort would have been difficult due to the large number of paint production facilities, coupled with the wide variety of individual paint products and the potential variability in waste characteristics. Considering the

[9] *Paint and Coating Raw Materials,* 1996. Michael and Irene Ash, Synapse Information resources, Gower Publishing Ltd, lists more than 11,000 trade names and generic raw materials from 1300 manufacturers that are available for use in paints.

extensive sampling effort that this would require, and the relatively small quantities of wastes produced by individual paint facilities, we do not feel that such an effort was justified.

D. How Did the Agency Use the Survey Results for This Proposed Listing Determination?

We used the 3007 survey data for several purposes: (1) To provide the information for a general assessment of the paint and coating industry's waste generation and management practices; (2) to identify plausible waste management scenarios that are the basis for our risk assessment and listing determination; and (3) to serve as the data input for risk modeling parameters such as waste types and amounts sent to specific management practices.

This section primarily addresses the survey results as a basis for choosing plausible management scenarios for risk assessment and listing determinations and for selecting data for input to our risk modeling parameters. In addition, we used the survey data for our land disposal restrictions treatment capacity analysis and for our economic impact analysis discussed in sections VI and IX.

1. General Assessment of the Paint Industry's Waste Generation and Management Practices

Our first step was to characterize the U.S. paint and coating industry's generation and management practices. We considered a series of questions, such as: how much waste was generated in 1998; of that total, how much was RCRA hazardous waste and nonhazardous waste; what types of waste were generated; and how were these wastes managed? Table III.D–1 captures the weighted quantities of wastes within the scope of this listing reported by facilities completing the 3007 survey. See Section II.H for a discussion of the weighting process. With respect to total amounts of waste generated our analysis showed the following:

- We extrapolated from our estimated 566 paint and coating manufacturers in the sampling population of 884 to estimate that there are 972 paint and coating manufacturers, as explained in Section II, H(e). Out of these 972, we estimate that about 600 facilities annually generate about 107,000 metric tons of hazardous and nonhazardous waste within the scope of this listing.[10]
- About 36 percent of paint manufacturing wastes are already RCRA hazardous wastes, while 64 percent are currently nonhazardous.
- A few paint manufacturers produce the majority of the waste. Ten percent of manufacturers generating waste potentially within the scope of this listing generate about 80 percent of the total amount of waste; and two percent of the manufacturers generate about 50 percent of the total waste. Approximately half of paint manufacturers generate less than five metric tons of waste per year.
- Paint manufacturers mainly generate five types of nonhazardous waste liquids and waste solids: washwater cleaning liquid, washwater cleaning sludge, wastewater treatment sludge, emission control dust and off-specification product. As shown in Table III.D–2, these five waste types account for over 99% of all nonhazardous waste generated in 1998.
- About 27 percent of the manufacturers do not generate any waste—all their waste liquids and waste solids are recycled back into paint production processes.

After a thorough review of the data and other general observations about the paint industry generation and management practices, we focused further analyses only on nonhazardous wastes. We believe that this approach is appropriate because hazardous paint manufacturing wastes are currently managed according to RCRA Subtitle C regulatory controls. From our survey of the industry, we found that about 36% of the paint manufacturing wastes were coded and managed as listed or characteristically hazardous waste. The listed wastes typically carried a code for solvent wastes (F001 through F005), and characteristic wastes usually exhibited the characteristic of ignitability or toxicity. Based on available data from the survey, we believe that listed or characteristically hazardous waste are being properly managed under RCRA. The data supplied voluntarily by survey respondents that we have on constituent concentrations in wastes classified as nonhazardous show that the concentrations of TC constituents are well below the TC levels. By narrowing the scope of our analysis to include only nonhazardous wastes, we were able to concentrate risk assessment and subsequent listing decisions on the wastes that may not already be managed in a way that adequately protects or minimizes threats to human health and the environment. However, this proposed listing would apply to any paint manufacturing waste generated by the paint manufacturers from tank and equipment cleaning operations that use solvents, water and/or caustic; emission control dust; waste treatment sludges and off-specification production waste regardless of how the waste has been or is currently being managed.

TABLE III.D–1.—PAINT MANUFACTURING WASTES GENERATED IN 1998

Weighted waste quantities (metric tons)	Paint manufacturing waste category					
	Solvent cleaning waste	Water and/ or caustic cleaning waste	Wastewater treatment sludge	Emission control dust/ sludges	Off-speci- fication product	Total
Hazardous	18507	1047	0	39	3029	22622
Nonhazardous	39	34098	1490	1972	1948	39547
Hazardous and Nonhazardous	18546	35145	1490	2011	4977	62169

[10] Note that we used weighted waste quantities in our risk assessments (explained in Section II.H(e)), because the weighted quantities are directly derived from our survey data and we are more certain these waste quantities represent the true distribution of the sampled population.

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TABLE III.D–2.—NONHAZARDOUS PAINT MANUFACTURING WASTE LIQUIDS AND SOLIDS GENERATED IN 1998

	Weighted waste quantity (metric tons)
Nonhazardous Waste Liquids:	
Solvent Cleaning Liquid	4
Washwater Cleaning Liquid	31,036
Caustic Cleaning Liquid	66
Total Nonhazardous Liquids	31,106
Nonhazardous Waste Solids:	
Solvent Cleaning Sludge	35
Washwater Cleaning Sludge	2990
Caustic Cleaning Sludge	6
Wastewater Treatment Sludge	1490
Emission Control Dust	1972
Emission Control Sludge	0
Off-Specification Product	1948
Total Nonhazardous Waste Solids	8441

2. Management Scenarios Currently Used at Paint Facilities and Our Selection of Waste Management Scenarios for Risk Assessment Modeling

This section summarizes our findings and conclusions concerning current paint manufacturing practices for nonhazardous waste management; the plausible waste management scenarios that we chose to model for the risk assessment; and why we did not model certain management practices. We also explain how we selected survey data from waste types and quantities going to specific management practices for risk modeling parameters. This entire section presents weighted survey data (See Section II.H(e)), unless otherwise noted. We believe that the weighted data that is derived from the responses of the estimated 566 paint manufacturing facilities most closely represents the distribution of actual paint facility waste quantities managed at individual waste management units at the 884 facilities in the sampling population, which we assume are representative of the universe of affected paint manufacturers. Table III.D–2 summarizes non-hazardous waste liquids and solids generation.

We chose to model four waste management scenarios based upon our review of the current waste handling practices reported in the survey and the plausibility that these scenarios represent actual practices that are used or could be used by the paint industry for disposal of paint manufacturing wastes. The scenarios that we chose are waste solids disposed in industrial nonhazardous waste landfills; waste liquids stored and treated in off-site tanks at centralized wastewater treatment facilities (CWTs) prior to discharge to a POTW or under a NPDES permit; waste liquids disposed in surface impoundments at CWTs; and, waste liquids stored and treated in tanks on-site at paint manufacturing facilities prior to discharge to a POTW or under a NPDES permit. The general criteria for selection of plausible waste management scenarios and the rationale for choosing each of these four scenarios is described in this section.

a. *Plausible Waste Management Selection Criteria and Modeling Considerations.* Our regulations at § 261.11(a)(3)(vii) require us to consider the risk associated with ''the plausible types of improper management to which the waste could be subjected'' because exposures to wastes (and therefore the risks involved) will vary by waste management practice. The choice of which ''plausible management scenario'' (or scenarios) to use in a listing determination depends on a combination of factors which are discussed in general terms in our policy statement on hazardous waste listing determinations contained in the proposed Dyes and Pigments Listing Determination (59 FR 66072, December 22, 1994). We have applied this policy in several previous listings and, with some specific modifications that reflect unique characteristics of the paint industry, believe it is appropriate to apply it here.

Our approach to selecting waste management scenarios to model for risk analysis is to examine current industry management practices; assess whether or not other practices are available to the industry; and to decide what the industry would reasonably be expected to use. There are common waste management practices, such as landfilling, which we generally presume may be plausible for solid wastes and which we will evaluate for potential risk. There are other practices which are less common, such as land treatment, where we consider them plausible only where the disposal methods have been reported to be practiced. Where a practice is actually reported in use, that practice is generally considered ''plausible'' and may be considered for potential risk. In some situations, potential trends in waste management for a specific industry suggest we will need to project ''plausible'' management even if it is not currently in use in order to be protective of potential changes in management and therefore in potential risk. We then evaluate which of these current or projected management practices for each waste stream are likely to pose significant risk based on an assessment of exposure pathways of concern associated with those practices.

To model plausible waste management practices in the paint industry, we used the individual waste quantities going from the surveyed facilities to a particular type of management unit. This data was used in a national risk modeling analysis to capture the range of waste quantities from all facilities in the sampling population sent to a particular type of waste management unit (the weighted waste quantity distribution). Each waste quantity in the weighted distribution has a weighting factor that represents the number of facilities in the total sampling population that send a particular waste to a particular waste management unit. We do not analyze the total quantity of wastes (i.e., the total universe waste generation data) going into a single waste management unit because this scenario never occurs. As discussed later in this section, when we found evidence that multiple waste streams from a single facility or wastes from more than one facility are sent to the same management unit, we added those quantities to ensure that we accurately reflect the individual and combined quantities of paint manufacturing wastes that are sent to a single management unit. (Section III.D.2(c), below explains the methodology we used to compile the survey data for input to the risk assessment models.)

EPA estimates that in 1998, the 884 facilities in the sampling population generated 8,441 metric tons of nonhazardous waste solids and 31,106 metric tons of nonhazardous waste liquids. As would be expected, wastes generated from paint production batches are also generated in batches rather than in a continuous stream. Generally, the waste quantities associated with each batch are relatively small, so that these smaller quantities are aggregated and added into containers or tanks as each new batch is produced. Liquid wastes are added into liquid wastes and solid wastes are added into solid wastes, so that a variety of waste types (for example sludges from tank cleaning operations and wastewater treatment) may be combined and sent off to one waste management unit. At the same time, some waste types are managed separately, if for example they have some value for fuel blending, rather than simply being sent off to land disposal or wastewater treatment and discharge. We were able to distinguish

these management practices from the survey data.

One final note, before looking at solid and liquid wastes separately. The total waste quantities that are accounted for in all of the management practices that we discuss are not equivalent to the total waste generation quantities. We believe there are several reasons for this. First, because of the way the survey was structured, we were not able to obtain an absolute balanced accounting of waste generation and waste management from each facility. Some of the discrepancy reflects waste management situations that may span one year to the next, e.g., when a facility accumulates waste over a longer time period before sending it on to disposal. Second, some wastes (or residuals) may be accumulated for a time, and then recycled back into the manufacturing process instead of being disposed. Third, there may be some undetected reporting errors in the database. In any event, the discrepancy between waste quantities generated in 1998 and waste quantities disposed in 1998 is not significant for risk assessment purposes. In the risk assessment, we use a distribution of individual waste quantities actually sent to management scenarios as input to the model, not national total waste quantities. The distribution of individual waste quantities would not be significantly affected by the discrepancy between wastes volumes generated and waste volumes disposed.

Before we proceed to the technical discussion of our rationale for choosing certain modeling scenarios and parameters, we will briefly explain why we chose to structure these discussions as they are presented in this preamble. We estimate that the 884 facilities in the sampling population disposed of 44,278 metric tons of nonhazardous waste solids and waste liquids in 1998 as shown in Tables III.D–3 and III.D–4. These tables show that the disposal destinations, as would be expected, are different for the waste solids and the waste liquids. The same four waste solids that comprised the majority of the nonhazardous waste solids generated in 1998 have very similar waste management patterns. In contrast, the largest quantity of waste liquid generated in 1998, washwater cleaning liquid is managed differently from the solids and almost entirely through discharge to off-site public and private wastewater treatment facilities. For these reasons, we split our analysis of the waste solids and waste liquids. It was clear that risk modeling for these two types of wastes would differ, therefore it seemed reasonable to analyze the waste management patterns for them separately.

b. *Selection of Waste Management Scenarios for Risk Assessment Modeling of Nonhazardous Paint Manufacturing Waste Solids.* Table III.D–3 lists the estimated weighted quantities of each type of nonhazardous waste solid going to each management practice for the 884 facilities in the sampling population. The total amount of waste solids disposed in 1998 was 8,226 metric tons (weighted). Of these 8,226 metric tons, 8,152 metric tons is made of the same four waste solids that comprised the majority of solid waste generated in 1998: off-specification product, emission control dust, washwater cleaning sludge and wastewater treatment sludge. We estimate that the major portion of these four solid waste streams, 6,926 metric tons, is disposed in Subtitle D municipal and industrial landfills (nonhazardous landfills). These 6,926 metric tons includes 942 metric tons of off-specification product, 1,947 metric tons of the emission control dust, 1,440 metric tons of wastewater treatment sludge and 2,597 metric tons of washwater cleaning sludge disposed in 1998. In addition, 35 metric tons of solvent sludge goes to nonhazardous landfills. The remaining 1,300 metric tons of waste solids disposed in 1998 go to Subtitle C landfills, fuel blenders, CWTs, waste piles, incinerators, cement kilns, boilers and industrial furnaces and ''other'' management units. Note that tanks and containers are intermediate storage and treatment units and their waste quantities are not counted in the total 8226 metric tons disposed in 1998.

TABLE III.D–3.—NONHAZARDOUS WASTE SOLIDS MANAGEMENT

Waste mgt. units	Waste solids types (weighted quantities in metric tons)						
	Off-spec. product	Emission control dust	Emission control sludge	Wastewater treatment sludge	Washwater cleaning sludge	Caustic cleaning sludge	Solvent cleaning sludge
Subtitle D/MLF	**942**	**1947**	0	**1440**	**2597**	0	**35**
Subtitle C	**80**	**9**	0	0	**352**	0	0
On-site S. tank	53	0	0	0	1814	0	0
Off-site S. tank	0	0	0	0	0	0	0
On-site Trt. tank	0	1066	0	487	0	0	0
Fuel Blending	**352**	0	0	**21**	**4**	0	0
POTW	0	0	0	0	0	0	0
WWTF	**48**	0	0	**5**	0	0	0
NPDES	0	0	0	0	0	0	0
INC	**72**	**5**	0	**24**	**50**	**6**	0
Cement Kiln	**56**	0	0	0	0	0	0
BIF	**3**	0	0	0	0	0	0
Container	2023	3052	0	992	1154	6	2
Waste Pile	0	0	0	0	0	0	**33**
Other	**133**	**11**	0	0	**1**	0	0
Totals**	**1686**	**1972**	0	**1490**	**3004**	**6**	**68**

**Total of each waste solid disposed in 1998 includes all disposal types except tanks and containers. The tanks and containers are considered intermediate handling, not final disposal destination steps.

Note: The bolded numbers within the table are those that were used to derive the totals for each column.

MLF=Municipal Landfill

On-site S. tank=On-site Storage tank

Off-site S. tank=Off-site Storage tank

On-site Trt. Tank=On-site Treatment tank

NPDES=National Pollutant Discharge Elimination System

INC=incinerator

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BIF=Boiler & Industrial Furnace
POTW=Publicly Owned Treatment Works
WWTF=Wastewater Treatment Facility

Based on this information, we chose to model disposal of waste solids in industrial nonhazardous landfills. This is a common disposal practice for a large portion of the waste solids disposed in 1998. There are only two differences in modeling assumptions for industrial nonhazardous landfills as compared to municipal landfills. Industrial nonhazardous landfills are slightly smaller than municipal landfills so the quantities of paint manufacturing waste modeled in the industrial landfill are a relatively larger proportion of the total waste quantities going into the unit. Also, industrial nonhazardous landfills are not assumed to have daily cover. Both of these add to the conservatism of the protective constituent levels predicted by the risk assessment. For our inputs to the risk modeling, we used quantities of off-specification product, emission control dust, wastewater treatment sludge, washwater cleaning sludge and solvent sludge sent to nonhazardous landfills. We did not include the small volume of caustic cleaning sludge because they were incinerated and they were not disposed in nonhazardous landfills. Emission control sludge was not included either because it was not generated by any of the survey respondents in 1998. The risk assessment in Section III.E, contains more details about the methodology of the risk modeling process.

At the outset of our analysis of the survey data, we did not believe that a landfill was a logical disposal destination for off-specification product. We further investigated the disposal information for off-specification product and decided that it should be in our waste solids quantity distribution for risk assessment. We contacted the eleven facilities that reported generating off-specification paint. Nine of the eleven facilities stated that they sent only dried paint wastes to nonhazardous landfills. The tenth facility reported sending 7.5 metric tons of mostly dried paint and paint flakes with small amounts of liquid paint wastes to landfills. The eleventh facility reported sending 14.7 metric tons of off-specification product of unknown physical characteristics to nonhazardous landfills in 1998. We chose to model off-specification product with waste solids sent to nonhazardous landfills because large quantities (920 out of 942 metric tons) of this waste are in dry form when sent to nonhazardous landfills. Also, Municipal Solid Waste landfills have a prohibition on disposal of liquids and we believe that the majority of commercial industrial landfills do also (according to a 1995 EPA report ''State Requirements for Industrial Non-Hazardous Waste Management Facilities,'' 28 states restrict the placement of liquids in industrial nonhazardous waste landfills).

The survey data contained information about four types of waste management practices for waste solids that we chose not to model. The first of these is treatment of solvent sludge in a waste pile. One facility reported using a waste pile as an intermediate waste management step for 33 metric tons of solvent sludge. Based on further discussion with the facility contact, we determined that this waste was a free flowing slurry that was piled on cardboard boxes inside a containment building to dry and then disposed in a nonhazardous landfill. We chose not to model this scenario because the waste is managed in a closed facility. It is not open to airborne wind transport and does not involve placement directly on the land. The remaining solidified waste is disposed in a nonhazardous landfill.

Another type of waste management that we did not model is combustion in incinerators, cement kilns, and boilers and industrial furnaces. In past listing determinations where we have attempted to assess risks from incineration, we found that the potential risks from the release of constituents through incineration would be at least several orders of magnitude below potential air risks from releases from tanks or impoundments (see listing determination for solvent wastes at 63 FR 64371, November 19, 1998). Further, it is difficult to model what goes into combustion units in relation to the residual constituents that are released from the combustion unit either in ash or air.[11]

We also chose not to model solid wastes sent to fuel blenders. All of the fuel blending facilities reported in the survey were located at Subtitle C permitted facilities. Since these fuel blenders receiving paint manufacturing waste solids are RCRA permitted, they must comply with protective regulations regarding releases from RCRA units and from the RCRA facility. Finally, for these units it is also difficult to model what goes into the unit in relation to the residual constituents that are released from the unit to the air.

One last category of management unit that we chose not to model is the ''other'' category. For the waste solids reported in this survey, ''other'' encompassed a variety of waste management types. The total 145 metric tons of waste solids handled in ''other'' management units can be divided into four categories: Wastes that are disposed off-site at waste treatment facilities, wastes that are reworked back into the paint process, wastes that are sold to other companies and wastes sent for precious metal recovery. Sixty-nine (69) metric tons of off-specification product and emission control dust were sent to off-site waste treatment and disposal facilities. Nine metric tons were treated on-site and then sent to a Subtitle C landfill. Fifty-nine (59) metric tons of off-specification product and emission control dust were reworked back into the paint process on-site. Small quantities of off-specification product and emission control dust totaling 3.5 metric tons were sold to other companies who were not concerned about the quality of the paint manufacturing waste for the manufacture of a new product or the resale of a low grade paint. Less than one metric ton (0.7) of emission control dust was sent to an off-site precious metal recovery facility for recovery of the silver in the paint manufacturing waste. Three metric tons of waste solids out of the 145 metric tons is emission control dust that was reported to be released to the air from pollution control devices that were not functional. The remaining one metric ton of washwater cleaning sludge was sent to an off-site waste treatment facility. We chose not to model any of these scenarios because the scenarios we did decide to evaluate were likely to be the riskier scenarios and over half of these wastes going to ''other'' units were either being reworked into the paint process or used for manufacture of other products.

The paint manufacturing industry recycles several of its waste streams. One of these streams is air emissions control dust. Sometimes this material is used on-site in the formulation of low-grade paint, or sent off-site to other

[11] While other products of incomplete combustion may present possible risks, it is difficult for us to assess this potential for the chemicals of concern, especially for the likely scenario of a small volume of paint manufacturing wastes being treated with other much larger volumes of organic wastes.

paint manufacturers for the same purpose (in neither case is reclamation involved). In either case, the dust would not be considered a solid waste because it is used or reused as an ingredient in an industrial process to make a product pursuant to 40 CFR 261.2(e)(I)). The dust contains valuable raw materials that are required to make paint products. We have therefore not included these recycled dusts when modeling our waste disposal scenarios. The Agency also notes that this practice appears to be a form of legitimate recycling because paint (even low-grade paint) must always meet certain specifications to be usable. Recycled dust would only be added if it served as a required ingredient in the paint.

Another method of recycling air pollution control dust involves sending the materials off-site for recovery of precious metals (e.g., gold, silver, platinum). These materials would be considered solid and hazardous wastes if they exhibit the toxicity characteristic for metals, or if they exceeded the concentration levels in today's proposed listing. Under those circumstances, they would be subject to the reduced regulatory requirements of 40 CFR 266.70. However, EPA has chosen not to include these materials in our waste disposal scenarios because we believe that their inherent economic value would ensure careful handling, thereby greatly minimizing the risk of releases. See the 1985 rationale for the special regulatory regime for precious metal reclamation (50 FR614, 648–49 (January 4, 1985)).

c. *Selection of Waste Management Scenarios for Risk Assessment Modeling of Nonhazardous Paint Manufacturing Waste Liquids.* EPA estimates that the 884 paint manufacturing facilities in the sampling population disposed of 36,052 metric tons (weighted) of waste liquids in 1998. Over 99% of this amount is washwater cleaning waste. A very small amount of solvent cleaning and caustic cleaning liquids make up the remaining 69 metric tons. Table III.D–4 shows how the 36,052 metric tons of nonhazardous waste liquids were disposed in 1998.

The predominant destinations for washwater cleaning liquids are POTWs and CWTs. About 27,625 metric tons of washwater cleaning liquid go to POTWs and 6407 metric tons go to CWTs. Some of the 27,625 metric tons of washwater cleaning liquid is directly discharged to POTWs, but a significant portion is stored and treated on-site prior to being sent to the POTW. Fourteen thousand five hundred thirty (14,530) metric tons of washwater cleaning liquids are managed in on-site storage tanks and 7487 metric tons of washwater cleaning liquids are managed in on-site treatment tanks. These tanks are the intermediate storage and treatment units for almost all of the washwater cleaning liquids going to POTWs, CWTs and the remaining waste management categories where these liquids are disposed. The survey results indicated that about 17,000 metric tons of washwater cleaning liquids are directly discharged by paint facilities to POTWs. The remainder of the washwater cleaning liquids (10,000 metric tons) that are sent to POTWs are stored or treated in on-site tanks prior to discharge to the POTW. One facility directly discharges 76 metric tons of washwater cleaning liquid under a NPDES permit. These NPDES and POTW point source discharges that are subject to regulation under Section 402 of the Clean Water Act are excluded from the RCRA statutory definition of solid waste and therefore are not subject to RCRA regulation. See 42 U.S.C. 6903(2) and 40 CFR 261.4(a)2. However, while the liquids are being collected, treated or stored they are subject to RCRA regulation. This also applies to any sludges derived from the storage or treatment of the liquids.

Another destination for washwater cleaning liquid is offsite storage and treatment tanks at CWTs. About 6407 metric tons of washwater is sent to CWTs for treatment and then discharged to POTWs or under a NPDES permit. The volumes of washwater liquid are probably stored and treated in offsite tanks as our survey data showed that they are onsite.

''Other'' management units receive 1309 metric tons of washwater cleaning liquids. Five hundred sixty-three (563) metric tons of washwater cleaning liquid goes to fuel blending units, incinerators and cement kilns. A very small amount of washwater cleaning liquid, 3 metric tons was sent to nonhazardous landfills in 1998.

The other two waste liquid streams, solvent cleaning and caustic cleaning liquid are disposed at fuel blending facilities and at POTWs, respectively. POTWs received about 32 metric tons of caustic cleaning liquids and fuel blenders received 4 metric tons of solvent cleaning liquid in 1998. Sixty-one (61) metric tons of caustic cleaning liquid is stored or treated in on-site tanks and an additional 33 metric tons is managed in ''other'' units.

Based on these facts, we chose several modeling scenarios. The first of these was the off-site storage of washwater cleaning liquids in uncovered tanks at CWTs. About 18% of the yearly total of washwater cleaning liquid disposed goes to CWTs. Another scenario we modeled was the onsite treatment of washwater in tanks prior to discharge to a POTW or under a NPDES permit. We also chose to model the on-site treatment of washwater cleaning liquids in tanks because a significant amount of liquids are handled in on-site tanks. This modeling scenario should account for any exposure to washwater cleaning liquids and sludges being treated in on-site tanks that are subsequently disposed through a POTW or NPDES discharge.

We also chose to model waste liquids managed in an unlined surface impoundment because we found one lined surface impoundment at a CWT and we cannot, at this time, rule out the possibility that some quantities of liquid paint manufacturing wastes may be managed in an unlined impoundment which would present greater risks of release to the environment. Survey respondents did not report any on-site impoundments for management of liquid wastes. However, because we know that waste management in surface impoundments, and particularly in unlined impoundments, could pose significant risk, we chose to look for other plausible scenarios that might involve impoundments.

TABLE III.D–4.—NONHAZARDOUS WASTE LIQUIDS MANAGEMENT

Waste mgt. units	Waste Liquid types (weighted quantities in metric tons)		
	Washwater cleaning liquid	Caustic cleaning liquid	Solvent cleaning liquid
Subtitle D/MLF	**3**	**0**	0
Subtitle C	0	0	0
On-site S. tank	14530	33	0

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TABLE III.D–4.—NONHAZARDOUS WASTE LIQUIDS MANAGEMENT—Continued

Waste mgt. units	Waste Liquid types (weighted quantities in metric tons)		
	Washwater cleaning liquid	Caustic cleaning liquid	Solvent cleaning liquid
Off-site S. tank	1	0	0
On-site Trt. tank	7487	28	0
Fuel Blending	**455**	0	**4**
POTW	**27625**	**32**	0
WWTF	**6407**	0	0
NPDES	**76**	0	0
INC	**56**	0	0
Cement Kiln	**52**	0	0
BIF	0	0	0
Container	1517	0	4
Waste Pile	0	0	0
Other	**1309**	**33**	0
Totals**	**35983**	**65**	**4**

** Totals for each column are derived from addition of all the bolded numbers in each column. This total includes all disposal types except tanks and containers, these are considered intermediate handling, not final disposal destination steps.

Note: The bolded numbers within the table represent the quantities of disposed waste that were summed to calculate the total waste disposed for each waste type.

MLF=Municipal Landfill
On-site S. tank=On-site Storage tank
Off-site S. tank=Off-site Storage tank
On-site Trt. Tank=On-site Treatment tank
NPDES=National Pollution Discharge Elimination System
INC=incinerator
BIF= Boiler & Industrial Furnace
POTW=Publicly Owned Treatment Works
WWTF=Wastewater Treatment Facility

In other listing determinations, we have found management in surface impoundments for a number of waste streams, although on-site impoundments are more often associated with industries managing larger quantities of liquids. As discussed above, a number of facilities send their liquid waste to CWTs. These are the facilities that we believe could plausibly be managing wastes in surface impoundments. We contacted nine CWTs identified by survey respondents as receiving their wastes to determine whether any of them employ impoundments as part of their treatment processes. In fact, we found one facility that uses a double-lined impoundment.

Twenty-one survey respondents indicated that they are sending liquid waste to facilities they identified as wastewater treatment facilities. Considering the universe of estimated 972 paint manufacturers, we estimate that 4 or 5 other impoundments may be receiving paint manufacturing wastes (see the listing background document for this analysis). It may be reasonable to assume that management of paint manufacturing wastes in an unlined surface impoundment may occur. Therefore, we assumed this is a plausible management scenario that we modeled for our risk assessment. Section IV. D (proposed listing determination) contains additional discussion concerning uncertainties associated with this scenario and discussion of whether this is likely to be sufficiently rare that we should consider an alternative approach.

Finally, we chose to model management of washwaters in on-site, uncovered treatment tanks. Eight survey respondents reported that they had uncovered on-site storage and treatment tanks. Volatile emissions from the hazardous constituents contained in the washwater cleaning liquids could be released into the air from these uncovered tanks. Therefore we also chose to model management of waste liquids in uncovered on-site treatment tanks because treatment tanks represent a more conservative modeling scenario (higher air emissions from aerated tanks) than storage tanks. We modeled the scenario of waste liquids stored in uncovered storage tanks. We used the weighted quantities of waste liquids (22,078 metric tons) reported in the survey as being managed in on-site storage and treatment tanks.

There were five types of waste liquid management that we did not choose to model. One of these management scenarios is the disposal of washwater cleaning liquid in nonhazardous landfills. We contacted the facilities that reported this practice and found that, in both cases, the washwater cleaning liquid sent to the landfills was a liquid/solids mixture. One facility reported that the mixture was filter pressed at the landfill, the water portion was discharged to a POTW and the remaining sludges were dried and disposed in a nonhazardous landfill. The other facility reported that the liquid portion was incinerated and the solids placed into a nonhazardous landfill. These scenarios are not, therefore placement of liquids in a landfill. The next type of waste liquids management that we did not model is the direct discharge of washwater cleaning liquids to a POTW. RCRA regulation of waste liquids that are stored or treated in tanks prior to discharge to a POTW or under a NPDES permit is excluded under 40 CFR 261.4(a)(2), at the permitted discharge point for the facility. The on-site storage, collection and treatment of liquids and sludges generated from waste liquids are however, subject to RCRA regulation. Another management type that was not modeled is the combustion of washwater cleaning liquids and caustic cleaning liquids in incinerators and cement kilns or via fuel blending. In the previous section on waste solids we explain the Agency's rationale for not modeling combustion

or fuel blending. That rationale applies equally to waste liquids.

The categories of ''other'' units reported for waste liquids that we considered but did not select for modeling are: 541 metric tons of washwater cleaning liquids reworked back into the paint process; 570 metric tons of washwater cleaning liquids treated on-site in tanks and discharged to POTW and NPDES point sources; 51 metric tons of washwater and caustic cleaning liquids stabilized on-site and sent to Subtitle C landfills and 179 metric tons of washwater cleaning liquids sent to on-site and off-site treatment units. The washwater cleaning liquids reworked back into the paint process may not be in the scope of this listing. However, our modeling of uncovered on-site treatment tanks does estimate the risks from any of these washwater liquids that are within the scope of the listing. The washwater cleaning liquids reported under ''other'' that are discharged to a POTW should have been reported as going to POTWs and included in that quantity of washwater cleaning liquids. As explained earlier, the on-site treatment or storage of any liquids being discharged to a POTW is covered by our risk modeling of on-site treatment tanks. The washwater and caustic cleaning liquids that are treated on-site and sent to a Subtitle C landfill are also covered by our on-site treatment tank modeling. The last group of ''other'' units (the 179 metric tons of waste liquids) consists of 23 metric tons of washwater cleaning liquid sent for off-site treatment and disposal; and 156 metric tons of on-site treatment conducted in tank type units. The estimate of any risks posed from the treatment of washwater cleaning liquids in these units should be covered by our risk modeling of on-site treatment in tanks of washwater cleaning liquids.

d. *Survey Data as Input to Modeling Parameters.* To conduct a risk assessment for these wastes, we needed to assemble the survey data associated with disposal of waste solids and waste liquids into our chosen waste management units of concern: industrial nonhazardous landfills, on-site tanks, off-site tanks and surface impoundments. The specific data we used were the quantities of waste solids and waste liquids sent by each facility to each of our four management units of concern. We used these data as input to the modeling parameters in our risk assessment. The risk assessment estimated the concentration of individual constituents that could be present in each waste and remain protective of human health and the environment. These risk based constituent concentration levels in the waste streams are the levels that can be managed in the waste streams and remain below a target cancer risk level of 1×10^{-5} excess lifetime cancer risk for individuals exposed to carcinogens in the waste streams and a target hazard quotient (HQ) of 1.0 for individuals exposed to constituents in the waste streams that produce noncancer health effects.

We also needed to capture the distribution of waste quantities going to individual waste management units. Once we determined that we could represent paint manufacturing wastes as solids and liquids disposed in nonhazardous landfills, on-site treatment tanks, off-site wastewater treatment tanks and surface impoundments, we then developed a methodology to assemble the waste quantity distributions for solids and liquids sent from each facility in the sampling population to each of these four types of waste management units. We used the individual weighted quantities of waste solids sent to nonhazardous landfills to compile the waste solids distribution and the individual weighted quantities of waste liquids sent to tanks and surface impoundments at offsite wastewater treatment facilities for the waste liquids distribution. We considered several factors in developing the waste quantity distributions including the total quantities of each individual type of waste stream reported by the surveyed facilities, whether any facilities that generate these wastes may produce quantities of waste conditionally exempted under EPA regulations for small quantity generators and whether any of the surveyed facilities reported waste co-management scenarios.

First, we identified conditionally exempt small quantity generators by combining the entire hazardous and nonhazardous paint manufacturing waste solid and liquid quantities for all waste streams within the scope of this listing generated by each surveyed facility. We compared these quantities of waste to the amount specified in § 261.5 (a), the Conditionally Exempt Small Quantity Generator (CESQG) exclusion criteria. This existing regulation excludes those facilities from Subtitle C that generate no more than 100 kilograms per month of hazardous waste or 1.2 metric tons per year. We separated the survey data from the CESQG facilities because under the Federal RCRA regulations, they could continue to send their small waste quantities to nonhazardous disposal facilities. Including these very small waste quantities in our risk modeling could inappropriately bias the modeling results toward the higher protective constituent concentrations. Therefore, it would be inappropriate to include these small volumes in the risk modeling to develop the regulatory limits, since these wastes would be excluded from the regulation. Also, including these small volumes in the modeling would bias the results towards higher protective limits because, all other things being equal, small volumes result in lower estimated risk and therefore higher protective levels. Further, even if all the CESQG facilities' wastes are hazardous, they could continue to manage them in a municipal solid waste landfill, in accordance with appropriate individual state requirements. Twelve facilities reported that they generated less than 1200 kilograms per year of hazardous and nonhazardous wastes combined. We did not use the data for these 12 for any of the risk assessment modeling because the generators of these conditionally exempt quantities could continue to manage their wastes as they are currently managing them even if the wastes were listed.

Next, we compiled separate waste quantity distributions for waste solids and waste liquids. We also accounted for co-management scenarios as reported in the survey responses. Co-management scenarios are: (1) Waste solids or waste liquids generated at a single paint facility that are disposed at the same off-site management unit, and (2) waste solids or waste liquids from different paint facilities that are sent to the same off-site waste management unit. Each of these combinations results in larger paint manufacturing waste quantities being associated with disposal at particular waste management units. We combined these quantities for 14 waste solid co-management scenarios.

At this point, the waste solids quantity distribution consisted of quantities of nonhazardous off specification product waste, nonhazardous emission control dust, nonhazardous water/caustic sludge, nonhazardous wastewater treatment sludge and nonhazardous solvent sludge sent to nonhazardous landfills. All waste solid quantities from any of the surveyed facilities that did not meet the conditionally exempt small quantity generator exclusion were included. The waste solids quantity distribution had 57 entries for single and co-managed waste streams. In addition to this quantity distribution that combined all the types of waste solids (combined waste solids), a second quantity distribution was constructed that contained only nonhazardous emission

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control dust sent to nonhazardous landfills. The emission control dust only distribution was constructed similarly to the manner in which the combined solids quantity distribution was constructed. It did not include the conditionally exempt small quantity generator facilities data and co-management of wastes was considered. The emission control dust only distribution was input into the risk model with an accompanying low moisture content to represent a worst-case scenario for wind blown materials that could be released from the nonhazardous landfill.

We created three separate waste liquid distributions in the same manner as the solids distributions to correspond to the modeling scenarios for liquids. Initially, any CESQG facilities that generated waste liquids were eliminated from consideration. The first waste liquid distribution contained washwater cleaning liquid quantities sent off-site to a CWT. We combined waste liquid quantities where we found co-management scenarios. We used this quantity distribution to evaluate washwater cleaning liquid stored in uncovered off-site tanks at CWTs. Next, the surface impoundment waste liquid quantity distribution was exactly the same as the distribution of all quantities of washwater cleaning liquids that sent to off-site CWTs. Because surface impoundments, when they exist, are a part of the CWT's treatment process, we assumed that quantities of waste liquids sent off-site to CWTs could be treated in unlined surface impoundments as well as in tanks. The third liquids quantity distribution consists of the largest washwater cleaning quantity reported in the survey. This single quantity was used to conduct a conservative risk assessment screening for exposure to emissions from waste liquids in uncovered on-site treatment tanks.

To summarize, we assembled five separate quantity distributions using the survey response information.

- One distribution consisted of all the survey quantities of nonhazardous combined waste solids from: nonhazardous solvent cleaning sludge, nonhazardous washwater cleaning sludge, nonhazardous waste water treatment sludge, nonhazardous emission control dust and nonhazardous off specification product. This distribution called, ''combined solids'' was used for risk analysis as a sludge-like material in a nonhazardous landfill.
- The second distribution consisted of all nonhazardous emission control dust quantities only. This distribution was used for risk assessment modeling as a dust-like material going to a landfill.
- The third distribution was a liquids distribution that consisted of all nonhazardous liquid quantities of nonhazardous washwater cleaning liquid that were disposed in off-site tanks at CWTs. This liquids distribution was used for risk modeling of waste liquids being sent to uncovered off-site treatment tanks.
- The fourth quantity distribution was exactly the same as the one above, but the target management unit was a surface impoundment instead of a tank.
- The last quantity used for modeling was a single quantity, the highest washwater cleaning liquid quantity managed in uncovered on-site treatment tanks as reported in the survey. This was used to evaluate risks from waste liquids managed in on-site storage and treatment tanks.

Each of these quantity distributions was used in the process of modeling the risk to human and environmental receptors from the disposal of waste solids and liquids in nonhazardous landfills, tanks and surface impoundments. The next section describes the risk assessment approach and process in detail.

E. What Risk Assessment Approach Did EPA Use to Determine Allowable Constituent Waste Concentrations?

1. Which Factors Did EPA Incorporate Into Its Quantitative Risk Assessment?

In making listing determinations, the Agency considers the listing criteria required in 40 CFR 261.11. The criteria provided in 40 CFR 261.11 include eleven factors for determining ''substantial present or potential hazard to human health and the environment.'' Nine of these factors, as described generally below, are directly incorporated into EPA's completion of a risk assessment for the waste streams of concern:

- Toxicity (§ 261.11(a)(3)(i)) is considered in developing the health benchmarks used in the risk assessment modeling.
- Constituent concentrations that pose a hazard to human health are determined in the risk assessment (§ 261.11(a)(3)(ii)).
- Waste volumes (§ 261.11(a) (3)(viii)) are used to define the initial conditions for the risk evaluation.
- Potential to migrate, persistence, degradation, and bioaccumulation of the hazardous constituents and any degradation products (sections 261(a)(3)(iii), 261.11(a)(3)(iv), 261.11(a)(3)(v), and 261.11(a)(3)(vi)) are all considered in the design of the fate and transport models used to determine the concentrations of the contaminants to which individuals are exposed.
- Finally, we consider two of the remaining factors, plausible mismanagement as discussed in the previous section and other regulatory actions as discussed in Section IV on the proposed listing determinations ((§§ 261.11(a)(3)(vii) and 261.11(a)(3)(x)) in establishing the waste management scenario(s) modeled in the risk assessment.

EPA conducted analyses of the risks posed by the waste streams evaluated for this listing to determine the concentrations of constituents that if found in paint production wastes would meet the criteria for listing set forth in 40 CFR 261.11(a)(3). This section discusses the human health risk analyses and ecological risk screening analyses EPA conducted to support our proposed listing determinations for paint and coatings production wastes. We consider the risk analyses in developing our listing decisions for each of the waste streams. The risk analyses we describe in this section are presented in detail in the Risk Assessment Technical Background Document for Paint and Coatings Listing Determination which is located in the docket for today's proposed rule.

2. How Did EPA Use Damage Case Information?

We also considered whether any damage cases exist that indicate impacts on human health or the environment from improper management of the wastes of concern, which is required under the listing regulations (§ 261.11(a)(3)(ix)). Damage incidents might be useful in not only establishing whether there was any impact on human health or the environment from improper management, but such incidents might also provide some information on plausible mismanagement practices, and on the potential of the waste constituents to migrate, persist, or degrade in the environment. We compiled damage incidents involving paint production wastes and paint constituents, including paints disposed of by non-paint manufacturing facilities. We found approximately 21 incidents that appear to involve the release of constituents from the management of paint product wastes either at the site of paint manufacture, or at off-site facilities. We also found damage incidents for the disposal of paint wastes by end-users, and numerous other possible incidents for which we did not have adequate information to determine the type of facility or the nature of the waste involved. A report summarizing the results of this search is in the docket for today's rule (Damage Incident Compendium and Report, July 2000).

A number of the data sources contained information on potential problems related to management or use of paint materials at a variety of sites. The information of most potential utility came from the Superfund Public Information System (SPIS). The SPIS contains data from the Record of Decision System (RODS), which

document remediation actions as sites on the National Priority List (NPL), and the Comprehensive Environmental Response Compensation and Liability Information System (CERCLIS), which contains other information on potential and actual Superfund sites. Information from other sources proved to be less useful. For example, a search of the Right-to-Know network database (RTK) provided some matches for paint as a pollutant in the database of civil cases filed by the Department of Justice on behalf of EPA, however these included violations of RCRA permitting, storage, and reporting requirements, rather than disposal problems, or violations of the CAA or CWA. The Defense Technical Information Center database provided information on defense installations on the NPL and slated for closing, however these appear to be end users, not paint manufacturers.

EPA believes the damage cases have limited utility for determining current plausible mismanagement scenarios. The vast majority of damage cases (especially Superfund sites) were from sites that operated prior to implementation of the current RCRA regulations, and generally reflect management practices that no longer occur (such as an in ground solvent pit, buried crushed drums and dumping liquids in trenches). We believe these past damage incidents do not represent current waste management practices by the paint manufacturing industry. This is supported by the results from the 3007 Survey, which indicate that manufacturers are coding and managing many wastes as hazardous, especially some of those likely to have the greatest solvent content. For example, all facilities that reported solvent cleaning wastes reported them to be hazardous, except for one that was sent to fuel blending. Therefore, we expect that waste management practices have changed, since the promulgation of the RCRA regulations, including the addition of a number of organics to the Toxicity Characteristic in 1990 and the listings for certain waste solvents (F001 to F005) in 1980 (and as revised in 1985).

In most cases, the available damage incident data rarely indicated the composition of the paint or paint manufacturing waste, nor the source of the waste. Instead, the data depicted the material or waste in general terms, such as ''paint,'' ''paint manufacturing waste,'' or ''sludges.'' Thus, the databases did not categorize the damage incidents involving paint manufacturing wastes into the specific waste categories of interest (solvent cleaning wastes; water/caustic cleaning wastes; wastewater treatment sludge; emission control dust or sludge; and off-specification production wastes) nor allow us to determine concentrations above which paint manufacturing wastes could pose a hazard. Thus we are unable to directly attribute contamination observed from the mismanagement of paint manufacturing wastes to those the wastes that are specifically addressed by this proposed listing.

Even if historical problems could be traced to paint materials, they are not very useful in assessing the potential risks for paint production wastes as they are currently generated. The damage incidents may represent the potential for the migration, mobility, and persistence of constituents in paint manufacturing wastes. The damage cases do provide some anecdotal information in support of a conclusion that some paint manufacturing wastes may yield environmental contamination when managed in the ways that lead to the damage cases. However, because the wastes in the damage cases may include wastes now managed as hazardous, and because the cases may reflect management scenarios we do not believe are currently common or plausible, it is difficult to use them to reach conclusions as to which of the wastes under evaluation in today's proposal may pose significant risks. Certainly it is difficult to use damage cases to ascertain at what concentration the paint manufacturing wastes under evaluation may pose such risks. Thus, while the damage cases supports that some paint manufacturing wastes may sometimes pose risks, EPA is relying upon its quantitative risk assessment in formulating today's proposal.

3. Overview of The Risk Assessment

For a concentration-based listing, EPA is proposing to calculate the concentration levels, or ''listing levels'' in the waste at or above which a waste would be considered hazardous. Risk assessment is used to identify the concentrations of individual constituents that can be present in each waste stream and remain below a specified level of risk to both humans and the environment.

To establish these listing levels, the Agency (1) Selected constituents of potential concern in waste, (2) evaluated plausible waste management scenarios, (3) calculated exposure concentrations by modeling the release and transport of the constituents from the waste management unit to the point of exposure, and (4) calculated waste concentrations that are likely to pose unacceptable risk. In addition, the EPA conducted a screening level ecological risk assessment to ensure that the concentration limits were dually protective of human health and ecological life.

The following sections explain the selection of constituents that we evaluated in the risk assessment and present an overview of the analysis the Agency used to calculate risk-based listing levels for solvent cleaning waste, water and/or caustic cleaning waste, waste water treatment sludge, emission control dust and sludges, and off-specification product. You will find more details of how we selected the constituents of concern in the Listing Background Document. Details of the risk assessment are provided in the document in the docket entitled Risk Assessment Technical Background Document for the Paint and Coatings Listing Determination (hereafter called the Technical Background Document).

4. How EPA Chose Potential Constituents of Concern

Our overall goal in choosing potential constituents of concern was to identify commonly used, potentially hazardous constituents that could pose unacceptable risk if present in mismanaged paint manufacturing wastes. Waste sampling was not practical because we would have had to conduct extensive sampling to adequately represent thousands of variable products and constituents. As an alternative, we chose to rely on published information and environmental databases to select constituents of concern. We believe our review of the literature available on paint formulation and manufacturing combined with our search of specific databases provided representative information on widely used raw materials. In addition, we selected constituents for which we had access to toxicity and fate and transport data to conduct a risk assessment for each potential constituent of concern. We verified and supplemented these sources with information provided by paint manufacturers when the 3007 survey data was available.

We used the following three-phased approach to develop a list of potential constituents of concern. In the first phase, we developed a preliminary list of potentially hazardous constituents in paint formulations which we could readily evaluate for potential risks to human health, and for which we have test methods to detect their presence in waste. In the second phase, we narrowed the list to constituents for which we would conduct a risk assessment. In the third phase, we

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added a limited number of constituents to the risk assessment, as additional information became available.

a. *Phase 1: How Did EPA Develop a Preliminary List of Constituents?* We developed a preliminary list of constituents in three steps: first, out of the thousands of constituents that are used as ingredients in paints, we identified a subset of potentially hazardous constituents used in paint formulations; second, we identified those constituents for which we have adequate data to complete a risk assessment so that we could develop a protective concentration level for the listing, if appropriate; finally, we ensured that test methods were available so paint manufacturers would be able to identify the presence and concentration of constituents in their wastes, as necessary.

Initially, we relied on the ''Database of Published Paint Information'' (available in the docket), a computerized database that characterizes paint raw materials. In particular, we used the ''Raw Materials Module'' which contains information on the following types of ingredients that are used to make paints (we believe that these categories cover the vast majority of paint ingredients that could pose a concern):

Additives—Inorganic and organic metal-containing raw material additives such as driers (siccatives), catalysts, stabilizers.

Binders—Organic polymeric compounds used to adhere the pigment particles and other paint ingredients into a film on the surface being painted.

Biocides—Compounds used to kill microorganisms and larger organisms such as insects. Categories of biocides include insecticides, anti-fouling compounds (e.g., for use on ships), fungicides, algaicides, and mildewcides.

Pigments—Insoluble particulates used to give the paint film color as well as structured strength, as well as in some cases imparting corrosion resistance or other properties to paint film.

Solvents—Solvents used both in traditional ''oil'' based (solvent based) paints, as well as those solvents used in waterborne paints.

The constituents in the ''Raw Materials Module'' were identified from an extensive set of reference materials, including textbooks, monographs, articles and Material Safety Data Sheets listed in the ''Bibliography of Documents Module'' of the database. We believe this survey approach allowed us to identify constituents that are used in paint formulations based on a variety of sources. We also emphasized constituents we had reason to believe were more likely to pose a risk to human health and the environment. (For example, we used other governmental sources, such as a National Institute of Occupational Safety and Health (NIOSH) document characterizing hazardous worker exposures in paint manufacturing, as well as our experience in the RCRA program dealing with a variety of hazardous and potentially hazardous constituents.) In the fall of 1999, when we developed the preliminary list of constituents, the Raw Materials Module contained approximately 500 constituents.

In developing the preliminary list of constituents, we also considered other sources that might provide information on specific constituents associated with paint manufacturing facilities. For this, we turned to the Toxics Release Inventory (TRI) data base. Under the Emergency Planning and Community Right-to-Know Act (EPCRA), all paint manufacturing facilities with ten or more employees must report chemical releases if they manufacture, process, or otherwise use any EPCRA section 313 chemicals in quantities greater than the established thresholds. Facilities must report the quantities of both routine and accidental releases. Facilities are required to report quantities only for individual constituents. In the 1997 TRI, a total of 646 facilities in SIC code 2851 reported releasing 115 different constituents into the environment. From these 115 constituents, we identified approximately 60 additional constituents that were not already in the ''Raw Materials Database,'' but were associated with paint manufacturing facilities. While TRI reports of constituent releases cannot be tied directly to the five waste streams in the scope of this rule, TRI releases do tell us that the constituents are used by paint manufacturing facilities, released into the environment, and could potentially be found in the waste streams of concern.

We recognize that the TRI data do not correlate perfectly to the scope of facilities and wastes potentially covered by this listing. For example, the SIC category also includes some facilities that are not paint producers. Also, TRI tracks releases of specific constituents. However, the TRI data do not distinguish whether the releases are hazardous or non-hazardous wastes or whether the constituents are present in a larger matrix with other materials. While TRI does not contain sufficiently detailed information to associate releases directly with paint production, it does provide the best available information source on toxic constituent releases to waste management units and environmental media from facilities within the appropriate SIC code.

Our next critical step in identifying a preliminary list of constituents was to determine which constituents we could readily analyze for potential human health effects and which constituents could be readily tested in wastes. We looked for the following:

Health benchmarks: values used to quantify a chemical's possible toxicity and ability to induce a health effect. Benchmarks are also specific to routes of exposure (ingestion or inhalation) and duration of exposure.

Physical/chemical properties: information used to predict the behavior and movement of constituents in the environment essential to model environmental fate and transport.

Analytic methods: reliable methods available to test for the presence of constituents at concentrations of concern in order to implement a concentration based listing. We identified those constituents that have available SW–846 analytic methods.

We found that of the constituents in the Raw Materials Module and the constituents reported in the TRI, 114 had health benchmarks. We then searched for data on physical/chemical properties and SW–846 analytic methods for each constituent. We finally had a list of 66 constituents with test methods and sufficient data to conduct further analyses. We included the 66 constituents in the 3007 survey and asked respondents to identify which constituents occurred in each of their paint manufacturing waste streams. Table III.E–1 lists the 66 constituents.

TABLE III.E–1.—CANDIDATE CONSTITUENTS FOR RISK ASSESSMENT

Acetone
Acrylamide and acrylamide derived polymers
Acrylonitrile and acrylonitrile derived polymers
Allyl alcohol
Antimony and compounds
Barium and compounds
Benzene
Benzyl alcohol
Butyl benzyl phthlate
Cadmium and compounds
Chloroform
Chromium and compounds
Cobalt and compounds
Copper and compounds
Cyanide
Cyclohexane
Dibutyl phthlate
3-(3,4__Dichlorophenyl-1)1 dimethylurea
Diethyl phthlate
Di (2-ethylhexyl) phthlate
2,4 Dimethylphenol
1,4 Dioxane
Ethyl acetate
Ethylbenzene
Ethylene glycol
Formaldehyde and formaldehyde-derived polymers
Isophorone
Lead and compounds

TABLE III.E–1.—CANDIDATE CONSTITUENTS FOR RISK ASSESSMENT—Continued

M-Cresol
Methanol
Methyl acrylate
Methylene chloride
Methyl ethyl ketone
Methyl isobutyl ketone
Methyl methacrylate and methyl methacrylate derivatives
2,2 Methylenebis (3,4,6-trichlorophenol)
Mercury and compounds
Molybdenum and compounds
M-Xylene
Naphthelene
N-Butyl alcohol
Nickel and compounds
Nitrobenzene
2-Nitropropane
O-Cresol
O-Xylene
P-Cresol
Pentachlorophenol
Phthalic anhydride
Phenol
Selenium and compounds
Silver and compounds
Styrene and styrene-derived compounds
Tetrachloroethene
Tin and compounds
Toluene
Toluene diisocyanate
1,1,1 Trichloroethane
1,2,4-Trichlorobenzene
Trichloroethene
2,4,6 Trichlorophenol
Vanadium and compounds
Vinyl acetate and vinyl acetate derived polymers
Vinylidene chloride and vinylidene chloride derived polymers
Xylene (mixed isomers)
Zinc and compounds

b. *Phase 2: How Did EPA Select Potential Constituents of Concern for the Risk Assessment?* Before we began our initial risk assessment analyses in the fall of 1999, and before survey data were available, we selected a subset of 34 constituents (from the 66) to use in developing the risk assessment structure. We believe that it is important to select toxic constituents that are likely to occur across a wider variety of waste streams so that the concentration-based listing will capture more wastes of concern. While it is possible that infrequently occurring constituents could pose risks, we believe it is most effective to address risks from constituents that could be associated with more paint production wastes and occur in larger volumes. To select these constituents, we looked for some indicators that could give us insight into which were more widely used or more likely to occur in wastes. We started with the 66 constituents identified in Table 1 and looked at 1997 TRI data first to find constituent volumes released to waste management units and environmental media. We then looked at RCRA Biennial Reporting System (BRS) data to find how frequently paint manufacturing facilities generated hazardous wastes that contain each of the 66 constituents. (Hazardous waste generators are required to report biennially the listed and characteristic hazardous wastes that they generate by waste code—the Biennial Reporting System. Each hazardous waste code for listed or TC characteristically hazardous wastes is associated with specific hazardous constituents that are the basis of the listing.) We looked at the number of paint manufacturing facilities that reported generating hazardous waste codes associated with the specific constituents we were interested in. While we know that these wastes are already hazardous, we looked at these data as possible indicators of constituents that might be associated with nonhazardous wastes at paint manufacturing operations. We also considered TRI data for two reasons. First, TRI ''releases'' cover a broader range of materials than ''hazardous wastes'' (in the BRS) and include non-hazardous wastes that are not reported to BRS. Also, TRI data provide some indication of the relative amounts or frequency that constituents may be released into the environment.

First, we looked at TRI for the volume of releases of each constituent from facilities in SIC 2851 to on-site landfills, solidification/stabilization, wastewater treatment, and offsite landfills and surface impoundments. We evaluated releases to these units first, because, while we did not yet have the results of the 3007 survey, these management units correspond most closely to waste management scenarios we generally address for listing purposes. We initially identified a list of 20 constituents out of the 66 with the largest volume releases to these management units.

Second, because solvents were heavily represented among the first 20 constituents we identified from TRI data, we focused on the remaining constituents that fell into other use categories, such as pigments, binders, and biocides. We believe that it is important to have a broader representation of other types of constituents, besides solvents, which are used in paint formulations. (We note that some constituents serve more than one purpose in paint formulations.) We considered total TRI releases (including releases to air, surface waters, etc., in addition to releases to the waste management units listed above) for each of the remaining constituents. We also looked at the number of RCRA facilities that are likely to generate the constituent in hazardous waste, based on BRS data. This resulted in adding 13 constituents, including all eight remaining pigments, binders and biocides that had any TRI releases and 5 that were only reported in the BRS.

Third, while we did not have TRI data available for two additional constituents, cobalt and tin, we added them based on our knowledge that they are commonly used as pigments in paints.

We initially identified 35 constituents that met our screening criteria. However, we later dropped one of the 35 constituents (phthalic anhydride) because it degrades too rapidly to model. In summary, we used the 34 constituents listed in Table III.E–2 to develop the risk assessment structure and draft analysis.

c. *Phase 3: How Did EPA Choose Additional Constituents for The Risk Assessment?* Before we completed the risk modeling, we added a limited number of constituents to the 34 we chose initially. We looked at three groups of constituents. First, since we had chosen the initial group of constituents in the fall of 1999, we identified five additional constituents (from the list of 114 constituents with health benchmarks) that met the criteria for risk assessment (the Agency's Office of Research and Development identified physical/chemical properties and SW–846 methods are available). Second, we had 3007 survey responses reporting which of the 66 constituents (candidates for modeling, including the 34 we used to develop the risk assessment modeling structure) occur in non-hazardous waste streams. Finally, we found TRI data for one additional constituent on the list of 66. Ultimately, we chose additional constituents based on the 3007 survey reporting.

First we considered the five constituents (from the initial list of 114, but not included in the 66) for which we received later information identifying physical/chemical properties, and SW–846 methods: these were acetophenone, chlorobenzene, ethyl ether, p-chloro-meta-cresol, and tetrachloroisophthalonitrile. As with the first group of 34 constituents, we considered the available data for further evidence associating the constituents with paint manufacturing facilities. Acetophenone and chlorobenzene are TRI chemicals but had no TRI releases reported by SIC 2851 facilities. Ethyl ether, o-chloro-meta-cresol, and tetrachloroisophthalonitrile are not covered by TRI. In the BRS, four SIC 2851 facilities reported hazardous wastes that were listed, at least in part based on chlorobenzene. We found no BRS reporting of hazardous wastes associated with the other four constituents.

Then, we also considered the additional information reported in the 3007 survey. The survey listed the 66 constituents that were candidates for

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risk assessment and asked respondents to identify which constituents occur in each of their waste streams, both hazardous and non-hazardous. While response to this question was mandatory, the responses were based on existing knowledge or waste testing already available to the respondent. In discussing these results below, ''reporting frequency'' or ''frequency of occurrence'' refers to the number of times each constituent was reported to occur in a non-hazardous waste stream by a facility. The numbers reflect the total number of waste streams that were reported with identified constituents, not the number of facilities. Some waste streams were reported without any associated constituents.

In survey data, respondents identified 45 of the 66 constituents occurring in their non-hazardous waste streams. Frequency of occurrence ranged from 127 for barium to one for o-xylene and benzyl alcohol. Twenty-nine of the 34 constituents we chose initially for modeling were among the 45. We initially modeled the top 22 in terms of reporting frequency and out of the top 26, we modeled 24. Five of the constituents we modeled were not identified by respondents as occurring in non-hazardous waste streams. These results support the interpretation that our initial approach to choosing constituents was appropriate.

Finally we considered trichloroethene, which was one of the 66 constituents, but was not initially chosen for risk modeling. We found there were TRI releases reported for trichloroethene, so we also looked at survey responses to find how often respondents identified it occurring in their waste streams. We found that trichloroethene was not reported in either non-hazardous or hazardous waste streams. We compared this to responses for several other widely used solvents. Several were reported in both non-hazardous and hazardous waste streams and the frequency of reporting was significantly higher in the hazardous waste streams. For example, toluene was reported in 38 non-hazardous waste streams and 249 listed hazardous waste streams. Xylene was reported in 33 non-hazardous waste streams and 246 listed hazardous waste streams. Ethylbenzene was reported in 6 non-hazardous wastes and 126 listed hazardous waste streams. Comparing ''no reported occurrence'' of trichloroethene in either non-hazardous or hazardous waste streams to the non-hazardous/hazardous reporting for other widely used solvents led us to conclude that trichloroethene is less likely to be a frequently occurring constituent in non-hazardous waste streams than other constituents that actually were reported in the survey as occurring in non-hazardous wastes.[12] Therefore, we did not model trichloroethene. It is not a constituent considered as a basis for the concentration based listing.

We decided to add additional modeling constituents from those identified in the survey results rather than any of the five constituents for which we received additional data that would allow us to conduct risk modeling. We have no TRI data for any of the five constituents with late-arriving information. BRS data provided some evidence that chlorobenzene is associated with hazardous wastes from four paint facilities. In contrast, the survey provides actual reporting from paint manufacturers on the occurrence of constituents in their nonhazardous waste streams. We believe that BRS reporting associated with chlorobenzene at four facilities is less compelling than reporting frequency in the survey as a basis for adding additional constituents for risk modeling.

Therefore, we added the following six constituents for risk modeling based on reported frequency of occurrence in non-hazardous waste streams: butyl benzyl phthalate with 26 occurrences; acrylamide with 22 occurrences; benzene with 11 occurrences; and m-, o-, and p-cresol isomers with 14 occurrences (for m-cresol and o-cresol). We modeled all three cresol isomers because they are sometimes difficult to distinguish with available sampling methods and they often occur together. Also, all three isomers are TC constituents.

In summary we modeled 43 constituents. There are several points to note concerning the constituents that we modeled:

- There are 11 metals on our list of modeling constituents, and we actually modeled 14 because we modeled elemental mercury and divalent mercury, chromium III and chromium VI, and nickel and nickel oxide. Metals exist in a wide variety of chemical species, and this may be an important factor in assessing the fate, mobility, and toxicity of metals in our risk analysis. For the metals noted above, we have sufficient information on mobility and toxicity to model different species. Metals are present in paint manufacturing wastes as simple metal salts, or the metal could be part of a larger organic or inorganic metal compound. For example, for lead there are a number of compounds used in paints, such as lead naphthenate, lead molybdate chromate, lead sulfate, lead chromate, lead oxide, etc. We believe that by modeling these 14 metals, we are in fact representing a broader range of compounds that are likely to be used in paints. As discussed in the Section III.E.3 (see discussion on uncertainty in human health risk results), we recognize that the ionic forms of metals we modeled may over or under represent the mobility of many of these metal compounds. However, given that metal speciation may also change as the constituents move from the waste into the environment, we believe our modeling efforts are a reasonable approach to assessing the risks presented by the metals.
- Fifteen of the constituents are TC constituents. We chose to model these because we were concerned that risk-based levels derived from modeling might be lower than TC concentration levels. We had experience from the petroleum listing where one TC constituent, benzene, was present in the wastes below the TC concentration level and potentially could pose a risk, (see 63 FR 42110, August 6, 1998). In addition, because we intended to conduct a multi-pathway risk assessment that would take into account direct and indirect risks from air and ground water as well as from ingestion of ground water, it was possible that risk-based concentrations for other exposure pathways might be lower than those for ingestion of ground water alone, which is the basis for the TC.
- Fifteen of the constituents are pigments; ten are biocides; 17 are solvents; five are binders; and two are driers (the numbers do not add up to the total number modeled because some constituents have more than one purpose).
- With the addition of the six new modeling constituents, we modeled 34 constituents with 3007 survey reported waste stream occurrences ranging from 127 to two. We modeled the top 30 in terms of reporting frequency in waste streams, with the exception of acetone (discussed below). We also completed modeling for the five constituents modeled initially but not reported in the survey, because there is a possibility that they may occur in the total universe of paint manufacturing wastes.

We did not model acetone, although it was reported at 11 occurrences, because it was removed from the TRI in 1995. It was removed from the TRI because ''* * * acetone: (1) Cannot reasonably be anticipated to cause cancer or neurotoxicity and has not been shown to be mutagenic and (2) cannot reasonably be anticipated to cause adverse developmental effects or other chronic effects except at relatively high dose levels.'' (**Federal Register:** June 16, 1995 (Volume 60, Number 116), pp. 31643–31646.) On the same day, EPA also added acetone to a list of compounds excluded from the definition of a VOC under Title I of the Clean Air Act, based on an Agency determination that acetone has a negligible contribution to tropospheric ozone formation.

[12] Also, generators should know if trichloroethene is in their wastes because it is a TC constituent (D040, trichloroethylene).

Table III.E–2 lists all the constituents that we modeled, the use category that they fall under and their frequency of occurrence when they were reported in non-hazardous waste streams.

TABLE III.E–2.—CONSTITUENTS MODELED FOR RISK ASSESSMENT

Constituent	Purpose	Weighted frequency of occurrence in non-hazardous waste streams
Barium [1]	Pigment	127.4
Zinc	Pigment/Biocide	126.8
Vinyl Acetate	Solvent/binder	98.4
Ethylene Glycol	Solvent	90.0
Copper	Pigment/Biocide	86.7
Chromium III [1]	Pigment	84.6
Chromium VI [1]		(Identified as chromium in the survey)
Cobalt	Pigment/drier	73.0
Styrene	Binder	63.0
Formaldehyde	Biocide	62.8
Lead [1]	Pigment/drier	58.2
Antimony	Pigment	45.9
Silver [1]	Pigment/biocide	45.6
Methanol	Solvent/biocide	40.0
Toluene	Solvent	38.8
Methyl Ethyl Ketone [1]	Solvent	36.9
N-Butyl Alcohol	Solvent	35.6
Acrylonitrile	Binder	35.0
Cadmium [1]	Pigment	34.5
Xylene	Solvent	33.5
Nickel	Pigment	28.3
Nickel oxide	Pigment	(identified as nickel in survey)
Phenol	Solvent/biocide	28.0
Methyl Methacrylate	Binder	27.2
Butyl Benzyl Phthalate [2]	Solvent	26.6
Acrylamide [2]	Binder	22.5
Dibutyl Phthalate	Solvent	22.0
m-Cresol [1,2]	Solvent	7.45
o-Cresol [1,2]	Solvent	7.45
p-Cresol [1,2]	Solvent	
Methyl Isobutyl Ketone	Solvent	11.8
Benzene [1,2]	Solvent	11.0
Tin	Pigment	9.0
Mercury [1]	Pigment/biocide	7.6
Divalent mercury	Pigment/biocide	(Identified as mercury in the survey)
Ethylbenzene	Solvent	6.1
Selenium [1]	Pigment	5.1
Di(2-ethylhexyl) Phthalate	Solvent	2.2
Chloroform [1]	Biocide	
Methylene chloride	Solvent	
2,4 dimethylphenol	Biocide	
Pentachlorophenol [1]	Biocide	
Tetrachloroethylene [1]	Solvent	

[1] Indicates Toxicity Characteristic (TC) constituents.
[2] Indicates constituents added to the risk assessment based on frequency of occurrence reported in the 3007 survey.

5. What Was EPA's Approach to Conducting Human Health Risk Assessment?

Our human health risk analysis for the paint and coating waste streams estimates the concentrations of individual constituents that can be present in each waste stream and provide a specified level of protectiveness to human health and the environment. The human health risk assessment for the paints and coatings listing determination evaluates waste management scenarios that may occur nationwide. A national analysis that captures variability in meteorological and hydro-geological conditions was selected for this listing because paint manufacturing is widespread, and facilities that generate the waste streams of interest are found nationwide.

This risk assessment is intended to limit the risk to individuals who reside near waste management units used for paint manufacturing waste disposal by determining the concentrations of particular constituents that can be managed in paint manufacturing wastes and remain below a specified individual target risk level.

For this listing, we generated risk-based concentration limits in waste streams by estimating the concentration of a constituent that can be managed in the waste streams reported in the 3007 survey and remain below a target risk level for both cancer risk and noncancer human health hazards to 90% of the individuals living near waste management units handling paint manufacturing wastes. Human health impacts are expressed as estimates of excess lifetime cancer risk for individuals (called ''receptors'') who may be exposed to carcinogenic contaminants and as hazard quotients (HQ's) for those contaminants that produce noncancer health effects. Excess lifetime cancer risk is the probability of an individual developing

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cancer over a lifetime as a result of exposure to a carcinogen. A hazard quotient is the ratio of an individual's chronic daily dose of a noncarcinogen to a reference dose (an estimate of daily exposure that is likely to be without appreciable risk or deleterious effects over a lifetime) for exposures to the noncarcinogen. For this listing, the Agency selected a target risk level for excess lifetime cancer risk for individuals exposed to carcinogenic (cancer-causing) contaminants of 1 chance in 100,000 (1E–05). For constituents that are non-carcinogens, the Agency selected the measure of safe intake levels to projected intake levels, a hazard quotient (HQ), of HQ=1.

The use of these risk levels is consistent with the EPA's hazardous waste listing policy and the target risk levels used in past hazardous waste listings (e.g., see 59 FR 24530, December 22, 1994). Risk levels themselves do not necessarily represent the sole basis for a listing. There can be uncertainty in calculated risk values and so other factors are considered in conjunction with risk in making a listing decision. EPA's current listing determination procedure uses as an initial cancer-risk ''level of concern'' a calculated risk level of 1E–05 and/or environmental risk quotients (EQ's) of 1 at any one point in time. Waste streams for which risks are calculated to be 1E–04 or higher, or 1 HQ or higher for any individual non carcinogen, or non carcinogens that elicit adverse effects on the same target organ, generally will be considered to pose a substantial present or potential hazard to human health and the environment and generally will be listed as hazardous waste. Such waste streams fall into a category presumptively assumed to pose sufficient risk to require their listing as hazardous waste. However, even for these waste streams there can in some cases be factors which could mitigate the high hazard presumption. Listing determinations for waste streams with calculated high-end individual cancer risk levels between 1E–04 and 1E–06 always involve assessment of additional factors. For today's proposed listing there are several factors that we considered in setting the risk level of concern, these included: (1) Certainty in the risk assessment methodology, (2) coverage by other regulatory programs, (3) damage cases, and (4) presence of toxicants with unquantifiable risks. We believe a target cancer risk level of 1E–05 and an HQ of 1 is appropriate for this listing, but we welcome comments and supporting data if there is a compelling reason for an alternative target.

To calculate listing levels for constituents of concern, we needed to determine what concentrations at the point of exposure would be associated with levels in the waste for each waste stream and waste management unit. We used three types of analyses to determine the risks associated with the management of paint manufacturing wastes: (1) A probabilistic analysis for all waste management scenarios; (2) a deterministic analysis for all waste management scenarios, and (3) a bounding analysis for on-site management of waste waters in treatment tanks. The results of the bounding analysis demonstrated that given the concentrations of constituents that we expect in paint manufacturing waste the risk generated from paint manufacturing wastes managed in on-site tanks is not significant. The following sections describe the risk assessment.

(1) *Probabilistic Analysis (Monte Carlo Method).* A probabilistic analysis calculates distributions of results (in this case protective waste concentrations for each constituent) by allowing some of the parameters used in an analysis to have more than one value. The model is run numerous times (for this analysis we ran the model 10,000 times) each time with different values selected from the distributions of input parameters. A parameter is any one of a number of inputs or variables (such as waste volume or distance between the waste management unit and the receptor) required for the fate and transport and exposure models and equations that EPA uses to assess risk. In the probabilistic analysis, we vary sensitive parameters for which distributions of data are available. Parameters varied for this analysis include waste volumes, waste management unit size, parameters related to the location of the waste management unit such as climate and hydro-geologic data, location of the receptor, and exposure factors (e.g., drinking water ingestion rates). In some cases, in order to maintain the inherent correlation between parameters, we treat multiple parameters as a single parameter for the purpose of conducting the analysis. We do this to prevent inadvertently combining parameters in our analyses in ways that are unrealistic. For example, we treat environmental setting (location) parameters such as climate, depth to groundwater, and aquifer type as a single set of parameters. We believe that, for example, allowing the climate from one location to be paired with the depth to groundwater from another location could result in a scenario that would not occur in nature.

The probabilistic analysis is conducted using a Monte Carlo methodology. Monte Carlo analysis provides a means of quantifying variability in risk assessments by using distributions that describe the full range of values that the various input parameters may have. Some of the parameters in the probabilistic analysis are set as constant values because (1) there are insufficient data to develop a probability distribution function ; (2) EPA made assumptions to simplify the analysis in cases where such simplifications would improve the efficiency of the analysis without significantly affecting the results; and (3) the analysis has not been shown to be sensitive to the value of the parameter, that is, even if the parameter varies, the resulting risk estimate does not vary significantly. The result of the probabilistic risk assessment is a distribution of risk-based concentration limits or ''listing levels.'' The EPA used the results of the probabilistic risk assessment to determine the regulatory listing levels.

(2) *Deterministic Analysis.* The deterministic method uses single values for input parameters in the models to produce a point estimate of risk or hazard. We used the deterministic analysis to corroborate the results of the probabilistic analysis. For the deterministic analysis, we conduct both a ''central tendency'' and a ''high end'' deterministic risk assessment. These two analyses attempt to quantify the cancer risk or non-cancer hazard for the ''average'' receptor in the population (the central tendency risk) and the risk or hazard for individuals in small, but definable ''high end'' segments of the population (the high end risk). For central tendency deterministic risk analyses, we set all parameters at their central tendency values. For the paint and coatings risk assessment, the central tendency values generally are either mean (average) or 50th percentile (median) values. We use high end deterministic risk analyses to predict the risks and hazards for those individuals exposed at the upper range of the distribution of exposures. EPA's Guidance For Risk Characterization (EPA 1995) advises that ''conceptually, high end exposure means exposure above about the 90th percentile of the population distribution, but not higher than the individual in the population who has the highest exposure,'' and recommends that ''* * * the assessor should approach estimating high end by identifying the most sensitive variables and using high end values for a subset

of these variables, leaving others at their central values.'' As such, for the paint and coatings risk assessment, high end deterministic risk analyses, EPA established a set of the parameters most likely to influence the results of the assessment and set two of these parameters at a time to their high end values (generally 90th percentile values), and set all other parameters at their central tendency. The high-end deterministic analysis results are based on the two most ''sensitive parameters.'' These are the two parameters that when set at their high-end values, generated the highest estimate of risk or hazard. These two most ''sensitive parameters'' vary according to the constituent and pathway evaluated. Appendix C of the risk assessment technical background document shows the two most sensitive parameters for each constituent and pathway. The EPA did not perform a sensitivity analysis on all parameters in this risk assessment. Rather, the parameters we selected to vary in the deterministic analysis were a smaller list based on sensitivity analyses performed on the same models for other listing determinations that determined the most sensitive parameters in our models. For the aboveground pathways, the parameters considered most likely to influence the results were the waste management unit surface area, the distance to the receptor, the meteorological station location, the sorption coefficients for the waste management unit and surficial soil, the receptor's exposure duration, and the volume of paint waste in the waste management unit. For the groundwater pathways, the parameters considered most likely to influence the results included; the distance to receptor well, depth to groundwater, the sorption coefficients, the receptor's exposure duration, and the volume of paint waste in the waste management unit. We did not use the deterministic analysis to develop today's proposed listing levels. The deterministic analysis is discussed in more detail in the Technical Background Document

(3) *Bounding Analysis.* This type of analysis is very conservative but presents a quick and simple way to ''screen out'' potential scenarios of concern. A bounding analysis was used for the on-site tank scenario because, based on previous listing determinations, we did not think volatilization from the small volumes managed on-site was likely to generate a risk of concern. Similar to the deterministic and probabilistic analyses, the results of this risk assessment are the concentration of each constituent that can be managed in a tank and remain protective of human health. To conduct this analysis, the most sensitive or risk-driving parameters in the risk assessment tank model were varied between their high-end and central tendency values. The tank characteristics (i.e., capacity, surface area, and diameter) used in the analysis were based on the tank reported by the facility with the highest waste volume managed in a tank. The tank modeled was a 9000 gallon, aerated waste water treatment tank. For the analysis we assumed there was no biodegradation in the tank. Similar to the deterministic assessment, two high-end parameters were varied at a time to determine the greatest ''high-end'' risk combination. The greatest reported waste volume was always used as one of the high-end parameters in the two parameter combination. The three other high-end parameters were varied between their high-end and central tendency values. These three parameters were; the distance from the waste management unit to the receptor, the duration that the receptor was exposed to the contaminant, and the meteorological location of the waste management unit. Based on the results of this analysis, we determined that the risk of waste water management in on-site tanks is insignificant for all constituents for one of three different reasons: (1) The estimated constituent concentration was greater than 1 million parts per million and therefore was not physically achievable, (2) the estimated constituent concentration was above the constituent's RCRA hazardous waste toxicity characteristic and the waste would already be classified as hazardous, or (3) we determined, based on knowledge of paint formulations, that non-hazardous paint manufacturing waste waters would never contain concentrations of the constituent at the level that may produce a risk (see Section for further discussion).

a. *What Waste Management Scenarios Were Evaluated?* We evaluated four waste management units that represent plausible management scenarios that are likely destinations for paint and coating production waste streams. The modeled units include landfills, surface impoundments, on-site tanks, and off-site tanks. Section III.D describes in detail why these waste management units were selected for evaluation in the risk assessment. The waste management scenarios for each of these units were created using information reported by industry on the management of their non-hazardous paint manufacturing waste streams. In addition, we used information on the national distributions of waste management unit characteristics (e.g., size and waste capacity) collected with surveys conducted for other rulemakings to establish the characteristics of the off-site waste management units.

(i) Type of Waste Management Units and Their Characteristics. We evaluated commercial industrial non-hazardous landfills, surface impoundments, and off-site tanks for the probabilistic and deterministic risk assessment. On-site tanks were also evaluated in a bounding analysis. With the exception of the on-site tanks, each type of waste management unit has a distribution that characterizes the units with respect to capacity and dimension (e.g., area and depth). These dimensions and operating characteristics are important determinants of the extent to which a contaminant may be released from the unit. Each type of waste management unit is assumed to have different operational lifetimes (between 20–50 years) and different lengths of time during which constituents are assumed to be released from the unit (between 30 and 200 years).

For landfills and surface impoundments we evaluated the scenario of disposal in an unlined waste management unit and assessed the impact of the release of leachate from the landfill and surface impoundment to the groundwater. In addition, we assumed that the landfill did not have daily cover and the surface impoundment was open to the air. The primary source of data used to establish the characteristics of landfills and surface impoundments for both the probabilistic and deterministic analysis is our 1985 Screening Survey of Industrial Subtitle D Establishments.[13] There are over 2,850 landfills reported in this survey. Since paint manufacturing facilities reported that their wastes were sent to off-site landfills, the characteristics the sixty-eight landfills reported in this survey to accept wastes in all or in-part from off-site sources were selected for characterizing the landfills included in this assessment.

There were 1,930 surface impoundments reported in the 1985 Industrial D Screening Survey. Twenty-seven of these surface impoundments were not included in the distribution used for this risk assessment because the data were not complete in the survey or the facility indicated that the

[13] Schroeder, K.R. Clickner, and E. Miller, 1987. Screening Survey of Industrial Subtitle D Establishments. Draft Final Report. Prepared for the Office of Solid Waste, U.S. Environmental Protection Agency. Westat, Inc. Rockville, MD.

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surface impoundments were only used as backup storage units. A stratified random sample of 200 of the remaining 1,903 surface impoundments was used in the analysis. Data on the surface impoundment total capacity and total 1985 waste quantity were used in the analysis. Surface impoundments were assumed to be operated with varying degrees of aeration. Aeration characteristics were not a parameter reported in the Industrial D survey and in the absence of this data, the distribution of aeration characteristics from the tanks database (described below) was randomly applied to surface impoundments.

For the evaluation of off-site management of waste waters in treatment tanks, a tank database was developed for this analysis that compiled flow rates, treatment methods, and tank volumes. The primary source for these data was EPA's 1986 National Survey of Hazardous Waste Treatment, Storage, Disposal, and Recycling Facilities (TSDR) Database.[14] Although this database collected information on hazardous waste tanks, this database was used since it is the most comprehensive collection available of information on tank characteristics. Since similar treatment technologies are used for hazardous and non-hazardous waste we believe that the characteristics of non-hazardous tanks is not significantly different from hazardous tanks. This database is a result of a comprehensive survey of 2,626 TSDR facilities, on 1986 waste management practices and quantities. A subset of the data contained information on 8,510 tanks that received wastes from off-site. Since it was not computationally feasible to model all 8,510 of the tanks for this analysis, a sample from the tanks in this survey was used to develop the characteristics of off-site tanks. There were several criteria used in selecting a sample from the tanks in the 1986 survey. Some of the criteria used were: (1) Only those tanks reporting flow rates (demonstrating they were used for waste management) were included in the analysis, (2) only treatment tanks were considered in the analysis and tanks that were closed or covered were not included in the distribution, (3) no reported tanks with a volume the size of a drum or smaller were included since these are likely to be short-term units or containers. From all the tanks that met the above mentioned criteria, a sample of 200 tanks was drawn from the data that comprised the tank distribution. The sampling was conducted to preserve the range and distribution of tanks in the underlying database. To reflect emission characteristics associated with differences within the treatment tank category related to aeration intensity, three different tank categories were identified and modeled: high aerated treatment tanks, low aerated treatment tanks, and nonaerated (quiescent) treatment tanks. Examples of quiescent treatment tanks are clarifiers and filters (such as sand or mixed-media filters). In the absence of aeration, quiescent treatment tanks are still subject to small amounts of agitation during filling and emptying operations if the tank has above-surface intakes. Sorting the tanks in the database into these three categories was done using the data reported in the TSDR category.

(ii) Location of Waste Management Units. Determining the location of waste management units is important for the selection of environmental setting data (e.g., meteorological and hydrological data) for constituent fate and transport modeling. Since we do not know the location of all specific paint production waste disposal, we assumed that waste disposal locations are correlated with the location of the paint production facilities. We also assumed that nonhazardous waste from paint manufacturing facilities is disposed within reasonable transport distances of the facility. Therefore, we created a distribution of locations of paint manufacturing waste treatment and disposal facilities across the United States. The locations of waste management in the distribution are weighted according to the total dollar value of product shipments reported for a State. We assumed that the larger the total dollar value of shipments, the greater the volume of paint production in the State and we weighted the probabilistic analysis accordingly. In other words, the meteorological locations in States with the larger reported dollar value of paint shipments in the probabilistic analysis had more of the 10,000 iterations. The source of information on the dollar value of product shipments is the 1997 Economic Census of Paint and Coating Manufacturing (U.S. Department of Commerce, 1999).[15] The Census reported the dollar value of shipments made by paint manufacturing facilities by State. In all, 36 states reported paint production volumes on a dollar value basis. The Census, however, included only States for which facility data can be reported without disclosing confidential business information. Data cannot be reported if the population of paint manufacturing facilities is so small that confidentiality cannot be maintained if data were reported on a State level. Since the States not included in the 1997 Census may only have a few paint manufacturing facilities, not including these States does not impact this analysis. Locations for modeling were selected first for States according to the volume of paint manufactured and then by the general location of paint manufacturing facilities within the State. The EPA's 1997 Toxic Release Inventory was used to determine the possible location of the paint manufacturing facilities within a State. In many cases the majority of the paint manufacturing facilities were located in several clusters throughout a State. Therefore, in some cases several different meteorological stations and hydrological regimes within a single State were modeled. Forty-nine meteorological stations in 39 states were used in the risk assessment.

(iii) Waste Volumes. In Part III, Section D, we explained how we identified waste volumes reported in the 3007 survey data that represent the distribution of volumes of non-hazardous waste being sent to non-hazardous landfills, surface impoundments, and tanks across the nation. We compiled distributions of waste solids sent to landfills and waste liquids sent to tanks and surface impoundments. Each waste volume has a corresponding weighting factor that represents the number of facilities in the total sampling population that sent a particular waste volume to a particular type of waste management unit. The risk assessment modeling requires the use of volumes going to a waste management unit, therefore the waste quantities here are presented as volumes (in gallons) as opposed to mass (in tons), the waste descriptor that has been used in previous sections of this preamble. For the probabilistic risk assessment the weights were used to determine the frequency a waste volume was evaluated in the 10,000 iterations comprising the Monte Carlo analysis. In general, the waste volumes reported were relatively small when compared to the total waste capacity of the waste management units. For the probabilistic analysis, the volumes of emission control dust going to a landfill range from 40 gallons to 78,650 gallons, the volumes of all the solids going to a landfill range from 5 gallons to 426,739

[14] U.S. EPA. 1987. 1986 National Survey of Hazardous Waste Treatment, Storage, Disposal, and Recycling Facilities Database.

[15] U.S. Department of Commerce. 1999. Paint and Coating Manufacturing: 1997 Economic Census; Manufacturing Industry Series. EC97M–3255A. U.S. Census Bureau, Washington, D.C. August.

gallons, and the range of aqueous wastes that can be managed in either a surface impoundment or off-site tank is from 151 gallons to 104,225 gallons. For the deterministic analysis, the 50th and 90th percentile waste volumes from each of the volume distributions was used. These volumes are shown in Table III.E–3 below.

TABLE III.E–3.—WASTE VOLUMES USED FOR THE RISK ASSESSMENT

Percentile	Emission control dust (gallons/yr)	Combined solids (gallons/yr)	Liquid wastes (gallons/yr)
Minimum	40	5	151
50th	644	375	12,000
90th	58,340	43,270	26,752
Maximum	78,650	426,739	104,225

b. *What Exposure Scenarios Did EPA Evaluate?* Prior to conducting the risk assessment, we had to establish that there is a plausible scenario under which a receptor might be exposed to contaminants managed in paint manufacturing wastes. Establishing this scenario required that we determine: how the waste is managed, how contaminants can be released from the waste management unit, how contaminants can be transported in the environment to a point of contact with a receptor; and how a receptor can be exposed to a contaminant. For the reasons discussed in Part II, Section D, we chose to evaluate the risk attributable to management of paint production wastes in uncovered biological treatment tanks, uncovered and unlined surface impoundments, and uncovered and unlined non-hazardous industrial landfills.

(i) Release Scenarios From Waste Management Units. We determined that releases from all of the waste management units (tanks, landfills, and surface impoundments) can occur through release of vapor emissions to the air. In addition, particulate emissions to the air from solids disposed in landfills is feasible. For the landfill and surface impoundment waste management scenarios, it was also determined that releases could occur through leaching of waste into the subsurface. We assumed that tanks were sufficiently impermeable that they were highly unlikely to release volumes of waste sufficient to pose an unacceptable groundwater risk. Therefore it was not necessary to develop risk-based concentrations for the groundwater pathway. The mechanisms and pathways we evaluated are as follows:

1. Vapor emissions can remain dispersed in the air, or can be deposited through wet and dry deposition. Specifically, we modeled the concentration of vapor phase contaminants in air, the diffusion of vapor phase contaminants into plants, the diffusion of vapor phase contaminants into surface water, wet deposition of vapors onto soils and surface water, dry deposition of vapors onto soils, and dry and wet vapor deposition onto plants.

2. Particulate emissions can remain dispersed in the air or be deposited through wet deposition (in precipitation) or dry deposition (particle settling). We assume that particulates may be deposited onto soil and surface water through both wet and dry deposition, and onto plants through dry deposition.

3. Leachate can migrate through the unsaturated zone to the saturated zone, where contaminants are transported in groundwater to drinking water wells.

4. Constituents deposited onto soils from vapor and particulate emissions can erode into nearby surface water bodies.

(ii) Routes of Exposure. Human receptors may come into contact with the chemicals of concern present in environmental media through a variety of routes. In general, exposure pathways are either direct, such as inhalation of ambient air, or indirect, such as consumption of contaminated food products. For this risk assessment, human receptors may come into contact indirectly with vapors that diffuse into vegetation, particulates that are deposited onto vegetation, or contaminants that are taken up by vegetation from the soil and ingested in fruits and vegetables, as well as exposure to contaminated beef and dairy products derived from cattle which have ingested contaminated forage, silage, grain, and surface soil. Receptors that ingest fish may also indirectly come into contact with contaminants in air-borne vapors and particulates (through vapor diffusion into surface water, vapor deposition onto surface water, and particulate deposition onto surface water) and runoff and eroded soil that has entered the surface water body.

(iii) Receptors Evaluated. Most paint facilities transport wastes generated during paint production to waste management units located off-site. For the off-site waste management units identified in the RCRA 3007 survey (e.g., landfills) it is not uncommon to have residential, recreational, or agricultural land uses surrounding the management unit. As such, we determined that the following receptors reasonably represent the types of individuals that may be located near the waste management units and could be exposed to contaminants in paint production wastes:

- An adult resident,
- The child of a resident,
- A farmer,
- The child of a farmer,
- A recreational fisher.

Some of these receptors might be exposed through several pathways and some might only be exposed through one pathway. Receptors are evaluated for exposures with respect to chemicals present in ambient air (both vapors and particles), soils, groundwater, fruits and vegetables, beef and dairy products, and fish. The magnitude of the exposure received by a receptor is dependant on the chemical and environmental setting modeled. The following sections describe our primary assumptions regarding the characteristics and activities of each of the receptor types, and the routes by which each receptor is exposed.

Adult Resident and Child of the Resident. We assume that an adult and child can reside near the waste management unit. The residential receptors inhale vapors and particulate matter that are dispersed in the ambient air. We assume that household water is supplied to the residential receptors by a private groundwater well that is located near their home. The adult resident and the child of the resident, drink water that comes from the well. We assume that the adult resident inhales vapors that are emitted from the water used for showering. The residential receptors do not ingest foods that are grown in the vicinity of their home, however, they do incidentally ingest surface soil from their yard. Groundwater exposures were only considered for the residential scenario. It was assumed that contaminated groundwater was not used for crop irrigation or stock water for cattle. In addition, groundwater recharge and

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subsequent contamination of fish was not considered. In general, the exposure to contaminants through the air pathway and contaminants in the groundwater occurs at very different time scales due to the long transport times associated with most chemicals in the groundwater medium. For example, transport of contamination to a receptor in ambient air can happen within a matter of hours while transport of contaminants to a residential well in groundwater can take hundreds, even thousands of years. As such, we did not add together the exposures from both the air pathway and groundwater pathway. There were a few organic constituents where the contaminant did travel to the receptor well in less than 50 years, however, we did not add together the exposures from these two pathways since the receptor locations for the groundwater and air pathways are different, therefore adding the exposures is not appropriate. We did add together the exposures from different routes for each receptor. For example, for carcinogens, we considered the additive exposure for an adult resident from ingestion of groundwater and inhalation of vapors while showering when it was appropriate.

Adult Farmer and Child of the Farmer. We assume that a farmer raises fruits, exposed vegetables, root vegetables, beef cattle, and dairy cattle in an agricultural field located near the waste management unit. Approximately 42 percent of the exposed vegetables, 17 percent of the root vegetables, 33 percent of the exposed fruits, 3 percent of the protected fruits, 49 percent of the beef, and 25 percent of the dairy products eaten by the farmer are grown/raised on the farmer's agricultural field. We assume that the farmer and the child of the farmer incidentally ingests soil from his/her yard.

Recreational Fisher. We assume that the residential receptor may be a recreational angler. Approximately 33 percent of the fish eaten by the fisher are from a stream located near the waste management unit. The fisher's other characteristics and activities are the same as those of the adult resident.

We establish the locations of all the receptors relative to waste management units based on information obtained from previous national surveys. These surveys are discussed below. Exposure to groundwater occurs through the use of water from drinking water wells, and exposure via non-groundwater pathways occurs through releases to the air. Therefore, ''distance to receptor'' for the groundwater pathways is the distance to the drinking water well that the receptor is using (the ''receptor well''). ''Distance to the receptor'' for non-groundwater pathways is the distance to the residence where the receptor is inhaling air or contacting the soil or the distance to the field where the receptor is growing crops or raising livestock. Consequently, we use different databases to establish ''distance to receptor,'' depending on whether we are evaluating a groundwater or a non-groundwater pathway.

For analysis of the air pathways risks in the deterministic analysis we assume that the receptors live either 75 meters (m) (high end) or 300 m (central tendency) from the waste management unit. The distance of 250 feet (ft) (approximately 75 m) is based on the actual measured distance to the nearest resident for the worst-case facility evaluated in the risk assessment conducted to support the 1990 ''Hazardous Waste Treatment, Storage, and Disposal Facilities-Organic Air Emissions Standards for Process Vents and Equipment Leaks Final Rule'' (55 FR 25454), and was used as distance to the nearest resident for that rulemaking. In the same risk assessment, we identified the receptor distance of 1000 ft (approximately 300 m) as the median distance in a random sample of distances to the nearest residence. For the deterministic analysis, we used the average air concentration and deposition values around the circumference at both 75 m and 300 m. For the probabilistic analysis, we identified the distance of 300 m as the median or central tendency distance from the WMU to the receptor. We then used the 75 m distance as a 10th percentile closest location (high-end) and created a normal distribution of receptor distances to sample from. The lowest and highest receptor distances (0 and 100 percentile) of the distribution were constrained to be between 50 and 550 m. The distance from the WMU boundary to the resident location was randomly selected from this distribution. In addition, the receptors in the probabilistic analysis are located in 16 directions around the entire circumference (360 degrees) of the waste management unit.

For evaluating the groundwater pathway in the deterministic analysis, we assume that a receptor well is located 102 m (high end) or 430 m (central tendency) from the waste management unit, and that the receptor well is located on the centerline of the plume (high end) or halfway between the centerline and the edge of the contaminant plume (central tendency). The 102 m distance is the 10th percentile value in the distribution of distances derived from our 1988 survey of Solid Waste (Municipal) Landfill Facilities. The 430 m value is the 50th percentile value in that same distribution. For the probabilistic analysis, the distance from the waste management unit to the receptor well is based on the complete distribution of distance to the receptor well reported by the survey respondents, and ranges from 0.6 m to 1610 m. For the Monte Carlo analysis we assume that the receptor well is located anywhere within the contaminant plume.

The Technical Background Document for the risk assessment provides a complete discussion of the values of additional parameters that define the characteristics of each receptor, such as the amounts of contaminated food and water they ingest, their inhalation rates, and how long they live near the waste management unit (i.e., their exposure duration).

c. *How did EPA Quantify Each Receptors Exposure to Contaminants?* Exposure is the condition that occurs when a contaminant comes into contact with the outer boundary of the body, such as the mouth and nostrils. Once we establish the concentrations of contaminants at the points of exposure, we can estimate the magnitude of each receptor's contaminant dose. Dose is the amount of contaminant that crosses the outer boundary of the body and is available for adsorption at internal exchange boundaries (lungs, gut, skin). For example, for exposure to a carcinogen through ingestion of contaminated drinking water, dose is a function of the concentration of the contaminant in the drinking water (exposure point concentration), as well as certain exposure factors, such as how much drinking water the receptor consumes each day (the intake rate), the number of years the receptor is exposed to contaminated drinking water (the exposure duration), how often the receptor is exposed to contaminated drinking water (the exposure frequency), the body weight of the receptor, and the period of time over which the dose is averaged. Our primary source of exposure factors is the ''Exposure Factors Handbook'' published by EPA in August 1997. For probabilistic analyses, we used the distributions of exposure factor values provided in the Exposure Factors Handbook. The one situation where we do not develop an expression of dose is the case where we use the Reference Concentration (RfCs) to estimate noncancer hazard for the inhalation exposure route. In this situation, we calculate noncancer hazard from concentration of the contaminant in air

and the RfC, without considering exposure factors other than those inherent in the RfC (e.g., inhalation rate, body weight).

Children are an important sub-population to consider in a risk assessment because they are likely to be more highly exposed to contaminants in the environment than adults. Compared to adults, children eat more food and drink more fluids per unit of body weight. This higher rate coupled with a lower body weight can result in higher average daily dose than adults experience. To evaluate childhood exposure for this analysis, a child of a resident and a child of a farmer whose exposure begins between the ages of 1 and 6 was evaluated. For the probabilistic assessment, a start age was randomly chosen between the ages of 1 and 6. The child was then aged for the number of years defined by the exposure duration. As children mature, however, their physical characteristics and behavior patterns change. To capture these changes in the analysis, the life of a child was divided into several cohorts: Cohort 1 (ages 1–5), Cohort 2 (ages 6 to 11), cohort 3 (ages 12 to 19), and cohort 4 (ages 20 to 70). Each cohort has a discrete value (for a deterministic assessment) and a distribution (for a Monte Carlo analysis) of exposure parameters that are required to calculate exposure to an individual. The exposure parameter distributions for each cohort reflect the physical characteristics and behavior patterns for that age range.

d. *How Did EPA Predict The Release and Transport of Constituents From a Waste Management Unit to Receptor Locations?* We conduct contaminant fate and transport modeling and indirect exposure modeling to determine what the concentrations of contaminants will be in the media that the receptor comes into contact with. These concentrations are called ''exposure point concentrations'' (that is, they are the contaminant concentrations at the point where the receptor is exposed to the contaminants.) There are a number of computer-based models and sets of equations that we use to predict exposure point concentrations. In the following sections we briefly discuss these models and equations and their application in the risk analyses.

(i) Landfill Partitioning Model. The landfill model is designed to simulate the gradual filling of an active landfill and the long-term releases from the active and closed landfill cells. The design assumes that the landfill is composed of a series of vertical cells of equal volume that are filled sequentially. We assumed that each cell requires one year to be filled. The formulation of the landfill model is based on the assumptions that the contaminant mass in the landfill cells might be linearly partitioned into the aqueous, vapor, and solid phases. The partitioning coefficients are based on those reported in literature, and are listed in the risk assessment's Technical Background Document. The model simulates the active lifetime of the landfill (30 years) and continues simulating releases until less than one percent of the initial mass is left or for a total of 200 years, whichever occurs first. We assume that the landfill has minimal controls with no liner and no daily cover. However, we assumed that there is no runoff and erosion from the unit. The cover at closure is a soil cover that still permits volatilization. We used the highest 9-year average leachate concentration predicted by the partitioning model as input into EPA's Composite Model for Leachate Migration with Transformation Products (discussed in Section III.E(b)(vii)).

Based on the design assumptions above, we simulated the annual release of chemical mass by leaching to the unsaturated zone underneath the landfill, volatilization to the air pathway, and particle emissions to the air pathway from wind erosion and truck movement during the active lifetime. It is assumed that the contaminant mass emitted as a particulate from the landfill is sorbed to particles in the waste. The model estimates the emission rate of contaminant mass adsorbed to particle sizes less than 30 micrometers (μm). The amount of contaminant mass emitted is assumed to be distributed between four particle size categories, 30 to 15 μm (40%), 15 to 10 μm (10%), 10 to 2.5 μm (30%), and less than 2.5 μm (20%).[16] While the emission control dust may be comprised primarily of the smaller size particles, we assumed that the waste material becomes mixed with other wastes and soils before being released as a particulate, therefore the particle size distribution used for estimating the particulate releases represent the range of particles sizes for all the wastes that may be in a landfill. We did not attempt to assess possible risks from short-term releases of unmixed dust particles that might occur during initial placement of wastes into the landfill cells. However, we do not believe such releases are likely to be significant for several reasons: (1) Dusts sent to landfills are typically contained, and are thus unlikely to cause large scale releases when placed in a landfill, (2) dust volumes are relatively small, especially in comparison to the size of commercial offsite landfills, and would likely be covered with other wastes at the landfill in a short time period, and (3) significant dusting would be minimized by both typical operating practices at landfills (e.g., dust suppressant activities), as well as regulations controlling air releases (e.g., see: Federal regulations for daily cover for municipal landfills at 40 CFR 258.21; widespread State requirements for cover at non-municipal Subtitle D,[17] and requirements under State Implementation Plans approved pursuant to section 110 of the CAA).

In addition, we simulated losses of mass through both anaerobic and aerobic biodegradation and hydrolysis within the landfill. We did not simulate the transport of constituents from the landfill as non-aqueous phase liquids (NAPL's). However, we do not believe that the waste streams evaluated for the landfill scenario will form NAPL's (see Section IV E). In addition, due to the variability of waste stream characteristics across the paint industry, it is impossible to know the exact composition of the waste matrices (e.g., the constituents present and the exact constituent concentrations), therefore, modeling did not take into account the effect of managing multiple solvents in the same waste stream. The management of multiple solvents in a waste may create a ''co-solvency effect'' where the solubility of a solvent may be increased due to the presence of other solvents.

The partitioning model incorporates other assumptions intended to improve the efficiency of the model. These assumptions are described in detail in the risk assessment technical background document. The assumptions include the lack of lateral transport between cells, simulation of only a single cell and then aggregation of results based on the time each cell is filled, and the assumption that waste is added at a constant concentration at a constant rate.

(ii) Surface Impoundment Partitioning Model. The surface impoundment model simulates the disposal of liquid wastes in an unlined surface impoundment and the releases of chemicals during the lifetime of the

[16] ''Compilation of Air Pollutant Emission Factors,'' AP–42, Section 13.2.5: Industrial Wind Erosion, U.S. Environmental Protection Agency, Office of Air and Radiation and Office of Air Quality Planning and Standards, September 1995.

[17] U.S. Environmental Protection Agency, Office of Solid Waste, State Requirements for Industrial Non-Hazardous Waste Management Facilities, October 1995.

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unit. The highest 9-year average leachate concentration is then used as input into EPA's Composite Model for Leachate Migration with Transformation Products (see section vii) which estimates the movement of the plume through the saturated and unsaturated zone over a 10,000 year time period. Runoff and erosion from the unit do not occur because we assume the impoundment is a sink in the watershed. We assume that there is no liner other than native soils and that the unit is not covered. The model assumes that the waste in the impoundment consists of two phases: Aqueous liquid and sediment. The model does not simulate any additional phases, such as non-aqueous phase liquids (NAPL's). However, we do not believe that NAPL formation is likely in the wastes evaluated for this listing (see Section IV E). The model simulates the changes at the bottom of the impoundment over time as settled solids fill pore space in native soils and act to reduce chemical transport to underlying soils and groundwater. In addition, a fraction of each surface impoundment is aerated, which enhances biodegradation and increases volatilization of some chemicals. The surface impoundment is assumed to operate 50 years and then undergoes clean closure (that is, all the waste is removed from the unit). Based on the design assumptions, the surface impoundment module simulates annual release of leachate to the unsaturated zone and volatile emissions to the air. The model does not account for redeposition of volatiles into the unit from precipitation. The model accounts for several biological, chemical, and physical processes including hydrolysis, volatilization, sorption as well as settlement, resuspension, growth and decay of solids, activated biodegradation in the liquid phase (that is, a higher rate based on the amount of biomass present) and hydrolysis and anaerobic biodegradation in the sediments.

(iii) Tank Emissions Model. The tank model simulates time-varying releases of constituents to the atmosphere. The tank unit only has volatile emissions (no particulate emissions) and the tank is assumed to have an impervious bottom so that there is no contaminant leaching. The treatment tank is divided into two primary compartments: a ''liquid'' compartment and a ''sediment'' compartment. Mass balances are performed on these primary compartments at time intervals small enough that the hydraulic retention time in the liquid compartment is not significantly impacted by the solids settling and accumulation. In the liquid compartment, there is flow both in and out of the WMU. Solids generation occurs in the liquid compartment due to biological growth; solids destruction occurs in the sediment compartment due to sludge digestion. Using a well-mixed assumption, the suspended solids concentration within the WMU is assumed to be constant throughout the tank. However, some stratification of sediment is expected across the length and depth of the WMU so that the effective total suspended solids (TSS) concentration within the tank is assumed to be a function of the WMU's TSS removal efficiency rather than equal to the effluent TSS concentration. The liquid (dissolved) phase contaminant concentration within the tank, however, is assumed to be equal to the effluent dissolved phase concentration (i.e., liquid is well mixed). The tank model does not consider separate non-aqueous phase liquid (NAPL) in the tank that might exist if a constituent is above its solubility limit. We do not believe that constituents managed in paint production waste will have high enough concentrations in waste waters to form an oily film layer on top of the tank. As such, we believe the modeling performed with this tank model is appropriate.

(iv) Air Dispersion and Deposition Model. The atmospheric modeling performed for this risk assessment provides annual average estimates of air concentrations of chemicals released from the waste management units and annual deposition rate estimates for vapors and particles at various receptor points in the areas of interest. The chemicals that are emitted are either in the form of volatilized gases or fugitive dust. The simulated air concentrations are used to estimate biological uptake from plants and human exposures due to direct inhalation. The predicted deposition rates are used to determine chemical loadings to watershed soils, farm crop areas, and surface waters. The atmospheric concentration and deposition of chemicals were determined through a steady-state Gaussian plume modeling approach using the Industrial Source Complex-Short Term (ISCST3) model. Each of the waste management unit types were modeled as an area source with ISCST3. ISCST3 provides hourly meteorological data and estimates of contaminant concentration, dry deposition (particles only) and wet deposition (particles and gases) for user-specified averaging periods. Dry deposition of vapors was also calculated, but outside the dispersion model. Annual averaging periods were used for this analysis. These long averaging times are consistent with the use of chronic benchmarks in this analysis. The dispersion model uses information on meteorology (e.g., wind speed and direction, temperature) to estimate the movement of constituents through the atmosphere. Modeling was conducted using five years of hourly data obtained from 49 representative meteorological stations throughout the country. Meteorological stations were selected based on the location of paint manufacturing facilities.

Currently, algorithms specifically designed to model the dry deposition of gases have not been verified for the specific compounds in question (primarily volatile organics). In place of algorithms, we used a transfer coefficient to model the dry deposition of gases. A concern with this approach is that the deposition is calculated outside the model. As a result, the mass that we estimate deposits on the ground from the plume is not subtracted from the air concentrations estimated by ISCST3. This results in a slight non-conservation of the mass in the system.

Due to the complexity of the analysis, it was not computationally feasible to run ISCST3 on an hourly basis for the lifetime of all the unit configurations. To reduce the computational burden, we made several simplifications to the air modeling. The dispersion model is sensitive to the surface area of the waste management unit. In order to make the dispersion modeling computationally feasible, we divided the different waste management unit configurations into area-based bins that represented the distribution of surface areas for each of the waste management unit types. For each waste management unit type, the median area for each bin was input into ISCST3 and modeled at each of the 49 meteorological stations. For tanks, each area-height combination was modeled for each of the 49 meteorological locations. For any specific unit, the median air concentration and deposition values for the bin that most closely represented the specific unit's surface area was used. Another simplification used in the dispersion modeling is that a scavenging coefficient for all gases was used based on approximating the gases as very small particles. This approach eliminates the need for running ISCST3 for each specific chemical, thus reducing the overall runtime. This simplification might lead to underprediction of wet deposition for some gases and over-prediction for others depending on the Henry's Law coefficient of the gas.

(v) Overland Transport Model. Addition of constituents to soils, called constituent loading, can result from atmospheric deposition and overland movement of constituents. The primary loading mechanisms of constituents onto soils is by wet and dry deposition predicted with the dispersion model. This constituent deposition was predicted based on the average air concentration and deposition flux for both the buffer area and the agricultural field. We assumed that there was no erosion and runoff from the WMU to the surrounding soils since we assumed that the landfill and surface impoundment were below grade. However, erosion and runoff (overland transport) were evaluated to predict the movement of deposited contaminants onto agricultural fields and into nearby water bodies. Five constituent losses in the surface soils were considered: (1) Leaching of the chemical due to precipitation; (2) erosion of the chemical laterally along with the soil due to water; (3) runoff of the dissolved chemical with the lateral flow of water; (4) biodegradation of the chemical in situ; (5) volatilization losses of the chemical. The Universal Soil Loss Equation (USLE) was used to estimate soil erosion losses. The USLE is an erosion model originally designed to estimate long-term average soil erosion losses from an agricultural field having uniform slope, soil type, vegetative cover, and erosion-control practices. We used a modified form of the USLE to estimate the mass of soil lost per year per unit from the soils around the waste management unit and deposited in the runoff directly onto the receptor site (agricultural field and residential lot) and into a nearby stream. We assume the receptor location is between the waste management unit and the surface water body. The area around the waste management unit is considered for the purposes of our analysis to be an independent, discrete drainage subbasin that is at steady-state. We estimate the soil erosion load from the subbasin to the surface water body using a distance-based sediment delivery ratio, and consider that the sediment not reaching the surface water body is deposited evenly over the area of the subbasin. Using equations, we estimate contaminant contributions to the surface water body and the receptor soil. Soils were characterized within a 20 mile radius around each meteorological station using data obtained from the 1994 U.S. Department of Agriculture's State Soil Geographic Data Base and other relevant sources that are described in Appendix I of the risk assessment's Technical Background Document.

(vi) Surface Water Model. We assume that fish are exposed to waste constituents in surface water. Specifically our modeling assumes that fish are exposed to contaminants in the water column, contaminants sorbed to suspended solids in the water column, and contaminants associated with the bed sediment in the surface water body. The beef cattle and dairy cows are exposed to both dissolved and suspended constituent concentrations in the surface water. The model accounts for four ways in which contaminants may enter the surface water body: (1) Contaminants may be sorbed to eroded soils that enter the surface water body, (2) contaminants may be dissolved in runoff that enters the surface water body, (3) contaminants may be bound to airborne particles that are deposited on the surface water body, and (4) vapor phase contaminants in air may be deposited on the surface water body in precipitation (that is, wet deposition of vapor phase contaminants). The model also accounts for processes that remove contaminants from the surface water body. These include: (1) Volatilization of contaminants that are dissolved in the surface water body and (2) burial of contaminants in the sediment at the bottom of the surface water body. The model assumes that the impact to the water body is uniform, which is more realistic for smaller water bodies than for larger ones. The model estimates the concentrations of contaminants in the water column and bed sediment. We used the water column or bed sediment concentrations and bioconcentration factors or bioaccumulation factors. The water body used in this analysis is a stream located down gradient of the WMU. Depending on the receptor scenario that is evaluated, the stream is either adjacent to the buffer area (the area that separates the WMU from the human receptor locations) or is located adjacent to the agricultural field on the side farthest from the WMU. For modeling purposes, the stream is shaped as a rectangle 5.5 m wide and as long as the width of the agricultural fields. The assumption is that the stream is a typical third-order fishable stream. The stream segment modeled in this assessment is assumed to be homogeneously mixed with a depth of 0.21 meters (including water column and benthic sediments) and has a flow of 0.5 m/s. This stream is the smallest water body that would routinely support recreational fishing of consumable fish. Because we modeled a small stream with a constant flow rate, the stream scenario is a conservative (environmentally protective) estimate of the constituent concentration in a surface water body that results from soil runoff and air deposition.

(vii) Groundwater Model. We used EPA's Composite Model for Leachate Migration with Transformation Products (EPACMTP) to model the subsurface and transport of contaminants that leach from the waste management units (landfills and surface impoundments) and migrate to a residential drinking water well. We assume that the soil and aquifer are uniform porous media and that flow and transport is described by Darcy's law and the advection-dispersion equation, respectively. EPACMTP accounts for the following processes affecting contaminant fate and transport: Advection, hydrodynamic dispersion, equilibrium sorption by the soil and aquifer solids (both in the unsaturated and saturated zones), and contaminant hydrolysis. EPACMTP does not account for preferential pathways such as fractures, macropores, or facilitated transport (i.e., any chemical process that has the potential to speed the transport of a pollutant beyond what is expected), which may increase the migration of constituents.

The groundwater pathway consists of two components: Flow and transport in the vadose zone (that is, the unsaturated zone directly below the unit), and flow and transport in the saturated zone. The primary transport mechanisms in the subsurface are downward movement along with infiltrating water flow in the unsaturated zone and movement along with ambient groundwater flow in the saturated zone. The advective movement in the unsaturated zone is one-dimensional, while the saturated zone module accounts for three-dimensional flow and transport. The model also considers mixing due to hydrodynamic dispersion in both the unsaturated and saturated zones. In the unsaturated zone, flow is gravity-driven and prevails in the vertically downward direction. Therefore, the flow is modeled in the unsaturated zone as one-dimensional in the vertical direction. It is also assumed that transverse dispersion (both mechanical dispersion and molecular diffusion) is negligible in the unsaturated zone. This assumption is based on the fact that lateral migration due to transverse dispersion is negligible compared with the horizontal dimensions of the WMUs. In addition, this assumption is environmentally protective because it allows the leading front of the constituent plume to arrive at the water table with greater peak concentration.

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In the saturated zone, the movement of constituents is primarily driven by ambient groundwater flow, which in turn is controlled by a regional hydraulic gradient and hydraulic conductivity in the aquifer formation. The model does take into account the effects of infiltration from the waste source as well as regional recharge into the aquifer. The effect of infiltration from the waste source is to increase the groundwater flow in the horizontal transverse and vertical directions underneath and in the immediate vicinity of the waste source as may result from groundwater mounding. This three-dimensional flow pattern will enhance the horizontal and vertical spreading of the plume. The effect of regional recharge outside of the waste source is to cause a downward dip in the movement of the plume as it moves in the downgradient groundwater flow direction.

In addition to advective movement along with groundwater flow, the model simulates mixing of contaminants with groundwater due to hydrodynamic dispersion, which acts in the longitudinal, (i.e., along the groundwater flow direction), as well as in horizontal and vertical transverse directions. The rate of movement of contaminants may be strongly affected by sorption reactions in both the unsaturated and saturated zone. The effect of sorption is expressed in a retardation factor, which is directly related to the magnitude of the constituent-specific $_{KD}$ value ($_{K.C.}$ in the case of organdies). Constituents with a zero or low $_{KD}$ (or $_{K.C.}$) value will have a retardation factor of 1, or close to it, which indicates that they will move at the same velocity as the groundwater, or close to it. Constituents with high $_{KD}$ values, such as certain semi volatile organic constituents and many metals, will have high retardation factors and may move many times slower than groundwater. EPA has sometimes used the MINTEQA2 equilibrium speciation model to estimate Kd's for a variety of metals rather than relying solely on field measurements. However, recently a number of technical issues have been raised concerning the model and its application.[18] EPA is in the process of evaluating the model to address those issues. Therefore, we have decided not to use MINTEQA2 for today's proposed rule. Once the evaluation is completed and the issues are satisfactorily resolved, EPA may again choose to use the model in an appropriate form in future rulemakings. For today's proposed rule, we used values for metal Kd's that have been derived from field studies and have been published in the scientific literature. An empirical distribution was used to characterize the variability of Kd for chemical contaminants for which sufficient published data were available. However, for chemical contaminants having relatively few published values, a log uniform distribution was used in which a three log unit (three orders of magnitude) expansion was made around the geometric mean of the data. This was done to better account for the variability most often seen in measurements of Kd and to capture the uncertainty that comes from having limited data. Our use of empirically derived partition coefficients assumes that sorption is linear with respect to concentration (i.e., the Kd isotherm is linear). However, sorption is not unlimited and will tend to level off as groundwater concentrations increase beyond the linear range (i.e., Kd isotherm becomes non-linear). This condition is most likely to occur in the unsaturated zone where dilution is limited, if leachate concentrations are sufficiently high.

(viii) Indirect Exposure Methodology. We use a series of ''indirect exposure equations'' to quantify the concentrations of contaminants that pass indirectly from contaminated environmental media to the receptor. For example, contaminants that are transported in air may be deposited on plants or onto the soil where they may accumulate in forage, grain, silage, or soil that is consumed by beef cattle and dairy cattle. Individuals may then ingest contaminated beef and dairy products. Similarly, contaminants may be transported in groundwater to domestic groundwater wells where the groundwater is extracted and used for showering. The water vapor generated in the shower may be inhaled by the receptor. The indirect exposure equations allow us to calculate exposure point concentrations for these pathways and routes of exposure. The indirect exposure equations we use to conduct this risk assessment are presented in the Technical Background Document for the risk assessment.

e. *What Is The Human Health Toxicity of COC's Identified by EPA?* To characterize the risk from human exposures to the constituents of concern, toxicity information on each COC is integrated with the results of exposure assessment. Chronic human health benchmarks were used in this risk assessment to evaluate potential noncancer and cancer risks. We use reference doses (RfDs) and reference concentrations (RfCs) to evaluate noncancer health impacts from oral and inhalation exposures, respectively. Oral cancer slope factors (CSF's), inhalation unit risk factors, and inhalation CSFs are used to evaluate risk for carcinogens. The benchmarks are chemical-specific and do not vary between receptors (i.e., residents, farmers, recreational fishers) or age groups. We use several sources to obtain human health benchmarks. Health benchmarks for this risk assessment were obtained primarily from the most recent Integrated Risk Information System (IRIS) and the most recent Health Effects Assessment Summary Tables (HEAST). IRIS and HEAST are maintained by EPA, and the values from IRIS and HEAST were used in this analysis whenever available[19]. If IRIS or HEAST chronic benchmarks were not available, we sought benchmarks from alternative sources. Provisional EPA benchmarks, Agency for Toxic Substances and Disease Registry minimal risk levels, California Environmental Protection Agency (CalEPA) chronic inhalation reference exposure levels, and CalEPA cancer potency factors were used when values were not available from IRIS and HEAST. The benchmark for lead is unique. Instead of using the benchmarks described above, the Office of Solid Waste and Emergency Response (OSWER) soil screening level of 400 ppm was used as the benchmark for the air pathways in this analysis. The SSL number developed by OSWER accounts for all identified sources of lead exposure (including background). The soil screening level was derived by predicting the concentration of lead that can be in soils in a child's play area such that a typical child would have an estimated risk of no more then 5% of exceeding a 10 ug/dL blood lead level. In addition, the EPA's drinking water action level for lead of 0.015 mg/L was used for the groundwater pathway. We also used a drinking water action level for the groundwater pathway analysis for copper since an ingestion benchmark was not available.

Appendix Q of the Risk Assessment Technical Background Document contains the toxicological profiles used in our analysis. The studies used as the basis for each of these benchmarks have

[18] Norris, C.H. and C.E. Hubbard, 1999. Use of MINTEQA2 and EPACMTP to estimate groundwater pathway risks from the land disposal of metal-bearing wastes. Prepared for Environmental Defense Fund, Friends of the Earth, Hoosier Environmental Council, and Mineral Policy Center.

[19] We are aware that health benchmarks for several constituents of concern or potential constituents of concern are currently being reevaluated in IRIS. Reviewers should note that if the IRIS health benchmarks change, the Agency would likely use the most current benchmarks as the basis for setting concentration levels.

been reviewed and summaries of these studies, along with reference to the complete studies, are presented in Appendix Q of the Risk Assessment Background Document.

f. *What Are The Results From The Risk Assessment?* We developed concentration limits based on the following waste management unit/waste stream combinations:

- Emission control dust managed in a landfill.
- Combined volumes of emission control dust, sludges from waste water treatment, and solid off-specification production wastes (called ''combined solids'' in the results table) going to a landfill.
- All waste waters managed in a surface impoundment.
- All waste waters managed in tanks.

For the landfill and surface impoundment scenarios we have risk-based concentration limits for the air and groundwater pathways. We assumed that tanks were sufficiently impermeable that they were highly unlikely to release sufficient volumes of waste to pose an unacceptable groundwater risk that therefore it was not necessary to develop risk-based concentrations for the groundwater pathway. Other than mercury, the air pathway is not relevant for metals managed in waste waters because of their low volatility.

The small waste volumes generated by the paint and coatings manufacturing industry resulted in most of the potential constituents of concern not creating an unacceptable risk. For example, the central tendency waste volume for emission control dust is 2.44 m^3 annually (approximately 644 gallons). When compared to the central tendency capacity of a landfill cell (the annual capacity of a landfill over a 30 year life), the landfill cell is more than 1000 times larger. This results in a thousand fold dilution effect for the leachate when waste is placed in a landfill. Another way to put the waste volumes into perspective is to consider that the central tendency emission control dust waste volume reported by the paint and coating facilities comprises only 0.07% of the capacity of a median sized landfill.

Most of the constituents screened out of the air pathway because the predicted concentration limits were either greater than 1 million parts per million (physically impossible) or greater than what the EPA expects to be managed in paint manufacturing wastes. Specifically, out of the 43 constituents evaluated in both the landfill and surface impoundment scenarios, only 5 had air pathway concentration limits below 1 million parts per million (ppm). In the tank scenario, only 3 constituents had protective waste concentrations that were below 1 million ppm.

Table III.E–2 shows the calculated risk-based concentration levels for all the possible constituents of concern in each of the waste stream scenarios evaluated[20]. The results are the total concentration in either mg/kg for solids (landfills) or mg/L for liquids (surface impoundments and off-site tanks) that can be managed in the units and remain protective of human health. The concentration levels in Table III.E–4 represent the probabilistic results at the 90th percentile risk level based on individuals living closest to the waste management unit. In other words, these concentration numbers meet a target cancer risk level of 10–5 or hazard quotient of 1 for 90% of the receptor scenarios we evaluated. As discussed previously, we are attempting to calculate estimates of exposure in the upper end of the distribution (i.e., above 90th percent), while avoiding estimates that are beyond the true distribution. EPA guidance for risk characterizations states that ''the 'high end' of the risk distribution (generally the area of concern for risk managers) is conceptually above the 90th percentile of the actual (either measured or estimated) distribution. This conceptual range is not meant to precisely define the limits of this descriptor, but should be used by the assessor as a target range for characterizing 'high-end risk'.[21]'' Therefore, a high-end estimate that falls within the range (at or above the 90th percentile but still realistically on the distribution) is a reasonable input to a decision.[22]

We are soliciting comment on our use of the 90th percentile risk level, rather than other high-end risk levels, such as the 95th percentile, to set the regulatory concentration. If we used the 95th percentile results, the calculated listing levels would be about a factor of 3 lower. In addition, if we used the 95th percentile results, we would consider adding an additional constituent in the listing for liquid wastes (methanol; see Section IV.A for a list of the constituents we are proposing for listing). Details of the levels calculated using the 95th percentile are given in the Technical Background Document for the risk assessment.

In this listing we are proposing to set the levels at the 90th percentile, because we believe that the 90th percentile levels are protective. We have limited information on constituent levels in wastes because, for the reasons stated earlier, we did not sample waste streams. Thus, we do not know with any certainty that a large fraction of paint production wastes will be close to the levels derived from either the 90th or 95th percentile. Based on the limited data from our survey of the industry, we expect that many of the paint production wastes generated will not approach these concentrations, but will likely be well below the proposed listing levels. Thus, we think that the paint production waste that would remain nonhazardous at the proposed levels would pose risks below that indicated by the benchmark risk-level at either the 90th or 95th percentile.

We are proposing to establish a concentration-based listing that sets a threshold level below which wastes would not be considered hazardous. This is different from the usual listing determinations we have made in the past. In a traditional listing, all wastes meeting the listing description are regulated as hazardous, with no provision to test for levels of hazardous constituents present. In a traditional listing, if we determined not to list a waste, then all of the waste would go unregulated and the risk remains unaffected. A concentration-based listing, however, would regulate the higher risk wastes and potentially leave lower risk wastes unregulated. This means that by setting the listing levels at the 90th percentile, we are ensuring that the residual risk for the unregulated wastes would likely be below the risk associated with the risk based on an assessment of all wastes. Therefore, we believe that using the 90th percentile levels to set the listing levels is appropriate for this concentration-based listing. Note that we also recently proposed to use the 90th percentile risk levels to set listing levels in the listing for two wastes from the dyes and pigments industries (64 FR 40192, July

[20] Reviewers should note that inputs used in he modeling to support today's proposal may change, and minor modifications to the model itself may be made as a result of ongoing internal quality assurance/quality control reviews, internal peer review and public comments. As a consequence, the proposed constituent levels may change as well. Reviewers should bear in mind that levels that increase or decrease sufficiently could result in adding or deleting constituents from the listing, based on whether the risk-based levels are likely to occur in paint production wastes.

[21] ''Guidance on Risk Characterization for Risk Managers and Risk Assessors'', by then Deputy Administrator F. Henry Habicht, 1992.

[22] The distributions are distributions of concentrations that when found in paint production wastes will generate risks of 10–5 or an HQ of 1 for individuals living closest to paint manufacturing waste facilities. The ''90th percentile'' then is the concentration in paint manufacturing waste at which 90% of the individuals living closest to paint manufacturing waste management facilities will be protected to these levels.

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23, 1999); this was also a concentration-based listing that established a threshold, below which wastes would not be listed. For traditional listing decisions, we considered a range of high-end risk results, including a range of probabilistic results at or above the 90th percentile, e.g., see the proposed listings for wastes from the production of chlorinated aliphatics (64 FR 46476, August 25, 1999) and inorganic chemicals (65 FR 55684, September 14, 2000).

TABLE III.E–4.—CALCULATED RISK-BASED CONCENTRATION LEVELS FOR POSSIBLE CONSTITUENTS OF CONCERN IN PAINT AND COATINGS WASTE [1]

Constituents	Emission control dust (mg/kg)		Combined solids (mg/kg)		Waste waters in surface impoundments (mg/L)		Waste waters in off-site tanks (mg/L)
	Air pathway	Ground-water pathway	Air pathway	Ground-water pathway	Air pathway	Ground-water pathway	
Acrylamide	E	3.1E+02	E	4.7E+02	2.3E+05	1.2E+01	E
Acrylonitrile	1.3E+05	4.3E+01	1.7E+05	6.0E+01	1.9E+04	9.3E+00	6.9E+04
Antimony	E	2.3E+03	E	3.2E+03	M	3.9E+02	M
Barium	E	E	E	E	M	E	M
Benzene	6.3E+05	3.1E+04	7.9E+05	4.7E+04	1.0E+05	5.6E+02	1.9E+05
Butylbenzylphthalate	E	L	E	L	E	E	E
Cadmium	E	1.3E+05	E	2.8E+05	M	3.9E+04	M
Chloroform	E	6.0E+05	E	E	E	1.5E+02	E
Chromium III	E	E	E	E	M	E	M
Chromium VI	E	6.8E+04	E	6.6E+04	M	8.8E+03	M
Cobalt	E	E	E	E	M	E	M
Copper	E	E	E	E	M	E	M
Cresol, m	E	E	E	E	E	2.2E+04	E
Cresol, o-	E	E	E	E	E	2.5E+04	E
Cresol, p-	E	E	E	E	E	2.6E+03	E
Di(2-ethylhexylphthalate)	E	L	E	L	E	E	E
Dibutylphthalate	E	L	E	L	E	E	E
Dichloromethane	E	2.4E+05	E	3.3E+05	E	4.5E+03	E
Dimethylphenol 2,4-	E	E	E	E	E	1.7E+04	E
Divalent mercury	6.0E+05	E	8.7E+05	E	2.5E+04	6.4E+05	E
Ethylbenzene	E	L	E	L	E	1.1E+04	E
Ethylene glycol	E	E	E	E	E	7.9E+05	E
Formaldehyde	E	9.3E+05	E	E	E	8.2E+04	E
Lead	E	E	E	E	M	E	M
Mercury	1.6E+05	E	2.1E+05	E	5.9E+03	E	1.0E+04
Methanol	E	E	E	E	E	2.0E+05	E
Methyl ethyl ketone	E	1.5E+05	E	2.2E+05	E	8.2E+03	E
Methyl isobutyl ketone	E	7.3E+04	E	1.2E+05	E	3.4E+02	E
Methyl methacrylate	E	2.8E+04	E	4.1E+04	E	2.1E+03	E
N-butyl alcohol	E	9.7E+05	E	E	E	4.1E+04	E
Nickel	E	E	E	E	M	E	M
Nickel oxide	E	B	E	B	M	B	M
Pentachlorophenol	E	9.6E+04	E	1.6E+05	E	1.0E+04	E
Phenol	E	E	E	E	E	2.7E+05	E
Selenium	E	2.5E+04	E	3.4E+04	M	6.1E+03	M
Silver	E	E	E	E	M	E	M
Styrene	E	E	E	E	E	4.6E+03	E
Tetrachloroethylene	E	1.4E+04	E	2.1E+04	E	4.8E+02	E
Tin	E	E	E	E	M	E	M
Toluene	E	E	E	E	E	1.2E+03	E
Vinyl acetate	E	G	E	G	E	G	E
Xylene (mixed isomers)	E	L	E	L	E	3.9E+03	E
Zinc	E	E	E	E	M	E	M

[1] Levels represent the 90th percentile protective waste concentration derived from the probabilistic analysis.
L = screened out of the groundwater due to no leachate.
E = risk-based waste concentration exceeds 1 million (1E+06) parts per million.
B = screened out of the pathway due to a lack of a human health toxicity benchmark.
M = not included in the risk analysis for that pathway since the constituent is a non-volatile metal.

g. *What Is The Uncertainty in Human Health Risk Results?* Uncertainty is a description of the imperfection in knowledge of the true value of a particular parameter. This risk assessment has inherent limitations that lead to uncertainty in our risk estimates because of the complexity associated with simulating the behavior of a chemical moving through the environment from disposal in a management unit, to exposure points in various environmental media, and subsequent impacts on receptors. As explained below, limitations also result from the amount, type, and quality of the data used in our assessment, the set of exposure pathways evaluated, and the types of waste management units considered. Because of the number of facilities that manufacture paint and

coatings, it was not feasible for us to directly measure data such as facility/site characteristics (for example, unit area and volume; depth to groundwater; aquifer thickness; hydraulic conductivity; location of wells; type of ecological receptors; behavioral characteristics of receptors) at each representative site to estimate risk.

This section discusses the major areas of uncertainty in risk assessments as classified by the EPA: scenario uncertainty, model uncertainty, and parameter uncertainty.

(a) Scenario uncertainty results from the assumptions we make regarding how receptors become exposed to contaminants. This uncertainty occurs because of the difficulty and general impracticality of making actual studies of all activities involved in the management of a waste and the human activities that occur around the waste management unit.

• This risk assessment does not consider the additive risk from exposure to multiple constituents. Chemical mixtures can display both synergistic and antagonist behavior with regard to risk. In general, however, the overall risks of a mixture are very likely to be greater than that of exposure to a single chemical. Therefore not adding exposures across the chemicals is an area of uncertainty that leads to an underestimate of total risk. We did not calculate the additive effects from multiple-chemical exposure since there was not information on the concentrations or co-management of particular constituents. In addition, for a concentration based listing it is not reasonable to set standards for a constituent that are developed based on the assumed presence of other constituents that have the same health affect. Whether or not a particular chemical mixture poses an additive risk or hazard depends on the targets (tissue, organ, or organ system), the concentrations of all the constituents in the mixture, and the mechanisms of action of the individual chemicals. Without information on the co-management of constituents, it was not feasible to consider additive risks.

• In certain cases, EPA performs a risk assessment on wastes that contain contaminants that also are present in the environment as a result of both natural processes and anthropogenic activities. Under these circumstances, receptors potentially receive a ''background'' exposure that may be greater than the exposure resulting from release of contaminants from the waste. For national analysis like this assessment, the inclusion of background concentrations as part of the analysis is not feasible due to (a) the variability of background concentrations nationwide and (b) the lack of data on national background concentrations for each constituent.

(b) Parameter uncertainty occurs when (1) there is a lack of data about the parameters used in the equations, (2) the data that are available are not representative of the particular instance being modeled, or (3) parameter values cannot be measured precisely and/or accurately because of limitations in measurement technology. Random, or sample errors, are a common source of parameter uncertainty that is especially critical for small sample sizes. More difficult to recognize are nonrandom or systematic errors that result from bias in sampling, experimental design, or choice of assumptions.

• The age of several of the databases used in this analysis to characterize the waste management units or the location of the receptors leads to uncertainty in the analysis. These databases contain information collected by the EPA in several surveys during the mid- to late 1980's. While these databases represent the best available information the Agency had at the time of this analysis, uncertainty exists in the analysis on changes in waste management practices or residential locations that may have occurred during the past decade. The uncertainty associated with these data may lead to an over or under estimate of risk.

• The sorption coefficient, K_d, which is used in the source partition model, the groundwater model, and in modeling constituent concentration in surficial soils, is an important parameter for modeling the fate and transport of metals in the environment. In previous analyses, K_d values were calculated using MINTEQ but, because of comments on the validity of some of the data upon which MINTEQ calculations are based, EPA decided, for this analysis, that K_d values would be derived from literature values. A comprehensive review of the literature was undertaken to compile K_d data for an earlier rulemaking (Inorganic Chemicals Listing Determination, 65 FR 55684, September 14, 2000.) Despite this substantial earlier effort, considerable uncertainty remains in the literature-based values of K_d used in this analysis because data concerning K_d values for particular constituents reported in the literature were limited. In addition, reported values often were not accompanied by qualifying information. Conditions that affect K_d values (e.g., constituent concentration, metal species evaluated, pH, experimental technique) are often not reported in the literature making interpretation of results difficult. For these reasons, substantial uncertainty concerning the values of K_d remain.

• Very little data were available on the physical and chemical characteristics of paint manufacturing waste. To address this, assumptions on the waste characteristics are based on general knowledge of paint and other similar industrial wastes. In this analysis, except for constituent concentration, which was calculated, EPA assumes that the paint manufacturing waste is mixed with other generic industrial wastes. Therefore, general waste characteristics, including default assumptions for the waste parameters (e.g., fraction of organic carbon, pH), were used.

• We used waste volume data in this risk assessment provided by the facilities as part of our RCRA 3007 survey. Since the survey was not a census, there is some uncertainty associated with the waste volume distribution. This uncertainty may lead to an over or under estimate of risk.

• We typically use regional databases to obtain the parameter values necessary to model contaminant fate and transport. Because the data that we used are not specific to the facilities at which the actual wastes are managed, the data represent our estimates of the generic site conditions. For an analysis where waste management locations are so variable, we believe this type of approach is reasonable and is the best method to address the fate and transport of constituents. Nevertheless, the use of these databases in lieu of site-specific data may result in either overestimates or underestimates of risk.

• Sources of uncertainty in toxicological benchmarks include one or more of the following: extrapolation from laboratory animal data to humans, variability of response within the human population, extrapolation of responses at high experimental doses under controlled conditions to low doses under highly variable environmental conditions, and adequacy of the database (number of studies available, toxic endpoints evaluated, exposure routes evaluated, sample sizes, length of study, etc.). Toxicological benchmarks are designed to be conservative (that is potentially overestimate risk) because of the uncertainties and challenges associated with condensing toxicity data into a single quantitative expression. Uncertainty factors are applied to address limitations of the available toxicological data and are necessary to ensure the RfD or RfC is protective of individuals in the general population. The use of uncertainty factors is based on long-standing scientific practice. Uncertainty factors, when combined commonly range from 10 to 1000 depending on the nature and quality of the underlying data. The RfD/RfC methodology is expected to have an uncertainty spanning perhaps an order of magnitude.

• We recognize that significant uncertainties and unknowns exist regarding the estimation of lifetime cancer risks in children. We estimated the risk of developing cancer from the estimated lifetime average daily dose and the slope of the dose-response curve. A cancer slope factor is derived from either human or animal data and is taken as the upper bound on the slope of the dose-response curve in the low-dose region, generally assumed to be linear, expressed as a lifetime excess cancer risk per unit exposure. However, individuals exposed to carcinogens in the first few years of life may be at increased risk of developing cancer.

• The non-cancer toxicological effects in children is also an area of uncertainty. Non-cancer reference doses and reference concentrations for children are based on comparing childhood exposure, for which we have age-specific data, with adult toxicity measures, where adequate age-specific dose-response data is lacking. This mismatch results in a large amount of uncertainty in the estimation of hazard quotients for children. This would sometimes result in an overestimation of children's risk and sometimes in an underestimation. This issue

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is still under investigation in the scientific community and no consensus has been reached.

(c) Model uncertainty is associated with all models used in all phases of a risk assessment, because models and their mathematical expressions are simplifications of reality that are used to approximate real-world conditions and processes, and their relationships. Computer models are simplifications of reality, requiring exclusion of some variables that influence predictions but cannot be included in models due either to increased complexity or to a lack of data on a particular parameter. Models do not include all parameters or equations necessary to express reality because of the inherent complexity of the natural environment, and the lack of sufficient data to describe the natural environment. Because this is a probabilistic assessment that predicts what may occur with the management of certain paint manufacturing wastes under assumed scenarios, it is not possible to compare the results of our models to any specific situation that may exist. The risk assessor needs to consider the importance of excluded variables on a case-by-case basis because a given variable may be important in some instances and not in others. A similar problem can occur when a model that is applicable under average conditions is used for conditions that differ from the average. In addition, in some instances choosing the correct model form is often difficult when conflicting theories seem to explain a phenomenon equally well. In other instances, the Agency does not have established model forms from which to choose to address certain phenomena, such as facilitated transport. We selected models used in this risk assessment based on science, policy, and professional judgement. Most of the models selected have been verified and some have been validated. In addition, most of these models have been peer reviewed. These models were selected because they provide the information needed for this analysis and because we generally consider them to be state-of-the-science. Even though the models used in the risk analyses are used widely and have been accepted for numerous applications, they each retain significant sources of uncertainty. Evaluated as a whole, the sources of model uncertainty in our analysis could result in either an overestimation or underestimation of risk. Specific areas of modeling uncertainty in this analysis are:

- There were constituents identified as materials used in paint manufacturing that were not modeled in this risk assessment due to a lack of information on how they behave when introduced to the environment. Our fate and transport modeling is limited to those constituents for which we have (1) the physical/chemical parameters necessary to run our models and (2) adequate information on toxicity to understand potential health impacts from exposure. In selecting constituents of concern, we found multiple constituents that were complex inorganic compounds containing more than one metal of concern and organometallic compounds (compounds containing both a metal and organic constituents) that can be used in manufacturing paint. For example, compounds such as lead chromate molybdate and lead naphthenate may be used as ingredients in paint. An adequate set of both the physical/chemical parameters and toxicity information for modeling fate and transport and predicting risk to human health are lacking for these metal complexes. The technical background document for the risk assessment contains the information we found on a set of organometallics. Due to this absence of data, we simulate the risk presented by these multiple compounds by modeling the ionic form of the metal. For example, the model predictions for lead are used to represent the complex lead inorganic metal compounds and lead organometallic compounds that may be used in paints. Since so little is known about these complex metal compounds and what their fate may be in the environment, our modeling may over or under-estimate the actual risks. In addition, for metals transformations may take place as the pH of the waste or media can change the state of the metal, sometimes to a less toxic form and sometimes to a more toxic form. The risk assessment did not model transformation products or changes in metal species.
- Exposure modeling relies heavily on default assumptions concerning population activity patterns, mobility, dietary habits, body weights, and other factors. There are some uncertainties associated with some of the data used for these parameters. Although it is possible to study various populations to determine various exposure parameters (e.g., age-specific soil ingestion rates or intake rates for food) or to assess past exposures (epidemiological studies) or current exposures, risk assessment is about prediction. Therefore, long-term exposure monitoring in this context is infeasible. The Exposure Factors Handbook provides the current state-of-the-science concerning exposure modeling and assumptions and is used in this risk assessment. To the extent that actual exposure factors vary from the assumptions in this risk assessment, risks could be underestimated or overestimated.
- In modeling the fate and transport of chemicals in groundwater, we did not assess complex hydrogeology such as karst or highly fractured aquifers. Some fraction of the groundwater settings in this analysis have fractured flow. In general, fractured flow in groundwater can channel the contaminant plume, thus allowing it to move faster and more concentrated than in nonfractured flow environment. As a result, our modeling may under or over estimate the concentrations in the groundwater.
- Finally, there is uncertainty in predicting the movement of contaminants over long periods of time. We assess the risk to receptors for the groundwater pathway over a time period of 10,000 years. There are significant uncertainties regarding how exposure, scientific, and environmental assumptions will change over time, and the modeling methodology does not change these assumptions over this 10,000 year period.

We request comments on each of these areas of uncertainty, including their potential impact on our conclusions and whether data are available to improve our analysis.

6. What Was EPA's Approach To Conducting the Ecological Risk Assessment?

Waste management activities cannot only impact the health of individuals living near a WMU, but can also have adverse effects on other organisms and natural systems. For example, wildlife can come into contact with constituents released from WMUs by swimming or living in contaminated waters or by drinking or catching prey such as fish from contaminated waters. For this risk assessment, the EPA conducted an ecological risk screening analysis for all the waste management units evaluated for the human health risk assessment. The purpose of this analysis was to identify whether there is potential for adverse ecological effects from the management of paint production waste in landfills, surface impoundments, and off-site treatment tanks. We performed this ecological risk assessment with a two tiered approach. For the first tier, we assumed that each of the constituents evaluated had a concentration in the waste of 750,000 parts per million. This concentration was a starting number for the analysis and does not have any significance to the way in which paint wastes are currently managed. This waste concentration was selected as a concentration level to perform a screening analysis with since it is greater than what the EPA expects would be managed in paint manufacturing wastes. All constituents except for mercury and lead did not pose an unacceptable risk to ecological receptors at this concentration. For these two constituents, we performed a second level of analysis. For mercury and lead, we predicted what concentrations could be managed in each waste management unit to ensure that all ecological receptors experience a hazard quotient of 1 or less when compared to the 90th percentile environmental media concentrations. These concentrations were 270,000 ppm and 7400 ppm for lead and mercury

respectively. Based on these concentrations we determined that lead and mercury in paint manufacturing wastes do not pose a threat to ecological life. Based on our knowledge of paint formulations and information we received on constituent concentrations from our 3007 survey, we do not expect paint production wastes to contain either lead or mercury at the levels we predicted would pose a hazard to ecological receptors. In addition, since lead and mercury are regulated as hazardous wastes with the toxicity characteristic, we believe that paint manufacturing wastes that have high levels of these constituents will already be regulated as hazardous waste.[23] Although we modeled high concentrations in the waste, we believe that risks were not found to ecological receptors in this screening level risk assessment because of the small waste volumes of non-hazardous waste that are being managed in the waste management units.

The models described in Section III were used to estimate the release of these concentrations from the waste management units, fate and transport of the constituents in the environment, and ultimately, the concentration of each constituent in the different environmental media (i.e., surface waters, soils). The ecological screening analysis compares these modeled media concentrations to ecologically protective media concentrations called chemical stressor concentration limits (CSCL's). The result of this comparison is a ratio called a hazard quotient. When the hazard quotient exceeds 1, there is potential for adverse effects to the ecological receptor. If the hazard quotient is equal to or less than 1, we do not expect adverse effects for a particular ecological receptor. The amount by which the hazard quotient exceeds 1 suggests the potential for adverse ecological effects; however, the screening results do not demonstrate actual ecological effects, nor do they indicate whether those effects will have significant implications for ecosystems and their components.

a. *How Were Ecological Exposures Estimated?* Similar to estimating human receptor exposures, we estimated ecological receptor exposures based on simulated contaminant concentrations in the various environmental media and food items, pathway specific ingestion rates, and receptor type-specific body weights. For this analysis, however, the EPA determined the upper bound constituent concentration that can be present in the emission control dust, combined solids, and aqueous waste and modeled the fate and transport of these constituents into the environment. The resulting media concentrations were then compared to ecological receptor chemical stressor concentration limits. The exposure pathways included in this analysis were (1) root uptake of constituents in soil or sediment by plants, (2) biological uptake of constituents in surface water by aquatic animals (e.g., fish or aquatic invertebrates); (3) biological uptake of constituents in sediment by benthic invertebrates; (4) biological uptake of constituents in soil by soil invertebrates; and (5) ingestion of constituents in surface water, soil, sediment, or food items (plants and animals) by terrestrial vertebrates. This assessment did not take into account the dermal absorption of constituents in surface water or soil by terrestrial vertebrates or the inhalation of volatile constituents in air. There are not enough data available on these types of exposures to wildlife to include them in this risk assessment. The 90th percentile media concentrations were then compared to CSCLs to determine the hazard quotient for each ecological receptor evaluated.

There were several simplifying assumptions made for this analysis that over-estimated the potential hazard to ecological receptors. For example, the exposures are estimated assuming that the receptors derive all their food from the contaminated area and the receptors diets consist predominantly of items with the highest contaminant uptake rates. The methodologies and equations used for the ecological receptor exposure estimates are fully described in the Technical Background Document for the risk assessment.

b. *What Ecological Receptors Did The EPA Evaluate?* Two general types of receptors were evaluated in the ecological assessment. For exposure through direct contact with contaminated media, the receptors were multispecies communities such as the soil invertebrate community or the terrestrial plant community. For indirect exposure through ingestion, the receptors are single species populations, such as white-tailed deer or raccoons and include representative trophic levels and feeding strategies. Evaluating risk to receptor populations and communities included consideration of both aquatic and terrestrial habitats. Within each habitat, risk was evaluated at all trophic levels (*i.e.,* position within the food chain) and for all feeding strategies (*e.g.,* plant feeder, predator). Although actual WMU sites were not defined, it was assumed that WMUs occur in a variety of settings that include terrestrial, wetland, and aquatic systems. Thus, the ecological receptors evaluated in this risk assessment include representative plants and animals from several different terrestrial, wetland, and aquatic habitats. In general, the receptors occur throughout most of the continental United States or throughout broad regions, such as east of the Mississippi River.

Relevant trophic levels and feeding strategies (*i.e.,* herbivorous, omnivorous, and carnivorous diets) were established using simple food webs that describe dietary composition and predator-prey relationships in each of the three habitat types. Receptors representing each feeding strategy at each trophic level were selected. In addition, the receptors represent a cross section of general taxa at each trophic level. For example, invertebrates as well as vertebrates were included, and vertebrate receptors include amphibians, mammals, and birds.

The ecological assessment does not specifically address federally listed threatened or endangered species.

c. *How Did EPA Consider The Toxicity of Constituents in The Ecological Risk Assessment?* The calculation of ecological risk for receptor populations is based on the implicit assumption that each receptor species forages only within the contaminated area, regardless of the size of its home range. For smaller animals, this assumption has little impact on the estimates of exposure. However, for larger animals with more extensive foraging areas, this assumption may overestimate exposure if the animal's foraging patterns tend to be evenly spread over the home range that extends beyond the contaminated area.

For the species specific receptors (both mammals and birds), the overall approach used to establish ecotoxicological benchmarks is similar to the methods used to establish RfDs for humans. Each method uses a hierarchy for the selection of toxicity data and extrapolates from a test species to the species of interest. However, there are fundamental differences in the goals of noncancer risk assessments for humans and ecological receptors. Risk assessments of humans seek to protect the individual while risk assessments of ecological receptors seek to protect

[23] Such high levels of mercury in paint manufacturing are also unlikely due to existing regulations controlling the use of mercury in paint. Prior to the 1990s, paint manufacturing used mercury in paints at low levels (e.g., phenylmercuric acetate was used as a biocide to control mildew in latex paints). EPA restricted this use under the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA), eliminating mercury in interior latex paints (55 FR 26754, June 29, 1990) and in exterior paints (56 FR 105, May 31, 1991).

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populations or communities of important species.

First, because population viability was selected as an assessment endpoint, the benchmarks were developed from measures of reproductive/developmental success or, if unavailable, other effects that could conceivably impair population dynamics. In addition, the population-level benchmark was preferred over population-inference benchmarks. Population-level benchmarks are based on studies of effects on an entire population (*i.e.,* many interacting individuals) while population-inference benchmarks are based on studies of individuals with protection of the population being inferred from protection of the individual (*e.g.,* no observed adverse effect levels for individual organisms on reproductive endpoints). Although relatively few population-level benchmarks have been developed to date, these benchmarks are considered to be more rigorous than the point estimates gleaned from toxicity studies. Once the appropriate ecotoxicological studies were identified for mammals and/or birds, the CSCLs for each receptor were calculated for each medium of interest by scaling the toxicity benchmark from the test species to the receptor species, identifying the uptake/accumulation factors, identifying the exposures from dietary intake, and determining a risk-based concentration in each media. The benchmarks for the community receptors were taken from various sources such as the final chronic values developed for the National Ambient Water Quality Criteria. A detailed description of the benchmarks developed for all of the receptors evaluated is contained in the Technical Background Document for the risk assessment.

7. *Did EPA Conduct a Peer Review of The Risk Assessment?* The Agency has obtained a peer review from independent experts. Their comments have been received and are part of the peer review document that is in the docket for today's proposed rule. The peer review document also describes how the experts were identified and selected, contains information on the experts experience and employment, and provides a copy of the questions the peer reviewers were asked to address. Due to the time constraints for proposal of this rule, the Agency has not yet reviewed and addressed those comments. Both the peer review comments and the public comments will be addressed in the final rulemaking.

IV. Proposed Listing Determinations and Regulations

A. What Are The Proposed Regulations for Paint Production Wastes?

We are proposing that, if you generate any of the paint manufacturing wastes described in these listings, then you must determine whether or not your waste is a listed hazardous waste, or you must assume that it is hazardous. For the wastes identified in the K179 and K180 listings, your waste would become a listed hazardous waste if it contains any of the constituents of concern at a concentration equal to or greater than the hazardous concentration identified for that constituent. You would need to make a determination that all the constituents of concern in your waste are below the hazardous concentrations to have your wastes remain nonhazardous. Waste liquids listed in K180, however, would not be subject to the listing, if the wastes are stored or treated exclusively in tanks or containers prior to discharge to a POTW or under an NPDES permit. We are proposing the following regulatory language in § 261.32 for these wastes:

K179—Paint manufacturing waste solids generated by paint manufacturing facilities that, at the point of generation, contain any of the constituents identified in paragraph (b)(6)(iii) of this section at a concentration equal to or greater than the hazardous level set for that constituent in paragraph (b)(6)(iii) of this section. Paint manufacturing waste solids are: (1) Waste solids generated from tank and equipment cleaning operations that use solvents, water and/or caustic; (2) emission control dusts or sludges; (3) wastewater treatment sludges; and (4) off-specification product. Waste solids derived from the management of K180 by paint manufacturers would also be subject to this listing. Waste liquids derived from the management of K179 by paint manufacturers are not covered by this listing, but such liquids are subject to the K180 listing. For the purposes of this listing, paint manufacturers are defined as specified in paragraph (b) of this section.

K180—Paint manufacturing waste liquids generated by paint manufacturing facilities that, at the point of generation, contain any of the constituents identified in paragraph (b)(6)(iii) of this section at a concentration equal to or greater than the hazardous level set for that constituent in paragraph (b)(6)(iii) of this section unless the wastes are stored or treated exclusively in tanks or containers prior to discharge to a POTW or under a NPDES permit. Paint manufacturing liquids are generated from tank and equipment cleaning operations that use solvents, water, and/or caustic. Waste liquids derived from the management of K179 by paint manufacturers would also be subject to this listing. Waste solids derived from the management of K180 by paint manufacturers are not covered by this listing, but such solids are subject to the K179 listing. For the purposes of this listing, paint manufacturers are defined as specified in paragraph (b) of this section.

Due to the uncertainties in our assessment of the management of paint manufacturing waste liquids in surface impoundments, we are seriously considering an alternative proposal not to list paint manufacturing waste liquids. We describe this alternative and our reasoning for this option later in this notice (see Section IV.D).

Under the proposed listings shown above, paint manufacturing wastes with constituents of concern below the concentration limits at the time of generation would not be hazardous waste K179 or K180; such wastes would be nonhazardous from their point of generation, and would not be subject to any RCRA Subtitle C management requirements for generation, storage, transport, treatment, or disposal (including the land disposal restrictions). Similarly, liquid paint manufacturing wastes would also be nonhazardous if the waste is managed or treated exclusively in tanks or containers prior to discharge to a POTW or under an NPDES permit regardless of whether it contained any of the constituents of concern. However, if paint manufacturing wastes are hazardous waste due to another listing code or because they exhibit a hazardous waste characteristic under section 261.24, the wastes remain hazardous under these other regulations.

We are proposing that the constituents and the concentrations in the two above listings (which would be specified in paragraph (b)(6)(iii) of § 261.32) would be those shown in Tables IV.A–1 for waste solids (K179) and in Table IV.A–2 for waste liquids (K180). These are waste concentrations that represent risk-based concentrations for constituents we determined to be of potential concern in paint manufacturing wastes. The concentration-based listing levels for waste solids are based on the risk modeling for landfills, and the levels for waste liquids are based on the risk modeling for surface impoundments. We also evaluated potential air releases from treatment of waste liquids in tanks, but as described in Section IV.C, we did not find significant risks for this management scenario. Therefore, we are proposing not to include wastes managed exclusively in tanks within the scope of the listing for waste liquids. See Section IV.D for further discussion of our reasoning for structuring the listing for waste liquids in this way, and for other options we are considering.

As described in Section III.E, we developed risk-based concentrations for the larger set of constituents shown in Table III.E–4. In general, we relied on the modeling results to guide us in deciding which constituents would be most useful in defining these paint manufacturing wastes as listed hazardous wastes. We chose constituents for listing from the list in Table III.E.4 using a number of criteria.

- We dropped constituents from further concern if the risk-based levels for the waste exceeded or approached 100% (i.e., 1,000,000 mg/kg), because these constituents could not present significant risks in the paint manufacturing wastes we evaluated.
- We did not include constituents that are already regulated by the TC. As discussed in Section IV.G, we found that the regulatory TC levels (see 40 CFR 261.24) would likely be below the protective levels we calculated for these chemicals. Therefore, based on our analysis, the existing TC regulations adequately regulate risks from these constituents in these wastes, because wastes exhibiting the TC would have to be treated prior to disposal.
- We dropped constituents if their levels were so high that we believe it is highly unlikely that these chemicals would ever exist at such levels in waste solids from paint manufacturing.

For paint manufacturing waste solids (K179) we used the risk levels in Table III.E–4 calculated for emission control dust, because these were slightly lower than the levels for the combined solids. Using the above criteria for the 43 constituents listed in Table III.E–4, we dropped 24 constituents that have risk-based levels above 100% and 11 other constituents that are TC chemicals. We dropped three others that are unlikely to exist in paint wastes at the calculated risk-based levels. Two of the three have risk-based levels that are close to 100% and are therefore implausible for waste (n-butyl alcohol—970,000 mg/kg, formaldehyde—930,000 mg/kg). The other constituent, methylene chloride (dichloromethane), has a level of 24% (240,000 mg/kg). This appears unlikely, given that manufacturers have moved away from using chlorinated solvents in paints. This is further supported by the responses to the 3007 survey, which showed that the presence of this chemical was not reported by any facility in nonhazardous waste.

For waste liquids (K180), we used the risk-based levels in Table III.E–2 derived for wastewaters in surface impoundments. We dropped 14 constituents that have risk-based levels above 100% and 13 others that are TC constituents. We also dropped four other constituents that have levels that appear unlikely for waste liquids: ethylene glycol, phenol, methanol, and 2,4-dimethylphenol. The calculated levels for ethylene glycol (790,000 mg/L), phenol (270,000 mg/L) and methanol (200,000 mg/L) were so high that we considered these unlikely to ever occur in liquid paint manufacturing wastes. While all three are potentially used as water-soluble solvent ingredients, phenol and methanol are also used as biocides in water-based paints.[24] While the Survey showed these chemicals were found frequently in paint manufacturing wastes, no generator reported levels in nonhazardous or hazardous wastes that would approach the modeled levels of concern (the only waste with high levels was an off-spec paint containing 20% of ethylene glycol that was sent to fuel blending). For waste streams to approach these concentrations, the constituents would have to start out at even higher concentrations in the product. Such high levels in the products are unrealistic, because products with such high concentration of these constituents would not have the attributes of paint. Therefore, we are not proposing to include these chemicals as constituents in the paint listings.[25]

We dropped 2,4-dimethylphenol as a constituent of concern for waste liquids because the 3007 Survey showed that facilities did not report its presence in nonhazardous waste. Furthermore, the only potential use in paint we found for this chemical was possibly as a biocide. Therefore the low concentrations resulting from such a use would be unlikely to approach the risk-based level (17,000 mg/L). We also note that the TRI data showed only minimal releases (5 lbs.) to off-site wastewater treatment for all facilities in SIC code 2851.

Regulations that limit air releases from off-site wastewater treatment facilities are also likely to keep levels of these organic constituents below such high levels. EPA is planning to propose a MACT standard for paint manufacturers (Miscellaneous Organic Chemical and Coatings Manufacturing) that would regulate HAPs in wastewaters, both when managed on-site and when sent off-site for treatment. Furthermore, subpart DD in 40 CFR part 63 sets National Emission Standards for Hazardous Air Pollutants (NESHAP) from off-site waste and recovery operations, which may include off-site centralized wastewater treatment facilities (July 1, 1996, 61 FR 34140).[26] In addressing potential air releases from such facilities, the CAA regulations are likely to prevent the levels of most chemicals at issue here (e.g., phenol and methanol) from reaching the risk-based levels under consideration in liquid paint manufacturing wastes. This is likely because such MACT standards often provide incentives to reduce HAPs through source reduction or pretreatment to avoid costly engineering controls.

We solicit comment on the proposed list of constituents and their levels. We seek comment and supporting information as to whether any other constituents discussed above should be added to the chemicals for listing paint solids or liquids and the basis for such action. We seek any information that may assist us in deciding whether any of the constituents or levels in Tables IV.A–1 and IV.A–2 are so unlikely to be present at the levels of concern that we should drop them from the listing. For example, the levels for the solids (K179) are high for methyl isobutyl ketone (73,000 mg/kg). The liquid level for formaldehyde (82,000 mg/L) is also unlikely for a chemical that has been used mainly as a biocide or in polymer binders. In addition, we question whether the chemicals methyl methacrylate and styrene, which are used primarily as resins rather than in their monomeric forms, would be present at the high levels shown in Tables IV.A–1 and IV.A–2 for the solid or liquid paint manufacturing wastes. However, we believe levels of the monomeric forms of acrylonitrile and acrylamide that are present in the resins may still present a potential risk at the relatively low levels set for waste solids and waste liquids not managed in tanks. Therefore, we are proposing to include acrylonitrile and acrylamide as listing constituents, because they may be in paint manufacturing wastes at or above these levels (see discussion in Section IV.C on potential risks from tanks). Depending on comments, we may choose to add or remove constituents from the concentration-based listing.

[24] We found solvent uses for phenol were limited in a listing determination for solvent uses of this chemical (see 61 FR 42318, August 14, 1996). Primary uses as a solvent were in the petroleum industry (extraction of lube oil) and in microelectronic and automotive industries (removing coatings). While this previous analysis did not focus on uses as ingredient, which is the potential use in paint formulations, this indicates that the use of phenol for its solvent properties is relatively rare.

[25] The proposed levels are based on the probabilistic risk results for the 90th percentile. If we were to use the results for the 95th percentile, we would consider including methanol, because then the listing level for liquid wastes would drop to 6.2%, which we believe is somewhat more likely.

[26] EPA concluded that this group of wastewater treatment plants would likely include some facilities that would be major sources of HAPs (see 61 FR 34144/2). Thus, these major sources would be subject to the MACT standard.

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As required under § 261.30(b), we are proposing to add the constituents that are the basis for the listings to Appendix VII of Part 261. We are proposing to add the constituents in Table IV.A–1 for K179 and the constituents in Table IV.A–2 for K180. In addition, a number of constituents in Tables IV.A–1 and IV.A–2 are not currently listed in Appendix VIII to Part 261 as ''hazardous constituents.'' EPA places constituents on Appendix VIII if scientific studies show the chemicals have toxic, carcinogenic, mutagenic, or teratogenic effects on humans or other life forms (see § 261.11(a)(3)). The Risk Assessment Background Document contains the detailed toxicological data for all constituents we evaluated, including the chemicals we are proposing to add to Appendix VIII: n-butyl alcohol, ethyl benzene, methyl isobutyl ketone, styrene, and xylene. If we choose the alternative of not listing paint manufacturing waste liquids (K180), then we would not need to add the constituents to Appendix VII for K180, and we would need to add only methyl isobutyl ketone to Appendix VIII.

TABLE IV.A–1.—CONCENTRATION LEVELS FOR WASTE SOLIDS (K179)

Constituent	Concentration levels (mg/kg)
Acrylamide	310
Acrylonitrile	43
Antimony	2,300
Methyl Isobutyl Ketone	73,000
Methyl methacrylate	28,000

TABLE IV.A–2.—CONCENTRATION LEVELS FOR WASTE LIQUIDS (K180)

Constituent	Concentration levels (mg/L)
Acrylamide	12
Acrylonitrile	9.3
Antimony	390
Ethylbenzene	11,000
Formaldehyde	82,000
Methyl Isobutyl Ketone	340
Methyl Methacrylate	2,100
Methylene Chloride	4,500
N-Butyl Alcohol	41,000
Styrene	4,600
Toluene	1,200
Xylene (mixed isomers)	3,900

The listing levels we are proposing for K179 and K180 are different for the waste solids and waste liquids. These levels are based on the risk assessment for various scenarios for disposal of solids (landfill) and the liquids (surface impoundment). In general, we believe generators will be able to readily determine which waste category their wastes would be in, based on their responses to the 3007 Survey, and their reported management practices. However, we are considering setting a clear definition to distinguish the waste solids and liquids, such that a generator can readily determine which listing applies. Thus, we request comment on several options in establishing a clear definition that would distinguish solids vs. liquids.

Perhaps the most straightforward approach would be to set a level of percent solids above which the waste would be a solid paint manufacturing waste and below which it would be a liquid paint manufacturing waste. One possible level could be 15%. Thus, this option would define paint manufacturing waste solids as those containing 15% or above solids (by weight). This cutoff reflects the general approach we used in our modeling for solids. In our assessment of releases from landfills we assumed that the waste contained a maximum moisture level of 85% (for sludges; we assumed a maximum moisture level of 15% for dusts). Furthermore, because of the restrictions on free liquids in municipal nonhazardous landfills (e.g., see § 258.28), we do not envision wastes containing less than 15% solids could reasonably be managed in a landfill. Therefore, we believe that wastes containing less than 15% solids will be managed in units associated with wastewater treatment, such as tanks or surface impoundments. In addition, in most cases water will be separated from solids as part of routine wastewater treatment. Thus, generators would be evaluating solid residues, which clearly meet our solid definition, or treated water, which would typically be discharged to a POTW or under an NPDES permit, and would not be covered by the K180 listing in any case.

Percent solids could be measured by an established method, such as the method for total suspended solids (TSS) described in EPA guidelines for test methods used under the CWA (EPA method 160.1 in 40 CFR 136.3, Table 1B).[27] However, generators may have the knowledge necessary to decide whether their paint manufacturing waste was a liquid or a solid, based on past analysis or disposal practices. We believe that in many cases, especially for wastes that are clearly ''wet'' or ''dry,'' the generator can easily tell from a visual inspection that solids content is well above or below 15%. Thus, if we were to set a level to define paint manufacturing waste solids and liquids, we believe we could allow the generator to use his knowledge, rather than necessarily requiring a test.

Instead of setting a specific level of percent solids, another option is to use the Paint Liquids Filter Test (method 9095 in SW–846) to determine if the waste is a liquid or a solid. A paint manufacturing waste found to contain free liquid under this method would be considered a liquid, and would be evaluated under the K180 listing, while a paint manufacturing waste that does not contain free liquids would be subject to the K179 listing. This method appears logical because it is presently used in defining the term ''liquid waste'' in the solid waste disposal criteria for determining compliance with the prohibition on disposing of bulk or containerized liquid in municipal landfills (§ 258.28). Method 9095 is also used in a similar way for hazardous waste landfills (§ 264.313(c)). Thus, using this method to distinguish paint manufacturing waste solids from liquids would be consistent with the definitions used in the operating practices for the management scenario modeled for solids, i.e., landfills.

A third option would be to use a definition of liquids that is analogous to the definition of wastewater used under the land disposal restrictions. Wastewater is defined as waste with less than 1% total suspended solids (TSS) and less than 1% total organic carbon (§ 268.2(f)); nonwastewater is defined as any waste that is not wastewater. While using this approach would allow some consistency in definitions in the listings and the LDR programs, we believe this would not be appropriate. A key disadvantage of this approach is that it defines wastes with greater than 1% TSS as a nonwastewater, i.e., a solid, even though such a waste is highly likely to be managed in wastewater treatment systems using tanks and surface impoundments, and not landfills. Given this problem, we do not think using this definition would be useful to define wastes solids and liquids for purposes of the paint listings.

We seek comment on the need for specific definitions for paint manufacturing waste liquids and solids, and the relative merits of the above options or similar approaches. We also request comment on whether facilities are likely to have information available on the percent solids in their wastes.

[27] Another option would be to use section 7.1 in the TCLP (method 1311) to measure filterable solids.

B. Why Are We Proposing to Use the Level of Constituents in the Waste Solids as Total Waste Concentrations Rather Than Leachate Concentrations?

We are proposing to set the concentration levels for defining hazardous paint solids using the concentrations measured in the waste itself, i.e., the totals concentration.[28] We considered using the landfill leachate levels instead of the waste levels to define the listed waste. Using landfill leachate levels would require generators to evaluate their wastes using a test such as the Toxicity Characteristic Leaching Procedure (TCLP).[29] However, we decided not to use the TCLP approach for a number of reasons. We believe that the partitioning model used to establish the totals concentrations is a more appropriate tool to assess risks posed by the paint manufacturing wastes. This is because the partitioning model factors in periodic placement of the specific waste volumes in cells within the landfill, closure of the landfill after 30 years, volatilization of constituents from the landfill through partitioning to the air, and any degradation of organics while in the unit. The leaching values for the paint manufacturing waste solids result from the partitioning of constituents from the waste to water infiltrating the unit. A test method like the TCLP does not reflect these factors. The TCLP approach is designed only to assess groundwater impacts, and does not account for other releases or processes occurring in landfills. Therefore, the estimated leaching numbers derived from our modeling assessment of paint manufacturing wastes, where partitioning and degradation are occurring before the constituents leave the unit, are not strictly comparable with the simple leaching of constituents from wastes represented by the TCLP.

We recognize that the totals levels appear somewhat high in comparison to the leachable levels we calculated for our assessment of paint manufacturing wastes (Table IV.–3). For example, the leaching level calculated for dichloromethane is 390 mg/L, compared to a total level of 240,000 mg/kg. However, it is not surprising that leachate levels derived from the waste would be lower than the levels in the waste itself. Most of the organic constituents assessed are relatively volatile, and will begin to volatilize as they are placed in the landfill. The entire mass of constituent in the waste is not placed in the landfill at once, but rather is placed in cells over the life of the unit. Therefore, as disposal occurs, the waste constituents are continuing to partition into air, soil, or leachate. Our model also factors in degradation of organics in the landfill. Such biodegradation is relatively slow for most chemicals, however this also assists in attenuating the levels of constituents that are released to the subsurface. We recently published related modeling results as part of the Hazardous Waste Identification Rule (HWIR) using the same modeling approach (64 FR 63382, November 19, 1999, and 65 FR 44491, July 20, 2000), though this effort covered a wider distribution of waste volumes. The use of totals rather than leachate for a concentration-based listing is also consistent with another recent EPA proposal for listing hazardous waste from the Dye and Pigments industry (64 FR 40192, July 23, 1999).

Therefore, we are proposing the concentration levels for the waste itself for the listing for waste solids from paint manufacturing. However, we seek comment on the option of setting the leachate concentrations from our modeling as the listing levels for the paint solids, and on the potential impacts (incremental costs and benefits) of such an approach. We may still consider a final regulation based on the measurement of leachate with the TCLP method, as shown in Table IV.B–3, after further consideration and review of comments.

TABLE IV.B–3.—ALTERNATIVE CONCENTRATION LEACHING LEVELS FOR WASTE SOLIDS (K179)

Constituent	Concentration levels (mg/L)
Acrylamide	0.70
Acrylonitrile	0.91
Antimony	58
Methyl Isobutyl Ketone	42
Methyl methacrylate	160

C. Why Are We Proposing to Exclude Waste Liquids Managed in Tanks?

We are proposing that liquid paint manufacturing wastes stored or treated exclusively in tanks or containers prior to discharge to a POTW or under an NPDES permit not be subject to today's proposed listing because these wastes managed in tanks do not pose sufficient risk to warrant hazardous waste regulation.

As shown in Table III.D–4, nearly all of the liquid paint manufacturing wastes are managed in some type of wastewater treatment system (small volumes are sent to fuel blending or other treatment). Furthermore, as indicated in Table III.D–4, liquid wastes are primarily classified as water or caustic cleaning liquids, except for one small volume of solvent cleaning liquid that went to a fuel blender.

For on-site tanks, as described in Section III.E, we conducted a bounding risk analysis for on-site treatment tanks that evaluated the worst case scenario for on-site management in tanks, including storage as well as treatment tanks. Our analysis identified some potential constituents of concern: Benzene, chloroform, mercury, methylene chloride, tetrachloroethylene, and acrylonitrile. However, when the survey responses provided data on constituent levels, these data indicated that these constituents are unlikely to be present in these wastes at levels of concern. In addition, for benzene, chloroform, mercury, and tetrachloroethylene, the risk-based concentrations derived from the bounding risk analysis are significantly higher than the respective TC levels; therefore, the TC regulations provide some control for most of these constituents. For acrylonitrile, the calculated risk-based concentration of 1,500 ppm is significantly higher than the projected range of concentration of 1–40 ppm for acrylonitrile in liquid waste streams; as such, it is not of concern. Most other constituents of concern either bounded out (*i.e.,* modeled levels were higher than 1,000,000 ppm), or were unrealistically high for paint manufacturing wastes. The risk-based levels derived from the risk assessment for methylene chloride, methyl isobutyl ketone, toluene, vinyl acetate, and xylene are so high that we believe they are highly unlikely to exist at such levels in nonhazardous liquid paint manufacturing wastes. This evaluation for on-site tanks is discussed in more detail in the following section (IV.C.1).

For off-site treatment tanks, we conducted a probabilistic risk assessment as described in Section III.E. This risk assessment identified three potential constituents of concern: Mercury, benzene and acrylonitrile. The survey responses showed that these constituents are not likely to be present in the wastes at concentrations of concern. In addition, the levels of mercury and benzene in the waste are also limited by the existing TC regulations, *i.e.,* the risk-based levels derived from the risk assessment are

[28] This is not an issue for the listing for paint liquid wastes, because any analysis of the liquids would include an analysis of the total liquid mixture.

[29] See method 1311 in OSW's methods manual, Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW–846.

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well above the TC levels. As described below, we determined that acrylonitrile is unlikely to exist in paint manufacturing waste liquids at the risk-based levels of 69,000 ppm. Therefore, there is no need to regulate paint manufacturing waste streams managed in off-site treatment tanks. See section IV.C.2 for a full discussion.

1. On-Site Storage and Treatment Tanks

Based on our extrapolated survey results, we estimate that 14,564 metric tons (approximately 47%) of nonhazardous liquid paint manufacturing wastes generated are managed in on-site storage tanks and 7,514 metric tons, or approximately 24%, of nonhazardous paint manufacturing waste liquids are managed in on-site treatment tanks. After these wastes are managed on-site in storage and treatment tanks, the wastes are then either directly discharged into a waterway under a NPDES permit, discharged into a POTW, or sent to centralized wastewater treatment facilities.

For tanks, we normally model air emissions. We assume that significant groundwater risks are unlikely because tanks do not leak liquids into the soil if properly maintained. Treatment tanks represent a more conservative scenario for modeling purposes because they are typically used for the aeration and flocculation of liquid wastes to settle out solids, causing more constituents to escape into the air than the relatively quiescent accumulation of liquids in storage tanks. Accordingly, we evaluated the potential risks from the management of liquids in treatment tanks to cover both scenarios.

As described earlier in Section III.E, we conducted a bounding analysis of the potential air releases from the nonhazardous liquid wastes treated in on-site treatment tanks. This conservative analysis assumed tanks are uncovered, and modeled the largest liquid residual volume and tank size reported by the surveyed facilities. The risk-based levels for most constituents exceeded 100%, and would not present significant risks in the paint manufacturing wastes for this scenario. The risk assessment results showed somewhat lower risk-based concentrations for paint manufacturing wastes in tanks for some constituents, *i.e.,* benzene (1,100 ppm), chloroform (15,000 ppm), mercury (41 ppm), tetrachloroethylene (22,000 ppm), acrylonitrile (1,500 ppm), methylene chloride (17,000 ppm), methyl isobutyl ketone (780,000 ppm), toluene (120,000 ppm), vinyl acetate (100,000 ppm), and xylene (830,000 ppm); we discuss these chemicals in detail below.

In general we do not expect significant levels of organic chemicals in on-site wastewater treatment systems for several reasons. First, the liquid wastes most likely to have high organic content, solvent cleaning wastes, are managed as hazardous. Except for one facility, these wastes were coded as hazardous waste, either due to a F-listing or because of a characteristic. The 3007 survey showed that all the generators of hazardous waste liquids reported the wastes were treated by incineration, fuel blending, or they were reused. Therefore, we have no data suggesting facilities are treating such high organic liquids in on-site wastewater treatment systems.

Second, the 3007 survey shows that none of the small number of facilities that treated wastes in on-site wastewater treatment (WWT) tanks (8 facilities, representing about 18 facilities in our weighted sample) reported significant organic content in their wastes. Of the 8 facilities, only one reported the presence of any organic constituents of potential concern, but listed them only because they may occasionally be present in the waste. Of the other 7 facilities, most reported the presence of metals, a few reported vinyl acetate polymers, and one reported the water-soluble ethylene glycol.

Finally, as noted in Section IV.A above, a MACT standard covering paint manufacturers will soon be proposed that will address potential air releases from these facilities. The MACT would place limits on HAPs in wastewater treatment systems, and would likely keep organic levels in paint manufacturing wastewaters relatively low.

Turning to the constituents of possible concern (benzene, chloroform, mercury, methylene chloride, tetrachloroethylene, and acrylonitrile), the facilities reported in their survey responses that these chemicals were either not present at all, or were present at only trace concentrations. Out of the 187 paint manufacturers surveyed, the responses showed benzene was present in trace amounts in only one facility's nonhazardous water cleaning liquid; mercury was present in only two facilities' nonhazardous water cleaning liquid at trace levels (up to 0.06 ppm). No facility reported the presence of any chloroform, methylene chloride, or tetrachloroethylene in any liquid residual. We discuss the possible presence of acrylonitrile in detail below. Furthermore, the risk-based levels for most of these constituents are well above their TC levels (benzene-0.50 ppm, chloroform-5.0 ppm, mercury-0.2 ppm, and tetrachloroethylene-0.7 ppm). Consequently, we are not proposing regulating these constituents under today's proposed listing.

Acrylonitrile is a monomer, *i.e.,* a relatively small compound with low molecular weight. It reacts with other monomers to form polymers (*i.e.,* cross-link into large, high molecular weight compounds) that are used as paint binders. However, the reaction is rarely 100% complete, and small amounts of the individual monomers remain unreacted as impurities in the polymer. Unreacted acrylonitrile monomers, not their polymers, are the targeted constituents of concern in our risk assessment.

With respect to acrylonitrile monomers, we do not expect this constituent to be present in paint manufacturing wastewaters above the risk-based concentrations derived from the bounding analysis for tanks. To analyze whether concentration levels of acrylonitrile at 1,500 ppm are reasonable as a basis for listing liquids in on-site tanks, we developed a methodology to determine whether these constituents are likely to occur in paint manufacturing waste liquids at concentrations within the range of the risk-based levels. We assessed potential concentrations of acrylonitrile in paint manufacturing liquid waste streams in a three-step process that involved tracking the monomers from point of origin (binder) to the final destination (liquid waste streams): (1) We estimated the concentration range of acrylonitrile monomers in the binder systems used to make paint; (2) we estimated the volume percentage of the binder systems added into paints themselves; and, (3) we estimated the monomer concentration range in paints in tank cleaning wastes. Based on these calculations (which are discussed in more detail below), we estimated that the ranges of acrylonitrile monomer concentrations in the liquid waste streams should be one to 40 ppm. We then compared these projected concentration ranges of acrylonitrile in the liquid waste streams to the risk-based levels calculated in the risk assessment.

As specified above, we estimated the likely range of unreacted monomer of acrylonitrile in the binders (*i.e.,* polymers) to be between 20 ppm and 1,000 ppm. This is reflected in our analysis of the use of acrylamide and acrylonitrile polymers in paint formulations [30] and the Material Safety

[30] See the memo from Paul Danault, Dynamac Corporation, to David Carver and Cate Jenkins, EPA,

Data Sheet (MSDS) data we obtained from some paint manufacturers (copies available in the public docket for today's proposed rule), which show the monomer mixture in binders in the 500 to 1,000 ppm range. Second, we projected that the likely concentration ranges of monomers in a paint or coating are approximately 10 ppm to 500 ppm for acrylonitrile. This estimate was based on our examination of paint formulations, which indicates that these paint formulations contain up to 50% by weight of acrylonitrile-acrylic polymer.[31] Finally, we estimated the projected monomer concentration in the resulting water cleaning liquids is approximately one ppm to 40 ppm for acrylonitrile given that approximately 50 gallons of water are needed to wash a typical paint mixing tank of approximately 5 feet in diameter and 8 feet in height with a paint depth of 6 feet,[32] and that a 0.0625-inch film of paint is attached to the inside surface of the tank up to 6 feet (amounting to a total of 4 gallons of paint to be rinsed). These projected acrylonitrile concentrations in paint manufacturing wastewaters are significantly lower than the calculated risk-based concentration of 1,500 ppm. For more details, see ''Potential Acrylonitrile Concentrations in Paint Manufacturing Liquid Waste Streams' in the public docket for today's proposed rule. Therefore, we believe it is highly unlikely for this constituent to be present in paint manufacturing liquid waste streams at such levels.

In addition, according to the information available to us, acrylonitrile is not widely used in the U.S. paint manufacturing industry, and its use is diminishing. For example, resin manufacturers are marketing ''acrylonitrile free'' resins. It is also a practice within the resin manufacturing industry to remove residual monomer before selling the polymer for paint production.

The low use of this binder in paints is supported by our survey data. Six of 187 surveyed paint manufacturing facilities reported acrylonitrile-derived polymers in their nonhazardous liquid residuals (in particular nonhazardous water cleaning liquids). In addition, one survey response indicated the presence of acrylonitrile and acrylonitrile-derived polymers in the nonhazardous water cleaning liquids at 2.8%. Assuming the polymers used by this facility include the monomers in concentrations ranging from 20 ppm to ×1,000 ppm for acrylonitrile as estimated above, the maximum monomer concentration in this facility's nonhazardous wash water would be less than 28 ppm (i.e., 2.83% x 1,000 ppm/acrylonitrile monomer in polymer), which is consistent with our assessment (i.e., between <1 ppm to 40 ppm).

The risk-based levels derived from the risk assessment for methyl isobutyl ketone (780,000 ppm, or 78%), toluene (120,000 ppm, or 12%), vinyl acetate (100,000 ppm, or 10%), and xylene (830,000 ppm, or 83%) are so high that we believe they are highly unlikely to exist at such levels in nonhazardous liquid paint manufacturing wastes. This is reflected in the responses to our Section 3007 survey, which indicated that the highest levels of toluene, vinyl acetate and vinyl acetate-derived polymers, and xylene in nonhazardous liquid residuals were 0.025 ppm, 16,000 ppm, and 118 ppm, respectively.

In conclusion, our analysis indicates there are no significant risks posed by the modeled constituents in nonhazardous paint manufacturing wastes that are managed in on-site storage and treatment tanks. We believe the likely levels of the potential constituents of concern in paint manufacturing wastewaters are substantially lower than the risk-based concentrations derived from the bounding risk analysis. Therefore, requiring the facilities to analyze or otherwise evaluate these constituents would impose an unnecessary burden on paint manufacturers. Thus, we are proposing that paint manufacturing waste liquids stored and/or treated in on-site tanks at paint manufacturing facilities are not subject to today's proposed listing.

2. Management of Liquid Paint Manufacturing Wastes in Off-Site Treatment Tanks

Based on our extrapolated survey results, we estimate that 6,407 metric tons (approximately 21%) of liquid nonhazardous paint manufacturing wastes generated are disposed off-site in privately owned wastewater treatment facilities where tanks and surface impoundments may be used as part of the treatment process. Following treatment, the wastes are typically discharged into surface waters under an NPDES permit, or discharged to the POTW system.

As described earlier in Section III.E, the risk assessment conducted for liquid paint manufacturing wastes managed in off-site treatment tanks identified potential inhalation risks associated with only a few constituents. The risk assessment estimated risk-based concentrations for mercury (10,000 ppm), benzene (190,000 ppm) and acrylonitrile (69,000 ppm).

As discussed above, the survey showed that facilities reported only traces of benzene or mercury in a few nonhazardous liquid residuals. Furthermore, levels of both constituents are controlled by the existing TC regulations. Therefore, there is no need to regulate these TC constituents further under today's proposed listing.

For acrylonitrile, the risk-based concentration of 69,000 ppm is significantly higher than the estimated range of acrylonitrile monomer in paint manufacturing wastewaters (see previous discussions on liquid wastes managed in on-site storage and treatment tanks). Therefore, it is highly unlikely for this constituent to be present in paint manufacturing liquid waste streams at such a high level.

We note that 21 of the 187 surveyed paint manufacturing facilities reported that they sent nonhazardous liquid wastes to off-site wastewater treatment facilities, of which only one reported having any of the three constituents of concern in the wastewater. Specifically, this facility sent a very small quantity of nonhazardous wash water (151 gallons/year) containing an unknown amount of acrylonitrile to a centralized wastewater treatment facility.

In conclusion, we believe there are no significant risks posed by the modeled constituents in nonhazardous paint manufacturing wastes that are managed in off-site treatment tanks. We believe the levels of the potential constituents of concern in paint manufacturing wastewaters are substantially lower than the risk-based concentrations derived from the risk assessment. Therefore, requiring the facilities to analyze or otherwise report these constituents would impose an unnecessary burden on paint manufacturers. In addition, the levels of some constituents are controlled by the existing TC regulations. Furthermore, as noted previously, EPA has recently proposed a NESHAP for miscellaneous paints and coating manufacturing operations that would regulate wastewaters, both on-site and if sent off-site for treatment.[33]

dated September 6, 2000, which is in the docket for today's proposed rule.

[31] *Ibid.*

[32] That is, 50 gallons of water used for washing per about 800 gallons of paint produced in the tank. This is a conservative assumption compared to the information in Reference 7 of the Bibliography, Development Document for Effluent Limitations Guidelines and Standards for the Paint Formulating Point Source Category, EPA 440/1–79/049B, which states that the median wastewater generation at waterbone paint facilities is 0.2 gallons per gallon of paint produced.

[33] As discussed previously, some off-site nonhazardous wastewater treatment facilities may also be covered by the NESHAP/MACT standards

Continued

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Thus, we are proposing paint manufacturing waste liquids treated in off-site treatment tanks are not subject to today's proposed listing.

D. Why Are We Proposing a Contingent Management Listing for Liquid Paint Manufacturing Wastes, and What Other Options Are We Considering?

We are considering various options for the listing for paint manufacturing waste liquid (K180). Under the listing proposed for K180, the wastes would not be listed if they are managed in on-site storage and treatment tanks or containers prior to discharge to a POTW or under a NPDES permit. (Of course, if the concentrations of the listing constituents are below the regulatory levels, the waste would not be hazardous in any case.) We are proposing this type of ''contingent management'' listing because we did not find significant risk from treatment or storage in tanks, as noted above. However, if a paint manufacturing waste generator intends to send the waste off-site for treatment outside of tanks (and waste constituents are not below the listing levels), the waste would be K180 and would be subject to storage requirements under Subtitle C. We recognize that the regulation of the onsite storage and treatment of the waste in tanks prior to the waste being shipped offsite may be unwarranted because our risk analysis for tanks shows no significant risk for liquid paint manufacturing waste. Therefore, we are soliciting comment on the option of exempting wastes stored or treated on-site in tanks or containers from being a hazardous waste while it is stored on-site, regardless of what the ultimate treatment or disposal practice might be. This would mean that the point of generation for K180 would be when the waste is sent off-site, and that it would not be classified as K180 hazardous waste while it is stored or treated in tanks or containers on-site prior to shipment off-site for disposal.

The constituent levels we are proposing are based on the possible risks from management of the liquid wastes in an off-site centralized wastewater treatment system with an unlined surface impoundment. We did not complete a risk assessment for possible risks for various other known or potential management practices. Given that we found risk in one management scenario, but did not assess risks from other major practices, we are limiting the exemption from the listing to the management practice that we determined posed no significant risk, i.e., management in tanks. Therefore, we are proposing to list the paint manufacturing waste liquids, unless they are managed in tanks prior to discharge under an NPDES permit or to a POTW.

As discussed in Section II.G, the 3007 Survey showed that 21 paint manufacturers reported sending their liquid wastes to 24 off-site wastewater treatment facilities. We contacted 9 of these 24 and found one treatment facility that reported using a lined surface impoundment to treat two different paint manufacturers' liquid wastes. Based on the weighting factors used for our survey sample, we estimate these 24 off-site wastewater treatment facilities represent about 40 facilities in the U.S. that may accept paint liquids. While we cannot extrapolate the information from nine wastewater treatment facilities to the overall population, we estimate that there could be 4 to 5 treatment facilities that use impoundments of some kind. The one facility with an impoundment indicated the unit was lined, however there are no Federal regulatory requirements that ensure this would be the case for other impoundments throughout the country. Hence, it may be reasonable to assume that some of these impoundments may be unlined for modeling purposes. We note that surface impoundments are used to treat wastewaters in general, and that a recent study confirmed that a significant portion of impoundments in some industries are unlined.[34] (However, this study focused primarily on on-site impoundments used in specific industries, and not commercial off-site treatment facilities). Therefore, if we assume management of liquid wastes in an unlined impoundment is a plausible management scenario, our assessment suggests that the risks from such management may present a significant potential hazard to human health and the environment for some constituents of concern.

However, we are also seriously considering not listing paint manufacturing waste liquids, or using a different approach for a listing, due to the uncertainty in management practices we assumed in our risk assessment. While we are proposing to list because of potential risks arising from unlined surface impoundments, we are considering the alternative of not listing this waste because this may not be a ''plausible'' management scenario. As noted above, while the survey data shows that management in an off-site treatment facility is relatively common, we found only one case where a surface impoundment was in use. We estimate that only 4 to 5 such impoundments may be receiving any of the paint manufacturing waste liquids from the estimated 972 paint manufacturers. Thus, management of these wastes in surface impoundments appears to be an infrequent occurrence. The number of unlined impoundments receiving this waste is more uncertain due to our limited data on surface impoundments, but the probability of off-site commercial treatment facilities treating paint manufacturing wastes in such unlined units is likely to be even lower than the number of facilities using impoundments.

The effectiveness of liner systems depends, in part, on how they are designed. Composite and double liners that combine two or more layers of liner material with leachate collection and leak detection should minimize leakage to the subsurface during the period when the leachate collection system is actively managed. While it is difficult to predict the level of protection afforded by a liner system due to the uncertainty concerning long-term performance, we believe the level of protection could be significant for a surface impoundment, which will contain liquid wastes only during its operating life.[35] Therefore, our assessment of an unlined surface impoundment may overestimate potential risks from this disposal scenario.

The risk results from modeling surface impoundments may also overestimate risks for other reasons. As noted in Section III.E, we used impoundment data gathered in a 1985 Industrial D Screening Survey. We were not able to distinguish off-site vs. on-site impoundments from these data, so we used a sample from all units in the database. Because most impoundments

in 40 CFR part 63 (61 FR 34140, July 1, 1996), if they are a major source of hazardous air pollutant (HAPs) emissions defined in section 112 of the CAA amendments of 1990, and if the wastes they receive from off-site contain one or more HAPs.

[34] Based on an initial review of data from the Study of Industrial Non-hazardous Waste Surface Impoundments required under the Land Disposal Program Flexibility Act. Also, in a 1995 EPA found only 26 States had requirements for liners under State regulations: see State Requirement for Industrial Non-Hazardous Waste Management Facilities, U.S. Environmental Protection Agency, October 1995.

[35] We believe there is greater uncertainty about the efficacy of liners in providing long-term protection from releases from landfills, because the wastes remain indefinitely. A synthetically lined impoundment with a finite operational life of perhaps 30 to 50 years is less likely to release wastewater during the life of the unit. During operation, leaks in the liner system would be detected and presumably fixed; active use of an impoundment can be stopped, drained, and liners repaired. Also, the leachate collection system is likely to prevent a significant release during operation.

are part of on-site treatment processes for industrial process wastewater, the data include a variety of types of units that may not be realistic for the off-site commercial wastewater treatment facilities we are attempting to model. Our database contains units with characteristics that are unlikely for large off-site treatment facilities, i.e., many units are relatively small (median area about 3,200 m^2) and have low flow rates with long retention times (median retention time about 0.5 years, 90th percentile retention of 50 years). These characteristics mean that many of the impoundments used in the modeling would have a fairly high fraction of paint manufacturing waste, e.g., the 90th percentile value for fraction of paint manufacturing waste in the unit was one. We believe that off-site commercial treatment units are more likely to be larger and have much shorter retention time, thereby reducing the average fraction of paint manufacturing waste in the treatment units. While it is difficult to gauge the importance of these characteristics in our risk assessment results, these may lead to an overestimate of impoundment risks. We may use this factor, in conjunction with a full review of all comments, as an additional reason not to list paint manufacturing waste liquids.

We solicit any information on the prevalence of surface impoundment management of paint manufacturing waste liquids, and any data related to the use of surface impoundments, either lined or unlined. After reviewing all comments and reconsidering all available information on the possible risks from management of paint manufacturing waste liquids, we may decide not to list this waste.

Assuming we decide to finalize a listing for paint manufacturing waste liquids due to the potential for risks from surface impoundments, we are also soliciting comments and supporting data on an alternative listing that would exclude other practices, such as incineration and fuel blending. We could limit the scope of the listing so that it would clearly apply only to wastes managed in surface impoundments. Thus, the listing could specify that it would apply only if the waste exceeded the regulatory concentration levels, and if the waste was managed in a surface impoundment. We may decide that such an approach is appropriate in this case given that this was the only practice modeled that presented unacceptable risk, and because the practice may be very infrequent. For the paint manufacturing wastes at issue in today's proposal, we did not find significant risks from management in tanks.[36]

The other reported management practices of potential concern were thermal treatment in incinerators, cement kilns, and fuel blending. As noted previously, in past listing determinations where we have attempted to assess risks from incineration, we found that the potential risks from the release of constituents through incineration would be at least several orders of magnitude below potential air risks from releases from tanks or impoundments (see listing determination for solvent wastes at 63 FR 64371, November 19, 1998). Although metal constituents would not be destroyed in thermal treatment, we expect the metal content of nonhazardous paint manufacturing waste liquids sent to incineration to be low; this is consistent with the 3007 Survey data, which show no nonhazardous paint manufacturing waste liquids with significant metal content. Limiting the listing to wastes only managed in impoundments would reduce the overall burden of the listing, so that it would apply only to the practice of most potential concern, i.e., surface impoundments.

E. Potential for Formation of Non-Aqueous Phase Liquids in Paint Manufacturing Wastes

We considered the possibility that some constituents in paint manufacturing wastes might form distinct nonaqueous phase liquids (NAPLs). NAPLs can be an issue, because once released to the subsurface a number of difficult problems may occur. Such problems include the creation of a long-term NAPL source in the subsurface and facilitated transport of contaminants that have an affinity for the NAPL fraction. The formation of NAPLs is strongly dependent on the specific wastes in question and the management practice, and it is difficult to predict when NAPLs might be important. However, many of the organic chemicals we evaluated for this listing are highly water soluble and in many cases volatile, thus most have little potential for NAPL formation. EPA has used a general approach in the Hazardous Waste Characteristics Scoping Study to identify which chemicals have some potential to form NAPLs based on water solubility and other parameters.[37] NAPL-forming chemicals generally have relatively low water solubilities (less than 5,000 mg/L) and are liquids at ambient temperature. Applying these criteria, the only non-TC constituents of concern that may potentially form NAPLs would be the phthalates and the aromatic hydrocarbons (ethylbenzene, styrene, toluene, and xylenes). Any NAPL-forming chemicals that are regulated under the TC (i.e., the slightly soluble chemicals benzene and tetrachloroethylene) are unlikely to form NAPLs in wastes, because the TC levels are well below their water solubility. Thus, wastes with TC constituents high enough to form NAPLs would be regulated as hazardous, and would not be land disposed until treated.

We believe that paint manufacturing wastes with the high organic content needed to form NAPLs are unlikely to be land disposed for several reasons. First, high organic wastes are typically sent for thermal treatment or recycling. For example, see the final listing determination for solvents (63 FR 64372, November 19, 1998); we found that solvent wastes with high organic content are usually thermally treated, and that wastes sent to landfills contained negligible amounts of solvent (63 FR 64384). Also, many landfills are unlikely to accept wastes with free liquids, and in fact such a practice is restricted under Federal regulations for municipal solid waste landfills (§ 258.28) and Subtitle C landfills (§ 264.314). Similar restrictions, while not federally mandated, are in place in most States for off-site nonmunicipal solid waste landfills.[38]

We believe that any paint manufacturing waste liquids that may be placed in impoundments or tanks at offsite wastewater treatment facilities are unlikely to contain significant NAPLs. The nonhazardous paint manufacturing waste liquids are nearly all reported to be from aqueous washing of equipment, with only one facility reporting generating a nonhazardous liquid from solvent cleaning; this facility sent this waste to a fuel blender.

[36] Discharges to surface waters are controlled under the CWA and require an NPDES permit, while discharges to a POTW are subject to State and national pretreatment standards. Note that 40 CFR 261.4 reflects the RCRA statute and excludes ''any mixture of domestic sewage and other wastes that passes through a sewer system to a POTW for treatment'' (40 CFR 261.4(a)(1)(ii)), and industrial wastewater discharges that are point source discharges subject to regulation under Section 402 of the CWA (40 CFR 261.4(a)(2)).

[37] U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response, Hazardous Waste Characteristic Scoping Study, November 1996, and U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response, Evaluation of the Likelihood of DNAPL Presence at NPL Sites, EPA 540–R–93–073, September 1993.

[38] U.S. Environmental Protection Agency, Office of Solid Waste, State Requirements for Industrial Non-Hazardous Waste Management Facilities, October 1995.

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All other waste solvents were coded and managed as hazardous waste. This is not surprising, given that many solvents used for cleaning equipment would yield wastes that are listed as hazardous (F001 through F005), or exhibit a characteristic, such as ignitability.

The nonhazardous water cleaning liquids are mixed with other wastewaters when treated in offsite centralized wastewater treatment systems, making significant NAPLs less likely. As noted above in Section IV.A, existing and proposed regulations under the CAA would also tend to keep the organic content of wastewaters low for any chemical designated a hazardous air pollutant, or HAP. Nearly all constituents of potential concern we identified for paint manufacturing wastes are HAPs under the CAA. We believe that these rules make it unlikely that NAPLs would form in offsite wastewater surface impoundments.

The information in the 3007 Survey suggests that wastes with liquid or free solvents are not disposed in landfills. The waste data we collected from the 3007 Survey indicates that few of the nonhazardous paint manufacturing wastes of concern have the high organic content necessary to form a separate NAPL phase. Of the nearly 200 nonhazardous wastes reported (125 solids, 74 liquids), only 15 were reported to have levels of any organic constituent above relatively low levels (1%). In most of these 15 cases, the organic constituents included levels of associated polymers (polymers of acrylonitrile, styrene, and vinyl acetate). The few nonhazardous wastes with significant concentrations of a constituent that might form a NAPL (3 wastes reported to contain 2% or 6% butyl benzyl phthalate) went to incineration (one waste with 10% xylene went to unspecified offsite treatment). The remaining wastes with significant organic content contained ethylene glycol, which is highly unlikely to form NAPLs given its extreme solubility in water. In any case, only one waste with organic content above 1% was reported to go to a landfill (an off-specification paint manufacturing waste with 2.5% ethylene glycol). We recognize that the information for constituents in the 3007 Survey is limited, however, the data in hand show that generators do not appear to be sending paint manufacturing waste with high organic content to land disposal. Even in the event some generators were sending some wastes with higher potential NAPL-forming chemicals to land-based units, the volumes would be relatively small. This makes it unlikely that organic levels in these units would be sufficient to generate a NAPL phase that would impact releases to groundwater.

As noted previously in Section IV.A, EPA is planning to propose a MACT standard to address potential releases of volatile HAPs from paint manufacturing facilities. The proposed MACT would place limits on HAPs in wastewaters and keep organic levels in paint manufacturing waste relatively low.

As another check on the potential for NAPL formation in paint manufacturing wastes, we examined the Survey data for discarded off-specification paint. Our survey data indicated that disposal of off-spec products in landfills was fairly infrequent (13 facilities reported a total of 941 metric tons in 1998). From follow-up telephone calls to these generators, the facilities almost uniformly indicated that the off-specification material was not in liquid form; the wastes were in solid resins, hard cured by drying, or otherwise solidified prior to disposal.

F. Scope of the Listings and the Effect on Treatment Residuals

Today's proposal would result in two new hazardous waste listings that differ from previously promulgated listed hazardous wastes in that they include constituent-specific concentrations to define the scope of the listings. The primary purpose of these ''concentration-based listings'' is to establish levels at the point of generation of a waste, above which that waste is considered to be a listed hazardous waste (i.e., ''entrance'' levels). Wastes that are generated below these levels would not be subject to these listings.

We are also proposing to use the listing concentrations as ''exit'' levels for residues from paint manufacturing waste solids (K179). Residuals from the treatment, storage, or disposal of listed hazardous wastes are usually classified as hazardous wastes based on the ''derived-from'' rule (see 40 CFR 261.3(c)(2)(i)).[39] The use of the listing concentrations as exit levels for treatment residues would terminate the applicability of the derived-from rule and, therefore, the treatment residues would no longer be considered a listed hazardous waste. We are specifically proposing to add language to the standards in 40 CFR 261.3 to describe this self-implementing process for paint manufacturing waste solids (K179). For reasons discussed below, we are proposing that generators cannot use the listing levels for paint manufacturing waste liquids (K180) as exit levels, even if the waste falls below those levels through treatment. In the following discussion we also clarify further the status of liquids derived from paint manufacturing waste solids and vice-versa, and address mixtures or treatment residues that occur away from the paint manufacturing facility, such as at an off-site treatment facility.

We envision that the proposed listing of the paint manufacturing waste solids (K179) would function similarly to a hazardous waste characteristic such as toxicity, except that the concentration levels would be the basis for deciding a waste is hazardous only when applied to the solids as generated or managed at a paint manufacturing facility. Thus, a waste would become hazardous K179 only if it meets or exceeds the listing levels at the paint manufacturing facility. Structuring the listing for paint manufacturing waste solids in this way avoids implications for solids generated off-site from a *nonhazardous* waste that in part, or in whole, originated from a paint manufacturing facility. For example, we avoid small quantities of nonhazardous paint manufacturing waste liquids treated at an off-site commercial wastewater treatment facility subjecting any liquid or solid derived from them at an offsite treatment facility to evaluation against the levels proposed today for paint manufacturing wastes.[40]

We are proposing, however, that the paint manufacturing waste solids that are hazardous K179 may be treated to generate nonhazardous waste, if the treatment results in constituent concentrations that are below the listing levels in K179. Note that land disposal restrictions would still apply, as they do to ''decharacterized'' waste that was hazardous only due to a hazardous waste characteristic, until the waste meets the LDR treatment requirements (see Section VI of today's notice for the proposed standards). Thus, if treatment of K179 yields constituent levels that are below the listing levels and meet the appropriate LDR standards, the waste may be disposed as a nonhazardous waste (e.g., in a Subtitle D landfill). We are specifically proposing to add language to the standards in 40 CFR 261.3 to exempt solids that previously

[39] Also, the ''mixture'' rule (see 40 CFR 261.3(a)(2)(iii) and (iv)) provides that, with certain limited exceptions, any mixture of a listed hazardous waste and a solid waste is itself a RCRA hazardous waste. We are not proposing any changes to the mixture rule in today's action.

[40] Note that a paint manufacturing waste solid could be nonhazardous when generated, but become hazardous later if management on-site led to the waste becoming more concentrated and exceeding the listing levels. If this occurs at the paint manufacturing facility, it would become a listed K179 waste.

met the K179 listing, if the constituent levels are below the listing levels. We request comment as to whether the derived-from rule should apply to the K179 paint manufacturing wastes solids beyond the paint manufacturing site as they would in a traditional listing. However, we believe that our evaluation of the risks of disposal of solid K179 would apply equally well to solids that have been treated.

The proposed listing of paint manufacturing waste liquids (K180) operates like a characteristic only in the sense that if a paint manufacturing waste is below the listing level at the point of generation, it is not covered by this listing. However, it would act as a traditional listing if a paint manufacturing liquid waste generated at a paint manufacturing facility meets or exceeds the listing levels, in that liquids derived from K180 remain subject to the listing even if they fall below those levels through dilution or treatment. We are proposing that liquid residuals from K180 wastes would remain hazardous, because the surface impoundment scenario we used to set the listing concentrations for K180 assumed that the liquid paint wastes are mixed with other wastewaters in an off-site treatment facility. The listing levels we set for K180 are for the waste prior to any mixing and would necessarily be higher than the levels of the constituents that may exist in the off-site impoundment. We believe that the listing levels for K180 would not be appropriate for use in exiting the RCRA hazardous waste regulatory program, because they do not correspond to risk-based levels for the diluted waste in the impoundment.[41] Therefore, we are proposing that any liquid wastes derived from K180 would remain listed as K180 (unless the waste is excluded under the petition process set out in §§ 261.20 and 261.22, typically known as ''delisting'').

We are proposing that the scope of the listings reflect the practical situations that arise at the site of paint manufacturing if derived-from wastes are in a different form than the original paint waste, i.e., if liquid wastes are derived from K179, and if waste solids are derived from K180. In such cases, we believe that is more appropriate to evaluate these on-site derived-from wastes against the listing concentrations that reflect the corresponding waste form. Solids generated from K180 at the site of paint manufacturing would no longer be K180, but would be subject to classification as K179, if the waste meet or exceed the listing levels for K179. Under this approach, solids generated from K180 on-site that are below the listing levels for K179 would not be a hazardous paint waste. Similarly, a liquid waste derived from K179 at the site of paint manufacturing would be evaluated against the K180 listing conditions; if such a liquid is either managed exclusively in tanks or containers, or if the constituents in the liquid are below the listing levels for K180, the K179-derived liquid would not be hazardous paint waste. We have included text in the listing descriptions for K179 and K180 to establish these changes in waste codes for on-site derived-from wastes.

We are not proposing that the above change in waste codes would apply to waste residuals generated off-site. We believe that changes in waste codes would be confusing for off-site treatment facilities and may be difficult to track and enforce. Furthermore, K179 or K180 wastes that are sent off-site for treatment would likely be treated at a facility that accepts and treats a wide variety of hazardous wastes, and any derived-from wastes generated from treatment of K179 or K180 would likely carry multiple hazardous waste codes. Therefore, we are proposing to allow the mixture-derived from rules to operate normally off-site, except for the exemption for treated K179 noted previously. This approach still allows a treatment facility to use the exemption to the derived-from rule we are proposing for waste solids (K179); the treatment facility would have to treat only for the K179 hazardous constituents of concern (provided no new characteristics are imparted by the treatment process).

Finally, we stress that solids and liquids derived off-site from nonhazardous paint manufacturing liquids are not listed paint manufacturing wastes (i.e., not K179 or K180). Such wastes are not paint manufacturing wastes, in that the waste management facility is not directly involved in the manufacture of paint products. Therefore, these wastes would not be subject to the listing criteria for K179 or K180.

G. Relationships of the Proposed Listings to the TC

Fifteen constituents that we assessed for paint manufacturing waste are also constituents covered by the broadly-applicable Toxicity Characteristic (TC). We modeled these constituents, along with the constituents not covered by the TC, to see if for any reason the modeling approach would indicate a significant hazard would be posed that is not already addressed by the TC. This might have occurred, for example, if the windblown dust pathway had produced significantly lower concentrations. However, we found that, with one exception, the concentrations of concern predicted in the paint-waste modeling were above the levels already regulated by the TC.

For the fourteen constituents for which the paint modeling yielded concentrations higher than TC levels, we are not setting levels in this listing, and the TC will continue to apply. We are proposing to retain the more restrictive TC levels for these constituents to protect human health and the environment. The specific levels calculated for paint manufacturing waste for this proposal represent amounts of constituents that can be safely disposed for the relatively small volumes of paint manufacturing waste solids and liquids subject to today's proposed listing. The TC levels, in contrast, broadly address all wastes in the country subject to RCRA Subtitle C. They were designed to protect human health and the environment from the possibility that many waste streams from multiple generators could be disposed of in a single landfill. Consequently, our TC risk assessments reflect much higher waste volumes arising from a broad spectrum of industries and sources. If we analyzed by itself any individual, small-volume waste stream subject to the TC, we might find that it did not pose risks at TC levels. However, a set of smaller waste streams from multiple sources could pose risks if disposed together with other wastes. Consequently, we believe we need to retain the broad, multiple-waste TC approach.[42]

For the remaining constituent, pentachlorophenol, the paint listing modeling results (at the 90th percentile probabilistic level) showed a protective leachable concentration of 66 mg/L. This is slightly lower than the existing TC level (100 mg/L). Upon review of 3007 survey data on prevalence, however, we found that this constituent is not currently used in paint production and it is not likely to be found in paint manufacturing wastes. While pentachlorophenol has apparently been used historically as a biocide in paint formulations, most

[41] Furthermore, wastes that are otherwise prohibited from land disposal may be treated in surface impoundments or series of impoundments that meet certain conditions (see section 268.4).

[42] This is consistent with current EPA regulations regarding ''delisting petitions'' under 40 CFR 260.22(c) and (d). If modeling indicates the waste does not pose a significant hazard, EPA exempts it from the hazardous waste listing. However, as required under the regulations, we do not exempt wastes that exhibit a hazardous waste characteristic.

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pesticide uses of this chemical have been halted.[43] In addition, despite the fact that this is a TC constituent, this chemical was not reported in any of the wastes in the 3007 survey data. Given these facts we see no reason to include pentachlorophenol as a listing constituent for paint manufacturing wastes. The TC, of course, would continue to apply to any paint manufacturing waste containing pentachlorophenol, and wastes exceeding the TC level would be regulated as hazardous.

H. What Is the Status of Landfill Leachate From Previously Disposed Wastes?

Leachate derived from the treatment, storage, or disposal of listed hazardous wastes is classified as a hazardous waste by virtue of the ''derived-from'' rule in 40 CFR 261.3(c)(2). The Agency has been clear in the past that hazardous waste listings apply to wastes disposed of prior to the effective date of a listing, even if the landfill ceases disposal of the waste when the waste becomes hazardous. (See 53 FR 31147, August 17, 1988). We also have a well-established interpretation that listings apply to leachate derived from the disposal of listed hazardous wastes, including leachate derived from wastes meeting the listing descriptions that were disposed before the effective date of a listing. We are not reopening nor taking comment on any of these issues with this proposed rulemaking.

Of course, as set out in detail in the August 1988 notice, this does not mean that landfills holding wastes that are listed now as hazardous become subject to Subtitle C regulation. However, previously disposed wastes now meeting a listing description, including residues such as leachate that are derived from such wastes, and that are managed actively do become subject to Subtitle C regulation. See 53 FR at 31149, August 17, 1988. In many, indeed most, circumstances, active management of leachate would be exempt from Subtitle C regulation because the usual pattern of management is discharged either to POTWs via the sewer system, where leachate mixes with domestic sewage and is excluded from RCRA jurisdiction (see RCRA section 1004(27) and 40 CFR 261.4(a)(1)), or to navigable waters, also excluded from RCRA jurisdiction (see RCRA section 1004(27) and 40 CFR 261.4(a)(2)). In addition, management of leachate in wastewater treatment tanks prior to discharge under the CWA is exempt from RCRA regulation (40 CFR 264.1(g)(6)).

It is possible that waste solids within the proposed scope of K179 may have been disposed in landfills. Because we are proposing that liquids derived from the offsite management of K179 would continue to carry the K179 waste code, leachate from a landfill that accepted paint manufacturing waste solids might be classified as K179. While we do not believe that it is likely that liquid K180 wastes would have been disposed in landfills in significant quantities, a landfill may have accepted a derived-from K180 solid (as a result of offsite treatment). However, the proposed listings for the two paint manufacturing wastes are concentration-based listings, and it would be difficult to know whether the previously disposed wastes that meet the narrative description of K179 did in fact have constituent concentrations that would be at or above the K179 listing levels. We don't anticipate that records documenting the concentrations of proposed constituents of concern for these wastes exist for previously disposed wastes. Therefore, absent a finding that the disposed wastes would have met the listing being proposed today, it is unlikely that the previously disposed wastes would be classified as K179, and thus unlikely that landfill leachate and gas condensate derived from these wastes that are actively managed would be K179.

However, if actively managed landfill leachate and gas condensate derived from the newly-listed wastes proposed for listing in today's notice could be classified as K179, we would be concerned about the potential disruption in current leachate management that could occur, and the possibility of redundant regulation. This issue was raised to the Agency in the context of the petroleum refinery waste listings (see 63 FR 42173, August 6, 1998). A commenter expressed concern that, because some of the commenter's nonhazardous waste landfills received newly-listed petroleum wastes prior to the effective date of the listing decision, the leachate that is collected and managed from these landfills would be classified as hazardous. The commenter argued that this could lead to vastly increased treatment and disposal costs without necessarily any environmental benefit. After examining and seeking comment on this issue, we published a final rule that temporarily defers regulation of landfill leachate and gas condensate derived from certain listed petroleum refining wastes (K169–K172) that were disposed before, but not after, the new listings became effective, provided certain conditions are met. See 64 FR 6806, February 11, 1999. We proposed listing determinations for wastes from the dye and pigment industries (64 FR 40192, July 23, 1999) and from the inorganic chemical manufacturing industries (65 FR 55684, September 14, 2000) that propose deferrals for similar wastes derived from landfills. We also promulgated a listing determination for the chlorinated aliphatics industry (65 FR 67068, November 8, 2000) that retains the deferral.

At the time this issue was brought to the Agency's attention in the context of the petroleum refinery waste listings, EPA's Office of Water had recently proposed national effluent limitations guidelines and pretreatment standards for wastewater discharges—most notably, leachate—from certain types of landfills. See 63 FR 6426, February 6, 1998. In support of this proposal, EPA conducted a study of the volume and chemical composition of wastewaters generated by both subtitle C (hazardous waste) and Subtitle D (nonhazardous waste) landfills, including treatment technologies and management practices currently in use. Most pertinent to finalizing the temporary deferral for the petroleum refining wastes, EPA did not propose (or subsequently finalize) pretreatment standards for subtitle D landfill wastewaters sent to POTWs because the Agency's information indicated that such standards were not required (see 65 FR 3008, January 19, 2000).

The conditions included in the temporary deferral we published on February 11, 1999 are that the leachate is subject to regulation under the Clean Water Act, and the leachate cannot be stored in surface impoundments after a period of two years (February 13, 2001). See 40 CFR 261.4(b)(15). We believe that it was appropriate to temporarily defer the application of the new waste codes to such leachate in order to avoid disruption of ongoing leachate management activities while the Agency decides if any further integration is needed of the RCRA and CWA regulations consistent with RCRA section 1006(b)(1). We believe that it is still appropriate to defer regulation and avoid leachate management activities, and to permit the Agency to decide whether any further integration of the two programs is needed. As such, we would be concerned about forcing pretreatment of leachate even though pretreatment is neither required by the CWA, nor needed. Therefore, we are proposing to temporarily defer the regulation of landfill leachate and gas condensate derived from management of K179 and K180 wastes that we are

[43] See the cancellation for non-wood uses at 52 FR 2282, January 21, 1987.

proposing for listing in today's rule, with the same conditions as described in 40 CFR 261.4(b)(15) for petroleum wastes. We request comment on this proposed conditional deferral.

V. Proposed Generator Requirements for Implementation of Concentration-Based Listings

We are proposing that these concentration-based listings be self-implementing. This means that you (the waste generator) would be responsible for determining whether or not your wastes are K179 or K180 listed hazardous wastes at the point of generation based on the proposed procedures we describe below.[44] We are proposing a two-tiered implementation approach for the concentration-based listings, based on waste form (liquids or solids) and total annual quantity of the paint manufacturing wastes generated at each paint production facility, that you could use to determine whether your wastes are nonhazardous. Before using the proposed two-tiered approach, you would determine if any of your paint manufacturing waste solids or paint manufacturing waste liquids could contain any of the constituents of concern identified for these types of wastes (see Tables IV.A–1 and IV.A–2). We are proposing that you could use knowledge of your wastes (e.g., knowledge of the constituents in your wastes based on existing sampling and analysis data and/or information about raw materials used, production processes used, and degradation products formed) to make this initial determination regardless of the quantity of waste you generate. If any portion of your wastes at the point of generation will not contain any of the constituents of concern identified for your specific type of wastes, you would not have to use the two-tiered approach to determine whether those wastes are nonhazardous (i.e., are not K179 or K180 listed wastes). Paint manufacturing wastes described in the K179 or K180 listings, but which do not contain any of the constituents of concern for K179 or K180, would not be K179 or K180 hazardous wastes at the point of generation. You should note, however, that absence of the constituents of concern in some portion of your wastes would not relieve you, the generator, from hazardous waste determination requirements for all other wastes that do contain constituents of concern.

If your paint manufacturing wastes contain one or more constituents of concern, then you would either use the two-tiered approach to determine whether they are nonhazardous or handle them as hazardous. Under this proposed approach, if you generate or expect to generate 40 metric tons or less of paint manufacturing waste solids or 100 metric tons or less of paint manufacturing waste liquids annually, then you would have the option of testing the wastes or using knowledge of the wastes to determine whether they are nonhazardous. However, if you generate or expect to generate over 40 metric tons of paint manufacturing waste solids or over 100 metric tons of paint manufacturing waste liquids, then you would be required to test the wastes annually to determine whether they are nonhazardous. Our reasons for proposing a two-tiered approach and requiring annual testing of larger quantity wastes are discussed in Section V.C. The exception to the annual testing requirement to determine whether wastes are nonhazardous, regardless of annual waste quantities generated, would be for paint manufacturing waste liquids that are stored or treated exclusively in tanks or containers and then discharged to a POTW or under a NPDES permit.

We are proposing the constituents of concern for the two types of wastes (solids and liquids) from paint production that are listed in Tables IV.A–1 and IV.A–2. We are also proposing the listing (hazardous concentration) level for each of these constituents that are in the same tables. We are proposing that you use this information, in conjunction with testing or knowledge of constituent levels in your wastes, to determine whether or not the wastes are hazardous.

Unless you make a determination that your wastes are nonhazardous for K179 or K180, using either knowledge that the wastes do not contain any of the constituents of concern or the specified procedures described in section C below, then we are proposing that your wastes would be hazardous and you would be subject to the existing requirements under RCRA for persons who generate hazardous waste. Thus, if you are not already a hazardous waste generator, you would have to notify the EPA, according to section 3010 of RCRA, that you generate a hazardous waste. You would also be subject to all applicable requirements for hazardous waste generators in 40 CFR Part 262.

If you determine that your paint manufacturing waste solids or liquids are nonhazardous, we are proposing to require, under the authority of sections 2002 and 3007 of RCRA, that you keep certain records (see Section E below) of your wastes at the generating site (on-site). Following the initial nonhazardous determination, you would be obligated to ensure that your wastes continue to meet all of the proposed conditions and requirements for the wastes to be deemed nonhazardous. Accordingly, you should also note that regardless of any type of nonhazardous determination that you make for your wastes, the wastes would be hazardous if we test and find that they actually have constituents of concern at or above the listing levels.

A. Would I Have to Determine Whether or Not My Wastes Are Hazardous?

Yes, we are proposing that you must determine whether or not your wastes are hazardous K179 or K180 wastes. This hazardous waste listing determination could be made in either of two ways. First, you could assume that your wastes are hazardous at the point of generation. If you do this, then you could forego the requirement for testing or using knowledge of the wastes to make a hazardous waste determination. In such a case, your wastes would be subject to all applicable RCRA Subtitle C hazardous waste requirements, including LDR requirements, either as of effective date of the final rule or as of initial generation of the wastes. Second, if you want the opportunity to determine that your wastes are nonhazardous at the point of generation (and therefore not subject to Subtitle C hazardous waste requirements), we are proposing that you must either test the wastes or use knowledge of constituent concentrations in the wastes using the procedures described in Section C below. The only exception to using procedures in Section C to determine that your wastes are nonhazardous would be if you generate paint manufacturing waste liquids that will be stored or treated exclusively in tanks or containers.

B. How Would I Manage My Wastes During The Period Between the Effective Date of The Final Rule and Initial Hazardous Waste Determination for My Wastes?

If you generate wastes that are described in either K179 or K180, we are proposing that you could not dispose of your wastes as nonhazardous until you complete an initial determination which shows that your wastes are nonhazardous except for

[44] Due to the uncertainties in our assessment of the management of paint manufacturing waste liquids in surface impoundments, we are considering an alternative proposal not to list paint manufacturing waste liquids. We describe this alternative elsewhere in this notice (see Section IV.D). The following discussion describes the approach we are proposing for paint manufacturing waste liquids if K180 is listed.

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waste liquids managed exclusively in tanks or containers prior to discharge to a POTW or under a NPDES permit. In the interim (from the time you generate the wastes to the time you make a determination on your wastes), you would be responsible for storing your wastes properly. If your wastes are determined to be hazardous and you are not complying with the Subtitle C storage requirements during the interim period, then you would be subject to an enforcement action for improper storage.

C. What Procedures Would I Follow to Determine If My Wastes Are Nonhazardous?

We are proposing that you use the following procedures annually to determine if your wastes, which contain one or more constituents of concern, are nonhazardous at the point of generation:

1. You must use the previous year's waste generation data (previous 12 consecutive months) or, if this data is not available, estimate the total annual quantities of paint manufacturing waste solids and paint manufacturing waste liquids that you expect to generate over the next 12 consecutive months based on current knowledge. You must combine the quantities of hazardous wastes (characteristic and otherwise listed) and nonhazardous wastes that meet the listing description for K179 or K180 to separately determine the total annual waste quantities for both the paint manufacturing waste solids and paint manufacturing waste liquids. Then, you must record the total annual quantities of paint manufacturing waste solids and paint manufacturing waste liquids that you expect to generate. If you initially estimate that your waste generation would fall under the low volume tier and, at any time within the 12 month period, the actual quantities of wastes you generate fall within the upper volume tier, from that point, you would be subject to the upper tier waste analysis requirements (see step 2 below). If you have not already tested your wastes, you must test your wastes. We are proposing that a new 12 month period for hazardous waste determination would start when you actually exceed the lower volume tier limit.

2. You must use the recorded total annual quantities of paint manufacturing waste solids and paint manufacturing waste liquids generated by your facility to determine the appropriate annual waste analysis requirement for your wastes in accordance with the following tables:

TABLE V.C–1.—TIERED WASTE ANALYSIS REQUIREMENTS FOR SOLIDS

Total annual quantity of hazardous and nonhazardous paint manufacturing waste solids	Annual waste analysis requirement
40 metric tons and less	Test Wastes or Use knowledge of Wastes.
Over 40 metric tons	Test Wastes.

TABLE V.C–2.—TIERED WASTE ANALYSIS REQUIREMENTS FOR LIQUIDS

Total annual quantity of hazardous and nonhazardous paint manufacturing waste liquids	Annual waste analysis requirement [a]
100 metric tons and less	Test Wastes or Use knowledge of Wastes.
Over 100 metric tons	Test Wastes.

[a] This requirement does not apply if the liquid wastes are stored or treated exclusively in tanks or containers and then sent to POTW or discharged under a NPDES permit.

We are proposing to establish the volume cut-offs in the above tables based on the § 3007 survey data on the annual quantities of solid and liquid wastes generated by paint production facilities. We used these data to develop the distributions for total hazardous and nonhazardous solid and total hazardous and nonhazardous liquid waste quantities generated across the sampled population of paint production facilities (see docket for Document on Distributions of Paint Production Wastes Generated). It was evident from these distributions that a relatively large percentage of the total hazardous and nonhazardous paint manufacturing wastes are generated by a relatively small percentage of the paint production facilities. For both paint manufacturing waste solids and liquids, approximately 90 percent of the total hazardous and nonhazardous wastes are generated by fewer than 20 percent of the paint production facilities. Based on this observation and in order to minimize the burden on small generators, we decided to propose this two-tiered implementation approach for the concentration-based listings. The tiered approach will allow small generators the option of testing or using knowledge of their wastes to determine whether or not their wastes are hazardous.

The annual quantity cut-off for wastes above which testing is required (40 metric tons for waste solids and 100 metric tons for waste liquids) is intended to ensure that the largest quantities of wastes generated by paint production facilities are tested and, at the same time, to minimize the burden on small generators. Using the cut-off quantities should result in approximately 90 percent of the total hazardous and nonhazardous paint manufacturing waste solids and paint manufacturing waste liquids being tested annually. Using the cut-off quantities also means that fewer than 20 percent of the facilities would be required to test their wastes annually, and more than 80 percent of the facilities would have the option of using knowledge. We believe that larger quantities of wastes have the potential for posing greater environmental risk than smaller quantities of wastes if a nonhazardous determination based on knowledge turns out to be inaccurate. Therefore, we believe it is reasonable to require larger quantity waste generators to test their wastes annually to make a determination, while smaller quantity waste generators are given the option to either test their wastes or use knowledge of their wastes annually to make a determination. We request comment on the appropriateness of giving smaller quantity waste generators the option of using knowledge of their wastes annually. We will consider requiring smaller quantity waste generators to test their wastes annually, like the larger quantity waste generators, if significant and defensible arguments are presented by commenters to support these requirements as necessary and appropriate.

We also request comment on an alternative to the two-tiered implementation approach discussed above for implementing the concentration-based listings proposed in today's rule. We could adopt a more streamlined approach for waste generators to use in implementing the

concentration-based listings for these wastes. The streamlined implementation approach would allow you to rely on process knowledge or testing (i.e., lower volume tier requirements) regardless of the volume of waste generated. If the wastes contain any constituent of concern at or above the final risk-based listing levels, the waste would be subject to Subtitle C requirements. The streamlined implementation approach would be similar to the existing program for determining whether a waste exhibits a hazardous characteristic. Although we prefer the two-tiered approach being proposed in today's rule, we will give careful consideration to any arguments presented or relevant waste analysis data submitted in response to today's proposal (e.g., data showing that only a small portion of the waste streams in the industry exceed the listing levels) in order to decide whether a more streamlined approach is warranted.

1. Testing Wastes

If the total annual quantity of your paint manufacturing waste solids or paint manufacturing waste liquids which meet the listing description of K179 or K180 falls into the tier where testing is required (and you have decided not to assume that your wastes are hazardous at the point of generation), we are proposing that you must test your wastes to determine whether they are nonhazardous. (Even if testing is required to determine that your wastes are nonhazardous, you could still use knowledge of your wastes to document that a constituent (or constituents) could not be present in your wastes and not test for that constituent (or constituents)). However, knowledge of the wastes could not be used to determine the level of constituent in your wastes.

For those wastes that you must test, we are proposing that you use the following procedures:

(i) Develop a waste sampling and analysis plan (if you do not already have one that is appropriate) to collect and analyze samples that are representative of your wastes. We discuss the waste sampling and analysis plan later in this section.

(ii) From the list of constituents of concern for paint manufacturing waste solids or paint manufacturing waste liquids, select the constituents that are reasonably expected to be present in your wastes based on your knowledge of the wastes (e.g., knowledge of the constituents in your wastes based on existing sampling and analysis data and/or information about raw materials used, production processes used, and degradation products formed).

(iii) Collect an appropriate number of samples that are representative of your wastes and analyze each for the constituents of concern selected in step (ii).

(iv) Compare the sampling and analysis results for the constituents of concern in your wastes to the listing levels established for these constituents to determine if your wastes are nonhazardous.

(v) After completing annual testing requirements for your wastes, if all samples taken during any three consecutive years are determined to be nonhazardous, then the annual testing requirements for your wastes are suspended.

(vi) After suspension of the annual testing requirements for your wastes, if paint manufacturing, formulation, or waste treatment processes are significantly altered (i.e., if it could result in significantly higher levels of the constituents of concern for K179 or K180), then the annual testing requirements for your wastes are reinstituted. In order to again suspend the annual testing requirements for your wastes, the requirement under step (v) above has to be met.

a. *Waste Sampling and Analysis Plan.* Whenever you are required to test, we are proposing that you must develop a waste sampling and analysis plan prior to testing your wastes. In developing a sampling and analysis plan, you would have to consider any expected fluctuations in concentrations of constituents of concern over time. The sample design should be described in the waste analysis plan. The sample design and the sensitivity of the analytical methods used should be sufficient to determine whether the levels of the constituents of concern in the wastes are above or below the listing concentrations for these constituents. We do not propose to specify a particular number of samples that you would need to collect annually to obtain representative data for your wastes. The number of samples required to determine that the concentrations of constituents of concern in your wastes are below the listing levels for these constituents would depend on how close the actual concentrations were to the listing concentrations and on the variability of the wastes you generated during the course of the year.

As stated in step (ii) of the procedures specified above, you would have to test for the constituents of concern that are reasonably expected to be present in your wastes. Also, as discussed previously, you might use knowledge of the wastes to document that a constituent (or constituents) could not be present in your wastes. If you determine that a constituent (or constituents) could not be present in your wastes, then you would not need to test for it. However, if you determine that your wastes are nonhazardous, then you would be responsible for ensuring that your wastes do not have any constituents of concern at or above the listing levels.

We are not proposing whether you must use grab or composite sampling to obtain samples that are representative of your wastes. However, we are proposing that, following a nonhazardous determination for your wastes, enforcement by EPA or an authorized State would be based on grab samples. It would be your responsibility to ensure that your sampling and analysis is unbiased, precise, and representative of your wastes. We are not proposing to require the use of SW–846 methods to comply with these requirements. We are proposing to allow the use of either SW–846 methods or alternative methods, so long as you can demonstrate that the selected methods have the appropriate sensitivity, bias, and precision to determine the presence or absence of the constituents of concern at or below the listing concentrations. You would be required to document the: (1) Detailed standard operating procedures (SOPs) for the sampling and analysis protocols that you used; (2) sensitivity and bias of the measurement process; (3) precision of the analytical results for each batch of waste (or ''super'' batch) tested; and (4) analytical results.

We would consider the analytical results adequate to demonstrate that concentrations for the constituents of concern in your wastes are below the listing concentrations for these constituents if: (1) You determined the concentrations without dilution of the wastes (i.e., no waste or other material were added to your wastes, after the point of generation, which did not meet the listing description of K179 or K180) and (2) you conducted an analysis in which the constituents of concern spiked at their listing levels indicates that the constituents of concern are present at those levels within analytical method performance limits (e.g., sensitivity, bias, and precision). To determine the performance limits for a method, we recommend following quality control (QC) guidance provided in Chapters One and Two of SW–846.

Following sampling and analysis, if none of your waste samples contain any of the constituents of concern at concentrations equal to or greater than the listing levels established for these constituents, then you would determine that your tested wastes are nonhazardous. Once you have determined your tested wastes to be nonhazardous, you would decide if these wastes are representative of the wastes that you will generate for the remainder of the year. If your tested wastes are representative (or you can

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reliably determine that these wastes exhibited the maximum concentrations for the constituents of concern), then you could determine that the wastes (or certain type of wastes) that you generate for the remainder of the year are also nonhazardous. As stated earlier, following a nonhazardous determination, you would have an obligation to ensure that your wastes continue to meet all of the conditions (i.e., constituents of concern in your wastes remain below listing levels) and requirements (i.e., records that support a nonhazardous determination) for the wastes to be deemed nonhazardous. We are also proposing annual follow-up sampling and analysis for wastes that you determine to be nonhazardous to check that these wastes continue to remain nonhazardous. However, if any of your waste samples contain any of the constituents of concern at a concentration equal to or greater than the listing level set for that constituent, your wastes would be listed hazardous wastes and are thereby subject to all applicable RCRA Subtitle C hazardous waste requirements.

We are proposing that the maximum concentration of any constituent detected in any sample must be below the established listing level in order for you to determine that the waste is nonhazardous. We are proposing this approach because we believe it is the most straightforward to ensuring concentrations are below risk-based listing levels. However, we request comment on whether the generator should be allowed to average the concentrations of constituents detected in multiple waste samples taken from some quantity of waste generated or collected over a certain period of time (e.g., 60 days). Under that approach, the generator would calculate concentrations using an upper confidence limit on the mean (e.g., 95th percentile) to compare to the listing levels established for the constituents.

We also request comment on whether the annual testing requirement should be continued beyond three years, if the generator determines the wastes to be nonhazardous for three consecutive years. Following suspension of annual testing requirements, the generator would still be liable if testing by EPA or an authorized State finds the waste to be hazardous.

2. Using Knowledge of The Wastes

Where testing is not required, or as a supplement to testing, we are proposing that you could use knowledge of your wastes (e.g., knowledge of the constituents in your wastes based on existing sampling and analysis data and/or information about raw materials used, production processes used, and degradation products formed) to conclude that concentrations for the constituents of concern in your waste would be below the listing levels (nonhazardous waste).

D. How Would The Proposed Contingent Management Listing for Liquid Wastes be Implemented?

Under this proposed listing, paint manufacturing waste liquids that meet the K180 listing description would be hazardous wastes unless managed exclusively in tanks or containers prior to discharge to a POTW or under a NPDES permit. If your liquid paint manufacturing wastes are going to be stored or treated in units other than tanks or containers, then they would be hazardous wastes unless you have determined (using the procedures described in Section C) that the constituents of concern in the waste liquids are below the listing levels. Therefore, you would need to determine as soon as the paint manufacturing waste liquids are generated whether they will be stored or treated in units other than tanks or containers. If your paint manufacturing waste liquids will be stored or treated in units other than tanks or containers, your wastes would be subject to the management requirements discussed in Section B above. If you are storing or treating paint manufacturing waste liquids on-site in tanks or containers prior to off-site disposal, you would need to maintain documentation showing that the wastes will be stored or treated exclusively in tanks or containers off-site prior to their discharge to a POTW or discharge under a NPDES permit. If the off-site disposal facility does not store or treat your paint manufacturing wastes exclusively in tanks or containers and the waste contains levels of constituents at or above the risk-based listing levels, then your wastes would be hazardous and you would need to store the wastes in accordance with the Subtitle C requirements applicable to storage of a hazardous waste.

E. What Records Would I Need to Keep On-site to Support a Nonhazardous Determination for My Wastes?

To support a nonhazardous determination, we are proposing that you must keep records of the total annual quantity of paint production waste solids and liquids from tank and equipment cleaning operations that use solvents, water, and/or caustic; emission control dusts or sludges; wastewater treatment sludges and off specification product for the most recent three years from the effective date of the final rule. If you generate a total annual quantity of paint manufacturing wastes that exceeds 40 metric tons for paint manufacturing waste solids or 100 metric tons for paint manufacturing waste liquids, we are proposing that you keep the following records on-site for the most recent three years:

1. The documentation supporting a determination that wastes are nonhazardous based on knowledge that they do not contain any of the constituents of concern.

2. If you determine that wastes are nonhazardous based on testing, then you must keep the following records on-site:

a. The sampling and analysis plan used for collecting and analyzing samples representative of your wastes, including detailed sampling methods used to account for spatial and temporal variability of the wastes, and sample preparative, cleanup (if necessary) and determinative methods.

b. The sampling and analysis data (including QA/QC data) and knowledge (if used to determine that one or more constituents of concern are not present in the wastes) that support a nonhazardous determination for your wastes (for the most recent three years of testing).

3. If storing or treating paint manufacturing waste liquids on-site in tanks or containers prior to off-site disposal, the documentation showing that the paint manufacturing waste liquids will be stored or treated solely in tanks or containers off-site before discharge by a facility to a POTW or discharge under an NPDES permit.

We request comment on the adequacy of the above recordkeeping requirements to support a nonhazardous determination.

F. What Would Happen if I Do Not Meet The Recordkeeping Requirements for The Wastes That I Have Determined Are Nonhazardous?

We are proposing to require recordkeeping under the authority of sections 2002 and 3007 of RCRA. These are requirements and not conditions of the waste being nonhazardous. A condition is a standard that you or your waste must meet in order for your waste to become or remain nonhazardous. If a condition is not fulfilled, then the waste is hazardous and subject to RCRA Subtitle C requirements. A requirement is an obligation whose violation would not affect the nonhazardous status of the waste, but would be a violation under RCRA. Failure to comply with these requirements could result in an enforcement action under section 3008 of RCRA. This section of the statute authorizes the imposition of civil penalties in an amount up to $27,500 for each day of noncompliance.

G. Could I Treat My Wastes to Below Listing Concentrations and Then Determine That My Wastes Are Nonhazardous?

1. Paint Manufacturing Waste Solids

If your paint manufacturing waste solids are hazardous (K179) at the point of generation, we are proposing that you could treat the wastes to make them nonhazardous (i.e., remove the K179 hazardous waste code from your wastes). However, if your wastes are K179, they would be required to be treated to meet the proposed LDR treatment standards (see Section VI D.) before placement in a land-based unit. Following LDR treatment, you could choose to use the initial hazardous waste determination procedures for K179 wastes (see Section C above) to determine if your treated waste residuals are nonhazardous. If your treated waste residuals are determined to be nonhazardous, they would no longer be subject to the requirements of Subtitle C. In other words, the derived from hazardous waste code would no longer attach to such treatment residuals.

2. Paint Manufacturing Waste Liquids

If your paint manufacturing waste liquids are hazardous (K180) at the point of generation because the concentration of the constituents of concern are not below the listing levels and they are not stored or treated solely in tanks or containers prior to discharge, then they would also be required to be treated to meet the proposed LDR treatment standards (see Section VI.D). However, we are proposing that the treatment of the K180 liquid wastes (e.g., to meet the proposed LDR treatment standards) would not result in the removal of the K180 hazardous waste code from your liquid residual wastes. This is because the proposed listing levels for K180 are for the waste prior to any mixing and would necessarily be higher than the levels of the constituents that may exit in the liquid paint wastes mixed with other wastewaters in an off-site impoundment. Therefore, we believe that the use of listing levels for K180 would not protect against paint manufacturing waste liquids being placed on land.

VI. Proposed Treatment Standards Under RCRA's Land Disposal Restrictions (LDRs)

A. What Are EPA's LDRs?

The RCRA statute requires EPA to establish treatment standards for all wastes destined for land disposal. These are the so called ''land disposal restrictions'' or LDRs. For any hazardous waste identified or listed after November 8, 1984, EPA must promulgate LDR prohibitions and treatment standards within six months of the date of identification or final listing (RCRA section 3004(g)(4), 42 U.S.C. 6924(g)(4)). RCRA also requires EPA to set as these treatment standards ''* * * levels or methods of treatment, if any, which substantially diminish the toxicity of the waste or substantially reduce the likelihood of migration of hazardous constituents from the waste so that short-term and long-term threats to human health and the environment are minimized.'' RCRA section 3004(m)(1), 42 U.S.C. 6924(m)(1). Once a hazardous waste is prohibited, the statute provides only two options for legal land disposal: meet the treatment standard for the waste prior to land disposal, or dispose of the waste in a land disposal unit that satisfies the statutory no migration test. A no migration unit is one from which there will be no migration of hazardous constituents for as long as the waste remains hazardous. RCRA sections 3004 (d), (e), (f), and (g)(5).

B. How Does EPA Develop LDR Treatment Standards?

To establish LDR treatment standards, EPA first identifies the best demonstrated available technology (BDAT) for the hazardous constituents present in the hazardous waste, and then determines what constituent concentrations can be achieved by the technology or technologies identified as BDAT.

EPA typically has established treatment standards based on performance data from the treatment of the waste at issue, if such data are available, and also from the treatment of wastes with similar chemical and physical characteristics or similar concentrations of hazardous constituents. Treatment standards typically cover both wastewater and nonwastewater waste forms on a constituent-specific basis. The constituents selected for regulation under the LDR program are not necessarily limited to those present in a proposed listing, but also may include those constituents or parameters that will ensure that treatment technologies are operated properly. For listed waste EPA identifies these as ''regulated constituents'' and they appear individually in the Table at 40 CFR 268.40, along with their respective treatment standards.

EPA may develop and promulgate either technology-specific treatment standards or numerical treatment standards. Should EPA elect to use technology-specific standards (*i.e.,* mandate use of a particular type of treatment technology), all wastes that meet the listing designations would have to be treated by the technology or technologies specified before disposal. These technologies are also identified in the Table at § 268.40 and are further described in § 268.42. Should EPA elect to use numerical treatment standards, the Agency allows the use of any technology (other than impermissible dilution) to comply with the treatment standards.

With the advent of the so-called Universal Treatment Standards (UTS) (the same numerical standards for common hazardous constituents in all prohibited hazardous wastes), EPA has somewhat refined this approach. Thus some of the evaluation of treatability goes to the issue of how well the UTS express potential treatability of a prohibited hazardous waste. Given that the UTS typically reflect performance of the best treatment technologies and minimizing threats, and the enormous savings in administrative expense to both the regulated communities and to EPA, EPA seeks to apply the UTS wherever technically justified. See generally 59 FR 47988–991 (September 19, 1994).

After developing the LDR treatment standards, we must also determine if adequate treatment capacity is available to treat the expected volumes of wastes. If so, the LDR treatment standards become effective essentially at the same time a listing does. If not, EPA may grant up to a two-year national capacity variance (NCV) during which time the LDR treatment standards are not effective.

For a more detailed overview of the Agency's approach for developing treatment standards for hazardous wastes, see the final rule on solvents and dioxins (51 FR 40572, November 7, 1986) and section III.A.1 of the preamble to the final rule that set land disposal restrictions for the ''Third Third'' wastes (55 FR 22535, June 1, 1990). EPA also has explained its BDAT procedures in ''Best Demonstrated Available Technology (BDAT) Background Document for Quality Assurance/Quality Control Procedures and Methodology (EPA/OSW, October 23, 1991)''. This document is available in the docket supporting this rulemaking.

C. What Treatment Standards Are Proposed?

For the hazardous constituents found in wastes from the manufacture of

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paints, hazardous waste numbers K179 and K180, we are proposing to transfer existing numerical or universal treatment standards to the hazardous constituents identified in the wastes, with the exception of formaldehyde and styrene. We believe that it is technically feasible to apply these existing numerical standards to the hazardous constituents of K179 and K180, because the waste compositions are similar to other wastes for which applicable treatment technologies have been demonstrated. Due to the uncertainties in our assessment of the management of paint manufacturing waste liquids in surface impoundments, we are also considering an alternative proposal not to list paint manufacturing waste liquids. We describe this alternative elsewhere in this notice (see Section IV.D). If we do not list wastes under K180, then there would be no need for any standards for formaldehyde or styrene. The following discussion describes the approach for treatment standards assuming that paint manufacturing waste liquids are listed under K180.

The hazardous constituents formaldehyde and styrene do not have existing numerical standards. For formaldehyde, we are proposing to require treatment by designated methods. When formaldehyde is present in K180 at levels triggering the listing, formaldehyde thus would be treated by the required technologies. (The other hazardous constituents must, of course, be treated to meet the applicable numerical standards.) Wastes that do not trigger the listing based on formaldehyde would not be subject to the formaldehyde technology requirement, but would be subject to all other numerical standards. The technology standards proposed for formaldehyde-listed K180 wastewaters are wet air oxidation (WETOX) or chemical or electrolytic oxidation (CHOXD) followed by carbon adsorption (CARBN); or combustion (CMBST). For nonwastewaters forms of K180, the technology standard proposed is combustion. These are the same treatment standards currently applicable to discarded product, off specification, container residues, and spill residues of formaldehyde (EPA hazardous waste U122).

For styrene, we are proposing numerical standards developed for this rulemaking. We are proposing a wastewater standard of 0.028 mg/L based on activated sludge treatment and a nonwastewater standard of 28.0 mg/kg based on thermal destruction of sludge. Alternatively, we propose the transfer of the ethylbenzene treatment standards of 0.057 mg/L for wastewaters, and 10 mg/kg for nonwastewaters, because of its structural similarity and similar physical properties with styrene similar treatment technologies have been demonstrated. Ethylbenzene and styrene have the same number of carbon atoms, and differ only in that styrene has one additional double bond and hence two fewer hydrogen atoms in its structure. See supporting background documents for the additional discussion on the derivation of the UTS for this new constituent.

Wastes identified as K179 or K180 may already be subject to hazardous waste regulation, because they exhibit a characteristic or are listed F001–F005 wastes. If promulgated, the treatment standards for K179 and K180 will apply in addition to any treatment requirements the wastes are currently subject to. Section 268.9(b) of current rules states that if a treatment standard for a listed waste which also exhibits a characteristic addresses the hazardous constituent which causes the waste to exhibit the characteristic, then, the waste is only subject to the treatment standard for the listed waste. Applied to these paint manufacturing wastes, therefore, the most likely result is that these wastes would be subject only to the treatment standards for K179 and K180 assuming that presence of organic hazardous constituents addressed in the treatment standard for the listed waste causes these wastes to exhibit a characteristic.

The treatment standards proposed are based on technology performance and not upon the listing levels of concern derived from the Paint Risk Assessment. In the Hazardous Waste Identification Rule proposed November 19, 1999, we outlined ways in which the HWIR risk assessment could be used to develop risk-based LDR levels (see 64 FR 63444, November 19, 1999), because the HWIR risk assessment evaluated the potential for constituent migration through the most significant environmental fate and transport pathways, looked at the total impact of those pathways, and considered a great number of ecological benchmarks. In the Paint Risk Assessment, we also have a substantial multipathway risk assessment that could potentially lead to treatment standards which could be either more lenient or stricter than current standards.

However, the listing levels proposed for K180 are for the waste prior to any mixing, and would necessarily be higher than the levels of the constituents that may exist in the off-site impoundment. Therefore, we believe the listing levels for K180 may not be appropriate for use in estimating minimized threat levels, because they do not correspond to risk-based levels for the diluted waste in the impoundment. The levels indicated would not be applicable as ''universal'' risk-based treatment standards (as we hope HWIR could eventually be).

Our preference is to develop a single set of treatment levels that would be applicable to all hazardous wastes. Waste-by-waste modeling would not only be highly resource intensive, but could lead to the potentially false conclusion that higher levels are justified only to realize that if we look at a range of wastes together we might conclude that more stringent treatment standards are needed to minimize threat to human health and the environment. Therefore, we believe the proposed listing levels are not minimized threat levels across all wastes and have chosen to propose treatment standards based on the performance of the best determined available technology (BDAT). We believe that there is still uncertainty as to what quantified levels minimize threats to human health and the environment, and therefore, we are proposing standards based on the performance of the BDAT. See *HWTC* vs. *EPA*.886 f. 2d 355, 361–63 (D.C. Cir. 1989) (accepting this approach).

The proposed treatment standards are set out in Table VI–1 below. Where EPA is proposing numerical concentration limits the use of any technology capable of achieving the proposed treatment standards would be allowed, except those treatment or reclamation practices constituting land disposal or impermissible dilution (see 40 CFR 268.3). As stated above, when formaldehyde is present in K180 at levels triggering the listing, we are proposing that formaldehyde must be treated by the required technologies. The other hazardous constituents would, of course, be treated to meet the applicable numerical standards.

TABLE VI–1.—TREATMENT STANDARDS FOR HAZARDOUS WASTE K179 AND K180

Regulated hazardous constituent		K179 solids	K180 liquids	Wastewaters	Nonwastewaters
Common name	CAS [1] No.			Concentration in mg/L,[2] or technology code [3]	Concentration in mg/kg [4] unless noted as "mg/L TCLP", or technology code [3]
Acrylamide	79–06–1	X	X	19	23
Acrylonitrile	107–13–1	X	X	0.24	84
n-Butyl alcohol	71–36–3		X	5.6	2.6
Ethyl benzene	100–41–4		X	0.057	10
Formaldehyde [5]	50–00–0		X	(WETOX or CHOXD) fb CARBN; or CMBST.	CMBST
Methylene chloride	75–09–2		X	0.089	30
Methyl isobutyl ketone	108–10–1	X	X	0.14	33
Methyl methacrylate	80–62–6	X	X	0.14	160
Styrene	100–42–5		X	0.028	28
Toluene	108–88–3		X	0.080	10
Xylenes—mixed isomers (sum of o-, m-, and p-xylene concentrations).	1330–20–7		X	0.32	30
Antimony	7440–36–0	X	X	1.9	1.15 mg/L TCLP

[1] CAS means Chemical Abstract Services. When the waste code and/or regulated constituents are described as a combination of a chemical with its salts and/or esters, the CAS number is given for the parent compound only.
[2] Concentration standards for wastewaters are expressed in mg/L and are based on analysis of composite samples.
[3] All treatment standards expressed as a Technology Code or combination of Technology Codes are explained in detail in 40 CFR 268.42 Table 1–Technology Codes and Descriptions of Technology-Based Standards.
[4] Except for Metals (EP or TCLP) and Cyanides (Total and Amenable) the nonwastewater treatment standards expressed as a concentration were established, in part, based upon incineration in units operated in accordance with the technical requirements of 40 CFR Part 264, Subpart O, or Part 265, Subpart O, or based upon combustion in fuel substitution units operating in accordance with applicable technical requirements. A facility may comply with these treatment standards according to provisions in 40 CFR 268.40(d). All concentration standards for nonwastewaters are based on analysis of grab samples.
[5] Wastes that do not exceed the § 261.32 listing criteria for this constituent are not subject to the treatment technology requirements, but are subject to all other numerical standards.

D. Other LDR-Related Provisions

1. F039 Multisource Leachate and Universal Treatment Standards

F039 applies to multiple listed hazardous waste landfill leachates in lieu of the original waste codes, and F039 wastes are subject to numerical treatment standards applicable to all listed wastes. To maintain the regulatory implementation benefits of having one waste code for multisource leachate, the treatment standards for F039 must be updated to include the constituents of newly listed wastes. Otherwise, multiple waste codes would again be applicable. Therefore, we propose to add to F039 the additional constituents acrylamide and styrene. We also propose to add the numerical standards for styrene to the Universal Treatment Standards of 40 CFR 268.48 [45] Characteristic wastes are already subject to treatment standards for acrylamide. As a result, characteristic wastes subject to treatment requirements for underlying hazardous constituents will also have to comply with these treatment standards.

We are proposing these changes, because acrylamide and styrene are toxic constituents. When paint manufacturing (or production) wastes are managed with other wastes at commercial treatment facilities, the combined waste residues that result for disposal would need to meet all part 268 requirements, including requirements for C disposal, if the paint listing codes were retained or mixed with other listed wastes. The new listing codes may also be retained if treatment meets only the LDR standards and not the listing levels. Thus, leachates that could be subject to multiple codes could be formed. By adding these constituents to F039, the regulatory benefits of having one waste code for multisource leachate is maintained.

Based on the treatment studies compiled for acrylamide and styrene, we believe the proposed treatment standards for these constituents can readily be achieved in the F039 leachate wastes, and in characteristic wastes. Nevertheless, we request comments on this assumption.

E. Is There Treatment and Management Capacity Available for These Proposed Newly Identified Wastes?

1. What Is a Capacity Determination?

EPA must determine whether adequate alternative treatment capacity exists nationally to manage the wastes subject to LDR treatment standards. RCRA Section 3004(h)(2). Thus, LDRs to be made effective immediately—in this case when the new listings are effective (typically 6 months after the new listings are published in the **Federal Register**)—unless EPA grants a national capacity variance from the otherwise-applicable date and establishes a different date (not to exceed two years beyond the statutory deadline) based on "the earliest date on which adequate alternative treatment, recovery, or disposal capacity which protects human health and the environment will be available" (RCRA Section 3004(h)(2), 42 U.S.C. 6924(h)(2)).

Our capacity analysis methodology focuses on the amount of waste currently disposed on the land, which will require alternative or additional treatment as a result of the LDRs. The quantity of wastes that is not disposed on the land, such as treatment in tanks, is not included in the quantities requiring additional treatment as a result of the LDRs. Also, land-disposed

[45] As noted previously, we are considering an alternative proposal not to list paint manufacturing waste liquids. If we do not like K180, then there would be no need to add styrene to the F039 or UTS standards.

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wastes that do not require alternative or additional treatment (i.e., those that currently are treated to meet the LDR treatment standards) are excluded from the required capacity estimates. Land-disposed wastes requiring alternative or additional treatment or recovery capacity that is available on-site or within the same company also are excluded from EPA's estimates of needed commercial capacity. EPA then compares the resulting estimates of required commercial capacity to estimates of available commercial capacity. If adequate commercial capacity exists, the waste is restricted from further land disposal. If protective alternative capacity does not exist, EPA has the authority to grant a national capacity variance.

In making the estimates described above, the volume of waste requiring treatment depends on the current waste management practices employed by the waste generators before this proposed regulation is promulgated and becomes effective. Data on waste management practices for these wastes were collected during the development of this proposed rule. However, we realize that as the regulatory process proceeds, generators of these wastes may decide to minimize or recycle their wastes or otherwise alter their management practices. Thus, we will monitor changes and update data on current management practices as these changes will affect the volume of wastes ultimately requiring commercial treatment or recovery capacity.

The commercial hazardous waste treatment industry may change rapidly. For example, national commercial treatment capacity changes as new facilities come on line or old facilities go off line, and as new units and new technologies are added at existing facilities. The available capacity at commercial facilities also changes as facilities change their commercial status (e.g., changing from a fully commercial to a limited commercial or ''captive''—company owned—facility). Thus, we also continue to update and monitor changes in available commercial treatment capacity.

For wastes required to meet today's proposed treatment standards, we request data on the annual generation volumes and characteristics of wastes affected by this proposed rule, including proposed hazardous wastes K179 and K180 in wastewater and nonwastewater forms. We also request data on soil or debris contaminated with these wastes, residuals generated from the treatment or recycling of these wastes, and the current and planned management practices for the wastes, waste mixtures, and treatment residuals.

For available capacity to meet the LDR requirements, we request data on the current treatment or recovery capacity capable of treating these wastes, facility and unit permit status related to treatment of the proposed wastes, and any plans that facilities may expand or reduce existing capacity or construct new capacity. In addition, we request information on the time and necessary procedures required for permit modification for generators or commercial treatment or disposal facilities to manage the wastes, required changes for operating practices due to the proposed listings or proposed additional constituents to be regulated in the wastes, and any waste minimization activities associated with the wastes. Of particular interest to us are chemical and physical constraints of treatment technologies for these wastes and any problems for disposing of these wastes. Also of interest are any analytical difficulties associated with identifying and monitoring the regulated constituents in these wastes.

2. What Are The Capacity Analysis Results?

This preamble only provides a summary of the capacity analysis performed to support this proposed regulation. For additional and more detailed information, please refer to the ''Background Document for Capacity Analysis for Land Disposal Restrictions: Newly Identified Paint Production Wastes (Proposed Rule), January 2001'' (i.e., the Capacity Background Document).

For this capacity analysis, we examined data on waste characteristics (such as whether the waste is a solid, solvent, or an aqueous waste) and management practices gathered for the paint manufacturing hazardous waste listing determination. We also examined data on available treatment or recovery capacity for these wastes. The sources for these data are the 2000 RCRA section 3007 survey and site visits (see the docket for this proposed regulation for more information on these survey instruments and facility activities), the available treatment capacity data submission that was collected in the 1990's, and the 1997 Biennial Report (BR).

We derived our estimated quantities requiring alternative or additional treatment to meet the LDR treatment standards from the estimated population for paint manufacturers (i.e., approximately one thousand paint manufacturing facilities in the United States, as discussed earlier for RCRA Section 3007 Survey (Section II.G)). K179 is paint manufacturing waste solid, so it is generated as a nonwastewater, as defined in 40 CFR 268.2(d) and (f) (i.e., nonwastewaters are wastes that do not meet the criteria for wastewaters which contain less than 1% by weight total organic carbon (TOC) and less than 1% by weight total suspended solids (TSS)). K180 is a paint manufacturing waste liquid and could be a nonwastewater or wastewater form based on the above definition.

Generally, facilities may combine a variety of wastes (for example, sludges from tank cleaning operations and wastewater treatment) and send their wastes off to one waste management unit. Some waste types are managed separately (for example, wastes with some value for fuel blending). We used weighted and extrapolated universe waste quantities from approximately one thousand paint manufacturing facilities for our capacity analysis. After examining waste generation quantities and their management practices, we estimated that approximately 17,000 tons per year of K179 and K180 wastes may require alternative or additional treatment to meet the LDR standards. This amount of waste covers the quantities which are currently land disposed, managed in a Subtitle D combustion unit, or uncertain on their management practices.

The quantities requiring alternative or additional treatment could be smaller because much of the proposed and newly identified paint manufacturing (or production) waste is mixed with existing listed and/or characteristic wastes which already had to meet the LDR requirements for at least some of the proposed constituents for K179 and K180 wastes. Also, most of the surveyed facilities that reported generation of waste residuals of concern under this listing determination reported that they recycled or reused the residuals to some extent. Furthermore, waste generated from the production batches are also generated in batches rather than in a continuous stream. We recognize the volume and type of paint produced, degree of automation, amount of non land-based recycling, age of facility, and the speed at which facilities may change product formulations can affect types and amount of waste generated. Therefore, the actual annual quantity of waste requiring commercial treatment may fluctuate due to these variations. However, we find that there is no shortfall for available commercial treatment capacity for these wastes proposed in today's rule. For a more detailed analysis regarding the amount of paint manufacturing (or production)

wastes requiring treatment to meet the LDR standards, see the Capacity Background Document in the public docket for this proposed rule.

As discussed in the section for the LDR treatment standards, we are proposing that numerical or technology-specific treatment standards be applied to K179 and K180 wastes, depending on the constituent in the wastes. For nonwastewater forms of these wastes, we anticipate that commercially available incineration, followed by stabilization if necessary (for antimony), can be used to meet these numerical treatment standards. For one organic constituent (formaldehyde) in wastewater and nonwastewater forms of K180, we are proposing to require treatment by specified methods. For formaldehyde in K180 wastewater we are proposing the following technologies as methods of treatment, wet air oxidation (WETOX) or chemical or electrolytic oxidation (CHOXD) followed by carbon adsorption (CARBN); or combustion (CMBST). For this constituent in the nonwastewater form of K180, the required technology standard proposed is combustion. We assume that facilities would achieve waste treatment standards using combustion, stabilization, or both for K179 and K180 wastes. The quantity of commercially available combustion capacity for sludge, solid, and liquids is well over one million tons per year based on 1997 Biennial Report data. The quantity of commercially available stabilization capacity is at least seven million tons per year based on 1995 Biennial Report data. Also, based on the data submittals in the early 1990's and 1997 BR data, we estimated that at least 34 million tons per year of commercial wastewater treatment capacity are available. Please note that facilities could use any available technologies (except impermissible dilution) to achieve the LDR numerical standards for these wastes.

Based on the results of the RCRA section 3007 survey and the site visits, we did not identify any paint manufacturing facilities that manage these proposed wastes in on-site surface impoundments. From the available information, we found that at least one wastewater treatment plant accepted proposed paint manufacturing waste liquids (K180) from the paint production industry, and the facility managed these wastes in a lined surface impoundment. Assuming such an impoundment satisfies requirements of section 3005(j)(11) (in essence, meets minimum technological requirements and is dredged annually), such wastes would not require treatment. If any wastes are managed in an impoundment not satisfying requirements of 3005(j)(11) (e.g., an unlined surface impoundment) of a wastewater treatment system, the wastes would be subject to land disposal prohibitions. However, we anticipate that very few facilities, if any, would manage the newly identified paint manufacturing wastes in such impoundments.

Based on the foregoing, we expect that sufficient capacity exists to treat the proposed K179 and K180 wastes that would require alternative or additional treatment. Therefore, we are proposing to not grant a national capacity variance for these wastes.

Further, soil and debris contaminated with these newly identified wastes may be subject to the LDRs (see LDR Treatment Standards for Soil in LDR Phase IV Final Rule, 63 FR 28602, May 26, 1998; 40 CFR 268.45 Treatment Standards for Hazardous Debris), but we believe that the contaminated soil and debris, if any, would not require substantial commercial treatment capacity. There are no data showing such contaminated soil and debris are currently generated. We expect that the majority of contaminated soil and debris, if generated, will be managed on-site. Therefore, we are not proposing to grant a national capacity variance for hazardous soil and debris contaminated with these wastes covered under this proposal.

Based on the RCRA section 3007 Survey conducted in early 2000 (which collected 1998 data), there are no data showing that the newly proposed wastes are managed by underground injection wells. Also, based on the 2000 RCRA section 3007 Survey, there are no data showing mixed radioactive wastes associated with the proposed listings. We are proposing to not grant a national capacity variance for underground injected wastes, mixed radioactive wastes (i.e., radioactive wastes mixed with K179 and K180), or soil and debris contaminated with these mixed radioactive wastes, if such wastes are generated.

Therefore, we propose that LDR treatment standards thus become effective when the listing determinations become effective for the wastes covered under today's rule. This conforms to RCRA section 3004(h)(1), which indicates that land disposal prohibitions must take effect immediately when there is sufficient treatment or disposal capacity available for the wastes. However, we may need to revise capacity analyses or capacity variance decisions if final listing determinations are changed or if we receive data and information to warrant any revision.

We request comments on the estimated quantities requiring alternative treatment and information on characteristics of the affected wastes, management practices for these wastes, and available treatment, recovery or disposal capacity for the wastes. We also request comments on whether any facility uses surface impoundment or underground injection to manage these wastes. In addition, we solicit comments on our decision not to grant a national capacity variance for any of the affected wastes. We will consider all available data and information provided during the public comment period and revise our capacity analysis accordingly in making the final capacity determinations. Please note that the ultimate volumes of wastes estimated to require alternative or additional commercial treatment may change if the final listing determinations change. Should this occur, we will revise the capacity analysis accordingly.

3. What Is the Available Treatment Capacity for Other Wastes Subject to Revised UTS and F039 Standards?

With respect to the revisions to the F039 and UTS lists, as discussed earlier in the section on K179 and K180 treatment standards, we are proposing to add acrylamide and styrene to the list of regulated constituents in F039 (40 CFR section 268.40). We are also proposing to add styrene to the UTS table (40 CFR section 268.48). Acrylamide is currently listed in the Appendix VIII of part 261. EPA is proposing to add styrene in the Appendix VIII as discussed in the earlier section (Section II). We have estimated what portion of the F039 or characteristic wastes (which require treatment of underlying hazardous constituents to UTS levels) may be required to meet these new treatment standards. We request comments on the estimates, the appropriate means of treatment (if necessary), and the sufficiency of available treatment capacity for the affected wastes by the addition of these constituents to the F039 and UTS lists.

When changing the treatment requirements for wastes already subject to LDR (including F039 under 40 CFR 261.31 and characteristic wastes under 40 CFR 261.24) for which the potential capacity variance periods have expired, EPA no longer has authority to use RCRA section 3004(h)(2) to grant a capacity variance to these wastes. However, EPA is guided by the overall objective of section 3004(h), namely that treatment standards which best

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accomplish the goal of RCRA section 3004(m) (to minimize threats posed by land disposal) should take effect as soon as possible, consistent with availability of treatment capacity.

We expect that only a limited quantity of hazardous waste leachate, if any, may be generated from the disposal of newly-proposed K179 and K180 wastes and added to the generation of leachates from other multiple restricted hazardous wastes already subject to LDR.

For the amount of characteristic wastes or leachates generated from those previously regulated hazardous wastes that would be subject only to the new treatment standards for these constituents, we evaluated the universe of wastes that might be impacted by revisions to the lists of regulated constituents for F039 and UTS based on limited information. Based on 1997 Biennial Report data and some assumptions of waste compositions and their potential for land disposal, we were able to estimate the potential need for additional treatment. For example, we estimated an upper bound of 7,000 tons per year of nonwastewaters mixed with other waste codes, the F039 leachate from which would be potentially impacted by the revision to the F039 treatment standards. In a similar fashion, we estimated that approximately 250,000 tons per year of characteristic nonwastewaters potentially might be affected by the proposed changes.

These upper bound estimates are most likely significantly overstated since only a portion of each estimated waste volume may contain the proposed additional constituents at concentrations above the proposed level specified in the UTS table and the F039 list. The estimates assume that these constituents are present at levels above the proposed treatment standards in all of these F039 and characteristically hazardous wastes and require alternative treatment, when it is likely that this may be true in only a small subset of the cases (as described in the Capacity Background Document). Furthermore, EPA does not anticipate that waste volumes subject to treatment for F039 or characteristic wastes would significantly increase because waste generators already are required to comply with the treatment requirements for other already regulated organic or metal constituents that may be present in the wastes. The volumes of wastes for which additional treatment is needed solely due to the addition of these constituents to the F039 and UTS lists are therefore expected to be small. See the Capacity Background Document for detailed analysis.

Even if we have underestimated the projected volume of wastes requiring treatment, we believe that there still would be no shortage of treatment capacity. Based on data submittals in the early 1990's and 1997 BRS data, EPA has estimated that at least 34 million tons per year of commercial wastewater treatment capacity are available, and approximately 1.6 million tons per year of liquid, sludge, and solid commercial combustion capacity are available. Also, as discussed earlier in this section, there are seven million tons of available stabilization capacity. These are well above the quantities of F039 or characteristic wastes potentially requiring treatment for the proposed additional constituents even under the conservative screening assumptions described above. Therefore, we are proposing a decision not to delay the effective date for adding these constituents to the lists of constituents for F039 and UTS.

We request comments on our proposed decision to not delay the effective date for adding these constituents to the lists of constituents for F039 and UTS. We request data on the annual generation volumes and characteristics of wastes affected by the proposed changes to UTS and F039 in wastewater and nonwastewater forms (if any), and the current and planned management practices for the wastes, waste mixtures, and treatment residuals. We also request data on the current treatment or recovery capacity available for treating the affected wastes.

VII. State Authority and Compliance

A. How Are States Authorized Under RCRA?

Under section 3006 of RCRA, EPA may authorize qualified States to administer and enforce the RCRA hazardous waste program within the State. (See 40 CFR Part 271 for the standards and requirements for authorization.) Following authorization, EPA retains enforcement authority under sections 3007, 3008, 3013, and 7003 of RCRA, although authorized States have primary enforcement responsibility.

Before the Hazardous and Solid Waste Amendments of 1984 (HSWA) amended RCRA, a State with final authorization administered its hazardous waste program entirely in lieu of the Federal program in that State. The Federal requirements no longer applied in the authorized State, and EPA could not issue permits for any facilities located in the State with permitting authorization. When new, more stringent Federal requirements were promulgated or enacted, the State was obligated to enact equivalent authority within specified time-frames. New Federal requirements did not take effect in an authorized State until the State adopted the requirements as State law.

By contrast, under section 3006(g) of RCRA, 42 U.S.C. 6926(g), new requirements and prohibitions imposed by the HSWA (including the hazardous waste listings finalized in this notice) take effect in authorized States at the same time that they take effect in non-authorized States. While States must still adopt HSWA-related provisions as State law to retain final authorization, EPA is directed to implement those requirements and prohibitions in authorized States, including the issuance of permits, until the State is granted authorization to do so.

Authorized States are required to modify their programs only when EPA promulgates Federal standards that are more stringent or broader in scope than existing Federal standards. Section 3009 of RCRA allows States to impose standards more stringent than those in the Federal program. See also 40 CFR 271.1(I). For those Federal program changes, both HSWA and non-HSWA, that are less stringent or reduce the scope of the Federal program, States are not required to modify their programs. Less stringent regulations, both HSWA and non-HSWA, do not go into effect in authorized States until those States adopt them and are authorized to implement them.

B. How Would This Rule Affect State Authorization?

We are proposing today's rule pursuant to HSWA authority. The listing of the new K-wastes is promulgated pursuant to RCRA section 3001(e)(2), a HSWA provision. Therefore, we are adding this rule to Table 1 in 40 CFR 271.1(j), which identifies the Federal program requirements that are promulgated pursuant to HSWA and take effect in all States, regardless of their authorization status. The land disposal restrictions for these wastes are promulgated pursuant to RCRA section 3004(g) and (m), also HSWA provisions. Table 2 in 40 CFR 271.1(j) is modified to indicate that these requirements are self-implementing. States may apply for either interim or final authorization for the HSWA provisions in 40 CFR 271.1(j), as discussed below. Until the States receive authorization for these more stringent HSWA provisions, EPA would implement them.

A State submitting a program modification for the portions of this proposed rule promulgated pursuant to

HSWA authority could apply to receive either interim authorization under RCRA section 3006(g) or final authorization under 3006(b), if the State requirements are, respectively, substantially equivalent or equivalent to EPA's requirements. States can only receive final authorization for program modifications implementing non-HSWA requirements. The procedures and schedule for final authorization of State program modifications are described in 40 CFR 271.21. It should be noted that all HSWA interim authorizations are currently scheduled to expire on January 1, 2003 (see 57 FR 60129, February 18, 1992).

Section 271.21(e)(2) of EPA's State authorization regulations (40 CFR part 271) requires that States with final authorization modify their programs to reflect Federal program changes and submit the modifications to EPA for approval. The deadline by which the States would need to modify their programs to adopt this proposed regulation is determined by the date of promulgation of a final rule in accordance with section 271.21(e)(2). Table 1 at 40 CFR 271.1 is amended accordingly. Once EPA approves the modification, the State requirements would become RCRA Subtitle C requirements.

States with authorized RCRA programs already may have regulations similar to those in this proposed rule. These State regulations have not been assessed against the Federal regulations being finalized to determine whether they meet the tests for authorization. Thus, a State would not be authorized to implement these regulations as RCRA requirements until State program modifications are submitted to EPA and approved, pursuant to 40 CFR 271.21. Of course, States with existing regulations that are more stringent than or broader in scope than current Federal regulations may continue to administer and enforce their regulations as a matter of State law. In implementing the HSWA requirements, EPA will work with the States under agreements to avoid duplication of effort.

C. Who Would Need to Notify EPA That They Have a Hazardous Waste?

Under RCRA Section 3010, the Administrator may require all persons who handle hazardous wastes to notify EPA of their hazardous waste management activities within 90 days after the wastes are identified or listed as hazardous. This requirement may be applied even to those generators, transporters, and treatment, storage, and disposal facilities (TSDFs) that have previously notified EPA with respect to the management of other hazardous wastes. The Agency is proposing to waive this notification requirement for persons who handle wastes that are covered by today's listings and have already (1) notified EPA that they manage other hazardous wastes, and (2) received an EPA identification number. However, any person who generates, transports, treats, stores, or disposes of these wastes and has not previously received an EPA identification number would need to obtain an identification number pursuant to 40 CFR 262.12 to generate, transport, treat, store, or dispose of these hazardous wastes 90 days after the effective date.

D. What Would Generators and Transporters Have to Do?

Once a final rule is promulgated, persons that generate newly identified hazardous wastes may be required to obtain an EPA identification number if they do not already have one (as discussed above). In order to be able to generate or transport these wastes after the effective date of this rule, generators of the wastes listed today would be subject to the generator requirements set forth in 40 CFR part 262. These requirements include standards for hazardous waste determination (40 CFR 262.11), compliance with the manifest (40 CFR 262.20 to 262.23), pretransport procedures (40 CFR 262.30 to 262.34), generator accumulation (40 CFR 262.34), record keeping and reporting (40 CFR 262.40 to 262.44), and import/export procedures (40 CFR 262.50 to 262.60). The generator accumulation provisions of 40 CFR 262.34 allow generators to accumulate hazardous wastes without obtaining interim status or a permit only in units that are container storage units or tank systems. These existing regulations also place a limit on the maximum amount of time that wastes can be accumulated in these units. If, however, the wastes covered in today's proposed rule are managed in units that are not tank systems or containers, then these units would be subject to the permitting requirements of 40 CFR parts 264 and 265, and the generator is required to obtain interim status and seek a permit (or modify interim status or a permit, as appropriate). Also, current regulations require that persons who transport newly identified hazardous wastes to obtain an EPA identification number as described above; such transporters will be subject to the transporter requirements set forth in 40 CFR part 263.

E. Which Facilities Would Be Subject to Permitting?

1. Facilities Newly Subject to RCRA Permit Requirements

Facilities that treat, store, or dispose of wastes that are subject to RCRA regulation for the first time by this proposed rule (that is, facilities that have not previously received a permit pursuant to Section 3005 of RCRA and are not currently operating pursuant to interim status), could be eligible for interim status (see section 3005(e)(1)(A)(ii) of RCRA). To obtain interim status based on treatment, storage, or disposal of such newly identified wastes, eligible facilities would be required to comply with 40 CFR 270.70(a) and 270.10(e) by providing notice under section 3010 and submitting a Part A permit application no later than 6 months after date of publication of the final rule. Such facilities would be subject to regulation under 40 CFR part 265 until a permit is issued.

In addition, under Section 3005(e)(3) and 40 CFR 270.73(d), not later than 6 months after date of publication of the final rule, land disposal facilities newly qualifying for interim status under section 3005(e)(1)(A)(ii) would also need to submit a Part B permit application and certify that the facility is in compliance with all applicable groundwater monitoring and financial responsibility requirements. If the facility fails to submit these certifications and a permit application, then interim status would terminate on that date.

2. Existing Interim Status Facilities

Pursuant to 40 CFR 270.72(a)(1), all existing hazardous waste management facilities (as defined in 40 CFR 270.2) that treat, store, or dispose of the newly identified hazardous wastes and are currently operating pursuant to interim status under section 3005(e) of RCRA, would need to file an amended Part A permit application with EPA no later than six months after date of publication of a final rule. By doing this, the facility could continue managing the newly listed wastes. If the facility fails to file an amended Part A application by that date, the facility would not receive interim status for management of the newly listed hazardous wastes and may not manage those wastes until the facility receives either a permit or a change in interim status allowing such activity (40 CFR 270.10(g)).

3. Permitted Facilities

Facilities that already have RCRA permits would need to request permit

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modifications if they want to continue managing newly listed wastes (see 40 CFR 270.42(g)). This provision states that a permittee may continue managing the newly listed wastes by following certain requirements, including submitting a Class 1 permit modification request by the date on which the waste or unit becomes subject to the new regulatory requirements (i.e., the effective date of a final rule), complying with the applicable standards of 40 CFR parts 265 and 266 and submitting a Class 2 or 3 permit modification request within 180 days of the effective date.

Generally, a Class 2 modification is appropriate if the newly listed wastes will be managed in existing permitted units or in newly regulated tank or container units and will not require additional or different management practices than those authorized in the permit. Please note that under this proposal, liquids managed in tanks or containers would only become newly listed waste if they meet the listing description for constituent concentration levels and if they are not managed solely in tanks and containers and then discharged directly from a POTW or centralized wastewater treatment facility. A Class 2 modification requires the facility owner to provide public notice of the modification request, a 60-day public comment period, and an informal meeting between the owner and the public within the 60-day period. The Class 2 process includes a ''default provision,'' which provides that if the Agency does not reach a decision within 120 days, the modification is automatically authorized for 180 days. If the Agency does not reach a decision by the end of that period, the modification is permanently authorized (see 40 CFR 270.42(b)).

A Class 3 modification is generally appropriate if management of the newly listed wastes requires additional or different management practices than those authorized in the permit or if newly regulated land-based units are involved. The initial public notification and public meeting requirements are the same as for Class 2 modifications. However, after the end of the 60-day public comment period, the Agency will grant or deny the permit modification request according to the more extensive procedures of 40 CFR part 124. There is no default provision for Class 3 modifications (see 40 CFR 270.42(c)).

Under 40 CFR 270.42(g)(1)(v), for newly regulated land disposal units, permitted facilities must certify that the facility is in compliance with all applicable 40 CFR Part 265 groundwater monitoring and financial responsibility requirements no later than 6 months after the date of publication of a final rule. If the facility fails to submit these certifications, authority to manage the newly listed wastes under 40 CFR 270.42(g) will terminate on that date.

For states which have not yet picked up the permit modification tables of 40 CFR 270.42, ''major'' and ''minor'' permit modifications should be applied as appropriate to the permit modification request.

4. Units

Units in which newly identified hazardous wastes are generated or managed would be subject to all applicable requirements of 40 CFR part 264 for permitted facilities or 40 CFR part 265 for interim status facilities, unless the unit is excluded from such permitting by other provisions, such as the wastewater treatment tank exclusions (40 CFR 264.1(g)(6) and 265.1(c)(10)) and the product storage tank exclusion (40 CFR 261.4(c)). Examples of units to which these exclusions could never apply include landfills, waste piles, incinerators, and any other miscellaneous units in which these wastes may be generated or managed.

5. Closure

All units in which newly identified hazardous wastes are treated, stored, or disposed after the effective date of this regulation that are not excluded from the requirements of 40 CFR parts 264 and 265 would be subject to both the general closure and post-closure requirements of subpart G of 40 CFR parts 264 and 265 and the unit-specific closure requirements set forth in the applicable unit technical standards subpart of 40 CFR part 264 or 265 (e.g., Subpart N for landfill units). In addition, EPA promulgated a final rule that allows, under limited circumstances, regulated landfills or surface impoundments to cease managing hazardous waste, but to delay Subtitle C closure to allow the unit to continue to manage nonhazardous waste for a period of time prior to closure of the unit (see 54 FR 33376, August 14, 1989). Units for which closure is delayed continue to be subject to all applicable 40 CFR parts 264 and 265 requirements. Dates and procedures for submittal of necessary demonstrations, permit applications, and revised applications are detailed in 40 CFR 264.113(c) through (e) and 265.113(c) through (e).

VIII. CERCLA Designation and Reportable Quantities

A. What Is the Relationship Between RCRA and CERCLA?

CERCLA (Comprehensive Environmental Response, Compensation, and Liability Act of 1980) defines the term ''hazardous substance'' to include RCRA listed and characteristic hazardous wastes. When EPA adds a hazardous waste under RCRA, the Agency also will add the waste to its list of CERCLA hazardous substances. EPA establishes a reportable quantity, or RQ, for each CERCLA hazardous substance. EPA provides a list of the CERCLA hazardous substances along with their RQs in Table 302.4 at 40 CFR 302.4. If you are the person in charge of a vessel or facility that releases a CERCLA hazardous substance in an amount that equals or exceeds its RQ, then you must report that release to the National Response Center (NRC) pursuant to CERCLA Section 103. You also may have to notify State and local authorities.

B. How Does EPA Determine Reportable Quantities?

Under CERCLA, all new hazardous substances automatically have a statutory one-pound RQ. EPA adjusts the RQ of a newly added hazardous substance based on an evaluation of its intrinsic physical, chemical, and toxic properties. These intrinsic properties—called ''primary criteria''—are aquatic toxicity, mammalian toxicity (oral, dermal, and inhalation), ignitability, reactivity, chronic toxicity, and potential carcinogenicity. EPA evaluates the data for a hazardous substance for each primary criterion. To adjust the RQs, EPA ranks each criterion on a scale that corresponds to an RQ value of 1, 10, 100, 1,000, or 5,000 pounds. For each criterion, EPA establishes a tentative RQ. A hazardous substance may receive several tentative RQ values based on its particular intrinsic properties. The lowest of the tentative RQs becomes the ''primary criteria RQ'' for that substance.

After the primary criteria RQs are assigned, EPA further evaluates substances for their susceptibility to certain degradative processes. These are secondary adjustment criteria. The natural degradative processes are biodegradation, hydrolysis, and photolysis (BHP). If a hazardous substance, when released into the environment, degrades rapidly to a less hazardous form by one or more of the BHP processes, EPA generally raises its RQ (as determined by the primary RQ

adjustment criteria) by one level. Conversely, if a hazardous substance degrades to a more hazardous product after its release, EPA assigns an RQ to the original substance equal to the RQ for the more hazardous substance.

The standard methodology used to adjust the RQs for RCRA hazardous waste streams differs from the methodology applied to individual hazardous substances. The procedure for assigning RQs to RCRA waste streams is based on the results of an analysis of the hazardous constituents of the waste streams. The constituents of each RCRA hazardous waste stream are identified in 40 CFR part 261, Appendix VII. EPA first determines an RQ for each hazardous constituent within the waste stream using the methodology described above. The lowest RQ value of these constituents becomes the adjusted RQ for the waste stream. When there are hazardous constituents of a RCRA waste stream that are not CERCLA hazardous substances, the Agency develops an RQ, called a ''reference RQ,'' for these constituents in order to assign an appropriate RQ to the waste stream (see 48 FR 23565, May 25, 1983). In other words, the Agency derives the RQ for waste streams based on the lowest RQ of all of the hazardous constituents, regardless of whether they are CERCLA hazardous substances.

C. Is EPA Proposing to Adjust the Statutory One Pound RQ for These Wastes?

In today's proposed rule, EPA is proposing to assign 100-pound adjusted RQs to the K179 and K180 wastes. The RQs for each of the constituents contained in the two proposed wastes are presented in the table below.[46]

TABLE VIII.C–1.—PROPOSED RQS FOR CONSTITUENTS IDENTIFIED IN K179 AND K180 WASTES

Constituents in K179 & K180 waste streams	Constituent RQ (lbs.) (40 CFR 302.4)
Acrylonitrile	100
Acrylamide	5000
Antimony	5000
N-butyl alcohol	5000
Methylene chloride (dichloromethane)	1000
Formaldehyde	100
Ethylbenzene	1000
Methyl isobutyl ketone	5000
Methyl methacrylate	1000
Styrene	1000
Toluene	1000
Xylene	1000

[46] We are considering an alternative proposal not to list paint manufacturing waste liquids (see Section IV.D). If we do not list wastes under K180, then there would be no need to promulgate adjusted RQs for the following constituents: n-butyl alcohol, methylene chloride, formaldehyde, ethylbenzene, styrene, toluene, and xylene.

D. How Would a Concentration-Based Hazardous Waste Listing Approach Relate to My Reporting Obligations Under CERCLA? When Would I Need To Report a Release of These Wastes Under CERCLA?

Today's proposed hazardous waste listings are based on the concentrations of the hazardous constituents in the wastes. Adjusted RQs of 100 pounds are being proposed for these wastes based on the lowest RQ of the hazardous constituents in the wastes. Notification is required under CERCLA when wastes meeting the listing descriptions are released into the environment in a quantity that equals or exceeds the RQ for the waste.

For CERCLA reporting purposes, the Clean Water Act mixture rule (40 CFR 302.6) applies to releases of these wastes when the quantity (or concentrations) of all of the hazardous constituents in the waste are known. In such a case, notification is required where an amount of waste is released that contains an RQ or more of any hazardous substance contained in the waste. When the quantity (or concentration) of one or more of the hazardous constituents is not known, notification is required when the quantity of waste released equals or exceeds the RQ for the waste stream.

Although today's proposed hazardous waste listings are based on the concentrations of the hazardous constituents in the wastes, the Agency recognizes that it may not be necessary for a generator of these wastes to learn the concentrations of every hazardous constituent in the wastes in order to determine whether one of the listing descriptions applies. This is because a waste stream need exceed only one of the constituent-specific regulatory levels to meet one of the listing descriptions. Moreover, many generators, after testing their waste streams initially, may use knowledge of the waste, or of the process generating the waste, to determine that their waste is or is not hazardous under 40 CFR 262.11. Today's proposed rule requires sampling and analysis only for large-volume generators of the proposed waste streams. Therefore, many smaller generators may not know the concentrations of the constituents in their wastes. For these reasons, EPA believes that many, if not a majority, of the generators of these wastes may not know the concentrations of every constituent in these wastes, and may not, therefore, be able to apply the mixture rule.

E. How Would I Report a Release?

To report a release of proposed K179 or K180 (or any other CERCLA hazardous substance) that equals or exceeds its RQ, you would need to immediately notify the National Response Center (NRC) as soon as you have knowledge of that release. The toll-free telephone number of the NRC is 1–800–424–8802; in the Washington, DC, metropolitan area, the number is (202) 267–2675.

You could also need to notify State and local authorities. The Emergency Planning and Community Right-to-Know Act (EPCRA) requires that owners and operators of certain facilities report releases of CERCLA hazardous substances and EPCRA extremely hazardous substances (see list in 40 CFR part 355, appendix A) to State and local authorities. After the release of an RQ or more of any of those substances, you must report immediately to the community emergency coordinator of the local emergency planning committee for any area likely to be affected by the release, and to the State emergency response commission of any State likely to be affected by the release.

F. What Is the Statutory Authority for This Program?

Section 101(14) of CERCLA defines the term hazardous substance by referring to substances listed under several other environmental statutes, as well as those substances that EPA designates as hazardous under CERCLA section 102(a). In particular, CERCLA section 101(14)(C) defines the term hazardous substance to include ''any hazardous waste having the characteristics identified under or listed pursuant to section 3001 of the Solid Waste Disposal Act.'' CERCLA section 102(a) gives EPA authority to establish RQs for CERCLA hazardous substances. CERCLA section 103(a) requires any person in charge of a vessel or facility that releases a CERCLA hazardous substance in an amount equal to or greater than its RQ to report the release immediately to the federal government. EPCRA section 304 requires owners or operators of certain facilities to report

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releases of CERCLA hazardous substances and EPCRA extremely hazardous substances to State and local authorities.

G. How Can I Influence EPA's Thinking on Regulating K179 and K180 Under CERCLA?

In developing this proposal, EPA tried to address the concerns of all our stakeholders. Your comments will help us to improve this proposal. We invite you to provide your views on this proposal and how it may affect you. We also are interested in receiving any comments that you have on the information provided in Table VIII.C–1, including the hazardous constituents identified for proposed K179 and K180 and the maximum observed concentrations for each constituent.

IX. Analytical And Regulatory Requirements

A. Is This a Significant Regulatory Action Under Executive Order 12866?

Under Executive Order 12866, EPA must determine whether a regulatory action is significant and, therefore, subject to comprehensive review by the Office of Management and Budget (OMB), and the other provisions of the Executive Order. A significant regulatory action is defined by the Order as one that may:

(1) Have an annual effect on the economy of $100 million or more or adversely affect in a material way the economy, a sector of the economy, productivity, competition, jobs, the environment, public health or safety, or State, local, or tribal governments or communities;

(2) Create a serious inconsistency or otherwise interfere with an action taken or planned by another agency;

(3) Materially alter the budgetary impact of entitlements, grants, user fees, or loan programs or rights and obligations or recipients thereof; or

(4) Raise novel legal or policy issues arising out of legal mandates, the President's priorities, or the principles set forth in Executive Order 12866.

OMB has determined that today's proposed rule is a ''significant regulatory action,'' because it may raise novel legal or policy issues. As such, this action was submitted to OMB for review. Changes made in response to OMB suggestions or recommendations will be documented in the public record.

Based on the results of our economic analysis of the proposed rule, we believe that the annual economic effects of this proposed rule do not meet the requirements for an economically significant regulatory action (see point one above). On the national level, the annual compliance costs of this rule, as proposed, are estimated to be less than $100 million. We are unable to quantify the benefits of the proposed rule, but anticipate that such benefits would also be less than $100 million. Furthermore, we do not expect this proposed rule to adversely affect, in a material way, the economy, a sector of the economy, productivity, competition, jobs, the environment, public health or safety, or State, local, or tribal governments or communities.

We have prepared two economic support documents for this proposed action. These are: Economic Assessment for the Proposed Concentration-Based Listing of Wastewaters and Non-Wastewaters from the Production of Paints and Coatings, and, Regulatory Flexibility Screening Analysis for the Proposed Concentration-Based Listing of Wastewaters and Non-Wastewaters from the Production of Paints and Coatings. The Economic Assessment addresses, among other elements, compliance costs to the regulated community, industry economic impacts, qualitative benefits, children's health, unfunded mandates, regulatory takings, federalism, and environmental justice. The Regulatory Flexibility Screening Analysis (RFSA) examines impacts to small entities that may result from this action, as proposed. These analyses cover not only the impacts on the paint industry, but also the potential impacts on land disposal facilities that have disposed of the wastes considered in this rulemaking. Because of the proposed listing, leachate from these landfills may be hazardous under the Derived-from Rule. Also, when the leachate from these two wastes mixes with leachate from other wastes disposed in these landfills the entire leachate quantity may be considered hazardous under the Mixture Rule. A summary of findings from this Economic Assessment is presented directly below. The RFSA is summarized in Part B of this Section. The complete Economic Assessment and RFSA documents are available in the RCRA docket established for this action.

Paint manufacturers produce varnishes, lacquers, enamels and shellac, putties, wood fillers and sealers, paint and varnish removers, paint and brush cleaners, and allied products. The products are produced for four end-use markets: architectural coatings, product finishes for original equipment manufacturers, special purpose coatings, and allied paint products. According to Census data for 1997 there are approximately 1,495 facilities in operation in the U.S., owned by 1,206 different companies. Total production is estimated to range from 1.2 billion and 1.5 billion gallons per year between 1992 and 1998, with a total product value of $17.2 billion in 1998. This industry segmentation includes all facilities identified in Standard Identification Classification (SIC) 2851 and under the North American Industrial Classification (NAICS) code 325510; this includes some manufacturers of miscellaneous allied paint products which will not be impacted by the proposed rule.

Approximately 1,146, or 95 percent of the paint manufacturing companies in the U.S. are estimated to be small according to the Small Business Administration (SBA) definition for small (fewer than 500 employees) based on corporate level data.[47] Many of these facilities (and companies) are very small, with fewer than ten full-time employees.

While the Census of Manufacturers identifies 1,495 facilities, not all of these facilities are actually paint manufacturers potentially affected by the proposed waste listing. The Agency has estimated, using a RCRA 3007 survey of the industry, that there are 972 facilities that manufacture paints and coatings in the U.S. Of this total, we estimate that 615 facilities operated by 494 companies generate the waste streams of concern for this proposed listing. On the basis of the extrapolated survey, we estimate that these facilities generate nearly 107,000 metric tons of the targeted waste streams (K179 and K180), of which about 36 percent is currently managed as hazardous waste. This analysis relies primarily on data generated through the Agency's survey of the industry, augmenting this information with Census and other industry specific information as appropriate.

We have developed impact estimates for the concentration-based listing proposal (the Agency's preferred approach) and two key options: A no-list or status quo option and a traditional or standard listing approach option. Under the proposed approach, we also evaluated two alternative scenarios: A nonwastewaters option which limits the listing to waste solids (K179) and a sensitivity analysis scenario where wastes currently going to hazardous fuel blending and cement kilns would be diverted to a commercial hazardous waste incinerator.

[47] Small Business Size Standards—Matched to North American Industrial Classification System (NAICS) Codes, Effective October 1, 2000, Small Business Administration (SBA)

A supplementary analysis of our RCRA 3007 survey data shows that an estimated 50 percent of the nonwastewaters and 20 percent of the wastewaters generated by survey respondents did not contain any of the constituents of concern. We used these ratios for our analysis of the percentage of wastes that would be listed hazardous waste for the concentration-based listing approach (the Agency's proposed option), e.g., 50 percent of nonwastewaters and 80 percent of wastewaters would become hazardous. Our findings under this approach may overestimate compliance costs for waste streams containing listed constituents that fall below risk-based concentration levels. We assumed that one-hundred percent of all targeted wastes were designated as hazardous under the aggregate findings for the traditional or standard listing option.

The estimated impacts associated with the Agency proposed approach, alternative scenarios to the proposed approach, and alternative waste listing options are presented in the table below. As indicated, we estimate that the nonwastewaters scenario under the proposed approach is the least costly, at $6.7 million per year for all impacted facilities. Our proposed approach has estimated annual costs of $7.3 million per year, or $600,000 more than the nonwastewaters scenario. If we assume that the wastes currently going to hazardous waste fuel blending will be diverted to commercial incinerators (the sensitivity analysis) we estimate aggregate cost of $18.1 million per year. The traditional or standard listing option is estimated to cost $10.9 million per year. The no-list or status quo option would result in no incremental costs to industry. The impact estimates in Table IX.A–1 are fully weighted to account for model facility representation. These figures (except the Traditional Option) also assume baseline conditions where 50 percent of the nonwastewaters and 20 percent of the wastewaters are nonhazardous, as managed under the proposed waste listing option.

TABLE IX.A–1.—SUMMARY OF ESTIMATED IMPACTS FROM ALL WASTE LISTING OPTIONS AND SCENARIOS

Listing option/scenario	Average weighted incremental annual cost as a percent of gross annual sales	Aggregate annual compliance cost impacts (million 1999 dollars)
Proposed Concentration-Based Listing—Agency Preferred Approach (APA)	0.07	[1] 7.3
Agency Preferred Approach-Sensitivity Analysis Scenario (APA 1) (Waste going to all fuel blending is diverted to commercial incineration)	0.19	18.1
Agency Preferred Approach—List Solids (K179) Only (APA 2)	0.06	6.7
Traditional or Standard Listing Option	0.10	[1] 10.9
No List—Status Quo Option	0.0	0.0

[1] While cost estimates under the APA represent only 50 percent of total nonhazardous solids and 80 percent of the nonhazardous liquids, aggregate impacts do not directly reflect this difference. The unweighted and unscaled waste management costs under the APA are estimated at $1.8 million. The unweighted and unscaled waste management costs under the Traditional Listing Option are estimated at $3.5 million. Applying the weighting and scaling factors, plus transportation, administrative, and analytical (APA only) costs results in aggregate annual nationwide compliance costs of $7.3 million for the APA and $10.9 million for the Traditional Option.

In addition to the costs presented above, incremental costs expected to be incurred by the landfill industry are estimated to be approximately $300,000 to $400,000 annually for the proposed option (The Clean Water Act Exemption with Two-Year Impoundment Replacement Deferral regulatory option). However, the costs may be considerably lower as the result of possible savings gained through contract negotiations for repeat customers who provide consistent revenue streams to shipping companies through their regularly scheduled shipments of leachate. It also is likely that not all landfills that received paint wastes prior to this proposed action have leachate collection systems, which would lower the cost estimates. Finally, there is likely some overlap from paint facilities disposing in the same landfill, which will result in lower costs to the landfill industry.

Table IX.A–2 presents impacts for different size classes of the model facilities, based on employment. The impacts presented in this table represent the impacts on the facilities associated with the proposed waste listing approach (APA). However, these figures assume that 100 percent of all of the waste generated is hazardous, as a high-end scenario. In general, cost impacts as a percent of sales are modest, averaging just over 0.1 percent of gross annual revenues. For three of the 151 ''model facilities,'' impacts exceed 1.0 percent of gross sales; these three model facilities are estimated to represent six total facilities. (The reader should note these findings are at the facility, not the company or parent firm level.)

TABLE IX.A–2.—ESTIMATED COST IMPACTS ON MODEL FACILITIES FROM THE AGENCY PREFERRED LISTING APPROACH

Model facility size range (number of employees per facility)	Estimated 1999 average annual gross sales (thousand dollars)	Unweighted incremental cost range per facility* (percent of gross annual sales)	Average unweighted incremental cost as a percent of sales*
1–19	3,661	0.04–3.77	0.11
20–49	11,484	0.01–0.50	0.05
50–149	31,839	0.01–4.06	0.11

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TABLE IX.A–2.—ESTIMATED COST IMPACTS ON MODEL FACILITIES FROM THE AGENCY PREFERRED LISTING APPROACH—Continued

Model facility size range (number of employees per facility)	Estimated 1999 average annual gross sales (thousand dollars)	Unweighted incremental cost range per facility* (percent of gross annual sales)	Average unweighted incremental cost as a percent of sales*
150 & Above	85,791	0.01–1.33	0.17

* Estimates derived assuming 100 percent of all waste streams generated by the model facilities are hazardous.

The proposed rule is intended to reduce the potential for environmental releases of hazardous wastes. Depending on current and future exposure patterns, the proposed rule could yield benefits in terms of reductions in health risks due to stricter controls on the management of this waste. The Agency has not monetized or quantitatively estimated the human health or environmental benefits, but anticipates that such benefits would be less than $100 million. Furthermore, additional data are necessary to determine whether there will be net benefits (i.e., benefits exceeding costs) from the proposed rule.

B. What Consideration Was Given to Small Entities Under the Regulatory Flexibility Act (RFA), as Amended by the Small Business Regulatory Enforcement Fairness Act of 1996 (SBREFA), 5 U.S.C. 601 et seq.?

Introduction

The RFA generally requires an agency to prepare a regulatory flexibility analysis of any rule subject to notice and comment rulemaking requirements under the Administrative Procedure Act or any other statute, unless the agency certifies that the rule will not have a significant economic impact on a substantial number of small entities. Small entities include small businesses, small organizations, and small governmental jurisdictions.

For purposes of assessing the impacts of rules on small entities, a small entity is defined as: (1) A small business that has fewer than 1000, 750, or 500 employees per firm depending upon the SIC code the firm is primarily classified in; (2) a small governmental jurisdiction that is a government of a city, county, town, school district or special district with a population of less than 50,000; or (3) a small organization that is any not-for-profit enterprise which is independently owned and operated and is not dominant in its field.

After considering the economic impacts of today's proposed rule on small entities, we believe that this action should not have a significant economic impact on a substantial number of small entities. In determining whether a rule has a significant economic impact on a substantial number of small entities, the impact of concern is any significant adverse economic impact on small entities, since the primary purpose of the regulatory flexibility analyses is to identify and address regulatory alternatives ''which minimize any significant economic impact of the proposed rule on small entities' (5 U.S.C. 603 and 604). Thus, an agency may certify that a rule will not have a significant economic impact on a substantial number of small entities if the rule relieves regulatory burden, or otherwise has a positive economic effect on all of the small entities subject to the rule.

We have completed a screening analysis (Regulatory Flexibility Screening Analysis for the Proposed Concentration-Based Listing of Wastewaters and Non-Wastewaters from the Production of Paints and Coatings), in support of today's proposed action. Findings from this Regulatory Flexibility Screening Analysis (RFSA), as described in the previous section above, suggest that today's rule, as proposed, will not result in significant economic impacts on a substantial number of small business paint manufacturers potentially subject to rule requirements.

Findings

Between 93 percent and 95 percent of all paint and coatings manufacturing companies are estimated to be ''small,'' based on the SBA definition. Census data from 1997 indicate a total of 95 percent are small companies, while our research based on the RCRA 3007 survey data on 1998 practices and research on representative companies indicate approximately 91 percent of all companies may be small. An average of these sources indicates approximately 93 percent, or 460 out of the total of 494 different companies operating 615 facilities potentially subject to rule requirements may be considered small for purposes of this analysis. We have determined that paint manufacturing facilities are not owned or operated by small (or large) entities (not-for-profits, local governments, tribes, etc.), other than businesses.

We estimate that, under the proposed regulatory option, impacts on small companies would average about 0.06 percent of annual gross revenues. Three small companies (operating four facilities) out of the total of 460 small companies potentially subject to rule requirements were found to experience annual compliance cost impacts greater than 1.0 percent of annual gross revenues. We also examined potential economic impacts to small businesses under three alternative regulatory options. Impacts to small businesses under these options all averaged less than 0.5 percent of annual gross revenues.

The Agency is required to make an initial determination if any regulatory action may have a ''significant economic impact on a substantial number of small entities,'' as required by the RFA as amended by SBREFA. However, the legislation presents no explicit guidelines regarding what constitutes a significant impact or what constitutes a significant number of small entities for this particular industry. Based on a review of overall impacts we believe that the impacts on small entities, as estimated in this report, should not be considered ''significant.'' It is also anticipated that the industry will pass at least some of these costs on in the form of higher paint prices, thereby reducing the actual effect on individual small entities.

The paint and coatings industry is dominated by small entities, at least in terms of number of facilities. Accordingly it may be argued that there could be a substantial number of small entities impacted. However it appears that the impacts on these small entities are modest, especially compared with large facilities, as illustrated in Table IX.B–3 below.

TABLE IX.B–3.—SUMMARY OF ESTIMATED IMPACTS FROM ALL WASTE LISTING OPTIONS SMALL AND LARGE FACILITIES *

Listing option	Entity size	Number of unweighted model facilities **	Average incremental cost as a percent of sales	Aggregate annual cost impacts (million 1999$/year)
No List Option	Large	14	0.00	0.0
	Small	137	0.00	0.0
Traditional or Standard Listing	Large	14	0.16	3.6
	Small	137	0.08	7.4
Agency Preferred Approach (APA)	Large	14	0.09	2.1
	Small	137	0.06	5.2
Agency Preferred Approach (Sensitivity Analysis Scenario APA1)	Large	14	0.42	9.4
	Small	137	0.11	8.7
Agency Preferred Approach (Scenario to List Solids Only APA2)	Large	14	0.09	2.0
	Small	137	0.05	4.7

* Large entities include all facilities which could be identified as being owned by companies with more than 500 employees. The small entity category contains all other facilities.
** The estimated total number of small entities affected by the rule industry-wide is 572; there are an estimated 43 large entities affected.

Conclusions

After considering the above findings, I certify that this proposed action should not result in significant economic impacts on a substantial number of small paints and coatings manufacturing businesses subject to rule requirements. Furthermore, this rule, as proposed does not require further analysis and evaluation under a full Regulatory Flexibility Analysis. The RFSA document: Regulatory Flexibility Screening Analysis for the Proposed Concentration-Based Listing of Wastewaters and Non-Wastewaters from the Production of Paints and Coatings, is available for review in the docket established for today's action. Concerned stakeholders are encouraged to conduct a comprehensive review and evaluation of this document and provide non-restricted data and comments designed to improve this analysis.

C. What Consideration Was Given to Children's Health Under Executive Order 13045?

''Protection of Children from Environmental Health Risks and Safety Risks'' (62 FR 19885, April 23, 1997) applies to any rule that: (1) Is determined to be ''economically significant'' as defined under E.O. 12866, and (2) concerns an environmental health or safety risk that EPA has reason to believe may have a disproportionate effect on children. If the regulatory action meets both criteria, the Agency must evaluate the environmental health or safety effects of the planned rule on children, and explain why the planned regulation is preferable to other potentially effective and reasonably feasible alternatives considered by the Agency. This proposed rule is not subject to the Executive Order because it is not economically significant as defined in E.O. 12866. Furthermore, the Agency does not have reason to believe that environmental health or safety risks addressed by this action present a disproportionate risk to children.

The topic of environmental threats to children's health is growing in regulatory importance as scientists, policy makers, and village leaders continue to recognize the extent to which children are particularly vulnerable to environmental hazards. Recent EPA actions have been in the forefront of addressing environmental threats to the health and safety of children. Today's proposed rule further reflects our commitment to mitigating environmental threats to all citizens, including children.

A few significant physiological characteristics are largely responsible for children's increased susceptibility to environmental hazards. First, children eat proportionately more food, drink proportionately more fluids, and breathe more air per pound of body weight than do adults. As a result, children potentially experience greater levels of exposure to environmental threats than do adults. Second, because children's bodies are still in the process of development, their immune systems, neurological systems, and other immature organs can be more easily and considerably affected by environmental hazards. The connection between these physical characteristics and children's susceptibility to environmental threats are reflected in the higher baseline risk levels for children.

Today's proposed rule is intended to reduce potential releases of hazardous wastes to the environment. Depending on current and future exposure patterns, any risks associated with such releases would also decrease. EPA considered risks to children in its risk assessment and set allowable concentrations for constituents in the waste at levels that are believed to be protective to children, as well as adults. The management practices proposed in this rule are intended to reduce the potential for unacceptable risks to children potentially exposed to the constituents of concern.

The public is invited to submit or identify peer-reviewed studies and data, of which the agency may not be aware, that assess results of early life exposure to the proposed hazardous constituents from paint manufacturing wastes addressed in this Proposal.

D. What Consideration Was Given to Environmental Justice Under Executive Order 12898?

Executive Order 12898, ''Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Population'' (February 11, 1994), is designed to address the environmental and human health conditions of minority and low-income populations. EPA is committed to addressing environmental justice concerns and has assumed a leadership role in environmental justice initiatives to enhance environmental quality for all citizens of the United States. The Agency's goals are to ensure that no segment of the population, regardless of race, color, national origin, income, or net worth bears disproportionately high and adverse human health and environmental impacts as a result of EPA's policies, programs, and activities. In response to Executive Order 12898, and to concerns voiced by many groups outside the Agency, EPA's Office of Solid Waste and Emergency Response (OSWER) formed an Environmental Justice Task Force to analyze the array of environmental justice issues specific

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to waste programs and to develop an overall strategy to identify and address these issues (OSWER Directive No. 9200.3–17).

We have assessed whether today's proposed rule may help mitigate, or result in disproportionate effects on minority or low-income populations. Due to budgeting and scheduling constraints, we have not compiled data correlating individual paint facility locations with minority/low income populations. However, our risk assessment did not identify risks from management of paint manufacturing waste liquids in tanks onsite at the paint manufacturing facility. Therefore, we believe that any populations in proximity to paint manufacturing facilities are not adversely affected by waste management practices within the purview of this proposal. This proposed listing is intended to reduce unacceptable risks associated with managing paint manufacturing wastes in nonhazardous waste landfills and in surface impoundments. This would reduce risks for any populations living in proximity to such facilities who rely on groundwater for drinking water supplies.

The affected paint manufacturing facilities, however, are distributed throughout the country and many are known to be located within highly urbanized areas. Furthermore, the waste management units in question are estimated, on average, to be located within 50 miles of the manufacturing facilities. Because the proposed rule would provide incentives for reducing the use of hazardous constituents and is intended to reduce environmental risks associated with the management of the targeted waste streams, the Agency believes that this rule could help mitigate health risks to minority and low income communities living near impacted facilities. Furthermore, we have no data indicating that today's proposal would result in disproportionately negative impacts on minority or low income communities.

E. What Consideration Was Given to Unfunded Mandates?

Unfunded Mandates Reform Act

Title II of the Unfunded Mandates Reform Act of 1995 (UMRA), Public Law 104–4, establishes requirements for Federal Agencies to assess the effects of their regulatory actions on State, local, and tribal governments and the private sector. Under section 202 of the UMRA, EPA must prepare a written analysis, including a cost-benefit analysis, for proposed and final rules with ''Federal mandates'' that may result in expenditures to State, local, and tribal governments, in the aggregate, or to the private sector, of $100 million or more in any one year. Before promulgating an EPA rule for which a written statement is needed, section 205 of the UMRA requires EPA to identify and consider a reasonable number of regulatory alternatives and adopt the least costly, most cost-effective, or least burdensome alternative that achieves the objectives of the rule. The provisions of section 205 do not apply when they are inconsistent with applicable law. Before EPA establishes any regulatory requirements that may significantly or uniquely affect small governments, including tribal governments, it must have developed under section 203 of the UMRA a small government agency plan. The plan must provide for notifying potentially affected small governments, enabling officials to have meaningful and timely input in the development of regulatory proposals, and informing, educating, and advising small governments on compliance with the regulatory requirements.

This rule does not include a Federal mandate that may result in expenditures of $100 million or more to State, local, or tribal governments in the aggregate, because this rule imposes no enforceable duty on any State, local, or tribal governments. EPA also has determined that this rule contains no regulatory requirements that might significantly or uniquely affect small governments. In addition, as discussed above, the private sector is not expected to incur costs exceeding $100 million. Therefore, today's proposed rule is not subject to the requirements of sections 202, 203, and 205 of UMRA.

F. What Consideration Was Given to Federalism Under Executive Order 13132?

Executive Order 13132, entitled ''Federalism'' (64 FR 43255, August 10, 1999), requires EPA to develop an accountable process to ensure ''meaningful and timely input by State and local officials in the development of regulatory policies that have federalism implications.'' ''Policies that have federalism implications'' are defined in the Executive Order to include regulations that have ''substantial direct effects on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government.''

Under Section 6 of Executive Order 13132, EPA may not issue a regulation that has federalism implications, that imposes substantial direct compliance costs, and that is not required by statute, unless the Federal government provides the funds necessary to pay the direct compliance costs incurred by State and local governments, or EPA consults with State and local officials early in the process of developing the proposed regulation. EPA also may not issue a regulation that has federalism implications and that preempts State law, unless the Agency consults with State and local officials early in the process of developing the proposed regulation.

Section 4 of the Executive Order contains additional requirements for rules that preempt State or local law, even if those rules do not have federalism implications (i.e., the rules will not have substantial direct effects on the States, on the relationship between the national government and the states, or on the distribution of power and responsibilities among the various levels of government). Those requirements include providing all affected State and local officials notice, and an opportunity for appropriate participation in the development of the regulation. If the preemption is not based on expressed or implied statutory authority, EPA also must consult, to the extent practicable, with appropriate State and local officials regarding the conflict between State law and federally protected interests within the agency's area of regulatory responsibility.

This proposed rule does not have federalism implications. It will not have substantial direct effects on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government, as specified in Executive Order 13132. This rule, as proposed, is projected to result in economic impacts to privately owned paint manufacturing facilities. Marginal administrative burden impacts may occur to selected States an/or EPA Regional Offices if these entities experience increased administrative needs, enforcement requirements, or voluntary information requests. However, this rule, as proposed, will not have substantial direct effects on the States, intergovernmental relationships, or the distribution of power and responsibilities. Thus, Executive Order 13132 does not apply to this rule.

In the spirit of Executive Order 13132, and consistent with EPA policy to promote communications between EPA and State and local governments, we specifically solicit comment on this proposed rule from State and local officials.

G. What Consideration Was Given to Tribal Governments Under Executive Order 13175: Consultation and Coordination With Indian Tribal Governments?

Executive Order 13175, ''Consultation and Coordination With Indian Tribal Governments,'' was signed by the President on November 6, 2000. As of January 6, 2001, Executive Order 13175 (65 FR 67249) took effect and revoked Executive Order 13084. Please note that we addressed tribal considerations under Executive Order 13084 because we developed this proposed rule during the period when this Order was in effect. We will analyze and fully comply with the requirements of Executive Order 13175 before promulgating the final rule.

This Order applies to regulations not specifically required by statute that significantly or uniquely affect the communities of Indian tribal governments, and that impose substantial direct compliance costs on Indian tribal governments. If any rule is projected to result in significant direct costs to Indian tribal communities, EPA cannot issue this rule unless the Federal government provides funds necessary to pay the direct costs incurred by the Indian tribal government or the tribe, or consults with the appropriate tribal government officials early in the process of developing the proposed regulation.

If EPA complies by consulting, we must provide the Office of Management and Budget (OMB) with all required information. We must also summarize, in a separately identified section of the preamble to the proposed or final rule, a description of the extent of our prior consultation with representatives of affected tribal governments, a summary of their concerns, and a statement supporting the need to issue the regulation. Also, Executive Order 13175 requires EPA to develop an effective process permitting elected and other representatives of Indian tribal governments to, ''provide meaningful and timely input in the development of regulatory policies on matters that significantly or uniquely affect their communities.''

Today's rule implements mandates specifically and explicitly set forth by the U.S. Congress. This action is proposed under the authority of sections 3001(b)(1), and 3001(e)(2) of the Hazardous and Solid Waste Amendments (HSWA) of 1984. These sections direct EPA to make a hazardous waste listing determination for ''paint production wastes.'' Accordingly, the requirements of Executive Order 13175 do not apply to this rule.

Furthermore, today's proposal would not significantly or uniquely affect the communities of Indian tribal governments, nor would it impose substantial direct compliance costs on them. Tribal communities are not known to own or operate any paint/coatings manufacturing facilities, nor are these communities disproportionately located adjacent to or near such facilities. Finally, tribal governments will not be required to assume any administrative or permitting responsibilities associated with this proposed rule.

X. Paperwork Reduction Act (PRA), 5 U.S.C. 3501–3520

A. How is the Paperwork Reduction Act Considered in Today's Proposed Rule?

The information collection requirements in this proposed rule have been submitted for approval to the Office of Management and Budget (OMB) under the Paperwork Reduction Act, 44 U.S.C. 3501 *et seq.* An Information Collection Request (ICR) document has been prepared (ICR No. 2006.01) and a copy may be obtained from Sandy Farmer by mail at Collection Strategies Division; U.S. Environmental Protection Agency (2822); 1200 Pennsylvania Ave., NW, Washington, DC 20460, by email at farmer.sandy@epamail.epa.gov, or by calling (202) 260–2740. A copy may also be downloaded off the internet at *http://www.epa.gov/icr.*

This rule is proposed under the authority of sections 3001(e)(2) and 3001(b)(1) of the Hazardous and Solid Waste Amendments (HSWA) of 1984. The effect of listing the wastes described earlier will be to subject industry to management and treatment standards under the Resource Conservation and Recovery Act (RCRA).

This proposed concentration-based listing is designed to be self-implementing. Under this proposed approach, generators of the K179 and/or K180 wastes must determine if their waste is nonhazardous. This determination will ensure that concentration levels of the constituents of concern in the targeted wastes are below the regulatory levels. As a result, this rule, as proposed, represents only an incremental increase in burden for generators and subsequent handlers of the newly listed wastes in complying with existing RCRA information collection requirements.

The total annual respondent burden and cost for all paperwork associated with the proposed rule is represented by the new paperwork requirements for listing paint wastes, plus the incremental increase in paperwork burden under five existing Information Collection Requests (ICRs). We estimate the total annual respondent burden for all information collection activities to be approximately 8,361 hours, at an annual aggregate cost of approximately $639,747. Of the total respondent burden, only 1,457 hours per year, or 17.4 percent results from new paperwork requirements. The remaining 6,904 hour increase is derived from five existing paperwork requirements. These include: The Biennial Report, Generator Standards, Land Disposal restrictions, Manifest, and Notification.

Burden means the total time, effort, or financial resources expended by persons to generate, maintain, retain, or disclose, or provide information to or for a Federal agency. This includes the time needed to review instructions; develop, acquire, install and use technology and systems for the purpose of collecting, validating, and verifying information, processing and maintaining information, and disclosing and providing information; adjust the existing ways to comply with any previous applicable instructions and requirements; train personnel to be able to respond to a collection of information; search new data sources; complete and review the collection of information; and transmit or otherwise disclose the information.

An agency may not conduct or sponsor, and a person is not required to respond to a collection of information unless it displays a currently valid OMB control number. The OMB control number for EPA's regulations are listed in 40 CFR part 9, and 48 CFR Chapter 15.

Comments are requested on the Agency's need for this information, the accuracy of the provided burden estimates, and any suggested methods for minimizing respondent burden, including through the use of automated collection techniques. Send comments on the ICR to the Director, Collection Strategies Division; U.S. Environmental Protection Agency (2822); 1200 Pennsylvania Ave., NW, Washington, DC 20460; and to the Office of Information and Regulatory Affairs, Office of Management and Budget, 725 17th St., NW, Washington, DC 20503, marked ''Attention: Desk Officer for EPA.'' Include the ICR number in any correspondence. Since OMB is required to make a decision concerning the ICR between 30 and 60 days after February 13, 2001, a comment to OMB is best assured of having its full effect if OMB receives it by March 15, 2001. The proposed rule will respond to any OMB or public comments on the information

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collection requirements contained in this proposal.

XI. National Technology Transfer and Advancement Act of 1995 (Pub L. 104–113, *12(d) (15 U.S.C. 272 Note))

A. Was The National Technology Transfer and Advancement Act Considered?

Section 12(d) of the National Technology Transfer and Advancement Act of 1995 (''NTTAA''), Public Law 104–113, section 12(d) (15 U.S.C. 272 note) directs EPA to use voluntary consensus standards in its regulatory activities unless to do so would be inconsistent with applicable law or otherwise impractical. Voluntary consensus standards are technical standards (e.g., materials specifications, test methods, sampling procedures, and business practices) that are developed or adopted by voluntary consensus standards bodies. The NTTAA directs EPA to provide Congress, through OMB, explanations when the Agency decides not to use available and applicable voluntary consensus standards.

This proposed rulemaking may involve voluntary consensus standards related to sampling and analysis procedures for waste characterization. Our implementation approach for waste characterization allows standard SW–846 methods, or appropriate alternatives. NTTAA does not apply to today's proposal because we are not requiring paint facilities to employ nonvoluntary consensus standards which they may deem as ''appropriate alternatives.''

List of Subjects

40 CFR Part 148

Administrative practice and procedure, Hazardous waste, Reporting and record keeping requirements, Water supply.

40 CFR Part 261

Environmental protection, Hazardous materials, Waste treatment and disposal, Recycling.

40 CFR Part 268

Environmental protection, Hazardous materials, Waste management, Reporting and record keeping requirements, Land Disposal Restrictions, Treatment Standards.

40 CFR Part 271

Environmental protection, Administrative practice and procedure, Confidential business information, Hazardous material transportation, Hazardous waste, Indians-lands, Intergovernmental relations, Penalties, Reporting and record keeping requirements, Water pollution control, Water supply.

40 CFR Part 302

Environmental protection, Air pollution control, Chemicals, Emergency Planning and Community Right-to-Know Act, Extremely hazardous substances, Hazardous chemicals, Hazardous materials, Hazardous materials transportation, Hazardous substances, Hazardous wastes, Intergovernmental relations, Natural resources, Reporting and record keeping requirements, Superfund, Waste treatment and disposal, Water pollution control, Water supply.

Dated: January 25, 2001.

W. Michael McCabe,

Acting Administrator.

For the reasons set out in the preamble, title 40, chapter I of the Code of Federal Regulations is proposed to be amended as follows:

PART 148—HAZARDOUS WASTE INJECTION RESTRICTIONS

1. The authority citation for part 148 continues to read as follows:

Authority: Secs. 3004, Resource Conservation and Recovery Act, 42 U.S.C. 6901, *et seq.*

2. Section 148.18 is amended by adding paragraphs (n) and (o) to read as follows:

§ 148.18 Waste specific prohibitions—newly listed and identified wastes.

* * * * *

(n) Effective [insert date six months after date of final rule], the wastes specified in 40 CFR 261.32 as EPA Hazardous Waste Numbers K179 and K180 are prohibited from underground injection.

(o) The requirements of paragraphs (a) through (n) of this section do not apply:

(1) If the wastes meet or are treated to meet the applicable standards specified in Subpart D of part 268 of this title; or

(2) If an exemption from a prohibition has been granted in response to a petition under subpart C of this part; or

(3) During the period of extension of the applicable effective date, if an extension has been granted under § 148.4 of this part.

PART 261—IDENTIFICATION AND LISTING OF HAZARDOUS WASTE

3. The authority citation for part 261 continues to read as follows:

Authority: 42 U.S.C. 6905, 6912(a), 6921, 6922, 6924(y), and 6938.

4. Section 261.3 is amended by adding paragraph (c)(2)(ii)(F) to read as follows:

§ 261.3 Definition of hazardous waste.

* * * * *

(c) * * *

(2) * * *

(ii) * * *

(F) Treatment residues from paint manufacturing waste solids that met the K179 listing, when they are below the constituent concentration levels specified in the listing at § 261.32(b)(6)(iii) and a new hazardous waste determination is made following the procedures specified in § 261.32(b). These exempted treatment residues must still meet all requirements specified in part 268 of this chapter prior to land disposal.

5. Section 261.4 is amended by revising paragraph (b)(15) to read as follows.

§ 261.4 Exclusions.

* * * * *

(b) * * *

(15) Leachate or gas condensate collected from landfills where certain solid wastes have been disposed, provided that:

(i) The solid wastes disposed would meet one or more of the listing descriptions for Hazardous Waste Codes K169, K170, K171, K172, K174, K175, K179 and K180 if these wastes had been generated after the effective date of the listing;

(ii) The solid wastes described in paragraph (b)(15)(i) of this section were disposed prior to the effective date of the listing;

(iii) The leachate or gas condensate do not exhibit any characteristic of hazardous waste nor are derived from any other listed hazardous waste;

(iv) Discharge of the leachate or gas condensate, including leachate or gas condensate transferred from the landfill to a POTW by truck, rail, or dedicated pipe, is subject to regulation under sections 307(b) or 402 of the Clean Water Act.

(v) After [insert date 24 months from date of promulgation], leachate or gas condensate derived from K179 and/or K180 will no longer be exempt if it is stored or managed in a surface impoundment prior to discharge. There is one exception: if the surface impoundment is used to temporarily store leachate or gas condensate in response to an emergency situation (e.g., shutdown of wastewater treatment system), provided the impoundment has a double liner, and provided the leachate or gas condensate is removed from the impoundment and continues to

be managed in compliance with the conditions of this paragraph after the emergency ends.

* * * * *

6. Section 261.32 is amended by designating the introductory text and the table as paragraph (a), and by amending the newly designated table by adding a new subgroup ''Paint Manufacturing'' and its entries at the end of the table and by adding paragraphs (b) and (c) to read as follows:

§ 261.32 Hazardous wastes from specific sources.

(a) * * *

Industry and EPA hazardous waste No.	Hazardous waste	Hazard code
*	* * * * * *	
Paint Manufacturing		
K179	K179—Paint manufactuirng waste solids generated by paint (T) manufacturing facilities that, at the point of generation, contain any of the constituents identified in paragraph (b)(6)(iii) of this section at a concentration equal to or greater than the hazardous level set for that constitutent in paragraph (b)(6)(iiiI) of this section. Paint manufacturing waste solids are: (1) waste solids generated from tank and equipment cleaning operations that use solvents, water and or caustic; (2) emission control dusts or sludges; (3) wastewater treatment sludges; and (4) off-specification product. Waste solids derived from the management of K180 by paint manufacturers would also be subject to this listing. Waste liquids derived from the management of K179 by paint manufacturers are not covered by this listing, but such liquids are subject to the K180 listing. For the purposes of this listing, paint manufacturers are defined as specified in paragraph (b) of this section.	(T)
K180	Paint manufacturing waste liquids generated by paint manufacturing facilities that, at the point of generation, contain any of the constituents identified in paragraph (b)(6)(iii) of this section at a concentration equal to or greater than the hazardous level set for that constituent in paragraph (b)(6)(iii) of this section unless the wastes are stored or treated exclusively in tanks or containers prior to discharge to a POTW or under a NPDES permit. Paint manufacturing liquids are generated from tank and equipment cleaning operations that use solvents, water, and/or caustic. Waste liquids derived from the management of K179 by paint manufacturers would also be subject to this listing. Waste solids derived from the management of K180 by paint manufacturers are not covered by this listing, but such solids are subject to the K179 listing. For the purposes of this listing, paint manufacturers are defined as specified in paragraph (b) of this section.	(T)
*	* * * * * *	

* * * * *

(b) *Procedures for paint manufacturers to determine potential K179 and K180 wastes to be nonhazardous.* For purposes of § 261.32 the term ''paint manufacturing facility'' means a facility that produces paints (including undercoats, primers, finishes, sealers, enamels, refinish paints, and tinting bases), stains, varnishes (including lacquers), product finishes for original equipment manufacturing and industrial application, and, coatings (including special purpose coatings and powder coatings), but the term does not include a facility that exclusively produces miscellaneous allied products (including paint and varnish removers, thinners for lacquers or other solvent-based paint products, pigment dispersions or putty) or artist paints. The term also does not include a facility that exclusively prepares paint products (such as adding pigments to a tinting base) for sale to end users of the product. If you generate wastes that potentially fall within the K179 or K180 listing descriptions, you must use the waste analysis and handling procedures described below if you want to determine that your wastes are nonhazardous. If you have knowledge (e.g., knowledge of constituents in wastes based on existing sampling and analysis data and/or information about raw materials used, production processes used, and degradation products formed) to determine that the potential K179 or K180 wastes do not contain any of the constituents of concern identified for these types of wastes (see tables under paragraph (b)(6)(iii) of this section), you can use this knowledge, in lieu of the annual waste analysis requirements described in paragraph (b)(2)(ii) of this section, to make a nonhazardous determination.

(1) *Dilution Prohibition.* Prior to making a determination, you may only mix potential K179 wastes with other potential K179 wastes or potential K180 wastes with other potential K180 wastes, that is paint manufacturing wastes from tank and equipment cleaning operations that use solvents, water, and/or caustic; emission control dusts or sludges; wastewater treatment sludges and off specification product. You must not dilute potential K179 or K180 wastes with other waste or material before making a determination.

(2) *Determine annual waste analysis requirements.* If you generate paint manufacturing wastes that contain one or more constituents of concern, you must at least on an annual basis, use the following procedures to determine the waste analysis requirements for your wastes:

(i) You must either use the previous year's (previous 12 months) waste generation data, or, if these data are not available, estimate the total annual quantities of paint manufacturing waste solids and liquids that you will generate over the next 12 months based on current knowledge. You must determine total annual quantities separately for paint manufacturing waste solids and liquids, including the quantities of hazardous wastes (characteristic and otherwise listed) and nonhazardous wastes from tank and equipment cleaning operations that use solvents, water, and/or caustic; emission control dusts or sludges; wastewater treatment sludges and off specification product. Then, you must record the total annual waste quantities you expect to generate.

(ii) You must use the recorded total annual quantities of paint manufacturing waste solids and liquids to determine the appropriate annual waste analysis requirement for your wastes in accordance with the tiered approach described in the applicable table below. If you initially estimate that your waste generation would fall under the low volume tier, and, at any time within the 12 month period, the actual quantities of waste you generate fall

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within the upper volume tier, from that time, you would be subject to the upper tier waste analysis requirements. If you have not already tested your wastes, you must test your wastes. A new 12 month period to make a hazardous waste determination for your waste also starts when the actual quantity of your waste exceeds the expected lower volume tier limit.

TIERED WASTE ANALYSIS REQUIREMENTS FOR SOLIDS

Total annual quantity of hazardous and nonhazardous paint manufacturing waste solids	Annual waste analysis requirement
40 metric tons and less.	Test Wastes or Use knowledge of Wastes
Over 40 metric tons	Test Wastes

TIERED WASTE ANALYSIS REQUIREMENTS FOR LIQUIDS

Total annual quantity of hazardous and nonhazardous paint manufacturing waste liquids	Annual waste analysis requirement[1]
100 metric tons and less.	Test Wastes or Use Knowledge of Wastes
Over 100 metric tons	Test Wastes

[1] This requirement does not apply if the liquid wastes are stored or treated exclusively in tanks or containers and then sent to a POTW or discharged under a NPDES permit.

(3) *Nonhazardous determination for wastes based on testing.* If the total annual quantity of paint manufacturing wastes your facility generates exceeds 40 metric tons for waste solids or 100 metric tons for waste liquids, you must test the wastes according to the following procedures:

(i) You must develop a waste sampling and analysis plan (if there is no appropriate existing plan) to collect samples that are representative of the wastes.

(ii) At a minimum, the plan must include:

(A) A discussion on the number of samples representative of the wastes that are needed to fully characterize the wastes;

(B) The sampling method used to obtain samples representative of the wastes;

(C) A detailed description of the test method(s) used; and

(D) How the design of the sampling plan accounts for potential variability of the wastes.

(iii) You must test the wastes for each constituent of concern that is reasonably expected to be present in the wastes (see paragraph (b)(3)(iii)(B) of this section).

(A) The constituents of concern and listing concentration levels for the paint manufacturing waste solids and liquids are identified in paragraph (b)(6)(iii) of this section.

(B) From the list of constituents of concern for paint manufacturing waste solids or liquids, you must select the constituents of concern that are reasonably expected to be present in your wastes based on your knowledge of the wastes (e.g., knowledge of the constituents in the wastes based on existing sampling and analysis data and/or information about raw materials used, and degradation products formed).

(C) You must test for all constituents of concern that are reasonably expected to be present in the paint manufacturing wastes, regardless of their concentrations in the wastes.

(iv) You must conduct sampling and analysis in accordance with your waste sampling and analysis plan developed under paragraph (b)(3)(i) of this section.

(v) You may use any reliable analytical method to demonstrate that the concentrations of constituents of concern in the waste samples are not at or above the listing levels (see applicable list under paragraph (b)(6)(iii) of this section). It is your responsibility to ensure that the sampling and analysis are unbiased, precise, and representative of the wastes.

(vi) You must ensure that the measurements are sufficiently sensitive, accurate and precise to demonstrate that the maximum concentrations of the constituents of concern in any sample analyzed are not at or above the listing levels.

(vii) In an enforcement action, you, as the generator, bear the burden of proof to establish that the concentrations of constituents of concern in your wastes are below the listing levels. For wastes determined to be nonhazardous, compliance with the requirement that concentrations of constituents of concern are below the listing levels is based on grab sampling.

(viii) If all samples you test during any three consecutive years are determined to be nonhazardous (see paragraph (b)(6)(ii) of this section), then the annual testing requirements for your wastes are suspended.

(ix) After suspension of the annual testing requirements for your wastes, if your paint manufacturing, formulation, or waste treatment processes are significantly altered (i.e., if it could result in significantly higher levels of the constituents of concern for K179 or K180), then you must resume annual testing for your wastes. In order to again suspend the annual testing requirements for your wastes, the requirement under paragraph (b)(3)(viii) of this section has to be met.

(4) *Nonhazardous determination for wastes based on knowledge.* If the total annual quantity of paint manufacturing wastes your facility generates is 40 metric tons or less for waste solids or 100 metric tons or less for waste liquids, you can use knowledge of the wastes (e.g., knowledge of constituents in wastes based on existing sampling and analysis data and/or information about raw materials used, production processes used, and degradation products formed) to conclude that concentrations for the constituents of concern in the wastes are below the listing levels.

(5) *Waste holding and handling.* During the interim period, from the point of generation to completion of hazardous waste determination, you are responsible for storing the wastes properly. If the wastes are determined to be hazardous and you are not complying with the Subtitle C storage requirements during the interim period, you are subject to an enforcement action for improper storage.

(6) *Hazardous or nonhazardous determination for wastes at the point of generation.* You must make a hazardous or nonhazardous determination for your wastes at the point of generation based on the test data and/or knowledge (see nonhazardous determination for wastes under paragraphs (b)(3) and (b)(4) of this section).

(i) *Hazardous determination.* If any of the waste being evaluated at the point of generation contains any of the constituents in the applicable list under paragraph (b)(6)(iii) of this section at a concentration equal to or greater than the hazardous level set for that constituent, the waste is a listed hazardous waste and subject to all applicable RCRA Subtitle C hazardous waste requirements.

(ii) *Nonhazardous determination.* If none of the waste being evaluated at the point of generation contains any of the constituents in the applicable list under paragraph (b)(6)(iii) of this section at concentrations equal to or greater than the hazardous levels set for these constituents, the waste is determined to be nonhazardous.

(iii) *Hazardous (listing) levels.* All concentrations in the waste for any constituents identified in this paragraph (b)(6)(iii) that are equal to or greater than the following levels:

CONSTITUENTS AND CONCENTRATION LEVELS OF CONCERN FOR K179, PAINT MANUFACTURING WASTE SOLIDS

Constituent	Chemical abstracts No.	Concentration levels (mg/kg)
Acrylamide	79–06–1	310
Acrylonitrile	107–13–1	43
Antimony	7440–36–0	2,300
Methyl Isobutyl Ketone	108–10–1	73,000
Methyl Methacrylate	80–62–6	28,000

CONSTITUENTS AND CONCENTRATION LEVELS OF CONCERN FOR K180, PAINT MANUFACTURING WASTE LIQUIDS

Constituent	Chemical abstracts No.	Concentration levels (mg/kg)
Acrylamide	79–06–1	12
Acrylonitrile	107–13–1	9.3
Antimony	7440–36–0	390
Methylene chloride	75–09–2	4500
Ethylbenzene	100–41–4	11,000
Formaldehyde	50–00–0	82,000
Methyl Isobutyl Ketone	108–10–1	340
Methyl Methacrylate	80–62–6	2,100
N-Butyl Alcohol	100–42–5	41,000
Styrene	100–42–5	4,600
Toluene	108–88–3	1,200
Xylene (mixed isomers)	1330–20–7	3,900

(7) *Hazardous or nonhazardous waste determination for wastes after treatment.* If wastes that have been determined to be K179 listed hazardous waste are treated to below hazardous levels, you, as the waste generator or treater, may make a determination that the residue of the treatment process is nonhazardous by applying the procedures described for wastes at the point of generation, in paragraphs (b)(1) through (b)(4) of this section, to the treated waste. However, the residue remains subject to the LDR treatment standards for K179 as appropriate.

(c) *Record keeping requirements for generators who have determined their wastes to be nonhazardous.* You must keep records documenting the total annual quantity of paint manufacturing waste solids and liquids you generate from tank and equipment cleaning operations that use solvents, water, and/or caustic; emission control dusts or sludges; wastewater treatment sludges and off specification product. If your annual generation of paint manufacturing wastes exceeds 40 metric tons for waste solids or 100 metric tons for waste liquids, you must also keep the following records on-site for the most recent three years of testing (from the effective date of the final rule):

(1) The documentation supporting a determination that wastes are nonhazardous based on knowledge that they do not contain any of the constituents of concern.

(2) If the wastes are determined to be nonhazardous based on testing, then the following records must be kept:

(i) The sampling and analysis plan used for collecting and analyzing samples representative of the wastes, including detailed sampling methods used to account for spatial and temporal variability of the wastes, and sample preparative, cleanup (if necessary) and determinative methods.

(ii) The sampling and analyses data (including QA/QC data) and knowledge (if used) that support a nonhazardous determination for the wastes.

(4) If storing or treating liquid paint wastes on-site in tanks or containers prior to off-site disposal, the documentation showing that the liquid paint manufacturing wastes will be stored or treated exclusively in tanks or containers off-site before discharge by a facility to a POTW or discharge under an NPDES permit.

7. Appendix VII to Part 261 is amended by adding the following waste streams in alphanumeric order (by the first column) to read as follows.

Appendix VII to Part 261—Basis for Listing Hazardous Waste

EPA hazardous waste No.	Hazardous Constituents for which listed
*	* * * * * *
K179	Acrylamide, Acrylonitrile, Antimony, Methyl Isobutyl Ketone, Methyl methacrylate
K180	Acrylamide, Acrylonitrile, Antimony, Methylene Chloride, Ethylbenzene, Formaldehyde, Methyl Isobutyl Ketone, Methyl Methacrylate, N-Butyl Alcohol, Styrene, Toluene, Xylene (mixed isomers)
*	* * * * * *

* * * * *

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8. Appendix VIII to Part 261 is amended by adding in alphabetical sequence of common name the following entries:

Appendix VIII to Part 261—Hazardous Constituents

Common name	Chemical abstracts name	Chemical abstracts No.	Hazardous waste No.
* * *	* * *		*
n-Butyl alcohol	1-Butanol	71–36–3	U031
* * *	* * *		*
Ethyl benzene	Same	100–41–4	
* * *	* * *		*
Methyl isobutyl ketone	4-Methyl-2-pentanone	108–10–1	U161
* * *	* * *		*
Styrene	Ethenylbenzene	100–42–5	
* * *	* * *		*
meta-Xylene	1,3-Dimethylbenzene	108–38–3	
ortho-Xylene	1,2-Dimethylbenzene	95–47–6	
para-Xylene	1,4-Dimethylbenzene	106–42–3	
Xylenes—mixed isomers (sum of o-, m-, and p-xylene concentrations).	Dimethylbenzene	1330–20–7	U239
* * *	* * *		*

* * * * *

PART 268—LAND DISPOSAL RESTRICTIONS

9. The authority citation for part 268 continues to read as follows:

Authority: 42 U.S.C. 6905, 6912(a), 6921, and 6924.

Subpart C—Prohibitions on Land Disposal

10. Section 268.20 is added and §§ 268.21 through 268.29 are added and reserved to subpart C to read as follows:

§ 268.20 Waste specific prohibitions—paint production wastes.

(a) Effective [Insert date six months from date of publication of final rule], the wastes specified in 40 CFR part 261 as EPA Hazardous Wastes Numbers K179, and K180, soil and debris contaminated with these wastes, radioactive wastes mixed with these wastes, and soil and debris contaminated with radioactive wastes mixed with these wastes are prohibited from land disposal.

(b) The requirements of paragraph (a) of this section do not apply if:

(1) The wastes meet the applicable treatment standards specified in Subpart D of this part;

(2) Persons have been granted an exemption from a prohibition pursuant to a petition under § 268.6, with respect to those wastes and units covered by the petition;

(3) The wastes meet the applicable treatment standards established pursuant to a petition granted under § 268.44;

(4) Hazardous debris has met the treatment standards in § 268.40 or the alternative treatment standards in § 268.45; or

(5) Persons have been granted an extension to the effective date of a prohibition pursuant to § 268.5, with respect to these wastes covered by the extension.

(c) To determine whether a hazardous waste identified in this section exceeds the applicable treatment standards specified in § 268.40, the initial generator must test a sample of the waste extract or the entire waste, depending on whether the treatment standards are expressed as concentrations in the waste extract or the waste, or the generator may use knowledge of the waste. If the waste contains regulated constituents in excess of the applicable subpart D levels, the waste is prohibited from land disposal, and all requirements of this part 268 are applicable, except as otherwise specified.

11. In § 268.40, the Table of Treatment Standards is amended by adding entries to F039 in alphabetical order and by adding in alphanumeric order new entries for K179 and K180 to read as follows:

§ 268.40 Applicability of treatment standards.

TREATMENT STANDARDS FOR HAZARDOUS WASTES

[Note: NA means not applicable]

Waste code	Waste description and treatment/regulatory subcategory [1]	Regulated hazardous constituent		Wastewaters	Nonwastewaters
		Common name	CAS [2] No.	Concentration in mg/L[3], or Technology Code [4]	Concentration in mg/kg [5] unless noted as "mg/L TCLP", or Technology Code [4]
	* * *	*	*	*	*
F039	Leachate (liquids that have percolated through land disposed wastes) resulting from the disposal of more than one restricted waste classified as hazardous under Subpart D of this part. (Leachate resulting from the disposal of one or more of the following EPA Hazardous Wastes and no other Hazardous Waste retains its EPA Hazardous Waste Number(s): F020, F021, F022, F026, F027, and/or F028.)	* * * * * * *			
		Acrylamide	79–06–1	19	23
		* * * * * * *			
		Styrene	100–42–5	0.028	28
		* * * * * * *			
	* * *	*	*	*	*
K179	Paint manufacturing waste solids generated by paint manufacturing facilities that, at the point of generation, contain any of the constituents identified in paragraph § 261.32 (b)(6)(iii) at a concentration equal to or greater than the hazardous level set for that constituent in paragraph § 261.32(b)(6)(iii). Paint manufacturing waste solids are: (1) waste solids generated from tank and equipment cleaning operations that use solvents, water and or caustic; (2) emission control dusts or sludges; (3) wastewater treatment sludges; and (4) off-specification product. Waste solids derived from the management of K180 by paint manufacturers would also be subject to this listing. Waste liquids derived from the management of K179 by paint manufacturers are not covered by this listing, but such liquids are subject to the K180 listing. For the purposes of this listing, paint manufacturers are defined as specified in paragraph § 261.32(b)	Acrylamide	79–06–1	19	23
		Acrylonitrile	107–13–1	0.24	84
		Methyl isobutyl ketone	108–10–1	0.14	33
		Methyl methacrylate	80–62–6	0.14	160
		Antimony	7440–36–0	1.9	1.15 mg/L 0 TCLP
K180	Paint manufacturing waste liquids generated by paint manufacturing facilities that, at the point of generation, contain any of the constituents identified in paragraph § 261.32(b)(6)(iii) at a concentration equal to or greater than the hazardous level set for that constituent in paragraph § 261.32 (b)(6)(iii) unless the wastes are stored or treated exclusively in tanks or containers prior to discharge to a POTW or under a NPDES permit. Paint manufacturing liquids are generated from tank and equipment cleaning operations that use solvents, water, and/or caustic. Waste liquids derived from the management of K179 by paint manufacturers would also be subject to this listing. Waste solids derived from the management of K180 by paint manufacturers are not covered by this listing, but such solids are subject to the K179 listing. For the purposes of this listing, paint manufacturers are defined as specified in paragraph § 261.32(b)	Acrylamide	79–06–1	19	23
		Acrylonitrile	107–13–1	0.24	84
		n-Butyl alcohol	71–36–3	536	2.6
		Ethyl benzene	100–41–4	0.057	10
		Formaldehyde [13]	50–00–0	(WETOX or CHOXD) fb CARBN; or CMBST	CMBST
		Methylene chloride	75–09–2	0.089	30
		Methyl isobutyl ketone	108–10–1	0.14	33
		Methyl methacrylate	80–62–6	0.14	160
		Styrene	100–42–5	0.028	28
		Toluene	108–88–3	0.080	10
		Xylenes—mixed isomers (sum of o-, m-, and p-xylene concentrations)	1330–20–7	0.32	30
		Antimony	7440–36–0	1.9	1.15 mg/L 0 TCLP
* * * * *	* *				

* * * * *

Footnotes to Treatment Standard Table 268.40.

[1] The waste descriptions provided in this table do not replace waste descriptions in 40 CFR Part 261. Descriptions of Treatment/Regulatory Subcategories are provided, as needed, to distinguish between applicability of different standards.

[2] CAS means Chemical Abstract Services. When the waste code and/or regulated constituents are described as a combination of a chemical with its salts and/or esters, the CAS number is given for the parent compound only.

[3] Concentration standards for wastewaters are expressed in mg/L and are based on analysis of composite samples.

[4] All treatment standards expressed as a Technology Code or combination of Technology Codes are explained in detail in 40 CFR 268.42 Table 1—Technology Codes and Descriptions of Technology-Based Standards.

[5] Except for Metals (EP or TCLP) and Cyanides (Total and Amenable) the nonwastewater treatment standards expressed as a concentration were established, in part, based upon incineration in units operated in accordance with the technical requirements technical requirements of 40 CFR part 264, subpart O or 40 CFR part 265, subpart O, or based upon combustion in fuel substitution units operating in accordance with applicable technical requirements. A facility may comply with these treatment standards according to provisions in 40 CFR 268.40(d). All concentration standards for nonwastewaters are based on analysis of grab samples.

* * * * *

[13] Wastes that do not exceed the § 261.32 listing criteria for this constituent are not subject to the treatment technology requirements, but are subject to all other numerical standards.

* * * * *

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12. In § 268.48 The Table—Universal Treatment Standards is amended by adding in alphabetical sequence the following entries under the headings ''organic constituents'': (The footnotes are republished without change.)

§ 268.48 Universal treatment standards.

(a) * * *

UNIVERSAL TREATMENT STANDARDS

[Note: NA means not applicable]

Regulated constituent common name	CAS [1] No.	Wastewater standard	Nonwastewater standard
		Concentration in mg/L [2]	Concentration in mg/Kg [3] unless noted in ''mg/L TCLP''
Organic Constituents:			
* * * *	*	*	*
Styrene	100–42–5	0.028	28
* * * *	*	*	*

* * * * * * *

[1] CAS means Chemical Abstract Services. When the waste code and/or regulated constituents are described as a combination of a chemical with its salts and/or esters, the CAS number is given for the parent compound only.

[2] Concentration standards for wastewaters are expressed in mg/L and are based on analysis of composite samples.

[3] Except for Metals (EP or TCLP) and Cyanides (Total and Amenable) the nonwastewater treatment standards expressed as a concentration were established, in part, based upon incineration in units operated in accordance with the technical requirements of 40 CFR Part 264, Subpart O, or Part 265, Subpart O, or based upon combustion in fuel substitution units operating in accordance with applicable technical requirements. A facility may comply with these treatment standards according to provisions in 40 CFR 268.40(d). All concentration standards for nonwastewaters are based on analysis of grab samples.

* * * * * * *

PART 271—REQUIREMENTS FOR AUTHORIZATION OF STATE HAZARDOUS WASTE PROGRAMS

13. The authority citation for Part 271 continues to read as follows:

Authority: 42 U.S.C. 6905, 6912(a), and 6926.

Subpart A—Requirements for Final Authorization

14. Section 271.1(j) is amended by adding the following entries to Table 1 in chronological order by date of publication in the **Federal Register**, and by adding the following entries to Table 2 in chronological order by effective date in the **Federal Register**, to read as follows.

§ 271.1 Purpose and scope.

* * * * *

(j) * * *

TABLE 1.—REGULATIONS IMPLEMENTING THE HAZARDOUS AND SOLID WASTE AMENDMENTS OF 1984

Promulgation date	Title of regulation	Federal Register reference	Effective date
* * *	*	*	*
[insert date of signature of final rule].	Paint Manufacturing Listing	[insert Federal Register page numbers for final rule].	[insert effective date of final rule]
* * *	*	*	*

TABLE 2.—SELF-IMPLEMENTING PROVISIONS OF THE SOLID WASTE AMENDMENTS OF 1984

Effective date	Self-implementing provision	RCRA citation	Federal Register reference
* * *	*	*	*
[Insert effective date of final rule]	Prohibition on land disposal of K179 and K180 wastes.	3004(g)(4)(C) and 3004(m).	[Insert date of publication of final rule], [Insert FR page numbers].
* * *	*	*	*

PART 302—DESIGNATION, REPORTABLE QUANTITIES, AND NOTIFICATION

15. The authority citation for Part 302 continues to read as follows:

Authority: 42 U.S.C. 9602, 9603, and 9604; 33 U.S.C. 1321 and 1361.

16. In § 302.4, Table 302.4 is amended by adding the following new entries in alphanumeric order at the end of the table, to read as follows. (The appropriate footnotes to Table 302.4 are republished without change.)

§ 302.4 Designation of hazardous substances.

* * * * *

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TABLE 302.4.—LIST OF HAZARDOUS SUBSTANCES AND REPORTABLE QUANTITIES

[Note: All Comments/Notes Are Located at the End of This Table]

Hazardous Substance	CASRN	Regulatory synonyms	Statutory			Final RQ	
			RQ	Code †	RCRA waste No.	Category	Pounds (Kg)
*	*	*	*	*	*		*
K179	.....	.....	1*	4	K179	X	100 (45.4)
Paint manufacturing waste solids generated by paint manufacturing facilities that, at the point of generation, contain any of the constituents identified in paragraph § 261.32 (b)(6)(iii) at a concentration equal to or greater than the hazardous level set for that constituent in paragraph § 261.32(b)(6)(iii). Paint manufacturing waste solids are: (1) Waste solids generated from tank and equipment cleaning operations that use solvents, water and or caustic; (2) emission control dusts or sludges; (3) wastewater treatment sludges; and (4) off-specification product. Waste solids derived from the management of K180 by paint manufacturers would also be subject to this listing. Waste solids derived from the management of K179 by paint manufacturers are not covered by this listing, but such solids are subject to the K180 listing. For the purposes of this listing, paint manufacturers are defined as specified in paragraph § 261.32(b).							
K180	.....	.....	1*	4	K180	X	100 (45.4)
Paint manufacturing waste solids generated by paint manufacturing facilities that, at the point of generation, contain any of the constituents identified in paragraph § 261.32(b)(6)(iii) at a concentration equal to or greater than the hazardous level set for that constituent in paragraph § 261.32(b)(6)(iii) unless the wastes are stored or treated exclusively in tanks or containers prior to discharge to a POTW or under a NPDES permit. Paint manufacturing liquids are generated from tank and equipment cleaning operations that use solvents, water, and/or caustic. Waste liquids derived from the management of K179 by paint manufacturers would also be subject to this listing. Waste liquids derived from the management of K180 by paint manufacturers are not covered by this listing, but such liquids are subject to the K179 listing. For the purposes of this listing, paint manufacturers are defined as specified in paragraph § 261.32(b).							
*	*	*	*	*	*		*

† Indicates the statutory source as defined by 1, 2, 3, and 4 below.

* * * * * * *

4—Indicates that the statutory source for designation of this hazardous substance under CERCLA is RCRA Section 3001.

1* Indicates that the 1-pound RQ is a CERCLA statutory RQ.

* * * * * * *

[FR Doc. 01–3087 Filed 2–12–01; 8:45 am]

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Federal Register

Tuesday,
February 13, 2001

Part III

Department of Agriculture

Forest Service

36 CFR Part 242

Department of the Interior

Office of the Secretary

50 CFR Part 100

Subsistence Management Regulations for Public Lands in Alaska, Subpart C and Subpart D—2001 Subsistence Taking of Fish and Wildlife Regulations; Final Rule

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DEPARTMENT OF AGRICULTURE

Forest Service

36 CFR Part 242

DEPARTMENT OF THE INTERIOR

Fish and Wildlife Service

50 CFR Part 100

RIN 1018–AF91

Subsistence Management Regulations for Public Lands in Alaska, Subpart C and Subpart D—2001 Subsistence Taking of Fish and Wildlife Regulations

AGENCIES: Forest Service, Agriculture; Fish and Wildlife Service, Interior.

ACTION: Final rule.

SUMMARY: This final rule establishes regulations for seasons, harvest limits, methods, and means related to taking of wildlife, fish, and shellfish for subsistence uses during the 2001 regulatory year. The rulemaking is necessary because Subpart D is subject to an annual public review cycle. This rulemaking replaces the fish and shellfish regulations included in the ''Subsistence Management Regulations for Public Lands in Alaska, Subparts A, B, C, and D, Redefinition to Include Waters Subject to Subsistence Priority,'' which expire on February 28, 2001. This rule also adds a paragraph in Section _____.25 relative to the issuance of educational and cultural harvest permits and amends the Customary and Traditional Use Determinations of the Federal Subsistence Board (Section _____.24 of Subpart C).

DATES: Section _____.24(a)(2) is effective March 1, 2001. Section _____.25(c) is effective March 1, 2001, through June 30, 2001. Sections _____.26, _____.27, and _____.28 are effective March 1, 2001, through February 28, 2002.

FOR FURTHER INFORMATION CONTACT: Chair, Federal Subsistence Board, c/o U.S. Fish and Wildlife Service, Attention: Thomas H. Boyd, Office of Subsistence Management; (907) 786–3888. For questions specific to National Forest System lands, contact Ken Thompson, Regional Subsistence Program Manager, USDA, Forest Service, Alaska Region, (907) 786–3888.

SUPPLEMENTARY INFORMATION:

Background

Title VIII of the Alaska National Interest Lands Conservation Act (ANILCA) (16 U.S.C. 3111–3126) requires that the Secretary of the Interior and the Secretary of Agriculture (Secretaries) implement a joint program to grant a preference for subsistence uses of fish and wildlife resources on public lands, unless the State of Alaska enacts and implements laws of general applicability that are consistent with ANILCA and that provide for the subsistence definition, preference, and participation specified in Sections 803, 804, and 805 of ANILCA. The State implemented a program that the Department of the Interior previously found to be consistent with ANILCA. However, in December 1989, the Alaska Supreme Court ruled in *McDowell* v. *State of Alaska* that the rural preference in the State subsistence statute violated the Alaska Constitution. The Court's ruling in McDowell required the State to delete the rural preference from the subsistence statute and, therefore, negated State compliance with ANILCA. The Court stayed the effect of the decision until July 1, 1990.

As a result of the McDowell decision, the Department of the Interior and the Department of Agriculture (Departments) assumed, on July 1, 1990, responsibility for implementation of Title VIII of ANILCA on public lands. On June 29, 1990, the Temporary Subsistence Management Regulations for Public Lands in Alaska were published in the **Federal Register** (55 FR 27114–27170). On January 8, 1999, (64 FR 1276), the Departments extended jurisdiction to include waters in which there exists a Federal reserved water right. This amended rule conformed the Federal Subsistence Management Program to the Ninth Circuit's ruling in *Alaska* v. *Babbitt.*

Consistent with Subparts A, B, and C of these regulations, the Departments established a Federal Subsistence Board to administer the Federal Subsistence Management Program. The Board's composition includes a Chair appointed by the Secretary of the Interior with concurrence of the Secretary of Agriculture; the Alaska Regional Director, U.S. Fish and Wildlife Service; the Alaska Regional Director, U.S. National Park Service; the Alaska State Director, U.S. Bureau of Land Management; the Alaska Regional Director, U.S. Bureau of Indian Affairs; and the Alaska Regional Forester, USDA Forest Service. Through the Board, these agencies participated in the development of regulations for Subparts A, B, and C, and the annual Subpart D regulations.

All Board members have reviewed this rule and agree with its substance. Because this rule relates to public lands managed by an agency or agencies in both the Departments of Agriculture and the Interior, identical text would be incorporated into 36 CFR part 242 and 50 CFR part 100.

Applicability of Subparts A, B, and C

Subparts A, B, and C (unless otherwise amended) of the Subsistence Management Regulations for Public Lands in Alaska, 50 CFR 100.1 to 100.23 and 36 CFR 242.1 to 242.23, remain effective and apply to this rule. Therefore, all definitions located at 50 CFR 100.4 and 36 CFR 242.4 apply to regulations found in this subpart.

Federal Subsistence Regional Advisory Councils

Pursuant to the Record of Decision, Subsistence Management Regulations for Federal Public Lands in Alaska, April 6, 1992, and the Subsistence Management Regulations for Federal Public Lands in Alaska, 36 CFR 242.11 (1999) and 50 CFR 100.11 (1999), and for the purposes identified therein, we divide Alaska into ten subsistence resource regions, each of which is represented by a Federal Subsistence Regional Advisory Council (Regional Council). The Regional Councils provide a forum for rural residents, with personal knowledge of local conditions and resource requirements, to have a meaningful role in the subsistence management of fish and wildlife on Alaska public lands. The Regional Council members represent varied geographical, cultural, and user diversity within each region.

The Regional Councils had a substantial role in reviewing the proposed rule and making recommendations for the final rule. Moreover, the Council Chairs, or their designated representatives, presented their Council's recommendations at the Board meeting of December 5–6, 2000.

Summary of Changes

Section _____.24 (Customary and traditional use determinations) was originally published in the **Federal Register** (57 FR 22940) on May 29, 1992. Since that time, the Board has made a number of Customary and Traditional Use Determinations at the request of impacted subsistence users. Those modifications, along with some administrative corrections, were published in the **Federal Register** (59 FR 27462, published May 27, 1994; 59 FR 51855, published October 13, 1994; 60 FR 10317, published February 24, 1995; 61 FR 39698, published July 30, 1996; 62 FR 29016, published May 29, 1997; 63 FR 35332, published June 29, 1998; 63 FR 46148, published August 28, 1998; 64 FR 1276, published January 8, 1999; and 64 FR 35776, published July 1, 1999). During its December 5–6,

2000, meeting, the Board made additional determinations in addition to various annual season and harvest limit changes. The public has had extensive opportunity to review and comment on all changes. Additional details on the recent Board modifications are contained below in Analysis of Proposals Adopted by the Board.

Subpart D regulations are subject to an annual cycle and require development of an entire new rule each year. Customary and traditional use determinations are also subject to an annual review process providing for modification each year. Proposed Subpart D regulations for the 2001–2002 seasons and harvest limits, and methods and means were published on February 2, 2000, in the **Federal Register** (65 FR 5197). A 55-day comment period providing for public review of the proposed rule and calling for proposals was advertised by mail, radio, and newspaper. During that period, the Regional Councils met and, in addition to other Regional Council business, received suggestions for proposals from the public. The Board received a total of 44 proposals for changes to Customary and Traditional Use Determinations or to Subpart D. Subsequent to the review period, the Board prepared a booklet describing the proposals and distributed it to the public. The public had an additional 49 days in which to comment on the proposals for changes to the regulations. The ten Regional Councils met again, received public comments, and formulated their recommendations to the Board on proposals for their respective regions. Ten of the proposals were withdrawn from consideration by their originators. These final regulations reflect Board review and consideration of Regional Council recommendations and public comments.

Analysis of Proposals Rejected by the Board

The Board rejected six proposals. All but two of these rejections were based on recommendations from the respective Regional Council. In those two other cases, the Regional Council recommendations to close a sport fishery in one instance and reduce harvest limits in another did not have sufficient justification, imposed an unnecessary restriction on the taking for nonsubsistence uses and were without biological justification.

The Board rejected two proposals requesting that State subsistence fishing permits be replaced with a Federal permit. In each case, the Federal permit would have imposed an undue burden on the user and duplicated permitting requirements already in place without adding any net benefit.

One proposal requested establishing a Federal subsistence fishery in the marine portion of a bay/river area. In this case, the area proposed for the fishery was not under jurisdiction of the Federal Subsistence Program.

One proposal requested restricting the subsistence fishery to the estuary portion of a river system. This proposal was rejected because it would be detrimental to the subsistence users who fish at many locations throughout the river system.

The Board deferred action on six proposals in order to assemble additional fisheries data, to allow communities or Regional Councils additional time to review the issues and provide additional information, or to work with an international treaty commission.

Analysis of Proposals Adopted by the Board

The Board adopted 21 proposals. Some of these proposals were adopted as submitted and others were adopted with modifications suggested by the respective Regional Council or developed during the Board's public deliberations.

All of the adopted proposals were recommended for adoption by at least one of the Regional Councils and were based on meeting customary and traditional uses, harvest practices, or protecting fish populations. Detailed information relating to justification for the action on each proposal may be found in the Board meeting transcripts, available for review at the Office of Subsistence Management, 3601 C Street, Suite 1030, Anchorage, Alaska or on the Office of Subsistence Management website (http://www.r7.fws.gov/asm/home.html). Additional technical clarifications and removal of excess materials have been made, which result in a more readable document. Also wording has been added based on previous Board action and public comment that allows for the Office of Subsistence Management to issue permit renewals for the taking of a limited number of fish or wildlife for educational or cultural purposes.

Kotzebue Fishery Management Area

The Board adopted two proposals affecting residents of the Kotzebue Fishery Management Area resulting in the following changes to the regulations found in § _____.27.

- Deleted a subsistence closure for char at the mouth of the Kelly River.
- Revised the regulations relative to blocking a stream with a net for the taking of whitefish and pike.

Yukon-Northern Fishery Management Area

The Board adopted four proposals affecting residents of the Yukon-Northern Fishery Management Area resulting in the following changes to the regulations found in § _____.27.

Deleted a restriction on subsistence fishermen who also fish commercially.

- Deleted a requirement for a non-salmon harvest permit on the Tanana River.
- Revised where a permit is required for whitefish and suckers on Birch Creek.
- Restricted the targeting of chinook salmon for dog food in the Yukon River drainage.

Kuskokwim Fishery Management Area

The Board adopted one proposal affecting residents of the Kuskokwim Fishery Management Area resulting in the following change to the regulations found in § _____.27.

- Revised the regulations relating to the taking of trout by certain villages.

Bristol Bay Fishery Management Area

The Board adopted one proposal affecting residents of the Bristol Bay Fishery Management Area resulting in the following change to the regulations found in § _____.27.

- Revised the regulations relating to the marking of subsistence-caught coho salmon.

Prince William Sound Fishery Management Area

The Board adopted four proposals affecting residents of the Prince William Sound Fishery Management Area resulting in the following changes to the regulations found in § _____.24 and in § _____.27.

- Established a customary and traditional use determination in the Chitina Subdistrict.
- Opened the salmon season earlier in the Glennallen Subdistrict.
- Revised the season and harvest limits for the Batzulnetas fishery.
- Revised the customary and traditional use determination for the Upper Copper River and the Batzulnetas areas.

Yakutat Fishery Management Area

The Board adopted one proposal affecting residents of the Yakutat Fishery Management Area resulting in the following change to the regulations found in § _____.24.

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• Revised the customary and traditional use determination for the Yakutat Fishery Management Area.

Southeastern Alaska Fishery Management Area

The Board adopted nine proposals affecting residents of the Southeastern Alaska Fishery Management Area resulting in the following changes to the regulations found in § _____.24 and in § _____.27.

• Revised the customary and traditional use determination for the Southeastern Alaska Fishery Management Area.

• Revised harvest limits for trout and Dolly Varden throughout the Southeastern Alaska Fishery Management Area and established a harvest limit and methods of take for steelhead trout on Prince of Wales Island.

• Revised the harvest limit for sockeye salmon in a number of areas.

• Closed three drainages to the non-subsistence harvest of sockeye salmon.

• Provided for the harvest of coho salmon in a portion of the Southeastern Alaska Fishery Management Area.

• Closed a portion of a river system to the use of nets.

Conformance with Statutory and Regulatory Authorities

National Environmental Policy Act Compliance

A Draft Environmental Impact Statement (DEIS) that described four alternatives for developing a Federal Subsistence Management Program was distributed for public comment on October 7, 1991. That document described the major issues associated with Federal subsistence management as identified through public meetings, written comments, and staff analysis and examined the environmental consequences of the four alternatives. Proposed regulations (Subparts A, B, and C) that would implement the preferred alternative were included in the DEIS as an appendix. The DEIS and the proposed administrative regulations presented a framework for an annual regulatory cycle regarding subsistence hunting and fishing regulations (Subpart D). The Final Environmental Impact Statement (FEIS) was published on February 28, 1992.

Based on the public comment received, the analysis contained in the FEIS, and the recommendations of the Federal Subsistence Board and the Department of the Interior's Subsistence Policy Group, the Secretary of the Interior, with the concurrence of the Secretary of Agriculture, through the U.S. Department of Agriculture—Forest Service, decided to implement Alternative IV as identified in the DEIS and FEIS (Record of Decision on Subsistence Management for Federal Public Lands in Alaska (ROD), signed April 6, 1992). The DEIS and the selected alternative in the FEIS defined the administrative framework of an annual regulatory cycle for subsistence hunting and fishing regulations. The final rule for Subsistence Management Regulations for Public Lands in Alaska, Subparts A, B, and C (57 FR 22940–22964, published May 29, 1992) implemented the Federal Subsistence Management Program and included a framework for an annual cycle for subsistence hunting and fishing regulations.

Compliance with Section 810 of ANILCA

The intent of all Federal subsistence regulations is to accord subsistence uses of fish and wildlife on public lands a priority over the taking of fish and wildlife on such lands for other purposes, unless restriction is necessary to conserve healthy fish and wildlife populations. A section 810 analysis was completed as part of the FEIS process. The final section 810 analysis determination appeared in the April 6, 1992, ROD, which concluded that the Federal Subsistence Management Program, under Alternative IV with an annual process for setting hunting and fishing regulations, may have some local impacts on subsistence uses, but the program is not likely to significantly restrict subsistence uses.

Paperwork Reduction Act

These rules contain information collection requirements subject to Office of Management and Budget (OMB) approval under the Paperwork Reduction Act of 1995. They apply to the use of public lands in Alaska. The information collection requirements described below were approved by OMB under 44 U.S.C. 3501 and were assigned clearance number 1018–0075, which expires July 31, 2003. The information collection requirements described below will be submitted to OMB for approval beyond that date. We will not conduct or sponsor, and you are not required to respond to, a collection of information request unless it displays a currently valid OMB control number.

The collection of information will be achieved through the use of the Federal Subsistence Harvest Permit Application. This collection of information will establish whether the applicant qualifies to participate in a Federal subsistence fishery on public lands in Alaska and will provide a report of harvest and location of harvest.

The likely respondents to this collection of information are rural Alaska residents who wish to participate in specific subsistence fisheries on Federal land. The collected information is necessary to determine harvest success and harvest location in order to make management decisions relative to the conservation of healthy fish and wildlife populations. The annual burden of reporting and recordkeeping is estimated to average 0.25 hours per response, including time for reviewing instructions, gathering and maintaining data, and completing and reviewing the form. The estimated number of likely respondents under this rule is less than 5,000, yielding a total annual reporting and recordkeeping burden of 1,250 hours or less.

Direct comments on the burden estimate or any other aspect of this form to: Information Collection Officer, U.S. Fish and Wildlife Service, 1849 C Street, NW, MS 222 ARLSQ, Washington, DC 20240. Additional information collection requirements may be imposed if Local Advisory Committees subject to the Federal Advisory Committee Act are established under Subpart B.

Other Requirements

This rule was not subject to OMB review under Executive Order 12866.

The Regulatory Flexibility Act of 1980 (5 U.S.C. 601 *et seq.*) requires preparation of flexibility analyses for rules that will have a significant effect on a substantial number of small entities, which include small businesses, organizations, or governmental jurisdictions. The Departments have determined that this rulemaking will not have a significant economic effect on a substantial number of small entities within the meaning of the Regulatory Flexibility Act.

This rulemaking will impose no significant costs on small entities; the exact number of businesses and the amount of trade that will result from this Federal land-related activity is unknown. The aggregate effect is an insignificant positive economic effect on a number of small entities, such as tackle, boat, and gasoline dealers. The number of small entities affected is unknown; but, the fact that the positive effects will be seasonal in nature and will, in most cases, merely continue preexisting uses of public lands indicates that they will not be significant.

In general, the resources harvested under this rule will be consumed by the local harvester and do not result in a dollar benefit to the economy. However,

we estimate that 24 million pounds of fish (including 8.3 million pounds of salmon) are harvested by the local subsistence users annually and, if given a dollar value of $3.00 per pound for salmon and $0.58 per pound for other fish, would equate to about $34 million in food value Statewide.

Title VIII of ANILCA requires the Secretaries to administer a subsistence preference on public lands. The scope of this program is limited by definition to certain public lands. Likewise, these regulations have no potential takings of private property implications as defined by Executive Order 12630.

The Service has determined and certifies pursuant to the Unfunded Mandates Reform Act, 2 U.S.C. 1502 *et seq.*, that this rulemaking will not impose a cost of $100 million or more in any given year on local or State governments or private entities. The implementation of this rule is by Federal agencies, and no cost is involved to any State or local entities or Tribal governments.

The Service has determined that these final regulations meet the applicable standards provided in sections 3(a) and 3(b)(2) of Executive Order 12988.

In accordance with Executive Order 13132, the rule does not have sufficient federalism implications to warrant the preparation of a Federalism Assessment. Title VIII of ANILCA precludes the State from exercising full management authority over fish and wildlife resources on Federal lands.

In accordance with the President's memorandum of April 29, 1994, ''Government-to-Government Relations with Native American Tribal Governments'' (59 FR 22951), 512 DM 2, and E.O. 13175, we have evaluated possible effects on Federally recognized Indian tribes and have determined that there are no effects. The Bureau of Indian Affairs is a participating agency in this rulemaking.

Drafting Information

William Knauer drafted these regulations under the guidance of Thomas H. Boyd, of the Office of Subsistence Management, Alaska Regional Office, U.S. Fish and Wildlife Service, Anchorage, Alaska. Curt Wilson, Alaska State Office, Bureau of Land Management; Rod Simmons, Alaska Regional Office, U.S. Fish and Wildlife Service; Bob Gerhard, Alaska Regional Office, National Park Service; Ida Hildebrand, Alaska Regional Office, Bureau of Indian Affairs; and Ken Thompson, USDA-Forest Service, provided additional guidance.

List of Subjects

36 CFR Part 242

Administrative practice and procedure, Alaska, Fish, National forests, Public lands, Reporting and recordkeeping requirements, Wildlife.

50 CFR Part 100

Administrative practice and procedure, Alaska, Fish, National forests, Public lands, Reporting and recordkeeping requirements, Wildlife.

For the reasons set out in the preamble, the Federal Subsistence Board amends Title 36, part 242, and Title 50, part 100, of the Code of Federal Regulations, as set forth below.

PART_____—SUBSISTENCE MANAGEMENT REGULATIONS FOR PUBLIC LANDS IN ALASKA

1. The authority citation for both 36 CFR Part 242 and 50 CFR Part 100 continues to read as follows:

Authority: 16 U.S.C. 3, 472, 551, 668dd, 3101–3126; 18 U.S.C. 3551–3586; 43 U.S.C. 1733.

Subpart C—Board Determinations

2. In Subpart C of 36 CFR part 242 and 50 CFR part 100, § _____.24(a)(2) is revised to read as follows:

§ _____24 Customary and traditional use determinations.

(a) * * *

(2) *Fish determinations.*

Area	Species	Determination
Kotzebue Area	All fish	Residents of the Kotzebue Area.
Norton Sound—Port Clarence Area	All fish	Residents of the Norton Sound-Port Clarence Area.
Yukon-Northern Area:		
Yukon River drainage	Salmon, other than Yukon River Fall Chum salmon.	Residents of the Yukon Area, including the community of Stebbins.
Yukon River drainage	Yukon River Fall chum salmon	Residents of the Yukon River drainage, including the communities of Stebbins, Scammon Bay, Hooper Bay, and Chevak.
Yukon River drainage	Freshwater fish species (other than salmon), including sheefish, whitefish, lamprey, burbot, sucker, grayling, pike, char, and blackfish.	Residents of the Yukon Northern Area.
Remainder of the Yukon-Northern Area	All fish	Residents of the Northern Area, except for those domiciled in Unit 26–B.
Kuskokwim Area	Salmon	Residents of the Kuskokwim Area, except those persons residing on the United States military installation located on Cape Newenham, Sparevohn USAFB, and Tatalina USAFB.
	Rainbow trout	Residents of the communities of Quinhagak, Goodnews Bay, Kwethluk, Eek, Akiachak, Akiak, and Platinum.
	Pacific cod	Residents of the communities of Chevak, Newtok, Tununak, Toksook Bay, Nightmute, Chefornak, Kipnuk, Mekoryuk, Kwigillingok, Kongiganak, Eek, and Tuntutuliak.
	All other fish other than herring	Residents of the Kuskokwim Area, except those persons residing on the United States military installation located on Cape Newenham, Sparevohn USAFB, and Tatalina USAFB.

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Area	Species	Determination
Waters around Nunivak Island	Herring and herring roe	Residents within 20 miles of the coast between the westernmost tip of the Naskonant Peninsula and the terminus of the Ishowik River and on Nunivak Island.
Bristol Bay Area:		
Nushagak District, including drainages flowing into the district.	Salmon and freshwater fish	Residents of the Nushagak District and freshwater drainages flowing into the district.
Naknek-Kvichak District—Naknek River drainage	Salmon and other freshwater fish	Residents of the Naknek and Kvichak River drainages.
Naknek-Kvichak District—Iliamna-Lake Clark drainage.	Salmon and other freshwater fish	Residents of the Iliamna-Lake Clark drainage.
Togiak District, including drainages flowing into the district.	Salmon and other freshwater fish	Residents of the Togiak District, freshwater drainage flowing into the district, and the other community of Manokotak.
Togiak District	Herring spawn on kelp	Residents of the Togiak District.
Remainder of the Bristol Bay Area	All fish	Residents of the Bristol Bay Area.
Aleutian Islands Area	All fish	Residents of the Aleutian Islands Area and the Pribilof Islands.
Alaska Peninsula Area	Halibut	Residents of the Alaska Peninsula Area and the communities of Ivanof Bay and Perryville.
	All other fish in the Alaska Peninsula Area.	Residents of the Alaska Peninsula Area.
Chignik Area	Halibut, salmon and fish other than steelhead and rainbow trout.	Residents of the Chignik Area.
Kodiak Area—except the Mainland District, all waters along the south side of the Alaska Peninsula bounded by the latitude of Cape Douglas (58°52′ North latitude) midstream Shelikof Strait, and east of the longitude of the southern entrance of Imuya Bay near Kilokak Rocks (57°11′22″ North latitude, 156°20′30″ W longitude).	Salmon	Residents of the Kodiak Island Borough, except those residing on the Kodiak Coast Guard Base.
Kodiak Area	Fish other than steelhead and rainbow trout and salmon.	Residents of the Kodiak Area.
Cook Inlet Area	Fish other than salmon, Dolly Varden, trout, char, grayling, and burbot.	Residents of the Cook Inlet Area.
Prince William Sound Area:		
South-Western District and Green Island	Salmon	Residents of the Southwestern District which is mainland waters from the outer point on the north shore of Granite Bay to Cape Fairfield, and Knight Island, Chenega Island, Bainbridge Island, Evans Island, Elrington Island, Latouche Island and adjacent islands.
North of a line from Porcupine Point to Granite Point, and south of a line from Point Lowe to Tongue Point.	Salmon	Residents of the Village of Tatitlek and Ellamar.
Chitinia Subdistrict of the Upper Copper River District.	Salmon	Residents of Chitina, Cantwell, Chistochina, Copper Center, Gakona, Gulkana, Mentasta Lake, and Tazlina.
Glennallen Subdistrict of the Upper Copper River District.	Salmon	Residents of the Prince William Sound Area and residents of Healy Lake, Dot Lake, Northway, Tanacross, Tetlin, Tok and those individuals living along the Alaska Highway from the Alaskan/Canadian border to Dot Lake, along the Tok Cutoff from Tok to Mentasta Pass, and along the Nabesna Road.
Waters of the Copper River between National Park Service regulatory makers located near the mouth of Tanada Creek, and in Tanada Creek between National Park Servcie regulatory markers identifying the open waters of the creek.	Salmon	Residents of Mentasta Lake and Dot Lake.
Prince William Sound Area—remainder	Salmon	Residents of the Prince William Sound Area.
Yakutat Area:		
Freshwater upstream from the terminus of of streams and rivers of the Yakutat Area from the Doame River to the Tsiu River.	Salmon	Residents of the area east of Yakutat Bay, including the islands within Yakutat Bay, west the Situk River drainage, and south of and including Knight Island.
Freshwater upstream from the terminus of streams and rivers of the Yakutat Area from the Doame River to Point Manby.	Dolly Varden, steelhead trout, and smelt.	Residents of the area east of Yakutat Bay, including the islands within Yakutat Bay, west of the Situk River drainage, and south of and including Knight Island.
Remainder of the Yakutat Area	Dolly Varden, trouth, smelt and eulachon.	Residents of Southeastern Alaska and Yakutat Area.

Area	Species	Determination
Southeastern Alaska Area:		
District 1—Section 1–E in waters of the Naha River and Roosevelt Lagoon.	Salmon, Dolly Varden, trout, smelt and eulachon.	Resdents of the City of Saxman.
District 1—Section 1–F in Boca de Quadra in waters of Sockeye Creek and Hugh Smith Lake within 500 yards of the terminus of Sockeye Creek.	Salmon, Dolly Varden, trout, smelt and eulachon.	Residents of the City of Saxman.
District 2—North of the latitude of the northern-most tip of Chasina Point and west of a line from the northern-most tip of Chasina Point to the eastern-most tip of Grindall Island to the eastern-most tip of the Kasaan Peninsula.	Salmon, Dolly Varden, trout, smelt and eulachon.	Residents of the City of kasaan and in the drainage of the southeastern shore of the Kasaan Peninsula west of 132°20′ W. long. and east of 132°25′ W. long.
District 3—Section 3–A	Salmon, Dolly Varden, trout, smelt and eulachon.	Residents of the townsite of Hydaburg.
District 3—Section A	Halibut and bottomfish	Residents of Southeast Area.
District 3–Section 3–B in waters east of a line from Point Idefonso to Tranquil Point.	Salmon, Dolly Varden, trout, smelt and eulachon.	Residents of the City of Klawock and on Prince of Wales Island within the boundaries of the Klawock Heenya Corporation land holdings they existed in January 1989, and those residents of the City of Craig and on Prince Wales Island within the boundaries of the Shan Seet Corporation land holdings as they existed in January 1989.
District 3—Section 3–C in waters of Sarkar lakes	Salmon, Dolly Varden trout, smelt and eulachon.	Residents of the City of Klawock and on Prince of Wales Island within the boundaries of the Klawock Heenya Corporation land holdings as they existed in January 1989, and those residents of the City of Craig and on Prince of Wales Island within the boundaries of the Shan Seet Corporation land holdings as they existed in January 1989.
District 5—North of a line from Point Barrier to Boulder Point.	Salmon, Dolly Varden, trout, smelt and eulachon.	Residents of the City of Kake and in Kupreanof Island drainages emptying into Keku Strait south of Point White and north of the Portage Bay boat harbor.
District 9—Section 9–A	Salmon, Dolly Varden, trout, smelt and eulachon.	Residents of the City of Kake and in Kupreanof Island drainages emptying into Keku Strait south of Point White and north of the Portage Bay boat harbor.
District 9—Section 9–B north of the latitude of Swain Point.	Salmon, Dolly Varden, trout, smelt and eulachon.	Residents of the City of Kake and in Kupreanof Island drainages emptying into Keku Strait south of Point White and north of the Portage eulachon Bay boat harbor.
District 10—West of a line from Pinta Point to False Point Pybus.	Salmon, Dolly Varden, trout, smelt and eulachon.	Residents of the City of Kake and in Kupreanof Island drainages emptying into Keku Strait south of Point White and north of the Portage Bay boat harbor.
District 12—South of a line from Fishery Point to south Passage Point and north of the latitude of Point Caution.	Salmon, Dolly Varden, trout, smelt and eulachon.	Residents of the City of Angoon and along the western shore of Admiralty Island north of the latitude of Sand Island, south of the latitude of Thayer Creek, and west of 134°30′ W. long., including Killisnoo Island.
District 13—Section 13–A south of the latitude of Cape Edward.	Salmon, Dolly Varden, trout, smelt and eulachon.	Residents of the City and Borough of Sitka in drainages which empty into Section 13–B north of the latitude of Dorothy Narrows.
District 13—Section 13–B north of the latitude of Redfish Cape.	Salmon, Dolly Varden, trout, smelt and eulachon.	Residents of the City and Borough of Sitka drainages which empty into Section 13–B north of the latitude of Dorothy Narrows.
District 13—Section 13–C	Salmon, Dolly Varden, trout, smelt and eulachon.	Residents of the City and Borough of Sitka in north of the Varden, drainages which empty into Section 13–B north latitude of trout, of the latitude of Dorothy Narrows.
District 13—Section 13–C east of the longitude of Point Elizabeth.	Salmon, Dolly Varden, trout, smelt and eulachon.	Residents of the City of Angoon and along the western shore of Admiralty Island north of the latitude of Sand Island, south of the latitude of Thayer Creek, and west of 134°30′ W. long., including Killisnoo Island.
District 14—Section 14–B and 14–C	Salmon, Dolly Varden, trout, smelt and eulachon.	Residents of the City of Hoonah and in Chichagof Island drainages on the eastern shore of Port Frederick from Gartina Creek to Point Sophia.
Southeastern Alaska Area—Remainder	Dolly Varden, trout, smelt and eulachon.	Residents of Southeastern Alaska and Yakutat Areas.

* * * * *

Subpart D—Subsistence Taking of Fish and Wildlife

3. In Subpart D of 36 CFR part 242 and 50 CFR part 100, § _____.25(c) is revised effective March 1, 2001, through June 30, 2001, to read as follows:

§ _____.25 Subsistence taking of wildlife.

* * * * *

(c) Possession and transportation of wildlife. (1) Except as specified in paragraph (c)(3)(ii), (c)(4), or (c)(5) of this section, or as otherwise provided, you may not take a species of wildlife in any Unit, or portion of a Unit, if your total take of that species already obtained anywhere in the State under Federal and State regulations equals or exceeds the harvest limit in that Unit.

(2) An animal taken under Federal or State regulations by any member of a community with an established community harvest limit for that species counts toward the community harvest limit for that species. Except for wildlife taken pursuant to § _____.6(f)(3), or as otherwise provided for by this Part, an animal taken as part of a community harvest limit counts toward every community member's harvest limit for that species taken under Federal or State of Alaska regulations.

(3) Harvest limits. (i) Harvest limits, including those related to ceremonial uses, authorized by this section and harvest limits established in State regulations may not be accumulated.

(ii) Wildlife taken by a designated hunter for another person pursuant to § _____.6(f)(2), counts toward the individual harvest limit of the person for whom the wildlife is taken.

(4) The U.S. Fish and Wildlife Service, Office of Subsistence Management may issue a permit to harvest wildlife for a qualifying cultural/educational program to an organization that has been granted a Federal subsistence permit for a similar event within the previous five years. A qualifying program must have instructors, enrolled students, minimum attendance requirements, and standards for successful completion of the course. Applications must be submitted to the Office of Subsistence Management 60 days prior to the earliest desired date of harvest. Permits will be issued for no more than one large mammal per culture/education camp. Large mammal species allowed to be harvested are limited to deer, moose, caribou, black bear, and mountain goat. Any animals harvested will count against any established Federal harvest quota for the area in which harvested. Appeal of a rejected request can be made to the Federal Subsistence Board. Application for an initial permit for a qualifying cultural/educational program, for a permit when the circumstances have changed significantly, when no permit has been issued within the previous five years, or when there is a request for harvest in excess of that provided above, will be considered by the Federal Subsistence Board.

(5) The harvest limit specified for a trapping season for a species and the harvest limit set for a hunting season for the same species are separate and distinct. This means that if you have taken a harvest limit for a particular species under a trapping season, you may take additional animals under the harvest limit specified for a hunting season or vice versa.

(6) A brown/grizzly bear taken in a Unit or portion of a Unit having a harvest limit of one brown/grizzly bear per year counts against a one brown/grizzly bear every four regulatory years harvest limit in other Units; an individual may not take more than one brown/grizzly bear in a regulatory year.

(7) A harvest limit applies to the number of animals that can be taken during a regulatory year; however, harvest limits for grouse, ptarmigan, and caribou (in some Units) are regulated by the number that may be taken per day. Harvest limits of grouse and ptarmigan are also regulated by the number that can be held in possession.

(8) Unless otherwise provided, any person who gives or receives wildlife shall furnish, upon a request made by a Federal or State agent, a signed statement describing the following: names and addresses of persons who gave and received wildlife, the time and place that the wildlife was taken, and identification of species transferred. Where a qualified subsistence user has designated another qualified subsistence user to take wildlife on his or her behalf in accordance with § _____.6, the permit shall be furnished in place of a signed statement.

(9) A rural Alaska resident who has been designated to take wildlife on behalf of another rural Alaska resident in accordance with § _____.6, shall promptly deliver the wildlife to that rural Alaska resident.

(10) You may not possess, transport, give, receive, or barter wildlife that was taken in violation of Federal or State statutes or a regulation promulgated thereunder.

(11) Evidence of sex and identity. (i) If subsistence take of Dall sheep is restricted to a ram, you may not possess or transport a harvested sheep unless both horns accompany the animal.

(ii) If the subsistence taking of an ungulate, except sheep, is restricted to one sex in the local area, you may not possess or transport the carcass of an animal taken in that area unless sufficient portions of the external sex organs remain attached to indicate conclusively the sex of the animal, except in Units 11 and 13 where you may possess either sufficient portions of the external sex organs (still attached to a portion of the carcass) or the head (with or without antlers attached; however, the antler stumps must remain attached), to indicate the sex of the harvested moose; however, this paragraph (c)(11)(ii) does not apply to the carcass of an ungulate that has been butchered and placed in storage or otherwise prepared for consumption upon arrival at the location where it is to be consumed.

(iii) If a moose harvest limit includes an antler size or configuration restriction, you may not possess or transport the moose carcass or its parts unless both antlers accompany the carcass or its parts. If you possess a set of antlers with less than the required number of brow tines on one antler, you must leave the antlers naturally attached to the unbroken, uncut skull plate; however, this paragraph (c)(11)(iii) does not apply to a moose carcass or its parts that have been butchered and placed in storage or otherwise prepared for consumption after arrival at the place where it is to be stored or consumed.

(12) You must leave all edible meat from caribou and moose harvested in Units 9(B), 17, and 19(B) prior to October 1 on the bones of the front quarters and hind quarters until you remove the meat from the field or process it for human consumption.

4. In Subpart D of 36 CFR part 242 and 50 CFR part 100, §_____.26 is added and reserved and §§_____.27 and _____.28 are added effective March 1, 2001, through February 28, 2002, to read as follows:

§ _____.26 [Reserved]

§ _____.27 Subsistence taking of fish.

(a) *Applicability.* (1) Regulations in this section apply to the taking of fish or their parts for subsistence uses.

(2) You may take fish for subsistence uses at any time by any method unless you are restricted by the subsistence fishing regulations found in this section. The harvest limit specified in this section for a subsistence season for a species and the State harvest limit set for a State season for the same species are not cumulative. This means that if

you have taken the harvest limit for a particular species under a subsistence season specified in this section, you may not, after that, take any additional fish of that species under any other harvest limit specified for a State season.

(b) *Definitions.* The following definitions shall apply to all regulations contained in this section:

ADF&G means the Alaska Department of Fish and Game.

Anchor means a device used to hold a fishing vessel or net in a fixed position relative to the beach; this includes using part of the seine or lead, a ship's anchor, or being secured to another vessel or net that is anchored.

Beach seine means a floating net which is designed to surround fish and is set from and hauled to the beach.

Cast net means a circular net with a mesh size of no more than 1½ inches and weights attached to the perimeter which, when thrown, surrounds the fish and closes at the bottom when retrieved.

Char means the following species: Arctic char (*Salvelinus alpinis*); lake trout (*Salvelinus namaycush*); brook trout (*Salvelinus fontinalis*), and Dolly Varden (*Salvelinus malma*).

Depth of net means the perpendicular distance between cork line and lead line expressed as either linear units of measure or as a number of meshes, including all of the web of which the net is composed.

Dip net means a bag-shaped net supported on all sides by a rigid frame; the maximum straight-line distance between any two points on the net frame, as measured through the net opening, may not exceed 5 feet; the depth of the bag must be at least one-half of the greatest straight-line distance, as measured through the net opening; no portion of the bag may be constructed of webbing that exceeds a stretched measurement of 4.5 inches; the frame must be attached to a single rigid handle and be operated by hand.

Drainage means all of the waters comprising a watershed, including tributary rivers, streams, sloughs, ponds, and lakes, which contribute to the water supply of the watershed.

Drift gillnet means a drifting gillnet that has not been intentionally staked, anchored, or otherwise fixed in one place.

Fishwheel means a fixed, rotating device, with no more than four baskets on a single axle, for catching fish, which is driven by river current or other means.

Freshwater of streams and rivers means the line at which freshwater is separated from saltwater at the mouth of streams and rivers by a line drawn headland to headland across the mouth as the waters flow into the sea.

Fyke net means a fixed, funneling (fyke) device used to entrap fish.

Gear means any type of fishing apparatus.

Gillnet means a net primarily designed to catch fish by entanglement in a mesh that consists of a single sheet of webbing which hangs between cork line and lead line, and which is fished from the surface of the water.

Groundfish or *bottomfish* means any marine fish except halibut, osmerids, herring and salmonids.

Hand purse seine means a floating net which is designed to surround fish and which can be closed at the bottom by pursing the lead line; pursing may only be done by hand power, and a free-running line through one or more rings attached to the lead line is not allowed.

Handline means a hand-held and operated line, with one or more hooks attached.

Harvest limit means the maximum legal take per person or designated group, per specified time period, in the area in which the person is fishing, even if part or all of the fish are preserved. A fish, when landed and killed by means of rod and reel becomes part of the harvest limit of the person originally hooking it.

Herring pound means an enclosure used primarily to contain live herring over extended periods of time.

Household means a person or persons having the same residence.

Hung measure means the maximum length of the cork line when measured wet or dry with traction applied at one end only.

Jigging gear means a line or lines with lures or baited hooks, drawn through the water by hand, and which are operated during periods of ice cover from holes cut in the ice, or from shore ice and which are drawn through the water by hand.

Lead means either a length of net employed for guiding fish into a seine, set gillnet, or other length of net, or a length of fencing employed for guiding fish into a fishwheel, fyke net, or dip net.

Legal limit of fishing gear means the maximum aggregate of a single type of fishing gear permitted to be used by one individual or boat, or combination of boats in any particular regulatory area, district, or section.

Long line means either a stationary, buoyed, or anchored line, or a floating, free-drifting line with lures or baited hooks attached.

Mechanical jigging machine means a mechanical device with line and hooks used to jig for halibut and bottomfish, but does not include hand gurdies or rods with reels.

Mile means a nautical mile when used in reference to marine waters or a statute mile when used in reference to fresh water.

Possession limit means the maximum number of fish a person or designated group may have in possession if the fish have not been canned, salted, frozen, smoked, dried, or otherwise preserved so as to be fit for human consumption after a 15-day period.

Pot means a portable structure designed and constructed to capture and retain live fish and shellfish in the water.

Purse seine means a floating net which is designed to surround fish and which can be closed at the bottom by means of a free-running line through one or more rings attached to the lead line.

Rockfish means all species of the genus Sebastes.

Rod and reel means either a device upon which a line is stored on a fixed or revolving spool and is deployed through guides mounted on a flexible pole, or a line that is attached to a pole. In either case, bait or an artificial fly or lure is used as terminal tackle. This definition does not include the use of rod and reel gear for snagging.

Salmon means the following species: pink salmon (*Oncorhynchus gorbuscha*); sockeye salmon (*Oncorhynchus nerka*); chinook salmon (*Oncorhynchus tshawytscha*); coho salmon (*Oncorhynchus kisutch*); and chum salmon (*Oncorhynchus keta*).

Salmon stream means any stream used by salmon for spawning, rearing, or for traveling to a spawning or rearing area.

Set gillnet means a gillnet that has been intentionally set, staked, anchored, or otherwise fixed.

Spear means a shaft with a sharp point or fork-like implement attached to one end which is used to thrust through the water to impale or retrieve fish and which is operated by hand.

Stretched measure means the average length of any series of 10 consecutive meshes measured from inside the first knot and including the last knot when wet; the 10 meshes, when being measured, shall be an integral part of the net, as hung, and measured perpendicular to the selvages; measurements shall be made by means of a metal tape measure while the 10 meshes being measured are suspended vertically from a single peg or nail, under 5-pound weight.

Subsistence fishing permit means a permit issued by the Alaska Department

of Fish and Game, unless specifically identified otherwise.

To operate fishing gear means any of the following: to deploy gear in the water; to remove gear from the water; to remove fish or shellfish from the gear during an open season or period; or to possess a gillnet containing fish during an open fishing period, except that a gillnet which is completely clear of the water is not considered to be operating for the purposes of minimum distance requirement.

Trawl means a bag-shaped net towed through the water to capture fish or shellfish, and includes beam, otter, or pelagic trawl.

Troll gear means a power gurdy troll gear consisting of a line or lines with lures or baited hooks which are drawn through the water by a power gurdy; hand troll gear consisting of a line or lines with lures or baited hooks which are drawn through the water from a vessel by hand trolling, strip fishing, or other types of trolling, and which are retrieved by hand power or hand-powered crank and not by any type of electrical, hydraulic, mechanical, or other assisting device or attachment; or dinglebar troll gear consisting of one or more lines, retrieved and set with a troll gurdy or hand troll gurdy, with a terminally attached weight from which one or more leaders with one or more lures or baited hooks are pulled through the water while a vessel is making way.

Trout means the following species: cutthroat trout (*Oncorhynchus clarki*) and rainbow trout or steelhead trout (*Oncorhynchus mykiss*).

(c) *Methods, means, and general restrictions*. (1) Unless otherwise specified in this section or under terms of a required subsistence fishing permit (as may be modified by this section), you may use the following legal types of gear for subsistence fishing:

(i) A set gillnet;
(ii) A drift gillnet;
(iii) A purse seine;
(iv) A hand purse seine;
(v) A beach seine;
(vi) Troll gear;
(vii) A fish wheel;
(viii) A trawl;
(ix) A pot;
(x) A longline;
(xi) A fyke net;
(xii) A lead;
(xiii) A herring pound;
(xiv) A dip net;
(xv) Jigging gear;
(xvi) A mechanical jigging machine;
(xvii) A handline;
(xviii) A cast net;
(xix) A rod and reel; and
(xx) A spear.

(2) You must include an escape mechanism on all pots used to take fish or shellfish. The escape mechanisms are as follows:

(i) A sidewall, which may include the tunnel, of all shellfish and bottomfish pots must contain an opening equal to or exceeding 18 inches in length, except that in shrimp pots the opening must be a minimum of 6 inches in length. The opening must be laced, sewn, or secured together by a single length of untreated, 100 percent cotton twine, no larger than 30 thread. The cotton twine may be knotted at each end only. The opening must be within 6 inches of the bottom of the pot and must be parallel with it. The cotton twine may not be tied or looped around the web bars. Dungeness crab pots may have the pot lid tie-down straps secured to the pot at one end by a single loop of untreated, 100 percent cotton twine no larger than 60 thread, or the pot lid must be secured so that, when the twine degrades, the lid will no longer be securely closed;

(ii) All king crab, Tanner crab, shrimp, miscellaneous shellfish and bottomfish pots may, instead of complying with paragraph (c)(2)(i) of this section, satisfy the following: a sidewall, which may include the tunnel, must contain an opening at least 18 inches in length, except that shrimp pots must contain an opening at least 6 inches in length. The opening must be laced, sewn, or secured together by a single length of treated or untreated twine, no larger than 36 thread. A galvanic timed release device, designed to release in no more than 30 days in salt water, must be integral to the length of twine so that, when the device releases, the twine will no longer secure or obstruct the opening of the pot. The twine may be knotted only at each end and at the attachment points on the galvanic timed release device. The opening must be within 6 inches of the bottom of the pot and must be parallel with it. The twine may not be tied or looped around the web bars.

(3) For subsistence fishing for salmon, you may not use a gillnet exceeding 50 fathoms in length, unless otherwise specified in this section. The gillnet web must contain at least 30 filaments of equal diameter or at least 6 filaments, each of which must be at least 0.20 millimeter in diameter.

(4) Except as otherwise provided for in this section, you may not obstruct more than one-half the width of any stream with any gear used to take fish for subsistence uses.

(5) You may not use live non-indigenous fish as bait.

(6) You must have your first initial, last name, and address plainly and legibly inscribed on the side of your fishwheel facing midstream of the river.

(7) You may use kegs or buoys of any color but red on any permitted gear.

(8) You must have your first initial, last name, and address plainly and legibly inscribed on each keg, buoy, stakes attached to gillnets, stakes identifying gear fished under the ice, and any other unattended fishing gear which you use to take fish for subsistence uses.

(9) You may not use explosives or chemicals to take fish for subsistence uses.

(10) You may not take fish for subsistence uses within 300 feet of any dam, fish ladder, weir, culvert or other artificial obstruction, unless otherwise indicated.

(11) The limited exchange for cash of subsistence-harvested fish, their parts, or their eggs, legally taken under Federal subsistence management regulations to support personal and family needs is permitted as customary trade, so long as it does not constitute a significant commercial enterprise. The Board may recognize regional differences and define customary trade differently for separate regions of the State.

(12) Individuals, businesses, or organizations may not purchase subsistence-taken fish, their parts, or their eggs for use in, or resale to, a significant commercial enterprise.

(13) Individuals, businesses, or organizations may not receive through barter subsistence-taken fish, their parts or their eggs for use in, or resale to, a significant commercial enterprise.

(14) Except as provided elsewhere in this section, you may not take rainbow trout or steelhead trout.

(15) You may not use as bait for commercial or sport fishing purposes fish taken for subsistence use or under subsistence regulations in this part.

(16) You may not accumulate harvest limits authorized in this section or § __.28 with harvest limits authorized under State regulations.

(17) Unless specified otherwise in this section, you may use a rod and reel to take fish without a subsistence fishing permit. Harvest limits applicable to the use of a rod and reel to take fish for subsistence uses shall be as follows:

(i) If you are required to obtain a subsistence fishing permit for an area, that permit is required to take fish for subsistence uses with rod and reel in that area. The harvest and possession limits for taking fish with a rod and reel in those areas are the same as indicated on the permit issued for subsistence fishing with other gear types;

(ii) Except as otherwise provided for in this section, if you are not required to obtain a subsistence fishing permit

for an area, the harvest and possession limits for taking fish for subsistence uses with a rod and reel is the same as for taking fish under State of Alaska subsistence fishing regulations in those same areas. If the State does not have a specific subsistence season for that particular species, the limit shall be the same as for taking fish under State of Alaska sport fishing regulations.

(18) Unless restricted in this section, or unless restricted under the terms of a subsistence fishing permit, you may take fish for subsistence uses at any time.

(19) You may not intentionally waste or destroy any subsistence-caught fish or shellfish; however, you may use for bait or other purposes, whitefish, herring, and species for which bag limits, seasons, or other regulatory methods and means are not provided in this section, as well as the head, tail, fins, and viscera of legally-taken subsistence fish.

(d) *Fishing by designated harvest permit.* (1) Any species of fish that may be taken by subsistence fishing under this part may be taken under a designated harvest permit.

(2) If you are a Federally-qualified subsistence user, you (beneficiary) may designate another Federally-qualified subsistence user to take fish on your behalf. The designated fisherman must obtain a designated harvest permit prior to attempting to harvest fish and must return a completed harvest report. The designated fisherman may fish for any number of beneficiaries but may have no more than two harvest limits in his/her possession at any one time.

(3) The designated fisherman must have in possession a valid designated fishing permit when taking, attempting to take, or transporting fish taken under this section, on behalf of a beneficiary.

(4) The designated fisherman may not fish with more than one legal limit of gear.

(5) You may not designate more than one person to take or attempt to take fish on your behalf at one time. You may not personally take or attempt to take fish at the same time that a designated fisherman is taking or attempting to take fish on your behalf.

(e) *Fishing permits and reports.* (1) You may take salmon only under the authority of a subsistence fishing permit, unless a permit is specifically not required in a particular area by the subsistence regulations in this part, or unless you are retaining salmon from your commercial catch consistent with paragraph (f) of this section.

(2) The U.S. Fish and Wildlife Service, Office of Subsistence Management may issue a permit to harvest fish for a qualifying cultural/educational program to an organization that has been granted a Federal subsistence permit for a similar event within the previous 5 years. A qualifying program must have instructors, enrolled students, minimum attendance requirements, and standards for successful completion of the course. Applications must be submitted to the Office of Subsistence Management 60 days prior to the earliest desired date of harvest. Permits will be issued for no more than 25 fish per culture/education camp. Appeal of a rejected request can be made to the Federal Subsistence Board. Application for an initial permit for a qualifying cultural/educational program, for a permit when the circumstances have changed significantly, when no permit has been issued within the previous 5 years, or when there is a request for harvest in excess of that provided in this paragraph (e)(2), will be considered by the Federal Subsistence Board.

(3) If a subsistence fishing permit is required by this section, the following permit conditions apply unless otherwise specified in this section:

(i) You may not take more fish for subsistence use than the limits set out in the permit;

(ii) You must obtain the permit prior to fishing;

(iii) You must have the permit in your possession and readily available for inspection while fishing or transporting subsistence-taken fish;

(iv) If specified on the permit, you shall keep accurate daily records of the catch, showing the number of fish taken by species, location and date of catch, and other such information as may be required for management or conservation purposes; and

(v) If the return of catch information necessary for management and conservation purposes is required by a fishing permit and you fail to comply with such reporting requirements, you are ineligible to receive a subsistence permit for that activity during the following calendar year, unless you demonstrate that failure to report was due to loss in the mail, accident, sickness, or other unavoidable circumstances.

(f) *Relation to commercial fishing activities.* (1) If you are a Federally-qualified subsistence user who also commercial fishes, you may retain fish for subsistence purposes from your lawfully-taken commercial catch.

(2) When participating in a commercial and subsistence fishery at the same time, you may not use an amount of combined fishing gear in excess of that allowed under the appropriate commercial fishing regulations.

(g) You may not possess, transport, give, receive, or barter subsistence-taken fish or their parts which have been taken contrary to Federal law or regulation or State law or regulation (unless superseded by regulations in this part).

(h) [Reserved]

(i) *Fishery management area restrictions.* (1) *Kotzebue Area.* The Kotzebue Area includes all waters of Alaska between the latitude of the westernmost tip of Point Hope and the latitude of the westernmost tip of Cape Prince of Wales, including those waters draining into the Chukchi Sea.

(i) You may take fish for subsistence purposes without a permit.

(ii) You may take salmon only by gillnets, beach seines, or a rod and reel.

(iii) In the Kotzebue District, you may take sheefish with gillnets that are not more than 50 fathoms in length, nor more than 12 meshes in depth, nor have a mesh size larger than 7 inches.

(iv) You may not obstruct more than one-half the width of a stream with any gear used to take fish for subsistence uses, except from May 15 to June 30 and August 15 to October 31 when taking whitefish or pike in steams, creeks, or sloughs within the Selawik and Kobuk River drainages. Only gillnets 60 feet or less in length with a mesh size from 2½ to 4½ inches may be used. You must check your net at least once in every 24-hour period.

(2) *Norton Sound-Port Clarence Area.* The Norton Sound-Port Clarence Area includes all waters of Alaska between the latitude of the westernmost tip of Cape Prince of Wales and the latitude of Canal Point light, including those waters of Alaska surrounding St. Lawrence Island and those waters draining into the Bering Sea.

(i) In the Port Clarence District, you may take fish at any time except as specified by emergency regulation.

(ii) In the Norton Sound District, you may take fish at any time except as follows:

(A) In Subdistricts 2 through 6, if you are a commercial fishermen, you may not fish for subsistence purposes during the weekly closures of the commercial salmon fishing season, except that from July 15 through August 1, you may take salmon for subsistence purposes 7 days per week in the Unalakleet and Shaktoolik River drainages with gillnets which have a mesh size that does not exceed 4½ inches, and with beach seines;

(B) In the Unalakleet River from June 1 through July 15, you may take salmon

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only from 8:00 a.m. Monday until 8:00 p.m. Saturday;

(C) In Subdistricts 1—3, you may take salmon other than chum salmon by beach seine during periods established by emergency regulations.

(iii) You may take salmon only by gillnets, beach seines, fishwheel, or a rod and reel.

(iv) You may take fish other than salmon by set gillnet, drift gillnet, beach seine, fish wheel, pot, long line, fyke net, jigging gear, spear, lead, or a rod and reel.

(v) In the Unalakleet River from June 1 through July 15, you may not operate more than 25 fathoms of gillnet in the aggregate nor may you operate an unanchored fishing net.

(vi) You may take fish for subsistence purposes without a subsistence fishing permit except that a subsistence fishing permit is required in the Norton Sound District for net fishing in all waters from Cape Douglas to Rocky Point.

(vii) Only one subsistence fishing permit will be issued to each household per year.

(3) *Yukon-Northern Area.* The Yukon-Northern Area includes all waters of Alaska between the latitude of Canal Point Light and the latitude of the westernmost point of the Naskonat Peninsula, including those waters draining into the Bering Sea, and all waters of Alaska north of the latitude of the westernmost tip of Point Hope and west of 141° W. long., including those waters draining into the Arctic Ocean and the Chukchi Sea.

(i) Unless otherwise restricted in this section, you may take fish in the Yukon-Northern Area at any time.

(ii) In the following locations, you may take salmon only during the open weekly fishing periods of the commercial salmon fishing season and may not take them for 24 hours before the opening of the commercial salmon fishing season:

(A) In District 4, excluding the Koyukuk River drainage;

(B) In Subdistricts 4–B and 4–C from June 15 through September 30, salmon may be taken from 6:00 p.m. Sunday until 6:00 p.m. Tuesday and from 6:00 p.m. Wednesday until 6:00 p.m. Friday;

(C) In District 6, excluding the Kantishna River drainage, salmon may be taken from 6:00 p.m. Friday until 6:00 p.m. Wednesday.

(iii) During any commercial salmon fishing season closure of greater than five days in duration, you may not take salmon during the following periods in the following districts:

(A) In District 4, excluding the Koyukuk River drainage, salmon may not be taken from 6:00 p.m. Friday until 6:00 p.m. Sunday;

(B) In District 5, excluding the Tozitna River drainage and Subdistrict 5–D, salmon may not be taken from 6:00 p.m. Sunday until 6:00 p.m. Tuesday.

(iv) Except as provided in this section, and except as may be provided by the terms of a subsistence fishing permit, you may take fish other than salmon at any time.

(v) In Districts 1, 2, 3, and Subdistrict 4–A, excluding the Koyukuk and Innoko River drainages, you may not take salmon for subsistence purposes during the 24 hours immediately before the opening of the commercial salmon fishing season.

(vi) In Districts 1, 2, and 3:

(A) After the opening of the commercial salmon fishing season through July 15, you may not take salmon for subsistence for 18 hours immediately before, during, and for 12 hours after each commercial salmon fishing period;

(B) After July 15, you may not take salmon for subsistence for 12 hours immediately before, during, and for 12 hours after each commercial salmon fishing period.

(vii) In Subdistrict 4–A after the opening of the commercial salmon fishing season, you may not take salmon for subsistence for 12 hours immediately before, during, and for 12 hours after each commercial salmon fishing period; however, you may take king salmon during the commercial fishing season, with drift gillnet gear only, from 6:00 p.m. Sunday until 6:00 p.m. Tuesday and from 6:00 p.m. Wednesday until 6:00 p.m. Friday.

(viii) In the upper Yukon River drainage, you may not subsistence fish, except for whitefish and suckers, in Birch Creek and waters within 500 feet of its mouth.

(ix) You may not subsistence fish in the following drainages located north of the main Yukon River:

(A) Kanuti River upstream from a point 5 miles downstream of the State highway crossing;

(B) Bonanza Creek;

(C) Jim River including Prospect and Douglas Creeks; and

(D) North Fork of the Chandalar River system upstream from the mouth of Quartz Creek.

(x) You may not subsistence fish in the Delta River.

(xi) You may not subsistence fish in the following rivers and creeks and within 500 feet of their mouths: Big Salt River, Hess Creek, and Beaver Creek.

(xii) You may not subsistence fish in the Deadman, Jan, Fielding, and Two-Mile Lakes.

(xiii) You may not subsistence fish in the Toklat River drainage from August 15 through May 15.

(xiv) You may take salmon only by gillnet, beach seine, fish wheel, or rod and reel, subject to the restrictions set forth in this section.

(xv) In District 4, if you are a commercial fisherman, you may not take salmon for subsistence purposes during the commercial salmon fishing season using gillnets with mesh larger than six-inches after a date specified by ADF&G emergency order issued between July 10 and July 31.

(xvi) In Districts 4, 5, and 6, you may not take salmon for subsistence purposes by drift gillnets, except as follows:

(A) In Subdistrict 4–A upstream from the mouth of Stink Creek, you may take king salmon by drift gillnets less than 150 feet in length from June 10 through July 14, and chum salmon by drift gillnets after August 2;

(B) In Subdistrict 4–A downstream from the mouth of Stink Creek, you may take king salmon by drift gillnets less than 150 feet in length from June 10 through July 14.

(xvii) Unless otherwise specified in this section, you may take fish other than salmon and halibut by set gillnet, drift gillnet, beach seine, fish wheel, long line, fyke net, dip net, jigging gear, spear, lead, or rod and reel, subject to the following restrictions, which also apply to subsistence salmon fishing:

(A) During the open weekly fishing periods of the commercial salmon fishing season, if you are a commercial fisherman, you may not operate more than one type of gear at a time, for commercial, personal use, and subsistence purposes;

(B) You may not use an aggregate length of set gillnet in excess of 150 fathoms and each drift gillnet may not exceed 50 fathoms in length;

(C) In Districts 4, 5, and 6, you may not set subsistence fishing gear within 200 feet of other operating commercial, personal use, or subsistence fishing gear except that, at the site approximately 1 mile upstream from Ruby on the south bank of the Yukon River between ADF&G regulatory markers containing the area known locally as the ''Slide,'' you may set subsistence fishing gear within 200 feet of other operating commercial or subsistence fishing gear and in District 4, from Old Paradise Village upstream to a point 4 miles upstream from Anvik, there is no minimum distance requirement between fish wheels;

(D) During the commercial salmon fishing season, within the Yukon River and the Tanana River below the

confluence of the Wood River, you may use drift gillnets and fish wheels only during open subsistence salmon fishing periods.

(xviii) In District 4, from September 21 through May 15, you may use jigging gear from shore ice.

(xix) You must possess a subsistence fishing permit for the following locations:

(A) For the Yukon River drainage from the mouth of Hess Creek to the mouth of the Dall River;

(B) For the Yukon River drainage from the upstream mouth of 22 Mile Slough to the U.S.-Canada border;

(C) For whitefish and suckers in Birch Creek upstream from the Steese Highway bridge at Mile 140;

(D) Only for salmon in the Tanana River drainage above the mouth of the Wood River.

(xx) Only one subsistence fishing permit will be issued to each household per year.

(xxi) In Districts 1, 2, and 3, you may not possess king salmon taken for subsistence purposes unless the dorsal fin has been removed immediately after landing.

(xxii) In the Yukon River drainage, chinook (king) salmon are to be used primarily for human consumption and not specifically targeted for dog food, except that whole fish unfit for human consumption (due to disease, deterioration, deformities), scraps, and small fish (jack kings 16 inches or less) may be fed to dogs.

(4) *Kuskokwim Area.* The Kuskokwim Area consists of all waters of Alaska between the latitude of the westernmost point of Naskonat Peninsula and the latitude of the southernmost tip of Cape Newenham, including the waters of Alaska surrounding Nunivak and St. Matthew Islands and those waters draining into the Bering Sea.

(i) Unless otherwise restricted in this section, you may take fish in the Kuskokwim Area at any time without a subsistence fishing permit.

(ii) In District 1 and in those waters of the Kuskokwim River between Districts 1 and 2, excluding the Kuskokuak Slough, you may not take salmon for 16 hours before, during, and for 6 hours after, each open commercial salmon fishing period for District 1.

(iii) In District 1, Kuskokuak Slough only from June 1 through July 31, you may not take salmon for 16 hours before and during each open commercial salmon fishing period in the district.

(iv) In Districts 4 and 5, from June 1 through September 8, you may not take salmon for 16 hours before, during, and 6 hours after each open commercial salmon fishing period in each district.

(v) In District 2, and anywhere in tributaries that flow into the Kuskokwim River within that district, from June 1 through September 8 you may not take salmon for 16 hours before, during, and 6 hours after each open commercial salmon fishing period in the district.

(vi) You may not take subsistence fish by nets in the Goodnews River east of a line between ADF&G regulatory markers placed near the mouth of the Ufigag River and an ADF&G regulatory marker placed near the mouth of the Tunulik River 16 hours before, during, and 6 hours after each open commercial salmon fishing period.

(vii) You may not take subsistence fish by nets in the Kanektok River upstream of ADF&G regulatory markers placed near the mouth 16 hours before, during, and 6 hours after each open commercial salmon fishing period.

(viii) You may not take subsistence fish by nets in the Arolik River upstream of ADF&G regulatory markers placed near the mouth 16 hours before, during, and 6 hours after each open commercial salmon fishing period.

(ix) You may take salmon only by gillnet, beach seine, fish wheel, or rod and reel subject to the restrictions set out in this section, except that you may also take salmon by spear in the Holitna, Kanektok, and Arolik River drainages, and in the drainage of Goodnews Bay.

(x) You may not use an aggregate length of set gillnets or drift gillnets in excess of 50 fathoms for taking salmon.

(xi) You may take fish other than salmon by set gillnet, drift gillnet, beach seine, fish wheel, pot, long line, fyke net, dip net, jigging gear, spear, lead, or rod and reel.

(xii) You must attach to the bank each subsistence gillnet operated in tributaries of the Kuskokwim River and fish it substantially perpendicular to the bank and in a substantially straight line.

(xiii) Within a tributary to the Kuskokwim River in that portion of the Kuskokwim River drainage from the north end of Eek Island upstream to the mouth of the Kolmakoff River, you may not set or operate any part of a set gillnet within 150 feet of any part of another set gillnet.

(xiv) The maximum depth of gillnets is as follows:

(A) Gillnets with 6-inch or smaller mesh may not be more than 45 meshes in depth;

(B) Gillnets with greater than 6-inch mesh may not be more than 35 meshes in depth.

(xv) You may take halibut only by a single hand-held line with no more than two hooks attached to it.

(xvi) You may not use subsistence set and drift gillnets exceeding 15 fathoms in length in Whitefish Lake in the Ophir Creek drainage. You may not operate more than one subsistence set or drift gillnet at a time in Whitefish Lake in the Ophir Creek drainage. You must check the net at least once every 24 hours.

(xvii) Rainbow trout may be taken by only residents of Goodnews Bay, Platinum, Quinhagak, Eek, Kwethluk, Akiachak, and Akiak. The following restrictions apply:

(A) You may take rainbow trout only by the use of gillnets, dip nets, fyke nets, handline, spear, rod and reel, or jigging through the ice;

(B) You may not use gillnets, dip nets, or fyke nets for targeting rainbow trout from March 15—June 15;

(C) If you take rainbow trout incidentally in other subsistence net fisheries and through the ice, you may retain them for subsistence purposes;

(D) There are no harvest limits with handline, spear, rod and reel, or jigging.

(5) *Bristol Bay Area.* The Bristol Bay Area includes all waters of Bristol Bay including drainages enclosed by a line from Cape Newenham to Cape Menshikof.

(i) Unless restricted in this section, or unless under the terms of a subsistence fishing permit, you may take fish at any time in the Bristol Bay area.

(ii) In all commercial salmon districts, from May 1 through May 31 and October 1 through October 31, you may subsistence fish for salmon only from 9:00 a.m. Monday until 9:00 a.m. Friday. From June 1 through September 30, within the waters of a commercial salmon district, you may take salmon only during open commercial salmon fishing periods.

(iii) In the Egegik River from 9:00 a.m. June 23 through 9:00 a.m. July 17, you may take salmon only from 9:00 a.m. Tuesday to 9:00 a.m. Wednesday and 9:00 a.m. Saturday to 9:00 a.m. Sunday.

(iv) You may not take fish from waters within 300 feet of a stream mouth used by salmon.

(v) You may not subsistence fish with nets in the Tazimina River and within one-fourth mile of the terminus of those waters during the period from September 1 through June 14.

(vi) Within any district, you may take salmon, herring, and capelin only by drift and set gillnets.

(vii) Outside the boundaries of any district, you may take salmon only by set gillnet, except that you may also take salmon as follows:

(A) By spear in the Togiak River excluding its tributaries;

(B) From August 30 through September 30, by spear, dip net, and

gillnet along a 100 yard length of the west shore of Naknek Lake near the outlet to the Naknek River as marked by ADF&G regulatory markers;

(C) From August 15 through September 15, by spear, dip net, and gillnet at Johnny's Lake on the northwestern side of Naknek Lake;

(D) From October 1 through November 15, by spear, dip net, and gillnet at the mouth of Brooks River at Naknek Lake;

(E) At locations and times specified in paragraphs (i)(5)(vii) (B) through (D) of this section, gillnets may not exceed 5 fathoms in length and may not be anchored or tied to a stake or peg, and you must be present at the net while fishing the net.

(viii) The maximum lengths for set gillnets used to take salmon are as follows:

(A) You may not use set gillnets exceeding 10 fathoms in length in the Egegik, River;

(B) In the remaining waters of the area, you may not use set gillnets exceeding 25 fathoms in length.

(ix) You may not operate any part of a set gillnet within 300 feet of any part of another set gillnet.

(x) You must stake and buoy each set gillnet. Instead of having the identifying information on a keg or buoy attached to the gillnet, you may plainly and legibly inscribe your first initial, last name, and subsistence permit number on a sign at or near the set gillnet.

(xi) You may not operate or assist in operating subsistence salmon net gear while simultaneously operating or assisting in operating commercial salmon net gear.

(xii) During closed commercial herring fishing periods, you may not use gillnets exceeding 25 fathoms in length for the subsistence taking of herring or capelin.

(xiii) You may take fish other than salmon, herring, capelin, and halibut by gear listed in this part unless restricted under the terms of a subsistence fishing permit.

(xiv) You may take salmon and char only under authority of a subsistence fishing permit.

(xv) Only one subsistence fishing permit may be issued to each household per year.

(xvi) In the Togiak River section and the Togiak River drainage, you may not possess coho salmon taken under the authority of a subsistence fishing permit unless both lobes of the caudal fin (tail) or the dorsal fin have been removed.

(6) *Aleutian Islands Area.* The Aleutian Islands Area includes all waters of Alaska west of the longitude of the tip of Cape Sarichef, east of 172° East longitude, and south of 54° 36' North latitude.

(i) You may take fish, other than salmon, rainbow trout, and steelhead trout, at any time unless restricted under the terms of a subsistence fishing permit. If you take rainbow trout and steelhead trout incidentally in other subsistence net fisheries, you may retain them for subsistence purposes.

(ii) In the Unalaska District, you may take salmon for subsistence purposes from 6:00 a.m. until 9:00 p.m. from January 1 through December 31, except:

(A) That from June 1 through September 15, you may not use a salmon seine vessel to take salmon for subsistence 24 hours before, during, or 24 hours after an open commercial salmon fishing period within a 50–mile radius of the area open to commercial salmon fishing;

(B) That from June 1 through September 15, you may use a purse seine vessel to take salmon only with a gillnet and you may not have any other type of salmon gear on board the vessel while subsistence fishing; or

(C) As may be specified on a subsistence fishing permit.

(iii) In the Adak, Akutan, Atka-Amlia, and Umnak Districts, you may take salmon at any time.

(iv) You may not subsistence fish for salmon in the following waters:

(A) The waters of Unalaska Lake, its tributaries and outlet stream;

(B) The waters between Unalaska and Amaknak Islands, including Margaret's Bay, west of a line from the ''Bishop's House'' at 53° 52.64′ N. lat., 166° 32.30′ W. long. to a point on Amaknak Island at 53° 52.82′ N. lat., 166° 32.13′ W. long., and north of line from a point south of Agnes Beach at 53° 52.28′ N. lat., 166° 32.68′ W. long. to a point at 53° 52.35′ N. lat., 166° 32.95′ W. long. on Amaknak Island;

(C) Within Unalaska Bay south of a line from the northern tip of Cape Cheerful to the northern tip of Kalekta Point, waters within 250 yards of any anadromous stream, except the outlet stream of Unalaska Lake, which is closed under paragraph (i)(6)(iv)(A) of this section;

(D) The waters of Summers and Morris Lakes and their tributaries and outlet streams;

(E) All streams supporting anadromous fish runs that flow into Unalaska Bay south of a line from the northern tip of Cape Cheerful to the northern tip of Kalekta Point;

(F) Waters of McLees Lake and its tributaries and outlet stream;

(G) Waters in Reese Bay from July 1 through July 9, within 500 yards of the outlet stream terminus to McLees Lake;

(H) All freshwater on Adak Island and Kagalaska Island in the Adak District.

(v) You may take salmon by seine and gillnet, or with gear specified on a subsistence fishing permit.

(vi) In the Unalaska District, if you fish with a net, you must be physically present at the net at all times when the net is being used.

(vii) You may take fish other than salmon by gear listed in this part unless restricted under the terms of a subsistence fishing permit.

(viii) You may take salmon, trout, and char only under the terms of a subsistence fishing permit, except that you do not need a permit in the Akutan, Umnak, and Atka-Amlia Islands Districts.

(ix) You may take no more than 250 salmon for subsistence purposes unless otherwise specified on the subsistence fishing permit, except that in the Unalaska and Adak Districts, you may take no more than 25 salmon plus an additional 25 salmon for each member of your household listed on the permit. You may obtain an additional permit.

(x) You must keep a record on the reverse side of the permit of subsistence-caught fish. You must complete the record immediately upon taking subsistence-caught fish and must return it no later than October 31.

(xi) The daily bag limit for halibut is two fish, and the possession limit is two daily bag limits. You may not possess sport-taken and subsistence-taken halibut on the same day.

(7) *Alaska Peninsula Area.* The Alaska Peninsula Area includes all Pacific Ocean waters of Alaska between a line extending southeast (135°) from the tip of Kupreanof Point and the longitude of the tip of Cape Sarichef, and all Bering Sea waters of Alaska east of the longitude of the tip of Cape Sarichef and south of the latitude of the tip of Cape Menshikof.

(i) You may take fish, other than salmon, rainbow trout, and steelhead trout, at any time unless restricted under the terms of a subsistence fishing permit. If you take rainbow trout and steelhead trout incidentally in other subsistence net fisheries or through the ice, you may retain them for subsistence purposes.

(ii) You may take salmon, trout, and char only under the authority of a subsistence fishing permit.

(iii) You must keep a record on the reverse side of the permit of subsistence-caught fish. You must complete the record immediately upon taking subsistence-caught fish and must return it no later than October 31.

(iv) You may take salmon at any time except within 24 hours before and

within 12 hours following each open weekly commercial salmon fishing period within a 50-mile radius of the area open to commercial salmon fishing, or as may be specified on a subsistence fishing permit.

(v) You may not subsistence fish for salmon in the following waters:

(A) Russell Creek and Nurse Lagoon and within 500 yards outside the mouth of Nurse Lagoon;

(B) Trout Creek and within 500 yards outside its mouth.

(vi) You may take salmon by seine, gillnet, rod and reel, or with gear specified on a subsistence fishing permit.

(vii) You may take fish other than salmon by gear listed in this part unless restricted under the terms of a subsistence fishing permit.

(viii) You may not use a set gillnet exceeding 100 fathoms in length.

(ix) You may take halibut for subsistence purposes only by a single handheld line with no more than two hooks attached.

(x) You may take no more than 250 salmon for subsistence purposes unless otherwise specified on your subsistence fishing permit.

(xi) The daily bag limit for halibut is two fish and the possession limit is two daily bag limits. You may not possess sport-taken and subsistence-taken halibut on the same day.

(8) *Chignik Area.* The Chignik Area includes all waters of Alaska on the south side of the Alaska Peninsula enclosed by 156° 20.22′ West longitude (the longitude of the southern entrance to Imuya Bay near Kilokak Rocks) and a line extending southeast (135°) from the tip of Kupreanof Point.

(i) You may take fish, other than rainbow trout and steelhead trout, at any time, except as may be specified by a subsistence fishing permit. If you take rainbow trout and steelhead trout incidentally in other subsistence net fisheries, you may retain them for subsistence purposes.

(ii) You may not take salmon in the Chignik River, upstream from the ADF&G weir site or counting tower, in Black Lake, or any tributary to Black and Chignik Lakes.

(iii) You may take salmon, trout and, char only under the authority of a subsistence fishing permit.

(iv) You must keep a record on your permit of subsistence-caught fish. You must complete the record immediately upon taking subsistence-caught fish and must return it no later than October 31.

(v) If you hold a commercial fishing license, you may not subsistence fish for salmon from 48 hours before the first commercial salmon fishing opening in the Chignik Area through September 30.

(vi) You may take salmon by seines, gillnets, rod and reel, or with gear specified on a subsistence fishing permit, except that in Chignik Lake you may not use purse seines.

(vii) You may take fish other than salmon by gear listed in this part unless restricted under the terms of a subsistence fishing permit.

(viii) You may take halibut for subsistence purposes only by a single handheld line with no more than two hooks attached.

(ix) You may take no more than 250 salmon for subsistence purposes unless otherwise specified on the subsistence fishing permit.

(x) The daily bag limit for halibut is two fish, and the possession limit is two daily bag limits. You may not possess sport-taken and subsistence-taken halibut on the same day.

(9) *Kodiak Area.* The Kodiak Area includes all waters of Alaska south of a line extending east from Cape Douglas (58° 51.10′ N. lat.), west of 150° W. long., north of 55° 30.00′ N. lat.; and east of the longitude of the southern entrance of Imuya Bay near Kilokak Rocks (156° 20.22′ W. long.).

(i) You may take fish, other than salmon, rainbow trout, and steelhead trout, at any time unless restricted by the terms of a subsistence fishing permit. If you take rainbow trout and steelhead trout incidentally in other subsistence net fisheries, you may retain them for subsistence purposes.

(ii) You may take salmon for subsistence purposes 24 hours a day from January 1 through December 31, with the following exceptions:

(A) From June 1 through September 15, you may not use salmon seine vessels to take subsistence salmon for 24 hours before, during, and for 24 hours after any open commercial salmon fishing period. The use of skiffs from any type of vessel is allowed;

(B) From June 1 through September 15, you may use purse seine vessels to take salmon only with gillnets, and you may have no other type of salmon gear on board the vessel.

(iii) You may not subsistence fish for salmon in the following locations:

(A) Womens Bay closed waters—all waters inside a line from the tip of the Nyman Peninsula (57°43.23′ N. lat., 152°31.51′ W long.), to the northeastern tip of Mary's Island (57°42.40′ N. lat., 152°32.00′ W. long.), to the southeastern shore of Womens Bay at 57°41.95′ N. lat., 152°31.50′ W. long.;

(B) Buskin River closed waters—all waters inside of a line running from a marker on the bluff north of the mouth of the Buskin River at approximately 57°45.80′ N. lat, 152°28.38′ W. long., to a point offshore at 57°45.35′ N. lat, 152°28.15′ W. long., to a marker located onshore south of the river mouth at approximately 57°45.15′ N. lat., 152°28.65′ W. long.;

(C) All waters closed to commercial salmon fishing within 100 yards of the terminus of Selief Bay Creek;

(D) In Afognak Bay north and west of a line from the tip of Last Point to the tip of River Mouth Point;

(E) From August 15 through September 30, all waters 500 yards seaward of the terminus of Little Kitoi Creek;

(F) All freshwater systems of Afognak Island.

(iv) You must have a subsistence fishing permit for taking salmon, trout, and char for subsistence purposes. You must have a subsistence fishing permit for taking herring and bottomfish for subsistence purposes during the commercial herring sac roe season from April 15 through June 30.

(v) With a subsistence salmon fishing permit you may take 25 salmon plus an additional 25 salmon for each member of your household whose names are listed on the permit. You may obtain an additional permit if you can show that more fish are needed.

(vi) You must record on your subsistence permit the number of subsistence fish taken. You must complete the record immediately upon landing subsistence-caught fish, and must return it by February 1 of the year following the year the permit was issued.

(vii) You may take fish other than salmon and halibut by gear listed in this part unless restricted under the terms of a subsistence fishing permit.

(viii) You may take salmon only by gillnet, rod and reel, or seine.

(ix) You must be physically present at the net when the net is being fished.

(x) You may take halibut only by a single hand-held line with not more than two hooks attached to it.

(xi) The daily bag limit for halibut is two fish, and the possession limit is two daily bag limits. You may not possess sport-taken and subsistence-taken halibut on the same day.

(10) *Cook Inlet Area.* The Cook Inlet Area includes all waters of Alaska enclosed by a line extending east from Cape Douglas (58° 51′ 06″ N. lat.) and a line extending south from Cape Fairfield (148° 50′ 15″ W. long.).

(i) Unless restricted in this section, or unless restricted under the terms of a subsistence fishing permit, you may take fish, other than rainbow trout and steelhead trout, at any time in the Cook

Inlet Area. If you take rainbow trout and steelhead trout incidentally in other subsistence net fisheries or through the ice, you may retain them for subsistence purposes.

(ii) You may not take salmon, Dolly Varden, trout, grayling, char, and burbot for subsistence purposes.

(iii) You may take fish by gear listed in this part unless restricted in this section or under the terms of a subsistence fishing permit (as may be modified by this section).

(iv) You may only take smelt with dip nets or gillnets in fresh water from April 1 through June 15. You may not use a gillnet exceeding 20 feet in length and 2 inches in mesh size. You must attend the net at all times when it is being used. There are no harvest or possession limits for smelt.

(v) Gillnets may not be used in freshwater, except for the taking of whitefish in the Tyone River drainage or for the taking of smelt.

(11) *Prince William Sound Area*. The Prince William Sound Area includes all waters of Alaska between the longitude of Cape Fairfield and the longitude of Cape Suckling.

(i) Unless restricted in this section or unless restricted under the terms of a subsistence fishing permit, you may take fish, other than rainbow trout and steelhead trout, at any time in the Prince William Sound Area.

(ii) You may take salmon in the Upper Copper River District only as follows:

(A) In the Glennallen Subdistrict, from May 15 through September 30;

(B) You may not take salmon in the Chitina Subdistrict.

(iii) You may take salmon in the vicinity of the former Native village of Batzulnetas only under the authority of a Batzulnetas subsistence salmon fishing permit available from the National Park Service under the following conditions:

(A) You may take salmon only in those waters of the Copper River between National Park Service regulatory markers located near the mouth of Tanada Creek and approximately one-half mile downstream from that mouth and in Tanada Creek between National Park Service regulatory markers identifying the open waters of the creek;

(B) You may use only fish wheels, dip nets, and rod and reel on the Copper River and only dip nets, spears, and rod and reel in Tanada Creek;

(C) You may take salmon only from May 15 through September 30 or until the season is closed by special action;

(D) You may retain chinook salmon taken in a fishwheel in the Copper River. You may not take chinook salmon in Tanada Creek;

(E) You must return the permit to the National Park Service no later than October 15.

(iv) You may take salmon for subsistence purposes with no bag or possession limits in those waters of the Southwestern District and along the northwestern shore of Green Island from the westernmost tip of the island to the northernmost tip, only as follows:

(A) You may use seines up to 50 fathoms in length and 100 meshes deep with a maximum mesh size of 4 inches, or gillnets up to 150 fathoms in length, except that you may take pink salmon only in fresh water using dip nets;

(B) You may take salmon only from May 15 until 2 days before the commercial opening of the Southwestern District, 7 days per week; during the commercial salmon fishing season, only during open commercial salmon fishing periods; and from 2 days following the closure of the commercial salmon season until September 30, 7 days per week;

(C) You may not fish within the closed waters areas for commercial salmon fisheries.

(v) You may take salmon for subsistence purposes with no bag or possession limits in those waters north of a line from Porcupine Point to Granite Point, and south of a line from Point Lowe to Tongue Point, only as follows:

(A) You may use seines up to 50 fathoms in length and 100 meshes deep with a maximum mesh size of 4 inches, or gillnets up to 150 fathoms in length with a maximum mesh size of 6¼ inches, except that you may only take pink salmon in fresh water using dip nets;

(B) You may take salmon only from May 15 until 2 days before the commercial opening of the Eastern District, 7 days per week during the commercial salmon fishing season, only during open commercial salmon fishing periods; and from 2 days following the closure of the commercial salmon season until October 31, 7 days per week;

(C) You may not fish within the closed water areas for commercial salmon fisheries.

(vi) If you take rainbow trout and steelhead trout incidentally in other subsistence net fisheries, you may retain them for subsistence purposes.

(vii) You may only take salmon in the waters of the Upper Copper River District, or in the vicinity of the Native Village of Batzulnetas.

(viii) You may take fish by gear listed in this part unless restricted in this section or under the terms of a subsistence fishing permit.

(ix) In the Glennallen Subdistrict, you may take salmon only by fish wheels, rod and reel, or dip nets.

(x) You may not rent, lease, or otherwise use your fish wheel used for subsistence fishing for personal gain. You must register your fish wheel with ADF&G. Your registration number and name and address must be permanently affixed and plainly visible on the fish wheel when the fish wheel is in the water; only the current year's registration number may be affixed to the fish wheel; you must remove any other registration number from the fish wheel. You must remove the fish wheel from the water at the end of the permit period. You may operate only one fish wheel at any one time. You may not set or operate a fish wheel within 75 feet of another fish wheel. No fish wheel may have more than two baskets. A wood or metal plate at least 12 inches high by 12 inches wide, bearing your name and address in letters and numerals at least 1 inch high, must be attached to each fish wheel so that the name and address are plainly visible.

(xi) You must personally operate the fish wheel or dip net. You may not loan or transfer a subsistence fish wheel or dip net permit except as permitted.

(xii) Except as provided in this section, you may take fish other than salmon and freshwater fish species for subsistence purposes without a subsistence fishing permit.

(xiii) You may take salmon and freshwater fish species only under authority of a subsistence fishing permit.

(xiv) Only one subsistence fishing permit will be issued to each household per year.

(xv) The following apply to Upper Copper River District subsistence salmon fishing permits:

(A) Only one type of gear may be specified on a permit;

(B) You must return your permit no later than October 31, or you may be denied a permit for the following year;

(C) A fish wheel may be operated only by one permit holder at one time; that permit holder must have the fish wheel marked as required by this section and during fishing operations;

(D) Only the permit holder and the authorized member of the household listed on the subsistence permit may take salmon;

(E) A permit holder must record on ADF&G forms all salmon taken immediately after landing the salmon.

(xvi) The total annual possession limit for an Upper Copper River District

subsistence salmon fishing permit is as follows:

(A) For a household with 1 person, 30 salmon, of which no more than 5 may be chinook salmon if taken by dip net;

(B) For a household with 2 persons, 60 salmon, of which no more than 5 may be chinook salmon if taken by dip net; plus 10 salmon for each additional person in a household over 2 persons, except that the household's limit for chinook salmon taken by dip net does not increase;

(C) Upon request, permits for additional salmon will be issued for no more than a total of 200 salmon for a permit issued to a household with 1 person, of which no more than 5 may be chinook salmon if taken by dip net; or no more than a total of 500 salmon for a permit issued to a household with 2 or more persons, of which no more than 5 may be chinook salmon if taken by dip net.

(xvii) A subsistence fishing permit may be issued to a village council, or other similarly qualified organization whose members operate fish wheels for subsistence purposes in the Upper Copper River District, to operate fish wheels on behalf of members of its village or organization. A permit may only be issued following approval by ADF&G of a harvest assessment plan to be administered by the permitted council or organization. The harvest assessment plan must include: provisions for recording daily catches for each fish wheel; sample data collection forms; location and number of fish wheels; the full legal name of the individual responsible for the lawful operation of each fish wheel; and other information determined to be necessary for effective resource management. The following additional provisions apply to subsistence fishing permits issued under this paragraph (i)(11)(xvii):

(A) The permit will list all households and household members for whom the fish wheel is being operated;

(B) The allowable harvest may not exceed the combined seasonal limits for the households listed on the permit; the permittee will notify the department when households are added to the list, and the seasonal limit may be adjusted accordingly;

(C) Members of households listed on a permit issued to a village council or other similarly qualified organization, are not eligible for a separate household subsistence fishing permit for the Upper Copper River District.

(xviii) You may not possess salmon taken under the authority of an Upper Copper River District subsistence fishing permit unless both lobes of the caudal (tail) fin have been immediately removed from the salmon.

(xix) In locations open to commercial salmon fishing other than described for the Upper Copper River District, the annual subsistence salmon limit is as follows:

(A) 15 salmon for a household of 1 person;

(B) 30 salmon for a household of 2 persons and 10 salmon for each additional person in a household;

(C) No more than five king salmon may be taken per permit.

(12) *Yakutat Area.* The Yakutat Area includes all waters of Alaska between the longitude of Cape Suckling and the longitude of Cape Fairweather.

(i) Unless restricted in this section or unless restricted under the terms of a subsistence fishing permit, you may take fish at any time in the Yakutat Area.

(ii) You may not take salmon during the period commencing 48 hours before an opening of commercial salmon net fishing season until 48 hours after the closure. This applies to each river or bay fishery individually.

(iii) When the length of the weekly commercial salmon net fishing period exceeds two days in any Yakutat Area salmon net fishery, the subsistence fishing period is from 6:00 a.m. to 6:00 p.m. on Saturday in that location.

(iv) You may take salmon, trout (other than steelhead,) and char only under authority of a subsistence fishing permit. You may only take steelhead trout in the Situk and Ahrnklin Rivers and only under authority of a subsistence fishing permit.

(v) If you take salmon, trout, or char incidentally by gear operated under the terms of a subsistence permit for salmon, you may retain them for subsistence purposes. You must report any salmon, trout, or char taken in this manner on your permit calendar.

(vi) You may take fish by gear listed in this part unless restricted in this section or under the terms of a subsistence fishing permit.

(vii) In the Situk River, each subsistence salmon fishing permit holder shall attend his or her gill net at all times when it is being used to take salmon.

(viii) You may block up to two-thirds of a stream with a gillnet or seine used for subsistence fishing.

(ix) You must remove the dorsal fin from subsistence-caught salmon when taken.

(x) You may not possess subsistence-taken and sport-taken salmon on the same day.

(xi) With a subsistence fishing permit, you may harvest at any time up to 10 Dolly Varden with no minimum size.

(13) *Southeastern Alaska Area.* The Southeastern Alaska Area includes all waters between a line projecting southwest from the westernmost tip of Cape Fairweather and Dixon Entrance.

(i) Unless restricted in this section or under the terms of a subsistence fishing permit, you may take fish, other than rainbow trout and steelhead trout, in the Southeastern Alaska Area at any time.

(ii) From July 7 through July 31, you may take sockeye salmon in the waters of the Klawock River and Klawock Lake only from 8:00 a.m. Monday until 5:00 p.m. Friday.

(iii) You must possess a subsistence fishing permit to take salmon, trout, or char.

(iv) You may take steelhead trout on Prince of Wales Island only under the terms of a Federal subsistence fishing permit. The annual harvest limit is two fish, 36 inches or larger. You may use only a dip net or rod and reel with artificial lure or fly. You may not use bait.

(v) You may take coho salmon in Subdistricts 3(A), (B), and (C) only under the terms of a Federal subsistence fishing permit. There is no closed season. The daily harvest limit is 20 fish per household. Only spears, dip net, and rod and reel may be used. Bait may be used only from September 15 through November 15.

(vi) If you take salmon, trout, or char incidentally with gear operated under terms of a subsistence permit for other salmon, they may be kept for subsistence purposes. You must report any salmon, trout, or char taken in this manner on your permit calendar.

(vii) No permits for the use of nets will be issued for the salmon streams flowing across or adjacent to the road systems within the city limits of Petersburg, Wrangell, and Sitka.

(viii) You shall immediately remove the pelvic fins of all salmon when taken.

(ix) You may not possess subsistence-taken and sport-taken salmon on the same day.

(x) For the Salmon Bay Lake system, the daily harvest and season limit per household is 30 sockeye salmon.

(xi) For Virginia Lake (Mill Creek), the daily harvest limit per household is 20 sockeye salmon, and the season limit per household is 40 sockeye salmon.

(xii) For Thoms Creek, the daily harvest limit per household is 20 sockeye salmon, and the season limit per household is 40 sockeye salmon.

(xiii) The Sarkar River system above the bridge is closed to the use of all nets by both Federally-qualified and non-Federally qualified users.

(xiv) Only Federally-qualified subsistence users may harvest sockeye

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salmon in streams draining into Falls Lake, Gut Bay, or Pillar Bay. In the Falls Lake and Gut Bay drainages, the possession limit is10 sockeye salmon per household. In the Pillar Bay drainage, the individual possession limit is15 sockeye salmon with a household possession limit of 25 sockeye salmon.

(xv) In Baranof Lake, Florence Lake, Hasselborg Lake and River, Mirror Lake, Virginia Lake, and Wilson Lake, in addition to the requirement for a subsistence fishing permit, the following restrictions for the harvest of Dolly Varden, cutthroat, and rainbow trout apply:

(A) You may harvest at any time up to 10 Dolly Varden of any size;

(B) You may harvest at any time six cutthroat or rainbow trout in combination. You may only retain fish between 11'' and 22''. You may only use a rod and reel without bait.

(xvi) In all waters, other than those identified in paragraph (i)(13)(xv) of this section, in addition to the requirement for a subsistence fishing permit, you may harvest at any time: Dolly Varden of any size with a daily possession limit of 10 fish; cutthroat and rainbow trout with a slot size limit of 11'' to 22'' with a daily possession limit of 2 fish in combination. You may only use a rod and reel without bait.

§ _____.28 Subsistence taking of shellfish.

(a) Regulations in this section apply to subsistence taking of Dungeness crab, king crab, Tanner crab, shrimp, clams, abalone, and other shellfish or their parts.

(b) *Definitions.* The following definitions shall apply to all regulations contained in this section:

Abalone iron means a flat device which is used for taking abalone and which is more than 1 inch (24 mm) in width and less than 24 inches (610 mm) in length, with all prying edges rounded and smooth.

ADF&G means the Alaska Department of Fish and Game.

Crab means the following species: red king crab (*Paralithodes camshatica*); blue king crab (*Paralithodes platypus*); brown king crab (*Lithodes aequispina*); *Lithodes couesi;* all species of tanner or snow crab (*Chionoecetes* spp.); and Dungeness crab (*Cancer magister*).

Diving gear means any type of hard hat or skin diving equipment, including SCUBA equipment; a tethered, umbilical, surface-supplied unit; or snorkel.

Gear means any type of fishing apparatus.

Grappling hook means a hooked device with flukes or claws, which is attached to a line and operated by hand.

Handline means a hand-held and operated line, with one or more hooks attached.

Harvest limit means the maximum legal take per person or designated group, per specified time period, in the area in which the person is fishing, even if part or all of the shellfish are preserved.

Household means a person or persons having the same residence.

Hydraulic clam digger means a device using water or a combination of air and water used to harvest clams.

Mechanical clam digger means a mechanical device used or capable of being used for the taking of clams.

Mile means a nautical mile when used in reference to marine waters or a statute mile when used in reference to fresh water.

Possession limit means the maximum number of shellfish a person or designated group may have in possession if the shellfish have not been canned, salted, frozen, smoked, dried, or otherwise preserved so as to be fit for human consumption after a 15-day period.

Pot means a portable structure designed and constructed to capture and retain live fish and shellfish in the water.

Ring net means a bag-shaped net suspended between no more than two frames; the bottom frame may not be larger in perimeter than the top frame; the gear must be nonrigid and collapsible so that free movement of fish or shellfish across the top of the net is not prohibited when the net is employed.

Scallop dredge means a dredge-like device designed specifically for and capable of taking scallops by being towed along the ocean floor.

Sea urchin rake means a hand-held implement, no longer than 4 feet, equipped with projecting prongs used to gather sea urchins.

Shovel means a hand-operated implement for digging clams.

Subsistence fishing permit means a permit issued by ADF&G, unless specifically identified otherwise.

To operate fishing gear means any of the following: to deploy gear in the water; to remove gear from the water; to remove fish or shellfish from the gear during an open season or period; or to possess a gillnet containing fish during an open fishing period, except that a gillnet which is completely clear of the water is not considered to be operating for the purposes of minimum distance requirement.

Trawl means a bag-shaped net towed through the water to capture fish or shellfish, and includes beam, otter, or pelagic trawl.

(c) You may take shellfish for subsistence uses at any time in any area of the public lands by any method unless restricted by this section.

(d) Methods, means, and general restrictions. (1) The harvest limit specified in this section for a subsistence season for a species and the State harvest limit set for a State season for the same species are not cumulative. This means that if you have taken the harvest limit for a particular species under a subsistence season specified in this section, you may not, after that, take any additional shellfish of that species under any other harvest limit specified for a State season.

(2) Unless otherwise provided in this section or under terms of a required subsistence fishing permit (as may be modified by this section), you may use the following legal types of gear to take shellfish:

(i) Abalone iron;
(ii) Diving gear;
(iii) A grappling hook;
(iv) A handline;
(v) A hydraulic clam digger;
(vi) A mechanical clam digger;
(vii) A pot;
(viii) A ring net;
(ix) A scallop dredge;
(x) A sea urchin rake;
(xi) A shovel; and
(xii) A trawl.

(3) You are prohibited from buying or selling subsistence-taken shellfish, their parts, or their eggs, unless otherwise specified.

(4) You may not use explosives and chemicals, except that you may use chemical baits or lures to attract shellfish.

(5) Marking requirements for subsistence shellfish gear are as follows:

(i) You shall plainly and legibly inscribe your first initial, last name, and address on a keg or buoy attached to unattended subsistence fishing gear, except when fishing through the ice, you may substitute for the keg or buoy, a stake inscribed with your first initial, last name, and address inserted in the ice near the hole; subsistence fishing gear may not display a permanent ADF&G vessel license number;

(ii) kegs or buoys attached to subsistence crab pots also must be inscribed with the name or United States Coast Guard number of the vessel used to operate the pots.

(6) Pots used for subsistence fishing must comply with the escape mechanism requirements found in § _____.27.

(7) You may not mutilate or otherwise disfigure a crab in any manner which would prevent determination of the minimum size restrictions until the crab has been processed or prepared for consumption.

(e) Taking shellfish by designated harvest permit. (1) Any species of shellfish that may be taken by subsistence fishing under this part may be taken under a designated harvest permit.

(2) If you are a Federally-qualified subsistence user (beneficiary), you may designate another Federally-qualified subsistence user to take shellfish on your behalf. The designated fisherman must obtain a designated harvest permit prior to attempting to harvest shellfish and must return a completed harvest report. The designated fisherman may harvest for any number of beneficiaries but may have no more than two harvest limits in his/her possession at any one time.

(3) The designated fisherman must have in possession a valid designated harvest permit when taking, attempting to take, or transporting shellfish taken under this section, on behalf of a beneficiary.

(4) You may not fish with more than one legal limit of gear as established by this section.

(5) You may not designate more than one person to take or attempt to take shellfish on your behalf at one time. You may not personally take or attempt to take shellfish at the same time that a designated fisherman is taking or attempting to take shellfish on your behalf.

(f) If a subsistence shellfishing permit is required by this section, the following conditions apply unless otherwise specified by the subsistence regulations in this section:

(1) You may not take shellfish for subsistence in excess of the limits set out in the permit unless a different limit is specified in this section;

(2) You must obtain a permit prior to subsistence fishing;

(3) You must have the permit in your possession and readily available for inspection while taking or transporting the species for which the permit is issued;

(4) The permit may designate the species and numbers of shellfish to be harvested, time and area of fishing, the type and amount of fishing gear and other conditions necessary for management or conservation purposes;

(5) If specified on the permit, you shall keep accurate daily records of the catch involved, showing the number of shellfish taken by species, location and date of the catch, and such other information as may be required for management or conservation purposes;

(6) You must complete and submit subsistence fishing reports at the time specified for each particular area and fishery;

(7) If the return of catch information necessary for management and conservation purposes is required by a subsistence fishing permit and you fail to comply with such reporting requirements, you are ineligible to receive a subsistence permit for that activity during the following calendar year, unless you demonstrate that failure to report was due to loss in the mail, accident, sickness, or other unavoidable circumstances.

(g) Subsistence take by commercial vessels. No fishing vessel which is commercially licensed and registered for shrimp pot, shrimp trawl, king crab, Tanner crab, or Dungeness crab fishing may be used for subsistence take during the period starting 14 days before an opening until 14 days after the closure of a respective open season in the area or areas for which the vessel is registered. However, if you are a commercial fisherman, you may retain shellfish for your own use from your lawfully taken commercial catch.

(h) You may not take or possess shellfish smaller than the minimum legal size limits.

(i) Unlawful possession of subsistence shellfish. You may not possess, transport, give, receive, or barter shellfish or their parts taken in violation of Federal or State regulations.

(j)(1) An owner, operator, or employee of a lodge, charter vessel, or other enterprise that furnishes food, lodging, or guide services may not furnish to a client or guest of that enterprise, shellfish that has been taken under this chapter, unless:

(i) The shellfish has been taken with gear deployed and retrieved by the client or guest who is a federally-qualified subsistence user;

(ii) The gear has been marked with the client's or guest's name and address; and

(iii) The shellfish is to be consumed by the client or guest or is consumed in the presence of the client or guest.

(2) The captain and crewmembers of a charter vessel may not deploy, set, or retrieve their own gear in a subsistence shellfish fishery when that vessel is being chartered.

(k) Subsistence shellfish areas and pertinent restrictions. (1) *Southeastern Alaska-Yakutat Area.* No marine waters are currently identified under Federal subsistence management jurisdiction.

(2) *Prince William Sound Area.* No marine waters are currently identified under Federal subsistence management jurisdiction.

(3) *Cook Inlet Area.* You may not take shellfish for subsistence purposes.

(4) *Kodiak Area.* (i) You may take crab for subsistence purposes only under the authority of a subsistence crab fishing permit issued by the ADF&G.

(ii) The operator of a commercially licensed and registered shrimp fishing vessel must obtain a subsistence fishing permit from the ADF&G before subsistence shrimp fishing during a closed commercial shrimp fishing season or within a closed commercial shrimp fishing district, section, or subsection. The permit shall specify the area and the date the vessel operator intends to fish. No more than 500 pounds (227 kg) of shrimp may be in possession aboard the vessel.

(iii) The daily harvest and possession limit is 12 male Dungeness crabs per person; only male Dungeness crabs with a shell width of 6½ inches or greater may be taken or possessed. Taking of Dungeness crab is prohibited in water 25 fathoms or more in depth during the 14 days immediately before the opening of a commercial king or Tanner crab fishing season in the location.

(iv) In the subsistence taking of king crab:

(A) The annual limit is six crabs per household; only male king crab may be taken or possessed;

(B) All crab pots used for subsistence fishing and left in saltwater unattended longer than a 2-week period shall have all bait and bait containers removed and all doors secured fully open;

(C) You may not use more than five crab pots, each being no more than 75 cubic feet in capacity to take king crab;

(D) You may take king crab only from June 1–January 31, except that the subsistence taking of king crab is prohibited in waters 25 fathoms or greater in depth during the period 14 days before and 14 days after open commercial fishing seasons for red king crab, blue king crab, or Tanner crab in the location;

(E) The waters of the Pacific Ocean enclosed by the boundaries of Womens Bay, Gibson Cove, and an area defined by a line ½ mile on either side of the mouth of the Karluk River, and extending seaward 3,000 feet, and all waters within 1,500 feet seaward of the shoreline of Afognak Island are closed to the harvest of king crab except by Federally-qualified subsistence users.

(v) In the subsistence taking of Tanner crab:

(A) You may not use more than five crab pots to take Tanner crab;

(B) You may not take Tanner crab in waters 25 fathoms or greater in depth

during the 14 days immediately before the opening of a commercial king or Tanner crab fishing season in the location;

(C) The daily harvest and possession limit is 12 male crab with a shell width 5½ inches or greater per person.

(5) *Alaska Peninsula-Aleutian Islands Area.* (i) The operator of a commercially licensed and registered shrimp fishing vessel must obtain a subsistence fishing permit from the ADF&G prior to subsistence shrimp fishing during a closed commercial shrimp fishing season or within a closed commercial shrimp fishing district, section, or subsection; the permit shall specify the area and the date the vessel operator intends to fish; no more than 500 pounds (227 kg) of shrimp may be in possession aboard the vessel.

(ii) The daily harvest and possession limit is 12 male Dungeness crabs per person; only crabs with a shell width of 5½ inches or greater may be taken or possessed.

(iii) In the subsistence taking of king crab:

(A) The daily harvest and possession limit is six male crabs per person; only crabs with a shell width of 6½ inches or greater may be taken or possessed;

(B) All crab pots used for subsistence fishing and left in saltwater unattended longer than a 2-week period shall have all bait and bait containers removed and all doors secured fully open;

(C) You may take crabs only from June 1–January 31.

(iv) The daily harvest and possession limit is 12 male Tanner crabs per person; only crabs with a shell width of 5½ inches or greater may be taken or possessed.

(6) *Bering Sea Area.* (i) In that portion of the area north of the latitude of Cape Newenham, shellfish may only be taken by shovel, jigging gear, pots, and ring net.

(ii) The operator of a commercially licensed and registered shrimp fishing vessel must obtain a subsistence fishing permit from the ADF&G prior to subsistence shrimp fishing during a closed commercial shrimp fishing season or within a closed commercial shrimp fishing district, section, or subsection; the permit shall specify the area and the date the vessel operator intends to fish; no more than 500 pounds (227 kg) of shrimp may be in possession aboard the vessel.

(iii) In waters south of 60° N. lat., the daily harvest and possession limit is 12 male Dungeness crabs per person.

(iv) In the subsistence taking of king crab:

(A) In waters south of 60° N. lat., the daily harvest and possession limit is six male crab per person;

(B) All crab pots used for subsistence fishing and left in saltwater unattended longer than a two-week period shall have all bait and bait containers removed and all doors secured fully open;

(C) In waters south of 60° N. lat., you may take crab only from June 1–January 31;

(D) In the Norton Sound Section of the Northern District, you must have a subsistence permit.

(v) In waters south of 60° N. lat., the daily harvest and possession limit is 12 male Tanner crab.

Dated: December 19, 2000.

Kenneth E. Thompson,

Acting Regional Forester, USDA-Forest Service.

Thomas H. Boyd,

Acting Chair, Federal Subsistence Board.

[FR Doc. 01–1953 Filed 2–12–01; 8:45 am]

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011445

Federal Register

Tuesday,
February 13, 2001

Part IV

Department of Agriculture

Forest Service

36 CFR Part 242

Department of the Interior

Fish and Wildlife Service

50 CFR Part 100

Subsistence Management Regulations for Public Lands in Alaska, Subpart C and Subpart D—2002 Subsistence Taking of Fish and Shellfish Regulations; Proposed Rule

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DEPARTMENT OF AGRICULTURE

Forest Service

36 CFR Part 242

DEPARTMENT OF THE INTERIOR

Fish and Wildlife Service

50 CFR Part 100

RIN 1018–AH77

Subsistence Management Regulations for Public Lands in Alaska, Subpart C and Subpart D—2002 Subsistence Taking of Fish and Shellfish Regulations

AGENCIES: Forest Service, Agriculture; Fish and Wildlife Service, Interior.

ACTION: Proposed rule.

SUMMARY: This proposed rule would establish regulations for seasons, harvest limits, methods, and means related to taking of fish and shellfish for subsistence uses during the 2002 regulatory year. The rulemaking is necessary because Subpart D is subject to an annual public review cycle. When final, this rulemaking would replace the fish and shellfish regulations included in the ''Subsistence Management Regulations for Public Lands in Alaska, Subpart C and Subpart D–2001 Subsistence Taking of Fish and Wildlife Resources,'' which expire on February 28, 2002. This rule would also amend the Customary and Traditional Use Determinations of the Federal Subsistence Board.

DATES: The Federal Subsistence Board must receive your written public comments and proposals to change this proposed rule no later than March 30, 2001. Federal Subsistence Regional Advisory Councils (Regional Councils) will hold public meetings to receive proposals to change this proposed rule from February 22, 2001—March 29, 2001. See **SUPPLEMENTARY INFORMATION** for additional information on the public meetings.

ADDRESSES: You may submit electronic comments and other data to *Bill_Knauer@fws.gov.* See **SUPPLEMENTARY INFORMATION** for file formats and other information about electronic filing. You may submit written comments and proposals to the Office of Subsistence Management, 3601 C Street, Suite 1030, Anchorage, Alaska 99503. The public meetings will be held at various locations in Alaska. See **SUPPLEMENTARY INFORMATION** for additional information on locations of the public meetings.

FOR FURTHER INFORMATION CONTACT: Chair, Federal Subsistence Board, c/o U.S. Fish and Wildlife Service, Attention: Thomas H. Boyd, Office of Subsistence Management; (907) 786–3888. For questions specific to National Forest System lands, contact Ken Thompson, Regional Subsistence Program Manager, USDA, Forest Service, Alaska Region, (907) 786–3592.

SUPPLEMENTARY INFORMATION:

Public Review Process—Regulation Comments, Proposals, and Public Meetings

The Federal Subsistence Board (Board) will hold meetings on this proposed rule at the following locations in Alaska:

Region 1—Southeast Regional Council	Sitka	March 22, 2001.
Region 2—Southcentral Regional Council	Copper Center	March 20, 2001.
Region 3—Kodiak/Aleutians Regional Council	Old Harbor	March 6, 2001.
Region 4—Bristol Bay Regional Council	Dillingham	February 22, 2001.
Region 5—Yukon-Kuskokwim Delta Regional Council	Kotlik	March 14, 2001.
Region 6—Western Interior Regional Council	Fairbanks	March 8, 2001.
Region 7—Seward Peninsula Regional Council	Nome	March 29, 2001.
Region 8—Northwest Arctic Regional Council	Kotzebue	March 1, 2001.
Region 9—Eastern Interior Regional Council	Fairbanks	March 6, 2001.
Region 10—North Slope Regional Council	Barrow	March 13, 2001.

We will publish notice of specific dates, times, and meeting locations in local and statewide newspapers prior to the meetings. We may need to change locations and dates based on weather or local circumstances. The amount of work on each Regional Council's agenda will determine the length of the Regional Council meetings.

Electronic filing of comments: You may submit electronic comments (proposals) and other data to *Bill_Knauer@fws.gov.* Please submit as either WordPerfect or MS Word files, avoiding the use of any special characters and any form of encryption.

We will compile and distribute for additional public review during early May 2001 the written proposals to change Subpart D fish and shellfish regulations and customary and traditional use determinations in Subpart C. A 30-day public comment period will follow distribution of the compiled proposal packet. We will accept written public comments on distributed proposals during the public comment period, which is presently scheduled to end on June 6, 2001.

We will hold a second series of Regional Council meetings in September and October 2001, to assist the Regional Councils in developing recommendations to the Board. You may also present comments on published proposals to change hunting and trapping and customary and traditional use determination regulations to the Regional Councils at those winter meetings.

The Board will discuss and evaluate proposed changes to this rule during a public meeting scheduled to be held in Anchorage, December 2001. You may provide additional oral testimony on specific proposals before the Board at that time. The Board will then deliberate and take final action on proposals received that request changes to this proposed rule at that public meeting.

Please Note: The Board will not consider proposals for changes relating to wildlife regulations at this time. The Board called for proposed changes to those regulations in August 2000 and will take final action on those proposals in May 2001.

The Board's review of your comments and fish and shellfish proposals will be facilitated by you providing the following information: (a) Your name, address, and telephone number; (b) The section and/or paragraph of the proposed rule for which your change is being suggested; (c) A statement explaining why the change is necessary; (d) The proposed wording change; (e) Any additional information you believe will help the Board in evaluating your proposal. Proposals that fail to include the above information, or proposals that are beyond the scope of authorities in § _____.24, Subpart C, § _____.27, Subpart D, and § _____.28, Subpart D, may be rejected. The Board may defer review and action on some proposals if workload exceeds work capacity of staff, Regional Councils, or Board. These deferrals will be based on recommendations of the affected Regional Council, staff members, and on

the basis of least harm to the subsistence user and the resource involved. Proposals should be specific to customary and traditional use determinations or to subsistence seasons, harvest limits, and/or methods and means.

Background

Title VIII of the Alaska National Interest Lands Conservation Act (ANILCA) (16 U.S.C. 3111–3126) requires that the Secretary of the Interior and the Secretary of Agriculture (Secretaries) implement a joint program to grant a preference for subsistence uses of fish and wildlife resources on public lands, unless the State of Alaska enacts and implements laws of general applicability that are consistent with ANILCA and that provide for the subsistence definition, preference, and participation specified in Sections 803, 804, and 805 of ANILCA. The State implemented a program that the Department of the Interior previously found to be consistent with ANILCA. However, in December 1989, the Alaska Supreme Court ruled in McDowell v. State of Alaska that the rural preference in the State subsistence statute violated the Alaska Constitution. The Court's ruling in McDowell required the State to delete the rural preference from the subsistence statute and, therefore, negated State compliance with ANILCA. The Court stayed the effect of the decision until July 1, 1990.

As a result of the McDowell decision, the Department of the Interior and the Department of Agriculture (Departments) assumed, on July 1, 1990, responsibility for implementation of Title VIII of ANILCA on public lands. On June 29, 1990, the Temporary Subsistence Management Regulations for Public Lands in Alaska were published in the **Federal Register** (55 FR 27114–27170). Consistent with Subparts A, B, and C of these regulations, as revised January 8, 1999, (64 FR 1276), the Departments established a Federal Subsistence Board to administer the Federal Subsistence Management Program. The Board's composition includes a Chair appointed by the Secretary of the Interior with concurrence of the Secretary of Agriculture; the Alaska Regional Director, U.S. Fish and Wildlife Service; the Alaska Regional Director, U.S. National Park Service; the Alaska State Director, U.S. Bureau of Land Management; the Alaska Regional Director, U.S. Bureau of Indian Affairs; and the Alaska Regional Forester, USDA Forest Service. Through the Board, these agencies participate in the development of regulations for Subparts A, B, and C, and the annual Subpart D regulations.

All Board members have reviewed this rule and agree with its substance. Because this rule relates to public lands managed by an agency or agencies in both the Departments of Agriculture and the Interior, identical text would be incorporated into 36 CFR part 242 and 50 CFR part 100.

Applicability of Subparts A, B, and C

Subparts A, B, and C (unless otherwise amended) of the Subsistence Management Regulations for Public Lands in Alaska, 50 CFR 100.1 to 100.23 and 36 CFR 242.1 to 242.23, remain effective and apply to this rule. Therefore, all definitions located at 50 CFR 100.4 and 36 CFR 242.4 would apply to regulations found in this subpart.

Federal Subsistence Regional Advisory Councils

Pursuant to the Record of Decision, Subsistence Management Regulations for Federal Public Lands in Alaska, April 6, 1992, and the Subsistence Management Regulations for Federal Public Lands in Alaska, 36 CFR 242.11 (1999) and 50 CFR 100.11 (1999), and for the purposes identified therein, we divide Alaska into ten subsistence resource regions, each of which is represented by a Federal Subsistence Regional Advisory Council (Regional Council). The Regional Councils provide a forum for rural residents with personal knowledge of local conditions and resource requirements to have a meaningful role in the subsistence management of fish and wildlife on Alaska public lands. The Regional Council members represent varied geographical, cultural, and user diversity within each region.

The Regional Councils have a substantial role in reviewing the proposed rule and making recommendations for the final rule. Moreover, the Council Chairs, or their designated representatives, will present their Council's recommendations at the Board meeting in December 2001.

Proposed Changes From 2000–2001 Seasons and Bag Limit Regulations

Subpart D regulations are subject to an annual cycle and require development of an entire new rule each year. Customary and traditional use determinations (§ _____.24 of Subpart C) are also subject to an annual review process providing for modification each year. The text of the 2001–2002 Subparts C and D Final Rule, with no modifications, served as the foundation for the 2002–2003 Subparts C and D proposed rule. The regulations contained in this proposed rule will take effect on March 1, 2002, unless elements are changed by subsequent Board action following the public review process outlined herein.

Conformance With Statutory and Regulatory Authorities

National Environmental Policy Act Compliance

A Draft Environmental Impact Statement (DEIS) for developing a Federal Subsistence Management Program was distributed for public comment on October 7, 1991. That document described the major issues associated with Federal subsistence management as identified through public meetings, written comments, and staff analysis and examined the environmental consequences of four alternatives. Proposed regulations (Subparts A, B, and C) that would implement the preferred alternative were included in the DEIS as an appendix. The DEIS and the proposed administrative regulations presented a framework for an annual regulatory cycle regarding subsistence hunting and fishing regulations (Subpart D). The Final Environmental Impact Statement (FEIS) was published on February 28, 1992.

Based on the public comment received, the analysis contained in the FEIS, and the recommendations of the Federal Subsistence Board and the Department of the Interior's Subsistence Policy Group, the Secretary of the Interior, with the concurrence of the Secretary of Agriculture, through the U.S. Department of Agriculture-Forest Service, implemented Alternative IV as identified in the DEIS and FEIS (Record of Decision on Subsistence Management for Federal Public Lands in Alaska (ROD), signed April 6, 1992). The DEIS and the selected alternative in the FEIS defined the administrative framework of an annual regulatory cycle for subsistence hunting and fishing regulations. The final rule for Subsistence Management Regulations for Public Lands in Alaska, Subparts A, B, and C (57 FR 22940–22964, published May 29, 1992, and amended January 8, 1999, 64 FR 1276) implemented the Federal Subsistence Management Program and included a framework for an annual cycle for subsistence hunting and fishing regulations.

Compliance With Section 810 of ANILCA

The intent of all Federal subsistence regulations is to accord subsistence uses

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of fish and wildlife on public lands a priority over the taking of fish and wildlife on such lands for other purposes, unless restriction is necessary to conserve healthy fish and wildlife populations. A Section 810 analysis was completed as part of the FEIS process. The final Section 810 analysis determination appeared in the April 6, 1992, ROD, which concluded that the Federal Subsistence Management Program may have some local impacts on subsistence uses, but the program is not likely to significantly restrict subsistence uses.

Paperwork Reduction Act

These rules contain information collection requirements subject to Office of Management and Budget (OMB) approval under the Paperwork Reduction Act of 1995. They apply to the use of public lands in Alaska. The information collection requirements described below were approved by OMB under 44 U.S.C. 3501 and were assigned clearance number 1018–0075, which expires July 31, 2003. The information collection requirements described below will be submitted to OMB for approval beyond that date, if needed. We will not conduct or sponsor, and you are not required to respond to, a collection of information request unless it displays a currently valid OMB control number.

The collection of information will be achieved through the use of the Federal Subsistence Harvest Permit Application. This collection of information will establish whether the applicant qualifies to participate in a Federal subsistence fishery on public lands in Alaska and will provide a report of harvest and location of harvest.

The likely respondents to this collection of information are rural Alaska residents who wish to participate in specific subsistence hunts on Federal land. The collected information is necessary to determine harvest success and harvest location in order to make management decisions relative to the conservation of healthy fish and shellfish populations. The annual burden of reporting and recordkeeping is estimated to average 0.25 hours per response, including time for reviewing instructions, gathering and maintaining data, and completing and reviewing the form. The estimated number of likely respondents under this rule is less than 6,000, yielding a total annual reporting and recordkeeping burden of 1,500 hours or less.

Direct comments on the burden estimate or any other aspect of this form to: Information Collection Officer, U.S. Fish and Wildlife Service, 1849 C Street, NW, MS 222 ARLSQ, Washington, DC 20240. Additional information collection requirements may be imposed if Local Advisory Committees subject to the Federal Advisory Committee Act are established under Subpart B. We will submit for OMB approval any changes or additional information collection requirements not included in 1018–0075.

Other Requirements

This rule was not subject to OMB review under Executive Order 12866.

The Regulatory Flexibility Act of 1980 (5 U.S.C. 601 *et seq.*) requires preparation of flexibility analyses for rules that will have a significant effect on a substantial number of small entities, which include small businesses, organizations, or governmental jurisdictions. The Departments have determined that this rulemaking will not have a significant economic effect on a substantial number of small entities within the meaning of the Regulatory Flexibility Act.

This rulemaking will impose no significant costs on small entities; the exact number of businesses and the amount of trade that will result from this Federal land-related activity is unknown. The aggregate effect is an insignificant positive economic effect on a number of small entities, such as tackle, boat, and gasoline dealers. The number of small entities affected is unknown; but, the fact that the positive effects will be seasonal in nature and will, in most cases, merely continue preexisting uses of public lands indicates that they will not be significant.

In general, the resources harvested under this rule will be consumed by the local harvester and do not result in a dollar benefit to the economy. However, we estimate that 24 million pounds of fish (including 8.3 million pounds of salmon) are harvested by the local subsistence users annually and, if given a dollar value of $3.00 per pound for salmon and $ 0.58 per pound for other fish, would equate to about $34 million in food value Statewide.

Title VIII of ANILCA requires the Secretaries to administer a subsistence preference on public lands. The scope of this program is limited by definition to certain public lands. Likewise, these regulations have no potential takings of private property implications as defined by Executive Order 12630.

The Service has determined and certifies pursuant to the Unfunded Mandates Reform Act, 2 U.S.C. 1502 *et seq.*, that this rulemaking will not impose a cost of $100 million or more in any given year on local or State governments or private entities. The implementation of this rule is by Federal agencies, and no cost is involved to any State or local entities or Tribal governments.

The Service has determined that these final regulations meet the applicable standards provided in Sections 3(a) and 3(b)(2) of Executive Order 12988 on Civil Justice Reform.

In accordance with Executive Order 13132, the rule does not have sufficient federalism implications to warrant the preparation of a Federalism Assessment. Title VIII of ANILCA precludes the State from exercising management authority over wildlife resources on Federal lands.

In accordance with the President's memorandum of April 29, 1994, ''Government-to-Government Relations with Native American Tribal Governments'' (59 FR 22951), 512 DM 2, and E.O. 13175, we have evaluated possible effects on Federally recognized Indian tribes and have determined that there are no effects. The Bureau of Indian Affairs is a participating agency in this rulemaking.

Drafting Information

William Knauer drafted these regulations under the guidance of Thomas H. Boyd, of the Office of Subsistence Management, Alaska Regional Office, U.S. Fish and Wildlife Service, Anchorage, Alaska. Curt Wilson, Alaska State Office, Bureau of Land Management; Rod Simmons, Alaska Regional Office, U.S. Fish and Wildlife Service; Bob Gerhard, Alaska Regional Office, National Park Service; Ida Hildebrand, Alaska Regional Office, Bureau of Indian Affairs; and Ken Thompson, USDA-Forest Service, provided additional guidance.

List of Subjects

36 CFR Part 242

Administrative practice and procedure, Alaska, Fish, National forests, Public lands, Reporting and recordkeeping requirements, Wildlife.

50 CFR Part 100

Administrative practice and procedure, Alaska, Fish, National forests, Public lands, Reporting and recordkeeping requirements, Wildlife.

For the reasons set out in the preamble, the Federal Subsistence Board proposes to amend Title 36, part 242, and Title 50, part 100, of the Code of Federal Regulations, as set forth below.

PART __—SUBSISTENCE MANAGEMENT REGULATIONS FOR PUBLIC LANDS IN ALASKA

1. The authority citation for both 36 CFR part 242 and 50 CFR part 100 continues to read as follows:

Authority: 16 U.S.C. 3, 472, 551, 668dd, 3101–3126; 18 U.S.C. 3551–3586; 43 U.S.C. 1733.

Subpart C—Board Determinations

2. In Subpart C of 36 CFR part 242 and 50 CFR part 100, § __.24(a)(2) is revised to read as follows:

§ _____.24 Customary and traditional use determinations.

(a) * * *

(2) *Fish determinations.*

Area	Species	Determination
Kotzebue Area	All fish	Residents of the Kotzebue Area.
Norton Sound-Port Clarence Area	All fish	Residents of the Norton Sound-Port Clarence Area
Yukon-Northern Area:		
Yukon River drainage	Salmon, other than Yukon River Fall Chum salmon.	Residents of the Yukon Area, including the community of Stebbins.
Yukon River drainage	Yukon River Fall chum salmon	Residents of the Yukon River drainage, including the communities of Stebbins, Scammon Bay, Hooper Bay, and Chevak.
Yukon River drainage	Freshwater fish species (other than salmon), including sheefish, whitefish, lamprey, burbot, sucker, grayling, pike, char, and blackfish.	Residents of the Yukon-Northern Area.
Remainder of the Yukon-Northern Area	All fish	Residents of the Northern Area, except for those domiciled in Unit 26–B.
Kuskokwim Area	Salmon	Residents of the Kuskokwim Area, except those persons residing on the United States military installation located on Cape Newenham, Sparevohn USAFB, and Tatalina USAFB.
	Rainbow trout	Residents of the communities of Quinhagak, Goodnews Bay, Kwethluk, Eek, Akiachak, Akiak, and Platinum.
	Pacific cod	Residents of the communities of Chevak, Newtok, Tununak, Toksook Bay, Nightmute, Chefornak, Kipnuk, Mekoryuk, Kwigillingok, Kongiganak, Eek, and Tuntutuliak.
	All other fish other than herring	Residents of the Kuskokwim Area, except those persons residing on the United States military installation located on Cape Newenham, Sparevohn USAFB, and Tatalina USAFB.
Waters around Nunivak Island	Herring and herring roe	Residents within 20 miles of the coast between the westernmost tip of the Naskonant Peninsula and the terminus of the Ishowik River and on Nunivak Island.
Bristol Bay Area:		
Nushagak District, including drainages flowing into the district.	Salmon and other freshwater fish	Residents of the Nushagak District and freshwater drainages flowing into the district.
Naknek-Kvichak District—Naknek River drainage	Salmon and other freshwater fish	Residents of the Naknek and Kvichak River drainages.
Naknek-Kvichak District—Iliamna-Lake Clark drainage.	Salmon and other freshwater fish	Residents of the Iliamna-Lake Clark drainage.
Togiak District, including drainages flowing into the district.	Salmon and other freshwater fish	Residents of the Togiak District, freshwater drainage flowing into the district, and the community of Manokotak.
Togiak District	Herring spawn on kelp	Residents of the Togiak District.
Remainder of the Bristol Bay Area	All fish	Residents of the Bristol Bay Area.
Aleutian Islands Area	All fish	Residents of the Aleutian Islands Area and the Pribilof Islands.
Alaska Peninsula Area	Halibut	Residents of the Alaska Peninsula Area and the communities of Ivanof Bay and Perryville.
	All other fish in the Alaska Peninsula Area.	Residents of the Alaska Peninsula Area.
Chignik Area	Halibut, salmon and fish other than steelhead and rainbow trout.	Residents of the Chignik Area.
Kodiak Area—except the Mainland District, all waters along the south side of the Alaska Peninsula bounded by the latitude of Cape Douglas (58°52′ North latitude) mid-stream Shelikof Strait, and east of the longitude of the southern entrance of Imuya Bay near Kilokak Rocks (57°11′22″ North latitude, 156°20′30″ W longitude).	Salmon	Residents of the Kodiak Island Borough, except those residing on the Kodiak Coast Guard Base.
Kodiak Area	Fish other than steelhead and rainbow trout and salmon.	Residents of the Kodiak Area.

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Area	Species	Determination
Cook Inlet Area	Fish other than salmon, Dolly Varden, trout, char, grayling, and burbot.	Residents of the Cook Inlet Area.
Prince William Sound Area:		
South-Western District and Green Island	Salmon	Residents of the Southwestern District which is mainland waters from the outer point on the north shore of Granite Bay to Cape Fairfield, and Knight Island, Chenega Island, Bainbridge Island, Evans Island, Elrington Island, Latouche Island and adjacent islands.
North of a line from Porcupine Point to Granite Point, and south of a line from Point Lowe to Tongue Point.	Salmon	Residents of the villages of Tatitlek and Ellamar.
Chitina Subdistrict of the Upper Copper River District.	Salmon	Residents of Chitina, Cantwell, Chistochina, Copper Center, Gakona, Gulkana, Mentasta Lake, and Tazlina.
Glennallen Subdistrict of the Upper Copper River District.	Salmon	Residents of the Prince William Sound Area and residents of Healy Lake, Dot Lake, Northway, Tanacross, Tetlin, Tok and those individuals living along the Alaska Highway from the Alaskan/Canadian border to Dot Lake, along the Tok Cutoff from Tok to Mentasta Pass, and along the Nabesna Road.
Waters of the Copper River between National Park Service regulatory markers located near the mouth of Tanada Creek, and in Tanada Creek between National Park Service regulatory markers identifying the open waters of the creek.	Salmon	Residents of Mentasta Lake and Dot Lake.
Prince William Sound Area—remainder	Salmon	Residents of the Prince William Sound Area.
Yakutat Area:		
Freshwater upstream from the terminus of streams and rivers of the Yakutat Area from the Doame River to the Tsiu River.	Salmon	Residents of the area east of Yakutat Bay, including the islands within Yakutat Bay, west the Situk River drainage, and south of and including Knight Island.
Freshwater upstream from the terminus of streams and rivers of the Yakutat Area from the Doame River to Point Manby.	Dolly Varden, steelhead trout, and smelt.	Residents of the area east of Yakutat Bay, including the islands within Yakutat Bay, west of the Situk River drainage, and south of and including Knight Island.
Remainder of the Yakutat Area	Dolly Varden, trout, smelt and eulachon.	Residents of Southeastern Alaska and Yakutat Areas.
Southeastern Alaska Area:		
District 1—Section 1–E in waters of the Naha River and Roosevelt Lagoon.	Salmon, Dolly Varden, trout, smelt and eulachon.	Residents of the City of Saxman.
District 1—Section 1–F in Boca de Quadra in waters of Sockeye Creek and Hugh Smith Lake within 500 yards of the terminus of Sockeye Creek.	Salmon, Dolly Varden, trout, smelt and eulachon.	Residents of the City of Saxman.
District 2—North of the latitude of the northern-most tip of Chasina Point and west of a line from the northern-most tip of Chasina Point to the eastern-most tip of Grindall Island to the eastern-most tip of the Kasaan Peninsula.	Salmon, Dolly Varden, trout, smelt and eulachon.	Residents of the City of Kasaan and in the drainage of the southeastern shore of the Kasaan Peninsula west of 132°20′ W. long. and east of 132°25′ W. long.
District 3—Section 3–A	Salmon, Dolly Varden, trout, smelt and eulachon.	Residents of the townsite of Hydaburg.
District 3—Section A	Halibut and bottomfish	Residents of Southeast Area.
District 3—Section 3–B in waters east of a line from Point Ildefonso to Tranquil Point.	Salmon, Dolly Varden, trout, smelt and eulachon.	Residents of the City of Klawock and on Prince of Wales Island within the boundaries of the Klawock Heenya Corporation land holdings as they existed in January 1989, and those residents of the City of Craig and on Prince of Wales Island within the boundaries of the Shan Seet Corporation land holdings as they existed in January 1989.
District 3—Section 3–C in waters of Sarkar Lakes.	Salmon, Dolly Varden, trout, smelt and eulachon.	Residents of the City of Klawock and on Prince of Wales Island within the boundaries of the Klawock Heenya Corporation land holdings as they existed in January 1989, and those residents of the City of Craig and on Prince of Wales Island within the boundaries of the Shan Seet Corporation land holdings as they existed in January 1989.

Area	Species	Determination
District 5—North of a line from Point Barrie to Boulder Point.	Salmon, Dolly Varden, trout, smelt and eulachon.	Residents of the City of Kake and in Kupreanof Island drainages emptying into Keku Strait south of Point White and north of the Portage Bay boat harbor.
District 9—Section 9–A	Salmon, Dolly Varden, trout, smelt and eulachon.	Residents of the City of Kake and in Kupreanof Island drainages emptying into Keku Strait south of Point White and north of the Portage Bay boat harbor.
District 9—Section 9–B north of the latitude of Swain Point.	Salmon, Dolly Varden, trout, smelt and eulachon.	Residents of the City of Kake and in Kupreanof Island drainages emptying into Keku Strait south of Point White and north of the Portage Bay boat harbor.
District 10—West of a line from Pinta Point to False Point Pybus.	Salmon, Dolly Varden, trout, smelt and eulachon.	Residents of the City of Kake and in Kupreanof Island drainages emptying into Keku Strait south of Point White and north of the Portage Bay boat harbor.
District 12—South of a line from Fishery Point to south Passage Point and north of the latitude of Point Caution.	Salmon, Dolly Varden, trout, smelt and eulachon.	Residents of the City of Angoon and along the western shore of Admiralty Island north of the latitude of Sand Island, south of the latitude of Thayer Creek, and west of 134″30′ W. long., including Killisnoo Island.
District 13—Section 13–A south of the latitude of Cape Edward.	Salmon, Dolly Varden, trout, smelt and eulachon.	Residents of the City and Borough of Sitka in drainages which empty into Section 13–B north of the latitude of Dorothy Narrows.
District 13—Section 13–B north of the latitude of Redfish Cape.	Salmon, Dolly Varden, trout, smelt and eulachon.	Residents of the City and Borough of Sitka in drainages which empty into Section 13–B north of the latitude of Dorothy Narrows.
District 13—Section 13–C	Salmon, Dolly Varden, trout, smelt and eulachon.	Residents of the City and Borough of Sitka in drainages which empty into Section 13–B north of the latitude of Dorothy Narrows.
District 13—Section 13–C east of the longitude of Point Elizabeth.	Salmon, Dolly Varden, trout, smelt and eulachon.	Residents of the City of Angoon and along the western shore of Admiralty Island north of the latitude of Sand Island, south of the latitude of Thayer Creek, and west of 134°30′ W. long., including Killisnoo Island.
District 14—Section 14–B and 14–C	Salmon, Dolly Varden, trout, smelt and eulachon.	Residents of the City of Hoonah and in Chichagof Island drainages on the eastern shore of Port Frederick from Gartina Creek to Point Sophia.
Southeastern Alaska Area—Remainder	Dolly Varden, trout, smelt and eulachon.	Residents of Southeastern Alaska and Yakutat Area.

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Subpart D—Subsistence Taking of Fish and Wildlife

3. In Subpart D of 36 CFR part 242 and 50 CFR part 100 as amended elsewhere in this issue of the **Federal Register**, §§ _____.27 and _____.28 are proposed to be revised effective March 1, 2002, through February 28, 2003, to read as follows:

§ _____.27 Subsistence taking of fish.

(a) *Applicability.* (1) Regulations in this section apply to the taking of fish or their parts for subsistence uses.

(2) You may take fish for subsistence uses at any time by any method unless you are restricted by the subsistence fishing regulations found in this section. The harvest limit specified in this section for a subsistence season for a species and the State harvest limit set for a State season for the same species are not cumulative. This means that if you have taken the harvest limit for a particular species under a subsistence season specified in this section, you may not, after that, take any additional fish of that species under any other harvest limit specified for a State season.

(b) *Definitions.* The following definitions shall apply to all regulations contained in this section:

ADF&G means the Alaska Department of Fish and Game.

Anchor means a device used to hold a fishing vessel or net in a fixed position relative to the beach; this includes using part of the seine or lead, a ship's anchor, or being secured to another vessel or net that is anchored.

Beach seine means a floating net which is designed to surround fish and is set from and hauled to the beach.

Cast net means a circular net with a mesh size of no more than 1½ inches and weights attached to the perimeter which, when thrown, surrounds the fish and closes at the bottom when retrieved.

Char means the following species: Arctic char (*Salvelinus alpinis*); lake trout (*Salvelinus namaycush*); brook trout (*Salvelinus fontinalis*), and Dolly Varden (*Salvelinus malma*).

Depth of net means the perpendicular distance between cork line and lead line expressed as either linear units of measure or as a number of meshes, including all of the web of which the net is composed.

Dip net means a bag-shaped net supported on all sides by a rigid frame; the maximum straight-line distance between any two points on the net frame, as measured through the net opening, may not exceed 5 feet; the depth of the bag must be at least one-half of the greatest straight-line distance, as measured through the net opening; no portion of the bag may be constructed of webbing that exceeds a stretched measurement of 4.5 inches; the frame must be attached to a single rigid handle and be operated by hand.

Drainage means all of the waters comprising a watershed, including tributary rivers, streams, sloughs, ponds, and lakes, which contribute to the water supply of the watershed.

Drift gillnet means a drifting gillnet that has not been intentionally staked,

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anchored, or otherwise fixed in one place.

Fishwheel means a fixed, rotating device, with no more than four baskets on a single axle, for catching fish, which is driven by river current or other means.

Freshwater of streams and rivers means the line at which freshwater is separated from saltwater at the mouth of streams and rivers by a line drawn headland to headland across the mouth as the waters flow into the sea.

Fyke net means a fixed, funneling (fyke) device used to entrap fish.

Gear means any type of fishing apparatus.

Gillnet means a net primarily designed to catch fish by entanglement in a mesh that consists of a single sheet of webbing which hangs between cork line and lead line, and which is fished from the surface of the water.

Groundfish or *bottomfish* means any marine fish except halibut, osmerids, herring and salmonids.

Hand purse seine means a floating net which is designed to surround fish and which can be closed at the bottom by pursing the lead line; pursing may only be done by hand power, and a free-running line through one or more rings attached to the lead line is not allowed.

Handline means a hand-held and operated line, with one or more hooks attached.

Harvest limit means the maximum legal take per person or designated group, per specified time period, in the area in which the person is fishing, even if part or all of the fish are preserved. A fish, when landed and killed by means of rod and reel becomes part of the harvest limit of the person originally hooking it.

Herring pound means an enclosure used primarily to contain live herring over extended periods of time.

Household means a person or persons having the same residence.

Hung measure means the maximum length of the cork line when measured wet or dry with traction applied at one end only.

Jigging gear means a line or lines with lures or baited hooks, drawn through the water by hand, and which are operated during periods of ice cover from holes cut in the ice, or from shore ice and which are drawn through the water by hand.

Lead means either a length of net employed for guiding fish into a seine, set gillnet, or other length of net, or a length of fencing employed for guiding fish into a fishwheel, fyke net, or dip net.

Legal limit of fishing gear means the maximum aggregate of a single type of fishing gear permitted to be used by one individual or boat, or combination of boats in any particular regulatory area, district, or section.

Long line means either a stationary, buoyed, or anchored line, or a floating, free-drifting line with lures or baited hooks attached.

Mechanical jigging machine means a mechanical device with line and hooks used to jig for halibut and bottomfish, but does not include hand gurdies or rods with reels.

Mile means a nautical mile when used in reference to marine waters or a statute mile when used in reference to fresh water.

Possession limit means the maximum number of fish a person or designated group may have in possession if the fish have not been canned, salted, frozen, smoked, dried, or otherwise preserved so as to be fit for human consumption after a 15-day period.

Pot means a portable structure designed and constructed to capture and retain live fish and shellfish in the water.

Purse seine means a floating net which is designed to surround fish and which can be closed at the bottom by means of a free-running line through one or more rings attached to the lead line.

Rockfish means all species of the genus *Sebastes.*

Rod and reel means either a device upon which a line is stored on a fixed or revolving spool and is deployed through guides mounted on a flexible pole, or a line that is attached to a pole. In either case, bait or an artificial fly or lure is used as terminal tackle. This definition does not include the use of rod and reel gear for snagging.

Salmon means the following species: pink salmon (*Oncorhynchus gorbuscha*); sockeye salmon (*Oncorhynchus nerka*); chinook salmon (*Oncorhynchus tshawytscha*); coho salmon (*Oncorhynchus kisutch*); and chum salmon (*Oncorhynchus keta*).

Salmon stream means any stream used by salmon for spawning, rearing, or for traveling to a spawning or rearing area.

Set gillnet means a gillnet that has been intentionally set, staked, anchored, or otherwise fixed.

Spear means a shaft with a sharp point or fork-like implement attached to one end which is used to thrust through the water to impale or retrieve fish and which is operated by hand.

Stretched measure means the average length of any series of 10 consecutive meshes measured from inside the first knot and including the last knot when wet; the 10 meshes, when being measured, shall be an integral part of the net, as hung, and measured perpendicular to the selvages; measurements shall be made by means of a metal tape measure while the 10 meshes being measured are suspended vertically from a single peg or nail, under 5-pound weight.

Subsistence fishing permit means a permit issued by the Alaska Department of Fish and Game, unless specifically identified otherwise.

To operate fishing gear means any of the following: to deploy gear in the water; to remove gear from the water; to remove fish or shellfish from the gear during an open season or period; or to possess a gillnet containing fish during an open fishing period, except that a gillnet which is completely clear of the water is not considered to be operating for the purposes of minimum distance requirement.

Trawl means a bag-shaped net towed through the water to capture fish or shellfish, and includes beam, otter, or pelagic trawl.

Troll gear means a power gurdy troll gear consisting of a line or lines with lures or baited hooks which are drawn through the water by a power gurdy; hand troll gear consisting of a line or lines with lures or baited hooks which are drawn through the water from a vessel by hand trolling, strip fishing, or other types of trolling, and which are retrieved by hand power or hand-powered crank and not by any type of electrical, hydraulic, mechanical, or other assisting device or attachment; or dinglebar troll gear consisting of one or more lines, retrieved and set with a troll gurdy or hand troll gurdy, with a terminally attached weight from which one or more leaders with one or more lures or baited hooks are pulled through the water while a vessel is making way.

Trout means the following species: cutthroat trout (*Oncorhynchus clarki*) and rainbow trout or steelhead trout (*Oncorhynchus mykiss*).

(c) *Methods, means, and general restrictions.* (1) Unless otherwise specified in this section or under terms of a required subsistence fishing permit (as may be modified by this section), you may use the following legal types of gear for subsistence fishing:

(i) A set gillnet;
(ii) A drift gillnet;
(iii) A purse seine;
(iv) A hand purse seine;
(v) A beach seine;
(vi) Troll gear;
(vii) A fish wheel;
(viii) A trawl;
(ix) A pot;
(x) A longline;
(xi) A fyke net;

(xii) A lead;
(xiii) A herring pound;
(xiv) A dip net;
(xv) Jigging gear;
(xvi) A mechanical jigging machine;
(xvii) A handline;
(xviii) A cast net;
(xix) A rod and reel; and
(xx) A spear.

(2) You must include an escape mechanism on all pots used to take fish or shellfish. The escape mechanisms are as follows:

(i) A sidewall, which may include the tunnel, of all shellfish and bottomfish pots must contain an opening equal to or exceeding 18 inches in length, except that in shrimp pots the opening must be a minimum of 6 inches in length. The opening must be laced, sewn, or secured together by a single length of untreated, 100 percent cotton twine, no larger than 30 thread. The cotton twine may be knotted at each end only. The opening must be within 6 inches of the bottom of the pot and must be parallel with it. The cotton twine may not be tied or looped around the web bars. Dungeness crab pots may have the pot lid tie-down straps secured to the pot at one end by a single loop of untreated, 100 percent cotton twine no larger than 60 thread, or the pot lid must be secured so that, when the twine degrades, the lid will no longer be securely closed;

(ii) All king crab, Tanner crab, shrimp, miscellaneous shellfish and bottomfish pots may, instead of complying with paragraph (c)(2)(i) of this section, satisfy the following: a sidewall, which may include the tunnel, must contain an opening at least 18 inches in length, except that shrimp pots must contain an opening at least 6 inches in length. The opening must be laced, sewn, or secured together by a single length of treated or untreated twine, no larger than 36 thread. A galvanic timed release device, designed to release in no more than 30 days in salt water, must be integral to the length of twine so that, when the device releases, the twine will no longer secure or obstruct the opening of the pot. The twine may be knotted only at each end and at the attachment points on the galvanic timed release device. The opening must be within 6 inches of the bottom of the pot and must be parallel with it. The twine may not be tied or looped around the web bars.

(3) For subsistence fishing for salmon, you may not use a gillnet exceeding 50 fathoms in length, unless otherwise specified in this section. The gillnet web must contain at least 30 filaments of equal diameter or at least 6 filaments, each of which must be at least 0.20 millimeter in diameter.

(4) Except as otherwise provided for in this section, you may not obstruct more than one-half the width of any stream with any gear used to take fish for subsistence uses.

(5) You may not use live non-indigenous fish as bait.

(6) You must have your first initial, last name, and address plainly and legibly inscribed on the side of your fishwheel facing midstream of the river.

(7) You may use kegs or buoys of any color but red on any permitted gear.

(8) You must have your first initial, last name, and address plainly and legibly inscribed on each keg, buoy, stakes attached to gillnets, stakes identifying gear fished under the ice, and any other unattended fishing gear which you use to take fish for subsistence uses.

(9) You may not use explosives or chemicals to take fish for subsistence uses.

(10) You may not take fish for subsistence uses within 300 feet of any dam, fish ladder, weir, culvert or other artificial obstruction, unless otherwise indicated.

(11) The limited exchange for cash of subsistence-harvested fish, their parts, or their eggs, legally taken under Federal subsistence management regulations to support personal and family needs is permitted as customary trade, so long as it does not constitute a significant commercial enterprise. The Board may recognize regional differences and define customary trade differently for separate regions of the State.

(12) Individuals, businesses, or organizations may not purchase subsistence-taken fish, their parts, or their eggs for use in, or resale to, a significant commercial enterprise.

(13) Individuals, businesses, or organizations may not receive through barter subsistence-taken fish, their parts or their eggs for use in, or resale to, a significant commercial enterprise.

(14) Except as provided elsewhere in this section, you may not take rainbow trout or steelhead trout.

(15) You may not use as bait for commercial or sport fishing purposes fish taken for subsistence use or under subsistence regulations in this part.

(16) You may not accumulate harvest limits authorized in this section or § _____.28 with harvest limits authorized under State regulations.

(17) Unless specified otherwise in this section, you may use a rod and reel to take fish without a subsistence fishing permit. Harvest limits applicable to the use of a rod and reel to take fish for subsistence uses shall be as follows:

(i) If you are required to obtain a subsistence fishing permit for an area, that permit is required to take fish for subsistence uses with rod and reel in that area. The harvest and possession limits for taking fish with a rod and reel in those areas are the same as indicated on the permit issued for subsistence fishing with other gear types;

(ii) Except as otherwise provided for in this section, if you are not required to obtain a subsistence fishing permit for an area, the harvest and possession limits for taking fish for subsistence uses with a rod and reel is the same as for taking fish under State of Alaska subsistence fishing regulations in those same areas. If the State does not have a specific subsistence season for that particular species, the limit shall be the same as for taking fish under State of Alaska sport fishing regulations.

(18) Unless restricted in this section, or unless restricted under the terms of a subsistence fishing permit, you may take fish for subsistence uses at any time.

(19) You may not intentionally waste or destroy any subsistence-caught fish or shellfish; however, you may use for bait or other purposes, whitefish, herring, and species for which bag limits, seasons, or other regulatory methods and means are not provided in this section, as well as the head, tail, fins, and viscera of legally-taken subsistence fish.

(d) *Fishing by designated harvest permit.* (1) Any species of fish that may be taken by subsistence fishing under this part may be taken under a designated harvest permit.

(2) If you are a Federally-qualified subsistence user, you (beneficiary) may designate another Federally-qualified subsistence user to take fish on your behalf. The designated fisherman must obtain a designated harvest permit prior to attempting to harvest fish and must return a completed harvest report. The designated fisherman may fish for any number of beneficiaries but may have no more than two harvest limits in his/her possession at any one time.

(3) The designated fisherman must have in possession a valid designated fishing permit when taking, attempting to take, or transporting fish taken under this section, on behalf of a beneficiary.

(4) The designated fisherman may not fish with more than one legal limit of gear.

(5) You may not designate more than one person to take or attempt to take fish on your behalf at one time. You may not personally take or attempt to take fish at the same time that a designated fisherman is taking or attempting to take fish on your behalf.

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(e) *Fishing permits and reports.* (1) You may take salmon only under the authority of a subsistence fishing permit, unless a permit is specifically not required in a particular area by the subsistence regulations in this part, or unless you are retaining salmon from your commercial catch consistent with paragraph (f) of this section.

(2) The U.S. Fish and Wildlife Service, Office of Subsistence Management may issue a permit to harvest fish for a qualifying cultural/educational program to an organization that has been granted a Federal subsistence permit for a similar event within the previous 5 years. A qualifying program must have instructors, enrolled students, minimum attendance requirements, and standards for successful completion of the course. Applications must be submitted to the Office of Subsistence Management 60 days prior to the earliest desired date of harvest. Permits will be issued for no more than 25 fish per culture/education camp. Appeal of a rejected request can be made to the Federal Subsistence Board. Application for an initial permit for a qualifying cultural/educational program, for a permit when the circumstances have changed significantly, when no permit has been issued within the previous 5 years, or when there is a request for harvest in excess of that provided in this paragraph (e)(2), will be considered by the Federal Subsistence Board.

(3) If a subsistence fishing permit is required by this section, the following permit conditions apply unless otherwise specified in this section:

(i) You may not take more fish for subsistence use than the limits set out in the permit;

(ii) You must obtain the permit prior to fishing;

(iii) You must have the permit in your possession and readily available for inspection while fishing or transporting subsistence-taken fish;

(iv) If specified on the permit, you shall keep accurate daily records of the catch, showing the number of fish taken by species, location and date of catch, and other such information as may be required for management or conservation purposes; and

(v) If the return of catch information necessary for management and conservation purposes is required by a fishing permit and you fail to comply with such reporting requirements, you are ineligible to receive a subsistence permit for that activity during the following calendar year, unless you demonstrate that failure to report was due to loss in the mail, accident, sickness, or other unavoidable circumstances.

(f) *Relation to commercial fishing activities.* (1) If you are a Federally-qualified subsistence user who also commercial fishes, you may retain fish for subsistence purposes from your lawfully-taken commercial catch.

(2) When participating in a commercial and subsistence fishery at the same time, you may not use an amount of combined fishing gear in excess of that allowed under the appropriate commercial fishing regulations.

(g) You may not possess, transport, give, receive, or barter subsistence-taken fish or their parts which have been taken contrary to Federal law or regulation or State law or regulation (unless superseded by regulations in this part).

(h) [Reserved]

(i) *Fishery management area restrictions.* (1) *Kotzebue Area.* The Kotzebue Area includes all waters of Alaska between the latitude of the westernmost tip of Point Hope and the latitude of the westernmost tip of Cape Prince of Wales, including those waters draining into the Chukchi Sea.

(i) You may take fish for subsistence purposes without a permit.

(ii) You may take salmon only by gillnets, beach seines, or a rod and reel.

(iii) In the Kotzebue District, you may take sheefish with gillnets that are not more than 50 fathoms in length, nor more than 12 meshes in depth, nor have a mesh size larger than 7 inches.

(iv) You may not obstruct more than one-half the width of a stream with any gear used to take fish for subsistence uses, except from May 15 to June 30 and August 15 to October 31 when taking whitefish or pike in steams, creeks, or sloughs within the Selawik and Kobuk River drainages. Only gillnets 60 feet or less in length with a mesh size from 2½ to 4½ inches may be used. You must check your net at least once in every 24-hour period.

(2) *Norton Sound-Port Clarence Area.* The Norton Sound-Port Clarence Area includes all waters of Alaska between the latitude of the westernmost tip of Cape Prince of Wales and the latitude of Canal Point light, including those waters of Alaska surrounding St. Lawrence Island and those waters draining into the Bering Sea.

(i) In the Port Clarence District, you may take fish at any time except as specified by emergency regulation.

(ii) In the Norton Sound District, you may take fish at any time except as follows:

(A) In Subdistricts 2 through 6, if you are a commercial fishermen, you may not fish for subsistence purposes during the weekly closures of the commercial salmon fishing season, except that from July 15 through August 1, you may take salmon for subsistence purposes 7 days per week in the Unalakleet and Shaktoolik River drainages with gillnets which have a mesh size that does not exceed 4½ inches, and with beach seines;

(B) In the Unalakleet River from June 1 through July 15, you may take salmon only from 8:00 a.m. Monday until 8:00 p.m. Saturday;

(C) In Subdistricts 1–3, you may take salmon other than chum salmon by beach seine during periods established by emergency regulations.

(iii) You may take salmon only by gillnets, beach seines, fishwheel, or a rod and reel.

(iv) You may take fish other than salmon by set gillnet, drift gillnet, beach seine, fish wheel, pot, long line, fyke net, jigging gear, spear, lead, or a rod and reel.

(v) In the Unalakleet River from June 1 through July 15, you may not operate more than 25 fathoms of gillnet in the aggregate nor may you operate an unanchored fishing net.

(vi) You may take fish for subsistence purposes without a subsistence fishing permit except that a subsistence fishing permit is required in the Norton Sound District for net fishing in all waters from Cape Douglas to Rocky Point.

(vii) Only one subsistence fishing permit will be issued to each household per year.

(3) *Yukon-Northern Area.* The Yukon-Northern Area includes all waters of Alaska between the latitude of Canal Point Light and the latitude of the westernmost point of the Naskonat Peninsula, including those waters draining into the Bering Sea, and all waters of Alaska north of the latitude of the westernmost tip of Point Hope and west of 141° W. long., including those waters draining into the Arctic Ocean and the Chukchi Sea.

(i) Unless otherwise restricted in this section, you may take fish in the Yukon-Northern Area at any time.

(ii) In the following locations, you may take salmon only during the open weekly fishing periods of the commercial salmon fishing season and may not take them for 24 hours before the opening of the commercial salmon fishing season:

(A) In District 4, excluding the Koyukuk River drainage;

(B) In Subdistricts 4–B and 4–C from June 15 through September 30, salmon may be taken from 6:00 p.m. Sunday until 6:00 p.m. Tuesday and from 6:00 p.m. Wednesday until 6:00 p.m. Friday;

(C) In District 6, excluding the Kantishna River drainage, salmon may be taken from 6:00 p.m. Friday until 6:00 p.m. Wednesday.

(iii) During any commercial salmon fishing season closure of greater than five days in duration, you may not take salmon during the following periods in the following districts:

(A) In District 4, excluding the Koyukuk River drainage, salmon may not be taken from 6:00 p.m. Friday until 6:00 p.m. Sunday;

(B) In District 5, excluding the Tozitna River drainage and Subdistrict 5–D, salmon may not be taken from 6:00 p.m. Sunday until 6:00 p.m. Tuesday.

(iv) Except as provided in this section, and except as may be provided by the terms of a subsistence fishing permit, you may take fish other than salmon at any time.

(v) In Districts 1, 2, 3, and Subdistrict 4–A, excluding the Koyukuk and Innoko River drainages, you may not take salmon for subsistence purposes during the 24 hours immediately before the opening of the commercial salmon fishing season.

(vi) In Districts 1, 2, and 3:

(A) After the opening of the commercial salmon fishing season through July 15, you may not take salmon for subsistence for 18 hours immediately before, during, and for 12 hours after each commercial salmon fishing period;

(B) After July 15, you may not take salmon for subsistence for 12 hours immediately before, during, and for 12 hours after each commercial salmon fishing period.

(vii) In Subdistrict 4–A after the opening of the commercial salmon fishing season, you may not take salmon for subsistence for 12 hours immediately before, during, and for 12 hours after each commercial salmon fishing period; however, you may take king salmon during the commercial fishing season, with drift gillnet gear only, from 6:00 p.m. Sunday until 6:00 p.m. Tuesday and from 6:00 p.m. Wednesday until 6:00 p.m. Friday.

(viii) In the upper Yukon River drainage, you may not subsistence fish, except for whitefish and suckers, in Birch Creek and waters within 500 feet of its mouth.

(ix) You may not subsistence fish in the following drainages located north of the main Yukon River:

(A) Kanuti River upstream from a point 5 miles downstream of the State highway crossing;

(B) Bonanza Creek;

(C) Jim River including Prospect and Douglas Creeks; and

(D) North Fork of the Chandalar River system upstream from the mouth of Quartz Creek.

(x) You may not subsistence fish in the Delta River.

(xi) You may not subsistence fish in the following rivers and creeks and within 500 feet of their mouths: Big Salt River, Hess Creek, and Beaver Creek.

(xii) You may not subsistence fish in the Deadman, Jan, Fielding, and Two-Mile Lakes.

(xiii) You may not subsistence fish in the Toklat River drainage from August 15 through May 15.

(xiv) You may take salmon only by gillnet, beach seine, fish wheel, or rod and reel, subject to the restrictions set forth in this section.

(xv) In District 4, if you are a commercial fisherman, you may not take salmon for subsistence purposes during the commercial salmon fishing season using gillnets with mesh larger than six-inches after a date specified by ADF&G emergency order issued between July 10 and July 31.

(xvi) In Districts 4, 5, and 6, you may not take salmon for subsistence purposes by drift gillnets, except as follows:

(A) In Subdistrict 4–A upstream from the mouth of Stink Creek, you may take king salmon by drift gillnets less than 150 feet in length from June 10 through July 14, and chum salmon by drift gillnets after August 2;

(B) In Subdistrict 4–A downstream from the mouth of Stink Creek, you may take king salmon by drift gillnets less than 150 feet in length from June 10 through July 14.

(xvii) Unless otherwise specified in this section, you may take fish other than salmon and halibut by set gillnet, drift gillnet, beach seine, fish wheel, long line, fyke net, dip net, jigging gear, spear, lead, or rod and reel, subject to the following restrictions, which also apply to subsistence salmon fishing:

(A) During the open weekly fishing periods of the commercial salmon fishing season, if you are a commercial fisherman, you may not operate more than one type of gear at a time, for commercial, personal use, and subsistence purposes;

(B) You may not use an aggregate length of set gillnet in excess of 150 fathoms and each drift gillnet may not exceed 50 fathoms in length;

(C) In Districts 4, 5, and 6, you may not set subsistence fishing gear within 200 feet of other operating commercial, personal use, or subsistence fishing gear except that, at the site approximately 1 mile upstream from Ruby on the south bank of the Yukon River between ADF&G regulatory markers containing the area known locally as the ''Slide,'' you may set subsistence fishing gear within 200 feet of other operating commercial or subsistence fishing gear and in District 4, from Old Paradise Village upstream to a point 4 miles upstream from Anvik, there is no minimum distance requirement between fish wheels;

(D) During the commercial salmon fishing season, within the Yukon River and the Tanana River below the confluence of the Wood River, you may use drift gillnets and fish wheels only during open subsistence salmon fishing periods.

(xviii) In District 4, from September 21 through May 15, you may use jigging gear from shore ice.

(xix) You must possess a subsistence fishing permit for the following locations:

(A) For the Yukon River drainage from the mouth of Hess Creek to the mouth of the Dall River;

(B) For the Yukon River drainage from the upstream mouth of 22 Mile Slough to the U.S.-Canada border;

(C) For whitefish and suckers in Birch Creek upstream from the Steese Highway bridge at Mile 140;

(D) Only for salmon in the Tanana River drainage above the mouth of the Wood River.

(xx) Only one subsistence fishing permit will be issued to each household per year.

(xxi) In Districts 1, 2, and 3, you may not possess king salmon taken for subsistence purposes unless the dorsal fin has been removed immediately after landing.

(xxii) In the Yukon River drainage, chinook (king) salmon are to be used primarily for human consumption and not specifically targeted for dog food, except that whole fish unfit for human consumption (due to disease, deterioration, deformities), scraps, and small fish (jack kings 16 inches or less) may be fed to dogs.

(4) *Kuskokwim Area.* The Kuskokwim Area consists of all waters of Alaska between the latitude of the westernmost point of Naskonat Peninsula and the latitude of the southernmost tip of Cape Newenham, including the waters of Alaska surrounding Nunivak and St. Matthew Islands and those waters draining into the Bering Sea.

(i) Unless otherwise restricted in this section, you may take fish in the Kuskokwim Area at any time without a subsistence fishing permit.

(ii) In District 1 and in those waters of the Kuskokwim River between Districts 1 and 2, excluding the Kuskokuak Slough, you may not take salmon for 16 hours before, during, and

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for 6 hours after, each open commercial salmon fishing period for District 1.

(iii) In District 1, Kuskokuak Slough only from June 1 through July 31, you may not take salmon for 16 hours before and during each open commercial salmon fishing period in the district.

(iv) In Districts 4 and 5, from June 1 through September 8, you may not take salmon for 16 hours before, during, and 6 hours after each open commercial salmon fishing period in each district.

(v) In District 2, and anywhere in tributaries that flow into the Kuskokwim River within that district, from June 1 through September 8 you may not take salmon for 16 hours before, during, and 6 hours after each open commercial salmon fishing period in the district.

(vi) You may not take subsistence fish by nets in the Goodnews River east of a line between ADF&G regulatory markers placed near the mouth of the Ufigag River and an ADF&G regulatory marker placed near the mouth of the Tunulik River 16 hours before, during, and 6 hours after each open commercial salmon fishing period.

(vii) You may not take subsistence fish by nets in the Kanektok River upstream of ADF&G regulatory markers placed near the mouth 16 hours before, during, and 6 hours after each open commercial salmon fishing period.

(viii) You may not take subsistence fish by nets in the Arolik River upstream of ADF&G regulatory markers placed near the mouth 16 hours before, during, and 6 hours after each open commercial salmon fishing period.

(ix) You may take salmon only by gillnet, beach seine, fish wheel, or rod and reel subject to the restrictions set out in this section, except that you may also take salmon by spear in the Holitna, Kanektok, and Arolik River drainages, and in the drainage of Goodnews Bay.

(x) You may not use an aggregate length of set gillnets or drift gillnets in excess of 50 fathoms for taking salmon.

(xi) You may take fish other than salmon by set gillnet, drift gillnet, beach seine, fish wheel, pot, long line, fyke net, dip net, jigging gear, spear, lead, or rod and reel.

(xii) You must attach to the bank each subsistence gillnet operated in tributaries of the Kuskokwim River and fish it substantially perpendicular to the bank and in a substantially straight line.

(xiii) Within a tributary to the Kuskokwim River in that portion of the Kuskokwim River drainage from the north end of Eek Island upstream to the mouth of the Kolmakoff River, you may not set or operate any part of a set gillnet within 150 feet of any part of another set gillnet.

(xiv) The maximum depth of gillnets is as follows:

(A) Gillnets with 6-inch or smaller mesh may not be more than 45 meshes in depth;

(B) Gillnets with greater than 6-inch mesh may not be more than 35 meshes in depth.

(xv) You may take halibut only by a single hand-held line with no more than two hooks attached to it.

(xvi) You may not use subsistence set and drift gillnets exceeding 15 fathoms in length in Whitefish Lake in the Ophir Creek drainage. You may not operate more than one subsistence set or drift gillnet at a time in Whitefish Lake in the Ophir Creek drainage. You must check the net at least once every 24 hours.

(xvii) Rainbow trout may be taken by only residents of Goodnews Bay, Platinum, Quinhagak, Eek, Kwethluk, Akiachak, and Akiak. The following restrictions apply:

(A) You may take rainbow trout only by the use of gillnets, dip nets, fyke nets, handline, spear, rod and reel, or jigging through the ice;

(B) You may not use gillnets, dip nets, or fyke nets for targeting rainbow trout from March 15–June 15;

(C) If you take rainbow trout incidentally in other subsistence net fisheries and through the ice, you may retain them for subsistence purposes;

(D) There are no harvest limits with handline, spear, rod and reel, or jigging.

(5) *Bristol Bay Area.* The Bristol Bay Area includes all waters of Bristol Bay including drainages enclosed by a line from Cape Newenham to Cape Menshikof.

(i) Unless restricted in this section, or unless under the terms of a subsistence fishing permit, you may take fish at any time in the Bristol Bay area.

(ii) In all commercial salmon districts, from May 1 through May 31 and October 1 through October 31, you may subsistence fish for salmon only from 9:00 a.m. Monday until 9:00 a.m. Friday. From June 1 through September 30, within the waters of a commercial salmon district, you may take salmon only during open commercial salmon fishing periods.

(iii) In the Egegik River from 9:00 a.m. June 23 through 9:00 a.m. July 17, you may take salmon only from 9:00 a.m. Tuesday to 9:00 a.m. Wednesday and 9:00 a.m. Saturday to 9:00 a.m. Sunday.

(iv) You may not take fish from waters within 300 feet of a stream mouth used by salmon.

(v) You may not subsistence fish with nets in the Tazimina River and within one-fourth mile of the terminus of those waters during the period from September 1 through June 14.

(vi) Within any district, you may take salmon, herring, and capelin only by drift and set gillnets.

(vii) Outside the boundaries of any district, you may take salmon only by set gillnet, except that you may also take salmon as follows:

(A) By spear in the Togiak River excluding its tributaries;

(B) From August 30 through September 30, by spear, dip net, and gillnet along a 100 yard length of the west shore of Naknek Lake near the outlet to the Naknek River as marked by ADF&G regulatory markers;

(C) From August 15 through September 15, by spear, dip net, and gillnet at Johnny's Lake on the northwestern side of Naknek Lake;

(D) From October 1 through November 15, by spear, dip net, and gillnet at the mouth of Brooks River at Naknek Lake;

(E) At locations and times specified in paragraphs (i)(5)(vii) (B) through (D) of this section, gillnets may not exceed 5 fathoms in length and may not be anchored or tied to a stake or peg, and you must be present at the net while fishing the net.

(viii) The maximum lengths for set gillnets used to take salmon are as follows:

(A) You may not use set gillnets exceeding 10 fathoms in length in the Egegik, River;

(B) In the remaining waters of the area, you may not use set gillnets exceeding 25 fathoms in length.

(ix) You may not operate any part of a set gillnet within 300 feet of any part of another set gillnet.

(x) You must stake and buoy each set gillnet. Instead of having the identifying information on a keg or buoy attached to the gillnet, you may plainly and legibly inscribe your first initial, last name, and subsistence permit number on a sign at or near the set gillnet.

(xi) You may not operate or assist in operating subsistence salmon net gear while simultaneously operating or assisting in operating commercial salmon net gear.

(xii) During closed commercial herring fishing periods, you may not use gillnets exceeding 25 fathoms in length for the subsistence taking of herring or capelin.

(xiii) You may take fish other than salmon, herring, capelin, and halibut by gear listed in this part unless restricted under the terms of a subsistence fishing permit.

(xiv) You may take salmon and char only under authority of a subsistence fishing permit.

(xv) Only one subsistence fishing permit may be issued to each household per year.

(xvi) In the Togiak River section and the Togiak River drainage, you may not possess coho salmon taken under the authority of a subsistence fishing permit unless both lobes of the caudal fin (tail) or the dorsal fin have been removed.

(6) *Aleutian Islands Area.* The Aleutian Islands Area includes all waters of Alaska west of the longitude of the tip of Cape Sarichef, east of 172° East longitude, and south of 54° 36′ North latitude.

(i) You may take fish, other than salmon, rainbow trout, and steelhead trout, at any time unless restricted under the terms of a subsistence fishing permit. If you take rainbow trout and steelhead trout incidentally in other subsistence net fisheries, you may retain them for subsistence purposes.

(ii) In the Unalaska District, you may take salmon for subsistence purposes from 6:00 a.m. until 9:00 p.m. from January 1 through December 31, except:

(A) That from June 1 through September 15, you may not use a salmon seine vessel to take salmon for subsistence 24 hours before, during, or 24 hours after an open commercial salmon fishing period within a 50-mile radius of the area open to commercial salmon fishing;

(B) That from June 1 through September 15, you may use a purse seine vessel to take salmon only with a gillnet and you may not have any other type of salmon gear on board the vessel while subsistence fishing; or

(C) As may be specified on a subsistence fishing permit.

(iii) In the Adak, Akutan, Atka-Amlia, and Umnak Districts, you may take salmon at any time.

(iv) You may not subsistence fish for salmon in the following waters:

(A) The waters of Unalaska Lake, its tributaries and outlet stream;

(B) The waters between Unalaska and Amaknak Islands, including Margaret's Bay, west of a line from the ''Bishop's House'' at 53° 52.64′ N. lat., 166° 32.30′ W. long. to a point on Amaknak Island at 53° 52.82′ N. lat., 166° 32.13′ W. long., and north of line from a point south of Agnes Beach at 53° 52.28′ N. lat., 166° 32.68′ W. long. to a point at 53° 52.35′ N. lat., 166° 32.95′ W. long. on Amaknak Island;

(C) Within Unalaska Bay south of a line from the northern tip of Cape Cheerful to the northern tip of Kalekta Point, waters within 250 yards of any anadromous stream, except the outlet stream of Unalaska Lake, which is closed under paragraph (i)(6)(iv)(A) of this section;

(D) The waters of Summers and Morris Lakes and their tributaries and outlet streams;

(E) All streams supporting anadromous fish runs that flow into Unalaska Bay south of a line from the northern tip of Cape Cheerful to the northern tip of Kalekta Point;

(F) Waters of McLees Lake and its tributaries and outlet stream;

(G) Waters in Reese Bay from July 1 through July 9, within 500 yards of the outlet stream terminus to McLees Lake;

(H) All freshwater on Adak Island and Kagalaska Island in the Adak District.

(v) You may take salmon by seine and gillnet, or with gear specified on a subsistence fishing permit.

(vi) In the Unalaska District, if you fish with a net, you must be physically present at the net at all times when the net is being used.

(vii) You may take fish other than salmon by gear listed in this part unless restricted under the terms of a subsistence fishing permit.

(viii) You may take salmon, trout, and char only under the terms of a subsistence fishing permit, except that you do not need a permit in the Akutan, Umnak, and Atka-Amlia Islands Districts.

(ix) You may take no more than 250 salmon for subsistence purposes unless otherwise specified on the subsistence fishing permit, except that in the Unalaska and Adak Districts, you may take no more than 25 salmon plus an additional 25 salmon for each member of your household listed on the permit. You may obtain an additional permit.

(x) You must keep a record on the reverse side of the permit of subsistence-caught fish. You must complete the record immediately upon taking subsistence-caught fish and must return it no later than October 31.

(xi) The daily bag limit for halibut is two fish, and the possession limit is two daily bag limits. You may not possess sport-taken and subsistence-taken halibut on the same day.

(7) *Alaska Peninsula Area.* The Alaska Peninsula Area includes all Pacific Ocean waters of Alaska between a line extending southeast (135°) from the tip of Kupreanof Point and the longitude of the tip of Cape Sarichef, and all Bering Sea waters of Alaska east of the longitude of the tip of Cape Sarichef and south of the latitude of the tip of Cape Menshikof.

(i) You may take fish, other than salmon, rainbow trout, and steelhead trout, at any time unless restricted under the terms of a subsistence fishing permit. If you take rainbow trout and steelhead trout incidentally in other subsistence net fisheries or through the ice, you may retain them for subsistence purposes.

(ii) You may take salmon, trout, and char only under the authority of a subsistence fishing permit.

(iii) You must keep a record on the reverse side of the permit of subsistence-caught fish. You must complete the record immediately upon taking subsistence-caught fish and must return it no later than October 31.

(iv) You may take salmon at any time except within 24 hours before and within 12 hours following each open weekly commercial salmon fishing period within a 50-mile radius of the area open to commercial salmon fishing, or as may be specified on a subsistence fishing permit.

(v) You may not subsistence fish for salmon in the following waters:

(A) Russell Creek and Nurse Lagoon and within 500 yards outside the mouth of Nurse Lagoon;

(B) Trout Creek and within 500 yards outside its mouth.

(vi) You may take salmon by seine, gillnet, rod and reel, or with gear specified on a subsistence fishing permit.

(vii) You may take fish other than salmon by gear listed in this part unless restricted under the terms of a subsistence fishing permit.

(viii) You may not use a set gillnet exceeding 100 fathoms in length.

(ix) You may take halibut for subsistence purposes only by a single handheld line with no more than two hooks attached.

(x) You may take no more than 250 salmon for subsistence purposes unless otherwise specified on your subsistence fishing permit.

(xi) The daily bag limit for halibut is two fish and the possession limit is two daily bag limits. You may not possess sport-taken and subsistence-taken halibut on the same day.

(8) *Chignik Area.* The Chignik Area includes all waters of Alaska on the south side of the Alaska Peninsula enclosed by 156°20.22′ West longitude (the longitude of the southern entrance to Imuya Bay near Kilokak Rocks) and a line extending southeast (135°) from the tip of Kupreanof Point.

(i) You may take fish, other than rainbow trout and steelhead trout, at any time, except as may be specified by a subsistence fishing permit. If you take rainbow trout and steelhead trout incidentally in other subsistence net fisheries, you may retain them for subsistence purposes.

(ii) You may not take salmon in the Chignik River, upstream from the ADF&G weir site or counting tower, in Black Lake, or any tributary to Black and Chignik Lakes.

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(iii) You may take salmon, trout and, char only under the authority of a subsistence fishing permit.

(iv) You must keep a record on your permit of subsistence-caught fish. You must complete the record immediately upon taking subsistence-caught fish and must return it no later than October 31.

(v) If you hold a commercial fishing license, you may not subsistence fish for salmon from 48 hours before the first commercial salmon fishing opening in the Chignik Area through September 30.

(vi) You may take salmon by seines, gillnets, rod and reel, or with gear specified on a subsistence fishing permit, except that in Chignik Lake you may not use purse seines.

(vii) You may take fish other than salmon by gear listed in this part unless restricted under the terms of a subsistence fishing permit.

(viii) You may take halibut for subsistence purposes only by a single handheld line with no more than two hooks attached.

(ix) You may take no more than 250 salmon for subsistence purposes unless otherwise specified on the subsistence fishing permit.

(x) The daily bag limit for halibut is two fish, and the possession limit is two daily bag limits. You may not possess sport-taken and subsistence-taken halibut on the same day.

(9) *Kodiak Area.* The Kodiak Area includes all waters of Alaska south of a line extending east from Cape Douglas (58°51.10′ N. lat.), west of 150° W. long., north of 55°30.00′ N. lat.; and east of the longitude of the southern entrance of Imuya Bay near Kilokak Rocks (156°20.22′ W. long.).

(i) You may take fish, other than salmon, rainbow trout, and steelhead trout, at any time unless restricted by the terms of a subsistence fishing permit. If you take rainbow trout and steelhead trout incidentally in other subsistence net fisheries, you may retain them for subsistence purposes.

(ii) You may take salmon for subsistence purposes 24 hours a day from January 1 through December 31, with the following exceptions:

(A) From June 1 through September 15, you may not use salmon seine vessels to take subsistence salmon for 24 hours before, during, and for 24 hours after any open commercial salmon fishing period. The use of skiffs from any type of vessel is allowed;

(B) From June 1 through September 15, you may use purse seine vessels to take salmon only with gillnets, and you may have no other type of salmon gear on board the vessel.

(iii) You may not subsistence fish for salmon in the following locations:

(A) Womens Bay closed waters—all waters inside a line from the tip of the Nyman Peninsula (57°43.23′ N. lat., 152°31.51′ W long.), to the northeastern tip of Mary's Island (57°42.40′ N. lat., 152°32.00′ W. long.), to the southeastern shore of Womens Bay at 57°41.95′ N. lat., 152°31.50′ W. long.;

(B) Buskin River closed waters—all waters inside of a line running from a marker on the bluff north of the mouth of the Buskin River at approximately 57°45.80′ N. lat, 152°28.38′ W. long., to a point offshore at 57°45.35′ N. lat, 152°28.15′ W. long., to a marker located onshore south of the river mouth at approximately 57°45.15′ N. lat., 152°28.65′ W. long.;

(C) All waters closed to commercial salmon fishing within 100 yards of the terminus of Selief Bay Creek;

(D) In Afognak Bay north and west of a line from the tip of Last Point to the tip of River Mouth Point;

(E) From August 15 through September 30, all waters 500 yards seaward of the terminus of Little Kitoi Creek;

(F) All freshwater systems of Afognak Island.

(iv) You must have a subsistence fishing permit for taking salmon, trout, and char for subsistence purposes. You must have a subsistence fishing permit for taking herring and bottomfish for subsistence purposes during the commercial herring sac roe season from April 15 through June 30.

(v) With a subsistence salmon fishing permit you may take 25 salmon plus an additional 25 salmon for each member of your household whose names are listed on the permit. You may obtain an additional permit if you can show that more fish are needed.

(vi) You must record on your subsistence permit the number of subsistence fish taken. You must complete the record immediately upon landing subsistence-caught fish, and must return it by February 1 of the year following the year the permit was issued.

(vii) You may take fish other than salmon and halibut by gear listed in this part unless restricted under the terms of a subsistence fishing permit.

(viii) You may take salmon only by gillnet, rod and reel, or seine.

(ix) You must be physically present at the net when the net is being fished.

(x) You may take halibut only by a single hand-held line with not more than two hooks attached to it.

(xi) The daily bag limit for halibut is two fish, and the possession limit is two daily bag limits. You may not possess sport-taken and subsistence-taken halibut on the same day.

(10) *Cook Inlet Area.* The Cook Inlet Area includes all waters of Alaska enclosed by a line extending east from Cape Douglas (58°51′06'' N. lat.) and a line extending south from Cape Fairfield (148°50′15'' W. long.).

(i) Unless restricted in this section, or unless restricted under the terms of a subsistence fishing permit, you may take fish, other than rainbow trout and steelhead trout, at any time in the Cook Inlet Area. If you take rainbow trout and steelhead trout incidentally in other subsistence net fisheries or through the ice, you may retain them for subsistence purposes.

(ii) You may not take salmon, Dolly Varden, trout, grayling, char, and burbot for subsistence purposes.

(iii) You may take fish by gear listed in this part unless restricted in this section or under the terms of a subsistence fishing permit (as may be modified by this section).

(iv) You may only take smelt with dip nets or gillnets in fresh water from April 1 through June 15. You may not use a gillnet exceeding 20 feet in length and 2 inches in mesh size. You must attend the net at all times when it is being used. There are no harvest or possession limits for smelt.

(v) Gillnets may not be used in freshwater, except for the taking of whitefish in the Tyone River drainage or for the taking of smelt.

(11) *Prince William Sound Area.* The Prince William Sound Area includes all waters of Alaska between the longitude of Cape Fairfield and the longitude of Cape Suckling.

(i) Unless restricted in this section or unless restricted under the terms of a subsistence fishing permit, you may take fish, other than rainbow trout and steelhead trout, at any time in the Prince William Sound Area.

(ii) You may take salmon in the Upper Copper River District only as follows:

(A) In the Glennallen Subdistrict, from May 15 through September 30;

(B) You may not take salmon in the Chitina Subdistrict.

(iii) You may take salmon in the vicinity of the former Native village of Batzulnetas only under the authority of a Batzulnetas subsistence salmon fishing permit available from the National Park Service under the following conditions:

(A) You may take salmon only in those waters of the Copper River between National Park Service regulatory markers located near the mouth of Tanada Creek and approximately one-half mile downstream from that mouth and in Tanada Creek between National Park

Service regulatory markers identifying the open waters of the creek;

(B) You may use only fish wheels, dip nets, and rod and reel on the Copper River and only dip nets, spears, and rod and reel in Tanada Creek;

(C) You may take salmon only from May 15 through September 30 or until the season is closed by special action;

(D) You may retain chinook salmon taken in a fishwheel in the Copper River. You may not take chinook salmon in Tanada Creek;

(E) You must return the permit to the National Park Service no later than October 15.

(iv) You may take salmon for subsistence purposes with no bag or possession limits in those waters of the Southwestern District and along the northwestern shore of Green Island from the westernmost tip of the island to the northernmost tip, only as follows:

(A) You may use seines up to 50 fathoms in length and 100 meshes deep with a maximum mesh size of 4 inches, or gillnets up to 150 fathoms in length, except that you may take pink salmon only in fresh water using dip nets;

(B) You may take salmon only from May 15 until 2 days before the commercial opening of the Southwestern District, 7 days per week; during the commercial salmon fishing season, only during open commercial salmon fishing periods; and from 2 days following the closure of the commercial salmon season until September 30, 7 days per week;

(C) You may not fish within the closed waters areas for commercial salmon fisheries.

(v) You may take salmon for subsistence purposes with no bag or possession limits in those waters north of a line from Porcupine Point to Granite Point, and south of a line from Point Lowe to Tongue Point, only as follows:

(A) You may use seines up to 50 fathoms in length and 100 meshes deep with a maximum mesh size of 4 inches, or gillnets up to 150 fathoms in length with a maximum mesh size of 6¼ inches, except that you may only take pink salmon in fresh water using dip nets;

(B) You may take salmon only from May 15 until 2 days before the commercial opening of the Eastern District, 7 days per week during the commercial salmon fishing season, only during open commercial salmon fishing periods; and from 2 days following the closure of the commercial salmon season until October 31, 7 days per week;

(C) You may not fish within the closed waters areas for commercial salmon fisheries.

(vi) If you take rainbow trout and steelhead trout incidentally in other subsistence net fisheries, you may retain them for subsistence purposes.

(vii) You may only take salmon in the waters of the Upper Copper River District, or in the vicinity of the Native Village of Batzulnetas.

(viii) You may take fish by gear listed in this part unless restricted in this section or under the terms of a subsistence fishing permit.

(ix) In the Glennallen Subdistrict, you may take salmon only by fish wheels, rod and reel, or dip nets.

(x) You may not rent, lease, or otherwise use your fish wheel used for subsistence fishing for personal gain. You must register your fish wheel with ADF&G. Your registration number and name and address must be permanently affixed and plainly visible on the fish wheel when the fish wheel is in the water; only the current year's registration number may be affixed to the fish wheel; you must remove any other registration number from the fish wheel. You must remove the fish wheel from the water at the end of the permit period. You may operate only one fish wheel at any one time. You may not set or operate a fish wheel within 75 feet of another fish wheel. No fish wheel may have more than two baskets. A wood or metal plate at least 12 inches high by 12 inches wide, bearing your name and address in letters and numerals at least 1 inch high, must be attached to each fish wheel so that the name and address are plainly visible.

(xi) You must personally operate the fish wheel or dip net. You may not loan or transfer a subsistence fish wheel or dip net permit except as permitted.

(xii) Except as provided in this section, you may take fish other than salmon and freshwater fish species for subsistence purposes without a subsistence fishing permit.

(xiii) You may take salmon and freshwater fish species only under authority of a subsistence fishing permit.

(xiv) Only one subsistence fishing permit will be issued to each household per year.

(xv) The following apply to Upper Copper River District subsistence salmon fishing permits:

(A) Only one type of gear may be specified on a permit;

(B) You must return your permit no later than October 31, or you may be denied a permit for the following year;

(C) A fish wheel may be operated only by one permit holder at one time; that permit holder must have the fish wheel marked as required by this section and during fishing operations;

(D) Only the permit holder and the authorized member of the household listed on the subsistence permit may take salmon;

(E) A permit holder must record on ADF&G forms all salmon taken immediately after landing the salmon.

(xvi) The total annual possession limit for an Upper Copper River District subsistence salmon fishing permit is as follows:

(A) For a household with 1 person, 30 salmon, of which no more than 5 may be chinook salmon if taken by dip net;

(B) For a household with 2 persons, 60 salmon, of which no more than 5 may be chinook salmon if taken by dip net; plus 10 salmon for each additional person in a household over 2 persons, except that the household's limit for chinook salmon taken by dip net does not increase;

(C) Upon request, permits for additional salmon will be issued for no more than a total of 200 salmon for a permit issued to a household with 1 person, of which no more than 5 may be chinook salmon if taken by dip net; or no more than a total of 500 salmon for a permit issued to a household with 2 or more persons, of which no more than 5 may be chinook salmon if taken by dip net.

(xvii) A subsistence fishing permit may be issued to a village council, or other similarly qualified organization whose members operate fish wheels for subsistence purposes in the Upper Copper River District, to operate fish wheels on behalf of members of its village or organization. A permit may only be issued following approval by ADF&G of a harvest assessment plan to be administered by the permitted council or organization. The harvest assessment plan must include: provisions for recording daily catches for each fish wheel; sample data collection forms; location and number of fish wheels; the full legal name of the individual responsible for the lawful operation of each fish wheel; and other information determined to be necessary for effective resource management. The following additional provisions apply to subsistence fishing permits issued under this paragraph (i)(11)(xvii):

(A) The permit will list all households and household members for whom the fish wheel is being operated;

(B) The allowable harvest may not exceed the combined seasonal limits for the households listed on the permit; the permittee will notify the department when households are added to the list,

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and the seasonal limit may be adjusted accordingly;

(C) Members of households listed on a permit issued to a village council or other similarly qualified organization, are not eligible for a separate household subsistence fishing permit for the Upper Copper River District.

(xviii) You may not possess salmon taken under the authority of an Upper Copper River District subsistence fishing permit unless both lobes of the caudal (tail) fin have been immediately removed from the salmon.

(xix) In locations open to commercial salmon fishing other than described for the Upper Copper River District, the annual subsistence salmon limit is as follows:

(A) 15 salmon for a household of 1 person;

(B) 30 salmon for a household of 2 persons and 10 salmon for each additional person in a household;

(C) No more than five king salmon may be taken per permit.

(12) *Yakutat Area.* The Yakutat Area includes all waters of Alaska between the longitude of Cape Suckling and the longitude of Cape Fairweather.

(i) Unless restricted in this section or unless restricted under the terms of a subsistence fishing permit, you may take fish at any time in the Yakutat Area.

(ii) You may not take salmon during the period commencing 48 hours before an opening of commercial salmon net fishing season until 48 hours after the closure. This applies to each river or bay fishery individually.

(iii) When the length of the weekly commercial salmon net fishing period exceeds two days in any Yakutat Area salmon net fishery, the subsistence fishing period is from 6:00 a.m. to 6:00 p.m. on Saturday in that location.

(iv) You may take salmon, trout (other than steelhead,) and char only under authority of a subsistence fishing permit. You may only take steelhead trout in the Situk and Ahrnklin Rivers and only under authority of a subsistence fishing permit.

(v) If you take salmon, trout, or char incidentally by gear operated under the terms of a subsistence permit for salmon, you may retain them for subsistence purposes. You must report any salmon, trout, or char taken in this manner on your permit calendar.

(vi) You may take fish by gear listed in this part unless restricted in this section or under the terms of a subsistence fishing permit.

(vii) In the Situk River, each subsistence salmon fishing permit holder shall attend his or her gill net at all times when it is being used to take salmon.

(viii) You may block up to two-thirds of a stream with a gillnet or seine used for subsistence fishing.

(ix) You must remove the dorsal fin from subsistence-caught salmon when taken.

(x) You may not possess subsistence-taken and sport-taken salmon on the same day.

(xi) With a subsistence fishing permit, you may harvest at any time up to 10 Dolly Varden with no minimum size.

(13) *Southeastern Alaska Area.* The Southeastern Alaska Area includes all waters between a line projecting southwest from the westernmost tip of Cape Fairweather and Dixon Entrance.

(i) Unless restricted in this section or under the terms of a subsistence fishing permit, you may take fish, other than rainbow trout and steelhead trout, in the Southeastern Alaska Area at any time.

(ii) From July 7 through July 31, you may take sockeye salmon in the waters of the Klawock River and Klawock Lake only from 8:00 a.m. Monday until 5:00 p.m. Friday.

(iii) You must possess a subsistence fishing permit to take salmon, trout, or char.

(iv) You may take steelhead trout on Prince of Wales Island only under the terms of a Federal subsistence fishing permit. The annual harvest limit is two fish, 36 inches or larger. You may use only a dip net or rod and reel with artificial lure or fly. You may not use bait.

(v) You may take coho salmon in Subdistricts 3(A), (B), and (C) only under the terms of a Federal subsistence fishing permit. There is no closed season. The daily harvest limit is 20 fish per household. Only spears, dip net, and rod and reel may be used. Bait may be used only from September 15 through November 15.

(vi) If you take salmon, trout, or char incidentally with gear operated under terms of a subsistence permit for other salmon, they may be kept for subsistence purposes. You must report any salmon, trout, or char taken in this manner on your permit calendar.

(vii) No permits for the use of nets will be issued for the salmon streams flowing across or adjacent to the road systems within the city limits of Petersburg, Wrangell, and Sitka.

(viii) You shall immediately remove the pelvic fins of all salmon when taken.

(ix) You may not possess subsistence-taken and sport-taken salmon on the same day.

(x) For the Salmon Bay Lake system, the daily harvest and season limit per household is 30 sockeye salmon.

(xi) For Virginia Lake (Mill Creek), the daily harvest limit per household is 20 sockeye salmon, and the season limit per household is 40 sockeye salmon.

(xii) For Thoms Creek, the daily harvest limit per household is 20 sockeye salmon, and the season limit per household is 40 sockeye salmon.

(xiii) The Sarkar River system above the bridge is closed to the use of all nets by both Federally-qualified and non-Federally qualified users.

(xiv) Only Federally-qualified subsistence users may harvest sockeye salmon in streams draining into Falls Lake, Gut Bay, or Pillar Bay. In the Falls Lake and Gut Bay drainages, the possession limit is 10 sockeye salmon per household. In the Pillar Bay drainage, the individual possession limit is 15 sockeye salmon with a household possession limit of 25 sockeye salmon.

(xv) In Baranof Lake, Florence Lake, Hasselborg Lake and River, Mirror Lake, Virginia Lake, and Wilson Lake, in addition to the requirement for a subsistence fishing permit, the following restrictions for the harvest of Dolly Varden, cutthroat, and rainbow trout apply:

(A) You may harvest at any time up to 10 Dolly Varden of any size;

(B) You may harvest at any time six cutthroat or rainbow trout in combination. You may only retain fish between 11″ and 22″. You may only use a rod and reel without bait.

(xvi) In all waters, other than those identified in paragraph (i)(13)(xv) of this section, in addition to the requirement for a subsistence fishing permit, you may harvest at any time: Dolly Varden of any size with a daily possession limit of 10 fish; cutthroat and rainbow trout with a slot size limit of 11″ to 22″ with a daily possession limit of 2 fish in combination. You may only use a rod and reel without bait.

§ _____.28 Subsistence taking of shellfish.

(a) Regulations in this section apply to subsistence taking of Dungeness crab, king crab, Tanner crab, shrimp, clams, abalone, and other shellfish or their parts.

(b) *Definitions.* The following definitions shall apply to all regulations contained in this section:

Abalone iron means a flat device which is used for taking abalone and which is more than 1 inch (24 mm) in width and less than 24 inches (610 mm) in length, with all prying edges rounded and smooth.

ADF&G means the Alaska Department of Fish and Game.

Crab means the following species: red king crab (*Paralithodes camshatica*);

blue king crab (*Paralithodes platypus*); brown king crab (*Lithodes aequispina*); *Lithodes couesi*; all species of tanner or snow crab (*Chionoecetes* spp.); and Dungeness crab (*Cancer magister*).

Diving gear means any type of hard hat or skin diving equipment, including SCUBA equipment; a tethered, umbilical, surface-supplied unit; or snorkel.

Gear means any type of fishing apparatus.

Grappling hook means a hooked device with flukes or claws, which is attached to a line and operated by hand.

Handline means a hand-held and operated line, with one or more hooks attached.

Harvest limit means the maximum legal take per person or designated group, per specified time period, in the area in which the person is fishing, even if part or all of the shellfish are preserved.

Household means a person or persons having the same residence.

Hydraulic clam digger means a device using water or a combination of air and water used to harvest clams.

Mechanical clam digger means a mechanical device used or capable of being used for the taking of clams.

Mile means a nautical mile when used in reference to marine waters or a statute mile when used in reference to fresh water.

Possession limit means the maximum number of shellfish a person or designated group may have in possession if the shellfish have not been canned, salted, frozen, smoked, dried, or otherwise preserved so as to be fit for human consumption after a 15-day period.

Pot means a portable structure designed and constructed to capture and retain live fish and shellfish in the water.

Ring net means a bag-shaped net suspended between no more than two frames; the bottom frame may not be larger in perimeter than the top frame; the gear must be nonrigid and collapsible so that free movement of fish or shellfish across the top of the net is not prohibited when the net is employed.

Scallop dredge means a dredge-like device designed specifically for and capable of taking scallops by being towed along the ocean floor.

Sea urchin rake means a hand-held implement, no longer than 4 feet, equipped with projecting prongs used to gather sea urchins.

Shovel means a hand-operated implement for digging clams.

Subsistence fishing permit means a permit issued by ADF&G, unless specifically identified otherwise.

To operate fishing gear means any of the following: to deploy gear in the water; to remove gear from the water; to remove fish or shellfish from the gear during an open season or period; or to possess a gillnet containing fish during an open fishing period, except that a gillnet which is completely clear of the water is not considered to be operating for the purposes of minimum distance requirement.

Trawl means a bag-shaped net towed through the water to capture fish or shellfish, and includes beam, otter, or pelagic trawl.

(c) You may take shellfish for subsistence uses at any time in any area of the public lands by any method unless restricted by this section.

(d) Methods, means, and general restrictions. (1) The harvest limit specified in this section for a subsistence season for a species and the State harvest limit set for a State season for the same species are not cumulative. This means that if you have taken the harvest limit for a particular species under a subsistence season specified in this section, you may not, after that, take any additional shellfish of that species under any other harvest limit specified for a State season.

(2) Unless otherwise provided in this section or under terms of a required subsistence fishing permit (as may be modified by this section), you may use the following legal types of gear to take shellfish:

(i) Abalone iron;
(ii) Diving gear;
(iii) A grappling hook;
(iv) A handline;
(v) A hydraulic clam digger;
(vi) A mechanical clam digger;
(vii) A pot;
(viii) A ring net;
(ix) A scallop dredge;
(x) A sea urchin rake;
(xi) A shovel; and
(xii) A trawl.

(3) You are prohibited from buying or selling subsistence-taken shellfish, their parts, or their eggs, unless otherwise specified.

(4) You may not use explosives and chemicals, except that you may use chemical baits or lures to attract shellfish.

(5) Marking requirements for subsistence shellfish gear are as follows:

(i) You shall plainly and legibly inscribe your first initial, last name, and address on a keg or buoy attached to unattended subsistence fishing gear, except when fishing through the ice, you may substitute for the keg or buoy, a stake inscribed with your first initial, last name, and address inserted in the ice near the hole; subsistence fishing gear may not display a permanent ADF&G vessel license number;

(ii) kegs or buoys attached to subsistence crab pots also must be inscribed with the name or United States Coast Guard number of the vessel used to operate the pots.

(6) Pots used for subsistence fishing must comply with the escape mechanism requirements found in § _____.27.

(7) You may not mutilate or otherwise disfigure a crab in any manner which would prevent determination of the minimum size restrictions until the crab has been processed or prepared for consumption.

(e) Taking shellfish by designated harvest permit. (1) Any species of shellfish that may be taken by subsistence fishing under this part may be taken under a designated harvest permit.

(2) If you are a Federally-qualified subsistence user (beneficiary), you may designate another Federally-qualified subsistence user to take shellfish on your behalf. The designated fisherman must obtain a designated harvest permit prior to attempting to harvest shellfish and must return a completed harvest report. The designated fisherman may harvest for any number of beneficiaries but may have no more than two harvest limits in his/her possession at any one time.

(3) The designated fisherman must have in possession a valid designated harvest permit when taking, attempting to take, or transporting shellfish taken under this section, on behalf of a beneficiary.

(4) You may not fish with more than one legal limit of gear as established by this section.

(5) You may not designate more than one person to take or attempt to take shellfish on your behalf at one time. You may not personally take or attempt to take shellfish at the same time that a designated fisherman is taking or attempting to take shellfish on your behalf.

(f) If a subsistence shellfishing permit is required by this section, the following conditions apply unless otherwise specified by the subsistence regulations in this section:

(1) You may not take shellfish for subsistence in excess of the limits set out in the permit unless a different limit is specified in this section;

(2) You must obtain a permit prior to subsistence fishing;

(3) You must have the permit in your possession and readily available for inspection while taking or transporting the species for which the permit is issued;

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(4) The permit may designate the species and numbers of shellfish to be harvested, time and area of fishing, the type and amount of fishing gear and other conditions necessary for management or conservation purposes;

(5) If specified on the permit, you shall keep accurate daily records of the catch involved, showing the number of shellfish taken by species, location and date of the catch, and such other information as may be required for management or conservation purposes;

(6) You must complete and submit subsistence fishing reports at the time specified for each particular area and fishery;

(7) If the return of catch information necessary for management and conservation purposes is required by a subsistence fishing permit and you fail to comply with such reporting requirements, you are ineligible to receive a subsistence permit for that activity during the following calendar year, unless you demonstrate that failure to report was due to loss in the mail, accident, sickness, or other unavoidable circumstances.

(g) Subsistence take by commercial vessels. No fishing vessel which is commercially licensed and registered for shrimp pot, shrimp trawl, king crab, Tanner crab, or Dungeness crab fishing may be used for subsistence take during the period starting 14 days before an opening until 14 days after the closure of a respective open season in the area or areas for which the vessel is registered. However, if you are a commercial fisherman, you may retain shellfish for your own use from your lawfully taken commercial catch.

(h) You may not take or possess shellfish smaller than the minimum legal size limits.

(i) Unlawful possession of subsistence shellfish. You may not possess, transport, give, receive, or barter shellfish or their parts taken in violation of Federal or State regulations.

(j) (1) An owner, operator, or employee of a lodge, charter vessel, or other enterprise that furnishes food, lodging, or guide services may not furnish to a client or guest of that enterprise, shellfish that has been taken under this chapter, unless:

(i) The shellfish has been taken with gear deployed and retrieved by the client or guest who is a federally-qualified subsistence user;

(ii) The gear has been marked with the client's or guest's name and address; and

(iii) The shellfish is to be consumed by the client or guest or is consumed in the presence of the client or guest.

(2) The captain and crewmembers of a charter vessel may not deploy, set, or retrieve their own gear in a subsistence shellfish fishery when that vessel is being chartered.

(k) Subsistence shellfish areas and pertinent restrictions. (1) *Southeastern Alaska-Yakutat Area.* No marine waters are currently identified under Federal subsistence management jurisdiction.

(2) *Prince William Sound Area.* No marine waters are currently identified under Federal subsistence management jurisdiction.

(3) *Cook Inlet Area.* You may not take shellfish for subsistence purposes.

(4) *Kodiak Area.* (i) You may take crab for subsistence purposes only under the authority of a subsistence crab fishing permit issued by the ADF&G.

(ii) The operator of a commercially licensed and registered shrimp fishing vessel must obtain a subsistence fishing permit from the ADF&G before subsistence shrimp fishing during a closed commercial shrimp fishing season or within a closed commercial shrimp fishing district, section, or subsection. The permit shall specify the area and the date the vessel operator intends to fish. No more than 500 pounds (227 kg) of shrimp may be in possession aboard the vessel.

(iii) The daily harvest and possession limit is 12 male Dungeness crabs per person; only male Dungeness crabs with a shell width of 6½ inches or greater may be taken or possessed. Taking of Dungeness crab is prohibited in water 25 fathoms or more in depth during the 14 days immediately before the opening of a commercial king or Tanner crab fishing season in the location.

(iv) In the subsistence taking of king crab:

(A) The annual limit is six crabs per household; only male king crab may be taken or possessed;

(B) All crab pots used for subsistence fishing and left in saltwater unattended longer than a 2-week period shall have all bait and bait containers removed and all doors secured fully open;

(C) You may not use more than five crab pots, each being no more than 75 cubic feet in capacity to take king crab;

(D) You may take king crab only from June 1–January 31, except that the subsistence taking of king crab is prohibited in waters 25 fathoms or greater in depth during the period 14 days before and 14 days after open commercial fishing seasons for red king crab, blue king crab, or Tanner crab in the location;

(E) The waters of the Pacific Ocean enclosed by the boundaries of Womens Bay, Gibson Cove, and an area defined by a line ½ mile on either side of the mouth of the Karluk River, and extending seaward 3,000 feet, and all waters within 1,500 feet seaward of the shoreline of Afognak Island are closed to the harvest of king crab except by Federally-qualified subsistence users.

(v) In the subsistence taking of Tanner crab:

(A) You may not use more than five crab pots to take Tanner crab;

(B) You may not take Tanner crab in waters 25 fathoms or greater in depth during the 14 days immediately before the opening of a commercial king or Tanner crab fishing season in the location;

(C) The daily harvest and possession limit is 12 male crab with a shell width 5½ inches or greater per person.

(5) *Alaska Peninsula-Aleutian Islands Area.* (i) The operator of a commercially licensed and registered shrimp fishing vessel must obtain a subsistence fishing permit from the ADF&G prior to subsistence shrimp fishing during a closed commercial shrimp fishing season or within a closed commercial shrimp fishing district, section, or subsection; the permit shall specify the area and the date the vessel operator intends to fish; no more than 500 pounds (227 kg) of shrimp may be in possession aboard the vessel.

(ii) The daily harvest and possession limit is 12 male Dungeness crabs per person; only crabs with a shell width of 5½ inches or greater may be taken or possessed.

(iii) In the subsistence taking of king crab:

(A) The daily harvest and possession limit is six male crabs per person; only crabs with a shell width of 6½ inches or greater may be taken or possessed;

(B) All crab pots used for subsistence fishing and left in saltwater unattended longer than a 2-week period shall have all bait and bait containers removed and all doors secured fully open;

(C) You may take crabs only from June 1–January 31.

(iv) The daily harvest and possession limit is 12 male Tanner crabs per person; only crabs with a shell width of 5½ inches or greater may be taken or possessed.

(6) *Bering Sea Area.* (i) In that portion of the area north of the latitude of Cape Newenham, shellfish may only be taken by shovel, jigging gear, pots, and ring net.

(ii) The operator of a commercially licensed and registered shrimp fishing vessel must obtain a subsistence fishing permit from the ADF&G prior to subsistence shrimp fishing during a closed commercial shrimp fishing season or within a closed commercial shrimp fishing district, section, or

subsection; the permit shall specify the area and the date the vessel operator intends to fish; no more than 500 pounds (227 kg) of shrimp may be in possession aboard the vessel.

(iii) In waters south of 60° N. lat., the daily harvest and possession limit is 12 male Dungeness crab per person.

(iv) In the subsistence taking of king crab:

(A) In waters south of 60° N. lat., the daily harvest and possession limit is six male crab per person;

(B) All crab pots used for subsistence fishing and left in saltwater unattended longer than a two-week period shall have all bait and bait containers removed and all doors secured fully open;

(C) In waters south of 60° N. lat., you may take crab only from June 1–January 31;

(D) In the Norton Sound Section of the Northern District, you must have a subsistence permit.

(v) In waters south of 60° N. lat., the daily harvest and possession limit is 12 male Tanner crab.

Dated: December 19, 2000.

Kenneth E. Thompson,

Acting Regional Forester, USDA-Forest Service.

Thomas H. Boyd,

Acting Chair, Federal Subsistence Board.

[FR Doc. 01–1954 Filed 2–12–01; 8:45 am]

BILLING CODE 3410–11–P; 4310–55–P

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Federal Register

Tuesday,
February 13, 2001

Part V

Department of Health and Human Services

42 CFR Part 36

Meeting of the Negotiated Rulemaking Committee on Joint Tribal and Federal Self-Governance; Proposed Rule

011465

DEPARTMENT OF HEALTH AND HUMAN SERVICES

42 CFR Part 36

Meeting of the Negotiated Rulemaking Committee on Joint Tribal and Federal Self-Governance

AGENCY: Indian Health Service, HHS.

ACTION: Notice of meeting.

SUMMARY: The Secretary of Health and Human Services has established a Negotiated Rulemaking Committee on Joint Tribal and Federal Self-Governance (Committee) to negotiated and develop a proposed rule implementing the Tribal Self-Governance Amendments of 2000, Public Law 106–260 (the Act). It is our intent to publish the proposed rule for notice and comment no later than one year after the date of enactment of the Act (August 18, 2000 + one year), as required by section 517(a)(2) of the Act.

DATES: The Committee will have its first two meetings as shown below:

1. February 27–28, 2001, 8:30 a.m.–5 p.m., Washington, DC.
2. March 15–16, 2001, 8:30 a.m.–5 p.m., San Diego, CA.

ADDRESSES: The meeting locations are:

1. Washington, DC—Sheraton Four Points Hotel, 1201 K Street, NW., Washington, DC 20005.
2. San Diego, CA—Clarion Hotel Bay View, 660 K Street, San Diego, CA 92101.

Written statements may be submitted to Paula Williams Director, Office of Tribal Self-Governance, Indian Health Service, 5600 Fishers Lane, Room 5A–55, Rockville, MD 20857.

FOR FURTHER INFORMATION CONTACT: Paula Williams, Director, Office of Tribal Self-Governance, Indian Health Services, 5600 Fishers Lane, Room 5A–55, Rockville, MD 20857, Telephone 301–443–7821. (This is not a toll-free number.)

SUPPLEMENTARY INFORMATION: The location and dates of future meetings will be published in the **Federal Register**. The meetings will be open to the public without advance registration. Public attendance may be limited to the space available. Members of the public may make statements during the meeting to the extent time permits can file written statements with the Committee for its consideration. Written statements should be submitted to the address listed above. Summaries of Committee meetings will be available for public inspection and copying ten days following each meeting at the same address. In accordance with 41 CFR 101–6.1015(b)(2), we note that this notice may be published less than 15 days prior to the first meeting because of delay in formal appointment of committee members due to temporary hiring freeze.

Dated: February 7, 2001.

Michael H. Trujillo,

Assistant Surgeon General, Director.

[FR Doc. 01–3569 Filed 2–12–01; 12:25 am]

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Satellite services; 911 requirements; comments due by 2-19-01; published 1-17-01

Frequency allocations and radio treaty matters:

27 MHz of spectrum transferred from Federal government use to non-government services; reallocation; comments due by 2-22-01; published 1-23-01

New advanced wireless services; comments due by 2-22-01; published 1-23-01

FEDERAL TRADE COMMISSION

Trade regulation rules:

Amplifiers utilized in home entertainment products; power output claims; comments due by 2-23-01; published 12-22-00

GENERAL SERVICES ADMINISTRATION

Federal Acquisition Regulation (FAR):

Federal Supply Schedule order disputes and incidental items; comments due by 2-20-01; published 12-19-00

HEALTH AND HUMAN SERVICES DEPARTMENT

Food and Drug Administration

Human drugs:

Digoxin products for oral use; marketing conditions; revocation; comments due by 2-22-01; published 11-24-00

Medical devices:

Reclassification of 38 preamendments Class III devices into Class II; comments due by 2-20-01; published 11-22-00

INTERIOR DEPARTMENT

Fish and Wildlife Service

Endangered and threatened species:

Critical habitat designations—

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White sturgeon; Kootenai River population; comments due by 2-20-01; published 12-21-00

INTERIOR DEPARTMENT

Surface Mining Reclamation and Enforcement Office

Abandoned mine land reclamation:

Fee collection and coal production reporting; OSM-1 Form; electronic filing; comments due by 2-21-01; published 1-22-01

JUSTICE DEPARTMENT

Immigration and Naturalization Service

Nonimmigrant classes:

Actuaries and plant pathologists; addition to Appendix 1603.D.1 of North American Free Trade Agreement; comments due by 2-20-01; published 12-19-00

LABOR DEPARTMENT

Employment and Training Administration

Aliens:

Nonimmigrants on H-1B visas in specialty occupations and as fashion models, temporary employment; and permanent employment, labor certification process; comments due by 2-20-01; published 12-20-00

Correction; comments due by 2-20-01; published 1-8-01

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

Federal Acquisition Regulation (FAR):

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NATIONAL CREDIT UNION ADMINISTRATION

Credit unions:

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Corporate credit unions; comments due by 2-20-01; published 11-22-00

Insurance and group purchasing activities; Incidental powers activities; comments due by 2-22-01; published 11-24-00

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Bombardier; comments due by 2-21-01; published 1-22-01

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011469

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Licensing and safety requirements for launch; correction; comments due by 2-22-01; published 2-8-01

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Income taxes:
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TREASURY DEPARTMENT

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LIST OF PUBLIC LAWS

Note: The List of Public Laws for the 106th Congress, Second Session has been completed and will resume when bills are enacted into public law during the next session of Congress.

A cumulative List of Public Laws was published in Part II of the **Federal Register** on January 16, 2001.

Public Laws Electronic Notification Service (PENS)

Note: PENS will resume service when bills are enacted into law during the next session of Congress.

This service is strictly for E-mail notification of new laws. The text of laws is not available through this service. **PENS** cannot respond to specific inquiries sent to this address.

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN DIEGO REGION

ORDER NO. 2001-01

NPDES NO. CAS0108758

WASTE DISCHARGE REQUIREMENTS FOR DISCHARGES OF URBAN RUNOFF FROM THE MUNICIPAL SEPARATE STORM SEWER SYSTEMS (MS4s) DRAINING THE WATERSHEDS OF THE COUNTY OF SAN DIEGO, THE INCORPORATED CITIES OF SAN DIEGO COUNTY, AND THE SAN DIEGO UNIFIED PORT DISTRICT

The California Regional Water Quality Control Board, San Diego Region (hereinafter SDRWQCB), finds that:

1. **COPERMITTEES ARE DISCHARGERS OF URBAN RUNOFF:** Each of the persons in Table 1 below, hereinafter called Copermittees or dischargers, owns or operates a municipal separate storm sewer system (MS4), through which it discharges urban runoff into waters of the United States within the San Diego Region. These MS4s fall into one or more of the following categories: (1) a medium or large MS4 that services a population of greater than 100,000 or 250,000 respectively; or (2) a small MS4 that is "interrelated" to a medium or large MS4; or (3) an MS4 which contributes to a violation of a water quality standard; or (4) an MS4 which is a significant contributor of pollutants to waters of the United States.

Table 1. Municipal Copermittees

1.	City of Carlsbad	11.	City of National City
2.	City of Chula Vista	12.	City of Oceanside
3.	City of Coronado	13.	City of Poway
4.	City of Del Mar	14.	City of San Diego
5.	City of El Cajon	15.	City of San Marcos
6.	City of Encinitas	16.	City of Santee
7.	City of Escondido	17.	City of Solana Beach
8.	City of Imperial Beach	18.	City of Vista
9.	City of La Mesa	19.	County of San Diego
10.	City of Lemon Grove	20.	San Diego Unified Port District

2. **URBAN RUNOFF CONTAINS "WASTE" AND "POLLUTANTS":** Urban runoff contains waste, as defined in the California Water Code, and pollutants, as defined in the federal Clean Water Act, and adversely affects the quality of the waters of the State.

3. **URBAN DEVELOPMENT AND RUNOFF CAUSES RECEIVING WATER DEGRADATION:** Urban runoff discharges from MS4s are a leading cause of receiving water quality impairment in the San Diego Region and throughout the United States. As runoff flows over urban areas, it picks up harmful pollutants such as pathogens, sediment (resulting from human activities), fertilizers, pesticides, heavy metals, and petroleum products. These pollutants often become dissolved or suspended in urban runoff and are conveyed and discharged to receiving waters, such as streams, lakes, lagoons, bays, and the ocean without treatment. Once in receiving waters, these pollutants harm aquatic life primarily through toxicity and habitat degradation. Furthermore, the pollutants can enter the food chain and may eventually enter the tissues of fish and humans.

There is a strong direct correlation between "urbanization" and "impacts to receiving water quality". In general, the more heavily developed the area, the greater the impacts to receiving waters from urban runoff.

These impacts especially threaten environmentally sensitive areas (such as Clean Water Act section 303(d) impaired water bodies, areas designated as Areas of Special Biological Significance, water bodies designated with the RARE beneficial use, and preserves containing receiving waters designated under the Multi Species Conservation Program within the Cities and County of San Diego). Such environmentally sensitive areas have a much lower capacity to withstand pollutant shocks than might be acceptable in the general circumstance. In essence, urban development that is ordinarily insignificant in its impact on the environment may, in a particularly sensitive environment, be significant.

4. **URBAN DEVELOPMENT INCREASES POLLUTANT LOAD, VOLUME, AND VELOCITY OF RUNOFF:** During urban development two important changes occur. First, natural vegetated pervious ground cover is converted to impervious surfaces such as paved highways, streets, rooftops, and parking lots. Natural vegetated soil can both absorb rainwater and remove pollutants providing a very effective natural purification process. Because pavement and concrete can neither absorb water nor remove pollutants, the natural purification characteristics of the land are lost.

   Secondly, urban development creates new pollution sources as human population density increases and brings with it proportionately higher levels of car emissions, car maintenance wastes, municipal sewage, pesticides, household hazardous wastes, pet wastes, trash, etc. which can either be washed or directly dumped into the MS4.

   As a result of these two changes, the runoff leaving the developed urban area is significantly greater in volume, velocity and pollutant load than the pre-development runoff from the same area.

   The significance of the impacts of urban development on receiving waters is determined by the scope of the project, such as the size of the project, the project land-use type, etc. Large projects (such as commercial developments greater than 100,000 square feet, home subdivisions greater than 10 units, and streets, roads, highways, and freeways) generally have large amounts of impervious surface, and therefore have greater potential to significantly impact receiving waters by increasing erosion (through increased peak flow rates, flow velocities, flow volumes, and flow durations) than smaller projects. Projects of particular land use types also have greater potential to significantly impact receiving waters due to the presence of typically large amounts of pollutants on site or an increased potential for pollutants to move off site (such as automotive repair shops, restaurants, parking lots, streets, roads, highways, and freeways, hillside development, and retail gasoline outlets).

5. **WATER QUALITY DEGRADATION INCREASES WITH PERCENT IMPERVIOUSNESS:** The increased volume and velocity of runoff from developed urban areas greatly accelerates the erosion of downstream natural channels. Numerous studies have demonstrated a direct correlation between the degree of imperviousness of an area and the degradation of its receiving water quality. Significant declines in the biological integrity and physical habitat of streams and other receiving waters have been found to occur with as little as a 10% conversion from natural to impervious surfaces. (Developments of medium density single family homes range between 25 to 60% impervious). Today "% impervious coverage" is believed to be a reliable indicator and predictor of the water quality degradation expected from planned new development.

6. **URBAN RUNOFF IS A HUMAN HEALTH THREAT:** Urban runoff contains pollutants, which threaten human health. Human illnesses have been clearly linked to recreating (i.e.,

swimming, surfing, etc.) near storm drains flowing to coastal beach waters. Such flows from urban areas often result in the posting or closure of local beaches.

Pollutants transported to receiving waters by urban runoff can also enter the food chain. Once in the food chain they can "bioaccumulate" in the tissues of invertebrates (e.g., mussels, oysters, and lobsters) and fish which may be eventually consumed by humans. Furthermore, some pollutants are also known to "biomagnify". This phenomenon can result in pollutant concentrations in the body fat of top predators that are millions of times greater than the concentrations in the tissues of their lower trophic (food chain) counterparts or in ambient waters.

7. **POLLUTANT TYPES:** The most common categories of pollutants in urban runoff include total suspended solids, sediment (due to anthropogenic activities); pathogens (e.g., bacteria, viruses, protozoa); heavy metals (e.g., copper, lead, zinc and cadmium); petroleum products and polynuclear aromatic hydrocarbons; synthetic organics (e.g., pesticides, herbicides, and PCBs); nutrients (e.g., nitrogen and phosphorus fertilizers), oxygen-demanding substances (decaying vegetation, animal waste), and trash.

8. **URBAN STREAMS AS AN MS4 COMPONENT:** Historic and current development make use of natural drainage patterns and features as conveyances for urban runoff. Urban streams used in this manner are part of the municipalities MS4 regardless of whether they are natural, man-made, or partially modified features. In these cases, the urban stream is both an MS4 and a receiving water.

9. **URBAN RUNOFF CAUSES BENEFICIAL USE IMPAIRMENT**: Individually and in combination, the discharge of pollutants and increased flows from MS4s can cause or threaten to cause a condition of pollution (i.e., unreasonable impairment of water quality for designated beneficial uses), contamination, or nuisance. The discharge of pollutants from MS4s can cause the concentration of pollutants to exceed applicable receiving water quality objectives and impair or threaten to impair designated beneficial uses.

10. **COPERMITTEES IMPLEMENT URBAN RUNOFF MANAGEMENT PROGRAMS (URMPs):** Copermittee implementation of Urban Runoff Management Programs (URMPs) designed to reduce discharges of pollutants and flow into and from MS4s to the maximum extent practicable (MEP) can protect receiving water quality by promoting attainment of water quality objectives necessary to support designated beneficial uses. To be most effective, URMPs must contain both structural and non-structural best management practices (BMPs).

11. **BEST MANAGEMENT PRACTICES (BMPs):** Pollutants can be effectively reduced in urban runoff by the application of a combination of pollution prevention, source control, and treatment control BMPs. Source control BMPs (both structural and non-structural) minimize the contact between pollutants and flows (e.g., rerouting run-on around pollutant sources or keeping pollutants on-site and out of receiving waters). Treatment control (or structural) BMPs remove pollutants from urban runoff. Where feasible, use of BMPs which utilize natural processes should be assessed. These types of BMPs, such as grassy swales and constructed wetlands, can frequently be as effective as less natural BMPs, while providing additional benefits such as aesthetics and habitat.

12. **POLLUTION PREVENTION**: Pollution prevention, the initial reduction/elimination of pollutant generation at its source, is the best "first line of defense" for Copermittees and should be used in conjunction with source control and treatment control BMPs. Pollutants that are never generated do not have to be controlled or treated. Encouragement during planning processes of the use of pollution prevention BMPs can be an effective means for pollution prevention BMPs to be implemented, through such methods as education, landscaping, etc.

13. **RECEIVING WATER LIMITATIONS:** Compliance with receiving water limits based on applicable water quality objectives is necessary to ensure that MS4 discharges will not cause or contribute to violations of water quality objectives and the creation of conditions of pollution.

14. **RECEIVING WATER LIMITATION COMPLIANCE STRATEGY**: Implementation of BMPs cannot ensure attainment of receiving water quality objectives under all circumstances; some BMPs may not prove to be as effective as anticipated. An iterative process of BMP development, implementation, monitoring, and assessment is necessary to assure that an Urban Runoff Management Program is sufficiently comprehensive and effective to achieve compliance with receiving water quality objectives.

15. **COPERMITTEES' RESPONSIBILITY FOR ILLICIT DISCHARGES FROM THIRD PARTIES:** As operators of MS4s, the Copermittees cannot passively receive and discharge pollutants from third parties. By providing free and open access to an MS4 that conveys discharges to the waters of the United States, the operator of an MS4 that does not prohibit and/or control discharges into its system essentially accepts responsibility for those discharges.

16. **COPERMITTEES' RESPONSIBILITY BASED ON LAND USE AUTHORITY**: Utilizing their land use authority, Copermittees authorize and realize benefits from the urban development which generates the pollutants and runoff that impair receiving waters. Since the Copermittees utilize their legal authority to authorize urbanization, they must also exercise their legal authority to ensure that the resulting increased pollutant loads and flows do not further degrade receiving waters.

17. **THREE PHASES OF URBAN DEVELOPMENT**: Urban development has three major phases: (1) land use planning for new development; (2) construction; and (3) the "use" or existing development phase. Because the Copermittees authorize, permit, and profit from each of these phases, and because each phase has a profound impact on water quality, the Copermittees have commensurate responsibilities to protect water quality during each phase.

    In other words, Copermittees are held responsible for the short and long-term water quality consequences of their land use planning, construction, and existing development decisions.

18. **PLANNING PHASE FOR NEW DEVELOPMENT**: Because land use planning and zoning is where urban development is conceived, it is the phase in which the greatest and most cost-effective opportunities to protect water quality exists. When a Copermittee incorporates policies and principles designed to safeguard water resources into its General Plan and development project approval processes, it has taken a far-reaching step towards the preservation of local water resources for future generations.

19. **CONSTRUCTION PHASE**: Construction activities are a significant cause of receiving water impairment. Siltation is currently the largest cause of river impairment in the United States. Sediment runoff rates from construction sites greatly exceed natural erosion rates of undisturbed lands causing siltation and impairment of receiving waters. In addition to requiring implementation of the full range of BMPs, an effective construction runoff program must include local plan review, permit conditions, field inspections, and enforcement.

20. **EXISTING DEVELOPMENT:** The Copermittees' wet weather monitoring results collected during the past decade, as well as volumes of other references in the literature today, confirm substantial pollutant loads to receiving waters in runoff from existing urban development. Implementation of jurisdictional and watershed URMPs, which include extensive controls on existing development, can reduce pollutant loadings over the long term.

21. **CHANGES NEEDED**: Because the urbanization process is a direct and leading cause of water quality degradation in this Region, fundamental changes to existing policies and

practices about urban development are needed if the beneficial uses of San Diego's natural water resources are to be protected.

22. **DUAL REGULATION OF INDUSTRIAL AND CONSTRUCTION SITES:** Discharges of runoff from industrial and construction sites in this Region are subject to dual (state and local) regulation. (1) All industries and construction sites are subject to the local permits, plans, and ordinances of the municipal jurisdiction in which it is located. Pursuant to this Order, local (storm water, grading, construction, and use) permits, plans, and ordinances must (a) prohibit the discharge of pollutants and non-storm water into the MS4; and (b) require the routine use of BMPs to reduce pollutants in site runoff. (2) Many industries and construction sites are also subject to regulation under the statewide General Industrial Storm Water Permit or statewide General Construction Storm Water Permit[1]. These statewide general permits are adopted by the State Water Resources Control Board and enforced by the nine Regional Water Quality Control Boards throughout California. Like the Copermittees' local permits and ordinances, the statewide General Industrial and Construction Permits also (a) prohibit the discharge of pollutants and non-storm water; and (b) require the routine use of BMPs to reduce pollutants in site runoff.

    Recognizing that both authorities share a common goal, the federal storm water regulations at 40 CFR 122.26 (and its preamble) call for the dual system to ensure the most effective oversight of industrial and construction site discharges. Under this dual system, each municipal Copermittee is responsible for enforcing its local permits, plans, and ordinances within its jurisdiction. Similarly, the SDRWQCB is responsible for enforcing both statewide general permits and this Order within the San Diego Region.

23. **EDUCATION:** Education is the foundation of every effective URMP and the basis for changes in behavior at a societal level. Education of municipal planning, inspection, and maintenance department staffs is especially critical to ensure that in-house staffs understand how their activities impact water quality, how to accomplish their jobs while protecting water quality, and their specific roles and responsibilities for compliance with this Order. Public education, designed to target various urban land users and other audiences, is also essential to inform the public of how individual actions impact receiving water quality and how these impacts can be minimized.

24. **ENFORCING LOCAL LEGAL AUTHORITY**: Enforcement of local urban runoff related ordinances, permits, and plans is an essential component of every URMP and is specifically required in the federal storm water regulations and this Order. Routine inspections provide an effective means by which Copermittees can evaluate compliance with their permits and ordinances. Inspections are especially important at high-risk areas for pollutant discharges such as industrial and construction sites.

    When industrial or construction site discharges occur in violation of local permits and ordinances, the SDRWQCB looks to the municipality that has authorized the discharge for appropriate actions (typically education followed by enforcement where education has been unsuccessful). Each Copermittee must also provide enforcement against illegal discharges from other land uses it has authorized, such as commercial and residential developments.

[1] The "statewide General Industrial Storm Water Permit" refers to State Water Resources Control Board Water Quality Order No. 97-03-DWQ National Pollutant Discharge Elimination System General Permit No. CAS000001, Waste Discharge Requirements for Discharges of Storm Water Associated with Industrial Activities Excluding Construction Activities. The "statewide General Construction Storm Water Permit" refers to State Water Resources Control Board Order No. 99-08-DWQ National Pollutant Discharge Elimination System General Permit No. CAS000002, Waste Discharge Requirements for Discharges of Storm Water Runoff Associated with Construction Activity.

25. **PUBLIC PARTICIPATION:** Public participation during the URMP development process is necessary to ensure that all stakeholder interests and a variety of creative solutions are considered.

26. **TOXICITY**: Urban runoff discharges from MS4s often contain pollutants that cause toxicity, (i.e., adverse responses of organisms to chemicals or physical agents ranging from mortality to physiological responses such as impaired reproduction or growth anomalies). The water quality objectives for toxicity provided in the Water Quality Control Plan, San Diego Basin, Region 9, (Basin Plan), state in part *"All waters shall be free of toxic substances in concentrations that are toxic to, or that produce detrimental physiological responses in human, plant, animal, or aquatic life….The survival of aquatic life in surface waters subjected to a waste discharge or other controllable water quality factors, shall not be less than that for the same water body in areas unaffected by the waste discharge…"* Urban runoff discharges from MS4s are considered toxic when (1) the toxic effect observed in an acute toxicity test exceeds zero Toxic Units Acute (TUa=0); or (2) the toxic effect observed in a chronic toxicity test exceeds one Toxic Unit Chronic (TUc=1).

27. **FOCUS ON MAN-MADE POLLUTANTS AND FLOWS:** The focus of this Order is on the control of urban runoff pollutants and flows which are either generated or accelerated by human activities. This Order is not meant to control background or naturally occurring pollutants and flows.

28. **COMMON WATERSHEDS AND CWA SECTION 303(d) IMPAIRED WATERS**: The Copermittees discharge urban runoff into lakes, drinking water reservoirs, rivers, streams, creeks, bays, estuaries, coastal lagoons, the Pacific Ocean, and tributaries thereto within ten of the eleven hydrologic units (watersheds) comprising the San Diego Region as shown in Table 2 below. During its downstream course, urban runoff is conveyed through lined and unlined (natural, manmade, and partially modified) channels, all of which are defined as components of the Copermittees' MS4.

    Some of the receiving water bodies, which receive or convey urban runoff discharges, have been designated as impaired by the SDRWQCB and USEPA in 1998 pursuant to Clean Water Act section 303(d). Also shown below are the watershed management areas (WMAs) as defined in the SDRWQCB report, Watershed Management Approach, January 2000.

Table 2. Watershed Management Areas (WMAs)

SDRWQCB WATERSHED MANAGEMENT AREA (WMA)	HYDROLOGIC UNIT(S)	MAJOR SURFACE WATER BODIES	303(d) POLLUTANT(S) OF CONCERN OR WATER QUALITY EFFECT	COPERMITTEES
Santa Margarita River	Santa Margarita (902.00)	Santa Margarita River and Estuary, Pacific Ocean	1. Coliform Bacteria 2. Nutrients	1. County of San Diego
San Luis Rey River	San Luis Rey (903.00)	San Luis Rey River and Estuary, Pacific Ocean	1. Coliform Bacteria 2. Nutrients	1. City of Escondido 2. City of Oceanside 3. City of Vista 4. County of San Diego
Carlsbad	Carlsbad (904.00)	Batiquitos Lagoon San Elijo Lagoon Agua Hedionda Lagoon Buena Vista Lagoon And Tributary Streams Pacific Ocean	1. Coliform Bacteria 2. Nutrients 3. Sediment	1. City of Carlsbad 2. City of Encinitas 3. City of Escondido 4. City of Oceanside 5. City of San Marcos 6. City of Solana Beach 7. City of Vista 8. County of San Diego
San Dieguito River	San Dieguito (905.00)	San Dieguito River and Estuary, Pacific Ocean	1. Coliform Bacteria	1. City of Del Mar 2. City of Escondido 3. City of Poway 4. City of San Diego 5. City of Solana Beach

SDRWQCB WATERSHED MANAGEMENT AREA (WMA)	HYDROLOGIC UNIT(S)	MAJOR SURFACE WATER BODIES	303(d) POLLUTANT(S) OF CONCERN OR WATER QUALITY EFFECT	COPERMITTEES
				6. County of San Diego
Mission Bay	Peñasquitos (906.00)	Los Peñasquitos Lagoon Mission Bay, Pacific Ocean	1. Coliform Bacteria 2. Metals 3. Nutrients 4. Sediment	1. City of Del Mar 2. City of Poway 3. City of San Diego 4. County of San Diego
San Diego River	San Diego (907.00)	San Diego River, Pacific Ocean	1. Coliform Bacteria	1. City of El Cajon 2. City of La Mesa 3. City of Poway 4. City of San Diego 5. City of Santee 6. County of San Diego
San Diego Bay	Pueblo San Diego (908.00) Sweetwater (909.00) Otay (910.00)	San Diego Bay Sweetwater River Otay River Pacific Ocean	1. Coliform Bacteria 2. Metals 3. Toxicity 4. Benthic Community Degradation	1. City of Chula Vista 2. City of Coronado 3. City of Imperial Beach 4. City of La Mesa 5. City of Lemon Grove 6. City of National City 7. City of San Diego 8. County of San Diego 9. San Diego Unified Port District
Tijuana River	Tijuana (911.00)	Tijuana River and Estuary Pacific Ocean	1. Coliform Bacteria 2. Low Dissolved Oxygen 3. Metals 4. Nutrients 5. Pesticides 6. Synthetic Organics 7. Total Dissolved Solids 8. Trash	1. City of Imperial Beach 2. City of San Diego 3. County of San Diego

29. **CUMULATIVE POLLUTANT LOAD CONTRIBUTIONS:** Because they are interconnected, each MS4 within a watershed contributes to the cumulative pollutant loading, volume, and velocity of urban runoff and the ensuing degradation of downstream receiving water bodies. Accordingly, inland MS4s contribute to coastal impairments.

30. **LAND USE PLANNING ON A WATERSHED SCALE**: Because urban runoff does not recognize political boundaries, "watershed-based" land use planning (pursued collaboratively by neighboring local governments) can greatly enhance the protection of shared natural water resources. Such planning enables multiple jurisdictions to work together to plan for both development and resource conservation that can be environmentally as well as economically sustainable.

31. **INTERGOVERNMENTAL COORDINATION:** Within their common watersheds it is essential for the Copermittees to coordinate their water quality protection and land use planning activities to achieve the greatest protection of receiving water bodies. Copermittee coordination with other watershed stakeholders, especially Caltrans, the Department of Defense, and Native American Tribes, is also critical.

    Establishment of a management structure, within which the Copermittees subject to this Order, will fund and coordinate those aspects of their joint obligations will promote implementation of Urban Runoff Management Programs on a watershed and regional basis in the most cost effective manner.

32. **WASTE REMOVAL:** Waste and pollutants which are deposited and accumulate in MS4 drainage structures will be discharged from these structures to waters of the United States unless they are removed. These discharges may cause or contribute to, or threaten to cause or contribute to, a condition of pollution in receiving waters. Once removed, such accumulated wastes must be characterized and lawfully disposed.

33. **TOXIC HOT SPOTS**: Urban runoff is a significant contributor to the creation and persistence of Toxic Hot Spots in San Diego Bay. California Water Code section 13395 requires regional boards to reevaluate waste discharge requirements (WDRs) associated with toxic hot spots. The State Water Resources Control Board (SWRCB) adopted the Consolidated Toxic Hot Spot Cleanup Plan in June 1999. The Plan states: "The reevaluation [of WDRs associated with toxic hot spots] shall consist of (1) an assessment of the WDRs that may influence the creation or further pollution of the known toxic hot spot, (2) an assessment of which WDRs need to be modified to improve environmental conditions at the known toxic hot spot, and (3) a schedule for completion of any WDR modifications deemed appropriate."

34. **CHANGING THE STORM WATER MANAGEMENT APPROACH**: In contrast to the conventional "conveyance" approach, a more natural approach to storm water management seeks to filter and infiltrate runoff by allowing it to flow slowly over permeable vegetated surfaces. By "preserving and restoring the natural hydrologic cycle", filtration and infiltration can greatly reduce the volume/peak rate, velocity, and pollutant loads of urban runoff. The greatest opportunities for changing from a "conveyance" to a more natural management approach occur during the land use planning and zoning processes and when new development projects are under early design.

35. **INFILTRATION AND POTENTIAL GROUNDWATER CONTAMINATION:** Any drainage feature that infiltrates runoff poses some risk of potential groundwater contamination. Although dependent on several factors, the risks typically associated with properly managed infiltration of runoff (especially from residential land use areas) are not significant. The risks associated with infiltration can be managed by many techniques, including (1) designing landscape drainage features that promote infiltration of runoff, but do not "inject" runoff (injection bypasses the natural processes of filtering and transformation that occur in the soil); (2) taking reasonable steps to prevent the illegal disposal of wastes; and (3) ensuring that each drainage feature is adequately maintained in perpetuity. Minimum conditions needed to protect groundwater are specified in section F.1.b. of this Order.

36. **VECTOR CONTROL:** Certain BMPs implemented or required by municipalities for urban runoff management may create a habitat for vectors (e.g. mosquitoes and rodents) if not properly designed or maintained. Close collaboration and cooperative effort between municipalities and local vector control agencies and the State Department of Health Services during the development and implementation of the Urban Runoff Management Programs is necessary to minimize nuisances and public health impacts resulting from vector breeding.

37. **LEGAL AUTHORITY:** This Order is based on the federal Clean Water Act, the Porter-Cologne Water Quality Control Act (Division 7 of the Water Code, commencing with Section 13000), applicable state and federal regulations, all applicable provisions of statewide Water Quality Control Plans and Policies adopted by the State Water Resources Control Board, the Regional Water Quality Control Plan (Basin Plan) adopted by the Regional Board, the California Toxics Rule, and the California Toxics Rule Implementation Plan.

38. **TOTAL MAXIMUM DAILY LOADS (TMDLs):** 40 CFR 122.44 (d)(vii)(B) requires that NPDES permits contain effluent limitations that are consistent with waste load allocations developed under a TMDL. Several TMDLs are being developed in the San Diego Region for impaired waterbodies that receive Copermittees' discharge. Once these TMDLs are approved by the SDRWQCB and USEPA, Copermittees' discharge of urban runoff into an impaired waterbody will be subject to load allocations established by the TMDLs.

39. **ANTIDEGRADATION:** Conscientious implementation of URMPs that satisfy the requirements contained in this Order will reduce the likelihood that discharges from MS4s will cause or contribute to unreasonable degradation of the quality of receiving waters. Therefore, this Order is in conformance with SWRCB Resolution No. 68-16 and the federal antidegradation policy described in 40 CFR 131.12.

40. **CEQA:** The issuance of waste discharge requirements for the discharge of urban runoff from MS4s to waters of the United States is exempt from the requirement for preparation of environmental documents under the California Environmental Quality Act (CEQA) (Public Resources Code, Division 13, Chapter 3, § 21000 et seq.) in accordance with the CWC § 13389.

41. **PUBLIC NOTICE:** The SDRWQCB has notified the Copermittees, all known interested parties, and the public of its intent to consider adoption of an order prescribing waste discharge requirements that would serve to renew an NPDES permit for the existing discharge of urban runoff.

42. **PUBLIC HEARING**: The SDRWQCB has, at a public meeting on December 13, 2000, held a public hearing and heard and considered all comments pertaining to the terms and conditions of this Order.

IT IS HEREBY ORDERED that the Copermittees, in order to meet the provisions contained in Division 7 of the California Water Code and regulations adopted thereunder, and the provisions of the Clean Water Act and regulations adopted thereunder, shall each comply with the following:

A. PROHIBITIONS -- DISCHARGES

1. Discharges into and from MS4s in a manner causing, or threatening to cause, a condition of pollution, contamination, or nuisance (as defined in CWC § 13050), in waters of the state are prohibited.

2. Discharges from MS4s which cause or contribute to exceedances of receiving water quality objectives for surface water or groundwater are prohibited.

3. Discharges from MS4s containing pollutants which have not been reduced to the maximum extent practicable (MEP) are prohibited.

4. Applicable to New Development and Redevelopment:
   Post-development runoff containing pollutants loads which cause or contribute to an exceedance of receiving water quality objectives or which have not been reduced to the maximum extent practicable is prohibited.

5. In addition to the above prohibitions, discharges from MS4s are subject to all Basin Plan prohibitions cited in **Attachment A** to this Order.

B. PROHIBITIONS -- NON-STORM WATER DISCHARGES

1. Each Copermittee shall effectively prohibit **all** types of non-storm water discharges into its Municipal Separate Storm Sewer System (MS4) unless such discharges are either authorized by a separate NPDES permit; or not prohibited in accordance with B.2. and B.3. below.

2. Pursuant to 40 CFR 122.26(d)(2)(iv)(B)(1), the following categories of non-storm water discharges need only be prohibited from entering an MS4 if such categories of discharges are identified by the Copermittee as a significant source of pollutants to waters of the United States:

   a. Diverted stream flows;
   b. Rising ground waters;
   c. Uncontaminated ground water infiltration [as defined at 40 CFR 35.2005(20)] to MS4s;
   d. Uncontaminated pumped ground water;
   e. Foundation drains;
   f. Springs;
   g. Water from crawl space pumps;
   h. Footing drains;
   i. Air conditioning condensation;
   j. Flows from riparian habitats and wetlands;

k. Water line flushing;
l. Landscape irrigation;
m. Discharges from potable water sources other than water main breaks;
n. Irrigation water;
o. Lawn watering;
p. Individual residential car washing; and
q. Dechlorinated swimming pool discharges.

3. When a discharge category above is identified as a significant source of pollutants to waters of the United States, the Copermittee shall either:

   a. Prohibit the discharge category from entering its MS4; ***OR***

   b. Not prohibit the discharge category and implement, or require the responsible party(ies) to implement, BMPs which will reduce pollutants to the MEP; ***AND***

   c. For each discharge category not prohibited, the Copermittee shall submit the following information to the SDRWQCB within **365 days** of adoption of this Order:

      (1) The non-storm water discharge category listed above which the Copermittee elects not to prohibit; and

      (2) The BMP(s) for each discharge category listed above which the Copermittee will implement, or require the responsible party(ies) to implement, to prevent or reduce pollutants to the MEP.

4. **Fire Fighting Flows:** Emergency fire fighting flows (i.e., flows necessary for the protection of life or property) do not require BMPs and need not be prohibited. As part of the Jurisdictional URMP, each Copermittee shall develop and implement a program within 365 days of adoption of this Order to reduce pollutants from non-emergency fire fighting flows (i.e., flows from controlled or practice blazes and maintenance activities) identified by the Copermittee to be significant sources of pollutants to waters of the United States.

5. **Dry Weather Analytical Monitoring and Non-Storm Water Discharges:** Each Copermittee shall examine all dry weather analytical monitoring results collected in accordance with section F.5. and Attachment E of this Order to identify water quality problems which may be the result of any non-prohibited discharge category(ies) identified above in Non-Storm Water Discharges to MS4s Prohibition B.2. Follow-up investigations shall be conducted as necessary to identify and control any non-prohibited discharge category(ies) listed above.

C. RECEIVING WATER LIMITATIONS

1. Discharges from MS4s that cause or contribute to the violation of water quality standards (designated beneficial uses and water quality objectives developed to protect beneficial uses) are prohibited.

2. Each Copermittee shall comply with Part C.1, Part A.2, and Part A.5 as it applies to Prohibition 5 in Attachment A of this Order through timely implementation of control measures and other actions to reduce pollutants in urban runoff discharges in accordance with the Jurisdictional Urban Runoff Management Program (Jurisdictional URMP) and other requirements of this Order including any modifications. The Jurisdictional URMP shall be designed to achieve compliance with Part C.1, Part A.2, and Part A.5 as it applies to Prohibition 5 in Attachment A of this Order. If exceedance(s) of water quality standards persist notwithstanding implementation of the URMP and other requirements of this Order, the Copermittee shall assure compliance with Part C.1, Part A.2, and Part A.5 as it applies to Prohibition 5 in Attachment A of this Order by complying with the following procedure:

a. Upon a determination by either the Copermittee or the SDRWQCB that MS4 discharges are causing or contributing to an exceedance of an applicable water quality standard, the Copermittee shall promptly notify and thereafter submit a report to the SDRWQCB that describes BMPs that are currently being implemented and additional BMPs that will be implemented to prevent or reduce any pollutants that are causing or contributing to the exceedance of water quality standards. The report may be incorporated in the annual update to the Jurisdictional URMP unless the SDRWQCB directs an earlier submittal. The report shall include an implementation schedule. The SDRWQCB may require modifications to the report;

b. Submit any modifications to the report required by the SDRWQCB within 30 days of notification;

c. Within 30 days following approval of the report described above by the SDRWQCB, the Copermittee shall revise its Jurisdictional URMP and monitoring program to incorporate the approved modified BMPs that have been and will be implemented, the implementation schedule, and any additional monitoring required;

d. Implement the revised Jurisdictional URMP and monitoring program in accordance with the approved schedule.

So long as the Copermittee has complied with the procedures set forth above and are implementing the revised Jurisdictional URMP, the Copermittee does not have to repeat the same procedure for continuing or recurring exceedances of the same receiving water limitations unless directed by the SDRWQCB to do so.

3. Nothing in this section shall prevent the SDRWQCB from enforcing any provision of this Order while the Copermittee prepares and implements the above report.

D. LEGAL AUTHORITY

1. Each Copermittee shall establish, maintain, and enforce adequate legal authority to control pollutant discharges **into** and **from** its MS4 through ordinance, statute, permit, contract or similar means. This legal authority must, at a minimum, authorize the Copermittee to:

   a. Control the contribution of pollutants in discharges of runoff associated with industrial and construction activity **to** its MS4 and control the quality of runoff **from** industrial and construction sites. This requirement applies both to industrial and construction sites which have coverage under the statewide general industrial or construction storm water permits, as well as to those sites which do not. Grading ordinances shall be upgraded and enforced as necessary to comply with this Order.

   b. Prohibit **all** identified illicit discharges not otherwise allowed pursuant to section B.2 including but not limited to:

      (1) Sewage;

      (2) Discharges of wash water resulting from the hosing or cleaning of gas stations, auto repair garages, or other types of automotive services facilities;

      (3) Discharges resulting from the cleaning, repair, or maintenance of any type of equipment, machinery, or facility including motor vehicles, cement-related equipment, and port-a-potty servicing, etc.;

      (4) Discharges of wash water from mobile operations such as mobile automobile washing, steam cleaning, power washing, and carpet cleaning, etc.;

(5) Discharges of wash water from the cleaning or hosing of impervious surfaces in municipal, industrial, commercial, and residential areas including parking lots, streets, sidewalks, driveways, patios, plazas, work yards and outdoor eating or drinking areas, etc.;

(6) Discharges of runoff from material storage areas containing chemicals, fuels, grease, oil, or other hazardous materials;

(7) Discharges of pool or fountain water containing chlorine, biocides, or other chemicals; discharges of pool or fountain filter backwash water;

(8) Discharges of sediment, pet waste, vegetation clippings, or other landscape or construction-related wastes; and

(9) Discharges of food-related wastes (e.g., grease, fish processing, and restaurant kitchen mat and trash bin wash water, etc.).

c. Prohibit and eliminate illicit connections to the MS4;

d. Control the discharge of spills, dumping, or disposal of materials other than storm water to its MS4;

e. Require compliance with conditions in Copermittee ordinances, permits, contracts or orders (i.e., hold dischargers to its MS4 accountable for their contributions of pollutants and flows);

f. Utilize enforcement mechanisms to require compliance with Copermittee storm water ordinances, permits, contracts, or orders;

g. Control the contribution of pollutants from one portion of the shared MS4 to another portion of the MS4 through interagency agreements among Copermittees. Control of the contribution of pollutants from one portion of the shared MS4 to another portion of the MS4 through interagency agreements with other owners of the MS4 such as Caltrans, the Department of Defense, or Native American Tribes is encouraged.;

h. Carry out all inspections, surveillance, and monitoring necessary to determine compliance and noncompliance with local ordinances and permits and with this Order, including the prohibition on illicit discharges to the MS4. This means the Copermittee must have authority to enter, sample, inspect, review and copy records, and require regular reports from industrial facilities discharging into its MS4, including construction sites; and

i. Require the use of best management practices (BMPs) to prevent or reduce the discharge of pollutants to MS4s.

2. Within **180 days** of adoption of this Order, each Copermittee shall provide to the SDRWQCB a statement certified by its chief legal counsel that the Copermittee has adequate legal authority to implement and enforce each of the requirements contained in 40 CFR 122.26(d)(2)(i)(A-F) and this Order. This statement shall include:

a. Identification of all departments within the jurisdiction that conduct urban runoff related activities, and their roles and responsibilities under this Order. Include an up to date organizational chart specifying these departments and key personnel.

b. Citation of urban runoff related ordinances and the reasons they are enforceable;

c. Identification of the local administrative and legal procedures available to mandate compliance with urban runoff related ordinances and therefore with the conditions of this

Order;

d. Description of how these ordinances are implemented and appealed; and

e. Description of whether the municipality can issue administrative orders and injunctions or if it must go through the court system for enforcement actions.

E. TECHNOLOGY BASED STANDARDS

Each Copermittee shall implement, or require implementation of, best management practices to ensure that the following pollutant discharges **into** and **from** its MS4 are reduced to the applicable technology based standard as specified below:

Table 3. Technology Based Standards[2]

POLLUTANT DISCHARGE FROM	DESCRIPTION	APPLICABLE PERFORMANCE STANDARD
Industrial Activity owned by the Copermittee	Categorical Industry in 40 CFR 122.26	BAT/BCT (pursuant to Statewide General Industrial Permit)
Industrial Activity	All other industry	MEP
Construction Activity owned by the Copermittee	Greater than or Equal to 5 Acres (or less than 5 acres and Part of a Larger Common Plan of Sale or Development)	BAT/BCT (pursuant to Statewide General Construction Permit)
Construction Activity	All Other construction	MEP
Other Sources	All Other Land Use Activities	MEP
MS4s	All discharges from MS4s	MEP

F. JURISDICTIONAL URBAN RUNOFF MANAGEMENT PROGRAM`

Each Copermittee shall take appropriate actions to reduce discharges of pollutants and runoff flow during each of the three major phases of urban development, i.e., the planning, construction, and existing development (or use) phases.

Each Copermittee shall implement a Jurisdictional Urban Runoff Management Program (Jurisdictional URMP) that contains the components shown below as described in Sections F.1. through F.8:

F.1. Land-Use Planning for New Development and Redevelopment Component
F.2. Construction Component
F.3. Existing Development Component
- **a. Municipal**
- **b. Industrial**
- **c. Commercial**
- **d. Residential**

F.4. Education Component
F.5. Illicit Discharge Detection and Elimination Component
F.6. Public Participation Component
F.7. Assessment of Jurisdictional URMP Effectiveness Component
F.8. Fiscal Analysis Component

[2] Pursuant to this Order, each Copermittee shall ensure that pollutants in runoff from industrial and construction sites within its jurisdiction have been reduced to the MEP standard before entering its MS4. The industrial and construction site dischargers themselves however must ensure that pollutants in runoff leaving their sites have been reduced to the BAT/BCT standard pursuant to either the statewide General Industrial or Construction Storm Water Permit. Runoff from industrial and construction sites owned by municipalities and subject to either the General Industrial or Construction Storm Water Permits, must meet the BAT/BCT standard.

F.1. Land-Use Planning for New Development and Redevelopment Component

Each Copermittee shall minimize the short and long-term impacts on receiving water quality from new development and redevelopment. In order to reduce pollutants and runoff flows from new development and redevelopment to the maximum extent practicable, each Copermittee shall at a minimum:

F.1.a Assess General Plan
F.1.b Modify Development Project Approval Processes
F.1.c Revise Environmental Review Processes
F.1.d Conduct Education Efforts Focused on New Development and Redevelopment

F.1.a. Assess General Plan

Each Copermittee's General Plan or equivalent plan (e.g., Comprehensive, Master, or Community Plan) shall include water quality and watershed protection principles and policies to direct land-use decisions and require implementation of consistent water quality protection measures for development projects. As part of its Jurisdictional Urban Runoff Management Program document, each Copermittee shall provide a workplan with time schedule detailing any changes to its General Plan regarding water quality and watershed protection. Examples of water quality and watershed protection principles and policies to be considered include the following:

(1) Minimize the amount of impervious surfaces and directly connected impervious surfaces in areas of new development and redevelopment and where feasible slow runoff and maximize on-site infiltration of runoff.

(2) Implement pollution prevention methods supplemented by pollutant source controls and treatment. Use small collection strategies located at, or as close as possible to, the source (i.e., the point where water initially meets the ground) to minimize the transport of urban runoff and pollutants offsite and into an MS4.

(3) Preserve, and where possible, create or restore areas that provide important water quality benefits, such as riparian corridors, wetlands, and buffer zones. Encourage land acquisition of such areas.

(4) Limit disturbances of natural water bodies and natural drainage systems caused by development including roads, highways, and bridges.

(5) Prior to making land use decisions, utilize methods available to estimate increases in pollutant loads and flows resulting from projected future development. Require incorporation of structural and non-structural BMPs to mitigate the projected increases in pollutant loads and flows.

(6) Avoid development of areas that are particularly susceptible to erosion and sediment loss; or establish development guidance that identifies these areas and protects them from erosion and sediment loss.

(7) Reduce pollutants associated with vehicles and increasing traffic resulting from development. Coordinate local traffic management reduction efforts with the San Diego County Congestion Management Plan.

(8) Implement the San Diego Association of Government's (SANDAG's) recommendations as found in the Water Quality Element of its Regional Growth Management Strategy.

(9) Post-development runoff from a site shall not contain pollutant loads which cause or contribute to an exceedance of receiving water quality objectives or which have not been reduced to the maximum extent practicable.

F.1.b. Modify Development Project Approval Processes

Prior to project approval and issuance of local permits, Copermittees shall require each proposed project to implement measures to ensure that pollutants and runoff from the development will be reduced to the maximum extent practicable and will not cause or contribute to an exceedance of receiving water quality objectives. Each Copermittee shall further ensure that all development will be in compliance with Copermittee storm water ordinances, local permits, all other applicable ordinances and requirements, and this Order.

(1) Development Project Requirements

Each Copermittee shall include development project requirements in local permits to ensure that pollutant discharges and runoff flows from development are reduced to the maximum extent practicable and that receiving water quality objectives are not violated throughout the life of the project. Such requirements shall, at a minimum:

(a) Require project proponent to implement source control BMPs for all applicable development projects.
(b) Require project proponent to implement site design/landscape characteristics where feasible which maximize infiltration, provide retention, slow runoff, and minimize impervious land coverage for all development projects.
(c) Require project proponent to implement buffer zones for natural water bodies, where feasible. Where buffer zone implementation is infeasible, require project proponent to implement other buffers such as trees, lighting restrictions, access restrictions, etc.
(d) Require industrial applicants subject to California's statewide General NPDES Permit for Storm Water Discharges Associated with Industrial Activities (Except Construction), (hereinafter General Industrial Permit), to provide evidence of coverage under the General Industrial Permit.
(e) Require project proponent to ensure its grading or other construction activities meet the provisions specified in Section F.2. of this Order.
(f) Require project proponent to provide proof of a mechanism which will ensure ongoing long-term maintenance of all structural post-construction BMPs.

(2) Standard Urban Storm Water Mitigation Plans (SUSMPs)

Within 365 days of adoption of this Order, the Copermittees shall collectively develop a model Standard Urban Storm Water Mitigation Plan (SUSMP) to reduce pollutants and runoff flows from all new development and significant redevelopment projects falling under the priority project categories or locations listed in section F.1.b.(2)(a) below. Within 180 days of approval of the model SUSMP in the public process by the SDRWQCB, each Copermittee shall adopt its own local SUSMP, and amended ordinances consistent with the approved model SUSMP, and shall submit both (local SUSMP and amended ordinances) to the SDRWQCB.

Immediately following adoption of its local SUSMP, each Copermittee shall ensure that all new development and significant redevelopment projects falling under the priority project categories or locations listed in F.1.b.(2)(a) below meet SUSMP requirements. The SUSMP requirements shall apply to all priority projects or phases of priority projects which have not yet begun grading or construction activities. If a Copermittee determines that lawful prior approval of a project exists, whereby application of SUSMP requirements to the project is infeasible, SUSMP requirements need not apply to the project. Where feasible, the Copermittees shall utilize the 18 month SUSMP implementation period to ensure that

projects undergoing approval processes include application of SUSMP requirements in their plans.

(a) *Priority Development Project Categories - SUSMP requirements shall apply to all new development and significant redevelopment projects falling under the priority project categories or locations listed below.* Significant redevelopment is defined as the creation or addition of at least 5,000 square feet of impervious surfaces on an already developed site. Significant redevelopment includes, but is not limited to: the expansion of a building footprint or addition or replacement of a structure; structural development including an increase in gross floor area and/or exterior construction or remodeling; replacement of impervious surface that is not part of a routine maintenance activity; and land disturbing activities related with structural or impervious surfaces. Where significant redevelopment results in an increase of less than fifty percent of the impervious surfaces of a previously existing development, and the existing development was not subject to SUSMP requirements, the numeric sizing criteria discussed in section F.1.b.(2)(c) applies only to the addition, and not to the entire development.

i. *Home subdivisions of 100 housing units or more*. This category includes single-family homes, multi-family homes, condominiums, and apartments.

ii. *Home subdivisions of 10-99 housing units*. This category includes single-family homes, multi-family homes, condominiums, and apartments.

iii. *Commercial developments greater than 100,000 square feet*. This category is defined as any development on private land that is not for heavy industrial or residential uses where the land area for development is greater than 100,000 square feet. The category includes, but is not limited to: hospitals; laboratories and other medical facilities; educational institutions; recreational facilities; commercial nurseries; multi-apartment buildings; car wash facilities; mini-malls and other business complexes; shopping malls; hotels; office buildings; public warehouses; automotive dealerships; commercial airfields; and other light industrial facilities.

iv. *Automotive repair shops.* This category is defined as a facility that is categorized in any one of the following Standard Industrial Classification (SIC) codes: 5013, 5014, 5541, 7532-7534, or 7536-7539.

v. *Restaurants*. This category is defined as a facility that sells prepared foods and drinks for consumption, including stationary lunch counters and refreshment stands selling prepared foods and drinks for immediate consumption (SIC code 5812), where the land area for development is greater than 5,000 square feet.

vi. *All hillside development greater than 5,000 square feet.* This category is defined as any development which creates 5,000 square feet of impervious surface which is located in an area with known erosive soil conditions, where the development will grade on any natural slope that is twenty-five percent or greater.

vii. *Environmentally Sensitive Areas: All development and redevelopment located within or directly adjacent to or discharging directly to an environmentally sensitive area (where discharges from the development or redevelopment will enter receiving waters within the environmentally sensitive area), which either creates 2,500 square feet of impervious surface on a proposed project site or increases the area of imperviousness of a proposed project site to 10% or more of its naturally occurring condition.* Environmentally sensitive areas include but are not limited to all Clean Water Act Section 303(d) impaired water bodies;

areas designated as Areas of Special Biological Significance by the State Water Resources Control Board (Water Quality Control Plan for the San Diego Basin (1994) and amendments); water bodies designated with the RARE beneficial use by the State Water Resources Control Board (Water Quality Control Plan for the San Diego Basin (1994) and amendments); areas designated as preserves or their equivalent under the Multi Species Conservation Program within the Cities and County of San Diego; and any other equivalent environmentally sensitive areas which have been identified by the Copermittees. "Directly adjacent" means situated within 200 feet of the environmentally sensitive area. "Discharging directly to" means outflow from a drainage conveyance system that is composed entirely of flows from the subject development or redevelopment site, and not commingled with flows from adjacent lands.

viii. *Parking lots 5,000 square feet or more or with 15 or more parking spaces and potentially exposed to urban runoff*. Parking lot is defined as a land area or facility for the temporary parking or storage of motor vehicles used personally, for business, or for commerce.

ix. *Street, roads, highways, and freeways.* This category includes any paved surface which is 5,000 square feet or greater used for the transportation of automobiles, trucks, motorcycles, and other vehicles.

(b) BMP Requirements – The SUSMP shall include a list of recommended source control and structural treatment BMPs. The SUSMP shall require all new development and significant redevelopment projects falling under the above priority project categories or locations to implement a combination of BMPs selected from the recommended BMP list, including at a minimum (1) source control BMPs and (2) structural treatment BMPs. The BMPs shall, at a minimum:

i. Control the post-development peak storm water runoff discharge rates and velocities to maintain or reduce pre-development downstream erosion, and to protect stream habitat;
ii. Conserve natural areas where feasible;
iii. Minimize storm water pollutants of concern in urban runoff from the new development or significant redevelopment (through implementation of source control BMPs). Identification of pollutants of concern should include at a minimum consideration of any pollutants for which water bodies receiving the development's runoff are listed as impaired under Clean Water Act section 303(d), any pollutant associated with the land use type of the development, and any pollutant commonly associated with urban runoff;
iv. Remove pollutants of concern from urban runoff (through implementation of structural treatment BMPs);
v. Minimize directly connected impervious areas where feasible;
vi. Protect slopes and channels from eroding;
vii. Include storm drain stenciling and signage;
viii. Include properly designed outdoor material storage areas;
ix. Include properly designed trash storage areas;
x. Include proof of a mechanism, to be provided by the project proponent or Copermittee, which will ensure ongoing long-term structural BMP maintenance;
xi. Include additional water quality provisions applicable to individual priority project categories;
xii. Be correctly designed so as to remove pollutants to the maximum extent practicable;
xiii. Be implemented close to pollutant sources, when feasible, and prior to discharging into receiving waters supporting beneficial uses; and

xiv. Ensure that post-development runoff does not contain pollutant loads which cause or contribute to an exceedance of water quality objectives or which have not been reduced to the maximum extent practicable.

(c) Numeric Sizing Criteria – The SUSMP shall require structural treatment BMPs to be implemented for all priority development projects. All structural treatment BMPs shall be located so as to infiltrate, filter, or treat the required runoff volume or flow prior to its discharge to any receiving waterbody supporting beneficial uses. Structural treatment BMPs may be shared by multiple new development projects as long as construction of any shared structural treatment BMPs is completed prior to the use of any new development project from which the structural treatment BMP will receive runoff.

In addition to meeting the BMP requirements listed in item F.1.b.(2)(b) above, all structural treatment BMPs for a single priority development project shall collectively be sized to comply with the following numeric sizing criteria:

Volume

Volume-based BMPs shall be designed to mitigate (infiltrate, filter, or treat) either:

i. The volume of runoff produced from a 24-hour 85th percentile storm event, as determined from the local historical rainfall record (0.6 inch approximate average for the San Diego County area);[3] or
ii. The volume of runoff produced by the 85th percentile 24-hour rainfall event, determined as the maximized capture storm water volume for the area, from the formula recommended in Urban Runoff Quality Management, WEF Manual of Practice No. 23/ASCE Manual of Practice No. 87, (1998); or
iii. The volume of annual runoff based on unit basin storage volume, to achieve 90% or more volume treatment by the method recommended in California Stormwater Best Management Practices Handbook – Industrial/Commercial, (1993); or
iv. The volume of runoff, as determined from the local historical rainfall record, that achieves approximately the same reduction in pollutant loads and flows as achieved by mitigation of the 85th percentile 24-hour runoff event;[4]

OR

Flow

Flow-based BMPs shall be designed to mitigate (infiltrate, filter, or treat) either:

[3] This volume is not a single volume to be applied to all of San Diego County. The size of the 85th percentile storm event is different for various parts of the County. The Copermittees are encouraged to calculate the 85th percentile storm event for each of their jurisdictions using local rain data pertinent to their particular jurisdiction (the 0.6 inch standard is a rough average for the County and should only be used where appropriate rain data is not available). In addition, isopluvial maps contained in the County of San Diego Hydrology Manual may be used to extrapolate rainfall data to areas where insufficient data exists in order to determine the volume of the local 85th percentile storm event in such areas. Where the Copermittees will use isopluvial maps to determine the 85th percentile storm event in areas lacking rain data, the Copermittees shall describe their method for using isopluvial maps in the model and local SUSMPs.

[4] Under this volume criteria, hourly rainfall data may be used to calculate the 85th percentile storm event, where each storm event is identified by its separation from other storm events by at least six hours of no rain. Where the Copermittees may use hourly rainfall data to calculate the 85th percentile storm event, the Copermittees shall describe their method for using hourly rainfall data to calculate the 85th percentile storm event in the model and local SUSMPs.

i. The maximum flow rate of runoff produced from a rainfall intensity of 0.2 inch of rainfall per hour; or
ii. The maximum flow rate of runoff produced by the 85th percentile hourly rainfall intensity, as determined from the local historical rainfall record, multiplied by a factor of two; or
iii. The maximum flow rate of runoff, as determined from the local historical rainfall record, that achieves approximately the same reduction in pollutant loads and flows as achieved by mitigation of the 85th percentile hourly rainfall intensity multiplied by a factor of two.

(d) Equivalent Numeric Sizing Criteria - The Copermittees may develop, as part of the model SUSMP, any equivalent method for calculating the volume or flow which must be mitigated (i.e., any equivalent method for calculating numeric sizing criteria) by post-construction structural treatment BMPs. Such equivalent sizing criteria may be authorized by the SDRWQCB for use in place of the above criteria. In the absence of development and subsequent authorization of such equivalent numeric sizing criteria, the above numeric sizing criteria requirement shall be implemented.

(e) Pollutants or Conditions of Concern – As part of the model SUSMP, the Copermittees shall develop a procedure for pollutants or conditions of concern to be identified for each new development or significant redevelopment project. The procedure shall include, at a minimum, consideration of (1) receiving water quality (including pollutants for which receiving waters are listed as impaired under Clean Water Act section 303(d)); (2) land use type of the development project and pollutants associated with that land use type; (3) pollutants expected to be present on site; (4) changes in storm water discharge flow rates, velocities, durations, and volumes resulting from the development project; and (5) sensitivity of receiving waters to changes in storm water discharge flow rates, velocities, durations, and volumes.

(f) Implementation Process – As part of the model SUSMP, the Copermittees shall develop a process by which SUSMP requirements will be implemented. The process shall identify at what point in the planning process development projects will be required to meet SUSMP requirements. The process shall also include identification of the roles and responsibilities of various municipal departments in implementing the SUSMP requirements, as well as any other measures necessary for the implementation of SUSMP requirements.

(g) Restaurants Less than 5,000 Square Feet - New development and significant redevelopment restaurant projects where the land area development is less than 5,000 square feet shall meet all SUSMP requirements except for structural treatment BMP and numeric sizing criteria requirement F.1.b.(2)(c) and peak flow rate requirement F.1.b(2)(b)(i). A restaurant is defined as a facility that sells prepared foods and drinks for consumption, including stationary lunch counters and refreshment stands selling prepared foods and drinks for immediate consumption (SIC Code 5812).

(h) Waiver Provision – A Copermittee may provide for a project to be waived from the requirement of implementing structural treatment BMPs (F.1.b.(2)(c)) if infeasibility can be established. A waiver of infeasibility shall only be granted by a Copermittee when all available structural treatment BMPs have been considered and rejected as infeasible. Copermittees shall notify the SDRWQCB within 5 days of each waiver issued and shall include the name of the person granting each waiver.

As part of the model SUSMP, the Copermittees may develop a program to require project proponents who have received waivers to transfer the savings in cost, as determined by the Copermittee(s), to a storm water mitigation fund. This program may be implemented by all Copermittees which choose to provide waivers. Funds may be

used on projects to improve urban runoff quality within the watershed of the waived project. The waiver program may identify:

i. The entity or entities that will manage the storm water mitigation fund (i.e., assume full responsibility for)
ii. The range and types of acceptable projects for which mitigation funds may be expended;
iii. The entity or entities that will assume full responsibility for each mitigation project including its successful completion
iv. How the dollar amount of fund contributions will be determined.

(i) Infiltration and Groundwater Protection – To protect groundwater quality, each Copermittee shall apply restrictions to the use of structural treatment BMPs which are designed to primarily function as infiltration devices (such as infiltration trenches and infiltration basins). Such restrictions shall ensure that the use of such infiltration structural treatment BMPs shall not cause or contribute to an exceedance of groundwater quality objectives. At a minimum, use of structural treatment BMPs which are designed to primarily function as infiltration devices shall meet the following conditions:[5]

i. Urban runoff shall undergo pretreatment such as sedimentation or filtration prior to infiltration.
ii. All dry weather flows shall be diverted from infiltration devices.
iii. Pollution prevention and source control BMPs shall be implemented at a level appropriate to protect groundwater quality at sites where infiltration structural treatment BMPs are to be used.
iv. Infiltration structural treatment BMPs shall be adequately maintained so that they remove pollutants to the maximum extent practicable.
v. The vertical distance from the base of any infiltration structural treatment BMP to the seasonal high groundwater mark shall be at least 10 feet. Where groundwater basins do not support beneficial uses, this vertical distance criteria may be reduced, provided groundwater quality is maintained.
vi. The soil through which infiltration is to occur shall have physical and chemical characteristics (such as appropriate cation exchange capacity, organic content, clay content, and infiltration rate) which are adequate for proper infiltration durations and treatment of urban runoff for the protection of groundwater beneficial uses.
vii. Infiltration structural treatment BMPs shall not be used for areas of industrial or light industrial activity; areas subject to high vehicular traffic (25,000 or greater average daily traffic on main roadway or 15,000 or more average daily traffic on any intersecting roadway); automotive repair shops; car washes; fleet storage areas (bus, truck, etc.); nurseries; and other high threat to water quality land uses and activities as designated by each Copermittee.
viii. Infiltration structural BMPs shall be located a minimum of 100 feet horizontally from any water supply wells.

As part of the model and local SUSMPs, the Copermittees may develop alternative restrictions on the use of structural treatment BMPs which are designed to primarily function as infiltration devices.

(j) Downstream Erosion – As part of the model SUSMP and the local SUSMPs, the Copermittees shall develop criteria to ensure that discharges from new development and significant redevelopment maintain or reduce pre-development downstream erosion

[5] These conditions do not apply to structural treatment BMPs which allow incidental infiltration and are not designed to primarily function as infiltration devices (such as grassy swales, detention basins, vegetated buffer strips, constructed wetlands, etc.)

and protect stream habitat. At a minimum, criteria shall be developed to control peak storm water discharge rates and velocities in order to maintain or reduce pre-development downstream erosion and protect stream habitat. Storm water discharge volumes and durations should also be considered.

F.1.c. Revise Environmental Review Processes

(1) To the extent feasible, the Copermittees shall revise their current environmental review processes to include requirements for evaluation of water quality effects and identification of appropriate mitigation measures. The following questions are examples to be considered in addressing increased pollutants and flows from proposed projects:

(a) Could the proposed project result in an increase in pollutant discharges to receiving waters? Consider water quality parameters such as temperature, dissolved oxygen, turbidity and other typical storm water pollutants (e.g., heavy metals, pathogens, petroleum derivatives, synthetic organics, sediment, nutrients, oxygen-demanding substances, and trash).
(b) Could the proposed project result in significant alteration of receiving water quality during or following construction?
(c) Could the proposed project result in increased impervious surfaces and associated increased runoff?
(d) Could the proposed project create a significant adverse environmental impact to drainage patterns due to changes in runoff flow rates or volumes?
(e) Could the proposed project result in increased erosion downstream?
(f) Is the project tributary to an already impaired water body, as listed on the Clean Water Act Section 303(d) list. If so, can it result in an increase in any pollutant for which the water body is already impaired?
(g) Is project tributary to other environmentally sensitive areas? If so, can it exacerbate already existing sensitive conditions?
(h) Could the proposed project have a potentially significant environmental impact on surface water quality, to either marine, fresh, or wetland waters?
(i) Could the proposed project have a potentially significant adverse impact on ground water quality?
(j) Could the proposed project cause or contribute to an exceedance of applicable surface or groundwater receiving water quality objectives or degradation of beneficial uses?
(k) Can the project impact aquatic, wetland, or riparian habitat?

F.1.d. Conduct Education Efforts Focused on New Development and Redevelopment

(1) Internal: Municipal Staff and Others

Each Copermittee shall implement an education program to ensure that its planning and development review staffs (and Planning Boards and Elected Officials, if applicable) have an understanding of:

(a) Federal, state, and local water quality laws and regulations applicable to development projects;
(b) The connection between land use decisions and short and long-term water quality impacts (i.e., impacts from land development and urbanization); and
(c) How impacts to receiving water quality resulting from development can be minimized (i.e., through implementation of various source control and structural BMPs).

(2) External: Project Applicants, Developers, Contractors, Property Owners, Community Planning Groups

As early in the planning and development process as possible, each Copermittee shall implement a program to educate project applicants, developers, contractors, property owners, and community planning groups on the following topics:

(a) Federal, state, and local water quality laws and regulations applicable to development projects;
(b) Required federal, state, and local permits pertaining to water quality;
(c) Water quality impacts of urbanization; and
(d) Methods for minimizing the impacts of development on receiving water quality.

F.2. Construction Component

Each Copermittee shall implement a Construction Component of its Jurisdictional URMP to reduce pollutants in runoff from construction sites during all construction phases. At a minimum the construction component shall address:

F.2.a. Pollution Prevention
F.2.b. Grading Ordinance Update
F.2.c. Modify Construction and Grading Approval Process
F.2.d. Source Identification
F.2.e. Threat to Water Quality Prioritization
F.2.f. BMP Implementation
F.2.g. Inspection of Construction Sites
F.2.h. Enforcement of Construction Sites
F.2.i. Reporting of Non-compliant Sites
F.2.j. Education Focused on Construction Activities

F.2.a. Pollution Prevention (Construction)

Each Copermittee shall implement pollution prevention methods in its Construction Component and shall require its use by construction site owners, developers, contractors, and other responsible parties, where appropriate.

F.2.b. Grading Ordinance Update (Construction)

Each Copermittee shall review and update its grading ordinances as necessary for compliance with its storm water ordinances and this Order. The updated grading ordinance shall require implementation of BMPs and other measures during all construction activities, including the following BMPs and other measures or their equivalent:

(1) Erosion prevention;
(2) Seasonal restrictions on grading;
(3) Slope stabilization requirements;
(4) Phased grading;
(5) Revegetation as early as feasible;
(6) Preservation of natural hydrologic features;
(7) Preservation of riparian buffers and corridors;
(8) Maintenance of all source control and structural treatment BMPs; and
(9) Retention and proper management of sediment and other construction pollutants on site.

F.2.c Modify Construction and Grading Approval Process (Construction)

Prior to approval and issuance of local construction and grading permits, each Copermittee shall require all individual proposed construction and grading projects to implement measures to ensure that pollutants from the site will be reduced to the maximum extent practicable and will not cause or contribute to an exceedance of water quality objectives. Each Copermittee shall further ensure that

all grading and construction activities will be in compliance with applicable Copermittee ordinances (e.g., storm water, grading, construction, etc.) and other applicable requirements, including this Order.

(1) Construction and Grading Project Requirements

Include construction and grading project requirements in local grading and construction permits to ensure that pollutant discharges are reduced to the maximum extent practicable and water quality objectives are not violated during the construction phase. Such requirements shall include the following requirements or their equivalent:

(a) Require project proponent to develop and implement a plan to manage storm water and non-storm water discharges from the site at all times;
(b) Require project proponent to minimize grading during the wet season and coincide grading with seasonal dry weather periods to the extent feasible. If grading does occur during the wet season, require project proponent to implement additional BMPs for any rain events which may occur, as necessary for compliance with this Order;
(c) Require project proponent to emphasize erosion prevention as the most important measure for keeping sediment on site during construction;
(d) Require project proponent to utilize sediment controls as a supplement to erosion prevention for keeping sediment on-site during construction, and never as the single or primary method;
(e) Require project proponent to minimize areas that are cleared and graded to only the portion of the site that is necessary for construction;
(f) Require project proponent to minimize exposure time of disturbed soil areas;
(g) Require project proponent to temporarily stabilize and reseed disturbed soil areas as rapidly as possible;
(h) (h) Require project proponent to permanently revegetate or landscape as early as feasible;
(i) Require project proponent to stabilize all slopes; and
(j) Require project proponents subject to California's statewide General NPDES Permit for Storm Water Discharges Associated With Construction Activities, (hereinafter General Construction Permit), to provide evidence of existing coverage under the General Construction Permit.

F.2.d. <u>Source Identification (Construction)</u>

Each Copermittee shall annually develop and update, prior to the rainy season, a watershed based inventory of all construction sites within its jurisdiction regardless of site size or ownership. This requirement is applicable to all construction sites regardless of whether the construction site is subject to the California statewide General NPDES Permit for Storm Water Discharges Associated With Construction Activities (hereinafter General Construction Permit), or other individual NPDES permit. The use of an automated database system, such as Geographical Information System (GIS) is highly recommended, but not required.

F.2.e. <u>Threat to Water Quality Prioritization (Construction)</u>

(1) To establish priorities for construction oversight activities under this Order, the Copermittee shall prioritize its watershed-based inventory (developed pursuant to F.2.d. above) by threat to water quality. Each construction site shall be classified as high, medium, or low threat to water quality. In evaluating threat to water quality each Copermittee shall consider (1) soil erosion potential; (2) site slope; (3) project size and type; (4) sensitivity of receiving water bodies; (5) proximity to receiving water bodies; (6) non-storm water discharges; and (7) any other relevant factors.

(2) A high priority construction site shall at a minimum be defined as a site meeting either of the following criteria or equivalent criteria:

(a) The site is 50 acres or more and grading will occur during the wet season; OR
(b) The site is (1) 5 acres or more and (2) tributary to a Clean Water Act section 303(d) water body impaired for sediment or is within or directly adjacent to or discharging directly to a coastal lagoon or other receiving water within an environmentally sensitive area (as defined in section F.1.b.(2)(a)vii of this Order).

F.2.f. <u>BMP Implementation (Construction)</u>

(1) Each Copermittee shall designate a set of minimum BMPs for high, medium, and low threat to water quality construction sites (as determined under section F.2.e). BMPs are to be implemented year round.

(2) Each Copermittee shall implement, or require the implementation of, the designated minimum BMPs (based upon the site's threat to water quality rating) at each construction site within its jurisdiction year round. If particular minimum BMPs are infeasible at any specific site, each Copermittee shall implement, or require the implementation of, other equivalent BMPs. Each Copermittee shall also implement or require any additional site specific BMPs as necessary to comply with this Order, including BMPs which are more stringent than those required under the statewide General Construction Permit.

(3) Each Copermittee shall implement, or require the implementation of, BMPs year round; however, BMP implementation requirements can vary based on wet and dry seasons.

(4) Each Copermittee shall implement, or require implementation of, additional controls for construction sites tributary to Clean Water Act section 303(d) water bodies impaired for sediment as necessary to comply with this Order. Each Copermittee shall implement, or require implementation of, additional controls for construction sites within or adjacent to or discharging directly to coastal lagoons or other receiving waters within environmentally sensitive areas (as defined in section F.1.b.(2)(a)(vii) of this Order) as necessary to comply with this Order.

F.2.g. <u>Inspection of Construction Sites (Construction)</u>

(1) Each Copermittee shall conduct construction site inspections for compliance with its ordinances (grading, storm water, etc.), permits (construction, grading, etc.), and this Order. Inspections shall include review of site erosion control and BMP implementation plans.

(2) Each Copermittee shall establish inspection frequencies and priorities as determined by the threat to water quality prioritization described in F.2.e above. During the wet season (i.e., October 1 through April 30 of each year), each Copermittee shall inspect, at a minimum, each High Priority construction site, either:

(a) Weekly
OR
(b) Monthly for any site that the responsible Copermittee certifies in a written statement to the SDRWQCB all of the following (certified statements may be submitted to the SDRWQCB at any time for one or more sites):

i. Copermittee has record of construction site's Waste Discharge Identification Number (WDID#) documenting construction site's coverage under the statewide General Construction Permit; and
ii. Copermittee has reviewed the constructions site's Storm Water Pollution Prevention Plan (SWPPP); and

iii. Copermittee finds SWPPP to be in compliance with all local ordinances, permits, and plans; and
iv. Copermittee finds that the SWPPP is being properly implemented on site.

At a minimum, Medium and Low Priority construction sites shall be inspected by Copermittees twice during the wet season. All construction sites shall be inspected by the Copermittees as needed during the dry season (i.e., May 1 through September 30 of each year).

(3) Based upon site inspection findings, each Copermittee shall implement all follow-up actions necessary to comply with this Order.

F.2.h. Enforcement of Construction Sites (Construction)

Each Copermittee shall enforce its ordinances (grading, storm water, etc.) and permits (construction, grading, etc.) at all construction sites as necessary to maintain compliance with this Order. Copermittee ordinances or other regulatory mechanisms shall include sanctions to ensure compliance. Sanctions shall include the following or their equivalent: Non-monetary penalties, fines, bonding requirements, and/or permit denials for non-compliance.

F.2.i. Reporting of Non-compliant Sites (Construction)

Each Copermittee shall provide oral notification to the SDRWQCB of non-compliant sites that are determined to pose a threat to human or environmental health within its jurisdiction within 24 hours of the discovery of noncompliance, as required under section R.1 (and B.6 of Attachment C) of this Order.

Each Copermittee shall develop and submit criteria by which to evaluate events of non-compliance to determine whether they pose a threat to human or environmental health. These criteria shall be submitted in the Jurisdictional Urban Runoff Management Program Document and Annual Reports for SDRWQCB review.

Such oral notification shall be followed up by a written report to be submitted to the SDRWQCB within 5 days of the incidence of non-compliance as required under section R.1 (and B.6 of Attachment C) of this Order. Sites are considered non-compliant when one or more violations of local ordinances, permits, plans, or this Order exist on the site.

F.2.j. Education Focused on Construction Activities (Construction)

(1) Internal: Municipal Staff

Each Copermittee shall implement an education program to ensure that its construction, building, and grading review staffs and inspectors have an understanding of:

(a) Federal, state, and local water quality laws and regulations applicable to construction and grading activities.
(b) The connection between construction activities and water quality impacts (i.e., impacts from land development and urbanization).
(c) How erosion can be prevented.
(d) How impacts to receiving water quality resulting from construction activities can be minimized (i.e., through implementation of various source control and structural BMPs).
(e) Applicable topics listed in section F.4. of this Order.

(2) External: Project Applicants, Contractors, Developers, Property Owners, and other Responsible Parties

Each Copermittee shall implement an education program to ensure that project applicants, contractors, developers, property owners, and other responsible parties have an understanding of the topics outlined in section F.2.j.1. above of this Order.

F.3. Existing Development Component

Each Copermittee shall minimize the short and long-term impacts on receiving water quality from all types of existing development.

F.3.a. Municipal (Existing Development)

Each Copermittee shall implement a Municipal (Existing Development) Component to prevent or reduce pollutants in runoff from all municipal land use areas and activities. At a minimum the municipal component shall address:

F.3.a.(1)	Pollution Prevention
F.3.a.(2)	Source Identification
F.3.a.(3)	Threat to Water Quality Prioritization
F.3.a.(4)	BMP Implementation
F.3.a.(5)	Maintenance of Municipal Separate Storm Sewer System
F.3.a.(6)	Management of Pesticides, Herbicides, and Fertilizers
F.3.a.(7)	Inspection of Municipal Areas and Activities
F.3.a.(8)	Enforcement of Municipal Areas and Activities

F.3.a.(1) Pollution Prevention (Municipal)

Each Copermittee shall implement pollution prevention methods in its Municipal (Existing Development) Component and shall require its use by appropriate municipal departments and personnel, where appropriate.

F.3.a.(2) Source Identification (Municipal)

Each Copermittee shall develop, and update annually, a watershed based inventory of the name, address (if applicable), and description of all municipal land use areas and activities which generate pollutants. The use of an automated database system, such as Geographical Information System (GIS) is highly recommended when applicable, but not required.

F.3.a.(3) Threat to Water Quality Prioritization (Municipal)

(a) To establish priorities for oversight of municipal areas and activities required under this Order, each Copermittee shall prioritize each watershed inventory in F.3.a.2. above by threat to water quality and update annually. Each municipal area and activity shall be classified as high, medium, or low threat to water quality. In evaluating threat to water quality, each Copermittee shall consider (1) type of municipal area or activity; (2) materials used; (3) wastes generated; (4) pollutant discharge potential; (5) non-storm water discharges; (6) size of facility or area; (7) proximity to receiving water bodies; (8) sensitivity of receiving water bodies; and (9) any other relevant factors.

(b) At a minimum, the high priority municipal areas and activities shall include the following:

i. Roads, Streets, Highways, and Parking Facilities.
ii. Flood Management Projects and Flood Control Devices.
iii. Areas and activities tributary to a Clean Water Act section 303(d) impaired water body, where an area or activity generates pollutants for which the water body is impaired. Areas and activities within or adjacent to or discharging

directly to coastal lagoons or other receiving waters within environmentally sensitive areas (as defined in section F.1.b.(2)(a)vii of this Order).

iv. Municipal Waste Facilities.
- Active or closed municipal landfills;
- Publicly owned treatment works (including water and wastewater treatment plants) and sanitary sewage collection systems;
- Municipal separate storm sewer systems;
- Incinerators;
- Solid waste transfer facilities;
- Land application sites;
- Uncontrolled sanitary landfills;
- Corporate yards including maintenance and storage yards for materials, waste, equipment and vehicles;
- Sites for disposing and treating sewage sludge; and
- Hazardous waste treatment, disposal, and recovery facilities.

v. Other municipal areas and activities that the Copermittee determines may contribute a significant pollutant load to the MS4.

vi. Municipal airfields.

F.3.a.(4) <u>BMP Implementation (Municipal)</u>

(a) Each Copermittee shall designate a set of minimum BMPs for high, medium, and low threat to water quality municipal areas and activities (as determined under section F.3.a.(3)). The designated minimum BMPs for high threat to water quality municipal areas and activities shall be area or activity specific as appropriate.

(b) Each Copermittee shall implement, or require the implementation of, the designated minimum BMPs (based upon the threat to water quality rating) at each municipal area or activity within its jurisdiction. If particular minimum BMPs are infeasible for any specific area or activity, each Copermittee shall implement, or require implementation of other equivalent BMPs. Each Copermittee shall also implement any additional BMPs as are necessary to comply with this Order.

i. Each Copermittee shall evaluate feasibility of retrofitting existing structural flood control devices and retrofit where needed.

(c) Each Copermittee shall implement, or require implementation of, any additional controls for municipal areas and activities tributary to Clean Water Act section 303(d) impaired water bodies (where an area or activity generates pollutants for which the water body is impaired) as necessary to comply with this Order. Each Copermittee shall implement, or require implementation of, additional controls for municipal areas and activities within or directly adjacent to or discharging directly to coastal lagoons or other receiving waters within environmentally sensitive areas (as defined in section F.1.b.(2)(a)(vii) of this Order) as necessary to comply with this Order.

F.3.a.(5) <u>Maintenance of Municipal Separate Storm Sewer System (Municipal)</u>

(a) Each Copermittee shall implement a schedule of maintenance activities at all structural controls designed to reduce pollutant discharges to or from its MS4s and related drainage structures.

(b) Each Copermittee shall implement a schedule of maintenance activities for the municipal separate storm sewer system.

(c) The maintenance activities must, at a minimum, include:

i. Inspection and removal of accumulated waste (e.g. sediment, trash, debris and other pollutants) between May 1 and September 30 of each year;

ii. Additional cleaning as necessary between October 1 and April 30 of each year;

iii. Record keeping of cleaning and the overall quantity of waste removed;

iv. Proper disposal of waste removed pursuant to applicable laws;

v. Measures to eliminate waste discharges during MS4 maintenance and cleaning activities.

F.3.a.(6) Management of Pesticides, Herbicides, and Fertilizers (Municipal)

The Copermittees shall implement BMPs to reduce the contribution of pollutants associated with the application, storage, and disposal of pesticides, herbicides and fertilizers from municipal areas and activities to MS4s. Important municipal areas and activities include municipal facilities, public rights-of-way, parks, recreational facilities, golf courses, cemeteries, botanical or zoological gardens and exhibits, landscaped areas, etc.

Such BMPs shall include, at a minimum: (1) educational activities, permits, certifications and other measures for municipal applicators and distributors; (2) integrated pest management measures that rely on non-chemical solutions; (3) the use of native vegetation; (4) schedules for irrigation and chemical application; and (5) the collection and proper disposal of unused pesticides, herbicides, and fertilizers.

F.3.a.(7) Inspection of Municipal Areas and Activities (Municipal)

At a minimum, each Copermittee shall inspect high priority municipal areas and activities annually. Based upon site inspection findings, each Copermittee shall implement all follow-up actions necessary to comply with this Order.

F.3.a.(8) Enforcement of Municipal Areas and Activities (Municipal)

Each Copermittee shall enforce its storm water ordinance for all municipal areas and activities as necessary to maintain compliance with this Order.

F.3.b. Industrial (Existing Development)

Each Copermittee shall implement an Industrial (Existing Development) Component to reduce pollutants in runoff from all industrial sites. At a minimum the industrial component shall address:

F.3.b.(1) Pollution Prevention
F.3.b.(2) Source Identification
F.3.b.(3) Threat to Water Quality Prioritization
F.3.b.(4) BMP Implementation
F.3.b.(5) Monitoring of Industrial Sites
F.3.b.(6) Inspection of Industrial Sites
F.3.b.(7) Enforcement Measures for Industrial Sites
F.3.b.(8) Reporting of Non-compliant Sites

F.3.b.(1) Pollution Prevention (Industrial)

Each Copermittee shall implement pollution prevention methods in its Industrial (Existing Development) Component and shall require its use by industry, where appropriate.

F.3.b.(2) Source Identification (Industrial)

Each Copermittee shall develop and update annually a watershed-based inventory of all industrial sites within its jurisdiction regardless of site ownership. This requirement is applicable to all industrial sites regardless of whether the industrial site is subject the California statewide General NPDES Permit for Storm Water Discharges Associated With Industrial Activities, Except Construction (hereinafter General Industrial Permit) or other individual NPDES permit.

The inventory shall include the following minimum information for each industrial site: name; address; and a narrative description including SIC codes which best reflects the principal products or services provided by each facility. The use of an automated database system, such as Geographical Information System (GIS) is highly recommended, but not required.

F.3.b.(3) Threat to Water Quality Prioritization (Industrial)

(a) To establish priorities for industrial oversight activities under this Order, the Copermittee shall prioritize each watershed-based inventory in F.3.b.(2) above by threat to water quality and update annually. Each industrial site shall be classified as high, medium, or low threat to water quality. In evaluating threat to water quality each Copermittee shall consider (1) type of industrial activity (SIC Code); (2) materials used in industrial processes; (3) wastes generated; (4) pollutant discharge potential; (5) non-storm water discharges; (6) size of facility; (7) proximity to receiving water bodies; (8) sensitivity of receiving water bodies; (9) whether the industrial site is subject to the statewide General Industrial Permit; and (10) any other relevant factors.

(b) At a minimum the high priority industrial sites shall include industrial facilities that are subject to section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA); industrial facilities tributary to a Clean Water Act section 303(d) impaired water body, where a facility generates pollutants for which the water body is impaired; industrial facilities within or directly adjacent to or discharging directly to coastal lagoons or other receiving waters within environmentally sensitive areas (as defined in section F.1.b.(2)(a)vii of this Order); facilities subject to the statewide General Industrial Permit; and all other industrial facilities that the Copermittee determines are contributing significant pollutant loading to its MS4, regardless of whether such facilities are covered under the statewide General Industrial Permit or other NPDES permit.

F.3.b.(4) BMP Implementation (Industrial)

(a) Each Copermittee shall designate a set of minimum BMPs for high, medium, and low threat to water quality industrial sites (as determined under section F.3.b.(3)). The designated minimum BMPs for high threat to water quality industrial sites shall be industry and site specific as appropriate.

(b) Each Copermittee shall implement, or require the implementation of, the designated minimum BMPs (based upon the site's threat to water quality rating) at each industrial site within its jurisdiction. If particular minimum BMPs are infeasible at any specific site, each Copermittee shall implement, or require implementation of, other equivalent BMPs. Each Copermittee shall also implement or require any additional site specific BMPs as necessary to comply with this Order including BMPs which are more stringent than those required under the statewide General Industrial Permit.

(c) Each Copermittee shall implement, or require implementation of, additional controls for industrial sites tributary to Clean Water Act section 303(d) impaired water bodies (where a site generates pollutants for which the water body is impaired) as necessary to comply

with this Order. Each Copermittee shall implement, or require implementation of, additional controls for industrial sites within or directly adjacent to or discharging directly to coastal lagoons or other receiving waters within environmentally sensitive areas (as defined in section F.1.b.(2)(a)(vii) of this Order) as necessary to comply with this Order.

F.3.b.(5) Monitoring of Industrial Sites (Industrial)

(a) Each Copermittee shall conduct, or require industry to conduct, a monitoring program for runoff from each high threat to water quality industrial site (identified in F.3.b.(3) above). Group monitoring by multiple industrial sites conducted under group monitoring programs approved by the State Water Resources Control Board is acceptable.

(b) At a minimum, the monitoring program shall provide quantitative data from two storm events per year on the following constituents:

i. Any pollutant listed in effluent guidelines subcategories where applicable;
ii. Any pollutant for which an effluent limit has been established in an existing NPDES permit for the facility;
iii. Oil and grease or Total Organic Carbon (TOC);
iv. pH;
v. Total suspended solids (TSS);
vi. Specific conductance; and
vii. Toxic chemicals and other pollutants that are likely to be present in storm water discharges.

F.3.b.(6) Inspection of Industrial Sites (Industrial)

(a) Each Copermittee shall conduct industrial site inspections for compliance with its ordinances, permits, and this Order. Inspections shall include review of BMP implementation plans.

(b) Each Copermittee shall establish inspection frequencies and priorities as determined by the threat to water quality prioritization described in F.3.b.(3) above. Each Copermittee shall inspect high priority industrial sites, at a minimum:

i. Annually

OR

ii. Bi-annually for any site that the responsible Copermittee certifies in a written statement to the SDRWQCB all of the following (certified statements may be submitted to the SDRWQCB at any time for one or more sites):

- Copermittee has record of industrial site's Waste Discharge Identification Number (WDID#) documenting industrial site's coverage under the statewide General Industrial Permit; and
- Copermittee has reviewed the industrial site's Storm Water Pollution Prevention Plan (SWPPP); and
- Copermittee finds SWPPP to be in compliance with all local ordinances, permits, and plans; and
- Copermittee finds that the SWPPP is being properly implemented on site.

Each Copermittee shall inspect medium and low threat to water quality industrial sites as needed.

(c) Based upon site inspection findings, each Copermittee shall implement all follow-up actions necessary to comply with this Order.

(d) To the extent that the SDRWQCB has conducted an inspection of a high priority industrial site during a particular year, the requirement for the responsible Copermittee to inspect this site during the same year will be satisfied.

F.3.b.(7) Enforcement of Industrial Sites (Industrial)

Each Copermittee shall enforce its storm water ordinance at all industrial sites as necessary to maintain compliance with this Order. Copermittee ordinances or other regulatory mechanisms shall include sanctions to ensure compliance. Sanctions shall include the following or their equivalent: Non-monetary penalties, fines, bonding requirements, and/or permit denials for non-compliance.

F.3.b.(8) Reporting of Non-compliant Sites (Industrial)

Each Copermittee shall provide oral notification to the SDRWQCB of non-compliant sites that are determined to pose a threat to human or environmental health within its jurisdiction within 24 hours of the discovery of noncompliance, as required under section R.1 (and B.6 of Attachment C) of this Order.

Each Copermittee shall develop and submit criteria by which to evaluate events of non-compliance to determine whether they pose a threat to human or environmental health. These criteria shall be submitted in the Jurisdictional Urban Runoff Management Program Document and Annual Reports for SDRWQCB review.

Such oral notification shall be followed up by a written report to be submitted to the SDRWQCB within 5 days of the incidence of non-compliance as required under section R.1(and B.6 of Attachment C) of this Order. Sites are considered non-compliant when one or more violations of local ordinances, permits, plans, or this Order exist on the site.

F.3.c. Commercial (Existing Development)

Each Copermittee shall implement a Commercial (Existing Development) Component to reduce pollutants in runoff from commercial sites. At a minimum the commercial component shall address:

F.3.c.(1) Pollution Prevention
F.3.c.(2) Source Identification
F.3.c.(3) BMP Implementation
F.3.c.(4) Inspection of Commercial Sites and Sources
F.3.c.(5) Enforcement of Commercial Sites and Sources

F.3.c.(1) Pollution Prevention (Commercial)

Each Copermittee shall implement pollution prevention methods in its Commercial (Existing Development) Component and shall require its use by commerce, where appropriate.

F.3.c.(2) Source Identification (Commercial)

Each Copermittee shall develop and update annually an inventory of the following high priority threat to water quality commercial sites/sources listed below. (If any commercial site/source listed below is inventoried as an industrial site, as required under section F.3.b.(2) of this Order, it is not necessary to also inventory it as a commercial site/source).

(a) Automobile mechanical repair, maintenance, fueling, or cleaning;
(b) Airplane mechanical repair, maintenance, fueling, or cleaning;
(c) Boat mechanical repair, maintenance, fueling, or cleaning;

(d) Equipment repair, maintenance, fueling, or cleaning;
(e) Automobile and other vehicle body repair or painting;
(f) Mobile automobile or other vehicle washing;
(g) Automobile (or other vehicle) parking lots and storage facilities;
(h) Retail or wholesale fueling;
(i) Pest control services;
(j) Eating or drinking establishments;
(k) Mobile carpet, drape or furniture cleaning;
(l) Cement mixing or cutting;
(m) Masonry;
(n) Painting and coating;
(o) Botanical or zoological gardens and exhibits;
(p) Landscaping;
(q) Nurseries and greenhouses;
(r) Golf courses, parks and other recreational areas/facilities;
(s) Cemeteries;
(t) Pool and fountain cleaning;
(u) Marinas;
(v) Port-a-Potty servicing;
(w) Other commercial sites/sources that the Copermittee determines may contribute a significant pollutant load to the MS4;
(x) Any commercial site or source tributary to a Clean Water Act section 303(d) impaired water body, where the site or source generates pollutants for which the water body is impaired; and
(y) Any commercial site or source within or directly adjacent to or discharging directly to a coastal lagoon or other receiving water within an environmentally sensitive area (as defined in F.1.b(2)(a)vii of this Order).

The use of an automated database system, such as Geographical Information System (GIS) is highly recommended, but not required.

F.3.c.(3) <u>BMP Implementation (Commercial)</u>

(a) Each Copermittee shall designate a set of minimum BMPs for the high priority threat to water quality commercial sites/sources (listed above in section F.3.c.(2)). The designated minimum BMPs for the high threat to water quality commercial sites/sources shall be site and source specific as appropriate.

(b) Each Copermittee shall implement, or require the implementation of, the designated minimum BMPs at each high priority threat to water quality commercial site/source within its jurisdiction. If particular minimum BMPs are infeasible for any specific site/source, each Copermittee shall implement, or require the implementation of, other equivalent BMPs. Each Copermittee shall also implement or require any additional site specific BMPs as necessary to comply with this Order.

(c) Each Copermittee shall implement, or require implementation of, additional controls for commercial sites or sources tributary to Clean Water Act section 303(d) impaired water bodies (where a site or source generates pollutants for which the water body is impaired) as necessary to comply with this Order. Each Copermittee shall implement, or require implementation of, additional controls for commercial sites or sources within or directly adjacent to or discharging directly to coastal lagoons or other receiving waters within environmentally sensitive areas (as defined in section F.1.b.(2)(a)(vii) of this Order) as necessary to comply with this Order.

F.3.c.(4) Inspection of Commercial Sites and Sources (Commercial)

Each Copermittee shall inspect high priority commercial sites and sources as needed. Based upon site inspection findings, each Copermittee shall implement all follow-up actions necessary to comply with this Order.

F.3.c.(5) Enforcement of Commercial Sites and Sources (Commercial)

Each Copermittee shall enforce its storm water ordinance for all commercial sites and sources as necessary to maintain compliance with this Order.

F.3.d. Residential (Existing Development)

Each Copermittee shall implement a Residential (Existing Development) Component to prevent or reduce pollutants in runoff from all residential land use areas and activities. At a minimum the residential component shall address:

F.3.d.(1) Pollution Prevention
F.3.d.(2) Threat to Water Quality Prioritization
F.3.d.(3) BMP Implementation
F.3.d.(4) Enforcement of Residential Areas and Activities

F.3.d.(1) Pollution Prevention (Residential)

Each Copermittee shall include pollution prevention methods in its Residential (Existing Development) Component and shall encourage their use by residents, where appropriate.

F.3.d.(2) Threat to Water Quality Prioritization (Residential)

Each Copermittee shall identify high priority residential areas and activities. At a minimum, these shall include:

- Automobile repair and maintenance;
- Automobile washing;
- Automobile parking;
- Home and garden care activities and product use (pesticides, herbicides, and fertilizers);
- Disposal of household hazardous waste (e.g., paints, cleaning products);
- Disposal of pet waste;
- Disposal of green waste;
- Any other residential source that the Copermittee determines may contribute a significant pollutant load to the MS4;
- Any residence tributary to a Clean Water Act section 303(d) impaired water body, where the residence generates pollutants for which the water body is impaired; and
- Any residence within or directly adjacent to or discharging directly to a coastal lagoon or other receiving waters within an environmentally sensitive area (as defined in F.1.b.(2)(a)vii of this Order).

F.3.d.(3) BMP Implementation (Residential)

(a) Each Copermittee shall designate a set of minimum BMPs for high threat to water quality residential areas and activities (as required under section F.3.d.(2)). The designated minimum BMPs for high threat to water quality municipal areas and activities shall be area or activity specific.

(b) Each Copermittee shall require implementation of the designated minimum BMPs for high threat to water quality residential areas and activities. If particular minimum BMPs are infeasible for any specific site/source, each Copermittee shall require implementation of other equivalent BMPs. Each Copermittee shall also implement, or require implementation of, any additional BMPs as are necessary to comply with this Order.

(c) Each Copermittee shall implement, or require implementation of, any additional controls for residential areas and activities tributary to Clean Water Act Section 303(d) impaired water bodies (where a residential area or activity generates pollutants for which the water body is impaired) as necessary to comply with this Order. Each Copermittee shall implement, or require implementation of, additional controls for residential areas within or directly adjacent to or discharging directly to coastal lagoons or other receiving waters within environmentally sensitive areas (as defined in section F.1.b.(2)(a)(vii) of this Order) as necessary to comply with this Order.

F.3.d.(4) Enforcement of Residential Areas and Activities (Residential)

Each Copermittee shall enforce its storm water ordinance for all residential areas and activities as necessary to maintain compliance with this Order.

F.4. Education Component

Each Copermittee shall implement an Education Component using all media as appropriate to (1) measurably increase the knowledge of the target communities regarding MS4s, impacts of urban runoff on receiving waters, and potential BMP solutions for the target audience; and (2) to measurably change the behavior of target communities and thereby reduce pollutant releases to MS4s and the environment. At a minimum the education component shall address the following target communities:

- Municipal Departments and Personnel
- Construction Site Owners and Developers
- Industrial Owners and Operators
- Commercial Owners and Operators
- Residential Community, General Public, and School Children
- Quasi-Governmental Agencies/Districts (i.e., educational institutions, water districts, sanitation districts, etc.)

F.4.a. All Target Communities

At a minimum the Education Program for each target audience shall contain information on the following topics where applicable:

- State and Federal water quality laws
- Requirements of local municipal permits and ordinances (e.g., storm water and grading ordinances and permits)
- Impacts of urban runoff on receiving waters
- Watershed concepts (i.e., stewardship, connection between inland activities and coastal problems, etc.)
- Distinction between MS4s and sanitary sewers
- Importance of good housekeeping (e.g., sweeping impervious surfaces instead of hosing)
- Pollution prevention and safe alternatives
- Household hazardous waste collection
- Recycling

- BMPs: Site specific, structural and source control
- BMP maintenance
- Non-storm water disposal alternatives (e.g., all wash waters)
- Pet and animal waste disposal
- Proper solid waste disposal (e.g., garbage, tires, appliances, furniture, vehicles)
- Equipment and vehicle maintenance and repair
- Public reporting mechanisms
- Green waste disposal
- Integrated pest management
- Native vegetation
- Proper disposal of boat and recreational vehicle waste
- Traffic reduction, alternative fuel use
- Water conservation

F.4.b. Municipal, Construction, Industrial, Commercial, and Quasi-Governmental (educational institutions, water districts, sanitation districts, etc.) Communities

In addition to the topics listed in F.4.a. above, the Municipal, Construction, Industrial, Commercial, and Quasi-Governmental (Educational Institutions, Water Districts, Sanitation Districts) Communities shall also be educated on the following topics where applicable:

- Basic urban runoff training for all personnel
- Additional urban runoff training for appropriate personnel
- Illicit Discharge Detection and Elimination observations and follow-up during daily work activities
- Lawful disposal of catchbasin and other MS4 cleanout wastes
- Water quality awareness for Emergency/First Responders
- California's Statewide General NPDES Permit for Storm Water Discharges Associated with Industrial Activities (Except Construction).
- California's Statewide General NPDES Permit for Storm Water Discharges Associated with Construction Activities
- SDRWQCB's General NPDES Permit for Groundwater Dewatering
- 401 Water Quality Certification by the SDRWQCB
- Statewide General NPDES Utility Vault Permit (NPDES No. CAG990002)
- SDRWQCB Waste Discharge Requirements for Dredging Activities
- Local requirements beyond statewide general permits
- Federal, state and local water quality regulations that affect development projects
- Water quality impacts associated with land development
- Alternative materials & designs to maintain peak runoff values
- How to conduct a storm water inspection
- Potable water discharges to the MS4
- Dechlorination techniques
- Hydrostatic testing
- Spill response, containment, & recovery
- Preventive maintenance
- How to do your job and protect water quality

F.4.c. Residential, General Public, School Children Communities

In addition to the topics listed in F.4.a. above, the Residential, General Public, and School Children Communities shall be educated on the following topics where applicable:

- Public reporting information resources
- Residential and charity car-washing

- Community activities (e.g., "Adopt a Storm Drain, Watershed, or Highway" Programs, citizen monitoring, creek/beach cleanups, environmental protection organization activities, etc.)

F.5. Illicit Discharge Detection and Elimination Component

Each Copermittee shall implement an Illicit Discharge Detection and Elimination Component containing measures to actively seek and eliminate illicit discharges and connections. At a minimum the Illicit Discharge Detection and Elimination Component shall address:

F.5.a Illicit Discharges and Connections
F.5.b Dry Weather Analytical Monitoring
F.5.c Investigation / Inspection and follow-up
F.5.d Elimination of Illicit Discharges and Connections
F.5.e Enforce Ordinance
F.5.f Prevent and Respond To Sewage Spills (Including from Private Laterals and Failing Septic Systems) and Other Spills
F.5.g Facilitate Public Reporting of Illicit Discharges and Connections – Public Hotline
F.5.h Facilitate Disposal of Used Oil and Toxic Materials
F.5.i Limit Infiltration From Sanitary Sewer to MS4

F.5.a. Illicit Discharges and Connections

Each Copermittee shall implement a program to actively seek and eliminate illicit discharges and connections into its MS4. The program shall address all types of illicit discharges and connections excluding those non-storm water discharges not prohibited by the Copermittee in accordance with Section B. of this Order.

F.5.b. Dry Weather Analytical Monitoring

Each Copermittee shall conduct dry weather analytical monitoring of MS4 outfalls within its jurisdiction to detect illicit discharges and connections in accordance with Attachment E of this Order.

F.5.c. Investigation / Inspection and Follow-Up

Each Copermittee shall investigate and inspect any portion of the MS4 that, based on dry weather analytical monitoring results or other appropriate information, indicates a reasonable potential for illicit discharges, illicit connections, or other sources of non-storm water (including non-prohibited discharge(s) identified in Section B. of this Order). Each Copermittee shall establish criteria to identify portions of the system where such follow-up investigations are appropriate.

F.5.d. Elimination of Illicit Discharges and Connections

Each Copermittee shall eliminate all detected illicit discharges, discharge sources, and connections immediately.

F.5.e. Enforce Ordinances

Each Copermittee shall implement and enforce its ordinances, orders, or other legal authority to prevent illicit discharges and connections to its MS4. Each Copermittee shall also implement and enforce its ordinance, orders, or other legal authority to eliminate detected illicit discharges and connections to it MS4.

F.5.f. Prevent and Respond to Sewage Spills (Including from Private Laterals and Failing Septic Systems) and Other Spills

Each Copermittee shall prevent, respond to, contain and clean up all sewage and other spills that may discharge into its MS4 from any source (including private laterals and failing septic systems). Spill response teams shall prevent entry of spills into the MS4 and contamination of surface water, ground water and soil to the maximum extent practicable. Each Copermittee shall coordinate spill prevention, containment and response activities throughout all appropriate departments, programs and agencies to ensure maximum water quality protection at all times.

Each Copermittee shall develop and implement a mechanism whereby it is notified of all sewage spills from private laterals and failing septic systems into its MS4. Each Copermittee shall prevent, respond to, contain and clean up sewage from any such notification.

F.5.g. Facilitate Public Reporting of Illicit Discharges and Connections - - Public Hotline

Each Copermittee shall promote, publicize and facilitate public reporting of illicit discharges or water quality impacts associated with discharges into or from MS4s. Each Copermittee shall facilitate public reporting through development and operation of a public hotline. Public hotlines can be Copermittee-specific or shared by Copermittees. All storm water hotlines shall be capable of receiving reports in both English and Spanish 24 hours per day / seven days per week. Copermittees shall respond to and resolve each reported incident. All reported incidents, and how each was resolved, shall be summarized in each Copermittee's individual Jurisdictional URMP Annual Report.

F.5.h. Facilitate Disposal of Used Oil and Toxic Materials

Each Copermittee shall facilitate the proper management and disposal of used oil, toxic materials, and other household hazardous wastes. Such facilitation shall include educational activities, public information activities, and establishment of collection sites operated by the Copermittee or a private entity. Curbside collection of household hazardous wastes is encouraged.

F.5.i. Limit Infiltration From Sanitary Sewer to MS4/ Provide Preventive Maintenance of Both

Each Copermittee shall implement controls and measures to limit infiltration of seepage from municipal sanitary sewers to MS4s through thorough, routine preventive maintenance of the MS4. Each Copermittee that operates both a municipal sanitary sewer system and a MS4 shall implement controls and measures to limit infiltration of seepage from the municipal sanitary sewers to the MS4s that shall include overall sanitary sewer and MS4 surveys and thorough, routine preventive maintenance of both.

F.6. Public Participation Component

Each Copermittee shall incorporate a mechanism for public participation in the implementation of the Jurisdictional URMP.

F.7. Assessment of Jurisdictional URMP Effectiveness Component

a. As part of its individual Jurisdictional URMP, each Copermittee shall develop a long-term strategy for assessing the effectiveness of its individual Jurisdictional URMP. The long-term assessment strategy shall identify specific direct and indirect measurements that each Copermittee will use to track the long-term progress of its individual Jurisdictional URMP towards achieving improvements in receiving water quality. Methods used for assessing effectiveness shall include the following or their equivalent: surveys, pollutant loading

estimations, and receiving water quality monitoring. The long-term strategy shall also discuss the role of monitoring data in substantiating or refining the assessment.

b. As part of its individual Jurisdictional URMP Annual Report, each Copermittee shall include an assessment of the effectiveness of its Jurisdictional URMP using the direct and indirect assessment measurements and methods developed in its long-term assessment strategy.

F.8. Fiscal Analysis Component

Each Copermittee shall secure the resources necessary to meet the requirements of this Order. As part of its individual Jurisdictional URMP, each Copermittee shall develop a strategy to conduct a fiscal analysis of its urban runoff management program in its entirety. In order to demonstrate sufficient financial resources to implement the conditions of this Order, each Copermittee shall conduct an annual fiscal analysis as part of its individual Jurisdictional URMP Annual Report. This analysis shall, for each fiscal year covered by this Order, evaluate the expenditures (such as capital, operation and maintenance, education, and administrative expenditures) necessary to accomplish the activities of the Copermittee's urban runoff management program. Such analysis shall include a description of the source(s) of funds that are proposed to meet the necessary expenditures, including legal restrictions on the use of such funds.

G. IMPLEMENTATION OF JURISDICTIONAL URMP

Each Copermittee shall have completed full implementation of all requirements of the Jurisdictional URMP section of this Order no later than **365 days after adoption** of this Order, except as stated as follows: Each Copermittee's local SUSMP must be implemented within 180 days of approval of the model SUSMP in the public process by the SDRWQCB.

H. SUBMITTAL OF JURISDICTIONAL URMP DOCUMENT

The written account of the overall program to be conducted by each Copermittee within its jurisdiction during the five-year life of this Order is referred to as the "Jurisdictional URMP Document".

1. Individual – Each Copermittee shall submit to the Principal Permittee(s) an individual Jurisdictional URMP document which describes all activities it has undertaken or is undertaking to implement the requirements of each component of the Jurisdictional URMP section F. of this Order.

   a. At a minimum, the individual Jurisdictional URMP document shall contain the following information for the following components:

      (1) Construction Component

         (a) Which pollution prevention methods will be required for implementation, and how and where they will be required
         (b) Updated grading ordinances
         (c) A description of the modified construction and grading approval process
         (d) Updated construction and grading project requirements in local grading and construction permits
         (e) A completed watershed-based inventory of all construction sites
         (f) A completed prioritization of all construction sites based on threat to water quality
         (g) Which BMPs will be implemented, or required to be implemented, for each priority category
         (h) How BMPs will be implemented, or required to be implemented, for each priority category
         (i) Planned inspection frequencies for each priority category
         (j) Methods for inspection
         (k) A description of enforcement mechanisms and how they will be used

(l) A description of how non-compliant sites will be identified and the process for notifying the SDRWQCB, including a list of current non-compliant sites
(m) A description of the construction education program and how it will be implemented

(2) Municipal (Existing Development) Component

(a) Which pollution prevention methods will be required for implementation, and how and where they will be required
(b) A completed watershed-based inventory of all municipal land use areas and activities
(c) A completed prioritization of all municipal areas and activities based on threat to water quality
(d) Which BMPs will be implemented, or required to be implemented, for each priority category
(e) How BMPs will be implemented, or required to be implemented, for each priority category
(f) Municipal maintenance activities and schedules
(g) Management strategy for pesticides, herbicides, and fertilizer use.
(h) Planned inspection frequencies for the high priority category
(i) Methods for inspection
(j) A description of enforcement mechanisms and how they will be used

(3) Industrial (Existing Development) Component

(a) Which pollution prevention methods will be required for implementation, and how and where they will be required
(b) A completed watershed-based inventory of all industrial sites
(c) A completed prioritization of all industrial sites based on threat to water quality
(d) Which BMPs will be implemented, or required to be implemented, for each priority category
(e) How BMPs will be implemented, or required to be implemented, for each priority category
(f) A description of the monitoring program to be conducted, or required to be conducted
(g) Planned inspection frequencies for each priority category
(h) Methods for inspection
(i) A description of enforcement mechanisms and how they will be used
(j) A description of how non-compliant sites will be identified and the process for notifying the SDRWQCB, including a list of current non-compliant sites

(4) Commercial (Existing Development) Component

(a) Which pollution prevention methods will be required for implementation, and how and where they will be required
(b) A completed watershed-based inventory of high priority commercial sites
(c) Which BMPs will be implemented, or required to be implemented, for high priority sites
(d) How BMPs will be implemented, or required to be implemented, for high priority sites
(e) Planned inspection frequencies for high priority sites
(f) Methods for inspection
(g) A description of enforcement mechanisms and how they will be used

(5) Residential (Existing Development) Component

(a) Which pollution prevention methods will be encouraged for implementation, and how and where they will be encouraged
(b) A completed inventory of high priority residential areas and activities

(c) Which BMPs will be implemented, or required to be implemented, for high priority areas and activities
(d) How BMPs will be implemented, or required to be implemented, for high priority areas and activities
(e) A description of enforcement mechanisms and how they will be used

(6) Education Component

(a) A description of the content, form, and frequency of education efforts for each target community

(7) Illicit Discharges Detection and Elimination Component

(a) A description of the program to actively seek and eliminate illicit discharges and connections
(b) A description of dry weather analytical monitoring to be conducted to detect illicit discharges and connections (see Attachment E)
(c) A description of investigation and inspection procedures to follow-up on dry weather analytical monitoring results or other information which indicate potential for illicit discharges and connections
(d) A description of procedures to eliminate detected illicit discharges and connections
(e) A description of enforcement mechanisms and how they will be used
(f) A description of methods to prevent, respond to, contain, and clean up all sewage (including spills from private laterals and failing septic systems) and other spills in order to prevent entrance into the MS4
(g) A description of the mechanism to receive notification of spills from private laterals
(h) A description of efforts to facilitate public reporting of illicit discharges and connections, including a public hotline
(i) A description of efforts to facilitate proper disposal of used oil and other toxic materials
(j) A description of controls and measures to be implemented to limit infiltration of seepage from sanitary sewers to MS4s
(k) A description of routine preventive maintenance activities on the sanitary system (where applicable) and the MS4

(8) Public Participation Component

(a) A description of how public participation will be included in the implementation of the Jurisdictional URMP

(9) Assessment of Jurisdictional URMP Effectiveness Component

(a) A description of strategies to be used for assessing the long-term effectiveness of the individual Jurisdictional URMP.

(10) Fiscal Analysis Component

(a) A description of the strategy to be used to conduct a fiscal analysis of the urban runoff management program.

(11) Land-Use Planning for New Development and Redevelopment Component

(a) Workplan for inclusion in General Plan (or equivalent plan) of water quality and watershed protection principles and policies
(b) Development project requirements in local development permits
(c) Participation efforts conducted in the development of the Model SUSMP

(d) Environmental review processes revisions
(e) A description of the planning education program and how it will be implemented

(12) Fire Fighting

(a) A description of a program to reduce pollutants from non-emergency fire fighting flows identified by the Copermittee to be significant sources of pollutants.

b. Each Copermittee shall submit to the Principal Permittee(s) each part of its individual Jurisdictional URMP document by the dates specified by the Principal Permittee(s).

c. In addition to submittal of the Jurisdictional URMP document, each Copermittee shall submit to the SDRWQCB its own adopted local SUSMP consistent with the approved Model SUSMP, as described in section F.1.b.(2). of this Order. Each Copermittee's own local SUSMP, along with its amended ordinances, shall be submitted to the SDRWQCB within 180 days of the SDRWQCB's approval of the Model SUSMP.

2. Unified – The Principal Permittee(s) shall submit the unified Jurisdictional URMP document to the SDRWQCB. The unified Jurisdictional URMP document shall be submitted in two parts (the collected Jurisdictional URMPs and the model SUSMP).

The unified Jurisdictional URMP document submittal shall address the requirements of the entire Jurisdictional URMP sections F.1 – F.8. of this Order, with the exception of the local SUSMP requirements (which are to be implemented 180 days after approval of the model SUSMP by the SDRWQCB). The unified Jurisdictional URMP document submittal shall contain a section covering common activities conducted collectively by the Copermittees, to be produced by the Principal Permittee(s), and the twenty individual Jurisdictional URMP documents. The Principal Permittee(s) shall be responsible for the development and production of a stand alone Model SUSMP document meeting the requirements of section F.1.b.(2) of this Order. The Principal Permittee(s) shall submit the unified Jurisdictional URMP document, including the Model SUSMP, to the SDRWQCB within **365 days of adoption** of this Order.

3. Universal Reporting Requirements

All individual and unified Jurisdictional URMP document submittals shall include an executive summary, introduction, conclusion, recommendations, and signed certified statement. Each Copermittee shall submit its individual Jurisdictional Urban Runoff Management Program Document with a signed certified statement. The Principal Permittee(s) shall submit a signed certified statement referring to its individual Jurisdictional Urban Runoff Management Program Document, the section covering common activities conducted collectively by the Copermittees, and the Model SUSMP document meeting the requirements of section F.1.b.(2) of this Order as produced by the Principal Permittee(s).

I. SUBMITTAL OF JURISDICTIONAL URMP ANNUAL REPORT

1. Individual - Each individual Jurisdictional URMP Annual Report shall be a documentation of the activities conducted by each Copermittee during the past annual reporting period. Each Jurisdictional URMP Annual Report shall, at a minimum, contain the following:

a. Comprehensive description of all activities conducted by the Copermittee to meet all requirements of each component of the Jurisdictional URMP section of this Order;

F.1. Land-Use Planning for New Development and Redevelopment Component
F.2. Construction Component
F.3. Existing Development Component (Including Municipal, Industrial, Commercial, Residential, and Education)

F.4. Education Component
F.5. Illicit Discharge Detection and Elimination Component
F.6. Public Participation Component
F.7. Assessment of Jurisdictional URMP Effectiveness Component
F.8. Fiscal Analysis Component

b. Each Copermittee's accounting of all:
   (1) Reports of illicit discharges (i.e., complaints) and how each was resolved (indicating referral source);
   (2) Inspections conducted;
   (3) Enforcement actions taken; and
   (4) Education efforts conducted.

c. Public participation mechanisms utilized during the Jurisdictional URMP implementation process;

d. Proposed revisions to the Jurisdictional URMP;

e. A summary of all urban runoff related data not included in the annual monitoring report (e.g., special investigations);

f. Budget for upcoming year;

g. Identification of management measures proven to be ineffective in reducing urban runoff pollutants and flow; and

h. Identification of water quality improvements or degradation.

2. Unified - The unified Jurisdictional URMP Annual Report shall contain a section covering common activities conducted collectively by the Copermittees, to be produced by the Principal Permittee(s), and the twenty individual Jurisdictional URMP Annual Reports. Each Copermittee shall submit to the Principal Permittee(s) an individual Jurisdictional URMP Annual Report by the date specified by the Principal Permittee(s). The Principal Permittee(s) shall submit a unified Jurisdictional URMP Annual Report to the SDRWQCB by **January 31, 2003 and every January 31 thereafter.** The reporting period for these annual reports shall be the previous fiscal year. For example, the report submitted January 31, 2003 shall cover the reporting period July 1, 2001 to June 30, 2002.

3. Universal Reporting Requirements

   All individual and unified Jurisdictional URMP submittals shall include an executive summary, introduction, conclusion, recommendations, and signed certified statement. Each Copermittee shall submit its individual Jurisdictional Urban Runoff Management Program Annual Report with a signed certified statement. The Principal Permittee(s) shall submit a signed certified statement referring to its individual Jurisdictional Urban Runoff Management Program Annual Report and the section covering common activities conducted collectively by the Copermittees as produced by the Principal Permittee(s).

J. WATERSHED URBAN RUNOFF MANAGEMENT PROGRAM

1. Each Copermittee shall collaborate with other Copermittees within its watershed(s) as shown in Table 4. below to identify and mitigate the highest priority water quality issues/pollutants in the watershed(s).

2. Each Copermittee shall collaborate with all other Copermittees discharging urban runoff into the same watershed to develop and implement a Watershed Urban Runoff Management Program (Watershed URMP) for the respective watershed. Each Watershed URMP shall, at a minimum

contain the following:

a. An accurate map of the watershed (preferably in Geographical Information System [GIS] format) that identifies all receiving waters (including the Pacific Ocean); all Clean Water Act section 303(d) impaired receiving waters (including the Pacific Ocean); land uses; MS4s, major highways; jurisdictional boundaries; and inventoried commercial, construction, industrial, municipal sites, and residential areas.

b. An assessment of the water quality of all receiving waters in the watershed based upon (1) existing water quality data; and (2) annual watershed water quality monitoring that satisfies the watershed monitoring requirements of Attachment B ;

c. An identification and prioritization of major water quality problems in the watershed caused or contributed to by MS4 discharges and the likely source(s) of the problem(s);

d. An implementation time schedule of short and long-term recommended activities (individual and collective) needed to address the highest priority water quality problem(s). For this section, "short-term activities" shall mean those activities that are to be completed during the life of this Order and "long-term activities" shall mean those activities that are to be completed beyond the life of this Order;

e. An identification of the Copermittee(s) responsible for implementing each recommended activity, including the selection of the Lead Permittee(s) and the time schedule for implementation. In the event that a Lead Permittee is not selected and identified by the Copermittees in a watershed, the Copermittee identified in Table 4 as the Lead Permittee for that watershed shall be responsible for implementing the requirements of the Lead Permittee in that watershed by default;

f. A mechanism for public participation throughout the entire watershed URMP process;

g. A watershed based education program;

h. A mechanism to facilitate collaborative "watershed-based" (i.e., natural resource-based) land use planning with neighboring local governments in the watershed.

i. Long-term strategy for assessing the effectiveness of the Watershed URMP. The long-term assessment strategy shall identify specific direct and indirect measurements that will track the long-term progress of Watershed URMP towards achieving improvements in receiving water quality. Methods used for assessing effectiveness shall include the following or their equivalent: surveys, pollutant loading estimations, and receiving water quality monitoring. The long-term strategy shall also discuss the role of monitoring data in substantiating or refining the assessment.

Table 4. Copermittees by Watershed

RESPONSIBLE COPERMITTEE(S)	WATERSHED URBAN RUNOFF MANAGEMENT PROGRAM	HYDROLOGIC UNIT OR AREA	MAJOR RECEIVING WATER BODIES
1. County of San Diego	Santa Margarita River	Santa Margarita HU (902.00)	Santa Margarita River and Estuary, Pacific Ocean
1. City of Escondido **2. City of Oceanside** 3. City of Vista 4. County of San Diego	San Luis Rey River	San Luis Rey HU (903.00)	San Luis Rey River and Estuary, Pacific Ocean
1. City of Carlsbad **2. City of Encinitas** 3. City of Escondido	Carlsbad	Carlsbad HU (904.00)	Batiquitos Lagoon San Elijo Lagoon Agua Hedionda Lagoon

RESPONSIBLE COPERMITTEE(S)	WATERSHED URBAN RUNOFF MANAGEMENT PROGRAM	HYDROLOGIC UNIT OR AREA	MAJOR RECEIVING WATER BODIES
4. City of Oceanside 5. City of San Marcos 6. City of Solana Beach 7. City of Vista 8. County of San Diego			Buena Vista Lagoon and Tributary Streams Pacific Ocean
1. City of Del Mar 2. **City of Escondido** 3. City of Poway 4. City of San Diego 5. City of Solana Beach 6. County of San Diego	San Dieguito River	San Dieguito HU (905.00)	San Dieguito River and Estuary Pacific Ocean
1. City of Del Mar 2. City of Poway 3. City of San Diego 4. County of San Diego	Peñasquitos	Miramar Reservoir HA (906.10) Poway HA (906.20)	Los Peñasquitos Creek Los Peñasquitos Lagoon Pacific Ocean
1. City of San Diego	Mission Bay	Scripps HA (906.30) Miramar HA(906.40) Tecolote HA (906.50)	Mission Bay Pacific Ocean
1. City of El Cajon 2. City of La Mesa 3. City of Poway 4. City of San Diego 5. City of Santee 6. County of San Diego	San Diego River	San Diego HU (907.00)	San Diego River Pacific Ocean
1. City of Chula Vista 2. City of Coronado 3. City of Imperial Beach 4. City of La Mesa 5. City of Lemon Grove 6. City of National City 7. City of San Diego 8. County of San Diego **9. San Diego Unified Port District**	San Diego Bay	Pueblo San Diego HU (908.00) Sweetwater HU (909.00) Otay HU (910.00)	San Diego Bay Sweetwater River Otay River Pacific Ocean
1. City of Imperial Beach 2. City of San Diego 3. County of San Diego	Tijuana River	Tijuana (911.00)	Tijuana River and Estuary Pacific Ocean

- The Lead Watershed Copermittee for each watershed is highlighted

K. IMPLEMENTATION OF WATERSHED URMP

Each Copermittee shall have completed full implementation of all requirements of the Watershed URMP section of this Order no later than January 31, 2003 unless otherwise specified.

L. SUBMITTAL OF WATERSHED URMP DOCUMENT

The written account of the overall watershed program to be conducted by each Copermittee during the remaining life of this Order is referred to as the "Watershed URMP Document". The Watershed URMP is conducted concurrently with the Jurisdictional URMP.[6]

[6]As each Copermittee transitions from conducting its management program only within its jurisdiction to conducting it also throughout the entire watershed (with neighboring Copermittees), it is expected that many activities will continue on a jurisdictional level (e.g., enforcement of local ordinances and permits). Implementation of the Watershed URMP is not meant to replace, but to expand implementation of the Jurisdictional URMP. For this reason, it is necessary to report management activities on both levels. This can be accomplished either by submitting both a Jurisdictional URMP Annual Report and a Watershed URMP Annual Report or by submitting a single Watershed URMP Annual Report that contains two separate sections (i.e., watershed activities and jurisdictional activities). Information need only be reported once (to the extent something is covered in the Watershed URMP Annual Report, it need not be covered again the Jurisdictional URMP Annual Report).

1. Each Watershed Specific URMP document shall state how the member Copermittees within each watershed will develop and implement the requirements of the Watershed URMP section J. of this Order. The Copermittees responsible for each of the nine Watershed URMPs are specified in Table 4 above. The Lead Watershed Copermittee for each watershed is highlighted, unless a different Lead Watershed Copermittee is designated. Each Lead Watershed Copermittee shall be responsible for producing its respective Watershed URMP document, as well as for coordination and meetings amongst all member watershed Copermittees. Each Lead Watershed Copermittee is further responsible for the submittal of the Watershed URMP document to the Principal Permittee(s) by the date specified by the Principal Permittee(s).

   a. Each Watershed specific URMP document shall include:
      (1) A completed watershed map
      (2) A water quality assessment and watershed monitoring needed
      (3) Prioritization of water quality problems
      (4) Recommended activities (short and long term)
      (5) Individual Copermittee implementation responsibilities and time schedules for implementation
      (6) A description of watershed public participation mechanisms
      (7) A description of watershed education mechanisms
      (8) A description of the mechanism and implementation schedule for watershed-based land use planning
      (9) A strategy for assessing the long-term effectiveness of the Watershed URMP

2. Unified - The unified Watershed URMP document shall contain a section covering common activities conducted collectively by the Copermittees, to be produced by the Principal Permittee(s), and the nine Watershed Specific URMP documents. The Principal Permittee(s) shall submit the unified Watershed URMP document to the SDRWQCB by **January 31, 2003.**

3. Universal Reporting Requirements.

   All individual and unified Watershed URMP submittals shall include an executive summary, introduction, conclusion, recommendations, and signed certified statement. Each Copermittee shall submit a signed certified statement covering its responsibilities in the specific Watershed URMP Document. The Principal Permittee(s) shall submit a signed certified statement referring to its specific Watershed URMP Document and the section covering common activities conducted collectively by the Copermittees as produced by the Principal Permittee(s).

M. SUBMITTAL OF WATERSHED URMP ANNUAL REPORT

1. Watershed Specific - Each Watershed Specific URMP Annual Report shall be a documentation of the activities conducted by watershed member Copermittees during the previous annual reporting period to meet the requirements of all components of the Watershed URMP section of this Order. Each Watershed URMP Annual Report shall, at a minimum, contain the following:

   a. Comprehensive description of all activities conducted by the watershed member Copermittees to meet all requirements of each component of Watershed URMP section J. of this Order

   b. Public participation mechanisms utilized during the Watershed URMP implementation process;
   c. Mechanism for watershed based land use planning;
   d. Assessment of effectiveness of Watershed URMP;
   e. Proposed revisions to the Watershed URMP;
   f. A summary of watershed effort related data not included in the annual monitoring report (e.g., special investigations); and
   g. Identification of water quality improvements or degradation.

2. Unified - The Unified Watershed URMP Annual Report shall contain a section covering common activities conducted collectively by the Copermittees, to be produced by the Principal Permittee(s), and the nine Watershed Specific URMP Annual Reports. Each Lead Watershed Copermittee shall submit to the Principal Permittee(s) a Watershed Specific URMP Annual Report by the date specified by the Principal Permittee(s). The Principal Permittee(s) shall submit the Unified Watershed URMP Annual Report to the SDRWQCB by January 31, 2004 and every January 31 thereafter. The reporting period for these annual reports shall be the previous fiscal year. For example, the report submitted January 31, 2004 shall cover the reporting period July 1, 2002 to June 30, 2003.

3. Universal Reporting Requirements

   All individual and unified Watershed URMP submittals shall include an executive summary, introduction, conclusion, recommendations, and signed certified statement. Each Copermittee shall submit a signed certified statement covering its responsibilities in the specific Watershed URMP Annual Report. The Principal Permittee(s) shall submit a signed certified statement referring to its specific Watershed URMP Annual Report and the section covering common activities conducted collectively by the Copermittees as produced by the Principal Permittee(s).

N. ALL COPERMITTEE COLLABORATION

1. Each Copermittee shall collaborate with all other Copermittees regulated under this Order to address common issues, promote consistency among Jurisdictional Urban Runoff Management Programs (Jurisdictional URMPs) and Watershed Urban Runoff Management Programs (Watershed URMPs), and to plan and coordinate activities required under this Order

   a. Management Structure - All Copermittees shall jointly execute and submit to the SDRWQCB no later than **365 days after adoption** of this Order, a Memorandum of Understanding, Joint Powers Authority, or other instrument of formal agreement which at a minimum provides a management structure for the following:

      - Designation of Joint Responsibilities
      - Decision making
      - Watershed activities;
      - Information management of data and reports, including the requirements under this Order; and
      - Any and all other collaborative arrangements for compliance with this Order.

   b. All Copermittees shall jointly develop a standardized format(s) for all reports required under this Order (e.g., annual reports, monitoring reports, fiscal analysis reports, and program effectiveness reports, etc.). The standardized reporting format(s) shall be used by all Copermittees and shall include protocols for electronic reporting. The Principal Permittee(s) shall submit the standardized format(s) to the SDRWQCB no later than **365 days after adoption** of this Order**.**

O. PRINCIPAL PERMITTEE RESPONSIBILITIES

Within 90 days of adoption of this Order, the Copermittees shall designate the Principal Permittee(s) and notify the SDRWQCB of the name(s) of the Principal Permittee(s). The Principal Permittee(s) may require the Copermittees to reimburse the Principal Permittee(s) for reasonable costs incurred while performing coordination responsibilities and other related tasks. The Principal Permittee(s) shall, at a minimum:

1. Serve as liaison(s) between the Copermittees and the SDRWQCB on general permit issues.

2. Coordinate permit activities among the Copermittees and facilitate collaboration on the development and implementation of programs required under this Order;

3. Integrate individual Copermittee documents and reports required under this Order into single unified documents and reports for submittal to the SDRWQCB as described below. If a reporting date falls on a non-working day or State holiday, then the report is to be submitted on the following working day.

   a. Unified Jurisdictional URMP Document – The Principal Permittee(s) shall submit the unified Jurisdictional URMP document in its entirety (including the model SUSMP) to the SDRWQCB within 365 days of the adoption of this Order.

      The Principal Permittee(s) shall be responsible for producing the sections of the unified Jurisdictional URMP document submittals covering common activities conducted by the Copermittees. The Principal Permittee(s) shall be responsible for the development and production of a stand alone Model SUSMP document meeting the requirements of section F.1.b.(2). of this Order. The Principal Permittee(s) shall also be responsible for collecting and assembling the individual Jurisdictional URMP document submittals covering the activities conducted by each individual Copermittee.

   b. Unified Jurisdictional URMP Annual Reports – The Principal Permittee(s) shall submit unified Jurisdictional URMP Annual Reports to the SDRWQCB by January 31 of each year, beginning on **January 31, 2003**. The reporting period for these annual reports shall be the previous fiscal year. For example, the report submitted January 31, 2003 shall cover the reporting period July 1, 2001 to June 30, 2002.

      The Principal Permittee(s) shall be responsible for producing the section of the unified Jurisdictional URMP Annual Reports covering common activities conducted by the Copermittees. The Principal Permittee(s) shall also be responsible for collecting and assembling the individual Jurisdictional URMP Annual Reports covering the activities conducted by each individual Copermittee.

   c. Unified Watershed URMP Document – The Principal Permittee(s) shall submit the unified Watershed URMP document to the SDRWQCB by **January 31, 2003**. The Principal Permittee(s) shall be responsible for producing the section of the unified Watershed URMP document covering common activities conducted by the Copermittees. The Principal Permittee(s) shall also be responsible for collecting and assembling the watershed specific Watershed URMP documents covering the activities conducted by each individual Copermittee.

   d. Unified Watershed URMP Annual Report - The Principal Permittee(s) shall submit unified Watershed URMP Annual Reports to the SDRWQCB by January 31 of each year, beginning on **January 31, 2004**. The reporting period for these annual reports shall be the previous fiscal year. For example, the report submitted January 3, 2004 shall cover the reporting period July 1, 2002 to June 30, 2003.

      The Principal Permittee(s) shall be responsible for producing the section of the unified Watershed URMP Annual Reports covering common activities conducted by the Copermittees. The Principal Permittee(s) shall also be responsible for collecting and assembling the watershed specific Watershed URMP Annual Reports covering the activities conducted by each individual Copermittee.

   e. Receiving Waters Monitoring and Reporting Program - The Principal Permittee(s) shall be responsible for the production and submittal of the Previous Monitoring and Future Recommendations Report. The report shall be submitted to the SDRWQCB within 180 days

of adoption of this Order.

f. Receiving Waters Monitoring and Reporting Program - The Principal Permittee(s) shall be responsible for the development and production of the Receiving Waters Monitoring Program as it is outlined in Attachment B. The Principal Permittee(s) shall submit the Receiving Waters Monitoring Program to the SDRWQCB within 180 days of adoption of this Order.

g. Receiving Waters Monitoring and Reporting Program - The Principal Permittee(s) shall submit the Receiving Waters Monitoring Annual Report to the SDRWQCB on January 31 of each year, beginning on January 31, 2003.

h. Formal Agreements/Standardized Formats - The Principal Permittee(s) shall submit to the SDRWQCB, within 365 days of adoption of this Order, a formal agreement between the Copermittees which provides a management structure for meeting the requirements of this Order (as described in section N.1.a.). The Principal Permittee(s) shall submit to the SDRWQCB, within 365 days of adoption of this Order, standardized formats for all reports and documents required under this Order.

i. Dry Weather Analytical Monitoring - The Principal Permittee(s) shall collectively submit the Copermittees' dry weather analytical monitoring maps and procedures to the SDRWQCB within 365 days of adoption of this Order.

P. RECEIVING WATERS MONITORING AND REPORTING PROGRAM

1. Pursuant to California Water Code section 13267, each Copermittee shall comply with Monitoring and Reporting Program for No. 2001-01 contained in **Attachment B** of this Order.

2. Each Copermittee shall also comply with standard provisions, reporting requirements, and notifications contained in **Attachment C** of this Order.

Q. TASKS AND SUBMITTAL SUMMARY

The tasks and submittals required under this Order are summarized in Tables 5 and 6 below:

Table 5. Task Summary

Task No.	Task	Permit Section	Completion Date	Frequency
1	Identify discharges not to be prohibited and BMPs required for treatment of discharges not prohibited	B.3.	365 days after adoption of Order	One Time
2	Examine field screening results to identify water quality problems resulting from non-prohibited non-storm water discharges, including follow-up of problems	B.5	January 31, 2003	Annually
3	Notify SDRWQCB of discharges causing or contributing to an exceedance of water quality standards	C.2.a.	Immediate	As Needed
4	Establish adequate legal authority to control pollutant discharges into and from MS4	D.1.	180 days after adoption of Order	One Time
5	Assess General Plan to incorporate water quality and watershed protection principles	F.1.a.	365 days after adoption of Order	One Time
6	Include Development Project Requirements in local permits	F.1.b.(1).	365 days after adoption of Order	One Time
7	Develop Model SUSMP	F.1.b.(2).	365 days after adoption of Order	One Time
8	Develop and adopt individual local SUSMP and amended ordinances	F.1.b.(2).	180 days after approval of Model SUSMP by SDRWQCB	One Time
9	Implement individual jurisdictional SUSMP	F.1.b.(2).	180 days after approval of Model	Continuous

			SUSMP by SDRWQCB	
10	Revise environmental review processes	F.1.c.(1).	365 days after adoption of Order	One Time
11	Conduct education program for municipal planning and development review staff, project applicants, developers, contractors, community planning groups, and property owners	F.1.d.(1). And F.1.d.(2).	365 days after adoption of Order	Ongoing
12	Implement all requirements of Construction Component of Jurisdictional URMP	F.2.a. – F.2.j.	365 days after adoption of Order	Ongoing
13	Notify SDRWQCB of non-compliant construction sites that pose a threat to human or environmental health	F.2.i	Within 24 hours of discovery of noncompliance	As Needed
14	Implement all requirements of Municipal Existing Development Component of Jurisdictional URMP	F.3.a.(1). – F.3.a.(8).	365 days after adoption of Order	Ongoing
15	Implement all requirements of Industrial Existing Development Component of Jurisdictional URMP	F.3.b.(1) – F.3.b.(8)	365 days after adoption of Order	Ongoing
16	Notify SDRWQCB of non-compliant industrial sites that pose a threat to human or environmental health	F.3.b.8	Within 24 hours of discovery of noncompliance	As Needed
17	Implement all requirements of Commercial Existing Development Component of Jurisdictional URMP	F.3.c.(1) – F.3.c.(5)	365 days after adoption of Order	Ongoing
18	Implement all requirements of Residential Existing Development Component of Jurisdictional URMP	F.3.d.(1) – F.3.d.(4)	365 days after adoption of Order	Ongoing
19	Implement all requirements of Education Component of Jurisdictional URMP	F.4.a. – F.4.c.	365 days after adoption of Order	Ongoing
20	Implement all requirements of Illicit Discharge Detection and Elimination Component of Jurisdictional URMP	F.5.a. – F.5.i.	365 days after adoption of Order	Ongoing
21	Implement all requirements of Public Participation Component of Jurisdictional URMP	F.6.	365 days after adoption of Order	Ongoing
22	Develop strategy for assessment of Jurisdictional URMP effectiveness	F.7.a.	365 days after adoption of Order	One Time
23	Assess Jurisdictional URMP effectiveness	F.7.b.	January 31, 2003	Annually
24	Develop strategy for fiscal analysis of urban runoff management program	F.8.	365 days after adoption of Order	One Time
25	Conduct fiscal analysis of urban runoff management program in entirety	F.8.	January 31, 2003	Annually
26	Develop and implement Watershed URMP	J.2.	January 31, 2003	Ongoing
27	Execute formal agreement which provides management structure for meeting Order requirements	N.1.a.	365 days after adoption of Order	One Time
28	Develop standardized formats for all required reports of this Order	N.1.b.	365 days after adoption of Order	One Time
29	Develop Previous Monitoring and Future Recommendations Report	Attachment B	180 days after adoption of Order	One Time
30	Develop Receiving Waters Monitoring Program	Attachment B	180 days after adoption of Order	One Time
31	Implement Receiving Waters Monitoring Program	Attachment B	180 days after adoption of Order	Continuous
32	Develop dry weather analytical and field screening monitoring map and procedures	Attachment E	365 days after adoption of Order	One Time
33	Conduct dry weather analytical and field screening monitoring	Attachment E	May 1, 2002	Annually
34	Complete NPDES applications for issuance of renewal watershed based permits	Attachment C	At least 180 days prior to expiration of Order	One Time
35	Notify SDRWQCB of any incidence of non-compliance with this Order that poses a threat to human or environmental health.	R.1, B.6 of Attachment C	Within 24 hours of discovery of non-compliance	As Needed
36	Designate Principal Permittee(s) and notify SDRWQCB	O.	90 days after adoption of the	One Time

			Order	

Table 6. Submittal Summary

Submittal No.	Submittal	Permit Section	Completion Date	Frequency
1	Submit identification of discharges not to be prohibited and BMPs required for treatment of discharges not prohibited	B.3.	365 days after adoption of Order	One Time
2	Report on discharges causing or contributing to an exceedance of water quality standards, including description of BMP implementation	C.2.a.	With individual Jurisdictional URMP Annual Reports	As Needed
3	Submit Certified Statement of Adequate Legal Authority	D.2.	180 days after adoption of Order	One Time
4	Submit certified statement if particular high priority construction sites are to be inspected monthly rather than weekly in the rainy season	F.2.g.(2).	365 days after adoption of Order and as needed thereafter	As Needed
5	Submit report on non-compliant construction sites that pose a threat to human or environmental health.	F.2.i.	Within 5 Days of discovery of non-compliance	As Needed
6	Submit report on non-compliant industrial sites that pose a threat to human or environmental health.	F.3.b.8.	Within 5 days of discovery of non compliance	As Needed
7	Submit to Principal Permittee(s) individual Jurisdictional URMP document covering requirements for all Components	H.1.a.	Prior to 365 days after adoption of Order (Principal Permittee(s) specifies date of submittal)	One Time
8	(This space reserved).			
9	Principal Permittee(s) shall submit to SDRWQCB unified Jurisdictional URMP document covering requirements for all Components, including Model SUSMP	H.2.a.	365 days after adoption of Order	One Time
10	(This space reserved).			
11	Submit to SDRWQCB local SUSMP and amended ordinances	F.1.b.(2). and H.1.d.	180 days after approval of Model SUSMP	One Time
12	Submit to Principal Permittee(s) individual Jurisdictional URMP Annual Report	I.1.	Prior to January 31, 2003 (Principal Permittee(s) specifies date of submittal)	Annually
13	Principal Permittee(s) shall submit 1st unified Jurisdictional URMP Annual Report to SDRWQCB	I.2.	January 31, 2003	One Time and Annually Thereafter
14	Submit to Principal Permittee(s) Watershed Specific URMP document	L.1.	Prior to January 31, 2003 (Principal Permittee(s) specifies date of submittal)	One Time
15	Principal Permittee(s) shall submit unified Watershed Specific URMP document to SDRWQCB	L.2.	January 31, 2003	One Time
16	Principal Permittee(s) shall submit 2nd unified Jurisdictional URMP Annual Report to SDRWQCB	I.2.	January 31, 2004	One Time
17	Submit to Principal Permittee(s) Watershed Specific URMP Annual Report	M.1.	Prior to January 31, 2004 (Principal Permittee(s) specifies date of submittal)	Annually
18	Principal Permittee(s) shall submit 1st unified Watershed Specific URMP Annual Report to SDRWQCB	M.2.	January 31, 2004	One Time and Annually Thereafter
19	Principal Permittee(s) shall submit 3rd unified Jurisdictional URMP Annual Report to SDRWQCB	I.2.	January 31, 2005	One Time

20	Principal Permittee(s) shall submit 2nd unified Watershed Specific URMP Annual Report to SDRWQCB	M.2.	January 31, 2005	One Time
21	Principal Permittee(s) shall submit 4th unified Jurisdictional URMP Annual Report to SDRWQCB	I.2.	January 31, 2006	One Time
22	Principal Permittee(s) shall submit 3rd unified Watershed Specific URMP Annual Report to SDRWQCB	M.2.	January 31, 2006	One Time
23	Principal Permittee(s) shall submit 5th unified Jurisdictional URMP Annual Report to SDRWQCB	I.2.	January 31, 2007	One Time
24	Principal Permittee(s) shall submit formal agreement between Copermittees which provides management structure for meeting Order requirements	N.1.a.	365 days after adoption of Order	One Time
25	Principal Permittee(s) shall submit standardized formats for all reports required under this Order	N.1.b.	365 days after adoption of Order	One Time
26	Principal Permittee(s) submits Previous Monitoring and Future Recommendations Report to SDRWQCB	Attachment B	180 days after adoption of Order	One Time
27	Principal Permittee(s) submits Receiving Waters Monitoring Program document to SDRWQCB	Attachment B	180 days after adoption of Order	One Time
28	Principal Permittee(s) submits Receiving Waters Monitoring Annual Report to SDRWQCB	Attachment B	January 31, 2003	Annually
29	Submit to Principal Permittee(s) dry weather analytical monitoring map and procedures	Attachment E	Prior to 365 days after adoption of Order	One Time
30	Principal Permittee(s) submits collective dry weather analytical monitoring maps and procedures	Attachment E	365 days after adoption of Order	One Time
31	Submit to Principal Permittee(s) dry weather analytical monitoring results as part of individual Jurisdictional URMP Annual Report	Attachment E	Prior to January 31, 2003, as part of individual Jurisdictional URMP Annual Report	Annually
32	Principal Permittee(s) shall submit NPDES applications for issuance of renewal watershed based permits	Attachment C	At least 180 days prior to expiration of this Order	One Time
33	Submit reports of any incidence of non-compliance with this Order that poses a threat to human or environmental health.	R.1, B.6 of Attachment C	Within 5 days of discovery of non compliance	As Needed

R. STANDARD PROVISIONS, REPORTING REQUIREMENTS AND NOTIFICATIONS

1. Each Copermittee shall comply with Standard Provisions, Reporting Requirements, and Notifications contained in **Attachment C** of this Order. This includes 24 hour/5day reporting requirements for any instance of non-compliance with this Order as described in section B.6 of Attachment C.

2. All plans, reports and subsequent amendments submitted in compliance with this Order shall be implemented immediately (or as otherwise specified) and shall be an enforceable part of this Order upon submission to the SDRWQCB. All submittals by Copermittees must be adequate to implement the requirements of this Order.

I, John H. Robertus, Executive Officer, do hereby certify the foregoing is a full, true, and correct copy of an Order adopted by the California Regional Water Quality Control Board, San Diego Region, on February 21, 2001, as amended by State Water Resources Control Board Order WQ 2001-15 adopted November 15, 2001.

_____
John H. Robertus
Executive Officer

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN DIEGO REGION

ORDER NO. 2001-01

NPDES NO. CAS0108758

WASTE DISCHARGE REQUIREMENTS FOR DISCHARGES OF URBAN RUNOFF FROM THE MUNICIPAL SEPARATE STORM SEWER SYSTEMS (MS4s) DRAINING THE WATERSHEDS OF THE COUNTY OF SAN DIEGO, THE INCORPORATED CITIES OF SAN DIEGO COUNTY, AND THE SAN DIEGO UNIFIED PORT DISTRICT

The California Regional Water Quality Control Board, San Diego Region (hereinafter SDRWQCB), finds that:

1. **COPERMITTEES ARE DISCHARGERS OF URBAN RUNOFF:** Each of the persons in Table 1 below, hereinafter called Copermittees or dischargers, owns or operates a municipal separate storm sewer system (MS4), through which it discharges urban runoff into waters of the United States within the San Diego Region. These MS4s fall into one or more of the following categories: (1) a medium or large MS4 that services a population of greater than 100,000 or 250,000 respectively; or (2) a small MS4 that is "interrelated" to a medium or large MS4; or (3) an MS4 which contributes to a violation of a water quality standard; or (4) an MS4 which is a significant contributor of pollutants to waters of the United States.

Table 1. Municipal Copermittees

1.	City of Carlsbad	11.	City of National City
2.	City of Chula Vista	12.	City of Oceanside
3.	City of Coronado	13.	City of Poway
4.	City of Del Mar	14.	City of San Diego
5.	City of El Cajon	15.	City of San Marcos
6.	City of Encinitas	16.	City of Santee
7.	City of Escondido	17.	City of Solana Beach
8.	City of Imperial Beach	18.	City of Vista
9.	City of La Mesa	19.	County of San Diego
10.	City of Lemon Grove	20.	San Diego Unified Port District

2. **URBAN RUNOFF CONTAINS "WASTE" AND "POLLUTANTS":** Urban runoff contains waste, as defined in the California Water Code, and pollutants, as defined in the federal Clean Water Act, and adversely affects the quality of the waters of the State.

3. **URBAN DEVELOPMENT AND RUNOFF CAUSES RECEIVING WATER DEGRADATION:** Urban runoff discharges from MS4s are a leading cause of receiving water quality impairment in the San Diego Region and throughout the United States. As runoff flows over urban areas, it picks up harmful pollutants such as pathogens, sediment (resulting from human activities), fertilizers, pesticides, heavy metals, and petroleum products. These pollutants often become dissolved or suspended in urban runoff and are conveyed and discharged to receiving waters, such as streams, lakes, lagoons, bays, and the ocean without treatment. Once in receiving waters, these pollutants harm aquatic life primarily through toxicity and habitat degradation. Furthermore, the pollutants can enter the food chain and may eventually enter the tissues of fish and humans.

There is a strong direct correlation between "urbanization" and "impacts to receiving water quality". In general, the more heavily developed the area, the greater the impacts to receiving waters from urban runoff.

These impacts especially threaten environmentally sensitive areas (such as Clean Water Act section 303(d) impaired water bodies, areas designated as Areas of Special Biological Significance, water bodies designated with the RARE beneficial use, and preserves containing receiving waters designated under the Multi Species Conservation Program within the Cities and County of San Diego). Such environmentally sensitive areas have a much lower capacity to withstand pollutant shocks than might be acceptable in the general circumstance. In essence, urban development that is ordinarily insignificant in its impact on the environment may, in a particularly sensitive environment, be significant.

4. **URBAN DEVELOPMENT INCREASES POLLUTANT LOAD, VOLUME, AND VELOCITY OF RUNOFF:** During urban development two important changes occur. First, natural vegetated pervious ground cover is converted to impervious surfaces such as paved highways, streets, rooftops, and parking lots. Natural vegetated soil can both absorb rainwater and remove pollutants providing a very effective natural purification process. Because pavement and concrete can neither absorb water nor remove pollutants, the natural purification characteristics of the land are lost.

   Secondly, urban development creates new pollution sources as human population density increases and brings with it proportionately higher levels of car emissions, car maintenance wastes, municipal sewage, pesticides, household hazardous wastes, pet wastes, trash, etc. which can either be washed or directly dumped into the MS4.

   As a result of these two changes, the runoff leaving the developed urban area is significantly greater in volume, velocity and pollutant load than the pre-development runoff from the same area.

   The significance of the impacts of urban development on receiving waters is determined by the scope of the project, such as the size of the project, the project land-use type, etc. Large projects (such as commercial developments greater than 100,000 square feet, home subdivisions greater than 10 units, and streets, roads, highways, and freeways) generally have large amounts of impervious surface, and therefore have greater potential to significantly impact receiving waters by increasing erosion (through increased peak flow rates, flow velocities, flow volumes, and flow durations) than smaller projects. Projects of particular land use types also have greater potential to significantly impact receiving waters due to the presence of typically large amounts of pollutants on site or an increased potential for pollutants to move off site (such as automotive repair shops, restaurants, parking lots, streets, roads, highways, and freeways, hillside development, and retail gasoline outlets).

5. **WATER QUALITY DEGRADATION INCREASES WITH PERCENT IMPERVIOUSNESS:** The increased volume and velocity of runoff from developed urban areas greatly accelerates the erosion of downstream natural channels. Numerous studies have demonstrated a direct correlation between the degree of imperviousness of an area and the degradation of its receiving water quality. Significant declines in the biological integrity and physical habitat of streams and other receiving waters have been found to occur with as little as a 10% conversion from natural to impervious surfaces. (Developments of medium density single family homes range between 25 to 60% impervious). Today "% impervious coverage" is believed to be a reliable indicator and predictor of the water quality degradation expected from planned new development.

6. **URBAN RUNOFF IS A HUMAN HEALTH THREAT:** Urban runoff contains pollutants, which threaten human health. Human illnesses have been clearly linked to recreating (i.e.,

swimming, surfing, etc.) near storm drains flowing to coastal beach waters. Such flows from urban areas often result in the posting or closure of local beaches.

Pollutants transported to receiving waters by urban runoff can also enter the food chain. Once in the food chain they can "bioaccumulate" in the tissues of invertebrates (e.g., mussels, oysters, and lobsters) and fish which may be eventually consumed by humans. Furthermore, some pollutants are also known to "biomagnify". This phenomenon can result in pollutant concentrations in the body fat of top predators that are millions of times greater than the concentrations in the tissues of their lower trophic (food chain) counterparts or in ambient waters.

7. **POLLUTANT TYPES:** The most common categories of pollutants in urban runoff include total suspended solids, sediment (due to anthropogenic activities); pathogens (e.g., bacteria, viruses, protozoa); heavy metals (e.g., copper, lead, zinc and cadmium); petroleum products and polynuclear aromatic hydrocarbons; synthetic organics (e.g., pesticides, herbicides, and PCBs); nutrients (e.g., nitrogen and phosphorus fertilizers), oxygen-demanding substances (decaying vegetation, animal waste), and trash.

8. **URBAN STREAMS AS AN MS4 COMPONENT:** Historic and current development make use of natural drainage patterns and features as conveyances for urban runoff. Urban streams used in this manner are part of the municipalities MS4 regardless of whether they are natural, man-made, or partially modified features. In these cases, the urban stream is both an MS4 and a receiving water.

9. **URBAN RUNOFF CAUSES BENEFICIAL USE IMPAIRMENT**: Individually and in combination, the discharge of pollutants and increased flows from MS4s can cause or threaten to cause a condition of pollution (i.e., unreasonable impairment of water quality for designated beneficial uses), contamination, or nuisance. The discharge of pollutants from MS4s can cause the concentration of pollutants to exceed applicable receiving water quality objectives and impair or threaten to impair designated beneficial uses.

10. **COPERMITTEES IMPLEMENT URBAN RUNOFF MANAGEMENT PROGRAMS (URMPs):** Copermittee implementation of Urban Runoff Management Programs (URMPs) designed to reduce discharges of pollutants and flow into and from MS4s to the maximum extent practicable (MEP) can protect receiving water quality by promoting attainment of water quality objectives necessary to support designated beneficial uses. To be most effective, URMPs must contain both structural and non-structural best management practices (BMPs).

11. **BEST MANAGEMENT PRACTICES (BMPs):** Pollutants can be effectively reduced in urban runoff by the application of a combination of pollution prevention, source control, and treatment control BMPs. Source control BMPs (both structural and non-structural) minimize the contact between pollutants and flows (e.g., rerouting run-on around pollutant sources or keeping pollutants on-site and out of receiving waters). Treatment control (or structural) BMPs remove pollutants from urban runoff. Where feasible, use of BMPs which utilize natural processes should be assessed. These types of BMPs, such as grassy swales and constructed wetlands, can frequently be as effective as less natural BMPs, while providing additional benefits such as aesthetics and habitat.

12. **POLLUTION PREVENTION**: Pollution prevention, the initial reduction/elimination of pollutant generation at its source, is the best "first line of defense" for Copermittees and should be used in conjunction with source control and treatment control BMPs. Pollutants that are never generated do not have to be controlled or treated. Encouragement during planning processes of the use of pollution prevention BMPs can be an effective means for pollution prevention BMPs to be implemented, through such methods as education, landscaping, etc.

13. **RECEIVING WATER LIMITATIONS:** Compliance with receiving water limits based on applicable water quality objectives is necessary to ensure that MS4 discharges will not cause or contribute to violations of water quality objectives and the creation of conditions of pollution.

14. **RECEIVING WATER LIMITATION COMPLIANCE STRATEGY**: Implementation of BMPs cannot ensure attainment of receiving water quality objectives under all circumstances; some BMPs may not prove to be as effective as anticipated. An iterative process of BMP development, implementation, monitoring, and assessment is necessary to assure that an Urban Runoff Management Program is sufficiently comprehensive and effective to achieve compliance with receiving water quality objectives.

15. **COPERMITTEES' RESPONSIBILITY FOR ILLICIT DISCHARGES FROM THIRD PARTIES:** As operators of MS4s, the Copermittees cannot passively receive and discharge pollutants from third parties. By providing free and open access to an MS4 that conveys discharges to the waters of the United States, the operator of an MS4 that does not prohibit and/or control discharges into its system essentially accepts responsibility for those discharges.

16. **COPERMITTEES' RESPONSIBILITY BASED ON LAND USE AUTHORITY**: Utilizing their land use authority, Copermittees authorize and realize benefits from the urban development which generates the pollutants and runoff that impair receiving waters. Since the Copermittees utilize their legal authority to authorize urbanization, they must also exercise their legal authority to ensure that the resulting increased pollutant loads and flows do not further degrade receiving waters.

17. **THREE PHASES OF URBAN DEVELOPMENT**: Urban development has three major phases: (1) land use planning for new development; (2) construction; and (3) the "use" or existing development phase. Because the Copermittees authorize, permit, and profit from each of these phases, and because each phase has a profound impact on water quality, the Copermittees have commensurate responsibilities to protect water quality during each phase.

    In other words, Copermittees are held responsible for the short and long-term water quality consequences of their land use planning, construction, and existing development decisions.

18. **PLANNING PHASE FOR NEW DEVELOPMENT**: Because land use planning and zoning is where urban development is conceived, it is the phase in which the greatest and most cost-effective opportunities to protect water quality exists. When a Copermittee incorporates policies and principles designed to safeguard water resources into its General Plan and development project approval processes, it has taken a far-reaching step towards the preservation of local water resources for future generations.

19. **CONSTRUCTION PHASE**: Construction activities are a significant cause of receiving water impairment. Siltation is currently the largest cause of river impairment in the United States. Sediment runoff rates from construction sites greatly exceed natural erosion rates of undisturbed lands causing siltation and impairment of receiving waters. In addition to requiring implementation of the full range of BMPs, an effective construction runoff program must include local plan review, permit conditions, field inspections, and enforcement.

20. **EXISTING DEVELOPMENT:** The Copermittees' wet weather monitoring results collected during the past decade, as well as volumes of other references in the literature today, confirm substantial pollutant loads to receiving waters in runoff from existing urban development. Implementation of jurisdictional and watershed URMPs, which include extensive controls on existing development, can reduce pollutant loadings over the long term.

21. **CHANGES NEEDED**: Because the urbanization process is a direct and leading cause of water quality degradation in this Region, fundamental changes to existing policies and

practices about urban development are needed if the beneficial uses of San Diego's natural water resources are to be protected.

22. **DUAL REGULATION OF INDUSTRIAL AND CONSTRUCTION SITES:** Discharges of runoff from industrial and construction sites in this Region are subject to dual (state and local) regulation. (1) All industries and construction sites are subject to the local permits, plans, and ordinances of the municipal jurisdiction in which it is located. Pursuant to this Order, local (storm water, grading, construction, and use) permits, plans, and ordinances must (a) prohibit the discharge of pollutants and non-storm water into the MS4; and (b) require the routine use of BMPs to reduce pollutants in site runoff. (2) Many industries and construction sites are also subject to regulation under the statewide General Industrial Storm Water Permit or statewide General Construction Storm Water Permit[1]. These statewide general permits are adopted by the State Water Resources Control Board and enforced by the nine Regional Water Quality Control Boards throughout California. Like the Copermittees' local permits and ordinances, the statewide General Industrial and Construction Permits also (a) prohibit the discharge of pollutants and non-storm water; and (b) require the routine use of BMPs to reduce pollutants in site runoff.

    Recognizing that both authorities share a common goal, the federal storm water regulations at 40 CFR 122.26 (and its preamble) call for the dual system to ensure the most effective oversight of industrial and construction site discharges. Under this dual system, each municipal Copermittee is responsible for enforcing its local permits, plans, and ordinances within its jurisdiction. Similarly, the SDRWQCB is responsible for enforcing both statewide general permits and this Order within the San Diego Region.

23. **EDUCATION:** Education is the foundation of every effective URMP and the basis for changes in behavior at a societal level. Education of municipal planning, inspection, and maintenance department staffs is especially critical to ensure that in-house staffs understand how their activities impact water quality, how to accomplish their jobs while protecting water quality, and their specific roles and responsibilities for compliance with this Order. Public education, designed to target various urban land users and other audiences, is also essential to inform the public of how individual actions impact receiving water quality and how these impacts can be minimized.

24. **ENFORCING LOCAL LEGAL AUTHORITY**: Enforcement of local urban runoff related ordinances, permits, and plans is an essential component of every URMP and is specifically required in the federal storm water regulations and this Order. Routine inspections provide an effective means by which Copermittees can evaluate compliance with their permits and ordinances. Inspections are especially important at high-risk areas for pollutant discharges such as industrial and construction sites.

    When industrial or construction site discharges occur in violation of local permits and ordinances, the SDRWQCB looks to the municipality that has authorized the discharge for appropriate actions (typically education followed by enforcement where education has been unsuccessful). Each Copermittee must also provide enforcement against illegal discharges from other land uses it has authorized, such as commercial and residential developments.

[1] The "statewide General Industrial Storm Water Permit" refers to State Water Resources Control Board Water Quality Order No. 97-03-DWQ National Pollutant Discharge Elimination System General Permit No. CAS000001, Waste Discharge Requirements for Discharges of Storm Water Associated with Industrial Activities Excluding Construction Activities. The "statewide General Construction Storm Water Permit" refers to State Water Resources Control Board Order No. 99-08-DWQ National Pollutant Discharge Elimination System General Permit No. CAS000002, Waste Discharge Requirements for Discharges of Storm Water Runoff Associated with Construction Activity.

25. **PUBLIC PARTICIPATION:** Public participation during the URMP development process is necessary to ensure that all stakeholder interests and a variety of creative solutions are considered.

26. **TOXICITY**: Urban runoff discharges from MS4s often contain pollutants that cause toxicity, (i.e., adverse responses of organisms to chemicals or physical agents ranging from mortality to physiological responses such as impaired reproduction or growth anomalies). The water quality objectives for toxicity provided in the Water Quality Control Plan, San Diego Basin, Region 9, (Basin Plan), state in part *"All waters shall be free of toxic substances in concentrations that are toxic to, or that produce detrimental physiological responses in human, plant, animal, or aquatic life....The survival of aquatic life in surface waters subjected to a waste discharge or other controllable water quality factors, shall not be less than that for the same water body in areas unaffected by the waste discharge..."* Urban runoff discharges from MS4s are considered toxic when (1) the toxic effect observed in an acute toxicity test exceeds zero Toxic Units Acute (TUa=0); or (2) the toxic effect observed in a chronic toxicity test exceeds one Toxic Unit Chronic (TUc=1).

27. **FOCUS ON MAN-MADE POLLUTANTS AND FLOWS:** The focus of this Order is on the control of urban runoff pollutants and flows which are either generated or accelerated by human activities. This Order is not meant to control background or naturally occurring pollutants and flows.

28. **COMMON WATERSHEDS AND CWA SECTION 303(d) IMPAIRED WATERS**: The Copermittees discharge urban runoff into lakes, drinking water reservoirs, rivers, streams, creeks, bays, estuaries, coastal lagoons, the Pacific Ocean, and tributaries thereto within ten of the eleven hydrologic units (watersheds) comprising the San Diego Region as shown in Table 2 below. During its downstream course, urban runoff is conveyed through lined and unlined (natural, manmade, and partially modified) channels, all of which are defined as components of the Copermittees' MS4.

    Some of the receiving water bodies, which receive or convey urban runoff discharges, have been designated as impaired by the SDRWQCB and USEPA in 1998 pursuant to Clean Water Act section 303(d). Also shown below are the watershed management areas (WMAs) as defined in the SDRWQCB report, Watershed Management Approach, January 2000.

Table 2. Watershed Management Areas (WMAs)

SDRWQCB WATERSHED MANAGEMENT AREA (WMA)	HYDROLOGIC UNIT(S)	MAJOR SURFACE WATER BODIES	303(d) POLLUTANT(S) OF CONCERN OR WATER QUALITY EFFECT	COPERMITTEES
Santa Margarita River	Santa Margarita (902.00)	Santa Margarita River and Estuary, Pacific Ocean	1. Coliform Bacteria 2. Nutrients	1. County of San Diego
San Luis Rey River	San Luis Rey (903.00)	San Luis Rey River and Estuary, Pacific Ocean	1. Coliform Bacteria 2. Nutrients	1. City of Escondido 2. City of Oceanside 3. City of Vista 4. County of San Diego
Carlsbad	Carlsbad (904.00)	Batiquitos Lagoon San Elijo Lagoon Agua Hedionda Lagoon Buena Vista Lagoon And Tributary Streams Pacific Ocean	1. Coliform Bacteria 2. Nutrients 3. Sediment	1. City of Carlsbad 2. City of Encinitas 3. City of Escondido 4. City of Oceanside 5. City of San Marcos 6. City of Solana Beach 7. City of Vista 8. County of San Diego
San Dieguito River	San Dieguito (905.00)	San Dieguito River and Estuary, Pacific Ocean	1. Coliform Bacteria	1. City of Del Mar 2. City of Escondido 3. City of Poway 4. City of San Diego 5. City of Solana Beach

SDRWQCB WATERSHED MANAGEMENT AREA (WMA)	HYDROLOGIC UNIT(S)	MAJOR SURFACE WATER BODIES	303(d) POLLUTANT(S) OF CONCERN OR WATER QUALITY EFFECT	COPERMITTEES
				6. County of San Diego
Mission Bay	Peñasquitos (906.00)	Los Peñasquitos Lagoon Mission Bay, Pacific Ocean	1. Coliform Bacteria 2. Metals 3. Nutrients 4. Sediment	1. City of Del Mar 2. City of Poway 3. City of San Diego 4. County of San Diego
San Diego River	San Diego (907.00)	San Diego River, Pacific Ocean	1. Coliform Bacteria	1. City of El Cajon 2. City of La Mesa 3. City of Poway 4. City of San Diego 5. City of Santee 6. County of San Diego
San Diego Bay	Pueblo San Diego (908.00) Sweetwater (909.00) Otay (910.00)	San Diego Bay Sweetwater River Otay River Pacific Ocean	1. Coliform Bacteria 2. Metals 3. Toxicity 4. Benthic Community Degradation	1. City of Chula Vista 2. City of Coronado 3. City of Imperial Beach 4. City of La Mesa 5. City of Lemon Grove 6. City of National City 7. City of San Diego 8. County of San Diego 9. San Diego Unified Port District
Tijuana River	Tijuana (911.00)	Tijuana River and Estuary Pacific Ocean	1. Coliform Bacteria 2. Low Dissolved Oxygen 3. Metals 4. Nutrients 5. Pesticides 6. Synthetic Organics 7. Total Dissolved Solids 8. Trash	1. City of Imperial Beach 2. City of San Diego 3. County of San Diego

29. **CUMULATIVE POLLUTANT LOAD CONTRIBUTIONS:** Because they are interconnected, each MS4 within a watershed contributes to the cumulative pollutant loading, volume, and velocity of urban runoff and the ensuing degradation of downstream receiving water bodies. Accordingly, inland MS4s contribute to coastal impairments.

30. **LAND USE PLANNING ON A WATERSHED SCALE**: Because urban runoff does not recognize political boundaries, "watershed-based" land use planning (pursued collaboratively by neighboring local governments) can greatly enhance the protection of shared natural water resources. Such planning enables multiple jurisdictions to work together to plan for both development and resource conservation that can be environmentally as well as economically sustainable.

31. **INTERGOVERNMENTAL COORDINATION:** Within their common watersheds it is essential for the Copermittees to coordinate their water quality protection and land use planning activities to achieve the greatest protection of receiving water bodies. Copermittee coordination with other watershed stakeholders, especially Caltrans, the Department of Defense, and Native American Tribes, is also critical.

    Establishment of a management structure, within which the Copermittees subject to this Order, will fund and coordinate those aspects of their joint obligations will promote implementation of Urban Runoff Management Programs on a watershed and regional basis in the most cost effective manner.

32. **WASTE REMOVAL:** Waste and pollutants which are deposited and accumulate in MS4 drainage structures will be discharged from these structures to waters of the United States unless they are removed. These discharges may cause or contribute to, or threaten to cause or contribute to, a condition of pollution in receiving waters. Once removed, such accumulated wastes must be characterized and lawfully disposed.

33. **TOXIC HOT SPOTS**: Urban runoff is a significant contributor to the creation and persistence of Toxic Hot Spots in San Diego Bay. California Water Code section 13395 requires regional boards to reevaluate waste discharge requirements (WDRs) associated with toxic hot spots. The State Water Resources Control Board (SWRCB) adopted the Consolidated Toxic Hot Spot Cleanup Plan in June 1999. The Plan states: "The reevaluation [of WDRs associated with toxic hot spots] shall consist of (1) an assessment of the WDRs that may influence the creation or further pollution of the known toxic hot spot, (2) an assessment of which WDRs need to be modified to improve environmental conditions at the known toxic hot spot, and (3) a schedule for completion of any WDR modifications deemed appropriate."

34. **CHANGING THE STORM WATER MANAGEMENT APPROACH**: In contrast to the conventional "conveyance" approach, a more natural approach to storm water management seeks to filter and infiltrate runoff by allowing it to flow slowly over permeable vegetated surfaces. By "preserving and restoring the natural hydrologic cycle", filtration and infiltration can greatly reduce the volume/peak rate, velocity, and pollutant loads of urban runoff. The greatest opportunities for changing from a "conveyance" to a more natural management approach occur during the land use planning and zoning processes and when new development projects are under early design.

35. **INFILTRATION AND POTENTIAL GROUNDWATER CONTAMINATION:** Any drainage feature that infiltrates runoff poses some risk of potential groundwater contamination. Although dependent on several factors, the risks typically associated with properly managed infiltration of runoff (especially from residential land use areas) are not significant. The risks associated with infiltration can be managed by many techniques, including (1) designing landscape drainage features that promote infiltration of runoff, but do not "inject" runoff (injection bypasses the natural processes of filtering and transformation that occur in the soil); (2) taking reasonable steps to prevent the illegal disposal of wastes; and (3) ensuring that each drainage feature is adequately maintained in perpetuity. Minimum conditions needed to protect groundwater are specified in section F.1.b. of this Order.

36. **VECTOR CONTROL:** Certain BMPs implemented or required by municipalities for urban runoff management may create a habitat for vectors (e.g. mosquitoes and rodents) if not properly designed or maintained. Close collaboration and cooperative effort between municipalities and local vector control agencies and the State Department of Health Services during the development and implementation of the Urban Runoff Management Programs is necessary to minimize nuisances and public health impacts resulting from vector breeding.

37. **LEGAL AUTHORITY:** This Order is based on the federal Clean Water Act, the Porter-Cologne Water Quality Control Act (Division 7 of the Water Code, commencing with Section 13000), applicable state and federal regulations, all applicable provisions of statewide Water Quality Control Plans and Policies adopted by the State Water Resources Control Board, the Regional Water Quality Control Plan (Basin Plan) adopted by the Regional Board, the California Toxics Rule, and the California Toxics Rule Implementation Plan.

38. **TOTAL MAXIMUM DAILY LOADS (TMDLs):** 40 CFR 122.44 (d)(vii)(B) requires that NPDES permits contain effluent limitations that are consistent with waste load allocations developed under a TMDL. Several TMDLs are being developed in the San Diego Region for impaired waterbodies that receive Copermittees' discharge. Once these TMDLs are approved by the SDRWQCB and USEPA, Copermittees' discharge of urban runoff into an impaired waterbody will be subject to load allocations established by the TMDLs.

39. **ANTIDEGRADATION:** Conscientious implementation of URMPs that satisfy the requirements contained in this Order will reduce the likelihood that discharges from MS4s will cause or contribute to unreasonable degradation of the quality of receiving waters. Therefore, this Order is in conformance with SWRCB Resolution No. 68-16 and the federal antidegradation policy described in 40 CFR 131.12.

40. **CEQA:** The issuance of waste discharge requirements for the discharge of urban runoff from MS4s to waters of the United States is exempt from the requirement for preparation of environmental documents under the California Environmental Quality Act (CEQA) (Public Resources Code, Division 13, Chapter 3, § 21000 et seq.) in accordance with the CWC § 13389.

41. **PUBLIC NOTICE:** The SDRWQCB has notified the Copermittees, all known interested parties, and the public of its intent to consider adoption of an order prescribing waste discharge requirements that would serve to renew an NPDES permit for the existing discharge of urban runoff.

42. **PUBLIC HEARING**: The SDRWQCB has, at a public meeting on December 13, 2000, held a public hearing and heard and considered all comments pertaining to the terms and conditions of this Order.

IT IS HEREBY ORDERED that the Copermittees, in order to meet the provisions contained in Division 7 of the California Water Code and regulations adopted thereunder, and the provisions of the Clean Water Act and regulations adopted thereunder, shall each comply with the following:

A. PROHIBITIONS -- DISCHARGES

1. Discharges into and from MS4s in a manner causing, or threatening to cause, a condition of pollution, contamination, or nuisance (as defined in CWC § 13050), in waters of the state are prohibited.

2. Discharges from MS4s which cause or contribute to exceedances of receiving water quality objectives for surface water or groundwater are prohibited.

3. Discharges from MS4s containing pollutants which have not been reduced to the maximum extent practicable (MEP) are prohibited.

4. Applicable to New Development and Redevelopment:
Post-development runoff containing pollutants loads which cause or contribute to an exceedance of receiving water quality objectives or which have not been reduced to the maximum extent practicable is prohibited.

5. In addition to the above prohibitions, discharges from MS4s are subject to all Basin Plan prohibitions cited in **Attachment A** to this Order.

B. PROHIBITIONS -- NON-STORM WATER DISCHARGES

1. Each Copermittee shall effectively prohibit **all** types of non-storm water discharges into its Municipal Separate Storm Sewer System (MS4) unless such discharges are either authorized by a separate NPDES permit; or not prohibited in accordance with B.2. and B.3. below.

2. Pursuant to 40 CFR 122.26(d)(2)(iv)(B)(1), the following categories of non-storm water discharges need only be prohibited from entering an MS4 if such categories of discharges are identified by the Copermittee as a significant source of pollutants to waters of the United States:

   a. Diverted stream flows;
   b. Rising ground waters;
   c. Uncontaminated ground water infiltration [as defined at 40 CFR 35.2005(20)] to MS4s;
   d. Uncontaminated pumped ground water;
   e. Foundation drains;
   f. Springs;
   g. Water from crawl space pumps;
   h. Footing drains;
   i. Air conditioning condensation;
   j. Flows from riparian habitats and wetlands;

k. Water line flushing;
l. Landscape irrigation;
m. Discharges from potable water sources other than water main breaks;
n. Irrigation water;
o. Lawn watering;
p. Individual residential car washing; and
q. Dechlorinated swimming pool discharges.

3. When a discharge category above is identified as a significant source of pollutants to waters of the United States, the Copermittee shall either:

   a. Prohibit the discharge category from entering its MS4; ***OR***

   b. Not prohibit the discharge category and implement, or require the responsible party(ies) to implement, BMPs which will reduce pollutants to the MEP; ***AND***

   c. For each discharge category not prohibited, the Copermittee shall submit the following information to the SDRWQCB within **365 days** of adoption of this Order:

      (1) The non-storm water discharge category listed above which the Copermittee elects not to prohibit; and

      (2) The BMP(s) for each discharge category listed above which the Copermittee will implement, or require the responsible party(ies) to implement, to prevent or reduce pollutants to the MEP.

4. **Fire Fighting Flows:** Emergency fire fighting flows (i.e., flows necessary for the protection of life or property) do not require BMPs and need not be prohibited. As part of the Jurisdictional URMP, each Copermittee shall develop and implement a program within 365 days of adoption of this Order to reduce pollutants from non-emergency fire fighting flows (i.e., flows from controlled or practice blazes and maintenance activities) identified by the Copermittee to be significant sources of pollutants to waters of the United States.

5. **Dry Weather Analytical Monitoring and Non-Storm Water Discharges:** Each Copermittee shall examine all dry weather analytical monitoring results collected in accordance with section F.5. and Attachment E of this Order to identify water quality problems which may be the result of any non-prohibited discharge category(ies) identified above in Non-Storm Water Discharges to MS4s Prohibition B.2. Follow-up investigations shall be conducted as necessary to identify and control any non-prohibited discharge category(ies) listed above.

C. RECEIVING WATER LIMITATIONS

1. Discharges from MS4s that cause or contribute to the violation of water quality standards (designated beneficial uses and water quality objectives developed to protect beneficial uses) are prohibited.

2. Each Copermittee shall comply with Part C.1, Part A.2, and Part A.5 as it applies to Prohibition 5 in Attachment A of this Order through timely implementation of control measures and other actions to reduce pollutants in urban runoff discharges in accordance with the Jurisdictional Urban Runoff Management Program (Jurisdictional URMP) and other requirements of this Order including any modifications. The Jurisdictional URMP shall be designed to achieve compliance with Part C.1, Part A.2, and Part A.5 as it applies to Prohibition 5 in Attachment A of this Order. If exceedance(s) of water quality standards persist notwithstanding implementation of the URMP and other requirements of this Order, the Copermittee shall assure compliance with Part C.1, Part A.2, and Part A.5 as it applies to Prohibition 5 in Attachment A of this Order by complying with the following procedure:

a. Upon a determination by either the Copermittee or the SDRWQCB that MS4 discharges are causing or contributing to an exceedance of an applicable water quality standard, the Copermittee shall promptly notify and thereafter submit a report to the SDRWQCB that describes BMPs that are currently being implemented and additional BMPs that will be implemented to prevent or reduce any pollutants that are causing or contributing to the exceedance of water quality standards. The report may be incorporated in the annual update to the Jurisdictional URMP unless the SDRWQCB directs an earlier submittal. The report shall include an implementation schedule. The SDRWQCB may require modifications to the report;

b. Submit any modifications to the report required by the SDRWQCB within 30 days of notification;

c. Within 30 days following approval of the report described above by the SDRWQCB, the Copermittee shall revise its Jurisdictional URMP and monitoring program to incorporate the approved modified BMPs that have been and will be implemented, the implementation schedule, and any additional monitoring required;

d. Implement the revised Jurisdictional URMP and monitoring program in accordance with the approved schedule.

So long as the Copermittee has complied with the procedures set forth above and are implementing the revised Jurisdictional URMP, the Copermittee does not have to repeat the same procedure for continuing or recurring exceedances of the same receiving water limitations unless directed by the SDRWQCB to do so.

3. Nothing in this section shall prevent the SDRWQCB from enforcing any provision of this Order while the Copermittee prepares and implements the above report.

D. LEGAL AUTHORITY

1. Each Copermittee shall establish, maintain, and enforce adequate legal authority to control pollutant discharges **into** and **from** its MS4 through ordinance, statute, permit, contract or similar means. This legal authority must, at a minimum, authorize the Copermittee to:

a. Control the contribution of pollutants in discharges of runoff associated with industrial and construction activity **to** its MS4 and control the quality of runoff **from** industrial and construction sites. This requirement applies both to industrial and construction sites which have coverage under the statewide general industrial or construction storm water permits, as well as to those sites which do not. Grading ordinances shall be upgraded and enforced as necessary to comply with this Order.

b. Prohibit **all** identified illicit discharges not otherwise allowed pursuant to section B.2 including but not limited to:

(1) Sewage;

(2) Discharges of wash water resulting from the hosing or cleaning of gas stations, auto repair garages, or other types of automotive services facilities;

(3) Discharges resulting from the cleaning, repair, or maintenance of any type of equipment, machinery, or facility including motor vehicles, cement-related equipment, and port-a-potty servicing, etc.;

(4) Discharges of wash water from mobile operations such as mobile automobile washing, steam cleaning, power washing, and carpet cleaning, etc.;

(5) Discharges of wash water from the cleaning or hosing of impervious surfaces in municipal, industrial, commercial, and residential areas including parking lots, streets, sidewalks, driveways, patios, plazas, work yards and outdoor eating or drinking areas, etc.;

(6) Discharges of runoff from material storage areas containing chemicals, fuels, grease, oil, or other hazardous materials;

(7) Discharges of pool or fountain water containing chlorine, biocides, or other chemicals; discharges of pool or fountain filter backwash water;

(8) Discharges of sediment, pet waste, vegetation clippings, or other landscape or construction-related wastes; and

(9) Discharges of food-related wastes (e.g., grease, fish processing, and restaurant kitchen mat and trash bin wash water, etc.).

c. Prohibit and eliminate illicit connections to the MS4;

d. Control the discharge of spills, dumping, or disposal of materials other than storm water to its MS4;

e. Require compliance with conditions in Copermittee ordinances, permits, contracts or orders (i.e., hold dischargers to its MS4 accountable for their contributions of pollutants and flows);

f. Utilize enforcement mechanisms to require compliance with Copermittee storm water ordinances, permits, contracts, or orders;

g. Control the contribution of pollutants from one portion of the shared MS4 to another portion of the MS4 through interagency agreements among Copermittees. Control of the contribution of pollutants from one portion of the shared MS4 to another portion of the MS4 through interagency agreements with other owners of the MS4 such as Caltrans, the Department of Defense, or Native American Tribes is encouraged.;

h. Carry out all inspections, surveillance, and monitoring necessary to determine compliance and noncompliance with local ordinances and permits and with this Order, including the prohibition on illicit discharges to the MS4. This means the Copermittee must have authority to enter, sample, inspect, review and copy records, and require regular reports from industrial facilities discharging into its MS4, including construction sites; and

i. Require the use of best management practices (BMPs) to prevent or reduce the discharge of pollutants to MS4s.

2. Within **180 days** of adoption of this Order, each Copermittee shall provide to the SDRWQCB a statement certified by its chief legal counsel that the Copermittee has adequate legal authority to implement and enforce each of the requirements contained in 40 CFR 122.26(d)(2)(i)(A-F) and this Order. This statement shall include:

a. Identification of all departments within the jurisdiction that conduct urban runoff related activities, and their roles and responsibilities under this Order. Include an up to date organizational chart specifying these departments and key personnel.

b. Citation of urban runoff related ordinances and the reasons they are enforceable;

c. Identification of the local administrative and legal procedures available to mandate compliance with urban runoff related ordinances and therefore with the conditions of this

Order;

d. Description of how these ordinances are implemented and appealed; and

e. Description of whether the municipality can issue administrative orders and injunctions or if it must go through the court system for enforcement actions.

E. TECHNOLOGY BASED STANDARDS

Each Copermittee shall implement, or require implementation of, best management practices to ensure that the following pollutant discharges **into** and **from** its MS4 are reduced to the applicable technology based standard as specified below:

Table 3. Technology Based Standards[2]

POLLUTANT DISCHARGE FROM	DESCRIPTION	APPLICABLE PERFORMANCE STANDARD
Industrial Activity owned by the Copermittee	Categorical Industry in 40 CFR 122.26	BAT/BCT (pursuant to Statewide General Industrial Permit)
Industrial Activity	All other industry	MEP
Construction Activity owned by the Copermittee	Greater than or Equal to 5 Acres (or less than 5 acres and Part of a Larger Common Plan of Sale or Development)	BAT/BCT (pursuant to Statewide General Construction Permit)
Construction Activity	All Other construction	MEP
Other Sources	All Other Land Use Activities	MEP
MS4s	All discharges from MS4s	MEP

F. JURISDICTIONAL URBAN RUNOFF MANAGEMENT PROGRAM`

Each Copermittee shall take appropriate actions to reduce discharges of pollutants and runoff flow during each of the three major phases of urban development, i.e., the planning, construction, and existing development (or use) phases.

Each Copermittee shall implement a Jurisdictional Urban Runoff Management Program (Jurisdictional URMP) that contains the components shown below as described in Sections F.1. through F.8:

F.1. Land-Use Planning for New Development and Redevelopment Component
F.2. Construction Component
F.3. Existing Development Component
- **a. Municipal**
- **b. Industrial**
- **c. Commercial**
- **d. Residential**

F.4. Education Component
F.5. Illicit Discharge Detection and Elimination Component
F.6. Public Participation Component
F.7. Assessment of Jurisdictional URMP Effectiveness Component
F.8. Fiscal Analysis Component

[2] Pursuant to this Order, each Copermittee shall ensure that pollutants in runoff from industrial and construction sites within its jurisdiction have been reduced to the MEP standard before entering its MS4. The industrial and construction site dischargers themselves however must ensure that pollutants in runoff leaving their sites have been reduced to the BAT/BCT standard pursuant to either the statewide General Industrial or Construction Storm Water Permit. Runoff from industrial and construction sites owned by municipalities and subject to either the General Industrial or Construction Storm Water Permits, must meet the BAT/BCT standard.

F.1. Land-Use Planning for New Development and Redevelopment Component

Each Copermittee shall minimize the short and long-term impacts on receiving water quality from new development and redevelopment. In order to reduce pollutants and runoff flows from new development and redevelopment to the maximum extent practicable, each Copermittee shall at a minimum:

F.1.a Assess General Plan
F.1.b Modify Development Project Approval Processes
F.1.c Revise Environmental Review Processes
F.1.d Conduct Education Efforts Focused on New Development and Redevelopment

F.1.a. Assess General Plan

Each Copermittee's General Plan or equivalent plan (e.g., Comprehensive, Master, or Community Plan) shall include water quality and watershed protection principles and policies to direct land-use decisions and require implementation of consistent water quality protection measures for development projects. As part of its Jurisdictional Urban Runoff Management Program document, each Copermittee shall provide a workplan with time schedule detailing any changes to its General Plan regarding water quality and watershed protection. Examples of water quality and watershed protection principles and policies to be considered include the following:

(1) Minimize the amount of impervious surfaces and directly connected impervious surfaces in areas of new development and redevelopment and where feasible slow runoff and maximize on-site infiltration of runoff.

(2) Implement pollution prevention methods supplemented by pollutant source controls and treatment. Use small collection strategies located at, or as close as possible to, the source (i.e., the point where water initially meets the ground) to minimize the transport of urban runoff and pollutants offsite and into an MS4.

(3) Preserve, and where possible, create or restore areas that provide important water quality benefits, such as riparian corridors, wetlands, and buffer zones. Encourage land acquisition of such areas.

(4) Limit disturbances of natural water bodies and natural drainage systems caused by development including roads, highways, and bridges.

(5) Prior to making land use decisions, utilize methods available to estimate increases in pollutant loads and flows resulting from projected future development. Require incorporation of structural and non-structural BMPs to mitigate the projected increases in pollutant loads and flows.

(6) Avoid development of areas that are particularly susceptible to erosion and sediment loss; or establish development guidance that identifies these areas and protects them from erosion and sediment loss.

(7) Reduce pollutants associated with vehicles and increasing traffic resulting from development. Coordinate local traffic management reduction efforts with the San Diego County Congestion Management Plan.

(8) Implement the San Diego Association of Government's (SANDAG's) recommendations as found in the Water Quality Element of its Regional Growth Management Strategy.

(9) Post-development runoff from a site shall not contain pollutant loads which cause or contribute to an exceedance of receiving water quality objectives or which have not been reduced to the maximum extent practicable.

F.1.b. Modify Development Project Approval Processes

Prior to project approval and issuance of local permits, Copermittees shall require each proposed project to implement measures to ensure that pollutants and runoff from the development will be reduced to the maximum extent practicable and will not cause or contribute to an exceedance of receiving water quality objectives. Each Copermittee shall further ensure that all development will be in compliance with Copermittee storm water ordinances, local permits, all other applicable ordinances and requirements, and this Order.

(1) Development Project Requirements

Each Copermittee shall include development project requirements in local permits to ensure that pollutant discharges and runoff flows from development are reduced to the maximum extent practicable and that receiving water quality objectives are not violated throughout the life of the project. Such requirements shall, at a minimum:

(a) Require project proponent to implement source control BMPs for all applicable development projects.
(b) Require project proponent to implement site design/landscape characteristics where feasible which maximize infiltration, provide retention, slow runoff, and minimize impervious land coverage for all development projects.
(c) Require project proponent to implement buffer zones for natural water bodies, where feasible. Where buffer zone implementation is infeasible, require project proponent to implement other buffers such as trees, lighting restrictions, access restrictions, etc.
(d) Require industrial applicants subject to California's statewide General NPDES Permit for Storm Water Discharges Associated with Industrial Activities (Except Construction), (hereinafter General Industrial Permit), to provide evidence of coverage under the General Industrial Permit.
(e) Require project proponent to ensure its grading or other construction activities meet the provisions specified in Section F.2. of this Order.
(f) Require project proponent to provide proof of a mechanism which will ensure ongoing long-term maintenance of all structural post-construction BMPs.

(2) Standard Urban Storm Water Mitigation Plans (SUSMPs)

Within 365 days of adoption of this Order, the Copermittees shall collectively develop a model Standard Urban Storm Water Mitigation Plan (SUSMP) to reduce pollutants and runoff flows from all new development and significant redevelopment projects falling under the priority project categories or locations listed in section F.1.b.(2)(a) below. Within 180 days of approval of the model SUSMP in the public process by the SDRWQCB, each Copermittee shall adopt its own local SUSMP, and amended ordinances consistent with the approved model SUSMP, and shall submit both (local SUSMP and amended ordinances) to the SDRWQCB.

Immediately following adoption of its local SUSMP, each Copermittee shall ensure that all new development and significant redevelopment projects falling under the priority project categories or locations listed in F.1.b.(2)(a) below meet SUSMP requirements. The SUSMP requirements shall apply to all priority projects or phases of priority projects which have not yet begun grading or construction activities. If a Copermittee determines that lawful prior approval of a project exists, whereby application of SUSMP requirements to the project is infeasible, SUSMP requirements need not apply to the project. Where feasible, the Copermittees shall utilize the 18 month SUSMP implementation period to ensure that

projects undergoing approval processes include application of SUSMP requirements in their plans.

(a) *Priority Development Project Categories - SUSMP requirements shall apply to all new development and significant redevelopment projects falling under the priority project categories or locations listed below.* Significant redevelopment is defined as the creation or addition of at least 5,000 square feet of impervious surfaces on an already developed site. Significant redevelopment includes, but is not limited to: the expansion of a building footprint or addition or replacement of a structure; structural development including an increase in gross floor area and/or exterior construction or remodeling; replacement of impervious surface that is not part of a routine maintenance activity; and land disturbing activities related with structural or impervious surfaces. Where significant redevelopment results in an increase of less than fifty percent of the impervious surfaces of a previously existing development, and the existing development was not subject to SUSMP requirements, the numeric sizing criteria discussed in section F.1.b.(2)(c) applies only to the addition, and not to the entire development.

i. *Home subdivisions of 100 housing units or more.* This category includes single-family homes, multi-family homes, condominiums, and apartments.

ii. *Home subdivisions of 10-99 housing units.* This category includes single-family homes, multi-family homes, condominiums, and apartments.

iii. *Commercial developments greater than 100,000 square feet.* This category is defined as any development on private land that is not for heavy industrial or residential uses where the land area for development is greater than 100,000 square feet. The category includes, but is not limited to: hospitals; laboratories and other medical facilities; educational institutions; recreational facilities; commercial nurseries; multi-apartment buildings; car wash facilities; mini-malls and other business complexes; shopping malls; hotels; office buildings; public warehouses; automotive dealerships; commercial airfields; and other light industrial facilities.

iv. *Automotive repair shops.* This category is defined as a facility that is categorized in any one of the following Standard Industrial Classification (SIC) codes: 5013, 5014, 5541, 7532-7534, or 7536-7539.

v. *Restaurants.* This category is defined as a facility that sells prepared foods and drinks for consumption, including stationary lunch counters and refreshment stands selling prepared foods and drinks for immediate consumption (SIC code 5812), where the land area for development is greater than 5,000 square feet.

vi. *All hillside development greater than 5,000 square feet.* This category is defined as any development which creates 5,000 square feet of impervious surface which is located in an area with known erosive soil conditions, where the development will grade on any natural slope that is twenty-five percent or greater.

vii. *Environmentally Sensitive Areas: All development and redevelopment located within or directly adjacent to or discharging directly to an environmentally sensitive area (where discharges from the development or redevelopment will enter receiving waters within the environmentally sensitive area), which either creates 2,500 square feet of impervious surface on a proposed project site or increases the area of imperviousness of a proposed project site to 10% or more of its naturally occurring condition.* Environmentally sensitive areas include but are not limited to all Clean Water Act Section 303(d) impaired water bodies;

areas designated as Areas of Special Biological Significance by the State Water Resources Control Board (Water Quality Control Plan for the San Diego Basin (1994) and amendments); water bodies designated with the RARE beneficial use by the State Water Resources Control Board (Water Quality Control Plan for the San Diego Basin (1994) and amendments); areas designated as preserves or their equivalent under the Multi Species Conservation Program within the Cities and County of San Diego; and any other equivalent environmentally sensitive areas which have been identified by the Copermittees. "Directly adjacent" means situated within 200 feet of the environmentally sensitive area. "Discharging directly to" means outflow from a drainage conveyance system that is composed entirely of flows from the subject development or redevelopment site, and not commingled with flows from adjacent lands.

viii. *Parking lots 5,000 square feet or more or with 15 or more parking spaces and potentially exposed to urban runoff.* Parking lot is defined as a land area or facility for the temporary parking or storage of motor vehicles used personally, for business, or for commerce.

ix. *Street, roads, highways, and freeways.* This category includes any paved surface which is 5,000 square feet or greater used for the transportation of automobiles, trucks, motorcycles, and other vehicles.

(b) BMP Requirements – The SUSMP shall include a list of recommended source control and structural treatment BMPs. The SUSMP shall require all new development and significant redevelopment projects falling under the above priority project categories or locations to implement a combination of BMPs selected from the recommended BMP list, including at a minimum (1) source control BMPs and (2) structural treatment BMPs. The BMPs shall, at a minimum:

i. Control the post-development peak storm water runoff discharge rates and velocities to maintain or reduce pre-development downstream erosion, and to protect stream habitat;
ii. Conserve natural areas where feasible;
iii. Minimize storm water pollutants of concern in urban runoff from the new development or significant redevelopment (through implementation of source control BMPs). Identification of pollutants of concern should include at a minimum consideration of any pollutants for which water bodies receiving the development's runoff are listed as impaired under Clean Water Act section 303(d), any pollutant associated with the land use type of the development, and any pollutant commonly associated with urban runoff;
iv. Remove pollutants of concern from urban runoff (through implementation of structural treatment BMPs);
v. Minimize directly connected impervious areas where feasible;
vi. Protect slopes and channels from eroding;
vii. Include storm drain stenciling and signage;
viii. Include properly designed outdoor material storage areas;
ix. Include properly designed trash storage areas;
x. Include proof of a mechanism, to be provided by the project proponent or Copermittee, which will ensure ongoing long-term structural BMP maintenance;
xi. Include additional water quality provisions applicable to individual priority project categories;
xii. Be correctly designed so as to remove pollutants to the maximum extent practicable;
xiii. Be implemented close to pollutant sources, when feasible, and prior to discharging into receiving waters supporting beneficial uses; and

xiv. Ensure that post-development runoff does not contain pollutant loads which cause or contribute to an exceedance of water quality objectives or which have not been reduced to the maximum extent practicable.

(c) Numeric Sizing Criteria – The SUSMP shall require structural treatment BMPs to be implemented for all priority development projects. All structural treatment BMPs shall be located so as to infiltrate, filter, or treat the required runoff volume or flow prior to its discharge to any receiving waterbody supporting beneficial uses. Structural treatment BMPs may be shared by multiple new development projects as long as construction of any shared structural treatment BMPs is completed prior to the use of any new development project from which the structural treatment BMP will receive runoff.

In addition to meeting the BMP requirements listed in item F.1.b.(2)(b) above, all structural treatment BMPs for a single priority development project shall collectively be sized to comply with the following numeric sizing criteria:

Volume

Volume-based BMPs shall be designed to mitigate (infiltrate, filter, or treat) either:

i. The volume of runoff produced from a 24-hour 85th percentile storm event, as determined from the local historical rainfall record (0.6 inch approximate average for the San Diego County area);[3] or

ii. The volume of runoff produced by the 85th percentile 24-hour rainfall event, determined as the maximized capture storm water volume for the area, from the formula recommended in Urban Runoff Quality Management, WEF Manual of Practice No. 23/ASCE Manual of Practice No. 87, (1998); or

iii. The volume of annual runoff based on unit basin storage volume, to achieve 90% or more volume treatment by the method recommended in California Stormwater Best Management Practices Handbook – Industrial/Commercial, (1993); or

iv. The volume of runoff, as determined from the local historical rainfall record, that achieves approximately the same reduction in pollutant loads and flows as achieved by mitigation of the 85th percentile 24-hour runoff event;[4]

OR

Flow

Flow-based BMPs shall be designed to mitigate (infiltrate, filter, or treat) either:

i. The maximum flow rate of runoff produced from a rainfall intensity of 0.2 inch of rainfall per hour; or

[3] This volume is not a single volume to be applied to all of San Diego County. The size of the 85th percentile storm event is different for various parts of the County. The Copermittees are encouraged to calculate the 85th percentile storm event for each of their jurisdictions using local rain data pertinent to their particular jurisdiction (the 0.6 inch standard is a rough average for the County and should only be used where appropriate rain data is not available). In addition, isopluvial maps contained in the County of San Diego Hydrology Manual may be used to extrapolate rainfall data to areas where insufficient data exists in order to determine the volume of the local 85th percentile storm event in such areas. Where the Copermittees will use isopluvial maps to determine the 85th percentile storm event in areas lacking rain data, the Copermittees shall describe their method for using isopluvial maps in the model and local SUSMPs.

[4] Under this volume criteria, hourly rainfall data may be used to calculate the 85th percentile storm event, where each storm event is identified by its separation from other storm events by at least six hours of no rain. Where the Copermittees may use hourly rainfall data to calculate the 85th percentile storm event, the Copermittees shall describe their method for using hourly rainfall data to calculate the 85th percentile storm event in the model and local SUSMPs.

ii. The maximum flow rate of runoff produced by the 85th percentile hourly rainfall intensity, as determined from the local historical rainfall record, multiplied by a factor of two; or

iii. The maximum flow rate of runoff, as determined from the local historical rainfall record, that achieves approximately the same reduction in pollutant loads and flows as achieved by mitigation of the 85th percentile hourly rainfall intensity multiplied by a factor of two.

(d) Equivalent Numeric Sizing Criteria - The Copermittees may develop, as part of the model SUSMP, any equivalent method for calculating the volume or flow which must be mitigated (i.e., any equivalent method for calculating numeric sizing criteria) by post-construction structural treatment BMPs. Such equivalent sizing criteria may be authorized by the SDRWQCB for use in place of the above criteria. In the absence of development and subsequent authorization of such equivalent numeric sizing criteria, the above numeric sizing criteria requirement shall be implemented.

(e) Pollutants or Conditions of Concern – As part of the model SUSMP, the Copermittees shall develop a procedure for pollutants or conditions of concern to be identified for each new development or significant redevelopment project. The procedure shall include, at a minimum, consideration of (1) receiving water quality (including pollutants for which receiving waters are listed as impaired under Clean Water Act section 303(d)); (2) land use type of the development project and pollutants associated with that land use type; (3) pollutants expected to be present on site; (4) changes in storm water discharge flow rates, velocities, durations, and volumes resulting from the development project; and (5) sensitivity of receiving waters to changes in storm water discharge flow rates, velocities, durations, and volumes.

(f) Implementation Process – As part of the model SUSMP, the Copermittees shall develop a process by which SUSMP requirements will be implemented. The process shall identify at what point in the planning process development projects will be required to meet SUSMP requirements. The process shall also include identification of the roles and responsibilities of various municipal departments in implementing the SUSMP requirements, as well as any other measures necessary for the implementation of SUSMP requirements.

(g) Restaurants Less than 5,000 Square Feet - New development and significant redevelopment restaurant projects where the land area development is less than 5,000 square feet shall meet all SUSMP requirements except for structural treatment BMP and numeric sizing criteria requirement F.1.b.(2)(c) and peak flow rate requirement F.1.b(2)(b)(i). A restaurant is defined as a facility that sells prepared foods and drinks for consumption, including stationary lunch counters and refreshment stands selling prepared foods and drinks for immediate consumption (SIC Code 5812).

(h) Waiver Provision – A Copermittee may provide for a project to be waived from the requirement of implementing structural treatment BMPs (F.1.b.(2)(c)) if infeasibility can be established. A waiver of infeasibility shall only be granted by a Copermittee when all available structural treatment BMPs have been considered and rejected as infeasible. Copermittees shall notify the SDRWQCB within 5 days of each waiver issued and shall include the name of the person granting each waiver.

As part of the model SUSMP, the Copermittees may develop a program to require project proponents who have received waivers to transfer the savings in cost, as determined by the Copermittee(s), to a storm water mitigation fund. This program may be implemented by all Copermittees which choose to provide waivers. Funds may be used on projects to improve urban runoff quality within the watershed of the waived

project. The waiver program may identify:

i. The entity or entities that will manage the storm water mitigation fund (i.e., assume full responsibility for)
ii. The range and types of acceptable projects for which mitigation funds may be expended;
iii. The entity or entities that will assume full responsibility for each mitigation project including its successful completion
iv. How the dollar amount of fund contributions will be determined.

(i) Infiltration and Groundwater Protection – To protect groundwater quality, each Copermittee shall apply restrictions to the use of structural treatment BMPs which are designed to primarily function as infiltration devices (such as infiltration trenches and infiltration basins). Such restrictions shall ensure that the use of such infiltration structural treatment BMPs shall not cause or contribute to an exceedance of groundwater quality objectives. At a minimum, use of structural treatment BMPs which are designed to primarily function as infiltration devices shall meet the following conditions:[5]

i. Urban runoff shall undergo pretreatment such as sedimentation or filtration prior to infiltration.
ii. All dry weather flows shall be diverted from infiltration devices.
iii. Pollution prevention and source control BMPs shall be implemented at a level appropriate to protect groundwater quality at sites where infiltration structural treatment BMPs are to be used.
iv. Infiltration structural treatment BMPs shall be adequately maintained so that they remove pollutants to the maximum extent practicable.
v. The vertical distance from the base of any infiltration structural treatment BMP to the seasonal high groundwater mark shall be at least 10 feet. Where groundwater basins do not support beneficial uses, this vertical distance criteria may be reduced, provided groundwater quality is maintained.
vi. The soil through which infiltration is to occur shall have physical and chemical characteristics (such as appropriate cation exchange capacity, organic content, clay content, and infiltration rate) which are adequate for proper infiltration durations and treatment of urban runoff for the protection of groundwater beneficial uses.
vii. Infiltration structural treatment BMPs shall not be used for areas of industrial or light industrial activity; areas subject to high vehicular traffic (25,000 or greater average daily traffic on main roadway or 15,000 or more average daily traffic on any intersecting roadway); automotive repair shops; car washes; fleet storage areas (bus, truck, etc.); nurseries; and other high threat to water quality land uses and activities as designated by each Copermittee.
viii. Infiltration structural BMPs shall be located a minimum of 100 feet horizontally from any water supply wells.

As part of the model and local SUSMPs, the Copermittees may develop alternative restrictions on the use of structural treatment BMPs which are designed to primarily function as infiltration devices.

(j) Downstream Erosion – As part of the model SUSMP and the local SUSMPs, the Copermittees shall develop criteria to ensure that discharges from new development and significant redevelopment maintain or reduce pre-development downstream erosion and protect stream habitat. At a minimum, criteria shall be developed to control peak

[5] These conditions do not apply to structural treatment BMPs which allow incidental infiltration and are not designed to primarily function as infiltration devices (such as grassy swales, detention basins, vegetated buffer strips, constructed wetlands, etc.)

storm water discharge rates and velocities in order to maintain or reduce pre-development downstream erosion and protect stream habitat. Storm water discharge volumes and durations should also be considered.

F.1.c. Revise Environmental Review Processes

(1) To the extent feasible, the Copermittees shall revise their current environmental review processes to include requirements for evaluation of water quality effects and identification of appropriate mitigation measures. The following questions are examples to be considered in addressing increased pollutants and flows from proposed projects:

(a) Could the proposed project result in an increase in pollutant discharges to receiving waters? Consider water quality parameters such as temperature, dissolved oxygen, turbidity and other typical storm water pollutants (e.g., heavy metals, pathogens, petroleum derivatives, synthetic organics, sediment, nutrients, oxygen-demanding substances, and trash).
(b) Could the proposed project result in significant alteration of receiving water quality during or following construction?
(c) Could the proposed project result in increased impervious surfaces and associated increased runoff?
(d) Could the proposed project create a significant adverse environmental impact to drainage patterns due to changes in runoff flow rates or volumes?
(e) Could the proposed project result in increased erosion downstream?
(f) Is the project tributary to an already impaired water body, as listed on the Clean Water Act Section 303(d) list. If so, can it result in an increase in any pollutant for which the water body is already impaired?
(g) Is project tributary to other environmentally sensitive areas? If so, can it exacerbate already existing sensitive conditions?
(h) Could the proposed project have a potentially significant environmental impact on surface water quality, to either marine, fresh, or wetland waters?
(i) Could the proposed project have a potentially significant adverse impact on ground water quality?
(j) Could the proposed project cause or contribute to an exceedance of applicable surface or groundwater receiving water quality objectives or degradation of beneficial uses?
(k) Can the project impact aquatic, wetland, or riparian habitat?

F.1.d. Conduct Education Efforts Focused on New Development and Redevelopment

(1) Internal: Municipal Staff and Others

Each Copermittee shall implement an education program to ensure that its planning and development review staffs (and Planning Boards and Elected Officials, if applicable) have an understanding of:

(a) Federal, state, and local water quality laws and regulations applicable to development projects;
(b) The connection between land use decisions and short and long-term water quality impacts (i.e., impacts from land development and urbanization); and
(c) How impacts to receiving water quality resulting from development can be minimized (i.e., through implementation of various source control and structural BMPs).

(2) External: Project Applicants, Developers, Contractors, Property Owners, Community Planning Groups

As early in the planning and development process as possible, each Copermittee shall implement a program to educate project applicants, developers, contractors, property owners, and community planning groups on the following topics:

(a) Federal, state, and local water quality laws and regulations applicable to development projects;
(b) Required federal, state, and local permits pertaining to water quality;
(c) Water quality impacts of urbanization; and
(d) Methods for minimizing the impacts of development on receiving water quality.

F.2. Construction Component

Each Copermittee shall implement a Construction Component of its Jurisdictional URMP to reduce pollutants in runoff from construction sites during all construction phases. At a minimum the construction component shall address:

F.2.a. Pollution Prevention
F.2.b. Grading Ordinance Update
F.2.c. Modify Construction and Grading Approval Process
F.2.d. Source Identification
F.2.e. Threat to Water Quality Prioritization
F.2.f. BMP Implementation
F.2.g. Inspection of Construction Sites
F.2.h. Enforcement of Construction Sites
F.2.i. Reporting of Non-compliant Sites
F.2.j. Education Focused on Construction Activities

F.2.a. Pollution Prevention (Construction)

Each Copermittee shall implement pollution prevention methods in its Construction Component and shall require its use by construction site owners, developers, contractors, and other responsible parties, where appropriate.

F.2.b. Grading Ordinance Update (Construction)

Each Copermittee shall review and update its grading ordinances as necessary for compliance with its storm water ordinances and this Order. The updated grading ordinance shall require implementation of BMPs and other measures during all construction activities, including the following BMPs and other measures or their equivalent:

(1) Erosion prevention;
(2) Seasonal restrictions on grading;
(3) Slope stabilization requirements;
(4) Phased grading;
(5) Revegetation as early as feasible;
(6) Preservation of natural hydrologic features;
(7) Preservation of riparian buffers and corridors;
(8) Maintenance of all source control and structural treatment BMPs; and
(9) Retention and proper management of sediment and other construction pollutants on site.

F.2.c Modify Construction and Grading Approval Process (Construction)

Prior to approval and issuance of local construction and grading permits, each Copermittee shall require all individual proposed construction and grading projects to implement measures to ensure that pollutants from the site will be reduced to the maximum extent practicable and will not cause or contribute to an exceedance of water quality objectives. Each Copermittee shall further ensure that

all grading and construction activities will be in compliance with applicable Copermittee ordinances (e.g., storm water, grading, construction, etc.) and other applicable requirements, including this Order.

(1) Construction and Grading Project Requirements

Include construction and grading project requirements in local grading and construction permits to ensure that pollutant discharges are reduced to the maximum extent practicable and water quality objectives are not violated during the construction phase. Such requirements shall include the following requirements or their equivalent:

(a) Require project proponent to develop and implement a plan to manage storm water and non-storm water discharges from the site at all times;
(b) Require project proponent to minimize grading during the wet season and coincide grading with seasonal dry weather periods to the extent feasible. If grading does occur during the wet season, require project proponent to implement additional BMPs for any rain events which may occur, as necessary for compliance with this Order;
(c) Require project proponent to emphasize erosion prevention as the most important measure for keeping sediment on site during construction;
(d) Require project proponent to utilize sediment controls as a supplement to erosion prevention for keeping sediment on-site during construction, and never as the single or primary method;
(e) Require project proponent to minimize areas that are cleared and graded to only the portion of the site that is necessary for construction;
(f) Require project proponent to minimize exposure time of disturbed soil areas;
(g) Require project proponent to temporarily stabilize and reseed disturbed soil areas as rapidly as possible;
(h) (h) Require project proponent to permanently revegetate or landscape as early as feasible;
(i) Require project proponent to stabilize all slopes; and
(j) Require project proponents subject to California's statewide General NPDES Permit for Storm Water Discharges Associated With Construction Activities, (hereinafter General Construction Permit), to provide evidence of existing coverage under the General Construction Permit.

F.2.d. Source Identification (Construction)

Each Copermittee shall annually develop and update, prior to the rainy season, a watershed based inventory of all construction sites within its jurisdiction regardless of site size or ownership. This requirement is applicable to all construction sites regardless of whether the construction site is subject to the California statewide General NPDES Permit for Storm Water Discharges Associated With Construction Activities (hereinafter General Construction Permit), or other individual NPDES permit. The use of an automated database system, such as Geographical Information System (GIS) is highly recommended, but not required.

F.2.e. Threat to Water Quality Prioritization (Construction)

(1) To establish priorities for construction oversight activities under this Order, the Copermittee shall prioritize its watershed-based inventory (developed pursuant to F.2.d. above) by threat to water quality. Each construction site shall be classified as high, medium, or low threat to water quality. In evaluating threat to water quality each Copermittee shall consider (1) soil erosion potential; (2) site slope; (3) project size and type; (4) sensitivity of receiving water bodies; (5) proximity to receiving water bodies; (6) non-storm water discharges; and (7) any other relevant factors.

(2) A high priority construction site shall at a minimum be defined as a site meeting either of the following criteria or equivalent criteria:

(a) The site is 50 acres or more and grading will occur during the wet season; OR
(b) The site is (1) 5 acres or more and (2) tributary to a Clean Water Act section 303(d) water body impaired for sediment or is within or directly adjacent to or discharging directly to a coastal lagoon or other receiving water within an environmentally sensitive area (as defined in section F.1.b.(2)(a)vii of this Order).

F.2.f. BMP Implementation (Construction)

(1) Each Copermittee shall designate a set of minimum BMPs for high, medium, and low threat to water quality construction sites (as determined under section F.2.e). BMPs are to be implemented year round.

(2) Each Copermittee shall implement, or require the implementation of, the designated minimum BMPs (based upon the site's threat to water quality rating) at each construction site within its jurisdiction year round. If particular minimum BMPs are infeasible at any specific site, each Copermittee shall implement, or require the implementation of, other equivalent BMPs. Each Copermittee shall also implement or require any additional site specific BMPs as necessary to comply with this Order, including BMPs which are more stringent than those required under the statewide General Construction Permit.

(3) Each Copermittee shall implement, or require the implementation of, BMPs year round; however, BMP implementation requirements can vary based on wet and dry seasons.

(4) Each Copermittee shall implement, or require implementation of, additional controls for construction sites tributary to Clean Water Act section 303(d) water bodies impaired for sediment as necessary to comply with this Order. Each Copermittee shall implement, or require implementation of, additional controls for construction sites within or adjacent to or discharging directly to coastal lagoons or other receiving waters within environmentally sensitive areas (as defined in section F.1.b.(2)(a)(vii) of this Order) as necessary to comply with this Order.

F.2.g. Inspection of Construction Sites (Construction)

(1) Each Copermittee shall conduct construction site inspections for compliance with its ordinances (grading, storm water, etc.), permits (construction, grading, etc.), and this Order. Inspections shall include review of site erosion control and BMP implementation plans.

(2) Each Copermittee shall establish inspection frequencies and priorities as determined by the threat to water quality prioritization described in F.2.e above. During the wet season (i.e., October 1 through April 30 of each year), each Copermittee shall inspect, at a minimum, each High Priority construction site, either:

(a) Weekly
OR
(b) Monthly for any site that the responsible Copermittee certifies in a written statement to the SDRWQCB all of the following (certified statements may be submitted to the SDRWQCB at any time for one or more sites):

i. Copermittee has record of construction site's Waste Discharge Identification Number (WDID#) documenting construction site's coverage under the statewide General Construction Permit; and
ii. Copermittee has reviewed the constructions site's Storm Water Pollution Prevention Plan (SWPPP); and

iii. Copermittee finds SWPPP to be in compliance with all local ordinances, permits, and plans; and
iv. Copermittee finds that the SWPPP is being properly implemented on site.

At a minimum, Medium and Low Priority construction sites shall be inspected by Copermittees twice during the wet season. All construction sites shall be inspected by the Copermittees as needed during the dry season (i.e., May 1 through September 30 of each year).

(3) Based upon site inspection findings, each Copermittee shall implement all follow-up actions necessary to comply with this Order.

F.2.h. Enforcement of Construction Sites (Construction)

Each Copermittee shall enforce its ordinances (grading, storm water, etc.) and permits (construction, grading, etc.) at all construction sites as necessary to maintain compliance with this Order. Copermittee ordinances or other regulatory mechanisms shall include sanctions to ensure compliance. Sanctions shall include the following or their equivalent: Non-monetary penalties, fines, bonding requirements, and/or permit denials for non-compliance.

F.2.i. Reporting of Non-compliant Sites (Construction)

Each Copermittee shall provide oral notification to the SDRWQCB of non-compliant sites that are determined to pose a threat to human or environmental health within its jurisdiction within 24 hours of the discovery of noncompliance, as required under section R.1 (and B.6 of Attachment C) of this Order.

Each Copermittee shall develop and submit criteria by which to evaluate events of non-compliance to determine whether they pose a threat to human or environmental health. These criteria shall be submitted in the Jurisdictional Urban Runoff Management Program Document and Annual Reports for SDRWQCB review.

Such oral notification shall be followed up by a written report to be submitted to the SDRWQCB within 5 days of the incidence of non-compliance as required under section R.1 (and B.6 of Attachment C) of this Order. Sites are considered non-compliant when one or more violations of local ordinances, permits, plans, or this Order exist on the site.

F.2.j. Education Focused on Construction Activities (Construction)

(1) Internal: Municipal Staff

Each Copermittee shall implement an education program to ensure that its construction, building, and grading review staffs and inspectors have an understanding of:

(a) Federal, state, and local water quality laws and regulations applicable to construction and grading activities.
(b) The connection between construction activities and water quality impacts (i.e., impacts from land development and urbanization).
(c) How erosion can be prevented.
(d) How impacts to receiving water quality resulting from construction activities can be minimized (i.e., through implementation of various source control and structural BMPs).
(e) Applicable topics listed in section F.4. of this Order.

(2) External: Project Applicants, Contractors, Developers, Property Owners, and other Responsible Parties

Each Copermittee shall implement an education program to ensure that project applicants, contractors, developers, property owners, and other responsible parties have an understanding of the topics outlined in section F.2.j.1. above of this Order.

F.3. Existing Development Component

Each Copermittee shall minimize the short and long-term impacts on receiving water quality from all types of existing development.

F.3.a. Municipal (Existing Development)

Each Copermittee shall implement a Municipal (Existing Development) Component to prevent or reduce pollutants in runoff from all municipal land use areas and activities. At a minimum the municipal component shall address:

F.3.a.(1)	Pollution Prevention
F.3.a.(2)	Source Identification
F.3.a.(3)	Threat to Water Quality Prioritization
F.3.a.(4)	BMP Implementation
F.3.a.(5)	Maintenance of Municipal Separate Storm Sewer System
F.3.a.(6)	Management of Pesticides, Herbicides, and Fertilizers
F.3.a.(7)	Inspection of Municipal Areas and Activities
F.3.a.(8)	Enforcement of Municipal Areas and Activities

F.3.a.(1) Pollution Prevention (Municipal)

Each Copermittee shall implement pollution prevention methods in its Municipal (Existing Development) Component and shall require its use by appropriate municipal departments and personnel, where appropriate.

F.3.a.(2) Source Identification (Municipal)

Each Copermittee shall develop, and update annually, a watershed based inventory of the name, address (if applicable), and description of all municipal land use areas and activities which generate pollutants. The use of an automated database system, such as Geographical Information System (GIS) is highly recommended when applicable, but not required.

F.3.a.(3) Threat to Water Quality Prioritization (Municipal)

(a) To establish priorities for oversight of municipal areas and activities required under this Order, each Copermittee shall prioritize each watershed inventory in F.3.a.2. above by threat to water quality and update annually. Each municipal area and activity shall be classified as high, medium, or low threat to water quality. In evaluating threat to water quality, each Copermittee shall consider (1) type of municipal area or activity; (2) materials used; (3) wastes generated; (4) pollutant discharge potential; (5) non-storm water discharges; (6) size of facility or area; (7) proximity to receiving water bodies; (8) sensitivity of receiving water bodies; and (9) any other relevant factors.

(b) At a minimum, the high priority municipal areas and activities shall include the following:

i. Roads, Streets, Highways, and Parking Facilities.
ii. Flood Management Projects and Flood Control Devices.
iii. Areas and activities tributary to a Clean Water Act section 303(d) impaired water body, where an area or activity generates pollutants for which the water body is impaired. Areas and activities within or adjacent to or discharging

directly to coastal lagoons or other receiving waters within environmentally sensitive areas (as defined in section F.1.b.(2)(a)vii of this Order).

iv. Municipal Waste Facilities.
- Active or closed municipal landfills;
- Publicly owned treatment works (including water and wastewater treatment plants) and sanitary sewage collection systems;
- Municipal separate storm sewer systems;
- Incinerators;
- Solid waste transfer facilities;
- Land application sites;
- Uncontrolled sanitary landfills;
- Corporate yards including maintenance and storage yards for materials, waste, equipment and vehicles;
- Sites for disposing and treating sewage sludge; and
- Hazardous waste treatment, disposal, and recovery facilities.

v. Other municipal areas and activities that the Copermittee determines may contribute a significant pollutant load to the MS4.

vi. Municipal airfields.

F.3.a.(4) <u>BMP Implementation (Municipal)</u>

(a) Each Copermittee shall designate a set of minimum BMPs for high, medium, and low threat to water quality municipal areas and activities (as determined under section F.3.a.(3)). The designated minimum BMPs for high threat to water quality municipal areas and activities shall be area or activity specific as appropriate.

(b) Each Copermittee shall implement, or require the implementation of, the designated minimum BMPs (based upon the threat to water quality rating) at each municipal area or activity within its jurisdiction. If particular minimum BMPs are infeasible for any specific area or activity, each Copermittee shall implement, or require implementation of other equivalent BMPs. Each Copermittee shall also implement any additional BMPs as are necessary to comply with this Order.

i. Each Copermittee shall evaluate feasibility of retrofitting existing structural flood control devices and retrofit where needed.

(c) Each Copermittee shall implement, or require implementation of, any additional controls for municipal areas and activities tributary to Clean Water Act section 303(d) impaired water bodies (where an area or activity generates pollutants for which the water body is impaired) as necessary to comply with this Order. Each Copermittee shall implement, or require implementation of, additional controls for municipal areas and activities within or directly adjacent to or discharging directly to coastal lagoons or other receiving waters within environmentally sensitive areas (as defined in section F.1.b.(2)(a)(vii) of this Order) as necessary to comply with this Order.

F.3.a.(5) <u>Maintenance of Municipal Separate Storm Sewer System (Municipal)</u>

(a) Each Copermittee shall implement a schedule of maintenance activities at all structural controls designed to reduce pollutant discharges to or from its MS4s and related drainage structures.

(b) Each Copermittee shall implement a schedule of maintenance activities for the municipal separate storm sewer system.

(c) The maintenance activities must, at a minimum, include:

i. Inspection and removal of accumulated waste (e.g. sediment, trash, debris and other pollutants) between May 1 and September 30 of each year;

ii. Additional cleaning as necessary between October 1 and April 30 of each year;

iii. Record keeping of cleaning and the overall quantity of waste removed;

iv. Proper disposal of waste removed pursuant to applicable laws;

v. Measures to eliminate waste discharges during MS4 maintenance and cleaning activities.

F.3.a.(6) Management of Pesticides, Herbicides, and Fertilizers (Municipal)

The Copermittees shall implement BMPs to reduce the contribution of pollutants associated with the application, storage, and disposal of pesticides, herbicides and fertilizers from municipal areas and activities to MS4s. Important municipal areas and activities include municipal facilities, public rights-of-way, parks, recreational facilities, golf courses, cemeteries, botanical or zoological gardens and exhibits, landscaped areas, etc.

Such BMPs shall include, at a minimum: (1) educational activities, permits, certifications and other measures for municipal applicators and distributors; (2) integrated pest management measures that rely on non-chemical solutions; (3) the use of native vegetation; (4) schedules for irrigation and chemical application; and (5) the collection and proper disposal of unused pesticides, herbicides, and fertilizers.

F.3.a.(7) Inspection of Municipal Areas and Activities (Municipal)

At a minimum, each Copermittee shall inspect high priority municipal areas and activities annually. Based upon site inspection findings, each Copermittee shall implement all follow-up actions necessary to comply with this Order.

F.3.a.(8) Enforcement of Municipal Areas and Activities (Municipal)

Each Copermittee shall enforce its storm water ordinance for all municipal areas and activities as necessary to maintain compliance with this Order.

F.3.b. Industrial (Existing Development)

Each Copermittee shall implement an Industrial (Existing Development) Component to reduce pollutants in runoff from all industrial sites. At a minimum the industrial component shall address:

F.3.b.(1)	Pollution Prevention
F.3.b.(2)	Source Identification
F.3.b.(3)	Threat to Water Quality Prioritization
F.3.b.(4)	BMP Implementation
F.3.b.(5)	Monitoring of Industrial Sites
F.3.b.(6)	Inspection of Industrial Sites
F.3.b.(7)	Enforcement Measures for Industrial Sites
F.3.b.(8)	Reporting of Non-compliant Sites

F.3.b.(1) Pollution Prevention (Industrial)

Each Copermittee shall implement pollution prevention methods in its Industrial (Existing Development) Component and shall require its use by industry, where appropriate.

F.3.b.(2) Source Identification (Industrial)

Each Copermittee shall develop and update annually a watershed-based inventory of all industrial sites within its jurisdiction regardless of site ownership. This requirement is applicable to all industrial sites regardless of whether the industrial site is subject the California statewide General NPDES Permit for Storm Water Discharges Associated With Industrial Activities, Except Construction (hereinafter General Industrial Permit) or other individual NPDES permit.

The inventory shall include the following minimum information for each industrial site: name; address; and a narrative description including SIC codes which best reflects the principal products or services provided by each facility. The use of an automated database system, such as Geographical Information System (GIS) is highly recommended, but not required.

F.3.b.(3) Threat to Water Quality Prioritization (Industrial)

(a) To establish priorities for industrial oversight activities under this Order, the Copermittee shall prioritize each watershed-based inventory in F.3.b.(2) above by threat to water quality and update annually. Each industrial site shall be classified as high, medium, or low threat to water quality. In evaluating threat to water quality each Copermittee shall consider (1) type of industrial activity (SIC Code); (2) materials used in industrial processes; (3) wastes generated; (4) pollutant discharge potential; (5) non-storm water discharges; (6) size of facility; (7) proximity to receiving water bodies; (8) sensitivity of receiving water bodies; (9) whether the industrial site is subject to the statewide General Industrial Permit; and (10) any other relevant factors.

(b) At a minimum the high priority industrial sites shall include industrial facilities that are subject to section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA); industrial facilities tributary to a Clean Water Act section 303(d) impaired water body, where a facility generates pollutants for which the water body is impaired; industrial facilities within or directly adjacent to or discharging directly to coastal lagoons or other receiving waters within environmentally sensitive areas (as defined in section F.1.b.(2)(a)vii of this Order); facilities subject to the statewide General Industrial Permit; and all other industrial facilities that the Copermittee determines are contributing significant pollutant loading to its MS4, regardless of whether such facilities are covered under the statewide General Industrial Permit or other NPDES permit.

F.3.b.(4) BMP Implementation (Industrial)

(a) Each Copermittee shall designate a set of minimum BMPs for high, medium, and low threat to water quality industrial sites (as determined under section F.3.b.(3)). The designated minimum BMPs for high threat to water quality industrial sites shall be industry and site specific as appropriate.

(b) Each Copermittee shall implement, or require the implementation of, the designated minimum BMPs (based upon the site's threat to water quality rating) at each industrial site within its jurisdiction. If particular minimum BMPs are infeasible at any specific site, each Copermittee shall implement, or require implementation of, other equivalent BMPs. Each Copermittee shall also implement or require any additional site specific BMPs as necessary to comply with this Order including BMPs which are more stringent than those required under the statewide General Industrial Permit.

(c) Each Copermittee shall implement, or require implementation of, additional controls for industrial sites tributary to Clean Water Act section 303(d) impaired water bodies (where a site generates pollutants for which the water body is impaired) as necessary to comply

with this Order. Each Copermittee shall implement, or require implementation of, additional controls for industrial sites within or directly adjacent to or discharging directly to coastal lagoons or other receiving waters within environmentally sensitive areas (as defined in section F.1.b.(2)(a)(vii) of this Order) as necessary to comply with this Order.

F.3.b.(5) Monitoring of Industrial Sites (Industrial)

(a) Each Copermittee shall conduct, or require industry to conduct, a monitoring program for runoff from each high threat to water quality industrial site (identified in F.3.b.(3) above). Group monitoring by multiple industrial sites conducted under group monitoring programs approved by the State Water Resources Control Board is acceptable.

(b) At a minimum, the monitoring program shall provide quantitative data from two storm events per year on the following constituents:

i. Any pollutant listed in effluent guidelines subcategories where applicable;
ii. Any pollutant for which an effluent limit has been established in an existing NPDES permit for the facility;
iii. Oil and grease or Total Organic Carbon (TOC);
iv. pH;
v. Total suspended solids (TSS);
vi. Specific conductance; and
vii. Toxic chemicals and other pollutants that are likely to be present in storm water discharges.

F.3.b.(6) Inspection of Industrial Sites (Industrial)

(a) Each Copermittee shall conduct industrial site inspections for compliance with its ordinances, permits, and this Order. Inspections shall include review of BMP implementation plans.

(b) Each Copermittee shall establish inspection frequencies and priorities as determined by the threat to water quality prioritization described in F.3.b.(3) above. Each Copermittee shall inspect high priority industrial sites, at a minimum:

i. Annually

OR

ii. Bi-annually for any site that the responsible Copermittee certifies in a written statement to the SDRWQCB all of the following (certified statements may be submitted to the SDRWQCB at any time for one or more sites):

- Copermittee has record of industrial site's Waste Discharge Identification Number (WDID#) documenting industrial site's coverage under the statewide General Industrial Permit; and
- Copermittee has reviewed the industrial site's Storm Water Pollution Prevention Plan (SWPPP); and
- Copermittee finds SWPPP to be in compliance with all local ordinances, permits, and plans; and
- Copermittee finds that the SWPPP is being properly implemented on site.

Each Copermittee shall inspect medium and low threat to water quality industrial sites as needed.

(c) Based upon site inspection findings, each Copermittee shall implement all follow-up actions necessary to comply with this Order.

(d) To the extent that the SDRWQCB has conducted an inspection of a high priority industrial site during a particular year, the requirement for the responsible Copermittee to inspect this site during the same year will be satisfied.

F.3.b.(7) Enforcement of Industrial Sites (Industrial)

Each Copermittee shall enforce its storm water ordinance at all industrial sites as necessary to maintain compliance with this Order. Copermittee ordinances or other regulatory mechanisms shall include sanctions to ensure compliance. Sanctions shall include the following or their equivalent: Non-monetary penalties, fines, bonding requirements, and/or permit denials for non-compliance.

F.3.b.(8) Reporting of Non-compliant Sites (Industrial)

Each Copermittee shall provide oral notification to the SDRWQCB of non-compliant sites that are determined to pose a threat to human or environmental health within its jurisdiction within 24 hours of the discovery of noncompliance, as required under section R.1 (and B.6 of Attachment C) of this Order.

Each Copermittee shall develop and submit criteria by which to evaluate events of non-compliance to determine whether they pose a threat to human or environmental health. These criteria shall be submitted in the Jurisdictional Urban Runoff Management Program Document and Annual Reports for SDRWQCB review.

Such oral notification shall be followed up by a written report to be submitted to the SDRWQCB within 5 days of the incidence of non-compliance as required under section R.1(and B.6 of Attachment C) of this Order. Sites are considered non-compliant when one or more violations of local ordinances, permits, plans, or this Order exist on the site.

F.3.c. Commercial (Existing Development)

Each Copermittee shall implement a Commercial (Existing Development) Component to reduce pollutants in runoff from commercial sites. At a minimum the commercial component shall address:

F.3.c.(1)	Pollution Prevention
F.3.c.(2)	Source Identification
F.3.c.(3)	BMP Implementation
F.3.c.(4)	Inspection of Commercial Sites and Sources
F.3.c.(5)	Enforcement of Commercial Sites and Sources

F.3.c.(1) Pollution Prevention (Commercial)

Each Copermittee shall implement pollution prevention methods in its Commercial (Existing Development) Component and shall require its use by commerce, where appropriate.

F.3.c.(2) Source Identification (Commercial)

Each Copermittee shall develop and update annually an inventory of the following high priority threat to water quality commercial sites/sources listed below. (If any commercial site/source listed below is inventoried as an industrial site, as required under section F.3.b.(2) of this Order, it is not necessary to also inventory it as a commercial site/source).

(a) Automobile mechanical repair, maintenance, fueling, or cleaning;
(b) Airplane mechanical repair, maintenance, fueling, or cleaning;
(c) Boat mechanical repair, maintenance, fueling, or cleaning;

(d) Equipment repair, maintenance, fueling, or cleaning;
(e) Automobile and other vehicle body repair or painting;
(f) Mobile automobile or other vehicle washing;
(g) Automobile (or other vehicle) parking lots and storage facilities;
(h) Retail or wholesale fueling;
(i) Pest control services;
(j) Eating or drinking establishments;
(k) Mobile carpet, drape or furniture cleaning;
(l) Cement mixing or cutting;
(m) Masonry;
(n) Painting and coating;
(o) Botanical or zoological gardens and exhibits;
(p) Landscaping;
(q) Nurseries and greenhouses;
(r) Golf courses, parks and other recreational areas/facilities;
(s) Cemeteries;
(t) Pool and fountain cleaning;
(u) Marinas;
(v) Port-a-Potty servicing;
(w) Other commercial sites/sources that the Copermittee determines may contribute a significant pollutant load to the MS4;
(x) Any commercial site or source tributary to a Clean Water Act section 303(d) impaired water body, where the site or source generates pollutants for which the water body is impaired; and
(y) Any commercial site or source within or directly adjacent to or discharging directly to a coastal lagoon or other receiving water within an environmentally sensitive area (as defined in F.1.b(2)(a)vii of this Order).

The use of an automated database system, such as Geographical Information System (GIS) is highly recommended, but not required.

F.3.c.(3) <u>BMP Implementation (Commercial)</u>

(a) Each Copermittee shall designate a set of minimum BMPs for the high priority threat to water quality commercial sites/sources (listed above in section F.3.c.(2)). The designated minimum BMPs for the high threat to water quality commercial sites/sources shall be site and source specific as appropriate.

(b) Each Copermittee shall implement, or require the implementation of, the designated minimum BMPs at each high priority threat to water quality commercial site/source within its jurisdiction. If particular minimum BMPs are infeasible for any specific site/source, each Copermittee shall implement, or require the implementation of, other equivalent BMPs. Each Copermittee shall also implement or require any additional site specific BMPs as necessary to comply with this Order.

(c) Each Copermittee shall implement, or require implementation of, additional controls for commercial sites or sources tributary to Clean Water Act section 303(d) impaired water bodies (where a site or source generates pollutants for which the water body is impaired) as necessary to comply with this Order. Each Copermittee shall implement, or require implementation of, additional controls for commercial sites or sources within or directly adjacent to or discharging directly to coastal lagoons or other receiving waters within environmentally sensitive areas (as defined in section F.1.b.(2)(a)(vii) of this Order) as necessary to comply with this Order.

F.3.c.(4) Inspection of Commercial Sites and Sources (Commercial)

Each Copermittee shall inspect high priority commercial sites and sources as needed. Based upon site inspection findings, each Copermittee shall implement all follow-up actions necessary to comply with this Order.

F.3.c.(5) Enforcement of Commercial Sites and Sources (Commercial)

Each Copermittee shall enforce its storm water ordinance for all commercial sites and sources as necessary to maintain compliance with this Order.

F.3.d. Residential (Existing Development)

Each Copermittee shall implement a Residential (Existing Development) Component to prevent or reduce pollutants in runoff from all residential land use areas and activities. At a minimum the residential component shall address:

F.3.d.(1)	Pollution Prevention
F.3.d.(2)	Threat to Water Quality Prioritization
F.3.d.(3)	BMP Implementation
F.3.d.(4)	Enforcement of Residential Areas and Activities

F.3.d.(1) Pollution Prevention (Residential)

Each Copermittee shall include pollution prevention methods in its Residential (Existing Development) Component and shall encourage their use by residents, where appropriate.

F.3.d.(2) Threat to Water Quality Prioritization (Residential)

Each Copermittee shall identify high priority residential areas and activities. At a minimum, these shall include:

- Automobile repair and maintenance;
- Automobile washing;
- Automobile parking;
- Home and garden care activities and product use (pesticides, herbicides, and fertilizers);
- Disposal of household hazardous waste (e.g., paints, cleaning products);
- Disposal of pet waste;
- Disposal of green waste;
- Any other residential source that the Copermittee determines may contribute a significant pollutant load to the MS4;
- Any residence tributary to a Clean Water Act section 303(d) impaired water body, where the residence generates pollutants for which the water body is impaired; and
- Any residence within or directly adjacent to or discharging directly to a coastal lagoon or other receiving waters within an environmentally sensitive area (as defined in F.1.b.(2)(a)vii of this Order).

F.3.d.(3) BMP Implementation (Residential)

(a) Each Copermittee shall designate a set of minimum BMPs for high threat to water quality residential areas and activities (as required under section F.3.d.(2)). The designated minimum BMPs for high threat to water quality municipal areas and activities shall be area or activity specific.

(b) Each Copermittee shall require implementation of the designated minimum BMPs for high threat to water quality residential areas and activities. If particular minimum BMPs are infeasible for any specific site/source, each Copermittee shall require implementation of other equivalent BMPs. Each Copermittee shall also implement, or require implementation of, any additional BMPs as are necessary to comply with this Order.

(c) Each Copermittee shall implement, or require implementation of, any additional controls for residential areas and activities tributary to Clean Water Act Section 303(d) impaired water bodies (where a residential area or activity generates pollutants for which the water body is impaired) as necessary to comply with this Order. Each Copermittee shall implement, or require implementation of, additional controls for residential areas within or directly adjacent to or discharging directly to coastal lagoons or other receiving waters within environmentally sensitive areas (as defined in section F.1.b.(2)(a)(vii) of this Order) as necessary to comply with this Order.

F.3.d.(4) Enforcement of Residential Areas and Activities (Residential)

Each Copermittee shall enforce its storm water ordinance for all residential areas and activities as necessary to maintain compliance with this Order.

F.4. Education Component

Each Copermittee shall implement an Education Component using all media as appropriate to (1) measurably increase the knowledge of the target communities regarding MS4s, impacts of urban runoff on receiving waters, and potential BMP solutions for the target audience; and (2) to measurably change the behavior of target communities and thereby reduce pollutant releases to MS4s and the environment. At a minimum the education component shall address the following target communities:

- Municipal Departments and Personnel
- Construction Site Owners and Developers
- Industrial Owners and Operators
- Commercial Owners and Operators
- Residential Community, General Public, and School Children
- Quasi-Governmental Agencies/Districts (i.e., educational institutions, water districts, sanitation districts, etc.)

F.4.a. All Target Communities

At a minimum the Education Program for each target audience shall contain information on the following topics where applicable:

- State and Federal water quality laws
- Requirements of local municipal permits and ordinances (e.g., storm water and grading ordinances and permits)
- Impacts of urban runoff on receiving waters
- Watershed concepts (i.e., stewardship, connection between inland activities and coastal problems, etc.)
- Distinction between MS4s and sanitary sewers
- Importance of good housekeeping (e.g., sweeping impervious surfaces instead of hosing)
- Pollution prevention and safe alternatives
- Household hazardous waste collection
- Recycling

- BMPs: Site specific, structural and source control
- BMP maintenance
- Non-storm water disposal alternatives (e.g., all wash waters)
- Pet and animal waste disposal
- Proper solid waste disposal (e.g., garbage, tires, appliances, furniture, vehicles)
- Equipment and vehicle maintenance and repair
- Public reporting mechanisms
- Green waste disposal
- Integrated pest management
- Native vegetation
- Proper disposal of boat and recreational vehicle waste
- Traffic reduction, alternative fuel use
- Water conservation

F.4.b. Municipal, Construction, Industrial, Commercial, and Quasi-Governmental (educational institutions, water districts, sanitation districts, etc.) Communities

In addition to the topics listed in F.4.a. above, the Municipal, Construction, Industrial, Commercial, and Quasi-Governmental (Educational Institutions, Water Districts, Sanitation Districts) Communities shall also be educated on the following topics where applicable:

- Basic urban runoff training for all personnel
- Additional urban runoff training for appropriate personnel
- Illicit Discharge Detection and Elimination observations and follow-up during daily work activities
- Lawful disposal of catchbasin and other MS4 cleanout wastes
- Water quality awareness for Emergency/First Responders
- California's Statewide General NPDES Permit for Storm Water Discharges Associated with Industrial Activities (Except Construction).
- California's Statewide General NPDES Permit for Storm Water Discharges Associated with Construction Activities
- SDRWQCB's General NPDES Permit for Groundwater Dewatering
- 401 Water Quality Certification by the SDRWQCB
- Statewide General NPDES Utility Vault Permit (NPDES No. CAG990002)
- SDRWQCB Waste Discharge Requirements for Dredging Activities
- Local requirements beyond statewide general permits
- Federal, state and local water quality regulations that affect development projects
- Water quality impacts associated with land development
- Alternative materials & designs to maintain peak runoff values
- How to conduct a storm water inspection
- Potable water discharges to the MS4
- Dechlorination techniques
- Hydrostatic testing
- Spill response, containment, & recovery
- Preventive maintenance
- How to do your job and protect water quality

F.4.c. Residential, General Public, School Children Communities

In addition to the topics listed in F.4.a. above, the Residential, General Public, and School Children Communities shall be educated on the following topics where applicable:

- Public reporting information resources
- Residential and charity car-washing

- Community activities (e.g., "Adopt a Storm Drain, Watershed, or Highway" Programs, citizen monitoring, creek/beach cleanups, environmental protection organization activities, etc.)

F.5. Illicit Discharge Detection and Elimination Component

Each Copermittee shall implement an Illicit Discharge Detection and Elimination Component containing measures to actively seek and eliminate illicit discharges and connections. At a minimum the Illicit Discharge Detection and Elimination Component shall address:

F.5.a	Illicit Discharges and Connections
F.5.b	Dry Weather Analytical Monitoring
F.5.c	Investigation / Inspection and follow-up
F.5.d	Elimination of Illicit Discharges and Connections
F.5.e	Enforce Ordinance
F.5.f	Prevent and Respond To Sewage Spills (Including from Private Laterals and Failing Septic Systems) and Other Spills
F.5.g	Facilitate Public Reporting of Illicit Discharges and Connections – Public Hotline
F.5.h	Facilitate Disposal of Used Oil and Toxic Materials
F.5.i	Limit Infiltration From Sanitary Sewer to MS4

F.5.a. Illicit Discharges and Connections

Each Copermittee shall implement a program to actively seek and eliminate illicit discharges and connections into its MS4. The program shall address all types of illicit discharges and connections excluding those non-storm water discharges not prohibited by the Copermittee in accordance with Section B. of this Order.

F.5.b. Dry Weather Analytical Monitoring

Each Copermittee shall conduct dry weather analytical monitoring of MS4 outfalls within its jurisdiction to detect illicit discharges and connections in accordance with Attachment E of this Order.

F.5.c. Investigation / Inspection and Follow-Up

Each Copermittee shall investigate and inspect any portion of the MS4 that, based on dry weather analytical monitoring results or other appropriate information, indicates a reasonable potential for illicit discharges, illicit connections, or other sources of non-storm water (including non-prohibited discharge(s) identified in Section B. of this Order). Each Copermittee shall establish criteria to identify portions of the system where such follow-up investigations are appropriate.

F.5.d. Elimination of Illicit Discharges and Connections

Each Copermittee shall eliminate all detected illicit discharges, discharge sources, and connections immediately.

F.5.e. Enforce Ordinances

Each Copermittee shall implement and enforce its ordinances, orders, or other legal authority to prevent illicit discharges and connections to its MS4. Each Copermittee shall also implement and enforce its ordinance, orders, or other legal authority to eliminate detected illicit discharges and connections to it MS4.

F.5.f. Prevent and Respond to Sewage Spills (Including from Private Laterals and Failing Septic Systems) and Other Spills

Each Copermittee shall prevent, respond to, contain and clean up all sewage and other spills that may discharge into its MS4 from any source (including private laterals and failing septic systems). Spill response teams shall prevent entry of spills into the MS4 and contamination of surface water, ground water and soil to the maximum extent practicable. Each Copermittee shall coordinate spill prevention, containment and response activities throughout all appropriate departments, programs and agencies to ensure maximum water quality protection at all times.

Each Copermittee shall develop and implement a mechanism whereby it is notified of all sewage spills from private laterals and failing septic systems into its MS4. Each Copermittee shall prevent, respond to, contain and clean up sewage from any such notification.

F.5.g. Facilitate Public Reporting of Illicit Discharges and Connections - - Public Hotline

Each Copermittee shall promote, publicize and facilitate public reporting of illicit discharges or water quality impacts associated with discharges into or from MS4s. Each Copermittee shall facilitate public reporting through development and operation of a public hotline. Public hotlines can be Copermittee-specific or shared by Copermittees. All storm water hotlines shall be capable of receiving reports in both English and Spanish 24 hours per day / seven days per week. Copermittees shall respond to and resolve each reported incident. All reported incidents, and how each was resolved, shall be summarized in each Copermittee's individual Jurisdictional URMP Annual Report.

F.5.h. Facilitate Disposal of Used Oil and Toxic Materials

Each Copermittee shall facilitate the proper management and disposal of used oil, toxic materials, and other household hazardous wastes. Such facilitation shall include educational activities, public information activities, and establishment of collection sites operated by the Copermittee or a private entity. Curbside collection of household hazardous wastes is encouraged.

F.5.i. Limit Infiltration From Sanitary Sewer to MS4/ Provide Preventive Maintenance of Both

Each Copermittee shall implement controls and measures to limit infiltration of seepage from municipal sanitary sewers to MS4s through thorough, routine preventive maintenance of the MS4. Each Copermittee that operates both a municipal sanitary sewer system and a MS4 shall implement controls and measures to limit infiltration of seepage from the municipal sanitary sewers to the MS4s that shall include overall sanitary sewer and MS4 surveys and thorough, routine preventive maintenance of both.

F.6. Public Participation Component

Each Copermittee shall incorporate a mechanism for public participation in the implementation of the Jurisdictional URMP.

F.7. Assessment of Jurisdictional URMP Effectiveness Component

a. As part of its individual Jurisdictional URMP, each Copermittee shall develop a long-term strategy for assessing the effectiveness of its individual Jurisdictional URMP. The long-term assessment strategy shall identify specific direct and indirect measurements that each Copermittee will use to track the long-term progress of its individual Jurisdictional URMP towards achieving improvements in receiving water quality. Methods used for assessing effectiveness shall include the following or their equivalent: surveys, pollutant loading

estimations, and receiving water quality monitoring. The long-term strategy shall also discuss the role of monitoring data in substantiating or refining the assessment.

b. As part of its individual Jurisdictional URMP Annual Report, each Copermittee shall include an assessment of the effectiveness of its Jurisdictional URMP using the direct and indirect assessment measurements and methods developed in its long-term assessment strategy.

F.8. Fiscal Analysis Component

Each Copermittee shall secure the resources necessary to meet the requirements of this Order. As part of its individual Jurisdictional URMP, each Copermittee shall develop a strategy to conduct a fiscal analysis of its urban runoff management program in its entirety. In order to demonstrate sufficient financial resources to implement the conditions of this Order, each Copermittee shall conduct an annual fiscal analysis as part of its individual Jurisdictional URMP Annual Report. This analysis shall, for each fiscal year covered by this Order, evaluate the expenditures (such as capital, operation and maintenance, education, and administrative expenditures) necessary to accomplish the activities of the Copermittee's urban runoff management program. Such analysis shall include a description of the source(s) of funds that are proposed to meet the necessary expenditures, including legal restrictions on the use of such funds.

G. IMPLEMENTATION OF JURISDICTIONAL URMP

Each Copermittee shall have completed full implementation of all requirements of the Jurisdictional URMP section of this Order no later than **365 days after adoption** of this Order, except as stated as follows: Each Copermittee's local SUSMP must be implemented within 180 days of approval of the model SUSMP in the public process by the SDRWQCB.

H. SUBMITTAL OF JURISDICTIONAL URMP DOCUMENT

The written account of the overall program to be conducted by each Copermittee within its jurisdiction during the five-year life of this Order is referred to as the "Jurisdictional URMP Document".

1. Individual – Each Copermittee shall submit to the Principal Permittee(s) an individual Jurisdictional URMP document which describes all activities it has undertaken or is undertaking to implement the requirements of each component of the Jurisdictional URMP section F. of this Order.

   a. At a minimum, the individual Jurisdictional URMP document shall contain the following information for the following components:

      (1) Construction Component

         (a) Which pollution prevention methods will be required for implementation, and how and where they will be required
         (b) Updated grading ordinances
         (c) A description of the modified construction and grading approval process
         (d) Updated construction and grading project requirements in local grading and construction permits
         (e) A completed watershed-based inventory of all construction sites
         (f) A completed prioritization of all construction sites based on threat to water quality
         (g) Which BMPs will be implemented, or required to be implemented, for each priority category
         (h) How BMPs will be implemented, or required to be implemented, for each priority category
         (i) Planned inspection frequencies for each priority category
         (j) Methods for inspection
         (k) A description of enforcement mechanisms and how they will be used

(l) A description of how non-compliant sites will be identified and the process for notifying the SDRWQCB, including a list of current non-compliant sites
(m) A description of the construction education program and how it will be implemented

(2) Municipal (Existing Development) Component

(a) Which pollution prevention methods will be required for implementation, and how and where they will be required
(b) A completed watershed-based inventory of all municipal land use areas and activities
(c) A completed prioritization of all municipal areas and activities based on threat to water quality
(d) Which BMPs will be implemented, or required to be implemented, for each priority category
(e) How BMPs will be implemented, or required to be implemented, for each priority category
(f) Municipal maintenance activities and schedules
(g) Management strategy for pesticides, herbicides, and fertilizer use.
(h) Planned inspection frequencies for the high priority category
(i) Methods for inspection
(j) A description of enforcement mechanisms and how they will be used

(3) Industrial (Existing Development) Component

(a) Which pollution prevention methods will be required for implementation, and how and where they will be required
(b) A completed watershed-based inventory of all industrial sites
(c) A completed prioritization of all industrial sites based on threat to water quality
(d) Which BMPs will be implemented, or required to be implemented, for each priority category
(e) How BMPs will be implemented, or required to be implemented, for each priority category
(f) A description of the monitoring program to be conducted, or required to be conducted
(g) Planned inspection frequencies for each priority category
(h) Methods for inspection
(i) A description of enforcement mechanisms and how they will be used
(j) A description of how non-compliant sites will be identified and the process for notifying the SDRWQCB, including a list of current non-compliant sites

(4) Commercial (Existing Development) Component

(a) Which pollution prevention methods will be required for implementation, and how and where they will be required
(b) A completed watershed-based inventory of high priority commercial sites
(c) Which BMPs will be implemented, or required to be implemented, for high priority sites
(d) How BMPs will be implemented, or required to be implemented, for high priority sites
(e) Planned inspection frequencies for high priority sites
(f) Methods for inspection
(g) A description of enforcement mechanisms and how they will be used

(5) Residential (Existing Development) Component

(a) Which pollution prevention methods will be encouraged for implementation, and how and where they will be encouraged
(b) A completed inventory of high priority residential areas and activities

(c) Which BMPs will be implemented, or required to be implemented, for high priority areas and activities
(d) How BMPs will be implemented, or required to be implemented, for high priority areas and activities
(e) A description of enforcement mechanisms and how they will be used

(6) Education Component

(a) A description of the content, form, and frequency of education efforts for each target community

(7) Illicit Discharges Detection and Elimination Component

(a) A description of the program to actively seek and eliminate illicit discharges and connections
(b) A description of dry weather analytical monitoring to be conducted to detect illicit discharges and connections (see Attachment E)
(c) A description of investigation and inspection procedures to follow-up on dry weather analytical monitoring results or other information which indicate potential for illicit discharges and connections
(d) A description of procedures to eliminate detected illicit discharges and connections
(e) A description of enforcement mechanisms and how they will be used
(f) A description of methods to prevent, respond to, contain, and clean up all sewage (including spills from private laterals and failing septic systems) and other spills in order to prevent entrance into the MS4
(g) A description of the mechanism to receive notification of spills from private laterals
(h) A description of efforts to facilitate public reporting of illicit discharges and connections, including a public hotline
(i) A description of efforts to facilitate proper disposal of used oil and other toxic materials
(j) A description of controls and measures to be implemented to limit infiltration of seepage from sanitary sewers to MS4s
(k) A description of routine preventive maintenance activities on the sanitary system (where applicable) and the MS4

(8) Public Participation Component

(a) A description of how public participation will be included in the implementation of the Jurisdictional URMP

(9) Assessment of Jurisdictional URMP Effectiveness Component

(a) A description of strategies to be used for assessing the long-term effectiveness of the individual Jurisdictional URMP.

(10) Fiscal Analysis Component

(a) A description of the strategy to be used to conduct a fiscal analysis of the urban runoff management program.

(11) Land-Use Planning for New Development and Redevelopment Component

(a) Workplan for inclusion in General Plan (or equivalent plan) of water quality and watershed protection principles and policies
(b) Development project requirements in local development permits
(c) Participation efforts conducted in the development of the Model SUSMP

(d) Environmental review processes revisions
(e) A description of the planning education program and how it will be implemented

(12) Fire Fighting

(a) A description of a program to reduce pollutants from non-emergency fire fighting flows identified by the Copermittee to be significant sources of pollutants.

b. Each Copermittee shall submit to the Principal Permittee(s) each part of its individual Jurisdictional URMP document by the dates specified by the Principal Permittee(s).

c. In addition to submittal of the Jurisdictional URMP document, each Copermittee shall submit to the SDRWQCB its own adopted local SUSMP consistent with the approved Model SUSMP, as described in section F.1.b.(2). of this Order. Each Copermittee's own local SUSMP, along with its amended ordinances, shall be submitted to the SDRWQCB within 180 days of the SDRWQCB's approval of the Model SUSMP.

2. Unified – The Principal Permittee(s) shall submit the unified Jurisdictional URMP document to the SDRWQCB. The unified Jurisdictional URMP document shall be submitted in two parts (the collected Jurisdictional URMPs and the model SUSMP).

The unified Jurisdictional URMP document submittal shall address the requirements of the entire Jurisdictional URMP sections F.1 – F.8. of this Order, with the exception of the local SUSMP requirements (which are to be implemented 180 days after approval of the model SUSMP by the SDRWQCB). The unified Jurisdictional URMP document submittal shall contain a section covering common activities conducted collectively by the Copermittees, to be produced by the Principal Permittee(s), and the twenty individual Jurisdictional URMP documents. The Principal Permittee(s) shall be responsible for the development and production of a stand alone Model SUSMP document meeting the requirements of section F.1.b.(2) of this Order. The Principal Permittee(s) shall submit the unified Jurisdictional URMP document, including the Model SUSMP, to the SDRWQCB within **365 days of adoption** of this Order.

3. Universal Reporting Requirements

All individual and unified Jurisdictional URMP document submittals shall include an executive summary, introduction, conclusion, recommendations, and signed certified statement. Each Copermittee shall submit its individual Jurisdictional Urban Runoff Management Program Document with a signed certified statement. The Principal Permittee(s) shall submit a signed certified statement referring to its individual Jurisdictional Urban Runoff Management Program Document, the section covering common activities conducted collectively by the Copermittees, and the Model SUSMP document meeting the requirements of section F.1.b.(2) of this Order as produced by the Principal Permittee(s).

I. SUBMITTAL OF JURISDICTIONAL URMP ANNUAL REPORT

1. Individual - Each individual Jurisdictional URMP Annual Report shall be a documentation of the activities conducted by each Copermittee during the past annual reporting period. Each Jurisdictional URMP Annual Report shall, at a minimum, contain the following:

a. Comprehensive description of all activities conducted by the Copermittee to meet all requirements of each component of the Jurisdictional URMP section of this Order;

F.1. Land-Use Planning for New Development and Redevelopment Component
F.2. Construction Component
F.3. Existing Development Component (Including Municipal, Industrial, Commercial, Residential, and Education)

F.4. Education Component
F.5. Illicit Discharge Detection and Elimination Component
F.6. Public Participation Component
F.7. Assessment of Jurisdictional URMP Effectiveness Component
F.8. Fiscal Analysis Component

b. Each Copermittee's accounting of all:
   (1) Reports of illicit discharges (i.e., complaints) and how each was resolved (indicating referral source);
   (2) Inspections conducted;
   (3) Enforcement actions taken; and
   (4) Education efforts conducted.

c. Public participation mechanisms utilized during the Jurisdictional URMP implementation process;

d. Proposed revisions to the Jurisdictional URMP;

e. A summary of all urban runoff related data not included in the annual monitoring report (e.g., special investigations);

f. Budget for upcoming year;

g. Identification of management measures proven to be ineffective in reducing urban runoff pollutants and flow; and

h. Identification of water quality improvements or degradation.

2. Unified - The unified Jurisdictional URMP Annual Report shall contain a section covering common activities conducted collectively by the Copermittees, to be produced by the Principal Permittee(s), and the twenty individual Jurisdictional URMP Annual Reports. Each Copermittee shall submit to the Principal Permittee(s) an individual Jurisdictional URMP Annual Report by the date specified by the Principal Permittee(s). The Principal Permittee(s) shall submit a unified Jurisdictional URMP Annual Report to the SDRWQCB by **January 31, 2003 and every January 31 thereafter.** The reporting period for these annual reports shall be the previous fiscal year. For example, the report submitted January 31, 2003 shall cover the reporting period July 1, 2001 to June 30, 2002.

3. Universal Reporting Requirements

   All individual and unified Jurisdictional URMP submittals shall include an executive summary, introduction, conclusion, recommendations, and signed certified statement. Each Copermittee shall submit its individual Jurisdictional Urban Runoff Management Program Annual Report with a signed certified statement. The Principal Permittee(s) shall submit a signed certified statement referring to its individual Jurisdictional Urban Runoff Management Program Annual Report and the section covering common activities conducted collectively by the Copermittees as produced by the Principal Permittee(s).

J. WATERSHED URBAN RUNOFF MANAGEMENT PROGRAM

1. Each Copermittee shall collaborate with other Copermittees within its watershed(s) as shown in Table 4. below to identify and mitigate the highest priority water quality issues/pollutants in the watershed(s).

2. Each Copermittee shall collaborate with all other Copermittees discharging urban runoff into the same watershed to develop and implement a Watershed Urban Runoff Management Program (Watershed URMP) for the respective watershed. Each Watershed URMP shall, at a minimum

contain the following:

a. An accurate map of the watershed (preferably in Geographical Information System [GIS] format) that identifies all receiving waters (including the Pacific Ocean); all Clean Water Act section 303(d) impaired receiving waters (including the Pacific Ocean); land uses; MS4s, major highways; jurisdictional boundaries; and inventoried commercial, construction, industrial, municipal sites, and residential areas.

b. An assessment of the water quality of all receiving waters in the watershed based upon (1) existing water quality data; and (2) annual watershed water quality monitoring that satisfies the watershed monitoring requirements of Attachment B ;

c. An identification and prioritization of major water quality problems in the watershed caused or contributed to by MS4 discharges and the likely source(s) of the problem(s);

d. An implementation time schedule of short and long-term recommended activities (individual and collective) needed to address the highest priority water quality problem(s). For this section, "short-term activities" shall mean those activities that are to be completed during the life of this Order and "long-term activities" shall mean those activities that are to be completed beyond the life of this Order;

e. An identification of the Copermittee(s) responsible for implementing each recommended activity, including the selection of the Lead Permittee(s) and the time schedule for implementation. In the event that a Lead Permittee is not selected and identified by the Copermittees in a watershed, the Copermittee identified in Table 4 as the Lead Permittee for that watershed shall be responsible for implementing the requirements of the Lead Permittee in that watershed by default;

f. A mechanism for public participation throughout the entire watershed URMP process;

g. A watershed based education program;

h. A mechanism to facilitate collaborative "watershed-based" (i.e., natural resource-based) land use planning with neighboring local governments in the watershed.

i. Long-term strategy for assessing the effectiveness of the Watershed URMP. The long-term assessment strategy shall identify specific direct and indirect measurements that will track the long-term progress of Watershed URMP towards achieving improvements in receiving water quality. Methods used for assessing effectiveness shall include the following or their equivalent: surveys, pollutant loading estimations, and receiving water quality monitoring. The long-term strategy shall also discuss the role of monitoring data in substantiating or refining the assessment.

Table 4. Copermittees by Watershed

RESPONSIBLE COPERMITTEE(S)	WATERSHED URBAN RUNOFF MANAGEMENT PROGRAM	HYDROLOGIC UNIT OR AREA	MAJOR RECEIVING WATER BODIES
1. County of San Diego	Santa Margarita River	Santa Margarita HU (902.00)	Santa Margarita River and Estuary, Pacific Ocean
1. City of Escondido **2. City of Oceanside** 3. City of Vista 4. County of San Diego	San Luis Rey River	San Luis Rey HU (903.00)	San Luis Rey River and Estuary, Pacific Ocean
1. City of Carlsbad **2. City of Encinitas** 3. City of Escondido	Carlsbad	Carlsbad HU (904.00)	Batiquitos Lagoon San Elijo Lagoon Agua Hedionda Lagoon

RESPONSIBLE COPERMITTEE(S)	WATERSHED URBAN RUNOFF MANAGEMENT PROGRAM	HYDROLOGIC UNIT OR AREA	MAJOR RECEIVING WATER BODIES
4. City of Oceanside 5. City of San Marcos 6. City of Solana Beach 7. City of Vista 8. County of San Diego			Buena Vista Lagoon and Tributary Streams Pacific Ocean
1. City of Del Mar 2. **City of Escondido** 3. City of Poway 4. City of San Diego 5. City of Solana Beach 6. County of San Diego	San Dieguito River	San Dieguito HU (905.00)	San Dieguito River and Estuary Pacific Ocean
1. **City of Del Mar** 2. City of Poway 3. City of San Diego 4. County of San Diego	Peñasquitos	Miramar Reservoir HA (906.10) Poway HA (906.20)	Los Peñasquitos Creek Los Peñasquitos Lagoon Pacific Ocean
1. **City of San Diego**	Mission Bay	Scripps HA (906.30) Miramar HA(906.40) Tecolote HA (906.50)	Mission Bay Pacific Ocean
1. **City of El Cajon** 2. City of La Mesa 3. City of Poway 4. City of San Diego 5. City of Santee 6. County of San Diego	San Diego River	San Diego HU (907.00)	San Diego River Pacific Ocean
1. City of Chula Vista 2. City of Coronado 3. City of Imperial Beach 4. City of La Mesa 5. City of Lemon Grove 6. City of National City 7. City of San Diego 8. County of San Diego 9. **San Diego Unified Port District**	San Diego Bay	Pueblo San Diego HU (908.00) Sweetwater HU (909.00) Otay HU (910.00)	San Diego Bay Sweetwater River Otay River Pacific Ocean
1. **City of Imperial Beach** 2. City of San Diego 3. County of San Diego	Tijuana River	Tijuana (911.00)	Tijuana River and Estuary Pacific Ocean

- The Lead Watershed Copermittee for each watershed is highlighted

K. IMPLEMENTATION OF WATERSHED URMP

Each Copermittee shall have completed full implementation of all requirements of the Watershed URMP section of this Order no later than January 31, 2003 unless otherwise specified.

L. SUBMITTAL OF WATERSHED URMP DOCUMENT

The written account of the overall watershed program to be conducted by each Copermittee during the remaining life of this Order is referred to as the "Watershed URMP Document". The Watershed URMP is conducted concurrently with the Jurisdictional URMP.[6]

[6] As each Copermittee transitions from conducting its management program only within its jurisdiction to conducting it also throughout the entire watershed (with neighboring Copermittees), it is expected that many activities will continue on a jurisdictional level (e.g., enforcement of local ordinances and permits). Implementation of the Watershed URMP is not meant to replace, but to expand implementation of the Jurisdictional URMP. For this reason, it is necessary to report management activities on both levels. This can be accomplished either by submitting both a Jurisdictional URMP Annual Report and a Watershed URMP Annual Report or by submitting a single Watershed URMP Annual Report that contains two separate sections (i.e., watershed activities and jurisdictional activities). Information need only be reported once (to the extent something is covered in the Watershed URMP Annual Report, it need not be covered again the Jurisdictional URMP Annual Report).

1. Each Watershed Specific URMP document shall state how the member Copermittees within each watershed will develop and implement the requirements of the Watershed URMP section J. of this Order. The Copermittees responsible for each of the nine Watershed URMPs are specified in Table 4 above. The Lead Watershed Copermittee for each watershed is highlighted, unless a different Lead Watershed Copermittee is designated. Each Lead Watershed Copermittee shall be responsible for producing its respective Watershed URMP document, as well as for coordination and meetings amongst all member watershed Copermittees. Each Lead Watershed Copermittee is further responsible for the submittal of the Watershed URMP document to the Principal Permittee(s) by the date specified by the Principal Permittee(s).

   a. Each Watershed specific URMP document shall include:
      (1) A completed watershed map
      (2) A water quality assessment and watershed monitoring needed
      (3) Prioritization of water quality problems
      (4) Recommended activities (short and long term)
      (5) Individual Copermittee implementation responsibilities and time schedules for implementation
      (6) A description of watershed public participation mechanisms
      (7) A description of watershed education mechanisms
      (8) A description of the mechanism and implementation schedule for watershed-based land use planning
      (9) A strategy for assessing the long-term effectiveness of the Watershed URMP

2. Unified - The unified Watershed URMP document shall contain a section covering common activities conducted collectively by the Copermittees, to be produced by the Principal Permittee(s), and the nine Watershed Specific URMP documents. The Principal Permittee(s) shall submit the unified Watershed URMP document to the SDRWQCB by **January 31, 2003.**

3. Universal Reporting Requirements.

   All individual and unified Watershed URMP submittals shall include an executive summary, introduction, conclusion, recommendations, and signed certified statement. Each Copermittee shall submit a signed certified statement covering its responsibilities in the specific Watershed URMP Document. The Principal Permittee(s) shall submit a signed certified statement referring to its specific Watershed URMP Document and the section covering common activities conducted collectively by the Copermittees as produced by the Principal Permittee(s).

M. SUBMITTAL OF WATERSHED URMP ANNUAL REPORT

1. Watershed Specific - Each Watershed Specific URMP Annual Report shall be a documentation of the activities conducted by watershed member Copermittees during the previous annual reporting period to meet the requirements of all components of the Watershed URMP section of this Order. Each Watershed URMP Annual Report shall, at a minimum, contain the following:

   a. Comprehensive description of all activities conducted by the watershed member Copermittees to meet all requirements of each component of Watershed URMP section J. of this Order

   b. Public participation mechanisms utilized during the Watershed URMP implementation process;
   c. Mechanism for watershed based land use planning;
   d. Assessment of effectiveness of Watershed URMP;
   e. Proposed revisions to the Watershed URMP;
   f. A summary of watershed effort related data not included in the annual monitoring report (e.g., special investigations); and
   g. Identification of water quality improvements or degradation.

2. Unified - The Unified Watershed URMP Annual Report shall contain a section covering common activities conducted collectively by the Copermittees, to be produced by the Principal Permittee(s), and the nine Watershed Specific URMP Annual Reports. Each Lead Watershed Copermittee shall submit to the Principal Permittee(s) a Watershed Specific URMP Annual Report by the date specified by the Principal Permittee(s). The Principal Permittee(s) shall submit the Unified Watershed URMP Annual Report to the SDRWQCB by January 31, 2004 and every January 31 thereafter. The reporting period for these annual reports shall be the previous fiscal year. For example, the report submitted January 31, 2004 shall cover the reporting period July 1, 2002 to June 30, 2003.

3. Universal Reporting Requirements

   All individual and unified Watershed URMP submittals shall include an executive summary, introduction, conclusion, recommendations, and signed certified statement. Each Copermittee shall submit a signed certified statement covering its responsibilities in the specific Watershed URMP Annual Report. The Principal Permittee(s) shall submit a signed certified statement referring to its specific Watershed URMP Annual Report and the section covering common activities conducted collectively by the Copermittees as produced by the Principal Permittee(s).

N. ALL COPERMITTEE COLLABORATION

1. Each Copermittee shall collaborate with all other Copermittees regulated under this Order to address common issues, promote consistency among Jurisdictional Urban Runoff Management Programs (Jurisdictional URMPs) and Watershed Urban Runoff Management Programs (Watershed URMPs), and to plan and coordinate activities required under this Order

   a. Management Structure - All Copermittees shall jointly execute and submit to the SDRWQCB no later than **365 days after adoption** of this Order, a Memorandum of Understanding, Joint Powers Authority, or other instrument of formal agreement which at a minimum provides a management structure for the following:

      - Designation of Joint Responsibilities
      - Decision making
      - Watershed activities;
      - Information management of data and reports, including the requirements under this Order; and
      - Any and all other collaborative arrangements for compliance with this Order.

   b. All Copermittees shall jointly develop a standardized format(s) for all reports required under this Order (e.g., annual reports, monitoring reports, fiscal analysis reports, and program effectiveness reports, etc.). The standardized reporting format(s) shall be used by all Copermittees and shall include protocols for electronic reporting. The Principal Permittee(s) shall submit the standardized format(s) to the SDRWQCB no later than **365 days after adoption** of this Order.

O. PRINCIPAL PERMITTEE RESPONSIBILITIES

Within 90 days of adoption of this Order, the Copermittees shall designate the Principal Permittee(s) and notify the SDRWQCB of the name(s) of the Principal Permittee(s). The Principal Permittee(s) may require the Copermittees to reimburse the Principal Permittee(s) for reasonable costs incurred while performing coordination responsibilities and other related tasks. The Principal Permittee(s) shall, at a minimum:

1. Serve as liaison(s) between the Copermittees and the SDRWQCB on general permit issues.

2. Coordinate permit activities among the Copermittees and facilitate collaboration on the development and implementation of programs required under this Order;

3. Integrate individual Copermittee documents and reports required under this Order into single unified documents and reports for submittal to the SDRWQCB as described below. If a reporting date falls on a non-working day or State holiday, then the report is to be submitted on the following working day.

   a. Unified Jurisdictional URMP Document – The Principal Permittee(s) shall submit the unified Jurisdictional URMP document in its entirety (including the model SUSMP) to the SDRWQCB within 365 days of the adoption of this Order.

      The Principal Permittee(s) shall be responsible for producing the sections of the unified Jurisdictional URMP document submittals covering common activities conducted by the Copermittees. The Principal Permittee(s) shall be responsible for the development and production of a stand alone Model SUSMP document meeting the requirements of section F.1.b.(2). of this Order. The Principal Permittee(s) shall also be responsible for collecting and assembling the individual Jurisdictional URMP document submittals covering the activities conducted by each individual Copermittee.

   b. Unified Jurisdictional URMP Annual Reports – The Principal Permittee(s) shall submit unified Jurisdictional URMP Annual Reports to the SDRWQCB by January 31 of each year, beginning on **January 31, 2003**. The reporting period for these annual reports shall be the previous fiscal year. For example, the report submitted January 31, 2003 shall cover the reporting period July 1, 2001 to June 30, 2002.

      The Principal Permittee(s) shall be responsible for producing the section of the unified Jurisdictional URMP Annual Reports covering common activities conducted by the Copermittees. The Principal Permittee(s) shall also be responsible for collecting and assembling the individual Jurisdictional URMP Annual Reports covering the activities conducted by each individual Copermittee.

   c. Unified Watershed URMP Document – The Principal Permittee(s) shall submit the unified Watershed URMP document to the SDRWQCB by **January 31, 2003**. The Principal Permittee(s) shall be responsible for producing the section of the unified Watershed URMP document covering common activities conducted by the Copermittees. The Principal Permittee(s) shall also be responsible for collecting and assembling the watershed specific Watershed URMP documents covering the activities conducted by each individual Copermittee.

   d. Unified Watershed URMP Annual Report - The Principal Permittee(s) shall submit unified Watershed URMP Annual Reports to the SDRWQCB by January 31 of each year, beginning on **January 31, 2004**. The reporting period for these annual reports shall be the previous fiscal year. For example, the report submitted January 3, 2004 shall cover the reporting period July 1, 2002 to June 30, 2003.

      The Principal Permittee(s) shall be responsible for producing the section of the unified Watershed URMP Annual Reports covering common activities conducted by the Copermittees. The Principal Permittee(s) shall also be responsible for collecting and assembling the watershed specific Watershed URMP Annual Reports covering the activities conducted by each individual Copermittee.

   e. Receiving Waters Monitoring and Reporting Program - The Principal Permittee(s) shall be responsible for the production and submittal of the Previous Monitoring and Future Recommendations Report. The report shall be submitted to the SDRWQCB within 180 days

of adoption of this Order.

f. Receiving Waters Monitoring and Reporting Program - The Principal Permittee(s) shall be responsible for the development and production of the Receiving Waters Monitoring Program as it is outlined in Attachment B. The Principal Permittee(s) shall submit the Receiving Waters Monitoring Program to the SDRWQCB within 180 days of adoption of this Order.

g. Receiving Waters Monitoring and Reporting Program - The Principal Permittee(s) shall submit the Receiving Waters Monitoring Annual Report to the SDRWQCB on January 31 of each year, beginning on January 31, 2003.

h. Formal Agreements/Standardized Formats - The Principal Permittee(s) shall submit to the SDRWQCB, within 365 days of adoption of this Order, a formal agreement between the Copermittees which provides a management structure for meeting the requirements of this Order (as described in section N.1.a.). The Principal Permittee(s) shall submit to the SDRWQCB, within 365 days of adoption of this Order, standardized formats for all reports and documents required under this Order.

i. Dry Weather Analytical Monitoring - The Principal Permittee(s) shall collectively submit the Copermittees' dry weather analytical monitoring maps and procedures to the SDRWQCB within 365 days of adoption of this Order.

P. RECEIVING WATERS MONITORING AND REPORTING PROGRAM

1. Pursuant to California Water Code section 13267, each Copermittee shall comply with Monitoring and Reporting Program for No. 2001-01 contained in **Attachment B** of this Order.

2. Each Copermittee shall also comply with standard provisions, reporting requirements, and notifications contained in **Attachment C** of this Order.

Q. TASKS AND SUBMITTAL SUMMARY

The tasks and submittals required under this Order are summarized in Tables 5 and 6 below:

Table 5. Task Summary

Task No.	Task	Permit Section	Completion Date	Frequency
1	Identify discharges not to be prohibited and BMPs required for treatment of discharges not prohibited	B.3.	365 days after adoption of Order	One Time
2	Examine field screening results to identify water quality problems resulting from non-prohibited non-storm water discharges, including follow-up of problems	B.5	January 31, 2003	Annually
3	Notify SDRWQCB of discharges causing or contributing to an exceedance of water quality standards	C.2.a.	Immediate	As Needed
4	Establish adequate legal authority to control pollutant discharges into and from MS4	D.1.	180 days after adoption of Order	One Time
5	Assess General Plan to incorporate water quality and watershed protection principles	F.1.a.	365 days after adoption of Order	One Time
6	Include Development Project Requirements in local permits	F.1.b.(1).	365 days after adoption of Order	One Time
7	Develop Model SUSMP	F.1.b.(2).	365 days after adoption of Order	One Time
8	Develop and adopt individual local SUSMP and amended ordinances	F.1.b.(2).	180 days after approval of Model SUSMP by SDRWQCB	One Time
9	Implement individual jurisdictional SUSMP	F.1.b.(2).	180 days after approval of Model SUSMP by	Continuous

			SDRWQCB	
10	Revise environmental review processes	F.1.c.(1).	365 days after adoption of Order	One Time
11	Conduct education program for municipal planning and development review staff, project applicants, developers, contractors, community planning groups, and property owners	F.1.d.(1). And F.1.d.(2).	365 days after adoption of Order	Ongoing
12	Implement all requirements of Construction Component of Jurisdictional URMP	F.2.a. – F.2.j.	365 days after adoption of Order	Ongoing
13	Notify SDRWQCB of non-compliant construction sites that pose a threat to human or environmental health	F.2.i	Within 24 hours of discovery of noncompliance	As Needed
14	Implement all requirements of Municipal Existing Development Component of Jurisdictional URMP	F.3.a.(1). – F.3.a.(8).	365 days after adoption of Order	Ongoing
15	Implement all requirements of Industrial Existing Development Component of Jurisdictional URMP	F.3.b.(1) – F.3.b.(8)	365 days after adoption of Order	Ongoing
16	Notify SDRWQCB of non-compliant industrial sites that pose a threat to human or environmental health	F.3.b.8	Within 24 hours of discovery of noncompliance	As Needed
17	Implement all requirements of Commercial Existing Development Component of Jurisdictional URMP	F.3.c.(1) – F.3.c.(5)	365 days after adoption of Order	Ongoing
18	Implement all requirements of Residential Existing Development Component of Jurisdictional URMP	F.3.d.(1) – F.3.d.(4)	365 days after adoption of Order	Ongoing
19	Implement all requirements of Education Component of Jurisdictional URMP	F.4.a. – F.4.c.	365 days after adoption of Order	Ongoing
20	Implement all requirements of Illicit Discharge Detection and Elimination Component of Jurisdictional URMP	F.5.a. – F.5.i.	365 days after adoption of Order	Ongoing
21	Implement all requirements of Public Participation Component of Jurisdictional URMP	F.6.	365 days after adoption of Order	Ongoing
22	Develop strategy for assessment of Jurisdictional URMP effectiveness	F.7.a.	365 days after adoption of Order	One Time
23	Assess Jurisdictional URMP effectiveness	F.7.b.	January 31, 2003	Annually
24	Develop strategy for fiscal analysis of urban runoff management program	F.8.	365 days after adoption of Order	One Time
25	Conduct fiscal analysis of urban runoff management program in entirety	F.8.	January 31, 2003	Annually
26	Develop and implement Watershed URMP	J.2.	January 31, 2003	Ongoing
27	Execute formal agreement which provides management structure for meeting Order requirements	N.1.a.	365 days after adoption of Order	One Time
28	Develop standardized formats for all required reports of this Order	N.1.b.	365 days after adoption of Order	One Time
29	Develop Previous Monitoring and Future Recommendations Report	Attachment B	180 days after adoption of Order	One Time
30	Develop Receiving Waters Monitoring Program	Attachment B	180 days after adoption of Order	One Time
31	Implement Receiving Waters Monitoring Program	Attachment B	180 days after adoption of Order	Continuous
32	Develop dry weather analytical and field screening monitoring map and procedures	Attachment E	365 days after adoption of Order	One Time
33	Conduct dry weather analytical and field screening monitoring	Attachment E	May 1, 2002	Annually
34	Complete NPDES applications for issuance of renewal watershed based permits	Attachment C	At least 180 days prior to expiration of Order	One Time
35	Notify SDRWQCB of any incidence of non-compliance with this Order that poses a threat to human or environmental health.	R.1, B.6 of Attachment C	Within 24 hours of discovery of non-compliance	As Needed
36	Designate Principal Permittee(s) and notify SDRWQCB	O.	90 days after adoption of the Order	One Time

Table 6. Submittal Summary

Submittal No.	Submittal	Permit Section	Completion Date	Frequency
1	Submit identification of discharges not to be prohibited and BMPs required for treatment of discharges not prohibited	B.3.	365 days after adoption of Order	One Time
2	Report on discharges causing or contributing to an exceedance of water quality standards, including description of BMP implementation	C.2.a.	With individual Jurisdictional URMP Annual Reports	As Needed
3	Submit Certified Statement of Adequate Legal Authority	D.2.	180 days after adoption of Order	One Time
4	Submit certified statement if particular high priority construction sites are to be inspected monthly rather than weekly in the rainy season	F.2.g.(2).	365 days after adoption of Order and as needed thereafter	As Needed
5	Submit report on non-compliant construction sites that pose a threat to human or environmental health.	F.2.i.	Within 5 Days of discovery of non-compliance	As Needed
6	Submit report on non-compliant industrial sites that pose a threat to human or environmental health.	F.3.b.8.	Within 5 days of discovery of non compliance	As Needed
7	Submit to Principal Permittee(s) individual Jurisdictional URMP document covering requirements for all Components	H.1.a.	Prior to 365 days after adoption of Order (Principal Permittee(s) specifies date of submittal)	One Time
8	(This space reserved).			
9	Principal Permittee(s) shall submit to SDRWQCB unified Jurisdictional URMP document covering requirements for all Components, including Model SUSMP	H.2.a.	365 days after adoption of Order	One Time
10	(This space reserved).			
11	Submit to SDRWQCB local SUSMP and amended ordinances	F.1.b.(2). and H.1.d.	180 days after approval of Model SUSMP	One Time
12	Submit to Principal Permittee(s) individual Jurisdictional URMP Annual Report	I.1.	Prior to January 31, 2003 (Principal Permittee(s) specifies date of submittal)	Annually
13	Principal Permittee(s) shall submit 1st unified Jurisdictional URMP Annual Report to SDRWQCB	I.2.	January 31, 2003	One Time and Annually Thereafter
14	Submit to Principal Permittee(s) Watershed Specific URMP document	L.1.	Prior to January 31, 2003 (Principal Permittee(s) specifies date of submittal)	One Time
15	Principal Permittee(s) shall submit unified Watershed Specific URMP document to SDRWQCB	L.2.	January 31, 2003	One Time
16	Principal Permittee(s) shall submit 2nd unified Jurisdictional URMP Annual Report to SDRWQCB	I.2.	January 31, 2004	One Time
17	Submit to Principal Permittee(s) Watershed Specific URMP Annual Report	M.1.	Prior to January 31, 2004 (Principal Permittee(s) specifies date of submittal)	Annually
18	Principal Permittee(s) shall submit 1st unified Watershed Specific URMP Annual Report to SDRWQCB	M.2.	January 31, 2004	One Time and Annually Thereafter
19	Principal Permittee(s) shall submit 3rd unified Jurisdictional URMP Annual Report to SDRWQCB	I.2.	January 31, 2005	One Time
20	Principal Permittee(s) shall submit 2nd	M.2.	January 31, 2005	One Time

	unified Watershed Specific URMP Annual Report to SDRWQCB			
21	Principal Permittee(s) shall submit 4th unified Jurisdictional URMP Annual Report to SDRWQCB	I.2.	January 31, 2006	One Time
22	Principal Permittee(s) shall submit 3rd unified Watershed Specific URMP Annual Report to SDRWQCB	M.2.	January 31, 2006	One Time
23	Principal Permittee(s) shall submit 5th unified Jurisdictional URMP Annual Report to SDRWQCB	I.2.	January 31, 2007	One Time
24	Principal Permittee(s) shall submit formal agreement between Copermittees which provides management structure for meeting Order requirements	N.1.a.	365 days after adoption of Order	One Time
25	Principal Permittee(s) shall submit standardized formats for all reports required under this Order	N.1.b.	365 days after adoption of Order	One Time
26	Principal Permittee(s) submits Previous Monitoring and Future Recommendations Report to SDRWQCB	Attachment B	180 days after adoption of Order	One Time
27	Principal Permittee(s) submits Receiving Waters Monitoring Program document to SDRWQCB	Attachment B	180 days after adoption of Order	One Time
28	Principal Permittee(s) submits Receiving Waters Monitoring Annual Report to SDRWQCB	Attachment B	January 31, 2003	Annually
29	Submit to Principal Permittee(s) dry weather analytical monitoring map and procedures	Attachment E	Prior to 365 days after adoption of Order	One Time
30	Principal Permittee(s) submits collective dry weather analytical monitoring maps and procedures	Attachment E	365 days after adoption of Order	One Time
31	Submit to Principal Permittee(s) dry weather analytical monitoring results as part of individual Jurisdictional URMP Annual Report	Attachment E	Prior to January 31, 2003, as part of individual Jurisdictional URMP Annual Report	Annually
32	Principal Permittee(s) shall submit NPDES applications for issuance of renewal watershed based permits	Attachment C	At least 180 days prior to expiration of this Order	One Time
33	Submit reports of any incidence of non-compliance with this Order that poses a threat to human or environmental health.	R.1, B.6 of Attachment C	Within 5 days of discovery of non compliance	As Needed

R. STANDARD PROVISIONS, REPORTING REQUIREMENTS AND NOTIFICATIONS

1. Each Copermittee shall comply with Standard Provisions, Reporting Requirements, and Notifications contained in **Attachment C** of this Order. This includes 24 hour/5day reporting requirements for any instance of non-compliance with this Order as described in section B.6 of Attachment C.

2. All plans, reports and subsequent amendments submitted in compliance with this Order shall be implemented immediately (or as otherwise specified) and shall be an enforceable part of this Order upon submission to the SDRWQCB. All submittals by Copermittees must be adequate to implement the requirements of this Order.

I, John H. Robertus, Executive Officer, do hereby certify the foregoing is a full, true, and correct copy of an Order adopted by the California Regional Water Quality Control Board, San Diego Region, on February 21, 2001, as amended by State Water Resources Control Board Order WQ 2001-15 adopted November 15, 2001.

John H. Robertus
Executive Officer

ATTACHMENT A

BASIN PLAN PROHIBITIONS

California Water Code Section 13243 provides that a Regional Board, in a water quality control plan, may specify certain conditions or areas where the discharge of waste, or certain types of waste is not permitted. The following discharge prohibitions are applicable to any person, as defined by Section 13050(c) of the California Water Code, who is a citizen, domiciliary, or political agency or entity of California whose activities in California could affect the quality of waters of the state within the boundaries of the San Diego Region.

1. The discharge of waste to waters of the state in a manner causing, or threatening to cause a condition of pollution, contamination or nuisance as defined in California Water Code Section 13050, is prohibited.

2. The discharge of waste to land, except as authorized by waste discharge requirements or the terms described in California Water Code Section 13264 is prohibited.

3. The discharge of pollutants or dredged or fill material to waters of the United States except as authorized by an NPDES permit or a dredged or fill material permit (subject to the exemption described in California Water Code §13376) is prohibited.

4. Discharges of recycled water to lakes or reservoirs used for municipal water supply or to inland surface water tributaries thereto are prohibited, unless this Regional Board issues a NPDES permit authorizing such a discharge; the proposed discharge has been approved by the State Department of Health Services and the operating agency of the impacted reservoir; and the discharger has an approved fail-safe long-term disposal alternative.

5. The discharge of waste to inland surface waters, except in cases where the quality of the discharge complies with applicable receiving water quality objectives, is prohibited. Allowances for dilution may be made at the discretion of the Regional Board. Consideration would include streamflow data, the degree of treatment provided and safety measures to ensure reliability of facility performance. As an example, discharge of secondary effluent would probably be permitted if streamflow provided 100:1 dilution capability.

6. The discharge of waste in a manner causing flow, ponding, or surfacing on lands not owned or under the control of the discharger is prohibited, unless the discharge is authorized by the Regional Board.

7. The dumping, deposition, or discharge of waste directly into waters of the state, or adjacent to such waters in any manner which may permit its being transported into the waters, is prohibited unless authorized by the Regional Board.

8. Any discharge to a storm water conveyance system that is not composed entirely of "*storm water*" is prohibited unless authorized by the Regional Board. [The federal regulations, 40 CFR 122.26 (b) (13), define storm water as storm water runoff, snow melt runoff, and surface runoff and drainage. 40 CFR 122.26 (b) (2) defines an illicit discharge as any discharge to a storm water conveyance system that is not composed entirely of storm water except discharges pursuant to a NPDES permit and discharges resulting from fire fighting activities. [§122.26 amended at 56 FR 56553, November 5, 1991; 57 FR 11412, April 2, 1992].

9. The unauthorized discharge of treated or untreated sewage to waters of the state or to a storm water conveyance system is prohibited.

10. The discharge of industrial wastes to conventional septic tank/subsurface disposal systems, except as authorized by the terms described in California Water Code Section 13264, is prohibited.

11. The discharge of radioactive wastes amenable to alternative methods of disposal into the waters of the state is prohibited.

12. The discharge of any radiological, chemical, or biological warfare agent into waters of the state is prohibited.

13. The discharge of waste into a natural or excavated site below historic water levels is prohibited unless the discharge is authorized by the Regional Board.

14. The discharge of sand, silt, clay, or other earthen materials from any activity, including land grading and construction, in quantities which cause deleterious bottom deposits, turbidity or discoloration in waters of the state or which unreasonably affect, or threaten to affect, beneficial uses of such waters is prohibited.

15. The discharge of treated or untreated sewage from vessels to Mission Bay, Oceanside Harbor, Dana Point Harbor, or other small boat harbors is prohibited.

16. The discharge of untreated sewage from vessels to San Diego Bay is prohibited.

17. The discharge of treated sewage from vessels to portions of San Diego Bay that are less than 30 feet deep at mean lower low water (MLLW) is prohibited.

18. The discharge of treated sewage from vessels, which do not have a properly functioning US Coast Guard certified Type I or Type II marine sanitation device, to portions of San Diego Bay that are greater than 30 feet deep at mean lower low water (MLLW) is prohibited.

ATTACHMENT B

RECEIVING WATERS MONITORING AND REPORTING PROGRAM FOR ORDER NO. 2001-01

Countywide to Watershed Based Monitoring and Reporting Program
The primary objectives of the Receiving Waters Monitoring and Reporting Program include, but are not limited to: 1) assessing compliance with Order No. 2001-01; 2) measuring the effectiveness of Urban Runoff Management Plans; 3) assessing the chemical, physical, and biological impacts to receiving waters resulting from urban runoff; and 4) assessing the overall health and evaluating long-term trends in receiving water quality.

Like Order No. 2001-01 in general, the monitoring requirements below are intended to transition during the five-year permit period from a countywide approach to a watershed based approach. During the first two reporting periods[1] of this Order, this monitoring program shall be conducted and reported on the same countywide basis as previously conducted under Order No. 90-42. Specifically, all monitoring shall be conducted jointly by all Copermittees under a single contractor with countywide coordination.

Beginning with the third monitoring period of this Order (unless otherwise directed by the SDRWQCB Executive Officer) the design of the monitoring program will shift to a watershed based approach. The monitoring program design, implementation, analysis, assessment, and reporting shall be conducted on a watershed basis for each of the nine hydrologic units. Monitoring results shall be assessed and reported on a watershed basis as a single report by the Copermittees consisting of one common section and nine watershed sections. Monitoring, analysis, assessment, and reporting shall satisfy the requirements of specified below for each watershed as applicable.

Order No. 2001-01 may be modified by the SDRWQCB Executive Officer without further public notice to direct the Copermittees to participate in comprehensive regional monitoring activities in the Southern California Bight in lieu of specific Order 2001-01 receiving waters monitoring requirements during the term of this Order.

I. Previous Monitoring and Future Recommendations Report

The Copermittees shall collaborate to develop a "Previous Monitoring and Future Recommendations Report" that summarizes all previous wet weather monitoring results and recommends future monitoring activities including the possibility of participating in coordinated comprehensive regional monitoring in the Southern California Bight. The Principal Permittee shall be responsible for the writing of the report and submittal to the SDRWQCB within **180 days** of adoption of this Order. At a minimum, the report shall:

A. Summarize the cumulative findings of all previous wet weather monitoring;
B. Identify detectable trends in water quality data and receiving water quality, based on the cumulative previous wet weather monitoring findings;
C. Interpret the cumulative previous wet weather monitoring findings;
D. Draw conclusions regarding the cumulative previous wet weather monitoring findings;
E. Provide recommendations for future monitoring activities; and
F. Include an executive summary, introduction, conclusion, and summary of recommendations.

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[1] A reporting period is defined as October 1st to September 30th of any year. The first reporting period under this Order is October 1, 2001 to September 30, 2002.

II. Receiving Waters Monitoring Program - - Year Round

Utilizing the findings of the "Previous Monitoring and Future Recommendations Report" discussed above, the Copermittees shall collaborate to develop, submit, conduct, and report on a year round countywide or watershed based Receiving Waters Monitoring Program[2]. The goals of both the countywide and watershed based Receiving Waters Monitoring Program shall be clearly stated. The Receiving Waters Monitoring Program goals shall focus on assessing compliance with this Order, achieving water quality objectives, protecting beneficial uses, and assessing the overall health and long-term water quality trends of receiving waters. For purposes of conducting the countywide or watershed based Receiving Waters Monitoring Program, the Copermittees are encouraged to collaborate with other agencies conducting similar monitoring, such as the Southern California Coastal Water Research Project (SCCWRP), the California Department of Fish and Game, or other municipalities in Southern California. Implementation of the countywide or watershed based Receiving Waters Monitoring Program shall begin within **180 days** of adoption of this Order. The countywide or watershed based Receiving Waters Monitoring Program shall include, at a minimum, the following components:

A. Urban Stream Bioassessment Monitoring
B. Long-term Mass Loading Monitoring
C. Coastal Storm Drain Outfall Monitoring
D. Ambient Bay, Lagoon, and Coastal Receiving Water Monitoring
E. Toxic Hot Spots Monitoring in San Diego Bay

A. <u>Urban Stream Bioassessment Monitoring</u>

1. The Copermittees shall collaborate to develop and implement an urban stream bioassessment monitoring program. At a minimum, the program shall consist of station identification, sampling, monitoring, and analysis of data for 20 bioassessment stations in order to determine the biological and physical integrity of urban streams within the County of San Diego. In addition to the urban stream bioassessment stations, three reference bioassessment stations shall be identified, sampled, monitored, and analyzed. The selection, sampling, monitoring, and analysis of bioassessment stations shall meet the following requirements:

   a. Each urban stream bioassessment station shall be selected using the following criteria. Each urban stream bioassessment station shall:
      (1) be located within the jurisdiction of a Copermittee; or
      (2) be located within one of the nine watersheds specified in Section J, Table 4 of this Order; and
      (3) be representative of urban stream conditions within one of the nine watersheds specified in Section J, Table 4 of this Order; and
      (4) meet the physical criteria of the California Stream Bioassessment Procedure[3]; and
      (5) to the extent feasible, coincide with the location of an already existing monitoring station used by the California Department of Fish and Game in the conduct of the SDRWQCB's Ambient Bioassessment Program.

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[2] During the first two years, monitoring and reporting will be conducted and reported on a countywide basis. Beginning in the third monitoring period of Order 2001-01, the monitoring and reporting program will shift to a watershed based approach.

[3] California Stream Bioassessment Procedure (Protocol Brief for Biological and Physical/Habitat Assessment in Wadeable Streams), California Department of Fish and Game – Aquatic Bioassessment Laboratory, May 1999.

b. Each bioassessment station shall be monitored twice annually, in May and October of each year, beginning in May 2001. A minimum of three replicate samples shall be collected at each station during each sampling event.

c. Sampling, laboratory, quality assurance, and analysis procedures shall follow the standardized procedures set forth in the California Department of Fish and Game's California Stream Bioassessment Procedure (CSBP). Analysis procedures shall include comparison between station mean values for various biological metrics. Sampling, laboratory, quality assurance, and analytical procedures shall follow the standardized "Non-Point Source Bioassessment Sampling Procedures" for professional bioassessment set forth in the CSBP. In the event that the CSBP "Point-Source Professional Bioassessment Procedure" is performed in place of the "Non Point Source Bioassessment Sampling Procedure," justification and documentation of the procedure shall be submitted with the report. Results of the Urban Stream Bioassessment Monitoring shall be reported annually as part of the overall Receiving Waters Monitoring and Reporting Program for Order No. 2001-01. Reporting of the bioassessment data shall follow the format of the San Diego Regional Water Quality Control Board 1999 Biological Assessment Annual Report[4]. The report shall include:

(1) All physical, chemical and biological data collected in the assessment;
(2) Photographic documentation of assessment and reference stations;
(3) Documentation of quality assurance and control procedures;
(4) Analysis that shall include calculation of the metrics used in both the CSBP and the 1999 Annual Report.
(5) The report shall provide interpretation for comparisons of mean biological and habitat assessment metric values between assessment and reference stations.
(6) Utilize a regional index of biological integrity as part of the analysis.
(7) Electronic data formatted to California Department of Fish and Game Aquatic Bioassessment Laboratory specifications for inclusion in the Statewide Access Bioassessment database.

d. A professional environmental laboratory shall perform all sampling, laboratory, quality assurance, and analytical procedures. While valuable, data collected by volunteer monitoring organizations shall not be submitted in place of professional assessments.

e. Reference stations shall be selected following the recommendations in the 1999 Annual Report, Hughes (1995)[5] and Barbour et. al. (1999)[6]. Reference stations shall be evaluated annually by the Copermittees for suitability and the results included in the annual report. New reference stations will be selected as needed by the Copermittees.

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4 San Diego Regional Water Quality Control Board ,1999 Biological Assessment Annual Report. A Water Quality Inventory Series: Biological and Physical/Habitat Assessment of California Water Bodies. California Department of Fish and Game Office of Spill Prevention and Response, Water Pollution Control Laboratory. December 1999.

5 Hughes, R. M. (1995) Defining Acceptable Biological Status by Comparing with Reference Conditions in Biological Assessment and Criteria: Tools for Water Resource Planning and Decision Making, Wayne S. Davis and Thomas P. Simon eds. Lewis Publishers, Boca Raton, LA.

6 Barbour, M.T. , J Gerritsen, B.D. Synder, and J.B. Stribling (1999) Rapid Bioassessment Protocols For Use in Streams and Wadeable Rivers: Periphyton, Benthic Macroinvertebrates, and Fish. Second Edition. EPA 841-B-99-002.

2. The Copermittees shall design and implement a program to conduct standardized toxicity testing at urban stream bioassessment stations where the bioassessment data indicates significant impairment. When findings indicate the presence of toxicity, a Toxicity Identification Evaluation (TIE) shall be conducted to determine the cause(s) of the toxicity.

B. Long-term Mass Loading Monitoring

For purposes of evaluating long-term trends, the Copermittees shall continue to monitor the five existing long-term mass loading stations as specified in Monitoring and Reporting Program No. 95-76 and amended by Technical Change Order Nos. 1-4. When findings indicate the presence of toxicity, a Toxicity Identification Evaluation (TIE) shall be conducted to determine the cause(s) of the toxicity.

C. Coastal Storm Drain Outfall Monitoring

The Copermittees shall collaborate to develop and implement a monitoring program for discharges of urban runoff from coastal storm drain outfalls. The program shall meet the following requirements:

1. The program shall include rationale and criteria for selection of storm drain outfalls to be monitored.

2. The program shall include collection of samples for analysis of total coliform, fecal coliform, and enterococci, in addition to any other indicators or pathogens identified by the Copermittees.

3. Samples shall be collected at both the storm drain outfall and in the surf zone (at ankle to knee water depths) directly in front of the outfall.

4. Samples shall be collected during both dry and wet weather periods.

5. Exceedances of public health standards for bacteria must be reported to the County Department of Public Health as soon as possible by the Copermittees.

D. Ambient Bay, Lagoon, and Coastal Receiving Water Monitoring

The Copermittees shall collaborate to develop and implement a program to assess the overall health of the receiving water and monitor the impact of urban runoff on ambient receiving water quality. This monitoring shall including San Diego Bay, Mission Bay, Oceanside Harbor, the Pacific Ocean coastline, coastal lagoons and estuaries, and all Clean Water Act section 303(d) water bodies or other environmentally sensitive areas as defined in F.1.b(2)(a)vii of this Order .

E. Toxic Hot Spots Monitoring in San Diego Bay

The Copermittees shall collaborate to develop and implement a program to assess the relative contribution of urban runoff on Toxic Hot Spots in San Diego Bay.

III. Submittal of Receiving Waters Monitoring Program Document

The Principal Permittee shall submit to the SDRWQCB the countywide or watershed based Receiving Waters Monitoring Program within **180 days** of adoption of this Order. The regional or watershed based Receiving Waters Monitoring Program shall describe how the Copermittees will meet the requirements of the components outlined in Section II of this Attachment.

IV. Submittal of Receiving Waters Monitoring Annual Reports

The Principal Permittee shall submit the Receiving Waters Monitoring Annual Report to the SDRWQCB on January 31 of each year, beginning on January 31, 2003.

V. Monitoring Annual Report Requirements

A. Monitoring reports shall provide the data/results, methods of evaluating the data, graphical summaries of the data, and an explanation/discussion of the data for each monitoring program component listed above.

B. Monitoring reports shall include an analysis of the findings of each monitoring program component listed above. The analysis shall identify and prioritize water quality problems. Based on the identification and prioritization of water quality problems, the analysis shall identify potential sources of the problems, and recommend future monitoring and BMP implementation measures for identifying and addressing the sources. The analysis shall also include an evaluation of the effectiveness of existing control measures.

C. Monitoring reports shall include identification and analysis of any long-term trends in storm water or receiving water quality.

D. Monitoring reports shall provide an estimation of total pollutant loads (wet weather loads plus dry weather loads) due to urban runoff for each of the watersheds specified in Section J, Table 4 of Order No. 2001-01.

E. Monitoring reports shall for each monitoring program component listed above, include an assessment of compliance with applicable water quality standards.

F. All monitoring reports shall use a standard report format and shall include the following:

1. A stand alone comprehensive executive summary addressing all sections of the monitoring report;
2. Comprehensive interpretations and conclusions; and
3. Recommendations for future actions.

G. All monitoring reports submitted to the Principal Permittee or the SDRWQCB shall contain the certified perjury statement described in Standard Reporting Requirements in Attachment C section B.10.d.

H. All monitoring reports shall be reviewed <u>prior</u> to submittal to the SDRWQCB by a committee (consisting of no less than three members). All review comments shall also be submitted to the SDRWQCB.

I. All monitoring reports shall be submitted in both electronic and paper formats.

J. All monitoring reports shall describe monitoring station locations by latitude and longitude coordinates, frequency of sampling, quality assurance/quality control procedures and sampling and analysis protocols.

K. Monitoring programs and reports shall comply with Section VI of Attachment B, as well as Attachment C.

VI. Standard Monitoring Requirements

A. All monitoring activities shall meet the following requirements:

1. Monitoring and Records [40 CFR 122.41(j)(1)]

Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity.

2. Monitoring and Records [40 CFR 122.41(j)(2)] [California Water Code § 13383(a)]

The discharger shall retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this Order, and records of all data used to complete the application for this permit, for a period of at least three years from the date of the sample, measurement, report or application. This period may be extended by request of the SDRWQCB at any time.

3. Monitoring and Records [40 CFR 122.21(j)(3)]

Records of monitoring information shall include the information requested in Attachment B and the following:

a. The date, exact place, and time of sampling or measurements;
b. The individual(s) who performed the sampling or measurements;
c. The date(s) analyses were performed;
d. The individual(s) who performed the analyses;
e. The analytical techniques or methods used; and
f. The results of such analyses.

4. Monitoring and Records [40 CFR 122.21(j)(4)]

Monitoring results must be conducted according to test procedures approved under 40 CFR part 136 unless other test procedures have been specified in this Order.

5. Monitoring and Records [40 CFR 122.21(j)(5)]

The Clean Water Act provides that any person who falsifies, tampers with, or knowingly renders inaccurate any monitoring device or method required to be maintained under this Order shall, upon conviction, be punished by a fine of not more than $10,000, or by imprisonment for not more than two years, or both. If a conviction of a person is for a violation committed after a first conviction of such person under this paragraph, punishment is a fine of not more than $20,000 per day of violation, or by imprisonment of not more than four years, or both.

6. Monitoring and Records [40 CFR 122.41(k)(2)]

The Clean Water Act provides that any person who knowingly makes any false statement, representation, or certification in any record or other document submitted or required to be maintained under this permit, including monitoring reports or reports of compliance or non-compliance shall, upon conviction, be punished by a fine of not more than $10,000 per violation, or by imprisonment for not more than six months per violation, or by both.

7. Monitoring Reports [40 CFR 122.41(l)(4)

Monitoring results shall be reported at the intervals specified elsewhere in this Order.

8. Monitoring Reports [40 CFR 122.41(l)(4)(ii)]

If the discharger monitors any pollutant more frequently than required by the permit using test procedures approved under 40 CFR part 136, unless otherwise specified in the Order, the results of this monitoring shall be included in the calculation and reporting of the data submitted in the reports requested by the SDRWQCB.

9. Monitoring Reports [40 CFR 122.41(l)(4)(iii)]

Calculations for all limitations which require averaging of measurements shall utilize an arithmetic mean unless otherwise specified by the SDRWQCB in the Order.

ATTACHMENT C

STANDARD PROVISIONS REPORTING REQUIREMENTS, AND NOTIFICATIONS

A. STANDARD PROVISIONS

1. Duty To Comply [40 CFR 122.41(a)(1)]
The discharger shall comply with effluent standards or prohibitions established under Section 307(a) of the Clean Water Act for toxic pollutants and with standards for sewage sludge use or disposal established under Section 405(d) of the Clean Water Act within the time provided in the regulations that establish these standards or prohibitions or standards for sewage sludge use or disposal, even if this Order has not yet been modified to incorporate the requirement.

2. Need to Halt or Reduce Activity Not a Defense [40 CFR 122.41(c)]
It shall not be a defense for the discharger in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this Order. Upon reduction, loss, or failure of a treatment facility, the discharger shall, to the extent necessary to maintain compliance with this Order, control production or all discharges, or both, until the facility is restored or an alternative method of treatment is provided. This provision applies, for example, when the primary source of power of a treatment facility fails, is reduced, or is lost.

3. Duty to Mitigate [40 CFR 122.41(d)]
The discharger shall take all reasonable steps to minimize or prevent any discharge or prevent any discharge or sludge use or disposal in violation of this Order which has a reasonable likelihood of adversely affecting human health or the environment.

4. Proper Operation and Maintenance [40 CFR 122.41(e)]
The discharger shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the discharger to achieve compliance with the conditions of this Order. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures. This provision requires the operation of back-up or auxiliary facilities or similar systems which are installed by the discharger only when the operation is necessary to achieve compliance with the conditions of this Order.

5. Permit Actions [40 CFR 122.41(f)] [California Water Code § 13381]
This Order may be modified, revoked and reissued, or terminated for cause including, but not limited to, the following:

   a. Violation of any terms or conditions of this Order;
   b. Obtaining this Order by misrepresentation or failure to disclose fully all relevant facts;
   c. A change in any condition that requires either a temporary or permanent reduction or elimination of the authorized discharge; or
   d. A determination that the permitted activity endangers human health or the environment and can only be regulated to acceptable levels by permit modification or termination.

   The filing of a request by the discharger for modification, revocation and reissuance, or termination of this Order, or a notification of planned changes or anticipated noncompliance does not stay any condition of this Order.

6. Property Rights [40 CFR 122.41(g)] [California Water Code §13263(g)]
This Order does not convey any property rights of any sort or any exclusive privilege. The requirements prescribed herein do not authorize the commission of any act causing injury to persons or property, nor protect the discharger from liabilities under federal, state, or local laws, nor create a vested right for the discharger to continue the waste discharge.

7. Inspection and Entry [40 CFR 122.41(i)] [California Water Code § 13267(c)]
The discharger shall allow the SDRWQCB, or an authorized SDRWQCB representative, or an authorized representative of the USEPA (including an authorized contractor acting as a representative of the SDRWQCB or USEPA), upon presentation of credentials and other documents as may be required by law, to:

   a. Enter upon the discharger's premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of this Order;
   b. Have access to and copy, at reasonable times, any records that must be kept under the conditions of this Order;
   c. Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this Order; and
   d. Sample or monitor at reasonable times, for the purposes of assuring compliance with this Order or as otherwise authorized by the Clean Water Act or California Water Code, any substances or parameters at any location.

8. Bypass of Treatment Facilities [40 CFR 122.41(m)]

   a. Definitions

      (1) "Bypass" means the intentional diversion of waste streams from any portion of a treatment facility.

      (2) "Severe property damage" means substantial physical damage to property, damage to the treatment facilities which causes them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production.

   b. Bypass not Exceeding Limitations

      The discharger may allow any bypass to occur which does not cause effluent limitations of this Order or the concentrations of pollutants set forth in Ocean Plan Table A or Table B to be exceeded, but only if it also is for essential maintenance to assure efficient operation. These bypasses are not subject to the provisions of paragraphs c. and d. of this provision.

   c. Notice

      (1) Anticipated bypass. If the discharger knows in advance of the need for a bypass, it shall submit prior notice, if possible, at least ten days before the date of the bypass.
      (2) Unanticipated bypass. The discharger shall submit notice of an unanticipated bypass as required in section B.7 of Attachment C.

d. Prohibition of Bypass

Bypass is prohibited, and the SDRWQCB may take enforcement action against the discharger for bypass, unless:

(1) Bypass was unavoidable to prevent loss of life, personal injury, or severe property damage;

(2) There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate back-up equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass which occurred during normal periods of equipment downtime or preventive maintenance; and

(3) The discharger submitted notices as required under paragraph c. of this section. The SDRWQCB may approve an anticipated bypass, after considering its adverse effects, if the SDRWQCB determines that it will meet the three conditions listed above in paragraph d.(1) of this section.

9. Upset [40 CFR 122.41(n)]

a. Definition "Upset" means an exceptional incident in which there is unintentional and temporary noncompliance with technology based effluent limitations because of factors beyond the reasonable control of the discharger. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation.

b. Effect of an Upset An upset constitutes an affirmative defense to an action brought for noncompliance with such technology based permit effluent limitations if the requirements of paragraph c. of this section are met. No determination made during administrative review of claims that noncompliance was caused by upset, and before an action for noncompliance, is final administrative action subject to judicial review.

c. Conditions Necessary for a Demonstration of Upset A discharger who wishes to establish the affirmative defense of upset shall demonstrate, through properly signed, contemporaneous operating logs, or other relevant evidence that:

(1) An upset occurred and that the discharger can identify the cause(s) of the upset;
(2) The permitted facility was at the time being properly operated;
(3) The discharger submitted notice of the upset as required in section B.7 of Attachment C of this Order; and
(4) The discharger complied with any remedial measures required under Provision A.5. of Attachment C of this Order.

d. Burden of Proof In any enforcement proceeding the discharger seeking to establish the occurrence of an upset has the burden of proof.

10. Other Effluent Limitations and Standards [40 CFR 122.44(b)(1)]
If any toxic effluent standard or prohibition (including any schedule of compliance specified in such effluent standard or prohibition) is promulgated under Section 307(a) of the Clean Water Act for a toxic pollutant which is present in the discharge and that standard or prohibition is more stringent than any limitation on the pollutant in this Order, the SDRWQCB may institute proceedings under these regulations to modify or revoke

and reissue the Order to conform to the toxic effluent standard or prohibition.

11. The discharger shall take all reasonable steps to minimize or correct any adverse impact on the environment resulting from noncompliance with this Order, including such accelerated or additional monitoring as may be necessary to determine the nature and impact of the noncomplying discharge.

12. The provisions of this Order are severable, and if any provision of this Order, or the application of any provision of this Order to any circumstances, is held invalid, the application of such provision to other circumstances, and the remainder of this Order, shall not be affected thereby.

13. The discharger shall comply with any interim effluent limitations as established by addendum, enforcement action, or revised waste discharge requirements which have been, or may be, adopted by this SDRWQCB.

B. REPORTING REQUIREMENTS

1. Duty to Reapply [40 CFR 122.41(b)] This Order expires on **February 21, 2006**. If the discharger wishes to continue any activity regulated by this Order after the expiration date of this Order, the discharger must apply for and obtain new waste discharge requirements. The discharger must file a Report of Waste Discharge in accordance with Title 23, California Code of Regulations not later than **180 days** in advance of the expiration date of this Order as application for issuance of new waste discharge requirements.

2. Duty to Provide Information [40 CFR 122.41(h)] The discharger shall furnish to the SDRWQCB, SWRCB, or USEPA, within a reasonable time, any information which the SDRWQCB, SWRCB, or USEPA may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this Order, or to determine compliance with this Order. The discharger shall also furnish to the SDRWQCB, SWRCB, or USEPA, upon request, copies of records required to be kept by this Order.

3. Planned Changes [40 CFR 122.41(l)(1)] The discharger shall give notice to the SDRWQCB as soon as possible of any planned physical alterations or additions to the permitted facility. Notice is required only when:

   a. The alteration or addition to a permitted facility may meet one of the criteria for determining whether a facility is a new source in 40 CFR Part 122.29(b);

   b. The alteration or addition could significantly change the nature or increase the quantity of pollutants discharged. This notification applies to pollutants which are subject neither to effluent limitations in this Order, nor to notification requirements under 40 CFR 122.42(a)(l); or

   c. The alteration or addition results in a significant change in the discharger's sludge use or disposal practices, and such alteration, addition, or change may justify the application of conditions in this Order that are different from or absent in the existing Order, including notification of additional use or disposal sites not reported during the permit application process or not reported pursuant to an approved land application plan.

4. Anticipated Non-Compliance [40 CFR 122.41(l)(2)] The discharger shall give advance notice to the SDRWQCB of any planned changes in the permitted facility or activity which may result in noncompliance with the requirements of this Order.

5. Transfers [40 CFR 122.41(l)(3)] This Order is not transferable to any person except after notice to the SDRWQCB. The SDRWQCB may require modification or revocation and reissuance of this Order to change the name of the discharger and incorporate such other requirements as may be necessary under the Clean Water Act or the California Water Code in accordance with the following:

   a. Transfers by Modification [40 CFR 122.61(a)]
   Except as provided in paragraph b. of this reporting requirement, this Order may be transferred by the discharger to a new owner or operator only if this Order has been modified or revoked and reissued, or a minor modification made to identify the new discharger and incorporate such other requirements as may be necessary under the Clean Water Act or California Water Code.

   b. Automatic Transfers [40 CFR 122.61(b)]
   As an alternative to transfers under paragraph a. of this reporting requirement, any NPDES permit may be automatically transferred to a new discharger if:

      (1) The current discharger notifies the SDRWQCB at least 30 days in advance of the proposed transfer date in paragraph b.(2) of this reporting requirement;

      (2) The notice includes a written agreement between the existing and new dischargers containing a specific date for transfer of permit responsibility, coverage, and liability between them; and

      (3) The SDRWQCB does not notify the existing discharger and the proposed new discharger of his or her intent to modify or revoke and reissue the Order. A modification under this subparagraph may also be a minor modification under 40 CFR Part 122.63. If this notice is not received, the transfer is effective on the date specified in the agreement mentioned in paragraph b.(2) of this reporting requirement.

6. Twenty-four Hour Reporting [40 CFR 122.41(l)(6)]
   Each Copermittee shall develop and submit criteria by which to evaluate events of non-compliance to determine whether they pose a threat to human or environmental health. These criteria shall be submitted in the Jurisdictional Urban Runoff Management Program Document and Annual Reports for SDRWQCB review. Using these criteria the discharger shall report any noncompliance with this Order or any noncompliance that may endanger human health or environmental health. Any information shall be provided orally to the SDRWQCB within **24 hours** from the time the discharger becomes aware of the circumstances. A written description of any noncompliance shall be submitted to the SDRWQCB within **five days** of such an occurrence and contain a description of the noncompliance and its cause; the period of noncompliance, including exact dates and times, and if the noncompliance has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent recurrence of the noncompliance. The following shall be included as information which must be reported within 24 hours under this reporting requirement:

   a. Any unanticipated bypass which exceeds any effluent limitation in this Order;

   b. Any discharge of treated or untreated wastewater, including reclaimed or recycled wastewater, resulting from pipeline breaks, obstruction, surcharge or any other circumstance;

   c. Any discharge or spill of raw or potable water not authorized by this order or resulting from pipeline breaks, obstruction, surcharge or any other circumstance;

d. Any upset which exceeds any effluent limitation in this Order;

e. Any spill or discharge of non-storm water not authorized by this Order. Non-storm water discharges not prohibited by the Copermittees pursuant to Section B of this Order need not be reported under this section; and

f. Any violation of this Order.

7. Other Non-Compliance [40 CFR 122.41(l)(7)]
The discharger shall report all instances of noncompliance not reported elsewhere under other sections of this Order at the time annual reports are submitted. The reports shall contain the information listed in part B.6 of Attachment C of this Order.

8. Other Information [40 CFR 122.41(l)(8)]
Where the discharger becomes aware that it failed to submit any relevant facts in a Report of Waste Discharge, or submitted incorrect information in a Report of Waste Discharge, or in any report to the SDRWQCB, it shall promptly submit such facts or information.

9. Signatory Requirements [40 CFR 122.41(k)(1) and 40 CFR 122.22]
All applications, reports, or information submitted to the SDRWQCB shall be signed and certified.

a. All Reports of Waste Discharge shall be signed as follows:

(1) For a corporation: by a responsible corporate officer. For the purpose of this section, a responsible corporate officer means: (a) a president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy- or decision-making functions for the corporation; or (b) the manager of one or more manufacturing, production, or operating facilities employing more than 250 persons or having gross annual sales or expenditures exceeding $25 million (in second-quarter 1980 dollars), if authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures.

(2) For a partnership or sole proprietorship: by a general partner or the proprietor, respectively; or

(3) For a municipality, State, Federal or other public agency: by either a principal executive officer or ranking elected official. For purposes of this section, a principal executive officer of a Federal agency includes: (a) the chief executive officer of the agency; or (b) a senior executive officer having responsibility for the overall operations of a principal geographic unit of the agency (e.g., Regional Administrators of USEPA).

b. All reports required by this Order, and other information requested by the SDRWQCB shall be signed by a person described in paragraph a. of this reporting requirement,

or by a duly authorized representative of that person. A person is a duly authorized representative only if:

(1) The authorization is made in writing by a person described in paragraph a. of this reporting requirement;

(2) The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity, such as the position of

plant manager, operator of a well or a well field, superintendent, position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters for the company. (A duly authorized representative may thus be either a named individual or any individual occupying a named position.); and,

(3) The written authorization is submitted to the SDRWQCB.

c. If an authorization under paragraph b. of this reporting requirement is no longer accurate because a different individual or position has responsibility for the overall operation of the facility, a new authorization satisfying the requirements of paragraph b. of this reporting requirement must be submitted to the SDRWQCB prior to or together with any reports, information, or applications to be signed by an authorized representative.

d. Any person signing a document under paragraph a. or b. of this reporting requirement shall make the following certification:

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

10. Except for data determined to be confidential under 40 CFR Part 2, all reports prepared in accordance with the terms of this Order shall be available for public inspection at the offices of the SDRWQCB. As required by the Clean Water Act, Reports of Waste Discharge, this Order, and effluent data shall not be considered confidential.

11. The discharger shall submit reports and provide notifications as required by this Order to the following:

Phil Hammer
STORM WATER UNIT
CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN DIEGO REGION
9771 CLAIREMONT MESA BLVD SUITE A
SAN DIEGO CA 92124-1324
Telephone: (858) 467-2952
Fax: (858) 571-6972

Eugene Bromley
US ENVIRONMENTAL PROTECTION AGENCY
REGION IX
PERMITS ISSUANCE SECTION (W-5-1)
75 HAWTHORNE STREET
SAN FRANCISCO CA 94105

12. Unless otherwise directed, the discharger shall submit three copies of each report required under this Order to the SDRWQCB and one copy to USEPA.

C. NOTIFICATIONS

1. California Water Code Section 13263(g)
   No discharge of waste into the waters of the state, whether or not such discharge is made pursuant to waste discharge requirements, shall create a vested right to continue such discharge. All discharges of waste into waters of the state are privileges, not rights.

2. The SDRWQCB has, in prior years, issued a limited number of individual NPDES permits for non-storm water discharges to municipal storm water conveyance systems. The SDRWQCB or SWRCB may in the future, upon prior notice to the Copermittee(s), issue an NPDES permit for any non-storm water discharge (or class of non-storm water discharges) to a municipal storm water conveyance system. Copermittees may prohibit any non-storm water discharge (or class of non-storm water discharges) to a municipal storm water conveyance system that is authorized under such separate NPDES permits.

3. Enforcement Provisions [40 CFR 122.41(a)(2)] [California Water Code §§ 13385 and 13387]
   The Clean Water Act provides that any person who violates section 301, 302, 306, 307, 308, 318 or 405 of the Act, or any condition or limitation of this Order, is subject to a civil penalty not to exceed $25,000 per day for each violation. The Clean Water Act provides that any person who negligently violates sections 301, 302, 306, 307, 308, 318, or 405 of the Act, or any condition or limitation of this Order, is subject to criminal penalties of $2,500 to $25,000 per day of violation, or imprisonment of not more than one year, or both. In the case of a second or subsequent conviction for a negligent violation, a person shall be subject to criminal penalties of not more than $50,000 per day of violation, or by imprisonment of not more than two years, or both. Any person who knowingly violates such sections, or such conditions or limitations is subject to criminal penalties of $5,000 to $50,000 per day of violation, or imprisonment for not more than three years, or both. In the case of a second or subsequent conviction for a knowing violation, a person shall be subject to criminal penalties of not more than $100,000 per day of violation, or imprisonment of not more than six years, or both. Any person who knowingly violates section 301, 302, 303, 306, 307, 308, 318 or 405 of the Act, or any condition or limitation of this Order, and who knows at that time that he or she thereby places another person in imminent danger of death or serious bodily injury, shall, upon conviction, be subject to a fine of not more than $250,000 or imprisonment of not more than 15 years, or both. In the case of a second or subsequent conviction for a knowing endangerment violation, a person shall be subject to a fine of not more than $500,000 or by imprisonment of not more than 30 years, or both. An organization, as defined in section 309(c)(3)(B)(iii) of the Clean Water Act, shall, upon conviction of violating the imminent danger provision, be subject to a fine of not more than $1,000,000 and can be fined up to $2,000,000 for second or subsequent convictions.

4. Except as provided in Standard Provisions A.10. and A.11. in Attachment C of this Order, nothing in this Order shall be construed to relieve the discharger from civil or criminal penalties for noncompliance.

5. Nothing in this Order shall be construed to preclude the institution of any legal action or relieve the discharger from any responsibilities, liabilities, or penalties to which the discharger is or may be subject to under Section 311 of the Clean Water Act.

6. Nothing in this Order shall be construed to preclude institution of any legal action or relieve the discharger from any responsibilities, liabilities, or penalties established pursuant to any applicable State law or regulation under authority preserved by Section 510 of the Clean Water Act.

7. This Order shall become effective on **February 21, 2001**, provided the USEPA Regional Administrator has no objection. If the Regional Administrator objects to its issuance, this Order shall not become effective until such objection is withdrawn.

8. This Order supersedes Order No. 90-42 upon the effective date of this Order.

ATTACHMENT D

GLOSSARY

Beneficial Uses - The uses of water necessary for the survival or well being of man, plants, and wildlife. These uses of water serve to promote the tangible and intangible economic, social, and environmental goals "Beneficial Uses" of the waters of the State that may be protected against include, but are not limited to, domestic, municipal, agricultural and industrial supply; power generation; recreation; aesthetic enjoyment; navigation; and preservation and enhancement of fish, wildlife, and other aquatic resources or preserves. Existing beneficial uses are uses that were attained in the surface or ground water on or after November 28, 1975; and potential beneficial uses are uses that would probably develop in future years through the implementation of various control measures. "Beneficial Uses" are equivalent to "Designated Uses" under federal law. [California Water Code Section 13050(f)].

Best Available Technology (BAT) – BAT is the acronym for best available technology economically achievable. BAT is the technology-based standard established by congress in CWA section 402(p)(3)(A) for industrial dischargers of storm water. Technology-based standards establish the level of pollutant reductions that dischargers must achieve, typically by treatment or by a combination of treatment and best management practices, or BMPs. For example, secondary treatment (or the removal of 85% suspended solids and BOD) is the BAT for suspended solid and BOD removal from a sewage treatment plant. BAT generally emphasizes treatment methods first and pollution prevention and source control BMPs secondarily.

The best economically achievable technology that will result in reasonable further progress toward the national goal of eliminating the discharge of all pollutants, as determined in accordance with regulations issued by the Environmental Protection Agency Administrator. Factors relating to the assessment of best available technology shall take into account the age of equipment and facilities involved, the process employed, the engineering aspects of the application of various types of control techniques, process changes, the cost of achieving such effluent reduction, non-water quality environmental impact (including energy requirements), and such other factors as the permitting authority deems appropriate.

Best Conventional Technology (BCT) – BCT is an acronym for Best Conventional Technology. BCT is the treatment techniques, processes and procedure innovations, operating methods that eliminate amounts of chemical, physical, and biological characteristics of pollutant constituents to the degree of reduction attainable through the application of the best management practices to the maximum extent practicable.

Best Management Practices - Best Management Practices (BMPs) are defined in 40 CFR 122.2 as schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the pollution of waters of the United States. BMPs also include treatment requirements, operating procedures and practices to control plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage. In the case of municipal storm water permits, BMPs are typically used in place of numeric effluent limits.

Bioaccumulate - The progressive accumulation of contaminants in the tissues of organisms through any route including respiration, ingestion, or direct contact with contaminated water, sediment, pore water, or dredged material to a higher concentration than in the surrounding environment. Bioaccumulation occurs with exposure and is independent of the tropic level.

Bioassessment - The use of biological community information to evaluate the biological integrity of a water body and its watershed. With respect to aquatic ecosystems, bioassessment is the collection and analysis of samples of the benthic macroinvertebrate community together with

physical/habitat quality measurements associated with the sampling site and the watershed to evaluate the biological condition (i.e. biological integrity) of a water body.

Bioconcentration – A process by which there is a net accumulation of a chemical directly from water into aquatic organisms resulting from simultaneous uptake and elimination by gill or epithelial tissue. Bioconcentration differs from bioaccumulation in that bioaccumulation refers to the progressive concentration of contaminants in the tissues of organisms through multiple pathways.

Biocriteria - Under the Clean Water Act, numerical values or narrative expressions that define a desired biological condition for a water body that are legally enforceable. The U.S. EPA defines biocriteria as: "numerical values or narrative expressions that describe the reference biological integrity of aquatic communities inhabiting waters of a given designated aquatic life use…(that)…describe the characteristics of water body segments least impaired by human activities."

Biological Integrity - Defined in Karr J.R. and D.R. Dudley. 1981. Ecological perspective on water quality goals. Environmental Management 5:55-68 as: "A balanced, integrated, adaptive community of organisms having a species composition, diversity, and functional organization comparable to that of natural habitat of the region." Also referred to as ecosystem health.

Biomagnication – The transfer and progressive increase in tissue concentrations of a contaminant along the food chain. Because some pollutants can be transferred to higher trophic levels, carnivores at the top of the food chain, such as predatory fish, birds, and mammals (including humans), obtain most of their pollution burden from aquatic ecosystems by ingestion. Thus, although such pollutants may only be present in receiving waters in low concentrations, they can have a significant impact to the integrity of the ecosystem through biomagnification.

Clean Water Act Section 402(p) - [33 USC 1342(p)] is the federal statute requiring municipal and industrial dischargers to obtain NPDES permits for their discharges of storm water.

Clean Water Act Section 303(d) Water Body - is an impaired water body in which water quality does not meet applicable water quality standards and/or is not expected to meet water quality standards, even after the application of technology based pollution controls required by the CWA. The discharge of urban runoff to these water bodies by the Copermittees is significant because these discharges can cause or contribute to violations of applicable water quality standards.

Contamination - As defined in the Porter-Cologne Water Quality Control Act, contamination is "an impairment of the quality of waters of the state by waste to a degree which creates a hazard to the public health through poisoning or through the spread of disease. 'Contamination' includes any equivalent effect resulting from the disposal of waste whether or not waters of the state are affected."

Designated Waste - Designated waste is defined as a "nonhazardous waste which consists of pollutants which, under ambient environmental conditions at the waste management unit, could be released at concentrations in excess of applicable water quality objectives, or which could cause degradation of waters of the state." [CCR Title 27, Chapter 3, Subchapter 2, Article 2, Section 20210; WC Section 13173]

Effluent Limitations - Limitations on the volume of each waste discharge, and the quantity and concentrations of pollutants in the discharge. The limitations are designed to ensure that the discharge does not cause water quality objectives to be exceeded in the receiving water and does not adversely affect beneficial uses.

Effluent limitations are limitations of the quantity and concentrations of pollutants in a discharge. The limitations are designed to ensure that the discharge does not cause water quality objectives

to be exceeded in the receiving water and does not adversely affect beneficial uses. In other words, an effluent limit is the maximum concentration of a pollutant that a discharge can contain. To meet effluent limitations, the effluent typically must undergo one or more forms of treatment to remove pollutants in order to lower the pollutant concentration below the limit. Effluent limits are typically numeric (e.g., 10 mg/l), but can also be narrative (e.g., no toxics in toxic amounts).

Erosion – When land is diminished or warn away due to wind, water, or glacial ice. Often the eroded debris (silt or sediment) becomes a pollutant via storm water runoff. Erosion occurs naturally but can be intensified by land clearing activities such as farming, development, road building, and timber harvesting.

Grading - The cutting and/or filling of the land surface to a desired slope or elevation.

Hazardous Waste - Hazardous waste is defined as "any waste which, under Section 600 of Title 22 of this code, is required to be managed according to Chapter 30 of Division 4.5 of Title 22 of this code." [CCR Title 22, Division 4.5, Chapter 11, Article 1]

Illicit Discharge - Any discharge to a municipal separate storm sewer that is not composed entirely of storm water except discharges pursuant to a NPDES permit (other than the NPDES permit for discharges form the municipal separate storm sewer) and discharges resulting from fire fighting activities.

Inert Waste - Inert waste is defined as one that "does not contain hazardous waste or soluble pollutants at concentrations in excess of applicable water quality objectives, and does not contain significant quantities of decomposable waste." [CCR Title 27, Chapter 3, Subchapter 2, Article 2, Section 20230]

MEP – MEP is the acronym for Maximum Extent Practicable. MEP is the technology-based standard established by Congress in CWA section 402(p)(3)(B)(iii) that municipal dischargers of storm water (MS4s) must meet. Technology-based standards establish the level of pollutant reductions that dischargers must achieve, typically by treatment or by a combination of treatment and best management practices (BMPs). MEP generally emphasizes pollution prevention and source control BMPs primarily (as the first line of defense) <u>in combination</u> with treatment methods serving as a backup (additional line of defense). MEP considers economics and is generally, but not necessarily, less stringent than BAT. A definition for MEP is not provided either in the statute or in the regulations. Instead the definition of MEP is dynamic and will be defined by the following process over time: municipalities propose their definition of MEP by way of their Urban Runoff Management Plan. Their total collective and individual activities conducted pursuant to the Urban Runoff Management Plan becomes their proposal for MEP as it applies both to their overall effort, as well as to specific activities (e.g., MEP for street sweeping, or MEP for municipal separate storm sewer system maintenance). In the absence of a proposal acceptable to the SDRWQCB, the SDRWQCB defines MEP.

In a memo dated February 11, 1993, entitled "Definition of Maximum Extent Practicable," Elizabeth Jennings, Senior Staff Counsel, SWRCB addressed the achievement of the MEP standard as follows:

> "*To achieve the MEP standard, municipalities must employ whatever Best Management Practices (BMPs) are technically feasible (i.e., are likely to be effective) and are not cost prohibitive. The major emphasis is on technical feasibility. Reducing pollutants to the MEP means choosing effective BMPs, and rejecting applicable BMPs only where other effective BMPs will serve the same purpose, or the BMPs would not be technically feasible, or the cost would be prohibitive. In selecting BMPs to achieve the MEP standard, the following factors may be useful to consider:*

a. *Effectiveness: Will the BMPs address a pollutant (or pollutant source) of concern?*
b. *Regulatory Compliance: Is the BMP in compliance with storm water regulations as well as other environmental regulations?*
c. *Public Acceptance: Does the BMP have public support?*
d. *Cost: Will the cost of implementing the BMP have a reasonable relationship to the pollution control benefits to be achieved?*
e. *Technical Feasibility: Is the BMP technically feasible considering soils, geography, water resources, etc?*

The final determination regarding whether a municipality has reduced pollutants to the maximum extent practicable can only be made by the Regional or State Water Boards, and not by the municipal discharger. If a municipality reviews a lengthy menu of BMPs and chooses to select only a few of the least expensive, it is likely that MEP has not been met. On the other hand, if a municipal discharger employs all applicable BMPs except those where it can show that they are not technically feasible in the locality, or whose cost would exceed any benefit derived, it would have met the standard. Where a choice may be made between two BMPs that should provide generally comparable effectiveness, the discharger may choose the least expensive alternative and exclude the more expensive BMP. However, it would not be acceptable either to reject all BMPs that would address a pollutant source, or to pick a BMP base solely on cost, which would be clearly less effective. In selecting BMPs the municipality must make a serious attempt to comply and practical solutions may not be lightly rejected. In any case, the burden would be on the municipal discharger to show compliance with its permit. After selecting a menu of BMPs, it is the responsibility of the discharger to ensure that all BMPs are implemented."

Municipal Storm Water Conveyance System – (See Municipal Separate Storm Sewer System or MS4).

Municipal Separate Storm Sewer System (MS4) – MS4 is an acronym for Municipal Separate Storm Sewer System. A Municipal Separate Storm Sewer System is a conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, natural drainage features or channels, modified natural channels, man-made channels, or storm drains): (i) Owned or operated by a State, city town, borough, county, parish, district, association, or other public body (created by or pursuant to State law) having jurisdiction over disposal of sewage, industrial wastes, storm water, or other wastes, including special districts under State law such as a sewer district, flood control district or drainage district, or similar entity, or an Indian tribe or an authorized Indian tribal organization, or designated and approved management agency under section 208 of the CWA that discharges to waters of the United States; (ii) Designated or used for collecting of conveying storm water; (iii) Which is not a combined sewer; (iv) Which is not part of the Publicly Owned Treatment Works (POTW) as defined at 40 CFR 122.2.

Historic and current development make use of natural drainage patterns and features as conveyances for urban runoff. Urban streams used in this manner are part of the municipalities MS4 regardless of whether they are natural, man-made, or partially modified features. In these cases, the urban stream is both an MS4 and a receiving water.

National Pollution Discharge Elimination System (NPDES) - These permits pertain to the discharge of waste to surface waters only. All State and Federal NPDES permits are also WDRs.

Non-hazardous Solid Waste - Non-hazardous solid waste means all putrescible and nonputrescible solid, semi-sold, and liquid wastes, including garbage, trash, refuse, paper, rubbish, ashes, industrial wastes, demolition and construction wastes, abandoned vehicles and parts thereof, discarded home and industrial appliances, manure, vegetable or animal solid and

semi-sold wastes and other discarded solid or semi-solid waste; provided that such wastes do not contain wastes which must be managed as hazardous wastes, or wastes which contain soluble pollutants in concentration which exceed applicable water quality objectives or could cause degradation of wasters of the state." [CCR Title 27, Chapter 3, Subchapter 2, Article 2, Section 20220]

Non Point Source (NPS) – Non point source refers to diffuse, widespread sources of pollution. These sources may be large or small, but are generally numerous throughout a watershed. Non Point Sources include but are not limited to urban, agricultural, or industrial areas, roads, highways, construction sites, communities served by septic systems, recreational boating activities, timber harvesting, mining, livestock grazing, as well as physical changes to stream channels, and habitat degradation. NPS pollution can occur year round any time rainfall, snowmelt, irrigation, or any other source of water runs over land or through the ground, picks up pollutants from these numerous, diffuse sources and deposits them into rivers, lakes, and coastal waters or introduces them into ground water.

Non-Storm Water - Non-storm water consists of all discharges to and from a storm water conveyance system that do not originate from precipitation events (i.e., all discharges from a conveyance system other than storm water). Non-storm water includes illicit discharges, non-prohibited discharges, and NPDES permitted discharges. An illicit discharge is defined at 40 CFR 122.26(b)(2) as any discharge to a municipal storm water conveyance system that is not composed entirely of storm water except discharges pursuant to a separate NPDES permit and discharges resulting from emergency fire fighting activities.

Nuisance - As defined in the Porter-Cologne Water Quality Control Act a nuisance is "anything which meets all of the following requirements: 1) Is injurious to health, or is indecent, or offensive to the senses, or an obstruction to the free use of property, so as to interfere with the comfortable enjoyment of life or property. 2) Affects at the same time an entire community or neighborhood, or any considerable number of persons, although the extent of the annoyance or damage inflicted upon individuals may be unequal. 3) Occurs during, or as a result of, the treatment or disposal of wastes."

Numeric effluent limitations - The typical method by which effluent limits are prescribed for pollutants in waste discharge requirements implementing the federal NPDES regulations. When numeric effluent limits are met at the "end-of-pipe", the effluent discharge generally will not cause water quality standards to be exceeded in the receiving waters (i.e., water quality standards will also be met).

Person - A person is defined as an individual, association, partnership, corporation, municipality, State or Federal agency, or an agent or employee thereof. [40 CFR 122.2].

Point Source - Any discernible, confined, and discrete conveyance, including, but not limited to, any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operations, landfill leachate collection systems, vessel, or other floating craft from which pollutants are or may be discharged.

Pollution - As defined in the Porter-Cologne Water Quality Control Act, pollution is "the alteration of the quality of the waters of the State by waste, to a degree that unreasonably affects the either of the following: A) The waters for beneficial uses; or 2) Facilities that serve these beneficial uses." Pollution may include contamination.

Pollutant - A pollutant is broadly defined as any agent that may cause or contribute to the degradation of water quality such that a condition of pollution or contamination is created or aggravated.

Pollution Prevention - Pollution prevention is defined as practices and processes that reduce or eliminate the generation of pollutants, in contrast to source control, treatment, or disposal.

Post-Construction BMPs - A subset of BMPs including structural and non-structural controls which detain, retain, filter, or educate to prevent the release of pollutants to surface waters during the final functional life of development.

Pre-Development Runoff Conditions - The runoff conditions that exist onsite immediately before the planned development activities occur. This definition is not intended to be interpreted as that period before any human-induces land activities occurred. This definition pertains to redevelopment as well as initial development.

Receiving Water Limitations - Waste discharge requirements issued by the SDRWQCB typically include both: (1) "Effluent Limitations" (or "Discharge Limitations") that specify the technology-based or water-quality-based effluent limitations; and (2) "Receiving Water Limitations" that specify the water quality objectives in the Basin Plan as well as any other limitations necessary to attain those objectives. In summary, the "Receiving Water Limitations" provision is the provision used to implement the requirement of CWA section 301(b)(1)(C) that NPDES permits must include any more stringent limitations necessary to meet water quality standards.

Sediment - Soil, sand, and minerals washed from land into water. Sediment resulting from anthropogenic sources (i.e. human induced land disturbance activities) is considered a pollutant. This Order regulates only the discharges of sediment from anthropogenic sources and does not regulate naturally occurring sources of sediment. Sediment can destroy fish-nesting areas, clog animal habitats, and cloud waters so that sunlight does not reach aquatic plants.

Storm Water - "Storm water" is as defined urban runoff and snowmelt runoff consisting only of those discharges which originate from precipitation events. Storm water is that portion of precipitation that flows across a surface to the storm drain system or receiving waters. Examples of this phenomenon include: the water that flows off a building's roof when it rains (runoff from an impervious surface); the water that flows into streams when snow on the ground begins to melt (runoff from a semi-pervious surface); and the water that flows from a vegetated surface when rainfall is in excess of the rate at which it can infiltrate into the underlying soil (runoff from a pervious surface). When all factors are equal, runoff increases as the perviousness of a surface decreases. During precipitation events in urban areas, rain water picks up and transports pollutants through storm water conveyance systems, and ultimately to waters of the United States.

Toxicity - Adverse responses of organisms to chemicals or physical agents ranging from mortality to physiological responses such as impaired reproduction or growth anomalies). The water quality objectives for toxicity provided in the Water Quality Control Plan, San Diego Basin, Region 9, (Basin Plan), state in part…*"All waters shall be free of toxic substances in concentrations that are toxic to, or that produce detrimental physiological responses in human, plant, animal, or aquatic life….The survival of aquatic life in surface waters subjected to a waste discharge or other controllable water quality factors, shall not be less than that for the same water body in areas unaffected by the waste discharge"….* Urban runoff discharges from MS4s are considered toxic when (1) the toxic effect observed in an acute toxicity test exceeds zero Toxic Units Acute (Tua=0); or (2) the toxic effect observed in a chronic toxicity test exceeds one Toxic Unit Chronic (Tuc=1). Urban runoff discharges from MS4s often contain pollutants that cause toxicity.

Total Maximum Daily Load (TMDL) - The TMDL is the maximum amount of a pollutant that can be discharged into a water body from all sources (point and non-point) and still maintain water quality standards. Under Clean Water Act section 303(d), TMDLs must be developed for all

water bodies that do not meet water quality standards after application of technology-based controls.

Urban Runoff - Urban runoff is defined as all flows in a storm water conveyance system and consists of the following components: (1) storm water (wet weather flows) and (2) non-storm water illicit discharges (dry weather flows).

Waste - As defined in California Water Code Section 13050(d), "waste includes sewage and any and all other waste substances, liquid, solid, gaseous, or radioactive, associated with human habitation, or of human or animal origin, or from any producing, manufacturing, or processing operation, including waste placed within containers of whatever nature prior to, and for purposes of, disposal."

Article 2 of CCR Title 23, Chapter 15 (Chapter 15) contains a waste classification system which applies to solid and semi-solid waste which cannot be discharged directly or indirectly to water of the state and which therefore must be discharged to land for treatment, storage, or disposal in accordance with Chapter 15. There are four classifications of waste (listed in order of highest to lowest threat to water quality): hazardous waste, designated waste, nonhazardous solid waste, and inert waste.

Water Quality Objective - Numerical or narrative limits on constituents or characteristics of water designated to protect designated beneficial uses of the water. [California Water Code Section 13050 (h)]. California's water quality objectives are established by the State and Regional Water Boards in the Water Quality Control Plans.

As stated in the Porter-Cologne Requirements for discharge (CWC 13263): "(Waste discharge) requirements shall implement any relevant water quality control plans that have been adopted, and shall take into consideration the beneficial uses to be protected, the water objectives reasonably required for that purpose, other waste discharges, the need to prevent nuisance, and the provisions of Section 13241."

A more comprehensive list of legal authority containing water quality objectives applicable to this Order can be found in Finding 37 and in Section VII Directives Discussion Underlying Broad Legal Authority for Order 2001-01 pp. 61-63.

Numeric or narrative limits for pollutants or characteristics of water designed to protect the beneficial uses of the water. In other words, a water quality objective is the maximum concentration of a pollutant that can exist in a receiving water and still generally ensure that the beneficial uses of the receiving water remain protected (i.e., not impaired). Since water quality objectives are designed specifically to protect the beneficial uses, when the objectives are violated the beneficial uses are, by definition, no longer protected and become impaired. This is a fundamental concept under the Porter Cologne Act. Equally fundamental is Porter Cologne's definition of pollution. A condition of <u>pollution</u> exists when the water quality needed to support designated beneficial uses has become unreasonably affected or impaired; in other words, when the water quality objectives have been violated. These underlying definitions (regarding beneficial use protection) are the reason why all waste discharge requirements implementing the federal NPDES regulations require compliance with water quality objectives. (Water quality objectives are also called water quality criteria in the Clean Water Act.)

Water Quality Standards - are defined as the beneficial uses (e.g., swimming, fishing, municipal drinking water supply, etc.,) of water and the water quality objectives necessary to protect those uses.

Waters of the State - Any water, surface or underground, including saline waters within the boundaries of the State [California Water Code Section 13050 (e)]. The definition of the Waters of the State is broader than that for the Waters of the United States in that all water in the State is

considered to be a Waters of the State regardless of circumstances or condition. Under this definition, a Municipal Separate Storm Sewer System (MS4) is always considered to be a Waters of the State.

Waters of the United States - Waters of the United States can be broadly defined as navigable surface waters and all tributary surface waters to navigable surface waters. Groundwater is not considered to be a Waters of the United States. Under this definition (see below), a Municipal Separate Storm Sewer System (MS4) is always considered a Waters of the United States.

As defined in the 40 CFR 122.2, the Waters of the U.S. are defined as: "**(a) All waters, which are currently used, were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide;** (b) All interstate waters, including interstate "wetlands;" (c) All other waters such as intrastate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, "wetlands," sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds the use, degradation or destruction of which would affect or could affect interstate or foreign commerce including any such waters: (1) Which are or could be used by interstate or foreign travelers for recreational or other purposes; (2) From which fish or shellfish are or could be taken and sold in interstate or foreign commerce; or (3) Which are used or could be used for industrial purposes by industries in interstate commerce; (d) All impoundments of waters otherwise defined as waters of the United States under this definition**: (e) Tributaries of waters identified in paragraphs (a) through (d) of this definition;** (f) The territorial seas; and (g) "Wetlands" adjacent to waters (other than waters that are themselves wetlands) identified in paragraphs (a) through (f) of this definition. Waters of the United States do not include prior converted cropland. Notwithstanding the determination of an area's status as prior converted cropland by any other federal agency, for the purposes of the Clean Water Act, the final authority regarding Clean Water Act jurisdiction remains with the EPA."

Watershed - That geographical area which drains to a specified point on a water course, usually a confluence of streams or rivers (also known as drainage area, catchment, or river basin).

ATTACHMENT E

DRY WEATHER ANALYTICAL AND FIELD SCREENING MONITORING SPECIFICATIONS - URBAN RUNOFF

Dry weather analytical and field screening monitoring consists of (1) field observations; (2) field screening monitoring; and (3) analytical monitoring at selected stations. Pursuant to section F.5 of this Order, the purpose of dry weather analytical and field screening monitoring is to detect and eliminate illicit connections and illegal discharges to the MS4 using frequent, geographically widespread dry weather discharge monitoring and follow-up investigations. Each Copermittee shall conduct the following dry weather analytical and field screening monitoring tasks:

1. Develop MS4 Map

   Each Copermittee shall develop or obtain an up-to-date labeled map of its entire municipal separate storm sewer system (MS4) and the corresponding drainage watersheds within its jurisdiction. The use of a Geographic Information System (GIS) is highly recommended, but not required. The accuracy of the MS4 map shall be confirmed during monitoring activities (See Task 6).

2. Select Dry Weather Analytical Monitoring Stations

   Based upon a review of its past Dry Weather Monitoring Programs, each Copermittee shall select dry weather analytical monitoring stations within its jurisdiction. Stations shall be either major outfalls or other outfall points (or any other point of access such as manholes) randomly located throughout the MS4 by placing a grid over a drainage system map and identifying those cells of the grid which contain a segment of the MS4 or major outfall; **or**, stations may be selected non-randomly provided adequate coverage of the entire MS4 system is ensured and that the selection of stations meets or exceeds the requirements given below. The dry weather analytical and field screening monitoring stations shall be established using the following guidelines and criteria:

   a. A grid system consisting of perpendicular north-south and east-west lines spaced ¼ mile apart shall be overlayed on a map of the MS4, creating a series of cells;
   b. All cells that contain a segment of the MS4 shall be identified and one dry weather analytical monitoring station shall be selected in each cell;
   c. Stations should be located downstream of any sources of suspected illegal or illicit activity;
   d. Stations shall be located to the degree practicable at the farthest manhole or other accessible location downstream in the system within each cell;
   e. Hydrological conditions, total drainage area of the site, traffic density, age of the structures or buildings in the area, history of the area, and land use types shall be considered in locating stations;
   f. Determining Number of Stations: Based upon review of previous Dry Weather Monitoring Programs, each Copermittee shall determine a minimum number of stations to be sampled each year with provisions for alternate stations to be sampled in place of selected stations that do not have flow.

3. Complete MS4 Map

   Each Copermittee shall clearly identify each dry weather analytical monitoring station on its MS4 Map as either a separate GIS layer or a map overlay hereafter referred to as a Dry Weather Analytical Stations Map. Each Copermittee shall confirm that each drainage area within its jurisdiction contains at least one station.

4. Develop Dry Weather Analytical Monitoring Procedures

Each Copermittee shall develop written procedures for dry weather analytical and field screening monitoring (consistent with 40 CFR part 136), including field observations, monitoring, and analyses to be conducted at a minimum between May 1st and September 30th of each year. The dry weather analytical and field screening monitoring program shall be designed to emphasize frequent, geographically widespread monitoring to detect illicit discharges and illegal connections. At a minimum, the procedures must be based on the following guidelines and criteria:

a. Determining Sampling Frequency: Dry weather analytical and field screening monitoring shall be conducted at each identified station at least once between May 1st and September 30th of each year or as often as the Copermittee determines is necessary to comply with the requirements of Section F.5 of the Order.

b. If flow or ponded runoff is observed at a dry weather analytical monitoring station and there has been at least seventy-two (72) hours of dry weather, make observations and collect at least one (1) grab sample. Record general information such as time since last rain, quantity of last rain, site descriptions (i.e., conveyance type, dominant watershed land uses), flow estimation (i.e., width of water surface, approximate depth of water, approximate flow velocity, flow rate), and visual observations (i.e., odor, color, clarity, floatables, deposits/stains, vegetation condition, structural condition, and biology).

c. At a minimum, collect samples for analytical laboratory analysis of the following constituents:

(1) Total Hardness
(2) Surfactants (MBAS)
(3) Oil and Grease
(4) Diazinon and Chlorpyrifos
(5) Cadmium (Dissolved)
(6) Copper (Dissolved)
(7) Lead (Dissolved)
(8) Zinc (Dissolved)
(9) Enterococcus bacteria
(10) Total Coliform bacteria
(11) Fecal Coliform bacteria

d. At a minimum, conduct field screening analysis of the following constituents:

(1) Specific conductance (calculate estimated Total Dissolved Solids).
(2) Turbidity
(3) pH
(4) Reactive Phosphorous
(5) Nitrate Nitrogen
(6) Ammonia Nitrogen

e. If the station is dry (no flowing or ponded runoff), make and record all applicable observations and select another station from the list of alternate stations for monitoring.

f. Develop criteria for dry weather analytical and field screening monitoring results whereby exceedance of the criteria will require follow-up investigations to be conducted to identify the source causing the exceedance of the criteria.

g. Dry weather analytical and field screening monitoring stations identified to exceed dry weather analytical monitoring criteria for any constituents shall continue to be screened in

subsequent years.

h. Develop procedures for source identification follow up investigations in the event of exceedance of dry weather analytical and field screening monitoring result criteria. These procedures shall be consistent with procedures required in section F.5.c. of this Order.

i. Develop procedures to eliminate detected illicit discharges and connections. These procedures shall be consistent with each Copermittees Illicit Discharge and Elimination component of its Jurisdictional Urban Runoff Management Plan as discussed in section F.5 of this Order.

5. Submit Dry Weather Analytical Monitoring Map and Procedures

Each Copermittee shall submit its dry weather analytical and field screening monitoring map (including the MS4, drainage watersheds, and station locations) and dry weather analytical monitoring procedures to the Principal Permittee as part of its Jurisdictional Urban Runoff Management Program Document on the date prescribed by the Principal Permittee. The procedures shall, at a minimum, address all issues included in sections 1-4 of this Attachment. The Principal Permittee shall collectively submit the dry weather monitoring analytical maps and procedures to the SDRWQCB within **365 days** of adoption of this Order. Implementation of dry weather analytical monitoring under the requirements of this Order shall commence by May 1, 2002.

6. Conduct Dry Weather Analytical Monitoring

Until the Dry Weather Analytical and Field Screening Monitoring Program is implemented under the requirements of this Order, each Copermittee shall continue to implement the Dry Weather Monitoring Program most recently implemented pursuant to Order No. 90-42. Starting May 1, 2002, each Copermittee shall conduct dry weather analytical and field screening monitoring in accordance with its storm water conveyance system map and dry weather analytical and field screening monitoring procedures as described in Tasks 1 – 4 above. If monitoring indicates an illicit connection or illegal discharge, conduct the follow-up investigation and elimination activities as described in submitted dry weather analytical and field screening monitoring procedures and sections F.5.c. and F.5.d. of this Order.

During monitoring, the accuracy of its MS4 map and shall be confirmed. Correct any inaccuracies in the either the MS4 map or the Dry Weather Analytical Stations Map and resubmit the corrected maps in the next annual report.

7. Summarize and Report Dry Weather Analytical Monitoring Results

As part of its individual Jurisdictional URMP Annual Report, each Copermittee shall summarize and report on its dry weather analytical monitoring results. The data shall be presented in tabular and graphical form. The reporting shall include analytical monitoring results, as well as follow up and elimination activities for potential illicit discharges and connections. Dry weather analytical monitoring reports shall comply with all monitoring and standard reporting requirements in Attachments B and C of Order 2001-01. The Principal Permittee shall submit to the SDRWQCB the individual dry weather analytical monitoring reports as part of the unified Jurisdictional URMP Annual Report on January 31, 2003, and every year thereafter.

FACT SHEET/TECHNICAL REPORT

FOR

SDRWQCB ORDER NO. 2001-01

MUNICIPAL STORM WATER PERMIT
FOR
SAN DIEGO COUNTY AND CITIES

San Diego Regional Water Quality Control Board
November 6, 2001

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Attachment 5 – Redline Strikeout Version of Order No. 2001-01 Dated February 21, 2001

Attachment 6 – Response to Comments on October 11, 2000 Version of Permit

LIST OF ABBREVIATIONS

BAT	Best Available Technology
BMP	Best Management Practice
CEQA	California Environmental Quality Act
CWA	Clean Water Act
CWC	California Water Code
MEP	Maximum Extent Practicable
MS4	Municipal Separate Storm Sewer System
NPDES	National Pollutant Discharge Elimination System
NURP	Nationwide Urban Runoff Program
SANDAG	San Diego Association of Governments
SDRWQCB	San Diego Regional Water Quality Control Board
SUSMP	Standard Urban Storm Water Mitigation Plan
SWRCB	State Water Resources Control Board
SWPPP	Storm Water Pollution Prevention Plan
TAC	State Water Resources Control Board Urban Runoff Technical Advisory Committee
TMDL	Total Maximum Daily Load
URMP	Urban Runoff Management Program
US EPA	United States Environmental Protection Agency

I. FACT SHEET/TECHNICAL REPORT FORMAT

The purpose of this Fact Sheet/Technical Report is to give the Copermittees and the interested public an overview of the permit and a practical discussion of its requirements, as well as a clear explanation of the regulatory justification for the permit requirements. The Fact Sheet/Technical Report can be considered to consist of two primary parts. The first part (which includes sections I. through V.) contains general information regarding urban runoff and the permit, including a summary of the permit in section IV. This part of the Fact Sheet/Technical Report provides an overview of the permit and the reasoning behind its requirements, and is likely to be the most pertinent part of the Fact Sheet/Technical Report for the more casual reader.

The second part of the Fact Sheet/Technical Report (which includes sections VI. and VII.) contains more detailed practical discussions and regulatory justifications of each permit component, and is meant to be used as a reference document during review of the permit. In sections V. and VI. of this Fact Sheet/Technical Report, each component of the permit is displayed in italics, followed by a discussion of the permit component. Section VII. (which addresses permit directives) also includes appropriate legal authority citations for each permit component. Each permit component is broken down in this manner so that the reader may find “stand alone” justification for each issue or permit component. This allows the Fact Sheet/Technical Report to be used as a reference during review of the permit. Please note that this has led to some repetition, as justifications for different sections are often similar or identical.

The text in the second part of the Fact Sheet/Technical Report (sections VI. and VII.) refers to the version of the permit provided to the San Diego Regional Water Quality Control Board (SDRWQCB) on October 11, 2000. The October 11, 2000 version of the permit is largely indicative of the final version of the permit, dated February 21, 2001. However, some minor changes to the permit were made between October 11, 2000 and February 21, 2001. To ensure that the final Fact Sheet/Technical Report is up to date and addresses the final permit in its entirety, Attachments 5 and 6 have been included in the final Fact Sheet/Technical Report. These attachments specifically address any changes to the permit not addressed in sections VI. and VII. of the Fact Sheet/Technical Report. Attachment 5 exhibits changes made to the permit between October 11, 2000 and February 21, 2001 in a redline strikeout version of the permit. Attachment 6 is a “response to comments” document which clarifies the reasoning behind each change to the permit found in the redline strikeout version of the permit. In this manner, the final Fact Sheet/Technical Report comprehensively addresses the contents of the final permit adopted by the SDRWQCB.

II. BACKGROUND – IMPACTS OF URBAN RUNOFF

Urban runoff is fundamentally important to the water quality of Southern California. It has been found to be a leading cause of water quality impairment in the San Diego Region and nationwide. Untreated pollutants in urban runoff, indiscriminate of dry or wet weather conditions, routinely find their way to our creeks, lagoons, bays, and ocean as easily from over watering of residential lawns as from rainstorms. San Diego area urban runoff is commonly contaminated with pesticides, fertilizers, animal droppings, trash, food wastes, automotive byproducts, and many other toxic substances which are generated by our urban environment. Water that flows over streets, parking lots, construction sites, and

industrial, commercial, residential, and municipal areas carries these untreated pollutants through storm drain networks directly to the receiving waters of the region. Southern California, with the highest coastal population density of the entire country,[1] suffers multiple tribulations from this urban generated pollution source.

The United States Environmental Protection Agency (US EPA) recognizes urban wet weather flows as the number one source of estuarine pollution in coastal communities.[2] This trend is reflected locally by the 1998-1999 City of San Diego and Co-Permittee NPDES Stormwater Monitoring Program Report, which names urban runoff as one of the most significant contributors of pollution to our waterways and coastal areas. Furthermore, this document reports that monitoring efforts indicate that instream concentrations of pathogen indicators (fecal coliform and streptococcus) and heavy metals (such as cadmium, copper, lead, and zinc) exceed state and federal water quality criteria. Storm water within the region has also been found to contain the pesticides diazinon and chlorpyrifos (Dursban) at levels that can cause chronic or acute toxicity. [3]

Urban runoff causes many impacts in Southern California, including increased public health risks, high concentrations of toxic metals in harbor and ocean sediments, and toxicity to aquatic life.[4] A study exploring the health risks associated with urban runoff in Southern California was conducted in 1995 by the Santa Monica Bay Restoration Project using a survey of 15,000 bathers at three Santa Monica beaches. The study concluded that there is a 57% higher rate of illness in swimmers who swim adjacent to storm drains than in swimmers who swim more than 400 yards away from storm drains.

This potential for public health risks resulting from urban runoff is reflected in the San Diego region as well. In 1999, there were 29 days in which the San Diego County Health Department issued general advisories to avoid waters 300 feet either side of all storm drain outlets in order to protect the public from potential adverse health effects caused by urban runoff. Also, in 1999 there were 720 combined beach closures and postings in San Diego County. The San Diego County Department of Health does not recommend the public recreate in closed or posted waters due to associated health risk. A breakdown of the beach closure and posting data is as follows: 127 of these closings were related to sewage spills, 71 related to river mouth outlets or some other excavation, and 522 of the days were related to some exceedance of water quality standards.[5] Urban runoff can also

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[1] Culliton, T.M. et al. 1988. "50 years of population changes along the nation's coast." *Coastal Trends Series, Report No. 2*. National Oceanic and Atmospheric Administration, Strategic Assessments Branch. As cited in Moore, S. L., et al. *Composition and Distribution of Beach Debris in Orange County, California.* Southern California Coastal Water Research Project, Southern California Marine Institute, Divers Involved Voluntarily in Environmental Rehabilitation and Safety.

[2] US EPA. 1999. 40 CFR Parts 9, 122, 123, and 124. National Pollutant Discharge Elimination System – Regulations for Revision of the Water Pollution Control Program Addressing Storm Water Discharges; Final Rule. 64 FR 68727.

[3] City of San Diego. 1999. 1989-1999 City of San Diego and Co-permittee NPDES Stormwater Monitoring Program Report. URS Greiner Woodward Clyde.

[4] Threats to beneficial uses such as swimming and seafood consumption or ecosystem health have been demonstrated in numerous studies. Two important studies to note for Southern California are: Bay, S., Jones, B.H. and Schiff, K. 1999. Study of the Impact of Stormwater Discharge on Santa Monica Bay. Sea Grant Program, University of Southern California; and Haile, R.W., et al. 1996. An Epidemiological Study of Possible Adverse Health Effects of Swimming in Santa Monica Bay. Santa Monica Bay Restoration Project.

[5] Information provided by the San Diego County Department of Public Health.

impact drinking water; contamination by urban runoff has forced the closure of potable water reservoirs within the City of San Diego in order to protect public health.

The SDRWQCB finds that such problems are indeed frequently urban runoff related. For instance, a common conveyance for a sewage spill to reach a beach is through the municipal storm water system. Also, exceedances of standards at some of our Region's beaches have unquestionably been conveyed by the storm water drainage system.[6] In addition, urban runoff is increasingly being targeted as the cause of beach closures and postings in other areas of the San Diego region and Southern California. Urban runoff has been identified as a principal contributor to fecal coliform contamination in Orange County's Aliso Creek, a creek which often causes beach postings when flowing into the ocean.[7] Municipal enforcement efforts focusing on urban runoff have also resulted in reduced coliform levels in receiving waters in Encinitas.[8] Finally, US EPA goes on to say that urban storm water runoff and sewer overflows have become the largest cause of beach closings in the United States for the previous three years, becoming more significant than such sources as oil spills and publicly owned treatment works.[9]

Regardless of how beach posting and closure data is interpreted, one thing is clear: Beneficial uses are not being met for the waters in the San Diego Region, and urban runoff is a significant contributor to this receiving water impairment. For San Diego, known throughout the world for its beach lifestyle, these statistics are bound to have increasingly serious effects on tourism revenue as well as the local cultural identity.

III. ECONOMIC ISSUES

Polluted urban runoff not only poses a public health threat, but an economic one as well. A January 5, 1997 New York Times article warns: *Travel Advisory. Storm Drains Pose San Diego Health Risk*.[10] In the July 3, 2000 edition of Forbes Magazine, an article entitled *Don't Go Near the Water. Beaches That Make You Go Ewwwww*!, two San Diego area beaches are highlighted as having troubles. The article is particularly hard on the Mission Bay beaches, in stating, "If San Diego County has established itself as the California capital of sewage spills, this beach is its White House."[11] Our local problems do indeed make national news. US EPA also brings attention to our region in the guidance document *Liquid Assets 2000* in saying, "Although our lakes, rivers, estuaries, and wetlands are much cleaner than they were in 1970, headlines like these are all too common…"[12] Next to the quote is pictured the San Diego page from the San Diego Union Tribune bearing the

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[6] SDRWQCB Cleanup and Abatement Order No. 97-69 and Cease and Desist Order No. 98-74, both were issued to the City of Coronado.

[7] SDRWQCB Cleanup and Abatement Order No. 99-211, issued to the City of Laguna Niguel and the County of Orange.

[8] Kathy Weldon, City of Encinitas, Presentation to Beach Water Quality Workgroup, June 1, 2000.

[9] US EPA. 1999. 40 CFR Parts 9, 122, 123, and 124. National Pollutant Discharge Elimination System – Regulations for Revision of the Water Pollution Control Program Addressing Storm Water Discharges; Final Rule. 64 FR 68727.

[10] Kopytoff, V.G. 1/5/1997. *Travel Advisory: Storm Drains Pose San Diego Health Risk*. The New York Times.

[11] Powers, K. 7/3/2000. *Don't Go Near the Water. Beaches That Make You Go Ewwwww*! Forbes Magazine.

[12] US EPA. 2000. Liquid Assets 2000. *America's Water Resources at a Turning Point*. EPA –840-B-00-001.

headline "Human Waste Fouls Three Beaches, DNA Tests Find."[13] Being spotlighted by the federal government in this context is definitely less than auspicious.

There may be no way to measure what effects such negative press have had on value lost due to changed vacation plans. However, one can presume that continued publicity will take its toll on local economies. According to a 1996 San Diego Association of Governments (SANDAG) Memorandum, the California Division of Tourism has estimated that each out-of-state visitor spends $101.00 a day. The memo goes on to state that based on projections from the California Department of Boating and Waterways nearly $1.2 billion in direct revenue and $1.2 billion in indirect revenue is pumped into the San Diego area economy each year by out-of-state visitors.[14] It would seem that given the importance of tourism to our area, municipalities cannot afford to ignore water quality. The bottom line is that there is no need to wait and see how much the waters can take before our economy is affected. We can simply look to catastrophes that other regions have already had to bear. The 1988 medical waste wash-ups closing New York and New Jersey beaches caused an estimated $4 billion loss to the local economy.[15]

"Willingness to pay" gives an indication of how much the public values clean water. A study conducted by Colorado State University researchers on a 45 mile stretch of the South Platte River looked at the value of ecosystem services. The services studied were habitat for fish and wildlife, recreation, erosion control, natural purification of water and dilution of wastewater. Results from nearly 100 in-person interviews show that households would pay on average $21 per month for additional ecosystem services.[16] The article goes on to explain that while the marginal benefits are often quite small per person, the non-rival nature of environmental goods often results in simultaneous enjoyment by millions of people. Therefore, ensuring dependable good water quality could mean huge social benefits. The National Water Research Institute states, "Water has a psychological value…People derive measurable pleasure from recreational activities like boating and fishing and find comfort in knowing that the water they drink is of the highest quality."[17]

Water quality as an externality can also cause shifts in real estate value. To help assess this we consider other areas of the country. US EPA looked at a study conducted on real estate around Lake Champlain in the Northeastern United States. Property values in the area of the lake with good water quality were valued an average of 20% more than property around poor water quality.[18] Research right here in California indicates that

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[13] Rodgers, T. 1/21/00. Human Waste Fouls 3 Beaches, DNA Tests find. The San Diego Union-Tribune.

[14] San Diego Association of Governments. 10/25/96. *Memorandum: California Department of Boating and Waterways: Unpublished Survey Information Regarding Beach Use*. Written to the Shoreline Erosion Committee.

[15] US EPA. 1996. Liquid Assets: A Summertime Perspective on the Importance of Clean Water to the Nation's Economy. EPA 800-R-96-002. Page 5.

[16] Loomis J., et al. 1999. Measuring the Total Economic Value of Restoring Ecosystem Services in an Impaired River Basin: Results from a Contingent Valuation Method Survey. Proceedings of the Third Workshop in the Environmental Policy and Economics Workshop Series. Sponsored by US EPA's Offices of Economy & Environment, and Reserved & Development. April 21-22, 1999.

[17] National Water Research Institute. The Value of Water: Recognizing and Using the Full Water Supply. National Water Research Institute, Fountain Valley, CA as cited in US EPA. 2000. Liquid Assets 2000. *America's Water Resources at a Turning Point*. EPA –840-B-00-001.

[18] US EPA. 1996. Liquid Assets: A Summertime Perspective on the Importance of Clean Water to the Nation's Economy. EPA 800-R-96-002. Page 8.

property values can increase by at least 3% for employing bank stabilization procedures and up to 11% for improving fishing habitat.[19]

Within the past decade or so we see that investor's concerns about environmental quality do indeed drive investment decisions. *Money* magazine conducts a "Best Places to Live" survey every year. In 1995, clean water and air ranked as the most important factors in choosing a place to live. It is important to note that they were ranked above typical high priority quality of life issues such as low crime rates, plentiful doctors or hospitals, and low taxes.[20] In the 2000 *Money* magazine "Best Places to Live" analysis, clean water was cited as a contributing factor in three of the top six choices from around the country.[21] Needless to say, San Diego did not make the list this year.

The SANDAG *Regional Growth Management Strategy, Water Quality Element* summarizes future needs in development strategies by stating, "Protecting the health of the water bodies in the region calls for a new approach to storm water management in new development and redevelopment, an approach which considers the possibilities for *pollution prevention* and maximizing infiltration."[22] However, many stakeholders feel that the prospect of such planning presents an economic burden. Not so, according to a *Watershed Protection Techniques* article, "The Benefits of Better Site Design in Residential Subdivision."[23] The journal did a comparative hydrology analysis for a medium-density residential subdivison using open space and conventional design. The following table shows the environmental benefits of using an open space versus conventional design.

Table One: Change in Site Characteristics from a Conventional Design to Open Space Design (*Both employ storm water protection practices*).

Factor of Concern	Percent Change by Applying Open Space Design
Impervious cover	24% decrease
Residential Lawn	48% decrease
Stormwater Runoff	24% decrease
Stormwater Infiltration	55% increase
Phosphorus Export	60% decrease
Nitrogen Export	45% decrease
Development Cost	20% decrease

Source: Adapted from the Center for Watershed Protection, 2000.

It's no surprise that environmentally sensitive planning techniques will produce environmental benefits, but what may be surprising is they can also produce economic

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[19] Streiner C. and Loomis. J. 1996. Estimating the Benefits of Urban Stream Restoration Using the Hedonic Price Method. Rivers 5(4): 267-268 as cited in Loomis J., et al. 1999. Measuring the Total Economic Value of Restoring Ecosystem Services in an Impaired River Basin: Results from a Contingent Valuation Method Survey. Proceedings of the Third Workshop in the Environmental Policy and Economics Workshop Series. Sponsored by US EPA's Offices of Economy & Environment, and Reserved & Development. April 21-22, 1999.

[20] US EPA. 1996. Liquid Assets: A Summertime Perspective on the Importance of Clean Water to the Nation's Economy. EPA 800-R-96-002. Page 9.

[21] Gertner J. and Kirwan, R. 2000. *Money Magazine.* "The Best Places to Live 2000." As downloaded from http://www.money.com/money/depts/real_estate/bestplaces

[22] San Diego Association of Governments. 1997. *Regional Growth Management Strategy: Water Quality Element.*

[23] Center for Watershed Protection. 2000. The Benefits of Better Site Design in Residential Subdivisions. Water Protection Techniques. 3(2): Page 641.

benefits. The total cost to build this development was about 20% less using the open space design as opposed to the conventional design. Less road paving, as well as shorter sidewalks, water lines, sewer lines, curbs and gutters contributed to the savings.

An example from Davis, California reflects similar results. The Village Homes development, consisting of 22 houses and 40 apartments, employed narrow streets, plus graded land, channels and ponds to encourage on-site rain absorption. The resulting cost savings was $700/unit less than using conventional storm water management systems. It is also important to note that the development did not flood when a 100-year level flood hit the area. In fact, the owner Judy Corbett reported that the development soaked in some runoff from surrounding communities.[24] The ideas and technologies used in both of these examples have been available for many years. However, outdated development requirements, subdivision codes, zoning regulations, street standards, and drainage requirements have discouraged developers from even attempting changes in convention.

This problem can best be remedied on the municipal level. Local authorities can work to better encourage water quality sensitive planning techniques. Conditions of approval for new developments can be updated to allow for site designs which address water quality concerns. For instance, cities could decrease the width of impervious streets by allowing one way streets on alternate blocks. Providing discretion for creative thinking on site design can save developers money and help municipalities protect their local water quality. Employing such techniques also follows with SANDAG's *Regional Growth Management Strategy.* Preserving natural habitats and open spaces is one of the five basic elements the strategy recommends for addressing all growth related questions.[25]

SANDAG has also developed *The Cites/County Forecast for the San Diego Region*, which attempts to project the demands that humans are going to place on the region over the next 20 years. The report contains some startling projections. According to the article, we can expect 1 million more people and over 400,000 new homes in the area over the next two decades.[26] According to the United States Census Bureau, the estimated population for San Diego County in July 1999 was 2,820,844 people.[27] We can therefore expect a 35% increase in population in just over 20 years. Secondly, the implications of 400,000 new homes extend beyond the homes themselves to include new roads, shopping malls, business parks, parking lots, schools and all the other amenities that accompany new development. Regulations of today must anticipate and address this growth.

To help with this matter, the 2000 Permit includes a requirement for Copermittees to develop Standard Urban Storm Water Mitigation Plans (SUSMPs) for broad categories of new development and significant redevelopment. SUSMPs as developed by the Copermittees will require developers to implement post-construction best management practices (BMPs) to reduce storm water flows and the associated pollutant loads generated from the development. What this means is that runoff carrying automobile

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[24] Keith, L.D. 6/5/00. Fight Brewing in Southern California Over Construction Rules Aimed at Stormwater Runoff. Fresno Bee.

[25] San Diego Association of Governments. 1999. "2020 Cities/County Forecast for the San Diego Region." *SANDAG INFO*. Page 2.

[26] San Diego Association of Governments. 1999. "2020 Cities/County Forecast for the San Diego Region." *SANDAG INFO*. Page 2.

[27] As downloaded from the United States Census Bureau website: Http://www.census.gov/population/estimates/county/co-00-1/99C_06.txt

byproducts, pet droppings, trash, and lawn chemicals for instance will need to be infiltrated, filtered, or treated before it is allowed to leave all new development. The reasoning for this is simple: Since we have not been successful in protecting the beneficial uses of water quality in the past, increased population and development pressures will need to be addressed differently than they were in the past.

IV. PERMIT SUMMARY

HISTORICAL PERSPECTIVE ON THE DEVELOPMENT OF THE PERMIT (PERMIT SUMMARY)

The federal Clean Water Act was amended in 1987 to address urban runoff. One requirement of the amendment was that many municipalities throughout the United States were obligated for the first time to obtain National Pollutant Discharge Elimination System (NPDES) permits for discharges of urban runoff from their municipal separate storm sewer systems (MS4s). In response to the Clean Water Act amendment (and the pending federal NPDES regulations which would implement the amendment), the SDRWQCB issued an "early" municipal storm water permit, Order No. 90-42, in July 1990 to the County of San Diego, the 18 incorporated cities within the County of San Diego, and the San Diego Unified Port District (hereinafter Copermittees) for their urban runoff discharges. As the name implies, this "early" permit was issued prior to the November 1990 promulgation of the final federal storm water regulations. Although Order No. 90-42 contained the "essentials" of the 1990 regulations, the requirements were written in very broad generic and often vague terms. Broad generic terms were incorporated into the permit for the purpose of providing the maximum amount of flexibility to the Copermittees in implementing the new requirements (flexibility was, in fact, the stated reason for issuing the permit in advance of the final regulations). From staff's perspective however, this same lack of specificity, combined with the lack of funding and political will, also provided the Copermittees with ample reasons to take few substantive steps towards permit compliance. The situation was exacerbated by the SDRWQCB's own lack of storm water resources and the general sense that the infant program was a considerably lower priority than its existing and competing core regulatory programs. In staff's assessment, the result was a general lack of action by the Copermittees and a general lack of corresponding reaction (enforcement) by the SDRWQCB during the early years of the storm water program.

When viewed relative to the early years, substantial progress towards compliance has been made by many of the Copermittees and improvements in the SDRWQCB's oversight have occurred as well. But when viewed relative to the magnitude of the problem, we've collectively progressed little in ten years and enormous challenges remain. Today, urban runoff is the leading cause of water quality impairment in the San Diego Region. One has only to look as far as the now too familiar "health advisory or beach closure" signs to see the troubling local consequences of urban runoff.

Although administratively extended pursuant to federal law, Order No. 90-42 was due for renewal in July 1995. Two previous formal drafts of the renewal permit were released to the public (in 1995 and 1998 respectively) and substantial written public comments on the drafts were considered by the SDRWQCB. In addition, a working group of Copermittees and stakeholders was convened by the SDRWQCB in 1997 and 1998 to advise the SDRWQCB on renewal permit issues, many of which were and currently remain

controversial in nature. Despite the efforts by the public, the stakeholder group, and SDRWQCB, and in part due to the concurrent issuance and appeal of three other municipal storm water permits, Order No. 90-42 was not reissued by the SDRWQCB.

MUNICIPAL STORM WATER NPDES PERMITS OVERVIEW (PERMIT SUMMARY)

Municipal storm water NPDES permits seek to ensure that the beneficial uses of a receiving water are protected despite discharges from MS4s into that receiving water. Beneficial uses are defined as the uses of water necessary for the survival or well being of man, plants, and wildlife. Municipal storm water NPDES permits contain requirements to achieve numeric and narrative receiving water quality objectives which are established to protect these beneficial uses. Water quality objectives are defined as constituent concentrations, levels, or narrative statements, representing a quality of water that supports the most sensitive beneficial uses which have been designated for a water body. At this time, municipal storm water NPDES permits contain water quality objectives and a prohibition that MS4 discharges may not cause the water quality objectives in the receiving water to be exceeded. By definition, when the water quality objectives of a receiving water are exceeded, the beneficial uses of that water are not adequately protected.

Typical NPDES permits are based on the concept of employing full-scale treatment of an effluent to remove pollutants at the end of the pipe (i.e., just before being discharged into receiving waters). Accordingly, typical NPDES permits contain numeric effluent limits which are arithmetically derived from receiving water quality objectives for each pollutant of concern in the effluent. However, municipal storm water permits are not typical NPDES permits because they are not based on the concept of full-scale treatment of polluted storm water. Full scale end of pipe treatment for storm water is not considered economically and technologically feasible at this time. Therefore municipal storm water permits do not contain numeric effluent limits, but rather are based on the concept that pollutants can be effectively reduced in storm water to the maximum extent practicable by the application of a wide range of best management practices (BMPs). The technology-based performance standard of “maximum extent practicable” refers to evaluation and implementation of BMPs to the maximum extent practicable, except where (1) other effective BMPs will achieve greater or substantially similar pollution benefits; (2) the BMP is not technically feasible; or (3) the cost of BMP implementation greatly outweighs the pollution control benefits.

In other words, in municipal storm water permits, receiving water quality objectives are attained by way of BMP implementation, including use of pollution prevention, source control, and treatment control BMPs. To protect receiving water beneficial uses, municipal storm water permits require the use of best management practices which prevent the generation of pollutants and keep runoff from coming into contact with pollutants, to be supplemented by the use of methods that remove or treat pollutants.

COPERMITTEE RESPONSIBILITY BASED ON LAND USE AUTHORITY (PERMIT SUMMARY)

Storm water permits are issued to municipalities because of their land use authority. The ultimate responsibility for the pollutant discharges, increased runoff, and inevitable long-term water quality degradation that results from urbanization lies with local governments. This responsibility is based on the fact that it is the local governments that have authorized the urbanization (i.e., conversion of natural pervious ground cover to impervious urban

surfaces) and the land uses that generate the pollutants and runoff. Furthermore, the MS4 through which the pollutants and increased flows are conveyed, and ultimately discharged into San Diego's natural receiving waters, are owned and operated by the same local governments. In summary, the municipal Copermittees under Order No. 2001-01 are responsible for discharges into and out of their storm water conveyance systems because (1) they own and operate the MS4; and (2) they have the legal authority that authorizes the very development and land uses which generate the pollutants and increased flows in the first place.

Order No. 2001-01 holds the local government accountable for this direct link between its land use decisions and water quality degradation. The permit recognizes that each of the three major stages in the urbanization process (development planning, construction, and the use or operational stage) are controlled by and must be authorized by the local government. Accordingly, this permit requires the local government to implement, or require others to implement, appropriate best management practices to reduce pollutant discharges and increased flow during each of the three stages of urbanization.

For example, since grading cannot commence prior to the issuance of a local grading permit, the Copermittees have a built-in mechanism to ensure that all grading activities are protective of receiving water quality. The Copermittee has the authority and discretion to withhold issuance of the grading permit until the project proponent has demonstrated to the satisfaction of the Copermittee that the project will not violate the Copermittee's ordinances or cause the Copermittee to be in violation of its municipal storm water permit. Since the Copermittee will ultimately be held responsible for any discharges from the grading project by the SDRWQCB, the Copermittee will want to use its own permitting authority to ensure that whatever measures the Copermittee deems necessary to protect discharges into its MS4 are in fact taken by the project proponent.

ORDER NO. 2001-01 OVERVIEW (PERMIT SUMMARY)

Order No. 2001-01 is the proposed re-issuance of Order No. 90-42 (i.e., the renewal municipal storm water permit for the Copermittees within the County of San Diego). Order No. 2001-01 incorporates not only the SDRWQCB's responses to all oral and written comments on previous drafts received to date; it also reflects two highly controversial precedent setting decisions by the State Water Resources Control Board (SWRCB). Specifically, Order No. 2001-01 includes: (1) explicit language requiring municipal storm water dischargers to meet numeric water quality standards[28] (in addition

28 The issue of whether municipal storm water dischargers must meet water quality standards has been intensely debated for the past five years in California and throughout the nation. During that same five-year period, and in between sporadic work on the municipal storm water permit for San Diego County Copermittees, the SDRWQCB developed and adopted three other municipal storm water permits. As a consequence of the ongoing debate, each of the three permits was immediately appealed (primarily) on the basis of the water quality standards language. SDRWQCB Order No. 96-03, the municipal storm water permit for Orange County Copermittees was adopted and appealed in 1996. SDRWQCB Order No. 97-08, the municipal storm water permit for CALTRANS was adopted and appealed in 1997. SDRWQCB Order No. 98-02, the municipal storm water permit for Riverside County Copermittees was adopted and appealed in 1998.

In response to the appeal of the SDRWQCB's permit for Orange County, the SWRCB issued Order WQ 98-01 prescribing specific precedent-setting water quality standards language to be included in all future California MS4 permits. In essence, the SWRCB's precedent-setting language made very clear that storm water discharges must attain receiving water quality standards. In addition, unlike previously adopted versions of the language, it did not state that "violations of water quality standards are not violations of the municipal storm

to meeting the Maximum Extent Practicable or MEP technology based-standard); and (2) numeric sizing criteria (i.e., design standards) for structural post-construction best management practices (BMPs) for new development and significant redevelopment.

While the requirements of Order No. 2001-01 are markedly more clear and specific than those of Order No. 90-42, they are based on the same 1990 federal storm water regulations. Where Order No. 90-42 and Order No. 2001-01 differ, Order No. 2000-01 is more specific as to what is necessary for Copermittee compliance. The increased specificity of Order No. 2001-01's requirements is necessary to address specific local urban runoff concerns, promote the attainment of water quality standards, and satisfy the Copermittee's repeated request for the SDRWQCB to identify the minimum effort required for compliance with the permit. Where requirements are more stringent than the federal storm water regulations, they are generally based on specific guidance from the USEPA and/or the SWRCB and are authorized under both the Clean Water Act section 402(p)(3)(iii) as well as the California Water Code section 13377. Furthermore, the requirements contained in Order No. 2001-01 represent the SDRWQCB's interpretation of the requisite maximum extent practicable (MEP) technology-based standard.

Order No. 2001-01 places the responsibility for urban runoff discharges into and from MS4s on the Copermittees which own and operate the systems. This responsibility is based on the Copermittees' land use authority. Since the Copermittees permit, authorize, and profit from urban development within their jurisdictions, Order No. 2001-01 holds the Copermittees responsible for the short and long-term water quality consequences of their land use decisions. Furthermore because water quality degradation is the direct result of the urbanization process, Copermittees must implement (or require others to implement) controls to reduce the flow and pollutants

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water permit under certain conditions." Likewise, the order's language did not indicate that the "implementation of best management practices is the 'functional equivalent' of meeting water quality standards."

In response to the appeal of the SDRWQCB's permit for Riverside County and the formal objection of the permit by the USEPA, the SWRCB issued Order WQ 99-05, modifying its own precedent-setting language (as specified in Order WQ 98-01) to meet the specific objections of the USEPA. SWRCB Order WQ 99-05 specified even more stringent requirements for municipal dischargers to meet water quality standards. In response to USEPA's formal objections to SDRWQCB Order No. 98-02, the USEPA assumed responsibility for the Riverside County permit and subsequently issued its own MS4 permit with water quality standards language for Riverside County in 1999. Upon issuance of its own permit, the USEPA returned full responsibility for the NPDES permit back to the SDRWQCB. (Riverside County Copermittees are currently subject to both SDRWQCB Order No. 98-02 as state waste discharge requirements and to the USEPA-issued NPDES permit No. CAS108766 for which the SDRWQCB has resumed full responsibility. In November 2000, the SDRWQCB plans to amend its Order No. 98-02 to replace the existing language with the full text of the USEPA-issued NPDES permit. At that time, SDRWQCB Order No. 98-02 will officially resume function as both state waste discharge requirements and a federal NPDES permit.)

Also following USEPA's issuance of its own MS4 permit for Riverside Copermittees (but in response to a separate similar USEPA-issued MS4 permit), the United States Court of Appeals for the Ninth Circuit (Defenders of Wildlife v. Browner, 1999, 197 F. 3d 1035), upheld USEPA's requirement for MS4 dischargers to meet water quality standards, but it did so on the basis of USEPA's discretion rather than on the basis of strict compliance with the Clean Water Act.

On October 14, 1999, the SWRCB issued what is currently its "final" legal opinion on the matter. In summary, the 1999 SWRCB opinion concluded that RWQCBs should continue to include the water quality standards language established in SWRCB Order WQ 99-05 in all future MS4 permits issued in California.

generated from each of the three major phases of urbanization that they authorize; namely the (1) land use planning, (2) construction; and (3) use or existing development phase.

The principal requirements of Order No. 2001-01 include the following: (1) each Copermittee shall prohibit non-storm water discharges to its MS4; (2) each Copermittee shall reduce pollutants in urban runoff discharges into and from its MS4 to the maximum extent practicable, (MEP); (3) each Copermittee shall ensure that urban runoff discharges into and from its MS4 do not cause or contribute to an exceedance of receiving water quality objectives; (4) each Copermittee shall actively seek and eliminate all sources of illicit discharges to its MS4; and (5) each Copermittee shall obtain, maintain, and enforce adequate legal authority (such as local ordinances and permits) to comply with all provisions of the order.

Two Levels of Copermittee Responsibility

Each Copermittee must carry out the requirements of Order No. 2001-01 across two broad levels of responsibility. Copermittees have responsibility for the water quality impacts of urbanization within (1) their jurisdiction and (2) their watershed. The jurisdictional responsibility of each Copermittee stems from Copermittee land use authority within its jurisdiction. As discussed above, the Copermittee has authority over the three stages of development (planning, construction, and use or operation) within its jurisdiction. Each Copermittee must therefore take responsibility for water quality impacts resulting from their jurisdictional land use decisions.

Watershed responsibility is also necessary from each Copermittee. This is because each Copermittee is located somewhere within a watershed it shares with other Copermittees. Urban runoff generated in various Copermittee jurisdictions does not follow jurisdictional boundaries, but rather travels through many jurisdictions while flowing towards receiving waters. Simplistically, a watershed can be thought of as a common pipe to the ocean, along the length of which reside the Copermittees within the watershed. Inland Copermittees can be thought of as upstream contributors of pollutants and flow to the common pipe; while coastal Copermittees can be considered downstream contributors. Collectively the Copermittees within the watershed each contribute to the cumulative pollutant load that is conveyed in urban runoff by their interconnected MS4 systems to the receiving waters. Therefore, each Copermittee has shared responsibility for the impacts of its urbanization on the watershed in which it is located. Both coastal and inland cities contribute to receiving water quality problems and both must accept responsibility for contributing to the solution.

Order No. 2001-01 reflects these two broad levels of responsibility, in that it requires implementation of comprehensive urban runoff management plans on both a jurisdictional and watershed level.

Permit Requirements

Order No. 2001-01 contains the following principal elements:

- Legal Authority – Each Copermittee shall establish and maintain adequate legal authority to control pollutant discharges into and from its MS4.

- Jurisdictional Urban Runoff Management Program – Each Copermittee shall develop and implement a Jurisdictional Urban Runoff Management Program which will reduce discharges of pollutants and runoff flow during each major phase of urban development (i.e., planning, construction, and use or operation phases) within its jurisdiction.
- Watershed Urban Runoff Management Program – Each Copermittee shall collaborate with other Copermittees within its watershed(s) to develop and implement a Watershed Urban Runoff Management Program which will identify and address the highest priority water quality issues/pollutants in their respective watershed(s).
- All Copermittee Collaboration – Each Copermittee shall collaborate with all other Copermittees to address common issues, promote consistency, and plan and coordinate urban runoff activities.
- Monitoring – The Copermittees shall develop and implement a Receiving Waters Monitoring Program which shall focus on the collection of monitoring data to be used for the achievement of water quality objectives and the protection of beneficial uses.
- Reporting – Each Copermittee shall submit various reports describing the measures it is undertaking to meet the requirements of Order No. 2001-01.

Each of these principal elements of Order No. 2001-01 is discussed in greater detail below.

Legal Authority

Each Copermittee must adopt and enforce whatever legal authority is needed to eliminate or reduce pollutant discharges from all urban land use sources into and out of its MS4. This legal authority must include the ability to prohibit all discharges into the MS4 except for those which originate from precipitation (and a few other minor exceptions). Each Copermittee must also have legal authority to conduct inspections, collect samples, and require businesses to implement BMPs. Legal authority can be developed through ordinance, permit, contract, or similar means. Each Copermittee must ensure that its requirements are being complied with and use its legal authority to take enforcement actions against violators which are not meeting the Copermittee's requirements.

Jurisdictional Urban Runoff Management Program

The focus of the Jurisdictional Urban Runoff Management Program (URMP) is to address urban runoff during each phase of urbanization (i.e., planning, construction, and use or operation phases). The Jurisdictional URMP includes specific requirements for each of these phases of urbanization, as well as broad requirements which apply to all of the phases.

The Jurisdictional URMP singles out the planning phase of urbanization since addressing urban runoff during the planning phase of development is an effective means (in terms of both cost and performance) for protecting receiving water quality. The planning stage provides the greatest number and variety of opportunities for addressing runoff, as well as the most cost effective time for implementation of BMPs. Order No. 2001-01 includes the following requirements for addressing urban runoff during the planning phase of new development:

- Each Copermittee shall incorporate water quality protection principles and policies into its General Plan or equivalent plan to guide land use decisions.
- Each Copermittee shall modify its development project approval processes to ensure water quality concerns are addressed by development projects. This requirement includes development and implementation by each Copermittee of water quality conditions of approval for projects. Each Copermittee shall also develop and implement Standard Urban Storm Water Mitigation Plans (SUSMPs), requiring various categories of development to implement post-construction BMPs meeting specific numeric sizing criteria.
- Each Copermittee shall revise its environmental review process, including California Environmental Quality Act (CEQA) checklists, to include requirements for evaluation of water quality effects from development projects.
- Each Copermittee shall conduct education efforts for its planning and development review staffs, as well as the development community at large.

The construction phase of urbanization is also singled out in the Jurisdictional URMP requirements of Order No. 2001-01. Construction sites and practices are given a high priority in the Jurisdictional URMP requirements due to their significant potential for erosion and discharge of pollutants to MS4s and receiving waters. Order No. 2001-01 includes the following requirements for addressing urban runoff during the construction phase of urbanization:

- Each Copermittee shall implement, or require implementation of, pollution prevention measures at construction sites.
- Each Copermittee shall update its grading ordinance to require grading and construction activities to include pollution prevention, source control, and structural treatment BMPs.
- Each Copermittee shall update its construction and grading approval processes to ensure water quality concerns are addressed by construction/grading projects. This requirement includes development and implementation by each Copermittee of water quality conditions of approval for construction and grading projects.
- Each Copermittee shall maintain an inventory of all construction sites within its jurisdiction.
- Each Copermittee shall establish priorities for construction oversight activities.
- Each Copermittee shall implement, or require implementation of, minimum BMPs at construction sites. The level of BMPs to be implemented shall be bases on the priority level of the site.
- Each Copermittee shall conduct inspections of construction sites based on construction site priority level.
- Each Copermittee shall enforce its ordinances at all construction sites.
- Each Copermittee shall report non-compliant construction sites to the SDRWQCB.
- Each Copermittee shall conduct education efforts for its construction, building, and grading review staffs, as well as the construction community at large.

The Jurisdictional URMP contains extensive requirements for existing development as well. All urban land uses are addressed by the requirements. The specific land uses identified in the Jurisdictional URMP are municipal, industrial, commercial, and residential land uses. In general, the structure of the Jurisdictional URMP requirements for each of

these land uses are similar. For each of the existing development land uses, the Jurisdictional URMP requirements include:

- Each Copermittee shall implement, or require implementation of, pollution prevention measures for each land use.
- Each Copermittee shall maintain an inventory of sites for the various land uses within its jurisdiction. The types of sites to be inventoried for each land use are detailed in section VII. of this fact sheet as well as the permit.
- Each Copermittee shall establish priorities for oversight activities of sites for each land use. The types of sites to be prioritized for each land use are detailed in section VII. of this fact sheet as well as the permit .
- Each Copermittee shall implement, or require implementation of, minimum BMPs at sites for each land use, based on the sites' designated priority levels.
- Each Copermittee shall conduct inspections of sites for each land use based on the sites' designated priority levels.
- Each Copermittee shall enforce its ordinances at all sites for all land uses.

In addition to the general requirements listed above for each land use, the Jurisdictional URMP also contains specific requirements for each land use. These requirements are detailed section VII. of this fact sheet as well as the permit.

While the specific Jurisdictional URMP requirements for each of the three phases of urbanization (i.e., planning, construction, and use or operational phase) are detailed above, the Jurisdictional URMP also contains requirements which apply to all of the phases of urbanization. These include:

- Education – Each Copermittee shall implement an education program using various types of media to (1) increase the knowledge of target communities regarding MS4s, impacts of urban runoff on receiving waters, and potential BMP solutions; and (2) change the behavior of target communities and thereby reduce pollutant releases to the MS4 and receiving waters.
- Illicit Discharge Detection and Elimination – Each Copermittee shall develop and implement measures to detect and eliminate all illicit discharges. This includes measures to respond to sewage and other spills, limit infiltration from sanitary sewers, and facilitate proper disposal and encourage reporting by the public.
- Public Participation – Each Copermittee shall incorporate a mechanism for public participation in the implementation of the Jurisdictional URMP.
- Assessment of Effectiveness – Each Copermittee shall develop a long-term strategy for assessing the effectiveness of its urban runoff management program.
- Fiscal Analysis – Each Copermittee conduct annual fiscal analyses to exhibit adequate fiscal resources necessary to meet the requirements of Order No. 2001-01.

Watershed Urban Runoff Management Program

As discussed above, each Copermittee has responsibility for the impacts of its urban runoff on its respective watershed(s). This is because urban runoff does not follow jurisdictional boundaries, and often travels through many jurisdictions while flowing to receiving waters. Therefore, the actions of various municipalities within a watershed regarding urban runoff can have a cumulative impact upon shared receiving waters. For

this reason, Order No. 2001-01 requires each Copermittee to develop and implement a Watershed URMP. The Watershed URMPs are to be developed later in the permit cycle. Copermittees within each watershed shall collaborate to develop and implement a Watershed URMP for the watershed. The purpose of the Watershed URMPs is to identify and address the highest priority water quality issues/pollutants in each watershed. Under the Watershed URMP requirements, the Copermittees of a watershed shall:

- Map the watershed and identify all receiving waters, all impaired receiving waters, land uses, highways, jurisdictional boundaries, and inventoried commercial, industrial, construction, municipal sites, and residential areas.
- Assess the water quality of all receiving waters in the watershed based on existing data, and eventually perform watershed based water quality monitoring.
- Identify and prioritize major water quality problems in the watershed caused or contributed to by discharges from MS4s, including potential sources of the problems.
- Develop and implement a time schedule of activities needed to address the highest priority water quality problems.
- Identify which Copermittee is responsible for implementing each recommended watershed activity.
- Develop and implement a mechanism for public participation in watershed activities.
- Develop and implement a watershed based education program.
- Develop a strategy for assessing the effectiveness of the Watershed URMP.

All Copermittee Collaboration

The Copermittees shall implement a collective management structure to allow individual Copermittees to carry out permit requirements with other Copermittees, either as a whole (all of the Copermittees countywide) or within a watershed (Copermittees within a watershed). This Order No. 2001-01 requirement provides for more effective urban runoff management, in that it allows for various Copermittee roles to be defined and aids in the sharing of costs to meet permit requirements.

Monitoring

Order No. 2001-01 requires a comprehensive monitoring program for urban runoff impacts to receiving waters. The monitoring program will help prioritize efforts so that limited resources will be most effective in improving receiving water quality. It will also aid in assessing the effectiveness of urban runoff management efforts. The Copermittees are to develop the monitoring program; however, the SDRWQCB has outlined several aspects to be included in the program. These aspects include:

- Development of a Previous Monitoring and Future Recommendations Report which summarizes all previous wet weather monitoring results and recommends future monitoring activities.
- Development and implementation of a urban stream bioassessment monitoring program, which shall consist of station identification, sampling, monitoring, and analysis of bioassessment stations to determine the biological and physical integrity of urban streams within the County of San Diego.

- Monitoring of existing mass loading stations for the purposes of evaluating long-term trends.
- Development and implementation of a monitoring program for discharges of urban runoff from coastal storm drain outfalls.
- Development and implementation of a monitoring program to assess the impact of urban runoff on ambient receiving water quality.
- Development and implementation of a monitoring program to assess the impact of urban runoff on Toxic Hot Spots in San Diego Bay.

Reporting

Under Order No. 2001-01, each Copermittee must submit a series of documents and reports. The following is a brief description of the primary reports required by Order No. 2001-01. When each Copermittee has developed its Jurisdictional Urban Runoff Management Programs and Watershed Urban Runoff Management Programs (by dates specified in the permit), it must submit documents describing the programs. Each Copermittee must also annually submit Jurisdictional URMP Annual Reports and Watershed URMP Annual Reports once the programs have been implemented. An annual monitoring report for the Copermittees must also be submitted. There are other documents and reports required for submittal; these documents and reports are detailed in section VII. of this fact sheet and in Order No. 2001-01.

CONCLUSION (PERMIT SUMMARY)

Order No. 2001-01 is an essential mechanism for maintaining and improving water quality in San Diego County. Since the inception of the NPDES Storm Water Program, some advancements have been made in the San Diego region to control urban runoff pollution. This includes a better understanding by local managers of the regulations, the Think Blue public education campaign, and improved Copermittee group communication. However, continued improvement in urban runoff quality is still necessary to achieve sound protection of beneficial uses of the region's receiving waters.

V. COMMON MUNICIPAL STORM WATER PERMIT ISSUES

Interested parties have frequently brought the following issues listed below to the attention of the SDRWQCB. During issuance of previous draft versions of this municipal storm water permit, most comments from interested parties have revolved around these issues. For this reason, the SDRWQCB has included its responses to the following issues in order to clarify its position regarding the issues.

1. Issue: Is the SDRWQCB required to meet California Environmental Quality Act (CEQA) requirements prior to adoption of the tentative Municipal Storm Water Permit for San Diego County and Cities (tentative permit)?

> **Response:** No. The adoption and issuance of the tentative permit itself, and the requirements contained in the tentative permit, are exempt from CEQA under California Water Code section 13389. California Water Code section 13389 exempts the adoption of waste discharge requirements (such as NPDES permits) from CEQA requirements.

2. Issue: Do the requirements of the tentative permit constitute an "unfunded mandate"?

Response: No. The requirements of the tentative permit are not within the definition of "unfunded mandate" that would require reimbursement of costs under the California Constitution. This is because the requirements of the tentative permit are derived from the federal Clean Water Act, as opposed to State Law. Since the order would implement a federal requirement, rather than a state requirement, the order is not an "unfunded mandate" by the state. The State Water Resources Control Board (SWRCB) has previously determined in several circumstances that regional board orders are exempt from the requirement for reimbursement under the California Constitution.

3. Issue: Does the SDRWQCB have the legal authority to require municipalities to regulate urban runoff flow to protect beneficial uses of receiving waters?

Response: Yes. Federal NPDES regulation 40 CFR 122.44(d)(1) requires municipal storm water permits to include any requirements necessary to "[a]cheive water quality standards established under section 303 of the CWA, including State narrative criteria for water quality." The term "water quality standards" in this context refers to a water body's **beneficial uses** and the water quality objectives necessary to protect those beneficial uses. The negative impact of urban runoff flow on the beneficial uses of receiving waters has been widely documented. Increases in flows from impervious surfaces associated with urbanization can result in (1) increases in the number of bankfull events and increased peak flow rates; (2) sedimentation and increased sediment transport; (3) frequent flooding; (4) stream bed scouring and habitat degradation; (5) shoreline erosion and stream bank widening; (6) decreased baseflow; (7) loss of fish populations and loss of sensitive aquatic species; (8) aesthetic degradation; and (9) changes in stream morphology.[29] US EPA finds that the level of imperviousness resulting from urbanization is strongly correlated with the water quality impairment of nearby receiving waters.[30] US EPA further attributes much of this water quality impairment to changes in flow conditions from urbanization, stating "[I]n many cases, the impacts on receiving streams due to high storm water flow rates or volumes can be more significant than those attributable to the contaminants found in storm water discharges."[31] Therefore, in order to protect the beneficial uses and water quality objectives of waters receiving urban runoff flows (as **required** by 40 CFR 122.44(d)(1)), the SDRWQCB has under certain circumstances placed limits on urban runoff flows in the tentative permit.

In addition, the authority of states to regulate flow in order to protect water quality standards has been addressed by the U.S. Supreme Court in PUD No. 1 v. Washington Department of Ecology, 511 U.S. 700 (1994). In this case the U.S.

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[29] U.S. Environmental Protection Agency. 1999. Preliminary Data Summary of Urban Storm Water Best Management Practices. EPA-821-R-99-012. p. 4-24.

[30] U.S. Environmental Protection Agency. 1999. 40 CFR Parts 9, 122, 123, and 124 National Pollutant discharge Elimination System – Regulations for Revision of the Water Pollution Control Program Addressing Storm Water Discharges; Final Rule. p. 68727.

[31] U.S. Environmental Protection Agency. 1999. Preliminary Data Summary of Urban Storm Water Best Management Practices. EPA-821-R-99-012. p. 4-23.

Supreme Court found that the Clean Water Act applies to water quantity as well as water quality, stating "[p]etitioners also assert more generally that the Clean Water Act is only concerned with water 'quality' and does not allow the regulation of water 'quantity.' This is an artificial distinction. In many cases, water quantity is closely related to water quality." The U.S. Supreme court goes on to refer to the Clean Water Act's definition of pollution ("the man-made or man induced alteration of the chemical, physical, biological, and radiological integrity of water" 33 U.S.C. 1362(19)) and states "[t]his broad conception of pollution – one which expressly evinces Congress' concern with the physical and biological integrity of water – refutes petitioners' assertion that the Act draws a sharp distinction between the regulation of water 'quantity' and water 'quality'." In this context, the U.S. Supreme Court held that the state's regulation of flow was "a limitation necessary to enforce the designated use of the River as a fish habitat." Finally, it was held that the state's regulation of flow was "a proper application of the state and federal antidegradation regulations, as it ensures than an 'existing instream water use' will be 'maintained and protected.' 40 CFR 131.12(a)(1) (1992)."

4. Issue: Can the SDRWQCB include in the tentative permit more specific requirements than those stated in the federal NPDES regulations?

Response: Yes. In both a general sense, as well as specifically relating to municipal storm water, the Clean Water Act explicitly preserves independent state authority to enact and implement its own standards and requirements, provided that such standards and requirements are at least as stringent as those that would be mandated by the Clean Water Act and the federal regulations. For example, as one general overriding principle, Clean Water Act section 510 states "nothing in this chapter shall (1) preclude or deny the right of any State or political subdivision thereof or interstate agency to adopt or enforce (A) any standard or limitation respecting discharges of pollutants, or (B) any requirement respecting control or abatement of pollution […]." When relating specifically to storm water, Clean Water Act section 402(p)(3)(B)(iii) clearly provides states with wide-ranging discretion, stating that municipal storm water permits "[s]hall require controls to reduce the discharge of pollutants to the maximum extent practicable, including management practices, control techniques and system, design and engineering methods, **and such other provisions as the Administrator or the State determines appropriate for the control of such pollutants**" (emphasis added).

Therefore, where the tentative permit contains requirements more specific than those included in the federal NPDES regulations 40 CFR 122.26(d), it is seeking to meet the above Clean Water Act requirements, as well as other particular federal NPDES regulations such as 40 CFR 122.44(d)(1)(i). This federal NPDES regulation requires NPDES permits to include limitations to "control all pollutants or pollutant parameters (either conventional, nonconventional, or toxic pollutants) which the Director determines are or may be discharged at a level which will cause, have the reasonable potential to cause, or contribute to an excursion above any State water quality standard, including State narrative criteria for water quality." Given the continued impact of urban runoff on receiving waters within the San Diego region, increased specificity in municipal storm water permits is necessary to meet the above CWA and federal regulation requirements.

In a 1992 decision, the U.S. Court of Appeals for the Ninth Circuit (NRDC v. US EPA, 966 F.2d 1292) interpreted the language in Clean Water Act section 402(p)(3)(B)(iii) as providing the State with substantial discretion and authority: "[t]he language in (iii), above, requires the Administrator or the State to design controls. Congress did not mandate a minimum standards approach or specify that U.S. EPA develop minimal performance requirements […] we must defer to U.S. EPA on matters such as this, where U.S. EPA has supplied a reasoned explanation of its choices." The decision in essence holds that the U.S. EPA and the States are authorized to require implementation of storm water control programs that, upon "reasoned explanation," accomplish the goals of CWA section 402(p). The Ninth Circuit Court of Appeals further reinforced the State's authority in this area more recently in 1999. In Defenders of Wildlife v. Browner (1999) Case No. 98-71080, the Court cited the language of CWA section 402(p)(3)(B)(iii) and stated "[t]hat provision gives the U.S. EPA discretion to determine what pollution controls are appropriate. As this court stated in NRDC v. U.S. EPA, 'Congress gave the administrator discretion to determine what controls are necessary […].'"

Furthermore, the increased specificity included in the tentative permit is in line with US EPA guidance included in its *Guidance Manual for the Preparation of Part 2 of the NPDES Permit Applications for Discharges from Municipal Separate Storm Sewer Systems*[32] and its *Interim Permitting Approach for Water Quality-Based Effluent Limitations in Storm Water Permits*.[33] Where the tentative permit is more specific than the federal regulations, it is frequently based on the recommendations of the Guidance Manual. The Interim Permitting Approach also supports increased specificity in storm water permits, recommending that municipal storm water permits use "best management practices (BMPs) in first-round storm water permits, and **expanded or better-tailored BMPs in subsequent permits**, where necessary, to provide for the attainment of water quality standards. In cases where adequate information exists to develop more specific conditions or limitations to meet water quality standards, these conditions or limitations are to be incorporated into storm water permits, as necessary and appropriate" (emphasis added). It is important to note that the SWRCB cited US EPA's Interim Permitting Approach as support for its recent tentative decision which upheld the increased specificity of numeric sizing criteria requirements for post-construction BMPs as appropriate requirements in municipal storm water permits.

Finally, the Copermittees have frequently requested clarification from the SDRWQCB on what is necessary to achieve compliance with the current Municipal Storm Water Permit for San Diego County and Cities (Order No. 90-42). The tentative permit responds to this request by describing the minimum permit requirements in detail.

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[32] U.S. Environmental Protection Agency. 1992. Guidance Manual for the Preparation of Part 2 of the NPDES Permit Applications for Discharges from Municipal Separate Storm Sewer Systems. EPA 833-B-92-002.

[33] U.S. Environmental Protection Agency. 1996. Interim Permitting Approach for Water Quality-Based Effluent Limitations in Storm Water Permits. 61 FR 43761.

5. Issue: Does the tentative permit dictate the design and manner of compliance in which the Copermittees are to comply with its requirements, in violation of California Water Code section 13360?

Response: No. CWA section 402(p)(3)(B)(iii) provides that municipal storm water permits "shall require controls to reduce the discharge of pollutants to the maximum extent practicable, including management practices, control techniques and system, design and engineering methods, and such other provisions as the Administrator or the State determines appropriate for the control of such pollutants." To meet this requirement of the CWA, the tentative permit requires the implementation of BMPs, as required under Federal NPDES regulation 40 CFR 122.44(k). While the tentative permit includes requirements for widespread BMP implementation, it does not require use of any particular BMPs. The tentative permit actually encourages implementation of combinations of BMPs, and further does not preclude any particular BMPs or other means of compliance. A permit which allows for seemingly infinite means for achieving compliance does not 'specify the design or manner of compliance' in violation of California Water Code section 13360.

The specified programs included in the tentative permit must be implemented by the Copermittees in order to carry out the CWA requirements. Any specified programs in the tentative permit are made all the more necessary by the exclusion of numerical effluent limits from the permit. Reliance on BMPs as opposed to numerical effluent limits requires specification of those programs that are relied upon to reduce pollution.

Finally, the SWRCB's recent tentative decision on the appeal of the Los Angeles Regional Water Quality Control Board's (LARWQCB's) action on SUSMPs and numeric sizing criteria appears to support inclusion of detail in municipal storm water permits on the level which is found in the tentative permit. The SWRCB tentatively found that the numeric sizing criteria requirement for post-construction BMPs did not violate California Water Code section 13360. Provided that the numeric sizing criteria requirement is most likely the most specific requirement in the tentative permit, the SWRCB tentative decision in support of numeric sizing criteria indicates its general approval of the level of detail found in the tentative permit.

6. Issue: Do discharges from municipal separate storm sewer systems (MS4s) need to meet the water quality standards (beneficial uses and water quality objectives) of the receiving waters to which they discharge?

Response: Yes. The issue of whether storm water discharges from MS4s must meet water quality standards has been intensely debated for the past five years. The argument arises because Clean Water Act section 402(p) fails to clearly state that municipal dischargers of storm water must meet water quality standards. On the issue of industrial discharges of storm water, the statute clearly indicates that industrial dischargers must meet both (1) the technology-based standard of "best available technology economically achievable (BAT)" and (2) applicable water quality standards. On the issue of municipal discharges however, the statute states that municipal dischargers must meet (1) the technology-based standard of "maximum extent practicable (MEP)" and (2) "such

other provisions that the Administrator or the State determines appropriate for the control of such pollutants." The statute fails, however, to specifically state that municipal dischargers must meet water quality standards.

As a result, the municipal storm water dischargers have argued that they do not have to meet water quality standards; and that they only are required to meet the MEP standard. Environmental interest groups maintain that not only do MS4 discharges have to meet water quality standards, but that MS4 permits must also comply with numeric effluent limitations for the purpose of meeting water quality standards. On the issue of water quality standards, the US EPA, the SWRCB, and the SDRWQCB have consistently maintained that MS4s must indeed comply with water quality standards. On the issue of whether water quality standards must be met by numeric effluent limits, the US EPA, the SWRCB (in Orders WQ 91-03 and WQ 91-04), and the SDRWQCB have maintained that MS4 permits can, at this time, contain narrative requirements for the implementation of BMPs in place of numeric effluent limits.

SWRCB rationale: In addition to relying on US EPA's legal opinion concluding that MS4s must meet MEP and water quality standards, the SWRCB also relied on the Clean Water Act's explicit authority for States to require "such other provisions that the Administrator or the State determines appropriate for the control of such pollutants" in addition to the technology-based standard of MEP. To further support its conclusions that MS4 permit dischargers must meet water quality standards, the SWRCB relied on provisions of the California Water Code that specify that all waste discharge requirements must implement applicable Basin Plans and take into consideration the appropriate water quality objectives for the protection of beneficial uses.

The SWRCB first formally concluded that permits for MS4s must contain effluent limitations based on water quality standards in its Order WQ 91-03. In that Order, the SWRCB also concluded that it was appropriate for Regional Boards to achieve this result by requiring best management practices, rather than by inserting numeric effluent limitations into MS4 permits. In Order WQ 98-01, the SWRCB prescribed specific precedent setting Receiving Water Limitations language to be included in all future MS4 permits. This language specifically requires that MS4 dischargers meet water quality standards and allows for the use of narrative BMPs (increasing in stringency and implemented in an iterative process) as the mechanism by which water quality standards can be met.

In Order WQ 99-05, the SWRCB modified its receiving water limitations language found in Order WQ 98-01 to meet specific objections by the US EPA (the modifications resulted in stricter compliance with water quality standards). SWRCB Order WQ 99-05 states "In Order WQ 98-01, the State Water Resources Control Board (State Water Board) ordered that certain receiving water limitation language be included in future municipal storm water permits. Following inclusion of that language in permits issued by the San Francisco Bay and San Diego Regional Water Quality Control Boards (Regional Water Boards) for Vallejo and Riverside respectively, the United States Environmental Protection Agency (EPA) objected to the permits. The EPA objection was based on the receiving water limitation language. The EPA has now issued those

permits itself and has included receiving water limitation language it deems appropriate.

"In light of EPA's objection to the receiving water limitation language in Order WQ 98-01 and its adoption of alternative language, the State Water Board is revising its instructions regarding receiving water limitation language for municipal storm water permits. It is hereby ordered that Order WQ 98-01 will be amended to remove the receiving water limitation language contained therein and to substitute the EPA language. Based on the reasons stated here, and as a precedent decision, the following receiving water limitation language [which is found in Receiving Water Limitations item C. of Order No. 2001-01] shall be included in future municipal storm water permits."

In a late 1999 case involving MS4 permits issued by US EPA to several Arizona cities (Defenders of Wildlife v. Browner, 1999, 197 F. 3d 1035), the United States Court of Appeals for the Ninth Circuit upheld US EPA's requirement for MS4 dischargers to meet water quality standards, but it did so on the basis of US EPA's discretion rather than on the basis of strict compliance with the Clean Water Act. In other words, while holding that the Clean Water Act does not require all MS4 discharges to comply strictly with state water quality standards, the Court also held that US EPA has the authority to determine that ensuring strict compliance with state water quality standards is necessary to control pollutants. On the question of whether MS4 permits must contain numeric effluent limitations, the court upheld US EPA's use of iterative BMPs in place of numeric effluent limits.

SWRCB's final position: On October 14, 1999, the SWRCB issued a legal opinion on the federal appellate decision and provided advice to the Regional Boards on how to proceed in the future. In the memorandum, the SWRCB concludes that the recent Ninth Circuit opinion upholds the discretion of US EPA and the State to (continue to) issue permits to MS4s that require compliance with water quality standards through iterative BMPs. Moreover, the memorandum states that "[…] because most MS4 discharges enter impaired water bodies, there is a real need for permits to include stringent requirements to protect those water bodies. As total maximum daily loads (TMDLs) are developed, it is likely that MS4s will have to participate in pollutant load reductions, and the MS4 permits are the most effective vehicles for those reductions." In summary, the SWRCB concludes that the Regional Boards should continue to include the Receiving Water Limitations language established in SWRCB Order WQ 99-05 in all future permits.

Accordingly, the SDRWQCB has required in the tentative permit that discharges from MS4s meet receiving water quality objectives.

7. Issue: What is the definition of "maximum extent practicable (MEP)" and who defines it?

Response: Under Section 402(p) of the Clean Water Act, municipalities are required to reduce the discharge of pollutants from their storm water conveyance systems to the maximum extent practicable (MEP). MEP is the critical technology-based performance standard which municipalities must attain in order to comply with their municipal storm water permits. The MEP standard establishes the level of pollutant reductions the municipality must achieve. MEP

generally emphasizes pollution prevention and source control BMPs (as the first line of defense) **in combination** with treatment methods serving as a backup (additional line of defense).

To achieve the MEP standard, municipalities must employ whatever BMPs are technically feasible (i.e., are likely to be effective) and are not cost prohibitive. The major emphasis is on technical feasibility. Reducing pollutants to the MEP means choosing effective BMPs, and rejecting applicable BMPs only where other effective BMPs will serve the same purpose, or the BMPs would not be technically feasible, or the cost would be prohibitive. In selecting BMPs to achieve the MEP standard, the following factors may be useful to consider:

a. Effectiveness: Will the BMPs address a pollutant (or pollutant source) of concern?
b. Regulatory Compliance: Is the BMP in compliance with storm water regulations as well as other environmental regulations?
c. Public Acceptance: Does the BMP have public support?
d. Cost: Will the cost of implementing the BMP have a reasonable relationship to the pollution control benefits to be achieved?
e. Technical Feasibility: Is the BMP technically feasible considering soils, geography, water resources, etc?

If a municipality reviews a lengthy menu of BMPs and chooses to select only a few of the least expensive BMPs, it is likely that MEP has not been met. On the other hand, if a municipal discharger employs all applicable BMPs except those where it can show that they are not technically feasible in the locality, or whose cost is prohibitive, it would have met the standard. Where a choice may be made between two BMPs which should provide generally comparable effectiveness, the discharger may choose the least expensive alternative and exclude the more expensive BMP. However, it would not be acceptable either to reject all BMPs which would address a pollutant source, or to pick a BMP base solely on cost, which would be clearly less effective. In selecting BMPs the municipality must make a serious attempt to comply and practical solutions may not be lightly rejected. In any case, the burden would be on the municipal discharger to show compliance with its permit. After selecting a menu of BMPs, it is the responsibility of the discharger to ensure that all BMPs are implemented.[34]

A definition of MEP is not provided in either the federal statute or in the federal regulations. The final determination regarding whether a municipality has reduced pollutants to the maximum extent practicable can only be made by the Regional or State Water Boards, and not by the municipal discharger. While Regional or State Boards ultimately define MEP, it is the responsibility of the Copermittees to initially propose actions that implement BMPs to reduce pollution to the MEP. In other words, the Copermittees' Jurisdictional and Watershed Urban Runoff Management Programs (URMPs) to be developed under the tentative permit are the Copermittees' proposals of MEP. Their total collective and individual activities conducted pursuant to their URMPs become their proposal for MEP as it applies both to their overall effort, as well as to specific activities.

[34] Source: February 11, 1993 memo entitled "Definition of Maximum Extent Practicable" by Elizabeth Jennings, Senior Staff Counsel, SWRCB

It is the SDRWQCB's responsibility to evaluate the proposed programs and specific BMPs to determine what constitutes MEP, using the above guidance and the court's decision in NRDC v. California Department of Transportation, Federal District Court, Central District of California (1994). The court stated that a permittee must evaluate and implement BMPs except where (1) other effective BMPs will achieve greater or substantially similar pollution control benefits; (2) the BMP is not technically feasible; or (3) the cost of BMP implementation greatly outweighs the pollution control benefits. In the absence of a proposal acceptable to the SDRWQCB, the SDRWQCB will define MEP by requiring implementation of additional measures by the Copermittees.

8. Issue: Can the SDRWQCB compel municipalities to use the local authority to control activities of third parties subject to their governmental jurisdiction that could affect the quality of the waters of the state?

Response: Yes. Copermittees cannot passively receive and discharge pollutants from third parties. As US EPA states, "The operator of a small MS4 that does not prohibit and/or control discharges into its system essentially accepts 'title' for those discharges. At a minimum, by providing free and open access to the MS4s that convey discharges to the waters of the United States, the municipal storm sewer system enables water quality impairment by third parties."[35]

Discharges of pollutants to the MS4 must therefore be controlled, and an important means for a municipality to achieve this is through the development and enforcement of municipal legal authority. USEPA states "A crucial requirement of the NPDES storm water regulation is that a municipality must demonstrate that it has adequate legal authority to control the contribution of pollutants in storm water discharged to its MS4. […] In order to have an effective municipal storm water management program, a municipality must have adequate legal authority to control the contribution of pollutants to the MS4. […] 'Control,' in this context, means not only to require disclosure of information, but also to limit, discourage, or terminate a storm water discharge to the MS4." [36]

Since discharges which enter the MS4 are generally discharged unimpeded directly into receiving waters, the Copermittee's legal authority is to apply to both discharges into and from MS4s. Federal NPDES regulations clearly provide the SDRWQCB with the legal authority to require municipalities to control discharges from third parties into their MS4. 40 CFR 122.26(d)(2)(iv)(A - D) require municipalities to implement controls to reduce pollutants in urban runoff **from** commercial, residential, industrial, and construction land uses or activities. Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(A - D) require municipalities to have legal authority to control various discharges **to** their MS4. This concept is further supported in the Preamble to the Phase II Final Rule NPDES storm water

[35] U.S. Environmental Protection Agency. 1999. 40 CFR Parts 9, 122, 123, and 124 National Pollutant discharge Elimination System – Regulations for Revision of the Water Pollution Control Program Addressing Storm Water Discharges; Final Rule. p. 68765.
[36] U.S. Environmental Protection Agency. 1992. Guidance Manual for the Preparation of Part 2 of the NPDES Permit Applications for Discharges from Municipal Separate Storm Sewer Systems. EPA 833-B-92-002.

regulations, which states "The operators of regulated small MS4s cannot passively receive and discharge pollutants **from** third parties"[37] (emphasis added). Due to the greater water quality concerns generally experienced by larger municipalities, Phase II Final Rule findings for small municipalities are also applicable to larger municipalities such as the Copermittees. Finally, underlying the Federal NPDES storm water regulations is the Clean Water Act, which states in section 402(p)(3)(B)(ii) that municipalities shall "effectively prohibit non-stormwater discharges **into** the storm sewers" (emphasis added).

The requirement for municipal storm water dischargers to have, and exercise, local governmental authority in order to comply with water quality control obligations is analogous to the requirement for Publicly Owned Treatment Works to have and exercise legal authority to require pretreatment of industrial wastes being discharged to their sewage collections systems (CWA 402(b)(8)).

9. Issue: Does the tentative permit improperly shift responsibility for control of construction and industrial sources of pollution to the Copermittees?

Response: No. US EPA felt it so important to control the discharge of pollutants from construction and industry that it established a double system of regulation over construction and industrial sites. Two parallel regulatory systems were established with the same common objective of keeping pollutants from construction and industrial sites out of the municipal separate storm sewer system (MS4). A structure was created where local governments must enforce their local ordinances and permits as required under their municipal storm water permits, while the SDRWQCB (state) must enforce its statewide general construction and industrial storm water permits. The two regulatory systems were designed to complement and support each other in the shared goal of minimizing pollutant discharges in runoff from construction and industrial sites.

Local governments have the primary regulatory authority over the majority of construction and industrial sites since they issue the development and land use permits for the sites. In other words, the Copermittees are responsible for the water quality consequences of their planning, construction, and land use decisions. Since local governments are the lead permitting authority for construction and industrial sites, they are also the lead for enforcement of discharges from the sites, with support coming from the SDRWQCB. If it is found that a local government has made a good faith, but unsuccessful effort to achieve compliance with its ordinances and permits, the SDRWQCB will step in to assist the local government by enforcing its general statewide permit. However, it is important to note that the SDRWQCB looks first to the local government that has authorized the construction or land use to enforce compliance with its applicable ordinances and permits.

US EPA supports this approach, clearly placing responsibility for the control of discharges from construction and industrial sites with municipalities. US EPA notes in the preamble to the storm water regulations that municipalities are in the

[37] U.S. Environmental Protection Agency. 1999. 40 CFR Parts 9, 122, 123, and 124 National Pollutant discharge Elimination System – Regulations for Revision of the Water Pollution Control Program Addressing Storm Water Discharges; Final Rule. p. 68765.

best place to enforce industrial compliance with storm water discharge requirements, stating "[b]ecause storm water from industrial facilities may be a major contributor of pollutants to MS4s, municipalities are obligated to develop controls for storm water discharges associated with industrial activity through their system in their storm water management program […]"[38] and "[t]hese permits are expected to require that controls be placed on storm water discharges associated with industrial activity which discharge through the municipal system."[39]

Regarding construction sites, US EPA also places enforcement responsibility on municipalities, requiring small municipalities to develop and implement "[a]n ordinance or other regulatory mechanism to require erosion and sediment controls, as well as **sanctions** to ensure compliance […]" (40 CFR 122.34(b)(4)(ii)(A)) (emphasis added). In its guidance for the Phase II regulations, US EPA goes on to support increased municipality responsibility, stating "Even though all construction sites that disturb more than one acre are covered nationally by an NPDES storm water permit, the construction site runoff control minimum measure for the small MS4 program is needed to induce more localized site regulation and enforcement efforts, and to enable operators of regulated small MS4s to more effectively control construction site discharges into their MS4s."[40] While these above citations refer to small municipalities under Phase II of the NPDES program, US EPA recommendations to small municipalities are applicable to larger municipalities such as the Copermittees, due to the typically more serious water quality concerns attributed to such larger municipalities.

10. Issue: Must the tentative permit require that municipal storm water discharges meet numeric effluent limits?

Response: No. Although NPDES permits must contain conditions to ensure that water quality standards are met, this does not require the use of numeric effluent limitations. Under the Clean Water Act and federal NPDES regulations, permitting authorities may employ a variety of conditions and limitations in storm water permits, including best management practices, performance objectives, narrative conditions, monitoring triggers, actions levels (e.g., monitoring benchmarks, toxicity reduction evaluation action levels), etc., as the necessary effluent limitations, where numeric effluent limitations are determined to be unnecessary or infeasible.

Neither the Clean Water Act nor the federal NPDES regulations require numeric effluent limitations for municipal storm water discharges. Section 301 of the Clean Water Act requires that discharger permits include effluent limitations necessary to meet water quality standards. Section 502 defines "effluent

[38] U.S. Environmental Protection Agency. 1990. 40 CFR Parts 122, 123, and 124 National Pollutant discharge Elimination System Permit Application Regulations for Storm Water Discharges; Final Rule. p. 48000.
[39] U.S. Environmental Protection Agency. 1990. 40 CFR Parts 122, 123, and 124 National Pollutant discharge Elimination System Permit Application Regulations for Storm Water Discharges; Final Rule. p. 48006.
[40] U.S. Environmental Protection Agency. 2000. Storm Water Phase II Compliance Assistance Guide. EPA 833-R-00-002.

limitations" to mean any restriction on quantities, rates, and concentrations of constituents discharged from point sources. The Clean Water Act does not say that effluent limitations need be numeric. As a result, US EPA and States have flexibility in terms of how to express effluent limitations.

US EPA has, through the federal NPDES regulations, interpreted the Clean Water Act statute to allow for non-numeric effluent limitations (e.g., best management practices) to replace numeric effluent limitations where numeric effluent limitations are infeasible (40 CFR 122.44(k)). US EPA has found numeric effluent limitations infeasible because storm water discharges are highly variable both in terms of flow and pollutant concentrations, and the relationships between discharges and water quality can be complex. The current use of system-wide permits and a variety of jurisdiction-wide BMPs, including educational and programmatic BMPs, does not easily lend itself to the existing methodologies for deriving numeric effluent limitations.

It should be noted that while the tentative permit does not specify numeric effluent limitations for municipal urban runoff discharges, it does not preclude numeric effluent limitations from applying to municipal urban runoff discharges into impaired water bodies. Where impaired water bodies are not meeting their water quality standards, numeric effluent limitations may be placed on municipal urban runoff discharges through the implementation of total maximum daily loads (TMDLs) or other means. Furthermore, methods utilized to calculate waste load allocations for TMDLs may eventually be used to develop numeric effluent limitations for urban runoff in municipal storm water permits.[41]

11. Issue: Does the tentative permit provide adequate time for the Copermittees to develop and implement programs to meet its requirements?

Response: Yes. The tentative permit provides the Copermittees with at least six months to develop and implement their Jurisdictional Urban Runoff Management Programs. With regards to the component of the Jurisdictional Urban Runoff Management Programs which addresses planning and new development, the Copermittees are given a full year for development and implementation. In addition, the Copermittees are allowed at least 18 months to develop and implement their individual Standard Urban Storm Water Mitigation Plans (SUSMPs) for new development. Given that the federal NPDES storm water regulations, as well as the Copermittees' current storm water permit, have been in place for approximately 10 years, the Copermittees should require little time to develop and implement Jurisdictional Urban Runoff Management Programs which meet the tentative permit requirements. The time periods provided by the tentative permit should be more than adequate.

12. Issue: Should the tentative permit allow for urban runoff from new development and significant redevelopment to be addressed by regional BMPs (i.e., end of pipe or diversion BMPs) in lieu of site-specific BMPs?

[41] Source: U.S. Environmental Protection Agency. 1996. Interim Permitting Approach for Water Quality-Based Effluent Limitations in Storm Water Permits. 61 FR 43761.

Response: No. The SDRWQCB feels that regional BMP approaches (such as end of pipe diversions) send the wrong message to dischargers and the public, which can then cause setbacks in progress which has already been made. Instead of the idea that "business as usual" is acceptable since regional BMPs will "take care of everything" downstream, the message that SUSMPs and numeric sizing criteria should send is that behavior and site design must change in order for water quality to improve. In the San Diego region, it is already difficult to convince residents and businesses in inland cities that activities there will have an important impact on water quality in coastal waters such as San Diego Bay or Los Penasquitos Lagoon. Both of these water bodies are listed as Clean Water Act section 303(d) impaired water bodies due in part to urban runoff. The advent of regional end of pipe BMP approaches will make that message even more difficult to communicate. Moreover, on-site structural BMPs are important education tools. Movement of BMPs out of sight of the public reduces their educational benefits. Rather than send false messages, BMPs and their site selection should encourage environmental stewardship by the public for the watersheds in which they live and work. Consequently, nearly all of the programs required and implemented under the Phase I Municipal Storm Water NPDES permits have been focused on source reduction through modification of behaviors/practices, in combination with the use of on-site structural BMPs, rather than on regional end of pipe treatment or diversion. In fact, on-site BMP implementation (such as a combination of pollution prevention, source control, and treatment BMPs) is a fundamental requirement of Order No. 2001-01. Shifting BMP implementation from an on-site focus to a regional focus violates this fundamental requirement.

The SDRWQCB is skeptical that large-scale regional BMPs would be cost effective. Treatment costs for municipal storm water generally increase with distance from the source. Regional "end of pipe" treatment also results in the loss of cost reducing opportunities for water quality improvements en route. Rather than increasing costs, small collection strategies, located at the point where runoff initially meets the ground, repeated consistently over entire projects, will usually yield the greatest water quality improvements for the least cost.[42] Furthermore, where regional approaches have been relatively successful, such as Fresno, generally few municipalities have been involved. In urbanized watersheds with many different jurisdictions, such as those in Los Angeles and San Diego, there will be significantly greater organizational and jurisdictional difficulties, and hence drastically higher costs. For example, the failure in the San Diego Region of a regional BMP approach, the Carmel Valley Restoration Project, occurred due to a breakdown in coordination among agencies and resulted in a $527,000 Administrative Civil Liability fine against the City of San Diego. While the SDRWQCB supports watershed based intergovernmental coordination, this coordination is not yet in place and may take many years to develop. Furthermore, the difficulties of coordination on a watershed level are only compounded when expanded to a regional level.

In specific cases, a coordinated regional approach may be appropriate for **existing** development. However, by its very definition, new development presents opportunities for on-site BMPs to be designed into the development as an integral

[42] Bay Area Stormwater Management Agencies Association. 1999. Start at the Source. Forbes Custom Publishing.

component, at low cost, and with a greater likelihood for protecting water quality downstream over the life of the development. Where a regional BMP approach is to be used, it must be done in conjunction with on-site BMPs. On-site BMPs provide the "pre-treatment" necessary to ensure effectiveness of any potential regional BMPs, as well as to minimize maintenance and the chance of "upsets."

The problem of locating and constructing regional end of pipe BMPs is also considerable. Costs associated with finding locations for the regional treatment facilities in areas that are already largely built out, as well as the hurdles that CEQA, Waste Discharge Requirements, and NPDES permitting may present, should not be ignored. Historically, the public has been very reluctant to support the construction of treatment facilities in their neighborhoods. Opposition to such facilities, especially along the coast, has been an especially virulent form of NIMBYism (Not In My Back Yard). Moreover, the construction, maintenance, and operation of such facilities sized to treat large, seasonal, and potentially toxic volumes of storm water runoff pose high costs and protracted time delays to implement. Additionally, popular short-term regional solutions, such as end of pipe diversions into sanitary sewers, are effective only for dry weather flows. The sanitary sewerage collection systems found in the San Diego region were not designed to handle the increased loads from dry weather flows, let alone flows from even minor storm runoff events. Likewise, the existing coastal Publicly Owned Treatment Works (POTWs) are not sized to treat wet weather flows, have almost no capacity for expansion, and will not be able to treat storm water flows.

Furthermore, a regional BMP approach (i.e. end of pipe treatment) will probably lead to a progressive erosion of storm water quality gains achieved through aforementioned education programs. Since most municipalities in Southern California have historically used natural drainage features as storm water conveyances, there could be a additional loss of beneficial uses, including aesthetic benefits, in those waterways upstream of the proposed regional mitigation facilities. The inadequate implementation of on-site BMPs, which may consequently result from focusing on regional end of pipe BMP approaches, may be more damaging than maintaining the status quo. The overall result of a regional BMP approach could be additional water quality degradation to already impacted receiving waters, while new development and significant redevelopment with inadequate BMP controls continues apace.

Finally, it is important to note that Governor Davis recently opposed increasing funding for regional diversion BMPs. In his veto message of a $6.9 million bill that would have funneled money to Orange County to help curb urban runoff and clean beaches, Davis said the legislation "focuses on a temporary, seasonal fix and does not provide for identification and elimination of the sources of contamination."

13. Issue: Will the SDRWQCB approve the Copermittees' Urban Runoff Management Programs (URMPs) and other submittals?

Response: No. The SDRWQCB does not approve dischargers' submittals.[43] It is the responsibility of the Copermittees to develop and implement adequate URMPs

[43] This response refers to the SDRWQCB's policy against staff approval of dischargers' programs or documents. At times, the SDRWQCB will approve dischargers' programs or documents at a public hearing

and other measures required by Order No. 2001-01 in a timely manner. In other words, a Copermittee cannot postpone implementation of its URMP because the URMP has not been approved by the SDRWQCB. The SDRWQCB will review the URMPs and other documents and provide comments where inadequacies are observed. Provision of comments by the SDRWQCB or lack thereof does not constitute approval on the part of the SDRWQCB. The SDRWQCB will provide as much guidance as possible regarding the requirements of Order No. 2001-01, but ultimately the responsibility for development and implementation lies with the Copermittees.

VI. FINDINGS DISCUSSION

1. Finding states the following:

COPERMITTEES ARE DISCHARGERS OF URBAN RUNOFF: Each of the persons in Table 1 below, hereinafter called Copermittees or dischargers, owns or operates a municipal separate storm sewer system (MS4), through which it discharges urban runoff into waters of the United States within the San Diego Region. These MS4s fall into one or more of the following categories: (1) a medium or large MS4 that services a population of greater than 100,000 or 250,000 respectively; or (2) a small MS4 that is "interrelated" to a medium or large MS4; or (3) an MS4 which contributes to a violation of a water quality standard; or (4) an MS4 which is a significant contributor of pollutants to waters of the United States.

Table 1. Municipal Copermittees

1.	*City of Carlsbad*	*11.*	*City of National City*
2.	*City of Chula Vista*	*12.*	*City of Oceanside*
3.	*City of Coronado*	*13.*	*City of Poway*
4.	*City of Del Mar*	*14.*	*City of San Diego*
5.	*City of El Cajon*	*15.*	*City of San Marcos*
6.	*City of Encinitas*	*16.*	*City of Santee*
7.	*City of Escondido*	*17.*	*City of Solana Beach*
8.	*City of Imperial Beach*	*18.*	*City of Vista*
9.	*City of La Mesa*	*19.*	*County of San Diego*
10.	*City of Lemon Grove*	*20.*	*San Diego Unified Port District*

Discussion: Section 402 of the Clean Water Act prohibits the discharge of any pollutant to waters of the United States from a point source, unless that discharge is authorized by a NPDES permit. Though urban runoff comes from a diffuse source, it is discharged through MS4s, which are point sources under the Clean Water Act. Federal NPDES regulation 40 CFR 122.26(a) (iii) and (iv) provide that discharges from MS4s, which service medium or large populations greater than 100,000 or 250,000 respectively, shall be required to obtain a NPDES permit. Federal NPDES regulation 40 CFR 122.26(a)(v) also provides that a NPDES permit is required for "A [storm water] discharge which the Director, or in States with approved NPDES programs, either the Director or the EPA Regional Administrator, determines to contribute to a violation of a water quality standard or is a significant contributor of pollutants to waters of the United States." Such sources are then designated into the program. See Attachment 1,

during the public process. An example of this is the Order No. 2001-01 requirement for the Copermittees to develop a model Standard Urban Storm Water Mitigation Plan (SUSMP). The model SUSMP is to be approved by the SDRWQCB during a public hearing. However, in general, the documents and programs required by Order No. 2001-01 will not be approved by SDRWQCB, and never by SDRWQCB staff.

NPDES Municipal Storm Water Permit Justifications, for an explanation on NPDES municipal storm water permit coverage for each municipality.

2. Finding states the following:

URBAN RUNOFF IS A "WASTE" AND A "POINT SOURCE DISCHARGE OF POLLUTANTS": Urban runoff is a waste, as defined in the California Water Code, that contains pollutants and adversely affects the quality of the waters of the State. The discharge of urban runoff from an MS4 is a "discharge of pollutants from a point source" into waters of the United States as defined in the Clean Water Act.

Discussion: The legal definition of "waste" can be found in California Water Code (CWC) section 13050(d), which states "'Waste' includes sewage and any and all other waste substances, liquid, solid, gaseous, or radioactive, associated with human habitation, or of human or animal origin, or from any producing, manufacturing, or processing operation, including waste placed within containers of whatever nature prior to, and for purposes of, disposal." 40 CFR 122.2 defines "point source" as "any discernible, confined, and discrete conveyance, including but not limited to, any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, landfill leachate collection system, vessel or other floating craft from which pollutants are or may be discharged. This term does not include return flows from irrigated agriculture or agricultural storm water runoff." 40 CFR 122.2 defines "discharge of a pollutant" as "Any addition of any 'pollutant' or combination of pollutants to 'waters of the United States' from any point source." Also, the justification for control of pollution into Californian waters can be found at CWC Section 13260(a)(1).

3. Finding states the following:

URBAN RUNOFF CAUSES RECEIVING WATER DEGRADATION: Urban runoff discharges from MS4s are a leading cause of receiving water quality impairment in the San Diego Region and throughout the United States. As runoff flows over urban areas, it picks up harmful pollutants such as pathogens, sediment, fertilizers, pesticides, heavy metals, and petroleum products. These pollutants often become dissolved or suspended in urban runoff and are conveyed and discharged to receiving waters, such as streams, lakes, lagoons, bays, and the ocean without treatment. Once in receiving waters, these pollutants harm aquatic life primarily through toxicity and habitat degradation. Furthermore, the pollutants can enter the food chain and may eventually enter the tissues of fish and humans.

There is a strong direct correlation between "urbanization" and "impacts to receiving water quality". In general, the more heavily developed the area, the greater the impacts to receiving waters from urban runoff.

Discussion: Urbanization generally results in an increase in pollutant sources and impervious surfaces. The increase in pollutant sources associated with human land use leads to an increase in pollutant loads found in urban runoff, while the increase in impervious surfaces associated with development prevents natural processes from reducing those pollutant loads. The impervious surfaces associated with urbanization prevent soil infiltration and natural vegetation filtration of urban runoff. The end result is urban runoff flows that are higher in volume and pollutant loads. This causes the quality of receiving waters to be adversely impacted and beneficial uses to be impaired.

The US EPA supports this finding, stating in its 1996 National Water Quality Inventory that urban runoff/discharges from storm sewers are a major source of water quality impairment nationwide.[44] The 1996 Inventory also found urban runoff to be the leading cause of ocean impairment for those ocean miles surveyed.[45] In addition, the Region's Clean Water Act section 303(d) list (see Attachment 2), which identifies water bodies with impaired beneficial uses within the region, also indicates that the impacts of urban runoff on receiving waters are significant. Many of the impaired water bodies on the 303(d) list are impaired by constituents which have been found at high levels within urban runoff by the regional storm water monitoring program.[46] Examples of constituents frequently responsible for beneficial use impairment include total and fecal coliform, heavy metals, and sediment; these constituents have been found at high levels in urban runoff both regionally and nationwide.[47, 48]

Beneficial use impairment resulting from urban runoff not only harms aquatic life, but can adversely impact human health as well. The US EPA finds that receiving water impairment from urban runoff can impact human health when it states "As runoff flows over areas altered by development, it picks up harmful sediment and chemicals such as oil and grease, pesticides, heavy metals, and nutrients (e.g., nitrogen and phosphorus). These pollutants often become suspended in runoff and are carried to receiving waters, such as lakes, ponds, and streams. Once deposited, these pollutants can enter the food chain through small aquatic life, eventually entering the tissues of fish and humans." [49]

4. Finding states the following:

URBAN DEVELOPMENT INCREASES POLLUTANT LOAD, VOLUME, AND VELOCITY OF RUNOFF: During urban development two important changes occur. First, natural vegetated pervious ground cover is converted to impervious surfaces such as paved highways, streets, rooftops, and parking lots. Natural vegetated soil can both absorb rainwater and remove pollutants providing a very effective natural purification process. Because pavement and concrete can neither absorb water nor remove pollutants, the natural purification characteristics of the land are lost.

Secondly, urban development creates new pollution sources as human population density increases and brings with it proportionately higher levels of car emissions, car maintenance wastes, municipal sewage, pesticides, household hazardous wastes, pet wastes, trash, etc. which can either be washed or directly dumped into the MS4.

As a result of these two changes, the runoff leaving the developed urban area is significantly greater in volume, velocity and pollutant load than the pre-development runoff from the same area.

Discussion: Urbanization increases the amount of impervious ground cover of an area. For example, residential areas commonly cover the ground with

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44 US EPA. 1998. The National Water Quality Inventory, 1996 Report to Congress. EPA 841-R-97-008. As cited in 64 FR 68726.

45 US EPA. 1998. The National Water Quality Inventory, 1996 Report to Congress. EPA 841-R-97-008. As cited in 64 FR 68726.

46 City of San Diego. 1999. 1998-1999 City of San Diego and Co-permittee NPDES Storm Water Monitoring Program Report. By URS Greiner Woodward Clyde.

47 City of San Diego. 1999. 1998-1999 City of San Diego and Co-permittee NPDES Storm Water Monitoring Program Report. By URS Greiner Woodward Clyde.

48 US EPA. 1983. Results of the Nationwide Urban Runoff Program, Volume 1 – Final Report.

49 US EPA. 2000. Storm Water Phase II Compliance Assistance Guide. EPA 833-R-00-002.

approximately 30-70% impervious surfaces.[50] Regarding the impact of urbanization's impervious surfaces on urban runoff volume and velocity, the State Water Resources Control Board (SWRCB) Urban Runoff Technical Advisory Committee states in its 1994 report:

> Changes in stream hydrology resulting from urbanization include: increased peak discharges; increased total volume of runoff; decreased time needed for runoff to reach the stream; increased frequency and severity of flooding; changes in stream flow during dry periods due to reduced levels of infiltration in the watershed; and greater runoff velocity during storms.

This finding is further supported by the SDRWQCB's Water Quality Control Plan (Basin Plan). Regarding the impact of urban development on urban runoff pollutant loads, the Basin Plan states:

> Nonpoint source pollution is primarily the result of man's uses of land such as urbanization, roads and highways, vehicles, agriculture, construction, industry, mineral extraction, physical habitat alteration (dredging/filling), hydromodification (diversion, impoundment, channelization), silviculture (logging), and other activities which disturb land.[51] As a result, when rain falls on and drains through urban freeways, industries, construction sites, and neighborhoods it picks up a multitude of pollutants. The pollutants can be dissolved in the runoff and quickly transported by gravity flow through a vast network of concrete channels and underground pipes referred to as storm water conveyance systems. Such systems ultimately discharge the polluted runoff, without treatment, into the nation's creeks, rivers, estuaries, bays, and oceans.[52]

5. Finding states the following:

WATER QUALITY DEGRADATION INCREASES WITH PERCENT IMPERVIOUSNESS: The increased volume and velocity of runoff from developed urban areas greatly accelerates the erosion of downstream natural channels. Numerous studies have demonstrated a direct correlation between the degree of imperviousness of an area and the degradation of its receiving water quality. Significant declines in the biological integrity and physical habitat of streams and other receiving waters have been found to occur with as little as a 10% conversion from natural to impervious surfaces. (Developments of medium density single family homes range between 25 to 60% impervious). Today "% impervious coverage" is believed to be a reliable indicator and predictor of the water quality degradation expected from planned new development.

Discussion: Studies have shown that the level of imperviousness in an area strongly correlates with the quality of nearby receiving waters.[53] One comprehensive study which looked at numerous areas, variables, and methods revealed that stream degradation occurs at levels of imperviousness as low as

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[50] Dunne, T. and Leopold, L.B. 1978. Water in Environmental Planning.

[51] SDRWQCB. 1994. Water Quality Control Plan for the San Diego Basin. Page 4-66.

[52] SDRWQCB. 1994. Water Quality Control Plan for the San Diego Basin. Page 4-69 through 4-70.

[53] US EPA. 1999. 40 CFR Parts 9, 122, 123, and 124 National Pollutant Discharge Elimination System-Regulations for Revision of the Water Pollution Control Program Addressing Storm Water Discharges. 64 FR 68725.

(10% to 20%).[54] Degradation indicates a decline in the biological integrity and physical habitat conditions that are necessary to support natural biological diversity. For instance, few urban streams can support diverse benthic communities with imperviousness greater or equal to 25%.[55] To provide some perspective, a medium density, single family home area can be from 25% to 60% impervious (variation due to street and parking design).[56]

The following figure shows the flow rate of an urban vs. a natural stream. What the figure demonstrates is that urban stream flows have greater peaks and volumes, as well as shorter retention times than natural stream flows. The greater peak flows and volumes result in stream degradation through increased erosion of stream banks and damage to aquatic habitat. The shorter retention times result in less time for sediments and other pollutants to settle before being carried out to the ocean. This sediment, and the associated pollutants it carries, can be a significant cause of degradation to the region's receiving waters, including coastal lagoons.

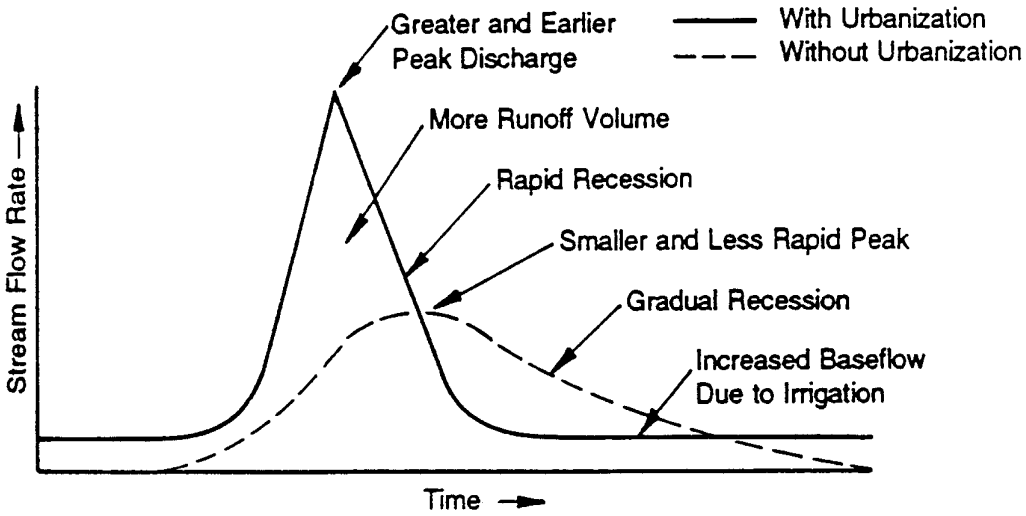

Source: Adapted from Schueler, 1997[57]

6. Finding states the following:

URBAN RUNOFF IS A HUMAN HEALTH THREAT: Urban runoff contains pollutants, which threaten human health. Human illnesses have been clearly linked to recreating (i.e., swimming, surfing, etc.) near storm drains flowing to coastal beach waters. Such flows from urban areas often result in the posting or closure of local beaches.

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[54] US EPA. 1999. 40 CFR Parts 9, 122, 123, and 124 National Pollutant Discharge Elimination System-Regulations for Revision of the Water Pollution Control Program Addressing Storm Water Discharges. 64 FR 68725.

[55] US EPA. 1999. 40 CFR Parts 9, 122, 123, and 124 National Pollutant Discharge Elimination System-Regulations for Revision of the Water Pollution Control Program Addressing Storm Water Discharges. 64 FR 68725.

[56] Schueler, T.R. 1994. *The Importance of Imperviousness*. Watershed Protection Techniques. As cited in 64 FR 68725.

[57] Schueler, T.R. 1987. Controlling Urban Runoff: A Practical Manual for Planning and Designing Urban BMPs. Metropolitan Washington Council of Governments.

Pollutants transported to receiving waters by urban runoff can also enter the food chain. Once in the food chain they can "bioaccumulate" in the tissues of invertebrates (e.g., mussels, oysters, and lobsters) and fish which may be eventually consumed by humans. Furthermore, some pollutants are also known to "biomagnify". This phenomenon can result in pollutant concentrations in the body fat of top predators that are millions of times greater than the concentrations in the tissues of their lower trophic (food chain) counterparts or in ambient waters.

Discussion: This finding is supported by a landmark study conducted by the Santa Monica Bay Restoration Project. The study found that there was an increased occurrence of illness in people that swam in proximity to a flowing storm drain outlet.[58]

In addition to the human health risk urban runoff poses from bodily contact, urban runoff also has the potential to adversely impact human health through bioaccumulation/biomagnification of urban runoff pollutants in the food chain. Pollutants such as heavy metals and pesticides, which are commonly found in urban runoff, have been found to bioaccummulate and biomagnify in long-lived organisms at the higher trophic levels.[59] Since many aquatic species are utilized for human consumption, toxic substances accumulated in species' tissues can pose a significant threat to public health.

The US EPA supports this finding when it states "As runoff flows over areas altered by development, it picks up harmful sediment and chemicals such as oil and grease, pesticides, heavy metals, and nutrients (e.g., nitrogen and phosphorus). These pollutants often become suspended in runoff and are carried to receiving waters, such as lakes, ponds, and streams. Once deposited, these pollutants can enter the food chain through small aquatic life, eventually entering the tissues of fish and humans." [60]

7. **Finding** states the following:

POLLUTANT TYPES: The most common categories of pollutants in urban runoff include total suspended solids, sediment (due to anthropogenic activities); pathogens (e.g., bacteria, viruses, protozoa); heavy metals (e.g., copper, lead, zinc and cadmium); petroleum products and polynuclear aromatic hydrocarbons; synthetic organics (e.g., pesticides, herbicides, and PCBs); nutrients (e.g., nitrogen and phosphorus fertilizers), oxygen-demanding substances (decaying vegetation, animal waste), and trash.

Discussion: US EPA Nationwide Urban Runoff Program (NURP) data shows that heavy metals, organics, coliform bacteria, nutrients (e.g., fertilizers), oxygen demanding substances (e.g., decaying vegetation), and total suspended solids are found at relatively high levels in urban runoff.[61] The Basin Plan goes on to identify examples of nonpoint sources in southern California to include lawn and garden chemicals, household and automotive care products dumped or drained on streets, sediment that erodes from construction sites, and various pollutants deposited by atmospheric deposition.[62] In addition, the SWRCB Urban Runoff Technical

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58 Haile, R.W., et al. 1996. An Epidemiological Study of Possible Adverse Health Effects of Swimming in Santa Monica Bay. Santa Monica Bay Restoration Project.

59 Abel, P.D. 1996. Water Pollution Biology.

60 US EPA. 2000. Storm Water Phase II Compliance Assistance Guide. EPA 833-R-00-002.

61 US EPA. 1983. Results of the Nationwide Urban Runoff Program, Volume 1-Final Report.

62 SDRWQCB. 1994. Water Quality Control Plan for the San Diego Basin. Page 4-1.

Advisory Committee finds urban runoff pollutants to include sediment, nutrients, oxygen-demanding substances, road salts, heavy metals, petroleum hydrocarbons, pathogenic bacteria, viruses, and pesticides."

8. Finding states the following:

URBAN STREAMS AS AN MS4 COMPONENT: Historic and current development make use of natural drainage patterns and features as conveyances for urban runoff. Urban streams used in this manner are part of the municipalities MS4 regardless of whether they are natural, man-made, or partially modified features. In these cases, the urban stream is both an MS4 and a receiving water.

Discussion: Natural drainage patterns and urban streams are frequently used by municipalities to convey urban runoff away from development within their jurisdiction. This is exhibited when urban streams and natural drainage systems are often altered (channelized, lined, widened, etc.) by municipalities in order to control and convey the increased urban runoff flows resulting from the urban development. Since the natural drainage or urban stream is used by the municipality to convey urban runoff, it becomes part of the municipality's MS4. However, urban streams and natural drainages used to convey urban runoff are part of a municipality's MS4 regardless of whether they have been altered by the municipality or not. For example, urban streams frequently run back and forth between lined and unlined (or natural) segments. Changes in the condition of an urban stream's channel (lined or unlined) does not constitute a change in the use of the urban stream or drainage by a municipality. In this manner, urban streams can be both receiving waters and MS4s.

9. Finding states the following:

URBAN RUNOFF CAUSES BENEFICIAL USE IMPAIRMENT: Individually and in combination, the discharge of pollutants and increased flows from MS4s can cause or threaten to cause a condition of pollution (i.e., unreasonable impairment of water quality for designated beneficial uses), contamination, or nuisance. The discharge of pollutants from MS4s can cause the concentration of pollutants to exceed applicable receiving water quality objectives and impair or threaten to impair designated beneficial uses.

Discussion: The Basin Plan supports this finding:

> [W]hen rain falls on and drains through urban freeways, industries, construction sites, and neighborhoods it picks up a multitude of pollutants. The pollutants can be dissolved in the runoff and quickly transported by gravity flow through a vast network of concrete channels and underground pipes referred to as storm water conveyance systems. Such systems ultimately discharge the polluted runoff, without treatment, into the nation's creeks, rivers, estuaries, bays, and oceans. […] These pollutants severely degrade the beneficial uses of surface waters, and threaten the health of both humans and aquatic organisms.[63]

The US EPA also supports this finding, stating in its 1996 National Water Quality Inventory that urban runoff/discharges from storm sewers are a major source of

[63] SDRWQCB. 1994. Water Quality Control Plan for the San Diego Basin. Page 4-69 through 4-70.

water quality impairment nationwide.[64] The 1996 Inventory also found urban runoff to be the leading cause of ocean impairment for those ocean miles surveyed.[65] In addition, the Region's Clean Water Act section 303(d) list (see Attachment 2), which identifies water bodies with impaired beneficial uses within the region, also indicates that the impacts of urban runoff on receiving waters are significant. Many of the impaired water bodies on the 303(d) list are impaired by constituents which have been found at high levels within urban runoff by the regional storm water monitoring program.[66] Examples of constituents frequently responsible for beneficial use impairment include total and fecal coliform, heavy metals, and sediment; these constituents have been found at high levels in urban runoff both regionally and nationwide.[67,68]

10. Finding states the following:

COPERMITTEES IMPLEMENT URBAN RUNOFF MANAGEMENT PROGRAMS (URMPs): Copermittee implementation of Urban Runoff Management Programs (URMPs) designed to reduce discharges of pollutants and flow into and from MS4s to the maximum extent practicable (MEP) can protect receiving water quality by promoting attainment of water quality objectives necessary to support designated beneficial uses. To be most effective, URMPs must contain both structural and non-structural best management practices (BMPs).

Discussion: US EPA finds that a "satisfactory proposed management program will address: management practices; control techniques and systems; design and engineering methods; and other measures to ensure the reduction of pollutants to the maximum extent practicable (MEP)."[69] The US EPA further states that "at a minimum, the proposed management program must include: […] Identification of structural control measures to be included in these proposed programs."[70] These statements indicate that it is expected that URMPs be developed by the Copermittees which contain both structural and non-structural BMPs for the purpose of reducing pollutants in MS4 discharges to the maximum extent practicable. When pollutants in MS4 discharges are treated to the maximum extent practicable, receiving water quality and beneficial uses are typically protected through the attainment of water quality objectives. However, its should be noted that pollutant discharges which have the potential to cause or contribute to an exceedance of water quality objectives (such as discharges to Clean Water Act section 303(d) waterbodies) may require implementation of BMPs beyond the "maximum extent practicable" standard (40 CFR 122.44(d)(1)(i).

11. Finding states the following:

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64 US EPA. 1998. The National Water Quality Inventory, 1996 Report to Congress. EPA 841-R-97-008. As cited in 64 FR 68726.

65 US EPA. 1998. The National Water Quality Inventory, 1996 Report to Congress. EPA 841-R-97-008. As cited in 64 FR 68726.

66 City of San Diego. 1999. 1998-1999 City of San Diego and Co-permittee NPDES Storm Water Monitoring Program Report. By URS Greiner Woodward Clyde.

67 City of San Diego. 1999. 1998-1999 City of San Diego and Co-permittee NPDES Storm Water Monitoring Program Report. By URS Greiner Woodward Clyde.

68 US EPA. 1983. Results of the Nationwide Urban Runoff Program, Volume 1 – Final Report.

69 US EPA. 1992. Guidance Manual for the Preparation of Part II of the NPDES Permit Applications for discharges from Municipal Separate Storm Sewer Systems. EPA 833-B-92-002.

70 US EPA. 1992. Guidance Manual for the Preparation of Part II of the NPDES Permit Applications for discharges from Municipal Separate Storm Sewer Systems. EPA 833-B-92-002.

BEST MANAGEMENT PRACTICES (BMPs): Pollutants can be effectively reduced in urban runoff by the application of a combination of pollution prevention, source control, and treatment control BMPs. Source control BMPs (both structural and non-structural) minimize the contact between pollutants and flows (e.g., rerouting run-on around pollutant sources or keeping pollutants on-site and out of receiving waters). Treatment control (or structural) BMPs remove pollutants from urban runoff.

Discussion: The SWRCB finds in its Order WQ 98-01 that BMPs are effective in reducing pollutants in urban runoff, stating that "implementation of BMPs [is] generally the most appropriate form of effluent limitations when designed to satisfy technology requirements, including reduction of pollutants to the maximum extent practicable." The SWRCB Urban Runoff Technical Advisory Committee further supports this finding by recommending "that nonpoint source pollution control can be accomplished most effectively by giving priority to [best management practices] in the following order:

1. Prevention – implementation of practices that use or promote pollution free alternatives;
2. Source Control – implementation of control measures that focus on preventing or minimizing urban runoff from contacting pollution sources;
3. Treatment Controls – implementation of practices that require treatment of polluted runoff either onsite or offsite."

US EPA also supports the utilization of a combination of BMPs to address pollutants in urban runoff. For example, US EPA has found there has been success in addressing illicit discharge related problems through BMP initiatives like storm drain stenciling and recycling programs, including household hazardous waste special collection days.[71] Structural BMP performance data has also been compiled and summarized by US EPA.[72] This data indicates that structural BMPs can be effective in reducing pollutants in urban runoff discharges. The summary provides the performance ranges of various types of structural BMPs for removing suspended solids, nutrients, pathogens, and metals from storm water flows. These pollutants are in general the pollutants of most concern in storm water in the San Diego Region. For suspended solids, the least effective structural BMP type was found to remove 30-65% of the pollutant load, while the most effective was found to remove 65-100% of the pollutant load. For nutrients, the least effective structural BMP type was found to remove 15-45% of the pollutant load, while the most effective was found to remove 65-100% of the pollutant load. For pathogens, the least effective structural BMP type was found to remove <30% of the pollutant load, while the most effective was found to remove 65-100% of the pollutant load. For metals, the least effective structural BMP type was found to remove 15-45% of the pollutant load, while the most effective was found to remove 65-100% of the pollutant load.

12. Finding states the following:

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[71] US EPA. 1999. 40 CFR Parts 9, 122, 123, and 124 National Pollutant Discharge Elimination System-Regulations for Revision of the Water Pollution Control Program Addressing Storm Water Discharges. 64 FR 68728.

[72] USEPA. 1999. Preliminary Data Summary of Urban Storm Water Best Management Practices. EPA 821-R-99-012.

POLLUTION PREVENTION: Pollution prevention, the initial reduction/elimination of pollutant generation at its source, is the best "first line of defense" for Copermittees and should be used in conjunction with source control and treatment control BMPs. Pollutants that are never generated do not have to be controlled or treated.

Discussion: Pollution prevention, the reduction or elimination of pollutant generation at its source, is an essential aspect of BMP implementation. By limiting the generation of pollutants by urban activities, less pollutants are available to be washed from urban areas, resulting in reduced pollutant loads in storm water discharges from these areas. In addition, there is no need to control or treat pollutants which are not initially generated. Furthermore, pollution prevention BMPs are generally more cost effective than removal of pollutants by treatment facilities or cleanup of contaminated media.

In the Pollution Prevention Act of 1990, Congress established a national policy that emphasizes pollution prevention over control and treatment. California Water Code section 13263.3(a) also supports pollution prevention, stating "The Legislature finds and declares that pollution prevention should be the first step in a hierarchy for reducing pollution and managing wastes, and to achieve environmental stewardship for society. The Legislature also finds and declares that pollution prevention is necessary to support the federal goal of zero discharge of pollutants into navigable waters." Finally, the Basin Plan also supports this finding by stating that "[T]o eliminate pollutants in storm water, one can either clean it up by removing pollutants or prevent it from becoming polluted in the first place. Because of the overwhelming volume of storm water and the enormous costs associated with pollutant removal, pollution prevention is the only approach that makes sense."

13. Finding states the following:

RECEIVING WATER LIMITATIONS: Compliance with receiving water limits based on applicable water quality objectives is necessary to ensure that MS4 discharges will not cause or contribute to violations of water quality objectives and the creation of conditions of pollution.

Discussion: Urban runoff discharges from MS4s are a leading cause of receiving water quality impairment in the San Diego Region and throughout the United States. Due to this significant contribution to the impairment of receiving waters, discharges from MS4s that cause or contribute to the violation of water quality standards (i.e., beneficial uses and the water quality objectives necessary to protect those uses) must be controlled and prohibited. MS4 permits must therefore include stringent discharge requirements to protect water bodies from discharges from MS4s.

The issue of whether storm water discharges from MS4s must meet water quality standards has been intensely debated for the past five years. The argument arises because Clean Water Act section 402(p) fails to clearly state that municipal dischargers of storm water must meet water quality standards. On the issue of industrial discharges of storm water, the statute clearly indicates that industrial dischargers must meet both (1) the technology-based standard of "best available technology economically achievable (BAT)" and (2) applicable water quality standards. On the issue of municipal discharges however, the statute states that municipal dischargers must meet (1) the technology-based standard of "maximum

extent practicable (MEP)" and (2) "such other provisions that the Administrator or the State determines appropriate for the control of such pollutants." The statute fails, however, to specifically state that municipal dischargers must meet water quality standards.

As a result, the municipal storm water dischargers have argued that they do not have to meet water quality standards; and that they only are required to meet MEP. Environmental interest groups maintain that not only do MS4 discharges have to meet water quality standards, but that MS4 permits must also comply with numeric effluent limitations for the purpose of meeting water quality standards. On the issue of water quality standards, the US EPA, the SWRCB, and the SDRWQCB have consistently maintained that MS4s must indeed comply with water quality standards. On the issue of whether water quality standards must be met by numeric effluent limits, the US EPA, the SWRCB (in Orders WQ 91-03 and WQ 91-04), and the SDRWQCB have maintained that MS4 permits can, at this time, contain narrative requirements for the implementation of BMPs in place of numeric effluent limits.

SWRCB rationale: In addition to relying on US EPA's legal opinion concluding that MS4s must meet MEP and water quality standards, the SWRCB also relied on the Clean Water Act's explicit authority for States to require "such other provisions that the Administrator or the State determines appropriate for the control of such pollutants" in addition to the technology-based standard of MEP. To further support its conclusions that MS4 permit dischargers must meet water quality standards, the SWRCB relied on provisions of the California Water Code that specify that all waste discharge requirements must implement applicable Basin Plans and take into consideration the appropriate water quality objectives for the protection of beneficial uses.

The SWRCB first formally concluded that permits for MS4s must contain effluent limitations based on water quality standards in its Order WQ 91-03. In that Order, the SWRCB also concluded that it was appropriate for Regional Boards to achieve this result by requiring best management practices, rather than by inserting numeric effluent limitations into MS4 permits. In Order WQ 98-01, the SWRCB prescribed specific precedent setting Receiving Water Limitations language to be included in all future MS4 permits. This language specifically requires that MS4 dischargers meet water quality standards and allows for the use of narrative BMPs (increasing in stringency and implemented in an iterative process) as the mechanism by which water quality standards can be met.

In Order WQ 99-05, the SWRCB modified its receiving water limitations language in Order WQ 98-01 to meet specific objections by the US EPA (the modifications resulted in stricter compliance with water quality standards). SWRCB Order WQ 99-05 states "In Order WQ 98-01, the State Water Resources Control Board (State Water Board) ordered that certain receiving water limitation language be included in future municipal storm water permits. Following inclusion of that language in permits issued by the San Francisco Bay and San Diego Regional Water Quality Control Boards (Regional Water Boards) for Vallejo and Riverside respectively, the United States Environmental Protection Agency (EPA) objected to the permits. The EPA objection was based on the receiving water limitation

language. The EPA has now issued those permits itself and has included receiving water limitation language it deems appropriate.

"In light of EPA's objection to the receiving water limitation language in Order WQ 98-01 and its adoption of alternative language, the State Water Board is revising its instructions regarding receiving water limitation language for municipal storm water permits. It is hereby ordered that Order WQ 98-01 will be amended to remove the receiving water limitation language contained therein and to substitute the EPA language. Based on the reasons stated here, and as a precedent decision, the following receiving water limitation language [which is found in Receiving Water Limitations item C. of Order No. 2001-01] shall be included in future municipal storm water permits."

In a late 1999 case involving MS4 permits issued by US EPA to several Arizona cities (*Defenders of Wildlife v. Browner*, 1999, 197 F. 3d 1035), the United States Court of Appeals for the Ninth Circuit upheld US EPA's requirement for MS4 dischargers to meet water quality standards, but it did so on the basis of US EPA's discretion rather than on the basis of strict compliance with the Clean Water Act. In other words, while holding that the Clean Water Act does not require all MS4 discharges to comply strictly with state water quality standards, the Court also held that US EPA has the authority to determine that ensuring strict compliance with state water quality standards is necessary to control pollutants. On the question of whether MS4 permits must contain numeric effluent limitations, the court upheld US EPA's use of iterative BMPs in place of numeric effluent limits.

SWRCB's final position: On October 14, 1999, the SWRCB issued a legal opinion on the federal appellate decision and provided advice to the Regional Boards on how to proceed in the future. In the memorandum, the SWRCB concludes that the recent Ninth Circuit opinion upholds the discretion of US EPA and the State to (continue to) issue permits to MS4s that require compliance with water quality standards through iterative BMPs. Moreover, the memorandum states that "[…] because most MS4 discharges enter impaired water bodies, there is a real need for permits to include stringent requirements to protect those water bodies. As total maximum daily loads (TMDLs) are developed, it is likely that MS4s will have to participate in pollutant load reductions, and the MS4 permits are the most effective vehicles for those reductions." In summary, the SWRCB concludes that the Regional Boards should continue to include the Receiving Water Limitations language established in SWRCB Order WQ 99-05 in all future permits.

Accordingly, the SDRWQCB has included the Receiving Water Limitations language in Receiving Water Limitations item C. of Order No. 2001-01.

14. Finding states the following:

RECEIVING WATER LIMITATION COMPLIANCE STRATEGY: Implementation of BMPs cannot ensure attainment of receiving water quality objectives under all circumstances; some BMPs may not prove to be as effective as anticipated. An iterative process of BMP development, implementation, monitoring, and assessment is necessary to assure that an Urban Runoff Management Program is sufficiently comprehensive and effective to achieve compliance with receiving water quality objectives.

Discussion: As discussed above in the Finding 13 discussion, the US EPA and SWRCB have discretion to issue municipal storm water permits which require

compliance with water quality standards. To ensure that MS4 discharges comply with water quality standards, the SWRCB has adopted US EPA language in SWRCB Order WQ 99-05 which dictates implementation of an iterative BMP process when water quality standards are not met. This language is included in Order No. 2001-01 in Receiving Water Limitations item C. The iterative BMP process requires the implementation of increasingly stringent BMPs until receiving water standards are achieved. This is necessary because implementation of BMPs alone cannot ensure attainment of receiving water quality objectives. For example, a BMP which is effective in one situation may not be applicable in another. An iterative process of BMP development, implementation, and assessment is needed to promote consistent compliance with receiving water quality objectives. If assessment of a given BMP confirms that the BMP is ineffective, the iterative process should be restarted, with redevelopment of a new BMP which is anticipated to result in compliance with receiving water quality objectives. Regarding BMP assessment, the SWRCB Urban Runoff Technical Advisory Committee states "The [Storm Water Pollution Prevention Plan] SWPPP must be revised if an inspection indicates a need to alter the BMPs: drop ineffective BMPs, add new BMPs, or modify a BMP that is to remain in the SWPPP." It should be noted that while implementation of the iterative BMP process is a means to achieve compliance with water quality objectives, it does not shield the discharger from enforcement actions for continued non-compliance with water quality objectives.

15. Finding states the following:

COPERMITTEES' RESPONSIBILITY FOR ILLICIT DISCHARGES FROM THIRD PARTIES: As operators of MS4s, the Copermittees cannot passively receive and discharge pollutants from third parties. By providing free and open access to an MS4 that conveys discharges to the waters of the United States, the operator of an MS4 that does not prohibit and/or control discharges into its system essentially accepts "title" for those discharges.

Discussion: Clean Water Act section 402(p) requires operators of MS4s to prohibit non-storm water into their MS4s. This is necessary because pollutants which enter the MS4 generally are conveyed through the MS4 to be eventually discharged into receiving waters. If a municipality does not prohibit non-storm water discharges, it is providing the pathway (its MS4) which enables pollutants to reach receiving waters. Since the municipality's storm water management service can result in pollutant discharges to receiving waters, the municipality must accept responsibility for the water quality consequences resulting from this service. Furthermore, third party discharges can cause a municipality to be out of compliance with its permit. Since pollutants from third parties which enter the MS4 will eventually be discharged from the MS4 to receiving waters, the third party discharges can result in a situation of municipality non-compliance if the discharges lead to an exceedance of water quality standards. For these reasons, each Copermittee must prohibit and/or control discharges from third parties to its MS4.

16. Finding states the following:

COPERMITTEES' RESPONSIBILITY BASED ON LAND USE AUTHORITY: Utilizing their land use authority, Copermittees authorize and profit from the urban development which generates the pollutants and runoff that impair receiving waters. Since the Copermittees utilize their legal authority to authorize urbanization, they must also exercise their legal authority to ensure that the resulting increased pollutant loads and flows do not further degrade receiving waters.

Discussion: Storm water permits are issued to municipalities because of their land use authority. The ultimate responsibility for the pollutant discharges, increased runoff, and inevitable long-term water quality degradation that results from urbanization lies with local governments. This responsibility is based on the fact that it is the local governments that have authorized the urbanization (i.e., conversion of natural pervious ground cover to impervious urban surfaces) and the land uses that generate the pollutants and runoff. Furthermore, the MS4 through which the pollutants and increased flows are conveyed, and ultimately discharged into San Diego's natural receiving waters, are owned and operated by the same local governments. In summary, the municipal Copermittees under Order No. 2001-01 are responsible for discharges into and out of their storm water conveyance systems because (1) they own and operate the MS4; and (2) they have the legal authority that authorizes the very development and land uses with generate the pollutants and increased flows in the first place.

Order No. 2001-01 holds the local government accountable for this direct link between its land use decisions and water quality degradation. The permit recognizes that each of the three major stages in the urbanization process (development planning, construction, and the use or operational stage) are controlled by and must be authorized by the local government. Accordingly, this permit requires the local government to implement, or require others to implement, appropriate best management practices to reduce pollutant discharges and increased flow during each of the three stages of urbanization.

For example, since grading cannot commence prior to the issuance of a local grading permit, the Copermittees have a built-in mechanism to ensure that all grading activities are protective of receiving water quality. The Copermittee has the authority and discretion to withhold issuance of the grading permit until the project proponent has demonstrated to the satisfaction of the Copermittee that the project will not violate the Copermittee's ordinances or cause the Copermittee to be in violation of its municipal storm water permit. Since the Copermittee will ultimately be held responsible for any discharges from the grading project by the SDRWQCB, the Copermittee will want to use its own permitting authority to ensure that whatever measures the Copermittee deems necessary to protect discharges into its MS4 are in fact taken by the project proponent.

17. Finding states the following:

THREE PHASES OF URBAN DEVELOPMENT: Urban development has three major phases: (1) land use planning for new development; (2) construction; and (3) the "use" or existing development phase. Because the Copermittees authorize, permit, and profit from each of these phases, and because each phase has a profound impact on water quality, the Copermittees have commensurate responsibilities to protect water quality during each phase.

In other words, Copermittees are held responsible for the short and long-term water quality consequences of their land use planning, construction, and existing development decisions.

Discussion: Through its permitting processes, each Copermittee authorizes the three major phases of urban development within its jurisdiction. Each Copermittee can also profit from the authorization of urban development. For these reasons, each Copermittee must assume responsibility for its urban development decisions

(see also the Discussion for Finding 16). The Federal Regulations clearly require municipalities to address urban runoff during each stage of development. Regarding BMP implementation during each stage of urban development, US EPA recommends that Copermittees ensure the appropriate implementation of the structural BMPs by considering some or all of the following: pre-construction review of BMP designs; inspections during construction to verify BMPs are built as designed; post-construction inspection and maintenance of BMPs; and penalty provisions for noncompliance with design, construction or operation and maintenance.[73]

18. Finding states the following:

PLANNING PHASE FOR NEW DEVELOPMENT: Because land use planning and zoning is where urban development is conceived, it is the phase in which the greatest and most cost effective opportunities to protect water quality exists. When a Copermittee incorporates policies and principles designed to safeguard water resources into its General Plan and development project approval processes, it has taken a far-reaching step towards the preservation of local water resources for future generations.

Discussion: Including plans for BMP implementation during the design phase of new development and redevelopment offers the most cost effective strategy to reduce urban runoff pollutant loads to surface waters.[74] The Phase II regulations for small municipalities reflect the necessity of addressing urban runoff during the early planning phase. Due to the greater water quality concerns generally experienced by larger municipalities, Phase II requirements for small municipalities are also applicable to larger municipalities such as the Copermittees. The Phase II regulations direct municipalities to develop, implement, and enforce a program to address storm water runoff from new development and redevelopment projects that disturb greater than or equal to one acre, including projects less than one acre that are part of a larger common plan of development or sale. The program must ensure that controls are in place that would prevent or minimize water quality impacts. This includes developing and implementing strategies which include a combination of structural and/or non-structural BMPs appropriate to the locality. The program must also ensure the adequate long-term operation and maintenance of BMPs.[75] US EPA expands on the Phase II regulations for urban development when it recommends that Copermittees:

> "[A]dopt a planning process that identifies the municipality's program goals (e.g., minimize water quality impacts resulting from post-construction runoff from new development and redevelopment), implementation strategies (e.g., adopt a combination of structural and/or non-structural BMPs), operation and maintenance policies and procedures, and enforcement procedures. In developing your program, you should consider assessing

[73] US EPA. 1999. 40 CFR Parts 9, 122, 123, and 124 National Pollutant Discharge Elimination System-Regulations for Revision of the Water Pollution Control Program Addressing Storm Water Discharges; Final Rule. 64 FR 68845.

[74] US EPA. 2000. Storm Water Phase II Compliance Assistance Guide. EPA 833-R-00-002.

[75] US EPA. 1999. 40 CFR Parts 9, 122, 123, and 124 National Pollutant Discharge Elimination System-Regulations for Revision of the Water Pollution Control Program Addressing Storm Water Discharges; Final Rule. 64 FR 68845.

existing ordinances, policies, programs and studies that address storm water runoff quality."

19. Finding states the following:

CONSTRUCTION PHASE: Construction activities are a significant cause of receiving water impairment. Siltation is currently the largest cause of river impairment in the United States. Sediment runoff rates from construction sites greatly exceed natural erosion rates of undisturbed lands causing siltation and impairment of receiving waters. In addition to requiring implementation of the full range of BMPs, an effective construction runoff program must include local plan review, permit conditions, field inspections, and enforcement.

Discussion: The US EPA strongly supports this finding in the Phase II regulations. The US EPA explains in the regulations that storm water discharges generated during construction activities can cause an array of physical, chemical, and biological water quality impacts. Specifically, the biological, chemical and physical integrity of the waters may become severely compromised due to runoff from construction sites. Fine sediment from construction sites can adversely affect aquatic ecosystems by reducing light penetration, impeding sight-feeding, smothering benthic organisms, abrading gills and other sensitive structures, reducing habitat by clogging interstitial spaces within the streambed, and reducing intergravel dissolved oxygen by reducing the permeability of the bed material. Water quality impairment also results, in part, because a number of pollutants are preferentially absorbed onto mineral or organic particles found in fine sediment. The interconnected process of erosion (detachment of the soil particles), sediment transport, and delivery is the primary pathway for introducing key pollutants, such as nutrients, metals, and organic compounds into aquatic systems.[76]

20. Finding states the following:

EXISTING DEVELOPMENT: The Copermittees' wet weather monitoring results collected during the past decade, as well as volumes of other references in the literature today, confirm substantial pollutant loads to receiving waters in runoff from existing urban development. Implementation of jurisdictional and watershed URMPs, which include extensive controls on existing development, can reduce pollutant loadings over the long term.

Discussion: This finding is supported by the results of the City of San Diego and Co-permittee NPDES Stormwater Monitoring Program annual reports.[77]

21. Finding states the following:

CHANGES NEEDED: Because the urbanization process is a direct and leading cause of water quality degradation in this Region, fundamental changes to existing policies and practices about urban development are needed if the beneficial uses of San Diego's natural water resources are to be protected.

Discussion: Urban runoff has been recognized as a leading cause of water quality degradation both regionally and nationwide. The 1998-1999 City of San Diego and

[76] US EPA. 1999. 40 CFR Parts 9, 122, 123, and 124 National Pollutant Discharge Elimination System-Regulations for Revision of the Water Pollution Control Program Addressing Storm Water Discharges; Final Rule. 64 FR 68728.

[77] City of San Diego. Multiple Years. City of San Diego and Co-permittee NPDES Stormwater Monitoring Program. Prepared by Woodward Clyde Consultants.

Co-Permittee NPDES Stormwater Monitoring Program Report reflects the water quality issues resulting from urban runoff that have been observed in the San Diego region and on a nationwide level. Monitoring efforts indicate that instream concentrations of pathogen indicators (fecal coliform and streptococcus) and heavy metals (such as cadmium, copper, lead, and zinc) exceed state and federal water quality criteria. In addition, storm water within the region has been found to contain the pesticides diazinon and chlorpyrifos (Dursban) at levels which can cause chronic or acute toxicity.[78]

As the monitoring program results indicate, urban runoff is identified as a primary source of receiving water quality impairment within the Region. Though urban land use occupies approximately 30% of the monitoring program study area, approximately 50% or more of the total pollutant load for many constituents is contributed by urbanized land uses including residential, commercial, and industrial land uses.[79] The Region's Clean Water Act Section 303(d) list, which identifies water bodies with impaired beneficial uses within the Region, also indicates that the impacts of urban runoff are significant. Many of the impaired water bodies on the 303(d) list are impaired by constituents which have been found at high levels within urban runoff by the regional storm water monitoring program. Examples of constituents frequently responsible for beneficial use impairment include total and fecal coliform, heavy metals, and sediment; these constituents have been found at high levels in urban runoff both regionally and nationwide.

Clearly, current policies and practices to protect water quality from the impacts of urbanization have not been entirely effective. A shift is toward new and expanded policies and practices is needed to achieve the requirements of the Clean Water Act. The requirements of Order No. 2001-01 include and encourage new policies and practices to manage urban runoff. These new policies and practices are based on US EPA and SWRCB guidance, and are supported by recent and ongoing research. The requirements of Order No. 2001-01 are discussed individually in further detail in section VII of this Fact Sheet/Technical Report.

22. Finding states the following:

DUAL REGULATION OF INDUSTRIAL AND CONSTRUCTION SITES: Discharges of runoff from industrial and construction sites in this Region are subject to dual (state and local) regulation. (1) All industries and construction sites are subject to the local permits, plans, and ordinances of the municipal jurisdiction in which it is located. Pursuant to this Order, local (storm water, grading, construction, and use) permits, plans, and ordinances must (a) prohibit the discharge of pollutants and non-storm water into the MS4; and (b) require the routine use of BMPs to reduce pollutants in site runoff. (2) Many industries and construction sites are also subject to regulation under the statewide General Industrial Storm Water Permit or statewide General Construction Storm Water Permit . These statewide general permits are adopted by the State Water Resources Control Board and enforced by the nine Regional Water Quality Control Boards throughout California. Like the Copermittees' local permits and ordinances, the statewide General Industrial and Construction Permits also (a) prohibit the discharge of pollutants and non-storm water; and (b) require the routine use of BMPs to reduce pollutants in site runoff.

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[78] City of San Diego. 1999. 1998-1999 City of San Diego and Co-permittee NPDES Stormwater Monitoring Program Report. Prepared by URS Greiner Woodward Clyde.

[79] City of San Diego. 1998. 1997-1998 City of San Diego and Co-permittee NPDES Stormwater Monitoring Program Report. Woodward Clyde Consultants.

Recognizing that both authorities share a common goal, the federal storm water regulations at 40 CFR 122.26 (and its preamble) call for the dual system to ensure the most effective oversight of industrial and construction site discharges. Under this dual system, each municipal Copermittee is responsible for enforcing its local permits, plans, and ordinances within its jurisdiction. Similarly, the SDRWQCB is responsible for enforcing both statewide general permits and this Order within the San Diego Region.

Discussion: US EPA finds the control of pollutant discharges from industry and construction so important to receiving water quality that it has established a double system of regulation over industrial and construction sites. This double system of regulation consists of two parallel regulatory systems with the same common objective: to keep pollutants from industrial and construction sites out of the MS4. In this double system of regulation for runoff from industrial and construction sites, local governments must enforce their legal authorities (i.e., local ordinances and permits) while the SDRWQCB must enforce its legal authority (i.e., statewide general industrial and construction storm water permits). These two regulatory systems are designed to complement and support each other. Municipalities are not required to enforce SDRWQCB and SWRCB permits; however, they are required to enforce their ordinances and permits. The Federal regulations are clear that municipalities have responsibility to address runoff from industrial and construction sites which enters their MS4s.

Municipalities have this responsibility because they have the authority to issue land use and development permits. Since municipalities are the lead permitting authority for industrial land use and construction activities, they are also the lead for enforcement regarding runoff discharges from these sites. For sites where the municipality is the lead permitting authority, the SDRWQCB will work with the municipality and provide support where needed. In some instances, where the SDRWQCB is the primary regulatory authority and lead permitting authority (e.g., for landfills and sewage collection and treatment systems), the SDRWQCB is the lead for enforcement and will look for support from the municipalities.

23. Finding states the following:

EDUCATION: Education is the foundation of every effective URMP and the basis for changes in behavior at a societal level. Education of municipal planning, inspection, and maintenance department staffs is especially critical to ensure that in-house staffs understand how their activities impact water quality, how to accomplish their jobs while protecting water quality, and their specific roles and responsibilities for compliance with this Order. Public education, designed to target various urban land users and other audiences, is also essential to inform the public of how individual actions impact receiving water quality and how these impacts can be minimized.

Discussion: The SWRCB and US EPA both recognize education as a critical component of storm water management. In its 1994 report, the SWRCB Technical Advisory Committee (TAC) "recognizes that education with an emphasis on pollution prevention is the fundamental basis for solving nonpoint source pollution problems." The TAC goes on to recommend that target audiences for education efforts include the government, youth groups, the development community, and business and industrial groups. According to the Phase II Storm Water Regulations found at 64 FR 68754 and 68754, US EPA believes that as the public gains a greater understanding of the storm water program through education, the municipality is likely to gain more support for the program (including funding initiatives). In addition, compliance with the program will probably be greater is the

public understands the personal responsibilities expected of them. US EPA goes on to explain that a public education program should inform individuals and households about problems and the steps they can take to reduce or prevent storm water pollution.

24. Finding states the following:

ENFORCING LOCAL LEGAL AUTHORITY: Enforcement of local urban runoff related ordinances, permits, and plans is an essential component of every URMP and is specifically required in the federal storm water regulations and this Order. Routine inspections provide an effective means by which Copermittees can evaluate compliance with their permits and ordinances. Inspections are especially important at high-risk areas for pollutant discharges such as industrial and construction sites.

When industrial or construction site discharges occur in violation of local permits and ordinances, the SDRWQCB looks first to the municipality that has authorized the discharge for appropriate actions (typically education followed by enforcement where education has been unsuccessful). If the municipality has demonstrated a good faith effort to educate and enforce but remains unsuccessful, the SDRWQCB will then step in to enforce the applicable statewide general permit. If the municipality has not demonstrated a good faith enforcement effort, the SDRWQCB may initiate enforcement action against both the industrial or construction discharger (under the statewide general permit), as well as against the authorizing municipal Copermittee for violations of this Order. Each Copermittee must also provide the first level of enforcement against illegal discharges from other land uses it has authorized, such as commercial and residential developments that it has authorized.

Discussion: Since municipalities approve and permit construction and land use within their jurisdiction, they must assume responsibility for urban runoff discharges from these activities and land uses. The Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(A – D) are clear in placing responsibility on municipalities for control of urban runoff from third party activities and land uses to their MS4. In order for municipalities to assume this responsibility, they must implement ordinances, permits, and plans addressing urban runoff from third parties. Assessments for compliance with their ordinances, permits, and plans are essential for a municipality to ensure that third parties are not causing the municipality to be in violation of its municipal storm water permit. When conditions of non-compliance is determined, enforcement is necessary to ensure that violations of municipality ordinances and permits are corrected. Without enforcement, third parties do not have incentive to correct violations. US EPA supports inspections and enforcement by municipalities when it states "Effective inspection and enforcement requires […] penalties to deter infractions and intervention by the municipal authority to correct violations. Enforcement mechanisms […] also must be described."[80]

US EPA discusses the "dual regulation" of construction sites in its *Storm Water Phase II Compliance Assistance Guide*, which states "Even though all construction sites that disturb more than one acre are covered nationally by an NPDES storm water permit, the construction site runoff control minimum measure […] is needed to induce more localized site regulation and enforcement efforts, and to enable operators […] to more effectively control construction site discharges into their MS4s." While the *Storm Water Phase II Compliance Assistance Guide* applies to small municipalities, requirements for small municipalities are applicable to larger

[80] US EPA. 1992. Guidance Manual for the Preparation of Part II of the NPDES Permit Applications for Discharges from Municipal Separate Storm Sewer Systems. EPA 833-B-92-002.

municipalities, such as the Copermittees, due to the generally more serious water quality problems caused by larger municipalities.

Municipalities assume initial responsibility for enforcement against illegal discharges from land uses and activities within their jurisdiction because of their land use authority. Since the municipality approves and permits development and land use, it must ensure that its development or land use decisions do not result in receiving water quality degradation. The SDRWQCB will assist municipalities in enforcement against non-compliant sites after the municipality has exhibited a good faith effort to bring the site into compliance.

25. Finding states the following:

PUBLIC PARTICIPATION: Public participation during the URMP development process is necessary to ensure that all stakeholder interests and a variety of creative solutions are considered.

Discussion: This finding is supported by the Phase II Storm Water Regulations found at 64 FR 68755 which states, "[E]arly and frequent public involvement can shorten implementation schedules and broaden public support for a program." It goes on to explain,"[P]ublic participation is likely to ensure a more successful storm water program by providing valuable expertise and a conduit to other programs and governments."

26. Finding states the following:

TOXICITY: Urban runoff discharges from MS4s often contain pollutants that cause toxicity, (i.e., adverse responses of organisms to chemicals or physical agents ranging from mortality to physiological responses such as impaired reproduction or growth anomalies). The water quality objectives for toxicity provided in the Water Quality Control Plan, San Diego Basin, Region 9, (Basin Plan), state in part "All waters shall be free of toxic substances in concentrations that are toxic to, or that produce detrimental physiological responses in human, plant, animal, or aquatic life….The survival of aquatic life in surface waters subjected to a waste discharge or other controllable water quality factors, shall not be less than that for the same water body in areas unaffected by the waste discharge…" Urban runoff discharges from MS4s are considered toxic when (1) the toxic effect observed in an acute toxicity test exceeds zero Toxic Units Acute (TUa=0); or (2) the toxic effect observed in a chronic toxicity test exceeds one Toxic Unit Chronic (TUc=1).

Discussion: Consideration of urban runoff toxicity is significant because toxicity assessments measure the potential effect of a discharge on receiving waters. This is particularly useful in assessing impacts, as opposed to measurements of pollutant concentrations where the effect of the pollutant concentration on receiving waters may be unknown. Finding 26 and this discussion clarify SDRWQCB expectations regarding urban runoff toxicity. Toxicity is also further discussed in Appendix I of the SWRCB's 1997 Water Quality Control Plan – Ocean Waters of California, "California Ocean Plan."

Toxicity is commonly evaluated in terms of both acute toxicity and chronic toxicity. "Acute toxicity concentration" can be expressed in Toxic Units Acute (TUa). The Ocean Plan defines acute toxicity and a method for calculating TUa in a manner that can be used for ocean waters and other waters. Using this Ocean Plan definition and calculation methodology, 100% survival of test organisms in an acute toxicity test yields an acute toxicity concentration of zero

TUa. 100% survival of test organisms corresponds to the Basin Plan narrative objective of 'no toxics in toxic amounts.' Therefore, an acute toxicity concentration in excess of zero TUa would not meet the Basin Plan narrative objective for toxicity.

"Chronic toxicity concentration" can be expressed in Toxic Units Chronic (TUc). As with acute toxicity, the Ocean Plan defines chronic toxicity and a method for calculating TUc that can be used for ocean waters and other waters. Using this Ocean Plan definition and calculation methodology, the absence of observable effects on test organisms in undiluted test water in a critical life stage toxicity test yields a chronic toxicity concentration of 1 TUc. The absence of observable effects on test organisms in undiluted test water corresponds to the Basin Plan narrative objective of 'no toxics in toxic amounts.' Therefore, a chronic toxicity concentration in excess of 1 TUc would not meet the Basin Plan narrative objective for toxicity.

27. Finding states the following:

FOCUS ON MAN-MADE POLLUTANTS AND FLOWS: The focus of this Order is on the control of urban runoff pollutants and flows which are either generated or accelerated by human activities. This Order is not meant to control background or naturally occurring pollutants and flows.

Discussion: In general, man-made pollutants and flows are the cause of receiving water impairment resulting from urban runoff. This is because human activities increase the concentrations of constituents above natural or background levels. Flow volumes and rates are also increased above background levels due to human activities, in both wet and dry weather. The focus of Order No. 2001-01 is therefore placed man-made pollutants and flows. Man-made pollutants and flows are also focused on due to our ability to control them. In comparison with naturally occurring pollutants and flows, man-made pollutants and flows are significantly easier to control. The SDRWQCB has discretion to require control of flows under a United States Supreme Court decision, which held that regulation of flow to protect beneficial uses is within the authority of the Clean Water Act (PUD No. 1 v. WA Dept. of Ecology, 511 U.S. 700 (1994)).

28. Finding states the following:

COMMON WATERSHEDS AND CWA SECTION 303(d) IMPAIRED WATERS: The Copermittees discharge urban runoff into lakes, drinking water reservoirs, rivers, streams, creeks, bays, estuaries, coastal lagoons, the Pacific Ocean, and tributaries thereto within ten of the eleven hydrologic units (watersheds) comprising the San Diego Region as shown in Table 2 below. During its downstream course, urban runoff is conveyed through lined and unlined (natural, manmade, and partially modified) channels, all of which are defined as components of the Copermittees' MS4.

Some of the receiving water bodies, which receive or convey urban runoff discharges, have been designated as impaired by the SDRWQCB and USEPA in 1998 pursuant to Clean Water Act section 303(d). Also shown below are the watershed management areas (WMAs) as defined in the SDRWQCB report, Watershed Management Approach, January 2000.

Table 2. Watershed Management Areas (WMAs)

SDRWQCB WATERSHED MANAGEMENT AREA (WMA)	HYDROLOGIC UNIT(S)	MAJOR SURFACE WATER BODIES	303(d) POLLUTANT(S) OF CONCERN OR WATER QUALITY EFFECT	COPERMITTEES
Santa Margarita River	*Santa Margarita (902.00)*	*Santa Margarita River and Estuary, Pacific Ocean*	*1. Coliform Bacteria 2. Nutrients*	*1. County of San Diego*
San Luis Rey River	*San Luis Rey (903.00)*	*San Luis Rey River and Estuary, Pacific Ocean*	*1. Coliform Bacteria 2. Nutrients*	*1. City of Escondido 2. City of Oceanside 3. City of Vista 4. County of San Diego*
Carlsbad	*Carlsbad (904.00)*	*Batiquitos Lagoon San Elijo Lagoon Agua Hedionda Lagoon Buena Vista Lagoon And Tributary Streams Pacific Ocean*	*1. Coliform Bacteria 2. Nutrients 3. Sediment*	*1. City of Carlsbad 2. City of Encinitas 3. City of Escondido 4. City of Oceanside 5. City of San Marcos 6. City of Solana Beach 7. City of Vista 8. County of San Diego*
San Dieguito River	*San Dieguito (905.00)*	*San Dieguito River and Estuary, Pacific Ocean*	*1. Coliform Bacteria*	*1. City of Del Mar 2. City of Escondido 3. City of Poway 4. City of San Diego 5. City of Solana Beach 6. County of San Diego*
Mission Bay	*Peñasquitos (906.00)*	*Los Peñasquitos Lagoon Mission Bay, Pacific Ocean*	*1. Coliform Bacteria 2. Metals 3. Nutrients 4. Sediment*	*1. City of Del Mar 2. City of Poway 3. City of San Diego 4. County of San Diego*
San Diego River	*San Diego (907.00)*	*San Diego River, Pacific Ocean*	*1. Coliform Bacteria*	*1. City of El Cajon 2. City of La Mesa 3. City of Poway 4. City of San Diego 5. City of Santee 6. County of San Diego*
San Diego Bay	*Pueblo San Diego (908.00) Sweetwater (909.00) Otay (910.00)*	*San Diego Bay Sweetwater River Otay River Pacific Ocean*	*1. Coliform Bacteria 2. Metals 3. Toxicity 4. Benthic Community Degradation*	*1. City of Chula Vista 2. City of Coronado 3. City of El Cajon 4. City of Imperial Beach 5. City of La Mesa 6. City of Lemon Grove 7. City of National City 8. City of San Diego 9. County of San Diego 10. San Diego Unified Port District*
Tijuana River	*Tijuana (911.00)*	*Tijuana River and Estuary Pacific Ocean*	*1. Coliform Bacteria 2. Low Dissolved Oxygen 3. Metals 4. Nutrients 5. Pesticides 6. Synthetic Organics 7. Total Dissolved Solids 8. Trash*	*1. City of Imperial Beach 2. City of San Diego 3. County of San Diego*

Discussion: The 1998 California 303(d) List and TMDL Priority Schedule identifies impaired receiving water bodies and their watersheds within the State of California. The Copermittees which discharge from Ms4s to these water bodies are identified in the Regional Board *Draft Watershed Management Approach*.[81] For an explanation on how the watershed approach fits into the NPDES municipal storm water permitting program, see Attachment 4, Municipal Storm Water Permitting and the Watershed Approach.

[81] SDRWQCB. 1999. Fifth Draft Watershed Management Approach for the San Diego Region.

29. Finding states the following:

CUMULATIVE POLLUTANT LOAD CONTRIBUTIONS: Because they are interconnected, each MS4 within a watershed contributes to the cumulative pollutant loading, volume, and velocity of urban runoff and the ensuing degradation of the downstream receiving water bodies. Accordingly, inland MS4s contribute to coastal impairments.

Discussion: A watershed is the drainage basin, outlined by topographic divides, which drain to a common outlet, such as a stream, lake, estuary, enclosed bay, or ocean. Therefore, when various MS4s discharge into the same watershed, the discharges eventually flow into a common receiving water body. In this manner, individual MS4s which share the same watershed contribute to cumulative pollutant loading in the watershed's receiving water body. To help alleviate this cumulative loading, watershed based water quality protection is needed. The SWRCB Urban Runoff Technical Advisory Committee defines watershed based water quality protection as "the prevention/control of pollution and management of human activities within a geographically or other defined drainage area to protect, restore, and/or enhance the natural resources and beneficial uses within the watershed."

30. Finding states the following:

LAND USE PLANNING ON A WATERSHED SCALE: Because urban runoff does not recognize political boundaries, "watershed-based" land use planning (pursued collaboratively by neighboring local governments) can greatly enhance the protection of shared natural water resources. Such planning enables multiple jurisdictions to work together to plan for both development and resource conservation that can be environmentally as well as economically sustainable.

Discussion: Conventional planning and zoning can be limited in their ability to protect the environmental quality of creeks, rivers, and other waterbodies. Watershed-based planning is often ignored, despite the fact that receiving waters unite land by collecting runoff from throughout the watershed. Since watersheds unite land, they can be used as an effective basis for planning. Watershed-based planning enables local and regional areas to realize economic, social, and other benefits associated with growth, while conserving the resources needed to sustain such growth, including water quality. This type of planning can involve four steps: (1) Identify the watersheds shared by the participating jurisdictions; (2) Identify, assess, and prioritize the natural, social, and other resources in the watersheds; (3) Prioritize areas for growth, protection, and conservation, based on prioritized resources; and (4) Develop plans and regulations to guide growth and protect resources. Local governments can start with simple, yet effective, steps toward watershed planning, such as adopting a watershed-based planning approach, articulating the basic strategy in their General Plans, and beginning to pursue the basic strategy in collaboration with neighboring local governments who share the watersheds. New mechanisms have been created to facilitate watershed-based planning and zoning, such as the San Francisquito Creek Watershed Coordinated Resource Management Process and the Santa Clara Basin Watershed Management Initiative.[82]

31. Finding states the following:

[82] Source: Bay Area Stormwater Management Agencies Association. 1999. Start at the Source. Forbes Custom Publishing.

INTERGOVERNMENTAL COORDINATION: Within their common watersheds it is essential for the Copermittees to coordinate their water quality protection and land use planning activities to achieve the greatest protection of receiving water bodies. Copermittee coordination with other watershed stakeholders, especially Caltrans and the Department of Defense, is also critical.

Establishment of a management structure, within which the Copermittees subject to this Order, will fund and coordinate those aspects of their joint obligations will promote implementation of Urban Runoff Management Programs on a watershed and regional basis in the most cost effective manner.

Discussion: Within a given watershed, "water quality and beneficial uses may be affected by many different activities – which may occur throughout or only in certain parts of watersheds, and which may occur near to or far from locations of known water problems" (SDRWQCB,1999). This implies that pollutant sources may actually be located far from where the water quality problem manifests itself. Therefore, water quality problems generated by one municipality may impact another municipality. In addition, municipalities within a watershed all contribute pollutants to shared receiving waters. For these reasons, coordination between municipalities and stakeholders within a watershed is necessary. Watershed scale coordination provides for the highest priority water quality problems to be addressed, resulting in the greatest improvements in water quality for costs incurred. Intergovernmental coordination can also result in cost savings through the sharing of resources between Copermittees.

Also, federal NPDES regulation 40 CFR 122.26(d)(2)(iv) requires where necessary intergovernmental coordination by stating "a proposed management program covers the duration of the permit. It shall include a comprehensive planning process which involves public participation and where necessary intergovernmental coordination, to reduce the discharge of pollutants to the maximum extent practicable using management practices, control techniques and system, design and engineering methods, and such other provisions which are appropriate." In addition, the US EPA finds that "[Copermittees] may use jurisdictional agreements to show adequate legal authority and to ensure planning, coordination, and the sharing of the resource burden of permit compliance" (1992).

32. Finding states the following:

WASTE REMOVAL: Waste and pollutants which are deposited and accumulate in MS4 drainage structures will be discharged from these structures to waters of the United States unless they are removed. These discharges may cause or contribute to, or threaten to cause or contribute to, a condition of pollution in receiving waters. Once removed, such accumulated wastes must be characterized and lawfully disposed.

Discussion: When rain falls and drains urban freeways, industries, construction sites, and neighborhoods it picks up a multitude of pollutants. Gravity flow transports the pollutants to the MS4. Illicit discharges and connections also contribute a significant amount of pollutants to MS4s. MS4s are commonly designed to convey their contents as quickly as possible. Due to these typically high flow rates within the concrete conveyance systems of MS4s, pollutants which enter or are deposited in the MS4 and not removed are generally flushed unimpeded through the MS4 to waters of the United States. The US EPA found in its National Urban Runoff Pollution study (1983) that pollutant concentrations in urban runoff discharged from MS4s frequently exceed established receiving water

quality objectives and drinking water standards. Therefore, when waste is deposited in the MS4, it is generally flushed to receiving waters, when it can potentially cause or contribute to a violation of water quality standards.

33. Finding states the following:

TOXIC HOT SPOTS: Urban runoff is a significant contributor to the creation and persistence of Toxic Hot Spots in San Diego Bay. California Water Code section 13395 requires regional boards to reevaluate waste discharge requirements (WDRs) associated with toxic hot spots. The State Water Resources Control Board (SWRCB) adopted the Consolidated Toxic Hot Spot Cleanup Plan in June 1999. The Plan states: "The reevaluation [of WDRs associated with toxic hot spots] shall consist of (1) an assessment of the WDRs that may influence the creation or further pollution of the known toxic hot spot, (2) an assessment of which WDRs need to be modified to improve environmental conditions at the known toxic hot spot, and (3) a schedule for completion of any WDR modifications deemed appropriate."

Discussion: Toxic hot spots are those areas in enclosed bays, estuaries, or any adjacent waters in the "contiguous zone" or the "ocean", where pollution or contamination affects the interests of the state, and where hazardous substances have accumulated to levels which: 1) may pose a substantial present or potential hazard to aquatic life, wildlife, fisheries, or human health, or 2) may adversely affect the beneficial uses of the bay, estuary, or ocean waters, or 3) exceeds adopted water quality or sediment quality objectives. San Diego Bay contains several toxic hot spots. In a National Oceanic and Atmospheric Administration (NOAA) study which compared EMAP-type sediment toxicity data from various bays, San Diego Bay ranked second with 56 percent of the area of the Bay considered toxic. For these reasons, Order No. 2001-01 includes directives to prevent urban runoff from contributing to the further degradation of toxic hot spots.

34. Finding states the following:

CHANGING THE STORM WATER MANAGEMENT APPROACH: In contrast to the conventional "conveyance" approach, a more natural approach to storm water management seeks to filter and infiltrate runoff by allowing it to flow slowly over permeable vegetated surfaces. By "preserving and restoring the natural hydrologic cycle", filtration and infiltration can greatly reduce the volume/peak rate, velocity, and pollutant loads of urban runoff. The greatest opportunities for changing from a "conveyance" to a more natural management approach occur during the land use planning and zoning processes and when new development projects are under early design.

Discussion: Urbanization generally results in an increase in pollutant sources and impervious surfaces. The increase in pollutant sources leads to an increase in pollutant loads found in storm water, while the increase in impervious surfaces prevents natural processes from reducing those pollutant loads. The impervious surfaces associated with urbanization and its storm water conveyance systems prevent storm water from infiltrating into the soil. Natural vegetation and soil are prevented from filtering urban runoff, resulting in storm water flows that are higher in volume and pollutant loads. This causes the quality of receiving waters to be adversely impacted and beneficial uses to be impaired.

Studies have revealed that the level of imperviousness resulting from urbanization is strongly correlated with the water quality impairment of nearby

receiving waters.[83] Urbanization creates new sources of pollutants and provides for their rapid transport to receiving waters through storm water conveyance systems. Urbanization also adversely impacts receiving waters through changes it causes to local hydrology. Increases in population density and imperviousness stemming from urbanization result in changes to stream hydrology, including:

1. increased peak discharges compared to predevelopment levels;
2. increased volume of storm water runoff with each storm compared to pre- development levels;
3. decreased travel time to reach receiving water;
4. increased frequency and severity of floods;
5. increased runoff velocity during storms due to a combination of effects of higher discharge peaks, rapid time of concentration, and smoother hydraulic surfaces from channelization; and
6. decreased infiltration and diminished groundwater recharge.

In many cases the impacts on receiving waters due to changes in hydrology can be more significant than those attributable to the contaminants found in storm water discharges (USEPA, 1999b). These impacts include stream bank erosion (increased sediment load and subsequent deposition), benthic habitat degradation, and decreased diversity of macroinvertebrates.

For the above reasons, this Order encourages an approach to storm water management which seeks to preserve and restore the natural hydrologic cycle. Open space designs which maximize pervious surfaces and retention of "natural" drainages have been found to reduce both the costs of development and pollutant export.[84] Moreover, US EPA finds including plans for a "natural" site design and BMP implementation during the design phase of new development and redevelopment offers the most cost effective strategy to reduce pollutant loads to surface waters.[85]

35. Finding states the following:

INFILTRATION AND POTENTIAL GROUNDWATER CONTAMINATION: Any drainage feature that infiltrates runoff poses some risk of potential groundwater contamination. Although dependent on several factors, the risks typically associated with the infiltration of runoff (especially from residential land use areas) are not significant. The risks associated with infiltration can be managed by many techniques, including (1) designing landscape drainage features that promote infiltration of runoff, but do not "inject" runoff (injection bypasses the natural processes of filtering and transformation that occur in the soil); (2) taking reasonable steps to prevent the illegal disposal of wastes; and (3) ensuring that each drainage feature is adequately maintained in perpetuity. Minimum conditions needed to protect groundwater are specified in section F.1.b. of this Order.

Discussion: Infiltration is an effective means for managing urban runoff. However, measures must be taken to protect groundwater quality when infiltration of urban

[83] U.S. Environmental Protection Agency. 1999. 40 CFR Parts 9, 122, 123, and 124 National Pollutant Discharge Elimination System – Regulations for Revision of the Water Pollution Control Program Addressing Storm Water Discharges; Final Rule.

[84] Center for Watershed Protection. 2000. "The Benefits of Better Site Design in Residential Subdivisions." Watershed Protection Techniques. Vol. 3. No. 2.

[85] U.S. Environmental Protection Agency. 1999. 40 CFR Parts 9, 122, 123, and 124 National Pollutant Discharge Elimination System – Regulations for Revision of the Water Pollution Control Program Addressing Storm Water Discharges; Final Rule.

runoff is implemented. US EPA supports urban runoff infiltration and provides guidance for protection of groundwater: "With a reasonable degree of site-specific design considerations to compensate for soil characteristics, infiltration may be very effective in controlling both urban runoff quality and quantity problems. This strategy encourages infiltration of urban runoff to replace the natural infiltration capacity lost through urbanization and to use the natural filtering and sorption capacity of soils to remove pollutants; however, the potential for some types of urban runoff to contaminate groundwater through infiltration requires some restrictions."[86] The restrictions placed on urban runoff infiltration in Order No. 2001-01 are based on recommendations provided by the US EPA Risk Reduction Engineering Laboratory. The SWRCB tentatively found in its draft order on the appeal of the Los Angeles Regional Water Quality Control Board's (LARWQCB's) Standard Urban Storm Water Mitigation Plan (SUSMP) requirements that the guidance provided in the above referenced document by the US EPA Risk Reduction Engineering Laboratory is sufficient for the protection of groundwater quality from urban runoff infiltration. To further protect groundwater quality, Order No. 2001-01 also includes guidance from the LARWQCB,[87] the State of Washington,[88] and the State of Maryland.[89]

36. Finding states the following:

ANTIDEGRADATION: Conscientious implementation of URMPs that satisfy the requirements contained in this Order will reduce the likelihood that discharges from MS4s will cause or contribute to unreasonable degradation of the quality of receiving waters. Therefore, this Order is in conformance with SWRCB Resolution No. 68-16 and the federal antidegradation policy described in 40 CFR 131.12.

Discussion: Implementation of URMPs is required to reduce pollutants in urban runoff to the maximum extent practicable. Reduction of pollutants to the maximum extent practicable will prevent degradation of the quality of receiving waters. Therefore, implementation of URMPs which satisfy the requirements of Order No. 2001-01 will prevent violations of receiving water quality objectives. The Basin Plan states that "Water quality objectives must […] conform to US EPA regulations covering antidegradation (40 CFR 131.12) and State Board Resolution 68-16, Statement of Policy with Respect to Maintaining High Quality of Waters in California." As a result, when water quality objectives are met through the implementation of URMPs, US EPA and SWRCB antidegradation policy requirements are also met.

37. Finding states the following:

CEQA: The issuance of waste discharge requirements for the discharge of urban runoff from MS4s to waters of the United States is exempt from the requirement for preparation of environmental documents under the California Environmental Quality Act (CEQA) (Public Resources Code, Division 13, Chapter 3, § 21000 et seq.) in accordance with the CWC § 13389.

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[86] U.S. Environmental Protection Agency. 1994. Potential Groundwater Contamination from Intentional and Nonintentional Stormwater Infiltration. EPA 600 SR-94 051.

[87] Guidance on vertical distance from base of BMP to groundwater table. LARWQCB. 2000. Standard Urban Storm Water Mitigation Plan for Los Angeles County and Cities in Los Angeles County.

[88] Washington State Department of Ecology. 1999. Draft Stormwater Management in Washington State. Volume V – Runoff Treatment BMPs. Pub. No. 99-15.

[89] Maryland Department of the Environment. 1999. 2000 Maryland Stormwater Design Manual. Volume I.

Discussion: CWC section 13389 provides that "Neither the state board nor the regional boards shall be required to comply with the provisions of Chapter 3 (commencing with section 21100) of Division 13 of the Public Resources Code prior to the adoption of any waste discharge requirement, except requirements for new sources as defined in the Federal Water Pollution Control Act or acts amendatory thereof or supplementary thereto."

38. Finding states the following:

PUBLIC NOTICE: The SDRWQCB has notified the Copermittees, all known interested parties, and the public of its intent to consider adoption of an order prescribing waste discharge requirements that would serve to renew an NPDES permit for the existing discharge of urban runoff.

Discussion: Public notification of development of a draft permit is required under Federal regulation 40 CFR 124.10(a)(1)(ii). This regulation states "(a) Scope. (1) The Director shall give public notice that the following actions have occurred: (ii) A draft permit has been prepared under Sec. 124.6(d)." Public notifications "shall allow at least 30 days for public comment," as required under Federal regulation 40 CFR 124.10(b)(1).

39. Finding states the following:

PUBLIC HEARING: The SDRWQCB has, at a public meeting on December 13, 2000, held a public hearing and heard and considered all comments pertaining to the terms and conditions of this Order.

Discussion: Public hearings are required under California Water Code Section 13378, which states "Waste discharge requirements and dredged or fill material permits shall be adopted only after notice and any necessary hearing." Federal regulation 40 CFR 124.12(a)(1) also requires public hearings for draft permits, stating "The Director shall hold a public hearing whenever he or she finds, on the basis or requests, a significant degree of public interest in a draft permit(s)." Regarding public notice of a public hearing, Federal regulation 40 CFR 124.10(b)(2) states that "Public notice of a public hearing shall be given at least 30 days before the hearing."

VII. DIRECTIVES DISCUSSION

UNDERLYING BROAD LEGAL AUTHORITY FOR ORDER NO. 2001-01

The following statutes, regulations, and Water Quality Control Plans provided the basis for Order No. 2001-01: Clean Water Act, California Water Code, 40 CFR Parts 122, 123, 124 (National Pollutant Discharge Elimination System Permit Application Regulations for Storm Water Discharges, Final Rule), Part II of 40 CFR Parts 9, 122, 123, and 124 (National Pollutant Discharge Elimination System – Regulations for Revision of the Water Pollution Control Program Addressing Storm Water Discharges; Final Rule), Water Quality Control Plan – Ocean Waters of California (California Ocean Plan), Water Quality Control Plan for the San Diego Basin (Basin Plan), 40 CFR 131 Water Quality Standards; Establishment of Numeric Criteria for Priority Toxic Pollutants for the State of California; Rule (California Toxics Rule), and the California Toxics Rule Implementation Plan.

The following broad legal authority citations generally apply to all directives in Order No. 2001-01, and provide the SDRWQCB with ample underlying authority to require each of the directives.

CWA 402(p)(3)(B)(ii) – Prohibit Non-Storm Water
The CWA requires in section 402(p)(3)(B)(ii) that permits for discharges from municipal storm sewers "shall include a requirement to effectively prohibit non-stormwater discharges into the storm sewers."

CWA 402(p)(3)(B)(iii) – Reduce to MEP and Whatever Else is Needed
The CWA requires in section 402(p)(3)(B)(iii) that permits for discharges from municipal storm sewers "shall require controls to reduce the discharge of pollutants to the maximum extent practicable, including management practices, control techniques and system, design and engineering methods, and such other provisions as the Administrator or the State determines appropriate for the control of such pollutants."

40 CFR 122.26(d)(2)(i)(B,C,E, and F) – Obtain Adequate Legal Authority
Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B,C,E, and F) provide that each Copermitee's permit application "shall consist of : (i) Adequate legal authority. A demonstration that the applicant can operate pursuant to legal authority established by statute, ordinance or series of contracts which authorizes or enables the applicant at a minimum to: […] (B) Prohibit through ordinance, order or similar means, illicit discharges to the municipal separate storm sewer; (C) Control through ordinance, order or similar means the discharge to a municipal separate storm sewer of spills, dumping or disposal of materials other than storm water; […] (E) Require compliance with condition in ordinances, permits, contracts or orders; and (F) Carry out all inspection, surveillance and monitoring procedures necessary to determine compliance and noncompliance with permit conditions including the prohibition on illicit discharges to the municipal separate storm sewer."

40 CFR 122.26(d)(2)(iv) – Reduce to the MEP and Whatever Else is Needed
Federal NPDES regulation 40 CFR 122.26(d)(2)(iv) provides that the Copermittee shall develop and implement a proposed management program which "shall include a comprehensive planning process which involves public participation and where necessary intergovernmental coordination, to reduce the discharge of pollutants to the maximum extent practicable using management practices, control techniques and system, design and engineering methods, and such other provisions which are appropriate. The program shall also include a description of staff and equipment available to implement the program. […] Proposed programs may impose controls on a systemwide basis, a watershed basis, a jurisdiction basis, or on individual outfalls. […] Proposed management programs shall describe priorities for implementing controls."

CWC 13377 – Implement Clean Water Act and Whatever Else is Needed
California Water Code section 13377 provides that "Notwithstanding any other provision of this division, the state board or the regional boards shall, as required or authorized by the Federal Water Pollution Control Act (Clean Water Act), as amended, issue waste discharge requirements and dredged or fill material

permits which apply and ensure compliance with all applicable provisions of the act and acts amendatory thereof or supplementary, thereto, together with anymore stringent effluent standards or limitation necessary to implement water quality control plans, or for the protection of beneficial uses, or to prevent nuisance."

In addition to the five broad legal authority items cited above, which underlie all of the directives in Order No. 2001-01, additional specific legal authority citations applicable to particular directives of Order No. 2001-01 are provided in this Fact Sheet/Technical Report as necessary. Some of these additional specific legal authority citations apply to entire components of Order No. 2001-01. In this case, the specific legal authority quotations are provided at the beginning of the discussion of the permit component, while the legal authority is again cited under each directive of the component. Furthermore, some specific legal authority citations only apply to distinct directives of Order No. 2001-01. When this occurs, the quotation of the specific legal authority citation will appear with the discussion of the distinct permit directive.

A. PROHIBITIONS – DISCHARGES

A.1. Prohibitions – Discharges states the following:

Discharges into and from MS4s in a manner causing, or threatening to cause, a condition of pollution, contamination, or nuisance (as defined in CWC § 13050), in waters of the state are prohibited.

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: The SDRWQCB Water Quality Control Plan for the San Diego Basin (Basin Plan) contains the following waste discharge prohibition: "The discharge of waste to waters of the state in a manner causing, or threatening to cause a condition of pollution, contamination, or nuisance as defined in California Water Code Section 13050, is prohibited."

California Water Code section 13050(l) states"(1) 'Pollution' means an alteration of the quality of waters of the state by waste to a degree which unreasonably affects either of the following: (A) The water for beneficial uses. (B) Facilities which serve beneficial uses. (2) 'Pollution' may include "contamination."

California Water Code section 13050(k) states "'Contamination' means an impairment of the quality of waters of the state by waste to a degree which creates a hazard to public health through poisoning or through the spread of disease. 'Contamination' includes any equivalent effect resulting from the disposal of waste, whether or not waters of the state are affected."

California Water Code section 13050(m) states "'Nuisance' means anything which meets all of the following requirements: (1) Is injurious to health, or is indecent or offensive to the senses, or an obstruction to the free use of property, so as to interfere with the comfortable enjoyment of life or property. (2) Affects at the same time an entire community or neighborhood, or any considerable number of

persons, although the extent of the annoyance or damage inflicted upon individuals may be unequal. (3) Occurs during, or as a result of, the treatment or disposal of wastes."

California Water Code Section 13243 provides that "A regional board, in a water quality control plan or in waste discharge requirements, may specify certain conditions or areas where the discharge of waste, or certain types of waste, will not be permitted."

California Water Code Section 13263(a) provides that waste discharge requirements prescribed by the SDRWQCB implement the Basin Plan.

Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(A - D) require municipalities to implement controls to reduce pollutants in urban runoff from commercial, residential, industrial, and construction land uses or activities.

Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(A - D) require municipalities to have legal authority to control various discharges to their MS4.

Discussion: Prohibition item A.1. characterizes a basic premise and primary goal of Order No. 2001-01. The entire thrust of Order No. 2001-01 is to prevent discharges from MS4s from causing, or threatening to cause, a condition of pollution, contamination, or nuisance. In fact, Prohibition item A.1. exhibits a major component of the SDRWQCB's mission, and is included in its Basin Plan. The SDRWQCB seeks to preserve and enhance the quality of the region's waters, and one primary method to achieve this is by preventing conditions of pollution, contamination, or nuisance in the region's waters. As discussed in Finding 9, urban runoff discharges from MS4s can cause these conditions. Therefore, Prohibition item A.1 is included in Order No. 2001-01 to prevent urban runoff discharges which may cause or threaten to cause conditions of pollution, contamination, or nuisance.

Since discharges which enter the MS4 are generally discharged unimpeded directly into receiving waters, this prohibition applies to both discharges into and from MS4s. Federal NPDES regulations clearly provide the SDRWQCB with the legal authority to require municipalities to control discharges from third parties into their MS4. 40 CFR 122.26(d)(2)(iv)(A - D) require municipalities to implement controls to reduce pollutants in urban runoff **from** commercial, residential, industrial, and construction land uses or activities. Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(A - D) require municipalities to have legal authority to control various discharges **to** their MS4. This concept is further supported in the Preamble to the Phase II Final Rule NPDES storm water regulations, which states "The operators of regulated small MS4s cannot passively receive and discharge pollutants **from** third parties" (US EPA, 1999). Due to the greater water quality concerns generally experienced by larger municipalities, Phase II Final Rule findings for small municipalities are also applicable to larger municipalities such as the Copermittees. Finally, underlying the Federal NPDES storm water regulations is the Clean Water Act, which states in section 402(p)(3)(B)(ii) that municipalities shall "effectively prohibit non-stormwater discharges **into** the storm sewers."

The requirement for municipal storm water dischargers to have, and exercise, local governmental authority in order to comply with water quality control obligations (such as Prohibition A.1 of Order No. 2001-01) is analogous to the requirement for Publicly Owned Treatment Works to have and exercise legal authority to require pretreatment of industrial wastes being discharged to their sewage collections systems (CWA 402(b)(8)).

The SDRWQCB has discretion to require Prohibition item A.1. in Order No. 2001-01 under the broad and specific legal authority cited above.

A.2. Prohibitions – Discharges states the following:

Discharges from MS4s which cause or contribute to exceedances of receiving water quality objectives for surface water or groundwater are prohibited.

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.44(d)(1)(i) requires NPDES permits to include limitations to "control all pollutants or pollutant parameters (either conventional, nonconventional, or toxic pollutants) which the Director determines are or may be discharged at a level which will cause, have reasonable potential to cause, or contribute to an excursion above any State water quality standard, including State narrative criteria for water quality."

California Water Code section 13241 requires each regional board to "establish such water quality objectives in water quality control plans as in its judgement will ensure the reasonable protection of beneficial uses and the prevention of nuisance […]."

California Water Code Section 13243 provides that "A regional board, in a water quality control plan or in waste discharge requirements, may specify certain conditions or areas where the discharge of waste, or certain types of waste, will not be permitted."

California Water Code Section 13263(a) provides that waste discharge requirements prescribed by the SDRWQCB implement the Basin Plan.

Discussion: As with Prohibition item A.1., Prohibition item A.2. also characterizes a primary goal of Order No. 2001-01 and the SDRWQCB. This goal is to protect the beneficial uses of the region's waters and achieve the water quality objectives necessary to protect those uses. The overarching intent of the Clean Water Act embodies Prohibition item A.2. as well; the Act's objective is to "restore and maintain all chemical, physical and biological integrity of the Nation's waters [to make all surface waters] fishable [and] swimmable."

As discussed in Finding 3, urban runoff discharges from MS4s can cause or contribute to exceedances of receiving water quality objectives. For this reason, there is a real need for municipal storm water permits to include stringent requirements such as Prohibition item A.2. to protect those water bodies. To meet

this need the SDRWQCB has included receiving water limitations, which dictate water quality standards (designated beneficial uses and water quality objectives developed to protect beneficial uses), in Receiving Water Limitations item C. of Order No. 2001-01 (see the Discussion for this item for more information). To ensure that water quality standards are protected and receiving water limitations met, the SDRWQCB must prohibit MS4 discharges that cause or contribute to exceedances of receiving water quality objectives.

The SDRWQCB has discretion to require Prohibition item A.2. in Order No. 2001-01 under the broad and specific legal authority cited above.

A.3. Prohibitions – Discharges states the following:

Discharges from MS4s to waters of the United States containing pollutants which have not been reduced to the maximum extent practicable (MEP) are prohibited.

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: California Water Code Section 13243 provides that "A regional board, in a water quality control plan or in waste discharge requirements, may specify certain conditions or areas where the discharge of waste, or certain types of waste, will not be permitted."

Discussion: As discussed in Findings 3 and 9, urban runoff discharges from MS4s can cause receiving water degradation and beneficial use impairment. For this reason, pollutants in these discharges must be reduced to the maximum extent practicable (see Finding 10). The Clean Water Act and Federal NPDES regulations clearly require operators of MS4s to reduce pollutants in discharges from MS4s to the maximum extent practicable. Therefore, the SDRWQCB has prohibited discharges which do not meet this requirement. The SDRWQCB has discretion to require Prohibition item A.3. in Order No. 2001-01 under the broad and specific legal authority cited above.

A.4. Prohibitions – Discharges states the following:

Applicable to New Development and Significant Redevelopment Only:
Post-development runoff which is greater in peak rate or velocity than pre-development runoff from the same site is prohibited. Post-development runoff containing pollutants loads which cause or contribute to an exceedance of receiving water quality objectives or which have not been reduced to the maximum extent practicable is prohibited. Discharges of post-development runoff into a Clean Water Act section 303(d) water body containing any pollutant (for which the water body is already impaired) in levels exceeding predevelopment levels (for those same pollutants) is prohibited.

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.44(d)(1)(i) requires NPDES permits to include limitations to "control all pollutants or pollutant parameters (either conventional, nonconventional, or toxic pollutants) which the Director determines are or may be discharged at a level which will cause, have

reasonable potential to cause, or contribute to an excursion above any State water quality standard, including State narrative criteria for water quality."

Federal NPDES regulation 40 CFR 122.44(d)(1) requires municipal storm water permits to include any requirements necessary to "[a]cheive water quality standards established under section 303 of the CWA, including State narrative criteria for water quality."

California Water Code Section 13243 provides that "A regional board, in a water quality control plan or in waste discharge requirements, may specify certain conditions or areas where the discharge of waste, or certain types of waste, will not be permitted."

Discussion: In order to prevent receiving water quality problems within the region from worsening, urban runoff from new development must be addressed. This is because the increased urbanization associated with new development generally results in an increase in pollutant sources and impervious surfaces. The increase in pollutant sources leads to an increase in pollutant loads found in storm water, while the increase in impervious surfaces prevents natural processes from reducing those pollutant loads. The impervious surfaces associated with urbanization prevent storm water from infiltrating into the soil. Natural vegetation and soil are prevented from filtering urban runoff, resulting in storm water flows that are higher in volume and pollutant loads. This causes the quality of receiving waters to be adversely impacted and beneficial uses to be impaired.

Federal NPDES regulation 40 CFR 122.44(d)(1) requires municipal storm water permits to include any requirements necessary to "[a]cheive water quality standards established under section 303 of the CWA, including State narrative criteria for water quality." The term "water quality standards" in this context refers to a water body's **beneficial uses** and the water quality objectives necessary to protect those beneficial uses. The negative impact of urban runoff flow on the beneficial uses of receiving waters has been widely documented. Increases in flows from impervious surfaces associated with urbanization can result in (1) increases in the number of bankfull events and increased peak flow rates; (2) sedimentation and increased sediment transport; (3) frequent flooding; (4) stream bed scouring and habitat degradation; (5) shoreline erosion and stream bank widening; (6) decreased baseflow; (7) loss of fish populations and loss of sensitive aquatic species; (8) aesthetic degradation; and (9) changes in stream morphology.[90] US EPA finds that the level of imperviousness resulting from urbanization is strongly correlated with the water quality impairment of nearby receiving waters.[91] US EPA further attributes much of this water quality impairment to changes in flow conditions from urbanization, stating "[I]n many cases, the impacts on receiving streams due to high storm water flow rates or volumes can be more significant than those attributable to the contaminants found

[90] U.S. Environmental Protection Agency. 1999. Preliminary Data Summary of Urban Storm Water Best Management Practices. EPA-821-R-99-012. p. 4-24.

[91] U.S. Environmental Protection Agency. 1999. 40 CFR Parts 9, 122, 123, and 124 National Pollutant discharge Elimination System – Regulations for Revision of the Water Pollution Control Program Addressing Storm Water Discharges; Final Rule. p. 68727.

in storm water discharges."[92] Therefore, in order to protect the beneficial uses and water quality objectives of waters receiving urban runoff flows from new development (as **required** by 40 CFR 122.44(d)(1)), the SDRWQCB has placed limits on urban runoff flows from new development in the Prohibition A.4.

While new development increases urban runoff flows, it also increases the amount of pollutants found in those flows. Urban runoff was found by the 1996 US EPA National Water Quality Inventory to be the leading cause of ocean impairment nationwide. As regional monitoring program results indicate, urban runoff is also identified as a primary source of receiving water quality impairment within the Region. Though urban land use occupies approximately 30% of the monitoring program study area, approximately 50% or more of the total pollutant load for many constituents is contributed by urbanized land uses including residential, commercial, and industrial land uses (City of San Diego, 1998). The Region's Clean Water Act Section 303(d) list, which identifies water bodies with impaired beneficial uses within the Region, also indicates that the impacts of urban runoff are significant. Many of the impaired water bodies on the 303(d) list are impaired by constituents which have been found at high levels within urban runoff by the regional storm water monitoring program. Examples of constituents frequently responsible for beneficial use impairment include total and fecal coliform, heavy metals, and sediment; these constituents have been found at high levels in urban runoff both regionally and nationwide.

Urban runoff clearly has a significant impact on receiving water quality within the region. Without proper controls, new development only exacerbates the problem. To keep the problem from worsening, and to prevent the further degradation of impaired receiving waters (as required by Federal NPDES regulation 40 CFR 122.44 (d)(1)(i)), Prohibition A.4 places limits on the discharge of pollutants from new development.

The SDRWQCB has discretion to require Prohibition item A.4. in Order No. 2001-01 under the broad and specific legal authority cited above.

A.5. Prohibitions – Discharges states the following:

In addition to the above prohibitions, discharges from MS4s are subject to all Basin Plan prohibitions cited in Attachment A to this Order.

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: California Water Code Section 13243 provides that "A regional board, in a water quality control plan or in waste discharge requirements, may specify certain conditions or areas where the discharge of waste, or certain types of waste, will not be permitted."

[92] U.S. Environmental Protection Agency. 1999. Preliminary Data Summary of Urban Storm Water Best Management Practices. EPA-821-R-99-012. p. 4-23.

California Water Code Section 13263(a) provides that waste discharge requirements prescribed by the SDRWQCB implement the Basin Plan.

Discussion: As discussed in Findings 3, 6, and 9, the discharge of pollutants from MS4s can cause the concentration of pollutants to exceed applicable receiving water quality objectives, impair or threaten to impair designated beneficial uses, and pose a significant threat to the public health. To prevent these conditions, the Prohibitions included in the SDRWQCB's Basin Plan must therefore apply to MS4 discharges. The Basin Plan contains Prohibitions established by the SDRWQCB pursuant to California Water Code Section 13243. The SDRWQCB is required to implement Basin Plan Prohibitions in Order No. 2001-01 pursuant to California Water Code Section 13263(a). The SDRWQCB has discretion to require Prohibition item A.5. in Order No. 2001-01 under the broad and specific legal authority cited above.

B.1. Prohibitions – Non-Storm Water Discharges states the following:

*Each Copermittee shall effectively prohibit **all** types of non-storm water discharges into its Municipal Separate Storm Sewer System (MS4) unless such discharges are either authorized by a separate NPDES permit; or not prohibited in accordance with B.2. and B.3. below.*

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B) requires MS4 operators "to detect and remove (or require the discharger to the municipal separate storm sewer to obtain a separate NPDES permit for) illicit discharges and improper disposal into the storm sewer."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B)(1) provides that the Copermittees shall prevent all types of illicit discharges into the MS4 except for the non-storm water discharges listed in Prohibition item B.2., provided that these discharges are not found to be a significant source of pollutants.

Discussion: Illicit or non-storm water discharges can constitute a significant portion of urban runoff discharges from MS4s. US EPA states "A study conducted in 1987 in Sacramento, California, found that almost one-half of the water discharged from a local MS4 was not directly attributable to precipitation runoff. A significant portion of these dry weather flows were from illicit and/or inappropriate discharges and connections to the MS4" (2000).

MS4 discharges attributable to illicit or non-storm water discharges can be a significant source of pollutant loading to receiving waters. The NURP study concluded that the quality of urban runoff can be adversely impacted by illicit discharges and connections (US EPA, 1983). Furthermore, US EPA states that illicit or non-storm water discharges result in "untreated discharges that contribute high levels of pollutants, including heavy metals, toxics, oil and grease, solvents, nutrients, viruses, and bacteria to receiving waterbodies. Pollutant levels from these illicit discharges have been shown in EPA studies to be high enough to

significantly degrade receiving water quality and threaten aquatic wildlife and human health" (2000).

For these reasons, CWA section 402(p)(3)(B)(ii) requires each Copermittee to prohibit non-storm water discharges into its MS4. The detection and elimination of illicit discharges and connections is also clearly identified in the federal regulations as a high priority (40 CFR 122.26(d)(2)(iv)(B) and 122.26(d)(2)(iv)(B)(1)). As guidance for detecting and eliminating illicit discharges and connections, the US EPA suggests "The proposed management program must include a description of inspection procedures, orders, ordinances, and other legal authorities necessary to prevent illicit discharges to the MS4" (1992).

The SDRWQCB has the discretion to require Prohibition item B.1. in Order 2001-01 under the broad and specific legal authority cited above.

B.2. Prohibitions – Non-Storm Water Discharges states the following:

Pursuant to 40 CFR 122.26(d)(2)(iv)(B)(1), the following categories of non-storm water discharges need only be prohibited from entering an MS4 if such categories of discharges are identified by the Copermittee as a significant source of pollutants to waters of the United States:

a. Diverted stream flows;
b. Rising ground waters;
c. Uncontaminated ground water infiltration [as defined at 40 CFR 35.2005(20)] to MS4s;
d. Uncontaminated pumped ground water;
e. Foundation drains;
f. Springs;
g. Water from crawl space pumps;
h. Footing drains;
i. Air conditioning condensation;
j. Flows from riparian habitats and wetlands;
k. Water line flushing;
l. Landscape irrigation;
m. Discharges from potable water sources;
n. Irrigation water;
o. Lawn watering;
p. Individual residential car washing; and
q. Dechlorinated swimming pool discharges.

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B) requires MS4 operators "to detect and remove (or require the discharger to the municipal separate storm sewer to obtain a separate NPDES permit for) illicit discharges and improper disposal into the storm sewer."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B)(1) provides that the Copermittees shall prevent all types of illicit discharges into the MS4 except for the non-storm water discharges listed in Prohibition item B.2., provided that these discharges are not found to be a significant source of pollutants.

Discussion: The discharges listed in Prohibition item B.2. are referred to as "de minimis" discharges in the Federal NPDES regulations. They are considered

acceptable non-storm water discharges to the MS4 only when found by the municipality to not be a significant source of pollutants to the MS4 (40 CFR 122.26(d)(2)(iv)(B)(1)). Regarding these discharges, US EPA states "While EPA does not consider these flows to be innocuous, they are only to be regulated by the storm water program to the extent that they may be identified as significant sources of pollutants to waters of the United States under certain circumstances" (1992). The SDRWQCB has discretion to require Prohibition item B.2. in Order No. 2001-01 under the broad and specific legal authority cited above.

B.3. Prohibitions – Non-Storm Water Discharges states the following:

When a discharge category above is identified as a significant source of pollutants to waters of the United States, the Copermittee shall either:

a. Prohibit the discharge category from entering its MS4; ***OR***

b. Not prohibit the discharge category and implement, or require the responsible party(ies) to implement, BMPs which will reduce pollutants to the MEP; ***AND***

c. For each discharge or discharge class not prohibited, the Copermittee shall submit the following information to the SDRWQCB within 180 days of adoption of this Order:

(1) The non-storm water discharge category listed above which the Copermittee elects not to prohibit; and

(2) The BMP(s) for each discharge class listed above which the Copermittee will implement, or require the responsible party(ies) to implement, to prevent or reduce pollutants to the MEP.

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B) requires MS4 operators "to detect and remove (or require the discharger to the municipal separate storm sewer to obtain a separate NPDES permit for) illicit discharges and improper disposal into the storm sewer."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B)(1) provides that the Copermittees shall prevent all types of illicit discharges into the MS4 except for the non-storm water discharges listed in Prohibition item B.2., provided that these discharges are not found to be a significant source of pollutants.

California Water Code Section 13267 provides that "the regional board may require that any person who has discharged […] shall furnish, under penalty of perjury, technical or monitoring reports which the regional board requires."

Discussion: Discharges listed in Prohibition item B.2. which are found to be significant sources of pollutants cannot be discharged to the MS4 without implementation of applicable control measures. These control measures can include prohibition of the discharges or implementation of BMPs to reduce pollutants in the discharges to the maximum extent practicable. If a municipality chooses not to prohibit such a discharge, the municipality must supply the SDRWQCB information assuring that pollutants in the discharges will be reduced to the maximum extent practicable. This will help ensure that the municipality has

a plan in place to address the discharges, thereby reducing the potential for the discharges to impact receiving water quality. The SDRWQCB has discretion to require Prohibition item B.3. in Order No. 2001-01 under the broad and specific legal authority cited above.

B.4. Prohibitions – Non-Storm Water Discharges states the following:

Fire Fighting Flows: *BMPs must be implemented to reduce pollutants from non-emergency fire fighting flows (i.e., flows from controlled or practice blazes) identified by the Copermittee to be significant sources of pollutants to waters of the United States. Emergency fire fighting flows (i.e., flows necessary for the protection of life or property) need not be prohibited.*

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B) requires MS4 operators "to detect and remove (or require the discharger to the municipal separate storm sewer to obtain a separate NPDES permit for) illicit discharges and improper disposal into the storm sewer."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B)(1) provides that Copermittees "shall address discharges or flows from fire fighting only where such discharges or flows are identified as significant sources of pollutants to waters of the United States."

Discussion: Discharges or flows from non-emergency fire fighting can be a significant source of pollutants to the MS4. Pollutants which enter the MS4 are generally flushed out to receiving waters. Discharges or flows from non-emergency fire fighting activities can therefore negatively impact receiving water quality. For this reason, non-emergency fire fighting discharges and flows must be addressed when identified as significant sources of pollutants. The SDRWQCB has discretion to require Prohibition item B.4. in Order No. 2001-01 under the broad and specific legal authority cited above.

B.5. Prohibitions – Non-Storm Water Discharges states the following:

Dry Weather Analytical Monitoring and Non-Storm Water Discharges: Each Copermittee shall examine all dry weather analytical monitoring results collected in accordance with section F.5. and Attachment E of this Order to identify water quality problems which may be the result of any non-prohibited discharge category(ies) identified above in Non-Storm Water Discharges to MS4s Prohibition B.2. Follow-up investigations shall be conducted as necessary to identify and control any non-prohibited discharge category(ies) listed above. Non-prohibited discharges listed in B.2. above which contain pollutants which cannot be reduced to the maximum extent practicable by the implementation of BMPs shall be prohibited on a categorical or case by case basis.

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B) requires MS4 operators "to detect and remove (or require the discharger to the municipal separate storm sewer to obtain a separate NPDES permit for) illicit discharges and improper disposal into the storm sewer."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B)(2) requires that Copermittees shall provide "A description of procedures to conduct on-going field screening activities during the life of the permit, including areas or locations that will be evaluated by such field screens."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B)(3) provides that Copermittees shall "investigate portions of the separate storm sewer system that, based on the results of a field screen, or other appropriate information, indicate a reasonable potential of containing illicit discharges or other sources on non-storm water."

Discussion: Non-prohibited non-storm water discharges can be a significant source of pollutants to the MS4. These discharges can reach receiving waters, causing negative impacts to receiving water quality. Field screening can be an effective tool to help prevent these conditions. Field screening results can be used to identify non-prohibited discharges which may be a significant source of pollutants to the MS4. When field screening results exhibit potential non-storm water discharges, follow-up investigations should be conducted to find if non-prohibited discharges are the source. This information can then be used to prohibit the non-prohibited discharge or require implementation of BMPs. The SDRWQCB has discretion to require Prohibition item B.5. in Order No. 2001-01 under the broad and specific legal authority cited above.

C. RECEIVING WATER LIMITATIONS

C. Receiving Water Limitation states the following:

1. *Discharges from MS4s that cause or contribute to the violation of water quality standards (designated beneficial uses and water quality objectives developed to protect beneficial uses) are prohibited.*

2. *Each Copermittee shall comply with Part C.1. of this Order through timely implementation of control measures and other actions to reduce pollutants in urban runoff discharges in accordance with the Jurisdictional Urban Runoff Management Program (Jurisdictional URMP) and other requirements of this Order including any modifications. The Jurisdictional URMP shall be designed to achieve compliance with Part C.1. of this Order. If exceedance(s) of water quality standards persist notwithstanding implementation of the URMP and other requirements of this Order, the Copermittee shall assure compliance with Part C.1. of this Order by complying with the following procedure:*

    a. *Upon a determination by either the Copermittee or the SDRWQCB that MS4 discharges are causing or contributing to an exceedance of an applicable water quality standard, the Copermittee shall promptly notify and thereafter submit a report to the SDRWQCB that describes BMPs that are currently being implemented and additional BMPs that will be implemented to prevent or reduce any pollutants that are causing or contributing to the exceedance of water quality standards. The report may be incorporated in the annual update to the Jurisdictional URMP unless the SDRWQCB directs an earlier submittal. The report shall include an implementation schedule. The SDRWQCB may require modifications to the report;*

b. Submit any modifications to the report required by the SDRWQCB within 30 days of notification;

c. Within 30 days following approval of the report described above by the SDRWQCB, the Copermittee shall revise its Jurisdictional URMP and monitoring program to incorporate the approved modified BMPs that have been and will be implemented, the implementation schedule, and any additional monitoring required;

d. Implement the revised Jurisdictional URMP and monitoring program in accordance with the approved schedule.

So long as the Copermittee has complied with the procedures set forth above and are implementing the revised Jurisdictional URMP, the Copermittee does not have to repeat the same procedure for continuing or recurring exceedances of the same receiving water limitations unless directed by the SDRWQCB to do so.

3. Nothing in this section shall prevent the SDRWQCB from enforcing any provision of this Order while the Copermittee prepares and implements the above report.

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: California Water Code Section 13241 provides that the "SDRWQCB shall establish such water quality objectives in water quality control plans as in its judgement will ensure the reasonable protection of beneficial uses and the prevention of nuisance."

California Water Code Section 13263(a) provides that waste discharge requirements prescribed by the SDRWQCB implement the Basin Plan.

Discussion: See the above discussion of Finding 13 in section VI. of this Fact Sheet/Technical Report.

D. LEGAL AUTHORITY

D.1. Legal Authority states the following:

*Each Copermittee shall establish, maintain, and enforce adequate legal authority to control pollutant discharges **into** and **from** its MS4 through ordinance, statute, permit, contract or similar means. This legal authority must, at a minimum, authorize the Copermittee to:*

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.26(d)(2)(i)(A) provides that the Copermittees shall develop and implement legal authority to "Control through ordinance, order or similar means, the contribution of pollutants to the municipal storm sewer by storm water discharges associated with industrial activity and the quality of storm water discharged from sites of industrial activity."

Federal NPDES regulation 40 CFR 122.26(d)(2)(i)(D) provides that the Copermittees shall develop and implement legal authority to "Control through

interagency agreements among coapplicants the contribution of pollutants from one portion of the municipal system to another portion of the municipal system."

Illicit discharge is defined under Federal NPDES regulation 40 CFR 122.26(b)(2) as "any discharge to a municipal separate storm sewer system that is not composed entirely of storm water except discharges pursuant to a NPDES permit (other than the NPDES permit for discharges from the municipal separate storm sewer) and discharges resulting from fire fighting activities."

Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(A - D) require municipalities to implement controls to reduce pollutants in urban runoff from commercial, residential, industrial, and construction land uses or activities.

Discussion: As discussed in Finding 15, Copermittees cannot passively receive and discharge pollutants from third parties. As US EPA states, "The operator of a small MS4 that does not prohibit and/or control discharges into its system essentially accepts 'title' for those discharges. At a minimum, by providing free and open access to the MS4s that convey discharges to the waters of the United States, the municipal storm sewer system enables water quality impairment by third parties" (1999).

Discharges of pollutants to the MS4 must therefore be controlled, and an important means for a municipality to achieve this is through development of municipal legal authority. USEPA states "A crucial requirement of the NPDES storm water regulation is that a municipality must demonstrate that it has adequate legal authority to control the contribution of pollutants in storm water discharged to its MS4. […] In order to have an effective municipal storm water management program, a municipality must have adequate legal authority to control the contribution of pollutants to the MS4. […] 'Control,' in this context, means not only to require disclosure of information, but also to limit, discourage, or terminate a storm water discharge to the MS4" (1992).

Since discharges which enter the MS4 are generally discharged unimpeded directly into receiving waters, the Copermittee's legal authority is to apply to both discharges into and from MS4s. Federal NPDES regulations clearly provide the SDRWQCB with the legal authority to require municipalities to control discharges from third parties into their MS4. 40 CFR 122.26(d)(2)(iv)(A - D) require municipalities to implement controls to reduce pollutants in urban runoff **from** commercial, residential, industrial, and construction land uses or activities. Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(A - D) require municipalities to have legal authority to control various discharges **to** their MS4. This concept is further supported in the Preamble to the Phase II Final Rule NPDES storm water regulations, which states "The operators of regulated small MS4s cannot passively receive and discharge pollutants **from** third parties" (US EPA, 1999). Due to the greater water quality concerns generally experienced by larger municipalities, Phase II Final Rule findings for small municipalities are also applicable to larger municipalities such as the Copermittees. Finally, underlying the Federal NPDES storm water regulations is the Clean Water Act, which states in section 402(p)(3)(B)(ii) that municipalities shall "effectively prohibit non-stormwater discharges **into** the storm sewers."

The requirement for municipal storm water dischargers to have, and exercise, local governmental authority in order to comply with water quality control obligations is analogous to the requirement for Publicly Owned Treatment Works to have and exercise legal authority to require pretreatment of industrial wastes being discharged to their sewage collections systems (CWA 402(b)(8)).

The SDRWQCB has discretion to require Legal Authority item D.1 in Order No. 2001-01 under the broad and specific legal authority cited above.

D.1.a. Legal Authority states the following:

*Control the contribution of pollutants in discharges of runoff associated with industrial and construction activity **to** its MS4 and control the quality of runoff **from** industrial and construction sites. This requirement applies both to industrial and construction sites which have coverage under the statewide general industrial or construction storm water permits, as well as to those sites which do not. Grading ordinances shall be upgraded as necessary to comply with this Order.*

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.26(d)(2)(i)(A) provides that the Copermittees shall develop and implement legal authority to "Control through ordinance, order or similar means, the contribution of pollutants to the municipal storm sewer by storm water discharges associated with industrial activity and the quality of storm water discharged from sites of industrial activity."

Federal NPDES regulation 40 CFR 122.26(b)(14) provides that "The following categories of facilities are considered to be engaging in 'industrial activity' for purposes of this subsection: […] (x) Construction activity including clearing, grading and excavation activities […]."

Discussion: Industrial and construction sites are frequently sources of pollutants such as hazardous materials or sediment. These pollutants are typically carried to MS4s by urban runoff. As discussed in Finding 32, pollutants in urban runoff which enter the MS4 are generally discharged from these structures into receiving waters, where they may cause or contribute to a condition of pollution. Pollutant discharges from industrial and construction sites to MS4s must therefore be controlled. As discussed in Finding 22, municipalities are responsible for discharges from industrial and construction sites to their MS4s (see also Discussion under Legal Authority item D.1). US EPA supports this when it states "To comply with its permit, a municipality must have the authority to hold dischargers accountable for their contributions to separate storm sewers" (1992).

A necessary means for controlling pollutant discharges from industrial and construction sites is the development and implementation of legal authority which addresses urban runoff from these sites. The Federal NPDES regulations clearly emphasize the development and implementation of legal authority for controlling pollutant discharges from industrial and construction sites in 40 CFR 122.26(d)(2)(i)(A) and 40 CFR 122.26(b)(14).

Ordinances, statutes, permits, or contracts can be used to develop legal authority. For example, grading ordinances should be upgraded to control pollutant discharges from construction sites. The US EPA suggests this, stating "All construction sites, regardless of size, must be addressed by the municipality. […] A description of the local erosion and sediment control law or ordinance is needed to satisfy this program requirement. The description should include information that links the enforcement of the law or ordinance to the legal authority of the applicant" (1992). The US EPA further states "a municipality, to satisfy its permit conditions, may need to impose additional requirements on discharges from permitted industrial facilities, as well as discharges from industrial facilities and construction sites not required to obtain permits. Therefore, a municipality should develop a mechanism to assure that all industrial facilities and construction sites that discharge to the MS4 know their obligation to comply with the applicable terms of the municipality's storm water ordinances" (1992).

The SDRWQCB has discretion to require Legal Authority item D.1.a in Order No. 2001-01 under the broad and specific legal authority cited above.

D.1.b. Legal Authority states the following:

*Prohibit **all** illicit discharges including but not limited to:*

(1) Sewage;

(2) Discharges of wash water resulting from the hosing or cleaning of gas stations, auto repair garages, or other types of automotive services facilities;

(3) Discharges resulting from the cleaning, repair, or maintenance of any type of equipment, machinery, or facility including motor vehicles, cement-related equipment, and port-a-potty servicing;

(4) Discharges of wash water from mobile operations such as mobile automobile washing, steam cleaning, power washing, and carpet cleaning, etc.;

(5) Discharges of wash water from the cleaning or hosing of impervious surfaces in municipal, industrial, commercial, and residential areas including parking lots, streets, sidewalks, driveways, patios, plazas, work yards and outdoor eating or drinking areas, etc.;

(6) Discharges of runoff from material storage areas containing chemicals, fuels, grease, oil, or other hazardous materials;

(7) Discharges of pool or fountain water containing chlorine, biocides, or other chemicals; discharges of pool or fountain filter backwash water;

(8) Discharges of sediment, pet waste, vegetation clippings, or other landscape or construction-related wastes; and

(9) *Discharges of food-related wastes (e.g., grease, fish processing, and restaurant kitchen mat and trash bin wash water, etc.).*

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.26 (b)(2) defines an illicit discharge as "any discharge to a municipal separate storm sewer that is not composed entirely of storm water except discharges pursuant to a NPDES permit (other than the NPDES permit for discharges from the municipal separate storm sewer) and discharges resulting from fire fighting activities."

California Water Code Section 13243 also provides that a "regional board, in a water quality control plan or in waste discharge requirements, may specify certain conditions or areas where the discharge of waste, or certain types of waste, will not be permitted."

Discussion: Illicit or non-storm water discharges can be a significant source of pollutants to the MS4. As discussed in Finding 32, pollutants which enter the MS4 are generally discharged to receiving waters, where they can impact receiving water quality. Illicit or non-storm water discharges must therefore be prohibited. In order to effectively prohibit illicit or non-storm water discharges, legal authority addressing the discharges must be developed and implemented by each Copermittee. The SDRWQCB has discretion to require Legal Authority item D.1.b in Order No. 2001-01 under the broad and specific legal authority cited above.

D.1.c. Legal Authority states the following:

Prohibit and eliminate illicit connections to the MS4;

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.26(b)(2) defines an illicit discharge as "any discharge to a municipal separate storm sewer that is not composed entirely of storm water except discharges pursuant to a NPDES permit (other than the NPDES permit for discharges from the municipal separate storm sewer) and discharges resulting from fire fighting activities."

California Water Code Section 13243 also provides that a "regional board, in a water quality control plan or in waste discharge requirements, may specify certain conditions or areas where the discharge of waste, or certain types of waste, will not be permitted."

Discussion: An illicit connection is a connection to the MS4 which carries illicit discharges to the MS4. Because illicit discharges to the MS4 are prohibited (discussed in section D.1.b. Legal Authority above), illicit connections are also prohibited and must be eliminated. In order to effectively prohibit and eliminate illicit connections, legal authority addressing the discharges must be developed and implemented by each Copermittee. The SDRWQCB has discretion to require Legal Authority item D.1.c in Order No. 2001-01 under the broad and specific legal authority cited above.

D.1.d. Legal Authority states the following:

Control the discharge of spills, dumping, or disposal of materials other than storm water to its MS4;

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: California Water Code Section 13243 also provides that a "regional board, in a water quality control plan or in waste discharge requirements, may specify certain conditions or areas where the discharge of waste, or certain types of waste, will not be permitted."

Discussion: Non-storm water discharges such as spills, dumping, and disposal of materials can be a significant source of pollutants to the MS4. As discussed in Finding 32, pollutants deposited in MS4s most likely will be discharged to receiving waters, where they can impact receiving water quality. Non-storm water discharges such as spills, dumping, or disposal of materials must therefore be prohibited. In order to effectively prohibit these non-storm water discharges, legal authority addressing the discharges must be developed and implemented by each Copermittee. The SDRWQCB has discretion to require Legal Authority item D.1.d in Order 2001-01 under the broad and specific legal authority cited above.

D.1.e. and D.1.f. Legal Authority state the following:

Require compliance with conditions in Copermittee ordinances, permits, contracts or orders (i.e., hold dischargers to its MS4 accountable for their contributions of pollutants and flows);

Utilize enforcement mechanisms to require compliance with Copermittee storm water ordinances, permits, contracts, or orders;

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv).

Discussion: As discussed in Finding 15, the Copermittees cannot passively receive and discharge pollutants from third parties. Each Copermittee must implement ordinances, permits, contracts, and orders to hold discharges to MS4s accountable for their contributions of pollutants. In order for the ordinances to be effective, each Copermittee must be able to require compliance with the ordinances. Lack of ordinance enforcement by a Copermittee allows third parties to violate a municipality's ordinances with little fear of retribution, leading to receiving water quality degradation. US EPA recommends that a municipality in its urban runoff management program "identify the administrative and legal procedures available to mandate compliance with appropriate ordinances, and therefore, with permit conditions. [Programs] should contain descriptions of how ordinances are implemented and appealed. In particular, a municipality should indicate if it can issues administrative orders and injunctions or if it must go through the court system for enforcement actions" (1992). The SDRWQCB has discretion to require Legal Authority item D.1.e in Order No. 2001-01 under the broad and specific legal authority cited above.

D.1.g. Legal Authority states the following:

Control the contribution of pollutants from one portion of the shared MS4 to another portion of the MS4 through interagency agreements among Copermittees (and other owners of the MS4 such as Caltrans or Department of Defense);

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.26(d)(2)(i)(D) provides that the Copermittee must demonstrate that it can control "through interagency agreements among coapplicants the contribution of pollutants from one portion of the municipal system to another portion of the municipal system."

Discussion: Discharges from Copermittees which share an MS4 eventually reach the same receiving water body. Each Copermittee which discharges to the shared MS4 is therefore responsible for discharges from the shared MS4, and the impacts of those discharges on receiving waters. The Copermittees of a shared MS4 must demonstrate that together they can control the contribution of pollutants over the whole shared MS4. To this effect, the US EPA states "When two or more municipalities submit a joint application, each coapplicant must demonstrate that it individually possesses adequate legal authority over the entire municipal system it operates and owns. A coapplicant need not fulfill every component of legal authority specified in the regulations, as long as the combined legal authority of all coapplicants satisfies the regulatory criteria for every segment of the MS4 (including authority over all sources that discharge to the MS4). […] Coapplicants also may use interjurisdictional agreements to show legal authority and to ensure planning, coordination, and the sharing of the resource burden of permit compliance" (1992). The SDRWQCB has discretion to require Legal Authority item D.1.g. in Order No. 2001-01 under the broad and specific legal authority cited above.

D.1.h. Legal Authority states the following:

Carry out all inspections, surveillance, and monitoring necessary to determine compliance and noncompliance with local ordinances and permits and with this Order, including the prohibition on illicit discharges to the MS4. This means the Copermittee must have authority to enter, sample, inspect, review and copy records, and require regular reports from industrial facilities discharging into its MS4, including construction sites; and

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv).

Discussion: The Copermittees' ability to determine compliance and noncompliance with permit conditions is critical to control pollutant discharges to and from MS4s. Determination of compliance and noncompliance allows for significant sources of pollutants to be identified and addressed, thereby minimizing the discharge of pollutants from the MS4 and the resulting receiving water quality degradation. For this reason each Copermittee must have legal authority to carry out the inspections, surveillance, and monitoring necessary to assess compliance. Regarding compliance determination, US EPA states "municipalities should provide documentation of their authority to enter, sample,

inspect, review, and copy records, etc., as well as demonstrate their authority to require regular reports" (1992). The SDRWQCB has discretion to require Legal Authority item D.1.g in Order No. 2001-01 under the broad legal authority cited above.

D.1.i. Legal Authority states the following:

Require the use of best management practices (BMPs) to prevent or reduce the discharge of pollutants to MS4s.

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.26(d)(1)(ii) requires from the Copermittee "A description of existing legal authority to control discharges to the municipal separate storm sewer system."

Discussion: As discussed in Finding 15, the Copermittees cannot passively receive and discharge pollutants from third parties. The Copermittees must ensure discharges of pollutants to the MS4 are reduced to the maximum extent practicable. In order to achieve this, and hold third party dischargers responsible for their contributions of pollutants, the Copermittees must require the use of BMPs by third party dischargers (see Discussion under Legal Authority item D.1). The SDRWQCB has discretion to require Legal Authority item D.1.i in Order 2001-01 under the broad and specific legal authority cited above.

D.2. Legal Authority states the following:

Within 90 days of adoption of this Order, each Copermittee shall provide to the SDRWQCB a statement certified by its chief legal counsel that the Copermittee has adequate legal authority to implement and enforce each of the requirements contained in 40 CFR 122.26(d)(2)(i)(A-F) and this Order. This statement shall include:

a. Identification of all departments within the jurisdiction that conduct urban runoff related activities, and their roles and responsibilities under this Order. Include an up to date organizational chart specifying these departments and key personnel.

b. Citation of urban runoff related ordinances and the reasons they are enforceable;

c. Identification of the administrative and legal procedures available to mandate compliance with urban runoff related ordinances and therefore with the conditions of this Order;

d. Description of how these ordinances are implemented and appealed; and

e. Description of whether the municipality can issue administrative orders and injunctions or if it must go through the court system for enforcement actions.

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.26(d)(2)(i)(A) provides that the Copermittees shall develop and implement legal authority to

"Control through ordinance, order or similar means, the contribution of pollutants to the municipal storm sewer by storm water discharges associated with industrial activity and the quality of storm water discharged from sites of industrial activity."

Federal NPDES regulation 40 CFR 122.26(d)(2)(i)(D) provides that the Copermittee must demonstrate that it can control "through interagency agreements among coapplicants the contribution of pollutants from one portion of the municipal system to another portion of the municipal system."

Discussion: Copermittees must demonstrate that they can operate pursuant to legal authority to meet the requirements of Federal NPDES regulations 40 CFR 122.26(d)(2)(A-F). For the Copermittee demonstrate this legal authority, the US EPA suggests that "One acceptable way to support a declaration of adequate legal authority, including the ability to enforce appropriate ordinances, is for the municipality to provide a certification from the Municipal General Counsel or equivalent. The certification should state that the applicant has the legal authority to apply and enforce the requirements of 40 CFR 122.26(d)(2)(i)(A-F) in State or local courts. The certification would, therefore, cite specific ordinances and the reasons why they are enforceable. The statement should discuss what the municipality can do to ensure full compliance with 40 CFR 122.26(d)(2)(i)" (1992). The SDRWQCB has discretion to require Legal Authority item D.2 in Order No. 2001-01 under the broad and specific legal authority cited above.

E. TECHNOLOGY BASED STANDARDS

E. Technology Based Standards states the following:

*Each Copermittee shall implement, or require implementation of, best management practices to ensure that the following pollutant discharges **into** and **from** its MS4 are reduced to the applicable technology based standard as specified below:*

Table 3. Technology Based Standards

POLLUTANT DISCHARGE FROM	DESCRIPTION	APPLICABLE PERFORMANCE STANDARD
Industrial Activity owned by the Copermittee	Categorical Industry in 40 CFR 122.26	BAT/BCT (pursuant to Statewide General Industrial Permit)
Industrial Activity	All other industry	MEP
Construction Activity owned by the Copermittee	Greater than or Equal to 5 Acres (or less than 5 acres and Part of a Larger Common Plan of Sale or Development)	BAT/BCT (pursuant to Statewide General Construction Permit)
Construction Activity	All Other construction	MEP
Other Sources	All Other Land Use Activities	MEP
MS4s	All discharges from MS4s	MEP

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: CWA section 402(p)(3)(A) requires "Permits for discharges associated with industrial activity shall meet all applicable provisions of this section and section 301."

CWA section 301(b)(2) requires "effluent limitations for categories and classes of point sources, other than publicly owned treatment works, which (i) shall require application of the best available technology economically achievable for such category or class, which will result in reasonable further progress toward the national goal of eliminating the discharge of all pollutants."

Federal NPDES regulation 40 CFR 122.26(b)(14) provides that "The following categories of facilities are considered to be engaging in 'industrial activity' for purposes of this subsection: […] (x) Construction activity including clearing, grading and excavation activities […]."

Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(A-D) require municipalities to control pollutants in urban runoff discharges to the MS4 to the maximum extent practicable from urban land uses such as residential, commercial, municipal, industrial, and construction.

Discussion: Pollutant discharges in storm water to and from MS4s are held to applicable technology based standards. Storm water discharges to the MS4 from industrial and construction activities owned by the Copermittee, which fall under the general statewide industrial and construction storm water permits, must meet the BAT/BCT performance standard per permit requirements. This BAT/BCT performance standard is required in CWA section 301(b)(2), and is further described in CWA sections 304(b)(2-4).

Pollutant discharges in storm water **to** and **from** the MS4 for all other urban land use activities, including industrial and construction activities not covered under the statewide general permits, must be reduced to the maximum extent practicable. CWA section 402(p)(3)(B)(iii) and Federal NPDES regulation 40 CFR 122.26 (d)(2)(iv) require pollutant discharges in urban runoff discharged **from** MS4s to be reduced to the maximum extent practicable.

Since discharges which enter the MS4 are generally discharged unimpeded directly into receiving waters, the maximum extent practicable standard is to apply to both discharges into and from MS4s. Federal NPDES regulations clearly provide the SDRWQCB with the legal authority to require municipalities to control discharges from third parties into their MS4. 40 CFR 122.26(d)(2)(iv)(A - D) require municipalities to implement controls to reduce pollutants in urban runoff **from** commercial, residential, industrial, and construction land uses or activities to the maximum extent practicable. Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(A - D) require municipalities to have legal authority to control various discharges **to** their MS4. This concept is further supported in the Preamble to the Phase II Final Rule NPDES storm water regulations, which states "The operators of regulated small MS4s cannot passively receive and discharge pollutants **from** third parties" (US EPA, 1999). Due to the greater water quality concerns generally experienced by larger municipalities, Phase II Final Rule findings for small municipalities are also applicable to larger municipalities such as the Copermittees. Finally, underlying the Federal NPDES storm water regulations is the Clean Water Act, which states in section 402(p)(3)(B)(ii) that municipalities shall "effectively prohibit non-stormwater discharges **into** the storm sewers."

The requirement for municipal storm water dischargers to have, and exercise, local governmental authority in order to comply with water quality control obligations is analogous to the requirement for Publicly Owned Treatment Works to have and exercise legal authority to require pretreatment of industrial wastes being discharged to their sewage collections systems (CWA 402(b)(8)).

The SDRWQCB has discretion to require Technology Based Standards item E. in Order No. 2001-01 under the broad and specific legal authority cited above.

F. JURISDICTIONAL URBAN RUNOFF MANAGEMENT PROGRAM

The following underlying broad legal authority citations generally apply to all directives of section F. Jurisdictional Urban Runoff Management Program of Order No. 2001-01, and provide the SDRWQCB with ample underlying authority to require each of the directives. These legal authority citations are also listed under the Underlying Broad Legal Authority for Order No. 2001-01 segment of section VII. of this Fact Sheet/Technical Report. They are repeated here to emphasize their pertinence to the Jurisdictional Urban Runoff Management Program section of Order No. 2001-01, which is the primary component of the Order.

In addition to the five broad legal authority items cited below that underlie all of the directives in section F. of Order No. 2001-01, additional specific legal authority citations applicable to particular directives of section F. are provided in this section of the Fact Sheet/Technical Report as necessary. Some of these additional specific legal authority citations apply to entire components of section F. of Order No. 2001-01. In these cases, the specific legal authority quotations are provided at the beginning of the discussion of the permit component, while the legal authority is again cited under each directive of the component. Furthermore, some specific legal authority citations only apply to distinct directives of section F. of Order No. 2001-01. When this occurs, the quotation of the specific legal authority citation will appear with the discussion of the distinct permit directive.

CWA 402(p)(3)(B)(ii) – Prohibit Non-Storm Water
The CWA requires in section 402(p)(3)(B)(ii) that a storm water program "shall include a requirement to effectively prohibit non-stormwater discharges into the storm sewers."

CWA 402(p)(3)(B)(iii) – Reduce to MEP and Whatever Else is Needed
The CWA requires in section 402(p)(3)(B)(iii) that a storm water program "shall require controls to reduce the discharge of pollutants to the maximum extent practicable, including management practices, control techniques and system, design and engineering methods, and such other provisions as the Administrator or the State determines appropriate for the control of such pollutants."

40 CFR 122.26(d)(2)(i)(B,C,E, and F) – Obtain Adequate Legal Authority
Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B,C,E, and F) provide that each Copermitee's permit application "shall consist of : (i) Adequate legal authority. A demonstration that the applicant can operate pursuant to legal authority established by statute, ordinance or series of contracts which authorizes or enables the applicant at a minimum to: […] (B) Prohibit through ordinance, order or similar means, illicit discharges to the municipal separate

storm sewer; (C) Control through ordinance, order or similar means the discharge to a municipal separate storm sewer of spills, dumping or disposal of materials other than storm water; […] (E) Require compliance with condition in ordinances, permits, contracts or orders; and (F) Carry out all inspection, surveillance and monitoring procedures necessary to determine compliance and noncompliance with permit conditions including the prohibition on illicit discharges to the municipal separate storm sewer."

40 CFR 122.26(d)(2)(iv) – Reduce to MEP and Whatever Else is Needed
Federal NPDES regulation 40 CFR 122.26(d)(2)(iv) provides that the Copermittee shall develop and implement a proposed management program which "shall include a comprehensive planning process which involves public participation and where necessary intergovernmental coordination, to reduce the discharge of pollutants to the maximum extent practicable using management practices, control techniques and system, design and engineering methods, and such other provisions which are appropriate. The program shall also include a description of staff and equipment available to implement the program. […] Proposed programs may impose controls on a systemwide basis, a watershed basis, a jurisdiction basis, or on individual outfalls. […] Proposed management programs shall describe priorities for implementing controls."

CWC 13377 – Implement CWA and Whatever Else is Needed
California Water Code section 13377 provides that "Notwithstanding any other provision of this division, the state board or the regional boards shall, as required or authorized by the Federal Water Pollution Control Act (Clean Water Act), as amended, issue waste discharge requirements and dredged or fill material permits which apply and ensure compliance with all applicable provisions of the act and acts amendatory thereof or supplementary, thereto, together with an more stringent effluent standards or limitation necessary to implement water quality control plans, or for the protection of beneficial uses, or to prevent nuisance."

F. Jurisdictional Urban Runoff Management Program states the following:

Each Copermittee shall take appropriate actions to reduce discharges of pollutants and runoff flow during each of the three major phases of urban development, i.e., planning, construction, and existing development (or use) phases.

Each Copermittee shall implement a Jurisdictional Urban Runoff Management Program (Jurisdictional URMP) that contains the components shown below as described in Sections F.1. through F.8:

F.1. Land-Use Planning for New Development and Redevelopment Component
F.2. Construction Component
F.3. Existing Development Component
- *a. Municipal*
- *b. Industrial*
- *c. Commercial*
- *d. Residential*

F.4. Education Component
F.5. Illicit Discharge Detection and Elimination Component
F.6. Public Participation Component
F.7. Assessment of Jurisdictional URMP Effectiveness Component
F.8. Fiscal Analysis Component

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B,C,E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(A – D) include provisions for inclusion of program components F.1 – F.8 in the Jurisdictional URMPs.

Discussion: As discussed in Finding 17, urban development has three major phases: (1) land use planning for new development; (2) construction; and (3) the land use or existing development phase. Because the Copermittees authorize each of these phases, they have commensurate responsibilities to protect water quality during each phase. Findings 18 – 20 indicate how each of these phases of development can be a significant source of pollutants in urban runoff and can impact receiving water quality. To address the potential negative impacts from the three phases of urban development, Urban Runoff Management Programs focusing on the three phases must be developed and implemented (see Finding 10). US EPA places importance on the development and implementation of URMPs when it states "Under the Part 2 application requirements, municipalities must propose site-specific storm water management programs. This is the most important aspect of the permit application" (1992). The SDRWQCB has discretion to require development and implementation of Jurisdictional Urban Runoff Management Programs in Order No. 2001-01 under the broad and specific legal authority cited above.

F.1. LAND-USE PLANNING FOR NEW DEVELOPMENT AND REDEVELOPMENT COMPONENT

In addition to the underlying broad legal authority citations listed above in section VII. of this Fact Sheet/Technical Report, the following specific legal authority item also generally applies to all directives under Jurisdictional Urban Runoff Management Program item F.1. Land-Use Planning for New Development and Redevelopment Component of Order No. 2001-01. Other specific legal authority items applicable only to distinct directives of Jurisdictional Urban Runoff Management Program item F.1. are provided as necessary.

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A)(2) provides that Copermittees develop and implement a proposed management program which is to include "A description of planning procedures including a comprehensive master plan to develop, implement and enforce controls to reduce the discharge of pollutants from municipal separate storm sewers which receive discharges from areas of new development and significant redevelopment. Such plan shall address controls to reduce pollutants in discharges from municipal separate storm sewers after construction is completed."

F.1. Land-Use Planning for New Development and Redevelopment Component states the following:

Each Copermittee shall minimize the short and long-term impacts on receiving water quality from new development and redevelopment. In order to reduce pollutants and runoff flows from new development and redevelopment to the maximum extent practicable, each Copermittee shall at a minimum:

F.1.a Revise General Plan
F.1.b Modify Development Project Approval Processes
F.1.c Revise Environmental Review Processes Including CEQA Checklists
F.1.d Conduct Education Efforts Focused on New Development and Redevelopment

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B,C,E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A)(2) generally applies to all directives under Jurisdictional Urban Runoff Management Program item F.1. Land-Use Planning for New Development and Redevelopment Component of Order No. 2001-01.

Discussion: As discussed in Finding 4, urban development can negatively impact receiving water quality by increasing the pollutant load, volume, and velocity of urban runoff. An effective means for minimizing these impacts is to address water quality concerns during the planning phase of urban development. US EPA supports this, stating "Post-construction storm water management in areas undergoing new development or redevelopment is necessary because runoff from these areas has been shown to significantly effect receiving waterbodies. Many studies indicate that prior planning and design for the minimization of pollutants in post-construction storm water discharges is the most cost-effective approach to storm water quality management" (2000). For these reasons, Order No. 2001-01 includes a requirement for the development and implementation of a Land-Use Planning for New Development and Redevelopment Component. The SDRWQCB has discretion to require Jurisdictional Urban Runoff Program item F.1. in Order No. 2001-01 under the broad and specific legal authority cited above.

F.1.a. Revise General Plan of the Jurisdictional Urban Runoff Management Program states the following:

Each Copermittee shall incorporate water quality and watershed protection principles and policies into the General Plan or equivalent plan (e.g., Comprehensive, Master, or Community Plan) to guide land-use decisions and require implementation of consistent water quality protection measures for all development projects. These principles and policies shall be designed to protect natural water bodies, reduce impervious land coverage, slow runoff, and where feasible, maximize opportunities for infiltration of rainwater into soil. Such water quality and watershed protection principles and policies shall include for example:

(1) Minimize the amount of impervious surfaces and directly connected impervious surfaces in areas of new development and redevelopment and where feasible maximize on-site infiltration of runoff.

(2) Implement pollution prevention methods supplemented by pollutant source controls and treatment. Use small collection strategies located at, or as close as possible to, the source (i.e., the point where water initially meets the ground) to minimize the transport of urban runoff and pollutants offsite and into an MS4.

(3) Preserve, and where possible, create or restore areas that provide important water quality benefits, such as riparian corridors, wetlands, and buffer zones. Encourage land acquisition of such areas.

(4) Limit disturbances of natural water bodies and natural drainage systems caused by development including roads, highways, and bridges.

(5) *Prior to making land use decisions, utilize methods available to estimate increases in pollutant loads and flows resulting from projected future development. Require incorporation of structural and non-structural BMPs to mitigate the projected increases in pollutant loads and flows.*

(6) *Avoid development of areas that are particularly susceptible to erosion and sediment loss; or establish development guidance that identifies these areas and protects them from erosion and sediment loss.*

(7) *Reduce pollutants associated with vehicles and increasing traffic resulting from development. Coordinate local traffic management reduction efforts with the San Diego County Congestion Management Plan.*

(8) *Implement the San Diego Association of Government's (SANDAG's) recommendations as found in the Water Quality Element of its Regional Growth Management Strategy.*

(9) *For new development and significant redevelopment only: The post-development runoff rates and velocities from a site shall not exceed the pre-development runoff rates and velocities from the same site. Post-development runoff from a site shall not contain pollutant loads which cause or contribute to an exceedance or receiving water quality objectives or which have not been reduced to the maximum extent practicable. Post-development runoff discharges into a Clean Water Act section 303(d) water body shall not contain any pollutant (for which the water body is already impaired) in levels exceeding pre-development levels (for those same pollutants).*

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B,C,E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A)(2) generally applies to all directives under Jurisdictional Urban Runoff Management Program item F.1. Land-Use Planning for New Development and Redevelopment Component of Order No. 2001-01.

Discussion: The US EPA finds that the Copermittee "must thoroughly describe how the municipality's comprehensive plan is compatible with the storm water regulations" (1992). To achieve this, the Copermittee shall incorporate water quality and watershed protection principles and policies into its General Plan (or equivalent plan). US EPA supports addressing urban runoff problems in General Plans (or equivalent plans) when it states "Runoff problems can be addressed efficiently with sound planning procedures. Master Plans, Comprehensive Plans, and zoning ordinances can promote improved water quality by guiding the growth of a community away from sensitive areas and by restricting certain types of growth (industrial, for example) to areas that can support it without compromising water quality" (2000).

The principles included in Jurisdictional Urban Runoff Management Program item F.1.a. are based on findings by the SWRCB Urban Runoff Technical Advisory Committee. They incorporate basic measures which have been found to minimize pollutants in urban runoff from new development and redevelopment.

The SDRWQCB has discretion to require Jurisdictional Urban Runoff Management Program item F.1.a. in Order No. 2001-01 under the broad legal authority cited above.

F.1.b. Modify Development Project Approval Processes of the Jurisdictional Urban Runoff Management Program states the following:

> *Prior to project approval and issuance of local permits, Copermittees shall review each individual proposed project plan and require measures to ensure that pollutants and runoff from the development will be reduced to the maximum extent practicable and will not cause or contribute to an exceedance of receiving water quality objectives. Each Copermittee shall further ensure that all development will be in compliance with Copermittee storm water ordinances, local permits, all other applicable ordinances and requirements, and this Order.*

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B,C,E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A)(2) generally applies to all directives under Jurisdictional Urban Runoff Management Program item F.1. Land-Use Planning for New Development and Redevelopment Component of Order No. 2001-01.

Discussion: As discussed in Finding 18, incorporating post-construction BMPs into new development and redevelopment during project planning and approval is an effective means for controlling pollutants in urban runoff. US EPA finds review of development plans during the project approval process necessary, stating: "Proposed storm water management programs should include planning procedures for both during and after construction to implement control measures to ensure that pollution is reduced to the maximum extent practicable in areas of new development and redevelopment. Design criteria and performance standards may be used to assist in meeting this objective. Further, storm water management program goals should be reviewed during planning processes that guide development to appropriate locations and steer intensive land uses away from sensitive environmental areas. […] A municipality should describe how it plans to implement the proposed standards (e.g., through an ordinance requiring approval of storm water management programs, a review and approval process, and adequate enforcement)" (1992). The SDRWQCB has discretion to require Jurisdictional Urban Runoff Program item F.1.b. in Order No. 2001-01 under the broad legal authority cited above.

F.1.b.(1). Conditions of Approval of the Jurisdictional Urban Runoff Management Program states the following:

> *Each Copermittee shall include conditions of approval in local permits to ensure that pollutant discharges and runoff flows from development are reduced to the maximum extent practicable and that receiving water quality objectives are not violated throughout the life of the project. Such conditions shall, at a minimum:*
>
> *(a) Require project proponent to implement pollution prevention and source control BMPs for all development projects.*
> *(b) Require project proponent to implement site design/landscape characteristics where feasible which maximize infiltration, provide retention, slow runoff, and minimize impervious land coverage for all development projects.*
> *(c) Require project proponent to implement buffer zones for natural water bodies.*

(d) Require industrial applicants subject to California's statewide General NPDES Permit for Storm Water Discharges Associated with Industrial Activities (Except Construction), (hereinafter General Industrial Permit), to provide evidence of coverage under the General Industrial Permit.

(e) Require project proponent to ensure its grading or other construction activities meet the provisions specified in Section F.2. of this Order.

(f) Require project proponent to ensure long-term maintenance of all post-construction BMPs in perpetuity.

(g) Require project proponent to ensure that the post-development runoff rates and velocities from a site do not exceed the pre-development runoff rates and velocities from the same site. Require project proponent to ensure that post-development runoff pollutants loads from a site have been reduced to the maximum extent practicable and do not cause or contribute to an exceedance of water quality objectives. Require project proponent to ensure that post-development runoff into a Clean Water Act section 303(d) water body containing any pollutant (for which the water body is already impaired) does not exceed pre-development levels (for those same pollutants).

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B,C,E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A)(2) generally applies to all directives under Jurisdictional Urban Runoff Management Program item F.1. Land-Use Planning for New Development and Redevelopment Component of Order No. 2001-01.

Discussion: Regarding conditions of approval in storm water permits, the US EPA finds that "Proposed storm water management programs should include planning procedures for both during and after construction to implement control measures to ensure that pollution is reduced to the maximum extent practicable in areas of new development and redevelopment. Design criteria and performance standards may be used to assist in meeting this objective" (1992). The US EPA further finds that "The municipality should consider storm water controls and structural controls in planning, zoning, and site or subdivision plan approval" (1992). In addition, US EPA states each Copermittee should "have an ordinance or other regulatory mechanism requiring the implementation of post-construction runoff controls […]" (2000).

Furthermore, in its Phase II Final Rule, US EPA requires small municipalities to "Use an ordinance or other regulatory mechanism to address post-construction runoff from new development and redevelopment projects […]" (1999). Due to the greater water quality concerns generally experienced by larger municipalities, Phase II Final Rule requirements for small municipalities are also applicable to larger municipalities such as the Copermittees.

The SDRWQCB has discretion to require Jurisdictional Urban Runoff Program item F.1.b.(1). in Order No. 2001-01 under the broad legal authority cited above.

F.1.b.(2). Standard Urban Storm Water Mitigation Plans (SUSMPs) of the Jurisdictional Urban Runoff Management Program states the following:

Within 365 days of adoption of this Order, the Copermittees shall collectively develop a model Standard Urban Storm Water Mitigation Plan (SUSMP) to reduce pollutants and runoff flows from all

new development and significant redevelopment projects falling under the priority project categories or locations listed in section F.1.b.(2)(a) below. Within 180 days of approval of the model SUSMP in the public process by the SDRWQCB, each Copermittee shall adopt its own local SUSMP, and amended ordinances consistent with the approved model SUSMP, and shall submit both (local SUSMP and amended ordinances) to the SDRWQCB.

Immediately following adoption of its local SUSMP, each Copermittee shall ensure that all new development and significant redevelopment projects falling under the priority project categories or locations listed in F.1.b.(2)(a) below meet SUSMP requirements. The SUSMP requirements shall apply to all priority projects or phases of priority projects, including those with approved tentative maps, which have not yet begun grading or construction activities.

(a) Priority Development Project Categories - SUSMP requirements shall apply to all new development and significant redevelopment projects falling under the priority project categories or locations listed below. Significant redevelopment is defined as the creation or addition of at least 5,000 square feet of impervious surfaces on an already developed site. Significant redevelopment includes, but is not limited to: the expansion of a building footprint or addition or replacement of a structure; structural development including an increase in gross floor area and/or exterior construction or remodeling; replacement of impervious surface that is not part of a routine maintenance activity; and land disturbing activities related with structural or impervious surfaces. Where significant redevelopment results in an increase of less than fifty percent of the impervious surfaces of a previously existing development, and the existing development was not subject to SUSMP requirements, the numeric sizing criteria discussed in section F.1.b.(2)(c) applies only to the addition, and not to the entire development.

i. Home subdivisions of 100 housing units or more. This category includes single-family homes, multi-family homes, condominiums, and apartments.

ii. Home subdivisions of 10-99 housing units. This category includes single-family homes, multi-family homes, condominiums, and apartments.

iii. Commercial developments greater than 100,000 square feet. This category is defined as any development on private land that is not for heavy industrial or residential uses where the land area for development is greater than 100,000 square feet. The category includes, but is not limited to: hospitals; laboratories and other medical facilities; educational institutions; recreational facilities; commercial nurseries; multi-apartment buildings; car wash facilities; mini-malls and other business complexes; shopping malls; hotels; office buildings; public warehouses; and other light industrial facilities.

iv. Automotive repair shops. This category is defined as a facility that is categorized in any one of the following Standard Industrial Classification (SIC) codes: 5013, 5014, 5541, 7532-7534, or 7536-7539.

v. Restaurants. This category is defined as a facility that sells prepared foods and drinks for consumption, including stationary lunch counters and refreshment stands selling prepared foods and drinks for immediate consumption (SIC code 5812), where the land area for development is greater than 5,000 square feet.

vi. All hillside development greater than 5,000 square feet. This category is defined as any development which creates 5,000 square feet of impervious surface which is located in an area with known erosive soil conditions, where the development will grade on any natural slope that is twenty-five percent or greater.

vii. Environmentally Sensitive Areas: All development and redevelopment located within or directly adjacent to or discharging directly to an environmentally sensitive area, which either creates 2,500 square feet of impervious surface on a proposed project site or increases the area of imperviousness of a proposed project site to 10% or more of its naturally occurring condition. Environmentally

sensitive areas include but are not limited to all Clean Water Act Section 303(d) impaired water bodies; areas designated as Areas of Special Biological Significance by the State Water Resources Control Board (Water Quality Control Plan for the San Diego Basin (1994) and amendments); water bodies designated with the RARE beneficial use by the State Water Resources Control Board (Water Quality Control Plan for the San Diego Basin (1994) and amendments); areas designated as preserves or their equivalent under the Multi Species Conservation Program within the Cities and County of San Diego; and any other equivalent environmentally sensitive areas which have been identified by the Copermittees. "Directly adjacent" means situated within 200 feet of the environmentally sensitive area. "Discharging directly to" means outflow from a drainage conveyance system that is composed entirely or predominantly of flows from the subject development or redevelopment site, and not commingled with flows from adjacent lands.

viii. Parking lots 5,000 square feet or more or with 15 or more parking spaces and potentially exposed to urban runoff. Parking lot is defined as a land area or facility for the temporary parking or storage of motor vehicles used personally, for business, or for commerce.

ix. Street, roads, highways, and freeways. This category includes any paved surface used for the transportation of automobiles, trucks, motorcycles, and other vehicles.

x. Retail Gasoline Outlets. Retail Gasoline Outlet is defined as any facility engaged in selling gasoline.

(b) *BMP Requirements – The SUSMP shall include a list of recommended pollution prevention, source control, and structural treatment BMPs. The SUSMP shall require all new development and significant redevelopment projects falling under the above priority project categories or locations to implement a combination of BMPs selected from the recommended BMP list, including at a minimum (1) pollution prevention BMPs, (2) source control BMPs, and (3) structural treatment BMPs. The BMPs shall, at a minimum:*

i. Maintain pre-development peak storm water runoff discharge rates and velocities;
ii. Conserve natural areas;
iii. Minimize storm water pollutants of concern (through implementation of pollution prevention and source control BMPs). Identification of pollutants of concern should include consideration of any pollutants for which the development's receiving water bodies are listed as impaired under Clean Water Act section 303(d), any pollutant associated with the land use type of the development, any pollutant commonly associated with urban runoff, and increased runoff flow rate from the development and its potential downstream impacts;
iv. Remove pollutants of concern from urban runoff (through implementation of structural treatment BMPs);
v. Minimize directly connected impervious areas;
vi. Protect slopes and channels from eroding;
vii. Include storm drain stenciling and signage;
viii. Include properly designed outdoor material storage areas;
ix. Include properly designed trash storage areas;
x. Include proof of a mechanism for ongoing long-term BMP maintenance;
xi. Include additional water quality provisions applicable to individual priority project categories;
xii. Be designed to maximize their pollutant removal capabilities;
xiii. Be implemented as close to pollutant sources as possible and prior to runoff discharges into the MS4 or other receiving waters;
xiv. Ensure that post-development runoff does not contain pollutant loads which cause or contribute to an exceedance of water quality objectives or which have not been reduced to the maximum extent practicable; and

xv. Ensure that post-development runoff into a Clean Water Act section 303(d) water body containing any pollutant (for which the water body is already impaired) does not contain those same pollutants in levels exceeding pre-development levels.

(c) Numeric Sizing Criteria – The SUSMP shall require structural treatment BMPs to be implemented at all priority development projects. In addition to meeting the BMP requirements listed in item F.1.b.(2)(b) above, all structural treatment BMPs for a single priority development project shall collectively be sized to comply with the following numeric sizing criteria:

Volume

Volume-based BMPs shall be designed to mitigate (infiltrate, filter, or treat) either:

i. The volume of runoff produced from a 24-hour 85th percentile storm event, as determined from the local historical rainfall record (0.6 inch approximate average for the San Diego County area); or
ii. The volume of runoff produced by the 85th percentile 24-hour rainfall event, determined as the maximized capture storm water volume for the area, from the formula recommended in Urban Runoff Quality Management, WEF Manual of Practice No. 23/ASCE Manual of Practice No. 87, (1998); or
iii. The volume of annual runoff based on unit basin storage volume, to achieve 90% or more volume treatment by the method recommended in California Stormwater Best Management Practices Handbook – Industrial/Commercial, (1993); or
iv. The volume of runoff, as determined from the local historical rainfall record, that achieves approximately the same reduction in pollutant loads and flows as achieved by mitigation of the 85th percentile 24-hour runoff event;

OR

Flow

Flow-based BMPs shall be designed to mitigate (infiltrate, filter, or treat) either:

i. The maximum flow rate of runoff produced from a rainfall intensity of 0.2 inch of rainfall per hour; or
ii. The maximum flow rate of runoff produced by the 85th percentile hourly rainfall intensity, as determined from the local historical rainfall record, multiplied by a factor of two; or
iii. The maximum flow rate of runoff, as determined from the local historical rainfall record, that achieves approximately the same reduction in pollutant loads and flows as achieved by mitigation of the 85th percentile hourly rainfall intensity multiplied by a factor of two.

(d) Equivalent Numeric Sizing Criteria - The Copermittees may develop any equivalent numeric sizing criteria or performance-based standard for post-construction structural treatment BMPs as part of the model SUSMP. Such equivalent sizing criteria may be authorized for use in place of the above criteria. In the absence of development and subsequent authorization of such equivalent numeric sizing criteria, the above numeric sizing criteria requirement shall be implemented.

(e) Pollutants of Concern – As part of the model SUSMP, the Copermittees shall develop a procedure for pollutants of concern to be identified for each new development or significant redevelopment project. The procedure shall include, at a minimum, consideration of (1) receiving water quality (including pollutants for which receiving waters are listed as impaired under Clean Water Act section 303(d)); (2) land use type of the development project and pollutants associated with that land use type; (3) pollutants expected to be present on site; and (4) changes in flow rates and volumes resulting from the development project and sensitivity of receiving waters to changes in

flow rates and volumes.

(f) Implementation Process – As part of the model SUSMP, the Copermittees shall develop a process by which SUSMP requirements will be implemented. The process shall identify at what point in the planning process development projects will be required to meet SUSMP requirements. The process shall also include identification of the roles and responsibilities of various municipal departments in implementing the SUSMP requirements, as well as any other measures necessary for the implementation of SUSMP requirements.

(g) Restaurants Less than 5,000 Square Feet - New development and significant redevelopment restaurant projects where the land area development is less than 5,000 square feet shall meet all SUSMP requirements except for structural treatment BMP and numeric sizing criteria requirement F.1.b.(2)(c) above. A restaurant is defined as a facility that sells prepared foods and drinks for consumption, including stationary lunch counters and refreshment stands selling prepared foods and drinks for immediate consumption (SIC Code 5812).

(h) Waiver Provision – A Copermittee may provide for a project to be waived from the requirement of implementing structural treatment BMPs (F.1.b.(2)(c)) if infeasibility can be established. A waiver of infeasibility shall only be granted by a Copermittee when all available structural treatment BMPs have been considered and rejected as infeasible. Copermittees shall notify the SDRWQCB within 5 days of each waiver issued and shall include the name of the person granting each waiver.

As part of the model SUSMP, the Copermittees shall develop a program to require project proponents who have received waivers to transfer the savings in cost, as determined by the Copermittee(s), to a storm water mitigation fund. This program shall be implemented by all Copermittees which choose to provide waivers. Funds shall only be used on projects to improve urban runoff quality within the watershed of the waived project. The waiver program shall, at a minimum, identify:

i. The entity or entities that will manage the storm water mitigation fund (i.e., assume full responsibility for)
ii. The range and types of acceptable projects for which mitigation funds may be expended;
iii. The entity or entities that will assume full responsibility for each mitigation project including its successful completion
iv. How the dollar amount of fund contributions will be determined.

(i) Infiltration and Groundwater Protection – At a minimum, use of infiltration structural treatment BMPs shall meet the following conditions:

i. Use of infiltration structural treatment BMPs shall not cause or contribute to an exceedance of groundwater water quality objectives.
ii. Urban runoff shall undergo pretreatment such as sedimentation or filtration prior to infiltration.
iii. All dry weather flows shall be diverted from infiltration devices.
iv. Pollution prevention and source control BMPs shall be implemented at a level appropriate to protect groundwater quality at sites where infiltration structural treatment BMPs are to be used.
v. Infiltration structural treatment BMPs shall be adequately maintained to maximize pollutant removal capabilities.
vi. The vertical distance from the base of any infiltration structural treatment BMP to the seasonal high groundwater mark shall be at least 10 feet.
vii. The soil through which infiltration is to occur shall have physical and chemical characteristics (such as appropriate cation exchange capacity, organic content, clay content, and infiltration rate) which are adequate for proper infiltration durations and treatment of urban runoff for the protection of groundwater beneficial uses.
viii. Infiltration structural treatment BMPs shall not be used for areas of industrial or light industrial activity; areas subject to high vehicular traffic (25,000 or greater

average daily traffic on main roadway or 15,000 or more average daily traffic on any intersecting roadway); automotive repair shops; car washes; fleet storage areas (bus, truck, etc.); nurseries; and other high threat to water quality land uses and activities as designated by each Copermittee.

ix. Infiltration structural BMPs shall be located a minimum of 100 feet horizontally from any water supply wells.

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B,C,E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A)(2) generally applies to all directives under Jurisdictional Urban Runoff Management Program item F.1. Land-Use Planning for New Development and Redevelopment Component of Order No. 2001-01.

California Water Code Section 13267 provides that "the regional board may require that any person who has discharged […] shall furnish, under penalty of perjury, technical or monitoring reports which the regional board requires."

Discussion: Copermittees must utilize planning procedures to reduce the discharge of pollutants from new development and redevelopment to the maximum extent practicable. This is necessary due to the potential for new development to increase the volume, flow velocity, and pollutant load of urban runoff (see Findings 4 and 5). As the SWRCB Urban Runoff Technical Advisory Committee (TAC) states, "Urban development often results in impacts to the land and consequently the water bodies adjacent to the land. The two major changes that result from urbanization are changes in stream hydrology and an increase in pollutant loading." To alleviate these potential negative impacts on receiving waters, each Copermittee must develop and implement a Standard Urban Runoff Mitigation Plan for various categories of development.

General Information on SUSMPs

The Federal NPDES regulations (40 CFR 122.26(d)(2)(iv)(A)(2)) have required Copermittees since 1990 to utilize "planning procedures including a master plan to develop, implement and enforce controls to reduce the discharge of pollutants from municipal separate storm sewers which receive discharges from areas of new development and significant redevelopment." The current Municipal Storm Water Permit for San Diego County and Cities (Order No. 90-42) was issued before the promulgation of these regulations. Its references and requirements for new development and significant redevelopment are therefore nondescript, despite the presence of requirements for new development and significant redevelopment in the Federal NPDES regulations. Due to this lack of clarification regarding urban runoff management requirements for development in Order No. 90-42, development projects have typically proceeded with minimal measures to reduce the impacts of urban runoff coming from the projects.

Since the requirements of Order No. 90-42 regarding development are vague and have been largely ineffective, Order No. 2001-01 contains the SUSMP requirements, which are more prescriptive in order to ensure that adequate measures are taken to address urban runoff from development. The SWRCB

Urban Runoff Technical Advisory Committee supports development of plans such as SUSMPs, stating that "The TAC recommends that communities of all sizes implement programs […] to address control of urban runoff pollution from new development and construction." US EPA further recommends design criteria (such as numeric sizing criteria) and performance standards for post-construction BMPs at development sites (1992). The increased specificity of the SUSMP requirements is also in line with US EPA Interim Permitting Approach guidance, which states that first-round permit BMPs should be expanded or better-tailored where necessary in subsequent permits to attain water quality standards (1996). In light of the continued impacts of urban runoff on receiving waters, the expanded BMP requirements of the SUSMPS are necessary to protect those receiving waters. As stated in the SWRCB's August 24, 2000 Draft Order on the appeal of the Los Angeles Regional Water Quality Control Board's (LARWQCB's) SUSMP action, "In the context of the entire effort required by the permit, the development controls can be seen as preventing the existing situation from becoming worse."

Comparison with LARWQCB Process

The SUSMP requirements (and their associated numeric sizing criteria) included in Order No. 2001-01 are highly controversial and have been widely discussed. While the SDRWQCB has followed the LARWQCB's lead in including SUSMP requirements in its Draft Municipal Storm Water Permit, it is important to note the differences between the approaches of the two regional boards. In its Municipal Storm Water Permit, the LARWQCB included requirements for its Copermittees to develop SUSMPs to address urban runoff from development. The requirements included general guidelines for the development of a plan (SUSMP) for post-construction BMP implementation at development project sites. The Los Angeles area Copermittees developed a model SUSMP and submitted it to the LARWQCB for approval. The LARWQCB then added details and requirements (including the numeric sizing criteria requirement) to their Copermittees' model SUSMP before approval. While the SWRCB has tentatively found in a draft order that the LARWQCB acted appropriately, the addition of details and requirements to the Copermittees' model SUSMP was strongly contested.

The SDRWQCB has had the advantage of observing the SUSMP process the LARWQCB has undergone. In order to minimize potential conflicts, the SDRWQCB is inserting sufficient detail and requirements (such as numeric sizing criteria) up front in its Municipal Storm Water Permit, as opposed to adding the detail and requirements at a later date after the permit has been adopted. This will reduce the potential for unexpected requirements and allow for expanded discourse with interested parties on the subject. In addition, the SDRWQCB has already held a public hearing and a workshop on the subject of SUSMPs, with several other hearings and workshops on SUSMPs and the permit planned for the future.

The SDRWQCB has also been able to use the LARWQCB process to help clarify various issues regarding SUSMPs. For example, tentative findings in the SWRCB's draft order on the appeal of the LARWQCB's actions have been incorporated into Order No. 2001-01. The SDRWQCB has used the definition for "significant redevelopment" as it was included in the SWRCB's draft order. Tentative SUSMP guidance included in the SWRCB's draft order regarding

environmentally sensitive areas[93], discretionary/non-discretionary projects, and a waiver funding requirement has also been used by the SDRWQCB to clarify applicable SUSMP requirements. Included here is a brief summary of the SWRCB's draft order.

Summary of SWRCB Draft Order on the Appeal of LARWQCB's Standard Urban Storm Water Mitigation Plan (SUSMP) Requirement for New Development

The State Water Resources Control Board (SWRCB) has issued a draft order on the subject of the appeal of the Los Angeles Regional Water Quality Control Board's (LARWQCB's) Standard Urban Storm Water Mitigation Plan (SUSMP) requirement for new development and significant redevelopment. The SUSMP requirement was prescribed for municipalities by the LARWQCB under the Municipal Storm Water Permit for the Los Angeles Region. In general, the SUSMP requirement called for municipalities to require certain categories of development projects to implement post-construction best management practices (BMPs) on site which would treat, filter, or infiltrate urban runoff generated by the development project. In particular, the SUSMPs provided that municipalities must ensure that post-construction BMPs for the categories of new development meet a specific numeric sizing criteria. The numeric sizing criteria required that post-construction BMPs for the categories of development be a specific size to effectively retain urban runoff pollutants and control urban runoff flows.

The SUSMP requirements were appealed to the SWRCB by many parties on several grounds. The petitioners for the appeal included approximately 24 municipalities (out of a total of approximately 80 municipalities), building industry representatives, and the Western States Petroleum Association. The principal contentions of the appeal included the following: (1) The LARWQCB failed to follow various proper procedural requirements in adopting the SUSMPs; (2) The SUSMPs (and numeric sizing criteria) did not properly apply the "maximum extent practicable" standard; (3) The LARWQCB failed to show that the SUSMPs are cost-effective and that the benefits to be obtained outweigh the costs; (4) Implementation of the SUSMP requirements posed a threat to groundwater; and (5) Various details of the SUSMP requirements were unclear and needed to be clarified/improved.

Regarding the procedural concerns of the appeal, if adopted the order would find that the LARWQCB complied with the necessary procedural requirements. Procedural requirements the order would find the LARWQCB to be in compliance with in adopting the SUSMPs include the Municipal Storm Water Permit for the Los Angeles Region, the Administrative Review Process, the Administrative Procedure Act, the California Environmental Quality Act (CEQA), and Constitutional provisions on state mandates.

On the controversial issue of post-construction BMPs and numeric sizing criteria, if adopted the SWRCB order would find that it is appropriate for the LARWQCB to require post-construction BMPs for new development and significant

[93] The definition of "environmentally sensitive area" in Order No. 2001-01 includes Areas of Special Biological Significance (ASBS). These areas are designated by the Regional Boards and SWRCB in Water Quality Control Plans.

redevelopment. The SWRCB order would also find that the numeric sizing criteria for post-construction BMPs is a correct interpretation of the "maximum extent practicable" standard. As a basis for the tentative finding on numeric sizing criteria, the SWRCB order would refer to United States Environmental Protection Agency (US EPA) guidance documents, which explain that expanded or better-tailored BMPs should be required in second-round storm water permits, where necessary, to provide for the attainment of water quality standards. While citing the number of water bodies impaired by urban runoff in the region, the SWRCB order would find the expansion of BMP requirements to include numeric sizing criteria to be appropriate.

The SWRCB order, if adopted, would also deny the appeal that an adequate cost-benefit analysis for SUSMPs was not performed by the LARWQCB. The order would determine that the LARWQCB did not have to demonstrate that the water quality benefits of SUSMPs outweigh the costs. However, the order would find that the LARWQCB did evaluate the cost of SUSMP implementation. It would also further find that the one or two percent of total development cost incurred from SUSMP implementation is reasonable, especially in light of the amount of impervious surface in Los Angeles County and the impacts on impaired water bodies.

The SWRCB order would also find that the LARWQCB adequately considered the potential for groundwater contamination stemming from implementation of the SUSMP requirements. The draft order states "The Regional Board did consider the potential impacts to groundwater from infiltration, and included appropriate limitations and guidance on its use as a BMP. These provisions will ensure adequate protection of groundwater from any adverse impacts due to infiltration."

With regards to the clarification/improvement of various SUSMP requirements, the SWRCB order, if adopted, would make several changes to the SUSMP document:

- Numeric sizing criteria would not be applied to retail gasoline outlets (RGOs). The SWRCB draft order cites the already heavy regulation of RGOs during construction, as well as feasibility and safety issues as the reasons for this proposed exemption. All other SUSMP requirements would continue to be applied to RGOs, however.
- "Significant redevelopment" would be defined as the creation or addition of at least 5,000 square feet of impervious surfaces to an already existing site. Also, where redevelopment results in an increase of less than fifty percent of the impervious surfaces of a previously existing development, and the existing development is not subject to the SUSMPs, the numeric sizing criteria would apply only to the addition, and not the entire development.
- "Environmentally sensitive areas" would be deleted from the development categories to which SUSMPs apply because they were poorly defined, with no minimum size limits. The SWRCB draft order states that this issue can be refined and addressed in a future re-issuance of the municipal storm water permit, however.
- SUSMP requirements would be limited to applying to discretionary projects only. The SWRCB draft order states that applying the requirements to non-discretionary projects is not consistent with the permit. However, the draft

order further states that the LARWQCB may consider expanding development controls to non-discretionary projects in a future re-issuance of the permit.

- The waiver funding requirement would be deleted from the SUSMP. This proposed requirement provided that the project proponent transfer their cost savings (resulting from receiving a waiver from the requirement to meet numeric sizing criteria) to a storm water mitigation fund. The draft order deletes this requirement due the lack of a management structure for such a fund. Again, the draft order states that the LARWQCB may want to revisit the issue during the future re-issuance of the permit.

October 5, 2000 SWRCB Final Decision on the Appeal of the LARWQCB's SUSMP Requirements

At its October 5, 2000 hearing, the SWRCB made its final decision regarding the LARWQCB's SUSMP requirements. Essentially, the final decision upheld the tentative findings of the SWRCB draft order on SUSMPs. While the final order has not yet been issued, the hearing made it evident that the final decision would include two significant changes to the draft order, however. With regards to retail gasoline outlets, the SWRCB upheld its tentative decision to exempt retail gasoline outlets from the numeric sizing criteria requirement of the LARWQCB SUSMP at this time. However, the SWRCB further found that numeric sizing criteria requirements could be applied to retail gasoline outlets in future permits, provided that proper justification for the numeric sizing criteria requirement is presented. The SWRCB also clarified its support for regional approaches to the management of urban runoff from new development. The SWRCB noted that regional BMP approaches are not precluded as a means for complying with the SUSMP requirements, provided that the regional approaches are approved by the regional board.

Categories of Development

The categories of development to which SUSMPs apply are based on their potential to cause impairment to receiving water bodies. The various categories of development generally either result in large increases in impervious area or are potential significant sources of pollutants. Many of the categories of development have also historically been found by the SDRWQCB and the Copermittees to have mismanagement of urban runoff. As discussed in Findings 4 and 5, these changes in urban runoff volume, velocity, and pollutant load resulting from new development and redevelopment can cause significant receiving water quality degradation. To minimize this relatively high potential for receiving water degradation, a plan to meet SUSMP requirements must be developed and implemented.

One category of development to which SUSMPs are proposed to apply which has generated considerable discussion is retail gasoline outlets. At its October 5, 2000 public hearing on the appeal of the LARWQCB's SUSMP requirements, the SWRCB finalized its decision on whether the SUSMP numeric sizing criteria requirement is to apply to retail gasoline outlets. As discussed above, the SWRCB found that retail gasoline outlets could be required to meet the numeric sizing criteria requirement, provided that adequate justification for the requirement is presented. Given the predominant impervious surfaces of most retail gasoline outlets, new retail gasoline outlets significantly increase the flow volumes, rates,

and velocities of urban runoff coming from the sites to above pre-development levels. As noted in Findings 4 and 5, increased runoff flow volumes, rates, and velocities can cause significant receiving water degradation. Furthermore, the pervasive presence of automobiles at retail gasoline outlets provides a significant source of pollutants to the sites. Similar to parking lots, runoff from retail gasoline outlets can be high in heavy metals and petroleum products. Retail gasoline outlets are a well defined source of urban storm water pollutants that impair receiving waters.[94]

Much debate has been devoted to the potential infeasibility of implementing structural BMPs at retail gasoline outlets. Some BMPs may pose a threat to groundwater quality or may pose a safety risk due to potential combustion resulting from gasoline entering them. With regards to infiltration BMPs which may pose a threat to groundwater quality, the SDRWQCB agrees that infiltration BMPs should not be implemented at retail gasoline outlets. This does not preclude the use of other types of BMPs, however. Many other BMPs such as underground filters, treatment-trains, and catch basin inserts are available for implementation at retail gasoline outlets.

The risk from combustion from gasoline entering BMPs has also been mentioned as a concern. This concern ignores the fact that oil-water separators and other pretreatment BMPs have been implemented at retail gasoline outlets for many years without significant problems. Considering the volatile nature of gasoline, the potential risk from combustion should be negligible, since gasoline would most likely volatilize before flowing into any BMP. Irregardless, any concern over combustion risk exhibits the need for structural BMP implementation at retail gasoline outlets; the same gasoline that which would purportedly pose a risk of combustion would also pose an environmental risk to receiving waters if no structural BMPs were in place.

While its possible some structural BMPs may need to be precluded from use at retail gasoline outlets due to the above concerns, other structural BMPs may be applicable for implementation at retail gasoline outlets. For example, treatment-train BMPs such as StormFilters are effective in reducing soluble metal concentrations commonly found in urban runoff from retail gasoline outlets. Furthermore, catch-basin inserts have been found by a USEPA funded study to be effective in removing debris, sediment, and oil from retail gasoline outlet urban runoff without causing backup.[95] Clearly, out of the many structural BMPs available today, a some BMPs are applicable for application at retail gasoline outlets.

Other SDRWQCB SUSMP Resources

As mentioned above, SUSMPs (and the numeric sizing criteria provision in particular) have been discussed extensively. Additional information can be obtained in the SDRWQCB's *Staff Report for Standard Urban Storm Water*

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[94] Los Angeles Regional Water Quality Control Board. 2000. Regional Board Comment on Proposed Order. Cites USEPA funded study conducted by County of Sacramento as identifying heavy metals in significant concentrations in urban runoff from gas stations.

[95] Rogue River National Wet Weather Demonstration Project. 1999. Evaluation of On-Line Media Filters in the Rouge River Watershed. RPO-NPS-TPM59.00.

Mitigation Plans and Numerical Sizing Criteria for Best Management Practices, the SDRWQCB's *Supplemental Information for Public Workshop on Numeric Sizing Criteria for Post-Construction BMPs for New and Re-Development,* and the SDRWQCB's *Draft Responses to Comments Received at Numeric Sizing Criteria Public Workshop II Held April 13, 2000.* These documents are available at www.swrcb.ca.gov/rwqcb9/Programs/Storm_Water/storm_water.html. The SDRWQCB documents available on the website include reference lists of documents and programs which can provide extensive guidance and examples on implementation of programs addressing urban runoff from new development and significant redevelopment.

For a discussion on storm water infiltration and groundwater protection, see the discussion for Finding 35 above.

The SDRWQCB has discretion to require Standard Urban Runoff Mitigation Plans in Jurisdictional Urban Runoff Management Program item F.1.b.(2). of Order No. 2001-01 under the broad and specific legal authority cited above.

F.1.c. Revise Environmental Review Processes Including CEQA Checklists of the Jurisdictional Urban Runoff Management Program states the following:

Revise current environmental review processes and California Environmental Quality Act (CEQA) initial study checklists to include requirements for evaluation of water quality effects and identification of appropriate mitigation measures. The CEQA initial study checklist shall include questions addressing increased pollutants and flows from the proposed project such as:

(a) Would the proposed project result in an increase in pollutant discharges to receiving waters? Consider water quality parameters such as temperature, dissolved oxygen, turbidity and other typical storm water pollutants (e.g., heavy metals, pathogens, petroleum derivatives, synthetic organics, sediment, nutrients, oxygen-demanding substances, and trash).
(b) Would the proposed project result in significant alteration of receiving water quality during or following construction?
(c) Would the proposed project result in increased impervious surfaces and associated increased runoff?
(d) Would the proposed project create a significant adverse environmental impact to drainage patterns due to changes in runoff flow rates or volumes?
(e) Would the proposed project result in increased erosion downstream?
(f) Is the project tributary to an already impaired water body, as listed on the Clean Water Act Section 303(d) list? If so, will it result in an increase in any pollutant for which the water body is already impaired?
(g) Is the project tributary to other environmentally sensitive areas? If so, will it exacerbate already existing sensitive conditions?
(h) Would the proposed project have a potentially significant environmental impact on surface water quality, to either marine, fresh, or wetland waters?
(i) Would the proposed project have a potentially significant adverse impact on ground water quality?
(j) Will the proposed project cause or contribute to an exceedance of applicable surface or groundwater receiving water quality objectives or degradation of beneficial uses?
(k) Will the project impact aquatic, wetland, or riparian habitat?

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B,C,E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A)(2) generally applies to all directives under Jurisdictional Urban Runoff Management

Program item F.1. Land-Use Planning for New Development and Redevelopment Component of Order No. 2001-01.

Discussion: Consideration of the effects of new development and redevelopment on water quality during project approval processes will help ensure that potential water quality problems resulting from the development are identified and addressed. The US EPA finds that "Proposed storm water management programs should include planning procedures for both during and after construction to implement control measures to ensure that pollution is reduced to the maximum extent practicable in areas of new development and redevelopment. Design criteria and performance standards may be used to assist in meeting this objective" (1992). The US EPA further finds that "The municipality should consider storm water controls and structural controls in planning, zoning, and site or subdivision plan approval" (1992). The SWRCB Urban Runoff Technical Advisory Committee advises that the Copermittees' CEQA initial study checklists be revised to include consideration of water quality effects from new development or redevelopment. The questions included in Jurisdiction Urban Runoff Management Program item F.1.c. are based on questions recommended by the Technical Advisory Committee. The SDRWQCB has discretion to require Jurisdictional Urban Runoff Program item F.1.c. in Order No. 2001-01 under the broad legal authority cited above.

F.1.d. Conduct Education Efforts Focused on New Development and Redevelopment of the Jurisdictional Urban Runoff Management Program states the following:

(1) Internal: Municipal Staff

Each Copermittee shall implement an education program to ensure that its planning and development review staffs have an understanding of:

(a) *Federal, state, and local water quality laws and regulations applicable to development projects;*
(b) *The connection between land use decisions and short and long term water quality impacts (i.e., impacts from land development and urbanization); and*
(c) *How impacts to receiving water quality resulting from development can be minimized (i.e., through implementation of various source control and structural BMPs).*

(2) External: Project Applicants, Developers, Contractors, Property Owners

As early in the planning and development process as possible, each Copermittee shall implement a program to educate project applicants, developers, contractors and property owners on the following topics:

(a) *Federal, state, and local water quality laws and regulations applicable to development projects;*
(b) *Required federal, state, and local permits pertaining to water quality;*
(c) *Water quality impacts of urbanization; and*
(d) *Methods for minimizing the impacts of development on receiving water quality.*

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B,C,E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A)(2) generally applies to all directives under Jurisdictional Urban Runoff Management Program item F.1. Land-Use Planning for New Development and Redevelopment Component of Order No. 2001-01.

Discussion: Training of municipal planning and development review staff is a critical aspect of an urban runoff management program. As discussed in Finding 18, development and implementation of urban runoff control measures as early in the project planning process as possible is an effective means (in terms of both cost and performance) for minimizing the impacts of urban runoff to receiving waters. Municipal planning and development review staff are well-positioned to ensure that water quality considerations are incorporated into development projects in the early planning stages. With adequate training, municipal planning and development review staff can require implementation of BMPs early in the project planning process, thereby minimizing the urban runoff impacts of development in a cost effective manner. US EPA supports training of municipal staff when it identifies "training for appropriate employees" as a measurable goal of an urban runoff management program (2000).

Education on storm water planning issues for the public sector involved with development is equally critical. When the public sector has knowledge of storm water issues and regulations, it is more likely to incorporate storm water planning in the development and redevelopment process. In this manner, implementation of measures to address storm water issues will be included in development plans, saving time and money for the developer and the municipality. The SWRCB Urban Runoff Technical Advisory Committee finds that Copermittees should "Establish an education/information dissemination program that includes such things as: brochures to distribute to developers and contractors at permit counters and by mail; reference and training manuals for planners, engineers, inspectors, developers, contractors; and training and information exchange workshops."

The SDRWQCB has discretion to require Jurisdictional Urban Runoff Program item F.1.d. in Order No. 2001-01 under the broad legal authority cited above.

F.2. CONSTRUCTION COMPONENT

In addition to the underlying broad legal authority citations listed above in section VII. of this Fact Sheet/Technical Report, the following specific legal authority item also generally applies to all directives under Jurisdictional Urban Runoff Management Program item F.2. Construction Component of Order No. 2001-01. Other specific legal authority items applicable only to distinct directives of Jurisdictional Urban Runoff Management Program item F.2. are provided as necessary.

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(D) provides that the proposed management program include "A description of a program to implement and maintain structural and non-structural best management practices to reduce pollutants in storm water runoff from construction sites to the municipal storm sewer system."

F.2. Construction Component of the Jurisdictional Urban Runoff Management Program states the following:

> *The Copermittees shall implement a Construction Component of its Jurisdictional URMP to reduce pollutants in runoff from construction sites during all construction phases. At a minimum the construction component shall address:*
>
> *F.2.a. Pollution Prevention*
> *F.2.b. Grading Ordinance Update*
> *F.2.c. Modify Construction and Grading Approval Process*
> *F.2.d. Source Identification*
> *F.2.e. Threat to Water Quality Prioritization*
> *F.2.f. BMP Implementation*
> *F.2.g. Inspection of Construction Sites*
> *F.2.h. Enforcement Measures for Construction Sites*
> *F.2.i. Reporting of Non-compliant Sites*
> *F.2.j. Education Focused on Construction Activities*

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B,C,E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(D) generally applies to all directives under Jurisdictional Urban Runoff Management Program item F.2. Construction Component of Order No. 2001-01.

Discussion: CWA sections 402(p)(3)(B)(ii-iii) requires each Copermittee to prohibit non-storm water discharges into its MS4 and to reduce the discharge of pollutants to the maximum extent practicable for all urban land uses. The purpose of these two broad requirements is to minimize the short and long-term impacts of urban runoff on receiving water quality. Land used for construction activities is clearly identified in the federal regulations as one of several high priority land uses from which pollutants in urban runoff discharges must be reduced to the maximum extent practicable by each Copermittee. Federal NPDES regulation 40 CFR 122.26(d)(2)(iv) requires the development of a proposed management program to reduce the discharge of pollutants in storm water to the maximum extent practicable. Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(D) requires that this program include components which address construction sites and activities.

Natural erosion processes are accelerated when existing protective cover is removed during construction. Suspended sediments constitute the largest mass of pollutant loadings to surface waters. As discussed in Finding 19, the primary source of these sediments is construction sites. Sediments from construction site erosion can be effectively reduced in urban runoff by the application of a wide range of BMPs, which emphasize pollution prevention and source control and are supplemented by treatment control BMPs. For these reasons, each Copermittee must develop and implement a Construction Component which utilizes BMPs to control pollutants in runoff generated from construction sites.

The SDRWQCB has discretion to require Jurisdictional Urban Runoff Program item F.2 in Order No. 2001-01 under broad legal authority cited above.

F.2.a. Pollution Prevention (Construction) of the Jurisdictional Urban Runoff Management Program states the following:

> *Each Copermittee shall implement pollution prevention methods in its Construction Component and shall require its use by construction site owners, developers, contractors, and other responsible parties.*

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B,C,E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(D) generally applies to all directives under Jurisdictional Urban Runoff Management Program item F.2. Construction Component of Order No. 2001-01.

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(D)(1) provides that the proposed management program include "A description of procedures for site planning which incorporate consideration of potential water quality impacts."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(D)(2) provides that the proposed management program include "A description of requirements for nonstructural and structural best management practices."

Discussion: Each Copermittee must develop a program to reduce the discharge of pollutants in storm water from construction sites to the maximum extent practicable. In order to achieve this level of pollution reduction, BMPs must be implemented. As discussed in Finding 12, pollution prevention (the reduction or elimination of pollutant generation at its source) is an essential aspect of BMPs. By limiting the generation of pollutants, less pollutants are available to be washed from construction sites, resulting in reduced pollutant loads in storm water discharges from these sites. In addition, there is no need to control or treat pollutants which are not initially generated. Furthermore, pollution prevention BMPs are generally more cost effective than removal of pollutants by treatment facilities or cleanup of contaminated media. In the Pollution Prevention Act of 1990, Congress established a national policy that emphasizes pollution prevention over control and treatment. Since pollution prevention is an effective and efficient means for reducing pollutant loads in storm water runoff, pollution prevention methods are an important aspect of BMPs to be included in the Construction Component of the Jurisdictional URMP. The SDRWQCB has discretion to require Jurisdictional Urban Runoff Program item F.4.a in Order No. 2001-01 under the broad and specific legal authority cited above.

F.2.b. Grading Ordinance Update (Construction) of the Jurisdictional Urban Runoff Management Program states the following:

> *Each Copermittee shall review and update its grading ordinances as necessary for compliance with its storm water ordinances and this Order. The updated grading ordinance shall require pollution prevention, source control, and structural treatment BMPs to be implemented during all construction activities, including for example:*
>
> *(1) Erosion prevention;*
> *(2) Seasonal restrictions on grading;*
> *(3) Slope stabilization requirements;*

(4) Phased grading;
(5) Revegetation as early as feasible;
(6) Preservation of natural hydrologic features;
(7) Preservation of riparian buffers and corridors;
(8) Maintenance of all source control and structural treatment BMPs; and
(9) *Retention of sediment and other construction pollutants on site..*

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B,C,E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(D) generally applies to all directives under Jurisdictional Urban Runoff Management Program item F.2. Construction Component of Order No. 2001-01.

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(D)(1) provides that the proposed management program include "A description of procedures for site planning which incorporate consideration of potential water quality impacts."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(D)(2) provides that the proposed management program include "A description of requirements for nonstructural and structural best management practices."

Federal NPDES regulation 40 CFR 122.26(d)(2)(i)(A) provides that each Copermitee must demonstrate that it can control "through ordinance, permit, contract, order or similar means, the contribution of pollutants to the municipal storm sewer by storm water discharges associated with industrial activity and the quality of storm water discharged from site of industrial activity."

Federal NPDES regulation 40 CFR 122.26(b)(14) provides that "The following categories of facilities are considered to be engaging in 'industrial activity' for the purposes of this subsection: […] (x) Construction activity including cleaning, grading and excavation activities […]."

Discussion: Copermittees must reduce pollutant discharges in storm water from construction sites to the maximum extent practicable. In order to achieve this level of pollution reduction, BMPs must be implemented. An effective means for ensuring BMP implementation at construction sites is through the development and implementation of grading ordinances which require pollution prevention, source control, and structural treatment BMPs. Updated grading ordinances which adequately address water quality considerations will provide Copermittees with the necessary legal authority to require effective BMPs at construction sites.

The US EPA suggests that local ordinance be used to require implementation of BMPs, stating that "A description of the local erosion and sediment control law or ordinance is needed to satisfy this requirement [i.e., Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(D)(2)]" (1992). Regarding Copermittee approval of construction activities, the US EPA further states that "applicants must propose site review and approval procedures that address sediment and erosion controls, storm water management, and other appropriate measures. Approvals should be clearly

tied to commitments to implement structural and nonstructural BMPs during the construction process" (1992).

Furthermore, in its Phase II Final Rule, US EPA requires small municipalities to develop and implement for construction sites "An ordinance or other regulatory mechanism to require erosion and sediment controls, as well as sanctions to ensure compliance […]" (1999). Due to the greater water quality concerns generally experienced by larger municipalities, Phase II Final Rule requirements for small municipalities are also applicable to larger municipalities such as the Copermittees.

The SDRWQCB has discretion to require Jurisdictional Urban Runoff Management Program item F.2.b in Order No. 2001-01 under the broad and specific legal authority cited above.

F.2.c. Modify Construction and Grading Approval Process (Construction) of the Jurisdictional Urban Runoff Management Program states the following:

Prior to approval and issuance of local construction and grading permits, each Copermittee shall review all individual proposed construction and grading plans and require measures to ensure that pollutants from the site will be reduced to the maximum extent practicable and will not cause or contribute to an exceedance of water quality objectives. Each Copermittee shall further ensure that all grading and construction activities will be in compliance with applicable Copermittee ordinances (e.g., storm water, grading, construction, etc.) and other applicable requirements, including this Order.

(1) Conditions of Approval

Include conditions of approval in local grading and construction permits to ensure that pollutant discharges are reduced to the maximum extent practicable and water quality objectives are not violated during the construction phase. Such conditions shall include for example:

(a) Require project proponent to develop and implement a plan to manage storm water and non-storm water discharges from the site at all times;
(b) Require project proponent to coincide grading with seasonal dry weather periods;
(c) Require project proponent to emphasize erosion prevention as the most important measure for keeping sediment on site during construction;
(d) Require project proponent to utilize sediment controls as a supplement to erosion prevention for keeping sediment on-site during construction, and never as the single or primary method;
(e) Require project proponent to minimize areas that are cleared and graded to only the portion of the site that is necessary for construction;
(f) Require project proponent to minimize exposure time of disturbed soil areas;
(g) Require project proponent to temporarily stabilize and reseed disturbed soil areas as rapidly as possible;
(h) Require project proponent to permanently revegetate or landscape as early as feasible;
(i) Require project proponent to stabilize all slopes; and
(j) *Require project proponents subject to California's statewide General NPDES Permit for Storm Water Discharges Associated With Construction Activities, (hereinafter General Construction Permit), to provide evidence of existing coverage under the General Construction Permit.*

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B,C,E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(D) generally applies to all directives under Jurisdictional Urban Runoff Management Program item F.2. Construction Component of Order No. 2001-01.

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(D)(1) provides that the proposed management program include "A description of procedures for site planning which incorporate consideration of potential water quality impacts."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(D)(2) provides that the proposed management program include "A description of requirements for nonstructural and structural best management practices."

Federal NPDES regulation 40 CFR 122.26(d)(2)(i)(A) provides that each Copermitee must demonstrate that it can control "through ordinance, permit, contract, order or similar means, the contribution of pollutants to the municipal storm sewer by storm water discharges associated with industrial activity and the quality of storm water discharged from site of industrial activity."

Federal NPDES regulation 40 CFR 122.26(b)(14) provides that "The following categories of facilities are considered to be engaging in 'industrial activity' for the purposes of this subsection: […] (x) Construction activity including cleaning, grading and excavation activities […]."

Discussion: As discussed in Finding 16, since each Copermittee approves and issues construction and grading permits, and discharges from construction and grading activities enter its MS4, each Copermittee is responsible for the pollutant discharges resulting from construction and grading activities. Each Copermittee must ensure that pollutant discharges from construction and grading activities are reduced to the maximum extent practicable and do not result in degradation of receiving waters. An effective means for achieving this is to develop conditions of approval for grading and construction permits which require measures to minimize pollutant discharges. The US EPA recommends approval processes which consider water quality impacts, stating that approval process requirements should "include phasing development to coincide with seasonal dry periods, minimizing areas that are cleared and graded to only the portion of the site that is necessary for construction, exposing areas for the briefest period possible, and stabilizing and reseeding disturbed areas rapidly after construction activity is completed" (1992). Other suggested construction and grading conditions of approval listed in this item are based on SWRCB Urban Runoff Technical Advisory Committee recommendations.

During approval and issuance of grading and construction permits, each Copermittee must review construction and grading plans to ensure that the conditions of approval are met. US EPA states that to determine if a construction site is in compliance with construction and grading ordinances and permits, the "MS4 operator should review the site plans submitted by the construction site operator before ground is broken" (2000). Furthermore, in its Phase II Final Rule, US EPA requires small municipalities to develop and implement for construction sites "Procedures for site plan review which incorporate consideration of potential water quality impacts" (1999). Due to the greater water quality concerns generally

experienced by larger municipalities, Phase II Final Rule requirements for small municipalities are also applicable to larger municipalities such as the Copermittees.

The SDRWQCB has discretion to require Jurisdictional Urban Runoff Management Program item F.2.c in Order No. 2001-01 under the broad and specific legal authority cited above.

F.2.d. Source Identification (Construction) of the Jurisdictional Urban Runoff Management Program states the following:

Each Copermittee shall annually develop and update, prior to the rainy season, a watershed based inventory of all construction sites within its jurisdiction regardless of site size or ownership. This requirement is applicable to all construction sites regardless of whether the construction site is subject to the California statewide General NPDES Permit for Storm Water Discharges Associated With Construction Activities (hereinafter General Construction permit), or other individual NPDES permit. The use of an automated database system, such as Geographical Information System (GIS) is highly recommended, but not required.

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B,C,E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(D) generally applies to all directives under Jurisdictional Urban Runoff Management Program item F.2. Construction Component of Order No. 2001-01.

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(D)(3) provides that the proposed management program include "A description of procedures for identifying priorities for inspecting sites and enforcing control measures which consider the nature of the construction activity, topography, and the characteristics of soils and receiving water quality."

Discussion: In order to prohibit non-storm water discharges, reduce construction pollutant sources to the maximum extent practicable, and ensure that adequate BMPs are implemented, Copermittees must first identify all of the construction sites within their jurisdiction. The construction sites are to be inventoried on a watershed basis in order to help with prioritization of the sites. For example, construction sites which are found to be located in a watershed with impaired receiving waters for sediment should be considered a high priority for BMP implementation, inspections, and enforcement. The US EPA requires that all construction sites be addressed (and therefore inventoried), stating: "All construction sites, regardless of size, must be addressed by the municipality. To begin to identify these sites, the applicant should obtain lists of construction site operators that are covered by general or individual storm water NPDES permits from the NPDES permitting authority. However, construction sites not covered by a storm water discharge permit also need to be addressed by the municipality. The best way to identify these construction sites and implement an effective BMP program to reduce pollutants in their runoff is through the site planning process" (1992). The SDRWQCB has discretion to require Jurisdictional Urban Runoff Program item F.4.d in Order No. 2001-01 under the broad and specific legal authority cited above.

F.2.e. Threat to Water Quality Prioritization (Construction) of the Jurisdictional Urban Runoff Management Program states the following:

> *(1) To establish priorities for construction oversight activities under this Order, the Copermittee shall prioritize each watershed based inventory (developed pursuant to F.2.d. above) by threat to water quality. Each construction site shall be classified as high, medium, or low threat to water quality. In evaluating threat to water quality each Copermittee shall consider (1) soil erosion potential; (2) site slope; (3) project size and type; (4) sensitivity of receiving water bodies; (5) proximity to receiving water bodies; (6) non-storm water discharges; and (7) any other relevant factors.*
>
> (2) *A high priority construction site shall at a minimum be defined as a site meeting any one of the following criteria or equivalent criteria:*
>
> *(a) 50 acres or more;*
> *(b) Grading will occur during the wet season;*
> *(c) Highly erosive soils;*
> *(d) Hillside development; and*
> (e) *Tributary to a Clean Water Act section 303(d) impaired water body or other environmentally sensitive area (as defined in section F.1.b.(2)(a)vii of this Order).*

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B,C,E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(D) generally applies to all directives under Jurisdictional Urban Runoff Management Program item F.2. Construction Component of Order No. 2001-01.

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(D)(3) provides that the proposed management program include "A description of procedures for identifying priorities for inspecting sites and enforcing control measures which consider the nature of the construction activity, topography, and the characteristics of soils and receiving water quality."

Discussion: As discussed in Finding 19, construction sites are high risk areas for pollutant discharges to storm water. Development of an inventory of construction sites within a watershed will help identify potential sources of pollutants in storm water. By assessing information provided in the inventory (such as site topography and site proximity to receiving waters), sites can be prioritized by threat to water quality. Those sites which pose the greatest threat can then be targeted for inspection and monitoring. This will allow for limited inspection and monitoring time to be most effective.

The types of construction sites identified as high priority in this item are identified as such due to their high potential for erosion and impacting receiving waters. These types of construction sites are generally large, requiring grading of a large area, resulting in a large area of disturbed earth which is susceptible to erosion. Hillside construction is also high priority, due to its susceptibility to slope erosion. Any construction sites tributary to a CWA section 303(d) waterbody are also high priority due to their potential to further degrade those waterbodies. US EPA supports this type of prioritization, stating that municipalities should "identify priority sites for inspection and enforcement based on the nature and extent of

the construction activity, topography, and the characteristics of soils and receiving water quality" (2000).

The SDRWQCB has discretion to require Jurisdictional Urban Runoff Program item F.2.e in Order No. 2001-01 under the broad and specific legal authority cited above.

F.2.f.(1), F.2.f.(2), and F.2.f.(3) BMP Implementation (Construction) of the Jurisdictional Urban Runoff Management Program state the following:

(1) Each Copermittee shall designate a set of minimum BMPs for high, medium, and low threat to water quality construction sites (as determined under section F.2.e). BMPs are to be implemented year round.

(2) Each Copermittee shall implement, or require the implementation of, the designated minimum BMPs (based upon the site's threat to water quality rating) at each construction site within its jurisdiction year round. If particular minimum BMPs are infeasible at any specific site, each Copermittee shall implement, or require the implementation of, other equivalent BMPs. Each Copermittee shall also implement or require any additional site specific BMPs as necessary to comply with this Order, including BMPs which are more stringent than those required under the statewide General Construction Permit.

(3) *Each Copermittee shall implement, or require the implementation of, BMPs year round; however, BMP implementation requirements can vary based on wet and dry seasons.*

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B,C,E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(D) generally applies to all directives under Jurisdictional Urban Runoff Management Program item F.2. Construction Component of Order No. 2001-01.

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(D)(2) provides that the proposed management program include "A description of requirements for nonstructural and structural best management practices."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(D)(3) provides that the proposed management program include "A description of procedures for identifying priorities for inspecting sites and enforcing control measures which consider the nature of the construction activity, topography, and the characteristics of soils and receiving water quality."

Discussion: Copermittees must reduce the discharge of pollutants in storm water from construction sites to the maximum extent practicable. To achieve this level of pollutant reduction, BMPs must be implemented (see Finding 11). Designation of a set of minimum BMPs for high, medium, and low threat construction sites will help ensure that appropriate BMPs are implemented at construction sites. These minimum BMPs will also serve as guidance as to the level of water quality protection required.

Regarding designation of BMPs to be implemented, the US EPA states that "the proposed management program should describe requirements for nonstructural

and structural BMPs that operators of construction activities that discharge to MS4s must meet" (1992). While minimum BMPs will be required at all construction sites, implementation of particular BMPs will be site specific in order to address various conditions at different sites. Regarding site specific BMPs, the US EPA states "Appropriate structural and nonstructural control requirements will vary by project. Project type, size, and duration, as well as soil composition, site slope, and proximity to sensitive receiving waters will determine the appropriate structural and nonstructural BMPs" (1992).

In order to comply with Order No. 2001-01 requirements, implemented BMPs may need to be more stringent than those required under the statewide General Construction Permit. The US EPA implies that local sediment and erosion control requirements may be more stringent than statewide General Construction Permit requirements when it states that "construction sites covered under NPDES permit regulations must indicate whether they are in compliance with State and local sediment and erosion control plans" (1992).

The SDRWQCB has discretion to require Jurisdictional Urban Runoff Program items F.2.f.(1-3) in Order No. 2001-01 under the broad and specific legal authority cited above.

F.2.f.(4) BMP Implementation (Construction) of the Jurisdictional Urban Runoff Management Program states the following:

Each Copermittee shall implement, or require implementation of, additional controls for construction sites tributary to CWA section 303(d) impaired water bodies, coastal lagoons, or other sensitive water bodies as necessary to comply with this Order.

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B,C,E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(D) generally applies to all directives under Jurisdictional Urban Runoff Management Program item F.2. Construction Component of Order No. 2001-01.

Federal NPDES regulation 40 CFR 122.44(d)(1)(i) requires NPDES permits to include limitations to "control all pollutants or pollutant parameters (either conventional, nonconventional, or toxic pollutants) which the Director determines are or may be discharged at a level which will cause, have reasonable potential to cause, or contribute to an excursion above any State water quality standard, including State narrative criteria for water quality."

Discussion: CWA section 303(d) water bodies are impaired water bodies which are not achieving the water quality objectives necessary to protect their beneficial uses. As discussed in Finding 3, urban runoff discharges from MS4s are a leading cause of receiving water quality impairment in the San Diego Region and throughout the United States. Since discharges which cause or contribute to an exceedance of water quality standards are prohibited (see section C.1. of Order No. 2001-01), any discharges to CWA section 303(d) waterbodies of pollutants for which the waterbody is impaired are prohibited. Therefore, construction sites and

activities tributary to these water bodies must implement additional controls to ensure that they are not discharging the pollutants which are causing or contributing to the impairment of these water bodies.

With regards to coastal lagoons and other sensitive water bodies, additional controls are needed to protect these valuable and unique resources. In their Nonpoint Source Program Strategy and Implementation Plan, the SWRCB and California Coastal Commission support additional controls for critical coastal areas, stating "the State will seek to attain and maintain applicable water quality standards, and protect waters threatened by land uses, or by substantial expansion of existing land uses, by implementing additional management measures."

Furthermore, US EPA supports additional controls for construction sites tributary to impaired or sensitive water bodies, stating "The proximity and sensitivity of the receiving water to which the construction site discharges is an important consideration. For construction sites that discharge to receiving waters that do not support their designated use or other waters of special concern, additional construction site controls are probably warranted and should be strongly considered" (1992).

The SDRWQCB has the discretion to require Jurisdictional Urban Runoff Program item F.2.f.(4) in Order No. 2001-01 under the broad and specific legal authority cited above.

F.2.g. Inspection of Construction Sites (Construction) of the Jurisdictional Urban Runoff Management Program item F.4.g states the following:

(1) Each Copermittee shall conduct construction site inspections for compliance with its ordinances (grading, storm water, etc.), permits (construction, grading, etc.), and this Order. Inspections shall include review of site erosion control and BMP implementation plans.

(2) Each Copermittee shall establish inspection frequencies and priorities as determined by the threat to water quality prioritization described in F.2.e above. During the wet season (i.e., October 1 through April 30 of each year), each Copermittee shall inspect, at a minimum, each High Priority construction site, either:

(a) Weekly
OR
(b) Monthly for any site that the responsible Copermittee certifies in a written statement to the SDRWQCB all of the following (certified statements may be submitted to the SDRWQCB at any time for one or more sites):

i. Copermittee has record of construction site's Waste Discharge Identification Number (WDID#) documenting construction site's coverage under the statewide General Construction Permit; and
ii. Copermittee has reviewed the constructions site's Storm Water Pollution Prevention Plan (SWPPP); and
iii. Copermittee finds SWPPP to be in compliance with all local ordinances, permits, and plans; and
iv. Copermittee finds that the SWPPP is being properly implemented on site.

At a minimum, Medium and Low Priority construction sites shall be inspected by Copermittees twice during the wet season. All construction sites shall be inspected by the Copermittees as needed during the dry season (i.e., May 1 through September 30 of each year).

(3) Based upon site inspection findings, each Copermittee shall implement all follow-up actions necessary to comply with this Order.

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B,C,E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(D) generally applies to all directives under Jurisdictional Urban Runoff Management Program item F.2. Construction Component of Order No. 2001-01.

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(D)(3) provides that the proposed management program include "A description of procedures for identifying priorities for inspecting sites and enforcing control measures which consider the nature of the construction activity, topography, and the characteristics of soils and receiving water quality."

Discussion: As discussed in Finding 24, inspections provide a necessary means by which Copermittees can evaluate compliance with their ordinances. Inspections are especially important at high risk areas for pollutant discharges, such as industrial and construction sites. To ensure that BMPs are properly installed, US EPA states MS4 operators should "develop procedures for site inspection and enforcement of control measures to deter infractions" (2000). Regarding inspections, US EPA further finds "Inspections give the MS4 operator an opportunity to provide additional guidance and education, issue warnings, or assess penalties" (2000).

Construction site inspections shall be conducted to determine compliance with applicable ordinances and permits, including Order No. 2001-01. To this effect, the US EPA finds that "Site inspections are expected to be the primary enforcement mechanism by which erosion and sediment controls are maintained" (1992). When inspections result in findings of noncompliance, follow-up by the Copermittee to ensure compliance is necessary. The US EPA states "Effective inspection and enforcement requires […] intervention by the municipal authority to correct violations" (1992).

Construction site inspection frequencies are to be based on threat to water quality prioritization. US EPA supports this, stating that site inspection procedures should "identify priority sites for inspection and enforcement based on the nature and extent of the construction activity, topography, and the characteristics of soils and receiving water quality" (2000). For example, construction sites which are considered a high threat to water quality are to be given a high priority for inspection. This will allow for limited inspection and monitoring time to be most effective. Weekly to monthly inspection of high threat sites is necessary due to the dynamic nature of construction activities. Medium and low threat construction sites can be inspected less frequently, due to their reduced risk of negatively impacting receiving waters. Review of SWPPPs can be one effective tool for determining frequency of site inspections. Construction sites which effectively implement the measures of a comprehensive SWPPP may not need to be inspected as frequently as less diligent sites.

The SDRWQCB has discretion to require Jurisdictional Urban Runoff Program item F.2.g in Order No. 2001-01 under the broad and specific legal authority cited above.

F.2.h. Enforcement of Construction Sites (Construction) of the Jurisdictional Urban Runoff Management Program states the following:

Each Copermittee shall enforce its ordinances (grading, storm water, etc.) and permits (construction, grading, etc.) at all construction sites as necessary to maintain compliance with this Order. Copermittee ordinances or other regulatory mechanisms shall include sanctions to ensure compliance. Sanctions shall include for example: Non-monetary penalties, fines, bonding requirements, and/or permit denials for non-compliance.

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B,C,E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(D) generally applies to all directives under Jurisdictional Urban Runoff Management Program item F.2. Construction Component of Order No. 2001-01.

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(D)(3) provides that the proposed management program include "A description of procedures for identifying priorities for inspecting sites and enforcing control measures which consider the nature of the construction activity, topography, and the characteristics of soils and receiving water quality."

Discussion: Each Copermittee must develop grading and storm water ordinances under its Jurisdictional Urban Runoff Management Program. As discussed in Finding 24, when a Copermittee determines a violation of its grading or storm water ordinance, it must pursue correction of the violation. A critical aspect of the correction of violations is enforcement of ordinances. Enforcement increases the probability of correction of a violation. The US EPA supports development of enforceable ordinances and permits when it states "applicants must describe proposed regulatory programs to reduce pollutants in storm water runoff from construction sites to the MS4" (1992). The US EPA supports enforcement of these ordinances and permits at construction sites when it states "Effective inspection and enforcement requires […] penalties to deter infractions and intervention by the municipal authority to correct violations. Enforcement mechanisms […] also must be described" (1992).

Furthermore, in its Phase II Final Rule, US EPA requires small municipalities to develop and implement "An ordinance or other regulatory mechanism to require erosion and sediment controls, as well as sanctions to ensure compliance […]" (1999). Due to the greater water quality concerns generally experienced by larger municipalities, Phase II Final Rule requirements for small municipalities are also applicable to larger municipalities such as the Copermittees.

The SDRWQCB has discretion to require Jurisdictional Urban Runoff Program item F.2.h of Order No. 2001-01 under the broad and specific legal authority cited above.

F.2.i. Reporting of Non-compliant Sites (Construction) of the Jurisdictional Urban Runoff Management Program states the following:

> *Each Copermittee shall provide oral notification to the SDRWQCB of non-compliant sites within its jurisdiction within 24 hours of the incidence of noncompliance, as required under section R.1 (and B.7 of Attachment C) of this Order. Such oral notification shall be followed up by a written report to be submitted to the SDRWQCB within 5 days of the incidence of non-compliance as required under section R.1 (and B.7 of Attachment C) of this Order. Sites are considered non-compliant when one or more violations of local ordinances, permits, plans, or this Order exist on the site.*

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B,C,E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(D) generally applies to all directives under Jurisdictional Urban Runoff Management Program item F.2. Construction Component of Order No. 2001-01.

California Water Code section 13267 provides that "the regional board may require than any person who has discharged […] shall furnish, under penalty of perjury, technical or monitoring reports which the regional board requires."

Federal NPDES regulation 40 CFR 122.44(l)(6) states "The permittee shall report any noncompliance which may endanger health or the environment. Any information shall be provided orally within 24 hours from the time the permittee becomes aware of the circumstances. A written submission shall also be provided within 5 days of the time the permittee becomes aware of the circumstances. The written submission shall contain a description of the noncompliance and its cause; the period of non-compliance, including exact dates and times, and if the noncompliance has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance."

Discussion: Follow-up with non-compliant construction sites is essential to ensure that the site has taken adequate corrective measures to achieve compliance. To help ensure that compliance has been achieved, the Copermittees shall report non-compliant industrial sites to the SDRWQCB. The SDRWQCB can then participate in follow-up efforts to assure that the construction site is in compliance. Notification of non-compliance is common to all NPDES permits under Federal NPDES regulation 40 CFR 122.44(l)(6). The SDRWQCB has discretion to require Jurisdictional Urban Runoff Program item F.3.b.(7) in Order No. 2001-01 under the broad and specific legal authority cited above.

F.2.j. Education Focused on Construction Activities (Construction) of the Jurisdictional Urban Runoff Management Program states the following:

> *(1) Internal: Municipal Staff*
>
> *Each Copermittee shall implement an education program to ensure that its construction, building, and grading review staffs and inspectors have an understanding of:*

(a) *Federal, state, and local water quality laws and regulations applicable to construction and grading activities.*
(b) *The connection between construction activities and water quality impacts (i.e., impacts from land development and urbanization).*
(c) *How erosion can be prevented.*
(d) *How impacts to receiving water quality resulting from construction activities can be minimized (i.e., through implementation of various source control and structural BMPs).*
(e) *Applicable topics listed in section F.4. of this Order.*

(2) External: Project Applicants, Contractors, Developers, Property Owners, and other Responsible Parties

Each Copermittee shall implement an education program to ensure that project applicants, contractors, developers, property owners, and other responsible parties have an understanding of the topics outlined in section F.2.i.1. above of this Order.

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B,C,E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(D) generally applies to all directives under Jurisdictional Urban Runoff Management Program item F.2. Construction Component of Order No. 2001-01.

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(D)(4) provides that the proposed management program include "A description of appropriate educational and training measures for construction site operators."

Discussion: As discussed in Finding 23, implementation of an education program is an important best management practice for construction sites and activities. The SWRCB Technical Advisory Committee "recognizes that education with an emphasis on pollution prevention is the fundamental basis for solving nonpoint source pollution problems." The TAC points out several target communities for education efforts, including "Government: Educate agencies and officials to achieve better communication, consistency, collaboration, and coordination at the federal, state and local levels" and "Development Community: Educate the development community, including developers, contractors, architects, and local government planners, engineers, and inspectors, on nonpoint source pollution problems associated with development and redevelopment and construction activities and involve them in problem definitions and solutions."

The US EPA also supports education efforts for parties involved in construction, stating "technical information on how to incorporate storm water management with erosion and sediment control and other BMP training courses are recommended for municipal employees and construction site operators."

The SDRWQCB has discretion to require Jurisdictional Urban Runoff Management Program item F.2.j. in Order No. 2001-01 under the broad and specific legal authority cited above.

F.3. EXISTING DEVELOPMENT COMPONENT

F.3. Existing Development Component of the Jurisdictional Urban Runoff Management Program states the following:

> *Each Copermittee shall minimize the short and long-term impacts on receiving water quality from all types of existing development.*

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B,C,E, and F) and 40 CFR 122.26(d)(2)(iv).

Discussion: CWA sections 402(p)(3)(B)(ii-iii) require each Copermittee to prohibit non-storm water discharges into its MS4 and to reduce the discharge of pollutants to the maximum extent practicable for all urban land uses. The purpose of these two broad requirements is to minimize the short and long-term impacts of urban runoff on receiving water quality. The SDRWQCB has discretion to require Jurisdictional Urban Runoff Management Program item F.3 of Order No. 2001-01 under the broad legal authority cited above.

F.3.a. MUNICIPAL (EXISTING DEVELOPMENT)

In addition to the underlying broad legal authority citations listed above in section VII. of this Fact Sheet/Technical Report, the following specific legal authority items also generally apply to all directives under Jurisdictional Urban Runoff Management Program item F.3.a. Municipal (Existing Development) of Order No. 2001-01. Other specific legal authority items applicable only to distinct directives of Jurisdictional Urban Runoff Management Program item F.3.a. are provided as necessary.

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A)(1) provides that the proposed management program include "A description of maintenance activities and a maintenance schedule for structural controls to reduce pollutants (including floatables) in discharges from municipal separate storm sewers."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A)(3) provides that the proposed management program include "A description for operating and maintaining public streets, roads and highways and procedures for reducing the impact on receiving waters of discharges from municipal storm sewer systems, including pollutants discharged as a result of deicing activities."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A)(4) provides that the proposed management program include "A description of procedures to assure that flood management projects assess the impacts on the water quality of receiving water bodies and that existing structural flood control devices have been evaluated to determine if retrofitting the device to provide additional pollutant removal from storm water is feasible."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A)(5) provides that the proposed management program include "A description of a program to monitor pollutants in runoff from operating or closed municipal landfills or other treatment, storage or disposal facilities for municipal waste, which shall identify priorities and

procedures for inspections and establishing and implementing control measures for such discharges."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A)(6) provides that the proposed management program include "A description of a program to reduce to the maximum extent practicable, pollutants in discharges from municipal separate storm sewers associated with the application of pesticides, herbicides, and fertilizer which will include, as appropriate, controls such as educational activities, permits, certifications, and other measures for commercial applicators and distributors, and controls for application in public right-of-ways and at municipal facilities."

F.3.a. Municipal (Existing Development) of the Jurisdictional Urban Runoff Management Program states the following:

Each Copermittee shall implement a Municipal (Existing Development) Component to prevent or reduce pollutants in runoff from all municipal land use areas and activities. At a minimum the municipal component shall address:

F.3.a.(1) Pollution Prevention
F.3.a.(2) Source Identification
F.3.a.(3) Threat to Water Quality Prioritization
F.3.a.(4) BMP Implementation
F.3.a.(5) Maintenance of Municipal Separate Storm Sewer System
F.3.a.(6) Management of Pesticides, Herbicides, and Fertilizers
F.3.a.(7) Inspection of Municipal Areas and Activities
F.3.a.(8) Enforcement of Municipal Areas and Activities

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B,C,E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(A)(1,3,4,5, and 6) generally apply to all directives under Jurisdictional Urban Runoff Management Program item F.3.a. Municipal (Existing Development) of Order No. 2001-01.

Discussion: CWA sections 402(p)(3)(B)(ii-iii) requires each Copermittee to prohibit non-storm water discharges into its MS4 and to reduce the discharge of pollutants to the maximum extent practicable for all urban land uses. The purpose of these two broad requirements is to minimize the short and long-term impacts of urban runoff on receiving water quality. Land used for municipal activities is clearly identified in the federal regulations as one of several high priority land uses from which pollutants in urban runoff discharges must be reduced to the maximum extent practicable by each Copermittee. Federal NPDES regulation 40 CFR 122.26(d)(2)(iv) requires the development of a proposed management program to reduce the discharge of pollutants in storm water to the maximum extent practicable. Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(A)(1) and 40 CFR 122.26 (d)(2)(iv)(A)(3-6) require that this program include components which address municipal areas and activities.

US EPA targets municipal areas and activities "to help ensure a reduction in the amount and type of pollution that (1) collects on streets, parking lots, open spaces, and storage and vehicle maintenance areas and is discharged into local

waterways; and (2) results from actions such as environmentally damaging land development and flood management practices or poor maintenance of storm sewer systems" (2000). To reduce pollutant discharges from municipal areas and activities to the maximum extent practicable, BMPs must be implemented. Therefore, a municipal existing development component requiring BMPs must be developed and implemented as part of each Copermittee's Jurisdictional URMP.

The SDRWQCB has discretion to require Jurisdictional Urban Runoff Management Program item F.3.a in Order No. 2001-01 under the broad legal authority cited above.

F.3.a.(1) Pollution Prevention (Municipal) of the Jurisdictional Urban Runoff Management Program states the following:

Each Copermittee shall implement pollution prevention methods in its Municipal (Existing Development) Component and shall require its use by appropriate municipal departments and personnel.

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B,C,E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(A)(1,3,4,5, and 6) generally apply to all directives under Jurisdictional Urban Runoff Management Program item F.3.a. Municipal (Existing Development) of Order No. 2001-01.

Discussion: Each Copermittee must develop a program to reduce the discharge of pollutants to and from the MS4 to the maximum extent practicable for all urban land uses and activities, including municipal areas and activities. In order to achieve this level of pollution reduction, BMPs must be implemented. Pollution prevention, the reduction or elimination of pollutant generation at its source, is an essential aspect of BMPs. By limiting the generation of pollutants, less pollutants are available to be washed from municipal areas and activities, resulting in reduced pollutant loads in storm water discharges from these areas and activities. In addition, there is no need to control or treat pollutants which are not initially generated. Furthermore, pollution prevention BMPs are generally more cost effective than removal of pollutants by treatment facilities or cleanup of contaminated media. In the Pollution Prevention Act of 1990, Congress established a national policy that emphasizes pollution prevention over control and treatment. Since pollution prevention is an effective and efficient means for reducing pollutant loads in storm water runoff, pollution prevention methods are an important aspect of BMPs to be included in the municipal existing development component. The SDRWQCB has discretion to require Jurisdictional Urban Runoff Management Program item F.3.a.(1) in Order No. 2001-01 under the broad legal authority cited above.

F.3.a.(2) Source Identification (Municipal) of the Jurisdictional Urban Runoff Management Program states the following:

Each Copermittee shall develop, and update annually, a watershed based inventory of the name, address (if applicable), and description of all municipal land use areas and activities which generate

pollutants. The use of an automated database system, such as Geographical Information System (GIS) is highly recommended when applicable, but not required.

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B,C,E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(A)(1,3,4,5, and 6) generally apply to all directives under Jurisdictional Urban Runoff Management Program item F.3.a. Municipal (Existing Development) of Order No. 2001-01.

Discussion: In order to prohibit non-storm water discharges, reduce municipal pollutant sources to the maximum extent practicable, and ensure that adequate BMPs are implemented, Copermittees must first identify all of the municipal areas and pollutant source activities within their jurisdiction. The municipal areas and pollutant source activities are to be inventoried on a watershed basis in order to help with prioritization of the sites. For example, municipal pollutant sources which are found to be located in a watershed with impaired receiving waters should be considered a high priority for BMP implementation, inspections, and monitoring. Regarding municipal pollutant source inventories, the US EPA states "The first step is to identify facilities that handle municipal waste and summarize their operations" (1992). The SDRWQCB has discretion to require Jurisdictional Urban Runoff Management Program item F.3.a.(2) of Order No. 2001-01 under the broad legal authority cited above.

F.3.a.(3)(a) Threat to Water Quality Prioritization (Municipal) of the Jurisdictional Urban Runoff Management Program states the following:

To establish priorities for oversight of municipal areas and activities required under this Order, each Copermittee shall prioritize each watershed inventory in F.3.a.(2) above by threat to water quality and update annually. Each municipal area and activity shall be classified as high, medium, or low threat to water quality. In evaluating threat to water quality each Copermittee shall consider (1) type of municipal area or activity; (2) materials used; (3) wastes generated; (4) pollutant discharge potential; (5) non-storm water discharges; (6) size of facility or area; (7) proximity to receiving water bodies; (8) sensitivity of receiving water bodies; and (9) any other relevant factors.

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B,C,E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(A)(1,3,4,5, and 6) generally apply to all directives under Jurisdictional Urban Runoff Management Program item F.3.a. Municipal (Existing Development) of Order No. 2001-01.

Discussion: Many municipal pollutant sources pose a high risk for pollutant discharges to storm water. By assessing information provided in the municipal pollutant source inventory (such as principal pollutants used or services provided by a municipal facility), sites can be prioritized by threat to water quality. Those sites which pose the greatest threat can then be targeted for BMP implementation, inspection, and monitoring. This will allow for limited resources

to be most effective in reducing pollutant discharges from municipal sources. The SDRWQCB has discretion to require Jurisdictional Urban Runoff Management Program item F.3.a.(3)(a) in Order No. 2001-01 under the broad legal authority cited above.

F.3.a.(3)(b) Threat to Water Quality Prioritization (Municipal) of the Jurisdictional Urban Runoff Management Program states the following:

At a minimum, the high priority municipal areas and activities shall include the following:

i Roads, Streets, Highways, and Parking Facilities.
ii Flood Management Projects and Flood Control Devices.
iii Areas and activities tributary to a Clean Water Act section 303(d) impaired water body or other environmentally sensitive area (as defined in section F.1.b.(2)(a)vii of this Order).
iv Municipal Waste Facilities.
- *Active or closed municipal landfills;*
- *Publicly owned treatment works (including water and wastewater treatment plants) and sanitary sewage collection systems;*
- *Municipal separate storm sewer systems;*
- *Incinerators;*
- *Solid waste transfer facilities;*
- *Land application sites;*
- *Uncontrolled sanitary landfills;*
- *Corporate yards including maintenance and storage yards for materials, waste, equipment and vehicles;*
- *Sites for disposing and treating sewage sludge; and*
- *Hazardous waste treatment, disposal, and recovery facilities;*

v *Other municipal areas and activities that the Copermittee determines may contribute a significant source pollutant load to the MS4.*

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B,C,E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(A)(1,3,4,5, and 6) generally apply to all directives under Jurisdictional Urban Runoff Management Program item F.3.a. Municipal (Existing Development) of Order No. 2001-01.

Discussion: Identification of high priority municipal pollutant areas and activities allows for limited pollution reduction resources to be most effective. Targeting high priority municipal areas and activities for BMP implementation, inspection, and monitoring provides the greatest reduction in risk of degrading receiving waters per expenditure.

Items (i), (ii), and (iv) above are considered to be high priority sources since they are specifically addressed in Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(A)(3-5). Regarding roads, highways, and parking facilities, the US EPA states “Road maintenance practices, especially snow management and road repair, and traffic are significant sources of pollutants in storm water discharges. […] Municipal equipment yards and maintenance shops that support road maintenance activities can also be significant sources of pollutants” (1992). Regarding flood management projects and flood control devices, the US EPA

states "Storm water management devices and structures that focus solely on water quantity are usually not designed to remove pollutants, and may sometimes harm aquatic habitat and aesthetic values" (1992). Regarding municipal waste facilities, the US EPA states "Applicants must describe programs that identify measures to monitor and reduce pollutants in storm water discharges from facilities that handle municipal waste, including sewage sludge. […] The types of facilities that should be included are: active or closed municipal waste landfills; publicly owned treatment works, including water and wastewater treatment plants; incinerators; municipal solid waste transfer facilities; land application sites; uncontrolled sanitary landfills; maintenance and storage yards for waste transportation fleets and equipment; sites for disposing or treating sludge from municipal treatment works; and other treatment, storage, or disposal facilities for municipal waste" (1992).

Areas and activities included in item (iii) are considered high priority due to their location in relation to CWA section 303(d) water bodies. Pollutant loading of these water bodies must be avoided to aid in their recovery and ensure against their further degradation. The SDRWQCB has discretion to require Jurisdictional Urban Runoff Management Program item F.3.a.(3)(b) in Order No. 2001-01 under the broad legal authority cited above.

F.3.a.(4)(a) and F.3.a.(4)(b) BMP Implementation (Municipal) of the Jurisdictional Urban Runoff Management Program state the following:

> *(a) Each Copermittee shall designate a set of minimum BMPs for high, medium, and low threat to water quality municipal areas and activities (as determined under section F.3.a.(3)). The designated minimum BMPs for high threat to water quality municipal areas and activities shall be area or activity specific as appropriate.*
>
> *(b) Each Copermittee shall implement, or require the implementation of, the designated minimum BMPs (based upon the threat to water quality rating) at each municipal area or activity within its jurisdiction. If particular minimum BMPs are infeasible for any specific area or activity, each Copermittee shall implement, or require implementation of other equivalent BMPs. Each Copermittee shall also implement any additional BMPs as are necessary to comply with this Order.*
>
> > *i. Each Copermittee shall evaluate feasibility of retrofitting existing structural food control devices and retrofit where needed.*

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B,C,E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(A)(1,3,4,5, and 6) generally apply to all directives under Jurisdictional Urban Runoff Management Program item F.3.a. Municipal (Existing Development) of Order No. 2001-01.

Discussion: Copermittees must reduce the discharge of pollutants to the MS4 to the maximum extent practicable. In order to achieve this level of pollution reduction in storm water discharges from municipal areas and activities, BMPs must be implemented. To ensure that adequate BMPs are utilized for various municipal areas and activities, each Copermittee shall designate and implement a

set of minimum BMPs for high, medium, and low threat to water quality municipal areas and activities. The designated minimum BMPs will provide guidance as to the level of water quality protection required for various municipal areas and activities.

The US EPA recommends that Copermittees include in the proposed management program BMP measures for addressing municipal area and activities. Regarding public street, road, or highway BMPs, the US EPA states that "proposed management programs must include a description of practices for operation and maintenance of public streets, roads, and highways, and procedures for reducing the impact of runoff from these areas on receiving waters. […] Pollutants from traffic can be minimized by using nonstructural controls (e.g., traffic reduction and improved traffic management), structural controls (e.g., traditional and innovative BMPs), and changing maintenance activities" (1992).

Regarding flood management projects, the US EPA finds that flood management projects can be harmful to receiving waters, stating that "Storm water management devices and structures that focus solely on water quantity are usually not designed to remove pollutants, and may sometimes harm aquatic habitat and aesthetic values" (1992). As flood control structures and other elements of the MS4 age and retrofitting becomes necessary, opportunities for water quality improvements arise. Conveyance systems which take water quality consideration into account (such as grassed swales, vegetated detention ponds, etc.) can often cost less to construct than traditional concrete systems. Evaluation of the applicability of such systems during retrofitting must occur to ensure that pollutants in urban runoff are reduced to the maximum extent practicable. The US EPA supports utilizing BMPs for pollution reduction in flood management projects, stating that "The proposed management program must demonstrate that flood management projects take into account the effects on the water quality of receiving water bodies. […] Opportunities for pollutant reduction should be considered" (1992).

Regarding municipal waste facility BMPs, the US EPA states that "Procedures to evaluate, inspect, monitor, and establish control measures for municipal waste sites over the term of the NPDES permit should be described" (1992). The SDRWQCB has discretion to require Jurisdictional Urban Runoff Management Program item F.3.a.(4)(a) in Order No. 2001-01 under the broad legal authority cited above.

F.3.a.(4)(c) BMP Implementation (Municipal) of the Jurisdictional Urban Runoff Management Program states the following:

Each Copermittee shall implement, or require implementation of, any additional controls for municipal areas and activities tributary to Clean Water Act section 303(d) impaired water bodies, coastal lagoons, or other environmentally sensitive areas necessary to comply with this Order.

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B,C,E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)

(A)(1,3,4,5, and 6) generally apply to all directives under Jurisdictional Urban Runoff Management Program item F.3.a. Municipal (Existing Development) of Order No. 2001-01.

Federal NPDES regulation 40 CFR 122.44(d)(1)(i) requires NPDES permits to include limitations to "control all pollutants or pollutant parameters (either conventional, nonconventional, or toxic pollutants) which the Director determines are or may be discharged at a level which will cause, have reasonable potential to cause, or contribute to an excursion above any State water quality standard, including State narrative criteria for water quality."

Discussion: CWA section 303(d) water bodies are water bodies which are not achieving the water quality objectives necessary to protect their beneficial uses. As discussed in Finding 3, urban runoff discharges from MS4s are a leading cause of receiving water quality impairment in the San Diego Region and throughout the United States. Since discharges which cause or contribute to an exceedance of water quality standards must be controlled and are prohibited (see section C.1. of Order No. 2001-01), discharges to CWA section 303(d) waterbodies of pollutants for which the waterbody is impaired must be controlled and are prohibited. Therefore, municipal areas and activities tributary to these water bodies must implement additional controls to ensure that they are not discharging the pollutants which are causing or contributing to the impairment of these water bodies.

With regards to coastal lagoons and other sensitive water bodies, additional controls are needed to protect these valuable and unique resources. In their Nonpoint Source Program Strategy and Implementation Plan, the SWRCB and California Coastal Commission support additional controls for critical coastal areas, stating "the State will seek to attain and maintain applicable water quality standards, and protect waters threatened by land uses, or by substantial expansion of existing land uses, by implementing additional management measures."

The SDRWQCB has the discretion to require Jurisdictional Urban Runoff Program item F.3.a.(4)(c) in Order No. 2001-01 under the broad and specific legal authority cited above.

F.3.a.(5) Maintenance of Municipal Separate Storm Sewer System (Municipal) of the Jurisdictional Urban Runoff Management Program states the following:

(a) Each Copermittee shall implement a schedule of maintenance activities at all structural controls designed to reduce pollutant discharges to or from its MS4s and related drainage structures.

(b) Each Copermittee shall implement a schedule of maintenance activities for the municipal separate storm sewer system.

(c) The maintenance activities must, at a minimum, include:

i. Inspection and removal of accumulated waste (e.g. sediment, trash, debris and other pollutants) between May 1 and September 30 of each year;

ii. Additional cleaning as necessary between October 1 and April 30 of each year;

iii. Record keeping of cleaning and the overall quantity of waste removed;

iv. Proper disposal of waste removed pursuant to applicable laws;

v. *Measures to eliminate waste discharges during MS4 maintenance and cleaning activities.*

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B,C,E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(A)(1,3,4,5, and 6) generally apply to all directives under Jurisdictional Urban Runoff Management Program item F.3.a. Municipal (Existing Development) of Order No. 2001-01.

Discussion: Maintenance is critical to the successful implementation of every URMP. The US EPA finds that "Lack of maintenance often limits the effectiveness of storm water structural controls such as detention/retention basins and infiltration devices. […] The proposed program should provide for maintenance logs and identify specific maintenance activities for each class of control, such as removing sediment from retention ponds every five years, cleaning catch basins annually, and removing litter from channels twice a year. If maintenance activities are scheduled infrequently, inspections must be scheduled to ensure that the control is operating adequately. In cases where scheduled maintenance is not appropriate, maintenance should be based on inspections of the control structure or frequency of storm events. If maintenance depends on the results of inspections or if it occurs infrequently, the applicant must provide an inspection schedule. The applicant should also identify the municipal department(s) responsible for the maintenance program" (1992). The maintenance schedule included in this item is based on the above US EPA recommendations. This maintenance schedule will help ensure that structural controls are in adequate condition to be effective year round but especially at the beginning of and throughout the rainy season.

Maintenance of municipal facilities, control structures, and the MS4 is considered so essential by US EPA that the requirement to conduct a maintenance program is specifically directed in both the Phase I and Phase II storm water regulations. In both cases, the maintenance programs must include a training component and have the ultimate goal of preventing pollutant runoff from municipal operations. Municipal activities should set a good example for all non-municipal personnel and the public.

The SDRWQCB has discretion to require Jurisdictional Urban Runoff Program item F.3.a.(5) in Order No. 2001-01 under the broad legal authority cited above.

F.3.a.(6) Management of Pesticides, Herbicides, and Fertilizers (Municipal) of the Jurisdictional Urban Runoff Management Program states the following:

The Copermittees shall implement BMPs to reduce the contribution of pollutants associated with the application, storage, and disposal of pesticides, herbicides and fertilizers from municipal areas and activities to MS4s. Important municipal areas and activities include all municipal facilities, public rights-of-way, parks, recreational facilities, golf courses, cemeteries, botanical or zoological gardens and exhibits, landscaped areas, etc.

Such BMPs shall include, at a minimum: (1) educational activities, permits, certifications and other measures for municipal applicators and distributors; (2) integrated pest management measures that rely on non-chemical solutions; (3) the use of native vegetation; (4) schedules for irrigation and chemical application; and (5) the collection and proper disposal of unused pesticides, herbicides, and fertilizers.

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B,C,E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(A)(1,3,4,5, and 6) generally apply to all directives under Jurisdictional Urban Runoff Management Program item F.3.a. Municipal (Existing Development) of Order No. 2001-01.

Discussion: Regarding the municipal use of pesticides, herbicides, and fertilizers, the US EPA finds that "The proposed program should include educational measures for the public and commercial applicators, and should include integrated pest management measures that rely on non-chemical solutions to pest control. The program should also describe how educational materials will be developed and distributed. Applicants are encouraged to consider providing information for the collection and proper disposal of unused pesticides, herbicides, and fertilizers, or to establish their own program. […] In addition, applicants must include a discussion of controls for the application of pesticides, herbicides, and fertilizers in public rights-of-way and at municipal facilities. Planting low-maintenance vegetation, such as perennial ground covers, reduces pesticide and herbicide use. Native vegetation is often preferable because there is less need to apply fertilizers and herbicides, and to perform other forms of maintenance, such as mowing" (1992). Based on these US EPA recommendations, the SDRWQCB included Jurisdictional Urban Runoff Management Program item F.3.a.(6) in Order No. 2001-01. The SDRWQCB has discretion to include Jurisdictional Urban Runoff Management Program item F.3.a.(6) in Order No. 2001-01 under the broad legal authority cited above.

F.3.a.(7) Inspection of Municipal Areas and Activities (Municipal) of the Jurisdictional Urban Runoff Management Program states the following:

At a minimum, each Copermittee shall inspect high priority municipal areas and activities annually. Based upon site inspection findings, each Copermittee shall implement all follow-up actions necessary to comply with this Order.

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B,C,E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(A)(1,3,4,5, and 6) generally apply to all directives under Jurisdictional Urban Runoff Management Program item F.3.a. Municipal (Existing Development) of Order No. 2001-01.

Discussion: The USEPA finds that the municipal areas and activities listed in section F.3.a.(3) of Order No. 2001-01 can be a significant source of pollutants in urban runoff (see Discussion for F.3.a.(3) above). Since these municipal areas and activities can be a significant source of pollutants, annual inspections are necessary to ensure that proper measures are being undertaken to reduce pollutant discharges to the maximum extent practicable. The USEPA supports inspections of municipal areas and activities, stating "Applicants must describe programs that identify measures to monitor and reduce pollutants in storm water discharges from facilities that handle municipal waste, including sewage sludge. […] The types of facilities that should be included are: active or closed municipal waste landfills; publicly owned treatment works, including water and wastewater treatment plants; incinerators; municipal solid waste transfer facilities; land application sites; uncontrolled sanitary landfills; maintenance and storage yards for waste transportation fleets and equipment; sites for disposing or treating sludge from municipal treatment works; and other treatment, storage, or disposal facilities for municipal waste" (1992). The USEPA further states that "Procedures to evaluate, inspect, monitor, and establish control measures for municipal waste sites over the term of the NPDES permit should be described" (1992). The SDRWQCB has discretion to require Jurisdictional Urban Runoff Management Program item F.3.a.(7) in Order No. 2001-01 under the broad legal authority cited above.

F.3.a.(8) Enforcement of Municipal Areas and Activities (Municipal) of the Jurisdictional Urban Runoff Management Program states the following:

Each Copermittee shall enforce its storm water ordinance for all municipal areas and activities as necessary to maintain compliance with this Order.

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B,C,E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(A)(1,3,4,5, and 6) generally apply to all directives under Jurisdictional Urban Runoff Management Program item F.3.a. Municipal (Existing Development) of Order No. 2001-01.

Discussion: When a Copermittee determines a violation of its storm water ordinance, it must pursue correction of the violation. A critical aspect of the correction of violations is enforcement of ordinances. Enforcement increases the probability of correction of a violation. Regarding inspection and enforcement measures, the US EPA states "Effective inspection and enforcement requires […] penalties to deter infractions and intervention by the municipal authority to correct violations. Enforcement mechanisms […] also must be described" (1992). The SDRWQCB has discretion to require Jurisdictional Urban Runoff Management Program item F.3.a.(8) in Order No. 2001-01 under the broad legal authority cited above.

F.3.b. INDUSTRIAL (EXISTING DEVELOPMENT)

In addition to the underlying broad legal authority citations listed above in section VII. of this Fact Sheet/Technical Report, the following specific legal authority items also generally apply to all directives under Jurisdictional Urban Runoff Management Program item F.3.b. Industrial (Existing Development) of Order No. 2001-01. Other specific legal authority items applicable only to distinct directives of Jurisdictional Urban Runoff Management Program item F.3.b. are provided as necessary.

> Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(C) provides that the proposed management program include "A description of a program to monitor and control pollutants in storm water discharges to municipal systems from municipal landfills, hazardous waste treatment, disposal and recovery facilities, industrial facilities that are subject to section 313 of title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA), and industrial facilities that the municipal permit applicant determines are contributing a substantial pollutant loading to the municipal storm sewer system."
>
> Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(C)(1) provides that the Copermittee must "identify priorities and procedures for inspections and establishing and implementing control measures for such discharges."

F.3.b. Industrial (Existing Development) for the Jurisdictional Urban Runoff Management Program states the following:

> *Each Copermittee shall implement an Industrial (Existing Development) Component to reduce pollutants in runoff from all industrial sites. At a minimum the industrial component shall address:*
>
> *F.3.b.(1) Pollution Prevention*
> *F.3.b.(2) Source Identification*
> *F.3.b.(3) Threat to Water Quality Prioritization*
> *F.3.b.(4) BMP Implementation*
> *F.3.b.(5) Monitoring of Industrial Sites*
> *F.3.b.(6) Inspection of Industrial Sites*
> *F.3.b.(7) Enforcement Measures for Industrial Sites*
> *F.3.b.(8) Reporting of Non-compliant Sites*

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B,C,E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(C) and 40 CFR 122.26(d)(2)(iv)(C)(1) generally apply to all directives under Jurisdictional Urban Runoff Management Program item F.3.b. Industrial (Existing Development) of Order No. 2001-01.

Discussion: CWA sections 402(p)(3)(B)(ii-iii) require each Copermittee to prohibit non-storm water discharges into its MS4 and to reduce the discharge of pollutants to the maximum extent practicable for all urban land uses. The purpose of these two broad requirements is to minimize the short and long-term impacts of urban runoff on receiving water quality. Land used for industrial activities is clearly identified in the federal regulations as one of several high priority land uses from which pollutants in urban runoff discharges must be reduced to the maximum

extent practicable by each Copermittee. Federal NPDES regulation 40 CFR 122.26(d)(2)(iv) requires the development of a proposed management program to reduce the discharge of pollutants in storm water to the maximum extent practicable. Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(C) requires that this program include a component which addresses industrial sites.

Due to their numerous potential pollutant sources, industrial sites are relatively high risk areas for pollutant discharges to storm water. In order to control the discharge of pollutants from industrial sites to the maximum extent practicable, implementation of BMPs is necessary. As discussed in Finding 12, BMPs effectively reduce pollutants in urban runoff by emphasizing pollution prevention and source controls, followed by treatment controls. The industrial existing development component will provide a program for the development and implementation of BMPs to address pollutants in storm water discharges from industrial sites. The US EPA supports such a program, stating "NPDES permits for MS4s will establish responsibilities for municipal system operators to control pollutants from industrial storm water discharged through their system" (1992).

The SDRWQCB has discretion to require Jurisdictional Urban Runoff Management Program item F.3.b. in Order No. 2001-01 under the broad legal authority cited above.

F.3.b.(1) Pollution Prevention (Industrial) of the Jurisdictional Urban Runoff Management Program states the following:

Each Copermittee shall implement pollution prevention methods in its Industrial (Existing Development) Component and shall require its use by industry.

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B,C,E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(C) and 40 CFR 122.26(d)(2)(iv)(C)(1) generally apply to all directives under Jurisdictional Urban Runoff Management Program item F.3.b. Industrial (Existing Development) of Order No. 2001-01.

Discussion: Each Copermittee must develop a program to reduce the discharge of pollutants to and from its MS4 to the maximum extent practicable for all urban land uses, including industrial land uses. In order to achieve this level of pollution reduction, BMPs must be implemented. Pollution prevention, the reduction or elimination of pollutant generation at its source, is an essential aspect of BMPs. By limiting the generation of pollutants, less pollutants are available to be washed from industrial sites, resulting in reduced pollutant loads in storm water discharges from these sites. In addition, there is no need to control or treat pollutants which are not initially generated. Furthermore, pollution prevention BMPs are generally more cost effective than removal of pollutants by treatment facilities or cleanup of contaminated media. In the Pollution Prevention Act of 1990, Congress established a national policy that emphasizes pollution prevention over control and treatment. Since pollution prevention is an effective and efficient means for reducing pollutant loads in storm water runoff, pollution prevention methods are an

important aspect of BMPs to be included in the industrial existing development component. The SDRWQCB has discretion to require Jurisdictional Urban Runoff Program item F.3.a in Order No. 2001-01 under the broad legal authority cited above.

F.3.b.(2) Source Identification (Industrial) of the Jurisdictional Urban Runoff Management Program states the following:

Each Copermittee shall develop and update annually a watershed based inventory of all industrial sites within its jurisdiction regardless of site ownership. This requirement is applicable to all industrial sites regardless of whether the industrial site is subject to the California statewide General NPDES Permit for Storm Water Discharges Associated With Industrial Activities, Except Construction (hereinafter General Industrial Permit) or other individual NPDES permit.

The inventory shall include the following minimum information for each industrial site: name; address; and a narrative description including SIC codes which best reflects the principal products or services provided by each facility. The use of an automated database system, such as Geographical Information System (GIS) is highly recommended, but not required.

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B,C,E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(C) and 40 CFR 122.26(d)(2)(iv)(C)(1) generally apply to all directives under Jurisdictional Urban Runoff Management Program item F.3.b. Industrial (Existing Development) of Order No. 2001-01.

Federal NPDES regulation 40 CFR 122.26(d)(2)(ii) provides that the Copermittee "Provide an inventory, organized by watershed of the name and address, and a description (such as SIC codes) which best reflects the principal products or services provided by each facility which may discharge, to the municipal separate storm sewer, storm water associated with industrial activity."

Discussion: Due to their numerous potential pollutant sources, industrial sites are high risk areas for pollutant discharges to storm water. In order to prohibit non-storm water discharges, reduce industrial pollutant sources to the maximum extent practicable, and ensure that adequate BMPs are implemented, each Copermittee must first identify all industrial sites within their jurisdiction. Development of an inventory of industrial sites within a watershed will help identify potential industrial sources of pollutants in storm water. By assessing information provided in the inventory (such as principal products, services provided, and location), sites with the highest risk to receiving water quality can be identified, and priority for inspection, monitoring, and enforcement can be placed on those sites. By focusing inspection and monitoring on high priority sites, the effectiveness of limited inspection and monitoring resources can be maximized. The SDRWQCB has discretion to require inventories of industrial sites in Jurisdictional Urban Runoff Program item F.3.b of Order No. 2001-01 under the broad and specific legal authority above.

F.3.b.(3) Threat to Water Quality Prioritization (Industrial) of the Jurisdictional Urban Runoff Management Program states the following:

> *(a) To establish priorities for industrial oversight activities under this Order, the Copermittee shall prioritize each watershed based inventory in F.3.b.(2) above by threat to water quality and update annually. Each industrial site shall be classified as high, medium, or low threat to water quality. In evaluating threat to water quality each Copermittee shall consider (1) type of industrial activity (SIC Code); (2) materials used in industrial processes; (3) wastes generated; (4) pollutant discharge potential; (5) non-storm water discharges; (6) size of facility; (7) proximity to receiving water bodies; (8) sensitivity of receiving water bodies; (9) whether the industrial site is subject to the statewide General Industrial Permit; and (10) any other relevant factors.*
>
> (b) *At a minimum the high priority industrial sites shall include industrial facilities that are subject to section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA); industrial facilities tributary to a Clean Water Act section 303(d) impaired water body or other environmentally sensitive area (as defined in section F.1.b.(2)(a)(vii of this Order); facilities subject to the statewide General Industrial Permit; and all other industrial facilities that the Copermittee determines are contributing significant pollutant loading to its MS4, regardless of whether such facilities are covered under the statewide General Industrial Permit or other NPDES permit.*

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B,C,E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(C) and 40 CFR 122.26(d)(2)(iv)(C)(1) generally apply to all directives under Jurisdictional Urban Runoff Management Program item F.3.b. Industrial (Existing Development) of Order No. 2001-01.

Federal NPDES regulation 40 CFR 122.26(d)(2)(ii) provides that the Copermittee "Provide an inventory, organized by watershed of the name and address, and a description (such as SIC codes) which best reflects the principal products or services provided by each facility which may discharge, to the municipal separate storm sewer, storm water associated with industrial activity."

Discussion: Due to their numerous pollutant sources, industrial sites are high risk areas for pollutant discharges to storm water. Development of an inventory of industrial sites within a watershed will help identify potential sources of pollutants in urban runoff. By assessing information provided in the inventory (such as principal products or services provided by the facility), sites can be prioritized by threat to water quality. Those sites which pose the greatest threat can then be targeted for inspection and monitoring. This will allow for limited inspection and monitoring time to be most effective. Regarding industrial site priority designation, the US EPA states that "When municipalities develop criteria for identifying additional priority industrial facilities, they are advised to consider, at a minimum:

- The type of industrial activity (SIC codes can help characterize the type of industrial activity);
- The use and management of chemicals or raw products at the facility and the likelihood that storm water discharge from the site will be contaminated; and

- The size and location of the facility in relation to sensitive watersheds" (1992).

The SDRWQCB has discretion to require Jurisdictional Urban Runoff Program item F.3.b.(3) in Order No. 2001-01 under the broad and specific legal authority cited above.

F.3.b.(4)(a) and F.3.b.(4)(b) BMP Implementation (Industrial) of the Jurisdictional Urban Runoff Management Program states the following:

(a) *Each Copermittee shall designate a set of minimum BMPs for high, medium, and low threat to water quality industrial sites (as determined under section F.3.b.(3)). The designated minimum BMPs for high threat to water quality industrial sites shall be industry and site specific as appropriate.*

(b) *Each Copermittee shall implement, or require the implementation of, the designated minimum BMPs (based upon the site's threat to water quality rating) at each industrial site within its jurisdiction. If particular minimum BMPs are infeasible at any specific site, each Copermittee shall implement, or require implementation of, other equivalent BMPs. Each Copermittee shall also implement or require any additional site specific BMPs as necessary to comply with this Order including BMPs which are more stringent than those required under the statewide General Industrial Permit.*

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B,C,E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(C) and 40 CFR 122.26(d)(2)(iv)(C)(1) generally apply to all directives under Jurisdictional Urban Runoff Management Program item F.3.b. Industrial (Existing Development) of Order No. 2001-01.

Discussion: Copermittees must reduce the discharge of pollutants to the MS4 from industrial sites to the maximum extent practicable. In order to achieve this level pollution reduction in storm water discharges from industrial sites, BMPs must be designated and implemented. To ensure that adequate BMPs are utilized at the industrial sites, each Copermittee shall designate and require implementation of a set of minimum BMPs for high, medium, and low threat to water quality industrial sites. The designated minimum BMPs will provide guidance on level of water quality protection required. The US EPA recommends that Copermittees provide BMP guidance to industrial facilities, stating "the applicant should suggest procedures for requiring pollutant control measures in runoff from priority industrial facilities. Applicants should provide information to the industrial facilities that discharge to the MS4s and industry-specific guidance on appropriate control measures that industries discharging to the systems should follow" (1992).

In order to adequately protect receiving water quality and allow Copermittees to meet their permit responsibilities under Order No. 2001-01, additional BMPs may be required, including BMPs more stringent than those required under the state wide General Industrial Permit. Regarding additional BMP requirements of this type, the US EPA finds that "nothing in the Federal regulations would prohibit the municipality from requiring additional controls beyond the permit requirements for industrial activities. For this reason, the EPA recommends that municipal

applicants incorporate a provision in the proposed storm water management program that allows the municipality to require priority industrial facilities to implement the controls necessary for the municipality to meet its permit responsibilities" (1992).

The SDRWQCB has discretion to require Jurisdictional Urban Runoff Program items F.3.b.(4)(a) and F.3.b.(4)(b) in Order No. 2001-01 under the broad legal authority cited above.

F.3.b.(4)(c) BMP Implementation (Industrial) of the Jurisdictional Urban Runoff Management Program states the following:

Each Copermittee shall implement, or require implementation of, additional controls for industrial sites tributary to CWA Section 303(d) impaired water bodies, coastal lagoons, or other environmentally sensitive areas as necessary to comply with this Order.

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B,C,E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(C) and 40 CFR 122.26(d)(2)(iv)(C)(1) generally apply to all directives under Jurisdictional Urban Runoff Management Program item F.3.b. Industrial (Existing Development) of Order No. 2001-01.

Federal NPDES regulation 40 CFR 122.44(d)(1)(i) requires NPDES permits to include limitations to "control all pollutants or pollutant parameters (either conventional, nonconventional, or toxic pollutants) which the Director determines are or may be discharged at a level which will cause, have reasonable potential to cause, or contribute to an excursion above any State water quality standard, including State narrative criteria for water quality."

Discussion: CWA section 303(d) water bodies are water bodies which are not achieving the water quality objectives necessary to protect their beneficial uses. As discussed in Finding 3, urban runoff discharges from MS4s are a leading cause of receiving water quality impairment in the San Diego Region and throughout the United States. Since discharges which cause or contribute to an exceedance of water quality standards must be controlled and are also prohibited (see section C.1. of Order No. 2001-01), discharges to CWA section 303(d) water bodies of pollutants for which the waterbody is impaired must be controlled and prohibited. Therefore, municipal areas and activities tributary to these water bodies must implement additional controls to ensure that they are not discharging the pollutants which are causing or contributing to the impairment of these water bodies.

Regarding coastal lagoons and other sensitive water bodies, additional controls are needed to protect these valuable and unique resources. In their Nonpoint Source Program Strategy and Implementation Plan, the SWRCB and California Coastal Commission support additional controls for critical coastal areas, stating "the State will seek to attain and maintain applicable water quality standards, and protect waters threatened by land uses, or by substantial expansion of existing land uses, by implementing additional management measures."

The SDRWQCB has the discretion to require Jurisdictional Urban Runoff Program item F.3.b.(4)(c) in Order No. 2001-01 under the broad and specific legal authority cited above.

F.3.b.(5) Monitoring of Industrial Sites (Industrial) of the Jurisdictional Urban Runoff Management Program item F.3.e. states the following:

(a) Each Copermittee shall conduct, or require industry to conduct, a monitoring program for runoff from each high threat to water quality industrial site (identified in F.3.b.(3) above).

(b) At a minimum, the monitoring program shall provide quantitative data from two storm events per year on the following constituents:

i. Any pollutant listed in effluent guidelines subcategories where applicable;
ii. Any pollutant for which an effluent limit has been established in an existing NPDES permit for the facility;
iii. Oil and grease or Total Organic Carbon (TOC);
iv. pH;
v. Total suspended solids (TSS);
vi. Specific conductance; and
vii. *Toxic chemicals and other pollutants that are likely to be present in storm water discharges.*

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B,C,E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(C) and 40 CFR 122.26(d)(2)(iv)(C)(1) generally apply to all directives under Jurisdictional Urban Runoff Management Program item F.3.b. Industrial (Existing Development) of Order No. 2001-01.

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(C)(2) provides that the proposed management program shall "Describe a monitoring program for storm water discharges associated with the industrial facilities identified in paragraph (d)(2)(iv)(C) of this section, to be implemented during the term of the permit, including the submission of quantitative data on the following constituents: any pollutants limited in effluent guidelines subcategories, where applicable; any pollutant listed in an existing NPDES permit for a facility; oil and grease, COD, pH, BOD_5, TSS, total phosphorus, total Kjeldhal nitrogen, nitrate plus nitrite nitrogen, and any information on discharges required under 40 CFR 122.21(g)(7)(iii) and (iv)."

Discussion: The purpose of the monitoring program is to provide the information needed by each Copermittee to assess the effectiveness of its Industrial BMP Program. Quantitative data is required for two storm events per year in order to identify potential trends and/or anomalies in the data. The Copermittee may be able to obtain this monitoring information from some industrial sites by requesting submittal of the Annual Reports required under the General Industrial Storm Water Permit. The SDRWQCB has discretion to require Jurisdictional Urban Runoff Program item F.3.b.(5) in Order No. 2001-01 under the broad and specific legal authority cited above.

F.3.b.(6) Inspection of Industrial Sites (Industrial) of the Jurisdictional Urban Runoff Management Program states the following:

(a) Each Copermittee shall conduct industrial site inspections for compliance with its ordinances, permits, and this Order. Inspections shall include review of BMP implementation plans.

(b) Each Copermittee shall establish inspection frequencies and priorities as determined by the threat to water quality prioritization described in F.3.b.(3) above. Each Copermittee shall inspect high priority industrial sites, at a minimum:

i. Annually

OR

ii. Bi-annually for any site that the responsible Copermittee certifies in a written statement to the SDRWQCB all of the following (certified statements may be submitted to the SDRWQCB at any time for one or more sites):

- *Copermittee has record of industrial site's Waste Discharge Identification Number (WDID#) documenting industrial site's coverage under the statewide General Industrial Permit; and*
- *Copermittee has reviewed the industrial site's Storm Water Pollution Prevention Plan (SWPPP); and*
- *Copermittee finds SWPPP to be in compliance with all local ordinances, permits, and plans; and*
- *Copermittee finds that the SWPPP is being properly implemented on site.*

Each Copermittee shall inspect medium and low threat to water quality industrial sites as needed.

(c) Based upon site inspection findings, each Copermittee shall implement all follow-up actions necessary to comply with this Order.

(d) To the extent that the SDRWQCB has conducted an inspection of a high priority industrial site during a particular year, the requirement for the responsible Copermittee to inspect this site during the same year will be satisfied.

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B,C,E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(C) and 40 CFR 122.26(d)(2)(iv)(C)(1) generally apply to all directives under Jurisdictional Urban Runoff Management Program item F.3.b. Industrial (Existing Development) of Order No. 2001-01.

Discussion: Routine inspections provide an effective means by which Copermittees can evaluate compliance with their ordinances. Inspections are especially important at high risk areas for pollutant discharges, such as industrial and construction sites. Industrial site inspection frequencies are to be based on threat to water quality prioritization. For example, industrial sites which are considered a high threat to water quality are to be given a high priority for inspection. This allows for limited inspection resources to be most effective. Annual or bi-annual inspection of high threat sites is necessary to ensure that changes to the site which may be detrimental to water quality are identified and addressed.

Review of a facility's Storm Water Pollution Prevention Plan (SWPPP) can be an effective tool in inspecting the facility's storm water controls. The US EPA recommends that municipalities review SWPPPs during inspections when it states "Municipalities are urged to evaluate pollution prevention plans and discharge monitoring data collected by the industrial facility to ensure that the facility is in compliance with its NPDES storm water permit. Site inspections should include (1) an evaluation of the pollution prevention plan and any other pertinent documents, and (2) an onsite visual inspection of the facility to evaluate the potential for discharges of contaminated storm water from the site and to assess the effectiveness of the pollution prevention plan" (1992).

Regarding industrial site inspections, the US EPA finds that "The proposed management program should describe the inspection procedures that will be followed.[…] Proposed management programs should address minimum frequency for routine inspections. For example, how often, how much of the site, and how long an inspection may take are appropriate to explain in this proposed management program component. Applicants should also describe procedures for conducting inspections and provide an inspector's checklist" (1992). The US EPA also finds that follow-up actions are to be implemented based upon site inspection findings: "The results of inspection may be used as a basis for requiring storm water management controls and enhanced pollution prevention measures" (1992).

Due to the large number of industrial sites within the region, sites which have been inspected by the SDRWQCB do not need to be re-inspected by a Copermittee within the same year. This practice will increase collaboration between the SDRWQCB and the Copermittees for industrial site inspections. Collaboration between the SDRWQCB and the Copermittees can provide for more efficient and effective overall inspection of industrial sites within the region. Regarding collaboration for inspection of industrial sites, US EPA states "The storm water regulations envision that NPDES permitting authorities and municipal operators will cooperate to develop programs to monitor and control pollutants in storm water discharges to municipal systems from various sites that handle waste and certain industrial facilities" (1992).

The SDRWQCB has discretion to require Jurisdictional Urban Runoff Program item F.3.b.(6) in Order No. 2001-01 under the broad legal authority cited above.

F.3.b.(7) Enforcement of Industrial Sites (Industrial) of the Jurisdictional Urban Runoff Management Program states the following:

Each Copermittee shall enforce its storm water ordinance at all industrial sites as necessary to maintain compliance with this Order. Copermittee ordinances or other regulatory mechanisms shall include sanctions to ensure compliance. Sanctions shall include for example: Non-monetary penalties, fines, bonding requirements, and/or permit denials for non-compliance.

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B,C,E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(C) and 40 CFR 122.26(d)(2)(iv)(C)(1) generally apply to all directives under Jurisdictional Urban Runoff Management Program item F.3.b. Industrial (Existing Development) of Order No. 2001-01.

Federal NPDES regulation 40 CFR 122.26(d)(2)(i)(A) provides that each Copermittee must demonstrate that it can control "through ordinance, permit, contract, order or similar means, the contribution of pollutants to the municipal storm sewer by storm water discharges associated with industrial activity and the quality of storm water discharged from site of industrial activity."

Discussion: The Copermittee is ultimately responsible for discharges to and from their MS4. Each Copermittee must therefore develop and enforce storm water ordinances in order reduce pollutant discharges to the MS4 to the maximum extent practicable and comply with its permit responsibilities. These ordinances must be applied at all industrial sites to ensure that pollutant discharges to the MS4 are reduced to the maximum extent practicable and permit requirements are met. To this effect, the US EPA "recommends that municipal applicants incorporate a provision in the proposed management program that allows the municipality to require priority industrial facilities to implement the controls necessary for the municipality to meet its permit responsibilities" (1992). Regarding enforcement at industrial sites, the US EPA further states "The municipality, as a permittee, is responsible for compliance with its permit and must have authority to implement the conditions in its permit. To comply with its permit, a municipality must have the authority to hold dischargers accountable for their contributions to separate storm sewers" (1992). The SDRWQCB has discretion to require Jurisdictional Urban Runoff Program item F.3.b.(7) in Order No. 2001-01 under the broad and specific legal authority cited above.

F.3.b.(8) Reporting of Non-compliant Sites (Industrial) of the Jurisdictional Urban Runoff Management Program states the following:

Each Copermittee shall provide oral notification to the SDRWQCB of non-compliant sites within its jurisdiction within 24 hours of the incidence of noncompliance, as required under section R.1 (and B.7 of Attachment C) of this Order. Such oral notification shall be followed up by a written report to be submitted to the SDRWQCB within 5 days of the incidence of non-compliance as required under section R.1 (and B.7 of Attachment C) of this Order. Sites are considered non-compliant when one or more violations of local ordinances, permits, plans, or this Order exist on the site.

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B,C,E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(C) and 40 CFR 122.26(d)(2)(iv)(C)(1) generally apply to all directives under Jurisdictional Urban Runoff Management Program item F.3.b. Industrial (Existing Development) of Order No. 2001-01.

Federal NPDES regulation 40 CFR 122.26(d)(2)(i)(A) provides that each Copermitee must demonstrate that it can control "through ordinance, permit, contract, order or similar means, the contribution of pollutants to the municipal

storm sewer by storm water discharges associated with industrial activity and the quality of storm water discharged from site of industrial activity."

Federal NPDES regulation 40 CFR 122.44(l)(6) states "The permittee shall report any noncompliance which may endanger health or the environment. Any information shall be provided orally within 24 hours from the time the permittee becomes aware of the circumstances. A written submission shall also be provided within 5 days of the time the permittee becomes aware of the circumstances. The written submission shall contain a description of the noncompliance and its cause; the period of non-compliance, including exact dates and times, and if the noncompliance has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance."

Discussion: Follow-up with non-compliant industrial sites is essential to ensure that the site has taken adequate corrective measures to achieve compliance. To help ensure that compliance has been achieved, the Copermittees shall report non-compliant industrial sites to the SDRWQCB. The SDRWQCB can then participate in follow-up efforts to assure that the industrial site is in compliance. The US EPA supports this type of collaboration when it states "the municipality will help EPA and authorized NPDES states: […] Inspect and monitor industrial facilities to verify that the industries discharging storm water to the municipal systems are in compliance with their NPDES storm water permit, if required" (1992). Notification of non-compliant sites is a common requirement of all NPDES permits under Federal NPDES regulation 40 CFR 122.44(l)(6). The SDRWQCB has discretion to require Jurisdictional Urban Runoff Program item F.3.b.(7) in Order No. 2001-01 under the broad and specific legal authority cited above.

F.3.c. COMMERCIAL (EXISTING DEVELOPMENT)

In addition to the underlying broad legal authority citations listed above in section VII. of this Fact Sheet/Technical Report, the following specific legal authority item also generally applies to all directives under Jurisdictional Urban Runoff Management Program item F.3.c. Commercial (Existing Development) of Order No. 2001-01. Other specific legal authority items applicable only to distinct directives of Jurisdictional Urban Runoff Management Program item F.3.c. are provided as necessary.

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A) provides that the Copermittee develop a proposed management program which includes "A description of structural and source control measures to reduce pollutants from runoff from commercial and residential areas that are discharged from the municipal storm sewer system that are to be implemented during the life of the permit, accompanied with an estimate of the expected reduction of pollutant loads and a proposed schedule for implementing such controls."

F.3.c. Commercial (Existing Development) of the Jurisdictional Urban Runoff Management Program states the following:

> *Each Copermittee shall implement a Commercial (Existing Development) Component to reduce pollutants in runoff from commercial sites. At a minimum the commercial component shall address:*
>
> > *F.3.c.(1) Pollution Prevention*
> > *F.3.c.(2) Source Identification*
> > *F.3.c.(3) BMP Implementation*
> > *F.3.c.(4) Inspection of Commercial Sites and Sources*
> > *F.3.c.(5) Enforcement Measures for Commercial Sites and Sources*

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B,C,E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A) generally applies to all directives under Jurisdictional Urban Runoff Management Program item F.3.c. Commercial (Existing Development) of Order No. 2001-01.

Discussion: CWA sections 402(p)(3)(B)(ii-iii) require each Copermittee to prohibit non-storm water discharges into its MS4 and to reduce the discharge of pollutants to the maximum extent practicable for all urban land uses. The purpose of these two broad requirements is to minimize the short and long-term impacts of urban runoff on receiving water quality. Land used for commercial activities is clearly identified in the federal regulations as one of several high priority land uses from which pollutants in urban runoff discharges must be reduced to the maximum extent practicable by each Copermittee. Federal NPDES regulation 40 CFR 122.26(d)(2)(iv) requires the development of a proposed management program to reduce the discharge of pollutants in storm water to the maximum extent practicable. Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A) requires that this program include a component which addresses commercial sites and sources.

Commercial sites and sources have the potential to be significant sources of pollutants in urban runoff. To reduce the discharge of pollutants in urban runoff from commercial sites to the maximum extent practicable, BMPs must be implemented. As discussed in Finding 12, BMPs effectively reduce pollutants in urban runoff by emphasizing pollution prevention and source controls, followed by treatment controls. The commercial existing development component will provide a program for the development and implementation of BMPs to address pollutants in storm water discharges from commercial sites and activities.

The SDRWQCB has discretion to require Jurisdictional Urban Runoff Program item F.3.c. in Order No. 2001-01 under the broad legal authority cited above.

F.3.c.(1) Pollution Prevention (Commercial) of the Jurisdictional Urban Runoff Management Program states the following:

> *Each Copermittee shall implement pollution prevention methods in its Commercial (Existing Development) Component and shall require its use by commerce.*

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B,C,E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A) generally applies to all directives under Jurisdictional Urban Runoff Management Program item F.3.c. Commercial (Existing Development) of Order No. 2001-01.

Discussion: Each Copermittee must develop a program to reduce the discharge of pollutants to and from its MS4 to the maximum extent practicable. In order to achieve this level of pollution reduction, BMPs must be implemented. As discussed in Finding 12, pollution prevention (the reduction or elimination of pollutant generation at its source) is an essential aspect of BMP programs. By limiting the generation of pollutants, less pollutants are available to be washed from commercial sites and sources, resulting in reduced pollutant loads in storm water discharges from these sites and sources. In addition, there is no need to control or treat pollutants which are not initially generated. Furthermore, pollution prevention BMPs are generally more cost effective than removal of pollutants by treatment facilities or cleanup of contaminated media. In the Pollution Prevention Act of 1990, Congress established a national policy that emphasizes pollution prevention over control and treatment. Since pollution prevention is an effective and efficient means for reducing pollutant loads in storm water runoff, pollution prevention methods are an important aspect of BMPs to be included in the commercial existing development component of the Jurisdictional URMP. The SDRWQCB has discretion to require Jurisdictional Urban Runoff Program item F.3.c.(1) in Order No. 2001-01 under the broad legal authority cited above.

F.3.c.(2) Source Identification (Commercial) of the Jurisdictional Urban Runoff Management Program states the following:

Each Copermittee shall develop and update annually an inventory of the following high priority threat to water quality commercial sites/sources:

(a) Automobile mechanical repair, maintenance, fueling, or cleaning;
(b) Airplane mechanical repair, maintenance, fueling, or cleaning;
(c) Boat mechanical repair, maintenance, fueling, or cleaning;
(d) Equipment repair, maintenance, fueling, or cleaning;
(e) Automobile & other vehicle body repair or painting;
(f) Mobile automobile or other vehicle washing;
(g) Automobile (or other vehicle) parking lots and storage facilities;
(h) Retail or wholesale fueling;
(i) Pest control services;
(j) Eating or drinking establishments;
(k) Mobile carpet, drape or furniture cleaning;
(l) Cement mixing or cutting;
(m) Masonry;
(n) Painting and Coating;
(o) Botanical or zoological gardens and exhibits;
(p) Landscaping;
(q) Nurseries and greenhouses;
(r) Golf courses, parks and other recreational areas/facilities;
(s) Cemeteries;
(t) Pool and fountain cleaning;
(u) Marinas;
(v) Port-a-Potty servicing;

(w) *Other commercial sites/sources that the Copermittee determines may contribute a significant pollutant load to the MS4; and*
(x) *Any commercial site or source tributary to a Clean Water Act section 303(d) impaired water body or other environmentally sensitive area (as defined in F.1.b(2)(a)vii of this Order).*

The use of an automated database system, such as Geographical Information System (GIS) is highly recommended, but not required.

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B,C,E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A) generally applies to all directives under Jurisdictional Urban Runoff Management Program item F.3.c. Commercial (Existing Development) of Order No. 2001-01.

Discussion: In order to prohibit non-storm water discharges, reduce commercial pollutant sources to the maximum extent practicable, and ensure that adequate BMPs are implemented, Copermittees must first identify all high priority threat to water quality commercial pollutant sources. Based on the number of complaints received by the SDRWQCB and the Copermittees, the types of commercial sites and activities listed in item F.3.c.(2) are potential high risk areas for pollutant discharges to storm water. The sites and activities are identified as such due to their frequent use of substances often found to be present as pollutants in urban runoff, combined with frequent mismanagement of runoff from the sites and activities. Therefore, development of an inventory of these commercial sites within a watershed will help identify the location of potential sources of pollutants in storm water. Pollutants found to be present in receiving waters can then be traced to the sites which frequently use such substances. In this manner an inventory of commercial sites can help in targeting commercial sites for inspection, monitoring, and potential enforcement. This will allow for limited inspection, monitoring, and enforcement time to be most effective. The SDRWQCB has discretion to require Jurisdictional Urban Runoff Program item F.3.c.(2) in Order No. 2001-01 under the broad legal authority cited above.

F.3.c.(3)(a) and F.3.c.(3)(b) BMP Implementation (Commercial) of the Jurisdictional Urban Runoff Management Program states the following:

Each Copermittee shall designate a set of minimum BMPs for the high priority threat to water quality commercial sites/sources (listed above in section F.3.c.(2)). The designated minimum BMPs for the high threat to water quality commercial sites shall be source and site specific as appropriate.

Each Copermittee shall implement, or require the implementation of, the designated minimum BMPs at each high priority threat to water quality commercial site/source within its jurisdiction. If particular minimum BMPs are infeasible for any specific site/source, each Copermittee shall implement, or require the implementation of, other equivalent BMPs. Each Copermittee shall also implement or require any additional site specific BMPs as necessary to comply with this Order.

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B,C,E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A) generally applies to all directives under Jurisdictional Urban Runoff Management Program item F.3.c. Commercial (Existing Development) of Order No. 2001-01.

Discussion: Copermittees must reduce the discharge of pollutants in storm water from commercial sites and activities to the maximum extent practicable. To achieve this level of pollutant reduction, BMPs must be implemented (see Finding 11). Designation of a set of minimum BMPs for high threat commercial sites will help ensure that appropriate BMPs are implemented at the sites. These minimum BMPs will also serve as guidance as to the level of water quality protection required. While minimum BMPs will be required at all high threat commercial sites, implementation of particular minimum BMPs will be site and source specific in order to address different conditions at various sites. BMPs to be implemented must comply with Order No. 2001-01. As such, additional site specific BMPs may be necessary to comply with other aspects of Order 2001-01. The SDRWQCB has discretion to require Jurisdictional Urban Runoff Program items F.3.c.(3)(a) and F.3.c.(3)(b) in Order No. 2001-01 under the broad legal authority cited above.

F.3.c.(3)(c) BMP Implementation (Commercial) of the Jurisdictional Urban Runoff Management Program states the following:

Each Copermittee shall implement, or require implementation of, additional controls for commercial sites tributary to CWA section 303(d) impaired water bodies, coastal lagoons, or other environmentally sensitive areas as necessary to comply with this Order.

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B,C,E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A) generally applies to all directives under Jurisdictional Urban Runoff Management Program item F.3.c. Commercial (Existing Development) of Order No. 2001-01.

Federal NPDES regulation 40 CFR 122.44(d)(1)(i) requires NPDES permits to include limitations to "control all pollutants or pollutant parameters (either conventional, nonconventional, or toxic pollutants) which the Director determines are or may be discharged at a level which will cause, have reasonable potential to cause, or contribute to an excursion above any State water quality standard, including State narrative criteria for water quality."

Discussion: CWA section 303(d) water bodies are water bodies which are not achieving the water quality objectives necessary to protect their beneficial uses. As discussed in Finding 3, urban runoff discharges from MS4s are a leading cause of receiving water quality impairment in the San Diego Region and throughout the United States. Since discharges which cause or contribute to an exceedance of water quality standards must be controlled and are also prohibited (see section C.1. of Order No. 2001-01), discharges to CWA section 303(d) water bodies of pollutants for which the waterbody is impaired must be controlled and prohibited. Therefore, commercial sites and activities tributary to these water bodies must implement additional controls to ensure that they are not discharging the pollutants which are causing or contributing to the impairment of these water bodies.

Regarding coastal lagoons and other sensitive water bodies, additional controls are needed to protect these valuable and unique resources. In their Nonpoint Source Program Strategy and Implementation Plan, the SWRCB and California Coastal Commission support additional controls for critical coastal areas, stating "the State will seek to attain and maintain applicable water quality standards, and protect waters threatened by land uses, or by substantial expansion of existing land uses, by implementing additional management measures."

The SDRWQCB has the discretion to require Jurisdictional Urban Runoff Program item F.3.c.(3)(c) in Order No. 2001-01 under the broad and specific legal authority cited above.

F.3.c.(4) Inspection of Commercial Sites and Sources (Commercial) and F.3.c.(5) Enforcement of Commercial Sites and Sources (Commercial) of the Jurisdictional Urban Runoff Management Program state the following:

Each Copermittee shall inspect high priority commercial sites and sources as needed. Based upon site inspection findings, each Copermittee shall implement all follow-up actions necessary to comply with this Order.

Each Copermittee shall enforce its storm water ordinance for all commercial sites and sources as necessary to maintain compliance with this Order.

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B,C,E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A) generally applies to all directives under Jurisdictional Urban Runoff Management Program item F.3.c. Commercial (Existing Development) of Order No. 2001-01.

Discussion: BMPs must be implemented for commercial sites and activities to reduce the discharge of pollutants from the sites and activities to the maximum extent practicable. Inspection of commercial sites is necessary to ensure that implemented BMPs are adequate. As discussed in Finding 24, inspections provide a necessary means by which Copermittees can evaluate compliance with their ordinances and requirements of Order No. 2001-01. Inspections are especially important for high risk commercial sites and activities, such as commercial sites and activities where urban runoff is not properly managed. If inspections identify noncompliance conditions, enforcement of storm water ordinance is also necessary to ensure adequate BMP implementation. Regarding inspection and enforcement measures, the US EPA states "Effective inspection and enforcement requires […] penalties to deter infractions and intervention by the municipal authority to correct violations. Enforcement mechanisms […] also must be described" (1992). The SDRWQCB has discretion to require Jurisdictional Urban Runoff Program items F.3.c.(4) and F.3.c.(5) in Order No. 2001-01 under the broad legal authority cited above.

F.3.d. RESIDENTIAL (EXISTING DEVELOPMENT)

In addition to the underlying broad legal authority citations listed above in section VII. of this Fact Sheet/Technical Report, the following specific legal authority item also generally applies to all directives under Jurisdictional Urban Runoff Management Program item F.3.d. Residential (Existing Development) of Order No. 2001-01. Other specific legal authority items applicable only to distinct directives of Jurisdictional Urban Runoff Management Program item F.3.d. are provided as necessary.

> Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A) provides that the Copermittee develop a proposed management program which includes "A description of structural and source control measures to reduce pollutants from runoff from commercial and residential areas that are discharged from the municipal storm sewer system that are to be implemented during the life of the permit, accompanied with an estimate of the expected reduction of pollutant loads and a proposed schedule for implementing such controls."

F.3.d. Residential (Existing Development) of the Jurisdictional Urban Runoff Management Program states the following:

> *Each Copermittee shall implement a Residential (Existing Development) Component to prevent or reduce pollutants in runoff from all residential land use areas and activities. At a minimum the residential component shall address:*
>
> *F.3.d.(1) Pollution Prevention*
> *F.3.d.(2) Threat to Water Quality Prioritization*
> *F.3.d.(3) BMP Implementation*
> *F.3.d.(4) Enforcement of Residential Areas and Activities*

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B,C,E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A) generally applies to all directives under Jurisdictional Urban Runoff Management Program item F.3.d. Residential (Existing Development) of Order No. 2001-01.

Discussion: CWA sections 402(p)(3)(B)(ii-iii) require each Copermittee to prohibit non-storm water discharges into its MS4 and to reduce the discharge of pollutants to the maximum extent practicable for all urban land uses. The purpose of these two broad requirements is to minimize the short and long-term impacts of urban runoff on receiving water quality. Land used for residential activities is clearly identified in the federal regulations as one of several high priority land uses from which pollutants in urban runoff discharges must be reduced to the maximum extent practicable by each Copermittee. Federal NPDES regulation 40 CFR 122.26(d)(2)(iv) requires the development of a proposed management program to reduce the discharge of pollutants in storm water to the maximum extent practicable. Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A) requires that this program include a component which addresses residential areas and activities.

Residential areas and activities have the potential to be significant sources of pollutants in urban runoff. To reduce the discharge of pollutants in urban runoff

from residential areas and activities to the maximum extent practicable, BMPs must be implemented. As discussed in Finding 12, BMPs effectively reduce pollutants in urban runoff by emphasizing pollution prevention and source controls, followed by treatment controls. The residential existing development component will provide a program for the development and implementation of BMPs to address pollutants in storm water discharges from residential areas and activities.

The SDRWQCB has discretion to require Jurisdictional Urban Runoff Program item F.3.c. in Order No. 2001-01 under the broad legal authority cited above.

F.3.d.(1) Pollution Prevention (Residential) for the Jurisdictional Urban Runoff Management Program states the following:

Each Copermittee shall include pollution prevention methods in its Residential (Existing Development) Component and shall encourage their use by all residents.

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B,C,E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A) generally applies to all directives under Jurisdictional Urban Runoff Management Program item F.3.d. Residential (Existing Development) of Order No. 2001-01.

Discussion: Each Copermittee must develop a program to reduce the discharge of pollutants to and from its MS4 to the maximum extent practicable. In order to achieve this level of pollution reduction, BMPs must be implemented. As discussed in Finding 12, pollution prevention (the reduction or elimination of pollutant generation at its source) is an essential aspect of BMP programs. By limiting the generation of pollutants, less pollutants are available to be washed from residential areas and activities, resulting in reduced pollutant loads in storm water discharges from these areas and activities. In addition, there is no need to control or treat pollutants which are not initially generated. Furthermore, pollution prevention BMPs are generally more cost effective than removal of pollutants by treatment facilities or cleanup of contaminated media. In the Pollution Prevention Act of 1990, Congress established a national policy that emphasizes pollution prevention over control and treatment. Since pollution prevention is an effective and efficient means for reducing pollutant loads in storm water runoff, pollution prevention methods are an important aspect of BMPs to be included in the residential existing development component of the Jurisdictional URMP. The SDRWQCB has discretion to require Jurisdictional Urban Runoff Program item F.3.d.(1) in Order No. 2001-01 under the broad legal authority cited above.

F.3.d.(2) Threat to Water Quality Prioritization (Residential) for the Jurisdictional Urban Runoff Management Program states the following:

Each Copermittee shall identify high priority residential areas and activities. At a minimum, these shall include:

- *Automobile repair and maintenance;*
- *Automobile washing;*
- *Automobile parking;*

- *Home and garden care activities and product use (pesticides, herbicides, and fertilizers);*
- *Disposal of household hazardous waste (e.g., paints, cleaning products);*
- *Disposal of pet waste;*
- *Disposal of green waste;*
- *Any other residential source that the Copermittee determines may contribute a significant pollutant load to the MS4; and*
- *Any residence tributary to a Clean Water Act section 303(d) impaired water body or other environmentally sensitive area (as defined in F.1.b.(2)(a)vii of this Order).*

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B,C,E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A) generally applies to all directives under Jurisdictional Urban Runoff Management Program item F.3.d. Residential (Existing Development) of Order No. 2001-01.

Discussion: The above residential areas and activities are identified as high priority threats to water quality due to their wide distribution, their association with pollutants of concern in urban runoff, and their historical mismanagement of associated urban runoff. Identification of high priority residential areas and activities will help focus BMP implementation efforts on these areas and activities. By focusing efforts on high priority areas and activities, the greatest potential for water quality improvements will result. Therefore, limited Copermittee staff time will be focused where it can be most effective. The SDRWQCB has discretion to require Jurisdictional Urban Runoff Program item F.3.d.(2) in Order No. 2001-01 under the broad legal authority cited above.

F.3.d.(3)(a) and F.3.d.(3)(b) BMP Implementation (Residential) for the Jurisdictional Urban Runoff Management Program state the following:

(a) Each Copermittee shall designate a set of minimum BMPs for high threat to water quality residential areas and activities (as required under section F.3.d.(2)). The designated minimum BMPs for high threat to water quality municipal areas and activities shall be area or activity specific.

(b) Each Copermittee shall require implementation of the designated minimum BMPs for high threat to water quality residential areas and activities. If particular minimum BMPs are infeasible for any specific site/source, each Copermittee shall require implementation of other equivalent BMPs. Each Copermittee shall also implement, or require implementation of, any additional BMPs as are necessary to comply with this Order.

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B,C,E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A) generally applies to all directives under Jurisdictional Urban Runoff Management Program item F.3.d. Residential (Existing Development) of Order No. 2001-01.

Discussion: Copermittees must reduce the discharge of pollutants in storm water from residential areas and activities to the maximum extent practicable. To achieve this level of pollutant reduction, BMPs must be implemented (see Finding 11). Designation of a set of minimum BMPs for high threat residential

areas and activities will help ensure that appropriate BMPs are implemented. These minimum BMPs will also serve as guidance as to the level of water quality protection required. While minimum BMPs will be required for all high threat residential areas and activities, implementation of particular minimum BMPs will be site and source specific in order to address different conditions for various areas and activities. BMPs to be implemented must comply with Order No. 2001-01. As such, additional site specific BMPs may be necessary to comply with other aspects of Order 2001-01. The SDRWQCB has discretion to require Jurisdictional Urban Runoff Program items F.3.d.(3)(a) and F.3.d.(3)(b) in Order No. 2001-01 under the broad legal authority cited above.

F.3.d.(3)(c) BMP Implementation (Residential) for the Jurisdictional Urban Runoff Management Program states the following:

Each Copermittee shall implement, or require implementation of, any additional controls for residential areas and activities tributary to CWA Section 303(d) impaired water bodies, coastal lagoons, or other environmentally sensitive areas as necessary to comply with this Order.

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B,C,E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A) generally applies to all directives under Jurisdictional Urban Runoff Management Program item F.3.d. Residential (Existing Development) of Order No. 2001-01.

Federal NPDES regulation 40 CFR 122.44(d)(1)(i) requires NPDES permits to include limitations to "control all pollutants or pollutant parameters (either conventional, nonconventional, or toxic pollutants) which the Director determines are or may be discharged at a level which will cause, have reasonable potential to cause, or contribute to an excursion above any State water quality standard, including State narrative criteria for water quality."

Discussion: CWA section 303(d) water bodies are water bodies which are not achieving the water quality objectives necessary to protect their beneficial uses. As discussed in Finding 3, urban runoff discharges from MS4s are a leading cause of receiving water quality impairment in the San Diego Region and throughout the United States. Since discharges which cause or contribute to an exceedance of water quality standards must be controlled and are also prohibited (see section C.1. of Order No. 2001-01), discharges to CWA section 303(d) water bodies of pollutants for which the waterbody is impaired must be controlled and prohibited. Therefore, residential areas and activities tributary to these water bodies must implement additional controls to ensure that they are not discharging the pollutants which are causing or contributing to the impairment of these water bodies.

Regarding coastal lagoons and other sensitive water bodies, additional controls are needed to protect these valuable and unique resources. In their Nonpoint Source Program Strategy and Implementation Plan, the SWRCB and California Coastal Commission support additional controls for critical coastal areas, stating "the State will seek to attain and maintain applicable water quality standards, and

protect waters threatened by land uses, or by substantial expansion of existing land uses, by implementing additional management measures."

The SDRWQCB has the discretion to require Jurisdictional Urban Runoff Program item F.3.d.(3)(c) in Order No. 2001-01 under the broad and specific legal authority cited above.

F.3.d.(4) Enforcement of Residential Areas and Activities (Residential) for the Jurisdictional Urban Runoff Management Program states the following:

Each Copermittee shall enforce its storm water ordinance for all residential areas and activities as necessary to maintain compliance with this Order.

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B,C,E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A) generally applies to all directives under Jurisdictional Urban Runoff Management Program item F.3.d. Residential (Existing Development) of Order No. 2001-01.

Discussion: As discussed in Finding 24, enforcement of storm water ordinances, permits, and plans is an essential aspect of a Jurisdictional URMP. Enforcement measures increase the probability that non-compliance situations will not occur or will be corrected. Regarding enforcement measures, the US EPA states "Effective inspection and enforcement requires […] penalties to deter infractions and intervention by the municipal authority to correct violations. Enforcement mechanisms […] also must be described" (1992). The SDRWQCB has discretion to require Jurisdictional Urban Runoff Program item F.3.d.(4) in Order No. 2001-01 under the broad legal authority cited above.

F.4. EDUCATION COMPONENT

F.4. Education Component of the Jurisdictional Urban Runoff Management Program states the following:

Each Copermittee shall implement an Education Component using all media as appropriate to (1) measurably increase the knowledge of the target communities regarding MS4s, impacts of urban runoff on receiving waters, and potential BMP solutions for the target audience; and (2) to measurably change the behavior of target communities and thereby reduce pollutant releases to MS4s and the environment. At a minimum the education component shall address the following target communities:

- *Municipal Departments and Personnel*
- *Construction Site Owners and Developers*
- *Industrial Owners and Operators*
- *Commercial Owners and Operators*
- *Residential Community, General Public, and School Children*
- *Quasi-Governmental Agencies/Districts (i.e., educational institutions, water districts, sanitation districts, etc.)*

F.4.a. All Target Communities

At a minimum the Education Program for each target audience shall contain information on the following topics where applicable:

- *State and Federal water quality laws*
- *Requirements of local municipal permits and ordinances (e.g., storm water and grading ordinances and permits)*
- *Impacts of urban runoff on receiving waters*
- *Watershed concepts (i.e., stewardship, connection between inland activities and coastal problems, etc.)*
- *Distinction between MS4s and sanitary sewers*
- *Importance of good housekeeping (e.g., sweeping impervious surfaces instead of hosing)*
- *Pollution prevention and safe alternatives*
- *Household hazardous waste collection*
- *Recycling*
- *BMPs: Site specific, structural and source control*
- *BMP maintenance*
- *Non-storm water disposal alternatives (e.g., all wash waters)*
- *Pet and animal waste disposal*
- *Proper solid waste disposal (e.g., garbage, tires, appliances, furniture, vehicles)*
- *Equipment and vehicle maintenance and repair*
- *Public reporting mechanisms*
- *Green waste disposal*
- *Integrated pest management*
- *Native vegetation*
- *Proper disposal of boat and recreational vehicle waste*
- *Traffic reduction, alternative fuel use*
- *Water conservation*

F.4.b. Municipal, Construction, Industrial, Commercial, and Quasi-Governmental (educational institutions, water districts, sanitation districts) Communities

In addition to the topics listed in F.4.a. above, the Municipal, Construction, Industrial, Commercial, and Quasi-Governmental (Educational Institutions, Water Districts, Sanitation Districts) Communities shall also be educated on the following topics where applicable:

- *Basic urban runoff training for all personnel*
- *Additional urban runoff training for appropriate personnel*
- *Illicit Discharge Detection and Elimination observations and follow-up during daily work activities*
- *Lawful disposal of catchbasin and other MS4 cleanout wastes*
- *Water quality awareness for Emergency/First Responders*
- *California's Statewide General NPDES Permit for Storm Water Discharges Associated with Industrial Activities (Except Construction).*
- *California's Statewide General NPDES Permit for Storm Water Discharges Associated with Construction Activities*
- *SDRWQCB's General NPDES Permit for Groundwater Dewatering*
- *401 Water Quality Certification by the SDRWQCB*
- *Statewide General NPDES Utility Vault Permit (NPDES No. CAG990002)*
- *SDRWQCB Waste Discharge Requirements for Dredging Activities*
- *Local requirements beyond statewide general permits*
- *Federal, state and local water quality regulations that affect development projects*
- *Water quality impacts associated with land development*
- *Alternative materials & designs to maintain peak runoff values*
- *How to conduct a storm water inspection*
- *Potable water discharges to the MS4*
- *Dechlorination techniques*
- *Hydrostatic testing*
- *Spill response, containment, & recovery*
- *Preventive maintenance*
- *How to do your job and protect water quality*

F.4.c. Residential, General Public, School Children Communities

In addition to the topics listed in F.4.a. above, the Residential, General Public, and School Children Communities shall be educated on the following topics where applicable:

- *Public reporting information resources*
- *Residential and charity car-washing*
- *Community activities (e.g., "Adopt a Storm Drain, Watershed, or Highway" Programs, citizen monitoring, creek/beach cleanups, environmental protection organization activities, etc.)*

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B,C,E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A)(6) provides that the proposed management program include "A description of a program to reduce to the maximum extent practicable, pollutants in discharges from municipal separate storm sewers associated with the application of pesticides, herbicides, and fertilizer which will include, as appropriate, controls such as educational activities, permits, certifications, and other measures for commercial applicators and distributors, and controls for application in public right-of-ways and at municipal facilities."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B)(6) provides that the proposed management program include "A description of educational activities, public information activities, and other appropriate activities to facilitate the proper management and disposal of used oil and toxic materials."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(D)(4) provides that the proposed management program include "A description of appropriate educational and training measures for construction site operators."

Discussion: As discussed in Finding 23, implementation of an Education Component is a critical best management practice and an important aspect of the Jurisdictional URMP. The SWRCB Technical Advisory Committee "recognizes that education with an emphasis on pollution prevention is the fundamental basis for solving nonpoint source pollution problems." The US EPA finds that "An informed and knowledgeable community is critical to the success of a storm water management program since it helps ensure the following:

> Greater support for the program as the public gains a greater understanding of the reasons why it is necessary and important. […]
>
> Greater compliance with the program as the public becomes aware of the personal responsibilities expected of them and others in the community, including the individual actions they can take to protect or improve the quality of area waters" (2000).

Regarding target audiences, US EPA states "The public education program should use a mix of appropriate local strategies to address the viewpoints and concerns of a variety of audiences and communities, including minority and disadvantaged

communities, as well as children" (2000). The target communities included in Education item 7 are based on recommendations of the TAC, which states:

"Target Audiences should include:

1. Government: Educate government agencies and officials to achieve better communication, consistency, collaboration, and coordination at the federal, state and local levels.
2. K-12/Youth Groups: Establish statewide education programs, including curricula, on watershed awareness and nonpoint source pollution problems and solutions, based on a state lead role building upon and coordinating with existing local programs.
3. Development Community: Educate the development community, including developers, contractors, architects, and local government planners, engineers, and inspectors, on nonpoint source pollution problems associated with development and redevelopment and construction activities and involve them in problem definitions and solutions.
4. Business and Industrial Groups."

The required topics to be covered in the Education Component are based on topics of concern as discussed by the US EPA (1992) and the SWRCB Technical Advisory Committee. Additional education topics were also added based on the number of complaints received by the SDRWQCB and the Copermittees for various topics of concern.

US EPA identifies measurable goals for urban runoff education programs, including such goals as creation of a website, halting dumping of grease and other pollutants into the storm drain by a certain percentage of restaurants, and detecting a percent reduction in litter or animal waste in discharges (2000).

The SDRWQCB has the discretion to require item F.4 of the Jurisdictional URMP in Order No. 2001-01 under the broad and specific legal authority cited above.

F.5. ILLICIT DISCHARGE DETECTION AND ELIMINATION COMPONENT

In addition to the underlying broad legal authority citations listed above in section VII. of this Fact Sheet/Technical Report, the following specific legal authority items also generally apply to all directives under Jurisdictional Urban Runoff Management Program item F.5. Illicit Discharge and Detection Elimination Component of Order No. 2001-01. Other specific legal authority items applicable only to distinct directives of Jurisdictional Urban Runoff Management Program item F.5. are provided as necessary.

Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(B) provides that the proposed management program "shall be based on a description of a program, including a schedule, to detect and remove (or require the discharger to the municipal storm sewer to obtain a separate NPDES permit for) illicit discharges and improper disposal into the storm sewer."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B)(1) provides that the Copermittee include in its proposed management program "a program, including inspections, to implement and enforce an ordinance, orders or similar means to

prevent illicit discharges to the municipal storm sewer system." This regulation excludes prohibition of those non-storm water discharges listed in Section B.1 of Order 2001-01.

F.5. Illicit Discharge Detection and Elimination Component of the Jurisdictional Urban Runoff Management Program states the following:

Each Copermittee shall implement an Illicit Discharge Detection and Elimination Component containing measures to actively seek and eliminate illicit discharges and connections. At a minimum the Illicit Discharge Detection and Elimination Component shall address:

F.5.a	*Illicit Discharges and Connections*
F.5.b	*Dry Weather Analytical Monitoring*
F.5.c	*Investigation / Inspection and follow-up*
F.5.d	*Elimination of Illicit Discharges and Connections*
F.5.e	*Enforce Ordinance*
F.5.f	*Prevent and Respond To Sewage Spills (Including from Private Laterals) and Other Spills*
F.5.g	*Facilitate Public Reporting of Illicit Discharges and Connections – Public Hotline*
F.5.h	*Facilitate Disposal of Used Oil and Toxic Materials*
F.5.i	*Limit Infiltration From Sanitary Sewer to MS4*

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B,C,E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(B) and 40 CFR 122.26(d)(2)(iv)(B)(1) generally apply to all directives under Jurisdictional Urban Runoff Management Program item F.5. Illicit Discharge Detection and Elimination Component of Order No. 2001-01.

Discussion: Illicit discharges and connections can constitute a significant portion of urban runoff discharges from MS4s. US EPA states "A study conducted in 1987 in Sacramento, California, found that almost one-half of the water discharged from a local MS4 was not directly attributable to precipitation runoff. A significant portion of these dry weather flows were from illicit and/or inappropriate discharges and connections to the MS4" (2000).

MS4 discharges attributable to illicit discharges and connections can be a significant source of pollutant loading to receiving waters. The NURP study concluded that the quality of urban runoff can be adversely impacted by illicit discharges and connections (US EPA, 1983). Furthermore, US EPA states that illicit discharges and connections result in "untreated discharges that contribute high levels of pollutants, including heavy metals, toxics, oil and grease, solvents, nutrients, viruses, and bacteria to receiving waterbodies. Pollutant levels from these illicit discharges have been shown in EPA studies to be high enough to significantly degrade receiving water quality and threaten aquatic wildlife and human health" (2000).

For these reasons, CWA section 402(p)(3)(B)(ii) requires each Copermittee to prohibit non-storm water discharges into its MS4. The detection and elimination of illicit discharges and connections is also clearly identified in the federal regulations as a high priority (40 CFR 122.26(d)(2)(iv)(B) and 122.26(d)(2)(iv)(B)(1)). As

guidance for detecting and eliminating illicit discharges and connections, the US EPA suggests "The proposed management program must include a description of inspection procedures, orders, ordinances, and other legal authorities necessary to prevent illicit discharges to the MS4" (1992).

The SDRWQCB has the discretion to require Jurisdictional Urban Runoff Management Program item F.5 in Order 2001-01 under the broad legal authority cited above.

F.5.a. Illicit Discharges and Connections of the Jurisdictional Urban Runoff Management Program states the following:

Each Copermittee shall implement a program to actively seek and eliminate illicit discharges and connections into its MS4. The program shall address all types of illicit discharges and connections excluding those non-storm water discharges not prohibited by the Copermittee in accordance with Section B. of this Order.

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B,C,E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(B) and 40 CFR 122.26(d)(2)(iv)(B)(1) generally apply to all directives under Jurisdictional Urban Runoff Management Program item F.5. Illicit Discharge Detection and Elimination Component of Order No. 2001-01.

Discussion: See discussion for F.5 Illicit Discharge Detection and Elimination Component above.

F.5.b. Dry Weather Analytical Monitoring of the Jurisdictional Urban Runoff Management Program states the following:

Each Copermittee shall conduct dry weather analytical monitoring of MS4 outfalls within its jurisdiction to detect illicit discharges and connections in accordance with Attachment E of this Order.

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B,C,E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(B) and 40 CFR 122.26(d)(2)(iv)(B)(1) generally apply to all directives under Jurisdictional Urban Runoff Management Program item F.5. Illicit Discharge Detection and Elimination Component of Order No. 2001-01.

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B)(2) provides that the Copermittee include in its proposed management program "a description of procedures to conduct on-going field screening activities during the life of the permit, including areas or locations that will be evaluated by such field screens."

Discussion: Since illicit discharges and connections can be significant sources of pollutants in urban runoff, and can cause receiving water degradation, the

locations of all illicit discharges and connections need to be identified. An effective means for achieving this is analytical monitoring of dry weather urban runoff flows. By analytically monitoring dry weather urban runoff, results of the analytical monitoring can be used to identify locations potentially impacted by illicit discharges or connections. If results indicate that an illicit discharge or connection may be present, then follow-up procedures can be followed to pinpoint the source of the illicit discharge or connection. Once the illicit discharge or connection source is identified, steps may be taken to eliminate the discharge or connection. In this manner, dry weather analytical monitoring of urban runoff can lead to the elimination of illicit discharges and connections and the reduction of pollutants in urban runoff. The SDRWQCB has the discretion to require Jurisdictional Urban Runoff Management Program item F.5.b in Order No. 2001-01 under the broad and specific legal authority cited above.

F.5.c. Investigation/Inspection and Follow-up of the Jurisdictional Urban Runoff Management Program states the following:

Each Copermittee shall investigate and inspect any portion of the MS4 that, based on dry weather analytical monitoring results or other appropriate information, indicates a reasonable potential of illegal discharges, illicit connections, or other sources of non-storm water (including non-prohibited discharge(s) identified in Section B. of this Order). Each Copermittee shall establish criteria to identify portions of the system where such follow-up investigations are appropriate.

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B,C,E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(B) and 40 CFR 122.26(d)(2)(iv)(B)(1) generally apply to all directives under Jurisdictional Urban Runoff Management Program item F.5. Illicit Discharge Detection and Elimination Component of Order No. 2001-01.

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B)(3) provides that the Copermittee include in its proposed management program "procedures to be followed to investigate portions of the separate storm sewer system that, based on the results of the field screen, or other appropriate information, indicate a reasonable potential of containing illicit discharges or other sources of non-storm water."

Discussion: The quality of urban runoff can be adversely impacted by illicit discharges and connections (US EPA, 1983). Elimination of these sources of pollutants can therefore result in a dramatic improvement in the quality of urban runoff discharges from MS4s, which in turn can result in improved receiving water quality. If field screening results indicate the presence of illicit discharges to the MS4, that portion of the MS4 must be investigated to eliminate the illicit discharge and prevent further potential degradation of receiving waters. To determine when follow-up procedures should be undertaken, US EPA states "Applicants should propose criteria to identify portions of the system where follow-up investigations are appropriate" (1992).

Procedures to investigate priority locations for illicit connections include sampling for such constituents as fecal coliform, fecal streptococcus, surfactants (MBAS),

residual chlorine, flourides and potassium, inspection of the storm sewer system, use of remote-control cameras, on-site inspections and dye testing at priority or suspect facilities, and additional discharge monitoring to pinpoint pollutant sources.

The SDRWQCB has the discretion to require Jurisdictional Urban Runoff Management Program item F.5.c in Order No. 2001-01 under the broad and specific legal authority cited above.

F.5.d. Elimination of Illicit Discharges and Connections of the Jurisdictional Urban Runoff Management Program states the following:

Each Copermittee shall eliminate all detected illicit discharges, discharge sources, and connections immediately.

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B,C,E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(B) and 40 CFR 122.26(d)(2)(iv)(B)(1) generally apply to all directives under Jurisdictional Urban Runoff Management Program item F.5. Illicit Discharge Detection and Elimination Component of Order No. 2001-01.

Water Quality Control Plan for the San Diego Basin Waste Discharge Prohibition 8 states "Any discharge to a storm water conveyance system that is not entirely composed of 'storm water' is prohibited unless authorized by the Regional Board." California Water Code Section 13263(a) provides that waste discharge requirements prescribed by the SDRWQCB implement the Basin Plan.

Discussion: Under CWA section 402(p)(3)(B)(ii) and Water Quality Control Plan for the San Diego Basin Waste Discharge Prohibition 8 non-storm water discharges are prohibited. By definition, illicit discharges and connections are non-storm water discharges. Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B) also requires illicit discharges and connections to be detected and removed. Therefore, any detected illicit discharges or connections must be eliminated. US EPA supports elimination of detected illicit discharges and connections when it states "Once the source is identified, the offending discharger should be notified and directed to correct the problem. Education efforts and working with the discharger can be effective in resolving the problem before taking legal action." The SDRWQCB has discretion to require Jurisdictional Urban Runoff Management Program item F.5.d in Order No. 2001-01 under the broad and specific legal authority cited above.

F.5.e. Enforce Ordinances of the Jurisdictional Urban Runoff Management Program states the following:

Each Copermittee shall implement and enforce its ordinances, orders, or other legal authority to prevent illicit discharges and connections to its MS4. Each Copermittee shall also implement and enforce its ordinance, orders, or other legal authority to eliminate detected illicit discharges and connections to it MS4.

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B,C,E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(B) and 40 CFR 122.26(d)(2)(iv)(B)(1) generally apply to all directives under Jurisdictional Urban Runoff Management Program item F.5. Illicit Discharge Detection and Elimination Component of Order No. 2001-01.

Discussion: To prevent and eliminate illicit discharges and connections, the Copermittee must implement and enforce its ordinance, orders, or other legal authority over illicit discharges and connections. The US EPA states that this "proposed management program component should describe how the prohibition on illicit discharges will be implemented and enforced. The description could include a schedule and allocation of staff and resources. A direct linkage should exist between this program component and the adequate legal authority requirements for the ordinances and orders to effectively implement the prohibition of illicit discharges" (1992). The SDRWQCB has the discretion to require Jurisdictional Urban Runoff Management Program item F.5.e in Order 2001-01 under the broad legal authority cited above.

F.5.f. Prevent and Respond to Sewage and Other Spills of the Jurisdictional Urban Runoff Management Program states the following:

Each Copermittee shall prevent, respond to, contain and clean up all sewage and other spills that may discharge into its MS4 from any source (including private laterals). Spill response teams shall prevent entry of spills into the MS4 and contamination of surface water, ground water and soil to the maximum extent practicable. Each Copermittee shall coordinate spill prevention, containment and response activities throughout all appropriate departments, programs and agencies to ensure maximum water quality protection at all times.

Each Copermittee shall develop and implement a mechanism whereby it is notified of all sewage spills from private laterals into its MS4. Each Copermittee shall prevent, respond to, contain and clean up sewage from any such notification.

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B,C,E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(B) and 40 CFR 122.26(d)(2)(iv)(B)(1) generally apply to all directives under Jurisdictional Urban Runoff Management Program item F.5. Illicit Discharge Detection and Elimination Component of Order No. 2001-01.

Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(B)(4) provides that the Copermittee include in its proposed management program "a description of procedures to prevent, contain, and respond to spills that may discharge into the municipal separate storm sewer."

Discussion: Sewage and other spills frequently enter the MS4, to be carried and discharged to receiving waters. Such spills into and from the MS4 can severely impair receiving water quality and pose a significant threat to public health. To avoid these negative impacts, the proposed management program must describe

procedures that the Copermittee will implement to prevent, contain, and respond to spills that may discharge into the MS4. The US EPA states "The goal of a spill prevention program is to reduce the frequency and extent of spills of hazardous materials which can cause water quality impairment. Spill containment programs may establish minimum chemical storage and handling requirements, require users to submit prevention and control plans, and ensure site inspections. […] Spill response teams should attempt to prevent or minimize contamination of surface water, groundwater, and soil. Spill response programs often require a coordinated response from a number of municipal departments. Municipalities should describe how response procedures within these programs attempt to mitigate potential pollutant discharges to surface waters and the MS4" (1992). The SDRWQCB has discretion to require Jurisdictional Urban Runoff Management Program item F.5.f in Order No. 2001-01 under the broad and specific legal authority cited above.

F.5.g. Facilitate Public Reporting of Illicit Discharges and Connections – Public Hotline of the Jurisdictional Urban Runoff Management Program states the following:

Each Copermittee shall promote, publicize and facilitate public reporting of illicit discharges or water quality impacts associated with discharges into or from MS4s. Each Copermittee shall facilitate public reporting through development and operation of a public hotline. Public hotlines can be Copermittee-specific or shared by Copermittees. All storm water hotlines shall be capable of receiving reports in both English and Spanish 24 hours per day/ seven days per week. Copermittees shall respond to and resolve each reported incident. All reported incidents, and how each was resolved, shall be summarized in each Copermittee's individual Jurisdictional URMP Annual Report.

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B,C,E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(B) and 40 CFR 122.26(d)(2)(iv)(B)(1) generally apply to all directives under Jurisdictional Urban Runoff Management Program item F.5. Illicit Discharge Detection and Elimination Component of Order No. 2001-01.

Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(B)(4) provides that the Copermittee include in its proposed management program "a description of a program to promote, publicize, and facilitate public reporting of the presence of illicit discharges or water quality impacts associated with discharges from municipal separate storm sewers."

Discussion: Regarding public reporting of illicit discharges or water quality impacts associated with discharges from MS4s, the US EPA states "Timely reporting by the public of improper disposal and illicit discharges are critical components of programs to control such sources. To enhance public awareness, programs may include setting up a public information hotline number, educating school students, community and volunteer watchdog groups, using inserts into utility bills, and newspaper, radio, and television announcements to inform the public about what to look for and how to report incidents" (1992). The SDRWQCB has discretion to require Jurisdictional Urban Runoff Management Program item F.5.g in Order No. 2001-01 under the broad and specific legal authority cited above.

F.5.h. Facilitate Disposal of Used Oil and Toxic Materials of the Jurisdictional Urban Runoff Management Program states the following:

> *Each Copermittee shall facilitate the proper management and disposal of used oil, toxic materials, and other household hazardous wastes. Such facilitation shall include educational activities, public information activities, and establishment of collection sites operated by the Copermittee or a private entity. Curbside collection of household hazardous wastes is encouraged.*

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B,C,E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(B) and 40 CFR 122.26(d)(2)(iv)(B)(1) generally apply to all directives under Jurisdictional Urban Runoff Management Program item F.5. Illicit Discharge Detection and Elimination Component of Order No. 2001-01.

Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(B)(6) provides that the Copermittee include in its proposed management program "a description of educational activities, public information activities, and other appropriate activities to facilitate the proper management and disposal of used oil and toxic materials."

Discussion: The US EPA states "If private individuals find the proper disposal of used oil or toxic materials difficult, incidents of improper disposal (such as into the MS4) increase" (1992). Therefore Copermittees are required to propose a program component that will facilitate the proper disposal of used oil and toxics from households by establishing municipally operated collection sites, or ensuring that privately operated collections sites are available. The US EPA suggests this program component "should describe outreach plans to handlers of used oil and to the public, and operating plans for oil and household waste collection programs" (1992). The SDRWQCB has discretion to require Jurisdictional Urban Runoff Management Program item F.5.h in Order No. 2001-01 under the broad and specific legal authority cited above.

F.5.i. Limit Infiltration from Sanitary Sewer to MS4 of the Jurisdictional Urban Runoff Management Program states the following:

> *Each Copermittee shall implement controls and measures to limit infiltration of seepage from municipal sanitary sewers to MS4s. Such controls shall include overall sanitary sewer and MS4 system surveys and thorough, routine preventive maintenance of both.*

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B,C,E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(B) and 40 CFR 122.26(d)(2)(iv)(B)(1) generally apply to all directives under Jurisdictional Urban Runoff Management Program item F.5. Illicit Discharge Detection and Elimination Component of Order No. 2001-01.

Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(B)(4) provides that the Copermittee include in its proposed management program "a description of

controls to limit infiltration of seepage from municipal sanitary sewers to municipal separate storm sewer systems where necessary."

Discussion: Regarding seepage from sanitary sewers, the US EPA states "Raw sewage can seep from sanitary sewage collection systems through leaks and cracks in aging pipes, poorly constructed manholes and joints, and main breaks. Sewage from a leaky sanitary system can flow to storm sewers or contaminate ground water supplies. Interaction between sanitary sewers and separate storm sewers may occur at manholes and where sanitary sewer laterals and storm sewer trenches cross. Separate storm sewers and sanitary sewers may share the same trench, which is generally filled with very porous material such as gravel" (1992). When raw sewage enters the storm water system, it can reach receiving waters untreated, posing a threat to water quality and public health. In order to prevent this condition, the SDRWQCB has discretion to require Jurisdictional Urban Runoff Management Program item F.5.i in Order No. 2001-01 under the broad and specific legal authority cited above.

F.6. PUBLIC PARTICIPATION COMPONENT

F.6. Public Participation Component of the Jurisdictional Urban Runoff Management Program states the following:

Each Copermittee shall incorporate a mechanism for public participation in the implementation of the Jurisdictional URMP.

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B,C,E, and F) and 40 CFR 122.26(d)(2)(iv).

Discussion: Public participation can be an important tool for strengthening an urban runoff management program. US EPA strongly supports public participation when it states "An active and involved community is crucial to the success of a storm water management program because it allows for:

> Broader public support since citizens who participate in the development and decision making process are partially responsible for the program and, therefore, may be less likely to raise legal challenges to the program and more likely to take an active role in its implementation;
>
> Shorter implementation schedules due to fewer obstacles in the form of public and legal challenges and increased sources in the form of citizen volunteers;
>
> A broader base of expertise and economic benefits since the community can be a valuable, and free, intellectual resource; and
>
> A conduit to other programs as citizens involved in the storm water program development process provide important cross-connections and relationships with other community and government programs. This benefit is particularly valuable when trying to implement a storm water program on a watershed basis, as encouraged by EPA" (2000).

The SDRWQCB has discretion to require Jurisdictional Urban Runoff Management Program item F.6 in Order No. 2001-01 under the broad legal authority cited above.

F.7. ASSESSMENT OF JURISDICTIONAL URMP EFFECTIVENESS COMPONENT

F.7. Assessment of Jurisdictional URMP Effectiveness Component of the Jurisdictional Urban Runoff Management Program states the following:

a. *As part of its individual Jurisdictional URMP, each Copermittee shall develop a long-term strategy for assessing the effectiveness of its individual Jurisdictional URMP. The long-term assessment strategy shall identify specific direct and indirect measurements that each Copermittee will use to track the long-term progress of its individual Jurisdictional URMP towards achieving improvements in receiving water quality. Methods used for assessing effectiveness shall include for example surveys, pollutant loading estimations, and receiving water quality monitoring. The long-term strategy shall also discuss the role of monitoring data in substantiating or refining the assessment.*

b. *As part of its individual Jurisdictional URMP Annual Report, each Copermittee shall include an assessment of the effectiveness of its Jurisdictional URMP using the direct and indirect assessment measurements and methods developed in its long-term assessment strategy.*

c. *Individual Jurisdictional URMP Annual Reports shall also include each Copermittees' self-assessment of its "status of compliance" with this Order. Specifically, each Annual Report shall specify its self-assessment of its "percent compliance with each component of its Jurisdictional URMP" (sections F.1.-F.8.), as well as the Copermittees' self-assessment of its "overall percent compliance" with this Order in its entirety.*

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B,C,E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.26(d)(2)(v) provides that the Copermittees must include "Estimated reductions in loadings of pollutants from discharges of municipal storm sewer constituents from municipal storm sewer systems expected as the result of the municipal storm water quality management program. The assessment shall also identify known impacts of storm water controls on ground water." Under Federal NPDES regulation 40 CFR 122.42(c) applicants must provide annual reports on the progress of their storm water management programs.

Discussion: Regarding the assessment of the effectiveness of URMPs, the US EPA states that "At a minimum, applicants must submit estimated reductions in pollutant loads expected to result from implemented controls and describe known impacts of storm water controls on groundwater" (1992). The US EPA suggests that the assessments include direct and indirect measurements of effectiveness, stating that "Reductions in pollutant loads due to the implementation and maintenance of structural controls provide direct measurements of the effectiveness of the storm water management program. In addition, EPA encourages applicants to go beyond the minimum requirement and assess the effectiveness of their storm water management program through other direct measurements as well as indirect measurements" (1992). The US EPA also recommends that monitoring data be used to substantiate or refine the

assessment, suggesting that "the estimated removal efficiencies can be refined through the monitoring program. […] Throughout the permit term, the municipality must submit refinements to its assessment or additional direct measurements of program effectiveness in its annual report" (1992). Finally, the US EPA suggests that the assessment be used for long-term assessment of progress when it states "The applicant should use direct measurements of program effectiveness as it begins to assess its long-term progress in improving water quality through storm water management practices. […] [A]pplicants are encouraged to use direct measurements of program effectiveness, such as annual pollutant loads, event mean concentrations, and seasonal pollutant loadings, to begin to estimate long-term trends" (1992). The SDRWQCB has discretion to require Jurisdiction Urban Runoff Management Program item F.7 in Order No. 2001-01 under the broad and specific legal authority cited above.

F.8. FISCAL ANALYSIS COMPONENT

F.8. Fiscal Analysis Component of the Jurisdictional Urban Runoff Management Program states the following:

> *Each Copermittee shall secure the resources necessary to meet the requirements of this Order. As part of its individual Jurisdictional URMP, each Copermittee shall develop a strategy to conduct a fiscal analysis of its urban runoff management program in its entirety. In order to demonstrate sufficient financial resources to implement the conditions of this Order, each Copermittee shall conduct an annual fiscal analysis as part of its individual Jurisdictional URMP Annual Report. This analysis shall, for each fiscal year covered by this Order, evaluate the expenditures (such as capital, operation and maintenance, education, and administrative expenditures) necessary to accomplish the activities of the Copermittee's urban runoff management program. Such analysis shall include a description of the source(s) of funds that are proposed to meet the necessary expenditures, including legal restrictions on the use of such funds.*

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B,C,E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.26(d)(2)(vi) provides that "[The Copermittee must submit] for each fiscal year to be covered by the permit, a fiscal analysis of the necessary capital and operation and maintenance expenditures necessary to accomplish the activities of the programs under paragraphs (d)(2)(iii) and (iv) of this section. Such analysis shall include a description of the source of funds that are proposed to meet the necessary expenditures, including legal restrictions on the use of such funds."

Discussion: A fiscal analysis can be an important planning tool. The US EPA finds that "examining the levels of proposed spending and funding allows the permitting authority to gauge the ability of the applicant to implement the program and predict its effectiveness. The fiscal analysis also will help the [SDRWQCB] determine whether the applicant has met the statutory requirement of reducing the discharge of pollutants to the MS4 to the maximum extent practicable. Finally, the estimates help the applicant evaluate the feasibility and cost-effectiveness of its program" (1992). The SDRWQCB has discretion to require Jurisdictional Urban Runoff Management item F.8 in Order No. 2001-01 under the broad and specific legal authority cited above.

G. IMPLEMENTATION OF JURISDICTIONAL URMP

G. Implementation of Jurisdictional URMP states the following:

*Each Copermittee shall have completed full implementation of all requirements of the Jurisdictional URMP section of this Order no later than **180 days after adoption** of this Order, with the exception of the requirements included in the Land-Use Planning for New Development and Redevelopment Component of the Jurisdictional URMP section of this Order. Each Copermittee shall have completed full implementation of all requirements of the Land-Use Planning for New Development and Redevelopment Component of the Jurisdictional URMP section of this Order no later **than 365 days after adoption** of this Order.*

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B,C,E, and F) and 40 CFR 122.26(d)(2)(iv).

Discussion: The requirements of the NPDES regulations for urban runoff have been in place for many years. Falling under these regulations, the Copermittees should currently be implementing adequate urban runoff programs to be in compliance with the regulations. The requirements in Order No. 2001-01 are based on the NPDES regulations; therefore, the vast majority of the requirements in Order No. 2001-01 should already be implemented by the Copermittees. For this reason, implementation schedules of 180 days and 365 days should be more than adequate to meet the requirements of Order No. 2001-01. The SDRWQCB has discretion to require Implementation of Jurisdictional URMP item G. in Order No. 2001-01 under the broad legal authority cited above.

H. SUBMITTAL OF JURISDICTIONAL URMP DOCUMENT

H. Submittal of Jurisdictional URMP Document states the following:

The written account of the overall program to be conducted by each Copermittee within its jurisdiction during the five-year life of this Order is referred to as the "Jurisdictional URMP Document".

1. *Individual – Each Copermittee shall submit to the Principal Permittee an individual Jurisdictional URMP document which describes all activities it is undertaking to implement the requirements of each component of the Jurisdictional URMP section F. of this Order. Individual Jurisdictional URMP documents shall be submitted in two parts.*

    a. *The first submittal of the individual Jurisdictional URMP document shall address the requirements of the entire Jurisdictional URMP section of this Order, with the exception of the Land-Use Planning for New Development and Redevelopment Component (i.e., sections F.2. – F.8.) At a minimum, the first submittal of the individual Jurisdictional URMP document shall contain the following information for the following components:*

        (1) *Construction Component*

            (a) *Which pollution prevention methods will be required for implementation and how they will be required*
            (b) *Updated grading ordinances*
            (c) *A description of the modified construction and grading approval process*
            (d) *Updated conditions of approval in local grading and construction permits*
            (e) *A completed watershed based inventory of all construction sites*
            (f) *A completed prioritization of all construction sites based on threat to water quality*
            (g) *Which BMPs will be implemented, or required to be implemented, for each priority category*

(h) How BMPs will be implemented, or required to be implemented, for each priority category
(i) Planned inspection frequencies for each priority category
(j) Methods for inspection
(k) A description of enforcement mechanisms and how they will be used
(l) A description of how non-compliant sites will be identified and the process for notifying the SDRWQCB, including a list of current non-compliant sites
(m) A description of the construction education program and how it will be implemented

(2) Municipal (Existing Development) Component

(a) Which pollution prevention methods will be required for implementation and how they will be required
(b) A completed watershed based inventory of all municipal land use areas and activities
(c) A completed prioritization of all municipal areas and activities based on threat to water quality
(d) Which BMPs will be implemented, or required to be implemented, for each priority category
(e) How BMPs will be implemented, or required to be implemented, for each priority category
(f) Municipal maintenance activities and schedules
(g) Planned inspection frequencies for the high priority category
(h) Methods for inspection
(i) A description of enforcement mechanisms and how they will be used

(3) Industrial (Existing Development) Component

(a) Which pollution prevention methods will be required for implementation and how they will be required
(b) A completed watershed based inventory of all industrial sites
(c) A completed prioritization of all industrial sites based on threat to water quality
(d) Which BMPs will be implemented, or required to be implemented, for each priority category
(e) How BMPs will be implemented, or required to be implemented, for each priority category
(f) A description of the monitoring program to be conducted, or required to be conducted
(g) Planned inspection frequencies for each priority category
(h) Methods for inspection
(i) A description of enforcement mechanisms and how they will be used
(j) A description of how non-compliant sites will be identified and the process for notifying the SDRWQCB, including a list of current non-compliant sites

(4) Commercial (Existing Development) Component

(a) Which pollution prevention methods will be required for implementation and how they will be required
(b) A completed watershed based inventory of high priority commercial sites
(c) Which BMPs will be implemented, or required to be implemented, for high priority sites
(d) How BMPs will be implemented, or required to be implemented, for high priority sites
(e) Planned inspection frequencies for high priority sites
(f) Methods for inspection
(g) A description of enforcement mechanisms and how they will be used

(5) Residential (Existing Development) Component

(a) Which pollution prevention methods will be encouraged for implementation and how they will be encouraged
(b) A completed inventory of high priority residential areas and activities

(c) Which BMPs will be implemented, or required to be implemented, for high priority areas and activities
(d) How BMPs will be implemented, or required to be implemented, for high priority areas and activities
(e) A description of enforcement mechanisms and how they will be used

(6) Education Component

(a) A description of the content, form, and frequency of education efforts for each target community

(7) Illicit Discharges Detection and Elimination Component

(a) A description of the program to actively seek and eliminate illicit discharges and connections
(b) A description of dry weather analytical monitoring to be conducted to detect illicit discharges and connections (see Attachment E)
(c) A description of investigation and inspection procedures to follow-up on dry weather analytical monitoring results or other information which indicate potential for illicit discharges and connections
(d) A description of procedures to eliminate detected illicit discharges and connections
(e) A description of enforcement mechanisms and how will they be used
(f) A description of methods to prevent, respond to, contain, and clean up all sewage (including spills from private laterals) and other spills in order to prevent entrance into the MS4
(g) A description of the mechanism to receive notification of spills from private laterals
(h) A description of efforts to facilitate public reporting of illicit discharges and connections, including a public hotline
(i) A description of efforts to facilitate proper disposal of used oil and other toxic materials
(j) A description of controls and measures to be implemented to limit infiltration of seepage from sanitary sewers to MS4s
(k) A description of routine preventive maintenance activities on the sanitary system and MS4

(8) Public Participation Component

(a) A description of how public participation will be included in the implementation of the Jurisdictional URMP

(9) Assessment of Jurisdictional URMP Effectiveness Component

(a) A description of strategies to be used for assessing the long-term effectiveness of the individual Jurisdictional URMP.

(10) Fiscal Analysis Component

(a) A description of the strategy to be used to conduct a fiscal analysis of the urban runoff management program.

b. The second submittal of the individual Jurisdictional URMP document shall address the requirements of the Land-Use Planning for New Development and Redevelopment Component of the Jurisdictional URMP section F.1. of this Order. At a minimum, the second submittal of the individual Jurisdictional URMP document shall contain the following information for the following components:

(1) General Plan or equivalent plan revisions, specifying water protection policies
(2) Conditions of project approval in local development permits
(3) Participation efforts conducted in the development of the Model SUSMP
(4) Environmental review processes and CEQA initial study checklist revisions

(5) A description of the planning education program and how it will be implemented

c. Each Copermittee shall submit to the Principal Permittee each part of its individual Jurisdictional URMP document by the dates specified by the Principal Permittee.

d. In addition to submittal of the two parts of the Jurisdictional URMP document, each Copermittee shall submit to the SDRWQCB its own adopted local SUSMP consistent with the approved Model SUSMP, as described in section F.1.b.(2). of this Order. Each Copermittee's own local SUSMP, along with its amended ordinances, shall be submitted to the SDRWQCB within 180 days of the SDRWQCB's approval of the Model SUSMP.

2. Unified – The Principal Permittee shall submit the unified Jurisdictional URMP document to the SDRWQCB. The unified Jurisdictional URMP document shall be submitted in two parts.

*a. The first unified Jurisdictional URMP document submittal shall address the requirements of the entire Jurisdictional URMP sections F.2 – F.8. of this Order, with the exception of the Land-Use Planning for New Development and Redevelopment Component. The first unified Jurisdictional URMP document submittal shall contain a section covering common activities conducted collectively by the Copermittees, to be written by the Principal Permittee, and the twenty individual Jurisdictional URMP documents. The Principal Permittee shall submit the first unified Jurisdictional URMP document to the SDRWQCB within **180 days of adoption** of this Order.*

*b. The second unified Jurisdictional URMP document submittal shall address the requirements of the Land-Use Planning for New Development and Redevelopment Component of the Jurisdictional URMP section of this Order. The second unified Jurisdictional URMP document submittal shall contain a section covering common activities conducted collectively by the Copermittees, to be written by the Principal Permittee, and the twenty individual Jurisdictional URMP documents. As part of the second unified Jurisdictional URMP document, the Principal Permittee shall be responsible for the development and writing of a stand alone Model SUSMP document meeting the requirements of section F.1.b.(2). of this Order. The Principal Permittee shall submit the second unified Jurisdictional URMP document, including the Model SUSMP, to the SDRWQCB within **365 days of adoption** of this Order.*

3. Universal Reporting Requirements

All individual and unified Jurisdictional URMP document submittals shall include an executive summary, introduction, conclusion, recommendations, and signed certified statement.

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B,C,E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: California Water Code section 13267 provides that "the regional board may require than any person who has discharged […] shall furnish, under penalty of perjury, technical or monitoring reports which the regional board requires."

Discussion: Federal NPDES regulations 40 CFR 122.26(d)(2)(iv) require each Copermittee to develop and implement an urban runoff management program. The SDRWQCB must assess the urban runoff management program to ensure that it is adequate to prohibit non-storm water discharges and reduce pollutant discharges to and from the MS4 to the maximum extent practicable. In order for the SDRWQCB to assess the urban runoff management program, each Copermittee must submit to the SDRWQCB a description of their program. The description must detail all activities the Copermitee is undertaking to implement the

requirements of each component of the Jurisdictional URMP section of Order No. 2001-01.

The submittal schedule of 180 and 365 days for Jurisdictional URMP documents is designed to provide each Copermittee some time to develop its Jurisdictional URMP. However, this time is limited since the Jurisdictional URMP requirements are based on NPDES regulations which have been in place for many years. The vast majority of the requirements in the Jurisdictional URMP should already be implemented by each Copermittee. Therefore, the provided submittal schedule should be more than adequate for each Copermittee to rework its Jurisdictional URMP to meet the Jurisdictional URMP requirements of Order No. 2001-01.

Compilation of the individual Jurisdictional URMP documents into a unified Jurisdictional URMP document by the Principal Permittee will ease the effort needed to assess and digest the information contained in the documents. The Principal Permittee's provision of a summary covering common activities conducted collectively by the Copermittees will provide a useful overview of urban runoff management efforts within the County of San Diego. This type of compilation of the Copermittees' documents has been recommended by the Copermittees in the past.

The SDRWQCB has discretion to require Submittal of Jurisdictional URMP Document item H. in Order No. 2001-01 under the broad and specific legal authority cited above.

I. SUBMITTAL OF JURISDICTIONAL URMP ANNUAL REPORT

I. Submittal of Jurisdictional URMP Annual Report states the following:

1. *Individual - Each individual Jurisdictional URMP Annual Report shall be a documentation of the activities conducted by each Copermittee during the past annual reporting period. Each Jurisdictional URMP Annual Report shall, at a minimum, contain the following:*

    a. *Comprehensive description of all activities conducted by the Copermittee to meet all requirements of each component of the Jurisdictional URMP section of this Order;*
        - *F.1. Land-Use Planning for New Development and Redevelopment Component*
        - *F.2. Construction Component*
        - *F.3. Existing Development Component (Including Municipal, Industrial, Commercial, Residential, and Education)*
        - *F.4. Education Component*
        - *F.5. Illicit Discharge Detection and Elimination Component*
        - *F.6. Public Participation Component*
        - *F.7. Assessment of Jurisdictional URMP Effectiveness Component*
        - *F.8. Fiscal Analysis Component*

    b. *Each Copermittee's accounting of all:*
        - *(1) Reports of illicit discharges and how each was resolved (indicating referral source);*
        - *(2) Inspections conducted;*
        - *(3) Enforcement actions taken; and*
        - *(4) Education efforts.*

    c. *Public participation mechanisms utilized during the Jurisdictional URMP implementation process;*

    d. *Proposed revisions to the Jurisdictional URMP;*

e. A summary of all urban runoff related data not included in the annual monitoring report (e.g., special investigations);

f. Annual expenditures from previous year and budget for upcoming year;

g. Identification of management measures proven to be effective in reducing urban runoff pollutants and flow;

h. Identification of management measures proven to be ineffective in reducing urban runoff pollutants and flow;

i. Identification of water quality improvements or degradation; and

j. Self-assessment of Copermittees' "percent compliance with each component of its Jurisdictional URMP" and "overall percent compliance with this Order" in its entirety.

*2. Unified - The unified Jurisdictional URMP Annual Report shall contain a section covering common activities conducted collectively by the Copermittees, to be written by the Principal Permittee, and the twenty individual Jurisdictional URMP Annual Reports. Each Copermittee shall submit to the Principal Permittee an individual Jurisdictional URMP Annual Report by the date specified by the Principal Permittee. The Principal Permittee shall submit a unified Jurisdictional URMP to the SDRWQCB by **January 31, 2002 and every January 31 thereafter**. The reporting period for these annual reports shall be the previous fiscal year. For example, the report submitted January 31, 2002 shall cover the reporting period July 1, 2000 to June 30, 2001.*

3. Universal Reporting Requirements

All individual and unified Jurisdictional URMP submittals shall include an executive summary, introduction, conclusion, recommendations, and signed certified statement.

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B,C,E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.42(c) requires that "The operator of a large or medium municipal separate storm sewer system or a municipal separate storm sewer system that has been designated by the director under § 122.26(a)(1)(v) of this part must submit an annual report by the anniversary of the date of the issuance of the permit for such system. The report shall include: (1) The status of implementing the components of the storm water management program that are established as permit conditions; (2) Proposed changes to the storm water management program that are established as permit condition. Such proposed changes shall be consistent with § 122.26(d)(2)(iii) of this part; (3) Revisions, if necessary, to the assessment of controls and the fiscal analysis reported in the permit application under § 122.26(d)(2)(iv) and (d)(2)(v) of this part; (4) A summary of data, including monitoring data, that is accumulated throughout the reporting year; (5) Annual expenditures and budget for year following each annual report; (6) A summary describing the number and nature of enforcement actions, inspections, and public education programs; (7) Identification of water quality improvements or degradation."

Discussion: Federal NPDES regulations 40 CFR 122.26(d)(2)(iv) require each Copermittee to develop and implement an urban runoff management program. The SDRWQCB must assess the urban runoff management program to ensure that it is adequate to prohibit non-storm water discharges and reduce pollutant

discharges to and from the MS4 to the maximum extent practicable. In order for the SDRWQCB to assess the urban runoff management program, each Copermittee must submit to the SDRWQCB an annual report describing all of the activities it undertook to meet the requirements of the Jurisdictional URMP section of Order No. 2001-01.

The Jurisdictional URMP Annual Reports can also be useful tools for the Copermittees. They provide a focus to review, update, or revise the URMPs on an annual basis. Successful and unsuccessful measures can be identified, helping to focus efforts on areas or issues which provide the greatest results. Areas or issues which have received insufficient efforts can also be identified and improved.

The SDRWQCB has the discretion to require Submittal of Jurisdictional URMP Annual Report item I. in Order No. 2001-01 under the broad and specific legal authority cited above.

J. WATERSHED URBAN RUNOFF MANAGEMENT PROGRAM

J.1. Watershed Urban Runoff Management Program states the following:

Each Copermittee shall collaborate with other Copermittees within its watershed(s) as shown in Table 4. below to identify and mitigate the highest priority water quality issues/pollutants in the watershed(s).

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B,C,E, and F) and 40 CFR 122.26(d)(2)(iv).

Discussion: Urban runoff does not follow municipality boundaries, and often travels through many municipalities while flowing towards receiving waters. The actions of various municipalities within a watershed regarding urban runoff can therefore have a cumulative impact upon shared receiving waters. Due to the interrelated nature of urban runoff management, Copermittee collaboration is necessary to minimize shared receiving water quality degradation (see Finding 31). Copermittee collaboration of this type focuses water quality protection on watersheds, which is effective because it "more clearly identif[ies] critical areas and practices which need to be targeted for pollution prevention and corrective actions" (SDRWQCB, 1994). The highest priority water quality issues/pollutants in each watershed can be identified and addressed, providing the greatest water quality improvements for the amount of effort. The SWRCB Urban Runoff Technical Advisory Committee recommends Copermittee collaboration for watershed based water quality protection, stating "Municipal permits should have watershed specific components." The SDRWQCB has discretion to require Watershed Urban Runoff Management Program item J.1. in Order No. 2001-01 under the broad legal authority cited above.

J.2. Watershed Urban Runoff Management Program states the following:

Each Copermittee shall collaborate with all other Copermittees discharging urban runoff into the same watershed to develop and implement a Watershed Urban Runoff Management Program (Watershed URMP) for the respective watershed. Each Watershed URMP shall, at a minimum

contain the following:

a. *An accurate map of the watershed (preferably in Geographical Information System [GIS] format) that identifies all receiving waters (including the Pacific Ocean); all Clean Water Act section 303(d) impaired receiving waters (including the Pacific Ocean); land uses; MS4s, major highways; jurisdictional boundaries; and inventoried commercial, construction, industrial, municipal sites, and residential areas.*

b. *An assessment of the water quality of all receiving waters in the watershed based upon (1) existing water quality data; and (2) annual watershed water quality monitoring that satisfies the watershed monitoring requirements of Attachment B;*

c. *An identification and prioritization of major water quality problems in the watershed caused or contributed to by MS4 discharges and the likely source(s) of the problem(s);*

d. *An implementation time schedule of short and long-term recommended activities (individual and collective) needed to address the highest priority water quality problem(s). For this section, "short-term activities" shall mean those activities that are to be completed during the life of this Order and "long-term activities" shall mean those activities that are to be completed beyond the life of this Order;*

e. *An identification of the Copermittee(s) responsible for implementing each recommended activity, including time schedule for implementation;*

f. *A mechanism for public participation throughout the entire watershed URMP process;*

g. *A watershed based education program;*

h. *A mechanism to facilitate collaborative "watershed-based" (i.e., natural resource-based) land use planning with neighboring local governments in the watershed;*

i. *An implementation schedule for collaborative watershed-based land use planning to begin no later than January 2005.*

j. *A long-term strategy for assessing the effectiveness of the Watershed URMP. The long-term assessment strategy shall identify specific direct and indirect measurements that will track the long-term progress of Watershed URMP towards achieving improvements in receiving water quality. Methods used for assessing effectiveness shall include for example: surveys, pollutant loading estimations, and receiving water quality monitoring. The long-term strategy shall also discuss the role of monitoring data in substantiating or refining the assessment.*

Table 4. Copermittees by Watershed

RESPONSIBLE COPERMITTEE(S)	***WATERSHED URBAN RUNOFF MANAGEMENT PROGRAM***	***HYDROLOGIC UNIT OR AREA***	***MAJOR RECEIVING WATER BODIES***
1. County of San Diego	*Santa Margarita River*	*Santa Margarita HU (902.00)*	*Santa Margarita River and Estuary, Pacific Ocean*
1. City of Escondido ***2. City of Oceanside*** *3. City of Vista* *4. County of San Diego*	*San Luis Rey River*	*San Luis Rey HU (903.00)*	*San Luis Rey River and Estuary, Pacific Ocean*
1. City of Carlsbad ***2. City of Encinitas*** *3. City of Escondido* *4. City of Oceanside* *5. City of San Marcos* *6. City of Solana Beach* *7. City of Vista* *8. County of San Diego*	*Carlsbad*	*Carlsbad HU (904.00)*	*Batiquitos Lagoon* *San Elijo Lagoon* *Agua Hedionda Lagoon* *Buena Vista Lagoon* *and Tributary Streams* *Pacific Ocean*
1. City of Del Mar ***2. City of Escondido*** *3. City of Poway*	*San Dieguito River*	*San Dieguito HU (905.00)*	*San Dieguito River and Estuary* *Pacific Ocean*

RESPONSIBLE COPERMITTEE(S)	***WATERSHED URBAN RUNOFF MANAGEMENT PROGRAM***	***HYDROLOGIC UNIT OR AREA***	***MAJOR RECEIVING WATER BODIES***
4. City of San Diego *5. City of Solana Beach* *6. County of San Diego*			
1. City of Del Mar ***2. City of Poway*** *3. City of San Diego* *4. County of San Diego*	*Peñasquitos*	*Miramar Reservoir HA (906.10)* *Poway HA (906.20)*	*Los Peñasquitos Creek* *Los Peñasquitos Lagoon* *Pacific Ocean*
1. City of San Diego	*Mission Bay*	*Scripps HA (906.30)* *Miramar HA(906.40)* *Tecolote HA (906.50)*	*Mission Bay* *Pacific Ocean*
1. City of El Cajon *2. City of La Mesa* *3. City of Poway* *4. City of San Diego* *5. City of Santee* *6. County of San Diego*	*San Diego River*	*San Diego HU (907.00)*	*San Diego River* *Pacific Ocean*
1. City of Chula Vista *2. City of Coronado* *3. City of El Cajon* *4. City of Imperial Beach* *5. City of La Mesa* *6. City of Lemon Grove* *7. City of National City* *8. City of San Diego* *9. County of San Diego* ***10. San Diego Unified Port District***	*San Diego Bay*	*Pueblo San Diego HU (908.00)* *Sweetwater HU (909.00)* *Otay HU (910.00)*	*San Diego Bay* *Sweetwater River* *Otay River* *Pacific Ocean*
1. City of Imperial Beach *2. City of San Diego* *3. County of San Diego*	*Tijuana River*	*Tijuana (911.00)*	*Tijuana River and Estuary* *Pacific Ocean*

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B,C,E, and F) and 40 CFR 122.26(d)(2)(iv).

Discussion: Management of urban runoff on a watershed basis is recommended by the SWRCB and the SDRWQCB. The SWRCB Urban Runoff Technical Advisory Committee (TAC) defines watershed based water quality protection as "the prevention/control of pollution and management of human activities in a geographically or other defined drainage area to protect, restore, and/or enhance the natural resources and beneficial uses within the watershed." The TAC recommends that "All NPDES permits and Waste Discharge Requirements should be considered for reissuance on a watershed basis." The SDRWQCB also recommends watershed based water quality protection, stating in its Basin Plan that "public agencies and private organizations concerned with water resources have come to recognize that a comprehensive evaluation of pollutant contributions on a watershed scale is the only way to realistically assess cumulative impacts and formulate workable strategies to truly protect our water resources. Both water pollution and habitat degradation problems can best be solved by following a basin-wide approach." The SDRWQCB has therefore required development of Watershed URMPs by the Copermittees. The various Watershed URMPs to be developed are based on Hydrologic Units or Areas defined by the SWRCB.

Development and implementation of Watershed URMPs will provide for more effective receiving water quality protection. Watershed URMPs provide for

threatened or impaired receiving waters, including their pollutants or concern, to be identified. The entire watershed for the receiving water can then be assessed, allowing for critical areas and practices to be targeted for corrective actions. Known sources of pollutants of concern can be investigated for potential water quality impacts. Problem areas can then be addressed, leading to eventual improvements in receiving water quality. Management of urban runoff on a watershed basis allows for specific water quality problems to be targeted so that efforts result in maximized water quality improvements.

Regarding watershed-based land-use planning, see the discussion of Finding 30.

The SDRWQCB has discretion to require Watershed Urban Runoff Management Program item J.2. in Order No. 2001-01 under the broad legal authority cited above.

K. IMPLEMENTATION OF WATERSHED URMP

K. Implementation of Watershed URMP states the following:

Each Copermittee shall have completed full implementation of all requirements of the Watershed URMP section of this Order no later than January 31, 2003.

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B,C,E, and F) and 40 CFR 122.26(d)(2)(iv).

Discussion: As discussed above in section J.2, the SDRWQCB finds watershed based urban runoff management to be an effective means for managing urban runoff. Watershed based urban runoff management focuses on the most pressing water quality concerns, so that management efforts result in the greatest water quality improvements. The SDWQCB is seeking to expand watershed based urban runoff management, including the potential for reissuance of municipal storm water permits on a watershed basis. In order to work towards this goal, the SDRWQCB is requiring implementation of Watershed URMPs by the Copermittees. The SWRCB Urban Runoff Technical Advisory Committee supports watershed management of urban runoff, stating "Municipal permits should have watershed specific components" and "All NPDES permits and Waste Discharge Requirements should be considered for reissuance on a watershed basis." The SDRWQCB foresees the shift to extensive watershed management of urban runoff to be gradual; it is therefore providing the Copermittees with several years before Watershed URMP implementation is required. The SDRWQCB has discretion to require Watershed Urban Runoff Management Program item K. in Order No. 2001-01 under the broad legal authority cited above.

L. SUBMITTAL OF WATERSHED URMP DOCUMENT

L. Submittal of Watershed URMP Document states the following:

The written account of the overall watershed program to be conducted by each Copermittee during the remaining life of this Order is referred to as the "Watershed URMP Document". The Watershed URMP is conducted concurrently with the Jurisdictional URMP.

1. *Watershed Specific - Each Watershed Specific URMP document shall state how the member Copermittees within each watershed will develop and implement the requirements of the Watershed URMP section J. of this Order. The Copermittees responsible for each of the nine Watershed URMPs are specified in Table 4. above. The Lead Watershed Copermittee for each watershed is highlighted. Each Lead Watershed Copermittee shall be responsible for producing its respective Watershed URMP document, as well as for coordination and meetings amongst all member watershed Copermittees. Each Lead Watershed Copermittee is further responsible for the submittal of the Watershed URMP document to the Principal Permittee by the date specified by the Principal Permittee.*

   a. *Each Watershed specific URMP document shall include:*

      (1) *A completed watershed map*
      (2) *A water quality assessment and watershed monitoring needed*
      (3) *Prioritization of water quality problems*
      (4) *Recommended activities (short and long term)*
      (5) *Individual Copermittee implementation responsibilities and time schedules for implementation*
      (6) *A description of watershed public participation mechanisms*
      (7) *A description of watershed education mechanisms*
      (8) *A description of the mechanism and implementation schedule for watershed-based land use planning*
      (9) *A strategy for assessing the long-term effectiveness of the Watershed URMP*

2. *Unified - The unified Watershed URMP document shall contain a section covering common activities conducted collectively by the Copermittees, to be written by the Principal Permittee, and the nine Watershed Specific URMP documents. The Principal Permittee shall submit the unified Watershed URMP document to the SDRWQCB by* ***January 31, 2003****.*

3. *Universal Reporting Requirements*

   All individual and unified Watershed URMP submittals shall include an executive summary, introduction, conclusion, recommendations, and signed certified statement.

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B,C,E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: California Water Code section 13267 provides that "the regional board may require than any person who has discharged […] shall furnish, under penalty of perjury, technical or monitoring reports which the regional board requires."

Discussion: Order No. 200-128 requires each Copermittee to participate in the development and implementation of applicable Watershed URMPs under Federal NPDES regulation 40 CFR 122.26(d)(2)(iv). The SDRWQCB must assess the Watershed URMPs to ensure that they are adequate to assess and address the specific water quality problems within each watershed. In order for the SDRWQCB to assess the Watershed URMPs, descriptions of the Watershed URMPs must be submitted to the SDRWQCB. The descriptions must detail all activities the applicable Copermittees are undertaking to implement the requirements of Watershed URMP section of Order No. 2001-01.

The submittal schedule for Watershed URMP documents is designed to provide the Copermittees adequate time to develop their Watershed URMPs. Several years are provided for the Copermittees to shift the focus of their urban runoff management efforts from a jurisdictional basis to a watershed basis. The provided

submittal schedule should be more than adequate for the Copermittees to collaborate for the development and implementation of Watershed URMPs.

Compilation of the specific Watershed URMP documents into a unified Watershed URMP document by the Principal Permittee will ease the effort needed to assess and digest the information contained in the documents. The Principal Permittee's provision of a summary covering common activities conducted collectively by the Copermittees will provide a useful overview of watershed efforts within the County of San Diego. This type of compilation of the Copermittees' documents has been recommended by the Copermittees in the past.

The SDRWQCB has discretion to require Submittal of Watershed URMP Document item L. in Order No. 2001-01 under the broad and specific legal authority cited above.

M. SUBMITTAL OF WATERSHED URMP ANNUAL REPORT

M. Submittal of Watershed URMP Annual Report states the following:

1. *Watershed Specific - Each Watershed Specific URMP Annual Report shall be a documentation of the activities conducted by watershed member Copermittees during the previous annual reporting period to meet the requirements of all components of the Watershed URMP section of this Order. Each Watershed URMP Annual Report shall, at a minimum, contain the following:*

    a. *Comprehensive description of all activities conducted by the watershed member Copermittees to meet all requirements of each component of Watershed URMP section J. of this Order;*

    b. *Public participation mechanisms utilized during the Watershed URMP implementation process;*

    c. *Mechanism for watershed based land use planning;*

    d. *Assessment of effectiveness of Watershed URMP;*

    e. *Proposed revisions to the Watershed URMP;*

    f. *A summary of watershed effort related data not included in the annual monitoring report (e.g., special investigations);*

    g. *Identification of water quality improvements or degradation;*

2. *Unified - The Unified Watershed URMP Annual Report shall contain a section covering common activities conducted collectively by the Copermittees, to be written by the Principal Permittee, and the nine Watershed Specific URMP Annual Reports. Each Lead Watershed Copermittee shall submit to the Principal Permittee a Watershed Specific URMP Annual Report by the date specified by the Principal Permittee. The Principal Permittee shall submit the Unified Watershed URMP Annual Report to the SDRWQCB by January 31, 2004 and every January 31 thereafter. The reporting period for these annual reports shall be the previous fiscal year. For example, the report submitted January 31, 2004 shall cover the reporting period July 1, 2002 to June 30, 2003.*

3. *Universal Reporting Requirements*

    All individual and unified Watershed URMP submittals shall include an executive summary, introduction, conclusion, recommendations, and signed certified statement.

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B,C,E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: California Water Code section 13267 provides that "the regional board may require than any person who has discharged […] shall furnish, under penalty of perjury, technical or monitoring reports which the regional board requires."

Federal NPDES regulation 40 CFR 122.42(c) requires that "The operator of a large or medium municipal separate storm sewer system or a municipal separate storm sewer system that has been designated by the director under § 122.26(a)(1)(v) of this part must submit an annual report by the anniversary of the date of the issuance of the permit for such system. The report shall include: (1) The status of implementing the components of the storm water management program that are established as permit conditions; (2) Proposed changes to the storm water management program that are established as permit condition. Such proposed changes shall be consistent with § 122.26(d)(2)(iii) of this part; (3) Revisions, if necessary, to the assessment of controls and the fiscal analysis reported in the permit application under § 122.26(d)(2)(iv) and (d)(2)(v) of this part; (4) A summary of data, including monitoring data, that is accumulated throughout the reporting year; (5) Annual expenditures and budget for year following each annual report; (6) A summary describing the number and nature of enforcement actions, inspections, and public education programs; (7) Identification of water quality improvements or degradation."

Discussion: Federal NPDES regulations 40 CFR 122.26(d)(2)(iv) require the Copermittees to develop and implement urban runoff management programs, of which the Watershed URMPs are a part. The SDRWQCB must assess the Watershed URMPs to ensure that they are adequate to assess and address the specific water quality problems within each watershed. In order for the SDRWQCB to assess the Watershed URMPs, the Copermittees must submit to the SDRWQCB annual reports describing all of the activities undertaken to meet the requirements of the Watershed URMP section of Order No. 2001-01.

The Watershed URMP Annual Reports can also be useful tools for the Copermittees. They provide a focus to review, update, or revise the URMPs on an annual basis. Successful and unsuccessful measures can be identified, helping to focus efforts on areas or issues which provide the greatest results. Areas or issues which have received insufficient efforts can also be identified and improved.

The SDRWQCB has the discretion to require Submittal of Watershed URMP Annual Report item M. in Order No. 2001-01 under the broad and specific legal authority cited above.

N. ALL COPERMITTEE COLLABORATION

N. All Copermittee Collaboration states the following:

1. *Each Copermittee shall collaborate with all other Copermittees regulated under this Order to address common issues, promote consistency among Jurisdictional Urban Runoff*

Management Programs (Jurisdictional URMPs) and Watershed Urban Runoff Management Programs (Watershed URMPs), and to plan and coordinate activities required under this Order.

*a. Management Structure - All Copermittees shall jointly execute and submit to the SDRWQCB no later than **180** days after adoption of this Order, a Memorandum of Understanding, Joint Powers Authority, or other instrument of formal agreement which at a minimum provides a management structure for the following:*

- *Designation of joint responsibilities;*
- *Cost sharing (monitoring, education, fees, common equipment purchase, etc.);*
- *Decision making;*
- *Watershed activities;*
- *Information management of data and reports, including the requirements under this Order; and*
- *Any and all other collaborative arrangements for compliance with this Order.*

*b. All Copermittees shall jointly develop a standardized format(s) for all reports required under this Order (e.g., annual reports, monitoring reports, fiscal analysis reports, and program effectiveness reports, etc.). The standardized reporting format(s) shall be used by all Copermittees and shall include protocols for electronic reporting. The Principal Permittee shall submit the standardized format(s) to the SDRWQCB no later **than 180 days after adoption** of this Order.*

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B,C,E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.26(d)(2)(i)(D) provides that "[The Copermittee must demonstrate that it can control] through interagency agreements among coapplicants the contribution of pollutants from one portion of the municipal system to another portion of the municipal system."

Discussion: Storm water runoff does not follow municipality boundaries, and often travels through many municipalities while flowing towards receiving waters. Municipalities' actions towards storm water can therefore have a cumulative impact upon shared receiving waters. Due to the interrelated nature of storm water management, Copermittee collaboration is necessary.

Copermittee collaboration results in more effective storm water management, while also aiding the process of complying with permit requirements. For example, formal agreements between Copermittees can help define Copermittee roles and ensure that all permit requirements are addressed. Agreements can also be made to share the costs necessary to maintain compliance with the permit. In addition, designation of a Principal Permittee, through which reporting tasks can be coordinated, provides for standardization and compilation of required reports, thereby easing reporting efforts. This in turn improves digestion and assessment of report information, making the reports more useful to the Copermittees, which in turn can result in more effective urban runoff management.

The US EPA recommends Copermittee collaboration when it suggests "Coapplicants […] may use interjurisdictional agreements to show adequate legal authority and to ensure planning, coordination, and the sharing of the resource burden of permit compliance. When more than one entity is submitting an

application for a MS4 (either as coapplicants or as individual applicants for different parts of a system), the role of each party must be well defined. Each applicant or coapplicant must show the ability to fulfill its responsibilities, including legal authority for the separate storm sewers it owns or operates" (1992).

The SDRWQCB has discretion to require All Copermittee Collaboration item N. in Order 2001-01 under the broad and specific legal authority cited above.

O. PRINCIPAL PERMITTEE RESPONSIBILITIES

O. Principal Permittee Responsibilities states the following:

The Principal Permittee shall be the City of San Diego. The Principal Permittee shall, at a minimum:

1. *Serve as liaison between the Copermittees and the SDRWQCB on general permit issues.*

2. *Ensure coordination of permit activities among the Copermittees and facilitate collaboration on the development and implementation of programs required under this Order;*

3. *Integrate individual Copermittee documents and reports required under this Order into single unified documents and reports for submittal to the SDRWQCB as described below. If a reporting date falls on a non-working day or State Holiday, then the report is to be submitted on the following working day.*

   a. *Unified Jurisdictional URMP Document – The Principal Permittee shall submit the unified Jurisdictional URMP document to the SDRWQCB. The first part of the unified Jurisdictional URMP document (as described in section H.2.a.) shall be submitted within **180 days of adoption** of this Order. The second part of the unified Jurisdictional URMP document (as described in section H.2.b.) shall be submitted **within 365 days of adoption** of this Order.*

      The Principal Permittee shall be responsible for producing the sections of the unified Jurisdictional URMP document submittals covering common activities conducted by the Copermittees. As part of the second unified Jurisdictional URMP document submittal, the Principal Permittee shall be responsible for the development and writing of a stand alone Model SUSMP document meeting the requirements of section F.1.b.(2). of this Order. The Principal Permittee shall also be responsible for collecting and assembling the individual Jurisdictional URMP document submittals covering the activities conducted by each individual Copermittee.

   b. *Unified Jurisdictional URMP Annual Reports – The Principal Permittee shall submit unified Jurisdictional URMP Annual Reports to the SDRWQCB by January 31 of each year, beginning on **January 31, 2002**. The reporting period for these annual reports shall be the previous fiscal year. For example, the report submitted January 31, 2002 shall cover the reporting period July 1, 2000 to June 30, 2001.*

      The Principal Permittee shall be responsible for producing the section of the unified Jurisdictional URMP Annual Reports covering common activities conducted by the Copermittees. The Principal Permittee shall also be responsible for collecting and assembling the individual Jurisdictional URMP Annual Reports covering the activities conducted by each individual Copermittee.

   c. *Unified Watershed URMP Document – The Principal Permittee shall submit the unified Watershed URMP document to the SDRWQCB by **January 31, 2003**. The Principal Permittee shall be responsible for producing the section of the unified Watershed URMP document covering common activities conducted by the Copermittees. The Principal Permittee shall also be responsible for collecting and assembling the watershed specific*

Watershed URMP documents covering the activities conducted by each individual Copermittee.

d. *Unified Watershed URMP Annual Report - The Principal Permittee shall submit unified Watershed URMP Annual Reports to the SDRWQCB by January 31 of each year, beginning on* ***January 31, 2004****. The reporting period for these annual reports shall be the previous fiscal year. For example, the report submitted January 3, 2004 shall cover the reporting period July 1, 2002 to June 30, 2003.*

   The Principal Permittee shall be responsible for producing the section of the unified Watershed URMP Annual Reports covering common activities conducted by the Copermittees. The Principal Permittee shall also be responsible for collecting and assembling the watershed specific Watershed URMP Annual Reports covering the activities conducted by each individual Copermittee.

e. *Receiving Waters Monitoring and Reporting Program - The Principal Permittee shall be responsible for the writing and submittal of the Previous Monitoring and Future Recommendations Report. The report shall be submitted to the SDRWQCB within 180 days of adoption of this Order.*

f. *Receiving Waters Monitoring and Reporting Program - The Principal Permittee shall be responsible for the development and writing of the Receiving Waters Monitoring Program as it is outlined in Attachment B. The Principal Permittee shall submit the Receiving Waters Monitoring Program to the SDRWQCB within 180 days of adoption of this Order.*

g. *Receiving Waters Monitoring and Reporting Program - The Principal Permittee shall submit the Receiving Waters Monitoring Annual Report to the SDRWQCB on January 31 of each year, beginning on January 31, 2002.*

h. *Formal Agreements/Standardized Formats - The Principal Permittee shall submit to the SDRWQCB, within 180 days of adoption of this Order, a formal agreement between the Copermittees which provides a management structure for meeting the requirements of this Order (as described in section N.1.a.). The Principal Permittee shall submit to the SDRWQCB, within 180 days of adoption of this Order, standardized formats for all reports and documents required under this Order.*

i. *Dry Weather Analytical Monitoring - The Principal Permittee shall collectively submit the Copermittees' dry weather analytical monitoring maps and procedures to the SDRWQCB within 180 days of adoption of this Order.*

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B,C,E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.26(a)(3)(iii)(C) provides that "A regional authority may be responsible for submitting a permit application."

Federal NPDES regulation 40 CFR 122.26(d)(2)(i)(D) provides that "[The Copermittee must demonstrate that it can control] through interagency agreements among coapplicants the contribution of pollutants from one portion of the municipal system to another portion of the municipal system."

Discussion: Intergovernmental coordination is necessary in urban runoff management, given the transitory nature of urban runoff problems. A Principal Permittee will facilitate intergovernmental coordination, which will improve the development, implementation, and effectiveness of urban runoff management efforts within the region. One way in which a Principal Permittee will improve

urban runoff management efforts is through the coordination of reporting tasks. This provides for the standardization and compilation of required reports, which in turn increases the ease with which report information can be digested and assessed. Standardized documents provide for easier assessment and application of report data, making reports more useful for Copermittees, which can result in more effective storm water management. The SDRWQCB has discretion to require Principal Permittee Responsibilities item O. in Order No. 2001-01 under the broad and specific legal authority cited above.

P. RECEIVING WATERS MONITORING AND REPORTING PROGRAM

P. Receiving Waters Monitoring and Reporting Program states the following:

1. *Pursuant to California Water Code section 13267, each Copermittee shall comply with Monitoring and Reporting Program for No. 2001-01 contained in **Attachment B** of this Order.*

2. *Each Copermittee shall also comply with standard provisions, reporting requirements, and notifications contained in **Attachment C** of this Order.*

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B,C,E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Copermittees must conduct a comprehensive monitoring program as required under Federal NPDES regulations 40 CFR 122.26(d)(2)(iii). Standard provisions, reporting requirements, and notifications included in Attachment C are consistent to all NPDES permits and are generally found in Federal NPDES regulation 40 CFR 122.41 (Federal NPDES regulation citations are provided in the Attachment).

Discussion: A comprehensive monitoring program is an important aspect of an urban runoff management program. The primary objectives of the monitoring program include, but are not limited to: 1) assessing compliance with Order No. 2001-01; 2) measuring the effectiveness of Urban Runoff Management Plans; 3) assessing the chemical, physical, and biological impacts to receiving waters resulting from urban runoff; and 4) assessing the overall health and evaluating long-term trends in receiving water quality. The monitoring and reporting requirements in Attachment B and C address this need for a comprehensive, flexible, iterative monitoring approach that is focused on compliance issues relevant to the different conditions existing in each watershed covered under this permit. A number of monitoring tools and approaches are available to achieve the objectives of this compliance oriented monitoring program. Order No. 2001-01 may be modified for a specified period of time to direct the Copermittees to participate in comprehensive regional monitoring activities conducted in the Southern California Bight during the term of the permit. This provision is consistent with other NPDES permits issued by the SDRWCB. Such participation maximizes scientific and financial resources using a wide ranging and cost-effective monitoring design to assess the chemical, physical and biological impacts of urban runoff on receiving waters throughout the Southern California Bight.

Using data collected from a monitoring program, urban runoff management efforts can be prioritized, helping limited resources be most effective in improving receiving water quality. For example, a monitoring program can provide data that can allow for specific receiving waters and watersheds to be targeted for urban runoff management efforts based on their need. Particular pollutants and their sources can also be identified and targeted using monitoring data. In addition, monitoring data can be useful in assessing the effectiveness of an urban runoff management program. Successful efforts that have resulted in receiving water quality improvements can be analyzed for application elsewhere, while areas that need greater efforts can also be identified. In general, a comprehensive monitoring program can supply a wealth of data that can be used in a wide range of applications for improving water quality.

The following is a discussion of each of the principal aspects of the proposed monitoring program required in Attachment B of Order No. 2001-01:

I. Previous Monitoring and Future Recommendations Report

The San Diego Copermittees have conducted wet weather monitoring since 1993. In addition, numerous other studies have been conducted in the Southern California Bight that bear on the issue of impacts to receiving waters resulting from municipal storm water discharge. The Receiving Waters Monitoring Program should be based on a sound understanding of storm water issues and the results of previous monitoring efforts to avoid duplicative or unproductive monitoring and to ensure that the data collected is the most scientifically valid and useful as practicable.

II. Receiving Waters Monitoring Program – Year Round

The objective of this program includes, but is not limited to, discharge characterization, source identification, and assessment of the chemical, physical, and biological impacts to receiving waters resulting from municipal urban runoff discharges.

A. Urban Stream Bioassessment Monitoring.
Bioassessment is the direct measurement of the biological and physical condition of receiving waters, such as rivers and streams, using benthic macroinvertebrates. This methodology utilizes in situ biological endpoints as an integrative measure of receiving water integrity. Because bioassessment focuses on living systems as integrators of cumulative impacts resulting from water quality degradation, it defines the ecological risks resulting from urban runoff that are as important to human health and well-being as the more obvious threats of toxic pollution or pathogens. Bioassessment not only identifies that an impact has occurred, but also measures the affect of the impact and tracks recovery when control or restoration measures have been taken.

B. Long-Term Mass Loading Monitoring
Wet weather monitoring by the Copermittees has focused on estimations of pollutant loadings in storm water runoff. Although this approach has drawbacks, it continues to represent the best long-term trend assessment

of pollutant discharges to receiving waters from municipal storm water sewer systems.

C. Coastal Storm Drain Outfall Monitoring.
One of the primary impacts to coastal receiving waters is the loss of recreational beneficial uses resulting from urban runoff. This component of the monitoring program is meant to be integrated and coordinated with similar monitoring programs to address this issue.

D. Ambient Bay, Lagoon, and Coastal Receiving Water Monitoring
This monitoring program component addresses the overall health of the receiving waters and assesses the impact on these water bodies from urban runoff. The Copermittees will develop a specific program for each bay, lagoon, and coastal area that integrates measures of the physical, chemical, and biological conditions of the water bodies as a function of urban runoff.

E. Toxic Hot Spots Monitoring in San Diego Bay
The Copermittees will develop a program to address the issue of the effects of urban runoff on toxic hot spots within San Diego Bay.

The SDRWQCB has discretion to require Receiving Waters Monitoring and Reporting Program item P. in Order No. 2001-01 under the broad and specific legal authority cited above.

Q. TASKS AND SUBMITTAL SUMMARY

Q. Tasks and Submittal Summary states the following:

The tasks and submittals required under this Order are summarized in Tables 5 and 6 below:

Table 5. Task Summary

Task No.	Task	Permit Section	Completion Date	Frequency
1	Identify discharges not to be prohibited and BMPs required for treatment of discharges not prohibited	B.3.	180 days after adoption of Order	One Time
2	Examine field screening results to identify water quality problems resulting from non-prohibited non-storm water discharges, including follow-up of problems	B.5	January 31, 2002	Annually
3	Notify SDRWQCB of discharges causing or contributing to an exceedance of water quality standards	C.2.a.	Immediate	As Needed
4	Establish adequate legal authority to control pollutant discharges into and from MS4	D.1.	90 days after adoption of Order	One Time
5	Revise General Plan to incorporate water quality and watershed protection principles	F.1.a.	365 days after adoption of Order	One Time
6	Include conditions of approval in local permits	F.1.b.(1).	365 days after adoption of Order	One Time
7	Develop Model SUSMP	F.1.b.(2).	365 days after adoption of Order	One Time
8	Develop and adopt individual local SUSMP and amended ordinances	F.1.b.(2).	180 days after approval of Model SUSMP by SDRWQCB	One Time
9	Implement individual jurisdictional SUSMP	F.1.b.(2).	180 days after approval of Model	Continuous

			SUSMP by SDRWQCB	
10	*Revise environmental review processes and CEQA checklists*	*F.1.c.(1).*	*365 days after adoption of Order*	*One Time*
11	*Conduct education program for municipal planning and development review staff, project applicants, developers, contractors, and property owners*	*F.1.d.(1). and F.1.d.(2).*	*365 days after adoption of Order*	*Ongoing*
12	*Implement all requirements of Construction Component of Jurisdictional URMP*	*F.2.a. – F.2.h.*	*180 days after adoption of Order*	*Ongoing*
13	*Notify SDRWQCB of non-compliant construction sites*	*F.2.i*	*Within 24 hours of incidence of noncompliance*	*As Needed*
14	*Implement all requirements of Municipal Existing Development Component of Jurisdictional URMP*	*F.3.a.(1). – F.3.a.(8).*	*180 days after adoption of Order*	*Ongoing*
15	*Implement all requirements of Industrial Existing Development Component of Jurisdictional URMP*	*F.3.b.(1) – F.3.b.(8)*	*180 days after adoption of Order*	*Ongoing*
16	*Notify SDRWQCB of non-compliant industrial sites*	*F.3.b.8*	*Within 24 hours of incidence of noncompliance*	*As Needed*
17	*Implement all requirements of Commercial Existing Development Component of Jurisdictional URMP*	*F.3.c.(1) – F.3.c.(5)*	*180 days after adoption of Order*	*Ongoing*
18	*Implement all requirements of Residential Existing Development Component of Jurisdictional URMP*	*F.3.d.(1) – F.3.d.(3)*	*180 days after adoption of Order*	*Ongoing*
19	*Implement all requirements of Education Component of Jurisdictional URMP*	*F.4.a. – F.4.c.*	*180 days after adoption of Order*	*Ongoing*
20	*Implement all requirements of Illicit Connections/Illegal Discharges Component of Jurisdictional URMP*	*F.5.a. – F.5.i.*	*180 days after adoption of Order*	*Ongoing*
21	*Implement all requirements of Public Participation Component of Jurisdictional URMP*	*F.6.*	*180 days after adoption of Order*	*Ongoing*
22	*Develop strategy for assessment of Jurisdictional URMP effectiveness*	*F.7.a.*	*180 days after adoption of Order*	*One Time*
23	*Assess Jurisdictional URMP effectiveness*	*F.7.b.*	*January 31, 2002*	*Annually*
24	*Develop strategy for fiscal analysis of urban runoff management program*	*F.8.*	*180 days after adoption of Order*	*One Time*
25	*Conduct fiscal analysis of urban runoff management program in entirety*	*F.8.*	*January 31, 2002*	*Annually*
26	*Develop and implement Watershed URMP*	*J.2.*	*January 31, 2003*	*Ongoing*
27	*Execute formal agreement which provides management structure for meeting Order requirements*	*N.1.a.*	*180 days after adoption of Order*	*One Time*
28	*Develop standardized formats for all required reports of this Order*	*N.1.b.*	*180 days after adoption of Order*	*One Time*
29	*Develop Previous Monitoring and Future Recommendations Report*	*Attachment B*	*180 days after adoption of Order*	*One Time*
30	*Develop Receiving Waters Monitoring Program*	*Attachment B*	*180 days after adoption of Order*	*One Time*
31	*Implement Receiving Waters Monitoring Program*	*Attachment B*	*180 days after adoption of Order*	*Continuous*
32	*Develop dry weather analytical monitoring map and procedures*	*Attachment E*	*180 days after adoption of Order*	*One Time*
33	*Conduct dry weather analytical monitoring*	*Attachment E*	*January 31, 2002*	*Annually*
34	*Complete NPDES applications for issuance of renewal watershed based permits*	*Attachment C*	*At least 180 days prior to expiration of Order*	*One Time*
35	*Notify SDRWQCB of any incidence of non-compliance with this Order*	*R1, B.7 of Attachment C*	*Within 24 hours of incidence of non-compliance*	*As Needed*

Table 6. Submittal Summary

Submittal No.	Submittal	Permit Section	Completion Date	Frequency
1	Submit identification of discharges not to be prohibited and BMPs required for treatment of discharges not prohibited	B.3.	180 days after adoption of Order	One Time
2	Report on discharges causing or contributing to an exceedance of water quality standards, including description of BMP implementation	C.2.a.	With individual Jurisdictional URMP Annual Reports	As Needed
3	Submit Certified Statement of Adequate Legal Authority	D.2.	90 days after adoption of Order	One Time
4	Submit certified statement if particular high priority construction sites are to be inspected monthly rather than weekly in the rainy season	F.2.g.(2).	180 days after adoption of Order and as needed thereafter	As Needed
5	Submit report on non-compliant construction sites	F.2.i.	Within 5 Days of incidence of non-compliance	As Needed
6	Submit report on non-compliant industrial sites	F.3.b.7.	Within 5 days of incidence of non compliance	As Needed
7	Submit to Principal Permittee first part of individual Jurisdictional URMP document covering requirements for all Components, excluding the Land-Use for New Development and Redevelopment Component	H.1.a.	Prior to 180 days after adoption of Order (Principal Permittee specifies date of submittal)	One Time
8	Submit to Principal Permittee second part of individual Jurisdictional URMP document covering Land-Use Planning for New Development and Redevelopment Component requirements	H.1.b.	Prior to 365 days after adoption of Order (Principal Permittee specifies date of submittal)	One Time
9	Principal Permittee shall submit to SDRWQCB first part of unified Jurisdictional URMP document covering requirements for all Components, excluding the Land-Use for New Development and Redevelopment Component	H.2.a.	180 days after adoption of Order	One Time
10	Principal Permittee shall submit to SDRWQCB second part of unified Jurisdictional URMP document covering Land-Use Planning for New Development and Redevelopment Component requirements, including Model SUSMP	H.2.b.	365 days after adoption of Order	One Time
11	Submit to SDRWQCB local SUSMP and amended ordinances	F.1.b.(2). and H.1.d.	180 days after approval of Model SUSMP	One Time
12	Submit to Principal Permittee individual Jurisdictional URMP Annual Report	I.1.	Prior to January 31, 2002 (Principal Permittee specifies date of submittal)	Annually
13	Principal Permittee shall submit 1st unified Jurisdictional URMP Annual Report to SDRWQCB	I.2.	January 31, 2002	One Time and Annually Thereafter
14	Submit to Principal Permittee Watershed Specific URMP document	L.1.	Prior to January 31, 2003 (Principal Permittee specifies date of submittal)	One Time
15	Principal Permittee shall submit unified Watershed Specific URMP document to SDRWQCB	L.2.	January 31, 2003	One Time
16	Principal Permittee shall submit 2nd unified Jurisdictional URMP Annual Report to SDRWQCB	I.2.	January 31, 2003	One Time
17	Submit to Principal Permittee Watershed Specific URMP Annual Report	M.1.	Prior to January 31, 2004 (Principal	Annually

			Permittee specifies date of submittal)	
18	*Principal Permittee shall submit 1st unified Watershed Specific URMP Annual Report to SDRWQCB*	*M.2.*	*January 31, 2004*	*One Time and Annually Thereafter*
19	*Principal Permittee shall submit 3rd unified Jurisdictional URMP Annual Report to SDRWQCB*	*I.2.*	*January 31, 2004*	*One Time*
20	*Principal Permittee shall submit 2nd unified Watershed Specific URMP Annual Report to SDRWQCB*	*M.2.*	*January 31, 2005*	*One Time*
21	*Principal Permittee shall submit 4th unified Jurisdictional URMP Annual Report to SDRWQCB*	*I.2.*	*January 31, 2005*	*One Time*
22	*Principal Permittee shall submit 3rd unified Watershed Specific URMP Annual Report to SDRWQCB*	*M.2.*	*January 31, 2006*	*One Time*
23	*Principal Permittee shall submit 5th unified Jurisdictional URMP Annual Report to SDRWQCB*	*I.2.*	*January 31, 2006*	*One Time*
24	*Principal Permittee shall submit formal agreement between Copermittees which provides management structure for meeting Order requirements*	*N.1.a.*	*180 days after adoption of Order*	*One Time*
25	*Principal Permittee shall submit standardized formats for all reports required under this Order*	*N.1.b.*	*180 days after adoption of Order*	*One Time*
26	*Principal Permittee submits Previous Monitoring and Future Recommendations Report to SDRWQCB*	*Attachment B*	*180 days after adoption of Order*	*One Time*
27	*Principal Permittee submits Receiving Waters Monitoring Program document to SDRWQCB*	*Attachment B*	*180 days after adoption of Order*	*One Time*
28	*Principal Permittee submits Receiving Waters Monitoring Annual Report to SDRWQCB*	*Attachment B*	*January 31, 2002*	*Annually*
29	*Submit to Principal Permittee dry weather analytical monitoring map and procedures*	*Attachment E*	*Prior to 180 days after adoption of Order*	*One Time*
30	*Principal Permittee submits collective dry weather analytical monitoring maps and procedures*	*Attachment E*	*180 days after adoption of Order*	*One Time*
31	*Submit to Principal Permittee dry weather analytical monitoring results as part of individual Jurisdictional URMP Annual Report*	*Attachment E*	*Prior to January 31, 2002, as part of individual Jurisdictional URMP Annual Report*	*Annually*
32	*Principal Permittee shall submit NPDES applications for issuance of renewal watershed based permits*	*Attachment C*	*At least 180 days prior to expiration of this Order*	*One Time*
33	*Submit reports of any incidence of non-compliance with this Order*	*R.1, B.7 of Attachment C*	*Within 5 days of incidence of non compliance*	*As Needed*

Discussion: See the legal authority citations and discussions of the applicable permit sections.

R. STANDARD PROVISIONS, REPORTING REQUIREMENTS AND NOTIFICATIONS

R. Standard Provisions, Reporting Requirements and Notifications states the following:

1. *Each Copermittee shall comply with Standard Provisions, Reporting Requirements, and Notifications contained in* ***Attachment C*** *of this Order. This includes 24 hour/5day reporting requirements for any instance of non-compliance with this Order as described in section B.7 of*

Attachment C.

2. *All plans, reports and subsequent amendments submitted in compliance with this Order shall be implemented immediately (or as otherwise specified) and shall be an enforceable part of this Order upon submission to the SDRWQCB. All submittals by Copermittees must be adequate to implement the requirements of this Order.*

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B,C,E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Standard provisions, reporting requirements, and notifications included in Attachment C are consistent to all NPDES permits and are generally found in Federal NPDES regulation 40 CFR 122.41 (Federal NPDES regulation citations are provided in the Attachment).

Federal NPDES regulation 40 CFR 122.44(l)(6) states "The permittee shall report any noncompliance which may endanger health or the environment. Any information shall be provided orally within 24 hours from the time the permittee becomes aware of the circumstances. A written submission shall also be provided within 5 days of the time the permittee becomes aware of the circumstances. The written submission shall contain a description of the noncompliance and its cause; the period of non-compliance, including exact dates and times, and if the noncompliance has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance."

Discussion: Implementation of plans, reports, and subsequent amendments by the Copermittees is an important requirement of Order No. 2001-01. Many of the requirements of Order No. 2001-01 rely upon the Copermittees' development and implementation of plans and programs. Without implementation, plans and programs will not improve water quality. For this reason, the plans must be implemented and shall be enforceable upon submission to the SDRWQCB. Incidences of noncompliance with the requirements of this Order must be reported to the SDRWCB within 24 hours, as required for all NPDES permits under Federal NPDES regulation 40 CFR 122.44(l)(6). The SDRWQCB has discretion to require Standard Provisions, Reporting Requirements and Notifications item R. in Order No. 2001-01 under the broad and specific legal authority cited above.

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Attachment 1

NPDES Municipal Storm Water Permit Justifications

Copermittee	Large or Medium MS4?	Contributes to a violation of a water quality standard or is a significant contributor of pollutants to waters of the U.S[1]?
Carlsbad	Yes, by interrelationship[2] to Escondido, Oceanside, & Co. of San Diego.	Yes, Pacific Ocean Shoreline, Buena Vista Creek HA 904.20; Pine Street (Carlsbad), Carlsbad Village Pkwy (Carlsbad); Agua Hedionda Lagoon; and Buena Vista Lagoon;
Chula Vista	Yes, by population.[3]	Yes, San Diego Bay Shoreline, Telegraph HSA 909.11; Chula Vista Marina.
Coronado	No.	Yes, Pacific Ocean Shoreline, Coronado HA 910.10; North Beach, Loma Avenue, Pine Street, Sunset Park (Coronado); San Diego Bay, Near Coronado Bridge;
Del Mar	Yes, by interrelationship[2] to City of San Diego & Co. of San Diego.	Yes, Pacific Ocean Shoreline, San Dieguito HU 905.00; Del Mar (Anderson Canyon), San Dieguito Lagoon Mouth.
El Cajon	Yes, by interrelationship[2] to City of San Diego & Co. of San Diego.	Yes, Pacific Ocean Shoreline, San Diego HU 907.00, San Diego River Mouth, (Ocean Beach).
Encinitas	Yes, by interrelationship[2] to Escondido, Oceanside, & Co. of San Diego.	Yes, Pacific Ocean Shoreline, San Marcos HA 904.50; Moonlight State Beach.
Escondido	Yes, by population.[3]	No.
Imperial Beach	Yes, by interrelationship[2] to Chula Vista, City of San Diego & Co. of San Diego.	Yes, Pacific Ocean Shoreline, Tijuana HU 911.00; Tijuana River; and Tijuana River Estuary.
La Mesa	Yes, by interrelationship[2] to Chula Vista, City of San Diego & Co. of San Diego.	Yes, Pacific Ocean Shoreline, San Diego HU 907.00, San Diego River Mouth, (Ocean Beach); and Chollas Creek.
Lemon Grove	Yes, by interrelationship[2] to Chula Vista, City of San Diego & Co. of San Diego.	Yes, Chollas Creek.
National City	Yes, by interrelationship[2] to Chula Vista, City of San Diego & Co. of San Diego.	Yes, San Diego Bay, San Diego Naval Station; Seventh Street Channel; North of 24th Street Marine Terminal;
Oceanside	Yes, by population.[3]	Yes, Pacific Ocean Shoreline, San Luis Rey HU 903.00, San Luis Rey Rivermouth; Guajome Lake; Pacific Ocean Shoreline, Loma Alta Creek Mouth; and Loma Alta Slough.
Poway	Yes, by interrelationship[1] to City of San Diego & Co. of San Diego.	Yes, Pacific Ocean Shoreline, San Dieguito HU 905.00; Del Mar (Anderson Canyon), San Dieguito Lagoon Mouth; Mission Bay; and Los Penasquitos Lagoon.
San Diego, City	Yes, by population.[3]	Yes, see Attachment 2, 1998 Clean Water Act Section 303(d) List, specifically San Dieguito WMA, Mission Bay WMA, San Diego River WMA, San Diego Bay WMA, and Tijuana River WMA.
San Diego, Co.	Yes, by population.[3]	Yes, see Attachment 2, 1998 Clean Water Act Section 303(d) List, all WMAs.
San Diego Unified Port Dist.	Yes, by interrelationship[2] to Chula Vista, City of San Diego & Co. of San Diego.	Yes, see Attachment 2, 1998 Clean Water Act Section 303(d) List, specifically San Diego Bay WMA and Tijuana River WMA.
San Marcos	Yes, by interrelationship[2] to Escondido, Oceanside, & Co. of San Diego.	Yes, Agua Hedionda Lagoon.
Santee	Yes, by interrelationship[2] to City of San Diego & Co. of San Diego.	Yes, Pacific Ocean Shoreline, San Diego HU 907.00, San Diego River Mouth, (Ocean Beach).
Solana Beach	Yes, by interrelationship[2] to Escondido, Oceanside, City of San Diego & Co. of San Diego.	Yes, San Elijo Lagoon; and Pacific Ocean Shoreline, Escondido Creek HA 904.60, Solana Beach, San Elijo Lagoon.
Vista	Yes, by interrelationship[2] to Escondido, Oceanside & Co. of San Diego.	Yes, Buena Vista Lagoon; Pacific Ocean Shoreline, Buena Vista Creek HA 904.20, Pine Street, Carlsbad Village Pkwy; and Agua Hedionda Lagoon.

[1] See Attachment 2, 1998 Clean Water Act Section 303(d) List.

[2] See 40 CFR 122.26(b)(4)(iii) and (7)(iii).

[3] See Attachment 3, Copermittee Populations.

Attachment 2 1998 Clean Water Act Section 303(d) Impaired Waterbody List

Waterbody [1]	Watershed Management Area	HU, HA, or HSA [2]	Total Size [3]	Non Support [4]	Partially Support [5]	Exceeds Standard [6]	Sources [7]	Impairment [8]	Beneficial Uses [9]	TMDL Priority [10]	Level [11]	Start [12]	End [13]
Aliso Creek	Aliso Creek WMA	901.13	7.2 mi			1 mi	Point/ Nonpoint	Coliform	Rec-1, Rec-2	Medium	1	7/97	7/01
Aliso Creek, mouth of	Aliso Creek WMA	901.13	0.3 ac			0.3 ac	Point/ Nonpoint	Coliform	Rec-1, Rec-2	Medium	1	7/97	7/01
Pacific Ocean Shoreline, Aliso Beach HSA 901.13; Aliso Beach	Aliso Creek WMA	901.13	1 mi		0.01 mi		Point/ Nonpoint	Coliform	Rec-1, Rec-2	Medium	1	7/97	7/01
Agua Hedionda Lagoon	Carlsbad WMA	904.31	320 ac		5 ac		Point/ Nonpoint	Sediment	Aquatic life	Medium	3	7/04	7/07
						5 ac	Point/ Nonpoint	Coliform	Rec-1, Rec-2	Low	2	7/99	7/09
					5 ac		Point/ Nonpoint	Coliform	Shellfish harvest	Low	2	7/99	7/09
Buena Vista Lagoon	Carlsbad WMA	904.21	350 ac		350 ac		Point/ Nonpoint	Sediment	Aquatic life	Medium	3	7/04	7/07
					150 ac		Point/ Nonpoint	Nutrients	Aquatic life	Low	3	7/04	7/07
						350 ac	Point/ Nonpoint	Coliform	Rec-1, Rec-2	Low	2	7/99	7/09
Loma Alta Slough	Carlsbad WMA	904.10	8 ac	8 ac			Nonpoint	Eutrophication	Aquatic life	Low	2	7/99	7/09
						8 ac	Nonpoint	Coliform	Rec-1, Rec-2	Low	2	7/99	7/09
Pacific Ocean Shoreline, Loma Alta HA 904.10; Loma Alta Creek Mouth	Carlsbad WMA	904.10	1.5 mi	0.01 to 1 mi*			Point/ Nonpoint	Coliform	Rec-1, Rec-2, Shellfish harvest	Low	2	7/99	7/09
Pacific Ocean Shoreline, Buena Vista Creek HA 904.20; Pine Street (Carlsbad), Carlsbad Village Pkwy (Carlsbad)	Carlsbad WMA	904.20	2.2 mi	0.02 mi			Point/ Nonpoint	Coliform	Rec-1, Rec-2, Shellfish harvest	Low	2	7/99	7/09
Pacific Ocean Shoreline, San Marcos HA 904.50; Moonlight State Beach	Carlsbad WMA	904.50	5.8 mi	0.01 mi			Point/ Nonpoint	Coliform	Rec-1, Rec-2, Shellfish harvest	Low	2	7/99	7/09
Pacific Ocean Shoreline, Escondido Creek HA 904.60; Solana Beach, San Elijo Lagoon	Carlsbad WMA	904.60	3.0 mi	0.02 mi			Point/ Nonpoint	Coliform	Rec-1, Rec-2, Shellfish harvest	Low	2	7/99	7/09

Waterbody [1]	Watershed Management Area	HU, HA, or HSA [2]	Total Size [3]	Non Support [4]	Partially Support [5]	Exceeds Standard [6]	Sources [7]	Impairment [8]	Beneficial Uses [9]	TMDL Priority [10]	Level [11]	Start [12]	End [13]
San Elijo Lagoon	Carlsbad WMA	904.61	330 ac	330 ac			Point/ Nonpoint	Eutrophication	Aquatic life	Low	2	7/99	7/09
					150 ac		Point/ Nonpoint	Sediment	Aquatic life	Medium	3	7/04	7/07
						150 ac	Point/ Nonpoint	Coliform	Rec-1,Rec-2, Shellfish harvest, Fish consumption	Low	2	7/99	7/09
Famosa Slough	Mission Bay WMA	906.40	28 ac		28 ac		Nonpoint	Eutrophication	Aquatic life	Medium	3	7/05	7/08
Los Penasquitos Lagoon	Mission Bay WMA	906.10	385 ac	385 ac			Point/ Nonpoint	Sediment	Aquatic life	Medium	3	7/05	7/08
Mission Bay	Mission Bay WMA	906.30	1540 ac	1 ac			Point/ Nonpoint	Eutrophication, Lead	Aquatic life	Medium	3	7/05	7/08
		906.40	906.50	1540 ac			Point/ Nonpoint	Coliform	Rec-1, Rec-2, Shellfish harvest	Low	2	7/99	7/09
Pacific Ocean Shoreline, Scripps HA 906.30, El Paseo Grande, Del Oro, Vallecitos, Avenida de la Playa, Coast Blvd, Children's Pool, Ravina, Vista de la Playa, Bonair, Playa del Norte, Palomar (La Jolla); Tourmaline, Grand Avenue (Pacific Beach)	Mission Bay WMA	906.30	13 mi	0.13 mi			Point/ Nonpoint	Coliform	Rec-1, Rec-2, Shellfish harvest	Low	2	7/99	7/09
Tecolote Creek	Mission Bay WMA	906.50	6 mi		6 mi		Point/ Nonpoint	Stormwater (Cadmium, Copper, Lead, Zinc, Toxicity)	Aquatic life	Medium	3	7/05	7/08
						6 mi	Point/ Nonpoint	Coliform	Rec-1, Rec-2	Low	2	7/99	7/09
Chollas Creek	San Diego Bay WMA	908.22	4.8 mi		1 mi		Point/ Nonpoint	Stormwater (Cadmium, Copper, Lead, Zinc, Toxicity)	Aquatic life	High	1	1/98	7/03
						1 mi	Point/ Nonpoint	Coliform	Rec-1, Rec-2	Low	2	7/99	7/09

Waterbody [1]	Watershed Management Area	HU, HA, or HSA [2]	Total Size [3]	Non Support [4]	Partially Support [5]	Exceeds Standard [6]	Sources [7]	Impairment [8]	Beneficial Uses [9]	TMDL Priority [10]	Level [11]	Start [12]	End [13]
Pacific Ocean Shoreline, Coronado HA 910.10; North Beach, Loma Avenue, Pine Street, Sunset Park (Coronado)	San Diego Bay WMA	910.00	10.2 mi	.04 mi			Point/ Nonpoint	Coliform	Rec-1, Rec-2, Shellfish harvest	Low	2	7/99	7/09
San Diego Bay; Near Sub Base	San Diego Bay WMA	900.00	12000 ac	16 ac			Point/ Nonpoint	Benthic community degradation*, Toxicity*	Aquatic life	High	1	1/98	7/03
San Diego Bay; Shelter Island Yacht Basin	San Diego Bay WMA	900.00	12000 ac			50 ac	Point/ Nonpoint	Dissolved copper	Aquatic life	High	1	1/98	7/03
San Diego Bay; Near Grape Street	San Diego Bay WMA	900.00	12000 ac	7 ac			Point/ Nonpoint	Benthic community degradation*, Toxicity*	Aquatic life	High	1	1/98	7/03
San Diego Bay; Downtown Piers	San Diego Bay WMA	900.00	12000 ac	10 ac			Point/ Nonpoint	Benthic community degradation*, Toxicity*	Aquatic life	High	1	1/98	7/03
San Diego Bay; Near Switzer Creek	San Diego Bay WMA	900.00	12000 ac	6 ac			Point/ Nonpoint	Benthic community degradation*, Toxicity*	Aquatic life	High	1	1/98	7/03
San Diego Bay; Near Coronado Bridge	San Diego Bay WMA	900.00	12000 ac	30 ac			Point/ Nonpoint	Benthic community degradation*, Toxicity*	Aquatic life	High	1	1/98	7/03
San Diego Bay; Near Chollas Creek	San Diego Bay WMA	900.00	12000 ac	14 ac			Point/ Nonpoint	Benthic community degradation*, Toxicity*	Aquatic life	High	1	1/98	7/03
San Diego Bay; San Diego Naval Station	San Diego Bay WMA	900.00	12000 ac	76 ac			Point/ Nonpoint	Benthic community degradation*, Toxicity*	Aquatic life	High	1	1/98	7/03
San Diego Bay; Seventh Street Channel	San Diego Bay WMA	900.00	12000 ac	9 ac			Point/ Nonpoint	Benthic community degradation*, Toxicity*	Aquatic life	High	1	1/98	7/03

Waterbody [1]	Watershed Management Area	HU, HA, or HSA [2]	Total Size [3]	Non Support [4]	Partially Support [5]	Exceeds Standard [6]	Sources [7]	Impairment [8]	Beneficial Uses [9]	TMDL Priority [10]	Level [11]	Start [12]	End [13]
San Diego Bay; North of 24th Street Marine Terminal	San Diego Bay WMA	900.00	12000 ac	10 ac			Point/ Nonpoint	Benthic community degradation*, Toxicity*	Aquatic life	High	1	1/98	7/03
San Diego Bay Shoreline, Lindbergh HSA 908.21; G St, B St Pier	San Diego Bay WMA	908.21	8.7 mi	0.2 mi			Point/ Nonpoint	Coliform	Rec-1, Rec-2	Low	2	7/99	7/09
San Diego Bay Shoreline, Telegraph HSA 909.11; Chula Vista Marina	San Diego Bay WMA	909.11	0.5 mi	0.01 mi			Point/ Nonpoint	Coliform	Rec-1, Rec-2	Low	2	7/99	7/09
Pacific Ocean Shoreline, San Diego HU 907.00, San Diego River Mouth, (Ocean Beach)	San Diego River WMA	907.00	1.4 mi	0.02 to 0.5 mi*			Point/ Nonpoint	Coliform	Rec-1, Rec-2, Shellfish harvest	Low	2	7/99	7/09
Pacific Ocean Shoreline, San Dieguito HU 905.00; Del Mar (Anderson Canyon), San Dieguito Lagoon Mouth	San Dieguito River WMA	905.00	3.0 mi	0.02 mi			Point/ Nonpoint	Coliform	Rec-1, Rec-2, Shellfish harvest	Low	2	7/99	7/09
Pacific Ocean Shoreline, Laguna Beach HSA 901.12; Laguna Beach, Irvine Cove-Riveria, Heisler Park -North, Main Beach (large), Laguna Ave, Cleo Street, Bluebird Canyon Road, Ocean Way, Dumond Dr, Lagunita/ Blue Lagoon, South Coast Hwy at Hospital, West St,	San Juan Creek WMA	901.12	2.5 mi		0.15 mi		Point/ Nonpoint	Coliform	Rec-1, Rec-2, Shellfish harvest	Low	2	7/00	7/10
1000 Steps, Table Rock													
Pacific Ocean Shoreline, Dana Point HSA 901.14, Salt Creek (large), Salt Creek Service Rd, Dana Strand, North Beach Creek, Capo Beach	San Juan Creek WMA	901.14	6.5 mi		0.06 mi		Point/ Nonpoint	Coliform	Rec-1, Rec-2, Shellfish harvest	Low	2	7/00	7/10
Pacific Ocean Shoreline, Lower San Juan HSA 901.27; San Juan Creek (large)	San Juan Creek WMA	901.3	1 mi		0.02 mi		Point/ Nonpoint	Coliform	Rec-1, Rec-2, Shellfish harvest	Low	2	7/00	7/10

Waterbody [1]	Watershed Management Area	HU, HA, or HSA [2]	Total Size [3]	Non Support [4]	Partially Support [5]	Exceeds Standard [6]	Sources [7]	Impairment [8]	Beneficial Uses [9]	TMDL Priority [10]	Level [11]	Start [12]	End [13]
Pacific Ocean Shoreline, San Clemente HA 901.30; Poche Beach (large), Pico Drain (large), El Portal Stairs, Mariposa, Linda Lane, South Linda Lane, Lifeguard Headquarters, Trafalgar Canyon, Under Pier, La Ladera, Riveria Beach, Salem Tressel,	San Juan Creek WMA	901.30	7 mi		0.15 mi		Point/ Nonpoint	Coliform	Rec-1, Rec-2, Shellfish harvest	Low	2	7/00	7/10
Cypress Shores													
San Juan Creek, Lower	San Juan Creek WMA	901.20	3.4 mi			1 mi	Point/ Nonpoint	Coliform	Rec-1, Rec-2	Low	2	7/00	7/10
San Juan Creek, Mouth	San Juan Creek WMA	901.20	2 ac			2 ac	Point/ Nonpoint	Coliform	Rec-1, Rec-2	Low	2	7/00	7/10
Guajome Lake	San Luis Rey River WMA	903.11	25 ac	25 ac			Point/ Nonpoint	Eutrophication	Aquatic life	Medium	3	7/08	7/11
Pacific Ocean Shoreline, San Luis Rey HU 903.00; San Luis Rey River Mouth	San Luis Rey River WMA	903.00	1 mi	0.01 mi			Point/ Nonpoint	Coliform	Rec-1, Rec-2, Shellfish harvest	Low	2	7/99	7/09
Rainbow Creek	Santa Margarita River WMA	902.20	11 mi	5 mi			Point/ Nonpoint	Rec-1, Rec-2, Eutrophication	Aquatic life	High	1	7/98	7/00
Santa Margarita Lagoon	Santa Margarita River WMA	902.11	268 ac	1 ac			Point/ Nonpoint	Eutrophication	Aquatic life, Rec-1, Rec-2	High	2	7/96	7/05
Pacific Ocean Shoreline, Tijuana HU 911.00; Tijuana	Tijuana River WMA	911.00	3.2 mi	3.2 mi			Point/ Nonpoint	Coliform	Rec-1, Rec-2	Low	2	7/98	7/11
River			3.2 mi		3.2 mi		Point/ Nonpoint	Coliform	Shellfish harvest, Fish consumption	Low	2	7/98	7/11
Tijuana River	Tijuana River WMA	911.11	7 mi	7 mi			Point/ Nonpoint	Coliform	Rec-1, Rec-2, Fish consumption	Low	2	7/98	7/11
				7 mi			Point/ Nonpoint	Eutrophication, Low dissolved oxygen, Solids, Trace metals, Synthetic organics, Pesticides	Aquatic life	Low	3	7/98	7/11

Waterbody [1]	Watershed Management Area	HU, HA, or HSA [2]	Total Size [3]	Non Support [4]	Partially Support [5]	Exceeds Standard [6]	Sources [7]	Impairment [8]	Beneficial Uses [9]	TMDL Priority [10]	Level [11]	Start [12]	End [13]
				7 mi			Point/ Nonpoint	Eutrophication, Trash, Pesticides, Synthetic organics, Trace metals	Fish consumption	Low	3	7/98	7/11
Tijuana River Estuary	Tijuana River WMA	911.11	150 ac		1 ac		Point/ Nonpoint	Nickel, Thallium, Lead, Pesticides, Eutrophication, Trash	Aquatic life	Low	3	7/98	7/11
				1 ac			Point/ Nonpoint	Pesticides	Fish consumption	Low	3	7/98	7/11
				150 ac			Point/ Nonpoint	Coliform	Rec-1, Rec-2, Fish consumption, Shellfish harvest	Low	2	7/98	7/11

Attachment 3

Copermittee Populations (1990 U.S. Census Bureau)

Copermittee	Population
Carlsbad	63,126
Chula Vista	135,163
Coronado	26,540
Del Mar	4,860
El Cajon	88,693
Encinitas	55,386
Escondido	108,635
Imperial Beach	26,512
La Mesa	52,931
Lemon Grove	23,984
National City	54,249
Oceanside	128,398
Poway	43,516
San Diego, City	1,110,549
San Diego, County	398,764
San Diego Unified Port District	0
San Marcos	38,974
Santee	52,902
Solana Beach	12,962
Vista	71,872

Attachment 4

Discussion of Municipal Storm Water Permitting and the Watershed Approach

Municipal Storm Water Requirements, Order No. 2001-01

Under the municipal storm water requirements, municipalities are responsible for pollutant discharges into and out of storm water conveyance systems from land uses within their jurisdiction and watershed. This responsibility is based in large part on land use and permitting authority, and underscores the direct link between land use decisions and the resulting long-term water quality consequences of those decisions. Accordingly, the municipal storm water requirements require municipalities to impose controls on existing and future development as necessary to reduce pollutant discharges. A critical requirement of your municipal storm water requirements is to obtain and enforce your legal authorities (i.e., local ordinances, permits) as necessary to maintain (or restore) your compliance with your municipal storm water requirements.

Municipal storm water requirements also specifically direct permittees to prohibit illicit discharges[96] from entering into their storm water conveyance systems. This means requirements to detect (actively seek out) polluted runoff entering your system, identify the source(s) causing the problem, and eliminate the problem(s).

SDRWQCB's Watershed Approach

The term "watershed approach" can mean different things to different people. It often involves several agencies, organizations, and communities addressing numerous environmental concerns. When the SDRWQCB defines a watershed approach, as it has

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96 The term "illicit discharge" is defined in the federal storm water regulations at 40 CFR 122.26 in very board terms. An illicit discharge is any discharge which is not composed entirely of "storm water". Storm water is one of two components of "urban runoff". Urban runoff is the correct term for any and all flows in a municipal storm water conveyance system. Storm water is defined as any flow that originated from precipitation only. Non-storm water is the "catch-all" phrase referring to all flows in the system that originated from any source other than precipitation.

Technically, uncontaminated rainwater is the only "allowable" flow in the storm water conveyance system. As a practical matter, we are currently assuming a rather lenient enforcement position against municipalities for discharging precipitation that has picked up urban pollutants. We have however assumed a much more aggressive enforcement position against municipalities that have failed to enforce their own legal authorities or implement appropriate source control and structural best management practices (BMPs) to the maximum extent practicable. Such BMPs must effectively reduce or eliminate pollutants that would otherwise be available for transport to receiving waters by precipitation. The SDRWQCB has also taken a much more stringent view of runoff originating from sources other than precipitation (e.g., excess irrigation, car washing, etc.) which convey urban pollutants. Such non-storm water flows are prohibited under the municipal storm water requirements. In all cases, the SDRWQCB looks to see if the responsible municipality(s) have truly demonstrated a "good faith" and thorough effort to find, reduce or eliminate pollutants, and their sources. Such good faith efforts must include enforcement of local ordinances and permits, education efforts that are focused on pollutant(s) of concern, and implementation of effective source control and structural BMPs. These efforts should concentrate on man-made, man-accelerated, or "controllable" sources, rather than on uncontrollable sources (e.g., focus on eliminating pet waste rather than wild animal waste).

in the document entitled "Watershed Management Approach for the San Diego Region,"[97] it is limiting its concerns exclusively to water quality issues.

The SDRWQCB's watershed approach considers each geographic watershed (or subwatershed) as a whole and seeks to identify and mitigate all sources of pollutants (both point and non-point sources) throughout the watershed which contribute to the impairment of common downstream receiving waters. This definition emphasizes the important contribution (of pollutants and flow) from "inland sources" to "coastal problems", such as those that have historically plagued San Diego are Beaches. Like the municipal storm water requirements, one of the most important steps in the SDRWQCB's watershed effort is the identification and elimination of the sources causing such water quality impairments.

A word about what a watershed approach is "not" is also in order. The SDRWQCB's (or any one else's) watershed approach is not: a reduction in the responsibility or authority of the SDRWQCB; an abdication of responsibility or authority by the SDRWQCB; a reduction in the tools at the disposal of the SDRWQCB; or a reduction in or limit on the discretion of the SDRWQCB.

Nexus Between Municipal Storm Water Permit and Watershed Approach

The municipal storm water requirements and the SDRWQCB's watershed approach are fully consistent with each other. Both have the same overall objectives and both direct many of the same specific actions; for example identification and elimination sources of pollutants. The municipal storm water requirements is a traditional regulatory measure. The "watershed approach" is, at the moment, largely a non-regulatory measure.

It is important to understand that regulatory and non-regulatory measures are not mutually exclusive. The premise that the watershed approach "contrasts" with regulation is incorrect. The best way to explain the relationship between the two is to say that a "watershed approach" includes, (but is not limited to) regulation. Waste discharge requirements may or may not include a watershed effort. A community watershed effort often involves issues beyond the scope of complying with waste discharge requirements, but compliance with applicable requirements is always an essential component of any watershed effort. Furthermore, because urban runoff pollution is inextricably linked to cumulative pollutants in runoff contributed by all sources in a watershed, it makes a great deal of sense that permittees would choose to implement the requirements of the municipal storm water permit in the context of a watershed approach. However, whether or not you choose to use a watershed approach to do so, it is each permittees responsibility to comply with the municipal storm water requirements.

In addition to fully supporting a watershed approach for protecting water quality, our agency is in a gradual process of shifting our regulatory efforts towards a watershed (rather than programmatic[98]) basis. This means that in the future waste discharge requirements may be issued on a watershed basis. At this time, a few waste discharge

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97 "Watershed Management Approach for the San Diego Region"; Sixth version (draft). Regional Water Quality Control Board, San Diego Region; January 7, 2000.

98 Our office is currently organized into discrete program units e.g., ground water unit, surface water unit, storm water unit, landfill unit, etc.

requirements “encourage” required activities to be conducted on a watershed basis. In the future, it is likely that waste discharge requirements will “require” that activities be conducted on a watershed basis by all dischargers within the watershed in order to address common water quality problems. The fact that many watershed efforts today are voluntary, but may soon be required under waste discharge requirements, illustrates the “three-tiered” watershed approach described in the SDRWQCB’s “Watershed Management Approach for the San Diego Region”. The three-tiered concept embodies the gradual shift from “tier one” stakeholder driven voluntary watershed efforts to “tier three” efforts mandated by waste discharge requirements.

To the extent that a watershed stakeholder is also subject to waste discharge requirements, a tier one, or voluntary watershed effort can only exist in conjunction with, and acknowledgment of, the mandatory requirements of the waste discharge requirements. This is the current situation for San Diego area Copermittees. It is the responsibility of the SDRWQB to ensure that you are complying with your municipal storm water requirements and to the extent that you are not, to take appropriate enforcement action.

Attachment 5

for

Fact Sheet/Technical Report for San Diego Municipal Storm Water Permit
(Order No. 2001-01)

Underline/Strikeout Version of San Diego Municipal Storm Water Permit

This version of the permit exhibits changes to the permit (in underline/strikeout format) not found in the main text of the Fact Sheet/Technical Report.

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN DIEGO REGION

TENTATIVE ORDER NO. 2001-01

NPDES NO. CAS0108758

WASTE DISCHARGE REQUIREMENTS
FOR DISCHARGES OF URBAN RUNOFF FROM
THE MUNICIPAL SEPARATE STORM SEWER SYSTEMS (MS4s)
DRAINING THE WATERSHEDS OF THE
COUNTY OF SAN DIEGO,
THE INCORPORATED CITIES OF SAN DIEGO COUNTY,
AND THE
SAN DIEGO UNIFIED PORT DISTRICT

The California Regional Water Quality Control Board, San Diego Region (hereinafter SDRWQCB), finds that:

1. **COPERMITTEES ARE DISCHARGERS OF URBAN RUNOFF:** Each of the persons in Table 1 below, hereinafter called Copermittees or dischargers, owns or operates a municipal separate storm sewer system (MS4), through which it discharges urban runoff into waters of the United States within the San Diego Region. These MS4s fall into one or more of the following categories: (1) a medium or large MS4 that services a population of greater than 100,000 or 250,000 respectively; or (2) a small MS4 that is "interrelated" to a medium or large MS4; or (3) an MS4 which contributes to a violation of a water quality standard; or (4) an MS4 which is a significant contributor of pollutants to waters of the United States.

Table 1. Municipal Copermittees

1.	City of Carlsbad	11.	City of National City
2.	City of Chula Vista	12.	City of Oceanside
3.	City of Coronado	13.	City of Poway
4.	City of Del Mar	14.	City of San Diego
5.	City of El Cajon	15.	City of San Marcos
6.	City of Encinitas	16.	City of Santee
7.	City of Escondido	17.	City of Solana Beach
8.	City of Imperial Beach	18.	City of Vista
9.	City of La Mesa	19.	County of San Diego
10.	City of Lemon Grove	20.	San Diego Unified Port District

2. **URBAN RUNOFF IS A "WASTE" AND A "POINT SOURCE DISCHARGE OF POLLUTANTS":** Urban runoff is a waste, as defined in the California Water Code, that contains pollutants and adversely affects the quality of the waters of the State. The discharge of urban runoff from an MS4 is a "discharge of pollutants from a point source" into waters of the United States as defined in the Clean Water Act.

3. **URBAN DEVELOPMENT AND RUNOFF CAUSES RECEIVING WATER DEGRADATION:** Urban runoff discharges from MS4s are a leading cause of receiving water quality impairment in the San Diego Region and throughout the United States. As runoff flows over urban areas, it picks up harmful pollutants such as pathogens, sediment (resulting from human activities), fertilizers, pesticides, heavy metals, and petroleum products. These pollutants often become dissolved or suspended in urban runoff and are conveyed and discharged to receiving waters,

such as streams, lakes, lagoons, bays, and the ocean without treatment. Once in receiving waters, these pollutants harm aquatic life primarily through toxicity and habitat degradation. Furthermore, the pollutants can enter the food chain and may eventually enter the tissues of fish and humans.

There is a strong direct correlation between "urbanization" and "impacts to receiving water quality". In general, the more heavily developed the area, the greater the impacts to receiving waters from urban runoff.

These impacts especially threaten environmentally sensitive areas (such as Clean Water Act section 303(d) impaired water bodies, areas designated as Areas of Special Biological Significance, water bodies designated with the RARE beneficial use, and preserves containing receiving waters designated under the Multi Species Conservation Program within the Cities and County of San Diego). Such environmentally sensitive areas have a much lower capacity to withstand pollutants shocks than might be acceptable in the general circumstance. In essence, urban development that is ordinarily insignificant in its impact on the environment may, in a particularly sensitive environment, be significant.

4. **URBAN DEVELOPMENT INCREASES POLLUTANT LOAD, VOLUME, AND VELOCITY OF RUNOFF:** During urban development two important changes occur. First, natural vegetated pervious ground cover is converted to impervious surfaces such as paved highways, streets, rooftops, and parking lots. Natural vegetated soil can both absorb rainwater and remove pollutants providing a very effective natural purification process. Because pavement and concrete can neither absorb water nor remove pollutants, the natural purification characteristics of the land are lost.

   Secondly, urban development creates new pollution sources as human population density increases and brings with it proportionately higher levels of car emissions, car maintenance wastes, municipal sewage, pesticides, household hazardous wastes, pet wastes, trash, etc. which can either be washed or directly dumped into the MS4.

   As a result of these two changes, the runoff leaving the developed urban area is significantly greater in volume, velocity and pollutant load than the pre-development runoff from the same area.

   The significance of the impacts of urban development on receiving waters is determined by the scope of the project, such as the size of the project, the project land-use type, etc. Large projects (such as commercial developments greater than 100,000 square feet, home subdivisions greater than 10 units, and streets, roads, highways, and freeways) generally have large amounts of impervious surface, and therefore have greater potential to significantly impact receiving waters by increasing erosion (through increased peak flow rates, flow velocities, flow volumes, and flow durations) than smaller projects. Projects of particular land use types also have greater potential to significantly impact receiving waters due to the presence of typically large amounts of pollutants on site or an increased potential for pollutants to move off site (such as automotive repair shops, restaurants, parking lots, streets, roads, highways, and freeways, hillside development, and retail gasoline outlets).

5. **WATER QUALITY DEGRADATION INCREASES WITH PERCENT IMPERVIOUSNESS:** The increased volume and velocity of runoff from developed urban areas greatly accelerates the erosion of downstream natural channels. Numerous studies have demonstrated a direct correlation between the degree of imperviousness of an area and the degradation of its receiving water quality. Significant declines in the biological integrity and physical habitat of streams and other receiving waters have been found to occur with as little as a 10% conversion from

natural to impervious surfaces. (Developments of medium density single family homes range between 25 to 60% impervious). Today "% impervious coverage" is believed to be a reliable indicator and predictor of the water quality degradation expected from planned new development.

6. **URBAN RUNOFF IS A HUMAN HEALTH THREAT:** Urban runoff contains pollutants, which threaten human health. Human illnesses have been clearly linked to recreating (i.e., swimming, surfing, etc.) near storm drains flowing to coastal beach waters. Such flows from urban areas often result in the posting or closure of local beaches.

   Pollutants transported to receiving waters by urban runoff can also enter the food chain. Once in the food chain they can "bioaccumulate" in the tissues of invertebrates (e.g., mussels, oysters, and lobsters) and fish which may be eventually consumed by humans. Furthermore, some pollutants are also known to "biomagnify". This phenomenon can result in pollutant concentrations in the body fat of top predators that are millions of times greater than the concentrations in the tissues of their lower trophic (food chain) counterparts or in ambient waters.

7. **POLLUTANT TYPES:** The most common categories of pollutants in urban runoff include total suspended solids, sediment (due to anthropogenic activities); pathogens (e.g., bacteria, viruses, protozoa); heavy metals (e.g., copper, lead, zinc and cadmium); petroleum products and polynuclear aromatic hydrocarbons; synthetic organics (e.g., pesticides, herbicides, and PCBs); nutrients (e.g., nitrogen and phosphorus fertilizers), oxygen-demanding substances (decaying vegetation, animal waste), and trash.

8. **URBAN STREAMS AS AN MS4 COMPONENT:** Historic and current development make use of natural drainage patterns and features as conveyances for urban runoff. Urban streams used in this manner are part of the municipalities MS4 regardless of whether they are natural, man-made, or partially modified features. In these cases, the urban stream is both an MS4 and a receiving water.

9. **URBAN RUNOFF CAUSES BENEFICIAL USE IMPAIRMENT**: Individually and in combination, the discharge of pollutants and increased flows from MS4s can cause or threaten to cause a condition of pollution (i.e., unreasonable impairment of water quality for designated beneficial uses), contamination, or nuisance. The discharge of pollutants from MS4s can cause the concentration of pollutants to exceed applicable receiving water quality objectives and impair or threaten to impair designated beneficial uses.

10. **COPERMITTEES IMPLEMENT URBAN RUNOFF MANAGEMENT PROGRAMS (URMPs):** Copermittee implementation of Urban Runoff Management Programs (URMPs) designed to reduce discharges of pollutants and flow into and from MS4s to the maximum extent practicable (MEP) can protect receiving water quality by promoting attainment of water quality objectives necessary to support designated beneficial uses. To be most effective, URMPs must contain both structural and non-structural best management practices (BMPs).

11. **BEST MANAGEMENT PRACTICES (BMPs):** Pollutants can be effectively reduced in urban runoff by the application of a combination of pollution prevention, source control, and treatment control BMPs. Source control BMPs (both structural and non-structural) minimize the contact between pollutants and flows (e.g., rerouting run-on around pollutant sources or keeping pollutants on-site and out of receiving waters). Treatment control (or structural) BMPs remove pollutants from urban runoff. Where feasible, use of BMPs which utilize natural processes should be assessed. These types of BMPs, such as grassy swales and constructed wetlands, can frequently be as effective as less natural BMPs, while providing additional benefits such as

aesthetics and habitat.

12. **POLLUTION PREVENTION**: Pollution prevention, the initial reduction/elimination of pollutant generation at its source, is the best "first line of defense" for Copermittees and should be used in conjunction with source control and treatment control BMPs. Pollutants that are never generated do not have to be controlled or treated. Encouragement during planning processes of the use of pollution prevention BMPs can be an effective means for pollution prevention BMPs to be implemented, through such methods as education, landscaping, etc.

13. **RECEIVING WATER LIMITATIONS:** Compliance with receiving water limits based on applicable water quality objectives is necessary to ensure that MS4 discharges will not cause or contribute to violations of water quality objectives and the creation of conditions of pollution.

14. **RECEIVING WATER LIMITATION COMPLIANCE STRATEGY**: Implementation of BMPs cannot ensure attainment of receiving water quality objectives under all circumstances; some BMPs may not prove to be as effective as anticipated. An iterative process of BMP development, implementation, monitoring, and assessment is necessary to assure that an Urban Runoff Management Program is sufficiently comprehensive and effective to achieve compliance with receiving water quality objectives.

15. **COPERMITTEES' RESPONSIBILITY FOR ILLICIT DISCHARGES FROM THIRD PARTIES:** As operators of MS4s, the Copermittees cannot passively receive and discharge pollutants from third parties. By providing free and open access to an MS4 that conveys discharges to the waters of the United States, the operator of an MS4 that does not prohibit and/or control discharges into its system essentially accepts responsibility ~~"title"~~ for those discharges.

16. **COPERMITTEES' RESPONSIBILITY BASED ON LAND USE AUTHORITY**: Utilizing their land use authority, Copermittees authorize and ~~profit~~ realize benefits from the urban development which generates the pollutants and runoff that impair receiving waters. Since the Copermittees utilize their legal authority to authorize urbanization, they must also exercise their legal authority to ensure that the resulting increased pollutant loads and flows do not further degrade receiving waters.

17. **THREE PHASES OF URBAN DEVELOPMENT:** Urban development has three major phases: (1) land use planning for new development; (2) construction; and (3) the "use" or existing development phase. Because the Copermittees authorize, permit, and profit from each of these phases, and because each phase has a profound impact on water quality, the Copermittees have commensurate responsibilities to protect water quality during each phase.

    In other words, Copermittees are held responsible for the short and long-term water quality consequences of their land use planning, construction, and existing development decisions.

18. **PLANNING PHASE FOR NEW DEVELOPMENT**: Because land use planning and zoning is where urban development is conceived, it is the phase in which the greatest and most cost-effective opportunities to protect water quality exists. When a Copermittee incorporates policies and principles designed to safeguard water resources into its General Plan and development project approval processes, it has taken a far-reaching step towards the preservation of local water resources for future generations.

19. **CONSTRUCTION PHASE**: Construction activities are a significant cause of receiving water impairment. Siltation is currently the largest cause of river impairment in the United States. Sediment runoff rates from construction sites greatly exceed natural erosion rates of undisturbed lands causing siltation and impairment of receiving waters. In addition to requiring

implementation of the full range of BMPs, an effective construction runoff program must include local plan review, permit conditions, field inspections, and enforcement.

20. **EXISTING DEVELOPMENT:** The Copermittees' wet weather monitoring results collected during the past decade, as well as volumes of other references in the literature today, confirm substantial pollutant loads to receiving waters in runoff from existing urban development. Implementation of jurisdictional and watershed URMPs, which include extensive controls on existing development, can reduce pollutant loadings over the long term.

21. **CHANGES NEEDED**: Because the urbanization process is a direct and leading cause of water quality degradation in this Region, fundamental changes to existing policies and practices about urban development are needed if the beneficial uses of San Diego's natural water resources are to be protected.

22. **DUAL REGULATION OF INDUSTRIAL AND CONSTRUCTION SITES:** Discharges of runoff from industrial and construction sites in this Region are subject to dual (state and local) regulation. (1) All industries and construction sites are subject to the local permits, plans, and ordinances of the municipal jurisdiction in which it is located. Pursuant to this Order, local (storm water, grading, construction, and use) permits, plans, and ordinances must (a) prohibit the discharge of pollutants and non-storm water into the MS4; and (b) require the routine use of BMPs to reduce pollutants in site runoff. (2) Many industries and construction sites are also subject to regulation under the statewide General Industrial Storm Water Permit or statewide General Construction Storm Water Permit[1]. These statewide general permits are adopted by the State Water Resources Control Board and enforced by the nine Regional Water Quality Control Boards throughout California. Like the Copermittees' local permits and ordinances, the statewide General Industrial and Construction Permits also (a) prohibit the discharge of pollutants and non-storm water; and (b) require the routine use of BMPs to reduce pollutants in site runoff.

    Recognizing that both authorities share a common goal, the federal storm water regulations at 40 CFR 122.26 (and its preamble) call for the dual system to ensure the most effective oversight of industrial and construction site discharges. Under this dual system, each municipal Copermittee is responsible for enforcing its local permits, plans, and ordinances within its jurisdiction. Similarly, the SDRWQCB is responsible for enforcing both statewide general permits and this Order within the San Diego Region.

23. **EDUCATION:** Education is the foundation of every effective URMP and the basis for changes in behavior at a societal level. Education of municipal planning, inspection, and maintenance department staffs is especially critical to ensure that in-house staffs understand how their activities impact water quality, how to accomplish their jobs while protecting water quality, and their specific roles and responsibilities for compliance with this Order. Public education, designed to target various urban land users and other audiences, is also essential to inform the public of how individual actions impact receiving water quality and how these impacts can be minimized.

24. **ENFORCING LOCAL LEGAL AUTHORITY**: Enforcement of local urban runoff related ordinances, permits, and plans is an essential component of every URMP and is specifically

[1] The "statewide General Industrial Storm Water Permit" refers to State Water Resources Control Board Water Quality Order No. 97-03-DWQ National Pollutant Discharge Elimination System General Permit No. CAS000001, Waste Discharge Requirements for Discharges of Storm Water Associated with Industrial Activities Excluding Construction Activities. The "statewide General Construction Storm Water Permit" refers to State Water Resources Control Board Order No. 99-08-DWQ National Pollutant Discharge Elimination System General Permit No. CAS000002, Waste Discharge Requirements for Discharges of Storm Water Runoff Associated with Construction Activity.

required in the federal storm water regulations and this Order. Routine inspections provide an effective means by which Copermittees can evaluate compliance with their permits and ordinances. Inspections are especially important at high-risk areas for pollutant discharges such as industrial and construction sites.

When industrial or construction site discharges occur in violation of local permits and ordinances, the SDRWQCB looks ~~first~~ to the municipality that has authorized the discharge for appropriate actions (typically education followed by enforcement where education has been unsuccessful). ~~If the municipality has demonstrated a good faith effort to educate and enforce but remains unsuccessful, the SDRWQCB will then step in to enforce the applicable statewide general permit. If the municipality has not demonstrated a good faith enforcement effort, the SDRWQCB may initiate enforcement action against both the industrial or construction discharger (under the statewide general permit), as well as against the authorizing municipal Copermittee for violations of this Order.~~ Each Copermittee must also provide ~~the first level of~~ enforcement against illegal discharges from other land uses it has authorized, such as commercial and residential developments.

25. **PUBLIC PARTICIPATION:** Public participation during the URMP development process is necessary to ensure that all stakeholder interests and a variety of creative solutions are considered.

26. **TOXICITY**: Urban runoff discharges from MS4s often contain pollutants that cause toxicity, (i.e., adverse responses of organisms to chemicals or physical agents ranging from mortality to physiological responses such as impaired reproduction or growth anomalies). The water quality objectives for toxicity provided in the Water Quality Control Plan, San Diego Basin, Region 9, (Basin Plan), state in part *"All waters shall be free of toxic substances in concentrations that are toxic to, or that produce detrimental physiological responses in human, plant, animal, or aquatic life….The survival of aquatic life in surface waters subjected to a waste discharge or other controllable water quality factors, shall not be less than that for the same water body in areas unaffected by the waste discharge…"* Urban runoff discharges from MS4s are considered toxic when (1) the toxic effect observed in an acute toxicity test exceeds zero Toxic Units Acute (TUa=0); or (2) the toxic effect observed in a chronic toxicity test exceeds one Toxic Unit Chronic (TUc=1).

27. **FOCUS ON MAN-MADE POLLUTANTS AND FLOWS:** The focus of this Order is on the control of urban runoff pollutants and flows which are either generated or accelerated by human activities. This Order is not meant to control background or naturally occurring pollutants and flows.

28. **COMMON WATERSHEDS AND CWA SECTION 303(d) IMPAIRED WATERS:** The Copermittees discharge urban runoff into lakes, drinking water reservoirs, rivers, streams, creeks, bays, estuaries, coastal lagoons, the Pacific Ocean, and tributaries thereto within ten of the eleven hydrologic units (watersheds) comprising the San Diego Region as shown in Table 2 below. During its downstream course, urban runoff is conveyed through lined and unlined (natural, manmade, and partially modified) channels, all of which are defined as components of the Copermittees' MS4.

Some of the receiving water bodies, which receive or convey urban runoff discharges, have been designated as impaired by the SDRWQCB and USEPA in 1998 pursuant to Clean Water Act section 303(d). Also shown below are the watershed management areas (WMAs) as defined in the SDRWQCB report, Watershed Management Approach, January 2000.

Table 2. Watershed Management Areas (WMAs)

SDRWQCB WATERSHED MANAGEMENT AREA (WMA)	HYDROLOGIC UNIT(S)	MAJOR SURFACE WATER BODIES	303(d) POLLUTANT(S) OF CONCERN OR WATER QUALITY EFFECT	COPERMITTEES
Santa Margarita River	Santa Margarita (902.00)	Santa Margarita River and Estuary, Pacific Ocean	1. Coliform Bacteria 2. Nutrients	1. County of San Diego
San Luis Rey River	San Luis Rey (903.00)	San Luis Rey River and Estuary, Pacific Ocean	1. Coliform Bacteria 2. Nutrients	1. City of Escondido 2. City of Oceanside 3. City of Vista 4. County of San Diego
Carlsbad	Carlsbad (904.00)	Batiquitos Lagoon San Elijo Lagoon Agua Hedionda Lagoon Buena Vista Lagoon And Tributary Streams Pacific Ocean	1. Coliform Bacteria 2. Nutrients 3. Sediment	1. City of Carlsbad 2. City of Encinitas 3. City of Escondido 4. City of Oceanside 5. City of San Marcos 6. City of Solana Beach 7. City of Vista 8. County of San Diego
San Dieguito River	San Dieguito (905.00)	San Dieguito River and Estuary, Pacific Ocean	1. Coliform Bacteria	1. City of Del Mar 2. City of Escondido 3. City of Poway 4. City of San Diego 5. City of Solana Beach 6. County of San Diego
Mission Bay	Peñasquitos (906.00)	Los Peñasquitos Lagoon Mission Bay, Pacific Ocean	1. Coliform Bacteria 2. Metals 3. Nutrients 4. Sediment	1. City of Del Mar 2. City of Poway 3. City of San Diego 4. County of San Diego
San Diego River	San Diego (907.00)	San Diego River, Pacific Ocean	1. Coliform Bacteria	1. City of El Cajon 2. City of La Mesa 3. City of Poway 4. City of San Diego 5. City of Santee 6. County of San Diego
San Diego Bay	Pueblo San Diego (908.00) Sweetwater (909.00) Otay (910.00)	San Diego Bay Sweetwater River Otay River Pacific Ocean	1. Coliform Bacteria 2. Metals 3. Toxicity 4. Benthic Community Degradation	1. City of Chula Vista 2. City of Coronado ~~3. City of El Cajon~~ ~~4~~3. City of Imperial Beach ~~5~~4. City of La Mesa ~~6~~5. City of Lemon Grove ~~7~~6. City of National City ~~8~~7. City of San Diego ~~9~~8. County of San Diego ~~10~~9.San Diego Unified Port District
Tijuana River	Tijuana (911.00)	Tijuana River and Estuary Pacific Ocean	1. Coliform Bacteria 2. Low Dissolved Oxygen 3. Metals 4. Nutrients 5. Pesticides 6. Synthetic Organics 7. Total Dissolved Solids 8. Trash	1. City of Imperial Beach 2. City of San Diego 3. County of San Diego

29. **CUMULATIVE POLLUTANT LOAD CONTRIBUTIONS:** Because they are interconnected, each MS4 within a watershed contributes to the cumulative pollutant loading, volume, and velocity of urban runoff and the ensuing degradation of downstream receiving water bodies. Accordingly, inland

MS4s contribute to coastal impairments.

30. **LAND USE PLANNING ON A WATERSHED SCALE:** Because urban runoff does not recognize political boundaries, "watershed-based" land use planning (pursued collaboratively by neighboring local governments) can greatly enhance the protection of shared natural water resources. Such planning enables multiple jurisdictions to work together to plan for both development and resource conservation that can be environmentally as well as economically sustainable.

31. **INTERGOVERNMENTAL COORDINATION:** Within their common watersheds it is essential for the Copermittees to coordinate their water quality protection and land use planning activities to achieve the greatest protection of receiving water bodies. Copermittee coordination with other watershed stakeholders, especially Caltrans and the Department of Defense, is also critical.

    Establishment of a management structure, within which the Copermittees subject to this Order, will fund and coordinate those aspects of their joint obligations will promote implementation of Urban Runoff Management Programs on a watershed and regional basis in the most cost effective manner.

32. **WASTE REMOVAL:** Waste and pollutants which are deposited and accumulate in MS4 drainage structures will be discharged from these structures to waters of the United States unless they are removed. These discharges may cause or contribute to, or threaten to cause or contribute to, a condition of pollution in receiving waters. Once removed, such accumulated wastes must be characterized and lawfully disposed.

33. **TOXIC HOT SPOTS:** Urban runoff is a significant contributor to the creation and persistence of Toxic Hot Spots in San Diego Bay. California Water Code section 13395 requires regional boards to reevaluate waste discharge requirements (WDRs) associated with toxic hot spots. The State Water Resources Control Board (SWRCB) adopted the Consolidated Toxic Hot Spot Cleanup Plan in June 1999. The Plan states: "The reevaluation [of WDRs associated with toxic hot spots] shall consist of (1) an assessment of the WDRs that may influence the creation or further pollution of the known toxic hot spot, (2) an assessment of which WDRs need to be modified to improve environmental conditions at the known toxic hot spot, and (3) a schedule for completion of any WDR modifications deemed appropriate."

34. **CHANGING THE STORM WATER MANAGEMENT APPROACH:** In contrast to the conventional "conveyance" approach, a more natural approach to storm water management seeks to filter and infiltrate runoff by allowing it to flow slowly over permeable vegetated surfaces. By "preserving and restoring the natural hydrologic cycle", filtration and infiltration can greatly reduce the volume/peak rate, velocity, and pollutant loads of urban runoff. The greatest opportunities for changing from a "conveyance" to a more natural management approach occur during the land use planning and zoning processes and when new development projects are under early design.

35. **INFILTRATION AND POTENTIAL GROUNDWATER CONTAMINATION:** Any drainage feature that infiltrates runoff poses some risk of potential groundwater contamination. Although dependent on several factors, the risks typically associated with ~~the~~ properly managed infiltration of runoff (especially from residential land use areas) are not significant. The risks associated with infiltration can be managed by many techniques, including (1) designing landscape drainage features that promote infiltration of runoff, but do not "inject" runoff (injection bypasses the natural processes of filtering and transformation that occur in the soil); (2) taking reasonable steps to prevent the illegal disposal of wastes; and (3) ensuring that each drainage feature is adequately maintained in

perpetuity. Minimum conditions needed to protect groundwater are specified in section F.1.b. of this Order.

36. **VECTOR CONTROL:** Certain BMPs implemented or required by municipalities for urban runoff management may create a habitat for vectors (e.g. mosquitoes and rodents) if not properly designed or maintained. Close collaboration and cooperative effort between municipalities and local vector control agencies and the State Department of Health Services during the development and implementation of the Urban Runoff Management Programs is necessary to minimize nuisances and public health impacts resulting from vector breeding.

37. **LEGAL AUTHORITY:** This Order is based on the federal Clean Water Act, the Porter-Cologne Water Quality Control Act (Division 7 of the Water Code, commencing with Section 13000), applicable state and federal regulations, all applicable provisions of statewide Water Quality Control Plans and Policies adopted by the State Water Resources Control Board, the Regional Water Quality Control Plan (Basin Plan) adopted by the Regional Board, the California Toxics Rule, and the California Toxics Rule Implementation Plan.

38. **TOTAL MAXIMUM DAILY LOADS (TMDLs):** 40 CFR 122.44 (d)(vii)(B) requires that NPDES permits contain effluent limitations that are consistent with waste load allocations developed under a TMDL. Several TMDLs are being developed in the San Diego Region for impaired waterbodies that receive Copermittees' discharge. Once these TMDLs are approved by the SDRWQCB and USEPA, Copermitees' discharge of urban runoff into an impaired waterbody will be subject to load allocations established by the TMDLs.

39. **ANTIDEGRADATION:** Conscientious implementation of URMPs that satisfy the requirements contained in this Order will reduce the likelihood that discharges from MS4s will cause or contribute to unreasonable degradation of the quality of receiving waters. Therefore, this Order is in conformance with SWRCB Resolution No. 68-16 and the federal antidegradation policy described in 40 CFR 131.12.

~~38.~~40. **CEQA:** The issuance of waste discharge requirements for the discharge of urban runoff from MS4s to waters of the United States is exempt from the requirement for preparation of environmental documents under the California Environmental Quality Act (CEQA) (Public Resources Code, Division 13, Chapter 3, § 21000 et seq.) in accordance with the CWC § 13389.

~~39.~~41. **PUBLIC NOTICE:** The SDRWQCB has notified the Copermittees, all known interested parties, and the public of its intent to consider adoption of an order prescribing waste discharge requirements that would serve to renew an NPDES permit for the existing discharge of urban runoff.

~~39.~~42. **PUBLIC HEARING**: The SDRWQCB has, at a public meeting on **December 13, 2000,** held a public hearing and heard and considered all comments pertaining to the terms and conditions of this Order.

IT IS HEREBY ORDERED that the Copermittees, in order to meet the provisions contained in Division 7 of the California Water Code and regulations adopted thereunder, and the provisions of the Clean Water Act and regulations adopted thereunder, shall each comply with the following:

A. PROHIBITIONS -- DISCHARGES

1. Discharges into and from MS4s in a manner causing, or threatening to cause, a condition of pollution, contamination, or nuisance (as defined in CWC § 13050), in waters of the state are

prohibited.

2. Discharges from MS4s which cause or contribute to exceedances of receiving water quality objectives for surface water or groundwater are prohibited.

3. Discharges into and from MS4s containing pollutants which have not been reduced to the maximum extent practicable (MEP) are prohibited.

4. Applicable to New Development and ~~Significant~~ Redevelopment ~~Only~~:
~~Post-development runoff which is greater in peak rate or velocity than pre-development runoff from the same site is prohibited.~~ Post-development runoff containing pollutants loads which cause or contribute to an exceedance of receiving water quality objectives or which have not been reduced to the maximum extent practicable is prohibited. ~~Discharges of post-development runoff into a Clean Water Act section 303(d) water body containing any pollutant (for which the water body is already impaired) in levels exceeding predevelopment levels (for those same pollutants) is prohibited.~~

5. In addition to the above prohibitions, discharges from MS4s are subject to all Basin Plan prohibitions cited in **Attachment A** to this Order.

B. PROHIBITIONS -- NON-STORM WATER DISCHARGES

1. Each Copermittee shall effectively prohibit **all** types of non-storm water discharges into its Municipal Separate Storm Sewer System (MS4) unless such discharges are either authorized by a separate NPDES permit; or not prohibited in accordance with B.2. and B.3. below.

2. Pursuant to 40 CFR 122.26(d)(2)(iv)(B)(1), the following categories of non-storm water discharges need only be prohibited from entering an MS4 if such categories of discharges are identified by the Copermittee as a significant source of pollutants to waters of the United States:

   a. Diverted stream flows;
   b. Rising ground waters;
   c. Uncontaminated ground water infiltration [as defined at 40 CFR 35.2005(20)] to MS4s;
   d. Uncontaminated pumped ground water;
   e. Foundation drains;
   f. Springs;
   g. Water from crawl space pumps;
   h. Footing drains;
   i. Air conditioning condensation;
   j. Flows from riparian habitats and wetlands;
   k. Water line flushing;
   l. Landscape irrigation;
   m. Discharges from potable water sources other than water main breaks;
   n. Irrigation water;
   o. Lawn watering;
   p. Individual residential car washing; and
   q. Dechlorinated swimming pool discharges.

3. When a discharge category above is identified as a significant source of pollutants to waters of the United States, the Copermittee shall either:

   a. Prohibit the discharge category from entering its MS4; ***OR***

   b. Not prohibit the discharge category and implement, or require the responsible party(ies) to implement, BMPs which will reduce pollutants to the MEP; ***AND***

   c. For each discharge category not prohibited, the Copermittee shall submit the following information to the SDRWQCB within **365 ~~180~~ days** of adoption of this Order:

      (1) The non-storm water discharge category listed above which the Copermittee elects not to prohibit; and

      (2) The BMP(s) for each discharge category listed above which the Copermittee will implement, or require the responsible party(ies) to implement, to prevent or reduce pollutants to the MEP.

4. **Fire Fighting Flows:** ~~BMPs must be implemented to reduce pollutants from non-emergency fire fighting flows (i.e., flows from controlled or practice blazes) identified by the Copermittee to be significant sources of pollutants to waters of the United States.~~ Emergency fire fighting flows (i.e., flows necessary for the protection of life or property) do not require BMPs and need not be prohibited. As part of the Jurisdictional URMP, each Copermittee shall develop and implement a program within 365 days of adoption of this Order to reduce pollutants from non-emergency fire fighting flows (i.e., flows from controlled or practice blazes and maintenance activities) identified by the Copermittee to be significant sources of pollutants to waters of the United States.

5. **Dry Weather Analytical Monitoring and Non-Storm Water Discharges:** Each Copermittee shall examine all dry weather analytical monitoring results collected in accordance with section F.5. and Attachment E of this Order to identify water quality problems which may be the result of any non-prohibited discharge category(ies) identified above in Non-Storm Water Discharges to MS4s Prohibition B.2. Follow-up investigations shall be conducted as necessary to identify and control any non-prohibited discharge category(ies) listed above. Non-prohibited discharges listed in B.2. above which contain pollutants which cannot be reduced to insignificant levels ~~the maximum extent practicable~~ by the implementation of BMPs shall be prohibited on a categorical or case by case basis.

C. RECEIVING WATER LIMITATIONS

1. Discharges from MS4s that cause or contribute to the violation of water quality standards (designated beneficial uses and water quality objectives developed to protect beneficial uses) are prohibited.

2. Each Copermittee shall comply with Part C.1. of this Order through timely implementation of control measures and other actions to reduce pollutants in urban runoff discharges in accordance with the Jurisdictional Urban Runoff Management Program (Jurisdictional URMP) and other requirements of this Order including any modifications. The Jurisdictional URMP shall be designed to achieve compliance with Part C.1. of this Order. If exceedance(s) of water quality standards persist notwithstanding implementation of the URMP and other requirements of this Order, the Copermittee shall assure compliance with Part C.1. of this Order by complying with the following procedure:

a. Upon a determination by either the Copermittee or the SDRWQCB that MS4 discharges are causing or contributing to an exceedance of an applicable water quality standard, the Copermittee shall promptly notify and thereafter submit a report to the SDRWQCB that describes BMPs that are currently being implemented and additional BMPs that will be implemented to prevent or reduce any pollutants that are causing or contributing to the exceedance of water quality standards. The report may be incorporated in the annual update to the Jurisdictional URMP unless the SDRWQCB directs an earlier submittal. The report shall include an implementation schedule. The SDRWQCB may require modifications to the report;

b. Submit any modifications to the report required by the SDRWQCB within 30 days of notification;

c. Within 30 days following approval of the report described above by the SDRWQCB, the Copermittee shall revise its Jurisdictional URMP and monitoring program to incorporate the approved modified BMPs that have been and will be implemented, the implementation schedule, and any additional monitoring required;

d. Implement the revised Jurisdictional URMP and monitoring program in accordance with the approved schedule.

So long as the Copermittee has complied with the procedures set forth above and are implementing the revised Jurisdictional URMP, the Copermittee does not have to repeat the same procedure for continuing or recurring exceedances of the same receiving water limitations unless directed by the SDRWQCB to do so.

3. Nothing in this section shall prevent the SDRWQCB from enforcing any provision of this Order while the Copermittee prepares and implements the above report.

D. LEGAL AUTHORITY

1. Each Copermittee shall establish, maintain, and enforce adequate legal authority to control pollutant discharges **into** and **from** its MS4 through ordinance, statute, permit, contract or similar means. This legal authority must, at a minimum, authorize the Copermittee to:

   a. Control the contribution of pollutants in discharges of runoff associated with industrial and construction activity **to** its MS4 and control the quality of runoff **from** industrial and construction sites. This requirement applies both to industrial and construction sites which have coverage under the statewide general industrial or construction storm water permits, as well as to those sites which do not. Grading ordinances shall be upgraded and enforced as necessary to comply with this Order.

   b. Prohibit **all** identified illicit discharges not otherwise allowed pursuant to section B.2 including but not limited to:

      (1) Sewage;

(2) Discharges of wash water resulting from the hosing or cleaning of gas stations, auto repair garages, or other types of automotive services facilities;

(3) Discharges resulting from the cleaning, repair, or maintenance of any type of equipment, machinery, or facility including motor vehicles, cement-related equipment, and port-a-potty servicing, etc.;

(4) Discharges of wash water from mobile operations such as mobile automobile washing, steam cleaning, power washing, and carpet cleaning, etc.;

(5) Discharges of wash water from the cleaning or hosing of impervious surfaces in municipal, industrial, commercial, and residential areas including parking lots, streets, sidewalks, driveways, patios, plazas, work yards and outdoor eating or drinking areas, etc.;

(6) Discharges of runoff from material storage areas containing chemicals, fuels, grease, oil, or other hazardous materials;

(7) Discharges of pool or fountain water containing chlorine, biocides, or other chemicals; discharges of pool or fountain filter backwash water;

(8) Discharges of sediment, pet waste, vegetation clippings, or other landscape or construction-related wastes; and

(9) Discharges of food-related wastes (e.g., grease, fish processing, and restaurant kitchen mat and trash bin wash water, etc.).

c. Prohibit and eliminate illicit connections to the MS4;

d. Control the discharge of spills, dumping, or disposal of materials other than storm water to its MS4;

e. Require compliance with conditions in Copermittee ordinances, permits, contracts or orders (i.e., hold dischargers to its MS4 accountable for their contributions of pollutants and flows);

f. Utilize enforcement mechanisms to require compliance with Copermittee storm water ordinances, permits, contracts, or orders;

g. Control the contribution of pollutants from one portion of the shared MS4 to another portion of the MS4 through interagency agreements among Copermittees. ~~(~~Control of the contribution of pollutants from one portion of the shared MS4 to another portion of the MS4 through interagency agreements with ~~and~~ other owners of the MS4 such as Caltrans or Department of Defense is encouraged.~~)~~);

h. Carry out all inspections, surveillance, and monitoring necessary to determine compliance and noncompliance with local ordinances and permits and with this Order, including the prohibition on illicit discharges to the MS4. This means the Copermittee must have authority to enter, sample, inspect, review and copy records, and require regular reports from industrial facilities discharging into its MS4, including construction sites; and

i. Require the use of best management practices (BMPs) to prevent or reduce the discharge of pollutants to MS4s.

2. Within ~~90~~ **180 days** of adoption of this Order, each Copermittee shall provide to the SDRWQCB a statement certified by its chief legal counsel that the Copermittee has adequate legal authority to implement and enforce each of the requirements contained in 40 CFR 122.26(d)(2)(i)(A-F) and this Order. This statement shall include:

a. Identification of all departments within the jurisdiction that conduct urban runoff related activities, and their roles and responsibilities under this Order. Include an up to date organizational chart specifying these departments and key personnel.

b. Citation of urban runoff related ordinances and the reasons they are enforceable;

c. Identification of the local administrative and legal procedures available to mandate compliance with urban runoff related ordinances and therefore with the conditions of this Order;

d. Description of how these ordinances are implemented and appealed; and

e. Description of whether the municipality can issue administrative orders and injunctions or if it must go through the court system for enforcement actions.

E. TECHNOLOGY BASED STANDARDS

Each Copermittee shall implement, or require implementation of, best management practices to ensure that the following pollutant discharges **into** and **from** its MS4 are reduced to the applicable technology based standard as specified below:

Table 3. Technology Based Standards[2]

POLLUTANT DISCHARGE FROM	DESCRIPTION	APPLICABLE PERFORMANCE STANDARD
Industrial Activity owned by the Copermittee	Categorical Industry in 40 CFR 122.26	BAT/BCT (pursuant to Statewide General Industrial

[2] Pursuant to this Order, each Copermittee shall ensure that pollutants in runoff from industrial and construction sites within its jurisdiction have been reduced to the MEP standard before entering its MS4. The industrial and construction site dischargers themselves however must ensure that pollutants in runoff leaving their sites have been reduced to the BAT/BCT standard pursuant to either the statewide General Industrial or Construction Storm Water Permit. Runoff from industrial and construction sites owned by municipalities and subject to either the General Industrial or Construction Storm Water Permits, must meet the BAT/BCT standard.

POLLUTANT DISCHARGE FROM	DESCRIPTION	APPLICABLE PERFORMANCE STANDARD
		Permit)
Industrial Activity	All other industry	MEP
Construction Activity owned by the Copermittee	Greater than or Equal to 5 Acres (or less than 5 acres and Part of a Larger Common Plan of Sale or Development)	BAT/BCT (pursuant to Statewide General Construction Permit)
Construction Activity	All Other construction	MEP
Other Sources	All Other Land Use Activities	MEP
MS4s	All discharges from MS4s	MEP

F. JURISDICTIONAL URBAN RUNOFF MANAGEMENT PROGRAM`

Each Copermittee shall take appropriate actions to reduce discharges of pollutants and runoff flow during each of the three major phases of urban development, i.e., the planning, construction, and existing development (or use) phases.

Each Copermittee shall implement a Jurisdictional Urban Runoff Management Program (Jurisdictional URMP) that contains the components shown below as described in Sections F.1. through F.8:

F.1. Land-Use Planning for New Development and Redevelopment Component
F.2. Construction Component
F.3. Existing Development Component
- **a. Municipal**
- **b. Industrial**
- **c. Commercial**
- **d. Residential**

F.4. Education Component
F.5. Illicit Discharge Detection and Elimination Component
F.6. Public Participation Component
F.7. Assessment of Jurisdictional URMP Effectiveness Component
F.8. Fiscal Analysis Component

F.1. Land-Use Planning for New Development and Redevelopment Component

Each Copermittee shall minimize the short and long-term impacts on receiving water quality from new development and redevelopment. In order to reduce pollutants and runoff flows from new development and redevelopment to the maximum extent practicable, each Copermittee shall at a minimum:

F.1.a ~~Revise~~ Assess General Plan
F.1.b Modify Development Project Approval Processes
F.1.c Revise Environmental Review Processes ~~Including CEQA Checklists~~
F.1.d Conduct Education Efforts Focused on New Development and Redevelopment

F.1.a. ~~Revise~~ Assess General Plan

Each Copermittee's General Plan or equivalent plan (e.g., Comprehensive, Master, or Community Plan) shall include ~~incorporate~~ water quality and watershed protection principles and policies ~~into the General Plan or equivalent plan (e.g., Comprehensive, Master, or Community Plan)~~ to direct land-use decisions and require implementation of consistent water quality protection measures for ~~all~~ development projects. ~~These principles and policies shall be designed to protect natural water bodies, reduce impervious land coverage, slow runoff, and where feasible, maximize opportunities for infiltration of rainwater into soil.~~ As part of its Jurisdictional Urban Runoff Management Program document, each Copermittee shall provide a workplan with time schedule detailing any changes to its General Plan regarding water quality and watershed protection. Examples of ~~Such~~ water quality and watershed protection principles and policies ~~shall~~ to be considered include the following~~for example~~:

(1) Minimize the amount of impervious surfaces and directly connected impervious surfaces in areas of new development and redevelopment and where feasible slow runoff and maximize on-site infiltration of runoff.

(2) Implement pollution prevention methods supplemented by pollutant source controls and treatment. Use small collection strategies located at, or as close as possible to, the source (i.e., the point where water initially meets the ground) to minimize the transport of urban runoff and pollutants offsite and into an MS4.

(3) Preserve, and where possible, create or restore areas that provide important water quality benefits, such as riparian corridors, wetlands, and buffer zones. Encourage land acquisition of such areas.

(4) Limit disturbances of natural water bodies and natural drainage systems caused by development including roads, highways, and bridges.

(5) Prior to making land use decisions, utilize methods available to estimate increases in pollutant loads and flows resulting from projected future development. Require incorporation of structural and non-structural BMPs to mitigate the projected increases in pollutant loads and flows.

(6) Avoid development of areas that are particularly susceptible to erosion and sediment loss; or establish development guidance that identifies these areas and protects them from erosion and sediment loss.

(7) Reduce pollutants associated with vehicles and increasing traffic resulting from development. Coordinate local traffic management reduction efforts with the San Diego County Congestion Management Plan.

(8) Implement the San Diego Association of Government's (SANDAG's) recommendations as found in the Water Quality Element of its Regional Growth Management Strategy.

~~(9)For new development and significant redevelopment only: The post-development runoff rates and velocities from a site shall not exceed the pre-development runoff rates and velocities from the same site.~~ Post-development runoff from a site shall not contain pollutant loads which cause or contribute to an exceedance of~~r~~ receiving water quality objectives or which have not been reduced to the maximum extent practicable. ~~Post-development runoff discharges into a Clean Water Act section 303(d) water body shall not contain any~~

~~pollutant (for which the water body is already impaired) in levels exceeding pre-development levels (for those same pollutants).~~

F.1.b. Modify Development Project Approval Processes

Prior to project approval and issuance of local permits, Copermittees shall require each ~~review each individual~~ proposed project ~~plan and require~~ to implement measures to ensure that pollutants and runoff from the development will be reduced to the maximum extent practicable and will not cause or contribute to an exceedance of receiving water quality objectives. Each Copermittee shall further ensure that all development will be in compliance with Copermittee storm water ordinances, local permits, all other applicable ordinances and requirements, and this Order.

(1) Development Project Requirements ~~Conditions of Approval~~

Each Copermittee shall include development project requirements ~~conditions of approval~~ in local permits to ensure that pollutant discharges and runoff flows from development are reduced to the maximum extent practicable and that receiving water quality objectives are not violated throughout the life of the project. Such requirements ~~conditions~~ shall, at a minimum:

(a) Require project proponent to implement ~~pollution prevention and~~ source control BMPs for all applicable development projects.
(b) Require project proponent to implement site design/landscape characteristics where feasible which maximize infiltration, provide retention, slow runoff, and minimize impervious land coverage for all development projects.
(c) Require project proponent to implement buffer zones for natural water bodies, where feasible. Where buffer zone implementation is infeasible, require project proponent to implement other buffers such as trees, lighting restrictions, access restrictions, etc.
(d) Require industrial applicants subject to California's statewide General NPDES Permit for Storm Water Discharges Associated with Industrial Activities (Except Construction), (hereinafter General Industrial Permit), to provide evidence of coverage under the General Industrial Permit.
(e) Require project proponent to ensure its grading or other construction activities meet the provisions specified in Section F.2. of this Order.
(f) Require project proponent to provide proof of a mechanism which will ensure ongoing long-term maintenance of all structural post-construction BMPs ~~in perpetuity~~.
(g) ~~Require project proponent to ensure that the post-development runoff rates and velocities from a site do not exceed the pre-development runoff rates and velocities from the same site. Require project proponent to ensure that post-development runoff pollutants loads from a site have been reduced to the maximum extent practicable and do not cause or contribute to an exceedance of water quality objectives. Require project proponent to ensure that post-development runoff into a Clean Water Act section 303(d) water body containing any pollutant (for which the water body is already impaired) does not exceed pre-development levels (for those same pollutants).~~

(2) Standard Urban Storm Water Mitigation Plans (SUSMPs)

Within 365 days of adoption of this Order, the Copermittees shall collectively develop a model Standard Urban Storm Water Mitigation Plan (SUSMP) to reduce pollutants and runoff flows from all new development and significant redevelopment projects falling under the priority project categories or locations listed in section F.1.b.(2)(a) below. Within 180

days of approval of the model SUSMP in the public process by the SDRWQCB, each Copermittee shall adopt its own local SUSMP, and amended ordinances consistent with the approved model SUSMP, and shall submit both (local SUSMP and amended ordinances) to the SDRWQCB.

Immediately following adoption of its local SUSMP, each Copermittee shall ensure that all new development and significant redevelopment projects falling under the priority project categories or locations listed in F.1.b.(2)(a) below meet SUSMP requirements. The SUSMP requirements shall apply to all priority projects or phases of priority projects~~, including those with approved tentative maps,~~ which have not yet begun grading or construction activities. If a Copermittee determines that lawful prior approval of a project exists, whereby application of SUSMP requirements to the project is infeasible, SUSMP requirements need not apply to the project. Where feasible, the Copermittees shall utilize the 18 month SUSMP implementation period to ensure that projects undergoing approval processes include application of SUSMP requirements in their plans.

(a) *Priority Development Project Categories - SUSMP requirements shall apply to all new development and significant redevelopment projects falling under the priority project categories or locations listed below.* Significant redevelopment is defined as the creation or addition of at least 5,000 square feet of impervious surfaces on an already developed site. Significant redevelopment includes, but is not limited to: the expansion of a building footprint or addition or replacement of a structure; structural development including an increase in gross floor area and/or exterior construction or remodeling; replacement of impervious surface that is not part of a routine maintenance activity; and land disturbing activities related with structural or impervious surfaces. Where significant redevelopment results in an increase of less than fifty percent of the impervious surfaces of a previously existing development, and the existing development was not subject to SUSMP requirements, the numeric sizing criteria discussed in section F.1.b.(2)(c) applies only to the addition, and not to the entire development.

i. *Home subdivisions of 100 housing units or more*. This category includes single-family homes, multi-family homes, condominiums, and apartments.

ii. *Home subdivisions of 10-99 housing units*. This category includes single-family homes, multi-family homes, condominiums, and apartments.

iii. *Commercial developments greater than 100,000 square feet.* This category is defined as any development on private land that is not for heavy industrial or residential uses where the land area for development is greater than 100,000 square feet. The category includes, but is not limited to: hospitals; laboratories and other medical facilities; educational institutions; recreational facilities; commercial nurseries; multi-apartment buildings; car wash facilities; mini-malls and other business complexes; shopping malls; hotels; office buildings; public warehouses; automotive dealerships; commercial airfields; and other light industrial facilities.

iv. *Automotive repair shops.* This category is defined as a facility that is categorized in any one of the following Standard Industrial Classification (SIC) codes: 5013, 5014, 5541, 7532-7534, or 7536-7539.

v. *Restaurants*. This category is defined as a facility that sells prepared foods and drinks for consumption, including stationary lunch counters and refreshment stands selling prepared foods and drinks for immediate consumption (SIC code 5812), where the land area for development is greater than 5,000 square feet.

vi. *All hillside development greater than 5,000 square feet.* This category is defined as any development which creates 5,000 square feet of impervious surface which is located in an area with known erosive soil conditions, where

the development will grade on any natural slope that is twenty-five percent or greater.

vii. *Environmentally Sensitive Areas: All development and redevelopment located within or directly adjacent to or discharging directly to an environmentally sensitive area (where discharges from the development or redevelopment will enter receiving waters within the environmentally sensitive area), which either creates 2,500 square feet of impervious surface on a proposed project site or increases the area of imperviousness of a proposed project site to 10% or more of its naturally occurring condition.* Environmentally sensitive areas include but are not limited to all Clean Water Act Section 303(d) impaired water bodies; areas designated as Areas of Special Biological Significance by the State Water Resources Control Board (Water Quality Control Plan for the San Diego Basin (1994) and amendments); water bodies designated with the RARE beneficial use by the State Water Resources Control Board (Water Quality Control Plan for the San Diego Basin (1994) and amendments); areas designated as preserves or their equivalent under the Multi Species Conservation Program within the Cities and County of San Diego; and any other equivalent environmentally sensitive areas which have been identified by the Copermittees. "Directly adjacent" means situated within 200 feet of the environmentally sensitive area. "Discharging directly to" means outflow from a drainage conveyance system that is composed entirely ~~or predominantly~~ of flows from the subject development or redevelopment site, and not commingled with flows from adjacent lands.

viii. *Parking lots 5,000 square feet or more or with 15 or more parking spaces and potentially exposed to urban runoff*. Parking lot is defined as a land area or facility for the temporary parking or storage of motor vehicles used personally, for business, or for commerce.

ix. *Street, roads, highways, and freeways.* This category includes any paved surface which is 5,000 square feet or greater used for the transportation of automobiles, trucks, motorcycles, and other vehicles.

x. *Retail Gasoline Outlets.* Retail Gasoline Outlet is defined as any facility engaged in selling gasoline.

(b) BMP Requirements – The SUSMP shall include a list of recommended ~~pollution prevention,~~ source control~~,~~ and structural treatment BMPs. The SUSMP shall require all new development and significant redevelopment projects falling under the above priority project categories or locations to implement a combination of BMPs selected from the recommended BMP list, including at a minimum ~~(1) pollution prevention~~

~~BMPs,~~ (1~~2~~) source control BMPs~~,~~ and (2~~3~~) structural treatment BMPs. The BMPs shall, at a minimum:

i. Control the ~~Maintain~~ post~~re~~-development peak storm water runoff discharge rates and velocities to maintain or reduce pre-development downstream erosion, and to protect stream habitat;
ii. Conserve natural areas where feasible;
iii. Minimize storm water pollutants of concern in urban runoff from the new development or significant redevelopment (through implementation of ~~pollution prevention and~~ source control BMPs). Identification of pollutants of concern should include at a minimum consideration of any pollutants for which water bodies receiving the development's runoff ~~receiving water bodies~~ are listed as impaired under Clean Water Act section 303(d), any pollutant associated with the land use type of the development, and any pollutant commonly associated with urban runoff~~, and increased runoff flow rate from the development and its potential downstream impacts~~;
iv. Remove pollutants of concern from urban runoff (through implementation of structural treatment BMPs);
v. Minimize directly connected impervious areas where feasible;
vi. Protect slopes and channels from eroding;
vii. Include storm drain stenciling and signage;
viii. Include properly designed outdoor material storage areas;
ix. Include properly designed trash storage areas;
x. Include proof of a mechanism, to be provided by the project proponent or Copermittee, which will ensure ~~for~~ ongoing long-term structural BMP maintenance;
xi. Include additional water quality provisions applicable to individual priority project categories;
xii. Be correctly designed so as to remove pollutants to the maximum extent practicable~~to maximize their pollutant removal capabilities~~;
xiii. Be implemented ~~as~~ close to pollutant sources, when feasible, ~~as possible~~ and prior to ~~runoff~~ discharging~~es~~ into ~~the MS4 or other~~ receiving waters supporting beneficial uses;
xiv. Ensure that post-development runoff does not contain pollutant loads which cause or contribute to an exceedance of water quality objectives or which have not been reduced to the maximum extent practicable; and
~~xv. Ensure that post-development runoff into a Clean Water Act section 303(d) water body containing any pollutant (for which the water body is already impaired) does not contain those same pollutants in levels exceeding pre-development levels.~~

(c) Numeric Sizing Criteria – The SUSMP shall require structural treatment BMPs to be implemented for ~~at~~ all priority development projects. All structural treatment BMPs shall be located so as to infiltrate, filter, or treat the required runoff volume or flow prior to its discharge to any receiving waterbody supporting beneficial uses. Structural treatment BMPs may be shared by multiple new development projects as long as construction of any shared structural treatment BMPs is completed prior to the use of any new development project from which the structural treatment BMP will receive runoff.

In addition to meeting the BMP requirements listed in item F.1.b.(2)(b) above, all

structural treatment BMPs for a single priority development project shall collectively be sized to comply with the following numeric sizing criteria:

Volume

Volume-based BMPs shall be designed to mitigate (infiltrate, filter, or treat) either:

i. The volume of runoff produced from a 24-hour 85th percentile storm event, as determined from the local historical rainfall record (0.6 inch approximate average for the San Diego County area);[3] or
ii. The volume of runoff produced by the 85th percentile 24-hour rainfall event, determined as the maximized capture storm water volume for the area, from the formula recommended in Urban Runoff Quality Management, WEF Manual of Practice No. 23/ASCE Manual of Practice No. 87, (1998); or
iii. The volume of annual runoff based on unit basin storage volume, to achieve 90% or more volume treatment by the method recommended in California Stormwater Best Management Practices Handbook – Industrial/Commercial, (1993); or
iv. The volume of runoff, as determined from the local historical rainfall record, that achieves approximately the same reduction in pollutant loads and flows as achieved by mitigation of the 85th percentile 24-hour runoff event;[4]

OR

Flow

Flow-based BMPs shall be designed to mitigate (infiltrate, filter, or treat) either:

i. The maximum flow rate of runoff produced from a rainfall intensity of 0.2 inch of rainfall per hour; or
ii. The maximum flow rate of runoff produced by the 85th percentile hourly rainfall intensity, as determined from the local historical rainfall record, multiplied by a factor of two; or
iii. The maximum flow rate of runoff, as determined from the local historical rainfall record, that achieves approximately the same reduction in pollutant

[3] This volume is not a single volume to be applied to all of San Diego County. The size of the 85th percentile storm event is different for various parts of the ~~c~~County. The Copermittees are encouraged to calculate the 85th percentile storm event for each of their jurisdictions using local rain data pertinent to their particular jurisdiction~~. T~~(the 0.6 inch standard is a rough average for the ~~c~~County and should only be used where appropriate rain data is not available). In addition, isopluvial maps contained in the County of San Diego Hydrology Manual may be used to extrapolate rainfall data to areas where insufficient data exists in order to determine the volume of the local 85th percentile storm event in such areas. Where the Copermittees will use isopluvial maps to determine the 85th percentile storm event in areas lacking rain data, the Copermittees shall describe their method for using isopluvial maps in the model and local SUSMPs.

[4] Under this volume criteria, hourly rainfall data may be used to calculate the 85th percentile storm event, where each storm event is identified by its separation from other storm events by at least six hours of no rain. Where the Copermittees may use hourly rainfall data to calculate the 85th percentile storm event, the Copermittees shall describe their method for using hourly rainfall data to calculate the 85th percentile storm event in the model and local SUSMPs.

loads and flows as achieved by mitigation of the 85th percentile hourly rainfall intensity multiplied by a factor of two.

(d) Equivalent Numeric Sizing Criteria - The Copermittees may develop, as part of the model SUSMP, any equivalent method for calculating the volume or flow which must be mitigated (i.e., any equivalent method for calculating numeric sizing criteria) by ~~or performance-based standard for~~ post-construction structural treatment BMPs ~~as part of the model SUSMP.~~. Such equivalent sizing criteria may be authorized by the SDRWQCB for use in place of the above criteria. In the absence of development and subsequent authorization of such equivalent numeric sizing criteria, the above numeric sizing criteria requirement shall be implemented.

(e) Pollutants or Conditions of Concern – As part of the model SUSMP, the Copermittees shall develop a procedure for pollutants or conditions of concern to be identified for each new development or significant redevelopment project. The procedure shall include, at a minimum, consideration of (1) receiving water quality (including pollutants for which receiving waters are listed as impaired under Clean Water Act section 303(d)); (2) land use type of the development project and pollutants associated with that land use type; (3) pollutants expected to be present on site; ~~and~~ (4) changes in storm water discharge flow rates, velocities, durations, ~~-~~and volumes resulting from the development project;

and (5) sensitivity of receiving waters to changes in storm water discharge flow rates, velocities, durations, and volumes.

(f) Implementation Process – As part of the model SUSMP, the Copermittees shall develop a process by which SUSMP requirements will be implemented. The process shall identify at what point in the planning process development projects will be required to meet SUSMP requirements. The process shall also include identification of the roles and responsibilities of various municipal departments in implementing the SUSMP requirements, as well as any other measures necessary for the implementation of SUSMP requirements.

(g) Restaurants Less than 5,000 Square Feet - New development and significant redevelopment restaurant projects where the land area development is less than 5,000 square feet shall meet all SUSMP requirements except for structural treatment BMP and numeric sizing criteria requirement F.1.b.(2)(c) ~~above~~and peak flow rate requirement F.1.b(2)(b)(i). A restaurant is defined as a facility that sells prepared foods and drinks for consumption, including stationary lunch counters and refreshment stands selling prepared foods and drinks for immediate consumption (SIC Code 5812).

(h) Waiver Provision – A Copermittee may provide for a project to be waived from the requirement of implementing structural treatment BMPs (F.1.b.(2)(c)) if infeasibility can be established. A waiver of infeasibility shall only be granted by a Copermittee when all available structural treatment BMPs have been considered and rejected as infeasible. Copermittees shall notify the SDRWQCB within 5 days of each waiver issued and shall include the name of the person granting each waiver.

As part of the model SUSMP, the Copermittees shall develop a program to require project proponents who have received waivers to transfer the savings in cost, as determined by the Copermittee(s), to a storm water mitigation fund. This program shall be implemented by all Copermittees which choose to provide waivers. Funds shall only

be used on projects to improve urban runoff quality within the watershed of the waived project. The waiver program shall, at a minimum, identify:

i. The entity or entities that will manage the storm water mitigation fund (i.e., assume full responsibility for)
ii. The range and types of acceptable projects for which mitigation funds may be expended;
iii. The entity or entities that will assume full responsibility for each mitigation project including its successful completion
iv. How the dollar amount of fund contributions will be determined.

(i) Infiltration and Groundwater Protection – To protect groundwater quality, each Copermittee shall apply restrictions to the use of structural treatment BMPs which are designed to primarily function as infiltration devices (such as infiltration trenches and infiltration basins). Such restrictions shall ensure that the use of such infiltration structural treatment BMPs shall not cause or contribute to an exceedance of groundwater quality objectives. At a minimum, use of ~~infiltration~~ structural treatment BMPs which are designed to primarily function as infiltration devices shall meet the following conditions:[5]

~~i. Use of infiltration structural treatment BMPs shall not cause or contribute to an exceedance of groundwater water quality objectives.~~
~~ii.~~ i. Urban runoff shall undergo pretreatment such as sedimentation or filtration prior to infiltration.
~~iii.~~ ii. All dry weather flows shall be diverted from infiltration devices.
~~iv.~~ iii. Pollution prevention and source control BMPs shall be implemented at a level appropriate to protect groundwater quality at sites where infiltration structural treatment BMPs are to be used.
~~v.~~ iv. Infiltration structural treatment BMPs shall be adequately maintained so that they remove pollutants to the maximum extent practicable~~to maximize pollutant removal capabilities~~.
~~vi.~~ v. The vertical distance from the base of any infiltration structural treatment BMP to the seasonal high groundwater mark shall be at least 10 feet. Where groundwater basins do not support beneficial uses, this vertical distance criteria may be reduced, provided groundwater quality is maintained.
~~vii.~~ vi. The soil through which infiltration is to occur shall have physical and chemical characteristics (such as appropriate cation exchange capacity, organic content, clay content, and infiltration rate) which are adequate for proper infiltration durations and treatment of urban runoff for the protection of groundwater beneficial uses.
~~viii.~~ vii. Infiltration structural treatment BMPs shall not be used for areas of industrial or light industrial activity; areas subject to high vehicular traffic (25,000 or greater average daily traffic on main roadway or 15,000 or more average daily traffic on any intersecting roadway); automotive repair shops; car washes; fleet storage areas (bus, truck, etc.); nurseries; and other high threat to water quality land uses and activities as designated by each Copermittee.

[5] These conditions do not apply to structural treatment BMPs which allow incidental infiltration and are not designed to primarily function as infiltration devices (such as grassy swales, detention basins, vegetated buffer strips, constructed wetlands, etc.)

~~ix.~~viii. Infiltration structural BMPs shall be located a minimum of 100 feet horizontally from any water supply wells.

As part of the model and local SUSMPs, the Copermittees may develop alternative restrictions on the use of structural treatment BMPs which are designed to primarily function as infiltration devices.

(j) Downstream Erosion – As part of the model SUSMP and the local SUSMPs, the Copermittees shall develop criteria to ensure that discharges from new development and significant redevelopment maintain or reduce pre-development downstream erosion and protect stream habitat. At a minimum, criteria shall be developed to control peak storm water discharge rates and velocities in order to maintain or reduce pre-development downstream erosion and protect stream habitat. Storm water discharge volumes and durations should also be considered.

F.1.c. Revise Environmental Review Processes ~~Including CEQA Checklists~~

(1) To the extent feasible, the Copermittees shall ~~R~~revise their current environmental review processes ~~and California Environmental Quality Act (CEQA) initial study checklists~~ to include requirements for evaluation of water quality effects and identification of appropriate mitigation measures. ~~The CEQA initial study checklist shall include~~ The following questions are examples to be considered in addressing increased pollutants and flows from ~~the~~ proposed projects ~~such as~~:

(a) Could ~~Would~~ the proposed project result in an increase in pollutant discharges to receiving waters? Consider water quality parameters such as temperature, dissolved oxygen, turbidity and other typical storm water pollutants (e.g., heavy metals, pathogens, petroleum derivatives, synthetic organics, sediment, nutrients, oxygen-demanding substances, and trash).
(b) Could ~~Would~~ the proposed project result in significant alteration of receiving water quality during or following construction?
(c) Could ~~Would~~ the proposed project result in increased impervious surfaces and associated increased runoff?
(d) Could ~~Would~~ the proposed project create a significant adverse environmental impact to drainage patterns due to changes in runoff flow rates or volumes?
(e) Could ~~Would~~ the proposed project result in increased erosion downstream?
(f) Is the project tributary to an already impaired water body, as listed on the Clean Water Act Section 303(d) list. If so, can ~~will~~ it result in an increase in any pollutant for which the water body is already impaired?
(g) Is project tributary to other environmentally sensitive areas? If so, can ~~will~~ it exacerbate already existing sensitive conditions?
(h) Could ~~Would~~ the proposed project have a potentially significant environmental impact on surface water quality, to either marine, fresh, or wetland waters?
(i) Could ~~Would~~ the proposed project have a potentially significant adverse impact on ground water quality?
(j) Could ~~Will~~ the proposed project cause or contribute to an exceedance of applicable surface or groundwater receiving water quality objectives or degradation of beneficial uses?
(j) (k) Can ~~Will~~ the project impact aquatic, wetland, or riparian habitat?

F.1.d. Conduct Education Efforts Focused on New Development and Redevelopment

(1) Internal: Municipal Staff and Others

Each Copermittee shall implement an education program to ensure that its planning and development review staffs (and Planning Boards and Elected Officials, if applicable) have an understanding of:

(a) Federal, state, and local water quality laws and regulations applicable to development projects;
(b) The connection between land use decisions and short and long-term water quality impacts (i.e., impacts from land development and urbanization); and
(c) How impacts to receiving water quality resulting from development can be minimized (i.e., through implementation of various source control and structural BMPs).

(2) External: Project Applicants, Developers, Contractors, Property Owners, Community Planning Groups

As early in the planning and development process as possible, each Copermittee shall implement a program to educate project applicants, developers, contractors, ~~and~~ property owners, and community planning groups on the following topics:

(a) Federal, state, and local water quality laws and regulations applicable to development projects;
(b) Required federal, state, and local permits pertaining to water quality;
(c) Water quality impacts of urbanization; and
(d) Methods for minimizing the impacts of development on receiving water quality.

F.2. Construction Component

Each Copermittee shall implement a Construction Component of its Jurisdictional URMP to reduce pollutants in runoff from construction sites during all construction phases. At a minimum the construction component shall address:

F.2.a. Pollution Prevention
F.2.b. Grading Ordinance Update
F.2.c. Modify Construction and Grading Approval Process
F.2.d. Source Identification
F.2.e. Threat to Water Quality Prioritization
F.2.f. BMP Implementation
F.2.g. Inspection of Construction Sites
F.2.h. Enforcement of Construction Sites
F.2.i. Reporting of Non-compliant Sites
F.2.j. Education Focused on Construction Activities

F.2.a. Pollution Prevention (Construction)

Each Copermittee shall implement pollution prevention methods in its Construction Component and shall require its use by construction site owners, developers, contractors, and other responsible parties, where appropriate.

F.2.b. Grading Ordinance Update (Construction)

Each Copermittee shall review and update its grading ordinances as necessary for compliance with its storm water ordinances and this Order. The updated grading ordinance shall require ~~pollution prevention, source control, and structural treatment~~ implementation of BMPs and other measures ~~to be implemented~~ during all construction activities, including the following BMPs and other measures or their equivalent~~for example~~:

(1) Erosion prevention;
(2) Seasonal restrictions on grading;
(3) Slope stabilization requirements;
(4) Phased grading;
(5) Revegetation as early as feasible;
(6) Preservation of natural hydrologic features;
(7) Preservation of riparian buffers and corridors;
(8) Maintenance of all source control and structural treatment BMPs; and
(9) Retention and proper management of sediment and other construction pollutants on site.

F.2.c Modify Construction and Grading Approval Process (Construction)

Prior to approval and issuance of local construction and grading permits, each Copermittee shall require ~~review~~ all individual proposed construction and grading projects to implement ~~plans and require~~ measures to ensure that pollutants from the site will be reduced to the maximum extent practicable and will not cause or contribute to an exceedance of water quality objectives. Each Copermittee shall further ensure that all grading and construction activities will be in compliance with applicable Copermittee ordinances (e.g., storm water, grading, construction, etc.) and other applicable requirements, including this Order.

(1) Construction and Grading Project Requirements ~~Conditions of Approval~~

Include construction and grading project requirements ~~conditions of approval~~ in local grading and construction permits to ensure that pollutant discharges are reduced to the maximum extent practicable and water quality objectives are not violated during the construction phase. Such requirements ~~conditions~~ shall include the following requirements or their equivalent~~for example~~:

(a) Require project proponent to develop and implement a plan to manage storm water and non-storm water discharges from the site at all times;
(b) Require project proponent to minimize grading during the wet season and coincide grading with seasonal dry weather periods to the extent feasible. If grading does occur during the wet season, require project proponent to implement additional BMPs for any rain events which may occur, as necessary for compliance with this Order;
(c) Require project proponent to emphasize erosion prevention as the most important measure for keeping sediment on site during construction;
(d) Require project proponent to utilize sediment controls as a supplement to erosion prevention for keeping sediment on-site during construction, and never as the single or primary method;
(e) Require project proponent to minimize areas that are cleared and graded to only the portion of the site that is necessary for construction;
(f) Require project proponent to minimize exposure time of disturbed soil areas;

(g) Require project proponent to temporarily stabilize and reseed disturbed soil areas as rapidly as possible;
(h) (h) Require project proponent to permanently revegetate or landscape as early as feasible;
(i) Require project proponent to stabilize all slopes; and
(j) Require project proponents subject to California's statewide General NPDES Permit for Storm Water Discharges Associated With Construction Activities, (hereinafter General Construction Permit), to provide evidence of existing coverage under the General Construction Permit.

F.2.d. Source Identification (Construction)

Each Copermittee shall annually develop and update, prior to the rainy season, a watershed based inventory of all construction sites within its jurisdiction regardless of site size or ownership. This requirement is applicable to all construction sites regardless of whether the construction site is subject to the California statewide General NPDES Permit for Storm Water Discharges Associated With Construction Activities (hereinafter General Construction Permit), or other individual NPDES permit. The use of an automated database system, such as Geographical Information System (GIS) is highly recommended, but not required.

F.2.e. Threat to Water Quality Prioritization (Construction)

(1) To establish priorities for construction oversight activities under this Order, the Copermittee shall prioritize its watershed-based inventory (developed pursuant to F.2.d. above) by threat to water quality. Each construction site shall be classified as high, medium, or low threat to water quality. In evaluating threat to water quality each Copermittee shall consider (1) soil erosion potential; (2) site slope; (3) project size and type; (4) sensitivity of receiving water bodies; (5) proximity to receiving water bodies; (6) non-storm water discharges; and (7) any other relevant factors.

(2) A high priority construction site shall at a minimum be defined as a site meeting either ~~any one~~ of the following criteria or equivalent criteria:

(a) The site is 50 acres or more~~;~~ and grading will occur during the wet season; OR
~~(b)Grading will occur during the wet season;~~
~~Highly erosive soils;~~
~~Hillside development; and~~
(b) The site is (1) 5 acres or more and (2) ~~T~~tributary to a Clean Water Act section 303(d) ~~impaired~~ water body impaired for sediment or is within or directly adjacent to or discharging directly to a coastal lagoon or other receiving water within an environmentally sensitive area (as defined in section F.1.b.(2)(a)vii of this Order).

F.2.f. BMP Implementation (Construction)

(1) Each Copermittee shall designate a set of minimum BMPs for high, medium, and low threat to water quality construction sites (as determined under section F.2.e). BMPs are to be implemented year round.

(2) Each Copermittee shall implement, or require the implementation of, the designated minimum BMPs (based upon the site's threat to water quality rating) at each construction site within its jurisdiction year round. If particular minimum BMPs are infeasible at any

specific site, each Copermittee shall implement, or require the implementation of, other equivalent BMPs. Each Copermittee shall also implement or require any additional site specific BMPs as necessary to comply with this Order, including BMPs which are more stringent than those required under the statewide General Construction Permit.

(3) Each Copermittee shall implement, or require the implementation of, BMPs year round; however, BMP implementation requirements can vary based on wet and dry seasons.

(4) Each Copermittee shall implement, or require implementation of, additional controls for construction sites tributary to Clean Water Act section 303(d) ~~impaired~~ water bodies impaired for sediment as necessary to comply with this Order. ~~,~~Each Copermittee shall implement, or require implementation of, additional controls for construction sites within or adjacent to or discharging directly to coastal lagoons~~,~~ or other receiving waters within environmentally sensitive areas (as defined in section F.1.b.(2)(a)(vii) of this Order) as necessary to comply with this Order.

F.2.g. Inspection of Construction Sites (Construction)

(1) Each Copermittee shall conduct construction site inspections for compliance with its ordinances (grading, storm water, etc.), permits (construction, grading, etc.), and this Order. Inspections shall include review of site erosion control and BMP implementation plans.

(2) Each Copermittee shall establish inspection frequencies and priorities as determined by the threat to water quality prioritization described in F.2.e above. During the wet season (i.e., October 1 through April 30 of each year), each Copermittee shall inspect, at a minimum, each High Priority construction site, either:

(a) Weekly
OR
(b) Monthly for any site that the responsible Copermittee certifies in a written statement to the SDRWQCB all of the following (certified statements may be submitted to the SDRWQCB at any time for one or more sites):

i. Copermittee has record of construction site's Waste Discharge Identification Number (WDID#) documenting construction site's coverage under the statewide General Construction Permit; and
ii. Copermittee has reviewed the constructions site's Storm Water Pollution Prevention Plan (SWPPP); and
iii. Copermittee finds SWPPP to be in compliance with all local ordinances, permits, and plans; and
iv. Copermittee finds that the SWPPP is being properly implemented on site.

At a minimum, Medium and Low Priority construction sites shall be inspected by Copermittees twice during the wet season. All construction sites shall be inspected by the Copermittees as needed during the dry season (i.e., May 1 through September 30 of each year).

(3) Based upon site inspection findings, each Copermittee shall implement all follow-up actions necessary to comply with this Order.

F.2.h. Enforcement of Construction Sites (Construction)

Each Copermittee shall enforce its ordinances (grading, storm water, etc.) and permits (construction, grading, etc.) at all construction sites as necessary to maintain compliance with this Order. Copermittee ordinances or other regulatory mechanisms shall include sanctions to ensure compliance. Sanctions shall include the following or their equivalent~~for example:~~ Non-monetary penalties, fines, bonding requirements, and/or permit denials for non-compliance.

F.2.i. Reporting of Non-compliant Sites (Construction)

Each Copermittee shall provide oral notification to the SDRWQCB of non-compliant sites that are determined to pose a threat to human or environmental health within its jurisdiction within 24 hours of the ~~incidence~~discovery of noncompliance, as required under section R.1 (and ~~B.7~~ B.6 of Attachment C) of this Order.

Each Copermittee shall develop and submit criteria by which to evaluate events of non-compliance to determine whether they pose a threat to human or environmental health. These criteria shall be submitted in the Jurisdictional Urban Runoff Management Program Document and Annual Reports for SDRWQCB review.

Such oral notification shall be followed up by a written report to be submitted to the SDRWQCB within 5 days of the incidence of non-compliance as required under section R.1 (and ~~B.7~~ B.6 of Attachment C) of this Order. Sites are considered non-compliant when one or more violations of local ordinances, permits, plans, or this Order exist on the site.

F.2.j. Education Focused on Construction Activities (Construction)

(1) Internal: Municipal Staff

Each Copermittee shall implement an education program to ensure that its construction, building, and grading review staffs and inspectors have an understanding of:

(a) Federal, state, and local water quality laws and regulations applicable to construction and grading activities.
(b) The connection between construction activities and water quality impacts (i.e., impacts from land development and urbanization).
(c) How erosion can be prevented.
(d) How impacts to receiving water quality resulting from construction activities can be minimized (i.e., through implementation of various source control and structural BMPs).
(e) Applicable topics listed in section F.4. of this Order.

(2) External: Project Applicants, Contractors, Developers, Property Owners, and other Responsible Parties

Each Copermittee shall implement an education program to ensure that project applicants, contractors, developers, property owners, and other responsible parties have an understanding of the topics outlined in section F.2.j.1. above of this Order.

F.3. Existing Development Component

Each Copermittee shall minimize the short and long-term impacts on receiving water quality from all types of existing development.

F.3.a. Municipal (Existing Development)

Each Copermittee shall implement a Municipal (Existing Development) Component to prevent or reduce pollutants in runoff from all municipal land use areas and activities. At a minimum the municipal component shall address:

F.3.a.(1) Pollution Prevention
F.3.a.(2) Source Identification
F.3.a.(3) Threat to Water Quality Prioritization
F.3.a.(4) BMP Implementation
F.3.a.(5) Maintenance of Municipal Separate Storm Sewer System
F.3.a.(6) Management of Pesticides, Herbicides, and Fertilizers
F.3.a.(7) Inspection of Municipal Areas and Activities
F.3.a.(8) Enforcement of Municipal Areas and Activities

F.3.a.(1) Pollution Prevention (Municipal)

Each Copermittee shall implement pollution prevention methods in its Municipal (Existing Development) Component and shall require its use by appropriate municipal departments and personnel, where appropriate.

F.3.a.(2) Source Identification (Municipal)

Each Copermittee shall develop, and update annually, a watershed based inventory of the name, address (if applicable), and description of all municipal land use areas and activities which generate pollutants. The use of an automated database system, such as Geographical Information System (GIS) is highly recommended when applicable, but not required.

F.3.a.(3) Threat to Water Quality Prioritization (Municipal)

(a) To establish priorities for oversight of municipal areas and activities required under this Order, each Copermittee shall prioritize each watershed inventory in F.3.a.2. above by threat to water quality and update annually. Each municipal area and activity shall be classified as high, medium, or low threat to water quality. In evaluating threat to water quality, each Copermittee shall consider (1) type of municipal area or activity; (2) materials used; (3) wastes generated; (4) pollutant discharge potential; (5) non-storm water discharges; (6) size of facility or area; (7) proximity to receiving water bodies; (8) sensitivity of receiving water bodies; and (9) any other relevant factors.

(b) At a minimum, the high priority municipal areas and activities shall include the following:

i. Roads, Streets, Highways, and Parking Facilities.
ii. Flood Management Projects and Flood Control Devices.
iii. Areas and activities tributary to a Clean Water Act section 303(d) impaired water body, where an area or activity generates pollutants for which the water

body is impaired. Areas and activities within or adjacent to or discharging directly to coastal lagoons or other receiving waters within environmentally sensitive areas (as defined in section F.1.b.(2)(a)vii of this Order).

iv. Municipal Waste Facilities.
- Active or closed municipal landfills;
- Publicly owned treatment works (including water and wastewater treatment plants) and sanitary sewage collection systems;
- Municipal separate storm sewer systems;
- Incinerators;
- Solid waste transfer facilities;
- Land application sites;
- Uncontrolled sanitary landfills;
- Corporate yards including maintenance and storage yards for materials, waste, equipment and vehicles;
- Sites for disposing and treating sewage sludge; and
- Hazardous waste treatment, disposal, and recovery facilities.

v. Other municipal areas and activities that the Copermittee determines may contribute a significant pollutant load to the MS4.

vi. Municipal airfields.

F.3.a.(4) BMP Implementation (Municipal)

(a) Each Copermittee shall designate a set of minimum BMPs for high, medium, and low threat to water quality municipal areas and activities (as determined under section F.3.a.(3)). The designated minimum BMPs for high threat to water quality municipal areas and activities shall be area or activity specific as appropriate.

(b) Each Copermittee shall implement, or require the implementation of, the designated minimum BMPs (based upon the threat to water quality rating) at each municipal area or activity within its jurisdiction. If particular minimum BMPs are infeasible for any specific area or activity, each Copermittee shall implement, or require implementation of other equivalent BMPs. Each Copermittee shall also implement any additional BMPs as are necessary to comply with this Order.

i. Each Copermittee shall evaluate feasibility of retrofitting existing structural flood control devices and retrofit where needed.

(c) Each Copermittee shall implement, or require implementation of, any additional controls for municipal areas and activities tributary to Clean Water Act section 303(d) impaired water bodies (where an area or activity generates pollutants for which the water body is impaired) as necessary to comply with this Order.~~,~~ Each Copermittee shall implement, or require implementation of, additional controls for municipal areas and activities within or directly adjacent to or discharging directly to coastal lagoons~~,~~ or other receiving waters within environmentally sensitive areas (as defined in section F.1.b.(2)(a)(vii) of this Order) as necessary to comply with this Order.

F.3.a.(5) Maintenance of Municipal Separate Storm Sewer System (Municipal)

(a) Each Copermittee shall implement a schedule of maintenance activities at all structural controls designed to reduce pollutant discharges to or from its MS4s and related

drainage structures.

(b) Each Copermittee shall implement a schedule of maintenance activities for the municipal separate storm sewer system.

(c) The maintenance activities must, at a minimum, include:

i. Inspection and removal of accumulated waste (e.g. sediment, trash, debris and other pollutants) between May 1 and September 30 of each year;

ii. Additional cleaning as necessary between October 1 and April 30 of each year;

iii. Record keeping of cleaning and the overall quantity of waste removed;

iv. Proper disposal of waste removed pursuant to applicable laws;

v. Measures to eliminate waste discharges during MS4 maintenance and cleaning activities.

F.3.a.(6) Management of Pesticides, Herbicides, and Fertilizers (Municipal)

The Copermittees shall implement BMPs to reduce the contribution of pollutants associated with the application, storage, and disposal of pesticides, herbicides and fertilizers from municipal areas and activities to MS4s. Important municipal areas and activities include municipal facilities, public rights-of-way, parks, recreational facilities, golf courses, cemeteries, botanical or zoological gardens and exhibits, landscaped areas, etc.

Such BMPs shall include, at a minimum: (1) educational activities, permits, certifications and other measures for municipal applicators and distributors; (2) integrated pest management measures that rely on non-chemical solutions; (3) the use of native vegetation; (4) schedules for irrigation and chemical application; and (5) the collection and proper disposal of unused pesticides, herbicides, and fertilizers.

F.3.a.(7) Inspection of Municipal Areas and Activities (Municipal)

At a minimum, each Copermittee shall inspect high priority municipal areas and activities annually. Based upon site inspection findings, each Copermittee shall implement all follow-up actions necessary to comply with this Order.

F.3.a.(8) Enforcement of Municipal Areas and Activities (Municipal)

Each Copermittee shall enforce its storm water ordinance for all municipal areas and activities as necessary to maintain compliance with this Order.

F.3.b. Industrial (Existing Development)

Each Copermittee shall implement an Industrial (Existing Development) Component to reduce pollutants in runoff from all industrial sites. At a minimum the industrial component shall address:

F.3.b.(1) Pollution Prevention

F.3.b.(2) Source Identification
F.3.b.(3) Threat to Water Quality Prioritization
F.3.b.(4) BMP Implementation
F.3.b.(5) Monitoring of Industrial Sites
F.3.b.(6) Inspection of Industrial Sites
F.3.b.(7) Enforcement Measures for Industrial Sites
F.3.b.(8) Reporting of Non-compliant Sites

F.3.b.(1) Pollution Prevention (Industrial)

Each Copermittee shall implement pollution prevention methods in its Industrial (Existing Development) Component and shall require its use by industry, where appropriate.

F.3.b.(2) Source Identification (Industrial)

Each Copermittee shall develop and update annually a watershed-based inventory of all industrial sites within its jurisdiction regardless of site ownership. This requirement is applicable to all industrial sites regardless of whether the industrial site is subject the California statewide General NPDES Permit for Storm Water Discharges Associated With Industrial Activities, Except Construction (hereinafter General Industrial Permit) or other individual NPDES permit.

The inventory shall include the following minimum information for each industrial site: name; address; and a narrative description including SIC codes which best reflects the principal products or services provided by each facility. The use of an automated database system, such as Geographical Information System (GIS) is highly recommended, but not required.

F.3.b.(3) Threat to Water Quality Prioritization (Industrial)

(a) To establish priorities for industrial oversight activities under this Order, the Copermittee shall prioritize each watershed-based inventory in F.3.b.(2) above by threat to water quality and update annually. Each industrial site shall be classified as high, medium, or low threat to water quality. In evaluating threat to water quality each Copermittee shall consider (1) type of industrial activity (SIC Code); (2) materials used in industrial processes; (3) wastes generated; (4) pollutant discharge potential; (5) non-storm water discharges; (6) size of facility; (7) proximity to receiving water bodies; (8) sensitivity of receiving water bodies; (9) whether the industrial site is subject to the statewide General Industrial Permit; and (10) any other relevant factors.

(b) At a minimum the high priority industrial sites shall include industrial facilities that are subject to section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA); industrial facilities tributary to a Clean Water Act section 303(d) impaired water body, where a facility generates pollutants for which the water body is impaired; industrial facilities within or directly adjacent to or discharging directly to coastal lagoons or other receiving waters within environmentally sensitive areas (as defined in section F.1.b.(2)(a)vii of this Order); facilities subject to the statewide

General Industrial Permit; and all other industrial facilities that the Copermittee determines are contributing significant pollutant loading to its MS4, regardless of whether such facilities are covered under the statewide General Industrial Permit or other NPDES permit.

F.3.b.(4) BMP Implementation (Industrial)

(a) Each Copermittee shall designate a set of minimum BMPs for high, medium, and low threat to water quality industrial sites (as determined under section F.3.b.(3)). The designated minimum BMPs for high threat to water quality industrial sites shall be industry and site specific as appropriate.

(b) Each Copermittee shall implement, or require the implementation of, the designated minimum BMPs (based upon the site's threat to water quality rating) at each industrial site within its jurisdiction. If particular minimum BMPs are infeasible at any specific site, each Copermittee shall implement, or require implementation of, other equivalent BMPs. Each Copermittee shall also implement or require any additional site specific BMPs as necessary to comply with this Order including BMPs which are more stringent than those required under the statewide General Industrial Permit.

(c) Each Copermittee shall implement, or require implementation of, additional controls for industrial sites tributary to Clean Water Act section 303(d) impaired water bodies~~,~~ (where a site generates pollutants for which the water body is impaired) as necessary to comply with this Order. Each Copermittee shall implement, or require implementation of, additional controls for industrial sites within or directly adjacent to or discharging directly to coastal lagoons~~,~~ or other receiving waters within environmentally sensitive areas (as defined in section F.1.b.(2)(a)(vii) of this Order) as necessary to comply with this Order.

F.3.b.(5) Monitoring of Industrial Sites (Industrial)

(a) Each Copermittee shall conduct, or require industry to conduct, a monitoring program for runoff from each high threat to water quality industrial site (identified in F.3.b.(3) above). Group monitoring by multiple industrial sites conducted under group monitoring programs approved by the State Water Resources Control Board is acceptable.

(b) At a minimum, the monitoring program shall provide quantitative data from two storm events per year on the following constituents:

i. Any pollutant listed in effluent guidelines subcategories where applicable;
ii. Any pollutant for which an effluent limit has been established in an existing NPDES permit for the facility;
iii. Oil and grease or Total Organic Carbon (TOC);
iv. pH;
v. Total suspended solids (TSS);
vi. Specific conductance; and
vii. Toxic chemicals and other pollutants that are likely to be present in storm water discharges.

F.3.b.(6) Inspection of Industrial Sites (Industrial)

(a) Each Copermittee shall conduct industrial site inspections for compliance with its ordinances, permits, and this Order. Inspections shall include review of BMP implementation plans.

(b) Each Copermittee shall establish inspection frequencies and priorities as determined by the threat to water quality prioritization described in F.3.b.(3) above. Each Copermittee shall inspect high priority industrial sites, at a minimum:

i. Annually

OR

ii. Bi-annually for any site that the responsible Copermittee certifies in a written statement to the SDRWQCB all of the following (certified statements may be submitted to the SDRWQCB at any time for one or more sites):

- Copermittee has record of industrial site's Waste Discharge Identification Number (WDID#) documenting industrial site's coverage under the statewide General Industrial Permit; and
- Copermittee has reviewed the industrial site's Storm Water Pollution Prevention Plan (SWPPP); and
- Copermittee finds SWPPP to be in compliance with all local ordinances, permits, and plans; and
- Copermittee finds that the SWPPP is being properly implemented on site.

Each Copermittee shall inspect medium and low threat to water quality industrial sites as needed.

(c) Based upon site inspection findings, each Copermittee shall implement all follow-up actions necessary to comply with this Order.

(d) To the extent that the SDRWQCB has conducted an inspection of a high priority industrial site during a particular year, the requirement for the responsible Copermittee to inspect this site during the same year will be satisfied.

F.3.b.(7) Enforcement of Industrial Sites (Industrial)

Each Copermittee shall enforce its storm water ordinance at all industrial sites as necessary to maintain compliance with this Order. Copermittee ordinances or other regulatory mechanisms shall include sanctions to ensure compliance. Sanctions shall include the following or their equivalent~~for example~~: Non-monetary penalties, fines, bonding requirements, and/or permit denials for non-compliance.

F.3.b.(8) Reporting of Non-compliant Sites (Industrial)

Each Copermittee shall provide oral notification to the SDRWQCB of non-compliant sites that are determined to pose a threat to human or environmental health within its jurisdiction within 24 hours of the ~~incidence~~discovery of noncompliance, as required under section R.1 (and ~~B.7~~ B.6 of Attachment C) of this Order.

Each Copermittee shall develop and submit criteria by which to evaluate events of non-compliance to determine whether they pose a threat to human or environmental health.

These criteria shall be submitted in the Jurisdictional Urban Runoff Management Program Document and Annual Reports for SDRWQCB review.

Such oral notification shall be followed up by a written report to be submitted to the SDRWQCB within 5 days of the incidence of non-compliance as required under section R.1(and ~~B.7~~ B.6 of Attachment C) of this Order. Sites are considered non-compliant when one or more violations of local ordinances, permits, plans, or this Order exist on the site.

F.3.c. Commercial (Existing Development)

Each Copermittee shall implement a Commercial (Existing Development) Component to reduce pollutants in runoff from commercial sites. At a minimum the commercial component shall address:

F.3.c.(1) Pollution Prevention
F.3.c.(2) Source Identification
F.3.c.(3) BMP Implementation
F.3.c.(4) Inspection of Commercial Sites and Sources
F.3.c.(5) Enforcement of Commercial Sites and Sources

F.3.c.(1) Pollution Prevention (Commercial)

Each Copermittee shall implement pollution prevention methods in its Commercial (Existing Development) Component and shall require its use by commerce, where appropriate.

F.3.c.(2) Source Identification (Commercial)

Each Copermittee shall develop and update annually an inventory of the following high priority threat to water quality commercial sites/sources~~:~~ listed below. (If any commercial site/source listed below is inventoried as an industrial site, as required under section F.3.b.(2) of this Order, it is not necessary to also inventory it as a commercial site/source).

(a) Automobile mechanical repair, maintenance, fueling, or cleaning;
(b) Airplane mechanical repair, maintenance, fueling, or cleaning;
(c) Boat mechanical repair, maintenance, fueling, or cleaning;
(d) Equipment repair, maintenance, fueling, or cleaning;
(e) Automobile and other vehicle body repair or painting;
(f) Mobile automobile or other vehicle washing;
(g) Automobile (or other vehicle) parking lots and storage facilities;
(h) Retail or wholesale fueling;
(i) Pest control services;
(j) Eating or drinking establishments;
(k) Mobile carpet, drape or furniture cleaning;
(l) Cement mixing or cutting;
(m) Masonry;

(n) Painting and coating;
(o) Botanical or zoological gardens and exhibits;
(p) Landscaping;
(q) Nurseries and greenhouses;
(r) Golf courses, parks and other recreational areas/facilities;
(s) Cemeteries;
(t) Pool and fountain cleaning;
(u) Marinas;
(v) Port-a-Potty servicing;
(w) Other commercial sites/sources that the Copermittee determines may contribute a significant pollutant load to the MS4; ~~and~~
(x) Any commercial site or source tributary to a Clean Water Act section 303(d) impaired water body, where the site or source generates pollutants for which the water body is impaired; and
(y) Any commercial site or source within or directly adjacent to or discharging directly to a coastal lagoon or other receiving water within an environmentally sensitive area (as defined in F.1.b(2)(a)vii of this Order).

The use of an automated database system, such as Geographical Information System (GIS) is highly recommended, but not required.

F.3.c.(3) BMP Implementation (Commercial)

(a) Each Copermittee shall designate a set of minimum BMPs for the high priority threat to water quality commercial sites/sources (listed above in section F.3.c.(2)). The designated minimum BMPs for the high threat to water quality commercial sites/sources shall be site and source specific as appropriate.

(b) Each Copermittee shall implement, or require the implementation of, the designated minimum BMPs at each high priority threat to water quality commercial site/source within its jurisdiction. If particular minimum BMPs are infeasible for any specific site/source, each Copermittee shall implement, or require the implementation of, other equivalent BMPs. Each Copermittee shall also implement or require any additional site specific BMPs as necessary to comply with this Order.

(c) Each Copermittee shall implement, or require implementation of, additional controls for commercial sites or sources tributary to Clean Water Act section 303(d) impaired water bodies~~,~~ (where a site or source generates pollutants for which the water body is impaired) as necessary to comply with this Order. Each Copermittee shall implement, or require implementation of, additional controls for commercial sites or sources within or directly adjacent to or discharging directly to coastal lagoons~~,~~ or other receiving waters within environmentally sensitive areas (as defined in section F.1.b.(2)(a)(vii) of this Order) as necessary to comply with this Order.

F.3.c.(4) Inspection of Commercial Sites and Sources (Commercial)

Each Copermittee shall inspect high priority commercial sites and sources as needed. Based upon site inspection findings, each Copermittee shall implement all follow-up actions necessary to comply with this Order.

F.3.c.(5) Enforcement of Commercial Sites and Sources (Commercial)

Each Copermittee shall enforce its storm water ordinance for all commercial sites and sources as necessary to maintain compliance with this Order.

F.3.d. Residential (Existing Development)

Each Copermittee shall implement a Residential (Existing Development) Component to prevent or reduce pollutants in runoff from all residential land use areas and activities. At a minimum the residential component shall address:

F.3.d.(1) Pollution Prevention
F.3.d.(2) Threat to Water Quality Prioritization
F.3.d.(3) BMP Implementation
F.3.d.(4) Enforcement of Residential Areas and Activities

F.3.d.(1) Pollution Prevention (Residential)

Each Copermittee shall include pollution prevention methods in its Residential (Existing Development) Component and shall encourage their use by ~~all~~ residents, where appropriate.

F.3.d.(2) Threat to Water Quality Prioritization (Residential)

Each Copermittee shall identify high priority residential areas and activities. At a minimum, these shall include:

- Automobile repair and maintenance;
- Automobile washing;
- Automobile parking;
- Home and garden care activities and product use (pesticides, herbicides, and fertilizers);
- Disposal of household hazardous waste (e.g., paints, cleaning products);
- Disposal of pet waste;
- Disposal of green waste;
- Any other residential source that the Copermittee determines may contribute a significant pollutant load to the MS4; ~~and~~
- Any residence tributary to a Clean Water Act section 303(d) impaired water body, where the residence generates pollutants for which the water body is impaired; and
- Any residence within or directly adjacent to or discharging directly to a coastal lagoon or other receiving waters within an environmentally sensitive area (as defined in F.1.b.(2)(a)vii of this Order).

F.3.d.(3) BMP Implementation (Residential)

(a) Each Copermittee shall designate a set of minimum BMPs for high threat to water quality residential areas and activities (as required under section F.3.d.(2)). The designated minimum BMPs for high threat to water quality municipal areas and activities shall be area or activity specific.

(b) Each Copermittee shall require implementation of the designated minimum BMPs for high threat to water quality residential areas and activities. If particular minimum BMPs are infeasible for any specific site/source, each Copermittee shall require implementation of other equivalent BMPs. Each Copermittee shall also implement, or require implementation of, any additional BMPs as are necessary to comply with this Order.

(c) Each Copermittee shall implement, or require implementation of, any additional controls for residential areas and activities tributary to Clean Water Act Section 303(d) impaired water bodies (where a residential area or activity generates pollutants for which the water body is impaired) as necessary to comply with this Order.~~,~~ Each Copermittee shall implement, or require implementation of, additional controls for residential areas within or directly adjacent to or discharging directly to coastal lagoons~~,~~ or other receiving waters within environmentally sensitive areas (as defined in section F.1.b.(2)(a)(vii) of this Order) as necessary to comply with this Order.

F.3.d.(4) Enforcement of Residential Areas and Activities (Residential)

Each Copermittee shall enforce its storm water ordinance for all residential areas and activities as necessary to maintain compliance with this Order.

F.4. Education Component

Each Copermittee shall implement an Education Component using all media as appropriate to (1) measurably increase the knowledge of the target communities regarding MS4s, impacts of urban runoff on receiving waters, and potential BMP solutions for the target audience; and (2) to measurably change the behavior of target communities and thereby reduce pollutant releases to MS4s and the environment. At a minimum the education component shall address the following target communities:

- Municipal Departments and Personnel
- Construction Site Owners and Developers
- Industrial Owners and Operators
- Commercial Owners and Operators
- Residential Community, General Public, and School Children
- Quasi-Governmental Agencies/Districts (i.e., educational institutions, water districts, sanitation districts, etc.)

F.4.a. All Target Communities

At a minimum the Education Program for each target audience shall contain information on the following topics where applicable:

- State and Federal water quality laws
- Requirements of local municipal permits and ordinances (e.g., storm water and grading ordinances and permits)
- Impacts of urban runoff on receiving waters
- Watershed concepts (i.e., stewardship, connection between inland activities and coastal problems, etc.)
- Distinction between MS4s and sanitary sewers

- Importance of good housekeeping (e.g., sweeping impervious surfaces instead of hosing)
- Pollution prevention and safe alternatives
- Household hazardous waste collection
- Recycling
- BMPs: Site specific, structural and source control
- BMP maintenance
- Non-storm water disposal alternatives (e.g., all wash waters)
- Pet and animal waste disposal
- Proper solid waste disposal (e.g., garbage, tires, appliances, furniture, vehicles)
- Equipment and vehicle maintenance and repair
- Public reporting mechanisms
- Green waste disposal
- Integrated pest management
- Native vegetation
- Proper disposal of boat and recreational vehicle waste
- Traffic reduction, alternative fuel use
- Water conservation

F.4.b. Municipal, Construction, Industrial, Commercial, and Quasi-Governmental (educational institutions, water districts, sanitation districts, etc.) Communities

In addition to the topics listed in F.4.a. above, the Municipal, Construction, Industrial, Commercial, and Quasi-Governmental (Educational Institutions, Water Districts, Sanitation Districts) Communities shall also be educated on the following topics where applicable:

- Basic urban runoff training for all personnel
- Additional urban runoff training for appropriate personnel
- Illicit Discharge Detection and Elimination observations and follow-up during daily work activities
- Lawful disposal of catchbasin and other MS4 cleanout wastes
- Water quality awareness for Emergency/First Responders
- California's Statewide General NPDES Permit for Storm Water Discharges Associated with Industrial Activities (Except Construction).
- California's Statewide General NPDES Permit for Storm Water Discharges Associated with Construction Activities
- SDRWQCB's General NPDES Permit for Groundwater Dewatering
- 401 Water Quality Certification by the SDRWQCB
- Statewide General NPDES Utility Vault Permit (NPDES No. CAG990002)
- SDRWQCB Waste Discharge Requirements for Dredging Activities
- Local requirements beyond statewide general permits
- Federal, state and local water quality regulations that affect development projects
- Water quality impacts associated with land development
- Alternative materials & designs to maintain peak runoff values
- How to conduct a storm water inspection
- Potable water discharges to the MS4
- Dechlorination techniques
- Hydrostatic testing
- Spill response, containment, & recovery
- Preventive maintenance
- How to do your job and protect water quality

F.4.c. Residential, General Public, School Children Communities

In addition to the topics listed in F.4.a. above, the Residential, General Public, and School Children Communities shall be educated on the following topics where applicable:

- Public reporting information resources
- Residential and charity car-washing
- Community activities (e.g., "Adopt a Storm Drain, Watershed, or Highway" Programs, citizen monitoring, creek/beach cleanups, environmental protection organization activities, etc.)

F.5. Illicit Discharge Detection and Elimination Component

Each Copermittee shall implement an Illicit Discharge Detection and Elimination Component containing measures to actively seek and eliminate illicit discharges and connections. At a minimum the Illicit Discharge Detection and Elimination Component shall address:

F.5.a Illicit Discharges and Connections
F.5.b Dry Weather Analytical Monitoring
F.5.c Investigation / Inspection and follow-up
F.5.d Elimination of Illicit Discharges and Connections
F.5.e Enforce Ordinance
F.5.f Prevent and Respond To Sewage Spills (Including from Private Laterals and Failing Septic Systems) and Other Spills
F.5.g Facilitate Public Reporting of Illicit Discharges and Connections – Public Hotline
F.5.h Facilitate Disposal of Used Oil and Toxic Materials
F.5.i Limit Infiltration From Sanitary Sewer to MS4

F.5.a. Illicit Discharges and Connections

Each Copermittee shall implement a program to actively seek and eliminate illicit discharges and connections into its MS4. The program shall address all types of illicit discharges and connections excluding those non-storm water discharges not prohibited by the Copermittee in accordance with Section B. of this Order.

F.5.b. Dry Weather Analytical Monitoring

Each Copermittee shall conduct dry weather analytical monitoring of MS4 outfalls within its jurisdiction to detect illicit discharges and connections in accordance with Attachment E of this Order.

F.5.c. Investigation / Inspection and Follow-Up

Each Copermittee shall investigate and inspect any portion of the MS4 that, based on dry weather analytical monitoring results or other appropriate information, indicates a reasonable potential for illicit discharges, illicit connections, or other sources of non-storm water (including non-prohibited discharge(s) identified in Section B. of this Order). Each Copermittee shall establish criteria to identify portions of the system where such follow-up investigations are appropriate.

F.5.d. Elimination of Illicit Discharges and Connections

Each Copermittee shall eliminate all detected illicit discharges, discharge sources, and connections immediately.

F.5.e. Enforce Ordinances

Each Copermittee shall implement and enforce its ordinances, orders, or other legal authority to prevent illicit discharges and connections to its MS4. Each Copermittee shall also implement and enforce its ordinance, orders, or other legal authority to eliminate detected illicit discharges and connections to it MS4.

F.5.f. Prevent and Respond to Sewage Spills (Including from Private Laterals and Failing Septic Systems) and Other Spills

Each Copermittee shall prevent, respond to, contain and clean up all sewage and other spills that may discharge into its MS4 from any source (including private laterals and failing septic systems). Spill response teams shall prevent entry of spills into the MS4 and contamination of surface water, ground water and soil to the maximum extent practicable. Each Copermittee shall coordinate spill prevention, containment and response activities throughout all appropriate departments, programs and agencies to ensure maximum water quality protection at all times.

Each Copermittee shall develop and implement a mechanism whereby it is notified of all sewage spills from private laterals and failing septic systems into its MS4. Each Copermittee shall prevent, respond to, contain and clean up sewage from any such notification.

F.5.g. Facilitate Public Reporting of Illicit Discharges and Connections - - Public Hotline

Each Copermittee shall promote, publicize and facilitate public reporting of illicit discharges or water quality impacts associated with discharges into or from MS4s. Each Copermittee shall facilitate public reporting through development and operation of a public hotline. Public hotlines can be Copermittee-specific or shared by Copermittees. All storm water hotlines shall be capable of receiving reports in both English and Spanish 24 hours per day / seven days per week. Copermittees shall respond to and resolve each reported incident. All reported incidents, and how each was resolved, shall be summarized in each Copermittee's individual Jurisdictional URMP Annual Report.

F.5.h. Facilitate Disposal of Used Oil and Toxic Materials

Each Copermittee shall facilitate the proper management and disposal of used oil, toxic materials, and other household hazardous wastes. Such facilitation shall include educational activities, public information activities, and establishment of collection sites operated by the

Copermittee or a private entity. Curbside collection of household hazardous wastes is encouraged.

F.5.i. Limit Infiltration From Sanitary Sewer to MS4/ Provide Preventive Maintenance of Both

Each Copermittee shall implement controls and measures to limit infiltration of seepage from

municipal sanitary sewers to MS4s through thorough, routine preventive maintenance of the MS4. Each Copermittee that operates both a municipal sanitary sewer system and a MS4 shall implement controls and measures to limit infiltration of seepage from the municipal sanitary sewers to the MS4s that shall include overall sanitary sewer and MS4 surveys and thorough, routine preventive maintenance of both. ~~Such controls shall include overall sanitary sewer and MS4 system surveys and thorough, routine preventive maintenance of both.~~

F.6. Public Participation Component

Each Copermittee shall incorporate a mechanism for public participation in the implementation of the Jurisdictional URMP.

F.7. Assessment of Jurisdictional URMP Effectiveness Component

a. As part of its individual Jurisdictional URMP, each Copermittee shall develop a long-term strategy for assessing the effectiveness of its individual Jurisdictional URMP. The long-term assessment strategy shall identify specific direct and indirect measurements that each Copermittee will use to track the long-term progress of its individual Jurisdictional URMP towards achieving improvements in receiving water quality. Methods used for assessing effectiveness shall include the following or their equivalent:~~for example~~ surveys, pollutant loading estimations, and receiving water quality monitoring. The long-term strategy shall also discuss the role of monitoring data in substantiating or refining the assessment.

b. As part of its individual Jurisdictional URMP Annual Report, each Copermittee shall include an assessment of the effectiveness of its Jurisdictional URMP using the direct and indirect assessment measurements and methods developed in its long-term assessment strategy.

~~c.Individual Jurisdictional URMP Annual Reports shall also include each Copermittees' self-assessment of its "status of compliance" with this Order. Specifically, each Annual Report shall specify its self-assessment of its "percent compliance with each component of its Jurisdictional URMP" (sections F.1.-F.8.), as well as the Copermittees' self-assessment of its "overall percent compliance" with this Order in its entirety.~~

F.8. Fiscal Analysis Component

Each Copermittee shall secure the resources necessary to meet the requirements of this Order. As part of its individual Jurisdictional URMP, each Copermittee shall develop a strategy to conduct a fiscal analysis of its urban runoff management program in its entirety. In order to demonstrate sufficient financial resources to implement the conditions of this Order, each Copermittee shall conduct an annual fiscal analysis as part of its individual Jurisdictional URMP Annual Report. This analysis shall, for each fiscal year covered by this Order, evaluate the expenditures (such as capital, operation and maintenance, education, and administrative expenditures) necessary to accomplish the activities of the Copermittee's urban runoff management program. Such analysis shall include a description of the source(s) of funds that are proposed to meet the necessary expenditures, including legal restrictions on the use of such funds.

G. IMPLEMENTATION OF JURISDICTIONAL URMP

Each Copermittee shall have completed full implementation of all requirements of the Jurisdictional URMP section of this Order no later than ~~**180**~~ **365 days after adoption** of this Order, except as stated as follows: Each Copermittee's local SUSMP must be implemented within 180 days of approval of the model SUSMP in the public process by the SDRWQCB. ~~with the exception of the requirements included in the Land-Use Planning for New Development and Redevelopment Component of the Jurisdictional URMP section of this Order. Each Copermittee shall have completed full implementation of all requirements of the Land-Use Planning for New Development and Redevelopment Component of the Jurisdictional URMP section of this Order no later than **365 days after adoption** of this Order.~~

H. SUBMITTAL OF JURISDICTIONAL URMP DOCUMENT

The written account of the overall program to be conducted by each Copermittee within its jurisdiction during the five-year life of this Order is referred to as the "Jurisdictional URMP Document".

~~1.~~Individual – Each Copermittee shall submit to the Principal Permittee(s) an individual Jurisdictional URMP document which describes all activities it has undertaken or is undertaking to implement the requirements of each component of the Jurisdictional URMP section F. of this Order. ~~Individual Jurisdictional URMP documents shall be submitted in two parts.~~

(a) ~~The first submittal of the individual Jurisdictional URMP document shall address the requirements of the entire Jurisdictional URMP section of this Order, with the exception of the Land-Use Planning for New Development and Redevelopment Component (i.e., sections F.2. – F.8.)~~ At a minimum, the ~~first submittal of the~~ individual Jurisdictional URMP document shall contain the following information for the following components:

(1) Construction Component

(a) Which pollution prevention methods will be required for implementation, and how and where they will be required
(b) Updated grading ordinances
(c) A description of the modified construction and grading approval process
(d) Updated construction and grading project requirements ~~conditions of approval~~ in local grading and construction permits
(e) A completed watershed-based inventory of all construction sites
(f) A completed prioritization of all construction sites based on threat to water quality
(g) Which BMPs will be implemented, or required to be implemented, for each priority category
(h) How BMPs will be implemented, or required to be implemented, for each priority category
(i) Planned inspection frequencies for each priority category
(j) Methods for inspection
(k) A description of enforcement mechanisms and how they will be used
(l) A description of how non-compliant sites will be identified and the process for notifying the SDRWQCB, including a list of current non-compliant sites
(m) A description of the construction education program and how it will be implemented

(2) Municipal (Existing Development) Component

(a) Which pollution prevention methods will be required for implementation, and how and where they will be required

(b) A completed watershed-based inventory of all municipal land use areas and activities
(c) A completed prioritization of all municipal areas and activities based on threat to water quality
(d) Which BMPs will be implemented, or required to be implemented, for each priority category
(e) How BMPs will be implemented, or required to be implemented, for each priority category
(f) Municipal maintenance activities and schedules
(g) Management strategy for pesticides, herbicides, and fertilizer use.
(h) Planned inspection frequencies for the high priority category
(i) Methods for inspection
(j) A description of enforcement mechanisms and how they will be used

(3) Industrial (Existing Development) Component

(a) Which pollution prevention methods will be required for implementation, and how and where they will be required
(b) A completed watershed-based inventory of all industrial sites
(c) A completed prioritization of all industrial sites based on threat to water quality
(d) Which BMPs will be implemented, or required to be implemented, for each priority category
(e) How BMPs will be implemented, or required to be implemented, for each priority category
(f) A description of the monitoring program to be conducted, or required to be conducted
(g) Planned inspection frequencies for each priority category
(h) Methods for inspection
(i) A description of enforcement mechanisms and how they will be used
(j) A description of how non-compliant sites will be identified and the process for notifying the SDRWQCB, including a list of current non-compliant sites

(4) Commercial (Existing Development) Component

(a) Which pollution prevention methods will be required for implementation, and how and where they will be required
(b) A completed watershed-based inventory of high priority commercial sites
(c) Which BMPs will be implemented, or required to be implemented, for high priority sites
(d) How BMPs will be implemented, or required to be implemented, for high priority sites
(e) Planned inspection frequencies for high priority sites
(f) Methods for inspection
(g) A description of enforcement mechanisms and how they will be used

(5) Residential (Existing Development) Component

(a) Which pollution prevention methods will be encouraged for implementation, and how and where they will be encouraged
(b) A completed inventory of high priority residential areas and activities
(c) Which BMPs will be implemented, or required to be implemented, for high priority areas and activities
(d) How BMPs will be implemented, or required to be implemented, for high priority areas and activities
(e) A description of enforcement mechanisms and how they will be used

(6) Education Component

(a) A description of the content, form, and frequency of education efforts for each target community

(7) Illicit Discharges Detection and Elimination Component

(a) A description of the program to actively seek and eliminate illicit discharges and connections
(b) A description of dry weather analytical monitoring to be conducted to detect illicit discharges and connections (see Attachment E)
(c) A description of investigation and inspection procedures to follow-up on dry weather analytical monitoring results or other information which indicate potential for illicit discharges and connections
(d) A description of procedures to eliminate detected illicit discharges and connections
(e) A description of enforcement mechanisms and how they will be used
(f) A description of methods to prevent, respond to, contain, and clean up all sewage (including spills from private laterals and failing septic systems) and other spills in order to prevent entrance into the MS4
(g) A description of the mechanism to receive notification of spills from private laterals
(h) A description of efforts to facilitate public reporting of illicit discharges and connections, including a public hotline
(i) A description of efforts to facilitate proper disposal of used oil and other toxic materials
(j) A description of controls and measures to be implemented to limit infiltration of seepage from sanitary sewers to MS4s
(k) A description of routine preventive maintenance activities on the sanitary system (where applicable) and the MS4

(8) Public Participation Component

(a) A description of how public participation will be included in the implementation of the Jurisdictional URMP

(9) Assessment of Jurisdictional URMP Effectiveness Component

(a) A description of strategies to be used for assessing the long-term effectiveness of the individual Jurisdictional URMP.

(10) Fiscal Analysis Component

(a) A description of the strategy to be used to conduct a fiscal analysis of the urban runoff management program.

(11) Land-Use Planning for New Development and Redevelopment Component

(a) Workplan for inclusion in General Plan (or equivalent plan) of water quality and watershed protection principles and policies
(b) Development project requirements in local development permits
(c) Participation efforts conducted in the development of the Model SUSMP
(d) Environmental review processes revisions

(e) A description of the planning education program and how it will be implemented

(12) Fire Fighting

(a) A description of a program to reduce pollutants from non-emergency fire fighting flows identified by the Copermittee to be significant sources of pollutants.

~~b. The second submittal of the individual Jurisdictional URMP document shall address the requirements of the Land-Use Planning for New Development and Redevelopment Component of the Jurisdictional URMP section F.1. of this Order. At a minimum, the second submittal of the individual Jurisdictional URMP document shall contain the following information for the following components:~~

~~(1) General Plan (or equivalent plan) revisions, specifying water protection policies~~
~~(2) Conditions of project approval in local development permits~~
~~(3) Participation efforts conducted in the development of the Model SUSMP~~
~~(4) Environmental review processes and CEQA initial study checklist revisions~~
~~(5) A description of the planning education program and how it will be implemented~~

c. Each Copermittee shall submit to the Principal Permittee(s) each part of its individual Jurisdictional URMP document by the dates specified by the Principal Permittee(s).

d. In addition to submittal of the ~~two parts of the~~ Jurisdictional URMP document, each Copermittee shall submit to the SDRWQCB its own adopted local SUSMP consistent with the approved Model SUSMP, as described in section F.1.b.(2). of this Order. Each Copermittee's own local SUSMP, along with its amended ordinances, shall be submitted to the SDRWQCB within 180 days of the SDRWQCB's approval of the Model SUSMP.

2. Unified – The Principal Permittee(s) shall submit the unified Jurisdictional URMP document to the SDRWQCB. The unified Jurisdictional URMP document shall be submitted in two parts (the collected Jurisdictional URMPs and the model SUSMP).

~~a.~~ The ~~first~~ unified Jurisdictional URMP document submittal shall address the requirements of the entire Jurisdictional URMP sections ~~F.2~~ F.1 – F.8. of this Order, with the exception of the local SUSMP requirements (which are to be implemented 180 days after approval of the model SUSMP by the SDRWQCB). ~~Land-Use Planning for New Development and Redevelopment Component.~~ The ~~first~~ unified Jurisdictional URMP document submittal shall contain a section covering common activities conducted collectively by the Copermittees, to be produced ~~written~~ by the Principal Permittee(s), and the twenty individual Jurisdictional URMP documents. The Principal Permittee(s) shall be responsible for the development and production of a stand alone Model SUSMP document meeting the requirements of section F.1.b.(2) of this Order. The Principal Permittee(s) shall submit the ~~first~~ unified Jurisdictional URMP document, including the Model SUSMP, to the SDRWQCB within ~~**180**~~ **365 days of adoption** of this Order.

~~b. The second unified Jurisdictional URMP document submittal shall address the requirements of the Land-Use Planning for New Development and Redevelopment Component of the Jurisdictional URMP section of this Order. The second unified Jurisdictional URMP document submittal shall contain a section covering common activities conducted collectively by the Copermittees, to be written by the Principal Permittee, and the twenty individual Jurisdictional URMP documents. As part of the second unified Jurisdictional URMP document, the Principal Permittee shall be responsible for the development and writing of a stand alone Model SUSMP document meeting~~

~~the requirements of section F.1.b.(2). of this Order. The Principal Permittee shall submit the second unified Jurisdictional URMP document, including the Model SUSMP, to the SDRWQCB within **365 days of adoption** of this Order.~~

3. Universal Reporting Requirements

All individual and unified Jurisdictional URMP document submittals shall include an executive summary, introduction, conclusion, recommendations, and signed certified statement. Each Copermittee shall submit its individual Jurisdictional Urban Runoff Management Program Document with a signed certified statement. The Principal Permittee(s) shall submit a signed certified statement referring to its individual Jurisdictional Urban Runoff Management Program Document, the section covering common activities conducted collectively by the Copermittees, and the Model SUSMP document meeting the requirements of section F.1.b.(2) of this Order as produced by the Principal Permittee(s).

I. SUBMITTAL OF JURISDICTIONAL URMP ANNUAL REPORT

1. Individual - Each individual Jurisdictional URMP Annual Report shall be a documentation of the activities conducted by each Copermittee during the past annual reporting period. Each Jurisdictional URMP Annual Report shall, at a minimum, contain the following:

   a. Comprehensive description of all activities conducted by the Copermittee to meet all requirements of each component of the Jurisdictional URMP section of this Order;

      F.1. Land-Use Planning for New Development and Redevelopment Component
      F.2. Construction Component
      F.3. Existing Development Component (Including Municipal, Industrial, Commercial, Residential, and Education)
      F.4. Education Component
      F.5. Illicit Discharge Detection and Elimination Component
      F.6. Public Participation Component
      F.7. Assessment of Jurisdictional URMP Effectiveness Component
      F.8. Fiscal Analysis Component

   b. Each Copermittee's accounting of all:
      (1) Reports of illicit discharges (i.e., complaints) and how each was resolved (indicating referral source);
      (2) Inspections conducted;
      (3) Enforcement actions taken; and
      (4) Education efforts conducted.

   c. Public participation mechanisms utilized during the Jurisdictional URMP implementation process;

   d. Proposed revisions to the Jurisdictional URMP;

   e. A summary of all urban runoff related data not included in the annual monitoring report (e.g., special investigations);

   ~~f.Annual expenditures from previous year and b~~Budget for upcoming year;

~~g. Identification of management measures proven to be effective in reducing urban runoff pollutants and flow;~~

~~h.~~g. Identification of management measures proven to be ineffective in reducing urban runoff pollutants and flow;

~~i~~h. Identification of water quality improvements or degradation; and

~~j Self-assessment of Copermittees' "percent compliance with each component of its Jurisdictional URMP" and "overall percent compliance with this Order" in its entirety.~~

2. Unified - The unified Jurisdictional URMP Annual Report shall contain a section covering common activities conducted collectively by the Copermittees, to be produced ~~written~~ by the Principal Permittee(s), and the twenty individual Jurisdictional URMP Annual Reports. Each Copermittee shall submit to the Principal Permittee(s) an individual Jurisdictional URMP Annual Report by the date specified by the Principal Permittee(s). The Principal Permittee(s) shall submit a unified Jurisdictional URMP Annual Report to the SDRWQCB by **January 31, ~~2002~~ 2003 and every January 31 thereafter.** The reporting period for these annual reports shall be the previous fiscal year. For example, the report submitted January 31, ~~2002~~ 2003 shall cover the reporting period July 1, 2001~~0~~ to June 30, ~~2001~~ 2002.

3. Universal Reporting Requirements

   All individual and unified Jurisdictional URMP submittals shall include an executive summary, introduction, conclusion, recommendations, and signed certified statement. Each Copermittee shall submit its individual Jurisdictional Urban Runoff Management Program Annual Report with a signed certified statement. The Principal Permittee(s) shall submit a signed certified statement referring to its individual Jurisdictional Urban Runoff Management Program Annual Report and the section covering common activities conducted collectively by the Copermittees as produced by the Principal Permittee(s).

J. WATERSHED URBAN RUNOFF MANAGEMENT PROGRAM

1. Each Copermittee shall collaborate with other Copermittees within its watershed(s) as shown in Table 4. below to identify and mitigate the highest priority water quality issues/pollutants in the watershed(s).

2. Each Copermittee shall collaborate with all other Copermittees discharging urban runoff into the same watershed to develop and implement a Watershed Urban Runoff Management Program (Watershed URMP) for the respective watershed. Each Watershed URMP shall, at a minimum contain the following:

   a. An accurate map of the watershed (preferably in Geographical Information System [GIS] format) that identifies all receiving waters (including the Pacific Ocean); all Clean Water Act section 303(d) impaired receiving waters (including the Pacific Ocean); land uses; MS4s, major highways; jurisdictional boundaries; and inventoried commercial, construction, industrial, municipal sites, and residential areas.

   b. An assessment of the water quality of all receiving waters in the watershed based upon (1) existing water quality data; and (2) annual watershed water quality monitoring that satisfies the

watershed monitoring requirements of Attachment B ;

c. An identification and prioritization of major water quality problems in the watershed caused or contributed to by MS4 discharges and the likely source(s) of the problem(s);

d. An implementation time schedule of short and long-term recommended activities (individual and collective) needed to address the highest priority water quality problem(s). For this section, "short-term activities" shall mean those activities that are to be completed during the life of this Order and "long-term activities" shall mean those activities that are to be completed beyond the life of this Order;

e. An identification of the Copermittee(s) responsible for implementing each recommended activity, including the selection of the Lead Permittee(s) and the time schedule for implementation. In the event that a Lead Permittee is not selected and identified by the Copermittees in a watershed, the Copermittee identified in Table 4 as the Lead Permittee for that watershed shall be responsible for implementing the requirements of the Lead Permittee in that watershed by default;

f. A mechanism for public participation throughout the entire watershed URMP process;

g. A watershed based education program;

h. A mechanism to facilitate collaborative "watershed-based" (i.e., natural resource-based) land use planning with neighboring local governments in the watershed.

i. ~~An implementation schedule for collaborative watershed-based land use planning to begin no later than January 2005.~~

i~~j~~. Long-term strategy for assessing the effectiveness of the Watershed URMP. The long-term assessment strategy shall identify specific direct and indirect measurements that will track the long-term progress of Watershed URMP towards achieving improvements in receiving water quality. Methods used for assessing effectiveness shall include the following or their equivalent ~~for example~~: surveys, pollutant loading estimations, and receiving water quality monitoring. The long-term strategy shall also discuss the role of monitoring data in substantiating or refining the assessment.

Table 4. Copermittees by Watershed

RESPONSIBLE COPERMITTEE(S)	WATERSHED URBAN RUNOFF MANAGEMENT PROGRAM	HYDROLOGIC UNIT OR AREA	MAJOR RECEIVING WATER BODIES
1. County of San Diego	Santa Margarita River	Santa Margarita HU (902.00)	Santa Margarita River and Estuary, Pacific Ocean
1. City of Escondido **2. City of Oceanside** 3. City of Vista 4. County of San Diego	San Luis Rey River	San Luis Rey HU (903.00)	San Luis Rey River and Estuary, Pacific Ocean
1. City of Carlsbad **2. City of Encinitas** 3. City of Escondido 4. City of Oceanside 5. City of San Marcos	Carlsbad	Carlsbad HU (904.00)	Batiquitos Lagoon San Elijo Lagoon Agua Hedionda Lagoon Buena Vista Lagoon and Tributary Streams

RESPONSIBLE COPERMITTEE(S)	WATERSHED URBAN RUNOFF MANAGEMENT PROGRAM	HYDROLOGIC UNIT OR AREA	MAJOR RECEIVING WATER BODIES
6. City of Solana Beach 7. City of Vista 8. County of San Diego			Pacific Ocean
1. City of Del Mar 2. **City of Escondido** 3. City of Poway 4. City of San Diego 5. City of Solana Beach 6. County of San Diego	San Dieguito River	San Dieguito HU (905.00)	San Dieguito River and Estuary Pacific Ocean
1. City of Del Mar 2. City of Poway 3. City of San Diego 4. County of San Diego	Peñasquitos	Miramar Reservoir HA (906.10) Poway HA (906.20)	Los Peñasquitos Creek Los Peñasquitos Lagoon Pacific Ocean
1. City of San Diego	Mission Bay	Scripps HA (906.30) Miramar HA(906.40) Tecolote HA (906.50)	Mission Bay Pacific Ocean
1. City of El Cajon 2. City of La Mesa 3. City of Poway 4. City of San Diego 5. City of Santee 6. County of San Diego	San Diego River	San Diego HU (907.00)	San Diego River Pacific Ocean
1. City of Chula Vista 2. City of Coronado ~~3. City of El Cajon~~ ~~4~~3. City of Imperial Beach ~~5~~4. City of La Mesa ~~6~~5. City of Lemon Grove ~~7~~6. City of National City ~~8~~7. City of San Diego ~~9~~8. County of San Diego **~~10~~9. San Diego Unified Port District**	San Diego Bay	Pueblo San Diego HU (908.00) Sweetwater HU (909.00) Otay HU (910.00)	San Diego Bay Sweetwater River Otay River Pacific Ocean
1. City of Imperial Beach 2. City of San Diego 3. County of San Diego	Tijuana River	Tijuana (911.00)	Tijuana River and Estuary Pacific Ocean

- The Lead Watershed Copermittee for each watershed is highlight

K. IMPLEMENTATION OF WATERSHED URMP

Each Copermittee shall have completed full implementation of all requirements of the Watershed URMP section of this Order no later than January 31, 2003 unless otherwise specified.

L. SUBMITTAL OF WATERSHED URMP DOCUMENT

The written account of the overall watershed program to be conducted by each Copermittee during the remaining life of this Order is referred to as the "Watershed URMP Document". The Watershed URMP

is conducted concurrently with the Jurisdictional URMP.[6]

1. Each Watershed Specific URMP document shall state how the member Copermittees within each watershed will develop and implement the requirements of the Watershed URMP section J. of this Order. The Copermittees responsible for each of the nine Watershed URMPs are specified in Table 4 above. The Lead Watershed Copermittee for each watershed is highlighted, unless a different Lead Watershed Copermittee is designated. Each Lead Watershed Copermittee shall be responsible for producing its respective Watershed URMP document, as well as for coordination and meetings amongst all member watershed Copermittees. Each Lead Watershed Copermittee is further responsible for the submittal of the Watershed URMP document to the Principal Permittee(s) by the date specified by the Principal Permittee(s).

   a. Each Watershed specific URMP document shall include:
      (1) A completed watershed map
      (2) A water quality assessment and watershed monitoring needed
      (3) Prioritization of water quality problems
      (4) Recommended activities (short and long term)
      (5) Individual Copermittee implementation responsibilities and time schedules for implementation
      (6) A description of watershed public participation mechanisms
      (7) A description of watershed education mechanisms
      (8) A description of the mechanism and implementation schedule for watershed-based land use planning
      (9) A strategy for assessing the long-term effectiveness of the Watershed URMP

2. Unified - The unified Watershed URMP document shall contain a section covering common activities conducted collectively by the Copermittees, to be produced ~~written~~ by the Principal Permittee(s), and the nine Watershed Specific URMP documents. The Principal Permittee(s) shall submit the unified Watershed URMP document to the SDRWQCB by **January 31, 2003.**

3. Universal Reporting Requirements.

   All individual and unified Watershed URMP submittals shall include an executive summary, introduction, conclusion, recommendations, and signed certified statement. Each Copermittee shall submit a signed certified statement covering its responsibilities in the specific Watershed URMP Document. The Principal Permittee(s) shall submit a signed certified statement referring to its specific Watershed URMP Document and the section covering common activities conducted collectively by the Copermittees as produced by the Principal Permittee(s).

M. SUBMITTAL OF WATERSHED URMP ANNUAL REPORT

1. Watershed Specific - Each Watershed Specific URMP Annual Report shall be a documentation of the activities conducted by watershed member Copermittees during the previous annual reporting

[6] As each Copermittee transitions from conducting its management program only within its jurisdiction to conducting it also throughout the entire watershed (with neighboring Copermittees), it is expected that many activities will continue on a jurisdictional level (e.g., enforcement of local ordinances and permits). Implementation of the Watershed URMP is not meant to replace, but to expand implementation of the Jurisdictional URMP. For this reason, it is necessary to report management activities on both levels. This can be accomplished either by submitting both a Jurisdictional URMP Annual Report and a Watershed URMP Annual Report or by submitting a single Watershed URMP Annual Report that contains two separate sections (i.e., watershed activities and jurisdictional activities). Information need only be reported once (to the extent something is covered in the Watershed URMP Annual Report, it need not be covered again the Jurisdictional URMP Annual Report).

period to meet the requirements of all components of the Watershed URMP section of this Order. Each Watershed URMP Annual Report shall, at a minimum, contain the following:

a. Comprehensive description of all activities conducted by the watershed member Copermittees to meet all requirements of each component of Watershed URMP section J. of this Order

b. Public participation mechanisms utilized during the Watershed URMP implementation process;
c. Mechanism for watershed based land use planning;
d. Assessment of effectiveness of Watershed URMP;
e. Proposed revisions to the Watershed URMP;
f. A summary of watershed effort related data not included in the annual monitoring report (e.g., special investigations); and
g. Identification of water quality improvements or degradation.

2. Unified - The Unified Watershed URMP Annual Report shall contain a section covering common activities conducted collectively by the Copermittees, to be produced ~~written~~ by the Principal Permittee(s), and the nine Watershed Specific URMP Annual Reports. Each Lead Watershed Copermittee shall submit to the Principal Permittee(s) a Watershed Specific URMP Annual Report by the date specified by the Principal Permittee(s). The Principal Permittee(s) shall submit the Unified Watershed URMP Annual Report to the SDRWQCB by January 31, 2004 and every January 31 thereafter. The reporting period for these annual reports shall be the previous fiscal year. For example, the report submitted January 31, 2004 shall cover the reporting period July 1, 2002 to June 30, 2003.

3. Universal Reporting Requirements

All individual and unified Watershed URMP submittals shall include an executive summary, introduction, conclusion, recommendations, and signed certified statement. Each Copermittee shall submit a signed certified statement covering its responsibilities in the specific Watershed URMP Annual Report. The Principal Permittee(s) shall submit a signed certified statement referring to its specific Watershed URMP Annual Report and the section covering common activities conducted collectively by the Copermittees as produced by the Principal Permittee(s).

N. ALL COPERMITTEE COLLABORATION

1. Each Copermittee shall collaborate with all other Copermittees regulated under this Order to address common issues, promote consistency among Jurisdictional Urban Runoff Management Programs (Jurisdictional URMPs) and Watershed Urban Runoff Management Programs (Watershed URMPs), and to plan and coordinate activities required under this Order

a. Management Structure - All Copermittees shall jointly execute and submit to the SDRWQCB no later than **~~180~~ 365 days after adoption** of this Order, a Memorandum of Understanding, Joint Powers Authority, or other instrument of formal agreement which at a minimum provides a management structure for the following:

- Designation of Joint Responsibilities
- Decision making
- Watershed activities;
- Information management of data and reports, including the requirements under this Order; and

- Any and all other collaborative arrangements for compliance with this Order.

b. All Copermittees shall jointly develop a standardized format(s) for all reports required under this Order (e.g., annual reports, monitoring reports, fiscal analysis reports, and program effectiveness reports, etc.). The standardized reporting format(s) shall be used by all Copermittees and shall include protocols for electronic reporting. The Principal Permittee(s) shall submit the standardized format(s) to the SDRWQCB no later than ~~**180**~~ **365 days after adoption** of this Order**.**

O. PRINCIPAL PERMITTEE RESPONSIBILITIES

~~The Principal Permittee shall be the City of San Diego.~~Within 90 days of adoption of this Order, the Copermittees shall designate the Principal Permittee(s) and notify the SDRWQCB of the name(s) of the Principal Permittee(s). The Principal Permittee(s) may require the Copermittees to reimburse the Principal Permittee(s) for reasonable costs incurred while performing coordination responsibilities and other related tasks. The Principal Permittee(s) shall, at a minimum:

1. Serve as liaison(s) between the Copermittees and the SDRWQCB on general permit issues.

2. ~~Ensure c~~Coordinate~~ion of~~ permit activities among the Copermittees and facilitate collaboration on the development and implementation of programs required under this Order;

3. Integrate individual Copermittee documents and reports required under this Order into single unified documents and reports for submittal to the SDRWQCB as described below. If a reporting date falls on a non-working day or State holiday, then the report is to be submitted on the following working day.

   a. Unified Jurisdictional URMP Document – The Principal Permittee(s) shall submit the unified Jurisdictional URMP document in its entirety (including the model SUSMP) to the SDRWQCB within 365 days of the adoption of this Order. ~~The first part of the unified Jurisdictional URMP document (as described in section H.2.a.) shall be submitted within **180 days of adoption** of this Order. The second part of the unified Jurisdictional URMP document (as described in section H.2.b.) shall be submitted within **365 days of adoption** of this Order.~~

      The Principal Permittee(s) shall be responsible for producing the sections of the unified Jurisdictional URMP document submittals covering common activities conducted by the Copermittees. ~~As part of the second unified Jurisdictional URMP document submittal, t~~The Principal Permittee(s) shall be responsible for the development and production ~~writing~~ of a stand alone Model SUSMP document meeting the requirements of section F.1.b.(2). of this Order. The Principal Permittee(s) shall also be responsible for collecting and assembling the individual Jurisdictional URMP document submittals covering the activities conducted by each individual Copermittee.

   b. Unified Jurisdictional URMP Annual Reports – The Principal Permittee(s) shall submit unified Jurisdictional URMP Annual Reports to the SDRWQCB by January 31 of each year, beginning on **January 31, ~~2002~~ 2003**. The reporting period for these annual reports shall be the previous fiscal year. For example, the report submitted January 31, ~~2002~~ 2003 shall cover the reporting period July 1, ~~2000~~ 2001 to June 30, ~~2001~~ 2002.

      The Principal Permittee(s) shall be responsible for producing the section of the unified Jurisdictional URMP Annual Reports covering common activities conducted by the

Copermittees. The Principal Permittee(s) shall also be responsible for collecting and assembling the individual Jurisdictional URMP Annual Reports covering the activities conducted by each individual Copermittee.

c. Unified Watershed URMP Document – The Principal Permittee(s) shall submit the unified Watershed URMP document to the SDRWQCB by **January 31, 2003**. The Principal Permittee(s) shall be responsible for producing the section of the unified Watershed URMP document covering common activities conducted by the Copermittees. The Principal Permittee(s) shall also be responsible for collecting and assembling the watershed specific Watershed URMP documents covering the activities conducted by each individual Copermittee.

d. Unified Watershed URMP Annual Report - The Principal Permittee(s) shall submit unified Watershed URMP Annual Reports to the SDRWQCB by January 31 of each year, beginning on **January 31, 2004**. The reporting period for these annual reports shall be the previous fiscal year. For example, the report submitted January 3, 2004 shall cover the reporting period July 1, 2002 to June 30, 2003.

   The Principal Permittee(s) shall be responsible for producing the section of the unified Watershed URMP Annual Reports covering common activities conducted by the Copermittees. The Principal Permittee(s) shall also be responsible for collecting and assembling the watershed specific Watershed URMP Annual Reports covering the activities conducted by each individual Copermittee.

e. Receiving Waters Monitoring and Reporting Program - The Principal Permittee(s) shall be responsible for the production ~~writing~~ and submittal of the Previous Monitoring and Future Recommendations Report. The report shall be submitted to the SDRWQCB within 180 days of adoption of this Order.

f. Receiving Waters Monitoring and Reporting Program - The Principal Permittee(s) shall be responsible for the development and production ~~writing~~ of the Receiving Waters Monitoring Program as it is outlined in Attachment B. The Principal Permittee(s) shall submit the Receiving Waters Monitoring Program to the SDRWQCB within 180 days of adoption of this Order.

g. Receiving Waters Monitoring and Reporting Program - The Principal Permittee(s) shall submit the Receiving Waters Monitoring Annual Report to the SDRWQCB on January 31 of each year, beginning on January 31, ~~2002~~ 2003.

h. Formal Agreements/Standardized Formats - The Principal Permittee(s) shall submit to the SDRWQCB, within ~~180~~ 365 days of adoption of this Order, a formal agreement between the Copermittees which provides a management structure for meeting the requirements of this Order (as described in section N.1.a.). The Principal Permittee(s) shall submit to the SDRWQCB, within ~~180~~ 365 days of adoption of this Order, standardized formats for all reports and documents required under this Order.

i. Dry Weather Analytical Monitoring - The Principal Permittee(s) shall collectively submit the Copermittees' dry weather analytical monitoring maps and procedures to the SDRWQCB within ~~180~~ 365 days of adoption of this Order.

P. RECEIVING WATERS MONITORING AND REPORTING PROGRAM

1. Pursuant to California Water Code section 13267, each Copermittee shall comply with Monitoring and Reporting Program for No. 2001-01 contained in **Attachment B** of this Order.

2. Each Copermittee shall also comply with standard provisions, reporting requirements, and notifications contained in **Attachment C** of this Order.

Q. TASKS AND SUBMITTAL SUMMARY

The tasks and submittals required under this Order are summarized in Tables 5 and 6 below:

Table 5. Task Summary

Task No.	Task	Permit Section	Completion Date	Frequency
1	Identify discharges not to be prohibited and BMPs required for treatment of discharges not prohibited	B.3.	~~180~~ 365 days after adoption of Order	One Time
2	Examine field screening results to identify water quality problems resulting from non-prohibited non-storm water discharges, including follow-up of problems	B.5	January 31, ~~2002~~ 2003	Annually
3	Notify SDRWQCB of discharges causing or contributing to an exceedance of water quality standards	C.2.a.	Immediate	As Needed
4	Establish adequate legal authority to control pollutant discharges into and from MS4	D.1.	~~90~~ 180 days after adoption of Order	One Time
5	~~Revise~~ Assess General Plan to incorporate water quality and watershed protection principles	F.1.a.	365 days after adoption of Order	One Time
6	Include ~~conditions of approval~~ Development Project Requirements in local permits	F.1.b.(1).	365 days after adoption of Order	One Time
7	Develop Model SUSMP	F.1.b.(2).	365 days after adoption of Order	One Time
8	Develop and adopt individual local SUSMP and amended ordinances	F.1.b.(2).	180 days after approval of Model SUSMP by SDRWQCB	One Time
9	Implement individual jurisdictional SUSMP	F.1.b.(2).	180 days after approval of Model SUSMP by SDRWQCB	Continuous
10	Revise environmental review processes ~~and CEQA checklists~~	F.1.c.(1).	365 days after adoption of Order	One Time
11	Conduct education program for municipal planning and development review staff, project applicants, developers, contractors, community planning groups, and property owners	F.1.d.(1). And F.1.d.(2).	365 days after adoption of Order	Ongoing
12	Implement all requirements of Construction Component of Jurisdictional URMP	F.2.a. – ~~F.2.h~~ F.2.j.	~~180~~ 365 days after adoption of Order	Ongoing
13	Notify SDRWQCB of non-compliant construction sites that pose a threat to human or environmental health	F.2.i	Within 24 hours of incidence of noncompliance	As Needed
14	Implement all requirements of Municipal Existing Development Component of Jurisdictional URMP	F.3.a.(1). – F.3.a.(8).	~~180~~ 365 days after adoption of Order	Ongoing
15	Implement all requirements of Industrial	F.3.b.(1) –	~~180~~ 365 days after	Ongoing

	Existing Development Component of Jurisdictional URMP	F.3.b.(8)	adoption of Order	
16	Notify SDRWQCB of non-compliant industrial sites that pose a threat to human or environmental health	F.3.b.8	Within 24 hours of discovery ~~incidence~~ of noncompliance	As Needed
17	Implement all requirements of Commercial Existing Development Component of Jurisdictional URMP	F.3.c.(1) – F.3.c.(5)	~~180~~ 365 days after adoption of Order	Ongoing
18	Implement all requirements of Residential Existing Development Component of Jurisdictional URMP	F.3.d.(1) – ~~F.3.d.(3)~~ F.3.d.(4)	~~180~~ 365 days after adoption of Order	Ongoing
19	Implement all requirements of Education Component of Jurisdictional URMP	F.4.a. – F.4.c.	~~180~~ 365 days after adoption of Order	Ongoing
20	Implement all requirements of Illicit Discharge Detection and Elimination ~~Connections/Illegal Discharges~~ Component of Jurisdictional URMP	F.5.a. – F.5.i.	~~180~~ 365 days after adoption of Order	Ongoing
21	Implement all requirements of Public Participation Component of Jurisdictional URMP	F.6.	~~180~~ 365 days after adoption of Order	Ongoing
22	Develop strategy for assessment of Jurisdictional URMP effectiveness	F.7.a.	~~180~~ 365 days after adoption of Order	One Time
23	Assess Jurisdictional URMP effectiveness	F.7.b.	January 31, ~~2002~~ 2003	Annually
24	Develop strategy for fiscal analysis of urban runoff management program	F.8.	~~180~~ 365 days after adoption of Order	One Time
25	Conduct fiscal analysis of urban runoff management program in entirety	F.8.	January 31, ~~2002~~ 2003	Annually
26	Develop and implement Watershed URMP	J.2.	January 31, 2003	Ongoing
27	Execute formal agreement which provides management structure for meeting Order requirements	N.1.a.	~~180~~ 365 days after adoption of Order	One Time
28	Develop standardized formats for all required reports of this Order	N.1.b.	~~180~~ 365 days after adoption of Order	One Time
29	Develop Previous Monitoring and Future Recommendations Report	Attachment B	180 days after adoption of Order	One Time
30	Develop Receiving Waters Monitoring Program	Attachment B	180 days after adoption of Order	One Time
31	Implement Receiving Waters Monitoring Program	Attachment B	180 days after adoption of Order	Continuous
32	Develop dry weather analytical and field screening monitoring map and procedures	Attachment E	~~180~~ 365 days after adoption of Order	One Time
33	Conduct dry weather analytical and field screening monitoring	Attachment E	~~January 31, 2002~~ May 1, 2002	Annually
34	Complete NPDES applications for issuance of renewal watershed based permits	Attachment C	At least 180 days prior to expiration of Order	One Time
35	Notify SDRWQCB of any incidence of non-compliance with this Order that poses a threat to human or environmental health.	R.1, ~~B.7~~ B.6 of Attachment C	Within 24 hours of incidence of non-compliance	As Needed
36	Designate Principal Permittee and notify SDRWQCB	O.	180 days after adoption of the Order	One Time

Table 6. Submittal Summary

Submittal No.	Submittal	Permit Section	Completion Date	Frequency
1	Submit identification of discharges not to be prohibited and BMPs required for treatment of discharges not prohibited	B.3.	~~180~~ 365 days after adoption of Order	One Time
2	Report on discharges causing or contributing to an exceedance of water quality standards, including description of BMP implementation	C.2.a.	With individual Jurisdictional URMP Annual Reports	As Needed
3	Submit Certified Statement of Adequate Legal Authority	D.2.	~~90~~ 180days after adoption of Order	One Time
4	Submit certified statement if particular high priority construction sites are to be inspected monthly rather than weekly in the rainy season	F.2.g.(2).	~~180~~ 365 days after adoption of Order and as needed thereafter	As Needed
5	Submit report on non-compliant construction sites that pose a threat to human or environmental health.	F.2.i.	Within 5 Days of incidence of non-compliance	As Needed
6	Submit report on non-compliant industrial sites that pose a threat to human or environmental health.	~~F.3.b.7~~ F.3.b.8.	Within 5 days of incidence of non compliance	As Needed
7	Submit to Principal Permittee(s) ~~first part of~~ individual Jurisdictional URMP document covering requirements for all Components, ~~excluding the Land-Use for New Development and Redevelopment Component~~	H.1.a.	Prior to ~~180~~ 365 days after adoption of Order (Principal Permittee(s) specifies date of submittal)	One Time
8	~~Submit to Principal Permittee second part of individual Jurisdictional URMP document covering Land-Use Planning for New Development and Redevelopment Component requirements~~ (This space reserved).	~~H.1.b.~~	~~Prior to 365 days after adoption of Order (Principal Permittee specifies date of submittal)~~	~~One Time~~
9	Principal Permittee(s) shall submit to SDRWQCB ~~first part of~~ unified Jurisdictional URMP document covering requirements for all Components, including Model SUSMP ~~excluding the Land-Use for New Development and Redevelopment Component~~	H.2.a.	~~180~~ 365 days after adoption of Order	One Time
10	~~Principal Permittee shall submit to SDRWQCB second part of unified Jurisdictional URMP document covering Land-Use Planning for New Development and Redevelopment Component requirements, including Model SUSMP~~ (This space reserved).	~~H.2.b.~~	~~365 days after adoption of Order~~	~~One Time~~
11	Submit to SDRWQCB local SUSMP and amended ordinances	F.1.b.(2). and H.1.d.	180 days after approval of Model SUSMP	One Time
12	Submit to Principal Permittee(s) individual Jurisdictional URMP Annual Report	I.1.	Prior to January 31, ~~2002~~ 2003 (Principal Permittee(s) specifies date of	Annually

			submittal)	
13	Principal Permittee(s) shall submit 1st unified Jurisdictional URMP Annual Report to SDRWQCB	I.2.	January 31, ~~2002~~ 2003	One Time and Annually Thereafter
14	Submit to Principal Permittee(s) Watershed Specific URMP document	L.1.	Prior to January 31, 2003 (Principal Permittee(s) specifies date of submittal)	One Time
15	Principal Permittee(s) shall submit unified Watershed Specific URMP document to SDRWQCB	L.2.	January 31, 2003	One Time
16	Principal Permittee(s) shall submit 2nd unified Jurisdictional URMP Annual Report to SDRWQCB	I.2.	January 31, ~~2003~~ 2004	One Time
17	Submit to Principal Permittee(s) Watershed Specific URMP Annual Report	M.1.	Prior to January 31, 2004 (Principal Permittee(s) specifies date of submittal)	Annually
18	Principal Permittee(s) shall submit 1st unified Watershed Specific URMP Annual Report to SDRWQCB	M.2.	January 31, 2004	One Time and Annually Thereafter
19	Principal Permittee(s) shall submit 3rd unified Jurisdictional URMP Annual Report to SDRWQCB	I.2.	January 31, ~~2004~~ 2005	One Time
20	Principal Permittee(s) shall submit 2nd unified Watershed Specific URMP Annual Report to SDRWQCB	M.2.	January 31, 2005	One Time
21	Principal Permittee(s) shall submit 4th unified Jurisdictional URMP Annual Report to SDRWQCB	I.2.	January 31, ~~2005~~ 2006	One Time
22	Principal Permittee(s) shall submit 3rd unified Watershed Specific URMP Annual Report to SDRWQCB	M.2.	January 31, 2006	One Time
23	Principal Permittee(s) shall submit 5th unified Jurisdictional URMP Annual Report to SDRWQCB	I.2.	January 31, ~~2006~~ 2007	One Time
24	Principal Permittee(s) shall submit formal agreement between Copermittees which provides management structure for meeting Order requirements	N.1.a.	~~180~~ 365 days after adoption of Order	One Time
25	Principal Permittee(s) shall submit standardized formats for all reports required under this Order	N.1.b.	~~180~~ 365 days after adoption of Order	One Time
26	Principal Permittee(s) submits Previous Monitoring and Future Recommendations Report to SDRWQCB	Attachment B	180 days after adoption of Order	One Time
27	Principal Permittee(s) submits Receiving Waters Monitoring Program document to SDRWQCB	Attachment B	180 days after adoption of Order	One Time
28	Principal Permittee(s) submits Receiving Waters Monitoring Annual Report to SDRWQCB	Attachment B	January 31, ~~2002~~ 2003	Annually
29	Submit to Principal Permittee(s) dry weather analytical monitoring map and procedures	Attachment E	Prior to ~~180~~ 365 days after adoption of Order	One Time

30	Principal Permittee(s) submits collective dry weather analytical monitoring maps and procedures	Attachment E	~~180~~ 365 days after adoption of Order	One Time
31	Submit to Principal Permittee(s) dry weather analytical monitoring results as part of individual Jurisdictional URMP Annual Report	Attachment E	Prior to January 31, ~~2002~~ 2003, as part of individual Jurisdictional URMP Annual Report	Annually
32	Principal Permittee(s) shall submit NPDES applications for issuance of renewal watershed based permits	Attachment C	At least 180 days prior to expiration of this Order	One Time
33	Submit reports of any incidence of non-compliance with this Order that poses a threat to human or environmental health.	R.1, ~~B.7~~ B.6 of Attachment C	Within 5 days of incidence of non compliance	As Needed

R. STANDARD PROVISIONS, REPORTING REQUIREMENTS AND NOTIFICATIONS

1. Each Copermittee shall comply with Standard Provisions, Reporting Requirements, and Notifications contained in **Attachment C** of this Order. This includes 24 hour/5day reporting requirements for any instance of non-compliance with this Order as described in section ~~B.7~~ B.6 of Attachment C.

2. All plans, reports and subsequent amendments submitted in compliance with this Order shall be implemented immediately (or as otherwise specified) and shall be an enforceable part of this Order upon submission to the SDRWQCB. All submittals by Copermittees must be adequate to implement the requirements of this Order.

I, John H. Robertus, Executive Officer, do hereby certify the foregoing is a full, true, and correct copy of an Order adopted by the California Regional Water Quality Control Board, San Diego Region, on ***February ~~14~~ 21, 2001.***

_____
John H. Robertus
Executive Officer

ATTACHMENT A

BASIN PLAN PROHIBITIONS

California Water Code Section 13243 provides that a Regional Board, in a water quality control plan, may specify certain conditions or areas where the discharge of waste, or certain types of waste is not permitted. The following discharge prohibitions are applicable to any person, as defined by Section 13050(c) of the California Water Code, who is a citizen, domiciliary, or political agency or entity of California whose activities in California could affect the quality of waters of the state within the boundaries of the San Diego Region.

1. The discharge of waste to waters of the state in a manner causing, or threatening to cause a condition of pollution, contamination or nuisance as defined in California Water Code Section 13050, is prohibited.

2. The discharge of waste to land, except as authorized by waste discharge requirements or the terms described in California Water Code Section 13264 is prohibited.

3. The discharge of pollutants or dredged or fill material to waters of the United States except as authorized by an NPDES permit or a dredged or fill material permit (subject to the exemption described in California Water Code §13376) is prohibited.

4. Discharges of recycled water to lakes or reservoirs used for municipal water supply or to inland surface water tributaries thereto are prohibited, unless this Regional Board issues a NPDES permit authorizing such a discharge; the proposed discharge has been approved by the State Department of Health Services and the operating agency of the impacted reservoir; and the discharger has an approved fail-safe long-term disposal alternative.

5. The discharge of waste to inland surface waters, except in cases where the quality of the discharge complies with applicable receiving water quality objectives, is prohibited. Allowances for dilution may be made at the discretion of the Regional Board. Consideration would include streamflow data, the degree of treatment provided and safety measures to ensure reliability of facility performance. As an example, discharge of secondary effluent would probably be permitted if streamflow provided 100:1 dilution capability.

6. The discharge of waste in a manner causing flow, ponding, or surfacing on lands not owned or under the control of the discharger is prohibited, unless the discharge is authorized by the Regional Board.

7. The dumping, deposition, or discharge of waste directly into waters of the state, or adjacent to such waters in any manner which may permit its being transported into the waters, is prohibited unless authorized by the Regional Board.

8. Any discharge to a storm water conveyance system that is not composed entirely of "*storm water*" is prohibited unless authorized by the Regional Board. [The federal regulations, 40 CFR 122.26 (b) (13), define storm water as storm water runoff, snow melt runoff, and surface runoff and drainage. 40 CFR 122.26 (b) (2) defines an illicit discharge as any discharge to a storm water conveyance system that is not composed entirely of storm water except discharges pursuant to a NPDES permit and discharges resulting from fire fighting activities. [§122.26 amended at 56 FR 56553, November 5, 1991; 57 FR 11412, April 2, 1992].

9. The unauthorized discharge of treated or untreated sewage to waters of the state or to a storm water conveyance system is prohibited.

10. The discharge of industrial wastes to conventional septic tank/subsurface disposal systems, except as authorized by the terms described in California Water Code Section 13264, is prohibited.

11. The discharge of radioactive wastes amenable to alternative methods of disposal into the waters of the state is prohibited.

12. The discharge of any radiological, chemical, or biological warfare agent into waters of the state is prohibited.

13. The discharge of waste into a natural or excavated site below historic water levels is prohibited unless the discharge is authorized by the Regional Board.

14. The discharge of sand, silt, clay, or other earthen materials from any activity, including land grading and construction, in quantities which cause deleterious bottom deposits, turbidity or discoloration in waters of the state or which unreasonably affect, or threaten to affect, beneficial uses of such waters is prohibited.

15. The discharge of treated or untreated sewage from vessels to Mission Bay, Oceanside Harbor, Dana Point Harbor, or other small boat harbors is prohibited.

16. The discharge of untreated sewage from vessels to San Diego Bay is prohibited.

17. The discharge of treated sewage from vessels to portions of San Diego Bay that are less than 30 feet deep at mean lower low water (MLLW) is prohibited.

18. The discharge of treated sewage from vessels, which do not have a properly functioning US Coast Guard certified Type I or Type II marine sanitation device, to portions of San Diego Bay that are greater than 30 feet deep at mean lower low water (MLLW) is prohibited.

ATTACHMENT B

RECEIVING WATERS MONITORING AND REPORTING PROGRAM FOR ORDER NO. 2001-01

Countywide to Watershed Based Monitoring and Reporting Program
The primary objectives of the Receiving Waters Monitoring and Reporting Program include, but are not limited to: 1) assessing compliance with Order No. 2001-01; 2) measuring the effectiveness of Urban Runoff Management Plans; 3) assessing the chemical, physical, and biological impacts to receiving waters resulting from urban runoff; and 4) assessing the overall health and evaluating long-term trends in receiving water quality.

Like Order No. 2001-01 in general, the monitoring requirements below are intended to transition during the five-year permit period from a countywide approach to a watershed based approach. During the first two reporting periods [1] of this Order, this monitoring program shall be conducted and reported on the same countywide basis as previously conducted under Order No. 90-42. Specifically, all monitoring shall be conducted jointly by all Copermittees under a single contractor with countywide coordination.

Beginning with the third monitoring period of this Order (unless otherwise directed by the SDRWQCB Executive Officer) the design of the monitoring program will shift to a watershed based approach. The monitoring program~~shall continue to be conducted under a single contractor with countywide coordination. However, the monitoring program~~ design, implementation, analysis, assessment, and reporting shall be conducted on a watershed basis for each of the nine hydrologic units. Monitoring results shall be assessed and reported on a watershed basis as a single report by the Copermittees consisting of one common section and nine watershed sections. Monitoring, analysis, assessment, and reporting shall satisfy the requirements of specified below for each watershed as applicable.

Order No. 2001-01 may be modified by the SDRWQCB Executive Officer without further public notice to direct the Copermittees to participate in comprehensive regional monitoring activities in the Southern California Bight in lieu of specific Order 2001-01 receiving waters monitoring requirements during the term of this Order.

I. Previous Monitoring and Future Recommendations Report

The Copermittees shall collaborate to develop a "Previous Monitoring and Future Recommendations Report" that summarizes all previous wet weather monitoring results and recommends future monitoring activities including the possibility of participating in coordinated comprehensive regional monitoring in the Southern California Bight. The Principal Permittee shall be responsible for the writing of the report and submittal to the SDRWQCB within **180 days** of adoption of this Order. At a minimum, the report shall:

A. Summarize the cumulative findings of all previous wet weather monitoring;
B. Identify detectable trends in water quality data and receiving water quality, based on the cumulative previous wet weather monitoring findings;
C. Interpret the cumulative previous wet weather monitoring findings;
D. Draw conclusions regarding the cumulative previous wet weather monitoring findings;
E. Provide recommendations for future monitoring activities; and
F. Include an executive summary, introduction, conclusion, and summary of recommendations.

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[1] A reporting period is defined as October 1st to September 30th of any year. The first reporting period under this Order is October 1, ~~2000~~2001 to September 30, ~~2001.~~2002.

II. Receiving Waters Monitoring Program - - Year Round

Utilizing the findings of the "Previous Monitoring and Future Recommendations Report" discussed above, the Copermittees shall collaborate to develop, submit, conduct, and report on a year round countywide or watershed based Receiving Waters Monitoring Program[2]. The goals of both the countywide and watershed based Receiving Waters Monitoring Program shall be clearly stated. The Receiving Waters Monitoring Program goals shall focus on assessing compliance with this Order, achieving water quality objectives, protecting beneficial uses, and assessing the overall health and long-term water quality trends of receiving waters. For purposes of conducting the countywide or watershed based Receiving Waters Monitoring Program, the Copermittees are encouraged to collaborate with other agencies conducting similar monitoring, such as the Southern California Coastal Water Research Project (SCCWRP), the California Department of Fish and Game, or other municipalities in Southern California. Implementation of the countywide or watershed based Receiving Waters Monitoring Program shall begin within **180 days** of adoption of this Order. The countywide or watershed based Receiving Waters Monitoring Program shall include, at a minimum, the following components:

A. Urban Stream Bioassessment Monitoring
B. Long-term Mass Loading Monitoring
C. Coastal Storm Drain Outfall Monitoring
D. Ambient Bay, Lagoon, and Coastal Receiving Water Monitoring
E. Toxic Hot Spots Monitoring in San Diego Bay

A. <u>Urban Stream Bioassessment Monitoring</u>

1. The Copermittees shall collaborate to develop and implement an urban stream bioassessment monitoring program. At a minimum, the program shall consist of station identification, sampling, monitoring, and analysis of data for 20 bioassessment stations in order to determine the biological and physical integrity of urban streams within the County of San Diego. In addition to the urban stream bioassessment stations, three reference bioassessment stations shall be identified, sampled, monitored, and analyzed. The selection, sampling, monitoring, and analysis of bioassessment stations shall meet the following requirements:

   a. Each urban stream bioassessment station shall be selected using the following criteria. Each urban stream bioassessment station shall:
      (1) be located within the jurisdiction of a Copermittee; or
      (2) be located within one of the nine watersheds specified in Section J, Table 4 of this Order; and
      (3) be representative of urban stream conditions within one of the nine watersheds specified in Section J, Table 4 of this Order; and
      (4) meet the physical criteria of the California Stream Bioassessment Procedure[3]; and
      (5) to the extent feasible, coincide with the location of an already existing monitoring station used by the California Department of Fish and Game in the conduct of the SDRWQCB's Ambient Bioassessment Program.

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[2] During the first two years, monitoring and reporting will be conducted and reported on a countywide basis. Beginning in the third monitoring period of Order 2001-01, the monitoring and reporting program will shift to a watershed based approach.

[3] California Stream Bioassessment Procedure (Protocol Brief for Biological and Physical/Habitat Assessment in Wadeable Streams), California Department of Fish and Game – Aquatic Bioassessment Laboratory, May 1999.

b. Each bioassessment station shall be monitored twice annually, in May and October of each year, beginning in May 2001. A minimum of three replicate samples shall be collected at each station during each sampling event.

c. Sampling, laboratory, quality assurance, and analysis procedures shall follow the standardized procedures set forth in the California Department of Fish and Game's California Stream Bioassessment Procedure (CSBP). Analysis procedures shall include comparison between station mean values for various biological metrics. Sampling, laboratory, quality assurance, and analytical procedures shall follow the standardized "Non-Point Source Bioassessment Sampling Procedures" for professional bioassessment set forth in the CSBP. In the event that the CSBP "Point-Source Professional Bioassessment Procedure" is performed in place of the "Non Point Source Bioassessment Sampling Procedure," justification and documentation of the procedure shall be submitted with the report. Results of the Urban Stream Bioassessment Monitoring shall be reported annually as part of the overall Receiving Waters Monitoring and Reporting Program for Order No. 2001-01. Reporting of the bioassessment data shall follow the format of the San Diego Regional Water Quality Control Board 1999 Biological Assessment Annual Report[4]. The report shall include:

(1) All physical, chemical and biological data collected in the assessment;
(2) Photographic documentation of assessment and reference stations;
(3) Documentation of quality assurance and control procedures;
(4) Analysis that shall include calculation of the metrics used in both the CSBP and the 1999 Annual Report.
(5) The report shall provide interpretation for comparisons of mean biological and habitat assessment metric values between assessment and reference stations.
(6) Utilize a regional index of biological integrity as part of the analysis.
(7) Electronic data formatted to California Department of Fish and Game Aquatic Bioassessment Laboratory specifications for inclusion in the Statewide Access Bioassessment database.

d. A professional environmental laboratory shall perform all sampling, laboratory, quality assurance, and analytical procedures. While valuable, data collected by volunteer monitoring organizations shall not be submitted in place of professional assessments.

e. Reference stations shall be selected following the recommendations in the 1999 Annual Report, Hughes (1995)[5] and Barbour et. al. (1999)[6]. Reference stations shall be evaluated annually by the Copermittees for suitability and the results included in the annual report. New reference stations will be selected as needed by the Copermittees.

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[4] San Diego Regional Water Quality Control Board ,1999 Biological Assessment Annual Report. A Water Quality Inventory Series: Biological and Physical/Habitat Assessment of California Water Bodies. California Department of Fish and Game Office of Spill Prevention and Response, Water Pollution Control Laboratory. December 1999.

5 Hughes, R. M. (1995) Defining Acceptable Biological Status by Comparing with Reference Conditions in Biological Assessment and Criteria: Tools for Water Resource Planning and Decision Making, Wayne S. Davis and Thomas P. Simon eds. Lewis Publishers, Boca Raton, LA.

6 Barbour, M.T. , J Gerritsen, B.D. Synder, and J.B. Stribling (1999) Rapid Bioassessment Protocols For Use in Streams and Wadeable Rivers: Periphyton, Benthic Macroinvertebrates, and Fish. Second Edition. EPA 841-B-99-002.

2. The Copermittees shall design and implement a program to conduct standardized toxicity testing at urban stream bioassessment stations where the bioassessment data indicates significant impairment. When findings indicate the presence of toxicity, a Toxicity Identification Evaluation (TIE) shall be conducted to determine the cause(s) of the toxicity.

B. Long-term Mass Loading Monitoring

For purposes of evaluating long-term trends, the Copermittees shall continue to monitor the five existing long-term mass loading stations as specified in Monitoring and Reporting Program No. 95-76 and amended by Technical Change Order Nos. 1-4. When findings indicate the presence of toxicity, a Toxicity Identification Evaluation (TIE) shall be conducted to determine the cause(s) of the toxicity.

C. Coastal Storm Drain Outfall Monitoring

The Copermittees shall collaborate to develop and implement a monitoring program for discharges of urban runoff from coastal storm drain outfalls. The program shall meet the following requirements:

1. The program shall include rationale and criteria for selection of storm drain outfalls to be monitored.

2. The program shall include collection of samples for analysis of total coliform, fecal coliform, and enterococci, in addition to any other indicators or pathogens identified by the Copermittees.

3. Samples shall be collected at both the storm drain outfall and in the surf zone (at ankle to knee water depths) directly in front of the outfall.

4. Samples shall be collected during both dry and wet weather periods.

5. Exceedances of public health standards for bacteria must be reported to the County Department of Public Health as soon as possible by the Copermittees.

D. Ambient Bay, Lagoon, and Coastal Receiving Water Monitoring

The Copermittees shall collaborate to develop and implement a program to assess the overall health of the receiving water and monitor the impact of urban runoff on ambient receiving water quality. This monitoring shall including San Diego Bay, Mission Bay, Oceanside Harbor, the Pacific Ocean coastline, coastal lagoons and estuaries, and all Clean Water Act section 303(d) water bodies or other environmentally sensitive areas as defined in F.1.b(2)(a)vii of this Order .

E. Toxic Hot Spots Monitoring in San Diego Bay

The Copermittees shall collaborate to develop and implement a program to assess the relative contribution of urban runoff on Toxic Hot Spots in San Diego Bay.

III. Submittal of Receiving Waters Monitoring Program Document

The Principal Permittee shall submit to the SDRWQCB the countywide or watershed based Receiving Waters Monitoring Program within **180 days** of adoption of this Order. The regional or watershed based Receiving Waters Monitoring Program shall describe how the Copermittees will meet the requirements of the components outlined in Section II of this Attachment.

IV. Submittal of Receiving Waters Monitoring Annual Reports

The Principal Permittee shall submit the Receiving Waters Monitoring Annual Report to the SDRWQCB on January 31 of each year, beginning on January 31, ~~2002.~~2003.

V. Monitoring Annual Report Requirements

A. Monitoring reports shall provide the data/results, methods of evaluating the data, graphical summaries of the data, and an explanation/discussion of the data for each monitoring program component listed above.

B. Monitoring reports shall include an analysis of the findings of each monitoring program component listed above. The analysis shall identify and prioritize water quality problems. Based on the identification and prioritization of water quality problems, the analysis shall identify potential sources of the problems, and recommend future monitoring and BMP implementation measures for identifying and addressing the sources. The analysis shall also include an evaluation of the effectiveness of existing control measures.

C. Monitoring reports shall include identification and analysis of any long-term trends in storm water or receiving water quality.

D. Monitoring reports shall provide an estimation of total pollutant loads (wet weather loads plus dry weather loads) due to urban runoff for each of the watersheds specified in Section J, Table 4 of Order No. 2001-01.

E. Monitoring reports shall for each monitoring program component listed above, include an assessment of compliance with applicable water quality standards.

F. All monitoring reports shall use a standard report format and shall include the following:

1. A stand alone comprehensive executive summary addressing all sections of the monitoring report;
2. Comprehensive interpretations and conclusions; and
3. Recommendations for future actions.

G. All monitoring reports submitted to the Principal Permittee or the SDRWQCB shall contain the certified perjury statement described in Standard Reporting Requirements in Attachment C section B.10.d.

H. All monitoring reports shall be~~peer~~ reviewed prior to submittal to the SDRWQCB by a~~n independent~~ committee (consisting of no less than three ~~members) of peers. All peer~~members). All review comments shall also be submitted to the SDRWQCB.

I. All monitoring reports shall be submitted in both electronic and paper formats.

J. All monitoring reports shall describe monitoring station locations by latitude and longitude coordinates, frequency of sampling, quality assurance/quality control procedures and sampling and analysis protocols.

K. Monitoring programs and reports shall comply with Section VI of Attachment B, as well as Attachment C.

VI. Standard Monitoring Requirements

A. All monitoring activities shall meet the following requirements:

1. Monitoring and Records [40 CFR 122.41(j)(1)]

Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity.

2. Monitoring and Records [40 CFR 122.41(j)(2)] [California Water Code § 13383(a)]

The discharger shall retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this Order, and records of all data used to complete the application for this permit, for a period of at least three years from the date of the sample, measurement, report or application. This period may be extended by request of the SDRWQCB at any time.

3. Monitoring and Records [40 CFR 122.21(j)(3)]

Records of monitoring information shall include the information requested in Attachment B and the following:

a. The date, exact place, and time of sampling or measurements;
b. The individual(s) who performed the sampling or measurements;
c. The date(s) analyses were performed;
d. The individual(s) who performed the analyses;
e. The analytical techniques or methods used; and
f. The results of such analyses.

4. Monitoring and Records [40 CFR 122.21(j)(4)]

Monitoring results must be conducted according to test procedures approved under 40 CFR part 136 unless other test procedures have been specified in this Order.

5. Monitoring and Records [40 CFR 122.21(j)(5)]

The Clean Water Act provides that any person who falsifies, tampers with, or knowingly renders inaccurate any monitoring device or method required to be maintained under this Order shall, upon conviction, be punished by a fine of not more than $10,000, or by imprisonment for not more than two years, or both. If a conviction of a person is for a violation committed after a first conviction of such person under this paragraph, punishment is a fine of not more than $20,000 per day of violation, or by imprisonment of not more than four years, or both.

6. Monitoring and Records [40 CFR 122.41(k)(2)]

The Clean Water Act provides that any person who knowingly makes any false statement, representation, or certification in any record or other document submitted or required to be maintained under this permit, including monitoring reports or reports of compliance or non-compliance shall, upon conviction, be punished by a fine of not more than $10,000 per violation, or by imprisonment for not more than six months per violation, or by both.

7. Monitoring Reports [40 CFR 122.41(l)(4)

Monitoring results shall be reported at the intervals specified elsewhere in this Order.

8. Monitoring Reports [40 CFR 122.41(l)(4)(ii)]

If the discharger monitors any pollutant more frequently than required by the permit using test procedures approved under 40 CFR part 136, unless otherwise specified in the Order, the results of this monitoring shall be included in the calculation and reporting of the data submitted in the reports requested by the SDRWQCB.

9. Monitoring Reports [40 CFR 122.41(l)(4)(iii)]

Calculations for all limitations which require averaging of measurements shall utilize an arithmetic mean unless otherwise specified by the SDRWQCB in the Order.

ATTACHMENT C

STANDARD PROVISIONS REPORTING REQUIREMENTS, AND NOTIFICATIONS

A. STANDARD PROVISIONS

1. Duty To Comply [40 CFR 122.41(a)(1)]
   The discharger shall comply with effluent standards or prohibitions established under Section 307(a) of the Clean Water Act for toxic pollutants and with standards for sewage sludge use or disposal established under Section 405(d) of the Clean Water Act within the time provided in the regulations that establish these standards or prohibitions or standards for sewage sludge use or disposal, even if this Order has not yet been modified to incorporate the requirement.

2. Need to Halt or Reduce Activity Not a Defense [40 CFR 122.41(c)]
   It shall not be a defense for the discharger in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this Order. Upon reduction, loss, or failure of a treatment facility, the discharger shall, to the extent necessary to maintain compliance with this Order, control production or all discharges, or both, until the facility is restored or an alternative method of treatment is provided. This provision applies, for example, when the primary source of power of a treatment facility fails, is reduced, or is lost.

3. Duty to Mitigate [40 CFR 122.41(d)]
   The discharger shall take all reasonable steps to minimize or prevent any discharge or prevent any discharge or sludge use or disposal in violation of this Order which has a reasonable likelihood of adversely affecting human health or the environment.

4. Proper Operation and Maintenance [40 CFR 122.41(e)]
   The discharger shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the discharger to achieve compliance with the conditions of this Order. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures. This provision requires the operation of back-up or auxiliary facilities or similar systems which are installed by the discharger only when the operation is necessary to achieve compliance with the conditions of this Order.

5. Permit Actions [40 CFR 122.41(f)] [California Water Code § 13381]
   This Order may be modified, revoked and reissued, or terminated for cause including, but not limited to, the following:

   a. Violation of any terms or conditions of this Order;
   b. Obtaining this Order by misrepresentation or failure to disclose fully all relevant facts;
   c. A change in any condition that requires either a temporary or permanent reduction or elimination of the authorized discharge; or
   d. A determination that the permitted activity endangers human health or the environment and can only be regulated to acceptable levels by permit modification or termination.

   The filing of a request by the discharger for modification, revocation and reissuance, or termination of this Order, or a notification of planned changes or anticipated noncompliance does not stay any condition of this Order.

6. Property Rights [40 CFR 122.41(g)] [California Water Code §13263(g)]
This Order does not convey any property rights of any sort or any exclusive privilege. The requirements prescribed herein do not authorize the commission of any act causing injury to persons or property, nor protect the discharger from liabilities under federal, state, or local laws, nor create a vested right for the discharger to continue the waste discharge.

7. Inspection and Entry [40 CFR 122.41(i)] [California Water Code § 13267(c)]
The discharger shall allow the SDRWQCB, or an authorized SDRWQCB representative, or an authorized representative of the USEPA (including an authorized contractor acting as a representative of the SDRWQCB or USEPA), upon presentation of credentials and other documents as may be required by law, to:

   a. Enter upon the discharger's premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of this Order;
   b. Have access to and copy, at reasonable times, any records that must be kept under the conditions of this Order;
   c. Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this Order; and
   d. Sample or monitor at reasonable times, for the purposes of assuring compliance with this Order or as otherwise authorized by the Clean Water Act or California Water Code, any substances or parameters at any location.

8. Bypass of Treatment Facilities [40 CFR 122.41(m)]

   a. Definitions

      (1) "Bypass" means the intentional diversion of waste streams from any portion of a treatment facility.

      (2) "Severe property damage" means substantial physical damage to property, damage to the treatment facilities which causes them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production.

   b. Bypass not Exceeding Limitations

      The discharger may allow any bypass to occur which does not cause effluent limitations of this Order or the concentrations of pollutants set forth in Ocean Plan Table A or Table B to be exceeded, but only if it also is for essential maintenance to assure efficient operation. These bypasses are not subject to the provisions of paragraphs c. and d. of this provision.

   c. Notice

      (1) Anticipated bypass. If the discharger knows in advance of the need for a bypass, it shall submit prior notice, if possible, at least ten days before the date of the bypass.
      (2) Unanticipated bypass. The discharger shall submit notice of an unanticipated bypass as required in section B.7 of Attachment C.

   d. Prohibition of Bypass

Bypass is prohibited, and the SDRWQCB may take enforcement action against the discharger for bypass, unless:

(1) Bypass was unavoidable to prevent loss of life, personal injury, or severe property damage;

(2) There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate back-up equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass which occurred during normal periods of equipment downtime or preventive maintenance; and

(3) The discharger submitted notices as required under paragraph c. of this section. The SDRWQCB may approve an anticipated bypass, after considering its adverse effects, if the SDRWQCB determines that it will meet the three conditions listed above in paragraph d.(1) of this section.

9. Upset [40 CFR 122.41(n)]

a. Definition "Upset" means an exceptional incident in which there is unintentional and temporary noncompliance with technology based effluent limitations because of factors beyond the reasonable control of the discharger. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation.

b. Effect of an Upset An upset constitutes an affirmative defense to an action brought for noncompliance with such technology based permit effluent limitations if the requirements of paragraph c. of this section are met. No determination made during administrative review of claims that noncompliance was caused by upset, and before an action for noncompliance, is final administrative action subject to judicial review.

c. Conditions Necessary for a Demonstration of Upset A discharger who wishes to establish the affirmative defense of upset shall demonstrate, through properly signed, contemporaneous operating logs, or other relevant evidence that:

(1) An upset occurred and that the discharger can identify the cause(s) of the upset;
(2) The permitted facility was at the time being properly operated;
(3) The discharger submitted notice of the upset as required in section B.7 of Attachment C of this Order; and
(4) The discharger complied with any remedial measures required under Provision A.5. of Attachment C of this Order.

d. Burden of Proof In any enforcement proceeding the discharger seeking to establish the occurrence of an upset has the burden of proof.

10. Other Effluent Limitations and Standards [40 CFR 122.44(b)(1)]
If any toxic effluent standard or prohibition (including any schedule of compliance specified in such effluent standard or prohibition) is promulgated under Section 307(a) of the Clean Water Act for a toxic pollutant which is present in the discharge and that standard or prohibition is more stringent than any limitation on the pollutant in this Order, the SDRWQCB may institute proceedings under these regulations to modify or revoke and reissue the Order to conform to the toxic effluent standard or prohibition.

11. The discharger shall take all reasonable steps to minimize or correct any adverse impact on the environment resulting from noncompliance with this Order, including such accelerated or additional monitoring as may be necessary to determine the nature and impact of the noncomplying discharge.

12. The provisions of this Order are severable, and if any provision of this Order, or the application of any provision of this Order to any circumstances, is held invalid, the application of such provision to other circumstances, and the remainder of this Order, shall not be affected thereby.

13. The discharger shall comply with any interim effluent limitations as established by addendum, enforcement action, or revised waste discharge requirements which have been, or may be, adopted by this SDRWQCB.

B. REPORTING REQUIREMENTS

1. Duty to Reapply [40 CFR 122.41(b)] This Order expires on ~~February 14, 2006~~**February 21, 2006**. If the discharger wishes to continue any activity regulated by this Order after the expiration date of this Order, the discharger must apply for and obtain new waste discharge requirements. The discharger must file a Report of Waste Discharge in accordance with Title 23, California Code of Regulations not later than **180 days** in advance of the expiration date of this Order as application for issuance of new waste discharge requirements.

2. Duty to Provide Information [40 CFR 122.41(h)] The discharger shall furnish to the SDRWQCB, SWRCB, or USEPA, within a reasonable time, any information which the SDRWQCB, SWRCB, or USEPA may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this Order, or to determine compliance with this Order. The discharger shall also furnish to the SDRWQCB, SWRCB, or USEPA, upon request, copies of records required to be kept by this Order.

3. Planned Changes [40 CFR 122.41(l)(1)] The discharger shall give notice to the SDRWQCB as soon as possible of any planned physical alterations or additions to the permitted facility. Notice is required only when:

   a. The alteration or addition to a permitted facility may meet one of the criteria for determining whether a facility is a new source in 40 CFR Part 122.29(b);

   b. The alteration or addition could significantly change the nature or increase the quantity of pollutants discharged. This notification applies to pollutants which are subject neither to effluent limitations in this Order, nor to notification requirements under 40 CFR 122.42(a)(l); or

   c. The alteration or addition results in a significant change in the discharger's sludge use or disposal practices, and such alteration, addition, or change may justify the application of conditions in this Order that are different from or absent in the existing Order, including notification of additional use or disposal sites not reported during the permit application process or not reported pursuant to an approved land application plan.

4. Anticipated Non-Compliance [40 CFR 122.41(l)(2)] The discharger shall give advance notice to the SDRWQCB of any planned changes in the permitted facility or activity which may result in noncompliance with the requirements of this Order.

5. Transfers [40 CFR 122.41(l)(3)] This Order is not transferable to any person except after notice to the SDRWQCB. The SDRWQCB may require modification or revocation and

reissuance of this Order to change the name of the discharger and incorporate such other requirements as may be necessary under the Clean Water Act or the California Water Code in accordance with the following:

a. Transfers by Modification [40 CFR 122.61(a)]
Except as provided in paragraph b. of this reporting requirement, this Order may be transferred by the discharger to a new owner or operator only if this Order has been modified or revoked and reissued, or a minor modification made to identify the new discharger and incorporate such other requirements as may be necessary under the Clean Water Act or California Water Code.

b. Automatic Transfers [40 CFR 122.61(b)]
As an alternative to transfers under paragraph a. of this reporting requirement, any NPDES permit may be automatically transferred to a new discharger if:

(1) The current discharger notifies the SDRWQCB at least 30 days in advance of the proposed transfer date in paragraph b.(2) of this reporting requirement;

(2) The notice includes a written agreement between the existing and new dischargers containing a specific date for transfer of permit responsibility, coverage, and liability between them; and

(3) The SDRWQCB does not notify the existing discharger and the proposed new discharger of his or her intent to modify or revoke and reissue the Order. A modification under this subparagraph may also be a minor modification under 40 CFR Part 122.63. If this notice is not received, the transfer is effective on the date specified in the agreement mentioned in paragraph b.(2) of this reporting requirement.

6. Twenty-four Hour Reporting [40 CFR 122.41(l)(6)]
Each Copermittee shall develop and submit criteria by which to evaluate events of non-compliance to determine whether they pose a threat to human or environmental health. These criteria shall be submitted in the Jurisdictional Urban Runoff Management Program Document and Annual Reports for SDRWQCB review. Using these criteria, the ~~The~~ discharger shall report any noncompliance with this Order or any noncompliance that may endanger human health or ~~the environment.~~environmental health. Any information shall be provided orally to the SDRWQCB within **24 hours** from the time the discharger becomes aware of the circumstances. A written description of any noncompliance shall be submitted to the SDRWQCB within **five days** of such an occurrence and contain a description of the noncompliance and its cause; the period of noncompliance, including exact dates and times, and if the noncompliance has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent recurrence of the noncompliance. The following shall be included as information which must be reported within 24 hours under this reporting requirement:

a. Any unanticipated bypass which exceeds any effluent limitation in this Order;

b. Any discharge of treated or untreated wastewater, including reclaimed or recycled wastewater, resulting from pipeline breaks, obstruction, surcharge or any other circumstance;

c. Any discharge or spill of raw or potable water not authorized by this order or resulting from pipeline breaks, obstruction, surcharge or any other circumstance;

d. Any upset which exceeds any effluent limitation in this Order;

e. Any spill or discharge of non-storm water not authorized by this Order. Non-storm water discharges not prohibited by the Copermittees pursuant to Section B of this Order need not be reported under this section; and

f. Any violation of this Order.

7. Other Non-Compliance [40 CFR 122.41(l)(7)]
The discharger shall report all instances of noncompliance not reported elsewhere under other sections of this Order at the time annual reports are submitted. The reports shall contain the information listed in part ~~B.7~~B.6 of Attachment C of this Order.

8. Other Information [40 CFR 122.41(l)(8)]
Where the discharger becomes aware that it failed to submit any relevant facts in a Report of Waste Discharge, or submitted incorrect information in a Report of Waste Discharge, or in any report to the SDRWQCB, it shall promptly submit such facts or information.

9. Signatory Requirements [40 CFR 122.41(k)(1) and 40 CFR 122.22]
All applications, reports, or information submitted to the SDRWQCB shall be signed and certified.

a. All Reports of Waste Discharge shall be signed as follows:

(1) For a corporation: by a responsible corporate officer. For the purpose of this section, a responsible corporate officer means: (a) a president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy- or decision-making functions for the corporation; or (b) the manager of one or more manufacturing, production, or operating facilities employing more than 250 persons or having gross annual sales or expenditures exceeding $25 million (in second-quarter 1980 dollars), if authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures.

(2) For a partnership or sole proprietorship: by a general partner or the proprietor, respectively; or

(3) For a municipality, State, Federal or other public agency: by either a principal executive officer or ranking elected official. For purposes of this section, a principal executive officer of a Federal agency includes: (a) the chief executive officer of the agency; or (b) a senior executive officer having responsibility for the overall operations of a principal geographic unit of the agency (e.g., Regional Administrators of USEPA).

b. All reports required by this Order, and other information requested by the SDRWQCB shall be signed by a person described in paragraph a. of this reporting requirement,

or by a duly authorized representative of that person. A person is a duly authorized representative only if:

(1) The authorization is made in writing by a person described in paragraph a. of this reporting requirement;

(2) The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity, such as the position of plant manager, operator of a well or a well field, superintendent, position of equivalent responsibility, or an individual or position having overall responsibility

for environmental matters for the company. (A duly authorized representative may thus be either a named individual or any individual occupying a named position.); and,

(3) The written authorization is submitted to the SDRWQCB.

c. If an authorization under paragraph b. of this reporting requirement is no longer accurate because a different individual or position has responsibility for the overall operation of the facility, a new authorization satisfying the requirements of paragraph b. of this reporting requirement must be submitted to the SDRWQCB prior to or together with any reports, information, or applications to be signed by an authorized representative.

d. Any person signing a document under paragraph a. or b. of this reporting requirement shall make the following certification:

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

10. Except for data determined to be confidential under 40 CFR Part 2, all reports prepared in accordance with the terms of this Order shall be available for public inspection at the offices of the SDRWQCB. As required by the Clean Water Act, Reports of Waste Discharge, this Order, and effluent data shall not be considered confidential.

11. The discharger shall submit reports and provide notifications as required by this Order to the following:

Phil Hammer
STORM WATER UNIT
CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN DIEGO REGION
9771 CLAIREMONT MESA BLVD SUITE A
SAN DIEGO CA 92124-1324
Telephone: (858) 467-2952
Fax: (858) 571-6972

Eugene Bromley
US ENVIRONMENTAL PROTECTION AGENCY
REGION IX
PERMITS ISSUANCE SECTION (W-5-1)
75 HAWTHORNE STREET
SAN FRANCISCO CA 94105

12. Unless otherwise directed, the discharger shall submit three copies of each report required under this Order to the SDRWQCB and one copy to USEPA.

C. NOTIFICATIONS

1. California Water Code Section 13263(g)
   No discharge of waste into the waters of the state, whether or not such discharge is made pursuant to waste discharge requirements, shall create a vested right to continue such discharge. All discharges of waste into waters of the state are privileges, not rights.

2. The SDRWQCB has, in prior years, issued a limited number of individual NPDES permits for non-storm water discharges to municipal storm water conveyance systems. The SDRWQCB or SWRCB may in the future, upon prior notice to the Copermittee(s), issue an NPDES permit for any non-storm water discharge (or class of non-storm water discharges) to a municipal storm water conveyance system. Copermittees may prohibit any non-storm water discharge (or class of non-storm water discharges) to a municipal storm water conveyance system that is authorized under such separate NPDES permits.

3. Enforcement Provisions [40 CFR 122.41(a)(2)] [California Water Code §§ 13385 and 13387]
   The Clean Water Act provides that any person who violates section 301, 302, 306, 307, 308, 318 or 405 of the Act, or any condition or limitation of this Order, is subject to a civil penalty not to exceed $25,000 per day for each violation. The Clean Water Act provides that any person who negligently violates sections 301, 302, 306, 307, 308, 318, or 405 of the Act, or any condition or limitation of this Order, is subject to criminal penalties of $2,500 to $25,000 per day of violation, or imprisonment of not more than one year, or both. In the case of a second or subsequent conviction for a negligent violation, a person shall be subject to criminal penalties of not more than $50,000 per day of violation, or by imprisonment of not more than two years, or both. Any person who knowingly violates such sections, or such conditions or limitations is subject to criminal penalties of $5,000 to $50,000 per day of violation, or imprisonment for not more than three years, or both. In the case of a second or subsequent conviction for a knowing violation, a person shall be subject to criminal penalties of not more than $100,000 per day of violation, or imprisonment of not more than six years, or both. Any person who knowingly violates section 301, 302, 303, 306, 307, 308, 318 or 405 of the Act, or any condition or limitation of this Order, and who knows at that time that he or she thereby places another person in imminent danger of death or serious bodily injury, shall, upon conviction, be subject to a fine of not more than $250,000 or imprisonment of not more than 15 years, or both. In the case of a second or subsequent conviction for a knowing endangerment violation, a person shall be subject to a fine of not more than $500,000 or by imprisonment of not more than 30 years, or both. An organization, as defined in section 309(c)(3)(B)(iii) of the Clean Water Act, shall, upon conviction of violating the imminent danger provision, be subject to a fine of not more than $1,000,000 and can be fined up to $2,000,000 for second or subsequent convictions.

4. Except as provided in Standard Provisions A.10. and A.11. in Attachment C of this Order, nothing in this Order shall be construed to relieve the discharger from civil or criminal penalties for noncompliance.

5. Nothing in this Order shall be construed to preclude the institution of any legal action or relieve the discharger from any responsibilities, liabilities, or penalties to which the discharger is or may be subject to under Section 311 of the Clean Water Act.

6. Nothing in this Order shall be construed to preclude institution of any legal action or relieve the discharger from any responsibilities, liabilities, or penalties established pursuant to any applicable State law or regulation under authority preserved by Section 510 of the Clean Water Act.

7. This Order shall become effective on **February ~~14,~~21, 2001**, provided the USEPA Regional Administrator has no objection. If the Regional Administrator objects to its issuance, this Order shall not become effective until such objection is withdrawn.

8. This Order supersedes Order No. 90-42 upon the effective date of this Order.

ATTACHMENT D

GLOSSARY

Beneficial Uses - The uses of water necessary for the survival or well being of man, plants, and wildlife. These uses of water serve to promote the tangible and intangible economic, social, and environmental goals "Beneficial Uses" of the waters of the State that may be protected against include, but are not limited to, domestic, municipal, agricultural and industrial supply; power generation; recreation; aesthetic enjoyment; navigation; and preservation and enhancement of fish, wildlife, and other aquatic resources or preserves. Existing beneficial uses are uses that were attained in the surface or ground water on or after November 28, 1975; and potential beneficial uses are uses that would probably develop in future years through the implementation of various control measures. "Beneficial Uses" are equivalent to "Designated Uses" under federal law. [California Water Code Section 13050(f)].

Best Available Technology (BAT) – BAT is the acronym for best available technology economically achievable. BAT is the technology-based standard established by congress in CWA section 402(p)(3)(A) for industrial dischargers of storm water. Technology-based standards establish the level of pollutant reductions that dischargers must achieve, typically by treatment or by a combination of treatment and best management practices, or BMPs. For example, secondary treatment (or the removal of 85% suspended solids and BOD) is the BAT for suspended solid and BOD removal from a sewage treatment plant. BAT generally emphasizes treatment methods first and pollution prevention and source control BMPs secondarily.

The best economically achievable technology that will result in reasonable further progress toward the national goal of eliminating the discharge of all pollutants, as determined in accordance with regulations issued by the Environmental Protection Agency Administrator. Factors relating to the assessment of best available technology shall take into account the age of equipment and facilities involved, the process employed, the engineering aspects of the application of various types of control techniques, process changes, the cost of achieving such effluent reduction, non-water quality environmental impact (including energy requirements), and such other factors as the permitting authority deems appropriate.

Best Conventional Technology (BCT) – BCT is an acronym for Best Conventional Technology. BCT is the treatment techniques, processes and procedure innovations, operating methods that eliminate amounts of chemical, physical, and biological characteristics of pollutant constituents to the degree of reduction attainable through the application of the best management practices to the maximum extent practicable.

Best Management Practices - Best Management Practices (BMPs) are defined in 40 CFR 122.2 as schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the pollution of waters of the United States. BMPs also include treatment requirements, operating procedures and practices to control plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage. In the case of municipal storm water permits, BMPs are typically used in place of numeric effluent limits.

Bioaccumulate - The progressive accumulation of contaminants in the tissues of organisms through any route including respiration, ingestion, or direct contact with contaminated water, sediment, pore water, or dredged material to a higher concentration than in the surrounding environment. Bioaccumulation occurs with exposure and is independent of the tropic level.

Bioassessment - The use of biological community information to evaluate the biological integrity of a water body and its watershed. With respect to aquatic ecosystems, bioassessment is the collection and analysis of samples of the benthic macroinvertebrate community together with

physical/habitat quality measurements associated with the sampling site and the watershed to evaluate the biological condition (i.e. biological integrity) of a water body.

Bioconcentration – A process by which there is a net accumulation of a chemical directly from water into aquatic organisms resulting from simultaneous uptake and elimination by gill or epithelial tissue. Bioconcentration differs from bioaccumulation in that bioaccumulation refers to the progressive concentration of contaminants in the tissues of organisms through multiple pathways.

Biocriteria - Under the Clean Water Act, numerical values or narrative expressions that define a desired biological condition for a water body that are legally enforceable. The U.S. EPA defines biocriteria as: "numerical values or narrative expressions that describe the reference biological integrity of aquatic communities inhabiting waters of a given designated aquatic life use…(that)…describe the characteristics of water body segments least impaired by human activities."

Biological Integrity - Defined in Karr J.R. and D.R. Dudley. 1981. Ecological perspective on water quality goals. Environmental Management 5:55-68 as: "A balanced, integrated, adaptive community of organisms having a species composition, diversity, and functional organization comparable to that of natural habitat of the region." Also referred to as ecosystem health.

Biomagnication – The transfer and progressive increase in tissue concentrations of a contaminant along the food chain. Because some pollutants can be transferred to higher trophic levels, carnivores at the top of the food chain, such as predatory fish, birds, and mammals (including humans), obtain most of their pollution burden from aquatic ecosystems by ingestion. Thus, although such pollutants may only be present in receiving waters in low concentrations, they can have a significant impact to the integrity of the ecosystem through biomagnification.

Clean Water Act Section 402(p) - [33 USC 1342(p)] is the federal statute requiring municipal and industrial dischargers to obtain NPDES permits for their discharges of storm water.

Clean Water Act Section 303(d) Water Body - is an impaired water body in which water quality does not meet applicable water quality standards and/or is not expected to meet water quality standards, even after the application of technology based pollution controls required by the CWA. The discharge of urban runoff to these water bodies by the Copermittees is significant because these discharges can cause or contribute to violations of applicable water quality standards.

Contamination - As defined in the Porter-Cologne Water Quality Control Act, contamination is "an impairment of the quality of waters of the state by waste to a degree which creates a hazard to the public health through poisoning or through the spread of disease. 'Contamination' includes any equivalent effect resulting from the disposal of waste whether or not waters of the state are affected."

Designated Waste - Designated waste is defined as a "nonhazardous waste which consists of pollutants which, under ambient environmental conditions at the waste management unit, could be released at concentrations in excess of applicable water quality objectives, or which could cause degradation of waters of the state." [CCR Title 27, Chapter 3, Subchapter 2, Article 2, Section 20210; WC Section 13173]

Effluent Limitations - Limitations on the volume of each waste discharge, and the quantity and concentrations of pollutants in the discharge. The limitations are designed to ensure that the discharge does not cause water quality objectives to be exceeded in the receiving water and does not adversely affect beneficial uses.

Effluent limitations are limitations of the quantity and concentrations of pollutants in a discharge. The limitations are designed to ensure that the discharge does not cause water quality objectives

to be exceeded in the receiving water and does not adversely affect beneficial uses. In other words, an effluent limit is the maximum concentration of a pollutant that a discharge can contain. To meet effluent limitations, the effluent typically must undergo one or more forms of treatment to remove pollutants in order to lower the pollutant concentration below the limit. Effluent limits are typically numeric (e.g., 10 mg/l), but can also be narrative (e.g., no toxics in toxic amounts).

Erosion – When land is diminished or warn away due to wind, water, or glacial ice. Often the eroded debris (silt or sediment) becomes a pollutant via storm water runoff. Erosion occurs naturally but can be intensified by land clearing activities such as farming, development, road building, and timber harvesting.

Grading - The cutting and/or filling of the land surface to a desired slope or elevation.

Hazardous Waste - Hazardous waste is defined as "any waste which, under Section 600 of Title 22 of this code, is required to be managed according to Chapter 30 of Division 4.5 of Title 22 of this code." [CCR Title 22, Division 4.5, Chapter 11, Article 1]

Illicit Discharge - Any discharge to a municipal separate storm sewer that is not composed entirely of storm water except discharges pursuant to a NPDES permit (other than the NPDES permit for discharges form the municipal separate storm sewer) and discharges resulting from fire fighting activities.

Inert Waste - Inert waste is defined as one that "does not contain hazardous waste or soluble pollutants at concentrations in excess of applicable water quality objectives, and does not contain significant quantities of decomposable waste." [CCR Title 27, Chapter 3, Subchapter 2, Article 2, Section 20230]

MEP – MEP is the acronym for Maximum Extent Practicable. MEP is the technology-based standard established by Congress in CWA section 402(p)(3)(B)(iii) that municipal dischargers of storm water (MS4s) must meet. Technology-based standards establish the level of pollutant reductions that dischargers must achieve, typically by treatment or by a combination of treatment and best management practices (BMPs). MEP generally emphasizes pollution prevention and source control BMPs primarily (as the first line of defense) in combination with treatment methods serving as a backup (additional line of defense). MEP considers economics and is generally, but not necessarily, less stringent than BAT. A definition for MEP is not provided either in the statute or in the regulations. Instead the definition of MEP is dynamic and will be defined by the following process over time: municipalities propose their definition of MEP by way of their Urban Runoff Management Plan. Their total collective and individual activities conducted pursuant to the Urban Runoff Management Plan becomes their proposal for MEP as it applies both to their overall effort, as well as to specific activities (e.g., MEP for street sweeping, or MEP for ~~sanitary~~municipal separate storm sewer system maintenance). In the absence of a proposal acceptable to the SDRWQCB, the SDRWQCB defines MEP.

In a memo dated February 11, 1993, entitled "Definition of Maximum Extent Practicable," Elizabeth Jennings, Senior Staff Counsel, SWRCB addressed the achievement of the MEP standard as follows:

> "*To achieve the MEP standard, municipalities must employ whatever Best Management Practices (BMPs) are technically feasible (i.e., are likely to be effective) and are not cost prohibitive. The major emphasis is on technical feasibility. Reducing pollutants to the MEP means choosing effective BMPs, and rejecting applicable BMPs only where other effective BMPs will serve the same purpose, or the BMPs would not be technically feasible, or the cost would be prohibitive. In selecting BMPs to achieve the MEP standard, the following factors may be useful to consider:*

a. Effectiveness: Will the BMPs address a pollutant (or pollutant source) of concern?
b. Regulatory Compliance: Is the BMP in compliance with storm water regulations as well as other environmental regulations?
c. Public Acceptance: Does the BMP have public support?
d. Cost: Will the cost of implementing the BMP have a reasonable relationship to the pollution control benefits to be achieved?
e. Technical Feasibility: Is the BMP technically feasible considering soils, geography, water resources, etc?

The final determination regarding whether a municipality has reduced pollutants to the maximum extent practicable can only be made by the Regional or State Water Boards, and not by the municipal discharger. If a municipality reviews a lengthy menu of BMPs and chooses to select only a few of the least expensive, it is likely that MEP has not been met. On the other hand, if a municipal discharger employs all applicable BMPs except those where it can show that they are not technically feasible in the locality, or whose cost would exceed any benefit derived, it would have met the standard. Where a choice may be made between two BMPs that should provide generally comparable effectiveness, the discharger may choose the least expensive alternative and exclude the more expensive BMP. However, it would not be acceptable either to reject all BMPs that would address a pollutant source, or to pick a BMP base solely on cost, which would be clearly less effective. In selecting BMPs the municipality must make a serious attempt to comply and practical solutions may not be lightly rejected. In any case, the burden would be on the municipal discharger to show compliance with its permit. After selecting a menu of BMPs, it is the responsibility of the discharger to ensure that all BMPs are implemented."

Municipal Storm Water Conveyance System – (See Municipal Separate Storm Sewer System or MS4).

Municipal Separate Storm Sewer System (MS4) – MS4 is an acronym for Municipal Separate Storm Sewer System. A Municipal Separate Storm Sewer System is a conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, natural drainage features or channels, modified natural channels, man-made channels, or storm drains): (i) Owned or operated by a State, city town, borough, county, parish, district, association, or other public body (created by or pursuant to State law) having jurisdiction over disposal of sewage, industrial wastes, storm water, or other wastes, including special districts under State law such as a sewer district, flood control district or drainage district, or similar entity, or an Indian tribe or an authorized Indian tribal organization, or designated and approved management agency under section 208 of the CWA that discharges to waters of the United States; (ii) Designated or used for collecting of conveying storm water; (iii) Which is not a combined sewer; (iv) Which is not part of the Publicly Owned Treatment Works (POTW) as defined at 40 CFR 122.2.

Historic and current development make use of natural drainage patterns and features as conveyances for urban runoff. Urban streams used in this manner are part of the municipalities MS4 regardless of whether they are natural, man-made, or partially modified features. In these cases, the urban stream is both an MS4 and a receiving water.

National Pollution Discharge Elimination System (NPDES) - These permits pertain to the discharge of waste to surface waters only. All State and Federal NPDES permits are also WDRs.

Non-hazardous Solid Waste - Non-hazardous solid waste means all putrescible and nonputrescible solid, semi-sold, and liquid wastes, including garbage, trash, refuse, paper, rubbish, ashes, industrial wastes, demolition and construction wastes, abandoned vehicles and parts thereof, discarded home and industrial appliances, manure, vegetable or animal solid and

semi-sold wastes and other discarded solid or semi-solid waste; provided that such wastes do not contain wastes which must be managed as hazardous wastes, or wastes which contain soluble pollutants in concentration which exceed applicable water quality objectives or could cause degradation of wasters of the state." [CCR Title 27, Chapter 3, Subchapter 2, Article 2, Section 20220]

Non Point Source (NPS) – Non point source refers to diffuse, widespread sources of pollution. These sources may be large or small, but are generally numerous throughout a watershed. Non Point Sources include but are not limited to urban, agricultural, or industrial areas, roads, highways, construction sites, communities served by septic systems, recreational boating activities, timber harvesting, mining, livestock grazing, as well as physical changes to stream channels, and habitat degradation. NPS pollution can occur year round any time rainfall, snowmelt, irrigation, or any other source of water runs over land or through the ground, picks up pollutants from these numerous, diffuse sources and deposits them into rivers, lakes, and coastal waters or introduces them into ground water.

Non-Storm Water - Non-storm water consists of all discharges to and from a storm water conveyance system that do not originate from precipitation events (i.e., all discharges from a conveyance system other than storm water). Non-storm water includes illicit discharges, non-prohibited discharges, and NPDES permitted discharges. An illicit discharge is defined at 40 CFR 122.26(b)(2) as any discharge to a municipal storm water conveyance system that is not composed entirely of storm water except discharges pursuant to a separate NPDES permit and discharges resulting from emergency fire fighting activities.

Nuisance - As defined in the Porter-Cologne Water Quality Control Act a nuisance is "anything which meets all of the following requirements: 1) Is injurious to health, or is indecent, or offensive to the senses, or an obstruction to the free use of property, so as to interfere with the comfortable enjoyment of life or property. 2) Affects at the same time an entire community or neighborhood, or any considerable number of persons, although the extent of the annoyance or damage inflicted upon individuals may be unequal. 3) Occurs during, or as a result of, the treatment or disposal of wastes."

Numeric effluent limitations - The typical method by which effluent limits are prescribed for pollutants in waste discharge requirements implementing the federal NPDES regulations. When numeric effluent limits are met at the "end-of-pipe", the effluent discharge generally will not cause water quality standards to be exceeded in the receiving waters (i.e., water quality standards will also be met).

Person - A person is defined as an individual, association, partnership, corporation, municipality, State or Federal agency, or an agent or employee thereof. [40 CFR 122.2].

Point Source - Any discernible, confined, and discrete conveyance, including, but not limited to, any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operations, landfill leachate collection systems, vessel, or other floating craft from which pollutants are or may be discharged.

Pollution - As defined in the Porter-Cologne Water Quality Control Act, pollution is "the alteration of the quality of the waters of the State by waste, to a degree that unreasonably affects the either of the following: A) The waters for beneficial uses; or 2) Facilities that serve these beneficial uses." Pollution may include contamination.

Pollutant - A pollutant is broadly defined as any agent that may cause or contribute to the degradation of water quality such that a condition of pollution or contamination is created or aggravated.

Pollution Prevention - Pollution prevention is defined as practices and processes that reduce or eliminate the generation of pollutants, in contrast to source control, treatment, or disposal.

Post-Construction BMPs - A subset of BMPs including structural and non-structural controls which detain, retain, filter, or educate to prevent the release of pollutants to surface waters during the final functional life of development.

Pre-Development Runoff Conditions - The runoff conditions that exist onsite immediately before the planned development activities occur. This definition is not intended to be interpreted as that period before any human-induces land activities occurred. This definition pertains to redevelopment as well as initial development.

Receiving Water Limitations - Waste discharge requirements issued by the SDRWQCB typically include both: (1) "Effluent Limitations" (or "Discharge Limitations") that specify the technology-based or water-quality-based effluent limitations; and (2) "Receiving Water Limitations" that specify the water quality objectives in the Basin Plan as well as any other limitations necessary to attain those objectives. In summary, the "Receiving Water Limitations" provision is the provision used to implement the requirement of CWA section 301(b)(1)(C) that NPDES permits must include any more stringent limitations necessary to meet water quality standards.

Sediment - Soil, sand, and minerals washed from land into water. Sediment resulting from anthropogenic sources (i.e. human induced land disturbance activities) is considered a pollutant. This Order regulates only the discharges of sediment from anthropogenic sources and does not regulate naturally occurring sources of sediment. Sediment can destroy fish-nesting areas, clog animal habitats, and cloud waters so that sunlight does not reach aquatic plants.

Storm Water - "Storm water" is as defined urban runoff and snowmelt runoff consisting only of those discharges which originate from precipitation events. Storm water is that portion of precipitation that flows across a surface to the storm drain system or receiving waters. Examples of this phenomenon include: the water that flows off a building's roof when it rains (runoff from an impervious surface); the water that flows into streams when snow on the ground begins to melt (runoff from a semi-pervious surface); and the water that flows from a vegetated surface when rainfall is in excess of the rate at which it can infiltrate into the underlying soil (runoff from a pervious surface). When all factors are equal, runoff increases as the perviousness of a surface decreases. During precipitation events in urban areas, rain water picks up and transports pollutants through storm water conveyance systems, and ultimately to waters of the United States.

Toxicity - Adverse responses of organisms to chemicals or physical agents ranging from mortality to physiological responses such as impaired reproduction or growth anomalies). The water quality objectives for toxicity provided in the Water Quality Control Plan, San Diego Basin, Region 9, (Basin Plan), state in part…*"All waters shall be free of toxic substances in concentrations that are toxic to, or that produce detrimental physiological responses in human, plant, animal, or aquatic life*….*The survival of aquatic life in surface waters subjected to a waste discharge or other controllable water quality factors, shall not be less than that for the same water body in areas unaffected by the waste discharge"*…. Urban runoff discharges from MS4s are considered toxic when (1) the toxic effect observed in an acute toxicity test exceeds zero Toxic Units Acute (Tua=0); or (2) the toxic effect observed in a chronic toxicity test exceeds one Toxic Unit Chronic (Tuc=1). Urban runoff discharges from MS4s often contain pollutants that cause toxicity.

Total Maximum Daily Load (TMDL) - The TMDL is the maximum amount of a pollutant that can be discharged into a water body from all sources (point and non-point) and still maintain water quality standards. Under Clean Water Act section 303(d), TMDLs must be developed for all

water bodies that do not meet water quality standards after application of technology-based controls.

Urban Runoff - Urban runoff is defined as all flows in a storm water conveyance system and consists of the following components: (1) storm water (wet weather flows) and (2) non-storm water illicit discharges (dry weather flows).

Waste - As defined in California Water Code Section 13050(d), "waste includes sewage and any and all other waste substances, liquid, solid, gaseous, or radioactive, associated with human habitation, or of human or animal origin, or from any producing, manufacturing, or processing operation, including waste placed within containers of whatever nature prior to, and for purposes of, disposal."

Article 2 of CCR Title 23, Chapter 15 (Chapter 15) contains a waste classification system which applies to solid and semi-solid waste which cannot be discharged directly or indirectly to water of the state and which therefore must be discharged to land for treatment, storage, or disposal in accordance with Chapter 15. There are four classifications of waste (listed in order of highest to lowest threat to water quality): hazardous waste, designated waste, nonhazardous solid waste, and inert waste.

Water Quality Objective - Numerical or narrative limits on constituents or characteristics of water designated to protect designated beneficial uses of the water. [California Water Code Section 13050 (h)]. California's water quality objectives are established by the State and Regional Water Boards in the Water Quality Control Plans.

As stated in the Porter-Cologne Requirements for discharge (CWC 13263): "(Waste discharge) requirements shall implement any relevant water quality control plans that have been adopted, and shall take into consideration the beneficial uses to be protected, the water objectives reasonably required for that purpose, other waste discharges, the need to prevent nuisance, and the provisions of Section 13241."

A more comprehensive list of legal authority containing water quality objectives applicable to this Order can be found in Finding 37 and in Section VII Directives Disussion Underlying Broad Legal Authority for Order 2001-01 pp. 61-63.

Numeric or narrative limits for pollutants or characteristics of water designed to protect the beneficial uses of the water. In other words, a water quality objective is the maximum concentration of a pollutant that can exist in a receiving water and still generally ensure that the beneficial uses of the receiving water remain protected (i.e., not impaired). Since water quality objectives are designed specifically to protect the beneficial uses, when the objectives are violated the beneficial uses are, by definition, no longer protected and become impaired. This is a fundamental concept under the Porter Cologne Act. Equally fundamental is Porter Cologne's definition of pollution. A condition of pollution exists when the water quality needed to support designated beneficial uses has become unreasonably affected or impaired; in other words, when the water quality objectives have been violated. These underlying definitions (regarding beneficial use protection) are the reason why all waste discharge requirements implementing the federal NPDES regulations require compliance with water quality objectives. (Water quality objectives are also called water quality criteria in the Clean Water Act.)

Water Quality Standards - are defined as the beneficial uses (e.g., swimming, fishing, municipal drinking water supply, etc.,) of water and the water quality objectives necessary to protect those uses.

Waters of the State - Any water, surface or underground, including saline waters within the boundaries of the State [California Water Code Section 13050 (e)]. The definition of the Waters of the State is broader than that for the Waters of the United States in that all water in the State is

considered to be a Waters of the State regardless of circumstances or condition. Under this definition, a Municipal Separate Storm Sewer System (MS4) is always considered to be a Waters of the State.

Waters of the United States - Waters of the United States can be broadly defined as navigable surface waters and all tributary surface waters to navigable surface waters. Groundwater is not considered to be a Waters of the United States. Under this definition (see below), a Municipal Separate Storm Sewer System (MS4) is always considered a Waters of the United States.

As defined in the 40 CFR 122.2, the Waters of the U.S. are defined as: **"(a) All waters, which are currently used, were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide;** (b) All interstate waters, including interstate "wetlands;" (c) All other waters such as intrastate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, "wetlands," sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds the use, degradation or destruction of which would affect or could affect interstate or foreign commerce including any such waters: (1) Which are or could be used by interstate or foreign travelers for recreational or other purposes; (2) From which fish or shellfish are or could be taken and sold in interstate or foreign commerce; or (3) Which are used or could be used for industrial purposes by industries in interstate commerce; (d) All impoundments of waters otherwise defined as waters of the United States under this definition**: (e) Tributaries of waters identified in paragraphs (a) through (d) of this definition;** (f) The territorial seas; and (g) "Wetlands" adjacent to waters (other than waters that are themselves wetlands) identified in paragraphs (a) through (f) of this definition. Waters of the United States do not include prior converted cropland. Notwithstanding the determination of an area's status as prior converted cropland by any other federal agency, for the purposes of the Clean Water Act, the final authority regarding Clean Water Act jurisdiction remains with the EPA."

Watershed - That geographical area which drains to a specified point on a water course, usually a confluence of streams or rivers (also known as drainage area, catchment, or river basin).

ATTACHMENT E

DRY WEATHER ANALYTICAL MONITORING SPECIFICATIONS - URBAN RUNOFF

Dry weather analytical and field screening monitoring consists of (1) field observations and screening monitoring and (2) analytical monitoring at selected stations. Pursuant to section F.5 of this Order, the purpose of dry weather analytical and field screening monitoring is to detect and eliminate illicit connections and illegal discharges to the MS4 using ~~MS4.~~frequent, geographically widespread dry weather discharge monitoring and follow-up investigations. Each Copermittee shall conduct the following dry weather analytical and field screening monitoring tasks:

1. Develop MS4 Map

   Each Copermittee shall develop or obtain an up-to-date labeled map of its entire municipal separate storm sewer system (MS4) and the corresponding drainage watersheds within its jurisdiction. The use of a Geographic Information System (GIS) is highly recommended, but not required. The accuracy of the MS4 map shall be confirmed during monitoring activities (See Task 6).

2. Select Dry Weather Analytical Monitoring Stations

   ~~Each~~Based upon a review of its past Dry Weather Monitoring Programs, each Copermittee shall select dry weather analytical monitoring stations within its jurisdiction. Stations shall be either major outfalls or other outfall points (or any other point of access such as manholes) randomly located throughout the MS4 by placing a grid over a drainage system map and identifying those cells of the grid which contain a segment of the MS4 or major outfall; or, stations may be selected non-randomly provided adequate coverage of the entire MS4 system is ensured and that the selection of stations meets or exceeds the requirements given below. The dry weather analytical and field screening monitoring stations shall be established using the following guidelines and criteria:

   a. A grid system consisting of perpendicular north-south and east-west lines spaced ¼ mile apart shall be overlayed on a map of the MS4, creating a series of cells;
   b. All cells that contain a segment of the MS4 shall be identified and one dry weather analytical monitoring station shall be selected in each cell;
   c. Stations should be located downstream of any sources of suspected illegal or illicit activity;
   d. Stations shall be located to the degree practicable at the farthest manhole or other accessible location downstream in the system within each cell;
   e. Hydrological conditions, total drainage area of the site, traffic density, age of the structures or buildings in the area, history of the area, and land use types shall be considered in locating stations;
   ~~f.For small MS4s (which serve a population of less than 100,000), no more than 100 cells need to have identified stations; for medium MS4s (which serve a population of 100,000 - 250,000), no more than 250 cells need to have identified stations; and for large MS4s (which serve a population of more than 250,000), no more than 500 cells need to have identified stations; and~~
   ~~g.If fewer than 100 cells in small MS4s, fewer than 250 cells in medium MS4s, and fewer than 500 cells in large MS4s are created by the overlay on the MS4 map, then a monitoring station shall be located in each cell which contains a segment of the MS4.~~

f. Determining Number of Stations: Based upon review of previous Dry Weather Monitoring Programs, each Copermittee shall determine a minimum number of stations to be sampled each year with provisions for alternate stations to be sampled in place of selected stations that do not have flow.

3. Complete MS4 Map

Each Copermittee shall clearly identify each dry weather analytical monitoring station on its MS4 Map as either a separate GIS layer or a map overlay hereafter referred to as a Dry Weather Analytical Stations Map. Each Copermittee shall confirm that each drainage area within its jurisdiction contains at least one station.

4. Develop Dry Weather Analytical Monitoring Procedures

Each Copermittee shall develop written procedures for dry weather analytical and field screening monitoring (consistent with 40 CFR part 136), including field observations, monitoring, and analyses to be conducted at a minimum between May 1st and September 30th of each year. The dry weather analytical and field screening monitoring program shall be ~~analyses.~~designed to emphasize frequent, geographically widespread monitoring to detect illicit discharges and illegal connections. At a minimum, the procedures must be based on the following guidelines and criteria:

a. Determining Sampling Frequency: Dry weather analytical and field screening monitoring shall be conducted at each identified station at least once ~~during the permit cycle of this Order.~~ between May 1st and September 30th of each year or as often as the Copermittee determines is necessary to comply with the requirements of Section F.5 of the Tentative Order. ~~At a minimum, approximately 1/5 of the identified stations shall be field screened annually.~~

b. If flow or ponded runoff is observed at a dry weather analytical monitoring station and there has been at least seventy-two (72) hours of dry weather, make observations and collect ~~two (2) grab samples during a twenty-four (24) hour period with a minimum period of four (4) hours between samples.~~at least one (1) grab sample. Record general information such as time since last rain, quantity of last rain, site descriptions (i.e., conveyance type, dominant watershed land uses), flow estimation (i.e., width of water surface, approximate depth of water, approximate flow velocity, flow rate), and visual observations (i.e., odor, color, clarity, floatables, deposits/stains, vegetation condition, structural condition, and biology).

c. At a minimum, collect samples for analytical laboratory analysis of the following constituents:

~~(1)Total Dissolved Solids~~
~~(2)Total Suspended Solids~~
~~(3)Turbidity~~
(1) Total Hardness
~~(5)pH~~
~~(6)Specific Conductance~~
(2) Surfactants (MBAS)
~~(8)Total Phosphorus~~
~~(9)Dissolved Phosphorus~~
~~(10) Nitrate Nitrogen~~
~~(11) Nitrite Nitrogen~~

~~(12) Total Kjeldahl Nitrogen~~
~~(13) Ammonia Nitrogen~~
~~(14) Biological Oxygen Demand~~
~~(15) Chemical Oxygen Demand~~
~~(17)~~(3) Oil and Grease
~~Total Petroleum Hydrocarbons~~
(4) Diazinon and Chlorpyrifos
~~(19) Cadmium (Total and Dissolved)~~
~~(20) Copper (Total and Dissolved)~~
~~(21) Mercury (Total and Dissolved)~~
~~(22) Silver (Total and Dissolved)~~
~~(23) Lead (Total and Dissolved)~~
~~(24) Zinc (Total and Dissolved)~~
~~(25) Antimony (Total and Dissolved)~~
~~(26) Arsenic (Total and Dissolved)~~
~~(27) Chromium (Total and Dissolved)~~
~~(28)~~(5) ~~Nickel (Total and Dissolved)~~Cadmium (Dissolved)
(6) Copper (Dissolved)
(7) Lead (Dissolved)
(8) Zinc (Dissolved)
(9) Enterococcus bacteria
(10) Total Coliform bacteria
(11) Fecal Coliform bacteria

At a minimum, field screening analysis of the following constituents:

(1) Specific conductance (calculate estimated Total Dissolved Solids).
(2) Turbidity
(3) pH
(4) Reactive Phosphorous
(5) Nitrate Nitrogen
(6) Ammonia Nitrogen

c. If the station is dry (no flowing or ponded runoff), make and record all applicable observations and select another station from the list of alternate stations for monitoring.

~~d.Develop a paired sample study to compare and evaluate the Colilert Quantitray method with the conventional Most Probable Number or Membrane Filtration methods for Total and Fecal coliform and Enterococcus bacteria analysis for dry weather monitoring.[7-8]~~

d. Develop criteria for dry weather analytical and field screening monitoring results whereby exceedance of the criteria will require follow-up investigations to be conducted to identify the source causing the exceedance of the criteria.

~~[7] The Colilert® System for Total Coliforms and Escherichia coli prepared by Stephen C. Edberg, Yale University School of Medicine; Frances Ludwig and Darrell B. Smith, South Central Connecticut Regional Water Authority; and Martin J. Allen, AWWA Research Foundation, April 1991. AWWA Research Foundation Order Number: 90576. http://www.awwarf.com/exsums/90576.htm~~

~~[8] Comparison of the Colilert® Method and Standard Fecal Coliform Methods Prepared by Stephen C. Edberg, Yale University School of Medicine; and Darrell B. Smith, South Central Connecticut Regional Water Authority, May 1994 AWWA Research Foundation Order Number: 90647 http://www.awwarf.com/exsums/90647.htm~~

e. Dry weather analytical and field screening monitoring stations identified to exceed dry weather analytical monitoring criteria for any constituents shall continue to be screened in subsequent years.

f. Develop procedures for source identification follow up investigations in the event of exceedance of dry weather analytical and field screening monitoring result criteria. These procedures shall be consistent with procedures required in section F.5.c. of this Order.

g. Develop procedures to eliminate detected illicit discharges and connections. These procedures shall be consistent with each Copermittees Illicit Discharge and Elimination component of its Jurisdictional Urban Runoff Management Plan as discussed in section F.5 of this Order.

5. Submit Dry Weather Analytical Monitoring Map and Procedures

Each Copermittee shall submit its dry weather analytical and field screening monitoring map (including the MS4, drainage watersheds, and station locations) and dry weather analytical monitoring procedures to the Principal Permittee as part of its Jurisdictional Urban Runoff Management Program Document on the date prescribed by the Principal Permittee. The procedures shall, at a minimum, address all issues included in section 4. of this Attachment. The Principal Permittee shall collectively submit the dry weather monitoring analytical maps and procedures to the SDRWQCB within ~~**180**~~**365 days** of adoption of this Order. Implementation of dry weather analytical monitoring under the requirements of this Order shall commence ~~within **180 days** of adoption of this Order.~~
by May 1, 2002.

6. Conduct Dry Weather Analytical Monitoring

~~Each~~Until the Dry Weather Analytical and Field Screening Monitoring Program is implemented, each Copermittee shall continue to implement the Dry Weather Monitoring Program required under Order 90-42. Starting May 1, 2002, each Copermittee shall conduct dry weather analytical and field screening monitoring in accordance with its storm water conveyance system map and dry weather analytical and field screening monitoring procedures as described in Tasks 1 – 4 above. If monitoring indicates an illicit connection or illegal discharge, conduct the follow-up investigation and elimination activities as described in submitted dry weather analytical and field screening monitoring procedures and sections F.5.c. and F.5.d. of this Order.

During monitoring, the accuracy of its MS4 map and shall be confirmed. Correct any inaccuracies in the either the MS4 map or the Dry Weather Analytical Stations Map and resubmit the corrected maps in the next annual report.

7. Summarize and Report Dry Weather Analytical Monitoring Results

As part of its individual Jurisdictional URMP Annual Report, each Copermittee shall summarize and report on its dry weather analytical monitoring results. The data shall be presented in tabular and graphical form. The reporting shall include analytical monitoring results, as well as follow up and elimination activities for potential illicit discharges and connections. Dry weather analytical monitoring reports shall comply with all monitoring and standard reporting requirements in Attachments B and C of Order 2001-01. The Principal Permittee shall submit to the SDRWQCB the individual dry weather analytical monitoring reports as part of the unified Jurisdictional URMP Annual Report on January 31, ~~2002,~~2003, and every year thereafter.

Attachment 6

for

Fact Sheet/Technical Report for San Diego Municipal Storm Water Permit
(Order No. 2001-01)

Response to Comments on San Diego Municipal Storm Water Permit

This document provides the rationale for changes to the San Diego Municipal Storm Water Permit not found or discussed in the main text of the Fact Sheet/Technical Report.

RESPONSE TO COMMENTS

ORDER NO. 2001-01
(San Diego Municipal Storm Water Permit)
November 6, 2001

Agenda Item 9
For
San Diego Regional Water Quality Control Board Meeting
On February 21, 2001

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LIST OF ABBREVIATIONS

303(d)	Water bodies listed as impaired under Section 303(d) of the Clean Water Act.
ASBS	Area of Special Biological Significance
BAT	Best Available Technology
BMP	Best Management Practice
CALTRANS	California Department of Transportation
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
CSBP	California Stream Bioassessment Procedure
CTR	California Toxics Rule
CWA	Clean Water Act
CWC	California Water Code
EMAP	Environmental Monitoring and Assessment Program
ESA	Environmentally Sensitive Area
FR	Federal Register
JURMP	Jurisdictional Urban Runoff Management Program
LARWQCB	Los Angeles Regional Water Quality Control Board
MBAS	Methylene Blue Activated Substance
MEP	Maximum Extent Practicable
MLLW	Mean Lower Low Water
MS4	Municipal Separate Storm Sewer System
NPDES	National Pollutant Discharge Elimination System
NPS	Non Point Source
NSC	Numeric Sizing Criteria
NURP	Nationwide Urban Runoff Program

PC	Porter-Cologne Water Quality Control Act
POTW	Publicly Owned Treatment Works
SANDAG	San Diego Association of Governments
SCCWRP	Southern California Coastal Water Research Project
SDRWQCB	San Diego Regional Water Quality Control Board
SUSMP	Standard Urban Storm Water Mitigation Plan
SWRCB	State Water Resources Control Board
SWPPP	Storm Water Pollution Prevention Plan
TAC	State Water Resources Control Board Urban Runoff Technical Advisory Committee
TIE	Toxicity Identification Evaluation
TMDL	Total Maximum Daily Load
TOC	Total Organic Carbon
TSS	Total Suspended Solids
TUa	Toxic Units Acute
TUc	Toxic Units Chronic
URMP	Urban Runoff Management Program
USEPA	United States Environmental Protection Agency
WDR	Waste Discharge Requirement
WEF	Water Environment Association
WMA	Watershed Management Area
WQA	Water Quality Act of 1987 (Amendments to the Clean Water Act)
WQO	Water Quality Objective
WURMP	Watershed Urban Runoff Management Program

INTRODUCTION

Background

The Regional Board received a total of approximately 1500 comments from almost 100 different organizations and individuals. These comments include oral comments received at the public hearing on December 13, 2000; formal written comments received by November 30, 2000 (close of written comment period); and comments received at a series of three public workshops conducted on tentative Order No. 2001-01. Public workshops were conducted on October 19, 2000, November 2, 2000, and November 16, 2000 for the purpose of obtaining public comment. In addition to being addressed in this document, each workshop comment was also responded to orally during the course of the workshops.

For purposes of developing responses, each of the approximately 1500 comments were placed into one of roughly 50 broad categories such as legal issues, construction, dry weather monitoring, cost, and education. Furthermore greater than 60% of the total comments were not unique; these comments were grouped with other similar comments in order to expedite/facilitate the responding process.

Permit Revisions

The Regional Board appreciates the efforts of all those who contributed a substantial amount of time and effort to provide comments on tentative Order No. 2001-01. The comments are valuable and many have resulted in proposed permit language changes. To the extent that a revision to the permit language is proposed as a result of a particular comment, that fact is noted in the response to that comment. The revised draft permit will be available to the public as soon as possible during the week of February 12, 2001.

Format of this Document

The overall organization of this document is consistent with the organization of tentative Order No. 2001-01. Responses to “General Comments” are presented first followed by responses to “Comments on Multiple Sections”. The remainder of the document contains responses to “Comments on Specific Sections” presented in same sequence as the sections in the tentative order, i.e., Findings 1 through 39, Directives A through R, and Attachments A through E.

Ample Legal Authority

Many of the comments received challenge the Regional Board’s authority to require one or more the directives contained in tentative Order No. 2001-01.

The tentative order is based on the federal Clean Water Act, the Porter-Cologne Water Quality Control Act (Division 7 of the Water Code, commencing with Section 13000), applicable state and federal regulations, as well as all applicable provisions of statewide Water Quality Control Plans and Policies adopted by the State Water Resources Control Board and the Regional Water Quality Control Plan (Basin Plan) adopted by the Regional Board.

As discussed in the Fact Sheet/Technical Report, the following five broad legal authority citations generally apply to all directives in Order No. 2001-01, and provide the SDRWQCB with ample underlying authority to require each of the directives.

CWA 402(p)(3)(B)(ii) – Prohibit Non-Storm Water
The CWA requires in section 402(p)(3)(B)(ii) that permits for discharges from municipal storm sewers "shall include a requirement to effectively prohibit non-stormwater discharges into the storm sewers."

CWA 402(p)(3)(B)(iii) – Reduce to MEP and Whatever Else is Needed
The CWA requires in section 402(p)(3)(B)(iii) that permits for discharges from municipal storm sewers "shall require controls to reduce the discharge of pollutants to the maximum extent practicable, including management practices, control techniques and system, design and engineering methods, **and such other provisions as the Administrator or the State determines appropriate for the control of such pollutants**." *(emphasis added.)*

40 CFR 122.26(d)(2)(i)(A-F) – Obtain Adequate Legal Authority
Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(A-F) provide that each Copermittee's permit application "shall consist of: (i) Adequate legal authority: A demonstration that the applicant can operate pursuant to legal authority established by statute, ordinance or series of contracts which authorizes or enables the applicant at a minimum to: (A) Control through ordinance, permit, contract, order or similar means, the contribution of pollutants to the municipal storm sewer by storm water discharges associated with industrial activity and the quality of storm water discharged from sites of industrial activity; (B) Prohibit through ordinance, order or similar means, illicit discharges to the municipal separate storm sewer; (C) Control through ordinance, order or similar means the discharge to a municipal separate storm sewer of spills, dumping or disposal of materials other than storm water; (D) Control through interagency agreements among coapplicants the contribution of pollutants from one portion of the municipal system to another portion of the municipal system; (E) Require compliance with conditions in ordinances, permits, contracts or orders; and (F) Carry out all inspection, surveillance and monitoring procedures necessary to determine compliance and noncompliance with permit

conditions including the prohibition on illicit discharges to the municipal separate storm sewer."

40 CFR 122.26(d)(2)(iv) – Reduce to the MEP and Whatever Else is Needed

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv) provides that the Copermittee shall develop and implement a proposed management program which "shall include a comprehensive planning process which involves public participation and where necessary intergovernmental coordination, to reduce the discharge of pollutants to the maximum extent practicable using management practices, control techniques and system, design and engineering methods, **and such other provisions which are appropriate**. *(emphasis added.)* The program shall also include a description of staff and equipment available to implement the program. […] Proposed programs may impose controls on a systemwide basis, a watershed basis, a jurisdiction basis, or on individual outfalls. […] Proposed management programs shall describe priorities for implementing controls."

Porter –Cologne Act section 13377 – Implement Clean Water Act and Whatever Else is Needed

California Water Code section 13377 provides that "Notwithstanding any other provision of this division, the state board or the regional boards shall, as required or authorized by the Federal Water Pollution Control Act (Clean Water Act), as amended, issue waste discharge requirements and dredged or fill material permits which apply and ensure compliance with all applicable provisions of the act and acts amendatory thereof or supplementary, thereto, **together with any more stringent effluent standards or limitations necessary to implement water quality control plans, or for the protection of beneficial uses, or to prevent nuisance**." *(emphasis added.)*

When a regional board issues waste discharge requirements to control discharges of urban runoff and storm water, it is exercising the authority of the state, as set forth in the Porter-Cologne Water Quality Control Act, in a manner that will implement the federal NPDES regulations as well as all applicable provisions of the Porter-Cologne Act, statewide Water Quality Control Plans and Policies and the Regional Water Quality Control Plan (Basin Plan). While regional board orders prescribing such requirements include the conditions and limitations prescribed for NPDES permits by the USEPA, the legal effect of waste discharge requirements depends, not on the Clean Water Act, but upon independent state law.

In other words, the regional boards have independent authority to impose requirements that exceed those contained in the federal regulations governing storm water discharges. California's Porter-Cologne Water Quality Control Act

antedates the 1972 federal Clean Water Act amendments to the Federal Water Pollution Control Act and, in some particulars, provides broader authority over activities that could affect water quality than the Clean Water Act. For example, state authority extends to all discharges of waste that could affect the quality of surface or ground water while the Clean Water Act applies only to discharges of pollutants from point sources to surface waters. The Clean Water Act explicitly preserves independent state authority to enact and implement its own standards and requirements, provided that such standards and requirements are at least as stringent as those that would be mandated by the Clean Water Act and the NPDES regulations:

> Except as expressly provided in this chapter, nothing in this chapter shall (1) preclude or deny the right of any State or political subdivision thereof or interstate agency to adopt or enforce (A) any standard or limitation respecting discharges of pollutants, or (B) any requirement respecting control or abatement of pollution; except that if an effluent limitation, or other limitation, effluent standard, prohibition, pretreatment standard, or standard of performance is in effect under this chapter, such State or political subdivision or interstate agency may not adopt or enforce any effluent limitation, or other limitation, effluent standard, prohibition, pretreatment standard, or standard of performance which is less stringent than the effluent limitation, or other limitation, effluent standard, prohibition, pretreatment standard, or standard of performance under this chapter; or (2) be construed as impairing or in any manner affecting any right or jurisdiction of the States with respect to the waters (including boundary waters) of such States. [CWA 510; 33USC1370.]

Thus, while the state is compelled to ensure implementation of the federal regulations for water pollution control, it is free to implement whatever additional water quality control measures may be authorized by state law. The California Legislature explicitly reiterated the independent regulatory discretion of the state in its amendments to reconcile Porter-Cologne with the Clean Water Act.

Discharges of Waste are Privileges, Not Rights

In addition to the Regional Board's broad legal authority and discretion as discussed above, it is important to keep in mind that the Porter Cologne Act clearly specifies that discharges of waste into waters of the state are privileges, not rights [section 13263(g)]. The Porter Cologne Act also specifies that requirements for discharges of waste need not allow use of the full waste assimilation capacity of receiving waters [section 13263(b)] and that discharges of waste may be prohibited [section 13243].

General Comments

Comment: Need more time to set up both industrial and commercial pollution prevention programs. (County of San Diego (1), County of San Diego (2))

Response: The implementation schedule for the Jurisdiction Urban Runoff Management Program, excluding Section F.1, has been extended in the revised Tentative Order from 180 days to 365 days.

Comment: Tentative Order No. 2001-01 cannot require Copermittees to "measurably increase the knowledge" or "measurably change the behavior" of target communities. (County of San Diego)

Response: As part of demonstrating that management measures have been completed to the Maximum Extent Practicable, there must be a demonstration of program effectiveness. Therefore, the requirement to demonstrate an increase in knowledge or beneficial behavior changes will remain in the Tentative Order.

Comment: The Order would undermine the Copermittees' CEQA process. The Copermittees will need to perform CEQA review before taking actions that will implement most of the requirements in the Order. The Order would force the Copermittees to amend their General Plans, amend ordinances, enter into agreements or build some type of facility. Each of these actions is likely to trigger CEQA review. The time needed to complete CEQA review varies greatly depending upon the type of review required, the size and the complexity of the proposed project. The Copermittees have identified several potential impacts to the environment that would be caused by implementing this Order. These potential impacts will compel the Copermittees at the least to prepare a Negative Declaration, and probably an Environmental Impact Report ("EIR"), before some of these requirements can be implemented. The 90- or 180-day timeline allowed for implementing most of the Order's requirements is unrealistic if merely a negative declaration is needed. The timelines are not possible if an EIR is needed. (County of San Diego, Procopio, Cory, Hargreaves & Savitch)

Response: Schedules for the implementation of the requirements of the Tentative Order have been extended. These extensions should be adequate for CEQA review.

It should be noted that many of the requirements imposed by the Tentative Order have been in place since the adoption of Order No. 90-42. Therefore amendments to General Plans and ordinances, agreements or construction of facilities and other work necessary for compliance with this order should have either been completed or well underway.

Comment: The County is also concerned that the environmental review will not be meaningful given the prescriptive nature of the Order. CEQA demands that a public agency analyze the environmental effects of a proposed project. The analytical process is supposed to include an opportunity for the public to participate and an opportunity for the public agency to take the environmental analysis and the public input into account when it makes decisions regarding the project. The prescriptive terms of the Order will reduce the County's environmental review to mere window dressing when the County acts to implement the Order. The County will not be able to consider modifications that will mitigate impacts or alternative projects that the analysis shows to be preferred because the County will be facing significant penalties unless it adopts a project consistent with the terms of the Order. (County of San Diego)

Response: The Tentative Order provides adequate flexibility to the Copermittees to implement their urban runoff management programs. The Copermittees are provided wide discretion in the implementation of BMPs. Furthermore, concerns regarding the Tentative Order's flow requirements potential for negative impacts have been alleviated, in that greater discretion has been provided to the Copermittees.

Comment: The Tentative Order's various requirements for implementation of structural BMPs and infiltration may adversely impact wetlands by reducing flows reaching the wetlands. (IEA, BIASC, BIASD, County of San Diego)

Response: The Tentative Order will not adversely impact wetlands through a reduction in their receipt of flows. There are two conditions to consider regarding flows to wetlands: wet weather flows and dry weather flows.

The Tentative Order has been revised to include only one requirement (F.1.b.2.b.i.) regarding wet weather flows. It is important to note this requirement only applies to new development and significant redevelopment, and therefore does not effect the majority of the area of most watersheds. The requirement states: "BMPs shall […] Control the post-development peak storm water runoff discharge rates and velocities as necessary to maintain or reduce pre-development downstream erosion, and to protect stream habitat." As can be seen, the requirement attempts to maintain peak flow rates at predevelopment levels. Nowhere does the requirement make it necessary for peak flow rates to be reduced below predevelopment rates. By seeking to maintain predevelopment peak flow rates, the Tentative Order helps preserve the natural wet-weather runoff conditions, thereby protecting wetlands, as opposed to adversely impacting them.

The Tentative Order's SUSMP requirements include the option of infiltration of storm water. This in an option, and need not be used if concerns exist regarding unforeseen impacts. The Tentative Order also promotes infiltration of storm water runoff during wet weather. Again, these requirements seek to maintain the natural infiltration rates and thereby maintain the natural flow regime, which can only benefit wetlands. Development, with its associated impervious surfaces, greatly reduces infiltration at newly developed sites. Maximization of infiltration at such development sites will only swing infiltration rates back closer to their natural predevelopment levels. It is doubtful that natural predevelopment infiltration levels can even be achieved at developed sites, as many engineers attested to at the Tentative Order workshops. Therefore, it is highly unlikely that requirements promoting the use of infiltration will result in decreased flows to wetlands, thereby causing any adverse impacts. On the contrary, promotion of infiltration maintains natural groundwater recharge and overland runoff rates, both of which are necessary

for most healthy wetlands. Any argument focusing only on quantity of overland flows misses the important impact groundwater recharge typically has on wetlands.

The other flow condition the Tentative Order addresses is dry weather flows. It has been stated that the Tentative Order's prohibitions on illicit discharges (section B) will impact the artificial dry weather flows upon which some wetlands are reliant. This is incorrect. The requirements for the prohibition of non-storm water discharges in section B of the Tentative Order are almost identical to requirements regarding non-storm water discharges in the current San Diego Municipal Storm Water Permit (Order No. 90-42). Clearly, these prohibitions have not led to the halt of dry weather urban runoff within San Diego County over the last ten years. It has been further stated that Legal Authority section D.1.b of the Tentative Order will also result in decreased dry weather flows to wetlands. Again, this is not the case. This section requires the Copermittees to have legal authority to prohibit the discharges described in the section. It does not require the discharges to be prohibited in all instances, but rather requires the Copermittees to have the legal authority to prohibit such discharges in the event that prohibition is determined to be necessary. Irregardless, it is doubtful that any of the discharges discussed in section D.1.b would be beneficial to wetlands.

It has also been suggested that the provisions of the Tentative Order will require the diversion of dry weather flows to the sanitary sewer, thereby depriving wetlands of valuable artificial flows. Nowhere does the Tentative Order require diversion of any types of flow to the sanitary sewer. The Tentative Order actually does the opposite by promoting onsite controls and discouraging diversion. The draft Fact Sheet/Technical Report also discusses a preference for on site controls as opposed to diversion-type regional solutions. Furthermore, the Tentative Order's requirement that dry weather flows be diverted from structural infiltration BMPs (section F.1.b.2.i.iii) does not constitute a diversion to the sanitary sewer. Dry weather flows can simply be diverted to other BMPs such as filters, which would remove pollutants in the dry weather flows prior to their discharge to wetlands or other downstream areas.

Comment: Allow co-permittees to develop time schedules for watershed mapping and implementation of watershed URMP and submittal of reports. (County of San Diego (1), County of San Diego (2))

Response: The Copermittees may develop time schedules for watershed mapping and implementation of the Watershed Urban Runoff Management Program Report that achieve compliance with the task completion and submittal dates specified in the revised Tentative Order.

Comment: Submittal dates for the first and second unified JURMP report, and model SUSMPs reports need to be extended. (County of San Diego (1), County of San Diego (2), County of San Diego (3))

Response: The revised Tentative Order eliminates the requirement to submit both a first and second unified Jurisdictional Urban Runoff Management Program Document. The revised Tentative Order requires the submittal of one Unified Jurisdictional Urban Runoff Management Program Document 365 days following the adoption of the Tentative Order. Additional time to develop the Model SUSMP will

not provided. The submittal of the first Unified Jurisdictional Urban Runoff Management Program Report has been extended by 365 days.

Comment: Several permit requirements constitute an unfunded mandate requiring reimbursement from the State. (Building Industry of Southern California, City of Del Mar, Building Industry of Southern California (2), Coalition for Practical Regulation, City of San Juan Capistrano, Coalition for Practical Regulation (2), City of El Cajon, County of San Diego)

Response: The requirements of the tentative permit are not within the definition of "unfunded mandate" that would require reimbursement of costs under the California Constitution. This is because the requirements of the tentative permit are derived from the federal Clean Water Act, as opposed to State Law. Since the tentative order would implement a federal requirement, rather than a state requirement, the tentative order is not an "unfunded mandate" by the state. The State Water Resources Control Board (SWRCB) has previously determined in several circumstances that regional board orders are exempt from the requirement for reimbursement under the California Constitution.
Also, although this program is a federal requirement, SDRWQCB staff has provided the Copermittees with information on creating funding sources. Several Copermittees have established funding sources to mitigate the strain on the municipalities general fund.

Comment: Comment period was too short to give the necessary responses. (City of Escondido, County of San Diego)

Response: The comment period was proposed and sufficiently noticed with the release of Tentative Order 2001-01. Extension of the adoption schedule was considered and rejected by the SDRWQCB in open hearing on December 13, 2000.

Comment: 365 days is not long enough to develop and implement SUSMP. The date to implement the land use planning date and SUSMP conflict by 180 days. (County of San Diego, City of San Diego)

Response: The development and implementation of the Model SUSMP requirements of Section F.1 of the Tentative Order are realistic and achievable. Additional time has been provided for the Copermittees to implement the other requirements of the Jurisdictional Urban Runoff Management Program in order to facilitate the timely completion and implementation of the entire Jurisdictional Urban Runoff Management Program. Under the revised Tentative Order, the dates for implementation of Land Use Planning and the Model SUSMP requirements now coincide.

Comment: There appears to be a schedule conflict with regards to Section F.1.b and Sections D.2. And D.2.d. (City of La Mesa, County of San Diego)

Response: Section F.1.b contains requirements for modifications to the project approval process and is not in conflict with the requirements of Section D.2 which require each Copermittee to submit certified statements from its chief legal counsel that the Copermittee has adequate legal authority to implement and enforce each of the requirements contained in 40 CFR 122.26(d)(2)(i)(A-F) and the revised Tentative Order. The revised Tentative Order extends the submittal date for requirements in Section D.2 by 90 days to accommodate the Copermittees request for additional time.

Comment: What authority do land use permitting agencies have to enforce the requirements of the Tentative Order on third parties? (City of Chula Vista)

Response: Storm water permits are issued to municipalities because of their land use authority. The ultimate responsibility for the pollutant discharges, increased runoff, and inevitable long-term water quality degradation that results from urbanization lies with local governments. This responsibility is based on the fact that it is the local governments that have authorized the urbanization (i.e., conversion of natural pervious ground cover to impervious urban surfaces) and the land uses that generate the pollutants and runoff. Furthermore, the MS4 through which the pollutants and increased flows are conveyed, and ultimately discharged into receiving waters, are owned and operated by the same local governments. In summary, the municipal Copermittees under Order No. 2001-01 are responsible for discharges into and out of their storm water conveyance systems because (1) they own and operate the MS4; and (2) they have the legal authority that authorizes the very development and land uses which generate the pollutants and increased flows in the first place.

Order No. 2001-01 holds the local government accountable for this direct link between its land use decisions and water quality degradation. The permit recognizes that each of the three major stages in the urbanization process (development planning, construction, and the use or operational stage) is controlled by and must be authorized by the local government. Accordingly, this permit requires the local government to implement, or require others to implement, appropriate best management practices to reduce pollutant discharges and increased flow during each of the three stages of urbanization.

For example, since grading cannot commence prior to the issuance of a local grading permit, the Copermittees have a built-in mechanism to ensure that all grading activities are protective of receiving water quality. A Copermittee has the authority and discretion to withhold issuance of the grading permit until the project proponent has demonstrated to the satisfaction of the Copermittee that the project will not violate the Copermittee's ordinances or cause the Copermittee to be in violation of its municipal storm water permit. Since the SDRWQCB will ultimately hold the Copermittee responsible for any discharges from the grading project, the Copermittee will want to use its own permitting authority to ensure that the project proponent implements whatever measures the Copermittee deems necessary to protect discharges into its MS4.

Comment: The RWQCB should not issue a municipal stormwater permit that is so fundamentally inconsistent with similar permits issued elsewhere in the state. The foundation of the permit may not be

legal. However, legal or not, the issuance of a radically different permit in San Diego than has been issued elsewhere in the state is not good policy, and it is not fair. The Order the San Diego RWQCB has proposed is more stringent and invasive in almost all respects than prior municipal stormwater permits issued in this state. The Order is much more stringent and prescriptive, and much less flexible than permits issued to Orange County, to other Los Angeles area Copermittees, and to municipalities in Ventura, Riverside, and Santa Clara. (County of San Diego)

Response: The mission of the RWQCBs and SWRCB is to preserve and enhance the quality of California's water resources, and ensure their proper allocation and efficient use for the benefit of present and future generations. The "benefit" to which this mission statement refers is expressed in terms of the beneficial uses designated in regional water quality control plans (basin plans). Each RWQCB develops these plans for its own region, in keeping with California Water Code § 13240 et seq. Since the mission of the RWQCBs involves protecting beneficial uses that are designated by region or portion thereof, it is appropriate for the actions of a RWQCB to be specific to its region or portions thereof. In other words, in carrying out its mission, it is more important that the SDRWQCB take actions as necessary and appropriate to protect beneficial uses in the San Diego region than it is to achieve multi-regional or statewide permit consistency. The Tentative Order is intended first and foremost to protect beneficial uses in the area to which it applies, not to be consistent with permits adopted in the past that are applicable to other areas.

Comment: The federal Clean Water Act and state Water Code do not give the RWQCB the broad legal authority which staff claims, and on which the validity of the Order depends.

In the Technical Report, at pages 62 and 63 and passim, the RWQCB claims broad authority to require in this Order "Whatever Else is Needed." This claim is based on both federal and state law. However, the Order goes well beyond any omnibus or general authority the cited statutes actually provide.

Section 401(p)(3) of the Clean Water Act provides that municipal stormwater permits

"shall require controls to reduce the discharge of pollutants to the maximum extent practicable, including management practices, control techniques and system, design and engineering methods, and such other provisions as the Administrator or the State determines appropriate for the control of such pollutants."

This language in section 401(p)(3) is all about controls to reduce discharges of pollutants. Even the "other provisions" the section authorizes must be appropriate for the control of such pollutants. Read by itself, this language plainly says nothing about the protection of water quality. Moreover, the language cannot be read as a subtle backdoor attempt to authorize water quality based requirements "if appropriate" since the Clean Water Act does not require municipal stormwater discharges to meet water quality standards. This language is not about the impacts of stormwater discharges on water quality, and it is not a blanket authorization for the RWQCB to require anything it wants based on amorphous or unsupported claims that such requirements are "appropriate" or "needed."

In Defenders of Wildlife v. Browner (Ninth Cir. 1999) 191 F3d 1159, the federal appellate court with jurisdiction over California contrasted this language with provisions of the Clean Water Act that applied to industrial dischargers, and held that EPA was not obliged to require in an EPA-issued permit that municipal discharges strictly comply with state water quality standards. In dicta, the Court also advised that EPA "has the authority to determine that ensuring strict compliance with state water-quality standards is necessary to control pollutants."

The dicta in Defenders of Wildlife does not authorize the regional water boards to require municipal stormwater discharges to meet state water quality standards in every case. At most, that dicta contemplates (as it clearly states) that this requirement could be imposed after a determination that this kind of requirement was in fact "necessary to control pollutants."

There is no determination or Finding of this kind supporting the Order. Instead, with complete circularity, Finding 13 states that compliance with receiving water limits based on water quality objectives is necessary to ensure that municipal stormwater discharges do not contribute to violations of water quality objectives. This is a legally insufficient Finding to support the water quality based requirements the Order seeks to impose.

Adding a new Finding to this Order before final promulgation would not cure this legal defect, because there is no reference in the Technical Report to evidence that could support the required Finding. Absent compelling evidence, it would be arbitrary for the RWQCB to find that application of the Clean Water Act's MEP standard by the Copermittees would not adequately control pollutants.

State law is also relevant there. The Technical Report cites to Water Code section 13377 as a source of omnibus authority. The second part of that section authorizes only "anymore stringent effluent standard or limitation," and only where "necessary to implement water quality control plans, or for the protection of beneficial uses, or to prevent nuisance." (Water Code § 13377.)

Many of the requirements imposed by the Order and based on this purported authority are not effluent standards or limitations—they are not even discharge- related requirements. Instead, they are directives to the Copermittees to take regulatory actions against third parties. These kinds of additional requirements are not authorized by section 13377.

Any authority that section 13377 might provide to impose requirements that are not "controls to reduce the discharge of pollutants," is further limited by Water Code section 13372. This section requires that state law be construed to prevent "any inconsistency" with respect to required NPDES permits. It is absolutely fundamental to the scheme for municipal stormwater discharges laid out in the Clean Water Act that these discharges are not subject to water quality standards. Any interpretation or application of section 13377 that reversed this fundamental policy decision would be inconsistent with the Clean Water Act, and is prohibited by Water Code section 13372. Congress made a fundamental distinction between industrial discharges and municipal stormwater discharges in the Clean Water Act. The Ninth Circuit affirmed that distinction in Defenders of Wildlife. Water Code section 13372 requires this RWQCB to do likewise.

Finally, any requirements that are based on Water Code section 13377 must be justified by the RWQCB "as necessary to implement water quality control plans, or for the protection of beneficial uses, or to prevent nuisance." The RWQCB has not acknowledged and has not met this burden. The burden is real. In Southern California's Edison Co. v. State Water Resources Control Board (1981) 116 Cal.App.3d 751, the Edison Company, operator of the San Onofre Nuclear Power Plant, brought an action against the State Water Resources Control Board challenging waste discharge requirements imposed upon the power plant by the San Diego Regional Water Quality Control Board under an NPDES permit and waste discharge requirements ("WDRs"). The San Diego Regional Board's Order was affirmed by the State Board. The petitioner challenged the WDRs, claiming the permit standards requiring the petitioner to remove pollutants entering into the generating stations through its water intake valve were required to have been set on a "net" rather than a "gross" basis. The State Board adopted a Water Control Plan ("Ocean Plan") from which the Regional Board presumably derived its authority to issue the permit, although that Plan

did not authorize the regulations on a gross basis as opposed to a net basis. (Id. at 757.) The trial court set aside the Regional Board's "gross standard," finding it was issued "beyond the authority of [either of] the Boards." (Id. at 754.)

On appeal, the Appellate Court held that while the Clean Water Act allows states or other agencies to enact stricter limitations than those found in the Federal Guidelines, such stricter limitations are only permitted "as necessary for the protection of the beneficial uses of the ocean." (Id. at 758-759, citing Water Code § 13377.) The court went on to find that in order for a regional board to make such a finding it must "first annunciate its reasoning; which must in turn be supported by the evidence." (Id.) In Southern California Edison Co., because the State Board's order was not supported by evidence showing that a more stringent standard was necessary to protect special beneficial uses of the ocean, "the Board's findings were inadequate" and "the absence of such evidence makes it impossible to determine whether stricter regulations than those found in the ocean plans are in fact necessary." (Id. at 759.) Finally, the Court held that as to the one finding that even addressed the issue, it "fails to explain how a specific use or uses will be benefited by implementation of the stricter standards or why stricter standards are in fact necessary." (Id. at 761.)

Neither the Clean Water Act nor the Porter-Cologne Act authorizes the RWQCB to impose the numerous programs and unfunded mandates set forth in the Tentative Order, particularly where the RWQCB has not provided sufficient evidence to justify the need for such stricter standards. Examples of overly restrictive provisions of the Tentative Order that are not supported by sufficient evidence include those provisions of the permit that prohibit the discharge of wash water from residential areas, the requirement that the Copermittees control the discharge of pollutants "to" the MS4, the requirement that the permittees carry out all "inspection surveillance and monitoring" apparently to be determined in the future by the Regional Board or through some private lawsuit, and numerous other provisions of the Tentative Order including the numerical sizing criteria set forth in the provisions dealing with SUSMPs. Further, the Regional Board has failed to annunciate its reasoning to support why such stricter standards are "necessary," and there is no evidence cited in the Technical Report to support such standards or reasoning. The stricter standards as set forth in the Tentative Order are not authorized under either the Clean Water Act or State Law.

The County believes the dicta in this case erroneously interprets what section 402(p)(3)(B) authorizes. This section need not and should not be read to authorize application of water quality prohibitions to municipal stormwater discharges; that would be a strained interpretation that is not consistent with the basic statutory scheme Congress created for municipal stormwater. Instead, the phrases “reduce the discharge of pollutants” at the beginning of the section, and “control of such pollutants” at the end of the section should be read as meaning the same thing. The authorization to do more in section 402(p)(3)(B) would then merely authorize expansion of the specific list of MEP techniques included as examples in the section. See comment “O” above. (County of San Diego)

Response: Water Code 13263 & 13377 give RWQCB authority to regulate discharges to preserve highest reasonable water quality and water quality needed to sustain beneficial uses, including aquatic habitat, etc. NPDES regulations mandate reduction of pollutants in storm water that cause or contribute to pollution to MEP by municipalities; evidence establishes risk of unreasonable degradation and pollution associated with urban runoff and support’s RWQCB imposition of requirements implementing “MEP” performance standards.

While CWA does not require municipalities to satisfy receiving water standards; [Defenders of Wildlife v Browner (9th c, 1999), 191F3d 1159] WQ sections 13263 & 13377 requires WDRs functioning as NPDES permits to implement water quality objectives (i.e., water quality standards) in basin plans and

provisions of the CWA and NPDES regulations needed to protect beneficial uses, and to prevent nuisance.

Comment: Tentative Order No. 2001-01 violates California Water Code section 13360 by specifying the "particular manner in which compliance may be had," in the form of specific BMPs. (County of San Diego)

Response: California Water Code (CWC) section 13360 generally prohibits the Regional Boards from specifying the manner of compliance with state waste discharge requirements. However, CWC section 13377 provides that the Regional Boards shall issue waste discharge requirements which apply and ensure compliance with all applicable provisions of the Federal Water Pollution Control Act (33 U.S.C. §1251 et seq.), as amended, also known as the federal Clean Water Act (CWA). Since tentative Order No. 2001-01 is written to implement CWA requirements, it does not violate section 13360 for the SDRWQCB to include specified programs of Best Management Practices (BMPs) to be implemented by the municipalities in order to carry out CWA requirements. Specificity is even more crucial in waste discharge requirements for storm water discharges given their lack of numerical effluent limits. In order to reduce storm water pollution to the maximum extent practicable (MEP), the tentative order must require specific styles of BMPs (i.e., structural or source control), but that is not to say that the SDRWQCB is dictating one specific BMP to accomplish the task. The municipalities often have many BMPs available to get the job done.

Comment: The Order unnecessarily and inappropriately creates additional and more severe penalties for requirements that should not be included in the Order, including restatements of existing non-water quality requirements.

Violation of any requirement of a valid NPDES permit can subject the "discharger" to severe penalties, as a result of EPA, RWQCB, or citizens' enforcement actions. This enforcement system should not be abused by adding requirements to an NPDES permit that do not directly implement the Clean Water Act and the state Water Code.

In the Order, the RWQCB has chosen to direct municipalities to become general permit enforcers, pollution prevention regulators, and water quality regulators. See comments "S" and "T" above. Even if the County were inclined to agree that it should implement these kinds of programs, it could not accept the burden of implementing such difficult programs within 180 days under the threat of Clean Water Act penalties. Continued inclusion of these kinds of programs as requirements of the Order, rather than as suggestions or guidance, would leave the County with no prudent option but to oppose the Order.

The Order also attempts to transform other existing non-water regulatory requirements into NPDES requirements. For example, the Order prohibits unlawful disposal of storm drain wastes. This activity is already illegal, and is already subject to appropriate penalties. The Order also requires "proper" disposal of unused pesticides, herbicides and fertilizers from municipal facilities. But "improper" disposal is already illegal. (County of San Diego)

Response: To the extent that the Tentative Order may require proper disposal of wastes, pesticides, herbicides, etc., the requirements are very broad. The Tentative Order's requirements addressing disposal are only included to help ensure such substances are not disposed of in the MS4. Therefore, the Tentative

Order's requirements on disposal are directly related to the Tentative Order's prohibition of illicit discharges. As such, they are appropriate requirements for the Tentative Order.

Comment: The theory behind the permit is that water pollution can be prevented by stopping water. (Building Industry Association of San Diego County)

Response: The Tentative Order seeks to ensure that the beneficial uses of a receiving water are protected despite discharges from MS4s into that receiving water. Beneficial uses are defined as the uses of water necessary for the survival or well being of humans, plants, and wildlife. Municipal storm water NPDES permits contain requirements to achieve numeric and narrative receiving water quality objectives which are established to protect these beneficial uses. The Tentative Order includes these water quality objectives and a prohibition that MS4 discharges may not cause the water quality objectives in the receiving water to be exceeded. By definition, when the water quality objectives of a receiving water are exceeded, the beneficial uses of that water are not adequately protected.

Typical NPDES permits are based on the concept of employing full-scale treatment of an effluent to remove pollutants at the end of the pipe (i.e., just before being discharged into receiving waters). Accordingly, typical NPDES permits contain numeric effluent limits which are arithmetically derived from receiving water quality objectives for each pollutant of concern in the effluent. However, municipal storm water permits are not typical NPDES permits because they are not based on the concept of full-scale treatment of polluted storm water. Full scale end of pipe treatment for storm water is not considered economically and technologically feasible at this time. Therefore municipal storm water permits do not contain numeric effluent limits, but rather are based on the concept that pollutants can be effectively reduced in storm water to the maximum extent practicable by the application of a wide range of best management practices (BMPs). The technology-based performance standard of “maximum extent practicable” refers to evaluation and implementation of BMPs to the maximum extent practicable, except where (1) other effective BMPs will achieve greater or substantially similar pollution benefits; (2) the BMP is not technically feasible; or (3) the cost of BMP implementation greatly outweighs the pollution control benefits.

In other words, in municipal storm water permits, receiving water quality objectives are attained by way of BMP implementation, including use of pollution prevention, source control, and treatment control BMPs. To protect receiving water beneficial uses, municipal storm water permits require the use of best management practices which prevent the generation of pollutants and keep runoff from coming into contact with pollutants, to be supplemented by the use of methods that remove or treat pollutants. The BMPs available to the Copermittees include many that do not act by "stopping water" but rather through a variety of means ranging from prevention and source reduction, which may not involve flow at all, to structural treatment BMPs that effectively remove pollutants from urban runoff prior to discharge to receiving waters. Within the framework of the Tentative Order, the Copermittees have the discretion to determine which BMPs to implement.

Comment: Beach closings will not be prevented with this permit since they are predominantly caused by sewage spill. (Building Industry Association of San Diego County)

Response: As discussed in the Fact Sheet/Technical Report and Findings 2-7, sewage spills are only one of many sources of the significant pollutant loadings characteristic of urban runoff. The Tentative

Order provides a regulatory framework within which the Copermittees will implement programs to reduce to the maximum extent practicable pollutants in urban runoff discharged from their MS4s and prevent their discharges from causing or contributing to exceedances of water quality objectives.

Urban runoff is fundamentally important to the water quality of Southern California. It has been found to be a leading cause of water quality impairment in the San Diego Region and nationwide. Untreated pollutants in urban runoff, indiscriminate of dry or wet weather conditions, routinely find their way to creeks, lagoons, bays, and ocean. These pollutants are transported by runoff from over watering of residential lawns, runoff from rainfall, and runoff from other sources. San Diego area urban runoff is commonly contaminated with pesticides, fertilizers, animal droppings, trash, food wastes, automotive byproducts, and many other toxic substances which are generated in the urban environment. Water that flows over streets, parking lots, construction sites, and industrial, commercial, residential, and municipal areas carries these untreated pollutants through storm drain networks directly to the receiving waters of the region. Southern California, with the highest coastal population density of the entire country, suffers multiple tribulations from these urban generated pollutants.

The United States Environmental Protection Agency (US EPA) recognizes urban wet weather flows as the number one source of estuarine pollution in coastal communities. This trend is reflected locally by the 1998-1999 City of San Diego and Co-Permittee NPDES Stormwater Monitoring Program Report, which names urban runoff as one of the most significant contributors of pollution to our waterways and coastal areas. Furthermore, this document reports that monitoring efforts indicate that instream concentrations of pathogen indicators (fecal coliform and streptococcus) and heavy metals (such as cadmium, copper, lead, and zinc) exceed state and federal water quality criteria. Storm water within the region has also been found to contain the pesticides diazinon and chlorpyrifos (Dursban) at levels that can cause chronic or acute toxicity.

Polluted urban runoff causes many impacts in Southern California, including increased public health risks, high concentrations of toxic metals in harbor and ocean sediments, and toxicity to aquatic life. A study exploring the health risks associated with urban runoff in Southern California was conducted in 1995 by the Santa Monica Bay Restoration Project using a survey of 15,000 bathers at three Santa Monica beaches. The study concluded that there is a 57% higher rate of illness in swimmers who swim adjacent to storm drains than in swimmers who swim more than 400 yards away from storm drains.

This potential for public health risks resulting from urban runoff is reflected in the San Diego region as well. In 1999, there were 29 days in which the San Diego County Health Department issued general advisories to avoid waters 300 feet either side of all storm drain outlets in order to protect the public from potential adverse health effects caused by urban runoff. Also, in 1999 there were 720 combined beach closures and postings in San Diego County. The San Diego County Department of Health does not recommend the public recreate in closed or posted waters due to associated health risk. A breakdown of the beach closure and posting data is as follows: 127 of these closings were related to sewage spills, 71 related to river mouth outlets or some other excavation, and 522 of the days were related to some exceedance of water quality standards. Urban runoff can also impact drinking water; contamination by urban runoff has forced the closure of potable water reservoirs within the City of San Diego in order to protect public health.

The San Diego Regional Water Quality Control Board (SDRWQCB) finds that such problems are indeed frequently urban runoff related. For instance, a common conveyance for a sewage spill to reach a beach is through the municipal storm water system. Also, exceedances of standards at some of the Region's beaches have unquestionably resulted from pollutants conveyed by the storm water drainage system. In addition, urban runoff is increasingly being targeted as the cause of beach closures and postings in other

areas of the San Diego region and Southern California. Urban runoff has been identified as a principal contributor to fecal coliform contamination in Orange County's Aliso Creek, a creek which often causes beach postings when flowing into the ocean. Municipal enforcement efforts focusing on urban runoff have also resulted in reduced coliform levels in receiving waters in Encinitas. Finally, US EPA goes on to say that urban storm water runoff and sewer overflows have become the largest cause of beach closings in the United States for the previous three years, becoming more significant than such sources as oil spills and publicly owned treatment works.

Regardless of how beach posting and closure data is interpreted, one thing is clear: Beneficial uses are not being met for the waters in the San Diego Region, and urban runoff is a significant contributor to this receiving water impairment. For San Diego, known throughout the world for its beach lifestyle, these statistics are bound to have increasingly serious effects on tourism revenue as well as the local cultural identity.

Comment: The permit conflicts with US EPA Phase II Storm Water Regulations which encourage implementation on a regional or watershed basis. (Building Industry Association of San Diego County)

Response: The Tentative Order requires the Copermittees within a watershed to collaborate to develop and implement a Watershed Urban Runoff Management Program.

Comment: Since the region's storm water problems stem from existing land use actions, new development and redevelopment would carry a disproportionate share of the financial obligation to implement the provisions of the permit. (Building Industry Association of San Diego County)

Response: The Tentative Order does not require new development and redevelopment to carry a disproportionate share of the financial burden to implement the provisions of the permit. The requirements on new development and redevelopment are required under the Federal NPDES regulations, and are designed to prevent new development and redevelopment from exacerbating existing conditions. The SWRCB supports this approach, stating in Order WQ 2000-11 that "[i]n the context of the entire effort required by the permit, the development controls can be seen as preventing the existing situation from becoming worse." The requirements for new development and redevelopment are only one section of the Tentative Order; the entire rest of the Tentative Order is focused on existing problems stemming from existing development conditions. The controls on new development do not result in a disproportionate financial obligation, since incorporation of BMPs during the planning phase of development has been consistently shown to be the most cost effective approach to reduce pollutant loads to receiving waters (USEPA, 1999b).

Comment: The creation of storm water utility districts would ensure equitable financial responsibility and provide essential regulatory flexibility to more accurately respond to specific pollutants of concern on a per watershed basis. The board is urged to consider this more practical and cost effective approach. (Building Industry Association of San Diego County)

Response: Nothing in the Tentative Order prevents the Copermittees from forming a storm water utility district to aid in funding and implementation of their urban runoff management programs.

Comment: SDRWQCB Has Failed To Show That The Proposed Permit Will Reduce Pollutants To The "Maximum Extent Practicable" As Required By CWA and Porter-Cologne.

SDRWQCB has failed to establish any findings to support the determination that the permit is protective of water quality. There has also been no determination made as to whether the program required by the permit is necessary, cost effective, or capable of implementation by the Copermittees or third parties.SDRWQCB has failed to establish any findings to support the determination that the permit is protective of water quality. Further, there are no findings which indicate that implementation of the permit will result in the reduction of pollutants in receiving water to the maximum extent practicable (MEP). (Building Industry Association of San Diego County)

Response: MEP is the acronym for Maximum Extent Practicable. MEP is the technology-based standard established by Congress in CWA section 402(p)(3)(B)(iii) that municipal dischargers of storm water (MS4s) must meet. It is implementation of actions required by the permit, not the permit itself, that will meet MEP. That implementation is the responsibility of the Permittees.

Comment: There has been no initial determination that any pollutants even exist in the storm water runoff. The necessity of determining the existence and source of pollutants was reaffirmed recently by the City of Huntington Beach. The City recently identified a prime suspect which caused beach closures in 1999: bird waste from a nearby marsh. These findings confirm the necessity to identify the source of pollutants, and analyze the methods used to treat them in order to meet MEP. The findings by the City of Huntington Beach also suggest that the objectives of the CWA and Porter-Cologne cannot and quite possibly should not be achieved in every circumstance. (Building Industry Association of San Diego County)

Response: Findings 3, 4, 5, 6, 7, and 9, together with their corresponding discussions in the draft Fact Sheet/Technical Report, identify the pollutants commonly found in urban runoff and their impacts to receiving waters. The Copermittees' monitoring efforts frequently find pollutants in storm water runoff at concentrations which exceed USEPA benchmark values for storm water, exceed water quality objectives, and cause toxicity.

Comment: The Proposed Permit Improperly Relies on Volume/Flow Control to Prevent Pollution.

The proposed Permit and Draft Fact Sheet/Technical Report for SDRWQCB Order No. 2001-01 ("Fact Sheet") professes to address both volume/flow control and specific pollutants of concern, examination of the proposed permit's actual application makes clear that it is a volume and flow control program, doing nothing by its own provisions to identify and clean up existing sources of pollution. Rather it relies upon volume capture and/or treatment from new development and redevelopment. By focusing on this high cost and low impact approach, adoption of the proposed permit would be an outright rejection of SDRWQCB's responsibility to bring about actual solutions to the existing problem. […]

The Fact Sheet in the proposed permit quotes Governor Davis:

"In his veto message of a $6.9 million bill that would have funneled money to Orange County to help curb urban runoff and clean beaches, Davis said the legislation 'focuses on a temporary, seasonal fix and does not provide for identification and elimination of the sources of contamination.'" (Fact Sheet, p. 33.)

The Governor's observation applies to the entire proposed permit.

[…]

The proposed permit instead seeks to classify all runoff affiliated with development or redevelopment as polluted. There is no attempt whatsoever to distinguish between types of runoff and the content of runoff. The "urban runoff" is impermissible under the proposed permit.

[…]

This across the board focus upon prospective urban runoff – without differentiation – to the exclusion of identifying and meaningfully remediating existing sources and collections of pollutants is an arbitrary and capricious exercise of SDRWQCB's discretion in adopting the proposed permit. (Building Industry Association of San Diego County)

Response: The Tentative Order addresses both urban runoff flows and the pollutants found in them. The Tentative Order also addresses urban runoff from all sources, including both existing and new development.

While the Tentative Order does address changes in peak flow rates resulting from new development, it does so in a limited manner. Based on the comments from many interested parties, the prohibition against any increase in peak flow rates resulting from new development has been changed; the requirement to address changes in peak flow rates now only applies to development falling under the SUSMP categories, where the potential for downstream erosion exists. The necessity for the control of peak flow rates increases from development is strongly supported. USEPA states: "In many cases the impacts on receiving waters due to changes in hydrology can be more significant than those attributable to the contaminants found in storm water discharges" (USEPA, 1999a). Furthermore, the SWRCB upheld in Order WQ 2000-11 that control of peak flow rates from SUSMP priority development projects was appropriate.

The Tentative Order does not treat all urban runoff from new development as polluted; rather, it finds that to adequately control pollutant discharges and changes in flow from new development, structural treatment BMPs must be implemented at various priority development project categories. The SWRCB has found that structural treatment BMPs are needed at SUSMP priority development project categories, stating in Order WQ 2000-11 that such an application constitutes MEP.

Finally, the Tentative Order does not only focus on new development, but also has extensive requirements for existing development. The Tentative Order requires that BMPs be implemented for the following types of existing land uses or activities: construction, municipal, commercial, residential, and industrial.

Comment: The SDRWQCB fails to demonstrate the constitutional justification for the exercise of federal jurisdiction over these wholly intrastate facilities, in advance of any discharge to waters of the United States in violation of the Commerce Clause. (Building Industry Association of San Diego County)

Response: State and Federal lands and activities will be addressed under the Phase II Storm Water NPDES Regulations in March 2003. The operators of these facilities will be added as Copermittees or otherwise be required to meet or exceed the requirements of the Jurisdictional Urban Runoff Management Program for the area in which they are located. The Tentative Order does not require the Copermittees to control runoff from freeways, agricultural land, etc. over which they do not have jurisdiction, provided that discharges from such sources do not enter their MS4s. Municipalities cannot arrogate to themselves the authority to regulate discharges from facilities or activities beyond their jurisdiction, e.g., discharges from state and federal facilities including highways and Indian reservations directly to waters of the state that are not part or tributary to the municipality's MS4. Municipalities are required, however, to have or develop legal authority to regulate storm water discharges and urban runoff within their jurisdictions, including discharges that may be subject to concurrent regulation by the state and federal governments. In addition, where municipalities control access to MS4 infrastructure for the accommodation of discharges from entities within their physical jurisdiction (including school districts, state and federal facilities, construction sites and industrial facilities) municipalities must exercise such control in a manner consistent with their obligation under the Regional Board's requirements to reduce pollutants in their MS4 to the maximum extent practicable.

Comment: The SDRWQCB despite its cursory denial in Finding 36, made no determination whether permit compliant MS4 discharges will cause or contribute to the unreasonable degradation of receiving water quality and therefore violate the state and federal Antidegradation Policies. (Building Industry Association of San Diego County)

Response: Tentative Order No. 2001-01 does not violate the state and federal Antidegradation Policies. The Policies ordinarily are triggered by new discharges, expansion of existing facilities, or a reduction in the level of treatment of an existing discharge, “since such activities would presumably lower water quality." US EPA Questions & Answers on Antidegradation, at p. 6. The antidegradation issues were analyzed in detail during the adoption of the original San Diego Municipal Storm Water Permit, Order No. 90-42, therefore, a new analysis for the reissuance of waste discharge requirements is unnecessary. Furthermore, Tentative Order No. 2001-01 complies with the Policies by requiring Copermittees to “meet waste discharge requirements which will result in the best practicable treatment or control of the discharge” and through the implementation of “cost-effective and reasonable best management practices.”

Comment: Flexibility in BMP design is needed to address non-stormwater quality issues associated with their construction, such as vector management (e.g. mosquito breeding). (County of Orange Public Facilities & Resources Dep)

Response: Flexibility in BMP design is provided in the Tentative Order. Structural treatment BMPs are only required to be a specific size. The type of BMPs to be implemented, as well as their design, is left to the discretion of the Copermittees.

Comment: The Tentative Order improperly delegates the Regional Board's enforcement duties to the municipalities. (Procopio, Cory, Hargreaves, & Savitch, L.L.P.)

Response: Tentative Order No. 2001-01 in no way delegates the SDRWQCB's enforcement authority to Copermittees. Throughout the tentative Order, Copermittees are required to implement and enforce their permit required legal authority. The genesis of this requirement is 40 CFR (Code of Federal Regulations) 122.26(d)(2)(i). This section states that Copermittees must demonstrate that they have adequate legal authority to: (1) control "the contribution of pollutants to the municipal storm sewer by storm water discharges associated with industrial activity and the quality of storm water discharged from sites of industrial activity;" (2) prohibit "illicit discharges to the municipal storm sewer;" (3) control "the discharge to a municipal separate storm sewer of spills, dumping or disposal of materials other than storm water;" (4) control "among coapplicants the contribution of pollutants from one portion of the municipal system to another portion of the municipal system;" (5) "[r]equire compliance with conditions in ordinances, permits, contracts or orders;" and (6) "[c]arry out all inspection, surveillance and monitoring procedures necessary to determine compliance and non-compliance with permit conditions including the prohibition on illicit discharges to the municipal separate storm sewer."

The federal regulations in 40 CFR 122.26 establish a dual system for regulation of industrial and construction site discharges through municipal storm water conveyance systems. Industries and construction sites are permitted under statewide general NPDES industrial or construction storm water permits. These permits require industries and construction sites to do the following: (1) to reduce pollutants to comply with best available technology (BAT) and best conventional technology (BCT) performance standards and (2) to not cause or contribute to violations of applicable water quality objectives. In addition, industries and construction sites are subject to regulation by municipalities through storm water ordinances developed according to municipal storm water permits issued by the state. Pursuant to Clean Water Act section 402(p)(3)(iii) municipalities are required to implement controls to reduce the discharge of pollutants from municipal storm water conveyance systems to the maximum extent practicable (MEP). Because storm water from industrial facilities may be a major contributor of pollutants to municipal storm water conveyance systems, municipalities are obligated to develop controls for storm water discharges associated with industrial activity through their system in their urban runoff management program. (See Federal Register preamble, Volume 55, No. 222, November 16, 1990, page 48000.)

The US EPA intended that the municipalities and delegated states share the responsibility of regulating storm water discharges from industrial and construction site activities. The US EPA believed that this dual approach would result in the most effective regulation. Since municipalities are ultimately responsible for discharges from their municipal storm water conveyance systems, it is in their best interest to regulate what is discharged into their system.

To satisfy the conditions of its own municipal storm water permit, a municipality may need to impose additional requirements on industrial or construction site dischargers. This need may apply to industries and construction sites which are permitted under the statewide general industrial or construction storm water permits, as well as those which are not. Therefore, a municipality should develop a mechanism to assure that all industrial and construction sites that discharge to the municipality's storm water conveyance system, know their obligation to comply with the terms of the municipality's storm water ordinance. (See Guidance Manual for the Preparation of Part 2 of The NPDES Permit Applications for discharges from Municipal Separate Storm Sewer Systems, pages 3-1 to 3-2.)

To the extent that a discharge from an industrial or construction site facility covered under the statewide general storm water permit causes a violation of an applicable receiving water objective contained in a municipality's storm water permit, both the industrial or construction site discharger and the municipality may be liable.

Comment: The permit does not extend clear, concise numeric sizing requirements to existing development, as it does for new development and significant redevelopment. (San Diego Baykeeper)

Response: While the Permittees may choose to implement numeric sizing criteria on existing development, the SDRWQCB will not be making this a requirement under the Tentative Order. The reasoning for this is to provide their Permittees maximum flexibility to choose from a wide spectrum of best management practices. In some cases retrofitting existing development with BMPs that are based on numeric sizing criteria will be the best approach. In other cases, another approach will have to be utilized as the numeric sizing will be technologically or economically prohibitive.

Comment: The co-permittees contentions that reducing pollutant loads in stormwater flows will harm wetlands or riparian habitat are unlikely ; to the contrary, selection of BMPs that will filter, infiltrate or treat runoff will benefit wetlands and the riparian habitat by providing cleaner water flows. (Surfers Tired of Pollution)

Response: Comment noted.

Comment: Constructed wetlands should not be considered as mitigation or rationalization for the destruction of existing habitat, filling or grading existing natural wetlands or vernal pools, or channelization of natural waterways, nor should co-permittees be permitted to claim that BMPs require them to degrade existing habitat, wetlands, vernal pools or lakes, rivers or streams in order to mitigate stormwater runoff from new development or redevelopment. (Surfers Tired of Pollution)

Response: Comment noted.

Comment: The Regional Board should encourage a cooperative approach and take the time to understand the real constraints faced by cities rather than imposing conditions which cities cannot implement, resulting in hard feelings and exposing the cities to litigation from the environmental community. (Coalition for Practical Regulation)

Response: Comment noted.

Comment: I strongly urge you and your board to support the current permit to keep the water safe for us, our children, and our wildlife. (Harmon, Warren)

Response: Comment noted.

Comment: There will be opposition to the permit from those who consider the cost too high, but it will be cheaper in the long run to adopt 2001-01and protect the quality of our water. (Hinton, Mel)

Response: Comment noted.

Comment: Strict controls over runoff should be established to maintain existing water quality in the face of the expected growth in population and land development. (Hinton, Mel)

Response: Comment noted.

Comment: There are areas of the permit that are unduly vague, such as in the areas of education and enforcement. The IEA would like to see guidelines set by the RWQCB in these areas to avoid confusion and inequitable enforcement of regulations. (Industrial Environmental Association)

Response: Where the Tentative Order is not prescriptive, it is to provide the Copermittees discretion in developing and implementing their programs.

Comment: Many areas of the permit call for prohibitions on specific discharges or industries, regardless of size. It does not seem efficient nor effective to prohibit minor discharges from very small businesses or minor sources. The IEA encourages the RWQCB to adopt a small business and/or small discharge exemption. (Industrial Environmental Association)

Response: The prohibition of non-storm water discharges in required by the Clean Water Act. The Clean Water Act does not include exemptions based on size of discharges. However, certain non-storm water discharges, listed in section B.2, are allowed if the Copermittees find that they are not a significant source of pollutants. For these types of non-storm water discharges, size of discharge may be considered.

Comment: Significant Redevelopment
Pollutants of Concern
Maximum Extent Practicable
Environmentally Sensitive Area
Tributary to an Environmentally Sensitive Area
We urge the Regional Board to include in this permit, clear, measurable definitions of the above referenced terms. (McKenna & Cuneo, L.L.P.)

Response: Please refer to the definitions and clarifications regarding significant redevelopment, pollutants of concern, maximum extent practicable, environmentally sensitive area, and tributary to an environmentally sensitive area addressed elsewhere in the response to comments.

Comment: The Permit imposes specific requirements on projects subject to the SUSWMP that may be impossible to achieve in the Urban Core. If the proposed SUSWMP requirements are infeasible for Urban Core projects, the Draft Permit should allow Copermittees to develop alternative requirements that achieve the same goal.

However, in order to assure that the Permit imposes the proper requirements on varying projects, a definition of Urban Core is required.

The level of urbanization in the urban core creates several unique problems when attempting to apply SUSWMPs to new construction and significant reconstruction. They include the cost of land, development (use) density, urban in fill, "Smart Growth," and ability to control pollutants, etc. SDRWQCB Staff fails to recognize the significant and different challenges that the SUSWMP imposes on geographies with varying levels of development.

As discussed below, the definition of Maximum Extent Practicable (MEP), in conjunction with the Waiver provisions of the SUSWMP may have the effect of creating different requirements for the Urban Core. Because these differing requirements may create what others will perceive as preferential treatment for the Urban Core, it is important that the Draft Permit defines the term "Urban Core" carefully, and narrowly.

Proposed Definition
This proposal defines the Urban Core as those watersheds, or portions of watersheds that meet the following criteria:
I . At least 90% of the land surface is currently impervious;
2. Average vehicular traffic on main roadways exceeds 25,000 ADT;
3. Average vehicular traffic on intersecting roadways exceeds 15000 ADT; and
4. Average land values exceed the Countywide average by 25%.

C. Rationale
The Draft Permit does not discuss the concept of the "Urban Core. The definition of Urban Core, however, ultimately affects two important concepts imbedded in the Draft Permit: "Maximum Extent Practicable" ("MEP") and the Waiver Provisions.

First, this proposed definition of Urban Core considers the issue of impervious surfaces; a concept that the Regional Board already concedes will result in greater volumes of water to be "mitigated" through treatment or infiltration. These volumes directly relate to project costs, which as described below, are integral to the definition of MEP.

Second, it considers the issue of traffic density. The Regional Board Staff is already aware that in high traffic density areas, infiltration, the most cost effective mitigation tool, will not be allowed without pretreatment. Ultimately, this prohibition will drive-up costs, which, in turn, will limit MEP. Defining the Urban Core in the manner proposed above also considers land values. Again, the cost of land will affect the cost of any Treatment Control BMPs that, in turn, will limit MEP. The Draft Permit states that the Waiver Provision is triggered by a finding of "extreme limitations of space for treatment on a redevelopment project". One rational basis for a finding of extreme of "impracticability for a specific property is that the value of the land required for the Treatment Control BMPs is so high that the project is no longer economically viable. (McKenna & Cuneo, L.L.P.)

Response: The commentor asserts that new development and significant redevelopment within the “urban core” should not be subject to the SUSMP requirement for implementation of structural treatment

BMPs which meet numeric sizing criteria. However, the implementation of structural treatment BMPs which meet numeric sizing criteria is quite feasible within the urban core.

Not all structural treatment BMPs require large amounts of land, which may be expensive in the urban core. For example, sand filters or catch basin inserts can be used. USEPA specifically identifies these BMPs for urban core use, stating "media filters are commonly used to treat runoff from small sites such as parking lots and small developments, in areas with high pollution potential such as industrial areas, or in highly urbanized areas where land availability or costs preclude the use of other BMP types. Filters should be placed off-line (i.e., a portion of the runoff volume, called the water quality volume, is diverted to the BMP, while any flows in excess of this volume are bypassed) and are sometimes designed to intercept and treat only the first half inch or inch of runoff and bypass larger storm water flows. A benefit of using filters in highly urbanized areas is that the filter can be placed under parking lots or in building basements, limiting or eliminating costly land requirements" (USEPA, 1999a). While these BMPs may not address increases in peak flow rates resulting from development, the permit provides that peak flow rates need not be controlled where potential for erosion does not exist (see change at permit section F.1.b.2.b.i). This would apply to significant parts of the urban core of downtown San Diego, which discharges directly into the bay.

Furthermore, the "heavy use" nature of the urban core requires BMP implementation. As the commentor states, the urban core experiences pervasive imperviousness (which reduces on site treatment) and high levels of vehicular traffic, which is a common source of pollutants in urban runoff. Rather than preclude structural treatment BMP use in the urban core, this "heavy use" instead necessitates the need for urban core structural treatment BMP implementation.

In addition, the SUSMP provisions provide for a waiver if implementation of all BMPs is found to be infeasible. If a project in the urban core cannot implement any BMP, a waiver may be granted.

Finally, exempting the urban core from SUSMP structural treatment BMP requirements would not be consistent with SWRCB guidance. SWRCB Order WQ 2000-11 found that the SUSMP provisions constitute MEP. Relaxing of the SUSMP provisions would therefore be below the MEP standard.

Comment: The document contains numerous acronyms, many of which are unique to this document. This makes for very difficult reading, particularly if one is interested in only one section or topic. Recommendations: (a) Provide a list of acronyms and their definitions, and more preferably, include a glossary -including the acronyms. (b) Provide a flow chart showing how all of the activities and decisions interrelate. (Padre Dam Municipal Water District)

Response: A list of acronyms is included in the draft Fact Sheet/Technical Report. A glossary is included in Attachment D of the Tentative Order. The Task and Submittal Summary Tables should be sufficient summarize the schedule for tasks and submittals required by the Tentative Order. Development of a flow chart is beyond the current scope of "response to comments," but will be considered after adoption of the Tentative Order.

Comment: The requirements of this permit should be in alignment with that of permits already issued to Caltrans, and others. Requirements should be consistent to avoid disconnects in operational methodology between agencies. (SANDAG)

Response: To the extent feasible, the requirements of the Tentative Order are consistent with permits already issued within the region. However, the Tentative Order regulates discharges of a different nature than other permits within the region. Due to the large volume of urban runoff regulated by the Tentative Order, and the continued impairment of receiving waters caused by urban runoff, the Tentative Order may contain specific requirements addressing municipal urban runoff not contained in other permits.

Comment: We urge that the Board resist the pressures to weaken this permit or to delay its adoption and implementation. There may be cases in which all of the elements of the proposed schedule can not be met. We urge that the Board treat these requests deliberately so that flexibility is allowed to address limited valid issues, but that shortsighted efforts to delay the process are rejected. (San Diego Audubon Society)

Response: Comment noted.

Comment: CALTRANS facilities and activities have a major impact on the water quality and development patterns of our region, as mentioned above. We understand that there may be problems with addressing actions of CALTRANS and other agencies that are not controlled by local jurisdictions. That is not a reason to exclude these sources of pollution. (San Diego Audubon Society)

Response: To the extent that Caltrans activities discharge to Copermittees' MS4s, the Tentative Order places responsibility on the Copermittees for such discharges. Municipalities cannot arrogate to themselves the authority to regulate discharges from facilities or activities beyond their jurisdiction, e.g., discharges from state and federal facilities including highways and Indian reservations directly to waters of the state that are not part or tributary to the municipality's MS4. Municipalities are required, however, to have or develop legal authority to regulate storm water discharges and urban runoff within their jurisdictions, including discharges that may be subject to concurrent regulation by the state and federal governments. In addition, where municipalities control access to MS4 infrastructure for the accommodation of discharges from entities within their jurisdiction (including school districts, state and federal facilities, construction sites and industrial facilities) municipalities must exercise such control in a manner consistent with their obligation under the Regional Board's requirements to reduce pollutants in their MS4 to the maximum extent practicable.

Therefore, while the Tentative Order does not address all Caltrans discharges, it does address them to the extent that they enter the Copermittees' MS4.

Comment: We urge that the permit include the regulation of these state and federal agencies. The impacts of their(Border Patrol & other state and federal agencies) operations could be significantly improved if the measures described in this permit were required and enforced for their activities. If Jurisdictional conflicts occur, we urge that the Board use these conflicts to elevate the issues to state and federal agencies and our state and federal legislators so the problems will be resolved to allow the Board to comprehensively and effectively protect our water quality. (San Diego Audubon Society)

Response: Phase II of the Federal NPDES storm water regulations will cover state and federal facilities. To the extent that the Border Patrol (or other state and federal agencies) own and operate a MS4, as well as meet the criteria for applicability under Phase II, the Border Patrol (or other state and federal agencies) will be issued Phase II NPDES storm water permits. Implementation of Phase II is anticipated for 2003.

Comment: The Tentative Order establishes policy inconsistent with the Clean Water Act and State Board policies, and may therefore set a precedent for future municipal storm water permits. (California Stormwater Quality Task Force)

Response: Tentative Order No. 2001-01 is consistent with the Clean Water Act (CWA) and State Board policies. Section 402(p)(3)(B)(iii) of the CWA requires municipalities to implement "controls to reduce the discharge of pollutants to the maximum extent practicable, including management practices, control techniques and system, design and engineering methods, and such other provisions as the Administrator or the State determines appropriate for the control of such pollutants." The SDRWQCB's responsibility is to translate this section of the CWA into the form of waste discharge requirements. The tentative Order's required programs are consistent with the CWA because they reduce the discharge of pollutants to the maximum extent practicable (MEP). Furthermore, the CWA and federal regulations describe only minimal storm water program components. Although the tentative Order may describe portions of program components that are not specifically addressed in the federal requirements and regulations, the SDRWQCB has made express findings that these components are significant sources of storm water pollution. Since the CWA and federal regulations do not exclude sources that are significant pollutant contributors, it is appropriate to cover the sources in the tentative Order.

Comment: To supplement funding for stormwater management programs, Copermittee's should be encouraged to issue citations containing administrative fines to repeat violators of local discharge control measures (Surfrider Foundation)

Response: As noted in Sections F.2.h and F.3.b.7, the Tentative Order does encourage the implementation of sanctions to ensure compliance. Such sanctions include non-monetary penalties, fines, bonding requirements, and permit denials for non compliance. The Copermittees have the authority and discretion to adopt ordinances and issue citations for the violations of those ordinances. The manner in which monies collected by a Copermittee for discharge violations is used is entirely the discretion of the Copermittee.

Comment: There is no recognition of other agencies that receive and treat urban runoff or those that must protect drinking water supplies from the impacts of urban runoff. We suggest that there be a more direct avenue for water agency involvement in the process. The Stormwater Permit addresses the federally mandated Clean WaterAct (CWA) but does not address the federally mandated Safe Drinking Water Act (SDWA). (Sweetwater Authority)

Response: The Copermittees are encouraged to coordinate with outside agencies in the Tentative Order in Finding 31, which states "Copermittee coordination with other watershed stakeholders, especially Caltrans and the Department of Defense, is also critical."

Comment: Protection from Existing Development: Sweetwater Authority agrees that urban runoff discharges are a leading cause of receiving water quality impairment in the San Diego Region. Nearly twenty years ago, the Authority began a process for protecting the water quality of Sweetwater Reservoir through the conceptualization, design and eventual construction of an Urban Runoff Diversion System (URDS) to capture urban runoff flows from development upstream of the reservoir. While successful implementation of the proposed Stormwater Permit may significantly control urban runoff from future development, ongoing operation and maintenance of the URDS will Protect Sweetwater Reservoir from water quality impacts originating from existing developments. (Sweetwater Authority)

Response: Comment noted.

Comment: The draft document will require Copermittees to implement Urban Runoff Management Programs (URMPs) designed to reduce discharges of pollutants and flow into and from municipal storm sewer systems. To be most effective, the permit states that "URMPS must contain both structural and non-structural best management practices (BMPs)." Sweetwater Authority's expertise should be included in the process of protecting the Sweetwater River watershed. (Sweetwater Authority)

Response: The Copermittees are encouraged to coordinate with outside agencies in the Tentative Order in Finding 31, which states "Copermittee coordination with other watershed stakeholders, especially Caltrans and the Department of Defense, is also critical."

Comment: On May 8, 1985, the County Board of Supervisors approved a request by Sweetwater Authority to collect fees from new development. Specifically, the Board directed the Department of Planning and Land Use (DPLU) to continue a practice of placing conditions on development proposals, to the satisfaction of Sweetwater Authority, regarding the protection of Sweetwater Reservoir. For future developments, including significant redevelopment in the Sweetwater River watershed, cooperation with Sweetwater Authority should be required in order to continue the implementation of this long standing policy and practice. The URDS was constructed at Sweetwater Authority's expense with the understanding that future watershed development would financially contribute to this structure, which was built solely to protect the reservoir from cumulative impacts of development. The payment of fees to mitigate cumulative impacts of urban runoff should be considered when determining the waste discharge requirements for new developments in the Sweetwater River watershed. (Sweetwater Authority)

Response: The Copermittees are encouraged to coordinate with outside agencies in the Tentative Order in Finding 31, which states "Copermittee coordination with other watershed stakeholders, especially Caltrans and the Department of Defense, is also critical."

Comment: The permit is sensible and equitable in that it vests responsibility for controlling water quality impacts with the parties that actually cause the impacts. (Environmental Health Coalition)

Response: Comment noted.

Comment: The permit is a smart approach to growth because it requires developers to plan for future impacts and address the impacts now instead of later. (Environmental Health Coalition)

Response: Comment noted.

Comment: The permit will assure a suitable minimal baseline if enforcement is adequate and if Copermittees act responsibly. (Environmental Health Coalition)

Response: Comment noted.

Comment: The permit is clear and it provides the maximum amount of specificity possible given the limits of the Board's legal authority. (Environmental Health Coalition)

Response: Comment noted.

Comment: The Board should issue a reference sheet to the public which explains the differences between the old and new permits. (Environmental Health Coalition)

Response: A comparison of the requirements of Order 90-42 (the current San Diego Municipal Storm Water Permit), the Federal NPDES storm water regulations, the 1995 draft of the reissuance of the San Diego Municipal Storm Water Permit, the 1998 draft of the reissuance of the San Diego Municipal Storm Water Permit, and the Tentative Order has been developed. The comparison was provided to Regional Board members for the December 13, 2000 Public Hearing. It is available on the SDRWQCB website at http://www.swrcb.ca.gov/rwqcb9/Programs/Storm_Water/permits_comparisondsj2.pdf.

Comment: Regional Board staff have done an excellent job in preparing and presenting the new permit. (Environmental Health Coalition)

Response: Comment noted.

Comment: The Fact Sheet is detailed, concise, and deeply relevant. (Environmental Health Coalition)

Response: Comment noted.

Comment: The San Diego permit is a great improvement on the Los Angeles Permit and supports the direction of the State Board. Further, we believe that the staff has done an excellent job reflecting the comments and intent of the State Board direction. The permit is reasoned in that it focuses on significant impacts to water quality and thereby avoids being arbitrary in its application. While we look forward to when all sources of pollution are regulated, we support the proposed phasing of "worst-first" sources as long as the others will follow in future revisions of the regulations. (Environmental Health Coalition)

Response: Comment noted.

Comment: A clause should be added to the permit which makes it clear that there will be future permit revisions and amendments to ultimately achieve optimal water quality protection. (Environmental Health Coalition)

Response: The Tentative Order encourages a long-term view of urban runoff management. It includes several components which are designed to expand over the long-term. For example, the watershed requirements included in the Tentative Order are designed to expand in future re-issuances of the Tentative Order. As such, the long-term context of the Tentative Order is sufficient.

Comment: The Permit appears to be an attempt to expand legal authority over local government in a manner not prescribed (though not specifically precluded) by the Clean Water Act. Such unrestricted expansion of control is troubling. (City of San Juan Capistrano)

Response: The Tentative Order does not expand on the legal authority provided the SDRWQCB by the Clean Water Act and Porter-Cologne. The increased detail in the Tentative Order is supported by the Clean Water Act, Porter-Cologne, and more recent guidance from USEPA and the SWRCB. Where the Tentative Order has increased detail, the detailed requirements are included as necessary to achieve water quality standards.

The Clean Water Act supports increased detail in permits, where necessary, in section 402(p)(3)(B)(iii), which requires that permits for discharges from municipal storm sewers “shall require controls to reduce the discharge of pollutants to the maximum extent practicable, including management practices, control techniques and system, design and engineering methods, and such other provisions as the Administrator or the State determines appropriate for the control of such pollutants.” Porter-Cologne also supports this approach in section 13377, which requires “Notwithstanding any other provision of this division, the state board or the regional boards shall, as required or authorized by the Federal Water Pollution Control Act (Clean Water Act), as amended, issue waste discharge requirements and dredged or fill material permits which apply and ensure compliance with all applicable provisions of the act and acts amendatory thereof or supplementary, thereto, together with anymore stringent effluent standards or limitation necessary to implement water quality control plans, or for the protection of beneficial uses, or to prevent nuisance.”

More recent USEPA guidance also supports more detail in storm water permits where needed to meet water quality standards. In its "Interim Permitting Approach for Water Quality-Based Effluent Limitations in Storm Water Permits" USEPA states "The interim permitting approach uses best management practices (BMPs) in first-round storm water permits, and expanded or better-tailored BMPs in subsequent permits, where necessary, to provide for the attainment of water quality standards." The

SWRCB cited this guidance in Order WQ 2000-11, which upheld SUSMP requirements as a correct interpretation of the MEP standard.

Comment: Provide Co-permittees a written commitment that SDRWQCB staff will participate in their programs over the next 5 years and then follow through with active participation, support and involvement. (San Diego Co-permittees)

Response: SDRWQCB staff will be an active participant by fulfilling stormwater program commitments prescribed by the SWRCB in its annual program workplan. These tasks include regulating storm water discharges in accordance with federal regulations, conducting a designated number of audits and compliance inspections of the co-permittees, conducting comprehensive reviews of a designated number of MS4 submittals and a cursory review of other submittals, conducting and attending workshops, develop outreach materials and program guidance, respond to public inquiries, etc.

Comment: In several places throughout the tentative order it states that compliance should be an "iterative process" that is comprehensive, effective, and flexible. The Co-permittees agree with this approach but the specificity of the tentative order seems to be in direct conflict with this approach. (San Diego Co-permittees)

Response: The term "iterative process" only appears in the Tentative Order once, at Finding 14, where it applies to section C of the Tentative Order. The term specifically refers to the process to be undertaken in the situation where discharges from an MS4 persist in causing or contributing to an exceedance of water quality objectives, despite the Copermittee's full implementation of its urban runoff management program (see section C of the Tentative Order). The term does not mean that compliance with the whole urban runoff management program and Tentative Order should be an "iterative process." Instead, the term means that efforts required to meet water quality standards, which go above and beyond those required in the urban runoff management program and other sections of the Tentative Order, may be implemented in an "iterative process."

Comment: We are concerned about the Order's directive to require interagency agreements and JPA type cooperation between municipalities. Several issues have been left undefined and require co-permittees to propose task definitions to SDRWQCB. If municipalities, environmental groups, or regulated agencies can't agree on some of the parameters of some of the Order's directives, we will find courts making the decisions. Effort directed towards defending a municipality's interpretation of the Order takes away from the time and resources devoted to the primary responsibility - that of keeping pollutants out of the receiving waters. (City of Imperial Beach)

Response: A certain level of Copermittee coordination is necessary to effectively implement the permit throughout the region. Some Copermittees request more emphasis on Copermittee collaboration within the Tentative Order to promote regional consistency. USEPA supports Copermittee collaboration, stating "Coapplicants […] may use interjurisdictional agreements to show adequate legal authority and to ensure planning, coordination, and the sharing of the resource burden of permit compliance. When more than one entity is submitting an application for a MS4 (either as coapplicants or as individual applicants for different parts of a system), the role of each party must be well defined. Each applicant or coapplicant

must show the ability to fulfill its responsibilities, including legal authority for the separate storm sewers it owns or operates" (USEPA, 1992).

The Tentative Order's requirements for Copermittee collaboration are relatively broad in order to allow the Copermittees discretion and flexibility in implementing their programs. Based on the Copermittees current collaboration efforts, it is anticipated that future collaboration efforts will be successful.

Comment: The City of La Mesa agrees with the comments presented by the City of S.D., the principal Copermittee. (City of La Mesa)

Response: Comment noted.

Comment: Are the indian reservations exempt from these requirements (Barona, Sycuan, Pala, Campo, etc.)? (Anonymous Workshop 1)

Response: The State of California has not been designated by the U.S. EPA to regulate Indian Reservation lands under the NPDES program.

Comment: For a project, is the discharge point at the boundary or some point down stream or up stream? (Wesch, Gary)

Response: In most cases, the project boundary would be considered the discharge point for runoff coming from a project. If a project is sharing a structural treatment BMP with another project, the discharge point may be considered the outlet of the structural treatment BMP, provided the subject project has implemented adequate pollution prevention and source control BMPs on its site.

Comment: At what point does polluted runoff become a liability for a municipality- When it enters MS4, or when it leaves it? (Anonymous Workshop 1)

Response: The Copermittees are responsible for discharges both into and from their MS4. Copermittees cannot passively receive and discharge pollutants from third parties. As US EPA states, "The operator of a small MS4 that does not prohibit and/or control discharges into its system essentially accepts 'title' for those discharges. At a minimum, by providing free and open access to the MS4s that convey discharges to the waters of the United States, the municipal storm sewer system enables water quality impairment by third parties" (USEPA, 1999b).

Discharges of pollutants to the MS4 must therefore be controlled, and an important means for a municipality to achieve this is through the development and enforcement of municipal legal authority. USEPA states "A crucial requirement of the NPDES storm water regulation is that a municipality must demonstrate that it has adequate legal authority to control the contribution of pollutants in storm water discharged to its MS4. […] In order to have an effective municipal storm water management program, a municipality must have adequate legal authority to control the contribution of pollutants to the MS4. […]

'Control,' in this context, means not only to require disclosure of information, but also to limit, discourage, or terminate a storm water discharge to the MS4" (USEPA, 1992).

Since discharges which enter the MS4 are generally discharged unimpeded directly into receiving waters, the Copermittee's legal authority is to apply to both discharges into and from MS4s. Federal NPDES regulations clearly provide the SDRWQCB with the legal authority to require municipalities to control discharges from third parties into their MS4. 40 CFR 122.26(d)(2)(iv)(A - D) require municipalities to implement controls to reduce pollutants in urban runoff from commercial, residential, industrial, and construction land uses or activities. Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(A - D) require municipalities to have legal authority to control various discharges to their MS4. This concept is further supported in the Preamble to the Phase II Final Rule NPDES storm water regulations, which states "The operators of regulated small MS4s cannot passively receive and discharge pollutants from third parties" (USEPA, 1999b). Due to the greater water quality concerns generally experienced by larger municipalities, Phase II Final Rule findings for small municipalities are also applicable to larger municipalities such as the Copermittees. Finally, underlying the Federal NPDES storm water regulations is the Clean Water Act, which states in section 402(p)(3)(B)(ii) that municipalities shall "effectively prohibit non-stormwater discharges into the storm sewers."

The requirement for municipal storm water dischargers to have, and exercise, local governmental authority in order to comply with water quality control obligations is analogous to the requirement for Publicly Owned Treatment Works to have and exercise legal authority to require pretreatment of industrial wastes being discharged to their sewage collections systems (CWA 402(b)(8)).

Comment: How is Caltrans affected by this tentative order? (Anonymous Workshop 1)

Response: SDRWQCB does not anticipate conflicts arising between tentative Order 20001-001 and Order No. 99-06-DWQ, NPDES No. CAS000003, National Pollutant Discharge Elimination System (NPDES) Permit, Statewide Storm Water Permit and Waste Discharge Requirements (WDRs) for the State of California, Department of Transportation (Caltrans). Order No. 99-06-DWQ applies to construction activities and maintenance from all Caltrans highways, properties, activities and facilities throughout the State and applies to Caltrans and/or their contractors. Tentative Order No. 2001-001 applies to discharges into municipal Separate Storm Sewer Systems. In the event that the requirements of Order No. 99-06-DWQ are in conflict with Tentative Order No. 2001-001 the SDRWQCB will conduct a thorough evaluation of individual conflicts and determine which requirement will prevail.

Comment: Are yard drains permissible in residential neighborhoods which connect to MS4? (Jim)

Response: The Tentative Order requires the Copermittees to prohibit all illicit discharges not composed entirely of storm water unless specifically addressed in Section B.2. However, runoff from residential yards (landscape irrigation, lawn watering) would only be prohibited by the Copermittee if the Copermittee determined it was a significant source of pollutants. Alternately, the Copermittee could implement or require the implementation of BMPs to reduce the pollutants in the non-storm water discharge to the MEP and report the information required in Section B.3.c.

Comment: How are you going to incorporate TMDL limits into the permit? (ie- diazinon for chollas creek) (Capretz, Nicole)

Response: Currently, there are no USEPA approved TMDLs for the San Diego Region, and therefore no limitations that can be explicitly included in the Tentative Order at this time. However, 40 CFR 122.44 (d)(vii)(B) requires that NPDES effluent limitations be consistent with any waste load allocation for the discharge prepared by the state (Regional Board) and approved by USEPA. In other words, once TMDL limits are established and approved by USEPA, NPDES permits must include effluent limitations that are consistent with the TMDL. Furthermore, USEPA's guidance for developing TMDLs in California includes a recommendation that the state (Regional Board) evaluate how waste load allocations will be translated into NPDES permits as part of the development of the TMDL implementation plan.

Comment: I understand you are hiring more staff..would you please explain how your role will be changing from regulatory to a more team and cooperative role to achieve water quality improvement outcome. (American Public Works Association)

Response: The SDRWQCB is currently hiring staff to fill vacancies from budget augmentations in several programs, including storm water. Staff assigned to work in oversight of storm water regulations will assist in the effective implementation of Order No. 2001-001. Increased staff will provide dischargers more resources to assist in achieving compliance with Order No. 2001-001. However, we do not anticipate a shifting the balance between compliance assurance and assistance.

Comment: Sediment should be redefined to exclude soils consist with natural soils and should also exclude all sediment that is directly deposited onto the coastline through improved drainage systems. (City of Solana Beach)

Response: Finding 7 of the Tentative Order states "[t]he most common categories of pollutants in urban runoff include […] sediment (due to anthropogenic activities) […]." By clarifying that it is sediment from "anthropogenic activities" which is the pollutant, the finding makes the distinction between natural sediment loading and sediment loading from anthropogenic activities such as construction. The Tentative Order does not seek to control sediment from natural erosion, but rather to control sediment from man-made sources. Sediment from man-made sources needs to be controlled for several reasons. The US EPA explains in the Phase II NPDES storm water regulations that storm water discharges generated from urban activities can cause an array of physical, chemical, and biological water quality impacts. Specifically, the biological, chemical and physical integrity of the waters may become severely compromised due to sediment loads in urban runoff. Increased fine sediment loads from construction sites can adversely affect aquatic ecosystems by reducing light penetration, impeding sight-feeding, smothering benthic organisms, abrading gills and other sensitive structures, reducing habitat by clogging interstitial spaces within the streambed, and reducing intergravel dissolved oxygen by reducing the permeability of the bed material. Water quality impairment also results from urban runoff carrying sediment, in part, because a number of pollutants are preferentially absorbed onto mineral or organic particles found in fine sediment. Sediment transport and delivery by urban runoff is a primary pathway for introducing key pollutants, such as nutrients, metals, and organic compounds into aquatic systems (USEPA, 1999b). Due to this capability for sediment in urban runoff to carry significant pollutant loads, sediment from anthropogenic activities is considered a pollutant which must be addressed.

Comment: There is no need to delay issuance of this permit for financial, implementation, or compliance issues. (Escondido Creek Conservancy)

Response: Comment noted.

Comment: Unregulated urban run-off is having a detrimental effect on Agua Hedionda Lagoon. Attempts made by this organization to address it through the normal channels have been unsuccessful. (University of California Natural Reserve System)

Response: Comment noted.

Comment: I'd like to urge the adoption of, or maybe the allowance for a public utility district or public utility to handle these storm water management facilities. Any kind of structural facility -- let me caveat this by saying I've worked in other regions for a number of years, namely in (inaudible) Bay region where we've had a system in place for 20 to 30 years doing this type of thing, and their structural major BMPs are controlled by the public agencies. And I wasn't involved in the very beginning of the process, but I don't know if they had found that out by accident or if they just locked into it from the beginning. But to allow or to require the individual owners, individual homeowners associations and individual entities scattered throughout the county to maintain and operate these storm water BMPs, you're not going to get the result that you want, I don't think. You're going to get a hodgepodge, a myriad of different levels of compliance. It's probably better to be managed by the co-permittees or a public utility to do that. (Project Design Consultants)

Response: How maintenance of BMPs is conducted is at the discretion of the Copermittees. This could include the Copermittees forming a public utility district to perform BMP maintenance.

Comment: Please, stay the course, stop any further delays, and make us all comply with what is good for all of us, not just for a few who want to make a buck. It's unfortunate that most of the co-permittees who were here this morning are not here to hear the other side of the story, and they probably believe themselves that they are it. But they're the ones who are responsible for our miseries at this time, the loss of quality of life, whether it is traffic, higher cost of electricity, shortages, inability to meet the requirements of our sewage systems, and a lot more of other pollution. I would like to say that it's because of you that I think the region will be forced to think another way around. You will be the catalyst to make all the co-permittees work together and improve our community finally. So please keep the course. (Ymzon, Ray)

Response: Comment noted.

Comments on Multiple Sections

Comment: The SDRWQCB does not have the legal authority to specify conditions of approval for the Copermittees' permits (in section F.1.b). Such conditions are most appropriately determined by the Copermittees. Inclusion of minimum conditions of approval in the Tentative Order also violates California Water Code section 13360. (County of San Diego, Procopio, Cory, Hargreaves & Savitch)

Response: Regional board has authority under Porter-Cologne to require municipalities to exercise local planning and permitting authority in a manner that will reduce discharges of pollutants in MS4 to MEP in a manner consistent with state and regional water quality control plans and policies. Discharges of pollutants from development and other activities pursuant to municipalities' planning and subject to local permitting constitute a significant source of pollutants discharged to MS4. It is practicable for municipalities to exercise their authority over development projects and other regulated activities in a manner that will implement best management practices developed for industrial and construction activities pursuant to regulation under statewide waste discharge requirements (and such additional conditions as may be reasonably necessary under the circumstances affecting discharges of pollutants to MS4 within each municipality).

Comment: As opposed to having specific flow criteria for new development in the Tentative Order, it is recommended that the Copermittees be required to address their control measures for streambed erosion on a drainage basin basis as part of their Urban Runoff Management Plans, due to the complex nature of stream bed erosion. The permit should merely require the Co-permittees to protect natural channels and minimize stream erosion to the maximum extent practicable. (APWA, City of San Diego, County of San Diego, San Diego Copermittees, Carlsbad, Sempra Energy, La Mesa, El Cajon)

Response: The Tentative Order's requirement that "Post-development runoff which is greater in peak rate or velocity than pre-development runoff from the same site is prohibited" was designed to protect downstream areas from erosion caused by increased flows resulting from development. However, the blanket prohibition, as proposed, could result in the application of the requirement at relatively small sites, which pose an insignificant threat of downstream erosion due to their limited impervious surfaces. Application of the prohibition at all sites could also pose significant implementation difficulties for the Copermittees.

For these reasons, the requirement that post-development peak flow rates not exceed predevelopment rates for all development sites has been removed. Instead, the requirement shall only apply to new development and significant redevelopment falling under the SUSMP priority development project categories. The SUSMP priority development project categories are comprehensive in their application to significant new development and redevelopment projects. The categories ensure that most new development and redevelopment will be subject to SUSMPs. Therefore, the requirement that post-development peak flow rates not exceed predevelopment rates will still apply to most development projects. Only smaller projects not falling under the SUSMP requirements will be exempted.

As part of their model and local SUSMPs, the Copermittees will be required to maintain predevelopment peak flow rates and velocities coming from new development as necessary to prevent increased downstream erosion where the potential for downstream erosion exists. This requirement allows the Copermittees discretion in the methods to be developed and implemented to control post-development peak flow rates and downstream erosion. Furthermore, the Copermittees can develop and implement different methods to be applied in different watersheds or different areas of a watershed, provided that the different methods are effective in adequately reducing post-development peak flow rates to control erosion. The Copermittees' model and local SUSMPs must include a description of how predevelopment peak flow rates will be maintained to control erosion in downstream areas.

There is extensive guidance for the Copermittees to draw from in developing criteria to address post-development peak flow rates for the control of downstream erosion. For example, the State of Washington has developed the following criteria regarding post-development peak flow rates: "Stormwater discharges to streams shall control streambank erosion by limiting the peak rate of runoff from individual development sites to 50 percent of the pre-developed condition of the 2-year, 24-hour design storm while maintaining the pre-developed condition peak runoff rate for the 10-year, 24-hour and 100-year, 24-hour design storms." Regarding control of post-development flow durations, the State of Washington has developed the following criteria: "Stormwater discharges to streams shall match developed discharge durations to predeveloped durations for the range of predeveloped discharge rates from 50% of the 2 year peak flow up to the full 50 year peak flow" (Washington State Department of Ecology, 1999). The State of Maryland has developed the following criteria to addressed increased peak flow rates resulting from development: "To protect channels from erosion, 24 hour extended detention of the one-year, 24 hour storm event shall be provided. […] The rationale for this criterion is that runoff will be stored and released in such a gradual manner that critical erosive velocities during bankfull and near-bankfull events will seldom be exceeded in downstream channels" (Maryland Department of the Environment, 1999).

It should be noted that this approach, of allowing the Copermittees to develop peak flow rate criteria to control downstream erosion, is consistent with the LARWQCB SUSMP, which was upheld by the SWRCB in Order WQ 2000-11.

See changes in permit sections A.4, F.1.a.9, F.1.b.1.g, F.1.b.2.b.i, and F.1.b.2.j.

Comment: Many requirements of the Tentative Order may require Copermittees to amend their municipal codes and increase criminal and/or civil penalties. If the civil penalties chargeable by the Regional Board exceed those authorized by our municipal code, the City could be responsible for any "shortfall" or the Regional Board might not deem the City's efforts to implement the various practices, programs and plans, as having been made "in good faith." Our authority to charge civil penalties is limited by the Government Code, and our authority to charge criminal penalties, and the total amount of any such fines, is likewise limited by the Penal Code. Additionally, the courts do not automatically impose the criminal penalties set forth in our municipal code. (Imperial Beach, El Cajon)

Response: Comment noted.

Comment: The prohibition of post-development peak flow rates exceeding pre-development peak flow rates may exacerbate flooding if implemented in lower watersheds. (Walker, El Cajon)

Response: The Tentative Order's requirement that "Post-development runoff which is greater in peak rate or velocity than pre-development runoff from the same site is prohibited" was designed to protect downstream areas from erosion caused by increased flows resulting from development. However, the blanket prohibition, as proposed, could result in increased flooding if implemented in lower watersheds, due to the potential for flow control devices in lower watersheds to release their peak discharges in correspondence with peak flows instream.

The blanket prohibition has therefore been removed from the Tentative Order. Instead, the requirement shall only apply to new development and significant redevelopment falling under the SUSMP priority development project categories. As part of their model and local SUSMPs, the Copermittees will be required to maintain predevelopment peak flow rates and velocities coming from new development as necessary to prevent increased downstream erosion where the potential for downstream erosion exists. This requirement allows the Copermittees discretion in the methods to be developed and implemented to control post-development peak flow rates and downstream erosion. Furthermore, the Copermittees can develop and implement different methods to be applied in different watersheds or different areas of a watershed (such as lower watersheds), provided that the different methods are effective in adequately reducing post-development peak flow rates to control erosion. The Copermittees' model and local SUSMPs must include a description of how predevelopment peak flow rates will be maintained to control erosion in downstream areas.

See changes in permit sections A.4, F.1.a.9, F.1.b.1.g, F.1.b.2.b.i, and F.1.b.2.j.

Comment: The Tentative Order exceeds SDRWQCB authority by requiring the Copermittees to regulate peak flows from development.

SDRWQCB relies upon PUD No. 1 v. Washington Department of Ecology (1994) 511 U.S. 700 to support its position that volume/flow control is proper. (See Fact Sheet, p. 21.) This reliance is misplaced. At issue in PUD No. 1 was a hydroelectric dam and a condition imposed upon a discharge permit that required a minimum level of discharges, i.e., that water discharges be increased. The case stressed the presence of evidence in the record as to the importance of the continual flow of water on the ecosystem surrounding the dam. The opinion also repeatedly stressed that the flowage concerns at issue are the "effects of dams and other diversions . . . "(E.g., PUD No. 1, 511 U.S. at p. 1913.) (County of San Diego, BIASD)

Response: The SDRWQCB has the legal authority to regulate flows from new development. The SWRCB has upheld this legal authority in adopting its Order WQ 2000-11. The Final LARWQCB SUSMP, upheld by SWRCB Order WQ 2000-11, states "Post-development peak storm water runoff discharge rates shall not exceed the estimated pre-development rate for developments where the increased peak storm water discharge rate will result in increased potential for downstream erosion."

This legal authority to regulate flows from new development is further explained in the Draft Fact Sheet/Technical Report for the Tentative Order. The Fact Sheet/Technical Report states:

Federal NPDES regulation 40 CFR 122.44(d)(1) requires municipal storm water permits to include any requirements necessary to "[a]cheive water quality standards established under section 303 of the CWA, including State narrative criteria for water quality." The term "water quality standards" in this context refers to a water body's beneficial uses and the water quality objectives necessary to protect those beneficial uses. The negative impact of urban runoff flow on the beneficial uses of receiving waters has been widely documented. Increases in flows from impervious surfaces associated with urbanization can result in (1) increases in the number of bankfull events and increased peak flow rates; (2) sedimentation and increased sediment transport; (3) frequent flooding; (4) stream bed scouring and habitat degradation; (5) shoreline erosion and stream bank widening; (6) decreased baseflow; (7) loss of fish populations and loss of sensitive aquatic species; (8) aesthetic degradation; and (9) changes in stream morphology (USEPA, 1999a). USEPA finds that the level of imperviousness resulting from urbanization is strongly correlated with the water quality impairment of nearby receiving waters (USEPA, 1999b). USEPA further attributes much of this water quality impairment to changes in flow conditions from urbanization, stating "[I]n many cases, the impacts on receiving streams due to high storm water flow rates or volumes can be more significant than those attributable to the contaminants found in storm water discharges" (USEPA, 1999a). Therefore, in order to protect the beneficial uses and water quality objectives of waters receiving urban runoff flows (as required by 40 CFR 122.44(d)(1)), the SDRWQCB has under certain circumstances placed limits on urban runoff flows in the tentative permit.

In addition, the authority of states to regulate flow in order to protect water quality standards has been addressed by the U.S. Supreme Court in PUD No. 1 v. Washington Department of Ecology, 511 U.S. 700 (1994). In this case the U.S. Supreme Court found that the Clean Water Act applies to water quantity as well as water quality, stating "[p]etitioners also assert more generally that the Clean Water Act is only concerned with water 'quality' and does not allow the regulation of water 'quantity.' This is an artificial distinction. In many cases, water quantity is closely related to water quality." The U.S. Supreme court goes on to refer to the Clean Water Act's definition of pollution ("the man-made or man induced alteration of the chemical, physical, biological, and radiological integrity of water" 33 U.S.C. 1362(19)) and states "[t]his broad conception of pollution – one which expressly evinces Congress' concern with the physical and biological integrity of water – refutes petitioners' assertion that the Act draws a sharp distinction between the regulation of water 'quantity' and water 'quality'." In this context, the U.S. Supreme Court held that the state's regulation of flow was "a limitation necessary to enforce the designated use of the River as a fish habitat." Finally, it was held that the state's regulation of flow was "a proper application of the state and federal antidegradation regulations, as it ensures than an 'existing instream water use' will be 'maintained and protected.' 40 CFR 131.12(a)(1) (1992)."

Comment: What design storm shall be used to determine the pre-development peak rate or velocity that may not be exceeded with new development or significant redevelopment? (Chula Vista, Walker, Project Design Consultants, SDCAA)

Response: Designation of the design storm which shall be used has been left to the discretion of the Copermittees. A blanket requirement to control a particular design storm may not be appropriate for all areas, such as lower watersheds. Therefore, development of criteria for the control of post-development peak flow rates shall be conducted by the Copermittees as part of the model and local SUSMPs.

As part of their model and local SUSMPs, the Copermittees will be required to maintain predevelopment peak flow rates and velocities coming from new development as necessary to prevent increased downstream erosion where the potential for downstream erosion exists. This requirement allows the

Copermittees discretion in the methods to be developed and implemented to control post-development peak flow rates and downstream erosion. Furthermore, the Copermittees can develop and implement different methods to be applied in different watersheds or different areas of a watershed, provided that the different methods are effective in adequately reducing post-development peak flow rates to control erosion. The Copermittees' model and local SUSMPs must include a description of how predevelopment peak flow rates will be maintained to control erosion in downstream areas.

There is extensive guidance for the Copermittees to draw from in developing criteria to address post-development peak flow rates for the control of downstream erosion. For example, the State of Washington has developed the following criteria regarding post-development peak flow rates: "Stormwater discharges to streams shall control streambank erosion by limiting the peak rate of runoff from individual development sites to 50 percent of the pre-developed condition of the 2-year, 24-hour design storm while maintaining the pre-developed condition peak runoff rate for the 10-year, 24-hour and 100-year, 24-hour design storms." Regarding control of post-development flow durations, the State of Washington has developed the following criteria: "Stormwater discharges to streams shall match developed discharge durations to predeveloped durations for the range of predeveloped discharge rates from 50% of the 2 year peak flow up to the full 50 year peak flow" (Washington State Department of Ecology, 1999). The State of Maryland has developed the following criteria to addressed increased peak flow rates resulting from development: "To protect channels from erosion, 24 hour extended detention of the one-year, 24 hour storm event shall be provided. […] The rationale for this criterion is that runoff will be stored and released in such a gradual manner that critical erosive velocities during bankfull and near-bankfull events will seldom be exceeded in downstream channels" (Maryland Department of the Environment, 1999).

It should be noted that this approach, of allowing the Copermittees to develop peak flow rate criteria to control downstream erosion, is consistent with the LARWQCB SUSMP, which was upheld by the SWRCB in Order WQ 2000-11.

See changes in permit sections A.4, F.1.a.9, F.1.b.1.g, F.1.b.2.b.i, and F.1.b.2.j.

Comment: Rather than hold pollutant discharges from new development to pre-development levels, the permit should hold discharges to natural levels. (Surfrider Foundation)

Response: The holding of post-development pollutant discharges to predevelopment or natural levels may not always be necessary for the protection of receiving water quality. There may be circumstances where a slight increase in pollutant concentrations from newly developed area may not contribute to an exceedance of water quality standards. For example, if a discharge's pollutant concentration from a newly developed area is increased but still well below the water quality objective for the 303(d) listed receiving water, the discharge will most likely not contribute to the exceedance of the water quality objective. The TMDL process frequently allows for such a situation, when "safety factors" for new development are included in waste load allocations.

The TMDL process is a more appropriate process for determining such allocations that the Tentative Order. It is a formal process which allows for extensive stakeholder involvement and public participation. It also addresses discharges from all sources, both existing and new.

For these reasons, the Tentative Order has been modified. The Tentative Order will still prohibit "post-development runoff containing pollutant loads which cause or contribute to an exceedance of receiving water quality objectives." Also, the potential for new development to cause or contribute to the 303(d) listing of a receiving water will need to be addressed in the Copermittees' planning processes. However, the requirement that post-development pollutant concentrations not exceed predevelopment pollutant concentrations will be removed. This issue will be addressed during the pending TMDL processes.

Comment: Holding discharges of pollutants from new development to pre-development levels is problematic because pre-development levels will not be known for a parcel and obtaining the information will cause project delays. How will pre-development levels be determined? (Sempra, SANDAG, Oceanside, Wesch)

Response: The blanket requirement that "Discharges of post-development runoff into a Clean Water Act section 303(d) water body containing any pollutant (for which the water body is already impaired) in levels exceeding predevelopment levels (for those same pollutants) is prohibited" has been removed from the Tentative Order. Therefore, this issue has been resolved.

Comment: The SDRWQCB should not require the Copermittees to address urban runoff flows "into" their MS4s because it does not have the appropriate legal authority. SDRWQCB does not have legal authority to apply performance standards (MEP or water quality standards) to individual project sites in Copermittee jurisdictions. Such requirements go beyond the requirements of the Clean Water Act.

Further, the County has no authority to enforce the California Water Code, and therefore has no legal authority to prohibit discharges by third parties based on the water quality impacts of those discharges.

The Order violates the separation of powers doctrine by legislating beyond the RWQCB's administrative power. California's governmental structure grants the right to make state laws only to the State's Senate and Assembly. (Cal. Const., Art. IV, § 1, Art. V, § 1; (City of San Jose v. State of California (1996) 45 Cal.App.4th 1802, 1810.) As a creature of statute, the RWQCB possesses only that power conferred by the Porter-Cologne Act to regulate water quality and the discharge of wastes affecting water quality. (See Water Code §§ 13225, 13260, 13263; 13263.3 13377, 20th Century Ins. v. Quakenbush (1998) 64 Cal.App.4th 135, 141.)

Moreover, the RWQCB need not rely on the Copermittees to prevent stormwater discharges that adversely affect water quality. The Clean Water Act specifically authorizes EPA and the States to require permits of "[a] discharge for which [EPA] or the State determines that the stormwater discharge contributes to a violation of a water quality standard or is a significant contributor of pollutants." The RWQCB is therefore free to require permits of any stormwater discharger that it believes contributes to a violation of water-quality standards. (Sempra, City of San Diego, BIASC, Orange County, Procopio, Cory, Hargreaves & Savitch, California Storm Water Quality Task Force, County of San Diego)

Response: The requirement for control of discharges into the MS4 is currently required of the Copermittees in Order No. 90-42. Section IX. of Order No. 90-42 states "The permittees shall develop and implement BMPs to reduce/control/eliminate pollutants in discharges to and from stormwater

conveyance systems in their areas of jurisdiction to the maximum extent practicable." Given the impact to receiving waters in the San Diego Region caused by urban runoff, as well as projections for increased urban growth in the region, it is not warranted to eliminate this requirement.

USEPA supports the concept that Copermittees cannot passively receive and discharge pollutants from third parties. As US EPA states, "The operator of a small MS4 that does not prohibit and/or control discharges into its system essentially accepts 'title' for those discharges. At a minimum, by providing free and open access to the MS4s that convey discharges to the waters of the United States, the municipal storm sewer system enables water quality impairment by third parties" (USEPA, 1999b).

Discharges of pollutants to the MS4 must therefore be controlled, and an important means for a municipality to achieve this is through the development and enforcement of municipal legal authority. USEPA states "A crucial requirement of the NPDES storm water regulation is that a municipality must demonstrate that it has adequate legal authority to control the contribution of pollutants in storm water discharged to its MS4. […] In order to have an effective municipal storm water management program, a municipality must have adequate legal authority to control the contribution of pollutants to the MS4. […] 'Control,' in this context, means not only to require disclosure of information, but also to limit, discourage, or terminate a storm water discharge to the MS4" (USEPA, 1992).

Since discharges which enter the MS4 are generally discharged unimpeded directly into receiving waters, the Copermittee's legal authority is to apply to both discharges into and from MS4s. Federal NPDES regulations clearly provide the SDRWQCB with the legal authority to require municipalities to control discharges from third parties into their MS4. 40 CFR 122.26(d)(2)(iv)(A - D) require municipalities to implement controls to reduce pollutants in urban runoff from commercial, residential, industrial, and construction land uses or activities. Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(A - D) also require municipalities to have legal authority to control various discharges to their MS4. This concept is further supported in the Preamble to the Phase II Final Rule NPDES storm water regulations, which states "The operators of regulated small MS4s cannot passively receive and discharge pollutants from third parties" (USEPA, 1999b). Due to the greater water quality concerns generally experienced by larger municipalities, Phase II Final Rule findings for small municipalities are also applicable to larger municipalities such as the Copermittees. Finally, underlying the Federal NPDES storm water regulations is the Clean Water Act, which states in section 402(p)(3)(B)(ii) that municipalities shall "effectively prohibit non-stormwater discharges into the storm sewers."

It is important to note the SWRCB also supports control of discharges into MS4s. The SWRCB recently upheld the LARWQCB SUSMP requirements in Order WQ 2000-11. These requirements place significant restrictions on discharges from third parties into MS4s. In fact, the SUSMP provisions included in the Tentative Order, as upheld by the SWRCB, represent the most stringent and specific requirements in the Tentative Order regarding the control of discharges into the MS4.

Finally, the requirement for municipal storm water dischargers to have, and exercise, local governmental authority in order to comply with water quality control obligations is analogous to the requirement for Publicly Owned Treatment Works to have and exercise legal authority to require pretreatment of industrial wastes being discharged to their sewage collections systems (CWA 402(b)(8)).

Comment: A regional approach to BMP implementation should be allowed by the permit, as opposed to the permit's site-by-site focus. Due to economies of scale, regional approaches are more cost effective.

Regional BMPs can enhance wetland and riparian habitats. By not allowing regional approaches, the Tentative Order goes against SWRCB Order WQ 2000-11, the Clean Water Act, the California Water Code (section 13360), and practices in the State of Florida, which all support regional approaches. (La Mesa, Sempra Energy, Carlsbad, SANDAG, Nolte, BIASC, County of San Diego, Coalition for Practical Regulation, BIASD, Escondido, Chula Vista, San Diego Co-permittees, Rancho Mission Viejo Company, APWA Committee, Project Design Consultants, Associated General Contractors of America)

Response: Implementation of BMPs on a site by site basis provides many benefits. By its very definition, new development presents opportunities for on-site BMPs to be designed into the development as an integral component, at low cost, and with a greater likelihood for protecting water quality downstream over the life of the development. Treatment costs for municipal storm water generally increase with distance from the source. Regional "end of pipe" treatment also results in the loss of cost reducing opportunities for water quality improvements en route. Rather than increasing costs, small collection strategies, located at the point where runoff initially meets the ground, repeated consistently over entire projects, will usually yield the greatest water quality improvements for the least cost (BASMAA, 1999).

Furthermore, regional BMP approaches (such as end of pipe diversions) can send the wrong message to dischargers and the public, which can then cause setbacks in progress which has already been made. Instead of the idea that "business as usual" is acceptable since regional BMPs will "take care of everything" downstream, the message that SUSMPs and numeric sizing criteria should send is that behavior and site design must change in order for water quality to improve.

Additionally, popular short-term regional solutions, such as end of pipe diversions into sanitary sewers, are effective only for dry weather flows. The sanitary sewerage collection systems found in the San Diego region were not designed to handle the increased loads from dry weather flows, let alone flows from even minor storm runoff events. Likewise, the existing coastal Publicly Owned Treatment Works (POTWs) are not sized to treat wet weather flows, have almost no capacity for expansion, and will not be able to treat storm water flows.

However, while onsite BMPs provide many benefits, there may be cases where offsite structural BMPs, implemented on a "neighborhood" or "sub-watershed" basis, may be more feasible. This is particularly the case for existing development, where opportunities for innovative site design do not exist. To allow more flexibility in BMP implementation, the Tentative Order SUSMP requirements regarding structural treatment BMPs will be changed to allow BMPs to be shared by multiple new development projects on a "neighborhood" or "sub-watershed" level. The SWRCB supports this approach in Order WQ 2000-11, which states "We do note that there could be further cost savings for developers if the permittees develop a regional solution to the problem." It should be noted, however, that shared BMPs will be required to be implemented upstream from any receiving water supporting beneficial uses. The receiving waters (such as urban streams) of the region cannot be used to transport potentially contaminated urban runoff to "regional" treatment facilities.

See change at permit sections F.1.b.2.c and F.1.b.2.b.xiii.

Comment: More stringent requirements for discharges to 303(d) listed do not account for causes of the impairment. (City of Chula Vista)

Response: The more stringent BMP requirements for discharges tributary to 303(d) listed water bodies refers specifically to activities that may be a source of those pollutants for which the water body is listed. Not all activities in the watershed tributary to a 303(d) listed water body generate pollutants impairing the waterbody. Activities that do not generate pollutants for which a 303(d) listed water body is listed would not be subject to the more stringent BMP requirements.

Comment: The requirements mandated by the Tentative Order for all storm water conveyance systems tributary to San Diego Bay do not appear to be based upon the MEP criteria, but take an overly broad approach to pollution prevention. Findings 9 and 10 (page 3) refers to storm water runoff's potential contribution to the impairment of designated beneficial uses and the need to "…attain water quality objectives necessary to support designated beneficial uses". However, the Tentative Order fails to relate the pollutants to be removed by the required BMPs to the impairment of designated beneficial uses. (City of Chula Vista)

Response: It is the Copermittees' responsibility to require the implementation of BMPs that meet MEP for all discharges from their MS4s. Discharges for which BMPs meeting MEP have been implemented are less likely to cause exceedances of water quality objectives or the impairment of beneficial uses of the receiving waters. With respect to more stringent BMP requirements in watersheds tributary to 303(d) listed impaired water bodies (e.g. San Diego Bay), the more stringent requirements refer to those pollutants for which the water body is listed as impaired and those activities that might generate those pollutants.

Comment: The required BMPs listed in the Tentative Order are not consistent with the "Comprehensive Management Plan for San Diego Bay." (City of Chula Vista)

Response: There is no requirement for the minimum BMPs required to be consistent with the "Comprehensive Management Plan for San Diego Bay."

Comment: Which BMPs are the most cost effective and how should they be implemented? (City of Chula Vista)

Response: It is the Copermittees' responsibility to determine the cost effectiveness of various BMPs and how they should be implemented. Compliance with the Tentative Order is based on the use of BMPs to reduce pollutants in urban runoff to the MEP. Manner of compliance with respect to specific BMP selection is legally and properly the responsibility of the Copermittees.

Comment: How will BMPs differ for high, medium, and low threats to water quality? (City of Chula Vista)

Response: The Copermittees have the responsibility and discretion to select BMPs that they conclude will best address high, medium, or low threats to water quality to reduce pollutants in discharges to the MEP. The differences in BMPs will largely depend on the potential threats, the conditions under which

the threats exist or may exist, and the cost effectiveness of various BMPs available to the Copermittees that reduce pollutants to the MEP.

Comment: The Tentative Order imposes significant new prohibitions and conditions on the release of stormwater that are not found in Order 90-42. (County of San Diego)

Response: Comment noted.

Comment: The RWQCB has failed to comply with the requirements of the Clean Water Act or State law in formulating the subject permit.
1. [Reserved]
2. The Tentative Order Exceeds the Authority Under the Regulations to Regulate Discharges "From" MS4s.
An additional example of the Regional Board exceeding its authority under state or federal law is illustrated by its attempt to impose various requirements and regulations on the County for discharges to and from municipal separate storm sewer systems ("MS4s") of which they are neither owners nor operators. The regulations to the Clean Water Act specifically provide that "Copermittees need only comply with permit conditions relating to discharges from the municipal separate sewer source for which they are operators." (40 CFR § 122.26(a)(3)(vi).) Because the Tentative Order seeks to impose upon the County numerous conditions relating to discharges from MS4s in which the County is not operator of the MS4, the Regional Board has exceeded its authority under the Clean Water Act and State Law. (40 CFR § 122.26(a)(3)(vi).)
3. The Tentative Permit Improperly Seeks to Require the Copermittees To Immediately Eliminate Illicit Connections.
In addition, the Regional Board through the Tentative Order, seeks to require the County to "prohibit and eliminate illicit connections to the MS4." (Tentative Order, p. 11, D.1.C.) "Each Copermittee shall eliminate all detected illicit discharges, discharge sources, and connections immediately." (Tentative Order, p. 35, § (F).5.d.) Yet, regulations to the Clean Water Act only authorize the State to require the removal of "illicit discharges," (see 40 CFR § 122.26(d)(2)(iv)(B)), and there is no authority anywhere in the Clean Water Act or State law which enables the State to impose upon the County the obligation to inspect and to force the removal and termination of "illicit connections," i.e., to initiate legal proceedings to obtain a mandatory injunction requiring the immediate removal of all such illicit connections.
4. [Reserved]
5. The Tentative Order Unlawfully Seeks to Transfer Oversight Responsibility of Other NPDES Permits to the Copermittees.
The Regional Board has further exceeded any authority it asserts it has under the Clean Water Act and State Law by attempting to shift to the Copermittees, the State Board's responsibility to administer and enforce the Clean Water Act's provisions governing industrial and construction activities (Tentative Order, p. 12, § C.1.h.) Clearly, the obligation to regulate industrial and construction activities falls on the shoulders of the State Board and, according to the Regional Board, in turn on the Regional Board. There is no authority anywhere under the Clean Water Act or State Law that would allow this Regional Board to in effect "pass the buck" and transfer this responsibility onto municipalities. That this obligation is not to be passed on to municipal permittees is made clear by the regulations themselves and the express exemption from the definition of "illicit discharges," of discharges otherwise authorized by a separate NPDES permit. (See, 40 CFR § 122.26(b)(2)): "Illicit discharges means any discharge to a municipal

separate storm sewer that is not composed entirely of storm water except discharges pursuant to an NPDES permit. . . .")
Pursuant to the regulations, a Copermittee need only monitor and control pollutants in storm water from such "industrial facilities" when the permittee determines such discharges "are contributing a substantial pollutant loading to the municipal storm sewer system." (40 CFR § 122.26(2)(iv)(C).) Without such a determination by the Copermittee, neither the State Board nor the regional boards can require the regulation of such facilities by any Copermittee.
Further evidence that the Copermittees have no authority over permitted industrial activities and sites, are additional regulations addressing the municipalities program for detecting and removing illicit discharges to the MS4. 40 CFR section 122.26(2)(iv)(B) requires the development of a management program to remove such illicit discharge to the MS4, "(or require the discharger to the municipal separate storm sewer to obtain a separate NPDES permit for) illicit discharges and improper disposal into the storm sewer." (See 40 CFR § 122.26(iv)(B).) Accordingly, a Copermittee has no authority to regulate and control an already permitted discharge into the MS4.
In sum, there is no authority under any portion of the Clean Water Act or under any provision of the Porter-Cologne Act, that authorizes the Regional Board or any other agency to impose upon the Copermittees the obligation to regulate, inspect, and enforce the requirements of the Clean Water Act dealing with industrial and construction NPDES permits. (County of San Diego)

Response: 2. The Tentative Order does not require the Copermittees to regulate discharges from MS4s they do not own, unless such discharges are entering their MS4. The Federal NPDES regulations are clear on this responsibility of the Copermittees. Federal NPDES regulation 40 CFR 122.26(d)(2)(i)(D) provides that "[The Copermittee must demonstrate that it can control] through interagency agreements among coapplicants the contribution of pollutants from one portion of the municipal system to another portion of the municipal system."

Municipalities cannot arrogate to themselves the authority to regulate discharges from facilities or activities beyond their jurisdiction, e.g., discharges from state and federal facilities including highways and Indian reservations directly to waters of the state that are not part or tributary to the municipality's MS4. Municipalities are required, however, to have or develop legal authority to regulate storm water discharges and urban runoff within their jurisdictions, including discharges that may be subject to concurrent regulation by the state and federal governments. In addition, where municipalities control access to MS4 infrastructure for the accommodation of discharges from entities within their jurisdiction (including school districts, state and federal facilities, construction sites and industrial facilities) municipalities must exercise such control in a manner consistent with their obligation under the Regional Board's requirements to reduce pollutants in their MS4 to the maximum extent practicable.

3. Illicit discharges to the MS4 are prohibited and must be eliminated, as required by the federal NPDES regulations. Illicit connections carry illicit discharges. In order to prevent illicit discharges, illicit connections must be eliminated. Therefore, the elimination of illicit connections is required in the Tentative Order.

The SDRWQCB has the authority to require the elimination of illicit connections under CWA section 402(p)(3)(B)(iii) and CWC section 13377.

5. The Tentative Order does not transfer oversight of the General Industrial and Construction Permits to the Copermittees. The Copermittees are not responsible for enforcing or overseeing the General Statewide Industrial or Construction Permits. The SDRWQCB will oversee and enforce the General Statewide Industrial and Construction Permits. The Copermittees are however, responsible for enforcing their ordinances that implement the Tentative Order, including the prohibitions against illicit discharges.

USEPA supports this approach, clearly placing responsibility for the control of discharges from construction and industrial sites with municipalities. The USEPA notes in the preamble to the Storm Water Regulations that municipalities are in the best place to enforce compliance with storm water discharge requirements:

"Because storm water from industrial facilities may be a major contributor of pollutants to MS4s, municipalities are obligated to develop controls for storm water discharges associated with industrial activity through their system in their storm water management program…The CWA provides that permits for municipal separate storm sewers shall require municipalities to reduce pollutants to the maximum extent practicable. Permits issued to municipalities for discharges from municipal separate storm sewers will reflect terms, specified controls, and programs that achieve that goal."

As noted in the Fact Sheet/Technical Report, the USEPA felt it so important to control the discharge of pollutants from construction and industry that it established a double system of regulation over construction and industrial sites. Two parallel regulatory systems were established with the same common objective of keeping pollutants from construction and industrial sites out of the MS4. A structure was created where local governments must enforce their local ordinances and permits as required under their municipal storm water permits, while the SDRWQCB (state) must enforce its statewide general construction and industrial storm water permits. The two regulatory systems were designed to complement and support each other in the shared goal of minimizing pollutant discharges in runoff from construction and industrial sites.

Regarding construction sites, USEPA also places enforcement responsibility on municipalities, requiring small municipalities to develop and implement "[a]n ordinance or other regulatory mechanism to require erosion and sediment controls, as well as sanctions to ensure compliance […]" (40 CFR 122.34(b)(4)(ii)(A)). In its guidance for the Phase II regulations, US EPA goes on to support increased municipality responsibility, stating "Even though all construction sites that disturb more than one acre are covered nationally by an NPDES storm water permit, the construction site runoff control minimum measure for the small MS4 program is needed to induce more localized site regulation and enforcement efforts, and to enable operators of regulated small MS4s to more effectively control construction site discharges into their MS4s." While these above citations refer to small municipalities under Phase II of the NPDES program, USEPA recommendations to small municipalities are applicable to larger municipalities such as the Copermittees, due to the typically more serious water quality concerns attributed to such larger municipalities.

The language of the Tentative Order has been revised to more carefully describe the requirements of the Tentative Order with regard to the dual regulation of construction and industrial sites as discussed above.

With the recent addition of resources and staff from budget augmentations in several programs, including storm water, the SDRWQCB expects to "vigorously administer and enforce" the General Statewide Industrial and Construction permits as requested by one commentor. The language of Finding 24 of the Tentative Order has been revised to remove all discussion of what constitutes "good faith" in enforcing local legal authority. Furthermore, the Tentative Order does not "reward" Copermittees that enforce its storm water ordinances that implement the Tentative Order. Rather, the Section F.2.g.2 offers the Copermittees the discretion to voluntarily use the requirements of the General Construction Permit to implement and enforce its own storm water ordinances. Nor does Section F.2.h "write" the Copermittees Stormwater Ordinances or even specify what types of penalties and fines must be included. Section F.2.h only requires that the Copermittees enforce their ordinances and is not an infringement on the Copermittees legislative authority or its police powers. The SDRWQCB will enforce the General

Statewide Construction Permit; the Copermittees are required to enforce their own storm water ordinances.

Comment: The Order purports to regulate discharges that the RWQCB has no authority to regulate by means of an Order to Copermittees

Finding 2 (p.1) of this Order correctly states:

The discharge of urban runoff from an MS4 is a "discharge of pollutants from a point source [Copermittee MS4s]" into waters of the United States as defined in the Clean Water Act.

The Order does not reflect the limitations that this places on the general applicability of this Order. The purpose of the Order is to regulate the quality of runoff discharged from Copermittee MS4s . The RWQCB also may require Copermittees to use their planning process, and prohibitions on illegal discharges, to affect discharges to their MS4s. However, discharges that never enter or leave these systems cannot be regulated through an Order issued to Copermittees. As such, this Order may not be used to regulate, or to require Copermittees to regulate, any of the following:

a.Discharges by third parties directly into groundwater,
b.Discharges by third parties directly into surface water , and
c.Discharges either directly into, or from a Copermittee MS4 into, any area which is not a water of the state (including "Environmentally Sensitive Areas").

The RWQCB also cannot use its focused and limited NPDES / WDR permitting authority as general authority to regulate non-point source pollution within Copermittee jurisdictions. This is simply not the purpose of this municipal stormwater point source discharge permitting system, and goes well beyond any authorities explicitly or implicitly granted by it. The County requests deletion of all provisions of the Order that conflict with the above limitations.

Under the CWC, this applies equally to waters of the state.

And with limitations, the policies and practices affecting the quality of the water entering the MS4.

As discussed in comment FF, the County disagrees with staff's conclusion that urban streams are MS4 components (Finding 8). (County of San Diego)

Response: The Tentative Order does not attempt to require Copermittees to regulate discharges from third parties directly to groundwater, surface water, or environmentally sensitive areas.

The Tentative Order requires the implementation of structural treatment BMPs, of which infiltration to groundwater is one option. Where the Copermittees choose to allow infiltration/redirection of flows which would otherwise enter their MS4s, restrictions are appropriate. The Copermittees cannot choose to redirect flows away from their MS4s and claim no responsibility for the potential impacts of such actions. In addition, the SWRCB upheld in Order WQ 2000-11 the infiltration restrictions included in the LARWQCB SUSMP, on which the infiltration restrictions in the Tentative Order are based.

Regarding discharges to surface water, discharges of storm water that are not within a municipality's jurisdiction or that are not tributary to a municipality's MS4 may be subject to other water quality control

requirements, but do not impose upon the municipality any regulatory obligation under these requirements. However, it is incorrect to assert that a municipality should not be responsible under the requirements for discharges to natural drainages that are used as part of the municipality's MS4, regardless of the "ownership" of such a natural drainage or stream. The determination of whether or not a particular natural drainage or urban stream channel is or is not part of the municipality's MS4 depends on the particular circumstances of the channel and the municipality's urban runoff management practices. If municipalities rely on natural drainage channels or urban streams to collect and convey urban runoff and storm water to or from an MS4, they should be recognized as components of the municipality's MS4; the municipality would be required to reduce pollutant discharges therein to the maximum extent practicable. Application of requirements for discharges of storm water in MS4s to natural drainages and urban streams does not "transform" such drainages and streams to MS4s; however, it does reflect the fact that the Regional Board recognizes the water quality consequences of municipalities' reliance on such drainages and streams for the management of storm water and urban runoff, and the environmental impact upon such drainages and streams as a consequence of the increased flows therein associated with urban development and land use under the planning and regulatory authority of municipalities.

Nevertheless, there may be discharges from activities and projects within municipalities that are not tributary to the municipality's MS4 and do not subject the municipality to liability for compliance with these requirements, e.g., a discharge of storm water or landscape irrigation runoff from an existing individual residential property directly to waters of the state that are not part of, or tributary to, the municipality's MS4. (Such discharges may, however, be subject to direct regulation by the regional board under individual waste discharge requirements if the discharge consists of or contains waste that could affect the quality of the waters of the state if it is not already covered by statewide requirements for industrial or construction activities.) Municipalities cannot arrogate to themselves the authority to regulate discharges from facilities or activities beyond their jurisdiction, e.g., discharges from state and federal facilities including highways and Indian reservations directly to waters of the state that are not part or tributary to the municipality's MS4. Municipalities are required, however, to have or develop legal authority to regulate storm water discharges and urban runoff within their jurisdictions, including discharges that may be subject to concurrent regulation by the state and federal governments. In addition, where municipalities control access to MS4 infrastructure for the accommodation of discharges from entities within their jurisdiction (including school districts, state and federal facilities, construction sites and industrial facilities) municipalities must exercise such control in a manner consistent with their obligation under the Regional Board's requirements to reduce pollutants in their MS4 to the maximum extent practicable.

Finally, language in the Tentative Order pertaining to discharges to environmentally sensitive areas has been modified. Requirements for such discharges only apply to environmentally sensitive areas containing receiving waters, where the discharge has entered or is entering the Copermittee's MS4.

Comment: The Order imposes liability on the county for stormwater that is beyond the County's jurisdiction.

The Order purports to impose liability on the County for all stormwater discharges within its jurisdiction by (1) pronouncing that natural streams not owned by the County are a part of the County's municipal separate storm sewer system, and (2) by pronouncing that "title" to all stormwater in the County passes to the County when that stormwater is "accepted" into a conveyance system. As a result, the County will face liability for stormwater discharges emanating from state and federal properties, Indian lands, school districts, state roads and freeways, private industry, residences and County properties.

The RWQCB cannot transform streams into MS4s, and cannot assign the County regulatory responsibility and potential liability for natural drainages it does not own or operate. Moreover, the possible involvement of the San Diego County Flood Control District in the "operation" of these streams does not confer jurisdiction over the County. The Flood Control District is a separate legal entity from the County.

The RWQCB also cannot simultaneously regulate streams as waters of the state and as MS4s. Separate and inconsistent regulatory authorities and requirements apply to waters of the state and to MS4s. Finally, the state has no authority under federal or state law to determine who has "title" to stormwater. See comment "O2." (County of San Diego)

Response: A municipality's responsibility for discharges of storm water and urban runoff in its MS4 must be coextensive with the municipality's jurisdiction to regulate such discharges. Discharges of storm water that are not within a municipality's jurisdiction or that are not tributary to a municipality's MS4 may be subject to other water quality control requirements, but may not impose upon the municipality any regulatory obligation under these requirements. However, the commentor is incorrect to assert that a municipality should not be responsible under the requirements for discharges to natural drainages that are used as part of the municipality's MS4, regardless of the "ownership" of such a natural drainage or stream. The determination of whether or not a particular natural drainage or urban stream channel is or is not part of the municipality's MS4 depends on the particular circumstances of the channel and the municipality's urban runoff management practices. If municipalities rely on natural drainage channels or urban streams to collect and convey urban runoff and storm water to or from an MS4, they should be recognized as components of the municipality's MS4; the municipality would be required to reduce pollutant discharges therein to the maximum extent practicable. Application of requirements for discharges of storm water in MS4s to natural drainages and urban streams does not "transform" such drainages and streams to MS4s; however, it does reflect the fact that the Regional Board recognizes the water quality consequences of municipalities' reliance on such drainages and streams for the management of storm water and urban runoff, and the environmental impact upon such drainages and streams as a consequence of the increased flows therein associated with urban development and land use under the planning and regulatory authority of municipalities.

Nevertheless, there may be discharges from activities and projects within municipalities that are not tributary to the municipality's MS4 and do not subject the municipality to liability for compliance with these requirements, e.g., a discharge of storm water or landscape irrigation runoff from an existing individual residential property directly to waters of the state that are not part of, or tributary to, the municipality's MS4. (Such discharges may, however, be subject to direct regulation by the regional board under individual waste discharge requirements if the discharge consists of or contains waste that could affect the quality of the waters of the state and if it is not already covered by statewide requirements for industrial or construction activities.) Municipalities cannot arrogate to themselves the authority to regulate discharges from facilities or activities beyond their jurisdiction, e.g., discharges from state and federal facilities including highways and Indian reservations directly to waters of the state that are not part or tributary to the municipality's MS4. Municipalities are required, however, to have or develop legal authority to regulate storm water discharges and urban runoff within their jurisdictions, including discharges that may be subject to concurrent regulation by the state and federal governments. In addition, where municipalities control access to MS4 infrastructure for the accommodation of discharges from entities within their jurisdiction (including school districts, state and federal facilities, construction sites and industrial facilities) municipalities must exercise such control in a manner consistent with their obligation under the Regional Board's requirements to reduce pollutants in their MS4 to the maximum extent practicable.

Terminology in Finding 15 based on "ownership" of and "title" to pollutants or flows may be confusing, and has been modified to articulate the fact that there must be a nexus between municipal jurisdiction and responsibility for pollutant reduction under the requirements. See change at permit Finding 15.

Comment: A Combination of BMPs (prevention, source and treatment) is recommended. But what role does cost-effectiveness play in the decision to implement a range of BMPs? (County of San Diego)

Response: At the level of BMP implementation, the Copermittees have the discretion to determine and optimize the cost effectiveness of a combination of BMPs that meet MEP.

Comment: Cities are generally prohibited from trespassing on private property, and it is questionable as to whether cities have the legal authority to implement the inspection and monitoring programs; cities generally have to obtain court orders to inspect private property, which is an expensive and cumbersome process. (Coalition for Practical Regulation)

Response: The Clean Water Act (CWA) and the implementing regulations found at 40 CFR 122.26 must be interpreted in a manner to carry out the purpose of the CWA. The U.S. EPA's guidance on this issue makes it clear that the CWA and the federal regulations seek to impose an inspection responsibility on the Copermittees. There is an express requirement for Copermittees to demonstrate or obtain the authority to conduct inspections at 40 CFR 122.26(d)(2)(i)(F). To the extent that cities do not presently possess authority to inspect, they will obtain such authority in compliance with this regulation.

Generally, the Copermittees should presently possess authority to enforce and ensure compliance with their various permits, such as for construction and business. The Copermittees should be able to rely on that authority to gain access to private property in the majority of cases to assure compliance with the storm water permit requirements. In the much smaller number of cases, where the inspectors are unable to gain consensual entry to premises, they may have no right of entry without a warrant.

Comment: The IEA recommends language be added to allow for future advances in technology. Such language might be "or equivalent alternative" after the word BMP. (Industrial Environmental Association)

Response: The definition of BMP in Attachment D of the Tentative Order is broad and inclusive. It is likely that any measure that constitutes an "equivalent alternative" would already fall under this broad definition, making the inclusion of the term unnecessary.

Comment: Municipal Wastewater Systems are likely to become Recipients of MS4 Flows. Several sections of the proposed permit require the removal or diversion of flows from the MS4 system Examples are Finding 32., which states that they should be removed from the MS4 system, Sections B.2. that prohibits from entering an MS4 any of the following:
c. Uncontaminated groundwater infiltration.
d. Uncontaminated pumped ground water;
f. Springs;

k. Water line flushing;
I. Landscape irrigation;
m. Discharges horn potable water sources other than water main breaks;
n. Dechlorinated swimming pool discharges.
Sections B4, D.b. (2) to (9), and F. 11 (2) also identify flows that would likely be discharged to the sanitary sewer system.
Consequently, there is the potential for substantial increases of flows into sanitary sewer systems, and for substantial increases in pollutant loads that the downstream treatment systems would need to treat. There are cost factors for additional facilities and the operations and maintenance thereof that would affect the contributing Copermittee. it is understood that the document under discussion is a permit document, however such a permit will require substantial investments in facilities and the maintenance and operation of them.
Recommendations: (a) Provide guidance that the sanitary sewer system may not be the most appropriate means for treating or conveying the flows and loads being regulated. (b) Coordinate this program with either State or Federal finding programs to provide the resources necessary to meet the objectives. (Padre Dam Municipal Water District)

Response: The requirements in Tentative Order 2001-01 that some flows or wastes in the MS4 should be diverted or removed does not necessarily mean that they should be removed or diverted into a sanitary sewer. Finding 32, noted in the comments, finds that wastes and pollutants that deposit and accumulate in the MS4 system will be discharged from those structures into receiving waters. The finding states only that such accumulated wastes must be characterized and lawfully disposed. It does not require, or even recommend, that they be discharged into a sanitary sewer. Section B.2, noted in the comment, refers to non-storm water discharges that are prohibited only if the Copermittee determines that they are a significant source of pollutants to waters of the United States. Section B.2 of the Tentative Order does not require such discharges to be diverted or removed into a sanitary sewer. The Copermittees have the flexibility and discretion to determine the manner in which they comply with the requirements of Section B.2 of the Tentative Order.

Comment: Some terminology used throughout the document such as "significant source of pollution" is vague and subject to interpretation. Where possible vague terms should be defined or avoided, creating a document that is clear in scope and intent. (SANDAG)

Response: The terminology used throughout the Tentative Order was selected to provide the Copermittees with flexibility and discretion to implement the Order in a manner that they determine to be the most effective while providing specific minimum standards and criteria. In some instances, the language is intended to allow the Copermittees to draft the programs, plans, prioritizations, etc in their Jurisdictional Urban Runoff Management (JURMP) Documents and Annual Reports, which are subject to SDRWQCB review and comment. In other instances, the language is purposefully broad to provide for the inclusion of a wide range of conditions, requirements, etc. In both situations, the specific language the commentor requests will be developed in the Copermittees JURMP Documents and Annual Reports.

Comment: The Permit should also place special emphasis on protected bodies of water that are "at risk of becoming degraded". (San Diego Audubon Society)

Response: The Tentative Order requirements are already so broad and far reaching that a special emphasis on protected bodies of water that are at "risk of becoming degraded" would be redundant. Arguably, nearly every water body in the San Diego Region could fit that description. The Copermittees, however, have the discretion to consider extending additional water quality protection measures to water bodies that are not presently listed as impaired under the 303(d) list.

Comment: The language concerning Conditions of Approval and Storm Water Mitigation Plans is vague. These sections should be reworded to require long-term maintenance of all post-construction BMPs in perpetuity and to establish a system of controls that assures that maintenance is performed. (Kristar)

Response: Details regarding the long term maintenance of post-construction BMPs is left to the discretion of the Copermittees, to provide them flexibility in developing and implementing their programs. The Copermittees model and local SUSMPs should address how long term BMP maintenance will be ensured.

More detailed requirements included in the LARWQCB SUSMP regarding BMP maintenance can serve as guidance to the Copermittees. The LARWQCB SUSMP states:

"[T]he Permittee shall require that the applicant provide verification of maintenance provisions through such means as may be appropriate, including, but not limited to legal agreements, covenants, CEQA mitigation requirements and/or Conditional Use Permits.

For all properties, the verification will include the developer's signed statement, as part of the project application, accepting responsibility for all structural and treatment control BMP maintenance until the time the property is transferred and, where applicable, a signed agreement from the public entity assuming responsibility for Structural or Treatment Control BMP maintenance. The transfer of property to a private of public owner must have conditions requiring the recipient to assume responsibility for maintenance of any Structural or Treatment Control BMP to be included in the sales or lease agreement for that property, and will be the owners responsibility. The condition of transfer shall include a provision that the property owners conduct maintenance inspection of all Structural or Treatment Control BMPs at least once a year and retain proof of inspection. For residential properties where the Structural or Treatment Control BMPs are located within a common area which will be maintained by a homeowner's association, language regarding the responsibility for maintenance must be included in the projects conditions, covenants and restrictions (CC&R). Printed educational materials will be required to accompany the first deed transfer to highlight the existence of the requirement and to provide information on what storm water management facilities are present, signs that maintenance is needed, how the necessary maintenance can be performed, and assistance that the Permittee can provide. The transfer of this information shall also be required with any subsequent sale of the property.

If Structural of Treatment Control BMPs are located within a public area proposed for transfer, they will be the responsibility of the developer until they are accepted for transfer by the County of other appropriate public agency. Structural or Treatment control BMPs proposed for transfer must meet design standards adopted by the public entity for the BMP installed and should be approved by the County or other appropriate public agency prior to its installation."

Comment: The permit does not address the problem of disposal of the collected contaminants and exposed materials such as sediment and debris from BMPs. (Kristar)

Response: Disposal of debris from BMPs is the responsibility and is at the discretion of the Copermittees.

Comment: The permit's focus on pollution prevention, source reduction and site specific measures is cost-effective, appropriate and much needed. (Environmental Health Coalition)

Response: Comment noted.

Comment: Amend F.2.g. pg.23, F.3.a.(7) pg.27, F.3.b(6) pg.29, and F.3.c.(4) pg.31 to require unannounced inspections. (Environmental Health Coalition)

Response: While unannounced inspections can be effective and are encouraged, the nature of inspections is left to the Copermittees. It is possible that in some cases unannounced inspections may be infeasible for legal reasons.

Comment: Numerous bold headings could be rewritten to be more informative (Findings 2,3,4,5,6 and 9). (City of San Juan Capistrano)

Response: The bold headings are meant to simply serve as a title thought for the entire findings. The SDRWQCB intended for the informative content to be in the explanatory remarks which follow the headings.

Comment: Insufficient Quantitative Data Exists to Support the Tentative Order.
Municipal MS4 permits are issued based on permit applications which require the inclusion of information concerning "source identification," "discharge characterization," and "characterization data." (40 CFR §§ 122.26(d)(1)(iii), (iv), and 122.26(d)(2)(ii) and (iii).) In fact, the primary purpose of the application process is to develop quantitative data on the types and sources of the pollutants in the effected receiving waters, and to thereafter develop various management programs based on the quantitative data developed. (40 CFR § 122.26(d)(2)(iv).)

In the instant case, the Regional Board has exceeded its authority under the Clean Water Act in attempting to issue the subject permit, as the Regional Board has failed to customize and particularize the terms of the permit to account for such "source identification," "discharge characterization," and "characterization data," as required by the Clean Water Act, before formulating the permit in question. (40 CFR § 122.26(d)(1)(ii).) In issuing a permit that is not based on the development of "quantitative data," and the information on the particular types and sources of pollutant in the subject receiving waters, the Regional Board is acting contrary to the policies and procedures of the Clean Water Act. An example of the lack of data development in formulating the provisions of the Tentative Order is illustrated by the rest of the Order itself. Specifically, Subsection D.1.b. requires the Copermittees to prohibit "discharges of wash

water from the cleaning or hosing of impervious surfaces in . . . residential areas including . . . driveways, patios . . . and outdoor eating or drinking areas, etc." Thus, the Tentative Order would require that the Copermittees adopt ordinances to prevent individual homeowners from cleaning patios, washing their windows or cleaning their pets. Yet, there is no quantitative data or other data to support such a restrictive requirement and draconian provision. (County of San Diego)

Response: The requirements of the Tentative Order are supported by source identification, discharge characterization, and characterization data. Copermittee monitoring reports, Copermittee annual reports, USEPA guidance, and SWRCB guidance are a few of the resources used to identify sources. In addition, the Copermittee monitoring reports, Copermittee annual reports, USEPA studies, and SWRCB studies provided discharge characterization data on the Copermittees' discharges. Information regarding source identification, discharge characterization, and characterization data are included in the draft Fact Sheet/Technical Report.

With regards to the prohibition of wash water, this type of discharge is clearly prohibited in the Clean Water Act at section 404(p)(3)(B)(iii), which states that municipal storm water permits shall "prohibit non-storm water discharges into the storm sewers." This requirement can be considered analogous to the speed limit. It is not enforced in all instances always; however, the Copermittees must have the legal authority to address problem situations. Washing of patios and outdoor eating areas can certainly impact receiving waters with pollutants such as oil and grease and coliform bacteria.

Comment: "Title" and thus Liability From Non-Copermittee Illicit Discharges Cannot Be Transferred to the Copermittees. The Tentative Order improperly seeks to transfer the responsibility for all private party illicit discharges, to the County and other Copermittees, without any authority to do so under the Clean Water Act or State law, by transferring title of an illicit discharges that enters the MS4 from a third party on to the Copermittees. In the instant proceeding, the Regional Board is presumably seeking to issue a "permit" to the Copermittees to allow discharges "from municipal storm sewers." (33 USC § 1342(p)(3)(B).) In issuing a permit to allow discharges from a municipal storm sewer, the authorizing agency, in this case the State Board, may require controls to reduce the discharge of pollutants to the "maximum extent practicable" including management practices, control techniques and system, design, engineering methods, and other provisions as the administrator or the State determines appropriate for the control of such pollutants. (Id.) However, under the Act, the State Board is limited in its ability to regulate Copermittees to controls that reduce the discharge of pollutants to the maximum extent possible "from municipal storm sewers."
The authorizing language under the Act does not authorize the State Board, or any other agency, to regulate discharges "to" the municipal storm sewer system, with the sole exception of imposing an obligation on Copermittees to "effectively prohibit non-storm water discharges into the storm sewers" (33 USC § 1342(p)(3)(b)(ii), which the County has already accomplished through prohibiting direct point source discharges of non-storm water to its MS4 system. Imposing any obligation on the permittees to take title to illicit discharges "to" its MS4 and thus assume liability for the same, when the permittee has otherwise complied with the terms of the Act, is not supported by the Act or State Law. (County of San Diego)

Response: The language in Finding 15 referring to "title" for storm water discharges into MS4s comes from the Preamble to the Phase II storm water regulations. While the Tentative Order holds the Copermittees responsible for discharges into their MS4s (as discussed in more detail elsewhere), it acknowledges that this responsibility does not constitute "title" for such discharges. Therefore, the language of Finding 15 will be modified for clarification.

See change at permit Finding 15.

Comment: The SDRWQCB is not authorized to issue municipal storm water permits in California. (County of San Diego)

Response: State regulations are not prerequisite for issuance of WDRs implementing federal CWA/NPDES regulations governing storm water. RWQCB is authorized by 13263/13377 to issue requirements for all discharges of waste that could affect the quality of water of the state, including those involving discharge of pollutants from point source to waters of the U.S. within each region. Water Code 13263/13377 together with state and regional Water Quality Control Plans and federal NPDES regulations provide sufficient guidance for RWQCB's to issue WDRs for individual municipalities or for all municipalities within a larger jurisdiction (i.e., County). While the SWRCB regulations do not specify either procedures or substantive requirements applicable only to discharges of storm water or urban runoff in MS4s, they do incorporate the applicable NPDES regulations, including those directly affecting storm water discharges (AOCFR 122.26).

Statewide consistency in the regulation of storm water discharges municipal S4s is desirable, requirements must also be tailored to the climatic, hydrologic and jurisdictional characteristics of each region. Informal coordination between regional boards and the state board as well as guidance published by USEPA ensures basic consistency between the MS4 requirements developed by each region. In addition, where the SWRCB has considered past actions by regional boards with regards to storm water discharges and has articulated principles governing such actions (as it did for receiving water limitations [citation]). Regional boards conform to their subsequent actions to such SWRCB precedents. Development of statewide precedents pursuant to the SWRCB's authority to under take administrative review of actions of the regional boards pursuant to WC 13320 does not require notification of proposed rulemaking under the Cal. APA (Gov't C. 11340). In fact all persons known to be interested in matters under review by the SWRCB are notified of such proceedings; in addition, notice of such proceedings are distributed very broadly in the SWRCBs Workshop and meeting notification process. The SWRCB solicits and considers comments from interested persons in its review of regional board actions [citations 23CCR 2205 et.seq.] Nonetheless, each region must also address the level of compliance with previous requirements achieved by municipalities with each region and within counties with each region. Accordingly, requirements in one region may be substantially more detailed than in another region in order to clarify the obligations and responsibilities of municipalities responsible for MS4s.

Comment: The Order exceeds RWQCB authority by requiring cooperation among Copermittees without the Copermittees' consent.

40 CFR Section 122.26(a)(3)(iii) provides that municipalities may either participate in a permit application with Copermittees, or may submit a distinct permit application for their separate storm sewers. 40 CFR. Section 122.26(a)(3)(vi) provides that Copermittees "need only comply with permit conditions relating to discharges from the municipal separate storm sewers for which they are operators." 40 CFR Section 122.26(b)(1) defines "Copermittee" to mean "a permittee to an NPDES permit that is only responsible for permit conditions relating to the discharge for which it is operator." 40 CFR Section 122.26(d) provides that operators may submit "a jurisdiction-wide or system-wide permit application."

40 CFR Section 122.26(d)(2)(iv) provides that separate proposed management programs may be submitted by each coapplicant.

These regulations clearly do not allow the state to order Copermittees to cooperate—the decision to cooperate, and the manner and extent of that cooperation, must be based on Copermittee decisions.

The 20 Copermittees in San Diego did submit a joint application for the renewal of Order 90-42—early in 1994. The renewal they contemplated was far different than the renewal the RWQCB has proposed. Copermittees retain their rights in these circumstances, under 40 CFR Section 122.26(d)(2)(iv), to decline to be directed to coordinate in areas that exceed their consent. They retain their right to submit separate proposed management programs.

The Order would deny these rights by mandating new areas and new levels of Copermittee cooperation. For example, the Order purports to dictate that land use planning be done regionally in the future, even though State law makes land use planning a local prerogative. The Order is highly prescriptive in requiring Copermittee coordination and joint funding of a regional water quality monitoring effort. The Order would require that jurisdictional stormwater management programs be essentially subsumed into watershed programs during the life of the permit. The role of the lead Copermittee would also be expanded, and the RWQCB asserts the right to designate and impose additional obligations on the lead Copermittee. Finally, the Order requires "interagency agreements" among the Copermittees to control the contribution of pollutants from one portion of a shared MS4 to another. All of this is contrary to the right that federal law provides each municipality to act separately.

The County strongly believes that Copermittee cooperation is the best means available to achieve strong stormwater programs in San Diego. However, cooperation must be entirely a Copermittee choice; the RWQCB has no authority to dictate the scope or terms of this cooperation. (County of San Diego)

Response: The Federal NPDES regulations are clear in their requirements for coordination between the Copermittees.

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv) provides that the Copermittee shall develop and implement a proposed management program which "shall include a comprehensive planning process which involves public participation and where necessary intergovernmental coordination, to reduce the discharge of pollutants to the maximum extent practicable using management practices, control techniques and system, design and engineering methods, and such other provisions which are appropriate. The program shall also include a description of staff and equipment available to implement the program. […] Proposed programs may impose controls on a systemwide basis, a watershed basis, a jurisdiction basis, or on individual outfalls. […] Proposed management programs shall describe priorities for implementing controls."

Federal NPDES regulation 40 CFR 122.26(d)(2)(i)(D) provides that "[The Copermittee must demonstrate that it can control] through interagency agreements among coapplicants the contribution of pollutants from one portion of the municipal system to another portion of the municipal system."

Furthermore, Copermittee coordination is a necessity, due to the interrelated nature of storm water management. Storm water runoff does not follow municipality boundaries, and often travels through many municipalities while flowing towards receiving waters. Municipalities' actions towards storm water can therefore have a cumulative impact upon shared receiving waters.

In addition, the Copermittees currently coordinate under Order No. 90-42. Pending watershed efforts, which most Copermittees support strongly, will also require coordination in the future. Non-point source programs will also make coordination a necessity.

For these reasons, the SDRWQCB has included coordination requirements in the Tentative Order.

Comment: The Order violates the U.S. Constitution and exceeds the RWQCB's authority under state law by commandeering local government

The Order exceeds the RWQCB's authority under state and federal law because it orders or "commandeers" the County by requiring it to enact ordinances, modify its General Plan and implement a very specific stormwater management program. But the federal government cannot order States to pass laws, or otherwise take control of the State governing apparatus. In two cases, the U.S. Supreme Court has held that the federal government cannot "commandeer" state governments. (New York v. United States, 505 U.S. 144 (1992); Printz v. United States, 138 L.Ed.2d 914 (1997).) In general, the federal government can enact and apply laws of general applicability (e.g., all wastewater discharges must obtain NPDES permits), and can pressure States to act by offering or withholding grants.

These constitutional principles apply to the commandeering of local as well as State governments. Neither the State Board nor any regional board has the authority to infringe on or to direct the use of the Copermittees' police powers under the California Constitution, or to intrude upon their local land use authority or other traditional areas of local regulation.

The California Constitution provides counties and cities with "plenary authority" to govern local land uses and enact zoning regulations. (Candid Enterprises, Inc. v. Grossmont Union High School Dist. (1985) 39 Cal.3d 878, 885; Cal. Const., art. XI, § 7; see also, e.g., Euclid v. Ambler Realty Company (1926) 272 U.S. 365.) In this regard, state law reserves in counties and cities the "maximum degree of control over zoning matters." (Govt. Code, § 65800; Birkenfield v. City of Berkely (1976) 17 Cal.3d 129, 140.) Unless preempted by the state legislature, counties and cities retain full autonomy over local land use controls. (IT Corp. v. Solano County Board of Supervisors (1991) 1 Cal. 4th 81, 89-101.) The Porter-Cologne Water Quality Control Act's provisions, however, do not "occupy" the fields of water quality regulation or local land uses so as to displace local governments' primary land use regulation authority. (Id.; Water Code, §§ 13000-13002; see Baldwin v. County of Tehama (1994) 31 Cal.App.4th 166, 176.) The Order exceeds the RWQCB's authority by unlawfully forcing the County to exercise its own sovereign police power of land use regulation. (County of San Diego)

Response: The requirements of the Tentative Order implement the Federal NPDES regulations. These regulations require the Copermittees to enact ordinances to address particular situational discharges. The regulations also require General Plans to include urban runoff considerations (40 CFR 122.26(d)(2)(iv)(A)(2). The Tentative Order has been modified to provide the Copermittees discretion in how they include such considerations in their General Plans. Therefore, the Tentative Order does not commandeer local government.

Comment: The Order should be withdrawn

The Order should be withdrawn to allow consultations with Copermittees. A revised Order should be released for an extended public comment period following those consultations.

It is common practice for RWQCB staff to work with dischargers on terms for the renewal of significant NPDES permits prior to release of a proposed permit for comment. These consultations help to ensure that the assumptions underlying an Order are correct, that the meaning of the language in the Order is clear, that concerns about costs and feasibility have been understood and considered, that alternatives have been considered, and that legal issues have been identified and discussed.

Consultations are also necessary for this Order. The Order is much more complex in its prescriptions than a typical permit. RWQCB staff also have less understanding of local government functions, processes and permits than they do of industrial dischargers. The Order raises political, governance, and public resource issues that RWQCB staff are not accustomed to addressing.

Finally, cooperation and coordination among government agencies and entities is essential if better stormwater programs are to be promptly and effectively implemented in San Diego. (County of San Diego)

Response: SDRWQCB has followed state and federal guidelines for the required public input to reissue a NPDES permit. In some cases the SDRWQCB has exceeded in comment period time and public workshops the required allowance for public input. SDRWQCB believes that the regulatory basis of this permit has been known to all interested parties for a period of over ten years. The Tentative Order is the result of the cumulative input and cooperation of these events.

Comment: Staff has not worked with Co-permittees to ensure the program is cost effective and realistic to implement and the lease intrusive upon the lives of citizens and the business community.. (City of Carlsbad)

Response: Comment noted.

Comment: The City of Escondido participated in the development of the letter transmitted to the Board by the Copermittees providing comments on the Tentative Order 2001 and is supportive of letter transmitted by the Storm Water Quality Task Force. We continue to believe each of the issues raised in each of those letters has merit and should be addressed by the Board. (City of Escondido)

Response: Comment noted. Responses to comments included in the above referenced letters are found elsewhere in this document.

Comment: We would like a glossary of terms or phrases to ensure uniform understanding of the permit phrase such as, ". . . prohibit the discharge of pollutants and non-storm water in MS4" (para. 22), and ". . . use of BMP to reduce pollutants in site runoff. . ." (para.22). (City of Imperial Beach)

Response: The Tentative Order and the Fact Sheet/Technical Report provide a glossary and extensive discussion of terms and phrases used in Tentative Order. With respect to the phrases in the comment, the

commentor can refer to Section VII of the Fact Sheet/Technical Report for a full discussion of prohibitions and the use of BMPs to reduce pollutants in discharges.

Comment: While it is agreed that the process of public' participation in a manner that builds consensus across the wide spectrum of interest groups, how the City accomplishes this should not be a matter of the URMP. It should be sufficient to direct the Copermittees to involve the public. (City of Imperial Beach)

Response: As discussed in the Fact Sheet/Technical Report, the Federal NPDES regulations 40 CFR 122.26(d)(2)(iv) require each Copermittee to develop and implement an urban runoff management program. The SDRWQCB must assess the urban runoff management program to ensure that it is adequate to prohibit non-storm water discharges and reduce pollutant discharges to and from the MS4 to the maximum extent practicable, including the requirement for incorporating public participation. In order for the SDRWQCB to assess the urban runoff management program, each Copermittee must submit to the SDRWQCB a description of their program. The description must detail all activities the Copermittee is undertaking to implement the requirements of each component of the Jurisdictional URMP section of Order No. 2001-01.

The SDRWQCB has discretion to require Submittal of Jurisdictional URMP Document and Annual Report items F.6, H. 1.a.(8)(a), and J.2.f. in Order No. 2001-01 under the broad and specific legal authority cited in Fact Sheet/Technical Report.

Comment: Criteria for establishing the thresholds for medium and low threat to water quality are not provided in the Order. Recommend SDRWQCB provides the criteria for a medium and a low threat sites. These criteria definitions are needed in order to provide uniformity across the region and consistency with the SDRWQCB's intent. (City of Imperial Beach)

Response: Criteria for establishing the thresholds for medium and low threat to water quality sites are left to the discretion of the Copermittees. The Copermittees may wish to collaborate to provide uniformity across the region.

Comment: Page 35 of 50 - paragraph F.6., Page 39 of 50 -paragraph H. 1.a.(8)(a) and Page 42 of 50 - paragraph J.21 - Requires Copermittees to include a public participation mechanism in the Jurisdictional URMP. This component is to describe how public participation will be included in the implementation of the Jurisdictional and Watershed URMP.

SDRWQCB staff supports this requirement by citing 64 FR 68755 "[E]arly and frequent public involvement can shorten implementation schedules and broaden public support for a program." While it is agreed that the process of public participation in a manner that builds consensus across the wide spectrum of interest groups, how the City accomplishes this should not be a matter of the URMP. It should be sufficient to direct the Copermittees to involve the public. It should not be a matter that requires SDRWQCB oversight. Recommend the requirement that the URMP include the process of public participation be excluded. (City of Imperial Beach)

Response: The federal NPDES regulations clearly require the Copermittees to include public participation in the development of their urban runoff management programs. 40 CFR 122.26(d)(2)(iv) requires management programs to "include a comprehensive planning process which involves public participation […]". Therefore, the Tentative Order requires public participation on the part of the Copermittees. How public participation is implemented is left to the discretion of the Copermittees in the Tentative Order.

Comment: Examples of some unnecessary and burdensome requirements are:

Municipalities must submit, each year, a fiscal analysis evaluating the expenditures needed to implement the various programs and proving they have adequate resources to meet these expenditures.

The implementation of numerous Best Management Practices (BMPs), required for industrial, commercial, municipal, and residential activities without regard to water quality benefits, or justification of any prior violation of water quality objectives.

The list of illicit discharges, which the permittees must prohibit and control is too extensive, including discharges which may not be storm water pollutants, thus exposing the permittees to unjustified penalties for violations. (City of La Mesa)

Response: A role of the Permittees under the Tentative Order is to achieve pollutant reduction to the MEP. A role of the Regional Board under the Tentative Order is to assess compliance of the Permittees in reducing pollution to the MEP. The SDRWQCB believes that the above mentioned permit terms are crucial and necessary for the Regional Board to gain the information necessary to assess whether MEP has been met.

A fiscal analysis is required by the Federal NPDES regulations at 40 CFR 122.26(d)(2)(vi).

In a permit without numeric effluent limits, BMPs are required.

The Clean Water Act prohibits non-storm water discharges at section 402(p)(3)(B)(ii).

Comment: Smart Growth Principles v. RWQB Policies: RWQCB policies expressed in T.O. 2001-01 enumerate several policies and practices which clearly express a preference for land use policies which favor development which provide for significant areas of permeable vegetative areas for on-site storm water management. Accepted regional growth projections that show that even existing local land use plans may not have sufficient area with urban land uses designated to accommodate these projected growth. With the RWQCB's policies on urban storm water management, the obvious conclusion would be that land use plans would need to utilize extremely lower residential densities to promote additional on-site permeable areas. In other words, we should be promoting urban sprawl land use patterns. (City of La Mesa)

Response: The Tentative Order does not require infiltration where it is infeasible. While the SDRWQCB supports minimization of impervious surfaces to foster natural infiltration, it is not required. For example, infiltration is only one category of BMP out of many which are available to meet SUSMP

requirements. If site restrictions exist, the develop can forgo infiltration and use filtration BMPs instead. Infiltration BMPs can frequently be constructed underground to conserve space. Therefore, the Tentative Order does not require reductions in development densities.

Comment: Regional Board staff should use the Regional Hazardous Waste Management Plans database and methodologies developed by SANDAG agencies to address the hazardous waste discharges to the storm drains. (City of La Mesa)

Response: Since the Copermittees are responsible for prohibiting illicit discharges into their MS4s per the Clean Water Act (section 402(p)(3)(B)(ii)), it is recommended that they utilize the Regional Hazardous Waste Management Plan and corresponding database in their efforts to seek and eliminate illicit discharges.

Comment: As a small community in the County of San Diego, the City of Lemon Grove supports the collective comments proposed by the Co-permittees. (City of Lemon Grove)

Response: Comment noted. Responses to comments included in the above referenced letter are found elsewhere in this document.

Comment: The Tentative Order is also likely to discourage or prevent the use of reclaimed water where such use (e.g., for irrigation) could result in runoff of non-stormwater. Because no consideration has been given to these factors, the Order must be withdrawn until these factors have been considered. The Order must then be adjusted as appropriate to reflect these factors. (County of San Diego)

Response: The Tentative Order does not regulate the use of reclaimed water. However, in circumstances in which reclaimed water is used for lawn watering or landscape irrigation, the discharge of reclaimed water from these uses to the MS4 would be prohibited by the Copermittee only if the Copermittee determined that it was a significant source of pollutants. As stated in Section B.2 of the Tentative Order, the Copermittees may implement or require the implementation of BMPs to reduce pollutants in the discharge of non storm water to the MEP rather than prohibit the discharge of landscaping or lawn water runoff.

Comment: The Metro Commission supports the re-issuance of the Municipal Storm Water Permit to improve the water quality of the region's receiving waters. (Metro Commission)

Response: Comment noted.

Comment: The permit, as written, contains many detailed, specific, and conflicting requirements that would make it impossible to comply with its requirements without diverting storm water flows into the existing sanitary sewer system as a treatment means. (Metro Commission)

Response: The Tentative Order requires the treatment and reduction of pollutants in urban runoff to maximum extent practicable through the implementation of BMPs. Diversion of urban runoff to the sanitary sewer is not required under Tentative Order 2001-01.

Comment: The Tentative Order will encourage the disposal of urban runoffs into the sanitary sewer system and therefore require increases in collection and treatment facility capacities. This diversion will also cause more sewage spills due to increases in flow and blockage causing material. (Metro Commission)

Response: A number of BMP alternatives exist for the Copermittees to choose from that will reduce pollutants in urban runoff discharges to maximum extent practicable. Diversion to the sanitary sewer is only one of the options the Copermittees can address in their Jurisdictional and Watershed Urban Runoff Management Programs.

Comment: The administrative financial burden to the Copermittees should be simplified by having the permit apply to neighboring cities watershed approach. (City of Encinitas)

Response: The Tentative Order requires both a Jurisdictional and a Watershed Urban Runoff Management Program (URMP). The Watershed URMP, which is an extension of the Jurisdictional URMP rather than a separate program, is intended to be a neighboring cities watershed approach that will encourage the Copermittees to collaborate and share cost effective measures to manage urban runoff.

Comment: Can the tentative order allow the cities to prioritize categories for BMP implementation rather than prescribe that all land uses have high priority sites? (City of Escondido)

Response: Yes. Per the Federal NPDES regulations, the Copermittees must control pollutants from construction, municipal, commercial, residential, and industrial land uses. BMPs must be implemented for all of these land uses. Since BMPs must be implemented for each land use, prioritization of sites falling under each land use category is an effective means for focusing efforts. In some cases, the SDRWQCB has identified high priority areas and activities based on USEPA guidance and experience with enforcement. However, it is the Copermittees' discretion which BMPs are implemented for the various prioritized sites.

Comment: The Port supports the collaborative efforts for the 303(d)-TMDL process and the Bay Protection Toxic Cleanup Program. (Port of San Diego)

Response: Comment noted.

Comment: Sections F.2.h., F.5.e., Attachment C - Enforcement - What will be the RWQCB's enforcement policies? (City of Coronado)

Response: Enforcement actions available to the State and Regional Boards are established in the Porter Cologne Water Quality Control Act. The State Board has also established enforcement Guidance to Implement the Water Quality Enforcement Policy. These documents are available for review on the State Water Resources Control Board's web site located at www.swrcb.ca.gov or can be obtained at the SDRWQCB office.

Comment: Sections B.2., F. I.b.(2)(e), F.2.e., F.3.a.(3), F.3.c.(2), F.3.d.(2) - How do we determine what our pollutants are and how do we prioritize these if data is "noisy" and changes with every sampling? (City of Coronado)

Response: To provide maximum flexibility, SDRWQCB has in the above referenced permit sections identified activities that are of concern. The Copermittees may then determine what pollutants are of concern and a method for prioritizing these pollutants based on their knowledge of receiving waters and discharges. However, in some cases, SDRWQCB has specifically explained what pollutants are of concern or what activities require oversight for the given land use. Refer to the following permit sections as they describe the process the Copermittees should take to determine what pollutants are of concern.

If data for discharges is noisy, other assessments can be used. For example, pollutants for which nearby 303(d) waters are impaired can be considered pollutants of concern. In addition, some studies have linked particular pollutants with a particular land uses (Washington, 1999).

Comment: Sections F.21, F.3.a.(4), F.3.b.(4), F.3.c.(3), F.3.d.(3) - What action will the RWQCB take against an agency that defines BMPs to be used based on the priority of the development and then that BMP fails? (City of Coronado)

Response: Failure of BMPs, whether because of an inadequate design, poor construction, or lack of proper maintenance, that result in the discharge of runoff containing pollutants that have not been reduced to the MEP, would be a violation of the waste discharge requirements prescribed in tentative Order No. 2001-01. Any violation of waste discharge requirements prescribed in an NPDES permit may subject dischargers to enforcement action in accordance with Chapter 5, Enforcement and Implementation of the California Water Code. Enforcement actions are progressive and can range from the issuance of lower level actions such as staff enforcement letters to formal enforcement actions established in with Porter Cologne Water Quality Control Act, such as cleanup and abatement orders which require proof of corrective action and/or abatement of deleterious water quality impacts. Ultimately, failure to implement adequate BMPs subject dischargers to monetary civil liability which can range up to $25,000 per day of violation.

Comment: The RWQCB issued its initial flow specifications without any prior environmental analysis, consultation with resource agencies, or public comment. Staff then proposed a radically different requirement based on a workshop comment, again with no analysis or consultation. There can

be no presumption that the Board had it right the first time, or that staff have got it right the second time. (County of San Diego)

Response: The Tentative Order's requirement that "Post-development runoff which is greater in peak rate or velocity than pre-development runoff from the same site is prohibited" was designed to protect downstream areas from erosion caused by increased flows resulting from development. However, the blanket prohibition, as proposed, could result in the application of the requirement at relatively small sites, which pose an insignificant threat of downstream erosion due to their limited impervious surfaces. Application of the prohibition at all sites could also pose significant implementation difficulties for the Copermittees.

For these reasons, the requirement that post-development peak flow rates not exceed predevelopment rates for all development sites has been removed from the Tentative Order. Instead, the requirement shall only apply to new development and significant redevelopment falling under the SUSMP priority development project categories. The SUSMP priority development project categories are comprehensive in their application to significant new development and redevelopment projects. The categories ensure that most new development and redevelopment will be subject to SUSMPs. Therefore, the requirement that post-development peak flow rates not exceed predevelopment rates will still apply to most development projects. Only smaller projects not falling under the SUSMP requirements will be exempted.

As part of their model and local SUSMPs, the Copermittees will be required to maintain predevelopment peak flow rates and velocities coming from new development as necessary to prevent increased downstream erosion where the potential for downstream erosion exists. This requirement allows the Copermittees discretion in the methods to be developed and implemented to control post-development peak flow rates and downstream erosion. Furthermore, the Copermittees can develop and implement different methods to be applied in different watersheds or different areas of a watershed, provided that the different methods are effective in adequately reducing post-development peak flow rates to control erosion. The Copermittees' model and local SUSMPs must include a description of how predevelopment peak flow rates will be maintained to control erosion in downstream areas.

There is extensive guidance for the Copermittees to draw from in developing criteria to address post-development peak flow rates for the control of downstream erosion. For example, the State of Washington has developed the following criteria regarding post-development peak flow rates: "Stormwater discharges to streams shall control streambank erosion by limiting the peak rate of runoff from individual development sites to 50 percent of the pre-developed condition of the 2-year, 24-hour design storm while maintaining the pre-developed condition peak runoff rate for the 10-year, 24-hour and 100-year, 24-hour design storms." Regarding control of post-development flow durations, the State of Washington has developed the following criteria: "Stormwater discharges to streams shall match developed discharge durations to predeveloped durations for the range of predeveloped discharge rates from 50% of the 2 year peak flow up to the full 50 year peak flow" (Washington State Department of Ecology, 1999). The State of Maryland has developed the following criteria to addressed increased peak flow rates resulting from development: "To protect channels from erosion, 24 hour extended detention of the one-year, 24 hour storm event shall be provided. […] The rationale for this criterion is that runoff will be stored and released in such a gradual manner that critical erosive velocities during bankfull and near-bankfull events will seldom be exceeded in downstream channels" (Maryland Department of the Environment, 1999).

It should be noted that this approach, of allowing the Copermittees to develop peak flow rate criteria to control downstream erosion, is consistent with the LARWQCB SUSMP, which was upheld by the SWRCB in Order WQ 2000-11.

See changes in permit sections A.4, F.1.a.9, F.1.b.1.g, F.1.b.2.b.i, and F.1.b.2.j.

Comments on Specific Sections

Section: Finding Subsection: 1

Comment: Amend Finding 1 pg.1 to include all Federal agencies including Navy, and the Department of Defense as Copermittee. The Department of Defense installations, and the property and projects under Navy ownership are among the largest potential sources of polluted urban runoff in the San Diego region. The Navy controls 181,000 acres of San Diego county and operates areas equivalent to small cities and large industries within its operations. In addition, the U. S. Navy should be listed in the appropriate watershed areas as a watershed Copermittee. (Sierra Club, Environmental Health Coalition, Surfrider Foundation, San Diego Audobon Society)

Response: The SDRWQCB intends to include the Navy in municipal storm water permits in the near future. However, in order to prevent any further delays in the adoption of the Tentative Order, this issue will be considered after adoption.

Section: Finding Subsection: 1

Comment: RWQCB should consider issuance of individual stormwater permits in the future. As Copermittee programs develop and additional knowledge of individual watersheds is obtained, there will likely result a need for more detailed runoff limitations and monitoring for each jurisdiction. (Surfrider Foundation)

Response: The Tentative Order is already an "individual" permit. Under the NPDES storm water municipal program, the permittees must submit an application which includes a proposed management plan as well as monitoring data. From this application, the Tentative Order is structured. SDRWQCB found the application to be inadequate to serve as the foundation for a permit reissuance and added additional requirements.

Section: Finding Subsection: 2

Comment: The Order includes a finding (No. 2 at page 1) that “urban runoff is a ‘waste’...” as defined in California Water Code, section 13050(d). This finding sets the tone for the entire Order. The County disagrees with this finding, and it questions the approach to stormwater management that staff has proposed based on this finding. The County questions the finding because of the actual language of section 13050(d). More importantly, however, the County is concerned that any program founded on the attitude that stormwater is a “waste,” will lead to the waste of stormwater. The section defines water as

including waste substances associated with human habitation, animals, producing, manufacturing or processing. It does not transform the water that may or may not contain such substances into "waste." Additionally, the Order and technical report have no factual basis to support this Finding. While staff may be able to demonstrate that runoff from a given site contains waste, there is no evidentiary or legal justification for categorically designating - across the board - any and all runoff from urbanized area as an "other waste substance." (County of San Diego, BIASC, BIASD, Orange County, San Juan Capistrano)

Response: The definition of waste included in Porter-Cologne is very broad. Waste includes "any and all other waste substances, liquid, solid, gaseous, or radioactive, associated with human habitation […]" To the extent that urban runoff commonly contains pollutants, and frequently contains them at toxic levels (per the Copermittees' monitoring efforts), it certainly falls under the definition of "any and all other waste substances […] associated with human habitation." That the USEPA chooses to issue NPDES permits for the discharge of urban runoff is telling, in that these permits are typically issued for discharges from industry and wastewater facilities. In fact, NPDES permits issued by the State of California, including the Tentative Order, are generally called "Waste Discharge Requirements."

Section: Finding **Subsection: 3**

Comment: Sediment is not a pollutant in and of itself. Sediment does not move into the food chain and is not harmful if eaten by humans or fish. Sediment, if constantly discharged into some natural water bodies in excess of the water body's ability to discharge the sediment, can be a problem. These should be treated on a case-by-case basis rather than stating sediment is bad and cannot be in your MS4 system. We strongly recommend that this paragraph be revised to define sediment as not including native soils that are consistent in volume and size with naturally occurring erosion. One time loading in excess of the normal loading should be allowed as these mimic how nature provides sediment to our beaches. Most of the naturally occurring sand comes from episodic events such as landslides and heavy rain seasons. (City of Solana Beach)

Response: The Tentative Order does not seek to control sediment from natural erosion, but rather to control sediment from man-made sources. Sediment from man-made (anthropogenic) sources needs to be controlled for several reasons. The US EPA explains in the Phase II NPDES storm water regulations that storm water discharges generated from urban activities can cause an array of physical, chemical, and biological water quality impacts. Specifically, the biological, chemical and physical integrity of the waters may become severely compromised due to sediment loads in urban runoff. One time loadings from construction sites can be harmful because of the fine nature of the sediment. USEPA states "A primary concern at most construction sites is the erosion and transport processes related to fine sediment […]" (USEPA, 1999b). Increased fine sediment loads from construction sites can adversely affect aquatic ecosystems by reducing light penetration, impeding sight-feeding, smothering benthic organisms, abrading gills and other sensitive structures, reducing habitat by clogging interstitial spaces within the streambed, and reducing intergravel dissolved oxygen by reducing the permeability of the bed material. Furthermore, one time sediment loadings from construction can be "the equivalent of many decades of natural or even agricultural erosion" (USEPA, 1999b).

Water quality impairment also results from urban runoff carrying sediment, in part, because a number of pollutants are preferentially absorbed onto mineral or organic particles found in fine sediment. Sediment transport and delivery by urban runoff is a primary pathway for introducing key pollutants, such as nutrients, metals, and organic compounds into aquatic systems (USEPA, 1999b).

Due to this capability for runoff from urban development to carry increased sediment loads, as well as the sediment's capability to carry significant pollutant loads, sediment from anthropogenic activities is considered a pollutant which must be addressed.

In order to clarify that the Tentative Order does not seek to reduce natural erosion, Finding 3 will be changed to clarify that it is sediment due to anthropogenic activities which is considered a pollutant.

See change at permit section Finding 3.

Section: Findings Subsection: 3

Comment: Finding no. 3 is over generalized and not supported by the evidence in the record. Although much urban runoff is harmful to our receiving waters, not all urban runoff is harmful.

The RWQCB has failed:

1. To identify the pollutants of concern from particular developments, the sources of those pollutants and the impact such pollutants would have on our receiving waters.

2. To develop or require the development of the quantitative data necessary to develop an appropriate series of management programs and the terms of a permit to address the pollutants of concern and the sources of those pollutants.

3. To develop sufficient evidence to determine the impact of requiring soil infiltration and natural vegetation filtration and otherwise the reduction of impervious surfaces on our groundwater quality, and thus appears to be determining that our surface water quality is more important than our groundwater quality, without adequately considering the impacts on our groundwater quality and developing sufficient information on the pollutants of concern and the impacts of those pollutants on both our surface water quality and our groundwater quality. (County of San Diego)

Response: The US EPA supports this finding, stating in its 1996 National Water Quality Inventory that urban runoff/discharges from storm sewers are a major source of water quality impairment nationwide. The 1996 Inventory also found urban runoff to be the leading cause of ocean impairment for those ocean miles surveyed. In addition, the Region's Clean Water Act section 303(d) list (see Attachment 2), which identifies water bodies with impaired beneficial uses within the region, also indicates that the impacts of urban runoff on receiving waters are significant. Many of the impaired water bodies on the 303(d) list are impaired by constituents which have been found at high levels within urban runoff by the regional storm water monitoring program. Examples of constituents frequently responsible for beneficial use impairment include total and fecal coliform, heavy metals, and sediment; these constituents have been found at high levels in urban runoff both regionally and nationwide.

Section: Findings Subsection: 3

Comment: Remove the word "strong" in phrase "strong direct correlation" (City of San Diego)

Response: Sufficient reports exist in the literature exist to justify the use of the phrase "strong direct correlation." Among these are Karr and Chu (1999), Pitt (1995), Riley (1998), and NURP.

Section: Finding **Subsection: 4**

Comment: Urbanization reduces sediment loading by reducing the areas available for erosion and reducing and controlling landslides. (City of Solana Beach)

Response: We do not concur with this statement. The process of urbanization can dramatically increase sediment loading during the construction phase. Increases in sediment loading during this phase can have long term effects. USEPA finds that studies have shown that "the equivalent of many decades of natural or even agricultural erosion may take place during a single year from areas cleared for construction" (USEPA, 1999b).

Section: Findings **Subsection: 4**

Comment: The City questions to Finding No. 4, as it implies that the City has failed to take any measures to control the volume, velocity, or pollutant load of urban run-off. (City of San Diego)

Response: Finding 4 was not intended to be interpreted as stating that the Copermittees have failed to take any measures to control the volume, velocity, or pollution load of urban runoff. Nonetheless, despite many measures implemented by the Copermittees, beneficial uses of receiving waters are being impaired, receiving water quality objectives are frequently exceeded, and there exists a heightened level of concern in the public for the deteriorating water quality resulting in large part from urban runoff. Despite many measures taken to date, urban development does result in an increased pollutant load, volume, and velocity of urban runoff.

Section: Findings **Subsection: 4**

Comment: The last sentence of the first paragraph should be revised to state, "the natural purification characteristics of the land are diminished". In general in a suburban environment 40% or more of the land remains vegetated so all purification is not lost. (City of Carlsbad)

Response: The sentence refers "pavement and concrete," both of which refer to unvegetated ground cover. The language will not be changed.

Section: Findings **Subsection: 5**

Comment: No studies supporting Finding no. 5 are actually cited. There has been no consideration given to other important competing concerns, including the need for low and moderate income housing, the importance of other future development projects, and the need for impervious surfaces in connection with such developments. Finally, there has been no consideration given to the importance of having impervious surfaces, including protecting our groundwater, providing a means of safe transportation, and avoiding subsidence and erosion problems. (County of San Diego)

Response: There are no less than five studies cited to support this finding in the Staff Report. See Page 37, Finding Five of the Staff Report. The Findings section of the Tentative Order is intended to outline (in general terms) the basis for the requirements that follow - not to provide a literature review.

Section: Findings **Subsection: 5**

Comment: Finding 5 on page 2 - The first sentence referring to increased volume and velocity of runoff greatly increasing downstream erosion in natural channels should be eliminated. The statement is inconsistent with the remainder of the finding and represents a gross generality and not reflective of the complex relationship between developed land characteristics, runoff and soil erosion. When all other factors remain constant, increased volume and velocity of runoff will increase downstream erosion; however, such circumstance rarely occurs. Increased downstream erosion is easily offset by reduced erosion upstream due to channelization of flows, construction of basins and check dams, installation of landscaping and the general decrease in erodable surface area brought about by development. I believe there is a substantial body of evidence, which supports the fact that overall siltation transport, is reduced, and not increased, once land is developed. (City of Carlsbad)

Response: Finding 5 is accurate. USEPA finds that in many cases the impacts on receiving waters due to changes in hydrology can be more significant than those attributable to the contaminants found in storm water discharges (USEPA, 1999a). Research exhibits that downstream erosion follows urbanization. Stream adjustments resulting from urbanization include increased stream cross-sectional area to accommodate higher flows and significant downcutting of the stream channel (WEF/ASCE, 1998). Research models developed in the Pacific Northwest suggest that a threshold for urban stream stability exists at approximately 10% imperviousness of a watershed (WEF/ASCE, 1998). As the commentor notes, these impacts can be reduced through the implementation of basins, landscaping, etc. These practices are the types of BMPs the Tentative Order requires. While development may eventually reduce the amount of sediment reaching a stream, research exhibits that it also results in significant changes in stream hydrology such as downstream erosion.

Section: Finding **Subsection: 6**

Comment: Sediment does not close beaches. Without sediment there are no sand beaches to worry about. We strongly recommend that sediment be redefined to exclude soils consist with the natural soils. (City of Solana Beach)

Response: Finding 6 refers to pollutants in urban runoff which can be a threat to human health, such as pathogens and toxics. Finding 6 makes no reference to sediment.

Section: Findings **Subsection: 6**

Comment: No evidence supportsFinding no. 6. The County agrees that there is a water quality problem created by pollutants in urban runoff, but the pollutants of concern and the sources of those pollutants should be identified with supporting studies. (County of San Diego)

Response: Whether or not it always or ever causes human health problems, urban runoff does pose a human health threat. This finding is supported by a landmark study conducted by the Santa Monica Bay Restoration Project. The study found that there was an increased occurrence of illness in people that swam in proximity to a flowing storm drain outlet.

In addition to the human health risk urban runoff poses from bodily contact, urban runoff also has the potential to adversely impact human health through bioaccumulation/biomagnification of urban runoff pollutants in the food chain. Pollutants such as heavy metals and pesticides, which are commonly found in urban runoff, have been found to bioaccummulate and biomagnify in long-lived organisms at the higher trophic levels. Since many aquatic species are utilized for human consumption, toxic substances accumulated in species' tissues can pose a significant threat to public health.

The US EPA supports this finding when it states "As runoff flows over areas altered by development, it picks up harmful sediment and chemicals such as oil and grease, pesticides, heavy metals, and nutrients (e.g., nitrogen and phosphorus). These pollutants often become suspended in runoff and are carried to receiving waters, such as lakes, ponds, and streams. Once deposited, these pollutants can enter the food chain through small aquatic life, eventually entering the tissues of fish and humans."

Section: Findings Subsection: 7

Comment: Tentative Order should discuss the concerned pollutants, as well as the sources of those pollutants, and the means in which to reduce the discharge of pollutants from such sources to the "maximum extent practicable". (County of San Diego)

Response: Comment noted. The Tentative Order addresses pollutants of concern and requires discharges of pollutants to be reduced to the "maximum extent practicable."

Section: Findings Subsection: 8

Comment: In Section 8, at page 3, the Tentative Order suggests that the Regional Board, under the Tentative Order, will treat all MS4s as receiving waters for purposes of water quality standards and enforcement. Indeed, the text suggests that man-made MS4s — even closed ones — will be treated as natural streams and receiving waters. Please provide a reference for the legal authority that allows the Regional Board to define man-made MS4s as receiving waters for purposes of water quality, since it is unclear that the water within man-made MS4s are technically waters of the State. (Procopio, Cory, Hargreaves, & Savitch, L.L.P.)

Response: The Tentative Order does not state that all MS4s are receiving waters; nor does it attempt to. Rather, it states that in some cases, where an urban stream is used to convey urban runoff, that urban stream is considered to be part of the Copermittee's MS4.

A municipality's responsibility for discharges of runoff from developments they have authorized depends upon the following two conditions: (1) The discharging development must be within the municipality's jurisdiction; and (2) the runoff must be channeled into the municipality's MS4.

If a municipality uses an urban stream to convey runoff from a development that it has authorized, then that urban stream is part of its MS4. This is because the regional board recognizes the water quality consequences of the municipality's reliance on the stream for management of runoff and the environmental impact on the creek as a consequence of the increased flow resulting from the development that the municipality authorized.

Many urban streams which are used to convey runoff from development within a municipality's jurisdiction are part of the municipality's MS4, but not every urban stream used in this way is part of the MS4. A factual determination must be made on a case by case basis. The key difference is whether or not the runoff is collected and channelized by the municipality, or if it just sheet flows off the property into a stream. We recognize the distinction between a housing development in a rural area where the runoff sheet flows off the properties directly into a creek (here the creek is not an MS4) verses when the runoff is channeled by the municipality and then discharged to the creek (here the creek is part of the MS4).

Section: Finding Subsection: 8

Comment: When an urban stream has been designated part of a flood control system, it may reasonable to consider it a component of an MS4. Other streams should only be considered receiving waters. Urban streams should be deleted from the definition of MS4s.

Although the City shares the Regional Board's concern regarding proper management of urban streams, the City does not have the authority to manage or control urban streams that it does not own or for which it is not otherwise legally responsible. This is consistent with the federal regulations which define an MS4, in part, as a storm water conveyance system owned by a public body. See 40 CFR § 122.26(b)(8). Thus, the City believes it is incorrect for Finding No. 5 to state that "urban streams are part of the municipalities MS4." Only urban streams owned by, or under the control of, the City are part of the City's MS4. (San Juan Capistrano, City of San Diego, County of San Diego, Solana Beach)

Response: A municipality's responsibility for discharges of storm water and urban runoff in its MS4 must be coextensive with the municipality's jurisdiction to regulate such discharges. Discharges of storm water that are not within a municipality's jurisdiction or that are not tributary to a municipality's MS4 may be subject to other water quality control requirements, but may not impose upon the municipality any regulatory obligation under these requirements. However, the commentor is incorrect to assert that a municipality should not be responsible under the requirements for discharges to natural drainages that are used as part of the municipality's MS4, regardless of the "ownership" of such a natural drainage or stream. The determination of whether or not a particular natural drainage or urban stream channel is or is not part of the municipality's MS4 depends on the particular circumstances of the channel and the municipality's urban runoff management practices. If municipalities rely on natural drainage channels or urban streams to collect and convey urban runoff and storm water to or from an MS4, they should be recognized as components of the municipality's MS4; the municipality would be required to reduce pollutant discharges therein to the maximum extent practicable. Application of requirements for discharges of storm water in MS4s to natural drainages and urban streams does not "transform" such drainages and streams to MS4s;

however, it does reflect the fact that the Regional Board recognizes the water quality consequences of municipalities' reliance on such drainages and streams for the management of storm water and urban runoff, and the environmental impact upon such drainages and streams as a consequence of the increased flows therein associated with urban development and land use under the planning and regulatory authority of municipalities.

Section: Findings Subsection: 9

Comment: Finding No. 9 is an over-generalization, does not identify the pollutants of concern and the sources of those pollutants, and indicates that all discharges of pollutants and increase flows "from MS4s" are to be prohibited. This Finding is inconsistent with the Clean Water Act. Furthermore, the impact of the discharges of pollutants from MS4s to receiving water quality objectives, specifically including to 303(d) listed water bodies, is not an area to be addressed through regulation under this Tentative Order. Rather, total maximum daily load requirements will need to be properly evaluated and determined in accordance with other provisions of the Clean Water Act. The RWQCB has no authority to do so here. Further, as discussed in connection with Finding 13, the RWQCB has no authority to impose water quality standards or numeric limitations on the Copermittees. (See Defenders of Wildlife v. Browner, 191 F.3d 1159 (9th Cir. 1999.) (County of San Diego)

Response: The 303(d) list includes information about the source of impairment of receiving waters. For an overwhelming number of impaired receiving waters, non-point discharges are identified as a source. Most of the watersheds for these impaired water bodies are urban. Therefore, it can be inferred that urban runoff causes or contributes to these impairments.

There should be no doubt that such problems are indeed frequently urban runoff related. For instance, a common conveyance for a sewage spill to reach a beach is through the municipal storm water system. Also, exceedances of standards at some of our Region's beaches have unquestionably resulted from pollutants conveyed by the storm water drainage system (SDRWQCB CAO 97-69 and CDO 98-74). In addition, urban runoff is increasingly being targeted as the cause of beach closures and postings in other areas of the San Diego region and Southern California. Urban runoff has been identified as a principal contributor to fecal coliform contamination in Orange County's Aliso Creek, a creek which often causes beach postings when flowing into the ocean (SDRWQCB CAO 99-211).

It is necessary to address exceedances of water quality standards in the Tentative Order since it has been found that discharges from MS4s cause or contribute to exceedances of water quality standards. By including them in the Tentative Order, the Tentative Order can be used to ensure that these conditions do not persist. The SDRWQCB has legal authority to require these standards under 40 CFR 122.44(d)(1)(i), which requires NPDES permits to include limitations to "control all pollutants or pollutant parameters (either conventional, nonconventional, or toxic pollutants) which the Director determines are or may be discharged at a level which will cause, have reasonable potential to cause, or contribute to an excursion above any State water quality standard, including State narrative criteria for water quality."

Section: Findings Subsection: 10

Comment: Finding No. 10
The City questions the characterization that, to "be most effective," URMPs must contain both structural and nonstructural BMPs. The City suggests that the last sentence of Finding No. 10 should state, instead,

that "URMPs should consider both structural and non-structural BMPs and require implementation of structural or non-structural BMPs, as appropriate." (City of San Diego)

Response: BMPs contain such broad categories of management practices as public education and code enforcement. Although these practices are intrinsic to an URMP, they are not by themselves going to be effective in all cases. Therefore, the broad terms of an urban area-wide runoff management plan must contain structural and non-structural BMPs. However, SDRWQCB recognizes that, from site to site, the municipality should consider both structural and non-structural BMPs and require implementation of structural or non-structural BMPs, as appropriate.

Section: Findings Subsection: 10

Comment: Since the Regional staff will not approve the Copermittees' Standard Urban Storm Water Mitigation Plans (SUSMPs) which implements the JURMP with respect to new development and significant redevelopment, Regional staff, therefore, will not be approving the Copermittees' selected list of BMP's either and apparently will not go so far as to even suggest levels of effectiveness that shall be expected of any particular structural BMP. How do the Copermittees establish and impose minimum water quality objectives that MEP is supposed to meet through installation and operation of structural BMP's during development? (City of Chula Vista)

Response: The SDRWQCB Basin Plan, the State Water Resources Control Board Ocean Plan, and the US EPA California Toxics Rule specify water quality objectives that apply to San Diego region receiving waters into which MS4s discharge. Through their Jurisdictional Urban Runoff Management Program Documents and Annual Reports, the Copermittees propose minimum BMPs necessary to meet pollution reduction in their urban runoff discharges to the MEP. The Copermittees' compliance with receiving water quality objectives will be evaluated in part through the monitoring and annual reports submitted to the SDRWQCB. In any case, the burden is on the Copermittee to demonstrate compliance with the Tentative Order.

Section: Findings Subsection: 10

Comment: Finding No. 10
Regional Board staff has failed to provide any legal or evidentiary support to justify the regulation of discharges "into" an MS4, and further, has failed to provide the appropriate legal authority and the sufficient evidence and findings to support the broad application of the URMPs program, as set forth in the Tentative Order. (County of San Diego)

Response: In the Pollution Prevention Act of 1990, Congress established a national policy that emphasizes pollution prevention over control and treatment. California Water Code section 13263.3(a) also supports pollution prevention, stating "The Legislature finds and declares that pollution prevention should be the first step in a hierarchy for reducing pollution and managing wastes, and to achieve environmental stewardship for society. The Legislature also finds and declares that pollution prevention is necessary to support the federal goal of zero discharge of pollutants into navigable waters." Finally, the Basin Plan also supports this finding by stating that "[T]o eliminate pollutants in storm water, one can either clean it up by removing pollutants or prevent it from becoming polluted in the first place. Because

of the overwhelming volume of storm water and the enormous costs associated with pollutant removal, pollution prevention is the only approach that makes sense."

Section: Findings Subsection: 10

Comment: The term "maximum extent practicable" (or "MEP") is not defined, nor is it clear that MEP means the same thing when applied to discharges into an MS4 as it does when applied to discharges from an MS4. (Procopio, Cory, Hargreaves, & Savitch, L.L.P.)

Response: MEP is defined in Attachment D of the Tentative Order. The definition applies to discharges both into and from the MS4.

Section: Findings Subsection: 10,12

Comment: The discussion of Finding No. 12 contradicts Finding No. 10. If pollution prevention measures are truly effective as the "first line of defense", then the effectiveness of structural BMPs, or any removal methodology for that matter, would be rendered more or less marginally effective. Is it really the intent of the Regional Board that MEP means implementation of enormously costly structural BMP's in order to achieve what may be a marginal improvement? (City of Chula Vista)

Response: Finding 12 does not conflict with Finding 10. Finding 12 states that "Pollution prevention…should be used in conjunction with source control and treatment control BMPs." The effectiveness of structural treatment BMPs can be enhanced with effective "pre-treatment" through source control and require less frequent and expensive maintenance. Effective pollution prevention provides the Copermittees with more options in the selection of BMPs that meet MEP and that can achieve more than "marginal improvement."

Section: Findings Subsection: 11

Comment: The discussion of Finding No. 11 (in the Fact Sheet/Technical Report) gives the effectiveness ranges of undefined types of structural BMPs, but makes no mention of the fact that the effectiveness of structural BMPs is also highly dependent on the scale of the BMP and its location within the watershed (relative to the source of the pollution). Before we can require compliance with specific onsite measures we must have some confidence that a minimum level of effectiveness can be demonstrated. (City of Chula Vista)

Response: The effectiveness ranges for BMPs discussed in the Fact Sheet/Technical Report can be assumed to be representative of the effectiveness of the BMPs in a wide range of conditions. The effectiveness ranges provided are a summary of over 20 years of data from many studies (USEPA, 1999a). The breadth of the summary indicates that its results can be relied on with a reasonable amount of assurance, provided the BMPs are sized and designed correctly. To ensure that BMPs are sized correctly, the Tentative Order includes numeric sizing criteria requirements. The Tentative Order also requires that structural treatment BMPs be "designed to maximize their pollutant removal capabilities" (section F.1.b.2.a.xii). Numerous guidance manuals on BMP design exist, such as by the State of

Washington, the State of Maryland, and the City of Sacramento (see the References section of these responses for more information). By requiring that BMPs be sized and designed correctly, the Tentative Order ensures that a structural treatment BMPs will achieve a minimum level of effectiveness.

Section: Findings Subsection: 11

Comment: Finding No. 11 provides in part that "Treatment control (or structural) BMPs remove pollutants from urban runoff." In its discussion of this finding in the Technical Report, the Regional Board asserts that data on structural BMPs "indicates that structural BMPs can be effective in reducing pollutants in urban runoff discharges." Thus, while the County does not dispute the fact that structural BMPs can be effective in reducing pollutants in urban runoff discharges, it does dispute the general contention that treatment control or structural BMPs always remove pollutants from urban runoff, and further disputes any finding that suggests that structural or treatment control BMPs are necessary and/or are effective for removing the subject "pollutants of concern." Whether any given treatment control BMP is appropriate and effective depends on the "pollutants of concern" which need to be identified before any treatment control BMP is forced on the project. Moreover, the requirement of any structural or treatment control BMPs must be imposed only after an appropriate cost/benefit analysis has been conducted and appropriate costs have been considered (including the impact of such BMPs on other policies of the State, such as the need for low/moderate income housing projects). (County of San Diego)

Response: The statement in Finding 11 that "Treatment control (or structural) BMPs remove pollutants from urban runoff" is correct. Based on data provided by USEPA, it is reasonable to conclude properly designed and sized BMPs are effective in removing pollutants. In its "Preliminary Data Summary of Urban Storm Water Best Management Practices," USEPA summarizes over 20 years of data on structural treatment BMP effectiveness (USEPA, 1999a). The summary concludes that for each category of structural treatment BMP assessed, that pollutants were removed to varying degrees of success. While various structural treatment BMPs were found to be more effective than others, none of the BMPs were found to be totally ineffective in reducing all pollutants.

Regarding the necessity of structural treatment BMPs, the SWRCB has found in Order WQ 2000-11 that structural treatment BMPs are necessary at SUSMP priority project development categories. The SUSMP provisions are the only part of the Tentative Order where structural treatment BMPs are specifically required. While structural treatment BMPs will most likely be necessary in areas outside of the new development SUSMP categories, the Tentative Order does not dictate their use.

The commentor is correct is asserting that pollutants of concern must be identified before implementation of a particular structural treatment BMPs. This why as part of the model and local SUSMPs, the Copermittees are required to develop a procedure for pollutant of concern identification (section F.1.b.2.e). Once pollutants of concern have been identified, then structural treatment BMPs are to be assessed for their effectiveness in removing those pollutants of concern.

Regarding the cost of implementing structural treatment BMPs at SUSMP priority development projects, the SDRWQCB and LARWQCB have demonstrated in past SUSMP documents that the cost of construction of structural treatment BMPs generally constitutes less than 1% of total project cost. Regarding costs of structural treatment BMPs, the SWRCB states in Order WQ 2000-11 "The Regional Board found that the cost to include BMPs that will meet the mitigation criteria will be one to two percent of the total development cost. This amount appears reasonable, especially in light of the amount of impervious surface already in Los Angeles County and the impacts on impaired water bodies."

Section: Findings Subsection: 12

Comment: The permit is supposed to regulate discharges "from" MS4s. There is no authority for the RWQCB to impose the Copermittees to regulate all business and personal practices of its community. (County of San Diego)

Response: In the Pollution Prevention Act of 1990, Congress established a national policy that emphasizes pollution prevention over control and treatment. California Water Code section 13263.3(a) also supports pollution prevention, stating "The Legislature finds and declares that pollution prevention should be the first step in a hierarchy for reducing pollution and managing wastes, and to achieve environmental stewardship for society. The Legislature also finds and declares that pollution prevention is necessary to support the federal goal of zero discharge of pollutants into navigable waters." Finally, the Basin Plan also supports this finding by stating that "[T]o eliminate pollutants in storm water, one can either clean it up by removing pollutants or prevent it from becoming polluted in the first place. Because of the overwhelming volume of storm water and the enormous costs associated with pollutant removal, pollution prevention is the only approach that makes sense."

Section: Finding Subsection: 13

Comment: Due to the time required to fully develop the BMP for attainment of receiving water limitations, is it likely that the opportunity to achieve source reduction in new developments will be missed? In the Eastern Territory of Chula Vista fully 75% of area is in SPA level review or better. Meaning the specific plans, policies, land plans and conditions are being developed at this very moment. (City of Chula Vista)

Response: It is the responsibility of the Copermittees to regulate the discharge of urban runoff from their MS4s to reduce pollutants to the MEP and to prevent an exceedance of receiving water quality objectives as a result of their urban runoff discharges. This requirement has been in force since the adoption of Order 90-42 in 1990. The City of Chula Vista, as cited in the example, is required to ensure that sufficient BMPs are implemented in both the new and existing developments to reduce pollutants to the MEP and to ensure that discharges from their MS4 do not cause or contribute to an exceedance of receiving water quality objectives. To the extent that implementation of some BMPs may not ensure attainment of receiving water quality objectives under all circumstances, an iterative process of BMP development, implementation, monitoring, and assessment is necessary and required to assure that an Urban Runoff Management Program is sufficiently comprehensive and effective to achieve compliance with receiving water quality objectives.

Section: Finding Subsection: 13

Comment: Finding No. 13 concerning receiving water limitations inappropriately provides that "compliance with receiving water limits based on applicable water quality objectives is necessary to ensure that MS4 discharges will not cause or contribute to violations of water quality objectives and the creation of conditions of pollution." In spite of the term "necessary," the Staff does not cite a single piece of evidence, study or analysis that supports the "necessity" for water quality standards in an MS4 permit. In fact, the Fact Technical Report merely makes a legal argument to attempt to support its position of "necessity," and no factual evidence or other evidence exists to support such a finding. Further, the Regional Board's authority to make such a finding is expressly refuted by the Ninth Circuit's decision in Defenders of Wildlife v. Browner 191 F.3d 1159 (9th Cir. 1999), wherein the Ninth Circuits expressly held that the language of the Clean Water Act does not provide the authority to impose numeric limitations in Municipal NPDES Permits. Thus, the Regional Board's citation of Defenders of Wildlife v. Browner as support for its position that it has such authority here, is in error as the Ninth Circuit specifically found that the Clean Water Act did not provide such authority, and that such authority if it existed, must exist under State law. Here, under California law, and specifically California Water Code Section 13377, the Administrator or State Board may only adopt more stringent requirements as provided for under the Clean Water Act, where there is a showing that more stringent requirements are "necessary to implement water quality control plans, or for the protection of the beneficial uses, or to prevent nuisance." There is no evidence anywhere in this record to support such a showing of "necessity," and thus there is no authority to impose water quality standards on the Copermittees.

The Clean Water Act is very clear that permits for discharges “from” municipal storm sewers are to require controls “to reduce the discharge of pollutants to the maximum extent practicable.” The attempt to impose any numeric effluent limits or water quality standards is an attempt to overlay a separate and more restrictive standard on the Copermittees. Any such more stringent standard is not supported by State law, as there has been no finding, or evidence to support such a finding, of “necessity” as required by the Porter-Cologne Act.

In Defenders of Wildlife v. Browner (9th Cir. 1999),191 F3d 1159 the federal appellate court with jurisdiction over California contrasted this language with provisions of the Clean Water Act that applied to industrial dischargers, and held that EPA was not obliged to require in an EPA-issued permit that municipal discharges strictly comply with state water quality standards. In dicta, this Court also advised that EPA “has the authority to determine that ensuring strict compliance with state water-quality standards is necessary to control pollutants.”

Again, State law is also relevant here. As noted, State Water Code section 13372 requires that State law be construed to prevent “any inconsistency” with respect to required NPDES permits. This should mean that the State must apply the State Water Code and the State water quality standards in the same way that federal law and federal water quality standards apply. It would be inconsistent with the fundamental principles of the Clean Water Act to assert that State water quality standards apply to municipal stormwater dischargers in the same manner as to industrial discharges. Congress made a distinction between these kinds of discharges, in the Clean Water Act, and the Ninth Circuit affirmed that distinction in Defenders of Wildlife. Water Code section 13372 requires the State to do likewise.

The dicta in Defenders of Wildlife does not authorize the regional water boards to require municipal stormwater discharges to meet state water quality standards in every case. At most, that dicta contemplates (as it clearly states) that this requirement could be imposed after a determination that this kind of requirement was “necessary to control pollutants.”

There is no determination or Finding of this kind supporting the Order. Instead, with complete circularity, Finding 13 states that compliance with receiving water limits based on water quality objectives is necessary to ensure that municipal stormwater discharges do not contribute to violations of water quality objectives. This is a legally insufficient Finding to support the water quality based requirements the Order seeks to impose.

Adding new Finding language to a final Order would not cure this legal defect, because there is no reference in the Technical Report to evidence that could support the required Finding. Absent compelling evidence, it would be arbitrary for the RWQCB to find that application of the Clean Water Act's MEP standard by the Copermittees would not adequately control pollutants.

The County believes the dicta in this case erroneously interprets what section 402(p)(3)(B) authorizes. This section need not and should not be read to authorize application of water quality prohibitions to municipal stormwater discharges; that would be a strained interpretation that is not consistent with the basic statutory scheme Congress created for municipal stormwater. Instead, the phrases "reduce the discharge of pollutants" at the beginning of the section, and "control of such pollutants" at the end of the section should be read as meaning the same thing. The authorization to do more in section 402(p)(3)(B) would then merely authorize expansion of the specific list of MEP techniques inclusions included as examples in the section. See comment "O" above. (County of San Diego)

Response: The impacts urban runoff causes to receiving waters within our region makes the necessity for the inclusion of water quality standards in the Tentative Order clear. Findings 3, 4, 5, 6, and 9, as well as their corresponding discussions in the draft Fact Sheet/Technical Report, all discuss the impacts of urban runoff to the region's receiving waters. Urban runoff is a leading cause of water quality impairment in the San Diego Region. To prevent urban runoff from continuing to be a leading cause of receiving water impairment, water quality standards are necessary in the Tentative Order. Compliance with water quality standards provides the necessary tool to ensure that water quality standards are achieved when implementation of BMPs to MEP are unsuccessful. The Copermittees efforts to date to implement BMPs to the MEP have not been sufficient to adequately protect receiving waters. The inclusion of requirements for compliance with water quality standards in the Tentative Order corrects this deficiency.

The issue of whether storm water discharges from MS4s must meet water quality standards has been intensely debated for the past five years. The argument arises because Clean Water Act section 402(p) fails to clearly state that municipal dischargers of storm water must meet water quality standards. On the issue of industrial discharges of storm water, the statute clearly indicates that industrial dischargers must meet both (1) the technology-based standard of "best available technology economically achievable (BAT)" and (2) applicable water quality standards. On the issue of municipal discharges however, the statute states that municipal dischargers must meet (1) the technology-based standard of "maximum extent practicable (MEP)" and (2) "such other provisions that the Administrator or the State determines appropriate for the control of such pollutants." The statute fails, however, to specifically state that municipal dischargers must meet water quality standards.

As a result, the municipal storm water dischargers have argued that they do not have to meet water quality standards; and that they only are required to meet the MEP standard. Environmental interest groups maintain that not only do MS4 discharges have to meet water quality standards, but that MS4 permits must also comply with numeric effluent limitations for the purpose of meeting water quality standards. On the issue of water quality standards, the US EPA, the SWRCB, and the SDRWQCB have consistently maintained that MS4s must indeed comply with water quality standards. On the issue of whether water quality standards must be met by numeric effluent limits, the US EPA, the SWRCB (in Orders WQ 91-03

and WQ 91-04), and the SDRWQCB have maintained that MS4 permits can, at this time, contain narrative requirements for the implementation of BMPs in place of numeric effluent limits.

SWRCB rationale: In addition to relying on US EPA's legal opinion concluding that MS4s must meet MEP and water quality standards, the SWRCB also relied on the Clean Water Act's explicit authority for States to require "such other provisions that the Administrator or the State determines appropriate for the control of such pollutants" in addition to the technology-based standard of MEP. To further support its conclusions that MS4 permit dischargers must meet water quality standards, the SWRCB relied on provisions of the California Water Code that specify that all waste discharge requirements must implement applicable Basin Plans and take into consideration the appropriate water quality objectives for the protection of beneficial uses.

The SWRCB first formally concluded that permits for MS4s must contain effluent limitations based on water quality standards in Order WQ 91-03. In that Order, the SWRCB also concluded that it was appropriate for Regional Boards to achieve this result by requiring best management practices, rather than by inserting numeric effluent limitations into MS4 permits. In Order WQ 98-01, the SWRCB prescribed specific precedent setting Receiving Water Limitations language to be included in all future MS4 permits. This language specifically requires that MS4 dischargers meet water quality standards and allows for the use of narrative BMPs (increasing in stringency and implemented in an iterative process) as the mechanism by which water quality standards can be met.

In Order WQ 99-05, the SWRCB modified its receiving water limitations language found in Order WQ 98-01 to meet specific objections by the US EPA (the modifications resulted in stricter compliance with water quality standards). SWRCB Order WQ 99-05 states "In Order WQ 98-01, the State Water Resources Control Board (State Water Board) ordered that certain receiving water limitation language be included in future municipal storm water permits. Following inclusion of that language in permits issued by the San Francisco Bay and San Diego Regional Water Quality Control Boards (Regional Water Boards) for Vallejo and Riverside respectively, the United States Environmental Protection Agency (EPA) objected to the permits. The EPA objection was based on the receiving water limitation language. The EPA has now issued those permits itself and has included receiving water limitation language it deems appropriate.

"In light of EPA's objection to the receiving water limitation language in Order WQ 98-01 and its adoption of alternative language, the State Water Board is revising its instructions regarding receiving water limitation language for municipal storm water permits. It is hereby ordered that Order WQ 98-01 will be amended to remove the receiving water limitation language contained therein and to substitute the EPA language. Based on the reasons stated here, and as a precedent decision, the following receiving water limitation language [which is found in Receiving Water Limitations item C. of Order No. 2001-01] shall be included in future municipal storm water permits."

In a late 1999 case involving MS4 permits issued by US EPA to several Arizona cities (Defenders of Wildlife v. Browner, 1999, 197 F. 3d 1035), the United States Court of Appeals for the Ninth Circuit upheld US EPA's requirement for MS4 dischargers to meet water quality standards, but it did so on the basis of US EPA's discretion rather than on the basis of strict compliance with the Clean Water Act. In other words, while holding that the Clean Water Act does not require all MS4 discharges to comply strictly with state water quality standards, the Court also held that US EPA has the authority to determine that ensuring strict compliance with state water quality standards is necessary to control pollutants. On the question of whether MS4 permits must contain numeric effluent limitations, the court upheld US EPA's use of iterative BMPs in place of numeric effluent limits.

SWRCB's final position: On October 14, 1999, the SWRCB issued a legal opinion on the federal appellate decision and provided advice to the Regional Boards on how to proceed in the future. In the memorandum, the SWRCB concludes that the recent Ninth Circuit opinion upholds the discretion of US EPA and the State to (continue to) issue permits to MS4s that require compliance with water quality standards through iterative BMPs. Moreover, the memorandum states that "[…] because most MS4 discharges enter impaired water bodies, there is a real need for permits to include stringent requirements to protect those water bodies. As total maximum daily loads (TMDLs) are developed, it is likely that MS4s will have to participate in pollutant load reductions, and the MS4 permits are the most effective vehicles for those reductions." In summary, the SWRCB concludes that the Regional Boards should continue to include the Receiving Water Limitations language established in SWRCB Order WQ 99-05 in all future permits.

Accordingly, the SDRWQCB has required in the Tentative Order that discharges from MS4s meet receiving water quality objectives.

Section: Finding Subsection: 13

Comment: Is the Copermittees' ability to impose water quality limits on new development restricted by not having numeric effluent limits in effect? Finding No. 13 is a two-edged sword for the Copermittees. On the one hand they are not, for the time being, held to numeric limits for discharges from MS4s and may utilize iterative "narrative BMPs" in their place as necessary to achieve the receiving water quality standard in effect. But a lack of numeric limits applied to what comes out of the pipe generally translates into a restriction on what may be required of new developments to control what goes into the pipe. (City of Chula Vista)

Response: The Copermittees are responsible for discharges that may cause or contribute to exceedances of receiving water quality objectives or that may constitute a threat to human or environmental health. The Copermittees are not, however, required under Tentative Order 2001-01 to impose water quality limits on new development. Tentative Order 2001-01 requires the Copermittees to implement programs and BMPs that reduce pollutants to the MEP. The Tentative Order does require that these BMPs meet numeric sizing criteria, but not numeric water quality limits, for some categories of new development and significant redevelopment. The selection of BMPs and other means to achieve MEP are the responsibility of the Copermittee and do not require water quality limits on effluent from new development. However, the Tentative Order would not prevent a Copermittee from establishing additional limits that are more protective of water quality and beneficial uses or different kinds of limits (such as numeric limits). As provided for in California Water Code § 13002, cities and counties may establish water quality protection requirements that go beyond the requirements of the SDRWQCB or SWRCB.

Section: Findings Subsection: 13

Comment: Receiving Water Limitations. In section 13, at page 3, the Tentative Order provides as follows: "Compliance with receiving water limits based on applicable water quality objectives is necessary to ensure that MS4 discharges will not cause or contribute to violations of water quality objectives and the creation of conditions of pollution." This statement implies that MS4s are not receiving waters, but instead are conveyances that discharge into receiving waters. This is arguably inconsistent with section 8, discussed above, which states that an urban stream is both an MS4 and a receiving water. Please explain this discrepancy. (Procopio, Cory, Hargreaves, & Savitch, L.L.P.)

Response: A municipality's responsibility for discharges of runoff from developments they have authorized depends upon the following two conditions: (1) The discharging development must be within the municipality's jurisdiction; and (2) the runoff must be channeled into the municipality's MS4.

If a municipality uses an urban stream to convey runoff from a development that it has authorized, then that urban stream is part of its MS4. This is because the regional board recognizes the water quality consequences of the municipality's reliance on the stream for management of runoff and the environmental impact on the creek as a consequence of the increased flow resulting from the development that the municipality authorized.

Many urban streams which are used to convey runoff from development within a municipality's jurisdiction are part of the municipality's MS4, but not every urban stream used in this way is part of the MS4. A factual determination must be made on a case by case basis. The key difference is whether or not the runoff is collected and channelized by the municipality, or if it just sheet flows off the property into a stream. We recognize the distinction between a housing development in a rural area where the runoff sheet flows off the properties directly into a creek (here the creek is not an MS4) verses when the runoff is channeled by the municipality and then discharged to the creek (here the creek is part of the MS4).

Section: Finding **Subsection: 14**

Comment: Good faith efforts at development, implementation, monitoring and assessment of BMP's that are later determined to be ineffective should not result in more restrictive requirements or fines, otherwise these unsuccessful attempts may lead to cover ups and the progress to develop better BMP's from lessons learned will not occur. (SANDAG)

Response: We generally concur with this statement. However, escalating enforcement to include the imposition of monetary penalties may occur when dischargers continue to implement ineffective BMPs, knowingly or willfully cover up unsuccessful BMPs, and/or fail to develop better BMPs from lessons learned. Further, inadequate BMPs that result in severe water quality impacts may also anticipate the imposition of monetary penalties and/or referred to the District Attorney for determination of whether criminal action should be pursued. Under criminal law, individual persons, as well as responsible parties in public agencies and business entities may be subject to fines or imprisonment for knowing, reckless or willful conduct that constitutes a serious threat to the environment

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Section: Findings **Subsection: 14**

Comment: Finding No. 14 provides that an iterative process of BMP development, implementation, monitoring and assessment is necessary to assure that an Urban Runoff Management Plan is sufficiently comprehensive and effective to achieve compliance with the receiving water quality objectives. Any requirement for an iterative BMP process must be justified by the Clean Water Act's standard of "maximum extent practicable" and there is no evidence cited in the record, nor any support in the Clean Water Act or the Porter-Cologne Act to support a finding that an iterative process of BMP is "necessary"

to assure that an Urban Runoff Management Plan is sufficiently comprehensive and effective. (County of San Diego)

Response: Finding 14's reference to an iterative process of BMP implementation applies to section C. of the Tentative Order. In section C., an iterative process of BMP implementation is required if exceedances of water quality standards persist, even after implementation of the Copermittees' urban runoff management programs. The language included in section C is consistent with the precedential SWRCB Order WQ 99-05.

Section: Finding Subsection: 15

Comment: Care should be taken to avoid alienation of the community, since community involvement and cooperation will be necessary to the success of the program. They may be the biggest assets to the clean water effort, and it is crucial that this process be handled sensitively with sufficient community outreach. (SANDAG)

Response: The SDRWQCB believes that individual citizen behavior does have a tremendous impact on the quality of waters in the Region. Public involvement, education, outreach, participation, and a sensitivity to the public's role are all crucial to protecting the environment. However, the SDRWQCB also believes that in all cases where an individual citizen refuses to take responsibility for his behavior, enforcement is a deterrent which must be considered.

Section: Finding Subsection: 15

Comment: Finding No. 15 is incorrect. It is based on a statement in the Final Rule for the Phase II regulations designed to encourage the Phase II communities to be more proactive than the regulations require. As the staff recognizes on page 46 of the Fact Sheet/Technical Report, if a municipality does not prohibit non-storm water discharges, it must accept responsibility for the water quality consequences of its decision. In other words, the municipality is responsible for the quality of discharges from its MS4. The staff goes on to say that, "For these reasons, each Co-permittee must prohibit and/or control discharges from third parties to its MS4." This is an extrapolation of existing law. A municipality is responsible for the quality of the discharges from its storm drain system, with the methods of achieving compliance up to the municipality. The proposed approach may lead to appeals and possibly litigation. (City of San Juan Capistrano)

Response: The Clean Water Act is clear that Copermittees must prohibit non-storm water discharges into its MS4. It states at section 403(p)(3)(B)(iii) that Copermittees shall “prohibit non-storm water discharges into the storm sewers.”

The requirement for control of discharges into the MS4 is also currently required of the Copermittees in Order No. 90-42. Section IX. of Order No. 90-42 states “The permittees shall develop and implement BMPs to reduce/control/eliminate pollutants in discharges to and from stormwater conveyance systems in their areas of jurisdiction to the maximum extent practicable.” Given the impact to receiving waters in the San Diego Region caused by urban runoff, as well as projections for increased urban growth in the region, it is not warranted to eliminate this requirement.

USEPA supports the concept that Copermittees cannot passively receive and discharge pollutants from third parties. As US EPA states, "The operator of a small MS4 that does not prohibit and/or control discharges into its system essentially accepts 'title' for those discharges. At a minimum, by providing free and open access to the MS4s that convey discharges to the waters of the United States, the municipal storm sewer system enables water quality impairment by third parties" (USEPA, 1999b).

Discharges of pollutants to the MS4 must therefore be controlled, and an important means for a municipality to achieve this is through the development and enforcement of municipal legal authority. USEPA states "A crucial requirement of the NPDES storm water regulation is that a municipality must demonstrate that it has adequate legal authority to control the contribution of pollutants in storm water discharged to its MS4. […] In order to have an effective municipal storm water management program, a municipality must have adequate legal authority to control the contribution of pollutants to the MS4. […] 'Control,' in this context, means not only to require disclosure of information, but also to limit, discourage, or terminate a storm water discharge to the MS4" (USEPA, 1992).

Since discharges which enter the MS4 are generally discharged unimpeded directly into receiving waters, the Copermittee's legal authority is to apply to both discharges into and from MS4s. Federal NPDES regulations clearly provide the SDRWQCB with the legal authority to require municipalities to control discharges from third parties into their MS4. 40 CFR 122.26(d)(2)(iv)(A - D) require municipalities to implement controls to reduce pollutants in urban runoff from commercial, residential, industrial, and construction land uses or activities. Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(A - D) also require municipalities to have legal authority to control various discharges to their MS4. This concept is further supported in the Preamble to the Phase II Final Rule NPDES storm water regulations, which states "The operators of regulated small MS4s cannot passively receive and discharge pollutants from third parties" (USEPA, 1999b). Due to the greater water quality concerns generally experienced by larger municipalities, Phase II Final Rule findings for small municipalities are also applicable to larger municipalities such as the Copermittees. Again, underlying the Federal NPDES storm water regulations is the Clean Water Act, which states in section 402(p)(3)(B)(ii) that municipalities shall "effectively prohibit non-stormwater discharges into the storm sewers."

It is important to note the SWRCB also supports control of discharges into MS4s. The SWRCB recently upheld the LARWQCB SUSMP requirements in Order WQ 2000-11. These requirements place significant restrictions on discharges from third parties into MS4s. In fact, the SUSMP provisions included in the Tentative Order, as upheld by the SWRCB, represent the most stringent and specific requirements in the Tentative Order regarding the control of discharges into the MS4.

Finally, the requirement for municipal storm water dischargers to have, and exercise, local governmental authority in order to comply with water quality control obligations is analogous to the requirement for Publicly Owned Treatment Works to have and exercise legal authority to require pretreatment of industrial wastes being discharged to their sewage collections systems (CWA 402(b)(8)).

Section: Findings **Subsection: 15**

Comment: We are not aware of any legal authority allowing the Regional Board to regulate discharges into an MS4. We are aware only of the Regional Board's legal right to regulate discharges from an MS4 into a receiving water for which beneficial uses have been assigned. Please provide a statutory or case law reference granting the Regional Board authority to control and regulate discharges into MS4s. (Procopio, Cory, Hargreaves, & Savitch, L.L.P.)

Response: The requirement for control of discharges into the MS4 is currently required of the Copermittees in Order No. 90-42. Section IX. of Order No. 90-42 states "The permittees shall develop and implement BMPs to reduce/control/eliminate pollutants in discharges to and from stormwater conveyance systems in their areas of jurisdiction to the maximum extent practicable." Given the impact to receiving waters in the San Diego Region caused by urban runoff, as well as projections for increased urban growth in the region, it is not warranted to eliminate this requirement.

USEPA supports the concept that Copermittees cannot passively receive and discharge pollutants from third parties. As US EPA states, "The operator of a small MS4 that does not prohibit and/or control discharges into its system essentially accepts 'title' for those discharges. At a minimum, by providing free and open access to the MS4s that convey discharges to the waters of the United States, the municipal storm sewer system enables water quality impairment by third parties" (USEPA, 1999b).

Discharges of pollutants to the MS4 must therefore be controlled, and an important means for a municipality to achieve this is through the development and enforcement of municipal legal authority. USEPA states "A crucial requirement of the NPDES storm water regulation is that a municipality must demonstrate that it has adequate legal authority to control the contribution of pollutants in storm water discharged to its MS4. […] In order to have an effective municipal storm water management program, a municipality must have adequate legal authority to control the contribution of pollutants to the MS4. […] 'Control,' in this context, means not only to require disclosure of information, but also to limit, discourage, or terminate a storm water discharge to the MS4" (USEPA, 1992).

Since discharges which enter the MS4 are generally discharged unimpeded directly into receiving waters, the Copermittee's legal authority is to apply to both discharges into and from MS4s. Federal NPDES regulations clearly provide the SDRWQCB with the legal authority to require municipalities to control discharges from third parties into their MS4. 40 CFR 122.26(d)(2)(iv)(A - D) require municipalities to implement controls to reduce pollutants in urban runoff from commercial, residential, industrial, and construction land uses or activities. Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(A - D) also require municipalities to have legal authority to control various discharges to their MS4. This concept is further supported in the Preamble to the Phase II Final Rule NPDES storm water regulations, which states "The operators of regulated small MS4s cannot passively receive and discharge pollutants from third parties" (USEPA, 1999b). Due to the greater water quality concerns generally experienced by larger municipalities, Phase II Final Rule findings for small municipalities are also applicable to larger municipalities such as the Copermittees. Finally, underlying the Federal NPDES storm water regulations is the Clean Water Act, which states in section 402(p)(3)(B)(ii) that municipalities shall "effectively prohibit non-stormwater discharges into the storm sewers."

It is important to note the SWRCB also supports control of discharges into MS4s. The SWRCB recently upheld the LARWQCB SUSMP requirements in Order WQ 2000-11. These requirements place significant restrictions on discharges from third parties into MS4s. In fact, the SUSMP provisions included in the Tentative Order, as upheld by the SWRCB, represent the most stringent and specific requirements in the Tentative Order regarding the control of discharges into the MS4.

Finally, the requirement for municipal storm water dischargers to have, and exercise, local governmental authority in order to comply with water quality control obligations is analogous to the requirement for Publicly Owned Treatment Works to have and exercise legal authority to require pretreatment of industrial wastes being discharged to their sewage collections systems (CWA 402(b)(8)).

Section: Findings Subsection: 15

Comment: The Copermittees should not be responsible for illicit discharges from third parties. There is no authority under any provision of the Clean Water Act, the Porter-Cologne Act, or any regulations thereunder, to suggest the concept that a municipality, or any other party (other than the discharger) must accept responsibility for its unlawful actions. Under the Regional Board's theory, the State Legislature would be responsible for every burglary committed in the State merely because the State Legislature made it a crime for one to commit the act of "burglary." The Clean Water Act allows discharges to a municipal storm sewer system, so long as the municipality has obtained a permit under the Clean Water Act which requires controls "to reduce the discharge of pollutants to the maximum extent practicable . . . ." Where such a permit has been obtained, so long as the municipality is in compliance with the terms of the permit, it is in compliance with the requirements of the Clean Water Act. The fact that some third party has violated the provisions of the County's code or some other Copermittee's ordinance, cannot, under any circumstances, automatically result in a violation by the municipality of the Clean Water Act where the municipality is otherwise in compliance with the terms of the NPDES permit. (County of San Diego)

Response: Clean Water Act Section 402(p) specifically requires the operators of MS4s to prohibit non-storm water into their MS4s. A measure to determine if the operator has effectively prohibited such discharges is for the regulatory authority to determine if such discharges are occurring. In such cases where they are occurring, the operator must be held responsible.

Section: Findings Subsection: 15

Comment: Finding No. 15. The City questions the language in Finding No. 15, which states that the City "essentially takes 'title' for" discharges into MS4s. This finding should state only that the City should take reasonable steps to identify and eliminate illicit discharges by third parties. (City of San Diego)

Response: The language "title" comes from the Preamble to the Phase II storm water regulations. While the intent of using this term was to exhibit the Copermittees responsibility for the discharges, it may be confusing. For this reason, any language referring to "title" will be removed.

See change at permit Finding 15.

Section: Finding Subsection: 16

Comment: Copermittees do not profit from land development. Co-Permittees are required by law to allow economic uses of the land. Co-Permittees have some control over what is built but cannot prevent anything from being built. In addition hundreds of independent fiscal impact studies iIlustrate that the service costs to cities of new residential, industrial and office development far exceed all of the combined revenues cities receive from these developments (City of Chula Vista, City of Carlsbad, City of Solana Beach, Coalition for Practical Regulation, County of San Diego)

Response: While the Copermittees may not "profit" from land development according to the common definition and use of the word, the Copermittees do realize, or intend to realize, net benefits that are not

exclusively financial from the residential, commercial, industrial, and other activities proposed by private parties that they authorize within their jurisdiction. Because the Copermittees have the land use authority to regulate these activities, which can be a source of pollutants and runoff that impair receiving waters, so the Copermittees must also exercise their legal authority to ensure that the resulting increased pollutant loads and flows do not further degrade receiving waters. Nonetheless, the Finding will be revised to use the words "realize benefits" in place of "profit."

Section: Finding Subsection: 16

Comment: Finding No. 16 would result in a similar consequence that would supercede the power of local government. The new permit is proposing that the Regional Board adopt a finding to justify telling local governments specifically how they must use their land use authority. Our elected City Council has that responsibility pursuant to the Government Code. (City of San Juan Capistrano)

Response: California Water Code (CWC) section 13377 provides that the Regional Boards shall issue waste discharge requirements which apply and ensure compliance with all applicable provisions of the Federal Water Pollution Control Act (33 U.S.C. §1251 et seq.), as amended, also known as the federal Clean Water Act (CWA). Section 402(p)(3)(B)(iii) of the CWA requires municipalities to implement "controls to reduce the discharge of pollutants to the maximum extent practicable, including management practices, control techniques and system, design and engineering methods, and such other provisions as the Administrator or the State determines appropriate for the control of such pollutants." The SDRWQCB's responsibility is to translate this section of the CWA into the form of waste discharge requirements. Therefore the SDRWQCB has the authority to require specified programs to be implemented by the municipalities in order to carry out CWA requirements. Furthermore, a program involving land use is specifically addressed at 40 CFR 122.26(d)(2)(iv)(A)(2), "[a] description of planning procedures including a comprehensive master plan to develop, implement and enforce controls to reduce the discharge of pollutants from municipal separate storm sewers which receive discharges from areas of new development and significant redevelopment." The tentative order solely requires Copermittees to exercise their planning power in a manner that takes into account potential water quality impacts and furthermore, for Copermittees to facilitate the smooth implementation of applicable provisions of the CWA.

Section: Findings Subsection: 16, 17, 18

Comment: What, if any effective control can the City exercise over pollution generation in much of the new development, after it is built out since there is a limit to what controls municipalities can enforce on property owners. (City of Chula Vista)

Response: The Copermittees are required to develop and implement a program to develop, implement, and evaluate the effectiveness of BMPs to reduce pollutants to the MEP and ensure that discharges of urban runoff to do cause or contribute to an exceedance of water quality objectives. The Copermittees are required to adopt and enforce sufficient legal authority and demonstrate sufficient financial resources to achieve permit compliance. The manner in which the Copermittees accomplish this is largely up to them.

Section: Findings Subsection: 17

Comment: Finding 17 is arbitrary and capricious and is not supported by the evidence. In Finding 17, Copermittees are held responsible for the short and long term water quality consequences of their land use planning, construction, and existing development decisions. On the contrary, the only "responsibility" under the Clean Water Act on the Copermittees is to comply with the terms of the NPDES permit, which is to be issued so long as sufficient controls are in place to reduce the discharge of pollutants to the maximum extent practicable from their MS4s. (County of San Diego)

Response: The Federal Regulations clearly require municipalities to address urban runoff during each stage of development. Regarding BMP implementation during each stage of urban development, US EPA recommends that Copermittees ensure the appropriate implementation of the structural BMPs by considering some or all of the following: pre-construction review of BMP designs; inspections during construction to verify BMPs are built as designed; post-construction inspection and maintenance of BMPs; and penalty provisions for noncompliance with design, construction or operation and maintenance.

Section: Finding Subsection: 18

Comment: Add: When a Copermittee incorporates policies and principles designed to safeguard water resources and protect public health into its General Plan. (State Department of Health Services)

Response: This issue has been addressed in the revised Tentative Order in Finding 36.

Section: Findings Subsection: 18

Comment: Finding No. 18 provides that land use planning and zoning is where urban development is conceived providing the greatest and most cost effective opportunity to protect water quality. The finding further provides that the incorporation of policies and principles to protect water resources in a Copermittee's general plan is a far reaching step towards the preservation of local water resources for future generations. As discussed elsewhere in the County's General and Specific comments, the provisions of the Tentative Order imposing on the Copermittees an obligation to modify their General Plans and to further adopt ordinances and laws in an attempt to preserve “local water resources for future generations,” is an improper attempt by the Regional Board to legislate and to act outside of any authority provided under the Clean Water Act or State law. It is also an attempt to "pass the buck" of protecting the waters of the State of California from the State and Regional Boards onto the individual Copermittees. It is, moreover, a clear attempt to impose an “unfunded mandate” on the Copermittees in violation of the California Constitution. (County of San Diego)

Response: The SDRWQCB has the legal authority to require the Copermittees' General Plans to include considerations of the water quality impacts caused by urban runoff. Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A)(2) provides that Copermittees are to develop and implement a proposed management program which is to include “A description of planning procedures including a comprehensive master plan to develop, implement and enforce controls to reduce the discharge of pollutants from municipal separate storm sewers which receive discharges from areas of new development and significant redevelopment. Such plan shall address controls to reduce pollutants in discharges from municipal separate storm sewers after construction is completed.”

USEPA states that the Copermittee "must thoroughly describe how the municipality's comprehensive plan is compatible with the storm water regulations" (USEPA, 1992). To achieve this, the Copermittee shall incorporate water quality and watershed protection principles and policies into its General Plan (or equivalent plan). USEPA supports addressing urban runoff problems in General Plans (or equivalent plans) when it states "Runoff problems can be addressed efficiently with sound planning procedures. Master Plans, Comprehensive Plans, and zoning ordinances can promote improved water quality by guiding the growth of a community away from sensitive areas and by restricting certain types of growth (industrial, for example) to areas that can support it without compromising water quality" (USEPA, 2000).

While the SDRWQCB has the legal authority to require the Copermittees' General Plans to include considerations of the water quality impacts caused by urban runoff, the Tentative Order has been modified to provide the Copermittees with more discretion regarding the General Plans' contents. The Tentative Order will only include examples of the types of principles and policies which should be in a General Plan, instead of specific requirements. In addition, the Copermittees will be allowed to develop their own work plan and time schedule for any changes to their General Plans they find necessary. See change at permit section F.1.a.

Section: Findings Subsection: 19

Comment: Finding 19 on page 4 - Suggest changing the first sentence to "Unregulated construction activities can be a significant cause of receiving water impairment". Eliminate the second sentence because 1) it is extraneous to the finding and 2) it incorrectly implies that river impairment is caused by siltation from construction activities. River impairment from siltation has a far greater set of causative factors than mere construction activities (ie clear cut logging operations, improper agricultural practices, poor land and water management practices, overdredging of rivers etc). revise the third sentence to read "Sediment runoff rates from unregulated construction sites can greatly exceed natural " Within Carlsbad and many other jurisdictions where good erosion control methods are utilized, siltation downstream from the development is generally lower than predevelopment conditions. (City of Carlsbad)

Response: The Preamble to the Phase II storm water regulations include a comprehensive summary of studies documenting the impact of construction sites on receiving waters. The Preamble does not make a distinction between regulated and unregulated sites. While impairment due to siltation is not solely caused by construction sites, they are a key contributor. Though siltation may be reduced over the long-term after development, this finding refers to construction. As noted above, the impacts of construction on receiving waters has been widely documented.

Section: Finding Subsection: 19

Comment: Construction sites do not greatly exceed natural erosion rates, unless construction is continuous in the watershed. In nature, erosion is episodic, occurring during heavy rains when large landslides occur. If construction in the watershed is also episodic, as it is in our built-out community, than construction impacts are similar or less than what might have occurred if urbanization had not taken place. (City of Solana Beach)

Response: Erosion rates from construction sites have great potential to exceed natural erosion rates. In the Preamble to the Phase II NPDES storm water regulations, USEPA is very clear on potential for significant erosion from construction sites. The Preamble cites many studies exhibiting the negative impacts to receiving waters caused by erosion from construction sties. One study cited in the Preamble states "the equivalent of many decades of natural or even agricultural erosion may take place during a single year from areas cleared for construction" (USEPA, 1999b).

Section: Findings Subsection: 19

Comment: Finding No. 20 provides that "the Copermittees' wet weather monitoring results collected over the past decade, as well as volumes of other references in the literature today confirm substantial pollutant loads to receiving waters in runoff from existing urban development." The Regional Board further concludes that "Implementation of jurisdictional and watershed URMPs, which include extensive controls on existing development, can reduce pollutant loadings over the long term." The so called "volumes of other references" referred to in the finding are not cited anywhere in the finding itself or in the Regional Board's discussion of the finding in the Technical Report. Further, the effectiveness of any given URMP will depend on the development in question and the selected BMPs. (County of San Diego)

Response: For a comprehensive summary of studies documenting the impacts of urban runoff on receiving waters, see the Preamble to the Phase II NPDES storm water regulations (USEPA, 1999b).

Regarding the effectiveness of urban runoff management programs, it is true that BMP implementation is critical. That is why the Tentative Order includes extensive requirements for BMP implementation, while providing the Copermittees flexibility in choosing which particular BMPs to implement.

Section: Findings Subsection: 19

Comment: Re Finding 19: The State Board is attempting to abandon their responsibilities to regulate, inspect, and enforce the provisions of the CWA by transferring such responsibilities to the Copermittees via unfunded mandates. (County of San Diego)

Response: The CWA describes a process of dual authority in which regulated industrial and construction activity should be regulated by both the permitting authority and MS4 operator. This finding simply clarifies that dual regulation relationship. In no way does the Tentative Order represent an attempt of the SWRCB or SDRWQCB to abandon their responsibilities to regulate certain categories of industrial and construction sites. These categories are clearly defined in CWA section 402.

Section: Finding Subsection: 20

Comment: To assist in stormwater program funding Copermittees should charge fees for connection to MS4s similar to connection fees charged for use of the sanitary sewer system. (Surfrider Foundation)

Response: Comment noted.

Section: Findings Subsection: 21

Comment: Finding No. 21 provides that "because the urbanization process is a direct and leading cause of water quality degradation in this Region, fundamental changes to existing policies and practices about urban development are needed if the beneficial uses of San Diego's natural water resources are to be protected." The Regional Board then seeks to support this finding by referring to the Region's 303(d) list, which it claims shows that the impacts of urban runoff are significant. The finding is inappropriate as it is the responsibility of the State Board, not the Copermittees, to implement water quality practices and procedures as needed to protect the beneficial uses of San Diego's natural water resources. Again, the Regional Board seeks to transfer its obligations on to the Copermittees, and to impose an unfunded mandate on Copermittees. There is no legal or other evidentiary support for such a finding. (County of San Diego)

Response: The 303(d) list includes information about the source of impairment. For an overwhelming number of impaired receiving waters, non-point discharges are identified as a source. Most of the watersheds for these impaired water bodies are urban. Therefore, it can be inferred that urban runoff causes or contributes to these impairments.

Such problems are indeed frequently urban runoff related. For instance, a common conveyance for a sewage spill to reach a beach is through the municipal storm water system. Also, exceedances of standards at some of our Region's beaches have unquestionably resulted from pollutants conveyed by the storm water drainage system (SDRWQCB CAO 97-69 and CDO 98-74). In addition, urban runoff is increasingly being targeted as the cause of beach closures and postings in other areas of the San Diego region and Southern California. Urban runoff has been identified as a principal contributor to fecal coliform contamination in Orange County's Aliso Creek, a creek which often causes beach postings when flowing into the ocean (SDRWQCB CAO 99-211).

Since discharges from MS4s are not allowed to cause or contribute to an exceedance of water quality standards, the Copermittees are responsible for the discharges from their MS4s under such conditions.

Section: Findings Subsection: 22

Comment: Finding No. 22
The City questions whether the City has authority to prohibit the discharge of storm water into its MS4s where such discharge is authorized under a general industrial or construction storm water permit. If there is need for more stringent control, the Regional Board, themselves, should include such requirements in general construction and industrial storm water permits. However, to the extent the City is required to inspect, monitor, and generally oversee permitted industrial and construction sites, the City needs to enter an agreement with the Regional Board that clearly spells out each party's role and shared responsibilities concerning storm water discharges at permitted industrial and construction sites. For example, such an agreement should include a requirement that the Regional Board notify the City of its inspections of certain industrial sites, so the City does not repeat inspections already performed by the Regional Board. See Tentative Order, Section F.3.b(6) (provides that the City is not required to inspect certain industrial sites already inspected by the Regional Board). In addition, such an agreement should specify whether monitoring at an industrial facility under the Tentative Order is in addition to, in place of, or supplements

such industrial facility's monitoring program under the general industrial storm water permit, and whether group monitoring is permitted. (City of San Diego)

Response: It seems likely that the coordination of inspection efforts described in this comment would be beneficial. SDRWQCB looks forward to creating such relationships with municipalities. However, in response to the statement that municipalities may not have "the authority to prohibit the discharge of storm water into its MS4s where such discharge is authorized under a general industrial or construction storm water permit," SDRWQCB disagrees. Such authority should already exist under the municipal responsibility to review plans, grant permits, and enforce ordinances within its jurisdiction. Also, as provided for in California Water Code § 13002, cities and counties may establish water quality protection requirements that go beyond the industrial or construction storm water permits or other requirements of the SDRWQCB or SWRCB.

Section: Finding Subsection: 23

Comment: Second sentence add: EDUCATION- ……..how to accomplish their jobs while protecting water quality and public health, and their specific roles…. (State Department of Health Services)

Response: This issue has been addressed in the revised Tentative Order in Finding 36.

Section: Findings Subsection: 24

Comment: Finding 24 implies that the Regional Board will not seek enforcement against the City if it can be established that the City has 'demonstrated a good faith effort to educate and enforce its local ordinance. No definition of "good faith effort" is found in the Tentative Order and will open the cities to speculation and litigation from the environmental community. If it is intended that the establishment and implementation of the requisite ordinances, best management practices ("BMPs"), jurisdictional urban runoff management program ("Jurisdictional URMP"), and standard urban storm water mitigation plan ("SUSMP"), are examples of good faith, it should be stated somewhere in the document. The Finding does not have legal or factual support. (La Mesa, County of San Diego, Coalition for Practical Regulation, Procopio, Cory, Hargreaves, & Savitch, L.L.P., El Cajon)

Response: Finding 24 has been revised in the Tentative Order to remove all discussion of what constitutes "good faith" enforcement of local legal authority.

Section: Finding Subsection: 24

Comment: The IEA strongly urges the RWQCB to set enforcement guidelines in all areas of the permit to
ensure fair and equitable enforcement. (Industrial Environmental Association)

Response: Sections C, F.2.h, F.3.b.7, and Attachment C of the revised Tentative Order contains enforcement guidelines for the Copermittees to consider. The establishment of enforcement guidelines at the jurisdictional level, however, is the discretion and responsibility of the Copermittees.

Section: Findings Subsection: 24

Comment: The City and State permits should be consolidated with fees and enforcement authority passed through to Co-permittees. (City of Carlsbad)

Response: The Tentative Order does not require the Copermittees to enforce the General Construction and Industrial Permits. Where the Tentative Order refers to the General Permits, it does not require enforcement of the permits, but rather allows for the Copermittees to use them as tools in enforcing their own local permits. For example, it is useful for the Copermittee to require coverage under the General Industrial Permit, in that it will help the Copermittee ensure that the site is in compliance with local permits. However, in using such information, the Copermittee is not enforcing the General Permit. Instead, the Copermittee would be using the information as a tool for enforcement of its local permits. Since the Tentative Order does not require the Copermittees to enforce the General Permits, and since the Copermittees have their own responsibility for oversight of construction and industrial sites, passing State fees to the Copermittees is not warranted.

Section: Findings Subsection: 26

Comment: Finding 26 and Section C of the Tentative Order could result in violations of Receiving Water Limitations for toxicity and trigger $3,000 per violation. Is this the SDRWQCB's interpretation and intent? (La Mesa, Oceanside)

Response: The presence of toxicity in urban runoff discharged from MS4s that causes or contributes to an exceedance of receiving water quality objectives or constitutes a threat to human or environmental health is a violation of Order 90-42 and the Tentative Order.

We assume the reference to $3000 per violation is based on the provisions for Mandatory Minimum Penalties (MMPs) recently incorporated into the California Water Code. The MMPs apply to violations of effluent limitations. Section C establishes receiving water limitations, to which the MMPs do not apply.

Section: Findings Subsection: 26

Comment: The toxicity requirement cited in Finding 26 is neither legal nor attainable; this is a drinking water standard. The finding and the discussion that follows in the Technical Report are utilized to support the implementation of water quality standards or numeric effluent limitations. The Regional Board has no legal authority to impose numeric limitations on the Copermittees, nor to force the Copermittees to comply with water quality standards. The CALTRANS Statewide Permit does not contain this language and it should be removed from the Tentative Order. This is a more appropriate requirement for The Basin Plan as a Total Maximum Daily Loads allowable. The Basin Plans may need to be re-written. The finding and the discussion that follows in the Technical Report are utilized to support the implementation of water quality standards or numeric effluent limitations. As discussed above in other portions of these comments, the Regional Board has no legal authority to impose numeric limitations on the Copermittees, nor to force the Copermittees to comply with water quality standards. Rather, as set forth in Defenders of Wildlife v. Browner, supra, such an attempt would amount to the

imposition of standards stricter than those provided for under the Clean Water Act, which can only be supported after there has been a finding of "necessity" by the Regional Board in accordance with California Water Code Section 13377. No such finding of necessity has been made, nor would such a finding be supported by the evidence. (SANDAG, County of San Diego)

Response: The Toxicity requirement is derived from the Ocean Plan and is not a drinking water standard. The Copermittees have the responsibility to ensure that the discharge from their MS4s does not cause or contribute to exceedances of receiving water quality objectives nor constitutes a threat to human or environmental health. Toxicity is a measurement of the impact of MS4 discharges to human and environmental health.

Section: Findings Subsection: 27

Comment: As set forth under the CWA, the focus of the Tentative Order should be on controlling discharges from MS4s "to the maximum extent practicable". (County of San Diego)

Response: The first statement made in Finding 27 must be coupled with the following statement that reads, "This Order is not meant to control background or naturally occurring pollutants and flows." The statement to which this comment refers just helps clarify that the SDRWQCB will not hold the Permittees responsible for natural background levels.

Section: Findings Subsection: 28

Comment: The "Watershed Management Areas (WMAs)" table in Finding No. 28 (i.e., Table 2) is inconsistent with the similar "Copermittees by Watershed" table in Section J of the Tentative Order (i.e., Table 4). The information regarding what Table 2 terms the Mission Bay WMA differs from that contained in Table 4 for the same area.
We also suggest making the format of Tables 2 and 4 the same, because the current differences in formatting and content of these two tables lead to unnecessary confusion (e.g., Table 2 lists Penasquitos under the heading "Hydrologic Unit(s)," while Table 4 lists it under the heading "Watershed Urban Runoff Management Program" and lists Miramar Reservoir, HA (906.10) and Poway HA (906.20) under the heading entitled "Hydrologic Unit or Area"). (City of San Diego)

Response: Table 2 and 4 differ in minor ways for specific reasons. Table 2 comes directly out of the SDRWQCB report "Watershed Management Approach," January 2000. It is a basic table used by the SDRWQCB for watershed concerns such as impairments. However, Table 2 is not entirely useful for the development of watershed urban runoff management programs by the Copermittees. For this purpose, Table 4 was developed. The primary difference between the two tables is that the Mission Bay and Los Penasquitos watersheds are separated in Table 4. This separation is appropriate for Copermittee watershed management, since the two watersheds have different primary issues. For the development of Watershed Urban Runoff Management Programs, Table 4 should be used.

Section: Findings Subsection: 28

Comment: Table 2 of the Findings (No. 28) and Table 4 of section J. Watershed Urban Runoff Management Program lists Cajon as being in the San Diego Bay Watershed. All of the City of Cajon Drains to the San Diego River. (City of El Cajon)

Response: The error has been corrected in the Final Draft of the Tentative Order.

Section: Finding **Subsection: 28**

Comment: The 303(d) list for the San Diego region is lacking, and more studies should be performed to determine additional impairments. (Surfrider Foundation)

Response: Comment noted.

Section: Finding **Subsection: 28**

Comment: What information was used to list the San Luis Rey River as being impaired by coliform and nutrients? (City of Oceanside)

Response: The San Luis Rey River is not known to be impaired for coliforms or nutrients and is not listed on the 303(d) list. However, a portion of the coastline, designated Pacific Ocean, San Luis Rey Hydrologic Unit (HU) is considered impaired for coliforms. This coliform impairment was determined based on numerous beach closure days posted by the County of San Diego.

Section: Finding **Subsection: 28**

Comment: The permit should name all listed water bodies and their impairments. (Surfrider Foundation)

Response: Table 2 under Finding No. 28 in the permit includes a list of the surface water bodies and their corresponding 303(d) pollutant(s) of concern and/or impairment. In addition, Attachment 2 of the Fact Sheet also includes the 303(d) list for the San Diego Region.

Section: Finding **Subsection: 28**

Comment: Copermittees should be encouraged to identify threatened receiving waters to be considered for listing. (Surfrider Foundation)

Response: The Regional Board uses the process required by USEPA for identifying waterbodies that should be listed on the 303(d) list. Part of the process involves the Regional Board's solicitation of dischargers, stakeholders, etc. to identify waterbodies that are threatened or impaired and should be considered for 303(d) listing. Furthermore, in the permit under Section J. Watershed Urban Runoff Management Program, part 2.b., Copermittees are required to assess water quality of all receiving waters in the watershed based upon existing water quality data and annual watershed water quality monitoring.

This information will be provided in the URMP's annual reports to the Regional Board and would also be considered when identifying waterbodies for 303(d) listing. Therefore, the Copermittees are encouraged both through the permit, and through the listing process, to identify threatened receiving waters to be considered for 303(d) listing.

Section: Findings Subsection: 30

Comment: The City believes it will be difficult to develop a watershed planning component at a multi-jurisdictional level. Although run-off does not recognize political boundaries, such boundaries nevertheless exist. Regional Board coordination and funding are needed to facilitate the development of a multi-jurisdictional approach to watershed planning. (City of San Diego)

Response: The SDRWQCB will not be providing funding for the multi-jurisdictional approach as the requirement falls within the purview of the NPDES Program created by the Clean Water Act. The State of California has simply been delegated to administer this federally mandated program. However, the SDRWQCB plans to participate in watershed planning. This participation will in no way include a coordination role. Such a duty is better conducted by a local stakeholder.

Section: Findings Subsection: 30

Comment: The discussion of Finding 30 in the Technical Report inappropriately expands the application of the finding to require the identification, assessment and prioritization of "natural, social and other resources in the watersheds" and to "develop plans and regulations to guide growth and protect resources." Neither the Clean Water Act nor the Porter-Cologne Act, authorize either the State Board or the Regional Board, to regulate other resources in our environment (including endangered species, critical habitat, or coastal access), except to the extent that such would be necessary to protect the quality of our State's waters, but not vise versa. (County of San Diego)

Response: The Basin Plan identifies many beneficial uses which the SDRWQCB is responsible to protect. Multiple types of habitat, navigation, aquaculture, recreation, municipal service supply are among the many uses identified. The mission of the SDRWQCB is to preserve and enhance the quality of California's water resources, and ensure their proper allocation and efficient use for the benefit of present and future generations. Good water quality is only one of the many uses which fall under the term "water resources."

Section: Finding Subsection: 30, 31

Comment: Finding No. 30: LAND USE PLANNING ON A WATERSHED SCALE and Finding No. 31: INTERGOVERNMENTAL COORDINATION
These findings will obviously require the close coordination of the various Copermittees. (SANDAG)

Response: Comment noted.

Section: Findings Subsection: 31

Comment: There is no authority under State or federal law that would allow the Regional Board to compel agreements between respective Copermittees. By definition, any "agreement" cannot be "compelled" and the Regional Board does not have any authority to compel agreements between Copermittees. Although agreements to assist in implementing programs "on a watershed and regional basis in the most cost effective manner" is a prudent course of action, unfortunately, the Tentative Order does not permit the implementation of the SUSMPs on a "regional basis." In fact, the Technical Report expressly states Staff is opposed to compliance with any SUSMP requirement using a "regional" approach, in spite of the fact that the State Board has already determined that "regional facilities" may be the most cost effective means in which to comply with SUSMP requirements, and in spite of the requirements of State law encouraging regional planning. (See Cal. Water Code § 13225(i).) (County of San Diego)

Response: The Federal NPDES regulations are clear that intergovernmental coordination between Copermittees can be required. They specifically prescribe coordination in two places. Federal NPDES regulation 40 CFR 122.26(d)(2)(i)(D) provides that "[The Copermittee must demonstrate that it can control through interagency agreements among coapplicants the contribution of pollutants from one portion of the municipal system to another portion of the municipal system." Federal NPDES regulation 40 CFR 122.26(d)(2)(iv) provides that the Copermittee shall develop and implement a proposed management program which "shall include a comprehensive planning process which involves public participation and where necessary intergovernmental coordination, to reduce the discharge of pollutants to the maximum extent practicable using management practices, control techniques and system, design and engineering methods, and such other provisions which are appropriate. The program shall also include a description of staff and equipment available to implement the program. […] Proposed programs may impose controls on a systemwide basis, a watershed basis, a jurisdiction basis, or on individual outfalls. […] Proposed management programs shall describe priorities for implementing controls."

Regarding the asserted conflict between intergovernmental coordination and SUSMPs, no conflict exists. First, the SUSMP provisions require development of a countywide model SUSMP. Second, the SUSMPs have been modified to allow for neighborhood or sub-watershed level structural BMP implementation.

Section: Findings Subsection: 31

Comment: Permit Section Pg. 7, Item 31: Governmental Coordination
The permit mentions that coordination with other watershed stakeholders, especially Caltrans and the Department of Defense, is critical. The staff and the Regional Water Quality Control Board (RWQCB) need to pursue State and Federal Legislation to mandate these other agencies to also cooperate with co-permittees. (City of Poway)

Response: Coordination with agencies such as Caltrans and the Department of Defense is critical and is addressed by the SDRWQCB in Finding 31. The Tentative Order does not require such coordination. Language in the Tentative Order regarding such coordination In Section D.1.g has been modified to clarify this.

Section: Findings Subsection: 32

Comment: The removal; characterization, and disposal of pollutants from MS4 (Municipal Separate Storm Sewer System) drainage structures will end up in the sewer system. (Metro Commission)

Response: The requirements in Tentative Order 2001-01 that some flows or wastes in the MS4 should be diverted or removed does not necessarily mean that they should be removed or diverted into a sanitary sewer. Finding 32, noted in the comments, finds that wastes and pollutants that deposit and accumulate in the MS4 system will be discharged from those structures into receiving waters. The finding states only that such accumulated wastes must be characterized and lawfully disposed. It does not require, or even recommend, that they be discharged into a sanitary sewer. Section B.2, noted in the comment, refers to non-storm water discharges that are prohibited only if the Copermittee determines that they are a significant source of pollutants to waters of the United States. Section B.2 of the Tentative Order does not require such discharges to be diverted or removed into a sanitary sewer. The Copermittees have the flexibility and discretion to determine the manner in which they comply with the requirements of Section B.2 of the Tentative Order.

Section: Findings Subsection: 33

Comment: Finding No. 33
As currently written, Finding No. 33 states that "Urban runoff is a significant contributor to the creation and persistence of Toxic Hot Spots in San Diego Bay." We believe it would be more accurate to state, at most, that urban runoff appears to be a potential contributor to Toxic Hot Spots – any broader statement is premature. As the Regional Board is aware, the City, in conjunction with the Port of San Diego and the U.S. Navy, are in the process of voluntarily conducting source identification work related to this issue. However, because this work is not yet completed, we believe there does not yet exist sufficient evidence or other documentation to support the broad language currently contained in Finding No. 33. (City of San Diego)

Response: The SWRCB's "Chemistry, Toxicity and Benthic Community Conditions in Sediments of the San Diego Bay Region" report supports Finding 33 (SWRCB, 1996). Regarding the Chollas Creek Toxic Hot Spot it states "Chollas Creek empties into the Bay near this site, carrying with it runoff from a large urban area. This creek is believed to carry high concentrations of PAHs into the Bay (McCain et al., 1992) and is the likely source of high chlordane levels at the site." Regarding the Downtown Piers Toxic Hot Spot, it states "Perhaps the most obvious explanation for these data [which found toxicity] would be the presence of a large storm drain and numerous smaller storm drains, which empty into the Bay near this station."

Section: Findings Subsection: 33

Comment: Finding No. 33 refers to California Water Code Section 13395 and provides that said section "requires regional boards to reevaluate waste discharge requirements ("WDR's") associated with toxic hot spots." The finding further refers to the consolidated toxic hot spot clean up program adopted by the State Water Resources Control Board in June of 1999. This finding is inappropriate in the subject Tentative Order, as Section 13395 specifically requires a reevaluation of waste discharge requirements for discharges who "have discharged all or part of the pollutants which have caused the toxic hot spot." Said

section further exempts the revision of a waste discharge requirement, if the toxic hot spot "resulted from practices no longer being conducted by the discharger or permitted under the existing waste discharge requirements, or that the discharger's contribution to the creation or maintenance of the toxic hot spot is not significant." Section 13395 is plainly directed at the actions of the person creating the "discharge" and would only apply to the requirements of the subject Tentative Order to the extent of discharges actually caused by the Copermittees. The finding incorrectly relies upon 13395 to support an expansion of the Tentative Order to toxic hot spot issues not otherwise authorized by Section 13395. (County of San Diego)

Response: The SWRCB's "Chemistry, Toxicity and Benthic Community Conditions in Sediments of the San Diego Bay Region" report supports Finding 33 (SWRCB, 1996). Regarding the Chollas Creek Toxic Hot Spot it states "Chollas Creek empties into the Bay near this site, carrying with it runoff from a large urban area. This creek is believed to carry high concentrations of PAHs into the Bay (McCain et al., 1992) and is the likely source of high chlordane levels at the site." Regarding the Downtown Piers Toxic Hot Spot, it states "Perhaps the most obvious explanation for these data [which found toxicity] would be the presence of a large storm drain and numerous smaller storm drains, which empty into the Bay near this station."

Section: Findings Subsection: 34

Comment: There is insufficient study and a lack of evidence to support the numeric sizing criteria set forth in the Tentative Order itself and its one size fits all application, and there is no finding, evidence, or other support for the general application of the exact same numerical sizing criteria to each and every one of the ten development categories identified in the Order. Finally, the numeric sizing criteria plainly violates Water Code Section 13360 and the prohibitions thereunder. (County of San Diego)

Response: Evidence in support of numeric sizing criteria is included in the "Staff Report for Standard Urban Storm Water Mitigation Plans and Numerical Sizing Criteria for Best Management Practices" and "Supplemental Information for Public Workshop on Numeric Sizing Criteria for Post-Construction BMPs for New and Re-Development," as referenced in the draft Fact Sheet/Technical Report. Application of SUSMPs and numeric sizing to the ten SUSMP priority development project categories is addressed elsewhere. Finally, the SWRCB found in Order WQ 2000-11 that SUSMPs and numeric sizing criteria constituted MEP and did not violate California Water Code section 13360.

Section: Finding Subsection: 34

Comment: Finding No 34: CHANGING THE STORM WATER MANAGEMENT APPROACH
The approach of filtering storm water by "...allowing it to flow slowly over permeable vegetative surfaces..." may not work well in the San Diego region because of the impermeable soil types that are predominant in this region, therefore this should not become a requirement, rather a recommendation. It may work in some areas of the region and may be a good solution, but if it is required without a determination of the soil types, vector control problems may be generated. Rats, roaches and mosquitoes tend to breed in areas where it is damp or where water is allowed to pond. (SANDAG)

Response: SDRWQCB recognizes that the region has an abundance of low permeability soil conditions. However, through the process of evapotranspiration, vegetative matter can abate nuisance waters that bare soil cannot. Also important to note is that infiltration is not the only option discussed in the finding. Filtration is also suggested.

Section: Findings **Subsection: 34**

Comment: Finding 34 on page 7 - Revise the finding to reduce the reliance upon "restoring and preserving the natural hydraulic cycle" through the use of over simplified structural controls like reducing post development runoff rates to predevelopment levels. Overemphasis of this simplified approach can potentially result in an effect opposite from what is intended. Even well designed facilities based upon "natural system" concepts can have significant negative environmental consequences. Poorly designed solutions can potentially have disastrous consequences. The City of Carlsbad and other coastal cities are characterized by hilly terrain subject to the very real potential of landslides and slippage. Directing runoff water into the geologic formations beneath land developments can result in catastrophic landslide events. Carlsbad is currently plagued with water seepage and springs that occur post development and which create a significant nuisance for the City and its residents. The construction of mandatory filtration basins could significantly increase the occurrence of these springs. Additionally, in some areas there is the potential for subsurface water to flow through soils containing -natural minerals which when leached out can result in runoff more deleterious than the pollutants in urban runoff. This document should instead focus on establishing clear goal based criteria designed to reduce pollutant loading rather than directing the agencies towards structural solutions based upon simple and potentially faulty assumptions. (City of Carlsbad)

Response: While the Tentative Order encourages infiltration, it is never required where it may be infeasible. Furthermore, the Tentative Order does not encourage accelerated infiltration rates; rather, it only encourages preserving natural infiltration rates. Finally, the Copermittees are provided discretion for the oversight of any infiltration BMPs. They can therefore ensure that natural infiltration does not cause significant negative environmental consequences.

Section: Findings **Subsection: 34**

Comment: In many cases, the “permeable vegetated surfaces” will have to be recreated or developed from scratch, since much of the watershed is now covered with hardscape. This will require significant funding that currently does not exist in many municipal budgets. Please provide information regarding how the Regional Board will assist Copermittees in creating the permeable, vegetated filters contemplated in the Tentative Order. (Procopio, Cory, Hargreaves, & Savitch, L.L.P.)

Response: The SDRWQCB will not be providing funding for the Co-Permittees to implement their programs.

Section: Finding **Subsection: 35**

Comment: Sweetwater Authority questions the soundness of the statement that, "...the risks typically associated with the infiltration of runoff (especially from residential land use areas) are not significant."

CWA requirements that may be addressed by pervious surfaces and infiltration may not resolve issues associated with drinking water supplies, based on SDWA requirements. (Sweetwater Authority)

Response: The SDRWQCB acknowledges the potential risk from infiltration of storm water. The Tentative Order includes requirements for the protection of groundwater in section F.1.b.2.i. These requirements are based on USEPA guidance, as developed by the USEPA Risk Reduction Engineering Laboratory. Implementation of such requirements should greatly reduce the risk of groundwater contamination resulting from storm water infiltration. Clearly, proper management of storm water infiltration is needed. For this reason, Finding 35 will state that the risk of groundwater contamination from storm water infiltration can only be reduced to insignificant levels if proper management is implemented.

Section: Finding Subsection: 35

Comment: We urge that the permit include specific requirements of the jurisdictions and the developers that long term operation, maintenance, and monitoring, and access be assured in perpetuity. (San Diego Audubon Society)

Response: Section F.1.b.2.b.x of the Tentative Order requires proof of a mechanism to ensure ongoing long-term BMP maintenance. A mechanism for long-term BMP maintenance would inherently include provisions for inspections/monitoring of the maintenance of the BMP. For example, the LARWQCB SUSMP includes consideration of inspections/monitoring of BMP maintenance. The LARWQCB SUSMP can serve as guidance to the Copermittees regarding BMP maintenance. The LARWQCB SUSMP states:

"[T]he Permittee shall require that the applicant provide verification of maintenance provisions through such means as may be appropriate, including, but not limited to legal agreements, covenants, CEQA mitigation requirements and/or Conditional Use Permits.

For all properties, the verification will include the developer's signed statement, as part of the project application, accepting responsibility for all structural and treatment control BMP maintenance until the time the property is transferred and, where applicable, a signed agreement from the public entity assuming responsibility for Structural or Treatment Control BMP maintenance. The transfer of property to a private of public owner must have conditions requiring the recipient to assume responsibility for maintenance of any Structural or Treatment Control BMP to be included in the sales or lease agreement for that property, and will be the owners responsibility. The condition of transfer shall include a provision that the property owners conduct maintenance inspection of all Structural or Treatment Control BMPs at least once a year and retain proof of inspection. For residential properties where the Structural or Treatment Control BMPs are located within a common area which will be maintained by a homeowner's association, language regarding the responsibility for maintenance must be included in the projects conditions, covenants and restrictions (CC&R). Printed educational materials will be required to accompany the first deed transfer to highlight the existence of the requirement and to provide information on what storm water management facilities are present, signs that maintenance is needed, how the necessary maintenance can be performed, and assistance that the Permittee can provide. The transfer of this information shall also be required with any subsequent sale of the property.

If Structural of Treatment Control BMPs are located within a public area proposed for transfer, they will be the responsibility of the developer until they are accepted for transfer by the County of other

appropriate public agency. Structural or Treatment control BMPs proposed for transfer must meet design standards adopted by the public entity for the BMP installed and should be approved by the County or other appropriate public agency prior to its installation."

Section: Findings Subsection: 35

Comment: Finding No. 35 involves infiltration of potential groundwater contamination and the management of the risks associated with infiltration, including requiring maintenance of drainage features in perpetuity. First, again as discussed elsewhere in these comments, it is the State Board and the Regional Board's obligation to protect the waters of the State of California and that obligation cannot be transferred onto the Copermittees. Second, a sufficient study has not been conducted for the Regional Board to conclude that the infiltration of urban runoff and the risks created through groundwater quality are superseded by the need to improve our surface water quality. In effect, there is insufficient evidence to support the application of a numerical sizing criteria, the objective of which is to discharge the pollutants of concern into our soil and into our groundwater, before they enter into the MS4 system, so as to avoid impacts on our surface water quality. Insufficient analysis has been conducted by the Regional Board to determine the impact of the numerical sizing criteria on the quality of our groundwater. In addition, the Regional Board's reference and reliance upon guidance from the State of Washington and the State of Maryland ignore those states (as well as the State of Florida's) reliance upon regional approaches, which Staff in this case has specifically disclaimed the benefits of, and their application in this permit. The Regional Board's refusal to consider "regional approaches" is also directly contrary to the express findings of the State Board in Order No. WQ 2000-11, and the provisions of California Water Code Section 13225(i).) (State Board Order No. WQ 2000-11, p. 21; Water Code § 13225(i).) (County of San Diego)

Response: The Tentative Order requires the implementation of structural treatment BMPs, of which infiltration is one option. Where the Copermittees choose to allow infiltration/redirection of flows which would otherwise enter their MS4s, restrictions are appropriate. The Copermittees cannot choose to redirect flows away from their MS4s and claim no responsibility for the potential impacts of such actions. In addition, the SWRCB upheld in Order WQ 2000-11 the infiltration restrictions included in the LARWQCB SUSMP, on which the infiltration restrictions in the Tentative Order are based.

Again, the Tentative Order does not require infiltration. It is merely one type of BMP out of many from which the Copermittees can choose. The Tentative Order includes infiltration restrictions in the event that infiltration is the chosen option for BMPs. The infiltration restrictions in the Tentative Order are based on a risk assessment conducted by USEPA's Risk Reduction Laboratory (USEPA, 1994). The sole purpose of the infiltration restrictions is to reduce the risk of groundwater contamination.

Regarding "regional approaches" the Tentative Order has been revised to allow for the implementation of neighborhood or sub-watershed level BMPs.

Section: Findings Subsection: 39

Comment: The public comment period and the hearing should be continued for at least ninety (90) days in order to give the Copermittees, and all interested Stakeholders, sufficient time to review and comment on such important issues. (County of San Diego)

Response: Sufficient time was given for interested parties to review the Tentative Order. Sufficient opportunity was given for all interested parties to voice their concerns and submit written comments.

Section: A Subsection:

Comment: The Permit must include numeric effluent limits. The Permit's omission of water quality-based effluent limits for numerous impairing pollutants is inconsistent with federal permitting regulations. If the State has failed to develop and implement numeric water quality criteria for a toxic pollutant, the regulations still require a numeric effluent limit to be established "Where a State has not established a water quality criterion for a specific chemical pollutant that is present in an effluent at a concentration that causes, has the reasonable potential to cause, or contributes to an excursion above a narrative criterion within an applicable State water quality standard, the permitting authority must establish effluent limits using one or more of the following options: [including using 'calculated numeric water quality criteria' and 'EPA water quality criteria']." 40 C.F.R. § 122.44(d)(1)(vi). (San Diego Baykeeper, Surfers Tired of Pollution, Surfrider Foundation, Environmental Health Coalition, San Diego Audobon Society)

Response: Typical NPDES permits are based on the concept of employing full-scale treatment of an effluent to remove pollutants at the end of the pipe (i.e., just before being discharged into receiving waters). Accordingly, typical NPDES permits contain numeric effluent limits which are arithmetically derived from receiving water quality objectives for each pollutant of concern in the effluent. However, municipal storm water permits are not typical NPDES permits because they are not based on the concept of full-scale treatment of polluted storm water. Full scale end of pipe treatment for storm water is not considered economically and technologically feasible at this time. Therefore municipal storm water permits do not contain numeric effluent limits, but rather are based on the concept that pollutants can be effectively reduced in storm water to the maximum extent practicable by the application of a wide range of best management practices (BMPs).

USEPA has issued guidance on the issue of numeric effluent limits in municipal NPDES storm water permits. It states "In response to recent questions regarding the type of water quality-based effluent limitations that are most appropriate for National Pollutant Discharge Elimination System (NPDES) storm water permits, the Environmental Protection Agency (EPA) is adopting an interim permitting approach for regulating wet weather storm water discharges. Due to the nature of storm water discharges, and the typical lack of information on which to base numeric water quality-based effluent limitations (expressed as concentration and mass), EPA will use an interim permitting approach for NPDES storm water permits.

"The interim permitting Approach uses best management practices (BMPs) in first-round storm water permits, and expanded or better-tailored BMPs in subsequent permits, where necessary, to provide for the attainment of water quality standards" (USEPA, 1996).

The Tentative Order follows this interim permitting approach.

Section: A Subsection:

Comment: The Permit should include in the Discharge Prohibition section that "The Permittee shall modify [their storm water management plan] to comply with waste load allocations developed and

approved pursuant to the process for the designation of Total Maximum Daily Loads for impaired water-bodies." (San Diego Baykeeper)

Response: 40 CFR 122.44 (d)(vii)(B) requires that NPDES permit effluent limitations be consistent with any waste load allocation for the discharge that are prepared by the state (Regional Board) and approved by USEPA. Once TMDL limits are established and approved by USEPA, NPDES permits will be required to include effluent limitations that are consistent with the TMDL allocations, so the concept of the proposed language is already required by federal regulation. In addition, a finding will be added to the permit to reference TMDLs and their relationship to the permit. This finding will be similar to the proposed language.

Section: A **Subsection:**

Comment: The title of the section "Prohibitions - Discharges" should be revised to read "Prohibitions Stormwater Discharges" (Sempra Energy)

Response: Section A of the Tentative Order can apply to both storm water and non-storm water discharges. Therefore, its title will not be changed.

Section: A **Subsection:**

Comment: The proposed Permit fails to include mass limits in the permit, and is thus inconsistent with 40 C.F.R. Section 122.45(f). Mass limits based on current performance should be applied for all pollutants referenced in the permit that are also listed on the 303(d) list for the permits' receiving waters. (San Diego Baykeeper)

Response: The inclusion of mass limits for pollutants in the Tentative Order is not required. 40 CFR 122.45(f) refers to requirements for pollutants for which numerical effluent limits have been calculated. Since numerical effluent limits have not been applied in the Tentative Order, as is allowed in 40 CFR 122.44(k), calculation of mass limits is not necessary or required.

Section: A **Subsection:**

Comment: A list of specific Water Quality Objectives for each pollutant should be compiled and included as an attachment to the permit. (San Diego Baykeeper)

Response: SDRWQCB publishes Water Quality Objectives for this region in the Water Quality Control Plan. This Basin Plan serves as the foundation for which every decision, permit, enforcement, and action is taken by the SDRWQCB. All Permittees are required to be knowledgeable on the terms and conditions set in the Basin Plan (including specific Water Quality Objectives). Therefore, the Tentative Order will not be amended to include an additional listing as doing so would be redundant.

Section: A Subsection:

Comment: The current definition of Water Quality Objectives included in Attachment D (Glossary) is not sufficiently specific to ensure violations are prohibited and should include those contained in the San Diego Basin Plan, the California Ocean Plan, the California Toxics Rule, the National Toxics Rule, and other state or federally approved surface water quality plans used by the Regional Board to regulate all discharges, including storm water discharges. (San Diego Baykeeper)

Response: The definition of water Quality Objectives in Attachment D (Glossary) has been revised to refer to the broad legal authority cited in the Fact Sheet/Technical Report (Section VII Directives Discussion Underlying Broad Legal Authority for Order No. 2001-01) and to contain the following:

As stated in the Porter-Cologne Requirements for discharge (CWC 13263),
"(Waste discharge) requirements shall implement any relevant water quality control plans that have been adopted , and shall take into consideration the beneficial uses to be protected, the water objectives reasonably required for that purpose, other waste discharges, the need to prevent nuisance, and the provisions of Section 13241."

Section: A Subsection: A.1

Comment: The phrase, "...or threaten to cause" is used in various places throughout the document. This phrase is very broad and subjective. This phrase should be removed. (SANDAG)

Response: Prohibition A.1, including the term "threatening to cause" is taken directly from the Basin Plan and therefore will not be changed.

Section: A Subsection: A.1

Comment: The definition of the term nuisance as defined in CWC § 13050 should be researched. This may be a similar concern to the phrase "threaten to cause". It is our understanding that Caltrans had the term nuisance removed from their permit. (SANDAG)

Response: Prohibition A.1, including the term "nuisance," is a Basin Plan Prohibition, and therefore will remain in the Tentative Order.

Section: A Subsection: A.2

Comment: Page 4 of 50 - paragraph 22. - Pursuant to this Order, local permits, plans, and ordinances must (a) prohibit the discharge of pollutants and non-storm water into the MS4; and (b) require the routine use of BMPs to reduce pollutants in site runoff.

These statements are or appear to be contradictory. Subparagraph (a) prohibits discharge of pollutants and non-storm water. Subparagraph (b) requires BMPs to reduce pollutants. What are the subtleties that distinguish when pollutant discharge is prohibited verses when the requirement is to reduce pollutants? Is the intent that subparagraph (a) is relative to non-storm water runoff; and subparagraph (b) is relative to

storm water runoff? Additionally, confusion exists within subparagraph (a) in that, the statement "discharge of pollutants and non-storm water" is prohibited could be interpreted to mean that discharge of pollutants and discharge of non-storm water are interdependent (i.e. must have both conditions to be prohibited) or independent (i.e. need only one condition to be prohibited). Finally in subparagraph (b) the pollutant reduction is relative to "site runoff." EPA defines storm water runoff as Urban Runoff; and runoff as precipitation, snow melt, or irrigation water. But there is no definition of site runoff. Recommend paragraph 22 be embellished to more clearly describe the intent of the section relative to the issues raised above. (City of Imperial Beach)

Response: The language in Finding 22 regarding prohibitions refers to Prohibitions section A and B in the Tentative Order. Prohibition A refers to the prohibition of discharges of pollutants which may cause conditions of pollution. Prohibition B refers to the prohibition of non-storm water. References to reducing pollutants to MEP are applicable when discharges of pollutants are not causing conditions which warrant prohibition.

Section: A Subsection: A.2, A.3

Comment: The City suggests that this Prohibition be deferred until the City is required to implement these and other relevant provisions of the Tentative Order. (City of San Diego)

Response: Prohibitions A.2 and A.3 are essentially in effect at present. Order No. 90-42 (section IX) requires the Copermittees to implement BMPs to reduce the discharge of pollutants into and from their MS4s to the maximum extent practicable. The Basin Plan prohibits discharges in a manner causing, or threatening to cause a condition of pollution, contamination or nuisance. Since these requirements are, for practical purposes, already in effect and enforceable, there is no compelling reason to defer their effective dates in the Tentative Order.

Section: A Subsection: A.3

Comment: At page 8 of the Tentative Order, Prohibition A.3 provides that "[d]ischarges into and from MS4s containing pollutants which have not been reduced to the maximum extent practicable (MEP) are prohibited." This prohibition provides little in the way of helpful guidance to Copermittees. First, "MEP" must be defined in the Order, so that Copermittees have a clear and convenient reference. Second, the Order should describe the criteria by which the Regional Board will determine whether discharges into and from MS4s have been reduced to MEP standards. Third, the Order should identify which party — the Copermittee or the Regional Board — has the burden of establishing that discharges have or have not been reduced to MEP. (Procopio, Cory, Hargreaves, & Savitch, L.L.P.)

Response: First, MEP has been defined in the Tentative Order. See Attachment D Glossary, Page D-3. Second, see the final portion for clarification of the criteria for which the Regional Board will determine if MEP has been met. Third, this portion also clarifies that the Regional and State Boards have the final responsibility of assessing whether MEP has been met. Please see excerpt from the Tentative Order below:

MEP is the acronym for Maximum Extent Practicable. MEP is the technology-based standard established by Congress in CWA section 402(p)(3)(B)(iii) that municipal dischargers of storm water (MS4s) must

meet. Technology-based standards establish the level of pollutant reductions that dischargers must achieve, typically by treatment or by a combination of treatment and best management practices (BMPs). MEP generally emphasizes pollution prevention and source control BMPs primarily (as the first line of defense) in combination with treatment methods serving as a backup (additional line of defense). MEP considers economics and is generally, but not necessarily, less stringent than BAT. A definition for MEP is not provided either in the statute or in the regulations. Instead the definition of MEP is dynamic and will be defined by the following process over time: municipalities propose their definition of MEP by way of their Urban Runoff Management Plan. Their total collective and individual activities conducted pursuant to the Urban Runoff Management Plan becomes their proposal for MEP as it applies both to their overall effort, as well as to specific activities (e.g., MEP for street sweeping, or MEP for sanitary sewer maintenance). In the absence of a proposal acceptable to the SDRWQCB, the SDRWQCB defines MEP.

In a memo dated February 11, 1993, entitled "Definition of Maximum Extent Practicable," Elizabeth Jennings, Senior Staff Counsel, SWRCB addressed the achievement of the MEP standard as follows:

"To achieve the MEP standard, municipalities must employ whatever Best Management Practices (BMPs) are technically feasible (i.e., are likely to be effective) and are not cost prohibitive. The major emphasis is on technical feasibility. Reducing pollutants to the MEP means choosing effective BMPs, and rejecting applicable BMPs only where other effective BMPs will serve the same purpose, or the BMPs would not be technically feasible, or the cost would be prohibitive. In selecting BMPs to achieve the MEP standard, the following factors may be useful to consider:

a.Effectiveness: Will the BMPs address a pollutant (or pollutant source) of concern?
b.Regulatory Compliance: Is the BMP in compliance with storm water regulations as well as other environmental regulations?
c.Public Acceptance: Does the BMP have public support?
d.Cost: Will the cost of implementing the BMP have a reasonable relationship to the pollution control benefits to be achieved?
e.Technical Feasibility: Is the BMP technically feasible considering soils, geography, water resources, etc?

The final determination regarding whether a municipality has reduced pollutants to the maximum extent practicable can only be made by the Regional or State Water Boards, and not by the municipal discharger. If a municipality reviews a lengthy menu of BMPs and chooses to select only a few of the least expensive, it is likely that MEP has not been met. On the other hand, if a municipal discharger employs all applicable BMPs except those where it can show that they are not technically feasible in the locality, or whose cost would exceed any benefit derived, it would have met the standard. Where a choice may be made between two BMPs that should provide generally comparable effectiveness, the discharger may choose the least expensive alternative and exclude the more expensive BMP. However, it would not be acceptable either to reject all BMPs that would address a pollutant source, or to pick a BMP based solely on cost which would be clearly less effective. In selecting BMPs the municipality must make a serious attempt to comply and practical solutions may not be lightly rejected. In any case, the burden would be on the municipal discharger to show compliance with its permit. After selecting a menu of BMPs, it is the responsibility of the discharger to ensure that all BMPs are implemented."

Section: A **Subsection: A.3**

Comment: Add: A.4. Water wasting and excessive water runoff is prohibited. (State Department of Health Services)

Response: The terms "water wasting and excessive water runoff" are too broad and subjective for the Copermittees to comply with and for the SDRWQCB to enforce adequately. Moreover, many of the Copermittees have already implemented measures to encourage water conservation. Regional Board does not recommend adding this language as a prohibition to Section A.4 of the Tentative Order.

Section: A **Subsection: A.4**

Comment: Clarify Section A4. Page 8. This prohibition appears to subject all new construction and redevelopment projects to SUSMP requirements, whereas, Section F.I.b(2), limits the applicability of SUSMPs to specific "Priority Development Project Categories" (Sections F. 1.b(2)(a)(i)-(x)). Therefore, the above language in this prohibition needs to be clarified that it is only applicable to the specific Priority Development Project Categories. (Sempra Energy)

Response: The language in Prohibition A.4 regarding peak flow rates and velocities has been removed. Requirements for the control peak flow rates and velocities will apply only to new development and significant redevelopment falling under the SUSMP categories.

Section: A **Subsection: A.4**

Comment: In areas altered from impervious to pervious, are storm water "volumes" regulated? (Anonymous Workshop 1)

Response: The Tentative Order does not require that increased storm water runoff volumes resulting from development be addressed, due to the difficulty in reducing such volumes. Impervious surfaces create increased storm water runoff volumes by preventing or reducing infiltration. Reduction in these resulting storm water runoff volumes by constructing infiltration devices is not always feasible, particularly due to soil conditions in many areas of the region, or due to limited space . Due to these limitations, reduction of storm water runoff volumes resulting from development is not required by the Tentative Order, but rather is strongly encouraged. Minimization of impervious surfaces is encouraged throughout the Tentative Order, while minimization of directly connected impervious areas is required in the SUSMP provisions. The Tentative Order also supports preserving and restoring the natural hydrologic cycle. Furthermore, in developing methods to control downstream erosion resulting from the development of SUSMP priority development projects, the Copermittees are required to consider means for reducing storm water runoff volumes. These can include infiltration and minimization of directly connected impervious areas, as noted above, as well as structural BMPs, such as cisterns.

Section: A **Subsection: A.4**

Comment: Section A.4: “Site” should be defined. (City of Chula Vista)

Response: Language in Prohibition A.4 which refers to peak flow rates and discharges to 303(d) listed water bodies has been removed. Therefore, the term "site" no longer is included in Prohibition A.4.

Section: A **Subsection: A.4**

Comment: The Tentative Order does not define the terms “New Development” and “Significant Redevelopment” so it is difficult to ascertain which projects fall within Prohibition A.4. For example, does “New Development” include projects that have approved tract maps but have not yet begun construction? And at what point does a redevelopment project become “significant” for purposes of this Order? (Procopio, Cory, Hargreaves, & Savitch, L.L.P.)

Response: Prohibition A.4 refers to all new development and redevelopment. It should be noted, however, that specific BMPs to be implemented for all new development and redevelopment is left to the discretion of the Copermittees. For very small or insignificant new development and redevelopment projects, the Copermittees may identify BMPs such as education measures as being sufficient. In addition, for clarification it should be noted that language in Prohibition A.4 which refers to peak flow rates and discharges to 303(d) listed water bodies has been removed. See change at permit section A.4.

Section: A **Subsection: A.4**

Comment: Is consideration given to redevelopment that does not exceed the pollution levels of existing development being replaced? (City of Chula Vista)

Response: Language in Prohibition A.4 which refers to predevelopment pollutant levels has been removed.

Section: A **Subsection: A.4**

Comment: A.4 Footnote 1 page 8 should be clarified or deleted because the wording is too vague and there should be an emphasis on actual impacts and not just flow rates and velocities. (Environmental Health Coalition)

Response: The footnote to Prohibition A.4 was included in the Proposed Changes document (Attachment 9 of the Executive Officer Summary Report for the December 13, 2000 Public Hearing). It referred to situations where detention in lower watersheds can increase the potential for flooding, by releasing detained flows which coincide with the timing of peak flood flows from upper watersheds.

Since the language of Prohibition A.4 has been removed from the Tentative Order, the footnote no longer applies.

Section: A **Subsection: A.4**

Comment: If the objective of the SUSMP is met if new development does not contribute to exceedance of receiving water quality objectives why impose the MEP rule on new development or redevelopment? Clarify. (City of Chula Vista)

Response: Copermittees must (1) reduce pollutants loads in post-development runoff to the maximum extent practicable and (2) ensure that post-development runoff does not cause or contribute to an exceedance of water quality standards. They cannot do one to the exclusion of the other. While post-development runoff in many situations may not be causing or contributing to an exceedance of water quality standards, significant increases in pollutant loads in post-development runoff may still degrade the quality of receiving waters, even if water quality standards are not exceeded. This is against antidegradation policy. For this reason, pollutants loads in post-development runoff must also be reduced to the maximum extent practicable.

Section: A **Subsection: A.4**

Comment: The proposed approach disregards the quality of runoff from new development. It is entirely possible that the runoff from new development will comply with water quality objectives but be higher than background levels in non-developed lands. (County of Orange Public Facilities & Resources Dep)

Response: The holding of post-development pollutant discharges to predevelopment or natural levels may not always be necessary for the protection of receiving water quality. There may be circumstances where a slight increase in pollutant concentrations from newly developed area may not contribute to an exceedance of water quality standards. For example, if a discharge's pollutant concentration from a newly developed area is increased but still well below the water quality objective for the 303(d) listed receiving water, the discharge will most likely not contribute to the exceedance of the water quality objective. The TMDL process frequently allows for such a situation, when "safety factors" for new development are included in waste load allocations.

The TMDL process is a more appropriate process for determining such allocations than the Tentative Order. It is a formal process which allows for extensive stakeholder involvement and public participation. It also addresses discharges from all sources, both existing and new.

For these reasons, the Tentative Order has been modified. The Tentative Order will still prohibit "post-development runoff containing pollutant loads which cause or contribute to an exceedance of receiving water quality objectives." Also, the potential for new development to cause or contribute to the 303(d) listing of a receiving water will need to be addressed in the Copermittees' planning processes. However, the requirement that post-development pollutant concentrations not exceed predevelopment pollutant concentrations will be removed. This issue will be addressed during the pending TMDL processes.

Section: A **Subsection: A.4**

Comment: Additionally, this prohibition should be redrafted so that it is clear that it applies only to specific Priority Development Project Categories. (Sempra Energy)

Response: Prohibition A.4 applies to all new development and redevelopment. However, language relating to peak flow rates and discharges to 303(d) listed water bodies has been removed.

Section: A **Subsection: A.4**

Comment: Section A.4.: "Post-development runoff which is greater in peak rate or velocity than pre-development runoff from the same site is prohibited." It is generally accepted that an undeveloped site, once developed, will have a higher peak rate runoff, additionally, because the runoff will in most cases be controlled, the velocity of that runoff will increase. It is more important to require that this increased rate or velocity cannot cause pollution. (City of Coronado)

Response: The language regarding peak flow rates and velocities in Prohibition A.4 has been removed from the Tentative Order. Control of peak flow rates and velocities shall instead apply only to SUSMP priority development projects. However, the control of peak flow rate and velocity increases from development is important. USEPA states: "In many cases the impacts on receiving waters due to changes in hydrology can be more significant than those attributable to the contaminants found in storm water discharges" (USEPA, 1999a). Therefore, the Tentative Order includes controls on both flows and pollutant discharges.

Section: A **Subsection: A.5**

Comment: Some of the prohibitions appear inappropriate.

For example, the prohibited discharges from vessels listed in paragraphs 15-18 are not relevant to the Tentative Order. This should be specified in Prohibition No. A.5. (i.e., that only relevant Basin Plan Prohibitions apply) or, alternatively, inappropriate prohibitions should be deleted from Attachment A. (City of San Diego)

Response: California Water Code Section 13243 provides that a Regional Board, in a water quality control plan, may specify certain conditions or areas where the discharge of waste, or certain types of waste is not permitted. The discharge prohibitions in Attachment A are applicable to any person, as defined by Section 13050(c) of the California Water Code, who is a citizen, domiciliary, or political agency or entity of California whose activities in California could affect the quality of waters of the state within the boundaries of the San Diego Region.

It is true that only those Basin Plan prohibitions that might pertain to discharges to or from a storm water conveyance system are relevant to the tentative Order. Some Basin Plan prohibitions may not be applicable to discharges to or from the storm water conveyance system of one or more Copermittees. However, it is neither prudent or necessary to delete a Basin Plan prohibition from Table A based on assumption that it would never be applicable. Doing so could weaken the permit if there were an unanticipated or unusual situation to which one of the deleted prohibitions might apply. In any case, there is no harm in having Attachment A include all the Basin Plan prohibitions, including those which may seem unlikely to apply to discharges to or from a storm water conveyance system.

Section: B Subsection: B.4

Comment: All fire activities such as washing and training should be exempted from storm water permit because:
1. Discharges from fire service activities are typically clean.
2. Many fire agencies have no funds to pay for water filter devices.
3. BMPs might hinder or interfere with important fire suppression drills, potentially leading to safety concerns due to inadequate training
4. Fire service discharges are minimal, and therefore have limited impact.
5. There are no commercial facilities to wash fire trucks. Therefore, the practical and efficient way for the user to discharge this water into the sanitary sewer system. (San Diego County Fire Chiefs' Association, Vista Fire Department, Ramona Fire Department, City of Escondido, City of Oceanside, Borrego Springs Fire Protection District, Procopio, Cory, Hargreaves, & Savitch, L.L.P., State Department of Forestry and Fire Protection, Fire Districts Association of California, Intermountain Volunteer Fire & Rescue Department, San Diego Lifeguard Service, Rancho Santa Fe Fire Protection District, Metro Commission)

Response: The SDRWQCB agrees that all fire service activities are important to the protection of life and property. It is possible that extensive BMP implementation could potentially impair fire service readiness in some cases. For these reasons, section B.4 of the Tentative Order will be changed. In order to allow the discharge of non-emergency fire fighting flows to be addressed in a manner which is feasible for the fire service, section B.4 will require the Copermittees to develop and implement a program to reduce pollutants in non-fire fighting flows identified by the Copermittees to be significant sources of pollutants. This will provide the Copermittees and the fire service with the means to develop a program which will not adversely affect fire service activities or require diversion of wash water, etc to the sanitary sewer.

Section: B Subsection: B.1

Comment: Prohibition No. B.1., which requires the City to “effectively prohibit all types of non-storm water discharges,” is unrealistic. The City cannot prohibit discharges of which it is not aware. (City of San Diego)

Response: Prohibition B.1 comes directly from the Clean Water Act (section 402(p)(3)(B)(ii)). There are no exemptions provided in the Clean Water Act for unknown discharges. Although eliminating discharges which are not known to occur may be difficult, there is nothing to prevent prohibition of discharges - known and unknown. Prohibit is defined as "to forbid by authority." Copermittee ordinances can effectively prohibit all non-storm water discharges, regardless of whether or not they have been identified.

Section: B Subsection: B.2

Comment: Prohibition B.2, set forth on page 9 of the Tentative Order, lists 17 categories (a through q) of non-storm water that may be discharged into and from an MS4, unless the Copermittee determines that

such categories of discharge are a "significant source of pollution to waters of the United States." The term "significant" is not defined qualitatively or quantitatively in the Order, so one is left to presume that "significance" will be defined not by the Regional Board but by the Copermittees themselves. By what authority and through what mechanism will the Regional Board overturn a Copermittee's determination that a given discharge category is not a "significant" source of pollution? How will the Regional Board address discharge categories that, when viewed from a single Copermittee's perspective, are individually insignificant, but when viewed from a watershed perspective are cumulatively significant? (Procopio, Cory, Hargreaves, & Savitch, L.L.P.)

Response: As per the Federal NPDES regulations, the determination of significance is left to the Copermittees' discretion. However, if it is determined that the discharges are individually or cumulatively causing or contributing to an exceedance of water quality standards, the SDRWCB may require implementation of BMPs for such discharges, per section C of the Tentative Order.

Section: B **Subsection: B.2**

Comment: Is there a method for determining which of the categories listed in this section are not significant sources of pollution? Please define significant. (SANDAG)

Response: As per the Federal NPDES regulations, determination of significance is left to the discretion of the Copermittees.

Section: B **Subsection: B.2**

Comment: In some hydrologic areas, the tap water from MWD may contains TDS at the level higher than the Basin Plan TDS water quality objectives for surface waters. Would TDS be considered a pollutant? Would mineral removal be required as a BMP to achieve MEP for tap water discharges? (City of Oceanside)

Response: Under the current Basin Plan, TDS levels in excess of defined water quality objectives could be considered a pollutant. In a recent decision, the SDRWQCB voted to uphold TDS water quality objectives in a ground water basin to prevent the degradation of water quality and the loss of beneficial uses.

Section: B **Subsection: B.2**

Comment: We urge that these categories be prohibited at levels well below those at which they each become significant. The paragraph might be improved to change the word "significant" to "potentially significant" or perhaps "observable". (San Diego Audubon Society)

Response: This requirement, and the term "significant," are based directly on the Federal NPDES regulations (40 CFR 122.26(d)(2)(iv)(B)(1). In order to be consistent with the Federal NPDES regulations, no change will be made.

Section: B **Subsection: B.2**

Comment: Strict adherence to these permit requirements will create a significantly greater risk to the environment than that posed by activities currently regulated by the RWQCB. The mandated requirement to unnaturally increase infiltration everywhere development occurs will create discharges from rising ground water, springs, crawl space pumps and footing drains. (City of Carlsbad)

Response: Nowhere does the Tentative Order mandate the unnatural acceleration of infiltration. The Tentative Order promotes the use of infiltration to offset losses of infiltration due to the creation of impervious surfaces due to development. This type of infiltration restore natural infiltration rates, as opposed exceeding natural infiltration rates.

Section: B **Subsection: B.2**

Comment: Will car dealers washing cars be allowed to continue draining to MS4?
How are cities to stop wash water from service stations from discharging to MS4? (Jim)

Response: The discharge of wash water from car dealerships and service stations into the MS4 constitutes an illicit discharge which is prohibited under the existing Order 90-42 and Tentative Order 2001-01. The Copermittees are required to address such activities under Sections F.3.c and F.5 of the Tentative Order.

Section: B **Subsection: B.2**

Comment: Is runoff from commercial parking lots which drain to MS4 prohibited? (Jim)

Response: Runoff from commercial parking lots that drain to MS4s are not prohibited, but pollutants in such non-storm water runoff must be reduced to the MEP.

Section: B **Subsection: B.2.c**

Comment: Contaminated groundwater is not allowed to be infiltrated or pumped into the MS4. Therefore, the only efficient means to dispose or treat contaminant underground water is to discharge it into the sanitary sewer system. (Metro Commission)

Response: Under the requirements of Section B.2 of the Tentative Order, after determining that groundwater in an area is a significant source of pollutants, the Copermittee is required to implement or require the implementation of BMPs that will reduce the pollutants to the MEP and include that information in a report to the SDRWQCB. Diversion to the sanitary sewer is only one option available to the Copermittees among a number of possible alternatives.

Section: B **Subsection: B.2.j**

Comment: Are manufactured or mitigation habitats or wetlands included in the discharge category: "Flows from riparian habitats and wetlands are prohibited only if the Copermittee identifies them as a significant source of pollution"(see section B. Prohibitions 2 j)?
What operational programs would be required to allow such wetlands or habitat to be considered a non-prohibited discharge? (City of Chula Vista)

Response: Properly designed, operated, and maintained artificial habitats or wetlands constructed for purposes of urban runoff treatment are not included in the discharge category "Flows from riparian habitats and wetlands are prohibited only if the Copermittee identifies them as a significant source of pollution" because, by definition, these are BMPs created by the Copermittees to treat urban runoff containing pollutants.

Section: B **Subsection: B.2.n**

Comment: In section B.2.n., include non-dechlorinated swimming pool discharges in the list to be complete. (Padre Dam Municipal Water District)

Response: The list of discharges included in Prohibition B.2 is taken directly from the Federal NPDES regulations (40 CFR 122.26(d)(2)(iv)(B)(1)). Dechlorinated swimming pool discharges are included in the list because they are generally not a significant source of pollutants. However, non-dechlorinated swimming pool discharges are not included in the list because they can be a significant source of pollutants, due to the presence of chlorine. For this reason, the list will not be changed.

Section: B **Subsection: B.2.p**

Comment: Individual residential car washing need not be prohibited under B 2 p because the prohibition against hosing of impervious surfaces in residential area will prohibit individual residential car washing. (City of Chula Vista)

Response: Section D.1.b.5 requires the Copermittees to prohibit the discharge of wash water from the cleaning or hosing of impervious surfaces in municipal, industrial, commercial, and residential areas. This prohibition does not require the Copermittees to prohibit these activities, only the discharge of the wash water to the MS4.

Section: B **Subsection: B.3**

Comment: It is not clear what constitutes a significant source of pollutants. It will be difficult for an agency to categorically determine which category will have a significant source of pollutant. Each category will be source dependent. It will be difficult to know which BMP is to be implemented before a discharge is anticipated. (City of La Mesa)

Response: The Copermittees are required to make the determination of what constitutes a significant source of pollutants with respect to the pollutants concerned, potential impact to receiving waters of the discharge of the pollutants, and the affect of the discharge of such pollutants on their compliance with Tentative Order 2001-01. Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B)(1) places determination of what constitutes a significant source of pollutants on the Copermittees. Implementation of BMPs is the responsibility of the Copermittees. If necessary, the Copermittees can contact the SDRWQCB for guidance.

Section: B **Subsection: B.3**

Comment: What constitutes a significant source of pollutants? (City of Chula Vista)

Response: The Copermittees are required to make the determination of what constitutes a significant source of pollutants with respect to the pollutants concerned, potential impact to receiving waters of the discharge of the pollutants, and the effect of the discharge of such pollutants on their compliance with Tentative Order 2001-01. Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B)(1) places determination of what constitutes a significant source of pollutants on the Copermittees.

Section: B **Subsection: B.3**

Comment: Can the tentative order require the Regional Board to approve BMPs submitted by the Copermittees? (Port of San Diego)

Response: It is not the SDRWQCB role to approve/disapprove submittals. However, upon review of BMPs the Copermittee will be notified if the submittal is not sufficient.

Section: B **Subsection: B.3**

Comment: Request the SDRWQCB include the definition of "significant source of pollutants" in measurable terms. (City of Imperial Beach)

Response: The Copermittees are required to make the determination of what constitutes a significant source of pollutants with respect to the pollutants concerned, potential impact to receiving waters of the discharge of the pollutants, and the affect of the discharge of such pollutants on their compliance with Tentative Order 2001-01. Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B)(1) places determination of what constitutes a significant source of pollutants on the Copermittees.

Section: B **Subsection: B.3**

Comment: Prohibition No. B.3. appears to be unnecessary, as it merely repeats what already is required pursuant to Section C of the Tentative Order. In addition, the 180 day deadline is impractical, as

the identification of non-storm water discharges and implementation of BMPs for the identified non-storm water discharges is a continuous process. (City of San Diego)

Response: Prohibition B.3 does not repeat the requirements of section C. Prohibition B.3 refers to "de minimis" non-storm water discharges only which have been found to be significant sources of pollutants. Section C of the Tentative Order refers to any discharge which causes or contributes to an exceedance of receiving water quality objectives.

In order to be consistent with extensions of the implementation deadline for the Jurisdictional Urban Runoff Management Programs, a similar extension has been provided here. See change at permit section B.3.c.

Section: B Subsection: B.3.c

Comment: Why are the Copermittees required to identify BMPs for non-storm water discharges that are not a significant source of pollutants or are not categorically prohibited? (Anonymous Workshop 2)

Response: If a non-prohibited non-storm water discharge listed in Section B.2 of the Tentative Order is determined by the Copermittee to not be a significant source of pollutants, no prohibition or BMPs are required under Tentative Order 2001-01.

Section: B Subsection: B.3.c.1

Comment: Page 9 of 50 B.3.c. (1) – How are the Copermittees to know which categories of non-storm water discharge will have a discharge and whether or not the discharge will be prohibited or not? (City of Chula Vista)

Response: The categories of discharges of non-storm water discharges listed in B.2 need only be prohibited from entering an MS4 if such categories of discharges are identified by the Copermittee as a significant source of pollutants. It is the Copermittees' responsibility to identify these discharges and determine whether they constitute a significant source of pollutants. For non-storm water discharges that are determined by the Copermittee to be a significant source of pollutants, it is the Copermittees responsibility to select and implement a BMP or other course of action to prevent the discharge of the non-storm water discharge in question. This has been a requirement under Order No. 90-42 (Section VIII. B) since July 1990.

Section: B Subsection: B.3.c.2

Comment: Page 9 of 50 B.3.c. (2) – How are the Copermittees to know which BMP is to be implemented before a discharge is anticipated (City of Chula Vista)

Response: The categories of discharges of non-storm water discharges cited in the comment (air conditioning condensation, lawn watering, [dechlorinated] swimming pool discharges, etc....) need only be prohibited from entering an MS4 if such categories of discharges are identified by the Copermittee as a

significant source of pollutants. It is the Copermittees' responsibility to identify these discharges and determine whether they constitute a significant source of pollutants. For non-storm water discharges that are determined by the Copermittee to be a significant source of pollutants, it is the Copermittees responsibility to select and implement a BMP or other course of action to prevent the discharge of the non-storm water discharge in question. This has been a requirement under Order No. 90-42 (Section VIII. B) since July 1990.

Section: B **Subsection: B.4**

Comment: The definition of fire-fighting flows included in the permit should be "flows necessitated by an emergency from the time of unit response until the unit is back in full service and ready for the next call." (Fire Districts Association of California)

Response: The SDRWQCB agrees that all fire service activities are important to the protection of life and property. It is possible that extensive BMP implementation could potentially impair fire service readiness in some cases. For these reasons, section B.4 of the Tentative Order will be changed. In order to allow for the discharge of non-emergency fire fighting flows to be addressed in a manner which is feasible for the fire service, section B.4 will require the Copermittees to develop and implement a program to reduce pollutants in non-fire fighting flows identified by the Copermittees to be significant sources of pollutants. This will provide the Copermittees and the fire service with the means to develop a program which will not adversely affect fire service activities. The Copermittees can work with the fire service to define fire fighting flows and non-fire fighting flows.

Section: B **Subsection: B.4**

Comment: Add: B.5. Vector Control: The application of pesticides and herbicides for public health protection by the local vector control agency are not prohibited. (State Department of Health Services)

Response: No provision of the Tentative Order prohibits vector control agencies from applying pesticides and herbicides for vector control purposes. However, in some cases, compliance with BMPs developed by the Copermittees may restrict or prevent such applications in order to mitigate collateral pollution associated with such applications. As discussed in Finding 36 of the revised Tentative Order, local vector control agencies are encouraged to work closely with the Copermittees in whose jurisdictions applications of pesticides or herbicides may be necessary for vector control. Sufficient provisions exist in the Jurisdictional Urban Runoff Management Program to allow collaborative development of vector control measures and BMPs that achieve meaningful vector control and compliance with Tentative Order.

Section: B **Subsection: B.4**

Comment: The Board should not exempt non-emergency fire fighting activities from runoff mitigation requirements and prohibitions. Non-emergency activities are not subject to the time pressures which exempt emergency flows. (Environmental Health Coalition)

Response: Comment noted.

Section: B **Subsection: B.4**

Comment: On page 9, paragraph B.4, the text exempts emergency fire fighting flows saying they do not require BMPs and need not be prohibited. We urge that this exemption be changed to say that BMPs shall be employed, except in cases where their implementation would impact effectiveness, safety, and property. (San Diego Audubon Society)

Response: Non-practice fire fighting situations are emergencies. Loss of life and property are real concerns. There are also safety concerns regarding fire fighters. Implementation of BMPs in these situations might inadvertently compromise safety or effectiveness. For these reasons, BMP implementation during emergency fire fighting activities are not required.

Section: B **Subsection: B.5**

Comment: On page 10 of 50 under B.5. The last sentence mentions discharges containing pollutants which cannot be reduced to MEP through BMPs shall be prohibited. What standard do you apply to determine MEP? Are there numeric standards? (City of Oceanside)

Response: MEP is defined in Attachment D of the Tentative Order.

Section: B **Subsection: B.5**

Comment: Prohibition B.5 also states that "[n]on-prohibited discharges listed in B.2 above which contain pollutants which cannot be reduced to the maximum extent practicable by the implementation of BMPs shall be prohibited on a categorical or case by case basis." This sentence in non-sensical. If a Copermittee applies all feasible BMPs to reduce pollutants from a certain category of discharge, it is our understanding that the MEP standard has been met, in which case the discharge would be allowed. If the MEP standards demand something over and above all feasible BMPs — which would be absurd — please identify what additional measures would be required to meet the standard. (Procopio, Cory, Hargreaves, & Savitch, L.L.P.)

Response: The intent of Prohibition B.5 is to require the prohibition of the discharges listed in Prohibition B.2, if those discharges contain pollutants which cannot be reduced to insignificant levels. This requirement is found at 40 CFR 122.26(d)(2)(iv)(B)(1). The language of this requirement has been changed to clarify this intent. See change at permit section B.5.

Section: C **Subsection:**

Comment: The Permit should include measurable benchmarks in storm water permits so that success or failure can be evaluated during the permit period and ensure that corrections can be made. (San Diego Baykeeper)

Response: The Tentative Order contains measurable benchmarks in the requirements for the Copermittees to develop and implement a Jurisdictional and Watershed Urban Runoff Management Program. Some examples include successful implementation of program elements and the results of the Dry Weather Monitoring and Receiving Water Monitoring Programs. The JURMP and WURMP both require an annual assessment of the program effectiveness with respect to both program implementation and water quality monitoring results.

Section: C Subsection: C.1

Comment: Reporting of discharges causing or contributing to cause an exceedance is an important element to the successful implementation of this permit. It is critical that Copermittees are confident that good faith effort implementation and subsequent reporting of errant discharges are not viewed in a punitive nature. Section C of the Tentative Order does not address whether compliance with the prescribed procedure "immunizes" the Copermittee from future enforcement actions (NOVs, CAOs, CDOs, ACLs) should the exceedances continue after the revised URMP is implemented. The Tentative Order suggests that this may in fact be the case, since section C.3 indicates that the Regional Board will continue to have enforcement powers only "while the Copermittee prepares and implements the above report." This is a critical issue that must be clarified in the Order. (Procopio, Cory, Hargreaves, & Savitch, L.L.P., SANDAG)

Response: As noted in Section C.3, at no time is a discharger whose discharge causes or contributes to an exceedance of receiving water quality objectives or that constitutes a threat to human or environmental health "immunized" from future enforcement actions by virtue of complying with standard NPDES Permitting BMP implementation and reporting requirements. Nonetheless, cooperative, responsible actions on the part of the discharger in attempt to comply with the Order are recognized as critical to resolving violations and protecting the beneficial uses of receiving waters.

Section: C Subsection: C.2

Comment: The Copermittees should be required in the Tentative Order to ensure that all proposed project-level storm water management programs, BMPs, or Storm Water Pollution Prevention Plans are available for review and comment by the public as part of the reconfigured environmental review process before they are approved for implementation. Furthermore, all comments need to be considered by the SDRWQCB prior to its approval of the report of exceedances of Receiving Water Limitations. (Sempra Energy, Surfrider Foundation)

Response: The public has the right to comment on all discretionary activities considered by the Copermittees. Storm Water Pollution Prevention Plans (SWPPPs) on file with the SDRWQCB are available for public review and comment. Unless requested, dischargers are not required to submit

SWPPPs to the SDRWQCB, but are required to have them on-site, up to date, and ready for review at any time during business hours.

Section: C **Subsection: C.2**

Comment: Add C.2.b.: Upon determination by the facility operator, local vector control agency or SDRWQCB that a BMP is breeding vectors, the facility operator shall promptly notify and thereafter submit a report to the SDRWQCB that describes the vector control measures and/or maintenance that will be done to correct the problem. (State Department of Health Services)

Response: While the SDRWQCB's authority to require submission of technical and monitoring reports is broad enough to require municipalities to monitor and report any alteration in the environment associated with water quality control measures; it would be more appropriate for the Copermittees to develop vector monitoring and management in collaboration with vector control agencies rather than to require municipalities to report any such collateral effects of storm water management to the SDRWQCB. Regional Board staff do not recommend the proposed language be added to Section C.2.b of the Tentative Order.

Section: C **Subsection: C.2**

Comment: Mere implementation of BMPs proposed in an approved Jurisdictional URMP will not preclude liability and possible third-party enforcement actions under the Clean Water Act if receiving water limitations are not strictly met.

Any additional time period granted by the RWQCB for modifications to the URMP will not act as a stay of enforcement action. (Surfrider Foundation)

Response: Comment noted.

Section: D **Subsection:**

Comment: The permit should include language that promotes the use of low tech controls such as vegetated filter traps. (Environmental Health Coalition)

Response: Section D of the Tentative Order refers only to the requirement for each Copermittee to establish, maintain and enforce adequate legal authority to control pollutant discharges into and from its MS4 through ordinance, statute, permit, contract or similar means. As discussed in Finding 11, the Copermittees have the discretion to the use of low tech controls such as vegetated filter traps in the implementation of the Jurisdictional Urban Runoff Management Programs.

Section: D **Subsection: D.1**

Comment: Parts of Section D.1.b appear to be in conflict with Section B.2 because it does not incorporate the non-storm water discharge categories that can be approved discharges pursuant to Section B (see Section B.2.(a-q). The list of "illicit discharges" should be deleted, as it is overly prescriptive and dictates the manner in which the City is required to comply with the general objectives of the Tentative Order. In order to avoid confusion with other provisions of the Tentative Order, the introductory clause of section D.1.b. be modified, as follows: "Prohibit all identified illicit discharges not otherwise allowed pursuant to section B.2." (City of San Diego, Sempra Energy, SANDAG)

Response: The list of illicit discharges was incorporated in the Tentative Order in part to satisfy repeated requests from the Copermittees and other commentors on previous drafts of the Tentative Order for more specificity and detail in the Tentative Order. The language of the introductory clause of section D.1.b. has been modified as suggested: "Prohibit all identified illicit discharges not otherwise allowed pursuant to section B.2."

Section: D **Subsection: D.1**

Comment: The enforcement obligations imposed on Copermittees by this section of the Tentative Order create additional problems. First, it is not clear that the Regional Board can delegate its enforcement duties to the Copermittees, since the Clean Water Act and California Water Code designate the State, and no one else, as the entity responsible for enforcing water quality standards. There is no provision for delegating enforcement to the holders of municipal storm water permits. (Procopio, Cory, Hargreaves, & Savitch, L.L.P.)

Response: Section D.1 does not delegate the enforcement duties of the SDRWQCB to the Copermittees. This section requires to Copermittees to develop legal authority to control discharges to its MS4, as required by the Clean Water Act and the Federal NPDES regulations. Section D.1.a requires the Copermittees to control the discharges of pollutants from construction and industrial sites which are discharged to the MS4. This requirement is taken directly from the Federal NPDES regulations at 40 CFR 122.26(d)(2)(i)(A). This requirement does not require the Copermittees to enforce the General Industrial and Construction Permits, but rather requires the Copermittees to enforce their own ordinances and permits at construction and industrial sites, as required by the Federal NPDES regulations at 40 CFR 122.26(d)(2)(iv)(C)(1) and 40 CFR 122.26(d)(2)(iv)(D)(3).

Sections D.1.b - D.1.i include standard requirements for the Copermittees to obtain legal authority, as required under Federal NPdES regulations 40 CFR 122.26(d)(2)(i)(B - F).

Where section D.1.g refers to interagency agreements with other owners of the MS4, such as Caltrans and the Department of Defense, the language in this section has been modified. Rather than require interagency agreements with such agencies, the Tentative Order will encourage such agreements. See change at section D.1.g.

Section: D **Subsection: D.1**

Comment: Copermittees will enforce their legal authority to control discharges into and from their MS4s. (Surfrider Foundation)

Response: Comment noted.

Section: D **Subsection: D.1**

Comment: We are unaware of any statute or case decision giving the Regional Board authority to dictate to municipalities the form and content of their ordinances, statutes, permits and/or contracts, to do so violates California Water Code section 13360. (Procopio, Cory, Hargreaves, & Savitch, L.L.P.)

Response: California Water Code (CWC) section 13360 generally prohibits the Regional Boards from specifying the manner of compliance with state waste discharge requirements. However, CWC section 13377 provides that the Regional Boards shall issue waste discharge requirements which apply and ensure compliance with all applicable provisions of the Federal Water Pollution Control Act (33 U.S.C. §1251 et seq.), as amended, also known as the federal Clean Water Act (CWA). Since tentative Order No. 2001-01 is written to implement CWA requirements, it does not violate section 13360 for the SDRWQCB to require the municipalities to demonstrate that they have adequate legal authority to implement the tentative order's requirements. The legal authority requirements can be found at 40 CFR (Code of Federal Regulations) 122.26(d)(2)(i). This section states that Copermittees must demonstrate that they have adequate legal authority to: "(A) Control through ordinance, permit, contract, order or similar means, the contribution of pollutants to the municipal storm sewer by storm water discharges associated with industrial activity and the quality of storm water discharged from sites of industrial activity; (B) Prohibit through ordinance, order or similar means, illicit discharges to the municipal storm sewer; (C) Control through ordinance, order or similar means the discharge to a municipal separate storm sewer of spills, dumping or disposal of materials other than storm water; (D) Control through interagency agreements among coapplicants the contribution of pollutants from one portion of the municipal system to another portion of the municipal system; (E) Require compliance with conditions in ordinances, permits, contracts or orders; and (F) Carry out all inspection, surveillance and monitoring procedures necessary to determine compliance and non-compliance with permit conditions including the prohibition on illicit discharges to the municipal separate storm sewer."

Section: D **Subsection: D.1.a**

Comment: The Tentative Order should require an ordinance requiring that the design and construction of all proposed structural BMPS shall be coordinated with the local Mosquito or Vector Control Agency or State Department of Health Service. (State Department of Health Services)

Response: In recognition of the potential public health threat, an additional Finding is recommended to be added to the Tentative Order. The Finding (no. 36) identifies the potential vector issues related to BMP implementation and the role of collaborative program development between municipalities and vector control agencies in addressing an minimizing vector production.

Section: D **Subsection: D.1.b.6**

Comment: D.1.b.(6). page 1; "Discharges of run off from material storage areas containing chemicals, fuels, grease, oil, or other hazardous materials. " should be revised to read "Discharges of stormwater from

storage areas that is contaminated by chemicals, fuels, grease, oil, or other hazardous materials. " (Sempra Energy)

Response: The language prohibiting illicit discharges of runoff from material storage areas containing chemicals, fuels, grease, oil, or other hazardous materials will be retained in Section D.1.b.6 of the Tentative Order. Storage areas for chemicals, fuels, grease, oil, or hazardous materials can be the site of spills or deposition from the materials stored there. Illicit discharges from these sites are likely to convey pollutants into the MS4. MS4 discharges attributable to illicit discharges and connections from industrial sites or hazardous materials storage sites can be a significant source of pollutant loading to receiving waters. The NURP study concluded that the quality of urban runoff can be adversely impacted by illicit discharges and connections (US EPA, 1983). Furthermore, US EPA states that illicit discharges and connections result in "untreated discharges that contribute high levels of pollutants, including heavy metals, toxics, oil and grease, solvents, nutrients, viruses, and bacteria to receiving waterbodies. Pollutant levels from these illicit discharges have been shown in EPA studies to be high enough to significantly degrade receiving water quality and threaten aquatic wildlife and human health" (2000).

For these reasons, CWA section 402(p)(3)(B)(ii) requires each Copermittee to prohibit non-storm water discharges into its MS4. The detection and elimination of illicit discharges and connections is also clearly identified in the federal regulations as a high priority (40 CFR 122.26(d)(2)(iv)(B) and 122.26(d)(2)(iv)(B)(1)). As guidance for detecting and eliminating illicit discharges and connections, the US EPA suggests "The proposed management program must include a description of inspection procedures, orders, ordinances, and other legal authorities necessary to prevent illicit discharges to the MS4" (1992). Furthermore, the Water Quality Control Plan for the San Diego Basin Waste Discharge Prohibition 8 states "Any discharge to a storm water conveyance system that is not entirely composed of 'storm water' is prohibited unless authorized by the Regional Board."

The SDRWQCB has discretion to require Jurisdictional Urban Runoff Management Program item F.5.d in Order No. 2001-01 under the broad and specific legal authority cited above.

Section: D Subsection: D.1.g

Comment: The order illegally requires the County to enter into agreements with third party dischargers such as Caltrans or the Department of Defense. The RWQCB has no authority to direct Copermittees to enter into "interagency agreements" of any kind with Copermittees or third parties. "Ordering" the County to make contracts cannot compel third parties to be reasonable. Moreover, even if all third parties were motivated and reasonable, entering into these agreements would be a daunting task. In addition to Caltrans and the Department of Defense, other "owners of the MS4" (as MS4 is defined by the Order) could include school districts, flood control authorities, Indian nations, any owner of property through which a stream flows, and any developer or homeowner's association with privately owned utility infrastructure. (County of San Diego, Procopio, Cory, Hargreaves, & Savitch)

Response: The intent of section D.1.g was for the Copermittees to form interagency agreements among themselves, while other interagency agreements were to be encouraged. In order to clarify this intent, the Tentative Order will be modified.

See change at permit section D.1.g.

Section: D Subsection: D.1.g

Comment: Section D.l.g. - How will the RWQCB enforce Tentative Order 2001-001 if it conflicts with Caltrans' NPDES permit? (City of Coronado)

Response: We do not anticipate conflicts arising between Tentative Order 2001-001 and Order No. 99-06-DWQ, NPDES No. CAS000003, National Pollutant Discharge Elimination System (NPDES) Permit, Statewide Storm Water Permit and Waste Discharge Requirements (WDRs) for the State of California, Department of Transportation (Caltrans). Order No. 99-06-DWQ applies to construction activities and maintenance from all Caltrans highways, properties, activities and facilities throughout the State and applies to Caltrans and/or their contractors. Tentative Order No. 2001-001 applies to discharges into Municipal Separate Storm Sewer Systems. In the event that the requirements of Order No. 99-06-DWQ are in conflict with Tentative Order No. 2001-001 the SDRWQCB will conduct a thorough evaluation of individual conflicts and determine which requirement will prevail.

Section: D Subsection: D.1.g

Comment: Since required interagency agreements may not be consummated with agencies not subject to state or federal law (e.g. Native American Tribes and Mexico) language should be included that states that such agreements should be pursued. (Environmental Health Coalition)

Response: Where section D.1.g refers to interagency agreements with other owners of the MS4, such as Caltrans and the Department of Defense, the language in this section has been modified. Rather than require interagency agreements with such agencies, the Tentative Order will encourage such agreements.

See change at section D.1.g.

Section: D Subsection: D.1.g

Comment: Page 11 of 50 D.1.g. – What kind of interagency agreements is required among the Copermittees and other owners that share the same Municipal Separate Storm Sewer System (MS4)? (City of Chula Vista)

Response: Tentative Order 2001-01 requires that the Copermittees "control the contribution of pollutants from one portion of the shared MS4 to another portion of the MS4 through interagency agreements among Copermittees (and other owners of the MS4 such as Caltrans or Department of Defense)." The nature and terms of the agreements are the responsibility of the Copermittees as operators of the MS4s to determine.

The Copermittees of a shared MS4 must demonstrate that together they can control the contribution of pollutants over the whole shared MS4. To this effect, the US EPA states “When two or more municipalities submit a joint application, each coapplicant must demonstrate that it individually possesses adequate legal authority over the entire municipal system it operates and owns. A coapplicant need not fulfill every component of legal authority specified in the regulations, as long as the combined legal

authority of all coapplicants satisfies the regulatory criteria for every segment of the MS4 (including authority over all sources that discharge to the MS4). […] Coapplicants also may use interjurisdictional agreements to show legal authority and to ensure planning, coordination, and the sharing of the resource burden of permit compliance" (1992).

Section: D **Subsection: D.1.h**

Comment: City must adopt and implement legal authority to enforce the requirements of the Tentative Order. (City of Chula Vista)

Response: The Copermittees' ability to determine compliance and noncompliance with permit conditions is critical to control pollutant discharges to and from MS4s. Determination of compliance and noncompliance allows for significant sources of pollutants to be identified and addressed, thereby minimizing the discharge of pollutants from the MS4 and the resulting receiving water quality degradation. For this reason each Copermittee must have legal authority to carry out the inspections, surveillance, and monitoring necessary to assess compliance. Regarding compliance determination, US EPA states "municipalities should provide documentation of their authority to enter, sample, inspect, review, and copy records, etc., as well as demonstrate their authority to require regular reports" (1992). The SDRWQCB has discretion to require Legal Authority item D.1.g in Order No. 2001-01 under the broad legal authority cited above.

Section: D **Subsection: D.1.h**

Comment: Section D.1.h, set forth on page 12 of the Tentative Order, requires that Copermittees pass ordinances giving them the power to "enter, sample, inspect, review and copy records, and require regular reports from industrial facilities discharging into its MS4, including construction sites . . ." Such ordinances, if adopted by a Copermittee, would be ripe for constitutional challenge by the regulated community. It is by no means clear that municipalities could impart to themselves the search and seizure powers prescribed in the above-quoted language. (Procopio, Cory, Hargreaves, & Savitch, L.L.P.)

Response: Local governments, like state and federal governments, are precluded from unreasonable searches for and seizure of evidence, and, absent extraordinarily exigent circumstances, must obtain warrants before inspecting private property to enforce local ordinances. Nevertheless, it is common governmental practice to require persons who must obtain governmental authorization for their activities, or whose activities are subject to governmental regulation, to consent to reasonable inspection by the regulatory officials of the government. Thus, persons who discharge waste that could affect the quality of the waters of the state are required as a condition of their waste discharge requirements to allow inspection and sampling by the Regional Board. Similarly, local governments regulate development, construction, and industrial and commercial uses of property within their jurisdiction. Commercial food service establishments are subject to inspection by local health officials as a routine matter and construction sites are visited by building inspectors. Municipalities are required by federal NPDES regulations to have or develop legal authority to implement regulatory programs needed to reduce the discharge of pollutants to MS4, including the authority to inspect sources of pollutants that are discharged to MS4. Given the routine nature of local governmental inspections to enforce local health and building ordinances, it is not unreasonable to expect municipalities to provide authority for such inspections as

may be necessary to reduce pollutants in MS4 by the consent of persons subject to the municipalities' regulatory authority.

Section: D Subsection: D.1.h

Comment: Copermittees should be encouraged to develop effective systems of record keeping to track chronic violators of local discharge prohibitions. All enforcement records must be made available to the public upon request. (Surfrider Foundation)

Response: SDRWQCB encourages the public disclosure of such information. However, in order to provide the greatest amount of flexibility to the Permittees, the Tentative Order will not specifically require any procedure for making such information available to the public. It should be noted that such information is provided to the SDRWQCB in Annual Reports, which are available for public review.

Section: D Subsection: D.1.i

Comment: Add: Require the use of BMPs to prevent or reduce the discharge of pollutants to MS4s, without creation of mosquito and disease vectors. (State Department of Health Services)

Response: In recognition of the potential public health threat, an additional Finding is recommended to be added to the Tentative Order. The Finding (no. 36) identifies the potential vector issues related to BMP implementation and the role of collaborative program development between municipalities and vector control agencies in addressing an minimizing vector production.

Section: D Subsection: D.2

Comment: The Regional Board has no legal right to demand a statement certifying that the Copermittee "has adequate legal authority to implement and enforce" each of the requirements of the Order as described in section D.2. (Procopio, Cory, Hargreaves, & Savitch, L.L.P.)

Response: The SDRWQCB is justified in requiring the Copermittees to submit a certified statement of adequate legal authority. California Water Code section 13377 provides that the Regional Boards shall issue waste discharge requirements which apply and ensure compliance with all applicable provisions of the Federal Water Pollution Control Act (33 U.S.C. §1251 et seq.), as amended, also known as the federal Clean Water Act (CWA). Tentative Order No. 2001-01 is written to implement CWA requirements, therefore the SDRWQCB can require the municipalities to demonstrate that they have adequate legal authority to implement the tentative order's requirements. The legal authority requirements can be found at 40 CFR (Code of Federal Regulations) 122.26(d)(2)(i). This section states that Copermittees must demonstrate that they "can operate pursuant to legal authority established by statute, ordinance or series of contracts which authorizes or enables the applicant at a minimum to: (A) Control through ordinance, permit, contract, order or similar means, the contribution of pollutants to the municipal storm sewer by storm water discharges associated with industrial activity and the quality of storm water discharged from sites of industrial activity; (B) Prohibit through ordinance, order or similar means, illicit discharges to the municipal storm sewer; (C) Control through ordinance, order or similar means the discharge to a

municipal separate storm sewer of spills, dumping or disposal of materials other than storm water; (D) Control through interagency agreements among coapplicants the contribution of pollutants from one portion of the municipal system to another portion of the municipal system; (E) Require compliance with conditions in ordinances, permits, contracts or orders; and (F) Carry out all inspection, surveillance and monitoring procedures necessary to determine compliance and non-compliance with permit conditions including the prohibition on illicit discharges to the municipal separate storm sewer."

Section: D Subsection: D.2

Comment: Legal authority certification, Section D.2, should be made consistent with 40 CFR 122.26(d)(2)(1). (Port of San Diego)

Response: Section D.2 of the revised Tentative Order is consistent with 40 CFR 122.26(d)(2)(1). Section D.2 requires each Copermittees' chief legal counsel certify and submit to the SDRWQCB a statement that the Copermittee has adequate legal authority to implement and enforce each of the requirements of the 40 CFR 122.26 (d)(2)(I)(A-F) and the Tentative Order. This is not a certification of the Jurisdictional Urban Runoff Management Program itself.

Section: E Subsection: E

Comment: Clarify which BMPs are approved by the SDRWQCB and under what field conditions are they to be used? Are the Copermittees expected to develop implementation manuals for "unproven" BMPs that will work in the San Diego region, or will SDRWQCB provide reference to existing approved sources? (City of Chula Vista)

Response: In order to provide the Copermittees with flexibility and discretion, under Tentative Order the Copermittees will specify which BMPs they will implement or require to be implemented to reduce pollutants in urban runoff discharges to the MEP. A list and description of these minimum BMPs and how they shall be implemented shall be described in the appropriate sections of the Jurisdictional Urban Runoff Management Program (JURMP) Documents and Annual Reports, subject to review and comment by the SDRWQCB. The SDRWQCB does not "approve" BMPs, but will review and provide comment on each JURMP Document and Annual Report. The Copermittees are not expected to develop implementation manuals for unproven BMPs unless they decide such an activity is necessary to meet MEP.

Section: E Subsection: E

Comment: why does the order require the Copermittee to ensure that the pollutants in the runoff is reduced to the MEP standard but requires construction and industrial permitted dischargers to meet BAT/BCT standards. Does that mean the municipality have to provide additional treatment to discharges from construction and industrial permitted sites? (City of Oceanside)

Response: Pollutant discharges in storm water to and from MS4s are held to applicable technology based standards. Storm water discharges to the MS4 from industrial and construction activities owned by the Copermittee, which fall under the general statewide industrial and construction storm water permits,

must meet the BAT/BCT performance standard per permit requirements. This BAT/BCT performance standard is required in CWA section 301(b)(2), and is further described in CWA sections 304(b)(2-4).

Pollutant discharges in storm water to and from the MS4 for all other urban land use activities, including industrial and construction activities not covered under the Statewide General Industrial and Construction Permits, must be reduced to the maximum extent practicable. CWA section 402(p)(3)(B)(iii) and Federal NPDES regulation 40 CFR 122.26 (d)(2)(iv) require pollutant discharges in urban runoff discharged from MS4s to be reduced to the maximum extent practicable.

Since discharges which enter the MS4 are generally discharged unimpeded directly into receiving waters, the maximum extent practicable standard is to apply to both discharges into and from MS4s. Federal NPDES regulations clearly provide the SDRWQCB with the legal authority to require municipalities to control discharges from third parties into their MS4. 40 CFR 122.26(d)(2)(iv)(A - D) require municipalities to implement controls to reduce pollutants in urban runoff from commercial, residential, industrial, and construction land uses or activities to the maximum extent practicable. Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(A - D) require municipalities to have legal authority to control various discharges to their MS4. This concept is further supported in the Preamble to the Phase II Final Rule NPDES storm water regulations, which states "The operators of regulated small MS4s cannot passively receive and discharge pollutants from third parties" (US EPA, 1999). Due to the greater water quality concerns generally experienced by larger municipalities, Phase II Final Rule findings for small municipalities are also applicable to larger municipalities such as the Copermittees. Finally, underlying the Federal NPDES storm water regulations is the Clean Water Act, which states in section 402(p)(3)(B)(ii) that municipalities shall "effectively prohibit non-stormwater discharges into the storm sewers."

The requirement for municipal storm water dischargers to have, and exercise, local governmental authority in order to comply with water quality control obligations is analogous to the requirement for Publicly Owned Treatment Works to have and exercise legal authority to require pretreatment of industrial wastes being discharged to their sewage collections systems (CWA 402(b)(8)).

The SDRWQCB has discretion to require Technology Based Standards item E. in Order No. 2001-01 under the broad and specific legal authority cited in the Fact Sheet/Technical Report.

Section: F **Subsection:**

Comment: Implementation of the Jurisdictional URMP will take longer than the time allowed in the permit. (Procopio, Cory, Hargreaves, & Savitch, County of San Diego, Carlsbad)

Response: The implementation schedule for the Jurisdiction Urban Runoff Management Program, excluding Section F.1, has been extended in the revised Tentative Order from 180 days to 365 days.

Section: F **Subsection:**

Comment: In Section F, add suggestions for information sharing among Copermittees such as, a jointly managed website, establishment of information-exchange programs and coordinated educational efforts. (Environmental Health Coalition)

Response: The Copermittees are encouraged in the Tentative Order to collaborate in the development and implementation of their Urban Runoff Management Programs. The manner in which the Copermittees share or exchange information is left to their discretion in order to provide flexibility in implementing the requirements of the Tentative Order.

Section: F **Subsection:**

Comment: Jurisdictional URMP (Section F.). Section F, found at page 13 of the Tentative Order, describes generally the Jurisdictional URMP that is required under the Order. Please describe what guidance and assistance the Regional Board will be providing to Copermittees as they attempt to develop their URMPs. (Procopio, Cory, Hargreaves, & Savitch, L.L.P.)

Response: Since the adoption of Order 90-42, the SDRWQCB staff has worked with the Permittees to provide guidance and assistance in the form of correspondence, written comments on proposed management measures, attendance at watershed stakeholder group meetings, and significant meeting time with Copermittees. The SDRWQCB is currently hiring staff to fill vacancies from budget augmentations in several programs, including storm water. Staff assigned to work in storm water will assist in the effective implementation of Order No. 2001-001 as previously under Order 90-42. Increased staff will provide dischargers more resources to assist in achieving compliance with Order No. 2001-001. However, we do not anticipate a significant shift in the balance between compliance assurance (enforcement) and assistance.

Section: F.1 **Subsection:**

Comment: Copermittees should be encouraged to develop and implement impervious surface cover limits (expressed as % of development) for new development and include such standards in their substantive planning documents. (Surfrider Foundation, San Diego Baykeeper)

Response: The Tentative Order requires that Copermittees consider the level of imperviousness within their jurisdictions and watersheds. For example, Finding 5 discusses the impacts to receiving water quality resulting from increases in imperviousness. Sections F.1.a.1, F.1.b.1.b, and F.1.b.2.b.v all require the Copermittees to address increased imperviousness in their planning processes. Through these requirements, the concept of impervious surface cover limits is encouraged. While the SDRWQCB encourages impervious surface cover limits, the Tentative Order has been written to provide the Copermittees with discretion in how they address increases in impervious surfaces.

Section: F.1 **Subsection:**

Comment: Not enough time is allotted for the revision of the General Plan Amendments as required in the Jurisdictional Urban Runoff Management Plan. Allow co-permittees to submit workplans for revision of General Plans. Need more time. (City of San Diego, County of San Diego, Chula Vista)

Response: In order to provide the Copermittees with flexibility in amending their General Plans, they will be allowed to submit a workplan, including time schedule, for their General Plan amendments. The workplan will be due with the Jurisdictional Urban Runoff Management Program document.

See change at permit section F.1.a.

Section: F.1 Subsection:

Comment: It's time that we raise the bar in the way that we deal with storm water. It's not changed in 100
years: gutter, pipe, culvert, channel. We have the intellect and creativity and financial resources to solve the problem. It's important that we accept the challenge, and I would like to add to that, this argument is not dissimilar from that prior to -- by the building industry prior to the implementation of the Americans with Disabilities Act, ADA. The sky was falling. It was going to cost hundreds of thousands of jobs. (Tuchscher Development Enterprises)

Response: Comment noted.

Section: F.1 Subsection:

Comment: Reference economics, our project-specific analysis and projects that we've actually planned have
proven that to implement best management practices, they're actually less expensive by about 30 percent. Concrete is very, very expensive. There is a maintenance cost. Vegetated infiltration basins, biofilter systems do cost money to maintain on a semi-annual basis, or an annual basis. But there are vehicles available to put in place -- financial vehicles that can allow for that maintenance to happen in the form of landscape maintenance districts, community facilities districts, or property owner associations. What we need to do is move from a purely mechanical hardware system of dealing with storm water to a hardware and software system, and that includes some of those maintenance elements. What we found is that when you do that, you end up with a financial wash. (Tuchscher Development Enterprises)

Response: Comment noted.

Section: F.1 Subsection:

Comment: The Order attempts to grant to the Regional Board comprehensive land use planning authority when the authority currently resides exclusively in the municipalities. (Procopio, Cory, Hargreaves, & Savitch, L.L.P.)

Response: The Tentative Order does not attempt to provide the SDRWQCB with land use authority. The Tentative Order does not restrict the location or type of development. This authority resides with the

Copermittees. The Tentative Order merely requires that developments within the Copermittees' jurisdictions consider water quality, and implement measures as necessary to achieve receiving water quality standards.

Section: F.1 Subsection:

Comment: In the area of zoning and building codes, currently in most all jurisdictions in dealing with storm water management, the codes cause the developer to build in a way that -- the city has or jurisdiction has standards, and those usually include gutters, pipe, culvert, and channel, concrete structures. Current codes do not allow developers to do the right thing without taking on additional discretionary political risk. What developers need really is predictability, and developers currently cannot afford to challenge staff or propose change in code or deviation from city or county standards that requires further discretionary political approval. The storm water management permit that you are considering will bring new regulations and cause new codes to change and allow, frankly, the right thing to be done for those of us that wish to do it. (Tuchscher Development Enterprises)

Response: Comment noted.

Section: F.1 Subsection:

Comment: One last area, land area. San Diego as far back as the Nolan Plan in 1908 decided from its general plan standpoint to preserve canyons, valleys, drainage basins and build on hilltops and mesas. What's interesting about that is when you compare it to the European model, all of those towns were built in the valleys, the canyons and not on the hilltops. We did that for a number of reasons, but, importantly, it was an environmental orientation. And our current planning efforts and the way that our planning has evolved still does that. What that means is that suburban projects usually have 30 to 70 percent open space and, frankly, plenty of room to put in place the infiltration basins and the BMPs that are being looked at now. Urban development is a different challenge, but the technology exists. To deal with this matter, in fact, Supervisor Roberts who testified earlier this morning in a previous life was an architect and designed a premiere example of a commercial application of BMPs in Davis, California, one of the few jurisdictions in California that allow those types of things to occur. It was about 20 years ago, but he was a leader in this effort. And the ballpark district downtown uses BMPs and, quite frankly, simply because they can. It's possible and economically viable. (Tuchscher Development Enterprises)

Response: Comment noted.

Section: F.1 Subsection: F.1

Comment: F.1.a.(4) "Limit disturbances of natural water bodies and natural drainage systems caused by development including roads, highways, and bridges."

F.1.a.(5) "Prior to making land use decisions, utilize methods available to estimate increases in pollutant loads and flows resulting from projected future development. Require incorporation of structural and non-structural BMPs to mitigate the projected increases in pollutant loads and flows."

F.1.a.(6) "Avoid development of areas that are particularly susceptible to erosion and sediment loss; or establish development guidance that identifies these areas and protects them from erosion and sediment loss."

F.1.a.(7) "Reduce pollutants associated with vehicles and increasing traffic from development. Coordinate local traffic management efforts with the San Diego County Congestion Management Plan."

F.1.a.(8) "Implement the San Diego Association of Governments (SANDAG's) recommendations as found in the Water Quality Element of its Regional Growth Management Strategy."

13. All of the above is inappropriate content for a GP, especially given that it is another agency's document, and this is no legal or practical basis to include the same in a GP. This requirement would give SANDAG a greater role in land use planning than is provided by state law. (County of San Diego)

Response: The Tentative Order has been changed to allow the Copermittees discretion in determining the contents of their General Plans with regards to urban runoff.

Section: F.1 Subsection: F.1

Comment: F.1. "Land Use Planning for New Development and Redevelopment Program"

1. Inadequacy of legal authorities cited. The Technical Report states ("Broad Legal Authority," p. 87) that the RWQCB possesses the authority to prescribe the conditions of section F.1. under the following broad legal authorities: Clean Water Act ("CWA") sections 402(p)(3)(B)(ii-iii), California Water Code ("CWC") section 13377, and Federal EPA NPDES regulations at 40 CFR § 122.26(d)(2)(i)(B,C,E, and F) and 40 CFR § 122.26(d)(2)(iv). The County disagrees with staff's contention that the sections cited above provide the blanket authority claimed by staff to prescribe the detailed programs in section F.1. A discussion of the County's position on the relevancy of these authorities is provided in section O of the County's comments.

Under Broad Legal Authority (page 87), the Technical Report states that "40 CFR 122.26(d)(2)(iv)(A)(2) generally applies to all directives under Jurisdictional Urban Runoff Management Program item F.1." This section reads as follows: "122.26(d)(2)(iv)(A)(2). [The applicant must include a] description of planning procedures including a comprehensive master plan to develop, implement and enforce controls to reduce the discharge of pollutants from municipal separate storm sewers which receive discharges from areas of new development and significant redevelopment. Such plans shall address controls to reduce pollutants in discharges from municipal separate storm sewers after construction is completed."

The County agrees that 40 CFR § 122.26(d)(2)(iv)(A)(2) generally applies to section F.1., but it disagrees that the regulation provides any authority for the specific details of this section. 40 CFR § 122.26(d)(2)(iv)(A)(2) generally discusses a program to reduce discharges of pollutants from Copermittee MS4s. While it is arguably not possible to effectively reduce such discharges without addressing the facilities that discharge to our MS4, this section in no way establishes even limited authority for the RWQCB to prescribe any conditions of the programs that Copermittees may establish to do so.

Moreover, that the Tentative Order may only regulate discharges "from" MS4s is clear from the language of the CWA itself, "Permits for Discharges from Municipal Storm Sewers." (3 U.S.C. § 1342(p)(3)B).) (County of San Diego)

Response: The SDRWQCB has authority to regulate discharges of waste that could affect the quality of the waters of the state by the issuance and enforcement of waste discharge requirements that will ensure attainment of water quality consistent with the water quality objectives established in the basin plan. While the SDRWQCB should not interfere in land use planning by local governments, it may properly require municipalities to consider the water quality consequences of land use decisions involving development projects and construction, and to exercise local government authority to ensure that the consequences of land use and planning decisions will not cause or contribute to the threat of pollution in waters of the state associated with discharges of pollutants in MS4. Failure to exercise local authority over land use, development, construction, and other sources of pollutants in the MS4 will subject municipalities to liability for failure to reduce pollutants in the MS4 to MEP.

Section: F.1 Subsection: F.1

Comment: Inadequacy of the Fact Sheet / Technical Report (Technical Report) The Technical Report (pp. 86-103) fails to provide adequate justification for, and analysis and explanation of, most of the significant new programs and activities proposed in section F.1. Examples of significant issues not addressed include but are not limited to:

Requirements applicable to all development projects. Section F.1. imposes significant new requirements on all development projects, and arguably sets the same high standard of compliance for single family homes that it does for each of the "high priority" SUSMP categories. No explanation or evidence of any kind is provided for application of the exact same one-size-fits-all standard. (County of San Diego)

Response: Section F.1 of the Tentative Order has been modified. Requirements applicable to all development projects have been modified to ensure applicability. See change at permit section F.1.

Section: F.1 Subsection: F.1.a

Comment: The General Plan should be used for general planning and not for site specific planning. It is not appropriate to assume pollutant source controls and treatment are needed for each specific project. They may be needed on an individual site to meet water quality requirements, but that decision should be made at the detailed plan review stage, not as a general plan requirement. (Building Industry Association of Southern CA)

Response: The Tentative Order has been changed to allow the Copermittees discretion in determining the contents of their General Plans with regards to urban runoff.

Section: F.1 Subsection: F.1.a

Comment: At F.1.a, the Tentative Order requires that Copermittees revise their respective General Plans so that land use decisions will be made in a manner consistent with water quality objectives. Again, however, the Regional Board has no authority to direct municipalities on matters of land use planning; and it certainly cannot dictate how and when and in what way a municipality revises its General Plan. Further, the Government Code, not the Water Code, regulates General Plan amendments and may preclude the very kinds of revisions demanded by the Tentative Order. (For example, the Government Code requires that the land use and circulation elements of a General Plan be coordinated, which often means that new roads must be constructed to serve new development. This will almost guarantee an increase in impervious surfaces, which the Order tries to prohibit.) (Procopio, Cory, Hargreaves, & Savitch, L.L.P.)

Response: The SDRWQCB has the legal authority to require the Copermittees' General Plans to include considerations of the water quality impacts caused by urban runoff. Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A)(2) provides that Copermittees develop and implement a proposed management program which is to include "A description of planning procedures including a comprehensive master plan to develop, implement and enforce controls to reduce the discharge of pollutants from municipal separate storm sewers which receive discharges from areas of new development and significant redevelopment. Such plan shall address controls to reduce pollutants in discharges from municipal separate storm sewers after construction is completed."

USEPA states that the Copermittee "must thoroughly describe how the municipality's comprehensive plan is compatible with the storm water regulations" (USEPA, 1992). To achieve this, the Copermittee shall incorporate water quality and watershed protection principles and policies into its General Plan (or equivalent plan). USEPA supports addressing urban runoff problems in General Plans (or equivalent plans) when it states "Runoff problems can be addressed efficiently with sound planning procedures. Master Plans, Comprehensive Plans, and zoning ordinances can promote improved water quality by guiding the growth of a community away from sensitive areas and by restricting certain types of growth (industrial, for example) to areas that can support it without compromising water quality" (USEPA, 2000).

While the SDRWQCB has the legal authority to require the Copermittees' General Plans to include considerations of the water quality impacts caused by urban runoff, the Tentative Order has been modified to provide the Copermittees with more discretion regarding the General Plans' contents. The Tentative Order has been revised to include examples of the types of principles and policies which should be in a General Plan, instead of specific requirements. In addition, the Copermittees will be allowed to develop their own work plan and time schedule for any changes to their General Plans they find necessary. See change at permit section F.1.a.

Section: F.1 Subsection: F.1.a

Comment: Page 13, Section F.1.a Revise General Plan -Please clarify language to ensure that in addition to General Plan Revisions, the co-permittees, where applicable, should be required to amend the Local Coastal Programs to include nonpoint source management measures for controlling and reducing stormwater and non-stormwater runoff. (Surfers Tired of Pollution)

Response: While the SDRWQCB agrees that it may be beneficial to include urban runoff considerations in Local Coastal Programs, this issue is at the discretion of the Copermittees.

Section: F.1 Subsection: F.1.a

Comment: Page 14, after F. 1. a. (5), add:
(6) Ensure that all structural BMPS are designed in a manner that will prevent breeding of mosquitoes. (State Department of Health Services)

Response: In recognition of the potential public health threat, an additional Finding is recommended to be added to the Tentative Order. The Finding (no. 36) identifies the potential vector issues related to BMP implementation and the role of collaborative program development between municipalities and vector control agencies in addressing an minimizing vector production.

Section: F.1 Subsection: F.1.a

Comment: Copermittees should be encouraged to make water quality protection a priority as compared to other non-environmental and non-public health related goals noted in planning documents. (Surfrider Foundation)

Response: The Tentative Order encourages the consideration of water quality in planing documents. The Tentative Order requires water quality and watershed protection principles and policies be included in the Copermittees' General Plans. The Copermittees are also required to modify development project approval processes to account for water quality.

Section: F.1 Subsection: F.1.a

Comment: It is contrary to state law, and the SDRWQCB lacks the legal authority, for the Tentative Order to specify what the Copermittees must include in their General Plan. Except where expressly provided by statute, the preparation of a General Plan ("GP") is a local matter. (Gov. Code sections 65300.7, 65300.9). The SDRWQCB may not dictate GP provisions, principles, or policies. State law provides that the inclusion of provisions in a GP concerning "prevention and control of the pollution of streams and other waters" is optional. The RWQCB cannot contradict the Government Code by making such provisions mandatory. At most, the Tentative Order should provide examples of certain objectives or categories of measures, but allow the Copermittees the necessary flexibility to determine what shall be included in their General Plans for purposes of complying with Tentative Order. Because the General Plan provision specifies in detail the manner in which the Copermittees must comply with the general objectives of the Tentative Order, it is inconsistent with Cal. Water Code § 13360(a). (County of San Diego, City of San Diego, La Mesa)

Response: The Tentative Order has been changed to allow the Copermittees discretion in determining the contents of their General Plans with regards to urban runoff.

Section: F.1 Subsection: F.1.a.1

Comment: How is the term "minimized" evaluated and enforced? (City of Carlsbad)

Response: The Regional Board may review at any time the proactive actions taken by the Copermittee to decrease to the least possible amount (e.g. minimize) impacts from storm water runoff to any given receiving water by new development and redevelopment. The Regional Board may at any time review revisions to the Copermittee's General Plan, Project approval process, and Environmental Review Process including their CEQA checklist to determine if the conditions require project proponents to decrease to the least possible amount impervious land coverage, slow runoff, and where feasible maximize opportunities for infiltration of rainwater into soil. The Regional Board may review at any time a Copermittee's Standard Urban Storm Water Mitigation Plan (SUSMP) to determine if it includes source control BMPs and pollution prevention measures to reduce to the lease possible amount pollutants of concern from reaching receiving water bodies and directly connected impervious areas. The Regional Board may review at any time the construction component of its Jurisdictional Urban Runoff Management Plan to determine if the approval process for local grading and construction permits include conditions which require project proponents to reduce to the least possible amount: 1) areas that are cleared and graded to only the portion of a site that is necessary for construction, and 2) the exposure time of disturbed soil areas. The Regional Board may review at any time the Copermittee's educational program for its 1) Planning and Development Review Staffs and Inspectors, and 2) Construction, Building, and Grading Staffs and Inspectors to determine if they understand how impacts to receiving water quality resulting from development and construction (respectively) can be reduced to the least possible amount through implementation of various source control and structural BMPs.

The Regional Board will enforce these requirements through its review of the required plans mentioned above and inspection of sites with violations of the requirement to reduce to the least possible amount (e.g. minimize) impacts to receiving waters from storm water runoff.

Section: F.1 Subsection: F.1.a.2

Comment: The use of detention basins and infiltration should be encouraged only if cost effective and feasible. (City of Poway)

Response: Tentative Order section F.1.a.2 refers to BMP implementation at new development sites during the planning phase. Implementation of BMPs for new development during the planning phase is the most cost effective approach. USEPA states: "Many studies indicate that prior planning and design for the minimization of pollutants in post-construction storm water discharges is the most cost-effective approach to storm water quality management" (USEPA, 2000). In addition, the SDRWQCB has calculated that implementation of structural treatment BMPs which meet numeric sizing criteria constitutes less than 1% of total project costs. The SWRCB has found that such costs are reasonable (SWRCB, 2000a). Therefore, the requirement for BMP implementation in F.1.a.2 is appropriate.

Section: F.1 Subsection: F.1.a.2

Comment: F.1.a.(2) The requirements of this section are unsubstantiated. This should be deleted entirely or moved to the Technical Report as suggested guidance, as it is not supported by the findings, and as there is no evidence in the record to support its inclusion. (County of San Diego)

Response: The Tentative Order has been changed to allow the Copermittees discretion in determining the contents of their General Plans with regards to urban runoff.

Section: F.1 Subsection: F.1.a.3

Comment: F.1.a.(3) "Preserve, and where possible, create or restore areas that provide important water quality benefits, such as riparian corridors, wetlands, and buffer zones. Encourage land acquisition of such areas."

12. The County supports the inclusion of this section only as suggested guidance. The RWQCB is a water quality regulatory agency and has only the authority specifically provided in state law. The RWQCB may not dictate habitat-related GP requirements to the County or dictate that land acquisitions be a preferred strategy for pursuing any goal. However, the County has a longstanding commitment to land acquisition, to protect habitat, and will continue those policies. (County of San Diego)

Response: The Tentative Order has been changed to allow the Copermittees discretion in determining the contents of their General Plans with regards to urban runoff.

Section: F.1 Subsection: F.1.a.3

Comment: Encourage land acquisition by who and how is this determined? (City of Carlsbad)

Response: Encouragement of land acquisition can be a significant means for protecting water quality. For example, acquisition of land adjacent to a receiving water can be a preventive measure which ensures that future pollutants sources will not be created on the land. This tactic is frequently used by water agencies to protect the water quality of drinking water reservoirs. Environmental and other interest groups also frequently use this method to preserve receiving waters. Municipalities may also be interested in protecting their riparian corridors and wetlands.

Section: F.1 Subsection: F.1.a.4

Comment: F.1. (a) (4) The statement to limit disturbance of natural water bodies could be used by third parties
as an arbitrary justification to prevent project development. Other environmental processes already address the issue of wetland impacts and mitigation. (SANDAG)

Response: Limiting disturbance of natural water bodies does not constitute prevention of project development.

Section: F.1 Subsection: F.1.a.5

Comment: Section F.1.a (5): What level of mitigation is required? (City of Chula Vista)

Response: The Copermittees have the responsibility of determining anticipated pollutant loading and planning BMP implementation that will minimize pollutant discharge in urban runoff to the MEP.

Section: F.1 Subsection: F.1.a.6

Comment: 15. F.1. (a) (6) The San Diego region has a significant presence of soil that is erosive. The purpose of this permit is to allow development in the region by utilizing Best Available Technology to eliminate adverse impacts to the waters of the U.S. This element could be used by third parties as justification to prevent project development. (SANDAG)

Response: Section F.1.a.6 comes directly from SANDAG's Water Quality Element - Regional Growth Management Strategy. It in no way requires the prevention of project development; instead, it says that development of such highly erodable areas should be avoided and/or that guidance should be developed to prevent erosion of such areas.

Section: F.1 Subsection: F.1.a.7

Comment: Section F.1.a.7 "Reduce pollutants associated with vehicles" is a requirement best handled by a system similar to the smog test where a vehicle would be tested for leaks on an biannual basis. It is unfair to hold cities responsible for pollutant sources that they cannot control. Street sweeping is the BMP of choice for maintaining streets but it is ineffective for oils. This problem should be handled at the state level through inspections instead of requiring cities to install expensive filters throughout their system. (City of Oceanside)

Response: The Tentative Order has been changed to allow the Copermittees discretion in determining the contents of their General Plans with regards to urban runoff. The revised Section F.1.a.7 contains examples which the Copermittees may implement at their discretion.

Specifically, the Copermittees shall under Section F.1.a.7 may include in their General Plan, measures that "Reduce pollutants associated with vehicles and increasing traffic resulting from development." Vehicles are the source of numerous pollutants apart from smog or apparent leaks. With respect to Finding 16 and Section F.1.a.7, requiring the design and construction of parking and traffic facilities in such a way as to reduce the discharge in urban runoff of pollutants deposited from vehicles is a reasonable and necessary requirement of Copermitteesunder their land-use permitting authority. While this problem can and is to some degree addressed at the state level through inspections and vehicle registration requirements, the Copermittees have the discretion to also address this source of pollutants in their Jurisdictional Urban Runoff Management Programs.

Section: F.1 Subsection: F.1.a.7

Comment: Reduce pollutants associated with vehicles … This clause is overly broad, vague, open to interpretation, and generally beyond the authority of the RWQCB. It should be removed. (Industrial Environmental Association)

Response: SDRWQCB believes that the sentence clearly states the objective. The objective is to protect water quality from the pollutant deposition caused by the combustion of fossil fuels. Where water quality is affected, the issue is most certainly within the authority of the SDRWQCB.

Section: F.1 Subsection: F.1.a.8

Comment: Implement the SANDAG recommendations as found in the Water Quality Element of its Regional Growth Management Strategy. This Strategy was not part of the original permit, nor was a copy incorporated in the permit. Comments cannot be made as to how it relates to the permit. This section should be deleted until such time as the plan can be provided and appropriate comment period set. (Industrial Environmental Association)

Response: SANDAG's Water Quality Element of its Regional Growth Management Strategy has been and is available from SANDAG and the SDRWQCB.

Section: F.1 Subsection: F.1.a.9

Comment: F.I.(a)(9) This element has been stated before within this document in various locations, A.4.
Prohibitions-Discharges, for example. There is no need to repeat the same text. (SANDAG)

Response: Certain requirements are repeated in the Tentative Order to ensure that impacts from urban runoff are considered during various stages of the municipalities' planning processes.

Section: F.1 Subsection: F.1.a.9

Comment: F. 1.a.(9) page 14 "For new development and significant redevelopment only: ... This section needs to be revised to clarify that it applies solely to specific Priority Development Project Categories. (Sempra Energy)

Response: The Tentative Order has been changed to allow the Copermittees discretion in determining the contents of their General Plans with regards to urban runoff.

Section: F.1 Subsection: F.1.a.9

Comment: Drainage law in California has developed from a number of court cases. The results generally have been an "upstream" property owner has a right to reasonably develop his property and the

"downstream" owner has an obligation to receive the increased runoff. Section F.1.a.9 appears to change what case law has developed. Is this the intent and can this be done? (Bras, Charles)

Response: The language in section F.1.a.9 of the Tentative Order regarding peak flow rates and velocities has been removed. Control of peak flow rates and velocities shall instead apply only to SUSMP priority development projects. The requirements regarding the control of peak flow rates and velocities do not infringe on a property owners' rights to develop. Nor do they infringe on property owners' alleged right to discharge greater volumes of water from a development than were discharged prior to development. Rather they ensure that a property owner's development does not result in increases in peak flow rates which may cause or contribute to an excursion above receiving water quality standards (such as impairment of beneficial uses). Control of peak flow rate increases resulting from development is necessary; as USEPA states "In may cases the impacts on receiving waters due to changes in hydrology can be more significant than those attributable to the contaminants found in storm water runoff" (USEPA, 1999a). Furthermore, the SWRCB has found in Order WQ 2000-11 that control of peak flow rate increases resulting from SUSMP priority development projects is appropriate.

Section: F.1 Subsection: F.1.b

Comment: A process to prioritize development projects and subsequent control strategies has not been followed by the RWQCB and is not provided to the Copermittees. Section F.1.b. requires that all development projects be required to implement all of the minimum BMPs listed in section F.1.b.(1). While the County agrees that all categories of projects should initially be evaluated in determining program priorities and requirements, we also believe that to effectively manage our water quality programs, by law, we must be allowed the flexibility to determine which types of projects we will address and how we will do so.

Section F.1. still restricts the ability of Copermittees to prioritize their control strategies in two important ways. First, it sets essentially the same standards for all sites in section F.1.b.(1) that it requires for “high priority” SUSMP sites in section F.1.b.(2) by mandating (1) pollution prevention, and (2) source control BMPs, and (3) run-off rate control and detention/treatment BMPs and by establishing identical performance standards in all instances. Second, the definitions of SUSMP categories are so broad and inclusive that most sites would be included anyway. The only significant difference appears to be in the size of the paper trail that will be generated. (County of San Diego, Sempra)

Response: The requirements of F.1.b.1 have undergone changes which make them applicable to all development projects. The requirements for pollution prevention BMPs have been removed. The requirements for peak flow rate control and discharges to 303(d) water bodies have also been removed. In addition, the requirement for buffer zones has been adapted to allow for other buffer methods, such as trees, noise reductions, etc. By making these changes, the requirements of section F.1.b.1 are basic requirements which should be met by all development projects.

See changes at permit section F.1.b.1.

Section: F.1 Subsection: F.1.b

Comment: The SDRWQCB has inadequate legal authority in CFR section 122.26(d)(2)(iv)(A)(2) to require the site-specific and universal application of the requirements of section F.1.b. on all development sites. (County of San Diego)

Response: Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A)(2) provides that Copermittees develop and implement a proposed management program which is to include "A description of planning procedures including a comprehensive master plan to develop, implement and enforce controls to reduce the discharge of pollutants from municipal separate storm sewers which receive discharges from areas of new development and significant redevelopment. Such plan shall address controls to reduce pollutants in discharges from municipal separate storm sewers after construction is completed."

USEPA places high priority on the inclusion of development permit requirements in planning process, stating "Proposed storm water management programs should include planning procedures for both during and after construction to implement control measures to ensure that pollution is reduced to the maximum extent practicable in areas of new development and redevelopment. Design criteria and performance standards may be used to assist in meeting this objective" (USEPA, 1992). The US EPA further finds that "The municipality should consider storm water controls and structural controls in planning, zoning, and site or subdivision plan approval" (USEPA, 1992). In addition, US EPA states each Copermittee should "have an ordinance or other regulatory mechanism requiring the implementation of post-construction runoff controls […]" (USEPA, 2000). Furthermore, in its Phase II Final Rule, US EPA requires small municipalities to "Use an ordinance or other regulatory mechanism to address post-construction runoff from new development and redevelopment projects […]" (USEPA, 1999b). In light of USEPA's focus on planning requirements, the Tentative Order contains requirements for project approval.

This increased detail is also necessary due to the continued degradation of the region's receiving waters caused by urban runoff. The "1998-1999 City of San Diego and Co-Permittee NPDES Stormwater Monitoring Program Report" indicates that the typical urban runoff coming from residential, commercial, industrial, and roadway land uses frequently contains such pollutants as Total Phosphorus, Nitrate + Nitrite Nitrogen, Total Suspended Solids, Lead, Copper, and Zinc at concentrations which exceed USEPA benchmark values for storm water (City of San Diego, 1999). Construction sites are also a significant concern due to the impairment caused by sediment of such valuable water resources within the region as Agua Hedionda Lagoon, Buena Vista Lagoon, San Elijo Lagoon, and Los Penasquitos Lagoon. Increased detail in the planning process is further supported by USEPA's "Interim Permitting Approach" which supports expansion of permit requirements where necessary to attain water quality standards (USEPA, 1996).

It should be noted that the project requirements in section F.1.b.1 have been modified to make them applicable to all projects. They have been broadened or flexibility has been added to provide discretion to the Copermittees.

See change at permit section F.1.b.1.

Section: F.1 Subsection: F.1.b.1.d

Comment: The SDRWQCB does not have the legal authority to require the Copermittees to verify evidence of coverage under the statewide General Construction Permit. (County of San Diego)

Response: Under federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(C), the Copermittees must address urban runoff from industry. One effective means to do this is to ensure coverage under the General Industrial Permit. USEPA supports the Copermittees using the General Industrial Permit requirements as a tool to help enforce their own ordinances and responsibilities when it states "Municipalities are urged to evaluate pollution prevention plans and discharge monitoring data collected by the industrial facility [as required under the General Industrial Permit] to ensure that the facility is in compliance with its NPDES storm water permit. Site inspections should include (1) an evaluation of the pollution prevention plan and any other pertinent documents, and (2) an onsite visual inspection of the facility to evaluate the potential for discharges of contaminated storm water from the site and to assess the effectiveness of the pollution prevention plan" (USEPA,1992). The Tentative Order requires verification of coverage under the General Industrial Permit because it is a useful tool to help ensure industrial sites are aware of their obligations to implement BMPs. It should be noted that the SDRWQCB is not requiring the municipality to enforce the General Industrial Permit, but rather to take advantage of the resources it provides.

The SDRWQCB has legal authority to include this requirement in the Tentative Order under Clean Water Act section 402(p)(3)(B)(iii) and California Water Code section 13377.

Section: F.1 **Subsection: F.1.b.2**

Comment: The SUSMP section of the Tentative Order should conform with SWRCB Order WQ 2000-11. (IEA)

Response: The SUSMP section of the Tentative Order does conform with SWRCB Order WQ 2000-11. The Tentative Order includes the same priority development project categories as outlined in SWRCB Order WQ 2000-11, with the following modifications/additions:

1. The parking lot size criteria was changed from 25 or more parking spaces to 15 or more parking spaces. This change was based on a comment from the Port of San Diego during the April 13, 2000 SDRWQCB SUSMP Public Workshop. The comment noted that the other parking lot size criteria of 5,000 square feet actually corresponded more closely with the size of 15 parking spaces, rather than 25 parking spaces. In order to make the two parking lot size criteria as similar as possible, the criteria for 25 parking spaces was reduced to 15 parking spaces.

2. The single-family hillside residence category was changed to "All hillside development greater than 5,000 square feet." This change was made to reflect the urban runoff concerns generated by hillside development. The primary concern regarding hillside development is the potential for on-site and downstream erosion resulting from changes in the flow regime caused by the development. While pollutants from hillside development (including single-family residences) can be significant, increases or changes in flow conditions provide the greatest potential for impacts to beneficial uses. Therefore, the type of development on a hillside is not at issue as much as the size of the development and the resulting changes in the on-site and downstream flow regime. For this reason, rather than focus on the type of hillside development, the SDRWQCB SUSMP requirements focus on size. The size (5,000 square feet)

was chosen based on SWRCB guidance in Order WQ 2000-11, which uses a size threshold of 5,000 square feet for significant redevelopment.

3. Retail gasoline outlets were added as a SUSMP priority development project category. Regarding retail gasoline outlets as a priority category, the SWRCB states in the December 26, 2000 memo that Order WQ 2000-11 "allows broader discretion by the Regional Water Boards to decide whether to include additional types of development in future SUSMPs. These areas for potential future inclusion in the SUSMPs include retail gasoline outlets […]." The Draft Fact Sheet/Technical Report for Tentative Order No. 2000-01 discusses the rationale for retail gasoline outlets to be designated a priority development project category.

4. Streets, roads, highways, and freeways were added as a SUSMP priority development project category. This is due to their potential to be a significant contributor of pollutants in urban runoff. A Federal Highway Administration "Pollutant Loading and Impacts from Highway Stormwater Runoff, Volume 3; Analytical Investigation and Research Report" (1990) finds that concentrations of total suspended solids, nitrate + nitrite nitrogen, and zinc exceed USEPA benchmark values for concentrations of these pollutants in urban runoff. Streets, roads, highways, and freeways also consist of extensive impervious surfaces, which alter flow regimes and increase potential for downstream erosion.

5. Projects within, directly adjacent to, or discharging directly to Environmentally Sensitive Areas (ESAs) were added as a SUSMP priority development project category. While the SWRCB withdrew Environmentally Sensitive Areas as a priority development project category from the LARWCB SUSMP, Order WQ 2000-11 provides discretion to Regional Boards in adding Environmentally Sensitive Areas in future permits. The primary reason the SWRCB withdrew ESAs as a LARWQCB SUSMP category was because the ESAs were in conflict with other language within the LARWQCB permit. This is not the case for the SDRWQCB Tentative Order. Furthermore, the SWRCB stated that a size threshold should be placed on the ESA category. The SDRWQCB has provided such a threshold in the Tentative Order, and has held three public workshops and participated in SUSMP stakeholder group meetings where no other size threshold has been formally suggested.

The Tentative Order also applies to both discretionary and non-discretionary projects. While the SWRCB did not include non-discretionary projects in the LARWQCB SUSMP in Order WQ 2000-11, the SWRCB upheld the discretion of Regional Boards to include non-discretionary projects in future permit SUSMPs. The SWRCB indicates the inclusion of non-discretionary projects in SUSMPs should be strongly considered when it states in Order WQ 2000-11 that "the limitation of the SUSMPs to discretionary projects may not be sufficiently broad for an effective storm water control program […]."

The Tentative Order further conforms with Order WQ 2000-11 by requiring pollution prevention, source control, and structural treatment BMPs. The functions these BMPs are required to perform in the Tentative Order mirror those required by the LARWQCB SUSMP (and upheld by the SWRCB). The SDRWQCB added the following functional requirements for implemented BMPs:

1. Minimize directly connected impervious areas. This requirement was added due to the strong correlation between imperviousness and receiving water impacts (as discussed in Finding 5). By minimizing the connections between impervious surfaces, the potential impacts resulting from imperviousness are reduced.

2. BMPS shall be designed to maximize their pollutant removal capabilities. This requirement was added to ensure that BMPs are designed correctly.

3. BMPs shall be implemented as close to pollutant sources as possible and prior to runoff discharges into the MS4 or other receiving waters.

4. BMPs shall ensure that post-development runoff does not contain pollutant loads which cause or contribute to an exceedance of water quality objectives or which have not been reduced to the maximum extent practicable. This is a basic requirement of the Tentative Order (see Prohibitions A.2 and A.3, and their corresponding discussions in the Fact Sheet/Technical Report) and is included here to reiterate the importance new development site design in protecting receiving waters.

5. BMPs shall ensure that post-development runoff into a Clean Water Act section 303(d) water body containing any pollutant (for which the water body is already impaired) does not contain those same pollutants in levels exceeding pre-development levels.

The Tentative Order also conforms with SWRCB Order 2000-11 regarding numeric sizing criteria for structural treatment BMPs. The methods proposed for calculating the size of volume-based structural treatment BMPs are the same as those upheld by the SWRCB. The Tentative Order also includes additional numeric sizing criteria for flow-based BMPs. These criteria for flow-based BMPs provide clarity to the Tentative Order, in that they account for the fact that volume-based BMPs are limited by the volume of water they can treat, while flow-based BMPs are limited by the flow rate of runoff they can treat. The methods used to calculate the numeric sizing criteria for flow-based BMPs are equivalent to those upheld by the SWRCB in Order WQ 2000-11.

The Tentative Order allows for equivalent numeric sizing criteria to be developed by the Copermittees. This provision was included in the Tentative Order to allow the Copermittees some flexibility in the methods used to calculate the numeric sizing criteria. While SWRCB Order WQ 2000-11 does not address such a provision, limited flexibility of SUSMP requirements does not contradict the Order.

The Tentative Order also includes provisions for the development of procedures to identify pollutants of concern and implement SUSMPs. These provisions were included to provide some consistency in SUSMP requirements throughout the County. Again, while SWRCB Order WQ 2000-11 does not address such a provision, provisions for consistency of SUSMP requirements does not contradict the Order.

The Tentative Order also includes an exemption from meeting the numeric sizing criteria requirement. This exemption conforms with the LARWQCB SUSMP, which was upheld by SWRCB Order WQ 2000-11. The LARWQCB SUSMP states "Restaurants, where the land area for development or redevelopment is less than 5,000 square feet, are excluded from the numerical structural or treatment control BMP design standard requirement only."

The Tentative Order also conforms with SWRCB Order WQ 2000-11 regarding the waiver process for SUSMPs. The SWRCB upheld a SUSMP waiver process in Order WQ 2000-11. The SWRCB also supports the concept of a waiver fund, as required by the Tentative Order, when it states "[t]he concept of a mitigation fund or 'bank' is a positive idea for obtaining regional solutions to storm water runoff." However, Order WQ 2000-11 proceeds to list several issues which must be resolved regarding a waiver fund. These issues are listed in the Tentative Order, and the Copermittees are provided one year to develop a waiver fund which addresses the issues, with an additional minimum of six months to implement the waiver fund.

Finally, the Tentative Order conforms with SWRCB Order WQ 2000-11 regarding infiltration and groundwater protection. Order WQ 2000-11 upheld the LARWQCB SUSMP's provisions regarding

infiltration. The LARWQCB SUSMP cites limitations and guidance for infiltration practices included in "Potential Groundwater Contamination from Intentional and Non-Intentional Stormwater Infiltration," Report No. EPA-600-R-94-051 (USEPA, 1994). It also includes limitations on infiltration based on provisions implemented in the States of Washington and Maryland. The limitations on infiltration included in the Tentative Order SUSMP requirements are from these same three sources.

Section: F.1 **Subsection: F.1.b.2**

Comment: Supports the draft permit and urges its adoption. (San Diego Audubon Society, San Diego State University Pacific Estuarine Lab, Environmental Health Coalition, Port of San Diego, City of Lemon Grove)

Response: Comment noted.

Section: F.1 **Subsection: F.1.b.2**

Comment: The SUSMP requirements are overly prescriptive, deny the Copermittees the opportunity to develop flexible and cost-effective programs, and are in violation of California Water Code 13360(a). For example, the Copermittees should be allowed to designate SUSMP Priority Categories of Development. (City of San Diego, County of San Diego)

Response: The level of detail in the SUSMP requirements has been upheld by the SWRCB. The SDRWQCB has incorporated SWRCB guidance into the SUSMP requirements wherever possible. In addition, Clean Water Act section 402(p)(3)(B)(iii) gives USEPA and States considerable discretion on establishing provisions for implementation in storm water programs, stating "require controls to reduce the discharge of pollutants to the maximum extent practicable, including management practices, control techniques and systems, design and engineering methods, and such other provisions as the Administrator or the State determines appropriate for the control of pollutants." Further, interim USEPA policy guidelines on BMPs for storm water programs explains that the permitting authority can require more specific conditions or limitations where water quality standards are not being met and adequate information exists (61 CFR 43761).

Section: F.1 **Subsection: F.1.b.2**

Comment: Non-discretionary projects should not be subject to SUSMPs, since it will lead to SUSMPs being applied to insignificant projects which will not impact water quality. (County of San Diego)

Response: It is necessary for SUSMPs to apply to both discretionary and non-discretionary projects in order to adequately reduce pollutants in urban runoff discharges resulting from new development. Non-discretionary projects constitute a significant portion of new development projects. Their status as "non-discretionary projects" does not ensure that they will not generate pollutants or increase flows in their

post-construction or "use" phase. The SWRCB supports this in Order WQ 2000-11 when it states "the limitation of the SUSMPs to discretionary projects may not be sufficiently broad for an effective storm water control program […]." Furthermore, the inclusion of non-discretionary projects under the SUSMP requirements will not lead to SUSMP requirements being applied to insignificant projects. Only non-discretionary projects which fall under the SUSMP Priority Development Project Categories will be subject to the SUSMP requirements. Urban runoff from projects falling under these categories have been determined to pose significant threats to receiving water quality by the SDRWQCB, SWRCB, and LARWQCB. Regarding non-discretionary projects, the SWRCB has stated in its December 26, 2000 memo from Craig M. Wilson to the Regional Board Executive Officers that its Order WQ 2000-11 "allows broader discretion by the Regional Boards to decide whether to include additional types of development in future SUSMPs. These areas for potential future inclusion in SUSMPs include […] ministerial projects […]."

Section: F.1 **Subsection: F.1.b.2**

Comment: The Tentative Order should not require SUSMPs. (La Mesa)

Response: Pursuant to the Clean Water Act and Federal NPDES regulations, municipal storm water permits must require controls to reduce the discharge of pollutants to the maximum extent practicable (MEP), including controls which address pollutant discharges resulting from new development and significant redevelopment. In a precedential decision (Order WQ 2000-11) the SWRCB found that the SUSMP provisions constitute MEP for addressing pollutant discharges resulting from new development and significant redevelopment.

Section: F.1 **Subsection: F.1.b.2**

Comment: The Copermittees cannot apply SUSMP or other Tentative Order requirements on projects which have already received approval, such as those which have undergone CEQA or have approved tentative maps. Such an added burden is either unenforceable or will expose the City to liability "taking" of the property without just compensation.

Government Code section 65961 may restrict our ability to impose certain conditions on these projects. That section prohibits the County for a five-year period following the recordation of a subdivision map from requiring conditions to the issuance of any building permit for single or multiple family residential units which the County could have lawfully imposed as a condition of the previously approved tentative or parcel map. Section 65961(a) does include exceptions for conditions required in order to protect the public health or safety or to comply with state or federal law, but the Order is not a state law. (City of San Diego, County of San Diego, La Mesa, Imperial Beach, Wesch, Hammann, Anonymous, Chula Vista, Carlsbad, El Cajon, McKenna & Cuneo)

Response: The tentative order is not intended to compel Copermittees to retroactively negate or otherwise displace previous lawful determinations concerning SUSMP requirements. The tentative order will impact development and redevelopment projects that have not been previously designed and approved for construction. Copermittees will have the responsibility to discern if the project proponent

claims that lawful prior approvals exist for their project. See paragraph (F.1.b.2.) that provides for an 18 month period of time after the adoption of the tentative order to facilitate Copermittee transition to the SUSMP requirements.

See change at permit section F.1.b.2.

Section: F.1 Subsection: F.1.b.2.a

Comment: Replacement of structures should not be considered significant redevelopment under SUSMPs unless the replacement results in an increase of 5,000 square feet of impervious surfaces or more. (Sempra Energy, County of San Diego)

Response: Replacement of structures is not considered significant redevelopment unless the replacement results in an increase of 5,000 square feet of impervious surfaces or more. In the Tentative Order, significant redevelopment is clearly defined "as the creation or addition of at least 5,000 square feet of impervious surfaces on an already developed site." Following this definition of significant redevelopment is a list of examples of significant redevelopment, which includes "replacement of a structure." None of the listed examples, including "replacement of a structure," constitute significant redevelopment unless they result in an increase of at least 5,000 square feet of impervious surface. The definition of significant redevelopment in the Tentative Order is identical to that included in SWRCB Order WQ 2000-11.

Section: F.1 Subsection: F.1.b.2.a

Comment: New airfields and expansions of existing airfields (municipal, private) should be added as a SUSMP Priority Project Category. (Sierra Club, EHC, San Diego Baykeeper)

Response: While private airfields would generally fall under the priority category “Commercial developments greater than 100,000 square feet,” due to the size of their impervious surfaces and the number of sources (planes and other vehicles) present at the private airfields, they will be included in the list of applicable commercial developments for clarification. Municipal airfields should be addressed as high priority municipal areas under the Copermittees’ Municipal Existing Development Components of their Jurisdictional Urban Runoff Management Programs.

See change at permit section F.1.b.2.a.iii.

Section: F.1 Subsection: F.1.b.2.a

Comment: An adequate rationale for the selection of the SUSMP Priority Development Project Categories has not been provided. An adequate analysis of existing development projects, their potential threat to water quality (both individually and collectively), and the feasibility of implementing these or

other proposed controls is needed to provide a nexus between the priority categories and their potential water quality impact. (County of San Diego)

Response: The SUSMP priority development project categories have been dictated by the SWRCB in its precedential decision in Order wq 2000-11. A December 26, 2000 SWRCB memo from Craig M. Wilson to the Regional Board Executive Officers states that Order WQ 2000-11 "determined that SUSMPs appropriately applied to the following categories of development: single-family hillside residences, 100,000 square foot commercial developments, automotive repair shops, restaurants, home subdivisions with 10 to 99 housing units, home subdivisions with 100 or more housing units, and parking lots with 5, 000 square feet or more or with 25 or more parking spaces and potentially exposed to storm water runoff."

The SDRWQCB has expanded on this SWRCB guidance in a few instances. The instances are as follows:

1. The parking lot size criteria was changed from 25 or more parking spaces to 15 or more parking spaces. This change was based on a comment from the Port of San Diego during the April 13, 2000 SDRWQCB SUSMP Public Workshop. The comment noted that the other parking lot size criteria of 5,000 square feet actually corresponded more closely with the size of 15 parking spaces, rather than 25 parking spaces. In order to make the two parking lot size criteria as similar as possible, the criteria for 25 parking spaces was reduced to 15 parking spaces.

2. The single-family hillside residence category was changed to "All hillside development greater than 5,000 square feet." This change was made to reflect the urban runoff concerns generated by hillside development. The primary concern regarding hillside development is the potential for erosion resulting from changes in the flow regime caused by the development. While pollutants from hillside development (including single-family residences) can be significant, increases or changes in flow conditions provide the greatest potential for impacts to beneficial uses. Therefore, the type of development on a hillside is not at issue as much as the size of the development and the resulting changes in the flow regime. For this reason, rather than focus on the type of hillside development, the SDRWQCB SUSMP requirements focus on size. The size (5,000 square feet) was chosen based on SWRCB guidance in Order WQ 2000-11, which uses a size threshold of 5,000 square feet for significant redevelopment.

3. Retail gasoline outlets were added as a SUSMP priority development project category. Regarding retail gasoline outlets as a priority category, the SWRCB states in the December 26, 2000 memo that Order WQ 2000-11 "allows broader discretion by the Regional Water Boards to decide whether to include additional types of development in future SUSMPs. These areas for potential future inclusion in the SUSMPs include retail gasoline outlets […]." The Draft Fact Sheet/Technical Report for Tentative Order No. 2000-01 discusses the rationale for retail gasoline outlets to be designated a priority development project category.

4. Streets, roads, highways, and freeways were added as a SUSMP priority development project category. This is due to their potential to be a significant contributor of pollutants in urban runoff. A Federal Highway Administration "Pollutant Loading and Impacts from Highway Stormwater Runoff, Volume 3; Analytical Investigation and Research Report" (1990) finds that concentrations of total suspended solids, nitrate + nitrite nitrogen, and zinc exceed USEPA benchmark values for concentrations of these pollutants in urban runoff. Streets, roads, highways, and freeways also consist of extensive impervious surfaces, which alter flow regimes and increase potential for downstream erosion.

5. Projects within, directly adjacent to, or discharging directly to Environmentally Sensitive Areas (ESAs) were added as a SUSMP priority development project category. While the SWRCB withdrew Environmentally Sensitive Areas as a priority development project category from the LARWCB SUSMP, Order WQ 2000-11 provides discretion to Regional Boards in adding Environmentally Sensitive Areas in future permits. The primary reason the SWRCB withdrew ESAs as a LARWQCB SUSMP category was because the ESAs were in conflict with other language within the LARWQCB permit. This is not the case for the SDRWQCB Tentative Order. Furthermore, the SWRCB stated that a size threshold should be placed on the ESA category. The SDRWQCB has provided such a threshold in the Tentative Order, and has held three public workshops and participated in SUSMP stakeholder group meetings where no other size threshold has been formally suggested.

Section: F.1 Subsection: F.1.b.2.a.i

Comment: The two SUSMP Priority Project Categories covering home subdivisions should be merged into one category for home subdivisions larger than 10 housing units. (Carlsbad, SANDAG)

Response: The two SUSMP priority project development categories covering home subdivisions are kept distinct to allow for different sets of pollution prevention and source control BMPs to be identified and applied at the two different categories. While different pollution prevention and source control BMPs can be applied for the two categories, it should be noted that the structural treatment BMP numeric sizing criteria requirement for the two categories is the same. The two distinct priority project development categories were upheld by the SWRCB in Order WQ 2000-11.

Section: F.1 Subsection: F.1.b.2.a.iii

Comment: The SUSMPs should apply to automotive dealerships. (McKenna & Cuneo)

Response: While automotive dealerships would generally fall under the SUSMP priority category "Commercial developments greater than 100,000 square feet," due to the size of their impervious surfaces and the number of sources (autos) present at the dealerships, they will be included in the list of applicable commercial developments for clarification.

See change at permit section F.1.b.2.a.iii.

Section: F.1 Subsection: F.1.b.2.a.v

Comment: What is the rationale for the restaurant size criteria? The Copermittees should be allowed to determine the size threshold for restaurants to be subject to SUSMP requirements. (La Mesa, McKenna & Cuneo)

Response: The size threshold for restaurants to be subject to SUSMP requirements has essentially been determined by the SWRCB. The LARWQCB SUSMP provisions, which the SWRCB upheld in a precedential decision in Order WQ 2000-11, includes the statement "[r]estaurants, where the land area for

development or redevelopment is less than 5,000 square feet, are excluded from the numerical structural or treatment control BMP design standard only." The size threshold for restaurants included in the Tentative Order matches this statement. Restaurants smaller than 5, 000 square feet are excluded from the numeric sizing criteria requirement to prevent small restaurants with BMP siting restrictions and minimal exposure to urban runoff from being subject to numeric sizing criteria.

Section: F.1 Subsection: F.1.b.2.a.vi

Comment: The hillside development SUSMP priority project category should not be included in the Tentative Order because it is not a significant source of pollutants after construction. (County of San Diego, BIASC)

Response: The hillside development SUSMP priority project category is necessary due to the high potential for erosion caused by hillside development. The primary concern regarding hillside development is the potential for erosion both on-site and downstream resulting from changes in the flow regime caused by the development, as discussed in Finding 4. This on-site and downstream erosion can be a significant source of pollutants after construction. Therefore, post-construction structural treatment BMPs are still needed to catch as well as prevent this accelerated on-site and downstream erosion.

The SWRCB supports post-construction structural treatment BMPs for hillside development in Order WQ 2000-11, which includes single-family hillside residences as a SUSMP priority project category. The SDRWQCB has expanded this category to include all hillside development greater than 5,000 square feet since the type of development on a hillside is not at issue as much as the size of the development and the resulting changes in the flow regime. While pollutants from hillside development can be significant, increases or changes in flow conditions provide the greatest potential for impacts to beneficial uses. For this reason, rather than focus on the type of hillside development, the SDRWQCB SUSMP requirements focus on size. The size (5,000 square feet) was chosen based on SWRCB guidance in Order WQ 2000-11, which uses a size threshold of 5,000 square feet for significant redevelopment.

Section: F.1 Subsection: F.1.b.2.a.vii

Comment: The SDRWQCB should include all San Diego County area Reserves, Preserves, Outstanding National Resources Waters, State National Resources Waters, Wildlife Refuges, and the South San Diego Bay National Wildlife Refuge as designated Environmentally Sensitive Areas. (EHC, San Diego Baykeeper, Port of San Diego)

Response: The list of Environmentally Sensitive Areas included in the Tentative Order was developed during SDRWQCB public workshops and City of San Diego stakeholder group meetings on SUSMPs. The SDRWQCB has left the identification and addition of Environmentally Sensitive Areas beyond those listed in the Tentative Order to the discretion of the Copermittees, since the Copermittees are most familiar with the natural resources within their jurisdictions. The Tentative Order's list of Environmentally Sensitive Areas includes "any other equivalent environmentally sensitive areas which have been identified by the Copermittees" to allow for additional designations of Environmentally Sensitive Areas by the Copermittees. Since most Copermittees have already identified Environmentally

Sensitive Areas within their jurisdictions, it is expected that Environmentally Sensitive Areas similar or identical to those listed in the comment will be included in the Copermittees' SUSMP programs.

Section: F.1 **Subsection: F.1.b.2.a.vii**

Comment: Environmentally Sensitive Areas (ESAs) should not be a SUSMP category for the following reasons:
1. The SDRWQCB does not have legal authority to create ESAs.
2. ESAs are already heavily regulated.
3. The Tentative Order does not provide for or require any nexus between the potential harm created to the "ESA" by urban runoff.
4. There is no support for the development threshold. (County of San Diego, BIASC, BIASD)

Response: The categorization of "all development and redevelopment located within or directly adjacent to or discharging directly to an environmentally sensitive area" as a SUSMP priority development project category is a necessary layer of protection for these valuable resources. Each designated environmentally sensitive area (ESA) is either a valuable receiving water resource which should be protected from the impacts of urban runoff, or a degraded receiving water resource which should be protected from additional impacts. The geographic location of a development project can impact an ecologically fragile area. A sensitive habitat has a much lower capacity to withstand pollutants shocks than might be acceptable in the general circumstance, and so deserves attention. In essence, a project that is ordinarily insignificant in its impact on the environment may, in a particularly sensitive environment, be significant (LARWQCB, 2000). USEPA, in discussing storm water controls, notes: "Sensitive area protection is an important element of conservation design […] These areas are particularly susceptible to degradation by storm water runoff" (USEPA, 1999a).

The potential for new urban runoff discharges from new development and redevelopment to impact receiving waters within environmentally sensitive areas is clear. Urban runoff has been found to be a leading cause of water quality impairment in the San Diego Region and nationwide. Untreated pollutants in urban runoff, indiscriminate of dry or wet weather conditions, routinely find their way to our creeks, lagoons, bays, and ocean as easily from over watering of residential lawns as from rainstorms. San Diego area urban runoff is commonly contaminated with pesticides, fertilizers, animal droppings, trash, food wastes, automotive byproducts, and many other toxic substances which are generated by our urban environment. Water that flows over streets, parking lots, construction sites, and industrial, commercial, residential, and municipal areas carries these untreated pollutants through storm drain networks directly to the receiving waters of the region.

The United States Environmental Protection Agency (USEPA) recognizes urban wet weather flows as the number one source of estuarine pollution in coastal communities (USEPA, 1999b). This trend is reflected locally by the 1998-1999 City of San Diego and Co-Permittee NPDES Stormwater Monitoring Program Report, which names urban runoff as one of the most significant contributors of pollution to our waterways and coastal areas. Furthermore, this document reports that monitoring efforts indicate that instream concentrations of pathogen indicators (fecal coliform and streptococcus) and heavy metals (such as cadmium, copper, lead, and zinc) exceed state and federal water quality criteria. Storm water within the region has also been found to contain the pesticides diazinon and chlorpyrifos (Dursban) at levels that can cause chronic or acute toxicity. As this evidence suggests, San Diego's urban runoff is frequently

contaminated; application of SUSMP provisions to new development and redevelopment within or near environmentally sensitive areas will help protect these areas from its impacts.

In requiring that new development and redevelopment within or near environmentally sensitive areas meet SUSMP provisions, the SDRWQCB has not created ESAs. It has simply identified water bodies that have previously been determined to be sensitive to discharges of waste (Areas of Special Biological Significance, 303(d) listed waterbodies, etc.) and required that appropriate BMPs be implemented at development sites which are located near these areas. ESAs at a level which is appropriate for the protection of such a valuable or degraded resource. It is important to note that the intent of identifying ESAs as a SUSMP was to protect receiving waters within the ESA. In order to clarify this intent, the Tentative Order will be revised to indicate that only developments which discharge to a receiving water within an ESA have the potential to be subject to the SUSMP provisions.

While some ESAs may be heavily regulated, it is not clear that this regulation pertains to development directly adjacent or directly discharging to ESAs. Nor is it clear that this regulation always relates to water quality. The SUSMP provisions for ESAs are meant to complement regulatory activities of other agencies, and fill in any gaps with regards to urban runoff and water quality.

The development threshold of 2,500 square feet for projects near ESAs to be subject to SUSMPs is based on CEQA development thresholds relating to projects in ESAs. CEQA exempts from its requirements projects located in environmentally sensitive areas if additions to existing structures are less than 2,500 square feet (19 CCR 15301).

Section: F.1 **Subsection: F.1.b.2.a.vii**

Comment: Please clarify the definition of "discharging directly to". The terms "predominantly" and "not commingled with" are contradictory. (Imperial Beach, Chula Vista)

Response: The appearance of the terms “predominantly” and “not commingled with” in the definition of “discharging directly to” appears to be contradictory. Therefore, the term “predominantly” will be deleted from the Tentative Order.

See change in permit section F.1.b.2.a.vii.

Section: F.1 **Subsection: F.1.b.2.a.vii**

Comment: By including Environmentally Sensitive Areas as a priority category under SUSMPs, the SDRWQCB is attempting to regulate matters outside of water quality, thereby exceeding its legal authority. (County of San Diego)

Response: The intent of the SUSMP Environmentally Sensitive Area priority development project category is to protect receiving waters within Environmentally Sensitive Areas. The Tentative Order will be changed to clarify that Environmentally Sensitive Areas must contain receiving waters which are receiving the subject discharges.

See change in permit section F.1.b.2.a.vii.

Section: F.1 Subsection: F.1.b.2.a.viii

Comment: Why was the criteria for the number of parking spaces required to trigger SUSMP requirements reduced to 15 parking spaces, when the LA SUSMP criteria was 25 parking spaces? (County of San Diego, BIASD, BIASC)

Response: The parking lot size criteria was changed from 25 or more parking spaces to 15 or more parking spaces. This change was based on a comment from the Port of San Diego during the April 13, 2000 SDRWQCB SUSMP Public Workshop. The comment noted that the other parking lot size criteria of 5,000 square feet actually corresponded more closely with the size of 15 parking spaces, rather than 25 parking spaces. In order to make the two parking lot size criteria as similar as possible, the criteria for 25 parking spaces was reduced to 15 parking spaces.

Section: F.1 Subsection: F.1.b.2.a.ix

Comment: The Copermittees should not be required to control runoff from streets, roads, highways, and freeways which they do not have authority over. (County of San Diego)

Response: The Tentative Order does not require the Copermittees to control runoff from freeways, etc. over which they do not have jurisdiction, provided that discharges from such sources do not enter their MS4s. Municipalities cannot arrogate to themselves the authority to regulate discharges from facilities or activities beyond their jurisdiction, e.g., discharges from state and federal facilities including highways and Indian reservations directly to waters of the state that are not part or tributary to the municipality's MS4. Municipalities are required, however, to have or develop legal authority to regulate storm water discharges and urban runoff within their jurisdictions, including discharges that may be subject to concurrent regulation by the state and federal governments. In addition, where municipalities control access to MS4 infrastructure for the accommodation of discharges from entities within their physical jurisdiction (including school districts, state and federal facilities, construction sites and industrial facilities) municipalities must exercise such control in a manner consistent with their obligation under the Regional Board's requirements to reduce pollutants in their MS4 to the maximum extent practicable.

Section: F.1 Subsection: F.1.b.2.a.ix

Comment: Due to its late addition as a SUSMP category, the Roads, Streets, Highways, and Freeways priority project category should be either deleted from the permit or the RWQCB should extend the

written review period to allow for more adequate discussion prior to permit adoption. (County of San Diego, La Mesa)

Response: Streets, roads, highways, and freeways were added as a SUSMP priority development project category due to their potential to be a significant contributor of pollutants in urban runoff. A Federal Highway Administration "Pollutant Loading and Impacts from Highway Stormwater Runoff, Volume 3; Analytical Investigation and Research Report" (1990) finds that concentrations of total suspended solids, nitrate + nitrite nitrogen, and zinc exceed USEPA benchmark values for concentrations of these pollutants in urban runoff. Streets, roads, highways, and freeways also consist of extensive impervious surfaces, which alter flow regimes and increase potential for downstream erosion.

Streets, roads, highways, and freeways were addressed in Tentative Order No. 2001-01. The written comment period for the Tentative Order was approximately 50 days, while the oral comment period was approximately 63 days. The SDRWQCB also held three public workshops on the Tentative Order. The SDRWQCB has provided sufficient time and opportunity for comment and discussion on this SUSMP priority project development category.

Section: F.1 **Subsection: F.1.b.2.a.x**

Comment: Retail Gasoline Outlets should be a SUSMP priority development category subject to numeric sizing criteria. At a minimum, if Retail Gasoline Outlets are not held to meeting the numeric sizing criteria, they should be required to implement a separate, stringent and specific set of BMPs. (EHC)

Response: Comment noted.

Section: F.1 **Subsection: F.1.b.2.a.x**

Comment: RGOs should not be a SUSMP priority category. (County of San Diego, WSPA, Alliance for Water Quality)

Response: A WSPA sponsored study, "Results of a Retail Gasoline Outlet and Commercial Parking Lot Stormwater Runoff Study ", concludes that pollutant concentrations from RGO runoff are similar to concentrations from commercial parking lots, restaurants and other urban developments that are properly regulated under Federal and State storm water pollution laws. Therefore, discharges from RGOs should be given the same level of priority. The fact that significant discharges were found in the study indicates that the current source control measures are not working and structural controls are needed. Use of structural controls such as filtration or treatment inserts is also technically and economically feasible. In an EPA funded study of four inserts ("The Rouge River National Wet Weather Demonstration Project") it was concluded that, "these devices are applicable for use in gas stations … and they have a relatively low cost".

Section: F.1 Subsection: F.1.b

Comment: For the purposes of establishing vesting of a tentative map: Does "grading or construction activities" include mass grading or site clearing?

Further definition of the activities that would allow a priority project to escape SUSMP requirements is necessary, or is it strictly the Copermittees' call as to when a project is vested under current requirements? (City of Chula Vista)

Response: Grading or construction activities includes mass grading and site clearing. Projects approved after adoption of Tentative Order 2001-01 will be expected to meet SUSMP requirements if they are in a SUSMP category.

Section: F.1 Subsection: F.1.b

Comment: In addition, because F.1.b. appears to set conditions of approval for all development projects, not just priority projects, it appears that section F.1.b(1)(g) (which concerns no net increase in run-off, compliance with water quality standards, and pollutant discharges to CWA section 303(d) water bodies) is inappropriately included as a permit condition for all projects. In other provisions (e.g., Prohibition A.4. and section F.1.a(9)), this requirement is specifically limited to new development and significant redevelopment projects. Is it the Regional Board's intent that this requirement apply to all new development? Further, requiring such controls for all projects regardless of their size or threat to water quality inappropriately dictates the manner in which the City is required to comply with the general objectives of the Tentative Order, contrary to Cal. Water Code § 13360(a). (City of San Diego)

Response: Language in section F.1.b.1.g concerning no net increase in runoff and pollutant discharges to 303(d) water bodies has been removed and therefore does not apply to all development projects. However, language regarding compliance with water quality standards does apply to all development projects. Compliance with water quality standards is a basic requirement of the Tentative Order (see section A.2) regardless of the size of the site. Requiring compliance with water quality standards does not specify the means by which compliance must be achieved and therefore does not violate CWC § 13360(a).

Section: F.1 Subsection: F.1.b

Comment: F.1.b states that all development comply with the requirements of F.1.b.1. Presumably this applies to any project regardless of whether it is listed as a SUSMP category in F.1.b.2. Is this the RWQCB's intent? (County of San Diego)

Response: F.1.b.1 applies to all development projects irregardless of whether they are subject to SUSMPs.

Section: F.1 Subsection: F.1.b

Comment: The tentative order should provide guidance when waste discharge requirements are needed for a project. (Port of San Diego)

Response: In accordance with the Porter- Cologne Water Quality Control Act, any person proposing to discharge waste, other than to a sanitary sewer system, must file a report of waste discharge (application) to obtain waste discharge requirements at least 120 days prior to commencing the discharge. The Regional Board will review the application and determine if waste discharge requirements are needed or if the discharge complies with the criteria for a conditional waiver of waste discharge requirements as described in Table 4-4 of the Water Quality Control Plan San Diego Basin. Regional Board staff are not recommending the Tentative Order 2001-01 be modified to include guidance on when waste discharge requirements are needed.

Section: F.1 Subsection: F.1.b

Comment: A justification for imposing significant new requirements on all development projects has not been provided. In spite of the significance of these changes, the Technical Report offers no explanation or justification. Some factual justification must be provided along with supporting findings. (County of San Diego)

Response: The Staff Report adequately establishes a link between urban development and water quality degradation.

Section: F.1 Subsection: F.1.b

Comment: The requirement to "review each individual proposed project plan" could eliminate the ability of Copermittees to issue ministerial permits. The cost and time associated with administering discretionary permits can be significantly higher than for ministerial permits. The County's preliminary estimate is that 36 additional County staff would be needed. Costs of $2.7 million would be passed through to permit applicants. The County recommends that the RWQCB work with Copermittees to simplify section F.1. to an extent that allows them to retain their ability to establish local permit conditions that can be administered ministerially. (County of San Diego)

Response: The requirement is not intended to eliminate the ability of the Copermittees to issue ministerial permits. It is intended to ensure that each project incorporates water quality considerations. The Tentative Order has been changed to clarify this intent. See change at permit section F.1.b.

Section: F.1 Subsection: F.1.b.1

Comment: The Copermittees only have authority under CEQA and the Subdivision Map Act to impose requirements for improvements and mitigation measures that are found to be necessary and sufficient to reduce impacts to less than significant levels. (City of Chula Vista)

Response: Municipalities are responsible for actions that determine the volume and character of wastes and pollutants discharged in (or as) urban runoff to their MS4s and are required by the Clean Water Act and NPDES regulations to prevent discharges of non-storm water pollutants to their MS4s.

Storm water permits are issued to municipalities because of their land use authority. The ultimate responsibility for the pollutant discharges, increased runoff, and inevitable long-term water quality degradation that results from urbanization lies with local governments. This responsibility is based on the fact that it is the local governments that have authorized the urbanization (i.e., conversion of natural pervious ground cover to impervious urban surfaces) and the land uses that generate the pollutants and runoff. Furthermore, the MS4 through which the pollutants and increased flows are conveyed, and ultimately discharged into receiving waters, are owned and operated by the same local governments. In summary, the municipal Copermittees under Order No. 2001-01 are responsible for discharges into and out of their storm water conveyance systems because (1) they own and operate the MS4; and (2) they have the legal authority that authorizes the very development and land uses which generate the pollutants and increased flows in the first place.

Section: F.1 Subsection: F.1.b.1

Comment: Section F.1.b (1) - Page 14 - Conditions of Approval: This section requires that receiving water quality objectives are not violated throughout the life of the project." It will be impossible to enforce this section. (City of La Mesa)

Response: The purposes of conditions of approval which contain water quality requirements is to ensure that pollutant discharges from the development are reduced to the maximum extent practicable and do not cause or contribute to an exceedance of water quality objectives. Section F.1.b.1 does not require any enforcement; rather, it requires that conditions of approval be designed to ensure these two purposes.

Section: F.1 Subsection: F.1.b.1

Comment: How do Copermittees respond to changes in beneficial uses or changes in projects when implementing the tentative order? (McKenna & Cuneo, L.L.P.)

Response: Beneficial uses are designated by the SDRWQCB in a Water Quality Control Plan (Basin Plan). The Basin Plan is reviewed every three years and amendments can only take place after these reviews. Most development projects have a much shorter life span than three years. Given that, it is highly unlikely that a designated beneficial use will change.

Section: F.1 Subsection: F.1.b.1

Comment: Page 15, after F. 1.b.(1) (g), add:
(h) Require project proponent to submit plans and specifications for any proposed structural BMP to the Local Vector Control Agency or StateDepartment of Health Services for review and approval prior to construction. Where appropriate a "Mosquito Vector Prevention and Control Plan" may also be required". (State Department of Health Services)

Response: In recognition of the potential public health threat, an additional Finding is recommended to be added to the Tentative Order. The Finding (no. 36) identifies the potential vector issues related to BMP implementation and the role of collaborative program development between municipalities and vector control agencies in addressing an minimizing vector production.

Section: F.1 Subsection: F.1.b.1

Comment: F.1.b (1) page 14 - This section requires "that receiving water quality objectives are not violated throughout the life of the project. This has no nexus to the issue of concern, will be impossible to enforce and of questionable legality. This portion of the sentence should be deleted. (City of Carlsbad)

Response: Requirements to ensure that pollutants in runoff from development are reduced to the maximum extent practicable and do not cause or contribute to an exceedance of water quality standards is in line with SWRCB guidance. The SWRCB upheld such requirements in SWRCB Order WQ 2000-11.

Section: F.1 Subsection: F.1.b.1

Comment: SDBK and SDSF strongly support the proposed shift in project approval process. It is our belief that this shift should have occurred when the current stormwater permit was promulgated more than ten years ago. At the very least, planning stage consideration of runoff impacts should have begun following EPA guidance in 1992. Given the length of time since the notion was brought forward, and the overwhelming lack of compliance with the measure, contrary arguments by Copermittees citing costs and logistical difficulties should carry little or no weight. Now, consideration of runoff controls at the planning stage will appropriately defer Copermittee costs of permit compliance to project developers. The current paradigm of tax-payer subsidy for private development pollution must end. (Surfrider Foundation)

Response: Comment noted.

Section: F.1 Subsection: F.1.b.1.a

Comment: Require project proponents to implement ...BMPs for all development projects. The IEA recommends language be added to allow for future advances in technology. Such language might be " equivalent alternative" after the word BMP. (Industrial Environmental Association)

Response: Advances in technology would still fall under the definition of BMP, as defined in Attachment D of the Tentative Order.

Section: F.1 Subsection: F.1.b.1.a

Comment: The pollution prevention requirements contained in section F.1.b.(1)(a) are not feasible to implement. The practical implications of requiring post-construction pollution prevention practices

through a land development / redevelopment program are fundamentally different than those of requiring source control and/or treatment control BMPs. While BMPs that will become a permanent post-construction feature can be addressed prior to construction (with some limitations), exercising control over the specific activities of future occupants or users is considerably less feasible and does not appear to have been adequately considered.

Section F.1.b.(1)(a) would require Copermittees to ensure that post-construction pollution prevention BMPs are implemented by the parties for all local permits, including any permit involving the construction or refurbishment of any residential property. Not only would this include the subdivisions subject to the section F.1.b.(2)(a)(i) – (ii) SUSMP requirements, but also all new single family residences, and in fact all local permits, including a permit to install a small retaining wall is residential landscaping. This implies that (1) pollution prevention plans, agreements, and/or contracts would be needed as a condition of occupancy, and/or (2) that the County would need to monitor the activities of these people to ensure compliance. Neither of these approaches could be effectively implemented in the real world. This section also contrasts sharply with permit section F.3.d. which encourages the use of pollution prevention methods in existing residential areas. This would establish a double standard that would be difficult, if not impossible, to enforce. It also raises doubts about whether Regional Board has fully considered the practical implications of implementing the section. For instance, how long would the requirement apply? Would it be applicable only for the first occupant? If the house is re-sold, would we then only be required to encourage pollution prevention BMPs of subsequent owners?

Section F.1.b.(1)(a) also requires that post-construction pollution prevention BMPs be implemented by the occupants of any new commercial or industrial facility that the County permits, regardless of whether the permit is discretionary or nondiscretionary. As before, how would we be expected to require and enforce this provision in seeking permits? It would virtually eliminate all ministerial permits. Has the RWQCB considered the potential staffing levels that would be necessary to develop a program to enforce this requirement? If so, why is this issue not addressed in the Technical Report?

Finally, the application of this section to streets, roads, highways, and freeways (F.1.b.(2)(a)(ix)) and parking lots (F.1.b.(2)(a)(viii)) presents significant concerns which have not been considered. How would post-construction pollution prevention be required for streets and roads? Would we be required to reduce or eliminate vehicles or the pollutants they generate? Would we be expected to require (or provide) tuneups or repairs for the vehicles that use our roads? Would we be expected to reduce the numbers of trips on local roads? How would we verify compliance? Additionally, would we be expected to apply these requirements to highways and freeways that we don't construct or maintain (e.g., Caltrans facilities already under a separate NPDES permit)? How would this requirement apply to parking lots? Would we be expected to restrict the number of vehicles using them? If so, where would they park? Further, has the Regional Board considered the fact that we do not have the authority to regulate Caltrans in this area? (County of San Diego)

Response: While the SDRWQCB supports consideration of pollution prevention BMPs during the planning process, it acknowledges that requiring pollution prevention BMPs in the project approval process may not always be possible. For this reason, the requirement for pollution prevention BMPs has been removed from section F.1.b.1.a. See change at permit section F.1.b.1.a. and Finding 12.

Section: F.1 Subsection: F.1.b.1.a

Comment: Recommend modifying the first sentence to: "The SUSMPs shall require structural treatment BMPs "or equivalent alternative" to be implemented at all priority development projects." (Port of San Diego)

Response: The definition of BMP in Attachment D of the Tentative Order is broad and inclusive. It is likely that most "equivalent alternative" would already fall under this broad definition, making the inclusion of the term unnecessary.

Section: F.1 Subsection: F.1.b.1.b

Comment: F.1.b.(1)(b) "Require project proponents to implement site design / landscape characteristics where feasible which maximize infiltration, provide retention, slow runoff, and minimize impervious land coverage for all development projects." This condition should be amended to "recommend" or "encourage" the use of these principles where that is consistent with other environmental goals. Maximizing infiltration would have adverse impacts on wetlands and riparian habitats, and on groundwater. Accordingly, rather than mandatory prescriptions, this condition should be amended to account for situations in which infiltration would adversely affect the pertinent environmental condition. (County of San Diego)

Response: The provision only requires the described site design/landscape characteristics where it is feasible. If the Copermittee determines that such measures are infeasible at a given site, they need not require them. Therefore, relaxing this requirement to "recommendation" status is not warranted.

Section: F.1 Subsection: F.1.b.1.c

Comment: BUFFER ZONES FOR NATURAL WATER BODIES Paragraph F. l.b(l)(c) requires that a project proponent implement buffer zones for natural water bodies. This requirement needs to be more specific about what is meant by a buffer and by a natural'water body. We have heard a developer claiming that a wall at the edge of a wetland can be considered an adequate buffer. An adequate buffer needs to preserve the full functions and values of the water body. The buffer needs to be adequate to stop such impacts as inappropriate water flows, disturbances to wildlife, night lighting, intrusion by pets, and it should provide adequate high water refuge habitat, appropriate transition vegetation for foraging, roosting, and nesting, natural inputs of nutrients from bank vegetation, a diversity of vegetation to assure ecological viability, etc. This one line requirement must be expanded to allow it be effective. (San Diego Audubon Society)

Response: SDRWQCB encourages the Permittees to include the above mentioned criteria in their buffer zone management. It is expected that the natural buffer zone will be designed to protect water quality. However, the SDRWQCB will not make such provisions a requirement of the Tentative Order as doing so will deny the Permittees flexibility in their approach to natural buffer zones.

Section: F.1 Subsection: F.1.b.1.c

Comment: What is used to determine a "natural water body" and the "size and nature of a buffer?" (City of Carlsbad)

Response: A natural water body is any water body that supports beneficial uses. In an attempt to provide the Copermittees flexibility, the Tentative Order does not specify size natural buffer areas. It is expected that the Copermittees will set criteria for natural buffer zones for their benefits in protecting water quality. However, the Tentative Order does not make such provisions a requirement as doing so would deny the Copermittees flexibility in their approach to natural buffer zones.

Section: F.1 Subsection: F.1.b.1.c

Comment: This condition should be amended to "recommend" or "encourage" the inclusion of buffer zones. While the County agrees that the establishment of buffer zones is generally a valuable objective, it is not realistic to require it as a condition of approval for all projects. This condition cannot be implemented in all instances, and shouldn't equate to a prohibition on the development of properties where it cannot be implemented. (County of San Diego)

Response: While buffer zones for water bodies may not always be feasible, some sort of buffer is. For example, trees, noise constraints, lighting constraints, and access limitations can all provide buffering for natural water bodies where extreme limitations of space exist. For this reason, section F.1.b.1.c will be modified to allow for buffers in place of buffer zones where extreme limitations of space exist. See change at permit section F.1.b.1.c.

Section: F.1 Subsection: F.1.b.1.c

Comment: F.1.b.1.c.
Please clarify if a buffer zone would be necessary for a redevelopment project when the previous development had none and other F. 1. b. 1. conditions are met. (Port of San Diego)

Response: The Tentative Order does not specify to this level of detail what course of action the Copermittees should take. It is expected that the Copermittee will consider natural buffer zones whenever possible for their benefits in protecting water quality. However, Tentative Order does not make such provisions a requirement as doing so will deny the Copermittees flexibility in their approach to natural buffer zones.

Section: F.1 Subsection: F.1.b.1.e

Comment: Section F.1.b.1.e. conflicts with finding 22 which states that "the RWQCB is responsible for enforcing both statewide general permits and this Order within the San Diego region." (County of San Diego)

Response: Tentative Order section F.1.b.1.e. (development of SUSMPs [Standard Urban Storm Water Mitigation Plans]) does not conflict with Finding No. 22 of the same order. The requirement that Copermittees develop SUSMPs (a plan to reduce pollutants and runoff flows from all new development

and significant redevelopment projects) does not conflict with the SDRWQCB's role in regulating these activities under statewide general permits. Section 402(p)(3)(B)(iii) of the CWA requires municipalities to implement "controls to reduce the discharge of pollutants to the maximum extent practicable, including management practices, control techniques and system, design and engineering methods, and such other provisions as the Administrator or the State determines appropriate for the control of such pollutants." The SDRWQCB's responsibility is to translate this section of the CWA into the form of waste discharge requirements. The tentative Order's required programs are consistent with the CWA because they reduce the discharge of pollutants to the maximum extent practicable (MEP). Furthermore, the CWA and federal regulations describe only minimal storm water program components. Although the tentative Order may describe portions of program components that are not specifically addressed in the federal requirements and regulations, the SDRWQCB has made express findings that these components are significant sources of storm water pollution. Since the CWA and federal regulations do not exclude sources that are significant pollutant contributors, it is appropriate to cover these sources in the tentative Order.

The federal regulations in 40 CFR 122.26 establish a dual system for regulation of industrial and construction site discharges through municipal storm water conveyance systems. Industries and construction sites are permitted under statewide general NPDES industrial or construction storm water permits. These permits require industries and construction sites to do the following: (1) to reduce pollutants to comply with best available technology (BAT) and best conventional technology (BCT) performance standards and (2) to not cause or contribute to violations of applicable water quality objectives. In addition, industries and construction sites are subject to regulation by municipalities through storm water ordinances developed according to municipal storm water permits issued by the state. Pursuant to Clean Water Act section 402(p)(3)(iii) municipalities are required to implement controls to reduce the discharge of pollutants from municipal storm water conveyance systems to the maximum extent practicable (MEP). Because storm water from industrial facilities may be a major contributor of pollutants to municipal storm water conveyance systems, municipalities are obligated to develop controls for storm water discharges associated with industrial activity through their system in their urban runoff management program. (See Federal Register preamble, Volume 55, No. 222, November 16, 1990, page 48000.)

The US EPA intended that the municipalities and delegated states share the responsibility of regulating storm water discharges from industrial and construction site activities. The US EPA believed that this dual approach would result in the most effective regulation. Since municipalities are ultimately responsible for discharges from their municipal storm water conveyance systems, it is in their best interest to regulate what is discharged into their system.

Section: F.1 Subsection: F.1.b.1.e

Comment: F.1.b.(1)(e) "Require project proponent to ensure its grading or other construction activities meet the provisions specified in Section F.2. of this Order." This section is unnecessary since section F.2. already specifies the projects to which it applies. This language also presents a significant potential for conflicts between the two sections since both specify their own separate criteria for project inclusion. (County of San Diego)

Response: Section F.1.b.1.e reiterates the requirements of section F.2 in order to place emphasis on the importance of the construction phase as a source of pollutants. The earlier project proponents are notified of their construction responsibilities, the more prepared they will be when construction begins.

Since section F.1.b.1.e and section F.2 generally apply to all development projects and construction projects, conflicts should not occur.

Section: F.1 Subsection: F.1.b.1.f

Comment: Paragraph F.1.b.(1)f, page 15, requires that the proponent of a project insure long term maintenance of all post-construction BMPs in perpetuity. But, in many cases the project proponent will not be associated with the project after construction. We urge that the paragraph be augmented to also require subsequent owners and operators to ensure long-term maintenance. (San Diego Audubon Society)

Response: Many developers may not be associated with developments for the long term. Therefore it will be difficult for them to ensure long-term maintenance of post-construction BMPs. However, it is possible for developers to provide a mechanism which will ensure long term BMP maintenance. For these reasons, the Tentative Order will be changed from requiring developers to ensure long term BMP maintenance to requiring developers to provide a mechanism which will ensure long term BMP maintenance.

Language included in the LARWQCB SUSMP regarding BMP maintenance, as upheld by SWRCB Order WQ 2000-11, can serve as guidance to the Copermittees regarding mechanisms which will ensure long term BMP maintenance. The LARWQCB SUSMP states:

"[T]he Permittee shall require that the applicant provide verification of maintenance provisions through such means as may be appropriate, including, but not limited to legal agreements, covenants, CEQA mitigation requirements and/or Conditional Use Permits.

For all properties, the verification will include the developer's signed statement, as part of the project application, accepting responsibility for all structural and treatment control BMP maintenance until the time the property is transferred and, where applicable, a signed agreement from the public entity assuming responsibility for Structural or Treatment Control BMP maintenance. The transfer of property to a private of public owner must have conditions requiring the recipient to assume responsibility for maintenance of any Structural or Treatment Control BMP to be included in the sales or lease agreement for that property, and will be the owners responsibility. The condition of transfer shall include a provision that the property owners conduct maintenance inspection of all Structural or Treatment Control BMPs at least once a year and retain proof of inspection. For residential properties where the Structural or Treatment Control BMPs are located within a common area which will be maintained by a homeowner's association, language regarding the responsibility for maintenance must be included in the projects conditions, covenants and restrictions (CC&R). Printed educational materials will be required to accompany the first deed transfer to highlight the existence of the requirement and to provide information on what storm water management facilities are present, signs that maintenance is needed, how the necessary maintenance can be performed, and assistance that the Permittee can provide. The transfer of this information shall also be required with any subsequent sale of the property.

If Structural of Treatment Control BMPs are located within a public area proposed for transfer, they will be the responsibility of the developer until they are accepted for transfer by the County of other appropriate public agency. Structural or Treatment control BMPs proposed for transfer must meet design standards adopted by the public entity for the BMP installed and should be approved by the County or other appropriate public agency prior to its installation."

See change in permit section F.1.b.1.f.

Section: F.1 Subsection: F.1.b.1.g

Comment: F.l.b.(l)(g) page 14; Clarify that these runoff requirements apply only to Priority Development Project Categories. (Sempra Energy)

Response: The language in section F.1.b.1.g regarding control of peak flow rates has been removed form the Tentative Order. Therefore this issue has been resolved.

Section: F.1 Subsection: F.1.b.1.g

Comment: Section F.1.b (1)(g): Does the requirement regarding post-development runoff apply to both direct and indirect discharges to a 303(d) water body? (City of Chula Vista)

Response: Yes, the requirement regarding post development runoff applies to all urban runoff discharges to a 303(d) listed water body.

Section: F.1 Subsection: F.1.b.1.g

Comment: The performance standards in section F.1.b.(1)(g) are not applicable to individual dischargers within Copermittee jurisdictions. These standards are applicable only to discharges from Copermittee MS4s. The RWQCB lacks the legal authority to apply these standards to third parties through Tentative Order No. 2001-01. 40 CFR § 122.26(d)(2)(iv)(A)(2) very clearly limits the MEP standard to discharges from MS4s. CWC section 13263(a) similarly establishes regional board authority to prescribe requirements "as to the nature of any proposed discharge" Again, the proposed discharge is from, not into, Copermittee MS4s. Requiring on a site-specific basis that developers (a) reduce pollutants to the MEP and (b) do not cause or contribute to exceedances of water quality objectives, both exceeds these authorities and violates CWC section 13360 by excluding from Copermittees other potential means of lawfully complying (including regional treatment plants if we so choose). Please note that nothing precludes Copermittees from requiring the same standards of individual dischargers that we must meet ourselves. It is simply beyond the authority of the RWQCB to compel Copermittees to do so. (County of San Diego)

Response: Requirements to ensure that pollutants in runoff from development are reduced to the maximum extent practicable and do not cause or contribute to an exceedance of water quality standards is in line with SWRCB guidance. The SWRCB upheld such requirements in SWRCB Order WQ 2000-11.

Section: F.1 Subsection: F.1.b.2.b

Comment: It is inappropriate and the SDRWQCB lacks the legal authority to require the Copermittees to implement, or require implementation by third parties of, particular types of BMPs or BMP standards

(i.e., pollution prevention, source control, and treatment control BMPs). The SDRWQCB does not have the legal authority to require implementation of one category of BMPs (i.e., pollution prevention) at all sites, or the legal authority to require implementation of all categories of BMPs (i.e., pollution prevention, source control, and treatment control BMPs) at one site. These types of requirements violate California Water Code section 13360. Justification for this requirement is needed. Which type of BMPs are to be implemented should be at the discretion of the Copermittees. (City of San Diego, County of San Diego)

Response: The most prescriptive requirements in the Tentative Order regarding the types of BMPs to be implemented are included in the SUSMP provisions. In the SUSMP provisions, source control and structural treatment BMPs are required at all priority development projects. The requirements for pollution prevention BMPs during the planning phase have been removed from the Tentative Order. This prescriptive application of source control and structural treatment BMPs in the SUSMP provisions was found to be appropriate by the SWRCB in Order WQ 2000-11. The SUSMP provisions were also determined by the SWRCB to not be in violation of CWC section 13360. Since the SUSMP provisions were the most prescriptive in the Tentative Order, it can be inferred that other BMP requirements in the Tentative Order are also appropriate and in compliance with CWC section 13360.

In fact, for the Construction, Municipal, Industrial, Commercial, and Residential Components of the Jurisdictional Urban Runoff Management Program, which types of BMP are to be implemented is left largely to the Copermittees. The only type of BMP required by the Tentative Order for each of these types of land uses is pollution prevention BMPs. However, the Tentative Order does not require pollution prevention BMPs at each site falling under these land use categories, but rather only requires their use at sites as determined by the Copermittees. Clearly these requirements provide flexibility and do not specify which BMPs must be used at which sites.

Widespread use of pollution prevention BMPs is required because of the benefits they provide with little cost. By limiting the generation of pollutants by urban activities, less pollutants are available to be washed from urban areas, resulting in reduced pollutant loads in storm water discharges from these areas. In addition, there is no need to control or treat pollutants which are not initially generated. Furthermore, pollution prevention BMPs are generally more cost effective than removal of pollutants by treatment facilities or cleanup of contaminated media.

In the Pollution Prevention Act of 1990, Congress established a national policy that emphasizes pollution prevention over control and treatment. California Water Code section 13263.3(a) also supports pollution prevention, stating "The Legislature finds and declares that pollution prevention should be the first step in a hierarchy for reducing pollution and managing wastes, and to achieve environmental stewardship for society. The Legislature also finds and declares that pollution prevention is necessary to support the federal goal of zero discharge of pollutants into navigable waters." Finally, the Basin Plan also supports this finding by stating that "[T]o eliminate pollutants in storm water, one can either clean it up by removing pollutants or prevent it from becoming polluted in the first place. Because of the overwhelming volume of storm water and the enormous costs associated with pollutant removal, pollution prevention is the only approach that makes sense."

The SDRWQCB has legal authority to require implementation of particular types of BMPs under the Clean Water Act and California Water Code. The CWA requires in section 402(p)(3)(B)(iii) that permits for discharges from municipal storm sewers "shall require controls to reduce the discharge of pollutants to the maximum extent practicable, including management practices, control techniques and system, design and engineering methods, and such other provisions as the Administrator or the State determines appropriate for the control of such pollutants." California Water Code section 13377 provides that "Notwithstanding any other provision of this division, the state board or the regional boards shall, as

required or authorized by the Federal Water Pollution Control Act (Clean Water Act), as amended, issue waste discharge requirements and dredged or fill material permits which apply and ensure compliance with all applicable provisions of the act and acts amendatory thereof or supplementary, thereto, together with anymore stringent effluent standards or limitation necessary to implement water quality control plans, or for the protection of beneficial uses, or to prevent nuisance."

Section: F.1 Subsection: F.1.b.2.b

Comment: Who will be responsible for maintaining BMPs? How will maintenance be monitored and enforced? There should be more detail regarding BMP maintenance to ensure that it is performed. (San Diego Audobon Society, Downstream Services, University of California Natural Reserve System)

Response: The party responsible for maintaining BMPs required under the SUSMP provisions is left to the discretion of the Copermittees. The monitoring and enforcement of BMP maintenance is also the responsibility of the Copermittees, with oversight from the SDRWQCB. The requirement in the Tentative Order that BMPs have proof of ongoing maintenance is the same basic requirement as that which was included in the LARWQCB SUSMP, which was upheld by the SWRCB in Order WQ 2000-11.

More detailed requirements included in the LARWQCB SUSMP regarding BMP maintenance can serve as guidance to the Copermittees. The LARWQCB SUSMP states:

"[T]he Permittee shall require that the applicant provide verification of maintenance provisions through such means as may be appropriate, including, but not limited to legal agreements, covenants, CEQA mitigation requirements and/or Conditional Use Permits.

For all properties, the verification will include the developer's signed statement, as part of the project application, accepting responsibility for all structural and treatment control BMP maintenance until the time the property is transferred and, where applicable, a signed agreement from the public entity assuming responsibility for Structural or Treatment Control BMP maintenance. The transfer of property to a private of public owner must have conditions requiring the recipient to assume responsibility for maintenance of any Structural or Treatment Control BMP to be included in the sales or lease agreement for that property, and will be the owners responsibility. The condition of transfer shall include a provision that the property owners conduct maintenance inspection of all Structural or Treatment Control BMPs at least once a year and retain proof of inspection. For residential properties where the Structural or Treatment Control BMPs are located within a common area which will be maintained by a homeowner's association, language regarding the responsibility for maintenance must be included in the projects conditions, covenants and restrictions (CC&R). Printed educational materials will be required to accompany the first deed transfer to highlight the existence of the requirement and to provide information on what storm water management facilities are present, signs that maintenance is needed, how the necessary maintenance can be performed, and assistance that the Permittee can provide. The transfer of this information shall also be required with any subsequent sale of the property.

If Structural of Treatment Control BMPs are located within a public area proposed for transfer, they will be the responsibility of the developer until they are accepted for transfer by the County of other appropriate public agency. Structural or Treatment control BMPs proposed for transfer must meet design

standards adopted by the public entity for the BMP installed and should be approved by the County or other appropriate public agency prior to its installation."

Section: F.1 Subsection: F.1.b.2.b.i

Comment: Section F.1.b.2.b.i. is redundant and should be deleted. (County of San Diego)

Response: Section F.1.b.2.b.i. is included to ensure that SUSMP implementation includes management of flows and their potential impacts.

Section: F.1 Subsection: F.1.b.2.b.ii

Comment: The requirement to conserve natural areas is beyond the SDRWQCB's legal authority and should therefore be left to the determination of the Copermittees, rather than required in the Tentative Order. (County of San Diego)

Response: The SWRCB has upheld that Regional Boards can require conservation of natural areas for the protection of water quality. The LARWCB SUSMP requirements, which were upheld by the SWRCB in Order WQ 2000-11, include the provision that all SUSMP priority project categories "conserve natural areas."

Section: F.1 Subsection: F.1.b.2.c

Comment: There should be a standardized formula by which developers or co-permittees must determine how the numeric sizing criteria translates into a runoff number (from a precipitation number) for a specific property.

If afforded the freedom to choose their own science, property owners might very well pick a model which underestimated the amount of runoff from their property, effectively relaxing the BMP requirements. At the very least, we encourage the Regional Board to establish an exclusive list of acceptable conversion models.

We request the Regional Board add the following language: "For determining the exact sizing requirements that numeric sizing criteria place on individual developments, the SUSMP shall require the use of one of the following models to convert precipitation to runoff volume or flow rate: [List Approved Models]. The SUSMP may include other conversion models subject to public review and Regional Board approval." (EHC)

Response: A formula by which developers or Copermittees must determine how numeric sizing criteria translates into a runoff volume or flow rate for a specific property is left to the discretion of the Copermittees. Such a formula should be included in the model and local SUSMPs, which will be

considered by the SDRWQCB in a public process. Guidance on such a formula can be obtained from other areas which have implemented similar programs, such as Los Angeles County, the State of Washington, and the State of Maryland. The SDRWQCB can aid the Copermittees in contacting applicable agencies and obtaining such documents.

Section: F.1 **Subsection: F.1.b.2.c**

Comment: Inclusion of numeric sizing criteria in the Tentative Order exceeds the SDRWQCB's legal authority and is not consistent with state and federal regulations. (County of San Diego, BIASD)

Response: Pursuant to the Clean Water Act and Federal NPDES regulations, municipal storm water permits must require controls to reduce the discharge of pollutants to the maximum extent practicable (MEP), including controls which address pollutant discharges resulting from new development and significant redevelopment. In a precedential decision (Order WQ 2000-11) the SWRCB found that the SUSMP provisions (including numeric sizing criteria) constitute MEP for addressing pollutant discharges resulting from new development and significant redevelopment. In a December 26, 2000 memo from Craig M. Wilson to the Regional Board Executive Officers, the SWRCB states that Order WQ 2000-11 "finds that the design standard [numeric sizing criteria] in the SUSMPs, which essentially requires that 85 percent of the runoff from specified categories of development be infiltrated or treated, reflects MEP."

Section: F.1 **Subsection: F.1.b.2.c**

Comment: The Tentative Order's numeric sizing criteria should be maintained as requiring treatment of the 24-hour 85th percentile storm event. (San Diego Audobon Society, Surfers Tired of Pollution)

Response: Comment noted.

Section: F.1 **Subsection: F.1.b.2.c**

Comment: We support the use of numerically sized structural treatment controls to control the discharge of pollutants from areas of new development and significant redevelopment to the MEP. (County of San Diego)

Response: Comment noted.

Section: F.1 **Subsection: F.1.b.2.c**

Comment: The 24-hour 80th percentile storm event, as proposed by APWA, should be the basis for numeric sizing criteria. Treatment of the 24-hour 80th percentile storm event is considered to meet the MEP standard for semi-arid regions, as noted by Urban Runoff Quality Management, WEF Manual of Practice No. 23/ASCE Manual and Report on Engineering Practice No. 87. (County of San Diego, APWA, ASCE, BIASD, BIASC, Lemon Grove, Imperial Beach, SDCAA, Nolte, IEA, Port of San Diego,SD Chapter of Consulting Engineers & Land Survey)

Response: The APWA proposal for determination of the amount of runoff to be treated under SUSMPs raises two issues: (1) The SUSMPs requirement for the treatment of the 85th percentile storm event should be reduced to the 80th percentile storm event; and (2) hourly rainfall data from Lindbergh Field should be applied to precipitation contour maps to determine the size of the storm which must be treated.

(1) First of all, reducing the requirement for the treatment of the 85th percentile storm event to the 80th percentile storm event is inappropriate for the San Diego Region. The sole reasoning provided by APWA for reducing the size of the design storm which must be captured is that the City of Denver has chosen to capture the 80th percentile storm event. It is doubtful that the City of Denver has a more than $1.2 billion tourism economy as closely tied to water quality as that of the San Diego Region (a SANDAG memo states that projections by the California Department of Boating and Waterways find nearly $1.2 billion in direct revenue and $1.2 billion in indirect revenue is pumped into the San Diego area economy each year by out-of-state visitors) (SANDAG, 1996).

Capture of the 80th percentile storm event is equivalent to capture of runoff form approximately 0.4 inch of rainfall in the City of San Diego, as calculated by APWA. This is a smaller amount of rainfall than must be treated in Austin, Virginia, Delaware, Maryland, New Jersey, Chicago, New Jersey, Florida, and the Puget Sound Basin. More importantly, the 80th percentile storm event is less than what has been determined to constitute MEP by the SWRCB in Order WQ 2000-11. The SWRCB states "The Order finds that the design standard in the SUSMPs, which essentially requires that 85 percent of the runoff from specified categories of development be infiltrated or treated, reflects MEP" (SWRCB, 2000b). While Denver may arguably have a climate which is somewhat similar to San Diego's, certainly criteria developed by the SWRCB for the Los Angeles region are more applicable to San Diego than criteria used by Denver, Colorado.

In addition, capture of the 80th percentile storm event ignores the concept of diminishing returns. The 85th percentile storm event is representative of the point of diminishing returns for the San Diego Region. The 85th percentile storm event represents the BMP capacity beyond which, insignificant increases in runoff capture will occur, relative to additional costs. Even a cursory look at APWA's graphed data (Exhibit A of their proposal, which is item B of Attachment 13 of the Executive Officer Summary Report for the December 13, 2000 Public Hearing) shows that capture of a 0.4 inch storm is well below the "knee of the curve," or the point of diminishing returns.

(2) The APWA proposal also recommends a different method for calculation of the design storm event from that proposed in the Tentative Order. Where the Tentative Order proposes use of 24-hour rainfall data from several locations, the APWA proposal uses hourly rainfall from one location (Lindbergh Field). The Tentative Order proposes that each Copermittee use 24-hour rainfall data from its area to calculate its design size storm. While use of 24-hour rainfall data is not as rigorous as use of hourly rainfall data, 24-hour data is typically much more available, thereby allowing Copermittees to use local data to calculate the design storm to be used in their jurisdictions. In fact, a lengthy record of hourly rainfall data is only available in one place within San Diego County: Lindbergh Field. The APWA proposal uses this hourly rainfall data from Lindbergh Field and applies it to the entire county through the use of precipitation

contour (isopluvial) maps. While there may be potential inaccuracies in applying data from one site to the entire county, use of such precipitation contour maps is common practice.

In light of the increased rigorousness of using hourly data, as well as the common practice of using precipitation contour maps, the Tentative Order will be modified to allow for the 85th percentile storm event to be calculated by applying hourly rainfall data from Lindbergh Field to precipitation contour maps.

See change at permit section F.1.b.2.c.

Section: F.1 Subsection: F.1.b.2.g

Comment: All restaurants should be required to meet numeric sizing criteria requirements, irregardless of their size. (EHC, Surfrider Foundation)

Response: The size threshold for restaurants to be subject to SUSMP requirements has essentially been determined by the SWRCB. The LARWQCB SUSMP provisions, which the SWRCB upheld in a precedential decision in Order WQ 2000-11, includes the statement "[r]estaurants, where the land area for development or redevelopment is less than 5,000 square feet, are excluded from the numerical structural or treatment control BMP design standard only." The size threshold for restaurants included in the Tentative Order matches this statement.

Section: F.1 Subsection: F.1.b.2.h

Comment: We recommend that the Tentative Order provide clearer guidelines for the SUSMP waiver and its corresponding mitigation fund. (Port of San Diego)

Response: Waiver guidelines provided in the Tentative Order are based on those provided by the SWRCB in Order WQ 2000-11. The level of detail of the guidelines was reduced to provide flexibility and discretion to the Copermittees in developing the waiver and its corresponding fund. In the Tentative Order, the Copermittees are provided with one year to develop the waiver and its corresponding fund, with another six months provided for their implementation.

Section: F.1 Subsection: F.1.b.2.i.

Comment: Requirements for infiltration of urban runoff have the potential to adversely impact groundwater quality. The restrictions staff has placed on infiltration are poorly thought out and should be reconsidered, rather than force the Copermittees to solve the problem. (County of San Diego)

Response: Focusing infiltration of large volumes of water in small areas has the potential to adversely impact groundwater quality. For this reason, infiltration restrictions have been placed on the use of

structural infiltration BMPs in section F.1.b.2.i. These restrictions are to apply to structural infiltration BMPs only. These restrictions on structural infiltration BMPs are appropriate and are based directly on USEPA guidance. The restrictions are predominantly recommended by the USEPA Risk Reduction Engineering Laboratory (USEPA, 1994). Other infiltration restrictions are based on restrictions used elsewhere, such as Los Angeles, the State of Washington, and the State of Maryland. Furthermore, the restrictions are supported by the SWRCB in Order WQ 2000-11. The Order states: "The Regional Board did consider the potential impacts to groundwater from infiltration, and included appropriate limitations and guidance on its use as a BMP." The limitations and guidance the SWRCB refers to in Order WQ 2000-11 include most of the restrictions on infiltration included in the Tentative Order.

However, the SDRWQCB acknowledges that infiltration restrictions may not be necessary in all cases. For this reason, the Tentative Order will be changed to allow the Copermittees to develop their own restrictions on the use of structural infiltration BMPs in the model SUSMP, for approval by the SDRWQCB.

See change at permit section F.1.b.2.i.

Section: F.1 **Subsection: F.1.b.2.i.**

Comment: The SDRWQCB does not have legal authority to include restrictions on infiltration in the Tentative Order since the discharges neither originate in nor pass through the Copermittees' MS4s. Furthermore, for the Copermittees to regulate infiltration and protect ground water quality would be beyond the legal authority they possess or could likely obtain. (County of San Diego)

Response: The Tentative Order requires the implementation of structural treatment BMPs, of which infiltration is one option. Where the Copermittees choose to allow infiltration/redirection of flows which would otherwise enter their MS4s, restrictions are appropriate. The Copermittees cannot choose to redirect flows away from their MS4s and claim no responsibility for the potential impacts of such actions. In addition, the SWRCB upheld in Order WQ 2000-11 the infiltration restrictions included in the LARWQCB SUSMP, on which the infiltration restrictions in the Tentative Order are based.

Section: F.1 **Subsection: F.1.b.2.i.**

Comment: The Technical Report does not adequately address the infiltration provisions. (County of San Diego)

Response: The infiltration provisions are discussed in the draft Fact Sheet/Technical Report in the discussion for Finding 35 on page 59.

Section: F.1 **Subsection: F.1.b.2.i.**

Comment: Requirements of the Tentative Order which promote infiltration are inconsistent with the infiltration restrictions of F.1.b.2.i. (Imperial Beach, County of San Diego, Carlsbad, La Mesa)

Response: The requirements promoting infiltration are not inconsistent with the infiltration restrictions of section F.1.b.2.i. The infiltration restrictions included in section F.1.b.2.i. were intended to apply to structural infiltration BMPs only. During the public workshops for the Tentative Order, interested parties noted to the SDRWQCB that this intent was not clear. In order to clarify that the infiltration restrictions of section F.1.b.2.i. were only to apply to structural infiltration BMPs, the SDRWQCB developed new language in the December 13, 2000 Proposed Changes document (Attachment 9 of the Executive Officer Summary Report for the December 13, 2000 Public Hearing).

By making the infiltration restrictions of section F.1.b.2.i. apply to structural infiltration BMPs only, requirements which promote infiltration are consistent with the infiltration restrictions. Infiltration restrictions are necessary for structural infiltration BMPs due to the large volume of storm water they are designed to infiltrate in a small area. By concentrating infiltration into a small area, structural infiltration BMPs can concentrate any pollutants which may be in storm water. This can lead to relatively high levels of pollutants in the soil of such structural infiltration BMPs. Furthermore, by infiltrating large volumes of storm water, the structural infiltration BMPs can help transport these pollutants. The combined potential for the concentration and transport of pollutants in structural treatment BMPs can pose a risk to groundwater quality. Therefore, restrictions on the use of structural infiltration BMPs are needed. These restrictions are included in section F.1.b.2.i. of the Tentative Order.

The inclusion of these restrictions is not inconsistent with other parts of the Tentative Order which promote infiltration, however. Other sections of the Tentative Order which promote infiltration do so by promoting the preservation of natural infiltration conditions (see Finding 34, section F.1.a.1, and section F.1.b.1.b). Preservation of natural infiltration conditions does not focus infiltration in one area, but rather provides for infiltration throughout a project by natural means. Therefore, potential pollutants are not concentrated in any one area, and infiltration rates are not accelerated. Infiltration under such circumstances poses minimal risk of groundwater contamination, and infiltration restrictions are not typically warranted.

For these reasons, infiltration requirements within the Tentative Order are consistent. Restrictions on infiltration are only required for structural infiltration BMPs.

See change at permit section F.1.b.2.i.

Section: F.1 Subsection: F.1.b.2.i.ii

Comment: The requirements for infiltration BMPs will severely limit the use of this BMP. The requirement that all urban runoff must undergo pretreatment prior to infiltration totally disregards the runoff quality. Copermittees should be allowed to determine when and where pretreatment is required. (Orange County, County of San Diego, BIASC, Metro Commission)

Response: Focusing infiltration of large volumes of water in small areas has the potential to adversely impact groundwater quality. For this reason, infiltration restrictions have been placed on the use of structural infiltration BMPs in section F.1.b.2.i. These restrictions are to apply to structural infiltration BMPs only. These restrictions on structural infiltration BMPs are appropriate and are based directly on

USEPA guidance. The restrictions are predominantly recommended by the USEPA Risk Reduction Engineering Laboratory (USEPA, 1994). Other infiltration restrictions are based on restrictions used elsewhere, such as Los Angeles, the State of Washington, and the State of Maryland. Furthermore, the restrictions are supported by the SWRCB in Order WQ 2000-11. The Order states: "The Regional Board did consider the potential impacts to groundwater from infiltration, and included appropriate limitations and guidance on its use as a BMP." The limitations and guidance the SWRCB refers to in Order WQ 2000-11 include most of the restrictions on infiltration included in the Tentative Order.

However, the SDRWQCB acknowledges that infiltration restrictions may not be necessary in all cases. For this reason, the Tentative Order will be changed to allow the Copermittees to develop their own restrictions on the use of structural infiltration BMPs in the model SUSMP, for approval by the SDRWQCB.

See change at permit section F.1.b.2.i.

Section: F.1 Subsection: F.1.b.2.i.iii

Comment: The infiltration of dry weather flows should be allowed where appropriate. It would replenish groundwater. The Copermittees should be allowed to determine when dry weather flow infiltration restrictions are necessary. Furthermore, no rationale has been provided for the blanket exclusion of dry weather flows from infiltration devices. Given all of the other restrictions on dry weather flows, it is unlikely that infiltrated dry weather flows would impact groundwater quality. (BIASC, Orange County, County of San Diego, Port of San Diego, Chula Vista)

Response: Focusing infiltration of large volumes of dry weather flows in small areas has the potential to adversely impact groundwater quality. For this reason, restrictions have been placed on the infiltration of dry weather flows in section F.1.b.2.i.iii. These restrictions are to apply to structural infiltration BMPs only. These restrictions on dry weather flow infiltration are appropriate and are based directly on USEPA guidance. The restrictions are recommended by the USEPA Risk Reduction Engineering Laboratory (USEPA, 1994). Furthermore, the restrictions are supported by the SWRCB in Order WQ 2000-11. The Order states: "The Regional Board did consider the potential impacts to groundwater from infiltration, and included appropriate limitations and guidance on its use as a BMP." The guidance the SWRCB refers to in Order WQ 2000-11 includes USEPA's recommendation against the infiltration of dry weather flows.

However, the SDRWQCB acknowledges that dry weather flow infiltration restrictions may not be necessary in all cases. For this reason, the Tentative Order will be changed to allow the Copermittees to develop their own restrictions on the use of structural infiltration BMPs in the model SUSMP, for approval by the SDRWQCB.

See change at permit section F.1.b.2.i.

Section: F.1 Subsection: F.1.b.2.i.vi

Comment: Does the requirement for 10 feet of separation between infiltration BMPs and groundwater preclude coastal cities with low elevations from using infiltration as a structural BMP? (Imperial Beach, Carlsbad)

Response: Many coastal cities have high groundwater near the coast. However, groundwater resources near the coast often do not support beneficial uses. Where groundwater resources do not support beneficial uses, the minimum vertical distance between the base of any infiltration structural treatment BMP to the seasonal high groundwater mark may be reduced, provided that the water quality of the groundwater resources is maintained.

See change in permit section F.1.b.2.i.vi.

Section: F.1 Subsection: F.1.b.2.vii

Comment: Does "directly adjacent" in F.1.b.(2)(a)vii apply if the development in question is hydrologically disconnected from the sensitive area? (Chula Vista)

Response: Situations regarding the application of SUSMP provisions at this level of detail will be left to the discretion of the Copermittees.

Section: F.1 Subsection: F.1.b.2

Comment: Copermittees should be encouraged to implement interim measures to ensure smooth transition upon adoption of individual SUSMPs. (Surfrider Foundation)

Response: The Tentative Order encourages a smooth transition to local SUSMP implementation. The requirement for the collective development of a model SUSMP by the Copermittees in a public process will help ensure that stakeholders will be familiar with the pending local SUSMP requirements. The development of the model SUSMP will ease the transition to full SUSMP implementation.

Section: F.1 Subsection: F.1.b.2

Comment: Deadlines for implementation of SUSMP provisions contained in the Permit are substantially longer than other Permit requirements and will allow unacceptable levels of pollution from development in the interim. (San Diego Baykeeper)

Response: The deadlines for implementation of the Standard Urban Storm Water Mitigation Plans under Tentative Order 2001-01 are based on realistic and achievable time frames for the Copermittees to develop the SUSMP requirements, subject to SDRWQCB approval.

Section: F.1 Subsection: F.1.b.2

Comment: The permit should contain concrete, aggressive time frames in order to achieve the stated goals of the SUSMPs. As written, it is somewhat unclear what steps must be taken within the 365 day period for collective development of a model SUSMP. (Surfrider Foundation)

Response: The deadlines for implementation of the Standard Urban Storm Water Mitigation Plans under Tentative Order 2001-01 are based on realistic and achievable time frames for the Copermittees to develop and implement the SUSMP requirements, subject to SDRWQCB approval. The Copermittees are provided discretion during this time to develop the SUSMP following their jurisdictional procedures. The amount of time following submittal of the SUSMP to the SDRWQCB necessary for the public process and adoption by the SDRWQCB cannot be dictated in the Tentative Order.

Section: F.1 Subsection: F.1.b.2

Comment: The Treatment Control BMPs proposed to implement the SUSWMP frequently require significant changes to traditional building and development codes. Thus, the project proponent is faced with a dilemma. If the Copermittees do not revise their building and development codes and ordinances before the date that the Treatment Control BMPs in the SUSWMP become a requirement, compliance becomes much more expensive, if not impossible.

Proposal
The Regional Board shall use its enforcement authority to assure that Copermittees modify their building and development codes and ordinances to allow for the use of Treatment and Source Control BMPs before the enforcement of the SUSWMP; and
The Regional Board shall grant the Copermittees any reasonable additional time necessary to modify their building and development codes and ordinances if it is shown at a publicly noticed hearing to the satisfaction of the Regional Board, that such modifications require additional time in order to comply with other regulations including but not limited to CEQA. (McKenna & Cuneo, L.L.P.)

Response: The Tentative Order requires the Copermittees to modify the building and development codes and ordinances as necessary to comply with the Tentative Order. The Tentative Order states "Within 180 days of approval of the model SUSMP in the public process by the SDRWQCB, each Copermittee shall adopt its own local SUSMP, and amended ordinances consistent with the approved model SUSMP, and shall submit both (local SUSMP and amended ordinances) to the SDRWQCB." The Copermittees are provided 365 days to develop the model SUSMP and an additional 180 days for the local SUSMP. One and a half years should be sufficient to develop the necessary ordinances.

Section: F.1 Subsection: F.1.b.2

Comment: We strongly support the permits emphasis on using natural processes such as wetlands and vegetated filters for water treatment. We urge that the implementation of these natural processes also be designed to inherently restore the ground water recharge value that existed prior to the hardening of our watersheds, wherever it can be done without risk of contamination. (San Diego Audubon Society)

Response: Comment noted.

Section: F.1 Subsection: F.1.b.2

Comment: Modify the SUSMP provisions to allow Co-permittees to develop a regional SUSMP and determine the mitigation plan categories, BMPs, Numeric Sizing Criteria, Pollutants of Concern, and Implementation Process, over a three-year period. (San Diego Co-permittees)

Response: The SUSMP provisions, including priority development project categories, have been upheld by the SWRCB in a precedential decision in Order WQ 2000-11. These provisions allow for the Copermittees to develop and determine BMPs, pollutants of concern, and implementation processes. Flexibility in the calculation of numeric sizing criteria is also provided. Furthermore, the time frame for development and implementation of the SUSMP provisions is sufficient. The Copermittees are provided with at least a year and a half before SUSMPs must be implemented. Considering the rapid development within the region, extension of the implementation of SUSMPs to three years would result in construction of significant development without adequate post-construction BMPs, causing additional long-term impacts to the region's receiving waters.

Section: F.1 Subsection: F.1.b.2

Comment: We very much support the standard urban storm water mitigation plans and the numeric sizing criteria and the requirements for new streets and highways. We know these to be reasonable and achievable. (USEPA)

Response: Comment noted.

Section: F.1 Subsection: F.1.b.2

Comment: The City supports the development of a model SUSMP.

The Stakeholder group recommended that the soon to be issued Tentative Order provide flexibility and discretion by allowing the City and other Copermittees to implement the requirements of the SUSMP. (City of San Diego)

Response: The SUSMP requirements allow for the Copermittees to develop processes to determine pollutants of concern and selection of appropriate BMPs. Section F.1.b.2.e of the Tentative Order states "[a]s part of the model SUSMP, the Copermittees shall develop a procedure for pollutants of concern to be identified […]." Section F.1.b.2.b states "[t]he SUSMP shall include a list of recommended pollution prevention, source control, and structural treatment BMPs." Both of these sections of the Tentative Order allow the Copermittees discretion in developing these particular parts of the SUSMP program.

Section: F.1 Subsection: F.1.b.2

Comment: Upon adoption of local SUSMPs, requirements should apply to all uncompleted priority projects or phases of priority projects regardless of whether grading or construction activities have begun. (Surfrider Foundation)

Response: Requiring SUSMPs to apply to development projects which have already begun construction could require significant retrofitting of already constructed facilities. Costs for retrofitting may in some cases be prohibitive, as opposed to implementation of BMPs in the planning phase, when BMP implementation is most cost effective. While the SDRWQCB strongly supports retrofitting of BMPs in areas of existing development where water quality conditions warrant, potential retrofitting requirements which may result from applying SUSMPs to projects already under construction may not be cost-effective in all cases. For this reason, SUSMP requirements will be applied only to development projects which have not yet begun construction.

Section: F.1 Subsection: F.1.b.2.

Comment: Page 19, F. 1.b.(2) (i) vii., revise:
The soil through which infiltration is to occur shall have physical and chemical characteristics (such as appropriate cation exchange capacity, organic content, clay content, sand content, and infiltration rate) which are adequate for proper infiltration duration and treatment of urban runoff for the protection of groundwater for beneficial uses, and to prevent ponding of water in the infiltration basin for more that 72 hours. Soil characteristics and infiltration rates shall be confirmed through field testing. (State Department of Health Services)

Response: Requirements regarding infiltration durations are left to the discretion of the Copermittees.

Section: F.1 Subsection: F.1.b.2.a

Comment: Increase in gross floor area where the amount of impervious surface does not increase beyond the threshold (i.e., 5,000 square feet) should be excluded from SUSMP requirements. (Sempra Energy)

Response: An increase in gross floor area which does not result in an increase in impervious surfaces of 5,000 square feet is not subject to the SUSMP requirements. Significant redevelopment is defined in the Tentative Order as "the creation or addition of at least 5,000 square feet of impervious surfaces on an already developed site." The list of examples of significant redevelopment provided in the Tentative Order, including "increases in gross floor area," must only meet the SUSMP provisions if they increase impervious surfaces by 5,000 square feet or more.

Section: F.1 Subsection: F.1.b.2.a

Comment: DEFINING SIGNIFICANT REDEVELOPMENT: DRAFT PERMIT SECTION F.1.b.(2)(a)

Based upon the proposed definition above, the Urban Core is already 90% developed. Thus, most construction activity occurring in the Urban Core constitutes redevelopment. Therefore, the definition of "significant redevelopment" is critical to CCDC.

A. Background
SUSWMPs are applicable to development and "significant redevelopment." The definition of significant redevelopment is obviously of great concern to CCDC because it will determine which of its projects are subject to the SUSMP requirements and to what extent. The definition of significant redevelopment was very contentious at the State Board hearings on the Los Angeles SUSWMP plan. The LA RWQCB reworked their definition in response to that hearing in an attempt to clarify the intent. Their definition is as follows:

[Significant redevelopment means] On an already developed site, the creation or addition of 5,000 square feet or more of impervious surfaces. If the creation or addition of impervious surfaces is fifty percent or more than the existing impervious surface area, then storm water runoff from the entire area (existing and additions) must be considered for purposes of storm water mitigation. If the creation or addition is less than fifty percent of the existing impervious area, then storm water run off from only the addition area needs mitigation. Redevelopment includes, but is not limited to: the expansion of a building footprint or addition or replacement of a structure; structural development including an increase in gross floor area and or exterior construction or remodeling; replacement of impervious surface that is not part of a routine maintenance activity; and land disturbing activities related with structural or impervious surfaces.

This definition only further confuses the reader. What are the distinctions between replacement, creation, and addition? What is the difference, if any, between expansion and structural development? What is routine maintenance? What are land disturbing activities? What else is included in the definition of redevelopment?

The SD RWQCB touched on the definition of significant redevelopment in its Draft Responses to Comments Received at Numeric Sizing Criteria Public Workshop 11, held April 13, 2000. Workshop participants asked: "When a site is under redevelopment, will the whole site have to meet the numeric sizing criteria or only the part of the site, which is to be redeveloped?" The RWQCB Staff responded:

If the redevelopment involves improvements for fifty percent or more of the site, then the entire site area becomes subject to numeric sizing criteria. If less than fifty percent of the area is to be redeveloped, then only the area that is improved is subject to the criteria.

This guidance also leaves many questions unanswered. For example, what is an improvement? Do improvements include repair and expansion? What the SD RWQCB appears to be saying is that if more than 50% of the site remains untouched then only that modified area are subject to SUSWMPs. Whether the SD RWQCB intended any other distinctions concerning the type or scale or redevelopment remains unclear.

The Permit proposes yet another definition:
Significant redevelopment includes, but is not limited to: the expansion of a building footprint or addition or replacement of a structure; structural development including an increase in gross floor area and/or exterior construction or remodeling; replacement of impervious surface that is not part of a routine maintenance activity; and land disturbing activities related with structural or impervious surfaces. Where significant redevelopment results in an increase of less than fifty percent of the impervious surfaces of a previously existing development, and the existing development was not subject to SUSWMP

requirements, the numeric sizing criteria discussed in section F. 1.b. (2)(c) applies only to the addition, and not the entire development.

This definition does not appear to encompass the SDRWQCB Staff s entire concept of significant redevelopment given it uses the language includes, but is not limited to all of the items listed. This is difficult to understand because the proposed definition appears to include all construction, remodeling, and replacement of impervious surfaces or land disturbing activities - seemingly an all-encompassing list of reconstruction activities. Thus, for example, the addition of an enclosure for trash receptacles or a bus enclosure could, under this definition, impose SUSWMP requirements on all or some of the property.

B. Proposed Definition
We propose the following, more understandable definition:
"Significant Redevelopment" is:
1. The construction of a replacement structure that includes more than 5000 square feet of impervious surface area;
2. The addition of more than 5000 square feet to an existing structure;
3. The repair of an impervious surface greater than 5000 square feet at an existing structure; or
4. Where the total square footage of the replacement, addition or repair exceeds 50% of the total impervious area of the completed redevelopment project, then storm water from the entire project must be considered for the purposes of storm water mitigation. Where the total square footage of the replacement, addition or repair is less than or equal to 50% of the total impervious area of the completed redevelopment project, only storm water from the replacement, addition or repair need be considered.

Discussion C.
This definition of "significant redevelopment" is more workable because it clearly defines the obligations of the Copermittees. It also makes technical and economic sense. Small additions at a project site will have little impact on water quality through the creation of additional impervious areas. Imposing the SUSWMP on projects less the 5,000 square feet will have significant cost implications. Further, the unintended consequence of requiring the SUSWMP for de minimis projects may well be to worsen water quality. No one is going to put up a ten-by-ten shed to house waste containers if they are then going to be faced with the added costs of capturing and treating the resulting storm water. (McKenna & Cuneo, L.L.P.)

Response: The definition for significant redevelopment in the Tentative Order is identical to that included in SWRCB Order WQ 2000-11. The Tentative Order states “Significant redevelopment is defined as the creation or addition of at least 5,000 square feet of impervious surfaces on an already developed site.” Following this definition of significant redevelopment is a list of examples of significant redevelopment, which includes "replacement of a structure." None of the listed examples, including "replacement of a structure," constitute significant redevelopment unless they result in an increase of at least 5,000 square feet of impervious surface.

Section: F.1 Subsection: F.1.b.2.a

Comment: Definition of "Significant Redevelopment". Section F.1.b(2)(a) of the Tentative Order, found at page 15, provides a definition of "significant redevelopment." If this definition is to be applied uniformly throughout the Order, it should be set forth at the very beginning of the Order, preferably when the term "significant redevelopment" is first used (i.e., Section A.4 at page 8). (Procopio, Cory, Hargreaves, & Savitch, L.L.P.)

Response: Comment noted.

Section: F.1 Subsection: F.1.b.2.a

Comment: Matters are further complicated by the discussion regarding Environmentally Sensitive Areas in section F.1.b(2)(a)vii., on page 16, which appears to include a different definition of significant redevelopment areas. This section provides as follows:

"Environmentally Sensitive Areas. All development and redevelopment located within or directly adjacent to or discharging directly to an environmentally sensitive area, which either creates 2,500 square feet of impervious surface on a proposed project site or increases the area of imperviousness of a proposed project site to 10% or more of its naturally occurring condition."

What happened to the 5,000 square foot threshold for "significant redevelopment"? Is that threshold reduced to 2,500 square feet in "Environmentally Sensitive Areas"? Please clarify. (Procopio, Cory, Hargreaves, & Savitch, L.L.P.)

Response: The definition of what constitutes significant redevelopment when the redevelopment is occurring within, or directly adjacent to, or discharging directly to an environmentally sensitive area is included in section F.1.b.2.a.vii. This section states "Environmentally Sensitive Areas. All development and redevelopment located within or directly adjacent to or discharging directly to an environmentally sensitive area, which either creates 2,500 square feet of impervious surface on a proposed project site or increases the area of imperviousness of a proposed project site to 10% or more of its naturally occurring condition." The 2,500 square foot size threshold applies to redevelopment within or near environmentally sensitive areas. The 5,000 square foot size threshold applies to redevelopment elsewhere.

Section: F.1 Subsection: F.1.b.2.a

Comment: F.1.b.(2)(b)iv: BMP Requirements - "Significant redevelopment" includes road-widening projects. In many cases structural BMP's are not a reasonable requirement for lineal redevelopment. (SANDAG)

Response: BMPs are a reasonable requirement for roads. Caltrans, as part of a BMP Pilot Study, has installed many structural BMPs to treat runoff from freeways in Southern California. Furthermore, BMPs for roads are necessary due to the concentrations of pollutants in runoff from roads. A Federal Highway Administration “Pollutant Loading and Impacts from Highway Stormwater Runoff, Volume 3; Analytical Investigation and Research Report” (1990) finds that concentrations of total suspended solids, nitrate + nitrite nitrogen, and zinc exceed USEPA benchmark values for concentrations of these pollutants in urban runoff. Streets, roads, highways, and freeways also consist of extensive impervious surfaces, which alter flow regimes and increase potential for downstream erosion.

Section: F.1 Subsection: F.1.b.2.a

Comment: The amount of land that may be temporarily disturbed during redevelopment activities, but not necessarily made more impervious, should not be included in the calculation to determine if the project exceeded 5,000 square feet and therefore is subject to SUSMP requirements. This language should be revised to clarify that this is not its intent. (Sempra Energy)

Response: Redevelopment is only considered significance redevelopment and subject to SUSMPs when it results in an increase in impervious surfaces of 5,000 square feet. This size limit for impervious surfaces is included in the significant redevelopment definition to prevent SUSMP provisions from applying to insignificant redevelopment projects which will not result in an impact to water quality. The definition of significant redevelopment included in the Tentative Order is identical to the definition developed by the SWRCB in its precedential Order WQ 2000-11.

Section: F.1 Subsection: F.1.b.2.a

Comment: This provision should be amended to mandate SUSMP compliance for entire facilities any time there is an increase in at least 10% of the impervious surfaces of a previously existing development. (Surfrider Foundation)

Response: The limited SUSMP applicability to partial redevelopment projects is included in the significant redevelopment definition to prevent SUSMP provisions from applying to large areas when only relatively minor redevelopment occurs. The definition of significant redevelopment included in the Tentative Order is identical to the definition developed by the SWRCB in its precedential Order WQ 2000-11.

Section: F.1 Subsection: F.1.b.2.a

Comment: Add redevelopment areas to significant redevelopment definition in F.l.b.(2)(a) pg.15 using the following language: ". . . SUSMP requirements shall apply to all new development and significant redevelopment projects falling under the priority project categories listed below and to all significant redevelopment in designated Redevelopment Areas. . .". (Environmental Health Coalition)

Response: Any redevelopment in "redevelopment areas" will be subject to SUSMP provisions (as required for significant redevelopment) if the redevelopment results in an increase in impervious surfaces of 5,000 square feet. Therefore, most redevelopment occurring in "redevelopment areas" will be subject to the SUSMP provisions. Applying SUSMP provisions to all redevelopment in "redevelopment areas" irregardless of size may result in the application of SUSMP provisions to insignificant redevelopment projects where meeting the SUSMP provisions may be unnecessary or infeasible. The significant redevelopment definition included in the Tentative Order is identical to that developed in the SWRCB's precedential Order WQ 2000-11.

Section: F.1 Subsection: F.1.b.2.a

Comment: Is it correct that a commercial development of 100,000 sq ft of impervious surface does not need an SUSMP if the building foot print is not increasing? (Vasquez, Ralph)

Response: The condition of the building footprint is not a trigger for SUSMP redevelopment requirements. SUSMP redevelopment requirements apply only if 5,000 square feet of impervious surface has been added. Of course, if the expansion of a building footprint results in a 5,000 square feet increase in impervious surface, SUSMP requirements would also apply. Any new commercial development in which the land area for development is larger than 100,000 square feet must meet the SUSMP requirements. Any redevelopment of a commercial development greater than 100,000 square feet must meet SUSMP requirements if the redevelopment results in an increase in impervious surfaces of 5,000 square feet.

Section: F.1 Subsection: F.1.b.2.a

Comment: How is "significant development" defined? (Anonymous Workshop 1)

Response: Significant redevelopment is defined in Tentative Order Section F.1.b.2.a.

Section: F.1 Subsection: F.1.b.2.a

Comment: Page 17, after F. 1.b.(2)(a) xv. add,

xvi. Be designed to prevent vector breeding. (State Department of Health Services)

Response: In recognition of the potential public health threat, an additional Finding is recommended to be added to the Tentative Order. The Finding (no. 36) identifies the potential vector issues related to BMP implementation and the role of collaborative program development between municipalities and vector control agencies in addressing an minimizing vector production.

Section: F.1 Subsection: F.1.b.2.a

Comment: We do not feel it is feasible to require structural treatment BMPs to be implemented at all the Permit listed priority development projects. These priority development projects were not selected based on any scientific basis, merely on the thought of which developments should be of higher priority than others. Structural treatment BMPs should be required on developments that will discharge pollutants of concern at levels that would negatively impact receiving water bodies. (Building Industry Association of Southern CA)

Response: The SUSMP priority development project categories have been dictated by the SWRCB in its precedential decision in Order wq 2000-11. A December 26, 2000 SWRCB memo from Craig M. Wilson to the Regional Board Executive Officers states that Order WQ 2000-11 "determined that SUSMPs appropriately applied to the following categories of development: single-family hillside residences, 100,000 square foot commercial developments, automotive repair shops, restaurants, home subdivisions with 10 to 99 housing units, home subdivisions with 100 or more housing units, and parking lots with 5, 000 square feet or more or with 25 or more parking spaces and potentially exposed to storm water runoff."

The SDRWQCB has expanded on this SWRCB guidance in a few instances. The instances are as follows:

1. The parking lot size criteria was changed from 25 or more parking spaces to 15 or more parking spaces. This change was based on a comment from the Port of San Diego during the April 13, 2000 SDRWQCB SUSMP Public Workshop. The comment noted that the other parking lot size criteria of 5,000 square feet actually corresponded more closely with the size of 15 parking spaces, rather than 25 parking spaces. In order to make the two parking lot size criteria as similar as possible, the criteria for 25 parking spaces was reduced to 15 parking spaces.

2. The single-family hillside residence category was changed to "All hillside development greater than 5,000 square feet." This change was made to reflect the urban runoff concerns generated by hillside development. The primary concern regarding hillside development is the potential for erosion resulting from changes in the flow regime caused by the development. While pollutants from hillside development (including single-family residences) can be significant, increases or changes in flow conditions provide the greatest potential for impacts to beneficial uses. Therefore, the type of development on a hillside is not at issue as much as the size of the development and the resulting changes in the flow regime. For this reason, rather than focus on the type of hillside development, the SDRWQCB SUSMP requirements focus on size. The size (5,000 square feet) was chosen based on SWRCB guidance in Order WQ 2000-11, which uses a size threshold of 5,000 square feet for significant redevelopment.

3. Retail gasoline outlets were added as a SUSMP priority development project category. Regarding retail gasoline outlets as a priority category, the SWRCB states in the December 26, 2000 memo that Order WQ 2000-11 "allows broader discretion by the Regional Water Boards to decide whether to include additional types of development in future SUSMPs. These areas for potential future inclusion in the SUSMPs include retail gasoline outlets […]." The Draft Fact Sheet/Technical Report for Tentative Order No. 2000-01 discusses the rationale for retail gasoline outlets to be designated a priority development project category. Also see responses to comments ( ).

4. Streets, roads, highways, and freeways were added as a SUSMP priority development project category. This is due to their potential to be a significant contributor of pollutants in urban runoff. A Federal Highway Administration "Pollutant Loading and Impacts from Highway Stormwater Runoff, Volume 3; Analytical Investigation and Research Report" (1990) finds that concentrations of total suspended solids, nitrate + nitrite nitrogen, and zinc exceed USEPA benchmark values for concentrations of these pollutants in urban runoff. Streets, roads, highways, and freeways also consist of extensive impervious surfaces, which alter flow regimes and increase potential for downstream erosion.

Section: F.1 Subsection: F.1.b.2.a.iii

Comment: And does F.1.b. (2)(a) iii and F.1.b. (2)(a) viii apply to redevelopment projects also? (City of Chula Vista)

Response: Redevelopment of any site falling under the SUSMP priority development project categories which increases impervious surfaces by 5,000 square feet or more is subject to the SUSMP provisions.

Section: F.1 Subsection: F.1.b.2.a.iii

Comment: Are the SUSMP requirements applied to 100,000 sq ft gross floor area or total land area for a development? (Hamilton, Julie)

Response: The Tentative Order states "Commercial developments greater than 100,000 square feet. This category is defined as any development on private land that is not for heavy industrial or residential uses where the land area for development is greater than 100,000 square feet. The category includes, but is not limited to: hospitals; laboratories and other medical facilities; educational institutions; recreational facilities; commercial nurseries; multi-apartment buildings; car wash facilities; mini-malls and other business complexes; shopping malls; hotels; office buildings; public warehouses; and other light industrial facilities."

Section: F.1 Subsection: F.1.b.2.a.iii

Comment: The commercial developments must be considered priority projects under the SUSMP requirement. But, given the likelihood of cumulatively significant pollutant discharges from all types of commercial developments, the limitation of this category to developments greater than 100,000 square feet is unwarranted. Copermittees should assess impervious cover percentages by watershed, and where more than 10% of the natural filtration is lost, all commercial development of any size should have to adopt SUSMP urban runoff controls. (Surfrider Foundation)

Response: The 100,000 square feet size threshold for commercial development will result in most commercial development being subject to the SUSMP provisions. This size threshold is included in the commercial development definition to prevent SUSMP provisions from applying to small commercial projects which most likely will not result in a significant impact to water quality. The definition of commercial development included in the Tentative Order is identical to the definition upheld by the SWRCB in its precedential Order WQ 2000-11.

Section: F.1 Subsection: F.1.b.2.a.iii

Comment: Does the entire impervious area of a redevelopment project fall subject to numeric sizing requirements if impervious area is added that is over 50% of the existing developments impervious area? And does F.1.b. (2)(a) iii and F.1.b. (2)(a) viii apply to redevelopment projects also?

Redevelopment may correct pollution problems inherent in existing development, and it also may reduce the need for developing new lands for housing and commercial space. However, stringent requirements that tend to reduce the viability of redevelopment projects can work to restrict these benefits and should be carefully considered. (City of Chula Vista)

Response: The Tentative Order states "[w]here significant redevelopment results in an increase of less than fifty percent of the impervious surfaces of a previously existing development, and the existing development was not subject to SUSMP requirements, the numeric sizing criteria discussed in section F.1.b.(2)(c) applies only to the addition, and not to the entire development."

Section: F.1 Subsection: F.1.b.2.a.ix

Comment: The IEA recommends emergency provisions be included in the permit and language exempting firebreaks, unpaved public utility access roads, and temporary roads. (Industrial Environmental Association)

Response: The SUSMP requirements are intended to apply to long-term developments. The requirements are therefore limited to paved streets, roads, highways, and freeways. Streets, roads, highways, and freeways are defined in the Tentative Order as "any paved surface used for the transportation of automobiles, trucks, motorcycles, and other vehicles. To the extent that the above roads are not paved, they are not required to meet the SUSMP conditions.

Section: F.1 Subsection: F.1.b.2.a.ix

Comment: F. 1.b.(2)(a)(ix) page 16; Streets, roads, highways, and freeways.
The language (i.e., "...any paved surface...") is all-inclusive and would potentially require even short paved access roads and/or roads that are gated (and therefore have limited access and use) to be subject to SUSMP requirements. This section should be revised to exclude short access roads and gated roads that have limited access and use. (Sempra Energy)

Response: The intent of the "streets, roads, highways, and freeways" SUSMP priority development project category is address such transportation corridors which have the potential to impact receiving waters, either through the discharge of pollutants or resulting changes in peak flow rates. Therefore, short access roads and gated roads which receive limited use need not be covered under SUSMPs. For this reason, a size threshold of 5,000 square feet will be placed on the "streets, roads, highways, and freeways" SUSMP priority development project category. For perspective, this threshold would allow for a SUSMP exemption for a 20 foot wide access road which was less than 250 feet long. The 5,000 square foot threshold was chosen based on the 5,000 square foot threshold for parking lots. Both roads and parking lots generate similar pollutants due to their similar sources of pollutants: automobiles. The 5,000 square foot threshold for parking lots was upheld by the SWRQCB in Order WQ 2000-11.

Section: F.1 Subsection: F.1.b.2.a.ix

Comment: Are road construction projects included in sizing criteria? (Anonymous Workshop 1)

Response: Numeric sizing criteria will apply to all new road construction projects, as well as road redevelopment projects which result in an increase in impervious surfaces of 5,000 square feet.

Section: F.1 Subsection: F.1.b.2.a.ix

Comment: Are streets and highways subject to the numeric sizing criteria? (Coalition for Practical Regulation)

Response: Yes; streets, roads, highways, and freeways are a priority development project category under the SUSMP provisions.

Section: F.1 Subsection: F.1.b.2.a.ix

Comment: This plan must vigorously address roads, streets, and highways for new and for existing development to be meaningful, systematic, fair, or effective. These elements are a major direct contributor to our water quality problems. (San Diego Audubon Society)

Response: Comment noted.

Section: F.1 Subsection: F.1.b.2.a.ix

Comment: Is the requirement for existing streets or new streets? (Coalition for Practical Regulation)

Response: The requirement applies to new streets as well as redevelopment of any existing streets which results in an increase in impervious surfaces of 5,000 square feet or more.

Section: F.1 Subsection: F.1.b.2.a.ix

Comment: The Regional Board should amend the Caltrans Storm water Permit to be consistent with the SUSMP requirements in the Municipal Storm water Permits since the Copermittees have no authority over Caltrans roads. (San Diego Baykeeper)

Response: Comment noted.

Section: F.1 Subsection: F.1.b.2.a.ix

Comment: Please clarify the intent of SUSMP with regard to new or existing sidewalk construction, curb and gutter construction, and minor roadway work. (Anonymous Workshop 1)

Response: Since sidewalks are not "used for the transportation of automobiles, trucks, motorcycles, and other vehicles," they are not subject to SUSMPs under the Street, Roads, Highways, and Freeways priority development project category. Addition of curb and gutter to an existing road is essentially redevelopment of the road. Therefore construction of curb and gutter on an existing road would be subject to SUSMP requirements if it met the significant redevelopment size criteria of adding 5,000 square feet of impervious surfaces. Other minor roadway work would also be subject to SUSMPs if it met the significant redevelopment size criteria.

Section: F.1 Subsection: F.1.b.2.a.ix

Comment: The Order, which departs from other regional NPDES permits by requiring that streets, roads, highways and freeways be regulated by SUSMP's, is vague and raises questions on what structural BMP's for streets will remove the pollutants of concern. (Coalition for Practical Regulation)

Response: Caltrans is currently conducting a BMP pilot study on the effectiveness of various BMPs for controlling pollutants in highway runoff. Preliminary results indicate many of the BMPs included in the study were effective in removing pollutants of concern from highway runoff (such as metals and total suspended solids). The Caltrans study can be consulted to determine which BMPs are most effective (Caltrans, 2000).

Section: F.1 Subsection: F.1.b.2.a.v

Comment: How is a restaurant regulated by the permit when the restaurant is less than 5,000 sq ft but shares a larger parking lot with other tenants? (Vasquez, Ralph)

Response: How to address detailed specific situations such as the one described above is left to the discretion of the Copermittees. The model and local SUSMPs to be developed by the Copermittees should include provisions to address such situations. One way to address the above situation would be to calculate the restaurant's area as the area of the restaurant combined with the area of the parking spaces allotted to the restaurant.

Section: F.1 Subsection: F.1.b.2.a.vi

Comment: The permit is too indefinite with regard to what constitutes "hillside development." To clarify the matter, the permit should either define "known erosive soil conditions, or point to an existing regulation (i.e. a specific Copermittee's existing hillside development ordinance) containing a more detailed and expansive description. In addition, the provision should be modified to include development where grading will occur on any parcel where the natural slope is 15% or greater or where plans include cut or fill slopes that are 30 feet high or greater. (Surfrider Foundation)

Response: Hillside development is defined in the Tentative Order as "any development which creates 5,000 square feet of impervious surface which is located in an area with known erosive soil conditions, where the development will grade on any natural slope that is twenty-five percent or greater." The identification of the location of erosive soil conditions is left to the discretion of the Copermittees, since they are most familiar with the soil conditions within their jurisdictions. The model and local SUSMPs to be developed by the Copermittees should identify areas or methods to identify areas with know erosive soil conditions within their jurisdictions. The definition of "hillside" included in the Tentative Order is identical to the definition included in the LARWQCB SUSMP, which was upheld by the SWRCB in Order WQ 2000-11.

Section: F.1 Subsection: F.1.b.2.a.vii

Comment: DEFINING ENVIRONMENTALLY SENSITIVE AREAS
The Municipal Permit requires that all development or redevelopment whose storm water discharges to an environmentally sensitive area " will be subject to the SUSWMP.

The Draft Permit defines "Environmentally Sensitive Areas" as-
Environmentally sensitive areas include but are not limited to all Clean Water Act Section 303(d) impaired water bodies; areas designated as Areas of Special Biological Significance by the State Water Resources Control Board (Water Quality Control Plan for the San Diego Basin (1994) and amendments); water bodies designated with the RARE beneficial use by the State Water Resources Control Board (Water Quality Control Plan for the San Diego Basin (1994) and amendments); areas designated as preserves or their equivalent under the Multi Species Conservation Program within the Cities and County of San Diego; and any other equivalent environmentally sensitive area which have been identified by the Copermittees. "Directly adjacent" means situated within 200 feet of the environmentally sensitive area. "Discharging directly to" means outflow from a drainage conveyance system that is composed entirely or predominantly of flows from the subject development or redevelopment site, and not commingled with flows from adjacent lands.

By this definition, the SD RWQCB Staff resolves any remaining ambiguities. Everything is an environmentally sensitive area unless the Copermittee finds otherwise. Since it is unlikely that any Copermittee will wish to take on the expense or potential legal liability of determining that a property is not an environmentally sensitive area, it is likely under this definition that any construction or reconstruction project that adds 2500 square feet of impervious area or increases the impervious area by more than 10% will be required to capture and treat its storm water. Thus, a homeowner with a 2500 square foot house who adds a 200 square foot patio will be required to capture and treat her storm water before discharge. However, the real impact of this definition becomes apparent when read in connection with the property prioritization requirements of the Draft Permit.

We propose the following definitions:
Environmentally Sensitive Area 1. -"Environmentally Sensitive Area" means an area designated as an Area of Special Biological Significance by the State Water Resources Board, an area designated as a Significant Natural Area by the California Resources Agency or an area designated as an area of Ecological Significance by the County of San Diego.

"Directly adjacent to" means situated within 200 feet of the environmentally sensitive area provided however, that the Executive Officer shall prepare a map of the County clearly identifying those areas which are within 200 feet of environmentally sensitive areas for approval by the Regional Board prior to the implementation of the SUSWMP. The Regional Board shall review and approve the map only upon a noticed motion.

"Directly discharging to" means outflow from a drainage conveyance system that is composed entirely of flows from the subject property, development, subdivision or industrial facility, and not commingled with the flows from adjacent lands. (McKenna & Cuneo, L.L.P.)

Response: The definition of Environmentally Sensitive Area is clear. Four specific types of Environmentally Sensitive Areas are identified in the definition. The definition also allows each Copermittee to identify any other equivalent Environmentally Sensitive Area. The commentor suggests that the Tentative Order defines all lands as Environmentally Sensitive Areas unless the Copermittees find otherwise. This is not the case. Only the four types of Environmentally Sensitive Areas listed in the definition, as well as any Environmentally Sensitive Areas identified by the Copermittees, are specified in the Tentative Order.

It is important to note that the definition of Environmentally Sensitive Area included in the Tentative Order is the result of the LARWQCB appeal process. The definition was refined over several months. While the SWRCB chose not to include Environmentally Sensitive Areas in the LARWQCB SUSMP, it was due to inconsistencies in the LARWQCB permit, not lack of a clear definition. SWRCB Order WQ 2000-11 states "The Regional Water Board may choose to consider the issue further when it reissues the permit."

Section: F.1 Subsection: F.1.b.2.a.vii

Comment: The definition for "directly adjacent to an environmentally area is unnecessarily limited. The provision should be expanded to include any proposed project within 1000 feet of a designated environmentally sensitive area. Further, "discharging directly" should be redefined to include any outflow from a drainage conveyance system that impacts the subject area, regardless of whether it is commingled with flows from adjacent lands. (Surfrider Foundation)

Response: The Environmentally Sensitive Area (ESA) priority development project category is meant to apply to projects which have the potential to cause a direct impact to an ESA. In other words, the inclusion of the ESA category in the Tentative Order is designed to provide additional protection of ESAs. For this reason, the ESA category is limited to projects which are "within or directly adjacent or discharging directly to" an ESA, where "discharging directly to" means flows that are "not commingled." For projects which are further away from an ESA, but still tributary to an ESA, the other Tentative Order provisions, including the other SUSMP priority development project categories, are expected to provide the necessary protection for the ESA from new development project impacts.

Section: F.1 Subsection: F.1.b.2.a.vii

Comment: PROTECTIONS FOR ENVIRONMENTALLY SENSITIVE AREAS Paragraph F.l.b.(2)(a)vii, on page 16 requires that projects be considered priority projects for implementation of SUSUMPs if they discharge directly into Environmentally Sensitive Areas. This is very appropriate. Unfortunately the last sentence appears to exempt cases in which the flow is commingled with flows from adjacent lands. We urge that this exemption be removed. A property should be considered a priority project if its outflow can potentially have a significant impact on a nearby Environmentally Sensitive Area. No exemptions should provided. (San Diego Audubon Society)

Response: The Environmentally Sensitive Area (ESA) priority development project category is meant to apply to projects which have the potential to cause a direct impact to an ESA. In other words, the inclusion of the ESA category in the Tentative Order is designed to provide additional protection of ESAs. For this reason, the ESA category is limited to projects which are "within or directly adjacent or discharging directly to" an ESA, where "discharging directly to" means flows that are "not commingled." For projects which are further away from an ESA, but still tributary to an ESA, the other Tentative Order provisions, including the other SUSMP priority development project categories, are expected to provide the necessary protection for the ESA from new development project impacts.

Section: F.1 Subsection: F.1.b.2.a.vii

Comment: Included among the categories of developments for which a SUSMP must be prepared are parking lots "5,000 square feet or more or with 15 or more parking spaces and potentially exposed to urban runoff." (See, section F.1.b(2)(a)viii, at page 16). Does this definition include parking garages that are underground or beneath residential structures? Does it include parking spaces that are above ground but covered? (Procopio, Cory, Hargreaves, & Savitch, L.L.P.)

Response: The Tentative Order states the SUSMP provisions will apply to "[p]arking lots 5,000 square feet or more or with 15 or more parking spaces and potentially exposed to urban runoff." Therefore, if the specific parking lot situations described above are not potentially exposed to urban runoff, then they would not be subject to the SUSMP provisions.

Section: F.1 Subsection: F.1.b.2.a.vii

Comment: F. 1.b.(2)(a)(vii) page 16; Environmentally Sensitive Areas
"Environmentally sensitive areas include ... and any other equivalent environmentally sensitive areas which have been identified by the Copermittees. "

The above language in bold type would open the designation of "environmentally sensitive areas" to a non-formal determination process that could lead to arbitrary decisions and a lack of consistency in their application. Therefore this language should be deleted from the permit. (Sempra Energy)

Response: How "any other equivalent environmentally sensitive areas" are identified is left to the discretion of the Copermittees. Utilization of the public process to identify such areas is encouraged in the Tentative Order, which states in section F.6 that "[e]ach Copermittee shall incorporate a mechanism for public participation in the implementation of the Jurisdictional URMP." Furthermore, approval of the model SUSMP by the SDRWQCB will also undergo the public process, as stated in Tentative Order section F.1.b.2. Finally, the environmentally sensitive areas listed in the Tentative Order have been open for public comment during the Tentative Order adoption process.

Section: F.1 Subsection: F.1.b.2.a.vii

Comment: Under the definition of Environmentally Sensitive Areas, the Permit includes Areas of Special Biological Significance as areas where numeric sizing criteria should be utilized. However, the Ocean Plan with Proposed Amendments (amending 1997 Ocean Plan), recently approved by the State Board, provides that “waste shall not be discharged to areas designated as being of special biological significance.” (page B-22). Waste is then defined as “total discharge, of whatever origin.” (page B-32). Therefore, the Permit must explicitly prohibit discharges into ASBS areas, which should either be included in this section or in Sections A or C. Prohibitions of discharges into ASBS areas should also be included wherever there is discussions of prohibition of pollutants into 303(d)-listed waters. (San Diego Baykeeper)

Response: This issue has statewide significance and is currently scheduled to be addressed by the SWRCB. At the time the SWRCB has addressed the issue, the SDRWQCB will act accordingly.

Section: F.1 Subsection: F.1.b.2.a.vii

Comment: BMPs should be required rigorously for all environmentally sensitive areas. Greater weight should be placed on sensitivity of individual sites. (Environmental Health Coalition)

Response: Comment noted.

Section: F.1 Subsection: F.1.b.2.a.vii

Comment: Modify the first sentence to: "AlI development and redevelopment located within or directly adjacent to or discharging directly to an environmentally sensitive area, which either creates 2,500 square feet of impervious surface on a proposed project site or increases the area of imperviousness of a proposed project site to 10% or more of its existing condition." (Port of San Diego)

Response: Section F.1.b.2.a.vii of the Tentative Order correctly refers to the increase of impervious area of greater than 10% of the naturally occurring condition because of the impact to receiving waters of impervious areas greater than 10% of a project area (Schueler 1994). Consequently, Regional Board staff recommend the language of Section F.1.b.2.a.vii be retained.

Section: F.1 Subsection: F.1.b.2.a.viii

Comment: Amend F.Lb.(2)(a)viii. pg.16 to include all open parking lots (instead of exempting non-commercial lots) as follows, "Parking lots 500 square feet or more or with 5 or more parking spaces and potentially exposed to urban runoff. . . ". (Environmental Health Coalition)

Response: The size threshold for parking lots of 5,000 square feet is the same as that included in the LARWQCB SUSMP, which was upheld by the SWRCB in Order WQ 2000-11. While the number of parking spaces threshold in the Tentative Order was reduced to 15 parking spaces (as opposed to the 25 parking space threshold included in the LARWQCB SUSMP), this reduction was based on comments received at the SDRWQCB's April 13, 2000 SUSMP Public Workshop. The size thresholds were placed on the parking lot SUSMP category to prevent SUSMP provisions from applying to smaller parking lots where SUSMP implementation may be cost prohibitive.

Section: F.1 Subsection: F.1.b.2.a.viii

Comment: Copermittees should be encouraged to collect runoff mitigation fees from new and redeveloped parking lots smaller than 5,000 square feet or 15 spaces. Such fees could then be applied to SUSMP or JURMP controls implemented on adjacent roads. (Surfrider Foundation)

Response: The Tentative Order requires the Copermittees to address urban runoff from parking lots of all sizes in sections F.3.a.3.b.i, F.3.c.2.g, and F.3.d.2. How the Copermittees address urban runoff from parking lots is left to their discretion in order to provide them with flexibility. Therefore, while the

SDRWQCB supports innovative measures such as runoff mitigation fees, they are not required by the Tentative Order.

Section: F.1 Subsection: F.1.b.2.a.viii

Comment: Would slurry sealing a parking lot constitute redevelopment, or would that be routine maintenance? (Industrial Environmental Association)

Response: Slurry sealing a parking lot would only constitute significant redevelopment, and therefore be subject to the SUSMP provisions, if the slurry sealing resulted in the creation or addition of 5,000 square feet of impervious surfaces or more.

Section: F.1 Subsection: F.1.b.2.a.x

Comment: If RGOs are forced to implement active control measures (exceeding the "maximum extent practicable" criterion) CEQA, APA and Unfunded Mandate requirements would have to be applied. (Western States Petroleum Association)

Response: Structural controls meet the criterion of "maximum extent practicable", not merely "practicable". Practicability or practicality from a cost viewpoint is not exceeded. The typical costs for installation of a filtering unit is 400 to 800 dollars with yearly maintenance costs averaging about 240 dollars.

Section: F.1 Subsection: F.1.b.2.a.x

Comment: The Water Code only requires that storm water control measures be implemented to the maximum extent practicable. Numeric Sizing Criteria and the use of treatment technologies at RGOs are not, therefore, mandated when other BMPs may suffice. (Western States Petroleum Association)

Response: A WSPA sponsored study, "Results of a Retail Gasoline Outlet and Commercial Parking Lot Stormwater Runoff Study ", concludes that pollutant concentrations from RGO runoff are similar to concentrations from commercial parking lots, restaurants and other urban developments that are properly regulated under Federal and State storm water pollution laws. Therefore, the discharges are significant. The fact that significant discharges were found in the study indicates that the current source control measures are not working and structural controls are needed to meet the criterion of "maximum extent practicable".

Section: F.1 Subsection: F.1.b.2.a.x

Comment: Sophisticated treatment technologies for dealing with gasoline spills are impractical because these approaches typically involve the installation of underground vaults. Such vaults trap gasoline vapors and air to create an explosive environment. (Western States Petroleum Association)

Response: Oil-water separators have been in common use at gasoline stations for many years. These separators are in essence the same as underground vaults. Safety issues have not been raised in the past concerning the potential for explosive environments to occur in separators. It is not likely that the chambers holding stormwater would create any more of an explosive environment than oil-water separators or utility vaults that are also common near RGOs.

Section: F.1 Subsection: F.1.b.2.a.x

Comment: Filtration and treatment technologies used at RGOs are ineffective as BMPs. The BMP Guide states that these technologies did not pass peer review. A Sacramento study found that these approaches were generally not acceptable. (Western States Petroleum Association)

Response: The study by Larry Walker and Associates does indeed indicate that 13 of 14 of the devices tested were "not acceptable". In all but one case, the listed "deficiencies" (the entire basis for concluding that the devices were "not acceptable") were deficiencies of the study, not the devices themselves. In nearly every case, the deficiencies cited were the lack of the number of storms or lack of a sufficient number of sites to justify any conclusion. Therefore, the conclusion that the devices are "not acceptable" is not only misleading. It is false. The data simply did not justify a determination of acceptability. An EPA funded study, "The Rouge River National Wet Weather Demonstration Project" evaluated four filtration/treatment storm drain inserts. This study concluded that "all four filters performed well … and were relatively easy to maintain". The study also stated that, "these devices are applicable for use in gas stations … and they have a relatively low cost". None of the four devices tested in this study were considered in the Larry Walker study and this study was ignored in the BMP Guide.

Section: F.1 Subsection: F.1.b.2.a.x

Comment: Numeric Sizing Criteria of the SUSMP promotes infiltration as a BMP for storm water runoff, but this is inappropriate for RGOs because it is not desirable to promote the infiltration of gasoline into soil and groundwater. (Western States Petroleum Association)

Response: SDRWQCB staff agree that infiltration BMPs should not be employed at RGOs. Numeric Sizing Criteria can be applied using other structural BMPs involving filtration or treatment.

Section: F.1 Subsection: F.1.b.2.a.x

Comment: RGOs are not a significant source of stormwater pollution. There is no evidence that stormwater runoff from well-maintained RGOs results in any significant adverse water quality impact. A study performed by Geomatrix provides evidence that most contaminant levels in stormwater runoff from RGOs are below EPA's benchmark levels and therefore RGOs are not a significant source of stormwater pollution. (Western States Petroleum Association)

Response: The cited WSPA sponsored study, "Results of a Retail Gasoline Outlet and Commercial Parking Lot Stormwater Runoff Study ", concludes that pollutant concentrations from RGO runoff are

similar to concentrations from commercial parking lots, restaurants and other urban developments that are properly regulated under Federal and State storm water pollution laws. Therefore, the discharges are significant. The cited study employed of six selected (I.e. not randomly chosen) RGOs and four parking lots. This study clearly was not broad enough in scope to justify the conclusion that, "contaminant levels in stormwater runoff from RGOs show most contaminants are below EPA's benchmark levels and therefore RGOs are not a significant source of stormwater pollution".

Section: F.1 Subsection: F.1.b.2.a.x

Comment: RGOs are a unique source category and should not be treated identically with other types of sources. This was acknowledged by the State Water Board when they determined that RGOs should not be subject to numerical standards in the Los Angeles Region. The Board ordered that all BMPs listed in the BMP Guide be mandated. (Western States Petroleum Association)

Response: As noted in the comment, the Board allowed for the possible future addition of RGOs in the SUSMP design standards if it were shown proper justification for doing so at a later date. The Los Angeles Regional Board is currently in the process of providing such a justification. Since this issue is pending, it is not accurate to say that it has been determined that all BMPs in the BMP Guide are mandated. No evidence has been presented to support the argument that RGOs are unique or deserving of special treatment.

Section: F.1 Subsection: F.1.b.2.a.x

Comment: SDBK and SDSF absolutely support the inclusion of Retail Gasoline outlets as priority projects subject to SUSMP requirements. (Surfrider Foundation)

Response: Comment noted.

Section: F.1 Subsection: F.1.b.2.a.x

Comment: The BMP Guide set out standards that are consistent with the requirement for reducing discharges "to the maximum extent practicable". The criterion of practicability implies the need for cost-effective measures. The proposed requirements of the tentative order - for example, the requirement regarding peak discharge rates, and the numerical design standards - go beyond those of the BMP Guide and are therefore, not cost-effective. (Western States Petroleum Association)

Response: An EPA funded study, "The Rouge River National Wet Weather Demonstration Project" evaluated four filtration/treatment storm drain inserts. This study concluded that "all four filters performed well … and were relatively easy to maintain". The study also stated that, "these devices are applicable for use in gas stations … and they have a relatively low cost". The typical costs for installation of the filtering units being studied is 400 to 800 dollars with yearly maintenance costs averaging about 240 dollars per device. These are clearly reasonable and manageable costs for facilities such as RGOs.

Section: F.1 Subsection: F.1.b.2.b

Comment: Shall priority projects, from the outset of the establishment of the SUSMP, be conditioned to use all three forms of BMPs?

The intent of Section F.1.b. (2)(b) and (c) in particular is that new development shall begin to install and maintain structural BMPs immediately upon adoption of the local SUSMPs and supporting ordinance amendments. There are serious questions about our ability to do this without the necessary findings that the controls: 1) are required to address a significant impact, 2) are feasible mitigation measures that are necessary to substantially reduce adverse impacts, and 3) are capable of reducing the impact to a less than significant level according to adopted threshold criteria. (City of Chula Vista)

Response: The SUSMP provision that requires implementation of pollution prevention, source control, and structural treatment BMPs has been upheld by the SWRCB in Order WQ 2000-11. The LARWQCB SUSMP, which was upheld by the SWRCB in Order WQ 2000-11, requires all three types of BMPs at all sites meeting the SUSMP priority development project category criteria. For example, pollution prevention BMPs (such as conservation of natural areas) are required at all SUSMP sites. Source control BMPs, such as properly designed trash storage areas, are also required. Furthermore, structural treatment BMPs which meet numeric sizing criteria are required at all SUSMP sites as well.

Findings 3, 4, and 5, as well as their corresponding discussions in the Draft Fact Sheet/Technical Report, address the impacts to receiving waters caused by urban development. Findings 11 and 12 discuss the effectiveness of BMPs in "substantially reduc[ing] adverse impacts," including data on the ability of various BMPs to reduce concentrations of pollutants in urban runoff. Furthermore, the feasibility of implementing such BMPs is addressed in the SDRWQCB's "Staff Report for Standard Urban Storm Water Mitigation Plans and Numerical Sizing Criteria for Best Management Practices," which found that structural BMP implementation could amount to less than 0.7% of project costs. Regarding similar cost calculations by the LARWQCB in the LARWQCB SUSMP, the SWRCB states in Order WQ 2000-11 that "[t]he Regional Board found that the cost to include BMPs that will meet the mitigation criteria will be one to two percent of the total development cost. This amount appears reasonable, especially in light of the amount of impervious surface already in Los Angeles County and the impacts on impaired water bodies."

Section: F.1 Subsection: F.1.b.2.b

Comment: Will the adequacy of BMPs for certain land uses and conditions be left solely to the municipal plan reviewer or will the RB specify adequacy of BMPs? (Anonymous Workshop 2)

Response: Determination of which BMPs are to be implemented is left to the discretion of the Copermittees, to provide the Copermittees flexibility in developing and implementing their programs.

Section: F.1 Subsection: F.1.b.2.b

Comment: Modify the first sentence to: "The SUSMP shall include a list of recommended pollution prevention, source control, and structural treatment BMPs or their equivalent." (Port of San Diego)

Response: The definition of BMP in Attachment D of the Tentative Order is broad and inclusive. It is likely that most equivalent or alternative BMPs would fall under this broad definition, making the inclusion of such terms unnecessary.

Section: F.1 Subsection: F.1.b.2.b

Comment: The allegations of The County of San Diego that the SUSMP BMP provision violates State Water Code Section 13360 is not valid. While the permit does mandates numerous goals and objectives that must be achieved through implementation of post-construction BMPs, it does not mandate what specific types must be used to meet the new standards. Furthermore It is important to note that the permit is required by the Federal Clean Water Act and cannot be preempted by a state water code. Even if the permit would violate section 13360, which it would not, the Clean Water Act allows the EPA Administrator, or here the RWQCB, to require numerical sizing criteria as a form of numerical effluent limitation for NPDES permits (Surfrider Foundation)

Response: Comment noted.

Section: F.1 Subsection: F.1.b.2.b

Comment: The permit should consider the economic viability of the measure being maintainable in perpetuity. The Permit allows the flexibility for the construction of manufactured BMPs. Many of these measures require a long term and high level of maintenance. (San Diego Audubon Society)

Response: In order to provide the Copermittees with flexibility, the Tentative Order does not specifically implementation of specific BMPs. Which BMPs are to be implemented at a particular site is left up to the Copermittees and developers. In deciding which BMPs are to be implemented, consideration of BMP maintenance is necessary. The Tentative Order ensures that BMP maintenance is considered during BMP implementation by requiring that a mechanism for the BMP maintenance be in place (section F.1.b.2.b.x).

Section: F.1 Subsection: F.1.b.2.b

Comment: Retain draft language for F.l.b. (2) (b)(c) because it is well-determined and well-supported by the facts and analysis. (Environmental Health Coalition)

Response: Comment noted.

Section: F.1 Subsection: F.1.b.2.b.I

Comment: The BMP requirement of Section F.1.b.2.b.i. to "Maintain pre-development peak storm water runoff discharge rates and velocities" is unnecessary unless there is a potential for downstream

erosion. Water quality effects of velocity are considered elsewhere in the permit. (Building Industry Association of Southern CA)

Response: The intent of requirement F.1.b.2.b.i. is to protect against downstream erosion. Where there is not potential for downstream erosion, such as for discharges which directly enter the bay, the requirement need not apply.

See permit change at F.1.b.2.b.i.

Section: F.1 Subsection: F.1.b.2.b.ii

Comment: How will the tentative order define and implement the "conservation of natural areas?" (City of Carlsbad)

Response: How natural areas are to be conserved is left to the discretion of the Copermittees, who are responsible for developing and implementing their programs. Conservation of natural areas was also a requirement of the LARWQCB SUSMP, which was upheld by the SWRCB in Order WQ 2000-11.

Details regarding the application of natural area conservation included in the LARWQCB SUSMP can provide guidance to the Copermittees. The LARWQCB SUSMP states:

"1. Concentrate or cluster development on portions of the site while leaving the remaining land in a natural undisturbed condition.
2. Limit clearing and grading of native vegetation at a site to the minimum amount needed to build lots, allow access, and provide fire protection.
3. Maximize trees and other vegetation at each site by planting additional vegetation, clustering tree areas, and promoting the use of native and/or drought tolerant plants.
4. Promote natural vegetation by using parking lot islands and other landscaped areas.
5. Preserve riparian areas and wetlands."

Section: F.1 Subsection: F.1.b.2.b.ii

Comment: As drafted, this requirement is too broad and undefined to be implemented. If read literally (and permits generally are), this equates to a prohibition on development since conservation and development are opposites. The County recommends amendment to state “Encourage the conservation of natural areas where feasible”. Conservation is an important objective which should be considered whenever possible. The County’s commitment to habitat conservation and land acquisition is longstanding. But, it is infeasible to require conservation as a standard condition of development project approval. (County of San Diego)

Response: Conservation of natural areas can provide significant protection to receiving waters from potential impacts from new development and significant redevelopment. For example, conservation of natural areas can be useful in helping maintain natural erosion and runoff rates. For these reasons, conservation of natural areas will be required in the SDRWQCB SUSMP provisions, as well as the LARWQCB SUSMP provisions, which were upheld by the SWRCB in Order WQ 2000-11. However, conservation of natural areas may not always be feasible, such as for small sites or redevelopment

projects. Therefore, Section F.1.b.2.b.ii of the Tentative Order will be changed to require conservation of natural areas only where feasible.

Section: F.1 Subsection: F.1.b.2.b.ii

Comment: Define conserve natural areas on page 17. (City of Carlsbad)

Response: To conserve natural areas is to use or manage natural areas wisely.

Section: F.1 Subsection: F.1.b.2.b.iii

Comment: What does "consideration of any pollutants for which the development's receiving water bodies are listed as impaired under CWA section 303(d)" mean? Section F.1.b.(1)(g) prohibits their discharge in any amount above pre-development levels. "Consideration" and "prohibition" are not synonymous. This section therefore implies a degree of flexibility which is precluded by section F.1.b.(1)(g). The inconsistency in its permit, moreover, creates an ambiguity in the permit. (County of San Diego)

Response: Language in section F.1.b.1.g which refers to the prohibition of discharges of pollutants in any amount above predevelopment levels has been removed. Therefore, the language in this section regarding consideration of pollutants is appropriate.

Section: F.1 Subsection: F.1.b.2.b.iii

Comment: The first sentence of this section misstates the function of source control BMPs. They do not minimize pollutants. They minimize or prevent their contact with stormwater. (County of San Diego)

Response: The first sentence of the requirement will be changed to clarify its intent. See change at permit section F.1.b.2.b.iii.

Section: F.1 Subsection: F.1.b.2.b.iii

Comment: "The development's receiving water bodies" is grammatically incorrect unless the RWQCB purports to assign ownership of receiving waters to the developments discharging to them. (County of San Diego)

Response: See change at permit section F.1.b.2.b.iii.

Section: F.1 Subsection: F.1.b.2.b.iii

Comment: "Increased runoff flow rate from the development and its potential downstream impacts" does not belong in this section since it has nothing to do with minimizing pollutants of concern or with the use of pollution prevention and source control BMPs. The County recommends its deletion. (County of San Diego)

Response: While increased runoff flow rates are a concern regarding new development and significant redevelopment, they are not controlled by pollution prevention and source control BMPs. Therefore, language in this section referring to increased runoff flow rates has been removed. See change at permit section F.1.b.2.b.iii.

Section: F.1 Subsection: F.1.b.2.b.iii

Comment: Section F.1.b (2)(b)iii: Does this provision refer to 303(d) water bodies within a development? (City of Chula Vista)

Response: Section F.1.b(2)(b)iii applies to all 303(d) listed water bodies that may be receiving waters for urban runoff discharges from areas subject to SUSMP requirements, including but not limited to 303(d) listed water bodies within a development.

Section: F.1 Subsection: F.1.b.2.b.iii

Comment: "Any pollutant associated with the land use type of the development" and "any pollutant commonly associated with urban runoff" are too broad and inclusive to have any chance of meaningful implementation. The goal of this program is not the removal of all identifiable substances. The County recommends deletion of everything after the first sentence or that this statement be amended to better reflect a process to identify contaminants that present a significant potential for beneficial use impairment. (County of San Diego)

Response: The Tentative Order states "[I]dentification of pollutants of concern should include consideration of any pollutants for which the development's receiving water bodies are listed as impaired under Clean Water Act section 303(d), any pollutant associated with the land use type of the development, any pollutant commonly associated with urban runoff, and increased runoff flow rate from the development and its potential downstream impacts." The key to this sentence is the terms "should include consideration." These words indicate that when a Copermittee or project proponent is identifying pollutants of concern, they should analyze "any pollutant associated with the land use type of the development" and "any pollutant commonly associated with urban runoff" to determine whether they might be a pollutant of concern. The Tentative Order does not state that "any pollutant associated with the land use type of the development" or "any pollutant commonly associated with urban runoff" is to be identified as a pollutant of concern, but rather that these types of pollutants must be assessed for their potential to be pollutants of concern during the identification process.

Section: F.1 Subsection: F.1.b.2.b.iv

Comment: In addition, the requirement to construct structural BMP's will increase the risk of vectors such as
mosquitoes and rats. Structural BMP's should be encouraged but not required. (SANDAG)

Response: This issue has been addressed in the revised Tentative Order in Finding 36. Although structural BMPs are a necessary component of the Standard Urban Storm Water Mitigation Plan, the Copermittees have the discretion to select and implement BMPs in such a way as to reduce the risk of vectors such as mosquitoes and rats.

Section: F.1 Subsection: F.1.b.2.b.iv

Comment: Revise the language "remove pollutants" to include the phrase "to the maximum extent practicable." (Building Industry Association of San Diego County)

Response: Controlling the discharge of pollutants to the maximum extent practicable is one basic standard of the Tentative Order. To the extent that it is a basic standard, it need not be reiterated on every line of the Tentative Order. Section F.1.b.2.b.iv requires that BMPs "[r]emove pollutants of concern from urban runoff […]". It does not require that all pollutants of concern be removed. While the MEP standard applies to this section, as well as throughout the permit, the language of the section in question is not conflict with the MEP standard.

Section: F.1 Subsection: F.1.b.2.b.iv

Comment: This requirement is open ended and exceeds the State's authority under the CWA. First "remove" should be amended to control the discharge of pollutants to its maximum extent practicable. Otherwise, its language exceeds the State's authority under the CWA. Second, if the definition of pollutants of concern used in section F.1.b.(2)(b)(iii) also applies here, this could amount to a mandate to remove everything detectable or imaginable. (County of San Diego)

Response: Controlling the discharge of pollutants to the maximum extent practicable is one basic standard of the Tentative Order. To the extent that it is a basic standard, it need not be reiterated on every line of the Tentative Order. Section F.1.b.2.b.iv requires that BMPs "[r]emove pollutants of concern from urban runoff […]". It does not require that all pollutants of concern be removed. While the MEP standard applies to this section, as well as throughout the permit, the language of the section in question is not conflict with the MEP standard.

Regarding the discussion of pollutants of concern in section F.1.b.2.b.iii, this section does not define pollutants of concern, but rather outlines the types of pollutants which must be considered when pollutants of concern are identified. That various types of pollutants must be considered during the identification of pollutants of concern does not indicate that these various types of pollutants must also be identified as pollutants of concern in all (or even most) cases.

Section: F.1 Subsection: F.1.b.2.b.iv

Comment: Section F. 1.b.2.b.iv lists "Remove pollutants of concern from urban runoff (through implementation of structural treatment BMPs)" should be reworded to acknowledge that there is no guarantee that implementing the BMPs will remove the pollutants of concern because the BMPs being implemented at this time have little or no effect on the majority of the pollutants of concern. (Building Industry Association of Southern CA)

Response: The wide range of BMPs available have been exhibited to be effective in removing pollutants of concern from urban runoff, both when used alone and in combination. Structural BMP performance data has been compiled and summarized by USEPA (USEPA, 1999a). This data indicates that structural BMPs can be effective in reducing pollutants of concern in urban runoff discharges. The summary provides the performance ranges of various types of structural BMPs for removing suspended solids, nutrients, pathogens, and metals from storm water flows. These pollutants are in general the pollutants of most concern in storm water in the San Diego Region. For suspended solids, the least effective structural BMP type was found to remove 30-65% of the pollutant load, while the most effective was found to remove 65-100% of the pollutant load. For nutrients, the least effective structural BMP type was found to remove 15-45% of the pollutant load, while the most effective was found to remove 65-100% of the pollutant load. For pathogens, the least effective structural BMP type was found to remove <30% of the pollutant load, while the most effective was found to remove 65-100% of the pollutant load. For metals, the least effective structural BMP type was found to remove 15-45% of the pollutant load, while the most effective was found to remove 65-100% of the pollutant load.

Section: F.1 Subsection: F.1.b.2.b.v

Comment: The County recommends amendment to state "Encourage the minimization of directly connected impervious areas where feasible". This should really be a performance objective established by Copermittees, not a condition of approval set by the RWQCB. (County of San Diego)

Response: As discussed in Finding 5, numerous studies have demonstrated a direct correlation between the degree of imperviousness of a watershed and the degradation of its receiving water quality. Minimization of directly connected impervious areas is an effective means to reduce the impacts of increased imperviousness on receiving waters by helping to maintain or restore the natural flow regime of a developed property. For this reason, minimization of directly connected impervious areas is a requirement of the Tentative Order. However, there may be conditions where minimization of directly connected impervious areas may not be appropriate, such as where there may be a potential for groundwater contamination. Therefore, the directive shall be worded as "Minimize directly connected impervious areas where feasible."

Section: F.1 Subsection: F.1.b.2.b.vii

Comment: As a blanket requirement on all sites, this requirement is intrusive and excessive. The County recommends amendment to state "Encourage developers to stencil or label storm drain inlets where appropriate and feasible". There is no evidence to show that labeling every storm drain on every new facility is worth the effort. Copermittees should be allowed to decide how they will utilize this in their programs. (County of San Diego)

Response: Storm drain stenciling and signage is a basic education measure widely used throughout the State. The effort needed to meet this requirement is minimal. In fact, volunteer groups are frequently utilized in the stenciling of storm drains. Regarding the pertinence of storm drain stenciling, USEPA states "Surrogate measures of the effectiveness of education and outreach programs include: […] the percentage of storm drains that have been stenciled" (USEPA, 1999a). Stenciling of storm drains is also a requirement of the LARWQCB SUSMP, the requirements of which were upheld by the SWRCB in Order WQ 2000-11.

Section: F.1 Subsection: F.1.b.2.b.x

Comment: F.1.b.(2)(b)(x) "Include proof of a mechanism for ongoing long-term BMP maintenance"

The County recognizes and acknowledges the role of BMP maintenance in preventing the discharge of stormwater contaminants from new facilities. However, we object to the specification by the RWQCB of this or any other condition of approval for local permits. Such conditions are most appropriately determined by the Copermittees. Moreover, other than requiring appropriate maintenance through amendments to Codes, the co-permittees have no legal means to require "proof of a mechanism" for ongoing long-term BMP maintenance. (County of San Diego)

Response: BMPs which are not maintained eventually become ineffective in removing pollutants from urban runoff. In other words, BMPs which are not maintained adequately will not remove pollutants in urban runoff to the maximum extent practicable. For this reason, BMP maintenance is a requirement of the Tentative Order. The requirement in the Tentative Order that BMPs have proof of ongoing maintenance is the same basic requirement as that which was included in the LARWQCB SUSMP, which was upheld by the SWRCB in Order WQ 2000-11.

The LARWQCB SUSMP can provide guidance on requiring proof of a mechanism for ongoing long term BMP maintenance. The LARWQCB SUSMP states:

"[T]he Permittee shall require that the applicant provide verification of maintenance provisions through such means as may be appropriate, including, but not limited to legal agreements, covenants, CEQA mitigation requirements and/or Conditional Use Permits.

For all properties, the verification will include the developer's signed statement, as part of the project application, accepting responsibility for all structural and treatment control BMP maintenance until the time the property is transferred and, where applicable, a signed agreement from the public entity assuming responsibility for Structural or Treatment Control BMP maintenance. The transfer of property to a private or public owner must have conditions requiring the recipient to assume responsibility for maintenance of any Structural or Treatment Control BMP to be included in the sales or lease agreement for that property, and will be the owners responsibility. The condition of transfer shall include a provision that the property owners conduct maintenance inspection of all Structural or Treatment Control BMPs at least once a year and retain proof of inspection. For residential properties where the Structural or Treatment Control BMPs are located within a common area which will be maintained by a homeowner's association, language regarding the responsibility for maintenance must be included in the project's conditions, covenants and restrictions (CC&R). Printed educational materials will be required to accompany the first deed transfer to highlight the existence of the requirement and to provide information on what storm water management facilities are present, signs that maintenance is needed, how the necessary maintenance can be performed,

and assistance that the Permittee can provide. The transfer of this information shall also be required with any subsequent sale of the property.

If Structural or Treatment Control BMPs are located within a public area proposed for transfer, they will be the responsibility of the developer until they are accepted for transfer by the County of other appropriate public agency. Structural or Treatment control BMPs proposed for transfer must meet design standards adopted by the public entity for the BMP installed and should be approved by the County or other appropriate public agency prior to its installation."

Section: F.1 Subsection: F.1.b.2.b.x

Comment: Section F.1.b(2)(b)x. requires "proof of a mechanism for ongoing long-term BMP maintenance". As discussed below with respect to section F.8. (Fiscal Analysis Component), however, the realities of municipal governance preclude "proof" of ongoing BMP maintenance in perpetuity. The City's ability to appropriate funding for future BMP maintenance efforts is severely constrained by state laws restricting the imposition and collection of fees, taxes and assessments at the local level. Although the City may be able to obtain agreements from developers to install certain BMPs and to provide a means of funding their ongoing maintenance, such private mechanisms, too, are subject to uncertainty. For example, if a developer agrees to retain responsibility for funding ongoing BMP maintenance, such a mechanism would be of little value if the developer were to go out of business. Therefore, at the very least, we request that the Regional Board delete the phrase "proof of" from this requirement, such that it would read simply "Include a mechanism for ongoing long-term BMP maintenance," in recognition of the issues described above. (City of San Diego)

Response: Proof of a mechanism for ongoing long term BMP maintenance can be provided by either the project proponent or the Copermittee. If a Copermittee finds that it shall have difficulty ensuring maintenance, it can require proof of a mechanism of BMP maintenance from the project proponent. This does not mean that the project proponent must be responsible for the BMP maintenance in perpetuity, but rather will be responsible for providing a mechanism which will ensure BMP maintenance in perpetuity. The requirement in the Tentative Order that BMPs have proof of ongoing maintenance is the same basic requirement as that which was included in the LARWQCB SUSMP, which was upheld by the SWRCB in Order WQ 2000-11.

More detailed requirements included in the LARWQCB SUSMP regarding BMP maintenance can serve as guidance to the Copermittees. The LARWQCB SUSMP states:

"[T]he Permittee shall require that the applicant provide verification of maintenance provisions through such means as may be appropriate, including, but not limited to legal agreements, covenants, CEQA mitigation requirements and/or Conditional Use Permits.

For all properties, the verification will include the developer's signed statement, as part of the project application, accepting responsibility for all structural and treatment control BMP maintenance until the time the property is transferred and, where applicable, a signed agreement from the public entity assuming responsibility for Structural or Treatment Control BMP maintenance. The transfer of property to a private of public owner must have conditions requiring the recipient to assume responsibility for maintenance of any Structural or Treatment Control BMP to be included in the sales or lease agreement for that property, and will be the owners responsibility. The condition of transfer shall include a provision that the property owners conduct maintenance inspection of all Structural or Treatment Control BMPs at least once a year

and retain proof of inspection. For residential properties where the Structural or Treatment Control BMPs are located within a common area which will be maintained by a homeowner's association, language regarding the responsibility for maintenance must be included in the projects conditions, covenants and restrictions (CC&R). Printed educational materials will be required to accompany the first deed transfer to highlight the existence of the requirement and to provide information on what storm water management facilities are present, signs that maintenance is needed, how the necessary maintenance can be performed, and assistance that the Permittee can provide. The transfer of this information shall also be required with any subsequent sale of the property.

If Structural of Treatment Control BMPs are located within a public area proposed for transfer, they will be the responsibility of the developer until they are accepted for transfer by the County of other appropriate public agency. Structural or Treatment control BMPs proposed for transfer must meet design standards adopted by the public entity for the BMP installed and should be approved by the County or other appropriate public agency prior to its installation."

Section: F.1 Subsection: F.1.b.2.b.x

Comment: What does "proof of a mechanism" mean? What kind of proof would the RWQCB expect? (County of San Diego)

Response: The requirement in the Tentative Order that BMPs have proof of ongoing maintenance is the same basic requirement as that which was included in the LARWQCB SUSMP, which was upheld by the SWRCB in Order WQ 2000-11. The LARWQCB SUSMP can provide guidance on requiring proof of a mechanism for ongoing long term BMP maintenance. The LARWQCB SUSMP states:

"[T]he Permittee shall require that the applicant provide verification of maintenance provisions through such means as may be appropriate, including, but not limited to legal agreements, covenants, CEQA mitigation requirements and/or Conditional Use Permits.

For all properties, the verification will include the developer's signed statement, as part of the project application, accepting responsibility for all structural and treatment control BMP maintenance until the time the property is transferred and, where applicable, a signed agreement from the public entity assuming responsibility for Structural or Treatment Control BMP maintenance. The transfer of property to a private or public owner must have conditions requiring the recipient to assume responsibility for maintenance of any Structural or Treatment Control BMP to be included in the sales or lease agreement for that property, and will be the owners responsibility. The condition of transfer shall include a provision that the property owners conduct maintenance inspection of all Structural or Treatment Control BMPs at least once a year and retain proof of inspection. For residential properties where the Structural or Treatment Control BMPs are located within a common area which will be maintained by a homeowner's association, language regarding the responsibility for maintenance must be included in the projects conditions, covenants and restrictions (CC&R). Printed educational materials will be required to accompany the first deed transfer to highlight the existence of the requirement and to provide information on what storm water management facilities are present, signs that maintenance is needed, how the necessary maintenance can be performed, and assistance that the Permittee can provide. The transfer of this information shall also be required with any subsequent sale of the property.

If Structural or Treatment Control BMPs are located within a public area proposed for transfer, they will be the responsibility of the developer until they are accepted for transfer by the County of other

appropriate public agency. Structural or Treatment control BMPs proposed for transfer must meet design standards adopted by the public entity for the BMP installed and should be approved by the County or other appropriate public agency prior to its installation."

Section: F.1 Subsection: F.1.b.2.b.xi

Comment: This statement should be amended to include "as needed". Otherwise, we would be required to include additional provisions for each category regardless of whether a need exists. (County of San Diego)

Response: Each SUSMP priority development project category has specific pollution prevention and source control BMPs which are applicable to it, but may not be applicable to the other priority development project categories. For example, properly designed kitchen mat washdown areas are necessary source control BMPs for restaurants, but are not applicable elsewhere. Similar SUSMP category specific BMPs exist for all SUSMP categories. Therefore, additional provisions are required for each SUSMP category. This is in line with the LARWQCB SUSMP, which was upheld by the SWRCB in Order WQ 2000-11. The LARWQCB SUSMP identified additional provisions to be required of each SUSMP priority development project category.

Section: F.1 Subsection: F.1.b.2.b.xii

Comment: This provision exceeds the MEP standard. (County of San Diego)

Response: The intent of this requirement was not to require BMPs to be designed to remove all pollutants beyond what is considered practical, but rather to ensure that BMPs be designed correctly so that they are effective in removing pollutants. Therefore, Section F.1.b.2.b.xii of the Tentative Order will be clarified to express this intent.

Section: F.1 Subsection: F.1.b.2.b.xii

Comment: In combination with the guidance for identifying pollutants of concern in section F.1.b.(2)(b)(iii) above, this requirement could result in significant costs that provide little or no environmental gain. Would the Copermittees have to identify all pollutants associated with runoff and design their BMPs to the most restrictive standard? Has there been a cost/benefit analysis? (County of San Diego)

Response: As stated elsewhere, the Tentative Order provides that "[I]dentification of pollutants of concern should include consideration of any pollutants for which the development's receiving water bodies are listed as impaired under Clean Water Act section 303(d), any pollutant associated with the land use type of the development, any pollutant commonly associated with urban runoff, and increased runoff flow rate from the development and its potential downstream impacts." The key to this sentence is the terms "should include consideration." These words indicate that when a Copermittee or project proponent is identifying pollutants of concern, they should analyze "any pollutant associated with the land use type of the development" and "any pollutant commonly associated with urban runoff" to determine whether

they might be a pollutant of concern. The Tentative Order does not state that "any pollutant associated with the land use type of the development" or "any pollutant commonly associated with urban runoff" is to be identified as a pollutant of concern, but rather that these types of pollutants must be assessed for their potential to be pollutants of concern during the identification process.

Therefore, BMPs are not required under this directive to maximize their pollutant removal capabilities for all pollutants, but rather for pollutants which have been identified as pollutants of concern. This directive seeks to ensure that BMPs are designed properly, so as to be effective in removing these pollutants of concern. Designing BMPs to maximize their capability for removing pollutants of concern will provide most environmental gain, contrary to the commentor's assertions. This in turn will increase the benefit of the BMP implementation.

Section: F.1 Subsection: F.1.b.2.b.xiii

Comment: This requirement violates CWC section 13360. With respect to F.1.b.(2)(b)(xiii), the CWC section 13360 is violated because RWQCB staff have attempted to specify (in this case to restrict) the location of controls (on-site, and prior to entry into the MS4 or receiving waters), thereby eliminating other viable and lawful approaches (for example, off-site and/or after entry into the MS4). The County continues to assert that regional and sub-regional approaches are legally valid, and in many instances can be more cost-effective than the site-specific approach advocated by RWQCB staff. This position was emphasized by the SWRCB during the LA County SUSMP appeal (State Board Order No. WP 2000-11, p. 21), and is consistent with the USEPA's Final Phase II Rule (Federal Register/Vol.. 64, No. 235,p. 68760) which states: "Each new development and redevelopment should have a BMP component. It is also required by State Law. (See Cal. Water Code § 13225(i).) If an approach is chosen that primarily focuses on regional or nonstructural BMPs, however, then, the BMPs may be located away from the actual development site (e.g., a regional water quality pond)." (County of San Diego)

Response: As stated elsewhere, "sub-regional" or "sub-watershed" or "neighborhood" BMPs implemented upgradient from any receiving waters supporting beneficial uses may be a viable option for addressing urban runoff from development. While the SDRWQCB strongly supports implementation of post-construction BMPs as close to the source as possible, it recognizes that this may not always be feasible. Therefore, the directive has been changed to reflect this. See change at permit section F.1.b.2.b.xiii.

Section: F.1 Subsection: F.1.b.2.b.xiii

Comment: This statement is grammatically incorrect. "[I]nto the MS4 or other receiving waters" should be amended to "into the MS4." As previously stated, MS4s are not receiving waters. (County of San Diego)

Response: While it is possible that a portion of an MS4 can also be considered a receiving water (see Finding 8), this is not always the case. Therefore, the commentors assertion that MS4s do not equate with receiving waters is correct. The directive has been changed to reflect this difference. See change in permit section F.1.b.2.b.xiii.

Section: F.1 Subsection: F.1.b.2.b.xv

Comment: Section F.1.b (2(b) xv: Does the requirement regarding runoff from developments apply only to direct discharges to a 303(d) water body? (City of Chula Vista)

Response: No, the requirement regarding post development runoff applies to all urban runoff discharges to a 303(d) listed water body.

Section: F.1 Subsection: F.1.b.2.c

Comment: As regards the SUSMP requirement, and especially the inclusion of numeric sizing criteria, the County of San Diego has taken the position that the RWQCB must conduct CEQA review to assess environmental impacts of the proposed permit. This position is totally untenable. Section 13389 of the California Water Code provides a specific CEQA exemption applicable to the adoption of any waste discharge requirement (WDR). CEQA Guidelines section 15307 and section 15308 also exempt the RWQCBs when the activities do not include a relaxation of standards leading to environmental degradation. (Surfrider Foundation)

Response: Comment noted.

Section: F.1 Subsection: F.1.b.2.c

Comment: Modify the first sentence to: "The SUSMP shall require structural treatment BMPs or their equivalent to be implemented at all priority development projects. In addition to meeting the BMPs requirements listed in item F. l. b. (2) (b) above, all structural BMPs or their equivalent for a single priority development project shall collectively be sized to with the following numeric sizing criteria:" (Port of San Diego)

Response: The definition of BMP in Attachment D of the Tentative Order is broad and inclusive. It is likely that any equivalent alternative would fall under this definition, making the inclusion of such terms unnecessary.

Section: F.1 Subsection: F.1.b.2.c

Comment: The permit will create hundreds of costly small-scale treatment facilities. The dependence on infiltration is flawed considering SD has limited infiltration capabilities. (Building Industry Association of San Diego County)

Response: The Tentative Order does not require that structural treatment BMPs infiltrate stormwater. The Tentative Order states that structural treatment BMPs "shall be designed to mitigate (infiltrate, filter, or treat) […]." This requirement provides flexibility in which type of BMP is to be implemented. Therefore, where infiltration is limited due to soil conditions, other types of BMPs can be used, such as detention or filtration BMPs.

Section: F.1 Subsection: F.1.b.2.c

Comment: Add a baseline numeric sizing criteria to F.Lb.(2)(c) pg.18. A minimum required numeric sizing criteria would mitigate polluted non-storm water runoff (dry weather flows) and insure against the potential misuse of flexibility in the numeric sizing criteria where insufficient mitigation may be allowed. We feel that an appropriate baseline numeric sizing standard, below which no discharger would be able to fall, would strengthen the permit and still afford local municipalities more than adequate flexibility to determine their own standards (which could be more protective) and how to meet them.

We request the Regional Board add the following language to the end of the subsection: "BUT Baseline Criteria vi. at a minimum, volume-based BMPs must collectively be sized for the volume of runoff produced by. 6 inches of rainfall in a 24- hour period; and vii. at a minimum, flow-based BMPs must collectively be sized for the maximum flow rate of runoff produced from rainfall intensity of 0.2 inches of rainfall per hour. " (Environmental Health Coalition)

Response: The requirement for capture of the 85th percentile storm event is based on the concept of diminishing returns. The 85th percentile storm event represents the BMP capacity beyond which, insignificant increases in pollutant removal (and hence water quality protection) will occur, relative to the additional costs. Therefore, it would not be cost effective to require municipalities to size BMPs to capture storm events larger than the 85th percentile storm event. A minimum numeric sizing criteria, as proposed, has the potential to require municipalities to capture runoff from storm events beyond the point of diminishing returns, thereby reducing the cost effectiveness of numeric sizing criteria. For example, the 85th percentile 24-hour storm event for Lindbergh Field is roughly 0.5 inches. Requiring BMPs at Lindbergh Field to capture 0.6 inches of rainfall would cost more, yet provide little water quality benefit. For this reason, a minimum numeric sizing criteria will not be included in the Tentative Order.

Section: F.1 Subsection: F.1.b.2.c

Comment: SDBK and SDSF strongly support the inclusion of numeric sizing criteria in the permit. All of the Copermittees have failed to adequately implement the past permit to a degree sufficient to protect receiving waters. The numerous beach closures, during periods of even moderate rain, make it clear that current practices are insufficient to protect receiving waters from pollutants in stormwater and urban runoff. (Surfrider Foundation)

Response: Comment noted.

Section: F.1 Subsection: F.1.b.2.c

Comment: Modify the first sentence to: "Volume-based BMPs or their equivalent shall be designated to mitigate (infiltrate, filter, or treat) either:" (Port of San Diego)

Response: The definition of BMP in Attachment D of the Tentative Order is broad and inclusive. It is likely that any equivalent alternative would fall under this definition, making the inclusion of such terms unnecessary.

Section: F.1 Subsection: F.1.b.2.c

Comment: Delete section F.1.b(2)(c) because it has no relationship to pollutant loading or water quality objectives. Each watershed should be given the flexibility to establish design criteria and programs that address pollutants of concern in relationship to basin objectives and facts on the ground. The section establishes a one size fits all approach of costly facilities, which may or may not address a demonstrated concern. (City of Carlsbad)

Response: Numeric sizing criteria for structural treatment BMPs is directly related to pollutant loading and water quality objectives. Section F.1.b.2.b.iv of the Tentative Order states "[r]emove pollutants of concern from urban runoff (through implementation of structural treatment BMPs)." Identification of pollutants of concern includes consideration of pollutant loading from various types of development, as well as consideration of pollutants which may cause or contribute to an exceedance of water quality objectives. Once pollutants of concern have been identified, the Tentative Order requires that BMPs be implemented which will address these pollutants of concern. Numeric sizing criteria essentially ensures that the BMPs implemented are adequately sized so as to be effective in removing the pollutants of concern.

The numeric sizing criteria section of the Tentative Order (which requires treatment of the 85th percentile storm event) is essentially the same as that of the LARWQCB SUSMP, which was upheld by the SWRCB in Order WQ 2000-11. A December 26, 2000 SWRCB memo states "[t]he Order finds that the design standard in the SUSMPs, which essentially requires that 85 percent of the runoff from specified categories of development be infiltrated or treated, reflects MEP" (SWRCB, 2000b).

Section: F.1 Subsection: F.1.b.2.c

Comment: Modify the first sentence to: "Flow-based BMPs or their equivalent shall be designated to mitigate (infiltrate, filter, or treat) either:" (Port of San Diego)

Response: The definition of BMP in Attachment D of the Tentative Order is broad and inclusive. It is likely that any equivalent alternative would fall under this definition, making the inclusion of such terms unnecessary.

Section: F.1 Subsection: F.1.b.2.c

Comment: Additionally, we recognize the need to periodically re-evaluate these and any other design criteria that we choose to utilize as part of our management programs. This is especially true since design criteria are only indirectly related to program performance objectives. As we continue to evaluate this nexus over time, it may become necessary to re-evaluate the use of particular criteria, especially in light of potential unintended environmental consequences. As such, we recommend that this section be moved

to the Technical Report as suggested guidance, and that flexibility be permitted in the application of the sizing criteria to particular developments. (County of San Diego)

Response: Inclusion of numeric sizing criteria in the Tentative Order has essentially been dictated by the SWRCB in its precedential decision in Order WQ 2000-11. The SWRCB states: "Several of the conclusions reached in the Order are likely to recur, and future municipal storm water permits must be consistent with the principles set forth therein. […] The Order finds that the design standard in the SUSMPs, which essentially requires that 85 percent of the runoff from specified categories of development be infiltrated or treated, reflects MEP" (SWRCB, 2000b).

Section: F.1 Subsection: F.1.b.2.c

Comment: The mandate that all new development and redevelopment adhere to structural numeric sizing BMPs is excessive, unwarranted, and bureaucratic overkill. (Building Industry Association of San Diego County)

Response: Numeric sizing criteria for structural treatment BMPs is directly related to pollutant loading and water quality objectives. Section F.1.b.2.b.iv of the Tentative Order states "[r]emove pollutants of concern from urban runoff (through implementation of structural treatment BMPs)." Identification of pollutants of concern includes consideration of pollutant loading from various types of development, as well as consideration of pollutants which may cause or contribute to an exceedance of water quality objectives. Once pollutants of concern have been identified, the Tentative Order requires that BMPs be implemented which will address these pollutants of concern. Numeric sizing criteria essentially ensures that the BMPs implemented are adequately sized so as to be effective in removing the pollutants of concern.

The numeric sizing criteria section of the Tentative Order (which requires treatment of the 85th percentile storm event) is essentially the same as that of the LARWQCB SUSMP, which was upheld by the SWRCB in Order WQ 2000-11. A December 26, 2000 SWRCB memo states "[t]he Order finds that the design standard in the SUSMPs, which essentially requires that 85 percent of the runoff from specified categories of development be infiltrated or treated, reflects MEP" (SWRCB, 2000b).

Section: F.1 Subsection: F.1.b.2.c

Comment: Reject the recommendation in the APWA September 21, 2000 Letter to the Regional Board
The APWA analysis is severely flawed on several fronts, is not adequately protective of our water quality, and should not be adopted by the Board. It is fatally flawed in that it uses an inappropriate MEP parameter, inadequate sampling, and mistaken comparative analysis to recommend a insufficient numeric sizing criteria for the new permit that does not provide adequate protection for water quality. Most essentially, the APWA bases its entire analysis on the assumption that the 80" percentile runoff event as the design event that achieves the MEP definition under the Clean Water Act. It bases its assumption on a single reference -- a popular engineering manual. The choice of a MEP parameter is the most determinative step in calculating the volume or flow criteria yet APWA affords it the most cursory research or explanation. While determining the percentile runoff event that best represents the design event for MEP is both technically and politically controversial, it is critical if the efforts for SUSMPS are

to yield the benefit we need. Yet, APWA pulls a number from a single reference with no defense of that position.

The APWA recommendations are also unsupportable because they rely on a single sample and incorrect comparisons. For its analysis of the whole of San Diego County, the APWA relies on weather monitoring data from Lindbergh Field. For these purposes, Lindbergh Field does not geographically or climactically represent the entire San Diego County. Moreover, any scientific analysis attempting to extrapolate conclusions from a single sample demonstrates crippling statistical weakness. In the alternative, the Regional Board staff's proposed method considers rainfall through out the County in its calculations.

Then, the APWA attempts to substantiate these faulty conclusions with inappropriate comparative analysis. The APWA takes the ratio of precipitation at a single location in Los Angeles County with precipitation at a single location in San Diego County and implies that they have calculated a universal conversion for precipitation and runoff between the two counties. They then proceed to calculate a San Diego volume criteria from the Los Angeles volume criteria as if rainfall to storm event frequency graphs are all linear. Frankly, their comparative analysis has little foundation in either science or common sense.

We request the Regional Board to reject the recommendations of the APWA September 10, 2000 letter and retain its current numeric sizing criteria provisions notwithstanding our other comments on those provisions. The 85' percentile is practicable and we support the staff finding that it may be the point of diminishing returns. Other proposal for flow and volume should not be considered unless they provide equivalent protection, not less. (Environmental Health Coalition)

Response: The APWA proposal for determination of the amount of runoff to be treated under SUSMPs raises two issues: (1) The SUSMPs requirement for the treatment of the 85th percentile storm event should be reduced to the 80th percentile storm event; and (2) hourly rainfall data from Lindbergh Field should be applied to precipitation contour maps to determine the size of the storm which must be treated.

(1) First of all, reducing the requirement for the treatment of the 85th percentile storm event to the 80th percentile storm event is inappropriate for the San Diego Region. The sole reasoning provided by APWA for reducing the size of the design storm which must be captured is that the City of Denver has chosen to capture the 80th percentile storm event. It is doubtful that the City of Denver has a more than $1.2 billion tourism economy as closely tied to water quality as that of the San Diego Region (a SANDAG memo states that projections by the California Department of Boating and Waterways find nearly $1.2 billion in direct revenue and $1.2 billion in indirect revenue is pumped into the San Diego area economy each year by out-of-state visitors) (SANDAG, 1996).

Capture of the 80th percentile storm event is equivalent to capture of runoff form approximately 0.4 inch of rainfall in the City of San Diego, as calculated by APWA. This is a smaller amount of rainfall than must be treated in Austin, Virginia, Delaware, Maryland, New Jersey, Chicago, New Jersey, Florida, and the Puget Sound Basin. More importantly, the 80th percentile storm event is less than what has been determined to constitute MEP by the SWRCB in Order WQ 2000-11. The SWRCB states “The Order finds that the design standard in the SUSMPs, which essentially requires that 85 percent of the runoff from specified categories of development be infiltrated or treated, reflects MEP” (SWRCB, 2000b). While Denver may arguably have a climate which is somewhat similar to San Diego’s, certainly criteria developed by the SWRCB for the Los Angeles region are more applicable to San Diego than criteria used by Denver, Colorado.

In addition, capture of the 80th percentile storm event ignores the concept of diminishing returns. The 85th percentile storm event is representative of the point of diminishing returns for the San Diego Region. The 85th percentile storm event represents the BMP capacity beyond which, insignificant increases in runoff capture will occur, relative to additional costs. Even a cursory look at APWA's graphed data (Exhibit A of their proposal, which is item B of Attachment 13 of the Executive Officer Summary Report for the December 13, 2000 Public Hearing) shows that capture of a 0.4 inch storm is well below the "knee of the curve," or the point of diminishing returns.

(2) The APWA proposal also recommends a different method for calculation of the design storm event from that proposed in the Tentative Order. Where the Tentative Order proposes use of 24-hour rainfall data from several locations, the APWA proposal uses hourly rainfall from one location (Lindbergh Field). The Tentative Order proposes that each Copermittee use 24-hour rainfall data from its area to calculate its design size storm. While use of 24-hour rainfall data is not as rigorous as use of hourly rainfall data, 24-hour data is typically much more available, thereby allowing Copermittees to use local data to calculate the design storm to be used in their jurisdictions. In fact, a lengthy record of hourly rainfall data is only available in one place within San Diego County: Lindbergh Field. The APWA proposal uses this hourly rainfall data from Lindbergh Field and applies it to the entire county through the use of precipitation contour (isopluvial) maps. While there may be potential inaccuracies in applying data from one site to the entire county, use of such precipitation contour maps is common practice.

In light of the increased rigorousness of using hourly data, as well as the common practice of using precipitation contour maps, the Tentative Order will be modified to allow for the 85th percentile storm event to be calculated by applying hourly rainfall data from Lindbergh Field to precipitation contour maps.

See change at permit section F.1.b.2.c.

Section: F.1 Subsection: F.1.b.2.c

Comment: Because it imposes an arbitrary requirement that the first .2 inches of storm water be captured and treated, the SUSMP will make it extremely difficult to develop new affordable housing, and, again, it could impose significant costs on local businesses and taxpayers. (Alliance for Water Quality)

Response: Comment noted. The requirement that flow-based BMPs be designed to mitigate runoff generated by a rainfall intensity of 0.2 inches per hour is based on hourly rainfall data from Lindbergh Field in San Diego. The 85th percentile hourly rainfall intensity was calculated from this data to be 0.1 in/hr. In developing the numeric sizing criteria for flow-based BMPs, this number was doubled to account for intense bursts of rainfall which may occur within an hour period. The 0.1 in/hr rainfall intensity assumes that rain falls at an even rate over an hour period. This is frequently not the case. Rainfall often occurs in intense bursts over periods of time shorter than an hour in duration. If 0.1 inches of rainfall were to occur in a short intense burst, as opposed to falling at an even rate over an hour, the flow rate resulting from the short intense burst of rainfall would be greater than the flow rate generated by the steady hour-long rain. Therefore, a BMP sized to treat or filter the peak flow rate resulting from a steady hour-long 0.1 in rainfall would be inadequately sized to treat peak flows from a 0.1 in rain event falling over a 30 minute period. For this reason, the 85th percentile hourly rainfall intensity was doubled to develop the numeric sizing criteria for flow-based BMPs. A flow-based BMP sized to treat or filter runoff resulting from a 0.2 in/hr rainfall intensity (as the proposed numeric sizing criteria would require) would be adequately sized to capture most peak flow rates resulting from 0.1 inch of rain falling over time

periods shorter than one hour. It is worth noting that this approach of doubling the design hourly rainfall intensity for developing numeric sizing criteria for flow based BMPs is supported by APWA (APWA, 2000) and the LARWQCB.

Section: F.1 Subsection: F.1.b.2.c

Comment: The Draft Permit appears to divide the world into "Source Control BMPs" and "Treatment Control BMPs." An unanswered question is why Regional Board Staff do not consider Source Control BMPs as part of the strategy for achieving SUSWMP MEP. The current SUSWMP proposal appears to reject Source Control BMPs.

Source Control BMPs are a necessary and essential strategy for the Urban Core. Here where infiltration is both economically and technically infeasible, the only Treatment Control BMPs that remain are filtration. While filtration may be effective in removing cigarette butts and Styrofoam cups from storm water, their usefulness in removing fecal coliform or dissolved metals is limited at best. Without equal recognition and emphasis for Source Control BMPs achieving storm water quality goals in the Urban Core will be prohibitively expensive. First, urban project proponents will be forced to install Treatment Control BMPs that have been shown not to work. Then, the project proponent inevitably will be required to implement Source Control BMPs at an additional cost.

We propose Copermittees may treat Source Control BMPs equally with Treatment Control BMPs for achieving compliance with the SUSWMP in the Urban Core. If a project proponent proposes only Source Control BMPs to achieve the removal of Pollutants of Concern to the Maximum Extent Practicable, the Copermittee should have to make the following findings before approval:
1. The proposed project is in the Urban Core;
2. The Copermittee projects that the removal rates achieved for the pollutants of concern are equivalent to or more stringent than those achievable through permissible Treatment Control BMPs in the Urban Core (i.e. no infiltration);
3. The project proponent has made adequate financial and technical provisions for the analysis of storm water discharges to assure that the predicted removal rates for pollutants of concern are achieved; and
4. The project proponent has made adequate provisions for the installation of Treatment Control BMPs if later storm water analysis shows that the Source Control BMPs are not achieving the projected removal rates.

Source Control BMPs are recognized to be the most cost-effective means of protecting storm water quality. Thus, by giving equal treatment to Source Control BMPs, project proponents have the opportunity to maximize the removal of pollutants of concern. However, if the Source Control BMPs are inadequate to achieve MEP, this proposal provides for the necessary resources to fall back on Treatment Control BMPs. (McKenna & Cuneo, L.L.P.)

Response: The Tentative Order explicitly includes source control BMPs as part of the SUSMP strategy for addressing urban runoff from new development. The Tentative Order states “[t]he SUSMP shall require all new development and significant redevelopment projects falling under the above priority project categories or locations to implement a combination of BMPs selected from the recommended BMP list, including at a minimum (1) pollution prevention BMPs, (2) source control BMPs, and (3) structural treatment BMPs.”

A combination of source control and structural treatment BMPs is the most effective means for controlling pollutant discharges in urban runoff coming from development. While source control BMPs can be effective, they do not assure that pollutants have been removed (or never generated). Structural treatment BMPs provide this assurance as a second line of defense. USEPA addresses the uncertainty of the effectiveness of source control BMPs by stating "BMPs such as street sweeping, public education and outreach, collection of lawn debris, etc., are conceptually very effective means of controlling the generation of pollutants that can enter storm water runoff. However, it is often very difficult to develop a representative means of monitoring or evaluating their effectiveness. Additional work in this area is needed in order to measure the effectiveness of these controls" (USEPA, 1999a).

In light of this uncertainty, the SUSMP requires structural treatment BMPs in addition to source control BMPs. Due to the heavy use of areas within the urban core, structural treatment BMPs are needed there as well as other locations. Structural treatment BMPs can be used to remove pollutants of concern quite effectively within the urban core. Sand and other media filters, which can be installed underground, have been found to remove 50-80% of metals, while porous pavement has been found to remove 65-100% of pathogens (USEPA, 1999a). Furthermore, the cost of implementation of such BMPs is reasonable. The capital cost for a sand filter for a 5-acre commercial site has been estimated at $35,000-70,000. The overall cost of development of a 5-acre commercial site could cost $6 million (see Attachment E of the SDRWQCB "Staff Report for Standard Urban Storm Water Mitigation Plans and Numerical Sizing Criteria for Best Management Practices"). The cost of the sand filter would therefore constitute approximately 1% of the total project cost. Regarding such costs, the SWRCB states in Order 2000-11 "[t]he Regional Board found that the cost to include BMPs that will meet the mitigation criteria will be one to two percent of the total development cost. This amount appears reasonable, especially in light of the amount of impervious surface already in Los Angeles County and the impacts on impaired water bodies."

Section: F.1 Subsection: F.1.b.2.c.

Comment: The permit should contain a more protective volume of rainfall capture requirement pending site specific determinations of the 85th percentile. Until such numbers are derived, the .75 inch standard adopted by the SWRCB for the Los Angeles Region should be used. (Surfrider Foundation)

Response: The SDRWQCB has calculated the 0.6-inch 24-hour storm as the rough average 85th percentile storm for San Diego County. Since this average is based on rainfall data from 4 areas within San Diego County, it is more applicable for use in San Diego County than criteria developed for the Los Angeles area using Los Angeles rainfall data.

Section: F.1 Subsection: F.1.b.2.d

Comment: Section F.1.b(2)(d), found at page 18, allows Copermittees to develop "any equivalent numeric sizing criteria or performance-based standard for post-construction structural treatment BMPs as part of the model SUSMP." However, this section does not indicate which entity -- the Copermittee or the Regional Board -- determines whether a proposed "equivalent" standard actually complies with the conditions of the Order. Please clarify. (Procopio, Cory, Hargreaves, & Savitch, L.L.P.)

Response: Any equivalent numeric sizing criteria put forward by the Copermittees must be part of the model SUSMP. Approval of the model SUSMP by the SDRWQCB will undergo a public process. Therefore, the SDRWQCB would authorize the use of an equivalent numeric sizing criteria. The Tentative Order has been changed to clarify this. See change at permit section F.1.b.2.d.

Section: F.1 Subsection: F.1.b.2.d

Comment: F.1.b.(2)(d) "Equivalent Numeric Sizing Criteria"
The County is very interested in the potential for flexibility this section could provide. Unfortunately, as its currently drafted, this section is extremely confusing. Section F.1.b.(2)(d) allows Copermittees to develop "any equivalent numeric sizing criteria or performance-based standard for post construction BMPs as part of the model SUSMP." For this section to have meaning, "Equivalency" must be defined. Numeric sizing criteria are a design criteria, yet this section seems to imply that an alternative performance standard could be proposed. This section seems to be confusing the meaning of the two terms. If both are meant, the section heading should be amended to reflect both.

Since minimum standards are already prescribed, it is difficult to see where the flexibility might occur. For instance, would a 70th percentile event be considered if a rational justification were proposed? What about after SUSMP model completion? If new information becomes available after SUSMP completion that suggests that we were headed in the wrong direction, how will flexibility be provided in the future? (County of San Diego)

Response: The intent of the "equivalent numeric sizing criteria" provision was to provide the Copermittees with flexibility in choosing methods for calculating the 85th percentile storm event. For example, APWA has proposed using isopluvial maps for determining what size storms BMPs must be sized to capture. The provision was not meant to provide means for reduction of the 85th percentile criteria. The SWRCB has found in Order WQ 2000-11 that capture of the 85th percentile storm event constitutes MEP for structural treatment BMPs at new development sites. The Tentative Order has been modified to clarify this intent.

See change at permit section F.1.b.2.d.

Section: F.1 Subsection: F.1.b.2.d

Comment: The Regional Board should delete section F.l.b.(2)(d) pg.18, or amend it as follows: ". . . Such equivalent sizing criteria may be authorized subject to public review and Regional Board action for use in place of the above criteria. . . ". Oversight is needed to prevent local authorization of inadequate numeric sizing criteria. (Environmental Health Coalition)

Response: Any equivalent numeric sizing criteria put forward by the Copermittees must be part of the model SUSMP. Approval of the model SUSMP by the SDRWQCB will undergo a public process.

Section: F.1 Subsection: F.1.b.2.d

Comment: Sections F.l.b (2) (d) (e) (f) (g) page 18 - Delete these sections. This whole approach of dictating a blanket criterion for the whole county should be eliminated in favor of an element developed as a part of the Watershed Urban Run-off Management Program. A section should be added to Section J.2. Watershed Co-permittees shall establish numeric sizing criteria to apply to new development, which will assist in assuring water quality objectives in pollutants of concern to the watershed by January 2005. (City of Carlsbad)

Response: The SWRCB upheld the general SUSMP requirements in Order WQ 2000-11. Furthermore, in a December 26, 2000 memo, the SWRCB stated "[t]he general principles of the Order [Order WQ 2000-11] - that design standards for BMPs for new development and redevelopment are required - must be implemented." In light of this guidance, the SUSMP provisions are included in the Tentative Order. In addition, based on the current rate of development within San Diego County, postponing SUSMPs and numeric sizing criteria implementation until a watershed program can be developed in 2005 is not warranted.

Section: F.1 Subsection: F.1.b.2.d

Comment: Any equivalent numeric sizing criteria put forward by a Copermittee must be subjected to public review, comment, and hearing. (Surfrider Foundation)

Response: Any equivalent numeric sizing criteria put forward by the Copermittees must be part of the model SUSMP. Approval of the model SUSMP by the SDRWQCB will undergo a public process.

Section: F.1 Subsection: F.1.b.2.e

Comment: Recommend providing definition for "pollutants of concern" that is consistent with the federal Clean Water Act and California Water Code. (Port of San Diego)

Response: Defining and identifying pollutants of concern is the responsibility of the Copermittees. The Copermittees are responsible for reducing pollutant discharges into and from their MS4s to the maximum extent practicable. Part of this responsibility is identifying the pollutants in the discharges, since it is difficult to remove pollutants if it is not known which pollutants are present. Data from the Copermittees dry and wet weather monitoring programs, as well as from other published sources, can be useful in identifying pollutants of concern. The SDRWQCB can help the Copermittees in locating applicable sources of information.

Section: F.1 Subsection: F.1.b.2.e

Comment: F. 1.b.(2)(e) Pollutants of concern, page 18. This section in part states "The procedure shall include, at a minimum, consideration of (1) receiving water quality (including pollutants for which receiving waters are listed as impaired under the Clean Water Act section 303 (d)..." The concern with this language is that "consideration" can be ineffectual in achieving the goal to clean up impaired waters. To this end we recommend a separate section devoted to impaired waters and how the Copermittee should address this issue. TMDL's are notably absent from the Tentative Order. In this case concerning the

impaired waters, we recommend that TMDL's be addressed in the permit. The permit should have a tie in with the TMDL programs. Paragraph F.3.a.(4)(c) on page 26 addresses this but it would be more direct to have BMP's for impaired waters in F. 1 .b. (Sierra Club)

Response: Currently, there are no USEPA approved TMDLs for the San Diego Region, and therefore no limitations that can be explicitly included in the Tentative Order at this time. However, 40 CFR 122.44 (d)(vii)(B) requires that NPDES effluent limitations be consistent with any waste load allocation for the discharge prepared by the state (Regional Board) and approved by USEPA. In other words, once TMDL limits are established and approved by USEPA, NPDES permits must include effluent limitations that are consistent with the TMDL. Furthermore, USEPA's guidance for developing TMDLs in California includes a recommendation that the state (State and Regional Boards) evaluate how waste load allocations will be translated into NPDES permits as part of the development of the TMDL implementation plan.

Section: F.1 Subsection: F.1.b.2.e

Comment: A number of the permit requirements, such as the SUSMP requirement, should be developed after the pollutants of concern have been identified. (County of San Diego)

Response: The overall impacts of runoff from urban development have been widely documented (see Findings 3, 4, 5, 6, 7, and 9, as well as their corresponding discussions in the Draft Fact Sheet/ Technical Report). Controls on new development and significant redevelopment are clearly needed, irregardless of which pollutants are identified to be of principal concern. SUSMPs provide the framework for addressing urban runoff from new development and significant redevelopment, while allowing for the details of implementation to be addressed after pollutants of concern have been identified. For example, the SUSMP requirements provide a framework by providing that structural BMPs must be implemented. However, the details of the SUSMP requirements, such as which particular BMPs are to be implemented, is left to be determined after pollutants of concern have been identified.

It is important to note SWRCB Order WQ 2000-11 supports the SUSMP approach.

Section: F.1 Subsection: F.1.b.2.e

Comment: The RWQCB should be the one to determine the pollutants of concern instead of the Copermittees. They have the expertise and have been receiving the monitoring data necessary to make such decisions. (Building Industry Association of Southern CA)

Response: The Copermittees are responsible for reducing pollutant discharges into and from their MS4s to the maximum extent practicable. Part of this responsibility is identifying the pollutants in the discharges, since it is difficult to remove pollutants if it is not known which pollutants are present. Therefore, defining and identifying pollutants of concern is the responsibility of the Copermittees. Data from the Copermittees dry and wet weather monitoring programs, as well as from other published sources, can be useful in identifying pollutants of concern. The SDRWQCB can help the Copermittees in locating applicable sources of information.

Section: F.1 Subsection: F.1.b.2.e

Comment: The Draft Permit requires that Copermittees will regulate all proposed and existing development to remove "Pollutants of Concern" to the "Maximum Extent Practicable. Thus, in order for Copermittees to assure compliance within their jurisdiction and thereby avoid the specter of costly litigation, they must have a clear understanding of what the term of art "Pollutant of Concern" means. Neither the Draft Permit nor the Glossary attached thereto defines the term.

We propose the following definition:
A "Pollutant of Concern" is a physical or chemical characteristic of the receiving water into which the Copermittee directly discharges its storm water for which the Regional Board determined the receiving water is "impaired" at the time the project proponent applies for a tentative map from the Copermittee. For the purposes of this definition, the term "receiving water" shall be defined as the first waters of the State, or of the United States, into which the Copermittee's storm water discharges. For the purposes of this definition, a finding of "impairment" by the Regional Board shall be defined as the placement of the water body on the 303(d) list for the pollutant in question or in the alternative, by a finding in the Regional Board's Basin Plan that a specific water segment is impaired for a specific beneficial use because the water quality objective for a specific pollutant has been exceeded.

Requiring the regulatory agencies primarily charged with the obligation to protect waters of the State and United States to define pollutants of concern significantly improves the SUSWMP process. It limits the potential liability of both Copermittees and project proponents. It provides clarity to the Copermittees. It places the obligation to set water quality standards on the agencies empowered to do so. Further, it assures consistency in implementation of the SUSWMP across the Basin. Further, this definition avoids later misunderstandings and second-guessing. Each Copermittee can determine the completeness of an application simply by comparing the application's discussion of pollutants of concern with the list of impairments to the appropriate receiving water in the 303(d) list and/or the Basin Plan. If the project proponent considers each of these pollutants in its proposal, both the proponent and the Copermittee will know that they have met the minimum requirements of this element of the SUSWMP. Further, this definition does not prevent a Copermittee from setting higher standards for itself following local ordinances. Thus, the definition defines a floor and not a ceiling. (McKenna & Cuneo, L.L.P.)

Response: The Copermittees are responsible for reducing pollutant discharges into and from their MS4s to the maximum extent practicable. Part of this responsibility is identifying the pollutants in the discharges, since it is difficult to remove pollutants if it is not known which pollutants are present. Therefore, defining and identifying pollutants of concern is the responsibility of the Copermittees.

The Tentative Order contains guidance for the identification of pollutants of concern in section F.1.b.2.e. It includes consideration of other pollutants besides those simply identified as a potential threat to 303(d) listed water bodies. These other pollutants must also be addressed in order to meet the MEP standard and antidegradation policy. The Copermittees are to develop a standard procedure for pollutants of concern to be identified in the model SUSMP. Development of such a standard procedure in the model SUSMP will help ensure consistency and clarity for the development project application process.

Data from the Copermittees dry and wet weather monitoring programs, as well as from other published sources, can be useful in identifying pollutants of concern. The SDRWQCB can help the Copermittees in locating applicable sources of information.

Section: F.1 Subsection: F.1.b.2.g

Comment: This exemption is meaningless unless section F.1.b.(1)(g) is deleted. These restaurants would still have to meet the requirement to maintain pre-development velocity / flow rates. They could not do this without numerically sized structural controls. (County of San Diego)

Response: The intent of this provision was to exempt restaurants smaller than 5,000 square feet from the structural treatment BMP requirements, including requirements for the control of flow rates. The language of section F.1.b.2.g has been clarified to address this. As discussed elsewhere, requirements for the control of flow rates from new development will be limited to development projects falling under the SUSMP categories. Section F.1.b.1.g. has been changed to reflect this, and therefore does not conflict with this provision. See change at permit sections F.1.b.1.g and F.1.b.2.g.

Section: F.1 Subsection: F.1.b.2.h

Comment: What is the criteria to be used in order to qualify for a waiver? (Anonymous Workshop 1)

Response: The Tentative Order states "A waiver of infeasibility shall only be granted by a Copermittee when all available structural treatment BMPs have been considered and rejected as infeasible." The Copermittees have discretion in identifying in their model and local SUSMPs applicable specific situations for waivers. However, it is important to note that the waiver fund requirement (for project proponents who have received a waiver to transfer their cost savings to a storm water mitigation fund) precludes findings of infeasibility based on cost.

The Los Angeles RWQCB SUSMP provides guidance on situations where waivers may apply, stating "[r]ecognized situations of impracticability include, (i) extreme limitations of space for treatment on a redevelopment project, (ii) unfavorable or unstable soil conditions at a site to attempt infiltration, and (iii) risk of groundwater contamination because a known unconfined aquifer lies beneath the land surface or an existing or potential underground source of drinking water is less than 10 feet from the soil surface."

Section: F.1 Subsection: F.1.b.2.h

Comment: Aside from that, the cost savings should be used in the Co-permittee's jurisdiction first, at the Co-permittee's discretion, before being used in the Co-permittee's watershed. (City of Coronado)

Response: How waiver funds are used is at the discretion of the Copermittees, provided funds "be used on projects to improve urban runoff quality within the watershed of the waived project."

Section: F.1 Subsection: F.1.b.2.h

Comment: The waiver funding requirement under the SUSMP provisions is unworkable and should be stricken.

The Tentative Order includes a "waiver funding" provision that allows a Copermittee to exempt a project from the numeric sizing requirements upon a showing of "infeasibility." In such instances, the Copermittees are required to develop a program "to require project proponents who have received waivers to transfer the savings in costs, as determined by the Copermittees(s) to a storm water mitigation fund. The problem with this waiver fund provision, in part, arises out of the obligation of the Copermittees to set up a fund that is equivalent to the total amount of savings in costs to the project applicant, irrespective of whether or not the finding of infeasibility was based on economics, i.e., if the waiver was granted because of the economics, the waiver will be ineffective as the same savings in costs apparently will have to be transferred to the waiver fund. Such a provision is impracticable and should be modified to provide discretion to the Copermittee to set the amount of the fund based on the use and purposes of the fund, and the projects to be carried out with the funds. (County of San Diego)

Response: The criteria included in the Tentative Order upon which a waiver may be issued is based upon the waiver criteria in the LARWQCB SUSMP, which was upheld by the SWRCB in Order WQ 2000-11. The LARWQCB SUSMP states "A waiver of impracticability shall be granted only when all other Structural and Treatment Control BMPs have been considered and rejected as infeasible." When discussing situations where a waiver may be issued, the LARWQCB SUSMP does not include cost considerations. Cost considerations are not a valid reason for waiver issuance, since the SDRWQCB and LARWQCB have exhibited that structural BMP implementation is generally less than 1% of total project cost. The SWRCB finds that this cost is "reasonable" in Order WQ 2000-11. Since waivers are not to be issued based on cost considerations, the requirement for project proponents who have received a waiver to transfer the resulting savings to a storm water mitigation fund is appropriate.

The waiver provision in the Tentative Order provides the Copermittees considerable discretion in how the dollar amount of fund contributions will be determined and spent. However, a waiver cannot be granted in order to save a project proponent money.

Section: F.1 Subsection: F.1.b.2.h

Comment: The Copermittee must show infeasibility of all available structural treatment BMPs including those not recommended in the local SUSMP. (Surfrider Foundation)

Response: It is anticipated that the list of structural treatment BMPs included in the model and local SUSMPs will be complete, wide-ranging, and thorough. While the list is not designed to exclude the use of any applicable BMPs, it should be adequate to assess the feasibility of BMP implementation at a site. In addition, requiring project proponents to show infeasibility of all BMPs in existence may be impractical.

Section: F.1 Subsection: F.1.b.2.h

Comment: Page 19, SectionF.1.b. (2) (h) Waiver Provision- Please include language to provide for public participation in the Waiver Provision process, and allow the public to comment on the validity of the waiver as well as how and where money from the stormwater mitigation fund will be spent. (Surfers Tired of Pollution)

Response: The SDRWQCB strongly encourages the Permittees to include public participation in their waiver and budget processes. However, in an attempt to provide the Permittees with flexibility no such requirement will be included in the Tentative Order. However, it is important to note that when a waiver is approved by a Permittee, that Permittee is required to notify us. The public is then welcome to review our files that contain these waiver notifications.

Section: F.1 Subsection: F.1.b.2.h

Comment: A waiver provision would be unnecessary if the permit provided sufficient flexibility to allow Copermittees to design and implement their programs. This section should be deleted and replaced with a provision to allow Copermittees to develop and submit a proposed waiver program. Copermittees should be allowed to propose, with sufficient rationale, a program that considers and addresses the full range of situations in which waivers might be needed and/or allowable (including regional strategies). (County of San Diego)

Response: The waiver provision provides significant flexibility to the Copermittees in identifying situations where waivers are applicable. The issuance of waivers is left entirely to the Copermittees, provided that "all available structural treatment BMPs have been considered and rejected as infeasible." The Copermittees have discretion in identifying in their model and local SUSMPs applicable situations for waivers. However, it is important to note that the waiver fund requirement (for project proponents who have received a waiver to transfer their cost savings to a storm water mitigation fund) precludes findings of infeasibility based on cost.

The LARWQCB SUSMP provides guidance on situations where waivers may apply, stating "[r]ecognized situations of impracticability include, (i) extreme limitations of space for treatment on a redevelopment project, (ii) unfavorable or unstable soil conditions at a site to attempt infiltration, and (iii) risk of groundwater contamination because a known unconfined aquifer lies beneath the land surface or an existing or potential underground source of drinking water is less than 10 feet from the soil surface."

Section: F.1 Subsection: F.1.b.2.h

Comment: Change or Delete F.1b.(2)(h) Waiver Provision pg.19.
We are very wary of the allowance of any waiver provision for numeric sizing criteria and think that at a minimum any such a provision must be based on negligibility of water quality impacts and not on feasibility. Land use law is simply all about public and environment protection overriding individual economic interest. Ideally, it is development interest that should accommodate regulatory requirements and not vice versa. If a project is infeasible under the requirements of the law, it shouldn't be built. We apply this simple calculus to earthquake and fire safety provisions all the time. The extreme interest in preventing the harms of noncompliance obviates the inclusion of any provision for waiver. Water quality protection rises to the same level of public and environmental concern, thereby precluding the availability of a waiver.

If the Regional Board chooses to permit waivers, we strongly encourage that such provisions require a lower on-site numeric sizing criteria in addition to off-site mitigation or fund contribution. For example, in addition to the transfer of savings in cost provisions, the model SUSMP must require project proponents who have received waivers to mitigate 80% of the volume or flow rate set by the numeric

sizing criteria. That way, at least we still protect against most of the dry weather flows and some of the first flush. (Environmental Health Coalition)

Response: A waiver provision is necessary for certain specific situations where compliance with numeric sizing criteria is infeasible. For example, it is conceivable that a project may have such extreme limitations of space that no room for structural treatment BMPs exists. Where a waiver is granted, the project proponent is still required to implement the other provisions of the SUSMP. Furthermore, a contribution to a storm water mitigation fund is required if a waiver is received. These two requirements will ensure that the project does not result in a cumulative impact to the watershed. Finally, inclusion of a waiver provision was supported by the SWRCB in Order WQ 2000-11.

Section: F.1 Subsection: F.1.b.2.h

Comment: Use of the word "infeasible" without an explanatory definition makes it another "I know it when I see it" concept that is inherently problematic.

We propose that the Draft Permit's Waiver Provisions be modified as follows:
A Copermittee may, through adoption of an ordinance or code incorporating the Treatment Control BMPs of the SUSWMP, provide for a waiver from the requirement if impracticability for a specific property can be established. Recognized situations of impracticability include, but are not limited to: (i) redevelopment in the Urban Core; (ii) extreme limitations of space for treatment on a redevelopment project outside the Urban Core; (iii) unfavorable or unstable soil conditions at a site to attempt infiltration; and (iv) risk of ground water contamination because an underground source or potential source of drinking water is less than 10 feet from the soil surface.

If a waiver is granted for impracticability, the Permittee shall first require the project proponent to propose one or more Source Control BMPs to reduce Pollutants of Concern to the Maximum Extent Practicable. Any savings in cost between the approved Source Control BMPs and the waived Treatment Control BMPs, but not exceeding 0.7% of the total cost of the project shall be transferred to a Storm Water Utility District encompassing the watershed in which the waiver was granted. The Storm Water Utility District shall use the transferred funds to develop and implement regional alternative solutions for storm water pollution in the storm watershed.

These modifications to the waiver language are intended to clarify the language of San Diego's SUSWMP. Second, they place time limits on the procedures which may be necessary. The revisions also recognize that Source Control BMPs as a viable part of the solution to storm water pollution. Finally, the proposed modifications encourage the development and funding of watershed Storm Water Utility Districts as the legitimate vehicle to expand storm water protection from individual projects to watersheds. (McKenna & Cuneo, L.L.P.)

Response: What constitutes infeasibility is at the discretion of the Copermittees, in order to provide them flexibility in developing and implementing their SUSMPs. The Copermittees' model and local SUSMPs should include criteria for the determination of infeasibility. However, it is important to note that the waiver fund requirement (for project proponents who have received a waiver to transfer their cost savings to a storm water mitigation fund) precludes findings of infeasibility based on cost. Also, due to the heavy use development projects receive in the urban core, infeasibility simply based on a project's location within the urban core (as proposed by the commentor) is not appropriate. While certain projects within the urban core may be eligible for a waiver, certainly many other projects have the capability for

structural treatment BMP implementation. For example, the proposed ballpark in downtown San Diego has extensive plans for structural BMP implementation. A blanket exemption of urban core projects is not adequately protective of receiving water quality.

It is also important to note that receipt of a waiver does not constitute a waiver from the entire SUSMP requirements. It is merely a waiver from the requirement that structural treatment BMPs be implemented which meet numeric sizing criteria. Therefore, the source control BMPs in section F.1.b.2.b are still required of projects which receive a waiver. For this reason, calculations to determine waiver fund contributions which include consideration of dollars spent on source control BMPs are inappropriate.

Finally, nothing in the Tentative Order precludes the Copermittees from developing a storm water utility district.

Section: F.1 Subsection: F.1.b.2.h

Comment: Section F.1.b(2)(h), found at page 19, provides that if a project cannot feasibly implement the required structural treatment BMPs, the Copermittee may grant that project a waiver from those requirements. However, the Tentative Order then states that "[a]s part of the model SUSMP, the Copermittees shall develop a program to require project proponents who have received waivers to transfer the savings in cost, as determined by the Copermittees, to a storm water mitigation fund." The problem here is that most project proponents seeking the waiver will do so on the grounds that the required structural BMPs are too expensive and therefore infeasible. It would make no sense to grant the waiver and then demand that the project proponent pay the amount "saved" into a storm water mitigation fund. The entire point of granting the waiver -- to avoid potentially devastating costs -- would be defeated. (Procopio, Cory, Hargreaves, & Savitch, L.L.P.)

Response: The point of the waiver is not to avoid asserted potentially devastating costs, but rather to allow flexibility "when all available structural treatment BMPs have been considered and rejected as infeasible" due to situations such as extreme limitations of space or dangerous soil conditions.

The criteria included in the Tentative Order upon which a waiver may be issued is based upon the waiver criteria in the LARWQCB SUSMP, which was upheld by the SWRCB in Order WQ 2000-11. The LARWQCB SUSMP states “A waiver of impracticability shall be granted only when all other Structural and Treatment Control BMPs have been considered and rejected as infeasible.” When discussing situations where a waiver may be issued, the LARWQCB SUSMP does not include cost considerations. Cost considerations are not a valid reason for waiver issuance, since the SDRWQCB and LARWQCB have exhibited that structural BMP implementation is generally less than 1% of total project cost. The SWRCB finds that this cost is “reasonable” in Order WQ 2000-11. Since waivers are not to be issued based on cost considerations, the requirement for project proponents who have received a waiver to transfer the resulting savings to a storm water mitigation fund is appropriate.

The waiver provision in the Tentative Order provides the Copermittees considerable discretion in how the dollar amount of fund contributions will be determined and spent. However, a waiver cannot be granted in order to save a project proponent money.

Section: F.1 Subsection: F.1.b.2.h

Comment: This waiver provision should only be granted when not doing so would constitute a "taking", denying an owner all economic Use of his property. As stated, a huge portion of projects are likely to routinely submit applications for waivers. The labor force and legal resources needed to evaluate them would be overwhelming. (San Diego Audubon Society)

Response: Waivers may only be issued "when all available structural treatment BMPs have been considered and rejected as infeasible." Due to the wide range and adaptability of BMPs available, it is anticipated that waiver issuance will be relatively rare. Where a waiver is granted, the project proponent is still required to implement the other provisions of the SUSMP. Furthermore, a contribution to a storm water mitigation fund is required if a waiver is received. These two requirements will ensure that the project does not result in a cumulative impact to the watershed. Finally, inclusion of a waiver provision was supported by the SWRCB in Order WQ 2000-11.

Section: F.1 Subsection: F.1.b.2.h

Comment: Further, this provision is confusing and ambiguous as it appears to require the same amount in cost savings for SUSMP compliance to be deposited into the Fund. As the State Board found with the LARWQCB sump, the Fund terms have not been sufficiently developed. (State Board Order WP 2000-11, p. 2.) (County of San Diego)

Response: The criteria included in the Tentative Order upon which a waiver may be issued is based upon the waiver criteria in the LARWQCB SUSMP, which was upheld by the SWRCB in Order WQ 2000-11. The LARWQCB SUSMP states “A waiver of impracticability shall be granted only when all other Structural and Treatment Control BMPs have been considered and rejected as infeasible.” When discussing situations where a waiver may be issued, the LARWQCB SUSMP does not include cost considerations. Cost considerations are not a valid reason for waiver issuance, since the SDRWQCB and LARWQCB have exhibited that structural BMP implementation is generally less than 1% of total project cost. The SWRCB determined in Order WQ 2000-11 that this cost is “reasonable”. Since waivers are not to be issued based on cost considerations, the requirement for project proponents who have received a waiver to transfer the resulting savings to a storm water mitigation fund is appropriate. The waiver provision in the Tentative Order provides the Copermittees considerable discretion in how the dollar amount of fund contributions will be determined and spent. However, a waiver cannot be granted in order to save a project proponent money.

The Tentative Order gives the Copermittees significant discretion in determining the terms of the waiver fund and in developing and implementing the fund. The terms of the fund which the Tentative Order requires the Copermittees to identify are based on SWRCB Order WQ 2000-11. The waiver fund terms included in the Tentative Order are terms the SWRCB identified in Order WQ 2000-11 as terms which need to be resolved. The Copermittees are provided one year from date of adoption of the Order to develop these waiver fund terms, and an additional six months to implement them.

Section: F.1 Subsection: F.1.b.2.h

Comment: If a cost estimate can be generated for a structural treatment BMP, how can that same BMP then be considered infeasible? From an engineering standpoint, what is infeasible is that which simply cannot be built, no matter how much is spent; therefore, no savings can be estimated.

Also, doesn't the waiver provision violate a fundamental premise that polluters shall not buy their way out of mitigation responsibilities? (City of Chula Vista)

Response: The primary criteria for infeasibility is that "all available structural treatment BMPs have been considered and rejected as infeasible" for implementation. The point of the waiver is not to avoid asserted high costs, but rather to allow flexibility "when all available structural treatment BMPs have been considered and rejected as infeasible" due to situations such as extreme limitations of space or dangerous soil conditions. In situations such as these, where a waiver is issued, the Copermittees have discretion with regard to "how the dollar amount of fund contributions will be determined," as stated in the Tentative Order. One way to determine the dollar amount to be contributed to the fund would be to simply assess how much a similar site (which doesn't have the same constraints) has spent on its structural treatment BMPs.

The waiver fund does not allow developers to buy their way out of mitigation, indeed, just the opposite. The waiver fund assures that even if a waiver is received, the developer must contribute to mitigation of urban runoff within the watershed of their development.

The waiver provision provides significant flexibility to the Copermittees in identifying situations where waivers are applicable. The issuance of waivers is left entirely to the Copermittees, provided that "all available structural treatment BMPs have been considered and rejected as infeasible." The Copermittees have discretion in identifying in their model and local SUSMPs applicable situations for waivers. However, it is important to note that the waiver fund requirement (for project proponents who have received a waiver to transfer their cost savings to a storm water mitigation fund) precludes findings of infeasibility based on cost.

The LARWQCB SUSMP provides guidance on situations where waivers may apply, stating "[r]ecognized situations of impracticability include, (i) extreme limitations of space for treatment on a redevelopment project, (ii) unfavorable or unstable soil conditions at a site to attempt infiltration, and (iii) risk of groundwater contamination because a known unconfined aquifer lies beneath the land surface or an existing or potential underground source of drinking water is less than 10 feet from the soil surface."

Section: F.1 Subsection: F.1.b.2.h

Comment: Section F. 1.b.(2)(h): Waiver Provision: The waiver provides for the transfer of any cost savings due to a determination of the unfeasibility of all structural treatment BMPs to a storm water mitigation fund. The amount of such transfer could be difficult to determine and could be open to wide interpretations. (City of Coronado)

Response: The dollar amounts of waiver mitigation fund transfers have large potential for a wide range of interpretations. The Tentative Order therefore requires, as part of the model SUSMP, that the Copermittees develop a waiver program which identifies how the dollar amount of fund contributions will be determined.The Copermittees are provided one year to develop the waiver program, with an additional six months for its implementation. Once a regionwide method for implementing the waiver program is developed by the Copermittees, consistency in waiver fund transfers should be achieved.

Section: F.1 Subsection: F.1.b.2.h

Comment: Any consideration for a waiver must also be based largely on what the pollution impact would result from granting the waiver. As it is currently written, the Copermittee, or the Regional Board would have no ability to require that a different type or magnitude of development be considered in lieu of the waiver. As written, this weak provision could largely undermine the implementation of this Permit. We urge that the waiver provision be limited to "takings" situations and that it incorporate a consideration of the water quality impact. In a situation where the two conflict the only viable alternative might be for the public to reject the project and acquire the property. (San Diego Audubon Society)

Response: Waivers may only be issued "when all available structural treatment BMPs have been considered and rejected as infeasible." Due to the wide range and adaptability of BMPs available, it is anticipated that waiver issuance will be relatively rare. Where a waiver is granted, the project proponent is still required to implement the other provisions of the SUSMP. Furthermore, a contribution to a storm water mitigation fund is required if a waiver is received. These two requirements will ensure that the project does not result in a cumulative impact to the watershed. Finally, inclusion of a waiver provision was supported by the SWRCB in Order WQ 2000-11.

Section: F.1 Subsection: F.1.b.2.h

Comment: If the waiver system is instituted, the proceeds should go only to mitigating pollution from existing sources, or for watershed-focused prevention programs. The Copermittees should resist proposals to use the Storm Water Mitigation Fund to offset pollution from new priority sources, unless there is a compelling rationale for doing so. (City of Chula Vista)

Response: Application of waiver funds is left to the discretion of the Copermittees, provided that the funds "be used on projects to improve urban runoff quality within the watershed of the waived project."

Section: F.1 Subsection: F.1.b.2.I

Comment: The Regional Board should not prohibit infiltration structural BMPs for areas subject to high vehicular traffic, but rather should ensure that proper siting and maintenance requirements are included in the permit. (San Diego Baykeeper)

Response: Focusing infiltration of large volumes of water in small areas has the potential to adversely impact groundwater quality. For this reason, infiltration restrictions have been placed on the use of structural infiltration BMPs in section F.1.b.2.i. These restrictions are to apply to structural infiltration BMPs only. These restrictions on structural infiltration BMPs are appropriate and are based directly on USEPA guidance. The restrictions are predominantly recommended by the USEPA Risk Reduction Engineering Laboratory (USEPA, 1994). Other infiltration restrictions are based on restrictions used elsewhere, such as Los Angeles, the State of Washington, and the State of Maryland. Furthermore, the restrictions are supported by the SWRCB in Order WQ 2000-11. The Order states: "The Regional Board did consider the potential impacts to groundwater from infiltration, and included appropriate limitations

and guidance on its use as a BMP." The limitations and guidance the SWRCB refers to in Order WQ 2000-11 include most of the restrictions on infiltration included in the Tentative Order.

However, the SDRWQCB acknowledges that infiltration restrictions may not be necessary in all cases. For this reason, the Tentative Order will be changed to allow the Copermittees to develop their own restrictions on the use of structural infiltration BMPs in the model SUSMP, for approval by the SDRWQCB.

See change at permit section F.1.b.2.i.

Section: F.1 Subsection: F.1.b.2.I

Comment: In regards to the use of infiltration structural treatment BMPs, the requirement to guarantee that an exceedance of groundwater water quality objectives will not occur should be removed because a property owner can only design the infiltration BMPs in compliance with the guidelines established by the RWQCB. They don't have the expertise to predict how well the BMPs will perform. (Building Industry Association of Southern CA)

Response: The Tentative Order states "Use of infiltration structural treatment BMPs shall not cause or contribute to an exceedance of groundwater quality objectives." If this requirement cannot be met, infiltration structural treatment BMPs should not be implemented.

Section: F.1 Subsection: F.1.b.2.I

Comment: This section is in conflict with Finding No. 34. Subsection (ii) implies that sedimentation occurs in an impervious basin. Subsection (iii) would indicate that wash water or irrigation run-off on parking lots could not be diverted onto landscaped areas. This appears to conflict with other parts of the permit and desirable practices. Subsection (iv) would appear to be adequate to address the concern addressed in section g). Subsection (vi) should not apply to degraded ground waters, which have no beneficial use to protect. Subsection (viii) appears to eliminate infiltration for any industrial use in Carlsbad. Subsurface geology needs to be taken into consideration to avoid consequences discussed above. (City of Carlsbad)

Response: Focusing infiltration of large volumes of water in small areas has the potential to adversely impact groundwater quality. For this reason, infiltration restrictions have been placed on the use of structural infiltration BMPs in section F.1.b.2.i. These restrictions are to apply to structural infiltration BMPs only. These restrictions on structural infiltration BMPs are appropriate and are based directly on USEPA guidance. The restrictions are predominantly recommended by the USEPA Risk Reduction Engineering Laboratory (USEPA, 1994). Other infiltration restrictions are based on restrictions used elsewhere, such as Los Angeles, the State of Washington, and the State of Maryland. Furthermore, the restrictions are supported by the SWRCB in Order WQ 2000-11. The Order states: "The Regional Board did consider the potential impacts to groundwater from infiltration, and included appropriate limitations and guidance on its use as a BMP." The limitations and guidance the SWRCB refers to in Order WQ 2000-11 include most of the restrictions on infiltration included in the Tentative Order.

However, the SDRWQCB acknowledges that infiltration restrictions may not be necessary in all cases. For this reason, the Tentative Order will be changed to allow the Copermittees to develop their own restrictions on the use of structural infiltration BMPs in the model SUSMP, for approval by the SDRWQCB.

See change at permit section F.1.b.2.i.

Section: F.1 Subsection: F.1.b.2.i.ii

Comment: Section F.l.b.(2).(i).ii and iii - Page 19 - Urban Runoff and Dry Weather Infiltration: The statement that all dry weather flows be pretreated or be diverted from infiltration devices conflicts with the requirement to mitigate the 85 th percentile flow or volume of a storm event. Technically, it may not be possible to capture one and divert the other. The permit shall allow agencies to exempt some dry weather flows from the permit requirements. (City of La Mesa)

Response: Focusing infiltration of large volumes of water in small areas has the potential to adversely impact groundwater quality. For this reason, infiltration restrictions have been placed on the use of structural infiltration BMPs in section F.1.b.2.i. These restrictions are to apply to structural infiltration BMPs only. These restrictions on structural infiltration BMPs are appropriate and are based directly on USEPA guidance. The restrictions are predominantly recommended by the USEPA Risk Reduction Engineering Laboratory (USEPA, 1994). Other infiltration restrictions are based on restrictions used elsewhere, such as Los Angeles, the State of Washington, and the State of Maryland. Furthermore, the restrictions are supported by the SWRCB in Order WQ 2000-11. The Order states: "The Regional Board did consider the potential impacts to groundwater from infiltration, and included appropriate limitations and guidance on its use as a BMP." The limitations and guidance the SWRCB refers to in Order WQ 2000-11 include most of the restrictions on infiltration included in the Tentative Order.

However, the SDRWQCB acknowledges that infiltration restrictions may not be necessary in all cases. For this reason, the Tentative Order will be changed to allow the Copermittees to develop their own restrictions on the use of structural infiltration BMPs in the model SUSMP, for approval by the SDRWQCB.

See change at permit section F.1.b.2.i.

Section: F.1 Subsection: F.1.b.2.i.iii

Comment: In many areas of the County there are no sanitary sewers into which dry weather flows can be diverted. Requiring the diversion of dry weather flows in these areas could not be feasibly implemented, and there is no support for its requirements. (County of San Diego)

Response: Diversion of dry weather flows away from infiltration devices, as the Tentative Order provides, does not require that all dry weather flows be diverted to the sanitary sewer. Rather, the dry weather flows are to be diverted to other categories of BMPs, such as swales or filters, where the primary function is not to infiltrate large quantities of water.

Section: F.1 Subsection: F.1.b.2.i.iii

Comment: All dry weather flows shall be diverted Page 19 of 50 - paragraph F. l.b.(2)(i)(iii) - from infiltration devices. Does this mean that non-prohibited water discharges from sources such as irrigation and residential car washes (sources of dry weather flows) must be diverted from lawns or grassy swales or other infiltration devices? If so, why? (City of Imperial Beach)

Response: Focusing infiltration of large volumes of dry weather flows in small areas has the potential to adversely impact groundwater quality. For this reason, restrictions have been placed on the infiltration of dry weather flows in section F.1.b.2.i.iii. These restrictions are to apply to structural infiltration BMPs only. These restrictions on dry weather flow infiltration are appropriate and are based directly on USEPA guidance. The restrictions are recommended by the USEPA Risk Reduction Engineering Laboratory (USEPA, 1994). Furthermore, the restrictions are supported by the SWRCB in Order WQ 2000-11. The Order states: "The Regional Board did consider the potential impacts to groundwater from infiltration, and included appropriate limitations and guidance on its use as a BMP." The guidance the SWRCB refers to in Order WQ 2000-11 includes USEPA's recommendation against the infiltration of dry weather flows.

However, the SDRWQCB acknowledges that dry weather flow infiltration restrictions may not be necessary in all cases. For this reason, the Tentative Order will be changed to allow the Copermittees to develop their own restrictions on the use of structural infiltration BMPs in the model SUSMP, for approval by the SDRWQCB.

See change at permit section F.1.b.2.i.

Section: F.1 Subsection: F.1.b.2.i.iii

Comment: Section F.1.b (2)(i) iii: Where shall dry weather flows be diverted? (City of Chula Vista)

Response: Where dry weather flows need to be diverted, they should be diverted to other BMPs, which do not have the principal function of infiltrating large quantities of water in a concentrated area. For example, filters and swales could be effective.

Section: F.1 Subsection: F.1.b.2.I.iv

Comment: Modify this sentence to: "Pollution prevention and source control BMPs or their equivalent shall be implemented at a level appropriate to protect groundwater quality at sites where infiltration structural treatment BMPs are to be used." (Port of San Diego)

Response: The definition of BMP in Attachment D of the Tentative Order is broad and inclusive. It is likely that any equivalent alternative would fall under this definition, making the inclusion of such terms unnecessary.

Section: F.1 Subsection: F.1.b.2.i.v

Comment: This section should be deleted. It violates the MEP standards under the CWA. (County of San Diego)

Response: The intent of this requirement is not meant to require removal of all pollutants but rather to ensure that infiltration BMPs be adequately maintained so as to be effective in removing pollutants. Section F.1.b.2.i.v of the Tentative Order is recommended to be changed to clarify this intent.

Section: F.1 Subsection: F.1.b.2.i.vi

Comment: This requirement cannot be feasibly implemented in all instances. In areas throughout the County, the seasonal high groundwater mark is within 10 feet of natural ground. The construction of detention basins to reduce stormwater discharge rates and velocities will naturally infiltrate in these areas. The discharge of roadway catch basins and down drains into natural water courses will also infiltrate these areas. (County of San Diego)

Response: Focusing infiltration of large volumes of water in small areas has the potential to adversely impact groundwater quality. For this reason, infiltration restrictions have been placed on the use of structural infiltration BMPs in section F.1.b.2.i. These restrictions are to apply to structural infiltration BMPs only. These restrictions on structural infiltration BMPs are appropriate and are based directly on USEPA guidance. The restrictions are predominantly recommended by the USEPA Risk Reduction Engineering Laboratory (USEPA, 1994). Other infiltration restrictions are based on restrictions used elsewhere, such as Los Angeles, the State of Washington, and the State of Maryland. Furthermore, the restrictions are supported by the SWRCB in Order WQ 2000-11. The Order states: "The Regional Board did consider the potential impacts to groundwater from infiltration, and included appropriate limitations and guidance on its use as a BMP." The limitations and guidance the SWRCB refers to in Order WQ 2000-11 include most of the restrictions on infiltration included in the Tentative Order.

However, the SDRWQCB acknowledges that infiltration restrictions may not be necessary in all cases. For this reason, the Tentative Order has been changed to allow the Copermittees to develop their own restrictions on the use of structural infiltration BMPs in the model SUSMP, for approval by the SDRWQCB. See change at permit section F.1.b.2.i.

Section: F.1 Subsection: F.1.b.2.i.vii

Comment: What physical and chemical characteristics of soil are adequate? What constitutes proper infiltration duration and treatment of urban runoff? (City of Chula Vista)

Response: Determination of whether a site has adequate soil characteristics for significant infiltration is the responsibility of the project proponent or the Copermittees. Numerous guidance documents are available such as "Storm Water Management in Washington State" (Washington State Department of Ecology, 1999), "Guidance Manual for On-Site Stormwater Quality Control Measures" (City of Sacramento, 2000), and "2000 Maryland Stormwater Design Manual" (Maryland Department of the Environment, 1999).

Section: F.1 Subsection: F.1.b.2.i.viii

Comment: Definition of "areas of industrial or light industrial activity" is needed. Would this be based on the specific facility type (e.g., SIC code), land use or zoning, or a particular area within a development boundary (a process area rather than an office)? What if the facility does not have significant exposure (e.g., an "industrial" facility with all activities indoors and properly contained)? (County of San Diego)

Response: The Tentative Order would leave to the discretion of the Copermittees designation of light industrial areas and activities for which structural infiltration BMPs should not be implemented.

Section: F.1 Subsection: F.1.b.2.i.viii

Comment: A rationale for the blanket exclusion of flows from infiltration devices in these areas should be provided. As before, flows must already meet an MEP standard for pollutant reduction, cannot cause or contribute to an exceedance of groundwater quality objectives, must be subjected to pollution prevention, source control, and pre-treatment BMPs, must be vertically separated from groundwater by at least 10 feet, and must be at least 100 feet from any supply well. If dischargers can (and must) meet these other conditions, why does the RWQCB believe it can and should lawfully impose these additional restrictions? No findings and evidence is provided in this regard. (County of San Diego)

Response: Focusing infiltration of large volumes of water in small areas has the potential to adversely impact groundwater quality. For this reason, infiltration restrictions have been placed on the use of structural infiltration BMPs in section F.1.b.2.i. These restrictions are to apply to structural infiltration BMPs only. These restrictions on structural infiltration BMPs are appropriate and are based directly on USEPA guidance. The restrictions are predominantly recommended by the USEPA Risk Reduction Engineering Laboratory (USEPA, 1994). Other infiltration restrictions are based on restrictions used elsewhere, such as Los Angeles, the State of Washington, and the State of Maryland. Furthermore, the restrictions are supported by the SWRCB in Order WQ 2000-11. The Order states: "The Regional Board did consider the potential impacts to groundwater from infiltration, and included appropriate limitations and guidance on its use as a BMP." The limitations and guidance the SWRCB refers to in Order WQ 2000-11 include most of the restrictions on infiltration included in the Tentative Order.

However, the SDRWQCB acknowledges that infiltration restrictions may not be necessary in all cases. For this reason, the Tentative Order has been changed to allow the Copermittees to develop their own restrictions on the use of structural infiltration BMPs in the model SUSMP, for approval by the SDRWQCB. See change at permit section F.1.b.2.i.

Section: F.1 Subsection: F.1.b.1.g

Comment: Although a requirement for structural treatment BMPs is not explicitly stated in this section, part F.1.b.(1)(g) imposes a requirement to maintain pre-development runoff rates and velocities, as well as similar requirements for pollutant reduction. Since it is not possible to meet these standards

without the use of structural controls, this equates to a mandate for their use on all development sites. (County of San Diego)

Response: The language regarding peak flow rates and velocities in F.1.b.1.g has been removed. Control of peak flow rates and velocities shall instead apply only to SUSMP priority development projects.

Section: F.1 Subsection: F.1.c

Comment: The word ""would" should be changed to ""could" in the CEQA Checklist questions. (Surfrider Foundation)

Response: The revised Tentative Order will use "could" in place of "would" in Section F.1.c.

Section: F.1 Subsection: F.1.c

Comment: We would note, though, that the Regional Board, despite being a "Responsible Agency" under CEQA, rarely comments on projects undergoing CEQA review. Such comments from the Regional Board would be helpful to municipalities attempting to evaluate and mitigate the water quality impacts of proposed projects. (Procopio, Cory, Hargreaves, & Savitch, L.L.P.)

Response: The Regional Board is aware of its responsibility to comment on CEQA projects that may have an impact on water quality. Currently, all CEQA documents received by the Regional Board office are logged into a database, and all staff are provided a list of these documents monthly. Staff reviews the list of CEQA documents to identify those that may have water quality issues, and comments on these documents as appropriate. However, due to limited staff resources, the Regional Board generally does not comment on CEQA documents that do not have identified water quality issues.

Section: F.1 Subsection: F.1.c.1.g

Comment: Section F.1.c (1)(g): How would this provision affect the Multiple Species Conservation Plan? (City of Chula Vista)

Response: Areas acquired and set aside for mitigation under the Multiple Species Conservation Plan would be considered environmentally sensitive areas.

Section: F.1 Subsection: F.1.c

Comment: What is required for CEQA compliance is well established by statute and the legislation there under, and the Regional Board has no authority to modify or amend the requirements of CEQA. Recommend coordinating the CEQA Checklist Form changes with the Governor's Office of Planning and

Research so they can be implemented consistently throughout California. (County of San Diego, Port of San Diego, Anonymous, La Mesa, Procopio, Cory, Hargreaves & Savitch)

Response: The intent of section F.1.c was for the Copermittees to consider water quality impacts in their environmental review processes. The requirement that CEQA initial study checklists be revised to consider water quality impacts was incorporated into the Tentative Order directly from SANDAG's Water Quality Element of its Regional Growth Management Strategy. However, since the Copermittees do not have authority to change CEQA checklists, language referring to CEQA checklists will be removed from section F.1.c.

See change at permit section F.1.c.

Section: F.1 Subsection: F.1.c.1.k

Comment: Add: (1) Will the project create new mosquito/vector breeding sites? and
Does it require a Mosquito/Vector Prevention Control Plan? (State Department of Health Services)

Response: In recognition of the potential public health threat, an additional Finding is recommended to be added to the Tentative Order. The Finding (no. 36) identifies the potential vector issues related to BMP implementation and the role of collaborative program development between municipalities and vector control agencies in addressing an minimizing vector production.

Section: F Subsection: F.1.d.

Comment: Add: (d) Mosquito/vector control impacts (State Department of Health Services)

Response: In recognition of the potential public health threat, an additional Finding is recommended to be added to the Tentative Order. The Finding (no. 36) identifies the potential vector issues related to BMP implementation and the role of collaborative program development between municipalities and vector control agencies in addressing an minimizing vector production.

Section: F.1 Subsection: F.1.d.2

Comment: Add: (e) Mosquito/vector impacts (State Department of Health Services)

Response: In recognition of the potential public health threat, an additional Finding is recommended to be added to the Tentative Order. The Finding (no. 36) identifies the potential vector issues related to BMP implementation and the role of collaborative program development between municipalities and vector control agencies in addressing an minimizing vector production.

Section: F.1 Subsection: F.1.d.2

Comment: Page 20, Section F.1.d.(2) External: Project Applicants, Developers,

Contractors, Property Owners- Please add Community Planning Groups, Planning Boards, and Elected Officials to those who should be included in the educational program. (Surfers Tired of Pollution)

Response: The SDRWQCB agrees that project applicants, developers, contractors, and property owners should all be included in the education program because of their influence over land use decisions. The SDRWQCB will make permit changes based on your suggestions.

See changes to Permit Section F.1.d.2.

Section: F.2 Subsection: F.2

Comment: Permit compliance should not be predicated on compliance with the plan. The actual status of grading will vary daily throughout the project until complete. The inspector needs the flexibility to adjust measures as required by weather condition. Effective measures require daily inspection to insure effectiveness of erosion control measures. Performance criteria are required to fairly enforce violation. It is suggested that the permit adopt a criteria that restricts construction sedimentation to fifty percent of the erosion potential in the before site conditions utilizing with Conservation Service Methods of analysis. For purpose of this section MEP should be defined as a 50 % reduction of sedimentation of the pre construction conditions. (La Mesa, Carlsbad (1), Carlsbad (2), Carlsbad (3), Carlsbad (4))

Response: Permit compliance is necessarily not determined by assessing a site's compliance with its erosion control/grading plan. It is more important to ensure that BMPs are implemented in the field. However, a upkept erosion control/grading plan can be a useful tool for both the contractor and the inspector. Both contractors and inspectors should utilize erosion control/grading plans. In addition, Copermittees are encouraged to develop performance standards for construction site runoff.

Section: F.2 Subsection: F.2

Comment: Implementation of F.2.a, F.2.b, F.2.c, F.2.d will take longer than 180 days. Infeasible implementation schedule. Copermittee grading ordinances updates cannot be completed within 180 days. The time needed for completing revisions, providing adequate public review, and conducting CEQA would extend well beyond the period proposed by staff. The County recommends that this implementation schedule be deleted from the permit and replaced with a requirement for the Copermittees to develop and submit a schedule for review and revision (if necessary) of their ordinances to comply with the permit as finally amended. (County of San Diego (1), County of San Diego (2), County of San Diego (3), County of San Diego (4), County of San Diego (5), County of San Diego (6))

Response: The implementation schedule for the Jurisdiction Urban Runoff Management Program, excluding Section F.1, has been extended in the revised Tentative Order from 180 days to 365 days.

Section: F.2 Subsection: F.2.b

Comment: "[S]hall review and update its grading ordinances as necessary for compliance with its stormwater ordinances and this Order" implies a relationship between stormwater and grading ordinances which does not exist. While Copermittees may choose to provide linkages between ordinances to bolster their effectiveness, they may just as often choose not to do so. The CWA only requires the Copermittees have in place sufficient legal authority to enforce the permit. Whether the authority exists, or whether it is in a "grading" ordinance or some other ordinance, is irrelevant. This statement should be deleted from the permit. Even assuming the RWQCB can compel Copermittees to require pollution prevention, source control, and structural BMPs on all project sites, which it cannot, such conditions need not be included in grading ordinances. This requirement should be deleted. (County of San Diego (355), County of San Diego (356))

Response: Grading ordinances and storm water ordinances are closely related. Grading activities and the ordinances which regulate them have the potential to significantly impact construction site runoff water quality. For example, a grading ordinance which does not place any restrictions on the amount of area which can be cleared at any time can result in hundreds of acres of exposed soil. When this much soil is exposed, it is nearly impossible to control the water quality of the runoff. To the extent that grading ordinances have the potential to impact water quality, they should be updated.

The provision does not require that the grading ordinances include ordinances which are better suited as storm water ordinances. Rather, the provision requires that the grading ordinances be in compliance with storm water ordinances. In other words, the requirement ensures that conflicts do not exist between the two types of ordinances.

USEPA provides legal authority for this requirement, stating that "A description of the local erosion and sediment control law or ordinance is needed to satisfy this requirement [i.e., Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(D)(2)]" (1992). Regarding Copermittee approval of construction activities, the US EPA further states that "applicants must propose site review and approval procedures that address sediment and erosion controls, storm water management, and other appropriate measures. Approvals should be clearly tied to commitments to implement structural and nonstructural BMPs during the construction process" (1992).

Furthermore, in its Phase II Final Rule, US EPA requires small municipalities to develop and implement for construction sites "An ordinance or other regulatory mechanism to require erosion and sediment controls, as well as sanctions to ensure compliance […]" (1999). Due to the greater water quality concerns generally experienced by larger municipalities, Phase II Final Rule requirements for small municipalities are also applicable to larger municipalities such as the Copermittees.

Section: F.2 Subsection: F.2.b

Comment: F.2.e Threat to Water Quality Prioritization (Construction)
Grading will occur during the rainy season. Making any project that has grading in the rainy season a high priority project will put many small projects on the high priority list. This may place single-family residence room additions on that list. This would be extremely cumbersome and make the list less valuable. A minimum size of project that has grading in the wet season should be considered. (SANDAG (782), County of San Diego (375))

Response: The construction site prioritization language of the Tentative Order has been modified in order to help ensure that insignificant projects are not designated as high priority, thereby requiring frequent inspections.

See change at permit section F.2.e.2.

Section: F.2 Subsection: F.2.c.1.b

Comment: The construction component conditions of approval says dry seasonal grading only. This is overly restrictive since grading is also restricted during other times for environmental concerns.

F.2.b. - Grading Ordinance Update (Construction)
The statewide permit for Caltrans does not have a restriction on grading m the coastal areas of the San Diego region. This permit should be aligned with the Caltrans permit. If seasonal grading restrictions are required, it potentially reduces the window available for grading to just a few months a year because of other environmental criteria already in
place. (Anonymous, BIASC, Chula Vista, SANDAG, County of San Diego, Associated General Contractors of America)

Response: The language of Section F.2.c.1.b has been changed to provide greater flexibility to allow wet season grading.

Section: F.2 Subsection: F.2.f.2

Comment: "[I]ncluding BMPs which are more stringent than those required under the statewide General Construction Permit" (section F.2.f.(2)) is beyond the State's authority. It would be impossible to require more stringent BMPs for a construction site than those required under the statewide General Construction Permit since the compliance level, in theory, required of construction sites for pollution prevention and elimination is identical for the statewide General Construction Permit and the Municipal Permit. This provision appears to be designed to transfer statewide General Construction Permit responsibilities to local agencies. (County of San Diego, Chula Vista)

Response: In order to comply with Order No. 2001-01 requirements, implemented BMPs may need to be more stringent than those required under the statewide General Construction Permit. The US EPA implies that local sediment and erosion control requirements may be more stringent than statewide General Construction Permit requirements when it states that "construction sites covered under NPDES permit regulations must indicate whether they are in compliance with State and local sediment and erosion control plans" (1992).

While minimum BMPs will be required at all construction sites, implementation of particular BMPs will be site specific in order to address various conditions at different sites. Regarding site specific BMPs, the US EPA states "Appropriate structural and nonstructural control requirements will vary by project.

Project type, size, and duration, as well as soil composition, site slope, and proximity to sensitive receiving waters will determine the appropriate structural and nonstructural BMPs" (1992).

Section: F.2 Subsection:

Comment: Recommend a separate section be added that is devoted to pollutant controls for staging areas to give this matter the attention it deserves. (Sierra Club)

Response: The Tentative Order provides the Copermittee flexibility in developing the specific BMPs of their URMP. Each Copermittee is required implement a Construction Component of its Jurisdictional URMP to reduce pollutants in runoff from construction sites during all construction phases. This includes a pollution prevention section. Pollution prevention implies source controls for all areas of the construction site, including staging areas. It is not necessary to add a section devoted to staging areas.

Section: F.2 Subsection:

Comment: Are street maintenance activities (slurry seal, resurfacing, sidewalk repair) considered to be construction under this permit? (Anonymous Workshop 2)

Response: Yes. Street maintenance activities are considered construction under the Tentative Order.

Section: F.2 Subsection:

Comment: We need aggressive construction site inspections for erosion control, and their enforcement of tougher ordinances regarding grading. Both the cities and the county needs to be leaders in this with the support of their elected officials. (USEPA)

Response: Comment noted.

Section: F.2 Subsection:

Comment: The permit should establish a performance standard that plans be implemented that reduce erosion potential to 50 percent of the before construction erosion potential. Erosion control performance standards should be established. Co-permittees should not be punished for minor technical infractions that have little or no impact on water quality objectives. (City of Carlsbad)

Response: The Copermittees have the discretion to develop and implement performance standards for construction sites. As part of their Jurisdictional Urban Runoff Management Programs, the Copermittees are required to describe the BMPs which will be required to be implemented at construction sites within their jurisdictions. This description of BMPs can be used to describe the BMPs which will be required by the Copermittee to ensure that performance standards developed by the Copermittee will be met.

Section: F.2 Subsection: F.2

Comment: The County disagrees with the Regional Board's contention that CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and 40 CFR 122.26(d)(2)(i)(B,C,E, and F) and 40 CFR 122.26(d)(2)(iv) provide blanket authority to prescribe the detailed programs in section F.2. (County of San Diego)

Response: California Water Code section 13377 provides that the Regional Boards shall issue waste discharge requirements which apply and ensure compliance with all applicable provisions of the Federal Water Pollution Control Act (33 U.S.C. §1251 et seq.), as amended, also known as the federal Clean Water Act (CWA). Section 402(p)(3)(B)(iii) of the CWA requires municipalities to implement "controls to reduce the discharge of pollutants to the maximum extent practicable, including management practices, control techniques and system, design and engineering methods, and such other provisions as the Administrator or the State determines appropriate for the control of such pollutants." The SDRWQCB's responsibility is to translate this section of the CWA into the form of waste discharge requirements. The Tentative Order's required programs are consistent with the CWA because they reduce the discharge of pollutants to the maximum extent practicable (MEP). Furthermore, the CWA and Federal regulations describe only minimal storm water program components, such as the construction component at 40 CFR 122.26(d)(2)(iv)(D). Although the Tentative Order may describe portions of program components that are not specifically addressed in the Federal requirements and regulations, the SDRWQCB has made express findings that these components are be necessary to address significant sources of storm water pollution. For example, most of the lagoons in San Diego are impaired for sediment. Construction is a significant source of sediment. Therefore, the SDRWQCB has required specific detail regarding the Copermittees' responsibility for oversight at construction sites. Since the CWA and Federal regulations do not exclude sources that are significant pollutant contributors, it is appropriate to cover the sources in the Tentative Order.

The SDRWQCB has discretion to require Jurisdictional Urban Runoff Program item F.2 in Order No. 2001-01 under the broad and specific legal authority cited in the Fact Sheet/Technical Report.

Section: F.2 Subsection: F.2.a

Comment: A requirement to implement pollution prevention BMPs exceeds the requirements for sites subject to the State General Construction Permit. Under the General permit, sites are required to develop a SWPPP that describes the implementation of BMPs to reduce or prevent pollutants in stormwater discharges and authorized non-stormwater discharges. Requirement of pollution prevention BMPs would therefore establish a general state of non-compliance even for sites already subject to significant regulation. (County of San Diego)

Response: It is the responsibility of each Copermittee to reduce pollutants in storm water discharges to the maximum extent practicable. The Statewide General Construction Permit requires that construction sites greater than 5 acres implement BMP to reduce the discharge of pollutants to the BAT/BCT level.

Section: F.2 Subsection: F.2.b

Comment: Modify the first sentence to read: "Each Copermittee shall review and update its grading and/or stormwater ordinances as necessary for compliance with this order." This modification is consistent with 40 CFR 122.26 (d) (2) (1). (Port of San Diego)

Response: Comment noted. Although both grading and stormwater ordinances are required to implement the Tentative Order, the grading ordinances are considered a subset of the Copermittees' storm water ordinances.

Section: F.2 Subsection: F.2.b

Comment: The County of San Diego must reconsider its grading ordinance as it pertains to the clearing and brushing of land for agricultural purposes. It is our understanding that many agricultural grading practices are currently exempted from environmental review due to the alleged economic hardship that would befall small farmers if forced to comply with CEQA. Under the permit, the County should be required to develop a grading ordinance that will allow adequate consideration of water quality (both surface and ground) impacts prior to all land alteration. Water quality impacts should not be balanced ,against any Copermittee's desire to promote agriculture locally or regionally. (Surfrider Foundation)

Response: The Tentative Order does not regulate grading or clearing and brushing of land for agricultural purposes. The Copermittees have the discretion to develop a grading ordinance with respect to agriculture that will allow adequate consideration of water quality (both surface and ground) impacts prior to all land alteration.

Section: F.2 Subsection: F.2.b

Comment: Grading Ordinance Update. Section F.2.b, set forth on page 21 of the Tentative Order, requires that each Copermittee review and update its grading ordinances to meet the storm water standards of the Order. Again, the Regional Board may be able to suggest changes to a municipality's grading ordinance, but it cannot dictate those changes. The same goes for the Order's requirement that Copermittees modify their construction and grading approval processes. (Section F.2.c, at page 22.) (Procopio, Cory, Hargreaves, & Savitch, L.L.P.)

Response: While the Copermittees are not responsible for enforcing or overseeing the General Statewide Industrial or Construction Permits, they are required to adopt and enforce ordinances that implement the requirements of Tentative Order 2001-01, including the prohibitions against illicit discharges. The SDRWQCB will enforce the General Statewide Industrial and Construction Permits. The Copermittees have local regulatory authority over the majority of construction and industrial sites since they issue the development and land use permits for the sites. In other words, the Copermittees are responsible for the water quality consequences of their planning, construction, and land use decisions. In some cases, the Copermittees may be required to implement or require the implementation of BMPs at construction or industrial sites that exceed the minimum requirements of the General Statewide Industrial or Construction Permits in order to achieve compliance with the requirements of the Tentative Order. USEPA supports this approach, clearly placing responsibility for the control of discharges from

construction and industrial sites with municipalities. The USEPA notes in the preamble to the Storm Water Regulations that municipalities are in the best place to enforce compliance with storm water discharge requirements:

"Because storm water from industrial facilities may be a major contributor of pollutants to MS4s, municipalities are obligated to develop controls for storm water discharges associated with industrial activity through their system in their storm water management program…The CWA provides that permits for municipal separate storm sewers shall require municipalities to reduce pollutants to the maximum extent practicable. Permits issued to municipalities for discharges from municipal separate storm sewers will reflect terms, specified controls, and programs that achieve that goal."

As noted in the Fact Sheet/Technical Report, the USEPA felt it so important to control the discharge of pollutants from construction and industry that it established a double system of regulation over construction and industrial sites. Two parallel regulatory systems were established with the same common objective of keeping pollutants from construction and industrial sites out of the MS4. A structure was created where local governments must enforce their local ordinances and permits as required under their municipal storm water permits, while the SDRWQCB (State) must enforce its statewide general construction and industrial storm water permits. The two regulatory systems were designed to complement and support each other in the shared goal of minimizing pollutant discharges in runoff from construction and industrial sites.

Regarding construction sites, USEPA also places enforcement responsibility on municipalities, requiring small municipalities to develop and implement "[a]n ordinance or other regulatory mechanism to require erosion and sediment controls, as well as sanctions to ensure compliance […]" (40 CFR 122.34(b)(4)(ii)(A)). Additionally, The US EPA suggests that local ordinance be used to require implementation of BMPs, stating that "A description of the local erosion and sediment control law or ordinance is needed to satisfy this requirement [i.e., Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(D)(2)]" (1992).

In its guidance for the Phase II regulations, US EPA goes on to support increased municipality responsibility, stating "Even though all construction sites that disturb more than one acre are covered nationally by an NPDES storm water permit, the construction site runoff control minimum measure for the small MS4 program is needed to induce more localized site regulation and enforcement efforts, and to enable operators of regulated small MS4s to more effectively control construction site discharges into their MS4s." While these above citations refer to small municipalities under Phase II of the NPDES program, USEPA recommendations to small municipalities are applicable to larger municipalities such as the Copermittees, due to the typically more serious water quality concerns attributed to such larger municipalities.

Furthermore, Copermittees must reduce pollutant discharges in storm water from construction sites to the maximum extent practicable. In order to achieve this level of pollution reduction, BMPs must be implemented. An effective means for ensuring BMP implementation at construction sites is through the development and implementation of grading ordinances which require pollution prevention, source control, and structural treatment BMPs. Updated grading ordinances which adequately address water quality considerations will provide Copermittees with the necessary legal authority to require effective BMPs at construction sites.

Regarding Copermittee approval of construction activities, the US EPA further states that "applicants must propose site review and approval procedures that address sediment and erosion controls, storm water

management, and other appropriate measures. Approvals should be clearly tied to commitments to implement structural and nonstructural BMPs during the construction process" (1992).

The SDRWQCB has discretion to require Jurisdictional Urban Runoff Management Program item F.2.b in Order No. 2001-01 under the broad and specific legal authority cited in the Fact Sheet/Technical Report.

Section: F.2 Subsection: F.2.b

Comment: The Grading Ordinance Update should distinguish "natural hydrologic features" by some parameter.

"Retention of sediments and other construction pollutants on-site" should be followed by: "Specific provisions for disposing of all retained sediments and construction pollutants shall be proposed and subject to City approval" (City of Chula Vista)

Response: Natural hydrologic features should be determined on a site by site basis by the Copermittees authorizing the construction activity.

A requirement has been added (to the list of requirements in F.2.b.) that the Copermittees adopt a grading ordinance specifying that "Specific provisions for disposing of all retained sediments and construction pollutants shall be proposed and subject to City approval."

Section: F.2 Subsection: F.2.b

Comment: Page 24, Section F.2.b. Grading Ordinance Update (Construction)- Please provide language to ensure that the public has the ability to review and comment on the adequacy of the BMPs for the grading permit prior to project approval, since the public currently has no opportunity to comment on the SWPPPs and the pre- and post-construction BMPs being proposed for the project. (Surfers Tired of Pollution)

Response: Review of grading and storm water control plans by the public is left to the discretion of the Copermittees.

Section: F.2 Subsection: F.2.b.

Comment: Add: (10) Prevention of mosquito/vector breeding (State Department of Health Services)

Response: In recognition of the potential public health threat, an additional Finding is recommended to be added to the Tentative Order. The Finding (no. 36) identifies the potential vector issues related to BMP implementation and the role of collaborative program development between municipalities and vector control agencies in addressing an minimizing vector production.

Section: F.2 Subsection: F.2.b.5

Comment: F.2.b (5) page 21 - Revegetation as early as feasible is one of the more effective measures to accomplish early site stabilization. Stabilizing with finish landscaping is the optimum condition. Implementation of this provision requires flexibility in time constraints and a long-term approach to the erosion strategy i.e. Multi Year Program. (City of Carlsbad)

Response: Comment noted.

Section: F.2 Subsection: F.2.c

Comment: F.2.c. "Modify Construction and Grading Approval Process"

Section F.2.c. requires a stormwater quality review for all construction and grading permits. This would eliminate the ability of Copermittees to issue these permits ministerially. This section should be replaced with the following: "The Copermittee shall amend its construction and grading approval process as needed to ensure compliance with the provisions of this section." (County of San Diego)

Response: The language of Section F.2.c has been revised in the Tentative Order for greater clarity and to permit ministerial approval.

Section: F.2 Subsection: F.2.c.1.a

Comment: Non-storm water discharges should be removed from regulation unless they are a significant source of pollution. (Building Industry Association of Southern CA)

Response: Only non-storm discharges specifically identified in Section B.2 of the Tentative Order are conditionally exempt. Non-storm water discharges listed in Section B. 2. only need to be prohibited if the Copermittee identifies them as a significant source of pollutants to water of the United States. Section F.2.c.1.a., referred to in this comment, gives examples of conditions of approval for local grading and construction permits to ensure that pollutant discharges from construction sites are reduced to the maximum extent practicable. Non-storm water discharges listed under Section B.2 may need to be managed on-site prior to discharge, whereas, non-storm water discharges not exempt under Section B.2 must be managed on-site to prevent from being discharged to a MS4.

Section: F.2 Subsection: F.2.c.1.j

Comment: Section F.2.c (1)(j): When would evidence of N.P.D.E.S. General Construction Permit be required? (City of Chula Vista)

Response: Evidence of coverage is a condition of approval under Tentative Order 2001-01. The Tentative Order requires that the Copermittees review evidence of coverage under the statewide NPDES General Construction Storm Water Permit and to review all proposed construction and grading plans (e.g.

the required Storm Water Pollution Prevention Plan) as well as to require measures to ensure that pollutants from the site will be reduced to the MEP and will not cause or contribute to an exceedance of water objectives.

Section: F.2 Subsection: F.2.c.I

Comment: Stabilization of all slopes infers that slopes under construction would also require stabilization at all times. This is not a requirement of the Statewide Permit with Caltrans. Again, these permits should be consistent with one another. (SANDAG)

Response: The mission of the RWQCBs and SWRCB is to preserve and enhance the quality of California's water resources, and ensure their proper allocation and efficient use for the benefit of present and future generations. The "benefit" to which this mission statement refers is expressed in terms of the beneficial uses designated in regional water quality control plans (basin plans). Each RWQCB develops these plans for its own region, in keeping with California Water Code § 13240 et seq. Since the mission of the RWQCBs involves protecting beneficial uses that are designated by region or portion thereof, it is appropriate for the actions of a RWQCB to be specific to its region or portions thereof. In other words, in carrying out its mission, it is more important that the SDRWQCB take actions as necessary and appropriate to protect beneficial uses in the San Diego region than it is to achieve multi-regional or statewide permit consistency. The Tentative Order is intended first and foremost to protect beneficial uses in the area to which it applies, not to be consistent with permits adopted in the past that are applicable to other areas. Therefore, the slope stabilization requirement will not be changed.

Section: F.2 Subsection: F.2.d

Comment: Each Copermittee, shall annually develop... a watershed based inventory of all construction sites ... regardless of size. The IEA strongly urges the RWQCB to set minimum exemptions. (Industrial Environmental Association)

Response: The Copermittees are being asked to inventory all construction sites. This inventory will help the Copermittee determine which sites are high priority and it will also be an important tool in watershed planning and management.

Section: F.2 Subsection: F.2.d

Comment: Inclusion of “all construction sites” in the inventory is too broad. While the intent here may be to use the inventory as a basis for prioritization in section F.2.e., it would be prudent to allow Copermittees to conduct some initial prioritization (e.g., based on project type) prior to assembling the inventory. Only those sites that have the potential for site or soil disturbance, rather than interior tenant improvements or remodels for example should be included in the inventory. (County of San Diego)

Response: The Copermittees are being asked to inventory all construction sites. This inventory will help the Copermittee determine which sites are high priority and it will also be an important tool in watershed planning and management.

Section: F.2 Subsection: F.2.e

Comment: Is the NPDES "threat to water quality/complexity" rating, similar or different than the water quality prioritization? (Zachary, Karen)

Response: The Threat to Water Quality Prioritization is similar to the waste discharge threat to water quality and complexity categorization scheme for state waste discharge requirements and NPDES permits. Threat to Water Quality Prioritization allows the Copermittee to rate which site (construction, municipal, industrial, residential) will receive more of their oversight resources due to the sites ability to cause an greater negative impact to the receiving water quality in the event of a discharge. Sites that receive high priority ratings would be inspected more frequently than a medium or low rated site and if the Copermittee so chooses be charged a higher fee for oversight.

Section: F.2 Subsection: F.2.e

Comment: Section F.2.e.(1) provides a list of criteria that must be addressed by Copermittees in determining construction site priorities. Presumably, the RWQCB used this prioritization methodology in determining the minimum list of high priority sites in section F.2.e.(2). Is this correct? If not, why? If so, why were the results of this assessment not provided in the Technical Report? If this assessment has not been conducted, the County recommends that the RWQCB delete section F.2.e.(2) from the permit. There is insufficient evidence to support the inclusion of such a requirement. (County of San Diego)

Response: Section F.2.e.(1) provides a list of criteria that the Copermittees should use in evaluating threat to water quality of construction sites. Section F.2.e (2) sets minimum criteria for determining if a construction site is a high priority site. The Tentative Order has been revised to define high priority sites as a site meeting either of the following criteria or equivalent criteria:
a. >50 acres and grading during the raining season
b. >5 acres and a tributary to a 303(d) impaired water body for sediment.
This change will allow the Copermittee greater flexibility in determining which sites within their jurisdiction are of the highest priority thus reducing the burden of potentially having all of their construction sites fall within the high priority classification. Also, the Copermittees have the option in its Jurisdiction URMP to propose an equivalent method to determine which sites they believe fall in the high priority classification.

Construction sites with large amounts of exposed sediment during the raining season pose a significant threat to water quality. Since these sites have a greater chance of discharging sediment they require frequent site visits to ensure the discharger is properly implementing BMP to prevent a discharge to the MS4. Sites greater than 5 acres and located near a tributary to a Clean Water Act section 303(d) impaired water body for sediment require frequent site visits to ensure the water body does not receive additional sediment. These are minimum requirements and this does not limit the Copermittee from developing additional criteria or equivalent criteria.

Section: F.2 Subsection: F.2.e

Comment: The RWQCB's proposed assignment of high priority sites is too broad and inclusive. The inclusion of several open-ended and poorly defined categories (e.g., hillside development, "tributary to" CWA 303(d) waterbodies, etc.) could make most or all sites high priority. Since this obviously has significant financial implications both for Copermittees and the parties they regulate, a closer and more reasoned examination of the methodology and results of this assessment must be conducted prior to permit adoption. (County of San Diego)

Response: Section F.2.e.(1) provides a list of criteria that the Copermittees should use in evaluating threat to water quality of construction sites. Section F.2.e (2) sets minimum criteria for determining if a construction site is a high priority site. The Tentative Order has been revised to define high priority sites as a site meeting either of the following criteria or equivalent criteria:
a. >50 acres and grading during the raining season
b. >5 acres and a tributary to a 303(d) impaired water body for sediment.
This change will allow the Copermittee greater flexibility in determining which sites within their jurisdiction are of the highest priority thus reducing the burden of potentially having all of their construction sites fall within the high priority classification. Also,
the Copermittees have the option in its Jurisdiction URMP to propose an equivalent method to determine which sites they believe fall in the high priority classification.

Section: F.2 Subsection: F.2.e.2

Comment: ... high priority construction sites shall at a minimum be defined as ...
After (2)(d) the word "and" should be replaced with "or" (Industrial Environmental Association)

Response: Comment noted.

See change at permit section F.2.e.2.d.

Section: F.2 Subsection: F.2.e.2

Comment: Page 23, Section F.2.e (2). Threat to Water Quality Prioritization-Please include as a high priority construction site: (f) any site that is located directly adjacent to or within 500 feet of wetlands, vernal pools, coastal salt marsh or estuaries that could discharge pollutants directly to or into a tributary of a waterbody that could impact the beneficial uses of those areas. (Surfers Tired of Pollution)

Response: Section F.2.e (2) does not preclude the Copermittee from including sites located directly adjacent to or within 500 feet of wetlands, vernal pools, coastal salt marsh or estuaries that could discharge pollutants directly to or into a tributary of a water body that could impact the beneficial uses of those areas. This section sets minimum criteria while allowing the Copermittees flexibility to determine which areas are high priority within their jurisdiction.

Section: F.2 Subsection: F.2.f

Comment: The SDRWQCB lacks legal authority to compel Copermittees to require year-round implementation of BMPs by project proponents. (County of San Diego)

Response: CWA 402(p)(3)(iii) requires controls to reduce the discharge of pollutants to the maximum extent practicable, including management practice, control techniques and system, design and engineering methods, and such provisions as the Administrator or the State determines appropriate for the control of such pollutants. Discharges of pollutants to the MS4 could occur year-round and are not limited to the rainy season. Construction sites typically use large amounts of water for activities including but not limited to, dust control, planting of vegetation on slopes and irrigation. These activities coupled with large amounts of exposed sediment, topsoil, and fertilizer can lead to discharges regardless of the time of year.

Section: F.2 Subsection: F.2.f.4

Comment: Page 23 of 50 F.2.f.(4), Page 28 of 50 F.3.b.(4)(c) – What kind of additional controls are required? Are the controls required if they exceed the Maximum Extent Practicable (MEP)? (City of Chula Vista)

Response: Additional controls may be necessary at construction sites where the discharge may be tributary to a 303(d) listed water body, coastal lagoon, or other sensitive water bodies as necessary to comply with the Tentative Order. The type and implementation of the additional controls will be determined by the Copermittee and will be dependent on the pollutant(s) of concern for the 303(d) listed water body, coastal lagoon or other sensitive water body and the potential source(s) of the pollutant(s) of concern at construction sites or related activities. The additional controls could include, but are not limited to, more stringent BMPs, more frequent inspections, grading ordinance restrictions, etc. The additional controls will be specified in the Copermittees' Jurisdictional Urban Runoff Management Documents and Annual Reports as well as during the construction authorization and inspection programs.

CWA section 303(d) water bodies are impaired water bodies which are not achieving the water quality objectives necessary to protect their beneficial uses. As discussed in Finding 3, urban runoff discharges from MS4s are a leading cause of receiving water quality impairment in the San Diego Region and throughout the United States. Since discharges which cause or contribute to an exceedance of water quality standards are prohibited (see section C.1. of Order No. 2001-01), any discharges to CWA section 303(d) waterbodies of pollutants for which the waterbody is impaired are prohibited. Therefore, construction sites and activities tributary to these water bodies must implement additional controls to ensure that they are not discharging the pollutants which are causing or contributing to the impairment of these water bodies.

With regards to coastal lagoons and other sensitive water bodies, additional controls are needed to protect these valuable and unique resources. In their Nonpoint Source Program Strategy and Implementation Plan, the SWRCB and California Coastal Commission support additional controls for critical coastal areas, stating “the State will seek to attain and maintain applicable water quality standards, and protect waters threatened by land uses, or by substantial expansion of existing land uses, by implementing additional management measures.”

Furthermore, US EPA supports additional controls for construction sites tributary to impaired or sensitive water bodies, stating "The proximity and sensitivity of the receiving water to which the construction site discharges is an important consideration. For construction sites that discharge to receiving waters that do not support their designated use or other waters of special concern, additional construction site controls are probably warranted and should be strongly considered" (1992).

Section: F.2 Subsection: F.2.g.1.a

Comment: Section F.2.g (1)(a): Is there a criterion for weekly inspections? (City of Chula Vista)

Response: As discussed in Finding 24, inspections provide a necessary means by which Copermittees can evaluate compliance with their ordinances. Inspections are especially important at high risk areas for pollutant discharges, such as industrial and construction sites. To ensure that BMPs are properly installed, US EPA states MS4 operators should "develop procedures for site inspection and enforcement of control measures to deter infractions" (2000). Regarding inspections, US EPA further states "Inspections give the MS4 operator an opportunity to provide additional guidance and education, issue warnings, or assess penalties" (2000).

Construction site inspections shall be conducted to determine compliance with applicable ordinances and permits, including Order No. 2001-01. To this effect, the US EPA states that "Site inspections are expected to be the primary enforcement mechanism by which erosion and sediment controls are maintained" (1992). When inspections result in findings of noncompliance, follow-up by the Copermittee to ensure compliance is necessary. The US EPA states "Effective inspection and enforcement requires […] intervention by the municipal authority to correct violations" (1992).

Construction site inspection frequencies are to be based on threat to water quality prioritization. US EPA supports this, stating that site inspection procedures should "identify priority sites for inspection and enforcement based on the nature and extent of the construction activity, topography, and the characteristics of soils and receiving water quality" (2000). For example, construction sites which are considered a high threat to water quality are to be given a high priority for inspection. This will allow for limited inspection and monitoring time to be most effective. Weekly to monthly inspection of high threat sites is necessary due to the dynamic nature of construction activities. Medium and low threat construction sites can be inspected less frequently, due to their reduced risk of negatively impacting receiving waters. Review of SWPPPs can be one effective tool for determining frequency of site inspections. Construction sites which effectively implement the measures of a comprehensive SWPPP may not need to be inspected as frequently as less diligent sites.

The SDRWQCB has discretion to require Jurisdictional Urban Runoff Program item F.2.g in Order No. 2001-01 under the broad and specific legal authority cited in the Fact Sheet/Technical Report.

Section: F.2 Subsection: F.2.g.2.a

Comment: RWQCB staff have failed to assess the potential staffing and cost implications of this section. Section F.2.g(2)(a) would require weekly inspections of all high priority construction sites during the wet season, and additional inspections. The County has only had time to estimate increased inspection costs for single family dwellings. For cost estimation purposes, the County also assumed that

inspection would only be required from the time ground was disturbed, until permanent BMPs were in place. This would still require that County inspections of single family homes be approximately tripled. This would require 40 additional staff and other supporting expenditures. First year costs (in this case, including office space) would be $5 million, and subsequent year costs $3.6 million per year.

Additionally, the difficulty of significantly increasing staffing levels for the wet season only have not been considered. Assuming that this extra work could be contracted, it would not be possible to find qualified temporary help in these numbers, especially if the competition with neighboring Copermittees is considered, and the provisions were otherwise found to be legal.

Monthly inspections would be allowed only if the County could and would take on the burden of directly enforcing general permits issued by the state, which is inappropriate. (County of San Diego)

Response: In response to comments and to provide the Copermittees with greater flexibility and discretion in implementing the Tentative Order, Section F.2.g has been revised to lower costs by reducing the number of high priority sites to be inspected. The criteria in Section F.2.e, which set the minimum criteria by which a site is determined to be a high threat to water quality, have been revised to reduce the number of high priority sites to be inspected. Also, the Copermittees have the discretion under F.2.e.2 to propose "equivalent criteria" by which to prioritize sites as high threats to water quality. The Tentative Order still requires weekly inspections of high priority construction sites in order to address frequently changing conditions on construction sites. However, the number of sites requiring inspections should be reduced due to the Tentative Order modifications.

The SDRWQCB has the authority to assign site priorities for oversight by the Copermittees. The Federal NPDES regulations clearly place an emphasis on the prioritization of sites of various land uses. Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(D)(3) provides that the proposed management program include "A description of procedures for identifying priorities for inspecting sites and enforcing control measures which consider the nature of the construction activity, topography, and the characteristics of soils and receiving water quality." Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A)(5) provides that the proposed management program include "A description of a program to monitor pollutants in runoff from operating or closed municipal landfills or other treatment, storage or disposal facilities for municipal waste, which shall identify priorities and procedures for inspections and establishing and implementing control measures for such discharges." Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(C)(1) provides that the Copermittee must "identify priorities and procedures for inspections and establishing and implementing control measures for such discharges."

The Tentative Order's requirements regarding site prioritization are more detailed than those in the Federal NPDES regulations. The SDRWQCB has increased the detail of the site prioritization requirements under Clean Water Act section 402(p)(3)(b)(iii), which states that a storm water program "shall require controls to reduce the discharge of pollutants to the maximum extent practicable, including management practices, control techniques and system, design and engineering methods, and such other provisions as the Administrator or the State determines appropriate for the control of such pollutants."

This increased detail is necessary due to the continued degradation of the region's receiving waters caused by urban runoff. The "1998-1999 City of San Diego and Co-Permittee NPDES Stormwater Monitoring Program Report" indicates that the typical urban runoff coming from residential, commercial, industrial, and roadway land uses frequently contains such pollutants as Total Phosphorus, Nitrate + Nitrite Nitrogen, Total Suspended Solids, Lead, Copper, and Zinc at concentrations which exceed USEPA benchmark values for storm water (City of San Diego, 1999). Construction sites are also a significant concern due to the impairment caused by sediment of such valuable water resources within the region as

Agua Hedionda Lagoon, Buena Vista Lagoon, San Elijo Lagoon, and Los Penasquitos Lagoon. Increased detail in the prioritization of sites is further supported by USEPA's "Interim Permitting Approach" which supports expansion of permit requirements where necessary to attain water quality standards (USEPA, 1996).

Finally, the SWRCB upheld in Order WQ 2000-11 prioritization of sites by a Regional Board in the LARWQCB SUSMP. The LARWQCB SUSMP identified various priority development project categories which are high priority. The SWRCB found that identification of high priority sites was appropriate.

Furthermore, Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(D)(3) requires construction site inspections by the Copermittees, stating their programs shall include "A description of procedures for identifying priorities for inspecting sites and enforcing control measures which consider the nature of the construction activity, topography, and the characteristics of soils and receiving water quality." USEPA places importance on inspections, stating "Site inspections are expected to be the primary enforcement mechanism by which erosion and sediment controls are maintained" (USEPA, 1992). Since USEPA places high priority on inspections, and since the majority of the lagoons within the region are impaired for sediment, the Tentative Order has placed high priority on construction site inspections. The SDRWQCB has authority to require these inspections under USEPA's "Interim Permitting Approach for Water Quality-Based Effluent Limitations in Storm Water Permits" (USEPA, 1996). This guidance states "The interim permitting approach uses best management practices (BMPs) in first-round permits, and expanded or better-tailored BMPs in subsequent permits, where necessary, to provide for the attainment of water quality standards."

The SDRWQCB has discretion to require Jurisdictional Urban Runoff Program item F.2.in Order No. 2001-01 under the broad and specific legal authority cited in the Fact Sheet/Technical Report.

Section: F.2 Subsection: F.2.j

Comment: This section is ambiguous and redundant. It should be deleted. (County of San Diego)

Response: Comment noted. As discussed in Finding 23, implementation of an education program is an important best management practice for construction sites and activities. The SWRCB Technical Advisory Committee (TAC) "recognizes that education with an emphasis on pollution prevention is the fundamental basis for solving nonpoint source pollution problems." The TAC points out several target communities for education efforts, including "Government: Educate agencies and officials to achieve better communication, consistency, collaboration, and coordination at the federal, state and local levels" and "Development Community: Educate the development community, including developers, contractors, architects, and local government planners, engineers, and inspectors, on nonpoint source pollution problems associated with development and redevelopment and construction activities and involve them in problem definitions and solutions."

The US EPA also supports education efforts for parties involved in construction, stating "technical information on how to incorporate storm water management with erosion and sediment control and other BMP training courses are recommended for municipal employees and construction site operators."

The SDRWQCB has discretion to require Jurisdictional Urban Runoff Management Program item F.2.j. in Order No. 2001-01 under the broad and specific legal authority cited in the Fact Sheet/Technical Report.

Section: F.2 Subsection: F.2.j

Comment: Page 24, Section F.2.j. Education Focused on Construction Activities (Construction) Please add Community Planning Groups, Planning Boards and Elected Officials to those who should be included in the education process. (Surfers Tired of Pollution)

Response: With respect to Section F.2.j Education Focused on Construction Activities (Construction), "Community Planning Groups, Planning Boards and Elected Officials" could be considered "responsible parties" by the Copermittees and do not need to be further specified in the Tentative Order.

Section: F.3 Subsection: F.3

Comment: A requirement to implement storm water pollution prevention BMPs exceeds the requirements of the State General Industrial Permit. Because the General Industrial permit allows applicants to choose the BMPs they will use to comply, a specific requirement to use pollution prevention BMPs would put virtually all of them out of compliance. This requirement for the Copermittees to develop pollution prevention techniques for all industries within their jurisdictions may not be as thorough as those developed by specific industries because they know the intricacies of their businesses. (Port of San Diego, County of San Diego)

Response: The Copermittees have the discretion under the revised Tentative Order to require industrial pollution prevention BMPs for cases where they decide they are appropriate.

Section: F.3 Subsection: F.3.a

Comment: The requirements for "all municipal land use areas, the inclusion of roads, street etc., muni waste facilities, and corporate yards" are vague and ill defined. The level of effort to include all of these facilities is objectionable and unnecessary, inappropriate, and are not based upon adequate data from either the Regional Board or data from the Copermittees. (County of SD)

Response: Section F.3.a. covers Municipal areas and is designed to address those properties and areas for which the Permittees have the most direct influence over land use and management decisions. The level of effort to include these facilities should be among the most reasonable and easily accomplished in the municipal storm water permitting program. Therefore, the requirements will not be changed.

Section: F.3 Subsection: F.3.a.3

Comment: The threat to water quality prioritization is not supported by the legal authorities cited, are not within the provisions of the federal and state statutes and regulations, and are overly broad. (County of San Diego)

Response: The municipal threat to water quality prioritization is supported by the federal NPDES regulations, as well as USEPA guidance.

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A)(1) provides that the proposed management program include "A description of maintenance activities and a maintenance schedule for structural controls to reduce pollutants (including floatables) in discharges from municipal separate storm sewers."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A)(3) provides that the proposed management program include "A description for operating and maintaining public streets, roads and highways and procedures for reducing the impact on receiving waters of discharges from municipal storm sewer systems, including pollutants discharged as a result of deicing activities."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A)(4) provides that the proposed management program include "A description of procedures to assure that flood management projects assess the impacts on the water quality of receiving water bodies and that existing structural flood control devices have been evaluated to determine if retrofitting the device to provide additional pollutant removal from storm water is feasible."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A)(5) provides that the proposed management program include "A description of a program to monitor pollutants in runoff from operating or closed municipal landfills or other treatment, storage or disposal facilities for municipal waste, which shall identify priorities and procedures for inspections and establishing and implementing control measures for such discharges."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A)(6) provides that the proposed management program include "A description of a program to reduce to the maximum extent practicable, pollutants in discharges from municipal separate storm sewers associated with the application of pesticides, herbicides, and fertilizer which will include, as appropriate, controls such as educational activities, permits, certifications, and other measures for commercial applicators and distributors, and controls for application in public right-of-ways and at municipal facilities."

Identification of high priority municipal pollutant areas and activities allows for limited pollution reduction resources to be most effective. Targeting high priority municipal areas and activities for BMP implementation, inspection, and monitoring provides the greatest reduction in risk of degrading receiving waters per expenditure.

Items (i), (ii), and (iv) above are considered to be high priority sources since they are specifically addressed in Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(A)(3-5). Regarding roads, highways, and parking facilities, the US EPA states "Road maintenance practices, especially snow management and road repair, and traffic are significant sources of pollutants in storm water discharges. […] Municipal equipment yards and maintenance shops that support road maintenance activities can also be significant sources of pollutants" (USEPA, 1992). Regarding flood management projects and flood control devices, the USEPA states "Storm water management devices and structures that focus solely on water quantity are usually not designed to remove pollutants, and may sometimes harm aquatic habitat and aesthetic

values" (USEPA, 1992). Regarding municipal waste facilities, the USEPA states "Applicants must describe programs that identify measures to monitor and reduce pollutants in storm water discharges from facilities that handle municipal waste, including sewage sludge. […] The types of facilities that should be included are: active or closed municipal waste landfills; publicly owned treatment works, including water and wastewater treatment plants; incinerators; municipal solid waste transfer facilities; land application sites; uncontrolled sanitary landfills; maintenance and storage yards for waste transportation fleets and equipment; sites for disposing or treating sludge from municipal treatment works; and other treatment, storage, or disposal facilities for municipal waste" (USEPA, 1992).

Areas and activities included in item (iii) are considered high priority due to their location in relation to CWA section 303(d) water bodies and environmentally sensitive areas. Pollutant loading of these water bodies must be avoided to aid in their recovery and ensure against their further degradation. The intent of this requirement was not to include all sites which were tributary to any 303(d) water body, but rather to include sites which had pollutants on site which were tributary to 303(d) water bodies impaired for the same pollutants. In addition, the intent regarding environmentally sensitive areas was to provide these areas protection from municipal areas and activities within or directly adjacent to the environmentally sensitive areas. For these reasons, the Tentative Order will changed to clarify this intent.

See change at permit section F.3.a.3.b.iii.

Section: F.3 Subsection: F.3.a.3

Comment: The prioritization criteria for construction site threat to water quality does not include a method for the process. The Fact Sheet/Technical Report does not provide an assessment matrix and Order should allow the Copermittees to develop the methodology that will ensure the criteria are met and stabilize the sites as quickly as possible. The frequencies stipulated are not adequate for most cases. Prioritization of basin has no operational value and should be eliminated. The approach outlined will likely lengthen the time of site exposure and maximize the opportunities for violation and the accompanying enforcement processes.

The County agrees with this approach, but questions whether the RWQCB has employed it in assigning their minimum frequencies. Since the Technical Report has not addressed the issue, we are specifically requesting an explanation of how staff determined the particular minimum inspection frequencies that it has assigned. What is the nexus between a high priority status and a weekly inspection frequency? Why are monthly inspections deemed to be equivalent to weekly if the Copermittees enforce the General Construction Permit? What is the reasoning for two inspections of medium and low priority sites during the wet season? Why not one or seven? If medium and low priority sites warrant the same inspection frequency, why are they ranked differently? Is there a Threat to Water Quality threshold below which inspection frequencies can all be the same? If so, how was it determined that high priority sites are above it? The Findings, the evidence, and the law do not support the inclusion of such a requirement. (County of San Diego, Carlsbad (1084), County of San Diego (385)

Response: The SDRWQCB has the authority to assign site priorities for oversight by the Copermittees. The Federal NPDES regulations clearly place an emphasis on the prioritization of sites of various land uses. Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(D)(3) provides that the proposed management program include "A description of procedures for identifying priorities for inspecting sites and enforcing control measures which consider the nature of the construction activity, topography, and the

characteristics of soils and receiving water quality." Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A)(5) provides that the proposed management program include "A description of a program to monitor pollutants in runoff from operating or closed municipal landfills or other treatment, storage or disposal facilities for municipal waste, which shall identify priorities and procedures for inspections and establishing and implementing control measures for such discharges." Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(C)(1) provides that the Copermittee must "identify priorities and procedures for inspections and establishing and implementing control measures for such discharges."

The Tentative Order's requirements regarding site prioritization are more detailed than those in the Federal NPDES regulations. The SDRWQCB has increased the detail of the site prioritization requirements under Clean Water Act section 402(p)(3)(b)(iii), which states that a storm water program "shall require controls to reduce the discharge of pollutants to the maximum extent practicable, including management practices, control techniques and system, design and engineering methods, and such other provisions as the Administrator or the State determines appropriate for the control of such pollutants."

This increased detail is necessary due to the continued degradation of the region's receiving waters caused by urban runoff. The "1998-1999 City of San Diego and Co-Permittee NPDES Stormwater Monitoring Program Report" indicates that the typical urban runoff coming from residential, commercial, industrial, and roadway land uses frequently contains such pollutants as Total Phosphorus, Nitrate + Nitrite Nitrogen, Total Suspended Solids, Lead, Copper, and Zinc at concentrations which exceed USEPA benchmark values for storm water (City of San Diego, 1999). Construction sites are also a significant concern due to the impairment caused by sediment of such valuable water resources within the region as Agua Hedionda Lagoon, Buena Vista Lagoon, San Elijo Lagoon, and Los Penasquitos Lagoon. Increased detail in the prioritization of sites is further supported by USEPA's "Interim Permitting Approach" which supports expansion of permit requirements where necessary to attain water quality standards (USEPA, 1996).

Finally, the SWRCB upheld in Order WQ 2000-11 prioritization of sites by a Regional Board in the LARWQCB SUSMP. The LARWQCB SUSMP identified various priority development project categories which are high priority. The SWRCB found that identification of high priority sites was appropriate.

Furthermore, Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(D)(3) requires construction site inspections by the Copermittees, stating their programs shall include "A description of procedures for identifying priorities for inspecting sites and enforcing control measures which consider the nature of the construction activity, topography, and the characteristics of soils and receiving water quality." USEPA places importance on inspections, stating "Site inspections are expected to be the primary enforcement mechanism by which erosion and sediment controls are maintained" (USEPA, 1992). Since USEPA places high priority on inspections, and since the majority of the lagoons within the region are impaired for sediment, the Tentative Order has placed high priority on construction site inspections. The SDRWQCB has authority to require these inspections under USEPA's "Interim Permitting Approach for Water Quality-Based Effluent Limitations in Storm Water Permits" (USEPA, 1996). This guidance states "The interim permitting approach uses best management practices (BMPs) in first-round permits, and expanded or better-tailored BMPs in subsequent permits, where necessary, to provide for the attainment of water quality standards."

It should be noted that the designation for high priority construction sites has been modified. This was to allow the Copermittees more discretion in their inspections. The Tentative Order still requires weekly inspections of high priority construction sites in order to address frequently changing conditions on

construction sites. However, the number of sites requiring inspections should be reduced due to the Tentative Order modifications.

See change at permit section F.2.e.2.

The SDRWQCB has discretion to require Jurisdictional Urban Runoff Program item F.2.g in Order No. 2001-01 under the broad and specific legal authority cited in the Fact Sheet/Technical Report.

Section: F.3 Subsection: F.3.a.4.b.i.

Comment: The requirement to retrofit where needed is open-ended and is not completely supported by statutes or regulations. The language should require an evaluation and then begin a process to retrofit. (County of San Diego, City of San Diego)

Response: The requirement to retrofit where needed is broad in order to provide Copermittees flexibility in maintaining their systems. Determination of necessity of retrofitting is left to the discretion of the Copermittees. The provision does require an evaluation, stating "Each Copermittee shall evaluate feasibility of retrofitting […]". Again, the process of retrofitting is the responsibility of the Copermittees.

Section: F.3 Subsection: F.3.a.4.b.i.

Comment: This section is unclear with regards to retrofits. Work with co-permittees for clarity and implementation schedule. (County of San Diego (1), County of San Diego (2))

Response: The Tentative Order says, "Each Copermittee shall evaluate feasibility of retrofitting existing structural flood control devices and retrofit where needed." In the phrase "where needed," SDRWQCB is giving the Permittees the opportunity to develop a schedule based on their needs. Therefore, SDRWQCB will not develop an implementation schedule as doing so would result in decreased flexibility given to the Permittees.

Section: F.3 Subsection: F.3.a.5

Comment: The requirement for annual inspections and removal of waste from urban streams is unfeasible and ambiguous. The total length of all the streams is very large and a cost/benefit analysis has not been conducted. Other regulatory requirements, such as, Fish and Game or Corps, permits will conflict with this requirement. Additional cleaning as necessary does not make sense. The scheduling of the cleaning is not clear and the requirement for proper disposal of waste is over regulation and repeats other statutory requirements and unnecessary. (County of San Diego)

Response: Section F.3.a.5 of the Tentative Order requires that each Copermittee implement a schedule of maintenance activities at all structural controls designed to reduce pollutant discharges to or

from its MS4 and related drainage structures, as well as a schedule of maintenance for the MS4. This requirement does not necessitate the maintenance of the entire MS4 system and related drainage structures every year, but rather that the Copermittee develop and submit as part of its Jurisdictional Urban Runoff Management Program Document and Annual Reports a schedule of maintenance activities for the MS4 system and related drainage structures. The Copermittees have the discretion under the Tentative Order to identify the 20% of the system that requires more frequent maintenance and schedule the remaining 80% as they determine is necessary to comply with the Tentative Order. The frequency of maintenance for lined channels necessary to comply with the Tentative Order is also left to the discretion of the Copermittees to determine.

Section: F.3 Subsection: F.3.a.6

Comment: The language used for the requirement of BMPs, such as at "important municipal area and activities," is unclear and unfeasible. (County of San Diego)

Response: The entire sentence reads, "Important municipal areas and activities include municipal facilities, public rights-of-way, parks, recreational facilities, golf courses, cemeteries, botanical or zoological gardens and exhibits, landscaped areas, etc." The phrase, "important municipal area and activities" is clarified by a subsequent list indicating what the SDRWQCB sees as "important."

Section: F.3 Subsection: F.3.b

Comment: Requiring the Copermittees to develop pollution prevention methods, F.3.b.(1) and to evaluate threat to water quality in F.3.b.(3) is a violation of CWC and CWA. (County of San Diego)

Response: Under the CWA, the Copermittees are required to reduce pollutants in urban runoff discharges to the maximum extent practicable. Pollution prevention is an important part of meeting the MEP standard. However, in order to provide the Copermittees discretion in implementing their urban runoff management programs, pollution prevention will only be required where the Copermittees deem it appropriate. By not specifying its use in any particular instance, and not specifying types of pollution prevention to be used, the requirement for pollution prevention does not violate the CWC and CWA.

The Federal NPDES regulations and USEPA guidance emphasize prioritization of industrial sites. Regarding prioritizing industrial sites, Federal NPDES regulation 40 CFR 122.26(d)(2)(ii) provides that the Copermittee “Provide an inventory, organized by watershed of the name and address, and a description (such as SIC codes) which best reflects the principal products or services provided by each facility which may discharge, to the municipal separate storm sewer, storm water associated with industrial activity.”

Regarding industrial site priority designation, the US EPA states that “When municipalities develop criteria for identifying additional priority industrial facilities, they are advised to consider, at a minimum: (1) The type of industrial activity (SIC codes can help characterize the type of industrial activity); (2) The use and management of chemicals or raw products at the facility and the likelihood that storm water

discharge from the site will be contaminated; and (3) The size and location of the facility in relation to sensitive watersheds" (USEPA, 1992).

The SDRWQCB has identified high priority industrial sites based on their potential to be sources of pollutants, as well as their proximity to sensitive water bodies. High priority designation is included in the Tentative Order under CWA section 402(p)(3)(B)(iii) and CWC section 13377.

Section: F.3 Subsection: F.3.b.

Comment: The responsibility for enforcing the state general industrial permit and this Order, and inspecting industrial facilities is the responsibility of the RWQCB not the Copermittees. (County of San Diego)

Response: The Tentative Order does not require the Copermittees to enforce the General Industrial Permit. The Tentative Order requires the Copermittees to implement their responsibility to inspect industrial facilities as required by Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(C)(1), which states "Identify priorities and procedures for inspections and establishing and implementing control measures for such discharges."

Routine inspections provide an effective means by which Copermittees can evaluate compliance with their ordinances. Inspections are especially important at high risk areas for pollutant discharges, such as industrial and construction sites. Industrial site inspection frequencies are to be based on threat to water quality prioritization. For example, industrial sites which are considered a high threat to water quality are to be given a high priority for inspection. This allows for limited inspection resources to be most effective. Annual or bi-annual inspection of high threat sites is necessary to ensure that changes to the site which may be detrimental to water quality are identified and addressed.

Review of a facility's Storm Water Pollution Prevention Plan (SWPPP) can be an effective tool in inspecting the facility's storm water controls. The US EPA recommends that municipalities review SWPPPs during inspections when it states "Municipalities are urged to evaluate pollution prevention plans and discharge monitoring data collected by the industrial facility to ensure that the facility is in compliance with its NPDES storm water permit. Site inspections should include (1) an evaluation of the pollution prevention plan and any other pertinent documents, and (2) an onsite visual inspection of the facility to evaluate the potential for discharges of contaminated storm water from the site and to assess the effectiveness of the pollution prevention plan" (1992).

Regarding industrial site inspections, the US EPA finds that "The proposed management program should describe the inspection procedures that will be followed.[…] Proposed management programs should address minimum frequency for routine inspections. For example, how often, how much of the site, and how long an inspection may take are appropriate to explain in this proposed management program component. Applicants should also describe procedures for conducting inspections and provide an inspector's checklist" (1992). The US EPA also finds that follow-up actions are to be implemented based upon site inspection findings: "The results of inspection may be used as a basis for requiring storm water management controls and enhanced pollution prevention measures" (1992).

Due to the large number of industrial sites within the region, sites which have been inspected by the SDRWQCB do not need to be re-inspected by a Copermittee within the same year. This provision has been included in the Tentative Order to ease the burden of inspections for the Copermittees.

Section: F.3 Subsection: F.3.b.3

Comment: The threat to water quality prioritization is too complex and the minimum list in F.3.b.(3) should be deleted to allow for the Copermittees to develop the methodology for the threat to water quality. Not all sites under the statewide permit pose a significant threat to water quality through storm water discharges. This also seems to require the municipalities to use a higher standard than the RWQCB uses. This section should be modified to exempt those sites not posing such a threat. (County of San Diego, Industrial Environmental Association)

Response: The designation of high priority industrial sites is reasonable and justified. Industrial sites that are subject to section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA) are identified in the Federal NPDES regulations as sites for which the Copermittees must provide oversight. USEPA has also placed high priority on industrial sites subject to the General Industrial Permit by requiring them to receive coverage under the permit.

Industries are also considered high priority due to their location in relation to CWA section 303(d) water bodies and environmentally sensitive areas. Pollutant loading of these water bodies must be avoided to aid in their recovery and ensure against their further degradation. The intent of this requirement was not to include all sites which were tributary to any 303(d) water body, but rather to include sites which had pollutants on-site which were tributary to 303(d) water bodies impaired for those same pollutants. In addition, the intent regarding environmentally sensitive areas was to provide these areas protection from industrial sites within or directly adjacent to the environmentally sensitive areas. For these reasons, the Tentative Order will changed to clarify this intent.

Annual or bi-annual inspection of high threat sites is necessary to ensure that changes to the site which may be detrimental to water quality are identified and addressed. However, due to the large number of industrial sites within the region, sites which have been inspected by the SDRWQCB do not need to be re-inspected by a Copermittee within the same year. This provision has been included in the Tentative Order to ease the Copermittees' inspection burden.

See change at permit section F.3.b.3.b.

Section: F.3 Subsection: F.3.b.5

Comment: Group monitoring should be allowed and the Copermittees should not be required to collect the data. (County of San Diego, Port of San Diego)

Response: The Tentative Order will be changed to allow for group monitoring. The Tentative Order does not require the Copermittees to collect data. The Copermittees can require industry to conduct monitoring and submit monitoring reports.

Section: F.3 Subsection: F.3.b.6

Comment: RWQCB staff have failed to assess the potential staffing and cost implications of this section. Section F.2.g(2)(a) would require annual inspections of all high priority industrial sites. The potential costs and staffing increases necessary to implement this provision are not addressed in the Technical Report. (County of San Diego, Procopio, Cory, Hargreaves & Savitch)

Response: USEPA places emphasis on the inspection of industrial sites. Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(C)(1) provides that the Copermittee must "identify priorities and procedures for inspections and establishing and implementing control measures for such discharges." USEPA also finds that "The proposed management program should describe the inspection procedures that will be followed.[…] Proposed management programs should address minimum frequency for routine inspections. For example, how often, how much of the site, and how long an inspection may take are appropriate to explain in this proposed management program component. Applicants should also describe procedures for conducting inspections and provide an inspector's checklist" (USEPA, 1992).

Annual or bi-annual inspection of high threat sites is necessary to ensure that changes to the site which may be detrimental to water quality are identified and addressed. The SDRWQCB attempted to ease the burden of inspection by providing that sites which have been inspected by the SDRWQCB do not need to be re-inspected by a Copermittee within the same year.

Section: F.3 Subsection: F.3.b.6

Comment: The County has an inspection program. The Regional Board has not justified requiring another inspection program and the requirement is an unfunded mandate. (County of San Diego)

Response: The Tentative Order leaves the development of inspection programs largely to the discretion of the Copermittees. The Copermittees are allowed to designate and inspect medium and low priority sites at their discretion. The Tentative Order only assigns minimum high priority sites and requires their annual inspection.

The designation of high priority industrial sites is reasonable and justified. Industrial sites that are subject to section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA) are identified in the Federal NPDES regulations as sites for which the Copermittees must provide oversight. USEPA has also placed high priority on industrial sites subject to the General Industrial Permit by requiring them to receive coverage under the permit.

Industries are also considered high priority due to their location in relation to CWA section 303(d) water bodies and environmentally sensitive areas. Pollutant loading of these water bodies must be avoided to aid in their recovery and ensure against their further degradation. The intent of this requirement was not to

include all sites which were tributary to any 303(d) water body, but rather to include sites which had pollutants on-site which were tributary to 303(d) water bodies impaired for those same pollutants. In addition, the intent regarding environmentally sensitive areas was to provide these areas protection from industrial sites within or directly adjacent to the environmentally sensitive areas. For these reasons, the Tentative Order will changed to clarify this intent.

Annual or bi-annual inspection of high threat sites is necessary to ensure that changes to the site which may be detrimental to water quality are identified and addressed. However, due to the large number of industrial sites within the region, sites which have been inspected by the SDRWQCB do not need to be re-inspected by a Copermittee within the same year. This provision has been included in the Tentative Order to ease the Copermittees' inspection burden.

See change at permit section F.3.b.3.b.

Section: F.3 Subsection: F.3.c.2

Comment: The priorities assigned by the SDRWCB "based on the number of complaints received by the RWQCB and Copermittees" do not appear to reflect our experience. Please provide documentation of the "analysis" of complaints that was used to assign these priorities. (County of San Diego, La Mesa)

Response: The assignment of high priority to the commercial sites and sources is based on several factors (as discussed in the draft Fact Sheet/ Technical Report). The primary factor considered was the presence of pollutants at the commercial sites/sources listed. All of the commercial sites/sources are associated with the use or generation of pollutants commonly found in urban runoff. These included oil, grease, and metals for categories a-h and u; Pesticides for categories i, o, p, q, r, and s; coliform for categories j and v; construction byproducts for categories l - n;detergents for category k; and chlorine for category t. In addition, the choice of categories was bolstered by years of professional experience receiving and reviewing complaints regarding illicit discharges. Other considerations included number of sites/sources and size of site/sources.

Section: F.3 Subsection: F.3.c.2

Comment: Section F.3.c.(2) - What is the RWQCB's expectation for inventorying mobile services? How do you require that a mobile service meet the requirements (and possibly permitting) of a number of agencies? If a mobile service obtains a countywide permit, who is responsible for enforcement if violations occur within city limits? (Coronado)

Response: In order to provide the Copermittees with the maximum amount of flexibility, a requirement for addressing interjurisdictional mobile services is left to their discretion. The Copermittees could address this issue through the interjurisdictional agreements the Tentative Order requires and through regional cooperative and collaborative efforts, which other commentors have cited and emphasized in their comments.

Section: F.3 Subsection: F.3.d.3

Comment: Further study the impact of the proposal with regard to the increased impact on existing residential uses. Our concerns center around the activities described in section F.3.d. (2) which out lines high level residential threats to water quality. These high threat activities include parking your car, washing your car, disposal of pet waste and the use of pesticides, herbicides and fertilizers. Section F.3.d. (3), which covers the implementation of BMPs, is so vague as to provide no guidance. In Section F.3.d (2) it is not clear why residential automobile washing and parking are included as high priority activities. The Order is confusing on the type of programs the cities are expected to implement in what the Order terms "existing high priority residential areas"; it is not clear if the Order is requesting that cities inventory every resident who either repairs or washes their own vehicle, and if the cities are supposed to cite or find residents who wash their own vehicles. (San Diego County Apartment Association, Lemon Grove, Coalition for Practical Regulation)

Response: SDRWQCB believes it is well established that these residential activities generate pollutants which find their way to surface waterways. By mere virtue of the materials and chemicals involved with these activities, the cumulative impact of hundreds of thousands of households are detrimental if done without water quality protection in mind. Further study of the impact of the proposal is not seen as necessary to establish a link to benefits that will be gained in addressing these pollutant sources. Due to the non specific nature of the many residential land uses in the San Diego Region, Section F.3.d. (3) is written to provide maximum flexibility to the Permittees. SDRWQCB feels that the Section is not vague but rather allows Permittees to design a program that is best for their locality. Again, in response to your comment, "...it is not clear if the Order is requesting that cities inventory every resident who either repairs or washes their own vehicle, and if the cities are supposed to cite or find residents who wash their own vehicles," the Tentative Order does not give a specific directive on the course of action the Permittees should take. In some instances, it will be necessary to survey residential activity. In other instances, it will be necessary to enforce ordinances when a resident contributes to illicit discharges. This discretion is left up to the local jurisdiction.

Section: F.3 Subsection:

Comment: The permit should speak as strongly as is legally possible to require Copermittees to take necessary steps to ban problematic chemical pest-control substances such as Diazinon (in F.3). (Environmental Health Coalition)

Response: The Tentative Order requires the Copermittees to address pesticides in Sections F.3.a.6 and F.3.d.2. The Copermittees are given the discretion and flexibility to track and report municipal pesticide use, to reduce commercial pesticide use, and to consider targeting percentile reductions for total use and the use of high priority (high risk) pesticides, through the use of ordinances, local policies, zoning and permitting processes, the letting of deeds and other “mechanisms” that may be used by local government to limit or eliminate pesticide use.

Section: F.3 Subsection:

Comment: 1. The Order does not specify what programs the cities are supposed to implement in "high priority" areas, leaving the Order open to speculation and litigation by the environmental community.

2. The permit lists "land application sites," but does not define what exactly this type of site consists of.

3. It is not clear what type of retrofitting the cities are supposed to evaluate, thus leaving the cites exposed to litigation from the environmental community, even when a city uses its best efforts to comply. (Coalition for Practical Regulation)

Response: The revised Tentative Order requires the Copermittees to identify high priority sites within the framework provided and specify the programs they will implement in high priority areas in their Jurisdictional Urban Runoff Management Program Document, which is subject to review and comment by the SDRWQCB. Land application sites are areas where wastes are applied onto or incorporated into the soil surface for treatment and disposal. With respect to retrofitting, the revised Tentative Order only requires the Copermittees to "evaluate feasibility of retrofitting existing structural flood control devices and retrofit where needed."

Section: F.3 Subsection: F.3.a

Comment: Add: (9) Disease prevention: mosquito and vector control (State Department of Health Services)

Response: In recognition of the potential public health threat, an additional Finding is recommended to be added to the Tentative Order. The Finding (no. 36) identifies the potential vector issues related to BMP implementation and the role of collaborative program development between municipalities and vector control agencies in addressing an minimizing vector production.

Section: F.3 Subsection: F.3.a

Comment: The Permit should require dischargers to track and report municipal pesticide use in addition to requiring pesticide use reduction. Also, the Permit should require actual pesticide use reductions, quantifying target percentile reductions for total use and the use of high priority (high risk) pesticides, through the use of ordinances, local policies, zoning and permitting processes, the letting of deeds and other “mechanisms” that may be used by local government to limit or eliminate pesticide use. (San Diego Baykeeper)

Response: The Tentative Order requires the Copermittees to address pesticides in Sections F.3.a.6 and F.3.d.2. The Copermittees are given the discretion and flexibility to track and report municipal pesticide use, to reduce commercial pesticide use, and to consider targeting percentile reductions for total use and the use of high priority (high risk) pesticides, through the use of ordinances, local policies, zoning and permitting processes, the letting of deeds and other “mechanisms” that may be used by local government to limit or eliminate pesticide use.

Section: F.3 Subsection: F.3.a.3

Comment: In Section F.3.a (3) it is not clear why existing roads and streets should be included as high priority areas instead of medium or low priority areas. (City of Lemon Grove)

Response: Roads and streets are identified as high priority due to their potential to be a significant contributor of pollutants in urban runoff. A Federal Highway Administration "Pollutant Loading and Impacts from Highway Stormwater Runoff, Volume 3; Analytical Investigation and Research Report" (1990) finds that concentrations of total suspended solids, nitrate + nitrite nitrogen, and zinc exceed USEPA benchmark values for concentrations of these pollutants in urban runoff.

Section: F.3 Subsection: F.3.a.3.b

Comment: Airfields should be included as a source of pollutants. (Sierra Club)

Response: Section F.3.a.3 of the Tentative Order has been revised to include airfields as a high priority threat to water quality to be addressed in the Jurisdictional Urban Runoff Management Program.

Section: F.3 Subsection: F.3.a.3.b.I

Comment: How will the permits handle existing parking lots? Due to oils, antifreeze, silt, etc. in parking lots, even one small storm event will cause non-compliance. Are parking lots also assumed to need best management and to be included in the permit? (Anonymous Workshop 1)

Response: The tentative order requires the Copermittees to designate and implement or require the implementation of minimum BMPs for high priority threats to water quality including municipal, commercial, and residential parking lots in Sections F.3.a.3, F.3.c.2, and F.3.d.2.

Section: F.3 Subsection: F.3.a.3.b.ii

Comment: What are "Flood Management Projects & Flood Control Devices" that are high priority municipal areas? -Give some examples. (Anonymous Workshop 1)

Response: Flood Management projects and Flood Control Devices include structures designed to manage water quantity, but not necessarily quality. Such structures were usually not designed to remove pollutants and may sometimes harm aquatic habitat and aesthetic values through downstream erosion, elevated water temperatures, and increased pollutant loadings. This is considered a high priority since it is specifically addressed in the Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(A)(3-5).

Identification of high priority municipal pollutant areas and activities allows for limited pollution reduction resources to be most effective. Targeting high priority municipal areas and activities for BMP implementation, inspection, and monitoring provides the greatest reduction in risk of degrading receiving waters per expenditure.

Section: F.3 Subsection: F.3.a.5

Comment: Section F.3.a. (5).(c). i. Maintenance of MS4 (Municipal): It is Page 26 - -not feasible for the City to inspect its entire system each year between May 1 to Sept. 30. This window is restricted further by nesting season restrictions for the unlined channels. 20% of the system creates 80% of the problems-Copermittees should be allowed to identify the problem areas and schedule them for more frequent maintenance. Requirements relative to the entire system make maintenance efforts less effective. It is recommended to eliminate the section or reword it to provide flexibility in maintenance schedules. Limit channel cleaning on an annual basis to lined sections. (City of La Mesa)

Response: Section F.3.a.5 of the Tentative Order requires that each Copermittee implement a schedule of maintenance activities at all structural controls designed to reduce pollutant discharges to or from its MS4 and related drainage structures, as well as a schedule for maintenance of the MS4. This requirement does not necessitate the maintenance of the entire MS4 system and related drainage structures every year, but rather that the Copermittee develop and submit as part of its Jurisdictional Urban Runoff Management Program Document and Annual Reports a schedule of maintenance activities for the MS4 system and related drainage structures. The Copermittees have the discretion under the Tentative Order to identify the 20% of the system that requires more frequent maintenance and schedule the remaining 80% as they determine is necessary to comply with the Tentative Order. The frequency of maintenance for lined channels necessary to comply with the Tentative Order is also left to the discretion of the Copermittees to determine.

Section: F.3 Subsection: F.3.a.5

Comment: Does the Regional Board consider BMP maintenance a BMP? (City of Encinitas)

Response: No. This would fall under your BMP maintenance program. Many BMPs are properly designed, installed, and used; but then never maintained. Without all steps, the BMP is rendered useless and may itself become a source of pollution. Maintenance of BMPs are a necessary management practice intrinsic to the existence of the Best Management Practice.

Section: F.3 Subsection: F.3.a.5.c

Comment: Add: vi. Measures to prevent breeding of vectors. (State Department of Health Services)

Response: In recognition of the potential public health threat, an additional Finding is recommended to be added to the Tentative Order. The Finding (no. 36) identifies the potential vector issues related to BMP implementation and the role of collaborative program development between municipalities and vector control agencies in addressing an minimizing vector production.

Section: F.3 Subsection: F.3.a.5.c.iv

Comment: The RWQCB lacks the legal authority to regulate the disposal of waste through this permit except as it pertains to the Copermittees' MS4s. There is no legal basis for requiring in this permit that wastes be disposed of lawfully. As per sections A and B of this Order, they may not be disposed of to the Copermittee's MS4. That is the limit of the RWQCB's authority on this matter. (County of San Diego)

Response: California Water Code § 13377 provides that the Regional Boards shall issue waste discharge requirements which apply and ensure compliance with all applicable provisions of the Federal Water Pollution Control Act (33 U.S.C. §1251 et seq.), as amended, also known as the federal Clean Water Act (CWA). Since tentative Order No. 2001-01 is written to implement CWA requirements, it does not violate section 13360 (Regional Board prohibition from specifying the manner of compliance with waste discharge requirements) for the SDRWQCB to include specified programs of Best Management Practices (BMPs) to be implemented by the municipalities in order to carry out CWA requirements. Specificity is even more crucial in waste discharge requirements for storm water discharges given their lack of numerical effluent limits. Therefore the SDRWQCB can supply certain details of BMPs including their maintenance and the lawful disposal of accumulated wastes.

Section: F.3 Subsection: F.3.a.6

Comment: Page 26, Section F.3.a. (6) Management of Pesticides, Herbicides, and Fertilizers (Municipal) - Please include language to require the inclusion of NGOs and members of the public to participate in the discussion, preparation and implementation of BMPs. (Surfers Tired of Pollution)

Response: SDRWQCB encourages the Permittees to include public input in the preparation of BMPs. However, it will not make such a provision a requirement of the Tentative Order as doing so will deny the Permittees flexibility in their approach to best management procedures.

Section: F.3 Subsection: F.3.a.6

Comment: The minimum BMP program this section would establish is unsupported by Federal regulation and violates CWC section 13360. On this matter, 122.26(d)(2)(iv)(A)(6) states: "[The applicant must include a] description of a program to reduce to the maximum extent practicable, pollutants in discharges from municipal separate storm sewers associated with the application of pesticides, herbicides and fertilizer which will include, as appropriate, controls such as educational activities, permits, certifications and other measures for commercial applicators and distributors, and controls for application in public right-of-ways and at municipal facilities."

Section F.3.a.(6) exceeds this authority in several important ways. First, it expands "application" to "application, storage, and disposal". Second, it specifically prescribes the municipal areas and activities to be included ("municipal facilities, public right-of-ways, parks, recreational facilities, golf courses, cemeteries, botanical or zoological gardens and exhibits, landscaped areas, etc."). Third, it specifies minimum BMPs that are applicable to each of these categories, and does so in a way that is so prescriptive that it violates CWC section 13360 by directing the manner of compliance toward RWQCB staff preferences. (County of San Diego)

Response: California Water Code (CWC) section 13360 generally prohibits the Regional Boards from specifying the manner of compliance with state waste discharge requirements. However, CWC section 13377 provides that the Regional Boards shall issue waste discharge requirements which apply and ensure compliance with all applicable provisions of the Federal Water Pollution Control Act (33 U.S.C. §1251 et seq.), as amended, also known as the federal Clean Water Act (CWA). Section 402(p)(3)(B)(iii) of the CWA requires municipalities to implement "controls to reduce the discharge of pollutants to the maximum extent practicable, including management practices, control techniques and system, design and engineering methods, and such other provisions as the Administrator or the State determines appropriate for the control of such pollutants." The SDRWQCB's responsibility is to translate this section of the CWA into the form of waste discharge requirements. Since tentative Order No. 2001-01 is written to implement CWA requirements, it does not violate section 13360 for the SDRWQCB to include specified programs of Best Management Practices (BMPs) to be implemented by the municipalities in order to carry out CWA requirements. Specificity is even more crucial in waste discharge requirements for storm water discharges given their lack of numerical effluent limits. In order to reduce storm water pollution to the maximum extent practicable (MEP), the tentative order must require specific styles of BMPs (i.e., structural or source control), but that is not to say that the SDRWQCB is dictating one specific BMP to accomplish the task. The municipalities often have many BMPs available to get the job done.

Section: F.3 Subsection: F.3.a.6

Comment: The Port of SD supports the IPM program. (Port of San Diego)

Response: Comment noted.

Section: F.3 Subsection: F.3.a.6

Comment: The IEA strongly supports the development and use of Integrated Pest Management (IPM) programs. (Industrial Environmental Association)

Response: Comment noted.

Section: F.3 Subsection: F.3.b

Comment: Section F.3.b, Page 27 – Definition of Industry is not clear. The Permit needs to clarify which Standard Industrial Classification (SIC) categories are intended to be covered by this section. (City of Chula Vista)

Response: The definition of industry is satisfactory. The requirements in Section F.3.b refer to all industrial sites regardless of whether the industrial site is subject to the California statewide General NPDES Permit for Storm Water Discharges Associated With Industrial Activities Except Construction or other individual NPDES permit. The Tentative Order requires the Copermittees to include in their inventories the minimum information for each site including SIC codes that best reflect the principal products or services offered by each facility.

Section: F.3 Subsection: F.3.b

Comment: Where there are conflicting requirements in an existing NPDES Permit, which Permit takes precedence? (Industrial Environmental Association)

Response: The requirements of Tentative Order 20001-001 should not conflict with the requirements of Order No. 97-03-DWQ, NPDES No. CAS000001, National Pollutant Discharge Elimination System (NPDES) Permit, Statewide Storm Water Permit and Waste Discharge Requirements (WDRs) for the Discharges of Storm Water Associated with Industrial Activities Excluding Construction Activities. Order No. 97-03-DWQ applies to storm water and authorized non-storm water discharges associated with industrial activities. Tentative Order No. 2001-001 applies to discharges into Municipal Separate Storm Sewer Systems. But in the event that the requirements of Order No. 97-03-DWQ are in conflict with Tentative Order No. 2001-001 the SDRWQCB will conduct a thorough evaluation of individual conflicts and determine which requirement will prevail.

Section: F.3 Subsection: F.3.b

Comment: If the General Industrial Permit is inadequate, the Regional Board staff should tell the SWRB and the USEPA. (County of San Diego)

Response: The General Industrial Permit is not inadequate, but in order to adequately protect receiving water quality and allow Copermittees to meet their permit responsibilities under Order No. 2001-01, additional BMPs may be required, including BMPs more stringent than those required under the state wide General Industrial Permit.

Regarding additional BMP requirements of this type, the US EPA finds that "nothing in the Federal regulations would prohibit the municipality from requiring additional controls beyond the permit requirements for industrial activities. For this reason, the EPA recommends that municipal applicants incorporate a provision in the proposed storm water management program that allows the municipality to require priority industrial facilities to implement the controls necessary for the municipality to meet its permit responsibilities" (1992).

The SDRWQCB has discretion to require Jurisdictional Urban Runoff Program items F.3.b.(4)(a) and F.3.b.(4)(b) in Order No. 2001-01 under the broad legal authority cited in the Tentative Order.

Section: F.3 Subsection: F.3.b

Comment: This section would place additional and more restrictive requirements on facilities already subject to the statewide General Industrial Permit. (County of San Diego)

Response: CWA sections 402(p)(3)(B)(ii-iii) require each Copermittee to prohibit non-storm water discharges into its MS4 and to reduce the discharge of pollutants to the maximum extent practicable for all urban land uses. The purpose of these two broad requirements is to minimize the short and long-term impacts of urban runoff on receiving water quality. Land used for industrial activities is clearly identified

in the federal regulations as one of several high priority land uses from which pollutants in urban runoff discharges must be reduced to the maximum extent practicable by each Copermittee. Federal NPDES regulation 40 CFR 122.26(d)(2)(iv) requires the development of a proposed management program to reduce the discharge of pollutants in storm water to the maximum extent practicable. Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(C) requires that this program include a component which addresses industrial sites.

Due to their numerous potential pollutant sources, industrial sites are relatively high risk areas for pollutant discharges to storm water. In order to control the discharge of pollutants from industrial sites to the maximum extent practicable, implementation of BMPs is necessary. As discussed in Finding 12, BMPs effectively reduce pollutants in urban runoff by emphasizing pollution prevention and source controls, followed by treatment controls. The industrial existing development component will provide a program for the development and implementation of BMPs to address pollutants in storm water discharges from industrial sites. The US EPA supports such a program, stating "NPDES permits for MS4s will establish responsibilities for municipal system operators to control pollutants from industrial storm water discharged through their system" (1992).

The revised Tentative Order requires the Copermittees to implement pollution prevention methods and require minimum BMPs for sites they determine to be high, medium and low threats to water quality based on their inventory and prioritization of sites. The Tentative Order requires minimum BMPs that are as industry-specific and site-specific as appropriate. The requirements of the pollution prevention methods and minimum BMPs must meet, but not necessarily exceed the requirements of the General Industrial Permit, unless the Copermittee determines that the BMPs must be more stringent to comply with the Tentative Order.

The SDRWQCB has discretion to require Jurisdictional Urban Runoff Management Program item F.3.b. in Order No. 2001-01 under the broad legal authority cited in the Fact Sheet/Technical Report.

Section: F.3 Subsection: F.3.b.1

Comment: Page 27, Section F.3.b.(1) - Pollution Prevention (Industrial) -
Please explain how the public can participate in this process, and if an education element will be required. (Surfers Tired of Pollution)

Response: The Copermittees are required under Section F.6 to incorporate a mechanism for public participation in the implementation of the Jurisdictional Urban Runoff Management Program. In order to provide the Copermittees with flexibility and discretion, the manner in which they implement a public participation component is left to their discretion.

Section: F.3 Subsection: F.3.b.2

Comment: The Watersheds should be given the flexibility to apply resources to the areas of highest concern and greatest potential to resolve problems. This whole section should be converted to a guidance document. (City of Carlsbad)

Response: CWA sections 402(p)(3)(B)(ii-iii) require each Copermittee to prohibit non-storm water discharges into its MS4 and to reduce the discharge of pollutants to the maximum extent practicable for all urban land uses. The individual Copermittee is held responsible for these requirements within its jurisdiction. The purpose of these two broad requirements is to minimize the short and long-term impacts of urban runoff on receiving water quality. Land used for industrial, commercial, and residential activities are clearly identified in the federal regulations as several high priority land uses from which pollutants in urban runoff discharges must be reduced to the maximum extent practicable by each Copermittee. Federal NPDES regulation 40 CFR 122.26(d)(2)(iv) requires the development of a proposed management program to reduce the discharge of pollutants in storm water to the maximum extent practicable.

The Tentative Order requires the Copermittees within a watershed to collaborate to develop a Watershed Urban Runoff Management Program in which they address the issues identified in the Jurisdictional Urban Runoff Management Program on a watershed level. The early cooperation and collaboration between Copermittees in a watershed within the framework provided in the Tentative Order will prevent the development of "inconsistent jurisdictional level activities" and ensure the "regional consistency" referred to by other commentors.

Section: F.3 Subsection: F.3.b.3

Comment: The State should provide a list of what industrial sites are considered high, medium or low threats to water quality (Page 28 of 50). Otherwise, the cities would be open to speculation and litigation from the environmental community due to the vagueness of the permit on the types of industrial sites which must be inventoried. (Coalition for Practical Regulation)

Response: Section F.3.b.2 of the revised Tentative Order does require the Copermittee to inventory and prioritize industrial sites as high, medium, or low priorities and provides specific criteria defining high priority industrial sites. The definition of low and medium priority sites will be made at the discretion of the Copermittees.

Section: F.3 Subsection: F.3.b.4

Comment: Subparagraph F.3.b.4 Proposed Wording:
(4) BMP implementation and proof of long-term maintenance. (Downstream Services)

Response: Comment noted.

Section: F.3 Subsection: F.3.b.4.a

Comment: Modify the first sentence to "Each Copermittee shall designate a set of minimum BMPs or their equivalent for high, medium, and low threat to water quality industrial sites (as determined under section F.3.b.(3)). (Port of San Diego)

Response: The definition of BMP in Attachment D of the Tentative Order is broad and inclusive. It is likely that any equivalent alternative would fall under this definition, making the inclusion of such terms unnecessary.

Section: F.3 Subsection: F.3.b.5

Comment: Where would Copermittees obtain the legal authority (1) to require them to monitor? and/or (2) to make them submit data they collected under a different permit? (County of San Diego)

Response: The Copermittees have the legal authority to require monitoring and pollution prevention BMPs under their individual authority to enact ordinances and issue permits for operation.

The Copermittee is ultimately responsible for discharges to and from their MS4. Each Copermittee must therefore develop and enforce storm water ordinances in order reduce pollutant discharges to the MS4 to the maximum extent practicable and comply with its permit responsibilities. These ordinances must be applied at all industrial sites to ensure that pollutant discharges to the MS4 are reduced to the maximum extent practicable and permit requirements are met. To this effect, the US EPA "recommends that municipal applicants incorporate a provision in the proposed management program that allows the municipality to require priority industrial facilities to implement the controls necessary for the municipality to meet its permit responsibilities" (1992). Regarding enforcement at industrial sites, the US EPA further states "The municipality, as a permittee, is responsible for compliance with its permit and must have authority to implement the conditions in its permit. To comply with its permit, a municipality must have the authority to hold dischargers accountable for their contributions to separate storm sewers" (1992). The SDRWQCB has discretion to require Jurisdictional Urban Runoff Program item F.3.b.(7) in Order No. 2001-01 under the broad and specific legal authority cited in the Fact Sheet/Technical Report.

Section: F.3 Subsection: F.3.b.5

Comment: Provisions are made in the Statewide Permit to reduce sampling. This section does not allow for the same provision. It should be modified to conform to SRWCB guidelines. (Industrial Environmental Association)

Response: Group monitoring will be allowed in the Tentative Order.

See change at permit section F.3.b.5

Section: F.3 Subsection: F.3.b.5

Comment: If this section is interpreted to mean all industrial sites having or needing all NPDES Permit or
General Industrial Permit must sample, the impact on analytical laboratories should be addressed. The IEA recommends language reaffirming group application and monitoring processes be placed in this section. (Industrial Environmental Association)

Response: Group monitoring will be allowed in the Tentative Order.

See change at permit section F.3.b.5

Section: F.3 Subsection: F.3.b.5

Comment: The monitoring program would impact current monitoring programs for industrial facilities required by industrial and/or construction storm water permits. Would the monitoring program in the Order be in addition to, replace or supplement facilities' monitoring programs. (City of San Diego)

Response: In most instances, it is expected that the monitoring program required by the Tentative Order will supplement the monitoring currently being conducted for industrial facilities. However, since there a number of facilities which use industrial-type materials, but are unregulated under the General Industrial Permit there will be areas in which the municipal monitoring program will be conducted in addition to current industrial monitoring.

Section: F.3 Subsection: F.3.b.5

Comment: This section would also expand these industrial permit monitoring requirements to an unspecified larger group of other "industrial" facilities. Where are these "industrial" facilities and why aren't they subject to the General Industrial permit? (County of San Diego)

Response: It is the Copermittees responsibility under Tentative Order 2001-01 to identify and inventory all industrial activities within their jurisdiction. During this process, the Copermittees may identify facilities that should be subject to the General Industrial permit that do not have the required coverage. Also, if the facility is not subject to the General Industrial permit, the Copermittee may determine that in order to control the discharge of pollutants from the facility in question to the maximum extent practicable, implementation of BMPs and the submittal of results from a monitoring program are necessary. The Copermittees are required to conduct or require the industry to conduct a monitoring program for runoff from each high threat to water quality industrial site.

Due to their numerous potential pollutant sources, industrial sites are high risk areas for pollutant discharges to storm water. In order to prohibit non-storm water discharges, reduce industrial pollutant sources to the maximum extent practicable, and ensure that adequate BMPs are implemented, each Copermittee must first identify all industrial sites within their jurisdiction. Development of an inventory of industrial sites within a watershed will help identify potential industrial sources of pollutants in storm water. By assessing information provided in the inventory (such as principal products, services provided, and location), sites with the highest risk to receiving water quality can be identified, and priority for inspection, monitoring, and enforcement can be placed on those sites. By focusing inspection and monitoring on high priority sites, the effectiveness of limited inspection and monitoring resources can be maximized.

In order to control the discharge of pollutants from industrial sites to the maximum extent practicable, implementation of BMPs is necessary. As discussed in Finding 12, BMPs effectively reduce pollutants in urban runoff by emphasizing pollution prevention and source controls, followed by treatment controls. The industrial existing development component will provide a program for the development and

implementation of BMPs to address pollutants in storm water discharges from industrial sites. The US EPA supports such a program, stating "NPDES permits for MS4s will establish responsibilities for municipal system operators to control pollutants from industrial storm water discharged through their system" (1992).

Section: F.3 Subsection: F.3.b.5

Comment: When the regulations conflict between the industrial permit, the construction permit or the municipal, which permit is enforced? (Sachse, Marvin)

Response: We do not anticipate conflicts arising between Tentative Order 20001-001 and Order No. 97-03-DWQ, NPDES No. CAS000001, National Pollutant Discharge Elimination System (NPDES) Permit, Statewide Storm Water Permit and Waste Discharge Requirements (WDRs) for the Discharges of Storm Water Associated with Industrial Activities Excluding Construction Activities or Order No. 99-08-DWG, NPDES No. CAS000002, National Pollutant Discharge Elimination System (NPDES) Permit, Statewide Storm Water Permit and Waste Discharge Requirements (WDRs) for the Discharges of Storm Water Runoff Associated with Construction Activity. Order No. 97-03-DWQ applies to storm water and authorized non-storm water discharges associated with industrial activities. Order No. 99-09-DWQ applies to storm water and non-storm water runoff associated with construction activity on sites greater than 5 acres. Tentative Order No. 2001-01 applies to discharges into Municipal Separate Storm Sewer Systems. At a minimum, the BMPs and other measures required for industrial and construction activities by the Copermittees must meet or exceed the requirements of the General Statewide Permits. The Copermittees may require more stringent measures be implemented at industrial or construction sites in order to comply with the Tentative Order. In the event that the requirements of Order No. 97-03-DWQ or Order No. 99-08-DWQ are in conflict with Tentative Order No. 2001-001 the SDRWQCB will conduct a thorough evaluation of individual conflicts and determine which requirement will prevail.

Section: F.3 Subsection: F.3.b.5

Comment: According to this section, Copermittees would have to require monitoring for all the listed constituents from at least two events every year. The General Industrial permit provides some flexibility with respect to monitoring requirements. For instance, some facilities participate in group monitoring programs in which they must only sample in two of the five years of the permit cycle. The General Industrial permit also allows other exemptions and reductions (Sampling and Analysis Exemptions and Reductions; Section B.12.). Tentative Order No. 2001-01 would not allow Copermittees to provide the same flexibility. (County of San Diego)

Response: The purpose of the monitoring program is to provide the information needed by each Copermittee to assess the effectiveness of its Industrial BMP Program. Quantitative data is required for two storm events per year in order to identify potential trends and/or anomalies in the data. The Copermittee may be able to obtain this monitoring information from some industrial sites by requesting submittal of the Annual Reports required under the General Industrial Storm Water Permit. The SDRWQCB has discretion to require Jurisdictional Urban Runoff Program item F.3.b.(5) in Order No. 2001-01 under the broad and specific legal authority cited in the Fact Sheet/Technical Report.

Section: F.3 Subsection: F.3.b.5.b

Comment: Section F.3.b (5)(b): What testing standards are required? (City of Chula Vista)

Response: Sampling and testing standards for industrial sites may be found in Section B of the Waste Discharge Requirements for Discharges of Storm Water Associated with Industrial Activities (General Industrial Storm Water Permit) SWRCB Order No. 97-03-DWQ.

Section: F.3 Subsection: F.3.b.6

Comment: Does Section F.3.b(6) allow for third-party (contractor) inspections of industrial site? (City of San Diego)

Response: Provided the Copermittees can demonstrate that all of the requirements of Tentative Order Section F.3.b(6) are met, the Copermittees are permitted to conduct the inspections using third-parties (contractors). The Copermittees are, however, ultimately responsible for implementing or requiring the implementation of all requirements in the Tentative Order.

Section: F.3 Subsection: F.3.c

Comment: Commercial BMP, F.3.C., is not clear if every parking lot is included. (City of Poway)

Response: Because parking lots are a surface onto which vehicles deposit a significant load of pollutants, they are addressed in the Tentative Order in the Jurisdictional Urban Runoff Management Program Municipal, Commercial and Residential components. The specific comment on F.3.c refers to all parking lots associated with commercial activities.

Section: F.3 Subsection: F.3.c.2

Comment: Please provide examples of types of commercial facilities or activities that were considered but not included on the RWQCB's high priority list (County of San Diego)

Response: The categories of commercial activities and facilities included in the high priority list in Section F.3.c.2 were drawn from the lists of complaint investigations and detections of illicit discharges reported to the SDRWQCB by the Copermittees and the public. The sites and activities are identified as such due to their frequent use of substances often found to be present as pollutants in urban runoff, combined with frequent mismanagement of runoff from the sites and activities. Therefore, development of an inventory of these commercial sites within a watershed will help identify the location of potential sources of pollutants in storm water. Pollutants found to be present in receiving waters can then be traced to the sites which frequently use such substances. In this manner an inventory of commercial sites can help in targeting commercial sites for inspection, monitoring, and potential enforcement. This will allow for limited inspection, monitoring, and enforcement time to be most effective.

Some commercial activities that were considered but were not included are strip malls providing multiple services, dry cleaning establishments, and home improvement centers. The Copermittees are free, however, to cover these and other potentially serious pollutant sources under item (w) "Other Commercial sites/sources that the Copermittee determines may contribute a significant pollutant load to the MS4..."

Section: F.3 Subsection: F.3.c.2

Comment: Home improvement and building supply centers should be listed as they contain many of the sources listed here. (Sierra Club)

Response: Home improvement and building supply centers may be addressed by the Copermittees under several of the categories listed (e.g. landscaping, greenhouses and nurseries, masonry) or they may elect to cover these commercial activities under Section F.3.c.2.w "Other commercial sites/sources that the Copermittee determines may contribute a significant pollutant load to the MS4." The Regional Board does not recommend adding this category to Tentative Order 2001-01.

Section: F.3 Subsection: F.3.c.3

Comment: F.3.c.(3) "BMP Implementation"

The RWQCB lacks the legal authority to compel Copermittees to require implementation of BMPs at commercial facilities. (County of San Diego)

Response: California Water Code (CWC) section 13377 provides that the Regional Boards shall issue waste discharge requirements which apply and ensure compliance with all applicable provisions of the Federal Water Pollution Control Act (33 U.S.C. §1251 et seq.), as amended, also known as the federal Clean Water Act (CWA). Section 402(p)(3)(B)(iii) of the CWA requires municipalities to implement "controls to reduce the discharge of pollutants to the maximum extent practicable, including management practices, control techniques and system, design and engineering methods, and such other provisions as the Administrator or the State determines appropriate for the control of such pollutants." The SDRWQCB's responsibility is to translate this section of the CWA into the form of waste discharge requirements. Therefore the SDRWQCB has the authority to require specified programs of Best Management Practices (BMPs) to be implemented by the municipalities in order to carry out CWA requirements. Furthermore, commercial facilities are specifically addressed at 40 CFR 122.26(d)(2)(iv)(A).

Section: F.3 Subsection: F.3.d.2

Comment: Threat to Water Quality Prioritization (Residential)- Automobile washing is listed here as a threat, but on Page 9 of the permit it is excluded unless it "is a significant source of pollutants." This seems incongruent and should be addressed. (Industrial Environmental Association)

Response: Automobile washing is appropriately identified as a threat to water quality because of the many pollutants associated with automobiles that may be washed into the MS4. This category of illicit

discharge is also correctly excluded from the list of prohibited illicit discharges until such time as the Copermittees identify this activity as a significant source of pollutants. Automobiles can be washed without discharging pollutants to the MS4 and so should not be prohibited without justification.

Section: F.3 Subsection: F.3.d.2

Comment: Section F.3.d (2): All residences in the City would be classified as "high priority" since the entire City is tributary to San Diego Bay. (City of Chula Vista)

Response: The City of Chula Vista is tributary to San Diego Bay, which is a 303(d) listed water body, and would be classified as high priority under Tentative Order 2001-01.

Section: F.3 Subsection: F.3.d.2

Comment: Section F.3.d.(2) - Page 31 - Threat to Water Quality Prioritization (Residential); and F.3.d.(3) - Page 32 - BMP Implementation (Residential): If automobile parking on the streets is determined to be a high priority residential activity, how do you mitigate (other than catch basin inserts which haven't proven to be too effective)? If some people park on the streets and others don't, who pays for the BMPs? (i.e., will residents who don't park on the streets be amiable to paying for those - other residents and visitors - who do?) How do you determine if parking or driving is the significant source? (City of La Mesa)

Response: The BMPs to be chosen for implementation is left to the discretion of the Copermittees. One method which might be effective is education. People could be educated on the impacts of their oil leaks, and potentially influenced to get the leaks fixed. Municipalities could also consider areas where cars are most heavily parked on the street, such as a downtown area, a choose to implement catch basin inserts in that particular area.

Section: F.3 Subsection: F.3.d.2

Comment: Section F.3.d. (2) - Page 31 - Threat to Water Quality Prioritization (Residential): It requires the Copermittees to identify a list of predetermined residential activities assumed to be threats to water quality. If any of these activities are not prohibited by the Copermittees (for being deemed a non-significant sources of pollutants) they should not be inventoried. (City of La Mesa)

Response: Section F.3.d.2 of the Tentative Order requires the Copermittees to identify high priority threats to water quality in their Jurisdictional Urban Runoff Management that include the categories in F.3.d.2 and to implement or require the implementation of minimum BMPs for high threat water quality residential areas and activities that are area or activity specific.

The above residential areas and activities are identified as high priority threats to water quality due to their wide distribution, their association with pollutants of concern in urban runoff, and their historical mismanagement of associated urban runoff. Identification of high priority residential areas and activities will help focus BMP implementation efforts on these areas and activities. By focusing efforts on high

priority areas and activities, the greatest potential for water quality improvements will result. Therefore, limited Copermittee staff time will be focused where it can be most effective. The SDRWQCB has discretion to require Jurisdictional Urban Runoff Program item F.3.d.(2) in Order No. 2001-01 under the broad legal authority cited in the Fact Sheet/Technical Report.

Section: F.4 Subsection:

Comment: Although cities share responsibility in increasing public awareness, the public would be better served by a State funded public education program. The State should approach this on a statewide basis to take advantage of major media outlets. A statewide-integrated program will be most cost effective and consistent. (Coalition for Practical Regulation, City of Carlsbad, City of Poway)

Response: SDRWQCB believes that public education is important at all levels of government. EPA develops and publishes storm water guidance materials. The State Water Quality Control Board also develops and distributes such guidance. This information is made available on several websites which are accessible to everyone. However, local entities need the flexibility to tailor public outreach to the efforts which are most pressing for that area. For instance, the land use activities and resulting water quality problems vary widely from urban centers to agricultural regions. The outreach must be tailored for the target audience and prioritized to local issues. A local entity would best be able to determine what those priorities should be. Such outreach is intrinsic to any storm water management plan. Therefore, the requirement for active municipal involvement in public education shall remain in the Tentative Order.

Section: F.4 Subsection:

Comment: Section F.4. establishment by the RWQCB of minimum target communities and minimum program content violates CWC section 13360. This also applies to Copermittee outreach programs. (County of San Diego)

Response: CWC Section 13360 specifies that the Regional Board shall not specify the design, location, type of construction, or particular manner in which a permittee shall comply with permit requirements. The education component of section F.4 of the draft permit specifies that communities are subject to the education component and which topics must be addressed. The draft permit, however, does not specify how the education component or outreach programs will be carried out. Copermittees will be required to design their own programs in order to comply with permit requirements; therefore Section F.4 of the draft permit is consistent with CWC 13360.

Section: F.4 Subsection:

Comment: What criteria will be used by the Regional Board to "measure" increases in knowledge and behavioral changes in target communities regarding MS4s, impacts of urban runoff, and potential BMP solutions, and judge whether a particular educational component is satisfactory? What is the RWQCB's expectation for measurably increasing the knowledge of transient target communities such as visitors (although not listed, they could possibly be identified as a "significant source of pollutants")? (Procopio, Cory, Hargreaves, & Savitch, L.L.P., Coronado)

Response: SDRWQCB believes that in order to provide the Permittees with maximum flexibility, they may develop their own criteria for which to measure their success. Some possible suggestions would be to conduct random baseline surveys of target audiences, followed by periodic follow-up surveys; charting the hits on Permittee-run informational internet sites over time; numbers of classroom presentations over time; measuring media attention on Permittee sponsored water quality protection issues; number of workshops participants overtime; etc. As these programs continue, it is expected that the Permittees will devise new and creative ways to measure increases in knowledge.

Section: F.4 Subsection:

Comment: Copermittees should consider partnerships with local environmental groups, such as SDBK and SDSF who are already engaged in programs of educating citizens regarding discharge impacts and requirements. (Surfrider Foundation)

Response: Comment noted.

Section: F.4 Subsection: F.4

Comment: Allowance should be made for water washing unsanitary conditions on side walks such as food spillage. (City of Lemon Grove)

Response: Washing of sidewalks, patios, etc. is permissible, provided BMPs are implemented. For example, the wash water could be captured and collected or absorbed, or directed towards pervious areas (as long as the washing is infrequent). Directing the wash water through a filter may also be acceptable. There are many guidance documents available regarding BMP implementation in such cases, such as the California Storm Water Best Management Practices Handbooks developed by the Storm Water Quality Task Force.

Section: F.4 Subsection: F.4.a

Comment: "F.4.a. All Target Communities"

This section is ambiguous and unworkable. It should be deleted. (County of San Diego)

Response: For at least eighteen categories, Section F.4.a specifically identifies the activities for which the Permittees must consider individuals as members of a "Target Community." This Section sets a clear minimum criteria for identifying the target communities to which the Permittees must direct public education efforts. Section F.4.a. is necessary to provide clarification, so it has not been deleted.

Section: F.4 Subsection: F.4.b

Comment: Add: Disease prevention, mosquito/vector awareness (State Department of Health Services)

Response: In recognition of the potential public health threat, an additional Finding is recommended to be added to the Tentative Order. The Finding (no. 36) identifies the potential vector issues related to BMP implementation and the role of collaborative program development between municipalities and vector control agencies in addressing an minimizing vector production.

Section: F.5 Subsection:

Comment: The requirement that each Copermittee "…shall prevent, respond to, contain and clean up all sewage and other spills that may discharge into its MS4 from any source (including private laterals)." should be modified to state that this requirement is to be performed to the MEP or be deleted. Because private laterals are owned and operated by private parties (such as residential property owners), preventing spills from such laterals is beyond the Copermittees' ability to control and such a program would be unlikely to be effective in practice. The Copermittees will be logistically unable to respond to both private lateral blocks and sewer main blockage as resources will spread too thin. The main priority must be to prevent sewage spills from the City main lines. While there is no way to assure that the Copermittee is notified of all spills into its MS4, it is practicable for the Copermittees to establish programs (i.e. educational outreach, communication links, etc.) to require and enable citizens to notify the Copermittees of sewage spills from private laterals. This requirement should be removed or modified to require such programs be implemented to the MEP. (City of San Diego, Chula Vista, La Mesa, Imperial Beach, Metro Commission)

Response: Sewage and other spills frequently enter the MS4, to be carried and discharged to receiving waters. Such spills into and from the MS4 can severely impair receiving water quality and pose a significant threat to public health. To avoid these negative impacts, the proposed management program must describe procedures that the Copermittee will implement to prevent, contain, and respond to spills that may discharge into the MS4. The US EPA states "The goal of a spill prevention program is to reduce the frequency and extent of spills of hazardous materials which can cause water quality impairment. Spill containment programs may establish minimum chemical storage and handling requirements, require users to submit prevention and control plans, and ensure site inspections. […] Spill response teams should attempt to prevent or minimize contamination of surface water, groundwater, and soil. Spill response programs often require a coordinated response from a number of municipal departments. Municipalities should describe how response procedures within these programs attempt to mitigate potential pollutant discharges to surface waters and the MS4" (1992). The SDRWQCB has discretion to require Jurisdictional Urban Runoff Management Program item F.5.f in Order No. 2001-01 under the broad and specific legal authority cited in the Fact Sheet/Technical Report pp. 157-158.

Section: F.5 Subsection: F.5.g

Comment: Citizens are extremely effective in assisting Copermittees to identify violators of local discharge prohibitions. However, citizens have experienced difficulty contacting local enforcement personnel on weekends or after hours, when many violations occur. To facilitate public reporting of violations, the Copermittees should be required to maintain a daily 24-hour "stormwater hotline," maintained by a live person during business hours and checked periodically after-hours. Moreover, the Copermittees should also facilitate the use of electronic mail as a means of reporting discharge violations.

The current hotline rolls over to the 911 emergency system after hours and on weekends. The IEA strongly feels this is an inappropriate use of the 911 emergency system, and may result in complaints or reports not being investigated in a timely manner. The IEA strongly urges the Board to direct the Copermittees to develop and properly staff a 24-hour hotline. (Surfrider Foundation, Industrial Environmental Association)

Response: The Copermittees have the discretion to implement the requirements of Section F.5.g of the Tentative Order in the manner they determine is the most effective. The revised Tentative Order does not direct the Copermittees to roll-over calls from their storm water hotline to the 911 emergency system. The Copermittees are not required, but do have the discretion, under the revised Tentative Order to facilitate the use of electronic mail as a means of reporting discharge violations.

Section: F.5 Subsection: F.5.h

Comment: The language in Section F.5.h “Facilitate Disposal of Used Oil and Toxic Materials” should be revised to clarify the SDRWQCB’s intent and add formal requirements or otherwise be deleted. Curbside collection of hazardous wastes may be a potential health risk and a source of contamination from leaky containers, improper handling and mixing, and irregular pick up, etc. Collection programs may increase public exposure to the risks of improperly handling and mixing of chemicals. Any mandate or encouragement by the Regional Board for curbside collection programs should include requirements for a formal collection program with authorized containers and educational programs.
To avoid these unintended consequences, we suggest the Regional Board add the following language: ". . . Formal curbside collection programs for the collection of household hazardous wastes deposited in secure authorized containers is encouraged. Such a curbside collection program must include a substantial educational component concerning the public handling and depositing of the household hazardous wastes. " The requirement is necessary, however, because the current programs for disposal of household toxic waste do not adequately facilitate the public's ability to dispose of their waste. There need to be more collection sites established with regular hours. It is difficult for many San Diegans to find disposal sites located in a convenient area. This discourages people from disposing of their wastes properly. (Environmental Health Coalition, Sierra Club, Surfers Tired Of Pollution)

Response: Curbside collection is only encouraged, not required, in the Tentative Order. The issues raised in the comment are pertinent and were addressed in the Public Workshops. It is the responsibility of the Copermittees to design and implement a program that meets or exceeds the requirements of Section F.5.h of the Tentative Order and does not result in a threat to human or environmental health.

The US EPA states "If private individuals find the proper disposal of used oil or toxic materials difficult, incidents of improper disposal (such as into the MS4) increase" (1992). Therefore Copermittees are required to propose a program component that will facilitate the proper disposal of used oil and toxics from households by establishing municipally operated collection sites, or ensuring that privately operated collections sites are available. The US EPA suggests this program component "should describe outreach plans to handlers of used oil and to the public, and operating plans for oil and household waste collection programs" (1992). The SDRWQCB has discretion to require Jurisdictional Urban Runoff Management Program item F.5.h in Order No. 2001-01 under the broad and specific legal authority cited in the Fact Sheet/Technical Report.

Section: F.5 Subsection:

Comment: Furthermore, we urge you to include specifically in Section F.5. coverage for failing septic systems as an illicit discharge. (USEPA)

Response: Section F.5 of the Tentative Order has been revised to specifically include failing septic systems as an illicit discharge.

Section: F.5 Subsection:

Comment: The Regional Board has not established that it has the jurisdictional authority to dictate the manner in which municipalities regulate illicit discharges into their MS4s. (Procopio, Cory, Hargreaves, & Savitch, L.L.P.)

Response: California Water Code (CWC) section 13377 provides that the Regional Boards shall issue waste discharge requirements which apply and ensure compliance with all applicable provisions of the Federal Water Pollution Control Act (33 U.S.C. §1251 et seq.), as amended, also known as the federal Clean Water Act (CWA). Section 402(p)(3)(B)(iii) of the CWA requires municipalities to implement "controls to reduce the discharge of pollutants to the maximum extent practicable, including management practices, control techniques and system, design and engineering methods, and such other provisions as the Administrator or the State determines appropriate for the control of such pollutants." The SDRWQCB's responsibility is to translate this section of the CWA into the form of waste discharge requirements. Therefore the SDRWQCB has the authority to require specified programs to be implemented by the municipalities in order to carry out CWA requirements. Furthermore, illicit discharges are specifically addressed at 40 CFR 122.26(d)(2)(iv)(B).

Section: F.5 Subsection: F.5.g

Comment: We strongly support the requirement for all reporting hotlines in Spanish and English (Section F. 5. G). (Environmental Health Coalition)

Response: Comment noted

Section: F.5 Subsection: F.5.I

Comment: Similarly, section F.5.i. requires Copermittees to limit infiltration of seepage from municipal sanitary sewers to MS4s, and to conduct routine maintenance of both the MS4 and the sanitary sewers. However, routine preventive maintenance of the storm drain system will not result in less sanitary sewer infiltration – such infiltration can be addressed effectively only through maintenance and repair of the sanitary sewer system which is the source of such infiltration. Furthermore, the sanitary sewer system is regulated under a separate NPDES permit, and it would be more appropriate and effective to require maintenance and repair of the sanitary sewer in the NPDES permit applicable to the sanitary sewer system. Finally, for the reasons just discussed, the City also requests that the reference to sanitary sewer maintenance be removed from the definition of MEP contained in Attachment D to the Tentative Order (Glossary). (City of San Diego)

Response: Regarding seepage from sanitary sewers, the US EPA states "Raw sewage can seep from sanitary sewage collection systems through leaks and cracks in aging pipes, poorly constructed manholes and joints, and main breaks. Sewage from a leaky sanitary system can flow to storm sewers or contaminate ground water supplies. Interaction between sanitary sewers and separate storm sewers may occur at manholes and where sanitary sewer laterals and storm sewer trenches cross. Separate storm sewers and sanitary sewers may share the same trench, which is generally filled with very porous material such as gravel" (1992). Also, the Federal NPDES regulations 40 CFR 122.26(d)(7)(iv)(B)(7) requires "A description of controls to limit infiltration of seepage from municipal sanitary sewers to municipal separate storm sewers…" When raw sewage enters the storm water system, it can reach receiving waters untreated, posing a threat to water quality and public health.

Municipalities that operate a MS4 often also operate or contract for the operation of a sanitary sewerage system as well. In such cases, the management and maintenance of the two systems should be coordinated to limit infiltration of seepage from the municipal sanitary sewer to the MS4s. The fact that the two activities are authorized under separate NPDES permits does not relieve the Copermittee in question of the requirement to perform or require the performance of routine and thorough preventative maintenance of both to limit infiltration from the municipal sanitary sewer into the MS4.

However, some Copermittees operate MS4s in service areas where a different entity operates or contracts for the operation of the municipal sanitary sewerage system. In such cases, the Tentative Order should not require those Copermittees to conduct thorough, routine preventive maintenance of the municipal sanitary sewer. Accordingly, the language of Section F.5.i has been revised (as written below) to require the thorough, routine preventive maintenance of the MS4 system of all Copermittees and the thorough, routine preventive maintenance of the municipal sanitary sewer only in those cases where the Copermittee has direct authority over the municipal sanitary sewer:

The definition of MEP contained in Attachment D of the Tentative Order has been revised to refer to the maintenance of the municipal separate storm water sewer system rather than the sanitary sewer system.

Section F.5.I has been revised as follows:
Each Copermittee shall implement controls to limit infiltration of seepage from municipal sanitary sewers to MS4s through thorough, routine preventive maintenance of the MS4. Each Copermittee that operates both a municipal sanitary sewer system and a MS4 shall implement controls and measures to limit infiltration of seepage from municipal sanitary sewers to MS4s that include overall sanitary sewer and MS4 surveys and thorough, routine preventive maintenance of both.

Section: F.5 Subsection: F.5.I

Comment: Paragraph F.5.i is another example. Padre Dam MWD owns and operates the wastewater collection system in Santee, and parts of El Cajon and the County of San Diego. We do not expect any one of these agencies to perform the acts specified in F.5, nor does the City of Santee have equipment and staffing to do this work.

Recommendation: (a) Ensure that this permit is not in conflict with other outstanding permits of agencies in the region. (b) Provide language excluding those Copermittee agencies from responsibilities of managing wastewater systems that are owned and operated by other agencies. (Padre Dam Municipal Water District)

Response: Municipalities that operate a MS4 often contract for the operation of a sanitary sewerage system as well. In such cases, the management and maintenance of the two systems should be coordinated to limit infiltration of seepage from the municipal sanitary sewer to the MS4s. The fact that the two activities are authorized under separate NPDES permits does not relieve a Copermittee of the requirement to perform or require the performance of routine and thorough preventative maintenance of both to limit infiltration from the municipal sanitary sewer into the MS4.

However, some Copermittees operate MS4s in service areas where a different entity operates or contracts for the operation of the municipal sanitary sewerage system. In such cases, the Tentative Order should not require those Copermittees to conduct thorough, routine preventive maintenance of the municipal sanitary sewer. Accordingly, the language of Section F.5.i has been revised (as written below) to require the thorough, routine preventive maintenance of the MS4 system of all Copermittees and the thorough, routine preventive maintenance of the municipal sanitary sewer only in those cases where the Copermittee has direct authority over the municipal sanitary sewer:

Regarding seepage from sanitary sewers, the US EPA states “Raw sewage can seep from sanitary sewage collection systems through leaks and cracks in aging pipes, poorly constructed manholes and joints, and main breaks. Sewage from a leaky sanitary system can flow to storm sewers or contaminate ground water supplies. Interaction between sanitary sewers and separate storm sewers may occur at manholes and where sanitary sewer laterals and storm sewer trenches cross. Separate storm sewers and sanitary sewers may share the same trench, which is generally filled with very porous material such as gravel” (1992). Also, the Federal NPDES regulations 40 CFR 122.26(d)(7)(iv)(B)(7) requires "A description of controls to limit infiltration of seepage from municipal sanitary sewers to municipal separate storm sewers…" When raw sewage enters the storm water system, it can reach receiving waters untreated, posing a threat to water quality and public health.

The definition of MEP contained in Attachment D of the Tentative Order has been revised to refer to the maintenance of the municipal separate storm water sewer system rather than the sanitary sewer system.

Section F.5.I has been revised as follows:
Each Copermittee shall implement controls to limit infiltration of seepage from municipal sanitary sewers to MS4s through thorough, routine preventive maintenance of the MS4. Each Copermittee that operates both a municipal sanitary sewer system and a MS4 shall implement controls and measures to limit

infiltration of seepage from municipal sanitary sewers to MS4s that include overall sanitary sewer and MS4 surveys and thorough, routine preventive maintenance of both.

Section: F.7 Subsection: F.7.c

Comment: The requirement in Section F.7.c to include in the Individual Jurisdictional URMP Annual Reports a self-assessment of "overall percent compliance" with the Tentative Order should be deleted. It is inappropriate to require Copermittees to assess their own compliance. It is not possible for Copermittees to assess their own "percent compliance" without the establishment of objective criteria by which to gauge their performance. Such criteria do not exist, and it would be inappropriate for the Copermittees to establish them since this would present an obvious conflict. Also, not only would it be difficult and potentially impossible to meaningfully satisfy this requirement on an individual basis, but the self-assessments of each Copermittee taken together would be even less meaningful because of the inherently subjective nature of such self-assessments. Assessing the performance of Copermittees is the responsibility of the RWQCB, and should remain so. (City of San Diego, County of San Diego, Chula Vista, La Mesa, Imperial Beach, Port of San Diego)

Response: The SDRWQCB agrees with your point that a self assessment of overall percent compliance is arbitrary and will result in the generation of meaningless figures which will not serve to measure true compliance. Therefore, the Tentative Order will be changed to reflect your suggestion.

See Section F.7.c. for the changes.

Section: F.7 Subsection: F.7

Comment: The Regional Board needs to provide guidance by working collaboratively with Watersheds in defining watershed objectives and performance measures. (City of Carlsbad)

Response: As addressed during the workshops, SDRWQCB staff will participate in the development of the Watershed Urban Runoff Management Plans as well as the County Project Clean Water Program. The definition of watershed objectives and performance measures will be determined by the Copermittees based in part on receiving water quality objectives, the Copermittees Jurisdictional Urban Runoff Management Programs, and other factors the Copermittees may identify.

Section: F.7 Subsection: F.7.a

Comment: Require testing program to measure pollutants meet MEP standards, not specific sites standards which may be under water due to tide or under influence from Mexico or other sources. (City of Imperial Beach)

Response: Section F.7 requires that the Copermittee develop a long term strategy to assess the effectiveness of the Jurisdictional Urban Runoff Management Program (JURMP) using a number of

parameters proposed in the it's JURMP Document subject to SDRWQCB review. The Copermittees have the discretion to include direct and indirect measures that include, but are not limited to pollutant loading and receiving water quality monitoring data.

Section: F.7 Subsection: F.7.a

Comment: How is the pollution from Mexico included when calculating the effectiveness of the URMP in Imperial Beach? (City of Imperial Beach)

Response: Selection of sample sites and water quality constituents can be conducted to identify local sources of pollutants resulting from urban runoff discrete from pollutant loadings from Mexico. In addition, the Copermittees can develop other methods of evaluating the effectiveness of the Jurisdictional and Watershed Urban Runoff Management Programs.

Section: F.8 Subsection:

Comment: This requirement is not supported by Federal regulations and could be impossible to implement. It is clear that the agencies will be required to pay for the implementation of the Tentative Order and that the SDRWQCB has little concern for what the cost may be or how the agencies shall provide funding comply with the Tentative Order. This requirement should be deleted. (County of San Diego, Imperial Beach, Carlsbad)

Response: Federal NPDES regulation 40 CFR 122.26(d)(2)(vi) provides that "[The Copermittee must submit] for each fiscal year to be covered by the permit, a fiscal analysis of the necessary capital and operation and maintenance expenditures necessary to accomplish the activities of the programs under paragraphs (d)(2)(iii) and (iv) of this section. Such analysis shall include a description of the source of funds that are proposed to meet the necessary expenditures, including legal restrictions on the use of such funds."

A fiscal analysis can be an important planning tool. The US EPA finds that "examining the levels of proposed spending and funding allows the permitting authority to gauge the ability of the applicant to implement the program and predict its effectiveness. The fiscal analysis also will help the [SDRWQCB] determine whether the applicant has met the statutory requirement of reducing the discharge of pollutants to the MS4 to the maximum extent practicable. Finally, the estimates help the applicant evaluate the feasibility and cost-effectiveness of its program" (1992). The SDRWQCB has discretion to require Jurisdictional Urban Runoff Management item F.8 in Order No. 2001-01 under the broad and specific legal authority cited in the Fact Sheet/Technical Report.

Section: F.8 Subsection:

Comment: The Copermittees' ability to obtain funding and effectively conduct a fiscal analysis, including securing the resources necessary to meet the requirements of this Tentative Order, is severely

constrained by state laws restricting the imposition and collection of fees, taxes and assessments at the local level, thereby inhibiting the Copermittees' ability to accurately forecast such receipts. For example, pursuant to Proposition 218, certain fees must be approved by City residents via the ballot process. Although Proposition 37 failed to pass in the recent election, a similar proposition could impact the City's ability to establish new fees or assessments. As a result, the City's ability both to obtain funding through this process, and to forecast the likely level of such funding, is highly unpredictable. Any fiscal analysis required by the Tentative Order needs to take account of these restrictions on municipal funding and planning efforts and include workable timelines. To help augment local programs, the City requests support by the Regional Board staff to work with the Copermittees to obtain state and federal funding. (City of San Diego, El Cajon, Escondido, Imperial Beach, Coalition for Practical Regulation)

Response: The implementation schedule for most of the Jurisdictional Urban Runoff Management Programs has been extended from 180 days to 365 days to provide the Copermittees additional time to secure adequate funding.

The SDRWQCB has recently undergone an extensive process to support the Copermittees attempts to securing funding resulting from passage of Proposition 13. The SDRWQCB also assists in securing funds from other state and federal sources.

Section: F.8 Subsection:

Comment: By what legal authority does the Regional Board impose the requirement that each Copermittee shall secure the fiscal resources necessary to meet the requirements of this Order? The order has no assessment of its economic and fiscal impacts on the Copermittees. (Procopio, Cory, Hargreaves, & Savitch, L.L.P.)

Response: California Water Code (CWC) section 13377 provides that the Regional Boards shall issue waste discharge requirements which apply and ensure compliance with all applicable provisions of the Federal Water Pollution Control Act (33 U.S.C. §1251 et seq.), as amended, also known as the federal Clean Water Act (CWA). Section 402(p)(3)(B)(iii) of the CWA requires municipalities to implement "controls to reduce the discharge of pollutants to the maximum extent practicable, including management practices, control techniques and system, design and engineering methods, and such other provisions as the Administrator or the State determines appropriate for the control of such pollutants." The SDRWQCB's responsibility is to translate this section of the CWA into the form of waste discharge requirements. Therefore the SDRWQCB has the authority to require specified programs to be implemented by the municipalities in order to carry out CWA requirements. Furthermore, a fiscal analysis is specifically addressed at 40 CFR 122.26(d)(2)(vi).

Section: F.8 Subsection: F.8

Comment: How can the fiscal analysis of the Jurisdictional URMP be completed before the watershed URMP is completed? The BMP's that may result from the Watershed URMP might have significant costs that affect the Jurisdictional URMP. (Pountney & Associates)

Response: The fiscal analysis of the Jurisdictional Urban Runoff Management Program is an annual reporting requirement that is expected to be updated every year that new data (i.e. increased or decreased costs estimates related to the Watershed Urban Runoff Management Program) becomes available.

Section: G **Subsection:**

Comment: The date to implement the land use planning date and SUSMP conflict by 180 days, even though SUSMPs are part of land use planning. (Bartleman, W.)

Response: Comment noted. Regional Board staff recommend the Tentative Order be modified to correct this discrepancy.

See change at permit section G.

Section: H **Subsection: H**

Comment: The City questions the submittal of the Jurisdictional URMP Documents.
Requiring the City to submit the unified Documents to the Regional Board on the same day that the City and other Copermittees must begin implementing the Jurisdictional URMP is impractical. The City suggests that it submit the unified Documents at a reasonable time after adoption of the Tentative Order, but prior to the date implementation of the Jurisdictional URMP must commence.
The City, as Principal Permittee, also questions that it be required to prepare and submit, as an additional section of the unified Documents, a description of common activities conducted by the Copermittees. This activities will be addressed by the Copermittees in their individual Documents and the Watershed URMPs. (City of San Diego)

Response: The Copermittees have the discretion to submit their Jurisdictional Urban Runoff Management Program Documents prior to the implementation date. While the SDRWQCB will review and comment on the JURMP Documents, the Copermittees are expected to implement their JURMPs immediately, since the JURMPs are based on requirements largely derived from Order 90-42 and the NPDES regulations which have been in place for many years.

Compilation of the individual Jurisdictional URMP documents into a unified Jurisdictional URMP document by the Principal Permittee will simplify review and evaluation of the information contained in the documents. The Principal Permittee's provision of a summary covering common activities conducted collectively by the Copermittees will provide a useful overview of urban runoff management efforts within the County of San Diego. This type of compilation of the Copermittees' documents has been recommended by the Copermittees in the past.

The SDRWQCB has discretion to require Submittal of Jurisdictional URMP Document item H. in Order No. 2001-01 under the broad and specific legal authority cited in the Fact Sheet/Technical Report.

Section: H **Subsection: H**

Comment: H. SUBMITTAL OF JURISDICTIONAL URMP DOCUMENT

The lists of reporting requirements in sections H.1.a. and H.1.b. are cumbersome and will likely be subject to significant change if the permit is amended. The County recommends that these lists be deleted and replaced with a requirement for the Copermittees to develop and submit report formats (including suggested content) at least 90 days prior to each submittal deadline. The deleted detail should instead be located in the Technical Report as suggested guidance. (County of San Diego)

Response: The reporting requirements in H.1.a and H.1.b are directly based on the requirements of the Jurisdictional Urban Runoff Management Programs. Reporting on all aspects of the Jurisdictional Urban Runoff Management Programs is necessary for the SDRWQCB to assess the Copermittees' compliance with the Tentative Order. Therefore, the requirements of H.1.a and H.1 b are appropriate.

Section: H Subsection: H

Comment: The City questions the need to prepare a unified Jurisdictional URMP annual report detailing the common activities of the Copermittees, as such activities will be set out in each Copermittee's individual Jurisdictional URMP annual report and more importantly, in the Watershed URMP Annual Report. (City of San Diego)

Response: The Tentative Order requires a Unified Jurisdictional Urban Runoff Management Program (JURMP) Annual Report to cover common activities conducted collectively by the Copermittees. The rest of the Unified JURMP Annual Report consists of the submitted JURMP Annual Reports submitted individually by the Copermittees. The Unified JURMP Annual Reports can also be useful tools for the Copermittees. They provide a focus to review, update, or revise the URMPs on an annual basis. Successful and unsuccessful measures can be identified, helping to focus efforts on areas or issues which provide the greatest results. Areas or issues which have received insufficient efforts can also be identified and improved.

The SDRWQCB has the discretion to require Submittal of Jurisdictional URMP Annual Report item I. in Order No. 2001-01 under the broad and specific legal authority cited in the Fact Sheet/Technical Report.

Section: H Subsection: H.1.a

Comment: Add the following requirement to sections (1), (2), (3), (4) & (5): Procedures for preventing vector breeding in BMPs, including plan review and approval and surveillance processes. (State Department of Health Services)

Response: In recognition of the potential public health threat, an additional Finding is recommended to be added to the Tentative Order. The Finding (no. 36) identifies the potential vector issues related to BMP implementation and the role of collaborative program development between municipalities and vector control agencies in addressing an minimizing vector production.

Section: H Subsection: H.2.b

Comment: H.2.b. [Unified URMPs]
To which activities does "a section covering common activities conducted collectively by the Copermittees" refer? Is the SDRWQCB asking for a description of the activities leading to the development of the SUSMPs? If so, why? Shouldn't the completed SUSMPs suffice? (County of San Diego)

Response: This refers to activities on which Copermittees collaborate in implementing parts of their urban runoff management programs. Examples can include regional education efforts (Think Blue campaign), preliminary watershed efforts, etc.

Section: I Subsection: I.1.f

Comment: Section I.1.f, which requires that Copermittees report on annual expenditures from previous years, is inconsistent with section F.8, which only requires an evaluation of projected expenditures. Because reports on annual expenditures from previous years exceed the requirements of 40 CFR 122.26(d)(2)(vi), the submission of financial data from previous fiscal years therefore cannot be required under Tentative Order No. 2001-01. (County of San Diego)

Response: Comparison of expenditures would be useful to help determine the level of efforts implemented by each Copermittee. However, it is not critical to the assessment of each Copermittee's compliance with the requirements of the Jurisdictional Urban Runoff Management Program. Therefore, section I.1.f will be changed to only require an evaluation of projected expenditures.

Section: I Subsection: I.2

Comment: The requirement for the first report should be deleted and that the January 21, 2003 report cover the period of January 1, 2001 through June 30, 2002. This will avoid the unnecessary cost of generating an additional report for a 6-month period during which significant program amendments will be occurring. (County of San Diego, Anonymous)

Response: The revised Tentative Order requires the submittal of the first Jurisdictional Urban Runoff Management Plan (JURMP) Annual Report to the SDRWQCB on January 31, 2003. This revision is the result of the consolidation of the submittals of the first and second JURMP Documents and the extension of the implementation of the JURMP from 180 days to 365 days following the adoption of the revised Tentative Order.

Section: I Subsection: I.1.e

Comment: SUBMITTAL OF JURISDICTIONAL URMP ANNUAL REPORT"

"I.1.e."

Would these "special investigations" be voluntary or directed by the RWQCB pursuant to Tentative Order No. 2001-01? The RWQCB lacks the legal authority to require the submission of data or other monitoring information relating to investigations not required under this Order. (County of San Diego)

Response: Section I.1.e. of the tentative order requires the submission of "[a] summary of all urban runoff related data not included in the annual monitoring report (e.g., special investigations)," therefore it is a requirement and not a voluntary submission. The SDRWQCB does have adequate justification in requesting the submission of a summary data document pursuant to 40 CFR 122.42(c)(4) which states annual reports shall include a "summary of data, including monitoring data, that is accumulated throughout the reporting year." California Water Code (CWC) section 13377 provides that the Regional Boards shall issue waste discharge requirements which apply and ensure compliance with all applicable provisions of the Federal Water Pollution Control Act (33 U.S.C. §1251 et seq.), as amended, also known as the federal Clean Water Act (CWA). Section 402(p)(3)(B)(iii) of the CWA requires municipalities to implement "controls to reduce the discharge of pollutants to the maximum extent practicable, including management practices, control techniques and system, design and engineering methods, and such other provisions as the Administrator or the State determines appropriate for the control of such pollutants." The SDRWQCB's responsibility is to translate this section of the CWA into the form of waste discharge requirements. Therefore the SDRWQCB has the authority to require specified programs to be implemented by the municipalities in order to carry out CWA requirements.

Section: I **Subsection: I.1.g**

Comment: I.1.g. / I.1.h. - How would conditions of "proven to be effective" and "proven to be ineffective" be determined? (County of San Diego)

Response: Under Order 90-42, the Copermittees have had ten years to identify BMPs that have proven or not proven to be effective in reducing pollutants in discharges to the MEP. As the Copermittees implement the requirements of the Tentative Order, additional information will be developed on specific BMPs or activities that are found to be effective or ineffective in reducing the pollutants in the discharges to the MEP and that do not cause or contribute to the exeedances of receiving water quality objectives. Section I.1.g and I.1.h require the Copermittees to include this information in their Jurisdictional Urban Runoff Management Program Annual Reports.

Section: I **Subsection: I.1.I**

Comment: This requirement is more appropriate for the Copermittees' monitoring reports. (County of San Diego)

Response: The Copermittees are expected to make use of their joint Receiving Water Monitoring Reports, but may also collect additional monitoring information that should be evaluated and reported. Identification of water quality improvements or degradation within a municipality's jurisdiction is an appropriate requirement of the Jurisdictional Urban Runoff Management Program Annual Report.

Section: I Subsection: I.3

Comment: It is unclear who would sign the certification statement on the Unified Report. It appears that there may be an expectation that the Principal Copermittee would certify data and information submitted to them by other Copermittees. This statement should be amended to clearly limit responsibility of all Copermittees to certifying their own reports or subsections of Unified Reports. (County of San Diego)

Response: The language of Section I.3 has been amended in the revised Tentative Order to clarify the certification signature requirements for the Unified Jurisdictional Urban Runoff Management Program(JURMP) Annual Report. The certification statement of the Unified JURMP Annual Report applies only to the material submitted by the Principal Permittee. Each Copermittee submits their individual Jurisdictional Urban Runoff Management Program Annual Report with a separate certification statement. The Principal Permittee is not expected to certify the data submitted to them by other Copermittees.

Section: J Subsection: J

Comment: The Tentative Order does not properly account for the different hydrology, soils, environments, jurisdictions, and other geographic features within a watershed. Applying the same requirements through the Watershed Urban Runoff Management Programs that disregard conditions between local water basins and topography is inappropriate. The Tentative Order does not consider existing efforts to manage local portions of watersheds. (Escondido)

Response: The Tentative Order's requirements for developing and implementing the Watershed Urban Runoff Management Programs (WURMP) are sufficiently flexible to allow the Copermittees to properly account for the different hydrology, soils, environments, jurisdictions, and other geographic features within a watershed as well as consider existing efforts to manage local portions of watersheds. Consistency of programs implemented under the WURMP within the guidelines provided is highly desirable as indicated by other commentors references to "regional consistency" and the threat of "inconsistent jurisdictional level activities."

Section: J Subsection: J

Comment: It is unlikely the local programs developed separately by the Copermittees in their Jurisdictional Urban Runoff Management Plans will provide the good basis for the transition to regional consistency and watershed URMPs that the Order envisions. During the first few years after final promulgation of the Order, each Copermittee will be forced by the prescriptive and detailed nature of the Order to focus attention on its own promulgation and implementation of mandatory program elements. The Order will lead to inconsistent jurisdictional level activities, and will make the transition from local programs to watershed-based programs more difficult than it needs to be. Cooperative study and planning by the Copermittees would provide a quicker path to excellent watershed-based storm water programs, but this Order would force Copermittees off of that path. (County of San Diego)

Response: Order No. 90-42 was drafted to provide the Copermittees with the maximum amount of flexibility to develop and implement their own jurisdictional storm water programs. Currently, each Copermittee focuses its attention on its own implementation of mandatory program elements, which has resulted in inconsistent jurisdictional level activities. The Tentative Order does not prevent the Copermittees from working together using cooperative study and planning to develop regional consistency and shared programs. It does, in fact, strongly encourage the Copermittees to develop regional and consistent management approaches to the management of storm water discharge. It is anticipated that future NPDES Permits for Storm Water will be issued by watershed rather than by jurisdiction. The elements of Section J are intended to transition the Copermittees into a watershed approach to storm water permitting and management.

Section: J Subsection: J

Comment: The additional requirement for the Watershed Urban Runoff Management Program is redundant with the Jurisdictional Urban Runoff Management Program and more importantly is in conflict with a stakeholder driven watershed approach. The proposed approach, without involvement from other stakeholders, will result in piece meal, redundant, and misdirected program producing little or no improvement in water quality. Generating another management program (i.e. the Watershed Urban Runoff Management Program) is redundant and inefficient as presently proposed and should be revised or deleted. (County of Orange)

Response: The Watershed Urban Runoff Management Program (WURMP) is not redundant with the Jurisdictional Management Program (JURMP) , but rather an extension of the JURMP and a means for each Copermittee to make the transition from jurisdictional storm water management programs to watershed based storm water management programs. The Tentative Order does not prevent the Copermittees from using a stakeholder driven approach and, in fact, requires and encourages public participation.

Section: J Subsection:

Comment: The permit's emphasis on "watershed-based" planning is appropriate and will result in efficient environmental management. (Environmental Health Coalition)

Response: Comment noted.

Section: J Subsection:

Comment: Why was the Tentative Order not based upon a watershed approach rather than a jurisdictional approach? (Aminpour, Khosro)

Response: The Tentative Order establishes that each Copermittee is responsible for the implementation of the Order within its jurisdiction. The Tentative Order, however, addresses the need for a watershed approach in urban runoff management and for consistency between jurisdictional level

programs. The requirement that within a watershed the Copermittees shall collaborate to develop and implement a Watershed Urban Runoff Management Program is intended to prepare the Copermittees for the anticipated watershed-delineated NPDES Storm Water Permits.

Section: J **Subsection:**

Comment: Are MS4s in more than one watershed subject to separate applications or regulations? (Mendoza, Carlos)

Response: The operators (Copermittees) of MS4s that are located in more than one watershed are subject to requirements for each watershed in which their MS4 is located. Several Copermittees will be required to participate in the development and implementation of more than one Watershed Urban Runoff Management Program.

Section: J **Subsection:**

Comment: Can the tentative order require the compilation of fertilizers and pesticides bought and applied per watershed from sales data? (San Diego Audubon Society)

Response: The compilation of fertilizers and pesticides purchased and applied per watershed from sales data can be performed at the Copermittees' discretion. The inclusion of this requirement in the Tentative Order is not necessary and would be too prescriptive.

Section: J **Subsection: J**

Comment: The City of Imperial Beach wants to implement lead watershed Copermittee responsibilities but wants financial and staffing assistance from the other watershed Copermittees. (City of Imperial Beach)

Response: Comment noted. The Copermittees are strongly encouraged to collaborate in the development of the Watershed Urban Runoff Management Programs.

Section: J **Subsection: J**

Comment: The City of El Cajon does not want to be the lead coordinator for the San Diego watershed because it is only a minor inland contributor to the watershed. (City of El Cajon)

Response: The selection of the Lead Permittees was based on a need to share the burden among all the Copermittees and to actively engage each Copermittee in the Watershed Urban Runoff Management Program development. The City of El Cajon is located within the watershed of a major tributary (Forrester Creek) of the San Diego River and has industrial and commercial parks located on the banks of this tributary. As indicated in the workshops, the Copermittees will be allowed discretion in selecting

Lead Permittees, but in the event that a Lead Permittee is not selected for a given watershed, the Copermittee indicated in the Tentative Order as the Lead Permittee will be designated the Lead Permittee by default.

Section: J **Subsection: J**

Comment: The City of Escondido does not want to be the lead watershed coordinator because it is a only a minor inland contributor in the watershed and a rationale should be developed to determine who the watershed lead coordinator should be. (City of Escondido)

Response: The selection of the Lead Permittees was based on a need to share the burden among all the Copermittees and to actively engage each Copermittee in the Watershed Urban Runoff Management Program development. As indicated in the workshops, the Copermittees will be allowed discretion in selecting Lead Permittees, but in the event that a Lead Permittee is not selected for a given watershed, the Copermittee indicated in the Tentative Order as the Lead Permittee will be designated the Lead Permittee by default.

Section: J **Subsection: J**

Comment: The BMP's that may result from the Watershed URMP might have significant costs that affect the Jurisdictional URMP. (Pountney & Associates)

Response: SDRWQCB recognizes that the implementation of BMPs may have significant costs. However, it does not expect that the implementation of the Watershed URMP will negatively impact the Jurisdictional URMP. These two programs were designed to compliment one another.

Section: J **Subsection: J**

Comment: Redundant phrase . . . to identify and mitigate. . . at p.41/50, paragraph J.1 should be deleted in favor of similar language in J.2.c which requires identification and prioritization of water quality problems. . . (City of Imperial Beach)

Response: Comment noted. Section J.1 of the Tentative Order identifies each of the Copermittees with their respective watershed(s) and requires collaboration to identify and mitigate the highest priority water quality issues/pollutants in the watershed(s). Section J.2 establishes the minimum requirements for the Watershed Urban Runoff Management Programs.

Section: J **Subsection: J**

Comment: Does the tentative Order allow a Storm Water Utility District be the lead watershed Copermittee? (Anonymous Workshop 1)

Response: A storm water utility district may be the lead watershed Copermittee. The formation of a storm water utility district, however, does not release the Copermittees from the individual and collective responsibilities to implement the requirements of the Tentative Order.

Section: J Subsection: J

Comment: When watershed URMP are in effect will jurisdiction URMP requirements be rescinded or modified? (Anonymous Workshop 1)

Response: The Jurisdictional Urban Runoff Management Program requirements will not be modified or rescinded by the SDRWQCB once the Watershed Urban Runoff Management Programs are in effect. The Watershed URMPs are an extension of the Jurisdictional URMPs and are meant to ensure consistency between programs within a watershed. The Watershed URMPs do not replace the Jurisdictional URMPs because each municipalities are individually responsible for their programs.

Section: J Subsection: J.1

Comment: Redundant phrase . . To identify and mitigate. . . at p.41/50, paragraph J.1 should be deleted in favor of similar language in J.2.c which requires identification and prioritization of water quality problems. . . (City of Imperial Beach)

Response: Comment noted. Section J.1 of the Tentative Order identifies each of the Copermittees with their respective watershed(s) and requires collaboration to identify and mitigate the highest priority water quality issues/pollutants in the watershed(s). Section J.2 establishes the minimum requirements for the Watershed Urban Runoff Management Programs.

Section: J Subsection: J.2.b

Comment: Water quality assessment is the responsibility of the RWQCB. While it is legal and appropriate to require Copermittees to monitor their own discharges, and the effects thereof, this requirement seems to reflect a different thinking. All monitoring data will be reported and interpreted in the Copermittees' monitoring reports. Also, the requirement to evaluate "[A]ll receiving waters in the watershed" is too broad a mandate. This does not allow for prioritization of efforts and would presumably open the door for a requirement for the collection of monitoring data from every receiving water in the County. Finally, the RWQCB cannot require Copermittees to assess "existing water quality data" unless it is collected pursuant to this Order. This requirement would be place the general responsibility for assessment and interpretation of water quality data on the Copermittees rather than the RWQCB. Section J.2.b should be deleted. (County of San Diego)

Response: The Tentative Order contains requirements for the development of Watershed Urban Runoff Management Programs. Most Copermittees have expressed strong support for the program, in that it allows for them to focus on the problems within their respective watersheds. However, to focus on problems within a watershed, one must know what those problems are. A water quality assessment that encompasses all of the receiving waters to which the Copermittees discharge urban Runoff is necessary.

An effective Watershed Urban Runoff Management Program should welcome consideration of all available data. Refusal to consider some data could lead to misguided programs. For this reason, section J.2.b was included in the Tentative Order.

Section 13225(c) of the California Water Code authorizes the Regional Board to "Require as necessary any state of local agency to investigate and report on any technical factors involved in water quality control or to obtain and submit analyses of water; provided that the burden, including costs, of such reports shall bear a reasonable relationship to the need for the report and the benefits to be obtained therefrom."

Section: J Subsection: J.2.f

Comment: The language of sections F.6, H.1.a(8)(a), and J.2.f should be revised to add language that is more specific and will provide for better public participation. This is one of the most important components of the permit and needs to be expanded to facilitate public involvement in the decision making processes. (Chula Vista, Surfers Tired of Pollution)

Response: The requirements for public participation provide flexibilityand discretion to the Copermittees to determine when and in what manner the public will participate in the development and implementation of the Jurisdictional and Watershed Urban Runoff Management Plans. Adding more specific language will limit that flexibility unnecessarily.

Section: J Subsection: J.2.a

Comment: Where can a listing of impairments to the Pacific Ocean be found?
Is the Pacific Ocean considered to be bacteriologically impaired at all times? (City of Coronado)

Response: The listing of impaired water bodies for the State of California may be found on the State Water Resources Control Board website (http://www.swrcb/tmdl/index.html). The determination that certain defined areas of the Pacific Ocean along the coast of the San Diego Region are bacteriologically impaired (i.e. the Pollutant/Stressor is High Coliform Count) is based on the number of beach closure days posted by the County of San Diego. Beach closures affect the beneficial uses of the Pacific Ocean. Thus, although coliform counts may vary day to day, an area is still considered impaired until the number of beach closure days is reduced and the area is formally removed from the 303(d) list.

Section: J Subsection: J.2.c

Comment: This directive is not implementable. Identification of the “likely source(s) of the problem(s)” at a watershed scale and understanding the relationship of MS4 discharges to “major water quality problems” are both exceedingly complex tasks that are beyond the expertise and resources of the Copermittees. In the context of this section, such a task is unlikely to produce more than general statements. (County of San Diego)

Response: The requirements of Section J.2.c for the Copermittees to identify and prioritize major water quality problems in the watershed caused or contributed to by MS4 discharges and the likely source(s) of the problem(s) is based on the ten years experience that the Copermittees have acquired while implementing the requirements of Order 90-42. In particular, the Copermittees have conducted seven years of receiving waters monitoring, which included mass loading estimates of pollutants from several categories of land use, and are currently in the process of evaluating previous monitoring data and methods for the Previous Monitoring and Future Recommendations Report. Some commentors have requested greater Copermittee latitude and discretion in determining the requirements of the receiving waters monitoring program, the dry weather monitoring program, and the development of storm water programs, among other provisions, based upon their knowledge of their existing MS4 systems and watershed information. In fact one Copermittee specifically requested that "the Watersheds should be given the flexibility to apply resources to the areas of highest concern and greatest potential to resolve problems." Given that there is some confidence among the Copermittees that they can make these determinations, the identification and prioritization of major water quality problems in the watersheds caused or contributed to by MS4 discharges and the likely source(s) of the problem(s) should not be beyond the expertise and resources of the Copermittees.

Section: J **Subsection: J.2.d**

Comment: This section is contradictory. If these activities really are “recommended”, the Copermittees cannot schedule their completion with any certainty. (County of San Diego)

Response: Section J.2.d is not contradictory. Section J.2.d of the Watershed Urban Runoff Management Program requires the Copermittees to propose an implementation schedule for activities they recommend to address high priority water quality problems. These activities can be conducted collectively or individually, at the Copermittees discretion, to address the highest priority water quality problems. The Copermittees have the flexibility and are in the best position to determine which of their recommended activities they can complete within a time frame they determine is most reasonable with some degree of certainty.

Section: J **Subsection: J.2.g**

Comment: Page 41 of 50 J.2.g. – Who are the audiences that the watershed based education program apply to? (City of Chula Vista)

Response: The Copermittees have the discretion to determine the audiences for their watershed based education programs. In general, the audiences would be those identified in their Jurisdictional Urban Runoff Management Programs for that watershed.

Section: J **Subsection: J.2.g**

Comment: Is this a requirement for an additional collaborative program or can jurisdictional programs be amended to reflect watershed issues? (County of San Diego)

Response: Jurisdictional programs can be amended to reflect watershed issues.

Section: J Subsection: J.2.h

Comment: Ambiguous requirements. Subsection (h) requires the Copermittees to create a "mechanism to facilitate collaborative 'watershed-based'. . . land use planning with neighboring local governments in the watershed." Even though each local agency has independent land use planning authority and processes, the Copermittees should be able to create a mechanism that will facilitate collaboration. However, subsection (i) requires that collaborative watershed-based land use planning occur on a schedule beginning in January 2005. Requiring the such planning occurs is completely different than creating a mechanism to facilitate collaboration. Therefore, subsection (i) is inconsistent with subsection (h) and removes the needed flexibility provided by the use of "facilitate" in subsection (h). (County of San Diego)

Response: While the SDRWQCB strongly supports collaborative watershed-based land use planning, it acknowledges that it may not always be possible. In order to provide the Copermittees with discretion with their land use planning, section J.2.i. has been removed from the Tentative Order.

See change at permit section J.2.i.

Section: J Subsection: J.2.i.

Comment: These requirements exceed the Regional Board's authority and demands that the Copermittees exercise authority they do not possess. Subsection (i)'s requirement is an unlawful and unwarranted invasion by the Regional Board into the land use planning authority of the Copermittees. They also require the Copermittees to be in a position to interfere with or control the land use planning processes of the other Copermittees. Subsection (h) provides sufficient flexibility to be workable for the Copermittees. However, the mandate required by subsection (i) is not workable, nor lawful. (County of San Diego)

Response: While the SDRWQCB strongly supports collaborative watershed-based land use planning, it acknowledges that it may not always be possible. In order to provide the Copermittees with discretion with their land use planning, section J.2.i. has been removed from the Tentative Order.

See change at permit section J.2.i.

Section: L Subsection: L

Comment: Please comment on the need or benefit of the unified watershed URMP document & annual report. Since the RWQCB has designated 9 watersheds based on their individual needs/concerns, is a unified approach contrary to the watershed approach?
The City questions the need to prepare a unified Jurisdictional URMP annual report detailing the common activities of the Copermittees, as such activities will be set out in each Copermittee's individual

Jurisdictional URMP annual report and more importantly, in the Watershed URMP Annual Report. (County of San Diego (492) City of San Diego)

Response: Federal NPDES regulations 40 CFR 122.26(d)(2)(iv) require each Copermittee to develop and implement an urban runoff management program. The SDRWQCB must assess the urban runoff management program to ensure that it is adequate to prohibit non-storm water discharges and reduce pollutant discharges to and from the MS4 to the maximum extent practicable. In order for the SDRWQCB to assess the urban runoff management program, each Copermittee must submit to the SDRWQCB a description of their program. The description must detail all activities the Copermittee is undertaking to implement the requirements of each component of the Jurisdictional URMP section of Order No. 2001-01.

The submittal schedule of 180 and 365 days for Jurisdictional URMP documents is designed to provide each Copermittee some time to develop its Jurisdictional URMP. However, this time is limited since the Jurisdictional URMP requirements are based on NPDES regulations which have been in place for many years. The vast majority of the requirements in the Jurisdictional URMP should already be implemented by each Copermittee. Therefore, the provided submittal schedule should be more than adequate for each Copermittee to rework its Jurisdictional URMP to meet the Jurisdictional URMP requirements of Order No. 2001-01.

Compilation of the individual Jurisdictional URMP documents into a unified Jurisdictional URMP document by the Principal Permittee will ease the effort needed to assess and digest the information contained in the documents. The Principal Permittee's provision of a summary covering common activities conducted collectively by the Copermittees will provide a useful overview of urban runoff management efforts within the County of San Diego. This type of compilation of the Copermittees' documents has been recommended by the Copermittees in the past.

The reporting requirements in H.1.a and H.1.b are directly based on the requirements of the Jurisdictional Urban Runoff Management Programs. Reporting on all aspects of the Jurisdictional Urban Runoff Management Programs is necessary for the SDRWQCB to assess the Copermittees' compliance with the Tentative Order. Therefore, the requirements of H.1.a and H.1 b are appropriate.

The SDRWQCB has discretion to require Submittal of Jurisdictional URMP Document item H. in Order No. 2001-01 under the broad and specific legal authority cited in the Fact Sheet/Technical Report.

Section: L **Subsection: L**

Comment: City of Poway does not want to be the lead watershed Copermittee until extent of work and cost is identified. (City of Poway)

Response: The selection of the Lead Permittees was based on a need to share the burden among all the Copermittees and to actively engage each Copermittee in the Watershed Urban Runoff Management Program development. The City of Poway is partially located within the watersheds of Los Penasquitos Creek and its tributaries Poway, Beeler, and Rattlesnake Creeks. As indicated in the workshops, the Copermittees will be allowed discretion in selecting Lead Permittees, but in the event that a Lead Permittee is not selected for a given watershed, the Copermittee indicated in the Tentative Order as the Lead Permittee will be designated the Lead Permittee by default.

Section: M Subsection: M

Comment: As part of the unified Watershed Annual Report, the Principal Permittee, must a draft a description of common activities performed collectively by the Copermittees. This is unnecessary since such common activities already will be described in each watershed's Watershed Annual Report. The requirement to submit the unified Watershed Annual Report be deleted. The lists of reporting requirements in sections (M1)... are cumbersome and will likely be subject to significant change if the permit is amended these lists should be deleted and replaced with a requirement for the Copermittees to develop and submit report formats (including suggested content) at least 90 days prior to each submittal deadline. The deleted detail should instead be located in the Technical Report as suggested guidance. (City of San Diego, County of San Diego)

Response: Federal NPDES regulations 40 CFR 122.26(d)(2)(iv) require the Copermittees to develop and implement urban runoff management programs, of which the Watershed Urban Runoff Management Programs (WURMPs) are a part. The SDRWQCB must assess the WURMPs to ensure that they are adequate to assess and address the specific water quality problems within each watershed. In order for the SDRWQCB to assess the WURMPs, the Copermittees must submit to the SDRWQCB annual reports describing all of the activities undertaken to meet the requirements of the Watershed URMP section of Order No. 2001-01.

The Unified Watershed Urban Runoff Management Program Annual Report (WURMP) to cover common activities conducted collectively by the Copermittees under the Watershed URMP section of Order No. 2001-01. The rest of the Unified WURMP Annual Report consists of the submitted WURMP Annual Reports submitted by the Copermittees from each watershed. The Unified WURMP Annual Reports can also be useful tools for the Copermittees. They provide a focus to review, update, or revise the URMPs on an annual basis. Successful and unsuccessful measures can be identified, helping to focus efforts on areas or issues which provide the greatest results. Areas or issues which have received insufficient efforts can also be identified and improved.

The SDRWQCB has the discretion to require Submittal of Watershed URMP Annual Report item M. in Order No. 2001-01 under the broad and specific legal authority cited in the Fact Sheet/Technical Report.

Section: N Subsection:

Comment: The relative brevity of this section reflects a general underemphasis on regional activities in Tentative Order No. 2001-01. As a whole, this Order presents a significant potential for the concurrent development of numerous inconsistent programs. By rushing to develop compliant programs that are consistent with their legal obligations at the jurisdictional level, Copermittees will give short shrift to the regional consistency that is critical for long-term program success. The region's citizens and business community will demand the consistency not provided for here. The County recommends that Tentative Order No. 2001-01 be withdrawn, and that the RWQCB work with Copermittees to develop a program structure that gives adequate weight to regional, watershed, and jurisdictional issues, and fully considers the inter-relationship of each during program implementation. (County of San Diego)

Response: The Tentative Order does require Copermittee collaboration and consistency regionwide. The Tentative Order states in section N.1 that "Each Copermittee shall collaborate with all other Copermittees regulated under this Order to address common issues, promote consistency among Jurisdictional Urban Runoff Management Programs (Jurisdictional URMPs) and Watershed Urban Runoff Management Programs (Watershed URMPs), and to plan and coordinate activities required under this Order." Nothing in the Tentative Order precludes the Copermittees from collaborating as much as they wish. In fact, nothing has precluded the Copermittees from collaborating on regional consistency over the last 10 years.

Section: O **Subsection:**

Comment: Add: 4. Serve as a liaison between the Copermittees and the Local Vector Control Agency and State Department of Health Services to ensure that the BMPs used do not create public nuisances. (State Department of Health Services)

Response: The proposed requirement that the Principle Permittee serve as a liaison between the Copermittees and local vector control agencies and State Department of Health Services is unnecessary. Sufficient provisions exist in the Jurisdictional Urban Runoff Management Program for the Copermittees and local vector control agencies and the State Department of Health Services to participate in the development of the JURMP to prevent vector production and the creation of public nuisances. However, in recognition of the potential public health threat, an additional Finding is recommended to be added to the Tentative Order. The Finding (no. 36) identifies the potential vector issues related to BMP implementation and the role of collaborative program development between municipalities and vector control agencies in addressing an minimizing vector production.

Section: O **Subsection: O**

Comment: Responsibilities of the principal permittee should not be specified in detail in Tentative Order No. 2001-01. These details should be worked out and formalized amongst the Copermittees. (County of San Diego)

Response: The revised Tentative Order defines the minimum level of responsibility that must be assumed by the Principal Permittee. The SDRWQCB has discretion to require Principal Permittee Responsibilities in item O. of Tentative Order No. 2001-01 under the broad and specific legal authority in the Fact Sheet/Technical Report.

Section: O **Subsection: O**

Comment: As previously noted, the City would want to enter into an agreement with the Regional Board that clearly spells out each party's role and shared responsibilities concerning storm water discharges at permitted industrial and construction sites, as well as to establish and clarify the roles, responsibilities, and expectations as Principal Permittee to expressly limit liability and legal exposure for other Copermittees' non-compliance. If the City is unable to come to an agreement with the Regional Board concerning these agreements, the City would be unwilling to serve as Principal Permittee. (City of San Diego)

Response: The Copermittees are not responsible for enforcing or overseeing the General Statewide Industrial or Construction Permits. The SDRWQCB will enforce the General Statewide Industrial and Construction Permits. The Copermittees are however, responsible for enforcing their ordinances that implement the Tentative Order, including the prohibitions against illicit discharges. In some cases, the Copermittees may be required to implement or require the implementation of BMPs at construction or industrial sites that exceed the minimum requirements of the General Statewide Industrial or Construction Permits in order to achieve compliance with the requirements of the Tentative Order. USEPA supports this approach, clearly placing responsibility for the control of discharges from construction and industrial sites with municipalities. The USEPA notes in the preamble to the Storm Water Regulations that municipalities are in the best place to enforce compliance with storm water discharge requirements:

"Because storm water from industrial facilities may be a major contributor of pollutants to MS4s, municipalities are obligated to develop controls for storm water discharges associated with industrial activity through their system in their storm water management program…The CWA provides that permits for municipal separate storm sewers shall require municipalities to reduce pollutants to the maximum extent practicable. Permits issued to municipalities for discharges from municipal separate storm sewers will reflect terms, specified controls, and programs that achieve that goal."

As noted in the Fact Sheet/Technical Report, the USEPA felt it so important to control the discharge of pollutants from construction and industry that it established a double system of regulation over construction and industrial sites. Two parallel regulatory systems were established with the same common objective of keeping pollutants from construction and industrial sites out of the MS4. A structure was created where local governments must enforce their local ordinances and permits as required under their municipal storm water permits, while the SDRWQCB (state) must enforce its statewide general construction and industrial storm water permits. The two regulatory systems were designed to complement and support each other in the shared goal of minimizing pollutant discharges in runoff from construction and industrial sites.

Local governments have the primary regulatory authority over the majority of construction and industrial sites since they issue the development and land use permits for the sites. In other words, the Copermittees are responsible for the water quality consequences of their planning, construction, and land use decisions.

Regarding construction sites, USEPA also places enforcement responsibility on municipalities, requiring small municipalities to develop and implement "[a]n ordinance or other regulatory mechanism to require erosion and sediment controls, as well as sanctions to ensure compliance […]" (40 CFR 122.34(b)(4)(ii)(A)). In its guidance for the Phase II regulations, US EPA goes on to support increased municipality responsibility, stating "Even though all construction sites that disturb more than one acre are covered nationally by an NPDES storm water permit, the construction site runoff control minimum measure for the small MS4 program is needed to induce more localized site regulation and enforcement efforts, and to enable operators of regulated small MS4s to more effectively control construction site discharges into their MS4s." While these above citations refer to small municipalities under Phase II of the NPDES program, USEPA recommendations to small municipalities are applicable to larger municipalities such as the Copermittees, due to the typically more serious water quality concerns attributed to such larger municipalities.

The language of the Tentative Order has been revised to more carefully describe the requirements of the Tentative Order with regard to the dual regulation of construction and industrial sites as discussed above. With the recent addition of resources and staff from budget augmentations in several programs, including storm water, the SDRWQCB will "vigorously administer and enforce" the General Statewide Industrial

and Construction permits as requested by one commentor. The language of Finding 24 of the Tentative Order has been revised to remove all discussion of what constitutes "good faith" in enforcing local legal authority. Furthermore, the Tentative Order does not "reward" Copermittees that enforce its storm water ordinances that implement the Tentative Order. Rather, the Section F.2.g.2 offers the Copermittees the discretion to voluntarily use the requirements of the General Construction Permit to implement and enforce its own storm water ordinances. The SDRWQCB will enforce the General Statewide Construction Permit; the Copermittees are enforcing their own storm water ordinances.

The Tentative Order clearly defines and describes the responsibilities of the Copermittees with regard to storm water and authorized non-storm water discharges from permitted industrial and construction sites. The Tentative Order is a NPDES Permit and Waste Discharge Requirements that specify the conditions under which discharges of urban runoff from municipal separate storm sewer systems is authorized and is not an "agreement" between the SDRWQCB and the Principle or Copermittees.

The SDRWQCB has the broad and specific legal authority cited in the Fact Sheet/Technical Report

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Section: O **Subsection: O**

Comment: What criteria was used to select the Principal Copermittee? (Anonymous Workshop 1)

Response: The Principal Permittee was selected based on the level of experience and organizational preparedness demonstrated by the Principal Permittee under Order 90-42. The revised Tentative Order provides the Copermittees the flexibility and discretion to select a Principle Permittee(s).

Section: R **Subsection: R.1**

Comment: Reference is made to Section B.7. of Attachment C - should this be B.6.? (City of Coronado)

Response: The reference should have been B.6. The revised Tentative Order contains the corrected reference to Section B.6 of Attachment C.

Section: Attachment B **Subsection: Attachment B**

Comment: It is premature to require Coastal Storm Drain Outfall Monitoring of the Copermittees in the Tentative Order. The San Diego County Department of Environmental Health should be responsible for conducting this monitoring since they are State funded under AB 411 and are familiar with the coastal areas and the monitoring requirements. By assigning this effort to the Copermittees, duplication of efforts and existing expertise would occur which doesn't seem to be a cost effective way to obtain the information.
1. As stated in the Draft Fact Sheet/Staff Report for the Tentative Order, this program should be "integrated and coordinated with similar monitoring programs."
2. The continuation of "routine monitoring" will not aid in the effective resolution of this problem.

3. The Tentative Order should be revised to require the development of a coordinated program between state, regional, and local entities to address water quality problems associated with coastal storm drains during dry and wet weathers.
4. It is recommended that the future monitoring program be based on the assessment being currently performed, that a coordinated coastal storm drain monitoring program be developed to address dry and wet weather water quality problems associated with coastal storm drains but not include it as a permit requirement at this time. (Anonymous, La Mesa, City of San Diego, San Diego Copermittees)

Response: Following adoption of the Order and the submittal and review of the Previous Monitoring and Recommendations Report, it was anticipated that the Copermittees would meet with the SDRWQCB and the County Department of Environmental Health to determine how to conduct the Coastal Storm Drain Outfall Monitoring. AB 411 only requires dry weather monitoring of storm drains that discharge onto public beaches visited by at least 50,000 people per year. This monitoring is not required during the wet weather months. The Coastal Storm Drain Outfall Monitoring was intended in part to fill in this gap in storm drain outfall monitoring while also serving as an assessment of compliance assessment.

Section: Attachment B **Subsection: Attachment B**

Comment: The Tentative Order should not specify that monitoring be performed by a single contractor.
1. The RWQCB does not possess the legal authority to specify contractual relationships between Copermittees and/or their contractors.
2. Given the number of new requirements specified in the receiving waters monitoring program, it is likely that a single contractor cannot perform the work efficiently or cost effectively.
3. This requirement would limit the co-permittees flexibility to get the work done cost effectively.
4. Protocols can be established and work executed successfully with several contractors. (Anonymous, City of San Diego, County of San Diego)

Response: The requirement has been deleted.

Section: Attachment B **Subsection: Attachment B**

Comment: The first reporting period specified in the Tentative Order (October 2000-September 2001) should be changed to reflect the adoption schedule of the Tentative Order and the submittal of the Previous Monitoring and Future Recommendations Report. (Anonymous, City of San Diego)

Response: The first reporting period has been changed to reflect the adoption schedule of the Tentative Order and the anticipated submittal of the Previous Monitoring and Future Recommendations Report.

Section: Attachment B **Subsection: Attachment B**

Comment: The SDRWQCB has not provided the necessary justification and cost/benefit analysis for the Receiving Waters Monitoring Program.
Technical Report provides little discussion of the proposed elements, and no discussion of how they support the four objectives stated in the introduction to Attachment B. The RWQCB has an obligation to provide this justification, and specifically to consider the potential costs of the program. These costs are clearly very significant, and therefore should not and cannot be imposed without adequate justification by the SDRWQCB. The Technical Report fails to provide this justification. The Order imposes monitoring requirements that cannot be compelled under state law because no cost/benefit analysis has been performed. Section 13267(b)(1) imposes a requirement that "[t]he burden, including costs, of these reports shall bear a reasonable relationship to the need for the report and the benefits to be obtained from the reports." Similarly, sections 13165 and 13235 require that a cost/benefit analysis be conducted before certain investigation obligations and reporting requirements can be imposed on state and local entities. The Fact Sheet/Technical Report argues that the reports mandated by the Order are needed, and are related to program goals. However, the Technical Report does not estimate the burden, costs, or benefits of the required work. Therefore, the requirements of sections 13267(b)(1), 13165, and13235 have not been met. Moreover, federal law also requires the "maximum extent practicable" standard to be applied in a "site specific flexible manner, taking into account cost considerations as well as water quality effects." (See 64 Fed. Reg. 68735.) (County of San Diego,)

Response: The Tentative Order and Fact Sheet/Technical Report provides the necessary justification and cite the broad and specific legal authority to require the Receiving Waters Monitoring Program. A cost/benefit analysis is the responsibility of the Copermittees to determine and optimize. According to one estimate submitted by a commentor, the annual financial burden for receiving waters monitoring under Tentative Order 2001-01 will be approximately $70,000 per Copermittee. Currently, each Copermittee contributes approximately $35,000 each annually for receiving waters monitoring. In comparison, San Diego shipyards with NPDES permits are spending in excess of $200,000 annually each for receiving water quality monitoring in a significantly smaller geographic area. The Bight 1998 Summer Shoreline Microbiology Study (Noble et. al. 2000) found that expressed as a fraction of tourism dollars and per capita,among the Southern California counties, San Diego County spent the smallest and second smallest amount, respectively, on shoreline monitoring similar to that proposed in the Tentative Order. The discharge of storm water in San Diego represents the single largest discharge of pollutants in San Diego receiving waters and yet receives one of the smallest relative monitoring efforts regionally. Consequently, the relative increase in expected expenditure per Copermittee for receiving water monitoring is reasonable and regionally consistent.

Section: Attachment B **Subsection: Attachment B**

Comment: The requirement that Receiving Waters Monitoring Reports be reviewed by an independent committee is illegal and impracticable and should be deleted. This process would substantially increase the cost and time required to produce and submit monitoring reports, with little or no apparent benefit. Clarification is required on the requirements and qualifications that an independent committee of peers need to review the monitoring reports prior to submittal to the SDRWQCB. The RWQCB does not possess adequate legal authority to mandate that reports the Copermittees submit be reviewed by an external committee. (County of San Diego, City of San Diego, Anonymous, Chula Vista)

Response: The requirement has been revised to require only that the Receiving Waters Monitoring Report be reviewed by a committee. The review of monitoring reports prior to submittal is reasonable and necessary to ensure completeness and scientific accuracy.

Section: Attachment B **Subsection: Attachment B**

Comment: The RWQCB also has no authority to require Copermittees to contribute to the costs of monitoring waters that are not affected by that Copermittee's discharges of stormwater without further public notice. We request that additional language be added to this paragraph clarifying that, if the Regional Board so directs Copermittees, Copermittees' participation in such comprehensive regional monitoring activities shall take the place of all monitoring activities specified in Attachment B, and Copermittees shall no longer be required to comply with the provisions contained in Attachment B. Any requirement to share the costs of regional monitoring must include an exemption if a Copermittee can demonstrate that discharges from its MS4s do not affect the quality of the waters being monitored. (City of San Diego, County of San Diego, Carlsbad)

Response: The requirement has been modified to require participation in regional monitoring efforts (e.g. The Bight 1998 Summer Shoreline Microbiology Study) in lieu of specific Tentative Order 2001-01 monitoring requirements by order of the SDRWQCB Executive Officer. San Diego Copermittees collectively discharge urban runoff to the Southern California Bight and thus bear a responsibility for monitoring receiving water quality impacts in the Southern California Bight resulting from that discharge. Participation in multi-agency monitoring efforts that address specific regional problems resulting from these discharges is both reasonable and necessary to satisfactorily assess the impact of permitted urban runoff on the water quality of the Southern California Bight.

Section: Attachment B **Subsection: Attachment B**

Comment: The Receiving Waters Monitoring Program is inadequate and should include an evaluation of the effectiveness of the pollution control BMPs. This section should be revised to require corrective action in the event that the monitoring program has identified a given BMP not to be effective. The current Copermittee joint monitoring and reporting is insufficient to comply with the mandates of the existing permit and EPA regulations. Expanded monitoring is required by both coastal and inland Copermittees. (Sierra Club, Surfrider Foundation)

Response: The Receiving Waters Monitoring Program of Attachment B is a framework for the Copermittees to implement as they and their advisors indicate is most scientifically and cost effectively effective manner subject to SDRWQCB review. The Receiving Waters Monitoring Program will implicitly assess the effectiveness of the Copermittees pollution control BMPS. Expanded monitoring and assessment are implicit on the Tentative Order's Receiving Waters Monitoring Program. The SDRWQCB has the authority to require corrective action in the event that the monitoring program has identified discharges that are causing or contributing to an exceedance of receiving water quality objectives.

Section: Attachment B **Subsection: Attachment B**

Comment: The monitoring requirement for San Diego Bay Toxic Hot Spots should only apply to the nine Copermittees in the San Diego Bay watershed, and should not be required until after the review and assessment of existing storm water data and program tools. (Anonymous, La Mesa, El Cajon, San Diego Copermittees, Esondido)

Response: The Copermittees have the discretion to assign responsibility for various monitoring requirements as they see fit. This element of the Receiving Waters Monitoring Program was discussed with the Copermittees on August 18, 2000. The results of the Previous Monitoring and Future Recommendations Report will be considered with respect to how to implement and coordinate this element in the Receiving Waters Monitoring Program.

Section: Attachment B **Subsection: Attachment B**

Comment: The proposed program is inconsistent with previous SDRWQCB direction. On August 18, 2000, several Copermittees and SDRWQCB staff met to discuss ideas on the future direction of the Copermittees' wet weather monitoring program both for the 2000/2001 wet weather season and beyond. All present agreed that greater cooperation between Copermittees and the SDRWQCB was desirable, and that the best means of finding a common direction was through an in-depth assessment of existing data and potential program tools. At that meeting, the Copermittees agreed to conduct this assessment, and committed approximately $250,000 toward that end. At that time, SDRWQCB staff also agreed that the development of future program details should be delayed until the results of the assessment were available. The receiving waters monitoring program should be proposed by the Copermittees after the completion of the review and assessment of the existing storm water monitoring data and potential program tools in August 2001. Moreover, it is inappropriate for the Tentative Order to require the submittal of the Previous Monitoring and Future Recommendations Report, as the Copermittees are preparing this aforementioned report under the existing MS4 storm water permit with a previously agreed upon deadline (with Regional Board staff) of August, 2001. (County of San Diego, City of San Diego, San Diego Copermittees)

Response: The monitoring requirements are not premature or inconsistent with previous SDRWQCB direction. During the August 18, 2000 meeting, the representatives of the Copermittees were shown the draft Receiving Waters Monitoring Program, including the requirement for the Previous Monitoring and Future Recommendations Report. The various elements of that program were discussed. Staff indicated that these elements were expected to form the framework for the Receiving Waters Monitoring Program that would be implemented under Tentative Order 2001. The Copermittees proposal to conduct an assessment of previous monitoring data and available tools and techniques under 90-42 was considered to be an early start on the Previous Monitoring and Future Recommendations requirement of Attachment B of the Tentative Order. The Previous Monitoring and Future Recommendations Report, to be submitted in August 2001, was expected to specify how these elements would be implemented and coordinated, not whether to include them or not. Nonetheless, staff expects revisions can be made at the discretion of the SDRWQCB Executive Officer after submittal and review of the Copermittees Previous Monitoring and Future Recommendations Report.

Section: Attachment Subsection: B

Comment: Who has the financial responsibility for sampling a dry weather storm drain within a POTW footprint? (Anonymous Workshop 3)

Response: The Tentative Order anticipates that the Copermittees will meet with operators of POTWs to determine an equitable division of responsibility for monitoring coastal storm drain outfalls within POTW footprints. The Copermittees will be expected to conduct year-round monitoring of coastal storm drain outfalls under the Receiving Waters Monitoring Program.

Section: Attachment Subsection: B

Comment: Do all Copermittees need to participate in storm drain monitoring or is storm drain monitoring just for the coastal cities? (City of San Diego)

Response: Each of the Copermittees will be responsible for participating in the Coastal Storm Drain Outfall Monitoring component of the Receiving Waters Monitoring Program. This monitoring is necessary for evaluating the impact of the discharge of urban runoff into coastal receiving waters.

Section: Attachment Subsection: B

Comment: How are samples to be taken when a storm drain discharge at a beach immediately infiltrates into the sand? (City of Imperial Beach)

Response: Samples should be taken just upgradient of the point where the discharge infiltrates into the sand. This location would be in the storm drain prior to the discharge entering the sand.

Section: Attachment Subsection: B

Comment: What is the correlation between bioassessment and waters impaired by sediment loading? (Anonymous Workshop 1)

Response: Bioassessment is a direct measurement of the impact of the discharge of urban runoff on the benthic invertebrate community of the receiving waters. Excess sediment loading is one of many parameters that is directly correlated with the benthic invertebrate community composition and structure.

Section: Attachment Subsection: B

Comment: What QA/QCand what monitoring data base will the tentative order require to ensure that the monitoring data collected by the Copermittees will be transferable and reasonably useful in analyzing the water quality of the watershed and analyzing the actions taken to improve the water quality of the watershed? (City of Encinitas)

Response: sufficient directives exist in Attachment B of the Tentative Order, in addition to the certification requirements of environmental laboratories in California under the Environmental Laboratory Certification Program, and in the American Water Works Association Standard Methods for the Examination of Water and Waste Water to provide the Copermittees with guidance and standards regarding quality assurance and quality control requirements. The Copermittees will be required under Tentative Order 2001-01 to submit for SDRWQCB review a Previous Monitoring and Future Recommendations Report which will address both quality assurance and the implementation of a Receiving Waters Monitoring and Reporting Program that identifies impairments resulting from the discharge of urban runoff and actions on the part of the Copermittees necessary to address those impairments.

Section: Attachment B **Subsection: Attachment B**

Comment: Attachment B implies, but does not state, a requirement for a year-round monitoring effort. This is true in two places; first, the title of section II of the Attachment is "Receiving Waters Monitoring Program – Year Round"; second, section V.D. states a requirement for estimation of pollutant loads both during wet and dry weathers. This issue must be clarified. If it is the RWQCB's intention to expand the Copermittees' monitoring obligations to year-round, the County asserts that this is unsupported by Federal regulations. (County of San Diego)

Response: Some elements of the Receiving Waters Monitoring Program (I.e. urban stream bioassessment and sediment toxicity) are best performed before and after the wet weather season rather during storm events. In addition, the Receiving Waters Monitoring Program also requires dry and wet season analytical monitoring of coastal storm drain outfalls. The SDRWQCB has the broad and specific legal authority cited in the Fact Sheet/Technical Report to require these elements of the Receiving Waters Monitoring Program.

Section: Attachment B **Subsection: Attachment B**

Comment: The Receiving Waters Monitoring Program objectives are too general and should be more specific. (City of Chula Vista)

Response: In order to provide the Copermittees with flexibility and discretion, the Receiving Waters Monitoring Program has been largely limited to general descriptions of program elements. During a meeting on August 18, 2000, the representatives of the Copermittees were shown the draft Receiving Waters Monitoring Program, including the requirement for the Previous Monitoring and Future Recommendations Report. The various elements of that program were discussed. The Previous Monitoring and Future Recommendations Report, to be submitted in August 2001, is expected to specify how these elements would be implemented and coordinated.

Section: Attachment B **Subsection: Attachment B.II.C.4**

Comment: Attachment B-4 II.C.4. – How often are the samples to be taken during the wet season and dry seasons? (City of Chula Vista)

Response: In order to provide the Copermittees flexibility and discretion to implement the Receiving Waters Monitoring Program, sampling frequency will be determined by the Copermittees following review of the Previous Monitoring and Future Recommendations Report.

Section: Attachment C **Subsection: B.6**

Comment: The proposed requirement to require Copermittees to report all non-compliance orally within 24 hours and in writing within 5 days is not supported by 40 CFR 122.44(I)(6). Although staff cite this section in support of a blanket 24 hour / 5 day reporting requirement, it is clearly limited to those events endangering health or the environment. First, all instances of noncompliance do not necessarily endanger health or the environment. Second, and more importantly, noncompliance in this instance refers to that of the Copermittee, not of third party dischargers within our jurisdictions (unless we determine that they endanger health or the environment). Copermittees are fully capable of determining when a violation is most appropriately referred to other agencies, including the RWQCB. The Copermittees have the discretion in determining when referrals of noncompliance should be made to the RWQCB. The proposed requirement to require Copermittees to report all violations orally within 24 hours and in writing within 5 days is impractical, would create a huge paper trail, and would have no benefit.

Non-compliance notification should be limited to major issues, otherwise much effort and resources will be spent without great water quality benefit. Are minute discharges required to be reported? Does the requirement refer to working or calendar days? How should violations that occur on weekends or holidays be detected and reported? Would it not be better to have comprehensive reporting of non-compliance and actions taken by Copermittee in the annual report? This section should also describe what actions Regional Board staff will undertake following the submittal of this information. (City of San Diego, SANDAG, Poway, La Mesa, County of San Diego, San Diego Co-permittees, Imperial Beach, Carlsbad, Chula Vista, Coronado)

Response: The language of Attachment C Section B.6 has been revised to require the Copermittees to develop criteria by which to evaluate events of non-compliance may pose a threat to human or environmental health. These criteria shall be submitted in the Copermittees Jurisdictional Urban Runoff Management Program Documents and Annual Reports. Events of non-compliance that are identified and evaluated by the Copermittees with these criteria and are found to pose a threat to human or environmental health must be reported by the Copermittees under the requirements of Attachment C, Section B.6.

Section: Attachment **Subsection: C.8.a**

Comment: Please provide a definition for "bypass" in Attachment D - Glossary. (Port of San Diego)

Response: "The term bypass, is defined in Attachment C.8(a), as follows

"Bypass" means the intentional diversion of waste streams from any portion of a treatment facility.

Section: Attachment Subsection: C.9

Comment: Please clarify if letters complying with Attachment C.9 reporting requirements need to be signed by either a principal executive officer or ranking elected official? (Port of San Diego)

Response: Reporting Requirement C.9(a)3 describes signatory requirements applicable to the Port of San Diego.

Section: Attachment Subsection: D

Comment: Should define "storm event". The definition should be the same as the Los Angeles County and Cities in Los Angles County (LA County) municipal permit definition. Where a "Storm Event"is a rainfall event that produces more than 0. I inch of precipitation and that which, is separated from previous storm event by at least 72 hours of dry weather. (Sempra Energy)

Response: Since the Tentative Order allows for various methods of calculating numeric sizing criteria, different definitions of storm event may apply. For this reason, the definition of storm event is left to the discretion of the Copermittees, to be included in the model SUSMP.

Section: Attachment Subsection: D

Comment: Pollution Prevention Definition Recommend revising the definition to: "practices and processes that recycle, reuse, reduce, or eliminate the generation of pollutants, in contrast to source control, treatment, or disposal." (Port of San Diego)

Response: The definition of Pollution Prevention is appropriate and is recommended to be retained in the revised Tentative Order. Although recycling and reusing are appropriate methods of managing waste, they are more characteristic of "treatment" rather than prevention. Pollution prevention refers to reducing or eliminating pollutant generating activities.

Section: Attachment D Subsection: Attachment D

Comment: A clear definition of the term "Maximum Extent Practicable" is essential to the selection and sizing of BMPs. An attempt should be made to define as dearly a possible "maximum extent practicable." Recommend providing definition for "maximum extent practicable."
Who determines when MEP has been achieved? (McKenna & Cuneo, L.L.P., SANDAG, Port of San Diego, Oceanside)

Response: The definition of the term "MEP" (Maximum Extent Practicable) in Attachment D Glossary is based upon and supported by direction from the Federal regulations and guidance, the

USEPA, and SWRCB. It is as narrowly defined as possible without prescribing for the Copermittees exact conditions. In order to provide the Copermittees with flexibility and discretion, the Tentative Order avoids as much as possible too prescriptive language in defining MEP.

In essence, the Copermittees are given the discretion, within an overall framework, to evaluate the totality of conditions and propose MEP in their Jurisdictional Urban Runoff Management Program Documents and Annual Reports, subject to review and comment by the SDRWQCB. Thus, both through the JURMP and an iterative BMP implementation process, the definition of MEP for a given set of circumstances is determined, after which, the Copermittees are responsible for determining and reporting that MEP is being met through implementation of BMPs under their JURMPs, and later, their joint WURMPS. Ultimately, the SDRWQCB is responsible for determining when MEP has not been met and taking appropriate action.

Section: Attachment D **Subsection: Attachment D**

Comment: B. Proposed Definition
We propose the following definition:
"Maximum Extent Practicable" (MEP) is achieved when:
The project proponent demonstrates that for each pollutant of concern a range of BMPs have been evaluated and one or more selected which together achieve the following criteria:
1. The project proponent selects BMPs designed to remove a significant portion of the mass of the pollutant of concern. (Note that this is a mass standard in harmony with the TMDL concept rather than a concentration standard.)
2. The addition or substitution of other BMPs would not yield a significant increase in mass removal rates at a cost less than or equal to 0.7% of the cost of the entire project. (McKenna & Cuneo, L.L.P.)

Response: The source of the definition in the tentative order is based on State Water Resource Control Board and U.S. EPA promulgated definitions. Regional Board staff is not recommending further modification to the definition in the tentative order.

Section: Attachment E **Subsection: Attachment E**

Comment: The collection and analysis of 2 samples per site in the Dry Weather Monitoring Program is unnecessary, will not produce significantly different results, be too expensive and should not be required for ponded water. Should the Board wish to retain multiple sampling within the new permit, we would recommend mixing the two samples and performing laboratory testing on the mixed sample only. The Copermittees should be permitted to submit a dry weather monitoring program for approval by the Regional Board based on threat to water quality rather than be required to implement a “blanket” monitoring program that ignores local conditions. (Nolte, D-Max, City of San Diego)

Response: The revised Dry Weather Monitoring Program requires only a single sample and provides more discretion on the part of the Copermittees to design and implement their Dry Weather Monitoring Programs subject to SDRWQCB review.

Section: Attachment E **Subsection: Attachment E**

Comment: The sampling frequency specified in the Analytical Dry Weather Monitoring Program (20% per year) is inadequate. The outfalls with no detected pollutants will not be investigated for the life of the permit. Due to the transient nature of non-storm water flow, there is no guarantee that these outfalls will be free of pollutants in the next dry weather season. This approach provides a snapshot of a limited number of outfalls at a single time. An effective program includes more frequent observations of the major outfalls within each municipality. This will provide a chronological data set, which reflects different activities within the drainage area. Some Copermittees currently perform two or more rounds of dry weather field screening sampling; the costs and other limitations of the Analytical Dry Weather Monitoring Program would limit the Copermittees to only one sampling per year. The scope of the Analytical Dry Weather Monitoring needs to be clarified with respect to the types of pollutants being identified and frequency of monitoring. The Copermittees should be allowed to design their own programs and submit them to the SDRWQCB for review. (D-Max, SANDAG)

Response: The Dry Weather Monitoring Program has been revised to permit greater discretion for the Copermittees to design and implement their own program subject to SDRWQCB review. The emphasis in the revised Dry Weather Monitoring Program is to encourage more frequent and widely distributed sampling on an annual basis to facilitate the detection and elimination of illicit discharges and illegal connections.

Section: Attachment E **Subsection: Attachment E**

Comment: The SDRWQCB has not shown that it has the authority to require dry weather monitoring. The analytical monitoring effort (vs. field screening) and list of constituents are not supported by 40 CFR 122.26(d)(2)(iv)(B)(3). The Dry Weather Monitoring Program should remain a field screening program to identify illicit discharges and illegal connections and should not include analytical monitoring to characterize runoff. The costs of the analytical monitoring have not been considered by the SDWQCB. The Analytical Dry Weather Monitoring Program section should be deleted. (Procopio, Cory, Hargreaves, & Savitch, L.L.P., County of San Diego)

Response: The Tentative Order and Fact Sheet/Technical Report contain citations of the broad and specific legal authority of SDRWQCB to require a dry weather monitoring program. Some degree of analytical monitoring is necessary since the field screening test kits typically have high detection levels that fail to detect pollutants in any but the highest concentrations. The Dry Weather Monitoring Program has been revised to lower costs and provide greater discretion on the part of the Copermittees to design and implement it.

Section: Attachment E **Subsection: Attachment E**

Comment: The Analytical Dry Weather Monitoring Program as written will be too expensive for the Copermittees to implement. Laboratory costs are estimated between $1,000 and $1,300 per sample.

Further, 40 CFR 122.26(d)(2)(iii)(A) requires between five and ten outfalls or field screening points as representative of the commercial, residential and industrial land use activities of the drainage area contributing to the system. Anything beyond this requirement is clearly an unfunded mandate. Permitting Copermittees to design their own Dry Weather Monitoring Programs will still identify sources and locations of pollution, while eliminating unnecessary and costly monitoring. (D-Max, San Juan Capistrano, Pountney & Associates)

Response: The Dry Weather Monitoring Program has been revised to lower costs and provide greater discretion on the part of the Copermittees to design and implement it. The Dry Weather Monitoring requirement is a waste discharge requirement and not an unfunded mandate.

Section: Attachment E **Subsection: Attachment E**

Comment: Many of the requirements of the Analytical Dry Weather Monitoring Program provide the Copermittees too little flexibility to perform dry weather monitoring based on threat to water quality. The Copermittees present Dry-Weather testing is more effective. The Tentative Order be revised to allow the Copermittees to design (with justification) a Dry Weather Monitoring Program (number of sampling sites, frequency, and analysis) based upon their knowledge of the existing system and watershed information (business types, general land use, % impervious). This will reduce the cost of the program substantially and provide better coverage of the municipality outfalls. Limit the comprehensive laboratory analyses to the outfalls that indicate the potential for existing non-storm water pollution during the field screening program. Increase the frequency of outfall monitoring to assure that the major outfalls are monitored at least once per year. The field screening still could include pH, temperature, total chlorine, total copper, phenols, detergents and ammonia. The revisions should include a provision for Co-permittees to reduce sampling or delete a constituent test when there is “nondetect” historical data. (D-Max, San Diego Copermittees, Anonymous, City of San Diego, Poway, Chula Vista, La Mesa)

Response: The Dry Weather Monitoring Program has been revised to permit greater discretion for the Copermittees to design and implement their own program subject to SDRWQCB review. The emphasis in the revised Dry Weather Monitoring Program is to encourage more frequent and widely distributed sampling on an annual basis to facilitate the detection and elimination of illicit discharges and illegal connections. The revisions do not include a provision for Copermittees to reduce sampling or delete a constituent test when there is “nondetect” historical data, because the dynamic and episodic nature of illicit discharges do not support a limited assessment that no future discharges or "detects" will occur at any given location.

Section: Attachment E **Subsection: Attachment E**

Comment: Sampling of ponded water twice over a four-hour period would be unnecessary duplication. It is suggested that ponded water be exempted from sampling. This will be a costly process which seems greatly to outweigh the benefits. It is more appropriate and reasonable for the Copermittees to be required to sample such ponded water once and analyze the samples based on sample location or other knowledge, such as land uses, historical information, etc. Water characteristics in ponded conditions during hot weather change drastically within a few hours. Presence or absence of pollutants in ponded

water does not necessarily correspond to the discharge of polluted water or vice versa. (City of San Diego, Chula Vista, San Diego Copermittees)

Response: The requirement to collect and analyze two samples was derived from the Federal NPDES regulations. The Dry Weather Monitoring Program has been revised to require only a single sample. The Dry Weather Monitoring Program has been revised to permit greater discretion for the Copermittees to design and implement their own program subject to SDRWQCB review. The emphasis in the revised Dry Weather Monitoring Program is to encourage more frequent and widely distributed sampling on an annual basis to facilitate the detection and elimination of illicit discharges and illegal connections. However, the requirement to sample ponded water remains in the Tentative Order. It is the responsibility of the Copermittees to determine the source of water impounded in their respective MS4s. There is no reason that an illicit discharge cannot appear within the MS4 as ponded water and only monitoring can determine the nature of the impounded waters. Otherwise, contaminated water ponded within the MS4 may be discharged to receiving waters and cause or contribute to an exceedance of receiving water quality objectives or a constitute a threat to human or environmental health.

Section: Attachment E **Subsection: Attachment E**

Comment: The requirement for analytical monitoring of 31 parameters exceeds the SDRWQCBs authority to require dry weather field screening to detect illicit discharges and will result in a very expensive program and would not likely provide any more valuable information. The Dry Weather Monitoring Program should be designed by the Copermittees for review by the SDRWQCB and should require only the constituents in 40 CFR 122.26(d)(2)(iii)(A)(3). Residential versus commercial or industrial testing will need to have different parameters. The list of constituents be consistent with 40 CFR 122.26 (d) (2) (iii) (A) (3)"Total suspended solids, total dissolved solids, COD, BOP, oil and grease, fecal coliform, fecal streptococcus, pH, total kjeldahl nitrogen, nitrate/nitrite, dissolved phosphorus, total ammonia plus organic nitrogen and total phosphorus." The full range of laboratory testing of these samples should only be required if the source and the pollutants in the flow can not be reasonably determined. Placing emphasis on frequent field screening and more extensive upstream investigations will be more effective than comprehensive laboratory testing. It is suggested that the list of 27 laboratory tests be provided as suggested tests to be performed in the case of suspect discharges as determined from field observations, field screening tests, and upstream land use, etc.
Clarification is needed on whether in subsequent years the analytical monitoring is to be carried out only on the constituents that exceeded criteria in previous tests, or all 27 tests will need to be repeated. In the latter case what is the reason? (San Diego Copermittees, Port of San Diego, Poway, Imperial Beach, Chula Vista, County of San Diego, La Mesa, IEA)

Response: The Analytical Monitoring requirement of the Dry Weather Monitoring Program was suggested by staff from County of San Diego as a proposed improvement to the field screening techniques, which have the potential to fail to detect constituents that increased flow and dilution from other sources has masked. Nonetheless, the Dry Weather Monitoring Program has been revised to permit greater discretion for the Copermittees to design and implement their own program subject to SDRWQCB review. The emphasis in the revised Dry Weather Monitoring Program is to encourage more frequent and widely distributed sampling on an annual basis to facilitate the detection and elimination of illicit discharges and illegal connections. The SDRWQCB has the broad and specific legal authority cited in the Fact Sheet/Technical Report to require a dry weather monitoring program.

Section: Attachment Subsection: E

Comment: Can the definition of "dry weather" be changed to include storms with rainfall at a lower precipitation rate such as 0.60" to 0.10" of rain which can produce urban runoff? (Wilkins, George)

Response: The definition of dry weather runoff is based on an antecedent dry period of 72 hours. Regional Board staff do not recommend changing the definition in the Tentative Order.

Section: Attachment Subsection: E

Comment: The Order does not specify which criterion is preferred for selecting the number of monitoring stations, whether it would be based on the municipality classification (large, medium or small) or classification based mainly on the interrelationships with the neighboring cities. (D-Max Engineering)

Response: The Dry Weather Monitoring Program has been revised to permit greater discretion for the Copermittees to design and implement their own program, including the selecting the number and location of sampling stations, subject to SDRWQCB review. The emphasis in the revised Dry Weather Monitoring Program is more frequent and widely distributed sampling on an annual basis to facilitate the detection and elimination of illicit discharges and illegal connections.

Section: Attachment Subsection: E

Comment: Attachment E does not specify the dry weather period. Previously, the dry weather period had been defined as the period from May 1 to September 30. (D-Max Engineering)

Response: The Dry Weather Monitoring Program has been revised to specify a dry weather period of May 1st to September 30th of each year. Nonetheless, the Copermittees are encouraged to evaluate year-round dry weather flows since illicit discharges in San Diego are not limited to summer months.

Section: Attachment Subsection: E-4

Comment: 2 grab samples, 4 hours apart in a 24 hr period. Are they analyzed separately or combined? (Anonymous Workshop 1)

Response: The Tentative Order requires separate collection and analysis of 2 samples 4 hours apart at each Dry Weather Monitoring Site. The purpose of 2 sampling events on the same day is to address daily changes in flow resulting from illicit discharges from businesses and residences.

Section: Attachment Subsection: E.2.f

Comment: If co-permittees and other municipal separate storm sewer system municipalities use the grid system that the State Plane Coordinate System, NAD83 be used as the baseline grid anchor. Following this system will allow municipalities to interface their data and will be useful in the watershed coordination efforts. (Port of San Diego)

Response: The Dry Weather Monitoring Program has been revised to permit greater discretion for the Copermittees to design and implement their own program subject to SDRWQCB review. The emphasis in the revised Dry Weather Monitoring Program is more frequent and widely distributed sampling on an annual basis to facilitate the detection and elimination of illicit discharges and illegal connections. The Copermittees are strongly encouraged to collaborate in developing and implementing their Dry Weather Monitoring programs to allow interfacing of the data and be useful for watershed coordination efforts.

Section: Attachment E Subsection: Attachment E

Comment: The City also questions the requirement that it submit dry weather monitoring maps and procedures and implement the dry weather monitoring program within 180 days of the adoption of the Tentative Order. These deadlines are unrealistic and likely unachievable. The City recommends instead that it first develop a more appropriate and reasonable dry weather program based on threat to water quality, which also includes a reasonable implementation schedule, and submit the program to the Regional Board for its review. (City of San Diego)

Response: The Dry Weather Monitoring implementation schedule was based on the existing requirement under Order 90-42 for dry weather field screening, which under Federal regulations, included developing a map of each Copermittees' MS4. With the benefit of ten years dry weather monitoring experience, the submittal of dry weather monitoring maps and procedures and the implementation of the Dry Weather Monitoring Program within 180 days is not unrealistic or unachievable. Under the revised Dry Weather Monitoring Program in Attachment E of the Tentative Order, the Copermittees are provided increased flexibility and discretion to develop a program and submit it for SDRWQCB review and comment. The submittal and implementation timeline for this requirement, however, is not recommended to be extended.

Section: Attachment E Subsection: Attachment E.2.b

Comment: Attachment E-1 2.b. – How can a Copermittee establish a monitoring station if the MS4 is underground and not accessible in the cell requiring a station? (City of Chula Vista)

Response: As stated in the Tentative Order, the Copermittees shall locate dry weather analytical monitoring stations within its jurisdiction "...either at major outlets or other outfall points (or any other point of access such as manholes)…"

Errata Sheet for Response to Comments Document for Order No. 2001-01 (San Diego Municipal Storm Water Permit)

Additional Comments and Responses:

Section: Multiple **Subsection:** Multiple

Comment: The new requirements imposed by the Tentative Order may have a greater incremental impact on the County than on some other Copermittees because it would apply for the first time to rural parts of the County that were explicitly excluded from Order 90-42, which applied only to those parts of the unincorporated area of San Diego County that were within the Urban Limit Line. Much of the unincorporated area in San Diego County is undeveloped, rural, or agricultural in character. Subsurface storm sewers exist only in a handful of developed areas, and most stormwater is conveyed in natural stream-beds. This early imposition of requirement is ill-advised, because it will divert limited County resources from urban areas and urban programs during a difficult transition period. Because this early imposition of requirements is also obviously not based on federal law and regulations, it is a state mandate for which state funding must be provided.

Order 90-42 did not define "Urban Limit Line." Two plausible definitions exist. One approach would be to include within this line the Current Urbanized Development Area (CUDA) and Future Urbanized Development Area (FUDA) as defined in the County General Plan. A second approach would be to apply the U.S. Bureau of the Census "Urbanized Area" line for the San Diego metropolitan area. The Census definition reaches the "urban fringe" as shown by census tract data. The FUDA definition reaches rural areas identified for future development that may not yet be densely settled on a census tract basis. The Census approach is used for some purposes in U.S. EPA's Storm Water Phase II Final Rule (64 Federal Register 68721 et seq, December 8, 1999).

These circumstances raise two legal issues: (1) whether, under U.S. EPA's Phase II stormwater regulations the SDRWQCB can bring rural parts of the County under an NPDES municipal stormwater permit; and (2) if so, when the requirements of this expanded NPDES permit can be made applicable to rural parts of the County. Under these Phase II stormwater regulations, the RWQCB can bring a rural part of the County under a municipal stormwater permit if the MS4 in that rural area is physically connected to an MS4 that is already regulated under an NPDES municipal stormwater permit. But, in most of the rural parts of the County MS4s do not exist. Stormwater in these areas is conveyed in natural streams that were not constructed by and are not owned, controlled or maintained by the County. These streams are waters of the state, not MS4s. The RWQCB could also bring these rural areas under an NPDES permit after determining based on designated criteria that stormwater discharges from the rural MS4 (if an MS4 exists) would cause or have the potential to cause water quality problems. The RWQCB, however, has not developed these criteria, done this study, or made this determination.

The Clean Water Act (§ 402(p)(4), states that municipal stormwater permits shall "provide for compliance as expeditiously as practicable, but in no event later than three years after the date of issuance of such permit." Similarly, EPA's Phase II regulations provide for newly regulated systems to obtain permit coverage by March 10, 2003. The Order, in contrast, requires programs to be up and running in all parts of the County in 180 days. Requiring compliance with this permit that soon in all parts of the County is not "practicable," and therefore is illegal.

Therefore, as a matter of law any requirements imposed on the County by a revised Order, to the extent they apply outside the "urbanized area" of San Diego as defined in U.S. EPA regulations, are based exclusively on state law. Those requirements would therefore be state mandates, for which state funding must be provided.

If the Order is not substantially amended for all Copermittees, a separate Order with substantially different terms should be issued to the County. The Clean Water Act and U.S. EPA implementing regulations recognize that urban and rural stormwater problems are different. Most of the unincorporated area of the County is rural, and most of that area is not presently subject to Order 90-42.

These facts place the County in the position of legitimately asking for terms, compliance schedules, and/or exclusions from the Order that the SDRWQCB may be reluctant to extend to other copermittees. The County continues to believe the best cure for weak local stormwater programs is regional cooperation, assistance, and leadership, not an overly prescriptive Order. The County is ready to do what is needed to help other Copermittees improve their stormwater programs, provided the Order is amended to delete requirements the RWQCB cannot legally impose, to provide sufficient flexibility to Copermittees, and to provide sufficient time for compliance. If the Order is not amended in this way, the County demands that it be issued a separate permit, that takes proper account of expanded scope of this Order, and of the rural nature of most of the unincorporated portion of the County. (County of San Diego (1), County of San Diego (2), County of San Diego (3))

Response: A municipality's responsibility for discharges of storm water and urban runoff in its MS4 must be coextensive with the municipality's jurisdiction to regulate such discharges. Discharges of storm water that are not within a municipality's jurisdiction or that are not tributary to a municipality's MS4 may be subject to other water quality control requirements, but may not impose upon the municipality any regulatory obligation under these requirements. However, the commentor is incorrect to assert that a municipality should not be responsible under the requirements for discharges to natural drainages that are used as part of the municipality's MS4, regardless of the "ownership" of such a natural drainage or stream. The determination of whether or not a particular natural drainage or urban stream channel is or is not part of the municipality's MS4 depends on the particular circumstances of the channel and the municipality's urban runoff management practices. If municipalities rely on natural drainage channels or urban streams to collect and convey urban runoff and storm water to or from an MS4,

they should be recognized as components of the municipality's MS4; the municipality would be required to reduce pollutant discharges therein to the maximum extent practicable. Application of requirements for discharges of storm water in MS4s to natural drainages and urban streams does not "transform" such drainages and streams to MS4s; however, it does reflect the fact that the Regional Board recognizes the water quality consequences of municipalities' reliance on such drainages and streams for the management of storm water and urban runoff, and the environmental impact upon such drainages and streams as a consequence of the increased flows therein associated with urban development and land use under the planning and regulatory authority of municipalities.

The Tentative Order does not implement Phase II Federal NPDES regulations. Tentative Order 2001-01 implements the 1990 Federal Phase I NPDES regulations. In the Preamble to the 1990 Federal Rule, the USEPA notes:

"EPA recognizes that some of the counties addressed by today's rule have, in addition to areas with high unincorporated urbanized populations, areas that are essentially rural or uninhabited and may not be the subject of planned development. While permits issued for these municipal system discharges in unincorporated portions of the county, it is the intent of EPA that management plans and other components of the programs focus on the urbanized and developing areas of the county."

The Jurisdictional Urban Runoff Management Program (JUMRP) Document, to be submitted by the County of San Diego as a Copermittee under Tentative Order 2001-01, does not have to include requirements that would implement Phase II NPDES regulations in unincorporated rural areas. Rather, the Tentative Order seeks to recognize and require extension of the JURMP to those specific parts of the unincorporated County of San Diego that are now or will plausibly be urbanized during the term of the Tentative Order. Significant growth is occurring in the previously rural northern, eastern and southern parts of the County that will result in significant urban runoff discharges to inland rivers, streams, and municipal drinking water supply reservoirs. For example, as published in the San Diego Union Tribune November 24, 2000, SANDAG projects the population of Alpine will grow from 15,368 to 30,273 by 2020. This is six times the size of the City of Del Mar. By 2020, the populations of Ramona and Valley Center are expected to grow to 60,000 and 45,853, respectively. By 2020, under the current San Diego County General Plan, approximately 850,000 people will live in the unincorporated parts of the county. A significant percentage of that growth can reasonably be predicted to occur during the term of the Tentative Order and the even greater percentage of future growth will be effected by how the County of San Diego implements the Tentative Order. The requirements of the Tentative Order 2001-01 Jurisdictional Urban Runoff Management Program, appropriately and legally applied to existing and planned new development, will ameliorate the impacts of urban runoff discharges in presently rural areas. This is not an unfunded mandate intended to be indiscriminately applied by the County throughout the urban and rural county at enormous cost in advance of the Phase II NPDES federal regulations. The Tentative Order implements Phase I NPDES regulations, but is consistent with the Phase II NPDES regulations. As described above,

the County is responsible for implementing Tentative Order 2001-01 with respect to discharges to and from demonstrable MS4 systems operated in the unincorporated county. The County of San Diego is correctly and necessarily identified in Tentative Order 2001-01 as a Copermittee.

Section: F.3 **Subsection:** F.3.a.5.c

Comment: F.3.a.(5)(c) [Maintenance of Municipal Separate Storm Sewer System] (Municipal) The definition of accumulated waste includes sediment. The definition of accumulated waste should not include sediment. It is no value to remove all sediment from roadway culverts as they are a small part of a natural drainage system. In fact, roadway culverts that convey stormwater in a natural watercourse under a road or highway should be exempt. This would also apply to streams. (County of San Diego)

Response: Section F.3.a.5.c does not require the removal of all accumulated waste in all instances. Therefore it does not require removal of all sediment. However, sediment is a frequent cause of receiving water impairment within the region. Therefore, in cases where large deposits of sediment exist which were generated by man-made activities, this accumulated sediment should be removed. Since roadway culverts are part of the Copermittees' MS4s, accumulated waste should be removed from them in a similar manner as from rest of the Copermittees' MS4s.

Section: F.3 **Subsection:** F.3.a.5.c.ii

Comment: "F.3.a.(5)(c)(ii) Additional cleaning as necessary between October 1 and April 30 of each year;" - "as necessary" is ambiguous. Does this mean we would be required to inspect the entire MS4 in the off-season to determine whether additional cleaning is necessary? (County of San Diego)

Response: The term "as necessary" is included in section F.3.a.5.c.ii to provide the Copermittees discretion and flexibility in determining when additional cleaning should be conducted.

Section: F.3 **Subsection:** F.3.a.5.c.iv

Comment: F.3.a.(5)(c)(iv) Proper disposal of waste removed pursuant to applicable laws. This section inappropriately places additional liability on Copermittees for violations of existing laws. These "second tier" violations could carry significantly more severe penalties than do the original laws they duplicate. The County recommends deletion of this section. If the RWQCB staff wish to remind Copermitees of the need to

comply with waste disposal laws, they should do so in the Technical Report. (County of San Diego)

Response: Language in the Tentative Order regarding proper disposal of waste is included in order to ensure that the waste is not discharged in a manner which will result in the waste re-entering an MS4 or receiving water. Therefore, requirements for proper disposal of waste are applicable to the Tentative Order and will remain in the Tentative Order.

Section: F.3 **Subsection:** F.3.a.8

Comment: F.3.a.(8) Enforcement of Municipal Areas and Activities - What is the meaning of this section? Is it the RWQCB's intention that Copermittees would take enforcement actions against their own employees? The section is ambiguous, and is not supported by the findings, by existing evidence, nor by law. (County of San Diego)

Response: Section F.3.a.8 requires municipalities to enforce their storm water ordinances for all municipal areas and activities. This can apply to municipal areas which are open to the public, such as parks and streets. Enforcement in these areas may be necessary due to their heavy use. In addition, municipalities should ensure their employees comply with storm water ordinances. If their employees are not complying with the ordinances, some form of enforcement may be necessary, such as warnings, reprimands, etc.

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BEFORE THE STATE WATER RESOURCES CONTROL BOARD

RESPONSE IN OPPOSITION TO PETITIONS FOR REVIEW OF CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD SAN DIEGO REGION ORDER NO. 2001-01 - NPDES PERMIT NO. CAS0108758 (SAN DIEGO MUNICIPAL STORM WATER PERMIT)

SWRCB/OCC FILES A-1362 and A-1362(a)

Submitted by
California Regional Water Quality Control Board
San Diego Region
June 11, 2001

I. INTRODUCTION

Petitioners (the Building Industry Association of San Diego County (BIA) and Western States Petroleum Association (WSPA)) have challenged the actions of the San Diego Regional Water Quality Control Board (SDRWQCB) in adopting Order No. 2001-01, the San Diego Municipal Storm Water Permit (Permit). Petitioners are alone in this appeal of the Permit. The municipalities which are directly regulated under the Permit (Copermittees) did not choose to join Petitioners in their appeal. This fact exhibits the general agreement within the region that strict measures are needed to adequately address the significant water quality problem posed by urban runoff. This general agreement exists despite Petitioners' reluctance to join in the effort to adequately address their contributions to the problem.

In their isolated appeal of the Permit, Petitioners employ a misguided across-the-board approach in challenging the Permit's requirements. These arguments fail on many fronts. A preponderance of Petitioners' arguments have previously and repeatedly been heard and denied by the State Water Resources Control Board (SWRCB) (during the SWRCB's hearing on the Los Angeles Regional Water Quality Control Board (LARWQCB) Standard Urban Storm Water Mitigation Plan (SUSMP) in particular). Other arguments cover issues typically addressed during the re-issuance of the Water Quality Control Plan - San Diego Basin (Basin Plan), not storm water permits. Moreover, many arguments rely on Petitioners' apparently purposeful misrepresentation of the Permit's requirements. Petitioners' arguments also heavily depend on an inverted burden of proof, attempting to place requirements on the SDRWQCB in adopting the Permit which do not exist.

For these reasons and many others (all discussed in more detail below), Petitioners' appeals are without merit and should be denied.

II. ARGUMENTS

A. The SDRWQCB Followed Proper Administrative Procedure in Adopting the Permit

1. <u>The Public Hearing for the Permit Followed Necessary Procedure and was Adequate</u>

Petitioners claim that the SDRWQCB did not conduct a proper adjudicative hearing on the Permit. However, the SDRWQCB followed the standard public hearing procedure of which it is required under Division 3 of Title 23 of the California Code of Regulations (CCR). The SDRWQCB is not required to expand upon this standard public hearing procedure, since it provides all interested parties due process and sufficient opportunity for comment. Furthermore, expansion of this public hearing procedure was not requested by interested parties. Nor was expansion of the public hearing procedure necessary, due to the extensive public participation process undertaken by the SDRWQCB in the years

and months preceding the December 13, 2000 public hearing on the Permit.[1] Due to its thoroughness, this public participation process effort by the SDRWQCB ensured that the standard public hearing process was adequate.

For example, various versions of the Permit were available for review and comment for over five years prior to the public hearing. Drafts of the Permit were previously issued to the County of San Diego, the incorporated Cities of San Diego County, and the San Diego Unified Port District (Copermittees) in both 1995 and 1998.[2] Each subsequent version of the Permit has incorporated changes based on written and oral comments received on previous drafts. The Permit before the Board on December 13, 2000 therefore reflected over five years of development fully within the public process.

Furthermore, in the months preceding the public hearing, the SDRWQCB held no less than five public workshops on the Permit's requirements.[3] Two of these workshops focused on the SUSMP requirements specifically, including one SUSMP workshop which was held before the Board on March 8, 2000. This SUSMP workshop provided the public the opportunity for comment before the Board. The other three workshops on the Permit's requirements were held by SDRWQCB staff in the months of October and November of 2000, directly prior to the public hearing. Every comment received during these public workshops was responded to, often with revisions to the draft Permit being the end result. It is worth noting that two of these three workshops (one of which one of the Petitioners attended)[4] ended early, due to the lack of public comments and questions on the Permit. Clearly, every opportunity for vocal input on the requirements of the Permit was provided at these workshops, to the point that interested parties did not have further comments (including the Petitioner BIA).

As Petitioners note, over 1,500 comments on the Permit were received. Approximately 51 days were provided to the public after the draft Permit's release for these written comments,[5] which were comprehensive in their scope. In addition, approximately 60% of the comments were duplicate comments, or comments which reiterated the same concern.[6] Due to this comprehensiveness and redundancy, it is doubtful that interested parties had new information to provide to the Board which could not be covered in the 3 minutes provided for oral comment during the hearing. Indeed, a review of the public hearing transcript shows that little, if any, new comments were provided to the Board which had not been previously provided as written comments. The vast majority of the

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[1] SDRWQCB, 2000. Summary and Statistics of Public Workshops for Tentative Order No. 2001-01. Includes detailed descriptions of SDRWQCB workshops on Tentative Order No. 2001-01. A.R. Vol. 1-26. Also: SDRWQCB, 2000. Chronology of the San Diego Municipal Storm Water Permit. Describes public outreach by SDRWQCB on Tentative Order No. 2001-01 and previous drafts.
[2] Tentative Order No. 95-76 and Tentative Order No. 99-01. A.R. Vol. 1-39 and 1-40.
[3] SUSMP workshops were held on March 8, 2000 and April 13, 2000. Permit workshops were held October 19, 2000, November 2, 2000, and November 16, 2000.
[4] Matt Adams of BIA attended the November 16, 2000 Permit workshop. A.R. Vol. 1-41.
[5] SDRWQCB, 2000. Proposed Adoption Schedule. A.R. Vol. 1-19. The Permit was released for public review on October 10, 2000 and written comments were accepted until November 30, 2000.
[6] SDRWQCB, 2001. Draft Response to Comments (Introduction). A.R. Vol. 1-14.

comments at the public hearing were merely a reiteration of comments which the Board had previously received in a written format.

2. Revisions Made to the Permit Did Not Require Reopening of the Public Hearing

In addition, Petitioners claim that the SDRWQCB materially revised the Permit without reopening the public hearing. It is worth noting that in making this argument, Petitioners provide no support as to why the minor revisions made to the Permit would require reopening of the public hearing. However, due to the insignificant nature of the revisions to the Permit following the public hearing, a reopening of the hearing was simply not necessary. The administrative record is replete with evidence of findings that the revisions made to the Permit after the public hearing were insignificant and minor in nature.[7] In fact, virtually all of the changes made to the Permit were made directly in response to comments from interested parties. As such, all of these changes were reasonably foreseeable and were a logical outgrowth of the Permit adoption process. Furthermore, the revisions essentially did not result in any additions or deletions of Permit requirements. Instead, the revisions were made in order to clarify the intent or improve the implementation of the Permit. In sum, the revisions only provided more discretion to the Copermittees in their Permit implementation, while the basic requirements of the Permit remained the same and were not fundamentally altered.

An example of this type of change is exhibited in the Permit's requirement for peak flow rates and velocities of urban runoff from new development to be controlled as necessary to maintain pre-development downstream erosion. Petitioners specifically claim that changes to this requirement constituted significant changes which necessitated further public comment in the public hearing process. However, review of the administrative record exhibits that the final version of this requirement was reasonably foreseeable based on previous versions of the requirement, SDRWQCB guidance regarding the requirement, and interested party comments pertaining to the previous versions of the requirement.

As publicly issued in the October 11, 2000 draft of Tentative Order No. 2001-01, the requirement stated "post development runoff which is greater in peak rate or velocity than pre-development runoff from the same site is prohibited" (Tentative Order No. 2001-01 section A.4).[8] This requirement applied to **all** new development and significant redevelopment, not just development occurring under the SUSMP priority development project categories. As discussed in the Draft Fact Sheet/Technical Report (issued to the public at the same time as Tentative Order No. 2001-01),[9] one purpose of this requirement was to control downstream erosion to protect water quality. Based on comments received by the SDRWQCB, the final version of the requirement was changed

[7] See SDRWQCB Staff Presentation to Board Members, February 21, 2001. A.R. Vol. 1-3. See also SDRWQCB Minutes of Meeting, February 21, 2001, pg. 5, A.R. Vol. 1-42, which states "Mr. Minan made a motion to adopt staff's characterization that the changes to the permit were insignificant therefore sending the revised permit to the public for comment was **not** necessary. The motion was seconded by Ms. Black and approved by unanimous vote."
[8] SDRWQCB, 2000. Tentative Order No. 2001-01. Pg. 8. A.R. Vol. 1-24.
[9] SDRWQCB, 2000. Draft Fact Sheet/Technical Report. Pg. 67-68. A.R. Vol. 1-25.

to only apply to new development and significant redevelopment falling under the SUSMP priority development project categories, in order to ease implementation and ensure application to significant projects only.[10] Furthermore, again in response to comments from **BIA of Southern California** and others,[11] the requirement was changed to require control of peak flow rates and velocities **as necessary** to maintain downstream erosion.[12] Therefore, the SDRWQCB increased the flexibility with which the requirement could be implemented in the final version, but in doing so had to include the purpose of the requirement (to protect against downstream erosion) in the Permit to ensure effectiveness. This in effect did not change the requirement, but rather only added clarification and flexibility. Since these changes were made either in response to comments or to clarify intent already discussed in the Draft Fact Sheet/Technical Report, they were a logical outgrowth of the permit adoption process and did not require further public comment or reopening of the public hearing process.

Moreover, the final language in the Permit regarding this issue was based directly on the LARWQCB SUSMP language, which was provided by the SDRWQCB to interested parties as a guidance document attached to the SDRWQCB's SUSMP staff report.[13] This further exhibits how the final requirement in the Permit was reasonably foreseeable, in that it had previously appeared in an attachment to a SDRWQCB document directly addressing the matter.

B. Inclusion of Prohibitions and Receiving Water Limits in the Permit Does Not Violate the Maximum Extent Practicable (MEP) Standard

1. <u>The Permit Does Not Require "Strict Compliance" with Water Quality Objectives through the Application of Numeric Effluent Limits</u>

Petitioners assert that the Permit violates MEP by inappropriately requiring discharges of urban runoff from municipal separate storm sewer systems (MS4s) to "strictly comply" with receiving water quality objectives through the application of numeric effluent limits on MS4 discharges. This assertion is based on Petitioners' misguided interpretation of the Permit and their misunderstanding of the MEP standard. While nothing precludes the SDRWQCB from requiring "strict compliance" with receiving water quality objectives through application of numeric effluent limits, the SDRWQCB has not done so. The Permit's approach to compliance with water quality standards is outlined in the receiving water limitations language of section C. of the Permit. This approach is also further discussed in the Draft Fact Sheet/Technical Report.[14] Rather that require "strict compliance" with water quality standards through application of numeric effluent limits, this section requires that discharges from MS4s do not cause or contribute to violations of

[10] SDRWQCB, 2001. Draft Response to Comments. Pg. 103. A.R. Vol. 1-14.
[11] Building Industry Association of Southern California, 2000. Comments on Municipal Storm Water Permit for San Diego County and Cities. Pg. 15. A.R. Vol. 1-31-D. States "this requirement should only apply where there is the potential for downstream erosion."
[12] SDRWQCB, 2001. Draft Response to Comments. Pg. 192-193. A.R. Vol. 1-14.
[13] SDRWQCB, 2000. Staff Report for Stand Urban Storm Water Mitigation Plans and Numerical Sizing Criteria for Best Management Practices. Attachment A. A.R. Vol. 1-36.
[14] SDRWQCB, 2000. Draft Fact Sheet/Technical Report. Pg. 24-26. A.R. Vol. 1-25.

water quality standards. Furthermore, section C. provides for the implementation of an iterative best management practice (BMP) process in order to achieve compliance with water quality standards. Allowance for such a process hardly constitutes application of numeric effluent limits or a "strict compliance" approach.

Nor does the Permit's application of Basin Plan prohibition 5 (at Permit Attachment A) to discharges from MS4s change this approach, as Petitioners assert. Prohibition 5 states:

> The discharge of waste to inland surface waters, except in cases where the quality of the discharge complies with applicable receiving water quality objectives, is prohibited. **Allowances for dilution** may be made at the discretion of the Regional Board. (emphasis added)

The prohibition 5 provision for 'allowance for dilution' when considering compliance with receiving water quality objectives is analogous to the Permit's requirement that MS4 discharges do not cause or contribute to a violation of receiving water quality standards. The requirement that MS4 discharges not cause or contribute to violations of receiving water quality standards allows for the concentration of pollutants in MS4 effluent to exceed receiving water quality objectives, provided that the receiving water can assimilate the pollutants and not exceed its water quality objectives. In other words, as long as the receiving water's water quality objectives are maintained, an allowance for dilution of MS4 effluent is provided for by section C of the Permit. This is essentially the same approach dictated by prohibition 5, which allows for dilution of discharges for compliance with receiving water quality objectives. Therefore, Basin Plan prohibition 5 conforms with the Permit's receiving water limitations approach. As noted above, section C. of the Permit dictates receiving water limits through an iterative BMP implementation process, and not "strict compliance" with receiving water quality objectives through application of numeric effluent limits.

Since the Permit does not include require "strict compliance" with receiving water quality objectives through application of numeric effluent limits, Petitioners' arguments that "strict compliance" with receiving water quality objectives violates MEP are without merit. Furthermore, the Permit does not go against SWRCB and United States Environmental Protection Agency (USEPA) guidance regarding numeric effluent limits in storm water permits. On the contrary, as discussed above, the Permit's receiving water limitations and iterative BMP approach is directly in line with such guidance.

2. <u>The Permit Does Not Require "Zero Contribution" of Impairing Pollutants to Impaired Water Bodies</u>

Petitioners also assert that the Permit's requirement for "zero contribution" of impairing pollutants to impaired water bodies exceeds the MEP standard. However, there is no such provision in the Permit requiring "zero contribution" of impairing pollutants to impaired water bodies. Petitioners claim that the Permit's requirement that MS4 discharges do not cause or contribute to a violation of water quality standards constitutes a requirement for "zero contribution." A review of the administrative record proves this

interpretation of the Permit to be incorrect. The Draft Response to Comments document states:

> There may be circumstances where a slight increase in pollutant concentrations [to an impaired water body] from a newly developed area may not contribute to an exceedance of water quality standards. For example, if a discharge's pollutant concentration from a newly developed area is well below the water quality objective for the 303(d) listed receiving water, the discharge will most likely not contribute to the exceedance of the water quality objective.[15]

It is important to note that the language included in section C. of the Permit is essentially identical to the language developed by the SWRCB regarding receiving water limitations.[16] While there have been recent developments[17] covering the issue of whether the Clean Water Act (CWA) requires inclusion of receiving water limitations in municipal storm water permits, the Permit incorporates the most recent guidance distributed by the SWRCB on the issue.[18] The receiving water limitations language in the Permit has also been included in storm water permits throughout California, including storm water permits adopted by the SDRWQCB. There is no evidence that either the SWRCB, SDRWQCB, or any other Regional Board has ever interpreted this language as requiring "zero contribution" of impairing pollutants to impaired water bodies. Petitioners' misinterpretation of the implementation of this requirement does not constitute a violation of the MEP standard by the SDRWQCB.

3. <u>The Permit's Receiving Water Limitations Language is Not Subject to the MEP Standard and Therefore Does Not Violate MEP</u>

Finally, Petitioners assert that the section C. Receiving Water Limitations language, which the SWRCB has instructed regional boards to include in storm water permits,[19] exceeds MEP in and of itself. This assertion reflects Petitioners' fundamental misunderstanding of the requirements of the National Pollutant Discharge Elimination System (NPDES) storm water program.

The receiving water limitations requirements for BMPs to be implemented to achieve water quality standards is not guided by the MEP standard. In actuality, the opposite is correct; USEPA states that MEP must be guided by compliance with water quality standards. USEPA states:

> One commenter observed that MEP is not static and that if the six minimum control measures are not achieving the necessary water quality improvements, then an MS4 should be expected to revise, and if necessary, expand its program. This concept, it is argued, must be clearly part of the definition of MEP and thus

[15] SDRWQCB, 2001. Draft Response to Comments. Pg. 105. A.R. Vol. 1-14.
[16] SWRCB, 1999. SWRCB Order No. WQ 99-05.
[17] <u>Defenders of Wildlife v. Browner</u>, 191 F.3d 1159, 1164-66 (9th Cir. 1999).
[18] SWRCB, 1999. Memorandum on Receiving Water Limitations in Municipal Storm Water Permits.
[19] SWRCB, 1999. Memorandum on Receiving Water Limitations in Municipal Storm Water Permits.

> incorporated into the binding and operative aspects of the rule. […] EPA believes that it is. The iterative process […] is intended to be sensitive to water quality concerns. EPA believes that today's rule contains provisions to implement an approach that is consistent with this comment.[20]

Furthermore, achievement of water quality standards is a separate and distinct goal for the NPDES municipal storm water program. It is not a subset of the MEP requirement to be overridden by the MEP standard. This is exhibited when USEPA states:

> Today's rule specifies that the "compliance target" for the design and implementation of municipal storm water control programs is "to reduce pollutants to the maximum extent practicable (MEP), to protect water quality, **and** to satisfy the appropriate water quality requirements of the CWA.[21] (emphasis added)

In summary, the Permit's requirements that MS4 discharges do not cause or contribute to a violation of water quality standards are not subject to the MEP standard, and therefore do not exceed MEP.

C. The Permit's Receiving Water Limits Are Directly Based on the Most Recent SWRCB and USEPA Guidance

Petitioners claim that the Permit's requirements that MS4 discharges do not cause or contribute to a violation of water quality standards are preempted by recent controlling authority and agency guidance. In fact, the opposite is true; the Permit's requirements regarding exceedances of water quality standards are directly based on such guidance.

As noted above, the Receiving Water Limitations language in section C. of the Permit is taken directly from SWRCB Order No. WQ 99-05. This language requires that MS4 discharges do not violate water quality standards, and that an iterative BMP process must be implemented to correct any violations of water quality standards. Note that the language allows for an iterative BMP implementation approach for compliance with water quality standards, and is not the "strict compliance" approach which Petitioners assert. Oddly, Petitioners argue that these requirements are not consistent with the SWRCB Orders (WQ 98-01 and 99-05) even though the language for the requirements is taken essentially verbatim from Order No. WQ 99-05.

Petitioners proceed to argue that this receiving water limitations language is preempted by the Ninth Circuit Court of Appeals Defenders of Wildlife v. Browner, 191 F.3d 1159, 1164-66 (9th Cir. 1999) decision. However, the phase II USEPA storm water regulations exhibit this to be untrue. USEPA states:

> EPA believes this iterative approach [of BMP implementation to achieve water quality standards] is consistent with and implements section 301(b)(1)(C) [of the

[20] 64 FR 68754
[21] 64 FR 68753

> CWA], **notwithstanding the Ninth Circuit's interpretation**. As an alternative to basing these water quality-based requirements on section 301(b)(1)(C), however, EPA also believes the iterative approach toward attainment of water quality standards represents a reasonable interpretation of CWA section 402(p)(3)(B)(iii).[22] (emphasis added)

In addition, inclusion of the receiving water limitations language in the Permit is not only consistent with USEPA phase II storm water regulations, but is also based directly on guidance from the SWRCB. As discussed in the Draft Fact Sheet/Technical Report,[23] the SWRCB issued on October 14, 1999 a legal opinion on the federal appellate decision and provided advice to the Regional Boards on how to proceed in the future regarding the decision.[24] In the memorandum, the SWRCB concludes that the recent Ninth Circuit opinion upholds the discretion of USEPA and the State to (continue to) issue permits to MS4s that require compliance with water quality standards through iterative BMPs. Moreover, the memorandum states that "[…] because most MS4 discharges enter impaired water bodies, there is a real need for permits to include stringent requirements to protect those water bodies. As total maximum daily loads (TMDLs) are developed, it is likely that MS4s will have to participate in pollutant load reductions, and the MS4 permits are the most effective vehicles for those reductions." In summary, the SWRCB concludes in the memorandum that the Regional Boards should continue to include the receiving water limitations language established in SWRCB Order WQ 99-05 in all future permits. Accordingly, the SDRWQCB has required in the Permit that discharges from MS4s do not cause or contribute to an violation of receiving water quality standards.

Petitioners further argue that the Permit's requirement that MS4 discharges do not cause or contribute to a violation of water quality standards is inconsistent with other USEPA guidance. They argue that USEPA guidance indicates that requirements for BMPs to be implemented to achieve water quality standards must be guided by the MEP standard. As discussed above in section B.3, this interpretation of the relationship between receiving water limitations and the MEP standard is incorrect. Achievement of water quality standards is a separate and distinct goal for the NPDES municipal storm water program. It is not a subset of the MEP requirement to be overridden by the MEP standard. In actuality, the opposite is correct; the MEP standard must be guided by compliance with water quality standards.

Petitioners also assert that the Permit's requirement that MS4 discharges do not cause or contribute to an exceedance of water quality standards violates USEPA's "Interim Permitting Approach for Water Quality-Based Effluent Limitations in Storm Water Permits." In actuality, both approaches are congruous. As USEPA describes, the interim approach "describes how permits would implement an iterative process using BMPs, assessment, and refocused BMPs, leading toward attainment of water quality

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[22] 64 FR 68753
[23] SDRWQCB, 2000. Draft Fact Sheet/Technical Report. Pg. 24-26. A.R. Vol. 1-25.
[24] SWRCB, 1999. Memorandum on Receiving Water Limitations in Municipal Storm Water Permits.

standards."[25] The Permit prescribes this same approach, describing a procedure for the iterative implementation of BMPs until compliance with water quality standards is achieved. Petitioners further argue that such a requirement for an iterative BMP process cannot be included in the permit because USEPA's "Interim Approach" requires the existence of "adequate information" for such a requirement to be developed. However, this guidance that "adequate information exists" refers only to development of "more specific conditions or limitations **to meet water quality standards**"[26] (emphasis added), not actual compliance with the water quality standards themselves, which is the issue at hand. In any event, "adequate information" exists showing the impact of urban runoff on receiving waters within the San Diego region,[27] exhibiting the need for enforcement of receiving water limitations regarding urban runoff discharges.

Finally, Petitioners argue that water quality-based requirements should be guided by "cost effectiveness, proportionate contribution of pollutants, and ability to reasonably achieve wasteload reductions."[28] However, this quote provided by Petitioners does not address the issue at hand. The quote more accurately addresses inclusion of numeric effluent limits or total maximum daily load (TMDL) provisions in storm water permits, as the language of the quote attests (e.g., "wasteload reductions"). Therefore, the quote does not apply to compliance with water quality standards through iterative BMP implementation, which is the current issue. See sections D.3, F, and G for further discussion of the SDRWQCB's ample consideration of factors such as cost, contribution of pollutants, ability to meet receiving water limitations, etc.

D. The SDRWQCB Is Not Required to Develop Special Wet-Weather Specific Water Quality Objectives for the Permit

1. Wet-Weather Specific Water Quality Objectives Are a Basin Plan Issue and Not a Storm Water Permit Issue

California Water Code (CWC) section 13377 requires that the Permit implement the Basin Plan and protect beneficial uses. The SWRCB has also instructed the Regional Boards to include receiving water limitations in municipal storm water permits.[29] Based on these requirements and guidance, the SDRWQCB included receiving water limitations in the Permit for the protection of receiving water quality objectives.

The above requirements and guidance require the inclusion of receiving water limitations in the Permit for the protection of receiving water quality objectives, irregardless of the basis of the water quality objectives. The issue of whether or not the SDRWQCB's water quality objectives are appropriate is not addressed during the determination to include receiving water limitations in a permit. An assessment of the appropriateness of the

[25] 64 FR 68753
[26] USEPA, 1996. Interim Permitting Approach for Water Quality-Based Effluent Limitations in Storm Water Permits. 61 FR 43761. Pg. 2.
[27] SDRWQCB, 2000. Draft Fact Sheet/Technical Report. Pg. 5-7, Attachment 2 (1998 Clean Water Act Section 303(d) Impaired Waterbody List). A.R. Vol. 1-25.
[28] 64 FR 68753
[29] SWRCB, 1999. Memorandum on Receiving Water Limitations in Municipal Storm Water Permits.

SDRWQCB's water quality objectives is conducted during the process of adoption and re-issuance of the Basin Plan, as well as during the Triennial Review of water quality standards that the SDRWQCB conducts pursuant to the Clean Water Act. Therefore, the issue of development of wet-weather specific water quality objectives is not an issue to be addressed during adoption of municipal storm water permits, but is rather a part of the Basin Plan's planning process.

2. The SDRWQCB's Current Water Quality Objectives Are Adequate and Appropriate for the Permit

Despite the fact that development of water quality objectives is a Basin Plan issue, and therefore should not be addressed here, the SDRWQCB's water quality objectives are appropriate and adequate as the basis of the Permit's receiving water limitations language. The SDRWQCB is not required to include various water quality objectives for various seasons. The Federal Regulations (40 CFR 131.10(f)) clearly provide the SDRWQCB discretion in this respect: "States **may** adopt seasonal uses as an alternative to reclassifying a water body or segment thereof to uses requiring less stringent water quality criteria" (emphasis added). In addition, California Water Code section 13241 only requires consideration of "past, present, and probable future beneficial uses of water." Any mention of seasonally varying beneficial uses is clearly missing from this directive, further exhibiting that wet-weather specific water quality objectives are not specifically required of the SDRWQCB.

Not only are wet-weather specific water quality objectives not required, they are not appropriate for the San Diego region at this time. The argument that wet-weather specific water quality objectives are needed assumes that beneficial uses of receiving waters change during wet weather. However, this assumption is frequently incorrect regarding the beneficial uses of receiving waters within the San Diego region. Due to the San Diego region's particularly mild climate, receiving waters within the region are used by residents and visitors year-round. It is common knowledge that beneficial uses such as surfing, kayaking, and fishing occur during winter. The San Diego Association of Governments (SANDAG) reports an average of approximately 31,504 beach visitors a day during winter within the region.[30] These beneficial uses do not cease to exist simply because of a few rain drops. Since most of the region's creeks discharge directly or indirectly to the ocean (particularly during storm events) this beneficial use must be considered in applying beneficial uses and water quality objectives not only to the ocean but to creeks as well. In addition, use of the region's creeks does not halt during wet weather. This is exhibited by the numbers of people frequently saved from creeks during flooding events.

Furthermore, Petitioners' proposed modification of water quality objectives during wet weather is an overly anthropocentric view. Aquatic habitat for wildlife is an important designated beneficial use of the San Diego region's receiving waters. Petitioners

[30] March 7, 2000 Fax from County of San Diego Department of Environmental Health to SDRWQCB. SANDAG beach use data. Beach use data based on 1989-1990 estimates from State and City Departments of Parks and Recreation. A.R. Vol. 1-43.

completely ignore this fact. Again, the region's creeks, lagoons, bays, and ocean do not cease to be used by wildlife as aquatic habitat simply because it is raining. Therefore, water quality objectives designed to protect the aquatic habitat beneficial use must be consistent during both dry and wet weather.

It is important to recognize that the impacts of wet-weather storm events extend into periods of dry weather as well. For example, the County of San Diego Department of Environmental Health advises people to refrain from entering the water for up to 72 hours following a rain event. In addition, fine sediment from construction sites discharged into creeks during wet weather can remain in the creeks for extended periods of time, clogging interstitial space in gravel banks needed for habitat and breeding, thereby causing long-term impacts. Provision for less stringent water quality objectives during wet weather, as Petitioners propose, would only worsen these unacceptable conditions. Indeed, the Federal Regulations prohibit such occurrences, requiring that any seasonal water quality objectives "shall not preclude the attainment and maintenance of a more protective use in another season" (40 CFR 131.10(f)). As such, wet-weather specific water quality objectives are not appropriate for urban runoff discharges in the San Diego region.

It is also worth noting that the Permit is not limited to wet weather conditions in its scope. A significant portion of the Permit directly addresses dry weather discharges; the Permit is a year round permit. The number of annual dry days within the region greatly exceed the number of annual wet weather days.[31] Therefore, the Permit actually applies to discharges occurring during dry weather approximately 88% of the time. Due to the preponderance of dry weather conditions in the San Diego region, a permit which includes receiving water limitations to protect dry weather beneficial uses is appropriate.

3. Compliance with Receiving Water Limitations Based on Current Water Quality Objectives is Achievable by the Copermittees

Petitioners also claim that the SDRWQCB's lack of wet weather specific water quality objectives violates CWC section 13241 because the SDRWQCB's current water quality objectives are unachievable for MS4 discharges during storm events. Firstly, this is a Basin Plan issue and not a storm water permit issue (see sections D.1 and G.1). It is also interesting to note that Petitioners do not explain why they cannot achieve compliance with water quality objectives during wet weather; they simply claim that it cannot be done. As discussed in section B.1, the Permit's receiving water limitations do not require strict compliance with water quality objectives through application of numeric effluent limits. On the contrary, the Permit's receiving water limitations require that MS4 discharges do not cause or contribute to a violation of receiving water quality objectives. This requirement is wholly achievable for MS4 discharges in both dry and wet weather,

[31] Earthinfo, 1994. Earthinfo SD West rainfall data from 01/1927 to 12/1994, provided by San Diego County Flood Control District. A.R. Vol. 1-44. Approximately 88% of the days at San Diego Lindbergh Field experience no or trace amounts of precipitation.

and is therefore in compliance with CWC section 13241, irregardless of whether adoption of the Permit is directly subject to CWC section 13241 or not.[32]

California Water Code section 13241 states that in establishing water quality objectives, regional boards must consider "(c) Water quality conditions that could reasonably be achieved through the **coordinated control of all factors** which affect water quality in the area" (emphasis added). The language "coordinated control of all factors" indicates the stringent standards to which water quality objectives are subject. Note that the language does not state "control of factors to the maximum extent practicable," as Petitioners appear to imply. Surely if the Copermittees were to commit to coordinated control of **all** factors affecting the quality of their urban runoff, they would be able to achieve compliance with the Permit's receiving water limitations requirements, even during storm events (as exhibited in the following paragraph). Furthermore, USEPA exhibits its belief that compliance with water quality standards for wet weather discharges is achievable when it states "EPA anticipates that a permit for a regulated small MS4 operator implementing BMPs to satisfy the six minimum control measures will be sufficiently stringent to protect water quality, **including water quality standards** […]"[33] (emphasis added).

In fact, the Copermittees' own monitoring data exhibits that compliance with water quality objectives can be achieved during wet weather. For example, the administrative record includes a summary of the Copermittees' "Wet Weather Water Quality Objective Exceedances by Percent of Samples Analyzed."[34] This summary exhibits that for the 1999/2000 wet weather monitoring effort, 36% of the coliform bacteria samples, 60% of the total dissolved solids samples, 80% of the dissolved zinc samples, and 93% of the dissolved copper samples collected were in compliance with water quality objectives. While these percentages still indicate significant exceedances of water quality objective concentrations, they also exhibit that compliance with water quality objectives has at times been achieved. That the Copermittees have occasionally achieved compliance with water quality objectives with their previous urban runoff management programs exhibits that the Permit's receiving water limitations can "reasonably be achieved." Therefore, Petitioners assertion that the water quality objectives which apply to the Permit are inappropriate because they cannot "reasonably be achieved" must be dismissed.

Nor does the contribution of pollutants to receiving waters from natural sources negate the Copermittees ability to achieve compliance with receiving water limitations. For example, while large storm events may result in significant natural erosion, causing a temporary natural exceedance of receiving water quality objectives for total suspended solids, the Permit clearly does not address pollutants from such sources. The Permit states "this Order is not meant to control background or naturally occurring pollutants and flows."[35] As such, the SDRWQCB will take such naturally occurring pollutants into account when assessing Copermittee compliance with the Permit's receiving water

[32] The applicability of CWC section 13241 to the adoption of the Permit is discussed further in section G.1.
[33] 64 FR 68753
[34] SDRWQCB, 2000. Draft Status of Copermittee Compliance. Pg. 8. A.R. Vol. 1-34.
[35] Finding 27

limitations. Therefore, natural pollutant sources do not make compliance with receiving water limitations unachievable.

4. Wet-Weather Specific Water Quality Objectives Are a New Issue Not Presented Previously to the SDRWQCB

It is important to note that Petitioners' arguments regarding wet-weather specific water quality objectives represent a new issue which was not presented before the SDRWQCB during consideration of adoption of the Permit. Since there is no reason these arguments could not have been raised before the SDRWQCB during the hearing process, Petitioners should be barred from raising this issue now.

E. Urban Runoff is a Waste as Defined in the California Water Code

Petitioners assert that the California Water Code definition of "waste" does not apply to urban runoff. This assertion is incorrect. The California Water Code defines "waste" as "sewage and **any and all other waste substances**, liquid, solid, gaseous, or radioactive, **associated with human habitation** […]" (emphasis added). The language of this definition clearly indicates the broad nature of its application. The inclusion of the terms "any and all" into the definition exhibits that the definition is not to be used to exclude certain substances from being defined as a waste, as Petitioners attempt to do with urban runoff. Rather, these terms provide for the definition to be all-encompassing. In addition, the use of the words "associated with human habitation" in the definition indicates that the waste need not be generated by human activity, but merely be related with human habitation.

Urban runoff certainly meets this broad definition. Urbanization (human habitation) unequivocally alters the characteristics of runoff which would otherwise leave undeveloped land in a natural condition. As discussed in the Permit's Findings and Draft Fact Sheet/Technical Report, urban development increases the pollutants load, volume, and velocity of runoff.[36] These changes to runoff indicate that the physical and chemical attributes of urban runoff are caused by urbanization, thereby exhibiting that urban runoff is "associated" with human habitation. In fact, the increase in volume of urban runoff caused by urbanization's impervious surfaces not only changes the characteristics of the runoff, but actually generates the urban runoff as well by increasing its volume.

Furthermore, the very fact that MS4s have been constructed with the sole purpose of disposing urban runoff exhibits that urban runoff is a waste. The MS4s are designed to dispose of the increased volumes of runoff generated by urbanization's impervious surfaces. The act of generating increased runoff, designing a system to collect the urban runoff, and discharging the urban runoff exhibits that urban runoff is a waste. MS4s would be unnecessary if urban runoff was not a waste and was not treated as such.

[36] Findings 3, 4, 5, 6, 7 and 9, and accompanying discussions in Draft Fact Sheet/Technical Report (pg. 35-41), A.R. Vol. 1-25.

Nor does Petitioners historical discussion of the development of the definition of "waste" refute the categorization of urban runoff as a "waste." Petitioners assert that since the development of the definition of "waste" did not include a discussion of urban runoff, the definition cannot be applied to urban runoff. However, no such restriction exists. In fact, Petitioners exhibit SWRCB's intention that waste be defined broadly when they cite the SWRCB as stating: "The proposed new definition of waste is intended to be as **all-inclusive** as the present definition of 'sewage' and 'other waste'" (emphasis added).[37] Rather than be a restriction on the types of discharges which can be identified as waste, such commentary indicates that the definition of waste was instead intended to be wide-ranging. The lack of information or knowledge on urban runoff and its impacts at the time the definition was developed in the late 1960s cannot be construed as intent on the part of the SWRCB to exclude any and all such discharges. Such an approach could severely limit any new types of discharges from being regulated under waste discharge requirements.

Moreover, the California Water Code provides that discharges permitted under the federal NPDES program (such as discharges from MS4s) are analogous with discharges of waste. Chapter 5.5 of the California Water Code consolidates the federal NPDES program with the State of California's waste discharge requirement program. Since the State of California is authorized by USEPA to issue NPDES permits in California, NPDES permits within California are also waste discharge requirements.[38] Section 13376 requires "any person discharging **pollutants**" (emphasis added) (such as under an NPDES MS4 permit) to file a report of the discharge in compliance with the procedures set forth in section 13260. Section 13260 then proceeds to apply waste discharge requirements on "any person discharging **waste**" (emphasis added). As can be seen, the California Water Code in these two sections equates the discharge of pollutants (as regulated under the NPDES program) with the discharge of waste. Since the California Water Code provides that discharges of pollutants are analogous to discharges of waste, and since discharges of urban runoff have been found to contain pollutants, the California Water Code finds discharges of urban runoff to be discharges of waste.

F. The Permit's Prohibitions are Appropriate and Need Not Incorporate Consideration of Such Factors as Petitioners Assert

Petitioners argue that the SDRWQCB did not consider various factors relating to the MEP standard when including the Prohibitions of section A. in the Permit. First, the Permit is required to implement the Basin Plan, and thereby implement the Prohibitions, under California Water Code sections 13263 and 13377, irregardless of MEP. In addition, as discussed above in section B.3, MEP does not apply to the Permit's prohibitions regarding MS4 discharges which cause or contribute to conditions of pollution, contamination, nuisance, or violations of water quality standards. Compliance with receiving water limitations is an objective of the NPDES storm water program which is separate from the objective of compliance with MEP. Moreover, Petitioners' inaccurate

[37] BIA, 2001. Statement of Points and Authorities in Support of Petition for Review of California Regional Water Quality Control Board San Diego Region Order No. 2001-01 NPDES No. CAS0108758. Pg. 22.
[38] California Water Code section 13374

interpretations of the Permit's prohibitions (also discussed above, in sections B.1 and B.2) do not alter this fact.

Furthermore, even if the Permit's prohibitions were subject to the MEP standard, which they are not, the SDRWQCB is not required to consider the MEP factors which Petitioners find to be "requisite." The "requisite" factors listed by Petitioners, which are taken from the Preamble to the phase II NPDES storm water regulations, are actually factors to be considered by the **dischargers**, not the SDRWQCB.[39] In addition, the factors are not required, but rather are factors which **may** be considered by dischargers when contemplating MEP.[40]

Petitioners also assert that MEP factors discussed in the 1994 Clinton Clean Water Initiative must be considered by the SDRWQCB. In fact, the Initiative states that "MEP **allows** for the consideration of different factors" (emphasis added). Use of the word "allows" in the Initiative indicates that this is clearly not a binding directive. Furthermore, this language again refers to municipalities' assessments of MEP, and is not a limitation on regulatory agencies' MEP interpretations. In any event, the Clinton Clean Water Initiative is a proposal which is non-regulatory, and therefore does not contain requirements for the SDRWQCB.

Petitioners also claim that the SDRWQCB must demonstrate that the Permit's Prohibitions can be enforced in a fair and consistent manner. While the state's policy is that enforcement of permits must be fair and consistent, a burden on the SDRWQCB to demonstrate how this will be achieved **prior to adoption** of a permit does not exist. Nor do Petitioners exhibit where such a requirement exists in law or policy as a basis for their argument. In fact, rather than negate the Permit's Prohibitions, the SWRCB's draft enforcement policy directly supports the Prohibitions. It states:

> For storm water and/or authorized non-storm water discharges that cause or substantially contribute to an exceedance of an applicable water quality standard, significant violations include the failure to comply with the procedures to address exceedances required by the permit.[41]

This approach outlined in the draft enforcement policy is congruous with the approach provided in the Permit in sections A (Prohibitions) and C.

Petitioners discussion of the supposed unfeasibility of enforcing the Permit's Prohibitions is based on their apparently purposeful misrepresentation of the Prohibitions. As discussed in sections B.1 and B.2 above, the Prohibitions do not require "strict compliance" with water quality objectives through application of numeric effluent limits, nor do they require "zero contribution" of pollutants to impaired water bodies. Since Petitioners arguments regarding the unfeasibility of enforcing the Prohibitions are based on incorrect interpretations of the Prohibitions, they must be dismissed.

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[39] 64 FR 68754
[40] 64 FR 68754
[41] SWRCB, 2000. Draft Revised Policy – Water Quality Enforcement Policy. Pg. 8.

While the SDRWQCB is not required to demonstrate how the Permit will be enforced in a fair and consistent manner, the SDRWQCB has taken many steps to ensure that such enforcement occurs. For example, the Permit requires each Copermittee to develop and implement a separate and distinct urban runoff management program within its jurisdiction. This helps ensure that each Copermittee will be held accountable for its own actions within its jurisdiction. The Permit also requires bioassessment monitoring of receiving waters within each Copermittee's jurisdiction or watershed,[42] further ensuring that the SDRWQCB will assess the impacts of urban runoff from each Copermittee's jurisdiction on receiving waters.

G. The SDRWQCB Reasonably Considered Any Statutory Factors Required by the California Permit Program

1. Adoption of the Permit is Not Directly Subject to CWC Section 13241

Petitioners assert that the provisions of section 13241 of the CWC directly apply to the adoption of the Permit. While the provisions of section 13241 may apply to the Permit, they do not apply in the direct manner proposed by Petitioners. Section 13241 clearly applies to the development of water quality objectives. It includes a list of "factors to be considered by a regional board in establishing water quality objectives." Therefore, section 13241 may only apply to the Permit's application of the water quality objectives designated in the Basin Plan. These water quality objectives are developed during the Basin Plan's planning process, not during adoption of permits meant to implement the Basin Plan (see section D.1 for further discussion). As such, the provisions of 13241 are met by the SDRWQCB during the process of adoption and re-issuance of the Basin Plan, as well as during the Triennial Review of water quality standards the SDRWQCB conducts pursuant to the Clean Water Act. Because the permit implements the Basin Plan's water quality objectives, these efforts to meet the provisions of 13241 during the Basin Plan planning process also apply to the Permit. Therefore, the SDRWQCB has met the requirements of 13241 with respect to both the Basin Plan and the Permit.

2. The SDRWQCB Has Considered Reasonably Achievable Water Quality Conditions in Adopting the Permit

Petitioners assert that per CWC section 13241 the SDRWQCB must demonstrate that the Permit's requirements are reasonably achievable in light of economic considerations. Even if section 13241 applies directly to the Permit's requirements, and not its water quality objectives, this assertion is incorrect. Section 13241 requires the consideration of "(c) water quality conditions that could be reasonably achieved through the coordinated control of all factors which affect water quality in the area" **and** "(d) economic considerations." Contrary to Petitioners assertions, the standard for determination of reasonably achievable water quality conditions is "control of all factors which affect water quality in the area," and not "economic considerations." The requirement for

[42] Order No. 2001-01, Attachment B, section II.A., pg. B-2. A.R. Vol. 1-1.

"economic considerations" is a distinct requirement separate from the requirement for consideration of "water quality conditions that could reasonably be achieved."

Whether or not the SDRWQCB is required to consider "water quality conditions that could reasonably be achieved through the coordinated control of all factors which affect water quality in the area" during adoption of a permit, the SDRWQCB has performed this task on multiple levels. The first of which was during the process of development and adoption of the Basin Plan's water quality objectives by the SDRWQCB, SWRCB, and USEPA. As the Permit must implement the Basin Plan (per California Water Code section 13377), the process undergone to consider reasonably achievable water quality conditions during development of the Basin Plan's water quality objectives is applicable when considering the Permit. Furthermore, as discussed in section D.3, the administrative record for adoption of the Permit itself includes ample evidence that compliance with water quality objectives is achievable for MS4 discharges.

3. The SDRWQCB Has Included Economic Considerations in Adopting the Permit

Again, while the provisions of section 13241 do not directly apply to the adoption of the Permit, the SDRWQCB has also adequately included "economic considerations" into its decision to adopt the Permit. The Draft Fact Sheet/Technical Report for the Permit contains a four page discussion of economic issues regarding the regulation and management of urban runoff.[43] The Staff Report for Standard Urban Storm Water Mitigation Plans and Numerical Sizing Criteria for Best Management Practices also includes calculations for estimated costs for compliance with the Permit's SUSMP provisions.[44] Information regarding the costs and benefits of implementing the SUSMP provisions were also provided to the SDRWQCB during a March 8, 2000 SUSMP workshop.[45] In addition, the SDRWQCB received, reviewed, and responded to many comments regarding the cost of implementing the permit.[46] Furthermore, largely effective urban runoff management programs, such as by the City of Encinitas, have been implemented with some success and have not been found to be cost prohibitive.[47]

With regards to cost considerations, Petitioners specifically argue that costs were not adequately considered respective to the application of SUSMP requirements at retail gasoline outlets. While the cost calculations for SUSMP implementation noted above directly apply to retail gasoline outlets as well, the SDRWQCB also specifically addressed the cost of SUSMP implementation at retail gasoline outlets. For example, the Draft Responses to Comment document cites the USEPA funded Rouge River National Wet Weather Demonstration Project, which states regarding catch basin inserts that

[43] SDRWQCB, 2000. Draft Fact Sheet/Technical Report. Pg. 7-10. A.R. Vol. 1-25.
[44] SDRWQCB, 2000. Staff Report for Standard Urban Storm Water Mitigation Plans and Numerical Sizing Criteria for Best Management Practices. Attachment E. A.R. Vol. 1-36.
[45] Staff Presentation to Board Members, March 8, 2000. A.R. Vol. 1-45.
[46] SDRWQCB, 2001. Draft Response to Comments. A.R. Vol. 1-14.
[47] City of Encinitas, 2000. Municipal Stormwater Permit Compliance Report. A.R. Vol. 1-46. This report indicates that the City of Encinitas' proposed storm water budget for the 2000/2001 fiscal year is $960,027. The City of Encinitas has reported improved receiving water quality within its jurisdiction resulting from its program (see Draft Fact Sheet/Technical Report, pg. 6-7, A.R. Vol. 1-25).

"these devices are applicable for use in gas stations […] and they have a relatively low cost." The Draft Responses to Comments document continues to consider costs, when it states "practicability or practicality from a cost viewpoint is not exceeded. The typical costs for installation of a filtering unit is 400-800 dollars with yearly maintenance costs averaging about 240 dollars."[48] Moreover, control of urban runoff peak flow rates and velocities to protect against downstream erosion is also cost effective at retail gasoline outlets. Cisterns, a technology used for centuries, are applicable for such a use. Clearly, as indicated above, the SDRWQCB considered the cost of SUSMP implementation at retail gasoline outlets.

4. The SDRWQCB Has Considered the Need for Developing Housing in Adopting the Permit

Petitioners also argue that the SDRWQCB failed to consider the need for developing housing within the region when adopting the Permit. While the SDRWQCB is not strictly required to consider this issue in adopting permits, in actuality it has considered the Permit's potential for impacting housing costs. The SDRWQCB has estimated that implementation of the SUSMP requirements would constitute less than 1% of total project construction costs.[49] Moreover, the SWRCB has found that an increase in cost of 1-2% for new development (including housing) is reasonable.[50] In light of these cost calculations and SWRCB guidance, it is clear that the SDRWQCB considered the need for developing housing with the region.

5. The Permit Does Not Impede Reclaimed Water Use

Petitioners further claim that the Permit's requirements impair efforts to use reclaimed water. The Permit places no restrictions on the use of reclaimed water, and only indirectly applies to reclaimed water use to the extent that over-irrigation can result in reclaimed water entering an MS4. This cannot be considered an impact on reclaimed water use, for the Permit has no jurisdiction over correctly used reclaimed water, in that correctly used reclaimed water will never reach the MS4 in the first place. Irregardless, the foundation of Petitioners' argument regarding the Permit's impact on reclaimed water use is based on Petitioners' misunderstanding of the Permit's prohibitions. As discussed above in section B.2, the Permit does not require "zero contribution" of pollutants to impaired water bodies, contrary to Petitioners' assertions. Therefore, Petitioners' argument that the Permit prohibits all reclaimed water from entering waterbodies impaired for nutrients is misguided. Petitioners' arguments that the Basin Plan's water quality objectives should not be applied to reclaimed water discharges are also without merit, since as discussed in section D.1 above, the appropriateness of water quality objectives is a Basin Plan issue, and not a municipal storm water permit issue.

[48] SDRWQCB, 2001. Draft Response to Comments. Pg. 150. A.R. Vol. 1-14.
[49] Staff Presentation to Board Members, March 8, 2000 SUSMP Workshop. A.R. Vol. 1-45.
[50] SWRCB, 2000. Order No. WQ 2000-11. Pg. 21.

H. The Permit's BMP Requirements for Existing and New Development are Consistent with MEP

1. The Permit's BMP Requirements for Existing Development are Consistent with MEP

Petitioners make various claims regarding the Permit's requirements being inconsistent with MEP. They first argue that the Permit is inconsistent with the MEP standard because it does not adequately address urban runoff from existing sources. Even a cursory review of the Permit exhibits this argument to be false. The Permit requires extensive BMP implementation and Copermittee oversight for existing municipal, industrial, commercial, and residential land uses in sections F.3.a, F.3.b, F.3.c, and F.3.d. Each of these sections of the Permit requires source identification and prioritization, BMP implementation (including pollution prevention BMPs), and enforcement by the Copermittees, among other requirements. Rather than "virtually ignore" these existing sources of pollutants in urban runoff, the Permit directly regulates them.

2. The Permit's BMP Requirements for New Development are Consistent with MEP

While Petitioners assert that the Permit underestimates MEP regarding existing pollutant sources, they also assert that the Permit exceeds MEP regarding regulation of new pollutant sources, such as construction and new development. Specifically, Petitioners claim that the Permit's requirements for new development to "control peak storm water discharge rates and velocities to maintain or reduce pre-development downstream erosion" are impossible to achieve and therefore exceed MEP. Not only is this requirement very achievable, it is standard practice in many areas.[51] In fact, the Los Angeles SUSMP, which was largely upheld by the SWRCB, had nearly identical requirements.[52] Furthermore, the SWRCB found that these SUSMP requirements collectively constituted MEP, directly in refutation of Petitioners' argument.[53] Moreover, the administrative record is replete with examples of how this requirement can be achieved.[54] One simple means for meeting this requirement is implementation of detention basins, which can reduce peak runoff rates and velocities from new development areas. Calculations by the SDRWQCB find that such detention basins can constitute approximately 0.5-1.0% of total project costs,[55] a cost level which the SWRCB generally has found to be "reasonable" for post-construction BMPs.[56] Clearly, a

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[51] Washington State Department of Ecology, 1999. Draft Storm Water Management in Washington State – Volume I, Minimum Technical Requirements. Pg. 41-45. A.R. Vol. 1-47. Maryland Department of the Environment, 1999. Draft 2000 Maryland Stormwater Design Manual – Volume I. Pg. 2.8. A.R. Vol. 1-48.
[52] LARWQCB, 2000. Standard Urban Storm Water Mitigation Plan for Los Angeles County and Cities in Los Angeles County. Pg. 6. States "Post-development peak storm water runoff rates shall not exceed the estimated pre-development rate for developments where the increased peak storm water discharge rate will result in increased potential for downstream erosion."
[53] SWRCB, 2000. Memorandum on State Water Board Order WQ 2000-11: SUSMP. Pg. 1.
[54] SDRWQCB, 2001. Draft Response to Comments. Pg. 31-32. A.R. Vol. 1-14.
[55] Staff presentation to Board Members, March 8, 2000 SUSMP Workshop. A.R. Vol. 1-45. SDRWQCB, 2000. Staff Report for Standard Urban Storm Water Mitigation Plans and Numerical Sizing Criteria for Best Management Practices. Attachment E. A.R. Vol. 1-36.
[56] SWRCB, 2000. SWRCB WQ Order No. 2000-11. Pg. 21.

requirement which is implemented for a reasonable cost in many areas of the United States, including Southern California, does not exceed the MEP standard.

Petitioners also assert that requirements to "minimize storm water pollutants of concern in urban runoff" and "remove pollutants of concern in urban runoff" exceed MEP.[57] The requirement to "minimize storm water pollutants of concern in urban runoff" applies to source control BMPs. The word "minimize" is used in the requirement to convey the concept that source control BMPs are a preliminary first line of defense, meant to minimize the contact between urban runoff and pollutants. While Black's Law Dictionary does not define the word "minimize," the American Heritage College Dictionary includes the definition "to reduce" for the word "minimize." Surely a requirement which is analogous to reducing pollutants of concern in urban runoff does not exceed MEP.

The requirement to "remove pollutants of concern in urban runoff" applies to structural treatment BMPs. The word "remove" is used in the requirement to convey the function of structural treatment BMPs; namely, to remove pollutants from urban runoff. Notice the provision does not require the removal of **all** pollutants. Again, the requirement is analogous to a requirement to reduce pollutants of concern in urban runoff. Such a requirement is a foundation of the storm water program and does not exceed the MEP standard.

Petitioners further state that the requirement to "protect slopes and channels from eroding" exceeds the standard of MEP because it applies to a natural phenomenon. This interpretation of the requirement is incorrect. Finding 27 of the Permit states "this Order is not meant to control background or naturally occurring pollutants and flows." The Finding therefore negates the Petitioners' argument regarding this requirement. Furthermore, this requirement is nearly identical to a requirement found in the Los Angeles SUSMP, which was largely upheld by the SWRCB. The SWRCB found that the Los Angeles SUSMP requirements collectively constituted MEP for urban runoff from new development and redevelopment.[58]

I. The Permit's Volume and Flow-Based Structural Treatment BMP Requirements for New Development and Significant Redevelopment are Consistent with MEP and SWRCB Guidance

The issue regarding the appropriateness of numeric sizing criteria has already been addressed extensively by the SWRCB during its consideration of the appeal of the LARWQCB SUSMP requirements. The numeric sizing criteria included in the Permit are essentially the same as those included in the Los Angeles SUSMP; therefore, the findings of the SWRCB regarding the LARWQCB's numeric sizing criteria generally apply to the SDRWQCB's numeric sizing criteria as well. Indeed, in its 12/26/00 memo, the SWRCB finds its decision on the Los Angeles SUSMPs and numeric sizing criteria to be precedential. The memo directs the Regional Boards to include SUSMPs and numeric

[57] Order No. 2001-01 sections F.1.b.2.b.iii and F.1.b.2.b.iv. A.R. Vol. 1-1.
[58] SWRCB, 2000. Memorandum on State Water Board Order WQ 2000-11: SUSMP. Pg. 1.

sizing criteria in municipal storm water permits, stating "several of the conclusions reached in the Order [WQ 2000-11] are likely to recur, and future municipal storm water permits must be consistent with the principles set forth therein." The memo further finds that the Los Angeles SUSMPs as a whole, and the numeric sizing criteria in particular, reflect MEP. Therefore, Petitioners' assertion that the "Permit's volume and flow-based structural treatment BMPs for new development and significant redevelopment are arbitrary, unreasonable and inconsistent with MEP" has already been resolved and refuted by the SWRCB. For this reason, Petitioners' appeal regarding the appropriateness of the Permit's numeric sizing criteria must be denied.

J. The Permit's Construction Site Inspection Schedule is Consistent with MEP

Petitioners argue that there has been no demonstration that the Permit's construction site inspection schedule is required by the MEP standard. Petitioners have not provided any argument as to why the SDRWQCB must demonstrate that the construction site inspection schedule is required by the MEP standard. The requirement for such a demonstration on the part of the SDRWQCB does not exist. Irregardless, the argument is incorrect, in that the administrative record is replete with references to the need for frequent construction site inspections.

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(D)(3) clearly requires inspection of construction sites, stating the Copermittees' urban runoff management programs must include:

> a description of procedures for identifying priorities for inspecting [construction] sites and enforcing control measures which consider the nature of the construction activity, topography, and the characteristics of soils and receiving water quality.

USEPA's Interim Permitting Approach for Water Quality-Based Effluent Limitations in Storm Water Permits provides the SDRWQCB discretion for detailed inspection frequencies when it states:

> the interim permitting approach uses best management practices (BMPs) in first-round storm water permits, and expanded or better-tailored BMPs in subsequent permits, where necessary, to provide for the attainment of water quality standards.[59]

The SDRWQCB has found the Permit's construction site inspection schedule to be necessary to attain water quality standards; an approach which is in concurrence with USEPA's interim permitting approach noted above. Sediment is one of the leading causes of receiving water impairment of the San Diego region's coastal lagoons, impairing four of these water bodies.[60] The SDRWQCB finds the contribution of

[59] USEPA, 1996. Interim Permitting Approach for Water Quality-Based Effluent Limitations in Storm Water Permits. 61 FR 43761. Pg. 2.
[60] SDRWQCB, 2000. Draft Fact Sheet/Technical Report. Attachment 2 – 1998 Clean Water Act Section 303(d) Impaired Waterbody List. A.R. Vol. 1-25.

sediment from construction sites to be significant, as is noted in Finding 19 of the Permit, as well as in the supporting Fact Sheet/Technical Report documentation for Finding 19. Furthermore, construction is expected to continue at a rapid pace within the region. The Fact Sheet/Technical Report for the Permit references San Diego Association of Governments estimate of 1 million more residents and 400,000 new homes within the region over the next 20 years.[61]

In order to help ensure that this rapid growth and construction does not further continue to degrade the region's coastal lagoons, an aggressive construction site inspection schedule is necessary. Finding 24 of the permit exhibits the importance of inspections at construction sites for being in compliance with the Permit's objectives. The Draft Fact Sheet/Technical Report further exhibits the importance of construction site inspections when it cites USEPA, which states "site inspections are expected to be the **primary** enforcement mechanism by which erosion and sediment controls are maintained" (emphasis added).[62] The Draft Fact Sheet/Technical Report also directly supports the Permit's construction site inspection frequency by stating:

> Weekly to monthly inspection of high threat sites is necessary due to the dynamic nature of construction activities. Medium and low threat construction sites can be inspected less frequently, due to their reduced risk of negatively impacting receiving waters.[63]

In addition, the Draft Response to Comments document also directly addresses the Permit's construction site inspection frequency by stating:

> Since USEPA places high priority on inspections, and since the majority of lagoons within the region are impaired for sediment, the Tentative Order has placed high priority on construction site inspections.[64]

Moreover, the administrative record exhibits that weekly or monthly inspections of high priority construction sites are indeed practicable. For example, the City of San Diego reported in 1999 that it inspected all construction sites within the Los Penasquitos watershed on a daily basis.[65] In its January 31, 2001 Compliance Report, the City of San Diego further states "for capital projects, construction management by the resident engineers/inspectors is done daily" and "for permits, the resident engineers/inspectors are called to the site once certain milestones in their work has occurred and inspection is necessary prior to moving forward. This can be a daily activity for fast moving projects, or weekly, etc."[66] The City of Santee also frequently inspects construction sites, stating in its January 31, 2001 Stormwater Permit Status Report that "the City's inspectors continue to monitor construction sites daily for compliance with the BMPs."[67] In

[61] SDRWQCB, 2000. Draft Fact Sheet/Technical Report. Pg. 10. A.R. Vol. 1-25.
[62] SDRWQCB, 2000. Draft Fact Sheet/Technical Report. Pg. 114. A.R. Vol. 1-25.
[63] SDRWQCB, 2000. Draft Fact Sheet/Technical Report. Pg. 114. A.R. Vol. 1-25.
[64] SDRWQCB, 2001. Draft Response to Comments. Pg. 245. A.R. Vol. 1-14.
[65] City of San Diego, 1999. Cleanup and Abatement Order No. 98-50 Status Report. A.R. Vol. 1-49.
[66] City of San Diego, 2001. City of San Diego Waste Discharge Compliance Report. A.R. Vol. 1-50.
[67] City of Santee, 2001. Stormwater Permit Status Report. A.R. Vol. 1-51.

addition, the City of Escondido finds that "on-site weekly inspections by the City's consultant have been instrumental in identifying potential problems and solutions to keep the projects in compliance."[68]

As the above examples exhibit, it appears that some of the Copermittees may already be in compliance with the Permit's construction site inspection requirements. The fact that several Copermittees already implement programs which may comply with the requirements exhibits that the requirements are indeed practicable. Clearly, measures that were already implemented by Copermittees under the flexible Order No. 90-42 cannot be found to exceed the maximum extent practicable standard.

K. The Permit Does Not Dictate the Manner in Which the Copermittees Must Comply with the Permit

1. The Permit's Numeric Sizing Criteria Requirements Do Not Violate Section 13360 of the California Water Code

Petitioners assert that the Permit's numeric sizing criteria requirements for post-construction BMPs violate Section 13360 of the California Water Code. This is another argument which has previously appeared before the SWRCB during the appeal of the Los Angeles SUSMP issue. As previously stated, the Permit's numeric sizing criteria are essentially identical to those in the Los Angeles SUSMP. Since the SWRCB upheld the Los Angeles numeric sizing criteria and found it to be in compliance with Section 13360, the SWRCB must reach the same conclusion regarding the Permit's numeric sizing criteria. Therefore, Petitioners appeal regarding this issue should be denied.

Irregardless of whether this issue has been previously resolved by the SWRCB, it is clear that the Permit's numeric sizing criteria requirements are in compliance with Section 13360. The numeric sizing criteria requirement simply ensures that BMPs are adequately sized so as to be effective. The necessity for adequate sizing of BMPs is strongly supported in the administrative record.[69] As such, the numeric sizing criteria is a component of the MEP standard, no different than a requirement for annual inspections of a facility or site. The numeric sizing criteria establishes an objective measure to evaluate compliance with the statutory criterion of MEP contained in federal and state law. Thus, the numeric design criteria is similar to technology standards such as Best Available Technology (BAT), as it is applied to traditional point source discharges.

Furthermore, the numeric sizing criteria have broad technical reach and are not unique to any singular approach. Seven equivalent methods are provided to calculate the numeric sizing criteria. The choice of using either runoff volume or flow rate as the basis for numeric sizing criteria calculations is provided. In addition, the criteria are minimum standards, allowing the Copermittees to use stricter criteria. Also, the numeric sizing criteria does not dictate which BMPs out of the myriad of choices are to be used. This

[68] City of Escondido. 2001. City of Escondido Program Progress Report. A.R. Vol. 1-52.
[69] SDRWQCB, 2000. Staff Report for Standard Urban Storm Water Mitigation Plans and Numerical Sizing Criteria for Best Management Practices. Pg. 1-8. A.R. Vol. 1-36.

choice is left wholly to the Copermittee or project proponent. A requirement such as the numeric sizing criteria requirement, which allows for a seemingly infinite number of ways to achieve compliance, does not "specify design or manner of compliance." Finally, the SWRCB has found that there is no violation of Section 13360 if an order allows a discharger to select from a number of permissible alternatives for achieving compliance with a standard.[70]

2. The Permit Adequately Provides for Regional Structural Treatment BMP Solutions in Accordance with Section 13360 of the California Water Code

Petitioners argue that the Copermittees should be given flexibility to implement "regional solutions" to the urban runoff impacts caused by new development. In fact, they have been given such flexibility. The Permit states "structural treatment BMPs may be shared by multiple new development projects." This allows proponents of multiple projects to cooperate in developing shared BMP systems which can be "regional" in their scope.

This apparently is not sufficient for Petitioners, who assert that "regional solutions" should be allowed to be placed within or downstream of receiving waters. Unfortunately, their proposed approach would not achieve the overriding goal of the Permit and the SDRWQCB, which is to protect receiving waters' beneficial uses. Indeed, such an approach would be in violation of the Clean Water Act for its failure to protect receiving waters. The Permit appropriately does not allow for receiving waters to be used by developers as conveyances or treatment systems for their untreated urban runoff. The creeks of the San Diego region are a valued natural resource, and the Permit treats them a such by rightfully providing that pollutants in urban runoff be reduced to the MEP **before** discharging to receiving waters, as required by the Clean Water Act.

L. MS4 Discharges with Increased Urban Runoff Peak Flow Rates and Velocities Resulting from New Development and Significant Redevelopment are Regulable Under the Permit

1. MS4 Discharges with Increased Urban Runoff Peak Flow Rates and Velocities Resulting from New Development and Significant Redevelopment are Regulable Under the NPDES Program

Petitioners assert that the Permit cannot regulate increased urban runoff flow volumes, rates, velocities, and durations as they are caused by new development and redevelopment. The basis for their argument is that urban runoff flow is not regulable under the NPDES program. In this argument, they are incorrect. As discussed in the Draft Fact Sheet/Technical Report,[71] NPDES permits must protect receiving water quality standards. Federal NPDES regulation 40 CFR 122.44(d)(1) **requires** municipal storm water permits to include any requirements necessary to "achieve water quality

[70] SWRCB, 1990. SWRCB Order No. 90-5. Finds that Cease and Desist Order did not violate Section 13360 because it allowed the dischargers to select the manner of compliance from permissible alternatives specified in the Order.
[71] SDRWQCB, 2000. Draft Fact Sheet/Technical Report. Pg. 21-22. A.R. Vol. (1-25).

standards established under section 303 of the CWA, including State narrative criteria for water quality." The administrative record includes ample evidence that altered flow regimes resulting from new development and significant redevelopment can negatively impact water quality standards.[72] As such, the Permit includes requirements for the management of flow in order to protect receiving water beneficial uses and water quality objectives, as it is required under the federal NPDES storm water regulations.

Indeed, the Permit's approach in this respect follows SWRCB guidance. The SWRCB states in Order WQ 98-01 "to comply with CWA section 301, municipal storm water permits must include effluent limitations where necessary to meet […] water quality standards" (at pg. 4). In fact, the municipal storm water receiving water limitations language, as drafted by the SWRCB,[73] requires MS4 discharges to be in compliance with water quality standards. This requirement stands irregardless of whether the MS4 discharge is causing or contributing to violations of water quality standards through altered flow regimes or pollutant discharges.

Furthermore, the Permit's language regarding regulation of urban runoff discharge peak flow rates and velocities is virtually identical to that of the LARWQCB's SUSMP. This SUSMP was predominantly upheld by the SWRCB in Order WQ 2000-11. The SWRCB has found that the LARWQCB SUSMP requirements collectively constitute MEP for urban runoff from new development and significant redevelopment.[74] Therefore, the SWRCB has found that requirements to control increases in peak flow rates and velocities resulting from new development and significant redevelopment are an appropriate provision of MEP for MS4 discharges. Moreover, the SWRCB has instructed that subsequent municipal storm water permits "must be consistent with the principles set forth [in Order WQ 2000-11]."[75] In order to be consistent with this SWRCB guidance, the SDRWQCB has included in the Permit regulation of urban runoff peak flow rates and velocities resulting from new development and significant redevelopment.

Petitioners specifically argue that increased urban runoff peak flow rates and velocities resulting from new development and significant redevelopment are not regulable under an NPDES permit because urban runoff flow does not meet the CWA definition of pollutant (CWA section 502(a)). In fact, the opposite is true. The CWA definition of pollutant includes "municipal waste." As discussed above in section E, the increased volumes and flows of urban runoff resulting from new development and significant redevelopment meet the definition of a municipal waste. New development and redevelopment, as approved by municipalities, generate increased urban runoff peak flow rates and velocities through the construction of impervious surfaces.[76] Municipalities then collect this increased urban runoff and discharge it to receiving waters by use of their MS4s. This generation, collection, and disposal of urban runoff by municipalities reflects urban runoff's condition as a municipal waste.

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[72] SDRWQCB, 2000. Draft Fact Sheet/Technical Report. Pg. 21-22, 35-38. A.R. Vol. (1-25).
[73] SWRCB, 1999. Order WQ 99-05.
[74] SWRCB, 2000. Memorandum on State Water Board Order WQ 2000-11. Pg. 1.
[75] SWRCB, 2000. Memorandum on State Water Board Order WQ 2000-11. Pg. 1.
[76] SDRWQCB, 2000. Draft Fact Sheet/Technical Report. Pg. 5-7. A.R. Vol. 1-25.

Nor is the CWA definition of pollutant as limiting as Petitioners assert. The list of substances included in the CWA definition of pollutant cannot be construed to be exclusive. For example, the definition lists rock and sand as pollutants, but makes no mention of clay or silt (e.g., suspended solids). Surely suspended solids such as clay or silt can be found to be pollutants, even though they are not specifically designated as such in the CWA definition of pollutant. Indeed, they commonly are found to be pollutants. In a similar manner, simply because urban runoff increased flow rates and velocities are not specifically listed in the CWA definition of pollutant, they are not limited from being regulated as such in an NPDES permit.

Furthermore, the Permit's regulation of increased urban runoff peak flow rates and velocities resulting from new development and significant redevelopment is a direct attempt to control the discharge of conventional pollutants in urban runoff to the MEP. Typical BMPs which control urban runoff peak flow rates and velocities (such as detention basins and grass swales) can greatly reduce the amount of pollutants (suspended solids, nutrients, and metals) in urban runoff.[77] Control of these pollutants in such a manner is certainly within the purview of the NPDES program. USEPA supports this approach, stating "in many cases, consideration of the increased flow rate, velocity and energy of storm water discharges following development unavoidably must be taken into consideration in order to reduce the discharge of pollutants."[78]

In addition, the downstream erosion caused by increased urban runoff peak flow rates and velocities constitutes a discharge of pollutants to receiving waters which needs to be reduced to the MEP. The increased volume, flow rate, velocity, and duration of runoff resulting from new development and redevelopment can increase sediment transport, stream bed scouring, shoreline erosion, stream bank widening, and changes in stream morphology.[79] All of these impacts can negatively impact water quality through their discharge of sediment into receiving waters. Unnaturally elevated levels of sediment suspension and transport can cause extended violations of water quality objectives for turbidity, total suspended solids, color, and floating material. Moreover, since sediment is often a transport mechanism for other pollutants, discharge of such sediment can lead to introduction of pollutants into the water column, further impacting receiving water quality. Due to the increased discharge of pollutants to receiving waters resulting from the increased peak flow rate and velocity of MS4 urban runoff discharges, regulation of urban runoff peak flow rate and velocity is applicable for an NPDES permit. It constitutes reduction to the MEP of pollutant discharges to receiving waters.

It is also worth noting that Petitioners' exclusion of the NPDES program from the regulation of peak flow rates and velocities defeats the intent of the Clean Water Act.[80]

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[77] USEPA, 1999. Preliminary Data Summary of Urban Storm Water Best Management Practices. EPA-821-R-99-012. Pg. 5-54.
[78] 64 FR 68761
[79] USEPA, 1999. Preliminary Data Summary of Urban Storm Water Best Management Practices. EPA-821-R-99-012. Pg. 4-23 – 4-24.
[80] SDRWQCB, 2000. Draft Fact Sheet/Technical Report. Pg. 21-22. A.R. Vol. 1-25. Discusses the applicability of the CWA to the regulation of flow.

The NPDES storm water program for MS4 discharges is designed to implement the Clean Water Act, which has the primary purpose to "restore and maintain the chemical, physical, and biological integrity of the Nation's waters" (33 U.S.C. section 1251(a)). As exhibited in the administrative record, increased urban runoff peak flow rates and velocities resulting from new development and significant redevelopment can greatly impact receiving water quality.[81] As such, in order for the NPDES storm water program to adequately protect the chemical, physical, and biological integrity of receiving waters, as it was intended, it must address increased urban runoff peak flow rates and velocities resulting from new development and significant redevelopment.

Finally, control of runoff to prevent downstream erosion has previously been included in many NPDES storm water permits, both within the State of California and nationwide. For example, the SWRCB's Statewide General Construction Storm Water Permit (Order No. 99-08-DWQ) directly requires control of runoff velocity to prevent downstream erosion when it states "the outflow of a sediment basin that discharges into a natural drainage shall be provided with outlet protection to **prevent erosion and scour of the embankment and channel**" (emphasis added) (section A.8, pg. 15). The LARWQCB has also included requirements to control flow for erosion prevention in its SUSMP for the cities of Los Angeles County, as well as in its municipal storm water permit for Ventura County (Order No. 00-108). Moreover, states such as Washington and Maryland have similar NPDES storm water permit requirements.[82]

2. <u>MS4 Discharges with Increased Urban Runoff Peak Flow Rates and Velocities Resulting from New Development and Significant Redevelopment are Regulable Under the California Water Code</u>

While the Clean Water Act is not explicit regarding the regulation of peak flow rates and velocities, the CWC clearly provides the SDRWQCB discretion to regulate flow in order to protect beneficial uses. In fact, such regulation is not only allowed by the CWC, it is required. CWC section 13377 provides that the SDRWQCB issue waste discharge requirements as required by the Clean Water Act, "together with any more stringent effluent standards or limitations necessary to implement water quality control plans, or for the protection of beneficial uses, or to prevent nuisance."

Findings 4 and 9 discuss the impacts of MS4 discharges on beneficial uses resulting from altered flow regimes caused by new development and significant redevelopment. As discussed in section L.1 above, increased urban runoff peak flow rates and velocities resulting from new development and significant redevelopment can cause elevated levels of sediment in receiving waters through downstream erosion. This sediment can also introduce other pollutants into receiving waters as a transport mechanism. In order to protect beneficial uses against these water quality impacts resulting from downstream

[81] SDRWQCB, 2000. Draft Fact Sheet/Technical Report. Pg. 35-38. A.R. Vol. 1-25.
[82] Washington State Department of Ecology, 1999. Draft Storm Water Management in Washington State – Volume I, Minimum Technical Requirements. Pg. 41-45. A.R. Vol. 1-47. Maryland Department of the Environment, 1999. Draft 2000 Maryland Stormwater Design Manual – Volume I. Pg. 2.8. A.R. Vol. 1-48.

erosion caused by altered flow regimes, the Permit regulates urban runoff peak flow rates and velocities from new development and significant redevelopment, as required by CWC section 13377.

Since the Permit is a set of waste discharge requirements issued under the California Water Code (which happens to implement the NPDES program), the NPDES program is only a set of minimum standards for the Permit. The NPDES program requirements are not a limitation on the contents of the Permit, as it is a set of waste discharge requirements under the California Water Code.[83] Nor do the NPDES storm water regulations set a maximum limit on States' individual implementation of the NPDES program. As such, the State of California can include specific requirements in an NPDES permit which need not be specifically addressed in the NPDES storm water regulations. However, to the extent that inclusion of such requirements is meant to implement and clarify the NPDES storm water program to protect the region's receiving waters, such requirements do not exceed the NPDES program.

M. The Permit Does Not Impinge on Local Government Authority to Regulate Land Use

Petitioners claim that the Permit impinges on local government's land use authority. However, no evidence is provided by Petitioners which exhibits such as situation. Petitioners merely lists several requirements of the Permit, but provides no connection between each requirement and how the requirement encroaches on the Copermittees' land use authority.

Petitioners first assert that the Permit's requirement that each Copermittee's General Plan include water quality and watershed protection principles improperly impinges on the Copermittees' land use authority. However, they fail to note the broad nature of the requirement, in that it does not specify the type or content of the principles to be included in the General Plan. All detail regarding the water quality and watershed principles to be included in the General Plan are left to the discretion of the Copermittees. A requirement which does not specify the contents of General Plan revisions does not encroach on land use authority. Furthermore, the requirement for the amendment of General Plans is directly specified in the federal NPDES regulations at 40 CFR 122.26(d)(2)(iv)(A)(2). They state that Copermittees' urban runoff programs shall include "planning procedures including a **comprehensive master plan** to develop, implement, and enforce controls to reduce the discharge of pollutants from municipal separate storm sewers which receive discharges from areas of new development and significant redevelopment" (emphasis added). USEPA guidance for this regulation further states that Copermittees "must thoroughly describe how the municipality's comprehensive plan is compatible with the

[83] California Water Code section 13377 provides that waste discharge requirements can be more stringent than NPDES permits when it states "the state or the regional boards shall, as required under or authorized by the Federal Water Pollution Control Act, as amended, issue waste discharge requirements or dredged or fill material permits which apply and ensure compliance with all applicable provisions of the act and acts thereto, **together with any more stringent effluent standards or limitations necessary to implement water quality control plans, or for the protection of beneficial uses, or to prevent nuisance**" (emphasis added).

storm water regulations."[84] Therefore, in order to be in compliance with the federal NPDES regulations, the Permit must include requirements for water quality provisions in the Copermittees' General Plans.

Petitioners further allege that compliance with the SUSMP requirements would impinge on the Copermittees' land use authority. Again, no discussion as to why the SUSMP requirements would encroach on the Copermittees' land use authority is provided. In truth, the SUSMP provisions do not place any limits on the type or location of any land use. The SUSMP provisions only seek to ensure that the development of an area does not negatively impact receiving water quality. The Copermittees are left to develop various land uses within their jurisdictions however they choose. The SUSMP provisions even include a waiver provision which allows projects to be waived from the SUSMP requirements if meeting the requirements is found to be infeasible. This waiver provision serves to further ensure that SUSMP implementation will not impact land use decisions. Furthermore, and most importantly, in its 12/26/00 memo the SWRCB states "that design standards for BMPs for new development and redevelopment [i.e., SUSMPs] are required [and] must be implemented." Therefore, the SWRCB has already determined that the SUSMP provisions are appropriate and do not impinge on local land use authority. For these reasons, Petitioners appeal regarding this matter must be denied.

Petitioners also state that the Permit's prohibitions of non-storm water discharges (driveway and patio washwater, lawn clippings, and pet waste) to the MS4 violate the Copermittees' land use authority. Once again, no discussion as to why the prohibitions would encroach on the Copermittees' land use authority is provided. There is no connection between the prohibition of these non-storm water discharges and land use. These non-storm water discharge prohibitions simply implement the Clean Water Act, which states that "permits for discharges from municipal storm sewers shall include a requirement to effectively prohibit non-storm water discharges into the storm sewers" (CWA section 402(p)(3)(B)). Therefore, the Permit must include such prohibitions in order to be in compliance with the Clean Water Act. . For these reasons, Petitioners appeal regarding this matter must also be denied.

N. Issuance of the Permit Does Not Violate of the California Environmental Quality Act (CEQA)

Petitioners argue that the SDRWQCB is required to review potential significant environmental impacts before issuance of the Permit. Water Code 13389 relieves the SDRWQCB of any obligation to prepare environmental impact documentation under the California Environmental Quality Act (CEQA) prior to issuing waste discharge requirements (WDRs), such as the Permit. The "project" in this case which would purportedly be subject to CEQA is issuance of requirements for discharges in MS4s, an action required by the CWA and federal NPDES regulations. Therefore, California Water Code section 13389 applies to the issuance of the Permit. The SWRCB has agreed that NPDES permits do not require CEQA documentation in WQ Order 2000-11, stating

[84] USEPA, 1992. Guidance Manual for the Preparation of Part 2 of the NPDES Permit Applications for Discharges from Municipal Separate Storm Sewer Systems. EPA 833-B-92-002. Pg. 6-4.

"the provisions of CEQA requiring adoption of environmental documents […] do not apply to NPDES permits."

Petitioners contend that the Permit contains provisions which are not specifically required by the CWA or federal NPDES regulations; however, all provisions are intended to implement or clarify specific requirements in applicable federal regulations to protect water quality of waters of the United States within the San Diego Region. The fact that some of the specific requirements of a regional board order may be more detailed than the nationwide minimum standards for MS4 regulation prescribed by the CWA and NPDES regulations in 40 CFR 122.26 does not abrogate this exception.

Specifically, Petitioners argue that the Permit's purported requirement for strict compliance with numeric effluent limits is not required by the Clean Water Act, and therefore is subject to CEQA. As discussed above, contrary to Petitioners' assertions, the Permit does not contain numeric effluent limits. Instead, the Permit requires that discharges from MS4s do not violate water quality standards. This requirement is found in the federal NPDES regulations at 40 CFR 122.44(d)(1) and is therefore required under the Clean Water Act (and subsequently exempt from CEQA).

Petitioners also misrepresent the import of Committee for a Progressive Gilroy v. State Water Resources Control Board, 192 Cal. App. 3d 847 (1987), by suggesting that reliance on the state statutory authority precludes reliance on the CEQA exemption in WC 13389. Gilroy is not applicable to the case at hand because the challenged orders in Gilroy were issued under the exclusive authority of the CWC, and not under the Clean Water Act, as the Permit was. Irregardless, all regulatory actions taken by the state to satisfy the requirements of the CWA rely on the state's independent authority to regulate activities affecting water quality. USEPA authorization for California to implement the NPDES program depends upon the state's demonstration of independent authority to accomplish under state law what would be required under the federal CWA and NPDES regulations; Chapter 5.5 of the Porter-Cologne Act ensures consistency between state and federal regulations for discharges subject to the Clean Water Act. Accordingly, California Water Code section 13389 provides exemption from environmental documentation under CEQA for any action that would be required for implementation of NPDES programs in California. Issuance of WDRs for MS4s is required for implementation of the CWA and NPDES program in California.

WSPA further argues that CEQA applies because the SUSMP provisions which apply to retail gasoline outlets are not federally mandated because they are impracticable, thereby exceeding the federal NPDES maximum extent practicable standard. In arguing this point, WSPA cites Defenders of Wildlife v. Browner. This case addressed the question of whether CWA section 402(p) requires the establishment of water quality-based numeric effluent limits for municipal storm water discharges. The SUSMP requirements are not numeric effluent limits, but rather a minimum performance level established to satisfy the MEP requirement. Thus, the Defenders of Wildlife case does not apply. Furthermore, as discussed in section R below, implementation of SUSMP requirements at retail gasoline outlets is practicable. Therefore, the SUSMP requirements are consistent

with the MEP standard, which is mandated by the Clean Water Act. Thus, the application of SUSMP requirements to retail gasoline outlets is the direct result of a CWA mandate, and it is exempt from the requirements of CEQA.

O. The Permit's SUSMP Requirements Are Not an Unfunded Mandate

Petitioners contend that the Permit contains SUSMP provisions which are not specifically required by the CWA or federal NPDES regulations and therefore constitute an unfunded mandate. However, all SUSMP provisions are intended to implement or clarify specific requirements in applicable federal regulations to protect water quality of waters of the United States within the San Diego Region. In fact, the SWRCB has found that the LARWQCB SUSMP provisions are consistent with MEP and are therefore federally mandated.[85] The SWRCB has found that the constitutional provisions regarding state mandates do not apply to federally mandated NPDES permits.[86] Since the SDRWQCB SUSMP provisions are fundamentally the same as the LARWQCB SUSMP provisions, the SWRCB findings regarding unfunded mandates apply in this case. Therefore, Petitioners appeal regarding this matter must be denied.

P. The Permit Does Not Violate the California Administrative Procedures Act

Petitioners contend that the SDRWQCB did not follow the requirements of the California Administrative Procedures Act (APA) in adopting the Permit. However, in actuality, adoption of the Permit is exempt from the APA. The APA explicitly excludes the "issuance of [WDRs] and permits pursuant to section 13263" from its ambit.[87] The SWRCB has found this to be true, stating "the Administrative Procedure Act exempts the adoption of permits from its requirements."[88]

Petitioners, citing California Government Code section 11342, go on to argue that the APA provides an exception to the exemption for cases in which a permit constitutes a "standard of general application." However, the section cited by Petitioners merely defines "regulation" to include standards of general application; it does not contradict the overarching restriction on the entire APA chapter at issue (i.e., that it does not apply to permits or waste discharge requirements).

Petitioners also argue that California Government Code section 11352(b) is inapplicable because it exempts only "required" waste discharge requirements and permits. However, the exemption provided by this statutory section is not so limited. Moreover, Petitioners provide no basis for its interpretation of the statute being so limited.

Irregardless, contrary to Petitioners assertions, the provisions of the Permit are required by the CWA and CWC, as is discussed in greater detail in section N. The CWA requires the discharge of pollutants from MS4s to be reduced to the maximum extent practicable.

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[85] SWRCB, 2000. Memorandum on State Water Board Order WQ 2000-11: SUSMP. Pg. 1.
[86] SWRCB, 1990. Order No. WQ 90-3.
[87] California Government Code section 11352(b).
[88] SWRCB, 2000. Order No. WQ 2000-11. Pg. 14.

The SDRWQCB has found that the requirements of the Permit constitute MEP. This determination has been made by the SDRWQCB in light of the continued degradation of the region's receiving waters due to the Copermittees' urban runoff discharges. The SDRWQCB's determination of MEP is consistent with SWRCB guidance, which states "the final determination regarding whether a municipality has reduced pollutants to the maximum extent practicable can only be made by the Regional or State Water Boards, and not by the municipal discharger."[89] Requirements in the Permit which are more detailed than those in the federal NPDES regulations are also consistent with USEPA's Interim Permitting Approach for Water Quality-Based Effluent Limitations in Storm Water Permits, which states "the interim permitting approach uses best management practices (BMPs) in first-round storm water permits, and expanded or better-tailored BMPs in subsequent permits, where necessary, to provide for the attainment of water quality standards."

Furthermore, the Permit's requirement that urban runoff discharges do not cause or contribute to an exceedance of water quality standards is required under both the federal NPDES regulations and CWC. Federal NPDES regulation 40 CFR 122.44(d)(1) requires NPDES permits to include any requirements necessary to "achieve water quality standards established under section 303 of the CWA, including State narrative criteria for water quality."

Section 13377 of Porter-Cologne also states:

> the regional boards shall, as required or authorized by the Federal Water Pollution Control Act, as amended, issue waste discharge requirements and dredged or fill material permits which apply and ensure compliance with all applicable provisions of the act and acts amendatory thereof or supplementary, thereto, **together with any more stringent effluent standards or limitations necessary to implement water quality control plans, or for the protection of beneficial uses, or to prevent nuisance**. (emphasis added)

Therefore, the Permit's requirements are necessary to be in compliance with the CWA, the federal NPDES regulations, and CWC. For this reason, the Permit is exempt from the APA under California Government Code section 11352(b).

Q. The Provisions of the Permit Are Not Vague, Ambiguous, and Overbroad

1. <u>The SUSMP's Application to Non-Discretionary Projects Is Not Overbroad</u>

Petitioners' argument that the application of SUSMP requirements to non-discretionary projects is overbroad is superficial. No evidence as to why this would be the case is provided by Petitioners. Under the Permit, only non-discretionary projects which fall under the SUSMP Priority Development Project Categories will be subject to the SUSMP requirements. Application of the SUSMP requirements to only the ten development categories serves to focus their application; the opposite of an overbroad application.

[89] SWRCB, 1993. Memorandum: Definition of Maximum Extent Practicable.

Limitation of the SUSMP requirements to these categories ensures that the projects will not be applied to insignificant non-discretionary projects.

It is necessary for SUSMPs to apply to both discretionary and non-discretionary projects in order to adequately reduce pollutants in urban runoff discharges resulting from new development. Non-discretionary projects constitute a significant portion of new development projects. Their status as "non-discretionary projects" does not ensure that they will not generate pollutants or increase flows in their post-construction or "use" phase.

The SWRCB has noted the necessity of application of the SUSMP requirements to non-discretionary projects in Order WQ 2000-11 when it stated "the limitation of the SUSMPs to discretionary projects may not be sufficiently broad for an effective storm water control program […]" (at pg. 26). Regarding non-discretionary projects, the SWRCB has stated in its December 26, 2000 memo from Craig M. Wilson to the Regional Board Executive Officers that its Order WQ 2000-11 "allows broader discretion by the Regional Boards to decide whether to include additional types of development in future SUSMPs. These areas for potential future inclusion in SUSMPs include […] ministerial projects […]."

2. <u>The SUSMP Application of Numeric Sizing Criteria to Both Pervious and Impervious Areas Is Not Overbroad</u>

Petitioners assert that the SUSMP numeric sizing criteria should only apply to directly-connected impervious areas. No reason is provided for why this should be the case. In fact, urban runoff from developed pervious areas can have a significant impact on receiving waters. The condition of perviousness does not ensure that urban runoff from such areas will not leave these areas and enter MS4s. Such pervious areas can be significant sources of pollutants. Pesticides, herbicides, and fertilizers are frequently applied to such areas. Residential areas, which typically have relatively high levels of pervious areas, have been found to contain pollutants in their urban runoff at levels which exceed USEPA benchmark values.[90] Furthermore, runoff from developed pervious areas can increase in volume, rate, and velocity due to soil compaction. It is common for soil in developed areas to be compacted to 90-95% maximum density. Such compaction can greatly reduce infiltration, pointing to the need for measures to address resulting increased flow volumes, rates, and velocities, which may cause downstream erosion. Moreover, the SUSMP requirements mirror the requirements of the LARWQCB SUSMP, in that they apply to all developed areas, and not just directly connected impervious areas. The SWRCB has found this approach to constitute MEP;[91] therefore the SDRWQCB has followed this same approach. For these reasons, Petitioners' argument must be denied.

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[90] City of San Diego, 1999. 1998-99 City of San Diego and Co-Permittee NPDES Stormwater Monitoring Program Report. Pg. 5-23. A.R. Vol. 1-53. Reports that arithmetic mean pollutant concentrations of total suspended solids, nitrate + nitrite, and total zinc from residential land uses (86.1% pervious) exceed USEPA benchmark values for industrial storm water (as found at 65 FR 64767).

[91] SWRCB, 2000. Memorandum on State Water Board Order WQ 2000-11: SUSMP. Pg. 1.

3. The Language of the Permit's Findings Is Clear and Appropriate

a. Petitioners assert that the Permit's language that "urban runoff contains pollutants which threaten human health" is overbroad, vague, and ambiguous. This Permit language is supported in both the Permit at Finding 6, as well as in the corresponding section of the Draft Fact Sheet/Technical Report.[92] The Preamble to the phase II NPDES storm water regulations also strongly supports the Finding.[93] As such, the Finding is not "overbroad." The Permit and Draft Fact Sheet/Technical Report's supporting language also clarifies and expands on the statement, ensuring that there is no vagueness or ambiguity when the Finding is considered as a whole.

b. Petitioners assert that the Permit's language that "urban runoff causes beneficial use impairment" is "overbroad." This Permit language is supported in both the Permit at Finding 9, as well as in the corresponding section of the Draft Fact Sheet/Technical Report.[94] The Preamble to the phase II NPDES storm water regulations also strongly supports the Finding .[95] As such, it is not "overbroad."

c. Petitioners claim that the SDRWQCB has made no finding that siltation is a problem within the region. This is false. Finding 19 directly addresses this issue. The Draft Fact Sheet/Technical Report further supports this Finding, both in its discussion of the Finding and its inclusion of the region's Clean Water Act section 303(d) list of impaired waterbodies.[96] The 303(d) list exhibits that Agua Hedionda Lagoon, Buena Vista Lagoon, San Elijo Lagoon, and Los Penasquitos Lagoon are all impaired for sediment. The listing of four of the significant lagoons within the region as impaired for sediment clearly exhibits that there is a siltation/sedimentation problem within the region covered by the Permit.

d. Petitioners assert that use of the term "background" in Finding 27 is ambiguous. This Permit language is supported in both the Permit at Finding 27, as well as in the corresponding discussion of the Draft Fact Sheet/Technical Report.[97] As such, it is not ambiguous.

4. The Location of the Point of Discharge From MS4s Is Clear

Petitioners assert that since the Permit designates urban streams which are used to convey urban runoff as part of the MS4, it is unclear where the point of discharge is defined in such cases. The Permit states at Finding 8 that urban streams used by Copermittees to convey their urban runoff are part of their MS4. However, this does not stop such an urban stream from being a receiving water.[98] Therefore, the point of discharge from an

[92] SDRWQCB, 2000. Draft Fact Sheet/Technical Report. Pg. 38-39. A.R. Vol. 1-25.
[93] 64 FR 68727
[94] SDRWQCB, 2000. Draft Fact Sheet/Technical Report. Pg. 40-41. A.R. Vol. 1-25.
[95] 64 FR 68726
[96] SDRWQCB, 2000. Draft Fact Sheet/Technical Report. Pg. 49, Attachment 2. A.R. Vol. 1-25.
[97] SDRWQCB, 2000. Draft Fact Sheet/Technical Report. Pg. 54. A.R. Vol. 1-25.
[98] SDRWQCB, 2000. Draft Fact Sheet/Technical Report. Pg. 40. A.R. Vol. 1-25. States "urban streams can be both receiving waters and MS4s."

MS4 is the point where a discharge leaves an MS4 and enters a receiving water, irregardless of the receiving water's status as both an urban stream and an MS4.

Also, regarding the Permit's designation of some urban streams as MS4s, Petitioners assert that such a designation results in the Permit's requirements being placed on nonpoint sheet flow entering such urban streams. However, this is not the case. The Permit states that "historic and current development make use of natural drainage patterns and features as conveyances of urban runoff. Urban streams used in this manner are part of the municipalities MS4 […]" (emphasis added) (Finding 8). The Draft Response to Comments document elaborates on this Finding, clarifying that a municipality's use of an urban stream as an MS4:

> Depends upon the following two conditions: (1) The discharging development must be within the municipality's jurisdiction; and (2) the runoff must be channeled into the municipality's MS4. […] The key difference is whether or not the runoff is collected and channelized by the municipality, or if it just sheet flows off the property into a stream. We recognize the distinction between a housing development in a rural area where the runoff sheet flows off the properties directly into a creek (here the creek is not an MS4) verses when the runoff is channeled by the municipality and then discharged to the creek (here the creek is part of the MS4).[99]

As the Draft Response to Comments document exhibits, the Permit does not apply to nonpoint sheet flow entering urban streams. Therefore, Petitioners' assertion that the Permit is invalid and overbroad in this respect is without merit.

5. <u>The Permit's Prohibition of Illicit Discharges Is Clear and Appropriate</u>

a. Petitioners assert that various non-storm water or illicit discharges should be allowed to enter the MS4 if they contain pollutants at levels below those which would cause conditions of pollution or nuisance. However, the Clean Water Act (section 402(p)(3)(B)(ii)) clearly prohibits such illicit discharges. Therefore, no such allowance is provided for by the Permit.

b. Petitioners assert that the use of the term "chemicals" in the Permit at section D.1.b.7 is unclear. The use of the term "chemicals" in the Permit is consistent with its common definition found in dictionaries. For example, the American Heritage Dictionary of Science defines chemical as "any substance obtained by or used in a chemical process. Sulfuric acid, sodium bicarbonate, and borax are chemicals."

c. Petitioners argue that the Permit's prohibition against the discharge of construction-related wastes to the MS4 is in conflict with the statewide General Construction Storm Water Permit. No such conflict exists. While the General Construction Storm Water Permit may or may not permit the discharge of certain construction-related wastes, it does not authorize the discharge of such waste into MS4s. The Permit's

[99] SDRWQCB, 2001. Draft Response to Comments. Pg. 67. A.R. Vol. 1-14.

prohibition of the discharge of construction-related wastes to the MS4 is consistent with Clean Water Act section 402(p)(3)(B)(ii), which requires municipalities to "prohibit non-stormwater discharges into the storm sewers."

6. The Permit's Discussion of "Pollutants or Conditions of Concern" Is Clear and Appropriate

a. Petitioners claim that the Permit's discussion of pollutants of concern in section F.1.b.2.iii is vague and overbroad. However, this section of the permit does not define pollutants of concern; rather, it requires that the Copermittees' determinations of pollutants of concern shall include **consideration** of several factors. Identification of pollutants of concern is left to the Copermittees' discretion (see Permit section F.1.b.2.e). As such, the Permit's language regarding pollutants of concern is flexible to provide for this discretion.

b. Petitioners assert that the term "pollutants or conditions of concern" is vague, potentially overbroad, and unintelligible. However, in section F.1.e the Permit describes five factors which are to be considered by the Copermittees in their identification of pollutants or conditions of concern. The description of pollutants or conditions of concern these five factors provide removes any vagueness or ambiguity regarding the term.

7. The Permit's Reference to Beneficial Uses is Clear and Appropriate

Petitioners assert that the Permit's use of the term "supporting beneficial uses" is unclear. As with all references to beneficial uses in the Permit, the term refers to beneficial uses designated in the Basin Plan. The word "supporting" is used in the Permit to exhibit that designated beneficial uses apply to all receiving waters within a particular hydrologic unit, and not just the particular named receiving waters specifically identified in Table 2-2 of the Basin Plan.

8. The Permit's Reference to Downstream Erosion and Stream Habitat is Clear and Appropriate

Petitioners assert that the Permit's reference to downstream erosion is unclear in the respect that it does not indicate how far downstream erosion must be controlled. However, detail beyond what is included in the Permit is not necessary, because the requirement applies for the distance downstream as far as impacts may occur. Therefore, the Permit's language regarding this matter is clear and accurate. Petitioners further assert that the Permit's use of the term "protect stream habitat" is also unclear. However, the requirement containing this term is quite clear, since protection of beneficial uses such as stream habitat is a fundamental goal of the storm water program. Protection of stream habitat is achieved under the Permit if in-stream water quality resulting from MS4 discharges is adequate to protect the aquatic habitat beneficial use. Therefore, the Permit's requirement to protect stream habitat is essentially the same as the Permit's receiving water limitations language in its implementation and enforcement.

9. The SDRWQCB Need Not Define Every Word in the Permit

Petitioners complain that the Permit does not contain definitions of common words or terms, such as "seasonal restrictions," "phased grading," and "minimization." It is not feasible, nor is it required for the SDRWQCB, to provide definitions of every word contained in the Permit, particularly when definitions are available in common dictionaries. Furthermore, to the extent that Permit requirements include flexible language, this is to provide the Copermittees discretion in implementing the requirements; a common request of the Copermittees.

10. The Permit is Consistent with the Statewide General Construction Storm Water Permit

Petitioners argue that the Permit's requirement that categories of minimum BMPs be designated and implemented at sites is in conflict with the statewide General Construction Storm Water Permit requirement that BMPs be site specific. No such conflict exists. Nothing in the Permit precludes the designated BMPs from being implemented in a site specific manner. Moreover, the BMPs are **minimum** BMPs. If the General Construction Storm Water Permit requires additional or more specific BMPs, the Permit does not prohibit their implementation. In addition, the Permit contains language which helps ensure that site specific BMPs are implemented at construction sites: (1) the Permit states "if particular minimum BMPs are infeasible at any **specific site**, each Copermittee shall implement, or require implementation of, other equivalent BMPs" (emphasis added); and (2) the Permit states "each Copermittee shall also implement or require additional **site specific** BMPs as necessary to comply with this Order" (emphasis added).[100]

11. Use of the Word "Waste" in Permit Section F.3.a.5.c.i Is Clear and Appropriate

Petitioners also assert that use of the word "waste" in Permit section F.3.a.5.c.i is inappropriate. The intent of this requirement is that accumulated debris be removed from the MS4. This intent is clearly stated in the Permit, which states: "Inspection and removal of accumulated waste **(e.g. sediment, trash, debris, and other pollutants)**" (emphasis added). This clarification provided in the Permit alleviates any confusion use of the term "waste" in this situation may cause.

[100] Permit section F.2.f.2.

12. The Permit's Definition of Pollutant is Consistent with the CWC and CWA

Petitioners claim that the Permit's definition of pollutant does not follow the CWA or CWC. However, the Permit's definition is a consistent interpretation of definitions included in the CWA or CWC. Moreover, the Permit's definition is a reasonable one consistent with common definitions in dictionaries. Petitioners' application of the Administrative Procedures Act to the Permit's definition does not apply, since such permits are exempt, as discussed in section P.

R. Retail Gasoline Outlets are Pollutant Hot-Spots Which Need Structural Treatment BMPs to Reduce Pollutants to the MEP

1. The Permit's Requirements for Implementation of Structural Treatment BMPs at RGOs is Consistent with MEP

Petitioners assert that the Permit's application of SUSMP structural treatment BMP requirements to retail gasoline outlets exceeds the MEP standard. Their basis for this argument is that source control BMPs at retail gasoline outlets meet MEP, and therefore any requirements beyond source control BMPs are unnecessary.

However, due to the concentrated nature of pollutants at RGOs, source control BMPs alone are simply not adequate in addressing RGO runoff. Research studies have identified RGOs as hotspots that produce significantly greater loadings of hydrocarbons and trace metals than other urban areas. The Center for Watershed Protection states that:

> Gas stations were found to be an extremely significant hotspot for hydrocarbons. Composite priority pollutant scans at the gas station sites revealed the presence of 37 potentially toxic compounds in the sediment and 19 in the water column. Many compounds were polycyclic aromatic hydrocarbons (PAHs) that are thought to be harmful to both humans and aquatic organisms. Non-gas station sites, on the other hand recorded far fewer priority pollutants that had much lower concentrations.[101]

While source control BMPs are obviously needed to address such significant pollution problems, structural treatment BMPs are necessary as well. The Permit directly addresses the need for implementation of multiple types of BMPs, stating "pollutants can be effectively reduced in urban runoff by the application of a **combination** of pollution prevention, source control, and treatment control BMPs" (emphasis added).[102]

Petitioners' own study also exhibits how source control BMPs alone are inadequate in reducing pollutants in urban runoff from retail gasoline outlets, thereby making their

[101] Center for Watershed Protection, 1994. Hydrocarbon Hotspots in the Urban Landscape. Watershed Protection Techniques. 1(1). A.R. Vol. 1-54. The SDRWQCB requests that the SWRCB take administrative notice of this document.
[102] Finding 11.

supplementation with structural treatment BMPs necessary. The "Geomatrix study," which Petitioners conducted, assessed the runoff from retail gasoline outlets handpicked by Petitioners. The study states that these RGOs utilized "Best Management Practices (BMPs) to minimize the buildup of potential storm water contaminants on exposed areas. These BMPs include regular sweeping of exposed areas, regular site inspections, and standardized spill response procedures." [103] In other words, the RGOs in the study used BMPs identical or similar to the source control BMPs developed by the California Storm Water Quality Task Force. These are the same source control BMPs which Petitioners assert are effective and constitute the maximum limit of MEP for retail gasoline outlets.

However, even a cursory review of the study's data reveals that the **median** event mean concentrations of both aluminum and zinc in runoff from these retail gasoline outlets **exceed the USEPA benchmark values** for those pollutants in storm water discharges from industrial sites.[104] More importantly, the median event mean concentrations calculated in the Geomatrix study exhibit that the subject retail gasoline outlet runoff is also in exceedance of the region's receiving water quality objectives. For example, the median event mean concentrations for copper and zinc in the study **exceed numeric criteria for priority toxic pollutants for the State of California**.[105] This is significant within the San Diego region, due to the identification of copper and zinc through a toxicity identification evaluation (TIE) as pollutants specifically causing impairment of Chollas Creek.

Moreover, even if such analysis is brushed aside, as Petitioners intend, the Geomatrix study's conclusion that pollutants in runoff from retail gasoline outlets are similar to pollutants in runoff from commercial parking lots exhibits the need for structural treatment BMPs at RGOs. The SWRCB has determined that structural treatment BMPs are necessary to meet MEP for runoff from commercial parking lots. Since runoff from retail gasoline outlets contains similar pollutant concentrations, the same level of BMP implementation must be conducted at RGOs for MEP to be met.

Clearly, the source control BMPs which Petitioners profess as constituting MEP are ineffective in addressing pollutants of concern and protecting water quality. However, it is precisely such effectiveness which is the overarching goal of the MEP criterion. Without effectiveness, MEP is not achieved. As the SWRCB states, "to achieve the MEP

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[103] Geomatrix, 1994. Results of a Retail Gasoline Outlet and Commercial Parking Lot Storm Water Runoff Study. A.R. Vol. 1-31-RR.

[104] Geomatrix, 1994. Results of a Retail Gasoline Outlet and Commercial Parking Lot Storm Water Runoff Study. Figures 17 and 24. A.R. Vol. 1-31-RR. Reports that median event mean pollutant concentrations of total aluminum and total zinc from retail gasoline outlets exceed USEPA benchmark values for industrial storm water (65 FR 64767).

[105] California Toxics Rule freshwater maximum concentration criteria for dissolved copper and zinc are 13 ug/L and 120 ug/L respectively. Median event mean concentrations of total recoverable copper and zinc in RGO runoff are reported to be approximately 20 ug/L and 188 ug/L by Geomatrix (Figures 20 and 24). Using the California Toxics Rule acute conversion factor to convert these total recoverable concentrations to dissolved concentrations, median event mean concentrations of dissolved copper and zinc in RGO runoff are estimated to be 19 ug/L and 183 ug/L. Assuming the California Toxics Rule conversion factors to be accurate in this case, these concentrations of dissolved copper and zinc in RGO runoff exceed California Toxics Rule freshwater maximum criteria.

standard, municipalities must employ whatever Best Management Practices (BMPs) are technically feasible (i.e., **are likely to be effective**) and are not cost prohibitive. The major emphasis is on technical feasibility" (emphasis added).[106] As such, in order for MEP to be achieved, Petitioners must implement other BMPs in addition to source control BMPs. Hence, requirements for implementation of structural treatment BMPs at retail gasoline outlets are included in the Permit as its interpretation of MEP.

Petitioners also assert that implementation of structural treatment BMPs at retail gasoline outlets is not practical, and therefore exceeds the MEP standard. However, as discussed in section G.3, the costs of meeting the SUSMP requirements at retail gasoline outlets are not prohibitive. Furthermore, some of Petitioners' constituents already meet requirements similar to those included in the SUSMP. Interestingly, this information was not provided by Petitioners in their argument that the requirements are not practical. Since 1992, retail gasoline outlets within municipalities covered under phase I of the NPDES storm water regulations in the Puget Sound Basin have been required to implement structural treatment BMPs sized to treat runoff from a 6-month, 24-hour storm. Retail gasoline outlets from this area have also been required to implement flow controls as well.[107] That Petitioners' constituents are already meeting structural treatment BMP requirements similar to those of the SUSMP in and of itself exhibits that the requirements are practical.

Structural Treatment BMPs Available for Use at RGOs Are Effective

Petitioners further assert that BMPs available for implementation at retail gasoline outlets are not effective, and therefore should not be required. Specifically, Petitioners claim that catch basin inserts have not been **proven** to be effective. While the SDRWQCB is not required to prove beyond doubt the effectiveness of its Permit requirements, the administrative record includes extensive evidence that catch basin inserts are effective in removing pollutants from urban runoff, including urban runoff from retail gasoline outlets. For example, as discussed in the Draft Response to Comments document, the Rouge River National Wet Weather Demonstration Project found various catch basin inserts to remove up to 6.6 lbs sediment and 9,700 mg/Kg oil per 1,000 gallons of retail gasoline outlet runoff filtered.[108]

The City of Dana Point supports these findings on the effectiveness of catch basin inserts, finding that 508 inserts captured 13.86 tons of debris during the 2000/2001 wet weather season (October, 2000 – March, 2001), or approximately **55 lbs of debris per filter**. Moreover, in analytically testing this debris, the City of Dana Point has found that the debris contains urban runoff and RGO pollutants of concern such as copper, lead,

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[106] SWRCB, 1993. Memorandum: Definition of Maximum Extent Practicable.
[107] Washington State Department of Ecology, 1992. Stormwater Management Manual for the Puget Sound Basin – Volume 1. Pg. I-2-1 – I-2-14. The SDRWQCB requests that the SWRCB take administrative notice of this document.
[108] Rouge River National Wet Weather Demonstration Project, 1999. Evaluation of On-Line Media Filters in the Rouge River Watershed. Rpo-NPS-TPM59.00. Pg. 16. A.R. Vol. 1-55.

cadmium, zinc, diesel, and fecal coliform.[109] This exhibits that catch basin inserts' capture of sediment and debris is significant and effective in protecting water quality, since many pollutants of concern at RGOs, such as metals and oils, can be transported to receiving waters on sediment and debris.

While catch basin inserts have been found to be effective in removing pollutants from urban runoff, other BMPs available to RGOs, such as sand filters or media filters, have been proven to be even more effective. The Sacramento Stormwater Management Program study supplied by Petitioners finds such BMPs as being effective and acceptable or conditionally acceptable for use.[110] USEPA finds that sand and other media filters can remove up to 100% of suspended solids, 45% of nitrogen, 80% of phosphorus, and 80% of metals.[111]

Structural Treatment BMPs at RGOs Need Not Pose Safety Concerns

Nor must such filters pose a safety concern, contrary to Petitioners' assertion. This assertion is questionable, at best. It is important to note that no evidence is provided by Petitioners as to how these BMPs pose a risk, or what the level of risk actually is. In fact, for many years similar BMPs (such as oil water separators) have been utilized at RGOs with apparently negligible (if any) adverse safety effects.[112] More importantly, many such filters are **currently** installed or being installed at RGOs within Petitioners' jurisdiction (Western United States, including California).[113] Apparently, these RGOs have not been notified of the dire risk they are subjecting themselves to.

To further alleviate any purported safety concerns, many such filters can be constructed at the surface or aboveground, negating any safety concerns regarding mixture of gasoline vapors with air in enclosed spaces. USEPA exhibits the applicability of sand filters at RGOs: "The surface sand filter was developed […] for sites that could not infiltrate runoff or were too small for effective use of detention systems."[114] Furthermore, there is nothing preventing the use of ventilation in the design of such systems. For example, rather than placing BMPs in an enclosed vault, the vault can be covered with a grate which provides ventilation.

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[109] City of Dana Point, 2001. Presentation: City of Dana Point's Effort to Improve Water Quality by Steve Avila and Cindy Asher, at Storm Drain Retrofits as Structural Controls for Stormwater: What Do We Know? Conference, Irvine, California, April 18, 2001. A.R. Vol. 1-56. The SDRWQCB requests that the SWRCB take administrative notice of this document.
[110] Larry Walker and Associates, Inc., 1999. Investigation of Structural Control Measures for New Development. Prepared for Sacramento Stormwater Management Program. A. R. Vol. 1-31-RR.
[111] USEPA, 1999. Preliminary Data Summary of Urban Storm Water Best Management Practices. EPA-821-R-99-012. Pg. 5-54.
[112] LARWQCB, 2000. Regional Comment on Proposed Order. Pg. 6. LARWQCB Comment on SWRCB Order WQ 2000-11.
[113] Stormwater Management Inc., 2001. Gas Stations List. A.R. Vol. 1-57. Lists retail gasoline outlets where underground storm filter units have been installed. The SDRWQCB requests that the SWRCB take administrative notice of this document.
[114] USEPA, 1999. Preliminary Data Summary of Urban Storm Water Best Management Practices. EPA-821-R-99-012. Pg. 5-18.

Control of Urban Runoff Peak Flow Rates and Velocities at RGOs is Feasible

Moreover, despite Petitioners' assertions, control of peak flow rates and velocities is feasible for RGOs. It is important to note that the Permit only requires control of peak flow rates and velocities as necessary to maintain preexisting downstream erosion conditions. This provides ample flexibility in meeting the requirement. For example, where a downstream receiving water is channelized and there is no potential for erosion, peak flow rates and velocities need not be controlled. In addition, peak flow rates and velocities can be controlled off-site, prior to discharge to receiving waters. Many interested parties have been strong proponents of shared BMPs; the control of peak flow rates and velocities from RGOs may be one situation where application of such BMPs are appropriate. In addition, control of peak flow rates and velocities is wholly feasible on-site at RGOs. Cisterns are a technology which have been used for centuries which can be applied at RGOs to control peak flow rates and velocities. Site design techniques such as small weirs, baffles, and directing roof runoff to pervious areas can also be employed. Due to the relatively small size of most RGOs, such measures can be constructed in an unobtrusive manner.

Summary

Clearly, there are many options for structural treatment BMP implementation at RGOs. There are also many options for how each structural treatment BMP is designed. These options serve to mitigate concerns regarding the effectiveness and applicability of structural treatment BMP implementation at RGOs. The wide range of options available ensures that effective, practical, and safe structural treatment BMPs are available and can be identified and implemented at RGOs.

2. <u>The Permit's Requirements for Structural Treatment BMPs at RGOs Is Consistent with SWRCB Order No. WQ 2000-11</u>

Petitioners argue that the Permit's requirement that RGOs implement structural treatment BMPs contradicts SWRCB Order No. WQ 2000-11. Rather than be in contradiction with the SWRCB Order, the Permit's application of structural treatment BMPs is consistent with the Order. The Order states that it "should not be construed to preclude inclusion of RGOs in the SUSMP design standards, with proper justification, when the permit is reissued."[115]

The SDRWQCB has found that there is proper justification for application of structural treatment BMP requirements at RGOs. This finding is supported in the administrative record. Permit Findings 3, 4, and 7 and their corresponding discussions in the Draft Fact Sheet/Technical Report find that vehicles and the pollutants they generate negatively impact receiving water quality.[116] RGOs, like parking lots, are convergence points for

[115] SWRCB, 2000. Order No. WQ 2000-11. Pg. 23.
[116] SDRWQCB, 2000. Draft Fact Sheet/Technical Report. Pg. 35-39. A.R. Vol. 1-25.

such vehicles and pollutants.[117] More importantly, as discussed in more detail in section R.1 above, the administrative record shows that even when source control BMPs are implemented at RGOs, **median** event mean concentrations of pollutants in runoff from these sites exceed USEPA benchmark values and most likely exceed receiving water quality objectives of the California Toxics Rule. Therefore, the SDRWQCB found that it is justified in requiring structural treatment BMPs in addition to source control BMPs at RGOs in order to address this problem.

Nor is the Permit inconsistent with the SWRCB Order in terms of its source control requirements. Petitioners assert that the SDRWQCB is at fault because it did not include requirements for the specific RGO source control requirements listed in the SWRCB Order. However, the SWRCB Order is addressing the contents of a model SUSMP, not a permit. Model SUSMPs are to be developed to flesh out permit requirements. As such, they are more detailed, including requirements for specific source control measures. Permits, on the other hand, are less detailed and generally do not include requirements for implementation of particular BMPs. The Permit therefore does not require specific source control BMP requirements, but rather leaves the selection of applicable source control BMPs to the discretion of the Copermittees, as part of their development process for their model SUSMP.

Finally, the Permit is not inconsistent with the SWRCB Order because the SDRWQCB chose not to include a size or other threshold in the Permit with regards to SUSMP applicability to RGOs. The SDRWQCB left the determination of a RGO threshold to the discretion of the Copermittees. There is nothing precluding the Copermittees from adding a RGO threshold to the Copermittees' model SUSMP. Since the model SUSMP is to be approved in the public process by the SDRWQCB, provision for public comment on the addition of such a threshold would be ample. The SDRWQCB and LARWQCB have conjunctively developed guidance for the Copermittees regarding RGO thresholds, should the Copermittees decide to develop such thresholds. This guidance also contains information supporting the application of all SUSMP requirements to RGOs.[118]

Moreover, the SWRCB recommendation for a RGO threshold is just that – a recommendation. It is not a binding requirement, contrary to Petitioners assertions. While the SDRWQCB supports development of a threshold by the Copermittees, the SDRWQCB found an RGO threshold to be extraneous for several reasons. The first of which is that the Permit contains a provision for a waiver from SUSMP requirements (Permit section F.1.b.2.h). This waiver is included in the Permit specifically to address size limitations, in addition to other potential restrictions.[119] Since the SWRCB's primary purpose for recommending a threshold was to address size limitations, the SDRWQCB finds the Permit SUSMP waiver provision to be sufficient to address the issue. Moreover,

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[117] Geomatrix, 1994. Results of a Retail Gasoline Outlet and Commercial Parking Lot Storm Water Runoff Study. A.R. Vol. 1-31-RR. Reports high-volume self service RGOs sell over 200,000 gallons of gasoline per month. Assuming an average 8 gallon fill-up per visit, this represents 25,000 vehicle visits per month.
[118] SDRWQCB and LARWQCB, 2001. Retail Gasoline Outlet New Development Design Standards for Mitigation of Storm Water Impacts – Technical Report. A.R. Vol. 1-58. The SDRWQCB requests that the SWRCB take administrative notice of this document.
[119] SDRWQCB, 2001. Draft Response to Comments. Pg. 215. A.R. Vol. 1-14.

the waiver can be utilized to address other factors causing SUSMP implementation to be infeasible at RGOs, such as the potential for groundwater contamination.[120]

Furthermore, the SDRWQCB found concerns regarding SUSMP implementation at RGOs to be minimal. As discussed in section R.1, many structural treatment BMPs are available for use at RGOs. Most of these BMPs require little space. They are required and implemented successfully in other areas of the Western United States. Moreover, RGOs are generally large. The typical modern gas station is between 15,000 and 30,000 square feet.[121] In comparison to SUSMP-regulated restaurants and parking lots, which are required to meet SUSMP requirements if they are larger than 5,000 square feet, RGOs are relatively spacious. It is also worth noting that the automotive repair shop SUSMP priority development project category, as reviewed and upheld by the SWRCB in Order No. WQ 2000-11, does not contain any such threshold in question. Automotive repair shops and RGOs are very similar in their design, use, and generation of pollutants of concern. It is unclear why RGOs purportedly must have a threshold while automotive repair shops need not.

III. CONCLUSION

The requirements of the Permit as adopted by the SDRWQCB are necessary and authorized by state and federal statute. In adopting the Permit the SDRWQCB acted based on the evidence presented before it and the rule of law. Therefore, for all the foregoing reasons stated above, the SDRWQCB requests the SWRCB to find Petitioners' claims invalid and deny the Petitions.

[120] SDRWQCB, 2001. Draft Response to Comments. Pg. 215. A.R. Vol. 1-14.
[121] LARWQCB, 2000. Regional Board Comment on Proposed Order. Pg. 5.

012266

A Report by a Panel of the

NATIONAL ACADEMY OF PUBLIC ADMINISTRATION

for the United States Environmental Protection Agency

EVALUATING ENVIRONMENTAL PROGRESS: HOW EPA AND THE STATES CAN IMPROVE THE QUALITY OF ENFORCEMENT AND COMPLIANCE INFORMATION

June 2001

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012267

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The views expressed in this document are those of the panel alone. They do not necessarily reflect the views of the Academy as an institution.
Project 1940

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FOREWORD

To improve the nation's system for protecting the environment, a recent Academy report, *Environment.gov*, emphasized the need for EPA and the states to tackle the most critical environmental problems, invest in better information and evaluation, redefine the ways that states are accountable to EPA and the public, and facilitate the use of a wide range of innovative tools to solve those problems. Good information is rapidly becoming an essential element for this transformation and for government's improved delivery of services to its citizens. The same is true for environmental protection, and a vital pre-requisite for all environmental programs is good data on enforcement and compliance. Such data are essential for EPA and the state environmental agencies to identify environmental problems, set goals, select tools to remedy the problems, measure their progress, analyze the effectiveness of their programs, and adjust their strategies accordingly.

In 1999, Congress asked the Academy to conduct this independent evaluation of the state and federal enforcement data, and to recommend to Congress, EPA, and the states actions as may be necessary for ensuring public access to accurate, credible and consistent enforcement data. For this study, the Academy's distinguished panel has examined the current status of EPA and state data on enforcement and compliance assistance and has investigated how EPA and state agencies can improve their environmental data systems. In their report, the Academy Panel concludes that current data on enforcement and compliance, and the systems used to collect and disseminate those data, are inadequate to meet the needs of the next generation of environmental programs.

The Academy Panel recommends that EPA and the state environmental agencies -- supported by Congress and state legislatures -- develop and deploy new, coordinated, multi-media data systems focused primarily on gathering and analyzing information on environmental conditions and results. These updated systems also should facilitate easier public access to more comprehensive environmental information, including data on the performance and results of enforcement and compliance assistance programs, not merely the numbers of activities undertaken by those programs.

EPA and the states are already making significant progress in reforming the nation's environmental data systems, and their joint proposal for a National Environmental Information Exchange Network is a promising step in that direction. The Panel's recommendations build on their efforts and suggest ways to orient these reforms more clearly toward obtaining data on environmental conditions and providing broader public access to those data.

In conducting this study, the Academy Panel has been greatly aided by the work of the Environmental Council of the States (ECOS), as reflected in its recent *Report to*

Congress on State Agency Contributions to Enforcement and Compliance. The staff of ECOS have worked with the Academy's researchers and have provided presentations to the Panel. This interaction has enhanced the Panel's understanding of often very technical issues and added substantially to this report. The Panel also appreciates the cooperation of agency leaders from Delaware, Maryland, Pennsylvania, and New Jersey, who graciously made themselves available to the Academy staff for interviews and other assistance. Similarly, EPA's Office of Enforcement and Compliance Assurance and Office of Environmental Information have provided cooperation and assistance to the Panel and staff, which have been very helpful in developing the recommendations and completing this report.

The Academy Panel hopes that this study will be helpful to Congress, EPA, the states, the regulated community, and environmental groups as they all work together on modernizing and integrating the nation's environmental information systems. The Panel believes that any remaining issues related to disputed data on state and federal enforcement and compliance activities should be set aside. Instead the energies of EPA, states, the regulated community, and environmental groups should be directed toward developing better environmental monitoring, evaluation of performance, and public access to data. Further, these data should record environmental results and should be more accurate, timely and comparable across communities, regions, states, and the nation.

The Academy Panel firmly believes that modernizing the nation's environmental data systems is absolutely essential for improving the performance of EPA and the state agencies. More important, it is essential for achieving better protection of public health and enhancing environmental quality.

David Garrison
Vice President

EXECUTIVE SUMMARY

Good information is fundamental to effective management and public confidence in government agencies. For the last three decades, however, EPA and most state environmental agencies have relied on data about enforcement activities that do not actually show how well the environment is doing, or how well the regulated community is obeying environmental laws. To the extent that these data measure enforcement or other governmental performance, they are much more likely to be misleading than useful.

The data on which EPA and the state agencies currently rely -- and that Congress asked the Academy Panel to evaluate -- relate almost exclusively to activities: the numbers of permits issued, inspections conducted, enforcement actions initiated, and penalty dollars collected. For many years, these data have served as the basis for management decisions and oversight of agency performance. When EPA delegated responsibility for implementing national environmental programs to the states and provided them with funding to do so, it created data systems to track these activities; and it has used activities data to hold states accountable for proper use of federal funds and implementation of federal laws, including timely and appropriate enforcement.

Using these same data, EPA's Inspector General and an environmental advocacy group have recently concluded that state enforcement activities declined between 1993 and 1997, raising concerns that states have de-emphasized enforcement to the detriment of the environment. The Environmental Council of the States (ECOS) challenged these conclusions, however, arguing that state data in the EPA systems were often incomplete and inaccurate, did not reflect the full range of state compliance activities, and revealed little about whether environmental conditions are improving.

The recent ECOS study on state enforcement and compliance activities provides a more complete picture of state enforcement and compliance assistance activities. At the same time, state information reported to ECOS also demonstrates the serious limitations of current data on enforcement activities. For example, the data show that one industrial state with a population of nearly 11.5 million regulates nearly 19,000 facilities, while a state with a smaller industrial base and a population of only 4.5 million regulates nearly five times as many facilities -- about 87,000 (See Appendix 15). This unlikely result apparently stems from the fact that only two media programs from the larger state reported data to ECOS, while 12 media programs from the smaller state reported data. Unfortunately, such disparities are commonplace in any collection of activities data; and they make accurate comparisons among states, as well as assessments of program effectiveness, virtually impossible.

SUMMARY OF FINDINGS

The Panel finds:

1. Collecting data limited solely to enforcement and compliance assistance activities provides little insight into how these activities contribute to actual improvements in environmental conditions, compliance with environmental laws, and fairness of the regulatory system across industries or among states.

2. The current single-medium EPA data systems that manage and monitor the performance of state and EPA enforcement and compliance programs are seriously flawed. The state activities data recently compiled for ECOS suggest that many state data systems also have serious limitations.

3. Congress, EPA, the states, and the public cannot readily evaluate the effectiveness, efficiency, or equity of state and EPA enforcement and compliance assistance efforts due to these problems with existing data.

SUMMARY OF RECOMMENDATIONS

The Panel recommends that:

1. EPA and the state environmental agencies should stop relying primarily on activities data to evaluate the effectiveness of environmental protection programs, including compliance assistance and enforcement initiatives.

2. EPA and the states should give immediate and sustained priority to implementing multi-media data systems for performance measurement and management that are focused on actual outcomes, both in environmental conditions and legal compliance.

3. The EPA and states should make information on environmental conditions central to their short-term and long-term decisions on regulating and protecting the environment.

4. EPA's information systems that monitor and collect state and national data should be modernized and integrated across all media so they can gather more accurate, timely, and comparable data on environmental conditions and activities.

5. EPA and the states should expand public access to information about environmental conditions in neighborhoods, communities and, more generally, across the country.

6. EPA and the state agencies should direct more attention to analyzing these data so they can identify changes in environmental impacts and conditions, opportunities for environmental gains, causes of environmental problems, and methods for evaluating past agency actions.

COMPLETE FINDINGS

1. Collecting data solely on EPA and state enforcement and compliance activities provides little insight into how these activities contribute to actual improvements in environmental conditions, compliance with environmental laws, and fairness of the regulatory system across industries or among states.

2. The current single-medium EPA data systems for managing and overseeing the performance of EPA and state environmental programs are seriously flawed. Data are often inaccurate, difficult to access -- especially by members of the public -- and out-of-date. Further, they are difficult to compare between EPA and the states, among the states, and across facilities.

3. The state activities data recently compiled for ECOS suggest that many state data systems also have serious limitations.

4. Most significantly, EPA and state data systems are hard to use for assessing changes in environmental conditions in specific places and for evaluating the environmental and compliance performance of individual facilities, groups of facilities, and responsible government agencies. As a result, Congress, EPA, state agencies, state legislatures, and the public cannot readily evaluate the effectiveness, efficiency, or equity of state and EPA enforcement and compliance assistance programs.

5. The debate between EPA and the states about the specific percentage of enforcement based on existing activities data is unproductive and should be set aside.

6. For data on regulatory activities to be useful, they must be based on standardized definitions and must be more complete, timely, and accurate.

7. The National Environmental Information Exchange Network is a promising first step in reforming EPA and state environmental data systems. In building the Network, the agencies need to incorporate comprehensive monitoring of ambient conditions as well as collecting and disseminating timely and accurate data that are comparable and outcome-focused.

COMPLETE RECOMMENDATIONS

1. The EPA and state environmental agencies should move rapidly to implement results-focused, multi-media data systems for measuring their performance and managing their agencies.

    1.a These new or redesigned systems should generate data on environmental and compliance outcomes, rather than primarily regulatory activities, so

EPA and the states can assess the effectiveness of environmental regulatory programs, including compliance and enforcement initiatives.

1.b. The agencies also should make information on environmental results and outcomes central to their short-term and long-term decisions on environmental protection.

1.c. The EPA Administrator should manage the agency with performance goals for each program office and region. EPA regions should negotiate location-specific outcome goals with states through the National Environmental Performance Partnership System (NEPPS). Information about EPA's national goals, each region's goals, and the state goals negotiated under NEPPS -- along with an annual status report on progress made toward those goals -- should be included in EPA's annual performance plans and reports submitted under the Government Performance and Results Act.

1.d. Each state should publicly report its progress in achieving environmental results as part of an annual state-of-the-environment report. These reports can strengthen the accountability of government agencies to each other and the public. They also can facilitate learning across agencies.

2. The current single-medium EPA data systems that monitor and collect state and national data must be modernized and integrated across all media so they can support results-based management and collect more accurate, timely, and comparable data on environmental outcomes and regulatory activities. EPA and the states should begin shifting to results-focused management even as they start to build a comprehensive data system that will provide outcome data. They can immediately begin to improve information on environmental results by generating data that measure the outcomes of their programs and inform their regulatory actions.

2.a. EPA and the states should emphasize their commitment to the initial accuracy of data on activities and environmental results by standardizing definitions, adopting common data standards, and establishing consistency checks and other automated systems that will minimize debates over data accuracy, as well as facilitate timely data release to the public.

2.b. Congress, EPA, and the states should assess the adequacy of, and identify needed investments for the nation's ambient monitoring networks to ensure they can generate the multi-media data necessary to support results-based environmental protection.

2.c. The National Environmental Information Exchange Network should be governed as a joint enterprise between EPA and the states. Interested non-governmental parties should be involved in its design, and incentives should be provided to encourage participation by all states.

2.d. Congress should authorize significant funding for EPA and the states to establish the Network and other data improvement programs, provided that these efforts support results-based management, significantly enhance public access to data, and clearly improve the accuracy, timeliness, and comparability of the data.

3. EPA and the states should expand public access to information about environmental conditions in neighborhoods, communities and, more generally, across the nation.

4. EPA and the states should direct more attention to analyzing, presenting, and disseminating environmental data in ways that help regulators, regulated parties, elected officials, and the public to identify changes in environmental impacts and conditions, opportunities for environmental gains, causes of environmental problems, and methods for evaluating past actions.

4.a. The nation's environmental information systems should enable EPA, states, citizens, and their elected officials to assess the effectiveness of environmental programs nationally, within EPA regional offices, in states, and within ecosystems based on accurate, timely, and comparable data.

4.b. New data systems should support the identification of specific, effective approaches to environmental protection, and compliance assurance that are worthy of replication. Data also should help to identify less successful approaches that should be curtailed and replaced.

4.c. EPA and the states should expand their research to develop sound methods for evaluating the effectiveness of their compliance assistance programs, more reliable measures of compliance rates, and improved methods for targeting enforcement and compliance resources on priority environmental problems.

4.d. Congress should mandate and fund routine agency reviews and public reporting on the accuracy, timeliness, comparability, and completeness of the information on environmental outcome and activities that is available from EPA and state data systems.

CHAPTER ONE

INTRODUCTION

In 1999, Congress asked the Academy to conduct "an independent evaluation of the state and federal enforcement data, including the national summary prepared by ECOS and comparable reports of EPA enforcement activities, and to recommend to Congress, EPA, and the states such actions as would be needed to ensure public access to accurate, credible, and consistent enforcement data."[1] At the same time, Congress directed the Environmental Council of the States (ECOS) to "analyze state enforcement and compliance statistics; identify the sources of any inconsistencies among the states and EPA in data collection, reporting, or definitions; and gather and make available to Congress and the public a national summary of state enforcement and compliance activities."[2]

In this report, the Academy Panel evaluates federal and state enforcement data as requested by Congress, but it does so in the context of recommendations made by other Academy panels during the past several years. These prior recommendations have called on the nation's environmental programs, both federal and state, to move toward a performance-based approach that emphasizes environmental outcomes and works on solving important environmental problems. This change means that Congress, EPA, the states, and the public should increasingly manage and oversee environmental programs focused on environmental results, not on the numbers of activities that agencies undertake. The changes needed to build more accurate and reliable data systems for environmental enforcement and compliance offer an important opportunity to promote this results-based approach to environmental management and agency oversight.

The complexity of environmental problems, the growing universe of regulated facilities, and the difficulty of associating individual agency activities with better environmental results have prompted state and federal agencies to start moving away from activities-based management and toward performance-based management. This change in approach has been required by Congress through the Government Performance and Results Act (GPRA) and has been supported by Academy reports to Congress, including *Environment.gov.*[3] A performance-based management system requires agencies to set appropriate goals. It also requires agencies to collect data for monitoring progress toward the goals and to assess the effectiveness of compliance assurance tools and strategies. Accurate enforcement and compliance data are important for agencies and other interested parties to understand the contribution of each regulatory tool in meeting performance goals; yet assessing performance must be based on whether environmental results are improving, not on the numbers of activities performed. Therefore, new environmental data systems must be capable of monitoring, collecting, integrating and analyzing the various kinds of data across all environmental media in order to ensure that performance-based management can operate successfully.

CHAPTER TWO
BACKGROUND

The Importance of Good Information

A previous Academy report observed, "To make the nation's environmental management system work effectively in the information age, the nation needs authoritative information about environmental conditions, and about whether agency efforts have helped improve those conditions."[4] Similarly, the U.S. General Accounting Office (GAO) pointed out, "EPA needs comprehensive information on environmental conditions to identify problems areas that are emerging and that require additional regulatory action or some other attention"[5] (see Appendix 1). As ECOS and EPA also have noted, "Information is fundamental to the work of environmental protection. State environmental agencies and U.S. EPA depend upon the rational flow of information for every aspect of their work, as individual agencies and collectively."[6]

Information is especially important as environmental agencies reorient their efforts to identify and solve specific problems, rather than focus so much on specific facilities. The ECOS study on State Environmental Agency Contributions to Enforcement and Compliance estimates that the states deal with more than 1.75 million regulated entities and notes that this is a very conservative estimate.[7] Using new management techniques aimed at producing results, environmental agencies must assess environmental problems and opportunities, choose the right tools for each job, determine the effectiveness and fairness of each tool, measure progress in accomplishing goals, adjust their strategies when necessary, and involve the public in the process. These functions all require good information on environmental conditions and good information on how effectively these tools reduce pollution.

Accurate, timely, and comparable data help to ensure that environmental agencies are held accountable for their work and provide a common language to clarify expectations and allow more uniform performance assessment.[8] Such accountability is especially important in the nation's system of federalism with responsibility for environmental protection dispersed among several levels of government. With clear performance goals, EPA, Congress, state legislatures, and the public are able to assess whether or not they support the goals and priorities of state environmental agencies. Reporting on environmental results helps to ascertain the states' progress in meeting the goals, as well as to hold them accountable for federal programs delegated to them.

Outcome goals and performance measures provide a means for agencies to assess their own work in a meaningful way and to adjust their efforts if they find that some programs are not producing adequate results. Information also plays an important role in targeting agency resources -- both staff and funding -- by identifying priority environmental problems and the

tools that are most likely to be effective in alleviating them. Good data can help to build confidence in agency programs if they demonstrate that real progress is being made.

Good information can also be an important factor in motivating agencies' staff, regulated entities, and the public to improve environmental performance. Both individuals and organizations like to perform well. Some like to lead the pack, while others feel comfortable in the middle. Yet few like to be considered the worst. The Toxics Release Inventory (TRI) is a prime example of this effect. Many companies listed as the highest emitters of toxic chemicals when TRI data were first published moved quickly to reduce their emissions. They did this to show that they were concerned about reducing pollution, or to ensure that they moved down the list in subsequent years. Moreover, emissions of chemicals on both the TRI list and on California's Proposition 65 list of cancer-causing substances have declined faster than emissions of chemicals listed only on the TRI.[9]

Accurate and timely data also strengthen democratic decision-making by allowing citizens to be more involved in debates about environmental quality in their neighborhoods, as well as debates over funding levels for state and federal environmental programs and the priorities of those programs. In addition, information allows people to make more informed decisions about where they will live, what products they will buy, and which candidates they will support.

Many companies publicly announce their environmental performance through annual environmental reports. These reports are a central commitment of signatories to the principles of the Coalition for Environmentally Responsible Economies (CERES). In addition, some companies have taken innovative steps to share information with the public about the environmental impacts of specific facilities, acknowledging the value of information in building public confidence about company operations in a community. Following a series of incidents and enforcement actions that cost several million dollars in penalties, the Koch Refinery in Pine Bend, Minnesota reached an agreement with a local environmental organization to construct a web site. The site provides the public with real-time access to data on all refinery emissions and their impacts. This precedent-setting collaboration provides nearby citizens with timely and accurate information about how their neighborhood is affected by the refinery. The data also encourage the refinery to look continuously for ways to lower its emissions and rebuild its reputation in the community and the state (see Appendix 2).

Early Emphasis on Counting Activities, Not Measuring Outcomes

Data on enforcement and compliance assistance are key components of environmental information because enforcement and compliance are essential to implementing effective federal, state, and local regulatory programs. However, even after 30 years, it is difficult to determine what information is needed to assess whether and how the agencies' enforcement and compliance efforts have helped to improve environmental conditions and increase compliance with the laws. Traditionally, EPA and the state environmental agencies have

measured the performance of enforcement and compliance assistance programs by counting the numbers of inspections conducted, enforcement actions pursued, and penalties collected -- performance criteria that are typically referred to as outputs or activity measures. This focus on activities -- plus the costs and sophistication of systems needed to monitor and collect more ambient environmental data -- made it easier and more certain for agencies to count activities instead of measuring environmental results. For this reason, Congress has used activity numbers to evaluate EPA's performance, and EPA has likewise used activity numbers to evaluate state agency performance.

For years, EPA has reported to Congress on the number of its enforcement activities and has announced in annual press releases the total dollar amount of penalties assessed and number of enforcement cases initiated. If those numbers have not increased annually, EPA has received heightened congressional scrutiny and public criticism. More recently, EPA has begun to assemble data on environmental outcomes from its enforcement and compliance assistance programs. It has reported this information, along with data on enforcement and compliance activities, in its annual Accomplishments Reports (see Appendix 3). This effort is commendable; but most national enforcement reporting still relies on numbers of activities, not on environmental conditions, results, or outcomes. Consequently, the current data generated by EPA do not provide a very clear picture of the actual environmental benefits of agency actions, such as inspections and technical assistance, let alone the less direct effect of deterrence resulting from enforcement actions.

Over time, a significant portion of the work required to implement the national environmental laws has been delegated to states. As part of these delegations, which also typically convey significant federal funding, state environmental agencies are required to account for the regulatory programs they undertake. The primary accountability mechanism used by Congress and EPA has also been counting activities that states provide for EPA's media-specific databases, such as numbers of permits, inspections, enforcement actions, and penalty dollars.

The recent ECOS study on state contributions to enforcement and compliance[10] also counts activities such as enforcement actions initiated, penalties collected, and on-site compliance assistance visits. ECOS notes that it has counted these activities to provide a complete picture of national enforcement and compliance efforts in the wake of criticism about declining levels of state enforcement. However, ECOS has clearly expressed a preference for assessing programs based on their environmental results rather than simply using numbers of activities.

Activities or output counts may be helpful in providing some sense of the coverage of EPA's and the states' compliance assistance, inspection and enforcement efforts, the scale of their penalty actions, and changes in their levels of activity over time. However, these activity numbers, whether generated by EPA or the states, provide little indication of whether enforcement activities contribute to improved environmental conditions. As Professor William Gormley has noted, "Outputs do not tell policymakers or managers whether progress has been made towards achieving an agency's stated goals. At worst, 'bean-counting' becomes an end

in itself, with outputs or 'beans' displacing statutory goals as values to be maximized. This is highly dysfunctional."[11]

The Shift to Performance-Based Management

In the early 1990s, EPA and several states began to reassess their management approaches due to several factors. They realized that some old environmental problems persisted and were insufficiently corrected. For example, water quality remained poor in many lakes and rivers despite decades of work. At the same time, they became aware of new problems that needed attention, such as toxic air emissions and the rapidly increasing number of small businesses subject to environmental regulation. Another Academy Panel observed, "The United States has relied heavily on one policy tool for controlling pollution: the enforceable -- and vigorously enforced -- federal and state permit. That tool cannot effectively reduce pollution from millions of small, dispersed sources, or even from thousands of large business-like farms."[12]

To tackle these persistent and emerging issues, EPA and state agencies have begun to adopt goal-setting or problem-solving approaches to complement their traditional environmental protection techniques. These approaches are reflected in such programs as the Great Lakes Initiative,[13] focused on protecting a specific valuable natural resource; Project XL,[14] offering flexibility on specific regulations in return for superior environmental performance; the National Environmental Performance Partnership System (NEPPS),[15] designed to focus on environmental outcomes and foster joint priority-setting between EPA and the states; and the ECOS-EPA Innovations Agreement,[16] encouraging states to launch new approaches for solving environmental problems.

These outcome-focused approaches were further supported by government-wide shifts in the early 1990s to require performance-based management. The federal Government Performance and Results Act (GPRA) and several equivalent state laws were passed to achieve this objective. These laws demand that government agencies become more focused on achieving results by setting priorities and goals, measuring their own performance against these goals, and reporting their progress to the public.

As an open letter to the incoming administration from the Executive Session on Public Sector Performance Management at the Harvard University Kennedy School of Government has recently noted:

> Effective performance management leads to better outcomes.
>
> - **Goals motivate.** People like to do well. Ambitious but achievable goals energize staff.
> - **Performance measures motivate.** Even without a direct link to goals or rewards, feedback improves performance. Performance measures help people see where their efforts are paying off and where they need adjustment.

- **Goals and performance measurements communicate.** Setting performance goals and monitoring progress toward them communicate your priorities. Performance goals and measures focus your workforce on strategic priorities and help enlist allies who share those goals.
- **Performance measurements lead to important insights.** Beyond communicating your priorities, performance measures reveal what works and what doesn't. An agency can replicate what works well and abandon what does not.
- **Performance measurement and management strengthen democracy.** Debate over priorities is healthy and natural in a democracy. By setting clear goals and reporting concrete progress, agency leaders facilitate better-informed deliberation among the public and its representatives.[17]

This results-driven approach to environmental management requires a shift in enforcement strategies. As a senior EPA enforcement official noted: "The traditional strategy of regulatory compliance programs has been to create and maintain a presence in the regulated universe, which could identify and correct violations and deter others from violating laws and regulations. This strategy viewed complete coverage of the regulated universe and uniform enforcement of the law as overarching goals."[18] EPA and state officials have increasingly recognized however, that complete inspection coverage by the government of the regulated universe is extraordinarily difficult, given budget and other resource constraints. Furthermore, it may not be the most effective way to address the most critical environmental problems.

Instead, many environmental agencies are adopting goal-setting and problem-solving approaches in order to produce increased compliance by the regulated community.[19] This shift is partially reflected in the Office of Enforcement and Compliance Assurance's (OECA) Core Enforcement Measures, which attempt to capture some outcomes or environmental results from enforcement although many measures remain counts of activities (see Appendix 4). OECA also has restructured its annual Accomplishments Report to assemble data on some of the pollutant reductions achieved through enforcement; here too, however, the recent reports still remain focused mostly on numbers of activities. Meanwhile, OECA has begun to target its resources toward higher priority violations and more significant environmental risks. For this purpose, OECA has developed new analytic tools such as the Online Targeting Information System (see Appendix 5) and has begun to use of a range of compliance tools to address specific environmental problems.

Some state programs also reflect movement toward goal-setting and problem-solving approaches. One noteworthy example is Florida's quarterly performance reporting, which has adopted "focus-watch" designations that allow agency managers to assess their progress in resolving problems by using performance measures.[20] These compliance management and problem-solving approaches require EPA and state programs to "identify important risks,

analyze underlying causes of noncompliance, and develop customized strategies to address them."[21]

> "Environmental enforcement needs to make a major shift in strategy, away from counting and evaluating the activities we do, toward selecting environmental and compliance results we want to achieve, and then deciding what activities will move us towards the results we have selected. We should set environmental and compliance goals **in advance**; our work can then be designed to accomplish the goals" (emphasis in original). [Source: C. Giles, "Aiming Before We Shoot: A Revolution in Environmental Enforcement" (2001).]

The effectiveness of a complex goal-setting or problem-solving approach to environmental protection that uses a broad range of tools -- education and voluntary incentive programs, technical assistance, market mechanisms, financial incentives, environmental management systems, and enforcement -- cannot be measured by the numbers of permits issued, inspections undertaken, enforcement cases filed, or dollars of penalties assessed. Such numbers may be useful for showing general activity trends and triggering questions about why activity levels may have changed, but they cannot establish whether environmental goals are being met or whether pollution problems are being solved. Different data are needed to determine whether environmental conditions are changing, problems are being solved, and goals are being met.

Citizens too are concerned about environmental results, as interest in environmental information has grown rapidly over the last decade. Their interest has been supported by right-to-know laws, such as the Toxic Release Inventory, and facilitated by the rapid expansion of the World Wide Web. As indicated by the very large numbers of visitors to such sites as Environmental Defense's electronic Scorecard,[22] the public now expects to be able to monitor the performance of regulated facilities and environmental agencies.

> Environmental Defense's Scorecard and EPA's new Window on My Environment are two examples of public web sites that provide data on environmental conditions and performance (see Appendices 7 and 8). These sites provide easily accessible local environmental information. Scorecard ranks and compares pollution levels by area code or name in areas across the United States. It also profiles 6,800 chemicals. In its first 24 hours of operation, Scorecard had more than one million hits, indicating citizens' desire for useable information about what is happening to the environment in their neighborhood. Pollution Watch recently launched a similar web site in Canada.

Accurate data on permits, inspections, and enforcement actions can provide citizens a more complete picture of the *activities* that a regulatory agency is carrying out in a particular neighborhood or facility. Yet the public and the regulated community tend to be more interested in the bottom line: Is their neighborhood, community, or watershed safe? Is

environmental quality improving? Are facilities being treated fairly and comparably, so that maintaining compliance does not put a well-managed facility at a competitive disadvantage?

The changing characteristics of environmental problems -- more diffuse pollution from a much larger universe of regulated facilities, new management approaches focusing on setting priorities and measuring environmental results, and greater public demand for information -- require modernized environmental information systems. Such systems should be capable of collecting timely, accurate, and comparable data related to enforcement and compliance assistance programs; yet they should do so along with providing more comprehensive data on environmental conditions and quality. Agencies at all levels can use these data to set environmental goals, assess the effectiveness of their tools for addressing priority problems, help the public understand what is happening in their neighborhoods, and document whether environmental conditions and public health are improving.

Building new information systems to support goal-setting and results-based environmental management will take time. The United States does not have the ambient monitoring networks in place in all areas to establish the baseline data from which to measure environmental improvements. It does, however, have ambient monitoring data available for some areas. It also has environmental impact data from permitted facilities, including permitted water discharge and air emissions levels, discharge monitoring reports, and exceedence notifications for many air permit holders. EPA and the states should immediately incorporate into their information systems the capability for capturing and analyzing monitoring data, for obtaining data necessary to support the agencies' problem-solving and results-based management, and for tracking the environmental outcomes of agency decisions and actions. They should also move rapidly to improve existing ambient monitoring. By having access to good data on environmental conditions, Congress, EPA, state legislatures, state environmental agencies, and the public can begin to assess performance based on these outcomes. In so doing, they can also hold each other accountable in a more meaningful way, rather than using remote surrogates such as permits issued, inspections conducted, enforcement actions initiated, and penalty dollars collected.

Boston's Charles River clean-up provides a good model for an outcome focused approach. In 1995, EPA's New England regional office announced a goal that the Charles River would be clean enough for swimming by 2005. After it set its goal, EPA began reporting on progress toward the goal using a letter grade, which it announced on Earth Day. The first year, EPA gave the river a D grade. To assess its progress, EPA used monthly monitoring data about river quality gathered by a local watershed association. The watershed association collected samples at 37 points along the river. This frequent, real-time information enabled EPA to detect problems more easily. When monitors showed a surge in pollution compared to water samples from an upstream point or samples from the previous month, these data prompted EPA to search for the cause. The monthly data provided fast feedback on the effectiveness of each intervention strategy. [23]

Outcome goals and measures for the Charles River also allowed EPA and its state and local partners to use a creative mix of enforcement, incentives, education, and informational tools to improve environmental quality. For example, based on information about direct storm-water hookups to the Charles River obtained during an earlier enforcement case, EPA sent letters to communities instructing them to inspect their storm-water pipes for illegal sewer connections. Rather than penalizing communities that identified improper connections, EPA negotiated agreements with them aimed at eliminating the connections. This approach did not add to the agency's enforcement statistics, but it quite effectively solved a significant problem. Consuming far fewer resources, it produced results more quickly than traditional enforcement cases. Meanwhile, EPA brought enforcement actions against recalcitrant sources of water pollution and provided incentives for communities to adopt new storm-water and pollution prevention practices not yet required by regulation. These and other creative problem-solving strategies raised the Charles River's grade to a "B" in 2000. As one analyst has observed: "The Clean Charles 2005 initiative demonstrates how starting with an outcome goal and organizing work around it -- combining functional activities such as permitting, plan review, science, inspections, the threat of enforcement followed up by enforcement when needed -- can push aside these concerns and barriers."[24] The reason that the Clean Charles 2005 initiative has worked so well is that the outcome-focused goal drives EPA's selection of activities, not the other way around.

New York City used a similar approach to reduce crime rates. The effort began with a performance goal, reducing crime, and used data from the police department's Computerized Crime Comparison Statistics (COMPSTAT) system to obtain detailed, up-to-date crime statistics and trends. These data helped the police to identify problem areas and concentrate their resources and tools there to reduce crime rates. Since 1993, this effort has contributed to a 43 percent reduction in overall crime and more than a 50 percent reduction in the city's murder rate.[25]

The Controversy Surrounding Enforcement and Compliance Information

The accuracy of EPA's data systems has become very controversial. Using data from these systems, an internal EPA study and a report by a public interest group[26] in the late 1990s suggested a decline in state enforcement and compliance activity nationwide. The internal EPA study also suggested that EPA regional offices were not adequately overseeing state enforcement work. Each study evaluated a limited number of states and EPA regions, but the data indicated similar downward trends in enforcement and compliance actions. Prompted by state and regional protests about the accuracy of the data in several studies, *Inside EPA* filed a Freedom of Information Act request for all the internal evaluations of states and regions performed by OECA between February and December 1998.

Inside EPA obtained state-by-state data for 18 states in Regions II, V, IX, and X (see Appendix 8). The data covered three- or four-year periods, depending on the region. Publication of these data in the May 14, 1999 issue of *Inside EPA* precipitated widespread controversy. *Inside EPA*'s article observed that "state enforcement activity nationwide has plummeted over

the past five years, and regional oversight of state programs has done little to prevent the slide."[27] Indeed, the states' data in all four regional evaluations showed that enforcement activity -- measured by administrative orders and civil referrals -- had dropped in all but two of the 18 states from 1993 to 1997.

Two months later, states replied to *Inside EPA's* allegations of inadequate state enforcement by pointing out that there were major problems with the integrity of EPA's state-by-state data. They provided numerous examples of errors,[28] including:

- Errors in posting data or entering them into EPA's mainframe computers
- Simple mathematical errors
- Discrepancies between data reported by a state and those recorded by EPA for the same state
- Differences in defining key terms, such as whether a notice of violation constitutes an enforcement action.

Perhaps most importantly, the states disputed "whether the number of enforcement actions actually reveals anything of value about the environment and whether any significant conclusions can be drawn from increasing or decreasing rates of enforcement."[29] The problems with the existing environmental data systems were confirmed when EPA issued a formal reply to the states a month later.[30] Although the reply conceded that EPA's data on enforcement contained numerous errors, it claimed that public release of such incorrect information by OECA was "extremely rare" and rejected the suggestion that "these mathematical errors indicate fundamental flaws in the national data system."[31]

At the same time, OECA acknowledged that there were several possible reasons for the discrepancies in state data when extracted from the EPA databases. Among them were "mathematical errors; the fact that many states no longer use EPA databases to track information and therefore do not pay attention to the quality of data given to the agency; and the difficulty of 'moving data between state and aging EPA systems.'"[32] OECA's reply seemed to agree that some problems had been correctly diagnosed by the states, and EPA indicated that it was willing to work on improving the quality of its data. However, EPA insisted that, even when corrected, the state data showed a 19 percent decrease in state enforcement activities. In reply, ECOS maintained that the corrected data showed only a statistically insignificant six percent drop in state enforcement activities.

EPA and environmental advocacy groups[33] (see Appendices 9 and 10) have continued to express concern that many states do not pursue enforcement cases in a timely manner or do not use their traditional enforcement tools with sufficient frequency. On the other hand, several states that have more actively embraced the use of outcomes to measure their own performance have urged EPA to stop counting state enforcement activities and focus instead on whether their overall environmental programs are achieving better results as demonstrated by improved environmental quality.

Many state environmental agencies note that it is important for EPA to use such results-driven, outcome measures to evaluate the performance of their programs because there are certain types of activities, such as compliance assistance or warning letters, that EPA does not include in counting enforcement activities or "beans." They believe that numerous non-traditional approaches are effective for encouraging regulated facilities to return to compliance or to remain there once corrective actions have been taken even though data to support this notion are not readily available.

The states' frustration with EPA's continued bean-counting is exacerbated by the lack of consistency in the way that EPA regions oversee and count state enforcement activities.[34] In some instances, states have also received mixed or lukewarm signals from EPA's regional and national media program managers about their support for performance-based management and outcome measures. Indeed, some have been told that, regardless of the priorities negotiated in their NEPPS agreements, EPA's media program managers expect the states to meet certain targets for numbers of facilities inspected and other traditional activities.[35]

Through this study, the Academy Panel seeks to shift the debate away from charges and counter-charges among EPA, environmental advocacy organizations, and the states over the adequacy of state enforcement programs. Instead, all of these parties need to focus their energies on determining whether environmental conditions are improving and on developing better ways to measure the effectiveness of environmental programs.

CHAPTER THREE

FINDINGS

FINDING 1 -- Collecting data on EPA and state enforcement and compliance activities alone provides little insight into how these activities contribute to actual improvements in environmental conditions, compliance with environmental laws, and fairness of the regulatory system across industries or among states.

Commentary on Finding 1

Setting goals, measuring progress in meeting them, assessing how various tools contribute to achieving progress, adjusting strategies based on this information, and informing the public about the goals and the progress all require better ambient data than are currently available. In this context, it is important to modernize and integrate the existing state and federal data systems so they collect and generate timely, accurate, and comparable data about the effectiveness of state and federal enforcement and compliance assistance.

The Academy Panel believes that the proposed National Environmental Information Exchange Network (Network), EPA's Integrated Information Initiative (I3), and related work on common data standards are promising steps toward fixing the shortcomings of current data. However, it is not sufficient merely to *fix* the data systems and improve the flow and accuracy of existing data activities. The systems must also be modernized, integrated, and expanded to include more environmental data, greater ability to analyze them, and increased utility for setting priorities, targeting resources, and providing better information to the public. It is important that future EPA efforts to integrate its data, as well as states' work on revamping their data systems and the joint EPA/state Network, emphasize collection of outcome-focused data. Otherwise, there is danger that so much attention will be directed to improving the current activity-focused systems that exhaustion will set in before time and resources can be dedicated to building the capacity of these data systems to deliver information on environmental outcomes and impacts.

Better Ambient Monitoring

A good understanding of environmental conditions is fundamental to a problem-solving approach to environmental management. However, the nation's existing network for ambient monitoring is not up to the task. As the GAO recently observed: "Although EPA and the states collect extensive amounts of environmental data, important gaps still exist on environmental conditions and the effects of such conditions on human health."[36] For example, thirty years after the passage of the Clean Water Act, states have assessed water quality for only 23 percent of the nation's river miles, 43 percent of its lakes, and 32 percent of its estuaries (see Figure 3-1 below).[37] Clearly, much more emphasis needs to be placed on expanding the nation's ambient monitoring network to provide the data needed for establishing baseline conditions and measuring environmental results.

Figure 3-1

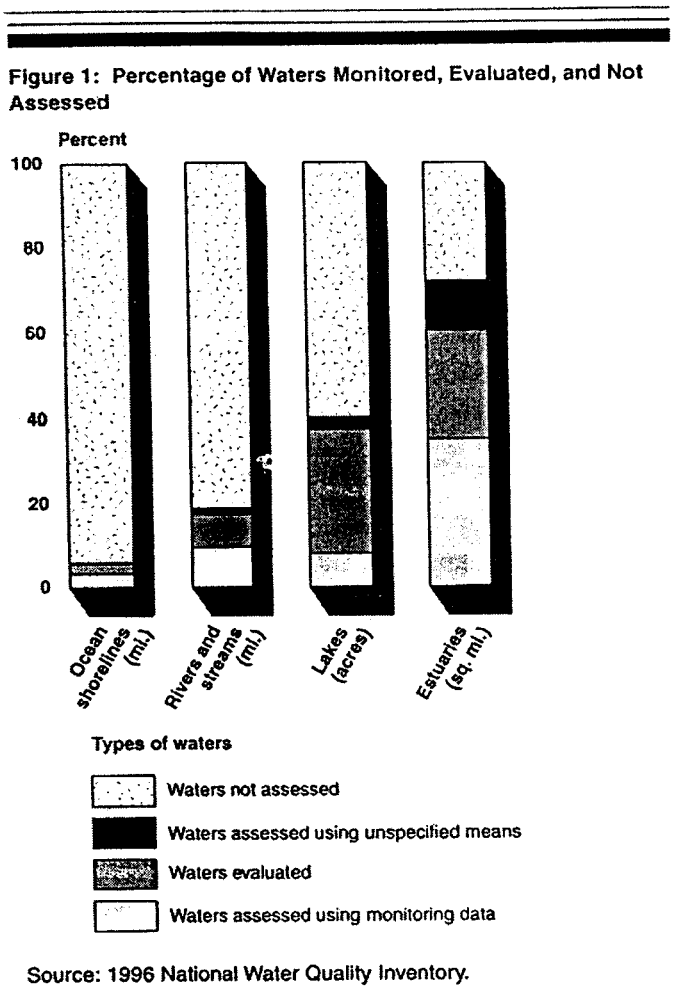

Source: U.S. General Accounting Office, "Major Management Challenges and Program Risks." 2000.

Developing better environmental data systems need not be delayed until the new Information Exchange Network is fully operational. Much of the ambient data that could be useful in establishing baselines and measuring progress already exist in state agencies, watershed districts, the U.S. and state geological surveys, and other places. A concerted effort to assemble and use these data in daily decisions about inspections, enforcement, permit renewals and other environmental agency activities could provide a much better short-term basis for EPA and state performance management. These data could then be used to establish baseline conditions, set goals, target high priority problems, and measure progress in solving those problems.

Geo-Spatial Identifiers

Better information on the exact location of facilities or releases of pollution is key to improving environmental data systems. Because EPA's single-medium data systems were developed independently, facilities have been identified in a different manner for each system. States often use yet another method for identifying facilities in each state. As a result, it has been very difficult to identify clearly which emissions came from which facility. In fact, when mapped by computers using data in the existing EPA systems, some facilities appear to be located in the Atlantic Ocean.

EPA and the states have been working diligently to develop more accurate geo-spatial identifiers that will provide precise, accurate locations for regulated facilities. For example, EPA's Facility Registration System now contains data on 20,000 facilities (see Appendix 11). This effort has been a central element in designing the new Information Exchange Network. Ensuring that each facility has a single identifier for both state and federal data systems and across all media programs, and that its geographic location is precisely documented, will enhance on-going efforts to integrate data from a variety of sources.

By ensuring that ambient air and water data, Toxics Release Inventory data, discharge and emissions data, enforcement and compliance history, better geo-spatial identifiers and other information are available through their new data systems, EPA and the states will be better able to identify problems, set goals, choose appropriate tools, resolve the problems, measure progress, and keep the public informed as environmental conditions change.

FINDING 2 -- EPA's enforcement and compliance information systems for managing and overseeing agency and state environmental program performance are seriously flawed. Data are often inaccurate, difficult to access (especially by members of the public), not up-to-date, and hard to compare between EPA and the states, among the states, and across facilities.

FINDING 3 -- The state activities data recently compiled for ECOS suggest that many state data systems also have serious limitations.

FINDING 4 -- Most significantly, data from EPA and state systems are hard to use in assessing changes of environmental conditions at specific locations and in evaluating the environmental and compliance performance of individual facilities, groups of facilities, or responsible government agencies. As a result, Congress, EPA, state legislatures, and the public cannot readily evaluate the effectiveness, efficiency, or equity of federal and state enforcement and compliance assistance programs.

Commentary on Findings 2, 3, and 4

Data Flaws

EPA's current data systems are seriously limited by data inaccuracies, failure of some states to submit complete data, separate single-medium systems, and data inaccessibility because information resides on antiquated main-frame machines. Current data systems also make it difficult to examine a facility's environmental impacts and compliance behavior across all media programs. These inadequacies have been widely recognized. The GAO has recently observed, "EPA's data management system is outmoded in many ways, including having separately designed databases that are generally not technically compatible."[38] Similarly, the joint ECOS-EPA Blueprint for the Information Exchange Network has noted: "Many of the state and EPA's current systems and approaches to information exchange work ineffectively and are overly burdensome, with obsolete and expensive computer systems that satisfy neither staff nor external users (e.g., the public, regulated industries)."[39]

The recent ECOS study further illuminates these problems. It notes that 80 percent of the states contributing data to the report found what ECOS characterized as "significant and/or pervasive" discrepancies between data maintained by state or local authorities and those in EPA's databases.[40] ECOS's survey documenting the prevalence of these incidents indicates that there are significant data discrepancies, and the Panel believes these errors are a cause for concern.

The ECOS study has identified at least four reasons for the problems:

- Database flaws: difficulties in using EPA's main-frame databases, including outmoded designs and difficult data entry protocols
- Guidance interpretation: problems with interpretation of EPA guidance for using the systems, including frequent coding changes and lack of guidance
- Time lags: data not entered or updated promptly and therefore not accurately reflected in the databases when queried
- Definitions: differences between EPA and the states on how different enforcement activities, such as notices of violations or significant non-compliance, are categorized and defined.

These problems make it difficult to use environmental data. EPA acknowledges that these data discrepancies exist and that states experience problems in working with its data systems. In fact, EPA recognizes "that many of our data systems are outdated, difficult to use, and in serious need of modernization."[41]

The Academy Panel concludes that, as the studies by ECOS and GAO note, there are fundamental problems with existing enforcement and compliance data. There is agreement that those problems must be corrected to facilitate better environmental decisions by both EPA and

the states and to provide the public with better data related to enforcement and compliance efforts. Because good information is fundamental to good decisions, the EPA Administrator and state environmental leaders should make improvement of their data systems a high priority.

Data limitations seriously constrain EPA and state efforts to use data for goal-setting, program evaluation, and oversight. As agencies begin to focus on identifying environmental problems and setting priorities, good data becomes extremely important. For example, OECA is increasingly trying to target its inspection and enforcement work through developing the Integrated Data for Enforcement Analysis system (see Appendix 11) and the Online Targeting Information System (see Appendix 5). These systems combine data from TRI, other business databases, and EPA/state databases to help EPA target the most important non-compliance and health risk problems. Such targeting systems are fundamentally good ideas, but they are burdened by the fact that the data they use often are based on the old or inaccurate information in EPA's data systems. Until better data systems are in place, EPA's and the states' ability to develop targeting programs is very limited.

The lack of accurate data has generated significant concerns about another EPA effort to analyze data on regulated facilities. EPA's Sector Facility Indexing Project (SFIP) identified five industrial sectors that "release relatively high levels of chemicals,"[42] essentially targeting those sectors for closer examination based on data about chemical release levels (see Appendix 12). The SFIP goals include making "environmental information about industrial facilities available to the public" and expanding "the comprehensiveness and improve the accuracy of data for analyzing the environmental track record of the industrial sector."[43] The SFIP also relies on the current databases for much of the information about facilities. Consequently, SFIP data were challenged soon after their release because several indexed facilities identified a number of major errors in their data. While EPA included an error correction process in the SFIP design, the fact that a number of factual errors were released to the public colored the credibility of the project. And, although indexed companies had a method for correcting mistakes (see Appendix 15 for a description of EPA's "Integrated Error Correction Process"), the erroneous data were released to the public before facilities could correct them, perhaps incorrectly influencing the public's impression of the facilities. To remedy these problems EPA is now working with states and preparing to publish an Information Products Bulletin that will announce new forms of data analyzed before they are publicly released (see Appendix 14).

The Academy panel believes that systems such as SFIP are a good idea, but they should be based on accurate data and should not, as a standard operating procedure, rely on regulated entities to identify mistakes only after the data have been released to the public. At the same time, EPA should be sensitive to whether facilities' reporting procedures create any incentives or disincentives for accuracy, because facilities need to have consistent incentives for reporting accurately in the first instance. In general, EPA and the states should ensure the accuracy of the data on both activities and environmental results at the initial collection stage by standardizing definitions, adopting common data standards, developing compatible data-sharing

systems, and establishing consistency checks and other automated systems that will minimize post-collection debates over accuracy, thus facilitating the data's timely release.

Incomplete Activities-Focused Data

Since 1995, EPA's Office of Enforcement and Compliance Assurance has prepared an annual "Accomplishment Report" outlining details of the nation's enforcement and compliance assistance efforts. Although states have been delegated authority to manage a very significant percentage of federal environmental programs (see Appendix 14), the Reports have only reflected state enforcement activities numbers in two years, 1996 and 1997 (see Appendix 3). The numbers captured in the Reports also cover only a limited range of enforcement actions reported to EPA through its data systems. As a result, Congress and the public have not had good information on the full extent and nature of EPA and state enforcement and compliance assistance activities.

The new ECOS study on enforcement and compliance fills the gap on reporting state enforcement and compliance assistance activities that has been created by the limited scope of EPA's Accomplishment Reports. It provides an unprecedented level of detail about delegated state enforcement and compliance assistance activities related to these problems, as well as analogous state programs. It also demonstrates that states play a major and critical role in the nation's compliance and enforcement efforts.

Although EPA has increasingly tried to capture the environmental benefit of its enforcement and compliance assistance efforts in its Accomplishment Reports, they remain focused heavily on counting activities. Even the reporting of environmental benefits is based on after-the-fact assessments of enforcement activities, rather than on progress in meeting before-the-fact environmental goals and the contributions that enforcement and compliance assistance have made toward meeting those goals.

Lack of Comparable Data

Similarly, even though the new ECOS data provide the most complete information to date on state enforcement and compliance activities, their usefulness is also limited because they are not comparable. First, the definitions of key enforcement terms used by states to report their activity statistics to ECOS are not uniform, making it difficult to compare one state to another. Second, the number of programs in each state that reported data to ECOS varied from one to 16, thus limiting the utility of aggregated data. Third, the states reported their number of regulated facilities, but each number may have been affected by how thoroughly a state identified the universe of facilities subject to regulation, whether the state used a common identifier for a facility subject to multiple program requirements, or whether it counted a single facility separately for its air, water, and waste programs. Fourth, state data on compliance rates and return to compliance, although valuable, provide only a general sense about the effectiveness of these tools because ECOS did not ask the states how they determined those

rates. As a result, the Panel believes the aggregated data and the conclusions drawn from them in the ECOS study should be used very cautiously.

While the purpose of the ECOS study was simply to gather state enforcement and compliance assistance data, not to make comparisons among states, the Academy Panel believes that good environmental data systems should allow this type of comparison. Comparable data help the states learn from each others' experience through benchmarking and strengthens government accountability to the public.

A few examples illustrate the problems with using aggregated state data. ECOS attempted to quantify the number of regulated sites and concluded that states deal with 1.7 million such sites. This number, which ECOS notes is likely to be conservative, shows that the states have a very significant workload.[43] However, the 1.7 million number can only be used to illustrate the order of magnitude states' regulated universe because not all media programs are reported in all states. Some states reported sites separately for each program when they are regulated by more than one program; some states reported very large numbers for certain media programs (such as underground storage tanks); and others did not report some programs at all. More importantly, all existing state databases only cover facilities that have been identified as regulated entities. Yet many facilities -- especially small businesses -- elude identification for a variety of reasons and are not included in the total regulated sites for many media programs. For example, when the Massachusetts Department of Environmental Protection made a concerted effort to identify all printers, dry cleaners, and photo processors subject to regulation as part of the state's Environmental Results Program, it determined that only 380 facilities had previously been in its data system, out of a total 2,200 facilities.[44]

The ECOS study also points out that most state programs report a higher number of significant violations -- also referred to as "significant non-compliances" -- under the state definitions compared with those that are reported using the federal definitions.[45] This discrepancy indicates that looking simply at federal counts of significant violations -- which the national enforcement audits tend to do -- underestimates the true levels of non-compliance found by the states. In general, the ECOS survey indicates that states undertake a larger number of important enforcement actions in response to non-compliance than counted by the EPA data systems. However, the exact scale of this difference is difficult to ascertain because there is no common definition among the states of what constitutes a significant violation or significant non-compliance. ECOS simply asked states to report cases that were determined to be significant based on the different definitions used by each state.

The resulting data discrepancies are illustrated by Table 5 in the ECOS report. It shows that, in 1999, Oregon pursued 1,988 significant violation cases, Pennsylvania only 108 cases, and Rhode Island none. One would anticipate that a state of Pennsylvania's size would have more significant violations than Oregon's much smaller regulated universe, and that Rhode Island would have identified at least a few significant violations. It is not possible to tell whether differences in definitions, in the way the states responded to the survey, or levels of enforcement led to these disparate and counter-intuitive sets of activity data. The Academy

Panel recognizes that ECOS' purpose in conducting the study was not to gather data allowing state-by-state comparisons of programs; ECOS simply reported the data provided to it by the states. However, these data discrepancies point out that it is very difficult to aggregate state data, to compare performance across states, or to draw nationwide conclusions on enforcement efforts using current state data.

Similarly, it is not possible to aggregate data and draw conclusions about state inspection programs when the data are not comparable. For example reported data on inspection rates show wide variations from state to state. These differences likely have more to do with the number of programs reporting or differences in inspection definitions than the actual rate of inspections. Appendix 11, which is derived from two ECOS tables, shows state inspection rates that vary from four percent to more than 125 percent of all identified regulated facilities in 1999. This variation seems unlikely and demonstrates the difficulty of aggregating state data or making general observations based both on incomplete data and on a survey that did not use standard definitions for key data elements. Thus, the Academy Panel views with caution the conclusion in the ECOS report that states "looked at just about half of these sites."[46]

EPA and the states must redesign their environmental data systems in light of the inherent flaws, the failure to capture the full picture of state work, and the focus on activities rather than environmental results. OECA has been reorienting its Accomplishment Reports to include environmental data, but it should consider additional changes that show more clearly how enforcement and compliance assistance efforts accomplish agency goals and connect to environmental outcomes. Organizing and presenting activities data by air shed and water shed, together with trend information for environmental quality in those places, would be a significant improvement. Although the ECOS study focuses on counting activities to provide a more complete picture of state efforts, the study reiterates the organization's position that it "does not support the collection of statistics about 'activities' (which states and others often call 'beans') to determine the success of environmental efforts. Environmental success should be measured by the progress we make with public health, with air, water and drinking water quality, with management of hazardous wastes and with the reduction of pollutants, among other things."[47]

FINDING 5 -- The debate between EPA, environmental advocacy organizations, and the states on the specific percentage of state enforcement based on existing activities data is unproductive and should be set aside.

Commentary on Finding 5

Due to the difficulties with existing activities data, the current debate over the adequacy of states' enforcement of national environmental laws is impossible to resolve. The Panel believes that future discussion about the adequacy of state and federal environmental programs should address what the programs accomplish, not how many activities they produce. As a result, the Panel recommends that EPA, environmental advocacy groups, and the states turn their attention to building a regulatory system that focuses more on setting goals and measuring environmental outcomes, as well as data systems to support this approach. This work includes

improved monitoring of ambient conditions and collecting more accurate, timely, and comparable data on environmental outcomes in specific places and on enforcement and compliance activities, so that the contribution of agency activities in meeting environmental goals can be better evaluated.

One example of the debate is the distinction that EPA has made between "formal" and "informal" enforcement in compiling enforcement statistics and reviewing state programs. EPA has focused its enforcement reporting on administrative orders that assess penalties and judicial actions, activities that it has labeled as "formal" enforcement. Other types of enforcement activities, such as oral warnings, warning letters, and notices of violations that require regulated facilities to correct violations without assessing penalties, are labeled as "informal" enforcement and have not been counted EPA, although the ECOS data suggest that these methods often result in facilities returning to compliance.

States believe that this formal-informal distinction undervalues non-penalty forms of enforcement and underestimates their contribution to the national enforcement effort. For example, using this distinction, EPA has calculated that states conduct about 70 percent of all environmental enforcement. In contrast, the ECOS study calculates that states do 90 percent of all enforcement if formal actions and state-issued notices of violation are counted.[48]

Recent discussions between EPA and the states have begun to discard the formal-informal enforcement distinction, recognizing that various forms of enforcement may be useful under different circumstances and that the choice of a more or less formal enforcement tool should be part of an overall compliance management plan designed to solve specific problems. Further, EPA essentially agrees with ECOS' conclusion about the percentage of state-conducted enforcement when notices of violations are included in the calculation.[49] Standardizing definitions for various enforcement tools, currently under consideration by the EPA-State Data Standards Committee and the EPA-State Enforcement and Compliance Action Team, should further help to resolve differences about the levels of enforcement activities conducted by various agencies (see Appendix 16).

FINDING 6 -- For regulatory data on activities a to be useful, they must be based on standardized definitions and must be more complete, timely, and accurate.

Commentary on Finding 6

Another area of controversy has been the states' interest in focusing on compliance rates rather than the numbers of enforcement cases initiated. Focusing on compliance rates allows an agency to choose among a range of tools from education to assistance to enforcement in order to produce higher rates of compliance. Yet calculating compliance rates is a difficult task, especially when basic data about the regulated community are incomplete or inaccurate.

The states responding to the ECOS study strongly preferred using compliance rates as a measure of success for enforcement and compliance programs.[50] The Panel believes that

compliance rates can be a useful intermediate outcome measure that may serve to indicate whether environmental conditions are improving. Compliance rates are notoriously difficult to calculate, however, because they rely on a number of data elements that must be explicitly and consistently defined, including:

- whether the entire regulated universe is identified
- whether all identified facilities are inspected
- the method by which compliance is verified (desk review, phone call, on-site inspection)
- the frequency of verification
- whether only one environmental medium or all media are included
- the definition of non-compliance
- uniform criteria for determining whether non-compliance is significant or not significant.

While supporting the use of compliance rates, the ECOS study recognizes that "there are a series of definitional and usage problems that frustrate those who would like to use this term."[51] Despite these difficulties, Figure 1 of the ECOS report purports to show that almost half the state programs responding to the survey achieved compliance rates between 90 and 100 percent.[52] Although this information is useful in understanding the states' views of compliance rates, it does not indicate whether any of the states have overcome the obstacles noted above or whether they have found a reliable method of calculating accurate compliance rates.

EPA and the states believe that compliance rates could be an important measure of program success, but far more work needs to be done on refining the definitions of data elements and developing a method for calculating compliance rates before using them as a reliable indicator of program effectiveness. It is important that EPA and the states work both separately and together on developing more rigorous, reliable, and uniform approaches to calculating and comparing compliance rates. OECA has recognized the value that compliance rates can play in targeting agency resources by awarding grants to states to test new methods for measuring compliance rates. So far, however, only one of its measurement grants (to Oregon) supports work designed to produce a potentially improved method for calculating compliance rates.

The ECOS study observes that states have found "strong efforts to help the regulated community understand what they are required to do to reduce incidences of non-compliance."[53] In 1999, states conducted more than 30,000 on-site compliance visits for the regulated universe of 1.7 million facilities. However, when states identified the measures they used to "calculate success of compliance programs for the time period 1995-1999," the most common was on-site visits. This indicator has two problems. First, the number of visits provides little information about how these visits really affected compliance, much less how they affected environmental outcomes. Second, the number of visits reported relative to the number of regulated facilities suggests that the compliance program applies to a small sub-set of the regulated universe. Some individual state responses to ECOS provide more information about compliance results, but clearly a more rigorous performance measure than simply numbers of visits is needed to

evaluate the substantial state investments being made. A much more careful evaluation of compliance assistance effectiveness is necessary to provide the foundation for better allocation of staff resources, ensure wise use of these resources, and assess the value of compliance assistance in achieving improved environmental results.

FINDING 7 -- The National Environmental Information Exchange Network is a promising first step in joint EPA-state efforts to reform their environmental data systems, provided the Network can develop effective mechanisms to ensure collection and dissemination of timely, accurate, comparable, and outcome-focused information.

Commentary on Finding 7

The World Wide Web, electronic commerce, and database allowing for sharing data all provide a practical solution for improving exchanges of information between states and EPA, among states, and with the public. EPA and the states are well into the development of the Information Exchange Network, which is based on standard Internet technology and will allow EPA and state agencies to "invest in internal data storage systems of their own choice at a pace they can afford, while also supporting easy exchange of environmental data."[54]

Figure 3-2: Conceptual Diagram of the Network Exchange

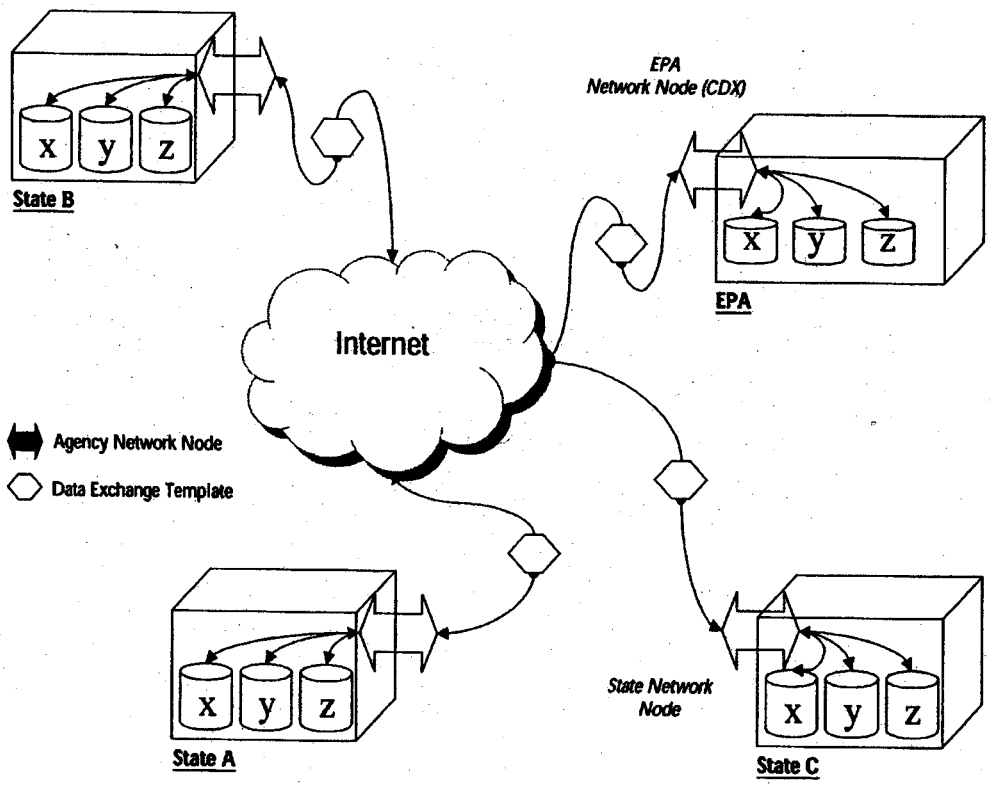

Source: Figure 3 from Environmental Council of the States and the U.S. Environmental Protection Agency, *Blueprint for a National Environmental Information Exchange Network* (2000).

As Figure 3 from the Blueprint for the Network indicates, it will facilitate information exchanges between different parties, designated as nodes. Each of these nodes -- a state or EPA data system -- will use the Internet to exchange information through standardized data exchange templates that require standard definitions of terms. The two-way arrows in Figure 3 show that states will be able to exchange information with each other and with EPA; similarly, EPA can share information with the states. This system also can include a public interface, making much of the information on the Network available to the public (see Appendix 17).

Both the joint ECOS/EPA committee designing the Network and the joint EPA/ECOS Data Standards Committee are working on standardized terms and definitions. These efforts have the potential to eliminate many issues that currently make EPA-to-state and state-to-state exchanges of enforcement and compliance data so difficult. To participate in the voluntary system, each party exchanging information will sign a Trading Partner Agreement. This agreement will set out the data to be exchanged and will define their quality, timeliness, and format.

The Network blueprint lists several benefits from this new design:

- common approach to environmental information exchange that is manageable by an agency, not a collection of stovepipe systems, loyalties, and approaches
- transition from traditional information exchange approaches, which are rife with management and data quality problems, to a data-centric approach focused on data and data quality
- enhanced potential for integration
- lower cost to exchange data
- more agency control over its own data, especially in light of public and legislative trends driving all public data onto the Internet.[55]

Because each party -- a state or EPA -- is responsible for the accuracy of the data it generates, because the data do not have to be transferred into another system using outdated technology, and because the data are developed for the organization's own management purposes and because standards are being developed for the data that Network participants agree to use, Network data have the potential to be more reliable, timely, and comparable than the data in the current system.

CHAPTER FOUR

RECOMMENDATIONS

1. **The EPA and state environmental agencies should move rapidly to implement results-focused, multi-media data systems for measuring their performance and managing their agencies.**

   1.a **These new or redesigned systems should generate data on environmental and compliance outcomes, rather than primarily regulatory activities, so EPA and the states can assess the effectiveness of environmental regulatory programs, including compliance and enforcement initiatives.**

   1.b. **The agencies also should make information on environmental results and outcomes central to their short-term and long-term decisions on environmental protection.**

   1.c. **The EPA Administrator should manage the agency with performance goals for each program office and region. EPA regions should negotiate location-specific outcome goals with states through the National Environmental Performance Partnership System (NEPPS). Information about EPA's national goals, each region's goals, and the state goals negotiated under NEPPS -- along with an annual status report on progress made toward those goals -- should be included in EPA's annual performance plans and reports submitted under the Government Performance and Results Act.**

   1.d. **Each state should publicly report its progress in achieving environmental results as part of an annual state-of-the-environment report. These reports can strengthen the accountability of government agencies to each other and the public. They also can facilitate learning across agencies.**

As the new administration at EPA assesses its objectives for the agency, it should emphasize the adoption of new approaches to management, measurement and oversight that are focused on environmental outcomes and results. This shift can be made through revising EPA's strategic plan to articulate more clearly outcome-focused goals EPA will pursue, including those that will be pursued through Performance Partnership Agreements between EPA and the states. It should also increase reporting of environmental results in its annual GPRA performance reports. In other words, EPA and the states should focus more on what EPA, its regional offices and states are accomplishing in terms of improving ambient environmental outcomes, reducing the environmental impacts of regulated parties, and enhancing data quality. Reporting nationwide activities should be done in the context of, and in relation to, environmental outcomes.

The EPA Administrator should manage the agency with performance goals for each media program and regional office. EPA regions should negotiate time- and place-specific outcome goals with all the states using the National Environmental Performance Partnership System, data on the current Core Performance Measures and, if needed, goal-specific performance measures. Once state goals are set, EPA should work with each state, or groups of states, if the goal warrants a multi-state approach, to devise strategies for making progress toward the goals and clarifying who will do what to meet them. Further, EPA's oversight system should include an annual report that is incorporated into the GPRA report, detailing the progress that headquarters, regions, and states are making toward meeting the GPRA goals. The Administrator and Deputy Administrator also should encourage the regions and states to work together on analyzing enforcement and compliance strategies that are working and those that are not producing improved environmental results.

2. **EPA's current single-medium data systems that monitor and collect state and national data must be modernized and integrated across all media so they can support results-based management and can collect more accurate, timely, and comparable data on environmental outcomes and regulatory activities. EPA and the states should begin shifting to results-focused management even as they start to build a comprehensive data system that will provide outcome data. They can immediately begin to improve information on environmental results by generating data that measure the outcomes of their programs and inform their regulatory actions.**

EPA and the state environmental agencies can and should immediately move from their current focus on counting activities, toward using goals and data that measure whether they are producing better environmental results. GAO recently noted that 81 percent of EPA's performance measures remain activities based.[56] To move toward measuring results, EPA and the states can start to collect and report much more outcome-focused enforcement and compliance assistance data than the data currently incorporated into EPA's Annual Accomplishments Reports. With existing data they can begin to report data identifying which communities have non-compliant drinking water systems. They cab show, water quality changes in specific watersheds, environmental accident rates in each state, solid waste disposal rates per person in various locations, changes in beach and water quality for selected water bodies, and locations where air and water quality are not adequately monitored. At the same time, EPA and the states should modernize and integrate their systems for monitoring and collecting environmental data to generate multi-media outcome-focused data, and they should make those data easier for the public to retrieve in multiple forms.

To support this effort, EPA needs to strengthen its analysis of the data it collects on environmental conditions, the environmental impacts caused by regulated and unregulated parties, and results of state and EPA activities so it can assess the effectiveness of various strategies for improving compliance and environmental results. EPA's ability to evaluate state performance in achieving improved environmental outcomes will be even more important if the new administration continues shifting responsibility to the states for implementing federal environmental programs.

To facilitate the increased emphasis on environmental outcomes, EPA and the states should design their information systems to produce data that will inform the daily decisions of their field staff, the development of longer-term strategies. They should also conduct, retrospective studies that identify patterns demonstrating the results of tracking specific environmental problems, as well as, successful interventions. The Chesapeake Bay program, New York City's COMPSTAT system, and the U.S. Department of Transportation's strategic plan and performance report provide useful models for this approach (see Appendix 17).

2.a. EPA and the states should emphasize their commitment to the initial accuracy of data on activities and environmental results by standardizing definitions, adopting common data standards, and establishing consistency checks and other automated systems that will minimize debates over data accuracy, as well as facilitate timely releases of data to the public.

The joint EPA-state Information Exchange Network will only fix the problems of the current data systems, if the states and EPA work diligently to develop consistent data definitions and standards, create incentives for ensuring that data are timely and accurately entered into the systems, train federal and state staff on proper use of the systems, and ensure accuracy by regular data audits. They must also provide appropriate sanctions (such as loss of funding support or termination of membership in the Network) when any party fails to maintain essential standards for data consistency, accuracy, and timeliness.

The Network promises to provide a mechanism for greatly enhanced public access to environmental information. The data will also be more accurate and much more useable if they include clear geo-spatial identifiers that allow emissions and facilities to be accurately identified by zip code or community.

2.b. Congress, EPA, and the states should assess the adequacy of, and identify needed investments for the nation's ambient monitoring networks to ensure they can generate the multi-media data necessary to support results-based environmental protection.

With congressional support, EPA should examine the quality of this nation's current ambient monitoring network and report on the accuracy and completeness of the monitoring capacity and practice for each media in each state and region. Based on this analysis and working with the states, EPA should formulate a plan and seek funding to improve monitoring of ambient environmental conditions and the environmental impacts of individual sources. In this context, Congress should avoid funding reductions that would inhibit the ability of the U.S. Geological Survey to gather ambient environmental data on behalf of EPA and the states. Increased monitoring also will facilitate a more consistent and accurate evaluation of the effectiveness of EPA and state programs for enforcement and compliance assistance.

2.c. The National Environmental Information Exchange Network should be governed as a joint enterprise between EPA and the states. Interested non-

governmental parties should be involved in its design, and incentives should be provided to encourage participation by all states.

The Network is a very promising and creative solution to many of the data issues that have plagued EPA-state relationships and have limited the availability and use of important environmental data. This EPA-state partnership for developing and managing environmental data also represents an important breakthrough that is likely to create a much more workable system for collecting and disseminating environmental information. To help the states and EPA in identifying priorities and measuring progress for reaching their environmental goals, the Network must also provide the capacity to collect and analyze data that will support goal-setting and problem-solving approaches to agency management.

Thus the Panel urges Congress, EPA, and the states to encourage rapid development and operation of the Network. Because the Network is designed as a voluntary system, EPA and ECOS should identify incentives and provide technical assistance to encourage adoption by as many states as possible.

Because development of the Information Exchange Network is essentially a joint enterprise between EPA and the states, the Panel believes the Network should be jointly managed by EPA and the states once operational. EPA and the states should consider establishing a separate, long-term governance structure for the Network, with members representing both EPA and the states, thus giving each party an equal voice in system design and operation. EPA and the states should also establish a steering committee for the network composed of public interest groups, the regulated community, all levels of government, and congressional staff. This group should meet periodically with EPA and the states to provide advice on the design and operation. The steering committee also could prepare an annual report for the public on the state of the nation's environmental information systems, progress in fixing problems with those systems, and that new needs the system should meet.

2.d. Congress should authorize significant funding for EPA and the states to establish the Network and other data improvement programs, provided that these efforts support results-based management, significantly enhance public access to data, and clearly improve the accuracy, timeliness, and comparability of the data.

Congress should follow up on the $5 million investment in FY 2000 for designing the Network with substantial funding for constructing and staffing it and for the associated modernization of EPA's data systems. The Panel recognizes that the cost of redesigning information systems is very high and varies substantially from state to state based on existing information system infrastructure. EPA's Offices of Enforcement and Compliance Assurance and Environmental Information have told the Panel that reforming and modernizing EPA's information systems as the Panel recommends will be an enormous task, requiring much funding and cooperative efforts over several years. Based on recent expenditures by states to modernize their information systems, the Panel urges EPA and the states, working with informed stakeholders,

to prepare and submit to Congress a comprehensive strategy and time schedule for establishing integrated, multi-media information systems that will support performance-based management at both state and federal levels. Such a plan should include a long-term funding proposal to Congress and state legislatures for upgrading the nation's environmental information systems. This plan should be completed within a year from the release of the Congressional mandate.

The Panel further urges Congress and state legislatures to provide the funding necessary to accomplish this task. Current investments in state information systems indicate that the $25 million funding request from EPA and the states for fiscal year 2002 is only a down-payment on the Congressional and state funding needed to reform environmental information systems, including those that collect enforcement data. For example, New Jersey has invested nearly $17 million in a complete restructuring of its information systems, and the small state of Delaware has budgeted $3.5 million for upgrading its data systems and other changes related to electronic government.

Because the Information Exchange Network will be designed to support improved state environmental program management, states should contribute significant funding to the Network. The federal funding should be commensurate with the value of the information to EPA and the value of making environmental data more available to the public. In addition, regulated parties should work with EPA and the states on finding ways to facilitate electronic reporting from the regulated community into the new data system, as well as investigating how regulated facilities could provide financial support to accelerate implementation of electronic reporting.

Creating the National Environmental Information Exchange Network and reconfiguring EPA's information systems in the ways the Panel has suggested will be an incremental process that requires very substantial state and federal investments over time. Yet the Panel believes that this investment is critical to better environmental management in this nation. Thus Congress should support the existing momentum for reforming EPA and state data systems with a substantial appropriation in fiscal year 2002 and continuing investments over the next few years. The Panel also recommends that EPA examine its base budgets for information systems to determine whether more of that funding can be reallocated to implementing the modernized and integrated systems suggested in this report.

3. EPA and the states should expand public access to information about environmental conditions in neighborhoods, communities, and across the nation.

As the Panel noted previously, public access to data is fundamental to environmental protection. Therefore, information developed by EPA and the states for the Information Exchange Network and other purposes should be made available to the public in easily accessible and understandable formats. There may be occasional exceptions to public access, but they should be few and for well-substantiated reasons. EPA and the states should move quickly to make existing, accurate information in their environmental data systems available to the public, except for data required by law to be protected as confidential business information

and enforcement-sensitive information about specific investigations or prosecutions for which disclosure might compromise those efforts. Some states are already making inspection and enforcement data available to the public. The Panel believes this public access is an excellent trend and should be supported through an effort to standardize reporting elements as part of the Network.

In designing public interfaces for their new systems, EPA and the states should study existing, widely used, publicly accessible environmental databases to learn how best to define, assemble, quality-control, and disseminate information. They should especially work to provide Internet-based, integrated geo-spatial systems. EPA and the states should also identify key audience segments and sub-segments likely to seek access to the data, as well as those whose use will contribute to improving environmental quality. They should make decisions about the design of the Network and other data systems with the needs of such users in mind.

These new data systems should develop and incorporate clear, user-friendly features that make the data readily accessible to the public for independent analysis, including easy to use macro-software packages that generate frequently requested analyses and reports. The systems should also include contextual information to help the public understand better how the data can be used, as well as limitations of the data.

4. EPA and the states should devote more attention to analyzing, presenting, and disseminating environmental data in ways that help regulators, regulated parties, elected officials, and the public to identify changes in environmental impacts and conditions, opportunities for environmental gains, causes of environmental problems, and methods for evaluating past actions.

EPA and the states should continue the promising steps taken by their joint Data Standards Committee toward developing (i) a comprehensive set of agreed-upon, consistent definitions for environmental and enforcement terms, (ii) common data standards for environmental quality indicators and enforcement measures, (iii) uniform data templates, and (iv) consistent data management practices.

Common data standards should be used to collect a combination of data on environmental conditions, intermediate outcomes such as compliance rates, and outputs such as numbers of enforcement actions and compliance assistance activities. Common standards are particularly important if EPA and states opt to use compliance rates as a performance indicator, given the number of variables that can affect compliance rate calculations.

4.a. The nation's environmental information systems should enable EPA, states, citizens, and their elected officials to assess the effectiveness of environmental programs nationally, within EPA regional offices, in states, and within ecosystems based on accurate, timely, and comparable data.

The Panel believes strongly that environmental data should be comparable among states and between EPA and the states, and they should be easy for the public to understand. The common definitions of terms should cover the full range of compliance tools, and collection of data should not be restricted based on whether the enforcement actions are formal or informal.

Moreover, EPA and state data systems need to be adaptable so that new data and analytical tools can be added to the systems over time, thereby increasing the agencies' and the public's understanding of the causes of environmental problems and opportunities for improving environmental conditions. These new tools will also enhance the agencies' ability to find the most serious environmental violations and non-compliant parties as well as their capacity to recognize exceptional environmental performers.

It is also important that new data systems include:

- Capacity to collect, incorporate, and analyze ambient environmental data that are useful for identifying and responding to environmental problems, setting priorities, and evaluating program effectiveness.
- Capacity to receive electronic emissions reports and discharge data from the regulated community and electronic data on ambient conditions from interested and qualified contributors, such as watershed organizations, NOAA, NASA, and the U.S. Geological Survey.
- Use of appropriate geo-spatial identifiers for all regulated facilities so that the accuracy and comparability of their emissions data can be verified.

4.b. New data systems should support the identification of specific, effective approaches to environmental protection and compliance assurance that are worthy of replication. Data also should help to identify less successful approaches that should be curtailed and replaced.

Virtually no useful data on the effectiveness of state and EPA compliance assistance programs are available. The grants provided to the states by OECA are a valuable first step to develop a better understanding of what data are needed for evaluating the results and effectiveness compliance assistance, but they support only small pilot efforts in scattered states. EPA should continue this grant program, and it should widely publish progress on the results of these pilots in a manner that enables all interested parties to learn from these valuable experiments, whether they create new measures or not. In addition, EPA and state data systems should include appropriate temporal identifiers for facility and agency actions so that returns to compliance can be better tracked and the effectiveness of intervention strategies evaluated.

4.c. EPA and the states should expand their research to develop (i) sound methods for evaluating the effectiveness of their compliance assistance programs, (ii) more reliable measures of compliance rates, and (iii) improved approaches for targeting enforcement and compliance resources on priority environmental problems.

EPA and the states have expressed a strong interest in calculating compliance rates as an intermediate outcome measure that may help them evaluate the effectiveness of various enforcement and compliance tools. However, no standard methodology exists for calculating reliable compliance rates, and only one of OECA's compliance measurement grants addresses this issue. EPA should work closely with the states, academics, environmental activists and the regulated community to develop uniform, reliable methods for calculating compliance rates for use by states and EPA. EPA should also significantly augment this effort with a more aggressive research and development to improve analysis of environmental outcome, impact, data quality, and compliance.

EPA can play a valuable role by integrating and analyzing data from the Information Exchange Network along with other data from EPA, states, other agencies and non-governmental sources. This analysis will help in building the states' capacity to:

- Target enforcement and compliance assistance efforts on high priority problems
- Measure the effectiveness of various types of enforcement and compliance assistance tools
- Assess the performance of certain types of facilities and industry sectors

EPA also should consider developing software that will help states to analyze information for use in targeting state enforcement and compliance resources.

4.d. Congress should mandate and fund routine agency reviews and public reporting on the accuracy, timeliness, comparability, and completeness of the information on environmental outcome and activities available from EPA and state data systems.

The Panel has recommended far-reaching changes to the ways that EPA and states collect and use environmental outcome data, including information on their enforcement and compliance programs. A concerted effort over the next several years by both EPA and the states will be needed to implement the Panel's recommendations, so Congress should fund periodic audits of this work.

Outcome focused data systems will work only if the data have a relatively high level of reliability. The data in current EPA and state databases vary greatly in their accuracy, timeliness completeness, and comparability. For example, some states monitor water quality in most of their waterbodies, while others monitor very few. Indeed, because this variance is possible for the water quality to appear to be excellent in a state that does little monitoring, but much worse in a state that conducts extensive, on-going monitoring. Unfortunately, existing data systems provide little information about variations in these attributes of data quality. As a result, the usefulness of existing EPA and state data for agency management, compliance assurance and public accountability is greatly limited.

CHAPTER FIVE

CONCLUSION

The data systems that currently support EPA and state compliance and enforcement programs are focused almost exclusively on counting types of enforcement actions, compliance assistance initiatives, and other regulatory activities. The data in these systems are seriously flawed and not useful for managing EPA or state environmental programs. Further, the information provides little insight into how EPA and state enforcement and compliance initiatives contribute to improving environmental quality, increasing compliance with regulatory requirements, or producing regulatory fairness across industries, among states, and within communities. As a result, Congress, EPA, state agencies, state regulations, the regulatory community, and the public cannot readily assess the effectiveness, efficiency, or fairness of federal and state environmental programs.

To obtain better environmental information and make it more easily accessible to the public, EPA and the states should stop relying primarily on activity data when evaluating environmental progress. Instead, they should give immediate and sustained priority to implementing new data systems that are focused on actual outcomes, in terms of both environmental conditions and legal compliance. They should then use these data to measure the effectiveness of their programs and evaluate the performance of their staffs. To achieve these goals, EPA must work with the states on modernizing and integrating environmental data systems, so they can monitor and collect more accurate, timely, and comparable data on environmental conditions in all media and on all of the agencies' regulatory activities. These new systems should also have the capacity for making information more readily available to the public, including the regulated community and concerned citizens, so they can all participate more effectively in protecting public health and the nation's environment.

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[4] Ibid.
[5] U.S.General Accounting Office, *Major Management Challenges and Program Risks: Environmental Protection Agency.* (Washington, D.C.: January 2001), 16.
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[10] Environmental Council of the States, *State Environmental Agency Contributions.*
[11] National Academy, *Environment.gov*, vol. III, 13.12.
[12] Ibid., 18.
[13] www.epa.gov/grtlakes/about.html
[14] www.epa.gov/projectxl
[15] www.epa.gov/ocirpage/nepps/index.html
[16] www.epa.gov/reinvent/ecos
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[25] www.ci.nyc.ny.us/html/om/html/97/sp268-97.html
[26] U.S. Environmental Protection Agency, Office of the Inspector General, *Consolidated Report on OECA's Oversight of Regional and State Air Enforcement Programs*, (Washington, D.C.: 1998); Environmental Working Group, *Prime Suspects*, (Washington, D.C.: 2000).
[27] *Inside EPA*, vol. 20, no. 19 (Washington, D.C.: Inside Washington Publishers, 1999), 1-11.
[28] *Inside EPA*, vol. 20, no. 32 (Washington, D.C.: Inside Washington Publishers, 1999), 7.
[29] Ibid.
[30] *The Reinvention Report*, vol. 2, no. 18 (Washington, D.C.: Inside Washington Publishers, 1999), 5-6.
[31] Ibid., 6.
[32] Ibid., 3.
[33] Environmental Working Group, *Prime Suspects,* (Washington, D.C.: 2000) and Environmental Council of the States, *Lack of Evidence: How the Environmental Working Group Mislead the Public about Environmental Enforcement,* (Washington, D.C.: 2000).
[34] U.S. General Accounting Office, *Environmental Protection: More Consistency Needed Among EPA Regions in Approach to Enforcement* (Washington, D.C.: 2000), 30-33.
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[36] U.S. General Accounting Office, *Major Management Challenges*, 14.
[37] Metzenbaum, "Measurement," 3.

[38] U.S. General Accounting Office, *Major Management Challenges,* 17.
[39] Environmental Council of the States and U.S. Environmental Protection Agency, *Blueprint for a National Environmental Information Exchange Network*, 3.
[40] Environmental Council of the States, *State Environmental Agency Contributions,* 8.
[41] Ibid.
[42] U.S. Environmental Protection Agency, Office of Enforcement and Compliance Assurance, *Sector Facility Indexing Project: Sector Facility Indexing Questions and Answers*, available at www.ef.gov/oeca/metd/sfiqa.html
[43] www.epa.gov/oeca/sfi
[43] Ibid., 17.
[44] National Academy, *Environment.gov,* vol. I, 1.25.
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[47] Ibid., 17.
[48] Ibid., 31.
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[52] Ibid., 42.
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6. Environmental Defense's "Scorecard" web site
7. EPA's Window to My Environment
8. EPA Office of Inspector General, *Consolidated Report on OECA's Oversight of Regional and State Air Enforcement Programs* (September 25, 1998).
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11. Facility Registry System (FRS)
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APPENDIX 1

U.S. General Accounting Office:
Major Management Challenges and Program Risks: EPA
(January 2001)

This U.S. General Accounting Office (Report #GAO-01-257) identifies the performance and accountability challenges that have hindered EPA in its efforts to establish integrated, cost-effective methods for meeting its critical mission of protecting human health and the environment. The challenges include:

- Improving management of environmental and performance information to use in setting priorities and measuring results
- Addressing and identifying the significant gaps that exist in environmental data
- Recognizing and eliminating the limits and usefulness of the existing incompatible systems for environmental data, which also hinder the development of outcome-oriented performance measures
- Strengthening EPA's information security program
- Placing greater emphasis on developing a comprehensive human capital approach
- Strengthening relationships with the states, EPA's workforce strategy, and its information management strategy

The report acknowledges that EPA is aware of the importance of meeting these management challenges and has various initiatives underway to address them. Some initiatives and examples of significant progress include:

- EPA's commitment to improving its management of the Superfund program by:
    - Allocating cleanup funds partly on the basis of the risk that sites pose to human health and the environment
    - Implementing a new process to recover more of its site cleanup costs from those parties responsible for the contamination, and better controlling contractors' costs
- EPA's delegation of responsibilities for environmental programs to the states:
    - EPA has initiated strategies with its state partners and other stakeholders to create an atmosphere in which an improved environmental regulatory system can be developed

APPENDIX 2
Web Site for
WWW.KOCHPINEBEND.COM

KOCH
KOCH PETROLEUM GROUP LP

Minnesota Center for Environmental Advocacy

Koch Industries, Minnesota Center for Environmental Advocacy Launch Joint Web Site

Rosemount, MN, March 21, 2001 - The public now has easy access to understandable emissions data from Koch Petroleum Group L.P.'s Rosemount refinery, thanks to a unique Web site launched today by Koch and the Minnesota Center for Environmental Advocacy (MCEA). Although the two organizations frequently have different points of view, they agreed to work together on this Web site in order to pioneer open access to information about how the refinery's operations impact the local environment. Previously, emissions data was generally available only in reports filed with regulatory agencies. MCEA found these reports to be large, complex and difficult to understand... Click here to read more.

what's the point? | refinery | emissions | impacts
news | koch/mcea

environmentalreporting madeeasy

Simple. Reliable. Accessible.

Environmental data isn't always easy - to understand, to believe, or even to find - no matter who measures it or reports it. And it isn't easy for an environmental advocate and an oil refinery to work together. But that's exactly what the Minnesota Center for Environmental Advocacy (MCEA) and Koch Petroleum Group are doing with this site.

The mission of Koch, maker of transportation fuels and energy products, is to be safe and clean while still creating value. MCEA's mission is to use law, science and research to protect Minnesota's natural resources, its wildlife and the health of its people.

Together, they have created a transparent view of the environmental performance of Koch's Pine Bend refinery in Rosemount, MN. Call up graphs that show the exact emissions - and impacts - of the refinery. See how Koch is doing on its 5 year/50% emission reduction plan. Put this data in context and learn what it means to you. And learn about the collaboration between Koch and MCEA that gives this site credibility.

search: go

first help: select one go

pointcounterpoint

Though we're on the same page, we sometimes see things differently. This image will appear alongside our differing points of view.

infolink

This image will alert you to in-depth information on other sites. Or click on the logo itself to go to a whole page of links.

pollutionprevention

Check out Koch's plan to prevent pollution before it occurs. And take home some ideas on how you can make a difference.

home | what's the point? | refinery | emissions | impacts
news | koch/mcea | first help | privacy & terms of use

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APPENDIX 3

Office of Enforcement and Compliance Assurance Accomplishment Reports

1995: *Enforcement and Compliance Assurance Accomplishments Report,* FY 1995
1996: *Enforcement and Compliance Assurance Accomplishments Report,* FY 1996
1997: *Enforcement and Compliance Assurance Accomplishments Report,* FY 1997
1998: *Enforcement and Compliance Assurance FY 98 Accomplishments Report*
1999: *Annual Report on Enforcement and Compliance Assurance Accomplishments in 1999*

Background

The Office of Enforcement and Compliance Assurance (OECA) annually publishes an Accomplishment Report that presents quantitative data for all enforcement activities, including inspections; administrative, civil, and criminal actions; and supplemental environmental projects for each fiscal year. In addition, some of these reports seek to quantify the benefits to the environment resulting from EPA's enforcement actions. In 1996 and 1997, the report also included numbers of state enforcement activities.

Enforcement Measures

The chart below compares compliance activities stemming from criminal investigations/resolutions during 1998 and 1999.

Types of Compliance Activities	1998	1999
• Storage/Disposal Change	X	X
• Emission/Discharge	X	X
• Remediation	X	X
• Removal	X	X
• Monitoring	X	X
• Industrial Process Changes	X	X
• Record Keeping	X	X
• Use Reduction	X	X
• Permit Application	X	X
• Auditing	--	X
• Clean Up	--	X
• Reporting	X	--
• Training	X	--

Comparing data from FY 1996-1999, there has been an overall steady increase in the numbers of EPA inspections. The exception is 1999, which EPA attributes to the unusually high number of inspections in the previous year.

- **1996:** 18,211
- **1997:** 18,706
- **1998:** 23,237

- **1999:** 21,847

The following three tables compile data from the OECA reports to Congress for FY 1995 through 1999.

Table 1: Enforcement Activities

Activity Type	1995	1996	1997	1998	1999
EPA Criminal Referrals	256	262	278	266	241
EPA Civil Referrals	214	295	426	411	403
State Enforcement Actions	N/A	9,739	10,894	N/A	N/A

Table 2: Dollar Value ($) Resulting from EPA Enforcement Actions

Enforcement Actions	1995	1996	1997	1998	1999
Criminal Penalties Assessed	23,221,100	76,660,670	169,000,000	92,800,000	61,500,000
Civil Judicial Penalties Assessed	34,925,472	66,200,000	46,000,000	91,800,000	141,200,000
Administrative Penalties Assessed	36,054,174	30,000,000	49,200,000	N/A	25,500,000
Dollar Value of Injunctive Relief	906,637,052	1,400,000,000	1,900,000,000	2,000,000,000	3,400,000,000

Table 3: Most Common Pollutants Reduced Due to Enforcement Actions and Settlements, FY 1996 through1999

	Top 10 Pollutants Reduced in 1996	Top 10 Pollutants Reduced in 1997	Top 10 Pollutants Reduced in 1998	Top 10 Pollutants Reduced in 1999
1	Carbon Monoxide	Polychlorinated Biphenyls (PCBs) and PCB-Containing Material	Contaminated Soils	NOx
2	Lead	VOC's	BOD	Contaminated Soil
3	Volatile Organic Chemicals (VOC's)	Tailings	Wetlands Fill Material	Iron
4	Particulates	Particulate Matter	Carbon Monoxide	PCBs Waste
5	Copper	Carbon Monoxide	Battery Casing Chips	Intermediate Chemicals
6	Asbestos	Propane	Explosives	Hydrocarbons
7	Carbon dioxide	Polynuclear Aromatic Hydrocarbons	Total Supsended Solids	Dredged Materials
8	Chromium Methanol	Lead	Sludge	Wood Tar
9	Toluene/Toluene waste	Oil, Crude Oil	Wood Tar	Radioactive Waste
10	Sulfur dioxide	Benzene	Used Oil/Waste/Spills	Asbestos

Compliance Assistance Centers

OECA's Accomplishment Reports list the following Compliance Assistance Centers. The centers serve as points of contact or information sources for businesses and organizations to achieve and maintain compliance.

There are nine EPA compliance assistance centers currently in operation. No new centers were added in 1999. Four centers were added in 1998.

CCAR-GreenLink
1-888-GRN-LINK (476-5465)
http://www.ccar-greenlink.org

ChemAlliance
1-800-672-6048
http://www.chemalliance.org

Local Government Environmental Assistance Network (LGEAN)
1-877-TO-LGEAN (865-4326
http://www.lgean.org

National Agriculture Compliance Assistance Center

1-888-663-2155
http://www.epa.gov/ocea/ag

National Metal Finishing Resource Center (NMFRC)
1-800-AT-NMFRC (286-6372)
http://www.nmfrc.org

Paints and Coatings Resource Center
http://www.paintcenter.org

Printed Wiring Board Resource Center (PWBRC)
http://www.pwbrc.org

Printer's National Environmental Assistance Center (PNEAC)
1-888-USPNEAC (877-6322)
http://www.pneac.org

Transportation Environmental Resource Center
1-888-459-0656
http://www.transource.org

All five Enforcement and Compliance Assurance Accomplishment Reports can be found at http://es.epa.gov/oeca/main/fedgov/accomplish.html.

APPENDIX 4

Accountability Measures for Enforcement and Compliance Assurance Programs

The Office of State and Local Relations (www.epa.gov/ocirpage/nepps/enftempl.html) has published accountability measures for state enforcement and compliance assurance programs that were jointly adopted by EPA and ECOS: these Core Performance Measures (CPMS)are listed below.

1. Environmental and/or public health benefits achieved through concluded enforcement activities, including case settlements and injunctive relief

2. Rates of significant non-compliance for selected regulated populations

3. Percentage of significant non-compliers (SNCs) that have been returned to compliance or otherwise addressed

4. Results of using state alternative compliance approaches such as audit laws or policies, small business compliance policies, XL projects, and compliance assistance

5. Total number of inspections conducted at major facilities, and the percent of the total universe of regulated sources inspected in negotiated priority areas, including industry sectors and geographic areas

6. Enforcement actions -- cases, referrals, orders, notices -- taken for each environmental medium

7. Number of facilities/entities reached through each type of compliance assistance activity

APPENDIX 5

Online Targeting Information System

The Online Targeting Information System (OTIS) is located at www.epa.gov/idea/otis. OTIS is a set of web tools developed by EPA's Office of Enforcement and Compliance Assurance (OECA) for use by federal, state, and local agencies. OTIS is designed to assist environmental agencies in using information systems to analyze inspection, enforcement, and compliance data that have been entered into national systems.

OTIS version 1.0 was first released within EPA in November 1999, then again as version 2.0 in May 2000. Finally, in September 2000, the OTIS state version was released on the Internet. OTIS was designed with the non-technical user in mind. Only state environmental agencies, other state agencies, local governments that have EPA program delegation, and federal departments and agencies have access to the OTIS state site. The public does not have access to OTIS. Forty-eight states, and more than forty other federal, state and local agencies have signed up to use OTIS.

The data in OTIS are from three of EPA's national enforcement and compliance databases: the Clean Air Act AIRS Facility Subsystem (AFS), the Clean Water Act Permit Compliance System (PCS), and the Resource Conservation and Recovery Act System (RCRIS), as integrated through the Integrated Data for Enforcement Analysis (IDEA) system. OTIS data are updated monthly.

OTIS also contains data from the Toxic Release Inventory (TRI) and demographic data from the U.S. Census. The key features of OTIS include:

- IDEA Web Queries for air (data from AFS), water (from PCS), and waste (from RCRA Info).
- Get Compliance Report.
- Significant Non-Compliance (SNC)/High Priority Violator (HPV) Tracker.
- EnviroMapper for Compliance Analysis.

In March 2001, OTIS was incorporated into in OECA's data modernization program as part of the Integrated Information Initiative (I-3). Several new components have been added, such as:

- Integration of environmental justice and pollutant release screening.
- Access to an IDEA Web Multimedia Interface.
- Searching the EPA Enforcement Docket.

Future development of OTIS will provide:

- IDEA Statistics Interface, for quick viewing of EPA's performance goals under GPRA and RECAP.
- Watershed/water quality and air quality data.
- Enhanced mapping capabilities.
- Capacity for on-line error correction, as well as continual updates/improvements to the current OTIS site.

APPENDIX 6

Scorecard

Background

Environmental Defense developed Scorecard, which can be found at www.scorecard.org. It is an easy-to-use database that quickly steers the public to information about pollution in a specific community. A tutorial offers a guided tour through the Scorecard website and explains its various features.

Scorecard integrates data from more than 400 federal and state scientific databases to profile local environmental problems and the health effects for toxic chemicals. It generates customized profiles of environmental quality for specific communities and regions.

Current Features of Scorecard

Scorecard offers data encompassing the following major environmental concerns and/or questions:

- Water: "Do Water Bodies in Your Community Meet Clean Act Standards?"
- Air: "Health Risks from Hazardous Pollutants"
- Land: " Potential Sources of Land Contamination"
- Waste: "Toxic Chemical Releases from Manufacturing Facilities"
- "Setting Environmental Priorities and Taking Action Suggestions"

Scorecard's main sections currently provide data on the following:

- Air: Criteria Air Pollutants and Hazardous Air Pollutants
- Water: Clean Water Act Status and Watershed Indicators
- Land: Lead Hazards and Potential Sources of Land Contamination
- Wastes: Toxic Chemical Releases from Manufacturing Firms and Animal Wastes
- Environmental Policy: Environmental Priorities
- Chemical Information: Profiles of Chemicals

Scorecard also provides tools for community organizing and educating the public.

APPENDIX 7

Window to My Environment

Background

Window to My Environment (WME), located at www.epa.gov/enviro/wme, is sponsored by EPA in partnership with federal, state, and local partner organizations. It is designed to improve the public's access to useful community-based environmental information. In connection with WME, EPA, the states, and other data partners are developing a comprehensive data exchange network that will serve a wide community.

WME is EPA's prototype of a geographic portal for integrating environmental information with local geography to answer public questions, examine critical problems, and discover potential solutions for environmental protection and human health issues.

WME was developed to incorporate new technology, environmental data, and information resources from EPA and other federal agencies, states, tribes, and communities. During 2001, the current demonstration phase will make WME more user-friendly, providing wider geographic coverage, live-streaming of data from partners, and greater breadth and depth of environmental data and information resources. Data standards, data quality, and consistency in reporting methods are also being refined as part of the WME pilot phase.

Current Features

Current features of WME include:

- State-of-the-Art Interactive Mapping Tools
- Data on "Ambient" Environmental Conditions
- Access to Analytical and Reporting Tools
- Local Governmental Services and Contacts

When a user enters a specific location to be profiled such as city/town and state or zip code, WME will display:

- An Interactive Map: Showing the location of regulated facilities, monitoring sites, water bodies, community demographics, and three-dimensional views. Hotlinks are provided to state/federal information about these items.
- Your Window: Giving statistics about conditions in a specific area, including population density, country/urban area designations, and local watersheds/water bodies.
- Your Environment: Linking to information from federal, state, and local partners on such environmental issues as air and water quality, watershed health, Superfund sites, fish advisories, polluted waters, and local services for protecting the environment.

In addition, WME will be enhanced to reach broader and more diverse audiences and will require the direct involvement of many other data and information partners. WME is currently designed for the Mid-Atlantic States (DE, MD, PA, VA, WV) and the District of Columbia. Its website is being tested for expansion later in 2001.

The WME contact person is Debra Villari, Associate Director, Information Access Division, Office of Information Analysis and Access, OEI.

APPENDIX 8

EPA Office of Inspector General:
Consolidated Report on OECA's Oversight of Regional and State Air Enforcement Programs
(September 1998)

EPA's Office of Inspector General (IG) performed audits on the agency's oversight of six state air enforcement programs. The states reviewed were Maryland, Pennsylvania, Arkansas, Washington, Massachusetts, and New Mexico, located in four of EPA's ten regions. The audits identified national issues which became the basis for the IG's report. The objective of the audits was to determine what steps the Office of Enforcement and Compliance Assurance (OECA) should undertake to resolve the deficiencies found in previous IG audits of state enforcement data.

The IG audits disclosed fundamental weaknesses with the states' identification and reporting of significant violators under the Clean Air Act. These violators were not made known to the general public, mainly because both the EPA regions and the states did not adhere to the EPA's Timely and Appropriate Enforcement Policy (TAE) and its Compliance Monitoring Strategy (CMS).

The IG's recommendations included:

- Continually reinforce compliance of EPA's region's with the TAE and CMS
- Assign oversight responsibility for the CMS
- Work with the Office of Air and Radiation to earmark Section 105 grant funds to support state enforcement
- Perform analysis and quality assurance of enforcement data
- Conduct evaluations of enforcement programs in the EPA regions to assess regional compliance with TAE and CMS
- Improve communications with EPA regions
- Establish focal points within OECA so that states and EPA regions can obtain clarification of agency enforcement directive.

OECA agreed with these recommendations in its response to the draft IG report, stating that many of the findings validated issues about which it was aware and contributed to its strategies for addressing them.

APPENDIX 9

Environmental Working Group:
Prime Suspects: The Law Breaking Polluters America Fails to Inspect
(July 2000)

The Environmental Working Group (EWG) is a nonprofit environmental research organization based in Washington, DC. In July 2000, it released, *Prime Suspects: The Law Breaking Polluters America Fails to Inspect*. The report alleges that state environmental agencies and EPA have failed to inspect or enforce against certain polluters over a two-year period.

Inspections

EWG used EPA and state activities data for its report. The report claims that, "EPA has failed to implement consistent, mandatory baseline requirements for enforcement of environmental laws, even as they have delegated just about all enforcement authority to the states...EPA has limited ability to ensure that minimum performance standards are met."

Federal Databases Used by EWG

EWG analyzed the data provided from the Permit Compliance System (PCS) and EPA's Air Facility System (AFS).

EWG's Recommendations

EWG's report recommends that:

- Congress restore EPA's enforcement budget to 1996 levels.
- EPA must issue regulations that define minimum performance standards for state agencies in enforcing the federal environmental laws.
- High priority violators be inspected every year.
- EPA's Inspector General audit state enforcement programs to determine what full compliance with environmental laws means in each state.
- EPA and the states make information about violations readily available to the public.
- EPA and the states ensure that inspectors get adequate recognition for their work.
- State and federal inspectors be given power to issue field citations.

APPENDIX 10

Response from the Environmental Council of the States to EWG's *Prime Suspects* Report (August 2000)

The Environmental Council of the States (ECOS) is a non-partisan, nonprofit organization of the state environmental agencies. In August 2000, ECOS issued a response identifying several errors. identifying several error.

Inspections

ECOS' response claimed that "EWG's characterization of state inspections is flawed in several respects." ECOS noted that EWG used a methodology based on data for the Clean Air Act, but applied it to Clean Water Act data. ECOS pointed out that EWG did not differentiate between Type 0 and Type 1 inspections, but instead integrated the data to suggest that EPA and the states are performing drive-by inspections. ECOS also noted that the EWG report treats inspections as the only type of enforcement the EPA and the states undertake. Yet there are many other types of enforcement, such as reviewing emissions reports and material-use records submitted to state agencies as required by permit conditions.

ECOS criticized the EWG report for its faulty logic, for selectivity in investigating EPA and state inspection sites, and for incorrectly stating that EPA "has no policies regarding frequency of inspections." ECOS pointed out that EPA has criteria and predetermined agreements with the states detailing where, when, and how often inspections are necessary.

Federal Databases

ECOS acknowledged that the primary data source used by EWG, the Integrated Data for Enforcement Analysis (see Appendix 3), is constructed from other federal databases that are themselves constructed from state data. Consequently, the "multiple transference of data often results in not only data errors, but in misapplication and misunderstanding of appropriateness of use."

ECOS noted that EWG frequently misinterpreted the data, often using data that were as much as a decade old. At the same time, it acknowledged that "EPA databases are notoriously difficult to use. States and EPA are working vigorously through our joint Data Management Workgroup to correct the systems' problems, which are long-standing."

ECOS concluded by pointing out that the methodology, conduct, and conclusions of the EWG report are flawed, and voiced its regret "that EWG spent so much time and effort on a report that is so inaccurate, and consequently useless, but which is likely to misinform the public. We suggest the next time the EWG wishes to engage in a debate over enforcement policy and performance, that it contacts ECOS and the States directly."

APPENDIX 11

Facility Registry System (FRS)

A description of the Facility Registry System can be found at www.epa.gov/enviro/html/frs_demo/new_overview.html. A brochure on the system can be found at www.epa.gov/enviro/html/frs_demo/frs_brochure.pdf. The Facility Registry System (FRS) is a database that contains records and information on facilities that are either subject to environmental regulations or of environmental interest. According to EPA, FRS identifies such facilities and produces "high-quality, accurate, and authoritative facility identification records through rigorous verification and management procedures." Additionally, integrated information on air, water, and waste for these facilities can all be found through FRS, allowing the public to more easily access environmental information. Currently, FRS contains data for more than 200,000 facilities.

FRS is managed by EPA's Office of Information Collection in the Office of Environmental Information. The purposes of FRS are:

- Reduce the burden of long-term environmental reporting
- Improve the quality of environmental data
- Reduce errors
- Provide a better means of evaluating cross-media data
- Improve public accessibility of environmental information
- Allow facilities to review and update their information

FRS also provides a more efficient means of transferring data among facilities, states, and EPA.

APPENDIX 12

Integrated Data for Enforcement Analysis

The Integrated Data for Enforcement Analysis system (IDEA) is located at www.epa.gov/oeca/idea. It is a comprehensive single source of environmental performance data from regulated facilities. First implemented in early 1991, IDEA supports a multi-media approach for analyzing environmental problems by retrieving facility data from EPA's media-specific databases. IDEA combines information: air, water, hazardous wastes, toxics, enforcement, spills, demographics, and federal facilities.

EPA developed IDEA in response to the need for integrated data on facilities that were potentially involved in federal enforcement or compliance actions. It was designed to facilitate three basic EPA functions:

1. Enforcement case screening
2. Enforcement/inspection targeting
3. Management decision making

IDEA contains updates from the EPA data systems and integrates the following databases:

- Aerometric Information and Retrieval System (AIRS)/ AIRS Facility Subsystem (AFS)
- Comprehensive Environmental Response, Compensation and Liability (CERCLA) Information System (CERCLIS)
- Census Demographic Data by ZIP Code (ZIP)
- Criminal Enforcement Docket (CRM)
- Civil Enforcement Docket (DOCKET)
- Emergency Response Notification System (ERNS)
- Federal Facility Information System (FFIS)
- Facility Identification Initiative (FII)
- National Compliance Data Base (NCDB)
- Integrated Management Information System (IMIS)/ Occupational Safety and Health Administration (OSHA)
- Permit Compliance System (PCS)
- Resource Conservation and Recovery Act (RCRA) Information System (RCRIS)
- Site Enforcement Tracking System (SETS)
- Toxic Release Inventory System (TRIS)

APPENDIX 13

Sector Facility Indexing Project

The Sector Facility Indexing Project (SFIP) is located at www.epa.gov/oeca/sfi. SFIP is part of EPA's community-right-to-know efforts. It is a computerized database of environmental information that provides the public with a single source of facility-level compliance data on the Internet. SFIP includes information about a facility's compliance and enforcement history, pollution releases, accidental spills, and the demographics of the surrounding community.

SFIP makes it possible for the public to easily find and compare information on the environmental record of many facilities. Government agencies can use the information as a planning tool, and facilities can benchmark their own data against those of other similar facilities or simply monitor their own regulatory performance.

All of this information was previously available to the public. However, the SFIP combines data from existing EPA databases to allow easier access to, and review of, the information. Initially released in 1998, SFIP includes data on facilities from five industry sectors: pulp manufacturing, petroleum refining, automobile assembly, iron and steel manufacturing, and primary smelting and refining of nonferrous metals.

In response to stakeholder interest, EPA is currently expanding SFIP to include a subset of federal facilities. The new subset includes all federal facilities that are considered to be major facilities under at least two of the three following statutes: the Clean Air Act, the Clean Water Act, and the Resource Conservation and Recovery Act. This expansion means that communities can now obtain compliance and enforcement information about some local federal facilities.

APPENDIX 14

Information Products Bulletin

The Information Products Bulletin (IPB) can be found at www.epa.gov/ipbpages. On November 20, 2000 the IPB was first announced in the Federal Register (Vol. 65, No. 231). The IPB is a new joint effort between EPA and the Environmental Council of the States (ECOS) to inform stakeholders and the public about upcoming significant information products being produced by EPA and the states.

The IPB will provide the public with pre-publication notification of these information products and, in some cases, will identify opportunities for stakeholder and public involvement. The IPB is proposed to start publication in mid-2001 and will be published regularly by the EPA's Office of Environmental Information, both in hard copy and on the World Wide Web.

The public was invited to submit comments to EPA regarding the IPB's draft framework plan by January 2, 2001. The first issue of the IPB is currently being prepared for publication, and it will be released during the summer of 2001.

For the purposes of IPB, "stakeholder" is defined as an individual or group who has a vested interest in the development and use of significant information product. In many cases, stakeholders are likely to be affected by the use of such a product. IPB defines "significant information product" as a product under development or undergoing major modification by EPA, which is derived from federal, state, local, tribal, and/or other organizations' data, and a state product that is regional or national in scope and aggregates data from more than one state. Such products often generate considerable attention when they use data to describe environmental conditions, trends, potential risks, and/or portray compliance or performance.

APPENDIX 15

Integrated Error Correction Process (IECP)

Descriptions of the Integrated Error Correction Process can be found at www.epa.gov/cdx/iecp.htm and at www.epa.gov/oeiinter/pdf/oei_newsletter_spring2001.pdf. The Integrated Error Correction Process (IECP) was implemented in May 2000. It was established by EPA's Office of Information Collection to ensure collection of high-quality data and to improve reporting of environmental data. The process allows the public to notify EPA of errors found in publicly accessible data in the EPA Envirofacts warehouse, which is found on EPA's web site at www.epa.gov/enviro/index_java.html.

Members of the public can submit an error notification by mail, phone, fax, e-mail, or by an electronic form found at http://oaspub.epa.gov/enviro/ets_grab_error.smart_form. Instructions for what to include and tips on how to describe errors are given on the web site. Once an error is reported, EPA and the party responsible for the data evaluate the possible error and either decide to correct it or verify it as being accurate. Subsequently, the party who reported the error is notified of the decision about whether it will be corrected. The entire process is tracked by IECP. In the past year since IECP was implemented, 600 error reports have been received. They have included misinterpretations of data, non-errors, and errors.

IECP builds on existing EPA data systems to improve the accountability and ease of use through new correction tools. According to the Office of Environmental Information, the changes enable EPA to improve its documentation of how error notification flows through the agency. IECP also reassures the regulated community and the public that error notifications will not be overlooked and provides more personalized communication for reporting errors.

APPENDIX 16

Chart of State Delegations for Federal Environmental Statutes

The Environmental Council of the States has complied the following information about state environmental agencies participating in the delegation of the various federal programs:

Statute & Program	# of states*
Clean Air Act (CAA)	
-New Source Performance Standards (NSPS)	41
-Hazardous Air Pollutants (NESHAPS)	41
-Protection of Clean Air Areas (PSD)	46
-New Source Permit Review (NSR)	50
Clean Water Act (CWA)	
-Construction Grants	45
-Discharge Elimination (NPDES)	44
-Sludge Management	3
-State Revolving Fund (SRF)	25
-Wetlands (section 404)	2
FIFRA (Federal Insecticide, Fungicide, and Rodendicide Act)	
-Enforcement	46
-Pest Certification	47
-Endangered Species	26
-Worker Protection	50
-Groundwater Protection	25
RCRA (Resource Conservation, and Recovery Act)	
-Subtitle C/Solid Waste	48
-Subtitle D/Hazardous Waste	29
-RCRA LUST (Leaking Underground Storage Tanks)	29
Safe Drinking Water Act (SDWA)	
-PWSS (Public Water System Supervision)	51
-Wellhead Protection	49
-Underground Injection Controls (UIC)	35
Toxic Substance Control Act (TSCA)	
-Indoor Radon	6
TOTAL DEGRADED PROGRAMS	**21**

(*Numbers of participating states are from 1999.)

APPENDIX 17

State Environmental Agency Contributions To Enforcement and Compliance, 1999.

Note: This table is included solely for the purpose of illustrating the problems associated with using data that are not based on standardized definitions. These data include information from varying numbers of state programs, which make it very difficult to draw conclusions by aggregating the data. Therefore, this table should not be used or cited as reflecting actual inspection rates for any state.

States Abbv.	Number of Programs Reporting Sites	Number of Programs Reporting Inspections	Inspections	Facilities	Inspection Rate
AL	12	12	18,507	67,302	27%
AK	2	4	78	1,842	4%
AZ	4	3	341	8,304	4%
AR	4	3	280	4,289	7%
CA	7	5	16,346	71,046	23%
CO	3	3	1,657	10,719	15%
CT	2	1	12,050	9,400	128%
DE	6	6	---	77,804	includes on-site wastewater systems
DE	5	---	1,488	3,213	46%
DC	3	3	153	1,129	14%
FL	5	5	15,808	44,023	36%
GA	7	7	13,083	61,366	21%
H	7	6	1,533	14,852	10%
ID	3	4	976	3,838	25%
IL	3	3	75,538	97,227	78%
IN	4	4	9,733	20,766	47%
IA	4	2	1,467	11,570	13%
KS	4	5	3,661	17,776	21%
KY	4	3	3,139	16,986	18%
LA	4	3	4,190	26,981	16%
ME	4	4	562	4,296	13%
MD	4	3	1,777	16,124	11%
MA	4	3	1,496	16,631	9%
MI	7	6	32,528	83,264	39%
MN	13	12	11,663	86,666	13%
MN	12	---	---	123,666	includes water quality for feedlots
MS	4	4	1,346	7,506	18%
MO	4	6	11,076	15,638	148%
MT	3	3	599	2,964	4%
NB	4	4	631	6,456	21%
NV	4	3	316	4,224	7%
NH	15	16	12,339	28,743	43%
NJ	8	7	21,040	86,360	24%
NM	4	3	385	4,416	9%
NY	4	4	4,356	39,267	11%
NC	4	4	4,824	15,929	30%
ND	6	6	1571	4,764	33%

OH	2	3	4,583	18,602	25%
OK	6	7	11,622	8,220	141%
OR	4	4	603	12,041	5%
PA	8	8	44,890	136,778	33%
PR	3	3	453	3,871	12%
RI	5	5	11,860	6,592	180%
SC	7	8	16,126	27,304	59%
SD	9	8	2,136	8,740	24%
TN	4	6	11,962	16,956	71%
TX	1	1	75,706	220,000	34%
UT	5	5	4,185	9,655	43%
VT	10	9	2,251	48,357	5%
VA	4	3	2,076	19,710	11%
WA	6	7	1,502	24,813	6%
WV	4	3	1,150	11,592	10%
WI	5	6	6,292	72,994	9%
WY	4	3	584	4,106	14%
TOTAL	283	259	501,492	1,754,865	---

Sources: Combination of **Table 1: Number of Regulated Sites in the States**, and **Table 2: Total Inspections by state, 1995-1999**, from the ECOS report: *State Environmental Agency Contributions to Enforcement and Compliance* (2001).

APPENDIX 18

State-EPA Data Standards Council

EPA and the Environmental Council of States (ECOS) have created action teams and councils to carry out the work of the State/EPA Information Management Workgroup (IMWG). Participating states and EPA have developed a proposal for a National Environmental Information Exchange Network through this initiative.

The network will revolutionize management of environmental information over the next three to five years by increasing efficiency, improving the quality of environmental data, providing agencies and the public ready access to data, and enhancing their ability to employ this information to protect public health and the environment. The network's design will be standards-based, highly inter-connected, dynamic, flexible and secure; and the network will operate with broad-based voluntary EPA and state participation

As of February 2001, the Data Standards Council is composed of Mark Luttner, L. Singleton, Jody Hudson, Mike Stahl, Geoff Grubbs, Kim Nelson, Tom Lamberson, Latane Donelin, and Nancy John.

APPENDIX 19

Enforcement and Compliance Data Public Access Workgroup

EPA's Office of Enforcement and Compliance Assurance (OECA) formed a joint EPA/state workgroup to determine how enforcement and compliance information could be provided to the public. The workgroup is composed of staff from EPA headquarters, regional offices and state agencies.

On July 14, 2000, the workgroup issued a report that included the following recommendations:

- **Data Users**: Due to the large number of interested stakeholders, EPA should not use a format for enforcement and compliance data that targets any one audience. Instead, data should be structured to allow their and use in different ways (e.g., by facility or by geographic area).

- **Data Delivery**: EPA should use the Internet as the primary method for delivering enforcement and compliance data. Publishing this information on the Internet should eliminate the need for other methods of information dissemination, but it should allow EPA to share pertinent data with a large number of users simultaneously and in a cost-effective manner.

- **Data Content**: The enforcement and compliance data made available to the public should include air, water, and hazardous waste information from the current EPA databases: Air Facility Subsystem, Permits Compliance System, and the Resource Conservation Recovery Information System.

- **Data Context**: Enforcement and compliance data should be accompanied by contextual information necessary for the public to use the data properly and accurately.

- **Data Review and Correction**: EPA and states should work together closely to review enforcement and compliance data prior to public distribution, and should conduct an up-front review of existing information. By partnering on this issue, EPA and the states can provide the public with data of the highest quality in a timely and efficient manner.

Once data have been reviewed prior to their release, EPA and the states should adopt an ongoing data review and correction process to ensure continued data quality.

APPENDIX 20

Examples of Successful Results-Based Programs

The Chesapeake Bay Foundation's web site can be found at http://www.cbf.org. CBNF has prepared Chesapeake 2000, an agreement that established several specific goals to improve the quality of the Bay by 2010. Primary goals seek to reduce nutrient levels, increase oyster populations, and reduce urban sprawl. These longer-term, specific performance measures illustrate the use of results-based measures for environmental programs that will help to restore the Bay.

A discussion of the New York City Computerized Crime Comparison Statistics (Compstat) system can be found at http://www.ci.nyc.ny.us/html/om/html/97/sp268-97.html. The use of Compstat transformed New York's police department from a reactive to a proactive service. Rather than relying solely on patrolling for crime control, the system allows the department's 76 commanders to meet with executives semi-weekly to discuss crime patterns and control tactics. The program has played a key role in reducing crime by over 43 percent since 1993.

The U.S. Department of Transportation's (DOT) Strategic Plan can be found at http://stratplan.dot.gov/. DOT's plan incorporates long-term strategies by creating various transportation scenarios for 30 years into the future, and by assessing its ability to function under these scenarios. The strategic plan is arranged according to the desired outcomes of DOT's programs and the actions necessary to realize those outcomes. DOT's performance report can be found at http://www.fhwa.dot.gov/////policy/1999cpr/index.htm. Produced biennially, the report informs DOT decision-makers about the status of highways, bridges, and transit so that knowledgeable choices and, if necessary legislation can be adopted. The strategic plan and performance report also allow the agency's progress in achieving its intended results to be more transparent to the public.

APPENDIX 21

Panel and Staff

PANEL

Jim Edgar, *Panel Chair* - Distinguished Fellow, Institute of Government and Public Affairs, University of Illinois. Former positions with the State of Illinois: Governor; Secretary of State; Director of Legislative Affairs, Office of the Governor; State Representative, Illinois General Assembly; Assistant to Illinois House and Senate Leadership. Former Director of State Services, National Conference of State Legislators.

Shelley Metzenbaum – Director, Performance Management Project, JFK School of Government, Harvard University; Visiting Professor, School of Public Affairs, University of Maryland; Convenor, Environmental Compliance Consortium. Former Associate Administrator for Regional Operations and State/Local Relations, U.S. Environmental Protection Agency; Undersecretary, Massachusetts Executive Office of Environmental Affairs; Director of Capital Budgeting, State of Massachusetts.

Susan Moore – Vice President, Environmental Affairs, Georgia Pacific Corporation. Responsible for establishing and implementing corporate environmental policy, managing environmental regulatory affairs, and providing environmental services to over 300 manufacturing facilities. She has spent over 20 years working in the environmental field, including senior positions in government, consulting and the private sector, specializing in waste, water, and air policy development as well as environmental management systems and public involvement processes.

David Roe – Senior Attorney, West Coast Office, Environmental Defense. Extensive experience in information-based approaches to public interest advocacy. Principal author, Proposition 65, California's landmark toxic chemical control law, enacted in 1986. Played a major role in developing the award-winning Scorecard website (www.scorecard.org).

Richard Wegman - Partner, Garvey, Schubert, & Barer. Former Chief Counsel and Staff Director, Senate Committee on Governmental Affairs; Executive Director, President's Commission on a National Agenda for the Eighties.

STAFF

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MITIGATION OF STORM WATER IMPACTS FROM NEW DEVELOPMENT IN ENVIRONMENTALLY SENSITIVE AREAS

Technical Report

October 2001

Matt Yeager and

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INTRODUCTION

The California Regional Water Quality Control Board, Los Angeles Region (LA Regional Board) issued the final version of the Standard Urban Storm Water Mitigation Plan (SUSMP) for the County of Los Angeles and Cities in Los Angeles County on March 8, 2000. As adopted, the SUSMP included locations within or directly discharging to an environmentally sensitive area (EnvSA) as a development category to be subject to SUSMP requirements. The Building Industry Association, Western States Petroleum Association, and 32 cities filed an amended petition to the State Water Resources Control Board (State Board) to appeal certain aspects of the SUSMP. On October 5, 2000, the State Board issued its decision, *In Re: Bellflower et al.* ("SUSMP Decision").[1]

Although the SUSMP decision upheld much of the Regional Board's action, it removed EnvSAs as a development category from the SUSMP. The State Board surmised that EnvSAs were not a developmental category, but rather a locational designation. Further, the State Board expressed some concern that no threshold size had been specified that would trigger SUSMP requirements[2], and that development in EnvSAs may already be extensively regulated. Although the LA Regional Board had proposed a threshold for development within, adjacent to or directly discharging to an EnvSA in its response, the State Board determined that adequate opportunity for discussion of the threshold by interested parties had not been provided.[3] In setting aside the EnvSAs, the State Board explained the types of evidence and findings that

[1] SWRCB, 2000. State Board Order No. WQ 2000-11: In the matter of the petitions of the Cities of Bellflower, et al., the City of Arcadia, and Western States Petroleum Association,

[2] *Ibid.* at page 24.

[3] SWRCB, 2000. State Board Order No. WQ 2000-11: In the matter of the petitions of the Cities of Bellflower, et al., the City of Arcadia, and Western States Petroleum Association, page 25.

Regional Boards must make for future inclusion of the category.[4] The action to set aside EnvSAs was not to be interpreted as precedent setting.

The LA Regional Board intends to insure consistency among the requirements of the different municipal storm water permits it adopts. On July 27, 2000, the LA Regional Board adopted a renewed municipal storm water permit for Ventura County (Ventura County MS4 Permit) (Board Order No. 00-108). The Ventura County MS4 Permit included the Ventura Countywide Stormwater Quality Urban Impact Mitigation Plan (SQUIMP), which is analogous to the SUSMP for Los Angeles County. The Ventura County MS4 Permit requires that that new development controls be implemented for several development categories, including projects sited within, adjacent to or directly discharging to an EnvSA. Like the SUSMP, the SQUIMP requires a suite of water quality-related best management practices (BMPs) intended to minimize impacts from development.

Following issuance of the SUSMP decision, the Ventura County Co-permittees requested to have the language of the Ventura Permit and SQUIMP revised to conform to the changes made to the Los Angeles County SUSMP. In response, the LA Regional Board Executive Officer issued a letter, which changed portions of the Ventura County MS4 Permit language. However these changes did not modify the Ventura County MS4 Permit with respect to the EnvSA language or SQUIMP requirements. Three Ventura County MS4 Permittees petitioned the State Board against the actions of the LA Regional Board Executive Officer in making these changes to the Ventura County MS4 Permit. The State Board and LA Regional Board have held the appeals in abeyance pending the resolution of related issues during the renewal of the LA County MS4 Permit. Until these appeals are resolved, the Ventura County MS4 Permit remains in effect as adopted, including the requirements for projects in EnvSAs.

The California Regional Water Quality Control Board, San Diego Region (SD Regional Board) adopted a Municipal Storm Water Permit for San Diego County and Cities (SD County MS4 Permit) on February 28, 2001. The SD County MS4 Permit designated EnvSAs as a development category to be subject to SUSMPs, and included threshold development size and/or alteration criteria that will trigger the requirements. The threshold criteria were either the creation of 2,500 square feet of impervious surface or increasing the imperviousness of a proposed project site by ten percent above its natural condition.[5]

URBAN STORM WATER RUNOFF AND WATER QUALITY IMPACTS

Urban storm water contains pollutants that degrade water quality and adversely impact aquatic habitat. Pollutants found in storm water include suspended solids, heavy metals and a broad suite of organic compounds including pesticides, nutrients, petroleum compounds, pathogen indicators and other by-products of urban activities.[6] [7] Urban storm water has also been shown to alter water quality parameters such as pH, oxygen demand, specific

[4] See Memorandum from Craig Wilson, Chief Counsel, State Board to Regional Board Executive Officers dated Dec. 26, 2000.

[2]Calfornia Regional Water Quality Control Board, San Diego Region, San Diego County Municipal Storm Water Permit, Order No. 2001-01, 52 pp.

[6] Makepeace, D.K., Smith, D.W. and Stanley, S.J., 1995. Urban stormwater quality: summary of contaminant data. *Critical Reviews in Environmental Science and Technology*, 25(2): 93-139.

[7] Ayers, M.A., Kennen, J.G. and Stackelberg, P.E., 2000. Water quality in the Long Island-New Jersey coastal drainages, New York and New Jersey, 1996-98. U.S. Geological Survey Circular 1201.

conductance, temperature and turbidity.[8] Finally, urbanization modifies the hydrologic properties of a site, generally leading to increased volumes of runoff from a given amount of precipitation, and a more rapidly developing runoff peak.[9]

These pollutants and hydromodifications can directly result in negative impacts to biota and degrade ecosystems. Metals, organic compounds and other pollutants can have acute and/or chronic toxic effects to aquatic flora and fauna[10], and flow modifications can directly degrade the physical conditions of a habitat through erosion and deposition of sediments.[11] [12] A growing body of research links urban storm water runoff to water quality impairments and habitat degradation.[13] [14] Rivers and tributary streams, lakes, wetlands, estuaries and near shore ocean waters are susceptible to storm water impacts.

Adjacent habitats may be indirectly impacted by the degradation of aquatic areas. Fauna in riparian habitats may be negatively impacted by water quality degradation through reduced aquatic food sources, alteration of reproductive environments and habitat alteration that fosters proliferation of non-native species.

FEDERAL STORM WATER REGULATIONS

Federal storm water regulations require MS4 permittees to control storm water pollution from new developments during and after construction. U.S.EPA guidance advocates preventative measures including development design, implementation and maintenance of structural and non-structural best management practices (BMPs), and adoption of post-construction runoff ordinances.[15]

In February 2001, the U.S.EPA issued a Memorandum of Agreement (MOA) between the U.S.EPA, U.S. Fish and Wildlife Service (USFW) and the National Marine Fisheries Service (NMFS). The MOA is designed to enhance coordination of protection of endangered and threatened species pursuant to the Endangered Species Act (ESA) and the Clean Water Act (CWA). EPA believes that a coordinated national approach will insure greater protection for listed species, enhance regulatory predictability, and increase the efficiency of ESA

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[8] Schueler, Tom, 1994. The importance of imperviousness. *Watershed Protection Techniques*, 1(3) 7 pages.

[9] Booth, D. and Jackson, C.R., 1997. Urbanization of aquatic systems: degradation thresholds, stormwater detention, and the limits of mitigation. *Journal of the American Water Resources Association*, 33(5):1077-1090.

[10] Field, R. and Pitt, R.E., 1990. Urban storm-induced discharge impacts: US Environmental Protection Agency research program review; *Water Science and Technology*, 22(10/11):1-7.

[11] Sovern, D.T. and P.M. Washington, 1996. Effects of urban growth on stream habitat. In Roesner, L., ed. Effects of watershed development and management on aquatic ecosystems. ASCE Conference, August 4-9, 1996, Snowbird, Utah.

[12] May, Christopher W.; Horner, Richard R.; Karr, James R.; Mar, Brian W.; Welch, Eugene B., 1997. Effects of urbanization on small streams in the Puget Sound Lowland ecoregion, *Watershed Protection Techniques* 2(4): 483-494.

[13] Bay, S., Greenstein, D., Jirik, A. and A. Zellers, 1996. Toxicity of Stormwater from Ballona and Malibu Creeks, Southern California Coastal Water Research Project, Annual Report 1996, p. 96-104.

[14] U.S. General Accounting Office, 2001. Water Quality: Better data and Evaluation of Urban Runoff Programs Needed to Assess Effectiveness, USGAO, June 2001.

[15] For a discussion see, Radulescu, D., Swamikannu, X. and P. Hammer, 2001. Retail gasoline outlets: New development design standards for mitigation of storm water impacts, Technical Report, June 2001, California Regional Water Quality Control Board, Los Angeles Region.

consultations.[16]

Under the CWA, the Regional Board is responsible for "restoring and maintaining the chemical, physical and biological integrity of the Nation's waters". Clearly, the MOA contemplates cooperation and coordination of the Regional Board's regulatory programs to enhance the relationship between the CWA and the ESA.

In issuing MS4 Permits, the Regional Boards are expected to ensure that all federal requirements are met. New developments that occur in EnvSAs should be required to incorporate into development design and long-term maintenance planning, storm water pollution prevention methods and appropriate BMPs.

ENVIRONMENTALLY SENSITIVE AREAS

California Public Resources Code defines EnvSAs as follows:

> "Environmentally sensitive area means any area in which plant or animal life or their habitats are either rare or especially valuable because of their special nature or role in an ecosystem and which could be easily disturbed or degraded by human activities and Development."[17]

In the proposed LA County MS4 Permit these include:

(i) Significant Ecological Areas (SEAs), designated by the County of Los Angeles;
(ii) Significant Natural Areas (SNAs) designated by the California Department of Fish and Game (CDFG);
(iii) Rare, Threatened, or Endangered Species (RARE) beneficial use areas listed in the Regional Board Basin Plan, designated by the LA Regional Board; and

For the Ventura County MS4 Permit, the SEA category is substituted with the following because the Ventura County Planning Agency has not performed an equivalent designation,

(iv) Other Areas identified by the Permittees as environmentally sensitive for water quality purposes.

EnvSAs in the LA County MS4 Permit have been designated through a public process by their designating agencies. SEAs provide a habitat for rare, endangered, or threatened plant and animal species; biotic communities, vegetative associations, and species that are either one of a kind, or are restricted in distribution. These habitats often serve as concentrated breeding, feeding, or resting, or migrating grounds, and is limited in availability. They contain biotic resources that are of scientific interest. Some of these areas are important as game species habitat or fisheries; provide for the preservation of examples of relatively undisturbed natural biotic communities; and areas that are special for other reasons.[18] SNAs are areas that may

[16] USEPA, 2001. Fact Sheet: Memorandum of Agreement between the Environmental Protection Agency, Fish and Wildlife Service and National Marine Fisheries Service regarding enhanced coordination under the Clean Water Act and Endangered Species Act. EPA-823-F-01-003.

[17] See, Cal. Pub Res. Code 30107.5

[18] Los Angeles County Department of Regional Planning, 2000. Los Angeles County Significant Ecological Area update study 2000, Background Report. Prepared for Los Angeles County by PCR Services, Frank Hovore & Associates, and FORMA Systems.

support extremely rare species or habitats, support associations or concentrations of rare species or habitats, or exhibit the best examples of rare species and habitats in California.[19] The RARE beneficial use designation is assigned to "uses of water that support habitats necessary, at least in part, for the survival and successful maintenance of plant or animal species established under state of federal law as rare, threatened, or endangered.

Since most of the selection criteria for EnvSAs involve rare, endangered or threatened species and associated habitat, any negative impact to such areas acquires a higher degree of severity. In these areas, recovery from impacts is inhibited by inherently smaller populations, restricted habitat boundaries, habitat fragmentation, and boundary effects. So, for a given negative stimulus, EnvSAs will experience a potentially greater and less reversible negative response than areas with more abundant and less sensitive species or biotic assemblages. Due to this sensitivity these areas are more easily degraded, therefore they merit a higher standard of protection.

RELATED ENVIRONMENTAL PROTECTION

Selected areas in California already merit a higher standard of protection from development impacts because of location. The California Ocean Plan prohibits the discharge of "waste" to Areas of Special Biological Significance (ASBS), and requires discharges to be located far enough away to allow maintenance of natural water quality conditions in ASBS.[20] The State Board recently issued a decision regarding storm water discharges where it determined that discharges to ASBS are prohibited.[21]

In the late 1980s the Sierra Club brought a petition against the County of Los Angeles alleging a failure to conduct an environmental review of a proposed project in a protected habitat area prior to granting project approval, as specified by the Malibu Local Coastal Plan (LCP). The trial court ruling in this case resulted in the creation of an environmental review board (ERB) to regulate development in sensitive environmental resource areas.[22] The function of the ERB is to advise decision-makers of the County of Los Angeles to insure that development within sensitive environmental resource areas is consistent with the environmental protection policies of the Malibu LCP. The ERB evaluates proposed projects, makes recommendations, and suggests mitigation measures or conditions to minimize adverse environmental impacts[23]. Projects found not to be consistent with the Malibu LCP could presumably be denied a permit.

Relevant policies in the Malibu LCP include:

Policy 86:

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[19] Significant Natural Areas website: http://www.dfg.ca.gov/whdab/html/moresna.html.

[20] SWRCB, 1997. California Ocean Plan: water quality control plan – ocean waters of California. California Environmental Protection Agency, Sacramento, California.

[21] SWRCB, 2001. In the matter of the Petition of California Department of Transportation (Cease and Desist Order No. 00-87 for Crystal Cove), issued by California Regional Water Quality Control Board, Santa Ana Region. SWRCB file A-1350.

[22] Sierra Club, et al. , F.P. Angel, Counsel,Vs. County of Los Angeles and Board of Supervisors, C. Moore, Counsel, September 26, 1991, Ronald M. Sohigian, Judge.

[23] Los Angeles County Board of Supervisors, 1986. Malibu Local Coastal Program Land Use Plan.

"A drainage control system, including on-site retention or detention where appropriate, shall be incorporated into the site design of new developments to minimize the effects of runoff and erosion. Runoff control systems shall be designed to prevent any increase in site runoff over pre-existing peak flows. Impacts on downstream sensitive riparian habitats must be mitigated."

Policy 96:

"Degradation of the water quality of groundwater basins, nearby streams, or wetlands shall not result from development of the site. Pollutants, such as chemicals, fuels, lubricants, raw sewage, and other harmful waste shall not be discharged into or alongside coastal streams or wetlands."

The California Coastal Act contains provisions for an increased level of protection for resources defined as Environmentally Sensitive Habitat Areas (ESHAs). Cal. Pub. Res. Code § 30240.a states that:

"Environmentally sensitive habitat areas shall be protected against any significant disruption of habitat values, and only uses dependent on those resources shall be allowed within those areas."

On September 28, 2000, the California Coastal Commission (CCC) sent a letter to the State Board supporting the LA Regional Board's action in extending SUSMP requirements to EnvSAs.[24] Recently in commenting on a draft of the LA County MS4 permit, the CCC reiterated its support for inclusion of EnvSAs.[25] The CCC explained that the inclusion of EnvSAs is an important action that would greatly assist the State's efforts to protect the ecological integrity of land and coastal environments.

THRESHOLDS/EXEMPTIONS

The State Board in the SUSMP decision explained that Regional Boards might extend new development requirements to EnvSAs in the future if thresholds are established after full public discussion.

From a review of exemption criteria for developments in the literature, we note that CEQA uses the criterion of 2,500 square feet of impervious surface area for projects in EnvSAs as the threshold below which there is no environmental review. CEQA categorically exempts from environmental review: single-family residences or second dwelling unit in a residential zone; up to three single-family residences in an urbanized area; a duplex or similar structure in a residential area; apartments or similar structures designed for not more than six dwelling units in an urbanized area; stores, motels, offices or similar structures not using significant amounts of hazardous materials, and not exceeding 2,500 square feet in floor area.[26] The CEQA categorical exemption for up to four commercial buildings not exceeding 10,000 square feet of floor area, and not using significant amounts of hazardous materials, applies only if the

[24] California Coastal Commission, 2000. Letter dated September 28, 2000, to Craig Wilson, Chief Counsel, SWRCB, from Jaime Kooser, Deputy Director, Energy, Ocean Resources, and Water Quality.

[25] See Comment Letter from Jamie Kooser, Deputy Director, California Coastal Commission to Dennis Dickerson, Executive Officer, LA Regional Board dated July25, 2001.

[26] Title 14. California Code of Regulations, Chapter 3. Guidelines for Implementation of the California Environmental Quality Act; Article 19. Categorical Exemptions.

surrounding area is not environmentally sensitive. Commercial facilities less than 10,000 square feet and surrounded by an area that is environmentally sensitive therefore are not exempt from CEQA requirements. The CCC exempts single family residences (subject to conditions for access, water supply, etc.) from requirements for a coastal development permit. [27] The SD Regional Board excludes the applicability of new development requirements for development in EnvSAs where the change in impervious surface area is less than ten percent from the natural condition.[28] States such as Maryland, Washington, Florida, and Virginia use a threshold of 4,000 square feet or 5,000 square feet of disturbed land area for new development requirements to apply, but do not have a separate threshold for projects in EnvSAs although they require a stricter performance standard.

Although, we were unable to find an express basis in the legislative record for the CEQA threshold of 2,500 square feet of impervious area, it is reasonable to assume that the threshold derives from the typical impervious surface footprint of a single-family residential home (less than 2,500 square feet). Similarly, the typical single family lot size (less than 5,000 square feet) may be the basis of the threshold for the application of new development controls in other States. The SD Regional Board's alternative criteria of ten percent change from the natural condition appears to be based on scientific studies in the Mid-West and Pacific-Northwest which demonstrated that a more than ten percent change in impervious cover of watershed resulted in visible change to the ecological health of streams. Highly urbanized watersheds such as those in Los Angeles County usually have more than 50 percent impervious cover.

From our review of the scientific and regulatory literature, it is clear that environmental law and policy on development controls have been often framed to avoid imposing regulatory obligations on the individual homebuilder and/ or homeowner. A threshold for development in EnvSAs based on a similar objective appears to be reasonable.

DESIGN STANDARDS

The SUSMP requires the implementation of a suite of BMPs for developments, to mitigate adverse environmental impacts due to storm water and urban runoff. The suggested BMPs are designed to reduce the pollutant load in runoff and impacts from increased runoff volume and flow rates. Examples of BMPs include design elements such as clustering development, preserving existing vegetated areas, covering exposed pollutant sources and minimizing impervious surfaces, and treatment devices including detention or retention basins, oil/water separators, and filter systems.

The SUSMP does not prescribe specific BMPs, but does provide flow-based and volume-based criteria for runoff treatment. The choice of BMP or combination of BMPs is left to local control as long as the Maximum Extent Practicable (MEP) standard is met.

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[27] California Public Resources Code, 30610.1. (a) Prior to certification of the applicable local coastal program, no coastal development permit shall be required for the construction of a single-family residence on any vacant lot meeting the criteria set forth in subdivision (c) and located in a specified area designated by the commission pursuant to subdivision (b).

[28] SD County MS4 Permit (Board Order No. 2001-01) at p. 16

ECONOMIC CONSIDERATION

BMPs required as part of the implementation of the SUSMP and SQUIMP will have economic impacts. Some BMPs would be implemented in most developments even if they were not explicitly required by regulation, including protection of slopes and channels and covered and contained trash and material storage areas. Other BMPs will be implemented only because they are required, and therefore potentially have a greater economic impact.

Economic impact will be case-specific and will depend on many factors. Studies about storm water BMP cost show that the size, type of development, existing environment, geology, and climate can affect the choice of BMP and its cost.[29] For example, an infiltration basin may be appropriate if the substrate is permeable, and groundwater contamination is not likely, whereas a biofiltration system that releases to the surface may be appropriate is the substrate is impermeable, or if sensitive groundwater resources are close to the surface. However, by imposing water quality requirements on the development at the design stage, cost savings can be maximized.

Clustered housing may save money on infrastructure, while minimizing the addition of impervious surface. Cost savings from alternative residential development designs have been estimated to be from 39–63% over conventional designs.[30] Commercial developments may demand certain parking space requirements, but water quality requirements can be met by pervious pavement, vegetative treatment swales, or water quality basins. Construction costs for storm water treatment BMPs for a five-acre commercial development have been estimated to range from $5,000 to $60,000 depending on the selected BMP. If water quality requirements are factored into the initial planning and design phase, total cost can be minimized and water quality benefits maximized.

JUSTIFICATION

The State Board excluded developments sited within, adjacent to, or directly discharging to EnvSAs from SUSMP requirements primarily because, it may have been mis-categorized as developmental rather than “locational”, the absence of a threshold, the lack of adequate consideration by interested parties, and concerns of extensive regulation.

The LA Regional Board at this time, after nearly 12 months of public review for comment on three drafts, has provided ample opportunity for all interested parties to comment on the proposed criteria and its basis. By the nature of the designation of EnvSAs as a category to provide enhanced protection for, the basis is locational and identified as such under the Cal. Pub. Res. Code. § 30107.5. We propose a threshold of 2,500 square feet of impervious surface area or more as a threshold to trigger SUSMP requirements for projects in EnvSAs. On the issue of extensive regulation, we submit that most of the existing regulations regarding EnvSAs, are intended to exclude development entirely or limit allowed activities within the area but seldom for water quality protection. For developments that will be allowed, it is the responsibility of the State Board and Regional Boards to require effective mitigation of impacts from storm water and urban runoff and ensure at the same time that their actions do not harm

[29] Center for Watershed Protection, 1998. Cost and Benefits of Storm Water BMPs, Final Report 9/14/98, Prepared for Parsons Engineering Science, EPA Contract 68-C6-0001.

[30] *Ibid.*

the natural resources of California.

We recommend a threshold of 2,500 square feet or more to trigger the SUSMP requirements for developments in EnvSAs. Developments that create less than 2,500 square feet of impervious area will not require a SUSMP, developments that create 2,500 square feet of impervious surface or more will require a SUSMP. Staff also proposes that the redevelopment (i.e. creation, addition, and replacement) of single-family structures (including those in EnvSAs) be excluded from SUSMP requirements.[31] Permittees may consider the threshold of altering the imperviousness cover to ten or more percent over the natural condition as an alternative approach when they submit a watershed or a regional plan for consideration by the Regional Board as a substitute for site-by-site SUSMP requirements.

CONCLUSION

EnvSAs are inherently sensitive habitats containing unique, rare, threatened or endangered species and/or assemblages of species. Their unique and sensitive nature merits a higher standard of environmental protection than more common areas with common and abundant species. Storm water and urban runoff are known to contain a wide range of pollutants and have demonstrated toxicity to plants and animals. Therefore it is necessary to mitigate impacts from storm water and urban runoff to the MEP for developments within or directly discharging to EnvSAs. Applying SUSMP requirements to these developments is feasible and can be accomplished by a range of BMPs that can be tailored to the size and type of a particular development. The recommended threshold of 2,500 square feet of impervious area for application of SUSMP requirements in EnvSAs is reasonable and consistent with current principles of environmental law and policy. The most effective and economic way to accomplish the mitigation of storm water pollution from new development is to identify and implement water quality control techniques at the planning and design stage rather than require post-construction retrofits.

[31] State of Maryland exempts existing single family structures from new development/ re-development standards, Storm Water Design Manual 2000 at p 1.13

012369

BILL NUMBER: SB 72 CHAPTERED
BILL TEXT

CHAPTER 492
FILED WITH SECRETARY OF STATE OCTOBER 4, 2001
APPROVED BY GOVERNOR OCTOBER 4, 2001
PASSED THE SENATE SEPTEMBER 12, 2001
PASSED THE ASSEMBLY SEPTEMBER 10, 2001
AMENDED IN ASSEMBLY SEPTEMBER 5, 2001
AMENDED IN ASSEMBLY AUGUST 28, 2001
AMENDED IN ASSEMBLY AUGUST 20, 2001
AMENDED IN SENATE JUNE 4, 2001

INTRODUCED BY Senator Kuehl

JANUARY 10, 2001

An act to add Section 13383.5 to the Water Code, relating to water.

LEGISLATIVE COUNSEL'S DIGEST

SB 72, Kuehl. Storm water.

Under existing law, the State Water Resources Control Board and the California regional water quality control boards prescribe waste discharge requirements for the discharge of storm water by municipalities and industries in accordance with the federal national pollutant discharge elimination system (NPDES) permit program.

This bill would require the state board to develop, before January 1, 2003, minimum monitoring requirements for regulated municipalities that were subject to a storm water permit on or before December 31, 2001, and minimum standard monitoring requirements for regulated industries, as specified, and would require the requirements established in accordance with the bill's provisions to be included in all storm water permits on or before July 1, 2008. The bill would require the state board to make available to the public via the Internet a summary of the results obtained from the storm water monitoring conducted in accordance with the bill, in a year in which the Legislature appropriates sufficient funds for that purpose.

THE PEOPLE OF THE STATE OF CALIFORNIA DO ENACT AS FOLLOWS:

SECTION 1. Section 13383.5 is added to the Water Code, to read:

13383.5. (a) As used in this section, "regulated municipalities and industries" means the municipalities and industries required to obtain a storm water permit under Section 402(p) of the Clean Water Act (33 U.S.C. Sec. 1342(p)) and implementing regulations.

(b) This section only applies to regulated municipalities that were subject to a storm water permit on or before December 31, 2001, and to regulated industries that are subject to the General Permit for Storm Water Discharges Associated with Industrial Activities Excluding Construction Activities.

(c) Before January 1, 2003, the state board shall develop minimum

monitoring requirements for each regulated municipality and minimum standard monitoring requirements for regulated industries. This program shall include, but is not limited to, all of the following:

(1) Standardized methods for collection of storm water samples.

(2) Standardized methods for analysis of storm water samples.

(3) A requirement that every sample analysis under this program be completed by a state certified laboratory or by the regulated municipality or industry in the field in accordance with the quality assurance and quality control protocols established pursuant to this section.

(4) A standardized reporting format.

(5) Standard sampling and analysis programs for quality assurance and quality control.

(6) Minimum detection limits.

(7) Annual reporting requirements for regulated municipalities and industries.

(8) For the purposes of determining constituents to be sampled for, sampling intervals, and sampling frequencies, to be included in a municipal storm water permit monitoring program, the regional board shall consider the following information, as the regional board determines to be applicable:

(A) Discharge characterization monitoring data.

(B) Water quality data collected through the permit monitoring program.

(C) Applicable water quality data collected, analyzed, and reported by federal, state, and local agencies, and other public and private entities.

(D) Any applicable listing under Section 303(d) of the Clean Water Act (33 U.S.C. Sec. 1313).

(E) Applicable water quality objectives and criteria established in accordance with the regional board basin plans, statewide plans, and federal regulations.

(F) Reports and studies regarding source contribution of pollutants in runoff not based on direct water quality measurements.

(d) The requirements prescribed pursuant to this section shall be included in all storm water permits for regulated municipalities and industries that are reissued following development of the requirements described in subdivision (c). Those permits shall include these provisions on or before July 1, 2008. In a year in which the Legislature appropriates sufficient funds for that purpose, the state board shall make available to the public via the Internet a summary of the results obtained from storm water monitoring conducted in accordance with this section.

STATE OF CALIFORNIA
STATE WATER RESOURCES CONTROL BOARD

ORDER WQ 2001- 15

In the Matter of the Petitions of

BUILDING INDUSTRY ASSOCIATION OF SAN DIEGO COUNTY
AND
WESTERN STATES PETROLEUM ASSOCIATION

For Review Of Waste Discharge Requirements Order No. 2001-01
for Urban Runoff from San Diego County
[NPDES No. CAS0108758]
Issued by the
California Water Quality Control Board,
San Diego Region

SWRCB/OCC FILES A-1362, A-1362(a)

BY THE BOARD:

On February 21, 2001, the San Diego Regional Water Quality Control Board (Regional Water Board) issued a revised national pollutant discharge elimination system (NPDES) permit in Order No. 2001-01 (permit) to the County of San Diego (County), the 18 incorporated cities within the County, and the San Diego Unified Port District. The permit covers storm water discharges from municipal separate storm sewer systems (MS4) throughout the County. The permit is the second MS4 permit issued for the County, although the first permit was issued more than ten years earlier.[1]

[1] NPDES permits generally expire after five years, but can be extended administratively where the Regional Water Board is unable to issue a new permit prior to the expiration date. As the record in this matter amply demonstrates, the Regional Water Board engaged in an extensive process of issuing draft permits, accepting comments, and holding workshops and hearings since at least 1995.

The permit includes various programmatic and planning requirements for the permittees, including construction and development controls, controls on municipal activities, controls on runoff from industrial, commercial, and residential sources, and public education. The types of controls and requirements included in the permit are similar to those in other MS4 permits, but also reflect the expansion of the storm water program since the first MS4 permit was adopted for San Diego County 11 years ago.[2]

On March 23, 2001, the State Water Resources Control Board (State Water Board or Board) received petitions for review of the permit from the Building Industry Association of San Diego County (BIA) and from the Western States Petroleum Association (WSPA).[3] The petitions are legally and factually related, and have therefore been consolidated for purposes of review.[4] None of the municipal dischargers subject to the permit filed a petition, nor did they file responses to the petitions.

I. BACKGROUND

MS4 permits are adopted pursuant to Clean Water Act section 402(p). This federal law sets forth specific requirements for permits for discharges from municipal storm sewers. One of the requirements is that permits "shall require controls to reduce the discharge of

[2] For a discussion of the evolution of the storm water program, consistent with guidance from the United States Environmental Protection Agency (U.S. EPA), see Board Order WQ 2000-11.

[3] On March 23, the State Water Board also received brief letters from the Ramona Chamber of Commerce, the North San Diego County Association of Realtors, the San Diego County Apartment Association, the National Association of Industrial and Office Properties, and the California Building Industry Association. All of these letters state that they are "joining in" the petition filed by BIA. None of the letters contain any of the required information for petitions, which is listed at Cal. Code of Regs., tit. 23, section 2050. These letters will be treated as comments on the BIA petition. To the extent the authors intended the letters be considered petitions, they are dismissed.

[4] Cal. Code of Regs., tit. 23, section 2054.

pollutants to the maximum extent practicable [MEP]." States establish appropriate requirements for the control of pollutants in the permits.

This Board very recently reviewed the need for controls on urban runoff in MS4 permits, the emphasis on best management practices (BMPs) in lieu of numeric effluent limitations, and the expectation that the level of effort to control urban runoff will increase over time.[5] We pointed out that urban runoff is a significant contributor of impairment to waters throughout the state, and that additional controls are needed. Specifically, in Board Order WQ 2000-11 (hereinafter, LA SUSMP order), we concluded that the Los Angeles Regional Water Board acted appropriately in determining that numeric standards for the design of BMPs to control runoff from new construction and redevelopment constituted controls to the MEP.[6]

The San Diego permit incorporates numeric design standards for runoff from new construction and redevelopment similar to those considered in the LA SUSMP order.[7] In addition, the permit addresses programmatic requirements in other areas. The LA SUSMP order was a precedential decision,[8] and we will not reiterate our findings and conclusions from that decision.[9]

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[5] Board Order WQ 2000-11.

[6] As explained in that Order, numeric design standards are not the same as numeric effluent limitations. While BIA contends that the permit under review includes numeric effluent limitations, it does not. A numeric design standard only tells the dischargers how much runoff must be treated or infiltrated; it does not establish numeric effluent limitations proscribing the quality of effluent that can be discharged following infiltration or treatment.

[7] The San Diego permit also includes provisions that are different from those approved in the LA SUSMP Order, but which were not the subject of either petition. Such provisions include the inclusion of non-discretionary projects. We do not make any ruling in this Order on matters that were not addressed in either petition.

[8] Government Code section 11425.60; State Board Order WR 96-1 (Lagunitas Creek), at footnote 11.

[9] BIA restates some of the issues this Board considered in the LA SUSMP order. For instance, BIA contends that it is inappropriate for the permit to regulate erosion control. While this argument was not specifically addressed in our prior Order, it is obvious that the most serious concern with runoff from construction is the potential for increased erosion. It is absurd to contend that the permit should have ignored this impact from urban runoff.

The petitioners make numerous contentions, mostly concerning requirements that they claim the dischargers will not be able to, or should not be required to, comply with. We note that none of the dischargers has joined in these contentions. We further note that BIA raises contentions that were already addressed in the LA SUSMP order. In this Order, we have attempted to glean from the petition issues that are not already fully addressed in Board Order Board Order WQ 2000-11, and which may have some impact on BIA and its members. WSPA restated the contentions it made in the petition it filed challenging the LA SUSMP order. We will not address those contentions again.[10] But we will address whether the Regional Water Board followed the precedent established there as it relates to retail gasoline outlets.[11]

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[10] On November 8, 2001, following the October 31 workshop meeting that was held to discuss the draft order, BIA submitted a "supplemental brief" that includes many new contentions raised for the first time. (Interested persons who were not petitioners filed comments on the draft order asking the State Water Board to address some of these.) The State Water Board will not address these contentions, as they were not timely raised. (Wat. Code § 13320; Cal. Code of Regs., tit. 23, § 2050(a).) Specific contentions that are not properly subject to review under Water Code section 13320 are objections to findings 16, 17, and 38 of the permit, the contention that permit provisions constitute illegal unfunded mandates, challenges to the permit's inspection and enforcement provisions, objections to permit provisions regarding construction sites, the contention that post-construction requirements should be limited to "discretionary" approvals, the challenge to the provisions regarding local government compliance with the California Environmental Quality Act, and contentions regarding the term "discharge" in the permit. BIA did not meet the legal requirements for seeking review of these portions of the permit.

[11] On November 8, 2001, the State Water Board received eight boxes of documents from BIA, along with a "Request for Entry of Documents into the Administrative Record." BIA failed to comply with Cal. Code of Regs., tit. 23, section 2066(b), which requires such requests be made "prior to or during the workshop meeting." The workshop meeting was held on October 31, 2001. The request will therefore not be considered. BIA also objected in this submittal that the Regional Water Board did not include these documents in its record. The Regional Water Board's record was created at the time the permit was adopted, and was submitted to the State Water Board on June 11, 2001. BIA's objection is not timely.

II. CONTENTIONS AND FINDINGS[12]

Contention: BIA contends that the discharge prohibitions contained in the permit are "absolute" and "inflexible," are not consistent with the standard of "maximum extent practicable" (MEP), and financially cannot be met.

Finding: The gist of BIA's contention concerns Discharge Prohibition A.2, concerning exceedance of water quality objectives for receiving waters: "Discharges from MS4s which cause or contribute to exceedances of receiving water quality objectives for surface water or groundwater are prohibited." BIA generally contends that this prohibition amounts to an inflexible "zero contribution" requirement.

BIA advances numerous arguments regarding the alleged inability of the dischargers to comply with this prohibition and the impropriety of requiring compliance with water quality standards in municipal storm water permits. These arguments mirror arguments made in earlier petitions that required compliance with water quality objectives by municipal storm water permittees. (See, e.g., Board Orders WQ 91-03, WQ 98-01, and WQ 99-05.) This Board has already considered and upheld the requirement that municipal storm water discharges must not cause or contribute to exceedances of water quality objectives in the receiving water. We adopted an iterative procedure for complying with this requirement, wherein municipalities must report instances where they cause or contribute to exceedances, and then must review and improve BMPs so as to protect the receiving waters. The language in the permit in Receiving

[12] This Order does not address all of the issues raised by the petitioners. The Board finds that the issues that are not addressed are insubstantial and not appropriate for State Water Board review. (See *People v. Barry* (1987) 194 Cal.App.3d 158 [239 Cal.Rptr. 349]; Cal. Code Regs., tit. 23, § 2052.) We make no determination as to whether we will address the same or similar issues when raised in future petitions.

Water Limitation C.1 and 2 is consistent with the language required in Board Order WQ 99-05, our most recent direction on this issue.[13]

While the issue of the propriety of requiring compliance with water quality objectives has been addressed before in several orders, BIA does raise one new issue that was not addressed previously. In 1999, the Ninth Circuit Court of Appeals issued an opinion addressing whether municipal storm water permits must require "strict compliance" with water quality standards.[14] (*Defenders of Wildlife v. Browner* (9th Cir. 1999) 191 F.3d 1159.) The court in *Browner* held that the Clean Water Act provisions regarding storm water permits do not require that municipal storm-sewer discharge permits ensure strict compliance with water quality standards, unlike other permits.[15] The court determined that: "Instead, [the provision for municipal storm water permits] *replaces* the requirements of [section 301] with the requirement that municipal storm-sewer dischargers 'reduce the discharge of pollutants to the maximum extent practicable, including management practices, control techniques and system, design and engineering methods, and such other provisions as the Administrator . . . determines appropriate for the control of such pollutants'." (191 F.3d at 1165.) The court further held that the Clean Water Act does grant the permitting agency discretion to determine what pollution controls are appropriate for municipal storm water discharges. (*Id.* at 1166.) Specifically, the court stated

[13] In addition to Discharge Prohibition A.2, quoted above, the permit includes Receiving Water Limitation C.1, with almost identical language: "Discharges from MS4s that cause or contribute to the violation of water quality standards (designated beneficial uses and water quality objectives developed to protect beneficial uses) are prohibited." Receiving Water Limitation C.2 sets forth the iterative process for compliance with C.1, as required by Board Order WQ 99-05.

[14] "Water quality objectives" generally refers to criteria adopted by the state, while "water quality standards" generally refers to criteria adopted or approved for the state by the U.S. EPA. Those terms are used interchangeably for purposes of this Order.

[15] Clean Water Act § 301(b)(1)(C) requires that most NPDES permits require strict compliance with quality standards.

that U.S. EPA had the authority either to require "strict compliance" with water quality standards through the imposition of numeric effluent limitations, or to employ an iterative approach toward compliance with water quality standards, by requiring improved BMPs over time. (*Id.*) The court in *Browner* upheld the EPA permit language, which included an iterative, BMP-based approach comparable to the language endorsed by this Board in Order WQ 99-05.

In reviewing the language in this permit, and that in Board Order WQ 99-05, we point out that our language, similar to U.S. EPA's permit language discussed in the *Browner* case, does not require strict compliance with water quality standards. Our language requires that storm water management plans be designed to achieve compliance with water quality standards. Compliance is to be achieved over time, through an iterative approach requiring improved BMPs. As pointed out by the *Browner* court, there is nothing inconsistent between this approach and the determination that the Clean Water Act does not mandate strict compliance with water quality standards. Instead, the iterative approach is consistent with U.S. EPA's general approach to storm water regulation, which relies on BMPs instead of numeric effluent limitations.

It is true that the holding in *Browner* allows the issuance of municipal storm water permits that limit their provisions to BMPs that control pollutants to the maximum extent practicable (MEP), and which do not require compliance with water quality standards. For the reasons discussed below, we decline to adopt that approach. The evidence in the record before us is consistent with records in previous municipal permits we have considered, and with the data we have in our records, including data supporting our list prepared pursuant to Clean Water Act section 303(d). Urban runoff is causing and contributing to impacts on receiving waters throughout the state and impairing their beneficial uses. In order to protect beneficial uses and to achieve compliance with water quality objectives in our streams, rivers, lakes, and the ocean, we

must look to controls on urban runoff. It is not enough simply to apply the technology-based standards of controlling discharges of pollutants to the MEP; where urban runoff is causing or contributing to exceedances of water quality standards, it is appropriate to require improvements to BMPs that address those exceedances.

While we will continue to address water quality standards in municipal storm water permits, we also continue to believe that the iterative approach, which focuses on timely improvement of BMPs, is appropriate. We will generally not require "strict compliance" with water quality standards through numeric effluent limitations and we will continue to follow an iterative approach, which seeks compliance over time.[16] The iterative approach is protective of water quality, but at the same time considers the difficulties of achieving full compliance through BMPs that must be enforced throughout large and medium municipal storm sewer systems.[17]

We have reviewed the language in the permit, and compared it to the model language in Board Order WQ 99-05. The language in the Receiving Water Limitations is virtually identical to the language in Board Order WQ 99-05. It sets a limitation on discharges that cause or contribute to violation of water quality standards, and then it establishes an iterative approach to complying with the limitation. We are concerned, however, with the language in Discharge Prohibition A.2, which is challenged by BIA. This discharge prohibition is similar to the Receiving Water Limitation, prohibiting discharges that cause or contribute to exceedance of

[16] Exceptions to this general rule are appropriate where site-specific conditions warrant. For example, the Basin Plan for the Lake Tahoe basin, which protects an outstanding national resource water, includes numeric effluent limitations for storm water discharges.

[17] While BIA argues that the permit requires "zero contribution" of pollutants in runoff, and "in effect" contains numeric effluent limitations, this is simply not true. The permit is clearly BMP-based, and there are no numeric effluent limitations. BIA also claims that the permit will require the construction of treatment plants for storm water similar to the publicly-owned treatment works for sanitary sewage. There is no basis for this contention; there is no requirement in the permit to treat all storm water. The emphasis is on BMPs.

water quality objectives. The difficulty with this language, however, is that it is not modified by the iterative process. To clarify that this prohibition also must be complied with through the iterative process, Receiving Water Limitation C.2 must state that it is also applicable to Discharge Prohibition A.2. The permit, in Discharge Prohibition A.5, also incorporates a list of Basin Plan prohibitions, one of which also prohibits discharges that are not in compliance with water quality objectives. (See, Attachment A, prohibition 5.) Language clarifying that the iterative approach applies to that prohibition is also necessary.[18]

BIA also objects to Discharge Prohibition A.3, which appears to require that treatment and control of discharges must always occur prior to entry into the MS4: "Discharges into and from MS4s containing pollutants which have not been reduced to the [MEP] are prohibited."[19] An NPDES permit is properly issued for "discharge of a pollutant" to waters of the United States.[20] (Clean Water Act § 402(a).) The Clean Water Act defines "discharge of a pollutant" as an "addition" of a pollutant to waters of the United States from a point source. (Clean Water Act section 502(12).) Section 402(p)(3)(B) authorizes the issuance of permits for discharges "from municipal storm sewers."

We find that the permit language is overly broad because it applies the MEP standard not only to discharges "from" MS4s, but also to discharges "into" MS4s. It is certainly

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[18] The iterative approach is not necessary for all Discharge Prohibitions. For example, a prohibition against pollution, contamination or nuisance should generally be complied with at all times. (See, Discharge Prohibition A.1.) Also, there may be discharge prohibitions for particularly sensitive water bodies, such as the prohibition in the Ocean Plan applicable to Areas of Special Biological Significance.

[19] Discharge Prohibition A.1 also refers to discharges into the MS4, but it only prohibits pollution, contamination, or nuisance that occurs "in waters of the state." Therefore, it is interpreted to apply only to discharges to receiving waters.

[20] Since NPDES permits are adopted as waste discharge requirements in California, they can more broadly protect "waters of the state," rather than being limited to "waters of the United States." In general, the inclusion of "waters (footnote continued)

true that in most instances it is more practical and effective to prevent and control pollution at its source. We also agree with the Regional Water Board's concern, stated in its response, that there may be instances where MS4s use "waters of the United States" as part of their sewer system, and that the Board is charged with protecting all such waters. Nonetheless, the specific language in this prohibition too broadly restricts all discharges "into" an MS4, and does not allow flexibility to use regional solutions, where they could be applied in a manner that fully protects receiving waters.[21] It is important to emphasize that dischargers into MS4s continue to be required to implement a full range of BMPs, including source control. In particular, dischargers subject to industrial and construction permits must comply with all conditions in those permits prior to discharging storm water into MS4s.

Contention: State law requires the adoption of wet weather water quality standards, and the permit improperly enforces water quality standards that were not specifically adopted for wet weather discharges.

Finding: This contention is clearly without merit. There is no provision in state or federal law that mandates adoption of separate water quality standards for wet weather conditions. In arguing that the permit violates state law, BIA states that because the permit applies the water quality objectives that were adopted in its Basin Plan, and those objectives were not specifically adopted for wet weather conditions only, the Regional Water Board violated

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of the state" allows the protection of groundwater, which is generally not considered to be "waters of the United States."

[21] There are other provisions in the permit that refer to restrictions "into" the MS4. (See, e.g., Legal Authority D.1.) Those provisions are appropriate because they do not apply the MEP standard to the permittees, but instead require the permittees to demand appropriate controls for discharges into their system. For example, the federal regulations require that MS4s have a program "to reduce pollutants in storm water runoff from construction sites to the municipal storm sewer system . . . ." (40 C.F.R. § 122.26(d)(2)(iv)(D).)

Water Code section 13241. These allegations appear to challenge water quality objectives that were adopted years ago. Such a challenge is clearly inappropriate as both untimely, and because Basin Plan provisions cannot be challenged through the water quality petition process. (See Wat. Code § 13320.) Moreover, there is nothing in section 13241 that supports the claim that Regional Water Boards must adopt separate wet weather water quality objectives. Instead, the Regional Water Board's response indicates that the water quality objectives were based on all water conditions in the area. There is nothing in the record to support the claim that the Regional Water Board did not in fact consider wet weather conditions when it adopted its Basin Plan. Finally, Water Code section 13263 mandates the Regional Water Board to implement its Basin Plan when adopting waste discharge requirements. The Regional Water Board acted properly in doing so.

BIA points to certain federal policy documents that authorize states to promulgate water quality standards specific to wet-weather conditions.[22] Each Regional Water Board considers revisions to its Basin Plan in a triennial review. That would be the appropriate forum for BIA to make these comments.

Contention: BIA contends that the permit improperly classifies urban runoff as "waste" within the meaning of the Water Code.

Finding: BIA challenges Finding 2, which states that urban runoff is a waste, as defined in the Water Code, and that it is a "discharge of pollutants from a point source" under the federal Clean Water Act. BIA contends that the legislative history of section 13050(d) supports

[22] These documents do not support the claim that U.S. EPA and the Clinton Administration indicated that the absence of such regulations "is a major problem that needs to be addressed," as claimed in BIA's Points and Authorities, at page 18.

its position that "waste" should be interpreted to exclude urban runoff. The Final Report of the Study Panel to the California State Water Resources Control Board (March, 1969) is the definitive document describing the legislative intent of the Porter-Cologne Water Quality Control Act. In discussing the definition of "waste," this document discusses its broad application to "current drainage, flow, or seepage into waters of the state of harmful concentrations" of materials, including eroded earth and garbage.

As we stated in Board Order WQ 95-2, the requirement to adopt permits for urban runoff is undisputed, and Regional Water Boards are not required to obtain any information on the impacts of runoff prior to issuing a permit. (At page 3.) It is also undisputed that urban runoff contains "waste" within the meaning of Water Code section 13050(d), and that the federal regulations define "discharge of a pollutant" to include "additions of pollutants into waters of the United States from: surface runoff which is collected or channeled by man." (40 C.F.R. § 122.2.) But it is the waste or pollutants in the runoff that meet these definitions of "waste" and "pollutant," and not the runoff itself.[23] The finding does create some confusion, since there are discharge prohibitions that have been incorporated into the permit that broadly prohibit the discharge of "waste" in certain circumstances. (See Attachment A to the permit.) The finding will therefore be amended to state that urban runoff contains waste and pollutants.

Contention: BIA contends that the Regional Water Board violated California Environmental Quality Act (CEQA).

[23] The Regional Water Board is appropriately concerned not only with pollutants in runoff but also the volume of runoff, since the volume of runoff can affect the discharge of pollutants in the runoff. (See Board Order WQ 2000-11, at page 5.)

Finding: As we have stated in several prior orders, the provisions of CEQA requiring adoption of environmental documents do not apply to NPDES permits.[24] BIA contends that the exemption from CEQA contained in section 13389 applies only to the extent that the specific provisions of the permit are required by the federal Clean Water Act. This contention is easily rejected without addressing whether federal law mandated all of the permit provisions. The plain language of section 13389 broadly exempts the Regional Water Board from the requirements of CEQA to prepare environmental documents when adopting "any waste discharge requirement" pursuant to Chapter 5.5 (§§ 13370 et seq., which applies to NPDES permits).[25] BIA cites the decision in *Committee for a Progressive Gilroy v. State Water Resources Control Board* (1987) 192 Cal.App.3d 847. That case upheld the State Water Board's view that section 13389 applies only to NPDES permits, and not to waste discharge requirements that are adopted pursuant only to state law. The case did not concern an NPDES permit, and does not support BIA's argument.

Contention: WSPA contends that the Regional Water Board did not follow this Board's precedent for retail gasoline outlets (RGOs) established in the LA SUSMP order.

Finding: In the LA SUSMP order, this Board concluded that construction of RGOs is already heavily regulated and that owners may be limited in their ability to construct infiltration facilities. We also noted that, in light of the small size of many RGOs and the proximity to underground tanks, it might not always be feasible or safe to employ treatment methodologies. We directed the Los Angeles Regional Water Board to mandate that RGOs

[24] Water Code section 13389; see, e.g., Board Order WQ 2000-11.

[25] The exemption does have an exception for permits for "new sources" as defined in the Clean Water Act, which is not applicable here.

employ the BMPs listed in a publication of the California Storm Water Quality Task Force. (*Best Management Practice Guide – Retail Gasoline Outlets* (March 1997).) We also concluded that RGOs should not be subject to the BMP design standards at this time. Instead, we recommended that the Regional Water Board undertake further consideration of a threshold relative to size of the RGO, number of fueling nozzles, or some other relevant factor. The LA SUSMP order did not preclude inclusion of RGOs in the SUSMP design standards, with proper justification, when the permit is reissued.

The permit adopted by the Regional Water Board did not comply with the directions we set forth in the LA SUSMP order for the regulation of RGOs. The permit contains no findings specific to the issues discussed in our prior order regarding RGOs, and includes no threshold for inclusion of RGOs in SUSMPs. Instead, the permit requires the dischargers to develop and implement SUSMPs within one year that include requirements for "Priority Development Project Categories," including "retail gasoline outlets." While other priority categories have thresholds for their inclusion in SUSMPs, the permit states: "Retail Gasoline Outlet is defined as any facility engaged in selling gasoline."[26]

The Regional Water Board responded that it did follow the directions in the LA SUSMP order. First, it points to findings that vehicles and pollutants they generate impact receiving water quality. But the only finding that even mentions RGOs is finding 4, which simply lists RGOs among the other priority development project categories as land uses that generate more pollutants. The Regional Water Board staff also did state some justifications for the inclusion of RGOs in two documents. The Draft Fact Sheet explains that RGOs contribute

[26] Permit at F.1.b(2)(a)(x).

pollutants to runoff, and opines that there are appropriate BMPs for RGOs. The staff also prepared another document after the public hearing, which was distributed to Board Members prior to their vote on the permit, and which includes similar justifications and references to studies.[27] The LA SUSMP order called for some type of threshold for inclusion of RGOs in SUSMPs. The permit does not do so. Also, justifications for permit provisions should be stated in the permit findings or the final fact sheet, and should be subject to public review and debate.[28] The discussion in the document submitted after the hearing did not meet these criteria. There was some justification in the "Draft Fact Sheet," but the fact sheet has not been finalized.[29] In light of our concerns over whether SUSMP sizing criteria should apply to RGOs, it was incumbent on the Regional Water Board to justify the inclusion of RGOs in the permit findings or in a final fact sheet, and to consider an appropriate threshold, addressing the concerns we stated. The Regional Water Board also responded that when the dischargers develop the SUSMPs, the dischargers might add specific BMPs and a threshold as directed in the LA SUSMP order. But the order specifically directed that any threshold, and the justification therefore, should be included in the permit. The Regional Water Board did not comply with these directions.

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[27] See "Comparison Between Tentative Order No. 2001-01 SUSMP Requirements and LARWQCB SUSMP Requirements (as Supported by SWRCB Order WQ 2000-11)."

[28] See 40 C.F.R. sections 124.6(e) and 124.8.

[29] U.S. EPA regulations require that there be a fact sheet accompanying the permit. (40 C.F.R. § 124.8.) The record contains only a draft fact sheet, which was never published or distributed in final form. The Regional Water Board should finalize the fact sheet, accounting for any revisions made in the final permit, and publish it on its web site as a final document.

III. CONCLUSIONS

Based on the discussion above, the Board concludes that:

1. The Regional Water Board appropriately required compliance with water quality standards and included requirements to achieve reduction of pollutants to the maximum extent practicable. The permit must be clarified so that the reference to the iterative process for achieving compliance applies not only to the receiving water limitation, but also to the discharge prohibitions that require compliance with water quality standards. The permit should also be revised so that it requires that MEP be achieved for discharges "from" the municipal sewer system, and for discharges "to" waters of the United States, but not for discharges "into" the sewer system.

2. The Regional Water Board was not required to adopt wet-weather specific water quality objectives.

3. The Regional Water Board inappropriately defined urban runoff as "waste."

4. The Regional Water Board did not violate the California Environmental Quality Act.

5. The permit will be revised to delete retail gasoline outlets from the Priority Development Project Categories for Standard Urban Storm Water Mitigation Plans. The Regional Water Board may consider adding retail gasoline outlets, upon inclusion of appropriate findings and a threshold describing which outlets are included in the requirements.

IV. ORDER

IT IS HEREBY ORDERED that the Waste Discharge Requirements for Discharges of Urban Runoff from the Municipal Separate Storm Sewer Systems in San Diego County (Order No. 2001-01) are revised as follows:

1. Part A.3: The words "into and" are deleted.

2. Part C.2: Throughout the first paragraph, the words ", Part A.2, and Part A.5 as it applies to Prohibition 5 in Attachment A" shall be inserted following "Part C.1."

3. Finding 2: Revise the finding to read: **URBAN RUNOFF CONTAINS "WASTE" AND "POLLUTANTS"**: Urban runoff contains waste, as defined in the California Water Code, and pollutants, as defined in the federal Clean Water Act, and adversely affects the quality of the waters of the State.

4. Part F.1.b(2)(a): Delete section "x."

In all other respects the petitions are dismissed.

CERTIFICATION

The undersigned, Clerk to the Board, does hereby certify that the foregoing is a full, true, and correct copy of a resolution duly and regularly adopted at a meeting of the State Water Resources Control Board held on November 15, 2001.

AYE: Arthur G. Baggett, Jr.
Peter S. Silva
Richard Katz

NO: None

ABSENT: None

ABSTAIN: None

Maureen Marché
Clerk to the Board

STATE OF CALIFORNIA

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
LOS ANGELES REGION

ORDER NO. 01-182
NPDES PERMIT NO. CAS004001
WASTE DISCHARGE REQUIREMENTS
FOR
MUNICIPAL STORM WATER AND URBAN RUNOFF DISCHARGES WITHIN THE COUNTY OF LOS ANGELES, AND THE INCORPORATED CITIES THEREIN, EXCEPT THE CITY OF LONG BEACH

December 13, 2001

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STATE OF CALIFORNIA

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
LOS ANGELES REGION

ORDER NO. 01-182
NPDES PERMIT NO. CAS004001
WASTE DISCHARGE REQUIREMENTS
FOR
MUNICIPAL STORM WATER AND URBAN RUNOFF DISCHARGES WITHIN THE COUNTY OF LOS ANGELES, AND THE INCORPORATED CITIES THEREIN, EXCEPT THE CITY OF LONG BEACH

The California Regional Water Quality Control Board, Los Angeles Region (hereinafter referred to as the Regional Board) finds:

A. Existing Permit

The Los Angeles County Flood Control District, the County of Los Angeles, and 84 incorporated cities within the Los Angeles County Flood Control District (see Attachment A, List of Permittees), hereinafter referred to separately as Permittees and jointly as the Discharger, discharge or contribute to discharges of storm water and urban runoff from municipal separate storm sewer systems (MS4s), also called storm drain systems. The discharges flow to water courses within the Los Angeles County Flood Control District and into receiving waters of the Los Angeles Region. These discharges are covered under countywide waste discharge requirements contained in Order No. 96-054 adopted by this Regional Board on July 15, 1996, which replaced Order No. 90-079 adopted by this Regional Board on June 18, 1990. Order No. 96-054 also serves as a National Pollutant Discharge Elimination System (NPDES) permit for the discharge of municipal storm water.

B. Nature of Discharges and Sources of Pollutant

1. Storm water discharges consist of surface runoff generated from various land uses in all the hydrologic drainage basins that discharge into water bodies of the State. The quality of these discharges varies considerably and is affected by the hydrology, geology, land use, season, and sequence and duration of hydrologic events. The primary constituents of concern currently identified by the Los Angeles County Flood Control District Integrated Receiving Water Impacts Report (1994-2000) are cyanide, indicator bacteria, total dissolved solids, turbidity, total suspended solids, nutrients, total aluminum, dissolved cadmium, copper, lead, total mercury, nickel, zinc, bis(2-ethylhexyl)phthalate, polycyclic aromatic hydrocarbons (PAHs), diazinon, and chlorpyrifos.

2. Certain pollutants present in storm water and/or urban runoff may be derived from extraneous sources that Permittees have no or limited jurisdiction over. Examples of such pollutants and their respective sources are: PAHs which are products of internal combustion engine

operation, nitrates, bis (2-ethylhexyl) phthalate and mercury from atmospheric deposition, lead from fuels, copper from brake pad wear, zinc from tire wear, dioxins as products of combustion, and natural-occurring minerals from local geology. However, the implementation of the measures set forth in this Order is intended to reduce the entry of these pollutants into storm water and their discharge to receiving waters.

3. Water quality assessments conducted by the Regional Board identified impairment, or threatened impairment, of beneficial uses of water bodies in the Los Angeles Region. The causes of impairments include pollutants of concern identified in municipal storm water discharges by the County of Los Angeles in the Integrated Receiving Water Impacts Report (1994-2000). Pollutants in storm water can have damaging effects on both human health and aquatic ecosystems.

4. The Los Angeles County Grand Jury, September 2000, completed an investigation into the health risks of swimming near beaches in Los Angeles County and made several recommendations to reduce public health risks (Final Report, Grand Jury, Los Angeles County, 1999-2000). The Grand Jury recommended that the Regional Board consider among other actions, (i) a focus on setting contaminant limits rather than programmatic evaluations, (ii) audit of MS4 Permittee programs; and (iii) clarifying enforcement responsibilities between the State and local governments.

5. Studies and research conducted by other Regional agencies, academic institutions, and universities have also identified storm water and urban runoff as significant sources of pollutants to surface waters in Southern California. See, e.g., [*Surface Runoff to the Southern California Bight*, Southern California Coastal Water Research Project, (1992); *Impacts of Urban Runoff on Santa Monica Bay and Surrounding Ocean Waters* (Gersberg, R.M., 1995); *State of the Bay 1998*, Santa Monica Bay Restoration Project; *Storm Water Impact*, In, Southern California Environmental Report Card 1999, Institute of the Environment, University of California, Los Angeles (Stenstrom, M.S., 1999); *Distribution of Anthropogenic and Natural Debris on the Mainland Shelf of Southern California Bight,* Shelly L. Moore and M. James Allen (1999); *The Health Effects of Swimming in Ocean Water Contaminated by Storm Drain Runoff*, Haile, R.W. et al. (1999); *Huntington Beach Closure Investigation: Technical Review* (University of Southern California, 2000); *A Regional Survey of the Microbiological Water Quality Along the Shoreline of the Southern California Bight,* Rachel T. Noble *et al.* (2001*); Integrated Receiving Water Impacts Report (1994-2000)*, County of Los Angeles (2001)].

6. Development and urbanization increase pollutant load, volume, and discharge velocity. First, natural vegetated pervious ground cover is converted to impervious surfaces such as paved highways, streets, rooftops and parking lots. Natural vegetated soil can both absorb rainwater and remove pollutants providing an effective natural purification process. In contrast, pavement and concrete can neither absorb water nor remove pollutants, and thus the natural purification characteristics are

lost. Second, urban development creates new pollution sources as the increased density of human population brings proportionately higher levels of vehicle emissions, vehicle maintenance wastes, municipal sewage waste, pesticides, household hazardous wastes, pet wastes, trash, and other anthropogenic pollutants. Development and urbanization especially threaten environmentally sensitive areas. Such areas have a much lower capacity to withstand pollutant shocks than might be acceptable in the general circumstance. In essence, development that is ordinarily insignificant in its impact on the environment may in a particular sensitive environment become significant. These environmentally sensitive areas designated by the State and/or the County of Los Angeles include Areas of Special Biological Significance (ASBS), water bodies designated as supporting a RARE beneficial use, Significant Natural Areas (SNAs), and Significant Ecological Areas (SEAs).

7. The increased volume, increased velocity, and discharge duration of storm water runoff from developed areas has the potential to greatly accelerate downstream erosion and impair stream habitat in natural drainages. Studies have demonstrated a direct correlation between the degree of imperviousness of an area and the degradation of its receiving waters. Significant declines in the biological integrity and physical habitat of streams and other receiving waters have been found to occur with as little as 10 percent conversion from natural to impervious surfaces. Percentage impervious cover is a reliable indicator and predictor of potential water quality degradation expected from new development. (*Impervious Cover as An Urban Stream Indicator and a Watershed Management Tool*, Schueler, T. and R. Claytor, In, Effects of Water Development and Management on Aquatic Ecosystems (1995), ASCE, New York; Leopold, L. B., (1973), *River Channel Change with Time: An Example*, Geological Society of America Bulletin, v. 84, p. 1845-1860; Hammer, T. R., (1972), *Stream Channel Enlargement Due to Urbanization: Water Resources Research*, v. 8, p. 1530-1540; Booth, D. B., (1991), *Urbanization and the Natural Drainage System--Impacts, Solutions and Prognoses*: The Northwest Environmental Journal, v. 7, p. 93-118; Klein, R. D., (1979), *Urbanization and Stream Quality Impairment*: Water Resources Bulletin, v. 15, p. 948-963; May, C. W., Horner, R. R., Karr, J. R., Mar, B. W., and Welch, E. B., (1997), *Effects of Urbanization on Small Streams in the Puget Sound Lowland Ecoregion*: Watershed Protection Techniques, v. 2, p. 483-494; Morisawa, M. and LaFlure, E. *Hydraulic Geometry, Stream Equilibrium and Urbanization* In Rhodes, D. P. and Williams, G. P. *Adjustments to the Fluvial System* p.333-350. (1979); Dubuque, Iowa, Kendall/Hunt. Tenth Annual Geomorphology Symposia Series; and *The Importance of Imperviousness*: Watershed Protection Techniques, 1(3), Schueler, T. (1994).)

8. The County of Los Angeles has identified as the seven highest priority industrial and commercial critical source types, (i) wholesale trade (scrap recycling, auto dismantling); (ii) automotive repair/parking; (iii) fabricated metal products; (iv) motor freight; (v) chemical and allied products; (vi) automotive dealers/gas stations; (vii) primary metal products (*Critical*

Source Selection and Monitoring Report, Los Angeles County Department of Public Works -Sept 1996). Monitoring conducted by Los Angeles County and the Regional Board demonstrates that the priority industrial sectors and auto repair facilities (one of the commercial sectors) on the list, contribute significant concentrations of heavy metals to storm water (*Los Angeles County 1999-2000 Storm Water Monitoring Report*, Los Angeles County Department of Public Works -July 2000; *Compliance Assessment of the Auto Dismantling Industry; Evaluation of the California General Industrial Storm Water Permit*, H. Chang, (2001), 70 pp., California Regional Water Quality Control Board, Los Angeles Region).

9. The discharge of washwaters and contaminated storm water from industries and businesses specified in this Order for inspection by Permittees is an environmental threat and can also adversely impact public health and safety. For example, a review of industrial waste/ pretreatment records performed in 1995 in the County of Los Angeles on illicit discharges indicates that automotive service facilities and food service facilities sometimes discharge polluted washwaters to the MS4. The pollutants of concern in such washwaters include food waste, oil and grease, and toxic chemicals. Other storm water/industrial waste programs in California have reported similar observations. Illicit discharges from automotive service facilities and food service facilities have been identified elsewhere as a major cause of widespread contamination and water quality problems (Washtenaw County Statutory Drainage Board - 1987 Huron River Pollution Abatement Program).

10. Studies indicate that facilities with paved surfaces subject to frequent motor vehicular traffic (such as parking lots and fast food restaurants), or facilities that perform vehicle repair, maintenance, or fueling (automotive service facilities) are potential sources of pollutants of concern in storm water. [References: Pitt *et* al., *Urban Storm Water Toxic Pollutants: Assessment, Sources, and Treatability*, Water Environment Res., 67, 260 (1995)*; Results of Retail Gas Outlet and Commercial Parking Lot Storm Water Runoff Study*, Western States Petroleum Association and American Petroleum Institute, (1994); *Action Plan Demonstration Project, Demonstration of Gasoline Fueling Station Best Management Practices*, Final Report, County of Sacramento (1993); *Source Characterization*, R. Pitt, In Innovative Urban Wet-Weather Flow Management Systems (2000) Technomic Press, Field, R *et al*. editors; *Characteristics of Parking Lot Runoff Produced by Simulated Rainfall*, , L.L. Tiefenthaler *et al*. Technical Report 343, Southern California Coastal Water Research Project (2001).]

11. Retail Gasoline Outlets (RGOs) are points of convergence for vehicular traffic and are similar to parking lots and urban roads. Studies indicate that storm water discharges from RGOs have high concentrations of hydrocarbons and heavy metals. [*The Quality of Trapped Sediments and Poor Water within Oil Grit Separators in Suburban MD,* Schueler T. and Shepp D. (1992), and *Concentrations of Selected Constituents in Runoff from Impervious Surfaces in Four Urban Catchments of Different*

Landuse, Ranabal, F.I., and T.J. Gizzard (1995), In Proceedings of the Fourth Biennial Stormwater Research Conference, Florida, pp-42-52]. Pilot studies indicate that treatment control best management practices installed at retail gasoline stations are effective in removing pollutants, reasonable in capital cost, easy to operate, and do not present safety risks [*Rouge River National Wet Weather Demonstration Project, Task Product Memorandum – Evaluation of On-line Media Filters RPO-NPS-TPM59.00*, Wayne County, MI, March 1999]. The Regional Board and the San Diego Regional Board have jointly prepared a Technical Report on the applicability of new development BMP design criteria for retail gasoline outlets, (*Retail Gasoline Outlets: New Development Design Standards for Mitigation of Storm Water Impacts*, (June 2001)). Retail Gasoline Outlets in Western U.S. States (such as Washington and Oregon) are already subject to numerical BMP design criteria, as well in other U.S. States.

C. Permit Background

1. The essential components of the Storm Water Management Program, as established by federal regulations [40 CFR 122.26(d)] are: (i) Adequate Legal Authority, (ii) Fiscal Resources, (iii) Storm Water Quality Management Program (SQMP) - (Public Information and Participation Program, Industrial/Commercial Facilities Program, Development Planning Program, Development Construction Program, Public Agency Activities Program, Illicit Connection and Illicit Discharges Elimination Program), and (iv) Monitoring and Reporting Program.

2. The Permittees have filed a Report of Waste Discharge (ROWD), dated February 1, 2001, and applied for renewal of their waste discharge requirements that serves as an NPDES permit to discharge wastes to surface waters. The ROWD includes a proposed SQMP and a Monitoring Program. The proposed SQMP contains programs previously approved under Board Order No. 96-054 in the following areas:

   Public Information and Participation
   Development Planning
   Development Construction
   Public Agency Activities
   Illicit Connection/Illicit Discharge Elimination Program

   These programs are revised pursuant to the provisions of this Order after adoption.

3. The County of Los Angeles has previously conducted source identification and pollutant characterization consistent with 40 CFR 122.26(d)(1)(ii) and (iii) under its storm water Monitoring Program. The Monitoring Program submitted with the ROWD proposes to advance the assessment of receiving water impacts, identification of sources of pollution, evaluation of Best Management Practices (BMPs), and measurement of long term trends in mass emissions.

4. The Regional Board has reviewed the ROWD and has determined it to be complete under the reapplication policy of MS4s issued by the U.S. Environmental Protection Agency (USEPA) (61 *Fed. Reg*. 41697). The Regional Board finds that the Permittees' proposed SQMP, incorporating the additional and/or revised provisions contained in this Order would meet the minimum requirements of federal regulations.

5. The City of Los Angeles has conducted shoreline and nearshore water quality monitoring off the Santa Monica Bay since the 1950s under the monitoring program for the Hyperion Waste Water Treatment Plant (NPDES No. CA0109991). The monitoring results indicate that effluent from Hyperion's 5-Mile Outfall does not impinge the shoreline, and that elevated bacterial counts are associated with runoff from storm drains and discharges from piers. In 1994, the Regional Board approved the relocation of Hyperion's shoreline stations to implement a bay-wide, regional shoreline-monitoring program associated with storm drain outfalls in the Santa Monica Bay. The City of Los Angeles requested that the shoreline-monitoring requirement be incorporated in this Order. The shoreline pathogen monitoring requirements are outlined in the Monitoring Program for this Order.

D. Permit Coverage

1. The requirements in this Order cover all areas within the boundaries of the Permittee municipalities (see Attachment A) over which they have regulatory jurisdiction as well as unincorporated areas in Los Angeles County within the jurisdiction of the Regional Board. The Permittees serve a population of about 9.5 million [Reference: *2000 Census of Population and Housing,* Bureau of the Census, U.S. Department of Commerce (2001)] in an area of approximately 3,100 square miles.

2. Federal, state, regional or local entities within the Permittees' boundaries or in jurisdictions outside the Los Angeles County Flood Control District, and not currently named in this Order, may operate storm drain facilities and/or discharge storm water to storm drains and watercourses covered by this Order. The Permittees may lack legal jurisdiction over these entities under state and federal constitutions. The Regional Board will coordinate with these entities to implement programs that are consistent with the requirements of this Order. The Regional Board will consider such facilities for coverage in 2003 under its NPDES permitting scheme pursuant to USEPA Phase II storm water regulations.

3. Sources of discharges into receiving waters in the County of Los Angeles but in jurisdictions outside its boundary include the following:

   About 34 square miles of unincorporated area in Ventura County, which drain into Malibu Creek and then to Santa Monica Bay,

   About 9 square miles of the City of Thousand Oaks, which also drain into Malibu Creek and then to Santa Monica Bay, and

About 86 square miles of area in Orange County, which drain into Coyote Creek and then into the San Gabriel River.

The Regional Board will ensure that storm water management programs for the areas in Ventura County and the City of Thousand Oaks that drain into Santa Monica Bay are consistent with the requirements of this Order. The Regional Board will coordinate with the Santa Ana Regional Board so that storm water management programs for the areas in Orange County that drain into Coyote Creek are consistent with the requirements of this Order.

4. This permit is intended to develop, achieve, and implement a timely, comprehensive, cost-effective storm water pollution control program to reduce the discharge of pollutants in storm water to the Maximum Extent Practicable (MEP) from the permitted areas in the County of Los Angeles to the waters of the U.S. subject to the Permittees' jurisdiction.

5. Permittees have expressed their intention to work cooperatively to control the contribution of pollutants from one portion of the MS4 to another portion of the system. Permittees may control the contribution of pollutants to the MS4 from non-permittee dischargers such as Caltrans, the U.S. Department of Defense, and other state and federal facilities, through interagency agreements.

E. Federal, State, and Regional Regulations

1. The Water Quality Act of 1987 added Section 402(p) to the federal Clean Water Act (CWA) (33 U.S.C. § 1251-1387). This section requires the USEPA to establish regulations setting forth NPDES requirements for storm water discharges in two phases.

   - The USEPA Phase I storm water regulations were directed at MS4s serving a population of 100,000 or more, including interconnected systems and storm water discharges associated with industrial activities, including construction activities. The Phase I Final Rule was published on November 16, 1990 (55 *Fed. Reg*. 47990).

   - The USEPA Phase II storm water regulations are directed at storm water discharges not covered in Phase I, including small MS4s (serving a population of less than 100,000), small construction projects (one to five acres), municipal facilities with delayed coverage under the Intermodal Surface Transportation Efficiency Act of 1991, and other discharges for which the USEPA Administrator or the State determines that the storm water discharge contributes to a violation of a water quality standard, or is a significant contributor of pollutants to waters of the United States. The Phase II Final Rule was published on December 8, 1999 (64 *Fed. Reg*. 68722).

2. The USEPA published an 'Interim Permitting Approach for Water Quality-Based Effluent Limitations in Storm Water Permits' on August 26, 1996 (61 *Fed. Reg.* 43761). This policy discusses the appropriate kinds of

water quality-based effluent limitations to be included in NPDES storm water permits to provide for the attainment of water quality standards.

3. The USEPA published an 'Interpretative Policy Memorandum on Reapplication Requirements' for MS4 permits on August 9, 1996 (61 *Fed. Reg*. 41697). This policy requires that MS4 reapplication for reissuance for a subsequent five-year permit term contain certain basic information and information for proposed changes and improvements to the storm water management program and monitoring program.

4. The USEPA has entered into a Memorandum of Agreement (MOA) with the U.S. Fish and Wildlife Service and the National Marine Fisheries Service for enhancing coordination regarding the protection of endangered and threatened species under Section 7 of the Endangered Species Act and the CWA's Water Quality Standards and NPDES programs. Among other actions, the MOA establishes a framework for coordination of actions by the USEPA, the Services, and CWA delegated States on CWA permit issuance under Section 402 of the CWA [66 *Fed. Reg*. 11202 – 11217].

5. USEPA regulations at 40 CFR 122.26(d)(2)(iv)(A) and 40 CFR 122.26(d)(2)(iv)(C) require that MS4 permittees implement a program to monitor and control pollutants in discharges to the municipal system from industrial and commercial facilities that contribute a substantial pollutant load to the MS4. The regulations require that permittees establish priorities and procedures for inspection of industrial facilities and priority commercial establishments. This permit, consistent with the USEPA policy, incorporates a cooperative partnership, including the specifications of minimum expectations, between the Regional Board and the Permittees for the inspection of industrial facilities and priority commercial establishments to control pollutants in storm water discharges (58 *Fed. Reg.* 61157).

6. Section 402 (p) of the CWA (33 U.S.C. § 1342(p) provides that MS4 permits must "require controls to reduce the discharge of pollutants to the maximum extent practicable, including management practices, control techniques and system, design engineering method and such other provisions as the [EPA] Administrator or the State determines appropriate for the control of such pollutants." The State Water Resources Control Board's (State Board) Office of Chief Counsel (OCC) has issued a memorandum interpreting the meaning of MEP to include technical feasibility, cost, and benefit derived with the burden being on the municipality to demonstrate compliance with MEP by showing that a BMP is not technically feasible in the locality or that BMPs costs would exceed any benefit to be derived (dated February 11, 1993).

7. The CWA authorizes the USEPA to permit a state to serve as the NPDES permitting authority in lieu of the USEPA. The State of California has in-lieu authority for an NPDES program. The Porter-Cologne Water Quality Control Act authorizes the State Board, through the Regional Boards, to regulate and control the discharge of pollutants into waters of the State. The State Board entered into a MOA with the USEPA, on

September 22, 1989, to administer the NPDES Program governing discharges to waters of the U.S.

8. Section 303(d) of the CWA requires that the State identify a list of impaired water-bodies and develop and implement Total Maximum Daily Loads (TMDLs) for these waterbodies (33 U.S.C. §1313(d)(1)). A TMDL specifies the maximum amount of a pollutant that a water-body can receive, still meet applicable water quality standards and protect beneficial uses. The USEPA entered into a consent decree with the Natural Resources Defense Council (NRDC), Heal the Bay, and the Santa Monica BayKeeper on March 22, 1999, under which the Regional Board must adopt all TMDLs for the Los Angeles Region within 13 years from that date. This permit incorporates a provision to implement and enforce approved load allocations for municipal storm water discharges and requires amending the SQMP after pollutants loads have been allocated and approved.

9. Section 6217(g) of the Coastal Zone Act Reauthorization Amendments of 1990 (CZARA) requires coastal states with approved coastal zone management programs to address non-point pollution impacting or threatening coastal water quality. CZARA (16 U.S.C. § 1451-1465) amends the Coastal Zone Management Act of 1972, to address five sources of non-point pollution: agriculture, silviculture, urban, marinas, and hydromodification. This NPDES permit addresses the management measures required for the urban category, with the exception of septic systems. The Regional Board addresses septic systems through the administration of other programs.

10. On May 18, 2000, the USEPA established numeric criteria for priority toxic pollutants for the State of California (California Toxics Rule (CTR)) 65 *Fed. Reg*. 31682 (40 CFR 131.38), for the protection of human health and aquatic life. These apply as ambient water quality criteria for inland surface waters, enclosed bays, and estuaries. The State Board adopted the *Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California (SIP) – 2000,* on March 2, 2000, for implementation of the CTR (State Board Resolution No. 2000-15 as amended by Board Resolution No. 2000-030). This policy requires that discharges comply with TMDL-derived load allocations as soon as possible but no later than 20 years from the effective date of the policy.

11. The State Board adopted a revised Water Quality Control Plan for Ocean Waters of California (Ocean Plan) on July 23, 1997. The Ocean Plan contains water quality objectives which apply to all discharges to the coastal waters of California.

12. The State Board in *In Re*: California Department of Transportation (State Board Order WQ 2001-08), determined that the discharge of storm water to ASBS is subject to the prohibition in the Ocean Plan against the discharge of wastes to an ASBS.

13. The Regional Board adopted an updated Water Quality Control Plan (Basin Plan) for the Los Angeles Region on June 13, 1994, *'Water Quality Control Plan, Los Angeles Region: Basin Plan for the Coastal Watersheds of Los Angeles and Ventura Counties*, (1994).' The Basin Plan designates beneficial uses of receiving waters and specifies both narrative and numerical water quality objectives for the receiving waters in Los Angeles County.

14. The Regional Board on September 19, 2001, adopted amendments to the Basin Plan, to incorporate TMDLs for trash in the Los Angeles River (Resolution No. 01-013) and Ballona Creek (Resolution No. 01-014). After approval by the State Board, the Office of Administrative Law, and the USEPA, the TMDLs for trash will be effective and enforceable.

15. The Regional Board on April 13, 1998, approved BMPs for sidewalk rinsing to minimize the discharge of wash waters to the storm drain system (Resolution No. 98-08). By the same resolution, the Regional Board prohibited the discharge of municipal street wash waters to the storm drain system.

16. The Regional Board on April 13, 1998, approved recommended BMPs for industrial/commercial facilities (Resolution No. 98-08).

17. The Regional Board on April 22, 1999, approved a list of BMPs for use in development planning and development construction (Resolution No. 99-03)

18. The Regional Board adopted and approved requirements for new development and significant redevelopment projects in Los Angeles County to control the discharge of storm water pollutants in post-construction storm water, on January 26, 2000, in Board Resolution No. R-00-02. The Regional Board Executive Officer issued the approved Standard Urban Storm Water Mitigation Plans (SUSMPs) on March 8, 2000. The State Board in large part affirmed the Regional Board action and SUSMPs in State Board Order No. WQ 2000-11 issued on October 5, 2000.

    - The State Board's Chief Counsel has issued a statewide policy memorandum (dated December 26, 2000), which interprets the Order to provide broad discretion to Regional Boards and identifies potential future areas for inclusion in SUSMPs and the types of evidence and findings necessary. Such areas include ministerial projects, projects in environmentally sensitive areas, and water quality design criteria for RGOs.

    - The State Board's Chief Counsel interprets the Order to encourage regional solutions and endorses a mitigation fund or "bank" that may be funded by developers who obtain waivers from the numerical design standards for new development and significant redevelopment.

19. 40 CFR 131.10(a) prohibits states from designating waste transport or waste assimilation as a use for any water of the U.S. Authorizing the

construction of a storm water/ urban runoff treatment facility in a jurisdictional water body would be tantamount to accepting waste assimilation as an appropriate use for that water body. Furthermore, the construction and operation of a pollution control facility in a water body can impact the physical, chemical, and biological integrity as well as the beneficial uses of the water body. Therefore, storm water treatment and/or mitigation in accordance with SUSMPs and any other requirements of this Order must occur prior to the discharge of storm water into a water of the U.S.

20. The Regional Board supports a Watershed Management Approach to address water quality protection in the region. The objective of the Watershed Management Approach should be to provide a comprehensive and integrated strategy towards water resource protection, enhancement, and restoration while balancing economic and environmental impacts within a hydrologically defined drainage basin or watershed. It emphasizes cooperative relationships between regulatory agencies, the regulated community, environmental groups, and other stakeholders in the watershed to achieve the greatest environmental improvements with available resources.

21. To promote a watershed management approach, the County of Los Angeles is divided into six Watershed Management Areas (WMAs) as follows:

    Malibu Creek and Rural Santa Monica Bay WMA
    Ballona Creek and Urban Santa Monica Bay WMA
    Los Angeles River WMA
    San Gabriel River WMA
    Dominguez Channel/Los Angeles Harbor WMA, and
    Santa Clara River WMA

    Attachment A shows the list of Permittees under each WMA and some Permittees have expressed an intent to form sub-watershed groups within the WMA to promote regional solutions for the mitigation of storm water discharge pollution.

22. To facilitate compliance with federal regulations, the State Board has issued two statewide general NPDES permits for storm water discharges: one for storm water from industrial sites [NPDES No. CAS000001, General Industrial Activity Storm Water Permit (GIASP)] and the other for storm water from construction sites [NPDES No. CAS000002, General Construction Activity Storm Water Permit (GCASP)]. The GCASP was reissued on August 19, 1999. The GIASP was reissued on April 17, 1997. Facilities discharging storm water associated with industrial activities and construction projects with a disturbed area of five acres or more are required to obtain individual NPDES permits for storm water discharges, or to be covered by a statewide general permit by completing and filing a Notice of Intent (NOI) with the State Board. The USEPA guidance anticipates coordination of the state-administered programs for

industrial and construction activities with the local agency program to reduce pollutants in storm water discharges to the MS4.

The Regional Board is the enforcement authority in the Los Angeles Region for the two statewide general permits regulating discharges from industrial facilities and construction sites, and all NPDES storm water and non-storm water permits issued by the Regional Board. These industrial and construction sites and discharges are also regulated under local laws and regulations.

23. The State Board, on October 28, 1968, adopted Resolution No. 68-16, which established an anti-degradation policy for the State and Regional Boards. This policy restricts the degradation of surface waters and protects waterbodies where existing water quality is higher than is necessary for the protection of beneficial uses.

24. The State Board, on June 17, 1999, adopted Order No. WQ 99-05, which, in a precedential decision, identifies acceptable receiving water limitations language to be included in municipal storm water permits issued by the State and Regional Boards. The receiving water limitations included herein are consistent with the State Board Order, USEPA Policy, and the U.S. Appellate court decision in, *Defenders of Wildlife v. Browner* (9th. Cir, 1999). The State Board OCC has determined that the federal court decision did not conflict with State Board Order No. WQ 99-05 (memorandum dated October 14, 1999)

25. California Water Code (CWC) § 13263(a) requires that waste discharge requirements issued by the Regional Board shall implement any relevant water quality control plans that have been adopted; shall take into consideration the beneficial uses to be protected and the water quality objectives reasonably required for that purpose; other waste discharges; the need to prevent nuisance; and provisions of CWC § 13241. The Regional Board has considered the requirements of § 13263 and § 13241, and applicable plans, policies, rules, and regulations in developing these waste discharge requirements.

26. CWC § 13370 *et seq.* requires that waste discharge requirements issued by the Regional Boards be consistent with provisions of the federal CWA and its amendments.

27. On March 12, 2001, the U.S. Court of Appeals ruled that it is necessary to obtain a NPDES permit for application of aquatic pesticides to waterways. (*Headwaters, Inc. vs. Talent Irrigation District,* 243 F.3d. 526 (9th Cir., 2001)) This decision is controlling in California for nonagricultural applications of pesticides to waterways. The State Board adopted a general NPDES permit (Order No. 2001-12-DWQ) on July 19, 2001, for public entities that discharge pollutants to waters of the U.S. associated with the application of aquatic pesticides for resource or pest management. Public entities that conduct such activities must seek coverage under the general permit.

F. Implementation

1. The California Environmental Quality Act (CEQA) (Cal. Pub. Resources Code § 21000 *et seq*.) requires that public agencies consider the environmental impacts of the projects they approve for development. CEQA applies to projects that are considered discretionary and does not apply to ministerial projects, which involve the use of established standards or objective measurements. A ministerial project may be made discretionary by adopting local ordinance provisions or imposing conditions to create decision-making discretion in approving the project. In the alternative, Permittees may establish standards and objective criteria administratively for storm water mitigation for ministerial projects. For water quality purposes, the Regional Board considers that all new development and significant redevelopment activity in specified categories, that receive approval or permits from a municipality, are subject to storm water mitigation requirements.

2. The objective of this Order is to protect the beneficial uses of receiving waters in Los Angeles County. To meet this objective, this Order requires that the SQMP specify BMPs that will be implemented to reduce the discharge of pollutants in storm water to the maximum extent practicable. Further, Permittees are to assure that storm water discharges from the MS4 shall neither cause nor contribute to the exceedance of water quality standards and objectives nor create conditions of nuisance in the receiving waters, and that the discharge of non-storm water to the MS4 has been effectively prohibited.

3. The SQMP required in this Order builds upon the programs established in Order Nos. 90-079, and 96-054, consists of the components recommended in the USEPA guidance manual, and was developed with the cooperation of representatives from the regulated community and environmental groups. The SQMP includes provisions that promote customized initiatives, both on a countywide and watershed basis, in developing and implementing cost-effective measures to minimize discharge of pollutants to the receiving water. The various components of the SQMP, taken as a whole rather than individually, are expected to reduce pollutants in storm water and urban runoff to the maximum extent practicable. Provisions of the SQMP are fully enforceable under provisions of this Order.

4. The emphasis of the SQMP is pollution prevention through education, public outreach, planning, and implementation as source control BMPs first and then Structural and Treatment Control BMPs next. Successful implementation of the provisions of the SQMP will require cooperation and coordination of all public agencies in each Permittee's organization, among Permittees, and with the regulated community.

5. The implementation of a Public Information and Participation Program is a critical component of a storm water management program. An informed and knowledgeable community is critical to the success of a storm water management program since it helps insure the following: (i) greater support for the program as the public gains a greater understanding of

the reasons why it is necessary and important, and (ii) greater compliance with the program as the public becomes aware of the personal responsibilities expected of them and others in the community, including the individual actions they can take to protect or improve the quality of area waters.

6. This Order includes a Monitoring Program that incorporates Minimum Levels (MLs) established under the SIP. The SIP's MLs represent the lowest quantifiable concentration for priority toxic pollutants that is measurable with the use of proper method-based analytical procedures and factoring out matrix interference. The SIP's MLs therefore represent the best available science for determining MLs and are appropriate for a storm water monitoring program. The use of MLs allows the detection of toxic priority pollutants at concentrations of concern using recent advances in chemical analytical methods.

7. This Order provides flexibility for Permittees to petition the Regional Board Executive Officer to substitute a BMP under the SQMP with an alternative BMP, if they can provide information and documentation on the effectiveness of the alternative, equal to or greater than the prescribed BMP in meeting the objectives of this Order.

8. This Order contemplates that the Permittees are responsible for considering potential storm water impacts when making planning decisions in order to fulfill the Permittees' CWA requirement to reduce the discharge of pollutants in municipal storm water to the MEP from new development and redevelopment activities. However, the Permittees retain authority to make the final land-use decisions and retain full statutory authority for deciding what land uses are appropriate at specific locations within each Permittee's jurisdiction. This Order and its requirements are not intended to restrict or control local land use decision-making authority.

9. This Order is not intended to prohibit the inspection for or abatement of vectors by the State Department of Health Services or local vector agencies in accordance with Cal. Health and Safety Code § 2270 *et seq*. and §116110 *et seq*. Certain Treatment Control BMPs if not properly designed, operated or maintained may create habitats for vectors (e.g. mosquito and rodents). This Order contemplates that the Permittees will closely cooperate and collaborate with local vector control agencies and the State Department of Health Services for the implementation, operation, and maintenance of Treatment Control BMPs in order to minimize the risk to public health from vector borne diseases.

G. Public Process

1. The Regional Board has notified the Permittees and interested agencies and persons of its intent to issue waste discharge requirements for this discharge, and has provided them with an opportunity to submit their written view and recommendations.

2. The Regional Board, in a public hearing, heard and considered all comments pertaining to the discharge and to the tentative requirements.

3. The Regional Board has conducted public workshops to discuss drafts of the permit. On April 24, 2001, Regional Board staff conducted a workshop outlining the reasoning behind the changes proposed for the new permit and received input from the Permittees and the public regarding those proposed changes. On July 26, 2001, a second public workshop was held at a special Regional Board meeting. The Permittees and the public had another opportunity to express their opinions regarding the proposed changes to the permit in front of the Regional Board members. A significant number of working meetings with the Permittees and other interested parties have occurred throughout the period from the submittal of the ROWD and completion of the tentative draft, in an attempt to incorporate and address all the comments presented.

4. The Los Angeles County Flood Control District, the County of Los Angeles and the other municipalities are co-permittees as defined in 40 CFR 122.26 (b)(1). Los Angeles County Flood Control District will coordinate with the other municipalities and facilitate program implementation. Each Permittee is responsible only for a discharge for which it is the operator.

5. This Order shall serve as a NPDES Permit, pursuant to CWA § 402, or amendments thereto, and shall take effect 50 days from Order adoption provided the Regional Administrator of the USEPA has no objections.

6. The action to adopt an NPDES permit is exempt from the provisions of Chapter 3 of CEQA (Cal. Pub. Resources Code § 21100 *et seq*.), in accordance with CWC § 13389.

7. Pursuant to CWC §13320, any aggrieved party may seek review of this Order by filing a petition with the State Board. A petition must be sent to: State Water Resources Control Board, P.O. Box 100, Sacramento, California, 95812, within 30 days of adoption of the Order by the Regional Board.

8. This Order may be modified or alternatively revoked or reissued prior to its expiration date, in accordance with the procedural requirements of the NPDES program, and the CWC for the issuance of waste discharge requirements.

IT IS HEREBY ORDERED that the Los Angeles County Flood Control District, Los Angeles County, and the Cities of Agoura Hills, Alhambra, Arcadia, Artesia, Azusa, Baldwin Park, Bell, Bellflower, Bell Gardens, Beverly Hills, Bradbury, Burbank, Calabasas, Carson, Cerritos, Claremont, Commerce, Compton, Covina, Cudahy, Culver City, Diamond Bar, Downey, Duarte, El Monte, El Segundo, Gardena, Glendale, Glendora, Hawaiian Gardens, Hawthorne, Hermosa Beach, Hidden Hills, Huntington Park, Industry, Inglewood, Irwindale, La Cañada Flintridge, La Habra Heights, Lakewood, La Mirada, La Puente, La Verne, Lawndale, Lomita, Los Angeles, Lynwood, Malibu, Manhattan Beach, Maywood, Monrovia, Montebello, Monterey Park, Norwalk, Palos Verdes Estates, Paramount, Pasadena, Pico Rivera, Pomona, Rancho Palos Verdes,

Redondo Beach, Rolling Hills, Rolling Hills Estates, Rosemead, San Dimas, San Fernando, San Gabriel, San Marino, Santa Clarita, Santa Fe Springs, Santa Monica, Sierra Madre, Signal Hill, South El Monte, South Gate, South Pasadena, Temple City, Torrance, Vernon, Walnut, West Covina, West Hollywood, Westlake Village, and Whittier, in order to meet the provisions contained in Division 7 of the CWC and regulations adopted thereunder, and the provisions of the CWA, as amended, and regulations and guidelines adopted thereunder, shall comply with the following:

Part 1. DISCHARGE PROHIBITIONS

The Permittees shall effectively prohibit non-storm water discharges into the MS4 and watercourses, except where such discharges:

1. Are covered by a separate individual or general NPDES permit for non-storm water discharges; or

2. Fall within one of the categories below, and meet all conditions when specified by the Regional Board Executive Officer:

   a) Category A - Natural flow:

      (1) Natural springs and rising ground water;

      (2) Flows from riparian habitats or wetlands;

      (3) Stream diversions, permitted by the State Board; and

      (4) Uncontaminated ground water infiltration [as defined by 40 CFR 35.2005(20)].

   b) Category B - Flows from emergency fire fighting activity.

   c) Category C - Flows incidental to urban activities:

      (1) Reclaimed and potable landscape irrigation runoff;

      (2) Potable drinking water supply and distribution system releases (consistent with American Water Works Association guidelines for dechlorination and suspended solids reduction practices);

      (3) Drains for foundations, footings, and crawl spaces;

      (4) Air conditioning condensate;

      (5) Dechlorinated/debrominated swimming pool discharges;

      (6) Dewatering of lakes and decorative fountains;

      (7) Non-commercial car washing by residents or by non-profit organizations; and

      (8) Sidewalk rinsing.

   The Regional Board Executive Officer may add or remove categories of non-storm water discharges above. Furthermore, in the event that any of

the above categories of non-storm water discharges are determined to be a source of pollutants by the Regional Board Executive Officer, the discharge will no longer be exempt from this prohibition unless the Permittee implements conditions approved by the Regional Board Executive Officer to ensure that the discharge is not a source of pollutants. Notwithstanding the above, the Regional Board Executive Officer may impose additional prohibitions of non-storm water discharges in consideration of anti-degradation policies and TMDLs.

Part 2. RECEIVING WATER LIMITATIONS

1. Discharges from the MS4 that cause or contribute to the violation of Water Quality Standards or water quality objectives are prohibited.

2. Discharges from the MS4 of storm water, or non-storm water, for which a Permittee is responsible for, shall not cause or contribute to a condition of nuisance.

3. The Permittees shall comply with Part 2.1. and 2.2. through timely implementation of control measures and other actions to reduce pollutants in the discharges in accordance with the SQMP and its components and other requirements of this Order including any modifications. The SQMP and its components shall be designed to achieve compliance with receiving water limitations. If exceedances of Water Quality Objectives or Water Quality Standards (collectively, Water Quality Standards) persist, notwithstanding implementation of the SQMP and its components and other requirements of this permit, the Permittee shall assure compliance with discharge prohibitions and receiving water limitations by complying with the following procedure:

   a) Upon a determination by either the Permittee or the Regional Board that discharges are causing or contributing to an exceedance of an applicable Water Quality Standard, the Permittee shall promptly notify and thereafter submit a Receiving Water Limitations (RWL) Compliance Report (as described in the Program Reporting Requirements, Section I of the Monitoring and Reporting Program) to the Regional Board that describes BMPs that are currently being implemented and additional BMPs that will be implemented to prevent or reduce any pollutants that are causing or contributing to the exceedances of Water Quality Standards. This RWL Compliance Report may be incorporated in the annual Storm Water Report and Assessment unless the Regional Board directs an earlier submittal. The RWL Compliance Report shall include an implementation schedule. The Regional Board may require modifications to the RWL Compliance Report.

   b) Submit any modifications to the RWL Compliance Report required by the Regional Board within 30 days of notification.

   c) Within 30 days following the approval of the RWL Compliance Report, the Permittee shall revise the SQMP and its components and monitoring program to incorporate the approved modified

BMPs that have been and will be implemented, an implementation schedule, and any additional monitoring required.

d) Implement the revised SQMP and its components and monitoring program according to the approved schedule.

4. So long as the Permittee has complied with the procedures set forth above and is implementing the revised SQMP and its components, the Permittee does not have to repeat the same procedure for continuing or recurring exceedances of the same receiving water limitations unless directed by the Regional Board to develop additional BMPs.

Part 3. STORM WATER QUALITY MANAGEMENT PROGRAM (SQMP) IMPLEMENTATION

A. General Requirements

1. Each Permittee shall, at a minimum, implement the SQMP. The SQMP is an enforceable element of this Order. The SQMP shall be implemented no later than February 1, 2002, unless a later date has been specified for a particular provision in this Order.

2. The SQMP shall, at a minimum, comply with the applicable storm water program requirements of 40 CFR 122.26(d)(2). The SQMP and its components shall be implemented so as to reduce the discharges of pollutants in storm water to the MEP.

3. Each Permittee shall implement additional controls, where necessary, to reduce the discharges of pollutants in storm water to the MEP.

4. Permittees that modify the countywide SQMP (i.e., implement additional controls, implement different controls than described in the countywide SQMP, or determine that certain BMPs in the countywide SQMP are not applicable in the area under its jurisdiction), shall develop a local SQMP, no later than August 1, 2002. The local SQMP shall be customized to reflect the conditions in the area under the Permittee's jurisdiction and shall specify activities being implemented under the appropriate elements described in the countywide SQMP.

B. Best Management Practice Implementation

The Permittees shall implement or require the implementation of the most effective combination of BMPs for storm water/urban runoff pollution control. When implemented, BMPs are intended to result in the reduction of pollutants in storm water to the MEP.

C. Revision of the Storm Water Quality Management Program

The Permittees shall revise the SQMP, at the direction of the Regional Board Executive Officer, to incorporate program implementation amendments so as to comply with regional, watershed specific requirements, and/or waste load

allocations developed and approved pursuant to the process for the designation and implementation of Total Maximum Daily Loads (TMDLs) for impaired water bodies.

D. Designation and Responsibilities of the Principal Permittee

The Los Angeles County Flood Control District is hereby designated as the Principal Permittee. As such, the Principal Permittee shall:

1. Coordinate and facilitate activities necessary to comply with the requirements of this Order, but is not responsible for ensuring compliance of any individual Permittee;
2. Coordinate permit activities among Permittees and act as liaison between Permittees and the Regional Board on permitting issues;
3. Provide personnel and fiscal resources for the necessary updates of the SQMP and its components;
4. Provide technical and administrative support for committees that will be organized to implement the SQMP and its components;
5. Convene the Watershed Management Committees (WMCs) constituted pursuant to Part F, below, upon designation of representatives;
6. Implement the Countywide Monitoring Program required under this Order and evaluate, assess and synthesize the results of the monitoring program;
7. Provide personnel and fiscal resources for the collection, processing and submittal to the Regional Board of annual reports and summaries of other reports required under the SQMP; and
8. Comply with the "Responsibilities of the Permittees" in Part 3.E., below.

E. Responsibilities of the Permittees

Each Permittee is required to comply with the requirements of this Order applicable to discharges within its boundaries (see Findings D.1, D.2. and D.3.) and not for the implementation of the provisions applicable to the Principal Permittee or other Permittees. Each Permittee shall, within its geographic jurisdiction:

1. Comply with the requirements of the SQMP and any modifications thereto;
2. Coordinate among its internal departments and agencies, as appropriate, to facilitate the implementation of the requirements of the SQMP applicable to such Permittee in an efficient and cost-effective manner;
3. Designate a technically knowledgeable representative to the appropriate WMC;

4. Participate in intra-agency coordination (e.g. Fire Department, Building and Safety, Code Enforcement, Public Health, etc.) necessary to successfully implement the provisions of this Order and the SQMP.

5. Prepare an annual Budget Summary of expenditures applied to the storm water management program. This summary shall identify the storm water budget for the following year, using estimated percentages and written explanations where necessary, for the specific categories noted below:

   a) Program management
      - Administrative costs

   b) Program Implementation

      Where information is available, provide an estimated percent breakdown of expenditures for the categories below:
      - Illicit connection/illicit discharge
      - Development planning
      - Development construction
      - Construction inspection activities
      - Industrial/Commercial inspection activities
      - Public Agency Activities
        - Maintenance of Structural BMPs and Treatment Control BMPs
        - Municipal Street Sweeping
        - Catch basin clean-up
        - Trash collection
        - Capital costs

   c) Public Information and Participation

   d) Monitoring Program

   e) Miscellaneous Expenditures

6. Each Permittee, in addition to the Budget Summary, shall report any supplemental dedicated budgets for the same categories.

F. Watershed Management Committees (WMCs)

1. Each WMC shall be comprised of a voting representative from each Permittee in the WMA.

2. The WMC's chair and secretary shall be chosen by the WMC upon Order adoption and on an annual basis, thereafter. In the absence of volunteer Permittee(s) for the positions, the Principal Permittee shall assume those roles until the WMC chooses members of the committee for the positions.

3. Each WMC shall:

   a) Facilitate cooperation and exchange of information among Permittees;

b) Establish additional goals and objectives and associated deadlines for the WMA, as the program implementation progresses;

c) Prioritize pollution control efforts based on beneficial use impairment(s), watershed characteristics and analysis of results from studies and the monitoring program;

d) Develop and/or update and monitor the adequate implementation, on an annual basis, of the tasks identified for the WMA;

e) Assess the effectiveness of, prepare revisions for, and recommend appropriate changes to the SQMP and its components;

f) Continue to prioritize the Industrial/Commercial critical sources for investigation, outreach and follow-up; and

g) Meet four times per year and, as necessary.

G. Legal Authority

1. Permittees shall possess the necessary legal authority to prohibit non-storm water discharges to the storm drain system, including, but not limited to:

a) Illicit discharges and illicit connections and require removal of illicit connections;

b) The discharge of wash waters to the MS4 from the cleaning of gas stations, auto repair garages, or other types of automotive service facilities;

c) The discharge of runoff to the MS4 from mobile auto washing, steam cleaning, mobile carpet cleaning, and other such mobile commercial and industrial operations;

d) The discharge of runoff to the MS4 from areas where repair of machinery and equipment which are visibly leaking oil, fluid or antifreeze, is undertaken;

e) The discharge of runoff to the MS4 from storage areas of materials containing grease, oil, or other hazardous substances, and uncovered receptacles containing hazardous materials;

f) The discharge of chlorinated/ brominated swimming pool water and filter backwash to the MS4;

g) The discharge of runoff from the washing of toxic materials from paved or unpaved areas to the MS4;

h) Washing impervious surfaces in industrial/commercial areas that results in a discharge of runoff to the MS4;

i) The discharge of concrete or cement laden wash water from concrete trucks, pumps, tools, and equipment to the MS4; and

j) Dumping or disposal of materials into the MS4 other than storm water, such as:

(1) Litter, landscape debris and construction debris;

(2) Any state or federally banned or unregistered pesticides;

(3) Food and food processing wastes; and

(4) Fuel and chemical wastes, animal wastes, garbage, batteries, and other materials that have potential adverse impacts on water quality.

2. The Permittees shall possess adequate legal authority to:

a) Require persons within their jurisdiction to comply with conditions in Permittees' ordinances, permits, contracts, model programs, or orders (i.e. hold dischargers to its MS4 accountable for their contributions of pollutants and flows);

b) Utilize enforcement mechanisms to require compliance with Permittees ordinances, permits, contracts, or orders;

c) Control pollutants, including potential contribution, in discharges of storm water runoff associated with industrial activities (including construction activities) to its MS4 and control the quality of storm water runoff from industrial sites (including construction sites). This requirement applies to Source Control, and Treatment Control BMPs;

d) Carry out all inspection, surveillance and monitoring procedures necessary to determine compliance and non-compliance with permit conditions, including the prohibition of illicit discharges to the MS4. Permittees must possess authority to enter, sample, inspect, review and copy records, and require regular reports from industrial facilities (including construction sites) discharging polluted or with the potential to discharge polluted storm water runoff into its MS4;

e) Require the use of BMPs to prevent or reduce the discharge of pollutants to MS4s to MEP; and

f) Require that Treatment Control BMPs be properly operated and maintained to prevent the breeding of vectors.

3. Each Permittee shall, no later than November 1, 2002, amend and adopt (if necessary), a Permittee-specific storm water and urban runoff ordinance to enforce all requirements of this permit.

4. Each Permittee shall submit no later than December 2, 2002, a new or updated statement by its legal counsel that the Permittee has obtained all

necessary legal authority to comply with this Order through adoption of ordinances and/or municipal code modifications.

Part 4. SPECIAL PROVISIONS

Maximum Extent Practicable Standard

This permit, and the provisions herein, are intended to develop, achieve, and implement a timely, comprehensive, cost-effective storm water pollution control program to reduce the discharge of pollutants in storm water to the MEP from the permitted areas in the County of Los Angeles to the waters of the State.

A. General Requirements

1. Best Management Practice Substitution

The Regional Board Executive Officer may approve any site-specific BMP substitution upon petition by a Permittee(s), if the Permittee can document that:

a) The proposed alternative BMP or program will meet or exceed the objective of the original BMP or program in the reduction of storm water pollutants; or

b) The fiscal burden of the original BMP or program is substantially greater than the proposed alternative and does not achieve a substantially greater improvement in storm water quality; and,

c) The proposed alternative BMP or program will be implemented within a similar period of time.

B. Public Information and Participation Program (PIPP)

The Principal Permittee shall implement a Public Information and Participation Program (PIPP) that includes, but is not limited to, the requirements listed in this section. The Principal Permittee shall be responsible for developing and implementing the Public Education Program, as described in the SQMP, and shall coordinate with Permittees to implement specific requirements.

The objectives of the PIPP are as follows:

- To measurably increase the knowledge of the target audiences regarding the MS4, the impacts of storm water pollution on receiving waters, and potential solutions to mitigate the problems caused;
- To measurably change the waste disposal and runoff pollution generation behavior of target audiences by encouraging implementation of appropriate solutions; and
- To involve and engage socio-economic groups and ethnic communities in Los Angeles County to participate in mitigating the impacts of storm water pollution.

The Principal Permittee shall convene an advisory committee to provide input and assistance in meeting the goals and objectives of the public education campaign. The advisory committee shall be consulted during the process of developing the PIPP campaign, and shall provide comments and advice during the process of preparing a Request For Proposals for a storm water public education contractor. The committee may participate as a part of a working group that evaluates contractor proposals and other tasks as appropriate. The committee shall be comprised of representatives of the environmental community, Permittee cities, Regional Board staff, and experts in the fields of public education and marketing. The Principal Permittee shall ensure that the committee meets at least once a year.

1. Residential Program

a) "No Dumping" Message

Each Permittee shall mark all storm drain inlets that they own with a legible “no dumping” message. In addition, signs with prohibitive language discouraging illegal dumping must be posted at designated public access points to creeks, other relevant water bodies, and channels no later than February 2, 2004. Signage and storm drain messages shall be legible and maintained as necessary during the term of the permit.

b) Countywide Hotline

The 888-CLEAN-LA hotline will serve as the general public reporting contact for reporting clogged catch basin inlets and illicit discharges/dumping, faded or lack of catch basin stencils, and general storm water management information. Each Permittee may establish its own hotline if preferred. Permittees shall include this information, updated when necessary, in public information, and the government pages of the telephone book, as they are developed or published. The Principal Permittee shall compile a list of the general public reporting contacts from all Permittees and make this information available on the web site (888CleanLA.com) and upon request. Permittees shall provide the Principal Permittee with their reporting contacts no later than March 1, 2002. Permittees are responsible for providing current, updated information to the Principal Permittee.

c) Outreach and Education

(1) The Principal Permittee shall continue to implement the following activities that were components of the first five-year PIPP:

(i) Advertising;

(ii) Media relations;

(iii) Public service announcements;

(iv) "How To" instructional material distributed in a targeted and activity-related manner;

(v) Corporate, community association, environmental organization and entertainment industry tie-ins; and

(vi) Events targeted to specific activities and population subgroups.

(2) The Principal Permittee shall develop a strategy to educate ethnic communities and businesses through culturally effective methods. Details of this strategy should be incorporated into the Public Education Program, and implemented, no later than February 3, 2003.

(3) The Principal Permittee shall enhance the existing outreach efforts to residents and businesses related to the proper disposal of cigarette butts.

(4) Each Permittee shall conduct educational activities within its jurisdiction and participate in countywide events.

(5) The Principal Permittee shall organize Public Outreach Strategy meetings for Permittees on a quarterly basis, beginning no later than May 1, 2002. The Principal Permittee shall provide guidance for Permittees to augment the countywide outreach and education program. Permittees shall coordinate regional and local outreach and education to reduce duplication of efforts. Permittees are encouraged to include other interested parties in the outreach strategy to strengthen and coordinate educational efforts.

(6) The Principal Permittee shall ensure that a minimum of 35 million impressions per year are made on the general public about storm water quality via print, local TV access, local radio, or other appropriate media.

(7) The Principal Permittee, in cooperation with the Permittees, shall provide schools within each School District in the County with materials, including, but not limited to, videos, live presentations, and other information necessary to educate a minimum of 50 percent of all school children (K-12) every 2 years on storm water pollution.

(8) Permittees shall provide the contact information for their appropriate staff responsible for storm water public education activities to the Principal Permittee no later than April 1, 2002, and changes to contact information no later than 30 days after a change occurs.

(9) The Principal Permittee shall develop a strategy to measure the effectiveness of in-school educational programs. The protocol shall include assessment of students' knowledge of storm water pollution problems and

solutions before and after educational efforts are conducted. The protocol shall be developed and submitted to the Regional Board Executive Officer for approval no later than May 1, 2002. It shall be implemented upon approval.

(10) In order to ensure that the PIPP is demonstrably effective in changing the behavior of the public, the Principal Permittee shall develop a behavioral change assessment strategy no later than May 1, 2002. The strategy shall be developed based on sociological data and studies (such as the County Segmentation Study). The Principal Permittee shall submit the assessment strategy to the Regional Board Executive Office for approval. It shall be implemented on approval.

d) Pollutant-Specific Outreach

The Principal Permittee, in cooperation with Permittees, shall coordinate to develop outreach programs that focus on the watershed-specific pollutants listed in Table 1 no later than February 3, 2003. Metals may be appropriately addressed through the Industrial/Commercial Facilities Program (e.g. distribute education materials on appropriate BMPs for metal waste management to facilities that have been identified as a potential source, such as metal fabricating facilities). Region-wide pollutants may be included in the Principal Permittee's mass media outreach efforts.

Table 1.

Watershed	***Target Pollutants for Outreach***
Ballona Creek	Trash, Indicator Bacteria, Metals, PAHs
Malibu Creek	Trash, Nutrients (Nitrogen), Indicator Bacteria, Sediments
Los Angeles River	Trash, Nutrients (Nitrogen), Indicator Bacteria, Metals, Pesticides, PAHs
San Gabriel River	Trash, Nutrients (Nitrogen), Indicator Bacteria, Metals
Santa Clara River	Nutrients (Nitrogen), Coliform
Dominguez Channel	Trash, Indicator Bacteria, PAHs

Each Permittee shall make outreach materials available to the general public and target audiences, such as schools, community groups, contractors and developers, and at appropriate public counters and events. Outreach material shall include information on pollutants, sources of concern, and source abatement measures.

2. Businesses Program

a) Corporate Outreach

The Principal Permittee shall develop and implement a Corporate Outreach program to educate and inform corporate managers about storm water regulations. The program shall target RGOs and restaurant chains. At a minimum, this program shall include:

(1) Conferring with corporate management to explain storm water regulations;

(2) Distribution and discussion of educational material regarding storm water pollution and BMPs, and provide managers with suggestions to facilitate employee compliance with storm water regulations.

Corporate Outreach for all RGOs and restaurant chain corporations shall be conducted not less than twice during the permit term, with the first outreach contact to begin no later than February 3, 2003.

b) Business Assistance Program

The Principal Permittee and Permittees may implement a Business Assistance Program to provide technical resource assistance to small businesses to advise them on BMPs implementation to reduce the discharge of pollutants in storm water runoff. Programs may include:

(1) On-site technical assistance or consultation via telephone to identify and implement storm water pollution prevention methods and best management practices; and

(2) Making available, distributing, and discussing of applicable BMP and educational materials.

C. Industrial/Commercial Facilities Control Program

Each Permittee shall require implementation of pollutant reduction and control measures at industrial and commercial facilities, with the objective of reducing pollutants in storm water runoff. Except as specified in other sections of this Order, pollutant reduction and control measures can be used alone or in combination, and can include Structural and Source Control BMPs, and operation and maintenance procedures, which can be applied before, during, and/or after pollution generating activities. At a minimum, the Industrial/Commercial Facilities Control Program shall include requirements to: (1) track, (2) inspect, and (3) ensure compliance at industrial and commercial facilities that are critical sources of pollutants in storm water.

1. Track Critical Sources

a) Each Permittee shall maintain a watershed-based inventory or database of all facilities within its jurisdiction that are critical sources of storm water pollution. Critical sources to be tracked are summarized below, and also specified in Attachment B:

(1) Commercial Facilities

- restaurants;
- automotive service facilities; and
- RGOs and automotive dealerships.

(2) USEPA Phase I Facilities (Tier 1 and 2)

(3) Other Federally-mandated Facilities [as specified in 40 CFR 122.26(d)(2)(iv)(C)]

- municipal landfills;
- hazardous waste treatment, disposal, and recovery facilities; and
- facilities subject to SARA Title III (also known as EPCRA).

b) Each Permittee shall include the following minimum fields of information for each industrial and commercial facility:

- name of facility and name of owner/operator;
- address;
- coverage under the GIASP or other individual or general NPDES permits; and
- a narrative description including SIC codes that best reflects the industrial activities at and principal products of each facility.

The Regional Board encourages Permittees to add other fields of information, such as material usage and/or industrial output, and discrepancies between SIC Code designations (as reported by facility operators) and the actual type of industrial activity has the potential to pollute storm water. In addition, the Regional Board recommends use of an automated database system, such as a Geographical Information System (GIS) or Internet-based system; however, this is not required.

c) Each Permittee shall update its inventory of critical sources at least annually. The update may be accomplished through collection of new information obtained through field activities or through other readily available intra-agency informational databases (e.g. business licenses, pretreatment permits, sanitary sewer hook-up permits).

2. Inspect Critical Sources

Each Permittee shall inspect all facilities in the categories and at a level and frequency as specified in the following subsections.

a) Commercial Facilities

(1) Restaurants

Frequency of Inspections: Twice during the 5-year term of the Order, provided that the first inspection occurs no later than August 1, 2004, and that there is a minimum interval of one year in between the first compliance inspection and the second compliance inspection.

Level of inspections: Each Permittee, in cooperation with its appropriate department (such as health or public works), shall inspect all restaurants within its jurisdiction to confirm that storm water BMPs are being effectively implemented in compliance with State law, County and municipal ordinances, Regional Board Resolution 98-08, and the SQMP. At each restaurant, inspectors shall verify that the restaurant operator:

- has received educational materials on storm water pollution prevention practices;
- does not pour oil and grease or oil and grease residue onto a parking lot, street or adjacent catch basin;
- keeps the trash bin area clean and trash bin lids closed, and does not fill trash bins with washout water or any other liquid;
- does not allow illicit discharges, such as discharge of washwater from floormats, floors, porches, parking lots, alleys, sidewalks and street areas (in the immediate vicinity of the establishment), filters or garbage/trash containers;
- removes food waste, rubbish or other materials from parking lot areas in a sanitary manner that does not create a nuisance or discharge to the storm drain.

(2) Automotive Service Facilities

Frequency of Inspections: Twice during the 5-year term of the Order, provided that the first inspection occurs no later than August 1, 2004, and that there is a minimum interval of one year in between the first compliance inspection and the second compliance inspection.

Level of inspections: Each Permittee shall inspect all automotive service facilities within its jurisdiction to confirm that storm water BMPs are effectively implemented in compliance with County and municipal ordinances, Regional Board Resolution 98-08, and the SQMP. At each

automotive service facility, inspectors shall verify that each operator:

- maintains the facility area so that it is clean and dry and without evidence of excessive staining;
- implements housekeeping BMPs to prevent spills and leaks;
- properly discharges wastewaters to a sanitary sewer and/or contains wastewaters for transfer to a legal point of disposal;
- is aware of the prohibition on discharge of non-storm water to the storm drain;
- properly manages raw and waste materials including proper disposal of hazardous waste;
- protects outdoor work and storage areas to prevent contact of pollutants with rainfall and runoff;
- labels, inspects, and routinely cleans storm drain inlets that are located on the facility's property; and
- trains employees to implement storm water pollution prevention practices.

(3) Retail Gasoline Outlets and Automotive Dealerships

Frequency of Inspection: Twice during the 5-year term of the Order, provided that the first inspection occurs no later than August 1, 2004, and that there is a minimum interval of one year in between the first compliance inspection and the second compliance inspection.

Level of Inspection: Each Permittee shall confirm that BMPs are being effectively implemented at each RGO and automotive dealership within its jurisdiction, in compliance with the SQMP, Regional Board Resolution 98-08, and the Stormwater Quality Task Force Best Management Practice Guide for RGOs. At each RGO and automotive dealership, inspectors shall verify that each operator:

- routinely sweeps fuel-dispensing areas for removal of litter and debris, and keeps rags and absorbents ready for use in case of leaks and spills;
- is aware that washdown of facility area to the storm drain is prohibited;
- is aware of design flaws (such as grading that doesn't prevent run-on, or inadequate roof covers and berms), and that equivalent BMPs are implemented;
- inspects and cleans storm drain inlets and catch basins within each facility's boundaries no later than October 1st of each year;

- posts signs close to fuel dispensers, which warn vehicle owners/operators against "topping off" of vehicle fuel tanks and installation of automatic shutoff fuel dispensing nozzles;
- routinely checks outdoor waste receptacle and air/water supply areas, cleans leaks and drips, and ensures that only watertight waste receptacles are used and that lids are closed; and
- trains employees to properly manage hazardous materials and wastes as well as to implement other storm water pollution prevention practices.

b) Phase I Facilities

Permittees need not inspect facilities that have been inspected by the Regional Board within the past 24 months. For the remaining Phase I facilities that the Regional Board has not inspected, each Permittee shall conduct compliance inspections as specified below.

Frequency of Inspection

Facilities in Tier 1 Categories: Twice during the 5-year term of the Order, provided that the first inspection occurs no later than August 1, 2004, and that there is a minimum interval of one year in between the first compliance inspection and the second compliance inspection.

Facilities in Tier 2 Categories: Twice during the 5-year term of the permit, provided that the first inspection occurs no later than August 1, 2004. Permittees need not perform additional inspections at those facilities determined to have no risk of exposure of industrial activity to storm water. For those facilities that do have exposure of industrial activities to storm water, a Permittee may reduce the frequency of additional compliance inspections to once every 5 years, provided that the Permittee inspects at least 20% of the facilities in Tier 2 each year.

Level of Inspection: Each Permittee shall confirm that each operator:

- has a current Waste Discharge Identification (WDID) number for facilities discharging storm water associated with industrial activity, and that a Storm Water Pollution Prevention Plan is available on-site, and
- is effectively implementing BMPs in compliance with County and municipal ordinances, Regional Board Resolution 98-08, and the SQMP.

c) Other Federally-mandated Facilities

Frequency of Inspection: Twice during the 5-year term of the Order, provided that the first inspection occurs no later than August 1, 2004, and that there is a minimum interval of one year in between the first compliance inspection and the second compliance inspection.

Level of Inspection: Each Permittee shall confirm that each operator:

- has a current Waste Discharge Identification (WDID) number for facilities discharging storm water associated with industrial activity, and that a Storm Water Pollution Prevention Plan is available on-site, and
- is effectively implementing BMPs in compliance with County and municipal ordinances, Regional Board Resolution 98-08, and the SQMP.

3. Ensure Compliance of Critical Sources

a) **BMP Implementation:** In the event that a Permittee determines that a BMP specified by the SQMP or Regional Board Resolution 98-08 is infeasible at any site, that Permittee shall require implementation of other BMPs that will achieve the equivalent reduction of pollutants in the storm water discharges. Likewise, for those BMPs that are not adequate to achieve water quality objectives, Permittees may require additional site-specific controls, such as Treatment Control BMPs.

b) **Environmentally Sensitive Areas and Impaired Waters:** For critical sources that are in ESAs or that are tributary to CWA § 303(d) impaired water bodies, Permittees shall consider requiring operators to implement additional controls to reduce pollutants in storm water runoff that are causing or contributing to the exceedences of Water Quality Objectives.

c) **Progressive Enforcement:** Each Permittee shall implement a progressive enforcement policy to ensure that facilities are brought into compliance with all storm water requirements within a reasonable time period as specified below.

(1) In the event that a Permittee determines, based on an inspection conducted above, that an operator has failed to adequately implement all necessary BMPs, that Permittee shall take progressive enforcement action which, at a minimum, shall include a follow-up inspection within 4 weeks from the date of the initial inspection.

(2) In the event that a Permittee determines that an operator has failed to adequately implement BMPs after a follow-up inspection, that Permittee shall take further enforcement action as established through authority in its municipal code and ordinances or through the judicial system.

(3) Each Permittee shall maintain records, including inspection reports, warning letters, notices of violations, and other enforcement records, demonstrating a good faith effort to bring facilities into compliance.

d) Interagency Coordination

(1) **Referral of Violations of the SQMP, Regional Board Resolution 98-08, and Municipal Storm Water Ordinances:** A Permittee may refer a violation(s) to the Regional Board provided that that Permittee has made a good faith effort of progressive enforcement. At a minimum, a Permittee's good faith effort must include documentation of:

- Two follow-up inspections, and
- Two warning letters or notices of violation.

(2) **Referral of Violations of the GIASP, including Requirements to File a Notice of Intent:** For those facilities in violation of the GIASP, Permittees may escalate referral of such violations to the Regional Board after one inspection and one written notice to the operator regarding the violation. In making such referrals, Permittees shall include, at a minimum, the following documentation:

- Name of the facility;
- Operator of the facility;
- Owner of the facility;
- Industrial activity being conducted at the facility that is subject to the GIASP; and
- Records of communication with the facility operator regarding the violation, which shall include at least an inspection report and one written notice of the violation.

Permittees shall, at a minimum, make such referrals on a quarterly basis.

(3) **Investigation of Complaints Regarding Facilities – Transmitted by the Regional Board Staff:** Each Permittee shall initiate, within one business day, investigation of complaints (other than non-storm water discharges) regarding facilities within its jurisdiction. The initial investigation shall include, at a minimum, a limited

inspection of the facility to confirm the complaint to determine if the facility is effectively complying with the SQMP and municipal storm water/urban runoff ordinances, and to oversee corrective action.

(4) **Support of Regional Board Enforcement Actions:** As directed by the Regional Board Executive Officer, Permittees shall support Regional Board enforcement actions by: assisting in identification of current owners, operators, and lessees of facilities; providing staff, when available, for joint inspections with Regional Board inspectors; appearing as witnesses in Regional Board enforcement hearings; and providing copies of inspection reports and other progressive enforcement documentation.

(5) **Participation in a Task Force:** The Permittees, Regional Board, and other stakeholders may form a Storm Water Task Force, the purpose of which is to communicate concerns regarding special cases of storm water violations by industrial and commercial facilities and to develop a coordinated approach to enforcement action.

D. Development Planning Program

The Permittees shall implement a development-planning program that will require all Planning Priority development and Redevelopment projects to:

- Minimize impacts from storm water and urban runoff on the biological integrity of Natural Drainage Systems and water bodies in accordance with requirements under CEQA (Cal. Pub. Resources Code § 21100), CWC § 13369, CWA § 319, CWA § 402(p), CWA § 404, CZARA § 6217(g), ESA § 7, and local government ordinances ;
- Maximize the percentage of pervious surfaces to allow percolation of storm water into the ground;
- Minimize the quantity of storm water directed to impervious surfaces and the MS4;
- Minimize pollution emanating from parking lots through the use of appropriate Treatment Control BMPs and good housekeeping practices;
- Properly design and maintain Treatment Control BMPs in a manner that does not promote the breeding of vectors; and
- Provide for appropriate permanent measures to reduce storm water pollutant loads in storm water from the development site.

1. Peak Flow Control

The Permittees shall control post-development peak storm water runoff discharge rates, velocities, and duration (peak flow control) in Natural

Drainage Systems (i.e., mimic pre-development hydrology) to prevent accelerated stream erosion and to protect stream habitat. Natural Drainage Systems are located in the following areas:

a) Malibu Creek;

b) Topanga Canyon Creek;

c) Upper Los Angeles River;

d) Upper San Gabriel River;

e) Santa Clara River; and

f) Los Angeles County Coastal streams (see Basin Plan Table 2-1).

The Principal Permittee in consultation with Permittees shall develop numerical criteria for peak flow control, based on the results of the Peak Discharge Impact Study (see Monitoring Program Section II.I).

Each Permittee shall, no later than February 1, 2005, implement numerical criteria for peak flow control.

A Permittee or group of Permittees may substitute for the countywide peak flow control criteria with a Hydromodification Control Plan (HCP), on approval by the Regional Board, in the following circumstances:

(1) Stream or watershed-specific conditions indicate the need for a different peak flow control criteria, and the alternative numerical criteria is developed through the application of hydrologic modeling and supporting field observations; or

(2) A watershed-wide plan has been developed for implementation of control measures to reduce erosion and stabilize drainage systems on a watershed basis.

2. Standard Urban Storm Water Mitigation Plans (SUSMPs)

a) Each Permittee shall amend codes and ordinances not later than August 1, 2002 to give legal effect to SUSMP changes contained in this Order. Changes to SUSMP requirements shall take effect not later than September 2, 2002.

b) Each Permittee shall require that a single-family hillside home:

(1) Conserve natural areas;

(2) Protect slopes and channels;

(3) Provide storm drain system stenciling and signage;

(4) Divert roof runoff to vegetated areas before discharge unless the diversion would result in slope instability; and

(5) Direct surface flow to vegetated areas before discharge unless the diversion would result in slope instability.

c) Each Permittee shall require that a SUSMP as approved by the Regional Board in Board Resolution No. R 00-02 be implemented for the following categories of developments:

(1) Ten or more unit homes (includes single family homes, multifamily homes, condominiums, and apartments);

(2) A 100,000 or more square feet of impervious surface area industrial/ commercial development;

(3) Automotive service facilities (SIC 5013, 5014, 5541, 7532-7534, and 7536-7539);

(4) Retail gasoline outlets;

(5) Restaurants (SIC 5812);

(6) Parking lots 5,000 square feet or more of surface area or with 25 or more parking spaces; and

(7) Redevelopment projects in subject categories that meet Redevelopment thresholds.

d) Each Permittee shall submit an ESA Delineation Map for its jurisdictional boundary, based on the Regional Board's ESA Definition, no later than June 3, 2002, for approval by the Regional Board Executive Officer in consultation with the California Department of Fish and Game, and the California Coastal Commission.

e) Each Permittee shall require the implementation of SUSMP provisions no later than September 2, 2002, for all projects located in or directly adjacent to or discharging directly to an ESA, where the development will:

(1) Discharge storm water and urban runoff that is likely to impact a sensitive biological species or habitat; and

(2) Create 2,500 square feet or more of impervious surface area.

3. Numerical Design Criteria

The Permittees shall require that post-construction Treatment Control BMPs incorporate, at a minimum, either a volumetric or flow based treatment control design standard, or both, as identified below to mitigate (infiltrate, filter or treat) storm water runoff:

a) Volumetric Treatment Control BMP

(1) The 85th percentile 24-hour runoff event determined as the maximized capture storm water volume for the area, from

the formula recommended in *Urban Runoff Quality Management, WEF Manual of Practice No. 23/ ASCE Manual of Practice No. 87, (1998*); or

(2) The volume of annual runoff based on unit basin storage water quality volume, to achieve 80 percent or more volume treatment by the method recommended in *California Stormwater Best Management Practices Handbook – Industrial/ Commercial,* (1993); or

(3) The volume of runoff produced from a 0.75 inch storm event, prior to its discharge to a storm water conveyance system; or

(4) The volume of runoff produced from a historical-record based reference 24-hour rainfall criterion for "treatment" (0.75 inch average for the Los Angeles County area) that achieves approximately the same reduction in pollutant loads achieved by the 85th percentile 24-hour runoff event.

b) Flow Based Treatment Control BMP

(1) The flow of runoff produced from a rain event equal to at least 0.2 inches per hour intensity; or

(2) The flow of runoff produced from a rain event equal to at least two times the 85th percentile hourly rainfall intensity for Los Angeles County; or

(3) The flow of runoff produced from a rain event that will result in treatment of the same portion of runoff as treated using volumetric standards above.

4. Applicability of Numerical Design Criteria

The Permittees shall require the following categories of Planning Priority Projects to design and implement post-construction treatment controls to mitigate storm water pollution:

a) Single-family hillside residential developments of one acre or more of surface area;

b) Housing developments (includes single family homes, multifamily homes, condominiums, and apartments) of ten units or more;

c) A 100,000 square feet or more impervious surface area industrial/ commercial development;

d) Automotive service facilities (SIC 5013, 5014, 5541, 7532-7534 and 7536-7539) [5,000 square feet or more of surface area];

e) Retail gasoline outlets [5,000 square feet or more of impervious surface area and with projected Average Daily Traffic (ADT) of 100 or more vehicles]. Subsurface Treatment Control BMPs

which may endanger public safety (i.e., create an explosive environment) are considered not appropriate;

f) Restaurants (SIC 5812) [5,000 square feet or more of surface area];

g) Parking lots 5,000 square feet or more of surface area or with 25 or more parking spaces;

h) Projects located in, adjacent to or discharging directly to an ESA that meet threshold conditions identified above in 2.e; and

i) Redevelopment projects in subject categories that meet Redevelopment thresholds.

5. Not later than March 10, 2003, each Permittee shall require the implementation of SUSMP and post-construction control requirements for the industrial/commercial development category to projects that disturb one acre or more of surface area.

6. Site Specific Mitigation

Each Permittee shall, no later than September 2, 2002, require the implementation of a site-specific plan to mitigate post-development storm water for new development and redevelopment not requiring a SUSMP but which may potentially have adverse impacts on post-development storm water quality, where one or more of the following project characteristics exist:

a) Vehicle or equipment fueling areas;

b) Vehicle or equipment maintenance areas, including washing and repair;

c) Commercial or industrial waste handling or storage;

d) Outdoor handling or storage of hazardous materials;

e) Outdoor manufacturing areas;

f) Outdoor food handling or processing;

g) Outdoor animal care, confinement, or slaughter; or

h) Outdoor horticulture activities.

7. Redevelopment Projects

The Permittees shall apply the SUSMP, or site specific requirements including post-construction storm water mitigation to all Planning Priority Projects that undergo significant Redevelopment in their respective categories.

a) Significant Redevelopment means land-disturbing activity that results in the creation or addition or replacement of 5,000 square

feet or more of impervious surface area on an already developed site.

Where Redevelopment results in an alteration to more than fifty percent of impervious surfaces of a previously existing development, and the existing development was not subject to post development storm water quality control requirements, the entire project must be mitigated. Where Redevelopment results in an alteration to less than fifty percent of impervious surfaces of a previously existing development, and the existing development was not subject to post development storm water quality control requirements, only the alteration must be mitigated, and not the entire development.

b) Redevelopment does not include routine maintenance activities that are conducted to maintain original line and grade, hydraulic capacity, original purpose of facility or emergency redevelopment activity required to protect public health and safety.

c) Existing single family structures are exempt from the Redevelopment requirements.

8. Maintenance Agreement and Transfer

Each Permittee shall require that all developments subject to SUSMP and site specific plan requirements provide verification of maintenance provisions for Structural and Treatment Control BMPs, including but not limited to legal agreements, covenants, CEQA mitigation requirements, and or conditional use permits. Verification at a minimum shall include:

a) The developer's signed statement accepting responsibility for maintenance until the responsibility is legally transferred; and either

b) A signed statement from the public entity assuming responsibility for Structural or Treatment Control BMP maintenance and that it meets all local agency design standards; or

c) Written conditions in the sales or lease agreement, which requires the recipient to assume responsibility for maintenance and conduct a maintenance inspection at least once a year; or

d) Written text in project conditions, covenants and restrictions (CCRs) for residential properties assigning maintenance responsibilities to the Home Owners Association for maintenance of the Structural and Treatment Control BMPs; or

e) Any other legally enforceable agreement that assigns responsibility for the maintenance of post-construction Structural or Treatment Control BMPs.

9. Regional Storm Water Mitigation Program

A Permittee or Permittee group may apply to the Regional Board for approval of a regional or sub-regional storm water mitigation program to substitute in part or wholly SUSMP requirements. Upon review and a determination by the Regional Board Executive Officer that the proposal is technically valid and appropriate, the Regional Board may consider for approval such a program if its implementation will:

a) Result in equivalent or improved storm water quality;

b) Protect stream habitat;

c) Promote cooperative problem solving by diverse interests;

d) Be fiscally sustainable and has secure funding; and

e) Be completed in five years including the construction and start-up of treatment facilities.

Nothing in this provision shall be construed as to delay the implementation of SUSMP requirements, as approved in this Order.

10. Mitigation Funding

The Permittees may propose a management framework, for endorsement by the Regional Board Executive Officer, to support regional or sub-regional solutions to storm water pollution, where any of the following situations occur:

a) A waiver for impracticability is granted;

b) Legislative funds become available;

c) Off-site mitigation is required because of loss of environmental habitat; or

d) An approved watershed management plan or a regional storm water mitigation plan exists that incorporates an equivalent or improved strategy for storm water mitigation.

11. California Environmental Quality Act (CEQA) Document Update

Each Permittee shall incorporate into its CEQA process, with immediate effect, procedures for considering potential storm water quality impacts and providing for appropriate mitigation when preparing and reviewing CEQA documents. The procedures shall require consideration of the following:

a) Potential impact of project construction on storm water runoff;

b) Potential impact of project post-construction activity on storm water runoff;

c) Potential for discharge of storm water from areas from material storage, vehicle or equipment fueling, vehicle or equipment maintenance (including washing), waste handling, hazardous

materials handling or storage, delivery areas or loading docks, or other outdoor work areas;

d) Potential for discharge of storm water to impair the beneficial uses of the receiving waters or areas that provide water quality benefit;

e) Potential for the discharge of storm water to cause significant harm on the biological integrity of the waterways and water bodies;

f) Potential for significant changes in the flow velocity or volume of storm water runoff that can cause environmental harm; and

g) Potential for significant increases in erosion of the project site or surrounding areas.

12. General Plan Update

a) Each Permittee shall amend, revise or update its General Plan to include watershed and storm water quality and quantity management considerations and policies when any of the following General Plan elements are updated or amended: (i) Land Use, (ii) Housing, (iii) Conservation, and (iv) Open Space.

b) Each Permittee shall provide the Regional Board with the draft amendment or revision when a listed General Plan element or the General Plan is noticed for comment in accordance with Cal. Govt. Code § 65350 *et seq*.

13. Targeted Employee Training

Each Permittee shall train its employees in targeted positions (whose jobs or activities are engaged in development planning) regarding the development planning requirements on an annual basis beginning no later than August 1, 2002, and more frequently if necessary. For Permittees with a population of 250,000 or more (2000 U.S. Census), training shall be completed no later than February 3, 2003.

14. Developer Technical Guidance and Information

a) Each Permittee shall develop and make available to the developer community SUSMP (development planning) guidelines immediately.

b) The Principal Permittee in partnership with Permittees shall issue no later than February 2, 2004, a technical manual for the siting and design of BMPs for the development community in Los Angeles County. The technical manual may be adapted from the revised California Storm Water Quality Task Force Best Management Practices Handbooks scheduled for publication in September 2002. The technical manual shall at a minimum include:

(1) Treatment Control BMPs based on flow-based and volumetric water quality design criteria for the purposes of countywide consistency;

(2) Peak Flow Control criteria to control peak discharge rates, velocities and duration;

(3) Expected pollutant removal performance ranges obtained from national databases, technical reports and the scientific literature;

(4) Maintenance considerations; and

(5) Cost considerations.

E. Development Construction Program

1. Each Permittee shall implement a program to control runoff from construction activity at all construction sites within its jurisdiction. The program shall ensure the following minimum requirements are effectively implemented at all construction sites:

   a) Sediments generated on the project site shall be retained using adequate Treatment Control or Structural BMPs;

   b) Construction-related materials, wastes, spills, or residues shall be retained at the project site to avoid discharge to streets, drainage facilities, receiving waters, or adjacent properties by wind or runoff;

   c) Non-storm water runoff from equipment and vehicle washing and any other activity shall be contained at the project site; and

   d) Erosion from slopes and channels shall be controlled by implementing an effective combination of BMPs (as approved in Regional Board Resolution No. 99-03), such as the limiting of grading scheduled during the wet season; inspecting graded areas during rain events; planting and maintenance of vegetation on slopes; and covering erosion susceptible slopes.

2. For construction sites one acre and greater, each Permittee shall comply with all conditions in section E.1. above and shall:

   a) Require the preparation and submittal of a Local Storm Water Pollution Prevention Plan (Local SWPPP), for approval prior to issuance of a grading permit for construction projects.

   The Local SWPPP shall include appropriate construction site BMPs and maintenance schedules. (A Local SWPPP may substitute for the State SWPPP if the Local SWPPP is at least as inclusive in controls and BMPs as the State SWPPP). The Local SWPPP must include the rationale used for selecting or rejecting BMPs. The project architect, or engineer of record, or authorized

qualified designee, must sign a statement on the Local SWPPP to the effect:

"As the architect/engineer of record, I have selected appropriate BMPs to effectively minimize the negative impacts of this project's construction activities on storm water quality. The project owner and contractor are aware that the selected BMPs must be installed, monitored, and maintained to ensure their effectiveness. The BMPs not selected for implementation are redundant or deemed not applicable to the proposed construction activity."

The landowner or the landowner's agent shall sign a statement to the effect:

"I certify that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, to the best of my knowledge and belief, the information submitted is true, accurate, and complete. I am aware that submitting false and/or inaccurate information, failing to update the Local SWPPP to reflect current conditions, or failing to properly and/or adequately implement the Local SWPPP may result in revocation of grading and/or other permits or other sanctions provided by law."

The Local SWPPP certification shall be signed by the landowner as follows, for a corporation: by a responsible corporate officer which means (a) a president, secretary, treasurer, or vice president of the corporation in charge of a principal business function, or any other person who performs similar policy or decision-making functions for the corporation, or (b) the manager of the construction activity if authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures; for a partnership or sole proprietorship: by a general partner or the proprietor; or for a municipality or other public agency: by an elected official, a ranking management official (e.g., County Administrative Officer, City Manager, Director of Public Works, City Engineer, District Manager), or the manager of the construction activity if authority to sign Local SWPPPs has been assigned or delegated to the manager in accordance with established agency policy.

b) Inspect all construction sites for storm water quality requirements during routine inspections a minimum of once during the wet season. The Local SWPPP shall be reviewed for compliance with local codes, ordinances, and permits. For inspected sites that have not adequately implemented their Local SWPPP, a follow-up inspection to ensure compliance will take place within 2 weeks. If compliance has not been attained, the Permittee will take additional actions to achieve compliance (as specified in municipal

codes). If compliance has not been achieved, and the site is also covered under a statewide general construction storm water permit, each Permittee shall enforce their local ordinance requirements, and if non-compliance continues the Regional Board shall be notified for further joint enforcement actions.

c) Require, no later than March 10, 2003, prior to issuing a grading permit for all projects less than five acres requiring coverage under a statewide general construction storm water permit, proof of a Waste Discharger Identification (WDID) Number for filing a Notice of Intent (NOI) for permit coverage and a certification that a SWPPP has been prepared by the project developer. A Local SWPPP may substitute for the State SWPPP if the Local SWPPP is at least as inclusive in controls and BMPs as the State SWPPP.

3. For sites five acres and greater, each Permittee shall comply with all conditions in Sections E.1. and E.2. and shall:

a) Require, prior to issuing a grading permit for all projects requiring coverage under the state general permit, proof of a Waste Discharger Identification (WDID) Number for filing a Notice of Intent (NOI) for coverage under the GCASP and a certification that a SWPPP has been prepared by the project developer. A Local SWPPP may substitute for the State SWPPP if the Local SWPPP is at least as inclusive in controls and BMPs as the State SWPPP.

b) Require proof of an NOI and a copy of the SWPPP at any time a transfer of ownership takes place for the entire development or portions of the common plan of development where construction activities are still on-going.

c) Use an effective system to track grading permits issued by each Permittee. To satisfy this requirement, the use of a database or GIS system is encouraged, but not required.

4. GCASP Violation Referrals

a) Referral of Violations of the SQMP, Regional Board Resolution 98-08, and municipal storm water ordinances:

A Permittee may refer a violation(s) to the Regional Board provided that the Permittee has made a good faith effort of progressive enforcement. At a minimum, a Permittee's good faith effort must include documentation of:

- Two follow-up inspections within 3 months, and
- Two warning letters or notices of violation.

b) Referral of Violations of GCASP Filing Requirements:

For those projects subject to the GCASP, Permittees shall refer non-filers (i.e., those projects which cannot demonstrate that they have a WDID number) to the Regional Board, within 15 days of

making a determination. In making such referrals, Permittees shall include, at a minimum, the following documentation:

- Project location;
- Developer;
- Estimated project size; and
- Records of communication with the developer regarding filing requirements.

5. Each Permittee shall train employees in targeted positions (whose jobs or activities are engaged in construction activities including construction inspection staff) regarding the requirements of the storm water management program no later than August 1, 2002, and annually thereafter. For Permittees with a population of 250,000 or more (2000 U.S. Census), initial training shall be completed no later than February 3, 2003. Each Permittee shall maintain a list of trained employees.

F. Public Agency Activities Program

Each Permittee shall implement a Public Agency program to minimize storm water pollution impacts from public agency activities. Public Agency requirements consist of:

- Sewage Systems Maintenance, Overflow, and Spill Prevention
- Public Construction Activities Management
- Vehicle Maintenance/Material Storage Facilities/Corporation Yards Management
- Landscape and Recreational Facilities Management
- Storm Drain Operation and Management
- Streets and Roads Maintenance
- Parking Facilities Management
- Public Industrial Activities Management
- Emergency Procedures
- Treatment Feasibility Study

1. Sewage System Maintenance, Overflow, and Spill Prevention

a) Each Permittee shall implement a response plan for overflows of the sanitary sewer system within their respective jurisdiction, which shall consist at a minimum of the following:

(1) Investigation of any complaints received;

(2) Upon notification, immediate response to overflows for containment; and

(3) Notification to appropriate sewer and public health agencies when a sewer overflows to the MS4.

b) In addition to 1.a.1, 1.a.2, and 1.a.3 above, for those Permittees, which own and/or operate a sanitary sewer system, the Permittee shall also implement the following requirements:

(1) Procedures to prevent sewage spills or leaks from sewage facilities from entering the MS4; and

(2) Identify, repair, and remediate sanitary sewer blockages, exfiltration, overflow, and wet weather overflows from sanitary sewers to the MS4.

2. Public Construction Activities Management

a) Each Permittee shall implement the Development Planning Program requirements (Permit Part 4.D) at public construction projects.

b) Each Permittee shall implement the Development Construction Program requirements (Permit Part 4.E) at Permittee owned construction sites.

c) Each Permittee shall obtain coverage under the GCASP for public construction sites 5 acres or greater (or part of a larger area of development) except that a municipality under 100,000 in population (1990 U.S. Census) need not obtain coverage under a separate permit until March 10, 2003.

d) Each Permittee, no later than March 10, 2003, shall obtain coverage under a statewide general construction storm water permit for public construction sites for projects between one and five acres.

3. Vehicle Maintenance/Material Storage Facilities/Corporation Yards Management

a) Each Permittee, consistent with the SQMP, shall implement SWPPPs for public vehicle maintenance facilities, material storage facilities, and corporation yards which have the potential to discharge pollutants into storm water.

b) Each Permittee shall implement BMPs to minimize pollutant discharges in storm water including but not be limited to:

(1) Good housekeeping practices;

(2) Material storage control;

(3) Vehicle leaks and spill control; and

(4) Illicit discharge control.

c) Each Permittee shall implement the following measures to prevent the discharge of pollutants to the MS4:

(1) For existing facilities, that are not already plumbed to the sanitary sewer, all vehicle and equipment wash areas (except for fire stations) shall either be:

(i) Self-contained;

(ii) Equipped with a clarifier;

(iii) Equipped with an alternative pre-treatment device; or

(iv) Plumbed to the sanitary sewer.

(2) For new facilities, or during redevelopment of existing facilities (including fire stations), all vehicle and equipment wash areas shall be plumbed to the sanitary sewer and be equipped with a pre-treatment device in accordance with requirements of the sewer agency.

4. Landscape and Recreational Facilities Management

Each Permittee shall implement the following requirements:

a) A standardized protocol for the routine and non-routine application of pesticides, herbicides (including pre-emergents), and fertilizers;

b) Consistency with State Board's guidelines and monitoring requirements for application of aquatic pesticides to surface waters (WQ Order No. 2001-12 DWQ);

c) Ensure no application of pesticides or fertilizers immediately before, during, or immediately after a rain event or when water is flowing off the area to be applied;

d) Ensure that no banned or unregistered pesticides are stored or applied;

e) Ensure that staff applying pesticides are certified by the California Department of Food and Agriculture, or are under the direct supervision of a certified pesticide applicator;

f) Implement procedures to encourage retention and planting of native vegetation and to reduce water, fertilizer, and pesticide needs;

g) Store fertilizers and pesticides indoors or under cover on paved surfaces or use secondary containment;

h) Reduce the use, storage, and handling of hazardous materials to reduce the potential for spills; and

i) Regularly inspect storage areas.

5. Storm Drain Operation and Management

a) Each Permittee shall designate catch basin inlets within its jurisdiction as one of the following:

Priority A: Catch basins that are designated as consistently generating the highest volumes of trash and/or debris.

Priority B: Catch basins that are designated as consistently generating moderate volumes of trash and/or debris.

Priority C: Catch basins that are designated as generating low volumes of trash and/or debris.

b) Permittees subject to a trash TMDL (Los Angeles River and Ballona Creek WMAs) shall continue to implement the requirements listed below until trash TMDL implementation measures are adopted. Thereafter, the subject Permittees shall implement programs in conformance with the TMDL implementation schedule, which shall include an effective combination of measures such as street sweeping, catch basin cleaning, installation of treatment devices and trash receptacles, or other BMPs. Default requirements include:

(1) Inspection and cleaning of catch basins between May 1 and September 30 of each year;

(2) Additional cleaning of any catch basin that is at least 40% full of trash and/or debris;

(3) Record keeping of catch basins cleaned; and

(4) Recording of the overall quantity of catch basin waste collected.

If the implementation phase for the Los Angeles River and Ballona Creek Trash TMDLs has not begun by October 2003, subject Permittees shall implement the requirements described below in subsection 5(c), until such time programs in conformance with the subject Trash TMDLs are being implemented.

c) Permittees not subject to a trash TMDL shall:

(1) Clean catch basins according to the following schedule:

Priority A: A minimum of three times during the wet season and once during the dry season every year.

Priority B: A minimum of once during the wet season and once during the dry season every year.

Priority C: A minimum of once per year.

In addition to the schedule above, between February 1, 2002 and July 1, 2003, Permittees shall ensure that any catch basin that is at least 40% full of trash and/or debris shall be cleaned out. After July 1, 2003, Permittees shall ensure that any catch basin that is at least 25% full of trash and debris shall be cleaned out.

(2) For any special event that can be reasonably expected to generate substantial quantities of trash and litter, include provisions that require for the proper management of trash and litter generated, as a condition of the special use permit issued for that event. At a minimum, the municipality who issues the permit for the special event shall arrange for either temporary screens to be placed on catch basins or for catch basins in that area to be cleaned out subsequent to the event and prior to any rain event.

(3) Place trash receptacles at all transit stops within its jurisdiction that have shelters no later than August 1, 2002, and at all other transit stops within its jurisdiction no later than February 3, 2003. All trash receptacles shall be maintained as necessary.

d) Each Permittee shall inspect the legibility of the catch basin stencil or label nearest the inlet. Catch basins with illegible stencils shall be recorded and re-stenciled or re-labeled within 180 days of inspection.

e) Each Permittee shall implement BMPs for Storm Drain Maintenance that include:

(1) A program to visually monitor Permittee-owned open channels and other drainage structures for debris at least annually and identify and prioritize problem areas of illicit discharge for regular inspection;

(2) A review of current maintenance activities to assure that appropriate storm water BMPs are being utilized to protect water quality;

(3) Removal of trash and debris from open channel storm drains shall occur a minimum of once per year before the storm season;

(4) Minimize the discharge of contaminants during MS4 maintenance and clean outs; and

(5) Proper disposal of material removed.

6. Streets and Roads Maintenance

a) Each Permittee shall designate streets and/or street segments within its jurisdiction as one of the following:

Priority A: Streets and/or street segments that are designated as consistently generating the highest volumes of trash and/or debris.

Priority B: Streets and/or street segments that are designated as consistently generating moderate volumes of trash and/or debris.

Priority C: Streets and/or street segments that are designated as generating low volumes of trash and/or debris.

b) Each Permittee shall perform street sweeping of curbed streets according to the following schedule:

Priority A: These streets and/or street segments shall be swept at least two times per month.

Priority B: Each Permittee shall ensure that each street and/or street segments is swept at least once per month.

Priority C: These streets and/or street segments shall be swept as necessary but in no case less than once per year.

c) Each Permittee shall require that:

(1) Sawcutting wastes be recovered and disposed of properly and that in no case shall waste be left on a roadway or allowed to enter the storm drain;

(2) Concrete and other street and road maintenance materials and wastes shall be managed to prevent discharge to the MS4; and

(3) The washout of concrete trucks and chutes shall only occur in designated areas and never discharged to storm drains, open ditches, streets, or catch basins.

d) Each Permittee shall, no later than August 1, 2002, train their employees in targeted positions (whose interactions, jobs, and activities affect storm water quality) regarding the requirements of the storm water management program to:

(1) Promote a clear understanding of the potential for maintenance activities to pollute storm water; and

(2) Identify and select appropriate BMPs.

For Permittees with a population of 250,000 or more (2000 U.S. Census) training shall be completed no later than February 1, 2003.

7. Parking Facilities Management

Permittee-owned parking lots exposed to storm water shall be kept clear of debris and excessive oil buildup and cleaned no less than 2 times per month and/or inspected no less than 2 times per month to determine if cleaning is necessary. In no case shall a Permittee-owned parking lot be cleaned less than once a month.

8. Public Industrial Activities Management

Each Permittee shall, for any municipal activity considered a discharge of storm water associated with industrial activity, obtain separate coverage under the GIASP except that a municipality under 100,000 in population (1990 U.S. Census) need not file the Notice Of Intent to be covered by said permit until March 10, 2003 (with the exception of power plants, airports, and uncontrolled sanitary landfills).

9. Emergency Procedures

Each Permittee shall repair essential public services and infrastructure in a manner to minimize environmental damage in emergency situations such as: earthquakes; fires; floods; landslides; or windstorms. BMPs shall be implemented to the extent that measures do not compromise public health and safety. After initial emergency response or emergency repair activities have been completed, each Permittee shall implement BMPs and programs as required under this Order.

10. Treatment Feasibility Study

The Permittees in cooperation with the County Sanitation Districts of Los Angeles County shall conduct a study to investigate the possible diversion of dry weather discharges or the use of alternative Treatment Control BMPs to treat flows from their jurisdiction which may impact public health and safety and/or the environment. The Permittees shall collectively review their individual prioritized lists and create a watershed based priority list of drains for potential diversion or treatment and submit the priority listing to the Regional Board Executive Officer, no later than July 1, 2003.

G. Illicit Connections and Illicit Discharges Elimination Program

Permittees shall eliminate all illicit connections and illicit discharges to the storm drain system, and shall document, track, and report all such cases in accordance

with the elements and performance measures specified in the following subsections.

1. General

a) Implementation: Each Permittee must develop an Implementation Program which specifies how each Permittee is implementing revisions to the IC/ID Program of the SQMP. This Implementation Program must be documented, and available for review and approval by the Regional Board Executive Officer, upon request.

b) Tracking: All Permittees shall, no later than February 3, 2003, develop and maintain a listing of all permitted connections to their storm drain system. All Permittees shall map at a scale and in a format specified by the Principal Permittee all illicit connections and discharges on their baseline maps, and shall transmit this information to the Principal Permittee. No later than February 3, 2003, the Principal Permittee shall use this information as well as results of baseline and priority screening for illicit connections (as set forth in subsection 2 below) to start an annual evaluation of patterns and trends of illicit connections and illicit discharges, with the objectives of identifying priority areas for elimination of illicit connections and illicit discharges.

c) Training: All Permittees shall train all targeted employees who are responsible for identification, investigation, termination, cleanup, and reporting of illicit connections and discharges. For Permittees with a population of less than 250,000 (2000 U.S. Census), training shall be completed no later than August 1, 2002. For Permittees with a population of 250,000 or more (2000 U.S. Census), training shall be completed no later than February 3, 2003. Furthermore, all Permittees shall conduct refresher training on an annual basis thereafter.

2. Illicit Connections

a) Screening for Illicit Connections

(1) Field Screening: All Permittees shall field Screen the storm drain system for illicit connections in accordance with the following schedule:

(i) Open channels: No later than February 3, 2003;

(ii) Underground pipes in priority areas: No later than February 1, 2005; and

(iii) Underground pipes with a diameter of 36 inches or greater: No later than December 12, 2006.

Permittees shall report, to the Principal Permittee, on the location and length of open channels or underground pipes that have been Screened *vis a vis* the entire storm drain

network, and on the status of suspected, confirmed, and terminated illicit connections. Permittees shall maintain a list containing all permitted connections and the status of connections under investigation for possible illicit connection.

(2) Permit Screening: No later than December 12, 2006, Permittees shall complete a review of all permitted connections to the storm drain system, to confirm compliance with Part 1 (Discharge Prohibition).

b) Response to Illicit Connections

(1) Investigation: Upon discovery or upon receiving a report of a suspected illicit connection, Permittees shall initiate an investigation within 21 days, to determine the source of the connection, the nature and volume of discharge through the connection, and the responsible party for the connection.

(2) Termination: Upon confirmation of the illicit nature of a storm drain connection, Permittees shall ensure termination of the connection within 180 days, using enforcement authority as needed.

3. Illicit Discharges

a) Abatement and Cleanup: Permittees shall respond, within one business day of discovery or a report of a suspected illicit discharge, with activities to abate, contain, and clean up all illicit discharges, including hazardous substances.

b) Investigation: Permittees shall investigate illicit discharges as soon as practicable (during or immediately following containment and cleanup activities), and shall take enforcement action as appropriate.

Part 5. DEFINITIONS

The following are definitions for terms applicable to this Order:

"Adverse Impact" means a detrimental effect upon water quality or beneficial uses caused by a discharge or loading of a pollutant or pollutants.

"Anti-degradation policies" means the *Statement of Policy with Respect to Maintaining High Quality Water in California* (State Board Resolution No. 68-16) which protects surface and ground waters from degradation. In particular, this policy protects waterbodies where existing quality is higher than that necessary for the protection of beneficial uses including the protection of fish and wildlife propagation and recreation on and in the water.

"Applicable Standards and Limitations" means all State, interstate, and federal standards and limitations to which a “discharge” or a related activity is subject under the CWA, including

"effluent limitations, "water quality standards, standards of performance, toxic effluent standards or prohibitions, "best management practices," and pretreatment standards under sections 301, 302, 303, 304, 306, 307, 308, 403 and 404 of CWA.

"**Areas of Special Biological Significance (ASBS)**" means all those areas of this state as ASBS, listed specifically within the California Ocean Plan or so designated by the State Board which, among other areas, includes the area from Mugu Lagoon to Latigo Point: Oceanwater within a line originating from Laguna Point at 34° 5' 40" north, 119° 6'30" west, thence southeasterly following the mean high tideline to a point at Latigo Point defined by the intersection of the meanhigh tide line and a line extending due south of Benchmark 24; thence due south to a distance of 1000 feet offshore or to the 100 foot isobath, whichever distance is greater; thence northwesterly following the 100 foot isobath or maintaining a 1,000-foot distance from shore, whichever maintains the greater distance from shore, to a point lying due south of Laguna Point, thence due north to Laguna Point.

"Authorized Discharge" means any discharge that is authorized pursuant to an NPDES permit or meets the conditions set forth in this Order.

"Automotive Service Facilities" means a facility that is categorized in any one of the following Standard Industrial Classification (SIC) codes: 5013, 5014, 5541, 5511, 7532-7534, or 7536-7539. For inspection purposes, Permittees need not inspect facilities with SIC codes 5013, 5014, 5541, 5511, provided that these facilities have no outside activities or materials that may be exposed to storm water.

"Basin Plan" means the Water Quality Control Plan, Los Angeles Region, Basin Plan for the Coastal Watersheds of Los Angeles and Ventura Counties, adopted by the Regional Board on June 13, 1994 and subsequent amendments.

"Beneficial Uses" means the existing or potential uses of receiving waters in the permit area as designated by the Regional Board in the Basin Plan.

"Best Management Practices (BMPs)" means methods, measures, or practices designed and selected to reduce or eliminate the discharge of pollutants to surface waters from point and nonpoint source discharges including storm water. BMPs include structural and nonstructural controls, and operation and maintenance procedures, which can be applied before, during, and/or after pollution producing activities.

"Commercial Development" means any development on private land that is not heavy industrial or residential. The category includes, but is not limited to: hospitals, laboratories and other medical facilities, educational institutions, recreational facilities, plant nurseries, car wash facilities, mini-malls and other business complexes, shopping malls, hotels, office buildings, public warehouses and other light industrial complexes.

"Construction" means constructing, clearing, grading, or excavation that results in soil disturbance. Construction includes structure teardown. It does not include routine maintenance to maintain original line and grade, hydraulic capacity, or original purpose of facility; emergency construction activities required to immediately protect public health and safety; interior remodeling with no outside exposure of construction material or construction waste to storm water; mechanical permit work; or sign permit work.

"Control" means to minimize, reduce, eliminate, or prohibit by technological, legal, contractual or other means, the discharge of pollutants from an activity or activities.

"Dechlorinated/Debrominated Swimming Pool Discharge" means swimming pool discharges which have no measurable chlorine or bromine and do not contain any detergents, wastes, or additional chemicals not typically found in swimming pool water. The term does not include swimming pool filter backwash.

"Development" means any construction, rehabilitation, redevelopment or reconstruction of any public or private residential project (whether single-family, multi-unit or planned unit development); industrial, commercial, retail and other non-residential projects, including public agency projects; or mass grading for future construction. It does not include routine maintenance to maintain original line and grade, hydraulic capacity, or original purpose of facility, nor does it include emergency construction activities required to immediately protect public health and safety.

"**Directly Adjacent**" means situated within 200 feet of the contiguous zone required for the continued maintenance, function, and structural stability of the environmentally sensitive area.

"Director" means the Director of a municipality and Person(s) designated by and under the Director's instruction and supervision.

"Discharge" means when used without qualification the "discharge of a pollutant."

"**Discharging Directly**" means outflow from a drainage conveyance system that is composed entirely or predominantly of flows from the subject, property, development, subdivision, or industrial facility, and not commingled with the flows from adjacent lands.

"Discharge of a Pollutant" means: any addition of any "pollutant" or combination of pollutants to "waters of the United States" from any "point source" or, any addition of any pollutant or combination of pollutants to the waters of the "contiguous zone" or the ocean from any point source other than a vessel or other floating craft which is being used as a means of transportation. The term discharge includes additions of pollutants into waters of the United States from: surface runoff which is collected or channeled by man; discharges through pipes, sewers, or other conveyances owned by a State, municipality, or other person which do not lead to a treatment works; and discharges through pipes, sewers, or other conveyances, leading into privately owned treatment works.

"Disturbed Area" means an area that is altered as a result of clearing, grading, and/or excavation.

"Environmentally Sensitive Areas (ESAs)" means an area in which plant or animal life or their habitats are either rare or especially valuable because of their special nature or role in an ecosystem and which would be easily disturbed or degraded by human activities and developments (California Public Resources Code § 30107.5). Areas subject to storm water mitigation requirements are: areas designated as Significant Ecological Areas by the County of Los Angeles (*Los Angeles County Significant Areas Study, Los Angeles County Department of Regional Planning (1976)* and amendments); an area designated as a Significant Natural Area by the California Department of Fish and Game's Significant Natural Areas Program, provided that area has been field verified by the Department of Fish and Game; an area listed in the

Basin Plan as supporting the "Rare, Threatened, or Endangered Species (RARE)" beneficial use; and an area identified by a Permittee as environmentally sensitive.

"General Construction Activities Storm Water Permit (GCASP)" means the general NPDES permit adopted by the State Board which authorizes the discharge of storm water from construction activities under certain conditions.

"General Industrial Activities Storm Water Permit (GIASP)" means the general NPDES permit adopted by the State Board which authorizes the discharge of storm water from certain industrial activities under certain conditions.

"Hillside" means property located in an area with known erosive soil conditions, where the development contemplates grading on any natural slope that is 25% or greater and where grading contemplates cut or fill slopes.

"Illicit Connection" means any man-made conveyance that is connected to the storm drain system without a permit, excluding roof drains and other similar type connections. Examples include channels, pipelines, conduits, inlets, or outlets that are connected directly to the storm drain system.

"Illicit Discharge" means any discharge to the storm drain system that is prohibited under local, state, or federal statutes, ordinances, codes, or regulations. The term illicit discharge includes all non storm-water discharges except discharges pursuant to an NPDES permit, discharges that are identified in Part 1, "Discharge Prohibitions" of this order, and discharges authorized by the Regional Board Executive Officer.

"Illicit Disposal" means any disposal, either intentionally or unintentionally, of material(s) or waste(s) that can pollute storm water.

"Industrial/Commercial Facility" means any facility involved and/or used in the production, manufacture, storage, transportation, distribution, exchange or sale of goods and/or commodities, and any facility involved and/or used in providing professional and non-professional services. This category of facilities includes, but is not limited to, any facility defined by the Standard Industrial Classifications (SIC). Facility ownership (federal, state, municipal, private) and profit motive of the facility are not factors in this definition.

"Infiltration" means the downward entry of water into the surface of the soil.

"Inspection" means entry and the conduct of an on-site review of a facility and its operations, at reasonable times, to determine compliance with specific municipal or other legal requirements. The steps involved in performing an inspection, include, but are not limited to:

1. Pre-inspection documentation research.;
2. Request for entry;
3. Interview of facility personnel;
4. Facility walk-through.
5. Visual observation of the condition of facility premises;
6. Examination and copying of records as required;
7. Sample collection (if necessary or required);

8. Exit conference (to discuss preliminary evaluation); and,
9. Report preparation, and if appropriate, recommendations for coming into compliance.

In the case of restaurants, a Permittee may conduct an inspection from the curbside, provided that such "curbside" inspection provides the Permittee with adequate information to determine an operator's compliance with BMPs that must be implemented per requirements of this Order, Regional Board Resolution 98-08, County and municipal ordinances, and the SQMP.

"Large Municipal Separate Storm Sewer System (MS4)" means all MS4s that serve a population greater than 250,000 (1990 Census) as defined in 40 CFR 122.26 (b)(4). The Regional Board designated Los Angeles County as a large MS4 in 1990, based on: (i) the U.S. Census Bureau 1990 population count of 8.9 million, and (ii) the interconnectivity of the MS4s in the incorporated and unincorporated areas within the County.

"Local SWPPP" means the Storm Water Pollution Prevention Plan required by the local agency for a project that disturbs one or more acres of land.

"Maximum Extent Practicable (MEP)" means the standard for implementation of storm water management programs to reduce pollutants in storm water. CWA § 402(p)(3)(B)(iii) requires that municipal permits "shall require controls to reduce the discharge of pollutants to the maximum extent practicable, including management practices, control techniques and system, design and engineering methods, and such other provisions as the Administrator or the State determines appropriate for the control of such pollutants. See also State Board Order WQ 2000-11 at page 20.

"Method Detection Limit (MDL)" means the minimum concentration of a substance that can be measured and reported with 99 percent confidence that the analyte concentration is greater than zero, as defined in 40 CFR 136, Appendix B.

"Minimum Level (ML)" means the concentration at which the entire analytical system must give a recognizable signal and acceptable calibration point. The ML is the concentration in a sample that is equivalent to the concentration of the lowest calibration standard analyzed by a specific analytical procedure, assuming that all the method specified sample weights, volumes, and processing steps have been followed.

"Municipal Separate Storm Sewer System (MS4)" means a conveyance or system of conveyances (including roads with drainage systems, municipal streets, alleys, catch basins, curbs, gutters, ditches, manmade channels, or storm drains) owned by a State, city, county, town or other public body, that is designed or used for collecting or conveying storm water, which is not a combined sewer, and which is not part of a publicly owned treatment works, and which discharges to Waters of the United States.

"National Pollutant Discharge Elimination System (NPDES)" means the national program for issuing, modifying, revoking and reissuing, terminating, monitoring and enforcing permits, and imposing and enforcing pretreatment requirements, under CWA §307, 402, 318, and 405. The term includes an "approved program."

"Natural Drainage Systems" means unlined or unimproved (not engineered) creeks, streams, rivers or similar waterways.

“New Development” means land disturbing activities; structural development, including construction or installation of a building or structure, creation of impervious surfaces; and land subdivision.

“Non-Storm Water Discharge” means any discharge to a storm drain that is not composed entirely of storm water.

"Nuisance" means anything that meets all of the following requirements: (1) is injurious to health, or is indecent or offensive to the senses, or an obstruction to the free use of property, so as to interfere with the comfortable enjoyment of life or property; (2) affects at the same time an entire community or neighborhood, or any considerable number of persons, although the extent of the annoyance or damage inflicted upon individuals may be unequal.; (3) occurs during, or as a result of, the treatment or disposal of wastes.

“Parking Lot” means land area or facility for the parking or storage of motor vehicles used for businesses, commerce, industry, or personal use, with a lot size of 5,000 square feet or more of surface area, or with 25 or more parking spaces.

"Permittee(s)" means Co-Permittees and any agency named in this Order as being responsible for permit conditions within its jurisdiction. Permittees to this Order include the Los Angeles County Flood Control District, Los Angeles County, and the cities of Agoura Hills, Alhambra, Arcadia, Artesia, Azusa, Baldwin Park, Bellflower, Bell Gardens, Beverly Hills, Bradbury, Burbank, Calabasas, Carson, Cerritos, Claremont, Commerce, Compton, Covina, Cudahy, Culver City, Diamond Bar, Downey, Duarte, El Monte, El Segundo, Gardena, Glendale, Glendora, Hawaiian Gardens, Hawthorne, Hermosa Beach, Hidden Hills, Huntington Park, Industry, Inglewood, Irwindale, La Canada Flintridge, La Habra Heights, Lakewood, La Mirada, La Puente, La Verne, Lawndale, Lomita, Los Angeles, Lynwood, Malibu, Manhattan Beach, Maywood, Monrovia, Montebello, Monterey Park, Norwalk, Palos Verdes Estates, Paramount, Pasadena, Pico Rivera, Pomona, Rancho Palos Verdes, Redondo Beach, Rolling Hills, Rolling Hills Estates, Rosemead, San Dimas, San Fernando, San Gabriel, San Marino, Santa Clarita, Santa Fe Springs, Santa Monica, Sierra Madre, Signal Hill, South El Monte, South Gate, South Pasadena, Temple City, Torrance, Vernon, Walnut, West Covina, West Hollywood, Westlake Village, and Whittier.

“Planning Priority Projects” means those projects that are required to incorporate appropriate storm water mitigation measures into the design plan for their respective project. These types of projects include:

1. Ten or more unit homes (includes single family homes, multifamily homes, condominiums, and apartments)
2. A 100,000 or more square feet of impervious surface area industrial/ commercial development (1 ac starting March 2003)
3. Automotive service facilities (SIC 5013, 5014, 5541, 7532-7534, and 7536-7539)
4. Retail gasoline outlets
5. Restaurants (SIC 5812)
6. Parking lots 5,000 square feet or more of surface area or with 25 or more parking spaces

7. Redevelopment projects in subject categories that meet Redevelopment thresholds
8. Projects located in or directly adjacent to or discharging directly to an ESA, which meet thresholds; and
9. Those projects that require the implementation of a site-specific plan to mitigate post-development storm water for new development not requiring a SUSMP but which may potentially have adverse impacts on post-development storm water quality, where the following project characteristics exist:

    a) Vehicle or equipment fueling areas;
    b) Vehicle or equipment maintenance areas, including washing and repair;
    c) Commercial or industrial waste handling or storage;
    d) Outdoor handling or storage of hazardous materials;
    e) Outdoor manufacturing areas;
    f) Outdoor food handling or processing;
    g) Outdoor animal care, confinement, or slaughter; or
    h) Outdoor horticulture activities.

"Pollutants" means those "pollutants" defined in CWA §502(6) (33.U.S.C.§1362(6)), and incorporated by reference into California Water Code §13373.

"Potable Water Distribution Systems Releases" means sources of flows from drinking water storage, supply and distribution systems including flows from system failures, pressure releases, system maintenance, distribution line testing, fire hydrant flow testing; and flushing and dewatering of pipes, reservoirs, vaults, and minor non-invasive well maintenance activities not involving chemical addition(s). It does not include wastewater discharges from activities that occur at wellheads, such as well construction, well development (i.e., aquifer pumping tests, well purging, etc.), or major well maintenance.

"Project" means all development, redevelopment, and land disturbing activities. The term is not limited to "Project" as defined under CEQA (Pub. Resources Code §21065).

"Rain Event" means any rain event greater than 0.1 inch in 24 hours except where specifically stated otherwise.

"Rare, Threatened, or Endangered Species (RARE)" means a beneficial use for waterbodies in the Los Angeles Region, as designated in the Basin Plan (Table 2-1), that supports habitats necessary, at least in part, for the survival and successful maintenance of plant or animal species established under state or federal law as rare, threatened, or endangered.

"Receiving Waters" means all surface water bodies in the Los Angeles Region that are identified in the Basin Plan.

"Redevelopment" means land-disturbing activity that results in the creation, addition, or replacement of 5,000 square feet or more of impervious surface area on an already developed site. Redevelopment includes, but is not limited to: the expansion of a building footprint;

addition or replacement of a structure; replacement of impervious surface area that is not part of a routine maintenance activity; and land disturbing activities related to structural or impervious surfaces. It does not include routine maintenance to maintain original line and grade, hydraulic capacity, or original purpose of facility, nor does it include emergency construction activities required to immediately protect public health and safety.

"Regional Administrator" means the Regional Administrator of the Regional Office of the USEPA or the authorized representative of the Regional Administrator.

"Restaurant" means a facility that sells prepared foods and drinks for consumption, including stationary lunch counters and refreshment stands selling prepared foods and drinks for immediate consumption (SIC Code 5812).

"Retail Gasoline Outlet" means any facility engaged in selling gasoline and lubricating oils.

"Runoff" means any runoff including storm water and dry weather flows from a drainage area that reaches a receiving water body or subsurface. During dry weather it is typically comprised of base flow either contaminated with pollutants or uncontaminated, and nuisance flows.

"Screening" means using proactive methods to identify illicit connections through a continuously narrowing process. The methods may include: performing baseline monitoring of open channels, conducting special investigations using a prioritization approach, analyzing maintenance records for catch basin and storm drain cleaning and operation, and verifying all permitted connections into the storm drains. Special investigation techniques may include: dye testing, visual inspection, smoke testing, flow monitoring, infrared, aerial and thermal photography, and remote control camera operation.

"Sidewalk Rinsing" means pressure washing of paved pedestrian walkways with average water usage of 0.006 gallons per square foot, with no cleaning agents, and properly disposing of all debris collected, as authorized under Regional Board Resolution No. 98-08.

"Significant Ecological Area (SEA)" means an area that is determined to possess an example of biotic resources that cumulatively represent biological diversity, for the purposes of protecting biotic diversity, as part of the Los Angeles County General Plan.[1]
Areas are designated as SEAs, if they possess one or more of the following criteria:

1. The habitat of rare, endangered, and threatened plant and animal species.
2. Biotic communities, vegetative associations, and habitat of plant and animal species that are either one of a kind, or are restricted in distribution on a regional basis.
3. Biotic communities, vegetative associations, and habitat of plant and animal species that are either one of a kind or are restricted in distribution in Los Angeles County.

[1] The 61 existing SEAs represent the findings of a study that was completed in 1976 by England and Nelson, Environmental Consultants, as amended through the adoption of a revised Los Angeles County General Plan in 1980. The results of an update study to evaluate existing SEAs within unincorporated Los Angeles County is currently being proposed to the Los Angeles County Planning Commission (*Los Angeles County Significant Ecological Area Update Study 2000, Background Report*, PCR Services Corporation). The *Update Study 2000*, which contains existing and proposed SEA boundaries, can be downloaded from the Los Angeles County Department of Planning website at http://planning.co.la.ca.us/drp_revw.html#SEA

4. Habitat that at some point in the life cycle of a species or group of species, serves as a concentrated breeding, feeding, resting, migrating grounds and is limited in availability either regionally or within Los Angeles County.
5. Biotic resources that are of scientific interest because they are either an extreme in physical/geographical limitations, or represent an unusual variation in a population or community.
6. Areas important as game species habitat or as fisheries.
7. Areas that would provide for the preservation of relatively undisturbed examples of natural biotic communities in Los Angeles County.
8. Special areas.[2]

"Significant Natural Area (SNA)" means an area defined by the California Department of Fish and Game (DFG), Significant Natural Areas Program, as an area that contains an important example of California's biological diversity. The most current SNA maps, reports, and descriptions can be downloaded from the DFG website at ftp://maphost.dfg.ca.gov/outgoing/whdab/sna/. These areas are identified using the following biological criteria only, irrespective of any administrative or jurisdictional considerations:

1. Areas supporting extremely rare species or habitats.
2. Areas supporting associations or concentrations of rare species or habitats.
3. Areas exhibiting the best examples of rare species and habitats in the state.

"Site" means the land or water area where any "facility or activity" is physically located or conducted, including adjacent land used in connection with the facility or activity.

"Source Control BMP" means any schedules of activities, prohibitions of practices, maintenance procedures, managerial practices or operational practices that aim to prevent storm water pollution by reducing the potential for contamination at the source of pollution.

"SQMP" means the Los Angeles Countywide Stormwater Quality Management Program.

"State Storm Water Pollution Prevention Plan (State SWPPP)" means a plan, as required by a State General Permit, identifying potential pollutant sources and describing the design, placement and implementation of BMPs, to effectively prevent non-stormwater Discharges and reduce Pollutants in Stormwater Discharges during activities covered by the General Permit.

"Storm Water" means storm water runoff, snow melt runoff, and surface runoff and drainage.

"Storm Water Discharge Associated with Industrial Activity" means industrial discharge as defined in 40 CFR 122.26(b)(14)

"Stormwater Quality Management Program" means the Los Angeles Countywide Stormwater Quality Management Program, which includes descriptions of programs, collectively developed by the Permittees in accordance with provisions of the NPDES Permit, to comply with applicable federal and state law, as the same is amended from time to time.

[2] These criteria from the 1976 study have been modified in the *Update Study 2000*.

"Structural BMP" means any structural facility designed and constructed to mitigate the adverse impacts of storm water and urban runoff pollution (e.g. canopy, structural enclosure). The category may include both Treatment Control BMPs and Source Control BMPs.

"SUSMP" means the Los Angeles Countywide Standard Urban Stormwater Mitigation Plan. The SUSMP shall address conditions and requirements of new development.

"Total Maximum Daily Load (TMDL)" means the sum of the individual waste load allocations for point sources and load allocations for nonpoint sources and natural background.

"Toxicity Identification Evaluation (TIE)" means a set of procedures to identify the specific chemical(s) responsible for toxicity. These procedures are performed in three phases (characterization, identification, and confirmation) using aquatic organism toxicity tests.

"Toxicity Reduction Evaluation (TRE)" means a study conducted in a step-wise process to identify the causative agents of effluent or ambient toxicity, isolate the sources of toxicity, evaluate the effectiveness of toxicity control options, and then confirm the reduction in toxicity.

"Treatment" means the application of engineered systems that use physical, chemical, or biological processes to remove pollutants. Such processes include, but are not limited to, filtration, gravity settling, media absorption, biodegradation, biological uptake, chemical oxidation and UV radiation.

"Treatment Control BMP" means any engineered system designed to remove pollutants by simple gravity settling of particulate pollutants, filtration, biological uptake, media absorption or any other physical, biological, or chemical process.

"USEPA Phase I Facilities" means facilities in specified industrial categories that are required to obtain an NPDES permit for storm water discharges, as required by 40 CFR 122.26(c). These categories include:

i. facilities subject to storm water effluent limitation guidelines, new source performance standards, or toxic pollutant effluent standards (40 CFR N)
ii. manufacturing facilities
iii. oil and gas/mining facilities
iv. hazardous waste treatment, storage, or disposal facilities
v. landfills, land application sites, and open dumps
vi. recycling facilities
vii. steam electric power generating facilities
viii. transportation facilities
ix. sewage of wastewater treatment works
x. light manufacturing facilities

"Vehicle Maintenance/Material Storage Facilities/Corporation Yards" means any Permittee owned or operated facility or portion thereof that:

i. Conducts industrial activity, operates equipment, handles materials, and provides services similar to Federal Phase I facilities;
ii. Performs fleet vehicle service/maintenance on ten or more vehicles per day including repair, maintenance, washing, and fueling;

iii. Performs maintenance and/or repair of heavy industrial machinery/equipment ; and
iv. Stores chemicals, raw materials, or waste materials in quantities that require a hazardous materials business plan or a Spill Prevention, Control , and Counter-measures (SPCC) plan.

"Water Quality Standards and Water Quality Objectives" means water quality criteria contained in the Basin Plan, the California Ocean Plan, the National Toxics Rule, the California Toxics Rule, and other state or federally approved surface water quality plans. Such plans are used by the Regional Board to regulate all discharges, including storm water discharges.

"Waters of the State" means any surface water or groundwater, including saline waters, within boundaries of the state.

"Waters of the United States" or "Waters of the U.S." means:

a. All waters that are currently used, were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide;
b. All interstate waters, including interstate "wetlands";
c. All other waters such as intrastate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, "wetlands," sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds the use, degradation, or destruction of which would affect or could affect interstate or foreign commerce including any such waters:

    1. Which are or could be used by interstate or foreign travelers for recreational or other purposes;
    2. From which fish or shellfish are or could be taken and sold in interstate or foreign commerce; or
    3. Which are used or could be used for industrial purposes by industries in interstate commerce;

d. All impoundments of waters otherwise defined as waters of the United States under this definition;
e. Tributaries of waters identified in paragraphs (a) through (d) of this definition;
f. The territorial sea; and
g. "Wetlands" adjacent to waters (other than waters that are themselves wetlands) identified in paragraph (a) through (f) of this definition.

Waste treatment systems, including treatment ponds or lagoons designed to meet the requirements of CWA (other than cooling ponds as defined in 40 CFR 423.22(m), which also meet the criteria of this definition) are not waters of the United States. This exclusion applies only to man-made bodies of water, which neither were originally created in waters of the United States (such as disposal area in wetlands) nor resulted from the impoundment of waters of the United States. Waters of the United States do not include prior converted cropland. Notwithstanding the determination of an area's status as prior converted cropland by any other federal agency, for the purposes of the CWA, the final authority regarding CWA jurisdiction remains with USEPA.

"Wet Season" means the calendar period beginning October 1 through April 15.

Part 6. STANDARD PROVISIONS

A. Standard Requirements

1. Each Permittee shall comply with all provisions and requirements of this permit.

2. Should a Permittee discover a failure to submit any relevant facts or that it submitted incorrect information in a report, it shall promptly submit the missing or correct information.

3. Each Permittee shall report all instances of non-compliance not otherwise reported at the time monitoring reports are submitted.

4. This Order includes the attached Monitoring and Reporting Program, and SUSMP(Regional Board Resolution No. R00-02), which are a part of the permit and must be complied with in the same manner as with the rest of the requirements in the permit.

B. Regional Board Review

Any formal determination or approval made by the Regional Board Executive Officer pursuant to the provisions of this Order may be reviewed by the Regional Board. A Permittee(s) or a member of the public may request such review upon petition within 30 days of the effective date of the notification of such decision to the Permittee(s) and interested parties on file at the Regional Board.

C. Public Review

1. All documents submitted to the Regional Board in compliance with the terms and conditions of this Order shall be made available to members of the public pursuant to the Freedom of Information Act (5 U.S.C. § 552 (as amended) and the Public Records Act (Cal. Government Code § 6250 *et seq.*).

2. All documents submitted to the Regional Board Executive Officer for approval shall be made available to the public for a 30-day period to allow for public comment.

D. Duty to Comply

1. Each Permittee must comply with all of the terms, requirements, and conditions of this Order. Any violation of this order constitutes a violation of the Clean Water Act, its regulations and the California Water Code, and is grounds for enforcement action, Order termination, Order revocation and reissuance, denial of an application for reissuance; or a combination thereof [40 CFR 122.41(a), CWC § 13261, 13263, 13265, 13268, 13300, 13301, 13304, 13340, 13350].

2. A copy of these waste discharge specifications shall be maintained by each Permittee so as to be available during normal business hours to Permittee employees and members of the public.

3. Any discharge of wastes at any point(s) other than specifically described in this Order is prohibited, and constitutes a violation of the Order.

E. Duty to Mitigate [40 CFR 122.41 (d)]

Each Permittee shall take all reasonable steps to minimize or prevent any discharge that has a reasonable likelihood of adversely affecting human health or the environment.

F. Inspection and Entry [40 CFR 122.41(i), CWC § 13267]

The Regional Board, USEPA, and other authorized representatives shall be allowed:

1. Entry upon premises where a regulated facility is located or conducted, or where records are kept under conditions of this Order;
2. Access to copy any records, at reasonable times, that are kept under the conditions of this Order;
3. To inspect at reasonable times any facility, equipment (including monitoring and control equipment), practices, or operations regulated or required under this Order; and,
4. To photograph, sample, and monitor at reasonable times for the purpose of assuring compliance with this Order, or as otherwise authorized by the CWA and the CWC.

G. Proper Operation and Maintenance [40 CFR 122.41 (e), CWC § 13263(f)]

The Permittees shall at all times properly operate and maintain all facilities and systems of treatment (and related appurtenances) that are installed or used by the Permittees to achieve compliance with this Order. Proper operation and maintenance includes adequate laboratory controls and appropriate quality assurance procedures. This provision requires the operation of backup or auxiliary facilities or similar system that are installed by a Permittee only when necessary to achieve compliance with the conditions of this Order.

H. Signatory Requirements [40 CFR 122.41(k) & 122.22]

Except as otherwise provided in this Order, all applications, reports, or information submitted to the Regional Board shall be signed by the Director of Public Works, City Engineer, or authorized designee and certified as set forth in 40 CFR 122.22.

I. Reopener and Modification [40 CFR 122.41(f) & 122.62]

1. This Order may only be modified, revoked, or reissued, prior to the expiration date, by the Regional Board, in accordance with the procedural requirements of the CWC and CCR Title 23 for the issuance of waste

discharge requirements, 40 CFR 122.62, and upon prior notice and hearing, to:

a) Address changed conditions identified in the required reports or other sources deemed significant by the Regional Board;

b) Incorporate applicable requirements or statewide water quality control plans adopted by the State Board or amendments to the Basin Plan;

c) Comply with any applicable requirements, guidelines, and/or regulations issued or approved pursuant to CWA Section 402(p); and/or,

d) Consider any other federal, or state laws or regulations that became effective after adoption of this Order.

2. After notice and opportunity for a hearing, this Order may be terminated or modified for cause, including, but not limited to:

a) Violation of any term or condition contained in this Order;

b) Obtaining this Order by misrepresentation, or failure to disclose all relevant facts; or,

c) A change in any condition that requires either a temporary or permanent reduction or elimination of the authorized discharge.

3. The filing of a request by the Principal Permittee or Permittees for a modification, revocation and re-issuance, or termination, or a notification of planned changes or anticipated noncompliance does not stay any condition of this Order.

4. This Order may be modified to make corrections or allowances for changes in the permitted activity listed in this section, following the procedures at 40 CFR 122.63, if processed as a minor modification. Minor modifications may only:

a) Correct typographical errors, or

b) Require more frequent monitoring or reporting by the Permittee.

J. Severability

The provisions of this permit are severable; and if any provision of this permit or the application of any provision of this permit to any circumstance is held invalid, the application of such provision to other circumstances and the remainder of this permit shall not be affected.

K. Duty to Provide Information [40 CFR 122.41(h)]

The Permittees shall furnish, within a reasonable time, any information the Regional Board or USEPA may request to determine whether cause exists for

modifying, revoking and reissuing, or terminating this Order. The Permittees shall also furnish to the Regional Board, upon request, copies of records required to be kept by this Order.

L. Twenty-four Hour Reporting [40 CFR 122.41(l)(6)][3]

1. The Permittees shall report to the Regional Board any noncompliance that may endanger health or the environment. Any information shall be provided orally within 24 hours from the time any Permittee becomes aware of the circumstances. A written submission shall also be provided within five days of the time the Permittee becomes aware of the circumstances. The written submission shall contain a description of the noncompliance and its cause; the period of noncompliance, including exact dates and times and, if the noncompliance has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance.

2. The Regional Board may waive the required written report on a case-by-case basis.

M. Bypass [40 CFR 122.41(m)][4]

Bypass (the intentional diversion of waste streams from any portion of a treatment facility) is prohibited. The Regional Board may take enforcement action against Permittees for bypass unless:

1. Bypass was unavoidable to prevent loss of life, personal injury or severe property damage. (Severe property damage means substantial physical damage to property, damage to the treatment facilities that causes them to become inoperable, or substantial and permanent loss of natural resources that can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production.);

2. There were no feasible alternatives to bypass, such as the use of auxiliary treatment facilities, retention of untreated waste, or maintenance during normal periods of equipment down time. This condition is not satisfied if adequate back-up equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass that could occur during normal periods of equipment downtime or preventive maintenance;

3. The Permittee submitted a notice at least ten days in advance of the need for a bypass to the Regional Board; or,

4. Permittees may allow a bypass to occur that does not cause effluent limitations to be exceeded, but only if it is for essential maintenance to

[3] This provision applies to incidents where effluent limitations (numerical or narrative) as provided in this Order or in the Los Angeles County SQMP are exceeded, and which endanger public health or the environment.

[4] This provision applies to the operation and maintenance of storm water controls and BMPs as provided in this Order or in the SQMP.

assure efficient operation. In such a case, the above bypass conditions are not applicable. The Permittee shall submit notice of an unanticipated bypass as required.

N. Upset [40 CFR 122.41(n)][5]

Upset means an exceptional incident in which there is unintentional and temporary noncompliance with technology based permit effluent limitations because of factors beyond the reasonable control of the permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation.

1. A Permittee that wishes to establish the affirmative defense of an upset in an action brought for non compliance shall demonstrate, through properly signed, contemporaneous operating logs, or other relevant evidence that:

   a) An upset occurred and that the Permittee can identify the cause(s) of the upset;

   b) The permitted facility was being properly operated by the time of the upset;

   c) The Permittee submitted notice of the upset as required; and,

   d) The Permittee complied with any remedial measures required.

2. No determination made before an action for noncompliance, such as during administrative review of claims that non-compliance was caused by an upset, is final administrative action subject to judicial review.

3. In any enforcement proceeding, the Permittee seeking to establish the occurrence of an upset has the burden of proof.

O. Property Rights [40 CFR 122.41(g)]

This Order does not convey any property rights of any sort, or any exclusive privilege.

P. Enforcement

1. Violation of any of the provisions of the NPDES permit or any of the provisions of this Order may subject the violator to any of the penalties described herein, or any combination thereof, at the discretion of the prosecuting authority; except that only one kind of penalties may be applied for each kind of violation. The CWA provides the following:

   a) Criminal Penalties for:

[5] *Supra*. See footnote number 3.

(1) Negligent Violations:

The CWA provides that any person who negligently violates permit conditions implementing § 301, 302, 306, 307, 308, 318, or 405 is subject to a fine of not less than $2,500 nor more than $25,000 per day for each violation, or by imprisonment for not more than 1 year, or both.

(2) Knowing Violations:

The CWA provides that any person who knowingly violates permit conditions implementing § 301, 302, 306, 307, 308, 318, or 405 is subject to a fine of not less than $5,000 nor more than $50,000 per day of violation, or by imprisonment for not more than 3 years, or both.

(3) Knowing Endangerment:

The CWA provides that any person who knowingly violates permit conditions implementing § 301, 302, 307, 308, 318, or 405 and who knows at that time that he is placing another person in imminent danger of death or serious bodily injury is subject to a fine of not more than $250,000, or by imprisonment for not more than 15 years, or both.

(4) False Statement:

The CWA provides that any person who knowingly makes any false material statement, representation, or certification in any application, record, report, plan, or other document filed or required to be maintained under the Act or who knowingly falsifies, tampers with, or renders inaccurate, any monitoring device or method required to be maintained under the Act, shall upon conviction, be punished by a fine of not more than $10,000 or by imprisonment for not more than two years, or by both. If a conviction is for a violation committed after a first conviction of such person under this paragraph, punishment shall be by a fine of not more than $20,000 per day of violation, or by imprisonment of not more than four years, or by both. (See CWA § 309(c)(4))

b) Civil Penalties

The CWA provides that any person who violates a permit condition implementing § 301, 302, 306, 307, 308, 318, or 405 is subject to a civil penalty not to exceed $27,500 per day for each violation.

2. The CWC provides that any person who violates a waste discharge requirement provision of the CWC is subject to civil penalties of up to $5,000 per day, $10,000 per day, or $25,000 per day of violation; or when the violation involves the discharge of pollutants, is subject to civil penalties of up to $10 per gallon per day or $25 per gallon per day of violation; or some combination thereof, depending on the violation or combination of violations.

Q. Need to Halt or Reduce Activity not a Defense [40 CFR 122.41(c)]

It shall not be a defense for a Permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this Order.

R. Rescission

Regional Board Order No. 96-054 is hereby rescinded.

S. Expiration

This Order expires on December 12, 2006. The Permittees must submit a Report of Waste Discharges and a proposed Storm Water Quality Management Program in accordance with CCR Title 23 as application for reissuance of waste discharge requirements no later than June 12, 2006.

I, Dennis A. Dickerson, Regional Board Executive Officer, do hereby certify that the foregoing is a full, true, and correct copy of an order adopted by the California Regional Water Quality Control Board, Los Angeles Region, on December 13, 2001.

_____
Dennis A. Dickerson
Executive Officer

State of California
CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
LOS ANGELES REGION
MONITORING AND REPORTING PROGRAM - CI 6948
FOR
ORDER No. 01-182
NPDES No. CAS004001
MUNICIPAL STORM WATER AND URBAN RUNOFF DISCHARGES WITHIN THE COUNTY OF LOS ANGELES, AND THE INCORPORATED CITIES, EXCEPT THE CITY OF LONG BEACH

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I. Program Reporting Requirements

The Principal Permittee shall submit, no later than October 15 of each year beginning in the year 2002, a Unified Annual Storm Water Report (Unified Annual Report) documenting the progress of Permittees' implementation of the SQMP and the requirements of this Order. The Unified Annual Report shall contain a section covering common activities conducted collectively by the Permittees, and an integrated summary of the Monitoring Program results. Each Permittee shall submit an Individual Annual Report to the Principal Permittee, by the date determined by the Principal Permittee, to be included in the Unified Annual Report. The Unified Annual Reports shall cover each fiscal year from July 1 through June 30. The first Unified Annual Report, to be submitted on October 15, 2002, shall report for the period from July 1, 2001 through June 30, 2002. Specific requirements that must be addressed in the Annual Reports are listed below.

A. Unified Annual Report

The Principal Permittee shall include the following in the Unified Annual Report:

1. A compilation of Permittee Individual Annual Reports.

2. Proposed changes to the SQMP, as recommended by the WMCs.

3. An assessment of the effectiveness of SQMP requirements to reduce storm water pollution. This assessment shall be comprised of a compilation of watershed-wide assessments conducted by each WMC. Assessments shall be based upon the specific record-keeping information requirement in each section of the permit, monitoring data, summaries of program effectiveness from each Permittee, and any other information related to program effectiveness. The program assessment shall include summaries of the following:

   a) Summary of common activities conducted by all Permittees;

   b) WMA BMP implementation;

   c) Identification of management measures proven to be effective and/or ineffective at reducing urban runoff pollutants and flow;

   d) Permittee level of effort, as indicated in their Individual Annual Report self evaluations (Attachment U-4, section VI); and

   e) Integrated summary of Monitoring Program results, including the identification of water quality improvements or degradation, and recommendations for improvements to the SQMP (including proposed BMPs) based on the results from the Monitoring Program.

4. Pursuant to Part 2 of this Order, after a determination by either a Permittee or the Regional Board that discharges are causing or contributing to an exceedance of an applicable Water Quality Standard, a Receiving Water Limitations (RWL) Compliance Report shall be attached to the subsequent Unified Annual Report. A status RWL Compliance Report shall be submitted every alternate year following the submittal of the first Report. The RWL Compliance Report shall include the following:

   a) A plan to comply with the RWL (Part 2 of this Order);

   b) Changes to the SQMP to eliminate water quality exceedances;

   c) Enhanced monitoring to demonstrate compliance; and

   d) Results of implementation.

   After all water quality exceedances have been abated, a RWL Compliance Report is not required.

B. Individual Annual Reports

Each Individual Annual Report shall document and describe all activities conducted by a Permittee to meet all requirements of this Order, during the completed annual reporting period. Individual Annual Reports shall use the attached form (Attachment U-4), or create another reporting format that includes all items on the attached form. Each Permittee shall complete the form in its entirety, except for those requirements applicable only to the Principal Permittee, as indicated on the form. Status of compliance with permit requirements including implementation dates for all time-specific deadlines should be included for each program area. If permit deadlines are not met, Permittees shall report the reasons why the requirement was not met and how the requirements will be met in the future, including projected implementation dates. A comparison of program implementation results to performance standards established in this Order and in the SQMP shall be included for each program area.

C. Monitoring Program Management

The Principal Permittee shall submit a Storm Water Monitoring Report (Monitoring Report) on August 15, 2002, and annually on August 15, thereafter. The Monitoring Report to be submitted on August 15, 2002 shall include the results of monitoring from July 1, 2001 through June 30, 2002. Each Monitoring Report shall include:

1. Status of implementation of the Monitoring Program.

2. Data, results, methods of evaluating the data, graphical summaries of the data, and an explanation/discussion of the data for each component of the monitoring program, including any specific reporting requirements included in Section II. Monitoring Program.

3. An analysis of the findings of each Monitoring Program component. The analysis shall identify and prioritize water quality problems. Based on the identification and prioritization of water quality problems, the analysis shall identify potential sources of the problems, and recommend future

monitoring and BMP implementation measures for identifying and addressing the sources. The analysis shall also include an evaluation of the effectiveness of existing control measures.

4. Identification and analysis of any long-term trends in storm water or receiving water quality.

5. An estimation of total pollutant loads due to storm water/urban runoff for each mass emission station.

6. A comparison to the applicable Water Quality Standards for each component of the Monitoring Program. The lowest applicable standard from the Basin Plan, the Ocean Plan, or the CTR shall be used for comparison. Constituents that exceed applicable Water Quality Standards shall be highlighted. When data indicate that discharges are causing or contributing to exceedances of applicable Water Quality Standards, a discussion of possible pollutant sources shall be included in the Monitoring Report and a RWL Compliance Report (Section I.A.4) shall be submitted with the subsequent Unified Annual Report.

7. For each monitoring component, maps of all monitoring station locations and descriptions of each location.

8. All Monitoring Reports shall be submitted in both electronic and paper formats.

D. Integrated Receiving Water Impacts Report

The Principal Permittee shall, not later than August 15, 2005, prepare and submit an Integrated Receiving Water Impacts Report, which may also serve as the fourth-year Monitoring Report. The Report shall include, but not be limited to, a comprehensive analysis of the results of the data from each component of the Monitoring Program, and other pertinent studies available, and feasible environmental indicators. It should also include a budget summary for each monitoring requirement and recommendations on future monitoring requirements. This report will be an integral part of the next ROWD.

E. Certification

All applications, reports, or information submitted to the Regional Board shall be signed and certified pursuant to US EPA regulations at 40 CFR 122.41 (k). Each report shall contain the following completed declaration:

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted.

Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for

submitting false information, including the possibility, of a fine and imprisonment for knowing violations.

Executed on the ___ day of _____ , 20_,

at _____.

(Signature)_____(Title)_____";

Permittee submittals to the Principal Permittee shall also be signed and certified pursuant to USEPA regulations 40 CFR 122.41 (k).

The Principal Permittee shall submit the original of each Unified Annual Report to:

INFORMATION TECHNOLOGY
CALIFORNIA REGIONAL WATER QUALITY
CONTROL BOARD - LOS ANGELES REGION
320 W. 4TH STREET, SUITE 200
LOS ANGELES, CA 90013

A copy of the Unified Annual Report shall also be mailed to:

REGIONAL ADMINISTRATOR
ENVIRONMENTAL PROTECTION AGENCY
REGION 9
75 Hawthorne Street
San Francisco, CA 94105

II. **Monitoring Program**

The primary objectives of the Monitoring Program include, but are not limited to:

- Assessing compliance with this Order;
- Measuring and improving the effectiveness of the SQMPs;
- Assessing the chemical, physical, and biological impacts of receiving waters resulting from urban runoff;
- Characterization of storm water discharges;
- Identifying sources of pollutants; and
- Assessing the overall health and evaluating long-term trends in receiving water quality.

Ultimately, the results of the monitoring requirements outlined below should be used to refine the SQMP for the reduction of pollutant loadings and the protection and enhancement of the beneficial uses of the receiving waters in Los Angeles County.

The Principal Permittee and Permittees shall implement the Monitoring Program as follows:

CORE MONITORING

A. Mass Emissions

The Principal Permittee shall monitor mass emissions to accomplish the following objectives:

- Estimate the mass emissions from the MS4;
- Assess trends in the mass emissions over time; and
- Determine if the MS4 is contributing to exceedances of Water Quality Standards by comparing results to applicable standards in the Basin Plan, the Ocean Plan, or the CTR, and with emissions from other dischargers.

1. The Principal Permittee shall monitor mass emissions from the following seven mass emission stations: Ballona Creek, Malibu Creek, Los Angeles River, San Gabriel River, Coyote Creek, Dominguez Channel, and the Santa Clara River. The Principal Permittee shall monitor the first storm event and a minimum of 2 additional storm events for each season. A minimum of two dry weather samples per year at each mass emission station shall also be analyzed. Sampling at all stations shall begin no later than February 1, 2002, except for sampling in the Santa Clara River, which will begin no later than October 15, 2002.

2. All storms events, in addition to those required above, that result in at least 0.25 inches of rainfall shall be sampled and analyzed for TSS. Results shall be used to assess the variability of storm water constituents and provide a more accurate estimate of mass emissions (pollutant correlation with TSS). This requirement does not apply to manual sampling stations.

3. Samples for mass emission monitoring may be taken with the same type of automatic sampler used under Order 96-054. Grab samples shall be taken for pathogen indicators and oil and grease. The samplers shall be set to monitor storms that produce 0.25 inches or greater of rainfall.

Samples taken at mass emission stations during the first storm event of the wet season shall be analyzed for all constituents listed in Attachment U-1.

4. Manual samples shall be collected from mass emission stations where it is not feasible to install an automatic sampler (Santa Clara River). Manual samples shall be flow-weighted composites, collected during the first 3 hours, or for the duration of the storm if it is less than 3 hours. A minimum of 3 sample aliquots, separated by a minimum of 15 minutes, shall be taken within each hour of discharge[1], unless the Regional Board Executive Officer approves an alternate protocol.

5. Samples from mass emission stations shall be analyzed for all constituents listed in Attachment U-1. If a constituent is not detected at the method detection limit for its respective test method listed in Attachment U-1 in more than 75 percent of the first 48 sampling events, it need not be further analyzed unless the observed occurrences show concentrations greater than state water quality standards. The Principal Permittee will also conduct annual confirmation sampling for non-detected constituents during the first storm of the wet season every year at each station.

6. The Principal Permittee shall perform an annual analysis, to be included in the Monitoring Report, of the correlation between pollutants of concern (including but not limited to metals and PAHs) and TSS loadings for the sampling events that are analyzed for the complete list of constituents.

B. Water Column Toxicity Monitoring

The Principal Permittee shall analyze mass emission samples for toxicity to evaluate the extent and causes of toxicity in receiving waters and to modify and utilize the SQMP to implement practices that eliminate or reduce sources of toxicity in storm water.

1. The Principal Permittee shall analyze samples from two storm events (including the first storm of each year) and two dry weather events from each mass emission station for toxicity every year. A minimum of one freshwater and one marine species shall be used for toxicity testing for each station event. Specifically, *Ceriodaphnia dubia* (water flea) 7-day survival/reproduction and *Strongylocentrotus purpuratus* (sea urchin) fertilization tests shall be used. These tests should include a dilution series (0.5x steps) that ranges from the undiluted sample (or the highest concentration that can be tested within the limitations of the test methods or sample type) to less than or equal to 6% sample.

2. Toxicity Identification Evaluations (TIE)

The Principal Permittee shall begin a Phase I TIE immediately on all samples that are substantially toxic (greater than or equal to 1 Toxic Unit)

[1] Required in 40 CFR 122.21(g)(7)(ii), and described in NPDES Storm Water Sampling Guidance Document EPA 833-B-92-001. Time-weighted samples may be appropriate if flow is measured during sampling.

to either test species.[2] If a sample is substantially toxic to both species, a TIE shall be performed for both species. The Phase I TIE shall include the following treatments and corresponding blanks:

a) Baseline toxicity;

b) Particle removal by centrifugation;

c) Solid phase extraction of the centrifuged sample using C18 media;

d) Complexation of metals using ethylenediaminetetraacetic acid (EDTA) addition to the raw sample;

e) Neutralization of oxidants/metals using sodium thiosulfate addition to the raw sample; and

f) Inhibition of organo-phosphate (OP) pesticide activation using piperonyl butoxide addition to the raw sample (crustacean toxicity tests only).

3. Toxicity Reduction Evaluations (TRE)

a) When the same pollutant or class of pollutants is identified through the TIE process as causing at least 50% of the toxic responses in at least 3 samples at a sampling location, a TRE shall be performed for that identified toxic pollutant. TRE development shall be performed by a neutral third party (retained by the Principal Permittee), with input from Permittees and Regional Board staff. The TRE shall include all reasonable steps to identify the source(s) of toxicity and discuss appropriate BMPs to eliminate the causes of toxicity. Once the source of toxicity and appropriate BMPs are identified, the Principal Permittee shall submit the TRE to the Regional Board Executive Officer for approval. At a minimum, it shall include a discussion of the following items:

(1) The potential sources of pollutant(s) causing toxicity;

(2) A list of municipalities that may have jurisdiction over sources of pollutant(s) causing toxicity;

(3) Recommended BMPs to reduce the pollutant(s) causing toxicity;

(4) Proposed changes to the SQMP to reduce the pollutant(s) causing toxicity; and

(5) Suggested follow-up monitoring to demonstrate that toxicity has been removed.

[2] Substantial toxicity means the amount of toxicity necessary to successfully conduct a Phase I TIE. Toxic Units are calculated by dividing 100 by the calculated median test response value (e.g., LC50 or EC50). For example, a LC50 of 50% sample equals 2 Toxic Units. Ceriodaphnia TIEs require at least 50% mortality in undiluted sample (1 Toxic Unit) at any time during the 7-day duration of the initial chronic bioassay (SCCWRP).

b) Since the Phase I TIEs may only identify a broad category of toxicants (e.g., nonpolar organics), additional TIE analyses may be required in order to identify or confirm the identity of the pollutants causing toxicity before the TRE can be completed.

c) If TRE implementation for a specific pollutant coincides with TMDL implementation for that pollutant, the efforts may be coordinated.

d) Upon approval by the Regional Board Executive Officer, the Permittee(s) having jurisdiction over sources causing or contributing to toxicity shall implement the recommended BMPs and take all reasonable steps necessary to eliminate toxicity.

e) The Principal Permittee shall be responsible for the development of a maximum of two TREs per year. If applicable, the Principal Permittee may use the same TRE for the same toxic pollutant or pollutant class in different watersheds. The TRE process shall be coordinated with TMDL development and implementation (ie. If a TMDL for zinc is being implemented when a TRE for zinc is required, the efforts shall be coordinated to avoid overlap).

f) The Principal Permittee shall report on the development, implementation, and results for each TRE in the annual Monitoring Report, beginning the year following the identification of each pollutant or pollutant class causing toxicity.

C. Tributary Monitoring

The Principal Permittee shall monitor tributaries to identify sub-watersheds where storm water discharges are causing or contributing to exceedances of Water Quality Standards, and to prioritize drainage and sub-drainage areas that need management actions.

1. The Principal Permittee shall develop and implement a watershed-based tributary monitoring program, in which a minimum of six tributaries per year will be monitored, based on the schedule described below:

a) Monitoring station locations will be rotated so that a minimum total of six tributaries will be monitored per year. Each tributary shall be monitored for a minimum period of one year. If no exceedances of applicable water quality standards occur during one year of monitoring at a single tributary station, the Principal Permittee may move that monitoring station to another tributary, subject to the approval of the Regional Board Executive Officer. When an applicable water quality standard is exceeded in three out of four sampling events in a given monitoring year, the Permittees shall initiate a focused effort to identify sources of pollutants within that subwatershed.

b) Tributary monitoring shall begin in the Los Angeles River WMA, and shall be rotated to locations in other watersheds as monitoring at each station is complete, as approved by the Regional Board Executive Officer. The Principal Permittee shall include a

description and explanation of each proposed station location and a summary of the prior year's results of the tributary monitoring program in the annual Monitoring Report.

c) Monitoring shall begin at the following tributaries:

(1) Aliso Creek;
(2) Bull Creek;
(3) Arroyo Seco Channel;
(4) Rio Hondo Channel;
(5) Burbank West; and
(6) Verdugo Wash.

2. Tributary monitoring shall begin October 15, 2002.

3. The Principal Permittee shall monitor the first storm event and at least 3 additional storm events during each storm season. At least one dry weather flow per year will also be sampled at each station.

4. Samples shall be flow-weighted composites, collected during the first 3 hours or for the duration of the storm if it is less than 3 hours. Samples may be collected manually or automatically. A minimum of 3 sample aliquots, separated by a minimum of 15 minutes, shall be taken within each hour of discharge[3], unless the Regional Board Executive Officer approves an alternate protocol. Samples shall be taken just upstream of the tributary's confluence with the mainstem. Constituents to be analyzed for each location shall include the following:

a) pH, dissolved oxygen, temperature, conductivity, and total suspended solids;

b) Indicator bacteria;

c) All priority pollutants (Attachment U-1) for the first storm of the year;

d) All constituents for which the water body is impaired downstream of the monitoring station;[4]

e) All constituents that caused toxicity or exceeded any applicable water quality criteria at the associated mass emission station the previous year (these constituents shall be listed in each Monitoring Report); and

f) Flow (flow may be estimated using EPA methods[5] at sites where flow measurement devices are not in place).

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[3] Required in 40 CFR 122.21(g)(7)(ii), and described in NPDES Storm Water Sampling Guidance Document EPA 833-B-92-001. Time-weighted samples may be appropriate if flow is measured during sampling.

[4] The 1998 California 303(d) List and TMDL Priority Schedule lists pollutants for which each water body is impaired, www.swrcb.ca.gov/tmdl/docs/303d98.pdf#reg4

[5] NPDES Storm Water Sampling Guidance Document, EPA 833-B-92-001, July 1992

D. Shoreline Monitoring

The City of Los Angeles shall monitor shoreline stations to evaluate the impacts to coastal receiving waters and the loss of recreational beneficial uses resulting from storm water/urban runoff. This component shall be integrated and coordinated with similar monitoring programs in the region.

1. The City of Los Angeles shall monitor eighteen water quality sampling stations along the shoreline of the Pacific Ocean within the Santa Monica Bay to determine compliance with the California's bathing water standards for public beaches and ocean water-contact sport areas[6], and the related impacts of discharges from storm drains and piers. The shoreline monitoring program shall be implemented as follows:

   a) The eighteen established shoreline water quality stations listed in Attachment U-2 shall be monitored. Station locations may be modified based on recommendations from the Santa Monica Bay Restoration Project (SMBRP) and approval from the Regional Board Executive Officer;

   b) Three indicator groups shall be tested for using either membrane filtration, multiple tube fermentation, or chromogenic substrate test kits. Monitoring shall include the following types and frequencies of sampling:

Parameter	Units	Sample Frequency
Total coliforms	CFU or MPN/100 ml	6/week (Mon-Sat)[7]
Fecal coliform[8]	CFU or MPN/100 ml	6/week (Mon-Sat)[5]
Enterococcus	CFU or MPN/100 ml	6/week (Mon-Sat)[5]

   c) Shoreline monitoring shall occur during daylight hours. Samples may be omitted in the event of hazardous weather;

   d) Shoreline monitoring frequencies at certain stations may be modified based on the use of the adjacent beaches and their proximity to storm drains, as recommended by the SMBRP's Technical Advisory Committee and the Los Angeles County Department of Health Services (LA County DHS).

   e) Data collected shall be transmitted daily to the LA County DHS. The City of Los Angeles will annually assess the data and submit it to the Principal Permittee for inclusion in the Monitoring Report;

   f) When exceedances of public health standards for bacteria occur, the LA County DHS shall take the appropriate action, as described in the Regulations for Public Beaches and Ocean Water-Contact Sports Areas.[9]

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[6] California Department of Health Services, Health and Safety Code §115880 (Assembly Bill 411, Statutes of 1997, Chapter 765

[7] Samples will be collected on Sundays preceding Monday holidays

[8] *Escherichia Coli (E. Coli)* may be substituted for Fecal Coliform if chromogenic substrate test kits are used

[9] Regulations for Public Beaches and Ocean Water-Contact Sports Areas, Title 17 CCR Group 10, developed in response to Health and Safety Code §115880

g) The City of Los Angeles will continue to conduct all monitoring, testing, and data transferring actions as part of the SMBRP regional program for the Santa Monica Bay.

E. Trash Monitoring

To assess the quantities of trash in receiving waters after storm events and to identify areas impaired for trash, the Principal Permittee shall conduct visual observations of trash and take a minimum of one photograph at each mass emission station after the first storm event and 3 additional storm events per year.

1. The Principal Permittee and Permittees in the Los Angeles River and Ballona Creek WMAs (listed in Permit Attachment A) shall develop and implement a trash monitoring program for the Los Angeles River and Ballona Creek watersheds no later than October 15, 2002. The monitoring program and schedule shall be consistent with and pursuant to CWC §13267 "Request for Trash Monitoring", issued by the Regional Board on December 21, 2001. For the first two years of monitoring, either of the following formats for monitoring plans may be used:

   a) For each watershed, the group of Permittees in that watershed will capture and quantify trash from an area no less than 10% of the total land area over which they have jurisdiction. The monitoring areas shall represent 10% of every land use the group of Permittees has jurisdiction over. If storm drain configuration versus land use make the representation of 10% of a land use infeasible, the Permittees can choose areas that represent their land uses as accurately as possible, as long as the extent of the surface being monitored represents 10%. This monitoring shall use full capture devices. During wet weather, all sampling devices will be emptied within 72 hours of every rain event of 0.25 inch or greater. During dry weather, sampling devices will be emptied and analyzed every three months in the absence of precipitation.

   b) For each watershed, the group of Permittees in that watershed will sample a minimum of ten representative sites for each land use monitored. For each sampling site, a minimum of five catch basins will be fitted with inserts, for a total of not less than 50 catch basin inserts per land use monitored. The existing litter removal practices that the cities implement will remain in place, so that monitoring will evaluate how much trash is washed into the system under current practices. A structural full capture device shall be installed downstream of at least one sampling site for each land use monitored. For this sampling site, all of the catch basins that are upstream of the full capture-monitoring device must be fitted with inserts. This configuration will provide information on the relative effectiveness of the catch basin inserts as opposed to the full capture systems in varying land uses and under varying weather conditions. During wet weather, all sampling devices will be emptied within 72 hours of every rain event of 0.25 inch or greater. During dry weather, sampling

devices will be emptied and analyzed every three months in the absence of precipitation.

2. Permittees shall report data in a single unit of measure that is reproducible and measures the amount of trash, irrespective of water content (e.g. compacted volume based on a standardized compaction rate, or dry weight). Permittees may select the unit, but all Permittees must use the same unit of measure.

3. Following the first two years of data collection, Permittees shall conduct compliance monitoring, which involves calculating trash loading as a running three-year average (estimated total load discharged from 2003-2006, divided by three).

4. All trash collected shall be disposed of in compliance with all applicable State, federal, and local regulations.

REGIONAL MONITORING

The Principal Permittee shall participate on regional monitoring committees to help establish on-going regional programs that address public health concerns, monitor trends in natural resources and nearshore habitats, and assess regional impacts from all pollutant sources. Regional Monitoring participation shall include, but not necessarily be limited to, the efforts described below.

F. Estuary Sampling

The Southern California Coastal Waters Research Project (SCCWRP), in conjunction with the USEPA, the State Board, three Regional Boards, and participating dischargers, has organized an effort to implement a regional monitoring program for the southern California bight. Previous studies (in 1994 and 1998) included microbiology, water quality, sediment chemistry, sediment toxicity testing, benthic infauna, demersal fish, and bioaccumulation. A similar bight-wide monitoring effort is planned to be conducted in 2003. The Principal Permittee shall participate on the Steering Committee for this bight-wide monitoring project, and complete the estuary sampling requirement described below in parallel with this effort.

In addition to participation in the Bight-wide study, the goal of this requirement is to sample estuaries for sediment chemistry, sediment toxicity, and benthic macroinvertibrate community to determine the spatial extent of sediment fate from storm water, and the magnitude of its effects. A map of each estuary which depicts the impacted areas shall be produced. The maps shall provide the information necessary to conduct effective sediment monitoring to determine trends and accumulation, as a future permit requirement.

1. The Principal Permittee shall sample a maximum of 25 sites in each estuary/mouth (Ballona Creek, Malibu Creek, Los Angeles River, San Gabriel River, and Dominguez Channel) once during the permit term. Sediment samples shall be taken at each station by means of a $0.1m^2$ ($1.1\ ft^2$) modified Van Veen sediment grab sampler.

2. The Principal Permittee shall also sample a total of 25 sites outside of the direct outfalls to assess cumulative effects.

3. All samples shall be analyzed for the following:
   a) Sediment Chemistry (priority pollutants)
   b) Total Organic Carbon (TOC)
   c) Grain size
   d) Sediment Toxicity
      (1) Amphipod survival bioassays shall be conducted on each sediment sample. Toxicity shall be indicated by an amphipod survival rate of 70% or less in a single test.
      (2) Phase I TIEs of interstitial water, using the amphipod test species, shall be conducted for samples from stations identified to be toxic in a single amphipod survival bioassay.
   e) Benthic Macroinvertibrates
      (1) All sediment samples shall be passed through a 1.0mm (0.039 in) screen to retrieve the benthic organisms. Benthic epifauna and infauna shall be analyzed to determine the structure of the benthic community.
      (2) The Principal Permittee shall identify all organisms to lowest possible taxon.
      (3) The Principal Permittee shall determine the Total Biomass of:
         (i) Mollusks;
         (ii) Echinoderms;
         (iii) Annelids/polychaetes
         (iv) Crustaceans; and
         (v) All other macroinvertebrates.
      (4) The Principal Permittee shall determine the community structure analysis, including wet weight of each taxonomic group (listed above), number of species, number of individuals per species, total numerical abundance, species abundance per grab, species richness, species diversity, species evenness and dominance, similarity analysis, cluster analyses, or other appropriate multivariate statistical techniques approved by the Regional Board Executive Officer, and the Infaunal Index[10].

4. The Principal Permittee shall create a map of each estuary depicting degraded areas and the spatial distribution of sediment from storm water. In the Integrated Monitoring Report, the Principal Permittee shall suggest appropriate locations for regular sediment monitoring, based on the results of this study.

[10] Benthic Response Index for Assessing Infaunal Communities on the Mainland Shelf of Southern California, the SCCWRP

G. Bioassessment

The Principal Permittee shall continue participation in the Stormwater Monitoring Coalition (SMC), as well as coordinate with the Surface Water Ambient Monitoring Program (SWAMP) being developed by the State Board to complete the bioassessment requirement. The Regional Board anticipates that the SMC will organize an effort to evaluate the biological index approach for southern California and to design a research project for developing an Index of Biological Integrity (IBI) for this region. The SWAMP has begun work on a statewide effort to determine how to identify reference sites with the goal of IBI development.

The purpose of the bioassessment requirement is to detect biological trends in receiving waters and to collect data for the development of an IBI for southern California. The ultimate goals of bioassessment are to assess the biological integrity of receiving waters, to detect biological responses to pollution, and to identify probable causes of impairment not detected by chemical and physical water quality analysis.

1. The Principal Permittee shall coordinate with the SMC and SWAMP to identify the most appropriate locations for bioassessment stations within Los Angeles County.

2. Station selection shall be complete within one year from the date this Order is adopted, and sampling shall begin no later than October of 2003.

3. The Principal Permittee shall monitor a minimum of 20 bioassessment stations in October of each year, beginning in 2003. A minimum of three replicate samples shall be collected at each station during each sampling event.

4. A professional environmental laboratory shall perform all laboratory, quality assurance, and analytical procedures. The Principal Permittee may collect samples when properly trained in CSBP methods. The Principal Permittee shall develop Standard Operation Procedures (SOPs) for the Bioassessment Monitoring Program that describes all procedures and responsible parties. The SOPs must contain step-by-step field, laboratory and data entry procedures, as well as, related QA/QC procedures. There must also be specific information about the bioassessment program including: assessment program description, its organization and the responsibilities of all its personnel; assessment project description and objectives; qualifications of all personnel; and the type of training each member has received. A copy of the SOPs shall be available to the Regional Board Executive Officer upon request.

5. Field sampling must conform to the SOP established for the California Stream Bioassessment Procedure (CSBP) when appropriate. For sampling of aquatic environments where the CSBP is not appropriate (i.e., an estuary or unwadable stream), California Department of Fish and Game and the Regional Board Executive Officer shall be consulted in order to determine the most appropriate protocol to be implemented. Field crews shall be trained on aspects of the protocol and appropriate safety issues. All field data and sample Chain of Custody (COC) forms must be examined for completion and gross errors by the field crews, the

receiving laboratory, and the Principal Permittee. These forms shall be available to California Department of Fish and Game or the Regional Board Executive Officer upon request. Field inspections should be planned with random visits and should be performed by the Principal Permittee, if properly trained in CSBP methods, or an independent auditor. These visits should report on all aspects of the field procedure with corrective action occurring immediately.

6. Taxonomic identification laboratories process the biological samples that usually consist of subsampling organisms, enumerating and identifying taxonomic groups and entering the information into an electronic format. There should be intra-laboratory QA/QC results for subsampling, taxonomic validation and corrective actions. Biological laboratories should also maintain reference collections, vouchered specimens (the Principal Permittee can request return of their sample voucher collections) and remnant collections. Biological laboratories shall participate in an inter-laboratory (external) taxonomic validation program at a recommended level of 20% for the first two years of the program. If there are no substantial QA/QC problems, the level of external validation may be decreased to 10% in year three upon approval from the Regional Board. External QA/QC should be arranged through the California Department of Fish and Game's Aquatic Bioassessment Laboratory in Rancho Cordova.

7. Sampling, laboratory, quality assurance, and analysis procedures shall follow the standardized "Non-point Source Bioassessment Sampling Procedures" for professional bioassessment as set forth in the California Department of Fish and Game California Stream Bioassessment Procedure (CSBP)[11]. The following results and information shall be included in the annual Monitoring Report:

   a) All physical, chemical and biological data collected in the assessment;

   b) Photographs and GPS locations of all stations;

   c) Documentation of quality assurance and control procedures;

   d) Analysis that shall include calculation of the metrics used in the CSBP;

   e) Comparison of mean biological and habitat assessment metric values between stations and year-to-year trends;

   f) Electronic data formatted to the California Department of Fish and Game Aquatic Bioassessment Laboratory for inclusion in the Statewide Access Bioassessment Database; and

   g) Copies of all QA/AC documents from laboratories.

[11] California Stream Bioassessment Procedure (Protocol Brief for Biological and Physical/Habitat Assessment in Wadeable Streams), California Department of Fish and Game - Aquatic Bioassessment Laboratory, May 1999. Located at www.dfg.ca.gov/cabw/protocols.html.

SPECIAL STUDIES

H. New Development Impacts Study in the Santa Clara Watershed

The Principal Permittee, with support from the City of Santa Clarita, shall monitor tributaries in the Santa Clara watershed to determine impacts from new development and to compare storm water quality between subwatersheds with and without SUSMPs.

1. The Principal Permittee, in cooperation with the City of Santa Clarita, shall select one station that is representative of a subwatershed in which the majority of development has occurred without SUSMP implementation, and one station (SUSMP station) in a subwatershed in which the majority of the development has/will include SUSMP implementation. Other inputs to runoff, such as septic systems, in the two subwatersheds should be similar.

2. The Principal Permittee shall coordinate with the City of Santa Clarita and the Regional Board to develop a proposed study design, including a description of the drainage areas to be monitored and sampling locations, no later than August 1, 2002. If appropriate, this study may be conducted in conjunction with the Peak Discharge Impact Study, described below.

3. The Principal Permittee shall monitor the first storm event and at least 2 additional storm events during each storm season. At least one dry weather event per year will also be sampled at each station.

4. Samples shall be flow-weighted composites, collected during the first 3 hours, or for the duration of the storm if it is less than 3 hours. Samples may be collected manually or automatically. A minimum of 3 sample aliquots, separated by a minimum of 15 minutes, shall be taken within each hour of discharge[12], unless the Regional Board Executive Officer approves alternate protocol. Constituents to be analyzed for each location shall include the following:

   a) pH, dissolved oxygen, temperature, conductivity, chloride, nitrogen, and TSS;

   b) Metals: aluminum, arsenic, beryllium, cadmium, chromium, copper, iron, lead, mercury, nickel, selenium, silver, and zinc;

   c) Pathogen Indicators (Coliform);

   d) PAHs; and

   e) Flow (flow may be estimated using EPA methods at sites where flow measurement devices are not in place).

5. The Principal Permittee shall submit an analysis of the data, including a description of each subwatershed, year-to-year changes compared to the amount of development that occurred in each, comparisons between

[12] Required in 40 CFR 122.21(g)(7)(ii), and described in NPDES Storm Water Sampling Guidance Document EPA 833-B-92-001. Time-weighted samples may be appropriate if flow is measured during sampling.

stations, and an analysis of SUSMP effectiveness, with the fourth year Monitoring Report.

I. Peak Discharge Impact Study

The Principal Permittee shall conduct a study to evaluate peak flow control and to determine numeric criteria to prevent or minimize erosion of natural stream channels and banks caused by urbanization.[13] The Principal Permittee may partner with the Ventura County Flood Control District to expand the stream erosion study to the Santa Clara River watershed. The study shall begin no later than August 1, 2002.

J. BMP Effectiveness Study

The Principal Permittee shall conduct or participate in studies to evaluate the effectiveness of structural and treatment control BMPs. The objective of this study shall include the following:

- Monitor the reduction of pollutants of concern in storm water (including, but not limited to: trash, suspended sediment, pathogen indicators, nutrients, heavy metals, and oil and grease) from five or more different types of BMPs that have been properly installed within the year preceding monitoring. Monitoring shall be continued until the effectiveness of the BMP can be determined.
- Evaluate the requirements, feasibility and cost of maintenance for each BMP.
- Develop recommendations for appropriate BMPs for the reduction of pollutants of concern in storm water in Los Angeles County.

The Principal Permittee may participate in the SMBRP's, "Performance Evaluation of Structural BMPs for Storm Water Pollution Control in the Santa Monica Bay Watershed" study to meet this requirement. Participation includes collaboration and fund contribution to cover the scope of the proposed study.

K. Standard Monitoring Provisions

All monitoring activities shall meet the following requirements:

1. Monitoring and Records [40 CFR 122.41(j)(1)]
   Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity.
2. Monitoring and Records [40 CFR 122.41(j)(2)] [CWC §13383(a)]
   The Principal Permittee and Permittees shall retain records of all monitoring information, including all calibration and maintenance of monitoring instrumentation, copies of all reports required by this Order, and records of all data used to complete the Report of Waste Discharge and application for this Order, for a period of at least five (5) years from

[13] Permit, Part 4.D.2 (Development Planning Program) requires the development of numerical criteria for peak flow control in natural drainage systems.

the date of the sample, measurement, report, or application. This period may be extended by request of the Regional Board or USEPA at any time and shall be extended during the course of any unresolved litigation regarding this discharge.

3. Monitoring and Records [40 CFR 122.21(j)(3)]

   Records of monitoring information shall include:

   a) The date, exact place, and time of sampling or measurements;

   b) The individual(s) who performed the sampling or measurements;

   c) The date(s) analyses were performed;

   d) The individual(s) who performed the analyses;

   e) The analytical techniques or methods used; and,

   f) The results of such analyses.

4. Monitoring and Records [40 CFR 122.21(j)(4)]

   All sampling, sample preservation, and analyses must be conducted according to test procedures under 40 CFR Part 136, unless other test procedures have been specified in this Order.

5. Monitoring and Records [40 CFR 122.21(j)(5)]

   The CWA provides that any person who falsifies, tampers with, or knowingly renders inaccurate any monitoring device or method required to be maintained under this Order shall, upon conviction, be punished by a fine of not more than $10,000, or by imprisonment for not more than two years, or both. If a conviction of a person is for a violation committed after a first conviction of such person under this paragraph, punishment is a fine of not more than $20,000 per day of violation, or by imprisonment of not more than four years, or both.

6. All chemical, bacteriological, and toxicity analyses shall be conducted at a laboratory certified for such analyses by an appropriate governmental regulatory agency.

7. For priority toxic pollutants that are identified in the CTR (65 *Fed. Reg.* 31682), the MLs published in Appendix 4 of the SIP shall be used for all analyses, unless otherwise specified. The MLs from the SIP are incorporated into the Constituent List (Attachment U-1).

8. The Monitoring Report shall specify the analytical method used, the MDL and the ML for each pollutant. For the purpose of reporting compliance with numerical limitations, performance goals, and receiving water limitations, analytical data shall be reported with one of the following methods, as appropriate:

a) An actual numerical value for sample results greater than or equal to the ML;

b) "Not-detected (ND)" for sample results less than the laboratory's MDL with the MDL indicated for the analytical method used; or

c) "Detected, but Not Quantified (DNQ)" if results are greater than or equal to the laboratory's MDL but less than the ML. The estimated chemical concentration of the sample shall also be reported. This is the concentration that results from the confirmed detection of the substance by the analytical method below the ML value.

9. For priority toxic pollutants, if the Principal Permittee or Permittee can demonstrate that a particular ML is not attainable, in accordance with procedures set forth in 40 CFR 136, the lowest quantifiable concentration of the lowest calibration standard analyzed by a specific analytical procedure (assuming that all the method specified sample weights, volumes, and processing steps have been followed) may be used instead of the ML listed in Appendix 4 of the SIP. The Principal Permittee must submit documentation from the laboratory to the Regional Board Executive Officer for approval prior to raising the ML for any constituent.

10. Monitoring Reports [40 CFR 122.41(l)(4)(ii)]

    If the Principal Permittee monitors any pollutant more frequently than required by the permit using test procedures approved under 40 CFR part 136, unless otherwise specified in the Order, the results of this monitoring shall be included in the calculation and reporting of the data submitted in the annual Monitoring Reports.

11. Monitoring Reports [40 CFR 122.41(l)(4)(iii)]

    Calculations for all limitations which require averaging of measurements shall utilize an arithmetic mean unless otherwise specified in this Order.

12. If no flow occurred during the reporting period, the Monitoring Report shall so state.

13. The Regional Board Executive Officer or the Regional Board, consistent with 40 CFR 122.41, may approve changes to the Monitoring Program, after providing the opportunity for public comment, either:

    a) By petition of the Principal Permittee or by petition of interested parties after the submittal of the annual Monitoring Report. Such petition shall be filed not later than 60 days after the Monitoring Report submittal date, or

    b) As deemed necessary by the Regional Board Executive Officer following notice to the Principal Permittee.

Ordered by:

Dennis A. Dickerson
Executive Officer
Date: December 13, 2001

ATTACHMENT U-1
LIST OF CONSTITUENTS FOR THE STORM WATER MONITORING PROGRAM AND ASSOCIATED MINIMUM LEVELS (MLs)[1]

CONSTITUENTS	MLs
CONVENTIONAL POLLUTANTS	**mg/L**
Oil and Grease	5
Total Phenols	0.1
Cyanide	0.005
pH	0 - 14
Temperature	None
Dissolved Oxygen	Sensitivity to 5 mg/L
BACTERIA	
Total coliform	<20mpn/100ml
Fecal coliform	<20mpn/100ml
Enterococcus (marine waters)	<20mpn/100ml
E. coli (fresh waters)	
GENERAL	**mg/L**
Dissolved Phosphorus	0.05
Total Phosphorus	0.05
Turbidity	0.1NTU
Total Suspended Solids	2
Total Dissolved Solids	2
Volatile Suspended Solids	2
Total Organic Carbon	1
Total Petroleum Hydrocarbon	5
Biochemical Oxygen Demand	2
Chemical Oxygen Demand	20-900
Total Ammonia-Nitrogen	0.1
Total Kjeldahl Nitrogen	0.1
Nitrate-Nitrite	0.1
Alkalinity	2
Specific Conductance	1umho/cm
Total Hardness	2
MBAS	0.5
Chloride	2
Fluoride	0.1
Methyl tertiary butyl ether (MTBE)	1

[1] For Priority Pollutants, the MLs represent the lowest value listed in Appendix 4 of SIP. MDLs must be lower than or equal to the ML value. If a particular ML is not attainable in accordance with procedures set forth in 40 CFR 136, the lowest quantifiable concentration of the lowest calibration standard analyzed by a specific analytical procedure may be used instead.

METALS	µg/L
Aluminum	100
Antimony	0.5
Arsenic	1
Beryllium	0.5
Cadmium	0.25
Chromium (total)	0.5
Copper	0.5
Hex. Chromium	5
Iron	100
Lead	0.5
Mercury	0.5
Nickel	1
Selenium	1
Silver	0.25
Thallium	1
Zinc	1
SEMIVOLATILE ORGANIC COMPOUNDS	**µg/L**
Acids	
2-Chlorophenol	2
2, 4-Dichlorophenol	1
2,4-Dimethylphenol	2
2, 4-Dinitrophenol	5
2-Nitrophenol	10
4-Nitrophenol	5
4-Chloro-3-methylphenol	1
Pentachlorophenol	2
Phenol	1
2,4,6-Trichlorophenol	10
BASE/NEUTRAL	**µg/L**
Acenaphthene	1
Acenaphthylene	2
Anthracene	2
Benzidine	5
1,2 Benzanthracene	5
Benzo(a)pyrene	2
Benzo(g,h,i)perylene	5
3,4 Benzoflouranthene	10
Benzo(k)flouranthene	2
Bis(2-Chloroethoxy) methane	5
Bis(2-Chloroisopropyl) ether	2
Bis(2-Chloroethyl) ether	1
Bis(2-Ethylhexl) phthalate	5
4-Bromophenyl phenyl ether	5

Butyl benzyl phthalate	10
2-Chloroethyl vinyl ether	1
2-Chloronaphthalene	10
4-Chlorophenyl phenyl ether	5
Chrysene	5
Dibenzo(a,h)anthracene	0.1
1,3-Dichlorobenzene	1
1,4-Dichlorobenzene	1
1,2-Dichlorobenzene	1
3,3-Dichlorobenzidine	5
Diethyl phthalate	2
Dimethyl phthalate	2
di-n-Butyl phthalate	10
2,4-Dinitrotoluene	5
2,6-Dinitrotoluene	5
4,6 Dinitro-2-methylphenol	5
1,2-Diphenylhydrazine	1
di-n-Octyl phthalate	10
Fluoranthene	0.05
Fluorene	0.1
Hexachlorobenzene	1
Hexachlorobutadiene	1
Hexachloro-cyclopentadiene	5
Hexachloroethane	1
Indeno(1,2,3-cd)pyrene	0.05
Isophorone	1
Naphthalene	0.2
Nitrobenzene	1
N-Nitroso-dimethyl amine	5
N-Nitroso-diphenyl amine	1
N-Nitroso-di-n-propyl amine	5
Phenanthrene	0.05
Pyrene	0.05
1,2,4-Trichlorobenzene	1
CHLORINATED PESTICIDES	**µg/L**
Aldrin	0.005
alpha-BHC	0.01
beta-BHC	0.005
delta-BHC	0.005
gamma-BHC (lindane)	0.02
alpha-chlordane	0.1
gamma-chlordane	0.1
4,4'-DDD	0.05
4,4'-DDE	0.05
4,4'-DDT	0.01
Dieldrin	0.01
alpha-Endosulfan	0.02

beta-Endosulfan	0.01
Endosulfan sulfate	0.05
Endrin	0.01
Endrin aldehyde	0.01
Heptachlor	0.01
Heptachlor Epoxide	0.01
Toxaphene	0.5
Polychlorinated Biphenyls	**µg/L**
Aroclor-1016	0.5
Aroclor-1221	0.5
Aroclor-1232	0.5
Aroclor-1242	0.5
Aroclor-1248	0.5
Aroclor-1254	0.5
Aroclor-1260	0.5
ORGANOPHOSPHATE PESTICIDES	**µg/L**
Chlorpyrifos	0.05
Diazinon	0.01
Prometryn	2
Atrazine	2
Simazine	2
Cyanazine	2
Malathion	1
HERBICIDES	**µg/L**
Glyphosate	5
2,4-D	0.02
2,4,5-TP-SILVEX	0.2

ATTACHMENT U-2
SHORELINE MONITORING STATIONS

Station	Location[1]	Latitude	Longitude
S1	Surfrider Beach, Malibu, 50 yds E. of breech	34.03500	118.67833
S2	Topanga Point, Malibu, seaward of lifeguard station	34.03833	118.58083
S3	Pulga storm drain, Pacific Palisades, 50 yds E. of drain	34.03361	118.53417
S4	Santa Monica Canyon storm drain, Pacific Palisades, 50 yds E. of drain	34.02639	118.51861
S5	Santa Monica Pier, Santa Monica, 50 yds S. of pier	34.00833	118.49667
S6	Pico-Kenter storm drain, Santa Monica, 50 yds S. of drain	34.00583	118.49250
S7	Ashland storm drain, Santa Monica, 50 yds S. of drain	33.99639	118.48472
S8	Windward storm drain, Los Angeles, 50 yds S. of drain	33.98778	118.47750
S9	Marina Del Rey Beach, Marina Del Rey, at lifeguard tower.	33.98139	118.45833
S10	Ballona Creek, Playa Del Rey, 50 yds S. of south jetty	33.96083	118.45611
S11	Culver Blvd., extended, Playa Del Rey, N side of Culver storm drain	33.95639	118.45167
S12	Imperial Hwy. Storm drain, Playa Del Rey, 50 yds S. of drain	33.93028	118.43722
S13	El Porto, Manhattan Beach, 40th St. extended	33.90389	118.42250
S14	Manhattan Beach Pier, Manhattan Beach, 50 yds S. of pier	33.88360	118.41278
S15	Hermosa Beach Pier, Hermosa Beach, 50 yds S. of pier	33.86111	118.40278
S16	Redondo Pier, Redondo Beach, 50 yds S. of pier	33.83833	118.39111
S17	Ave. I storm drain, Redondo Beach, Ave. I extended, 50 yds S. of drain	33.81889	118.39111
S18	Malaga Cove, Palos Verdes Estates, Arroyo Circle extended	33.80500	118.39467

[1] Station locations from *Ocean Water Regulatory & Monitoring Protocol*, County of Los Angeles, Department of Health Services, May 5, 1999.

Attachment U-3
Total Maximum Daily Loads Scheduled for Implementation in Los Angeles County within 10 Years

Watershed	***TMDL***
Malibu	Coliform, Nutrients
Malibu Creek Lakes and Tributaries	Metals
Ballona Creek	Trash, Coliform, Historic Pesticides, Metals, TBT
Dominguez Channel/LA Harbor	Coliform, PAHs, Historic Pesticides, PCBs, DDT, Metals, Nutrients, Trash
Los Angeles River	Trash, Nutrients, Coliform, Chlorpyrifos, Metals
San Gabriel River	Nutrients, Coliform, Metals, Trash
San Gabriel Lakes	Coliform
Santa Monica Bay Beaches	Coliform, Metals, Chlordane, Historic PCBs and Pesticides
Santa Clara River	Historic Pesticides, Chloride, Coliform, Nitrogen, Eutrophication, Trash
Los Cerritos Channel	Metals, Ammonia, Coliform

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This form summarizes the requirements in Order No. 01-182. Each Permittee must complete this form in its entirety, except for those requirements applicable only to the Principal Permittee. Only report activities that were performed during the previous fiscal year. Upon completion, this form shall be submitted to the Principal Permittee, by the date specified by the Principal Permittee, for inclusion in the unified Annual Storm Water Program Report. Attachments should be included where necessary to provide sufficient information on program implementation.

The goals of this Report are to: 1) concisely document implementation of the Storm Water Quality Management Program (SQMP) during the past fiscal year; 2) evaluate program results for continuous improvement; 3) to determine compliance with Order 01-182; and 4) to share this information with other Permittees, municipal decision makers, and the public.

!	YOU MUST FILL OUT ALL THE INFORMATION REQUESTED *Do not leave any of the sections blank.*
N/A	If the question does not apply to your municipality, please indicate N/A in the space provided and provide a brief explanation
U	If the information requested is currently unavailable, please indicate U in the space provided and give a brief explanation.

This Report Form consists of the following sections:

SECTION	PAGE
I. Program Management	**2-4**
II. Receiving Water Limitations	**5**
III. SQMP Implementation	**5-7**
IV. Special Provisions	**8**
IV.A. Public Information and Participation Program	**8-14**
IV.B. Industrial/Commercial Facilities Program	**15-17**
IV.C. Development Planning Program	**18-21**
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Reporting Year 200__- 200__

I. Program Management

A. Permittee Name: _____

B. Permittee Program Supervisor: _____
Title:
Address:
City: Zip Code:
Phone: Fax:

C. In the space below, briefly describe how the storm water program is coordinated within your agency's departments and divisions. Include a description of any problems with coordination between departments. To facilitate this, complete the Table 1.

TABLE 1 - Program Management

Storm Water Management Activity	Division/Department	# of Individuals Responsible for Implementing
1. Outreach & Education		
2. Industrial/Commercial Inspections		
3. Construction Permits/Inspections		
4. IC/ID Inspections		
5. Street sweeping		
6. Catch Basin Cleaning		
7. Spill Response		
8. Development Planning (project/SUSMP review and approval)		
9. Trash Collection		

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D. Staff and Training

Attach a summary of staff training over the last fiscal year. This shall include the staff name, department, type of training, and date of training.

E. Budget Summary

1. Does your municipality have a storm water utility? Yes ☐ No ☐

If no, describe the funding source(s) used to implement the requirements of Order No. 01-182.

2. Are the existing financial resources sufficient to accomplish all required activities? Yes ☐ No ☐
3. Complete Table 2 to the extent that accurate information is available (indicate U in the spaces where the information is unavailable), and report any supplemental dedicated budgets for the same categories on the lines below the table.
4. List any additional state/federally funded projects related to storm water.

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TABLE 2

Program Element	Expenditures in Previous Fiscal Year	Estimated Amount Needed to implement Order 01-182
1. Program management a. Administrative costs b. Capital costs		
2. Public Information and Participation a. Public Outreach/Education b. Employee Training c. Corporate Outreach d. Business Assistance		
3. Industrial/Commercial inspection/ site visit activities		
4. Development Planning		
5. Development Construction a. Construction inspections		
6. Public Agency Activities a. Maintenance of structural and treatment control BMPs b. Municipal street sweeping c. Catch basin cleaning d. Trash collection/recycling e. Capital costs f. Other		
7. IC/ID Program a. Operations and Maintenance b. Capitol Costs		
8. Monitoring		
9. Other		
10. TOTAL		

List any supplemental dedicated budgets for the above categories:

List any activities that have been contracted out to consultants/other agencies:

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II. Receiving Water Limitations (Part 2)

A. Are you aware, or have you been notified, of any discharges from your MS4 that cause or contribute to a condition of nuisance or to the violation of any applicable water quality standards? Yes ☐ No ☐

B. Has the Regional Board notified you that discharges from your MS4 are causing or contributing to an exceedance of water quality standards? Yes ☐ No ☐

C. If you answered Yes to either of the above questions, you must attach a Receiving Water Limitations (RWL) Compliance Report. The Report must include the following:

1. A description of the pollutants that are in exceedance and an analysis of possible sources;
2. A plan to comply with the RWL (Permit, Part 2);
3. Changes to the SQMP to eliminate water quality exceedances;
4. Enhanced monitoring to demonstrate compliance; and
5. Results of implementation.

III. SQMP Implementation (Part 3)

A. Has your agency implemented the SQMP and any additional controls necessary to reduce the discharges of pollutants in storm water to the maximum extent practicable? Yes ☐ No ☐

B. If your agency has implemented additional or different controls than described in the countywide SQMP, has your agency developed a local SQMP that reflects the conditions in its jurisdiction and specifies activities being implemented under the appropriate elements described in the countywide SQMP? Yes ☐ No ☐

C. Describe the status of developing a local SQMP in the box below.

D. If applicable, describe an additional BMP, in addition to those in the countywide SQMP, that your city has implemented to reduce pollutants in storm water to the maximum extent practicable.

E. Watershed Management Committees (WMCs)

1. Which WMC are you in?
2. Who is your designated representative to the WMC?
3. How many WMC meetings did you participate in last year?
4. Describe specific improvements to your storm water management program as a result of WMC meetings.
5. Attach any comments or suggestions regarding your WMC.

F. Storm Water Ordinance

1. Have you adopted a storm water and urban runoff ordinance to enforce all requirements of Order 01-182? Yes ☐ No ☐

   If not, describe the status of adopting such an ordinance.

2. If yes, have you already submitted a copy of the ordinance to the Regional Board? Yes ☐ No ☐

   If not, please attach a copy to this Report.

3. Were any amendments made to your storm water ordinance during the last fiscal year? Yes ☐ No ☐
   If yes, attach a copy of amendments to this Report.

G. Discharge Prohibitions

1. List any non-storm water discharges you feel should be further regulated:

2. List any non-storm water discharges you feel should be exempt, and provide an explanation for each:

IV. Special Provisions (Part 4)

A. Public Information and Participation (Part 4.B)

In addition to answering the following questions, attach a summary of all storm water education activities that your agency conducted or participated in last year.

1. No Dumping Message

a) How many storm drain inlets does your agency own?

b) How many storm drain inlets were marked with a no dumping message in the last fiscal year?

c) What is the total number of storm drain inlets that are legibly marked with a no dumping message?

If this number is less than the number in question 1.b, describe why all inlets have not been marked, the process used to implement this requirement, and the expected completion date.

d) How many public access points to creeks, channels, and other water bodies within your jurisdiction have been posted with no dumping signage in the past year?

Describe your agency's status of implementing this requirement by the date required in Order No. 01-182.

2. Reporting Hotline

a) Has your agency established its own hotline for reporting and for general storm water management information? Yes ☐ No ☐

b) If so, what is the number?

c) Is this information listed in the government pages of the telephone book? Yes ☐ No ☐

d) If no, is your agency coordinated with the countywide hotline? Yes ☐ No ☐

e) Do you keep record of the number of calls received and how they were responded to? Yes ☐ No ☐

f) How many calls were received in the last fiscal year?

g) Describe the process used to respond to hotline calls.

h) Have you provided the Principal Permittee with your current reporting contact information? Yes ☐ No ☐

i) Have you compiled a list of the general public reporting contacts for all Permittees and posted it on the www.888CleanLA.com web site (*Principal Permittee only)?* Yes ☐ No ☐

If not, when is this scheduled to occur?

3. Outreach and Education

a) Describe the strategy developed to provide outreach and bilingual materials to target ethnic communities. Include an explanation of why each community was chosen as a target, how program effectiveness will be determined, and status of implementation. *(Principal Permittee only)*

b) Did the Principal Permittee organize quarterly Public Outreach Strategy meetings that you were aware of? Yes ☐ No ☐

How many Public Outreach Strategy meetings did your agency participate in last year?

Explain why your agency did not attend any or all of the organized meetings.

Identify specific improvements to your storm water education program as a result of these meetings:

List suggestions to increase the usefulness of quarterly meetings:

If quarterly Public Outreach Strategy meetings were not organized, explain why not and when this requirement will be implemented *(Principal Permittee only).*

c) Approximately how many impressions were made last year on the general public about storm water quality via print, local TV, local radio, or other media?

d) Describe efforts your agency made to educate local schools on storm water pollution.

e) Did you provide all schools within each school district in Los Angeles County with materials necessary to educate a minimum of 50 percent of all school children (K-12) every 2 years on storm water pollution *(Principal Permittee only)*? Yes ☐ No ☐

If not, explain why.

f) Describe the strategy developed to measure the effectiveness of in-school educational programs, including assessing students' knowledge of storm water pollution problems and solutions before and after educational efforts *(Principal Permittee only).*

For Permit Years 2-5, attach an assessment of the effectiveness of in-school storm water education programs.

g) What is the behavioral change target that was developed based on sociological data and other studies *(Principal Permittee only)?*

If no target has been developed, explain why and describe the status of developing a target.

What is the status of meeting the target by the end of Year 5?

4. Pollutant-Specific Outreach

   a) Attach a description of each watershed-specific outreach program that your agency developed *(Principal Permittee only).* All pollutants listed in Table 1 (Section B.1.d.) must be included.

   b) Did your agency cooperate with the Principal Permittee to develop specific outreach programs to target pollutants in your area? Yes ☐ No ☐

   c) Did your agency help distribute pollutant-specific materials in your city? Yes ☐ No ☐

   d) Describe how your agency has made outreach material available to the general public, schools, community groups, contractors and developers, etc…

5. Businesses Program

   a) Briefly describe the Corporate Outreach Program that has been developed to target gas stations and restaurant chains *(Principal Permittee only).*

   b) How many corporate managers did your agency *(Principal Permittee only)* reach last year?

   c) What is the total number of corporations to be reached through this program *(Principal Permittee only)*?

   d) Is your agency meeting the requirement of reaching all gas station and restaurant corporations once every two years *(Principal Permittee only)*? Yes ☐ No ☐

   If not, describe measures that will be taken to fully implement this requirement.

e) Has your agency developed and/or implemented a Business Assistance Program? Yes ☐ No ☐

If so, briefly describe your agency's program, including the number of businesses assisted, the type of assistance, and an assessment of the program's effectiveness.

6. Did you encourage local radio stations and newspapers to use public service announcements? Yes ☐ No ☐

How many media outlets were contacted?

Which newspapers or radio stations ran them?

Who was the audience?

7. Did you supplement the County's media purchase by funding additional media buys? Yes ☐ No ☐

Estimated dollar value/in-kind contribution:

Type of media purchased:

Frequency of the buys:

Did another agency help with the purchase? Yes ☐ No ☐

8. Did you work with local business, the County, or other Permittees to place non-traditional advertising? Yes ☐ No ☐

If so, describe the type of advertising.

9. Did you establish local community partnerships to distribute educational storm water pollution prevention material? Yes ☐ No ☐

Describe the materials that were distributed:

Who were the key partners?
Who was the audience (businesses, schools, etc.)?

10. Did you participate in or publicize workshops or community events to discuss storm water pollution? Yes ☐ No ☐
How many events did you attend?

11. Does your agency have a website that provides storm water pollution prevention information? Yes ☐ No ☐
If so, what is the address?

12. Has awareness increased in your community regarding storm water pollution? Yes ☐ No ☐
Do you feel that behaviors have changed? Yes ☐ No ☐
Explain the basis for your answers. Include a description of any evaluation methods that are used to determine the effectiveness of your agency's outreach.

13. How would you modify the storm water public education program to improve it on the City or County level?

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B. Industrial/Commercial Facilities Program

1. Critical Source Inventory Database

Did you (individually or jointly) update the Database for Critical Sources Inventory? Yes ☐ No ☐

Comments/Explanation/Conclusion:

2. Inspection Program

Provide the reporting data as suggested in the following tables.

Category	Initial Number of Facilities at the start of cycle proposed for inspection by categories (after the initial year, the updated number based on the new data)	Number of facilities inspected in the current reporting year	% Completed at the time of this report for present cycle (from the initial value, and from the updated value after first cycle)	Total number since permit adoption
Landfills				
TSDF				
…				

Comments/Explanation/Conclusion:

3. BMPs Implementation

Provide the reporting data as suggested in the following table.

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Category	Number of facilities inspected by category in this reporting year	Number of facilities identified as adequately implementing BMPs as specified in this reporting year	% adequately implementing out of total in this reporting year	Number of facilities required to implement or upgrade in this reporting year	Number of facilities inspected by category in this reporting cycle	Number of facilities identified as adequately implementing BMPs as specified in this reporting cycle	% adequately implementing out of total in this reporting cycle	Number of facilities required to implement or upgrade in this reporting cycle	Total Number during this permit adequately implementing	Total Number during this permit required to implement or upgrade
Landfills										
…										

Comments/Explanation/Conclusion:

4. Enforcement Activities

Provide the reporting data as suggested in the following tables.

Enforcement Actions by categories (e.g. Warning letter, NOV, referral to D.A., etc.)	Number of facilities issued enforcement actions in the current reporting year	Number of facilities issued enforcement actions in the current reporting cycle	Number of facilities (re)inspected due to enforcement actions in current reporting year	Number of facilities (re)inspected due to enforcement actions in current reporting cycle	Number of facilities brought into compliance in the current reporting year	Number of facilities brought into compliance in current reporting cycle	Total number of enforcement actions since permit adoption (by category)

Facilities by category	Number of Warning letters	Number of NOVs	Number of Referral	Number of Other

Comments/Explanation/Conclusion:

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5. Program Implementation Effectiveness Assessment

Please give a brief assessment of the implementation of the program in removing pollutants from the storm water discharges. Please provide an explanation. Suggested improvements or adjustments based on the knowledge gained through this reporting period activities must be reflected in a change in the SQMP, if warranted.

Highly Effective ☐ Somewhat Effective ☐ Non-effective ☐

Comments/Explanation/Conclusion:

6. You must also submit a quarterly electronic submittal of your Industrial/Commercial Facilities Program activities.

C. Development Planning Program (Part 4.D)

1. Does your agency have a process to minimize impacts from storm water and urban runoff on the biological integrity of natural drainage systems and water bodies in accordance with requirements under CEQA, Section 404 of the CWA, local ordinances, and other legal authorities? Yes ☐ No ☐

   Attach examples showing how storm water quality impacts were addressed in environmental documents for projects over the past year.

2. Does your agency have procedures to include the following requirements in all priority development and redevelopment projects:

   a) Maximize the percentage of permeable surfaces to allow more percolation of storm water into the ground? Yes ☐ No ☐

   b) Minimize the quantity of storm water directed to impermeable surfaces and the MS4? Yes ☐ No ☐

   c) Minimize pollution emanating from parking lots through the use of appropriate treatment control BMPs and good housekeeping practices? Yes ☐ No ☐

   d) Provide for appropriate permanent measures to reduce storm water pollutant loads from the development site? Yes ☐ No ☐

3. List the types and numbers of BMPs that your agency required for priority projects to meet the requirements described above.

4. Describe the status of the development or implementation of peak flow controls in Natural Drainage Systems.

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5. Has your agency amended codes and/or ordinances to give legal effect to the SUSMP changes required in the Permit? Yes ☐ No ☐

6. Describe the process your agency uses to include SUSMP design standards in new development and redevelopment project approvals.

7. How many of each of the following projects did your agency review and condition to meet SUSMP requirements last year?

   a) Residential

   b) Commercial

   c) Industrial

   d) Automotive Service Facilities

   e) Retail Gasoline Outlets

   f) Restaurants

   g) Parking Lots

   h) Projects located in or directly adjacent to or discharging directly to an environmentally sensitive area

   i) Total number of permits issued to priority projects

8. What is the percentage of total development projects that were conditioned to meet SUSMP requirements? %

9. How has your agency prepared to reduce the SUSMP threshold for industrial/commercial facilities to 1 acre from 100,000 square feet in 2003?

10. After 2003, how many additional projects per year will require/did require implementation of SUSMP requirements as a result of the lower threshold?

11. Does your agency participate in an approved regional or sub-regional storm water mitigation program to substitute in part or wholly SUSMP requirements for new development? Yes ☐ No ☐

12. Has your agency modified its planning procedures for preparing and reviewing CEQA documents to consider potential storm water quality impacts and provide for appropriate mitigation? Yes ☐ No ☐

If no, provide an explanation and an expected date of completion.

13. Did your agency update any of the following General Plan elements in the past year?

a) Land Use Yes ☐ No ☐

b) Housing Yes ☐ No ☐

c) Conservation Yes ☐ No ☐

d) Open Space Yes ☐ No ☐

If yes, please describe how watershed and storm water quality and quantity management considerations were included.

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14. How many targeted staff were trained last year?

15. How many targeted staff are trained annually?

16. What percentage of total staff are trained annually? %

17. Has your agency developed and made available development planning guidelines? Yes ☐ No ☐

18. If no, what is the expected date that guidelines will be developed and available to developers?

19. What is the status of completion of the technical manual for siting and design of BMPs for the development community?

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D. Development Construction Program

1. Describe your agency's program to control runoff from construction activity at all construction sites within its jurisdiction.

2. Does your agency require the preparation, submittal, and implementation of a Local Storm Water Pollution Prevention Plan (Local SWPPP) prior to the issuance of a grading permit for all sites that meet one or all of the following criteria?

   a) Will result in soil disturbance of one acre or greater Yes ☐ No ☐

   b) Is within, directly adjacent to, or is discharging directly to an environmentally sensitive area Yes ☐ No ☐

   c) Is located in a hillside area Yes ☐ No ☐

3. Attach one example of a local SWPPP

4. Describe the process your agency uses to require proof of filing a Notice of Intent for coverage under the State General Construction Activity Storm Water permit and a certification that a SWPPP has been prepared prior to issuing a grading permit?

5. How many building/grading permits were issued to sites requiring Local SWPPPs last year?

6. How many building/grading permits were issued to sites requiring coverage under the General Construction Activities Storm Water Permit last year?

7. How many building/grading permits were issued to construction site less than one acre in size last year?

8. How many construction sites were inspected during the last wet season?

9. Complete the table below.

Type of Violation	# of Violations	% of Total Inspections	# of Follow-up Inspections	# of Enforcement Actions
Off-site discharge of sediment				
Off-site discharge of other pollutants				
No or inadequate SWPPP				
Inadequate BMP/SWPPP implementation				

10. Describe the process for taking enforcement actions against construction site violations, including the types of actions that are taken.

11. Describe the system that your agency uses to track the issuance of grading permits.

E. Public Agency Activities (Part 4.F)

1. Sewage System Maintenance, Overflow, and Spill Prevention (only applicable to agencies that own and/or operate a sanitary sewer system)

a) Has your agency developed and implemented a response plan for sanitary sewer overflows that includes the requirements in Order 01-182? Yes ☐ No ☐

b) How many sanitary sewer overflows occurred within your jurisdiction?

c) How many did your agency respond to?

d) Did your agency investigate all complaints received? Yes ☐ No ☐

e) How many complaints were received?

f) Upon notification, did your agency immediately respond to overflows by containment? Yes ☐ No ☐

g) Did your agency notify appropriate sewer and public health agencies when a sewer overflowed to the MS4? Yes ☐ No ☐

h) Did your agency implement a program to prevent sewage spills or leaks from sewage facilities from entering the MS4? Yes ☐ No ☐

If so, describe the program:

i) Did your agency implement a program to identify, repair, and remediate sanitary sewer blockages, exfiltration, overflow, and wet weather overflows from sanitary sewers to the MS4? Yes ☐ No ☐

If so, describe the program:

2. Public Construction Activities Management

a) What percentage of public construction sites 5 acres or greater in size did your agency obtain coverage under the State of California General Construction Activities Storm Water Discharge Permit ? ☐ %

b) Give an explanation for any sites greater than 5 acres that were not covered:

c) What is the total number of active public construction sites?

How many were 5 acres or greater in size?

d) (After March, 2003) Did your agency obtain coverage under the State of California General Construction Activities Storm Water Discharge Permit coverage for public construction sites for sites one acre or greater? Yes ☐ No ☐

3. Vehicle Maintenance/Material Storage Facilities/Corporation Yards Management

a) Did your agency implement pollution prevention plans for each public vehicle maintenance facility, material storage facility, and corporation yard? Yes ☐ No ☐

b) Briefly describe how your agency implements the following, and any additional, BMPs to minimize pollutant discharges in storm water:

(1) Good housekeeping practices

(2) Material storage control

(3) Vehicle leaks and spill control

(4) Illicit discharge control

c) Are all Permittee owned and/or operated vehicle/equipment wash areas self-contained, covered, equipped with a clarifier, and properly connected to the sanitary sewer? Yes ☐ No ☐

If not, what is the status of implementing this requirement?

d) How many Permittee owned and/or operated vehicle/equipment wash areas are scheduled to be redeveloped to include the BMPs listed above?

4. Landscape and Recreational Facilities Management

a) Has your agency developed a standardized protocol for the routine and non-routine application of pesticides, herbicides (including pre-emergents), and fertilizers? Yes ☐ No ☐

Briefly describe this protocol:

b) How does your agency ensure that there is no application of pesticides or fertilizers immediately before, during, or immediately after a rain event or when water is flowing off the area to be applied?

c) Are any banned pesticides, herbicides, fungicides, or rodenticides stored or applied in your agency's jurisdiction that you know of? Yes ☐ No ☐

If so, list them:

d) What percentage of your agency's staff that apply pesticides are certified by the California Department of Food and Agriculture, or are under the direct supervision of a certified pesticide applicator?

e) Describe procedures your agency has implemented to encourage retention and planting of native vegetation and to reduce water, fertilizer, and pesticide needs:

5. Storm Drain Operation and Management

a) Did your agency designate catch basin inlets within its jurisdiction as Priority A; Priority B; and Priority C? Yes ☐ No ☐

b) How many of each designation exist in your jurisdiction?

Priority A:
Priority B:
Priority C:

c) Is your city subject to a trash TMDL? Yes ☐ No ☐

d) If yes, describe the activities and/or implementation measures that your agency conducted pursuant to the TMDL and any other trash reduction efforts that occurred.

e) How many times were all Priority A basins cleaned last year?

f) How many times were all Priority B basins cleaned last year?

g) How many times were all Priority C basins cleaned last year?

h) How much total waste was collected in tons from catch basin clean-outs last year?

i) Attach a record of all catch basins in your jurisdiction. This shall identify each basin as City or County owned, and Priority A, B, or C. For all basins that are owned and operated by your agency, include dates that each was cleaned out over the past year.

j) Did your agency place and maintain trash receptacles at all transit stops within its jurisdiction. Yes ☐ No ☐

k) How many new trash receptacles were installed last year?

l) Did your agency place special conditions for events that generated substantial quantities of trash and litter including provisions that:

(1) Provide for the proper management of trash and litter generated from the event? Yes ☐ No ☐

(2) Arrange for temporary screens to be placed on catch basins? Yes ☐ No ☐

(3) Or for catch basins in that area to be cleaned out subsequent to the event and prior to any rain? Yes ☐ No ☐

m) Did your agency inspect the legibility of the catch basin stencil or labels? Yes ☐ No ☐

What percentage of stencils were legible?

n) Were illegible stencils recorded and re-stenciled or re-labeled within 180 days of inspection? Yes ☐ No ☐

o) Did your agency visually monitor Permittee-owned open channel storm drains and other drainage structures for debris at least annually and identify and prioritize problem areas of illicit discharge for regular inspection? Yes ☐ No ☐

Is the prioritization attached? Yes ☐ No ☐

p) Did your agency review its maintenance activities to assure that appropriate storm water BMPs are being utilized to protect water quality? Yes ☐ No ☐

What changes have been made?

q) Did your agency remove trash and debris from open channel storm drains a minimum of once per year before the storm season? Yes ☐ No ☐

r) How did your agency minimize the discharge of contaminants during MS4 maintenance and clean outs?

s) Where is removed material disposed of?

6. Streets and Roads Maintenance

a) Did your agency designate streets and/or street segments within its jurisdiction as one of the following:

(1) Priority A – streets and/or street segments that are designated as consistently generating the highest volumes of trash and/or litter? Yes ☐ No ☐

(2) Priority B - streets and/or street segments that are designated as consistently generating moderate volumes of trash and/or litter? Yes ☐ No ☐

(3) Priority C – streets and/or street segments that are designated as generating low volumes of trash and/or litter? Yes ☐ No ☐

b) Did your agency perform all street sweeping in compliance with the permit and according to the following schedule:

(1) Priority A – These streets and/or street segments shall be swept at least two times per month? Yes ☐ No ☐

(2) Priority B - Each Permittee shall ensure that each streets and/or street segments is cleaned at least once per month? Yes ☐ No ☐

(3) Priority C – These streets and/or street segments shall be cleaned as necessary but in no case less than once per year? Yes ☐ No ☐

c) Did your agency require that saw cutting wastes be recovered and disposed of properly and that in no case shall waste be left on a roadway or allowed to enter the storm drain? Yes ☐ No ☐

d) Did your agency require that concrete and other street and road maintenance materials and wastes be managed to prevent pollutant discharges? Yes ☐ No ☐

e) Did your agency require that the washout of concrete trucks and chutes only occur in designated areas and never into storm drains, open ditches, streets, or catch basins leading to the storm drain system? Yes ☐ No ☐

f) Did your agency train its employees in targeted positions (whose interactions, jobs, and activities affect storm water quality) regarding the requirements of the storm water management program to:

(1) Promote a clear understanding of the potential for maintenance activities to pollute storm water? and Yes ☐ No ☐

(2) Identify and select appropriate BMPs? Yes ☐ No ☐

7. Parking Facilities Management

a) Did your agency ensure that Permittee-owned parking lots be kept clear of debris and excessive oil buildup and cleaned no less than 2 times per month and/or inspected no less than 2 times per month to determine if cleaning is necessary. Yes ☐ No ☐

b) Were any Permittee-owned parking lots cleaned less than once a month? Yes ☐ No ☐

How many?

8. Public Industrial Activities Management

   a) Did your agency, for all municipal activity considered an industrial activity under USEPA Phase I storm water regulations, obtain separate coverage under the State of California General Industrial Activities Storm Water Discharge Permit no later than December 31, 2001? Yes ☐ No ☐

   b) Does your agency serve a population of less than 100,000 people? Yes ☐ No ☐

9. Emergency Procedures

   a) In case of real emergencies, did your agency repair essential public services and infrastructure in a manner to minimize environmental damage? Yes ☐ No ☐

   b) Were BMPs implemented to the extent that measures did not compromise public health and safety? Yes ☐ No ☐

10. Feasibility Study

   a) Did your agency cooperate with the County Sanitation Districts of Los Angeles County to prepare a study which investigates the possible diversion of dry weather flows or the use of alternative treatment control BMPs? Yes ☐ No ☐

   b) Did your agency review its individual prioritized list and create a watershed based priority list of drains for potential diversion and submit a listing of priority diversions to the Regional Board Executive Officer? Yes ☐ No ☐

F. Illicit Connections and Illicit Discharges (IC/ID) Elimination Program (Part 4.G)

1. Attach a copy of your agency's IC/ID Elimination Implementation Program (Part 4.G.1.a.).

2. Attach a map of your storm drain system showing all permitted connections (if available), and the locations of all illicit connections and discharges that occurred last year (Part 4.G.1.b). If your agency has not completed this requirement, describe the status of the development of a baseline map, including an expected completion date.

3. Describe your enforcement procedures for eliminating illicit discharges and terminating illicit connections.

4. Describe your record keeping system to document all illicit connections and discharges.

5. What is the total length of open channel that your agency owns and operates?

6. What length was screened last year for illicit connections?

7. What is the total length of closed storm drain that your agency owns and operates?

8. What length was screened last year for illicit connections?

9. Describe the method used to screen your storm drains.

10. Provide the reporting data for illicit connections as suggested in the following table (you may submit a spreadsheet from your database that contains the information).

Year	Total # reported/ identified	Total # investigated	# that conveyed exempt discharges or NPDES permitted	# that conveyed illicit discharges that were terminated	# that were removed	# that resulted in enforcement action	# that resulted in *other* actions
01/02							
02/03							
03/04							
04/05							
05/06							

11. Explain any *other* actions that occurred in the last year.

12. What is the average time it takes your agency to initiate an illicit connection investigation after it is reported?

    a) Were all identified connections terminated within 180 days? Yes ☐ No ☐

    b) If not, explain why.

13. Provide the reporting data for illicit discharges as suggested in the following table (you may submit a spreadsheet from you database that contains this information).

Year	Total # reported	Total # that were discontinued/ cleaned up voluntarily through enforcement and the source was identified	# that were cleaned up but the source could not be identified	# that resulted in no evidence of discharge	# that were determined to be conditionally exempt	# that were exempt or in compliance and the source identified	# that resulted in enforcement action
01/02							
02/03							
03/04							
04/05							
05/06							

Los Angeles County Municipal Storm Water Permit (Order 01-182)
Individual Annual Report Form
Attachment U-4

14. What is the average response time after an illicit discharge is reported?

    a) Did any response times exceed 72 hours? Yes ☐ No ☐

    b) If yes, explain why.

15. Describe the your agency's spill response procedures.

16. What would you do differently to improve your agency's IC/ID Elimination Program?

17. Attach a list of all permitted connections to your storm sewer system.

V. Monitoring

Briefly describe any storm water monitoring activities that are not required by Order No. 01-182 that your municipality conducted, participated in, or received funding to conduct in the past fiscal year. These activities should correspond with the dollar amount you listed in Table 2.

VI. Assessment of Program Effectiveness

A. Attach a summary of the effectiveness of your storm water management program. This summary should include, at a minimum, the following:

1. An assessment of your agency's compliance with permit requirements, based on your responses to the questions in this form;
2. Descriptions of any evaluation methods that your agency uses to determine the effectiveness of your storm water management program;
3. A summary of the strengths and weaknesses of your agency's storm water management program;
4. A list of specific program highlights and accomplishments;
5. A description of water quality improvements or degradation in your watershed over the past fiscal year;
6. Interagency coordination between cities to improve the storm water management program;
7. Future plans to improve your agency's storm water management program; and
8. Suggestions to improve the effectiveness of your program or the County model programs.

B. On a scale of 1 to 10 (10 being full implementation of requirements by their deadlines), rate your municipality's level of compliance with Order No. 01-182.

C. List any suggestions your agency has for improving program reporting and assessment.

Los Angeles County Municipal Storm Water Permit (Order 01-182)
Individual Annual Report Form
Attachment U-4

VII. Certification Statement

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted.

Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility, of a fine and imprisonment for knowing violations.

Executed on the ___ day of _____ , 20_,

at _____.

Printed Name _____ Title _____

(Signature) _____

Signature by duly authorized representative

ATTACHMENT A
LIST OF PERMITTEES
BY
WATERSHED MANAGEMENT AREAS

Santa Monica Bay

Malibu Creek and Other Rural
Agoura Hills
*Calabasas
Los Angeles County Flood Control
Los Angeles County
Malibu
Westlake Village

Ballona Creek and Other Urban
Beverly Hills
Culver City
El Segundo
Hermosa Beach
Los Angeles (City of)
Los Angeles County Flood Control
Los Angeles (County of)
Manhattan Beach
Palos Verdes Estates
Rancho Palos Verdes
Redondo Beach
Rolling Hills
Rolling Hills Estates

*Santa Monica
West Hollywood

Dominguez Channel/ Los Angeles Harbor Drainage

Carson
Gardena
Hawthorne
Inglewood
Lawndale
Lomita
Los Angeles (City of)
Los Angeles County Flood Control

Los Angeles (County of)
*Torrance

Los Angeles River

Alhambra
Arcadia
Bell
Bell Gardens
Burbank
Commerce
Compton
Cudahy
El Monte
*Glendale
Hidden Hills
Huntington Park
La Canada Flintridge
Los Angeles (City of)
Los Angeles County Flood Control
Los Angeles (County of)
Lynwood
Maywood
Monrovia
Montebello
Monterey Park
Paramount

Pasadena
Rosemead
San Fernando
San Gabriel
San Marino
Sierra Madre
Signal Hill
South El Monte
South Gate
South Pasadena
Temple City
Vernon

San Gabriel River

Artesia
Azusa
Baldwin Park
Bellflower
Bradbury
Cerritos
Claremont
Covina
Diamond Bar
Downey
Duarte
Glendora
Hawaiian Gardens
Industry
Irwindale
La Habra Heights
La Mirada
La Puente
La Verne
Lakewood
*Long Beach[1]
Los Angeles County Flood Control
Los Angeles (County of)
Norwalk
Pomona
Pico Rivera
San Dimas
Santa Fe Springs
Walnut
West Covina
Whittier

Santa Clara River

*Santa Clarita
Los Angeles County Flood Control
Los Angeles (County of)

*Italicized agencies are present in more than one Watershed Management Area. *Indicates City with the largest watershed population other than County of Los Angeles and the City of Los Angeles.*

[1] *The City of Long Beach is covered under order No. 99-060*

ATTACHMENT B
Critical Sources Categories[1]

Tier 1 Categories

Municipal Landfills (SIC 4953)

Hazardous Waste Treatment, Disposal and Recovery Facilities[2]

Facilities Subject to SARA Title III (also known as EPCRA)[2]

Restaurants[3]

Wholesale trade (scrap, auto dismantling) (SIC 50)

Automotive service facilities[3]

Fabricated metal products (SIC 34)

Motor freight (SIC 42)

Chemical/allied products (SIC 28)

Automotive Dealers/Gas Stations (SIC 55)

Primary Metals Products (SIC 33)

Tier 2 Categories

Electric/Gas/Sanitary (SIC 49)

Air Transportation (SIC 45)

Rubbers/Miscellaneous Plastics (SIC 30)

Local/Suburban Transit (SIC 41)

Railroad Transportation (SIC 40)

Oil & Gas Extraction (SIC 13)

Lumber/Wood Products (SIC 24)

Machinery Manufacturing (SIC 35)

Transportation Equipment (SIC 37)

Stone, Clay, Glass, Concrete (SIC 32)

Leather/Leather Products (SIC 31)

Miscellaneous Manufacturing (SIC 39)

Food and kindred Products (SIC 20)

Mining of Nonmetallic Minerals (SIC 14)

Printing and Publishing (SIC 27)

Electric/Electronic (SIC 36)

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[1] Italicized categories belong to Phase 1 facilities
[2] Various categories subject to these requirements
[3] See Definition in Part 5. of the permit

Paper and Allied Products (SIC 26)

Furniture and Fixtures (SIC 25)

Laundries *(SIC 72)*

Instruments (SIC 38)

Textile Mills Products (SIC 22)

Apparel (SIC 23)

STATE OF CALIFORNIA

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
LOS ANGELES REGION

ORDER NO. 01-182
NPDES PERMIT NO. CAS004001
WASTE DISCHARGE REQUIREMENTS
FOR
MUNICIPAL STORM WATER AND URBAN RUNOFF DISCHARGES WITHIN THE COUNTY OF LOS ANGELES, AND THE INCORPORATED CITIES THEREIN, EXCEPT THE CITY OF LONG BEACH

December 13, 2001
(Amended on September 14, 2006 by Order R4-2006-0074; August 9, 2007 by Order R4-2007-0042; December 10, 2009 by Order R4-2009-0130; and October 19, 2010 and April 14, 2011 pursuant to the peremptory writ of mandate in L.A. Superior Court Case No. BS122724)

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STATE OF CALIFORNIA

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
LOS ANGELES REGION

ORDER NO. 01-182
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MUNICIPAL STORM WATER AND URBAN RUNOFF DISCHARGES WITHIN THE COUNTY OF LOS ANGELES, AND THE INCORPORATED CITIES THEREIN, EXCEPT THE CITY OF LONG BEACH

The California Regional Water Quality Control Board, Los Angeles Region (hereinafter referred to as the Regional Board) finds:

A. Existing Permit

The Los Angeles County Flood Control District, the County of Los Angeles, and 84 incorporated cities within the Los Angeles County Flood Control District (see Attachment A, List of Permittees), hereinafter referred to separately as Permittees and jointly as the Discharger, discharge or contribute to discharges of storm water and urban runoff from municipal separate storm sewer systems (MS4s), also called storm drain systems. The discharges flow to water courses within the Los Angeles County Flood Control District and into receiving waters of the Los Angeles Region. These discharges are covered under countywide waste discharge requirements contained in Order No. 96-054 adopted by this Regional Board on July 15, 1996, which replaced Order No. 90-079 adopted by this Regional Board on June 18, 1990. Order No. 96-054 also serves as a National Pollutant Discharge Elimination System (NPDES) permit for the discharge of municipal storm water.

B. Nature of Discharges and Sources of Pollutant

1. Storm water discharges consist of surface runoff generated from various land uses in all the hydrologic drainage basins that discharge into water bodies of the State. The quality of these discharges varies considerably and is affected by the hydrology, geology, land use, season, and sequence and duration of hydrologic events. The primary constituents of concern currently identified by the Los Angeles County Flood Control District Integrated Receiving Water Impacts Report (1994-2000) are cyanide, indicator bacteria, total dissolved solids, turbidity, total suspended solids, nutrients, total aluminum, dissolved cadmium, copper, lead, total mercury, nickel, zinc, bis(2-ethylhexyl)phthalate, polycyclic aromatic hydrocarbons (PAHs), diazinon, and chlorpyrifos.

2. Certain pollutants present in storm water and/or urban runoff may be derived from extraneous sources that Permittees have no or limited

jurisdiction over. Examples of such pollutants and their respective sources are: PAHs which are products of internal combustion engine operation, nitrates, bis (2-ethylhexyl) phthalate and mercury from atmospheric deposition, lead from fuels, copper from brake pad wear, zinc from tire wear, dioxins as products of combustion, and natural-occurring minerals from local geology. However, the implementation of the measures set forth in this Order is intended to reduce the entry of these pollutants into storm water and their discharge to receiving waters.

3. Water quality assessments conducted by the Regional Board identified impairment, or threatened impairment, of beneficial uses of water bodies in the Los Angeles Region. The causes of impairments include pollutants of concern identified in municipal storm water discharges by the County of Los Angeles in the Integrated Receiving Water Impacts Report (1994-2000). Pollutants in storm water can have damaging effects on both human health and aquatic ecosystems.

4. The Los Angeles County Grand Jury, September 2000, completed an investigation into the health risks of swimming near beaches in Los Angeles County and made several recommendations to reduce public health risks (Final Report, Grand Jury, Los Angeles County, 1999-2000). The Grand Jury recommended that the Regional Board consider among other actions, (i) a focus on setting contaminant limits rather than programmatic evaluations, (ii) audit of MS4 Permittee programs; and (iii) clarifying enforcement responsibilities between the State and local governments.

5. Studies and research conducted by other Regional agencies, academic institutions, and universities have also identified storm water and urban runoff as significant sources of pollutants to surface waters in Southern California. See, e.g., [*Surface Runoff to the Southern California Bight*, Southern California Coastal Water Research Project, (1992); *Impacts of Urban Runoff on Santa Monica Bay and Surrounding Ocean Waters* (Gersberg, R.M., 1995); *State of the Bay 1998*, Santa Monica Bay Restoration Project; *Storm Water Impact*, In, Southern California Environmental Report Card 1999, Institute of the Environment, University of California, Los Angeles (Stenstrom, M.S., 1999); *Distribution of Anthropogenic and Natural Debris on the Mainland Shelf of Southern California Bight,* Shelly L. Moore and M. James Allen (1999); *The Health Effects of Swimming in Ocean Water Contaminated by Storm Drain Runoff*, Haile, R.W. et al. (1999); *Huntington Beach Closure Investigation: Technical Review* (University of Southern California, 2000); *A Regional Survey of the Microbiological Water Quality Along the Shoreline of the Southern California Bight,* Rachel T. Noble *et al.* (2001*); Integrated Receiving Water Impacts Report (1994-2000)*, County of Los Angeles (2001)].

6. Development and urbanization increase pollutant load, volume, and discharge velocity. First, natural vegetated pervious ground cover is converted to impervious surfaces such as paved highways, streets, rooftops and parking lots. Natural vegetated soil can both absorb rainwater and remove pollutants providing an effective natural purification

process. In contrast, pavement and concrete can neither absorb water nor remove pollutants, and thus the natural purification characteristics are lost. Second, urban development creates new pollution sources as the increased density of human population brings proportionately higher levels of vehicle emissions, vehicle maintenance wastes, municipal sewage waste, pesticides, household hazardous wastes, pet wastes, trash, and other anthropogenic pollutants. Development and urbanization especially threaten environmentally sensitive areas. Such areas have a much lower capacity to withstand pollutant shocks than might be acceptable in the general circumstance. In essence, development that is ordinarily insignificant in its impact on the environment may in a particular sensitive environment become significant. These environmentally sensitive areas designated by the State and/or the County of Los Angeles include Areas of Special Biological Significance (ASBS), water bodies designated as supporting a RARE beneficial use, Significant Natural Areas (SNAs), and Significant Ecological Areas (SEAs).

7. The increased volume, increased velocity, and discharge duration of storm water runoff from developed areas has the potential to greatly accelerate downstream erosion and impair stream habitat in natural drainages. Studies have demonstrated a direct correlation between the degree of imperviousness of an area and the degradation of its receiving waters. Significant declines in the biological integrity and physical habitat of streams and other receiving waters have been found to occur with as little as 10 percent conversion from natural to impervious surfaces. Percentage impervious cover is a reliable indicator and predictor of potential water quality degradation expected from new development. (*Impervious Cover as An Urban Stream Indicator and a Watershed Management Tool*, Schueler, T. and R. Claytor, In, Effects of Water Development and Management on Aquatic Ecosystems (1995), ASCE, New York; Leopold, L. B., (1973), *River Channel Change with Time: An Example*, Geological Society of America Bulletin, v. 84, p. 1845-1860; Hammer, T. R., (1972), *Stream Channel Enlargement Due to Urbanization: Water Resources Research*, v. 8, p. 1530-1540; Booth, D. B., (1991), *Urbanization and the Natural Drainage System--Impacts, Solutions and Prognoses*: The Northwest Environmental Journal, v. 7, p. 93-118; Klein, R. D., (1979), *Urbanization and Stream Quality Impairment*: Water Resources Bulletin, v. 15, p. 948-963; May, C. W., Horner, R. R., Karr, J. R., Mar, B. W., and Welch, E. B., (1997), *Effects of Urbanization on Small Streams in the Puget Sound Lowland Ecoregion*: Watershed Protection Techniques, v. 2, p. 483-494; Morisawa, M. and LaFlure, E. *Hydraulic Geometry, Stream Equilibrium and Urbanization* In Rhodes, D. P. and Williams, G. P. *Adjustments to the Fluvial System* p.333-350. (1979); Dubuque, Iowa, Kendall/Hunt. Tenth Annual Geomorphology Symposia Series; and *The Importance of Imperviousness*: Watershed Protection Techniques, 1(3), Schueler, T. (1994).)

8. The County of Los Angeles has identified as the seven highest priority industrial and commercial critical source types, (i) wholesale trade (scrap recycling, auto dismantling); (ii) automotive repair/parking; (iii) fabricated

metal products; (iv) motor freight; (v) chemical and allied products; (vi) automotive dealers/gas stations; (vii) primary metal products (*Critical Source Selection and Monitoring Report*, Los Angeles County Department of Public Works -Sept 1996). Monitoring conducted by Los Angeles County and the Regional Board demonstrates that the priority industrial sectors and auto repair facilities (one of the commercial sectors) on the list, contribute significant concentrations of heavy metals to storm water (*Los Angeles County 1999-2000 Storm Water Monitoring Report*, Los Angeles County Department of Public Works -July 2000; *Compliance Assessment of the Auto Dismantling Industry; Evaluation of the California General Industrial Storm Water Permit*, H. Chang, (2001), 70 pp., California Regional Water Quality Control Board, Los Angeles Region).

9. The discharge of washwaters and contaminated storm water from industries and businesses specified in this Order for inspection by Permittees is an environmental threat and can also adversely impact public health and safety. For example, a review of industrial waste/ pretreatment records performed in 1995 in the County of Los Angeles on illicit discharges indicates that automotive service facilities and food service facilities sometimes discharge polluted washwaters to the MS4. The pollutants of concern in such washwaters include food waste, oil and grease, and toxic chemicals. Other storm water/industrial waste programs in California have reported similar observations. Illicit discharges from automotive service facilities and food service facilities have been identified elsewhere as a major cause of widespread contamination and water quality problems (Washtenaw County Statutory Drainage Board - 1987 Huron River Pollution Abatement Program).

10. Studies indicate that facilities with paved surfaces subject to frequent motor vehicular traffic (such as parking lots and fast food restaurants), or facilities that perform vehicle repair, maintenance, or fueling (automotive service facilities) are potential sources of pollutants of concern in storm water. [References: Pitt *et a*l., *Urban Storm Water Toxic Pollutants: Assessment, Sources, and Treatability*, Water Environment Res., 67, 260 (1995)*; Results of Retail Gas Outlet and Commercial Parking Lot Storm Water Runoff Study*, Western States Petroleum Association and American Petroleum Institute, (1994); *Action Plan Demonstration Project, Demonstration of Gasoline Fueling Station Best Management Practices*, Final Report, County of Sacramento (1993); *Source Characterization*, R. Pitt, In Innovative Urban Wet-Weather Flow Management Systems (2000) Technomic Press, Field, R *et al*. editors; *Characteristics of Parking Lot Runoff Produced by Simulated Rainfall*, , L.L. Tiefenthaler *et al*. Technical Report 343, Southern California Coastal Water Research Project (2001).]

11. Retail Gasoline Outlets (RGOs) are points of convergence for vehicular traffic and are similar to parking lots and urban roads. Studies indicate that storm water discharges from RGOs have high concentrations of hydrocarbons and heavy metals. [*The Quality of Trapped Sediments and Poor Water within Oil Grit Separators in Suburban MD,* Schueler T. and

Shepp D. (1992), and *Concentrations of Selected Constituents in Runoff from Impervious Surfaces in Four Urban Catchments of Different Landuse*, Ranabal, F.I., and T.J. Gizzard (1995), In Proceedings of the Fourth Biennial Stormwater Research Conference, Florida, pp-42-52]. Pilot studies indicate that treatment control best management practices installed at retail gasoline stations are effective in removing pollutants, reasonable in capital cost, easy to operate, and do not present safety risks [*Rouge River National Wet Weather Demonstration Project, Task Product Memorandum – Evaluation of On-line Media Filters RPO-NPS-TPM59.00*, Wayne County, MI, March 1999]. The Regional Board and the San Diego Regional Board have jointly prepared a Technical Report on the applicability of new development BMP design criteria for retail gasoline outlets, (*Retail Gasoline Outlets: New Development Design Standards for Mitigation of Storm Water Impacts*, (June 2001)). Retail Gasoline Outlets in Western U.S. States (such as Washington and Oregon) are already subject to numerical BMP design criteria, as well in other U.S. States.

C. Permit Background

1. The essential components of the Storm Water Management Program, as established by federal regulations [40 CFR 122.26(d)] are: (i) Adequate Legal Authority, (ii) Fiscal Resources, (iii) Storm Water Quality Management Program (SQMP) - (Public Information and Participation Program, Industrial/Commercial Facilities Program, Development Planning Program, Development Construction Program, Public Agency Activities Program, Illicit Connection and Illicit Discharges Elimination Program), and (iv) Monitoring and Reporting Program.

2. The Permittees have filed a Report of Waste Discharge (ROWD), dated February 1, 2001, and applied for renewal of their waste discharge requirements that serves as an NPDES permit to discharge wastes to surface waters. The ROWD includes a proposed SQMP and a Monitoring Program. The proposed SQMP contains programs previously approved under Board Order No. 96-054 in the following areas:

   Public Information and Participation
   Development Planning
   Development Construction
   Public Agency Activities
   Illicit Connection/Illicit Discharge Elimination Program

   These programs are revised pursuant to the provisions of this Order after adoption.

3. The County of Los Angeles has previously conducted source identification and pollutant characterization consistent with 40 CFR 122.26(d)(1)(ii) and (iii) under its storm water Monitoring Program. The Monitoring Program submitted with the ROWD proposes to advance the assessment of receiving water impacts, identification of sources of pollution, evaluation of Best Management Practices (BMPs), and measurement of long term trends in mass emissions.

4. The Regional Board has reviewed the ROWD and has determined it to be complete under the reapplication policy of MS4s issued by the U.S. Environmental Protection Agency (USEPA) (61 *Fed. Reg*. 41697). The Regional Board finds that the Permittees' proposed SQMP, incorporating the additional and/or revised provisions contained in this Order would meet the minimum requirements of federal regulations.

5. The City of Los Angeles has conducted shoreline and nearshore water quality monitoring off the Santa Monica Bay since the 1950s under the monitoring program for the Hyperion Waste Water Treatment Plant (NPDES No. CA0109991). The monitoring results indicate that effluent from Hyperion's 5-Mile Outfall does not impinge the shoreline, and that elevated bacterial counts are associated with runoff from storm drains and discharges from piers. In 1994, the Regional Board approved the relocation of Hyperion's shoreline stations to implement a bay-wide, regional shoreline-monitoring program associated with storm drain outfalls in the Santa Monica Bay. The City of Los Angeles requested that the shoreline-monitoring requirement be incorporated in this Order. The shoreline pathogen monitoring requirements are outlined in the Monitoring Program for this Order.

D. Permit Coverage

1. The requirements in this Order cover all areas within the boundaries of the Permittee municipalities (see Attachment A) over which they have regulatory jurisdiction as well as unincorporated areas in Los Angeles County within the jurisdiction of the Regional Board. The Permittees serve a population of about 9.5 million [Reference: *2000 Census of Population and Housing,* Bureau of the Census, U.S. Department of Commerce (2001)] in an area of approximately 3,100 square miles.

2. Federal, state, regional or local entities within the Permittees' boundaries or in jurisdictions outside the Los Angeles County Flood Control District, and not currently named in this Order, may operate storm drain facilities and/or discharge storm water to storm drains and watercourses covered by this Order. The Permittees may lack legal jurisdiction over these entities under state and federal constitutions. The Regional Board will coordinate with these entities to implement programs that are consistent with the requirements of this Order. The Regional Board will consider such facilities for coverage in 2003 under its NPDES permitting scheme pursuant to USEPA Phase II storm water regulations.

3. Sources of discharges into receiving waters in the County of Los Angeles but in jurisdictions outside its boundary include the following:

   About 34 square miles of unincorporated area in Ventura County, which drain into Malibu Creek and then to Santa Monica Bay,

   About 9 square miles of the City of Thousand Oaks, which also drain into Malibu Creek and then to Santa Monica Bay, and

About 86 square miles of area in Orange County, which drain into Coyote Creek and then into the San Gabriel River.

The Regional Board will ensure that storm water management programs for the areas in Ventura County and the City of Thousand Oaks that drain into Santa Monica Bay are consistent with the requirements of this Order. The Regional Board will coordinate with the Santa Ana Regional Board so that storm water management programs for the areas in Orange County that drain into Coyote Creek are consistent with the requirements of this Order.

4. This permit is intended to develop, achieve, and implement a timely, comprehensive, cost-effective storm water pollution control program to reduce the discharge of pollutants in storm water to the Maximum Extent Practicable (MEP) from the permitted areas in the County of Los Angeles to the waters of the U.S. subject to the Permittees' jurisdiction.

5. Permittees have expressed their intention to work cooperatively to control the contribution of pollutants from one portion of the MS4 to another portion of the system. Permittees may control the contribution of pollutants to the MS4 from non-permittee dischargers such as Caltrans, the U.S. Department of Defense, and other state and federal facilities, through interagency agreements.

E. Federal, State, and Regional Regulations

1. The Water Quality Act of 1987 added Section 402(p) to the federal Clean Water Act (CWA) (33 U.S.C. § 1251-1387). This section requires the USEPA to establish regulations setting forth NPDES requirements for storm water discharges in two phases.

   - The USEPA Phase I storm water regulations were directed at MS4s serving a population of 100,000 or more, including interconnected systems and storm water discharges associated with industrial activities, including construction activities. The Phase I Final Rule was published on November 16, 1990 (55 *Fed. Reg*. 47990).

   - The USEPA Phase II storm water regulations are directed at storm water discharges not covered in Phase I, including small MS4s (serving a population of less than 100,000), small construction projects (one to five acres), municipal facilities with delayed coverage under the Intermodal Surface Transportation Efficiency Act of 1991, and other discharges for which the USEPA Administrator or the State determines that the storm water discharge contributes to a violation of a water quality standard, or is a significant contributor of pollutants to waters of the United States. The Phase II Final Rule was published on December 8, 1999 (64 *Fed. Reg*. 68722).

2. The USEPA published an 'Interim Permitting Approach for Water Quality-Based Effluent Limitations in Storm Water Permits' on August 26, 1996 (61 *Fed. Reg.* 43761). This policy discusses the appropriate kinds of

water quality-based effluent limitations to be included in NPDES storm water permits to provide for the attainment of water quality standards.

3. The USEPA published an 'Interpretative Policy Memorandum on Reapplication Requirements' for MS4 permits on August 9, 1996 (61 *Fed. Reg*. 41697). This policy requires that MS4 reapplication for reissuance for a subsequent five-year permit term contain certain basic information and information for proposed changes and improvements to the storm water management program and monitoring program.

4. The USEPA has entered into a Memorandum of Agreement (MOA) with the U.S. Fish and Wildlife Service and the National Marine Fisheries Service for enhancing coordination regarding the protection of endangered and threatened species under Section 7 of the Endangered Species Act and the CWA's Water Quality Standards and NPDES programs. Among other actions, the MOA establishes a framework for coordination of actions by the USEPA, the Services, and CWA delegated States on CWA permit issuance under Section 402 of the CWA [66 *Fed. Reg*. 11202 – 11217].

5. USEPA regulations at 40 CFR 122.26(d)(2)(iv)(A) and 40 CFR 122.26(d)(2)(iv)(C) require that MS4 permittees implement a program to monitor and control pollutants in discharges to the municipal system from industrial and commercial facilities that contribute a substantial pollutant load to the MS4. The regulations require that permittees establish priorities and procedures for inspection of industrial facilities and priority commercial establishments. This permit, consistent with the USEPA policy, incorporates a cooperative partnership, including the specifications of minimum expectations, between the Regional Board and the Permittees for the inspection of industrial facilities and priority commercial establishments to control pollutants in storm water discharges (58 *Fed. Reg.* 61157).

6. Section 402 (p) of the CWA (33 U.S.C. § 1342(p) provides that MS4 permits must "require controls to reduce the discharge of pollutants to the maximum extent practicable, including management practices, control techniques and system, design engineering method and such other provisions as the [EPA] Administrator or the State determines appropriate for the control of such pollutants." The State Water Resources Control Board's (State Board) Office of Chief Counsel (OCC) has issued a memorandum interpreting the meaning of MEP to include technical feasibility, cost, and benefit derived with the burden being on the municipality to demonstrate compliance with MEP by showing that a BMP is not technically feasible in the locality or that BMPs costs would exceed any benefit to be derived (dated February 11, 1993).

7. The CWA authorizes the USEPA to permit a state to serve as the NPDES permitting authority in lieu of the USEPA. The State of California has in-lieu authority for an NPDES program. The Porter-Cologne Water Quality Control Act authorizes the State Board, through the Regional Boards, to regulate and control the discharge of pollutants into waters of the State. The State Board entered into a MOA with the USEPA, on

September 22, 1989, to administer the NPDES Program governing discharges to waters of the U.S.

8. Section 303(d) of the CWA requires that the State identify a list of impaired water-bodies and develop and implement Total Maximum Daily Loads (TMDLs) for these waterbodies (33 U.S.C. §1313(d)(1)). A TMDL specifies the maximum amount of a pollutant that a water-body can receive, still meet applicable water quality standards and protect beneficial uses. The USEPA entered into a consent decree with the Natural Resources Defense Council (NRDC), Heal the Bay, and the Santa Monica BayKeeper on March 22, 1999, under which the Regional Board must adopt all TMDLs for the Los Angeles Region within 13 years from that date. This permit incorporates a provision to implement and enforce approved load allocations for municipal storm water discharges and requires amending the SQMP after pollutants loads have been allocated and approved.

9. Section 6217(g) of the Coastal Zone Act Reauthorization Amendments of 1990 (CZARA) requires coastal states with approved coastal zone management programs to address non-point pollution impacting or threatening coastal water quality. CZARA (16 U.S.C. § 1451-1465) amends the Coastal Zone Management Act of 1972, to address five sources of non-point pollution: agriculture, silviculture, urban, marinas, and hydromodification. This NPDES permit addresses the management measures required for the urban category, with the exception of septic systems. The Regional Board addresses septic systems through the administration of other programs.

10. On May 18, 2000, the USEPA established numeric criteria for priority toxic pollutants for the State of California (California Toxics Rule (CTR)) 65 *Fed. Reg*. 31682 (40 CFR 131.38), for the protection of human health and aquatic life. These apply as ambient water quality criteria for inland surface waters, enclosed bays, and estuaries. The State Board adopted the *Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California (SIP) – 2000,* on March 2, 2000, for implementation of the CTR (State Board Resolution No. 2000-15 as amended by Board Resolution No. 2000-030). This policy requires that discharges comply with TMDL-derived load allocations as soon as possible but no later than 20 years from the effective date of the policy.

11. The State Board adopted a revised Water Quality Control Plan for Ocean Waters of California (Ocean Plan) on July 23, 1997. The Ocean Plan contains water quality objectives which apply to all discharges to the coastal waters of California.

12. The State Board in *In Re*: California Department of Transportation (State Board Order WQ 2001-08), determined that the discharge of storm water to ASBS is subject to the prohibition in the Ocean Plan against the discharge of wastes to an ASBS.

13. The Regional Board adopted an updated Water Quality Control Plan (Basin Plan) for the Los Angeles Region on June 13, 1994, *'Water Quality Control Plan, Los Angeles Region: Basin Plan for the Coastal Watersheds of Los Angeles and Ventura Counties*, (1994).' The Basin Plan designates beneficial uses of receiving waters and specifies both narrative and numerical water quality objectives for the receiving waters in Los Angeles County.

14. The Regional Board on September 19, 2001, adopted amendments to the Basin Plan, to incorporate TMDLs for trash in the Los Angeles River Watershed (Resolution No. R01-013) and Ballona Creek Watershed (Resolution No. R01-014). The amendments were subsequently approved by the State Board, the Office of Administrative Law, and the United States Environmental Protection Agency. Twenty-two cities[1] ("Cities") sued the Regional Board and State Board to set aside the Los Angeles River Trash TMDL. The trial court entered an order deciding some claims in favor of the Water Boards and some in favor of the Cities. Both sides appealed, and on January 26, 2006, the Court of Appeal decided every one of the Cities' claims in favor of the Water Boards, except with respect to California Environmental Quality Act (CEQA) compliance (*City of Arcadia et al. v. Los Angeles Regional Water Quality Control Board et al.* (2006) 135 Cal.App.4th 1392). The Court therefore declared the Los Angeles River Trash TMDL void, and issued a writ of mandate that ordered the Water Boards to set aside and not implement the TMDL, until it had been brought into compliance with CEQA. As a result of the appellate court's decision, in 2006, the Regional Board set aside its 2001 action incorporating the TMDL into the Basin Plan (Resolution R06-013) (*City of Arcadia et al. v. Los Angeles Regional Water Quality Control Board et al.* (2006) 135 Cal.App.4th 1392). After conducting the required CEQA analysis, the Regional Board readopted the Los Angeles River Watershed Trash TMDL on August 9, 2007 (Resolution No. R07-012). This TMDL was subsequently approved by the State Board (Resolution No. 2008-0024), the Office of Administrative Law (File No. 2008-0519-02 S), and the United States Environmental Protection Agency, and became effective on September 23, 2008. The Water Boards filed their final return to the writ of mandate on August 6, 2008, and on August 26, 2008, the superior court entered an order discharging the writ, and dismissing the case, thus concluding the legal challenges to the Trash TMDL.

15. The Regional Board on April 13, 1998, approved BMPs for sidewalk rinsing to minimize the discharge of wash waters to the storm drain system (Resolution No. 98-08). By the same resolution, the Regional Board prohibited the discharge of municipal street wash waters to the storm drain system.

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[1] The cities include Arcadia, Baldwin Park, Bellflower, Cerritos, Commerce, Diamond Bar, Downey, Irwindale, Lawndale, Monrovia, Montebello, Monterey Park, Pico Rivera, Rosemead, San Gabriel, Santa Fe Springs, Sierra Madre, Signal Hill, South Pasadena, Vernon, West Covina, and Whittier.

16. The Regional Board on April 13, 1998, approved recommended BMPs for industrial/commercial facilities (Resolution No. 98-08).

17. The Regional Board on April 22, 1999, approved a list of BMPs for use in development planning and development construction (Resolution No. 99-03)

18. The Regional Board adopted and approved requirements for new development and significant redevelopment projects in Los Angeles County to control the discharge of storm water pollutants in post-construction storm water, on January 26, 2000, in Board Resolution No. R-00-02. The Regional Board Executive Officer issued the approved Standard Urban Storm Water Mitigation Plans (SUSMPs) on March 8, 2000. The State Board in large part affirmed the Regional Board action and SUSMPs in State Board Order No. WQ 2000-11 issued on October 5, 2000.

    - The State Board's Chief Counsel has issued a statewide policy memorandum (dated December 26, 2000), which interprets the Order to provide broad discretion to Regional Boards and identifies potential future areas for inclusion in SUSMPs and the types of evidence and findings necessary. Such areas include ministerial projects, projects in environmentally sensitive areas, and water quality design criteria for RGOs.

    - The State Board's Chief Counsel interprets the Order to encourage regional solutions and endorses a mitigation fund or "bank" that may be funded by developers who obtain waivers from the numerical design standards for new development and significant redevelopment.

19. 40 CFR 131.10(a) prohibits states from designating waste transport or waste assimilation as a use for any water of the U.S. Authorizing the construction of a storm water/ urban runoff treatment facility in a jurisdictional water body would be tantamount to accepting waste assimilation as an appropriate use for that water body. Furthermore, the construction and operation of a pollution control facility in a water body can impact the physical, chemical, and biological integrity as well as the beneficial uses of the water body. Therefore, storm water treatment and/or mitigation in accordance with SUSMPs and any other requirements of this Order must occur prior to the discharge of storm water into a water of the U.S.

20. The Regional Board supports a Watershed Management Approach to address water quality protection in the region. The objective of the Watershed Management Approach should be to provide a comprehensive and integrated strategy towards water resource protection, enhancement, and restoration while balancing economic and environmental impacts within a hydrologically defined drainage basin or watershed. It emphasizes cooperative relationships between regulatory agencies, the regulated community, environmental groups, and other

stakeholders in the watershed to achieve the greatest environmental improvements with available resources.

21. To promote a watershed management approach, the County of Los Angeles is divided into six Watershed Management Areas (WMAs) as follows:

    Malibu Creek and Rural Santa Monica Bay WMA
    Ballona Creek and Urban Santa Monica Bay WMA
    Los Angeles River WMA
    San Gabriel River WMA
    Dominguez Channel/Los Angeles Harbor WMA, and
    Santa Clara River WMA

    Attachment A shows the list of Permittees under each WMA and some Permittees have expressed an intent to form sub-watershed groups within the WMA to promote regional solutions for the mitigation of storm water discharge pollution.

22. To facilitate compliance with federal regulations, the State Board has issued two statewide general NPDES permits for storm water discharges: one for storm water from industrial sites [NPDES No. CAS000001, General Industrial Activity Storm Water Permit (GIASP)] and the other for storm water from construction sites [NPDES No. CAS000002, General Construction Activity Storm Water Permit (GCASP)]. The GCASP was reissued on August 19, 1999. The GIASP was reissued on April 17, 1997. Facilities discharging storm water associated with industrial activities and construction projects with a disturbed area of five acres or more are required to obtain individual NPDES permits for storm water discharges, or to be covered by a statewide general permit by completing and filing a Notice of Intent (NOI) with the State Board. The USEPA guidance anticipates coordination of the state-administered programs for industrial and construction activities with the local agency program to reduce pollutants in storm water discharges to the MS4.

    The Regional Board is the enforcement authority in the Los Angeles Region for the two statewide general permits regulating discharges from industrial facilities and construction sites, and all NPDES storm water and non-storm water permits issued by the Regional Board. These industrial and construction sites and discharges are also regulated under local laws and regulations.

23. The State Board, on October 28, 1968, adopted Resolution No. 68-16, which established an anti-degradation policy for the State and Regional Boards. This policy restricts the degradation of surface waters and protects waterbodies where existing water quality is higher than is necessary for the protection of beneficial uses.

24. The State Board, on June 17, 1999, adopted Order No. WQ 99-05, which, in a precedential decision, identifies acceptable receiving water limitations language to be included in municipal storm water permits issued by the State and Regional Boards. The receiving water limitations included herein are consistent with the State Board Order, USEPA Policy,

and the U.S. Appellate court decision in, *Defenders of Wildlife v. Browner* (9th. Cir, 1999). The State Board OCC has determined that the federal court decision did not conflict with State Board Order No. WQ 99-05 (memorandum dated October 14, 1999)

25. California Water Code (CWC) § 13263(a) requires that waste discharge requirements issued by the Regional Board shall implement any relevant water quality control plans that have been adopted; shall take into consideration the beneficial uses to be protected and the water quality objectives reasonably required for that purpose; other waste discharges; the need to prevent nuisance; and provisions of CWC § 13241. The Regional Board has considered the requirements of § 13263 and § 13241, and applicable plans, policies, rules, and regulations in developing these waste discharge requirements.

26. CWC § 13370 *et seq.* requires that waste discharge requirements issued by the Regional Boards be consistent with provisions of the federal CWA and its amendments.

27. On March 12, 2001, the U.S. Court of Appeals ruled that it is necessary to obtain a NPDES permit for application of aquatic pesticides to waterways. (*Headwaters, Inc. vs. Talent Irrigation District,* 243 F.3d. 526 (9th Cir., 2001)) This decision is controlling in California for nonagricultural applications of pesticides to waterways. The State Board adopted a general NPDES permit (Order No. 2001-12-DWQ) on July 19, 2001, for public entities that discharge pollutants to waters of the U.S. associated with the application of aquatic pesticides for resource or pest management. Public entities that conduct such activities must seek coverage under the general permit.

The Marina Del Rey Harbor Mothers' Beach and Back Basins Bacteria TMDL

28. [Intentionally left blank]

29. The Regional Board adopted the Marina del Rey Harbor Mothers' Beach and Back Basins Bacteria TMDL (hereinafter "MDR Bacteria TMDL") on August 7, 2003. The TMDL was subsequently approved by the SWRCB, the OAL, and the USEPA and became effective on March 18, 2004.

30. Tables 7-5.1, 7-5.2, and 7-5.3 of the Basin Plan set forth the pertinent provisions of the MDR Bacteria TMDL.

31. [Intentionally left blank]

32. [Intentionally left blank]

33. On March 14, 2007, Marina del Rey watershed responsible agencies submitted to the Regional Board the results of a non-point source study conducted over a one year period between July 2005 and July 2006, which was required under the terms of the MDR TMDL. The study was designed to determine the relative bacterial loading to the harbor from sources including but not limited to storm drains, boats, birds, and other non-point sources. The study has not yet been peer reviewed, and is currently under review by Regional Board staff.

34. On January 8, 2007, as required by the MDR Bacterial TMDL, Marina del Rey watershed responsible agencies submitted to the Regional Board an implementation plan describing the strategy by which they intend to comply with the MDR Bacterial TMDL. This implementation plan was developed through a process that included both Regional Board staff and representatives from Heal the Bay and Santa Monica Baykeeper.

35. The Regional Board acknowledges the County's timely submittals of reports required by the TMDL and implementation measures initiated thus far towards meeting water quality standards for bacteria in Marina del Rey. As a result of the adoption of the MDR Bacterial TMDL in 2003, the County has funded or received grants to initiate the following activities:

- Marina Beach Water Quality Improvement Project, Phase I and Phase II through a CBI grant;
- Mothers' Beach and Back Basins Bacterial TMDL Non-point Source Study;
- Marina del Rey Harbor Mothers Beach and Back Basins Report of Small Drain Identification;
- Marina del Rey Vessel Discharge Report;
- Marina del Rey Harbor Mothers' Beach and Back Basins Bacterial TMDL Coordinated Monitoring Plan; and
- Three low-flow diversion projects, which were partially funded by a grant, two of which have been completed.

In addition to participation in the above studies, the County and other Marina del Rey watershed responsible agencies continue to implement BMPs proposed in the January 8, 2007, Implementation Plan.

36. [Intentionally left blank][2]

37. [Intentionally left blank]

a) [Intentionally left blank]

[2] [Intentionally left blank]

b) [Intentionally left blank]

c) [Intentionally left blank]

d) [Intentionally left blank]

38. [Intentionally left blank]

39. [Intentionally left blank]

Findings Related to the Incorporation of the Los Angeles River Watershed Trash TMDL

40. The Regional Board adopted the Los Angeles River Trash Total Maximum Daily Load (TMDL) on August 9, 2007 as an amendment to the region's Water Quality Control Plan (Basin Plan) to address water quality impairments due to trash in the Los Angeles River Watershed that were identified in 1998 on the State's Clean Water Act Section 303(d) List. This TMDL was subsequently approved by the State Board, the Office of Administrative Law (OAL), and the USEPA, and it became effective on September 23, 2008.

41. By its adoption of the Trash TMDL, the Regional Board determined that trash discharged to the Los Angeles River and its tributaries discourages recreational activity, degrades aquatic habitat, threatens wildlife through ingestion and entanglement, and also poses risks to human health. Existing beneficial uses impaired by trash in the Los Angeles River are contact recreation (REC-1) and non-contact recreation (REC-2); warm fresh water habitat (WARM); wildlife habitat (WILD); estuarine habitat (EST) and marine habitat (MAR); rare, threatened or endangered species (RARE); migration of aquatic organisms (MIGR) and spawning, reproduction and early development of fish (SPWN); commercial and sport fishing (COMM); wetland habitat (WET); and cold freshwater habitat (COLD).

42. The Los Angeles River Watershed Trash TMDL identifies discharges from the municipal separate storm sewer system as the principal source of trash to the Los Angeles River and its tributaries. As such, WLAs were assigned to MS4 Permittees that discharge to the MS4 in the watershed. The WLAs are expressed as progressively decreasing allowable amounts of trash discharges from jurisdictional areas within the watershed. The Trash TMDL requires MS4 Permittees to make annual reductions of their discharges of trash to the Los Angeles River Watershed over a 9-year period, until the numeric target of zero trash discharged from the MS4 is achieved for the 2013-2014 storm year. The Basin Plan assigns MS4 Permittees within the Los Angeles River Watershed baseline Waste Load Allocations from which annual reductions are to be made. (See Basin Plan, Table 7-2.2.) The Basin Plan also specifies interim and final Waste Load Allocations as decreasing percentages of the Table 7-2.2 baseline

WLAs, and specifies the corresponding "Compliance Points". (See Basin Plan, Table 7-2.3.)

43. The Los Angeles River Watershed Trash TMDL specifies that the WLAs shall be implemented through MS4 permits. Federal regulations require that NPDES permits be consistent with the assumptions and requirements of any available waste load allocation. (40 CFR 122.44(d)(1)(vii)(B).) State law requires both that the Regional Board implement its Basin Plan when adopting waste discharge requirements (WDRs) and that NPDES permits apply "any more stringent effluent standards or limitations necessary to implement water quality control plans…" (Wat. Code §§ 13263, 13377).

44. The Ninth Circuit Court of Appeals in *Defenders of Wildlife v. Browner* ruled that the Clean Water Act grants the permitting agency discretion either to require "strict compliance" with water quality standards through the imposition of numeric effluent limitations, or to employ an iterative approach toward compliance with water quality standards, by requiring improved BMPs over time (*Defenders of Wildlife v. Browner* (9th Cir. 1999) 191 F.3d 1159). In a precedential decision, the State Board acknowledged that the holding in *Browner* allows the issuance of MS4 permits that limit their provisions to BMPs that control pollutants to the MEP, and which do not require compliance with water quality standards. However, the Water Boards have declined to adopt that approach in light of the impacts of discharges from MS4s on waters throughout the State and Los Angeles region (see Order WQ 2001-15 and Part 2 of the LA County MS4 Permit). The State Board concluded and the Regional Board agrees that "where urban runoff is causing or contributing to exceedances of water quality standards, it is appropriate to require improvements to BMPs that address those exceedances" (Order WQ 2001-15, p. 8).

45. In a recent decision, the State Board also concluded that incorporation of the provisions of TMDLs into MS4 permits requires extra consideration. Specifically, the State Board held: "TMDLs, which take significant resources to develop and finalize, are devised with specific implementation plans and compliance dates designed to bring impaired waters into compliance with water quality standards. It is our intent that federally mandated TMDLs be given substantive effect. Doing so can improve the efficacy of California's NPDES storm water permits." The State Board stated that TMDLs should not be an "academic exercise", and indicated that in some instances when implementing TMDLs, numeric effluent limitations may be an appropriate means of controlling pollutants in storm water, provided the Regional Board's determination is adequately supported in the permit findings (Order WQ 2009-0008). The following paragraphs support the Regional Board's determination to implement the Trash TMDL with numeric effluent limitations.

46. The Trash TMDL specified a specific formula for calculating and allocating annual reductions in trash discharges from each jurisdiction.

The formula results in specified annual amounts of trash that may be discharged from each jurisdiction into the receiving waters. Translation of the compliance points described in the TMDL into jurisdiction-specific load reductions from the baseline levels, as specified in the TMDL, logically results in the articulation of an annual limit on the amount of a pollutant that may be discharged. The specification of allowable annual trash discharge amounts meets the definition of an "effluent limitation", as that term is defined in subdivision (c) of section 13385.1 of the California Water Code. Specifically, the trash discharge limitations constitute a "numeric restriction … on the quantity [or] discharge rate … of a pollutant or pollutants that may be discharged from an authorized location." While there may be other ways to incorporate the compliance points from the TMDL into permit conditions, the Regional Board is not aware of any other mechanisms that would result in actual compliance with the requirements of the TMDL as it was intended.

47. The process to establish the Trash TMDL was exceedingly lengthy, heavily litigated and scrutinized, and contained extensive analysis. The essence of this TMDL has been twice adopted by the Regional Board, and approved by the State Board, OAL, and the US EPA, and has been subject to considerable judicial review. Therefore, the assumptions underlying this TMDL have been thoroughly vetted by staff, stakeholders, other agencies, and the courts over a significant period of time.

48. In its resolution establishing the Trash TMDL, the Regional Board already determined that the implementation schedule was reasonable and feasible, and noted that the MS4 Permittees had notice of the trash impairment since at least 1998 (with its listing on the 1998 303(d) list) and had been required to attain water quality standards for trash in the receiving waters since this order was first adopted in December of 2001. (See e.g., Resolution R07-012, finding 14.) The Court of Appeal affirmed the Regional Board's determination that the final waste load allocations were attainable and not inordinately expensive. (*Cities of Arcadia*, 135 Cal.App.4th at 1413 and 1427-1430.) Full capture systems, partial capture devices, and institutional controls are presently available to feasibly and practicably attain the interim and final effluent limitations, and it is anticipated that this order will precipitate additional innovations in control strategies and technologies, just as the adoption of the Trash TMDL resulted in the proffering and certification of seven full capture systems.

49. The Trash TMDL and this order include provisions that allow Permittees to be deemed in compliance with their effluent limitations through the installation of certain best management practices (certified full capture systems). Any Permittee that is deemed in compliance through the use of certified full capture systems would not be in violation of the effluent limitations even if some trash is discharged in excess of the annual limitations.

50. The Trash TMDL includes provisions requiring its reconsideration after a trash reduction of 50% has been achieved and sustained in the

watershed, which provides an opportunity to reexamine some of the assumptions of the TMDL after tangible and meaningful progress has been made in the watershed. (See Basin Plan, Table 7-2.3, fn. 2.) Should this reconsideration result in a modification to the final waste load allocations, the permit will be reopened pursuant to Part 6., paragraph I.1.b, to ensure the effluent limitations contained in Tables 1a and 1b of Appendix 7-1 are consistent with the assumptions and requirements of any revised waste load allocations. (40 CFR § 122.44(d)(1)(vii)(B).)

51. Depending upon the compliance strategy selected by each Permittee, compliance with the effluent limitations set forth in Appendix 7-1 may require a demonstration that the Permittee is in strict compliance with water quality standards. It remains the Permittee's choice, however, to comply via certified full capture systems (which do not require a demonstration of strict compliance with water quality standards), or partial capture devices and/or institutional controls.

52. Section 402(p)(3)(B)(iii) of the Clean Water Act, requires MS4 Permittees to reduce the pollutants in their storm water discharges to the "maximum extent practicable" (MEP). As set forth herein, "practicable" options presently exist to achieve compliance with the effluent limitations. Since the effluent limitations can be practicably achieved, their imposition is within the federally mandated MEP standard, and no analysis contemplated by *City of Burbank v. SWRCB* (2005) 35 Cal.4th 613 pursuant to Water Code section 13241 is necessary to support these effluent limitations.

53. In its discretion, the Regional Board may administratively impose civil liability of up to $10,000 for "each day in which the violation [of waste discharge requirements] occurs." (Wat. C. § 13385, subd (c).) Not every storm event may result in trash discharges. The Los Angeles River Trash TMDL adopted by the Regional Board states that improperly deposited trash is mobilized during storm events of greater than 0.25 inches of precipitation. Therefore, violations of the effluent limitations are limited to the days of a storm event of greater than 0.25 inches. Once a Permittee has violated the annual effluent limitation, any subsequent discharges of trash during any day of a storm event of greater than 0.25 inches during the same storm year constitutes an additional "day in which the violation [of the effluent limitation] occurs".

54. Unlike subdivision (c) of Water Code section 13385 where violations of effluent limitations are assessed on a per day basis, the mandatory minimum penalties subdivisions (Wat. Code § 13385, subd. (h) and (i)) require the Regional Board to assess mandatory minimum penalties for "each violation" of an effluent limitation. The effluent limitations in Appendix 7-1 are expressed as annual limitations. Therefore, there can be no more than one violation of each interim or final effluent limitation per year. Trash is considered a Group I pollutant, as specified in Appendix A to section 123.45 of Title 40 of the Code of Federal Regulations. Therefore, each annual violation of an effluent limitation in

Appendix 7-1 by forty percent or more would be considered a "serious violation" under subdivision (h). With respect to the final effluent limitation of zero trash, any detectable discharge of trash necessarily is a serious violation, in accordance with the State Board's Enforcement Policy. Violations of the effluent limitations in Appendix 7-1 would not constitute "chronic" violations that would give rise to mandatory liability under subdivision (i) because four or more violations of the effluent limitations subject to a mandatory penalty cannot occur in a period of six consecutive months.

55. Therefore, the modifications to the Order include effluent limitations in a manner consistent with the assumptions and requirements of the WLAs from which they are derived as well as an allowance to comply with these effluent limitations [*i.e.* WLAs] through proper installation and maintenance of certified full capture systems.

56. Modifications consistent with the assumptions and requirements of the TMDL are therefore included in Parts 4 (Special Provisions) and 5 (Definitions) of this Order. Part 7 (Total Maximum Daily Load Provisions) is added to this Order and incorporates provisions to assure that Los Angeles County MS4 Permittees achieve the Waste Load Allocations (WLAs) and comply with other requirements of Total Maximum Daily Loads (TMDLs) covering impaired waters impacted by the Permittees' discharges. These modifications are made pursuant to 40 CFR sections 122.41(f), 122.44.(d)(1)(vii)(B), and 122.62, and Part 6.I.1 of this Order. Tables 7-2.1, 7-2.2, and 7-2.3 of the Basin Plan set forth the pertinent provisions of the Los Angeles River Watershed Trash TMDL. The interim and final effluent limitations consistent with the assumptions and requirements of the waste load allocations, and related provisions required of Permittees within the watershed are provided in Part 7 of this Order.

57. Permittees identified as responsible agencies in the Trash TMDL may achieve compliance with interim and final effluent limitations through progressive installation of BMPs meeting the definition of "full capture" throughout their jurisdictions' drainage areas. Alternatively, Permittees may install "partial capture" devices and/or implement institutional controls to meet their respective interim and final effluent limitations. Where partial capture devices are utilized as the sole trash control measure, the degree of compliance may be demonstrated based upon performance data specific to the jurisdictional area. However, compliance with the final effluent limitation cannot be achieved through the exclusive use of partial capture devices. Where a combination of partial capture devices and institutional controls are used, compliance shall be determined based on the approximation of jurisdiction-specific trash discharges.

58. The Executive Officer will develop a standard reporting form, consistent with these provisions, which shall be used by Permittees to report compliance with the effluent limitations on an annual basis.

60. Pursuant to federal regulations at 40 CFR sections 124.8 and 125.56, a Fact Sheet was prepared to provide the basis for incorporating the Los Angeles River Watershed Trash TMDL into this Order. This Fact Sheet is hereby incorporated by reference into these findings.

F. Implementation

1. The California Environmental Quality Act (CEQA) (Cal. Pub. Resources Code § 21000 *et seq.*) requires that public agencies consider the environmental impacts of the projects they approve for development. CEQA applies to projects that are considered discretionary and does not apply to ministerial projects, which involve the use of established standards or objective measurements. A ministerial project may be made discretionary by adopting local ordinance provisions or imposing conditions to create decision-making discretion in approving the project. In the alternative, Permittees may establish standards and objective criteria administratively for storm water mitigation for ministerial projects. For water quality purposes, the Regional Board considers that all new development and significant redevelopment activity in specified categories, that receive approval or permits from a municipality, are subject to storm water mitigation requirements.

2. The objective of this Order is to protect the beneficial uses of receiving waters in Los Angeles County. To meet this objective, this Order requires that the SQMP specify BMPs that will be implemented to reduce the discharge of pollutants in storm water to the maximum extent practicable. Further, Permittees are to assure that storm water discharges from the MS4 shall neither cause nor contribute to the exceedance of water quality standards and objectives nor create conditions of nuisance in the receiving waters, and that the discharge of non-storm water to the MS4 has been effectively prohibited.

3. The SQMP required in this Order builds upon the programs established in Order Nos. 90-079, and 96-054, consists of the components recommended in the USEPA guidance manual, and was developed with the cooperation of representatives from the regulated community and environmental groups. The SQMP includes provisions that promote customized initiatives, both on a countywide and watershed basis, in developing and implementing cost-effective measures to minimize discharge of pollutants to the receiving water. The various components of the SQMP, taken as a whole rather than individually, are expected to reduce pollutants in storm water and urban runoff to the maximum extent practicable. Provisions of the SQMP are fully enforceable under provisions of this Order.

4. The emphasis of the SQMP is pollution prevention through education, public outreach, planning, and implementation as source control BMPs first and then Structural and Treatment Control BMPs next. Successful implementation of the provisions of the SQMP will require cooperation

and coordination of all public agencies in each Permittee's organization, among Permittees, and with the regulated community.

5. The implementation of a Public Information and Participation Program is a critical component of a storm water management program. An informed and knowledgeable community is critical to the success of a storm water management program since it helps insure the following: (i) greater support for the program as the public gains a greater understanding of the reasons why it is necessary and important, and (ii) greater compliance with the program as the public becomes aware of the personal responsibilities expected of them and others in the community, including the individual actions they can take to protect or improve the quality of area waters.

6. This Order includes a Monitoring Program that incorporates Minimum Levels (MLs) established under the SIP. The SIP's MLs represent the lowest quantifiable concentration for priority toxic pollutants that is measurable with the use of proper method-based analytical procedures and factoring out matrix interference. The SIP's MLs therefore represent the best available science for determining MLs and are appropriate for a storm water monitoring program. The use of MLs allows the detection of toxic priority pollutants at concentrations of concern using recent advances in chemical analytical methods.

7. This Order provides flexibility for Permittees to petition the Regional Board Executive Officer to substitute a BMP under the SQMP with an alternative BMP, if they can provide information and documentation on the effectiveness of the alternative, equal to or greater than the prescribed BMP in meeting the objectives of this Order.

8. This Order contemplates that the Permittees are responsible for considering potential storm water impacts when making planning decisions in order to fulfill the Permittees' CWA requirement to reduce the discharge of pollutants in municipal storm water to the MEP from new development and redevelopment activities. However, the Permittees retain authority to make the final land-use decisions and retain full statutory authority for deciding what land uses are appropriate at specific locations within each Permittee's jurisdiction. This Order and its requirements are not intended to restrict or control local land use decision-making authority.

9. This Order is not intended to prohibit the inspection for or abatement of vectors by the State Department of Health Services or local vector agencies in accordance with Cal. Health and Safety Code § 2270 *et seq*. and §116110 *et seq*. Certain Treatment Control BMPs if not properly designed, operated or maintained may create habitats for vectors (e.g. mosquito and rodents). This Order contemplates that the Permittees will closely cooperate and collaborate with local vector control agencies and the State Department of Health Services for the implementation, operation, and maintenance of Treatment Control BMPs in order to minimize the risk to public health from vector borne diseases.

G. Public Process

1. The Regional Board has notified the Permittees and interested agencies and persons of its intent to issue waste discharge requirements for this discharge, and has provided them with an opportunity to submit their written view and recommendations.

2. The Regional Board, in a public hearing, heard and considered all comments pertaining to the discharge and to the tentative requirements.

3. The Regional Board has conducted public workshops to discuss drafts of the permit. On April 24, 2001, Regional Board staff conducted a workshop outlining the reasoning behind the changes proposed for the new permit and received input from the Permittees and the public regarding those proposed changes. On July 26, 2001, a second public workshop was held at a special Regional Board meeting. The Permittees and the public had another opportunity to express their opinions regarding the proposed changes to the permit in front of the Regional Board members. A significant number of working meetings with the Permittees and other interested parties have occurred throughout the period from the submittal of the ROWD and completion of the tentative draft, in an attempt to incorporate and address all the comments presented.

4. The Los Angeles County Flood Control District, the County of Los Angeles and the other municipalities are co-permittees as defined in 40 CFR 122.26 (b)(1). Los Angeles County Flood Control District will coordinate with the other municipalities and facilitate program implementation. Each Permittee is responsible only for a discharge for which it is the operator.

5. This Order shall serve as a NPDES Permit, pursuant to CWA § 402, or amendments thereto, and shall take effect 50 days from Order adoption provided the Regional Administrator of the USEPA has no objections.

6. The action to adopt an NPDES permit is exempt from the provisions of Chapter 3 of CEQA (Cal. Pub. Resources Code § 21100 *et seq.*), in accordance with CWC § 13389.

7. Pursuant to CWC §13320, any aggrieved party may seek review of this Order by filing a petition with the State Board. A petition must be sent to: State Water Resources Control Board, P.O. Box 100, Sacramento, California, 95812, within 30 days of adoption of the Order by the Regional Board.

8. This Order may be modified or alternatively revoked or reissued prior to its expiration date, in accordance with the procedural requirements of the NPDES program, and the CWC for the issuance of waste discharge requirements.

IT IS HEREBY ORDERED that the Los Angeles County Flood Control District, Los Angeles County, and the Cities of Agoura Hills, Alhambra, Arcadia, Artesia, Azusa, Baldwin Park, Bell,

Bellflower, Bell Gardens, Beverly Hills, Bradbury, Burbank, Calabasas, Carson, Cerritos, Claremont, Commerce, Compton, Covina, Cudahy, Culver City, Diamond Bar, Downey, Duarte, El Monte, El Segundo, Gardena, Glendale, Glendora, Hawaiian Gardens, Hawthorne, Hermosa Beach, Hidden Hills, Huntington Park, Industry, Inglewood, Irwindale, La Cañada Flintridge, La Habra Heights, Lakewood, La Mirada, La Puente, La Verne, Lawndale, Lomita, Los Angeles, Lynwood, Malibu, Manhattan Beach, Maywood, Monrovia, Montebello, Monterey Park, Norwalk, Palos Verdes Estates, Paramount, Pasadena, Pico Rivera, Pomona, Rancho Palos Verdes, Redondo Beach, Rolling Hills, Rolling Hills Estates, Rosemead, San Dimas, San Fernando, San Gabriel, San Marino, Santa Clarita, Santa Fe Springs, Santa Monica, Sierra Madre, Signal Hill, South El Monte, South Gate, South Pasadena, Temple City, Torrance, Vernon, Walnut, West Covina, West Hollywood, Westlake Village, and Whittier, in order to meet the provisions contained in Division 7 of the CWC and regulations adopted thereunder, and the provisions of the CWA, as amended, and regulations and guidelines adopted thereunder, shall comply with the following:

Part 1. DISCHARGE PROHIBITIONS

Part 1. A. The Permittees shall effectively prohibit non-storm water discharges into the MS4 and watercourses, except where such discharges:

1. Are covered by a separate individual or general NPDES permit for non-storm water discharges; or

2. Fall within one of the categories below, and meet all conditions when specified by the Regional Board Executive Officer:

   a) Category A - Natural flow:

      (1) Natural springs and rising ground water;

      (2) Flows from riparian habitats or wetlands;

      (3) Stream diversions, permitted by the State Board; and

      (4) Uncontaminated ground water infiltration [as defined by 40 CFR 35.2005(20)].

   b) Category B - Flows from emergency fire fighting activity.

   c) Category C - Flows incidental to urban activities:

      (1) Reclaimed and potable landscape irrigation runoff;

      (2) Potable drinking water supply and distribution system releases (consistent with American Water Works Association guidelines for dechlorination and suspended solids reduction practices);

      (3) Drains for foundations, footings, and crawl spaces;

      (4) Air conditioning condensate;

(5) Dechlorinated/debrominated swimming pool discharges;

(6) Dewatering of lakes and decorative fountains;

(7) Non-commercial car washing by residents or by non-profit organizations; and

(8) Sidewalk rinsing.

The Regional Board Executive Officer may add or remove categories of non-storm water discharges above. Furthermore, in the event that any of the above categories of non-storm water discharges are determined to be a source of pollutants by the Regional Board Executive Officer, the discharge will no longer be exempt from this prohibition unless the Permittee implements conditions approved by the Regional Board Executive Officer to ensure that the discharge is not a source of pollutants. Notwithstanding the above, the Regional Board Executive Officer may impose additional prohibitions of non-storm water discharges in consideration of antidegradation policies and TMDLs.

Part 1. B. [Intentionally left blank][3,4]

Part 2. RECEIVING WATER LIMITATIONS

1. Discharges from the MS4 that cause or contribute to the violation of Water Quality Standards or water quality objectives are prohibited.

2. Discharges from the MS4 of storm water, or non-storm water, for which a Permittee is responsible for, shall not cause or contribute to a condition of nuisance.

3. The Permittees shall comply with Part 2.1. and 2.2. through timely implementation of control measures and other actions to reduce pollutants in the discharges in accordance with the SQMP and its components and other requirements of this Order including any modifications. The SQMP and its components shall be designed to achieve compliance with receiving water limitations. If exceedances of Water Quality Objectives or Water Quality Standards (collectively, Water Quality Standards) persist, notwithstanding implementation of the SQMP and its components and other requirements of this permit, the Permittee shall assure compliance with discharge prohibitions and receiving water limitations by complying with the following procedure:

   a) Upon a determination by either the Permittee or the Regional Board that discharges are causing or contributing to an exceedance of an applicable Water Quality Standard, the Permittee shall promptly notify and thereafter submit a Receiving Water Limitations (RWL) Compliance Report (as

[3] [Intentionally left blank]

[4] [Intentionally left blank]

described in the Program Reporting Requirements, Section I of the Monitoring and Reporting Program) to the Regional Board that describes BMPs that are currently being implemented and additional BMPs that will be implemented to prevent or reduce any pollutants that are causing or contributing to the exceedances of Water Quality Standards. This RWL Compliance Report may be incorporated in the annual Storm Water Report and Assessment unless the Regional Board directs an earlier submittal. The RWL Compliance Report shall include an implementation schedule. The Regional Board may require modifications to the RWL Compliance Report.

b) Submit any modifications to the RWL Compliance Report required by the Regional Board within 30 days of notification.

c) Within 30 days following the approval of the RWL Compliance Report, the Permittee shall revise the SQMP and its components and monitoring program to incorporate the approved modified BMPs that have been and will be implemented, an implementation schedule, and any additional monitoring required.

d) Implement the revised SQMP and its components and monitoring program according to the approved schedule.

4. So long as the Permittee has complied with the procedures set forth above and is implementing the revised SQMP and its components, the Permittee does not have to repeat the same procedure for continuing or recurring exceedances of the same receiving water limitations unless directed by the Regional Board to develop additional BMPs.

5. [Intentionally left blank][5]

6. During Summer Dry Weather there shall be no discharges of bacteria from MS4s into Marina del Rey Harbor Basins D, E, or F, including Mothers' Beach that cause or contribute to exceedances of the applicable bacteria objectives. The applicable bacteria objectives include both the single sample and geometric mean bacteria objectives set to protect the Water Contact Recreation (REC-1) beneficial use, as set forth in the Basin Plan.[6]

[5] [Intentionally left blank]

[6] Samples collected for determining compliance with the receiving water limitations of Part 2.6 shall be processed in accordance with the sampling procedures and analytical methodology set forth in the *Marina del Rey Harbor Mothers' Beach and Back Basins Bacterial TMDL Coordinated Shoreline Monitoring Plan* dated April 13, 2007 and the Monitoring and Reporting Program CI 6948.

Part 3. STORM WATER QUALITY MANAGEMENT PROGRAM (SQMP) IMPLEMENTATION

A. General Requirements

1. Each Permittee shall, at a minimum, implement the SQMP. The SQMP is an enforceable element of this Order. The SQMP shall be implemented no later than February 1, 2002, unless a later date has been specified for a particular provision in this Order.

2. The SQMP shall, at a minimum, comply with the applicable storm water program requirements of 40 CFR 122.26(d)(2). The SQMP and its components shall be implemented so as to reduce the discharges of pollutants in storm water to the MEP.

3. Each Permittee shall implement additional controls, where necessary, to reduce the discharges of pollutants in storm water to the MEP.

4. Permittees that modify the countywide SQMP (i.e., implement additional controls, implement different controls than described in the countywide SQMP, or determine that certain BMPs in the countywide SQMP are not applicable in the area under its jurisdiction), shall develop a local SQMP, no later than August 1, 2002. The local SQMP shall be customized to reflect the conditions in the area under the Permittee's jurisdiction and shall specify activities being implemented under the appropriate elements described in the countywide SQMP.

B. Best Management Practice Implementation

The Permittees shall implement or require the implementation of the most effective combination of BMPs for storm water/urban runoff pollution control. When implemented, BMPs are intended to result in the reduction of pollutants in storm water to the MEP.

C. Revision of the Storm Water Quality Management Program

The Permittees shall revise the SQMP, at the direction of the Regional Board Executive Officer, to incorporate program implementation amendments so as to comply with regional, watershed specific requirements, and/or waste load allocations developed and approved pursuant to the process for the designation and implementation of Total Maximum Daily Loads (TMDLs) for impaired water bodies.

D. Designation and Responsibilities of the Principal Permittee

The Los Angeles County Flood Control District is hereby designated as the Principal Permittee. As such, the Principal Permittee shall:

1. Coordinate and facilitate activities necessary to comply with the requirements of this Order, but is not responsible for ensuring compliance of any individual Permittee;

2. Coordinate permit activities among Permittees and act as liaison between Permittees and the Regional Board on permitting issues;

3. Provide personnel and fiscal resources for the necessary updates of the SQMP and its components;

4. Provide technical and administrative support for committees that will be organized to implement the SQMP and its components;

5. Convene the Watershed Management Committees (WMCs) constituted pursuant to Part F, below, upon designation of representatives;

6. Implement the Countywide Monitoring Program required under this Order and evaluate, assess and synthesize the results of the monitoring program;

7. Provide personnel and fiscal resources for the collection, processing and submittal to the Regional Board of annual reports and summaries of other reports required under the SQMP; and

8. Comply with the "Responsibilities of the Permittees" in Part 3.E., below.

E. Responsibilities of the Permittees

Each Permittee is required to comply with the requirements of this Order applicable to discharges within its boundaries (see Findings D.1, D.2. and D.3.) and not for the implementation of the provisions applicable to the Principal Permittee or other Permittees. Each Permittee shall, within its geographic jurisdiction:

1. Comply with the requirements of the SQMP and any modifications thereto;

2. Coordinate among its internal departments and agencies, as appropriate, to facilitate the implementation of the requirements of the SQMP applicable to such Permittee in an efficient and cost-effective manner;

3. Designate a technically knowledgeable representative to the appropriate WMC;

4. Participate in intra-agency coordination (e.g. Fire Department, Building and Safety, Code Enforcement, Public Health, etc.) necessary to successfully implement the provisions of this Order and the SQMP.

5. Prepare an annual Budget Summary of expenditures applied to the storm water management program. This summary shall identify the storm water budget for the following year, using estimated percentages and written explanations where necessary, for the specific categories noted below:

   a) Program management
      - Administrative costs

   b) Program Implementation

Where information is available, provide an estimated percent breakdown of expenditures for the categories below:

- Illicit connection/illicit discharge
- Development planning
- Development construction
- Construction inspection activities
- Industrial/Commercial inspection activities
- Public Agency Activities
  - Maintenance of Structural BMPs and Treatment Control BMPs
  - Municipal Street Sweeping
  - Catch basin clean-up
  - Trash collection
  - Capital costs

c) Public Information and Participation

d) Monitoring Program

e) Miscellaneous Expenditures

6. Each Permittee, in addition to the Budget Summary, shall report any supplemental dedicated budgets for the same categories.

F. Watershed Management Committees (WMCs)

1. Each WMC shall be comprised of a voting representative from each Permittee in the WMA.

2. The WMC's chair and secretary shall be chosen by the WMC upon Order adoption and on an annual basis, thereafter. In the absence of volunteer Permittee(s) for the positions, the Principal Permittee shall assume those roles until the WMC chooses members of the committee for the positions.

3. Each WMC shall:

a) Facilitate cooperation and exchange of information among Permittees;

b) Establish additional goals and objectives and associated deadlines for the WMA, as the program implementation progresses;

c) Prioritize pollution control efforts based on beneficial use impairment(s), watershed characteristics and analysis of results from studies and the monitoring program;

d) Develop and/or update and monitor the adequate implementation, on an annual basis, of the tasks identified for the WMA;

e) Assess the effectiveness of, prepare revisions for, and recommend appropriate changes to the SQMP and its components;

f) Continue to prioritize the Industrial/Commercial critical sources for investigation, outreach and follow-up; and

g) Meet four times per year and, as necessary.

G. Legal Authority

1. Permittees shall possess the necessary legal authority to prohibit non-storm water discharges to the storm drain system, including, but not limited to:

a) Illicit discharges and illicit connections and require removal of illicit connections;

b) The discharge of wash waters to the MS4 from the cleaning of gas stations, auto repair garages, or other types of automotive service facilities;

c) The discharge of runoff to the MS4 from mobile auto washing, steam cleaning, mobile carpet cleaning, and other such mobile commercial and industrial operations;

d) The discharge of runoff to the MS4 from areas where repair of machinery and equipment which are visibly leaking oil, fluid or antifreeze, is undertaken;

e) The discharge of runoff to the MS4 from storage areas of materials containing grease, oil, or other hazardous substances, and uncovered receptacles containing hazardous materials;

f) The discharge of chlorinated/ brominated swimming pool water and filter backwash to the MS4;

g) The discharge of runoff from the washing of toxic materials from paved or unpaved areas to the MS4;

h) Washing impervious surfaces in industrial/commercial areas that results in a discharge of runoff to the MS4;

i) The discharge of concrete or cement laden wash water from concrete trucks, pumps, tools, and equipment to the MS4; and

j) Dumping or disposal of materials into the MS4 other than storm water, such as:

(1) Litter, landscape debris and construction debris;

(2) Any state or federally banned or unregistered pesticides;

(3) Food and food processing wastes; and

(4) Fuel and chemical wastes, animal wastes, garbage, batteries, and other materials that have potential adverse impacts on water quality.

2. The Permittees shall possess adequate legal authority to:

   a) Require persons within their jurisdiction to comply with conditions in Permittees' ordinances, permits, contracts, model programs, or orders (i.e. hold dischargers to its MS4 accountable for their contributions of pollutants and flows);

   b) Utilize enforcement mechanisms to require compliance with Permittees ordinances, permits, contracts, or orders;

   c) Control pollutants, including potential contribution, in discharges of storm water runoff associated with industrial activities (including construction activities) to its MS4 and control the quality of storm water runoff from industrial sites (including construction sites). This requirement applies to Source Control, and Treatment Control BMPs;

   d) Carry out all inspection, surveillance and monitoring procedures necessary to determine compliance and non-compliance with permit conditions, including the prohibition of illicit discharges to the MS4. Permittees must possess authority to enter, sample, inspect, review and copy records, and require regular reports from industrial facilities (including construction sites) discharging polluted or with the potential to discharge polluted storm water runoff into its MS4;

   e) Require the use of BMPs to prevent or reduce the discharge of pollutants to MS4s to MEP; and

   f) Require that Treatment Control BMPs be properly operated and maintained to prevent the breeding of vectors.

3. Each Permittee shall, no later than November 1, 2002, amend and adopt (if necessary), a Permittee-specific storm water and urban runoff ordinance to enforce all requirements of this permit.

4. Each Permittee shall submit no later than December 2, 2002, a new or updated statement by its legal counsel that the Permittee has obtained all necessary legal authority to comply with this Order through adoption of ordinances and/or municipal code modifications.

Part 4. SPECIAL PROVISIONS

Maximum Extent Practicable Standard

This permit, and the provisions herein, are intended to develop, achieve, and implement a timely, comprehensive, cost-effective storm water pollution control program to reduce the discharge of pollutants in storm water to the MEP from the permitted areas in the County of Los Angeles to the waters of the State.

A. General Requirements

1. Best Management Practice Substitution

The Regional Board Executive Officer may approve any site-specific BMP substitution upon petition by a Permittee(s), if the Permittee can document that:

a) The proposed alternative BMP or program will meet or exceed the objective of the original BMP or program in the reduction of storm water pollutants; or

b) The fiscal burden of the original BMP or program is substantially greater than the proposed alternative and does not achieve a substantially greater improvement in storm water quality; and,

c) The proposed alternative BMP or program will be implemented within a similar period of time.

B. Public Information and Participation Program (PIPP)

The Principal Permittee shall implement a Public Information and Participation Program (PIPP) that includes, but is not limited to, the requirements listed in this section. The Principal Permittee shall be responsible for developing and implementing the Public Education Program, as described in the SQMP, and shall coordinate with Permittees to implement specific requirements.

The objectives of the PIPP are as follows:

- To measurably increase the knowledge of the target audiences regarding the MS4, the impacts of storm water pollution on receiving waters, and potential solutions to mitigate the problems caused;
- To measurably change the waste disposal and runoff pollution generation behavior of target audiences by encouraging implementation of appropriate solutions; and
- To involve and engage socio-economic groups and ethnic communities in Los Angeles County to participate in mitigating the impacts of storm water pollution.

The Principal Permittee shall convene an advisory committee to provide input and assistance in meeting the goals and objectives of the public education campaign. The advisory committee shall be consulted during the process of developing the PIPP campaign, and shall provide comments and advice during the process of preparing a Request For Proposals for a storm water public education contractor. The committee may participate as a part of a working group that evaluates contractor proposals and other tasks as appropriate. The committee shall be comprised of representatives of the environmental community, Permittee cities, Regional Board staff, and experts in the fields of public education and marketing. The Principal Permittee shall ensure that the committee meets at least once a year.

1. Residential Program

a) "No Dumping" Message

Each Permittee shall mark all storm drain inlets that they own with a legible “no dumping” message. In addition, signs with prohibitive language discouraging illegal dumping must be posted at designated public access points to creeks, other relevant water bodies, and channels no later than February 2, 2004. Signage and storm drain messages shall be legible and maintained as necessary during the term of the permit.

b) Countywide Hotline

The 888-CLEAN-LA hotline will serve as the general public reporting contact for reporting clogged catch basin inlets and illicit discharges/dumping, faded or lack of catch basin stencils, and general storm water management information. Each Permittee may establish its own hotline if preferred. Permittees shall include this information, updated when necessary, in public information, and the government pages of the telephone book, as they are developed or published. The Principal Permittee shall compile a list of the general public reporting contacts from all Permittees and make this information available on the web site (888CleanLA.com) and upon request. Permittees shall provide the Principal Permittee with their reporting contacts no later than March 1, 2002. Permittees are responsible for providing current, updated information to the Principal Permittee.

c) Outreach and Education

(1) The Principal Permittee shall continue to implement the following activities that were components of the first five-year PIPP:

(i) Advertising;

(ii) Media relations;

(iii) Public service announcements;

(iv) "How To" instructional material distributed in a targeted and activity-related manner;

(v) Corporate, community association, environmental organization and entertainment industry tie-ins; and

(vi) Events targeted to specific activities and population subgroups.

(2) The Principal Permittee shall develop a strategy to educate ethnic communities and businesses through culturally effective methods. Details of this strategy should be incorporated into the Public Education Program, and implemented, no later than February 3, 2003.

(3) The Principal Permittee shall enhance the existing outreach efforts to residents and businesses related to the proper disposal of cigarette butts.

(4) Each Permittee shall conduct educational activities within its jurisdiction and participate in countywide events.

(5) The Principal Permittee shall organize Public Outreach Strategy meetings for Permittees on a quarterly basis, beginning no later than May 1, 2002. The Principal Permittee shall provide guidance for Permittees to augment the countywide outreach and education program. Permittees shall coordinate regional and local outreach and education to reduce duplication of efforts. Permittees are encouraged to include other interested parties in the outreach strategy to strengthen and coordinate educational efforts.

(6) The Principal Permittee shall ensure that a minimum of 35 million impressions per year are made on the general public about storm water quality via print, local TV access, local radio, or other appropriate media.

(7) The Principal Permittee, in cooperation with the Permittees, shall provide schools within each School District in the County with materials, including, but not limited to, videos, live presentations, and other information necessary to educate a minimum of 50 percent of all school children (K-12) every 2 years on storm water pollution.

(8) Permittees shall provide the contact information for their appropriate staff responsible for storm water public education activities to the Principal Permittee no later than April 1, 2002, and changes to contact information no later than 30 days after a change occurs.

(9) The Principal Permittee shall develop a strategy to measure the effectiveness of in-school educational programs. The protocol shall include assessment of students' knowledge of storm water pollution problems and solutions before and after educational efforts are conducted. The protocol shall be developed and submitted to the Regional Board Executive Officer for approval no later than May 1, 2002. It shall be implemented upon approval.

(10) In order to ensure that the PIPP is demonstrably effective in changing the behavior of the public, the Principal Permittee shall develop a behavioral change assessment strategy no later than May 1, 2002. The strategy shall be developed based on sociological data and studies (such

as the County Segmentation Study). The Principal Permittee shall submit the assessment strategy to the Regional Board Executive Office for approval. It shall be implemented on approval.

d) Pollutant-Specific Outreach

The Principal Permittee, in cooperation with Permittees, shall coordinate to develop outreach programs that focus on the watershed-specific pollutants listed in Table 1 no later than February 3, 2003. Metals may be appropriately addressed through the Industrial/Commercial Facilities Program (e.g. distribute education materials on appropriate BMPs for metal waste management to facilities that have been identified as a potential source, such as metal fabricating facilities). Region-wide pollutants may be included in the Principal Permittee's mass media outreach efforts.

Table 1.

Watershed	***Target Pollutants for Outreach***
Ballona Creek	Trash, Indicator Bacteria, Metals, PAHs
Malibu Creek	Trash, Nutrients (Nitrogen), Indicator Bacteria, Sediments
Los Angeles River	Trash, Nutrients (Nitrogen), Indicator Bacteria, Metals, Pesticides, PAHs
San Gabriel River	Trash, Nutrients (Nitrogen), Indicator Bacteria, Metals
Santa Clara River	Nutrients (Nitrogen), Coliform
Dominguez Channel	Trash, Indicator Bacteria, PAHs

Each Permittee shall make outreach materials available to the general public and target audiences, such as schools, community groups, contractors and developers, and at appropriate public counters and events. Outreach material shall include information on pollutants, sources of concern, and source abatement measures.

2. Businesses Program

a) Corporate Outreach

The Principal Permittee shall develop and implement a Corporate Outreach program to educate and inform corporate managers about storm water regulations. The program shall target RGOs and restaurant chains. At a minimum, this program shall include:

(1) Conferring with corporate management to explain storm water regulations;

(2) Distribution and discussion of educational material regarding storm water pollution and BMPs, and provide

managers with suggestions to facilitate employee compliance with storm water regulations.

Corporate Outreach for all RGOs and restaurant chain corporations shall be conducted not less than twice during the permit term, with the first outreach contact to begin no later than February 3, 2003.

b) Business Assistance Program

The Principal Permittee and Permittees may implement a Business Assistance Program to provide technical resource assistance to small businesses to advise them on BMPs implementation to reduce the discharge of pollutants in storm water runoff. Programs may include:

(1) On-site technical assistance or consultation via telephone to identify and implement storm water pollution prevention methods and best management practices; and

(2) Making available, distributing, and discussing of applicable BMP and educational materials.

C. Industrial/Commercial Facilities Control Program

Each Permittee shall require implementation of pollutant reduction and control measures at industrial and commercial facilities, with the objective of reducing pollutants in storm water runoff. Except as specified in other sections of this Order, pollutant reduction and control measures can be used alone or in combination, and can include Structural and Source Control BMPs, and operation and maintenance procedures, which can be applied before, during, and/or after pollution generating activities. At a minimum, the Industrial/Commercial Facilities Control Program shall include requirements to: (1) track, (2) inspect, and (3) ensure compliance at industrial and commercial facilities that are critical sources of pollutants in storm water.

1. Track Critical Sources

a) Each Permittee shall maintain a watershed-based inventory or database of all facilities within its jurisdiction that are critical sources of storm water pollution. Critical sources to be tracked are summarized below, and also specified in Attachment B:

(1) Commercial Facilities

- restaurants;
- automotive service facilities; and
- RGOs and automotive dealerships.

(2) USEPA Phase I Facilities (Tier 1 and 2)

(3) Other Federally-mandated Facilities [as specified in 40 CFR 122.26(d)(2)(iv)(C)]

- municipal landfills;
- hazardous waste treatment, disposal, and recovery facilities; and
- facilities subject to SARA Title III (also known as EPCRA).

b) Each Permittee shall include the following minimum fields of information for each industrial and commercial facility:

- name of facility and name of owner/operator;
- address;
- coverage under the GIASP or other individual or general NPDES permits; and
- a narrative description including SIC codes that best reflects the industrial activities at and principal products of each facility.

The Regional Board encourages Permittees to add other fields of information, such as material usage and/or industrial output, and discrepancies between SIC Code designations (as reported by facility operators) and the actual type of industrial activity has the potential to pollute storm water. In addition, the Regional Board recommends use of an automated database system, such as a Geographical Information System (GIS) or Internet-based system; however, this is not required.

c) Each Permittee shall update its inventory of critical sources at least annually. The update may be accomplished through collection of new information obtained through field activities or through other readily available intra-agency informational databases (e.g. business licenses, pretreatment permits, sanitary sewer hook-up permits).

2. Inspect Critical Sources

Each Permittee shall inspect all facilities in the categories and at a level and frequency as specified in the following subsections.

a) Commercial Facilities

(1) Restaurants

Frequency of Inspections: Twice during the 5-year term of the Order, provided that the first inspection occurs no later than August 1, 2004, and that there is a minimum interval of one year in between the first compliance inspection and the second compliance inspection.

Level of inspections: Each Permittee, in cooperation with its appropriate department (such as health or public works), shall inspect all restaurants within its jurisdiction to confirm that storm water BMPs are being effectively

implemented in compliance with State law, County and municipal ordinances, Regional Board Resolution 98-08, and the SQMP. At each restaurant, inspectors shall verify that the restaurant operator:

- has received educational materials on storm water pollution prevention practices;
- does not pour oil and grease or oil and grease residue onto a parking lot, street or adjacent catch basin;
- keeps the trash bin area clean and trash bin lids closed, and does not fill trash bins with washout water or any other liquid;
- does not allow illicit discharges, such as discharge of washwater from floormats, floors, porches, parking lots, alleys, sidewalks and street areas (in the immediate vicinity of the establishment), filters or garbage/trash containers;
- removes food waste, rubbish or other materials from parking lot areas in a sanitary manner that does not create a nuisance or discharge to the storm drain.

(2) Automotive Service Facilities

Frequency of Inspections: Twice during the 5-year term of the Order, provided that the first inspection occurs no later than August 1, 2004, and that there is a minimum interval of one year in between the first compliance inspection and the second compliance inspection.

Level of inspections: Each Permittee shall inspect all automotive service facilities within its jurisdiction to confirm that storm water BMPs are effectively implemented in compliance with County and municipal ordinances, Regional Board Resolution 98-08, and the SQMP. At each automotive service facility, inspectors shall verify that each operator:

- maintains the facility area so that it is clean and dry and without evidence of excessive staining;
- implements housekeeping BMPs to prevent spills and leaks;
- properly discharges wastewaters to a sanitary sewer and/or contains wastewaters for transfer to a legal point of disposal;
- is aware of the prohibition on discharge of non-storm water to the storm drain;
- properly manages raw and waste materials including proper disposal of hazardous waste;

- protects outdoor work and storage areas to prevent contact of pollutants with rainfall and runoff;
- labels, inspects, and routinely cleans storm drain inlets that are located on the facility's property; and
- trains employees to implement storm water pollution prevention practices.

(3) Retail Gasoline Outlets and Automotive Dealerships

Frequency of Inspection: Twice during the 5-year term of the Order, provided that the first inspection occurs no later than August 1, 2004, and that there is a minimum interval of one year in between the first compliance inspection and the second compliance inspection.

Level of Inspection: Each Permittee shall confirm that BMPs are being effectively implemented at each RGO and automotive dealership within its jurisdiction, in compliance with the SQMP, Regional Board Resolution 98-08, and the Stormwater Quality Task Force Best Management Practice Guide for RGOs. At each RGO and automotive dealership, inspectors shall verify that each operator:

- routinely sweeps fuel-dispensing areas for removal of litter and debris, and keeps rags and absorbents ready for use in case of leaks and spills;
- is aware that washdown of facility area to the storm drain is prohibited;
- is aware of design flaws (such as grading that doesn't prevent run-on, or inadequate roof covers and berms), and that equivalent BMPs are implemented;
- inspects and cleans storm drain inlets and catch basins within each facility's boundaries no later than October 1st of each year;
- posts signs close to fuel dispensers, which warn vehicle owners/operators against "topping off" of vehicle fuel tanks and installation of automatic shutoff fuel dispensing nozzles;
- routinely checks outdoor waste receptacle and air/water supply areas, cleans leaks and drips, and ensures that only watertight waste receptacles are used and that lids are closed; and
- trains employees to properly manage hazardous materials and wastes as well as to implement other storm water pollution prevention practices.

b) Phase I Facilities

Permittees need not inspect facilities that have been inspected by the Regional Board within the past 24 months. For the remaining Phase I facilities that the Regional Board has not inspected, each Permittee shall conduct compliance inspections as specified below.

Frequency of Inspection

Facilities in Tier 1 Categories: Twice during the 5-year term of the Order, provided that the first inspection occurs no later than August 1, 2004, and that there is a minimum interval of one year in between the first compliance inspection and the second compliance inspection.

Facilities in Tier 2 Categories: Twice during the 5-year term of the permit, provided that the first inspection occurs no later than August 1, 2004. Permittees need not perform additional inspections at those facilities determined to have no risk of exposure of industrial activity to storm water. For those facilities that do have exposure of industrial activities to storm water, a Permittee may reduce the frequency of additional compliance inspections to once every 5 years, provided that the Permittee inspects at least 20% of the facilities in Tier 2 each year.

Level of Inspection: Each Permittee shall confirm that each operator:

- has a current Waste Discharge Identification (WDID) number for facilities discharging storm water associated with industrial activity, and that a Storm Water Pollution Prevention Plan is available on-site, and
- is effectively implementing BMPs in compliance with County and municipal ordinances, Regional Board Resolution 98-08, and the SQMP.

c) Other Federally-mandated Facilities

Frequency of Inspection: Twice during the 5-year term of the Order, provided that the first inspection occurs no later than August 1, 2004, and that there is a minimum interval of one year in between the first compliance inspection and the second compliance inspection.

Level of Inspection: Each Permittee shall confirm that each operator:

- has a current Waste Discharge Identification (WDID) number for facilities discharging storm water associated with industrial activity, and that a Storm Water Pollution Prevention Plan is available on-site, and
- is effectively implementing BMPs in compliance with County and municipal ordinances, Regional Board Resolution 98-08, and the SQMP.

3. Ensure Compliance of Critical Sources

a) **BMP Implementation:** In the event that a Permittee determines that a BMP specified by the SQMP or Regional Board Resolution 98-08 is infeasible at any site, that Permittee shall require implementation of other BMPs that will achieve the equivalent reduction of pollutants in the storm water discharges. Likewise, for those BMPs that are not adequate to achieve water quality objectives, Permittees may require additional site-specific controls, such as Treatment Control BMPs.

b) **Environmentally Sensitive Areas and Impaired Waters:** For critical sources that are in ESAs or that are tributary to CWA § 303(d) impaired water bodies, Permittees shall consider requiring operators to implement additional controls to reduce pollutants in storm water runoff that are causing or contributing to the exceedences of Water Quality Objectives.

c) **Progressive Enforcement:** Each Permittee shall implement a progressive enforcement policy to ensure that facilities are brought into compliance with all storm water requirements within a reasonable time period as specified below.

(1) In the event that a Permittee determines, based on an inspection conducted above, that an operator has failed to adequately implement all necessary BMPs, that Permittee shall take progressive enforcement action which, at a minimum, shall include a follow-up inspection within 4 weeks from the date of the initial inspection.

(2) In the event that a Permittee determines that an operator has failed to adequately implement BMPs after a follow-up inspection, that Permittee shall take further enforcement action as established through authority in its municipal code and ordinances or through the judicial system.

(3) Each Permittee shall maintain records, including inspection reports, warning letters, notices of violations, and other enforcement records, demonstrating a good faith effort to bring facilities into compliance.

d) Interagency Coordination

(1) **Referral of Violations of the SQMP, Regional Board Resolution 98-08, and Municipal Storm Water Ordinances:** A Permittee may refer a violation(s) to the Regional Board provided that that Permittee has made a good faith effort of progressive enforcement. At a minimum, a Permittee's good faith effort must include documentation of:

- Two follow-up inspections, and
- Two warning letters or notices of violation.

(2) **Referral of Violations of the GIASP, including Requirements to File a Notice of Intent:** For those facilities in violation of the GIASP, Permittees may escalate referral of such violations to the Regional Board after one inspection and one written notice to the operator regarding the violation. In making such referrals, Permittees shall include, at a minimum, the following documentation:

- Name of the facility;
- Operator of the facility;
- Owner of the facility;
- Industrial activity being conducted at the facility that is subject to the GIASP; and
- Records of communication with the facility operator regarding the violation, which shall include at least an inspection report and one written notice of the violation.

Permittees shall, at a minimum, make such referrals on a quarterly basis.

(3) **Investigation of Complaints Regarding Facilities – Transmitted by the Regional Board Staff:** Each Permittee shall initiate, within one business day, investigation of complaints (other than non-storm water discharges) regarding facilities within its jurisdiction. The initial investigation shall include, at a minimum, a limited inspection of the facility to confirm the complaint to determine if the facility is effectively complying with the SQMP and municipal storm water/urban runoff ordinances, and to oversee corrective action.

(4) **Support of Regional Board Enforcement Actions:** As directed by the Regional Board Executive Officer, Permittees shall support Regional Board enforcement actions by: assisting in identification of current owners, operators, and lessees of facilities; providing staff, when available, for joint inspections with Regional Board

inspectors; appearing as witnesses in Regional Board enforcement hearings; and providing copies of inspection reports and other progressive enforcement documentation.

(5) **Participation in a Task Force:** The Permittees, Regional Board, and other stakeholders may form a Storm Water Task Force, the purpose of which is to communicate concerns regarding special cases of storm water violations by industrial and commercial facilities and to develop a coordinated approach to enforcement action.

D. Development Planning Program

The Permittees shall implement a development-planning program that will require all Planning Priority development and Redevelopment projects to:

- Minimize impacts from storm water and urban runoff on the biological integrity of Natural Drainage Systems and water bodies in accordance with requirements under CEQA (Cal. Pub. Resources Code § 21100), CWC § 13369, CWA § 319, CWA § 402(p), CWA § 404, CZARA § 6217(g), ESA § 7, and local government ordinances ;
- Maximize the percentage of pervious surfaces to allow percolation of storm water into the ground;
- Minimize the quantity of storm water directed to impervious surfaces and the MS4;
- Minimize pollution emanating from parking lots through the use of appropriate Treatment Control BMPs and good housekeeping practices;
- Properly design and maintain Treatment Control BMPs in a manner that does not promote the breeding of vectors; and
- Provide for appropriate permanent measures to reduce storm water pollutant loads in storm water from the development site.

1. Peak Flow Control

The Permittees shall control post-development peak storm water runoff discharge rates, velocities, and duration (peak flow control) in Natural Drainage Systems (i.e., mimic pre-development hydrology) to prevent accelerated stream erosion and to protect stream habitat. Natural Drainage Systems are located in the following areas:

a) Malibu Creek;

b) Topanga Canyon Creek;

c) Upper Los Angeles River;

d) Upper San Gabriel River;

e) Santa Clara River; and

f) Los Angeles County Coastal streams (see Basin Plan Table 2-1).

The Principal Permittee in consultation with Permittees shall develop numerical criteria for peak flow control, based on the results of the Peak Discharge Impact Study (see Monitoring Program Section II.I).

Each Permittee shall, no later than February 1, 2005, implement numerical criteria for peak flow control.

A Permittee or group of Permittees may substitute for the countywide peak flow control criteria with a Hydromodification Control Plan (HCP), on approval by the Regional Board, in the following circumstances:

(1) Stream or watershed-specific conditions indicate the need for a different peak flow control criteria, and the alternative numerical criteria is developed through the application of hydrologic modeling and supporting field observations; or

(2) A watershed-wide plan has been developed for implementation of control measures to reduce erosion and stabilize drainage systems on a watershed basis.

2. Standard Urban Storm Water Mitigation Plans (SUSMPs)

a) Each Permittee shall amend codes and ordinances not later than August 1, 2002 to give legal effect to SUSMP changes contained in this Order. Changes to SUSMP requirements shall take effect not later than September 2, 2002.

b) Each Permittee shall require that a single-family hillside home:

(1) Conserve natural areas;

(2) Protect slopes and channels;

(3) Provide storm drain system stenciling and signage;

(4) Divert roof runoff to vegetated areas before discharge unless the diversion would result in slope instability; and

(5) Direct surface flow to vegetated areas before discharge unless the diversion would result in slope instability.

c) Each Permittee shall require that a SUSMP as approved by the Regional Board in Board Resolution No. R 00-02 be implemented for the following categories of developments:

(1) Ten or more unit homes (includes single family homes, multifamily homes, condominiums, and apartments);

(2) A 100,000 or more square feet of impervious surface area industrial/ commercial development;

(3) Automotive service facilities (SIC 5013, 5014, 5541, 7532-7534, and 7536-7539);

(4) Retail gasoline outlets;

(5) Restaurants (SIC 5812);

(6) Parking lots 5,000 square feet or more of surface area or with 25 or more parking spaces; and

(7) Redevelopment projects in subject categories that meet Redevelopment thresholds.

d) Each Permittee shall submit an ESA Delineation Map for its jurisdictional boundary, based on the Regional Board's ESA Definition, no later than June 3, 2002, for approval by the Regional Board Executive Officer in consultation with the California Department of Fish and Game, and the California Coastal Commission.

e) Each Permittee shall require the implementation of SUSMP provisions no later than September 2, 2002, for all projects located in or directly adjacent to or discharging directly to an ESA, where the development will:

(1) Discharge storm water and urban runoff that is likely to impact a sensitive biological species or habitat; and

(2) Create 2,500 square feet or more of impervious surface area.

3. Numerical Design Criteria

The Permittees shall require that post-construction Treatment Control BMPs incorporate, at a minimum, either a volumetric or flow based treatment control design standard, or both, as identified below to mitigate (infiltrate, filter or treat) storm water runoff:

a) Volumetric Treatment Control BMP

(1) The 85th percentile 24-hour runoff event determined as the maximized capture storm water volume for the area, from the formula recommended in *Urban Runoff Quality Management, WEF Manual of Practice No. 23/ ASCE Manual of Practice No. 87, (1998*); or

(2) The volume of annual runoff based on unit basin storage water quality volume, to achieve 80 percent or more volume treatment by the method recommended in *California Stormwater Best Management Practices Handbook – Industrial/ Commercial,* (1993); or

(3) The volume of runoff produced from a 0.75 inch storm event, prior to its discharge to a storm water conveyance system; or

(4) The volume of runoff produced from a historical-record based reference 24-hour rainfall criterion for "treatment" (0.75 inch average for the Los Angeles County area) that achieves approximately the same reduction in pollutant loads achieved by the 85th percentile 24-hour runoff event.

b) Flow Based Treatment Control BMP

(1) The flow of runoff produced from a rain event equal to at least 0.2 inches per hour intensity; or

(2) The flow of runoff produced from a rain event equal to at least two times the 85th percentile hourly rainfall intensity for Los Angeles County; or

(3) The flow of runoff produced from a rain event that will result in treatment of the same portion of runoff as treated using volumetric standards above.

4. Applicability of Numerical Design Criteria

The Permittees shall require the following categories of Planning Priority Projects to design and implement post-construction treatment controls to mitigate storm water pollution:

a) Single-family hillside residential developments of one acre or more of surface area;

b) Housing developments (includes single family homes, multifamily homes, condominiums, and apartments) of ten units or more;

c) A 100,000 square feet or more impervious surface area industrial/ commercial development;

d) Automotive service facilities (SIC 5013, 5014, 5541, 7532-7534 and 7536-7539) [5,000 square feet or more of surface area];

e) Retail gasoline outlets [5,000 square feet or more of impervious surface area and with projected Average Daily Traffic (ADT) of 100 or more vehicles]. Subsurface Treatment Control BMPs which may endanger public safety (i.e., create an explosive environment) are considered not appropriate;

f) Restaurants (SIC 5812) [5,000 square feet or more of surface area];

g) Parking lots 5,000 square feet or more of surface area or with 25 or more parking spaces;

h) Projects located in, adjacent to or discharging directly to an ESA that meet threshold conditions identified above in 2.e; and

i) Redevelopment projects in subject categories that meet Redevelopment thresholds.

5. Not later than March 10, 2003, each Permittee shall require the implementation of SUSMP and post-construction control requirements for the industrial/commercial development category to projects that disturb one acre or more of surface area.

6. Site Specific Mitigation

Each Permittee shall, no later than September 2, 2002, require the implementation of a site-specific plan to mitigate post-development storm water for new development and redevelopment not requiring a SUSMP but which may potentially have adverse impacts on post-development storm water quality, where one or more of the following project characteristics exist:

a) Vehicle or equipment fueling areas;

b) Vehicle or equipment maintenance areas, including washing and repair;

c) Commercial or industrial waste handling or storage;

d) Outdoor handling or storage of hazardous materials;

e) Outdoor manufacturing areas;

f) Outdoor food handling or processing;

g) Outdoor animal care, confinement, or slaughter; or

h) Outdoor horticulture activities.

7. Redevelopment Projects

The Permittees shall apply the SUSMP, or site specific requirements including post-construction storm water mitigation to all Planning Priority Projects that undergo significant Redevelopment in their respective categories.

a) Significant Redevelopment means land-disturbing activity that results in the creation or addition or replacement of 5,000 square feet or more of impervious surface area on an already developed site.

Where Redevelopment results in an alteration to more than fifty percent of impervious surfaces of a previously existing development, and the existing development was not subject to post development storm water quality control requirements, the entire project must be mitigated. Where Redevelopment results in an alteration to less than fifty percent of impervious surfaces of

a previously existing development, and the existing development was not subject to post development storm water quality control requirements, only the alteration must be mitigated, and not the entire development.

b) Redevelopment does not include routine maintenance activities that are conducted to maintain original line and grade, hydraulic capacity, original purpose of facility or emergency redevelopment activity required to protect public health and safety.

c) Existing single family structures are exempt from the Redevelopment requirements.

8. Maintenance Agreement and Transfer

Each Permittee shall require that all developments subject to SUSMP and site specific plan requirements provide verification of maintenance provisions for Structural and Treatment Control BMPs, including but not limited to legal agreements, covenants, CEQA mitigation requirements, and or conditional use permits. Verification at a minimum shall include:

a) The developer's signed statement accepting responsibility for maintenance until the responsibility is legally transferred; and either

b) A signed statement from the public entity assuming responsibility for Structural or Treatment Control BMP maintenance and that it meets all local agency design standards; or

c) Written conditions in the sales or lease agreement, which requires the recipient to assume responsibility for maintenance and conduct a maintenance inspection at least once a year; or

d) Written text in project conditions, covenants and restrictions (CCRs) for residential properties assigning maintenance responsibilities to the Home Owners Association for maintenance of the Structural and Treatment Control BMPs; or

e) Any other legally enforceable agreement that assigns responsibility for the maintenance of post-construction Structural or Treatment Control BMPs.

9. Regional Storm Water Mitigation Program

A Permittee or Permittee group may apply to the Regional Board for approval of a regional or sub-regional storm water mitigation program to substitute in part or wholly SUSMP requirements. Upon review and a determination by the Regional Board Executive Officer that the proposal is technically valid and appropriate, the Regional Board may consider for approval such a program if its implementation will:

a) Result in equivalent or improved storm water quality;

b) Protect stream habitat;

c) Promote cooperative problem solving by diverse interests;

d) Be fiscally sustainable and has secure funding; and

e) Be completed in five years including the construction and start-up of treatment facilities.

Nothing in this provision shall be construed as to delay the implementation of SUSMP requirements, as approved in this Order.

10. Mitigation Funding

The Permittees may propose a management framework, for endorsement by the Regional Board Executive Officer, to support regional or sub-regional solutions to storm water pollution, where any of the following situations occur:

a) A waiver for impracticability is granted;

b) Legislative funds become available;

c) Off-site mitigation is required because of loss of environmental habitat; or

d) An approved watershed management plan or a regional storm water mitigation plan exists that incorporates an equivalent or improved strategy for storm water mitigation.

11. California Environmental Quality Act (CEQA) Document Update

Each Permittee shall incorporate into its CEQA process, with immediate effect, procedures for considering potential storm water quality impacts and providing for appropriate mitigation when preparing and reviewing CEQA documents. The procedures shall require consideration of the following:

a) Potential impact of project construction on storm water runoff;

b) Potential impact of project post-construction activity on storm water runoff;

c) Potential for discharge of storm water from areas from material storage, vehicle or equipment fueling, vehicle or equipment maintenance (including washing), waste handling, hazardous materials handling or storage, delivery areas or loading docks, or other outdoor work areas;

d) Potential for discharge of storm water to impair the beneficial uses of the receiving waters or areas that provide water quality benefit;

e) Potential for the discharge of storm water to cause significant harm on the biological integrity of the waterways and water bodies;

f) Potential for significant changes in the flow velocity or volume of storm water runoff that can cause environmental harm; and

g) Potential for significant increases in erosion of the project site or surrounding areas.

12. General Plan Update

a) Each Permittee shall amend, revise or update its General Plan to include watershed and storm water quality and quantity management considerations and policies when any of the following General Plan elements are updated or amended: (i) Land Use, (ii) Housing, (iii) Conservation, and (iv) Open Space.

b) Each Permittee shall provide the Regional Board with the draft amendment or revision when a listed General Plan element or the General Plan is noticed for comment in accordance with Cal. Govt. Code § 65350 *et seq*.

13. Targeted Employee Training

Each Permittee shall train its employees in targeted positions (whose jobs or activities are engaged in development planning) regarding the development planning requirements on an annual basis beginning no later than August 1, 2002, and more frequently if necessary. For Permittees with a population of 250,000 or more (2000 U.S. Census), training shall be completed no later than February 3, 2003.

14. Developer Technical Guidance and Information

a) Each Permittee shall develop and make available to the developer community SUSMP (development planning) guidelines immediately.

b) The Principal Permittee in partnership with Permittees shall issue no later than February 2, 2004, a technical manual for the siting and design of BMPs for the development community in Los Angeles County. The technical manual may be adapted from the revised California Storm Water Quality Task Force Best Management Practices Handbooks scheduled for publication in September 2002. The technical manual shall at a minimum include:

(1) Treatment Control BMPs based on flow-based and volumetric water quality design criteria for the purposes of countywide consistency;

(2) Peak Flow Control criteria to control peak discharge rates, velocities and duration;

(3) Expected pollutant removal performance ranges obtained from national databases, technical reports and the scientific literature;

(4) Maintenance considerations; and

(5) Cost considerations.

E. Development Construction Program

1. Each Permittee shall implement a program to control runoff from construction activity at all construction sites within its jurisdiction. The program shall ensure the following minimum requirements are effectively implemented at all construction sites:

   a) Sediments generated on the project site shall be retained using adequate Treatment Control or Structural BMPs;

   b) Construction-related materials, wastes, spills, or residues shall be retained at the project site to avoid discharge to streets, drainage facilities, receiving waters, or adjacent properties by wind or runoff;

   c) Non-storm water runoff from equipment and vehicle washing and any other activity shall be contained at the project site; and

   d) Erosion from slopes and channels shall be controlled by implementing an effective combination of BMPs (as approved in Regional Board Resolution No. 99-03), such as the limiting of grading scheduled during the wet season; inspecting graded areas during rain events; planting and maintenance of vegetation on slopes; and covering erosion susceptible slopes.

2. For construction sites one acre and greater, each Permittee shall comply with all conditions in section E.1. above and shall:

   a) Require the preparation and submittal of a Local Storm Water Pollution Prevention Plan (Local SWPPP), for approval prior to issuance of a grading permit for construction projects.

      The Local SWPPP shall include appropriate construction site BMPs and maintenance schedules. (A Local SWPPP may substitute for the State SWPPP if the Local SWPPP is at least as inclusive in controls and BMPs as the State SWPPP). The Local SWPPP must include the rationale used for selecting or rejecting BMPs. The project architect, or engineer of record, or authorized qualified designee, must sign a statement on the Local SWPPP to the effect:

      "As the architect/engineer of record, I have selected appropriate BMPs to effectively minimize the negative impacts of this project's construction activities on storm water quality. The project owner and contractor are aware that the selected BMPs must be installed, monitored, and maintained to ensure their effectiveness. The BMPs not selected for implementation are redundant or deemed not applicable to the proposed construction activity."

The landowner or the landowner's agent shall sign a statement to the effect:

"I certify that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, to the best of my knowledge and belief, the information submitted is true, accurate, and complete. I am aware that submitting false and/or inaccurate information, failing to update the Local SWPPP to reflect current conditions, or failing to properly and/or adequately implement the Local SWPPP may result in revocation of grading and/or other permits or other sanctions provided by law."

The Local SWPPP certification shall be signed by the landowner as follows, for a corporation: by a responsible corporate officer which means (a) a president, secretary, treasurer, or vice president of the corporation in charge of a principal business function, or any other person who performs similar policy or decision-making functions for the corporation, or (b) the manager of the construction activity if authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures; for a partnership or sole proprietorship: by a general partner or the proprietor; or for a municipality or other public agency: by an elected official, a ranking management official (e.g., County Administrative Officer, City Manager, Director of Public Works, City Engineer, District Manager), or the manager of the construction activity if authority to sign Local SWPPPs has been assigned or delegated to the manager in accordance with established agency policy.

b) Inspect all construction sites for storm water quality requirements during routine inspections a minimum of once during the wet season. The Local SWPPP shall be reviewed for compliance with local codes, ordinances, and permits. For inspected sites that have not adequately implemented their Local SWPPP, a follow-up inspection to ensure compliance will take place within 2 weeks. If compliance has not been attained, the Permittee will take additional actions to achieve compliance (as specified in municipal codes). If compliance has not been achieved, and the site is also covered under a statewide general construction storm water permit, each Permittee shall enforce their local ordinance requirements, and if non-compliance continues the Regional Board shall be notified for further joint enforcement actions.

c) Require, no later than March 10, 2003, prior to issuing a grading permit for all projects less than five acres requiring coverage under a statewide general construction storm water permit, proof of a Waste Discharger Identification (WDID) Number for filing a Notice of Intent (NOI) for permit coverage and a certification that a

SWPPP has been prepared by the project developer. A Local SWPPP may substitute for the State SWPPP if the Local SWPPP is at least as inclusive in controls and BMPs as the State SWPPP.

3. For sites five acres and greater, each Permittee shall comply with all conditions in Sections E.1. and E.2. and shall:

   a) Require, prior to issuing a grading permit for all projects requiring coverage under the state general permit, proof of a Waste Discharger Identification (WDID) Number for filing a Notice of Intent (NOI) for coverage under the GCASP and a certification that a SWPPP has been prepared by the project developer. A Local SWPPP may substitute for the State SWPPP if the Local SWPPP is at least as inclusive in controls and BMPs as the State SWPPP.

   b) Require proof of an NOI and a copy of the SWPPP at any time a transfer of ownership takes place for the entire development or portions of the common plan of development where construction activities are still on-going.

   c) Use an effective system to track grading permits issued by each Permittee. To satisfy this requirement, the use of a database or GIS system is encouraged, but not required.

4. GCASP Violation Referrals

   a) Referral of Violations of the SQMP, Regional Board Resolution 98-08, and municipal storm water ordinances:

      A Permittee may refer a violation(s) to the Regional Board provided that the Permittee has made a good faith effort of progressive enforcement. At a minimum, a Permittee's good faith effort must include documentation of:
      - Two follow-up inspections within 3 months, and
      - Two warning letters or notices of violation.

   b) Referral of Violations of GCASP Filing Requirements:

      For those projects subject to the GCASP, Permittees shall refer non-filers (i.e., those projects which cannot demonstrate that they have a WDID number) to the Regional Board, within 15 days of making a determination. In making such referrals, Permittees shall include, at a minimum, the following documentation:
      - Project location;
      - Developer;
      - Estimated project size; and
      - Records of communication with the developer regarding filing requirements.

5. Each Permittee shall train employees in targeted positions (whose jobs or activities are engaged in construction activities including construction inspection staff) regarding the requirements of the storm water management program no later than August 1, 2002, and annually

thereafter. For Permittees with a population of 250,000 or more (2000 U.S. Census), initial training shall be completed no later than February 3, 2003. Each Permittee shall maintain a list of trained employees.

F. Public Agency Activities Program

Each Permittee shall implement a Public Agency program to minimize storm water pollution impacts from public agency activities. Public Agency requirements consist of:

- Sewage Systems Maintenance, Overflow, and Spill Prevention
- Public Construction Activities Management
- Vehicle Maintenance/Material Storage Facilities/Corporation Yards Management
- Landscape and Recreational Facilities Management
- Storm Drain Operation and Management
- Streets and Roads Maintenance
- Parking Facilities Management
- Public Industrial Activities Management
- Emergency Procedures
- Treatment Feasibility Study

1. Sewage System Maintenance, Overflow, and Spill Prevention

a) Each Permittee shall implement a response plan for overflows of the sanitary sewer system within their respective jurisdiction, which shall consist at a minimum of the following:

(1) Investigation of any complaints received;

(2) Upon notification, immediate response to overflows for containment; and

(3) Notification to appropriate sewer and public health agencies when a sewer overflows to the MS4.

b) In addition to 1.a.1, 1.a.2, and 1.a.3 above, for those Permittees, which own and/or operate a sanitary sewer system, the Permittee shall also implement the following requirements:

(1) Procedures to prevent sewage spills or leaks from sewage facilities from entering the MS4; and

(2) Identify, repair, and remediate sanitary sewer blockages, exfiltration, overflow, and wet weather overflows from sanitary sewers to the MS4.

2. Public Construction Activities Management

a) Each Permittee shall implement the Development Planning Program requirements (Permit Part 4.D) at public construction projects.

b) Each Permittee shall implement the Development Construction Program requirements (Permit Part 4.E) at Permittee owned construction sites.

c) Each Permittee shall obtain coverage under the GCASP for public construction sites 5 acres or greater (or part of a larger area of development) except that a municipality under 100,000 in population (1990 U.S. Census) need not obtain coverage under a separate permit until March 10, 2003.

d) Each Permittee, no later than March 10, 2003, shall obtain coverage under a statewide general construction storm water permit for public construction sites for projects between one and five acres.

3. Vehicle Maintenance/Material Storage Facilities/Corporation Yards Management

a) Each Permittee, consistent with the SQMP, shall implement SWPPPs for public vehicle maintenance facilities, material storage facilities, and corporation yards which have the potential to discharge pollutants into storm water.

b) Each Permittee shall implement BMPs to minimize pollutant discharges in storm water including but not be limited to:

(1) Good housekeeping practices;

(2) Material storage control;

(3) Vehicle leaks and spill control; and

(4) Illicit discharge control.

c) Each Permittee shall implement the following measures to prevent the discharge of pollutants to the MS4:

(1) For existing facilities, that are not already plumbed to the sanitary sewer, all vehicle and equipment wash areas (except for fire stations) shall either be:

(i) Self-contained;

(ii) Equipped with a clarifier;

(iii) Equipped with an alternative pre-treatment device; or

(iv) Plumbed to the sanitary sewer.

(2) For new facilities, or during redevelopment of existing facilities (including fire stations), all vehicle and equipment wash areas shall be plumbed to the sanitary sewer and be equipped with a pre-treatment device in accordance with requirements of the sewer agency.

4. Landscape and Recreational Facilities Management

Each Permittee shall implement the following requirements:

a) A standardized protocol for the routine and non-routine application of pesticides, herbicides (including pre-emergents), and fertilizers;

b) Consistency with State Board's guidelines and monitoring requirements for application of aquatic pesticides to surface waters (WQ Order No. 2001-12 DWQ);

c) Ensure no application of pesticides or fertilizers immediately before, during, or immediately after a rain event or when water is flowing off the area to be applied;

d) Ensure that no banned or unregistered pesticides are stored or applied;

e) Ensure that staff applying pesticides are certified by the California Department of Food and Agriculture, or are under the direct supervision of a certified pesticide applicator;

f) Implement procedures to encourage retention and planting of native vegetation and to reduce water, fertilizer, and pesticide needs;

g) Store fertilizers and pesticides indoors or under cover on paved surfaces or use secondary containment;

h) Reduce the use, storage, and handling of hazardous materials to reduce the potential for spills; and

i) Regularly inspect storage areas.

5. Storm Drain Operation and Management

a) Each Permittee shall designate catch basin inlets within its jurisdiction as one of the following:

Priority A: Catch basins that are designated as consistently generating the highest volumes of trash and/or debris.

Priority B: Catch basins that are designated as consistently generating moderate volumes of trash and/or debris.

Priority C: Catch basins that are designated as generating low volumes of trash and/or debris.

b) Permittees subject to a trash TMDL (Ballona Creek WMA) shall continue to implement the requirements listed below until trash TMDL implementation measures are adopted. Thereafter, the subject Permittees shall implement programs in conformance with the TMDL implementation schedule, which shall include an effective combination of measures such as street sweeping, catch basin cleaning, installation of treatment devices and trash receptacles, or other BMPs. Default requirements include:

(1) Inspection and cleaning of catch basins between May 1 and September 30 of each year;

(2) Additional cleaning of any catch basin that is at least 40% full of trash and/or debris;

(3) Record keeping of catch basins cleaned; and

(4) Recording of the overall quantity of catch basin waste collected.

If the implementation phase for the Los Angeles River and Ballona Creek Trash TMDLs has not begun by October 2003, subject Permittees shall implement the requirements described below in subsection 5(c), until such time programs in conformance with the subject Trash TMDLs are being implemented.

Permittees subject to the Los Angeles River Watershed Trash TMDL shall implement the requirements set forth in Part 7. Total Maximum Daily Load Provisions, subsection 1 “TMDL for Trash in the Los Angeles River Watershed”.

c) Permittees not subject to a trash TMDL shall:

(1) Clean catch basins according to the following schedule:

Priority A: A minimum of three times during the wet season and once during the dry season every year.

Priority B: A minimum of once during the wet season and once during the dry season every year.

Priority C: A minimum of once per year.

In addition to the schedule above, between February 1, 2002 and July 1, 2003, Permittees shall ensure that any catch basin that is at least 40% full of trash and/or debris shall be cleaned out. After July 1, 2003, Permittees shall

ensure that any catch basin that is at least 25% full of trash and debris shall be cleaned out.

(2) For any special event that can be reasonably expected to generate substantial quantities of trash and litter, include provisions that require for the proper management of trash and litter generated, as a condition of the special use permit issued for that event. At a minimum, the municipality who issues the permit for the special event shall arrange for either temporary screens to be placed on catch basins or for catch basins in that area to be cleaned out subsequent to the event and prior to any rain event.

(3) Place trash receptacles at all transit stops within its jurisdiction that have shelters no later than August 1, 2002, and at all other transit stops within its jurisdiction no later than February 3, 2003. All trash receptacles shall be maintained as necessary.

d) Each Permittee shall inspect the legibility of the catch basin stencil or label nearest the inlet. Catch basins with illegible stencils shall be recorded and re-stenciled or re-labeled within 180 days of inspection.

e) Each Permittee shall implement BMPs for Storm Drain Maintenance that include:

(1) A program to visually monitor Permittee-owned open channels and other drainage structures for debris at least annually and identify and prioritize problem areas of illicit discharge for regular inspection;

(2) A review of current maintenance activities to assure that appropriate storm water BMPs are being utilized to protect water quality;

(3) Removal of trash and debris from open channel storm drains shall occur a minimum of once per year before the storm season;

(4) Minimize the discharge of contaminants during MS4 maintenance and clean outs; and

(5) Proper disposal of material removed.

6. Streets and Roads Maintenance

a) Each Permittee shall designate streets and/or street segments within its jurisdiction as one of the following:

Priority A: Streets and/or street segments that are designated as consistently generating the highest volumes of trash and/or debris.

Priority B: Streets and/or street segments that are designated as consistently generating moderate volumes of trash and/or debris.

Priority C: Streets and/or street segments that are designated as generating low volumes of trash and/or debris.

b) Each Permittee shall perform street sweeping of curbed streets according to the following schedule:

Priority A: These streets and/or street segments shall be swept at least two times per month.

Priority B: Each Permittee shall ensure that each street and/or street segments is swept at least once per month.

Priority C: These streets and/or street segments shall be swept as necessary but in no case less than once per year.

c) Each Permittee shall require that:

(1) Sawcutting wastes be recovered and disposed of properly and that in no case shall waste be left on a roadway or allowed to enter the storm drain;

(2) Concrete and other street and road maintenance materials and wastes shall be managed to prevent discharge to the MS4; and

(3) The washout of concrete trucks and chutes shall only occur in designated areas and never discharged to storm drains, open ditches, streets, or catch basins.

d) Each Permittee shall, no later than August 1, 2002, train their employees in targeted positions (whose interactions, jobs, and activities affect storm water quality) regarding the requirements of the storm water management program to:

(1) Promote a clear understanding of the potential for maintenance activities to pollute storm water; and

(2) Identify and select appropriate BMPs.

For Permittees with a population of 250,000 or more (2000 U.S. Census) training shall be completed no later than February 1, 2003.

7. Parking Facilities Management

Permittee-owned parking lots exposed to storm water shall be kept clear of debris and excessive oil buildup and cleaned no less than 2 times per month and/or inspected no less than 2 times per month to determine if

cleaning is necessary. In no case shall a Permittee-owned parking lot be cleaned less than once a month.

8. Public Industrial Activities Management

Each Permittee shall, for any municipal activity considered a discharge of storm water associated with industrial activity, obtain separate coverage under the GIASP except that a municipality under 100,000 in population (1990 U.S. Census) need not file the Notice Of Intent to be covered by said permit until March 10, 2003 (with the exception of power plants, airports, and uncontrolled sanitary landfills).

9. Emergency Procedures

Each Permittee shall repair essential public services and infrastructure in a manner to minimize environmental damage in emergency situations such as: earthquakes; fires; floods; landslides; or windstorms. BMPs shall be implemented to the extent that measures do not compromise public health and safety. After initial emergency response or emergency repair activities have been completed, each Permittee shall implement BMPs and programs as required under this Order.

10. Treatment Feasibility Study

The Permittees in cooperation with the County Sanitation Districts of Los Angeles County shall conduct a study to investigate the possible diversion of dry weather discharges or the use of alternative Treatment Control BMPs to treat flows from their jurisdiction which may impact public health and safety and/or the environment. The Permittees shall collectively review their individual prioritized lists and create a watershed based priority list of drains for potential diversion or treatment and submit the priority listing to the Regional Board Executive Officer, no later than July 1, 2003.

G. Illicit Connections and Illicit Discharges Elimination Program

Permittees shall eliminate all illicit connections and illicit discharges to the storm drain system, and shall document, track, and report all such cases in accordance with the elements and performance measures specified in the following subsections.

1. General

a) Implementation: Each Permittee must develop an Implementation Program which specifies how each Permittee is implementing revisions to the IC/ID Program of the SQMP. This Implementation Program must be documented, and available for review and approval by the Regional Board Executive Officer, upon request.

b) Tracking: All Permittees shall, no later than February 3, 2003, develop and maintain a listing of all permitted connections to their storm drain system. All Permittees shall map at a scale and in a format specified by the Principal Permittee all illicit connections and discharges on their baseline maps, and shall transmit this information to the Principal Permittee. No later than February 3, 2003, the Principal Permittee shall use this information as well as results of baseline and priority screening for illicit connections (as set forth in subsection 2 below) to start an annual evaluation of patterns and trends of illicit connections and illicit discharges, with the objectives of identifying priority areas for elimination of illicit connections and illicit discharges.

c) Training: All Permittees shall train all targeted employees who are responsible for identification, investigation, termination, cleanup, and reporting of illicit connections and discharges. For Permittees with a population of less than 250,000 (2000 U.S. Census), training shall be completed no later than August 1, 2002. For Permittees with a population of 250,000 or more (2000 U.S. Census), training shall be completed no later than February 3, 2003. Furthermore, all Permittees shall conduct refresher training on an annual basis thereafter.

2. Illicit Connections

a) Screening for Illicit Connections

(1) Field Screening: All Permittees shall field Screen the storm drain system for illicit connections in accordance with the following schedule:

(i) Open channels: No later than February 3, 2003;

(ii) Underground pipes in priority areas: No later than February 1, 2005; and

(iii) Underground pipes with a diameter of 36 inches or greater: No later than December 12, 2006.

Permittees shall report, to the Principal Permittee, on the location and length of open channels or underground pipes that have been Screened *vis a vis* the entire storm drain network, and on the status of suspected, confirmed, and terminated illicit connections. Permittees shall maintain a list containing all permitted connections and the status of connections under investigation for possible illicit connection.

(2) Permit Screening: No later than December 12, 2006, Permittees shall complete a review of all permitted connections to the storm drain system, to confirm compliance with Part 1 (Discharge Prohibition).

b) Response to Illicit Connections

(1) Investigation: Upon discovery or upon receiving a report of a suspected illicit connection, Permittees shall initiate an investigation within 21 days, to determine the source of the connection, the nature and volume of discharge through the connection, and the responsible party for the connection.

(2) Termination: Upon confirmation of the illicit nature of a storm drain connection, Permittees shall ensure termination of the connection within 180 days, using enforcement authority as needed.

3. Illicit Discharges

a) Abatement and Cleanup: Permittees shall respond, within one business day of discovery or a report of a suspected illicit discharge, with activities to abate, contain, and clean up all illicit discharges, including hazardous substances.

b) Investigation: Permittees shall investigate illicit discharges as soon as practicable (during or immediately following containment and cleanup activities), and shall take enforcement action as appropriate.

Part 5. DEFINITIONS

The following are definitions for terms applicable to this Order:

"Adverse Impact" means a detrimental effect upon water quality or beneficial uses caused by a discharge or loading of a pollutant or pollutants.

"Anti-degradation policies" means the *Statement of Policy with Respect to Maintaining High Quality Water in California* (State Board Resolution No. 68-16) which protects surface and ground waters from degradation. In particular, this policy protects waterbodies where existing quality is higher than that necessary for the protection of beneficial uses including the protection of fish and wildlife propagation and recreation on and in the water.

"Applicable Standards and Limitations" means all State, interstate, and federal standards and limitations to which a “discharge” or a related activity is subject under the CWA, including “effluent limitations, "water quality standards, standards of performance, toxic effluent standards or prohibitions, “best management practices,” and pretreatment standards under sections 301, 302, 303, 304, 306, 307, 308, 403 and 404 of CWA.

“**Areas of Special Biological Significance (ASBS)**” means all those areas of this state as ASBS, listed specifically within the California Ocean Plan or so designated by the State Board which, among other areas, includes the area from Mugu Lagoon to Latigo Point: Oceanwater within a line originating from Laguna Point at 34° 5’ 40” north, 119° 6’30” west, thence southeasterly following the mean high tideline to a point at Latigo Point defined by the intersection of the meanhigh tide line and a line extending due south of Benchmark 24; thence

due south to a distance of 1000 feet offshore or to the 100 foot isobath, whichever distance is greater; thence northwesterly following the 100 foot isobath or maintaining a 1,000-foot distance from shore, whichever maintains the greater distance from shore, to a point lying due south of Laguna Point, thence due north to Laguna Point.

"Authorized Discharge" means any discharge that is authorized pursuant to an NPDES permit or meets the conditions set forth in this Order.

"Automotive Service Facilities" means a facility that is categorized in any one of the following Standard Industrial Classification (SIC) codes: 5013, 5014, 5541, 5511, 7532-7534, or 7536-7539. For inspection purposes, Permittees need not inspect facilities with SIC codes 5013, 5014, 5541, 5511, provided that these facilities have no outside activities or materials that may be exposed to storm water.

"Baseline Waste Load Allocation" means the Waste Load Allocation assigned to a Permittee before reductions are required. The progressive reductions in the Waste Load Allocations are based on a percentage of the Baseline Waste Load Allocation. The Baseline Waste Load Allocation for each jurisdiction was calculated based on the annual average amount of trash discharged to the storm drain system from a representative sampling of land use areas, as determined during the Baseline Monitoring Program. The Baseline Waste Load Allocations are incorporated into the Basin Plan at Table 7-2.2.

"Basin Plan" means the Water Quality Control Plan, Los Angeles Region, Basin Plan for the Coastal Watersheds of Los Angeles and Ventura Counties, adopted by the Regional Board on June 13, 1994 and subsequent amendments.

"Beneficial Uses" means the existing or potential uses of receiving waters in the permit area as designated by the Regional Board in the Basin Plan.

"Best Management Practices (BMPs)" means methods, measures, or practices designed and selected to reduce or eliminate the discharge of pollutants to surface waters from point and nonpoint source discharges including storm water. BMPs include structural and nonstructural controls, and operation and maintenance procedures, which can be applied before, during, and/or after pollution producing activities.

"Commercial Development" means any development on private land that is not heavy industrial or residential. The category includes, but is not limited to: hospitals, laboratories and other medical facilities, educational institutions, recreational facilities, plant nurseries, car wash facilities, mini-malls and other business complexes, shopping malls, hotels, office buildings, public warehouses and other light industrial complexes.

"Construction" means constructing, clearing, grading, or excavation that results in soil disturbance. Construction includes structure teardown. It does not include routine maintenance to maintain original line and grade, hydraulic capacity, or original purpose of facility; emergency construction activities required to immediately protect public health and safety; interior remodeling with no outside exposure of construction material or construction waste to storm water; mechanical permit work; or sign permit work.

"Control" means to minimize, reduce, eliminate, or prohibit by technological, legal, contractual or other means, the discharge of pollutants from an activity or activities.

"Daily Generation Rate (DGR)" means the estimated amount of trash deposited within a representative drainage area during a 24-hour period, derived from the amount of trash collected from streets and catch basins in the area over a 30-day period.

"Dechlorinated/Debrominated Swimming Pool Discharge" means swimming pool discharges which have no measurable chlorine or bromine and do not contain any detergents, wastes, or additional chemicals not typically found in swimming pool water. The term does not include swimming pool filter backwash.

"Development" means any construction, rehabilitation, redevelopment or reconstruction of any public or private residential project (whether single-family, multi-unit or planned unit development); industrial, commercial, retail and other non-residential projects, including public agency projects; or mass grading for future construction. It does not include routine maintenance to maintain original line and grade, hydraulic capacity, or original purpose of facility, nor does it include emergency construction activities required to immediately protect public health and safety.

"Directly Adjacent" means situated within 200 feet of the contiguous zone required for the continued maintenance, function, and structural stability of the environmentally sensitive area.

"Director" means the Director of a municipality and Person(s) designated by and under the Director's instruction and supervision.

"Discharge" means when used without qualification the "discharge of a pollutant."

"Discharging Directly" means outflow from a drainage conveyance system that is composed entirely or predominantly of flows from the subject, property, development, subdivision, or industrial facility, and not commingled with the flows from adjacent lands.

"Discharge of a Pollutant" means: any addition of any "pollutant" or combination of pollutants to "waters of the United States" from any "point source" or, any addition of any pollutant or combination of pollutants to the waters of the "contiguous zone" or the ocean from any point source other than a vessel or other floating craft which is being used as a means of transportation. The term discharge includes additions of pollutants into waters of the United States from: surface runoff which is collected or channeled by man; discharges through pipes, sewers, or other conveyances owned by a State, municipality, or other person which do not lead to a treatment works; and discharges through pipes, sewers, or other conveyances, leading into privately owned treatment works.

"Disturbed Area" means an area that is altered as a result of clearing, grading, and/or excavation.

"Environmentally Sensitive Areas (ESAs)" means an area in which plant or animal life or their habitats are either rare or especially valuable because of their special nature or role in an ecosystem and which would be easily disturbed or degraded by human activities and developments (California Public Resources Code § 30107.5). Areas subject to storm water mitigation requirements are: areas designated as Significant Ecological Areas by the County of Los Angeles (*Los Angeles County Significant Areas Study, Los Angeles County Department of Regional Planning (1976)* and amendments); an area designated as a Significant Natural Area

by the California Department of Fish and Game's Significant Natural Areas Program, provided that area has been field verified by the Department of Fish and Game; an area listed in the Basin Plan as supporting the "Rare, Threatened, or Endangered Species (RARE)" beneficial use; and an area identified by a Permittee as environmentally sensitive.

"Full Capture System" means any single device or series of devices, certified by the Executive Officer, that traps all particles retained by a 5 mm mesh screen and has a design treatment capacity of not less than the peak flow rate Q resulting from a one-year, one-hour storm in the sub-drainage area. The Rational Equation is used to compute the peak flow rate:

$$Q = C \times I \times A,$$

Where:
Q = design flow rate (cubic feet per second, cfs);
C = runoff coefficient (dimensionless);
I = design rainfall intensity (inches per hour, as determined per the Los Angeles County rainfall isohyetal maps relevant to the Los Angeles River watershed),[7] and
A = sub-drainage area (acres).

"General Construction Activities Storm Water Permit (GCASP)" means the general NPDES permit adopted by the State Board which authorizes the discharge of storm water from construction activities under certain conditions.

"General Industrial Activities Storm Water Permit (GIASP)" means the general NPDES permit adopted by the State Board which authorizes the discharge of storm water from certain industrial activities under certain conditions.

"Hillside" means property located in an area with known erosive soil conditions, where the development contemplates grading on any natural slope that is 25% or greater and where grading contemplates cut or fill slopes.

"Illicit Connection" means any man-made conveyance that is connected to the storm drain system without a permit, excluding roof drains and other similar type connections. Examples include channels, pipelines, conduits, inlets, or outlets that are connected directly to the storm drain system.

"Illicit Discharge" means any discharge to the storm drain system that is prohibited under local, state, or federal statutes, ordinances, codes, or regulations. The term illicit discharge includes all non storm-water discharges except discharges pursuant to an NPDES permit, discharges that are identified in Part 1, "Discharge Prohibitions" of this order, and discharges authorized by the Regional Board Executive Officer.

"Illicit Disposal" means any disposal, either intentionally or unintentionally, of material(s) or waste(s) that can pollute storm water.

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[7] The isohyetal map may be updated annually by the Los Angeles County hydrologist to reflect additional rain data gathered during the previous year. Annual updates published by the Los Angeles County Department of Public Works are prospectively incorporated by reference into this Order.

"Industrial/Commercial Facility" means any facility involved and/or used in the production, manufacture, storage, transportation, distribution, exchange or sale of goods and/or commodities, and any facility involved and/or used in providing professional and non-professional services. This category of facilities includes, but is not limited to, any facility defined by the Standard Industrial Classifications (SIC). Facility ownership (federal, state, municipal, private) and profit motive of the facility are not factors in this definition.

"Infiltration" means the downward entry of water into the surface of the soil.

"Inspection" means entry and the conduct of an on-site review of a facility and its operations, at reasonable times, to determine compliance with specific municipal or other legal requirements. The steps involved in performing an inspection, include, but are not limited to:

1. Pre-inspection documentation research.;
2. Request for entry;
3. Interview of facility personnel;
4. Facility walk-through.
5. Visual observation of the condition of facility premises;
6. Examination and copying of records as required;
7. Sample collection (if necessary or required);
8. Exit conference (to discuss preliminary evaluation); and,
9. Report preparation, and if appropriate, recommendations for coming into compliance.

In the case of restaurants, a Permittee may conduct an inspection from the curbside, provided that such "curbside" inspection provides the Permittee with adequate information to determine an operator's compliance with BMPs that must be implemented per requirements of this Order, Regional Board Resolution 98-08, County and municipal ordinances, and the SQMP.

"Institutional Controls" means programmatic trash control measures that do not require construction or structural modifications to the MS4. Examples include street sweeping, public education, and clean out of catch basins that discharge to storm drains.

"Large Municipal Separate Storm Sewer System (MS4)" means all MS4s that serve a population greater than 250,000 (1990 Census) as defined in 40 CFR 122.26 (b)(4). The Regional Board designated Los Angeles County as a large MS4 in 1990, based on: (i) the U.S. Census Bureau 1990 population count of 8.9 million, and (ii) the interconnectivity of the MS4s in the incorporated and unincorporated areas within the County.

"Local SWPPP" means the Storm Water Pollution Prevention Plan required by the local agency for a project that disturbs one or more acres of land.

"Maximum Extent Practicable (MEP)" means the standard for implementation of storm water management programs to reduce pollutants in storm water. CWA § 402(p)(3)(B)(iii) requires that municipal permits "shall require controls to reduce the discharge of pollutants to the maximum extent practicable, including management practices, control techniques and system, design and engineering methods, and such other provisions as the Administrator or the State determines appropriate for the control of such pollutants. See also State Board Order WQ 2000-11 at page 20.

"Method Detection Limit (MDL)" means the minimum concentration of a substance that can be measured and reported with 99 percent confidence that the analyte concentration is greater than zero, as defined in 40 CFR 136, Appendix B.

"Minimum Level (ML)" means the concentration at which the entire analytical system must give a recognizable signal and acceptable calibration point. The ML is the concentration in a sample that is equivalent to the concentration of the lowest calibration standard analyzed by a specific analytical procedure, assuming that all the method specified sample weights, volumes, and processing steps have been followed.

"Municipal Separate Storm Sewer System (MS4)" means a conveyance or system of conveyances (including roads with drainage systems, municipal streets, alleys, catch basins, curbs, gutters, ditches, manmade channels, or storm drains) owned by a State, city, county, town or other public body, that is designed or used for collecting or conveying storm water, which is not a combined sewer, and which is not part of a publicly owned treatment works, and which discharges to Waters of the United States.

"National Pollutant Discharge Elimination System (NPDES)" means the national program for issuing, modifying, revoking and reissuing, terminating, monitoring and enforcing permits, and imposing and enforcing pretreatment requirements, under CWA §307, 402, 318, and 405. The term includes an "approved program."

"Natural Drainage Systems" means unlined or unimproved (not engineered) creeks, streams, rivers or similar waterways.

"New Development" means land disturbing activities; structural development, including construction or installation of a building or structure, creation of impervious surfaces; and land subdivision.

"Non-Storm Water Discharge" means any discharge to a storm drain that is not composed entirely of storm water.

"Nuisance" means anything that meets all of the following requirements: (1) is injurious to health, or is indecent or offensive to the senses, or an obstruction to the free use of property, so as to interfere with the comfortable enjoyment of life or property; (2) affects at the same time an entire community or neighborhood, or any considerable number of persons, although the extent of the annoyance or damage inflicted upon individuals may be unequal.; (3) occurs during, or as a result of, the treatment or disposal of wastes.

"Parking Lot" means land area or facility for the parking or storage of motor vehicles used for businesses, commerce, industry, or personal use, with a lot size of 5,000 square feet or more of surface area, or with 25 or more parking spaces.

"Partial Capture Device" means any structural trash control device that has not been certified by the Executive Officer as meeting the "full capture" performance requirements.

"Permittee(s)" means Co-Permittees and any agency named in this Order as being responsible for permit conditions within its jurisdiction. Permittees to this Order include the Los Angeles County Flood Control District, Los Angeles County, and the cities of Agoura Hills, Alhambra, Arcadia, Artesia, Azusa, Baldwin Park, Bellflower, Bell Gardens, Beverly Hills,

Bradbury, Burbank, Calabasas, Carson, Cerritos, Claremont, Commerce, Compton, Covina, Cudahy, Culver City, Diamond Bar, Downey, Duarte, El Monte, El Segundo, Gardena, Glendale, Glendora, Hawaiian Gardens, Hawthorne, Hermosa Beach, Hidden Hills, Huntington Park, Industry, Inglewood, Irwindale, La Canada Flintridge, La Habra Heights, Lakewood, La Mirada, La Puente, La Verne, Lawndale, Lomita, Los Angeles, Lynwood, Malibu, Manhattan Beach, Maywood, Monrovia, Montebello, Monterey Park, Norwalk, Palos Verdes Estates, Paramount, Pasadena, Pico Rivera, Pomona, Rancho Palos Verdes, Redondo Beach, Rolling Hills, Rolling Hills Estates, Rosemead, San Dimas, San Fernando, San Gabriel, San Marino, Santa Clarita, Santa Fe Springs, Santa Monica, Sierra Madre, Signal Hill, South El Monte, South Gate, South Pasadena, Temple City, Torrance, Vernon, Walnut, West Covina, West Hollywood, Westlake Village, and Whittier.

"Planning Priority Projects" means those projects that are required to incorporate appropriate storm water mitigation measures into the design plan for their respective project. These types of projects include:

1. Ten or more unit homes (includes single family homes, multifamily homes, condominiums, and apartments)
2. A 100,000 or more square feet of impervious surface area industrial/ commercial development (1 ac starting March 2003)
3. Automotive service facilities (SIC 5013, 5014, 5541, 7532-7534, and 7536-7539)
4. Retail gasoline outlets
5. Restaurants (SIC 5812)
6. Parking lots 5,000 square feet or more of surface area or with 25 or more parking spaces
7. Redevelopment projects in subject categories that meet Redevelopment thresholds
8. Projects located in or directly adjacent to or discharging directly to an ESA, which meet thresholds; and
9. Those projects that require the implementation of a site-specific plan to mitigate post-development storm water for new development not requiring a SUSMP but which may potentially have adverse impacts on post-development storm water quality, where the following project characteristics exist:

    a) Vehicle or equipment fueling areas;
    b) Vehicle or equipment maintenance areas, including washing and repair;
    c) Commercial or industrial waste handling or storage;
    d) Outdoor handling or storage of hazardous materials;
    e) Outdoor manufacturing areas;
    f) Outdoor food handling or processing;
    g) Outdoor animal care, confinement, or slaughter; or
    h) Outdoor horticulture activities.

"Pollutants" means those "pollutants" defined in CWA §502(6) (33.U.S.C.§1362(6)), and incorporated by reference into California Water Code §13373.

"Potable Water Distribution Systems Releases" means sources of flows from drinking water storage, supply and distribution systems including flows from system failures, pressure releases, system maintenance, distribution line testing, fire hydrant flow testing; and flushing and dewatering of pipes, reservoirs, vaults, and minor non-invasive well maintenance activities not involving chemical addition(s). It does not include wastewater discharges from activities that occur at wellheads, such as well construction, well development (i.e., aquifer pumping tests, well purging, etc.), or major well maintenance.

"Project" means all development, redevelopment, and land disturbing activities. The term is not limited to "Project" as defined under CEQA (Pub. Resources Code §21065).

"Rain Event" means any rain event greater than 0.1 inch in 24 hours except where specifically stated otherwise.

"Rare, Threatened, or Endangered Species (RARE)" means a beneficial use for waterbodies in the Los Angeles Region, as designated in the Basin Plan (Table 2-1), that supports habitats necessary, at least in part, for the survival and successful maintenance of plant or animal species established under state or federal law as rare, threatened, or endangered.

"Receiving Waters" means all surface water bodies in the Los Angeles Region that are identified in the Basin Plan.

"Redevelopment" means land-disturbing activity that results in the creation, addition, or replacement of 5,000 square feet or more of impervious surface area on an already developed site. Redevelopment includes, but is not limited to: the expansion of a building footprint; addition or replacement of a structure; replacement of impervious surface area that is not part of a routine maintenance activity; and land disturbing activities related to structural or impervious surfaces. It does not include routine maintenance to maintain original line and grade, hydraulic capacity, or original purpose of facility, nor does it include emergency construction activities required to immediately protect public health and safety.

"Regional Administrator" means the Regional Administrator of the Regional Office of the USEPA or the authorized representative of the Regional Administrator.

"Restaurant" means a facility that sells prepared foods and drinks for consumption, including stationary lunch counters and refreshment stands selling prepared foods and drinks for immediate consumption (SIC Code 5812).

"Retail Gasoline Outlet" means any facility engaged in selling gasoline and lubricating oils.

"Runoff" means any runoff including storm water and dry weather flows from a drainage area that reaches a receiving water body or subsurface. During dry weather it is typically comprised of base flow either contaminated with pollutants or uncontaminated, and nuisance flows.

"Screening" means using proactive methods to identify illicit connections through a continuously narrowing process. The methods may include: performing baseline monitoring of open channels, conducting special investigations using a prioritization approach, analyzing

maintenance records for catch basin and storm drain cleaning and operation, and verifying all permitted connections into the storm drains. Special investigation techniques may include: dye testing, visual inspection, smoke testing, flow monitoring, infrared, aerial and thermal photography, and remote control camera operation.

"Sidewalk Rinsing" means pressure washing of paved pedestrian walkways with average water usage of 0.006 gallons per square foot, with no cleaning agents, and properly disposing of all debris collected, as authorized under Regional Board Resolution No. 98-08.

"Significant Ecological Area (SEA)" means an area that is determined to possess an example of biotic resources that cumulatively represent biological diversity, for the purposes of protecting biotic diversity, as part of the Los Angeles County General Plan.[8]
Areas are designated as SEAs, if they possess one or more of the following criteria:

1. The habitat of rare, endangered, and threatened plant and animal species.
2. Biotic communities, vegetative associations, and habitat of plant and animal species that are either one of a kind, or are restricted in distribution on a regional basis.
3. Biotic communities, vegetative associations, and habitat of plant and animal species that are either one of a kind or are restricted in distribution in Los Angeles County.
4. Habitat that at some point in the life cycle of a species or group of species, serves as a concentrated breeding, feeding, resting, migrating grounds and is limited in availability either regionally or within Los Angeles County.
5. Biotic resources that are of scientific interest because they are either an extreme in physical/geographical limitations, or represent an unusual variation in a population or community.
6. Areas important as game species habitat or as fisheries.
7. Areas that would provide for the preservation of relatively undisturbed examples of natural biotic communities in Los Angeles County.
8. Special areas.[9]

"Significant Natural Area (SNA)" means an area defined by the California Department of Fish and Game (DFG), Significant Natural Areas Program, as an area that contains an important example of California's biological diversity. The most current SNA maps, reports, and descriptions can be downloaded from the DFG website at ftp://maphost.dfg.ca.gov/outgoing/whdab/sna/. These areas are identified using the following biological criteria only, irrespective of any administrative or jurisdictional considerations:

1. Areas supporting extremely rare species or habitats.
2. Areas supporting associations or concentrations of rare species or habitats.
3. Areas exhibiting the best examples of rare species and habitats in the state.

[8] The 61 existing SEAs represent the findings of a study that was completed in 1976 by England and Nelson, Environmental Consultants, as amended through the adoption of a revised Los Angeles County General Plan in 1980. The results of an update study to evaluate existing SEAs within unincorporated Los Angeles County is currently being proposed to the Los Angeles County Planning Commission (*Los Angeles County Significant Ecological Area Update Study 2000, Background Report*, PCR Services Corporation). The *Update Study 2000*, which contains existing and proposed SEA boundaries, can be downloaded from the Los Angeles County Department of Planning website at http://planning.co.la.ca.us/drp_revw.html#SEA

[9] These criteria from the 1976 study have been modified in the *Update Study 2000*.

"Site" means the land or water area where any "facility or activity" is physically located or conducted, including adjacent land used in connection with the facility or activity.

"Source Control BMP" means any schedules of activities, prohibitions of practices, maintenance procedures, managerial practices or operational practices that aim to prevent storm water pollution by reducing the potential for contamination at the source of pollution.

"SQMP" means the Los Angeles Countywide Stormwater Quality Management Program.

"State Storm Water Pollution Prevention Plan (State SWPPP)" means a plan, as required by a State General Permit, identifying potential pollutant sources and describing the design, placement and implementation of BMPs, to effectively prevent non-stormwater Discharges and reduce Pollutants in Stormwater Discharges during activities covered by the General Permit.

"Storm Water" means storm water runoff, snow melt runoff, and surface runoff and drainage.

"Storm Water Discharge Associated with Industrial Activity" means industrial discharge as defined in 40 CFR 122.26(b)(14)

"Stormwater Quality Management Program" means the Los Angeles Countywide Stormwater Quality Management Program, which includes descriptions of programs, collectively developed by the Permittees in accordance with provisions of the NPDES Permit, to comply with applicable federal and state law, as the same is amended from time to time.

"Structural BMP" means any structural facility designed and constructed to mitigate the adverse impacts of storm water and urban runoff pollution (e.g. canopy, structural enclosure). The category may include both Treatment Control BMPs and Source Control BMPs.

"SUSMP" means the Los Angeles Countywide Standard Urban Stormwater Mitigation Plan. The SUSMP shall address conditions and requirements of new development.

"Total Maximum Daily Load (TMDL)" means the sum of the individual waste load allocations for point sources and load allocations for nonpoint sources and natural background.

"Toxicity Identification Evaluation (TIE)" means a set of procedures to identify the specific chemical(s) responsible for toxicity. These procedures are performed in three phases (characterization, identification, and confirmation) using aquatic organism toxicity tests.

"Toxicity Reduction Evaluation (TRE)" means a study conducted in a step-wise process to identify the causative agents of effluent or ambient toxicity, isolate the sources of toxicity, evaluate the effectiveness of toxicity control options, and then confirm the reduction in toxicity.

"Treatment" means the application of engineered systems that use physical, chemical, or biological processes to remove pollutants. Such processes include, but are not limited to, filtration, gravity settling, media absorption, biodegradation, biological uptake, chemical oxidation and UV radiation.

"Treatment Control BMP" means any engineered system designed to remove pollutants by simple gravity settling of particulate pollutants, filtration, biological uptake, media absorption or any other physical, biological, or chemical process.

"USEPA Phase I Facilities" means facilities in specified industrial categories that are required to obtain an NPDES permit for storm water discharges, as required by 40 CFR 122.26(c). These categories include:

i. facilities subject to storm water effluent limitation guidelines, new source performance standards, or toxic pollutant effluent standards (40 CFR N)
ii. manufacturing facilities
iii. oil and gas/mining facilities
iv. hazardous waste treatment, storage, or disposal facilities
v. landfills, land application sites, and open dumps
vi. recycling facilities
vii. steam electric power generating facilities
viii. transportation facilities
ix. sewage of wastewater treatment works
x. light manufacturing facilities

"Vehicle Maintenance/Material Storage Facilities/Corporation Yards" means any Permittee owned or operated facility or portion thereof that:

i. Conducts industrial activity, operates equipment, handles materials, and provides services similar to Federal Phase I facilities;
ii. Performs fleet vehicle service/maintenance on ten or more vehicles per day including repair, maintenance, washing, and fueling;
iii. Performs maintenance and/or repair of heavy industrial machinery/equipment ; and
iv. Stores chemicals, raw materials, or waste materials in quantities that require a hazardous materials business plan or a Spill Prevention, Control , and Counter-measures (SPCC) plan.

"Water Quality Standards and Water Quality Objectives" means water quality criteria contained in the Basin Plan, the California Ocean Plan, the National Toxics Rule, the California Toxics Rule, and other state or federally approved surface water quality plans. Such plans are used by the Regional Board to regulate all discharges, including storm water discharges.

"Waters of the State" means any surface water or groundwater, including saline waters, within boundaries of the state.

"Waters of the United States" or "Waters of the U.S." means:

a. All waters that are currently used, were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide;
b. All interstate waters, including interstate "wetlands";
c. All other waters such as intrastate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, "wetlands," sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds the use, degradation, or destruction of which would affect or could affect interstate or foreign commerce including any such waters:

1. Which are or could be used by interstate or foreign travelers for recreational or other purposes;
2. From which fish or shellfish are or could be taken and sold in interstate or foreign commerce; or
3. Which are used or could be used for industrial purposes by industries in interstate commerce;

d. All impoundments of waters otherwise defined as waters of the United States under this definition;
e. Tributaries of waters identified in paragraphs (a) through (d) of this definition;
f. The territorial sea; and
g. "Wetlands" adjacent to waters (other than waters that are themselves wetlands) identified in paragraph (a) through (f) of this definition.

Waste treatment systems, including treatment ponds or lagoons designed to meet the requirements of CWA (other than cooling ponds as defined in 40 CFR 423.22(m), which also meet the criteria of this definition) are not waters of the United States. This exclusion applies only to man-made bodies of water, which neither were originally created in waters of the United States (such as disposal area in wetlands) nor resulted from the impoundment of waters of the United States. Waters of the United States do not include prior converted cropland. Notwithstanding the determination of an area's status as prior converted cropland by any other federal agency, for the purposes of the CWA, the final authority regarding CWA jurisdiction remains with USEPA.

"Wet Season" means the calendar period beginning October 1 through April 15.

Part 6. STANDARD PROVISIONS

A. Standard Requirements

1. Each Permittee shall comply with all provisions and requirements of this permit.

2. Should a Permittee discover a failure to submit any relevant facts or that it submitted incorrect information in a report, it shall promptly submit the missing or correct information.

3. Each Permittee shall report all instances of non-compliance not otherwise reported at the time monitoring reports are submitted.

4. This Order includes the attached Monitoring and Reporting Program, and SUSMP(Regional Board Resolution No. R00-02), which are a part of the permit and must be complied with in the same manner as with the rest of the requirements in the permit.

B. Regional Board Review

Any formal determination or approval made by the Regional Board Executive Officer pursuant to the provisions of this Order may be reviewed by the Regional Board. A Permittee(s) or a member of the public may request such review upon petition within 30 days of the effective date of the notification of such decision to the Permittee(s) and interested parties on file at the Regional Board.

C. Public Review

1. All documents submitted to the Regional Board in compliance with the terms and conditions of this Order shall be made available to members of the public pursuant to the Freedom of Information Act (5 U.S.C. § 552 (as amended) and the Public Records Act (Cal. Government Code § 6250 *et seq.*).

2. All documents submitted to the Regional Board Executive Officer for approval shall be made available to the public for a 30-day period to allow for public comment.

D. Duty to Comply

1. Each Permittee must comply with all of the terms, requirements, and conditions of this Order. Any violation of this order constitutes a violation of the Clean Water Act, its regulations and the California Water Code, and is grounds for enforcement action, Order termination, Order revocation and reissuance, denial of an application for reissuance; or a combination thereof [40 CFR 122.41(a), CWC § 13261, 13263, 13265, 13268, 13300, 13301, 13304, 13340, 13350].

2. A copy of these waste discharge specifications shall be maintained by each Permittee so as to be available during normal business hours to Permittee employees and members of the public.

3. Any discharge of wastes at any point(s) other than specifically described in this Order is prohibited, and constitutes a violation of the Order.

E. Duty to Mitigate [40 CFR 122.41 (d)]

Each Permittee shall take all reasonable steps to minimize or prevent any discharge that has a reasonable likelihood of adversely affecting human health or the environment.

F. Inspection and Entry [40 CFR 122.41(i), CWC § 13267]

The Regional Board, USEPA, and other authorized representatives shall be allowed:

1. Entry upon premises where a regulated facility is located or conducted, or where records are kept under conditions of this Order;

2. Access to copy any records, at reasonable times, that are kept under the conditions of this Order;

3. To inspect at reasonable times any facility, equipment (including monitoring and control equipment), practices, or operations regulated or required under this Order; and,

4. To photograph, sample, and monitor at reasonable times for the purpose of assuring compliance with this Order, or as otherwise authorized by the CWA and the CWC.

G. Proper Operation and Maintenance [40 CFR 122.41 (e), CWC § 13263(f)]

The Permittees shall at all times properly operate and maintain all facilities and systems of treatment (and related appurtenances) that are installed or used by the Permittees to achieve compliance with this Order. Proper operation and maintenance includes adequate laboratory controls and appropriate quality assurance procedures. This provision requires the operation of backup or auxiliary facilities or similar system that are installed by a Permittee only when necessary to achieve compliance with the conditions of this Order.

H. Signatory Requirements [40 CFR 122.41(k) & 122.22]

Except as otherwise provided in this Order, all applications, reports, or information submitted to the Regional Board shall be signed by the Director of Public Works, City Engineer, or authorized designee and certified as set forth in 40 CFR 122.22.

I. Reopener and Modification [40 CFR 122.41(f) & 122.62]

1. This Order may only be modified, revoked, or reissued, prior to the expiration date, by the Regional Board, in accordance with the procedural requirements of the CWC and CCR Title 23 for the issuance of waste discharge requirements, 40 CFR 122.62, and upon prior notice and hearing, to:

   a) Address changed conditions identified in the required reports or other sources deemed significant by the Regional Board;

   b) Incorporate applicable requirements or statewide water quality control plans adopted by the State Board or amendments to the Basin Plan;

   c) Comply with any applicable requirements, guidelines, and/or regulations issued or approved pursuant to CWA Section 402(p); and/or,

   d) Consider any other federal, or state laws or regulations that became effective after adoption of this Order.

2. After notice and opportunity for a hearing, this Order may be terminated or modified for cause, including, but not limited to:

   a) Violation of any term or condition contained in this Order;

   b) Obtaining this Order by misrepresentation, or failure to disclose all relevant facts; or,

   c) A change in any condition that requires either a temporary or permanent reduction or elimination of the authorized discharge.

3. The filing of a request by the Principal Permittee or Permittees for a modification, revocation and re-issuance, or termination, or a notification of planned changes or anticipated noncompliance does not stay any condition of this Order.

4. This Order may be modified to make corrections or allowances for changes in the permitted activity listed in this section, following the procedures at 40 CFR 122.63, if processed as a minor modification. Minor modifications may only:

   a) Correct typographical errors, or

   b) Require more frequent monitoring or reporting by the Permittee.

J. Severability

The provisions of this permit are severable; and if any provision of this permit or the application of any provision of this permit to any circumstance is held invalid, the application of such provision to other circumstances and the remainder of this permit shall not be affected.

K. Duty to Provide Information [40 CFR 122.41(h)]

The Permittees shall furnish, within a reasonable time, any information the Regional Board or USEPA may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this Order. The Permittees shall also furnish to the Regional Board, upon request, copies of records required to be kept by this Order.

L. Twenty-four Hour Reporting [40 CFR 122.41(l)(6)][10]

1. The Permittees shall report to the Regional Board any noncompliance that may endanger health or the environment. Any information shall be provided orally within 24 hours from the time any Permittee becomes aware of the circumstances. A written submission shall also be provided within five days of the time the Permittee becomes aware of the circumstances. The written submission shall contain a description of the noncompliance and its cause; the period of noncompliance, including exact dates and times and, if the noncompliance has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance.

2. The Regional Board may waive the required written report on a case-by-case basis.

M. Bypass [40 CFR 122.41(m)][11]

[10] This provision applies to incidents where effluent limitations (numerical or narrative) as provided in this Order or in the Los Angeles County SQMP are exceeded, and which endanger public health or the environment.

Bypass (the intentional diversion of waste streams from any portion of a treatment facility) is prohibited. The Regional Board may take enforcement action against Permittees for bypass unless:

1. Bypass was unavoidable to prevent loss of life, personal injury or severe property damage. (Severe property damage means substantial physical damage to property, damage to the treatment facilities that causes them to become inoperable, or substantial and permanent loss of natural resources that can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production.);

2. There were no feasible alternatives to bypass, such as the use of auxiliary treatment facilities, retention of untreated waste, or maintenance during normal periods of equipment down time. This condition is not satisfied if adequate back-up equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass that could occur during normal periods of equipment downtime or preventive maintenance;

3. The Permittee submitted a notice at least ten days in advance of the need for a bypass to the Regional Board; or,

4. Permittees may allow a bypass to occur that does not cause effluent limitations to be exceeded, but only if it is for essential maintenance to assure efficient operation. In such a case, the above bypass conditions are not applicable. The Permittee shall submit notice of an unanticipated bypass as required.

N. Upset [40 CFR 122.41(n)][12]

Upset means an exceptional incident in which there is unintentional and temporary noncompliance with technology based permit effluent limitations because of factors beyond the reasonable control of the permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation.

1. A Permittee that wishes to establish the affirmative defense of an upset in an action brought for non compliance shall demonstrate, through properly signed, contemporaneous operating logs, or other relevant evidence that:

   a) An upset occurred and that the Permittee can identify the cause(s) of the upset;

   b) The permitted facility was being properly operated by the time of the upset;

[11] This provision applies to the operation and maintenance of storm water controls and BMPs as provided in this Order or in the SQMP.
[12] *Supra*. See footnote number 3.

c) The Permittee submitted notice of the upset as required; and,

d) The Permittee complied with any remedial measures required.

2. No determination made before an action for noncompliance, such as during administrative review of claims that non-compliance was caused by an upset, is final administrative action subject to judicial review.

3. In any enforcement proceeding, the Permittee seeking to establish the occurrence of an upset has the burden of proof.

O. Property Rights [40 CFR 122.41(g)]

This Order does not convey any property rights of any sort, or any exclusive privilege.

P. Enforcement

1. Violation of any of the provisions of the NPDES permit or any of the provisions of this Order may subject the violator to any of the penalties described herein, or any combination thereof, at the discretion of the prosecuting authority; except that only one kind of penalties may be applied for each kind of violation. The CWA provides the following:

a) Criminal Penalties for:

(1) Negligent Violations:

The CWA provides that any person who negligently violates permit conditions implementing § 301, 302, 306, 307, 308, 318, or 405 is subject to a fine of not less than $2,500 nor more than $25,000 per day for each violation, or by imprisonment for not more than 1 year, or both.

(2) Knowing Violations:

The CWA provides that any person who knowingly violates permit conditions implementing § 301, 302, 306, 307, 308, 318, or 405 is subject to a fine of not less than $5,000 nor more than $50,000 per day of violation, or by imprisonment for not more than 3 years, or both.

(3) Knowing Endangerment:

The CWA provides that any person who knowingly violates permit conditions implementing § 301, 302, 307, 308, 318, or 405 and who knows at that time that he is placing another person in imminent danger of death or serious bodily injury is subject to a fine of not more than $250,000, or by imprisonment for not more than 15 years, or both.

(4) False Statement:

The CWA provides that any person who knowingly makes any false material statement, representation, or certification in any application, record, report, plan, or other document filed or required to be maintained under the Act or who knowingly falsifies, tampers with, or renders inaccurate, any monitoring device or method required to be maintained under the Act, shall upon conviction, be punished by a fine of not more than $10,000 or by imprisonment for not more than two years, or by both. If a conviction is for a violation committed after a first conviction of such person under this paragraph, punishment shall be by a fine of not more than $20,000 per day of violation, or by imprisonment of not more than four years, or by both. (See CWA § 309(c)(4))

b) Civil Penalties

The CWA provides that any person who violates a permit condition implementing § 301, 302, 306, 307, 308, 318, or 405 is subject to a civil penalty not to exceed $27,500 per day for each violation.

2. The CWC provides that any person who violates a waste discharge requirement provision of the CWC is subject to civil penalties of up to $5,000 per day, $10,000 per day, or $25,000 per day of violation; or when the violation involves the discharge of pollutants, is subject to civil penalties of up to $10 per gallon per day or $25 per gallon per day of violation; or some combination thereof, depending on the violation or combination of violations.

Q. Need to Halt or Reduce Activity not a Defense [40 CFR 122.41(c)]

It shall not be a defense for a Permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this Order.

R. Rescission

Regional Board Order No. 96-054 is hereby rescinded.

S. Expiration

This Order expires on December 12, 2006. The Permittees must submit a Report of Waste Discharges and a proposed Storm Water Quality Management Program in accordance with CCR Title 23 as application for reissuance of waste discharge requirements no later than June 12, 2006.

Part 7. TOTAL MAXIMUM DAILY LOAD PROVISIONS

The provisions of this Part implement and are consistent with the assumptions and requirements of Waste Load Allocations from TMDLs for which some or all of the Permittees in this Order are responsible.

1. TMDL for Trash in the Los Angeles River Watershed

A. Waste Load Allocations: Each Permittee identified in Appendix 7-1 shall comply with the interim and final effluent limitations set forth in Appendix 7-1 hereto.[13]

B. Compliance:

(1) Permittees may comply with the effluent limitations using any lawful means. Such compliance options are broadly classified as *full capture*, *partial capture*, or *institutional controls*, as described below, and any combination of these may be employed to achieve compliance:

(a) Full Capture Systems:

1) The Basin Plan authorizes the Executive Officer to certify *full capture systems*, which are systems that meet the operating and performance requirements as described in this Order, and the procedures identified in "Procedures and Requirements for Certification of a Best Management Practice for Trash Control as a Full Capture System." (See Appendix 7-2.)[14]

2) Permittees are authorized to comply with their effluent limitations through certified *full capture systems* provided the requirements of paragraph 3), immediately below, and any conditions in the certification, continue to be met.

3) Permittees may comply with their effluent limitations through progressive installation of *full capture systems* throughout their jurisdiction until all areas draining to the Los Angeles River system are addressed. For purposes of this Permit, attainment of the effluent limitations shall be conclusively presumed for any drainage area to the Los Angeles River (or its tributaries)[15] where certified *full capture systems* treat all drainage from the area, provided that the *full capture systems* are adequately sized and maintained, and that maintenance records are up-to-date and available for inspection by the Regional Board.

i. A Permittee relying entirely on *full capture systems* shall be deemed in compliance with its final effluent limitation if it demonstrates that all drainage areas

[13] The interim and final effluent limitations set forth in Appendix 7-1 are equivalent to the Compliance Points identified in Table 7-2.3 of the Basin Plan.

[14] The Regional Board currently recognizes eight *full capture systems*. These are: Vortex Separation Systems (VSS) and seven other Executive Officer certified *full capture systems*, including specific types or designs of trash nets; two gross solids removal devices (GSRDs); catch basin brush inserts and mesh screens; vertical and horizontal trash capture screen inserts; and a connector pipe screen device.

[15] Tributaries to the Los Angeles River include, but are not limited to, Pacoima Wash, Tujunga Wash, Burbank Western Channel, Verdugo Wash, Arroyo Seco, Rio Hondo, and Compton Creek.

under its jurisdiction are serviced by appropriate certified *full capture systems* as described in paragraph (a)(3).

ii. A Permittee relying entirely on *full capture systems* shall be deemed in compliance with its interim effluent limitations:

1. By demonstrating that *full capture systems* treat the percentage of drainage areas in the watershed that corresponds to the required trash abatement.
2. Alternatively, a Permittee may propose a schedule for jurisdiction-wide installation of *full capture systems*, targeting first the areas of greatest trash generation (based upon the information on drainage area and litter generation rates by land use provided in Appendices I and III of the Los Angeles River Trash TMDL Staff Report) for the Executive Officer's approval. The Executive Officer shall not approve any such schedule that does not result in timely compliance with the final effluent limitations. A Permittee shall be deemed in compliance with its interim effluent limitations provided it is fully in compliance with any such approved schedule.

(b) Partial Capture Devices and Institutional Controls: Permittees may comply with their interim and final effluent limitations through the installation of *partial capture devices* and the application of *institutional controls*.[16]

1) Trash discharges from areas serviced solely by *partial capture devices* may be estimated based on demonstrated performance of the device(s) in the jurisdictional area.[17] That is, trash reduction is equivalent to the *partial capture devices'* trash removal efficiency multiplied by the percentage of drainage area serviced by the devices.
2) Except as provided in subdivision 3), below, trash discharges from areas addressed by *institutional controls* and/or *partial capture devices* (where site-specific performance data is not available) shall be calculated using a mass balance approach, based on the daily generation rate (DGR) for a representative area.[18] The DGR shall be determined from direct measurement of

[16] While interim effluent limitations may be complied with using partial capture devices, compliance with final effluent limitations cannot be achieved with the exclusive use of partial capture devices.
[17] Performance shall be demonstrated under different conditions (e.g. low to high trash loading).
[18] The area should be representative of the land uses within the jurisdiction and shall be approved by the Executive Officer prior to the 30-day collection period.

trash deposited in the drainage area during any thirty-day period between June 22nd and September 22nd exclusive of rain events[19], and shall be re-calculated every year thereafter. The DGR shall be calculated as the total amount of trash collected during this period divided by 30 (the length of the collection period).

DGR = (Amount of trash collected during a 30-day collection period[20]) / (30 days)

The DGR for the applicable area of the jurisdiction shall be extrapolated from that of the representative drainage area. A mass balance equation shall be used to estimate the amount of trash discharged during a storm event.[21] The *Storm Event Trash Discharge* for a given rain event in a Permittee's drainage area shall be calculated by multiplying the number of days since the last street sweeping by the DGR and subtracting the amount of any trash recovered in the catch basins.[22] For each day of a storm event that generates precipitation greater than 0.25 inches, the Permittee shall calculate a *Storm Event Trash Discharge*.

Storm Event Trash Discharge = [(Days since last street sweeping*DGR)] – [Amount of trash recovered from catch basins][23]

The sum of the *Storm Event Trash Discharges* for the storm year shall be the Permittee's calculated annual trash discharge.

Total Storm Year Trash Discharge = ∑Storm Event Trash Discharges from Drainage Area

3) The Executive Officer may approve alternative compliance monitoring approaches for calculating total storm year trash discharge, upon finding that the program will provide a scientifically-based estimate of the amount of trash discharged from the MS4.

(c) Combined Compliance Approaches:

[19] Provided no special events are scheduled that may affect the representative nature of that collection period.
[20] Between June 22nd and September 22nd
[21] Amount of trash shall refer to the uncompressed volume (in gallons) or drip-dry weight (in pounds) of trash collected.
[22] Any negative values shall be considered to represent a zero discharge.
[23] When more than one storm event occurs prior to the next street sweeping the discharge shall be calculated from the date of the last assessment.

Permittees may comply with their interim and final effluent limitations through a combination of *full capture systems*, *partial capture devices*, and *institutional controls*. Permittees relying on a combination of approaches shall demonstrate compliance with the interim and final effluent limitations as specified in (a)(3) in areas where *full capture systems* are installed and as specified in (b)(2) in areas where *partial capture devices* and *institutional controls* are applied.

(2) Permittees that are not in compliance with the applicable interim and/or final effluent limitations as identified in Appendix 7-1 shall be in violation of this permit.

(a) Permittees relying on *partial capture devices* and/or *institutional controls* that have violated their interim or final effluent limitations as identified in Appendix 7-1 shall be presumed to have violated the applicable limitation for each day of each storm event that generated precipitation greater than 0.25 inches during the applicable storm year, except those storm days on which they establish that their cumulative Storm Event Trash Discharges have not exceeded the applicable effluent limitation.

(b) For Permittees relying on full capture systems who have failed to demonstrate that the *full capture systems* for any drainage area are adequately sized and maintained, and that maintenance records are up-to-date and available for inspection by the Regional Board, and that they are in compliance with any conditions of their certification, shall be presumed to have discharged trash in an amount that corresponds to the percentage of the baseline waste load allocation represented by the drainage area in question.

1) A Permittee may overcome this presumption by demonstrating (using any of the methods authorized in this Part 7.1.B(1)(b)) that the actual or calculated discharge for that drainage area is in compliance with the applicable interim or final effluent limitations as specified in Appendix 7-1.

(3) Each Permittee shall be held liable for violations of the Effluent Limitations assigned to its jurisdiction in Appendix 7-1. Any Permittee whose compliance strategy includes full or partial capture devices and who chooses to install a full or partial capture device in the MS4 physical infrastructure of another public entity is responsible for obtaining all necessary permits to do so. If a Permittee believes it is unable to obtain the permits needed to install a full capture or partial capture device within another Permittee's MS4 physical infrastructure, either Permittee may request the Executive Officer to hold a conference with the Permittees. Nothing in this Order shall affect the right of that public entity or a Permittee to seek indemnity or other recourse from the other as they deem appropriate. Nothing in this subsection shall be construed as relieving a Permittee of any liability that the Permittee would otherwise have under this Order.

C. <u>Monitoring and Reporting Requirements (pursuant to Water Code section 13383)</u>

(1) Within 60 days of adoption of Part 7, Section 1 (Los Angeles River Trash TMDL) and on October 31, 2010 and every year thereafter, each Permittee identified in Appendix 7-1 shall submit a TMDL Compliance Report detailing compliance with the interim and final effluent limitations. Reporting shall include the information specified below. The report shall be submitted on a reporting form to be specified by the Executive Officer. The report shall be signed under penalty of perjury by the Director of Public Works or other agency head (or their delegee) that is responsible for ensuring compliance with this permit. Permittees shall be charged with and shall demonstrate compliance with the relevant effluent limitations beginning with their October 31, 2010 TMDL Compliance Report.

(a) Reporting Compliance based on Full Capture Systems:
Permittees identified in Appendix 7-1 shall provide information on the number and location of full capture installations, the sizing of each full capture installation, the drainage areas addressed by these installations, and compliance with the applicable interim or final effluent limitation, in their TMDL Compliance Report. The Regional Board will periodically audit sizing, performance, and other data to validate that a system satisfies the criteria established for a *full capture system* and any conditions established by the Executive Officer in the certification.

(b) Reporting Compliance based on Partial Capture Systems and/or Institutional Controls:

(1) Using Performance Data Specific to the Jurisdictional Area: Permittees identified in Appendix 7-1 shall provide (i) site-specific performance data for the applicable device(s), (ii) information on the number and location of such installations, and the drainage areas addressed by these installations, and (iii) calculated compliance with the applicable effluent limitations, in their TMDL Compliance Report.

(2) Using Direct Measurement of Trash Discharge: Permittees identified in Appendix 7-1 shall provide an accounting of DGR and trash removal via street sweeping, catch basin clean outs, etc., in a database to facilitate the calculation of discharge for each rain event. The database shall be maintained and provided to the Regional Board for inspection upon request. Permittees identified in Appendix 7-1 shall provide the annual DGR, calculated storm year discharge, and compliance with the applicable effluent limitation, in their TMDL Compliance Report.

(c) Reporting Compliance based on Combined Compliance Approaches:
Permittees identified in Appendix 7-1 shall provide the information specified in subsection (a) for areas where full capture systems are installed and that specified in subsection (b)(1) or (b)(2), as appropriate, for areas where partial capture devices and institutional controls are applied. Permittees shall also provide information on compliance with the applicable effluent limitation based on the combined compliance approaches, in their TMDL Compliance Report

(2) Violation of the reporting requirements of this Part shall be punishable pursuant to inter alia Water Code subdivision (a)(1) of section 13385.1 and/or subdivision (a)(3) of section 13385.

I, Samuel Unger, Regional Board Executive Officer, do hereby certify that the foregoing is a full, true, and correct copy of the Order amended by the California Regional Water Quality Control Board, Los Angeles Region, pursuant to the peremptory writ of mandate in L.A. Superior Court Case No. BS122724, and that such action occurred on April 14, 2011.

Samuel Unger

Samuel Unger, P.E.
Executive Officer

Water Quality Inventory Series
BIOLOGICAL AND PHYSICAL/ HABITAT ASSESSMENT OF
CALIFORNIA WATER BODIES

California Regional Water Quality Control Board, San Diego Region 2002 Biological Assessment Report:

Results of May 2001 Reference Site Study and Preliminary Index of Biotic Integrity

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INTRODUCTION

Bioassessment in California

In order to add a biological component to its water quality monitoring programs as required under the federal Clean Water Act, the State of California began the initial stages of biocriteria development in 1993. These efforts have steadily increased over the last decade to the point that bioassessments are being used for a wide range of applications throughout the state and several regions have made considerable progress toward the goal of biocriteria implementation.

Because water quality regulatory authority in California is divided into nine autonomous Regional Water Quality Control Boards, the State of California has taken a regional approach to biocriteria development instead of the statewide approach common in other states. The California Department of Fish and Game (DFG) has helped to coordinate this approach by developing standard statewide procedures for collecting bioassessment data and by working with individual regions to apply appropriate bioassessment techniques to support water quality management decisions.

Bioassessments are typically based on fish (McCormick *et al*. 2001, Karr 1981), attached algae (Pan *et al*. 2000) or invertebrate communities (Resh and Jackson 1993, Kerans and Karr 1994), each having advantages and disadvantages. Like most states, California has adopted the use of invertebrate communities as its primary tool, however future programs in the state are likely to include other communities (especially algae). In 1995, DFG developed and distributed standardized sampling, laboratory and quality assurance procedures for invertebrate bioassessment (the California Stream Bioassessment Procedure [CSBP]).

The CSBP is a regional adaptation of the U.S. Environmental Protection Agency (EPA) Rapid Bioassessment Protocols (Barbour *et al*. 1999) and is recognized by the EPA as California's standardized bioassessment procedure (Davis *et al*. 1996). The CSBP is a cost-effective tool that utilizes measures of the stream's benthic macroinvertebrate (BMI) community and its physical/ habitat structure. Because BMIs are sensitive in varying degrees to many environmental disturbances (Resh and Jackson 1993), they can provide considerable information regarding the biological condition of water bodies. Together, biological and physical assessments integrate the effects of water quality over time, are sensitive to multiple aspects of water and habitat quality, and provide the public with familiar expressions of ecological health (Gibson 1996, Yoder and Rankin 1998, Barbour *et al*. 1999).

Bioassessment in the San Diego Region

The California Regional Water Quality Control Board, San Diego Region [RWQCB (9)] has been a leader in the state's incorporation of biological information into its water quality monitoring programs. In 1997 and 1999 the RWQCB (9) contracted DFG's Aquatic Bioassessment Laboratory (ABL) to help them incorporate bioassessment into their ambient water quality monitoring program. The initial sampling strategy was designed to supplement existing water column chemistry and toxicity data with biological community data. As the program developed, emphasis was shifted toward gathering baseline information that would serve as a foundation for bioassessment in the San Diego region.

In April 2000, ABL first reported the results of bioassessments conducted in May 1998,

September 1998, November 1998 and May 1999 at 48 locations spread throughout the San Diego region. Most of these initial sites were significantly impacted by human activities (Ode and Harrington 2000). Subsequent sampling events incorporated an increasing number of less disturbed sites (= reference sites) in addition to many of the original locations. A second ABL report contained the results of sampling events in November 1999, May 2000 and November 2000. In May 2001, a new set of sites was selected to explicitly characterize reference conditions in the San Diego region, increasing the number of sampling sites to 93 for all eight sampling events. The addition of data from many new reference sites allowed establishment of a framework for interpreting biotic condition for the San Diego region.

Interpretation of Biotic Condition: Multimetric vs. Mulitvariate Approaches

While there are many potential ways of evaluating biotic condition from community data, most approaches can be grouped into one of two categories: multimetric techniques and multivariate techniques. In multimetric techniques a set of biological measurements ("metrics"), each representing a different aspect of the community data, is taken at each site. An overall site score is calculated as the sum of individual metric scores. Sites are then ranked according to their scores and classified into groups with "good", "fair" and "poor" water quality. This system of scoring and ranking sites is referred to as an Index of Biotic Integrity (IBI) and is the end point of a multi-metric analytical approach recommended by the EPA for development of biocriteria (Davis and Simon 1995). The original IBI was created for assessment of fish communities (Karr 1981), but was subsequently adapted for BMI communities (Kerans and Karr 1994).

In multivariate techniques the response of biological communities to natural environmental gradients is evaluated either directly or indirectly. Community composition at test sites can then be predicted based on strongly correlated environmental variables. Overall site quality is estimated by comparing the observed biological community with the community expected based on key environmental variables (Wright *et al*. 1984, 1993).

Relative advantages of the two approaches have been debated extensively in the scientific literature (see summaries in Norris and Georges 1993, Norris 1995, Barbour *et al*. 1999). Both techniques are valid approaches to analysis of bioassessment data, and both types of analyses can be applied to the same dataset. Our recommendation is to use information from both approaches whenever possible in order to provide the most robust analysis of the data. Although a framework is not currently in place for the use of a multivariate approach, we expect to take advantage of ongoing work by the US Forest Service (Hawkins *et al*. 2000) and others to develop a model of expected conditions for California within the next few years.

Our initial strategy has been to develop IBIs for different regions of California; we are currently exploring several potentially appropriate ways to classify regions for unique IBI development (e.g. watershed-based IBIs, ecoregion-based IBIs and water management region-based IBIs). The first California regional IBI was successfully applied to the Russian River watershed in 1999 (Harrington 1999). Increased knowledge of how biological communities respond to environmental disturbance will lead toward a standardized approach to using IBIs throughout California.

In this report, the results of the May 2001 sampling event are presented in a format similar to previous reports and are combined with the results of earlier sampling events to construct and

test a provisional IBI for the San Diego region. Two recent analyses of fish communities, one in the Willamette Valley of Oregon (Hughes *et al*. 1998) and one in the Middle Atlantic Highlands region of the eastern US (McCormick *et al*. 2001), developed a modified version of the original IBI. The IBI presented for the San Diego region combines the original Karr approach with these recent modifications.

Materials and Methods

May 2001 Sampling Event

Bioassessment data for the May 2001 sampling event were collected in the same manner described for the previous seven sampling events.

Monitoring Reach Delineation

Sampling reaches were delineated according to the methods described in the CSBP (Harrington 1999). Reaches normally consisted of a five-riffle stretch of stream in which all riffles had similar gradient and substrate characteristics. Three of the five riffles within a reach were then randomly selected for sampling. Occasionally, it was not possible to find 5 contiguous riffles of similar characteristics at a site in which case fewer riffles (3 or 4) were used. Monitoring reach descriptions are summarized in Table 1 and a map of sampling locations is presented in Figure 1. Monitoring activities occurred between May 15 and May 25, 2001.

BMI Sampling

Riffle length was measured for each of the three riffles, and a random number table was used to randomly establish a point along the upstream third of each riffle at which a transect was established perpendicular to stream flow. Starting with the riffle transect furthest downstream, the benthos within a 2 ft^2 area was sampled upstream of a 1 ft wide, 0.5 mm mesh D-frame kick-net. Sampling of the benthos was performed manually by rubbing cobble and boulder substrates in front of the net, followed by "kicking" the upper layers of substrate to dislodge any remaining invertebrates. The duration of sampling ranged from 60-120 seconds, depending on the amount of boulder and cobble-sized substrate that required rubbing by hand; more and larger substrates required more time to process. Three locations along each transect were sampled to represent habitat diversity within transects, and these were combined into a composite sample, representing a 6 ft^2 area for each transect and 18 ft^2 for the entire reach. Each composite sample was transferred into a 500 ml wide-mouth plastic jar containing approximately 200 ml of 95% ethanol. This technique was repeated for each of three riffles in each reach.

Physical Habitat Assessment (Reach Scale and Riffle Scale)

Physical habitat quality was assessed for the monitoring reaches using the visual scoring system described in the U.S. Environmental Protection Agency (EPA) Rapid Bioassessment Protocols (RBPs) (Barbour *et al*. 1999). Habitat quality assessments were recorded for each monitoring reach during each sampling event. Photographs were taken within each of the monitoring reaches to document overall riffle condition at the time of sampling. At a minimum, photographs were taken upstream and downstream through each reach sampled.

In addition to the physical habitat quality assessments for each entire reach, we recorded several additional measures of habitat characteristics within each riffle. The following measurements were taken in the vicinity of the BMI collection sites: GPS coordinates, elevation, riffle gradient, riffle width and depth, canopy cover, substrate complexity, substrate consolidation and the proportion of different substrate sizes (substrate composition).

Ambient Water Chemistry Recording

General Parameters

Ambient water chemistry was recorded at each site using a Yellow Springs Instruments (YSI 3800 or YSI 85) water quality meter. Recorded measurements included water temperature, dissolved oxygen concentration, specific conductance, salinity and pH.

Nitrogen and Phosphorus Series, TDS and Alkalinity

Additional chemistry measurements were collected at most of the May 2001 sites. Water samples were processed for the following analytes (Nitrogen-Nitrite, Nitrogen-Nitrate, Nitrogen-Kjeldahl, Nitrogen-Ammonia, Nitrogen-Total, Phosphorus-Orthophosphate, TDS, and Phosphorus-Total) by Environmental Engineering Laboratory (EEL) in San Diego. Alkalinity samples were processed at the DFG's Water Pollution Control Laboratory in Rancho Cordova.

BMI Laboratory Analysis

At the ABL laboratory, each sample was rinsed through a No. 35 standard testing sieve (0.5 mm brass mesh) and transferred into a tray marked with twenty, 25 cm^2 grids. All sample material was removed from one randomly selected grid at a time and placed in a petri dish for inspection under a stereomicroscope. All invertebrates from the grid were separated from the surrounding detritus and transferred to vials containing 70% ethanol and 5% glycerol. This process was continued until 300 organisms were removed from each sample. The material left from the processed grids was transferred into a jar with 70% ethanol and labeled as "remnant" material. Any remaining unprocessed sample from the tray was transferred back to the original sample container with 70% ethanol and archived. BMIs were then identified to a standard taxonomic level, typically genus level for insects and order or class for non-insects, using standard taxonomic keys (Brown 1972, Edmunds *et al*. 1976, Klemm 1985, Merritt and Cummins 1995, Pennak 1989, Stewart and Stark 1993, Thorp and Covich 2001, Usinger 1963, Wiederholm 1983, 1986, Wiggins 1996, Wold 1974).

Data Analysis

A taxonomic list of BMIs identified from the samples was entered into a Microsoft Excel® spreadsheet program. MS Excel® was used to calculate and summarize BMI community based metric values. A description of the metric values used to describe the community is shown in Table 2.

Table 1. Benthic macroinvertebrate sampling site information for sampling events between May 1998 and May 2001 in the San Diego region indicating site identification (ID), latitude and longitude and sampling dates. Reference sites are indicated in red.

WATERSHED NAME	LOCATION DESCRIPTION	SITE ID	LATITUDE/ LONGITUDE	Site No.	May 1998	Sept 1998	Nov 1998	May 1999	Nov 1999	May 2000	Nov 2000	May 2001
San Juan Hydrologic Unit	Aliso Creek: Reach consisted of 3 riffles upstream of Pacific Park Drive	AC-PPD	N33° 34' 30.6", W117° 42' 53.9"	**1**	x	x	x	x	x	-	-	x
San Juan Hydrologic Unit	Aliso Creek: Reach consisted of 5 riffles parallel to Country Club Road upstream of Hwy 1	AC-CCR	N33° 30' 51.2" W117° 44' 34.9"	**2**	x	x	x	x	x	x	x	-
San Juan Hydrologic Unit	Arroyo Trabuco Creek: Reach consisted of 5 riffles parallel to Country Club Road upstream of Highway 1	ATC-AP	N33° 35' 3.0" W117° 38' 9.0"	**3**	-	x	x	x	x	x	x	-
San Juan Hydrologic Unit	Bell Canyon Creek: Reach consisted of 5 riffles at Star Rise Trail in Casper's Wilderness Park	BCC-SRT	N33° 33' 51.2" W117° 33' 49.3"	**4**	-	-	-	-	-	-	-	x
San Juan Hydrologic Unit	Bell Canyon Creek: Reach consisted of 5 riffles at Bell Canyon Trail in Casper's Wilderness Park	BCC-BCT	N33° 34' 8.5" W117° 33' 54.3"	**5**	-	-	-	-	-	-	-	x
San Juan Hydrologic Unit	Arroyo Trabuco Creek: Reach consisted of 5 riffles in Trabuco Canyon	ATC-TC	N33° 40' 29.2" W117° 32' 49.5"	**6**	-	-	-	-	-	-	-	x
San Juan Hydrologic Unit	San Juan Creek: Reach consisted of 5 riffles upstream of Highway 74 bridge crossing	SJC-74	N33° 31' 9.0" W117° 37' 25.4"	**7**	-	x	x	x	-	x	x	-
San Juan Hydrologic Unit	Wood Creek: Reach consisted of 5 riffles at 2 mile marker	WC-2MM	N33° 33 56.6 W117° 44′ 47.1″	**8**	-	-	-	-	-	-	-	x
San Juan Hydrologic Unit	Wood Creek: Reach consisted of 5 riffles at Coyote Run Trail	WC-CRT	N33° 34 05.0 W117″ 44′ 51.7″	**9**	-	-	-	-	-	-	-	x
San Juan Hydrologic Unit	Wood Creek: Reach consisted of 5 riffles at end of Wood Canyon Trail	WC-EOT	N33° 33 50.9 W117° 44′ 41.2″	**10**	-	-	-	-	-	-	-	x
San Juan Hydrologic Unit	San Mateo Creek: San Mateo Canyon	SMC-SMC	N33° 32′ 58.65″ W117° 23′ 46.23″	**11**	-	-	-	-	-	-	-	x
San Juan Hydrologic Unit	San Mateo Creek: Immediately upstream of confluence with Devil's Canyon Creek	SMC-DC	N33° 28' 22.0" W117° 27' 53.4"	**12**	-	-	-	-	-	-	-	x
San Juan Hydrologic Unit	San Mateo Creek: at San Mateo Road	SMC-SMR	N33° 25' 24.2" W117° 31′ 52.9"	**13**	-	-	-	-	-	-	-	x
San Juan Hydrologic Unit	Devils Canyon Creek: Immediately upstream of confluence with San Mateo Cr.	DCC-DC	N33° 28' 15.9" W117° 27' 52.6"	**14**	-	-	-	-	-	-	-	x
San Juan Hydrologic Unit	Silverado Creek: Reach consisted o f 5 riffles near Ladd Canyon Road	SC-LCR	N33° 44 52.5 W117° 38′ 28.5″	**15**	-	-	-	-	-	-	-	x
San Juan Hydrologic Unit	Silverado Creek: Reach consisted of 5 riffles above Silverado	SC-AS	N33° 44 49.1 W117° 36′ 43.7″	**16**	-	-	-	-	-	-	-	x
Santa Margarita Hydrologic Unit	Santa Margarita River: Reach consisted of 5 riffles 2 miles upstream of Willow Glen Road	SMR-WGR	N33° 25' 49.3" W117° 11' 43.1"	**17**	x	x	x	x	x	x	x	x
Santa Margarita Hydrologic Unit	Santa Margarita River: Reach consisted of 5 riffles downstream of Sandia Road (near DeLuz/ Pico Road)	SMR-DP	N33° 24' 51.0" W117° 14' 26.3"	**18**	x	x	x	x	x	x	x	x

WATERSHED NAME	LOCATION DESCRIPTION	SITE ID	LATITUDE/ LONGITUDE	Site No.	May 1998	Sept 1998	Nov 1998	May 1999	Nov 1999	May 2000	Nov 2000	May 2001
Santa Margarita Hydrologic Unit	Santa Margarita River: Reach consisted of 5 riffles upstream of DeLuz Rd. (downstream of confluence with Sandia Creek)	SMR-DLR	N33° 23' 56" W117° 15' 45"	**19**	-	-	-	-	-	-	-	x
Santa Margarita Hydrologic Unit	Santa Margarita River: Reach consisted of 5 riffles downstream of Santa Margarita Road, Camp Pendleton	SMR-CP	N33° 20' 22.1" W117° 19' 51.9"	**20**	x	x	x	x	x	x	x	x
Santa Margarita Hydrologic Unit	Santa Margarita River: Reach consisted of 5 riffles upstream of Stuart Mesa Blvd., Camp Pendleton	SMR-SMB	N33° 14' 12.1" W117° 23' 30.3"	**21**	x	-	-	x	-	-	-	-
Santa Margarita Hydrologic Unit	Murrieta Creek: Reach consisted of 5 riffles adjacent to USGS gauging station	MC-GS	N33° 28' 36.8" W117° 08' 25.5"	**22**	x	x	x	x	-	x	x	-
Santa Margarita Hydrologic Unit	Temecula Creek: Reach consisted of 5 riffles immediately downstream of I-15	TC-I-15	N33° 28' 27.9" W117° 08' 16.8"	**23**	x	x	x	x	x	x	x	-
Santa Margarita Hydrologic Unit	Rainbow Creek: Reach consisted of 3 riffles upstream of Willow Glen Road	RC-WGR	N33° 24' 26.1" W117° 11' 58.9"	**24**	x	x	x	x	x	x	x	-
Santa Margarita Hydrologic Unit	Murrieta Creek: Reach consisted of 3 riffles downstream of Calle del Oso Oro	MC-WB	N33° 34' 5.7" W117° 14' 21.2"	**25**	x	-	-	-	-	-	-	-
Santa Margarita Hydrologic Unit	Sandia Creek: Reach consisted of 5 riffles along Sandia Creek Drive, 0.7 miles upstream of Rock Mountain Road	SC-SCR	N33° 25' 27.3" W117° 14' 53.2"	**26**	x	x	x	x	x	x	x	x
Santa Margarita Hydrologic Unit	Sandia Creek: Reach consisted of 5 riffles upstream of DeLuz Rd.	SC-DLR	N33° 29′ 31.9″ W117° 14′ 47.1″	**27**	-	-	-	-	-	x	x	x
Santa Margarita Hydrologic Unit	Roblar Creek: Reach consisted of 5 riffles upstream of confluence with De Luz Creek	ROB-DLZ	N33° 23′ 13.65″ W117° 19′ 25.39″	**28**	-	-	-	-	-	-	-	x
Santa Margarita Hydrologic Unit	De Luz Creek: Reach consisted of 5 riffles upstream of DeLuz-Murrieta Road	DLC-DLM	N33° 27′ 34.5″ W117° 17′ 25.9″	**29**	-	-	-	-	-	-	x	x
San Luis Rey Hydrologic Unit	Keys Creek: Reach consisted of 5 riffles upstream and downstream of Lilac Road	KC-LR	N33° 17' 38.1" W117° 05' 10.3"	**30**	x	x	x	x	x	x	x	x
San Luis Rey Hydrologic Unit	Pauma Creek: Site is located downstream of Doque Trail at Palomar Mountain Park	PC-PMP	N33° 20′ 55.7″ W116° 54′ 48.2″	**31**	-	-	-	-	-	-	x	-
San Luis Rey Hydrologic Unit	San Luis Rey River: Reach consisted of 5 riffles about 50 meters upstream of pullout opposite Outdoor Education School on Hwy 76	SLRR-PG	N33° 15' 44.5" W116° 48' 29.5"	**32**	x	x	x	x	x	x	x	x
San Luis Rey Hydrologic Unit	San Luis Rey River: Reach consisted of 3 riffles downstream of old Hwy 395 and I–15	SLRR-395	N33° 19' 27.8" W117° 09' 28.2"	**33**	x	x	x	x	x	x	-	x
San Luis Rey Hydrologic Unit	San Luis Rey River: Reach consisted of 3 riffles upstream of Mission Road	SLRR-MR	N33° 15' 41.6" W117° 14' 06.1"	**34**	x	x	x	x	x	x	x	-
San Luis Rey Hydrologic Unit	San Luis Rey River: Reach consisted of five riffles upstream of Fousat Road crossing	SLRR-FR	N33° 13′ 34.3″ W117° 20′ 39.2″	**35**	x	x	x	x	x	-	-	-
San Luis Rey Hydrologic Unit	French Creek: Reach consisted of 5 riffles in Palomar State Park	FC-PSP	N33° 21′ 01″ W116° 54′ 42″	**36**	-	-	-	-	-	-	-	x

WATERSHED NAME	LOCATION DESCRIPTION	SITE ID	LATITUDE/ LONGITUDE	Site No.	May 1998	Sept 1998	Nov 1998	May 1999	Nov 1999	May 2000	Nov 2000	May 2001
San Luis Rey Hydrologic Unit	Fry Creek: Fry Creek Campground	FC-FCC	N33° 20′ 39″ W116° 52′ 49″	**37**	-	-	-	-	-	-	-	x
Carlsbad Hydrologic Unit	Loma Alta Creek: Reach consisted of 5 riffles downstream of College Blvd.	LAC-CB	N33° 12' 18.0" W117° 17' 13.4"	**38**	x	x	x	x	x	-	-	-
Carlsbad Hydrologic Unit	Loma Alta Creek: Reach consisted of 5 riffles downstream of El Camino Real	LAC-ECR	N33° 11' 57.6" W117° 19' 48.2"	**39**	x	x	x	x	-	x	x	-
Carlsbad Hydrologic Unit	Buena Vista Creek: Reach consisted of 5 riffles downstream of Santa Fe Avenue	BVR-ED	N33° 11' 57.9" W117° 14' 35.1"	**40**	x	x	x	x	x	-	-	-
Carlsbad Hydrologic Unit	Buena Vista Creek: Reach consisted of 5 riffles upstream of South Vista Way	BVR-SVW	N33° 10' 48.7" W117° 19' 41.1"	**41**	x	x	x	x	x	x	x	-
Carlsbad Hydrologic Unit	Agua Hedionda Creek: Reach consisted of 5 riffles downstream of Sycamore Avenue	AHC-SA	N33° 09' 22.5" W117° 13' 34.0"	**42**	x	x	-	-	-	-	-	-
Carlsbad Hydrologic Unit	Agua Hedionda Creek: Reach consisted of 5 riffles downstream of El Camino Real	AHC-ECR	N33° 08' 57.0" W117° 17' 46.9"	**43**	x	x	x	x	x	x	x	x
Carlsbad Hydrologic Unit	San Marcos Creek: Reach consisted of 5 riffles 50 m upstream of Mc Mahr Road intersection	SMC-M	N33° 07' 47.8" W117° 11' 29.0"	**44**	x	x	x	x	x	x	x	-
Carlsbad Hydrologic Unit	San Marcos Creek: Reach consisted of 5 riffles downstream of Santar Place	SMC-SP	N33° 08' 37.0" W117° 08' 54.2"	**45**	x	x	x	x	x	-	-	-
Carlsbad Hydrologic Unit	San Marcos Creek: Reach consisted of 5 riffles 50 m upstream of Mc Mahr Road intersection	SMC-RSFR	N33° 06' 12.9" W117° 13' 33.6"	**46**	x	x	x	x	x	-	x	-
Carlsbad Hydrologic Unit	San Marcos Creek: Reach consisted of 5 riffles downstream of Rancho Santa Fe Road	SMC-LCCC	N33° 05' 18.7" W117° 14' 43.6"	**47**	x	x	x	x	x	x	x	-
Carlsbad Hydrologic Unit	Encinitas Creek: Reach consisted of 5 riffles downstream of Green Valley Rd	ENC-GVR	N33° 04' 17.5" W117° 15' 43.8"	**48**	x	x	x	x	x	x	-	-
Carlsbad Hydrologic Unit	Encinitas Creek: Reach consisted of minimal riffle habitat, large pool was sampled using lentic procedures in May 2000	ENC-RSFR	N33° 04′ 4.2″ W117° 14′ 42.1″	**49**	-	-	-	-	-	x	-	-
Carlsbad Hydrologic Unit	Chicarita Creek: Site consisted of 5 riffles downstream of Evening Creek Road	CC-ECR	N32° 57′ 43.5″ W117° 05′ 36.2″	**50**	-	-	-	-	-	x	x	-
Carlsbad Hydrologic Unit	Escondido Creek: Reach consisted of 5 riffles downstream of Harmony Grove bridge	EC-HRB	N33° 06' 31.6" W117° 06' 41.2"	**51**	x	x	x	x	x	-	-	-
Carlsbad Hydrologic Unit	Escondido Creek: Reach consisted of 5 riffles downstream of Elfin Forest Resort	EC-EF	N33° 04' 17.6" W117° 09' 52.0"	**52**	x	x	x	x	x	x	-	-
Carlsbad Hydrologic Unit	Escondido Creek: Reach consisted of 5 riffles upstream of Elfin Forest on Harmony Grove Rd.	EC-HG	N33E04' 35.2″ W117E 09' 33.3″	**53**	-	-	-	-	-	-	x	-
Carlsbad Hydrologic Unit	Escondido Creek: Reach consisted of 5 riffles upstream of Rancho Santa Fe Road	EC-RSFR	N33° 02' 10.2" W117° 14' 6.1"	**54**	x	-	-	-	-	-	-	-

WATERSHED NAME	LOCATION DESCRIPTION	SITE ID	LATITUDE/ LONGITUDE	Site No.	May 1998	Sept 1998	Nov 1998	May 1999	Nov 1999	May 2000	Nov 2000	May 2001
San Dieguito Hydrologic Unit	Black Mountain Creek: Upstream of Santa Ysabel Creek	BMC-CG	N33° 07′ 37.4″ W116° 48′ 13.0″	55	-	-	-	-	-	-	-	x
San Dieguito Hydrologic Unit	Boden Canyon Creek: Reach consisted of 5 riffles ~0.5 mile upstream of Santa Ysabel Creek	BCN-1	N33° 06′ 19″ W116° 53′ 35″	56	-	-	-	-	-	-	-	x
San Dieguito Hydrologic Unit	Boden Canyon Creek: just above confluence with Santa Ysabel Creek	BCN-2	N33° 05′ 33″ W116° 53′ 45″	57	-	-	-	-	-	-	-	x
San Dieguito Hydrologic Unit	Santa Ysabel Creek: Reach consisted of 5 riffles above and below Highway 79 crossing	SYC-H79	N33° 07′ 18″ W116° 40′ 39″	58	-	-	-	-	-	x	x	x
San Dieguito Hydrologic Unit	Santa Ysabel Creek: at North Trail on Hwy. 78	SYC-NT	N33° 05” 10 .1” W116° 55′ 0.2″	59	-	-	-	-	-	-	-	x
San Dieguito Hydrologic Unit	Kit Carson Creek: Reach consisted of 5 riffles above/below Sunset Drive crossing	KCC-SD	N33° 04′ 3.2″ W117° 03′ 57.8″	60	-	-	-	-	-	-	x	-
San Dieguito Hydrologic Unit	Green Valley Creek: Reach consisted of 5 riffles just below West Bernardo Road	GVC-WB	N33° 02′ 38″ W117° 04′ 36.5″	61	-	-	-	-	-	-	x	-
Los Peñasquitos Hydrologic Unit	Rattlesnake Creek: Reach consisted of 5 riffles adjacent to Hillary Park	RC-HP	N32° 57' 36.0" W117° 02' 31.2"	62	x	x	x	x	-	x	-	-
Los Peñasquitos Hydrologic Unit	Los Peñasquitos Creek: Reach consisted of 5 riffles upstream of Cobblestone Creek Road	LPC-CCR	N32° 56' 55.9" W117° 04' 06.6"	63	x	x	x	x	x	-	-	-
Los Peñasquitos Hydrologic Unit	Los Peñasquitos Creek: Reach consisted of 5 riffles upstream of Black Mountain Road	LPC-BMR	N32°56' 24.8" W117° 07' 36.5"	64	x	x	x	x	x	-	x	x
Los Peñasquitos Hydrologic Unit	Carroll Canyon Creek: Reach consisted of 5 riffles near Interstate 805	CCC-805	N32° 53' 30.3" W117° 12' 53.9"	65	-	x	x	x	x	x	x	-
San Diego Hydrologic Unit	Tecolote Creek: Reach consisted of 5 riffles in the Tecolote Creek Nature Preserve	TC-TCNP	N32° 46' 30.6" W117° 11' 15.5"	66	-	-	x	x	x	x	x	-
San Diego Hydrologic Unit	Boulder Creek: Reach consisted of 5 riffles upstream of Boulder Creek Road	BC-BCR	N32° 57' 48.2" W116° 39' 50.2"	67	-	-	-	-	-	-	-	x
San Diego Hydrologic Unit	Cedar Creek: Reach consisted of 5 riffles upstream of Cedar Creek Road	CC-CCR	N33° 0' 8" W116° 42' 32"	68	-	-	-	-	-	-	-	x
San Diego Hydrologic Unit	Conejos Creek: Reach consisted of 5 riffles upstream of El Capitan Reservoir	CON-ECR	N32° 53' 25" W116° 45' 47"	69	-	-	-	-	-	-	-	x
San Diego Hydrologic Unit	San Vicente Creek: Site consisted of 5 riffles just downstream of Wildcat Canyon road crossing	SV-WCR	N32° 59′ 46.9″ W116° 50′ 38.5″	70	-	-	-	-	-	-	x	-
San Diego Hydrologic Unit	San Diego River: Reach consisted of 5 riffles upstream of Mission Dam	SDR-MD	N32° 50' 25.8" W117° 02' 20.7"	71	x	x	x	x	x	-	-	-
San Diego Hydrologic Unit	San Diego River: Reach consisted of 5 riffles at the downstream boundary of Mission Trails Regional Park	SDR-MT	N32° 49' 06.9" W117° 03' 55.1"	72	x	x	x	x	x	x	x	-
San Diego Hydrologic Unit	San Diego River: Reach consisted of 5 riffles adjacent to the River Valley golf course	SDR-1	N32° 45' 53.9" W117° 11' 28.9"	73	x	x	x	x	x	-	-	-

WATERSHED NAME	LOCATION DESCRIPTION	SITE ID	LATITUDE/ LONGITUDE	Site No.	May 1998	Sept 1998	Nov 1998	May 1999	Nov 1999	May 2000	Nov 2000	May 2001
Sweetwater Hydrologic Unit	Cold Creek: Reach consisted of 5 riffles in Cuyamaca State Park	CC-CSP	N32° 56′ 24.1″ W116° 33′ 52″	74	-	-	-	-	-	-	-	x
Sweetwater Hydrologic Unit	Sweetwater River: Reach consisted of 5 riffles downstream of Highway 79 at Cuyamaca State Park	SWR-CSPD	N32° 54′ 33.9″ W116° 34′ 34.8″	75	-	-	-	-	-	-	-	x
Sweetwater Hydrologic Unit	Sweetwater River: Reach consisted of 5 riffles upstream of Highway 79 at Cuyamaca State Park	SWR-CSPU	N32° 54' 32.0" W116° 34' 16.2"	76	-	-	-	-	-	-	-	x
Sweetwater Hydrologic Unit	Sweetwater River: Reach consisted of 5 riffles downstream of Riverside Drive near I-8	SWR-79	N32° 50' 20.8" W116° 36' 51.2"	77	x	x	x	x	x	-	x	x
Sweetwater Hydrologic Unit	Sweetwater River: Reach consisted of 5 riffles directly upstream of Hwy 94	SWR-94	N32° 43' 59.9" W116° 56' 19.0"	78	x	x	x	x	x	-	x	-
Sweetwater Hydrologic Unit	Sweetwater River: Reach consisted of 5 riffles directly downstream of Sweetwater Road	SWR-WS	N32° 39' 29.1" W117° 02' 36.4"	79	x	x	x	x	x	-	-	-
Otay Hydrologic Unit	Jamul Creek: Reach consisted of 5 riffles located directly upstream of Otay Lakes Road	JC-OLR	N32° 38′ 13.1″ W116° 53′ 3.7″	80	-	-	-	-	-	-	x	x
Otay Hydrologic Unit	Jamul Creek: Reach consisted of 5 riffles at USGS gauging station	JC-GS	N32° 38′ 1.0″ W116° 53′ 9.7″	81	-	-	-	-	-	-	-	x
Tijuana Hydrologic Unit	Kitchen Creek: Reach consisted of 5 riffles upstream of Kitchen Creek Road	KC-KCR	N32° 47′ 14.9″ W116° 27′ 03.8″	82	-	-	-	-	-	-	-	x
Tijuana Hydrologic Unit	Kitchen Creek: Reach consisted of 5 riffles below Cibbets Flat Campground	KC-BCF	N32° 45′ 38.2″ W116° 27′ 05.7″	83	-	-	-	-	-	-	-	x
Tijuana Hydrologic Unit	Long Canyon Creek: Reach consisted of 5 riffles at Cibbets Flat Campground	LCC-CFC	N32° 46′ 42″ W116° 26′ 42″	84	-	-	-	-	-	-	-	x
Tijuana Hydrologic Unit	Noble Creek: Reach consisted of 5 riffles directly upstream of Pine Creek Road	NC-PCR	N32° 51′ 49.6″ W116° 31′ 02.5″	85	-	-	-	-	-	-	-	x
Tijuana Hydrologic Unit	North Pine Creek: Reach consisted of 5 riffles directly upstream of Noble Creek	NPC-NC	N32° 51′ 54.6″ W116° 31′ 05.8″	86	-	-	-	-	-	-	-	x
Tijuana Hydrologic Unit	Troy Canyon Creek: Reach located above Kitchen Creek Road, site at trail crossing.	TCC-TC	N32° 48′ 28″ W116° 26′ 24″	87	-	-	-	-	-	x	x	x
Tijuana Hydrologic Unit	Wilson Creek: Reach consisted of 5 riffles upstream of Barrett Lake	WLC-ABL	N32° 41′ 37″ W116° 41′ 43″	88	-	-	-	-	-	-	-	x
Tijuana Hydrologic Unit	Middle Cottonwood Creek: Reach consisted of 5 riffles below Morena Lake	MCC-BML	N32° 40′ 33″ W116° 34′ 59″	89	-	-	-	-	-	-	-	x
Tijuana Hydrologic Unit	Pine Creek: Reach consisted of 5 riffles just upstream of Old HWY 80 crossing.	PC-H80	N32° 50′ 13.9″ W116° 32′ 10.9″	90	-	-	-	-	-	x	x	x

WATERSHED NAME	LOCATION DESCRIPTION	SITE ID	LATITUDE/ LONGITUDE	Site No.	May 1998	Sept 1998	Nov 1998	May 1999	Nov 1999	May 2000	Nov 2000	May 2001
Tijuana Hydrologic Unit	Cottonwood Creek: Reach consisted of 5 riffles directly downstream of Old HWY 80 crossing.	CC-H80	N32° 47′ 16.9″ W116° 29′ 51.4″	**91**	-	-	-	-	-	x	x	x
Tijuana Hydrologic Unit	La Posta Creek: Reach consisted of 5 riffles located in The Narrows between Cameron Truck Trail and Buckman Springs Road.	LPC-CTT	N32° 41′ 59.7″ W116° 28′ 44.9″	**92**	-	-	-	-	-	-	x	x
Tijuana Hydrologic Unit	Campo Creek: Reach consisted of 5 riffles just upstream of HWY 94 Gauging Station.	CC-H94	N32° 35′ 21.4″ W116° 31′ 04.7″	**93**	-	-	-	-	-	-	x	x

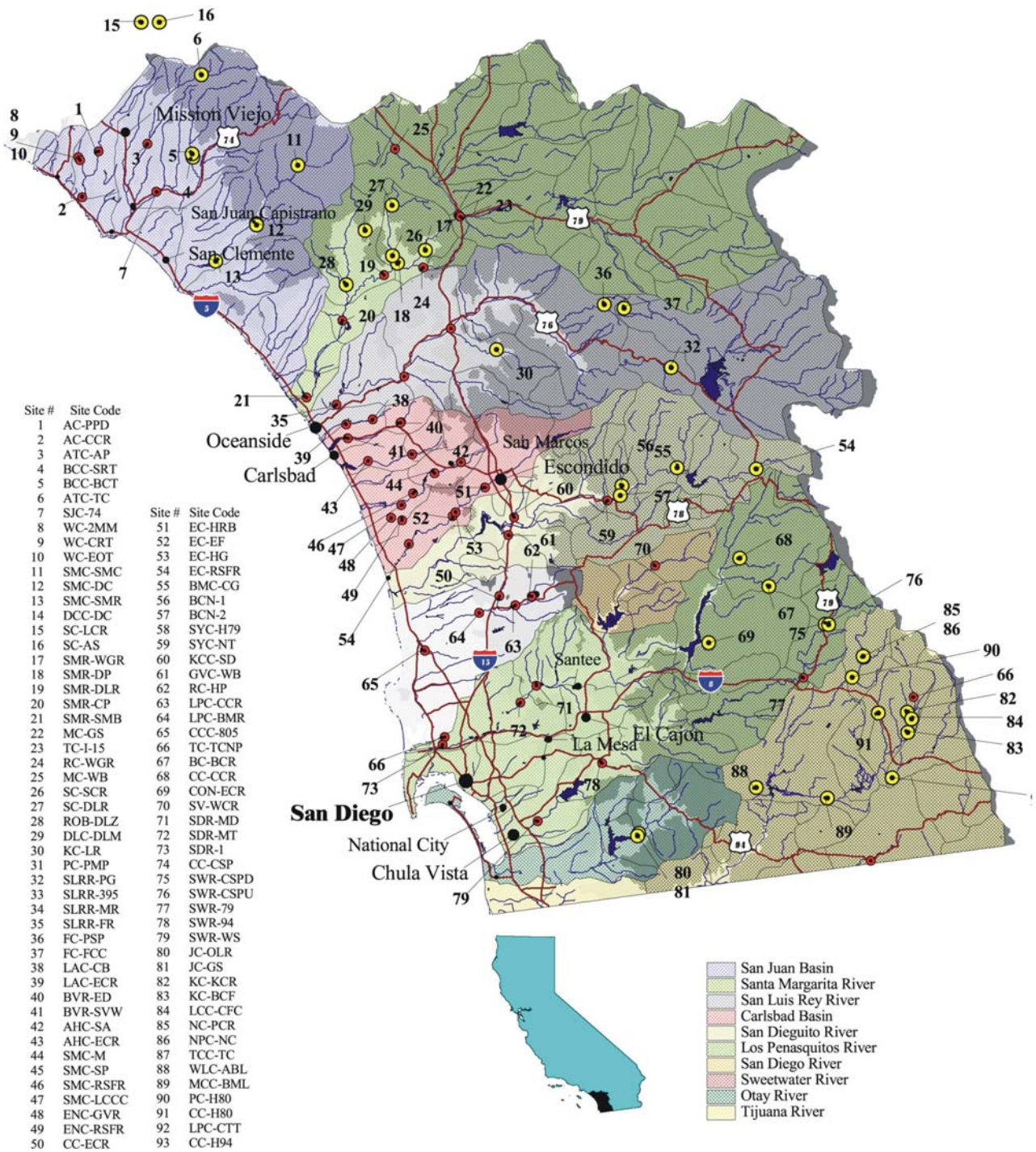

Site #	Site Code	Site #	Site Code
1	AC-PPD	51	EC-HRB
2	AC-CCR	52	EC-EF
3	ATC-AP	53	EC-HG
4	BCC-SRT	54	EC-RSFR
5	BCC-BCT	55	BMC-CG
6	ATC-TC	56	BCN-1
7	SJC-74	57	BCN-2
8	WC-2MM	58	SYC-H79
9	WC-CRT	59	SYC-NT
10	WC-EOT	60	KCC-SD
11	SMC-SMC	61	GVC-WB
12	SMC-DC	62	RC-HP
13	SMC-SMR	63	LPC-CCR
14	DCC-DC	64	LPC-BMR
15	SC-LCR	65	CCC-805
16	SC-AS	66	TC-TCNP
17	SMR-WGR	67	BC-BCR
18	SMR-DP	68	CC-CCR
19	SMR-DLR	69	CON-ECR
20	SMR-CP	70	SV-WCR
21	SMR-SMB	71	SDR-MD
22	MC-GS	72	SDR-MT
23	TC-I-15	73	SDR-1
24	RC-WGR	74	CC-CSP
25	MC-WB	75	SWR-CSPD
26	SC-SCR	76	SWR-CSPU
27	SC-DLR	77	SWR-79
28	ROB-DLZ	78	SWR-94
29	DLC-DLM	79	SWR-WS
30	KC-LR	80	JC-OLR
31	PC-PMP	81	JC-GS
32	SLRR-PG	82	KC-KCR
33	SLRR-395	83	KC-BCF
34	SLRR-MR	84	LCC-CFC
35	SLRR-FR	85	NC-PCR
36	FC-PSP	86	NPC-NC
37	FC-FCC	87	TCC-TC
38	LAC-CB	88	WLC-ABL
39	LAC-ECR	89	MCC-BML
40	BVR-ED	90	PC-H80
41	BVR-SVW	91	CC-H80
42	AHC-SA	92	LPC-CTT
43	AHC-ECR	93	CC-H94
44	SMC-M		
45	SMC-SP		
46	SMC-RSFR		
47	SMC-LCCC		
48	ENC-GVR		
49	ENC-RSFR		
50	CC-ECR		

Figure 1. Benthic macroinvertebrate sites sampled in May 1998, September 1998, November 1998, May 1999, November 1999, May 2000, November 2000 and May 2001. Sampling dates for sites are indicated in the legend. Reference sites are indicated by yellow points and non-reference sites are indicated by red points.

Table 2. Bioassessment metrics used to describe characteristics of the benthic macroinvertebrate (BMI) community at sampling reaches within the San Diego region.

BMI Metric	Description	Response to Impairment
Richness Measures		
Taxa Richness	Average number of individual taxa at each site	decrease
EPT Taxa	Average number of taxa in the Ephemeroptera (mayfly), Plecoptera (stonefly) and Trichoptera (caddisfly) insect orders	decrease
Cumulative Taxa	Total number of taxa at each site	decrease
Cumulative EPT Taxa	Total number of EPT taxa at each site	decrease
Dipteran Taxa	Number of taxa in the insect order (Diptera," true flies")	increase
Non-Insect Taxa	Number of non-insect taxa	increase
Composition Measures		
EPT Index	Percent composition of mayfly, stonefly and caddisfly larvae	decrease
Sensitive EPT Index	Percent composition of mayfly, stonefly and caddisfly larvae with tolerance values between 0 and 3	decrease
Shannon Diversity Index	General measure of sample diversity that incorporates richness and evenness (Shannon and Weaver 1963)	decrease
Tolerance/Intolerance Measures		
Tolerance Value	Weighted average value (0-10) of individuals designated as pollution tolerant (high values) or intolerant (low values)	increase
Percent Dominant Taxa	Percent composition of the single most abundant taxon	increase
Percent Chironomidae	Percent composition of the tolerant dipteran family Chironomidae	increase
Percent Intolerant Organisms	Percent of organisms in sample that are highly intolerant to impairment as indicated by a tolerance value of 0, 1 or 2	decrease
Percent Tolerant Organisms	Percent of organisms in sample that are highly tolerant to impairment as indicated by a tolerance value of 8, 9 or 10	increase
Functional Feeding Groups (FFG)		
Percent Collectors	Percent of macrobenthos that collect or gather fine particulate matter	increase
Percent Filterers	Percent of macrobenthos that filter fine particulate matter	increase
Percent Grazers	Percent of macrobenthos that graze upon periphyton	variable
Percent Predators	Percent of macrobenthos that feed on other organisms	variable
Percent Shredders	Percent of macrobenthos that shreds coarse particulate matter	decrease
Abundance		
Estimated Abundance	Estimated number of benthic macroinvertebrates in sample calculated by extrapolating from the proportion of organisms in the subsample	variable

RESULTS

Results of May 2001 Sampling Event

To facilitate comparison of data from the May 2001 sampling event with data from earlier sampling events, May 2001 data are presented in the same format used in our previous two reports. The data are presented in tables, figures and appendices as listed below:

- Table 3 presents a list of top five most abundant taxa identified from each site sampled during the May 2001 sampling event
- Figure 2 presents BMI ranking scores for macroinvertebrate monitoring sites sampled in May 2001
- Appendices A, B and C contain the complete May 2001 taxonomic lists, transect metrics and site metric summaries, respectively

This report utilizes the newly established ranking criteria based on the IBI described herein. Since this method integrates multiple components of biological community data, no attempt is made in this report to interpret general trends in abundance or community composition based on visual assessment of the May 2001 data tables as was done in previous bioassessment reports for RWQCB (9) (Ode and Harrington 1999).

Table 3. The top five most abundant taxa identified at each site sampled during the May 2001 sampling event (percent contribution in parentheses).

StationID	Top Five Most Abundant Taxa at Each Site				
	1	2	3	4	5
San Juan Hydrologic Unit					
AC-PPD	*Fallceon quilleri* (36.7)	*Baetis* (28.2)	*Simulium* (12.4)	Orthocladiinae (7.6)	Cyclopoida (5.2)
BCC-SRT	*Physa/ Physella* (23.6)	Naididae (21.9)	*Baetis* (20.5)	*Simulium* (8.1)	Orthocladiinae (8.1)
BCC-BCT	*Physa/ Physella* (32.9)	*Baetis* (16.4)	Naididae (11.9)	Tanytarsini (9.3)	*Fossaria* (7.9)
ATC-TC	Orthocladiinae (33.8)	*Physa/ Physella* (16.3)	*Serratella* (12.6)	*Baetis* (9.7)	Tanytarsini (6.9)
WC-2MM	*Simulium* (56.6)	Orthocladiinae (26.0)	Naididae (7.5)	*Baetis* (7.0)	Megadrili (1.4)
WC-CRT	*Simulium* (42.7)	Orthocladiinae (23.1)	*Baetis* (16.1)	Naididae (14.9)	Tanytarsini (1.9)
WC-EOT	Tanytarsini (34.5)	Orthocladiinae (22.1)	Nematoda (14.2)	*Simulium* (11.2)	Planariidae (7.1)
SMC-SMC	Tanytarsini (26.7)	Orthocladiinae (20.8)	Naididae (10.4)	*Simulium* (9.3)	*Serratella* (7.8)
SMC-DC	Orthocladiinae (20.5)	*Baetis* (11.2)	*Wormaldia* (10.9)	*Amiocentrus* (8.6)	Tanytarsini (6.9)
SMC-SMR	*Physa/ Physella* (28.8)	*Fossaria* (14.6)	Naididae (9.6)	*Helisoma* (7.1)	*Baetis* (6.8)
DCC-DC	*Physa/ Physella* (15.7)	Orthocladiinae (12.7)	Tanytarsini (9.4)	*Baetis* (7.3)	Naididae (6.6)
SC-LCR	Orthocladiinae (47.8)	Tanytarsini (20.2)	*Baetis* (10.3)	*Physa/ Physella* (8.2)	Hygrobatidae (2.4)
SC-AS	Orthocladiinae (21.4)	Amiocentrus (20.6)	*Physa/ Physella* (19.2)	*Baetis* (17.3)	Tanytarsini (4.7)
Santa Margarita Hydrologic Unit					
SMR-WGR	*Simulium* (35.0)	*Baetis* (13.2)	Orthocladiinae (10.8)	Chironomini (8.4)	Chironominae (5.5)
SMR-DP	*Baetis* (25.3)	*Hydropsyche* (14.4)	*Tricorythodes* (13.9)	Orthocladiinae (9.9)	*Amiocentrus* (7.7)
SMR-DLR	*Tricorythodes* (35.6)	Orthocladiinae (15.8)	*Corbicula* (14.4)	*Fallceon quilleri* (9.8)	*Baetis* (6.4)
SMR-CP	*Fallceon quilleri* (28.6)	*Centroptilum/ Procloeon* (12.8)	Orthocladiinae (11.5)	*Tricorythodes* (9.4)	*Corbicula fluminea* (8.7)
SC-SCR	Baetis (31.5)	Orthocladiinae (12.9)	Chironominae (10.9)	*Simulium* (10.9)	*Micrasema* (3.9)
SC-DLR	*Baetis* (15.0)	*Physa/ Physella* (14.6)	Orthocladiinae (13.2)	*Prosimulium* (8.9)	*Simulium* (6.5)
ROB-DLZ	*Gyraulus* (32.2)	Tanytarsini (14.3)	Orthocladiinae (11.3)	*Cheumatopsyche* (6.7)	Naididae (6.6)
DLC-DLM	*Baetis* (25.1)	*Hydropsyche* (11.3)	Orthocladiinae (10.4)	*Zaitzevia* (9.0)	*Amiocentrus* (7.1)

San Luis Rey Hydrologic Unit					
KC-LR	Orthocladiinae (33.0)	*Baetis* (16.6)	*Simulium* (10.3)	*Hydropsyche* (9.3)	Tanytarsini (6.6)
SLRR-PG	*Baetis* (33.2)	*Simulium* (25.8)	Orthocladiinae (10.4)	Tanytarsini (7.6)	Naididae (7.6)
SLRR-395	*Gammarus* (36.6)	*Corbicula* (32.0)	Orthocladiinae (16.2)	Tanytarsini (6.1)	*Simulium* (4.2)
FC-PSP	Chironomini (17.7)	*Simulium* (16.4)	Orthocladiinae (12.7)	*Caenis* (10.1)	*Argia* (7.2)
FC-FCC	Orthocladiinae (31.4)	Tanytarsini (16.0)	*Serratella* (7.8)	*Hydraena* (7.5)	Tanypodinae (6.6)
Carlsbad Hydrologic Unit					
AHC-ECR	*Baetis* (27.8)	*Simulium* (26.2)	*Fallceon quilleri* (14.7)	Cyprididae (6.8)	Tanytarsini (4.5)
San Dieguito Hydrologic Unit					
BMC-CG	Orthocladiinae (26.0)	Chironomini (11.5)	Tanytarsini (8.2)	*Wormaldia* (7.1)	*Hydropsyche* (6.4)
BCN-1	Orthocladiinae (15.2)	*Wormaldia* (14.8)	Tanytarsini (13.4)	*Zaitzevia* (9.3)	Chironomini (7.2)
BCN-2	Tanytarsini (29.5)	Cyprididae (24.5)	Orthocladiinae (18.2)	*Physa/ Physella* (6.0)	*Wormaldia* (4.1)
SYC-H79	*Physa/ Physella* (57.1)	*Agapetus* (10.5)	Tanytarsini (7.9)	*Baetis* (5.1)	*Simulium* (3.6)
SYC-NT	Orthocladiinae (50.1)	Tanytarsini (22.4)	*Serratella* (4.7)	*Wormaldia* (4.6)	*Isoperla* (2.6)
Los Peñasquitos Hydrologic Unit					
LPC-BMR	*Simulium* (77.0)	*Fallceon quilleri* (5.5)	*Corbicula* (3.3)	*Baetis* (2.6)	*Hyalella azteca* (2.6)
San Diego Hydrologic Unit					
BC-BCR	Orthocladiinae (25.7)	Tanytarsini (24.8)	*Simulium* (17.1)	Chironomini (11.9)	Tanypodinae (6.8)
CC-CCR	*Serratella* (13.0)	Orthocladiinae (12.4)	*Wormaldia* (11.2)	Tanytarsini (10.9)	Chironomini (6.4)
CON-ECR	Tanytarsini (44.8)	Naididae (21.5)	Orthocladiinae (13.6)	*Physa/ Physella* (8.0)	*Hydroptila* (3.1)
Sweetwater Hydrologic Unit					
CC-CSP	Tanytarsini (27.2)	Nematoda (24.5)	Orthocladiinae (22.5)	*Ameletus* (3.6)	*Optioservus* (2.8)
SWR-CSPD	Orthocladiinae (16.0)	Tanytarsini (13.1)	*Hyalella azteca* (10.8)	*Pisidium* (7.7)	Chironomini (5.4)
SWR-CSPU	Orthocladiinae (31.9)	*Simulium* (11.6)	Tanytarsini (11.6)	*Baetis* (8.2)	Chironomini (4.7)
SWR-79	Tanytarsini (30.4)	*Physa/ Physella* (28.8)	Orthocladiinae (19.1)	Megadrili (6.3)	*Baetis* (3.3)

Otay Hydrologic Unit					
JC-OLR	*Baetis* (39.4)	Tanytarsini (15.1)	*Hydropsyche* (11.0)	*Amiocentrus* (10.8)	Orthocladiinae (4.9)
JC-GS	Tanytarsini (38.1)	*Baetis* (15.8)	*Hydropsyche* (13.0)	*Amiocentrus* (7.8)	Orthocladiinae (5.0)
Tijuana Hydrologic Unit					
KC-KCR	Orthocladiinae (42.0)	Tanypodinae (18.8)	Tanytarsini (8.5)	*Serratella* (4.3)	Nematoda (3.8)
KC-BCF	Orthocladiinae (36.5)	Nematoda (19.5)	Tanytarsini (16.1)	*Isoperla* (6.7)	*Serratella* (4.1)
LCC-CFC	Orthocladiinae (40.4)	Tanytarsini (29.3)	*Baetis* (8.4)	*Isoperla* (7.9)	Enchytraeidae (4.4)
NC-PCR	Orthocladiinae (33.4)	Nematoda (29.0)	Tanytarsini (11.8)	Enchytraeidae (5.9)	Naididae (4.2)
NPC-NC	Orthocladiinae (22.6)	*Serratella* (15.4)	Tanytarsini (14.1)	*Physa/ Physella* (9.3)	*Metrichia* (6.2)
TCC-TC	Orthocladiinae (37.0)	*Hyalella azteca* (13.7)	Cyprididae (9.9)	Tanypodinae (7.7)	Tanytarsini (5.6)
WLC-ABL	Tanytarsini (26.9)	Orthocladiinae (24.1)	*Baetis* (14.9)	*Physa/ Physella* (5.2)	*Hyalella azteca* (5.1)
MCC-BML	Tanytarsini (33.1)	Orthocladiinae (24.4)	*Simulium* (19.7)	Enchytraeidae (6.5)	Chironomini (4.8)
PC-H80	Orthocladiinae (33.7)	*Baetis* (13.2)	*Simulium* (11.5)	Tanytarsini (10.4)	Chironomini (4.9)
CC-H80	Hydrobiidae (31.7)	Orthocladiinae (20.5)	*Microcylloepus* (10.9)	*Pisidium* (3.9)	Sphaeriidae (3.4)
LPC-CTT	Orthocladiinae (31.8)	*Hyalella azteca* (11.7)	*Baetis* (10.4)	Cyprididae (6.7)	Tubificidae (6.1)
CC-H94	Orthocladiinae (42.8)	Tanytarsini (24.6)	Chironomini (5.2)	*Hyalella azteca* (3.7)	*Fallceon quilleri* (3.4)

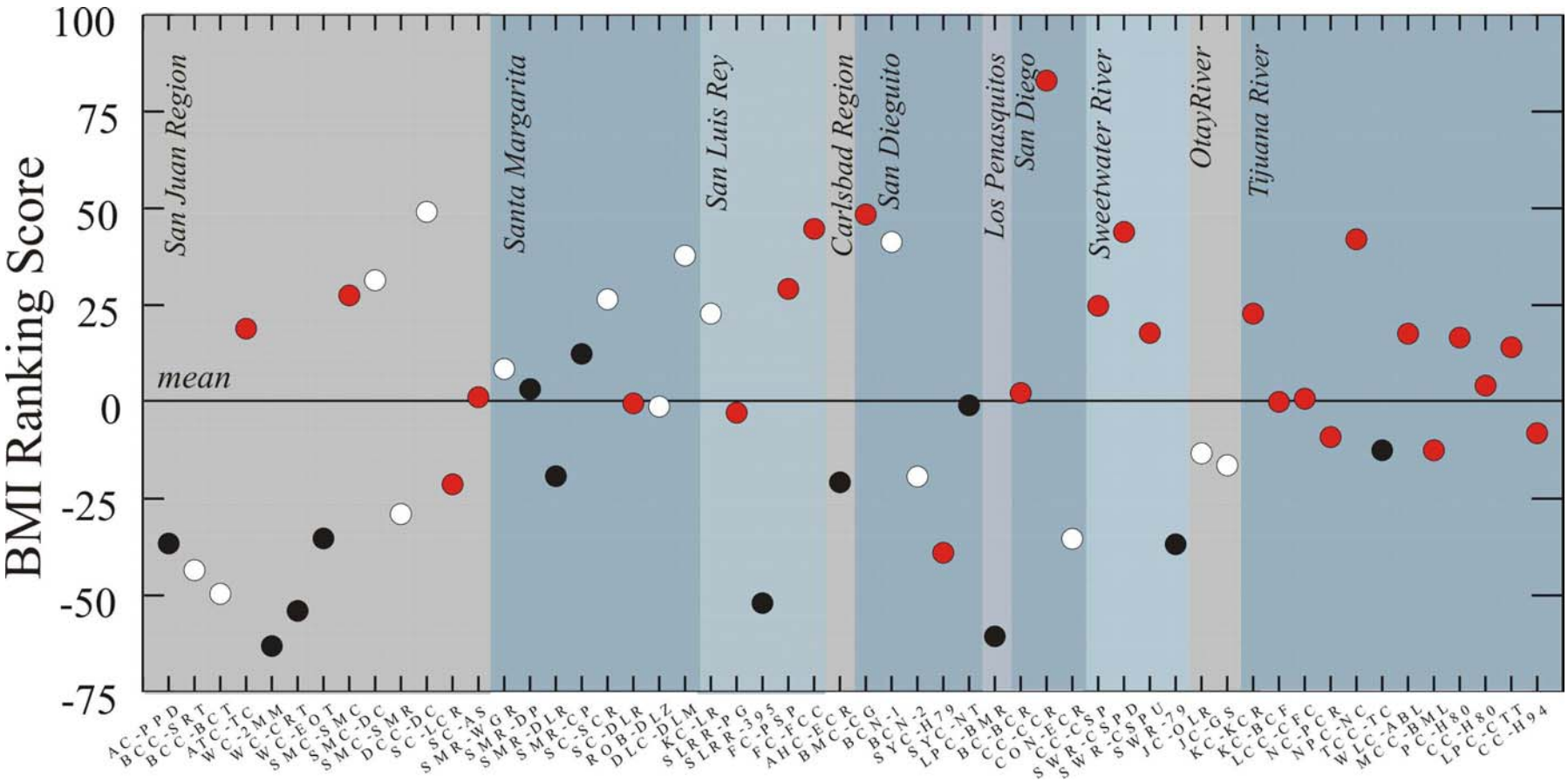

Figure 2. BMI ranking scores for macroinvertebrate monitoring sites sampled in May 2001. Red points indicate reference sites above 1000 feet elevation, white points represent reference sites below 1000 feet elevation, and black points indicate non-reference sites.

IBI Methodology

General Steps for Creating an Index of Biotic Integrity (IBI)

Barbour *et al*. (1999) identify 6 general steps involved in the development of an IBI; each step can be modified based on the needs of the region or availability of research tools. We discuss here some of the major conceptual issues involved in each step and describe specifically the methods that we used to create the San Diego IBI. Topics for future development are also discussed.

I. Classify stream types into classes and select reference sites
II. Select potential metrics
III. Evaluate metrics to select most robust ones
IV. Score metrics and combine scores into IBI
V. Assign rating categories to IBI score ranges
VI. Evaluate IBI and refine

Step I. Stream Type Classification and Reference Site Selection

General Theory
Reference sites are sections of streams that represent the desired state of stream health (*sensu* Meyer 1997) for a region of interest. Since natural stream communities vary both spatially and temporally, it is natural that measures of biotic integrity also should be expected to vary. Once candidate reference reaches have been identified, these are used to characterize the range of biotic conditions expected for minimally disturbed sites. Deviation from this range can then be used as an indication that test sites may be impaired.

Variation is fundamental to biological communities. Although this variation poses challenges to the interpretation of water quality, sound scientific approaches for interpreting impairment in the context of natural variation have been and continue to be developed for both multivariate and multimetric analytical techniques (Wright et al. 1993, Barbour *et al*. 1999, Karr and Chu 1999, Hawkins *et al*. 2000). The objective of a sound IBI is to identify potential sources of variation and control for this variation by classifying stream types and using IBI metrics that are less susceptible to natural variation (Karr and Chu 1999, Barbour *et al*. 1999).

Techniques for the selection of reference sites have been discussed extensively (Hughes and Larsen 1988, Hughes 1995, Stoddard unpublished ms). There are many definitions of the term "reference condition" ranging from the pristine, undisturbed state of a stream, to merely the "best available" or "best attainable" conditions in a region. Since practical considerations limit our ability to find minimally disturbed sites, most reference condition approaches seek to identify a compromise, the "least disturbed condition" in region. In some regions, particularly those that have been severely impacted by human activity, it is necessary to select sites that represent the "best attainable" condition given best management practices in a manipulated ecosystem.

(SNARL) Reference Site Selection Approach
To date, most of the bioassessment projects/ programs in California that have attempted to include information about minimally impacted conditions have used either "control sites" or a few "reference" sites to supplement data collected at test sites, but this has rarely been done in a systematic manner. Almost all programs have used the subjective technique of "best professional judgement" for selecting sites.

In May 2000, the DFG and Sierra Nevada Aquatic Research Laboratory (SNARL) collaborated to develop a quantitative approach to selecting reference sites in California. The basic approach combines landscape analysis tools (geographic information system,GIS) with ground-truthing to identify a pool of reference sites that can be subsampled to define the range of variability in benthic communities in relatively undisturbed portions of a region of interest. The procedure consists of the following steps:

1. *Identification of the Region of Interest and Classes of Streams to be Evaluated–*
   a. The region of interest will be defined by the scale of the questions and the entity asking the questions. It could be based on regulatory or other political boundaries, bioregions or ecoregions, watersheds or other groupings.
   b. Classification of streams into different categories serves as the basis for dividing the natural variation into classes of similar stream types. Ecoregions are the most commonly used unit for grouping reference streams, but many other partitions may be equally useful: stream order, stream gradient, watershed area, elevation zones, prior beneficial use designations, etc. Note that there is no *a priori* reason to avoid combinations of classification schemes might be used in an attempt to partition natural variation and many of these factors may be interrelated.

2. *Within the Region of Interest, Identify Areas to be used as Units of Analysis*
   a. Because they integrate all upstream landuse activities, watersheds are the logical choice for analysis areas. Ideally this would mean using the smallest watersheds (defined by first order streams) as the basic unit of analysis, but adequate watershed areas are not currently available for GIS analysis.
   b. Existing CalWater Watershed Planning Areas (WPAs) can serve as the basic analysis unit. However, because they often do not match true watershed boundaries at the smallest scales, their use limits analysis to larger scale watershed boundaries. This is acceptable for coarse screening of target areas, but will need to be resolved before GIS can be used at a finer scale.

3. *Develop a List of Land Use Disturbances of Interest*
   a. Assemble a list of major impacts that have the potential to affect stream condition.
   b. Landuse categories and measures of human activities in the watershed are available in GIS formats from various state and federal agencies.
   c. Additional factors affecting stream condition include the presence of dams and other diversion structures, presence of mining activity, previous history of pollution events, etc.

4. *Use GIS tools to Summarize Potential Land Use Impacts for each Area*
    a. This is the quantitative step in the process. Using GIS tools like the USEPA's Analytical Tools for Landscape Analysis (ATtILA) extension, landuse data layers are analyzed to calculate impact scores for each impact identified in Step 3 (e.g. percent impervious surface in each target unit).
    b. At present, available GIS tools are limited to analysis of land use and related measures (e.g. road density, percentages of different landuse activities, estimates of nitrogen and phosphorous loading). Additional criteria (e.g. presence of dams and other diversion structures, presence of mining activity, previous history of pollution events) can be scored the same way by hand using other datasets and maps to supplement the GIS data. Ultimately, important additional factors can be integrated into ATtILA to provide a unified tool for analysis.

5. *Use Statistical Properties of the Distributions to Score Impacts*
    a. Frequency histograms of impact intensity are used to set criteria for eliminating sites from consideration as having candidate reference streams.
    b. This can be done visually by looking for "natural breaks" in distributions (which may indicate impact thresholds) or by using statistical properties of the distributions to select cutoffs (e.g. eliminate all sites having road densities >1 standard deviation above the mean for the region)

6. *Use Impact Scores to Identify Regions with Minimal Disturbance: Target Areas*
    a. Using scoring criteria, progressively eliminate all target areas that do not meet all of the criteria established in Step 5.
    b. This may require modification of the scoring criteria if too many or too few candidate areas are selected.
    c. This stage can be further modified to emphasize specific impact types based on *a priori* or *a posteriori* decisions about the relative importance of these factors.

7. *Ground Truthing*
    a. Stage I– Rapid Reconnaissance. Once areas with potential for containing candidate reference sites are identified, field crews drive through the area to identify stream reaches that meet basic criteria for bioassessment sampling (e.g. adequate flow, practical access). Preliminary screening of streams within each target areas will identify regions that need to be eliminated based on information not available through GIS tools.
    b. Stage II–Identify Ownership and Obtain Access Permission. It is usually desirable to select sampling locations that occur on publicly owned land or land with easy access. However, since it is important to sample streams from a truly representative set of sites within an area, it is often necessary to sample from reaches running through privately owned land. Reasonable efforts should be taken to obtain permission from landowners before rejecting candidate sites.
    c.Stage III–Intensive Habitat Scoring and Selection of Reference Sites for Sampling. Sites that make it through Stage I reconnaissance and for which legal access is obtained are evaluated using an intensive physical habitat scoring procedure that emphasizes quantitative physical measurements.

8. *Sampling of Biotic Communities*
   a. A subsample of the pool of reference sites is sampled for benthic invertebrates and the data are analyzed to define the range of biological metric values in the pool of reference sites.
   b. Reference sites may be sampled for other measures of stream or riparian health (e.g. fish or algal communities, water column chemistry, toxicity, etc)

9. *Refinement of the Reference Pool*
   a. The reference site pool is further refined based on biological, chemical and physical habitat data collected at each site.
   b. Some candidate reference sites will be eliminated as land use changes occur, while others may be added if conditions improve.

Between Fall 2000 and Fall 2001, DFG has applied a test of this procedure to the Sierra Nevada Foothills Ecoregion (SNFE) of the Sacramento River Watershed Program (SRWP). As this methodology is developed we will apply these techniques to the San Diego Region. Although most of these techniques were not applied to the selection of reference sites in the current IBI, we expect to use these techniques extensively in the future refinement phase of the IBI.

Application to San Diego IBI

Most reference sites in the San Diego region were selected by David Gibson between 1991 and 1999, with a few additional sites selected by DFG in April 2001. The approach used in the selection process represents a combination of objective and subjective criteria. Sites were selected on the following criteria:

1. Relatively Easy Access: Legal, reliable access that minimized foot travel time. David Gibson made an effort in 1995-1997 to sample stream reaches that were significant distances from roads, impoundments, and public access, but found that the effort to reach the sites usually did not result in locating sites that were significantly better candidates for reference conditions.

2. Base Flow Stream Chemistry:
   - low nitrates (<0.25 ppm)
   - low nitrites(<0.005 ppm)
   - low orthophosphate (<0.25 ppm)
   - low turbidity (<0.75 NTU)
   - low manganese (<0.3 ppm)
   - low iron (<0.5 ppm)
   - non-detect ammonia (<0.01 ppm)
   - non-detect copper(<0.01ppm)
   - non-detect aluminum (<0.01 ppm)
   - non-detect chromium, (<0.01 ppm)
   - REC-1 bacteria levels (Total Coliform <1000MPN, Fecal Coliform <400CFU, and Enterococcus <104 CFU).

3. Absence of Grazing: (or minimal grazing) during the previous 5 years. Minimal grazing meant that few livestock were observed and little or no impact on the stream was observed during site visits. Grazing pressure has recently been increasing in parts of the

Cleveland National Forest as privately owned grazing rangelands have come off the lease market, so some of these sites are now more impacted than previously.

4. Residential Land Use: Areas without residential land use or where residential land use was minimal. In particular, we tried to avoid areas with dense septic tank fields, hobby agriculture, extensive groundwater pumping, and road networks (paved or dirt).

5. Stream Flow Status:
    a. Perennial streams 1st Order
    b. Perennial streams 2nd –3rd Order
    c. Intermittent streams (1st –2nd Order) with at least 3-4 months of reliable flow (typically March - June).

6. Additional Criteria:
    a. Upstream of road crossings and recreational areas (campgrounds, picnic grounds, popular road side visitation areas).
    b. Upstream of impoundments or on drainages without impoundments.
    c. If upstream impoundments were present, site was located at least 5 stream-miles downstream of the impoundments.
    d. Presence of mature riparian habitat and an otherwise high RBP physical habitat score.

7. Professional Judgement: Additional experience of RWQCB Environmental Scientist David Gibson (based on at least 1 annual visit to the area around the site over several years) indicating that the stream reach was minimally impacted by land use upstream or that the impact was mitigated.

8. Elevation: Considerable effort was taken to identify reference sites from different parts of the area covered by the San Diego RWQCB (9). We were especially careful to select a comparable number of sites above and below 1000 feet elevation so that we could evaluate minimally disturbed sites in both regions.

Rejection of Candidate Reference Sites

After the initial screening criteria were used to identify potential reference sites for the San Diego Region, we eliminated a few sites from consideration based on their physical habitat scores. To do so, we calculated a Physical Ranking Score (PRS) for each of the May 2001 sites

(Figure 3, Figure 4). The PRS was calculated in the same manner as the BMI Ranking Score that we have described in previous San Diego reports. We used 8 physical habitat metrics, representing both reach and riffle scale measures of physical habitat integrity. These metrics are defined in the CSBP (Harrington 1999) and were selected on the basis of their responsiveness to physical condition:

1. Epifaunal Substrate
2. Riffle Embeddedness
3. Sediment Deposition
4. Bank Vegetation
5. Canopy Cover
6. Substrate Consolidation
7. Percent Fines
8. Specific Conductance

Physical Rank Scores were calculated using the following formula:

$$Score = \sum \left(x_i - \bar{x} \right) / \, sem_i$$

where: x_i = site value for the *i*-th metric; x bar = overall mean for the *i*-th metric; sem_i = standard error of the mean for the *i*-th metric. An overall score of "0" is the average for all sites.

For a methods comparison, we also calculated an Index of Physical Integrity (using methodologies similar to those used for calculating the Karr style IBI (Karr 1981). However, the PRS scores provided a better means of discriminating between sites.

On the basis of PRS scores we eliminated several sites from consideration as reference sites (sites removed from the reference pool include: WC-2MM, WC-CRT, WC-EOT, SMR-DP, SYC-NT, TCC-TC, and SWR-79). Final reference sites used in the IBI are identified in red in the site description table (Table 1).

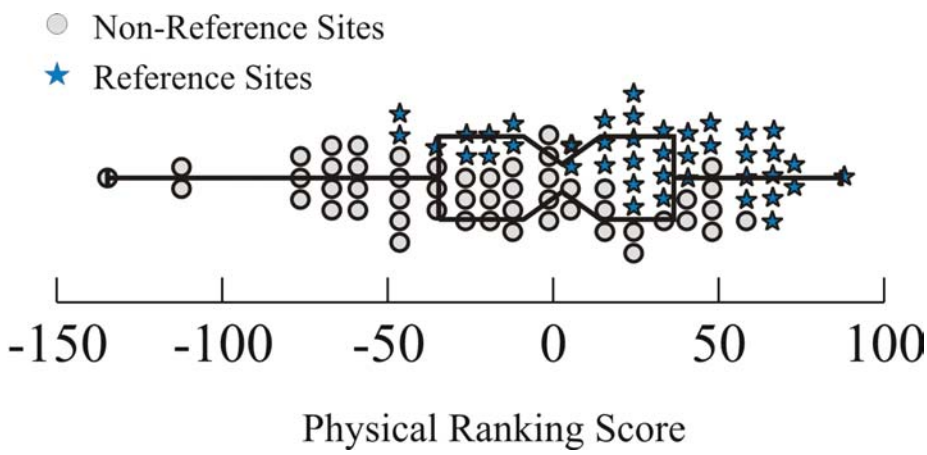

Figure 3. Distribution plot of physical ranking scores for all sites. The box represents 25th and 75th percentiles, the constriction in the plot represents the median value and the lines represent 95% confidence limits. References sites are indicated by blue stars.

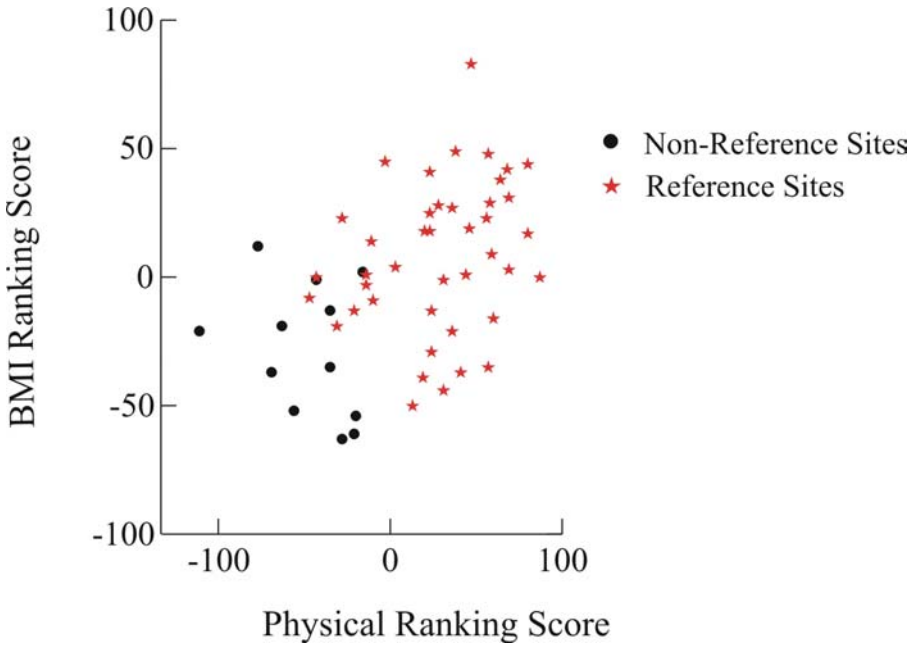

Figure 4. Relationship between physical ranking score and the BMI ranking score for the May 2001 sampling event.

Steps II and III. Metrics Screening and Selection for Use in IBI

Selection of the most appropriate bioassessment metrics for an IBI is a critical phase in the creation of an IBI and typically undergoes the most revision in subsequent refinement of the IBI. According to Barbour *et al*. (1999), a metric is "a measure of the biota that changes in a predictable way with increased human influence". Ideal metrics differ from region to region (hence the need for regional IBIs), but share common characteristics. Most critically, "core" metrics should be able to discriminate between known reference condition sites and known impaired condition sites Barbour *et al*. (1999).

We used a series of techniques to select appropriate metrics following the United States Environmental Protection Agency's (EPA) recommendations (Barbour *et al*. 1999, Hughes *et al*. 1998, McCormick *et al*. 2001). We screened approximately 20 metrics, first by testing their discriminatory power and then by evaluating their relationship with an independent measure of human impact. In a prior report, we used a measure of land use activity (percent developed land) to screen metrics. Metrics used in this IBI were selected on the basis of their responsiveness to the Gibson Score, a measure developed by RWQCB staff David Gibson to integrate multiple aspects of land use impairment in a site. The measure is a quantification of many of the criteria that were used to select reference sites. In addition to these criteria, Karr (1986) and the EPA (Barbour *et al*. 1999) recommend selecting metrics from all of the different metrics categories (richness measures, composition measures, tolerance measures and trophic/ habitat measures). Figures 5 and 6 present examples of how these two techniques are used to screen metrics. Figure 5 compares the distribution of metric values for references sites and non-reference sites; Figure 5a demonstrates a metric with good separation between reference sites and non-reference sites, 5b demonstrates a metric with poor separation between reference and non-reference sites. Figure 6 compares the relationship between two metrics and a measure of human influence; Figure 6a demonstrates a strong relationship between the Gibson Score and Cumulative EPT Taxa, while

6b demonstrates a weak relationship between the Gibson Score and Percent Chironomidae. On the basis of these screening techniques, we selected the following 7 "core" metrics to use in the San Diego IBI:

1. Cumulative Taxa
2. Cumulative EPT Taxa
3. Percent Sensitive EPT
4. Percent Dominant Taxon
5. Shannon Diversity
6. Intolerant Taxa
7. Percent Grazers.

Other approaches used in creating IBIs include measurement of signal: noise ratios (good metrics have a high degree of precision in repeat measurements) and tests for independence of measurement, which are sometimes called "redundancy" or "orthogonality" tests (see discussion in Barbour *et al*. 1999 and Hughes *et al*. 1998). There were insufficient reference sites with repeat site visits to adequately apply these tests, but both are approaches that should be used in future refinement of the IBI.

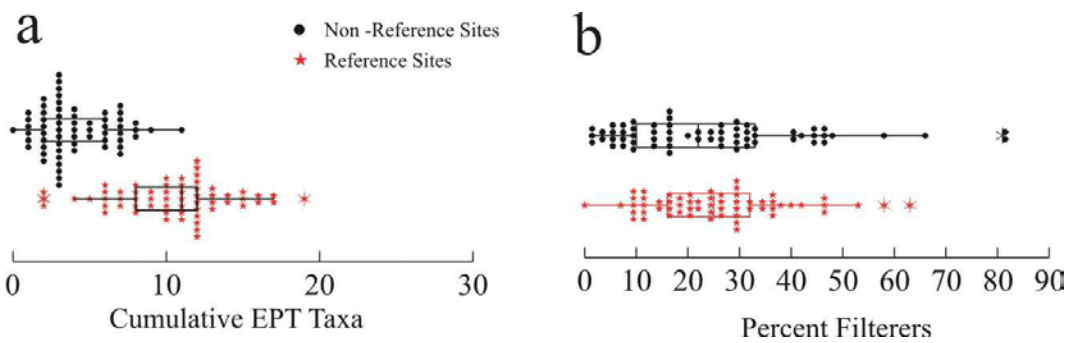

Figure 5. Boxplots describing the distribution of site values for a) Cumulative EPT Taxa and b) Percent Filterers.

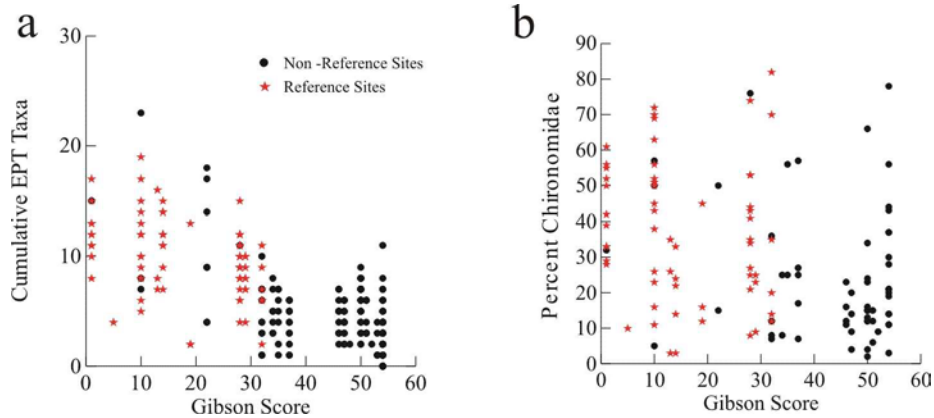

Figure 6. Scatterplots describing the relationship between the Gibson Score values and a) Cumulative EPT Taxa and b) Percent Chironomidae.

Step IV. Defining Scoring Ranges of Core Metrics

Scoring ranges were defined using techniques described in Hughes *et al*. (1998) and McCormick *et al*. (2001). Statistical properties of the distribution of metric scores for both reference sites and non-reference sites were used to define cutoffs using the following criteria: 1) any site with a metric value of less than the 5th percentile of the non-reference sites was assigned a "0" score, 2) any site with a metric value of greater than the 50th percentile of the reference sites was assigned a "10" score. The range between these values was divided into 9 equal portions and assigned values between 1 and 9 (Figure 7). Scoring ranges were calculated for all core metrics based on the data from the last three sampling events (May 2000, November 2000 and May 2001) and are listed in Table 4.

The cutoffs that define the ranges for each metric (here: 5% and 50%) are arbitrary and can be adjusted if necessary to better describe the range of variability in scores. We investigated the use of other cutoffs to see if other values would result in more optimal distribution of the final IBI scores. We also used a Karr –style IBI scoring methodology (Barbour *et al*. 1999) in which 95% of the complete range is divided into 3 (=trisection) or 4 (=quadrisection) equal ranges. This approach was used in the creation of the Russian River IBI (Harrington 1999). A comparison of the three alternatives indicated that the Hughes/ McCormick methodology provided the best discrimination of site quality.

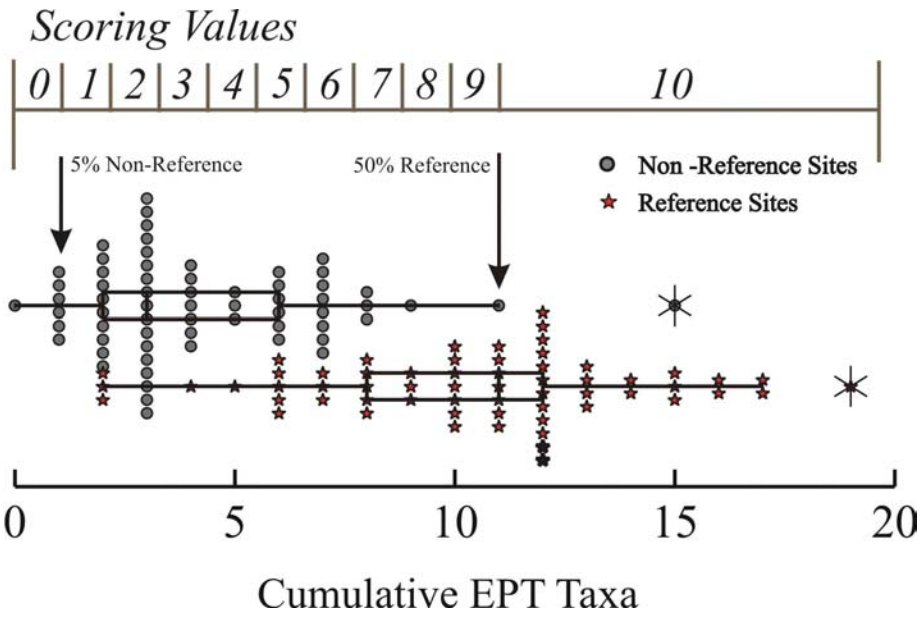

Figure 7. Example of methodology for setting scoring ranges for the core metrics. See text for full description of scoring methodology.

Step V. Calculation of the IBI

After the core metrics have all been assigned scoring ranges (Table 4), the IBI score for each site is calculated by summing the component metric scores. The distribution of resulting IBI scores for all the sites is then divided into ranges that define thresholds of biotic condition (Table 4). Ranking ranges for the San Diego IBI were established by using the 25th percentile of reference sites (again using only the last three sampling events which included a substantial number of reference sites) to set the boundary between the "Good" and "Fair" scoring ranges. Then the top end of the scale was divided into two equal sections ("Good" and "Very Good") and the bottom end of the scale was divided into three equal sections ("Fair", "Poor" and "Very Poor"). A distribution plot of the site IBI scores used to establish the rating thresholds for the San Diego IBI is presented in Figure 8.

Table 4. Scoring ranges for the seven metrics included in the San Diego IBI and the IBI values

	Metric Scoring Ranges for San Diego IBI						
Score	**Cumulative Taxa**	**Dominant Taxon**	**Sensitive EPT Index**	**Cumulative EPT Taxa**	**Shannon Diversity**	**Intolerant Taxa**	**Percent Grazers**
0	0-16	>56	0-0.6	0-1	0-1.31	0-.5	0-0.6
1	17-19	54-56	0.7-1.3	2	1.31-1.4	0.6-1.0	0.7-1.3
2	20-21	51-53	1.4-2.0	3	1.41-1.49	1.1-1.6	1.4-2.0
3	22-23	49-50	2.1-2.7	4	1.5-1.58	1.7-2.1	2.1-2.7
4	24-25	47-48	2.8-3.3	5	1.59-1.67	2.2-2.7	2.8-3.4
5	26-27	45-46	3.4-4	6	1.68-1.76	2.8-3.2	3.5-4.1
6	28-29	42-44	4.1-4.6	7	1.77-1.84	3.3-3.8	4.2-4.8
7	30-31	40-41	4.7-5.3	8	1.85-1.93	3.9-4.3	4.9-5.5
8	32-33	37-39	5.4-6	9	1.94-2.02	4.4-4.9	5.6-6.2
9	34-35	34-36	6.1-6.9	10	2.03-2.11	5.0-5.4	6.3-7
10	>35	0-33	>6.9	11	>2.11	>5.4	>7

IBI Scores	**Very Poor**	**Poor**	**Fair**	**Good**	**Very Good**
	0-12	13-25	26-37	38-54	55-70

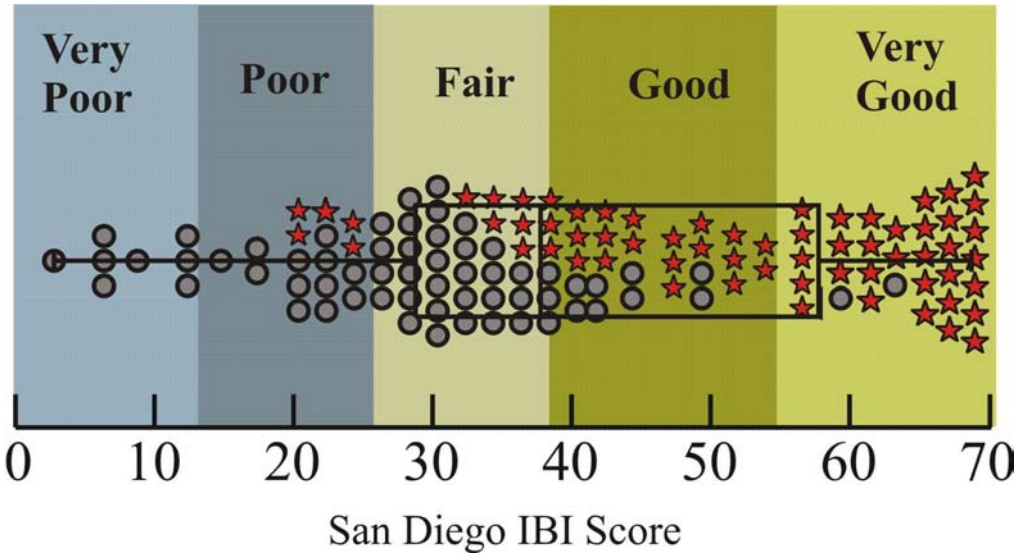

Figure 8. Distribution of IBI scores for May 2000, November 2000 and May 2001 sampling events with range cutoffs for assignment of index thresholds. Reference sites are indicated by red stars, while non-reference sites are indicated by gray circles.

Step VI: Testing and Refining the IBI

After IBI ranges are established, the final step in IBI development is to test the performance of the IBI and make adjustments as necessary to refine the scoring ranges. IBI development is an iterative process: "setting scoring criteria is an iterative process and should be revisited as regional databases and biological knowledge expand" (Karr and Chu 1999).

The first step is to test the IBI to see if it discriminates sites as expected. Some sites designated as "reference" or "non-reference" should be re-evaluated for reassignment to the appropriate class (see commentary in Barbour *et al*. 1999, sections 9-12). Reasons for eliminating reference sites based on data include: 1) unusually high degrees of natural variability at a site, 2) evidence of impairment from stressors not measured in the reference site selection phase (see Step I above), and 3) evidence that a site is not representative of its class.

IBI scoring ranges are presented in Figure 9 for all sites and all 8 sampling events. Scoring values in the May 1998 and May 1999 sampling events were abnormally low for many sites (see Figure 12), obscuring patterns in the data. To make it easier to see patterns we have removed data from these two sampling events in Figure 10.

On the basis of the distribution of IBI scores, several sites appear to be good candidates for status review. At least three sites classified as non-reference sites should be considered for re-classification as reference sites (PC-PMP, SYC-NT, and TCC-TC). Interestingly, these were sites that were removed from the reference pool based on their physical condition. In contrast, at least one site (SLRR-PG) should be dropped from the reference site pool as an outlier on the basis of its performance here. All of the reference sites sampled for the first time in May 2001 will need additional sampling events before their suitability can be confirmed. Several sites that scored in the fair range in the May 2001 event should receive carefully review: CON-ECR, BCC-SRT, BCC-BCT, SMC-SMR, SC-LCR, BC-BCR, JC-GS, NC-PCR, and MCC-BML.

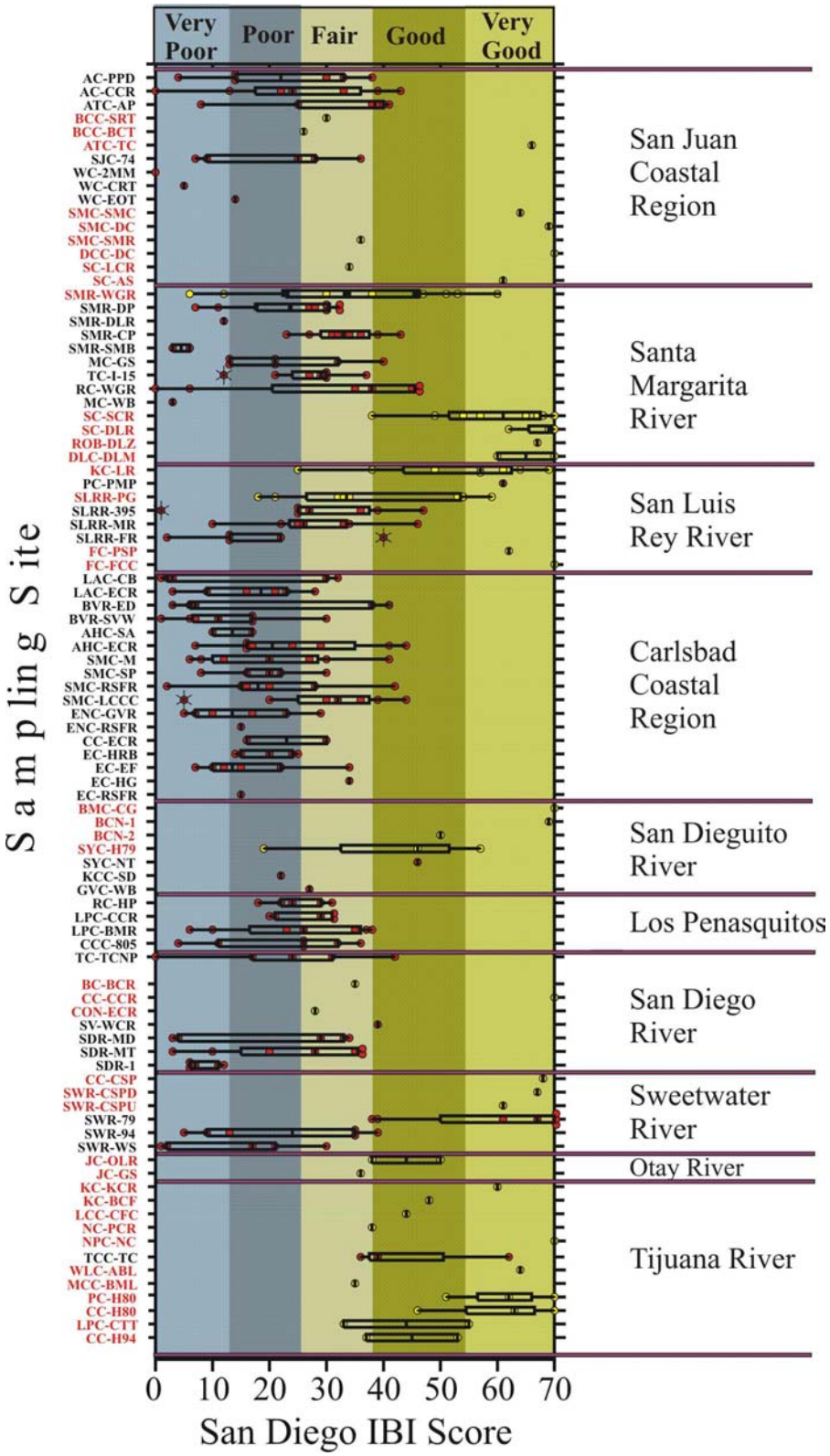

Figure 9. Boxplots demonstrating the range of IBI scores calculated for all sites sampled in the San Diego Region between 1998 and 2001. Values for individual sampling events are indicated by the separate points, reference sites are indicated by yellow points and red text site codes.

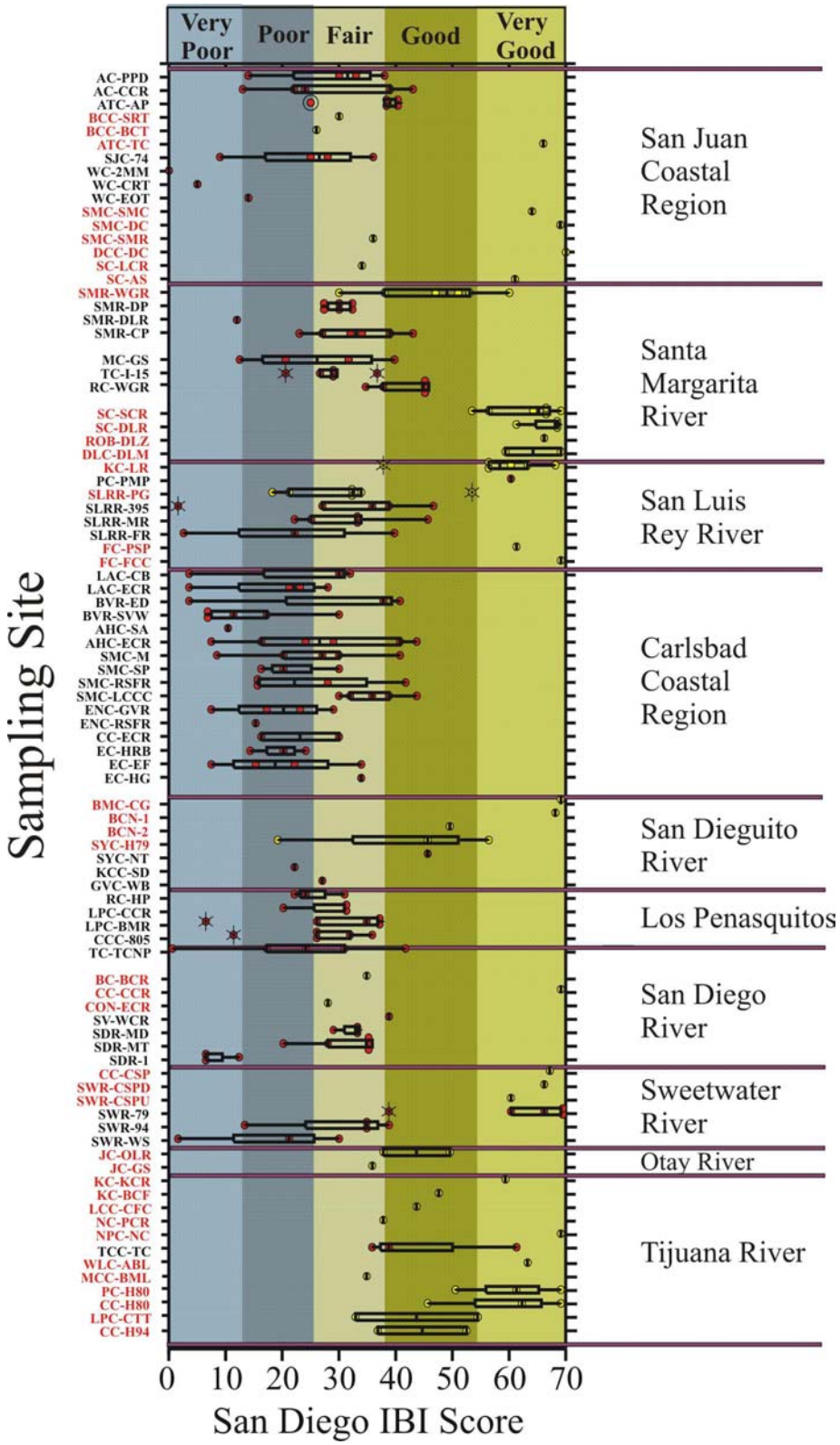

Figure 10. Boxplots demonstrating the range of IBI scores calculated for all sites sampled in the San Diego Region between 1998 and 2001. **Sampling points from May 1998 and May 1999 are removed.** Values for individual sampling events are indicated by the separate points, reference sites are indicated by yellow points and red text site codes.

Additional Considerations: Reviewing the need to classify stream types

One of the fundamental challenges of bioassessment is the fact that stream communities naturally vary spatially and temporally. In order for bioassessment to provide meaningful guidance for water quality managers, it is critical that this variation be managed so that signals (evidence of impairment) can be detected over the noise of variation.

One of the most common ways that multimetric approaches (e.g. IBI) deal with natural variation is by partitioning that variation into natural classes of streams or natural classes of stream sites. The assumption inherent to this approach is that streams (or sites) of similar types (based on stream order, underlying geology, elevation zones, ecoregion or subecoregion) have relatively similar aquatic communities in their natural state. However, there is a trade-off between the advantage gained by partitioning variation into multiple classes and the decreased efficiency caused by creating and maintaining multiple IBIs for a region. In theoretical terms, the ideal number of classes is the smallest one that provides adequate power to detect impairment.

For the San Diego IBI we considered several ways of partitioning variation. Our initial year of sampling suggested that bioassessment data collected in spring samples had lower biotic condition scores than those collected from the same sites in fall. We therefore continued to sample in May and November in subsequent years. Because we expected stream condition to vary with elevation, we were careful to select a similar distribution of reference sites upstream and downstream of 1000 ft. We did not address stream order in this study because there was little variation in stream size compared to what we have seen in other regions. However, we have not fully explored this factor and intend to investigate it in future iterations.

Figures 11 and 12 demonstrate the relationship between two of these factors, elevation and sampling season. Site elevation did not appear to have any influence on IBI scores for the last three sampling events (Figure 11). Although lower elevation sites appear to have lower IBI scores when all sites are considered (Figure 11a), this appears to be an artifact of the fact that most of the impaired (non-reference) sites in the May 2000 sampling event were also low elevation sites (this is apparent in Figure 11b). Seasonality, which appeared to strongly influence metric scores in the first set of samples (May 1998 through May 1999), was not a consistent factor in IBI scores (Figure 12). This was especially true for reference sites, which did not show the same reduction in IBI scores in the May 1998 and May 1999 sampling events.

To further investigate the need for stratification into elevation or season, we compared the patterns we saw in the IBI scores to patterns derived from measures of the community composition at each site. To do this we used multivariate ordination techniques designed for analysis of community data.

Use of Multivariate Statistics in Bioassessment

Multivariate statistics are often used in community ecology to determine which environmental variables, out of many that might be measured, best explain observed species distributions. Ordination is one set of multivariate techniques used to arrange sites along axes based on their species composition. Sites that are plotted closely together are similar in species composition and sites that are dissimilar are plotted farther apart. When environmental data is lacking or not included the ordination is unconstrained, and sites are plotted along theoretical axes that represent a combination of variables that best explain the variance in the species data. Resulting scatter plots can then be interpreted *post-hoc* by calculating correlation coefficients between environmental variables and ordination axes. An advantage of unconstrained ordination is that it can show whether important environmental variables have been overlooked (ter Braak 1995). When environmental data is available, ordination can be constrained so that the ordination axes must be a linear combination of environmental variables; this approach has a direct environmental basis, and ordination axes appear in order of the degree to which each explains variance in the species data.

In the field of bioassessment, multivariate techniques have been employed extensively in the development of predictive models (Wright *et al.* 1984, Moss *et al.* 1987). This type of modeling is used in the River Invertebrate Prediction and Classification (RIvPACS) approach (Wright *et al*. 1993) and its derivative Australian River Assessment System (AusRivAS, Norris 1995), and is considered to be the main alternative to multi-metric (IBI) methods (Barbour *et al*. 1999). In these methods, reference sites are ordinated on the basis of species composition, groups of similar reference sites are defined with some type of clustering algorithm, and then those groups are described in terms of their environmental variables using discriminant function analysis. Measurement of the same environmental variables at a test site allows estimation of reference group membership, and therefore allows prediction of the expected community at the test site. Test sites can be placed into impairment categories based on the ratio of taxa observed to taxa expected.

Use of multivariate techniques, including ordination, is not limited to generation of predictive models and can be used in many stages of IBI development including setting reference condition criteria, screening metrics and defining stream or site classifications (ter Braak 1986, Barbour *et al*. 1999). In addition to ordination of sites based on species composition, multiple regression can be used to express metrics as a function of several environmental variables at once, which is important when environmental variables are correlated or when they show interaction (the value of one variable depends on the value of another variable). Alternatively, ordination can be performed on chemical and physical variables alone, a technique that allows identification of the primary gradients that might determine organismal distributions. Finally, canonical ordination is an approach that combines ordination with regression and expresses the main relationships between species and each environmental variable (Jongman *et al*. 1995, Legendre and Legendre 1998).

Use of Multivariate Methods in San Diego IBI

To determine if a separate IBI was needed for fall and spring index periods or for low and high elevations, and to explore differences in reference and non-reference communities, detrended correspondence analysis (DCA), a type of unconstrained ordination, was used in analysis of all years of the San Diego data set. Ordination plots showed whether variance in species composition across sites was best explained by sampling season, site elevation or site classification as reference vs. non-reference. Sites did not cluster by elevation category (< 1000 ft = "low"; > 1000 ft = "high", Figure 13b) or by reference status (Figure 13c), but did show clustering based on whether they were sampled in the spring or fall (Figure 13a); this effect was particularly noticeable in the last three sampling events, upon which our IBI is based, but was also present when we looked at all sampling events.

Site Classification: Elevation and Seasonality

There was no evidence from either multi-metric or ordination techniques that elevation had a strong influence on stream invertebrate communities. Although most non-reference sites were located in the lower elevation band (due to management decisions for water quality testing) we attempted to find reference sites across a range of elevations (Figure 14). Non-reference sites had higher IBI scores in higher elevation sites, but the lack of relationship between elevation and IBI scores at reference sites indicates that this was due to higher degrees of impairment at lower non-reference sites rather than differences in biotic community composition at different elevation bands. This is further supported by the distribution of IBI scores by elevation categories (Figure 11) and ordination results (Figure 13c).

In spite of evidence that the taxonomic composition of spring communities differs from fall communities (Figure 13a), metric scoring was not affected by seasonal differences in community composition, and it was determined that a separate IBI for spring and fall index periods was unnecessary. Although community composition differs greatly from spring to fall in terms of which taxa are present, biological metrics used in the present IBI (e.g., cumulative taxa richness, cumulative EPT taxa) are not greatly affected by the seasonal turnover.

One possible explanation for the difference between the ordination and IBI result is that the taxonomic richness may be lower in the non-reference sites, resulting in lower IBI scores. However, reference and non-reference sites may cluster together on the basis of a few common (and abundant) taxa. Thus this may be in part an artifact of the way clustering techniques score similarity as a function of the abundance of individual taxa.

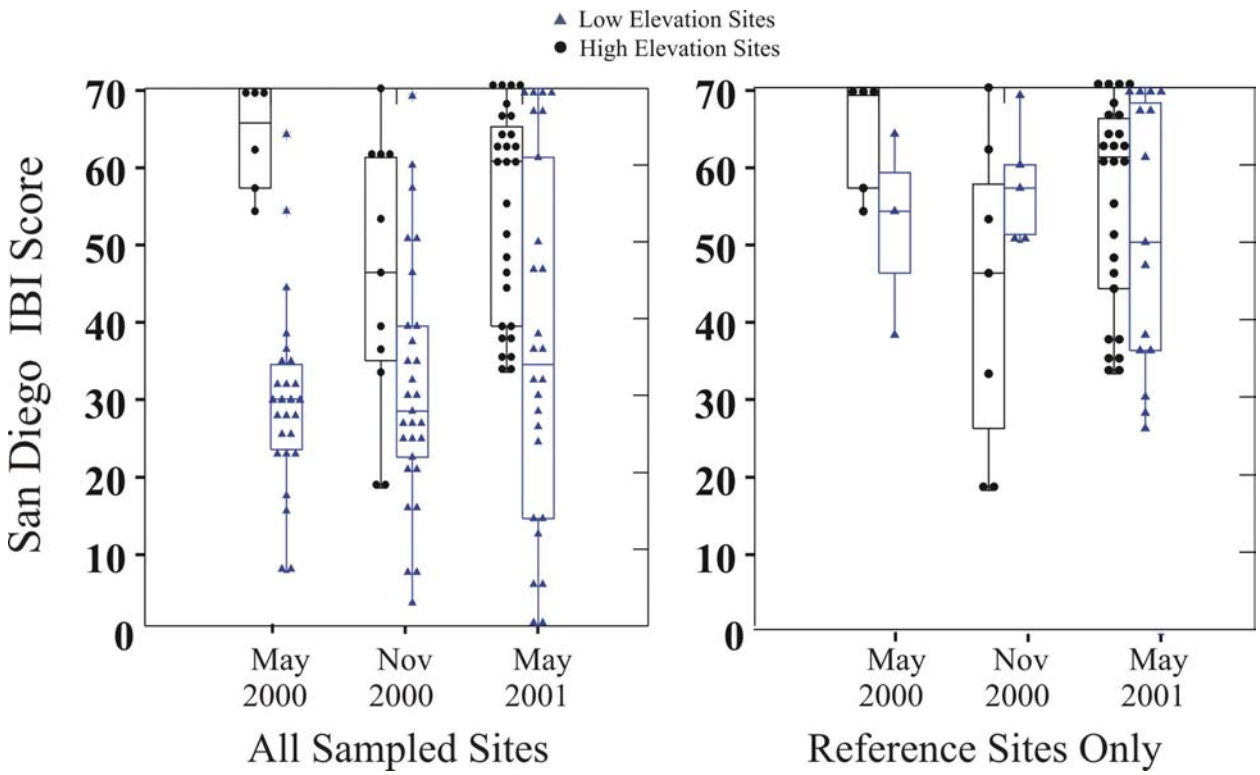

Figure 11. Distribution box plots of IBI scores v. elevation categories for the last three sampling events. Blue boxplots with blue triangular points indicate sites less than 1000' elevation, while black boxplots with black circular points represent sites greater than 1000' elevation.

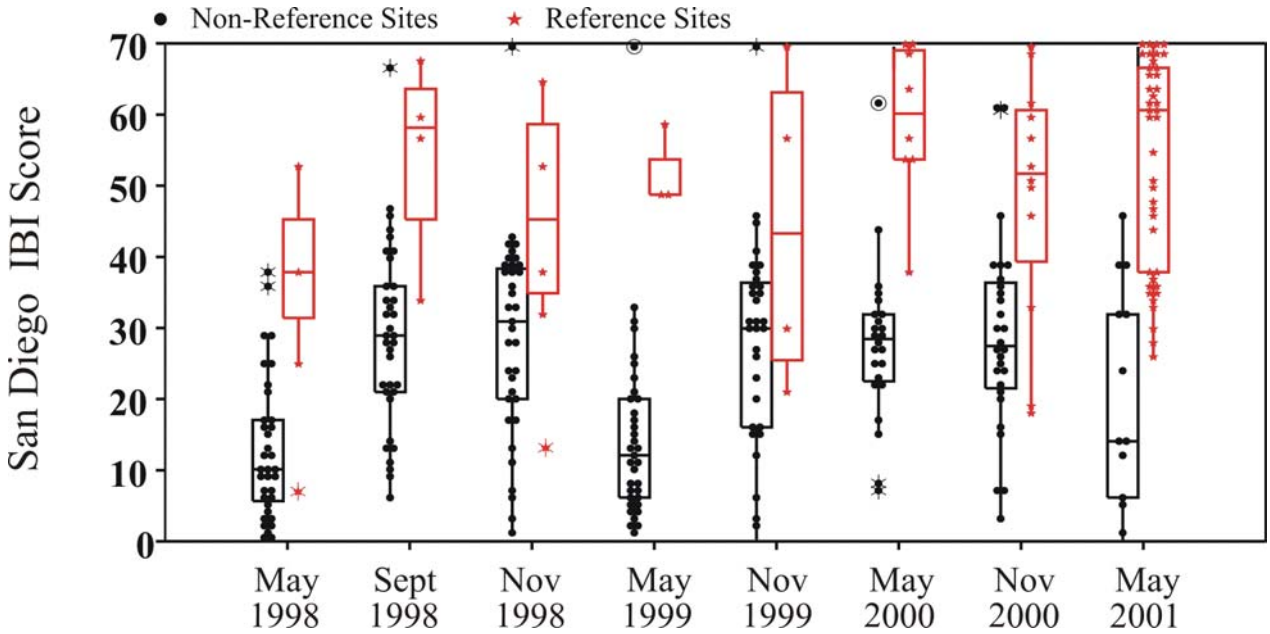

Figure 12. Distribution box plots of IBI scores for each of the eight sampling events, with separate plots for reference sites and non-reference sites. The number of sites in each sampling event are indicated by the separate points superimposed on the boxplots.

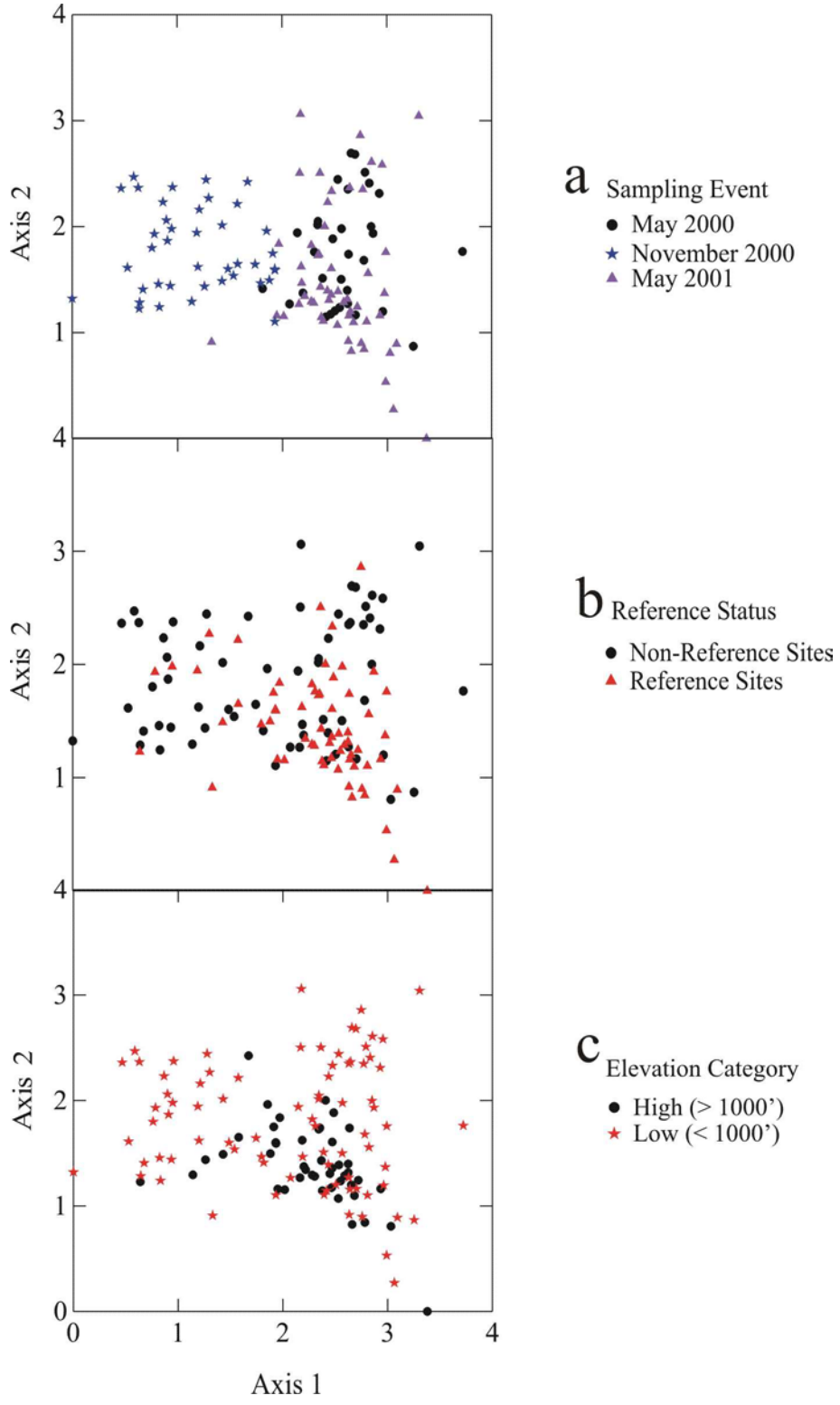

Figure 13. Multivariate ordination plots comparing communities at each site sampled in the last three sampling events (May 2000, November 2000 and May 2001). See text for interpretation of axes and explanation of the ordination techniques.

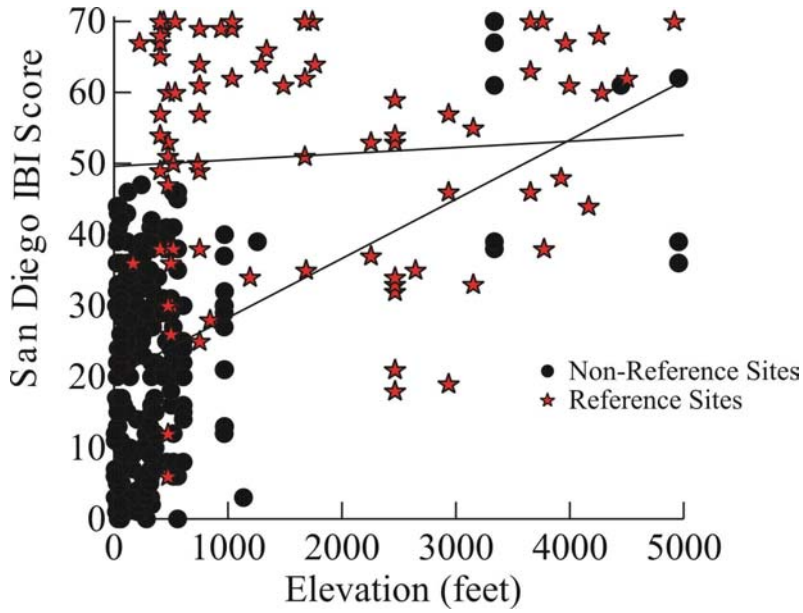

Figure 14. Distribution of IBI scores at different elevations. Reference sites are indicated by red stars and non-reference sites are indicated by black dots.

DISCUSSION

This report presents a preliminary IBI that provides the first context for assessing biotic condition from benthic macroinvertebrate assemblages in the San Diego region. Use of this IBI may extend beyond the boundaries of the San Diego RWQCB, but should be done so with caution since all of the data used to create the IBI were collected within the region's boundaries.

There was a considerable amount of within site variation in IBI score, and many sites ranked across two or three of the five rating categories in different sampling events. Therefore, we recommend that sites should be sampled at least twice before the current San Diego IBI is used to assign rating categories. Nonetheless, the IBI is clearly able to discriminate between major classes of site quality, especially when multiple sampling points are available. For example, all sites in the Carlsbad and the Peñasquitos hydrologic units consistently scored in the lower half of the range, while several sites in the Santa Margarita and Tijuana hydrologic units consistently scored in the upper half of the range. Variation in biotic condition has itself been noted as an indicator of stressed environments (see multiple papers in JNABS volume 19, no.3), but we do not have enough repeat visits at most reference sites to evaluate reference site variability versus non-reference site variability.

The number of water quality ranks established in an IBI can affect perceived variability in site rank because fewer categories reduce within site variation in IBI assignment of ranges. The current San Diego IBI has five rating categories. Based on the ranges of sites scores we found, the IBI seems to reliably assign three categories of biotic condition. The objective of future work on this IBI should be focused on decreasing the measured variability and thus increasing the ability of the IBI to discriminate more tightly defined classes.

There are several potential sources of this variation in site scoring; these can be roughly grouped into two classes: 1) differences in site health (increased or decreased impairment) in the different sampling events and 2) natural variation in bioassessment metrics at these sites. The next step in applying bioassessment to regional assessments is therefore to refine the IBI in order to reduce the portion of variation that is due to natural causes so that impairment signals can be detected. Most of the techniques involved in this step involve one of two strategies: 1) partitioning natural variation into different classes of streams and 2) investigating metrics that are least influenced by this natural variation.

IBI Partitioning

Since IBI development is an iterative process, the partitioning of stream classes can be investigated at any stage in the IBI development. Our initial investigation into the influence of sampling season and site elevation and found at most weak relationships between these factors and IBI scores, but there may be other environmental variables for which we have not accounted.

There is also reason to investigate possible seasonality in metric scores further. Although the strong seasonal component to biological metrics that we noted in the first sampling year was not apparent in later years, the taxonomic composition of biological communities in this region appears to be very much influenced by seasonality and sampling timing. This suggests that there may be some metrics (not captured in the IBI) that are affected by sampling season. We should, therefore, consider the possibility that exploration of new metrics might necessitate the need to revisit the question of partitioning by season. Although there was not enough evidence to justify creation of seasonal IBIs at this stage, the data warrant further investigation.

Metrics Improvement and Correlation with Physio-chemical Variables

Improvement of the core metric pool that makes up the IBI has the greatest potential for reducing the natural variability that is measured in the IBI and should be the greatest focus for future efforts. One promising direction for future research is multivariate analysis of the major physical and chemical factors driving community composition. It will be very important to continue to monitor intensive quantitative physical and chemical monitoring at all biomonitoring sites (test sites and reference sites). This data will be critical to refinement of the IBI because it will allow for the identification of physio-chemical factors of key influence to natural community variation.

SUMMARY AND RECOMMENDATIONS

1. This report establishes a preliminary IBI for the San Diego Region (Table 4) which provides the first context available for interpreting aquatic macroinvertebrate data in the San Diego Region.

2. Initial evidence suggests that there is no need to create separate seasonal IBIs or separate IBIs based on elevation. However, we recommend further investigation of this with expanded datasets from surrounding regions.

3. The San Diego Region IBI is appropriate for use in screening test sites for further analysis, but we recommend that sites should be evaluated at more than one sampling event before assigning a rating category to them.

4. We recommend that the RWQCB (9) continue to develop and refine the IBI with special emphasis on supporting metrics evaluation with the goal of improving IBI precision.
    a. We recommend establishing a program for continued monitoring of sites that includes more intensive quantitative physical and chemical monitoring at all biomonitoring sites (test sites and reference sites). This data will be critical to refinement of the IBI because it will allow for the identification of physio-chemical factors of key influence to natural community variation. This could be a portion (~ 15-20 sites) of the sites identified here.
    b. The influence of seasonality should continue to be evaluated. This could be evaluated with a smaller set of reference and non-reference sites.
    c. We recommend quantification of IBI performance so that IBI scores can be assigned a degree of estimated precision. This could be done by taking 3 samples (9 transects) from10-20 sites and using iterative techniques like bootstrapping to calculate error rates.
    d. We recommend continuing efforts to identify reference sites, including efforts to adapt the new DFG/ SNARL reference site selection methodology to the San Diego region.

5. Currently, the RWQCB (9) has assigned responsibility for ongoing sampling of many suspected impaired locations to various co-permittees in the region.
    a. We recommend establishing a plan to integrate data collected from these co-permittees along with data collected by the RWCBQ (9) into a common database.
    b. This should be done on an on-going basis and include continuing evaluation of reference sites.
    c. The quality assurance/ quality control (QA/QC) program already in place should be maintained to ensure compatibility among datasets from the various entities.

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Appendix A (56 pp.)

Taxonomic list of benthic macroinvertebrates identified from samples collected in the San Diego Region in May 2001

Appendix B (8pp.)

Bioassessment metrics calculated from benthic macroinvertebrate samples collected in the San Diego region in May 2001

Appendix C (6 pp.)

Summary statistics (means and coefficients of variation) calculated for bioassessment metrics for samples collected in the San Diego region in May 2001

Appendix D (18 pp.)

General data matrix for physical habitat measures and water chemistry measure collected at bioassessment collection sites in the San Diego region over eight sampling events between May 1998 and May 2001. Physical habitat measures are the most recent available for a site and most chemistry measures are only available for the May 2001 sampling event.

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FEATURE

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Legitimizing Fluvial Ecosystems as Users of Water: An Overview[1]

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ABSTRACT / We suggest that fluvial ecosystems are legitimate users of water and that there are basic ecological principles guiding the maintenance of long-term ecological vitality. This article articulates some fundamental relationships between physical and ecological processes, presents basic principles for maintaining the vitality of fluvial ecosystems, identifies several major scientific challenges and opportunities for effective implementation of the basic ecological principles, and acts as an introduction to three specific articles to follow on biodiversity, biogeochemistry, and riparian communities. All the objectives, by necessity, link climate, land, and fresh water. The basic principles proposed are: (1) the natural flow regime shapes the evolution of aquatic biota and ecological processes, (2) every river has a characteristic flow regime and an associated biotic community, and (3) aquatic ecosystems are topographically unique in occupying the lowest position in the landscape, thereby integrating catchment-scale processes. Scientific challenges for the immediate future relate to quantifying cumulative effects, linking multidisciplinary knowledge and models, and formulating effective monitoring and assessment procedures. Additionally, forecasting the ecological consequences of changing water regimes is a fundamental challenge for science, especially as environmental issues related to fresh waters escalate in the next two to three decades.

Freshwater ecosystems touch nearly all aspects of the natural environment and human culture. Acting as centers of organization within the landscape, they provide natural resources (e.g., fish and clean water) as well as cultural and ecological services (e.g., transportation, energy, irrigation, recreation, and waste assimilation). Sadly, human societies have exploited the natural benefits for centuries without understanding the basic environmental principles that allow freshwater systems to maintain their inherent vitality (Naiman and others 1995, Naiman and Turner 2000). Today, important freshwater-related issues range from environmental, to available supply, to human health and safety, and even to national security (SCOWAR 1998, Postel 1998). It is clear that a basic understanding of the trends in water resource use and their ecological consequences, in combination with the identification and application of basic environmental principles, is needed to formulate tomorrow's management and policy decisions (NRC 1998, Postel 1998, Rogers 1998). The environment, as a legitimate user of water, requires the same level of respect, advocacy, and protection allocated to societal needs if resource management is to achieve success.

KEY WORDS: Fluvial ecosystems; Flow regime; Ecological principles; Watershed management; Rivers; Research challenges

[1]This is a contribution of the Scientific Committee on Water Research (SCOWAR) of the International Council for Science (ICSU).

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Ineffective water policies and inefficient water infrastructures seriously disrupt societies as well as the environment. Gleick (1998, 2001) summarizes numerous cases where both societies and the environment are put at risk. Here are a few examples: Preventable water-related diseases kill an estimated 10,000–20,000 children every 1.5 days. Tens of millions of people have been forced to move from their homes—often with little warning or compensation—to make way for reservoirs behind dams. Moreover, >20% of all freshwater fish species are now threatened or endangered because dams, water withdrawals, and changing land use practices have destroyed the free-flowing river systems where they thrive. It is well known that certain irrigation practices degrade soil quality and reduce agricultural productivity, now and into the future. Additionally, groundwater aquifers are being pumped down faster than they are naturally replenished in many parts of India, China, and the United States, causing significant subsidence of land in some areas. Disputes over shared water resources have led to violence and continue to raise local, national, and international tensions—over 50% of the Earth's land area lies within 261 major river basins shared by two or more countries. Gleick (2001) and others project that by the year 2025 at least 40% of the Earth's 7.2 billion people may face serious problems with agriculture, industry, or human health if they must rely solely on natural endowments of fresh water—alarmingly, water for the environment is not part of these projections.

It is plain that land use and public perceptions of land-based resources no longer can be divorced from freshwater systems (Naiman and others 1998a, b; Dale and others 2000). Indeed there are strong and intimate links between terrestrial and aquatic systems that shape the character and productivity of the environment. Alterations to natural disturbance regimes and the spatial arrangement of terrestrial vegetation and soils have important, long-term consequences for freshwater ecosystems. Likewise, recent efforts to articulate the global-scale problems of population growth and economic development on water (Vörösmarty and others 2000) and corresponding pressure to engineer the water cycle (Vörösmarty and Sahagian 2000, Revenga and others 2000) support the arguments put forward for a better articulation of guiding ecological principles.

Some cultures rightly argue that environmental and human needs cannot be separated, suggesting that human culture cannot exist without water for the long term. This appears to be true since there are no known materials that can substitute for fresh water, as there are for energy and materials. There are compelling reasons for designating the environment as a legitimate water user because of the services provided (Postel and Carpenter 1997). These benefits fall into three broad categories: (1) water for drinking, irrigation, and other human needs; (2) goods other than water, such as fish and waterfowl; and (3) nonextractive benefits such as recreation, transportation, self-purification, energy, and flood control. Ecological goods and services provided by freshwater systems have sustained human civilizations for millennia. The global value of all services and benefits provided by freshwater systems remains difficult to measure accurately but most certainly ranges around several trillions of dollars annually, a significant proportion of the gross world product (Postel and Carpenter 1997).

Understanding natural ecological processes and using that understanding for better ecosystem management are improving environmental and human conditions in many parts of the world. Recent research efforts and traditional knowledge have been especially effective in using freshwaters and their associated riparian ecosystems to:

- Improve water quality, thus increasing the availability of useful drinking water
- Provide high-quality recreation areas
- Provide fiber and food, or contribute indirectly to human food production by producing hay (i.e., cattle food) and aquatic species (e.g., fish)
- Offer early warnings about environmental change, thus reducing the chance of potential health-related problems becoming critical
- Provide approaches and solutions for improving watershed management (Naiman and Décamps 1997, Naiman and others 2000)

Much has been written about the environment as a legitimate user of water in recent years. These writings have ranged from the philosophical (Postel 1992, Lee 1993) to the analytical (Postel and Carpenter 1997), with the concept becoming embedded into the laws of water-conscious countries such as South Africa and Australia (DCS 1997, Commonwealth of Australia 1996). The ways in which societies think about managing water-based resources are changing as human needs and desires challenge the maintenance of environmental quality (Gleick 1998). Concomitantly, a major challenge for ecological sciences is to develop methods and approaches that unequivocally demonstrate the legitimate "water rights" of ecosystems and of ecosystems in service to societies. The basic principles articulated in this article and those to follow (Nilsson and Swedmark 2002, Pinay and others 2002, Bunn and Arthington

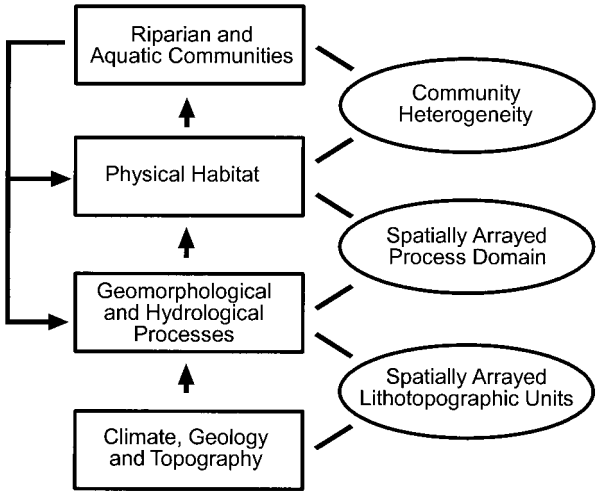

Figure 1. Schematic representation of the relations among hydrogeomorphic processes, habitat dynamics, and riverine communities. Lithotopographic units are areas with similar topography and geology, and within which similar suites of geomorphic processes occur. Other terms are addressed in the text (modified from Montgomery 1999).

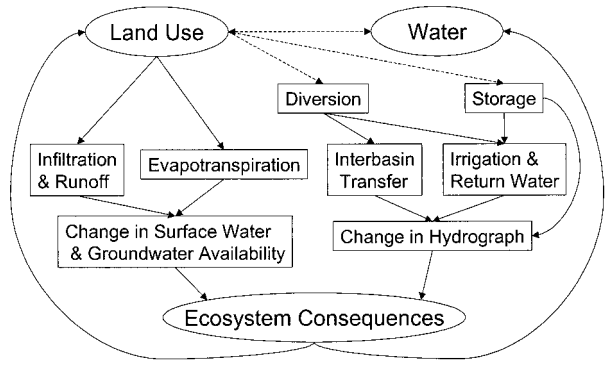

Figure 2. Illustration of the variety of fundamental human impacts on water regimes. Solid lines indicate direct influences, dashed lines indicate indirect effects.

2002) provide foundations for the development of appropriate methods and approaches.

This article serves as a basic introduction for the companion articles that follow. The objectives here are threefold. First, we introduce fundamental relationships between physical and ecological processes. Second, we present and discuss basic principles for maintaining and restoring the vitality of aquatic ecosystems. Finally, we identify several major scientific challenges and opportunities for effective implementation of the basic principles. All of the objectives, by necessity, link climate, land, and fresh water. The perspectives adopted in this article are that the environment is a legitimate user of water and that there are basic ecological principles guiding the maintenance of long-term ecological vitality. We explore derivatives of these perspectives in greater detail in the articles by Nilsson and Svedmark (2002) on riparian communities, by Pinay and others (2002) on biogeochemical cycles, and by Bunn and Arthington (2002) on biodiversity.

Physical Processes and Ecological Change

Physical processes in streams and rivers largely are driven by the magnitude, intensity, duration, and frequency of water discharge in combination with the catchment's lithology and the streamside vegetation (Figure 1). Additionally, flow regularity, as well as variations in amplitude, frequency, duration, base flow, and rate of change, is also ecologically significant (Walker and others 1995, Richter and others 1996). These characteristics provide the template for the ecological processes and are the underpinnings of every major theoretical and conceptual advance made about the ecology of rivers in the last three decades. There are, of course, strong biotic influences on the physical processes, but these are often shaped by the nature of the biophysical interactions (Naiman and others 2000).

Recognizing the importance of physical processes, researchers have made important strides in classifying rivers based on physical features and dynamic processes (e.g., Rosgen 1994, Gurnell and others 1994, Montgomery 1999). Along a complementary avenue there have been equal advances in understanding the physical basis for ecological processes at multiple scales (Richter and others 1996, Poff and Ward 1989, Puckridge and others 1998). In the past decade there have been important advances in relating channel form to the physical processes creating that form as well as relating the physical template to the functional characteristics of ecological communities and processes (see Naiman and Bilby 1998, Newson and Newson 2000). Although these efforts have yielded significant advances in understanding rivers as integrated systems within the surrounding landscape, there are still many unknowns related to regional climate, land use, and flow–habitat–biota relationships.

Direct modification of flow regimes, or indirect modifications through changing land use or land cover, are manifested in ecological responses (Figure 2). The Mobile River basin, which drains approximately 113,000 km^2 and includes more than 4000 river km in eight major systems, can serve as an example. The river is in the southeastern United States, which is a global center of diversity and endemism in temperate fresh-

water fish and mollusks. Pringle and others (2000) describe the effects of hydrologic alterations to this river system. The basin historically contained more than 190 native freshwater fishes, of which at least 40 were endemic species; 118 gastropod species, with four endemic genera; and 75 mussel species, including at least 33 endemic ones. The Mobile River basin is now extensively developed for navigation and hydropower production. Nineteen locks and dams facilitate navigation, and an additional 15 dams serve hydropower production. The dams cumulatively impound approximately 44% of river mainstem length in the basin as well as portions of many tributary streams, implying extensive loss of free-flowing riverine habitat. Additional examples for other river systems are provided in the three articles that follow.

Dam construction and hydrologic alteration profoundly affected aquatic biota in the Mobile River basin. Diadromous fishes have been eliminated from portions of their habitat because dams impede migrations between the sea and the river. Large-bodied, mobile fishes have been extirpated or are severely reduced in portions of their former ranges. Small-bodied fishes also have been negatively affected. Fish abundance and species diversity typically are diminished in flow-altered river segments downstream from dams. At least 10 small-bodied fishes in the Mobile River basin are imperiled because of range reduction and fragmentation. Mussels have suffered even more severe reductions, and at least 16 endemic species are presumed extinct. Of the rich gastropod fauna, 38 species are presumed extinct, and at least 71 additional species are considered close to extinction. Exotic species in the Mobile River basin include approximately 16 fishes, many of which were intentionally introduced to support sport fisheries (e.g., small-mouth bass *Micropterus dolomieu*). Invasion by the zebra mussel (*Dreissena polymorpha*) represents another potential threat to the basin's native fauna.

There are numerous similar examples to that of the Mobile River basin that could be cited. Nevertheless, the ecological consequences of changing the physical regime often are difficult to predict in a precise way, especially when changes are made to multiple physical processes and when different changes are made at different times [i.e., cumulative effects (Bedford and Preston 1988, Reid 1998)]. Developing methods for quantifying the ecological consequences of multiple or cumulative effects is one of the great challenges for environmental science (e.g., Hunsaker 1993). However, in the meantime, is there an approach that can be used to guide human actions in developing, using, protecting, and restoring freshwater resources?

We believe that there are three overarching ecological principles that, if used to guide river management, would ameliorate many of the difficult issues facing resource managers and policy-makers. The principles, which are deceptively simple, are distilled from decades of research in river ecology and, most importantly, based on several spatially broad overviews of riverine characteristics (e.g., Puckridge and others 1998, Richter and others 1997). The principles are:

(1) The natural flow regime shapes the evolution of aquatic biota and ecological processes;
(2) every river has a characteristic flow regime and an associated biotic community; and
(3) aquatic ecosystems are topographically unique in occupying the lowest position in the landscape, thereby integrating catchment-scale processes.

The Natural Flow Regime Shapes the Evolution of Aquatic Biota and Ecological Processes

Examples abound as to how the physical environment shapes ecological processes. Virtually every theoretical and empirical construct related to the dynamics of freshwater ecosystems explicitly identifies hydrology and attendant material movements as being fundamental to system creation and maintenance. Collectively, science tells us that the ecological integrity of freshwater ecosystems, including the associated riparian zone, depends on the naturally dynamic characteristics of the water regime (Naiman and others 1995, Poff and others 1997, Richter and Richter 2000). Fortunately, the importance of the natural flow regime for rivers is being increasingly recognized in management strategies for a number of countries (e.g., Australia and South Africa).

However, this is not a trivial undertaking. Natural river systems are constantly changing in a complex mosaic of time periods and spatial dimensions. The vitality of river systems is created and maintained by substantial variation in time and space (Naiman and others 1992). Processes associated with climate, soil formation, and geological disturbances act to structure the diversity, productivity, and availability of aquatic resources that human societies depend upon. For example, the ecological characteristics of riparian forests are structured by a complex array of dynamic and spatially variable hydrological processes that erode and deposit materials, deliver nutrients and propagules, and remove waste products (Figure 3). Variability in time and space results in the biological diversity and productivity characteristically found in riparian environments (Naiman and Décamps 1997). A key managerial challenge is balancing human needs with varia-

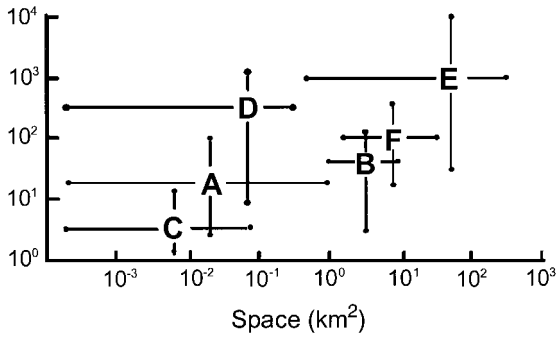

Figure 3. Illustration of the diversity of spatial and temporal scales influencing the creation and maintenance of riparian forests in the coastal temperate rainforest of North America. Colonization surfaces created by flooding (A), colonization surfaces created by debris flow (B), seedling germination and establishment (C), longevity and size of species patches (D), persistence and movement of dead wood in channel (E), and impact of herbivores (F) (from Naiman and others 1998a, with permission).

tions in physical and chemical characteristics so that significant declines or losses of species and ecological attributes (i.e., biodiversity, productivity and resilience) do not occur.

Human modification of natural hydrologic processes disrupts the dynamic equilibrium between the movement of water, sediment, and organisms that exists in free-flowing rivers (Pringle 1997, Jansson and others 2000a, b). This disruption alters both coarse- and fine-scale geomorphic features that constitute habitat for aquatic and riparian species (Poff and others 1997). After such a disruption, it may take centuries for a new dynamic equilibrium to be attained by channel and floodplain adjustment to the new flow regime. In some cases a new equilibrium is never attained, and the channel remains in a state of continuous recovery from the most recent flood event. As a consequence, the biological adjustments may take many decades or even centuries to be fully expressed. The direction of the ecological consequences of modified water regimes is not just downstream, however. Water abstraction, channel modification, land use changes, nutrient enrichment, and toxic discharge in the lower portions of catchments produce ecological changes far upstream at scales ranging from genes to ecosystems (Pringle 1997). Extreme examples are becoming more common, highlighted by rivers completely deprived of water for all or part or the year (Postel 2000). Rivers such as the Colorado, Ganges, Nile, and Yellow have lost virtually all of their natural functions except in exceptionally wet years when they are allowed to flow again.

Recent scientific advances are beginning to define what types of hydrologic regimes are necessary to maintain specific ecological processes. Richter and Richter (2000) have developed an approach for identifying natural flooding characteristics that must be protected or restored to maintain riparian ecosystems along meandering rivers while providing opportunities to harvest a portion of the floodwaters for human purposes. There are other ongoing research activities in Australia, South Africa, and North America with equal promise. In Australia, there is general acceptance that rivers and wetlands are legitimate users of water and that the provision of environmental flows is important to sustain river and floodplain ecosystems (Arthington and others 1998, Commonwealth of Australia 1996, Bunn 1999, Kingsford 2000). This has led to some major achievements relating to water abstractions and flow allocations, most notably the Murray-Darling Basin Cap (limiting water diversions to 1993–1994 levels) and, more recently, the Snowy River flow restoration project (Pigram 2000). Two broad approaches have been adopted in the testing of environmental flow requirements: those aimed at mitigating impacts by restoring flows in regulated systems and those aimed at setting environmental provisions to protect largely unregulated systems (Arthington and others 1998).

The Campaspe Flow Manipulation Project in southeastern Australia is an experiment in flow restoration designed to assess the ecological response of aquatic invertebrates and fish to manipulated flows using the translucent dam approach (Humphries and Lake 2000). The Brisbane River study applied a hydrological model to demonstrate how the translucent dam approach could be used to restore a wider range of flows including low flows, flood pulses, and flow variability (Arthington and others 2000). The ARIDFLO project (Puckridge and others 1999) is an example of the flow protection approach, aimed at assessing the ecological response of dryland floodplain river systems to large flood events. Several other studies have been undertaken to estimate environmental flow requirements of rivers prior to further water resource development; for example, the Burnett Water Resource Plan developed a risk assessment framework to evaluate the ecological impacts of future water resource development scenarios using the benchmarking methodology (reviewed in Arthington 1998). In South Africa, the Phongolo River Project offers a good example (see http://www.nwl.ac.uk/ih/www/research/bmanfloodrel.html), while in North America the Colorado River is one of several examples that can be cited (Patten and others 2001).

Every River Has a Characteristic Flow Regime and an Associated Biotic Community

At a global scale, an ecoregion is sufficiently homogeneous to be considered as a single type of area, and indeed there is often some consistency in aquatic community structure and vegetation (Naiman and Bilby 1998). Within an ecoregion there may be great similarities in climate and topography, but there is also physical variability in the amount, timing, and intensity of water delivery. Several attempts have been made to classify the hydrologic regimes of rivers into relatively homogeneous groupings (Haines and others 1988, Poff and Ward 1989, Puckridge and others 1998, Richter and others 1996, 1997). Some of these approaches work well within carefully defined but small regions. However, at even larger scales (continental and global) there is more complexity because catchments often overlap climate zones and because flow variations occur at different scales. There is some concern that many contemporary generalizations are too simplistic (Haines and others 1988) because individual rivers, with their distinctive pattern of flow variability, shape specific biotic characteristics that are of concern to resource managers (Puckridge and others 1998).

This complex situation is exemplified by the case of Pacific salmon (*Oncorhynchus* spp.), which exhibit broad variability in life history traits in response to natural flow regimes. Salmon, because they return to the same streams to spawn generation after generation, provide an exceptionally clear illustration of the relationship between natural flow regimes and biotic characteristics. Over millennia the physical environment has shaped individual population traits related to body size and reproduction. For example, individual populations within the same species exhibit variations in adult body size related to flow conditions (Healey 1991, Roni and Quinn 1995). In short and powerful rivers, Chinook salmon (*O. tshwaytscha*) are large bodied, which enables them to move coarse substrates during spawning and create egg pockets (redds) appropriate to the river's flow regime. However, in less powerful rivers, Chinook salmon are smaller yet appropriately sized for establishing successful redds. Likewise, the timing of salmon reproduction is carefully aligned to flow regimes. Again, within the same species, populations enter the river either early or late depending on the long-term predictability of flow characteristics. In southeastern Alaska coho salmon (*O. kisutch*) enter many rivers for reproduction at the onset of autumn rains in September and October, whereas in Washington and Oregon, river entry is delayed until the rains start in November.

It is well accepted that at the smaller scales (e.g., catchments, stream reaches) relevant to resource management and conservation, there are ecologically significant variations in genetic diversity, evolutionary processes, life history strategies, and other biotic characteristics. Like Pacific salmon, other species are well adapted to the wide variations in physical properties and to the disturbance regimes associated with individual river systems. Moreover, there are often important physical gradients within ecoregions that have significant ecological implications for population and community processes, for life history strategies, and for the behavior of riparian biota.

Naiman and Anderson (1997) illustrate these points in a physical gradient for the Pacific Coastal Ecoregion (PCE) of North America, which serves as an example for other ecoregions. The PCE ranges over ~2000 km from central California to Alaska. Annual precipitation and runoff generally increase from south to north (Figure 4a), being partially influenced by mountain ranges, which have a general north–south orientation. The seasonality of runoff is influenced by temperature as well as by precipitation. At high elevations and latitudes north of about 48°N, much of the winter precipitation is stored in snow. In the Olympic Range, the North Cascades of Washington, and the coastal ranges of British Columbia and southeast Alaska, melting of winter snows and glaciers produces peak streamflows in spring and early summer and maintains moderate flows throughout the summer (Figure 4c). Glaciers are present in these areas, and meltwater runoff from glaciers commonly peaks during the warmest periods of the summer in July and August. South of latitude 48°N (California, Oregon, and much of Washington), about 80% of the total annual precipitation (75 to >350 cm) falls during the six-month period between the beginning of October to the end of March. Patterns of streamflow discharge reflect the strong contrast in precipitation between summer and winter (Figure 4b). There are strong north–south gradients but also increasing variability from river to river in a northerly direction (Figure 4). Every river in the region has a characteristic flow regime and a biotic community well adapted to the monthly, seasonal, annual, and interannual variability's in flow (Naiman and Bilby 1998).

The influence of the natural flow regime on ecological communities can be illustrated further in a comprehensive example for North America. Poff and Allan (1995) showed that the functional organization of fish communities was related to hydrologic variability. The hydrologic data clearly separated two assemblages into groups that were either associated with hydrologically variable streams (high coefficient of variation in daily

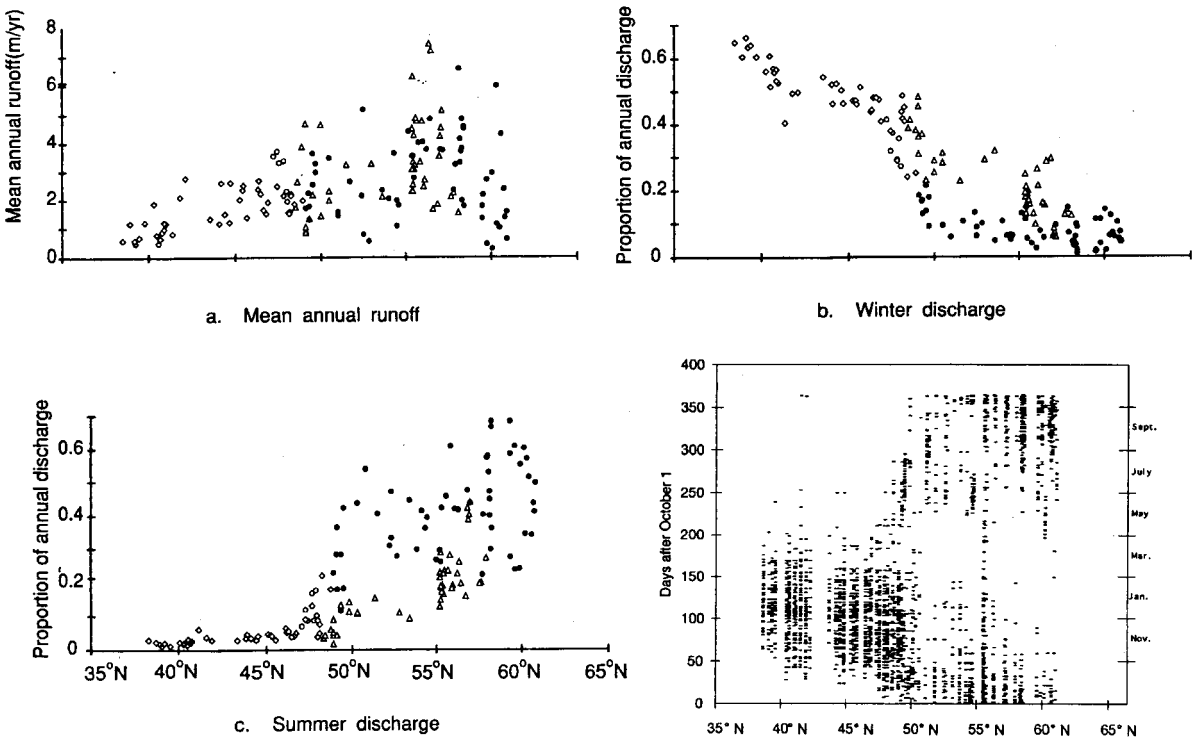

Figure 4. Variation with latitude of hydrologic characteristics for 151 rivers draining four subregions of the Pacific Coastal Ecoregion: (◇) southern coastal mountains, (o) Olympic Mountains, (△) northern lowlands and islands, (●) northern mainland mountains. (**a**) Mean annual runoff as a function of latitude; (**b**) proportion of annual discharge carried during three months of winter; (**c**) temporal distribution of peak annual discharge. Each point represents the date and latitude of a maximum daily discharge for a given river in a single water year (93 rivers have at least 10 years of record) (from Naiman and Anderson 1997 with permission).

flows, moderate frequency of spates) or hydrologically stable streams (high predictability of daily flows, stable baseflow conditions). Thirty-four assemblages were placed into the correct ecological group with 85% accuracy. The strong hydrological–fish assemblage relations found in their study [as well as many others (see Bunn and Arthington 2002)] demonstrate that hydrologic factors are significant environmental variables that shape the fluvial communities over the long term. Modifications to the hydrologic regime, therefore, can have severe and unanticipated repercussions that are transmitted throughout the entire aquatic system.

Hydrologic modifications also affect riparian ecological communities. Jansson and others (2000a) compared eight major river channels in northern Sweden, four of which are strongly regulated by dams, and four that remain largely free-flowing. Biogeographically, all these rivers run through the boreal coniferous zone with a cold-temperate climate. The annual growing season in the entire region of these rivers varies between 130 and 170 days. The hydrology has been modified in fundamentally different ways. Storage reservoirs experience a changed timing and increased intensity of water-level fluctuations, and run-of-river impoundments have increased frequency of water-level fluctuations compared to free-flowing rivers. Jansson and his colleagues found that the riparian vegetation along both storage reservoirs and run-of-river impoundments had 23%–33% lower numbers of plant species per site and 67%–98% sparser plant cover, compared to the free-flowing rivers. Ruderal and aquatic plant species were the only plant groups that had equal species numbers in both types of rivers. This suggests that riparian plants are sensitive both to increased frequency and changed timing of water-level fluctuations. Regulation also implied a reduced current velocity and a reduced capacity of the rivers to carry waterborne plant propagules. This resulted in an increased proportion of long-floating plant species in the riparian vegetation; these have better colonization abilities compared to short-floaters that are likely to sink before reaching the shoreline.

Aquatic Ecosystems Are Topographically Unique in Occupying the Lowest Position in the Landscape, Thereby Integrating Catchment-Scale Processes

Nearly all biologically important materials flow downhill. Water, sediment, nutrients, and contaminants eventually pass by or accumulate at the lowest topographic point, which often is the aquatic ecosystem. Freshwater ecosystems therefore integrate the events and changes in the catchment. As a consequence, factors affecting the ecological vitality of freshwater resources are complex and cumulative (Naiman and others 1995, Karr 1998). When catchments or stream channels are modified, there are changes in the ability of the ecological system to provide the natural goods and services that are so important to human societies (Postel and Carpenter 1997). Catchment-scale changes eventually alter one or more of five principal factors in fresh waters: physical habitat, seasonal flow of water, the food base of the system, interactions among the stream biota, and chemical cycling (Karr 1991). These factors are connected physically, chemically, and biologically. Furthermore, the biota of fresh waters depend upon connectivity throughout the catchment (Hynes 1975, Stanford and Ward 1992). Effective management of freshwater resources accounts for all these factors and the cumulative effects that human-induced changes impose on them.

It is precisely because fresh waters are integrators of catchment conditions that several indices have been developed to evaluate ecosystem integrity using freshwater and riparian biota (e.g., Innis and others 2000, Karr and Chu 2000). Additionally, catchment management has begun examining innovative concepts such as mimicking normal river flow conditions in an attempt to reestablish seminatural communities and processes (Hesse 1995, Stanford and others 1996). The consequences of individual alterations within the catchment can be difficult to quantify but collectively they change flow duration, amplitude, shape of the flow pulse, minimum flow, and pulse frequencies among other physical processes. In combination the effects may be permanent shifts in ecosystem or community structure and function. Hence, the biotic indices aid in quantifying the effects and often suggest ways by which the biotic effects of flows may be ameliorated (Karr and Chu 1998). Nevertheless, the issue can be much more complicated if a specific need arises to separate flow effects from those associated with temperature, nutrients, disease, pollutants, and so forth.

This principle that aquatic ecosystems integrate catchment-scale processes has important implications for aquatic resource management. Financial support for detecting environmental changes is often limited. The questions then become what, where, and how to measure so as to detect change and understand the causes of change. Fortunately, subtle modifications to the hydrologic cycle will be exposed in the responses of freshwater communities (including riparian zones) and ecological processes (Nilsson and Svedmark 2002, Pinay and others 2002).

Although natural ecological systems offer dangers to humans in terms of extreme water flows and diseases, human alteration of those systems often magnify the existing problems in unexpected ways. In South Africa, interbasin transfer of water in the Orange-Vaal Scheme has carried schistosomiasis into rivers previously free of this parasite. Additionally, the transmission of schistosomes may be accelerated by temperature changes below large dams through alterations to host snail and parasite populations (Pitchford and Visser 1975). In the Lower Vaal River, South Africa, outbreaks of blackflies, which cause river blindness, followed the construction of impoundments (De Moor 1986). Globally, the proliferation of blue-green algal blooms in regulated river reaches and impoundments, as well as massive expansions of harmful algal blooms in coastal zones are linked largely to alterations of river flows and inputs (NRC 2000). Other examples of human health effects resulting from the accumulation and integration of many small changes in the catchment are less direct but still have serious long-term implications.

Much of the world's population still suffers with water services inferior to those available to the ancient Greeks and Romans—and the latest evidence suggests that we are falling behind in efforts to solve these problems (Gleick 2001). The examples above represent only a few of the tens of thousands of documented cases occurring worldwide. Collectively, the effects on human health indirectly caused by alteration of the hydrologic regime have enormous societal costs in terms of expenditures, suffering, and productivity.

Provided that adequate and effective monitoring and assessment programs are in place, freshwater ecosystems can act as early warning detectors of environmental change (Naiman and others 1995), as long as natural variability can be quantified. This latter aspect is one of the important challenges for science. The role as an early warning system is critical not only for the environment but also for cultural issues related to water availability, human health, and quality of life. Fortunately, there are monitoring approaches (e.g., temperature patterns, indicator species, riparian dynamics)

that can be used to quantify deviations from the natural condition.

Scientific Uncertainty and Research Challenges

Uncertainties and challenges abound in any profession but are especially acute in freshwater sciences and management. Major uncertainties relate to predicting future water availability in light of human population pressures and climate fluctuations, as well as the ecological consequences of changing water regimes (Gleick 1998, Palmer and others 2002). Specific research challenges relate to detection and quantification of environmental changes and cumulative effects, linking interdisciplinary knowledge and models, and integrating the roles of human cultures and individual decisions in shaping and resolving the environmental issues (Naiman and others 1995, Lackey 1996). An example of such a challenge can be provided for Australia (as well as many other regions) where most of the flow records and precipitation–runoff relationships were developed after clearing vegetation in catchments. How will the relationships be altered after reforestation occurs? Managerial challenges relate to developing effective monitoring and assessment protocols, determining when ecosystem components are outside the normal range of variation, and implementing corrective measures. Basically, the key challenge is to understand how naturally variable systems operate and to predict the environmental consequences of human activities in these systems. Ultimately, forecasting thresholds of irreversible change, coupled with a better understanding of factors that humans can control, will lead to more effective management. A key goal of this collection of articles is to articulate basic ecological principles as a means of improving our capacity to predict thresholds.

These uncertainties and challenges, as daunting as they may be, only serve to underscore the urgency of decisive actions related to the environment's need for water. Nearly every country on Earth is facing water-based challenges that, without effective leadership, will increasingly worsen over the next decade (Gleick 2001). This deterioration poses serious threats to both the environment and the vitality of human cultures. Steps already taken toward identification and resolution of water-based issues have been numerous, but the scale has been limited to individual countries or regions and is far from being commensurate with the magnitude of the problems.

Additional uncertainty remains as to the most effective solutions—and therein lie the challenges. The challenges can be scientific, such as finding ways to partition cumulative effects, or they can be social, such as reformulating institutions and education to better blend environmental and human needs (Postel 2001). In either case, progress only will be made if there is a general resolve to move forward at all levels of society. There are abundant opportunities for improving restoration and rehabilitation efforts, for understanding and predicting the ecological consequences of changing flow regimes, for quantifying ecological processes, for maintaining biodiversity, for developing a predictive management process, and for appreciating the goods and services provided by freshwater ecosystems (Naiman and others 1995). The United Nations, by declaring the year 2003 the "Year of Fresh Water," has given water scientists a golden opportunity. Now, the challenge is not only to do *good* and *useful* science but also to do science that will be *used*. This latter challenge means developing and sustaining effective partnerships with resource managers, nongovernmental organizations, and decision-makers, as well as using our collective abilities to think and work at much broader scales than in the past.

Conclusions

The ultimate goal for water managers and other decision-makers is to improve use efficiency and sustainable resource development. Unfortunately, many human interventions alter flow regimes—but the modifications need not ignore or completely violate the fundamental ecological principles articulated here. The major challenge to freshwater management is to place water resource development within the context of these fundamental ecological principles in order to maintain the ecological vitality (i.e., goods and services) of the system. Indeed, this is moving forward on several fronts (Table 1). Dale and others (2000) identify five principles to guide land use. Jackson and others (2001) offer innovative approaches for managing water. Stanford and others (1996) outline means for managing rivers where water resource structures are already in place, and Naiman and others (1998a, b) outline several approaches for effective watershed management. In combination, these and other recommendations offer powerful tools for maintaining the vitality of freshwater ecosystems, providing that the recommendations are implemented and the results are monitored. To reiterate: it is no longer sufficient to do *good* and *useful* science; the science must be *used*. Therein lies the fundamental challenge.

In the three companion articles, the Scientific Committee on Water Research (SCOWAR, a committee of the International Council for Science) presents specific physical and ecological principles to underpin future

Table 1. Examples from four recent attempts to articulate fundamental principles for maintaining the biotic vitality of land and freshwater ecosystems

Ecological principles and guidelines for managing land use (Dale and others 2000)
- Time: Ecological processes occur and change with a temporal setting
- Species: Individual and interacting networks of species have strong effects on ecosystem processes
- Site: Each location has a unique set of organisms and abiotic conditions influencing and constraining ecological processes
- Disturbances: Important, ubiquitous ecological events whose effects strongly influence ecological dynamics
- Landscape: Size, shape, and spatial relationships of habitat patches affect ecological processes

Recommendations for an environmentally based water policy (Jackson and others 2001)
- Environmental water reserve: Ensure that ecosystems receive the quantity, quality, and timing of flows needed to support their ecological functions and their services to society
- Legal recognition: Ground and surface waters are a single coupled resource
- Monitoring, assessment, and forecasting: Efficient use and allocation of water resources among competing needs
- Realistic water valuation: Stronger economic incentives for efficient water use in all sectors of the economy
- Pollution abatement: Continued improvement in eliminating point and non-point sources of pollution

The normative river (Stanford and others 1996)
- Flow: Incorporate natural flow regime characteristics in regulated rivers to promote aquatic and riparian diversity and resilience
- Stability: Allow streams and rivers to migrate laterally for habitat development
- Riparian: Restore biophysical properties of riparian zones improves all natural resource values
- Connectivity: Protect interactions between surface flows and groundwater is essential to aquatic–riparian ecosystem integrity
- Exotics: Control of exotic species depends on re-establishing natural land-water interactions in riparian areas

Principles of watershed management (Naiman and others 1998a)
- Cooperation: Watershed management demands unparalleled cooperation since the complexity of information and the scope of change exceed the capacity of any single group
- Balance: Technical solutions to specific human-generated problems can be balanced with the maintenance of environmental components providing similar ecological services
- Data-based decisions: Minimize decisions based on conceptualization and perception; strive for data-driven decisions as the standard for issue resolution
- Regulatory fairness: Apply regulations evenly throughout the watershed in a manner that encourages citizen initiatives and landowner incentives
- Human activities: Recognize and accept that appropriate human activities are fundamental ecological elements of the watershed

development of fresh water. Each article addresses an important component of aquatic ecosystems: riparian dynamics, biotic assemblages, and nutrient cycling. Nilsson and Svedmark (2002) articulate three ecological principles related to maintaining the fundamental qualities of riparian systems. Translating their principles into management directives will require more information about environmental water needs, how fragmentation affects organisms, and how the effects vary with location in the catchment. Bunn and Arthington (2002) articulate four principles related to maintaining biodiversity. Translating their principles into management directives will require active manipulations or experiments to measure ecosystem responses and an ability to distinguish the effects of modified flow regimes from land use change. Pinay and others (2002) articulate three ecological principles driving the biogeochemical cycle of nitrogen in river systems. Translating their principles into management directives will require understanding the cumulative impact of water regime change, providing an empirical appraisal of these impacts, and determining the proportions of the impacts due to natural and human changes.

SCOWAR fully admits that there are gaps in the coverage of topics. The review provided by the three articles is not intended to be comprehensive but, rather, a catalyst for informed discussion. The principles provided are designed to guide water resource managers in making better implementation decisions. If the principles are successfully applied, SCOWAR believes that many environmental difficulties associated with water resource development and restoration can be ameliorated.

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AMENDMENT

SANTA MARGARITA RIVER WATERSHED

ANNUAL WATERMASTER REPORT

WATER YEAR 2000-2001

UNITED STATES OF AMERICA
V.
FALLBROOK PUBLIC UTILITY DISTRICT, ET AL

CIVIL NO. 1247 - SD-T

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OCTOBER 16, 2002

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012682

October 16, 2002

Honorable Gordon Thompson, Jr.
United States District Court
Southern District of California
U. S. District Courthouse
940 Front Street
San Diego, CA 92189

Re: *United States of America v. Fallbrook Public Utility District*
Civil No. 1247 - SD-T

Dear Judge Thompson:

Responsive to Section II of the Order for the Appointment of a Watermaster; Powers and Duties, dated March 13, 1989, a copy of the Annual Watermaster Report for the Water Year 2000-2001 was transmitted to you on July 30, 2002.

On August 29, 2002, a "Request for Clarification of the Santa Margarita River Watershed Annual Watermaster Report, Water Year 2000-01, dated July 2002" was filed with the Court on behalf of The Francis Domenigoni Family Trust and Domenigoni Barton Properties (Domenigoni).

Responsive to the Request for Clarification, the Annual Report is hereby amended by adding the following language to page 36:

> Additionally, agreements provide for MWD to mitigate the Diamond Valley Reservoir Project's potential groundwater impacts. During 2000-2001, injections into the Domenigoni Valley groundwater basin under the Agreements for Mitigation of Groundwater totaled 184 acre feet. As previously noted the groundwater in the Domenigoni Valley groundwater basin is outside this Court's jurisdiction when groundwater levels are below 1400 feet.

The Annual Report is further amended by adding the following language on page 53 at the end of the last sentence in the section entitled "Metropolitan Water District of Southern California:"

> MWD also imported 184 acre feet for groundwater recharge in the Domenigoni Valley groundwater basin under the Agreements for Mitigation of Groundwater Impacts. As previously noted the groundwater in the Domenigoni Valley groundwater basin is outside this Court's jurisdiction when groundwater levels are below 1400 feet.

Honorable Gordon Thompson, Jr.
October 16, 2002
Page Two

Copies of this letter amendment were mailed to the parties listed on the Court-approved service list. In addition notice that the report has been amended and that copies of this letter amendment are available upon request, was posted on October 16, 2002, at the following locations: Fallbrook Public Utility District, 990 E. Mission Road, Fallbrook, California; Rancho California Water District, 42135 Winchester Road, Temecula, California; and the Post office at Anza, California. A copy of this letter amendment will be mailed to any party requesting a copy.

Any party objecting to any portion of this amendment may file written notice with the Court within 30 days of service. Objections must refer to the portion of the amendment that is objectionable and state specifically the grounds for the objections.

Very truly yours,

James S. Jenks
Watermaster

JSJ:rbb
cc: Service List
Jackson/Demarco/Peckenpaugh

SANTA MARGARITA RIVER WATERSHED

ANNUAL WATERMASTER REPORT

WATER YEAR 2000-2001

UNITED STATES OF AMERICA
V.
FALLBROOK PUBLIC UTILITY DISTRICT, ET AL

CIVIL NO. 1247 - SD-T

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JULY 2002

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Major Water Purveyors — Bound at back of report

SECTION 1 - SUMMARY

Section 1 - A summary of the Santa Margarita River Watershed Annual Watermaster Report for the 2000-2001 Water Year.

Section 2 - This Annual Watermaster Report is prepared pursuant to Section II of the U. S. District Court Order dated March 13, 1989. The Court has retained jurisdiction over all surface flows of the Santa Margarita River Watershed and all underground waters determined by the Court to be subsurface flow of streams or creeks or which is determined by the Court to add to, support or contribute to the Santa Margarita River stream system. Thus imported waters, whether in storage in Lake Skinner or being transported through the Watershed, are outside Court jurisdiction, along with local, vagrant groundwaters that do not support the Santa Margarita River stream system.

Section 3 - Surface water flows were well below normal in 2000-2001, with flows for long-term stations ranging from 24% to 68% of the long-term average flow. Surface diversions to use totaled 983 acre feet compared with 1,046 acre feet in 1999-2000. The total quantity of water in storage in the Watershed on September 30, 2001, was 630,090 acre feet, of which 21,118 acre feet was Santa Margarita River water and 608,972 acre feet was imported water.

Section 4 - Groundwater extractions were 41,765 acre feet compared to 43,434 acre feet in 1999-2000. Water purveyors pumped 35,704 acre feet and 6,061 acre feet were pumped by other substantial users. Total annual local production including surface diversions for use for the period 1992-2001 is shown below on Figure 1.1.

FIGURE 1.1

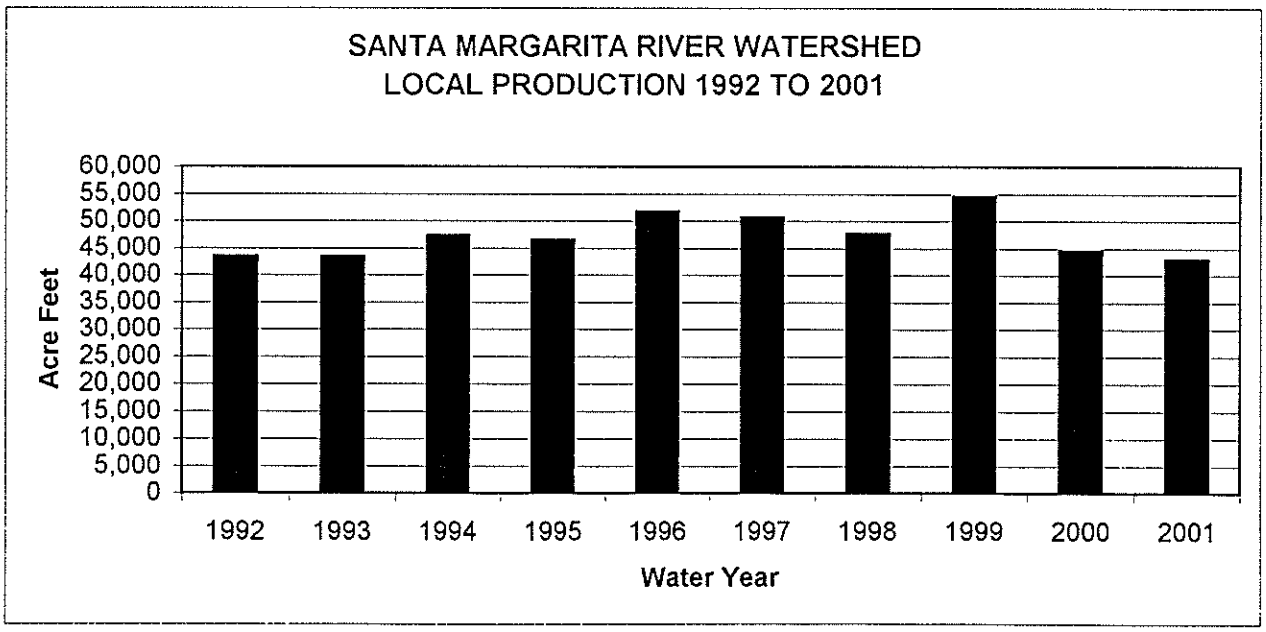

Section 5 - During 2000-2001, 65,386 acre feet of water were imported and distributed in the Santa Margarita River Watershed by eight purveyors. This compares with 82,277 acre feet in 1999-2000 and represents a 20.5 percent decrease. Net exports, including wastewater, were 7,996 acre feet. Annual imports for the period 1992-2001 are shown below on Figure 1.2.

FIGURE 1.2

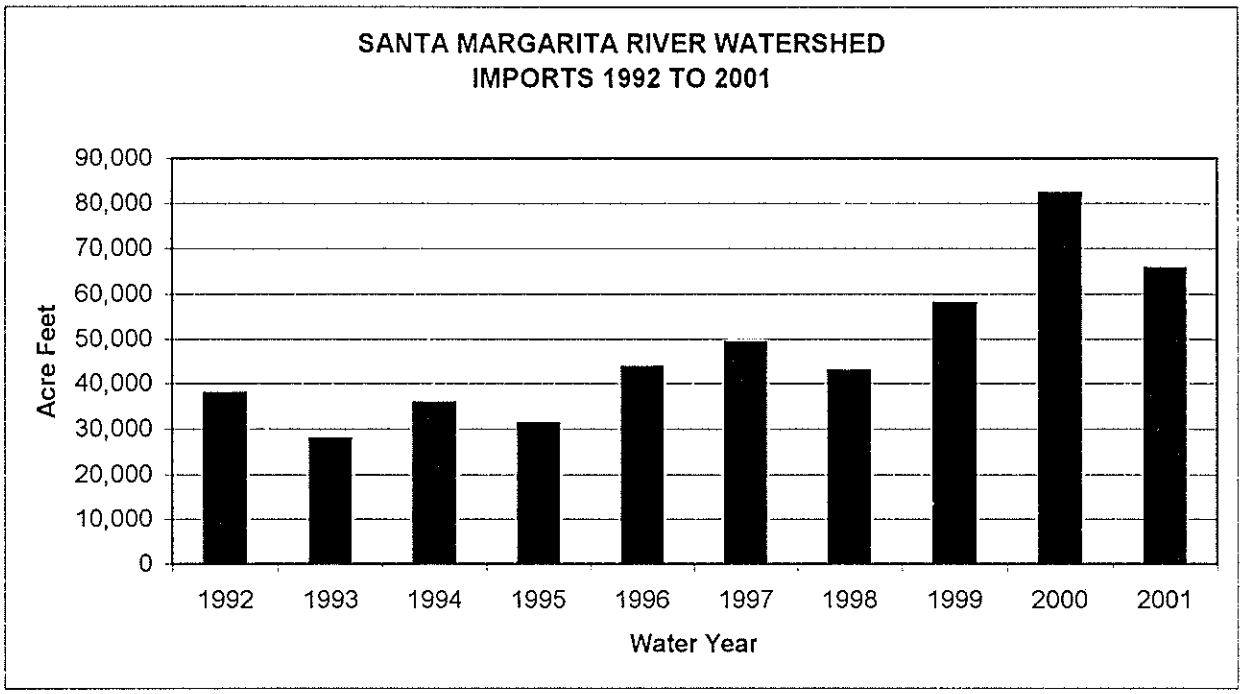

Section 6 - Water rights during the 1950's and 1960's consisted primarily of riparian and overlying rights. Other rights included appropriative rights and federal reserved rights. More recently, water purveyors in the Watershed have begun exercising groundwater appropriative rights. Perfected appropriative surface water rights on file with the State Water Resources Control Board (SWRCB) amount to 906,892 gallons per day which corresponds to 1.4 cfs or 2.78 acre feet per day of direct diversion rights and 44,315.5 acre feet of active storage rights.

Section 7 - Total imported supplies plus local production totaled 108,134 acre feet compared to 126,757 reported in 1999-2000. Of that quantity, 49,212 acre feet were used for agriculture; 5,390 acre feet were used for commercial purposes; and 41,802 acre feet were used for domestic purposes; 514 acre feet were discharged to Murrieta and Temecula Creeks; 3,653 acre feet of fresh water were exported; 184 acre feet were directly recharged by Metropolitan WD; and 2,374 acre feet were recharged by Rancho California WD and not recovered. The overall system loss of 5,005 acre feet. System gain or loss is the result of many factors including errors in measurement, differences between periods of use and periods of production, leakage and unmeasured uses.

Total annual production for the period 2000-2001 is shown below on Figure 1.3

FIGURE 1.3

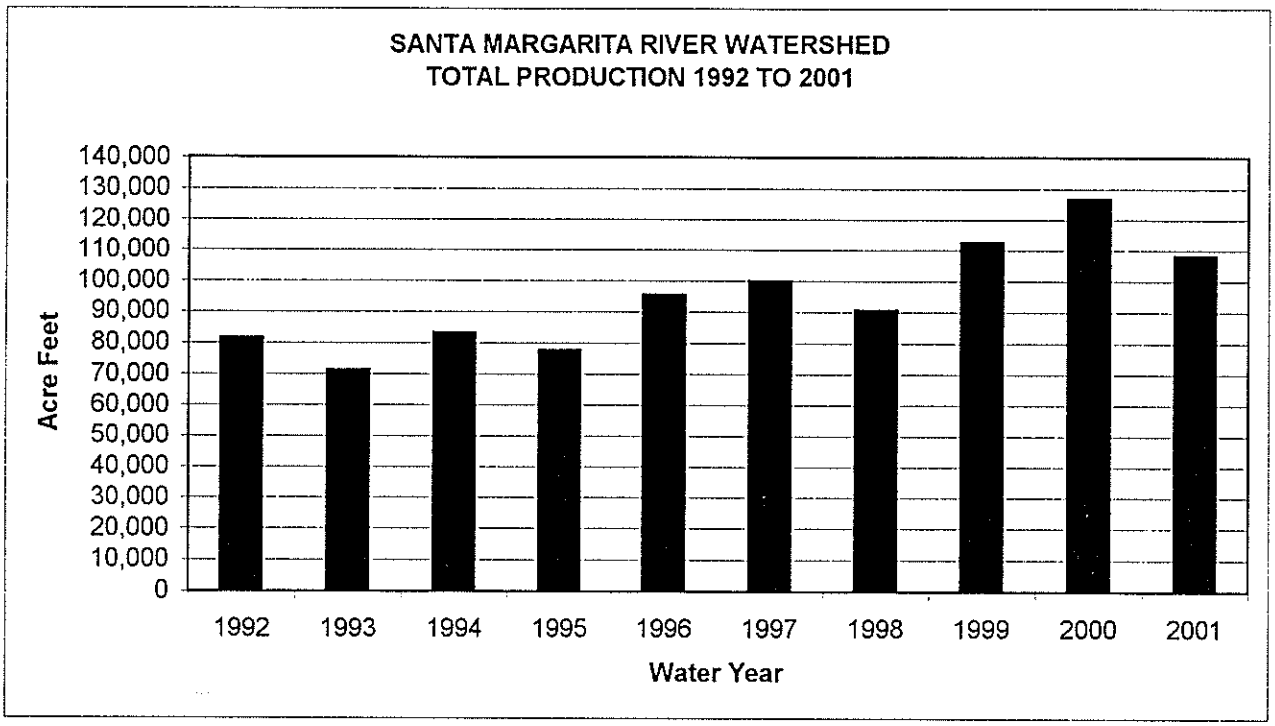

Section 8 - The United States has raised a number of issues regarding unauthorized water use by Rancho California WD including violation of the 1940 Stipulated Judgment. During 2000-2001, representatives of Rancho California WD and the United States developed a settlement agreement that would resolve their issues. The parties are now in the process of obtaining the necessary approvals of the agreement.

Section 9 - Threats to water supply include high nitrate levels in Rainbow Creek and Anza Valley in past years, potential overdraft conditions in the Murrieta-Temecula and Anza groundwater basins, and salt balance issues in the upper Watershed.

Section 10 - Water quality data in the Watershed for 2000-2001 are presented in Appendix D.

Section 11 - Projected Watermaster tasks for the next five years are listed.

Section 12 - A total Watermaster budget of $287,850 is proposed for the 2002-2003 Water Year. This budget includes $170,000 for the Watermaster Office and $117,850 for operation of gaging stations by the U. S. Geological Survey (U.S.G.S.).

SECTION 2 - INTRODUCTION

2.1 Background

On January 25, 1951, the United States of America filed Complaint No. 1247 in the United States District Court for the Southern District of California to seek a judicial determination of all respective water rights within the Santa Margarita River Watershed. The Final Judgment and Decree was entered on May 8, 1963, and appealed to the U. S. Court of Appeals. A Modified Final Judgment and Decree was entered on April 6, 1966. Among other things, the Decree provided that the Court:

> . . . retains continuing jurisdiction of this cause as to the use of all surface waters within the watershed of the Santa Margarita River and all underground or sub-surface waters within the watershed of the Santa Margarita River, which are determined in any of the constituent parts of this Modified Final Judgment to be a part of the sub-surface flow of any specific river or creek, or which are determined in any of the constituent parts of this Modified Final Judgment to add to, contribute to, or support the Santa Margarita River stream system.

In March 1989, the Court appointed James S. Jenks as Watermaster to administer and enforce the provisions of the Modified Final Judgment and Decree and subsequent orders of the Court. The appointing Order described the Watermaster's Powers and Duties as well as procedures for funding and operating the Watermaster's Office. Also in 1989, the Court appointed a Steering Committee that at the conclusion of 2000-2001 was comprised of representatives from the United States, Eastern Municipal Water District, Fallbrook Public Utility District, Metropolitan Water District of Southern California, Pechanga Tribe, and Rancho California Water District. The purposes of the Steering Committee are to assist the Court, to facilitate litigation, and to assist the Watermaster.

2.2 Authority

Section II of the appointing Order requires that the Watermaster submit a written report containing his findings and conclusions to the Court promptly after the end of each water year.

2.3 Scope

The subjects addressed in this report are responsive to Section II of the appointing order. Information and data contained in this report are based on information reported to the Watermaster by others. Therefore, the Watermaster does not guarantee the completeness and accuracy of the information presented in this report, although most of the data presented are based on measurements. Estimates by the Watermaster are so noted.

SECTION 3 - SURFACE WATER AVAILABILITY AND USE

3.1 Surface Flow

Over the years, flows in the Santa Margarita River Watershed have been measured at the stations listed on Table 3.1. A number of these stations have been discontinued. During Water Year 2000-2001 the U. S. Geological Survey (U.S.G.S.) operated 13 stations under an agreement with the Watermaster. The U.S.G.S. also operated a station on Murrieta Creek at Tenaja Road in cooperation with the Watermaster and Riverside County Flood Control District. In addition to stream flows, the U.S.G.S. also measures water elevation at Vail Lake.

The U.S.G.S. also operates several stations in the watershed under contract with Camp Pendleton. These include stream gaging stations on Fallbrook Creek and on the outlet channel and spillway for Lake O'Neill. The U.S.G.S. also operates a tidal water level recorder on the Santa Margarita River at its mouth.

Monthly flows for stations in Water Year 2000-2001 are shown on Table 3.2. Those flows consist of U.S.G.S. discharge determinations available at the time this report is published. Official U.S.G.S. discharges for 2000-2001 are published by the U.S.G.S. in its annual Water Resources Data report.

In considering the historical record of flow at these stations, it should be recognized that the long term averages include variations in watershed conditions such as level of development, groundwater production, return flows, impoundments and vegetative use as well as hydrologic conditions, changes in gaging station locations and other factors. Descriptions of the various historical locations of gaging stations may be found in the publication, *Water Resources Data - California*, which is published annually by the U.S.G.S.

The Santa Margarita River station near Ysidora was discontinued on February 25, 1999, due to the reconstruction of the Basilone Bridge. A temporary station, installed at the U. S. Marine Corps Diversion Dam located about 2.3 miles upstream from the Ysidora site, was in operation throughout the 2000-2001 water year. The temporary station was closed and the permanent Basilone Bridge station was reestablished at the end of the year.

TABLE 3.1

SANTA MARGARITA RIVER WATERSHED
STREAM GAGING STATIONS
2000-2001

STATION NAME	STATION NO.	AREA SQ MI	RECORDED BY	PERIOD OF RECORD 1920	1930	1940	1950	1960	1970	1980	1990	2000
Temecula Creek Near Aguanga	11042400	131	USGS				8/57					
Wilson Creek Above Vail Lake	11042490	122	USGS							10/89	10/94	
Temecula Creek At Vail Dam	11042520	320	USGS	2/23					10/77			
Vail Lake at Temecula (Reservoir Storage)	11042510	320	USGS			10/48						
Pechanga Creek Near Temecula	11042631	13.8	USGS							10/87		
Warm Springs Creek Near Murrieta	11042800	55.4	USGS							10/87		
Santa Gertrudis Creek Near Temecula	11042900	90.1	USGS							10/87		
Murrieta Creek At Tenaja Road	11042700	30	USGS								10/97	
Murrieta Creek At Temecula	11043000	222	USGS	10/25								
Santa Margarita River Near Temecula	11044000	588	USGS	2/23								
Rainbow Creek Near Fallbrook	11044250	10.3	USGS								9/89	
Sandia Creek Near Fallbrook	11044350	21.1	USGS								9/89	
Santa Margarita River At FPUD Sump	11044300	620	USGS	10/24						9/80	9/89	
Santa Margarita River Tributary Near Fallbrook	11044600	0.52	USGS					10/61 9/65				
DeLuz Creek Near DeLuz *1/*	11044800	33	USGS/ USMC				2/51	67 69	77		9/89	
Santa Margarita River Near DeLuz Station	11045000	705	USGS	10/24 - 9/26								
Fallbrook Creek *2/* Near Fallbrook	11045300	6.97	USGS/ USMC					10/64	9/76	12/88		
Santa Margarita River At Ysidora *3/*	11046000	723	USGS	3/23								
Santa Margarita River at USMC Diversion Dam near Ysidora	11045050	710	USGS								2/99	
			WATER YEAR ENDING	1920	1930	1940	1950	1960	1970	1980	1990	2000

1/ Recorded by USMC, Camp Pendleton October 1966 to 1977
2/ Recorded by USMC, Camp Pendleton prior to October 1993
3/ Station temporarily discontinued in February 1999

TABLE 3.2

SANTA MARGARITA RIVER WATERSHED
MEASURED SURFACE WATER FLOW

2000-2001

Quantities in Acre Feet

GAGING STATION	DRAINAGE AREA SQ MI	MONTH OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	WATER YEAR TOTAL	ANNUAL AVERAGE THRU 2000	YEARS OF RECORD THRU 2000
Temecula Creek Near Aguanga	131	67	86	132	183	220	277	219	112	41	38	31	34	1,440	5,990	43
Pechanga Creek Near Temecula	13.8	0	0	0	22	91	10	1	0	0	0	0	0	124	694	13
Warm Springs Creek Near Murrieta	55.4	8	5	9	76	481	58	3	1	0	1	2	0	644	3,290	13
Santa Gertrudis Creek Near Temecula	90.2	4	1	0	118	433	50	12	0	0	0	0	0	618	3,100	13
Murrieta Creek At Tenaja Road	30	0	11	1	46	283	56	14	0	0	0	0	0	411	2,710	3
Murrieta Creek At Temecula	222	219	139	58	1,159	3,060	575	365	202	177	173	177	176	6,480	9,512	76
Santa Margarita River Near Temecula	588	298	192	87	1,630	4,090	762	482	228	206	219	229	212	8,635	14,223 20,390	52 (1949-2000) 26 (1923-48)
Rainbow Creek Near Fallbrook	10.3	16	18	17	110	245	187	76	17	9	4	2	1	702	3,070	11
Sandia Creek Near Fallbrook	21.1	219	254	272	461	794	828	495	346	222	146	137	119	4,293	7,480	11
Santa Margarita River At FPUD Sump	620	425	352	380	1,720	4,270	1,580	880	468	283	192	224	183	10,957	35,160	11
DeLuz Creek Near DeLuz	33	15	25	16	131	997	750	294	202	67	0	0	0	2,497	12,750 N/A 3,826	8 (1993-2000) (1989-90) 27 (1951-77)
Santa Margarita River At Ysidora	723	Station temporarily discontinued												0	29,026 31,390	51 (1949-99) 26 (1923-48)
Santa Margarita River At USMC Diversion Dam near Ysido	710	445	541	544	2,080	4,700	1,510	33	0	0	44	203	242	10,342	N/A	N/A
Fallbrook Creek Near Fallbrook	6.97	1	19	11	144	259	92	62	29	10	1	0	0	628	1,525 1,462 *	12 (1989-2000) 12 (1965-76)

* Includes wastewater flows
N/A - Not Applicable

Total flows at four long-term stations for Water Years 1999-2000 and 2000-2001 are compared with their averages in the tabulation below. Average flows for the Santa Margarita River stations near Temecula and near Ysidora are shown for two periods: before and after Vail Dam was constructed (1923 to 1948, and 1949 to 2000).

	TOTAL FLOW		AVERAGE FLOW
	1999-2000	2000-2001	Through 2000
	Acre Feet	Acre Feet	Acre Feet
Temecula Creek Near Aguanga	2,190	1,440	5,990 (1957-2000)
Murrieta Creek At Temecula	3,916	6,480	9,512 (1925-2000)
Santa Margarita River Near Temecula	5,628	8,630	14,223 (1949-2000) 20,390 (1923-1948)
Santa Margarita River Near Ysidora (various locations) (At Diversion Weir 2000-2001)	4,695	10,350	28,558 (1949-2000) 31,390 (1923-1948)

The foregoing tabulation indicates that, flows in 1999-2000 and 2000-2001 were much lower than the long-term averages. In 2000-2001 annual flows at long-term stations on Temecula Creek, Murrieta Creek and the Santa Margarita River near Temecula ranged from 24 to 68 percent of the long-term average. In addition, flow at the temporary Santa Margarita River station at the Diversion Weir was 36 percent of the long-term average for the Ysidora station.

Monthly flows shown in Table 3.2 consist primarily of naturally occurring surface runoff, including return flows, except for Rancho California WD discharges into Temecula and Murrieta Creeks. A portion of the Rancho California WD discharges are pursuant to Section Eleventh of the 1940 Stipulated Judgment which requires maintenance of three cubic feet per second (cfs) flow at the Santa Margarita River near Temecula station

between May 1 and October 31 of each year. Total flow at that station for October 2000 and May through September 2001 are shown below:

Month	Monthly Discharge Acre Feet	Average Daily Flow CFS
October 2000	298	4.8
May 2001	228	3.7
June 2001	206	3.5
July 2001	219	3.6
August 2001	229	3.7
September 2001	212	3.6
TOTAL	1,392	3.8

During 2000-2001, Rancho California WD released 514 acre feet into Murrieta and Temecula Creeks of which 505 acre feet were released during October 2000, and between May 1 and September 30, 2001. Of the 505 acre feet released in October 2000 and May through September 2001, 30 acre feet were from wells and 475 acre feet were from the System River Meter. The System River Meter refers to discharges directly from Rancho California WD's distribution system into Murrieta Creek at a location just upstream from the Murrieta Creek gaging station.

Rancho California WD also discharged 2,015 acre feet of treated wastewater into Murrieta Creek at a point about five miles upstream from the Murrieta Creek at Temecula gaging station.

3.2 Surface Water Diversions

Surface diversions to surface water storage and groundwater storage during 1999-2000 and 2000-2001 are shown in Table 3.3. In general, diversions to surface storage at Vail Lake and Lake O'Neill are computed as being equal to inflow less spill, however, diversion to surface storage at Vail Lake excludes inflow during the period from May 1 through October 31 when Permit 7032 does not allow such diversions. Inflow to Vail is calculated as the sum of evaporation, spill, releases and change of storage. Inflow into Vail Lake during the period when diversions are not permitted is released and not credited to groundwater storage. Representatives of the United States do not agree with this method of calculation.

Surface diversions to use for 2000-2001 are shown in Table 3.4. The use is primarily irrigation although the diversions on the Pechanga Indian Reservation are into the domestic water system. Estimated consumptive uses, losses and returns are also shown.

TABLE 3.3

SANTA MARGARITA RIVER WATERSHED
SURFACE WATER DIVERSIONS TO STORAGE
2000-2001
Quantities in Acre Feet

Surface Water Storage

	Vail Lake		Lake O'Neill	
	1999-2000	2000-2001	1999-2000	2000-2001
Storage end of prior year	22,130	21,170	663	578
Inflow - Total	2,934	2,559	485 [1]	1,508 [2]
Inflow to be Bypassed	371	429	0	0
Spill	0	0	0	73
Diversions to Surface Storage	2,563 [3]	2,130 [3]	485 [4]	1,435 [4]
Annual Evaporation	3,572	3,470	365	367
Releases - Total	322	68	0	0
Release to GW Storage	(49) [5]	(361) [5]	0	339
Apparent Seepage to GW	0	0	205[6]	389 [6]
Change of Storage	(960)	(979)	(85)	340
Storage End of Year	21,170	20,200	578	918
Groundwater Storage				
Recharge Release from Storage Facility	0	0	0	0
Direct Recharge	0	0	4,648	4,350

1 0 AF diverted from the Santa Margarita River and 485 AF estimated inflow from Fallbrook Creek
2 743 AF diverted from the Santa Margarita River and 765 AF estimated inflow from Fallbrook Creek
3 Inflow less Spill less Inflow (Oct 1 to Oct 31 and May 1 to Sept 30)
4 Inflow less Spill
5 Total Release less Inflow to be bypassed
6 Includes seepage losses, leakage through flashboards and unaccounted for water

TABLE 3.4

SANTA MARGARITA RIVER WATERSHED
SURFACE WATER DIVERSIONS TO USE
2000-2001
Quantities in Acre Feet

	Surface Diversions	Consumptive Use[1]	Losses[2]	Returns[3]
Prestininzi	23	17	2	4
Blue Bird Ranch	31	21	3	7
Chambers	3	2	0.3	0.7
Cal June, Inc.	325	219	33	73
Strange	250	169	25	56
Agri-Empire, Inc. Kohler Canyon	50	38	5	7
Papac	38	26	4	8
Sage Ranch Nursery	100	68	10	22
Daily Family Trust	7	5	1	1
Carter*	107	72	11	24
Pechanga Tribe	4	3	0.4	0.6
San Diego State University Foundation	45	31	4	10
TOTAL	983	671	99	213

1 Consumptive use equals 75% of Diversions less Losses
2 Losses equal 10% of Diversions
3 Returns equal 25% of Diversions less Losses
* Includes Spring Flows

3.3 Water Storage

Major water storage facilities in the Santa Margarita River Watershed are listed on Table 3.5, together with the water in storage on September 30, 2000, and September 30, 2001. Total Santa Margarita River stream system water in storage at the end of Water Year 2000-2001 totaled 21,118 acre feet, compared to 21,748 acre feet at the end of the previous year. Imported water in storage in Lake Skinner and Diamond Valley Lake, both operated by Metropolitan Water District of Southern California (MWD), is also shown on Table 3.5. Imported water is not under Court jurisdiction.

TABLE 3.5

SANTA MARGARITA RIVER WATERSHED
WATER IN STORAGE
2000-2001
Quantities in Acre Feet

Santa Margarita River Storage	Total Capacity	Water in Storage 9/30/2000	Water in Storage 9/30/2001
Dunn Ranch Dam	90	0	0
Upper Chihuahua Creek Reservoir	± 47	0	0
Vail Lake	49,370	21,170	20,200
Lake O'Neill	1,200	578	918
Subtotal	50,707	21,748	21,118
Imported Water Storage			
Lake Skinner	44,000	41,532	39,655
Diamond Valley Lake	800,000	255,400	569,317
TOTAL STORAGE	894,707	318,680	630,090

SECTION 4 - SUBSURFACE WATER AVAILABILITY

4.1 General

Much of the water from the Santa Margarita River stream system is obtained by pumping subsurface water. The Court has identified two basic types of subsurface water in its interlocutory judgments. One type is vagrant, local, percolating waters that do not add to, support or contribute to the Santa Margarita River or its tributaries. Such waters have been determined to be outside the continuing jurisdiction of the Court. These waters are typically found in the basement complex and/or residuum deposits in the Watershed. Wells tapping these deposits typically have low yields.

Other subsurface waters were found by the Court to add to, contribute to and support the Santa Margarita River and/or its tributaries. Aquifers containing such waters have been designated by the Court as younger alluvium and older alluvium. Younger alluvial deposits are commonly exposed along streams and in valleys. Older alluvium may be found underneath younger alluvium and is not limited to areas along stream channels. Older alluvium may or may not be exposed at ground surface. The use of subsurface water found in younger and older alluvium is generally under the continuing jurisdiction of the Court and is reported upon in this report.

4.2 Extractions

Production of Santa Margarita River water by substantial water users in the Watershed from all sources is listed on Table 4.1 by hydrologic area along with estimated consumptive use and return flows. Recovery of imported water that has been directly recharged is not included in Table 4.1. Substantial water users include water purveyors as well as private irrigators who irrigate eight acres or more or use an equivalent quantity of water.

In 2000-2001, production by purveyors totaled 35,704 acre feet, compared to 37,139 acre feet in 1999-2000. Monthly quantities are shown in Appendix A and annual production for water years between 1966 and 2001 is shown in Appendix B.

The quantities of subsurface extractions by private irrigators are based on the irrigated acreage and the crop type. These quantities are reported in Appendix C to total 6,061 acre feet in 2000-2001. Of the subsurface extractions, 75 percent is estimated to have been consumptively used and 25 percent to have been return flow. Return flow is that portion of the total deliveries that is not consumed. Although return flows average about 25 percent, such flows are affected with the type of use (domestic, commercial and irrigation), the type of irrigation application (drip, micro-sprinkler, furrow), and exports from watersheds.

TABLE 4.1

SANTA MARGARITA RIVER WATERSHED

SANTA MARGARITA RIVER WATER PRODUCTION BY SUBSTANTIAL USERS

2000-2001

HYDROLOGIC AREA	WATER PURVEYOR PRODUCTION ACRE FEET	OTHER IRRIGATED ACRES	IRRIGATION PRODUCTION ACRE FEET	TOTAL GROUNDWATER PRODUCTION ACRE FEET	SURFACE WATER DIVERSIONS ACRE FEET	TOTAL PRODUCTION ACRE FEET	ESTIMATED CONSUMPTIVE USE ACRE FEET 1/	ESTIMATED RETURN FLOW ACRE FEET
Wilson Creek Above Aguanga GWA Includes Anza Valley	361 *(Lake Riverside, (Anza MWC, Cahuilla)*	1,181 2/	1,950	2,311	0	2,311	1,733	578
Temecula Creek Above Aguanga GWA	10 *(Butterfield Oaks MHP)*	341	568	578	88	666	493	173
Aguanga GWA	512 *(Outdoor Resorts) (Jojoba Hills)*	422	1,248	1,760	250	2,010	1,489	521
Upper Murrieta Creek (Warm Springs Creek above 7S/3W-14)	0	0	0	0	0	0	0	0
Lower Murrieta Creek (Santa Gertrudis/Tucalota Creek above 7S/2W-18)	0	410	43	43	100	143	100	43
Murrieta-Temecula GWA	28,455 *(RCWD, MCWD, EMWD, Pechanga)*	1,386	1,754	30,209	111	30,320	22,732	7,588
Santa Margarita River Below the Gorge								
Deluz Creek	0	218	495	495	64	559	414	145
Sandia Creek	0	65	0	0	325	325	219	106
Rainbow Creek	0	0	0	0	0	0	0	0
Santa Margarita River	6,366 *(USMC)*	20	3	6,369	45	6,414	1,425	3,410
TOTAL	**35,704**	**4,043**	**6,061**	**41,765**	**983** 3/	**42,748**	**28,605**	**12,564**

1/ Estimated consumptive use is equal to 75% of groundwater production plus 75% of surface diversions less 10% except for Camp Pendleton where net export of 1,578 acre feet is excluded and return flows include measured wastewater returns
2/ Includes lands overlying deep aquifer in Anza Valley
3/ Includes surface diversion for irrigation, commercial and domestic use.

In addition to groundwater production by water purveyors and private irrigators, surface diversions are also listed on Table 4.1 as well as total production of Santa Margarita River water.

4.3 Water Levels

Water levels in selected wells in the Watershed are measured periodically by various entities. Historical water levels in five wells at various locations in the Watershed are shown in this report on Figures 4.1, 4.2, 4.3, 4.4 and 4.5. Figure 4.1 shows water levels in Well No. 8S/2W-12H1 (Windmill Well) located in the Rancho California WD service area downstream from Vail Lake. Note the extended drawdown from 1945 to 1978, the major recoveries during the wet years in 1980 and 1993, and the effect of relatively dry years after 1980 and after 1993. Water levels declined 7.5 feet in 2000-2001. It should be noted that the Windmill Well is located in Pauba Valley about 1.5 miles downslope from the Valle de los Caballos (VDC) recharge area. Releases from Vail Lake as well as imported water are recharged there. In 2000-2001, 18,080 acre feet of imported water were recharged in the VDC of which about 88 percent was recovered in the same year.

FIGURE 4.1

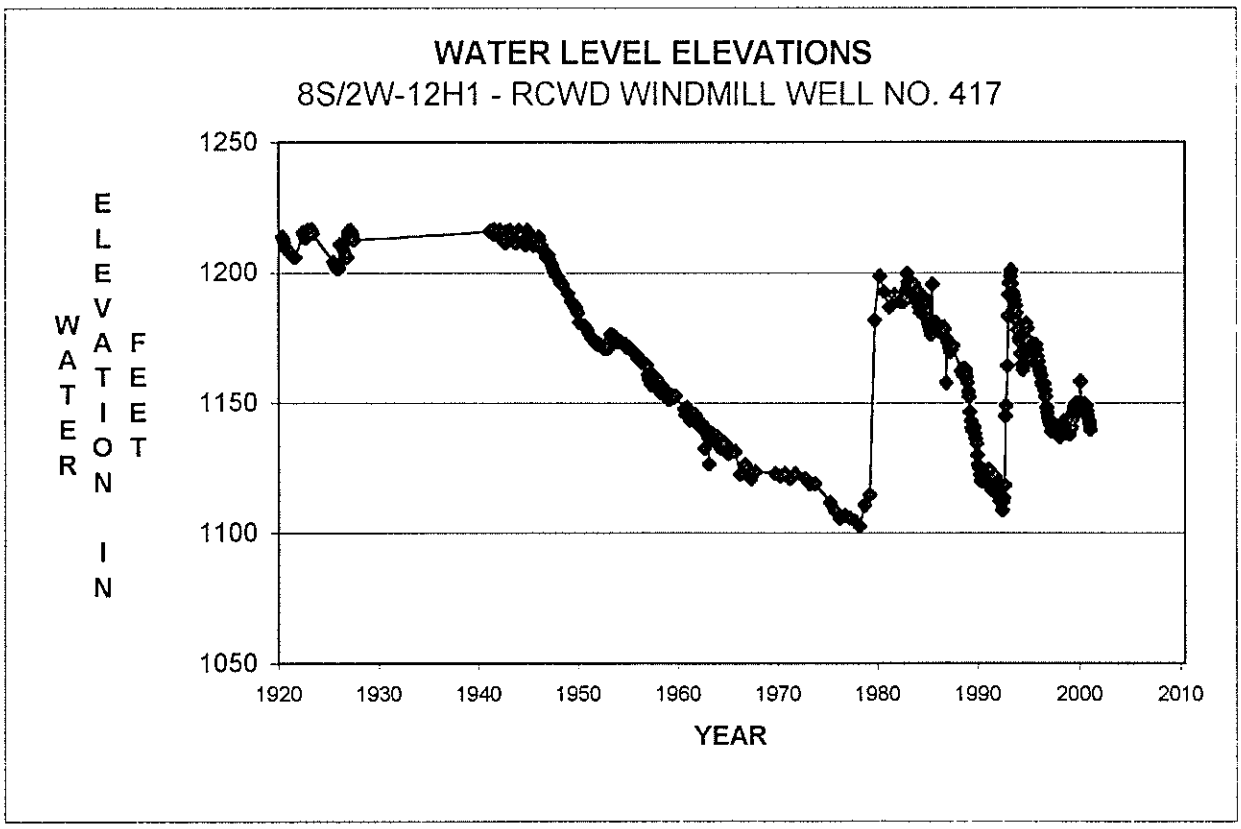

Collar El. 1216.7 Feet; Depth 515 Feet; Drilled in Alluvium
Ref: RCWD reports (1920-2001)

Figure 4.2 shows water levels at Camp Pendleton in Well No. 10S/4W-7J1, a monitoring well located in the Upper Sub-basin. Fluctuations in recent years illustrate recharge during the winter months and drawdown each summer, with the water levels generally between 82 and 90 feet in elevation. Water levels in Well 7J1 rose 1.9 feet between the fall of 2000 and the fall of 2001.

FIGURE 4.2

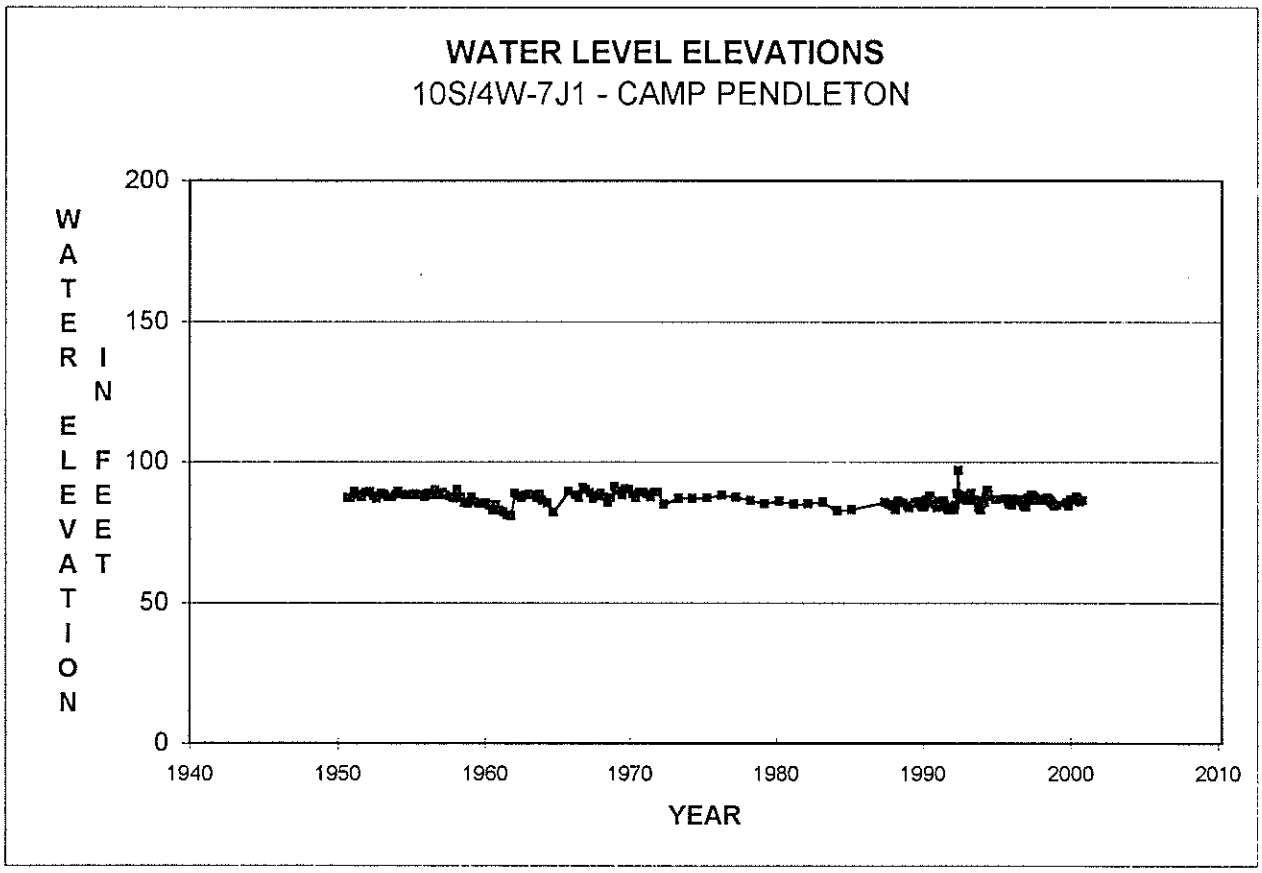

Ground El. 93 Feet; Depth 138.8 Feet; Perf. Unknown; Drilled in Alluvium
Camp Pendleton Records (1950-72) (1988-2001); Leeds Hill Study (1973-85) Dates Estimated

Figure 4.3 shows water levels from production Well No. 7S/3W-20C9 (Holiday Well) in the Murrieta County Water District service area. Water levels in this well rose 13 feet since the fall of 2000. Water levels in the Lynch Well, 7S/3W-17R2, which serves as a monitoring well and had no production in 2000-2001, dropped 10 feet.

FIGURE 4.3

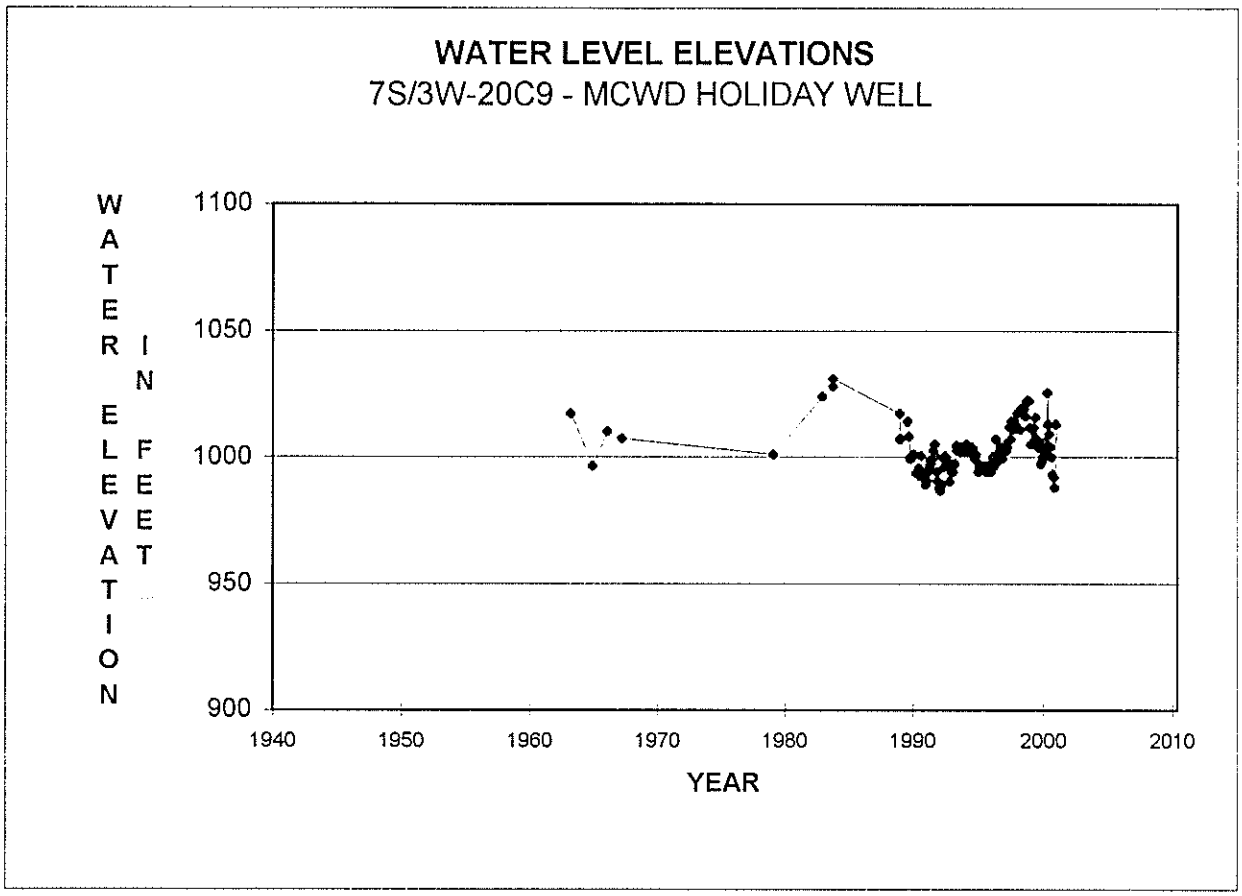

Ground El. 1090 Feet; Depth 307 Feet; Perf. 60 - 307 Feet
Murrieta County Water District Records

Figure 4.4 shows water levels for Well No. 7S/3E-21G1, Anza Mutual Water Company's Well No. 1, a production well located in the Anza Valley. Water levels in this well rose 21.5 feet this year. As may be noted from Figure 4.4, recent measurements show annual 50 foot fluctuations in groundwater levels at this well, partly in response to the operation of nearby irrigation wells. Current levels are within the historical range.

FIGURE 4.4

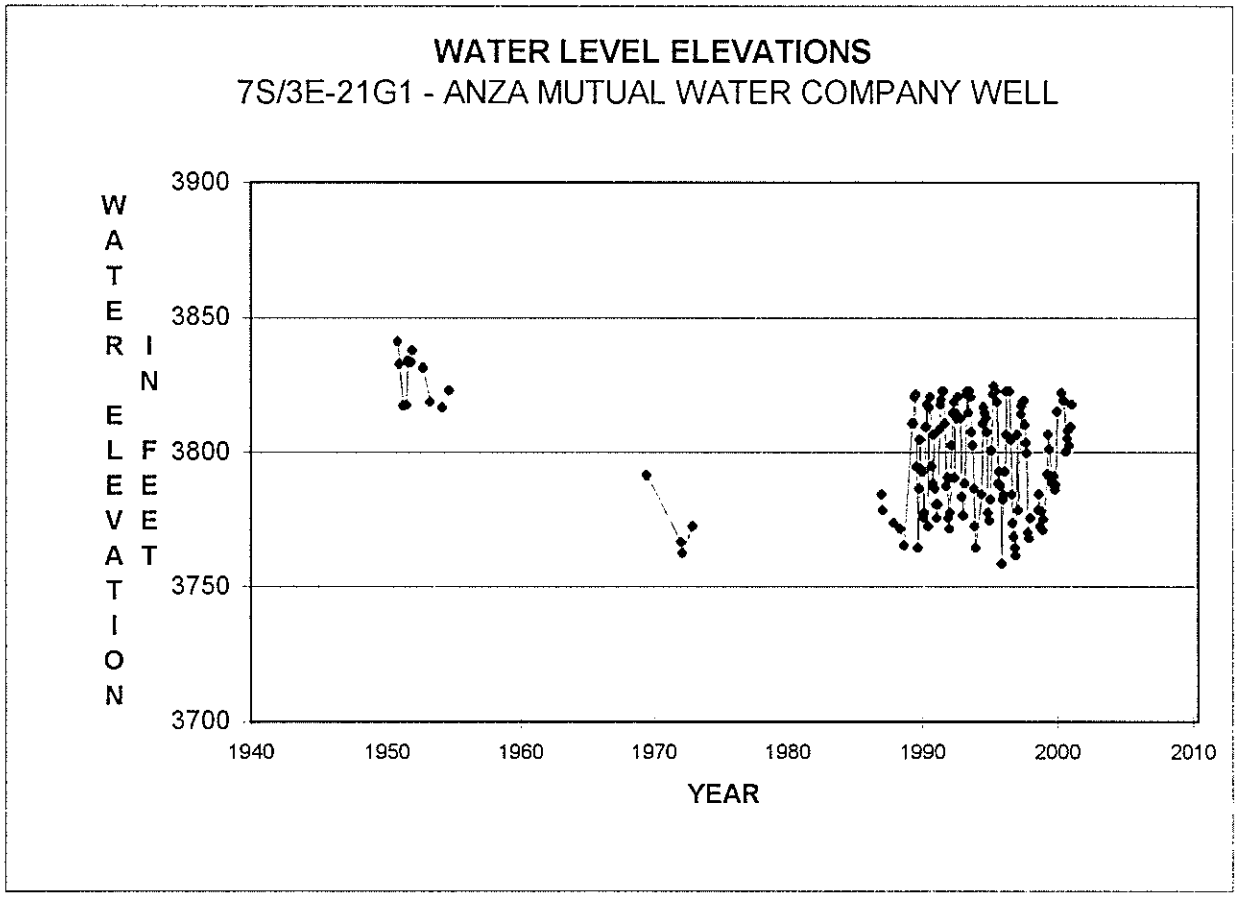

Ground El. 3862.6 Feet; Depth 260 Feet; Perf. 20 - 260 Feet; Drilled in Alluvium
Anza Mutual Water Co. Well No. 1 (1987-2001); DWR Bulletin 91-22 (1950-73)

Figure 4.5 shows water levels at Well No. 8S/2W-29G1, located in Wolf Valley on the Kelsey Tract of the Pechanga Indian Reservation. The well is not used for water production and its depth as measured in 1972 was 159 feet. Water levels collected since 1925 reflect unconfined groundwater levels. As shown on Figure 4.5 the groundwater levels have fluctuated within a 44 foot range above and below elevation 1050 feet in response to wet years and dry periods. Water levels in this well fell 3.2 feet in 2000-2001.

FIGURE 4.5

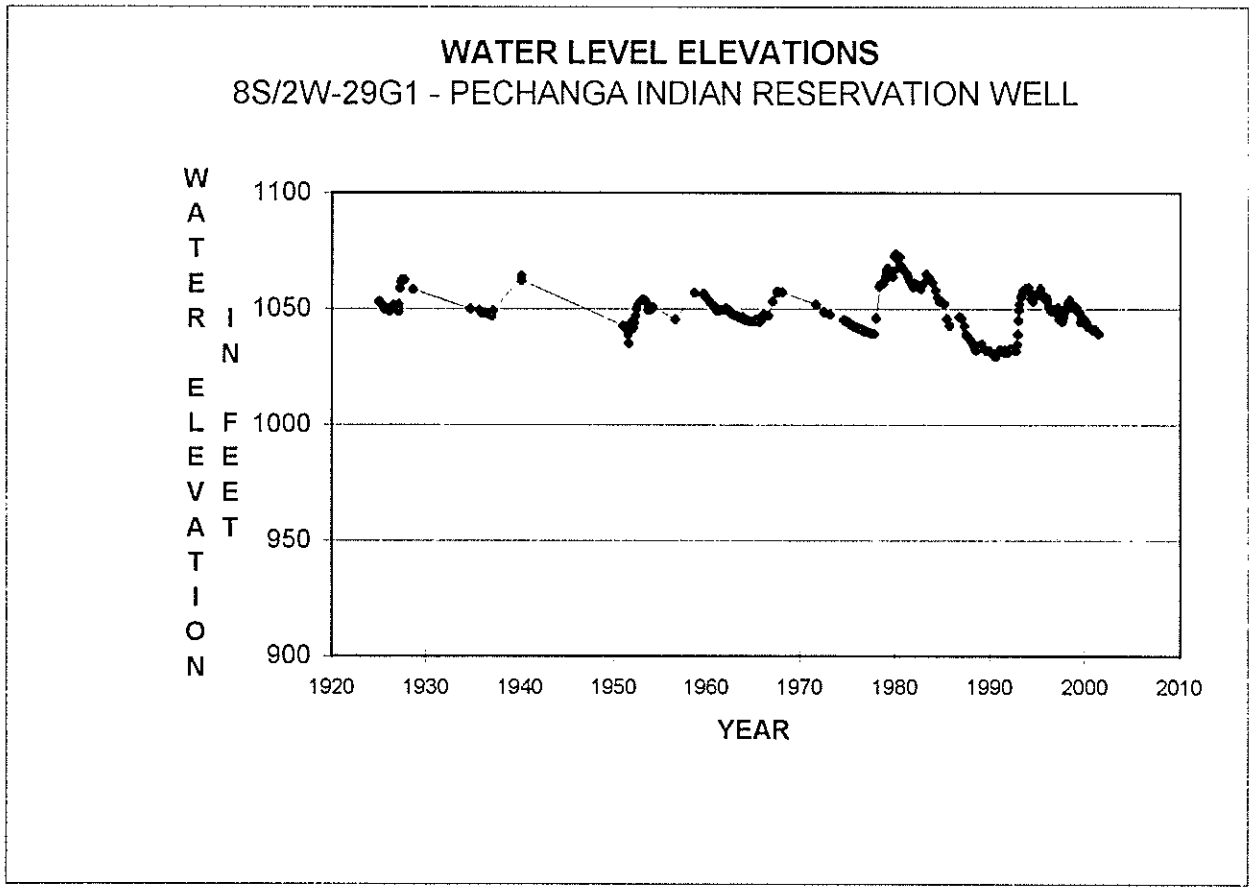

Ground El. 1091.1 Feet; Depth 159.1 Feet
U.S. Geological Survey Records

Changes in water levels in the above noted wells between the end of the previous water year and the end of the 2001 water year are shown below:

Well	Water Elevation 2000 Feet	Water Elevation 2001 Feet	Change in Water Level Feet	
RCWD 8S/2W-12H1	1147.2	1139.7	Down	7.5
USMC 10S/4W-7J1	84.3	86.2	Up	1.9
MCWD 7S/3W-20C9	1000.0	1013.0	Up	13.0
Anza MWC 7S/3E-21G1	3788.1	3809.6	Up	21.5
Pechanga IR 8S/2W-29G1	1042.9	1039.7	Down	3.2

4.4. Groundwater Storage

Bulletins 118 and 118-80 prepared by the State of California Department of Water Resources describe three groundwater basins in the Santa Margarita River Watershed: Santa Margarita Valley, Temecula Valley, and Coahuila Valley. These basins are also known as the Santa Margarita Groundwater Basin, the Murrieta-Temecula Groundwater Basin, and the Anza Groundwater Basin. The quantity of storage in each of these basins is described in this section.

Santa Margarita Groundwater Basin – The Santa Margarita Groundwater Basin is located along the Santa Margarita River at Camp Pendleton and includes three sub-basins: Upper, Chappo, and Ysidora. Useable groundwater storage in place at the end of water year 2000-2001 is summarized in Table 4.2. Table 4.2 shows that the combined storage in the three sub-basins between the depths of 5 and 100 feet is 48,100 acre feet. However, much of that storage is below sea level and the useable storage amounts to 28,700 acre feet.

Water levels in wells in each of the sub-basins were reported by Camp Pendleton during 2001. The unused storage below a depth of five feet is shown on the tabulation to be 1,527 acre feet, leaving a total useable quantity in storage of 27,173 acre feet. It may be noted that classification of that storage as useable is made without allowances for maintenance of riparian habitat.

TABLE 4.2

SANTA MARGARITA RIVER WATERSHED
GROUNDWATER STORAGE AT CAMP PENDLETON
2000-2001
Quantities in Acre Feet

	Sub-basin			
I. Available Storage	Upper	Chappo	Ysidora	Total
A. Total Storage [1] AF	12,500	27,000	8,600	48,100
B. Useable Storage AF	12,500	15,000 [2]	1,200 [3]	28,700
II. Unused Storage				
A. Wells used for Depth	10S/4W-7J1	10S/4W-18L1	11S/5W-2E1 11S/5W-11D4	
B. Depth to Water - Feet	6.8	8.2	6.45	
C. Depth below 5 Feet	1.8	3.2	1.45	
D. Average Area - Acres	840	2,552	1,060	
E. Unused Storage below 5 Feet	327	1,062	138	1,527
III. Useable Storage in Place – AF [4]	12,173	13,938	1,062	27,173
IV. Useable Storage in Place 1999-2000	11,822	13,544	914	26,280
V. Change in Storage 2000-2001	+ 351	+ 394	+ 148	+ 893

[1] Computed by U.S.G.S. as the storage between depths of 5 and 100 feet.
[2] Storage between 5 foot depth and sea level.
[3] Storage between 5 foot depth and 10 feet above sea level.
[4] Does not include stored water reserved for riparian habitat.

Note: Groundwater depths measured at the end of August 2001, except well 11S/5W-2E1 measured the end of June 2001

Murrieta-Temecula Groundwater Basin – The Murrieta-Temecula Groundwater Basin is located along Murrieta and Temecula Creeks in the Upper Santa Margarita River Watershed. Groundwater storage at the end of water year 2001 was computed for each of 22 hydrologic subareas that make up the Groundwater Basin. These computations were based on the areal extent of each subarea, the thickness of each of three aquifers, (younger alluvium, Pauba aquifer and Temecula aquifer), a specific yield for each aquifer, and the depth to water in each aquifer at the end of the water year. The total groundwater storage in the uppermost 500 feet as of September 30, 2001, is estimated at 1,340,556 acre feet.

Anza Groundwater Basin – The Anza Groundwater Basin is located along Cahuilla Creek in the upper portion of the Santa Margarita River Watershed.

No recent groundwater levels are available for use in computing useable storage at the end of water year 2000-2001.

The most recent study that determined storage volumes was conducted by Riverside County in 1990. That study concluded that the groundwater storage of about 182,200 acre feet in 1950 had decreased to about 165,000 acre feet in 1986. The study also concluded that ". . . basin hydrogeologic features, production facilities conditions, and locations/depths of storage . . ." limited the useable portion to 40% of the groundwater storage or about 56,200 acre feet in 1986.

SECTION 5 - IMPORTS/EXPORTS

5.1 General

Court Orders require the Watermaster to determine the quantities of imported water used in the Watershed. Most of the water imported into the Santa Margarita River Watershed is delivered by Metropolitan Water District of Southern California (MWD) to local districts. MWD obtains its water from the State Water Project (SWP) and the Colorado River. Both the SWP and the Colorado River system have major storage reservoirs to provide long-term carryover storage. The quantities of water in storage at the end of the water year in the major reservoirs in each system are indicated on Table 5.1. Total storage in the SWP each year since 1992 is shown graphically on Figure 5.1. Similarly, total storage for the Colorado River Reservoirs each year since 1992 is shown on Figure 5.2. It may be seen from Table 5.1 that during Water Year 2000-2001 water in storage in the SWP decreased from 2.94 million acre feet on September 30, 2000, to 2.59 million acre feet on September 30, 2001. Storage on September 30, 2001, corresponds to about 49 percent of the total SWP storage capacity.

Water in storage in the Colorado River system declined 4.2 million acre feet from the prior year to 46.2 million acre feet on September 30, 2001. On September 30, 2001, those reservoirs contained 72 percent of their total combined capacity.

Projections of water availability on the SWP for the coming year (2002) are prepared by the State Department of Water Resources on a monthly basis from February through May. The report dated May 1, 2002, indicates that statewide October 1 through May 1 precipitation was 80 percent of average. As of May 1, the SWP has approved delivery of 60 percent of the requests for deliveries in the year 2002.

The following entities imported water directly or indirectly from MWD into the Santa Margarita River Watershed:

Eastern Municipal Water District
Elsinore Valley Municipal Water District
Fallbrook Public Utility District
Rainbow Municipal Water District
Rancho California Water District
U. S. Naval Weapons Center
Western Municipal Water District

TABLE 5.1

SANTA MARGARITA RIVER WATERSHED
STORAGE IN STATE WATER PROJECT AND COLORADO RIVER RESERVOIRS

Thousands of Acre Feet

STATE WATER PROJECT RESERVOIRS

Reservoir	Total Capacity	Water in Storage - September 30									
		1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Oroville	3,540	1,317	2,666	1,683	2,897	2,736	2,140	2,832	2,427	1,920	1,488
San Luis (State Share)	1,060	381	944	394	1,067	740	462	900	592	388	516
Pyramid	171	159	156	160	168	158	163	161	155	164	162
Castaic	324	257	263	237	297	284	237	306	288	285	227
Silverwood	73	68	68	68	54	40	73	71	72	70	72
Perris	132	117	120	110	126	126	105	124	125	110	122
Total	5,300	2,299	4,217	2,652	4,609	4,084	3,180	4,394	3,659	2,937	2,587
Percent of Capacity		43%	80%	50%	87%	77%	60%	83%	69%	55%	49%

MAJOR COLORADO RIVER RESERVOIRS

Reservoir	Total Capacity	Water in Storage - September 30									
		1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Flaming Gorge	3,789	3,106	3,471	2,887	3,488	3,364	3,599	3,580	3,425	3,010	2,982
Blue Mesa	941	604	720	615	782	686	761	624	740	560	597
Navajo	1,709	1,579	1,625	1,400	1,556	1,203	1,543	1,380	1,558	1,357	1,409
Powell	27,000	14,085	18,825	17,772	22,311	21,155	22,802	22,404	22,997	20,939	19,135
Mead	28,537	19,416	21,379	19,930	20,714	21,614	23,769	25,126	24,592	22,444	19,873
Mohave	1,818	1,623	1,375	1,467	1,635	1,578	1,674	1,729	1,515	1,523	1,610
Havasu	648	548	579	571	588	597	580	565	584	566	567
Total	64,442	40,961	47,974	44,642	51,074	50,197	54,728	55,408	55,411	50,399	46,173
Percent of Capacity		64%	74%	69%	79%	78%	85%	86%	86%	78%	72%

FIGURE 5.1

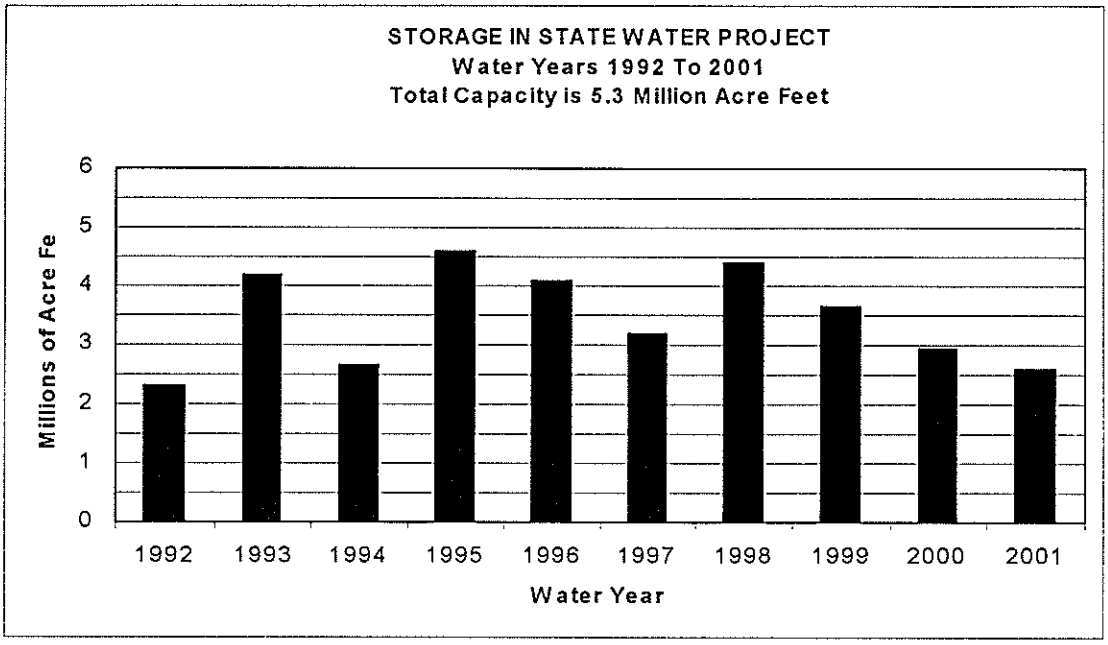

FIGURE 5.2

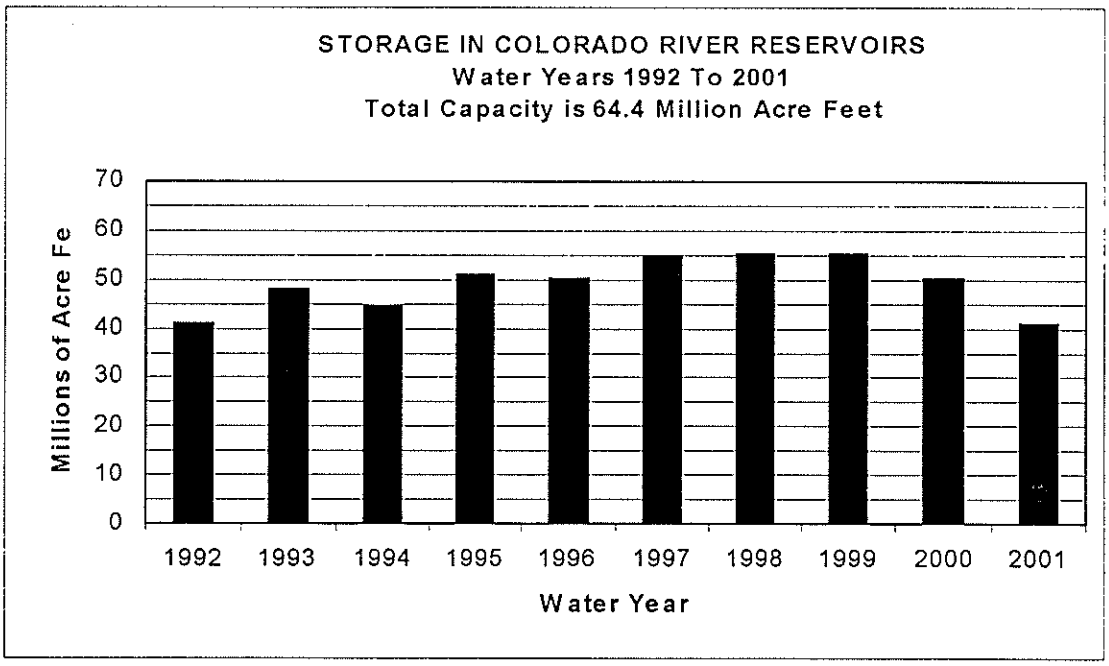

In addition to net deliveries through member agencies, MWD, pursuant to a Court Order, delivered 505 acre feet of water for irrigation of lands in Domenigoni Valley within the Santa Margarita Watershed during 2000-2001. MWD also imported 184 acre feet for groundwater recharge.

Water is also imported into the Santa Margarita River Watershed from adjacent watersheds. Such importation occurs from the Santa Ana Watershed where Elsinore Valley MWD pumps water from wells outside the Santa Margarita River Watershed but delivers water to a portion of its service area that is inside the Santa Margarita River Watershed.

At Camp Pendleton, there is a pipeline connection to wells located in the Las Flores Creek Watershed to the north of the Santa Margarita River Watershed. Water can be either imported or exported through that line, depending on relative water demands and pumping capacities.

Exportations from the Santa Margarita River Watershed include water pumped at Camp Pendleton that is used in the San Luis Rey River Watershed to the south or in the Las Flores Creek Watershed to the north. Some of the water exported at Camp Pendleton is returned to the Watershed as wastewater. Wastewater from the Fallbrook area and the Naval Weapons Station located on Camp Pendleton is exported by the Fallbrook Public Utility District and wastewater in the Elsinore Valley MWD is exported by that district.

Eastern MWD uses a 24-inch pipeline along Winchester Road to transport wastewater from the Temecula Valley Regional Water Reclamation Facility to areas within the Watershed for reuse as well as for export of up to 10 MGD from the Watershed. A total of 4,457 acre feet of treated wastewater were exported by Eastern MWD in 2000-2001.

The following paragraphs of this report describe imports and exports during Water Year 2000-2001 and during the 1966-2001 period. There is also discussion of MWD's Lake Skinner and Diamond Valley Lake operations.

5.2 Water Year 2000-2001

During 2000-2001, 65,386 acre feet of water were imported and distributed in the Santa Margarita River Watershed by eight purveyors. This compares with 82,277 acre feet in 1999-2000 and represents a 20.5 percent decrease. This large decrease is related to a year-to-year drop of 10,290 acre feet in agricultural use and a decrease in direct recharge of 1,849 acre feet at Rancho California Water District. Water quantities imported into and exported from the Santa Margarita River Watershed for months during Water Year 2000-2001 are listed on Table 5.2

TABLE 5.2

SANTA MARGARITA RIVER WATERSHED

IMPORTS/EXPORTS

2000-2001

Quantities in Acre Feet

	IMPORTS									EXPORTS							
											CAMP PENDLETON						
YEAR MONTH	EASTERN MWD	ELSINORE VALLEY MWD	FALLBROOK PUD	MWD 1/	RAINBOW MWD	RANCHO CAL WD	U.S. NAVAL WS	WESTERN MWD 2/	TOTAL IMPORTS	EXPORTS	WASTEWATER RETURNS	NET EXPORT	U.S. NAVAL WS	EASTERN MWD	ELSINORE VALLEY MWD	FALLBROOK PUD	TOTAL EXPORTS
2000																	
OCT	244	746	772	40	197	3,559	5	5	5,568	358	200	158	0.5	300	25	145	629
NOV	725	326	610	26	134	2,216	4	3	4,044	241	183	58	0.8	390	24	157	630
DEC	499	438	682	20	120	2,189	4	4	3,956	230	162	68	0.5	413	23	143	647
2001																	
JAN	449	444	336	25	147	2,553	3	4	3,961	220	151	69	0.8	357	24	125	576
FEB	(643)	294	276	16	59	1,755	2	4	1,763	172	148	24	1.4	400	23	120	568
MAR	531	164	283	12	51	2,086	3	3	3,133	196	171	25	0.9	486	28	149	689
APR	237	361	503	23	57	2,347	3	3	3,534	220	156	64	0.5	423	26	131	644
MAY	836	557	828	71	81	3,245	12	5	5,635	270	172	98	0.5	412	29	140	679
JUNE	786	665	786	93	169	4,835	8	7	7,349	346	171	175	0.4	303	23	133	634
JULY	827	1,003	1,046	71	264	5,593	9	6	8,819	456	193	263	0.4	292	30	126	711
AUG	903	803	1,111	203	252	5,855	10	7	9,144	492	193	299	0.8	332	29	142	803
SEPT	554	791	1,165	89	273	5,590	10	8	8,480	452	175	277	0.6	349	26	132	785
TOTAL	5,948	6,592	8,398	689	1,804	41,823	73	59	65,386	3,653	2,075	1,578	8	4,457	310	1,643	7,996

1/ Metropolitan Water District direct deliveries in Domenigoni Valley
2/ Improvement District A - Rainbow Canyon Only (WR-13)

Water quality of the imported supplies in 2000-2001 as reflected by the average monthly total dissolved solids at the Skinner Treatment Plant effluent line from Plant No. 1 is shown on Table 5.3, together with the percent of imported water obtained from the SWP.

5.3 Water Years 1966-2001

Water quantities imported by districts into the Santa Margarita River Watershed during Water Years 1966-2001 are shown on Table 5.4. Total imports to these districts are measured, however some districts serve lands outside the Watershed. For these districts, which include Eastern MWD, Elsinore Valley MWD, Fallbrook PUD and Rainbow MWD, the portion delivered in the Santa Margarita River Watershed must be estimated.

Review of the historical trend of total imports shown on Table 5.4 indicates significant year-to-year variations with relatively low imports in wet years and higher imports in dry years, combined with an underlying growth rate to serve increasing municipal water demands in the Murrieta-Temecula area.

Exports over the 1966-2001 period are also shown on Table 5.4. These include estimated water exports on Camp Pendleton less estimated wastewater returns, as well as an estimate of exports by the Fallbrook Public Utility District and the Naval Weapons Station after 1983, and Elsinore Valley MWD after 1986. Exports by Eastern MWD were initiated in 1992-1993. Exports do not include water that naturally flows from the Santa Margarita River into the Pacific Ocean.

5.4 Lake Skinner

Lake Skinner is a 44,000 acre foot reservoir constructed by MWD on Tucalota Creek, within the Santa Margarita River Watershed. The purpose of Lake Skinner is to provide regulatory and emergency storage capacity for water imported to southern California. A Memorandum of Understanding and Agreement on Operation of Lake Skinner (MOU), dated November 12, 1974, approved by the Court on January 16, 1975, contains provisions to protect Santa Margarita River Watershed water users from potential effects of Lake Skinner on either subsurface or surface flows.

Protection against a decrease in subsurface flows caused by the dam is afforded by a provision in the MOU that requires that MWD release water from Lake Skinner into Tucalota Creek if groundwater levels in Well AV-28B fall below an elevation of 1356.64 feet. Between June and September MWD released a total of 71.11 acre feet to maintain well levels above the minimum. At the end of September 30, 2001, the well level was 1357.47 feet.

TABLE 5.3

SANTA MARGARITA RIVER WATERSHED
TOTAL DISSOLVED SOLIDS
CONCENTRATION OF IMPORTED WATER

YEAR MONTH	TOTAL DISSOLVED SOLIDS MG/L /1		PERCENT STATE PROJECT WATER	
	1999-2000	2000-2001	1999-2000	2000-2001
OCT	444	453	32	28
NOV	479	457	25	29
DEC	493	473	23	31
JAN	494	480	24	31
FEB	488	498	31	24
MAR	460	503	33	25
APR	453	493	33	28
MAY	462	493	29	28
JUNE	477	494	23	27
JULY	476	496	24	25
AUG	469	512	26	21
SEPT	462	497	24	27

1/ As measured in the Skinner Treatment Plant Effluent line.

TABLE 5.4

SANTA MARGARITA RIVER WATERSHED

IMPORTS/EXPORTS

Quantities in Acre Feet

	IMPORTS									EXPORTS							
										------ CAMP PENDLETON ------							
YEAR	EASTERN MWD	ELSINORE VALLEY MWD	FALLBROOK PUD 1/	MWD 2/	RAINBOW MWD	RANCHO CAL WD	U.S. NAVAL WS	WESTERN MWD 3/	TOTAL IMPORTS	EXPORT	WASTEWATER RETURNS	NET EXPORT	U. S. NAVAL WS	EASTERN MWD	ELSINORE VALLEY MWD	FALLBROOK PUD	TOTAL EXPORTS
1966	1,604	N/R	3,351		1,308	0	0	24	6,287	3,251	974	2,277	0	0	0	0	2,277
1967	1,630	N/R	2,852		1,095	0	0	20	5,597	3,180	1,243	1,937	0	0	0	0	1,937
1968	1,464	N/R	3,423		1,377	0	0	27	6,291	3,368	1,214	2,154	0	0	0	0	2,154
1969	1,741	N/R	2,837		1,253	0	0 E	25	5,856	3,276	1,170	2,106	0	0	0	0	2,106
1970	1,417	N/R	3,538		1,689	0	0 E	31	6,675	3,809	1,113	2,696	0	0	0	0	2,696
1971	1,383	N/R	3,405		1,650	0	76 E	34	6,548	3,527	1,090	2,437	0	0	0	0	2,437
1972	1,470	N/R	3,916		2,037	0	115 E	34	7,572	3,543	1,168	2,375	0	0	0	0	2,375
1973	1,533	N/R	3,210		1,616	0	115 E	30	6,504	3,544	1,187	2,357	0	0	0	0	2,357
1974	1,601	N/R	3,967		2,049	0	115 E	36	7,768	3,532	1,140	2,392	0	0	0	0	2,392
1975	1,969	N/R	3,597		1,247	0	115 E	34	6,962	3,098	1,530	1,568	0	0	0	0	1,568
1976	2,493	N/R	4,627		2,239	119	115 E	35	9,628	3,619	1,497	2,122	0	0	0	0	2,122
1977	2,947	N/R	5,212		2,343	1,845	115 E	24	12,486	3,194	1,416	1,778	0	0	0	0	1,778
1978	2,551	569	5,202		2,188	5,774	115 E	26	16,425	3,071	1,283	1,788	0	0	0	0	1,788
1979	1,894	712	5,723		2,348	7,009	115 E	24	17,824	4,756	1,427	3,329	0	0	0	0	3,329
1980	1,192	696	6,404		2,489	10,126	115 E	25	21,047	3,651	1,405	2,246	0	0	0	0	2,246
1981	716	798	8,543		3,153	15,282	115 E	34	28,642	3,892	1,249	2,643	0	0	0	0	2,643
1982	1,112	678	7,079		2,460	13,378	115 E	34	24,856	3,761	1,273	2,488	0	0	0	0	2,488
1983	1,211	658	6,720		2,190	5,752	115 E	26	16,672	3,000	1,242	1,758	26 E	0	0	1,003	2,787
1984	699	816	8,506		3,068	6,716	115 E	26	19,946	3,243	1,120	2,123	26 E	0	0	1,032	3,181
1985	679	808	7,831		3,410	7,158	102	27	20,015	3,377	1,200	2,177	26 E	0	0	1,060	3,263
1986	760	882	8,585		2,945	11,174	94	34	24,474	3,326	981	2,345	16 P	0	0	1,096	3,457
1987	1,155	938	8,656		3,390	7,564	116	36	21,855	3,444	1,799	1,645	26	0	4	1,129	2,805
1988	2,047	1,032	8,033		2,985	17,854	120	36	32,108	3,457	1,872	1,585	26	0	55	1,154	2,820
1989	3,746	1,341	9,066		3,003	22,895	128	24	40,203	3,418	1,446	1,972	23	0	74	1,181	3,250
1990	5,601	2,255	10,103		3,818	22,030	145	22	43,974	2,971	1,451	1,520	27	0	114	1,271	2,932
1991	9,479	2,421	7,962		2,904	21,238	109	20	44,133	2,168	1,219	949	13	0	134	960	2,056
1992	8,593	2,190	7,893		2,277	16,931	99	25	38,008	2,426	1,548	878	7	0	140	1,083	2,108
1993	5,393	1,914	6,925		1,965	11,411	117	30	27,755	2,329	1,926	403	16	705	150	1,255	2,529
1994	7,150	3,221	7,250		1,651	16,386	73	37	35,768	2,702	1,501	1,201	5	3,159	170	1,068	5,603
1995	4,625	3,117	6,538	547	1,661	15,108	125	29	31,750	2,781	1,611	1,170	12	3,908	185	1,153	6,428
1996	4,960	4,181	7,993	1,005	1,815	23,600	100	35	43,689	3,577	1,493	2,084	5	2,993	213	1,035	6,330
1997	3,284	4,283	7,894	3,521	1,429	26,992	109	30	47,542	3,643	1,932	1,711	6	3,201	226	1,021	6,165
1998	5,117	5,100	6,382	5,023	1,601	19,584	97	31	42,935	3,742	2,073	1,669	8	4,513	247	1,482	7,919
1999	4,327	6,134	7,430	3,781	1,727	34,490	111	41	58,041	3,558	2,130	1,428	5	4,133	254	1,377	7,197
2000	7,256	7,172	9,365	712	2,217	55,409	104	42	82,277	4,072	2,115	1,957	7	3,649	279	1,634	7,526
2001	5,948	6,592	8,398	689	1,804	41,823	73	59	65,386	3,653	2,075	1,578	8	4,457	310	1,643	7,996

1/ Includes DeLuz Heights MWD prior to 1991
2/ Metropolitan Water District direct deliveries in Domenigoni Valley
3/ Improvement District A - Rainbow Canyon Only (WR-13)
N/R - Not Reported
E - Estimate
P - Partial year data

The MOU also provides that all local surface inflow that enters Lake Skinner will be released into Tucalota Creek. In its 1980 modification the MOU provides that local surface inflow is to be determined by using the hydrologic equation for Lake Skinner that is specified in the MOU. That equation is used to determine inflow and the related release for large flood events. However, in many years the local inflow is small compared to the large quantities of imported water inflow and outflow at Lake Skinner. The error of measurement for these large inflows and outflows is larger than the local inflow in many instances. Accordingly, MWD also monitors the flow in Tucalota Creek, Rawson Creek and Middle Creek during storms and uses those observations to supplement the hydrologic equation.

During 2000-2001, there was no local runoff into Lake Skinner.

5.5 Diamond Valley Lake

Diamond Valley Lake is located in Diamond and Domenigoni Valleys within the Santa Margarita River Watershed. The Lake was created by three dams, one each at the east and west ends of Domenigoni/Diamond Valley and a saddle dam at the low point on the north rim. The East Dam diverts surface and groundwater flows from a 4.2 square mile drainage area in the Santa Margarita River Watershed, known as Goodhart Canyon, into the Santa Ana River Watershed. The West Dam intercepts existing westward surface and subsurface flows from an additional 13.19 square mile area. These intercepted flows may or may not be offset by seepage losses from the reservoir when filled.

MWD does not have a water right to store local waters in the reservoir, so a Memorandum of Understanding and Agreement on Operation of Domenigoni Valley Reservoir (now known as Diamond Valley Lake) (MOU) was developed and approved by the Court on January 19, 1995. Among other things, the MOU provides:

> The quantity and quality of surface runoff that would flow past the West Dam in the absence of the Reservoir will be determined and a like quantity of water of similar quality will be released from the Reservoir or San Diego Canal (SDC) into Warm Springs Creek.

The MOU indicates that the required releases would be determined by measuring the surface inflows into Goodhart Canyon Detention Basin. A quantity equal to 4.1 times the measured flow will be released into Warm Springs Creek.

Total required releases into Warm Springs Creek during 2000-2001 were 8.7 acre feet.

Although all surface waters within the Santa Margarita River Watershed in Domenigoni and Diamond Valley are subject to the continuing jurisdiction of the Court, groundwater contained within the younger alluvium, north of the south line of Section 9, Township 6 South, Range 2 West, SBM is not considered by the Court to be a part of the Santa Margarita River system as long as groundwater levels are below an elevation of 1400 feet. During 2000-2001 groundwater elevations in Well MO-6, which is located along the south line of Section 9, decreased from 1359.68 feet at the beginning of the water year to 1359.11 feet on October 4, 2001.

SECTION 6 - WATER RIGHTS

6.1 General

Water is used in the Santa Margarita River Watershed under a variety of water rights. In the early 1960's, the U. S. District Court in its Interlocutory Judgments described water rights in the Watershed as primarily riparian rights and overlying rights. Riparian rights belong to owners of land parcels located adjacent to streams in the Watershed or overlying younger alluvium deposits generally along the stream channels. Overlying rights were divided by the Court into two categories based on the location where the water is obtained and used. Water extracted from lands where subsurface waters add to, contribute to and support the Santa Margarita River stream system was found to be subject to the continuing jurisdiction of the Court. Lands in this category were identified by the Court and listed in Interlocutory Judgments. In general, these parcels of land overlie younger or older alluvium deposits.

The other category of overlying use applies to parcels of land where subsurface flows do not add to, contribute to or support the Santa Margarita River stream system. These parcels were also identified by the Court and found to be outside the continuing jurisdiction of the Court. In general, these lands overlie basement complex or residuum deposits.

The Court also described a number of other rights in the Watershed. These included surface water appropriative water rights that have been administered by the State of California since 1914. These rights are discussed in the following subsection of this report.

In Interlocutory Judgment No. 41, the Court found that the United States reserved rights to the use of the waters of the Santa Margarita River stream system which under natural conditions would be physically available on the Cahuilla, Pechanga and Ramona Indian Reservations, including rights to the use of groundwaters sufficient for the present and future needs of the Indians residing thereon. In Interlocutory Judgment No. 44, the Court recognized and reserved water rights for lands within the Cleveland and San Bernardino National Forests and for lands being administered pursuant to the Taylor Grazing Act.

Since the early 1960's there have been substantial changes in water use in the Watershed, especially in the Murrieta-Temecula Groundwater Area. During the 1950's and early 1960's when this case was under active litigation, most of the water use in the Murrieta-Temecula area consisted of individual property owners pumping water for use on their own properties. In 1965, the Rancho California WD was formed. The District developed Agency Agreements with most of the landowners within the District. In these Agency Agreements, the landowners "...without transferring any water rights and privileges

pertaining to said land...." designated the District as their exclusive agent for the development and management of their water supply.

Thus, many landowners within the Rancho California WD are now not exercising their overlying rights. Instead, Rancho California WD pumps groundwater and uses it throughout the District area as agent on behalf of the landowners.

Other water purveyors, including Murrieta CWD and Eastern MWD, pump under groundwater appropriative rights.

Another change from the early 1960's is the large scale importation of water into the Santa Margarita River Watershed by Rancho California WD. A portion of such importation finds its way into the groundwater aquifers. The legal status of return flows from imported supplies as well as direct recharge of imported water was clarified by the final judgment in *City of Los Angeles v. City of San Fernando, et al.,* 1975 14 Cal. 3rd 199. This decision in the Supreme Court of the State of California made two major findings with respect to imported water.

The first was that agencies have the right to recharge and store imported water in a groundwater basin and to extract the imported water for use, subject to applicable state and federal laws. In addition, agencies that import and deliver water to lands overlying a groundwater basin have a continuing right to extract the return flow from such water. The return flow is that portion of the imported supply that percolates into the groundwater basin. In the San Fernando case this portion was found to range from 20 percent to 35.7 percent of the imported supplies.

The Rancho Division of the Rancho California WD overlies the Murrieta-Temecula Groundwater Area. Thus a portion of the import supply delivered to the Rancho Division of Rancho California WD percolates into the underlying aquifers. The first water pumped by Rancho California WD in the ensuing year constitutes recapture of such return flows.

Imported water is also supplied to the Santa Rosa Division within Rancho California WD, however only a relatively small part of this division overlies the Murrieta-Temecula Groundwater Area. Thus there is less imported water return flow from the Santa Rosa Division.

Classification of Rancho California WD supplies into various water right categories is discussed in Section 7 of this Report.

6.2 Appropriative Surface Water Rights

Another broad category of water rights used in the Watershed is surface water appropriative rights. Since 1914, these rights have been administered by the SWRCB.

A list of current permits, licenses and other active rights obtained from the SWRCB is shown on Table 6.1. A permit by the SWRCB authorizes construction of a project, sets terms for the project's completion and development of water use and may impose other conditions. After the permittee demonstrates that construction is complete, water is being put to use and the permit conditions have been met, the SWRCB can issue a license. The license remains in effect as long as the license conditions are met and the water is put to beneficial use.

Perfected direct diversion rights and active storage rights from creeks in the Watershed are summarized below:

	Direct Diversions Gallons Per Day	Storage Acre Feet
Cahuilla Valley	720	5
Cottonwood Creek	485,000	60
Cutea Creek	5,825	---
DeLuz Creek	4,700	100
Fern Creek	213,000	100
Kohler Canyon	158,000	40
Long Canyon Spring	89	---
Rainbow Creek	---	0.5
Rattlesnake Canyon	12,000	---
Temecula Creek	25,820	40,000
Sandia Canyon	---	8
Sourdough Spring	55	---
Santa Margarita River	133	4,000
Nelson Creek	1,550	---
TOTAL	906,892	44,313.5

These direct diversion rights of 906,892 gallons per day correspond to 1.4 cfs or 2.78 acre feet per day.

TABLE 6.1

SANTA MARGARITA RIVER WATERSHED
APPROPRIATIVE WATER RIGHTS

PERMITS AND LICENSES

I.D. NO.	OWNER	FILING DATE	SOURCE OF WATER	POINT OF DIVERSION	AMOUNT	USE	STATUS
6629	William H. & Sandra J. Cyrus	4/9/30	Coahuila Valley	Sec. 4, 7S, 3E	DD-720 gpd	D	License
6893	Earl C. & Mamie LaBine	2/13/31	Temecula Creek	Sec. 20, 9S, 2E	DD-820 gpd	D/I	License
7035	Nyla Lawler	8/10/31	Cutca Creek	Sec. 29, 9S, 1E	DD-5725 gpd	D/I	License
7731	Earl C. & Mamie LaBine	11/02/33	Temecula Creek	Sec. 20, 9S, 2E	DD-7200 gpd	D/I	License
9137	Goodarz Irani	10/07/37	Temecula Creek	Sec. 12, 9S, 1E	DD-400 gpd	D	License
9291	Luis Olivos	5/13/38	Nelson Creek	Sec. 23, 8S, 5W	DD-1550 gpd	D	License
10806	James R., Phyllis & Bruce Grammer	4/22/44	Temecula Creek	Sec. 34, 9S, 2E	DD-2880 gpd	D	License
11161	Roy C. Pursche & J. Zink	9/26/45	Rattlesnake Canyon	Sec. 28, 9S, 2E	DD-12,000 gpd	D/I	License
11518	Rancho California Water District	8/16/46	Temecula Creek	Sec. 10, 8S, 1W	ST-40,000 AF	D/I/R	Permit
11587	U. S. Bureau of Reclamation	10/11/46	Santa Margarita River	Sec. 12, 9S, 4W	ST-10,000 AF	D/I/M	Permit
12178	Fallbrook Public Utility District	11/28/47	Santa Margarita River	Sec. 12, 9S, 4W	ST-10,000 AF	D/I/M	Permit
12179	U. S. Bureau of Reclamation	11/28/47	Santa Margarita River	Sec. 12, 9S, 4W	ST-10,000 AF	D/I/M	Permit
13505	David H. & Kathleen C. Lypps	12/12/49	Cottonwood Creek	Sec. 30, 8S, 4W	DD-0.75 cfs & ST-42 AF	R/S	License
17239	Ward Family Trust	8/15/56	Temecula Creek	Sec. 20, 9S, 2E	DD-120 gpd	D/E	License
20507	David H. & Kathleen C. Lypps	11/24/61	Cottonwood Creek	Sec. 19, 8S, 4W Sec. 30, 8S, 4W	ST-18 AF	I/R	License
20608	Pete and Dorothy Prestininzi	2/13/62	DeLuz Creek	Sec. 20, 8S, 4W	ST-100 AF	D/I/R	License
20742	U. S. Cleveland National Forest	4/24/62	Sourdough Spring	Sec. 25, 9S, 1E	DD-55 gpd	E	License
21074	U. S. Cleveland National Forest	12/07/62	Cutca Spring	Sec. 17, 9S, 1E	DD-100 gpd	S/W	License
21471A	U. S. Department of Navy	9/23/63	Santa Margarita River	Sec. 5, 10S, 4W Sec. 2, 11S, 5W	ST-4,000 AF	D/I/M/Z	License
21471B	U. S. Bureau of Reclamation	9/23/63	Santa Margarita River	Sec. 32, 9S, 4W	ST-165,000 AF	D/I/M/Z	Permit
27756	James R. Grammer	5/23/83	Temecula Creek	Sec. 3, 10S, 2E	DD-14,400 gpd	I/S	Permit
28133	Charles F. Ruggles	5/14/84	Cahuilla Creek	Sec. 15, 8S, 2E	ST-5AF	E/H/I/R/S	Permit

OTHER RIGHTS

05751S/Federal	U. S. Cleveland National Forest	1/01/70	Long Canyon Spring	Sec. 16, 9S, 1E	DD-89 gpd	E/R/S/W
000024/State	Judge Dial Perkins	12/26/86	Santa Margarita River	Sec. 12, 9S, 4W	DD-133.3 gpd	D
000751/State	Lawrence Butler	5/31/67	Fern Creek	Sec. 31, 8S, 4W	DD-0.33 cfs ST-100 AF	I
011411/State	Agri Empire, Inc.	5/16/84	Kohler Canyon	Sec. 33, 9S, 2E	DD-0.245 cfs ST-40 AF	I/S
012235/State	William A. & Lois D. Cunningham	8/27/85	DeLuz Creek	Sec. 4, 9S, 4W	DD-4700 gpd	D/I
001583/Stock	George F. Yackey	12/27/77	Sandia Canyon	Sec. 25, 8S, 4W	ST-8.0 AF	S
002380/Stock	Chris R. & Jeanette L. Duarte	12/16/77	Rainbow Creek	Sec. 12, 9S, 3W	ST-0.5 AF	S

KEY TO USE: *DD - Direct Diversion* *D - Domestic* *R - Recreation* *E - Fire Protection* *H - Fish Culture*
ST - Diversion to Storage *I - Irrigation* *M - Municipal* *S - Stockwatering* *Z - Other*
W - Fish & Wildlife Protection and/or Enhancement

Storage rights shown in Table 6.1 include 185,000 acre feet of storage rights on the Santa Margarita River held by the U. S. Bureau of Reclamation (ID Nos. 11587, 12179, and 21471B) that have not been exercised. The time period during which these rights must be exercised has recently been extended by the SWRCB to December 31, 2008.

Table 6.1 also lists other rights recognized by the SWRCB. These rights generally are based on Statements of Water Diversion and Use that have been filed with the SWRCB. Such statements include one by the United States on behalf of the Cleveland National Forest, which states that the diversion and use of water from Long Canyon Spring is made pursuant to a withdrawal and reservation of the land and resources for National Forest System purposes as of February 14, 1907.

Besides the federal filing, there are also Statements of Water Diversion and Use filed by individuals. Three of these statements represent riparian or pre-1914 appropriative diversions from DeLuz Creek, Fern Creek and Santa Margarita River that have been reported to the SWRCB. The other statement represents a pre-1914 appropriative right to divert water from a spring in Kohler Canyon into a 40 acre foot reservoir.

The last two rights noted on Table 6.1 represent filings made in 1977 pursuant to Subchapter 2.5 to Chapter 3 of Title 23 of the California Code of Regulations. That subchapter deals with Water Rights for Stockponds.

In addition to appropriative rights under SWRCB jurisdiction, there are a number of nonstatutory appropriative rights that were established prior to 1914. These rights continue to be used to support diversions of water from the Santa Margarita River stream system. Such rights, which are listed in the various Interlocutory Orders developed in this litigation, are shown on Table 6.2.

In 1990-91, in Order No. 91-07, the SWRCB revised its Order No. 89-25 entitled, "Order Adopting Declaration of Fully Appropriated Stream Systems and Specifying Conditions for Acceptance of Applications and Registrations." These Orders list the Santa Margarita River stream system as fully appropriated "from the confluence of the Santa Margarita River and the Pacific Ocean upstream including all tributaries where hydraulic continuity exists."

The consequences of this Order are as follows:

1. The Board is precluded from accepting any application to appropriate water from the Santa Margarita River System except where the proposed appropriation is consistent with conditions contained in the Declaration.

TABLE 6.2

SANTA MARGARITA RIVER WATERSHED
PRE - 1914 APPROPRIATIVE WATER RIGHTS
Listed in Interlocutory Decrees

LISTED OWNER	CURRENT OWNER	DATE OF APPROPRIATION	SOURCE OF WATER	POINT OF DIVERSION	AMOUNT	USE
Anderson, Nina B.	Nezami, Mohammed	April 11, 1892	Fern Creek	NW 1/4 Of SE 1/4 Sec 31, T8S, R4W	32 gpm	Irrigation
Butler, Lawrence W. and Mary C.	Vanginkel, Norman Tr and Vanginkel, Deborah San Diego Gas & Electric	Sept. 23, 1896	Fern Creek	NW 1/4 Of SE 1/4 Sec 31, T8S, R4W	Capacity of 8 inch pipe	Irrigation
Wilson, Samuel M. and Hazel A.	Shirley, Robert G. and Bobbi J.	Aug. 3, 1911	DeLuz Creek	NW 1/4 Of SW 1/4 Sec 32, T8S, R4W	50 miner's inches 65 AF/Yr	Irrigation
United States	United States	1883	Santa Margarita River	Sec 5, T10S, R4W	20 cfs 1200 AF/Yr	Domestic Irrigation Stock Water

2. Initiation of a water right pursuant to the Water Rights Permitting Reform Act of 1988 (Water code Section 1228 et seq.) --that is, by registering small use domestic appropriations--is precluded, except where the proposed appropriation is consistent with conditions contained in the Declaration. Small use domestic appropriations refer to uses that do not exceed direct diversions of 4,500 gallons per day or diversion by storage of 10 acre feet per year for incidental aesthetic, recreational, or fish and wildlife purposes.

3. Pursuant to Water Code Section 1206(a) the Board is authorized, but not required, to cancel pending applications where inconsistent with conditions contained in the Declaration; previous Orders implement a procedure for disposition of such applications pending on the effective date of the Declaration.

The Order provides for reconsideration of the Order either upon petition of an interested party or upon the Board's own motion.

6.3 Fallbrook PUD Proposal to Change Point of Diversion and Place of Use

For some years, the Bureau of Reclamation has held Permit Nos. 8511, 11356, 11357, and 15000 (Application Nos. 11587, 12178, 12179, and 2147B) (see Table 6.1) for the benefit of Fallbrook PUD and the United States of America, the Department of the Navy, Marine Corps Base, Camp Pendleton, California. However in February 1999 Permit No. 11356 (Application No. 12178) was transferred back to Fallbrook PUD in order for Fallbrook to change the point of diversion for Permit 11356 to Lake Skinner.

Lake Skinner is owned by Metropolitan Water District of Southern California and is presently used to store and regulate imported water. The permit would provide for storage and diversion of up to 10,000 AF per year. Storage of local water in Lake Skinner and subsequent diversion will also reduce the volume of local stormwater flow downstream of Lake Skinner during significant storm events. The project will not alter a requirement of the current Memorandum of Understanding for Lake Skinner that provides for continued monitoring and maintenance of specified groundwater levels downstream of the reservoir.

A mitigated negative declaration on the project was circulated for public comment and certified by Fallbrook. On September 29, 2000, the Petition for Change was submitted to the State Water Resources Control Board for processing.

SECTION 7 - WATER PRODUCTION AND USE

7.1 General

Water production and use data were obtained from several types of substantial users including water purveyors, Indian Reservations, mobile home parks and private landowners. Substantial water users are those who irrigate eight or more acres or who produce or use an equivalent quantity of water.

Major water purveyors who reported production and use data in 2000-2001 Water Year are listed as follows:

Anza Mutual Water Company
Eastern Municipal Water District
Elsinore Valley Municipal Water District
Fallbrook Public Utility District
Lake Riverside Estates
Metropolitan Water District of Southern California
Murrieta County Water District
Rainbow Municipal Water District
Rancho California Water District
U. S. Marine Corps, Camp Pendleton including U.S. Naval Weapons Station, Fallbrook Annex
Western Municipal Water District

Lake Riverside Estates is listed with major water purveyors although it does not deliver water to customers. However it does produce make-up water for losses from Lake Riverside.

In addition to the major purveyors, there are a number of smaller water systems in the Watershed. Of these, Butterfield Oaks Mobile Home Park, Jojoba Hills SKP Resort, and Outdoor Resorts Rancho California, Inc. are substantial users.

Three Indian Reservations, the Cahuilla, Pechanga and Ramona, are noted in Interlocutory Judgment No. 41, the Judgment that deals with Water Rights on Indian Reservations in the Watershed. Estimates and/or measurements of water production and use are reported for the Cahuilla and Pechanga Indian Reservations; the Ramona Reservation has no reported water use.

A portion of a fourth Reservation, the Pauma Mission Reserve Tract of the Pauma Yuima Band of Mission Indians, is also located within the Watershed. However, these lands overlie basement complex, which waters have been found by the Court to not add to, support or contribute to the Santa Margarita River stream system.

The final category of water users are private landowners who use water primarily for irrigation.

The water use data collected for the 2000-2001 Water Year are summarized on Table 7.1. Total imported supplies plus local production totaled 108,134 acre feet compared to 126,757 reported in 1999-2000. Of that quantity, 49,212 acre feet were used for agriculture; 5,390 acre feet were used for commercial purposes; 41,802 acre feet were used for domestic purposes; 514 acre feet were discharged to Murrieta and Temecula Creeks; 3,653 acre feet of fresh water were exported; 184 acre feet were directly recharged by Metropolitan WD; and 2,374 acre feet were recharged by Rancho California WD and not recovered. The overall system loss was 5,005 acre feet. System gain or loss is the result of many factors including errors in measurement, differences between periods of use and periods of production, leakage and unmeasured uses.

Monthly production and use data for major water purveyors are attached to this report as Appendix A. Uses are listed under agricultural, ag/domestic, commercial and domestic categories. The definition of agricultural, ag/domestic, commercial and domestic uses varies for the different purveyors in the Watershed. Accordingly definitions of these uses for major water purveyors are shown on Table 7.2. It is noted that much of the non-agricultural water use in the Watershed can also be considered municipal use, which includes both the domestic and commercial uses shown in tables in this report. Similar data for Water Years 1966-2001 are summarized in tables presented in Appendix B. Appendix C presents information on substantial users outside purveyor service areas.

7.2 Water Purveyors

Anza Mutual Water Company

Anza Mutual Water Company's service area is in the eastern part of the Watershed in the Anza Valley. Production is from two wells: Well No. 1 drilled in 1951 and perforated from 20 feet to 260 feet; and Well No. 2 drilled later to a depth of 287 feet and perforated in the bottom 130 feet. Production for 2000-2001 was 19.13 acre feet from Well No. 1 and 26.19 acre feet from Well No. 2 for a total production of 45.32 acre feet as shown in Appendix A, Table A-8. The depth of water in Well No. 1 ranged from 45 feet to 62.5 feet.

Interlocutory Judgment No. 33 divides aquifers in Anza Valley at this location into two categories: the shallow aquifer and the deep aquifer. Based on information available to the Court the shallow aquifer was determined to include the younger and older alluvial deposits in the Anza Groundwater Basin and extend to a maximum but variable depth of approximately 100 feet. The deep aquifer underlies the shallow aquifer in an area about one-half mile in width and two miles in length, within portions of Sections 16, 17, 21, 22, 27 and 28 of Township 7 South, Range 3 East, SBM. Anza Mutual Water Company's wells are within the area of the deep aquifer. From the perforated intervals in the wells, it may be

TABLE 7.1

SANTA MARGARITA RIVER WATERSHED
WATER PRODUCTION AND USE
2000-2001
Quantities in Acre Feet

	PRODUCTION			USE					
	WELL	IMPORT	TOTAL	AG	COMM	DOM	LOSS	TOTAL	WATER RIGHT
WATER PURVEYORS									
Anza Mutual Water Company	45	0	45	0	0	41	4 *1/*	45	Appropriative
Eastern MWD	355	5,948	6,303	0	0	5,989	314	6,303	Appropriative
Elsinore Valley MWD	0	6,592	6,592	0	0	0 6,526	66 *1/*	6,592	----
Fallbrook PUD	0	8,398	8,398	4,413	594	2,943	448	8,398	Appropriative
Lake Riverside Estates	274	0	274	0	274 *2/*	0	0	274	Appropriative
Metropolitan Water District	0	689	689	505	0	0	184 *3/*	689	----
Murrieta CWD	1,389	0	1,389	163	414	713	99	1,389	Appropriative
Rainbow MWD	0	1,804	1,804	1,439	0	202	163	1,804	----
Rancho California WD	26,420 *4/*	41,823	68,243	34,909 *5/*	4,055	22,864	6,415 *6/*	68,243	Various
U.S.M.C. - Camp Pendleton	6,366	0	6,366	399	------ *7/*	2,083	3,884 *1/*	6,366	Appropriative/ Riparian
U.S. Naval Weapons Station	0	73	73	0	------ *7/*	66	*8/* 7 *1/*	73	----
Western MWD	0	59	59	0	53	0	6 *1/*	59	----
INDIAN RESERVATIONS									
Cahuilla	42	0	42	0	------	42	0	42	Overlying/Reserved
Pechanga	295	0	295	56	------ *7/*	210	29 *1/*	295	Overlying/Reserved
MOBILE HOME PARKS/CAMPGROUNDS									
Butterfield Oaks	10	0	10	0	0	9	1 *1/*	10	Riparian/Overlying
Outdoor Resorts Rancho California, Inc.	437	0	437	386	0	46	5 *1/*	437	Overlying
Jojoba Hills SKP Resort	75	0	75	0	0	68	7 *1/*	75	Overlying
OTHER SUBSTANTIAL USERS	7,040 *9/*	0	7,040	6,942	0	0	98 *10/*	7,040	
TOTAL	**42,748**	**65,386**	**108,134**	**49,212**	**5,390**	**41,802**	**11,730**	**108,134**	

1/ Assumes 10% system loss
2/ Recreation Use
3/ Groundwater recharge at Diamond Valley Lake
4/ Includes 25,393 AF production from Old Alluvium and 1,027 AF of Vail Recovery
5/ Includes 30,382 AF Ag, and 4,527 Ag/Domestic
6/ Includes 514 acre feet discharged into Murrieta and Temecula Creeks, 2,374 acre feet of unrecovered direct import recharge, and a system loss of 3,527 acre feet
7/ Listed with Domestic uses
8/ Includes exports of 3,653 acre feet
9/ 983 acre feet for surface diversion plus 6,394 acre feet from groundwater as shown in Appendix C minus 42 acre feet on the Cahuilla Reservation and minus 295 acre feet on the Pechanga Reservation
10/ 10% of surface diversions

TABLE 7.2

SANTA MARGARITA RIVER WATERSHED
DEFINITIONS OF WATER USE
BY MUNICIPAL WATER PURVEYORS
2000-2001

DISTRICT	AGRICULTURAL	DOMESTIC	COMMERCIAL
EASTERN MUNICIPAL WATER DISTRICT	A commercial enterprise producing a crop/livestock on at least 5 acres and able to accept a delivery of at least 24 consecutive hours	Single family, multiple units and agricultural uses of less than 5 acres	Not reported
FALLBROOK PUBLIC UTILITY DISTRICT	AG - A commercial enterprise producing a crop/livestock/fowl on at least 1 acre fully used for ag purposes; can include incidental domestic use related to residency AG/DOM - Water used for both ag and domestic purposes	Single family, multi-unit and large domestic residences and the first 20,000 gallons used by an ag/domestic meter	Offices, businesses, schools and hydrants
RAINBOW MUNICIPAL WATER DISTRICT	AG- 1 acre or more of plantable, resalable products DOM/AG - Same as Ag with a house on the parcel	DOMESTIC - Homes	Generally no commercial use in district
RANCHO CALIFORNIA WATER DISTRICT	AG - 1 acre or more of plantable, resalable products GOLF - Outside water use at golf courses VINEYARDS - Outside irrigation for vineyards LANDSCAPE - Landscaping around freeways, parking lots, office buildings, median strips, etc. AG/DOM - First 1600 c.f. for each user alloted to domestic, and the balance to agriculture	DOMESTIC - Homes MULTIPLE - Apartments and Condominiums	COMMERCIAL - Office buildings, industrial users other than agri-businesses FLOATING - Fire hydrants used during construction CONSTRUCTION - Other fire hydrants used for grading LAKE SKINNER - Recreational use at Lake Skinner MISCELLANEOUS - Schools, fire departments, parks, government agencies DETECTOR CK. METERS - Only used when there is a fire
MURRIETA COUNTY WATER DISTRICT	Agricultural uses and irrigation for crops	Homes and multiple units	Businesses, public agencies, schools and construction
USMC, CAMP PENDLETON	Irrigation - Water used for ag purposes, not landscaping, golf courses or parks	Camp Supply - Includes landscaping, golf courses parks and commercial use	Reported under Camp Supply

concluded that most of the production from Well No. 1 and all of the production from Well No. 2 are from the deep aquifer. Interlocutory Judgment No. 33 concluded that waters contained in the deep aquifer did not add to, support or contribute to the Santa Margarita River stream system and were, therefore, declared to be outside the Court's jurisdiction.

Thus, most of the water produced by the Anza Mutual Water Company is outside the Court's jurisdiction. The relatively small portion pumped from the shallow aquifer in Well No. 1 is pumped under a groundwater appropriative right.

Eastern Municipal Water District

Eastern MWD is a member agency of MWD and its service area includes a portion of the Rancho California WD. Within the Watershed, the District wholesales water to Rancho California WD and also sells water directly to consumers. Water sold to Rancho California WD is listed in this report as imported water to the Rancho California WD service area.

Eastern MWD's service area outside Rancho California WD is located in the northern part of the Watershed. Water for their service area is imported or produced locally from groundwater.

Imports, not including water wholesaled to Rancho California WD or delivered to Elsinore Valley MWD, totaled 9,219 acre feet. A portion of that import amounting to 3,271 acre feet was exported from the Santa Margarita River Watershed resulting in net import to the watershed of 5,948 acre feet. These data are shown in Appendix A.

Groundwater production for the 2000-2001 Water Year in the Santa Margarita River Watershed totaled 355 acre feet from Well 7S/3W-15N which is 345 feet deep. The well is generally perforated between the depths of 106 and 333 feet. Recent static water levels in Eastern MWD's well have varied from a depth of 102 feet in December 1987, to as low as 191 feet in January 2001. The well is located within the Murrieta-Temecula Groundwater Area where the older alluvium is at ground surface. Thus the well produces water from the older alluvium under groundwater appropriative rights.

In addition to producing fresh water, Eastern MWD also reclaims wastewater at its Temecula Valley Regional Water Reclamation Facility.

Disposition of wastewater from the Temecula Valley Regional Water Reclamation Facility (Facility) service area for Water Years 1999-2000 and 2000-2001 is shown below:

	1999-2000		2000-2001	
	Quantity	Percent	Quantity	Percent
	AF	%	AF	%
Used in Santa Margarita	4,669	56	4,571	51
Used outside Santa Margarita	3,664	44	3,249	36
Reuse	8,333	100	7,820	87
Unaccounted for Production	(15)	----	1,208	13
TOTAL PRODUCTION	8,318	100	8,318	100

It can be noted that the quantities of reclaimed wastewater used within the Santa Margarita River Watershed decreased from 4,669 acre feet in 1999-2000 to 4,571 acre feet in 2000-2001. During the same period reuse outside the Santa Margarita River Watershed decreased from 3,664 acre feet to 3,249 acre feet. From the foregoing it may be concluded that 51 percent of the wastewater is reused in the watershed. Unaccounted for production increased substantially from a negative 15 acre feet to 1,208 acre feet. Unaccounted for production includes changes of storage in Winchester and Sun City storage ponds, evaporation and percolation losses, and discharges to the Santa Ana Watershed.

Because of concerns about the potential export of native Santa Margarita water, the sources of water supply to the Facility service area were determined and are shown on Table 7.3. In 2000-2001, 36 percent of the supply to the service area was groundwater. Thus, the percent of wastewater reused within the Santa Margarita Watershed exceeded the percent of groundwater in the supply, and on a proportional basis there was no export of native waters.

Estimates of water production and use for the period 1966-2001 are shown in Appendix B.

TABLE 7.3

SANTA MARGARITA RIVER WATERSHED
WATER DELIVERIES TO TEMECULA VALLEY
REGIONAL WATER RECLAMATION FACILITY SERVICE AREA

	1997		1998		1999		2000 *		2001	
Eastern MWD	AF	%	AF	%	AF	%	AF	%	AF	%
Deliveries to TVRWRF Service Area										
1. Groundwater	408		240		669		630		355	
2. Import 1/	3,284		5,117		4,327		7,256		5,948	
3. Total	3,692		5,357		4,996		7,886		6,303	
Rancho California WD										
Deliveries to TVRWRF Service Area										
1. Groundwater	8,571 **		7986 **		7,319		7,149		7,481	
2. Import	3,058 **		2,865 **		5,941		8,643		8,076	
3. Total	11,629		10,851		13,260		15,792		15,557	
Total Deliveries to TVRWRF Service Area										
1. Groundwater	8,979	58.6%	8,226	50.8%	7,988	43.8%	7,779	32.9%	7,836	35.8%
2. Import	6,342	41.4%	7,982	49.2%	10,268	56.2%	15,899	67.1%	14,024	64.2%
3. Total	15,321	100.0%	16,208	100.0%	18,256	100.0%	23,678	100.0%	21,860	100.0%

1/ EMWD imports are based on discharges from EM-17.
* Revised
** Revised to reflect recovery of import direct recharge

Elsinore Valley Municipal Water District

Elsinore Valley MWD provides water to its service area around Lake Elsinore, a portion of which is within the Santa Margarita River Watershed. Elsinore Valley MWD obtains its supply from ten wells, all located outside the Santa Margarita River Watershed, and also imports MWD water through Eastern MWD and Western MWD.

The District reports that 6,592 acre feet were imported into the portion of their service area that is inside the Santa Margarita River Watershed in 2000-2001. Also during 2000-2001, approximately 310 acre feet of wastewater were exported from that same area.

Fallbrook Public Utility District

In 2000-2001, Fallbrook PUD imported 15,249 acre feet through its contract with the San Diego County Water Authority as shown in Appendix A. Of this quantity, 2,562 acre feet were delivered to the former DeLuz Heights Water District service area that is entirely within the Santa Margarita River Watershed. Of the remaining importations it is estimated that 46 percent, or 5,836 acre feet, were delivered to lands inside the Santa Margarita River Watershed. The remainder was delivered to lands in the adjacent San Luis Rey River Watershed. Thus, imports to the Watershed totaled 8,398 acre feet in 2000-2001.

In addition to importations, the District has three wells; however, in 2000-2001, there was no pumpage from these wells. In 2000-2001 Fallbrook PUD reclaimed 1,675 acre feet of wastewater of which 24 acre feet were reused in the watershed.

Production during the period 1966 to 2001included direct diversions from the Santa Margarita River for water years before 1972 as well as imported water and well production as shown in Appendix B.

Lake Riverside Estates

Lake Riverside Estates pumps water from Well No. 7S/2E-32C1, into Lake Riverside to make up evaporation losses. Production for 2000-2001 was 274 acre feet as shown in Appendix A, Table A-8. The production well was drilled in 1962 and is located in an area of younger alluvium in the Cahuilla Groundwater Basin. The driller's log shows sand and clay for the entire well depth of 338 feet.

Interlocutory Judgment No. 33 indicates that the owners of lands in the Cahuilla Groundwater Basin have correlative overlying rights to the use of the groundwater that is the basis for this production.

Metropolitan Water District of Southern California

Pursuant to a Court Order, MWD delivered 505 acre feet of imported water for irrigation of lands in Domenigoni Valley during 2000-2001. MWD also imported 184 acre feet for groundwater recharge.

Murrieta County Water District

Murrieta CWD serves an area in the vicinity of the town of Murrieta. In Water Year 2000-2001, Murrieta CWD produced 1,389 acre feet of water from five wells as shown in the following tabulation and in Appendix A.

Well Designation	Well Name	2000-2001 Production Acre Feet	Casing Depth Feet	Water Depth Feet	Well Depth Feet	Perforated Interval Feet
7S/3W-20C9	Holiday	236	25	64 - 102	307	60 - 307
7S/3W-20G5	House	182	50	158 - 181	298	120 - 252
7S/3W-17R2	Lynch	0	26	43 - 54	212	172 - 212
7S/3W-18J2	North	421	50	181 - 209	650	240 - 260 500 - 640
7S/3W-20D	South	429	50	147 - 173	446	120 - 446
7S/3W-7E	Alson	121	50	162 - 250	416	106 - 416

All of these wells are located in the Murrieta-Temecula Groundwater Area. Interlocutory Judgment No. 30 indicates that in Murrieta Valley the younger alluvium deposits extend in various depths to a maximum of approximately 30 feet from the ground surface.

The Court noted that it was impossible, based on evidence available in 1962, to determine with exactness the depth of the younger alluvial deposits throughout the Valley. However, it did decide that subsequent findings could be made, if needed, because the Court would retain continuing jurisdiction. Older alluvial deposits are found below the younger alluvium.

Five of the six Murrieta CWD wells are perforated at depths of 106 feet or more. One of the Murrieta CWD wells has perforations beginning at a depth of 60 feet. This depth is well below the maximum depth of younger alluvium found by the Court in 1962. In addition, water depths in the well with perforations at 60 feet ranged from 64 to 102 feet in 2000-2001. Accordingly all of Murrieta CWD well production is from the older alluvium under a groundwater appropriative right.

Production for the period between 1966 and 2001 is shown in Appendix B.

Rainbow Municipal Water District

Rainbow MWD is located in San Diego County in the south-central part of the Watershed. In recent years about ten percent of the District's imported supply is delivered to the portion of the District's service area inside the Watershed. Most of the District is in the San Luis Rey River Watershed. As shown in Appendix A, total deliveries of imported water in the Watershed in 2000-2001 amounted to 1,804 acre feet.

Total imports to the District for years between 1966 and 2001 as well as the estimated portion served inside the Santa Margarita River Watershed, are shown in Appendix B.

Rancho California Water District

Rancho California WD serves water to a 99,600 acre service area in the central portion of the Watershed. The District produced water from 46 wells in 2000-2001 and also imported water, as shown in Appendix A. Use is shown in Appendix A under the categories of agriculture, ag/domestic, commercial and domestic. In Water Year 2000-2001, 42,126 acre feet were pumped from the Murrieta-Temecula Groundwater Area. This quantity included 25,393 acre feet from the older alluvium, 15,706 acre feet of recovered import recharge, and 1,027 acre feet from Vail recharge. Import supplies totaled 41,823 acre feet of which 23,743 acre feet were direct use and 18,080 acre feet were recharged. During 2000-2001, 509 acre feet were released into Murrieta Creek and 5 acre feet into Temecula Creek.

The District reclaimed and reused 3,719 acre feet of wastewater during the year, in addition to 1,851 acre feet obtained from Eastern MWD for reuse.

In addition the District treated and discharged 2,015 acre feet of reclaimed wastewater to Murrieta Creek as part of its 2 MGD Demonstration Project.

Rancho California WD produces groundwater under a variety of rights as follows:

1. Recovery of water appropriated at Vail Lake
2. Recovery of import return flows and recharged imported water
3. Groundwater appropriative rights
4. As agent on behalf of overlying landowners

Vail Appropriation

Rancho California WD's Vail Dam appropriative rights are described in Application No. 11518 as amended on June 17, 1947, and in Permit 7032. That right provides that the District may store up to 40,000 acre feet in Vail Reservoir each year between November 1 and April 30, subject to applicable limitations, and that the water so stored may be used for irrigation and domestic uses incidental to farming operations on 3,797 acres of land between May 1 and October 31. Such use may be by direct diversion from Vail Lake or by recovery with wells of water released from Vail and spread downstream in Pauba Valley.

The place of use for irrigation and domestic use is described as follows:

Sections 5, 6, 7 and 18; T8S, R1W
Sections 1, 10 through 21, 28 and 29; T8S, R2W
Sections 13 and 24; T8S, R3W.

In 1971, the Permit was amended to add recreational use at Vail Reservoir within Section 10, T8S, R1W.

A total of 68 acre feet were released from Vail during 2000-2001 none of which were to groundwater recharge. Releases from Vail for groundwater recharge for the period 1980 to 2001 are shown on Table B-6.

Water use in the Permit 7032 service area is shown on Table 7.4. This use will be compared with well production from the younger alluvium in a later section of this report.

Representatives of the United States contend that under the 1940 Stipulated Judgment storage of water in Vail Lake is limited to Rancho California Water District's share of the flood waters of the Santa Margarita River system. However, to date, the parties have not agreed on a definition of "flood waters." The Camp Pendleton/Rancho California Water District Technical Advisory Committee is considering the issue.

TABLE 7.4

SANTA MARGARITA RIVER WATERSHED
RANCHO CALIFORNIA WATER DISTRICT
PERMIT 7032 AREA WATER USE
2000-2001

Quantities in Acre Feet

MONTH YEAR	AG	COMM	AG/DOM	DOM	TOTAL
2000					
OCT	31	11	86	94	222
NOV	24	10	65	66	165
DEC	20	11	54	60	145
2001					
JAN	14	9	39	55	117
FEB	8	11	61	44	124
MAR	3	8	26	27	64
APR	9	11	20	36	76
MAY	14	15	61	50	140
JUNE	25	30	93	110	258
JULY	24	29	93	113	259
AUG	25	29	95	113	262
SEPT	33	35	105	143	316
TOTAL	230	209	798	911	2,148

Imported Water Return Flows

During 2000-2001, Rancho California WD imported 23,743 acre feet of water for direct use compared to 35,480 acre feet in 1999-2000. Quantities of imported water delivered to the Rancho Division and the Santa Rosa Division are shown below for Water Years 1999-2000 and 2000-2001.

	Rancho Division Imports		Santa Rosa Division Imports		Total Imports	
Month	2000	2001	2000	2001	2000	2001
October	1,404	703	2,716	1,120	4,120	1,823
November	844	75	1,864	639	2,708	714
December	662	76	1,826	810	2,488	886
January	662	140	1,301	375	1,963	515
February	0	0	69	87	69	87
March	0	0	222	110	222	110
April	338	157	753	462	1,091	619
May	902	525	1,768	1,500	2,670	2,025
June	1,665	948	2,751	2,609	4,416	3,557
July	2,175	1,416	3,225	2,981	5,400	4,397
August	2,012	1,820	3,441	2,873	5,453	4,693
September	1,749	1,384	3,131	2,933	4,880	4,317
Total	12,413	7,244	23,067	16,499	35,480	23,743

Return flows for 2000-2001 based on imported water use in the Rancho Division and Santa Rosa Division are shown on Table 7.5 and on Table 7.6.

In those tables, imported water is allocated to agricultural, ag/domestic, commercial and domestic uses in each of eight hydrogeologic areas in the Rancho Division service area. This allocation is the proportion of the total deliveries to each use that is made up of imported water. In 2000-2001, 52.05 percent of the supply to the Rancho Division was imported and 69.75 percent of the supply to the Santa Rosa Division was imported.

In general the Santa Rosa Division does not overlie the groundwater area. However there are several areas classified as being in the Santa Rosa Division that do overlie the groundwater area and generate return flows from imported supplies. Data from most of these lands have been reported since December 1991.

TABLE 7.5

SANTA MARGARITA RIVER WATERSHED

RANCHO CALIFORNIA WATER DISTRICT

RETURN FLOW CREDIT

2000-2001

RANCHO DIVISION

Quantities in Acre Feet

HYDROGEOLOGIC AREAS

	0 NO HYDRO-GEO CODE	1 MURRIETA WOLF 1/2 QYAL 1/2 QTOAL	2 SANTA GERTRUDIS QYAL	3 LOWER MESA QTOAL	4 PAUBA QYAL	5 SOUTH MESA QTOAL	6 UPPER MESA QTOAL	7 PALOMAR QTOAL	TOTAL
AGRICULTURAL *									
Total Use	1,296.04	540.59	450.59	2,729.35	218.10	893.20	1,376.00	1,246.47	8,750.34
% Import	52.05	52.05	52.05	52.05	52.05	52.05	52.05	52.05	
Import Use	674.65	281.40	234.55	1,420.74	113.53	464.95	716.27	648.84	4,554.93
% Credit	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	
Credit	168.66	70.35	58.64	355.19	28.38	116.24	179.07	162.21	1,138.73
AG/DOMESTIC									
Total Use	538.14	42.91	0.00	19.61	634.39	26.45	479.70	148.43	1,889.63
% Import	52.05	52.05	52.05	52.05	52.05	52.05	52.05	52.05	
Import Use	280.13	22.34	0.00	10.21	330.23	13.77	249.71	77.26	983.63
% Credit	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	
Credit	70.03	5.58	0.00	2.55	82.56	3.44	62.43	19.32	245.91
COMMERCIAL									
Total Use	138.41	1,171.93	700.08	1,054.99	57.92	135.76	52.27	5.31	3,316.68
% Import	52.05	52.05	52.05	52.05	52.05	52.05	52.05	52.05	
Import Use	72.05	610.04	364.42	549.17	30.15	70.67	27.21	2.77	1,726.48
% Credit	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	
Credit	7.20	61.00	36.44	54.92	3.01	7.07	2.72	0.28	172.65
DOMESTIC									
Total Use	859.74	1,932.94	1,111.67	10,350.96	452.07	2,637.60	1,029.75	398.83	18,773.57
% Import	52.05	52.05	52.05	52.05	52.05	52.05	52.05	52.05	
Import Use	447.53	1,006.18	578.67	5,388.12	235.32	1,372.99	536.03	207.61	9,772.45
% Credit	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	
Credit	111.88	251.54	144.67	1,347.03	58.83	343.25	134.01	51.90	2,443.11
TOTAL USE	2,832.34	3,688.38	2,262.35	14,154.91	1,362.48	3,693.01	2,937.72	1,799.04	32,730.23
TOTAL									
Total Import Use	1,474.35	1,919.96	1,177.65	7,368.24	709.23	1,922.37	1,529.21	936.48	17,037.49
Total Credit	357.78 **	388.48	239.75	1,759.68	172.78	469.99	378.22	233.70	4,000.40
Total Credit Qyal		194.24	239.75		172.78				606.77
Total Credit Qtoal		194.24		1,759.68		469.99	378.22	233.70	3,035.85

* Includes golf course and landscape irrigation
** This credit not applied to either Qyal or Qtoal

TABLE 7.6

SANTA MARGARITA RIVER WATERSHED
RANCHO CALIFORNIA WATER DISTRICT
RETURN FLOW CREDIT
2000-2001
SANTA ROSA DIVISION
Quantities in Acre Feet

	HYDROGEOLOGIC AREAS			
	1 MURRIETA WOLF 1/2 QYAL 1/2 QTOAL	3 LOWER MESA QTOAL	8 RTS 279, 280 & 285 1/4 QYAL 3/4 QTOAL	TOTAL
AGRICULTURAL *				
Total Use	0.00	0.00	910.37	910.37
% Import	69.75	69.75	69.75	
Import Use	0.00	0.00	634.99	634.99
% Credit	25.00	25.00	25.00	
Credit	0.00	0.00	158.75	158.75
AG/DOMESTIC				
Total Use	0.00	0.00	0.00	0.00
% Import	69.75	69.75	69.75	
Import Use	0.00	0.00	0.00	0.00
% Credit	25.00	25.00	25.00	
Credit	0.00	0.00	0.00	0.00
COMMERCIAL				
Total Use	0.00	0.00	547.71	547.71
% Import	69.75	69.75	69.75	
Import Use	0.00	0.00	382.03	382.03
% Credit	10.00	10.00	10.00	
Credit	0.00	0.00	38.20	38.20
DOMESTIC				
Total Use	0.00	0.00	1,433.08	1,433.08
% Import	69.75	69.75	69.75	
Import Use	0.00	0.00	999.57	999.57
% Credit	25.00	25.00	25.00	
Credit	0.00	0.00	249.89	249.89
TOTAL USE	0.00	0.00	2,891.17	2,891.17
TOTAL				
Total Import Use	0.00	0.00	2,016.59	2,016.59
Total Credit	0.00	0.00	446.84	446.84
Total Credit Qyal	0.00		111.71	111.71
Total Credit Qtoal	0.00	0.00	335.13	335.13

* Includes golf course and landscape irrigation

The percentage of imported water that becomes return flow varies according to the use as follows:

Agricultural Use	25%
Ag/Domestic Use	25%
Commercial Use	10%
Domestic Use	25%

Based on the foregoing factors, the return flow credit for 2000-2001 is computed to be 4,000.40 acre feet for the Rancho Division and 446.84 acre feet for the Santa Rosa Division, as shown on Tables 7.5 and 7.6 respectively.

Some of the hydrogeologic areas overlie older alluvium and some overlie younger alluvium. Comparison of exposures of younger alluvium with maps of the District's hydrogeologic areas indicates that the Santa Gertrudis, Pauba and half of the Murrieta-Wolf areas overlie younger alluvium. The area of the Santa Rosa Division that overlies the groundwater area is one-fourth in the younger alluvium and three-fourths in the older alluvium. Import return flows in these areas can be credited against pumping from the younger alluvium. These credits for 2000-2001 are 606.77 acre feet for the Rancho Division and 111.71 acre feet for the Santa Rosa Division, as shown on Tables 7.5 and 7.6 respectively.

Rancho California WD imported an additional 18,080 acre feet of water for groundwater recharge in 2000-2001, of which 15,706 acre feet were recovered.

Division of Local Water

During 2000-2001, Rancho California WD pumped 42,126 acre feet of groundwater. Some of this water was pumped from the younger alluvium and some from the older alluvium. The Court determined that water in both the younger alluvium and older alluvium add to, contribute to and support the Santa Margarita River stream system. The primary reason for differentiating between younger alluvium and older alluvium production is that, in California, production from the younger alluvium is generally considered to be governed by water rights that apply to the regulation of surface waters. Production from the older alluvium is generally considered to be governed by regulations that apply to groundwater.

In 1995 well logs and geophysical logs of all Rancho California WD wells were reviewed by representatives of the United States and Rancho California WD to determine the depths of the younger alluvium. There was general agreement between the parties about the depth of the younger alluvium in production wells, except for ten wells shown on Table 7.7 of the 1994-1995 report. The remaining disagreements relate to differences about the magnitude of the clay layer needed to define the base of the younger alluvium, the importance of neighboring well logs, and general concepts about the overall geologic setting.

During joint development of a groundwater model of the area it was necessary to develop estimates of the transmissivity for each aquifer. These estimates were based on pump tests. The resulting transmissivity values were then used to estimate the relative groundwater production from each aquifer. For Rancho California WD wells, the percent production estimated to originate in the younger alluvium is shown in Table 7.7.

Production from the younger alluvium and older alluvium for 2000-2001 using the percentages noted in Table 7.7 is presented in Table 7.8. It may be noted that 16,733 acre feet were pumped from the younger alluvium and 25,393 acre feet were pumped from the older alluvium in 2000-2001.

The production of 16,733 acre feet from the younger alluvium, as shown on Table 7.8 includes recovery of 1,027 acre feet of Vail recharge and 15,706 feet of import recharge. The recovered Vail recharge was used for authorized uses in the Permit 7032 service area as shown in Table 7.4. Although there were no Vail releases to groundwater storage in 2000-2001 there is sufficient unrecovered recharge from prior years to offset the use of 1,027 acre feet in 2000-2001. Rancho California WD imported 18,080 acre feet of water in 2000-2001 for direct recharge of which 15,706 acre feet were recovered leaving 2,374 acre feet as unrecovered direct recharge.

Imported water carryover to 2001-2002 includes the following:

		AF
1.	Carryover from 1999-2000	11,566*
2.	Unrecovered direct recharge in 2000-2001	2,374
3.	Import Return Flow Credit for 2000-2001	719
4.	Total Carryover to 2001-2002	14,659

Thus, there was no unauthorized use under Permit 7032 in 2000-2001 and 14,659 acre feet of imported supplies remain available to offset younger alluvium production in future years.

* Revised

TABLE 7.7

SANTA MARGARITA RIVER WATERSHED
PERCENT PRODUCTION FROM YOUNGER ALLUVIUM IN RANCHO CALIFORNIA WATER DISTRICT WELLS

RCWD WELL NO.	LOCATION TOWNSHIP/ RANGE/ SECTION	SEAL DEPTH FEET	PERFORATED INTERVAL FEET	DEPTH YOUNGER ALLUVIUM FEET	PERCENT YOUNGER ALLUVIUM %		REMARKS
106	7S/3W-26R1	55	130-210; 250-310; 340-440; 700-740; 780-980	0	0.0%	Murrieta	No. 108 Winchester, clay 0'-40'
107	7S/3W-26J1	55	60-120; 190-260; 280-300; 390-590	58	0.0%	Murrieta	No. 105 - gravel & clay 58'-84'
108	7S/3W-25E1		60-110; 190-280; 350-410; 430-450; 470-490; 530-590	55	0.0%	Murrieta	Formerly No. 109 gravel/sandy clay 55'-70'
109	8S/2W-17J1	52	70-150; 170-210	75	84.0%		Brown clay and gravel 75' to 105'
110	8S/1W-6K1	54	75-155	165	97.0%		Clay 165'-190'. Prior to 10/23/97 perf int. 70-150; 200-240; 320-380; 420-460
113	7S/2W-25H1	52	96-136; 275-462; 482-542	Shallow	0.0%		
116	8S/1W-6J	Unknown	60-120; 140-200; 220-260; 270-330; 370-390	150	94.0%		Clay 150'-170'
119	8S/2W-19J	55	170-260; 300-470		0.0%	Wolf Valley	Perforated below 170'
123	8S/1W-7B	55	100-260; 300-380; 420-500	135	65.0%		Brown Sand Clay 135'-210'
129	7S/2W-20L	Unknown	180-290; 416-480; 520-600	Shallow	0.0%	Santa Gertrudis Creek	Qyal very shallow along Santa Gertrudis Creek
132	8S/1W-7D	55	70-390; 430-500	135	82.0%		Brown Clay Streaks 135'-175'
135	7S/3W-27M10	55	70-170	50	0.0%	Murrieta Valley	Silty clay 50'-69'
141	8S/2W-11P	55	120-190; 215-235; 270-380; 430-510	104	0.0%		Silt & sand 104'-185', Well 11L1 is 112'
144	7S/3W-27D	55	983-1123; 1143-1263; 1343 1483; 1503-1743	25	0.0%	Murrieta Valley	Sand with silty clay 25'-45'
146	7S/3W-28	50	50-190	42	0.0%	Murrieta	
153	8S/1W-5K3	50	50-220	170	99.0%		Forebay
157	8S/1W-5L	50	50-210	128	96.8%		Forebay
158	8S/1W-5K	96	50-210	100	96.5%		Forebay
205	7S/3W-35A	50	150-1000	10	0.0%	Santa Gertrudis/ Murrieta Valley	Sandy clay 10'-20'
210	8S/2W-12K	None	48-228	140	94.0%		Clay cobblestones 160'-167', 175'-227'
218	8S/2W-20B5	27	48-289	40	0.0%		Old 28; clay with sand layer 40'-60'; now monitoring wells 427, 428 and 429
466	8S/3W-1P2	Unknown	106-822	49	0.0%	Long Canyon	Old 219, Cantarini, hard clay 49'-60'
220	7S/3W-26Q1	34	114-450	58	0.0%		Clay 58' - 73'
467	8S/2W-12K1	Unknown	50-100; 100-140	140	100.0%		Old 221, JK, Exh. 16, Monitoring well since 1983
223	8S/2W-20C1	Unknown	48-250	60	94.0%	Wolf Valley	CAT Well; east of Wildomar Fault; nearby Exh 16 wells 17Q @62' & 17M @55' are also east of the Wildomar Fault
224	8S/2W-15D	Unknown	48-250	106	68.0%		Old Well 50, clay 106'-138'
230	8S/2W-11J1	Unknown	24-31; 32.5-34; 35-40; 61-65; 70-76; 80-85; 86.5-91; 92.5-98.5	>119	100.0%		Old Well 30, depth of well is 119'
231	8S/2W-20B6	55	80-120; 150-270	35	0.0%		Old 104, P-34, Clay 20'-23'; 35'-41'; East of Wildomar Fault
232	8S/2W-11J3	51	95-135; 175-215; 235-295	135	92.0%		Old 111, 105, P-31; coarse sand & clay 135' - 155'
233	8S/2W-12K2	51	95-135; 175-215; 235-295	145	88.0%		Old 112, P32; sand and clay at 145'-220'
234	8S/2W-11P1	52	80-100; 120-140; 200-240; 280-320; 340-400	125	74.0%		Brown Clay at 125'; sand and clay at 125'-140'
235	8S/3W-1Q1	55	Unknown	Shallow	0.0%	Long Canyon	
240	8S/2W-11L1	Unknown	48-298	112	86.0%		Old Well No. 40; clay 112'-136'
301	7S/3W-18Q1	93	140-280; 280-520; 540-640	26	0.0%	Murrieta	Old JR1; blue clay 26'-32'

TABLE 7.8

SANTA MARGARITA RIVER WATERSHED
RANCHO CALIFORNIA WATER DISTRICT
WELL PRODUCTION FROM YOUNGER AND OLDER ALLUVIUM
2000-2001
Quantities in Acre Feet

WELL NO.	QYAL	QTOAL	TOTAL
101	0.00	0.00	0.00
102	0.00	0.00	0.00
106	0.00	803.00	803.00
108	0.00	412.00	412.00
109	390.60	74.40	465.00
110	1,417.17	43.83	1,461.00
113	0.00	288.00	288.00
118	0.00	0.00	0.00
119	0.00	1,579.00	1,579.00
120	0.00	1,126.00	1,126.00
121	0.00	93.00	93.00
122	0.00	457.00	457.00
123	352.30	189.70	542.00
124	0.00	645.00	645.00
125	0.00	589.00	589.00
126	0.00	1,220.00	1,220.00
128	0.00	1,186.00	1,186.00
129	0.00	67.00	67.00
130	0.00	767.00	767.00
131	0.00	848.00	848.00
132	369.00	81.00	450.00
133	0.00	358.00	358.00
135	0.00	6.00	6.00
138	0.00	1,643.00	1,643.00
139	0.00	1,060.00	1,060.00
140	0.00	216.00	216.00
141	0.00	437.00	437.00
143	0.00	749.00	749.00
144	0.00	310.00	310.00
145	0.00	756.00	756.00
146	0.00	10.00	10.00
149	0.00	366.00	366.00
151	0.00	0.00	0.00
153	2,986.83	30.17	3,017.00
155	0.00	190.00	190.00
157	3,419.94	113.06	3,533.00
158	2,241.70	81.31	2,323.00
201	0.00	0.00	0.00
203	0.00	360.00	360.00
205	0.00	896.00	896.00
207	0.00	0.00	0.00
208	0.00	0.00	0.00
209	0.00	0.00	0.00
210	1,410.94	90.06	1,501.00
211	0.00	1,389.00	1,389.00
215	0.00	0.00	0.00
216	0.00	0.00	0.00
217	0.00	889.00	889.00
231	0.00	253.00	253.00
232	868.48	75.52	944.00
233	2,504.48	341.52	2,846.00
234	771.82	271.18	1,043.00
235	0.00	1,579.00	1,579.00
301	0.00	38.00	38.00
302	0.00	222.00	222.00
309	0.00	2,194.00	2,194.00
TOTAL	**16,733.26**	**25,392.74**	**42,126.00**

Western Municipal Water District

Western MWD wholesales imported water to Rancho California WD and also serves water to its Improvement District A near the southern boundary of Riverside County along I-15 freeway. Deliveries to Rancho California WD are included under Rancho California WD.

In Water Year 2000-2001, imports to Improvement District A amounted to approximately 59 acre feet as shown in Appendix A, Table A-8.

Deliveries to Improvement District A through turnout WR-13 for the period 1966 to 2001 are shown in Table 5.4.

U. S. Marine Corps - Camp Pendleton

Camp Pendleton is located on the coastal side of the Santa Margarita River Watershed. Water is provided by 11 wells that produced 7,366 acre feet in Water Year 2000-2001. This production is from the younger alluvium and is based on riparian and appropriative rights. Of this quantity, 3,653 acre feet were exported to areas of the Base outside the Watershed as shown in Appendix A.

A portion of the exported water amounting to 2,075 acre feet were returned to the Santa Margarita River Watershed as wastewater.

Production and estimated use inside and outside the Watershed, as well as wastewater returns, are shown in Appendix B for the period 1966-2001.

In addition to the operations at Camp Pendleton involving diversions from the Santa Margarita River, water is also imported by the Naval Weapons Station (NWS). The NWS occupies about 9,148 acres in the northeastern part of Camp Pendleton. Since 1969 the NWS has relied on imported water delivered via Fallbrook PUD for its supply. Wastewater is exported from the NWS and the Watershed via an outfall line also used by the Fallbrook Public Utility District. In 2000-2001, 73 acre feet were imported of which 8 acre feet of wastewater were exported, as shown in Appendix A. Imports and use between 1966 and 2001 are shown in Appendix B.

7.3 Indian Reservations

Water use information about the Cahuilla, Pechanga and Ramona Indian Reservations in the Watershed is described in the following sections:

Cahuilla Indian Reservation

In general, domestic water use on the Cahuilla Indian Reservation is not measured, however reports indicate that 300 people reside on the Reservation. These residents use water primarily for domestic purposes as well as for livestock watering and grazing. Annual domestic water use, based on 125 gallons per capita per day, amounts to a total annual use of about 42 acre feet from wells listed in Appendix C.

The foregoing estimate is for total domestic water use on the Reservation. A portion of this use may not be under Court jurisdiction, but the estimate will be used until individual well production quantities are available to allow determination of the portion under Court jurisdiction. The estimated domestic use is included on Table 4.1 under water purveyor production.

An additional 5 acre feet was put to commercial use at a casino. This water was pumped from well 7S/2E-26B3 that overlies basement complex and is outside court jurisdiction.

Pechanga Indian Reservation

During 2000-2001, water well production by the Pechanga Water System amounted to 291 acre feet. In addition, it is estimated that a spring produced about 4 acre feet during the year for a total production of 295 acre feet as shown in Appendix A, Table A-8. Information about system wells and the spring is shown in the following tabulation:

Well/Spring Designation	Name	Water Depth Feet	Well Depth Feet	Perf. Interval Feet
28R1	Ball Park	120.27	1,000	130 - 220
28Q6	Sea Bee	111.06	610	N/A
29A1	Kelsey Tract	55.70	348	N/A
29B10	Eduardo	38.75 *	N/A	N/A

N/A - Not Available
* Water depth in Well 8S/2W-29B9

The wells listed above are in areas of younger alluvium at ground surface. The depth of the younger alluvium in Wolf Valley was estimated by representatives of Rancho California WD and the United States for Rancho California WD Wells No. 117 (8S/2W-20E) and No. 119 (8S/2W-19J) to be in the range of 120 to 170 feet in depth. Thus, based on available well construction data, some of the production is from the younger alluvium and some from the older alluvium. Under state law production from the wells that originate in the older alluvium can be considered to be under a groundwater appropriative right or an overlying right, depending on the circumstances at each well.

Under federal law, production from wells that originate in either the younger or older alluvium can be considered to be under a federal reserved right, in accordance with Interlocutory Judgment No. 41 which provides as follows in Order No. 7:

> *IT IS FURTHER ORDERED, ADJUDGED AND DECREED that the United States of America intended to reserve, and did reserve, rights to the use of the waters of the Santa Margarita River stream system which under natural conditions would be physically available on the Pechanga Indian Reservation, including rights to the use of ground waters sufficient for the present and future needs of the Indians residing thereon with priority dates of June 27, 1882, for those lands established by the Executive Order of that date; January 9, 1907, for those lands transferred by the Executive Order of that date; August 29, 1893, for those lands added to the Reservation by Patent on that date; and May 25, 1931, for those lands added to the Reservation by Patent of that date.*

Ramona Indian Reservation

The Ramona Indian Reservation occupies 560 acres of land of which 321 acres are inside the Watershed. The Ramona Reservation has no reported water use or residents.

7.4 Mobile Home Parks/Campgrounds

There are a number of mobile home parks in the Watershed. These range from relatively permanent structures, to those catering to recreational vehicles and campgrounds. Water production from wells is shown in Appendix A, Table A-8 for Butterfield Oaks Mobile Home Park, Outdoor Resorts Rancho California, Inc., and Jojoba Hills SKP Resort.

7.5 Irrigation Water Use

Estimated water production reported by substantial users for irrigation in the Santa Margarita River Watershed is shown on Table 7.1 to be 7,040 acre feet. This quantity includes 6,394 acre feet of well production and 983 acre feet of surface diversion (as shown in Appendix C), less 42 acre feet of production on the Cahuilla Indian Reservation, and less 295 acre feet of production on the Pechanga Indian Reservation. The foregoing production on the Indian Reservations is shown at a separate location on Table 7.1.

SECTION 8 - UNAUTHORIZED WATER USE

8.1 General

From time to time there are complaints of unauthorized water uses of various types in the Watershed. Such complaints are investigated when they are brought to the attention of the Watermaster. The status of the current list of unauthorized uses is described as follows:

8.2 Unauthorized Small Storage Ponds

Many small dams and reservoirs have been constructed on streams in the Watershed. The legal basis for these ponds is described in the 1988-89 Watermaster Report. Basically, the Court has held that storage of water in ponds less than 10 acre feet in capacity and used for stock watering is a valid use of riparian water. The Court has also held that:

> The temporary or non-seasonal impoundment by riparian owners for the purpose of providing a head for irrigation or for the purpose of temporarily accumulating sufficient water to make possible efficient irrigation is a proper riparian use of water.

Criteria for determining non-seasonal storage of irrigation water have yet to be developed.

8.3 Rancho California Water District Water Use

A number of unauthorized water use issues have been raised by the United States. These issues and action to investigate and/or correct the issues are as follows:

1. Violation of the 1940 Stipulated Judgment - United States' representatives have indicated their belief that the provisions of the 1940 Stipulated Judgment have been violated in two respects by Rancho California WD:

   A. Storage of water in Vail Lake and the related recharge and rediversion operations exceed the portion of the Santa Margarita River flow allocated to Rancho California WD by the Stipulated Judgment.

   B. Production of water by Rancho California WD from the older alluvium should be included with surface water in determining whether water use by Rancho California WD exceeds that portion allocated to Rancho California WD by the Stipulated Judgment.

   Rancho California WD disagrees with each of these contentions.

2. Rediversion and Use Not in Accord with Terms of Permit 7032 - As noted in Section 7 of this report, the place of use, rediversion facilities and the type of use of water appropriated under Rancho California WD's Application No. 11518 and Permit 7032 have changed since the Application was filed in 1947.

Use of water under Permit 7032 is limited to irrigation, domestic use incidental to farming operations and recreation. Such use for municipal and industrial purposes represents an unauthorized use.

As noted in the previous section of this report, there was no unauthorized use of water under Permit 7032 in 2000-2001. However, in prior years water appropriated under Permit 7032 was either used outside the designated place of use or partially used within the designated service area for commercial and/or domestic use, neither of which is authorized under Permit 7032.

Accordingly, Rancho California WD initiated the process of changing Permit 7032 on September 1, 1992, by filing a Notice of Intent to Adopt a Negative Declaration for a Petition for Change to the SWRCB, Division of Water Rights, relative to Appropriations Water Permit 7032.

On January 15, 1993, the United States in a petition filed with the Superior Court of the State of California for Riverside County alleged that the District had violated the California Environmental Quality Act (CEQA) by adopting the Negative Declaration. On April 12, 1994, the Court denied the United States' petition and declared that Rancho California WD had complied with CEQA by adopting the Negative Declaration. On August 11, 1994, the parties jointly requested an extension of time for the filing of an appeal pending current settlement negotiations. The appellate Court granted that extension of the process as well as several subsequent extensions.

On January 13, 1993, the District filed a Petition for Change in the points of rediversion, the place of use and the purpose of use with the SWRCB. The Petition for Change was protested by Camp Pendleton, U. S. Fish and Wildlife Service, the U. S. Bureau of Indian Affairs, and the California Sportfishing Alliance.

In March 1993, Camp Pendleton filed a Complaint with the SWRCB that Rancho California WD was violating the terms of Permit 7032 regarding place, season and purpose of use. On May 25, 1993, the SWRCB advised that it would process the Complaint prior to acting on the District's Petition for Change.

A representative from the SWRCB visited the area in July 1993, and completed a draft staff Report of Investigation. Prior to release of the staff report the SWRCB agreed to a joint request by the parties to defer issuance of the report and allow the parties to negotiate a settlement of the issues. Upon request by the parties, the SWRCB has continued to defer issuance of the report.

3. Unauthorized Pumping - United States' representatives also contend that water is being pumped from the younger alluvium without permit outside Pauba Valley and that there is pumping in violation of Court adjudications from the older alluvium.

4. Settlement - Representatives of Rancho California WD and the United States have developed a settlement agreement that will resolve the foregoing issues. Rancho California WD agreed with the settlement in Water Year 2000. During 2000-2001 the United States continued the process of obtaining the necessary approvals in the Department of the Navy and Department of Justice.

8.4 Complaint to the State Water Resources Control Board Regarding Unauthorized Diversions

In August 1999 the State Water Resources Control Board (SWRCB) received two complaints that unauthorized diversions were being made to storage by the Wild Horse Peak Mountain Vineyard, owned by James and Maggie Carter. A total of 200 acres of grapes are irrigated using a water supply system that includes several springs, a shallow well, a deep well, diversion from Arroyo Seco Creek and a 40 acre foot reservoir. The ensuing investigation indicated that while the vineyard has a valid riparian right to divert water onto the lands, it does not have the right to divert water to the reservoir for seasonal storage (storage for more than 30 days).

Groundwater underlying the property has been determined by the Court not to be a part of the Santa Margarita River system, so that overlying owner can use water from the deep well for any beneficial purpose.

After some discussions with SWRCB representatives, it was concluded that the vineyard could continue to divert water from the stream as long as there was documentation in the form of a dated photograph(s) showing the storage reservoir to be either full on the first day of stream diversions, or demonstrating that there was not an increase in storage during stream diversions that could not be accounted for by well production.

SECTION 9 - THREATS TO WATER SUPPLY

9.1 General

General threats to the long-term water supply in the Santa Margarita River Watershed, which have been described in previous Watermaster Reports, are as follows:

1. High nitrate concentrations in Rainbow Creek and in Anza Valley.

2. Potential overdraft conditions at various locations in the Watershed.

3. Potentially adverse salt balance conditions in the upper Santa Margarita River area.

9.2 High Nitrate Concentrations

In past years, high concentrations of nitrate have been measured in Anza Valley and on Rainbow Creek. Conditions in Anza Valley were generally described in the 1993-94 report. Few measurements have been reported since then.

During 1999 and 2000, the Regional Water Quality Control Board staff prepared a draft technical Total Maximum Daily Load (TMDL) plan for Rainbow Creek. As part of the process, the Regional Board monitored water quality at three sites on Rainbow Creek between January and August 2000 and conducted more comprehensive monitoring involving ten sites between August and October 2000.

Data collected by the Regional Board was summarized in the 1999-2000 report. The data indicated that the drinking water standard of 10 mg/l as N for nitrate was being exceeded at most of the sampling locations. The data also showed that phosphorous concentrations consistently exceeded the desired goal of 0.1 mg/l for biostimulatory substances contained in the Basin Plan.

In the draft TMDL the Regional Board concluded that the observed concentrations on nitrate were far in excess of 1.0 mg/l, a goal for nitrate that may be computed using a ratio of 10 parts nitrogen to one part phosphorous and the desired Basin Plan goal of 0.1 mg/l phosphorous. The draft TMDL further reports that the concentrations that exceed the Basin Plan goals for biostimulatory substances have caused excessive algae growth at various locations along Rainbow Creek.

As a result of the foregoing findings, the draft technical TMDL was substantially revised in 2000-2001.

The current draft TMDL calls for a 28% reduction in nitrogen and phosphorous loads to meet drinking water standards for nitrate within four years after the TMDL is approved by the EPA. Thereafter the load allocations will be reduced by 10% every four years until biostimulatory goals are met.

Meeting the initial 28% reduction will require loading reduction of 70 – 80% for commercial nurseries, irrigated agricultural lands, residential land uses and septic tanks.

The draft TMDL also requires the County of San Diego to develop and implement a watershed management plan for nutrients. This plan is to describe measures to achieve the necessary reductions. The County will also be responsible for investigating groundwater and septic tank conditions.

The Regional Board's timetable calls for adoption of the TMDL by the Regional Board in 2001-2002 followed by approvals by the State and the EPA.

9.3 Potential Overdraft Conditions

Previous Watermaster reports have noted concerns about overdraft conditions in Anza Valley and in the Murrieta-Temecula area. The 1989-90 Watermaster Report described a water supply study, conducted by a consultant to Riverside County, which concluded that Anza Valley water use in 1986 was approximately equal to the perennial yield and that as of 1986 useable groundwater in storage approximated 56,000 acre feet. No further studies relative to groundwater use in Anza Valley are available. Historical measurements of groundwater levels for Anza Mutual Water Company's Well No. 1 (7S/3E-21G1) located in Anza Valley are plotted in this Report on Figure 4.4. It can be noted that the water level in October 2001 of 3809.6 feet is within the general range observed since the early 1970's.

No recent published studies of safe yield are available for the Murrieta-Temecula area. Groundwater resources in much of the area are being managed by Rancho California WD. The District prepares an annual groundwater production program with the goal of developing the maximum perennial yield from the basin. The District monitors water levels and well production in each of several hydrogeologic subareas. Each year that data, combined with other information including water quality, natural and artificial recharge, pump settings, and well construction factors, are used to develop a recommended production program. Production rates are commonly lowered in subareas where water levels have declined over several years, and production rates are increased in areas where decline has not occurred. As a final check the recommended production rates are checked using the latest version of the RCWD groundwater model.

Groundwater level data for three wells in the Murrieta-Temecula Groundwater Area are included in this report as Figures 4.1, 4.3 and 4.5. Water levels in the Windmill Well (8S/2W-12H1) located at the eastern part of Pauba Valley declined 7.5 feet in 2000-2001. Water levels in Well 7S/3W-20C9 in the Murrieta CWD area rose 13 feet from last year, and those in Well 8S/2W-29G1 on the Pechanga Indian Reservation in Wolf Valley were down 3.24 feet from last year. As can be seen from the long-term hydrographs, the foregoing groundwater levels are within the broad range of groundwater levels experienced in recent years.

9.4 Salt Balance

A key issue in management of a groundwater basin is potential build up of salts from imported water supplies. Such a build-up could decrease the usability of waters in a basin. Consideration must be given to measures that allow export of salts from a basin to offset the salt load in water entering the groundwater basin.

A 2 MGD Demonstration Project involving discharge of treated wastewater into the Santa Margarita River system by Rancho California Water District was implemented in late 1997. This five-year project provides cost-effective disposal of wastewater from the upper Santa Margarita River area, assists in controlling salt balance in the Murrieta-Temecula Groundwater Area, and supplements water supplies to the Santa Margarita River system downstream of Temecula. In 2000-2001, RCWD initiated an application to the Regional Board to extend the Demonstration Project for an additional five years and to increase the maximum discharge to 5 MGD between December and April. The maximum discharge would be 3 MGD between May and November. Also, RCWD is requesting that the first 2 MGD be made permanent and that discharges above 2 MGD be considered to be Demonstration Project flows.

In a separate project, Eastern MWD exported 3,249 acre feet of treated wastewater from the watershed for reuse. An additional 1,208 acre feet was exported for operational reasons. At an average total dissolved solids concentration of 650 mg/l there are approximately 1,768 pounds of salt in every acre foot of wastewater. Thus in 2000-2001, approximately 3,940 tons of salt were exported by EMWD.

In addition to export of treated wastewater, the salt balances of the Murrieta-Temecula groundwater area and the lower Santa Margarita River groundwater area are affected by discharges from wells into Murrieta Creek or Temecula Creek. In 2000-2001 wells discharged 39 acre feet, as shown below, together with estimated total dissolved solids in the water.

Well No.	Release Acre Feet	TDS mg/l	Sample Date
108	9	350	5/16/00
118	24	580	11/02/99
121	1	640	7/24/97
231	5	1080	5/24/01
Total	39		

SECTION 10 - WATER QUALITY

10.1 Surface Water Quality

During 2000-2001 there was extensive sampling of surface water quality by Rancho California WD as part of its 2 MGD Demonstration Program. Portions of these data are shown in Appendix Table D-2.1. Weekly samples were collected from the Santa Margarita River at the Temecula gaging station, Murrieta Creek gaging station and Temecula Creek at Highway 79. These samples were analyzed for total dissolved solids (TDS), nitrate, total nitrogen and total phosphorous. TDS concentrations at the Santa Margarita River station ranged from a low of 250 mg/l to as much as 860 mg/l during the year.

Nitrate concentrations as nitrogen at the Santa Margarita River gaging station ranged from none detected, to a high of 2.4 mg/l. All measurements of nitrate were well below the drinking water standard of 10 mg/l as N.

Rancho California WD collected samples at additional locations in the Santa Margarita River system including Santa Margarita River at Willow Glen, DeLuz Crossing and the Estuary. Among other things, these samples were analyzed for TDS and Nitrate as N, as shown in Table D-2.1. Except for the Estuary, TDS concentrations were generally in the 700 - 1000 mg/l range while the maximum nitrate sample was 3.2 mg/l as N measured at the DeLuz Crossing. Samples of the water being discharged into Murrieta Creek from the system were also collected at a station called the Murrieta River Meter. Nitrate concentration at the River Meter ranged from 0.2 to 3.4 mg/l as N.

Surface water quality data collected in prior years by Camp Pendleton and Eastern MWD are listed in earlier Watermaster reports.

The U.S.G.S. using funding provided by Camp Pendleton, collects continuous water quality measurements for dissolved oxygen, pH, specific conductance and temperature at the Santa Margarita River gaging stations near Temecula and at Fallbrook PUD Sump near Fallbrook. The latter station is about nine miles downstream from the Temecula station, and the intervening drainage area is 32 square miles. Data collected at the two stations is published by the U.S.G.S. in its annual Water Resource Data report. The highest average daily high and the lowest average daily low for each parameter for each month are shown in Tables 10.1 and 10.2 for months in water year 2001.

TABLE 10.1

SANTA MARGARITA RIVER WATERSHED

RANGES IN AVERAGE DAILY CONCENTRATION OF DISSOLVED OXYGEN, PH, SPECIFIC CONDUCTANCE AND TEMPERATURE AT SANTA MARGARITA RIVER NEAR TEMECULA

Water Year 2000-2001

COLLECTION MONTH/YEAR	DISSOLVED OXYGEN mg/l		pH mg/l		SPECIFIC CONDUCTANCE microsiemens/cm		TEMPERATURE Deg C	
	High	Low	High	Low	High	Low	High	Low
2000								
October	10.0	4.8	8.5	7.7	1250	469	24.0	13.5
November	10.1	6.8	8.1	7.5	1180	798	15.5	8.0
December	12.0	6.5	8.5	7.8	1390	1060	14.0	6.0
2001								
January	12.3	7.3	8.5	7.5	1390	220	12.5	6.5
February	11.4	6.6	8.6	7.6	1310	1150	16.0	7.0
March	10.5	5.3	8.7	7.6	1410	1170	23.5	9.0
April	10.0	6.0	8.2	7.4	1440	383	24.0	11.5
May	10.5	4.4	8.3	7.1	1320	937	25.5	16.5
June	11.8	5.4	8.3	7.1	1280	1060	25.5	18.5
July	10.9	5.0	8.0	6.4	1370	1060	26.0	19.0
August	10.4	5.4	8.1	6.9	1330	963	26.5	19.0
September	9.3	4.9	8.0	7.2	1320	1040	24.5	17.0

TABLE 10.2

SANTA MARGARITA RIVER WATERSHED

RANGES IN AVERAGE DAILY CONCENTRATION OF DISSOLVED OXYGEN, PH, SPECIFIC CONDUCTANCE AND TEMPERATURE AT FPUD SUMP NEAR FALLBROOK

Water Year 2000-2001

COLLECTION MONTH/YEAR	DISSOLVED OXYGEN mg/l		pH		SPECIFIC CONDUCTANCE microsiemens/cm		TEMPERATURE Deg C	
	High	Low	High	Low	High	Low	High	Low
2000								
October	9.0	5.9	7.9	7.4	1340	1190	21.5	13.0
November	10.4	7.5	8.0	7.0	1440	1180	15.5	7.0
December	11.3	6.2	7.9	7.3	1560	1360	14.0	6.0
2001								
January	11.1	5.0	7.9	7.2	1570	519	12.5	6.5
February	13.4	7.5	8.4	7.3	1530	549	15.0	6.5
March	11.4	6.3	8.4	6.8	1420	1310	21.5	9.5
April	9.4	6.2	8.2	6.8	1470	1010	23.5	11.0
May	10.7	7.7	8.3	7.1	1540	1330	26.5	15.5
June	10.6	5.4	8.3	7.1	1630	1460	26.5	18.0
July	9.1	5.1	8.2	7.0	1600	1460	26.5	18.5
August	9.4	5.3	8.1	7.3	1490	1350	26.5	19.0
September	8.5	4.6	8.2	7.3	1540	1370	24.5	16.0

Measured values are similar for the two stations except for specific conductance. The average high specific conductance values increase by about 12 - 16% between the two stations, while the increase in the average lows is generally in the 30% to 50% range.

It may be noted that between May and October, RCWD discharges relatively high quality water to the stream thereby improving the relative quality of the water at the Temecula station. Another factor is that inflows from the intervening 32 square mile drainage area include irrigation return flows that have high specific conductance.

10.2 Groundwater Quality

During 2000-2001 water quality data were collected from wells by Rancho California WD, the U.S.G.S. for wells on Indian Reservations, and the U.S.M.C. at Camp Pendleton.

Water quality data for Rancho California WD wells are shown in Appendix Table D-4. Samples were collected from 43 wells during 2000-2001. Of the 43 wells, 28 wells were analyzed for nitrates only. In these wells, nitrate concentrations ranged up to 22 mg/l as NO_3, with the drinking water standard being 45 mg/l as NO_3. Samples from most of the remaining wells were subjected to standard chemical analysis: TDS concentrations increased in 5 wells, decreased in 7 wells, and 3 wells remained the same.

Total dissolved solids concentrations for RCWD Well 210 are shown on Figure 10.1 for samples collected since 1957 when the well was constructed. The figure shows a decline in TDS from approximately 900 mg/l for the first two samples collected to the 500-600 mg/l range in recent years.

FIGURE 10.1

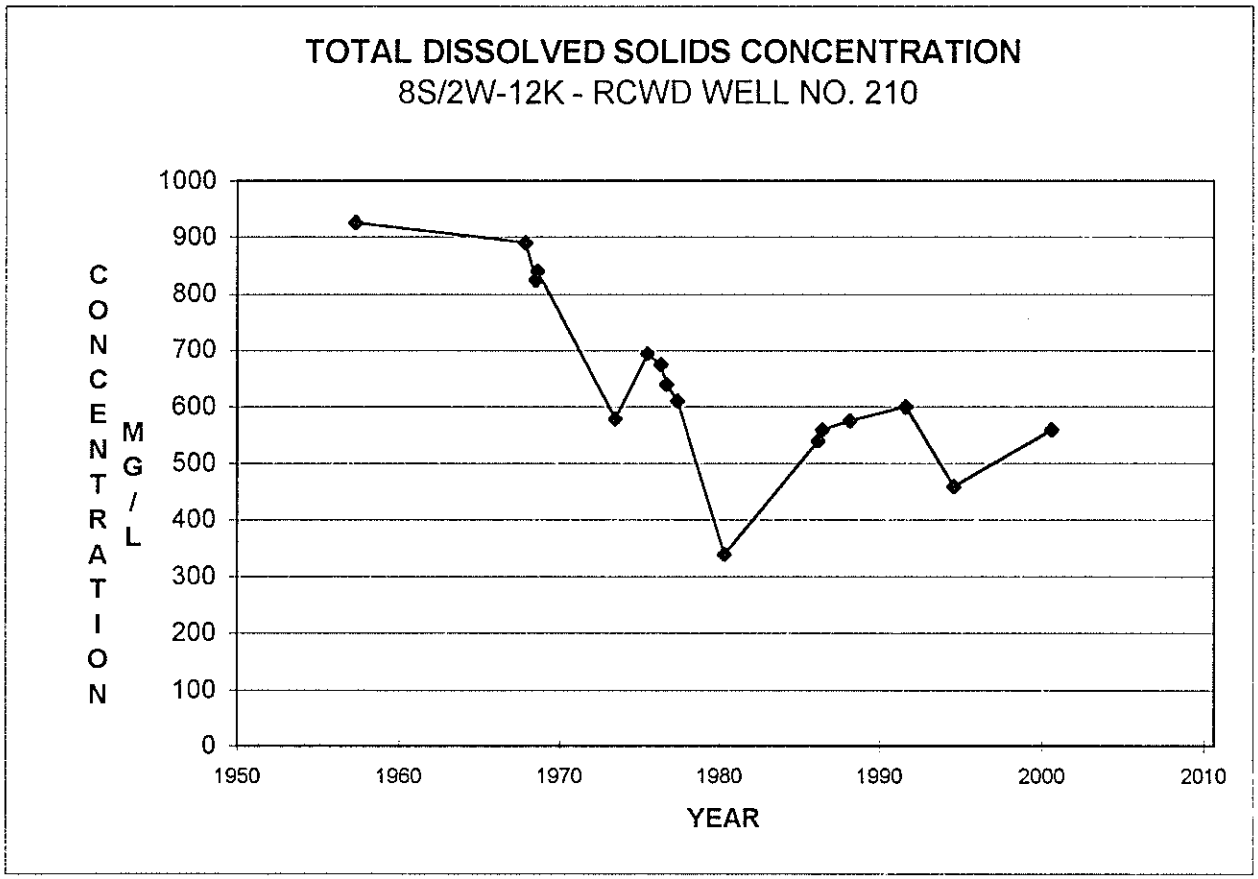

Appendix Table D-5 shows water quality data collected by the U.S.G.S. from wells on Indian Reservations. In 2000-2001 samples were collected from five wells on the Pechanga Indian Reservation and subjected to standard chemical analysis. Concentrations of the various constituents were consistent with historical results.

During 2000-2001 samples of groundwater were collected from 11 wells at Camp Pendleton as shown on Appendix Table D-6. These wells were subjected to standard chemical analysis with results generally consistent with the historical results. Of the 11 wells sampled, seven provided one or more samples where total dissolved solids concentrations exceeded 750 mg/l, the Basin Plan Objective.

Historical total dissolved solids concentrations for Camp Pendleton Well 7A2 are shown on Figure 10.2 for samples collected since the mid-1950's. The figure shows a decline between the mid-1950's and 1970, then a period of increasing concentration to levels in the 550-800 mg/l range. Three samples collected in 2000-2001 indicated total dissolved solids concentration of 753, 736 and 741 mg/l.

FIGURE 10.2

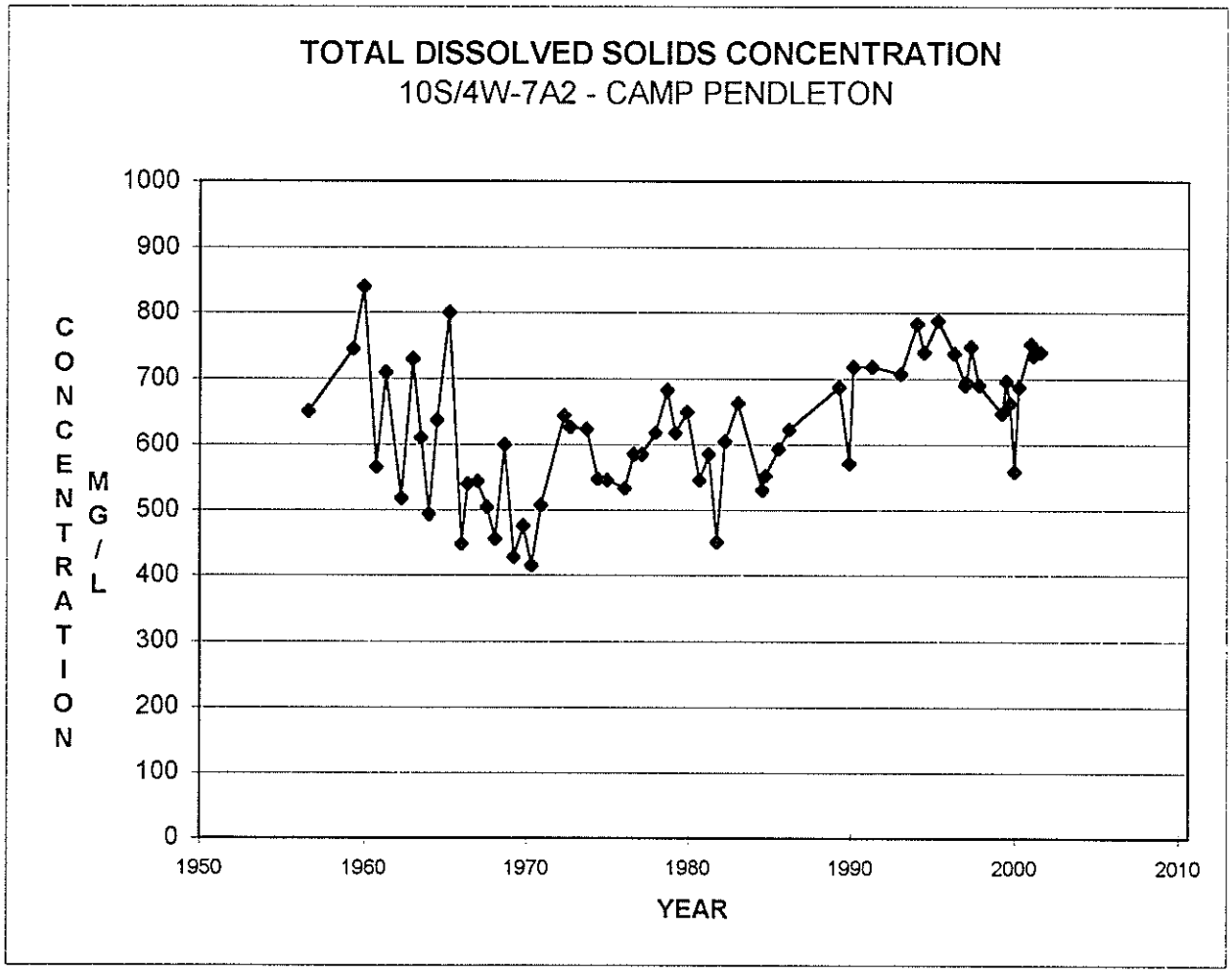

Historical nitrate concentrations for the same well (7A2) are shown on Figure 10.3. The three samples collected in 2000-2001 indicated there were no detected concentrations of Nitrate.

FIGURE 10.3

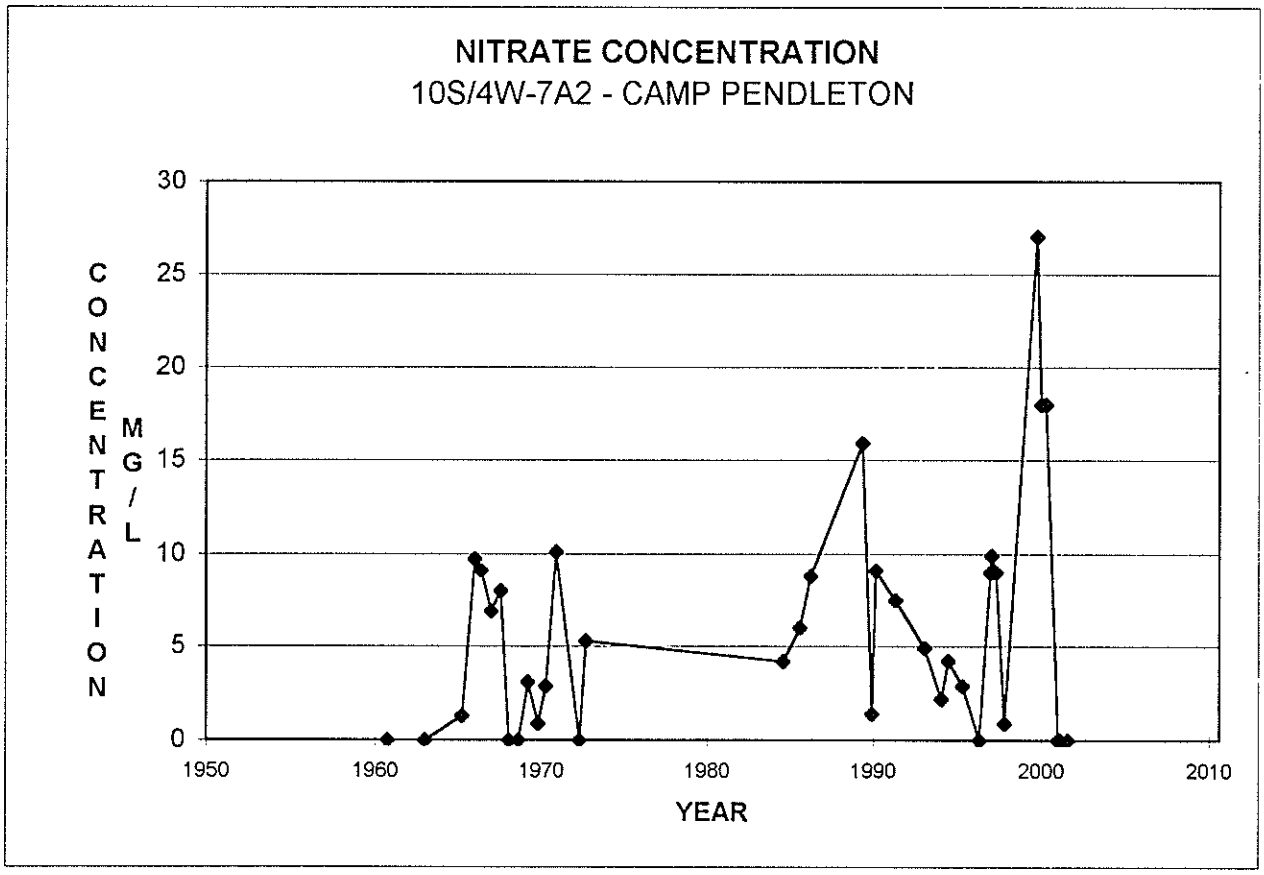

SECTION 11 - FIVE YEAR PROJECTION OF WATERMASTER OFFICE TASKS, EXPENDITURES AND REQUIREMENTS

11.1 General

Projected tasks over the next five years are listed below in two categories: normal tasks, which are part of the usual Watermaster office operation; and additional tasks, which are foreseen but are not part of the normal office operations.

11.2 Normal Tasks

Tasks that are normally part of the Watermaster Office operation are as follows:

1. Update List of Substantial Users
2. Collect Water Production, Use, Import and Availability Data
3. Collect Well Location, Construction and Water Level Data
4. Administer Water Rights
5. Collect Water Quality Data
6. Monitor Water Quality and Water Right Activities
7. Administer Lake Skinner and Diamond Valley Lake MOU's
8. Administer Steering Committee Matters
9. Prepare Court Reports/Budgets
10. Monitor Streamflow and Water Quality Measuring
11. Data Management

11.3 Additional Tasks

Tasks that have been identified but which are not part of normal operations are as follows:

1. Initiate administration of RCWD/Camp Pendleton Water Rights Settlement Agreement
2. Determine Salt Balance
3. Prepare List of All Water Users Under Court Jurisdiction
4. Prepare Inventory of Ponds and Reservoirs

11.4 Projected Expenditures

Projected expenditures for the current year and over the next five years are listed as follows:

		Projected Expenditures		
		Watermaster Office	Gaging Station	Total
Current Year	2001/2002	$169,000	$114,325	$283,325
Projected Years	2002/2003	$170,000	$117,850	$287,850
	2003/2004	$178,500	$123,700	$302,200
	2004/2005	$187,400	$129,900	$317,300
	2005/2006	$196,800	$136,400	$333,200
	2006/2007	$206,600	$143,200	$349,800

SECTION 12 - WATERMASTER OFFICE BUDGET 2002-2003

A total Watermaster Budget of $287,850 for the Water Year ending September 30, 2003, is shown below.

This budget includes $170,000 for the Watermaster Office and $117,850 for U.S.G.S. gaging station operations. The budgeted cost for gaging station operation is based on the annual renewal of an agreement between the Watermaster and the U. S. Geological Survey.

	APPROVED BUDGET CURRENT YEAR 2001-2002 $	PROPOSED BUDGET 2002-2003 $
Watermaster Office		
Rent	9,600	9,600
Accounting Services	4,000	4,000
Supplies	700	700
General Liability & Professional Insurance	3,500	3,900
Printing	1,800	1,800
Audit	2,400	2,400
Publications	2,000	2,100
Clerical/Data Management	45,000	45,000
Telephone	1,400	1,400
Miscellaneous Operating/Maintenance	800	1,000
Mileage/Travel	500	500
Office Equipment and Software	2,200	2,200
Watermaster		
Consulting Services	80,000	80,000
Automobile Expense	3,600	3,600
Travel Reimbursement	11,500	11,800
SUBTOTAL WATERMASTER OFFICE	**$ 169,000**	**$ 170,000**
USGS Gaging Station Operation and Maintenance	$ 114,325	$ 117,850
TOTAL	**$ 283,325**	**$ 287,850**

SANTA MARGARITA RIVER WATERSHED

ANNUAL WATERMASTER REPORT

WATER YEAR 2000-2001

APPENDIX A

WATER PRODUCTION AND USE

WATER YEAR 2000-2001

JULY 2002

TABLE A-1

SANTA MARGARITA RIVER WATERSHED
MONTHLY WATER PRODUCTION AND USE

EASTERN MUNICIPAL WATER DISTRICT
2000-2001
Quantities in Acre Feet

	PRODUCTION					USE						RECLAIMED WASTEWATER					
MONTH YEAR	WELLS	IMPORT 1/	EXPORT FROM SMRW	NET IMPORT	TOTAL	AG 2/	COMM	DOM 3/	TOTAL	LOSS	TOTAL USE	REUSE IN SMRW 4/	OUTSIDE SMRW REUSE	OUTSIDE SMRW OTHER EXPORT 5/	RELEASE TO RIVER	RECHARGE	TOTAL
2000																	
OCT	47	290	46	244	291	0	0	277	277	14	291	431	150	150	0	0	731
NOV	42	811	86	725	767	0	0	729	729	38	767	323	237	153	0	0	713
DEC	45	564	65	499	544	0	0	517	517	27	544	323	86	327	0	0	736
2001																	
JAN	49	(134)	(583)	449	498	0	0	474	474	24	498	362	124	233	0	0	719
FEB	45	246	889	(643)	(598)	0	0	(569)	(569)	(29)	(598)	242	54	346	0	0	642
MAR	44	702	171	531	575	0	0	545	545	30	575	265	25	461	0	0	751
APR	46	550	313	237	283	0	0	269	269	14	283	334	181	242	0	0	757
MAY	28	1,212	376	836	864	0	0	821	821	43	864	384	288	124	0	0	796
JUNE	9	1,248	462	786	795	0	0	755	755	40	795	465	293	10	0	0	768
JULY	0	1,264	437	827	827	0	0	786	786	41	827	503	546	(254)	0	0	795
AUG	0	1,456	553	903	903	0	0	858	858	45	903	487	622	(290)	0	0	819
SEPT	0	1,010	456	554	554	0	0	527	527	27	554	452	643	(294)	0	0	801
TOTAL	355	9,219	3,271	5,948	6,303	0	0	5,989	5,989	314	6,303	4,571	3,249	1,208	0	0	9,028

1/ Does not include deliveries to Rancho California Water District or Elsinore Valley Municipal Water District

2/ Figures are 95% of water pumped and imported to allow for 5% loss

3/ Figures are 95% of water pumped and imported to allow for 5% loss

4/ Includes 1,201 AF of sewage diverted to RCWD

5/ Unaccounted for Export

TABLE A-2

SANTA MARGARITA RIVER WATERSHED
MONTHLY WATER PRODUCTION AND USE

FALLBROOK PUBLIC UTILITY DISTRICT
2000-2001
Quantities in Acre Feet

	PRODUCTION							USE						WASTEWATER			
MONTH YEAR	WELLS	TOTAL DISTRICT IMPORT	DELUZ AREA IMPORT	FALLBROOK AREA IMPORT	SMRW IMPORT 1/	TOTAL SMRW IMPORT	TOTAL PRODUCTION	AG	COMM	DOM	TOTAL IN SMRW	LOSS*	TOTAL USE IN SMRW	FROM SMRW	REUSE IN SMRW	FROM U. S. N.W.S.	EXPORTED FROM SMRW
2000																	
OCT	0	1,314	310	1,004	462	772	772	508	63	336	907	(135)	772	146	0	0.50	145
NOV	0	1,062	226	836	385	611	611	356	46	203	605	6	611	159	2	0.80	157
DEC	0	1,221	222	999	459	681	681	350	44	241	635	46	681	145	2	0.48	143
2001																	
JAN	0	710	17	693	319	336	336	235	41	199	475	(139)	336	127	1	0.82	125
FEB	0	496	88	408	187	275	275	131	25	184	340	(65)	275	122	1	1.35	120
MAR	0	598	16	582	268	284	284	50	23	106	179	105	284	151	1	0.88	149
APR	0	902	163	739	340	503	503	217	38	173	428	75	503	133	2	0.47	131
MAY	0	1,479	274	1,205	554	828	828	378	51	190	619	209	828	144	3	0.45	140
JUNE	0	1,684	22	1,662	765	787	787	341	57	315	713	74	787	137	4	0.35	133
JULY	0	1,814	392	1,422	654	1,046	1,046	587	66	289	942	104	1,046	131	4	0.44	126
AUG	0	1,917	424	1,493	687	1,111	1,111	631	68	402	1,101	10	1,111	144	1	0.84	142
SEPT	0	2,052	408	1,644	756	1,164	1,164	629	72	305	1,006	158	1,164	136	3	0.59	132
TOTAL	0	15,249	2,562	12,687	5,836	8,398	8,398	4,413	594	2,943	7,950	448	8,398	1,675	24	8	1,643

1/ Approximately 46% of the Fallbrook area is within the Santa Margarita River Watershed

*Loss = Total production less total use

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TABLE A-3

SANTA MARGARITA RIVER WATERSHED
MONTHLY WATER PRODUCTION AND USE

MURRIETA COUNTY WATER DISTRICT
2000-2001
Quantities in Acre Feet

	PRODUCTION	USE					
MONTH YEAR	WELLS	AG	COMM	DOM	TOTAL DELIVERED	LOSS *	TOTAL USE
2000							
OCT	101	11	15	50	76	25	101
NOV	78	3	15	49	67	11	78
DEC	79	11	9	46	66	13	79
2001							
JAN	78	8	9	45	62	16	78
FEB	66	8	29	7	44	22	66
MAR	50	7	44	25	76	(26)	50
APR	82	8	18	34	60	22	82
MAY	110	11	23	69	103	7	110
JUNE	143	22	23	85	130	13	143
JULY	202	21	29	101	151	51	202
AUG	205	30	40	107	177	28	205
SEPT	195	23	160	95	278	(83)	195
TOTAL	1,389	163	414	713	1,290	99	1,389

* Loss = Total production less total delivered

TABLE A-4

SANTA MARGARITA RIVER WATERSHED

MONTHLY WATER PRODUCTION AND USE

RAINBOW MUNICIPAL WATER DISTRICT

2000-2001

Quantities in Acre Feet

	PRODUCTION			USE				
MONTH YEAR	LOCAL	IMPORT TO WATERSHED	TOTAL IN WATERSHED	AG	COMMERCIAL/ DOMESTIC	TOTAL DELIVERIES	LOSS*	TOTAL USE
2000								
OCT	0	197	197	159	20	179	18	197
NOV	0	134	134	107	15	122	12	134
DEC	0	120	120	95	14	109	11	120
2001								
JAN	0	147	147	117	17	134	13	147
FEB	0	59	59	43	11	54	5	59
MAR	0	51	51	36	10	46	5	51
APR	0	57	57	42	10	52	5	57
MAY	0	81	81	63	11	74	7	81
JUNE	0	169	169	135	19	154	15	169
JULY	0	264	264	215	25	240	24	264
AUG	0	252	252	207	22	229	23	252
SEPT	0	273	273	220	28	248	25	273
TOTAL	0	1,804	1,804	1,439	202	1,641	163	1,804

*Loss = 10% of use

TABLE A-5

SANTA MARGARITA RIVER WATERSHED

MONTHLY WATER PRODUCTION AND USE

RANCHO CALIFORNIA WATER DISTRICT

2000-2001

Quantities in Acre Feet

	PRODUCTION					USE										RECLAIMED WASTEWATER	
MONTH YEAR	WELLS IN GWA (1)	WELLS OUT GWA	VAIL RELEASE (2)	IMPORT	TOTAL	AG	AG/ DOM	COMM	DOM	SMR RELEASE (3)	VAIL RECHARGE	IMPORT RECHARGE	TOTAL USE	LOSS (4)	TOTAL	REUSE IN SMRW (5)	MURRIETA CREEK DISCHARGE (6)
2000																	
OCT	3,480	0	(80)	3,559	6,959	3,107	445	449	2,133	120	(80)	1,736	7,910	(951)	6,959	313	161
NOV	3,473	0	35	2,216	5,724	1,864	280	297	1,567	1	35	1,502	5,546	178	5,724	295	172
DEC	3,352	0	0	2,189	5,541	2,604	360	351	1,644	3	0	1,303	6,265	(724)	5,541	319	167
2001																	
JAN	2,644	0	0	2,553	5,197	1,900	270	205	1,336	1	0	2,038	5,750	(553)	5,197	309	148
FEB	1,786	0	0	1,755	3,541	805	142	215	1,220	3	0	1,668	4,053	(512)	3,541	270	159
MAR	2,508	0	0	2,086	4,594	179	49	159	779	0	0	1,976	3,142	1,452	4,594	316	160
APR	3,084	0	0	2,347	5,431	1,250	178	193	1,131	1	0	1,728	4,481	950	5,431	302	150
MAY	4,730	0	(147)	3,245	7,828	2,453	361	305	1,557	63	(147)	1,220	5,812	2,016	7,828	304	181
JUNE	5,011	0	42	4,835	9,888	3,955	583	420	2,750	68	42	1,278	9,096	792	9,888	309	172
JULY	4,110	0	(90)	5,593	9,613	3,940	578	475	2,689	64	(90)	1,196	8,852	761	9,613	322	189
AUG	3,875	0	(76)	5,855	9,654	3,835	574	449	2,748	109	(76)	1,162	8,801	853	9,654	336	172
SEPT	4,073	0	(45)	5,590	9,618	4,490	707	537	3,310	81	(45)	1,273	10,353	(735)	9,618	324	184
TOTAL	42,126	0	(361)	41,823	83,588	30,382	4,527	4,055	22,864	514	(361)	18,080	80,061	3,527	83,588	3,719	2,015

1/ Wells recovered 25,393 AF from older alluvium, 238 AF from Vail recharge, and 16,495 from Direct Import Recharge
2/ Vail releases and the related Vail recharge are computed as Total Release less Inflow to be bypassed
2/ 5 AF into Temecula Creek from Well 231; 34 AF into Murrieta Creek from Wells 108, 118 & 121; and 475 AF from System River Meter
4/ Loss = Total production less total use
5/ Does not include EMWD reclaimed wastewater production
6/ Discharge from 2 MGD Demonstration Project

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TABLE A-6

SANTA MARGARITA RIVER WATERSHED
MONTHLY WATER PRODUCTION AND USE

U.S.M.C. - CAMP PENDLETON
2000-2001
Quantities in Acre Feet

	PRODUCTION			USE						RECLAIMED WASTEWATER		
MONTH YEAR	AG LOCAL	CAMP SUPPLY	TOTAL	AGRICULTURE 1/ IN SMRW	AGRICULTURE 1/ OUT SMRW	CAMP SUPPLY 2/ IN SMRW	CAMP SUPPLY 2/ OUT SMRW	TOTAL EXPORT	TOTAL 3/ IN SMRW	RECHARGED IN SMRW 4/	IMPORT 5/ RECHARGED IN SMRW	TOTAL RECHARGED IN SMRW
2000												
OCT	159	462	621	62	97	201	261	358	263	87	200	287
NOV	24	401	425	10	14	174	227	241	184	83	183	266
DEC	16	394	410	6	10	174	220	230	180	85	162	247
2001												
JAN	13	377	390	5	8	165	212	220	170	94	151	245
FEB	0	304	304	0	0	132	172	172	132	93	148	241
MAR	0	348	348	0	0	152	196	196	152	94	171	265
APR	0	380	380	0	0	160	220	220	160	87	156	243
MAY	32	439	471	12	20	189	250	270	201	87	172	259
JUNE	121	477	598	47	74	205	272	346	252	87	171	258
JULY	198	588	786	77	121	253	335	456	330	94	193	287
AUG	233	614	847	91	142	264	350	492	355	88	193	281
SEPT	229	557	786	89	140	245	312	452	334	86	175	261
TOTAL	1,025	5,341	6,366	399	626	2,314	3,027	3,653	2,713	1,065	2,075	3,140

1/ Agricultural water use is divided with 39% used inside the SMRW and 61% used outside

2/ Camp Supply water use inside the SMRW equals 44% of sum of Camp Supply production plus Naval Weapons Station Import, minus the NWS Import (SMRW CS = .44 {CS+NWS Imp} - NWS Imp.)

3/ Assumes no losses

4/ Discharge from Plant Nos. 3 plus 8 plus 29.17 acre feet per month from Plant No. 13

5/ Discharge from Plant No. 1, plus discharge from Pond 2, plus excess of Plant No. 13 over 29.17 acre feet per month

TABLE A-7

SANTA MARGARITA RIVER WATERSHED
MONTHLY WATER PRODUCTION AND USE

U. S. NAVAL WEAPONS STATION, FALLBROOK ANNEX

2000-2001

Quantities in Acre Feet

	PRODUCTION			USE				WASTEWATER
MONTH YEAR	LOCAL	IMPORT TO WATERSHED 1/	TOTAL	AG	COMMERCIAL/ DOMESTIC	LOSS 2/	TOTAL USE	EXPORTED
2000								
OCT	0.0	4.8	4.8	0.0	4.4	0.4	4.8	0.5
NOV	0.0	3.9	3.9	0.0	3.5	0.4	3.9	0.8
DEC	0.0	4.0	4.0	0.0	3.6	0.4	4.0	0.5
2001								
JAN	0.0	3.3	3.3	0.0	3.0	0.3	3.3	0.8
FEB	0.0	2.2	2.2	0.0	2.0	0.2	2.2	1.4
MAR	0.0	3.0	3.0	0.0	2.7	0.3	3.0	0.9
APR	0.0	2.8	2.8	0.0	2.5	0.3	2.8	0.5
MAY	0.0	12.1	12.1	0.0	11.0	1.1	12.1	0.5
JUNE	0.0	8.3	8.3	0.0	7.5	0.8	8.3	0.4
JULY	0.0	8.7	8.7	0.0	7.9	0.8	8.7	0.4
AUG	0.0	9.7	9.7	0.0	8.8	0.9	9.7	0.8
SEPT	0.0	10.4	10.4	0.0	9.5	0.9	10.4	0.6
TOTAL	0.0	73.2	73.2	0.0	66.5	6.7	73.2	8.0

1/ - Import via Fallbrook Public Utility District

2/ - Loss = 10% of Use

TABLE A-8

SANTA MARGARITA RIVER WATERSHED

MISCELLANEOUS WATER PRODUCTION AND IMPORTS

2000-2001

Quantities in Acre Feet

	IMPORT	PRODUCTION					
MONTH YEAR	WESTERN MWD IMPORTS TO IMPROVEMENT DISTRICT A	ANZA MUTUAL WATER COMPANY	OUTDOOR RESORTS RANCHO CALIFORNIA, INC.	BUTTERFIELD OAKS MOBILE HOME PARK	LAKE RIVERSIDE ESTATES	PECHANGA INDIAN RESERVATION	JOJOBA HILLS SKP RESORT
2000							
OCT	4.70	4.00	2.83	0.18	12.10	25.05	3.53
NOV	3.40	6.00	2.28	0.19	14.12	23.06	3.07
DEC	4.00	7.00	2.62	0.15	12.25	22.73	3.83
2001							
JAN	4.10	1.00	2.63	0.07	6.08	19.03	4.02
FEB	4.30	1.00	3.26	0.07	0.00	22.82	4.19
MAR	3.10	1.00	2.76	0.14	12.12	24.24	4.46
APR	2.90	1.00	3.12	0.15	10.60	26.04	6.18
MAY	4.80	3.00	6.70	0.14	19.35	24.12	7.21
JUNE	6.50	5.00	7.76	0.21	18.11	26.92	7.19
JULY	6.20	4.00	2.64	0.29	35.76	24.26	9.72
AUG	6.90	7.00	8.08	0.29	100.68	27.83	10.59
SEPT	7.80	5.00	5.96	0.22	33.08	24.90	10.88
SUBTOTAL			50.64	2.10		291.00	
			158.00 *	7.50 *		4.00 **	
TOTAL	58.70	45.00	208.64	9.60	274.25	295.00	74.87

E - Estimate

* Estimated non-metered use

** Surface Diversion

SANTA MARGARITA RIVER WATERSHED

ANNUAL WATERMASTER REPORT

WATER YEAR 2000-2001

APPENDIX B

WATER PRODUCTION AND USE

WATER YEAR 1965-66 TO WATER YEAR 2000-2001

JULY 2002

TABLE B-1

SANTA MARGARITA RIVER WATERSHED
ANNUAL WATER PRODUCTION AND USE

EASTERN MUNICIPAL WATER DISTRICT

Quantities in Acre Feet

	PRODUCTION					USE						RECLAIMED WASTEWATER					
WATER YEAR	WELLS	IMPORT 1/	EXPORT FROM SMRW	NET IMPORT	TOTAL	AG 2/	COMM	DOM 3/	TOTAL	LOSS	TOTAL USE	REUSE IN SMRW	OUTSIDE SMRW REUSE	OUTSIDE SMRW OTHER EXPORT 4/	RELEASE TO RIVER	RECHARGE	TOTAL
1966	0	1,604	0	1,604	1,604	1,520	0	4	1,524	80	1,604	0	0		0	100	100
1967	0	1,630	0	1,630	1,630	1,544	0	4	1,548	82	1,630	0	0		0	100	100
1968	0	1,464	0	1,464	1,464	1,386	0	5	1,391	73	1,464	0	0		0	100	100
1969	0	1,741	0	1,741	1,741	1,648	0	6	1,654	87	1,741	0	0		0	100	100
1970	0	1,417	0	1,417	1,417	1,340	0	7	1,346	71	1,417	0	0		0	101	101
1971	0	1,383	0	1,383	1,383	1,306	0	8	1,314	69	1,383	0	0		0	119	119
1972	0	1,470	0	1,470	1,470	1,388	0	8	1,396	74	1,470	0	0		0	242	242
1973	0	1,533	0	1,533	1,533	1,447	0	10	1,456	77	1,533	0	0		0	217	217
1974	0	1,601	0	1,601	1,601	1,511	0	10	1,521	80	1,601	0	0		0	193	193
1975	0	1,969	0	1,969	1,969	1,859	0	11	1,871	98	1,969	0	0		0	253	253
1976	145	2,493	0	2,493	2,638	2,356	0	150	2,506	132	2,638	134	0		0	155	289
1977	431	2,947	0	2,947	3,378	2,723	64	423	3,209	169	3,378	244	0		0	70	314
1978	375	2,551	0	2,551	2,926	2,409	0	371	2,780	146	2,926	300	0		0	75	375
1979	289	1,894	0	1,894	2,183	1,784	0	290	2,074	109	2,183	350	0		0	147	497
1980	281	1,192	0	1,192	1,473	1,116	0	283	1,399	74	1,473	375	0		0	220	595
1981	282	716	0	716	998	663	0	285	948	50	998	375	0		0	304	679
1982	321	1,112	0	1,112	1,433	1,038	0	323	1,361	72	1,433	375	0		0	386	761
1983	106	1,211	0	1,211	1,317	1,131	0	120	1,251	66	1,317	375	0		0	466	841
1984	236	699	0	699	935	644	0	244	888	47	935	400	0		0	525	925
1985	314	679	0	679	993	624	0	319	943	50	993	450	0		0	565	1,015
1986	229	760	0	760	989	700	0	239	940	49	989	600	0		0	509	1,109
1987	89	1,155	0	1,155	1,244	638	0	543	1,182	62	1,244	650	0		0	554	1,204
1988	4	2,047	0	2,047	2,051	524	0	1,424	1,948	103	2,051	650	0		0	650	1,300
1989	685	3,746	0	3,746	4,431	1,146	0	3,064	4,209	222	4,431	1,058	0		0	1,636	2,694
1990	492	8,578	2,977	5,601	6,093	978	0	4,810	5,788	305	6,093	1,567	0		0	2,160	3,727
1991	456	16,621	7,142	9,479	9,935	851	0	8,587	9,438	497	9,935	1,282	0		0	2,272	3,554
1992	527	13,486	4,893	8,593	9,120	29	0	8,635	8,664	456	9,120	1,323	0		245	2,385	3,953
1993	524	7,287	1,894	5,393	5,917	36	0	5,585	5,621	296	5,917	1,709	990	(285)	192	2,020	4,626
1994	232	10,082	2,932	7,150	7,382	0	0	7,013	7,013	369	7,382	2,687	2,465	694	0	0	5,846
1995	182	11,539	6,914	4,625	4,807	16	0	4,551	4,567	240	4,807	2,154	1,357	2,551	0	0	6,062
1996	299	11,730	6,770	4,960	5,259	0	0	4,996	4,996	263	5,259	2,979	2,473	520	0	0	5,972
1997	408	5,093	1,809	3,284	3,692	0	0	5,226	5,226	(1,534)	3,692	3,126	2,319	882	0	0	6,327
1998	240	6,609	1,492	5,117	5,357	0	0	5,090	5,090	267	5,357	2,949 5/	2,139	2,374	0	0	7,462
1999	669	7,118	2,719	4,327	4,996	0	0	4,746	4,746	250	4,996	3,741 6/	3,070	1,063	0	0	7,874
2000	630	9,179	1,923	7,256	7,886	0	0	7,493	7,493	393	7,886	4,669 7/	3,664	(15)	0	0	8,318
2001	355	9,219	3,271	5,948	6,303	0	0	6,274	6,274	29	6,303	4,571 8/	3,249	1,208	0	0	9,028

1/ Does not include deliveries to Rancho California Water District or Elsinore Valley Municipal Water District

2/ Figures are 95% of water pumped and imported to allow for 5% loss

3/ Figures are 95% of water pumped and imported to allow for 5% loss

4/ Unaccounted for Export

5/ Includes 905 AF of sewage diverted to RCWD

6/ Includes1,159 AF of sewage diverted to RCWD

7/ Includes1,162 AF of sewage diverted to RCWD

8/ Includes1,201 AF of sewage diverted to RCWD

TABLE B-2

SANTA MARGARITA RIVER WATERSHED

ANNUAL WATER PRODUCTION AND USE

FALLBROOK PUBLIC UTILITY DISTRICT

Quantities in Acre Feet

	PRODUCTION							USE				
WATER YEAR	WELLS	TOTAL DISTRICT IMPORT	DELUZ AREA IMPORT	FALLBROOK AREA IMPORT	FALLBROOK SMRW IMPORT 1/	TOTAL SMRW IMPORT	TOTAL PRODUCTION	AG	COMM/ DOM	TOTAL IN SMRW	LOSS /2	TOTAL USE IN SMRW
1966	176	11,169	0	11,169	3,351	3,351	3,404	2,735	328	3,063	341	3,404
1967	16	9,508	0	9,508	2,852	2,852	2,857	2,253	319	2,572	285	2,857
1968	13	11,411	0	11,411	3,423	3,423	3,427	2,554	531	3,085	342	3,427
1969	178	9,458	0	9,458	2,837	2,837	2,891	1,787	814	2,601	290	2,891
1970	305	11,794	0	11,794	3,538	3,538	3,630	2,649	617	3,266	364	3,630
1971	7	11,350	0	11,350	3,405	3,405	3,407	2,386	681	3,067	340	3,407
1972	0	13,054	0	13,054	3,916	3,916	3,916	2,749	775	3,524	392	3,916
1973	0	10,610	38	10,572	3,172	3,210	3,210	2,156	732	2,888	322	3,210
1974	0	12,911	134	12,777	3,833	3,967	3,967	2,703	868	3,571	396	3,967
1975	0	11,492	213	11,279	3,384	3,597	3,597	2,420	816	3,236	361	3,597
1976	0	13,147	431	12,716	4,196	4,627	4,627	3,200	965	4,165	462	4,627
1977	20	13,435	587	12,848	4,625	5,212	5,232	3,536	1,174	4,710	522	5,232
1978	97	12,626	651	11,975	4,551	5,202	5,299	3,504	1,265	4,769	530	5,299
1979	187	12,865	961	11,904	4,762	5,723	5,910	3,820	1,498	5,318	592	5,910
1980	192	13,602	1,191	12,411	5,213	6,404	6,596	4,258	1,678	5,936	660	6,596
1981	87	16,878	1,994	14,884	6,549	8,543	8,630	5,688	2,144	7,832	798	8,630
1982	0	13,270	1,805	11,465	5,274	7,079	7,079	4,614	1,862	6,476	603	7,079
1983	0	12,298	1,969	10,329	4,751	6,720	6,720	4,320	1,871	6,191	529	6,720
1984	0	15,429	2,609	12,820	5,897	8,506	8,506	5,814	2,077	7,891	615	8,506
1985	0	14,256	2,358	11,898	5,473	7,831	7,831	5,187	2,135	7,322	509	7,831
1986	0	15,383	2,794	12,589	5,791	8,585	8,585	5,698	2,319	8,017	568	8,585
1987	0	15,313	2,986	12,327	5,670	8,656	8,656	5,793	2,281	8,074	582	8,656
1988	28	14,460	2,559	11,901	5,474	8,033	8,061	5,181	2,348	7,529	532	8,061
1989	94	16,179	3,007	13,172	6,059	9,066	9,160	5,620	2,706	8,326	834	9,160
1990	15	17,568	3,745	13,823	6,358	10,103	10,118	6,275	2,878	9,153	965	10,118
1991	46	13,939	2,871	11,068	5,091	7,962	8,008	5,146	2,314	7,460	548	8,008
1992	45	13,698	2,950	10,748	4,943	7,893	7,938	5,285	2,201	7,486	452	7,938
1993	86	12,695	2,010	10,685	4,915	6,925	7,011	4,329	2,349	6,678	333	7,011
1994	83	13,124	2,246	10,878	5,004	7,250	7,333	4,282	2,666	6,948	385	7,333
1995	3	11,620	2,208	9,412	4,330	6,538	6,541	3,818	2,798	6,316	225	6,541
1996	0	14,168	2,733	11,435	5,260	7,993	7,993	4,411	3,247	7,658	335	7,993
1997	0	14,005	2,688	11,317	5,206	7,894	7,894	4,351	3,249	7,600	294	7,894
1998	0	11,757	1,803	9,954	4,579	6,382	6,382	3,245	2,798	6,043	339	6,382
1999	0	14,307	1,572	12,735	5,858	7,430	7,430	3,748	3,271	7,019	411	7,430
2000	0	15,983	2,705	14,478	6,660	9,365	9,365	5,138	3,903	9,041	324	9,365
2,001	0	15,249	2,562	12,687	5,836	8,398	8,398	4,413	3,537	7,950	448	8,398

/1 Total SMRW production equals SMRW Import plus 30% local (1966-1971)

/2 Loss = Total production less total use (Neglects change in Storage at Red Mtn After 1985)

TABLE B-3

SANTA MARGARITA RIVER WATERSHED

ANNUAL WASTEWATER PRODUCTION AND DISTRIBUTION

FALLBROOK PUBLIC UTILITY DISTRICT

Quantities in Acre Feet

WATER YEAR	TOTAL WASTEWATER PRODUCTION	PERCENT WASTEWATER FROM SMRW	WASTEWATER FROM SMRW	WASTEWATER REUSED IN SMRW	WASTEWATER FROM U.S.N.W.S.	WASTEWATER EXPORTED FROM SMRW	PERCENT WASTEWATER FROM SLR WATERSHED 1/	WASTEWATER IMPORTED FROM SLR WATERSHED
1966	395	81	320		0	0	19	75
1967	460	80	368		0	0	20	92
1968	524	80	419		0	0	20	105
1969	588	79	465		0	0	21	123
1970	652	78	509		0	0	22	143
1971	717	78	559		0	0	22	158
1972	782	77	602		0	0	23	180
1973	847	76	644		0	0	24	203
1974	912	75	684		0	0	25	228
1975	976	75	732		0	0	25	244
1976	1,040	74	770		0	0	26	270
1977	1,105	73	807		0	0	27	298
1978	1,170	72	842		0	0	28	328
1979	1,234	72	888		0	0	28	346
1980	1,298	71	922		0	0	29	376
1981	1,363	70	954		0	0	30	409
1982	1,428	69	985		0	0	31	443
1983	1,492	69	1,029		26 E	1,003	0	0
1984	1,556	68	1,058		26 E	1,032	0	0
1985	1,621	67	1,086		26 E	1,060	0	0
1986	1,685	66	1,112		18 P	1,094	0	0
1987	1,750	66	1,155		27	1,128	0	0
1988	1,815	65	1,180		25	1,155	0	0
1989	1,881	64	1,204		22	1,182	0	0
1990	1,952	66	1,298		27	1,271	0	0
1991	1,622	60	973		11	962	0	0
1992	1,730	63	1,090		7	1,083	0	0
1993	2,051	62	1,271		16	1,255	0	0
1994	1,834	58	1,073		5	1,068	0	0
1995	1,941	60	1,165		12	1,153	0	0
1996	1,799	58	1,040		5	1,035	0	0
1997	1,780	58	1,027		6	1,021	0	0
1998	2,297	65	1,490		8	1,482	0	0
1999	2,175	64	1,382		5	1,377	0	0
2000	2,164	76	1,641		7	1,634	0	0
2001	2,191	76	1,675	24	8	1,643	0	0

NOTE: Measured quantities available for Total Wastewater in Water Year 1969 and July 1989
All other quantities are estimated (1966 - 1989). Prior to 1983, Wastewater was discharged into Fallbrook Creek. After 1983, Wastewater is discharged into an ocean outfall.

1/ - San Luis Rey Watershed
E - Estimated
P - Partial Year Data

TABLE B-4

SANTA MARGARITA RIVER WATERSHED
ANNUAL WATER PRODUCTION AND USE

MURRIETA COUNTY WATER DISTRICT

Quantities in Acre Feet

	PRODUCTION	USE					
WATER YEAR	WELLS	AG	COMM	DOM	TOTAL DELIVERED	LOSS *	TOTAL USE
1966	41	0	0	37	37	4	41
1967	45	0	0	41	41	4	45
1968	54	0	0	49	49	5	54
1969	54	0	0	49	49	5	54
1970	73	0	0	66	66	7	73
1971	83	3	0	72	75	8	83
1972	111	10	0	91	101	10	111
1973	92	11	0	72	84	8	92
1974	132	14	0	107	120	12	132
1975	153	18	0	121	139	14	153
1976	117	22	0	84	106	11	117
1977	170	21	0	134	155	15	170
1978	169	19	0	135	154	15	169
1979	197	19	0	160	179	18	197
1980	218	20	0	178	198	20	218
1981	265	30	0	211	241	24	265
1982	230	21	0	188	209	21	230
1983	216	14	0	182	196	20	216
1984	304	26	0	250	276	28	304
1985	308	19	0	261	280	28	308
1986	305	22	0	255	277	28	305
1987	326	23	0	273	296	30	326
1988	303	13	35	262	275	28	303
1989	286	11	72	262	344	(4)	340
1990	465	13	76	266	355	110	465
1991	459	15	88	250	353	106	459
1992	492	6	122	302	430	62	492
1993	508	4	105	323	432	76	508
1994	512	10	103	324	437	75	512
1995	521	12	86	312	420	101	521
1996	629	88	110	373	571	58	629
1997	638	76	96	379	551	87	638
1998	603	79	87	349	515	88	603
1999	827	79	125	548	752	75	827
2000	1,123	199	365	493	1,057	66	1,123
2001	1,389	163	414	713	1,290	99	1,389

* Loss = Total production less total delivered

TABLE B-5

SANTA MARGARITA RIVER WATERSHED
ANNUAL WATER PRODUCTION AND USE

RAINBOW MUNICIPAL WATER DISTRICT
Quantities in Acre Feet

	PRODUCTION			USE				
WATER YEAR	LOCAL	IMPORT TO DISTRICT	TOTAL IN WATERSHED 1/	AG 2/	COMMERCIAL DOMESTIC 3/	TOTAL DELIVERIES	LOSS 4/	TOTAL USE
1966	0	14,538	1,308	1,049	140	1,189	119	1,308
1967	0	12,167	1,095	878	117	995	100	1,095
1968	0	15,301	1,377	1,104	147	1,252	125	1,377
1969	0	13,917	1,253	1,005	134	1,139	114	1,252
1970	0	18,764	1,689	1,354	181	1,535	154	1,689
1971	0	18,338	1,650	1,324	177	1,500	150	1,650
1972	0	22,633	2,037	1,634	218	1,852	185	2,037
1973	0	17,955	1,616	1,296	173	1,469	147	1,616
1974	0	22,768	2,049	1,643	219	1,863	186	2,049
1975	0	13,856	1,247	1,000	133	1,134	113	1,247
1976	0	24,878	2,239	1,796	240	2,035	204	2,239
1977	0	26,038	2,343	1,879	251	2,130	213	2,343
1978	0	24,312	2,188	1,755	234	1,989	199	2,188
1979	0	26,084	2,348	1,883	251	2,134	213	2,347
1980	0	27,660	2,489	1,997	266	2,263	226	2,489
1981	0	35,036	3,153	2,529	337	2,866	287	3,153
1982	0	27,334	2,460	1,973	263	2,236	224	2,460
1983	0	24,957	2,190	1,735	256	1,991	199	2,190
1984	0	32,526	3,068	2,483	306	2,789	279	3,068
1985	0	28,612	3,410	2,798	302	3,100	310	3,410
1986	0	29,023	2,945	2,353	324	2,677	268	2,945
1987	0	29,449	3,390	2,765	317	3,082	308	3,390
1988	0	29,070	2,985	2,372	342	2,714	271	2,985
1989	0	32,034	3,003	2,385	345	2,730	273	3,003
1990	0	34,612	3,818	3,003	468	3,471	347	3,818
1991	0	27,754	2,904	2,276	364	2,640	264	2,904
1992	0	26,056	2,277	1,877	193	2,070	207	2,277
1993	0	23,766	1,965	1,655	132	1,787	178	1,965
1994	0	22,173	1,651	1,368	133	1,501	150	1,651
1995	0	20,935	1,661	1,398	112	1,510	151	1,661
1996	0	24,835	1,815	1,487	163	1,650	165	1,815
1997	0	24,638	1,429	1,139	160	1,299	130	1,429
1998	0	19,693	1,601	1,315	141	1,456	145	1,601
1999	0	24,961	1,727	1,411	159	1,570	157	1,727
2000	0	30,446	2,217	1,861	154	2,015	202	2,217
2001	0	27,214	1,804	1,439	202	1,641	163	1,804

1/ 1966 through 1982 estimated to be 9% of total district imports

2/ 1966 through 1982 estimated to be 80.2% of total deliveries to watershed

3/ 1966 through 1982 estimated to be 10.7% of total deliveries to watershed

4/ Loss = 10% of use

TABLE B-6

SANTA MARGARITA RIVER WATERSHED

ANNUAL WATER PRODUCTION AND USE

RANCHO CALIFORNIA WATER DISTRICT

Quantities in Acre Feet

	PRODUCTION						USE										RECLAIMED WASTEWATER	
YEAR	WELLS IN GWA	WELLS OUT GWA	VAIL RELEASE	VAIL IRRIGATION 1/	IMPORT	TOTAL 2/	AG	AG/DOM	COMM	DOM	SMR RELEASE	VAIL RECHARGE	IMPORT RECHARGE	TOTAL USE	LOSS 3/	TOTAL	REUSE IN SMRW	MURRIETA CREEK DISCHARGE 4/
1966		0	0	185 *	0	185						0	0					
1967	4,288	0	0	1,136 *	0	5,424						0	0			5,424	0	0
1968	5,100	0	0	398 *	0	5,498						0	0			5,498	0	0
1969	3,617	0	0	697 *	0	4,314						0	0			4,314	0	0
1970	6,721	0	0	840 *	0	7,561						0	0			7,561	0	0
1971	7,960	0	0	1,541 *	0	9,501						0	0			9,501	0	0
1972	8,369	0	0	203 *	0	8,572						0	0			8,572	0	0
1973	7,726	0	0	524 *	0	8,250						0	0			8,250	0	0
1974	10,163	0	0	1,066 *	0	11,229						0	0			11,229	0	0
1975	10,357	0	0	369 *	0	10,726						0	0			10,726	0	0
1976	11,809	0	0	50 *	119	11,978						0	0			11,978	0	0
1977	10,522	0	0	0	1,845	12,367						0	0			12,367	0	0
1978	8,930	0	0	0	5,774	14,704						0	0			14,704	0	0
1979	11,371	0	0	0	7,009	18,380						0	0			18,380	0	0
1980	12,621	0	10,944	0	10,126	33,691						10,944	0			33,691	0	0
1981	15,612	0	6,802	0	15,282	37,696						6,802	0			37,696	0	0
1982	12,631	0	6,058	0	13,378	32,067						6,058	0			32,067	0	0
1983	16,577	98	12,113	715	5,752	35,255						12,113	0			35,255	0	0
1984	25,660	4	6,612	1,144	6,716	40,136						6,612	0			40,136	0	0
1985	24,373	0	5,027	1,201	7,158	37,759						5,027	0			37,759	0	0
1986	26,997	0	8,722	1,053	11,174	47,946						8,722	0			47,946	0	0
1987	33,735	0	8,089	273	7,564	49,661						8,089	0			49,661	48	0
1988	21,367	0	4,844	0	17,854	44,065						4,844	0			44,065	82	0
1989	26,131	0	0	0	22,895	49,026	25,533		3,316	13,198	852	0	2,294	45,193	3,833	49,026	168	0
1990	33,241	0	0	0	22,030	55,271	27,643		3,940	14,916	902	0	0	47,401	7,870	55,271	133	0
1991	26,503	0	6,253	0	21,238	53,994	32,924		2,941	10,603	785	6,253	701	54,207	(213)	53,994	352	0
1992	29,968	0	2,244	0	16,931	49,143	30,651		2,406	9,672	683	2,244	0	45,656	3,487	49,143	374	0
1993	31,029	0	31,704	0	11,411	74,144	29,265		2,141	10,618	519	31,704	0	74,247	(103)	74,144	378	0
1994	32,725	0	8,469	0	16,386	57,580	32,534		2,322	12,370	467	8,469	0	56,162	1,418	57,580	1,936	0
1995	33,111	0	11,158	0	15,108	59,377	31,081		2,526	13,779	1,464	11,158	0	60,008	(631)	59,377	1,753	0
1996	36,086	0	9,427	0	23,600	69,113	35,912		2,752	16,330	2,149	9,427	0	66,570	2,543	69,113	2,264	0
1997	35,131	0	1,725	0	26,992	63,848	38,287		3,350	18,635	2,978	1,725	1,315	66,290	(2,442)	63,848	693 *(5)*	0
1998	31,846	0	4,514	0	19,584	55,944	28,307		2,805	16,273	459	4,514	2,785	55,143	801	55,944	1,376 *(5)*	1,179
1999	37,737	0	1,010	0	34,490	73,237	37,157		3,674	19,310	1,044	1,010	9,425	71,620	1,617	73,237	1,524 *(5)*	1,654
2000	39,859	0	(49)	0	55,409	95,219	40,672	3,339	2,162	23,783	1,067	(49)	19,929	90,903	4,316	95,219	3,550 *(5)*	1,854
2001	42,126	0	(361)	0	41,823	83,588	30,382	4,527	4,055	22,864	514	(361)	18,080	80,061	3,527	83,588	3,719 *(5)*	2,015

1/ Figures from 1966 to 1972 supplied by USGS; 1972 to 2001 supplied by RCWD

2/ Total production = Wells, Total Diversions and Import

3/ Loss = Total production less total use

4/ Discharge from 2MGD Demonstration Project

5/ Does not include EMWD reclaimed wastewater production

* - Irrigation 1966 to 1976 by pumping from Vail Lake

012797

TABLE B-7

SANTA MARGARITA RIVER WATERSHED
ANNUAL WATER PRODUCTION AND USE

U.S.M.C. - CAMP PENDLETON
EXCLUDING NAVAL WEAPONS STATION SHOWN ON B-8

Quantities in Acre Feet

	PRODUCTION			USE						RECLAIMED WASTEWATER		
WATER YEAR	AG LOCAL	CAMP SUPPLY	TOTAL	AGRICULTURE 1/ IN SMRW	AGRICULTURE 1/ OUT SMRW	CAMP SUPPLY 2/ IN SMRW	CAMP SUPPLY 2/ OUT SMRW	TOTAL EXPORT	TOTAL 3/ IN SMRW	RECHARGED IN-SMR 4/	IMPORT 5/ RECHARGED IN SMRW	TOTAL RECHARGED IN SMRW
1966	1,101	4,605	5,706	429	672	2,026	2,579	3,251	2,455	919	974	1,893
1967	796	4,811	5,607	310	486	2,117	2,694	3,180	2,427	914	1,243	2,156
1968	986	4,939	5,925	385	601	2,172	2,767	3,368	2,557	866	1,214	2,080
1969	940	4,821	5,761	367	573	2,058	2,763	3,276	2,485	1,019	1,170	2,189
1970	1,106	5,481	6,587	431	675	2,347	3,134	3,809	2,778	1,032	1,113	2,145
1971	819	5,291	6,110	319	500	2,264	3,028	3,527	2,583	921	1,090	2,011
1972	817	5,323	6,140	319	498	2,278	3,045	3,543	2,597	900	1,168	2,068
1973	1,003	5,121	6,124	391	612	2,189	2,932	3,544	2,580	949	1,187	2,137
1974	909	5,202	6,111	355	554	2,224	2,978	3,532	2,579	915	1,140	2,055
1975	757	4,593	5,350	295	462	1,957	2,636	3,098	2,252	989	1,530	2,519
1976	885	5,384	6,269	345	540	2,305	3,079	3,619	2,650	949	1,497	2,447
1977	994	4,506	5,500	388	606	1,918	2,588	3,194	2,306	942	1,416	2,358
1978	176	5,177	5,353	69	107	2,213	2,964	3,071	2,282	1,164	1,283	2,446
1979	1,070	7,213	8,283	417	653	3,109	4,104	4,756	3,527	1,065	1,427	2,493
1980	835	5,495	6,330	326	509	2,353	3,142	3,651	2,679	1,101	1,405	2,506
1981	1,464	5,240	6,704	571	893	2,241	2,999	3,892	2,812	1,119	1,249	2,368
1982	1,447	5,024	6,471	564	883	2,146	2,878	3,761	2,710	982	1,273	2,254
1983	942	4,215	5,157	367	575	1,790	2,425	3,000	2,157	1,252	1,242	2,494
1984	1,078	4,501	5,579	420	658	1,916	2,585	3,243	2,336	1,323	1,120	2,443
1985	1,069	4,764	5,833	417	652	2,039	2,725	3,377	2,456	1,419	1,200	2,619
1986	953	4,807	5,760	372	581	2,062	2,745	3,326	2,434	1,259	981	2,240
1987	1,098	4,838	5,936	428	670	2,064	2,774	3,444	2,492	1,367	1,799	3,166
1988	1,223	4,721	5,944	477	746	2,010	2,711	3,457	2,487	1,523	1,872	3,396
1989	856	5,044	5,900	334	522	2,148	2,896	3,418	2,482	1,301	1,446	2,747
1990	855	4,228	5,083	333	522	1,779	2,449	2,971	2,112	1,277	1,451	2,728
1991	554	3,159	3,713	216	338	1,329	1,830	2,168	1,545	1,070	1,219	2,289
1992	898	3,254	4,152	350	548	1,376	1,878	2,426	1,726	933	1,548	2,481
1993	1,067	2,879	3,946	416	651	1,201	1,678	2,329	1,617	1,049	1,926	2,975
1994	1,471	3,150	4,621	574	897	1,345	1,805	2,702	1,919	1,034	1,501	2,535
1995	985	3,768	4,753	384	601	1,588	2,180	2,781	1,972	980	1,473	2,453
1996	1,000	5,199	6,199	390	610	2,232	2,967	3,577	2,622	951	1,493	2,444
1997	1,066	5,238	6,304	416	650	2,244	2,994	3,644	2,660	988	1,932	2,920
1998	1,026	5,468	6,494	400	626	2,352	3,116	3,742	2,752	935	2,073	3,008
1999	1,064	5,054	6,118	415	649	2,145	2,909	3,558	2,560	893	2,130	3,023
2000	1,296	5,765	7,061	506	790	2,483	3,282	4,072	2,989	1,036	2,116	3,152
2001	1,025	5,341	6,366	399	626	2,314	3,027	3,653	2,713	1,065	2,075	3,140

1/ Agricultural water use is divided with 39% used inside the SMRW and 61% used outside.

2/ Camp Supply water use inside the SMRW equals 44% of sum of Camp Supply production plus Naval Weapons Station Import, less the NWS Import for years beginning 1969. Prior to 1969 44% was used inside the SMRW and 56% was used outside.

3/ Assumes No Losses

4/ Wastewater Recharged in SMR equals effluent from Plants 3, 8 and 13 (partial).

5/ Wastewater Import Recharged in SMRW equals effluent from Plant 1 plus the portion of the effluent from Plant 2 returned to the SMRW via Pond 2 plus the portion of the effluent from Plant 13 not included in 4/.
No record available for effluent from Plant 2 returned to SMRW for 1966-1974 and 1982 - June 1990.
Calculation of import recharged in Santa Margarita River from Plant 2 is based on zero when no record is available.

TABLE B-8

SANTA MARGARITA RIVER WATERSHED
ANNUAL WATER PRODUCTION AND USE

U. S. NAVAL WEAPONS STATION, FALLBROOK ANNEX
Quantities in Acre Feet

	PRODUCTION			USE				WASTEWATER
WATER YEAR	LOCAL	IMPORT TO WATERSHED 1/	TOTAL	AG	COMMERCIAL DOMESTIC	LOSS 2/	TOTAL USE	EXPORTS
1966	87	0	87	0	79	9	87	0
1967	92	0	92	0	83	9	92	0
1968	108	0	108	0	97	11	108	0
1969	138	0	138	0	113	25	138	0
1970	152	0	152	0	125	27	152	0
1971	39 P	76 E	115	0	100	15	115	0
1972	0	115 E	115	0	105	10	115	0
1973	0	115 E	115	0	105	10	115	0
1974	0	115 E	115	0	105	10	115	0
1975	0	115 E	115	0	105	10	115	0
1976	0	115 E	115	0	105	10	115	0
1977	0	115 E	115	0	105	10	115	0
1978	0	115 E	115	0	105	10	115	0
1979	0	115 E	115	0	105	10	115	0
1980	0	115 E	115	0	105	10	115	0
1981	0	115 E	115	0	105	10	115	0
1982	0	115 E	115	0	105	10	115	0
1983	0	115 E	115	0	105	10	115	26 E
1984	0	115 E	115	0	105	10	115	26 E
1985	0	102	102	0	93	9	102	26 E
1986	0	94	94	0	85	9	94	18 P
1987	0	116	116	0	105	11	116	27
1988	0	120	120	0	109	11	120	25
1989	0	128	128	0	116	12	128	22
1990	0	145	145	0	132	13	145	27
1991	0	109	109	0	99	10	109	11
1992	0	99	99	0	90	9	99	7
1993	0	117	117	0	106	11	117	16
1994	0	73	73	0	66	7	73	5
1995	0	125	125	0	114	11	125	12
1996	0	100	100	0	91	9	100	5
1997	0	109	109	0	99	10	109	6
1998	0	97	97	0	88	9	97	8
1999	0	111	111	0	101	10	111	5
2000	0	104	104	0	95	9	104	7
2001	0	73	73	0	66	7	73	8

1/ - Estimate 1969-1984 - Records not available
2/ - Loss = 10% of Use

E - Estimate
P - Partial year data

SANTA MARGARITA RIVER WATERSHED

ANNUAL WATERMASTER REPORT

WATER YEAR 2000-2001

APPENDIX C

SUBSTANTIAL USERS OUTSIDE

ORGANIZED WATER SERVICE AREAS

JULY 2002

APPENDIX C

SANTA MARGARITA RIVER WATERSHED

SUBSTANTIAL USERS OUTSIDE ORGANIZED WATER SERVICE AREAS

CURRENT OWNER	ADDRESS	ASSESSOR PARCEL NO.	PARCEL ACREAGE	ACRES IRRIGATED 2000-2001	IRRIGATED CROP 2000-2001	WELL/ DIVERSION LOCATION TWP/RNG/SEC	WELL PRODUCTION AC. FT	SURFACE DIVERSION AC. FT
AGUANGA GROUNDWATER AREA								
Clawson, Gary A.	43425 Sage Road	917-050-009	309.74	Total				
	Aguanga, Ca. 92536	917-050-007	82.19	|				
		581-070-013	43.10	of				
		581-150-013	120.56	|				
		581-150-016	25.37	|				
		581-070-014	158.08	30.00	Alfalfa	8S/1E-7N(1)	Total	
						8S/1E-7N(2)	of	
						8S/1E-7Q(1)	|	
						8S/1E-7Q(2)	90.00	
Strange, Owen W. and Elizabeth G. Trustees, Strange Living Trust of 4-15-88	m/t P.O. Box 1974	583-040-022	97.78	Total		8S/1E-19Q(1)	150.00	
	Rancho Santa Fe,	583-040-021	13.45	|			Domestic	
	Ca. 92067	583-130-001-3	80.00	of				
	43023 Hwy 79	583-120-001-2	120.00	|	Barley and			
	Aguanga, CA 92536	583-060-003-9	41.60	90.00	Permanent pasture			
						8S/1E-29L Diversion		250.00
Twin Creek Ranch/ Chester M. Mason Family Trust	c/o Jim Holden	583-120-081	17.29	15.00	Row Crops			
	P. O. Box 519	583-120-083	68.09	65.00	Row Crops	8S/1E-28N1	Total	
	Corona, Ca. 91718					8S/1E-28N(2)	|	
	44201 Hwy 79 Aguanga						|	
	44735 Hwy 79 Aguanga	583-120-084	179.39	30.00	Row Crops	8S/1E-29H	of	
		583-150-001	80.00	15.00	Row Crops		|	
				15.00	Row Crops		|	
		583-140-014	48.03	15.00	Row Crops	8S/1E-33F	|	
		583-140-015	40.00	35.00	Row Crops	8S/1E-33G1	|	
		583-140-016	40.00	38.00	Row Crops	8S/1E-33B	912.00	
		583-140-018	10.09	0.00				
		583-140-020	10.15	0.00				
		583-140-019	10.00	0.00				
Vrieling, Gerrit J. and Betty J.	m/t 15015 Cheshire	583-240-022	10.00	9.00	Pistachios	8S/1E-23N	9.90	
	La Mirada, Ca. 90638							
	45195 Hwy 371 Aguanga							

APPENDIX C

SANTA MARGARITA RIVER WATERSHED

SUBSTANTIAL USERS OUTSIDE ORGANIZED WATER SERVICE AREAS

CURRENT OWNER	ADDRESS	ASSESSOR PARCEL NO.	PARCEL ACREAGE	ACRES IRRIGATED 2000-2001	IRRIGATED CROP 2000-2001	WELL/ DIVERSION LOCATION TWP/RNG/SEC	WELL PRODUCTION AC. FT	SURFACE DIVERSION AC. FT
AGUANGA GROUNDWATER AREA (Cont)								
Harris, Homer N.	44444 Sage Road	581-160-014	17.73	Total Of		8S/1E-18J(1)	0.20	
and Dolores G.	Aguanga, CA 92536			15.00	Citrus	8S/1E-18J(2)	0.25	
		581-160-015	7.42	5.00	Fruit and			
		581-150-009	7.00	10.00	Walnuts	8S/1E-18H(1)	2.00	
						8S/1E-18H(2)	0.20	
		581-180-022	30.00	0.00				
		581-180-004	20.00	0.00				
		581-180-020	20.00	0.00		8S/1E-17M		
		581-180-021	2.15			8S/1E-17E	15.00	
Valeywide Recreation	901 W. Esplanade Ave	581-170-009	7.82	7.82	Grass	Used 8S/1E-17E	owned by Harris	
and Parks District	San Jacinto, CA 92582							
Missionary Foundation,	44350 Sage Road	581-170-011	290.03	20.00	Row Crops	8S/1E-17B	40.00	
Inc.	Aguanga, CA 92536					8S/1E-17H	Domestic	
	m/t 5160 Acadia Drive	581-180-009	120.00	0.00				
	Riverside, CA 92505	581-190-001	320.00	0.00				
California Golf	43590 Sage Road	581-120-006	200.00	7.00	Row Crops	8S/1E-8K2	28.00	
Academy	Aguanga, CA 92536							
	m/t 8762 Garden Grove Blvd.							
	Suite #204							
	Garden Grove, CA 92844							
TOTAL AGUANGA GROUNDWATER AREA				**421.82**			**1,247.55**	**250.00**

APPENDIX C

SANTA MARGARITA RIVER WATERSHED
SUBSTANTIAL USERS OUTSIDE ORGANIZED WATER SERVICE AREAS

CURRENT OWNER	ADDRESS	ASSESSOR PARCEL NO.	PARCEL ACREAGE	ACRES IRRIGATED 2000-2001	IRRIGATED CROP 2000-2001	WELL/ DIVERSION LOCATION TWP/RNG/SEC	WELL PRODUCTION AC. FT	SURFACE DIVERSION AC. FT
TEMECULA CREEK ABOVE AGUANGA GROUNDWATER AREA								
Agri-Empire, Inc.	m/t P. O. Box 490	113-090-01	377.07					
	San Jacinto, CA 92383	113-090-03	21.46					
		113-090-05	541.22	71.00	Potatoes			
		113-100-01	389.81	165.00	Barley	9S/2E-11B - Diversion		0.00
		113-130-01	150.09			9S/2E-17D - Spring		0.00
		113-140-03	196.54			9S/2E-16N2	0.00	
						9S/2E-16M	280.00	
						9S/2E-16F1	0.00	
						9S/2E-16N1	0.00	
						9S/2E-16F2	0.00	
						9S/2E-16K - Diversion		50.00
		113-140-04	503.24					
		113-140-05	45.09					
		113-140-06	93.94					
		114-020-09	37.16					
		114-030-08	331.79	55.00	Potatoes	9S/2E-22	150.00	
		114-030-26	42.87					
		114-020-12	108.78	0.00				
		114-030-10	41.51	0.00				
		113-130-03	115.75	0.00				
		113-130-04	39.65	0.00				
Ward, Donald F.	38790 Highway 79	112-030-58	69.83	20.00	Bermuda	9S/1E-1Q(1)	100.00	
	Warner Springs, CA 9208	112-030-22	24.77	0.00				
		112-030-38	40	0		9S/1E-12A	Domestic	
		112-030-67	67.41	10.00	Bermuda	Used 9S/1E-1Q(1)		
		112-030-59	160.00	0.00		9S/1E-1M - Diversion		0.00
Papac, Andrew and Olga	m/t 2030 Santa Anita Ave	113-060-012	63.21	20.00	Bermuda Grass	9S/2E-7D	38.00	
	South El Monte, CA 91733					9S/2E-7E - Diversion		38.00
	38642 Highway 79							
	Warner Springs, CA 92086							
TOTAL TEMECULA CREEK ABOVE AGUANGA GROUNDWATER AREA				**341.00**			**568.00**	**88.00**

APPENDIX C

SANTA MARGARITA RIVER WATERSHED
SUBSTANTIAL USERS OUTSIDE ORGANIZED WATER SERVICE AREAS

CURRENT OWNER	ADDRESS	ASSESSOR PARCEL NO.	PARCEL ACREAGE	ACRES IRRIGATED 2000-2001	IRRIGATED CROP 2000-2001	WELL/ DIVERSION LOCATION TWP/RNG/SEC	WELL PRODUCTION AC. FT	SURFACE DIVERSION AC. FT
WILSON CREEK ABOVE AGUANGA GROUNDWATER AREA								
ANZA VALLEY								
Greenwald, Alvin G.	6010 Wilshire Blvd #500	573-180-001	156.38	156.38	Row Crops	7S/3E-17E	625.52	
	Los Angeles, CA 90036	576-070-001	70.00	70.00	Pasture	7S/3E-20N	266.00	
Agri-Empire, Inc.	P.O. Box 490							
	San Jacinto, CA 92383							
	Section 8	573-090-005	40.00	0.00				
		573-100-002	27.79	0.00				
	Section 10	575-050-044	14.36	0.00				
		575-060-002	133.93	0.00		7S/3E-11N4	223.15	
						7S/3E-11P3	187.51	
	Section 13	575-100-037	57.80	0.00				
	Section 14	575-110-021	143.75	80.00	Potatoes	7S/3E-14D1	76.63	
		575-110-027	54.45	0.00				
		575-310-002	39.09	0.00		7S/3E-14C2	307.53	
		575-310-011	80.00	0.00				
		575-310-012	80.00	0.00				
		575-310-013	17.46	0.00				
		575-310-027	17.46	0.00				
	Section 15	575-080-014	9.92	0.00				
		575-080-015	4.35	0.00				
		575-080-017	9.75	0.00				
		575-080-018	10.13	0.00				
		575-080-019	31.29	0.00				
		575-080-021	20.00	0.00				
		575-080-022	20.00	0.00				
		575-080-024	20.00	0.00				
		575-080-027	20.00	0.00				
		575-090-010	38.80	0.00				
	Section 17	573-180-011	39.74	0.00				
* Land leased from		573-200-004 *	18.24	Total				
Linus W. & Helen M. Miller		573-200-005 *	18.50	Grown				
P. O. Box 602		573-200-006 *	18.89	On				
Anza, CA 92306		573-200-007 *	18.88	Miller				
		573-200-008 *	18.31	Lease				
		573-200-009 *	36.40	Is				
		573-200-010 *	18.68	125.00	Potatoes			

APPENDIX C

SANTA MARGARITA RIVER WATERSHED

SUBSTANTIAL USERS OUTSIDE ORGANIZED WATER SERVICE AREAS

CURRENT OWNER	ADDRESS	ASSESSOR PARCEL NO.	PARCEL ACREAGE	ACRES IRRIGATED 2000-2001	IRRIGATED CROP 2000-2001	WELL/ DIVERSION LOCATION TWP/RNG/SEC	WELL PRODUCTION AC. FT	SURFACE DIVERSION AC. FT
WILSON CREEK ABOVE AGUANGA GROUNDWATER AREA								
ANZA VALLEY (Cont)								
Agri-Empire, Inc. (Cont)								
	Section 20	576-060-009	8.26	Total				
		576-060-031	16.09	of				
		576-060-033	79.45	|				
		576-060-037	41.41	|				
		576-070-003	80.00	|				
		576-070-005	116.57	160.00	Potatoes			
	Section 21	576-080-003	133.72	Total of				
		576-100-061	37.71	140.00	Potatoes			
* Land leased from		576-110-001 *	160.00	35.00	Grain			
Louise Phebe Hamilton Tr								
P. O. Box 102, Anza, CA 92306								
		576-110-002	28.00	0.00				
		576-110-004	50.00	0.00				
		576-110-006	19.29	0.00		7S/3E-21R3	208.92	
		576-110-007	17.82	0.00				
		576-110-008	17.00	0.00				
		576-110-009	18.41	0.00				
	Section 22	575-120-012	88.03	70.00	Barley			
		575-130-003	19.55	0.00				
		575-130-006	40.89	0.00				
		575-130-008	18.56	Total				
		575-130-009	20.06	|				
		575-130-010	20.07	|				
		575-130-011	19.19	of				
		575-130-012	18.18	|				
		575-130-013	19.02	75.00	Barley			
		575-130-014	19.00	and				
		575-130-015	17.56	75.00	Potatoes			
		575-120-018	20.45	Total				
		575-120-019	20.45	|				
		575-120-032	4.69	|				
		575-120-033	4.68	of				
		575-120-034	4.68	|				
		575-120-035	4.28	60.00	Potatoes			
*Leased from Dionisios & Irini Argyros		575-120-028*	4.68	Total				
2813 Monogram Ave, Long Beach, CA 90815		575-120-029*	4.68	of				
		575-120-030*	4.68	|				
		575-120-031*	4.23	20.00	Potatoes			
	Section 23	575-140-019	105.04	65.00	Barley			

APPENDIX C

SANTA MARGARITA RIVER WATERSHED

SUBSTANTIAL USERS OUTSIDE ORGANIZED WATER SERVICE AREAS

CURRENT OWNER	ADDRESS	ASSESSOR PARCEL NO.	PARCEL ACREAGE	ACRES IRRIGATED 2000-2001	IRRIGATED CROP 2000-2001	WELL/ DIVERSION LOCATION TWP/RNG/SEC	WELL PRODUCTION AC. FT	SURFACE DIVERSION AC. FT
WILSON CREEK ABOVE AGUANGA GROUNDWATER AREA								
ANZA VALLEY (Cont)								
Cahuilla Indian Reservation								
Domestic and Commercial Wells Reported by Bureau of Indian Affairs							Total	
Wells in Basement Complex		Wells out of Watershed		Wells with QYAL and/or QTOAL				
7S/2E-14L1		8S/3E-2A1	7S/2E-14J1	7S/2E-28Q1	7S/3E-31L2			
7S/2E-25D1		8S/3E-2B1	7S/2E-14M1	7S/2E-33C1	7S/3E-34E1			
7S/2E-26B1		8S/3E-2D1	7S/2E-14M2	7S/2E-33E1	7S/3E-34N1			
7S/2E-26B2		8S/3E-2E1	7S/2E-14R1	7S/2E-33N1	7S/3E-34Q1			
7S/2E-26B3		8S/3E-2G1	7S/2E-23A1	7S/3E-27C1	8S/2E-4D1			
7S/2E-34E1		8S/3E-2H1	7S/2E-23D1	7S/3E-27C2	8S/2E-4N1			
7S/2E-36A1		8S/3E-2K1	7S/2E-23F1	7S/3E-27H1	8S/2E-4N2			
7S/2E-36J1			7S/2E-23G1	7S/3E-27M1	8S/2E-4P1			
7S/2E-36R1			7S/2E-23H1	7S/3E-28A1	8S/2E-4R1			
7S/3E-26A1			7S/2E-23K1	7S/3E-28A2	8S/2E-4R2			
7S/3E-29Q1			7S/2E-23M1	7S/3E-28D1	8S/3E-5Q1		of	
7S/3E-30H1			7S/2E-23P1	7S/3E-29C1	8S/3E-6J1			
7S/3E-31A1			7S/2E-23Q1	7S/3E-29M1				
7S/3E-31N1			7S/2E-25C1	7S/3E-3OP1				
7S/3E-31Q1			7S/2E-25F1	7S/3E-3OQ1				
7S/3E-32D1			7S/2E-25R1	7S/3E-3OR1				
7S/3E-32D2			7S/2E-26E1	7S/3E-3OR2				
8S/3E-6B1			7S/2E-26L1	7S/3E-3OR3				
8S/3E-6B2			7S/2E-27A1	7S/3E-31C1				
8S/3E-6G1			7S/2E-27H1	7S/3E-31F1				
8S/3E-6R1			7S/2E-28N1	7S/3E-31L1				
							42.00	
SUBTOTAL ANZA VALLEY				1,131.38			1,937.26	0.00
WILSON CREEK ABOVE AGUANGA GROUNDWATER AREA								
LEWIS VALLEY								
Green Shell Company	39850 Sage Road Hemet, CA 92343	571-080-012	80.00	50.00	Olive Trees	7S/1E-20Q	55.00	
SUBTOTAL LEWIS VALLEY				50.00			55.00	0.00
TOTAL WILSON CREEK ABOVE AGUANGA GROUNDWATER AREA				1,181.38			1,992.26	0.00

APPENDIX C

SANTA MARGARITA RIVER WATERSHED

SUBSTANTIAL USERS OUTSIDE ORGANIZED WATER SERVICE AREAS

CURRENT OWNER	ADDRESS	ASSESSOR PARCEL NO.	PARCEL ACREAGE	ACRES IRRIGATED 2000-2001	IRRIGATED CROP 2000-2001	WELL/ DIVERSION LOCATION TWP/RNG/SEC	WELL PRODUCTION AC. FT	SURFACE DIVERSION AC. FT
MURRIETA-TEMECULA GROUNDWATER AREA								
Temecula Ranchos	m/t 2100 Tulare St #405	952-240-001	429.43	378.46	Citrus	8S/2W-14P1		
c/o Chester Rowell	Fresno, CA 93271	952-230-002	48.92	41.20	Citrus	8S/2W-14F	233.00	
and Roger Rowell	45055 Rio Linda Road	943-230-001	109.34	107.00	Citrus	7S/2W-26L	245.00	
	Rancho California Road	943-230-003	14.18	13.00	Citrus			
	La Serena Way	942-230-003	37.84	37.00	Citrus			
	Temecula, CA 92390	943-040-011	20.00	18.00	Citrus	7S/2W-28L	0.00	
		943-060-010	94.49	89.00	Citrus			
		943-060-011	26.50	29.00	Citrus			
Anza Grove	c/o McMillan Farm Mgt.	942-180-002	40.28	Total of				
	29379 Rancho Cal. Rd	942-240-003	40.83	155.00	Citrus			
	#201	942-240-004	40.83	and				
	Temecula, CA 92390	942-240-005	39.31	6.00	Grapes	7S/2W-26B1	275.00	
Stage Ranch Farm	P. O. Box 1371	927-620-004	17.84	18.00	Wine Grapes	7S/3W-31G(1)	37.00	
Management	Temecula, CA 92593							
A Peel Citrus	c/o Stage Ranch Farm Mgmt.	917-240-015-7	20.00	Total				
Giddings, Richard W.	P. O. Box 1371	917-240-014-6	60.00	of				
Mendoza, Bertha	Temecula, CA 92593	917-150-006-1	120.00	110.00	Citrus and	8S/1W-21K(1)	Total	
	38695 Highway 79	917-150-002-7	117.76	10.00	Apples	8S/1W-21K(2)	of	
	Warner Springs, CA 92086					8S/1W-21P(1)	|	
						8S/1W-21P(2)	375.00	
Boots, Clydene	P. O. Box 321	909-090-019	16.66	14.00	Pasture			
	Murrieta, CA 92362	909-100-017				7S/3W-21P	60.00	
	25555 Washington Ave							
	Murrieta, Ca. 92564							
James A. and	Highway 79 S	917-250-004	80.00	200.00	Grapes	8S/1W-25Q	20.77	
Maggie Carter	Temecula, CA	917-250-005	80.00			8S/1W-25P	132.23	
Living Trust	m/t P. O. Box 507					8S/1W-25N(1)Spring 3		24.79
	Santa Ana, CA 92702-0507	917-250-007	240.00			8S/1W-36K Spring 4		33.06
						8S/1W-36H Spring 6		41.32
						8S/1W-36L - Stream Diversion		7.83

APPENDIX C

SANTA MARGARITA RIVER WATERSHED

SUBSTANTIAL USERS OUTSIDE ORGANIZED WATER SERVICE AREAS

CURRENT OWNER	ADDRESS	ASSESSOR PARCEL NO.	PARCEL ACREAGE	ACRES IRRIGATED 2000-2001	IRRIGATED CROP 2000-2001	WELL/ DIVERSION LOCATION TWP/RNG/SEC	WELL PRODUCTION AC. FT	SURFACE DIVERSION AC. FT
MURRIETA-TEMECULA GROUNDWATER AREA (Cont)								
Regency Properties	44051 Rainbow Cyn Rd.	922-220-002	86.11	Total		8S/2W-19(D)	335.67	
	Temecula, CA 92592	922-220-003	5.75	|				
		922-220-004	52.18	|				
		922-220-007	14.36	|				
		922-220-008	3.99	of				
		922-230-002	59.29	|				
		922-230-003	1.00	|				
		922-230-004	40.00	|				
		922-230-007	25.00	|				
		922-230-008	16.11	150.00	Grass			
Carson, David M.	25471 Hayes Ave	909-260-036	8.87	7.00	Pasture	7S/3W-29G	39.90	
and Carol J.	Murrieta, CA 92362	909-260-042	4.31	3.50	Pasture			
Pechanga Indian Reservation								
	Domestic and Commercial Wells Reported by Bureau of Indian Affairs						Total	
	Wells in Basement Complex	Wells out of SMR Watershed		Wells with QYAL and/or QTOAL			|	
				8S/2W-28J1	8S/2W-34B3		|	
				8S/2W-28J2	8S/2W-34B4		|	
				8S/2W-28P1	8S/2W-34C1		|	
				8S/2W-28Q1	8S/2W-34D1		of	
				8S/2W-28Q2	8S/2W-34E1		|	
				8S/2W-28Q4	8S/2W-34F1		|	
				8S/2W-28Q6	8S/2W-34F2		|	
				8S/2W-28Q7	8S/2W-34F3		|	
				8S/2W-28R1	8S/2W-34F4		|	
				8S/2W-29A1	8S/2W-34F7		|	
				8S/2W-29B10	8S/2W-35D1		|	
					Domestic Use	149.40		
					Commercial Use	85.40		
					Irrigation	56.20		
					TOTAL USE		291.00	4.00
TOTAL MURRIETA-TEMECULA GROUNDWATER AREA				**1,386.16**			**2,044.57**	**111.00**

APPENDIX C

SANTA MARGARITA RIVER WATERSHED
SUBSTANTIAL USERS OUTSIDE ORGANIZED WATER SERVICE AREAS

CURRENT OWNER	ADDRESS	ASSESSOR PARCEL NO.	PARCEL ACREAGE	ACRES IRRIGATED 2000-2001	IRRIGATED CROP 2000-2001	WELL/ DIVERSION LOCATION TWP/RNG/SEC	WELL PRODUCTION AC. FT	SURFACE DIVERSION AC. FT
SANTA MARGARITA RIVER BELOW GORGE								
DE LUZ CREEK								
Ezor, Albert E.	40922 DeLuz Road	101-271-17	47.79	12.00	Avocados	8S/4W-29D(1)	36.80	
	Fallbrook, CA 92028			2.00	Vegetables	8S/4W-29D(2)	Total	
Bryant, Warren	40724 DeLuz Rd	101-271-19	19.08	Total		8S/4W-29E(1)	30.40	
and Lori	Fallbrook, CA 92028	101-271-20	5.02	of			|	
		101-271-21	11.86	8.00	Pasture	8S/4W-29E(2)	Total	
		101-271-22	6.41					
Prestininzi, Pete	2525 E. Mission Road	101-220-12	31.63	6.00	Pasture & Flowers			
and Dorothy N.	Fallbrook, CA 92028	101-210-53	50.44	12.00	Avocados	8S/4W-20A(1)	8.00	
	Richmond Truck Trail				and Citrus	8S/4W-20H(1)	8.00	
	and DeLuz Murrieta Road					8S/4W-20H(2)	7.00	
						8S/4W-20A(2)		
						8S/4W-20H(3)		
						8S/4W-20A - Diversion		23.00
Varela, Alfred	41125 DeLuz Rd	101-210-11	15.23	8.50	Avocados	8S/4W-20Q(1)	21.60	
	Fallbrook, CA 92028			0.50	Citrus	8S/4W-20Q(2)	Total	
Herbel, John	41257 DeLuz Rd	101-210-12	30.28	10.00	Avocados	8S/4W-20Q(1)	Total	
and Jeraldine	Fallbrook, CA 92028			18.00	Citrus	8S/4W-20Q(2)	of	
				2.00	Row crops	8S/4W-20Q(3)	66.20	
Wagner, Wilbur A.	41128 DeLuz	101-210-23	17.19	11.00	Avocados			
				3.00	Persimmons			
		101-210-22	4.55	3.00	Persimmons	8S/4W-20P(1)	0.00	
						8S/4W-20P(2)	0.00	
						8S/4W-20P(3)	33.00	
Chambers, Robert R.	m/t 11439 Laurelcrest Dr.	101-571-03	41.72	20.00	Flowers	8S/4W-28A	42.00	
and Clytia M.	Studio City, CA 91604					8S/4W-28A - Diversion		3.00
	40888 DeLuz-Murrieta Rd.							
Welburn, Douglas J.	40787 DeLuz Murrieta Rd.	101-571-08	26.98	8.00	Row Crops	8S/4W-28G1	33.00	
and Sue	Fallbrook, CA 92028			1.50	Trees			
	40751 DeLuz Murrieta Rd							
Nezami, Mohammed	2193 Calle Rociada	101-312-02	58.17	45.00	Flowers	8S/4W-31K(1)	Total	
Bluebird Ranch	Fallbrook, CA			5.00	Avocados	8S/4W-31K(2)	of	
	m/t P. O. Box 1089					8S/4W-31K(3)	|	
	Fallbrook, CA 92088	101-312-01	82.29	42.00	Flowers	8S/4W-31L	162.18	
						8S/4W-31L - Diversion		31.48

APPENDIX C

SANTA MARGARITA RIVER WATERSHED

SUBSTANTIAL USERS OUTSIDE ORGANIZED WATER SERVICE AREAS

CURRENT OWNER	ADDRESS	ASSESSOR PARCEL NO.	PARCEL ACREAGE	ACRES IRRIGATED 2000-2001	IRRIGATED CROP 2000-2001	WELL/ DIVERSION LOCATION TWP/RNG/SEC	WELL PRODUCTION AC. FT	SURFACE DIVERSION AC. FT
SANTA MARGARITA RIVER BELOW GORGE (Cont)								
DE LUZ CREEK (Cont)								
Vanginkel, Norman and Deborah	39452 DeLuz Road	101-312-03	80.00	20.00	Nursery Stock	8S/4W-31J(1)	0.00	
	Fallbrook, CA 92028					8S/4W-31J(2)	15.00	
	m/t 20664 Calle De La Ladera					8S/4W-31J(3)	3.00	
	Yorba Linda, CA 92887					8S/4W-31J(4)	25.00	
		102-052-04	22.04			8S/4W-6A	4.00	
		102-731-02	4.26					
Daily Family Trust	40555 Ross Road	101-430-27	2.73	Total of				
	Fallbrook, CA 92028	101-430-30	16.39	7.00	Avocados			
		101-500-01	16.62	7.00	Limes			
		101-480-14	13.20	6.00	Persimmons	8S/4W-34- Lake Diversion		7.00
SUBTOTAL DELUZ CREEK				**217.50**			**495.18**	**64.48**
SANDIA CREEK								
Cal June, Inc.	P. O. Box 9551	101-360-40	126.32	65.00	Avocados	8S/4W-25P(1)		
	No. Hollywood, CA 91609					8S/4W-25P(2)		
	40376 Sandia Creek					8S/4W-25P(3)		
	Fallbrook, CA 92028					8S/4W-25P(4)		
						8S/4W-25P(5)		
						8S/4W-25P - Diversion		325.00
SUBTOTAL SANDIA CREEK				**65.00**			**0.00**	**325.00**
SANTA MARGARITA RIVER								
San Diego State University Foundation	47981 Willow Glen Rd.	918-040-10	120.00	Total of	Citrus and	8S/3W-33Q1	0.00	
	Temecula, CA	918-060-17	40.00	20.00	Avocados	8S/3W-33Q(2)	3.00	
	m/t Louis Haberkern, Director					8S/3W-33Q - Diversion		44.75
	SDSU Foundation							
	5250 Campanile Dr., 4th Flr.							
	San Diego, CA 92182-1999							
SUBTOTAL SANTA MARGARITA RIVER				**20.00**			**3.00**	**44.75**
TOTAL SANTA MARGARITA RIVER BELOW GORGE				**302.50**			**498.18**	**434.23**

APPENDIX C

SANTA MARGARITA RIVER WATERSHED
SUBSTANTIAL USERS OUTSIDE ORGANIZED WATER SERVICE AREAS

CURRENT OWNER	ADDRESS	ASSESSOR PARCEL NO.	PARCEL ACREAGE	ACRES IRRIGATED 2000-2001	IRRIGATED CROP 2000-2001	WELL/ DIVERSION LOCATION TWP/RNG/SEC	WELL PRODUCTION AC. FT	SURFACE DIVERSION AC. FT
LOWER MURRIETA								
Northwind Farms, Inc.	c/o Cliff Ronnenberg	571-020-046	81.09	0.00				
	11292 Western Avenue	571-020-047	40.80	0.00				
	Stanton, CA 90680	571-020-048	36.75	0.00				
(Sage Ranch Nursery)	42522 E. Benton Rd.	571-020-049	148.86	0.00		7S/1E-7D	5.50	
	Aguanga, CA	571-020-004	1.50	0.00				
		571-520-007	109.50	Total				
		571-520-008	99.43	|				
		571-520-009	80.23	of				
		571-520-010	78.20	|				
		915-140-003	101.65	|				
		915-140-008	21.39	|				
		470-210-007	53.62	|				
		470-220-004	121.00	400.00	Olive trees	7S/1E-7E - Diversion		100.00
Zamora, John and Linda	39800 E. Benton Rd. Temecula, CA 92390	915-120-18	37.74	10.00	Pasture	7S/1W-10R(1)	Total	
						7S/1W-10R(2)	of	
						7S/1W-10R(3)	|	
						7S/1W-10R(4)	38.00	
						7S/1W-10R(5)	Domestic	
						7S/1W-10R(6)		
TOTAL LOWER MURRIETA				410.00			43.50	100.00
GRAND TOTAL				4,042.86			6,394.06	983.23
GRAND TOTAL	Not including Pechanga Indian Reservation (295 AF) and Cahuilla Indian Reservation Domestic Use (42 AF)			4,042.86			6,061.06	979.23

SANTA MARGARITA RIVER WATERSHED

ANNUAL WATERMASTER REPORT

WATER YEAR 2000-2001

APPENDIX D

WATER QUALITY DATA

JULY 2002

TABLE D-2.1

SANTA MARGARITA RIVER WATERSHED
WATER QUALITY DATA

NUTRIENT SAMPLING BY RANCHO CALIFORNIA WATER DISTRICT

2000-2001

Site Location	Date Tested	Total Dissolved Solids (mg/l)	Nitrate as N (mg/l)	Total N (mg/l)	Total P (mg/l)
Murrieta Creek at Gaging Station	10/04/00	520	2.8	2.8	0.08
	10/11/00	570	1	1.5	0.10
	10/18/00	670	ND	0.6	0.08
	10/25/00	560	1.5	1.8	0.06
	11/01/00	590	0.4	1.2	0.28
	11/08/00	650	0.3	0.5	0.10
	11/15/00	650	0.4	0.9	0.12
	11/22/00	680	0.3	0.8	0.08
	11/29/00	600	0.3	0.8	0.51
	12/06/00	610	0.6	1.3	0.47
	12/13/00	770	0.5	1.2	0.16
	12/20/00	800	1.3	1.8	0.39
	12/27/00	790	ND	0.8	0.15
	01/03/01	770	0.2	0.9	0.13
	01/10/01	480	0.9	2.1	0.28
	01/17/01	640	0.3	1.0	0.24
	01/24/01	700	ND	0.8	0.21
	01/31/01	650	ND	0.7	0.37
	02/07/01	790	ND	1.2	0.26
	02/14/01	260	0.4	3.2	0.86
	02/21/01	390	ND	1.5	0.27
	02/28/01	300	0.7	2.4	0.62
	03/07/01	360	0.3	1.1	1.10
	03/14/01	640	ND	0.5	0.20
	03/21/01	790	ND	0.7	0.38
	03/28/01	920	0.1	1.4	0.28
	04/04/01	790	ND	0.07	0.25
	04/11/01	470	0.9	1.6	0.91
	04/18/01	840	ND	0.9	0.15
	04/25/01	690	ND	1.4	0.19
	05/02/01	690	0.7	1.3	0.18
	05/09/01	650	0.8	1.6	0.07
	05/16/01	710	0.8	1.6	0.12
	05/23/01	750	0.3	1.5	0.17
	05/30/01	810	ND	0.8	0.18
	06/06/01	690	0.7	1.1	0.13
	06/13/01	730	ND	0.9	0.12
	06/20/01	670	1.6	1.9	0.10
	06/27/01	740	0.5	1.1	0.09
	07/05/01	750	0.4	1.6	0.33
	07/11/01	740	ND	1.0	0.17
	07/18/01	730	0.8	1.1	0.12
	07/25/01	740	0.7	1.2	0.37
	08/01/01	710	ND	0.4	0.18
	08/08/01	670	0.6	0.8	0.55
	08/15/01	650	0.6	1.0	0.15
	08/22/01	650	0.4	0.7	0.17
	08/29/01	660	0.6	0.9	0.14
	09/05/01	720	0.5	1.2	0.23
	09/12/01	800	ND	1.0	0.22
	09/19/01	730	0.4	1.5	0.27
	09/26/01	720	0.4	0.8	0.17

ND - None Detected

TABLE D-2.1 (cont'd)

SANTA MARGARITA RIVER WATERSHED
WATER QUALITY DATA

NUTRIENT SAMPLING BY RANCHO CALIFORNIA WATER DISTRICT

2000-2001

Site Location	Date Tested	Total Dissolved Solids (mg/l)	Nitrate as N (mg/l)	Total N (mg/l)	Total P (mg/l)
Temecula Creek	10/04/00	910	ND	0.3	0.20
	10/11/00	930	ND	0.6	0.23
	10/18/00	940	ND	0.5	0.19
	10/25/00	920	ND	0.4	0.19
	11/01/00	900	ND	0.7	0.22
	11/08/00	910	ND	0.5	0.13
	11/15/00	890	ND	0.5	0.12
	11/22/00	920	ND	0.6	0.10
	11/29/00	900	ND	0.5	0.12
	12/06/00	910	ND	0.4	0.22
	12/13/00	910	ND	0.6	0.16
	12/20/00	900	ND	0.3	0.27
	12/27/00	900	ND	0.5	0.23
	01/03/01	920	ND	0.6	0.12
	01/10/01	920	ND	0.2	0.14
	01/17/01	910	ND	1.0	0.28
	01/24/01	820	0.3	0.7	0.17
	02/07/01	910	ND	0.7	0.18
	02/14/01	270	0.5	2.6	0.93
	02/21/01	860	0.4	1.0	0.23
	02/28/01	350	0.7	4.7	1.50
	03/07/01	430	0.5	1.7	0.67
	03/14/01	890	0.8	1.2	0.85
	03/21/01	990	0.6	1.2	0.28
	03/28/01	790	ND	0.5	0.56
	04/04/01	950	0.6	1.2	0.24
	04/11/01	930	0.9	1.5	0.35
	04/18/01	940	0.7	1.5	0.20
	04/25/01	950	1.0	2.8	0.44
	05/02/01	940	0.8	1.7	0.26
	05/09/01	970	1.8	2.8	0.20
	05/16/01	1040	0.6	1.5	0.29
	05/23/01	950	0.5	1.3	0.24
	05/30/01	980	0.3	1.1	0.23
	06/06/01	1000	0.2	0.8	0.33
	06/13/01	970	ND	0.7	0.25
	06/20/01	980	ND	0.4	0.14
	06/27/01	1010	ND	0.5	0.22
	07/05/01	1070	ND	1.2	0.20
	07/11/01	1000	ND	0.9	0.23
	07/18/01	980	0.2	0.3	0.20
	07/25/01	1020	ND	0.6	0.23
	08/01/01	1000	0.2	0.5	0.30
	08/08/01	1070	ND	0.5	0.24
	08/15/01	1000	ND	0.5	0.28
	08/22/01	990	ND	0.5	0.33
	08/29/01	1050	ND	0.5	0.40
	09/05/01	1030	ND	0.8	0.38
	09/12/01	1030	ND	0.9	0.76
	09/19/01	970	ND	0.8	0.27
	09/26/01	980	ND	0.6	0.46

ND - None Detected

TABLE D-2.1 (cont'd)

SANTA MARGARITA RIVER WATERSHED
WATER QUALITY DATA

NUTRIENT SAMPLING BY RANCHO CALIFORNIA WATER DISTRICT

2000-2001

Site Location	Date Tested	Total Dissolved Solids (mg/l)	Nitrate as N (mg/l)	Total N (mg/l)	Total P (mg/l)
Santa Margarita River at Gaging Station	10/04/00	520	1.5	1.8	0.06
	10/11/00	610	1.0	1.3	0.07
	10/18/00	610	0.6	1.0	0.05
	10/25/00	640	1.4	1.7	0.06
	11/01/00	590	0.4	1.0	0.23
	11/08/00	660	ND	0.8	0.10
	11/15/00	720	0.3	0.9	0.10
	11/22/00	680	0.2	0.8	ND
	11/29/00	640	0.2	0.7	0.11
	12/06/00	720	ND	0.6	0.06
	12/11/00	800	ND	0.5	0.08
	12/20/00	820	2.4	2.8	0.21
	12/27/00	800	ND	0.7	0.13
	01/03/01	800	ND	0.7	0.28
	01/10/01	490	0.8	1.9	0.24
	01/17/01	690	0.3	0.8	0.23
	01/24/01	710	ND	0.7	0.18
	01/31/01	570	ND	0.7	0.19
	02/07/01	780	ND	0.6	0.21
	02/14/01	250	0.5	2.3	0.68
	02/21/01	360	ND	0.6	0.26
	02/28/01	300	0.7	2.7	0.64
	03/07/01	360	0.2	0.9	0.43
	03/14/01	640	ND	0.6	0.82
	03/21/01	810	ND	0.5	0.22
	03/28/01	820	ND	0.5	0.29
	04/04/01	860	ND	0.8	0.23
	04/11/01	530	1.0	1.5	0.12
	04/18/01	820	0.2	0.9	0.15
	04/25/01	680	ND	1.8	0.87
	05/02/01	720	1.4	2.2	0.19
	05/09/01	690	0.6	1.5	0.33
	05/16/01	730	0.7	1.5	0.13
	05/23/01	680	0.6	1.5	0.14
	05/30/01	820	ND	0.7	0.56
	06/06/01	750	0.3	0.9	0.15
	06/13/01	760	0.3	0.8	0.20
	06/20/01	690	0.8	1.1	0.22
	06/27/01	770	0.3	1.1	0.10
	07/05/01	770	0.2	1.6	0.27
	07/11/01	780	ND	1.2	0.18
	07/18/01	730	0.7	0.9	0.14
	07/25/01	800	0.5	1.0	0.35
	08/01/01	780	ND	0.5	0.15
	08/08/01	740	0.7	1.0	0.17
	08/15/01	700	0.5	1.1	0.16
	08/22/01	690	0.6	0.9	0.19
	08/29/01	700	0.7	1.0	0.17
	09/05/01	730	0.6	1.7	0.32
	09/12/01	810	ND	1.1	0.24
	09/19/01	730	0.5	2.4	0.20
	09/26/01	730	ND	0.8	0.20

ND - None Detected

TABLE D-2.1 (cont'd)

SANTA MARGARITA RIVER WATERSHED
WATER QUALITY DATA

NUTRIENT SAMPLING BY RANCHO CALIFORNIA WATER DISTRICT

2000-2001

Site Location	Date Tested	Total Dissolved Solids (mg/l)	Nitrate as N (mg/l)	Total N (mg/l)	Total P (mg/l)
System Discharge to Murrieta Creek at River Meter	10/04/00	490	3.4	3.5	0.07
	10/11/00	460	1.9	2	0.06
	10/25/00	490	2.7	2.9	0.07
	05/02/01	490	2.5	2.8	ND
	05/09/01	460	2.0	2.2	ND
	05/16/01	490	2.6	3.0	ND
	05/23/01	540	1.8	2.1	ND
	06/06/01	500	2.6	2.6	ND
	06/13/01	500	0.2	1.0	ND
	06/20/01	530	2.6	2.5	ND
	06/27/01	500	0.9	1.1	0.06
	07/05/01	490	2.5	3.0	0.10
	07/11/01	520	0.3	1.4	0.45
	07/18/01	500	2.4	2.1	0.06
	07/25/01	500	1.6	1.5	0.06
	08/01/01	500	0.5	0.4	0.12
	08/08/01	530	1.3	1.4	0.42
	08/15/01	500	0.7	0.8	0.79
	08/22/01	520	0.6	0.7	0.05
	08/29/01	510	0.5	0.6	ND
	09/05/01	490	1.5	1.6	0.07
	09/19/01	470	0.9	1.7	0.07
	09/26/01	480	2.4	2.6	0.05
Santa Margarita River at Willow Glen	10/17/00	740	1.3	1.7	ND
	12/11/00	920	1.7	2.8	0.06
	03/13/01	710	2.9	3.7	0.15
	05/09/01	900	1.2	2.1	0.10
	06/19/01	950	1.2	1.8	ND
	07/10/01	870	0.6	1.6	0.06
	08/13/01	960	1.1	1.4	0.06
	09/24/01	830	0.2	0.9	ND
Santa Margarita River at DeLuz Crossing	10/17/00	850	ND	0.3	ND
	12/11/00	890	0.4	0.7	ND
	03/13/01	740	3.2	3.7	0.18
	05/09/01	850	1.4	2.3	0.09
	06/19/01	930	0.5	0.9	ND
	07/10/01	900	ND	0.5	0.09
	08/13/01	800	ND	0.3	ND
	09/24/01	940	ND	0.3	0.05
Santa Margarita River at Estuary	10/17/00	12,600	5.5	7.4	2.10
	12/12/00	9,700	6.0	8.7	2.20
	03/13/01	760	1.3	2.0	0.10
	05/09/01	1,030	ND	0.7	0.31
	06/19/01	2,570	ND	1.2	0.68
	07/10/01	4,250	6.3	7.2	1.30
	08/13/01	3,740	ND	2.1	1.80
	09/24/01	9,630	ND	2.5	2.80

ND - None Detected

TABLE D-4

SANTA MARGARITA RIVER WATERSHED
WATER QUALITY DATA

WELLS SAMPLED BY RANCHO CALIFORNIA WATER DISTRICT

Site Location	Date Tested	Specific Conductance umhos	Total Dissolved Solids (mg/l)	Chemical Constituents - mg/l							
				Ca	Mg	Na	K	Cl	SO4	HCO3	NO3
No. 101	06/01/88	810	495	76	15	79	8	116	16	314	---
7S/3W-34G1	08/05/88	---	---	---	---	---	---	---	---	---	<1
	05/23/90	630	365	30	6	91	2	101	35	107	3
	08/04/93	860	465	76	14	78	2	120	22	275	<1
	08/09/96	820	480	69	14	83	2	110	15	310	<2
	10/16/97	---	---	---	---	---	---	---	---	---	<2
	08/11/99	840	510	70	14	85	2	110	17	300	<2
No. 102	01/04/89	695	370	9	2	134	1	101	25	195	<1
8S/3W-2Q1	01/15/92	930	615	38	4	160	3	160	55	250	<1
	05/17/95	850	475	21	1	144	1	120	130	98	<1
	06/20/95	1190	700	26	2	207	2	150	220	131	<1
	06/09/97	---	---	---	---	---	---	---	---	---	<2
No. 105	07/06/89	500	280	30	6	66	2	71	22	134	14
7S/3W-25M1	03/17/93	480	310	17	2	80	2	67	22	110	14
No. 106	06/29/88	920	485	38	5	143	3	182	66	70	16
7S/3W-26R1	05/13/92	880	515	35	4	142	2	180	72	110	17
	05/16/95	870	495	32	3	138	2	160	57	116	14
	07/07/97	---	---	---	---	---	---	---	---	---	8
	07/20/98	---	---	---	---	---	---	---	---	---	9
	07/20/99	---	---	---	---	---	---	---	---	---	9
	07/06/00	---	---	---	---	---	---	---	---	---	8
	05/01/01	490	300	7	<1	96	<1	70	23	100	8
	07/10/01	---	---	---	---	---	---	---	---	---	12
No. 107	04/11/88	490	365	19	4	73	2	69	22	116	15
7S/3W-26J1	05/29/91	950	535	63	15	104	3	130	120	171	11
No. 108	05/25/88	780	455	51	11	96	2	120	68	153	14
7S/3W-25E1	05/29/91	930	500	59	14	104	3	130	110	153	10
	05/13/94	640	395	23	5	100	2	120	51	104	7
	05/16/95	---	---	---	---	---	---	---	---	---	5
	05/13/97	540	300	7	<1	110	<1	110	15	85	4
	05/05/99	---	---	---	---	---	---	---	---	---	8
	05/16/00	630	350	7	<1	110	<1	130	12	65	3
	05/02/01	---	---	---	---	---	---	---	---	---	2

TABLE D-4 (cont'd)

SANTA MARGARITA RIVER WATERSHED
WATER QUALITY DATA

WELLS SAMPLED BY RANCHO CALIFORNIA WATER DISTRICT

Site Location	Date Tested	Specific Conductance umhos	Total Dissolved Solids (mg/l)	Chemical Constituents - mg/l Ca	Mg	Na	K	Cl	SO4	HCO3	NO3
No. 109	06/01/88	1400	920	136	35	120	4	100	300	296	---
8S/2W-17J1	08/05/88	---	---	---	---	---	---	---	---	---	10
	06/12/91	1330	800	110	26	120	5	120	270	275	9
	06/22/94	1370	1010	138	32	124	5	140	320	287	7
	06/06/95	---	---	---	---	---	---	---	---	---	8
	06/13/97	1440	1010	130	31	140	4	140	330	280	10
	07/16/97	---	---	---	---	---	---	---	---	---	2.2 @N
	04/14/99	---	---	---	---	---	---	---	---	---	12
	04/11/00	---	---	---	---	---	---	---	---	---	13
	06/21/00	1330	870	120	28	130	4	120	280	270	3.2
	04/10/01	---	---	---	---	---	---	---	---	---	13
No. 110	03/31/88	1100	630	70	23	132	6	115	163	268	3
8S/1W-06K1	03/11/93	1010	610	60	21	124	5	110	200	201	3
	04/27/95	---	---	---	---	---	---	---	---	---	1
	07/20/99	---	---	---	---	---	---	---	---	---	<2
	07/06/00	---	---	---	---	---	---	---	---	---	2
	07/10/01	---	---	---	---	---	---	---	---	---	2
No. 113	03/28/88	700	400	41	12	87	2	11	20	192	18
7S/2W-25H01	03/21/91	570	290	21	5	79	2	88	17	119	11
	03/03/94	700	410	46	13	86	2	120	25	189	19
	04/27/95	---	---	---	---	---	---	---	---	---	24
	03/20/97	880	500	53	15	96	2	140	33	200	22
	07/20/98	---	---	---	---	---	---	---	---	---	23
	09/16/98	---	---	---	---	---	---	---	---	---	22
	02/25/99	---	---	---	---	---	---	---	---	---	19
	04/14/99	---	---	---	---	---	---	---	---	---	17
	06/03/99	---	---	---	---	---	---	---	---	---	21
	09/14/99	---	---	---	---	---	---	---	---	---	22
	10/21/99	---	---	---	---	---	---	---	---	---	25
	11/02/99	---	---	---	---	---	---	---	---	---	22
	12/14/99	---	---	---	---	---	---	---	---	---	23
	01/11/00	---	---	---	---	---	---	---	---	---	18
	03/07/00	810	470	75	16	59	2	70	94	200	11
	04/11/00	---	---	---	---	---	---	---	---	---	23
	05/03/00	---	---	---	---	---	---	---	---	---	24
	06/21/00	---	---	---	---	---	---	---	---	---	23
	09/13/00	---	---	---	---	---	---	---	---	---	23

TABLE D-4 (cont'd)

SANTA MARGARITA RIVER WATERSHED
WATER QUALITY DATA

WELLS SAMPLED BY RANCHO CALIFORNIA WATER DISTRICT

Site Location	Date Tested	Specific Conductance umhos	Total Dissolved Solids (mg/l)	Chemical Constituents - mg/l							
				Ca	Mg	Na	K	Cl	SO4	HCO3	NO3
No. 113 (cont'd)	10/06/00	---	---	---	---	---	---	---	---	---	21
7S/2W-25H01	02/14/01	---	---	---	---	---	---	---	---	---	16
	05/30/01	---	---	---	---	---	---	---	---	---	23
	06/12/01	---	---	---	---	---	---	---	---	---	22
	08/01/01	---	---	---	---	---	---	---	---	---	22
No. 118	08/08/90	715	480	14	1	162	1	120	79	101	1
8S/3W-11B	09/26/90	---	---	---	---	---	---	---	---	---	1
	09/10/93	860	525	19	1	178	1	130	94	198	<1
	06/20/95	---	---	---	---	---	---	---	---	---	<1
	09/16/96	970	560	33	2	180	2	120	120	230	<2
	07/23/97	---	---	---	---	---	---	---	---	---	0.2 @N
	09/16/98	---	---	---	---	---	---	---	---	---	2
	11/02/99	1040	580	46	4	170	2	130	100	240	<2
	09/20/00	---	---	---	---	---	---	---	---	---	<2
No. 119	07/16/96	450	280	44	9	35	<1	39	18	180	15
8S/2W-19J	08/14/97	---	---	---	---	---	---	---	---	---	12
	12/24/97	---	320	---	---	---	---	---	---	---	3.1@N
	03/04/98	---	380	---	---	---	---	---	---	---	3.3@N
	06/04/98	---	---	---	---	---	---	---	---	---	3.8@N
	06/12/98	---	400	---	---	---	---	---	---	---	---
	09/16/98	---	---	---	---	---	---	---	---	---	3.7@N
	01/08/99	---	430	---	---	---	---	---	---	---	---
	04/13/99	---	---	---	---	---	---	---	---	---	28
	06/02/99	---	560	---	---	---	---	---	---	---	4.8@N
	07/27/99	940	640	103	21	58	1	70	150	264	30
	09/14/99	---	---	---	---	---	---	---	---	---	22
	09/14/99	---	---	---	---	---	---	---	---	---	4.8@N
	10/26/99	---	---	---	---	---	---	---	---	---	24
	11/02/99	---	---	---	---	---	---	---	---	---	22
	12/14/99	---	560	---	---	---	---	---	---	---	22
	04/04/00	---	---	---	---	---	---	---	---	---	20
	12/14/00	---	---	---	---	---	---	---	---	---	4.6@N
	03/29/01	---	---	---	---	---	---	---	---	---	20
	06/20/01	---	---	---	---	---	---	---	---	---	4.2@N
	09/14/01	---	---	---	---	---	---	---	---	---	4.2@N
	09/28/01	---	---	---	---	---	---	---	---	---	18

TABLE D-4 (cont'd)

SANTA MARGARITA RIVER WATERSHED
WATER QUALITY DATA

WELLS SAMPLED BY RANCHO CALIFORNIA WATER DISTRICT

Site Location	Date Tested	Specific Conductance umhos	Total Dissolved Solids (mg/l)	Chemical Constituents - mg/l							
				Ca	Mg	Na	K	Cl	SO4	HCO3	NO3
No. 120	06/20/90	570	330	6	1	116	1	82	31	113	11
8S/2W-17G	06/10/93	590	340	6	<1	122	1	85	35	104	12
	07/19/96	630	360	6	<1	120	1	88	42	120	14
	06/16/97	---	---	---	---	---	---	---	---	---	10
	08/14/97	---	---	---	---	---	---	---	---	---	9
	06/02/99	620	360	6	<1	122	<1	84	45	120	10
	06/06/00	---	---	---	---	---	---	---	---	---	11
	06/13/01	---	---	---	---	---	---	---	---	---	12
No. 121	10/27/89	900	475	63	14	99	2	109	28	290	<1
7S/3W-34J	05/19/92	1000	560	72	17	120	3	170	56	270	<1
	07/18/97	---	---	---	---	---	---	---	---	---	ND
	07/24/97	---	640	---	---	---	---	---	---	---	ND
	08/20/97	---	---	---	---	---	---	---	---	---	ND
	09/03/97	---	---	---	---	---	---	---	---	---	ND
No. 122	06/23/97	---	---	---	---	---	---	---	---	---	6
8S/2W-20P1	07/25/97	660	460	64	13	44	1	61	65	190	8
	10/10/97	---	---	---	---	---	---	---	---	---	9
	12/23/97	---	400	---	---	---	---	---	---	---	1.8@N
	03/25/98	---	450	---	---	---	---	---	---	---	2.2@N
	06/03/98	---	---	---	---	---	---	---	---	---	2.4@N
	06/05/98	---	460	---	---	---	---	---	---	---	---
	09/17/98	---	---	---	---	---	---	---	---	---	2.2@N
	01/08/99	---	450	---	---	---	---	---	---	---	---
	06/03/99	---	470	---	---	---	---	---	---	---	2.1@N
	04/13/99	---	---	---	---	---	---	---	---	---	9
	09/21/99	---	---	---	---	---	---	---	---	---	2.1@N
	03/07/00	---	---	---	---	---	---	---	---	---	16
	04/04/00	---	---	---	---	---	---	---	---	---	9
	06/28/00	780	470	79	16	62	1	73	100	210	11
	12/13/00	---	---	---	---	---	---	---	---	---	2.5@N
	03/27/01	---	---	---	---	---	---	---	---	---	2.5@N
	04/18/01	---	---	---	---	---	---	---	---	---	10
	06/20/01	---	---	---	---	---	---	---	---	---	2.4@N
	09/13/01	---	---	---	---	---	---	---	---	---	2.7@N

ND - None Detected

TABLE D-4 (cont'd)

SANTA MARGARITA RIVER WATERSHED
WATER QUALITY DATA

WELLS SAMPLED BY RANCHO CALIFORNIA WATER DISTRICT

Site Location	Date Tested	Specific Conductance umhos	Total Dissolved Solids (mg/l)	Chemical Constituents - mg/l							
				Ca	Mg	Na	K	Cl	SO4	HCO3	NO3
No. 123	06/06/90	1100	690	69	27	132	6	130	170	281	4
8S/1W-7B	06/10/93	1120	690	74	25	136	6	120	190	250	5
	02/05/97	930	550	55	18	110	5	83	130	250	1.3
	04/27/99	---	---	---	---	---	---	---	---	---	3
	06/02/99	---	---	---	---	---	---	---	---	---	3
	07/20/99	---	---	---	---	---	---	---	---	---	2
	08/11/99	---	---	---	---	---	---	---	---	---	2
	09/14/99	---	---	---	---	---	---	---	---	---	2
	10/21/99	---	---	---	---	---	---	---	---	---	2
	11/02/99	---	---	---	---	---	---	---	---	---	2
	02/09/00	1150	610	59	20	100	5	83	150	240	3
	02/09/01	---	---	---	---	---	---	---	---	---	3
No. 124	06/20/90	660	380	38	4	92	3	97	48	153	13
8S/2W-11R1	07/22/93	690	430	42	5	89	3	90	57	159	17
	07/18/95	---	---	---	---	---	---	---	---	---	11
	10/26/99	700	420	45	4	94	3	97	61	160	16
	07/06/00	---	---	---	---	---	---	---	---	---	17
	07/10/01	---	---	---	---	---	---	---	---	---	16
No. 125	06/20/90	740	425	17	5	132	3	99	54	186	4
8S/2W-12H	06/10/93	770	450	18	5	140	3	150	60	131	3
	06/20/95	---	---	---	---	---	---	---	---	---	2
	06/09/97	---	---	---	---	---	---	---	---	---	2
	09/17/98	---	---	---	---	---	---	---	---	---	3
	06/03/99	720	440	10	3	135	2	89	76	170	<2
	11/02/99	---	---	---	---	---	---	---	---	---	3
	11/15/00	---	---	---	---	---	---	---	---	---	2
	07/24/01	---	---	---	---	---	---	---	---	---	4
No. 126	05/04/88	480	290	4	<1	106	<1	53	14	64	<1
8S/2W-15H	07/06/89	500	270	2	1	108	<1	55	11	98	<1
	07/18/95	540	315	1	<1	122	<1	72	11	122	<1
	07/07/97	---	---	---	---	---	---	---	---	---	<2
	07/16/97	---	---	---	---	---	---	---	---	---	0.2@N
	07/23/97	---	---	---	---	---	---	---	---	---	0.2@N
	08/20/97	---	---	---	---	---	---	---	---	---	0.4@N
	09/03/97	---	---	---	---	---	---	---	---	---	0.2@N
	09/17/97	---	---	---	---	---	---	---	---	---	0.2@N

TABLE D-4 (cont'd)

SANTA MARGARITA RIVER WATERSHED
WATER QUALITY DATA

WELLS SAMPLED BY RANCHO CALIFORNIA WATER DISTRICT

Site Location	Date Tested	Specific Conductance umhos	Total Dissolved Solids (mg/l)	Chemical Constituents - mg/l							
				Ca	Mg	Na	K	Cl	SO4	HCO3	NO3
No. 126	07/20/98	520	330	2	<1	120	<1	56	11	130	<2
8S/2W-15H	09/16/98	---	300	---	---	---	---	---	---	---	0.4@N
	04/14/99	---	---	---	---	---	---	---	---	---	2
	04/11/00	---	---	---	---	---	---	---	---	---	<2
	04/11/01	---	---	---	---	---	---	---	---	---	2
	07/12/01	530	300	2	<1	100	<1	53	12	140	<2
No. 128	07/06/89	400	230	27	3	54	2	59	7	101	25
7/3W-36M	07/08/92	390	230	21	2	59	2	55	1	110	24
	07/20/95	380	275	16	2	66	1	65	10	101	19
	07/07/97	---	---	---	---	---	---	---	---	---	15
	07/20/98	370	260	12	<1	71	1	48	11	110	14
	06/02/99	---	---	---	---	---	---	---	---	---	13
	06/08/01	---	---	---	---	---	---	---	---	---	14
	07/10/01	400	230	10	<1	68	<1	44	12	100	12
No. 129	11/29/89	430	260	16	3	66	2	71	16	92	9
7S/2W-20L	08/08/90	440	280	20	5	64	2	72	14	119	10
	04/01/92	---	---	---	---	---	---	---	---	---	12
	09/10/93	470	275	24	6	60	2	74	16	110	13
	08/09/96	460	270	19	3	67	2	70	15	100	11
	02/04/97	---	---	---	---	---	---	---	---	---	53
	12/20/00	550	330	44	13	47	2	81	14	130	20
	03/22/01	---	---	---	---	---	---	---	---	---	20
	04/17/01	---	---	---	---	---	---	---	---	---	20
	05/02/01	---	---	---	---	---	---	---	---	---	18
	06/08/01	---	---	---	---	---	---	---	---	---	20
No. 130	02/17/88	650	365	16	1	132	1	69	64	0	4
8S/2W-11R	02/14/91	640	365	4	<1	132	1	68	56	122	---
	04/24/91	---	---	---	---	---	---	---	---	---	3
	02/09/94	650	410	3	<1	148	1	81	72	146	4
	05/16/95	---	---	---	---	---	---	---	---	---	4
	02/05/97	780	450	4	<1	170	<1	78	82	150	5
	05/14/97	---	---	---	---	---	---	---	---	---	4
	04/14/99	---	---	---	---	---	---	---	---	---	5
	02/10/00	750	440	4	<1	170	<1	76	77	170	5
	04/12/00	---	---	---	---	---	---	---	---	---	5
	05/25/00	---	---	---	---	---	---	---	---	---	6
	05/24/01	---	---	---	---	---	---	---	---	---	6

TABLE D-4 (cont'd)

SANTA MARGARITA RIVER WATERSHED
WATER QUALITY DATA

WELLS SAMPLED BY RANCHO CALIFORNIA WATER DISTRICT

Site Location	Date Tested	Specific Conductance umhos	Total Dissolved Solids (mg/l)	Chemical Constituents - mg/l							
				Ca	Mg	Na	K	Cl	SO4	HCO3	NO3
No. 131	03/10/88	530	270	4	<1	108	1	57	52	31	1
8S/1W-12J	03/21/91	630	335	7	<1	120	1	74	65	98	3
	03/03/94	660	345	9	<1	124	2	86	73	119	2
	03/30/95	---	---	---	---	---	---	---	---	---	2
	03/20/97	660	370	6	<1	125	1	81	73	100	2
	07/07/97	---	---	---	---	---	---	---	---	---	<2
	07/27/98	---	---	---	---	---	---	---	---	---	2
	06/03/99	---	---	---	---	---	---	---	---	---	<2
	03/07/00	720	380	9	<1	140	2	81	80	130	3
	06/21/00	---	---	---	---	---	---	---	---	---	2
	06/27/01	---	---	---	---	---	---	---	---	---	2
No. 132	04/18/88	1000	620	94	13	103	6	109	153	235	2
8S/1W-07D	05/08/91	920	590	64	19	110	5	100	160	201	<1
	05/13/94	730	460	50	15	78	5	73	110	195	1
	05/16/95	---	---	---	---	---	---	---	---	---	<1
	07/18/95	860	520	59	17	100	4	90	130	223	1
	07/20/98	900	590	69	20	110	5	89	150	230	2
	01/06/99	---	---	---	---	---	---	---	---	---	2
	02/03/99	---	---	---	---	---	---	---	---	---	2
	04/14/99	---	---	---	---	---	---	---	---	---	3
	06/03/99	---	---	---	---	---	---	---	---	---	3
	07/27/99	---	---	---	---	---	---	---	---	---	5
	08/11/99	---	---	---	---	---	---	---	---	---	4
	09/15/99	---	---	---	---	---	---	---	---	---	4
	10/21/99	---	---	---	---	---	---	---	---	---	4
	11/02/99	---	---	---	---	---	---	---	---	---	3
	12/15/99	---	---	---	---	---	---	---	---	---	3
	05/03/00	---	---	---	---	---	---	---	---	---	2
	05/16/01	800	500	57	17	74	5	63	180	150	3
No. 133	03/28/90	970	605	50	20	112	5	120	131	235	3
8S/1W-7C	03/11/93	970	580	48	19	120	4	110	140	204	3
	06/06/95	---	---	---	---	---	---	---	---	---	2
	07/18/95	850	680	26	10	142	2	120	100	174	2
	06/23/97	---	---	---	---	---	---	---	---	---	3
	07/20/98	790	500	24	9	140	2	96	93	170	2
	08/02/00	---	---	---	---	---	---	---	---	---	3
	03/28/01	800	460	22	10	130	2	98	100	170	<2
	08/02/01	---	---	---	---	---	---	---	---	---	<2

TABLE D-4 (cont'd)

SANTA MARGARITA RIVER WATERSHED
WATER QUALITY DATA

WELLS SAMPLED BY RANCHO CALIFORNIA WATER DISTRICT

Site Location	Date Tested	Specific Conductance umhos	Total Dissolved Solids (mg/l)	Chemical Constituents - mg/l Ca	Mg	Na	K	Cl	SO4	HCO3	NO3
No. 135	05/24/89	2450	1390	122	65	300	2	410	225	464	33
7S/3W-27M	06/06/90	1540	945	73	36	215	1	250	150	323	13
	12/11/90	4400	2670	270	109	480	4	1030	380	314	<1
	08/06/92	1800	810	63	33	170	1	200	160	281	---
	01/16/97	---	---	---	---	---	---	---	---	---	3.7 @N
	02/04/97	---	---	---	---	---	---	---	---	---	3.5 @N
	02/12/97	---	---	---	---	---	---	---	---	---	4.0 @N
	02/20/97	---	---	---	---	---	---	---	---	---	3.4 @N
	02/25/97	---	---	---	---	---	---	---	---	---	3.4 @N
	03/04/97	---	---	---	---	---	---	---	---	---	3.7 @N
	03/18/97	---	---	---	---	---	---	---	---	---	3.3 @N
	03/25/97	---	---	---	---	---	---	---	---	---	3.5 @N
	04/08/97	---	---	---	---	---	---	---	---	---	3.4 @N
	04/15/97	---	---	---	---	---	---	---	---	---	3.4 @N
	04/22/97	---	---	---	---	---	---	---	---	---	3.5 @N
	05/06/97	1930	1050	97	48	220	2	340	190	360	3.3 @N
	05/14/97	---	---	---	---	---	---	---	---	---	3.4 @N
	05/21/97	---	---	---	---	---	---	---	---	---	3.3 @N
	06/04/97	---	---	---	---	---	---	---	---	---	3.3 @N
	06/11/97	---	---	---	---	---	---	---	---	---	3.3 @N
	06/18/97	---	---	---	---	---	---	---	---	---	3.3 @N
	06/25/97	---	---	---	---	---	---	---	---	---	3.3 @N
	07/02/97	---	---	---	---	---	---	---	---	---	3.3 @N
	09/17/97	1960	1260	---	---	---	---	430	220	---	13
No. 138	10/30/90	460	240	19	2	74	2	71	13	113	18
8S/2W-6F	10/06/93	420	240	11	<1	70	1	56	10	92	14
	10/11/96	430	270	9	<1	78	1	55	8.9	100	15
	04/14/99	---	---	---	---	---	---	---	---	---	5
	06/03/99	---	---	---	---	---	---	---	---	---	3
	10/26/99	430	240	10	<1	76	1	60	11	100	19
	03/13/00	---	---	---	---	---	---	---	---	---	5
	03/22/01	---	---	---	---	---	---	---	---	---	17
No. 139	12/29/87	460	295	24	7	65	1	60	11	104	7
7S/2W-32G	11/23/92	450	275	32	9	46	2	60	13	134	20
	12/19/95	500	298	36	12	50	2	72	12	156	2.8
	03/25/97	---	---	---	---	---	---	---	---	---	10
	03/13/00	---	---	---	---	---	---	---	---	---	9
	03/28/01	---	---	---	---	---	---	---	---	---	8

TABLE D-4 (cont'd)

SANTA MARGARITA RIVER WATERSHED
WATER QUALITY DATA

WELLS SAMPLED BY RANCHO CALIFORNIA WATER DISTRICT

Site Location	Date Tested	Specific Conductance umhos	Total Dissolved Solids (mg/l)	Chemical Constituents - mg/l							
				Ca	Mg	Na	K	Cl	SO4	HCO3	NO3
No. 140	02/18/88	560	325	33	10	65	2	77	14	153	13
7S/2W-33F	01/15/92	450	235	11	2	88	1	68	18	107	2
	02/28/95	560	325	36	11	58	2	94	14	140	12
	03/25/97	---	---	---	---	---	---	---	---	---	8
	02/27/98	650	360	31	11	76	2	95	16	130	5
	09/17/98	---	---	---	---	---	---	---	---	---	8
	05/16/01	---	---	---	---	---	---	---	---	---	11
	02/01/01	650	370	31	12	72	2	110	21	150	4
No. 141	01/06/88	780	440	64	11	82	3	65	91	217	13
8S/2W-11P	01/30/92	820	500	63	13	95	3	79	110	238	19
	03/30/95	840	490	58	11	100	3	70	97	241	14
	03/25/97	---	---	---	---	---	---	---	---	---	15
	03/26/98	760	480	62	12	90	3	69	86	230	16
	01/04/99	---	---	---	---	---	---	---	---	---	14
	02/12/99	---	---	---	---	---	---	---	---	---	19
	10/21/99	---	---	---	---	---	---	---	---	---	17
	11/03/99	---	---	---	---	---	---	---	---	---	14
	12/14/99	---	---	---	---	---	---	---	---	---	14
	06/20/00	---	---	---	---	---	---	---	---	---	15
	01/04/01	700	450	52	6	84	3	75	70	190	15
	09/28/01	---	---	---	---	---	---	---	---	---	18
No. 143	01/15/88	670	345	8	2	134	1	91	57	95	11
8S/2W-17J	10/17/90	660	345	25	4	112	2	89	62	140	12
	03/03/94	690	370	24	3	114	2	93	68	131	11
	03/30/95	---	---	---	---	---	---	---	---	---	11
	03/25/97	600	330	15	2	110	1	87	44	89	9
	07/18/97	---	---	---	---	---	---	---	---	---	2.0 @N
	07/23/97	---	---	---	---	---	---	---	---	---	2.0 @N
	08/20/97	---	---	---	---	---	---	---	---	---	2.3 @N
	09/03/97	---	---	---	---	---	---	---	---	---	2.2 @N
	09/17/97	---	---	---	---	---	---	---	---	---	2.0 @N
	09/17/98	---	350	---	---	---	---	---	---	---	2.3 @N
	10/21/99	---	---	---	---	---	---	---	---	---	13
	03/07/00	730	400	21	3	120	2	84	68	140	12
	10/13/00	---	---	---	---	---	---	---	---	---	8

TABLE D-4 (cont'd)

SANTA MARGARITA RIVER WATERSHED
WATER QUALITY DATA

WELLS SAMPLED BY RANCHO CALIFORNIA WATER DISTRICT

Site Location	Date Tested	Specific Conductance umhos	Total Dissolved Solids (mg/l)	Chemical Constituents - mg/l							
				Ca	Mg	Na	K	Cl	SO4	HCO3	NO3
No. 144	09/14/88	610	335	8	<1	114	1	95	33	92	<1
7S/3W-27D3	12/19/95	730	420	34	1	124	1	120	33	186	<1
	12/20/00	690	400	28	1	120	<1	120	35	170	<2
	05/22/01	---	---	---	---	---	---	---	---	---	<2
No. 145	10/04/90	800	490	43	8	110	2	110	78	171	<1
7S/3W-28C	10/06/93	650	375	23	3	106	1	85	58	146	<1
	11/27/96	650	340	26	2	110	1	87	48	150	<2
	02/04/97	670	370	24	2	110	1	87	55	160	<2
	01/28/98	---	---	---	---	---	---	---	---	---	<2
	01/04/99	---	---	---	---	---	---	---	---	---	<2
	10/26/99	690	400	29	3	110	1	96	61	170	<2
	01/06/00	---	---	---	---	---	---	---	---	---	<2
	01/25/01	---	---	---	---	---	---	---	---	---	<2
No. 146	12/10/96	900	500	57	23	98	<1	100	64	280	15
7S/3W-28	03/02/00	---	---	---	---	---	---	---	---	---	4
No. 149	06/15/93	---	---	---	---	---	---	---	---	---	5
8S/1W-2C											
No. 149A	08/26/88	950	540	71	211	96	1	115	47	302	18
7S/3W-28A	10/31/91	800	480	36	13	122	3	93	110	195	---
No. 150	09/29/88	1950	1235	134	29	225	2	290	220	390	15
7S/3W-27P	12/21/91	1000	590	74	17	108	4	130	110	207	---
No. 151	09/20/88	5780	3410	280	114	840	5	1660	670	369	<1
7S/3W-34B											
Abandoned											
No. 151	07/25/91	860	485	53	16	103	4	90	130	183	---
8S/2W-2G	07/28/91	730	400	39	12	100	3	91	58	177	---
	07/29/91	600	340	9	2	122	5	63	34	204	---
	10/17/91	510	295	3	<1	118	1	45	10	137	---
	08/10/94	550	340	3	<1	110	1	59	22	119	<1
	06/16/97	---	---	---	---	---	---	---	---	---	<2
	08/14/97	540	300	2	<1	110	<1	44	10	160	<2
	09/16/98	---	---	---	---	---	---	---	---	---	<2
	01/06/00	510	300	1	<1	110	<1	33	4.6	180	<2

TABLE D-4 (cont'd)

SANTA MARGARITA RIVER WATERSHED
WATER QUALITY DATA

WELLS SAMPLED BY RANCHO CALIFORNIA WATER DISTRICT

Site Location	Date Tested	Specific Conductance umhos	Total Dissolved Solids (mg/l)	Chemical Constituents - mg/l							
				Ca	Mg	Na	K	Cl	SO4	HCO3	NO3
No. 153	12/29/93	804	485	53	18	92	5	86	120	214	<1
8S/1W-5K3	04/13/99	880	540	63	23	79	5	68	220	150	<2
	04/11/00	---	---	---	---	---	---	---	---	---	2
	06/14/01	---	---	---	---	---	---	---	---	---	<2
No. 154	01/28/94	930	530	46	20	106	6	89	130	214	3
8S/1W-5L2											
No. 155	09/16/93	680	355	22	2	108	1	90	64	104	<1
7S/3W-28C	02/23/95	760	445	30	3	126	1	120	82	140	4
	06/06/95	---	---	---	---	---	---	---	---	---	5
	08/14/97	---	---	---	---	---	---	---	---	---	4
	02/25/98	880	540	43	5	130	1	100	100	190	5
	07/27/98	---	---	---	---	---	---	---	---	---	3
	02/09/00	---	---	---	---	---	---	---	---	---	2
	09/13/00	690	410	23	2	120	<1	100	72	130	2
	02/14/01	---	---	---	---	---	---	---	---	---	5
No. 157	04/13/99	930	600	59	21	110	7	95	150	240	<2
8S/1W-5L	04/11/00	---	---	---	---	---	---	---	---	---	2
	06/14/01	---	---	---	---	---	---	---	---	---	<2
No. 158	06/21/94	1090	620	67	23	124	7	120	170	259	---
8S/1W-5K	04/14/99	1050	660	63	24	120	7	110	160	270	<2
	04/11/00	---	---	---	---	---	---	---	---	---	2
	06/14/01	---	---	---	---	---	---	---	---	---	2
No. 201	03/28/91	530	315	19	6	83	2	83	16	110	2
7S/2W-27J	03/11/93	460	300	8	2	87	1	51	20	146	<1
No. 202	12/11/88	740	440	47	18	84	3	97	48	223	17
7S/2W-36J1											
No. 203	05/18/88	960	580	50	39	110	4	96	115	275	---
8S/1W-6P1	06/29/88	970	530	44	36	112	4	120	123	250	5
	06/12/91	800	415	21	17	108	3	91	90	174	2
	06/22/94	980	645	59	38	99	4	130	130	256	4
	06/07/95	---	---	---	---	---	---	---	---	---	5
	06/23/97	880	530	31	26	120	3	100	110	230	4
	08/14/97	---	---	---	---	---	---	---	---	---	3
	11/02/99	---	---	---	---	---	---	---	---	---	5
	06/22/00	820	580	94	18	58	<1	63	110	250	22
	07/12/00	880	570	43	33	120	3	100	130	240	7
	08/08/00	---	---	---	---	---	---	---	---	---	6
	11/22/00	---	---	---	---	---	---	---	---	---	5

TABLE D-4 (cont'd)

SANTA MARGARITA RIVER WATERSHED
WATER QUALITY DATA

WELLS SAMPLED BY RANCHO CALIFORNIA WATER DISTRICT

Site Location	Date Tested	Specific Conductance umhos	Total Dissolved Solids (mg/l)	Chemical Constituents - mg/l							
				Ca	Mg	Na	K	Cl	SO4	HCO3	NO3
No. 204	05/22/91	740	425	50	12	85	3	120	18	198	19
7S/2W-26G	05/13/94	690	375	37	7	85	3	130	19	125	19
No. 205	03/28/88	500	290	23	3	81	2	83	27	107	21
7S/3W-35A	03/13/91	490	275	22	3	75	2	62	23	113	21
	03/03/94	510	275	20	2	72	2	72	24	104	20
	04/26/95	---	---	---	---	---	---	---	---	---	22
	03/25/97	480	270	20	2	75	2	66	18	110	21
	05/09/01	410	270	21	3	67	1	60	17	120	23
No. 207	09/01/88	510	245	1	<1	108	<1	54	26	82	<1
8S/2W-14B	09/14/88	480	305	3	<1	106	<1	58	23	24	1
	08/14/91	480	245	1	<1	100	<1	52	28	55	<1
	08/10/94	440	285	2	<1	91	1	56	29	76	2
	08/15/97	510	280	2	<1	97	<1	52	25	98	<2
	07/27/98	---	---	---	---	---	---	---	---	---	2
	12/27/00	480	280	2	<1	100	<1	53	30	120	2
No. 208	09/01/88	680	415	44	15	77	3	119	14	186	18
7S/2W-35M	09/14/88	690	440	44	14	77	3	129	14	183	16
	08/14/91	600	340	23	7	89	2	85	18	162	4
	08/10/94	560	370	22	6	89	2	93	20	156	5
	06/06/95	---	---	---	---	---	---	---	---	---	4
	08/12/96	---	---	---	---	---	---	---	---	---	2
	07/27/99	---	---	---	---	---	---	---	---	---	15
	08/18/99	---	---	---	---	---	---	---	---	---	20
No. 209	05/22/91	790	435	40	14	105	2	150	35	162	8
7S/2W-28J	05/13/94	760	525	64	22	48	3	150	15	153	25
	06/20/95	---	---	---	---	---	---	---	---	---	5
	05/15/97	690	390	10	3	130	<1	110	56	130	1.3
No. 210	04/15/59	1366	---	101	23	150	10	149	200	275	3
8S/2W-12K	01/18/63	400	926	99	30	17.5	4.5	145	255	329	4
	11/30/67	1415	890	136	5	152	10	146	230	305	3
	07/26/68	1250	825	96	22	144	8	130	190	290	5
	09/06/68	1310	840	82	26	132	5	142	222	276	12
	07/19/73	1200	579	84	21.4	149	6.8	122	237	301	19.7
	08/08/75	1140	695	84	14	150	6	101	190	287	15
	06/22/76	1240	675	76	26	142	7	101	205	278	36
	10/13/76	1120	640	92	22	100	6	110	170	262	5

TABLE D-4 (cont'd)

SANTA MARGARITA RIVER WATERSHED
WATER QUALITY DATA

WELLS SAMPLED BY RANCHO CALIFORNIA WATER DISTRICT

Site Location	Date Tested	Specific Conductance umhos	Total Dissolved Solids (mg/l)	Chemical Constituents - mg/l							
				Ca	Mg	Na	K	Cl	SO4	HCO3	NO3
No. 210 (Cont'd)	06/16/77	1130	610	84	18	114	6	110	170	259	11
8S/2W-12K	05/20/80	580	340	30	8	75	4	51	67	152	9
	04/03/86	800	540	65	17	86	4.5	75	112	235	3.5
	07/15/86	830	560	72	19	86	4	87	118	250	4
	03/28/88	1030	575	76	22	93	5	99	143	247	4
	09/25/91	1040	600	74	20	120	5	120	160	238	5
	09/19/94	645	460	52	14	79	4	70	100	198	2
	09/16/96	---	---	---	---	---	---	---	---	---	3
	09/16/98	---	---	---	---	---	---	---	---	---	3
	12/15/98	---	---	---	---	---	---	---	---	---	2
	01/04/99	---	---	---	---	---	---	---	---	---	2
	02/03/99	---	---	---	---	---	---	---	---	---	2
	04/08/99	---	---	---	---	---	---	---	---	---	3
	06/02/99	---	---	---	---	---	---	---	---	---	3
	09/07/99	---	---	---	---	---	---	---	---	---	4
	10/21/99	---	---	---	---	---	---	---	---	---	5
	12/15/99	---	---	---	---	---	---	---	---	---	5
	05/03/00	---	---	---	---	---	---	---	---	---	5
	09/13/00	830	560	64	17	100	4	74	190	180	4
	05/08/01	---	---	---	---	---	---	---	---	---	4
No. 211	04/08/97	720	400	67	14	54	1	59	65	220	13
8S/2W-20R1	12/23/97	---	410	---	---	---	---	---	---	---	3.1@N
	03/25/98	---	620	---	---	---	---	---	---	---	3.6@N
	06/03/98	---	---	---	---	---	---	---	---	---	3.4@N
	06/05/98	---	480	---	---	---	---	---	---	---	---
	09/17/98	---	---	---	---	---	---	---	---	---	3.3@N
	12/17/98	---	430	---	---	---	---	56	66	---	16
	06/03/99	---	430	---	---	---	---	---	---	---	3.4@N
	12/14/99	---	310	---	---	---	---	---	---	---	10
	04/04/00	700	430	71	14	52	1	57	66	220	17
	06/22/00	---	400	---	---	---	---	---	---	---	15
	12/13/00	---	---	---	---	---	---	---	---	---	4.5@N
	03/27/01	---	---	---	---	---	---	---	---	---	4.5@N
	06/20/01	---	---	---	---	---	---	---	---	---	2.7@N
	09/13/01	---	---	---	---	---	---	---	---	---	4.7@N
No. 212	03/28/88	640	330	42	2	74	3	81	33	146	14
8S/2W-11N	09/25/91	600	320	41	2	82	4	86	35	146	14
No. 215	08/15/90	650	380	40	13	71	3	100	14	162	11
7S/2W-34M	09/26/90	---	---	---	---	---	---	---	---	---	13
	06/22/94	630	400	41	13	67	2	110	16	159	11
	06/16/97	630	370	29	9	81	2	110	16	160	6
	08/15/97	---	---	---	---	---	---	---	---	---	7

TABLE D-4 (cont'd)

SANTA MARGARITA RIVER WATERSHED
WATER QUALITY DATA

WELLS SAMPLED BY RANCHO CALIFORNIA WATER DISTRICT

Site Location	Date Tested	Specific Conductance umhos	Total Dissolved Solids (mg/l)	Chemical Constituents - mg/l							
				Ca	Mg	Na	K	Cl	SO4	HCO3	NO3
No. 216	06/01/88	480	280	25	4	65	2	71	11	134	---
8S/2W-7W	06/29/88	480	275	29	5	59	3	81	7	110	26
	06/12/91	500	285	30	5	59	2	76	9	113	23
	05/27/92	470	285	33	6	53	2	72	10	119	20
	04/25/01	490	300	28	4	55	2	74	13	120	12
No. 217	03/28/88	580	285	8	1	108	1	81	20	113	15
8S/2W-17M1	08/10/88	570	280	8	1	105	1	82	20	55	13
	08/14/91	570	305	17	2	99	2	74	28	134	16
	08/10/94	610	365	20	3	97	2	82	38	134	16
	08/15/97	660	370	20	3	107	1	80	41	130	13
	05/09/00	---	---	---	---	---	---	---	---	---	15
	10/12/00	650	380	19	2	110	1	81	49	150	16
	05/14/01	---	---	---	---	---	---	---	---	---	17
No. 231	08/15/90	1280	805	126	18	120	5	100	310	244	9
8S/2W-20B6	09/26/90	---	---	---	---	---	---	---	---	---	6
	03/04/92	1700	1270	180	51	160	6	140	510	332	5
	06/20/95	1640	1300	171	44	124	6	75	520	287	5.3
	02/27/98	---	---	---	---	---	---	---	---	---	3
	05/16/00	---	---	---	---	---	---	---	---	---	5
	05/24/01	1490	1080	140	35	120	5	120	340	330	3
No. 232	08/15/90	960	590	71	19	110	5	98	130	235	30
8S/2W-11J3	09/26/90	---	---	---	---	---	---	---	---	---	35
	09/25/91	980	565	74	19	106	5	98	120	244	37
	09/19/94	805	495	54	14	92	4	80	110	207	15
	09/13/96	---	---	---	---	---	---	---	---	---	22
	11/04/97	1000	660	76	20	110	4	97	130	230	29
	07/27/98	---	---	---	---	---	---	---	---	---	38
	12/10/98	---	---	---	---	---	---	---	---	---	22
	01/06/98	---	---	---	---	---	---	---	---	---	30
	01/29/99	---	---	---	---	---	---	---	---	---	10
	02/03/99	---	---	---	---	---	---	---	---	---	26
	02/24/99	---	---	---	---	---	---	---	---	---	37
	04/08/99	---	---	---	---	---	---	---	---	---	33
	04/21/99	---	---	---	---	---	---	---	---	---	34
	06/23/99	---	---	---	---	---	---	---	---	---	33
	07/08/99	---	---	---	---	---	---	---	---	---	36
	08/25/99	---	---	---	---	---	---	---	---	---	33
	09/21/99	---	---	---	---	---	---	---	---	---	31

TABLE D-4 (cont'd)

SANTA MARGARITA RIVER WATERSHED
WATER QUALITY DATA

WELLS SAMPLED BY RANCHO CALIFORNIA WATER DISTRICT

Site Location	Date Tested	Specific Conductance umhos	Total Dissolved Solids (mg/l)	Chemical Constituents - mg/l							
				Ca	Mg	Na	K	Cl	SO4	HCO3	NO3
No. 232 (cont'd)	10/06/99	---	---	---	---	---	---	---	---	---	30
8S/2W-11J3	11/17/99	---	---	---	---	---	---	---	---	---	32
	12/14/99	---	---	---	---	---	---	---	---	---	32
	01/18/00	---	---	---	---	---	---	---	---	---	31
	02/29/00	---	---	---	---	---	---	---	---	---	10
	03/21/00	---	---	---	---	---	---	---	---	---	25
	04/11/00	---	---	---	---	---	---	---	---	---	29
	05/25/00	---	---	---	---	---	---	---	---	---	26
	06/21/00	---	---	---	---	---	---	---	---	---	26
	07/11/00	---	---	---	---	---	---	---	---	---	25
	09/13/00	920	590	65	17	105	4	91	150	210	21
	10/06/00	---	---	---	---	---	---	---	---	---	18
	11/08/00	---	---	---	---	---	---	---	---	---	17
	12/13/00	---	---	---	---	---	---	---	---	---	20
	01/04/01	---	---	---	---	---	---	---	---	---	19
	02/28/01	---	---	---	---	---	---	---	---	---	10
	04/10/01	---	---	---	---	---	---	---	---	---	20
No. 233 (Old 112)	06/15/88	900	535	71	21	100	5	96	136	247	4
8S/2W-12K2	03/27/91	1020	580	66	19	114	5	95	140	247	12
	03/03/94	740	425	50	14	75	4	71	100	186	2
	04/27/95	---	---	---	---	---	---	---	---	---	6
	03/27/97	880	510	57	15	100	4	81	120	220	4
	01/04/99	---	---	---	---	---	---	---	---	---	5
	02/03/99	---	---	---	---	---	---	---	---	---	4
	04/08/99	---	---	---	---	---	---	---	---	---	4
	06/03/99	---	---	---	---	---	---	---	---	---	4
	07/20/99	---	---	---	---	---	---	---	---	---	5
	08/11/99	---	---	---	---	---	---	---	---	---	4
	09/07/99	---	---	---	---	---	---	---	---	---	4
	10/21/99	---	---	---	---	---	---	---	---	---	5
	11/03/99	---	---	---	---	---	---	---	---	---	4
	04/11/00	970	570	64	18	110	4	85	150	230	4
	10/06/00	---	---	---	---	---	---	---	---	---	3
No. 234 (Old 114)	03/31/88	840	480	54	15	100	4	61	109	241	18
8S/2W-11P	03/27/91	1020	605	69	19	114	5	77	138	256	37
	06/20/95	---	---	---	---	---	---	---	---	---	11
	09/26/96	---	---	---	---	---	---	---	---	---	9

TABLE D-4 (cont'd)

SANTA MARGARITA RIVER WATERSHED
WATER QUALITY DATA

WELLS SAMPLED BY RANCHO CALIFORNIA WATER DISTRICT

Site Location	Date Tested	Specific Conductance umhos	Total Dissolved Solids (mg/l)	Chemical Constituents - mg/l							
				Ca	Mg	Na	K	Cl	SO4	HCO3	NO3
No. 234 (cont'd)	02/04/97	---	---	---	---	---	---	---	---	---	12
(Old 114)	04/25/97	840	500	56	15	95	4	77	120	230	8
8S/2W-11P	01/19/99	---	---	---	---	---	---	---	---	---	12
	02/12/99	---	---	---	---	---	---	---	---	---	16
	04/21/99	---	---	---	---	---	---	---	---	---	15
	06/03/99	---	---	---	---	---	---	---	---	---	16
	07/27/99	---	---	---	---	---	---	---	---	---	18
	08/19/99	---	---	---	---	---	---	---	---	---	17
	09/21/99	---	---	---	---	---	---	---	---	---	16
	10/26/99	---	---	---	---	---	---	---	---	---	13
	04/13/00	900	550	64	18	10	4	70	150	220	13
	07/06/00	---	---	---	---	---	---	---	---	---	12
	07/12/01	---	---	---	---	---	---	---	---	---	7
	08/02/01	---	---	---	---	---	---	---	---	---	<2
No. 235 (Old 137)	06/24/88	460	310	40	10	41	2	58	10	140	15
8S/3W-1Q1	06/20/90	420	230	22	4	56	2	50	6	128	18
	06/10/93	370	235	15	2	65	2	51	9	113	17
	07/16/96	410	230	16	2	60	1	48	8.9	110	20
	06/09/97	---	---	---	---	---	---	---	---	---	17
	06/03/99	390	240	13	1	63	1	46	6.7	98	17
	11/03/99	---	---	---	---	---	---	---	---	---	16
	11/09/00	---	---	---	---	---	---	---	---	---	15
No. 301	07/29/92	500	290	20	6	80	1	45	56	143	<1
7S/3W-18Q1	02/27/97	580	350	45	16	48	2	49	54	200	4
	08/15/97	---	---	---	---	---	---	---	---	---	6
	12/27/00	570	360	49	15	53	2	55	57	180	7
No. 302	04/11/88	690	360	36	6	100	1	77	65	192	<1
7S/3W-18H	05/15/91	760	425	58	9	87	2	83	72	220	<1
	05/14/92	---	270	12	2	90	<1	48	48	---	---
	05/05/94	870	530	69	16	84	2	110	88	238	<1
	05/16/95	---	---	---	---	---	---	---	---	---	<1
	07/16/96	530	320	---	---	---	---	60	54	---	2
	05/13/97	560	500	73	14	94	2	110	86	240	<2
	07/27/99	---	---	---	---	---	---	---	---	---	<2
	05/17/00	520	320	11	1	99	<1	51	50	130	<2
	06/13/00	520	310	---	---	---	---	---	---	---	<2
	07/11/00	---	---	---	---	---	---	---	---	---	<2

TABLE D-4 (cont'd)

SANTA MARGARITA RIVER WATERSHED
WATER QUALITY DATA

WELLS SAMPLED BY RANCHO CALIFORNIA WATER DISTRICT

Site Location	Date Tested	Specific Conductance umhos	Total Dissolved Solids (mg/l)	Chemical Constituents - mg/l							
				Ca	Mg	Na	K	Cl	SO4	HCO3	NO3
No. 309	08/15/90	690	370	19	3	119	2	140	25	73	5
7S/3W-27H	04/11/91	---	---	---	---	---	---	---	---	---	<.001
	09/25/91	730	365	19	2	122	2	150	27	82	5
	08/11/94	730	430	20	2	120	2	160	30	73	5
	02/16/95	---	---	---	---	---	---	---	---	---	18
	07/16/97	---	---	---	---	---	---	---	---	---	1.1@N
	07/23/97	---	---	---	---	---	---	---	---	---	1.2@N
	08/20/97	---	---	---	---	---	---	---	---	---	1.1@N
	09/03/97	---	---	---	---	---	---	---	---	---	1.1@N
	09/18/97	---	---	---	---	---	---	---	---	---	1.1@N
	10/03/97	790	520	21	2	130	2	170	33	85	6
	08/06/98	---	---	---	---	---	---	---	---	---	6
	09/16/98	---	460	---	---	---	---	---	---	---	1.4@N
	07/20/99	---	---	---	---	---	---	---	---	---	6
	05/10/00	---	450	20	2	130	<1	---	---	85	---
	07/06/00	---	---	---	---	---	---	---	---	---	6
	08/02/00	740	450	21	2	140	1	180	38	87	7
	07/19/01	---	---	---	---	---	---	---	---	---	7

TABLE D-5

SANTA MARGARITA RIVER WATERSHED

WATER QUALITY DATA

WELLS ON INDIAN RESERVATIONS

Site Location	Date Tested	Specific Conductance umhos	Total Dissolved Solids (mg/l)	Chemical Constituents - mg/l Ca	Mg	Na	K	Cl	SO4	CO3	NO3
Pechanga Indian Reservation											
8S/2W-28R01	08/03/89	495	286	41	4.0	60	0.9	37	13	177	1.1 @N
	07/26/90	525	296	48	4.8	54	1.0	45	14	191	1.5 @N
	07/17/91	462	261	31	3.2	66	0.8	44	12	155	.8 @N
	07/27/93	445	269	44	4.4	43	0.5	28	14	170	1.9 @N
	08/15/94	421	232	32	3.3	55	0.9	28	11	156	1.5 @N
	08/30/95	375	200	21	2.2	55	0.6	31	11	129	.7 @N
	08/27/96	---	---	---	---	---	---	---	---	---	1.5 @N
	08/13/97	398	241	20	2.1	59	0.62	37	11	130	.572 @N
	08/20/98	481	282	36	3.9	60	0.85	38	14	167	1.1 @N
	08/25/99	446	252	28	3.1	59	0.66	41	12	---	.758@N
	08/22/00	456	265	29	3.3	61	0.73	39	14	---	.759@N
	08/21/01	522	320	51	5.9	48	1	42	16	---	1.73@N
8S/2W-35D01	08/03/89	660	358	43	5.5	87	1.2	78	35	169	.35 @N
	07/26/90	669	384	41	4.9	92	1.5	82	36	176	.40 @N
	07/17/91	641	371	40	4.4	98	1.7	81	36	175	.39 @N
	07/27/93	638	374	49	5.9	79	1.8	71	27	199	.34 @N
	08/16/94	601	334	30	3.2	95	1.5	71	29	163	.16 @N
	08/30/95	587	322	33	4	81	1.5	68	25	178	.11 @N
	08/27/96	596	352	28	3.3	92	1.4	72	29	167	.10 @N
8S/2W-29A01	08/02/89	346	207	31	11	24	0.4	18	7.0	131	2.0 @N
	07/24/90	354	193	32	11	25	0.4	24	6.7	133	2.0 @N
	07/18/91	361	194	32	10	26	0.4	25	6.0	134	1.8 @N
	08/15/94	363	216	33	12	25	0.5	24	7.7	132	2.6 @N
	08/31/95	363	208	32	11	23	0.4	21	8.1	137	2.6 @N
	08/28/96	---	---	---	---	---	---	---	---	---	2.9 @N
	08/12/97	368	238	32	12	24	0.44	22	7.4	138	3.05 @N
	08/19/98	411	246	36	11	31	0.45	25	8.2	153	2.94@N
	08/25/99	375	222	33	12	23	0.39	20	6.7	---	3.81@N
	08/22/00	374	237	33	12	24	0.42	18	7.3	---	3.48@N
	08/21/01	374	236	34	12	24	0.46	20	7.3	---	3.56@N
8S/2W-34B04	10/05/89	617	371	51	8.2	67	1	58	30	192	.47 @N
	07/26/90	605	341	50	8	65	1	61	31	194	.50 @N
	07/18/91	564	339	46	7.4	67	1	53	27	185	.87 @N
	07/27/93	267	170	18	2.8	34	0.5	14	9.7	96	1.10 @N

* - Alkalinity as CAC02

TABLE D-5 (cont'd)

SANTA MARGARITA RIVER WATERSHED
WATER QUALITY DATA

WELLS ON INDIAN RESERVATIONS

Site Location	Date Tested	Specific Conductance umhos	Total Dissolved Solids (mg/l)	Chemical Constituents - mg/l Ca	Mg	Na	K	Cl	SO4	HCO3*	NO3
Pechanga Indian Reservation (Continued)											
8S/2W-28Q02	10/05/89	629	378	48	19	49	0.7	76	14	169	4.2 @N
	07/26/90	613	383	48	18	47	0.6	75	12	171	3.9 @N
	07/18/91	618	379	49	18	49	0.7	83	14	172	3.0 @N
	07/28/93	620	400	51	20	47	0.7	63	15	174	9.6 @N
	08/17/94	641	396	51	21	50	0.8	60	17	179	11.0 @N
	08/31/95	653	396	53	21	48	0.7	60	19	184	12.0 @N
	08/28/96	---	---	---	---	---	---	---	---	---	11.0 @N
	08/12/97	614	411	47	19	47	0.7	63	15	176	8.9 @N
	08/19/98	625	402	47	20	47	0.67	60	14	---	9.85@N
8S/2W-28Q06	09/17/93	312	200	19	2.9	43	1	16	2.8	126	1.0 @N
	08/30/95	310	174	16	3.4	46	0.6	16	3.8	131	1.4 @N
	08/13/97	300	186	11	1.4	55	0.59	17	2.7	122	1.16 @N
	08/20/98	434	247	12	0.7	79	0.6	57	15	111	<.05@N
8S/2W-28Q07	08/20/98	367	223	13	1.4	66	0.57	32	10	121	.731@N
	08/25/99	377	216	13	1.4	63	0.52	32	9.8	---	.760@N
	08/22/00	384	234	18	2.1	62	0.68	28	11	---	1.14@N
	08/21/01	402	242	22	2.5	60	0.81	33	12	---	1.03@N
8S/2W-20J01	08/15/90	1130	596	100	22	110	2.3	110	200	236	1.3 @N
	12/20/93	868	---	80	16	76	1.4	86	110	---	3.6 @N
8S/2W-20J02	08/15/90	404	216	42	6.3	38	0.8	27	12	159	1.2 @N
	12/20/93	408	---	42	6	35	0.8	29	12	---	1.2 @N
8S/2W-29B01	08/19/98	367	223	12	0.64	75	0.62	50	10	121	<.05@N
	08/26/99	393	219	12	0.72	68	0.56	46	11	---	<.05@N
	08/22/00	393	228	12	0.76	69	0.58	43	11	---	<.05@N
	08/21/01	398	231	11	0.62	72	0.57	49	15	---	.04@N
8S/2W-29B02	03/01/90	456	257	5.5	0.14	89	0.8	66	22	100	---
	03/06/90	456	256	5.9	0.13	90	0.7	66	20	99	<0.1 @N
8S/2W-29B03	03/06/90	478	275	14	1.9	84	0.8	65	16	123	<0.1 @N
8S/2W-29B05	03/02/90	397	229	29	9.5	43	1.2	35	4.9	141	1.8 @N

* - Alkalinity as CAC03

TABLE D-5 (cont'd)

SANTA MARGARITA RIVER WATERSHED
WATER QUALITY DATA

WELLS ON INDIAN RESERVATIONS

Site Location	Date Tested	Specific Conductance umhos	Total Dissolved Solids (mg/l)	Chemical Constituents - mg/l Ca	Mg	Na	K	Cl	SO4	HCO3*	NO3
Pechanga Indian Reservation (Continued)											
8S/2W-29B06	03/02/90	406	259	34	11	38	0.8	38	10	143	---
	03/06/90	427	240	32	11	40	1.0	40	8.1	148	1.2 @N
8S/2W-29B07	03/07/90	396	230	8.6	2.5	71	0.9	51	11	102	<0.1 @N
	08/16/90	371	199	8.4	1.8	69	0.8	50	14	106	<0.1 @N
8S/2W-29B08	03/07/90	464	272	31	9.4	52	1.2	58	12	134	0.45 @N
	08/16/90	458	261	34	9.1	48	1.1	59	17	135	0.4 @N
8S/2W-29B09	03/07/90	343	210	21	9.2	39	1.0	24	6.7	131	1.3 @N
	08/17/90	317	197	26	10	26	1.1	22	3.4	130	1.6 @N
8S/2W-28M03	08/26/99	562	319	38	13	52	0.77	68	15	---	2.59 @N
8S/2W-29J02	08/26/99	565	329	39	15	47	1.6	66	14	---	2.67 @N
	08/22/00	562	337	39	15	47	1.5	65	14	---	2.70@N
	08/21/01	574	351	40	15	50	1.6	70	15	---	2.63@N
Cahuilla Indian Reservation											
8S/3E-2K01	07/20/89	531	323	46	11	41	3.4	60	22	136	3.6 @N
	08/01/90	508	310	46	11	38	3.3	60	19	134	3.8 @N
	07/16/91	522	306	50	10	39	3.3	61	21	139	3.7 @N
7S/3E-21L01	08/02/89	1050	675	90	19	100	3.5	84	190	216	3.1 @N
	08/01/90	1020	610	87	18	100	3.4	85	180	217	3.0 @N
	07/17/91	995	636	93	18	100	3.7	95	180	206	2.5 @N
7S/2E-33N	08/02/89	355	206	16	2.1	53	3.5	48	15	78	.73 @N
7S/3E-34E01	07/20/89	338	204	30	5.6	26	5.0	29	7.0	98	3.3 @N
	07/31/91	337	109	31	5.5	25	4.5	31	6.3	99	3.5 @N
	07/16/91	335	209	31	5.9	26	4.7	32	6.3	99	3.5 @N

* - Alkalinity as CAC03

TABLE D-6

SANTA MARGARITA RIVER WATERSHED
WATER QUALITY DATA

WELLS ON CAMP PENDLETON

Site Location	Date Tested	Specific Conductance umhos	Total Dissolved Solids (mg/l)	Chemical Constituents - mg/l							
				Ca	Mg	Na	K	Cl	SO4	HCO3	NO3
10S/5W-26C1	10/60	1060	639	66.5	24.0	116.0	4.5	160	110.0	264.0	trace
(Bldg 2201)	06/62	1190	718	60.0	33.2	123.0	3.8	190	124.0	232.0	1.4
	07/64	1217	734	79.2	27.8	144.0	1.6	180	150.0	248.9	---
	05/65	1485	896	75.2	30.3	158.0	2.4	180	120.0	253.8	0
	01/66	---	808	76.8	33.2	157.0	3.4	170	180.0	292.8	0.62
	06/66	---	684	75.2	26.8	112.0	2.4	128	148.0	263.5	3.9
	01/67	---	856	81.6	26.3	138.0	3.5	162	140.0	310.0	3
	08/67	---	880	99.2	38.1	156.0	3.6	160	230.0	322.1	5.3
	02/68	---	768	65.6	25.4	156.0	3.4	160	164.0	236.7	0
	04/69	---	852	66.0	32.0	162.0	3.2	166	210.0	249.0	0
	11/69	---	844	87.0	31.0	140.0	3.6	164	180.0	262.0	0
	07/70	---	672	99.0	32.0	139.0	3	158	205.0	259.0	2.7
	12/70	1180	712	83.0	28.0	138.0	3	166	170.0	266.0	0
	09/71	1062	640	83.0	27.0	128.0	2.8	136	175.0	278.0	0.4
	05/72	1130	681	56.0	24.0	140.0	2.8	136	165.0	220.0	0
	10/72	1165	703	64.0	27.0	159.0	3.6	132	180.0	293.0	1.8
	10/73	1140	688	72.0	27.0	131.0	3.8	144	190.0	200.0	0.3@N
	02/76	1140	688	70.4	28.3	143.0	3.1	132	182.0	273.3	1.8@N
	09/76	1100	663	67.0	25.0	152.0	2.5	152	131.0	327.0	2.8@N
	03/77	1080	651	67.0	28.0	173.0	3.1	128	160.0	254.0	4.4@N
	10/78	1150	694	70.0	25.0	120.0	3.5	139	145.0	253.8	<1@N
	06/79	1100	663	72.0	27.3	125.0	3	134	142.0	258.6	<1@N
	10/80	1200	693	78.8	23.7	136.0	3.3	172	136.0	273.3	0.2@N
	04/81	1160	737	82.4	22.4	126.0	3.6	140	134.0	268.4	<0.5@N
	11/81	1300	863	97.6	31.5	169.0	2.2	204	209.0	248.9	0.8@N
	11/81	950	573	74.0	18.3	120.0	2.1	144	130.0	224.5	0.3@N
	05/82	1100	663	80.8	26.6	140.0	1.5	181	138.0	268.4	<0.5@N
	03/83	1000	603	84.0	20.5	144.0	3.2	152	143.0	273.3	<0.5@N
	05/84	1150	694	80.0	27.6	126.0	3.1	133	150.0	283.0	0.2@N
	06/85	1100	680	89.0	26.0	140.0	3	150	64.0	440.0	<0.4
	09/85	1242	724	78.0	28.0	122.0	6	154	149.1	244.4	<0.4
	05/86	1387	750	85.2	29.1	130.7	4.3	166	130.8	242.6	<1
	06/89	1302	734	78.1	23.0	85.9	---	136	145.0	212.0	<0.4
	01/91	1271	---	81.0	36.1	152.0	---	166	---	---	<0.04
	06/91	1290	752	99.0	32.4	133.0	---	167	136.0	237.0	<0.4
	03/92	1210	792	91.0	29.8	146.0	---	159	135.0	279.0	<0.4
	06/93	1290	764	68.3	27.5	149.0	---	168	130.0	265.0	<0.4
	03/94	1210	783	100.0	37.1	100.0	---	145	167.0	---	2.2
	08/94	1160	741	87.5	35.5	96.1	---	141	187.0	---	4.23

TABLE D-6 (cont'd)

SANTA MARGARITA RIVER WATERSHED
WATER QUALITY DATA

WELLS ON CAMP PENDLETON

Site Location	Date Tested	Specific Conductance umhos	Total Dissolved Solids (mg/l)	Chemical Constituents - mg/l Ca	Mg	Na	K	Cl	SO4	HCO3	NO3
10S/5W-26C1	06/95	1330	806	97.7	37.4	142.0	---	207	166.0	---	<0.04
(Bldg 2201)	01/96	1300	764	91.0	33.0	140.0	---	177	142.0	363.0	<0.0
(Continued)	06/96	1300	751	93.0	30.0	130.0	---	164	156.0	252.0	<0.0
	06/97	1215	758	88.0	29.0	130.0	<2	151	148.0	292.0	<2@N
	12/97	1200	690	81.0	29.0	140.0	3	155	150.0	250.0	ND
	04/98	1200	790	83.0	31.0	101.0	3	170	156.0	240.0	ND
	06/98	1230	714	85.0	30.0	136.0	3	163	ND	293.0	ND
	02/99	1250	731	84.0	29.0	127.0	3	160	140.0	281.0	ND
	04/99	1220	769	88.0	30.0	127.0	3	138	160.0	317.0	ND
	05/01	1300	794	98.0	36.0	130.0	3	173	179.0	317.0	ND
10S/4W-18M4	06/89	1156	688	74.6	24.4	67.9	---	130	138.0	197.0	8.9
(Bldg 2373)	01/90	1120	630	86.4	32.3	101.0	---	156	166.0	210.0	<0.05
	04/90	1160	720	98.8	34.8	107.0	---	152	146.0	218.0	1.4
	01/91	1202	---	84.1	40.5	117.0	---	162	153.0	---	<0.04
	06/91	1180	736	102.0	37.1	106.0	---	163	138.0	197.0	<0.4
	03/94	1020	658	69.6	27.8	104.0	---	135	140.0	---	0.89
	08/94	1110	684	81.4	32.2	178.0	---	144	157.0	---	<0.44
	06/95	1170	679	95.3	35.2	113.0	---	145	116.0	---	13.8
	06/96	1100	682	86.0	32.0	95.0	---	155	261.0	210.0	<0.0
	02/97	1180	640	79.0	32.0	110.0	---	142	162.0	190.0	<2@N
	06/97	1117	709	85.0	33.0	110.0	<5	150	164.0	223.0	<2@N
	12/97	1100	700	82.0	33.0	110.0	3	141	157.0	220.0	ND
	03/98	1100	710	83.0	33.0	100.0	3	182	158.0	150.0	ND
	06/98	1200	720	85.0	34.0	119.0	4	159	154.0	281.0	ND
	02/99	1020	613	70.0	30.0	85.0	4	130	85.0	179.0	8
	05/00	1020	709	91.0	33.0	94.0	4	146	149.0	220.0	ND
	08/00	1160	707	81.0	39.0	79.0	4	149	153.0	177.0	ND
	02/01	1200	736	85.0	35.0	116.0	4	164	180.0	244.0	ND
	04/01	1200	606	85.0	34.0	112.0	4	154	177.0	232.0	ND
	09/01	1250	761	90.0	37.0	115.0	4	166	188.0	232.0	ND
10S/5W-23J1	05/56	1090	685	61.5	24.3	142.0	---	142	110.0	293.0	0.06
(Bldg 2301)	12/56	1060	666	67.0	27.0	96.0	---	124	85.0	274.0	---
	12/57	---	780	66.3	23.9	159.0	---	138	155.0	308.0	10.6
	05/59	1100	691	75.2	25.3	112.0	---	136	152.0	297.7	---
	01/60	1120	704	72.7	27.3	116.5	---	112	144.0	291.0	---
	10/60	1045	657	63.2	21.4	99.0	3.6	140	112.0	242.0	0
	05/61	1280	770	76.0	36.5	136.0	3	124	195.0	299.6	0
	05/62	1133	712	68.8	30.3	136.0	2	128	175.0	275.7	---
	01/63	1111	698	72.0	35.1	127.0	2.8	128	199.0	268.4	---
	06/63	1108	696	78.4	25.4	118.0	2.9	148	130.0	258.6	0@N

ND - None Detected

TABLE D-6 (cont'd)

SANTA MARGARITA RIVER WATERSHED

WATER QUALITY DATA

WELLS ON CAMP PENDLETON

Site Location	Date Tested	Specific Conductance umhos	Total Dissolved Solids (mg/l)	Chemical Constituents - mg/l Ca	Mg	Na	K	Cl	SO4	HCO3	NO3
10S/5W-23J1	07/64	1165	732	74.4	27.8	128.0	1.2	139	160.0	268.4	---
(Bldg 2301)	05/65	1130	710	80.0	26.4	145.0	2.1	148	120.0	268.4	0.14
(Continued)	01/66	---	736	88.0	18.1	142.0	2.8	124	155.0	263.5	1.8
	06/66	---	736	75.2	29.3	138.0	2.7	145	175.0	295.2	4.8
	01/67	---	744	76.8	25.9	118.0	3	136	125.0	287.9	2.2
	08/67	---	680	70.4	28.3	128.0	2.3	140	100.0	292.8	8.4
	02/68	---	660	48.0	19.5	130.0	2.8	124	119.0	234.0	6.1
	04/69	---	708	70.0	28.0	126.0	2.5	128	170.0	278.0	0
	11/69	---	684	73.0	28.0	126.0	2.8	138	165.0	273.0	0
	05/70	---	716	74.0	25.0	122.0	0.1	134	170.0	210.0	4.4
	12/70	1090	385	78.0	25.0	126.0	2.6	142	170.0	250.0	3.1
	09/71	1025	644	75.0	38.0	120.0	2.7	124	190.0	229.0	0.9
	05/72	1050	660	75.0	21.0	124.0	2.3	124	155.0	244.0	2.2
	10/73	1140	716	74.0	22.0	128.0	2.8	136	160.0	220.0	0.5@N
	06/74	1060	680	74.0	13.0	131.0	2.9	158	138.0	220.0	0.01@N
	02/76	1050	660	73.6	25.4	136.0	2.9	119	170.0	248.9	2.0@N
	09/76	1100	691	58.0	32.0	146.0	2.6	140	148.0	321.8	2.6@N
	03/77	1080	679	69.0	29.0	110.0	3	128	155.0	259.0	4.3@N
	01/78	1100	691	70.0	23.0	147.0	3	140	135.0	259.0	4.4@N
	10/78	1150	723	74.0	22.0	120.0	2.9	134	149.0	248.9	<1@N
	04/79	1000	628	70.4	22.4	118.0	2.6	122	138.0	239.1	<1@N
	10/80	1150	745	74.0	22.5	128.0	3	152	138.0	239.1	0.2@N
	05/81	1020	580	67.2	17.3	116.0	3.1	132	111.0	205.0	<0.5@N
	03/83	900	599	65.6	19.5	129.0	2.8	136	129.0	234.2	<0.5@N
	12/83	1000	628	72.4	22.4	127.0	2.6	140	150.0	249.0	<0.1@N
	05/84	1100	691	78.8	25.9	120.0	2.8	130	150.0	254.0	0.2@N
	06/85	1100	691	59.0	26.0	130.0	3	140	70.0	440.0	3.5
	09/85	1203	705	66.0	26.0	110.0	6	150	144.0	226.6	<0.4
	06/89	1139	662	71.5	21.7	80.8	---	117	128.0	209.0	<0.4
	01/90	1150	632	90.6	32.4	102.0	---	160	170.0	214.0	<0.5
	01/91	1112	---	73.7	32.0	128.0	---	136	136.0	---	<0.04
	06/91	1090	662	87.4	29.7	117.0	---	140	121.0	204.0	<0.4
	03/92	1080	644	74.2	25.8	133.0	---	127	118.0	282.0	1.3
	03/93	1210	674	72.8	24.5	117.0	---	127	124.0	261.0	<0.4
	06/93	1090	670	63.9	25.7	119.0	---	117	128.0	237.0	<0.4
	03/94	1120	683	73.9	27.0	121.0	---	141	130.0	---	<0.4
	08/94	1160	707	78.9	28.2	129.0	---	139	153.0	---	<0.44
	06/95	1160	742	88.2	28.8	131.0	---	165	147.0	---	<0.04
	01/96	1300	690	79.0	29.0	140.0	---	147	131.0	292.0	<0.0
	06/96	1020	674	82.0	29.0	120.0	---	134	129.0	204.0	<0.0

TABLE D-6 (cont'd)

SANTA MARGARITA RIVER WATERSHED
WATER QUALITY DATA

WELLS ON CAMP PENDLETON

Site Location	Date Tested	Specific Conductance umhos	Total Dissolved Solids (mg/l)	Chemical Constituents - mg/l Ca	Mg	Na	K	Cl	SO4	HCO3	NO3
10S/5W-23J1	02/97	1100	650	74.0	27.0	150.0	---	126	172.0	245.0	<2@N
(Bldg 2301)	03/97	1073	630	77.0	28.0	130.0	---	142	134.0	254.0	<2@N
(Continued)	02/99	1180	647	75.0	27.0	125.0	3	150	130.0	272.0	ND
	04/99	1240	722	81.0	30.0	124.0	3	157	150.0	293.0	ND
	08/99	1180	735	79.0	29.0	120.0	3	190	183.0	281.0	ND
	12/99	1190	699	83.0	30.0	118.0	3	100	158.0	278.0	ND
	02/00	1110	723	81.0	30.0	116.0	3	90	163.0	293.0	ND
	05/00	1070	714	81.0	29.0	115.0	3	170	152.0	273.0	ND
	08/00	1200	735	80.0	29.0	117.0	3	150	118.0	275.0	ND
	02/01	1230	730	84.0	31.0	132.0	ND	158	158.0	293.0	ND
	04/01	1190	636	81.0	30.0	123.0	3	146	148.0	287.0	ND
	09/01	1300	751	88.0	32.0	132.0	3	155	160.0	293.0	ND
10S/4W-18E3	06/89	1166	758	80.5	28.1	67.4	---	132	157	198.0	9.5
(Bldg 2393)	01/90	1230	748	97.4	39.7	106.0	---	178	179	226.0	<0.05
	04/90	1190	733	99.6	37.5	112.0	---	159	156	207.0	2.5
	06/91	1130	680	97.6	37.6	100.0	---	139	142	166.0	2.7
	02/94	1180	731	83.3	35.5	104.0	---	142	159	---	11.1
	08/94	1150	725	84.3	35.2	102.0	---	147	164	---	1
	06/95	932	636	75.4	29.1	86.6	---	102	140	---	14
	06/96	1117	710	92.0	36.0	93.0	---	180	297	206.0	<0.0
	02/97	1100	686	89.0	38.0	110.0	---	157	166	220.0	<2@N
	03/97	1116	673	87.0	36.0	110.0	---	147	113	213.0	<2@N
	06/97	1131	779	90.0	37.0	99.0	<5	151	177	199.0	<2@N
	09/98	1160	727	83.0	36.0	90.0	3	160	181	232.0	ND
	10/99	1200	325	88.0	39.0	117.0	4	130	180	268.0	ND
	02/00	1100	739	84.0	37.0	100.0	4	130	180	281.0	ND
	05/00	1030	717	80.0	35.0	96.0	4	168	183	229.0	2
	02/01	1360	798	97.0	44.0	111.0	4	184	212	244.0	ND
	04/01	1310	728	94.0	42.0	114.0	4	168	208	232.0	ND
	09/01	1330	791	96.0	42.0	115.0	4	173	209	224.0	ND
10S/4W-7R2	06/89	1281	765	76.5	25.1	82.4	---	149	153	209.0	10.3
(Bldg 2603)	04/89	1270	788	104.0	36.5	126.0	---	173	161	215.0	2.6
	06/91	1400	836	111.0	41.1	130.0	---	195	155	215.0	0.04
	02/94	1260	738	83.3	32.0	131.0	---	169	155	---	<0.04
	08/94	1260	738	84.3	33.7	129.0	---	166	149	---	<0.44
	06/95	1290	897	93.6	35.2	129.0	---	202	164	---	0.69

ND - None Detected

TABLE D-6 (cont'd)

SANTA MARGARITA RIVER WATERSHED
WATER QUALITY DATA

WELLS ON CAMP PENDLETON

Site Location	Date Tested	Specific Conductance umhos	Total Dissolved Solids (mg/l)	Chemical Constituents - mg/l Ca	Mg	Na	K	Cl	SO4	HCO3	NO3
10S/4W-7R2	02/97	1200	720	84.0	36.0	130.0	---	150	152	240.0	<1@N
(Bldg 2603)	03/97	1143	708	83.0	35.0	130.0	---	152	137	240.0	<2@N
(Continued)	06/97	1227	831	94.0	34.0	120.0	<5	185	147	247.0	<2@N
	12/97	1200	700	84.0	36.0	120.0	3	150	173	240.0	ND
	03/98	1200	780	85.0	36.0	110.0	3	187	162	180.0	ND
	06/98	1190	734	ND	ND	ND	ND	ND	ND	ND	ND
	12/97	1200	700	84.0	36.0	120.0	3	150	173	240.0	ND
	03/98	1200	780	85.0	36.0	110.0	3	187	162	180.0	ND
	06/98	1190	734	ND	ND	ND	ND	ND	ND	ND	ND
	02/99	1160	663	76.0	32.0	102.0	3.0	150.0	150.0	214.0	ND
	08/99	1120	727	76.0	33.0	99.0	3.0	156.0	230.0	281.0	ND
	10/99	1130	660	78.0	33.0	120.0	3.0	110.0	160.0	262.0	ND
	02/00	1030	592	79.0	35.0	95.0	3.0	120.0	160.0	244.0	ND
	05/00	1010	699	76.0	33.0	96.0	3.0	129.0	127.0	229.0	ND
	08/00	1140	720	77.0	33.0	87.0	3.0	ND	157.0	232.0	ND
10S/4W-7H2	08/56	1060	882	78.0	30.0	112	---	150	82	326.0	---
(Bldg 2671)	01/60	820	500	55.2	14.7	85.0	---	76	98	224.0	---
	10/60	1300	793	74.5	20.5	126.0	4.3	182	116	320.0	---
	05/61	1390	840	100.0	29.2	170.0	3.3	170	135	362.0	---
	05/62	1220	744	70.4	39.0	142.0	2.4	184	86	312.3	---
	01/63	1300	740	65.6	26.4	162.0	2.4	166	153	259.0	0.7
	07/63	1100	671	64.0	25.4	118.0	2.7	148	97	280.6	0.0@N
	01/64	1020	622	70.4	33.2	117.0	2.7	172	98	302.6	3.3
	07/64	1400	854	83.2	27.3	134.0	1.4	164	98	322.1	---
	04/65	1490	909	97.6	23.4	152.0	4.7	196	110	346.5	0.9
	01/66	---	832	102.0	28.0	166.0	3.1	194	88	414.8	6.6
	06/66	---	768	86.4	26.3	150.0	3.1	184	110	331.8	6.9
	01/67	---	768	72.0	29.3	128.0	3.1	174	72	324.5	6.9
	08/67	---	608	57.6	24.4	116.0	2.4	132	70	251.3	10.2
	02/68	---	572	67.2	17.6	105.0	2.4	118	94	251.0	0
	09/68	---	636	74.0	19.0	112.0	3	144	96	268.0	0.4
	04/69	---	820	72.0	33.0	138.0	2.8	180	140	285.0	0.9
	11/69	---	604	66.0	24.0	116.0	2.8	140	110	259.0	1.8
	05/70	---	640	65.0	26.0	115.0	2.4	142	120	183.0	3.1
	09/71	1075	656	77.0	24.0	120.0	2.8	144	125	273.0	1.3
	05/72	1000	610	46.0	24.0	117.0	2.4	140	130	141.0	0
	10/72	1110	677	88.0	26.0	105.0	3.6	144	126	283.0	3.5
	10/73	1120	683	75.0	23.0	118.0	2.7*	132	130	200.0	0.6@N
	06/74	1210	712	72.0	19.0	150.0	3.1	208	112	195.0	0.01@N
	01/75	850	519	61.0	21.0	93.0	2.4	102	95	212.0	2.3@N

* Reported as 27
ND - None Detected

TABLE D-6 (cont'd)

SANTA MARGARITA RIVER WATERSHED
WATER QUALITY DATA

WELLS ON CAMP PENDLETON

Site Location	Date Tested	Specific Conductance umhos	Total Dissolved Solids (mg/l)	Chemical Constituents - mg/l Ca	Mg	Na	K	Cl	SO4	HCO3	NO3
10S/4W-7H2	02/76	1200	732	91.2	20.5	126.0	3.2	176	130	244.0	2.6@N
(Bldg 2671)	09/76	1200	732	48.0	29.0	180.0	2.4	192	123	336.7	4.2@N
(Continued)	03/77	1400	854	94.0	33.0	158.0	2.8	216	140	342.0	2.8@N
	01/78	1000	610	66.0	23.0	100.0	2.7	128	123	205.0	4.4@N
	10/78	1300	793	82.0	31.0	134.0	2.7	160	157	258.6	<1@N
	04/79	1200	732	84.8	28.3	144.0	3.1	164	116	312.3	<1@N
	01/80	1450	885	93.0	30.0	163.0	3	196	200	273.0	<1@N
	10/80	1050	591	70.4	21.7	104.0	3.7	140	125	219.6	2.0@N
	05/81	1000	645	72.4	21.7	105.0	3.5	128	123	209.8	<0.5@N
	05/82	1330	811	100.8	35.9	176.0	1.6	269	198	263.5	<0.5@N
	03/83	890	669	77.2	23.7	95.0	3.4	132	136	209.8	0.65@N
	12/83	1000	610	70.4	23.7	123.0	2.6	136	150	224.0	0.5@N
	05/84	1100	671	77.2	24.6	116.0	2.7	133	155	244.0	0.2@N
	09/84	1300	650	6.6	29.0	120.0	2.6	200	170	250.0	12
	11/84	1100	671	81.6	23.4	124.0	2.7	149	175	249.0	1.2@N
	05/86	1592	994	104.7	39.7	167.3	4.4	232	167	301.8	<1@N
	06/89	1137	826	79.1	28.5	85.5	---	157	158	246.0	12.6
	01/90	1290	772	96.3	38.6	116.0	---	184	179	252.0	0.9/1.2
	04/90	1320	817	109.0	42.1	128.0	---	177	167	249.0	5.4
	01/91	401	---	87.3	44.4	103.1	---	205	179	---	1.07
	03/93	1500	824	92.6	33.1	136.0	---	194	154	277.0	1.8
	03/94	1370	827	103.0	36.4	135.0	---	163	145	---	0.9
	08/94	1270	762	91.1	35.5	129.0	---	162	172	---	5.64
	06/95	1260	771	100.0	35.8	127.0	---	197	178	---	2.8
	06/96	1300	751	96.0	36.0	120.0	---	162	174	247.0	1.1
	02/97	1300	830	100.0	41.0	150.0	---	186	161	186.0	<2@N
	06/97	1323	831	94.0	36.0	140.0	<5	158	149	271.0	2@N
	12/97	1200	670	91.0	36.0	120.0	3	150	169	220.0	ND
	12/97	1200	710	87.0	35.0	120.0	2	152	182	220.0	1.5
	03/98	1200	810	89.0	36.0	120.0	3	201	168	240.0	ND
	06/98	1390	830	ND	ND	ND	ND	ND	ND	ND	ND
	09/98	1290	748	87.0	32.0	110.0	2.0	158	160	299	ND
	02/99	1130	663	75.0	31.0	106.0	3.0	150	150	238	5
	05/99	1170	711	75.0	32.0	85.0	4.0	ND	180	268	ND
	08/99	1040	310	74.0	30.0	94.0	2.0	100	400	207	ND
	10/99	1210	757	86.0	35.0	120.0	3.0	154	100	295	3
	08/00	1290	766	83.0	33.0	89.0	2.0	184	150	323	ND
	02/01	1140	707	85.0	35.0	107.0	2.0	152	179	232	ND
	04/01	1190	718	88.0	37.0	112.0	3.0	153	193	210	ND
	09/01	1200	729	89.0	38.0	106.0	3.0	158	192	201	ND

ND - None Detected

TABLE D-6 (cont'd)

SANTA MARGARITA RIVER WATERSHED
WATER QUALITY DATA

WELLS ON CAMP PENDLETON

Site Location	Date Tested	Specific Conductance umhos	Total Dissolved Solids (mg/l)	Chemical Constituents - mg/l Ca	Mg	Na	K	Cl	SO4	HCO3	NO3
10S/4W-7A2	05/56	920	651	59.0	22.0	100	---	104	94	213.0	---
(Bldg 2673)	05/59	---	745	52.8	16.5	60.3	---	84	41	207.4	---
	01/60	---	840	51.2	17.6	95.0	---	98	92	210.0	---
	10/60	870	566	62.0	23.0	80.0	4.2	110	104	234.0	0
	05/61	1180	710	72.0	34.0	114.0	3.3	104	150	227.0	---
	05/62	797	518	63.2	23.4	75.0	2	100	96	214.7	---
	01/63	1195	730	64.0	24.9	157.0	3.1	162	183	220.0	0
	07/63	574	610	57.6	19.5	85.0	2.7	102	100	244.0	0.3@N
	01/64	760	494	59.2	19.3	82.0	3.3	100	85	253.7	0.5@N
	07/64	980	637	64.0	21.5	94.0	1.4	100	95	241.6	---
	04/65	1230	800	73.3	22.5	106.0	4.5	120	110	248.9	1.3
	01/66	---	448	---	---	86.0	2.5	82	75	190.3	9.7
	06/66	---	540	60.8	21.0	81.0	2.5	102	95	222.0	9.1
	01/67	---	544	60.8	19.5	88.0	2.9	106	69	229.4	6.9
	08/67	---	504	54.4	20.0	79.0	2.1	96	58	214.7	8
	02/68	---	456	60.8	17.6	86.0	2.7	94	78	222.0	0
	09/68	---	600	67.0	18.0	90.0	3	110	96	232.0	0
	04/69	---	428	46.0	18.0	73.0	20	76	90	183.0	3.1
	11/69	---	476	59.0	18.0	88.0	2.7	98	110	198.0	0.9
	05/70	---	416	54.0	18.0	79.0	2.6	92	90	151.0	2.9
	12/70	780	507	64.0	16.0	89.0	2.7	100	90	222.0	10.1
	05/72	990	644	77.0	24.0	86.0	2.8	116	135	207.0	0
	10/72	965	627	77.0	27.0	94.0	2.9	104	145	239.0	5.3
	10/73	960	624	72.0	19.0	105.0	2.8	112	140	195.0	0.9@N
	06/74	950	548	68.0	19.0	101.0	3.1	138	102	207.0	0.35@N
	01/75	840	546	58.0	22.0	87.0	2.7	98	95	217.0	2.2@N
	02/76	820	533	68.8	20.5	76.0	3	106	88	214.7	2.2@N
	09/76	900	585	48.0	45.0	98.0	2.3	116	112	258.6	3.0@N
	03/77	900	585	70.0	23.0	76.0	2.8	123	113	195.0	2.6@N
	01/78	950	618	64.0	24.0	100.0	2.7	124	108	200.0	4.3@N
	10/78	1050	683	74.0	20.0	80.0	3	113	128	205.0	<1@N
	04/79	950	618	65.6	19.5	98.0	3.1	109	118	190.3	<1@N
	01/80	1000	650	67.0	23.0	99.0	3.1	128	111	187.0	<1@N
	10/80	900	546	67.2	20.5	86.0	3.4	108	86	205.0	2.3@N
	05/81	810	585	57.2	14.4	83.0	3.4	92	84	180.6	0.7@N
	11/81	800	451	57.2	16.3	85.0	2	92	110	185.4	0.5@N
	05/82	930	605	68.8	21.5	97.0	1.6	115	96	205.0	<0.5@N
	03/83	900	663	78.8	23.7	95.0	3.4	132	135	209.8	0.7@N

TABLE D-6 (cont'd)

SANTA MARGARITA RIVER WATERSHED
WATER QUALITY DATA

WELLS ON CAMP PENDLETON

Site Location	Date Tested	Specific Conductance umhos	Total Dissolved Solids (mg/l)	Chemical Constituents - mg/l Ca	Mg	Na	K	Cl	SO4	HCO3	NO3
10S/4W-7A2	09/84	1000	530	51.0	23.0	80.0	2.9	110	110	200.0	4.2
(Bldg 2673)	11/84	850	553	67.2	28.3	73.0	2.9	111	137	190.0	1.7@N
(Continued)	09/85	1007	593	66.0	26.0	64.0	5.8	124	139	180.6	6
	05/86	1051	623	72.6	26.5	79.5	3.5	131	124	153.6	8.8
	06/89	1073	688	72.1	23.9	59.6	---	120	140	184	15.9
	01/89	1080	572	91.2	34.2	80.2	---	151	178	174	1.4
	04/90	1130	718	111.0	42.1	91.0	---	148	167	175	9.1
	06/91	1190	718	113.0	40.3	93.8	---	173	180	160	7.5
	03/93	1370	708	86.9	32.8	93.3	---	147	93.3	200	4.9
	03/94	1210	783	100.0	37.1	100.0	---	145	167	---	2.2
	08/94	1160	741	87.5	35.5	96.1	---	141	184	---	4.23
	06/95	1200	788	99.4	37.5	101.0	---	173	200	---	2.9
	06/96	1129	739	91.0	37.0	90.0	---	188	312	206	<0.0
	02/97	1100	690	82.0	35.0	140.0	---	127	131	180	<2@N
	03/97	1109	695	91.0	39.0	93.0	---	137	191	166	2.2@N
	06/97	1096	749	89.0	36.0	90.0	<5	138	178	187	2@N
	12/97	1100	690	84.0	36.0	83.0	4	140	181	160	<.2@N
	05/99	1050	648	78.0	32.0	111.0	3	171	192	207	ND
	08/99	1040	696	78.0	33.0	84.0	4	120	390	146	ND
	10/99	1070	663	78.0	34.0	90.0	4	132	120	195	6@N
	02/00	1010	559	83.0	35.0	82.0	4	140	190	220	4@N
	05/00	972	688	80.0	34.0	79.0	4	144	167	190	4@N
	02/01	1200	753	92.0	40.0	100.0	3	164	212	195	ND
	04/01	1210	736	91.0	40.0	103.0	5	159	217	183	ND
	09/01	1200	741	93.0	41.0	98.0	4	153	228	183	ND
10S/5W-23G3	06/91	1160	684	83.4	28.3	125.0	---	145	124	223	<0.04
(Bldg 33926)	03/92	1060	674	75.9	24.1	127.0	---	139	111	269	<0.4
	03/93	1182	584	67.8	21.1	110.0	---	135	101	274	<0.4
	06/93	1020	623	60.5	22.4	116.0	---	125	107	225	<0.4
	03/94	1120	665	80.0	25.0	122.0	---	129	117	---	1.8
	08/94	1150	699	78.7	26.4	125.0	---	141	118	---	<0.44
	06/95	1060	673	75.9	23.1	118.0	---	158	114	---	<0.04
	01/96	1200	619	71.0	24.0	120.0	---	139	107	262	<0.0
	07/96	---	---	---	---	---	---	---	---	---	<0.0

ND - None Detected

TABLE D-6 (cont'd)

SANTA MARGARITA RIVER WATERSHED
WATER QUALITY DATA

WELLS ON CAMP PENDLETON

Site Location	Date Tested	Specific Conductance umhos	Total Dissolved Solids (mg/l)	Chemical Constituents - mg/l Ca	Mg	Na	K	Cl	SO4	HCO3	NO3
10S/5W-23K2	06/89	1207	698	75.6	22.8	84.0	---	138	137	231	<0.4
(Bldg 33924)	04/89	1240	728	100.0	32.9	129.0	---	158	148	245	1.3
	01/91	1193	---	80.6	35.2	131.0	---	21.3	146	---	<0.04
	06/91	1160	676	88.1	29.6	118.0	---	141	129	224	<0.04
	03/92	1130	705	76.7	26.0	126.0	---	149	125	279	<0.4
	06/92	1130	717	66.8	26.7	124.0	---	146	140	232	<0.4
	03/93	1285	331	72.1	23.8	115.0	---	131	122	273	<0.4
	02/97	1200	780	89.0	32.0	130.0	---	166	165	250	<2@N
	03/97	1230	700	94.0	34.0	140.0	---	187	162	264	<2@N
	06/97	1231	778	91.0	31.0	130.0	<2	171	165	264	<2@N
	12/97	1200	710	82.0	30.0	130.0	2	156	162	230	ND
	03/98	1200	710	82.0	30.0	110.0	2	191	146	240	ND
	06/98	1170	658	79.0	28.0	123.0	2	157	ND	293	ND
	02/99	1170	696	75.0	27.0	123.0	3	160	130	259	ND
	04/99	1210	667	76.0	27.0	118.0	3	148	140	268	ND
	08/99	1140	714	79.0	27.0	116.0	3	180	165	268	ND
	10/99	1150	721	80.0	28.0	131.0	3	110	150	281	ND
	02/00	1050	619	82.0	28.0	108.0	3	100	140	293	ND
	05/00	1060	716	80.0	29.0	112.0	3	173	141	268	ND
	08/00	1210	722	82.0	29.0	105.0	3	162	156	268	ND
	04/01	1210	705	85.0	30.0	130.0	3	163	157	281	ND
	09/01	1210	672	85.0	30.0	125.0	3	163	149	281	ND
10S/5W-13R2	01/90	1030	540	*96	26.6	94.8	---	141	130	200	0.7
(Bldg 2363)	06/91	1150	702	98.7	32.0	109.0	---	149	125	288	1.3
	06/93	1130	705	72.0	28.4	107.0	---	140	139	262	0.9
	03/94	1020	658	69.6	27.8	104.0	---	135	140	---	0.89
	06/95	1140	636	92.5	30.7	115.0	---	149	151	---	14.2
	06/96	1103	680	91.0	31.0	100.0	---	148	251	233	<0.0
	06/97	1082	708	85.0	29.0	110.0	<5	135	145	244	<2@N
	12/97	1000	640	81.0	28.0	100.0	2	119	128	250	ND
	03/98	1100	620	85.0	31.0	110.0	2	161	144	220	ND
	06/98	1100	680	83.0	30.0	109.0	3	137	140	275	0.68
	09/98	1160	662	81.0	28.0	90.0	3	144	90	256	ND
	04/01	1100	612	83.0	29.0	106.0	3	131	146	238	ND
	09/01	1150	679	89.0	31.0	156.0	2	142	156	241	ND

* - Reported as .96
ND - None Detected

TABLE D-6 (cont'd)

SANTA MARGARITA RIVER WATERSHED
WATER QUALITY DATA

WELLS ON CAMP PENDLETON

Site Location	Date Tested	Specific Conductance umhos	Total Dissolved Solids (mg/l)	Chemical Constituents - mg/l Ca	Mg	Na	K	Cl	SO4	HCO3	NO3
10S/4W-7A3	03/99	1280	765	91.0	34.0	127.0	2	190	160	272	ND
	06/99	1080	706	76.0	31.0	88.0	2.2	163	118	220	ND
	08/99	1080	690	76.0	32.0	93.0	3	160	191	244	ND
	10/99	1070	660	76.0	32.0	100.0	3	131	120	232	4
	05/00	1010	702	79.0	34.0	94.0	3	177	164	254	4
	08/00	1170	732	84.0	36.0	89.0	3	155	188	201	5
	02/01	1230	753	89.0	39.0	113.0	2	170	198	220	ND
	04/01	1230	726	89.0	39.0	115.0	4	160	191	243	ND
	09/01	1210	735	89.0	39.0	107.0	4	163	185	217	ND
10S/5W-23G4	06/99	1070	668	69.0	23.0	106.0	1.7	163	144	305	ND
	08/99	1090	657	72.0	25.0	115.0	2	180	153	317	ND
	10/99	1150	716	79.0	27.0	140.0	2	120	140	305	ND
	02/00	956	622	78.0	23.0	117.0	2	90	120	268	ND
	05/00	1040	686	77.0	27.0	116.0	2	181	141	307	ND
	08/00	1180	722	80.0	28.0	105.0	2	155	143	232	ND
	02/01	1100	706	73.0	25.0	125.0	2	149	164	268	ND
	04/01	1170	701	61.0	29.0	126.0	2	154	149	282	ND
	09/01	1180	671	80.0	28.0	125.0	2	149	142	271	ND
10S/5W-23K3	06/99	1150	700	75.0	27.0	106.0	2.2	163	155	317	ND
(Bldg 330923	08/99	1170	722	79.0	28.0	114.0	3	120	140	293	ND
	10/99	1170	723	78.0	28.0	140.0	3	120	140	293	ND
	02/00	1120	712	83.0	30.0	117.0	3	120	157	293	ND
	02/01	1240	758	85.0	61.0	136.0	3	167	152	305	ND
	04/01	1220	726	85.0	61.0	135.0	3	162	154	293	ND
	09/01	1240	682	81.0	29.0	132.0	3	162	144	281	ND
10S/5W-26C3 (Bldg 2202	09/01	1410	804	101.0	38.0	138.0	3	173	175	296	ND

ND - None Detected

012850

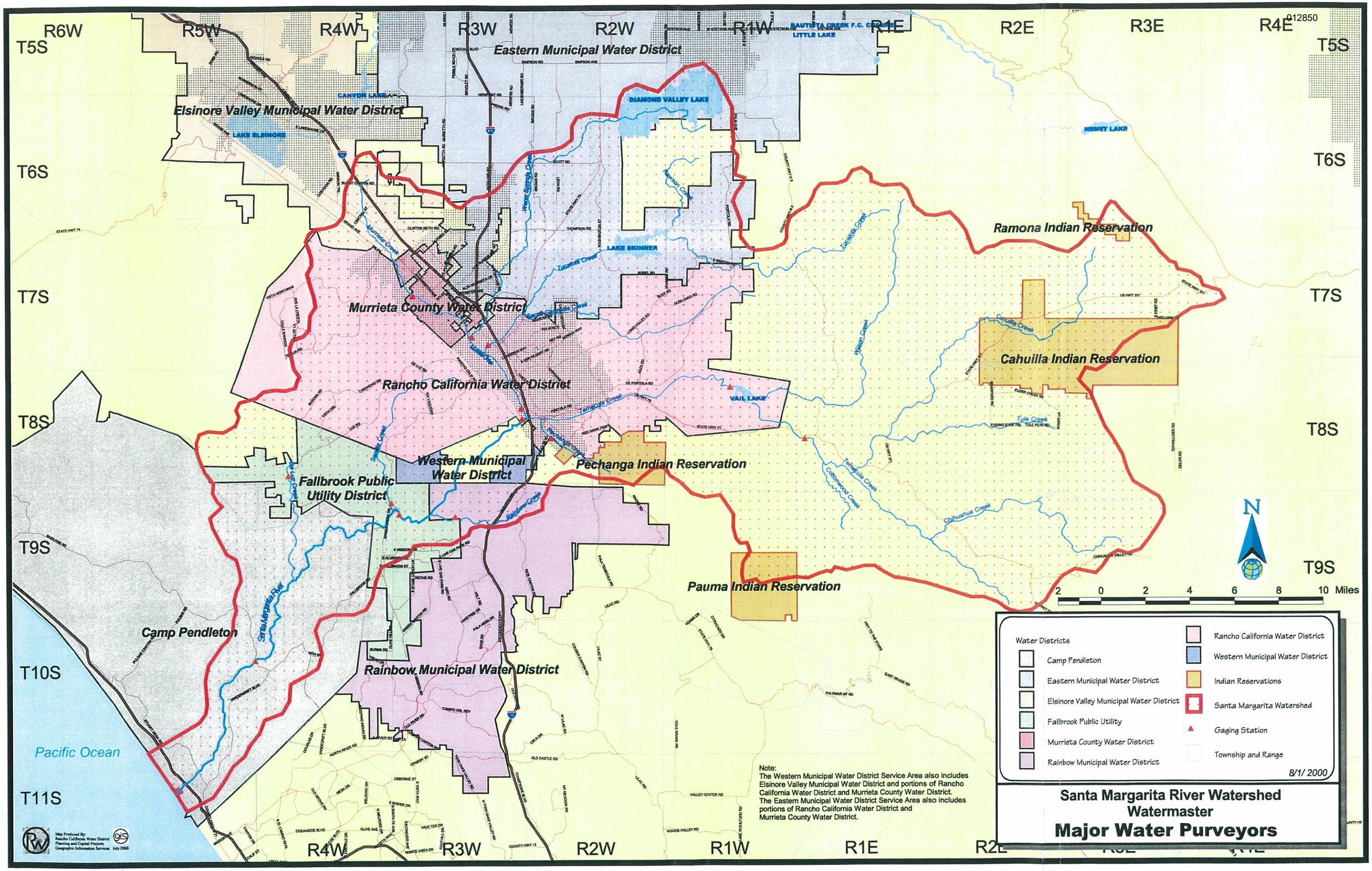

Santa Margarita River Watershed
Watermaster
Major Water Purveyors

STATE OF CALIFORNIA
STATE WATER RESOURCES CONTROL BOARD

ORDER WQO 2002 - 0014

In the Matter of the Petitions of

CITY OF ALISO VIEJO; CITY OF MISSION VIEJO; AND GOLDEN RAIN FOUNDATION OF LAGUNA WOODS (AKA LEISURE WORLD)

For Review of Waste Discharge Requirements Order No. R9-2002-0001
[NPDES No. CAS0108740]
for Discharges of Urban Runoff From the Municipal Separate Storm Sewer Systems (MS4s)
Draining the Watersheds of the County of Orange, the Incorporated Cities of Orange County,
and the Orange County Flood Control District
Within the San Diego Region
Issued by the
California Regional Water Quality Control Board,
San Diego Region

SWRCB/OCC FILES A-1465(c),(d), AND (f)

BY THE BOARD:

The San Diego Regional Water Quality Control Board (Regional Board) issued waste discharge requirements Order No. R9-2002-0001 [NPDES No. CAS0108740] (Permit). The Permit regulates discharges of storm water and urban runoff from municipal separate storm sewer systems (generally called MS4s) in the portion of south Orange County that lies within the jurisdiction of the Regional Board. Seven petitions were filed with the State Water Resources Control Board (State Board) challenging the Permit.[1] Three of the petitioners, City of Mission Viejo, City of Aliso Viejo, and the Golden Rain Foundation of Laguna Woods (hereinafter referred to as Leisure World), jointly referred to herein as Petitioners, submitted complete requests to stay the effect of the Permit.[2] Leisure World sought a stay of the entire permit, while

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[1] The seven petitioners are County of Orange and Orange County Flood Control District, et al.; City of Lake Forest; City of Dana Point; City of Mission Viejo; City of Aliso Viejo; Building Industry Association of Southern California, Inc. (BIASC), et al.; and the Golden Rain Foundation of Laguna Woods (aka Leisure World). Of these seven petitions, only the City of Mission Viejo's petition is active, as the remaining petitions have been placed in abeyance at the petitioners' requests.

[2] Three other petitioners requested stays. The State Board dismissed BIASC's stay request for failure to respond by the deadline for remedying defects in the request. Dana Point and Lake Forest withdrew their requests for an immediate stay.

Aliso Viejo and Mission Viejo sought limited stays.[3] For the reasons discussed below, we will grant partial relief to Aliso Viejo and Mission Viejo and deny the request of Leisure World.[4]

I. BACKGROUND

The Permit is the third area-wide storm water permit issued for Orange County.[5] For the cities of Lake Forest and Laguna Woods, the Permit regulates only those portions of the cities within the Regional Board's boundary.[6]

In March 2002, seven petitioners filed petitions seeking review of the Permit, with six seeking stays of all or a portion of the Permit. On April 15, 2002, the State Board sent a letter concerning the status of the stay requests stating that all six requests were, to some extent, incomplete. By June 7, 2002, the three Petitioners had amended their stay requests, while the others had not.[7] On June 18, the State Board issued a notice of public hearing to be held on the afternoon of July 2, 2002. The State Board continued the hearing in order to notify all interested persons. On July 9, the State Board issued a second notice and held a hearing on July 29, 2002. Leisure World did not participate in the hearing.

In order to issue a stay of the Permit, the State Board must find that the Petitioners have alleged facts and produced proof of: (1) substantial harm to the Petitioners or to the public interest if a stay is not granted; (2) a lack of substantial harm to other interested persons and to the public interest if a stay is granted; and (3) substantial questions of law and fact regarding the disputed action. (Cal. Code Regs., tit. 23, § 2053. See, State Board Order WQO 2002-0007.)

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[3] Aliso Viejo sought the stay of a toxicity finding and the industrial, commercial, and construction components of the Permit, while Mission Viejo sought a more generalized stay that included the industrial, commercial, and construction components plus a requirement to prevent sanitary sewer overflows from entering the storm sewer system.

[4] This is a non-precedential order pursuant to State Board Resolution No. 2002-0103.

[5] The first permit, Order No. 90-38, was adopted on July 16, 1990, followed by Order No. 96-03, adopted on August 8, 1996.

[6] Other portions of Orange County and the cities are regulated by Santa Ana Regional Water Quality Control Board Order No. R8-2002-0020, adopted on January 18, 2002.

[7] See *supra*, note 2.

II. CONTENTIONS AND FINDINGS

1. Contention: Petitioners contend that they will suffer substantial harm if a stay of the Permit is not granted.

A. Aliso Viejo's Contention of Substantial Harm

Finding: Aliso Viejo requested a limited stay. First, it sought to stay provisions F.3.b, F.3.c, and F.2. of the Permit, which require co-permittees to enforce their municipal storm water ordinances as applied to industrial, commercial, and construction sites. Next, it sought to stay the last sentence of Finding 26. This sentence provides a numeric interpretation of the Water Quality Control Plan for the San Diego Region (Basin Plan) prohibition of toxic discharges.

Aliso Viejo, a recently incorporated city, produced proof that it faces $95,000 in total costs to comply with the industrial, commercial, and construction components of the Permit over the next year.[8] Most of the $55,000 cost for the industrial and commercial programs was attributed to program development costs (e.g., establishing a database and staff), while most of the $40,000 construction costs stemmed from inspection requirements.[9]

We find that these requirements do not constitute substantial harm. First, most of the costs are associated with the requirement to inventory industrial and commercial sites. Industrial inventories are one of the basic requirements of the Phase I storm water regulations and are required in the permit applications.[10] The fact that costs are necessary to a storm water program does not constitute substantial harm, since comparable costs will be borne by all dischargers. In addition, Aliso Viejo has already prepared a preliminary inventory of commercial sites within its jurisdiction.[11] Looking at this list, it is clear that Aliso Viejo is well on its way towards compliance with the inventory and prioritization requirements of the Permit. Finally, implementation of the challenged inspection program is not required until at least

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[8] Aliso Viejo, Exhibit A (McGowan testimony), at pp. 1-3.

[9] *Id.*

[10] For example, co-permittees are to "provide an inventory, organized by watershed of the name and address, and a description (such as SIC codes) which best reflects the principal products or services provided by *each facility which may discharge, to the municipal separate storm sewer, storm water associated with industrial activity*." 40 C.F.R. § 122.26(d)(2)(ii) (emphasis added).

[11] Aliso Viejo, Exhibit 2.

February 13, 2003.[12] Any inspections that may occur between February 13 and the date of the decision on the merits will not comprise substantial harm because the petition could be resolved soon thereafter.[13] We also note that the prior MS4 permit required the enforcement of municipal storm water ordinances through inspections, although it did not specify the details of an enforcement program, and therefore Aliso Viejo would presumably have conducted some inspections during this period of time. For these reasons, we find that Aliso Viejo did not produce proof of substantial harm related to the Permit's new industrial, commercial, and construction components.

Next, Aliso Viejo alleges that Finding 26 causes it substantial harm. The finding includes a numerical interpretation of a prohibition in the Basin Plan that forbids toxic discharges in toxic amounts.[14] Finding 26 defines acute toxicity as any acute discharge test that exceeds TUa=0.[15] Aliso Viejo contends that the standard is statistically unattainable and will force the city to perform expensive Toxic Identification Evaluations.[16] While the Regional Board suggests that the co-permittees have flexibility in establishing a receiving water monitoring program, we find validity in Aliso Viejo's concerns. Also, we are concerned that this "unattainable" standard may result in violation of discharge prohibition A.4, immediately forcing many co-permittees into the iterative process of revising the storm water management program.[17] In the absence of a stay, the acute toxicity standard of Finding 26 may cause substantial harm to the 13 co-permittees because it will force them into immediate noncompliance and potentially force them to expend substantial monies, while the discharge may not be causing any acute toxicity under a more flexible interpretation of the Basin Plan prohibition.

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[12] February 13, 2003, is the deadline for the submission of Jurisdictional Urban Runoff Management Programs, where the co-permittees will establish the proposed "inspection frequencies." Permit, at H.1.a.

[13] Aliso Viejo has requested that its petition on the merits be held in abeyance. Therefore, there is not a planned date for resolution of the petition. Aliso Viejo may, at any time, request that its petition be activated.

[14] Permit, at Finding 26.

[15] According to Ms. McGowan's testimony, TUa exceeds zero when less than 100 percent of test organisms survive in the receiving water. TUc=1 when there is no observable difference between the chronic effects of the receiving water in question and receiving waters unaffected by the receiving waters in question. Aliso Viejo, Exhibit A, at p. 5.

[16] *Id.*, at p. 4.

[17] Permit, at C.2.

B. Mission Viejo's Contention of Substantial Harm

Finding: Mission Viejo requested a limited stay by specifying a number of provisions that allegedly will cause it substantial harm. These include the industrial, commercial, and construction components, provisions on sanitary sewer overflows, and receiving water limitations language.[18] As its proof of harm, it produced cost reports created by Orange County and Charles Abbott Associates (CAA). For fiscal year 2002/2003, Mission Viejo will owe Orange County $340,515 for shared work done on Mission Viejo's behalf.[19] Also, Mission Viejo will likely pay CAA $685,859 in consulting fees linked to permit compliance.[20] These total costs are for first-year compliance with all Permit provisions. The proof presented was not linked to the challenged provisions and, therefore, did not establish the precise costs Mission Viejo would face if these provisions were not stayed.[21] We do note, however, that the lion's share of costs appeared to originate from the industrial, commercial, and construction enforcement requirements. In light of our discussion regarding a similar claim by Aliso Viejo, we conclude that these enforcement costs do not constitute substantial harm to the co-permittees.

Despite its failure to prove substantial harm for most of the challenged provisions, we find that Mission Viejo has produced proof of substantial harm caused by provision F.5.f. of the Permit, which, among other things, requires all co-permittees to prevent and clean up sewage spills.[22] The provision outlines how the MS4 operators must "prevent, respond to, contain and clean up all sewage . . . spills that may discharge into its MS4 . . . ."[23] Also, they "shall coordinate spill prevention, containment, and response activities throughout all appropriate departments, programs, and agencies . . . .[24] Like the other challenged provisions, F.5.f. takes

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[18] See, generally, Mission Viejo's Further Points and Authorities and Evidence Supporting Request for Stay (June 7, 2002); and Mission Viejo's Policy Statement in Support of Request for Stay (June 27, 2002).

[19] Mission Viejo, Supplemental Declaration of Dennis Wilberg (June 7, 2002), at paragraph 5.

[20] *Id.*, at paragraph 6.

[21] While Mission Viejo estimates the total costs of the challenged provisions to "exceed $200,000," we find no proof in the record to justify this claim. See Mission Viejo, Second Supplemental Declaration of Dennis Wilberg (July 25, 2002) at paragraph 11.

[22] We note that the Natural Resources Defense Council (NRDC), in a written request dated August 1, 2002, asked the State Board to strike Mission Viejo's sanitary sewer testimony and exhibits because NRDC did not receive them until after the July 29 hearing. We find that NRDC waived this objection by failing to raise it during Mission Viejo's testimony, or at any time during the July 29 hearing. Moreover, NRDC was allowed to extensively cross-examine the witnesses for Mission Viejo, and it was therefore not harmed.

[23] Permit, at F.5.f.

[24] *Id.*

effect on February 13, 2003. The record shows that three separate water districts operate these sewers within Mission Viejo, and are regulated by a sanitary sewer NPDES permit issued by the Regional Board.[25] Mission Viejo alleged that the duplication of effort that would ensue by having Mission Viejo also be responsible for preventing and responding to sanitary sewage spills could lead to delayed responses as agencies try to determine jurisdiction and primary responsibility. Orange County's cost table for the upcoming year estimated total co-permittee costs of $56,512 to implement this requirement.[26] While these costs, by themselves, do not constitute substantial harm, we find that the duplicative nature of the costs, combined with potential response delay and confusion, do.

Except for its proof of harm linked to provision F.5.f., we find that Mission Viejo failed to produce proof of the substantial harm of all challenged provisions.[27] For these provisions of the Permit, we conclude that Mission Viejo has not established the first prong of substantial harm if a stay is not granted.

C. Leisure World's Contention of Substantial Harm

Finding: Leisure World, a community comprising 90 percent of Laguna Woods' population, sought a stay of the entire Permit, alleging that increased compliance costs required by two separate MS4 permits cause it substantial harm. Leisure World did not participate in the hearing. Because its request was based solely on affidavits, and there was no opportunity to cross-examine the affiants, it has not produced proof of substantial harm We will deny its request for stay.

2. Contention: Petitioners contend there will not be substantial harm to interested persons and to the public interest if a stay is granted.

Aliso Viejo. Because Petitioners must produce proof of all three factors listed in our regulations, we will only discuss in detail those provisions found in the previous section to constitute substantial harm. However, we do mention that a stay of the industrial, commercial,

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[25] Mission Viejo, Declaration of Richard Schlesinger (June 27, 2002), at paragraph 8. See also San Diego Regional Board Order No. 96-04.

[26] Mission Viejo, A1 (Final Estimated Municipal NPDES Costs and Proposed Budget 2002-2006), at p. 59. Mission Viejo submitted three separate sets of exhibits. For citation purposes, we have assigned each exhibit a prefix, depending on the submission date. For the June 26, 2002, submittal, the prefix is A; for July 24, it is B, for July 25, it is C.

[27] We find that Mission Viejo's allegation concerning other provisions of the Permit was supported by little or no evidence.

and construction components would likely amount to substantial harm to the public. At the hearing, Aliso Viejo conceded that its claimed "incremental costs" of the new Permit were due to the creation and implementation of entirely new inspection programs. In other words, under the prior permit, it was not performing any inspections to determine compliance with its storm water ordinance. The lack of any enforcement component could cause substantial harm to the public interest.[28]

With regard to the challenged toxicity finding, we find that a stay will not cause substantial harm to the public pending review of the petition.[29] By staying this finding, the narrative Basin Plan standard (and all related Permit provisions) remains intact. Also, the definition of chronic toxicity is unchanged. Therefore, the Permit continues to prohibit toxic discharges in toxic amounts. Because of this, we find that a stay of the last sentence of Finding 26 does not cause substantial harm to the public.

Mission Viejo. We now address whether substantial harm will occur if provision F.5.f., regarding sanitary sewer overflows, is stayed. At the hearing, Mission Viejo provided proof that the Regional Board's existing sanitary sewer permit regulates sanitary sewer operation, and specifically requires updated overflow prevention plans and response plans.[30] The sanitary sewer permit, like all NPDES permits, allows for enforcement for violations. We find that these permits reduce the risk of sanitary sewage spills to the MS4, without causing overlap and potential delays in responding to overflows. Staying provision F.5.f. will not result in substantial harm to the public.

3. Contention: Petitioners contend there are substantial issues of law and fact.

Finding: We find that the two provisions that we will stay—the definition of acute toxicity and the provision regarding sanitary sewer overflows—involve substantial questions of law and fact. The determination of what constitutes acute toxicity in storm water runoff is a complex issue, and the use of a simple numeric criterion could result in significant requirements to perform extensive remedial actions. Similarly, the regulation of sanitary sewer

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[28] We do not make any determination on the merits of the petition, which concerns the propriety of the specific inspection and enforcement requirements included in this Permit.

[29] We note that Aliso Viejo's petition is currently in abeyance. The Regional Board may request activation of Aliso Viejo's petition so that the State Board can address this issue on the merits.

[30] See San Diego Regional Board Order No. 96-04. See also Mission Viejo, B3 (Santa Margarita Sanitary Sewer Overflow Prevention Plan), and Mission Viejo, B4 (Santa Margarita Sanitary Sewer Overflow Response Plan).

overflows by municipal storm water entities, while other public entities are already charged with that responsibility in separate NPDES permits, may result in significant confusion and unnecessary control activities. For example, the Permit appears to assign primary spill prevention and response coordination authority to the co-permittees. While the federal regulations clearly assign some spill prevention and response duties to the co-permittees,[31] we find that the extent of these duties is a substantial question of law and fact. Finally, we find that requirements for enforcement and inspection of industrial, commercial, and construction activities may raise substantial issues of law and fact, but we have already concluded that these requirements do not meet the other prongs of the test for a stay.

III. SUMMARY AND CONCLUSION

The State Board concludes that Aliso Viejo and Mission Viejo have met their burden of proving each of the three conditions required for issuance of a partial stay. Accordingly, we will stay provision F.5.f. We will also stay part of the last sentence of Finding 26, which will read, "Urban runoff discharges are considered toxic when the toxic effect observed in a chronic toxicity test exceeds one Toxic Unit Chronic (TUc=1)."

IV. ORDER

IT IS HEREBY ORDERED that provision F.5.f. of the Permit is stayed. Also, part of the last sentence of Finding 26 is stayed. In the interim, this sentence reads "Urban runoff discharges are considered toxic when the toxic effect observed in a chronic toxicity test exceeds one Toxic Unit Chronic (TUc=1)."

Dated: August 15, 2002

Arthur G. Baggett, Jr.
Chair

[31] MS4 permittees must have "procedures to prevent, contain, and respond to spills that may discharge into the MS4." 40 C.F.R. § 122.26(d)(2)(iv)(B)(4).

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN DIEGO REGION

ORDER NO. R9-2002-0001

NPDES NO. CAS0108740

WASTE DISCHARGE REQUIREMENTS FOR DISCHARGES OF URBAN RUNOFF FROM THE MUNICIPAL SEPARATE STORM SEWER SYSTEMS (MS4s) DRAINING THE WATERSHEDS OF THE COUNTY OF ORANGE, THE INCORPORATED CITIES OF ORANGE COUNTY, AND THE ORANGE COUNTY FLOOD CONTROL DISTRICT WITHIN THE SAN DIEGO REGION

The California Regional Water Quality Control Board, San Diego Region (hereinafter SDRWQCB), finds that:

1. **COPERMITTEES ARE DISCHARGERS OF URBAN RUNOFF:** Each of the persons in Table 1 below, hereinafter called Copermittees or dischargers, owns or operates a municipal separate storm sewer system (MS4), through which it discharges urban runoff into waters of the United States within the San Diego Region. The Copermittees serve a population of approximately 500,000 people within the San Diego Region. The MS4s operated by the Copermittees fall into one or more of the following categories: (1) a medium or large MS4 that services a population of greater than 100,000 or 250,000 respectively; or (2) a small MS4 that is "interrelated" to a medium or large MS4; or (3) an MS4 which contributes to a violation of a water quality standard; or (4) an MS4 which is a significant contributor of pollutants to waters of the United States.

Table 1. Municipal Copermittees

1.	City of Aliso Viejo	8.	City of Mission Viejo
2.	City of Dana Point	9.	City of Rancho Santa Margarita
3.	City of Laguna Beach	10.	City of San Clemente
4.	City of Lake Forest	11.	City of San Juan Capistrano
5.	City of Laguna Hills	12.	County of Orange
6.	City of Laguna Niguel	13.	Orange County Flood Control District
7.	City of Laguna Woods		

2. **URBAN RUNOFF CONTAINS "WASTE" AND IS A "POINT SOURCE DISCHARGE OF POLLUTANTS":** Urban runoff contains waste, as defined in the California Water Code, and pollutants that adversely affect the quality of the waters of the State. The discharge of urban runoff from an MS4 is a "discharge of pollutants from a point source" into waters of the United States as defined in the Clean Water Act.

3. **URBAN DEVELOPMENT AND RUNOFF CAUSES RECEIVING WATER DEGRADATION:** Urban runoff discharges from MS4s are a leading cause of receiving water quality impairment in the San Diego Region and throughout the United States. As runoff flows over urban areas, it picks up harmful pollutants such as pathogens, sediment (resulting from human activities), fertilizers, pesticides, heavy metals, and petroleum products. These pollutants often become dissolved or suspended in urban runoff and are conveyed and discharged to receiving waters, such as streams, lakes, lagoons, bays, and the ocean without treatment. Once in receiving waters, these pollutants harm aquatic life primarily through toxicity and habitat degradation. Furthermore, the pollutants can enter the food chain and may eventually enter the tissues of fish and humans.

There is a strong direct correlation between “urbanization” and “impacts to receiving water quality”. In general, the more heavily developed the area, the greater the impacts to receiving waters from urban runoff.

These impacts especially threaten environmentally sensitive areas (such as Clean Water Act section 303(d) impaired water bodies, areas designated as Areas of Special Biological Significance, water bodies designated with the RARE beneficial use, riparian or estuarine areas designated by the Copermittees as Critical Aquatic Resources (CARS), and regional parks and preserves containing receiving waters within the Cities and County of Orange). Such environmentally sensitive areas have a much lower capacity to withstand pollutant shocks than might be acceptable in the general circumstance. In essence, urban development that is ordinarily insignificant in its impact on the environment may, in a particularly sensitive environment, be significant.

4. **URBAN DEVELOPMENT INCREASES POLLUTANT LOAD, VOLUME, AND VELOCITY OF RUNOFF:** During urban development two important changes occur. First, natural vegetated pervious ground cover is converted to impervious surfaces such as paved highways, streets, rooftops, and parking lots. Natural vegetated soil can both absorb rainwater and remove pollutants providing a very effective natural purification process. Because pavement and concrete can neither absorb water nor remove pollutants, the natural purification characteristics of the land are lost.

   Secondly, urban development creates new pollution sources as human population density increases and brings with it proportionately higher levels of car emissions, car maintenance wastes, municipal sewage, pesticides, household hazardous wastes, pet wastes, trash, etc. which can either be washed or directly dumped into the MS4.

   As a result of these two changes, the runoff leaving the developed urban area is significantly greater in volume, velocity and pollutant load than the pre-development runoff from the same area.

   The significance of the impacts of urban development on receiving waters is determined by the scope of the project, such as the size of the project, the project land-use type, etc. Large projects (such as commercial developments greater than 100,000 square feet, home subdivisions greater than 10 units, and streets, roads, highways, and freeways) generally have large amounts of impervious surface, and therefore have greater potential to significantly impact receiving waters by increasing erosion (through increased peak flow rates, flow velocities, flow volumes, and flow durations) than smaller projects. Projects of particular land use types also have greater potential to significantly impact receiving waters due to the presence of typically large amounts of pollutants on site or an increased potential for pollutants to move off site (such as automotive repair shops, restaurants, parking lots, streets, roads, highways, and freeways, hillside development, and retail gasoline outlets).

5. **WATER QUALITY DEGRADATION INCREASES WITH PERCENT IMPERVIOUSNESS:** The increased volume and velocity of runoff from developed urban areas greatly accelerates the erosion of downstream natural channels. Numerous studies have demonstrated a direct correlation between the degree of imperviousness of an area and the degradation of its receiving water quality. Significant declines in the biological integrity and physical habitat of streams and other receiving waters have been found to occur with as little as a 10% conversion from natural to impervious surfaces. (Developments of medium density single family homes range between 25 to 60% impervious). Today “% impervious coverage” is believed to be a reliable indicator and predictor of the water quality degradation expected from planned new development.

6. **URBAN RUNOFF IS A HUMAN HEALTH THREAT:** Urban runoff contains pollutants, which threaten human health. Human illnesses have been clearly linked to recreating (i.e., swimming, surfing, etc.) near storm drains flowing to coastal beach waters. Such flows from urban areas often result in the posting or closure of local beaches.

   Pollutants transported to receiving waters by urban runoff can also enter the food chain. Once in the food chain they can “bioaccumulate” in the tissues of invertebrates (e.g., mussels, oysters, and

lobsters) and fish which may be eventually consumed by humans. Furthermore, some pollutants are also known to "biomagnify". This phenomenon can result in pollutant concentrations in the body fat of top predators that are millions of times greater than the concentrations in the tissues of their lower trophic (food chain) counterparts or in ambient waters.

7. **POLLUTANT TYPES:** The most common categories of pollutants in urban runoff include total suspended solids, sediment (due to anthropogenic activities); pathogens (e.g., bacteria, viruses, protozoa); heavy metals (e.g., copper, lead, zinc and cadmium); petroleum products and polynuclear aromatic hydrocarbons; synthetic organics (e.g., pesticides, herbicides, and PCBs); nutrients (e.g., nitrogen and phosphorus fertilizers), oxygen-demanding substances (decaying vegetation, animal waste), and trash.

8. **URBAN STREAMS AS AN MS4 COMPONENT:** Historic and current development make use of natural drainage patterns and features as conveyances for urban runoff. Urban streams used in this manner are both MS4s and receiving waters.

9. **URBAN RUNOFF CAUSES BENEFICIAL USE IMPAIRMENT**: Individually and in combination, the discharge of pollutants and increased flows from MS4s can cause or threaten to cause a condition of pollution (i.e., unreasonable impairment of water quality for designated beneficial uses), contamination, or nuisance. The discharge of pollutants from MS4s can cause the concentration of pollutants to exceed applicable receiving water quality objectives and impair or threaten to impair designated beneficial uses. The discharge of urban runoff may also impact the physical habitat of receiving waters. Significant stream channel incision and bank erosion is a feature common in the Aliso Creek watershed and other drainages in Orange County and may be caused in part by changes in peak flow rates and volumes resulting from urban development. Preliminary results of the Ambient Bioassessment Monitoring Program in Aliso Creek and San Juan Creek in 1998 and 1999 indicate impacts to the benthic community that may be the result of water quality and habitat degradation.

10. **COPERMITTEES IMPLEMENT URBAN RUNOFF MANAGEMENT PROGRAMS (URMPs):** Copermittee implementation of Urban Runoff Management Programs (URMPs) designed to reduce discharges of pollutants and flow into and from MS4s to the maximum extent practicable (MEP) can protect receiving water quality by promoting attainment of water quality objectives necessary to support designated beneficial uses. To be most effective, URMPs must contain both structural and non-structural best management practices (BMPs).

11. **BEST MANAGEMENT PRACTICES (BMPs):** Pollutants can be effectively reduced in urban runoff by the application of a combination of pollution prevention, source control, and treatment control BMPs. Source control BMPs (both structural and non-structural) minimize the contact between pollutants and flows (e.g., rerouting run-on around pollutant sources or keeping pollutants on-site and out of receiving waters). Treatment control (or structural) BMPs remove pollutants from urban runoff. Where feasible, use of BMPs that utilize natural processes should be assessed. These types of BMPs, such as grassy swales and constructed wetlands, can frequently be as effective as less natural BMPs, while providing additional benefits such as aesthetics and habitat.

12. **POLLUTION PREVENTION**: Pollution prevention, the initial reduction/elimination of pollutant generation at its source, is the best "first line of defense" for Copermittees and should be used in conjunction with source control and treatment control BMPs. Pollutants that are never generated do not have to be controlled or treated. Encouragement during planning processes of the use of pollution prevention BMPs can be an effective means for pollution prevention BMPs to be implemented, through such methods as education, landscaping, etc.

13. **RECEIVING WATER LIMITATIONS:** Compliance with receiving water limits based on applicable water quality objectives is necessary to ensure that MS4 discharges will not cause or contribute to violations of water quality objectives and the creation of conditions of pollution.

14. **RECEIVING WATER LIMITATION COMPLIANCE STRATEGY**: Implementation of BMPs cannot ensure attainment of receiving water quality objectives under all circumstances; some BMPs may not prove to be as effective as anticipated. An iterative process of BMP development, implementation, monitoring, and assessment is necessary to assure that an Urban Runoff Management Program is sufficiently comprehensive and effective to achieve compliance with receiving water quality objectives.

15. **COPERMITTEES' RESPONSIBILITY FOR ILLICIT DISCHARGES FROM THIRD PARTIES:** As operators of MS4s, the Copermittees cannot passively receive and discharge pollutants from third parties. By providing free and open access to an MS4 that conveys discharges to the waters of the United States, the operator of an MS4 that does not prohibit and/or control discharges into its system essentially accepts responsibility for those discharges. These discharges may cause or contribute to a condition of contamination or exceedances of receiving water quality objectives.

16. **COPERMITTEES' RESPONSIBILITY BASED ON LAND USE AUTHORITY**: Utilizing their land use authority, Copermittees authorize and realize benefits from the urban development which generates the pollutants and runoff that impair receiving waters. Since the Copermittees utilize their legal authority to authorize urbanization, they must also exercise their legal authority to ensure that the resulting increased pollutant loads and flows do not further degrade receiving waters.

17. **THREE PHASES OF URBAN DEVELOPMENT**: Urban development has three major phases: (1) land use planning for new development; (2) construction; and (3) the "use" or existing development phase. Because the Copermittees authorize, permit, and realize benefits from each of these phases, and because each phase has a profound impact on water quality, the Copermittees have commensurate responsibilities to protect water quality during each phase. In other words, Copermittees are held responsible for the short and long-term water quality consequences of their land use planning, construction, and existing development decisions.

18. **PLANNING PHASE FOR NEW DEVELOPMENT**: Because land use planning and zoning is where urban development is conceived, it is the phase in which the greatest and most cost-effective opportunities to protect water quality exists. When a Copermittee incorporates policies and principles designed to safeguard water resources into its General Plan and development project approval processes, it has taken a far-reaching step towards the preservation of local water resources for future generations.

19. **CONSTRUCTION PHASE**: Construction activities are a significant cause of receiving water impairment. Siltation is currently the largest cause of river impairment in the United States. Sediment runoff rates from construction sites greatly exceed natural erosion rates of undisturbed lands causing siltation and impairment of receiving waters. In addition to requiring implementation of the full range of BMPs, an effective construction runoff program must include local plan review, permit conditions, field inspections, and enforcement.

20. **EXISTING DEVELOPMENT:** The Copermittees' wet weather monitoring results collected during the past decade, as well as volumes of other references in the literature today, confirm substantial pollutant loads to receiving waters in runoff from existing urban development. Implementation of jurisdictional and watershed URMPs, which include extensive controls on existing development, can reduce pollutant loadings over the long term.

21. **CHANGES NEEDED**: Because the urbanization process is a direct and leading cause of water quality degradation in this Region, fundamental changes to existing policies and practices about urban development are needed if the beneficial uses of the San Diego Region's natural water resources are to be protected.

22. **DUAL REGULATION OF INDUSTRIAL AND CONSTRUCTION SITES:** Discharges of runoff from industrial and construction sites in this Region are subject to dual (state and local) regulation. (1) All industries and construction sites are subject to the local permits, plans, and ordinances of the municipal jurisdiction in which it is located. Pursuant to this Order, local (storm water, grading,

construction, and use) permits, plans, and ordinances must (a) prohibit the discharge of pollutants and non-storm water into the MS4; and (b) require the routine use of BMPs to reduce pollutants in site runoff. (2) Many industries and construction sites are also subject to regulation under the statewide General Industrial Storm Water Permit or statewide General Construction Storm Water Permit[1]. These statewide general permits are adopted by the State Water Resources Control Board and enforced by the nine Regional Water Quality Control Boards throughout California. Like the Copermittees' local permits and ordinances, the statewide General Industrial and Construction Permits also (a) prohibit the discharge of pollutants and non-storm water; and (b) require the routine use of BMPs to reduce pollutants in site runoff.

Recognizing that both authorities share a common goal, the federal storm water regulations at 40 CFR 122.26 (and its preamble) call for the dual system to ensure the most effective oversight of industrial and construction site discharges. Under this dual system, each municipal Copermittee is responsible for enforcing its local permits, plans, and ordinances within its jurisdiction. Similarly, the SDRWQCB is responsible for enforcing both statewide general permits and this Order within the San Diego Region.

23. **EDUCATION:** Education is the foundation of every effective URMP and the basis for changes in behavior at a societal level. Education of municipal planning, inspection, and maintenance department staffs is especially critical to ensure that in-house staffs understand how their activities impact water quality, how to accomplish their jobs while protecting water quality, and their specific roles and responsibilities for compliance with this Order. Public education, designed to target various urban land users and other audiences, is also essential to inform the public of how individual actions impact receiving water quality and how these impacts can be minimized. The proposed Drainage Area Management Plan (DAMP) that was submitted to the SDRWQCB by the Orange County Copermittees in September 2000 has a strong emphasis on education measures.

24. **ENFORCING LOCAL LEGAL AUTHORITY**: Enforcement of local urban runoff related ordinances, permits, and plans is an essential component of every URMP and is specifically required in the federal storm water regulations and this Order. Routine inspections provide an effective means by which Copermittees can evaluate compliance with their permits and ordinances. Inspections are especially important at high-risk areas for pollutant discharges such as industrial and construction sites.

    When industrial or construction site discharges occur in violation of local permits and ordinances, the SDRWQCB looks to the municipality that has authorized the discharge for appropriate actions (typically education followed by enforcement where education has been unsuccessful). Each Copermittee must also provide enforcement against illegal discharges from other land uses it has authorized, such as commercial and residential developments.

25. **PUBLIC PARTICIPATION:** Public participation during the URMP development process is necessary to ensure that all stakeholder interests and a variety of creative solutions are considered.

26. **TOXICITY**: Urban runoff discharges from MS4s often contain pollutants that cause toxicity, (i.e., adverse responses of organisms to chemicals or physical agents ranging from mortality to physiological responses such as impaired reproduction or growth anomalies). The water quality objectives for toxicity provided in the Water Quality Control Plan, San Diego Basin, Region 9, (Basin Plan), state in part *"All waters shall be free of toxic substances in concentrations that are toxic to, or that produce detrimental physiological responses in human, plant, animal, or aquatic life….The survival of aquatic life in surface waters subjected to a waste discharge or other controllable water quality factors, shall not be less than*

[1] The "statewide General Industrial Storm Water Permit" refers to State Water Resources Control Board Water Quality Order No. 97-03-DWQ National Pollutant Discharge Elimination System General Permit No. CAS000001, Waste Discharge Requirements for Discharges of Storm Water Associated with Industrial Activities Excluding Construction Activities. The "statewide General Construction Storm Water Permit" refers to State Water Resources Control Board Order No. 99-08-DWQ National Pollutant Discharge Elimination System General Permit No. CAS000002, Waste Discharge Requirements for Discharges of Storm Water Runoff Associated with Construction Activity.

that for the same water body in areas unaffected by the waste discharge…" Urban runoff discharges from MS4s are considered toxic when (1) the toxic effect observed in an acute toxicity test exceeds zero Toxic Units Acute (TUa=0); or (2) the toxic effect observed in a chronic toxicity test exceeds one Toxic Unit Chronic (TUc=1).

27. **FOCUS ON MAN-MADE POLLUTANTS AND FLOWS:** The focus of this Order is on the control of urban runoff pollutants and flows, which are either generated or accelerated by human activities. This Order is not meant to control background or naturally occurring pollutants and flows.

28. **COMMON WATERSHEDS AND CWA SECTION 303(d) IMPAIRED WATERS**: The Copermittees discharge urban runoff into lakes, streams, creeks, bays, the Pacific Ocean, and tributaries thereto within six hydrologic areas within Orange County as shown in Table 2 below. During its downstream course, urban runoff is conveyed through lined and unlined (natural, manmade, and partially modified) channels, all of which are defined as components of the Copermittees' MS4.

    Some of the receiving water bodies listed below, which receive or convey urban runoff discharges, have been designated as impaired by the SDRWQCB and USEPA in 1998 pursuant to Clean Water Act section 303(d). Additional water bodies may be listed during the term of this Order pursuant to Clean Water Act section 303(d) as impaired as more information is collected and analyzed.

Table 2. Watershed Management Areas (WMAs)

SDRWQCB WATERSHED MANAGEMENT AREA (WMA)	HYDROLOGIC UNIT(S)	MAJOR SURFACE WATER BODIES	303(d) POLLUTANT(S) OF CONCERN OR WATER QUALITY EFFECT	COPERMITTEES
San Juan Creek WMA	San Juan Hydrologic Unit (901.00)	Moro Canyon Creek Laguna Canyon Creek Aliso Creek English Canyon Creek Sulphur Creek Wood Canyon Creek Salt Creek San Juan Creek Bell Canyon Creek Canada Gobernadora Arroyo Trabuco Oso Creek Prima Deshecha Canada Segunda Deshecha Canada Pacific Ocean	1. Coliform Bacteria	1. County of Orange 2. City of Aliso Viejo 3. City of Dana Point 4. City of Laguna Beach 5. City of Lake Forest 6. City of Laguna Hills 7. City of Laguna Niguel 8. City of Laguna Woods 9. City of Mission Viejo 10. City of Rancho Santa Margarita 11. City of San Juan Capistrano 12. City of San Clemente 13. Orange County Flood Control District

29. **CUMULATIVE POLLUTANT LOAD CONTRIBUTIONS:** Because they are interconnected, each MS4 within a watershed contributes to the cumulative pollutant loading, volume, and velocity of urban runoff and the ensuing degradation of downstream receiving water bodies. Accordingly, inland MS4s contribute to coastal impairments.

30. **LAND USE PLANNING ON A WATERSHED SCALE**: Because urban runoff does not recognize political boundaries, "watershed-based" land use planning (pursued collaboratively by neighboring local governments) can greatly enhance the protection of shared natural water resources. Such planning enables multiple jurisdictions to work together to plan for both development and resource conservation that can be environmentally as well as economically sustainable.

31. **INTERGOVERNMENTAL COORDINATION:** Within their common watersheds it is essential for the Copermittees to coordinate their water quality protection and land use planning activities to achieve the greatest protection of receiving water bodies. Copermittee coordination with other watershed stakeholders, especially CALTRANS and the Department of Defense is also critical.

Continued implementation of the management structure developed under previous permits, within which the Copermittees subject to this Order, will fund and coordinate those aspects of their joint obligations will promote implementation of Urban Runoff Management Programs on a watershed and regional basis in the most cost effective manner.

32. **WASTE REMOVAL:** Waste and pollutants which are deposited and accumulate in MS4 drainage structures will be discharged from these structures to waters of the United States unless they are removed. These discharges may cause or contribute to, or threaten to cause or contribute to, a condition of pollution in receiving waters. Once removed, such accumulated wastes must be characterized and lawfully disposed.

33. **CHANGING THE STORM WATER MANAGEMENT APPROACH**: In contrast to the conventional "conveyance" approach, a more natural approach to storm water management seeks to filter and infiltrate runoff by allowing it to flow slowly over permeable vegetated surfaces. By "preserving and restoring the natural hydrologic cycle", filtration and infiltration can greatly reduce the volume/peak rate, velocity, and pollutant loads of urban runoff. The greatest opportunities for changing from a "conveyance" to a more natural management approach occur during the land use planning and zoning processes and when new development projects are under early design.

34. **INFILTRATION AND POTENTIAL GROUNDWATER CONTAMINATION:** Any drainage feature that infiltrates runoff poses some risk of potential groundwater contamination. Although dependent on several factors, the risks typically associated with properly managed infiltration of runoff (especially from residential land use areas) are not significant. The risks associated with infiltration can be managed by many techniques, including (1) designing landscape drainage features that promote infiltration of runoff, but do not "inject" runoff (injection bypasses the natural processes of filtering and transformation that occur in the soil); (2) taking reasonable steps to prevent the illegal disposal of wastes; and (3) ensuring that each drainage feature is adequately maintained in perpetuity. Minimum conditions needed to protect groundwater are specified in section F.1.b. of this Order.

35. **VECTOR CONTROL:** Certain BMPs implemented or required by municipalities for urban runoff management may create a habitat for vectors (e.g. mosquitoes and rodents) if not properly designed or maintained. Close collaboration and cooperative effort between municipalities and local vector control agencies and the State Department of Health Services during the development and implementation of the Urban Runoff Management Programs is necessary to minimize nuisances and public health impacts resulting from vector breeding.

36. **LEGAL AUTHORITY:** This Order is based on the federal Clean Water Act, the Porter-Cologne Water Quality Control Act (Division 7 of the Water Code, commencing with Section 13000), applicable state and federal regulations, all applicable provisions of statewide Water Quality Control Plans and Policies adopted by the State Water Resources Control Board, the Regional Water Quality Control Plan (Basin Plan) adopted by the Regional Board, the California Toxics Rule, and the California Toxics Rule Implementation Plan.

37. **TOTAL MAXIMUM DAILY LOADS (TMDLs):** 40 CFR 122.44 (d)(vii)(B) requires that NPDES permits contain effluent limitations that are consistent with waste load allocations developed under a TMDL. Several TMDLs are being developed in the San Diego Region for impaired water bodies that receive Copermittees' discharge. Once these TMDLs are approved by the SDRWQCB and USEPA, Copermittees' discharge of urban runoff into an impaired water body will be subject to load allocations established by the TMDLs. This Order may be revised by the Regional Board to implement the TMDL waste load allocations for specific water bodies within the Orange County watersheds.

38. **ANTIDEGRADATION:** Conscientious implementation of URMPs that satisfy the requirements contained in this Order will reduce the likelihood that discharges from MS4s will cause or contribute to unreasonable degradation of the quality of receiving waters. Therefore, this Order is in

conformance with SWRCB Resolution No. 68-16 and the federal antidegradation policy described in 40 CFR 131.12.

39. **CEQA:** The issuance of waste discharge requirements for the discharge of urban runoff from MS4s to waters of the United States is exempt from the requirement for preparation of environmental documents under the California Environmental Quality Act (CEQA) (Public Resources Code, Division 13, Chapter 3, § 21000 et seq.) in accordance with the CWC § 13389.

40. **COMMON INTEREST DEVELOPMENTS AND HOMEOWNERS ASSOCIATIONS:** Common interest developments occur within the jurisdiction of the Copermittees. Commonly owned areas can include those used to convey urban runoff. State Law (Civil code 1350-1376) requires that an association be established to manage the commonly owned areas. Urban runoff from storm water conveyance systems within common interest developments is discharged to receiving waters and/or MS4s. This runoff is expected to have water quality and quantity characteristics similar to runoff from areas of similar land use and drainage area.

41. **REPORT OF WASTE DISCHARGE:** In September 2000, the Orange County Copermittees submitted a Report of Waste Discharge and a proposed Drainage Area Management Plan (DAMP) for 2001-2006 to the SDRWQCB.

42. **PUBLIC NOTICE:** The SDRWQCB has notified the Copermittees, all known interested parties, and the public of its intent to consider adoption of an Order prescribing waste discharge requirements that would serve to renew an NPDES permit for the existing discharge of urban runoff.

43. **PUBLIC HEARING**: The SDRWQCB has, at a public meeting on January 9, 2002, held a public hearing and heard and considered all comments pertaining to the terms and conditions of this Order.

IT IS HEREBY ORDERED that the Copermittees, in order to meet the provisions contained in Division 7 of the California Water Code and regulations adopted thereunder, and the provisions of the Clean Water Act and regulations adopted thereunder, shall each comply with the following:

A. PROHIBITIONS -- DISCHARGES

1. Discharges into and from MS4s in a manner causing, or threatening to cause, a condition of pollution, contamination, or nuisance (as defined in CWC § 13050), in waters of the state are prohibited.

2. Discharges from MS4s that cause or contribute to exceedances of receiving water quality objectives for surface water or groundwater are prohibited.

3. Discharges from MS4s containing pollutants which have not been reduced to the maximum extent practicable (MEP) are prohibited.

4. In addition to the above prohibitions, discharges from MS4s are subject to all Basin Plan prohibitions cited in **Attachment A** to this Order.

B. PROHIBITIONS -- NON-STORM WATER DISCHARGES

1. Each Copermittee shall effectively prohibit **all** types of non-storm water discharges into its Municipal Separate Storm Sewer System (MS4) unless such discharges are either authorized by a separate NPDES permit; or not prohibited in accordance with B.2. and B.3. below.

2. Pursuant to 40 CFR 122.26(d)(2)(iv)(B)(1), the following categories of non-storm water discharges need only be prohibited from entering an MS4 if such categories of discharges are identified by the Copermittee as a significant source of pollutants to waters of the United States:

a. Diverted stream flows;
b. Rising ground waters;
c. Uncontaminated ground water infiltration [as defined at 40 CFR 35.2005(20)] to MS4s;
d. Uncontaminated pumped ground water;
e. Foundation drains;
f. Springs;
g. Water from crawl space pumps;
h. Footing drains;
i. Air conditioning condensation;
j. Flows from riparian habitats and wetlands;
k. Water line flushing;
l. Landscape irrigation;
m. Discharges from potable water sources other than water main breaks;
n. Irrigation water;
o. Lawn watering;
p. Individual residential car washing; and
q. Dechlorinated swimming pool discharges.

3. When a discharge category above is identified as a significant source of pollutants to waters of the United States, the Copermittee shall either:

   a. Prohibit the discharge category from entering its MS4; ***OR***

   b. Not prohibit the discharge category and implement, or require the responsible party(ies) to implement, BMPs which will reduce pollutants to the MEP; ***AND***

   c. For each discharge category not prohibited, the Copermittee shall submit the following information to the SDRWQCB within **365 days** of adoption of this Order:

      (1) The non-storm water discharge category listed above which the Copermittee elects not to prohibit; and

      (2) The BMP(s) for each discharge category listed above which the Copermittee will implement, or require the responsible party(ies) to implement, to prevent or reduce pollutants to the MEP.

4. **Fire Fighting Flows:** Emergency and non-emergency fire fighting flows need not be prohibited. However, where applicable, when not interfering with health and safety issues, BMPs for non-emergency fire fighting flows are encouraged.

5. **Dry Weather Monitoring and Non-Storm Water Discharges:** Each Copermittee shall examine all dry weather monitoring results collected in accordance with section F.5. and Attachment E of this Order to identify water quality problems which may be the result of any non-prohibited discharge category(ies) identified above in Non-Storm Water Discharges to MS4s Prohibition B.2. Follow-up investigations shall be conducted as necessary to identify and control any non-prohibited discharge category(ies) listed above.

C. RECEIVING WATER LIMITATIONS

1. Discharges from MS4s that cause or contribute to the violation of water quality standards (designated beneficial uses and water quality objectives developed to protect beneficial uses) are prohibited.

2. Each Copermittee shall comply with Part C.1., Part A.2, and Part A.4 as it applies to Prohibition 5 in Attachment A of this Order through timely implementation of control measures and other actions to

reduce pollutants in urban runoff discharges in accordance with the Jurisdictional Urban Runoff Management Program (Jurisdictional URMP) and other requirements of this Order including any modifications. The Jurisdictional URMP shall be designed to achieve compliance with Part C.1., Part A.2, and Part A.4 as it applies to Prohibition 5 in Attachment A of this Order. If exceedance(s) of water quality standards persist notwithstanding implementation of the URMP and other requirements of this Order, the Copermittee shall assure compliance with Part C.1., Part A.2, and Part A.4 as it applies to Prohibition 5 in Attachment A of this Order by complying with the following procedure:

a. Upon a determination by either the Copermittee or the SDRWQCB that MS4 discharges are causing or contributing to an exceedance of an applicable water quality standard, the Copermittee shall promptly notify and thereafter submit a report to the SDRWQCB that describes BMPs that are currently being implemented and additional BMPs that will be implemented to prevent or reduce any pollutants that are causing or contributing to the exceedance of water quality standards. The report may be incorporated in the annual update to the Jurisdictional URMP unless the SDRWQCB directs an earlier submittal. The report shall include an implementation schedule. The SDRWQCB may require modifications to the report;

b. Submit any modifications to the report required by the SDRWQCB within 30 days of notification;

c. Within 30 days following approval of the report described above by the SDRWQCB, the Copermittee shall revise its Jurisdictional URMP and monitoring program to incorporate the approved modified BMPs that have been and will be implemented, the implementation schedule, and any additional monitoring required;

d. Implement the revised Jurisdictional URMP and monitoring program in accordance with the approved schedule.

So long as the Copermittee has complied with the procedures set forth above and are implementing the revised Jurisdictional URMP, the Copermittee does not have to repeat the same procedure for continuing or recurring exceedances of the same receiving water limitations unless directed by the SDRWQCB to do so.

3. Nothing in this section shall prevent the SDRWQCB from enforcing any provision of this Order while the Copermittee prepares and implements the above report.

D. LEGAL AUTHORITY

1. Each Copermittee shall establish, maintain, and enforce adequate legal authority to control pollutant discharges **into** and **from** its MS4 through ordinance, statute, permit, contract or similar means. This legal authority must, at a minimum, authorize the Copermittee to:

   a. Control the contribution of pollutants in discharges of runoff associated with industrial and construction activity **to** its MS4 and control the quality of runoff **from** industrial and construction sites. This requirement applies both to industrial and construction sites that have coverage under the statewide general industrial or construction storm water permits, as well as to those sites that do not. Grading ordinances shall be upgraded and enforced as necessary to comply with this Order.

   b. Prohibit **all** identified illicit discharges not otherwise allowed pursuant to section B.2 including but not limited to:

      (1) Sewage;

(2) Discharges of wash water resulting from the hosing or cleaning of gas stations, auto repair garages, or other types of automotive services facilities;

(3) Discharges resulting from the cleaning, repair, or maintenance of any type of equipment, machinery, or facility including motor vehicles, cement-related equipment, and port-a-potty servicing, etc.;

(4) Discharges of wash water from mobile operations such as mobile automobile washing, steam cleaning, power washing, and carpet cleaning, etc.;

(5) Discharges of wash water from the cleaning or hosing of impervious surfaces in municipal, industrial, commercial, and residential areas including parking lots, streets, sidewalks, driveways, patios, plazas, work yards and outdoor eating or drinking areas, etc.;

(6) Discharges of runoff from material storage areas containing chemicals, fuels, grease, oil, or other hazardous materials;

(7) Discharges of pool or fountain water containing chlorine, biocides, or other chemicals; discharges of pool or fountain filter backwash water;

(8) Discharges of sediment, pet waste, vegetation clippings, or other landscape or construction-related wastes; and

(9) Discharges of food-related wastes (e.g., grease, fish processing, and restaurant kitchen mat and trash bin wash water, etc.).

c. Prohibit and eliminate illicit connections to the MS4;

d. Control the discharge of spills, dumping, or disposal of materials other than storm water to its MS4;

e. Require compliance with conditions in Copermittee ordinances, permits, contracts or orders (i.e., hold dischargers to its MS4 accountable for their contributions of pollutants and flows);

f. Utilize enforcement mechanisms to require compliance with Copermittee storm water ordinances, permits, contracts, or orders;

g. Control the contribution of pollutants from one portion of the shared MS4 to another portion of the MS4 through interagency agreements among Copermittees. Control of the contribution of pollutants from one portion of the shared MS4 to another portion of the MS4 through interagency agreements with other owners of the MS4 such as CALTRANS, Native American Tribes, and the Department of Defense is encouraged;

h. Carry out all inspections, surveillance, and monitoring necessary to determine compliance and noncompliance with local ordinances and permits and with this Order, including the prohibition on illicit discharges to the MS4. This means the Copermittee must have authority to enter, sample, inspect, review and copy records, and require regular reports from industrial facilities discharging into its MS4, including construction sites; and

i. Require the use of best management practices (BMPs) to prevent or reduce the discharge of pollutants to MS4s.

2. Within **365 days** of adoption of this Order, each Copermittee shall provide to the SDRWQCB a statement certified by its chief legal counsel that the Copermittee has adequate legal authority to

implement and enforce each of the requirements contained in 40 CFR 122.26(d)(2)(i)(A-F) and this Order. This statement shall include:

a. Identification of all departments within the jurisdiction that conduct urban runoff related activities, and their roles and responsibilities under this Order. Include an up to date organizational chart specifying these departments and key personnel;

b. Citation of urban runoff related ordinances and the reasons they are enforceable;

c. Identification of the local administrative and legal procedures available to mandate compliance with urban runoff related ordinances and therefore with the conditions of this Order;

d. Description of how these ordinances are implemented and appealed; and

e. Description of whether the municipality can issue administrative orders and injunctions or if it must go through the court system for enforcement actions.

E. TECHNOLOGY BASED STANDARDS

Each Copermittee shall implement, or require implementation of, best management practices to ensure that the following pollutant discharges **into** and/or **from** its MS4 are reduced to the applicable technology based standard as specified below:

Table 3. Technology Based Standards[2]

POLLUTANT DISCHARGE FROM	DESCRIPTION	APPLICABLE PERFORMANCE STANDARD
Industrial Activity owned by the Copermittee	Categorical Industry in 40 CFR 122.26	The Copermittees are required to implement BMPs to the BAT/BCT standard (pursuant to Statewide General Industrial Permit)
Industrial Activity	All other industry	The Copermittees are required to implement or require the implementation of BMPs to the MEP standard for discharges into their MS4s. [3]
Construction Activity owned by the Copermittee	Greater than or Equal to 5 Acres (or less than 5 acres and Part of a Larger Common Plan of Sale or Development)	The Copermittees are required to implement BMPs to the BAT/BCT standard (pursuant to Statewide General Construction Permit)
Construction Activity	All Other construction	The Copermittees are required to implement or require the implementation of BMPs to the MEP standard for discharges into their MS4s[4]
Other Sources	All Other Land Use Activities	The Copermittees are required to implement or require the implementation of BMPs to the MEP standard for discharges into their MS4s
MS4s	All discharges from MS4s	The Copermittees are required to implement or require the implementation of BMPs to the MEP standard for all discharges from their MS4s

[2] Pursuant to this Order, each Copermittee shall ensure that pollutants in runoff from industrial and construction sites within its jurisdiction have been reduced to the MEP standard before entering its MS4. The industrial and construction site dischargers themselves however must ensure that pollutants in runoff leaving their sites have been reduced to the BAT/BCT standard pursuant to either the statewide General Industrial or Construction Storm Water Permit. Runoff from industrial and construction sites owned by municipalities and subject to either the General Industrial or Construction Storm Water Permits, must meet the BAT/BCT standard.

[3] The facility operator is required to implement BMPs to the BAT/BCT standard pursuant to the Statewide General Industrial permit.

[4] The facility operator is required to implement BMPs to the BAT/BCT standard pursuant to the Statewide General Construction permit.

F. JURISDICTIONAL URBAN RUNOFF MANAGEMENT PROGRAM

Each Copermittee shall take appropriate actions to reduce discharges of pollutants and runoff flow during each of the three major phases of urban development, i.e., the planning, construction, and existing development (or use) phases. Following the adoption of the Order and prior to the full implementation of the Jurisdictional URMP, each Copermittee shall at a minimum implement the provisions and commitments of the proposed DAMP submitted in September 2000.

Each Copermittee shall implement a Jurisdictional Urban Runoff Management Program (Jurisdictional URMP) that contains the components shown below as described in Sections F.1. through F.9:

F.1. Land-Use Planning for New Development and Redevelopment Component
F.2. Construction Component
F.3. Existing Development Component
- **a. Municipal**
- **b. Industrial**
- **c. Commercial**
- **d. Residential**

F.4. Education Component
F.5. Illicit Discharge Detection and Elimination Component
F.6. Common Interest Areas and Homeowners Associations
F.7. Public Participation Component
F.8. Assessment of Jurisdictional URMP Effectiveness Component
F.9. Fiscal Analysis Component

F.1. Land-Use Planning for New Development and Redevelopment Component

Each Copermittee shall minimize the short and long-term impacts on receiving water quality from new development and redevelopment. In order to reduce pollutants and runoff flows from new development and redevelopment to the maximum extent practicable, each Copermittee shall at a minimum:

F.1.a Assess General Plan
F.1.b Modify Development Project Approval Processes
F.1.c Revise Environmental Review Processes
F.1.d Conduct Education Efforts Focused on New Development and Redevelopment

F.1.a. <u>Assess General Plan</u>

Each Copermittee's General Plan or equivalent plan (e.g., Comprehensive, Master, or Community Plan) shall include water quality and watershed protection principles and policies to direct land-use decisions and require implementation of consistent water quality protection measures for development projects. As part of its Jurisdictional Urban Runoff Management Program document, each Copermittee shall provide a workplan with time schedule detailing any changes to its General Plan regarding water quality and watershed protection. Examples of water quality and watershed protection principles and policies to be considered include the following:

(1) Minimize the amount of impervious surfaces and directly connected impervious surfaces in areas of new development and redevelopment and where feasible slow runoff and maximize on-site infiltration of runoff.

(2) Implement pollution prevention methods supplemented by pollutant source controls and treatment. Use small collection strategies located at, or as close as possible to, the source (i.e., the point where water initially meets the ground) to minimize the transport of urban runoff and pollutants offsite and into an MS4.

(3) Preserve, and where possible, create or restore areas that provide important water quality benefits, such as riparian corridors, wetlands, and buffer zones. Encourage land acquisition of such areas.

(4) Limit disturbances of natural water bodies and natural drainage systems caused by development including roads, highways, and bridges.

(5) Prior to making land use decisions, utilize methods available to estimate increases in pollutant loads and flows resulting from projected future development. Require incorporation of structural and non-structural BMPs to mitigate the projected increases in pollutant loads and flows.

(6) Avoid development of areas that are particularly susceptible to erosion and sediment loss; or establish development guidance that identifies these areas and protects them from erosion and sediment loss.

(7) Reduce pollutants associated with vehicles and increasing traffic resulting from development. Coordinate local traffic management reduction efforts with Orange County Transit Authority's Congestion Management Plan.

(8) Post-development runoff from a site shall not contain pollutant loads that cause or contribute to an exceedance of receiving water quality objectives and which have not been reduced to the maximum extent practicable.

F.1.b. Modify Development Project Approval Processes

Prior to project approval and issuance of local permits, Copermittees shall require each proposed project to implement measures to ensure that pollutants and runoff from the development will be reduced to the maximum extent practicable and will not cause or contribute to an exceedance of receiving water quality objectives. Each Copermittee shall further ensure that all development will be in compliance with Copermittee storm water ordinances, local permits, all other applicable ordinances and requirements, and this Order.

(1) Development Project Requirements

Each Copermittee shall include development project requirements in local permits to ensure that pollutant discharges from development are reduced to the maximum extent practicable, peak runoff velocities and runoff volumes from development are controlled, and that receiving water quality objectives are not violated throughout the life of the project. Such requirements shall, at a minimum:

(a) Require project proponent to implement source control BMPs for all applicable development projects.
(b) Require project proponent to implement site design/landscape characteristics where feasible which maximize infiltration, provide retention, slow runoff, and minimize impervious land coverage for all development projects.
(c) Require project proponent to implement buffer zones for natural water bodies, where feasible. Where buffer zone implementation is infeasible, require project proponent to implement other buffers such as trees, lighting restrictions, access restrictions, etc.
(d) Require industrial applicants subject to California's statewide General NPDES Permit for Storm Water Discharges Associated with Industrial Activities (Except Construction), (hereinafter General Industrial Permit), to provide evidence of coverage under the General Industrial Permit.
(e) Require project proponent to ensure its grading or other construction activities meet the provisions specified in Section F.2. of this Order.

(f) Require project proponent to provide proof of a mechanism which will ensure ongoing long-term maintenance of all structural post-construction BMPs.

(2) Standard Urban Storm Water Mitigation Plans (SUSMPs)

Within 365 days of adoption of this Order, the Copermittees shall collectively develop a model Standard Urban Storm Water Mitigation Plan (SUSMP) to reduce pollutants and to maintain or reduce downstream erosion and stream habitat from all new development and significant redevelopment projects falling under the priority project categories or locations listed in section F.1.b.(2)(a) below. The Copermittes shall submit the model SUSMP to the SDRWQCB. Within 180 days of development of the model SUSMP, each Copermittee shall adopt its own local SUSMP, and amended ordinances consistent with the model SUSMP, and shall submit both (local SUSMP and amended ordinances) to the SDRWQCB.

Immediately following adoption of its local SUSMP, each Copermittee shall ensure that all new development and significant redevelopment projects falling under the priority project categories or locations listed in F.1.b.(2)(a) below meet SUSMP requirements. The SUSMP requirements shall apply to all priority projects or phases of priority projects that have not yet begun grading or construction activities. If a Copermittee determines that lawful prior approval of a project exists, whereby application of SUSMP requirements to the project is infeasible, SUSMP requirements need not apply to the project. Where feasible, the Copermittees shall utilize the 18-month SUSMP implementation period to ensure that projects undergoing approval processes include application of SUSMP requirements in their plans.

(a) *Priority Development Project Categories - SUSMP requirements shall apply to all new development and significant redevelopment projects falling under the priority project categories or locations listed below.* Significant redevelopment is defined as the creation or addition of at least 5,000 square feet of impervious surfaces on an already developed site. Significant redevelopment includes, but is not limited to: the expansion of a building footprint or addition or replacement of a structure; structural development including an increase in gross floor area and/or exterior construction or remodeling; replacement of impervious surface that is not part of a routine maintenance activity; and land disturbing activities related with structural or impervious surfaces. Where significant redevelopment results in an increase of less than fifty percent of the impervious surfaces of a previously existing development, and the existing development was not subject to SUSMP requirements, the numeric sizing criteria discussed in section F.1.b.(2)(c) applies only to the addition, and not to the entire development.

i. *Home subdivisions of 10 or more housing units*. This category includes single-family homes, multi-family homes, condominiums, and apartments.

ii. *Commercial developments greater than 100,000 square feet*. This category is defined as any development on private land that is not for heavy industrial or residential uses where the land area for development is greater than 100,000 square feet. The category includes, but is not limited to: hospitals; laboratories and other medical facilities; educational institutions; recreational facilities; commercial nurseries; multi-apartment buildings; car wash facilities; mini-malls and other business complexes; shopping malls; hotels; office buildings; public warehouses; automotive dealerships; commercial airfields; and other light industrial facilities.

iii. *Automotive repair shops.* This category is defined as a facility that is categorized in any one of the following Standard Industrial Classification (SIC) codes: 5013, 5014, 5541, 7532-7534, or 7536-7539.

iv. *Restaurants*. This category is defined as a facility that sells prepared foods and drinks for consumption, including stationary lunch counters and refreshment stands selling prepared foods and drinks for immediate consumption (SIC code 5812), where the land area for development is greater than 5,000 square feet. Restaurants where land development is less than 5,000 square feet shall meet all SUSMP requirements except for structural treatment BMP and numeric sizing criteria requirement F.1.b.(2)(c) and peak flow rate requirement F.1.b(2)(b)(i).

v. *All hillside development greater than 5,000 square feet.* This category is defined as any development which creates 5,000 square feet of impervious surface which is located in an area with known erosive soil conditions, where the development will grade on any natural slope that is twenty-five percent or greater.

vi. *Environmentally Sensitive Areas: All development and redevelopment located within or directly adjacent to or discharging directly to an environmentally sensitive area (where discharges from the development or redevelopment will enter receiving waters within the environmentally sensitive area), which either creates 2,500 square feet of impervious surface on a proposed project site or increases the area of imperviousness of a proposed project site to 10% or more of its naturally occurring condition.* Environmentally sensitive areas include but are not limited to all Clean Water Act Section 303(d) impaired water bodies; areas designated as Areas of Special Biological Significance by the State Water Resources Control Board (Water Quality Control Plan for the San Diego Basin (1994) and amendments); water bodies designated with the RARE beneficial use by the State Water Resources Control Board (Water Quality Control Plan for the San Diego Basin (1994) and amendments); areas designated as preserves or equivalent under the Natural Community Conservation Planning Program; and any areas designated as Critical Aquatic Resources (CARS) or other equivalent environmentally sensitive areas which have been identified by the Copermittees. “Directly adjacent” means situated within 200 feet of the environmentally sensitive area. “Discharging directly to” means outflow from a drainage conveyance system that is composed entirely of flows from the subject development or redevelopment site, and not commingled with flows from adjacent lands.

vii. *Parking lots 5,000 square feet or more or with 15 or more parking spaces and potentially exposed to urban runoff*. Parking lot is defined as a land area or facility for the temporary parking or storage of motor vehicles used personally, for business, or for commerce.

viii. *Street, roads, highways, and freeways.* This category includes any paved surface that is 5,000 square feet or greater used for the transportation of automobiles, trucks, motorcycles, and other vehicles.

(b) BMP Requirements – The SUSMP shall include a list of recommended source control and structural treatment BMPs. The SUSMP shall require all new development and significant redevelopment projects falling under the above priority project categories or locations to implement a combination of BMPs selected from the recommended BMP list, including at a minimum (1) source control BMPs and (2) structural treatment BMPs. The BMPs shall, at a minimum:

i. Control the post-development peak storm water runoff discharge rates and velocities to maintain or reduce pre-development downstream erosion, and to protect stream habitat;

ii. Conserve natural areas where feasible;
iii. Minimize storm water pollutants of concern in urban runoff from the new development or significant redevelopment (through implementation of source control BMPs). Identification of pollutants of concern should include at a minimum consideration of any pollutants for which water bodies receiving the development's runoff are listed as impaired under Clean Water Act section 303(d), any pollutant associated with the land use type of the development, and any pollutant commonly associated with urban runoff;
iv. Remove pollutants of concern from urban runoff (through implementation of structural treatment BMPs);
v. Minimize directly connected impervious areas where feasible;
vi. Protect slopes and channels from eroding;
vii. Include storm drain stenciling and signage;
viii. Include properly designed outdoor material storage areas;
ix. Include properly designed trash storage areas;
x. Include proof of a mechanism, to be provided by the project proponent or Copermittee, which will ensure ongoing long-term structural BMP maintenance;
xi. Include additional water quality provisions applicable to individual priority project categories;
xii. Be correctly designed so as to remove pollutants to the maximum extent practicable;
xiii. Be implemented close to pollutant sources, when feasible, and prior to discharging into receiving waters supporting beneficial uses; and
xiv. Ensure that post-development runoff does not contain pollutant loads which cause or contribute to an exceedance of water quality objectives and which have not been reduced to the maximum extent practicable.

(c) Numeric Sizing Criteria – The SUSMP shall require structural treatment BMPs to be implemented for all priority development projects. All structural treatment BMPs shall be located so as to infiltrate, filter, or treat the required runoff volume or flow prior to its discharge to any receiving water body supporting beneficial uses. Structural treatment BMPs may be shared by multiple new development projects as long as construction of any shared structural treatment BMPs is completed prior to the use of any new development project from which the structural treatment BMP will receive runoff.

In addition to meeting the BMP requirements listed in item F.1.b.(2)(b) above, all structural treatment BMPs for a single priority development project shall collectively be sized to comply with the following numeric sizing criteria:

Volume

Volume-based BMPs shall be designed to mitigate (infiltrate, filter, or treat) either:

i. The volume of runoff produced from a 24-hour 85th percentile storm event, as determined from the local historical rainfall record (0.8 inch approximate average for the Orange County area);[5] or
ii. The volume of runoff produced by the 85th percentile 24-hour rainfall event, determined as the maximized capture storm water volume for the area, from the formula recommended in Urban Runoff Quality

[5]This volume is not a single volume to be applied to all of Orange County. The size of the 85th percentile storm event is different for various parts of the County. The Copermittees are encouraged to calculate the 85th percentile storm event for each of their jurisdictions using local rain data pertinent to their particular jurisdiction (the 0.8 inch standard is a rough average for the County and should only be used where appropriate rain data is not available). In addition, isopluvial maps may be used to extrapolate rainfall data to areas where insufficient data exists in order to determine the volume of the local 85th percentile storm event in such areas. Where the Copermittees will use isopluvial maps to determine the 85th percentile storm event in areas lacking rain data, the Copermittees shall describe their method for using isopluvial maps in the model and local SUSMPs.

Management, WEF Manual of Practice No. 23/ASCE Manual of Practice No. 87, (1998); or

iii. The volume of annual runoff based on unit basin storage volume, to achieve 90% or more volume treatment by the method recommended in California Stormwater Best Management Practices Handbook – Industrial/Commercial, (1993); or

iv. The volume of runoff, as determined from the local historical rainfall record, that achieves approximately the same reduction in pollutant loads and flows as achieved by mitigation of the 85th percentile 24-hour runoff event;[6]

OR

Flow

Flow-based BMPs shall be designed to mitigate (infiltrate, filter, or treat) either:

i. The maximum flow rate of runoff produced from a rainfall intensity of 0.2 inch of rainfall per hour, for each hour; or

ii. The maximum flow rate of runoff produced by the 85th percentile hourly rainfall intensity, as determined from the local historical rainfall record, multiplied by a factor of two; or

iii. The maximum flow rate of runoff, as determined from the local historical rainfall record, that achieves approximately the same reduction in pollutant loads and flows as achieved by mitigation of the 85th percentile hourly rainfall intensity multiplied by a factor of two.

(d) Equivalent Numeric Sizing Criteria - The Copermittees may develop, as part of the model SUSMP, any equivalent method for calculating the volume or flow which must be mitigated (i.e., any equivalent method for calculating numeric sizing criteria) by post-construction structural treatment BMPs. Such equivalent sizing criteria may be authorized by the SDRWQCB for use in place of the above criteria. In the absence of development and subsequent authorization of such equivalent numeric sizing criteria, the above numeric sizing criteria requirement shall be implemented.

(e) Pollutants or Conditions of Concern – As part of the model SUSMP, the Copermittees shall develop a procedure for pollutants or conditions of concern to be identified for each new development or significant redevelopment project. The procedure shall include, at a minimum, consideration of (1) receiving water quality (including pollutants for which receiving waters are listed as impaired under Clean Water Act section 303(d)); (2) land use type of the development project and pollutants associated with that land use type; (3) pollutants expected to be present on site; (4) changes in storm water discharge flow rates, velocities, durations, and volumes resulting from the development project; and (5) sensitivity of receiving waters to changes in storm water discharge flow rates, velocities, durations, and volumes.

(f) Implementation Process – As part of the model SUSMP, the Copermittees shall develop a process by which SUSMP requirements will be implemented. The process shall identify at what point in the planning process development projects will be required to meet SUSMP requirements. The process shall also include identification of the roles and responsibilities of various municipal departments in implementing the SUSMP requirements, as well as any other measures necessary for the implementation of SUSMP requirements.

[6] Under this volume criteria, hourly rainfall data may be used to calculate the 85th percentile storm event, where each storm event is identified by its separation from other storm events by at least six hours of no rain. Where the Copermittees may use hourly rainfall data to calculate the 85th percentile storm event, the Copermittees shall describe their method for using hourly rainfall data to calculate the 85th percentile storm event in the model and local SUSMPs.

(g) Waiver Provision – A Copermittee may provide for a project to be waived from the requirement of implementing all structural treatment BMPs (F.1.b.(2)(b) & F.1.b.(2)(c)) if infeasibility can be established. A waiver of infeasibility shall only be granted by a Copermittee when all available structural treatment BMPs have been considered and rejected as infeasible. Copermittees shall notify the SDRWQCB within 5 days of each waiver issued and shall include the name of the person granting each waiver.

As part of the model SUSMP, the Copermittees may develop a program to require project proponents who have received waivers to transfer the savings in cost, as determined by the Copermittee(s), to a storm water mitigation fund. This program may be implemented by all Copermittees that choose to provide waivers. Funds may be used on projects to improve urban runoff quality within the watershed of the waived project. The waiver program may identify:

i. The entity or entities that will manage the storm water mitigation fund (i.e., assume full responsibility for)
ii. The range and types of acceptable projects for which mitigation funds may be expended;
iii. The entity or entities that will assume full responsibility for each mitigation project including its successful completion
iv. How the dollar amount of fund contributions will be determined.

(h) Infiltration and Groundwater Protection – To protect groundwater quality, each Copermittee shall apply restrictions to the use of structural treatment BMPs which are designed to primarily function as infiltration devices (such as infiltration trenches and infiltration basins). Such restrictions shall ensure that the use of such infiltration structural treatment BMPs shall not cause or contribute to an exceedance of groundwater quality objectives. At a minimum, use of structural treatment BMPs which are designed to primarily function as infiltration devices shall meet the following conditions:[7]

i. Urban runoff shall undergo pretreatment such as sedimentation or filtration prior to infiltration.
ii. All dry weather flows shall be diverted from infiltration devices.
iii. Pollution prevention and source control BMPs shall be implemented at a level appropriate to protect groundwater quality at sites where infiltration structural treatment BMPs are to be used.
iv. Infiltration structural treatment BMPs shall be adequately maintained so that they remove pollutants to the maximum extent practicable.
v. The vertical distance from the base of any infiltration structural treatment BMP to the seasonal high groundwater mark shall be at least 10 feet. Where groundwater basins do not support beneficial uses, this vertical distance criteria may be reduced, provided groundwater quality is maintained.
vi. The soil through which infiltration is to occur shall have physical and chemical characteristics (such as appropriate cation exchange capacity, organic content, clay content, and infiltration rate) which are adequate for proper infiltration durations and treatment of urban runoff for the protection of groundwater beneficial uses.
vii. Infiltration structural treatment BMPs shall not be used for areas of industrial or light industrial activity; areas subject to high vehicular traffic (25,000 or greater average daily traffic on main roadway or 15,000 or more average daily traffic on any intersecting roadway); automotive repair shops; car washes; fleet storage

[7] These conditions do not apply to structural treatment BMPs which allow incidental infiltration and are not designed to primarily function as infiltration devices (such as grassy swales, detention basins, vegetated buffer strips, constructed wetlands, etc.)

areas (bus, truck, etc.); nurseries; and other high threat to water quality land uses and activities as designated by each Copermittee.

viii. Infiltration structural BMPs shall be located a minimum of 100 feet horizontally from any water supply wells.

As part of the model and local SUSMPs, the Copermittees may develop alternative restrictions on the use of structural treatment BMPs which are designed to primarily function as infiltration devices.

(i) Downstream Erosion – As part of the model SUSMP and the local SUSMPs, the Copermittees shall develop criteria to ensure that discharges from new development and significant redevelopment maintain or reduce pre-development downstream erosion and protect stream habitat. At a minimum, criteria shall be developed to control peak storm water discharge rates and velocities in order to maintain or reduce pre-development downstream erosion and protect stream habitat. Storm water discharge volumes and durations should also be considered.

F.1.c. Revise Environmental Review Processes

(1) To the extent feasible, the Copermittees shall revise their current environmental review processes to include requirements for evaluation of water quality effects and identification of appropriate mitigation measures. The following questions are examples to be considered in addressing increased pollutants and flows from proposed projects:

(a) Could the proposed project result in an increase in pollutant discharges to receiving waters? Consider water quality parameters such as temperature, dissolved oxygen, turbidity and other typical storm water pollutants (e.g., heavy metals, pathogens, petroleum derivatives, synthetic organics, sediment, nutrients, oxygen-demanding substances, and trash).
(b) Could the proposed project result in significant alteration of receiving water quality during or following construction?
(c) Could the proposed project result in increased impervious surfaces and associated increased runoff?
(d) Could the proposed project create a significant adverse environmental impact to drainage patterns due to changes in runoff flow rates or volumes?
(e) Could the proposed project result in increased erosion downstream?
(f) Is the project tributary to an already impaired water body, as listed on the Clean Water Act Section 303(d) list? If so, can it result in an increase in any pollutant for which the water body is already impaired?
(g) Is project tributary to other environmentally sensitive areas? If so, can it exacerbate already existing sensitive conditions?
(h) Could the proposed project have a potentially significant environmental impact on surface water quality, to either marine, fresh, or wetland waters?
(i) Could the proposed project have a potentially significant adverse impact on ground water quality?
(j) Could the proposed project cause or contribute to an exceedance of applicable surface or groundwater receiving water quality objectives or degradation of beneficial uses?
(k) Can the project impact aquatic, wetland, or riparian habitat?

F.1.d. Conduct Education Efforts Focused on New Development and Redevelopment

(1) Internal: Municipal Staff and Others

Each Copermittee shall implement an education program to ensure that its planning and development review staffs (and Planning Boards and Elected Officials, if applicable) have an understanding of:

(a) Federal, state, and local water quality laws and regulations applicable to development projects;
(b) The connection between land use decisions and short and long-term water quality impacts (i.e., impacts from land development and urbanization); and
(c) How impacts to receiving water quality resulting from development can be minimized (i.e., through implementation of various source control and structural BMPs).

(2) External: Project Applicants, Developers, Contractors, Property Owners, Community Planning Groups

As early in the planning and development process as possible, each Copermittee shall implement a program to educate project applicants, developers, contractors, property owners, and community planning groups on the following topics:

(a) Federal, state, and local water quality laws and regulations applicable to development projects;
(b) Required federal, state, and local permits pertaining to water quality;
(c) Water quality impacts of urbanization; and
(d) Methods for minimizing the impacts of development on receiving water quality.

F.2. Construction Component

Each Copermittee shall implement a Construction Component of its Jurisdictional URMP to reduce pollutants in runoff from construction sites during all construction phases. At a minimum the construction component shall address:

F.2.a. Pollution Prevention
F.2.b. Grading Ordinance Update
F.2.c. Modify Construction and Grading Approval Process
F.2.d. Source Identification
F.2.e. Threat to Water Quality Prioritization
F.2.f. BMP Implementation
F.2.g. Inspection of Construction Sites
F.2.h. Enforcement of Construction Sites
F.2.i. Reporting of Non-compliant Sites
F.2.j. Education Focused on Construction Activities

F.2.a. <u>Pollution Prevention (Construction)</u>

Each Copermittee shall implement pollution prevention methods in its Construction Component and shall require its use by construction site owners, developers, contractors, and other responsible parties, where appropriate.

F.2.b. <u>Grading Ordinance Update (Construction)</u>

Each Copermittee shall review and update its grading ordinances as necessary for compliance with its storm water ordinances and this Order. The updated grading ordinance shall require implementation of BMPs and other measures during all construction activities, including the following BMPs and other measures or their equivalent:

(1) Erosion prevention;
(2) Seasonal restrictions on grading;
(3) Slope stabilization requirements;
(4) Phased grading;
(5) Revegetation as early as feasible;

(6) Preservation of natural hydrologic features;
(7) Preservation of riparian buffers and corridors;
(8) Maintenance of all source control and structural treatment BMPs; and
(9) Retention and proper management of sediment and other construction pollutants on site.

F.2.c Modify Construction and Grading Approval Process (Construction)

Prior to approval and issuance of local construction and grading permits, each Copermittee shall require all individual proposed construction and grading projects to implement measures to ensure that pollutants from the site will be reduced to the maximum extent practicable and will not cause or contribute to an exceedance of water quality objectives. Each Copermittee shall further ensure that all grading and construction activities will be in compliance with applicable Copermittee ordinances (e.g., storm water, grading, construction, etc.) and other applicable requirements, including this Order.

(1) Construction and Grading Project Requirements

Include construction and grading project requirements in local grading and construction permits to ensure that pollutant discharges are reduced to the maximum extent practicable and water quality objectives are not violated during the construction phase. Such requirements shall include the following requirements or their equivalent:

(a) Require project proponent to develop and implement a plan to manage storm water and non-storm water discharges from the site at all times;
(b) Require project proponent to minimize grading during the wet season and coincide grading with seasonal dry weather periods to the extent feasible. If grading does occur during the wet season, require project proponent to implement additional BMPs for any rain events which may occur, as necessary for compliance with this Order;
(c) Require project proponent to emphasize erosion prevention as the most important measure for keeping sediment on site during construction;
(d) Require project proponent to utilize sediment controls as a supplement to erosion prevention for keeping sediment on-site during construction, and never as the single or primary method;
(e) Require project proponent to minimize areas that are cleared and graded to only the portion of the site that is necessary for construction;
(f) Require project proponent to minimize exposure time of disturbed soil areas;
(g) Require project proponent to temporarily stabilize and reseed disturbed soil areas as rapidly as possible;
(h) Require project proponent to permanently revegetate or landscape as early as feasible;
(i) Require project proponent to stabilize all slopes; and
(j) Require project proponents subject to California's statewide General NPDES Permit for Storm Water Discharges Associated With Construction Activities, (hereinafter General Construction Permit), to provide evidence of existing coverage under the General Construction Permit.

F.2.d. Source Identification (Construction)

Each Copermittee shall annually develop and update, prior to the rainy season, a watershed-based inventory of all construction sites within its jurisdiction regardless of site size or ownership. This requirement is applicable to all construction sites regardless of whether the construction site is subject to the California statewide General NPDES Permit for Storm Water Discharges Associated With Construction Activities (hereinafter General Construction Permit), or other individual NPDES permit. The use of an automated database system, such as Geographical Information System (GIS) is highly recommended, but not required.

F.2.e. Threat to Water Quality Prioritization (Construction)

(1) To establish priorities for construction oversight activities under this Order, the Copermittee shall prioritize its watershed-based inventory (developed pursuant to F.2.d. above) by threat to water quality. Each construction site shall be classified as high, medium, or low threat to water quality. In evaluating threat to water quality each Copermittee shall consider (1) soil erosion potential; (2) site slope; (3) project size and type; (4) sensitivity of receiving water bodies; (5) proximity to receiving water bodies; (6) non-storm water discharges; and (7) any other relevant factors.

(2) A high priority construction site shall at a minimum be defined as a site meeting either of the following criteria or equivalent criteria:

(a) The site is 50 acres or more and grading will occur during the wet season; OR
(b) The site is (1) 5 acres or more and (2) tributary to a Clean Water Act section 303(d) water body impaired for sediment or is within or directly adjacent to or discharging directly to a receiving water within an environmentally sensitive area (as defined in section F.1.b.(2)(a)vi. of this Order).

F.2.f. BMP Implementation (Construction)

(1) Each Copermittee shall designate a set of minimum BMPs for high, medium, and low threat to water quality construction sites (as determined under section F.2.e). BMPs are to be implemented year round.

(2) Each Copermittee shall implement, or require the implementation of, the designated minimum BMPs (based upon the site's threat to water quality rating) at each construction site within its jurisdiction year round. If particular minimum BMPs are infeasible at any specific site, each Copermittee shall implement, or require the implementation of, other equivalent BMPs. Each Copermittee shall also implement or require any additional site specific BMPs as necessary to comply with this Order, including BMPs which are more stringent than those required under the statewide General Construction Permit.

(3) Each Copermittee shall implement, or require the implementation of, BMPs year round; however, BMP implementation requirements can vary based on wet and dry seasons.

(4) Each Copermittee shall implement, or require implementation of, additional controls for construction sites tributary to Clean Water Act section 303(d) water bodies impaired for sediment as necessary to comply with this Order. Each Copermittee shall implement, or require implementation of, additional controls for construction sites within or adjacent to or discharging directly to receiving waters within environmentally sensitive areas (as defined in section F.1.b.(2)(a)vi. of this Order) as necessary to comply with this Order.

F.2.g. Inspection of Construction Sites (Construction)

(1) Each Copermittee shall conduct construction site inspections for compliance with its ordinances (grading, storm water, etc.), permits (construction, grading, etc.), and this Order. Inspections shall include review of site erosion control and BMP implementation plans.

(2) Each Copermittee shall establish inspection frequencies and priorities as determined by the threat to water quality prioritization described in F.2.e above. During the wet season (i.e., October 1 through April 30 of each year), each Copermittee shall inspect, at a minimum, each High Priority construction site, either:

(a) Weekly

OR

(b) Monthly for any site that the responsible Copermittee certifies in a written statement to the SDRWQCB all of the following (certified statements may be submitted to the SDRWQCB at any time for one or more sites):

i. Copermittee has record of construction site's Waste Discharge Identification Number (WDID#) documenting construction site's coverage under the statewide General Construction Permit; and
ii. Copermittee has reviewed the constructions site's Storm Water Pollution Prevention Plan (SWPPP); and
iii. Copermittee finds SWPPP to be in compliance with all local ordinances, permits, and plans; and
iv. Copermittee finds that the SWPPP is being properly implemented on site.

At a minimum, Medium and Low Priority construction sites shall be inspected by Copermittees twice during the wet season. All construction sites shall be inspected by the Copermittees as needed during the dry season (i.e., May 1 through September 30 of each year).

(3) Based upon site inspection findings, each Copermittee shall implement all follow-up actions necessary to comply with this Order.

F.2.h. Enforcement of Construction Sites (Construction)

Each Copermittee shall enforce its ordinances (grading, storm water, etc.) and permits (construction, grading, etc.) at all construction sites as necessary to maintain compliance with this Order. Copermittee ordinances or other regulatory mechanisms shall include sanctions to ensure compliance. Sanctions shall include the following or their equivalent: Non-monetary penalties, fines, bonding requirements, and/or permit denials for non-compliance.

F.2.i. Reporting of Non-compliant Sites (Construction)

Each Copermittee shall provide oral notification to the SDRWQCB of non-compliant sites that are determined to pose a threat to human or environmental health within its jurisdiction within 24 hours of the discovery of noncompliance, as required under section R.1 (and B.6 of Attachment C) of this Order.

Each Copermittee shall develop and submit criteria by which to evaluate events of non-compliance to determine whether they pose a threat to human or environmental health. These criteria shall be submitted in the Jurisdictional Urban Runoff Management Program Document and Annual Reports for SDRWQCB review.

Such oral notification shall be followed up by a written report to be submitted to the SDRWQCB within 5 days of the incidence of non-compliance as required under section R.1 (and B.6 of Attachment C) of this Order. Sites are considered non-compliant when one or more violations of local ordinances, permits, plans, or this Order exist on the site.

F.2.j. Education Focused on Construction Activities (Construction)

(1) Internal: Municipal Staff

Each Copermittee shall implement an education program to ensure that its construction, building, and grading review staffs and inspectors have an understanding of:

(a) Federal, state, and local water quality laws and regulations applicable to construction and grading activities.
(b) The connection between construction activities and water quality impacts (i.e., impacts from land development and urbanization).
(c) How erosion can be prevented.
(d) How impacts to receiving water quality resulting from construction activities can be minimized (i.e., through implementation of various source control and structural BMPs).
(e) Applicable topics listed in section F.4. of this Order.

(2) External: Project Applicants, Contractors, Developers, Property Owners, and other Responsible Parties

Each Copermittee shall implement an education program to ensure that project applicants, contractors, developers, property owners, and other responsible parties have an understanding of the topics outlined in section F.2.j.(1) above of this Order.

F.3. Existing Development Component

Each Copermittee shall minimize the short and long-term impacts on receiving water quality from all types of existing development.

F.3.a. Municipal (Existing Development)

Each Copermittee shall implement a Municipal (Existing Development) Component to prevent or reduce pollutants in runoff from all municipal land use areas and activities. At a minimum the municipal component shall address:

F.3.a.(1)	Pollution Prevention
F.3.a.(2)	Source Identification
F.3.a.(3)	Threat to Water Quality Prioritization
F.3.a.(4)	BMP Implementation
F.3.a.(5)	Maintenance of Municipal Separate Storm Sewer System
F.3.a.(6)	Management of Pesticides, Herbicides, and Fertilizers
F.3.a.(7)	Inspection of Municipal Areas and Activities
F.3.a.(8)	Enforcement of Municipal Areas and Activities

F.3.a.(1) Pollution Prevention (Municipal)

Each Copermittee shall include and describe pollution prevention methods within its Municipal (Existing Development) Component. Each Copermittee shall require the use of pollution prevention methods by municipal departments, contractors, and personnel, where appropriate.

F.3.a.(2) Source Identification (Municipal)

Each Copermittee shall develop, and update annually, a watershed-based inventory of the name, address (if applicable), and description of all municipal land use areas and activities which generate pollutants.

F.3.a.(3) Threat to Water Quality Prioritization (Municipal)

(a) To establish priorities for oversight of municipal areas and activities required under this Order, each Copermittee shall prioritize each watershed inventory in F.3.a.2. above by threat to water quality and update annually. Each municipal area and activity shall be classified as high, medium, or low threat to water quality. In evaluating threat to water quality, each Copermittee shall consider (1) type of municipal area or activity; (2) materials used; (3) wastes generated; (4) pollutant discharge potential; (5) non-storm water discharges; (6) size of facility or area; (7) proximity to receiving water bodies; (8) sensitivity of receiving water bodies; and (9) any other relevant factors.

(b) At a minimum, the high priority municipal areas and activities shall include the following:

i. Roads, Streets, Highways, and Parking Facilities.
ii. Flood Management Projects and Flood Control Devices.
iii. Areas and activities tributary to a Clean Water Act section 303(d) impaired water body, where an area or activity generates pollutants for which the water body is impaired. Areas and activities within or adjacent to or discharging directly to receiving waters within environmentally sensitive areas (as defined in section F.1.b.(2)(a)vi of this Order).
iv. Municipal Waste Facilities.
- Active or closed municipal landfills;
- Publicly owned treatment works (including water and wastewater treatment plants) and sanitary sewage collection systems;
- Municipal separate storm sewer systems;
- Incinerators;
- Solid waste transfer facilities;
- Land application sites;
- Uncontrolled sanitary landfills;
- Corporate yards including maintenance and storage yards for materials, waste, equipment and vehicles;
- Sites for disposing and treating sewage sludge; and
- Hazardous waste treatment, disposal, and recovery facilities.

v. Other municipal areas and activities that the Copermittee determines may contribute a significant pollutant load to the MS4.
vi. Municipal airfields.

F.3.a.(4) BMP Implementation (Municipal)

(a) Each Copermittee shall designate a set of minimum BMPs for high, medium, and low threat to water quality municipal areas and activities (as determined under section F.3.a.(3)). The designated minimum BMPs for high threat to water quality municipal areas and activities shall be area or activity specific as appropriate.

(b) Each Copermittee shall implement, or require the implementation of, the designated minimum BMPs (based upon the threat to water quality rating) at each municipal area or activity within its jurisdiction. If particular minimum BMPs are infeasible for any specific area or activity, each Copermittee shall implement, or require implementation of other equivalent BMPs. Each Copermittee shall also implement any additional BMPs as are necessary to comply with this Order.

i. Each Copermittee shall evaluate feasibility of retrofitting existing structural flood control devices and retrofit where needed.

(c) Each Copermittee shall implement, or require implementation of, any additional controls for municipal areas and activities tributary to Clean Water Act section 303(d) impaired

water bodies (where an area or activity generates pollutants for which the water body is impaired) as necessary to comply with this Order. Each Copermittee shall implement, or require implementation of, additional controls for municipal areas and activities within or directly adjacent to or discharging directly to receiving waters within environmentally sensitive areas (as defined in section F.1.b.(2)(a)vi. of this Order) as necessary to comply with this Order.

F.3.a.(5) Maintenance of Municipal Separate Storm Sewer System (Municipal)

(a) Each Copermittee shall implement a schedule of maintenance activities at all structural controls designed to reduce pollutant discharges to or from its MS4s and related drainage structures.

(b) Each Copermittee shall implement a schedule of maintenance activities for the municipal separate storm sewer system.

(c) The maintenance activities must, at a minimum, include:

i. Inspection and removal of accumulated waste (e.g. sediment, trash, debris and other pollutants) between May 1 and September 30 of each year;

ii. Additional cleaning as necessary between October 1 and April 30 of each year;

iii. Record keeping of cleaning and the overall quantity of waste removed;

iv. Proper disposal of waste removed pursuant to applicable laws;

v. Measures to eliminate waste discharges during MS4 maintenance and cleaning activities.

F.3.a.(6) Management of Pesticides, Herbicides, and Fertilizers (Municipal)

The Copermittees shall implement BMPs to reduce the contribution of pollutants associated with the application, storage, and disposal of pesticides, herbicides and fertilizers from municipal areas and activities to MS4s. Important municipal areas and activities include municipal facilities, public rights-of-way, parks, recreational facilities, golf courses, cemeteries, botanical or zoological gardens and exhibits, landscaped areas, etc.

Such BMPs shall include, at a minimum: (1) educational activities, permits, certifications and other measures for municipal applicators and distributors; (2) integrated pest management measures that rely on non-chemical solutions; (3) the use of native vegetation; (4) schedules for irrigation and chemical application; and (5) the collection and proper disposal of unused pesticides, herbicides, and fertilizers.

F.3.a.(7) Inspection of Municipal Areas and Activities (Municipal)

At a minimum, each Copermittee shall inspect high priority municipal areas and activities annually. Based upon site inspection findings, each Copermittee shall implement all follow-up actions necessary to comply with this Order.

F.3.a.(8) Enforcement of Municipal Areas and Activities (Municipal)

Each Copermittee shall enforce its storm water ordinance for all municipal areas and activities as necessary to maintain compliance with this Order.

F.3.b. Industrial (Existing Development)

Each Copermittee shall implement an Industrial (Existing Development) Component to reduce pollutants in runoff from all industrial sites. At a minimum the industrial component shall address:

F.3.b.(1)	Pollution Prevention
F.3.b.(2)	Source Identification
F.3.b.(3)	Threat to Water Quality Prioritization
F.3.b.(4)	BMP Implementation
F.3.b.(5)	Monitoring of Industrial Sites
F.3.b.(6)	Inspection of Industrial Sites
F.3.b.(7)	Enforcement Measures for Industrial Sites
F.3.b.(8)	Reporting of Non-compliant Sites

F.3.b.(1) Pollution Prevention (Industrial)

Each Copermittee shall include and describe pollution prevention methods within its Industrial (Existing Development) Component. Each Copermittee shall require the use of pollution prevention methods by industry, where appropriate.

F.3.b.(2) Source Identification (Industrial)

Each Copermittee shall develop and update annually a watershed-based inventory of all industrial sites within its jurisdiction regardless of site ownership. This requirement is applicable to all industrial sites regardless of whether the industrial site is subject to the California statewide General NPDES Permit for Storm Water Discharges Associated With Industrial Activities, Except Construction (hereinafter General Industrial Permit) or other individual NPDES permit.

The inventory shall include the following minimum information for each industrial site: name; address; and a narrative description including SIC codes which best reflects the principal products or services provided by each facility.

F.3.b.(3) Threat to Water Quality Prioritization (Industrial)

(a) To establish priorities for industrial oversight activities under this Order, the Copermittee shall prioritize each watershed-based inventory in F.3.b.(2) above by threat to water quality and update annually. Each industrial site shall be classified as high, medium, or low threat to water quality. In evaluating threat to water quality each Copermittee shall consider (1) type of industrial activity (SIC Code); (2) materials used in industrial processes; (3) wastes generated; (4) pollutant discharge potential; (5) non-storm water discharges; (6) size of facility; (7) proximity to receiving water bodies; (8) sensitivity of receiving water bodies; (9) whether the industrial site is subject to the statewide General Industrial Permit; and (10) any other relevant factors.

(b) At a minimum the high priority industrial sites shall include industrial facilities that are subject to section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA); industrial facilities tributary to a Clean Water Act section 303(d) impaired water body, where a facility generates pollutants for which the water body is impaired; industrial facilities within or directly adjacent to or discharging directly to receiving waters within environmentally sensitive areas (as defined in section F.1.b.(2)(a)vi. of this Order); facilities subject to the statewide General Industrial Permit (excluding those facilities that have been approved for No Exposure Certification); and all other industrial facilities that the Copermittee determines are contributing significant pollutant loading to its MS4, regardless of whether such facilities are covered under the statewide General Industrial Permit or other NPDES permit.

F.3.b.(4) BMP Implementation (Industrial)

(a) Each Copermittee shall designate a set of minimum BMPs for high, medium, and low threat to water quality industrial sites (as determined under section F.3.b.(3)). The designated minimum BMPs for high threat to water quality industrial sites shall be industry and site specific as appropriate.

(b) Each Copermittee shall implement, or require the implementation of, the designated minimum BMPs (based upon the site's threat to water quality rating) at each industrial site within its jurisdiction. If particular minimum BMPs are infeasible at any specific site, each Copermittee shall implement, or require implementation of, other equivalent BMPs. Each Copermittee shall also implement or require any additional site specific BMPs as necessary to comply with this Order including BMPs which are more stringent than those required under the statewide General Industrial Permit.

(c) Each Copermittee shall implement, or require implementation of, additional controls for industrial sites tributary to Clean Water Act section 303(d) impaired water bodies (where a site generates pollutants for which the water body is impaired) as necessary to comply with this Order. Each Copermittee shall implement, or require implementation of, additional controls for industrial sites within or directly adjacent to or discharging directly to receiving waters within environmentally sensitive areas (as defined in section F.1.b.(2)(a)vi. of this Order) as necessary to comply with this Order.

F.3.b.(5) Monitoring of Industrial Sites (Industrial)

(a) Each Copermittee shall conduct, or require industry to conduct, a monitoring program for runoff from each high threat to water quality industrial site (identified in F.3.b.(3) above). Group monitoring by multiple industrial sites conducted under group monitoring programs approved by the State Water Resources Control Board is acceptable.

(b) At a minimum, the monitoring program shall provide quantitative data from two storm events per year on the following constituents:

i. Any pollutant listed in effluent guidelines subcategories where applicable;
ii. Any pollutant for which an effluent limit has been established in an existing NPDES permit for the facility;
iii. Oil and grease or Total Organic Carbon (TOC);
iv. pH;
v. Total suspended solids (TSS);
vi. Specific conductance; and
vii. Toxic chemicals and other pollutants that are likely to be present in storm water discharges.
viii. Any pollutant that may be used, stored, or generated at the facility, which may be discharged to a water body or a tributary of that water body that is listed as impaired under Clean Water Act Section 303(d) for that pollutant(s), unless the facility can demonstrate approval of No Exposure Certification.

F.3.b.(6) Inspection of Industrial Sites (Industrial)

(a) Each Copermittee shall conduct industrial site inspections for compliance with its ordinances, permits, and this Order. Inspections shall include review of BMP implementation plans.

(b) Each Copermittee shall establish inspection frequencies and priorities as determined by the threat to water quality prioritization described in F.3.b.(3) above. Each Copermittee shall inspect high priority industrial sites, at a minimum:

i. Annually

OR

ii. Bi-annually for any site that the responsible Copermittee certifies in a written statement to the SDRWQCB all of the following (certified statements may be submitted to the SDRWQCB at any time for one or more sites):

- Copermittee has record of industrial site's Waste Discharge Identification Number (WDID#) documenting industrial site's coverage under the statewide General Industrial Permit; and
- Copermittee has reviewed the industrial site's Storm Water Pollution Prevention Plan (SWPPP); and
- Copermittee finds SWPPP to be in compliance with all local ordinances, permits, and plans; and
- Copermittee finds that the SWPPP is being properly implemented on site.

Each Copermittee shall inspect medium and low threat to water quality industrial sites as needed.

(c) Based upon site inspection findings, each Copermittee shall implement all follow-up actions necessary to comply with this Order.

(d) To the extent that the SDRWQCB has conducted an inspection of a high priority industrial site during a particular year, the requirement for the responsible Copermittee to inspect this site during the same year will be satisfied.

F.3.b.(7) Enforcement of Industrial Sites (Industrial)

Each Copermittee shall enforce its storm water ordinance at all industrial sites as necessary to maintain compliance with this Order. Copermittee ordinances or other regulatory mechanisms shall include sanctions to ensure compliance. Sanctions shall include the following or their equivalent: Non-monetary penalties, fines, bonding requirements, and/or permit denials for non-compliance.

F.3.b.(8) Reporting of Non-compliant Sites (Industrial)

Each Copermittee shall provide oral notification to the SDRWQCB of non-compliant sites that are determined to pose a threat to human or environmental health within its jurisdiction within 24 hours of the discovery of noncompliance, as required under section R.1 (and B.6 of Attachment C) of this Order.

Each Copermittee shall develop and submit criteria by which to evaluate events of non-compliance to determine whether they pose a threat to human or environmental health. These criteria shall be submitted in the Jurisdictional Urban Runoff Management Program Document and Annual Reports for SDRWQCB review.

Such oral notification shall be followed up by a written report to be submitted to the SDRWQCB within 5 days of the incidence of non-compliance as required under section R.1(and B.6 of Attachment C) of this Order. Sites are considered non-compliant when one or more violations of local ordinances, permits, plans, or this Order exist on the site.

F.3.c. Commercial (Existing Development)

Each Copermittee shall implement a Commercial (Existing Development) Component to reduce pollutants in runoff from commercial sites. At a minimum the commercial component shall address:

F.3.c.(1) Pollution Prevention
F.3.c.(2) Source Identification
F.3.c.(3) BMP Implementation
F.3.c.(4) Inspection of Commercial Sites and Sources
F.3.c.(5) Enforcement of Commercial Sites and Sources

F.3.c.(1) Pollution Prevention (Commercial)

Each Copermittee shall include and describe pollution prevention methods within its Commercial (Existing Development) Component. Each Copermittee shall require the use of pollution prevention methods by commercial facilities, where appropriate.

F.3.c.(2) Source Identification (Commercial)

Each Copermittee shall develop and update annually an inventory of the following high priority threat to water quality commercial sites/sources listed below. (If any commercial site/source listed below is inventoried as an industrial site, as required under section F.3.b.(2) of this Order, it is not necessary to also inventory it as a commercial site/source).

(a) Automobile mechanical repair, maintenance, fueling, or cleaning;
(b) Airplane mechanical repair, maintenance, fueling, or cleaning;
(c) Boat mechanical repair, maintenance, fueling, or cleaning;
(d) Equipment repair, maintenance, fueling, or cleaning;
(e) Automobile and other vehicle body repair or painting;
(f) Mobile automobile or other vehicle washing;
(g) Automobile (or other vehicle) parking lots and storage facilities;
(h) Retail or wholesale fueling;
(i) Pest control services;
(j) Eating or drinking establishments;
(k) Mobile carpet, drape or furniture cleaning;
(l) Cement mixing or cutting;
(m) Masonry;
(n) Painting and coating;
(o) Botanical or zoological gardens and exhibits;
(p) Landscaping;
(q) Nurseries and greenhouses;
(r) Golf courses, parks and other recreational areas/facilities;
(s) Cemeteries;
(t) Pool and fountain cleaning;
(u) Marinas;
(v) Port-a-Potty servicing;
(w) Other commercial sites/sources that the Copermittee determines may contribute a significant pollutant load to the MS4;
(x) Any commercial site or source tributary to a Clean Water Act section 303(d) impaired water body, where the site or source generates pollutants for which the water body is impaired; and
(y) Any commercial site or source within or directly adjacent to or discharging directly to a coastal lagoon or other receiving water within an environmentally sensitive area (as defined in F.1.b(2)(a)vi. of this Order).

F.3.c.(3) BMP Implementation (Commercial)

(a) Each Copermittee shall designate a set of minimum BMPs for the high priority threat to water quality commercial sites/sources (listed above in section F.3.c.(2)). The designated minimum BMPs for the high threat to water quality commercial sites/sources shall be site and source specific as appropriate.

(b) Each Copermittee shall implement, or require the implementation of, the designated minimum BMPs at each high priority threat to water quality commercial site/source within its jurisdiction. If particular minimum BMPs are infeasible for any specific site/source, each Copermittee shall implement, or require the implementation of, other equivalent BMPs. Each Copermittee shall also implement or require any additional site specific BMPs as necessary to comply with this Order.

(c) Each Copermittee shall implement, or require implementation of, additional controls for commercial sites or sources tributary to Clean Water Act section 303(d) impaired water bodies (where a site or source generates pollutants for which the water body is impaired) as necessary to comply with this Order. Each Copermittee shall implement, or require implementation of, additional controls for commercial sites or sources within or directly adjacent to or discharging directly to coastal lagoons or other receiving waters within environmentally sensitive areas (as defined in section F.1.b.(2)(a)vi. of this Order) as necessary to comply with this Order.

F.3.c.(4) Inspection of Commercial Sites and Sources (Commercial)

Each Copermittee shall inspect high priority commercial sites and sources as needed. Based upon site inspection findings, each Copermittee shall implement all follow-up actions necessary to comply with this Order.

F.3.c.(5) Enforcement of Commercial Sites and Sources (Commercial)

Each Copermittee shall enforce its storm water ordinance for all commercial sites and sources as necessary to maintain compliance with this Order.

F.3.d. Residential (Existing Development)

Each Copermittee shall implement a Residential (Existing Development) Component to prevent or reduce pollutants in runoff from all residential land use areas and activities. At a minimum the residential component shall address:

F.3.d.(1) Pollution Prevention
F.3.d.(2) Threat to Water Quality Prioritization
F.3.d.(3) BMP Implementation
F.3.d.(4) Enforcement of Residential Areas and Activities

F.3.d.(1) Pollution Prevention (Residential)

Each Copermittee shall include pollution prevention methods in its Residential (Existing Development) Component and shall encourage their use by residents, where appropriate.

F.3.d.(2) Threat to Water Quality Prioritization (Residential)

Each Copermittee shall identify high priority residential areas and activities. At a minimum, these shall include:

- Automobile repair and maintenance;
- Automobile washing;
- Automobile parking;
- Home and garden care activities and product use (pesticides, herbicides, and fertilizers);
- Disposal of household hazardous waste (e.g., paints, cleaning products, and other wastes generated during home improvement or maintenance activities);
- Disposal of pet waste;
- Disposal of green waste;
- Any other residential source that the Copermittee determines may contribute a significant pollutant load to the MS4;
- Any residence tributary to a Clean Water Act section 303(d) impaired water body, where the residence generates pollutants for which the water body is impaired; and
- Any residence within or directly adjacent to or discharging directly to coastal waters or other receiving waters within an environmentally sensitive area (as defined in F.1.b.(2)(a)vi. of this Order).

F.3.d.(3) BMP Implementation (Residential)

(a) Each Copermittee shall designate a set of minimum BMPs for high threat to water quality residential areas and activities (as required under section F.3.d.(2)). The designated minimum BMPs for high threat to water quality residential areas and activities shall be area or activity specific.

(b) Each Copermittee shall implement or require implementation of the designated minimum BMPs for high threat to water quality residential areas and activities. If particular minimum BMPs are infeasible for any specific site/source, each Copermittee shall require implementation of other equivalent BMPs. Each Copermittee shall also implement, or require implementation of, any additional BMPs as are necessary to comply with this Order.

(c) Each Copermittee shall implement, or require implementation of, any additional controls for residential areas and activities tributary to Clean Water Act Section 303(d) impaired water bodies (where a residential area or activity generates pollutants for which the water body is impaired) as necessary to comply with this Order. Each Copermittee shall implement, or require implementation of, additional controls for residential areas within or directly adjacent to or discharging directly to coastal waters or other receiving waters within environmentally sensitive areas (as defined in section F.1.b.(2)(a)vi. of this Order) as necessary to comply with this Order.

F.3.d.(4) Enforcement of Residential Areas and Activities (Residential)

Each Copermittee shall enforce its storm water ordinance for all residential areas and activities as necessary to maintain compliance with this Order.

F.4. Education Component

Each Copermittee shall implement an Education Component using all media as appropriate to (1) measurably increase the knowledge of the target communities regarding MS4s, impacts of urban runoff on receiving waters, and potential BMP solutions for the target audience; and (2) to measurably change the behavior of target communities and thereby reduce pollutant releases to MS4s and the environment. At a minimum the education component shall address the following target communities:

- Municipal Departments and Personnel

- Construction Site Owners and Developers
- Industrial Owners and Operators
- Commercial Owners and Operators
- Residential Community, General Public, and School Children
- Quasi-Governmental Agencies/Districts (i.e., educational institutions, water districts, sanitation districts, etc.)

F.4.a. All Target Communities

The Education Program for each target audience may contain information on the following topics where applicable:

- State and Federal water quality laws
- Requirements of local municipal permits and ordinances (e.g., storm water and grading ordinances and permits)
- Water conservation
- Impacts of urban runoff on receiving waters
- Watershed concepts (i.e., stewardship, connection between inland activities and coastal problems, etc.)
- Distinction between MS4s and sanitary sewers
- Importance of good housekeeping (e.g., sweeping impervious surfaces instead of hosing)
- Pollution prevention and safe alternatives
- Household hazardous waste collection
- Recycling
- BMPs: Site specific, structural and source control
- BMP maintenance
- Non-storm water disposal alternatives (e.g., all wash waters)
- Pet and animal waste disposal
- Proper solid waste disposal (e.g., garbage, tires, appliances, furniture, vehicles)
- Equipment and vehicle maintenance and repair
- Public reporting mechanisms
- Green waste disposal
- Integrated pest management
- Native vegetation
- Proper disposal of boat and recreational vehicle waste
- Traffic reduction, alternative fuel use

F.4.b. Municipal, Construction, Industrial, Commercial, and Quasi-Governmental (educational institutions, water districts, sanitation districts, etc.) Communities

In addition to the topics listed in F.4.a. above, the Municipal, Construction, Industrial, Commercial, and Quasi-Governmental (Educational Institutions, Water Districts, Sanitation Districts) Communities may also be educated on the following topics where applicable:

- Basic urban runoff training for all personnel
- Additional urban runoff training for appropriate personnel
- Illicit Discharge Detection and Elimination observations and follow-up during daily work activities
- Lawful disposal of catchbasin and other MS4 cleanout wastes
- Water quality awareness for Emergency/First Responders
- California's Statewide General NPDES Permit for Storm Water Discharges Associated with Industrial Activities (Except Construction).

- California's Statewide General NPDES Permit for Storm Water Discharges Associated with Construction Activities
- SDRWQCB's General NPDES Permit for Groundwater Dewatering
- 401 Water Quality Certification by the SDRWQCB
- Statewide General NPDES Utility Vault Permit (NPDES No. CAG990002)
- SDRWQCB Waste Discharge Requirements for Dredging Activities
- Local requirements beyond statewide general permits
- Federal, state and local water quality regulations that affect development projects
- Water quality impacts associated with land development
- Alternative materials & designs to maintain peak runoff values
- How to conduct a storm water inspection
- Potable water discharges to the MS4
- Dechlorination techniques
- Hydrostatic testing
- Spill response, containment, & recovery
- Preventive maintenance
- How to do your job and protect water quality

F.4.c. Residential, General Public, School Children Communities

In addition to the topics listed in F.4.a. above, the Residential, General Public, and School Children Communities may be educated on the following topics where applicable:

- Public reporting information resources
- Residential and charity car-washing
- Community activities (e.g., "Adopt a Storm Drain, Watershed, or Highway" Programs, citizen monitoring, creek/beach cleanups, environmental protection organization activities, etc.)

F.5. Illicit Discharge Detection and Elimination Component

Each Copermittee shall implement an Illicit Discharge Detection and Elimination Component containing measures to actively seek and eliminate illicit discharges and connections. At a minimum the Illicit Discharge Detection and Elimination Component shall address:

F.5.a Illicit Discharges and Connections
F.5.b Dry Weather Monitoring Program
F.5.c Investigation / Inspection and Follow-up
F.5.d Elimination of Illicit Discharges and Connections
F.5.e Enforce Ordinances
F.5.f Prevent and Respond To Sewage Spills (Including from Private Laterals and Failing Septic Systems) and Other Spills
F.5.g Facilitate Public Reporting of Illicit Discharges and Connections – Public Hotline
F.5.h Facilitate Disposal of Used Oil and Toxic Materials
F.5.i Limit Infiltration From Sanitary Sewer to MS4

F.5.a. <u>Illicit Discharges and Connections</u>

Each Copermittee shall implement a program to actively seek and eliminate illicit discharges and connections into its MS4. The program shall address all types of illicit discharges and connections excluding those non-storm water discharges not prohibited by the Copermittee in accordance with Section B. of this Order.

F.5.b. Dry Weather Monitoring Program

Each Copermittee shall conduct dry weather inspections, field screening, and analytical monitoring of MS4 outfalls within its jurisdiction to detect illicit discharges and connections in accordance with Attachment E of this Order.

F.5.ç. Investigation / Inspection and Follow-Up

Each Copermittee shall investigate and inspect any portion of the MS4 that, based on dry weather monitoring results or other appropriate information, indicates a reasonable potential for illicit discharges, illicit connections, or other sources of non-storm water (including non-prohibited discharge(s) identified in Section B. of this Order). Each Copermittee shall establish criteria to identify portions of the system where such follow-up investigations are appropriate.

F.5.d. Elimination of Illicit Discharges and Connections

Each Copermittee shall eliminate all detected illicit discharges, discharge sources, and connections immediately.

F.5.e. Enforce Ordinances

Each Copermittee shall implement and enforce its ordinances, orders, or other legal authority to prevent illicit discharges and connections to its MS4. Each Copermittee shall also implement and enforce its ordinance, orders, or other legal authority to eliminate detected illicit discharges and connections to it MS4.

F.5.f. Prevent and Respond to Sewage Spills (Including from Private Laterals and Failing Septic Systems) and Other Spills

Each Copermittee shall prevent, respond to, contain and clean up all sewage and other spills that may discharge into its MS4 from any source (including private laterals and failing septic systems). Spill response teams shall prevent entry of spills into the MS4 and contamination of surface water, ground water and soil to the maximum extent practicable. Each Copermittee shall coordinate spill prevention, containment and response activities throughout all appropriate departments, programs and agencies to ensure maximum water quality protection at all times.

Each Copermittee shall develop and implement a mechanism whereby it is notified of all sewage spills from private laterals and failing septic systems into its MS4. Each Copermittee shall prevent, respond to, contain and clean up sewage from any such notification.

F.5.g. Facilitate Public Reporting of Illicit Discharges and Connections - Public Hotline

Each Copermittee shall promote, publicize and facilitate public reporting of illicit discharges or water quality impacts associated with discharges into or from MS4s. Each Copermittee shall facilitate public reporting through development and operation of a public hotline. Public hotlines can be Copermittee-specific or shared by Copermittees. All storm water hotlines shall be capable of receiving reports in both English and Spanish 24 hours per day / seven days per week. Copermittees shall respond to and resolve each reported incident. All reported incidents, and how each was resolved, shall be summarized in each Copermittee's individual Jurisdictional URMP Annual Report.

F.5.h. Facilitate Disposal of Used Oil and Toxic Materials

Each Copermittee shall facilitate the proper management and disposal of used oil, toxic materials, and other household hazardous wastes. Such facilitation shall include educational

activities, public information activities, and establishment of collection sites operated by the Copermittee or a private entity. Neighborhood collection of household hazardous wastes is encouraged.

F.5.i. Limit Infiltration From Sanitary Sewer to MS4/ Provide Preventive Maintenance of Both

Each Copermittee shall implement controls and measures to limit infiltration of seepage from municipal sanitary sewers to MS4s through thorough, routine preventive maintenance of the MS4. Each Copermittee that operates both a municipal sanitary sewer system and a MS4 shall implement controls and measures to limit infiltration of seepage from the municipal sanitary sewers to the MS4s that shall include overall sanitary sewer and MS4 surveys and thorough, routine preventive maintenance of both.

F.6. Common Interest Areas and Homeowners Associations

a. Each Copermittee shall develop and implement a plan for ensuring that urban runoff within common interest areas from private roads, drainage facilities, and other components of the storm water conveyance system, including those managed by associations, meets the objectives of this Order.
b. As part of its individual Jurisdictional URMP Annual Report, each Copermittee shall describe the measures taken to ensure that urban runoff from common interest areas to the MS4 meets the objectives of this Order.

F.7. Public Participation Component

Each Copermittee shall incorporate a mechanism for public participation in the implementation of the Jurisdictional URMP.

F.8. Assessment of Jurisdictional URMP Effectiveness Component

a. As part of its individual Jurisdictional URMP, each Copermittee shall develop a long-term strategy for assessing the effectiveness of its individual Jurisdictional URMP. The long-term assessment strategy shall identify specific direct and indirect measurements that each Copermittee will use to track the long-term progress of its individual Jurisdictional URMP towards achieving improvements in receiving water quality. Methods used for assessing effectiveness shall include the following or their equivalent: surveys, pollutant loading estimations, and receiving water quality monitoring. The long-term strategy shall also discuss the role of monitoring data in substantiating or refining the assessment.

b. As part of its individual Jurisdictional URMP Annual Report, each Copermittee shall include an assessment of the effectiveness of its Jurisdictional URMP using the direct and indirect assessment measurements and methods developed in its long-term assessment strategy.

F.9. Fiscal Analysis Component

Each Copermittee shall secure the resources necessary to meet the requirements of this Order. As part of its individual Jurisdictional URMP, each Copermittee shall develop a strategy to conduct a fiscal analysis of its urban runoff management program in its entirety. In order to demonstrate sufficient financial resources to implement the conditions of this Order, each Copermittee shall conduct an annual fiscal analysis as part of its individual Jurisdictional URMP Annual Report. This analysis shall, for each fiscal year covered by this Order, evaluate the expenditures (such as capital, operation and maintenance, education, and administrative expenditures) necessary to accomplish the activities of the Copermittee's urban runoff management program. Such analysis shall include a description of the source(s) of funds that are proposed to meet the necessary expenditures, including legal restrictions on the use of such funds.

G. IMPLEMENTATION OF JURISDICTIONAL URMP

Each Copermittee shall have completed full implementation of all requirements of the Jurisdictional URMP section of this Order no later than **365 days after adoption** of this Order, except as stated as follows: Within 180 days of development of the model SUSMP, each Copermittee shall adopt its own local SUSMP, and amended ordinances consistent with the model SUSMP, and shall submit both (local SUSMP and amended ordinances) to the SDRWQCB.

Following the adoption of the Order and prior to the full implementation of the Jurisdictional URMP, the Copermittees shall at a minimum implement the provisions and commitments of the proposed DAMP submitted in September 2000.

H. SUBMITTAL OF JURISDICTIONAL URMP DOCUMENT

The written account of the overall program to be conducted by each Copermittee within its jurisdiction during the five-year life of this Order is referred to as the "Jurisdictional URMP Document".

1. Individual – Each Copermittee shall submit to the Principal Permittee(s) an individual Jurisdictional URMP document which describes all activities it has undertaken or is undertaking to implement the requirements of each component of the Jurisdictional URMP section F. of this Order.

   a. At a minimum, the individual Jurisdictional URMP document shall contain the following information for the following components:

      (1) Construction Component

         (a) Which pollution prevention methods will be required for implementation, and how and where they will be required
         (b) Updated grading ordinances
         (c) A description of the modified construction and grading approval process
         (d) Updated construction and grading project requirements in local grading and construction permits
         (e) A completed watershed-based inventory of all construction sites
         (f) A completed prioritization of all construction sites based on threat to water quality
         (g) Which BMPs will be implemented, or required to be implemented, for each priority category
         (h) How BMPs will be implemented, or required to be implemented, for each priority category
         (i) Planned inspection frequencies for each priority category
         (j) Methods for inspection
         (k) A description of enforcement mechanisms and how they will be used
         (l) A description of how non-compliant sites will be identified and the process for notifying the SDRWQCB, including a list of current non-compliant sites
         (m) A description of the construction education program and how it will be implemented

      (2) Municipal (Existing Development) Component

         (a) Which pollution prevention methods will be required for implementation, and how and where they will be required
         (b) A completed watershed-based inventory of all municipal land use areas and activities
         (c) A completed prioritization of all municipal areas and activities based on threat to water quality
         (d) Which BMPs will be implemented, or required to be implemented, for each priority category
         (e) How BMPs will be implemented, or required to be implemented, for each priority category

(f) Municipal maintenance activities and schedules
(g) Management strategy for pesticides, herbicides, and fertilizer use.
(h) Planned inspection frequencies for the high priority category
(i) Methods for inspection
(j) A description of enforcement mechanisms and how they will be used

(3) Industrial (Existing Development) Component

(a) Which pollution prevention methods will be required for implementation, and how and where they will be required
(b) A completed watershed-based inventory of all industrial sites
(c) A completed prioritization of all industrial sites based on threat to water quality
(d) Which BMPs will be implemented, or required to be implemented, for each priority category
(e) How BMPs will be implemented, or required to be implemented, for each priority category
(f) A description of the monitoring program to be conducted, or required to be conducted
(g) Planned inspection frequencies for each priority category
(h) Methods for inspection
(i) A description of enforcement mechanisms and how they will be used
(j) A description of how non-compliant sites will be identified and the process for notifying the SDRWQCB, including a list of current non-compliant sites

(4) Commercial (Existing Development) Component

(a) Which pollution prevention methods will be required for implementation, and how and where they will be required
(b) A completed watershed-based inventory of high priority commercial sites
(c) Which BMPs will be implemented, or required to be implemented, for high priority sites
(d) How BMPs will be implemented, or required to be implemented, for high priority sites
(e) Planned inspection frequencies for high priority sites
(f) Methods for inspection
(g) A description of enforcement mechanisms and how they will be used

(5) Residential (Existing Development) Component

(a) Which pollution prevention methods will be encouraged for implementation, and how and where they will be encouraged
(b) A completed inventory of high priority residential areas and activities
(c) Which BMPs will be implemented, or required to be implemented, for high priority areas and activities
(d) How BMPs will be implemented, or required to be implemented, for high priority areas and activities
(e) A description of enforcement mechanisms and how they will be used

(6) Education Component

(a) A description of the content, form, and frequency of education efforts for each target community

(7) Illicit Discharges Detection and Elimination Component

(a) A description of the program to actively seek and eliminate illicit discharges and connections

(b) A description of dry weather monitoring to be conducted to detect illicit discharges and connections (see Attachment E)
(c) A description of investigation and inspection procedures to follow-up on dry weather monitoring results or other information which indicate potential for illicit discharges and connections
(d) A description of procedures to eliminate detected illicit discharges and connections
(e) A description of enforcement mechanisms and how they will be used
(f) A description of methods to prevent, respond to, contain, and clean up all sewage (including spills from private laterals and failing septic systems) and other spills in order to prevent entrance into the MS4
(g) A description of the mechanism to receive notification of spills from private laterals
(h) A description of efforts to facilitate public reporting of illicit discharges and connections, including a public hotline
(i) A description of efforts to facilitate proper disposal of used oil and other toxic materials
(j) A description of controls and measures to be implemented to limit infiltration of seepage from sanitary sewers to MS4s
(k) A description of routine preventive maintenance activities on the sanitary system (where applicable) and the MS4

(8) Public Participation Component

(a) A description of how public participation will be included in the implementation of the Jurisdictional URMP

(9) Assessment of Jurisdictional URMP Effectiveness Component

(a) A description of strategies to be used for assessing the long-term effectiveness of the individual Jurisdictional URMP.

(10) Fiscal Analysis Component

(a) A description of the strategy to be used to conduct a fiscal analysis of the urban runoff management program.

(11) Land-Use Planning for New Development and Redevelopment Component

(a) Workplan for inclusion in General Plan (or equivalent plan) of water quality and watershed protection principles and policies
(b) Development project requirements in local development permits
(c) Participation efforts conducted in the development of the Model SUSMP
(d) Environmental review processes revisions
(e) A description of the planning education program and how it will be implemented

(12) Fire Fighting

(a) A description of a program to reduce pollutants from non-emergency fire fighting flows identified by the Copermittee to be significant sources of pollutants.

(13) Common Interest Areas and Homeowners Associations

(a) A description of the program that will be implemented to ensure that urban runoff within common interest areas from private roads, drainage facilities, and other components of the storm water conveyance system including those managed by associations meets the objectives of this Order.

b. Each Copermittee shall submit to the Principal Permittee(s) each part of its individual Jurisdictional URMP document by the dates specified by the Principal Permittee(s).

c. In addition to submittal of the Jurisdictional URMP document, each Copermittee shall submit to the SDRWQCB its own adopted local SUSMP consistent with the submitted Model SUSMP, as described in section F.1.b.(2). of this Order. Each Copermittee's own local SUSMP, along with its amended ordinances, shall be submitted to the SDRWQCB within 180 days of the submittal of the Model SUSMP to the SDRWQCB.

2. Unified – The Principal Permittee(s) shall submit the unified Jurisdictional URMP document to the SDRWQCB. The unified Jurisdictional URMP document shall be submitted in two parts (the collected Jurisdictional URMPs and the model SUSMP).

a. The unified Jurisdictional URMP document submittal shall address the requirements of the entire Jurisdictional URMP sections F.1 - F.9. of this Order, with the exception of the local SUSMP requirements (which are to be implemented 180 days after submittal of the model SUSMP by the SDRWQCB).

b. The unified Jurisdictional URMP document submittal shall contain a section covering common activities conducted collectively by the Copermittees including jointly developed reporting formats (section O.4), to be produced by the Principal Permittee(s), and the thirteen individual Jurisdictional URMP documents.

c. The Principal Permittee(s) shall be responsible for the development and production of a stand alone Model SUSMP document meeting the requirements of section F.1.b.(2) of this Order.

d. The Principal Permittee(s) shall submit the unified Jurisdictional URMP document, including the Model SUSMP, to the SDRWQCB within **365 days of adoption** of this Order.

3. Universal Reporting Requirements

All individual and unified Jurisdictional URMP document submittals shall include an executive summary, introduction, conclusion, recommendations, and signed certified statement. Each Copermittee shall submit its individual Jurisdictional Urban Runoff Management Program Document with a signed certified statement. The Principal Permittee(s) shall submit a signed certified statement referring to its individual Jurisdictional Urban Runoff Management Program Document, the section covering common activities conducted collectively by the Copermittees, and the Model SUSMP document meeting the requirements of section F.1.b.(2) of this Order as produced by the Principal Permittee(s).

I. SUBMITTAL OF JURISDICTIONAL URMP ANNUAL REPORT

1. Individual - Each individual Jurisdictional URMP Annual Report shall be a documentation of the activities conducted by each Copermittee during the past annual reporting period. Each Jurisdictional URMP Annual Report shall, at a minimum, contain the following:

a. Comprehensive description of all activities conducted by the Copermittee to meet all requirements of each component of the Jurisdictional URMP section of this Order;

F.1. Land-Use Planning for New Development and Redevelopment Component
F.2. Construction Component
F.3. Existing Development Component (Including Municipal, Industrial, Commercial, Residential, and Education)
F.4. Education Component
F.5. Illicit Discharge Detection and Elimination Component
F.6 Common Interest Areas and Homeowners Associations

F.7. Public Participation Component
F.8. Assessment of Jurisdictional URMP Effectiveness Component
F.9. Fiscal Analysis Component

b. Each Copermittee's accounting of all:
   (1) Reports of illicit discharges (i.e., complaints) and how each was resolved (indicating referral source);
   (2) Inspections conducted;
   (3) Enforcement actions taken; and
   (4) Education efforts conducted.

c. Public participation mechanisms utilized during the Jurisdictional URMP implementation process;

d. Proposed revisions to the Jurisdictional URMP;

e. A summary of all urban runoff related data not included in the annual monitoring report (e.g., special investigations);

f. Budget for upcoming year;

g. Identification of management measures proven to be ineffective in reducing urban runoff pollutants and flow; and

h. Identification of water quality improvements or degradation.

2. Unified - The unified Jurisdictional URMP Annual Report shall contain a section covering common activities conducted collectively by the Copermittees, to be produced by the Principal Permittee(s), and the thirteen individual Jurisdictional URMP Annual Reports. Each Copermittee shall submit to the Principal Permittee(s) an individual Jurisdictional URMP Annual Report by the date specified by the Principal Permittee(s). The Principal Permittee(s) shall submit a unified Jurisdictional URMP Annual Report to the SDRWQCB prior to **November 9, 2003 and prior to every November 9th thereafter.** The reporting period for these annual reports shall be the previous fiscal year. For example, the report submitted prior to November 9, 2003 shall cover the reporting period July 1, 2002 to June 30, 2003.

3. Universal Reporting Requirements

   All individual and unified Jurisdictional URMP submittals shall include an executive summary, introduction, conclusion, recommendations, and signed certified statement. Each Copermittee shall submit its individual Jurisdictional Urban Runoff Management Program Annual Report with a signed certified statement. The Principal Permittee(s) shall submit a signed certified statement referring to its individual Jurisdictional Urban Runoff Management Program Annual Report and the section covering common activities conducted collectively by the Copermittees as produced by the Principal Permittee(s).

J. WATERSHED URBAN RUNOFF MANAGEMENT PROGRAM

1. Each Copermittee shall collaborate with other Copermittees to identify, address, and mitigate the highest priority water quality issues/pollutants in the six (Table 4) watersheds in the San Juan Creek Watershed Management Area.

2. Each Copermittee shall collaborate with all other Copermittees discharging urban runoff into the same watershed to develop and implement a Watershed Urban Runoff Management Program (Watershed URMP) for the six watersheds in the San Juan Creek Watershed Management Area.

The Watershed URMP shall, at a minimum contain the following:

a. An accurate map of the watersheds of the San Juan Creek Watershed Management Area in Orange County (preferably in Geographical Information System [GIS] format) that identifies all receiving waters (including the Pacific Ocean); all Clean Water Act section 303(d) impaired receiving waters (including the Pacific Ocean); existing and planned land uses; MS4s, major highways; jurisdictional boundaries; and inventoried commercial, construction, industrial, municipal sites, and residential areas.

b. An assessment of the water quality of all receiving waters in the watershed based upon (1) existing water quality data; and (2) annual dry weather monitoring that satisfies requirements of section F.5 and Attachment E of this Order; and (3) watershed receiving water quality monitoring that satisfies the watershed monitoring requirements of Attachment B;

c. An identification and prioritization of major water quality problems in the watershed caused or contributed to by MS4 discharges and the likely source(s) of the problem(s);

d. An implementation time schedule of short and long-term recommended activities (individual and collective) needed to address the highest priority water quality problem(s) identified in section J.2.c of this Order. For this section, “short-term activities” shall mean those activities that are to be completed during the life of this Order and “long-term activities” shall mean those activities that are to be completed beyond the life of this Order;

e. A mechanism for public participation throughout the entire watershed URMP process;

f. A watershed-based education program that builds on and expands upon the education activities conducted by each Copermittee in a given watershed and that can focus on water quality issues specific to that watershed;

g. A mechanism to facilitate collaborative “watershed-based” (i.e., natural resource-based) land use planning with neighboring local governments in the watershed.

h. Short-term strategy for assessing the effectiveness of the activities and programs implemented under the Watershed URMP. The short term assessment strategy shall identify methods to assess the Watershed URMP effectiveness and include specific direct and indirect performance measurements that will track the immediate progress and accomplishments of the Watershed URMP towards improving receiving water quality impacted by urban runoff discharges. The short-term strategy shall also discuss the role of monitoring data collected by the Copermittees in substantiating or refining the assessment.

i. Long-term strategy for assessing the effectiveness of the Watershed URMP. The long-term assessment strategy shall identify specific direct and indirect performance measurements that will track the long-term progress of Watershed URMP towards achieving improvements in receiving water quality impacted by urban runoff discharges. Methods used for assessing effectiveness shall include the following or their equivalent: surveys, pollutant loading estimations, and receiving water quality monitoring. The long-term strategy shall also discuss the role of monitoring data in substantiating or refining the assessment.

Table 4. Orange County Copermittees by Watershed
for the San Juan Creek Watershed Management Area

Watershed	Major Receiving Water Bodies[8]	Copermittees
Orange County Coastal Streams - Laguna	Moro Canyon Creek Emerald Canyon Creek Laguna Canyon Creek Blue Bird Canyon Creek Rim Rock Canyon Creek Hobo Canyon Creek	County of Orange Laguna Beach Laguna Woods Orange County Flood Control District Aliso Viejo
Aliso Creek	Aliso Creek English Canyon Creek Sulphur Canyon Creek Wood Canyon Creek	Aliso Viejo Laguna Beach Laguna Hills Laguna Niguel Laguna Woods Lake Forest Mission Viejo County of Orange Orange County Flood Control District
Dana Point Coastal Streams	Salt Creek Arroyo Salada Creek San Juan Canyon	Dana Point Laguna Niguel Orange County Flood Control District
San Juan Creek	San Juan Creek Trampas Canyon Creek Canada Gobernadora Canada Chiquita Horno Creek Arroyo Trabuco Creek Tijeras Canyon Creek Live Oak Canyon Creek Oso Creek La Paz Creek Lucas Canyon Creek Verdugo Canyon Creek Bell Canyon Creek Dove Canyon Creek Crow Canyon Creek	San Juan Capistrano Mission Viejo Laguna Hills Laguna Niguel Dana Point Rancho Santa Margarita County of Orange Orange County Flood Control District San Clemente
Orange County Coastal Streams - San Clemente	Prima Deshecha Canada Segunda Deshecha Canada	San Clemente San Juan Capistrano County of Orange Orange County Flood Control District Dana Point
San Mateo Creek	Christianitos Creek Gambino Canyon Creek La Paz Canyon Creek Talega Canyon Creek	San Clemente County of Orange Orange County Flood Control District

[8] Indented water bodies are tributary to the above water body.

K. IMPLEMENTATION OF WATERSHED URMP

Each Copermittee shall implement all requirements of the Watershed URMP section of this Order by August 13, 2003 unless otherwise specified. Following the adoption of the Order and prior to the full implementation of the Watershed URMP, the Copermittees shall at a minimum collectively implement the provisions and commitments of the proposed DAMP submitted in September 2000.

L. SUBMITTAL OF WATERSHED URMP DOCUMENT

The written account of the overall watershed program to be conducted by each Copermittee during the remaining life of this Order is referred to as the "Watershed URMP Document". The Watershed URMP is conducted concurrently with the Jurisdictional URMP.[9]

1. The Watershed URMP document shall state how the member Copermittees within each watershed will develop and implement the requirements of the Watershed URMP section J. of this Order. The Watershed URMP document shall include:

    (1) A completed watershed map
    (2) A water quality assessment of the San Juan Creek Watershed Management Area within Orange County and watershed monitoring needed
    (3) Prioritization of water quality problems within Orange County in the San Diego Region
    (4) Recommended activities (short and long term) to be conducted jointly by the Copermittees and a timeline for implementation
    (5) Individual Copermittee implementation responsibilities and time schedules for implementation
    (6) A description of watershed public participation mechanisms
    (7) A description of watershed education mechanisms
    (8) A description of the mechanism and implementation schedule for watershed-based land use planning
    (9) A strategy for assessing the short-term effectiveness of the Watershed URMP
    (10) A strategy for assessing the long-term effectiveness of the Watershed URMP
    (11) A program to address common interest areas and homeowners associations

2. The Principal Permittee(s) shall submit the Watershed URMP document to the SDRWQCB by August 13, 2003.

3. Universal Reporting Requirements.

    All Watershed URMP submittals shall include an executive summary, introduction, conclusion, recommendations, and signed certified statement. Each Copermittee shall submit a signed certified statement covering its responsibilities in the Watershed URMP Document. The Principal Permittee(s) shall submit a signed certified statement referring to its responsibilities in the Watershed URMP Document and the section covering common activities conducted collectively by the Copermittees as produced by the Principal Permittee(s).

[9] As the Copermittees jointly revise and implement the submitted proposed DAMP and each Copermittee revises and implements its jurisdictional level program to satisfy the requirements of this Order, it is expected that many activities will be conducted on both a jurisdictional level (e.g., enforcement of local ordinances and permits) and a watershed level. Implementation of the Watershed URMP is not meant to replace, but to expand and complement implementation of the Jurisdictional URMP. For this reason, it is necessary to report management activities on both levels. This can be accomplished either by submitting both a Jurisdictional URMP Annual Report and a Watershed URMP Annual Report or by submitting a single Watershed URMP Annual Report that contains two separate sections (i.e., watershed activities and jurisdictional activities). Information need only be reported once (to the extent something is covered in the Watershed URMP Annual Report, it need not be covered again the Jurisdictional URMP Annual Report).

M. SUBMITTAL OF WATERSHED URMP ANNUAL REPORT

1. Each Watershed URMP Annual Report shall be a documentation of the activities conducted by watershed member Copermittees during the previous annual reporting period to meet the requirements of all components of the Watershed URMP section of this Order. Each Watershed URMP Annual Report shall, at a minimum, contain the following:

    a. Comprehensive description of all activities conducted by the watershed member Copermittees to meet all requirements of each component of Watershed URMP section J. of this Order
    b. A section covering common activities conducted collectively by the Copermittees, to be produced by the Principal Permittee(s)
    c. Public participation mechanisms utilized during the Watershed URMP implementation process;
    d. Mechanism for watershed-based land use planning;
    e. Assessment of effectiveness of Watershed URMP;
    f. Proposed revisions to the Watershed URMP;
    g. A summary of watershed effort related data not included in the annual monitoring report (e.g., special investigations); and
    h. Identification of water quality improvements or degradation.

2. The Principal Permittee(s) shall submit the Watershed URMP Annual Report to the SDRWQCB prior to November 9, 2004 and prior to every November 9th thereafter. The reporting period for these annual reports shall be the previous fiscal year. For example, the report submitted prior to November 9, 2004 shall cover the reporting period July 1, 2003 to June 30, 2004.

3. Universal Reporting Requirements

    All Watershed URMP submittals shall include an executive summary, introduction, conclusion, recommendations, and signed certified statement. Each Copermittee shall submit a signed certified statement covering its responsibilities in the Watershed URMP Annual Report. The Principal Permittee(s) shall submit a signed certified statement referring to its responsibilities in the Watershed URMP Annual Report and the section covering common activities conducted collectively by the Copermittees as produced by the Principal Permittee(s).

N. PROGRAM MANAGEMENT

1. The Copermittees shall implement the Program Management activities and commitments as described in section 2 (Program Management) of the proposed DAMP.

O. PRINCIPAL PERMITTEE RESPONSIBILITIES

Within 90 days of adoption of this Order, the Copermittees shall designate the Principal Permittee(s) and notify the SDRWQCB of the name(s) of the Principal Permittee(s). The Principal Permittee(s) may require the Copermittees to reimburse the Principal Permittee(s) for reasonable costs incurred while performing coordination responsibilities and other related tasks. The Principal Permittee(s) shall, at a minimum:

1. Be responsible for implementing or coordinating the implementation of the Program Management activities and commitments described in section 2 (Program Management) of the proposed DAMP.

2. Serve as liaison(s) between the Copermittees and the SDRWQCB on general permit issues.

3. Coordinate permit activities among the Copermittees and facilitate collaboration on the development and implementation of programs required under this Order;

4. Coordinate the joint development by all of the Copermittees of standardized format(s) for all reports required under this Order (e.g., annual reports, monitoring reports, fiscal analysis reports, and program effectiveness reports, etc.). The standardized reporting format(s) shall be used by all Copermittees and shall include protocols for electronic reporting. The Principal Permittee(s) shall submit the standardized format(s) to the SDRWQCB as part of the unified Jurisdictional URMP document no later than **365 days after adoption** of this Order**.**

5. Integrate individual Copermittee documents and reports required under this Order into single unified documents and reports for submittal to the SDRWQCB as described below. If a reporting date falls on a non-working day or State holiday, then the report is to be submitted on the following working day.

   a. Unified Jurisdictional URMP Document – The Principal Permittee(s) shall submit the unified Jurisdictional URMP document in its entirety (including the model SUSMP) to the SDRWQCB within 365 days of the adoption of this Order.

      The Principal Permittee(s) shall be responsible for producing the sections of the unified Jurisdictional URMP document submittals covering common activities conducted by the Copermittees. The Principal Permittee(s) shall be responsible for the development and production of a stand alone Model SUSMP document meeting the requirements of section F.1.b.(2). of this Order. The Principal Permittee(s) shall also be responsible for collecting and assembling the individual Jurisdictional URMP document submittals covering the activities conducted by each individual Copermittee.

   b. Unified Jurisdictional URMP Annual Reports – The Principal Permittee(s) shall submit unified Jurisdictional URMP Annual Reports to the SDRWQCB prior to November 9th of each year, beginning on **November 9, 2003**. The reporting period for these annual reports shall be the previous fiscal year. For example, the report submitted prior to November 9, 2003 shall cover the reporting period July 1, 2002 to June 30, 2003.

      The Principal Permittee(s) shall be responsible for producing the section of the unified Jurisdictional URMP Annual Reports covering common activities conducted by the Copermittees. The Principal Permittee(s) shall also be responsible for collecting and assembling the individual Jurisdictional URMP Annual Reports covering the activities conducted by each individual Copermittee.

   c. Watershed URMP Document – The Principal Permittee(s) shall prepare and submit the Watershed URMP document to the SDRWQCB by **August 13, 2003** .

   d. Watershed URMP Annual Report - The Principal Permittee(s) shall prepare and submit the Watershed URMP Annual Reports to the SDRWQCB prior to November 9th of each year, beginning on **November 9, 2004**. The reporting period for these annual reports shall be the previous fiscal year. For example, the report submitted prior to November 9, 2004 shall cover the reporting period July 1, 2003 to June 30, 2004.

   e. Receiving Waters Monitoring and Reporting Program - The Principal Permittee(s) shall be responsible for the production and submittal of the Previous Monitoring and Future Recommendations Report. The report shall be submitted to the SDRWQCB within 180 days of adoption of this Order.

   f. Receiving Waters Monitoring and Reporting Program - The Principal Permittee(s) shall be responsible for the development and production of the Receiving Waters Monitoring Program as it is outlined in Attachment B. The Principal Permittee(s) shall submit the Receiving Waters Monitoring Program to the SDRWQCB within 180 days of adoption of this Order.

g. Receiving Waters Monitoring and Reporting Program – The Principal Permittee(s) shall be responsible for coordinating the joint development by all of the Copermittees of monitoring reporting formats (Section O.4) and for implementing the Receiving Waters Monitoring Program as outlined in Attachment B by August 13, 2002.

h. Receiving Waters Monitoring and Reporting Program - The Principal Permittee(s) shall submit the Receiving Waters Monitoring Annual Report to the SDRWQCB prior to November 9th of each year, beginning on November 9, 2003.

i. Formal Agreements/Standardized Formats - The Principal Permittee(s) shall submit to the SDRWQCB, within 365 days of adoption of this Order, a formal agreement between the Copermittees which provides a management structure for meeting the requirements of this Order (as described in section N.1.). The Principal Permittee(s) shall submit to the SDRWQCB, within 365 days of adoption of this Order, standardized formats for all reports and documents required under this Order.

j. Dry Weather Monitoring - The Principal Permittee(s) shall collectively submit the Copermittees' dry weather monitoring maps and procedures to the SDRWQCB within 365 days of adoption of this Order.

P. RECEIVING WATERS MONITORING AND REPORTING PROGRAM

1. Pursuant to California Water Code section 13267, each Copermittee shall comply with the Receiving Waters Monitoring and Reporting Program for Order No. R9-2002-0001 contained in **Attachment B** of this Order.

2. Each Copermittee shall also comply with standard provisions, reporting requirements, and notifications contained in **Attachment C** of this Order.

Q. TASKS AND SUBMITTAL SUMMARY

The tasks and submittals required under this Order are summarized in Tables 5 and 6 below:

Table 5. Task Summary

Task No.	Task	Permit Section	Completion Date	Frequency
1	Identify discharges not to be prohibited and BMPs required for treatment of discharges not prohibited	B.3.	365 days after adoption of Order	One Time
2	Examine field screening results to identify water quality problems resulting from non-prohibited non-storm water discharges, including follow-up of problems	B.5.	Prior to November 9, 2003	Annually
3	Notify SDRWQCB of discharges causing or contributing to an exceedance of water quality standards	C.2.a.	Immediate	As Needed
4	Establish adequate legal authority to control pollutant discharges into and from MS4	D.1.	365 days after adoption of Order	One Time
5	Assess General Plan to incorporate water quality and watershed protection principles	F.1.a.	365 days after adoption of Order	One Time
6	Include Development Project Requirements in local permits	F.1.b.(1).	365 days after adoption of Order	One Time
7	Develop Model SUSMP	F.1.b.(2).	365 days after adoption of Order	One Time
8	Develop and adopt individual local SUSMP and amended ordinances	F.1.b.(2).	180 days after development of Model SUSMP	One Time
9	Implement individual jurisdictional SUSMP	F.1.b.(2).	180 days after submittal of Model SUSMP to SDRWQCB	Continuous

Task No.	Task	Permit Section	Completion Date	Frequency
10	Revise environmental review processes	F.1.c.(1).	365 days after adoption of Order	One Time
11	Conduct education program for municipal planning and development review staff, project applicants, developers, contractors, community planning groups, and property owners	F.1.d.(1). And F.1.d.(2).	365 days after adoption of Order	Ongoing
12	Implement all requirements of Construction Component of Jurisdictional URMP	F.2.a. – F.2.j.	365 days after adoption of Order	Ongoing
13	Notify SDRWQCB of non-compliant construction sites that pose a threat to human or environmental health	F.2.i.	Within 24 hours of discovery of noncompliance	As Needed
14	Implement all requirements of Municipal Existing Development Component of Jurisdictional URMP	F.3.a.(1). – F.3.a.(8).	365 days after adoption of Order	Ongoing
15	Implement all requirements of Industrial Existing Development Component of Jurisdictional URMP	F.3.b.(1) – F.3.b.(8)	365 days after adoption of Order	Ongoing
16	Notify SDRWQCB of non-compliant industrial sites that pose a threat to human or environmental health	F.3.b.8.	Within 24 hours of discovery of noncompliance	As Needed
17	Implement all requirements of Commercial Existing Development Component of Jurisdictional URMP	F.3.c.(1) – F.3.c.(5)	365 days after adoption of Order	Ongoing
18	Implement all requirements of Residential Existing Development Component of Jurisdictional URMP	F.3.d.(1) – F.3.d.(4)	365 days after adoption of Order	Ongoing
19	Implement all requirements of Education Component of Jurisdictional URMP	F.4.a. – F.4.c.	365 days after adoption of Order	Ongoing
20	Implement all requirements of Illicit Discharge Detection and Elimination Component of Jurisdictional URMP	F.5.a. – F.5.i.	365 days after adoption of Order	Ongoing
21	Develop a plan to manage urban runoff from common interest areas, private roads, drainage facilities, and other components of the storm water conveyance system, including those managed by homeowners associations.	F.6.	365 days after adoption of Order	One Time
22	Implement all requirements of Public Participation Component of Jurisdictional URMP	F.7.	365 days after adoption of Order	Ongoing
23	Develop strategy for assessment of Jurisdictional URMP effectiveness	F.8.a.	365 days after adoption of Order	One Time
24	Assess Jurisdictional URMP effectiveness	F.8.b.	Prior to November 9, 2003	Annually
25	Develop strategy for fiscal analysis of urban runoff management program	F.9.	365 days after adoption of Order	One Time
26	Conduct fiscal analysis of urban runoff management program in entirety	F.9.	Prior to November 9, 2003	Annually
27	Develop and implement Watershed URMP	J.2.	August 13, 2003	Ongoing
28	Implement Program Management activities and commitments in proposed DAMP	N.1.	Immediately	Ongoing
29	Develop standardized formats for all required reports of this Order	O.4.	365 days after adoption of Order	One Time
30	Develop Receiving Waters Monitoring Document	Attachment B	180 days after adoption of Order	One Time
31	Implement Receiving Waters Monitoring Program	Attachment B	180 days after adoption of Order	Continuous
32	Develop Dry Weather Monitoring Program Document	Attachment E	365 days after adoption of Order	One Time
33	Conduct Dry Weather Monitoring Program	Attachment E	Begins May 1, 2003 Thereafter conducted May 1st to September 30th	Annually
34	Complete NPDES applications for issuance of renewal watershed-based permits	Attachment C	At least 180 days prior to expiration of Order	One Time

Task No.	Task	Permit Section	Completion Date	Frequency
35	Notify SDRWQCB of any incidence of non-compliance with this Order that poses a threat to human or environmental health.	R.1, B.6 of Attachment C	Within 24 hours of discovery of non-compliance	As Needed
36	Designate Principal Permittee(s) and notify SDRWQCB	O.	90 days after adoption of the Order	One Time

Table 6. Submittal Summary

Submittal No.	Submittal	Permit Section	Completion Date	Frequency
1	Submit identification of discharges not to be prohibited and BMPs required for treatment of discharges not prohibited	B.3.	365 days after adoption of Order	One Time
2	Report on discharges causing or contributing to an exceedance of water quality standards, including description of BMP implementation	C.2.a.	With individual Jurisdictional URMP Annual Reports	As Needed
3	Submit Certified Statement of Adequate Legal Authority	D.2.	365 days after adoption of Order	One Time
4	Submit certified statement if particular high priority construction sites are to be inspected monthly rather than weekly in the rainy season	F.2.g.(2).	365 days after adoption of Order and as needed thereafter	As Needed
5	Submit report on non-compliant construction sites that pose a threat to human or environmental health.	F.2.i.	Within 5 Days of discovery of non-compliance	As Needed
6	Submit report on non-compliant industrial sites that pose a threat to human or environmental health.	F.3.b.8.	Within 5 days of discovery of non compliance	As Needed
7	Submit to Principal Permittee(s) individual Jurisdictional URMP document covering requirements for all Components	H.1.a.	Prior to 365 days after adoption of Order (Principal Permittee(s) specifies date of submittal)	One Time
8	(This space reserved).			
9	Principal Permittee(s) shall submit to SDRWQCB unified Jurisdictional URMP document covering requirements for all Components, including Model SUSMP	H.2.a.	365 days after adoption of Order	One Time
10	(This space reserved).			
11	Submit to SDRWQCB local SUSMP and amended ordinances	F.1.b.(2). and H.1.d.	180 days after development of Model SUSMP	One Time
12	Submit to Principal Permittee(s) individual Jurisdictional URMP Annual Report	I.1.	Prior to November 9, 2003 (Principal Permittee(s) specifies date of submittal)	Annually
13	Principal Permittee(s) shall submit 1st unified Jurisdictional URMP Annual Report to SDRWQCB	I.2.	Prior to November 9, 2003	One Time and Annually Thereafter
14	Submit to Principal Permittee(s) Watershed Specific URMP document	L.1.	Prior to August 13, 2003 (Principal Permittee(s) specifies date of submittal)	One Time
15	Principal Permittee(s) shall submit Watershed URMP document to SDRWQCB	L.2.	August 13, 2003	One Time
16	Principal Permittee(s) shall submit 2nd unified Jurisdictional URMP Annual Report to SDRWQCB	I.2.	Prior to November 9, 2004	One Time
17	(This space reserved).			
18	Principal Permittee(s) shall submit 1st Watershed URMP Annual Report to SDRWQCB	M.2.	Prior to November 9, 2004	One Time and Annually Thereafter
19	Principal Permittee(s) shall submit 3rd unified Jurisdictional URMP Annual Report to SDRWQCB	I.2.	Prior to November 9, 2005	One Time

Submittal No.	Submittal	Permit Section	Completion Date	Frequency
20	Principal Permittee(s) shall submit 2nd Watershed URMP Annual Report to SDRWQCB	M.2.	Prior to November 9, 2005	One Time
21	Principal Permittee(s) shall submit 4th unified Jurisdictional URMP Annual Report to SDRWQCB	I.2.	Prior to November 9, 2006	One Time
22	Principal Permittee(s) shall submit 3rd Watershed URMP Annual Report to SDRWQCB	M.2.	Prior to November 9, 2006	One Time
23	Principal Permittee(s) shall submit 5th unified Jurisdictional URMP Annual Report to SDRWQCB	I.2.	Prior to November 9, 2007	One Time
24	Principal Permittee(s) shall submit standardized formats for all reports required under this Order	O.4.	365 days after adoption of Order	One Time
25	Principal Permittee(s) submits Receiving Waters Monitoring Program Document	Attachment B	180 days after adoption of Order	One Time
26	Principal Permittee(s) submits Receiving Waters Monitoring Annual Report to SDRWQCB	Attachment B	Prior to November 9, 2003	Annually
27	Submit to Principal Permittee(s) Dry Weather Monitoring Program Document	Attachment E	Prior to 365 days after adoption of Order	One Time
28	Principal Permittee(s) submits collective Dry Weather Monitoring Program Documents	Attachment E	365 days after adoption of Order	One Time
29	Submit to Principal Permittee(s) Dry Weather Monitoring Program results as part of individual Jurisdictional URMP Annual Report	Attachment E	Prior to November 9, 2003, as part of individual Jurisdictional URMP Annual Report	Annually
30	Principal Permittee(s) shall submit NPDES applications for issuance of renewal watershed-based permits	Attachment C	At least 180 days prior to expiration of this Order	One Time
31	Submit reports of any incidence of non-compliance with this Order that poses a threat to human or environmental health.	R.1, B.6 of Attachment C	Within 5 days of discovery of non compliance	As Needed

R. STANDARD PROVISIONS, REPORTING REQUIREMENTS AND NOTIFICATIONS

1. Each Copermittee shall comply with Standard Provisions, Reporting Requirements, and Notifications contained in **Attachment C** of this Order. This includes 24 hour/5day reporting requirements for any instance of non-compliance with this Order as described in section B.6 of Attachment C.

2. All plans, reports and subsequent amendments submitted in compliance with this Order shall be implemented immediately (or as otherwise specified) and shall be an enforceable part of this Order upon submission to the SDRWQCB. All submittals by Copermittees must be adequate to implement the requirements of this Order.

I, John H. Robertus, Executive Officer, do hereby certify the foregoing is a full, true, and correct copy of an Order adopted by the California Regional Water Quality Control Board, San Diego Region, on ***February 13, 2002.***

John H. Robertus
Executive Officer

ATTACHMENT A

BASIN PLAN PROHIBITIONS

California Water Code Section 13243 provides that a Regional Board, in a water quality control plan, may specify certain conditions or areas where the discharge of waste, or certain types of waste is not permitted. The following discharge prohibitions are applicable to any person, as defined by Section 13050(c) of the California Water Code, who is a citizen, domiciliary, or political agency or entity of California whose activities in California could affect the quality of waters of the state within the boundaries of the San Diego Region.

1. The discharge of waste to waters of the state in a manner causing, or threatening to cause a condition of pollution, contamination or nuisance as defined in California Water Code Section 13050, is prohibited.

2. The discharge of waste to land, except as authorized by waste discharge requirements or the terms described in California Water Code Section 13264 is prohibited.

3. The discharge of pollutants or dredged or fill material to waters of the United States except as authorized by an NPDES permit or a dredged or fill material permit (subject to the exemption described in California Water Code §13376) is prohibited.

4. Discharges of recycled water to lakes or reservoirs used for municipal water supply or to inland surface water tributaries thereto are prohibited, unless this Regional Board issues a NPDES permit authorizing such a discharge; the proposed discharge has been approved by the State Department of Health Services and the operating agency of the impacted reservoir; and the discharger has an approved fail-safe long-term disposal alternative.

5. The discharge of waste to inland surface waters, except in cases where the quality of the discharge complies with applicable receiving water quality objectives, is prohibited. Allowances for dilution may be made at the discretion of the Regional Board. Consideration would include streamflow data, the degree of treatment provided and safety measures to ensure reliability of facility performance. As an example, discharge of secondary effluent would probably be permitted if streamflow provided 100:1 dilution capability.

6. The discharge of waste in a manner causing flow, ponding, or surfacing on lands not owned or under the control of the discharger is prohibited, unless the discharge is authorized by the Regional Board.

7. The dumping, deposition, or discharge of waste directly into waters of the state, or adjacent to such waters in any manner which may permit its being transported into the waters, is prohibited unless authorized by the Regional Board.

8. Any discharge to a storm water conveyance system that is not composed entirely of "*storm water*" is prohibited unless authorized by the Regional Board. [The federal regulations, 40 CFR 122.26 (b) (13), define storm water as storm water runoff, snow melt runoff, and surface runoff and drainage. 40 CFR 122.26 (b) (2) defines an illicit discharge as any discharge to a storm water conveyance system that is not composed entirely of storm water except discharges pursuant to a NPDES permit and discharges resulting from fire fighting activities. [§122.26 amended at 56 FR 56553, November 5, 1991; 57 FR 11412, April 2, 1992].

9. The unauthorized discharge of treated or untreated sewage to waters of the state or to a storm water conveyance system is prohibited.

10. The discharge of industrial wastes to conventional septic tank/subsurface disposal systems, except as authorized by the terms described in California Water Code Section 13264, is prohibited.

11. The discharge of radioactive wastes amenable to alternative methods of disposal into the waters of the state is prohibited.

12. The discharge of any radiological, chemical, or biological warfare agent into waters of the state is prohibited.

13. The discharge of waste into a natural or excavated site below historic water levels is prohibited unless the discharge is authorized by the Regional Board.

14. The discharge of sand, silt, clay, or other earthen materials from any activity, including land grading and construction, in quantities which cause deleterious bottom deposits, turbidity or discoloration in waters of the state or which unreasonably affect, or threaten to affect, beneficial uses of such waters is prohibited.

15. The discharge of treated or untreated sewage from vessels to Mission Bay, Oceanside Harbor, Dana Point Harbor, or other small boat harbors is prohibited.

16. The discharge of untreated sewage from vessels to San Diego Bay is prohibited.

17. The discharge of treated sewage from vessels to portions of San Diego Bay that are less than 30 feet deep at mean lower low water (MLLW) is prohibited.

18. The discharge of treated sewage from vessels, which do not have a properly functioning US Coast Guard certified Type I or Type II marine sanitation device, to portions of San Diego Bay that are greater than 30 feet deep at mean lower low water (MLLW) is prohibited.

ATTACHMENT B

RECEIVING WATERS MONITORING AND REPORTING PROGRAM FOR ORDER NO. R9-2002-0001

B.1 Receiving Waters Monitoring Program

The Copermittees shall collaborate to develop, implement, and report annually on a Receiving Waters Monitoring Program for Orange County within the San Diego Region. The primary objectives of the Receiving Waters Monitoring and Reporting Program include:

- Assessing compliance with Order No. R9-2002-0001;
- Measuring the effectiveness of Urban Runoff Management Plans;
- Assessing the chemical, physical, and biological impacts to receiving waters resulting from urban runoff; and
- Assessing the overall health and evaluating long-term trends in receiving water quality.

Order No. R9-2002-0001 may be modified by the SDRWQCB Executive Officer without further public notice to direct the Copermittees to participate in comprehensive regional monitoring activities in the Southern California Bight in lieu of specific Order R9-2002-0001 receiving waters monitoring requirements during the term of this Order.

B.2 Receiving Waters Monitoring Program Document

Within **180** days of the adoption of this Order the Copermittees shall submit to the SDRWQCB a Receiving Waters Monitoring Program document, subject to SDRWQCB review, that incorporates the following components:

a. Previous Monitoring and Future Recommendations Technical Report; and
b. Receiving Waters Monitoring Program

<u>B.2.a. Previous Monitoring and Future Recommendations Technical Report</u>

The Copermittees shall collaborate to prepare a technical report that provides analysis, interpretation, and summary of all previous wet weather monitoring results from programs conducted in the watersheds within the San Diego Region under the First Term Permit, the Second Term Permit, and the Orange County Water Quality Monitoring Program (99-04 Plan) currently being implemented by the Copermittees. The report shall also provide recommendations for the Receiving Waters Monitoring Program to comply with the objectives listed in Attachment B.1 above and incorporates the specific receiving waters monitoring requirements of Attachment B.2.b. At a minimum, the report shall:

(1) Summarize the cumulative findings of all previous wet weather monitoring;
(2) Identify detectable trends in water quality data and receiving water quality, based on the cumulative previous wet weather monitoring findings;
(3) Interpret the cumulative previous wet weather monitoring findings;
(4) Describe the monitoring design, sampling and analytical methods employed in the 99-04 Plan within the San Diego Region;
(5) Describe the identification of Critical Aquatic Resources and Warm Spots in the 99-04 Plan within the San Diego Region and how these will be addressed in the Receiving Waters Monitoring Program;
(6) Draw conclusions regarding the cumulative previous wet weather monitoring findings;

(7) Describe how the monitoring data collected under the previous monitoring programs, including the 99-04 Plan, have been utilized by the Copermittees in the implementation of the 1993 DAMP under Order No. 96-03;
(8) Describe how the monitoring data collected under this Order will be utilized in the implementation of the Jurisdictional and Watershed Urban Runoff Management Plans;
(9) Provide recommendations for future monitoring activities in the San Diego Region (i.e. number and location of sampling stations, frequency of sampling, parameters to be analyzed, methods and materials to be used, and a rationale for each) that achieves the objectives listed in section B.1 and incorporates the specific program requirements of section B.2.b of this Attachment; and
(10) Include an executive summary, introduction, conclusion, and summary of recommendations.

B.2.b. Receiving Waters Monitoring Program

The Copermittees shall collaborate to review and revise the existing 99-04 Plan utilizing the findings of the Previous Monitoring and Future Recommendations Technical Report. The revised 99-04 Plan shall incorporate the specific requirements of this section for Orange County within the San Diego Region and henceforth referred to under this Order as the Receiving Waters Monitoring Program. The Receiving Waters Monitoring Program shall at a minimum include, satisfy, or exceed the following requirements:

(1) The Receiving Waters Monitoring shall be conducted during each reporting period under the Order. A reporting period is defined as October 1st to September 30th of any year. The first reporting period under this Order is October 1, 2002 to September 30, 2003.
(2) Both the annual and long-term objectives of the Receiving Waters Monitoring Program shall be clearly stated and reported annually and shall focus on the primary objectives of the program listed in Attachment B.1.
(3) The monitoring program design, implementation, analysis, assessment, and reporting shall be conducted annually on a watershed basis for each of the six hydrologic units in the San Juan Creek Watershed Management Area within Orange County (Orange County Coastal Streams – Laguna, Aliso Creek Watershed, Dana Point Watershed, San Juan Creek Watershed, Orange County Coastal Streams – San Clemente, and San Mateo Creek) as defined in the Water Quality Control Plan for the San Diego Region (9) and Watershed Management Chapter for the San Diego Region.
(4) Monitoring results shall be assessed and reported annually on a watershed basis as a single report by the Copermittees consisting of one common section and six watershed sections. Monitoring, analysis, assessment, and reporting shall satisfy the requirements of specified below for each watershed as applicable.
(5) Describe how the Copermittees may collaborate with other agencies or organizations conducting similar monitoring, such as the Southern California Coastal Water Research Project (SCCWRP), including the possibility of participating in coordinated comprehensive regional monitoring in the Southern California Bight under this Order.
(6) The Receiving Waters Monitoring Program document shall be submitted to the SDRWQCB for review and comment no later than 180 days following the adoption of this Order.
(7) Implementation of the Receiving Waters Monitoring Program shall begin no later than August 13, 2002.
(8) The Receiving Waters Monitoring Program shall incorporate the components listed below and shall address the primary objectives of the Receiving Waters Monitoring Program:
    (a) Urban Stream Bioassessment
    (b) Long Term Mass Loading

(c) Coastal Storm Drain Outfall Monitoring
(d) Ambient Coastal Receiving Waters Monitoring

B.2.b.8.a Urban Stream Bioassessment Monitoring

1. The Copermittees shall collaborate to develop and implement an urban stream bioassessment monitoring program. At a minimum, the program shall consist of station identification, sampling, monitoring, and analysis of data for 12 bioassessment stations in order to determine the biological and physical integrity of urban streams within the County of Orange. In addition to the urban stream bioassessment stations, three reference bioassessment stations shall be identified, sampled, monitored, and analyzed. The selection, sampling, monitoring, and analysis of bioassessment stations shall meet the following requirements:

   a. Each urban stream bioassessment station shall be selected using the following criteria. Each urban stream bioassessment station shall:

      (1) be located within the jurisdiction of a Copermittee; or
      (2) be located within one of the six watersheds described above; and
      (3) be representative of urban stream conditions within one of the six watersheds specified in Section J, Table 4 of this Order; and
      (4) meet the physical criteria of the California Stream Bioassessment Procedure[1]; and
      (5) to the extent feasible, coincide with the location of an already existing monitoring station used by the California Department of Fish and Game in the conduct of the SDRWQCB's Ambient Bioassessment Program.

   b. Each bioassessment station shall be monitored twice annually, in May and October of each year, beginning in October 2002[2]. A minimum of three replicate samples shall be collected at each station during each sampling event.

   c. Sampling, laboratory, quality assurance, and analysis procedures shall follow the standardized procedures set forth in the California Department of Fish and Game's California Stream Bioassessment Procedure (CSBP). Analysis procedures shall include comparison between station mean values for various biological metrics. Sampling, laboratory, quality assurance, and analytical procedures shall follow the standardized "Non-Point Source Bioassessment Sampling Procedures" for professional bioassessment set forth in the CSBP. In the event that the CSBP "Point-Source Professional Bioassessment Procedure" is performed in place of the "Non Point Source Bioassessment Sampling Procedure," justification and documentation of the procedure shall be submitted with the report. Results of the Urban Stream Bioassessment Monitoring shall be reported annually as part of the overall Receiving Waters Monitoring and Reporting Program for Order No. R9-2002-0001. Reporting of the bioassessment data shall follow the format of the San Diego Regional Water Quality Control Board 1999 Biological Assessment Annual Report[3]. The report shall include:

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[1] California Stream Bioassessment Procedure (Protocol Brief for Biological and Physical/Habitat Assessment in Wadeable Streams), California Department of Fish and Game – Aquatic Bioassessment Laboratory, May 1999.

[2] Bioassessment sampling shall be performed in May and October each year.

[3] San Diego Regional Water Quality Control Board ,1999 Biological Assessment Annual Report. A Water Quality Inventory Series: Biological and Physical/Habitat Assessment of California Water Bodies. California Department of Fish and Game Office of Spill Prevention and Response, Water Pollution Control Laboratory. December 1999.

(1) All physical, chemical and biological data collected in the assessment;
(2) Photographic documentation of assessment and reference stations;
(3) Documentation of quality assurance and control procedures;
(4) Analysis that includes calculation of the metrics used in both the CSBP and the 1999 Annual Report.
(5) The assessment shall utilize a regional index of biological integrity when it becomes available.
(6) The report shall provide interpretation for comparisons of mean biological and habitat assessment metric values between assessment and reference stations.
(7) Electronic data formatted to California Department of Fish and Game Aquatic Bioassessment Laboratory specifications for inclusion in the Statewide Access Bioassessment database.

d. A professional environmental laboratory or Copermittee staff shall perform all sampling, laboratory, quality assurance, and analytical procedures. While valuable, data collected by volunteer monitoring organizations shall not be submitted in place of professional assessments.

e. Reference stations shall be selected following the recommendations in the 1999 Annual Report, Hughes (1995)[4] and Barbour et. al. (1999)[5]. Reference stations shall be evaluated annually by the Copermittees for suitability and the results included in the annual report. New reference stations will be selected as needed by the Copermittees.

2. The Copermittees shall design and implement a program to conduct standardized toxicity testing at urban stream bioassessment stations where the bioassessment data indicates significant impairment. When findings indicate the presence of toxicity, a Toxicity Identification Evaluation (TIE) shall be conducted to determine the cause(s) of the toxicity.

B.2.b.8.b <u>Long Term Mass Loading</u>

For purposes of evaluating long-term trends and assessing the effectiveness of urban runoff management programs, the Copermittees shall continue to implement the mass loading monitoring conducted under the 99-04 Plan in Orange County within the San Diego Region. The mass loading monitoring component shall, however, be revised as necessary to ensure adequate coverage of the San Diego Region and to specify that when findings or observations indicate the possible presence of toxicity, a Toxicity Identification Evaluation (TIE) shall be conducted to determine the cause(s) of the toxicity.

B.2.b.8.c. <u>Coastal Storm Drain Outfall Monitoring</u>

The Copermittees shall collaborate to develop and implement a monitoring program for discharges of urban runoff from coastal storm drain outfalls. The program shall meet the following requirements:

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4 Hughes, R. M. (1995) Defining Acceptable Biological Status by Comparing with Reference Conditions in Biological Assessment and Criteria: Tools for Water Resource Planning and Decision Making, Wayne S. Davis and Thomas P. Simon eds. Lewis Publishers, Boca Raton, LA.

5 Barbour, M.T. , J Gerritsen, B.D. Synder, and J.B. Stribling (1999) Rapid Bioassessment Protocols For Use in Streams and Wadeable Rivers: Periphyton, Benthic Macroinvertebrates, and Fish. Second Edition. EPA 841-B-99-002.

1. The program shall include rationale and criteria for selection of storm drain outfalls to be monitored.

2. The program shall include collection of samples for analysis of total coliform, fecal coliform, and enterococci, in addition to any other indicators or pathogens identified by the Copermittees.

3. Samples shall be collected at both the storm drain outfall and in the surf zone (at ankle to knee water depths) directly in front of the outfall.

4. Samples shall be collected during both dry and wet weather periods.

5. Exceedances of public health standards for bacteria must be reported to the County of Orange Health Care Agency, Regulatory Health Services, Environmental Health, Ocean Recreation Protection Program as soon as possible by the Copermittees.

B.2.b.8.d. Ambient Coastal Receiving Water Monitoring

The Copermittees shall collaborate to develop and implement a program to assess the overall health of the coastal receiving waters and monitor the impact of urban runoff on ambient receiving water quality. This monitoring shall include Dana Cove, the creek and stream mouths, the Pacific Ocean coastline of Orange County within the San Diego region, and all Clean Water Act section 303(d) water bodies or other environmentally sensitive areas as defined in F.1.b.(2)(a)vi of this Order.

B.3 Implementation of the Receiving Waters Monitoring Program

Upon approval by the SDRWQCB the Copermittees shall implement the Receiving Waters Monitoring Program.

B.4 Interim Implementation of the 99-04 Plan

Until approval of the Receiving Waters Monitoring Program by the SDRWQCB, the Copermittees shall continue to implement the 99-04 Plan as described in Appendix K of the proposed DAMP.

B.5 Submittal of Receiving Waters Monitoring Annual Reports

The Principal Permittee shall submit the Receiving Waters Monitoring Annual Report to the SDRWQCB prior to November 9th of each year, beginning on November 9, 2003.

B.6 Monitoring Annual Report Requirements

a. Monitoring reports shall provide the data/results, methods of evaluating the data, graphical summaries of the data, and an explanation/discussion of the data for each monitoring program component listed above.

b. Monitoring reports shall include an analysis of the findings of each monitoring program component listed above. The analysis shall identify and prioritize water quality problems. Based on the identification and prioritization of water quality problems, the analysis shall identify potential sources of the problems, and recommend future monitoring and BMP implementation measures for identifying and addressing the sources. The analysis shall also include an evaluation of the effectiveness of existing control measures.

c. Monitoring reports shall include identification and analysis of any long-term trends in storm water or receiving water quality.

d. Monitoring reports shall provide an estimation of total pollutant loads (wet weather loads plus dry weather loads) due to urban runoff for each of the watersheds specified in Section J, Table 4 of Order No. R9-2002-0001.

e. Monitoring reports shall for each monitoring program component listed above, include an assessment of compliance with applicable water quality standards.

f. All monitoring reports shall use a standard report format and shall include the following:

   1. A stand alone comprehensive executive summary addressing all sections of the monitoring report;
   2. Comprehensive interpretations and conclusions; and
   3. Recommendations for future actions.

g. All monitoring reports submitted to the Principal Permittee or the SDRWQCB shall contain the certified perjury statement described in Standard Reporting Requirements in Attachment C section B.9.d.

h. A committee (consisting of no less than three members) shall review all monitoring reports prior to submittal to the SDRWQCB. All review comments shall also be submitted to the SDRWQCB.

i. All monitoring reports shall be submitted in both electronic and paper formats.

j. All monitoring reports shall describe monitoring station locations by latitude and longitude coordinates, frequency of sampling, quality assurance/quality control procedures and sampling and analysis protocols.

k. Monitoring programs and reports shall comply with Section B.7 of Attachment B, as well as Attachment C.

B.7 Standard Monitoring Requirements

a. All monitoring activities shall meet the following requirements:

   1. Monitoring and Records [40 CFR 122.41(j)(1)]

   Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity.

   2. Monitoring and Records [40 CFR 122.41(j)(2)] [California Water Code § 13383(a)]

   The discharger shall retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this Order, and records of all data used to complete the application for this permit, for a period of at least three years from the date of the sample, measurement, report or application. This period may be extended by request of the SDRWQCB at any time.

3. Monitoring and Records [40 CFR 122.21(j)(3)]

Records of monitoring information shall include the information requested in Attachment B and the following:

a. The date, exact place, and time of sampling or measurements;
b. The individual(s) who performed the sampling or measurements;
c. The date(s) analyses were performed;
d. The individual(s) who performed the analyses;
e. The analytical techniques or methods used; and
f. The results of such analyses.

4. Monitoring and Records [40 CFR 122.21(j)(4)]

Monitoring results must be conducted according to test procedures approved under 40 CFR part 136 unless other test procedures have been specified in this Order.

5. Monitoring and Records [40 CFR 122.21(j)(5)]

The Clean Water Act provides that any person who falsifies, tampers with, or knowingly renders inaccurate any monitoring device or method required to be maintained under this Order shall, upon conviction, be punished by a fine of not more than $10,000, or by imprisonment for not more than two years, or both. If a conviction of a person is for a violation committed after a first conviction of such person under this paragraph, punishment is a fine of not more than $20,000 per day of violation, or by imprisonment of not more than four years, or both.

6. Monitoring and Records [40 CFR 122.41(k)(2)]

The Clean Water Act provides that any person who knowingly makes any false statement, representation, or certification in any record or other document submitted or required to be maintained under this permit, including monitoring reports or reports of compliance or non-compliance shall, upon conviction, be punished by a fine of not more than $10,000 per violation, or by imprisonment for not more than six months per violation, or by both.

7. Monitoring Reports [40 CFR 122.41(l)(4)

Monitoring results shall be reported at the intervals specified elsewhere in this Order.

8. Monitoring Reports [40 CFR 122.41(l)(4)(ii)]

If the discharger monitors any pollutant more frequently than required by the permit using test procedures approved under 40 CFR part 136, unless otherwise specified in the Order, the results of this monitoring shall be included in the calculation and reporting of the data submitted in the reports requested by the SDRWQCB.

9. Monitoring Reports [40 CFR 122.41(l)(4)(iii)]

Calculations for all limitations which require averaging of measurements shall utilize an arithmetic mean unless otherwise specified by the SDRWQCB in the Order.

ATTACHMENT C

STANDARD PROVISIONS REPORTING REQUIREMENTS, AND NOTIFICATIONS

A. STANDARD PROVISIONS

1. Duty To Comply [40 CFR 122.41(a)(1)]
   The discharger shall comply with effluent standards or prohibitions established under Section 307(a) of the Clean Water Act for toxic pollutants and with standards for sewage sludge use or disposal established under Section 405(d) of the Clean Water Act within the time provided in the regulations that establish these standards or prohibitions or standards for sewage sludge use or disposal, even if this Order has not yet been modified to incorporate the requirement.

2. Need to Halt or Reduce Activity Not a Defense [40 CFR 122.41(c)]
   It shall not be a defense for the discharger in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this Order. Upon reduction, loss, or failure of a treatment facility, the discharger shall, to the extent necessary to maintain compliance with this Order, control production or all discharges, or both, until the facility is restored or an alternative method of treatment is provided. This provision applies, for example, when the primary source of power of a treatment facility fails, is reduced, or is lost.

3. Duty to Mitigate [40 CFR 122.41(d)]
   The discharger shall take all reasonable steps to minimize or prevent any discharge or prevent any discharge or sludge use or disposal in violation of this Order which has a reasonable likelihood of adversely affecting human health or the environment.

4. Proper Operation and Maintenance [40 CFR 122.41(e)]
   The discharger shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the discharger to achieve compliance with the conditions of this Order. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures. This provision requires the operation of back-up or auxiliary facilities or similar systems which are installed by the discharger only when the operation is necessary to achieve compliance with the conditions of this Order.

5. Permit Actions [40 CFR 122.41(f)] [California Water Code § 13381]
   This Order may be modified, revoked and reissued, or terminated for cause including, but not limited to, the following:

   a. Violation of any terms or conditions of this Order;
   b. Obtaining this Order by misrepresentation or failure to disclose fully all relevant facts;
   c. A change in any condition that requires either a temporary or permanent reduction or elimination of the authorized discharge; or
   d. A determination that the permitted activity endangers human health or the environment and can only be regulated to acceptable levels by permit modification or termination.

   The filing of a request by the discharger for modification, revocation and reissuance, or termination of this Order, or a notification of planned changes or anticipated noncompliance does not stay any condition of this Order.

6. Property Rights [40 CFR 122.41(g)] [California Water Code §13263(g)]
This Order does not convey any property rights of any sort or any exclusive privilege. The requirements prescribed herein do not authorize the commission of any act causing injury to persons or property, nor protect the discharger from liabilities under federal, state, or local laws, nor create a vested right for the discharger to continue the waste discharge.

7. Inspection and Entry [40 CFR 122.41(i)] [California Water Code § 13267(c)]
The discharger shall allow the SDRWQCB, or an authorized SDRWQCB representative, or an authorized representative of the USEPA (including an authorized contractor acting as a representative of the SDRWQCB or USEPA), upon presentation of credentials and other documents as may be required by law, to:

   a. Enter upon the discharger's premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of this Order;
   b. Have access to and copy, at reasonable times, any records that must be kept under the conditions of this Order;
   c. Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this Order; and
   d. Sample or monitor at reasonable times, for the purposes of assuring compliance with this Order or as otherwise authorized by the Clean Water Act or California Water Code, any substances or parameters at any location.

8. Bypass of Treatment Facilities [40 CFR 122.41(m)]

   a. Definitions

      (1) "Bypass" means the intentional diversion of waste streams from any portion of a treatment facility.

      (2) "Severe property damage" means substantial physical damage to property, damage to the treatment facilities which causes them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production.

   b. Bypass not Exceeding Limitations

      The discharger may allow any bypass to occur which does not cause effluent limitations of this Order or the concentrations of pollutants set forth in Ocean Plan Table A or Table B to be exceeded, but only if it also is for essential maintenance to assure efficient operation. These bypasses are not subject to the provisions of paragraphs c. and d. of this provision.

   c. Notice

      (1) Anticipated bypass. If the discharger knows in advance of the need for a bypass, it shall submit prior notice, if possible, at least ten days before the date of the bypass.
      (2) Unanticipated bypass. The discharger shall submit notice of an unanticipated bypass as required in section B.7 of Attachment C.

d. Prohibition of Bypass

Bypass is prohibited, and the SDRWQCB may take enforcement action against the discharger for bypass, unless:

(1) Bypass was unavoidable to prevent loss of life, personal injury, or severe property damage;

(2) There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate back-up equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass which occurred during normal periods of equipment downtime or preventive maintenance; and

(3) The discharger submitted notices as required under paragraph c. of this section. The SDRWQCB may approve an anticipated bypass, after considering its adverse effects, if the SDRWQCB determines that it will meet the three conditions listed above in paragraph d.(1) of this section.

9. Upset [40 CFR 122.41(n)]

a. Definition "Upset" means an exceptional incident in which there is unintentional and temporary noncompliance with technology based effluent limitations because of factors beyond the reasonable control of the discharger. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation.

b. Effect of an Upset An upset constitutes an affirmative defense to an action brought for noncompliance with such technology based permit effluent limitations if the requirements of paragraph c. of this section are met. No determination made during administrative review of claims that noncompliance was caused by upset, and before an action for noncompliance, is final administrative action subject to judicial review.

c. Conditions Necessary for a Demonstration of Upset A discharger who wishes to establish the affirmative defense of upset shall demonstrate, through properly signed, contemporaneous operating logs, or other relevant evidence that:

(1) An upset occurred and that the discharger can identify the cause(s) of the upset;
(2) The permitted facility was at the time being properly operated;
(3) The discharger submitted notice of the upset as required in section B.7 of Attachment C of this Order; and
(4) The discharger complied with any remedial measures required under Provision A.5. of Attachment C of this Order.

d. Burden of Proof In any enforcement proceeding the discharger seeking to establish the occurrence of an upset has the burden of proof.

10. Other Effluent Limitations and Standards [40 CFR 122.44(b)(1)]
If any toxic effluent standard or prohibition (including any schedule of compliance specified in such effluent standard or prohibition) is promulgated under Section 307(a) of the Clean Water Act for a toxic pollutant which is present in the discharge and that standard or prohibition is more stringent than any limitation on the pollutant in this Order, the SDRWQCB may institute proceedings under these regulations to modify or revoke and reissue the Order to conform to the toxic effluent standard or prohibition.

11. The discharger shall take all reasonable steps to minimize or correct any adverse impact on the environment resulting from noncompliance with this Order, including such accelerated or additional monitoring as may be necessary to determine the nature and impact of the noncomplying discharge.

12. The provisions of this Order are severable, and if any provision of this Order, or the application of any provision of this Order to any circumstances, is held invalid, the application of such provision to other circumstances, and the remainder of this Order, shall not be affected thereby.

13. The discharger shall comply with any interim effluent limitations as established by addendum, enforcement action, or revised waste discharge requirements which have been, or may be, adopted by this SDRWQCB.

B. REPORTING REQUIREMENTS

1. Duty to Reapply [40 CFR 122.41(b)] This Order expires on **February 13, 2007**. If the discharger wishes to continue any activity regulated by this Order after the expiration date of this Order, the discharger must apply for and obtain new waste discharge requirements. The discharger must file a Report of Waste Discharge in accordance with Title 23, California Code of Regulations not later than **180 days** in advance of the expiration date of this Order as application for issuance of new waste discharge requirements.

2. Duty to Provide Information [40 CFR 122.41(h)] The discharger shall furnish to the SDRWQCB, SWRCB, or USEPA, within a reasonable time, any information which the SDRWQCB, SWRCB, or USEPA may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this Order, or to determine compliance with this Order. The discharger shall also furnish to the SDRWQCB, SWRCB, or USEPA, upon request, copies of records required to be kept by this Order.

3. Planned Changes [40 CFR 122.41(l)(1)] The discharger shall give notice to the SDRWQCB as soon as possible of any planned physical alterations or additions to the permitted facility. Notice is required only when:

    a. The alteration or addition to a permitted facility may meet one of the criteria for determining whether a facility is a new source in 40 CFR Part 122.29(b);

    b. The alteration or addition could significantly change the nature or increase the quantity of pollutants discharged. This notification applies to pollutants which are subject neither to effluent limitations in this Order, nor to notification requirements under 40 CFR 122.42(a)(l); or

    c. The alteration or addition results in a significant change in the discharger's sludge use or disposal practices, and such alteration, addition, or change may justify the application of conditions in this Order that are different from or absent in the existing Order, including notification of additional use or disposal sites not reported during the permit application process or not reported pursuant to an approved land application plan.

4. Anticipated Non-Compliance [40 CFR 122.41(l)(2)] The discharger shall give advance notice to the SDRWQCB of any planned changes in the permitted facility or activity which may result in noncompliance with the requirements of this Order.

5. Transfers [40 CFR 122.41(l)(3)] This Order is not transferable to any person except after notice to the SDRWQCB. The SDRWQCB may require modification or revocation and reissuance of this Order to change the name of the discharger and incorporate such other requirements as may be necessary under the Clean Water Act or the California Water Code in accordance with the following:

   a. Transfers by Modification [40 CFR 122.61(a)]
   Except as provided in paragraph b. of this reporting requirement, this Order may be transferred by the discharger to a new owner or operator only if this Order has been modified or revoked and reissued, or a minor modification made to identify the new discharger and incorporate such other requirements as may be necessary under the Clean Water Act or California Water Code.

   b. Automatic Transfers [40 CFR 122.61(b)]
   As an alternative to transfers under paragraph a. of this reporting requirement, any NPDES permit may be automatically transferred to a new discharger if:

      (1) The current discharger notifies the SDRWQCB at least 30 days in advance of the proposed transfer date in paragraph b.(2) of this reporting requirement;

      (2) The notice includes a written agreement between the existing and new dischargers containing a specific date for transfer of permit responsibility, coverage, and liability between them; and

      (3) The SDRWQCB does not notify the existing discharger and the proposed new discharger of his or her intent to modify or revoke and reissue the Order. A modification under this subparagraph may also be a minor modification under 40 CFR Part 122.63. If this notice is not received, the transfer is effective on the date specified in the agreement mentioned in paragraph b.(2) of this reporting requirement.

6. Twenty-four Hour Reporting [40 CFR 122.41(l)(6)]
   Each Copermittee shall develop and submit criteria by which to evaluate events of non-compliance to determine whether they pose a threat to human or environmental health. These criteria shall be submitted in the Jurisdictional Urban Runoff Management Program Document and Annual Reports for SDRWQCB review. Using these criteria the discharger shall report any noncompliance with this Order or any noncompliance that may endanger human health or environmental health. Any information shall be provided orally to the SDRWQCB within **24 hours** from the time the discharger becomes aware of the circumstances. A written description of any noncompliance shall be submitted to the SDRWQCB within **five days** of such an occurrence and contain a description of the noncompliance and its cause; the period of noncompliance, including exact dates and times, and if the noncompliance has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent recurrence of the noncompliance. The following shall be included as information which must be reported within 24 hours under this reporting requirement:

   a. Any unanticipated bypass which exceeds any effluent limitation in this Order;

   b. Any discharge of treated or untreated wastewater, including reclaimed or recycled wastewater, resulting from pipeline breaks, obstruction, surcharge or any other circumstance;

   c. Any discharge or spill of raw or potable water not authorized by this order or resulting from pipeline breaks, obstruction, surcharge or any other circumstance;

d. Any upset which exceeds any effluent limitation in this Order;

e. Any spill or discharge of non-storm water not authorized by this Order. Non-storm water discharges not prohibited by the Copermittees pursuant to Section B of this Order need not be reported under this section; and

f. Any violation of this Order.

7. Other Non-Compliance [40 CFR 122.41(l)(7)]
The discharger shall report all instances of noncompliance not reported elsewhere under other sections of this Order at the time annual reports are submitted. The reports shall contain the information listed in part B.6 of Attachment C of this Order.

8. Other Information [40 CFR 122.41(l)(8)]
Where the discharger becomes aware that it failed to submit any relevant facts in a Report of Waste Discharge, or submitted incorrect information in a Report of Waste Discharge, or in any report to the SDRWQCB, it shall promptly submit such facts or information.

9. Signatory Requirements [40 CFR 122.41(k)(1) and 40 CFR 122.22]
All applications, reports, or information submitted to the SDRWQCB shall be signed and certified.

a. All Reports of Waste Discharge shall be signed as follows:

(1) For a corporation: by a responsible corporate officer. For the purpose of this section, a responsible corporate officer means: (a) a president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy- or decision-making functions for the corporation; or (b) the manager of one or more manufacturing, production, or operating facilities employing more than 250 persons or having gross annual sales or expenditures exceeding $25 million (in second-quarter 1980 dollars), if authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures.

(2) For a partnership or sole proprietorship: by a general partner or the proprietor, respectively; or

(3) For a municipality, State, Federal or other public agency: by either a principal executive officer or ranking elected official. For purposes of this section, a principal executive officer of a Federal agency includes: (a) the chief executive officer of the agency; or (b) a senior executive officer having responsibility for the overall operations of a principal geographic unit of the agency (e.g., Regional Administrators of USEPA).

b. All reports required by this Order, and other information requested by the SDRWQCB shall be signed by a person described in paragraph a. of this reporting requirement,

or by a duly authorized representative of that person. A person is a duly authorized representative only if:

(1) The authorization is made in writing by a person described in paragraph a. of this reporting requirement;

(2) The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity, such as the position of

plant manager, operator of a well or a well field, superintendent, position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters for the company. (A duly authorized representative may thus be either a named individual or any individual occupying a named position.); and,

(3) The written authorization is submitted to the SDRWQCB.

c. If an authorization under paragraph b. of this reporting requirement is no longer accurate because a different individual or position has responsibility for the overall operation of the facility, a new authorization satisfying the requirements of paragraph b. of this reporting requirement must be submitted to the SDRWQCB prior to or together with any reports, information, or applications to be signed by an authorized representative.

d. Any person signing a document under paragraph a. or b. of this reporting requirement shall make the following certification:

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

10. Except for data determined to be confidential under 40 CFR Part 2, all reports prepared in accordance with the terms of this Order shall be available for public inspection at the offices of the SDRWQCB. As required by the Clean Water Act, Reports of Waste Discharge, this Order, and effluent data shall not be considered confidential.

11. The discharger shall submit reports and provide notifications as required by this Order to the following:

DAVE GIBSON
NORTHERN WATERSHED PROTECTION UNIT
CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN DIEGO REGION
9174 SKY PARK COURT, SUITE 100
SAN DIEGO CA 92123-4340
Telephone: (858) 467-4387 Fax: (858) 571-6972

EUGENE BROMLEY
US ENVIRONMENTAL PROTECTION AGENCY
REGION IX
PERMITS ISSUANCE SECTION (W-5-1)
75 HAWTHORNE STREET
SAN FRANCISCO CA 94105

12. Unless otherwise directed, the discharger shall submit three copies of each report required under this Order to the SDRWQCB and one copy to USEPA.

C. NOTIFICATIONS

1. California Water Code Section 13263(g)
   No discharge of waste into the waters of the state, whether or not such discharge is made pursuant to waste discharge requirements, shall create a vested right to continue such discharge. All discharges of waste into waters of the state are privileges, not rights.

2. The SDRWQCB has, in prior years, issued a limited number of individual NPDES permits for non-storm water discharges to municipal storm water conveyance systems. The SDRWQCB or SWRCB may in the future, upon prior notice to the Copermittee(s), issue an NPDES permit for any non-storm water discharge (or class of non-storm water discharges) to a municipal storm water conveyance system. Copermittees may prohibit any non-storm water discharge (or class of non-storm water discharges) to a municipal storm water conveyance system that is authorized under such separate NPDES permits.

3. Enforcement Provisions [40 CFR 122.41(a)(2)] [California Water Code §§ 13385 and 13387]
   The Clean Water Act provides that any person who violates section 301, 302, 306, 307, 308, 318 or 405 of the Act, or any condition or limitation of this Order, is subject to a civil penalty not to exceed $25,000 per day for each violation. The Clean Water Act provides that any person who negligently violates sections 301, 302, 306, 307, 308, 318, or 405 of the Act, or any condition or limitation of this Order, is subject to criminal penalties of $2,500 to $25,000 per day of violation, or imprisonment of not more than one year, or both. In the case of a second or subsequent conviction for a negligent violation, a person shall be subject to criminal penalties of not more than $50,000 per day of violation, or by imprisonment of not more than two years, or both. Any person who knowingly violates such sections, or such conditions or limitations is subject to criminal penalties of $5,000 to $50,000 per day of violation, or imprisonment for not more than three years, or both. In the case of a second or subsequent conviction for a knowing violation, a person shall be subject to criminal penalties of not more than $100,000 per day of violation, or imprisonment of not more than six years, or both. Any person who knowingly violates section 301, 302, 303, 306, 307, 308, 318 or 405 of the Act, or any condition or limitation of this Order, and who knows at that time that he or she thereby places another person in imminent danger of death or serious bodily injury, shall, upon conviction, be subject to a fine of not more than $250,000 or imprisonment of not more than 15 years, or both. In the case of a second or subsequent conviction for a knowing endangerment violation, a person shall be subject to a fine of not more than $500,000 or by imprisonment of not more than 30 years, or both. An organization, as defined in section 309(c)(3)(B)(iii) of the Clean Water Act, shall, upon conviction of violating the imminent danger provision, be subject to a fine of not more than $1,000,000 and can be fined up to $2,000,000 for second or subsequent convictions.

4. Except as provided in Standard Provisions A.10. and A.11. in Attachment C of this Order, nothing in this Order shall be construed to relieve the discharger from civil or criminal penalties for noncompliance.

5. Nothing in this Order shall be construed to preclude the institution of any legal action or relieve the discharger from any responsibilities, liabilities, or penalties to which the discharger is or may be subject to under Section 311 of the Clean Water Act.

6. Nothing in this Order shall be construed to preclude institution of any legal action or relieve the discharger from any responsibilities, liabilities, or penalties established pursuant to any applicable State law or regulation under authority preserved by Section 510 of the Clean Water Act.

7. This Order shall become effective on **February 13, 2002**, provided the USEPA Regional Administrator has no objection. If the Regional Administrator objects to its issuance, this Order shall not become effective until such objection is withdrawn.

8. This Order supersedes Order No. 96-03 upon the effective date of this Order.

ATTACHMENT D

GLOSSARY

Beneficial Uses - The uses of water necessary for the survival or well being of man, plants, and wildlife. These uses of water serve to promote the tangible and intangible economic, social, and environmental goals "Beneficial Uses" of the waters of the State that may be protected against include, but are not limited to, domestic, municipal, agricultural and industrial supply; power generation; recreation; aesthetic enjoyment; navigation; and preservation and enhancement of fish, wildlife, and other aquatic resources or preserves. Existing beneficial uses are uses that were attained in the surface or ground water on or after November 28, 1975; and potential beneficial uses are uses that would probably develop in future years through the implementation of various control measures. "Beneficial Uses" are equivalent to "Designated Uses" under federal law. [California Water Code Section 13050(f)].

Best Available Technology (BAT) – BAT is the acronym for best available technology economically achievable. BAT is the technology-based standard established by congress in CWA section 402(p)(3)(A) for industrial dischargers of storm water. Technology-based standards establish the level of pollutant reductions that dischargers must achieve, typically by treatment or by a combination of treatment and best management practices, or BMPs. For example, secondary treatment (or the removal of 85% suspended solids and BOD) is the BAT for suspended solid and BOD removal from a sewage treatment plant. BAT generally emphasizes treatment methods first and pollution prevention and source control BMPs secondarily.

The best economically achievable technology that will result in reasonable further progress toward the national goal of eliminating the discharge of all pollutants, as determined in accordance with regulations issued by the Environmental Protection Agency Administrator. Factors relating to the assessment of best available technology shall take into account the age of equipment and facilities involved, the process employed, the engineering aspects of the application of various types of control techniques, process changes, the cost of achieving such effluent reduction, non-water quality environmental impact (including energy requirements), and such other factors as the permitting authority deems appropriate.

Best Conventional Technology (BCT) – BCT is an acronym for Best Conventional Technology. BCT is the treatment techniques, processes and procedure innovations, operating methods that eliminate amounts of chemical, physical, and biological characteristics of pollutant constituents to the degree of reduction attainable through the application of the best management practices to the maximum extent practicable.

Best Management Practices - Best Management Practices (BMPs) are defined in 40 CFR 122.2 as schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the pollution of waters of the United States. BMPs also include treatment requirements, operating procedures and practices to control plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage. In the case of municipal storm water permits, BMPs are typically used in place of numeric effluent limits.

Bioaccumulate - The progressive accumulation of contaminants in the tissues of organisms through any route including respiration, ingestion, or direct contact with contaminated water, sediment, pore water, or dredged material to a higher concentration than in the surrounding environment. Bioaccumulation occurs with exposure and is independent of the tropic level.

Bioassessment - The use of biological community information to evaluate the biological integrity of a water body and its watershed. With respect to aquatic ecosystems, bioassessment is the collection and analysis of samples of the benthic macroinvertebrate community together with physical/habitat quality measurements associated with the sampling site and the watershed to evaluate the biological condition (i.e. biological integrity) of a water body.

Bioconcentration – A process by which there is a net accumulation of a chemical directly from water into aquatic organisms resulting from simultaneous uptake and elimination by gill or epithelial tissue. Bioconcentration differs from bioaccumulation in that bioaccumulation refers to the progressive concentration of contaminants in the tissues of organisms through multiple pathways.

Biocriteria - Under the Clean Water Act, numerical values or narrative expressions that define a desired biological condition for a water body that are legally enforceable. The U.S. EPA defines biocriteria as: "numerical values or narrative expressions that describe the reference biological integrity of aquatic communities inhabiting waters of a given designated aquatic life use…(that)…describe the characteristics of water body segments least impaired by human activities."

Biological Integrity - Defined in Karr J.R. and D.R. Dudley. 1981. Ecological perspective on water quality goals. Environmental Management 5:55-68 as: "A balanced, integrated, adaptive community of organisms having a species composition, diversity, and functional organization comparable to that of natural habitat of the region." Also referred to as ecosystem health.

Biomagnication – The transfer and progressive increase in tissue concentrations of a contaminant along the food chain. Because some pollutants can be transferred to higher trophic levels, carnivores at the top of the food chain, such as predatory fish, birds, and mammals (including humans), obtain most of their pollution burden from aquatic ecosystems by ingestion. Thus, although such pollutants may only be present in receiving waters in low concentrations, they can have a significant impact to the integrity of the ecosystem through biomagnification.

Clean Water Act Section 402(p) - [33 USC 1342(p)] is the federal statute requiring municipal and industrial dischargers to obtain NPDES permits for their discharges of storm water.

Clean Water Act Section 303(d) Water Body - is an impaired water body in which water quality does not meet applicable water quality standards and/or is not expected to meet water quality standards, even after the application of technology based pollution controls required by the CWA. The discharge of urban runoff to these water bodies by the Copermittees is significant because these discharges can cause or contribute to violations of applicable water quality standards.

Contamination - As defined in the Porter-Cologne Water Quality Control Act, contamination is "an impairment of the quality of waters of the state by waste to a degree which creates a hazard to the public health through poisoning or through the spread of disease. 'Contamination' includes any equivalent effect resulting from the disposal of waste whether or not waters of the state are affected."

Designated Waste - Designated waste is defined as a "nonhazardous waste which consists of pollutants which, under ambient environmental conditions at the waste management unit, could be released at concentrations in excess of applicable water quality objectives, or which could cause degradation of waters of the state." [CCR Title 27, Chapter 3, Subchapter 2, Article 2, Section 20210; WC Section 13173]

Effluent Limitations - Limitations on the volume of each waste discharge, and the quantity and concentrations of pollutants in the discharge. The limitations are designed to ensure that the

discharge does not cause water quality objectives to be exceeded in the receiving water and does not adversely affect beneficial uses.

Effluent limitations are limitations of the quantity and concentrations of pollutants in a discharge. The limitations are designed to ensure that the discharge does not cause water quality objectives to be exceeded in the receiving water and does not adversely affect beneficial uses. In other words, an effluent limit is the maximum concentration of a pollutant that a discharge can contain. To meet effluent limitations, the effluent typically must undergo one or more forms of treatment to remove pollutants in order to lower the pollutant concentration below the limit. Effluent limits are typically numeric (e.g., 10 mg/l), but can also be narrative (e.g., no toxics in toxic amounts).

Erosion – When land is diminished or warn away due to wind, water, or glacial ice. Often the eroded debris (silt or sediment) becomes a pollutant via storm water runoff. Erosion occurs naturally but can be intensified by land clearing activities such as farming, development, road building, and timber harvesting.

Grading - The cutting and/or filling of the land surface to a desired slope or elevation.

Hazardous Waste - Hazardous waste is defined as “any waste which, under Section 600 of Title 22 of this code, is required to be managed according to Chapter 30 of Division 4.5 of Title 22 of this code.” [CCR Title 22, Division 4.5, Chapter 11, Article 1]

Illicit Discharge - Any discharge to a municipal separate storm sewer that is not composed entirely of storm water except discharges pursuant to a NPDES permit (other than the NPDES permit for discharges form the municipal separate storm sewer) and discharges resulting from fire fighting activities.

Inert Waste - Inert waste is defined as one that “does not contain hazardous waste or soluble pollutants at concentrations in excess of applicable water quality objectives, and does not contain significant quantities of decomposable waste.” [CCR Title 27, Chapter 3, Subchapter 2, Article 2, Section 20230]

MEP – MEP is the acronym for Maximum Extent Practicable. MEP is the technology-based standard established by Congress in CWA section 402(p)(3)(B)(iii) that municipal dischargers of storm water (MS4s) must meet. Technology-based standards establish the level of pollutant reductions that dischargers must achieve, typically by treatment or by a combination of treatment and best management practices (BMPs). MEP generally emphasizes pollution prevention and source control BMPs primarily (as the first line of defense) <u>in combination</u> with treatment methods serving as a backup (additional line of defense). MEP considers economics and is generally, but not necessarily, less stringent than BAT. A definition for MEP is not provided either in the statute or in the regulations. Instead the definition of MEP is dynamic and will be defined by the following process over time: municipalities propose their definition of MEP by way of their Urban Runoff Management Plan. Their total collective and individual activities conducted pursuant to the Urban Runoff Management Plan becomes their proposal for MEP as it applies both to their overall effort, as well as to specific activities (e.g., MEP for street sweeping, or MEP for municipal separate storm sewer system maintenance). In the absence of a proposal acceptable to the SDRWQCB, the SDRWQCB defines MEP.

In a memo dated February 11, 1993, entitled "Definition of Maximum Extent Practicable," Elizabeth Jennings, Senior Staff Counsel, SWRCB addressed the achievement of the MEP standard as follows:

> “*To achieve the MEP standard, municipalities must employ whatever Best Management Practices (BMPs) are technically feasible (i.e., are likely to be effective) and are not cost*

prohibitive. The major emphasis is on technical feasibility. Reducing pollutants to the MEP means choosing effective BMPs, and rejecting applicable BMPs only where other effective BMPs will serve the same purpose, or the BMPs would not be technically feasible, or the cost would be prohibitive. In selecting BMPs to achieve the MEP standard, the following factors may be useful to consider:

a. Effectiveness: Will the BMPs address a pollutant (or pollutant source) of concern?
b. Regulatory Compliance: Is the BMP in compliance with storm water regulations as well as other environmental regulations?
c. Public Acceptance: Does the BMP have public support?
d. Cost: Will the cost of implementing the BMP have a reasonable relationship to the pollution control benefits to be achieved?
e. Technical Feasibility: Is the BMP technically feasible considering soils, geography, water resources, etc?

The final determination regarding whether a municipality has reduced pollutants to the maximum extent practicable can only be made by the Regional or State Water Boards, and not by the municipal discharger. If a municipality reviews a lengthy menu of BMPs and chooses to select only a few of the least expensive, it is likely that MEP has not been met. On the other hand, if a municipal discharger employs all applicable BMPs except those where it can show that they are not technically feasible in the locality, or whose cost would exceed any benefit derived, it would have met the standard. Where a choice may be made between two BMPs that should provide generally comparable effectiveness, the discharger may choose the least expensive alternative and exclude the more expensive BMP. However, it would not be acceptable either to reject all BMPs that would address a pollutant source, or to pick a BMP base solely on cost, which would be clearly less effective. In selecting BMPs the municipality must make a serious attempt to comply and practical solutions may not be lightly rejected. In any case, the burden would be on the municipal discharger to show compliance with its permit. After selecting a menu of BMPs, it is the responsibility of the discharger to ensure that all BMPs are implemented."

Municipal Storm Water Conveyance System – (See Municipal Separate Storm Sewer System or MS4).

Municipal Separate Storm Sewer System (MS4) – MS4 is an acronym for Municipal Separate Storm Sewer System. A Municipal Separate Storm Sewer System is a conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, natural drainage features or channels, modified natural channels, man-made channels, or storm drains): (i) Owned or operated by a State, city town, borough, county, parish, district, association, or other public body (created by or pursuant to State law) having jurisdiction over disposal of sewage, industrial wastes, storm water, or other wastes, including special districts under State law such as a sewer district, flood control district or drainage district, or similar entity, or an Indian tribe or an authorized Indian tribal organization, or designated and approved management agency under section 208 of the CWA that discharges to waters of the United States; (ii) Designated or used for collecting of conveying storm water; (iii) Which is not a combined sewer; (iv) Which is not part of the Publicly Owned Treatment Works (POTW) as defined at 40 CFR 122.2.

Historic and current development make use of natural drainage patterns and features as conveyances for urban runoff. Urban streams used in this manner are part of the municipalities MS4 regardless of whether they are natural, man-made, or partially modified features. In these cases, the urban stream is both an MS4 and a receiving water.

National Pollution Discharge Elimination System (NPDES) - These permits pertain to the discharge of waste to surface waters only. All State and Federal NPDES permits are also WDRs.

Non-hazardous Solid Waste - Non-hazardous solid waste means all putrescible and nonputrescible solid, semi-sold, and liquid wastes, including garbage, trash, refuse, paper, rubbish, ashes, industrial wastes, demolition and construction wastes, abandoned vehicles and parts thereof, discarded home and industrial appliances, manure, vegetable or animal solid and semi-sold wastes and other discarded solid or semi-solid waste; provided that such wastes do not contain wastes which must be managed as hazardous wastes, or wastes which contain soluble pollutants in concentration which exceed applicable water quality objectives or could cause degradation of wasters of the state." [CCR Title 27, Chapter 3, Subchapter 2, Article 2, Section 20220]

Non Point Source (NPS) – Non point source refers to diffuse, widespread sources of pollution. These sources may be large or small, but are generally numerous throughout a watershed. Non Point Sources include but are not limited to urban, agricultural, or industrial areas, roads, highways, construction sites, communities served by septic systems, recreational boating activities, timber harvesting, mining, livestock grazing, as well as physical changes to stream channels, and habitat degradation. NPS pollution can occur year round any time rainfall, snowmelt, irrigation, or any other source of water runs over land or through the ground, picks up pollutants from these numerous, diffuse sources and deposits them into rivers, lakes, and coastal waters or introduces them into ground water.

Non-Storm Water - Non-storm water consists of all discharges to and from a storm water conveyance system that do not originate from precipitation events (i.e., all discharges from a conveyance system other than storm water). Non-storm water includes illicit discharges, non-prohibited discharges, and NPDES permitted discharges. An illicit discharge is defined at 40 CFR 122.26(b)(2) as any discharge to a municipal storm water conveyance system that is not composed entirely of storm water except discharges pursuant to a separate NPDES permit and discharges resulting from emergency fire fighting activities.

Nuisance - As defined in the Porter-Cologne Water Quality Control Act a nuisance is "anything which meets all of the following requirements: 1) Is injurious to health, or is indecent, or offensive to the senses, or an obstruction to the free use of property, so as to interfere with the comfortable enjoyment of life or property. 2) Affects at the same time an entire community or neighborhood, or any considerable number of persons, although the extent of the annoyance or damage inflicted upon individuals may be unequal. 3) Occurs during, or as a result of, the treatment or disposal of wastes."

Numeric effluent limitations - The typical method by which effluent limits are prescribed for pollutants in waste discharge requirements implementing the federal NPDES regulations. When numeric effluent limits are met at the "end-of-pipe", the effluent discharge generally will not cause water quality standards to be exceeded in the receiving waters (i.e., water quality standards will also be met).

Person - A person is defined as an individual, association, partnership, corporation, municipality, State or Federal agency, or an agent or employee thereof. [40 CFR 122.2].

Point Source - Any discernible, confined, and discrete conveyance, including, but not limited to, any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operations, landfill leachate collection systems, vessel, or other floating craft from which pollutants are or may be discharged.

Pollution - As defined in the Porter-Cologne Water Quality Control Act, pollution is "the alteration of the quality of the waters of the State by waste, to a degree that unreasonably affects the either of the following: A) The waters for beneficial uses; or 2) Facilities that serve these beneficial uses." Pollution may include contamination.

Pollutant - A pollutant is broadly defined as any agent that may cause or contribute to the degradation of water quality such that a condition of pollution or contamination is created or aggravated.

Pollution Prevention - Pollution prevention is defined as practices and processes that reduce or eliminate the generation of pollutants, in contrast to source control, treatment, or disposal.

Post-Construction BMPs - A subset of BMPs including structural and non-structural controls which detain, retain, filter, or educate to prevent the release of pollutants to surface waters during the final functional life of development.

Pre-Development Runoff Conditions - The runoff conditions that exist onsite immediately before the planned development activities occur. This definition is not intended to be interpreted as that period before any human-induces land activities occurred. This definition pertains to redevelopment as well as initial development.

Receiving Water Limitations - Waste discharge requirements issued by the SDRWQCB typically include both: (1) "Effluent Limitations" (or "Discharge Limitations") that specify the technology-based or water-quality-based effluent limitations; and (2) "Receiving Water Limitations" that specify the water quality objectives in the Basin Plan as well as any other limitations necessary to attain those objectives. In summary, the "Receiving Water Limitations" provision is the provision used to implement the requirement of CWA section 301(b)(1)(C) that NPDES permits must include any more stringent limitations necessary to meet water quality standards.

Sediment - Soil, sand, and minerals washed from land into water. Sediment resulting from anthropogenic sources (i.e. human induced land disturbance activities) is considered a pollutant. This Order regulates only the discharges of sediment from anthropogenic sources and does not regulate naturally occurring sources of sediment. Sediment can destroy fish-nesting areas, clog animal habitats, and cloud waters so that sunlight does not reach aquatic plants.

Storm Water - "Storm water" is as defined urban runoff and snowmelt runoff consisting only of those discharges which originate from precipitation events. Storm water is that portion of precipitation that flows across a surface to the storm drain system or receiving waters. Examples of this phenomenon include: the water that flows off a building's roof when it rains (runoff from an impervious surface); the water that flows into streams when snow on the ground begins to melt (runoff from a semi-pervious surface); and the water that flows from a vegetated surface when rainfall is in excess of the rate at which it can infiltrate into the underlying soil (runoff from a pervious surface). When all factors are equal, runoff increases as the perviousness of a surface decreases. During precipitation events in urban areas, rain water picks up and transports pollutants through storm water conveyance systems, and ultimately to waters of the United States.

Toxicity - Adverse responses of organisms to chemicals or physical agents ranging from mortality to physiological responses such as impaired reproduction or growth anomalies). The water quality objectives for toxicity provided in the Water Quality Control Plan, San Diego Basin, Region 9, (Basin Plan), state in part…*"All waters shall be free of toxic substances in concentrations that are toxic to, or that produce detrimental physiological responses in human, plant, animal, or aquatic life….The survival of aquatic life in surface waters subjected to a waste*

discharge or other controllable water quality factors, shall not be less than that for the same water body in areas unaffected by the waste discharge"…. Urban runoff discharges from MS4s are considered toxic when (1) the toxic effect observed in an acute toxicity test exceeds zero Toxic Units Acute (Tua=0); or (2) the toxic effect observed in a chronic toxicity test exceeds one Toxic Unit Chronic (Tuc=1). Urban runoff discharges from MS4s often contain pollutants that cause toxicity.

Total Maximum Daily Load (TMDL) - The TMDL is the maximum amount of a pollutant that can be discharged into a water body from all sources (point and non-point) and still maintain water quality standards. Under Clean Water Act section 303(d), TMDLs must be developed for all water bodies that do not meet water quality standards after application of technology-based controls.

Urban Runoff - Urban runoff is defined as all flows in a storm water conveyance system and consists of the following components: (1) storm water (wet weather flows) and (2) non-storm water illicit discharges (dry weather flows).

Waste - As defined in California Water Code Section 13050(d), "waste includes sewage and any and all other waste substances, liquid, solid, gaseous, or radioactive, associated with human habitation, or of human or animal origin, or from any producing, manufacturing, or processing operation, including waste placed within containers of whatever nature prior to, and for purposes of, disposal."

Article 2 of CCR Title 23, Chapter 15 (Chapter 15) contains a waste classification system which applies to solid and semi-solid waste which cannot be discharged directly or indirectly to water of the state and which therefore must be discharged to land for treatment, storage, or disposal in accordance with Chapter 15. There are four classifications of waste (listed in order of highest to lowest threat to water quality): hazardous waste, designated waste, nonhazardous solid waste, and inert waste.

Water Quality Objective - Numerical or narrative limits on constituents or characteristics of water designated to protect designated beneficial uses of the water. [California Water Code Section 13050 (h)]. California's water quality objectives are established by the State and Regional Water Boards in the Water Quality Control Plans.

As stated in the Porter-Cologne Requirements for discharge (CWC 13263): "(Waste discharge) requirements shall implement any relevant water quality control plans that have been adopted, and shall take into consideration the beneficial uses to be protected, the water objectives reasonably required for that purpose, other waste discharges, the need to prevent nuisance, and the provisions of Section 13241."

A more comprehensive list of legal authority containing water quality objectives applicable to this Order can be found in Finding 37 and in Section VII Directives Discussion Underlying Broad Legal Authority for Order R9-2002-0001 pp. 76-78.

Numeric or narrative limits for pollutants or characteristics of water designed to protect the beneficial uses of the water. In other words, a water quality objective is the maximum concentration of a pollutant that can exist in a receiving water and still generally ensure that the beneficial uses of the receiving water remain protected (i.e., not impaired). Since water quality objectives are designed specifically to protect the beneficial uses, when the objectives are violated the beneficial uses are, by definition, no longer protected and become impaired. This is a fundamental concept under the Porter Cologne Act. Equally fundamental is Porter Cologne's definition of pollution. A condition of <u>pollution</u> exists when the water quality needed to support designated beneficial uses has become unreasonably affected or impaired; in other words, when

the water quality objectives have been violated. These underlying definitions (regarding beneficial use protection) are the reason why all waste discharge requirements implementing the federal NPDES regulations require compliance with water quality objectives. (Water quality objectives are also called water quality criteria in the Clean Water Act.)

Water Quality Standards - are defined as the beneficial uses (e.g., swimming, fishing, municipal drinking water supply, etc.,) of water and the water quality objectives necessary to protect those uses.

Waters of the State - Any water, surface or underground, including saline waters within the boundaries of the State [California Water Code Section 13050 (e)]. The definition of the Waters of the State is broader than that for the Waters of the United States in that all water in the State is considered to be a Waters of the State regardless of circumstances or condition. Under this definition, a Municipal Separate Storm Sewer System (MS4) is always considered to be a Waters of the State.

Waters of the United States - Waters of the United States can be broadly defined as navigable surface waters and all tributary surface waters to navigable surface waters. Groundwater is not considered to be a Waters of the United States.

As defined in the 40 CFR 122.2, the Waters of the U.S. are defined as: **"(a) All waters, which are currently used, were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide;** (b) All interstate waters, including interstate "wetlands;" (c) All other waters such as intrastate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, "wetlands," sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds the use, degradation or destruction of which would affect or could affect interstate or foreign commerce including any such waters: (1) Which are or could be used by interstate or foreign travelers for recreational or other purposes; (2) From which fish or shellfish are or could be taken and sold in interstate or foreign commerce; or (3) Which are used or could be used for industrial purposes by industries in interstate commerce; (d) All impoundments of waters otherwise defined as waters of the United States under this definition**: (e) Tributaries of waters identified in paragraphs (a) through (d) of this definition;** (f) The territorial seas; and (g) "Wetlands" adjacent to waters (other than waters that are themselves wetlands) identified in paragraphs (a) through (f) of this definition. Waters of the United States do not include prior converted cropland. Notwithstanding the determination of an area's status as prior converted cropland by any other federal agency, for the purposes of the Clean Water Act, the final authority regarding Clean Water Act jurisdiction remains with the EPA."

Watershed - That geographical area which drains to a specified point on a water course, usually a confluence of streams or rivers (also known as drainage area, catchment, or river basin).

ATTACHMENT E

DRY WEATHER MONITORING PROGRAM SPECIFICATIONS - URBAN RUNOFF

E.1 Dry Weather Monitoring Program

Each Copermittees shall review and revise as necessary its Dry Weather Monitoring Program to comply with section F.5 of this Order. The Dry Weather Monitoring Program for each Copermittee shall meet or exceed the specifications of this Attachment. The objectives of the Dry Weather Monitoring Program are:

- Assessing compliance with Order No. R9-2002-0001;
- Detect and eliminate illicit discharges and illegal connections to the MS4; and
- Characterize urban runoff within the MS4 system with respect to water quality constituents that may cause or contribute to exceedances of receiving water quality objectives when discharged to receiving waters.

E.2 Dry Weather Monitoring Program Document

Based upon a review of its Detection/Elimination of Illegal Discharges and Illicit Connections Program, each Copermittee shall revise or develop a Dry Weather Monitoring Program Document that meets or exceeds the specifications listed in section E.4 of this Attachment. The Dry Weather Monitoring Program shall be designed and implemented to address the objectives listed in section E.1 of this Attachment. Each Copermittee shall submit its Dry Weather Monitoring Program to the Principal Permittee as part of its Jurisdictional Urban Runoff Management Program Document on the date prescribed by the Principal Permittee. The Principal Permittee shall collectively submit the dry weather monitoring maps and procedures to the SDRWQCB within **365** days of adoption of this Order.

E.3 Implementation of the Dry Weather Monitoring Program

Each Copermittee shall implement its Dry Weather Monitoring Program by May 1, 2003. Following the adoption of this Order and prior to implementation of the Dry Weather Monitoring Program under the Jurisdictional URMP, each Copermittee shall continue to implement the Illicit Discharge and Illegal Connection programs and commitments described in the Orange County Water Quality Monitoring Program (99-04 Plan) and the proposed Drainage Area Management Plan (DAMP).

E.4 Dry Weather Monitoring Program Specifications

Each Copermittee shall develop or revise its Dry Weather Monitoring Program to meet or exceed the following requirements:

a. <u>Develop MS4 Map:</u> Each Copermittee shall develop or obtain an up-to-date labeled map of its entire municipal separate storm sewer system (MS4) and the corresponding drainage watersheds within its jurisdiction. The use of a Geographic Information System (GIS) is highly recommended, but not required. The accuracy of the MS4 map shall be confirmed and updated at least annually during monitoring activities.

b. Monitoring Stations: Based upon a review of its past Dry Weather Monitoring Programs, each Copermittee shall select dry weather monitoring stations within its jurisdiction to be monitored in the Dry Weather Monitoring Program.

(1) Each Copermittee shall develop or revise its program to describe the rationale used to determine the number and locations of stations necessary to comply with the Order.
(2) Each Copermittee shall confirm that each major drainage area within its jurisdiction contains at least one station.
(3) Stations shall be either major outfalls or other outfall points (or any other point of access such as manholes) located throughout the MS4 to provide adequate coverage of the entire MS4 system.
(4) Each Copermittee shall clearly identify each dry weather monitoring station on its MS4 Map as either a separate GIS layer or a map overlay hereafter referred to as a Dry Weather Monitoring Stations Map.

c. Determining Sampling Frequency: Dry weather analytical and field screening monitoring shall be conducted at each identified station at least twice between May 1st and September 30th of each year or as more frequently as the Copermittee determines is necessary to comply with the requirements of Section F.5 of the Order.

(1) Each Copermittee shall develop or revise written procedures that describe the criteria and process used to determine the number and frequency of inspections, field screening and analytical monitoring to be performed.
(2) Any changes in Dry Weather Monitoring inspection or sampling frequency shall be described and reported in detail annually in the Dry Weather Monitoring Report section of the Jurisdictional URMP Annual Report.

d. Develop Dry Weather Analytical Monitoring Procedures: Each Copermittee shall develop or revise written procedures for dry weather analytical and field screening monitoring (consistent with 40 CFR part 136), that shall include field observations, field screening monitoring, and analytical monitoring.

(1) The Dry Weather Monitoring Program shall be designed to emphasize frequent, geographically widespread inspections, monitoring, and follow up investigations to detect illicit discharges and illegal connections. At a minimum, the procedures must be based on or incorporate the following guidelines and criteria:
    (a) At each site inspected or sampled, record general information such as time since last rain, quantity of last rain, site descriptions (i.e., conveyance type, dominant watershed land uses), flow estimation (i.e., width of water surface, approximate depth of water, approximate flow velocity, flow rate), and visual observations (e.g., odor, color, clarity, floatables, deposits/stains, vegetation condition, structural condition, and biology).
    (b) If flow or ponded runoff is observed at a station and there has been at least seventy-two (72) hours of dry weather, shall make observations and collect at least one (1) set of grab samples for field screening and/or analytical testing that meets or exceeds the requirements of section E.4.d.1.d (Field Screening Parameters) or E.4.d.1.e (Analytical Monitoring Parameters).
    (c) Perform field screening analysis on all sites with ponded or flowing water and at a minimum collect samples at no less than 25% of these sites for analytical testing.
    (d) Field Screening Monitoring Parameters: At a minimum, conduct field screening analysis of the following constituents:
        (1) Specific conductance (calculate estimated Total Dissolved Solids).
        (2) Turbidity
        (3) pH

(4) Reactive Phosphorous
(5) Nitrate Nitrogen
(6) Ammonia Nitrogen
(7) Phenol
(8) Surfactants (MBAS)

(e) Analytical Monitoring Parameters: At a minimum, collect samples for analytical laboratory analysis of the following constituents:
(1) Total Hardness
(2) Oil and Grease
(3) Diazinon and Chlorpyrifos
(4) Cadmium (Dissolved)
(5) Copper (Dissolved)
(6) Lead (Dissolved)
(7) Zinc (Dissolved)
(8) Enterococcus Bacteria
(9) Total Coliform Bacteria
(10) Fecal Coliform Bacteria

(f) If the station is dry (no flowing or ponded runoff), make and record all applicable observations and select another station from the list of alternate stations for monitoring.

(2) The Dry Weather Monitoring Program shall include criteria for dry weather inspection, analytical and field screening monitoring results whereby exceedance of the criteria will require follow-up investigations to be conducted to identify the source causing the exceedance of the criteria.
(3) Dry weather analytical and field screening monitoring stations identified to exceed dry weather monitoring criteria for any constituents shall continue to be screened in subsequent years.
(4) The Dry Weather Monitoring Program shall include procedures for source identification follow up investigations in the event of exceedance of dry weather analytical and field screening monitoring result criteria. These procedures shall be consistent with procedures required in section F.5.c. of this Order.
(5) The Dry Weather Monitoring Program shall include procedures to eliminate detected illicit discharges and connections. These procedures shall be consistent with each Copermittee's Illicit Discharge and Elimination component of its Jurisdictional Urban Runoff Management Plan as discussed in section F.5 of this Order.
(6) During monitoring, the accuracy of its MS4 map and shall be confirmed. Correct any inaccuracies in either the MS4 map or the Dry Weather Monitoring Stations Map and resubmit the corrected maps in the next annual report.

E.5 Summarize and Report Dry Weather Monitoring Results

As part of its individual Jurisdictional URMP Annual Report, each Copermittee shall summarize and report on its Dry Weather Monitoring Program results. The data shall be presented in tabular and graphical form. The reporting shall include all inspection, field screening, and analytical monitoring results. Each Copermittee shall also report all follow up and elimination activities for potential illicit discharges and connections undertaken by the Copermittee during that year. Dry weather analytical monitoring reports shall comply with all monitoring and standard reporting requirements in Attachments B and C of Order R9-2002-0001. The Principal Permittee shall submit to the SDRWQCB the individual Dry Weather Monitoring reports as part of the unified Jurisdictional URMP Annual Report prior to November 9, 2003, and every year thereafter.

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN DIEGO REGION

ORDER NO. R9-2002-0020
NPDES NO. CAG679001

GENERAL WASTE DISCHARGE REQUIREMENTS
FOR
DISCHARGES OF HYDROSTATIC TEST WATER AND POTABLE WATER TO SURFACE WATERS AND STORM DRAINS OR OTHER CONVEYANCE SYSTEMS

SAN DIEGO REGION

The California Regional Water Quality Control Board, San Diego Region (hereinafter Regional Board), finds that:

1. Water purveyors, water districts, municipalities, and private entities may discharge hydrostatic test water and/or potable water to various receiving waters within the San Diego Region.

2. Certain constituents potentially contained in hydrostatic test water and potable water discharges threaten to cause or contribute to excursions above narrative and numeric water quality objectives contained in state and federal regulations.

3. Potable water[1] discharges include discharges resulting from repair, maintenance, and disinfection of pipelines, tanks, and reservoirs dedicated to drinking water purveyance and storage. This permit does not apply to potable water being discharged for conveyance with the purpose of transport or delivery to storage (e.g. potable water and/or process water that is returned to a drinking water reservoir).

4. Hydrostatic test water discharges are those discharges resulting from testing of pipelines, storage tanks, storage vessels, and conveyance vessels that are dedicated to drinking water purveyance and storage as well as testing of newly constructed non-drinking water (gas, oil, reclaimed water, etc.) pipelines, tanks, and vessels. This permit does not cover discharges from hydrostatic tests done on used non-drinking water pipelines, tanks, and vessels.

5. The U.S. EPA granted the State of California, hence the State and Regional Boards, the authority to issue general NPDES permits pursuant to 40 CFR Sections 122 and 123.

6. NPDES Regulations, 40 CFR 122.28, provides for the issuance of general permits to regulate discharges of waste which result from similar operations, are the same type of waste, require the same effluent limitations, require similar monitoring, and are more appropriately regulated under a general permit rather than individual permits.

7. This Order shall serve as a general NPDES permit for hydrostatic test water and potable water discharges to surface waters within the San Diego Region and storm drains or other conveyance

[1] For the purpose of this Order, potable water will refer to all water dedicated for municipal supply, including treated and non-treated potable water and raw water (e.g. aqueduct water, reservoir water, and potable well water).

systems tributary thereto pursuant to Section 402 of the federal Clean Water Act, and amendments thereto.

8. To minimize potential impacts from hydrostatic test water and potable water discharges on the beneficial uses of surface waters within the San Diego Region, this Order requires the application of best available technology economically achievable (BAT) for the removal of pollutants commonly found in hydrostatic test water and potable water discharges. Discharges in compliance with BAT-based effluent limitations are not expected to have a significant impact on the beneficial uses of surface waters within the San Diego Region.

9. Hydrostatic test water and potable water discharges covered under Order No. R9-2002-0020 include, but are not limited to, discharges that result from the following:

    - Repair and maintenance of potable water supply pipelines, tanks, reservoirs, etc.;
    - Disinfection of potable water supply pipelines, tanks, reservoirs, etc.; and
    - Hydrostatic testing of pipelines, tanks, vessels, etc.

10. For coverage under this general permit, a discharger is required to submit a complete Notice of Intent Form (see *Attachment A*) together with information described in *Application Requirements, E* and to receive approval from the Executive Officer. If the proposed discharge meets the requirements of this general permit, the Executive Officer will provide the discharger with a written authorization letter (Enrollment Letter) to initiate the discharge.

11. A discharger that has multiple projects during the year, which result in the type of discharges described in *Finding 9* of this Order, can be enrolled under one authorization letter. A summary of the discharges expected over the next 12-month has to be submitted with the initial Notice of Intent (*Attachment A* of this Order) and on a yearly basis thereafter.

12. Hydrostatic test and/or potable water discharges of less than 500,000 gallons per day (GPD) are exempt from the requirements of the Monitoring and Reporting Program No. R9-2002-0020 if all of the following are met: (1) the discharge is directly into a MS4 storm drain[2] or the discharge is directly into a dry/seasonal stream (blue-line streams shown on USGS topographic maps), creek, river, etc. but will percolate and/or evaporate prior to reaching any water that is present downstream; (2) the discharge does not contain pollutants in excess of the levels specified in this Order; and (3) the discharger is implementing a Best Management Practices Plan before, during, and after the discharge.

13. Pursuant to Chapter 7, Article 7, Section 13550 of the Porter-Cologne Water Quality Control Act (Water Code) on preventing waste and unreasonable use of waters of the State, this Regional Board encourages, wherever practical, water conservation and/or reuse of wastewater. To obtain coverage under this general permit, the discharger shall first investigate the feasibility of conservation, land disposal, and/or re-use of the water. Such options, which would not require an NPDES permit, would include discharges to the sanitary sewer system, discharges to land, such as use of the water for soil compaction, dust control, percolation, or irrigation.

[2] Storm drains, for the purpose of this Order, refer to a man-made storm water conveyance system as opposed to channelized or natural drainage, and does not include blue line streams, creeks, or rivers that are either ephemeral or perennial.

14. The Regional Board encourages dischargers and MS4 owners/operators within a common watershed to coordinate their water quality protection activities.

15. This Order is not applicable to discharges of recycled water from any recycled water conveyance system or related appurtenance, unless potable water is used for the initial hydrostatic testing. Discharges of recycled water are regulated under *Recycled Water Permits*, which have been issued to purveying agencies.

16. The Regional Board or the Director of the United States Environmental Protection Agency may require any person requesting authorization to discharge under this Order to apply for and obtain an individual NPDES permit. Cases where an individual NPDES permit may be required include, but are not limited to, those described in 40 CFR 122.28 (b)(3).

17. Effluent limitations and toxic and effluent standards established pursuant to Section 301, 302, 303, 304, 306, 307, and 403 of the federal Clean Water Act (CWA), as amended (33 U.S.C., Section 1251 et seq.), are applicable to discharges regulated under this Order.

18. The State Water Resources Control Board (hereinafter State Board), in the *Water Quality Control Policy for Enclosed Bays and Estuaries of California* (Bays and Estuaries Policy) promulgated water quality principles, quality requirements for waste discharges, discharge prohibitions, and general provisions to prevent water quality degradation and to protect the beneficial uses of waters in the enclosed bays and estuaries of California.

19. Hydrostatic test water and potable water discharges, as limited by Order No. R9-2002-0020, will comply with the Bays and Estuary Policy provided that discharges comply with *Discharge Specification*s, *B*, of this Order.

20. The *Comprehensive Water Quality Control Plan, San Diego Basin (9)* (Basin Plan) contains prohibitions applicable to discharges to surface waters. The applicable prohibitions of the Basin Plan have been incorporated herein as *Attachment B*.

21. The *Water Quality Control Plan for Ocean Waters of California* (Ocean Plan) contains prohibitions applicable to discharges to the ocean in order to protect the beneficial uses of the ocean waters of the State.

22. Hydrostatic test water and potable water discharges, as limited by Order No. R9-2002-0020, will comply with the Ocean Plan provided that discharges comply with *Discharge Specifications, B*, of this Order.

23. The U.S. EPA promulgated the final California Toxic Rule (CTR) on May 18, 2000, as required by Section 303(c)(2)(B) of the federal Clean Water Act. The CTR regulations, codified in 40 CFR 131.38, establish numeric criteria for water quality standards for priority toxic pollutants for the State of California.

24. The *Policy for Implementation of Toxic Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California* (Implementation Policy) provides guidance for the development of effluent limits for priority toxic pollutants that will be consistent with water quality criteria for such pollutants promulgated by the U.S. EPA in 40 CFR 131.38.

25. The CTR and the Implementation Policy are applicable to hydrostatic test water and/or potable water discharges.

26. On January 3, 2002 the San Diego County Water Authority (SDCWA) submitted to the Regional Board analytical results of testing conducted on potable water discharged from their distribution system during a routine maintenance project. The data was evaluated pursuant to the Implementation Policy. The results indicated that no limits for priority toxic pollutants are necessary.

27. The Regional Board considers the CTR analysis results as being representative of the potable water distributed in the San Diego Region.

28. Pursuant to 40 CFR 131.12 and State Board Resolution No. 68-16, *Statement of Policy with Respect to Maintaining High Quality of Waters in California* (collectively "Antidegradation Policies"), antidegradation analysis is not necessary since Order No. R9-2002-0020 protects existing instream water uses and the level of water quality necessary to protect the existing uses shall be maintained and protected.

29. The requirements contained in this Order are consistent with and are established by considering, all water quality control policies, plans, and regulations mentioned above and, if the requirements are met, will protect and maintain the beneficial uses of the receiving waters.

30. Discharges covered under this General Permit are not expected to cause toxicity, therefore no acute or chronic toxicity limits are specified in this Order.

31. This general permit is exempt from the requirement for preparation of environmental documents under the California Environmental Quality Act (Public Resources Code, Division 13, Chapter 3, Section 21000 et seq.) in accordance with the California Water Code, Section 13389.

32. The Regional Board, in establishing the requirements contained herein, considered factors including, but not limited to, the following:

    a. Beneficial uses, such as estuary and wildlife habitats, to be protected and the water quality objectives reasonably required for that purpose;

    b. The need to prevent nuisance, such as obstruction to the free use of property;

    c. Environmental characteristics of the waters under consideration;

    d. The need to develop and use recycled water; and

    e. Water quality conditions that could reasonably be achieved through the coordinated control of all factors that affect water quality in the area.

33. This Order or the Enrollment Letter shall be modified or revoked at any time if, on the basis of any data, the Regional Board determines that continued discharges may cause unreasonable degradation of the aquatic environment.

34. This Order or the Enrollment Letter does not convey any property rights of any sort, or any exclusive privileges. The requirements prescribed herein do not authorize the commission of any act causing injury to persons or property of another, nor protect the Enrollee from liabilities under federal, state, or local laws, nor create a vested right for the Enrollee to continue the waste discharge.

35. It shall not be a defense for the Enrollee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with this Order or the Enrollment Letter.

36. It shall not be a defense for the Enrollee in an enforcement action that effluent limitation violations are a result of analytical variability rendering the results inaccurate. The validity of the testing results, whether or not the Enrollee has monitored or sampled more frequently than required by this Order, shall not be a defense to an enforcement action.

37. The Regional Board has notified all known interested parties of its intent to adopt this general NPDES permit for hydrostatic test water and potable water discharges to surface waters within the San Diego Region and has provided them with an opportunity to submit their written comments and recommendations.

38. The Regional Board has, in a public meeting, heard and considered all comments pertaining to Order No. R9-2002-0020.

IT IS HEREBY ORDERED, that each discharger, their agents, successors, and assigns, who are discharging the type of wastes listed in *Finding 9*, above, (hereinafter Enrollee or discharger), in order to meet the provisions contained in Division 7 of the California Water Code and regulations adopted thereunder and the provisions of the Clean Water Act and the regulations adopted thereunder, shall comply with the following:

A. PROHIBITIONS

1. The discharge of oil, trash, industrial waste sludge, or other solids directly to the surface waters in this region or in any manner, which could ultimately affect surface waters in this region, is prohibited.

2. The discharge of any substances in concentrations toxic to animal or plant life is prohibited.

3. The discharger shall not cause water pollution and nuisance, including unusual odors or other nuisances beyond the limit of each discharger's facility.

4. Compliance with Discharge Prohibitions contained in the Basin Plan (*Attachment B*) is required as a condition of this Order.

5. Compliance with 40 CFR Standard Provisions (*Attachment C)* is required as a condition of this Order.

6. Compliance with Discharge Prohibitions as stated in the 1974 Bays and Estuaries Plan (*Attachment D*) is required as a condition of this Order.

B. DISCHARGE SPECIFICATIONS

1. The discharger shall not cause pollution, contamination, or nuisance, as those terms are defined in CWC, Section 13050, as a result of the treatment or discharge of wastes.

2. Hydrostatic test and/or potable water discharges shall not contain concentrations in excess of the following:

CONSTITUENTS	**UNITS** [3]	**MAXIMUM CONCENTRATION** [4]
Daily Flow	GPD	Specified in the Enrollment Letter. [5]
Total Residual Chlorine	mg/L	0.1
pH	Units	Within the limits of 6.0 and 9.0 at all times.

[3] GPD = gallons per day, mg/L = milligram per liter
[4] The maximum effluent concentration limitation shall apply to flow weighted 24-hour composite samples, or grab samples if the duration of the discharge is less than 24 hours.
[5] The daily maximum discharge flowrate limitation for each discharge will be specified in the Enrollment Letter.

3. The discharge of hydrostatic test and/or potable water shall not cause the receiving water to exceed the water quality objectives specified in *Attachment E* (Water Quality Objectives by Hydrological Unit, taken from Table 3.2 of the Basin Plan).

4. The discharge shall not contain oils, greases, waxes, or other materials in concentrations which result in a visible film or coating on the surface of the receiving water or on objects in the receiving water, or which cause nuisance or which otherwise adversely affect beneficial uses of the receiving water.

C. RECEIVING WATER LIMITATIONS

1. The discharge shall not cause the following to be present in receiving waters:

   a. Toxic pollutants at concentrations that will bioaccumulate in aquatic life to levels that are harmful to aquatic life or human health;

b. Biostimulatory substances at concentrations that promote aquatic growth to the extent that such growth causes nuisance or adversely affects beneficial uses;

c. Chemical substances in amounts that adversely affect any designated beneficial use;

d. Visible floating materials, including solids, liquids, foams, and scum;

e. Oils, greases, waxes, or other materials in concentrations that result in a visible film or coating on the surface of the receiving water or on objects in the water;

f. Suspended or settleable materials in concentrations that cause nuisance or adversely affect beneficial uses;

g. Taste or odor-producing substances in concentrations that alter the natural taste, odor, and/or color of fish, shellfish, or other edible aquatic resources; cause nuisance; or adversely affect beneficial uses; and

h. Substances that result in increases of $BOD_5$20°C (5-day, 20°C biochemical oxygen demand) that adversely affect beneficial uses.

2. The discharge shall not cause the following to occur in the receiving waters:

a. Dissolved oxygen levels less than 5.0 mg/L in waters designated for MARINE or WARM beneficial uses or less than 6.0 mg/L in waters designated for COLD beneficial uses. The annual mean dissolved oxygen concentration shall not be less than 7.0 mg/L more than 10% of the time;

b. Changes in ambient pH levels shall not exceed 0.2 units in waters designated MARINE, or ESTUARINE, or SALINE. Changes in normal ambient pH levels shall not exceed 0.5 units in fresh waters designated COLD or WARM;

c. The temperature at any time or place and within any given 24-hour period to be altered by more than 5°F above natural temperature; but at no time be raised above 80°F for waters designated WARM;

d. The turbidity to increase to the extent that such an increase causes nuisance or adversely affects beneficial uses; such increase shall not exceed 20% when the natural turbidity is over 50 NTU or 10% when the natural turbidity is 50 NTU or less;

e. Residual chlorine in concentrations that persist and impairs beneficial uses;

f. Any individual pesticide or combination of pesticides in concentrations that adversely affect beneficial uses or increase pesticide concentration in bottom sediments or aquatic life; and

g. Sedimentation in the receiving water.

3. The discharge shall not alter the color, create a visual contrast with the natural appearance, nor cause aesthetically undesirable discoloration of the receiving waters.

4. The discharge shall not degrade surface water communities and population including vertebrate, invertebrate, and plant species.

5. The discharge shall not damage, discolor, nor cause formation of sludge deposits on flood control structures, storm water conveyance systems or other facilities nor overload their design capacity.

D. ELIGIBILITY

1. This Order is applicable for existing and future discharges that result from the following:

   - Repair and maintenance of potable water supply pipelines, tanks, reservoirs, etc.;
   - Disinfection of potable water supply pipelines, tanks, reservoirs, etc.; and
   - Hydrostatic testing of pipelines, tanks, vessels, etc.

2. Discharges must meet the following criteria to be covered under this Order:

   - Pollutant concentrations in the discharge shall not cause violation of any applicable water quality objective for the receiving waters, including discharge prohibitions;
   - The discharge shall not cause acute or chronic toxicity in receiving waters; and
   - The discharge shall not need waste treatment systems to meet the requirements of this Order. De-chlorination is not considered to be a 'treatment system', as described in the Fact Sheet, *Authority, E*.

3. Current or existing discharges, which meet the eligibility criteria, must submit an application (pursuant to *Application Requirements, E,* and *Provisions, F*, below) to obtain authorization to discharge.

4. When an individual NPDES permit with more specific requirements for hydrostatic test water and potable water discharges is issued to an Enrollee, the applicability of this Order to that Enrollee is automatically terminated on the effective date of the individual permit.

E. APPLICATION REQUIREMENTS

All new applicants shall submit an application at least 60 days before the planned commencement of discharge to obtain an Enrollment Letter from the Executive Officer. The application shall consist of the following information:

1. Completed Notice of Intent Form (see *Attachment A*).

2. A report for each project (any discharge listed in *Eligibility, D.1*), proposed over the next 12-month period, that is expected to result in a discharge of 500,000 GPD or greater. The report should include the following:

   - Characterization of the proposed discharge (see *Finding 9*);
   - The estimated average and maximum daily flow rates for the proposed discharge (if known);
   - The frequency and duration of the discharge (if known); and
   - The proposed date of the discharge (if known).

3. A report for each project, proposed over the next 12-month period, that is expected to result in a discharge of less than 500,000 GPD <u>and does not meet one or more of the following</u>:

   - The discharge is directly into a MS4 storm drain or the discharge is directly into a dry/seasonal stream (blue-line streams shown on USGS topographic maps), creek, river, etc. but will percolate and/or evaporate prior to reaching any water that is present downstream;
   - The discharge does not contain pollutants in excess of the levels specified in Order R9-2002-0020; and
   - The discharger is implementing a Best Management Practices Plan before, during, and after the discharge.

   The report should include the items listed in *Application Requirements, E2*.

4. A check or money order, payable to the "State Water Resources Control Board", for the first annual fee of $400.

5. Any other information deemed necessary by the Executive Officer.

F. PROVISIONS

1. As used in this Order, waste includes an Enrollee's total discharge of whatever origin, i.e. gross, not net, discharge.

2. Neither the treatment nor the discharge of wastes shall create a pollution, contamination, or nuisance as defined by Section 13050 of the California Water Code.

3. The Enrollee shall take all reasonable steps to minimize, correct, or prevent any adverse impact on the environment resulting from noncompliance with this Order or the Enrollment Letter, including such accelerated or additional monitoring as may be necessary to determine the nature and impact of the non-complying discharge.

4. The Enrollee shall comply with the effluent standards or prohibitions established under Section 307(a) of the Clean Water Act for toxic pollutants within the time provided in the regulations, even if this Order has not yet been modified to incorporate the requirement.

5. An authorized discharge, either separately or jointly with any other discharge, shall not cause a violation of any applicable water quality standard for receiving waters adopted by the Regional Board or the SWRCB as required by the CWA and regulations adopted thereunder. If more stringent applicable water quality standards are promulgated or approved pursuant to Section 303 of the CWA or amendments thereto, the Regional Board will revise and modify this Order in accordance with the more stringent standards.

6. This Order or the Enrollment Letter is not transferable to any person/agency except after notice to the Regional Board. The Regional Board may require the transmittal of a new application to change the name of the Enrollee and incorporate such other requirements as may be necessary under the California Water Code and the Clean Water Act. The Enrollee shall submit notice of any transfer of this Order's responsibility and coverage to a new Enrollee as described under *Reporting Requirement*s, *G.3*.

7. The Enrollee shall allow the Regional Board, or an authorized representative or any representative of the U.S. EPA, upon the presentation of credentials and other documents as may be required by law, to:

   - Enter upon the Enrollee's premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of this Order;

   - Have access to and copy, at reasonable times, any records that must be kept under the conditions of this Order;

   - Inspect, at reasonable times, any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this Order; and

   - Sample or monitor at reasonable times, for the purpose of assuring compliance with this Order or as otherwise authorized by the Clean Water Act or California Water Code, any substances or parameters at any location.

8. A copy of this Order and the Enrollment Letter shall be posted at a prominent location at or near the Enrollee's facility or activity, and shall be available to operating personnel at all times.

9. The provisions of this Order and the Enrollment Letter are severable and if any provision of this Order or the Enrollment Letter, or the application of any provision of this Order or the Enrollment Letter, to any circumstances is held invalid, the application of such provision to other circumstances, and the remainder of this Order and the Enrollment Letter, shall not be affected thereby.

10. The Enrollee shall comply with any interim effluent limitations as established by addendum, enforcement action or revised waste discharge requirements, which have been adopted by this Regional Board.

11. All analytical data shall be reported uncensored with detection limits and quantitation limits identified. For any effluent limitation, compliance shall be determined using appropriate statistical methods to evaluate multiple samples. Sufficient sampling and analysis shall be conducted to determine compliance.

12. Published values for the Method Detection Limits (MDLs) (defined below) should be used except where revised MDLs are available from recent laboratory performance evaluations, in which case the revised MDLs should be used. Where published values are not available, the Regional Board will determine appropriate values based on available information, including information submitted by the Enrollee upon request of the Regional Board.

13. MDL is the minimum concentration of a substance that can be measured and reported with 99% confidence that the analyte concentration is greater than zero, as defined in 40 CFR Part 136 Appendix B.

14. Practical Quantitation Level (PQL) is the lowest concentration of a substance which can be consistently determined within +/- 20 % of the true concentration by 75 % of the labs tested in a performance evaluation study. Alternatively, if performance data are not available, the PQL for carcinogens is the MDL x 5, and for non-carcinogens is the MDL x 10.

15. This Order does not exempt the Enrollee from compliance with any other laws, regulations, or ordinances that may be applicable.

16. This general NPDES permit does not preempt or supersede the authority of other state or local agencies to prohibit, restrict, or control the discharge of hydrostatic test water and potable water discharges from facilities subject to this Order in any manner subject to their authority.

G. REPORTING REQUIREMENTS

1. The Enrollee shall give advance notice to the Regional Board of any planned changes in the permitted facility or activity that may result in noncompliance with the requirements of this Order or the Enrollment Letter.

2. Reports for annual proposed discharges, as described in *Application Requirements, E.2* and *E.3,* have to be submitted on a yearly basis, starting with the initial application for enrollment.

3. Enrollees that propose to discharge potable water which does not contain more than 50% MWDs water are required to either submit the necessary data needed to perform a reasonable potential analysis (see *Attachment F* of the Order) or submit the information required under Section 5.3 of the Implementation Policy to be considered for an exemption.

4. The Enrollee must notify the Regional Board in writing, at least 30 days in advance of any proposed transfer of enrollment and responsibility for compliance with this Order to a new Enrollee. The notice must include a written agreement between the existing and new

Enrollee containing a specific date for the transfer of this Order's responsibility and enrollment between the current Enrollee and the new Enrollee. This agreement shall include an acknowledgement that the existing Enrollee is liable for violations up to the transfer date and that the new Enrollee is liable from the transfer date on.

5. The Enrollee shall report any noncompliance that may endanger health or the environment. Any information shall be provided orally to the Regional Board within 24 hours from the time the Enrollee becomes aware of the circumstances. The Enrollee shall submit a written report within 5 days, containing a description of the noncompliance and its cause; the period of noncompliance, including exact dates and times, and if the noncompliance has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent recurrence of the noncompliance. The written report shall be included with the monitoring report for the period in which the noncompliance occurred, or earlier if requested by the Regional Board. The following occurrence(s) must be reported orally to the Regional Board within 24 hours:

   - Any exceedence of the effluent limitations specified in this Order or the Enrollment Letter.

   - Any violation of any of the prohibitions of this Order or the Enrollment Letter.

6. The Enrollee shall notify the Regional Board as soon as it is known or there is reason to believe that any activity has occurred or which will occur which would result in the discharge of any toxic pollutant which is not limited in this Order, if the concentration of that pollutant(s) will exceed the following notification level:

   One hundred micrograms per liter (100 μg/L);

7. The Enrollee shall furnish to the Regional Board, within a reasonable time, any information which the Regional Board may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this Order or an Enrollment Letter, or to determine compliance with this Order or other requirements established by the Regional Board. The Enrollee shall also furnish to the Regional Board, upon request, copies of records required to be kept by this Order or the Enrollment Letter.

8. The Enrollee shall provide adequate notice to the Regional Board of the following:

   - Any new introduction of pollutants to the discharge.

   - Any substantial change in the volume or character of pollutants being introduced into the discharge.

   - For the purpose of this provision, adequate notice shall include information on

     - The quality and quantity of waste introduced into the discharge,

     - Relocation of the point of discharge or change in the storm drain or conveyance system used to discharge to surface waters within the San Diego Region, and

- Any anticipated impact due to the change of the quantity or quality of effluent to be discharged to surface waters within the San Diego Region.

9. Where the Enrollee becomes aware that it failed to submit any relevant facts in an application, or submitted incorrect information in an application, or in any report to the Regional Board, it shall promptly submit such facts or information.

10. This Order expires on August 14, 2007. However, it will continue in force and effect until a new general permit is issued or the Regional Board rescinds this general permit.

11. All applications, reports, or information submitted to the Regional Board shall be signed and certified in accordance with 40 CFR 122.22 (*Attachment C*).

12. Except for data determined to be confidential under 40 CFR, Part 2, all reports prepared in accordance with the terms of this Order shall be available for public inspection at the offices of the California Regional Water Quality Control Board, San Diego Region and the United States Environmental Protection Agency, Region 9. As required by the Clean Water Act, Reports of Waste Discharge, this Order, and effluent data shall not be considered confidential.

13. Dischargers submitting an application for authorization to discharge under this Order shall notify the agency/municipality that owns, operates, and maintains the storm drain conveyance system that the Enrollee proposes to use as a discharge conveyance system to a surface water.

14. The Enrollee shall submit written notification of the termination of the discharge for each project to the Regional Board within 30 days of termination of the discharge.

15. The Enrollee shall submit a written request to terminate enrollment under this Order. A statement has to be included with the request in which the Enrollee certifies that all discharges were terminated.

16. The Enrollee shall submit reports required under this Order to:

    California Regional Water Quality Control Board
    San Diego Region
    ATTN: Industrial Compliance Unit
    9174 Sky Park Court, Suite 100
    San Diego, CA 92123-4340

    Notifications required to be provided to this Regional Board shall be made to:

    Telephone - (858) 467-2952, or
    Facsimile - (858) 571-6972

H. EMERGENCIES

The discharger shall establish a set of Best Management Practices (BMPs) that would address unforeseeable emergencies which could not have been prevented or avoided by the exercise of due care or foresight (e.g. water main breaks). During an emergency, BMPs shall be implemented, whenever feasible, to prevent the discharge of pollutants into the receiving waters. The BMPs should include source control BMPs to minimize contact between pollutants and flow (e.g. rerouting of flow to prevent erosion, which can lead to sedimentation in discharge) as well as treatment control BMPs to remove pollutants present in the discharged water before it enters the storm drain system. Implementation of BMPs shall not interfere with necessary repair operations or impact public health and safety. A copy of the BMPs addressing emergencies has to be submitted to the Regional Board, if requested.

I. NOTIFICATIONS

1. California Water Code Section 13263(g) states:

   "No discharge of waste into the waters of the State, whether or not such discharge is made pursuant to waste discharge requirements, shall create a vested right to continue such discharge. All discharges of waste into waters of the State are privileges, not rights."

2. The Enrollee must comply with all conditions of this Order. Any permit noncompliance constitutes a violation of the Clean Water Act and the Enrollee will be subject to enforcement action; permit termination, revocation, reissuance, or modification; and/or denial of a new Enrollee application in accordance with 40 CFR 122.41(a).

3. Nothing in this Order shall be construed to relieve the Enrollee from civil or criminal penalties for noncompliance.

4. Nothing in this Order shall be construed to preclude the institution of any legal action or relieve the Enrollee from any responsibilities, liabilities, or penalties to which the Enrollee is or maybe subject to under Section 311 of the Clean Water Act.

5. Nothing in this Order shall be construed to preclude institution of any legal action or relieve the Enrollee from any responsibilities, liabilities, or penalties established pursuant to any applicable State law or regulation under authority preserved by Section 510 of the Clean Water Act.

6. The Enrollee shall notify the appropriate County Department of Health Services, Vector Control, if a discharge pursuant to this Order could result in ponded water that has the potential to cause or lead to vector nuisances.

7. If the Water Quality Control Policy for Enclosed Bays and Estuaries of California is revised, this Order may be modified to incorporate such revisions.

8. This Order shall become effective 10 days after the date of its adoption, provided the Regional Administrator or Director, United States Environmental Protection Agency, has no objection. If the Regional Administrator or Director objects to its issuance, this Order shall not become effective until such objection is withdrawn.

I, John H. Robertus, Executive Officer, do hereby certify the foregoing is a full, true, and correct copy of an Order adopted by the California Regional Water Quality Control Board, San Diego Region, on August 14, 2002.

JOHN H. ROBERTUS
Executive Officer
August 14, 2002

Las Vegas Wash Water Quality and Implications to Fish and Wildlife

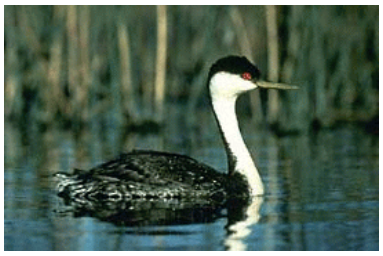

Peter L. Tuttle
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for

Robert D. Williams
Nevada Fish and Wildlife Office
Region 1

November 1, 2002

FFS Numbers: 1F27 and 1F31
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LAS VEGAS WASH WATER QUALITY AND IMPLICATIONS TO FISH AND WILDLIFE

Peter L. Tuttle[1] and Erik L. Orsak[2]

INTRODUCTION

Recent investigations have documented degraded water quality conditions in Las Vegas Wash and Las Vegas Bay of Lake Mead, Clark County, Nevada (Bureau of Reclamation 2001; Snyder *et al.* 1999; Covay and Beck 1998; Covay and Leiker 1998; Bevans *et al.* 1998, 1996). The degradation of water quality has adversely affected the quality of fish and wildlife habitat associated with these areas. Environmental degradation has affected Department of the Interior (DOI) trust resources, including National Park Service and Bureau of Reclamation managed-lands. Effects to DOI trust fish and wildlife resources, including three endangered species and a variety of migratory bird species, are still under investigation. However, the occurrence of a variety of environmental contaminants in water, sediment, and biological tissues from Las Vegas Wash and Las Vegas Bay indicate that environmental conditions are not conducive to healthy populations of fish and wildlife. Contaminant accumulation, tissue abnormalities, and evidence of reproductive effects (endocrine disruption) have been identified in fish from Las Vegas Wash and Bay (Goodbred *et al.* 1999; Bevans *et al.* 1998, 1996; Patiño *et al* in review).

In 1998, the U.S. Geological Survey (USGS) Biological Resources Division and the U.S. Fish and Wildlife Service (Service) initiated a joint investigation to assess contaminants associated with Las Vegas Wash and effects to wildlife. The investigation was expanded in 2000 to address concerns specific to DOI trust resources. The objectives of the Service's components of the investigation included:

1) reviewing existing data to assess the existence and degree of threats to fish and wildlife,
2) assessing organochlorine (OC) compounds and trace elements in avian eggs,

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3) assessing razorback sucker (*Xyrauchen texanus*) exposure to endocrine disrupting compounds and other contaminants, and

4) assessing the potential for downstream impacts to endangered fishes and critical habitat.

Field data collection for this joint investigation was completed in 2001. A portion of the data have not been fully analyzed by USGS and are not ready for release. This report provides the findings of the Service components of the investigation. A comprehensive report of the combined USGS-Service investigation is expected in 2003.

The following report is divided into five sections. The first section provides an overview of the study area and DOI trust resources in the vicinity. The second section provides a review of existing data to identify contaminant concerns and assess implications of contaminants to fish and wildlife. The third section evaluates contaminant concentrations in avian eggs to evaluate contaminant availability and the potential for impacts to birds. The fourth section evaluates contaminant exposure, accumulation, and effects in endangered razorback suckers. The final section evaluates the downstream transport of contaminants associated with Las Vegas Wash and the potential for these contaminants to adversely affect fish and wildlife downstream of Hoover Dam.

STUDY AREA

Lake Mead was created in 1935 by the construction of Hoover Dam and is located on the main stem of the Colorado River, Arizona-Nevada (Figure 1). Tributaries to Lake Mead include the Las Vegas Wash and the Colorado, Virgin, and Muddy rivers. Las Vegas Wash extends over 15 miles from the Las Vegas Metropolitan Area to Las Vegas Bay in Boulder Basin of Lake Mead. The Wash provides the sole route of surface and sub-surface water drainage from the Las Vegas Valley, some 2,200 square miles (Bureau of Reclamation 1982), and therefore, receives all point and non-point source pollution. Prior to development in the Las Vegas Valley, flow in Las Vegas Wash was perennial (Kilroy *et al.* 1997). However, extensive groundwater withdrawal in the early 20th century resulted in diminished flow in the Wash causing stream flow

to become ephemeral, with flows resulting only from precipitation and runoff events. Flows in the Las Vegas Wash again became perennial following the increased discharge of treated wastewater, groundwater flows, urban runoff from landscape irrigation, and industrial process water (Covay and Leiker 1998). Flow volume in the Wash has steadily increased with rapid population growth in the Las Vegas Metropolitan Area, averaging over 160 million gallons per day at Northshore Road bridge in 2001 (Bureau of Reclamation 2001). Currently, the population in the Las Vegas Metropolitan Area exceeds 1.5 million permanent residents and some 35 million tourists annually, generating over 150 million gallons per day (> 90 percent of the total flow during dry weather) of wastewater effluent discharges into Las Vegas Wash (Montgomery Watson 1997). This volume is expected to increase to more than 250 million gallons per day by 2020.

Changes in land use and coverage have contributed to large-scale erosion in Las Vegas Wash. Glancy and Whitney (1986) estimated a loss of as much as 4 square miles of sediment from Las Vegas Wash between 1969 and 1984. Channel down-cutting and sediment deposition have contributed to the extensive loss of wetlands associated with the Wash. Several local, State, and Federal agencies have initiated efforts to reduce erosion and restore wetland habitat along Las Vegas Wash.

Lake Mead National Recreation Area (NRA), administered by the National Park Service, receives annual visitation in excess of 27 million people and is one of the most heavily used National Park Service facilities in the nation. Recreational activities include swimming, boating, fishing, and other forms of water contact recreation. The Nevada Division of Wildlife manages a recreational fishery in Lake Mead. Principle game fishes include striped bass (*Morone saxatilis*), largemouth bass (*Micropterus salmoides*), and channel catfish (*Ictalurus punctatus*). Lake Mead also serves as the primary source for drinking water to southern Nevada.

Department of the Interior trust responsibilities include lands administered by the National Park Service (Lake Mead NRA), land along Las Vegas Wash administered by the Bureau of Reclamation, and limited lands administered by the Bureau of Land Management. Additionally, six federally-listed species as well as a variety of migratory birds have been identified in areas associated with Las Vegas Wash, Las Vegas Bay, and Boulder Basin of Lake Mead. Endangered species include razorback sucker, southwestern willow flycatcher

(*Empidonax traillii extimus*), Yuma clapper rail (*Rallus longirostris yumanensis*), and bonytail chub (*Gila elegans*). Threatened species include bald eagle (*Haliaeetus leucocephalus*) and desert tortoise (*Gopherus agassizii*).

Razorback suckers were historically abundant throughout the Colorado River and its major tributaries. However, declining numbers and the extirpation of populations throughout its range prompted the listing of this species as endangered in 1991. The primary reasons for the decline were identified as changes to biological and physical features of the habitat. The effects of these changes are most clearly seen in the virtual lack of natural recruitment to any population in the historic range of the species. Although razorback sucker are producing viable young, few individuals appear to survive to adulthood. Predation of larval razorback sucker by non-native fish is an important factor contributing to the decline of this species. Recent studies also indicate that environmental contaminants may result in poor recruitment of this species in some areas (Hamilton and Buhl 1997). Critical habitat was designated in 1994 and includes, among other areas, portions of the Colorado River from Pierce Ferry to Hoover Dam, including Lake Mead to its full pool elevation, and from Hoover Dam to Davis Dam, including Lake Mohave to its full pool elevation.

Ongoing research sponsored by the Southern Nevada Water Authority (SNWA) has added to the knowledge of razorback distribution and habits within Lake Mead (Holden *et al.* 1999). Among the findings are that two populations of razorback suckers occur in Lake Mead, one at Echo Bay on the Overton Arm and another in Las Vegas Bay. In 1997, Holden *et al.* (1997) estimated that 300 to 400 adult razorback suckers occupied Las Vegas Bay and 50 to 60 occupied Echo Bay. Holden *et al.* (2001) reduced their estimates to #100 adults for each population in 2000, based on additional data. Trapping and telemetry studies indicate that razorback suckers occur throughout Las Vegas Bay and use the mouth of Las Vegas Wash. Razorback suckers were also found in lower Las Vegas Wash upstream of Lake Mead. Larval sampling indicates that razorback suckers spawn in Las Vegas Bay in the vicinity of Blackbird Point.

Like the razorback sucker, bonytail chub were historically abundant in the Colorado River and its major tributaries but population numbers have declined throughout its range. Bonytail chub were listed as endangered in 1980. The cause of the decline was identified as

changes to biological and physical features of the habitat. The effects of these changes have been most noticeable by the almost complete lack of natural recruitment to any population in the historic range of the species. Populations are generally small and composed of aging individuals. Designated critical habitat includes, among other areas, the Colorado River from Hoover Dam to Davis Dam, including Lake Mohave to its full pool elevation. Although bonytail chub historically occurred in Lake Mead, this species has not been recently documented in Lake Mead and is now presumed extirpated.

Southwestern willow flycatcher historically occurred in southern California, Arizona, New Mexico, western Texas, southwestern Colorado, southern Utah, northwestern Mexico, and extreme southern Nevada (Unitt 1987). Declines in numbers across its range prompted the listing of this species in 1995. The southwestern willow flycatcher is a riparian obligate, nesting in riparian thickets associated with rivers, streams, and other wetlands where dense tree or shrub growth is present. Since 1998, flycatcher surveys have been conducted in the Las Vegas Wash. Results of these surveys have detected flycatchers in most years, but individuals have not been identified to the subspecies level because breeding activity has not yet been observed (SWCA 1998, 1999, 2000). The flycatcher is insectivorous, and forages within and above dense riparian vegetation, taking insects on the wing or gleaning them from foliage (Wheelock 1912, Bent 1960).

Within the United States, Yuma clapper rail are most frequently observed in extreme southern California and southwestern Arizona. This species was identified in Las Vegas Wash during a survey conducted in 1998. Clapper rail occur in marsh habitats and forage on crustaceans, small fish, insects, and limited vegetation in shallow water or mud flats.

The bald eagle was previously listed as endangered due to population declines across much of its range. Like peregrine falcons (*Falco peregrinus*), contaminants contributed to the decline of this species. Its status was upgraded to threatened in the lower 48 States in 1995. Bald eagles have been reported to migrate through, and winter along, the lower Colorado River. Fish are the preferred food, although carrion, blacktailed jackrabbits, and wounded or injured waterfowl will also be consumed.

The Mohave population of desert tortoise was emergency listed as endangered in 1989 and as threatened under a normal listing procedure in 1990. The desert tortoise, a large

herbivorous reptile, is generally found in desert scrub habitats throughout its range, which includes a portion of the Mojave Desert and the Colorado Desert subdivision of the Sonoran Desert. The desert tortoise has the potential to occur in upland habitat north of Las Vegas Wash. On February 8, 1994, the Service designated approximately 6.4 million acres of critical habitat for the Mojave population of the desert tortoise (59 FR 45748), which became effective on March 10, 1994. Approximately 1.2 million acres were designated as critical habitat in Nevada.

Lake Mead NRA provides habitat for over 240 species of migratory birds. More than 200 bird species use the Las Vegas Wash and Bay for nesting, loafing, foraging, and resting during migration (SNWA 2002). Species in the area include the great blue heron (*Ardea herodias*), great egret (*Ardea alba*), snowy egret (*Egretta thula*), eared grebe (*Podiceps nigricollis*), Western grebe (*Aechmophorus occidentalis*), Clark's grebe (*Aechmophorus clarkii*), gadwall (*Anas strepera*), American wigeon (*Anas americana*), mallard (*Anas platyrhynchos*), blue-winged teal (*Anas discors*), cinnamon teal (*Anas cyanoptera*), northern shoveler (*Anas clypeata*), northern pintail (*Anas acuta*), American coot (*Fulica americana*), red-winged blackbird (*Agelaius phoeniceus*), brewer's blackbird (*Euphagus cyanocephalus*), yellow-headed blackbird (*Xanthocephalus xanthocephalus*), marsh wren (*Cistothorus palustris*), double-crested cormorant (*Phalacrocorax auritus*), American avocet (*Recurvirostra americana*), killdeer (*Charadrius vociferus*), and black-necked stilt (*Himantopus mexicanus*). Restoration efforts along Las Vegas Wash and the subsequent creation of suitable habitat will likely increase the diversity and abundance of migratory birds that use this area, including the Yuma clapper rail and southwestern willow flycatcher.

REVIEW OF EXISTING INFORMATION

A variety of environmental contaminants have been identified at levels of concern in Las Vegas Wash and Bay including nutrients, pathogens (e.g., bacteria), trace metals, pesticides, pharmaceuticals, and industrial compounds. Primary concerns are discussed below.

NUTRIENTS

Nutrients in aquatic systems include a variety of chemical constituents which are necessary for growth and survival of aquatic organisms. Certain nutrients, particularly nitrogen and phosphorus compounds, limit primary productivity and, therefore, control limnological characteristics of the water body. Eutrophication, or the occurrence of excessive nutrients in surface waters, may result in high primary productivity in the water body which, in turn, may cause a variety of potentially deleterious effects such as dissolved oxygen depletion in the water column and sediments, increased pH, and changes in the biogeochemical cycling of chemical elements. Eutrophication is commonly associated with structural simplification and reduced stability of aquatic communities (Wetzel 1983).

Concerns for elevated nutrients in Las Vegas Wash water and detrimental impacts to Las Vegas Bay were expressed in 1971 in a U.S. Environmental Protection Agency (USEPA) report on pollution affecting Las Vegas Wash, Lake Mead, and the Lower Colorado River (USEPA 1971). Due to population growth and increasing wastewater flows, elevated nutrient concentrations and loading continue to affect water quality in Las Vegas Wash and Lake Mead. Bevans *et al.* (1998) reported that nutrient concentrations at two Las Vegas Wash sites exceeded the 75th percentile of sites investigated under the USGS National Water Quality Assessment (NAWQA) program nation-wide. The lower Las Vegas Wash site, which included treated sewage effluent, exceeded the 99th percentile. The greatest concern was with un-ionized ammonia, which exceeded the USEPA aquatic life criterion in all water samples collected from April 1993 to April 1995. Following full implementation of tertiary treatment of sewage effluent discharged to Las Vegas Wash in the mid 1990's, un-ionized ammonia and phosphorous concentrations have declined (LaBounty and Horn 1997). However, total nitrogen concentrations entering Las Vegas Bay have remained relatively constant following

implementation of tertiary treatment and nitrogen loading continues to increase (University of Nevada, Las Vegas [UNLV] 2002).

The input of nutrients and organic material from Las Vegas Wash has contributed to the eutrophication and subsequent high primary production in Las Vegas Bay (LaBounty and Horn 1997). Boulder Basin is a phosphorus limited system, hence the availability of phosphorus drives primary productivity, which is measured by determining chlorophyll-*a* concentrations. From 1991 to 1996, concentrations of chlorophyll *a*, a measure of algae biomass, in Las Vegas Bay near the Las Vegas Wash confluence ranged from <3 to 253 ug/L with annual means ranging from 16 to 34 ug/L (Nevada Division of Environmental Protection [NDEP] 1998). LaBounty and Horne (1997) reported chlorophyll *a* concentrations between 300 and 400 ug/L during algae bloom events in the inner Las Vegas Bay during 1993 and 1996. The mean chlorophyll *a* concentration in eutrophic lakes was reported as 14.3 ug/L by Wetzel (1983). There are currently no State-imposed water quality standards for chlorophyll *a,* only recommended limits between 5 ug/L in Boulder Basin and 45 ug/L in Las Vegas Bay to "maintain existing higher quality." Drought conditions and dropping lake levels contributed to a massive green algae bloom throughout Boulder Basin in 2001, which persisted for over six months and resulted in recreational losses. Although phosphorus concentrations in the Las Vegas Wash have declined since dischargers incorporated enhanced phosphorus removal in 1995 (average of 0.5 mg/L and maximum of 2.3 mg/L total phosphorus in 2000), due to the large and ever increasing volume of effluent flows, phosphorus and nitrogen loading of Boulder Basin continues to increase and primary productivity remains high. Eutrophication of freshwater lakes is undesirable, causing an imbalance in primary productivity that can lead to more toxic forms of algae, often resulting in fish kills.

High primary productivity and the occurrence of high concentrations of organic material may result in the diurnal and seasonal depletion of dissolved oxygen in the water column. In highly productive systems, photosynthetic production of oxygen may result in supersaturation of dissolved oxygen concentrations during periods of sunlight (Wetzel 1983). However, high chemical and biological oxygen demand associated with high productivity may result in the depression of dissolved oxygen concentrations during hours of darkness. Dissolved oxygen levels in the effluent dominated waters of lower Las Vegas Wash were consistently between 8 -

10 mg/L in 2000. Monitoring data from Las Vegas Bay indicates that dissolved oxygen exceeded the saturation point in the bulk of the near surface daytime observations (maximum observed value 19.3 mg/L) with areas greatly deficient in oxygen developing at night (minimum observed value less than 0.2 mg/L)(SNWA 2001).

LaBounty and Horn (1997) noted a pattern in the seasonal dynamics of dissolved oxygen in Las Vegas Bay and Lake Mead. These researchers consistently detected the lowest dissolved oxygen concentrations in Las Vegas Bay near the confluence of Las Vegas Wash. As thermal stratification of the Lake developed during the spring, conditions of low dissolved oxygen developed in the hypolimnion. Anoxic conditions expanded farther into the main body of Boulder Basin as stratification intensified through the summer. Anoxic conditions persisted below the thermocline from July into October (Figure 2). Depressed dissolved oxygen concentrations were observed as far away as Hoover Dam. These researchers attributed the spatial and seasonal dissolved oxygen patterns to the introduction of nutrients and organic material from Las Vegas Wash. Concerns with seasonal depletion of dissolved oxygen persisted at the time of completion of this report.

Conditions of low dissolved oxygen in water (less than 4 or 5 mg/L) have the potential to cause adverse effects to aquatic organisms and habitats. In addition to causing suffocation, the toxicity of many contaminants increases as dissolved oxygen concentrations decrease (Lloyd 1961). Increased toxicity may be attributed to the movement of greater water volumes and associated waterborne contaminants across the gill surface when dissolved oxygen is depressed. Conditions of depressed dissolved oxygen persist in the hypolimnion in a significant portion of Las Vegas Bay throughout the summer. Because razorback suckers are a benthic-dwelling species, anoxic conditions in the hypolimnion are of particular concern. Anoxic conditions do not appear to coincide with razorback sucker spawning in Las Vegas Bay. However, razorback sucker adults have been documented in Las Vegas Bay during seasons of depressed dissolved oxygen (Holden *et al.* 1997). It is uncertain if juvenile razorback suckers continue to reside in Las Vegas Bay during these periods. Seasonally anoxic conditions would presumably continue to have an effect on invertebrate communities, food availability, and general habitat quality throughout the year.

High concentrations of certain nutrients may be toxic to aquatic organisms. Ammonia levels are of particular concern in Las Vegas Wash and Bay due to the presence of razorback suckers. In natural waters, ammonia exists in an ionized and an un-ionized form. Un-ionized ammonia is considered the more toxic form and is acutely toxic to most fish species at elevated concentrations (Russo 1985). Chronic exposure to lower concentrations of un-ionized ammonia may cause a variety of sublethal effects to aquatic organisms, including decreased growth, reduced fecundity, reduced numbers of red blood cells, kidney and gill degeneration, and reduced resistance to disease (Russo 1985). Additionally, ammonia may increase the toxicity of other contaminants such as copper and zinc. The proportion of un-ionized ammonia is controlled by pH and, to a lesser extent, temperature. As such, the current aquatic life criteria recommended by the USEPA are based on pH. The pH of Las Vegas Bay generally ranges between 8 and 9, which corresponds to recommended acute ammonia nitrogen criteria (Criteria Maximum Concentrations; CMC) between 1.3 and 8.4 mg/L and chronic criteria (Criteria Continuous Concentration; CCC) between 0.25 and 1.27 mg/L. The CMC should not be exceeded more than once every three years. The CCC is averaged over thirty days, and again should not be exceeded more than once every three years. The State of Nevada acute and chronic water quality standards for ammonia in Las Vegas Bay and Lake Mead are 0.45 mg/L NH3 (single value not to be exceeded more than once every three years) and 0.05 mg/L (average not to be exceeded more than once every three years), respectively. There is no ammonia standard for the Las Vegas Wash although the State restricts ammonia loading during the months of April through September.

As indicated previously, ammonia in all Las Vegas Wash samples collected from 1992 - 1996 by Bevans *et al* (1998) from areas downstream of the sewage discharges exceeded the aquatic life criterion recommended by USEPA. Review of 1996 data (following implementation of tertiary treatment of sewage) indicates that ammonia concentrations have declined, and in all but one sample were less than the CCC. It is important to remember, however, that EPA's criterion (CMC and CCC) are derived to be protective to the range of taxa tested (i.e., protect 95 percent of all fish and aquatic invertebrate taxa). This protection is considered adequate for protecting populations of organisms but implies that a small percentage of a population may be affected (i.e., loss of individuals). When interpreted within the context of the Endangered

Species Act, this small effect to a population is considered unacceptable for a listed species since any further decline in the population may lead to its local extirpation or cumulative extinction across its range. Average ammonia values in 2000 were 0.18 mg/L for Las Vegas Wash, which exceeds chronic effect levels for many sensitive species of fish (USEPA 1984), and 0.08 mg/L for Las Vegas Bay, which exceeds the State chronic standard. Therefore, additional data are needed on the sensitivity of razorback suckers to ammonia before it may be concluded that ammonia no longer represents a threat to this species.

PATHOGENS

Total and fecal coliforms are regularly monitored in Las Vegas Wash and Bay and bacteriological concerns have been identified. Although coliform bacteria are considered harmless to humans, elevated levels of these bacteria are considered an indicator of environmental conditions conducive to the occurrence and proliferation of other pathogens, including a variety of potentially harmful bacteria, viruses, or parasites. Possible sources of fecal contamination include septic tanks, illegal dumping into storm drains, domestic animals, wildlife, and treated wastewater. Fecal coliform densities in the Las Vegas Wash increased with the onset of effluent dechlorination in 1993 (UNLV 2002), a step that was taken to reduce chlorine toxicity in wastewater flows. The UNLV (2002) study also concluded that the source of fecal contamination in Las Vegas Wash cannot be attributed entirely to wastewater, with the majority of enterococci bacteria comprised of avian related species (81 percent) versus human (18 percent). The State of Nevada has adopted a human water contact standard of 200 colony forming units (CFU) per 100 ml of water and a propagation of wildlife standard of 1,000 CFU/ml. The State beneficial use standard for Lake Mead and Las Vegas Wash are that fecal coliforms "must not exceed a log mean of 200 most probable number (MPN)/100mL (for > five samples in 30 days), nor exceed 400 MPN/100mL for a single sample maximum (Nevada Administrative Code 445A.195)." Several states have adopted standards of 1,000 CFU/100 ml for total coliform bacteria. Fecal coliform counts during wet and dry weather flows have regularly exceeded applicable standards in Las Vegas Wash (Figure 3). In 1996, bacterial counts exceeded 400 CFU/100ml in at least half of the water samples at monitoring stations in Las Vegas Wash (NDEP 1998). Log mean concentrations at all sites also exceeded this standard.

Eight of 38 samples collected near the confluence of Lake Mead exceeded 1,000 CFU/ml. Contamination extended to Las Vegas Bay, where 17 percent of the samples collected from the inner Las Vegas Bay in 1996 exceeded the 200 CFU/100 ml standard (NDEP 1998). Approximately 4 percent of the samples collected near the razorback spawning area exceeded the 200 CFU/100 ml standard. Fecal coliform counts between 1992 and 1998 appear to be highest in the Las Vegas Wash during infrequent storm events, averaging 250,000 to 500,000 MPN/100 ml, with maximum concentrations ranging up to 5,000,000 MPN/100 ml. As a result of elevated bacterial counts, water contact recreation in a portion of Las Vegas Bay within the National Park Service Lake Mead NRA is not permitted.

Pathogens represent a threat to both terrestrial and aquatic species associated with Las Vegas Wash and Bay. The manifestation of disease in fish and wildlife populations are dependent on a number of factors. Herman (1990) identified pathogenic organisms, predisposing environmental conditions, and susceptible hosts as primary factors influencing the susceptibility of fish populations to disease outbreaks. Friend (1985) identified transmission, threshold levels, and susceptible hosts as key factors influencing the susceptibility of wildlife populations to diseases. Friend noted that contaminated water is an efficient vehicle for transmission of many diseases to wildlife. The occurrence of high concentrations of total and fecal coliforms in Las Vegas Wash and Las Vegas Bay near the confluence indicates that conditions are conducive to the survival and proliferation of pathogenic organisms. It is uncertain if threshold concentrations are exceeded. Stressful environmental conditions such as low dissolved oxygen and elevated salinity may increase the susceptibility of the host to infection by pathogenic organisms (Friend 1985). Similarly, a variety of chemical pollutants, such as un-ionized ammonia, several trace elements, pesticides, and industrial compounds have been shown to compromise immune response in fish and wildlife, thereby making affected individuals more susceptible to infection (Friend 1985).

Additional information is needed to adequately assess the implications of pathogens to fish and wildlife associated with Las Vegas Wash and Bay. The USGS is currently assessing the incidence of disease in common carp (*Cyprinus carpio*). Results of their investigation are expected to be released in 2003.

TRACE METALS

Concerns with a variety of metals and other trace elements have been identified in Las Vegas Wash. Few data are available for Las Vegas Bay; however, metal concentrations in Bay water should be comparatively lower than in Las Vegas Wash due to dilution. Water quality monitoring in Las Vegas Wash by the USGS (2001), NDEP (2000), and SNWA (2001) indicate regular exceedances of standards for iron, mercury, molybdenum, and selenium, with less frequent exceedances of standards for boron, lead, and cadmium. Numerical standards for some trace elements have not been revised since 1985 (or earlier) and are considered by many to be outdated and possibly inadequate for protection of sensitive species. USEPA issued a Notice of Intent in 1999 to revise aquatic life criteria for copper, silver, lead, cadmium, iron and selenium. The new criterion, when released, may be more stringent (e.g., lower values for chronic criteria) due to advances in the field of toxicology. At the time of preparation of this report the revision process was still ongoing, with the exception of cadmium, which was updated in 2001.

Aquatic life standards for cadmium, chromium, copper, lead, nickel, silver, and zinc are based on water hardness. Water hardness in Las Vegas Wash is high, ranging from 800 to over 1300 mg/L, which allows metal concentrations in water to be higher without exceeding water quality standards. For example, the CCC for cadmium is 1.07 ug/L at a hardness of 700 mg/L, but only 0.25 ug/L at a hardness of 100 mg/L. Regardless of water hardness, many trace metals are known to accumulate in sediments and biota and may adversely affect wildlife health in the long-term. Evaluation of water quality data compared to effect levels in fish and wildlife and standards for protection of aquatic life revealed concerns with several elements. In the following discussion, our interpretation of selenium and mercury data was hampered where sample concentrations were listed as non-detect but the detection limit substantially exceeded levels known to adversely affect fish and wildlife.

Arsenic, at a concentration of 0.04 mg/L in water, has been associated with adverse effects to amphibian embryos and larvae (USEPA 1985a) and low level toxicity to fish (Birge *et al.* 1980). Arsenic was detected in 60 percent (49 of 82) of the water samples from Las Vegas Wash. Sixteen percent of the samples exceeded the 0.04 mg/L effect level. The highest concentration was 0.12 mg/L.

Copper may be lethal or cause teratogenic effects to fish and amphibian eggs at concentrations in water between 0.005 and 0.01 mg/L (Eisler 1997). Copper concentrations met or exceeded 0.01 mg/L in more than half (66 of 127) of the Las Vegas Wash water samples reported by SNWA (Figure 4). The highest reported concentration was 0.270 mg/L.

Iron is considered an essential element for most organisms in small quantities but may be toxic at higher concentrations. The USEPA and State chronic standard for iron is 1.0 mg/L in water. Iron concentrations in Las Vegas Wash frequently exceed this standard, ranging from 1.0 to over 13.0 mg/L in 1999 and 2000 (NDEP 2000).

Lead may cause low level toxicity in fish at concentrations of 0.003 mg/L with substantial toxicity at a concentration of 0.11 mg/L (Birge *et al.* 1980). Reproduction of *Daphnia magna* was impaired 10 percent at a concentration of 0.001 mg/L and 50 percent at a concentration of 0.01 mg/L (USEPA 1985b). The USEPA chronic criterion for lead to protect aquatic life in Las Vegas Wash is 0.019 mg/L and the State chronic standard is 0.009 mg/L. The highest of four NDEP grab samples collected in 1999 and 2000 was 0.018 mg/L. More than 40 percent (42 of 102) of SNWA water samples exceeded 0.01 mg/L (Figure 4). Eight samples exceeded 0.11 mg/L. The highest reported lead concentration was 0.28 mg/L.

Mercury in water is toxic to aquatic invertebrates at concentrations as low as 0.002 mg/L for inorganic mercury or as low as 0.0009 mg/L for organic forms (USEPA 1980). Mercury has been shown to cause adverse effects to salmonids at concentrations below 0.0001 mg/L (Birge *et al.* 1980) and warm water fishes at a concentration as low as 0.0005 mg/L (Snarski and Olson 1982). Mercury also strongly accumulates in organisms and magnifies in food chains. Schwarzbach (1998) identified a concentration of 0.00000064 mg/L in water as a criterion for the protection of piscivorous birds. The USEPA and State chronic criterion for mercury to protect aquatic life is 0.000012 mg/L. Mercury concentrations in Las Vegas Wash exceed this standard and are routinely 0.0005 to 0.001 mg/L. The highest concentration was 0.006 mg/L.

Molybdenum may be acutely toxic to larval fish at concentrations as low as 0.028 mg/L (Birge *et al.* 1980). The State chronic standard for protection of aquatic life is 0.019 mg/L. Molybdenum concentrations in Las Vegas Wash ranged from 0.01 to 0.395 mg/L and averaged 0.195 between 1995 and 2000.

Nickel may cause mortality of sensitive fish species (salmonids) at concentrations as low as 0.011 mg/L (Birge *et al.* 1980). Eisler (1998) noted that toxic effects of nickel may be expected in salmonids at concentrations ranging from 0.03 to 0.05 mg/L, and recommended a safe level of less than 0.029 mg/L for salmonids. The USEPA chronic criterion for nickel is 0.27 mg/L. In Las Vegas Wash, nickel concentrations averaged 0.125 mg/L in water samples reported by SNWA from 1997 to 1999. The highest concentration was 0.25 mg/L.

Selenium is strongly bioaccumulated in aquatic organisms and relatively low concentrations in water can quickly become concentrated to potentially toxic levels in aquatic organisms and wetland birds (Lemly 1996). Toxic endpoints commonly include histopathology, physiological effects, reduced reproduction, and reduced survival. Selenium is recognized as a powerful teratogen and reproduction is generally considered the most sensitive and significant toxic endpoint. Waterborne concentrations in the low part per billion range can lead to reproductive failure in adult fish with little or no additional symptoms of selenium poisoning in the environment (Lemly 1996). Maier and Knight (1994) summarized seven recent studies that provided estimates of waterborne thresholds for food chain-mediated toxicity to fish and wildlife. All reports concluded that toxic thresholds were less than or equal to 0.003 mg/L in water. Selenium has been identified as a concern in the lower Colorado River and may affect reproductive success of native Colorado River fishes (Hamilton 1999). Anthropogenic sources, particularly agricultural drainage, were identified as the primary cause of elevated concentrations in the lower basin. Las Vegas Wash monitoring data indicate that the Wash is a selenium source to the Colorado River. The USEPA and State chronic standard for selenium is 0.005 mg/L. Average selenium concentrations in Las Vegas Wash exceed these standards, falling between 0.007 and 0.010 mg/L. The highest observed concentration in 1995 was 0.1 mg/L.

Zinc has been found to be acutely toxic to aquatic invertebrates at a concentration as low as 0.032 mg/L in water (USEPA 1987). Lethal and sublethal effects have been found in sensitive fish (salmonids) at concentrations of less than 0.01 mg/L (Eisler 1993). The most restrictive chronic criterion for zinc in Las Vegas Wash is 0.47 mg/L imposed by the State of Nevada. Over 80 percent of the samples reported by SNWA exceeded a 0.02 mg/L detection

limit (Figure 4). Average zinc concentrations in lower Las Vegas Wash ranged from 0.07 to 0.09 mg/L with a high of 0.13 mg/L (SNWA 2001).

The USGS computed an urban trace element index (UTEI) for seven sites in Las Vegas Wash and Bay (Bevans *et al.* 1998). Index values were determined by calculating the ratio of concentrations of cadmium, chromium, copper, lead, and zinc at each site to corresponding concentrations at a background site. Ratios were then summed to provide a single UTEI value. The UTEI values at sites in lower Las Vegas Wash and near the mouth of Las Vegas Wash were 1.5 to 2 times higher than the background site.

The toxicity of trace elements to birds may be modified in the presence of other environmental contaminants. As indicated previously, the toxicity of copper and zinc may be enhanced in the presence of ammonia (Russo 1985). Copper toxicity to aquatic organisms may also be enhanced in the presence of zinc. Finlayson and Ashuckian (1979) concluded that safe levels of copper and zinc were 0.011 and 0.083 mg/L, respectively. Mixtures of arsenic, boron, copper, selenium, and zinc in water have been reported to be toxic to razorback sucker larvae (Hamilton and Buhl 1997). Toxicities of the mixtures were found to be greater than the toxicity of any single element. Concentrations of arsenic, boron, copper, selenium, and zinc in Las Vegas Wash water exceeded or were commonly within the range of concentrations where risk to razorback sucker larvae was predicted by Hamilton and Buhl (1997).

PESTICIDES

The U.S. Geological Survey detected 24 pesticides in water samples collected in Las Vegas Wash downstream of Las Vegas (Bevans *et al.* 1998). The pesticides most commonly detected were simazine, prometon, diuron, dacthal, diazinon, and malathion. Diazinon and malathion exceeded aquatic life criteria in 47 and 25 percent of the samples, respectively. Carbaryl and chlorpyrifos concentrations exceeded levels recommended for protection of aquatic life by the National Academy of Sciences (1973). The highest pesticide concentrations were found in Las Vegas Wash upstream of the sewage treatment plant discharges. Concentrations at this site were greater than the 75th percentile of sites investigated by the USGS under the National Water Quality Program.

In 1996, the USGS used semipermeable membrane devices (SPMDs) to sample organic contaminants in water in Las Vegas Wash, Las Vegas Bay, and a background site (Callville Bay) in Lake Mead (Bevans *et al* 1996). Semipermeable membrane devices sequester lipid-soluble contaminants from the water column, thus allowing time-integrated sampling of a variety of organic contaminants. While this sampling technology allows for the detection of contaminants at low concentrations and provides an accurate representation of the biological availability of lipid-soluble compounds, it generally does not allow for the accurate assessment of exceedances of water quality standards. Bevans *et al.* (1996) identified a variety of OC and semivolatile industrial compounds in water, bottom sediments, and carp in Las Vegas Wash and Las Vegas Bay. The number and combined concentrations of OC compounds were highest in Las Vegas Wash, followed by Las Vegas Bay (Bevans *et al.* 1996). The compounds hexachlorobenzene, dacthal, trans-chlordane, cis-chlordane, trans-nonachlor, dieldrin, *p,p*'-DDE, *p,p*'-DDD, and total polychlorinated biphenyls (PCBs) were detected at all sample sites in Las Vegas Wash and Bay. The number of compounds and concentrations were lower at Calville Bay, the background site. Organochlorine compounds were also detected in sediment and carp from Las Vegas Wash and Bay. Organochlorine compounds were not detected in sediment from the background site. The number of OC compounds and concentrations of both total OC and total DDT were significantly higher in carp from Las Vegas Bay than in carp from the background site. Median concentrations of total DDT (DDT and its metabolites DDD and DDE) in cross-sectional carp tissue from Las Vegas Wash and Bay (72 µg/kg and 120 µg/kg, respectively) fell within levels of concern for at-risk groups based on human consumption guidelines (USEPA 2000). At present, the Nevada State Health Department and NDEP are considering whether a human health consumption advisory is warranted for OC compounds and other contaminants in game fish from Lake Mead.

PERCHLORATE

Perchlorate, a chemical used since the 1940s in solid rocket fuels, lubricating oils, and fireworks, has been detected in water from Las Vegas Wash, Las Vegas Bay, and the lower Colorado River. The source of perchlorate has been identified as an industrial site operated by Kerr-McGee Chemical Company located in Henderson, Nevada near Las Vegas Wash. The

perchlorate anion is highly soluble, extremely stable, and may persist in water for decades. Perchlorates may affect wildlife health by preventing assimilation of iodine and interfering with thyroid functioning. The potential biological and ecological effects of perchlorate toxicity in wildlife are still being investigated by the scientific community. Goleman *et al.* (2002) found levels as low as 0.059 mg/L ammonium perchlorate inhibited thyroid activity and altered sex ratios in the South African frog (*Xenopus laevis*), significantly reducing the percentage of males at metamorphosis. The mode of action of perchlorate in biological systems raises concerns for possible carcinogenic, neurodevelopmental, developmental, reproductive, and immunotoxic effects. Concern for perchlorate in water has prompted the State of California to establish a human health standard of 0.018 mg/L in drinking water. USEPA recently concluded that perchlorate may be harmful at lower levels than previously thought and is considering lowering the perchlorate level deemed safe in drinking water from 0.018 to 0.001 mg/L. Safe levels for fish and wildlife are uncertain. Perchlorate levels in Las Vegas Valley drinking water (i.e., tap water) are routinely 0.010 to 0.015 mg/L and reached a high of 0.030 mg/L in December of 2001, when limnological conditions were not favorable for mixing and Las Vegas Wash flows remained relatively intact within Boulder Basin. Sampling by the Bureau of Reclamation in 1998 revealed perchlorate contamination in Las Vegas Bay near the Las Vegas Wash confluence, with concentrations ranging from 0.65 to more than 1 mg/L. Recent concentrations in Las Vegas Bay ranged from 0.020 to 0.110 mg/L (SNWA 2001). Water quality data in 2002 ranged from 0.25 to 0.45 mg/L at the confluence of the Las Vegas Wash, indicating that perchlorate concentrations may be on the decline, possibly due to ongoing remediation efforts by NDEP and Kerr-McGee.

POLYCYCLIC AROMATIC HYDROCARBONS

Polycyclic aromatic hydrocarbons (PAHs) and phthalates were detected in water and sediment from Las Vegas Wash and Las Vegas and Callville Bays (Bevans *et al.* 1996). Combined concentrations of these compounds were an order of magnitude greater in sediment from Las Vegas Wash and Bay than from the background site (Bevans *et al.* 1996). The areal distribution of PAH compounds in Las Vegas Bay indicated that Las Vegas Wash was the source of at least some of these compounds in Lake Mead, but there were also more general sources in

Lake Mead. Covay and Leiker (1998) found highly elevated concentrations of a variety of PAH compounds in the upper Las Vegas Wash, which drains the Las Vegas Metropolitan Area, suggesting that municipal runoff is a source of PAH to Las Vegas Wash.

DIOXINS AND FURANS

Bevans *et al.* (1996) found that combined concentrations of tetrachlorodibenzo-*p*-dioxins (TCDD) in SPMDs and sediment from Las Vegas Wash and Bay were two orders of magnitude higher than the background site (i.e., Callville Bay). Again, the distribution of dioxins and furans in Las Vegas Bay indicate that Las Vegas Wash is the source of these compound in Las Vegas Bay. Bioassays using the tissues from carp confirmed the occurrence of dioxins and furans with low toxic equivalent factors relative to 2,3,7,8-tetrachlorodibenzo-*p*-dioxin, thereby confirming biological exposure to these compounds.

ENDOCRINE DISRUPTING CHEMICALS

A variety of endocrine disrupting chemicals (EDCs) have been identified in Las Vegas Wash and Bay. An EDC, or endocrine disruptor, has been defined as "an exogenous chemical substance or mixture that alters the structure or function(s) of the endocrine system and causes adverse effects at the level of the organism, its progeny, populations, or subpopulations of organisms ..." (USEPA 1997). The mode of action of EDCs may include interference with the synthesis, secretion, transport, binding, or elimination of natural hormones in the body. In this manner, EDCs have the potential to compromise normal reproduction, development, growth, and homeostasis. Known EDCs include a variety of pesticides, industrial compounds, and pharmaceuticals and personal care products (PPCPs). An increasing number of studies have linked the occurrence of EDCs in the environment with biochemical and physiological changes and a variety of behavioral, reproductive, developmental, and immune system effects in invertebrates, fish, amphibians, reptiles, birds, and mammals (USEPA 1997). Effects are often subtle and may occur at extremely low concentrations (Daughton and Ternes 1999). Several of these studies linked the occurrence of effects with EDCs in effluents discharged from municipal wastewater treatment plants.

A variety of known EDCs, including a number of pesticides, industrial compounds, and PPCPs have been identified in water, sediment, fish blood plasma, and tissues collected from Las Vegas Wash and Bay. Bevans *et al.* (1996) found that water, sediment, and carp tissue from Las Vegas Wash and Bay contained elevated concentrations of a variety of known or suspected EDCs, including OC compounds, PAHs, phthalates, phenols, dioxins, and furans. Goodbred *et al.* (1999) reported ethynylestradiol, a synthetic estradiol typically found in oral contraceptives, in blood plasma of fish from Las Vegas Bay. Snyder *et al.* (1999) detected nonylphenol, octylphenol, 17β-estradiol, and ethynylestradiol in water samples from Las Vegas Wash and Las Vegas Bay. Monitoring by several entities has documented elevated perchlorate concentrations in water from Las Vegas Wash and Bay. Perchlorate is known to affect thyroid function in humans and implications to endocrine system effects in wildlife are still under investigation.

Assessment of EDCs in biological samples from Lake Mead is continuing under the direction of Tom Lieker of the USGS National Water Quality Laboratory, Denver, Colorado. Several known or suspected EDCs have been identified in blood plasma and tissues of carp, largemouth bass, and razorback sucker from Lake Mead (Tom Lieker, USGS, pers. comm., 2002). The number of identified compounds and concentration of most compounds of concern is substantially higher in samples from Las Vegas Bay as compared to other sites in Lake Mead. Results of this investigation are expected to be released in 2003.

ASSESSMENT OF CONTAMINANTS IN AVIAN EGGS

INTRODUCTION

A diverse assemblage of migratory birds is associated with Las Vegas Wash and Bay. The number and diversity of birds using this area is expected to increase as a result of efforts to develop wetlands along Las Vegas Wash. However, several contaminants identified in this area have the potential to adversely affect avian reproduction and survival. This component of the study was initiated to evaluate the potential for OC compounds and trace elements and trace elements to adversely affect avian reproduction.

METHODS

Eggs of three and possibly four migratory bird species representing two feeding guilds (piscivorous and insectivorous) were collected in the spring of 1999 for OC, metal, and trace element and metals analyses. For piscivorous species, seven western grebe (*Aechmophorus occidentalis*) and/or Clark's grebe (*A. clarkii*) eggs were collected from Las Vegas Bay near the confluence of Las Vegas Wash. Eggs and nests of both species are similar in appearance and adult grebes were not on the nests at the time of egg collection. Therefore, it is uncertain whether the eggs were laid by western or Clark's grebes or both. A suitable background site for grebes was not located in the southern Nevada area. Therefore, no eggs from a background site were collected. For insectivorous birds, six cliff swallow (*Hirundo pyrrhonota*) eggs were collected from nests beneath the bridge over Las Vegas Wash on State Highway 147 and two barn swallow (*H. rustica*) eggs were collected from the Las Vegas Wash outflow structure on Lake Las Vegas Dam. Ten cliff swallow eggs were collected from nests beneath a bridge on State Highway 169 near Overton, Nevada to represent a background site.

Eggs were collected by hand, placed in a chemically cleaned jars, stored on ice in the field, and later opened using pre-cleaned stainless steel instruments in the laboratory. Embryos were inspected for gross abnormalities and egg contents were placed in 60 ml acid-washed glass containers and then frozen. Because of their small sizes, two swallow eggs from the same nest

were composited for each of the swallow egg samples. Each grebe egg was treated as a discrete sample.

Samples were submitted to designated laboratories under contract with the Service's Patuxent Analytical Control Facility (PACF) at Laurel, Maryland, for trace element and OC analyses. The OC scan was conducted using a gas-liquid chromatograph and included the following compounds: HCB, total PCBs, *alpha* BHC, *alpha* chlordane, *beta* BHC, dieldrin, endrin, *gamma* BHC, *gamma* chlordane, heptachlor epoxide, mirex, *o,p*'-DDD, *o,p*'-DDE, *o,p*'-DDT, oxychlordane, *p,p*'-DDD, *p,p*'-DDE, *p,p*'-DDT, toxaphene, and *trans*-nonachlor. The trace element scan included the following elements: aluminum, arsenic, boron, barium, beryllium, cadmium, chromium, copper, iron, mercury, magnesium, manganese, molybdenum, nickel, lead, selenium, strontium, vanadium, and zinc. Trace element analysis for arsenic and selenium was conducted using atomic absorption spectroscopy, mercury using cold vapor atomic absorption spectroscopy, and the remaining trace elements using inductively coupled plasma emission spectroscopy. Quality assurance and quality control of the chemical analysis were approved by PACF.

The toxicity and potential for OCs and trace elements to adversely affect migratory birds varies by compound and by species. Birds may respond differently to certain contaminants and doses. Species-specific differences among birds to contaminants are often reported in the scientific literature. Avian toxicity and effects on short and long term health are not well understood, particularly when wildlife receptors are exposed to complex mixtures of xenobiotics, as is the case for Las Vegas Wash. Thus, our review of avian contaminant effect studies should be viewed with caution. Contaminant related effects reported in other bird species may not necessarily be exhibited by western grebes, Clark's grebes, cliff swallows, or barn swallows.

RESULTS AND DISCUSSION

Several OCs were detected in grebe eggs collected from Las Vegas Bay and swallow eggs collected from Las Vegas Wash and Overton, Nevada. Principal compounds detected included DDT metabolites DDD and DDE, PCB compounds, chlordane compounds, and benzene hexachloride (BHC) (Figure 5). The number of detected OCs (15, 13, and 11 for Las

Vegas Bay grebes, Las Vegas Wash swallow, and Overton swallows, respectively) and total OC concentrations (Figure 6) were significantly higher in swallow eggs from Las Vegas Wash compared to the Overton reference site. DDT and its metabolites DDD and DDE (collectively termed total DDT) accounted for the majority of the total OC burden in all but one case in eggs from Las Vegas Wash and Bay. Principal compounds in Overton eggs included DDT metabolites and chlordane compounds.

The potential for DDT to cause the thinning of avian egg shells and, subsequently, a reduction in reproductive success in birds is well documented (Blus 1996). Eggshell thinning is primarily attributed to the metabolite, DDE. Sensitive species may experience significant reproductive declines with DDE egg residues as low as 3 ppm, wet weight (ww). Lindvall and Low (1980) did not find apparent effects to productivity in western grebes when concentrations in eggs averaged 6.6 ppm, ww. DDE concentrations in grebe eggs from Las Vegas Bay ranged from 1.3 to 13.9 ppm, ww with a mean of 7.1 ppm, ww (Figure 7). Relationships were not apparent between DDE or total DDT concentrations and egg shell thickness or Ratliffe index values for grebe eggs. DDE ranged from 2.1 to 8.6 ppm, ww (0 = 5.2 ppm) in swallow eggs from Las Vegas Wash and from 0.2 to 2.1 ppm, ww (0 = 0.8 ppm) in swallow eggs from Overton. Swallow eggs shells were too small to provide accurate measurement of thickness with the instrumentation available.

Hoffman *et al.* (1996) identified an avian egg PCB concentration of 1 ppm, ww as a threshold for sensitive birds. Primary effects included reduced hatching. PCB concentrations in grebe eggs from Las Vegas Bay ranged from 1.5 to 6.6 ppm, ww (0 = 3.4 ppm). Concentrations in swallow eggs from Las Vegas Wash ranged 0.9 to 1.2 ppm, ww (Figure 7). PCB concentrations in three of five samples from Overton were less than the 0.05 ppm detection limit. The highest concentration was 0.83 ppm, ww.

Hexachlorobenzene, dieldrin, and mirex concentrations were lower than known effect levels in avian eggs (Wiemeyer 1996, Peakall 1996). Information on egg residues of chlordane compounds and effects to reproduction are lacking (Wiemeyer 1996). Toxaphene was less than the lower analytical detection limit (0.05 ppm, ww) in all eggs sampled.

Due to the smaller size of swallow eggs and inadequate sample volume following OC analyses, trace element residue analyses for avian eggs could only be performed on grebe

samples. As stated previously, a suitable background (i.e., control) site for grebes was not located, therefore, interpretation of elemental residues in grebe eggs was limited to comparison with toxic thresholds in published literature.

Aluminum, arsenic, barium, beryllium, cadmium, lead, molybdenum, and vanadium were less than the analytical detection limits for all samples (Table 1). Boron (0 = 0.321 ppm ww), chromium (0 = 0.304), copper (0 = 0.518), iron (0 = 22.7), magnesium (0 = 75.8), manganese (0 = 0.304), mercury (0 = 0.0249*), nickel[3] (0 = 0.044*), selenium (0 = 0.39), strontium (0 = 1.16), and zinc (0 = 7.94) were detected but concentrations were less than known biological effect levels. Chromium residues in grebe eggs ranged from 0.246 to 0.417 ppm, ww which is within the range found in other avian species reported by Burger *et al.* (1999) and is not indicative of chromium contamination (i.e., not $ 4.0 ppm) as described by Eisler (1986). Copper ranged from 0.383 to 0.678 ppm, ww and did not appear elevated compared to other bird studies (Hui *et al.* 1998; de Moreno *et al.* 1997; Morera *et al.* 1997). Likewise, selenium concentrations ranged from 0.259 to 0.495 ppm, ww and were lower than contaminant threshold concentrations reported by Skorupa and Ohlendorf (1991). Mercury concentrations ranged from 0.0219 to 0.0757 ppm, ww. Zillioux and others (1993) estimated that the significant toxic effects threshold concentration for mercury in most aquatic bird eggs was between 1.0 and 3.6 µg/g, ww. Observed mercury values were also well below safe levels reported by Eisler (1987) and Heinz (1979). Typically, iron, magnesium, manganese, and strontium are not ecological contaminants of concern and will not be discussed in this report.

CONCLUSIONS

The occurrence of OC compounds in avian eggs confirms that migratory birds utilizing the Las Vegas Bay are exposed to these contaminants. DDT metabolites and PCBs occur at levels that have the potential to affect embryo and hatchling survival. Although grebes are known to occupy Las Vegas Bay waters as year-round residents, there is inherently some degree

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* indicates that more than half of the samples were below the lower detection limit. Values below the detection limit were halved to determine average concentrations (0).

of uncertainty when collecting avian samples as to whether contaminant concentrations reflect local conditions (i.e., whether or not exposure is from a local source). However, the occurrence of OCs in environmental media in Las Vegas Wash and Bay combined with higher concentrations in swallow eggs from Las Vegas Wash than from Overton suggests that Las Vegas Wash is a source of DDT metabolites and PCBs. In addition, the concentration of certain analytes in avian eggs (e.g., selenium) has been shown to strongly reflect local conditions due to the resident time needed for courtship, embryo development, and nesting activities (Joseph Skorupa, Service, pers. comm., 2002). Additional research is recommended to determine if OCs are affecting avian productivity in Las Vegas Wash and Bay.

Trace elements do not appear to be at levels of concern in grebe eggs. However, trace element concentrations in water, sediment, and biota from Las Vegas Bay are consistently lower than Las Vegas Wash due to dilution. Grebes prefer open water habitat and would presumably reflect conditions in Las Vegas Bay. Also, the number of samples analyzed for trace elements was small (n = 7) and should be verified through additional sampling to ensure concentrations are representative of the population as a whole.

A cooperative effort between the Service and SNWA to monitor trace element and organochlorine residues in bird eggs along Las Vegas Wash is planned for the spring of 2003. The monitoring will provide additional information needed to better assess risks to birds utilizing the Las Vegas Wash and its tributaries. Monitoring activities along Las Vegas Wash may be expanded in the future to include measures of avian reproductive success (e.g., nest success).

ASSESSMENT OF CONTAMINANT EXPOSURE AND EFFECTS IN LAKE MEAD RAZORBACK SUCKERS

INTRODUCTION

This portion of the study was initiated to determine exposure of adult razorback suckers to environmental contaminants in Las Vegas Wash and Lake Mead and to evaluate implications to survival and reproduction. Although active razorback sucker spawning, as evidenced by the presence of eggs and larvae, has been documented within each of two populations in Lake Mead, recruitment of juveniles is rare. The contribution of contaminants to declines in reproduction, recruitment, and adult survival is uncertain when compared with other factors such as habitat modification and non-native predation.

METHODS

Two frozen whole razorback suckers were opportunistically obtained due to mortalities from a telemetry study by a private consultant using implanted sonic tags in Lake Mead. One fish was a 588 mm (total length), 1,940 g male between 9 and 10 years of age collected at Blackbird Point in Las Vegas Bay. The other was a 381 mm, 575 g, 4 to 5 year old juvenile collected from Echo Bay. Both fish were submitted to PACF, Laurel, Maryland for determination of trace element and OC compounds in whole-body fish.

Hormone concentrations and ratios, contaminants in blood plasma, and sperm quality were assessed to evaluate endocrine system effects in razorback suckers. Trammel nets were used to collect a total of 44 male and 17 female razorback suckers from Lake Mead. Fish were collected between February and March of 2000 and 2001. Net success at each site over the two year study were 24 male and 8 female at Las Vegas Bay and 20 male and 9 female from Echo Bay. At the time of preparation of this report, evaluation of 2001 samples was in progress and will therefore be included in the joint USGS-Service investigation report to be released in 2003. The following discussion will include 2000 results only, consisting of 11 males and 1 female from Las Vegas Bay, and 10 male and 4 female from Echo Bay.

Echo Bay served as the reference site for the razorback sucker contaminant assessment portion of this study. Echo Bay receives naturally occurring runoff (infrequently) from an unpopulated region near the Overton Arm of Lake Mead and is therefore considered an ideal location for sampling background contaminant levels in razorback sucker. Razorback suckers were weighed, measured, and visually inspected for external lesions, parasites, and other abnormalities then released. All razorback suckers were implanted with passive integrated transponder (PIT) tags to prevent resampling of same fish and to assist in ongoing population studies sponsored by the SNWA. Approximately 3 cubic centimeters (cc) of whole blood was collected from the caudal peduncle of each fish and placed in lithium-heparinized vacutainer tubes. The blood samples were centrifuged at 10,000 RPM for 10 minutes, blood plasma was separated from packed cells with a pipet, and frozen on dry ice. Plasma samples were submitted to the Florida Caribbean Science Center for analysis of 17β-estradiol, 11-ketotestosterone, ethynyl-estradiol, and vitellogenin. Analyses followed methods described in Goodbred *et al.* (1997).

An aliquot of whole-body razorback sucker homogenate and remaining razorback sucker blood plasma were also provided to Tom Leiker of the USGS National Water Quality Laboratory for assessment of non-conventional pollutants (e.g., pharmaceuticals). These analyses were in progress at the time of preparation of this report. Results will be included in the joint investigation report to be released in 2003.

To evaluate exposure to genotoxic compounds, two drops of whole blood from each razorback sucker captured in 2001 were frozen on liquid nitrogen and submitted to the University of California, Davis, Bodega Marine Laboratory for assessment of DNA adducts.

RESULTS AND DISCUSSION

Two populations of razorback suckers occur in Lake Mead, one at Las Vegas Bay and another at Echo Bay (Holden *et al.* 1999). Fish tagged at one location have not been captured at the other location, suggesting that there is little, if any, intermixing between the two populations. Water quality monitoring has demonstrated that a variety of contaminants occur in Las Vegas

Wash. Differences in temperature and total dissolved solids discourage mixing of Las Vegas Wash water with Lake Mead water (LaBounty and Horn 1997). As a result, Las Vegas Wash water intrudes into Lake Mead and maintains a distinct temperature, conductivity, and presumably chemical signature some distance into Lake Mead. Therefore, aquatic species residing in Las Vegas Bay and portions of Lake Mead may be exposed to chemical and biological (e.g., pathogens) contaminants at concentrations occurring in Las Vegas Wash. The depth of the intrusion and the distance that it extends into Lake Mead depend on seasonal conditions and are predictable seasonally. From February to late May, when razorback sucker adults, eggs, and larvae would be expected to be present near the spawning area in Las Vegas Bay, the intrusion occurs at a depth of 20 to 30 meters and intrudes well into the lake. In April, the intrusion was recorded at least 8 km into the lake. Blackbird Point, a documented spawning location for razorback suckers in Lake Mead, occurs approximately 4 km from the confluence of Las Vegas Wash and Bay. Depending on lake elevation, spawning in Las Vegas Bay may occur at depths between 10 and 25 meters.

As reported earlier, elevated concentrations of a variety of contaminants have been reported in Las Vegas Wash water. Concentrations were generally higher in the upper reaches of Las Vegas Wash but concentrations associated with both acute and chronic toxicity to aquatic organisms were identified in the lower reaches of the Wash. Concentrations of several inorganic contaminants were similar to, or exceeded concentrations found to adversely affect razorback sucker reproduction and recruitment (Hamilton and Buhl 1997). The intrusion of Las Vegas Wash water into Lake Mead (LaBounty and Horn 1997) increases the possibility that potentially toxic trace element concentrations occur at the area where razorback suckers spawn in Las Vegas Bay. Fish are more sensitive to the effects of certain contaminants during early developmental life stages.

With the exception of selenium, concentrations of potentially toxic metals and trace elements did not exceed concern levels in tissues of either of the two analyzed razorback suckers. Arsenic, boron, beryllium, cadmium, mercury, and molybdenum were less than the analytical detection limits. Chromium, copper, nickel, lead, and zinc were detected at one or both sites, but concentrations were less than known biological effect levels. Selenium concentrations were 6.2 μg/g, dry weight (dw) and less than 0.3 μg/g, dw in Echo Bay and Las

Vegas Bay razorback suckers, respectively. Selenium is strongly bioaccumulated by aquatic organisms (Lemly 1996). Skorupa *et al.* (1996) reported normal whole body selenium in fish as <1 - 4 μg/g, dw, and estimated a threshold range for reproductive impairment in sensitive fish species as between 4 and 6 μg/g, dw whole body concentration. Toxic endpoints commonly include histopathology, physiological effects, reduced reproduction, and reduced survival. Selenium is recognized as a powerful teratogen, and reproduction is generally considered the most sensitive and significant toxic endpoint. Selenium has been identified as a concern throughout the Colorado River basin (Hamilton 1999). Anthropogenic sources, particularly agricultural drainage, were identified as the primary cause of elevated concentrations in the lower basin.

Assessment of chemical concentrations in single razorback sucker samples collected from each of Las Vegas Bay and Echo Bay (reference) indicate that Lake Mead razorback suckers are exposed to and accumulate certain contaminants. Distinct differences were found in the samples collected from each area. Nine of 22 analyzed OC compounds were detected in the razorback sucker collected from Las Vegas Bay (Figure 8). The total OC concentration was 0.737 μg/g, ww. No OC compounds were detected in the razorback sucker from Echo Bay. DDT residues (the sum of DDT and the metabolites DDD and DDE) accounted for more than half of the total detected OC concentration (0.408 μg/g, ww) in the Las Vegas Bay razorback sucker. Total PCBs accounted for about a third of the total detected OC concentration (0.267 μg/g, ww). Bevans *et al.* (1996) found median total DDT concentrations of 0.072 and 0.120 μg/g, ww in cross sectional carp tissue samples collected from Las Vegas Wash and Bay, respectively. USGS analyzed only *p,p*'-DDT, *p,p*'-DDD, and *p,p*'-DDE. The total *p,p*'-DDT concentration in the Las Vegas razorback sucker sample was more than twice the median concentration for Las Vegas Bay carp (0.29 μg/g, ww). Bevans *et al.* (1996) found a median concentration of total PCBs of 0.13 and 0.14 μg/g, ww in carp tissue from Las Vegas Wash and Bay, respectively. The total PCB concentration in the Las Vegas Bay razorback sucker (0.267 μg/g, ww) was approximately twice these median concentrations.

DDT and PCBs have been associated with a variety of effects to fish. Tissue concentrations associated with adverse effects to fish have not been well established. According to the summary of Niimi (1996), tissue concentrations of PCBs in razorback suckers and carp

from Las Vegas Wash and Bay were below levels associated with effects to survival, growth, or reproduction in fish (> 50 mg/kg) and the range associated with biochemical changes and cellular-level effects (> 5 mg/kg).

The limited number of razorback suckers from Las Vegas Bay and Echo Bay examined during sampling did not exhibit overt external indications of adverse health effects from environmental contaminants. Size, weight, and Fulton's condition factor of male razorback suckers were not significantly different between sites (Table 3). No tumors or external lesions were noted on any of the razorback suckers examined. Histological analysis of common carp collected from Las Vegas Wash, Las Vegas Bay, and Calville Bay in Lake Mead indicated necrotic changes in hepatopancreas (e.g., liver) and kidney tissues (Bevans *et al.* 1996). The pattern and severity of necrosis were consistent with subchronic exposure to contaminants or combinations of contaminants. Because of their endangered status and limited numbers in Lake Mead, razorback suckers were not sacrificed for assessment of histopathology.

Dioxins, PAHs, certain metals, and other contaminants identified at elevated concentrations in Las Vegas Wash have the ability of cause DNA damage (genotoxic). Exposure to such compounds may result in carcinogenic or mutagenic effects in fish and wildlife. An initial step in chemical carcinogenesis is the modification of DNA by genotoxic compounds resulting in the formation of adducts (Beland and Kadlubar 1985, Poirier *et al.* 1991). The number of DNA adducts formed and the relative persistence of the adducts appear to be related to the carcinogenicity of a chemical (Reichert *et al.* 2001). As such, measurement of DNA adduct levels in fish may be used to assess relative risk from exposure to environmental carcinogens and mutagens in fish. The frequency of DNA adducts in razorback sucker red blood cells was not significantly different ($p = 0.59$) between Las Vegas Bay and Overton Bay (Table 3).

A variety of known EDCs have been identified in water, sediment, fish blood plasma, and tissues collected from Las Vegas Wash and Bay. Consistent with this, research has identified indications of endocrine disruption in fish from Lake Mead. Bevans *et al.* (1996) found significantly lower levels of the sex steroids 11-ketotestosterone and 17β-estradiol in male carp from Las Vegas Bay compared to those from a reference site (Callville Bay in Lake Mead). Low concentrations of sex steroids can cause premature sexual maturity, reduced gonad size, and

reduced secondary sex characteristics (Munkittrick *et al.* 1992). Male carp from Las Vegas Wash and Bay also had significantly higher concentrations of the protein vitellogenin than did males from the reference site. Vitellogenin, an estrogen-controlled egg protein, is usually at or below the lower analytical detection limit and has no known function in males. Female carp from Las Vegas Wash had significantly higher levels of 11-ketotestosterone compared to controls. The ratio of 17β-estradiol to 11-ketotestosterone in female carp from Las Vegas Bay was comparable to male carp. The ratio of 17β-estradiol to 11-ketotestosterone was significantly higher in male carp from Las Vegas Bay compared to the reference site.

Goodbred *et al.* (1999) examined sex steroid hormone concentrations and ratios, vitellogenin concentrations, and physiological indications of endocrine disruption in carp from eight sites along the lower Colorado River from Pierce Ferry in upper Lake Mead to Lake Mohave. Concentrations of 11-ketotestosterone again were significantly lower in Las Vegas Bay male carp and the ratio of 17β-estradiol to 11-ketotestosterone was more than 80 percent higher in Las Vegas Bay male carp than controls. Forty percent of the male carp from Las Vegas Bay had a ratio that exceeded 1 (male ratios are typically < 1, females > 1). Vitellogenin was detected in male carp from five of the eight sites, but was not found in male carp from Las Vegas Bay. Ethynylestradiol, an estrogen used in commercial birth control pills, was detected in carp from Las Vegas Bay and Calville Bay. Concentrations were significantly higher in male carp from Las Vegas Bay. Sperm viability was significantly lower in Las Vegas Bay carp. The mean gonadosomatic index (ratio of gonad weight to total body weight) of female carp from Las Vegas Bay was 30 percent lower than predicted based on the stage of egg maturation. Reduced gonadosomatic indices have been associated with contaminant exposure in other studies (Dey and Bhattacharya 1998; Shukla and Pandey 1985).

Assessment of Lake Mead carp and largemouth bass reproductive physiology and functionality by the USGS and Service is ongoing. Preliminary data do not indicate a substantial difference in hormone concentrations or physiological measurements in female carp collected from Las Vegas Bay and a Lake Mead reference site (Overton Beach). Observed differences appear to be attributable to seasonal asynchrony between sites. Several differences were found in male carp, including reduced 11-ketotestosterone concentrations in blood plasma, skewed

ratios of 17β-estradiol to 11-ketotestosterone, decreased gonadosomatic index values, and decreased sperm motility and viability. Reduced 11-ketotestosterone concentrations in blood plasma and skewed ratios of 17β-estradiol to 11-ketotestosterone were also found in male largemouth bass from Las Vegas Bay as compared to the reference site. Female largemouth bass from Las Vegas Bay had higher 11-ketotestosterone concentrations in blood plasma than controls. Results of these investigations are expected to be reported in 2003.

Razorback suckers in Lake Mead also exhibit indications of endocrine disruption. Concentrations of 17β-estradiol were significantly higher ($p = 0.015$) in male razorback suckers from Las Vegas Bay than those from Echo Bay (Figure 10). Concentrations of 11-ketotestosterone were lower, with the difference approaching significance ($p = 0.068$). The ratio of 17β-estradiol to 11-ketotestosterone was also significantly higher in Las Vegas Bay males than in Echo Bay males. The mean ratios were 1.01 and 0.23 in males from Las Vegas Bay ($n = 11$) and Echo Bay ($n = 10$), respectively. The mean ratio and ratios in 5 of 11 male razorback suckers exceeded 1 (Figure 9). Ethynylestradiol was detected in blood plasma of razorback suckers collected from Las Vegas Bay (Tim Gross, USGS Florida Caribbean Science Center, pers. comm. 2001).

Due to the limited sample sizes, statistical comparisons of hormone concentrations and ratios were not attempted for female razorback suckers. However, the 17β-estradiol concentration in a single female from Las Vegas Bay was substantially lower than concentrations observed in females from Echo Bay (Figure 9). Consistent with this, the ratio of 17β-estradiol to 11-ketotestosterone was substantially lower in the Las Vegas Bay female.

Effects of EDCs to razorback sucker physiology and functionality are uncertain at this time. Due to their endangered status and limited numbers in Lake Mead, razorback suckers were not sacrificed for assessment of gonad histology, gonadosomatic index, or organosomatic assays. Attempts to assess sperm motility and viability of male razorback suckers were not successful in 2000, due to the absence of an appropriate sperm extender (necessary for microscopic observation of sperm). Preliminary data from 2001, indicate that sperm motility and viability are lower in male razorback suckers from Las Vegas Bay. Results of this component of the investigation will be reported in 2003.

Hormone concentrations in fish can vary with season and reproductive status. All razorback suckers evaluated in our investigation were collected near known spawning areas during the time period that razorback suckers spawn. Additionally, all but one male at each site

expressed milt when palpated. Therefore, differences in reproductive status are not believed to account for differences in hormone concentrations and ratios observed between razorback sucker populations in Lake Mead.

CONCLUSIONS

Razorback suckers in Lake Mead are exposed to and accumulate contaminants. Several contaminants have the potential to compromise reproduction and survival of the Lake Mead populations. The highest selenium concentration was in a single whole-body razorback sucker sample from Echo Bay. The concentration in this sample was sufficient to reduce reproductive success. Other trace elements do not appear to be at levels of concern to razorback suckers. Several OC compounds were detected in the razorback sucker sample from Las Vegas Bay but none were detected in the Echo Bay sample. PCBs and metabolites of DDT accounted for the majority of the combined OC concentration in the Las Vegas Bay razorback sucker.

The Lake Mead razorback suckers examined during trammel netting did not exhibit overt external indications of contaminant exposure and effects. Condition factor values of Las Vegas Bay and Echo Bay razorback suckers were similar. Additionally, no difference in indications of exposure to genotoxic compounds was found between the two Lake Mead razorback sucker populations.

As compared to Echo Bay, Las Vegas Bay razorback suckers exhibit evidence of endocrine disruption. Male razorback suckers in Las Vegas Bay had higher concentrations of 17β-estradiol and skewed ratios of 17β-estradiol to 11-ketotestosterone. Based on a limited sample size, female razorback suckers in Las Vegas Bay appear to have depressed 17β-estradiol concentrations and skewed ratios of 17β-estradiol to 11-ketotestosterone. Efforts to initiate a cooperative study to determine potential reproductive effects in fish at the population level are ongoing.

ASSESSMENT OF DOWNSTREAM CONTAMINANT EXPOSURE AND EFFECTS

INTRODUCTION

Water quality monitoring has demonstrated that a variety of potentially toxic constituents are introduced to Lake Mead from Las Vegas Wash. The occurrence of elevated perchlorate concentrations in the Colorado River downstream of Hoover Dam demonstrates that contaminants from Las Vegas Wash affect water quality in the lower Colorado River. Analysis of biological samples provides evidence that fish and wildlife in Las Vegas Bay are exposed to and accumulate some of these constituents. Biochemical and physiological differences between fish collected from Las Vegas Bay and sites upstream of the Bay raise concern for potential effects to fish, wildlife, and their habitat downstream of Las Vegas Wash. The largest razorback sucker population in the lower Colorado River basin occurs in Lake Mohave and the Colorado River downstream of Hoover Dam. Additionally, these areas also support endangered bonytail chub and southwestern willow flycatcher. This portion of the investigation was designed to assess the occurrence of contaminants and biological effects in the Colorado River downstream of Hoover Dam and in Lake Mohave.

METHODS

Semi-permeable membrane devices were employed to assess the occurrence of selected OC compounds in the water column in Las Vegas Bay and areas downstream of Lake Mead. SPMDs, which consist of low-density polyethylene tubes filled with triolene or other lipid materials, are effective at sequestering lipid soluble compounds dissolved in water (Huckins *et al.* 1990). SPMDs were attached to anchor chains of channel buoys in Las Vegas Bay (equivalent to site 3 in Bevans *et al.*, 1996), near the USGS gaging station on the Colorado River downstream of Hoover Dam, near the Willow Beach boat launch area, and in Cottonwood Cove on Lake Mohave. At each location, SPMDs were affixed at a depth of approximately 1 m for a five week period from early June to mid July, 1998. The time period and length of time SPMDs were set coincided with SPMD sampling conducted in 1995 (Bevans *et al.* 1996). SPMDs and deployment devices, along with dialysis and cleaning services upon retrieval were provided by

Environmental Sampling Technologies (St. Joseph, Missouri). SPMD extracts were submitted to the Mississippi State Chemical Laboratory for analysis of selected OC and PAH compounds.

Lake Mead carp were collected in 1995 (Bevans *et al.* 1996). Organochlorine pesticide and PCB residue concentrations in that study were determined in 5-cm vertical cross sections of Lake Mead carp taken mid-body by the USEPA Region 9 Laboratory in Richmond, CA, using dual column gas chromatography with electron capture detectors. Additional analyses were performed by atomic emission detector with identification and confirmations by ion trap detector. Carp from Lake Mohave and Lake Mead were collected in 1998. Whole carp carcasses were stored and shipped frozen to PACF, Laurel, MD for determination of OC residues. Residue concentrations were quantified with gas-liquid chromatography (GLC) equipped with a 63Ni electron capture detector. The GLC column used was a 30m MEGABORE coated with a 1.0 micron film of 7 percent cyanopropyl 7 percent phenyl polysiloxane. Residues in 10 percent of the samples were confirmed by gas chromatography/ mass spectrometry (GC/MS). The nominal lower limit of detection was 0.01 ppm for pesticides and 0.05 ppm for PCBs based on a 10 g aliquot, ww. Only analytes common to both groups (alpha BHC, alpha chlordane, beta BHC, dieldrin, endrin, gamma BHC, gamma chlordane, heptachlor epoxide, *p,p'*-DDD, *p,p'*-DDE, *p,p'*-DDT, PCBs resembling Aroclor 1254, and toxaphene) were included in subsequent figures.

In 1998, a total of 46 adult carp were collected from Lake Mead near Hoover Dam (Hemenway Beach area, n = 7), the Colorado River between Lake Mead and Lake Mohave (Willow Beach area, n = 19), and Lake Mohave (Cottonwood Cove area, n = 20) to assess contaminant accumulation and effects in areas downstream of Las Vegas Wash. Carp were collected by boat-operated electrofishing techniques, temporarily held in an on-board tank, then transferred to an in-situ livebox for 1 to 3 hours prior to necropsy. Each fish was lightly anesthetized with MS222, struck on the head, rapidly examined for external abnormalities (gill, eye, skin), weighed, measured for total and fork length, and bled from the caudal peduncle with a heparinized syringe. The blood sample was used for a bloodsmear (methanol fixed, Leishman-Giemsa stain) and aliqouts then centrifuged (10,000 RPM, 10 min.) for measurement of hematocrit, leukocrit, and collection of plasma. Blood smears were examined at 1000X magnification and the first 100 leukocytes counted as lymphocytes, thrombocytes (elongated forms only), neutrophils, eosinophils, or monocytes (Roberts 1989, Witten *et al.* 1998). Clot activation during the collection of the blood sample can result in "spent" thrombocytes which

resemble small lymphocytes (Roberts 1989). As these atypical thrombocytes are easily confused with small lymphocytes, a combined lymphocyte + thrombocyte count was compared with the granulocyte count (neutrophil, eosinophil, and rarely monocytes).

Plasma was frozen on dry ice and later assayed for total protein (spectrophotometer assay using Pierce Chemical Company bicinchoninic acid reagent and standard) and electrophoretic profile. Plasma protein electrophoresis was performed with a 7 FL sample run on a CIBA agarose gel (1M barbital buffer, 90V for 45 min.). The stained gels were scanned and the percent area of each fraction determined with Seprascan ™ software. Analysis of variance was performed on percent area values for each fraction (or combined fractions).

The peritoneal cavity was opened and internal organs were examined for gross abnormalities. A sterile swab was inserted into the kidney and used to inoculate a trypicase soy agar plate. After the gonad was removed and weighed, kidney samples were collected for *R. salmoninarum* antigen enzyme-linked immunosorbent assay and viral assay on both fathead minnow (FHM) and CHSE214 cell lines (five fish pooled samples cultured for 15 days at 15 °C). Samples of kidney, liver, and gonad for histological examination were collected and fixed in Davidson's fixative for 24 hours then transferred to 70 percent ethanol. These tissues were processed for 5 mm paraffin sections and stained with hematoxylin and eosin. A subset of sections from each sample group were stained with Perl's Iron stain (hemosiderin), Acid fast stain (ceriod/lipofuscin), and Sudan Black B (ceriod/lipofuscin).

Blood plasma samples were also submitted to the Florida Caribbean Science Center for analysis of 17β-estradiol, 11-ketotestosterone, ethynyl-estradiol, and vitellogenin. Analyses followed methods described in Goodbred *et al.* (1997).

Three composited crayfish samples were collected from backwater ponds used as rearing ponds for larval razorback suckers. Each sample consisted of a composite of a minimum of five crayfish. Samples were placed into clean glass jars and submitted for OC and trace element residue analysis to PACF in Laurel, Maryland.

RESULTS AND DISCUSSION

Semipermeable Membrane Device Monitoring

Bevans *et al.* (1996) detected a variety of organic compounds in extracts from SPMDs set in Las Vegas Wash (1 site), Las Vegas Bay (3 sites), and Calville Bay (1 site) in Lake Mead.

Semipermeable membrane devices sequester lipid-soluble contaminants from the water column, thus allowing time-integrated sampling of a variety of organic contaminants. The number of detected OC compounds and combined concentrations were significantly higher in Las Vegas Wash and Bay compared to sites below Hoover Dam. Combined concentrations of tetrachlorodibenzo-*p*-dioxins and tetrachlorodibenzofurans were also higher in Las Vegas Wash followed by Las Vegas Bay. Polycyclic aromatic hydrocarbons were elevated at all sites. We identified 12 OC compounds in extracts of an SPMD placed in Las Vegas Wash (Figure 11). Compounds detected in 1996 and 1998 included hexachlorobenzene, cis-chlordane, trans-chlordane, trans-nonachlor, dieldrin, *p,p'*-DDD, *p,p'*-DDE, and PCBs. The combined concentration of these compounds in 1998 was lower than that found by Bevans *et al.* (1996) (Figure 11). The DDT metabolites DDD and DDE accounted for about one-half of the combined concentration of all OCs (0.222 and 0.433 μg/g, respectively), with PCBs accounting for about one-quarter (0.100 μg/g). Although not reflected in Figure 11, *o,p'*-DDD and *o,p'*-DDE were also found at a combined concentration of 0.08 μg/g in 1998. Organochlorine compounds were not detected in extracts of SPMDs placed in the Colorado River immediately downstream of Hoover Dam, the Colorado River at Willow Beach, or Cottonwood Cove of Lake Mohave.

Trace Elements in Carp

Unless otherwise noted, trace element concentrations in the following discussion are given on a dry weight basis.

Arsenic, beryllium, and molybdenum were at or less than analytical detection limits (0.33, 0.07, and 1.3 μg/g, respectively) in all whole-body carp samples. We are not aware of information to evaluate concerns with boron in whole fish. Boron concentrations in all samples, ranging from less than 1.3 to 42 μg/g, were well below a 300 μg/g concentration associated with reduced reproductive success in birds (Smith and Anders 1989). Similarly, we found no information on the implications of cadmium in whole fish but concentrations in all carp samples (<0.06 to 0.8 μg/g) were less than a 2.0 μg/g concentration associated with biochemical changes in birds (Furness 1996) and well below a 20 μg/g concentration associated with histopathology in birds (Cain *et al.* 1983).

With the exception of a single fish from Willow Beach which had a chromium concentration of 3.9 μg/g, chromium concentrations in carp were well below (# 1.2 μg/g) a 4.0 μg/g concentration identified as a concern level by Eisler (1986). Chromium concentrations

were similar in whole carp collected from Hemenway Beach, Willow Beach, and Cottonwood Cove.

Ohlendorf (1998) indicated that a copper concentration of 9.8 μg/g in whole rainbow trout was associated with a slight increase in mortality and a concentration of 13.3 μg/g was associated with significant mortality. In our study, copper concentrations in whole carp samples from all sites ranged from 1.2 to 15.2 μg/g. Concentrations in 5 samples (~ 10 percent) exceeded the 9.8 μg/g effect level. Only a single sample exceeded 13.3 μg/g. Concentrations were similar among sites.

Lead concentrations were less than the 0.33 μg/g analytical detection limit in 30 of 46 (65 percent) whole-body carp samples in our study. The highest concentration was 2.3 μg/g. We were unable to locate information on effect levels of lead in whole-body fish. Concentrations in all carp samples were well below a 25 μg/g dietary concentration associated with biochemical effects and a 125 μg/g dietary level associated with reduced growth and abnormal development in birds (Finley *et al.* 1976, Hoffman *et al.* 1985).

Mercury was detected in 4 of 7 samples (~57 percent) from Hemenway Beach, 1 of 19 samples (5 percent) from Willow Beach, and 10 of 20 samples (50 percent) from Cottonwood Cove. The highest concentration, 0.48 μg/g, was found in a Hemenway Beach sample. Snarski and Olson (1982) reported reduced reproduction of fathead minnows (*Pimephales promelas*) when whole body concentrations exceeded 0.6 μg/g, ww. Kania and O'Hara (1974) reported diminished predator-avoidance behavior in mosquitofish (*Gambusia affinis*) when whole-body mercury concentration exceeded 0.7 μg/g, ww. Wet weight concentrations in all of our whole-body carp samples (# 0.07 μg/g, ww) were below these effect levels.

Selenium concentrations in whole-body carp in our study ranged from 2.4 to 12.6 μg/g, with a mean of 4.9 μg/g for all sites combined (Figure 11). Lemly (1996) identified a concentration of 4 μg/g in whole-body fish as a threshold of toxic effects to fish. Toxic endpoints commonly include histopathology, physiological effects, reduced reproduction, and reduced survival. Selenium is recognized as a powerful teratogen, and reproduction is generally considered the most sensitive and significant toxic endpoint. Selenium concentrations exceeded this threshold in approximately 60 percent of the whole fish samples in our study and, as such, likely represents a threat to fish reproduction in the lower Colorado River. Additionally, 17 percent of the whole fish samples exceeded a critical avian dietary threshold of 5.0 μg/g identified by Skorupa and Ohlendorf (1991). Therefore, selenium also represents a threat to

piscivorous birds in the study area. Selenium has been identified as a concern throughout the Colorado River basin (Hamilton 1999). Anthropogenic sources, particularly agricultural drainage, were identified as the primary cause of elevated concentrations in the lower basin.

Organochlorine Compounds in Carp

We detected a total of 2, 10, and 5 OC compounds at Hemenway Beach, Willow Beach, and Cottonwood Cove, respectively. Bevans *et al.* (1996) found nine OC compounds in carp from Callville Bay and 17 compounds in carp from Las Vegas Bay. Of the 13 OC compounds common to both data sets, the number of detected OC compounds detected in carp (Figure 12) and the combined concentrations were statistically higher ($p<0.00$, $p=0.02$) in Las Vegas Bay carp (Figure 13). With the exception of Cottonwood Cove where endrin was elevated in about one-third of the samples, total DDT (combined concentrations of *p,p'*-DDD and *p,p'*-DDE) and PCBs (resembling Aroclor 1254) accounted for the bulk of the total OC concentrations. Total DDT concentrations were highest in carp from Las Vegas Bay followed by carp from downstream sites (Figure 14). Concentrations in Las Vegas Bay carp were statistically higher (p#0.02) than Callville Bay, Hemenway Beach, and Cottonwood Cove, but not Willow Beach ($p=0.29$). PCBs resembling Aroclor 1254 were detected in all but one carp from Las Vegas Bay but in fewer than one-half of the fish at other sites. PCB concentrations were lower than known effect concentrations for fish (Niimi 1996).

Carp Health

Generally, carp evaluated at Colorado River sites downstream of Las Vegas Wash and Bay (Hemenway Beach, Willow Beach, and Cottonwood Cove) were in good condition (Foott and Harmon 1999). Total length of sampled carp (412 - 442 mm) were similar at all sites (Figure 15). Weights were greater in females than males (Figure 15) as were associated condition factors (Figure 16). These differences were likely attributable to the gravid condition of the females (Foott and Harmon 1999). Fulton's condition factor values for female carp from Cottonwood Cove were significantly lower ($p=0.03$) than those from Hemenway Beach. Although no difference was found for gonadosomatic index values for females among sites, there was uncertainty in these data due to the loss of eggs during capture and necropsy. Gonadosomatic index values were significantly lower in male carp from Willow Beach than at

other sites (Figure 17). The difference may have been due to cooler water temperatures and associated delayed maturation at the Willow Beach site.

Several differences were found in blood cell characteristics in carp from Hemenway Beach as compared with Willow Beach and Cottonwood Cove (Foott and Harmon, 1999). Carp from Hemenway Beach had both lower percentages of white blood cell volumes (e.g., lower leukocrit values) and elevated eosinophil counts. Lymphocyte to monocyte/granulocyte ratios for carp from Willow Beach and Cottonwood Cove were within the normal range for carp but were significantly lower in fish from Hemenway Beach. Exposure to a variety of contaminants, such as ammonia, metals, and PCBs, have been associated with depression of lymphocytes and corresponding elevation of granulocytes (Modra *et al.* 1998). The stress hormone cortisol may also induce decreased lymphocyte levels in carp (Weyts *et al.* 1998). No statistically significant differences in plasma protein composition were found among sites or between sexes.

No obvious trends in bacterial or viral infections were noted at the Colorado River sites downstream of Las Vegas Wash.

Several histological abnormalities in kidney and hepatopancreas (e.g., liver) tissue were common to most carp examined at all sites. Of note were hemosiderin deposits in the majority of fish examined from all sites. Apoptopic macrophage aggregates were often observed in association with hemosiderin deposits. Hemosiderin, a golden-brown pigment composed of aggregates of ferritin micelles, forms when there is an excess of iron in tissue (Cotran *et al.* 1989). In fish, hemosiderosis (an excess of hemosiderin in tissue) is usually associated with hemolytic anemia or excessive intake of iron in diet or directly from water (Thiyagarajah *et al.* 1998). Lipopigments, including lipofuscin and ceroid, form as a result of peroxidation of cellular lipids and, therefore, may provide an indication of oxidative stress in fish in this reach of the river. Endogenous pigments were also observed in kidney and hepatopancreas tissue of fish collected from Overton Bay in Lake Mead (Foott *et al.* 2000). Other histological abnormalities observed in carp from all sites include hyperplastic musculature surrounding the bile ducts, thyroid follicles of various sizes within the kidney interstitium, and calcium oxalate crystals in the distal kidney tubules. The prevalence of these conditions at all sites would suggest that the possible cause or causes are related to general conditions in this reach of the Colorado River and is likely not attributable to contaminants associated with Las Vegas Wash.

Endocrine Disruption Biomarkers

Assessment of the principle androgen or estrogen in carp did not reveal significant abnormalities in concentrations and ratios in female carp collected downstream of Las Vegas Wash. Concentrations of 17β-estradiol and vitellogenin in female carp were significantly lower (p=0.05) at Willow Beach as compared to Hemenway Beach (Figures 18 and 21, respectively). The difference between Hemenway Beach and Cottonwood Cove was not significant. Cooler water temperatures (13ºC at Willow Beach versus 20ºC at Hemenway Beach) and temperature-mediated differences in reproductive status likely accounted for differences. Between site differences in 11-ketotestosterone (Figure 19) and ratios of 17β-estradiol to 11-ketotestosterone (Figure 20) were not significant (p>0.06).

Like females, significant abnormalities in the principle androgen or estrogen concentrations or ratios were not apparent in male carp collected downstream of Las Vegas Wash. Although based on a limited sample size of male carp from Hemenway Beach (n = 2), the gonadosomatic index values for male carp from Willow Beach were significantly lower than those for male carp from Hemenway Beach and Cottonwood Cove (Figure 17). Temperature-mediated differences in reproductive status are again suspected. The lowest concentrations of 11-ketotestosterone were in male carp from Hemenway Beach (Figure 19). Concentrations were significantly lower (p = 0.25) than concentrations in males from Cottonwood Cove. Concentrations of 17β-estradiol (Figure 18) and ratios of 17β-estradiol to 11-ketotestosterone (Figure 20) were not significant among sites (p$0.14). The ratio of 17β-estradiol to 11-ketotestosterone was less than one (male values below one are considered normal) for all male carp at all sites. Vitellogenin was detected in three males from Willow Beach and three males from Cottonwood Cove (30 percent of the samples, each). Vitellogenin was not detected in either of the male carp from Hemenway Beach (Figure 21).

Contaminants at Razorback Sucker Recovery Sites

Razorback sucker recovery strategies include the rearing of razorback sucker larvae in predator-free backwater areas adjacent to Lake Mohave. Juvenile razorback suckers are later released back to the lake when they have attained sufficient size to avoid predation. We assessed contaminant concentrations in environmental samples collected from backwater areas to determine if contaminants have the potential to reduce larval survival or otherwise compromise the suitability of backwater areas for use as nursery habitats. Several of the contaminants associated with Las Vegas Wash and the mainstem of the lower Colorado River have a

propensity to bioaccumulate in organisms and concentrate in food chains. Therefore, crayfish were selected as a sample medium because they reflect exposure to contaminants in water and diet and have the ability to accumulate contaminants.

The highest concentrations of most trace elements of concern were found in crayfish from Davis Cove (Table 4). Beryllium, mercury, molybdenum, and selenium were less than the analytical detection limits at all sites. Analytical detection limits were lower than known biological effect levels for these elements. Concentrations were less than effect levels for whole-body fish and avian or fish dietary effect levels for arsenic (Gilderhus 1966), boron (Smith and Anders 1989), cadmium (Furness 1996), chromium (Eisler 1986), and lead (Hoffman *et al.* 1985).

None of the 22 target organochlorine compounds were detected in crayfish from the sampled coves (Table 5) suggesting that OC compounds are not of concern in these razorback sucker recovery sites.

CONCLUSIONS

Elevated perchlorate concentrations in the lower Colorado River indicate that contaminants introduced from Las Vegas Wash affect water downstream of Hoover Dam. This portion of the investigation was initiated to evaluate the potential for environmental contaminants from Las Vegas Wash to adversely affect reproduction and survival of aquatic organisms in Lake Mohave and the Colorado River downstream of Hoover Dam.

Sampling with SPMDs suggest that lipid-soluble contaminants did not pass Hoover Dam in significant concentrations during the period sampled. The period in which SPMDs were set coincided with the maximum extent of intrusion of Las Vegas Wash water into Lake Mead (LaBounty and Horn 1997). The detection of organochlorine compounds in fish downstream of Hoover Dam indicate that fish are exposed to and accumulate organochlorines in the Colorado River downstream of Hoover Dam and in Lake Mohave. However, the detected organochlorine compounds at the concentrations observed do not appear to represent a significant threat to fish reproduction or survival. The source of these contaminants downstream of Hoover Dam remains uncertain.

Fish collected downstream of Hoover Dam contained selenium at concentrations that have the potential to compromise reproduction and survival of aquatic organisms and birds.

However, elevated selenium concentrations were detected upstream of the inflow of Las Vegas Wash into Lake Mead indicating that selenium was a concern throughout Lake Mead and Lake Mohave. Previous investigations have identified selenium input to the upper Colorado River as a threat to fish and wildlife throughout the lower Colorado River basin. Other trace elements did not appear to represent significant threats to fish and wildlife downstream of Hoover Dam.

Fish collected in Lake Mead exhibited indications of tissue damage. Observed histopathology was consistent with chronic exposure to sublethal contaminant concentrations. Again, similar tissue damage was observed in fish collected upstream of the inflow of Las Vegas Wash suggesting that histopathology was a regional concern and not specifically attributable to the input of contaminants from Las Vegas Wash. No significant concerns with fish pathogens were identified in the study area. Overt indications of endocrine disruption were not identified downstream of Hoover Dam.

Significant contaminant concerns were not identified in backwater areas adjacent to Lake Mohave that are used as rearing areas for razorback sucker larvae.

GENERAL CONCLUSIONS

Degraded water quality conditions and environmental contaminants associated with Las Vegas Wash and Bay have the potential to adversely affect fish, wildlife, and habitat quality in Lake Mead. This study was initiated to assess the extent and magnitude of contaminant threats to trust resources occurring from Las Vegas Wash to Lake Mead and the Colorado River downstream of Hoover Dam. Concerns to trust resources have been identified due to elevated nutrient, trace element, pathogen, and pesticide concentrations in water from Las Vegas Wash and Las Vegas Bay. Low dissolved oxygen concentrations are a concern to aquatic species in portions of Las Vegas Bay. Potentially toxic compounds that have been identified in Las Vegas Wash and Las Vegas Bay water and/or sediment, include metals and other trace elements, perchlorate, pesticides, organochlorine compounds, dioxins, furans, polycyclic aromatic hydrocarbons, phthalates, phenolic compounds, and suspected EDCs (e.g., ethynylestradiol). Many of these contaminants were identified at levels known to be toxic to fish and wildlife. With the exception of selenium, which occurred at concentrations of concern throughout the study area, degraded habitat conditions and contaminants at concentrations of concern appeared to be localized in the Las Vegas Wash and Bay areas. Elevated organochlorine compound

concentrations were found in fish and avian eggs in the Las Vegas Wash and Bay areas. Selenium was elevated in fish tissue throughout the study area. Observed biological effects included abnormal hormone concentrations and ratios and tissue damage in fish. Fish endocrine system effects appear to be localized to the Las Vegas Wash and Bay area while histopathology occurred throughout the study area. This study adds to the growing literature that indicates that certain contaminants are present in Las Vegas Wash and Bay biota at levels known to adversely affect fish and wildlife.

ONGOING EFFORTS AND RECOMMENDATIONS

Since 1998, several steps have been taken to address water quality issues in Las Vegas Wash and Bay. Perhaps most significant is the formation of two technical advisory groups, the Lake Mead Water Quality Forum and the Las Vegas Wash Coordination Committee. The Service serves as an active participant on these committees, which have coordinated research and assessment efforts of multiple agencies, utilities, and private entities. Clark County and the cities of Las Vegas, North Las Vegas, and Henderson have initiated efforts to restore wetlands in the lower sections of Las Vegas Wash. Southern Nevada Water Authority, comprised of seven member agencies responsible for water delivery and wastewater treatment in southern Nevada, has also increased monitoring, assessment, and restoration efforts along Las Vegas Wash. However, successful habitat restoration requires careful design and implementation to prevent the increase of contaminant exposure and effects in created habitats and to ensure contaminant threats are not transfered to other areas.

Effective water quality management and habitat restoration are dependent on comprehensive monitoring programs that will identify adverse effects to fish and wildlife. As such, it is vital that monitoring programs assess the occurrence and severity of all contaminants and conditions of concern, including the presence of non-conventional pollutants (e.g., pharmaceuticals and personal care products) and toxic constituents associated with sewage effluent and urban runoff. Similarly, monitoring efforts should include assessment of habitat conditions and the diversity, abundance, health, and condition of fish, wildlife, plants, and invertebrates. Monitoring should include several areas where construction or restoration activities are planned for comparison of baseline to post-construction conditions. Southern Nevada Water Authority has already initiated surveys for reptiles, macroinvertebrates, and birds

to assess species diversity along Las Vegas Wash. A cooperative effort between the Service and SNWA to monitor trace element and organochlorine residues in bird eggs and fish along Las Vegas Wash is planned for the spring of 2003.

Integral to the success of the combined efforts to improve water quality and improve habitat is the establishment of appropriate water quality standards and criteria. In the absence of appropriate standards, Las Vegas Wash and Bay may not be identified as impaired waters under Section 303(d) of the Clean Water Act (CWA), despite evidence that certain conditions are not conducive to healthy populations of fish and wildlife. Adequate standards first require the designation of appropriate beneficial uses and reaches which are reflective of existing conditions and existing species assemblages. Examples where beneficial uses are not adequate include a segment of lower Las Vegas Wash where "propagation of fish" is excluded as a beneficial use in an area which has been designated as critical habitat and where an endangered fish occurs, as well as, where water contact recreation is prohibited in an area within the Lake Mead National Recreation Area.

Endocrine disrupting chemicals in wastewater flows and associated affects to wildlife are yet another water quality issue in Las Vegas Wash and Las Vegas Bay. The Service has been involved in ongoing negotiations with representatives from NDEP and wastewater treatment facilities for Clark County, City of Las Vegas, and City of Henderson to address this issue. The wastewater dischargers are collectively known as the Clean Water Coalition (CWC). Despite the fact that the State and CWC have developed a better understanding of Service concerns and the issue of endocrine disruption in general, no real progress has been made on how best to address EDCs and to what extent the CWC should be held accountable for the ecological impacts of wastewater flows. The Service maintains that there is overwhelming evidence that EDC's are present in wastewater that comprises over 90 percent of Las Vegas Wash base flows, that scientific studies have demonstrated a relationship between certain constituents in wastewater and adverse effects to trust resources in the area, and that the best approach to assess population level effects is to conduct a cooperative reproductive endpoint study on fish exposed to wastewater. Although the CWC has agreed to allow access to their property for the proposed study, as of the writing of this report, the CWC seems unwilling or unable to assist in the financial support necessary for such an endeavor.

Over the last decade, the City of Las Vegas, Clark County, and City of Henderson have expended considerable time and money to improve the capacity and capabilities of their

wastewater treatment plants, often incorporating state-of-the-art technology. These efforts are to be commended and have undoubtedly improved water quality conditions in Las Vegas Wash. Additionally, the CWC is in the process of preparing an environmental impact statement for alternative sites to discharge future increases in wastewater flows from Las Vegas Valley, and possibly for diverting a portion of existing flows from Las Vegas Wash. Alternatives that are being considered include diverting flows to a wash along the north or south shoreline of Boulder Basin, diverting flows immediately above or below Hoover Dam, and enhancements to wastewater treatment to improve water quality within the existing discharge channel (Las Vegas Wash). At present, discharging above or below Hoover Dam appears to be favored by the CWC, raising concerns about potential impacts to razorback suckers occurring downstream of Hoover Dam including Lake Mohave. The Willow Beach National Fish Hatchery, located approximately 18 miles downstream of Hoover Dam in Arizona, collects adult razorback suckers from below Hoover Dam each year as part of the captive breeding and release recovery program. If a discharge above or below Hoover Dam is chosen as the preferred alternative, and wastewater flows are diverted in increasing volumes, EDCs and abnormal hormones in fish will likely occur in the Colorado River downstream, as has already been documented in largemouth bass, common carp, and razorback sucker from Las Vegas Wash and Bay. Reproductive impacts at the population level are uncertain, however, any loss in reproductive ability for an endangered fish could jeopardize recovery efforts.

Section 101(a) of the CWA establishes the objective to restore and maintain the chemical, physical, and biological integrity of the Nation's waters. Primary to achieving this objective are the goals of achieving water quality that provides for protection and propagation of fish, shellfish, and wildlife and recreation in and on the water. The establishment of water quality standards (Section 303) and the issuance of discharge permits under the National Pollutant Discharge Elimination System program (Section 402) are primary mechanisms to attain goals of the CWA. As required under the CWA, water quality standards should be reviewed and, if appropriate, revised every three years. Water quality standards for Las Vegas Wash and Lake Mead were last revised in 1998 and are overdue. Existing conditions in Las Vegas Wash and Las Vegas Bay seem to indicate that due to increasing wastewater flows (point and non-point), past water quality standards may have been inadequate to preserve the chemical and biological integrity of water.

The goals of the Clean Water Act are clearly consistent with the goals of the Endangered Species Act (ESA). Sections 4(d) and 9 of the ESA prohibit the taking of fish and wildlife species listed as endangered or threatened. "Take" is defined under the ESA as "... to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in any such conduct." "Harm" is further defined to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing behavioral patterns such as breeding, feeding, or sheltering (50 CFR § 17.3). The results of our investigation concur with previous studies and indicate conditions in Las Vegas Wash and Bay that are not conducive to healthy populations of fish and wildlife, including an endangered fish and possibly two endangered bird species. These conditions appear to constitute take as defined under the ESA and may approach the definition of adverse modification of critical habitat. Section VIII. B. of the Memorandum of Agreement Between the Environmental Protection Agency, Fish and Wildlife Service, and National Marine Fisheries Service Regarding Enhanced Coordination Under the CWA and the ESA states "... If the Services present information to USEPA, or USEPA otherwise has information supporting a determination that existing State or Tribal water quality standards are not adequate to avoid jeopardizing endangered or threatened federally-listed species or adversely modifying critical habitat or for protecting and propagating fish, shellfish, and wildlife, EPA will work with the State or Tribe in the context of its triennial review process to obtain revisions in the State and Tribal standards..." We believe this report, supported by Bevans *et al.* (1998 and 1996), constitutes evidence of adverse effects to listed species. Water quality standards for Las Vegas Wash and Lake Mead should be revised, as needed, to address water quality concerns identified in wildlife. Formal consultation on the proposed standards by USEPA should accompany this process.

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344 F.3d 832 (9th Cir. 2003)

ENVIRONMENTAL DEFENSE CTR., INC. V. U.S.E.P.A

SUMMARIES FROM SUBSEQUENT CASES (7)

"Finding statute that required certain sewer providers to educate the public about the hazards of improper waste disposal constitutional where the purpose of the provision is legitimate and consistent with the regulatory goals of the Clean Water Act"

Dex Media West Inc. v. City of Seattle, 793 F.Supp.2d 1213 (W.D. Wash.

MORE SUMMARIES

KEY PASSAGES FROM THIS CASE (42)

"We treat EPA's decision with great deference because we are reviewing the agency's technical analysis and judgments, based on an evaluation of complex scientific data within the agency's technical expertise." **Quoted 6 times**

MORE PASSAGES

*835 *836 *837 *838 *839

ORDER AND OPINION

ORDER

and published at 319 F.3d 398 are vacated. They are replaced by the Opinion and Dissent filed today.

With the filing of the new Opinion and Dissent, the panel has voted to deny the petitions for rehearing and the petition for rehearing en banc. (Judge Tallman would grant the petition for rehearing filed by *840 the Environmental Protection Agency.) The full court has been advised of the new Opinion, new Dissent, and petition for rehearing en banc. No judge has requested a vote on the petition for rehearing en banc. Fed.R.App.P. 35.

The petitions for rehearing and the petition for rehearing en banc are DENIED. The clerk is instructed not to accept for filing any new petitions for rehearing or petitions for rehearing en banc in this case.

Each party shall bear its own costs in this appeal.

OPINION

JAMES R. BROWNING, Circuit Judge.

Petitioners challenge a rule issued by the United States Environmental Protection Agency pursuant to the Clean Water Act, 33 U.S.C. §§ 1251 - 1387, to control pollutants introduced into the nation's waters by storm sewers.

Storm sewers drain rainwater and melted snow from developed areas into water bodies that can handle the excess flow. Draining stormwater picks up a variety of contaminants as it filters through soil and over pavement on its way to sewers. Sewers are also used on occasion as an easy (if illicit) means for the direct discharge of unwanted contaminants.

into federally protected water bodies, they are subject to the controls of the Clean Water Act.

In October of 1999, after thirteen years in process, the Environmental Protection Agency ("EPA") promulgated a final administrative rule (the "Phase II Rule" [1] or "the Rule") under § 402(p) of the Clean Water Act, 33 U.S.C. § 1342(p), mandating that discharges from small municipal separate storm sewer systems and from construction sites between one and five acres in size be subject to the permitting requirements of the National Pollutant Discharge Elimination System ("NPDES"), 33 U.S.C. §§ 1311(a), 1342. EPA preserved authority to regulate other harmful stormwater discharges in the future.

1. The "Phase II Rule" reviewed here is the product of the second stage of EPA's two-phase stormwater rulemaking effort. The "Phase I Rule," governing larger-scale stormwater discharges, was issued in 1990 and reviewed by this court in *Natural Res. Def. Council v. EPA,* 966 F.2d 1292 (9th Cir. 1992).

In the three cases consolidated here, petitioners and intervenors challenge the Phase II Rule on twenty-two constitutional, statutory, and procedural grounds. We remand three aspects of the Rule concerning the issuance of notices of intent under the Rule's general permitting scheme, and a fourth aspect concerning the regulation of forest roads. We affirm the Rule against all other challenges.

I. BACKGROUND

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A. The Problem of Stormwater Runoff

Stormwater runoff is one of the most significant sources of water pollution in the nation, at times "comparable to, if not

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Storm sewer waters carry suspended metals, sediments, algae-promoting nutrients (nitrogen and phosphorus), floatable trash, used motor oil, raw sewage, pesticides, and other toxic contaminants into streams, rivers, lakes, *841 and estuaries across the United States.[3] In 1985, three-quarters of the States cited urban stormwater runoff as a major cause of waterbody impairment, and forty percent reported construction site runoff as a major cause of impairment.[4] Urban runoff has been named as the foremost cause of impairment of surveyed ocean waters.[5] Among the sources of stormwater contamination are urban development, industrial facilities, construction sites, and illicit discharges and connections to storm sewer systems.[6]

2. Richard G. Cohn-Lee and Diane M. Cameron, *Urban Stormwater Runoff Contamination of the Chesapeake Bay: Sources and Mitigation,* THE ENVIRONMENTAL PROFESSIONAL, Vol. 14, p. 10, at 10 (1992); *see also Natural Res. Def. Council,* 966 F.2d at 1295 (citing a study by the Nationwide Urban Runoff Program).

3. Regulation for Revision of the Water Pollution Control Program Addressing Storm Water, 64 Fed. Reg. 68,722, 68,724, 68,727 (Dec. 8, 1999) (codified at 40 C.F.R. pts. 9, 122, 123, and 124).

4. *Id.* at 68,726.

5. *Id.*

6. *Id.* at 68,725-31.

B. Stormwater and the Clean Water Act

Congress enacted the Clean Water Act in 1948 to "restore and

as the Federal Water Pollution Control Act, 62 Stat. 1155). The Clean Water Act prohibits the discharge of pollutants from a "point source" [7] into the waters of the United States without a permit issued under the terms of the National Pollutant Discharge Elimination System, 33 U.S.C. §§ 1311(a), 1342, which requires dischargers to comply with technology-based pollution limitations (generally according to the "best available technology economically achievable," or "BAT" standard). 33 U.S.C. § 1311(b)(2)(A).

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NPDES permits are issued by EPA or by States that have been authorized by EPA to act as NPDES permitting authorities. 33 U.S.C. § 1342(a)-(b). The permitting authority must make copies of all NPDES permits and permit applications available to the public, 33 U.S.C. §§ 1342(j), 1342(b)(3); state permitting authorities must provide EPA notice of each permit application, 33 U.S.C. § 1342(b)(4); and a permitting authority must provide an opportunity for a public hearing before issuing any permit, 33 U.S.C. §§ 1342(a)(1), 1342(b)(3); *cf.* 33 U.S.C. § 1251(e) (requiring public participation).

7. A point source is "any discernible, confined and discrete conveyance, including but not limited to any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, or vessel or other floating craft, from which pollutants are or may be discharged." 33 U.S.C. § 1362(14).

Storm sewers are established point sources subject to NPDES permitting requirements. *Natural Res. Def. Council v. Costle,* 568 F.2d 1369, 1379 (D.C. Cir. 1977) (holding unlawful EPA's exemption of stormwater discharges from NPDES

966 F.2d 1292, 1295 (9th Cir. 1992).[8]

1

In 1987, to better regulate pollution conveyed by stormwater runoff, Congress enacted Clean Water Act § 402(p), 33 U.S.C. § 1342(p), "Municipal and Industrial Stormwater Discharges." Sections 402(p)(2) and 402(p)(3) mandate NPDES permits for stormwater discharges "associated with industrial activity," discharges from large and medium-sized municipal storm sewer systems, and certain other discharges. Section 402(p)(4) sets out a timetable for promulgation of the first of a *842 two-phase overall program of stormwater regulation. *Id.* at § 1342(p)(2)-(4); *Natural Res. Def. Council,* 966 F.2d at 1296. In 1990, pursuant to § 402(p)(4), EPA issued the Phase I Rule regulating large discharge sources.[9]

8. Diffuse runoff, such as rainwater that is not channeled through a point source, is considered nonpoint source pollution and is not subject to federal regulation. *Oregon Natural Desert Ass'n v. Dombeck,* 172 F.3d 1092, 1095 (9th Cir. 1998).

9. National Pollutant Discharge Elimination System Permit Application Regulations for Stormwater Discharges, 55 Fed. Reg. 47,990 (Nov. 16, 1990) (codified at 40 C.F.R. pt. 122-124). The Phase I rule was challenged in this court in *Natural Res. Def. Council,* 966 F.2d at 1292. We held, *inter alia,* that EPA must impose deadlines for permit approvals, *id.* at 1300, that EPA's decision to regulate construction sites only over five acres in size was arbitrary and capricious, *id.* at 1306, and that EPA did not act capriciously in defining "municipal," *id.* at 1304, or in placing differently-sized municipalities on different permitting schedules, *id.* at 1301.

C. The Phase II Stormwater Rule

and address sources of pollution not covered by the Phase I Rule. Section 402(p)(1) placed a temporary moratorium (expiring in 1994) on the permitting of other stormwater discharges pending the results of studies mandated in § 402(p)(5) to identify the sources and pollutant content of such discharges and to establish procedures and methods to control them as "necessary to mitigate impacts on water quality." 33 U.S.C. § 1342(p)(5) . Section 402(p)(6) required that EPA establish "a comprehensive program to regulate" these stormwater discharges "to protect water quality," following the studies mandated in § 402(p)(5) and consultation with state and local officials. *Id.* at § 1342(p)(6).

EPA proposed the Phase II Rule in January of 1998. [10] In October, 1999, Congress passed legislation precluding EPA from promulgating the new Rule until EPA submitted an additional report to Congress supporting certain anticipated aspects of the Rule. [11] EPA was also required to publish its report in the Federal Register for public comment. Pub.L. No. 106-74, § 431(c), 113 Stat. at 1097. Later that month, EPA submitted the required ("Appropriations Act") study and promulgated the Rule.[12]

10. Proposed Regulations for Revision of the Water Pollution Control Program Addressing Storm Water Discharges, 63 Fed. Reg. 1536 (proposed Jan. 9, 1998).

11. Pub.L. No. 106-74, § 431(a), 113 Stat. 1047, 1096 (1999) ("Appropriations, 2000 — Department of Veterans Affairs and Housing and Urban Development, and Independent Agencies").

12. Regulations for Revision of the Water Pollution Control Program Addressing Storm Water Discharges, 64 Fed. Reg. 68,722 (Dec. 8, 1999) (codified at 40 C.F.R. pts. 9, 122, 123, and 124).

discharges from small municipal separate storm sewer systems ("small MS4s") and stormwater discharges from construction activity disturbing between one and five acres ("small construction sites"). 40 C.F.R. §§ 122.26(a)(9)(i)(A) - (B). Small MS4s may seek permission to discharge by submitting an individualized set of best-management plans in six specified categories, *id.* at § 122.34, either in the form of an individual permit application, or in the form of a notice of intent to comply with a general permit. *Id.* at § 122.33(b). Small MS4s may also seek permission to discharge through an alternative process, under which a permit may be sought without requiring the operator to regulate third parties, *id.* at §§ 122.33(b)(2)(ii), 122.26(d).[13] Small construction sites may *843 apply for individual NPDES permits or seek coverage under a promulgated general permit. *Id.* at § 122.26(c). EPA also preserved authority to regulate other categories of harmful stormwater discharges on a regional, as-needed basis. *Id.* at § 122.26(a)(9)(i)(C)-(D).

13. The Rule also allows a small MS4 to be regulated under an individual NPDES permit covering a nearby large or medium MS4, with provisions adapted to address the small MS4. 40 C.F.R. § 122.33(b)(3).

D. Facial Challenges to the Phase II Rule

The Rule was challenged in the Fifth, Ninth, and D.C. Circuits in three separate actions ultimately consolidated before the Ninth Circuit.

The Texas Cities Coalition on Stormwater and the Texas Counties Stormwater Coalition (collectively, "the Municipal Petitioners") assert that EPA lacked authority to require permitting, that its promulgation of the Rule was procedurally

arbitrary and capricious, and that the Rule impermissibly requires municipalities to regulate their own citizens in contravention of the Tenth Amendment and to communicate a federally mandated message in contravention of the First Amendment. The Natural Resources Defense Council ("NRDC") intervened on behalf of EPA.

Environmental Defense Center, joined by petitioner-intervenor NRDC ("the Environmental Petitioners"), asserts that the regulations fail to meet minimum Clean Water Act statutory requirements because they constitute a program of impermissible self-regulation, fail to provide required avenues of public participation, and neglect to address stormwater runoff associated with forest roads and other significant sources of runoff pollution.

The American Forest Paper Association ("AFPA") and the National Association of Home Builders ("the Industrial Petitioners") assert that promulgation of the Rule was procedurally defective and violated the Regulatory Flexibility Act, that EPA's retention of authority to regulate future sources of runoff pollution is *ultra vires,* and that the decision to regulate discharge from construction sites one to five acres in size is arbitrary and capricious. NRDC again intervened on behalf of EPA.

We have jurisdiction pursuant to section 509(b)(1) of the Clean Water Act, 33 U.S.C. § 1369(b)(1) (assigning review of EPA effluent and permitting regulations to the Federal Courts of Appeals).

II. DISCUSSION

A. The Permit Requirements

Phase II Rule compels small MS4s to regulate citizens as a condition of receiving a permit to operate, and that EPA lacks both statutory and constitutional authority to impose such a requirement.

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Because we avoid considering constitutionality if an issue may be resolved on narrower grounds, *Greater New Orleans Broadcasting Ass'n v. United States,* 527 U.S. 173, 184, 119 S.Ct. 1923, 144 L.Ed.2d 161 (1999), we first ask whether the Phase II Rule is supported by statutory authority.

1. Statutory Authority

The Municipal Petitioners assert that the statutory command in Clean Water Act § 402(p)(6) that EPA develop a "comprehensive program to regulate" small MS4s did not authorize a program based on NPDES permits. Petitioners argue that because § 402(p)(6) explicitly indicates elements that the program may *844 contain (performance standards, guidelines, etc.) without mentioning "permits," Congress must have intended that the program exclude permitting.[14]

14. The text of that section reads: "Not later than October 1, 1993, [EPA], in consultation with state and local officials, shall issue regulations (based on the results of the studies conducted under paragraph (5)) which designate stormwater discharges, other than those discharges described in paragraph (2), to be regulated to protect water quality and shall establish a comprehensive program to regulate such designated sources. The program shall, at a minimum, (A) establish priorities, (B) establish requirements for State stormwater management programs, and (C) establish expeditious deadlines. The program may include performance standards, guidelines, guidance, and management practices and treatment requirements, as appropriate." 33 U.S.C. § 1342(p)(6).

elements that the program "may" include is not determinative, because the list is manifestly nonexclusive. The only constraints are that the § 402(p)(6) regulations be based on the § 402(p)(5) studies, that they be issued in consultation with state and local officials, and that — "at a minimum" — they establish priorities, requirements for state stormwater management programs, and expeditious deadlines, and constitute a comprehensive program "to protect water quality." 33 U.S.C. § 1342(p)(6) . EPA was free to adopt any regulatory program, including a permitting program, that included these elements. *See Chevron, U.S.A. v. Natural Res. Def. Council,* 467 U.S. 837, 842-43, 104 S.Ct. 2778, 81 L.Ed.2d 694 (1984) (deference to an agency's reasonable interpretation is required unless Congress expressed its intent unambiguously). It is more reasonable to interpret congressional silence about permits as an indication of EPA's flexibility not to use them than as an outright prohibition.[15]

15. The lesser category of "permits" may also be implied by the inclusion of "performance standards" in the list of possible program features.

The Municipal Petitioners further contend that their interpretation is supported by the structure of § 402(p), which expressly requires permits for large and medium sized MS4s in a separate section, § 402(p)(3)(B). [16] However, as EPA counters, the language in § 402(p)(3) requiring permits for municipal storm sewers may be interpreted to apply both to Phase I *and* Phase II MS4s. Moreover, as respondent-intervenor NRDC notes, the mere existence of the § 402(p)(1) permitting moratorium, designed to apply only to Phase II dischargers, necessarily implies that EPA has the authority to require permits from these sources after the 1994 expiration of the moratorium.

> "Where Congress includes particular language in one section of a statute but omits it in another section of the same Act, it is generally presumed that Congress acts intentionally and purposely in the disparate inclusion or exclusion." *Bates v. United States,* 522 U.S. 23, 29-30, 118 S.Ct. 285, 139 L.Ed.2d 215 (1997).

Since there would have been no need to establish a permitting moratorium for these sources if the sources could *never* be subject to permitting requirements, petitioners' interpretation violates the bedrock principle that statutes not be interpreted to render any provision superfluous. *See Burrey v. Pacific Gas Elec. Co.,* 159 F.3d 388, 394 (9th Cir. 1998). EPA's interpretation of its mandate under § 402(p)(6) was reasonable and EPA acted within its statutory authority in formulating the Phase II Rule as a permitting program.

2. The Tenth Amendment

The Municipal Petitioners contend that the Phase II Rule on its face compels *845 operators of small MS4s to regulate third parties in contravention of the Tenth Amendment. We conclude that the Rule does not violate the Tenth Amendment, because it directs no unconstitutional coercion.

The Phase II Rule contemplates several avenues through which a small MS4 may obtain permission to discharge. First, if the NPDES Permitting Authority overseeing the small MS4 has issued an applicable general permit, the small MS4 may submit a notice of intent wherein the small MS4 agrees to comply with the terms of the general permit and specifies plans for implementing six "Minimum Measures" designed to protect water quality. 40 C.F.R. §§ 122.33(b)(1), 122.34(d)(1)(i), 122.34(b). Second, the small MS4 may apply for an individual permit under 40 C.F.R. § 122.34, which would

an "Alternative Permit" option, the small MS4 may apply for an individualized permit under 40 C.F.R. § 122.26(d), the permitting program established by the Phase I Rule for large and medium-sized MS4s. *Id.* at §§ 122.33(b)(2)(ii), 122.26(d).[17]

17. The Phase II Rule also allows a small MS4 to be regulated under an NPDES permit covering a nearby large or medium-sized MS4, with provisions adapted to address the small MS4. 40 C.F.R. § 122.33(b)(3).

The Minimum Measures mentioned above require small MS4s to implement programs for: (1) conducting public education and outreach on stormwater impacts, *id.* at § 122.34(b)(1); (2) engaging public participation in the development of stormwater management programs, *id.* at § 122.34(b)(2); (3) detecting and eliminating illicit discharges to the MS4, *id.* at § 122.34(b)(3); (4) reducing pollution to the MS4 from construction activities disturbing one acre or more, *id.* at § 122.34(b)(4); (5) minimizing water quality impacts from development and redevelopment activities that disturb one acre or more, *id.* at § 122.34(b)(5); and (6) preventing or reducing pollutant runoff from municipal activities, *id.* at § 122.34(b)(6).[18] *846

18. The Municipal Petitioners argue that the Minimum Measures exceed EPA's statutory authority under § 402(p) of the Clean Water Act. We disagree. The list of elements for a regulatory program that appears in § 402(p)(6) is nonexclusive, and EPA's adoption of the Minimum Measures represents a permissible interpretation of its authority under § 402(p)(6). *See Chevron,* 467 U.S. at 843-44, 104 S.Ct. 2778.

    The Municipal Petitioners argue that EPA is not entitled to *Chevron* deference, and that the Minimum Measures must be rejected absent a clear statement of congressional intent that EPA enact the Minimum

> "significant constitutional questions" about the permissibility of the Minimum Measures under the Tenth Amendment, and because the Minimum Measures alter "the federal-state framework by permitting federal encroachment upon a traditional state power." *Solid Waste Agency of N. Cook County v. Army Corps of Eng'rs,* 531 U.S. 159, 173, 121 S.Ct. 675, 148 L.Ed.2d 576 (2001).
>
> As we explain, because the Phase II Rule includes at least one alternative to the Minimum Measures, *i.e.,* the option of seeking a permit under 40 C.F.R. § 122.26(d), the Minimum Measures do not present significant Tenth Amendment problems demanding a clear statement of congressional intent. Nor does the Phase II Rule alter the federal-state balance. To the contrary, the option of seeking a permit under 40 C.F.R. § 122.26(d) maintains precisely the same federal-state balance as existed prior to the Phase II Rule. *See, e.g., Natural Res. Def. Council v. EPA,* 966 F.2d 1292 (9th Cir. 1992) (reviewing Phase I Rule); *Natural Res. Def. Council v. Costle,* 568 F.2d 1369, 1379 (D.C. Cir. 1977) (denying EPA authority to exempt MS4s from regulation under the Clean Water Act). Furthermore, even if a clear statement of congressional intent were necessary, § 402(p) of the Clean Water Act is replete with clear statements that Congress intended EPA to require MS4s either to obtain NPDES permits or to stop discharging stormwater.

The Municipal Petitioners contend that the measures regulating illicit discharges, small construction sites, and development activities unconstitutionally compel small MS4 operators to regulate third parties, *i.e.,* upstream dischargers. The Illicit Discharge Detection and Elimination measure requires that a permit seeker prohibit non-stormwater discharges to the MS4 and implement appropriate enforcement procedures. 40 C.F.R. § 122.34(b)(3)(ii)(B) .[19] The Construction Site Stormwater Runoff Control measure requires a permit seeker to implement and enforce a program to reduce stormwater pollutants from small construction sites.

sedimentation controls, site plan reviews that take account of water quality impacts, site inspections, and the consideration of public comment, and requires that construction site operators implement erosion, sedimentation, and waste management best management practices. *Id.* The Post-Construction/New Development measure requires permit seekers to address post-construction runoff from new development and redevelopment projects disturbing one acre or more. *Id.* at § 122.34(b)(5)(ii)(B).[21]

19. This subsection provides that permit seekers must, "[t]o the extent allowable under State, Tribal, or local law, effectively prohibit, through ordinance or other regulatory mechanism, non-stormwater discharges into your storm sewer systems and implement appropriate enforcement procedures and actions. . . ." 40 C.F.R. § 122.34(b)(3)(ii)(B).

20. This subsection provides that permit seekers "must develop, implement, and enforce a program to reduce pollutants in any storm water runoff to your small MS4 from construction activities that result in a land disturbance of greater than or equal to one acre. . . . [The] program must include the development and implementation of, at a minimum: (A) An ordinance or other regulatory mechanism to require erosion and sediment controls, as well as sanctions to ensure compliance, to the extent allowable under State, Tribal, or local law; (B) Requirements for construction site operators to implement appropriate erosion and sediment control best management practices; (C) Requirements for construction site operators to control waste such as discarded building materials, concrete truck washout, chemicals, litter, and sanitary waste at the construction site that may cause adverse impacts to water quality; (D) Procedures for site plan review which incorporate consideration of potential water quality impacts; (E) Procedures for receipt and consideration of information submitted by the public, and (F) Procedures for site inspection and enforcement control measures." 40 C.F.R. §§ 122.34(b)(4)(i)-(ii).

> address post-construction runoff from new development and redevelopment projects [disturbing one acre or more] to the extent allowable under State, Tribal or local law." 40 C.F.R. §§ 122.34(b)(5)(ii)(B).

Noting that most MS4s are operated by municipal governments, and that "[t]he drainage of a city in the interest of the public health and welfare is one of the most important purposes for which the police power can be exercised," *New Orleans Gaslight Co. v. Drainage Comm'n,* 197 U.S. 453, 460, 25 S.Ct. 471, 49 L.Ed. 831 (1905), the Municipal Petitioners argue that requiring operators of small MS4s to implement "through ordinance or other regulatory mechanism" the regulations required by the Minimum Measures contravenes the Tenth Amendment. *See, e.g., New York v. United States,* 505 U.S. 144, 188, 112 S.Ct. 2408, 120 L.Ed.2d 120 (1992).

EPA counters that the Phase II Rule does not violate the Tenth Amendment because operators of small MS4s may opt to avoid the Minimum Measures by seeking a permit under the Alternative Permit *847 option, 40 C.F.R. § 122.33(b)(2)(ii).[22]

> 22. EPA and NRDC also argue that the Minimum Measures are facially constitutional, and that the Phase II Rule presents no Tenth Amendment difficulties because operators of small MS4s may avoid stormwater regulation entirely by electing not to discharge stormwater into federal waters in the first place. In light of our holding with regard to the Alternative Permit option, we do not consider these arguments.

Under the Tenth Amendment, "the Federal Government may not compel States to implement, by legislation or executive action, federal regulatory programs." *Printz v. United States,* 521 U.S. 898, 925, 117 S.Ct. 2365, 138 L.Ed.2d 914 (1997);

Similarly, the federal government may not force the States to regulate third parties in furtherance of a federal program. *See Reno v. Condon,* 528 U.S. 141, 151, 120 S.Ct. 666, 145 L.Ed.2d 587 (2000) (upholding a federal statutory scheme because it "does not require the States in their sovereign capacity to regulate their own citizens"). These protections extend to municipalities. *See, e.g., Printz* 521 U.S. at 931 n. 15, 117 S.Ct. 2365.

However, while the federal government may not *compel* them to do so, it may *encourage* States and municipalities to implement federal regulatory programs. *See New York,* 505 U.S. at 166-68, 112 S.Ct. 2408 . For example, the federal government may make certain federal funds available only to those States or municipalities that enact a given regulatory regime. *See, e.g., South Dakota v. Dole,* 483 U.S. 203, 205-08, 107 S.Ct. 2793, 97 L.Ed.2d 171 (1987) (upholding federal statute conditioning state receipt of federal highway funds on state adoption of minimum drinking age of twenty-one). The crucial proscribed element is coercion; the residents of the State or municipality must retain "the ultimate decision" as to whether or not the State or municipality will comply with the federal regulatory program. *New York,* 505 U.S. at 168, 112 S.Ct. 2408 . However, as long as "the alternative to implementing a federal regulatory program does not offend the Constitution's guarantees of federalism, the fact that the alternative is difficult, expensive or otherwise unappealing is insufficient to establish a Tenth Amendment violation." *City of Abilene v. EPA,* 325 F.3d 657, 662 (5th Cir. 2003).

With the Phase II Rule, EPA gave the operators of small MS4s a choice: either implement the regulatory program spelled out by the Minimum Measures described at 40 C.F.R.

a permit under the Phase I Rule as described at 40 C.F.R. § 122.26(d). Thus, unless § 122.26(d) itself offends the Constitution's guarantees of federalism, the Phase II Rule does not violate the Tenth Amendment.

Pursuing a permit under the Alternative Permit option does require permit seekers, in their application for a permit to discharge, to propose management programs that address substantive concerns similar to those addressed by the Minimum Measures. *See* 40 C.F.R. § 122.26(d) . However, § 122.26(d) lists the requirements for an *application* for a permit to discharge, not the requirements of the permit itself. Therefore, nothing in § 122.26(d) requires the operator of an MS4 to implement a federal regulatory program in order to receive a permit to discharge, because nothing in § 122.26(d) specifies the contents of the permit that will result from the application process.

City of Abilene, 325 F.3d 657 , provides a helpful illustration. The cities of Abilene and Irving, Texas, have populations between 100,000 and 250,000, and so were *848 required to apply for permits under the Phase I Rule, 40 C.F.R. § 122.26(d). *City of Abilene,* 325 F.3d at 659-60 . Under § 122.26(d) the cities were required to submit proposed stormwater management programs. *Id.* at 660. They negotiated the terms of those programs with EPA, and EPA eventually presented the cities with proposed management permits that contained conditions requiring the implementation of stormwater regulatory programs, and potentially requiring the regulation of third parties. *Id.* But, as the Fifth Circuit noted, this did not mean that the cities had no choice but to implement a federal regulatory program. Instead:

> The Cities filed comments objecting to those conditions, and negotiations continued until the EPA offered the Cities the option of pursuing numeric end-of-pipe permits, which would have required the Cities to satisfy specific effluent limitations rather than implement management programs. The Cities declined this offer, electing to continue negotiations on the management permits.

Id. The Fifth Circuit rejected the cities' contention that the resulting permits violated the Tenth Amendment by requiring the cities to regulate third parties according to federal standards. *Id.* at 661-63. Because the cities chose to pursue the management permits despite the fact that EPA provided them with an option for obtaining permits that would not have involved implementing a management program or regulating third parties, no unconstitutional coercion occurred. *Id.* at 663. The ultimate decision to implement the federal program remained with the cities.

Any operator of a small MS4 that wishes to avoid the Minimum Measures may seek a permit under § 122.26(d), and, as *City of Abilene* demonstrates, nothing in § 122.26(d) will compel the operator of a small MS4 to implement a federal regulatory program or regulate third parties, because § 122.26(d) specifies application requirements, not permit requirements. Therefore, by presenting the option of seeking a permit under § 122.26(d), the Phase II Rule avoids any unconstitutional coercion. The Municipal Petitioners' claim that the Phase II Rule violates the Tenth Amendment therefore fails.

3. The First Amendment and the Minimum Measures

municipalities to deliver EPA's political message in violation of the First Amendment. The Phase II Rule's "Public Education and Outreach" Minimum Measure directs regulated small MS4s to "distribute educational materials to the community . . . about the impacts of stormwater discharges on water bodies and the steps the public can take to reduce pollutants in stormwater runoff." 40 C.F.R. § 122.34(b)(1)(i) . The "Illicit Discharge Detection and Elimination" measure requires regulated small MS4s to "[i]nform public employees, businesses, and the general public of hazards associated with illegal discharges and improper disposal of waste." 40 C.F.R. § 122.34(b)(3)(ii)(D).

The Municipal Petitioners argue that the First Amendment prohibits EPA from compelling small MS4s to communicate messages that they might not otherwise wish to deliver. They further contend that EPA's interpretation of § 402(p) as authorizing these Measures does not warrant *Chevron* deference because it raises serious constitutional issues, but that even if deference were given, the resulting rule is unconstitutional because neither Congress nor EPA may dictate the speech of MS4s. They contend that municipalities are protected by the First Amendment, *849 *Pacific Gas Elec. v. Public Utilities Comm'n,* 475 U.S. 1, 8, 106 S.Ct. 903, 89 L.Ed.2d 1 (1986) ("Corporations and other associations, like individuals, contribute to the [discourse] that the First Amendment seeks to foster. . . ."), which applies as much to compelled statements of "fact" as to those of "opinion." *Riley v. Nat'l Fed. of the Blind,* 487 U.S. 781, 797-98, 108 S.Ct. 2667, 101 L.Ed.2d 669 (1988).

We conclude that the purpose of the challenged provisions is

overall scheme of the Clean Water Act, *cf. Glickman v. Wileman Bros. Elliott, Inc.,* 521 U.S. 457, 476, 117 S.Ct. 2130, 138 L.Ed.2d 585 (1997), and does not offend the First Amendment.[23] The State may not constitutionally require an individual to disseminate an ideological message, *Wooley v. Maynard,* 430 U.S. 705, 713, 97 S.Ct. 1428, 51 L.Ed.2d 752 (1977), but requiring a provider of storm sewers that discharge into national waters to educate the public about the impacts of stormwater discharge on water bodies and to inform affected parties, including the public, about the hazards of improper waste disposal falls short of compelling such speech.[24]

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These broad requirements do not dictate a specific message. They require appropriate educational and public information activities that need not include any specific speech at all. A regulation is facially unconstitutional only when every possible reading compels it, *Meinhold v. U.S. Dep't of Def.,* 34 F.3d 1469, 1476 (9th Cir. 1994), [25] but this is clearly not the case here.

23. We decline to address two further arguments raised by EPA: first, that municipalities do not receive full First Amendment protections, under *Muir v. Alabama Educational Television Commission,* 688 F.2d 1033, 1038 n. 12 (5th Cir. 1982) (*en banc*) ("Government expression, being unprotected by the First Amendment, may be subject to legislative limitation which would be impermissible if sought to be applied to private expression. . . ."), and *Aldrich v. Knab,* 858 F.Supp. 1480, 1491 (W.D.Wash. 1994) (holding that "unlike private broadcasters, the state itself does not enjoy First Amendment rights"), and second, that even if the First Amendment were fully applicable, the Phase II regulations would satisfy them because MS4s may avoid the compulsion to speak by seeking a permit

24. As a subsidiary matter, we note that it also falls short of compelling the MS4 to "regulate" third parties in contravention of the Tenth Amendment. Dispensing information to facilitate public awareness about safe disposal of toxic materials constitutes "encouragement," not regulation.

25. "When the constitutional validity of a statute or regulation is called into question, it is a cardinal rule that courts must first determine whether a construction is possible by which the constitutional problem may be avoided." *Meinhold,* 34 F.3d at 1476.

As in *Zauderer v. Office of Disciplinary Counsel of the Sup. Ct. of Ohio,* 471 U.S. 626, 105 S.Ct. 2265, 85 L.Ed.2d 652 (1985), where the Supreme Court upheld certain disclosure requirements in attorney advertising, "[t]he interests at stake in this case are not of the same order as those discussed in *Wooley* [invalidating a law requiring that drivers display the motto `Live Free or Die' on New Hampshire license plates] . . . and *Barnette* [forbidding the requirement that public school students salute the flag because the State may not impose on the individual `a ceremony so touching matters of opinion and political attitude']." *Id.* at 651. EPA has not attempted to "prescribe what shall be orthodox in politics, nationalism, religion, or other matters of opinion or force citizens to confess by word or act their faith therein." *West Virginia State Bd. of Ed. v. Barnette,* 319 U.S. 624, 642, 63 S.Ct. 1178, 87 L.Ed. 1628 (1943). *850

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Informing the public about safe toxin disposal is non-ideological; it involves no "compelled recitation of a message" and no "affirmation of belief." *PruneYard Shopping Ctr. v. Robins,* 447 U.S. 74, 88, 100 S.Ct. 2035, 64 L.Ed.2d 741 (1980) (upholding state law protecting petitioning in

involved the compelled recitation of a message containing an affirmation of belief"). It does not prohibit the MS4 from stating its own views about the proper means of managing toxic materials, or even about the Phase II Rule itself. Nor is the MS4 prevented from identifying its dissemination of public information as required by federal law, or from making available federally produced informational materials on the subject and identifying them as such.

Even if such a loosely defined public information requirement could be read as compelling speech, the regulation resembles another regulation that the Supreme Court has held permissible. In *Glickman,* 521 U.S. 457, 117 S.Ct. 2130, 138 L.Ed.2d 585 , the Court upheld a generic advertising assessment promulgated by the Department of Agriculture on behalf of California tree fruit growers because the order was consistent with an overall regulatory program that did not abridge protected speech:

> Three characteristics of the regulatory scheme at issue distinguish it from laws that we have found to abridge the freedom of speech protected by the First Amendment. First, the marketing orders impose no restraint on the freedom of any producer to communicate any message to any audience. Second, they do not compel any person to engage in any actual or symbolic speech. Third, they do not compel the producers to endorse or to finance any political or ideological views. Indeed, since all of the respondents are engaged in the business of marketing California nectarines, plums, and peaches, it is fair to presume that they agree with the central message of the speech that is generated by the generic program.

freedom of any MS4 to communicate any message to any audience. They do not compel any specific speech, nor do they compel endorsement of political or ideological views. And since all permittees are engaged in the handling of stormwater runoff that must be conveyed in reasonably unpolluted form to national waters, it is similarly fair to presume that they will agree with the central message of a public safety alert encouraging proper disposal of toxic materials.[26] The Phase II regulation departs only from the second element in the *Glickman* analysis, because the public information requirement may compel a *851 regulated party to engage in some speech at some time; but unlike the offensive messages in *Maynard* and *Barnette* (and even the inoffensive advertising messages at issue in *Glickman*) that speech is not specified by the regulation.[27]

26. In its most recent treatment of compelled speech, the Supreme Court held that a generic advertising campaign violated free speech where the message was specific and antagonistic to the preferred advertising message of the plaintiff, and the regulation compelling participation was not part of a broader regulatory apparatus already constraining the plaintiff's autonomy in the relevant arena. *United States Dep't. of Agriculture v. United Foods,* 533 U.S. 405, 410-17, 121 S.Ct. 2334, 150 L.Ed.2d 438 (2001). The court distinguished this advertising program from the one in *Glickman* on the latter point: "[t]he program sustained in *Glickman* differs from the one under review in a most fundamental respect. In *Glickman* the mandated assessments for speech were ancillary to a more comprehensive program restricting market autonomy." *Id.* at 411, 121 S.Ct. 2334 . Although the Phase II Rule is not an advertising or marketing regulation, it constitutes a "comprehensive program" restricting the autonomy of MS4s in the relevant arena of controlling toxic discharges to storm sewers that drain to U.S. waters.

> manufacturers of mercury-containing products to inform consumers how to dispose safely of the toxic material, the Second Circuit held that "mandated disclosure of accurate, factual, commercial information does not offend the core First Amendment values of promoting efficient exchange of information or protecting individual liberty interests." *Nat'l Elec. Mfrs. Ass'n v. Sorrell,* 272 F.3d 104, 114 (2d Cir. 2001). What speech may follow from the Phase II directive will not be "commercial" in the same sense that manufacturer labeling is, but it will be similar in substance to *Sorrell* to the extent that it informs the public how to dispose safely of toxins. We think the policy considerations underlying the commercial speech treatment of labeling requirements, *see, e.g.,* the Federal Cigarette Labeling and Advertising Act, 15 U.S.C. §§ 1333-39 , apply similarly in the context of the market-participant municipal storm sewer provider.

The public information requirement does not impermissibly compel speech, and nothing else in the Phase II Rule offends the First Amendment. [28] The Rule does not compel a recitation of a specific message, let alone an affirmation of belief.

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To the extent MS4s are regulated by the public information requirement, the regulation is consistent with the overall regulatory program of the Clean Water Act and the responsibilities of point source dischargers.

> 28. The Alternative option contains a public education requirement that is similar but even less specific, and therefore even less burdensome, than the requirements in the Minimum Measures. *See* § 122.26(d)(2)(iv)(B)(6) (requiring permit seekers to propose programs to counter illicit discharges, including a "description of educational activities, public information activities, and other appropriate activities to facilitate the proper management and disposal of used oil and toxic materials").

The Municipal Petitioners contend that, in adopting the Alternative Permit option, EPA did not comply with the minimum notice and comment procedures required in informal rulemaking by the Administrative Procedures Act ("APA"), 5 U.S.C. § 553 . The APA requires an agency to publish notice of a proposed rulemaking that includes "either the terms or substance of the proposed rule or a description of the subjects and issues involved." *Id.* at § 553(b)(3).

We have held that a "final regulation that varies from the proposal, even substantially, will be valid as long as it is `in character with the original proposal and a logical outgrowth of the notice and comments.'" *Hodge v. Dalton,* 107 F.3d 705, 712 (9th Cir. 1997). In determining whether notice was adequate, we consider whether the complaining party should have anticipated that a particular requirement might be imposed. The test is whether a new round of notice and comment would provide the first opportunity for interested parties to offer comments that could persuade the agency to modify its rule. *Am. Water Works Ass'n v. EPA,* 40 F.3d 1266, 1274 (D.C. Cir. 1994).

The Municipal Petitioners argue that the Alternative Permit option is not a logical outgrowth of EPA's proposed rule because, although numerous alternatives were discussed in the Preamble to the proposed rule, 63 Fed. Reg. at 1554-1557, the Alternative Permit option eventually adopted was not. EPA counters that the proposed rule included a supplementary alternative permitting system based on concepts similar to those in the Minimum *852 Measures, including "simplified individual permit application requirements."[29] EPA contends that the Alternative Permit

Measures might violate the Tenth Amendment. 64 Fed. Reg. at 68,765.

29. Municipal Petitioners concede that "simplified individual permit application requirements" were discussed, but they contend that the permit requirements discussed are not sufficiently similar to those promulgated to establish a logical outgrowth.

The Alternative Permit option passes the *Hodge* test. The proposed rule suggested an individualized permitting option to be developed in response to comments during the notice and comment period. The Alternative option contains no elements that were not part of the original rule, even if they are configured differently in the final rule. Petitioners had, and took, their opportunity to object to the aspects of the Rule that they did not support in their comments on the Minimum Measures.

B. The General Permit Option and Notices of Intent

The Environmental Petitioners contend that the general permitting scheme of the Phase II Rule allows regulated small MS4s to design stormwater pollution control programs without adequate regulatory and public oversight, and that it contravenes the Clean Water Act because it does not require EPA to review the content of dischargers' notices of intent and does not contain express requirements for public participation in the NPDES permitting process.

In reviewing a federal administrative agency's interpretation of a statute it administers, we first determine whether Congress has expressed its intent unambiguously on the question before the court. *See Chevron,* 467 U.S. 837, 842-44,

agency, must give effect to the unambiguously expressed intent of Congress."). "If, instead, Congress has left a gap for the administrative agency to fill, we proceed to step two. At step two, we must uphold the administrative regulation unless it is arbitrary, capricious, or manifestly contrary to the statute." *Defenders of Wildlife v. Browner,* 191 F.3d 1159, 1162, *amended by* 197 F.3d 1035 (9th Cir. 1999) (citations and internal quotations omitted).

We conclude that the Phase II General Permit option violates the Clean Water Act's requirement that permits for discharges "require controls to reduce the discharge of pollutants to the maximum extent practicable," 33 U.S.C. § 1342(p)(3)(B)(iii). We also conclude that the Phase II General Permit option violates the Clean Water Act because it does not contain express requirements for public participation in the NPDES permitting process. We remand these aspects of the Phase II Rule.[30] *853 ***1. Phase II General Permits and Notices of Intent***

30. EPA argues that the Environmental Petitioner's challenge is not ripe for review because "the question of whether some general permit somewhere might fail to assure that pollutants are reduced to the maximum extent practicable is not ripe for review." But we are not addressing the merits of any specific permit. Rather, the question before us "is purely one of statutory interpretation that would not benefit from further factual development of the issues presented." *Whitman v. American Trucking,* 531 U.S. 457, 479, 121 S.Ct. 903, 149 L.Ed.2d 1 (2001). Specifically, we are addressing whether EPA, in promulgating the Phase II Rule, has accomplished the substantive controls for municipal stormwater that Congress mandated in § 402(p) of the Clean Water Act. As we held in *Natural Resources Defense Council v. EPA,* 966 F.2d at 1296-97, 1308, this question is ripe for review.

the Clean Water Act is vested in the Administrator of the EPA. 33 U.S.C. § 1251(d) ; *see also* 33 U.S.C. § 1361(a) ("The Administrator [of EPA] is authorized to prescribe such regulations as are necessary to carry out his functions under this chapter."). The Clean Water Act renders illegal any discharge of pollutants not specifically authorized by a permit. 33 U.S.C. § 1311(a) ("Except in compliance with this section and [other sections detailing permitting requirements] of this title, the discharge of any pollutant by any person shall be unlawful."). Under the Phase II Rule, dischargers may apply for an individualized permit with the relevant permitting authority, or may file a "Notice of Intent" ("NOI") to seek coverage under a "general permit." 40 C.F.R. § 122.33(b).

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A general permit is a tool by which EPA regulates a large number of similar dischargers. Under the traditional general permitting model, each general permit identifies the output limitations and technology-based requirements necessary to adequately protect water quality from a class of dischargers. Those dischargers may then acquire permission to discharge under the Clean Water Act by filing NOIs, which embody each discharger's agreement to abide by the terms of the general permit. Because the NOI represents no more than a formal acceptance of terms elaborated elsewhere, EPA's approach does not require that permitting authorities review an NOI before the party who submitted the NOI is allowed to discharge. General permitting has long been recognized as a lawful means of authorizing discharges. *Natural Res. Def. Council v. Costle,* 568 F.2d 1369 (D.C. Cir. 1977).

requires EPA to ensure that operators of small MS4s "reduce the discharge of pollutants to the maximum extent practicable." 33 U.S.C. § 1342(p)(3)(B).

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To ensure that operators of small MS4s achieve this "maximum extent practicable" standard, the Phase II Rule requires that each NOI contain information on an individualized pollution control program that addresses each of the six general criteria specified in the Minimum Measures; thus, according to the Phase II Rule, submitting an NOI and implementing the Minimum Measures it contains "constitutes compliance with the standard of reducing pollutants to the `maximum extent practicable.'" 40 C.F.R. § 122.34(a).

Because a Phase II NOI establishes what the discharger will do to reduce discharges to the "maximum extent practicable," the Phase II NOI crosses the threshold from being an item of procedural correspondence to being a substantive component of a regulatory regime.

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The text of the Rule itself acknowledges that a Phase II NOI is a permit application that is, at least in some regards, functionally equivalent to a detailed application for an individualized permit. *See, e.g.,* 40 C.F.R. § 122.34(d)(1) ("In your permit application (either a notice of intent for coverage under a general permit or an individual permit application), you must identify and submit to your NPDES permitting authority the following information. . . ."). For this reason, EPA rejected the possibility of providing a "form NOI" to Phase II permittees, explaining that "[w]hat will be required on an MS4's NOI . . . is more extensive than what is usually

impractical." 64 Fed. Reg. at 68,764.

2. Failure to Regulate

The Environmental Petitioners argue that, by allowing NPDES authorities to grant dischargers permits based on unreviewed NOIs, the Rule creates an impermissible self-regulatory system. [31] Petitioners contend the Rule impermissibly fails to require that the permitting authority review an NOI to assure compliance with Clean Water Act standards, including the standard that municipal stormwater pollution be reduced to "the maximum extent practicable." 33 U.S.C. § 1342(p)(3)(B)(iii) . *See* 40 C.F.R. § 123.35 (setting out requirements for permitting authorities, but not requiring review of NOI); 64 Fed. Reg. at 68,764 ("EPA disagrees that formal approval or disapproval by the permitting authority is needed").

31. Petitioners suggest that EPA should be held to the standard it espoused to procure judicial approval for the Phase I program. In 1991, responding to NRDC's assertion that the Phase I Rule failed to set "hard criteria" for review of MS4 stormwater programs, EPA responded that "inadequate proposals will result in the denial of permit applications." Respondent's Brief at 67, *Natural Res. Def. Council v. EPA,* 966 F.2d 1292 (9th Cir. 1992) (Nos. 91-70200, 91-70176, 90-70671). Petitioners contend that this court relied on that representation in ruling for EPA on that issue. *Natural Res. Def. Council v. EPA,* 966 F.2d at 1308 n. 17 ("Individual NPDES permit writers . . . will decide whether application proposals are adequate. . . .").

EPA maintains that the Phase II permit system is fully consistent with the authorizing statute. It contends that § 402(p)(6) granted EPA flexibility in designing the Phase II "comprehensive program," and notes that while the statute does not require general permits, neither does it preclude

designing the program to EPA, and that EPA reasonably adopted a "flexible version" of the NPDES permit program to suit the unique needs of the Phase II program. It disputes that the general permit program creates "paper tigers," especially since EPA, States, and citizens may initiate enforcement actions. Finally, EPA argues that the Rule does not create a self-regulatory program, but that even if it did, nothing in § 402(p)(6) precludes such a program.

Reviewing the Phase II Rule under the first step of *Chevron,* we note that the plain language of § 402(p) of the Clean Water Act, 33 U.S.C. § 1342(p) , expresses unambiguously Congress's intent that EPA issue no permits to discharge from municipal storm sewers unless those permits "require controls to reduce the discharge of pollutants to the maximum extent practicable."

Phase II general permits will likely impose requirements that ensure that operators of small MS4s comply with many of the standards of the Clean Water Act. Thus, general permits issued under Phase II will ordinarily contain numerous substantive requirements, just as did the permits issued under Phase I. *See* 40 C.F.R. §§ 123.35 123.35(a) ("§ 123.35 As the NPDES Permitting Authority for regulated small MS4s, what is my role? (a) You must comply with the requirements for all NPDES permitting authorities under Parts 122, 123, 124 and 125 of this chapter."); *see also* 40 C.F.R. § 122.28 (outlining requirements for NPDES authorities issuing general permits). And every operator of a small MS4 who files an NOI under Phase II "must comply with other applicable NPDES permit requirements, standards, and conditions established in *855 the . . . general permit." *See* 40 C.F.R. §§ 122.34 122.34(f).

standards of the Clean Water Act, they will not "require controls to reduce the discharge of pollutants to the maximum extent practicable." According to the Phase II Rule, the operator of a small MS4 has complied with the requirement of reducing discharges to the "maximum extent practicable" when it implements its stormwater management program, *i.e.,* when it implements its Minimum Measures. 40 C.F.R. § 122.34(a); *see also* 64 Fed. Reg. at 68753 (stating EPA's anticipation that limitations more stringent that the minimum control measures "will be unnecessary").

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Nothing in the Phase II regulations requires that NPDES permitting authorities review these Minimum Measures to ensure that the measures that any given operator of a small MS4 has decided to undertake will *in fact* reduce discharges to the maximum extent practicable.[32] *See* 40 C.F.R. § 123.35 ("As the NPDES Permitting Authority for regulated small MS4s, what is my role?"). Therefore, under the Phase II Rule, nothing prevents the operator of a small MS4 from misunderstanding or misrepresenting its own stormwater situation and proposing a set of minimum measures for itself that would reduce discharges by far less than the maximum extent practicable.

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32. That the Rule allows a permitting authority to review an NOI is not enough; every permit must comply with the standards articulated by the Clean Water Act, and unless every NOI issued under a general permit is reviewed, there is no way to ensure that such compliance has been achieved.

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The regulations do require NPDES permitting authorities to provide operators of small MS4s with

C.F.R. § 123.35(g) , but again, nothing requires that the combination of items that the operator of a small MS4 selects from this "menu" will have the combined effect of reducing discharges to the maximum extent practicable.

Nor is the availability of citizen enforcement actions a substitute for EPA's enforcement responsibility, especially because, as discussed below, the Rule does not require that NOIs be publicly available. Absent review on the front end of permitting, the general permitting regulatory program loses meaning even as a procedural exercise.

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In fact, under the Phase II Rule, in order to receive the protection of a general permit, the operator of a small MS4 needs to do nothing more than decide for itself what reduction in discharges would be the maximum practical reduction. No one will review that operator's decision to make sure that it was reasonable, or even good faith. [33] Therefore, as the Phase II Rule stands, EPA would allow permits to issue that would do less than *require* controls to reduce the discharge of pollutants to the maximum extent practicable. [34] *See* *856 64 Fed. Reg. at 68753 (explaining that the minimum control measures will protect water quality if they are "properly implemented"). We therefore must reject this aspect of the Phase II Rule as contrary to the clear intent of Congress. *Cf. Natural Res. Def. Council,* 966 F.2d at 1305 (rejecting as arbitrary and capricious a permitting system that allowed regulated industrial stormwater dischargers to "self-report" whether they needed permit coverage).

33. EPA identifies no other general permitting program that leaves the choice of substantive pollution control requirements to the regulated entity, and we are not persuaded by the analogy it urges to the traditional model of general permitting (where NOIs routinely are

34. In its petition for rehearing, EPA argues for the first time that because the regulations require NPDES Permitting Authorities to include in general permits "any additional measures necessary" to ensure that the maximum extent practicable standard is met, 40 C.F.R. §§ 123.35(h)(1), 123.35(f) (incorporating by reference the "maximum extent practicable" requirement of 40 C.F.R. §§ 122.34(a)), 122.34(f) (requiring small MS4s to comply with additional measures), the Phase II Rule ensures that discharges will be reduced to the maximum extent practicable.

    The trouble with EPA's reasoning is that the Phase II Rule defines the "maximum extent practicable" standard in such a way that no "additional measures" will ever be necessary under § 123.35(h)(1). While a Permitting Authority may impose additional measures, nothing compels it to do so because, merely by implementing the best management practices that the operator of a small MS4 has chosen for itself, that small MS4 will already have met the "maximum extent practicable" standard. *See* 40 C.F.R. § 122.34(a).

Involving regulated parties in the development of individualized stormwater pollution control programs is a laudable step consistent with the directive to consult with state and local authorities in the development of the § 402(p)(6) comprehensive program. But EPA is still required to ensure that the individual programs adopted are consistent with the law. Our holding should not prevent the Phase II general permitting program from proceeding mostly as planned. Our holding does not preclude regulated parties from designing aspects of their own stormwater management programs, as contemplated under the Phase II Rule.

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However, stormwater management programs that are designed by regulated parties must, in every instance, be subject to meaningful review by an appropriate regulating

therefore remand this aspect of the Rule.

3. Public Participation

The Environmental Petitioners contend that the Phase II Rule fails to provide for public participation as required by the Clean Water Act, because the public receives neither notice nor opportunity for hearing regarding an NOI. The EPA replies on the one hand by arguing that NOIs are not "permits" and therefore are not subject to the public availability and public hearing requirements of the Clean Water Act, and on the other hand by arguing that the combination of the public involvement minimum measure, 40 C.F.R. § 122.34(b)(2) , the Federal Freedom of Information Act, 5 U.S.C. § 552 , and state freedom of information acts would fulfill any such requirements if NOIs were permits.

Reviewing the Phase II Rule under *Chevron* step one, we conclude that clear Congressional intent requires that NOIs be subject to the Clean Water Act's public availability and public hearings requirements. The Clean Water Act requires that "[a] copy of each permit application and each permit issued under [the NPDES permitting program] shall be available to the public," 33 U.S.C. § 1342(j), and that the public shall have an opportunity for a hearing before an permit application is approved, 33 U.S.C. § 1342(a)(1) . Congress identified public participation rights as a critical means of advancing the goals of the Clean Water Act in its primary statement of the Act's approach and philosophy. *See* 33 U.S.C. § 1251(e) ; *see also Costle v. Pacific Legal Found.,* 445 U.S. 198, 216, 100 S.Ct. 1095, 63 L.Ed.2d 329 (1980) (noting the "general policy of encouraging public participation is applicable to the administration of the NPDES permit program"). EPA has

NPDES permits should be decided in "the most open, accessible forum possible, *857 and at a stage where the [permitting authority] has the greatest flexibility to make appropriate modifications to the permit." 44 Fed. Reg. 32,854, 32,885 (June 7, 1979).

As we noted above, under the Phase II Rule it is the NOIs, and not the general permits, that contain the substantive information about how the operator of a small MS4 will reduce discharges to the maximum extent practicable. Under the Phase II Rule, NOIs are functionally equivalent to the permit applications Congress envisioned when it created the Clean Water Act's public availability and public hearing requirements. Thus, if the Phase II Rule does not make NOIs "available to the public," and does not provide for public hearings on NOIs, the Phase II Rule violates the clear intent of Congress. EPA's first argument — that NOIs are not subject to the public availability and public hearings requirements of the Clean Water Act — therefore fails.

We therefore reject the Phase II Rule as contrary to the clear intent of Congress insofar as it does not provide for public hearings on NOIs as required by 33 U.S.C. § 1342(a)(1). However, Congress has not directly addressed the question of what would constitute an NOI being "available to the public" as required by 33 U.S.C. § 1342(j). Under *Chevron* step two, we must defer to EPA's interpretation of "available to the public" unless it is arbitrary, capricious, or manifestly contrary to the statute.

EPA argues that the NOIs are "available to the public" as a result of the combined effects of the public participation minimum measures, and of federal and state freedom of

public participation Minimum Measure only requires dischargers to design a program minimally consistent with State, Tribal, and local requirements. 40 C.F.R. § 122.34(b)(2). Second, the federal Freedom of Information Act only applies to documents that are actually in EPA's possession, not to documents that are in the possession of state or tribal NPDES authorities, *see* 40 C.F.R. § 2 (providing EPA's policy for releasing documents under the federal Freedom of Information Act), and nothing in the Phase II Rule provides that EPA obtain possession of every NOI that is submitted to a NPDES permitting authority. *See* 40 C.F.R. § 123.41(a) (making information provided to state NPDES authorities available to EPA only *upon request*). Thus, under the Phase II Rule, NOIs will only "be available to the public" subject to the vagaries of state and local freedom of information acts. We conclude that EPA's interpretation of 33 U.S.C. § 1342(j), as embodied in the provisions of the Phase II Rule providing for the public availability of NOIs, is manifestly contrary to the Clean Water Act, which contemplates greater scope, greater certainty, and greater uniformity of public availability than the Phase II Rule provides. We therefore reject this aspect of the Phase II Rule.[35] *858

35. EPA argues for the first time in its petition for rehearing that NOIs will be publicly available under 40 C.F.R. § 122.34(g)(2). Addressing operators of regulated small MS4s, this section provides: "You must make your records, including a description of your storm water management program, available to the public at reasonable times during regular business hours." While this section does seem to provide for the public availability of a small MS4's records, we are troubled that nothing in EPA's initial briefs indicated that EPA considered NOIs to be subject to this section. We normally defer to an agency's interpretations of its own regulations, but we may decline to defer to the *post hoc*

499 U.S. 144, 150, 156, 111 S.Ct. 1171, 113 L.Ed.2d 117 (1991). If EPA intends this section to provide for the public availability of NOIs — for example because it intends NOIs to be among the records subject to this section — it may clarify on remand.

In sum, we conclude that EPA's failure to require review of NOIs, which are the functional equivalents of permits under the Phase II General Permit option, and EPA's failure to make NOIs available to the public or subject to public hearings contravene the express requirements of the Clean Water Act. We therefore vacate those portions of the Phase II Rule that address these procedural issues relating to the issuance of NOIs under the Small MS4 General Permit option, and remand so that EPA may take appropriate action to comply with the Clean Water Act.

C. Failure to Designate

We reject the Environmental Petitioners' contention that EPA's failure to designate for Phase II regulation serious sources of stormwater pollution, including certain industrial ("Group A") sources and forest roads, was arbitrary and capricious. *See Marsh v. Oregon Natural Res. Council,* 490 U.S. 360, 378, 109 S.Ct. 1851, 104 L.Ed.2d 377 (1989).[36] ***1. "Group A" Facilities***

36. Agency determinations based on the record are reviewed under the "arbitrary and capricious" standard. 5 U.S.C. § 706(2)(A) . The standard is narrow and the reviewing court may not substitute its judgment for that of the agency. *Marsh,* 490 U.S. at 378, 109 S.Ct. 1851.

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However, the agency must articulate a rational connection between the facts found and the conclusions made. *Washington v. Daley,* 173 F.3d 1158, 1169 (9th Cir. 1999). The reviewing court must determine whether the decision was based on a consideration of

> 1851. The court may reverse under the "arbitrary and capricious" standard only if the agency: has relied on factors which Congress has not intended it to consider, entirely failed to consider an important aspect of the problem, offered an explanation for its decision that runs counter to the evidence before the agency, or is so implausible that it could not be ascribed to a difference in view or the product of agency expertise.
>
> *Motor Vehicle Mfrs. Ass'n,* 463 U.S. at 43, 103 S.Ct. 2856.

In addition to the small MS4s and construction sites ultimately designated for regulation under the Phase II Rule, EPA evaluated a variety of other point-source discharge categories for potential Phase II regulation. One group of dischargers (referred to as the "Group A" facilities) included sources that "are very similar, or identical" to regulated stormwater discharges associated with industrial activity that were not designated for Phase I regulation for administrative reasons unrelated to their environmental impacts. [37] 64 Fed. Reg. at 68,779. EPA estimates that Group A includes approximately 100,000 facilities, including auxiliary facilities and secondary activities (" *e.g.,* maintenance of construction equipment and vehicles, local trucking for an unregulated facility such as a grocery store," *id.*) and facilities intentionally omitted from Phase I designation (" *e.g.,* publicly owned treatment works with a design flow of less than 1 million gallons per day, landfills that have not received industrial waste," *id.*). *859

37. EPA explains that the Group A facilities were not regulated with the other Phase I sources because EPA used Standard Industrial Classification Index (SIC) codes in defining the universe of regulated industrial activities: "By relying on SIC codes, a classification system created to identify industries rather than environmental impacts from these industries [sic]

> included in the existing NPDES storm water program."
> 64 Fed. Reg. at 68,779.

The Environmental Petitioners contend that EPA should have designated the Group A facilities for categorical Phase II regulation after finding (1) that stormwater discharges from these facilities are the same as those from the industrial sources regulated under Phase I, and (2) that such discharges may cause "adverse water quality impacts." *Id.* Petitioners argue that these findings, and EPA's failure to provide individualized analysis regarding whether any specific source category within Group A requires regulation, render EPA's decision not to regulate any of these sources under the Rule arbitrary and capricious. They maintain that EPA's "line-drawing," which regulates some pollution sources but leaves nearly identical sources unregulated without any persuasive rationale, is necessarily arbitrary and capricious. *See Natural Res. Def. Council,* 966 F.2d at 1306 (EPA's decision not to regulate construction sites smaller than five acres was arbitrary when EPA provided no data to justify the five-acre threshold and admitted that unregulated sites could have significant water quality impacts).

Petitioners argue that § 402(p)(6) at least required EPA to make findings with respect to individual Group A categories, and that data collected from Phase I permit applications could be used to evaluate the pollutant potential of the identical Group A sources. They contend that these findings should have sufficed as a basis for designating at least some Group A sources, and that EPA's conclusion that it lacked adequate nationwide data upon which to designate any of these sources is not supported by the record evidence. Comparing EPA's identification of the serious polluting potential of some of

protect water quality," they argue that EPA fails even the forgiving standard of arbitrary and capricious review in that it has "offered an explanation for its decision that runs counter to the evidence before [it]" and "is so implausible that it could not be ascribed to a difference in view or the product of agency expertise." *See Motor Vehicle Mfrs.,* 463 U.S. at 43, 103 S.Ct. 2856.

EPA maintains that it considered Group A facilities' similarity to already regulated sources as only one of several criteria that it used in designating sources for regulation under Phase II, 64 Fed. Reg. at 68,780, and that sources that appear "similarly situated" under one criterion are not necessarily similarly situated under all. EPA asserts that nothing in § 402(p)(6) implied a responsibility to make individualized findings regarding each Group A subcategory, and it maintains that it simply lacked sufficient data to support nationwide designation of the Group A facilities.

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EPA notes that, after failing to receive requested comment providing such data, it proposed instead "to protect water quality" by allowing regional regulation of problem Group A facilities under the residual designation authority. EPA contends that agencies must be afforded deference in determining the data necessary to support regulatory decisionmaking and that it reasonably determined the quantum of data it would need to support the designation of additional sources on a nationwide basis. *See Sierra Club v. EPA,* 167 F.3d 658, 662 (D.C. Cir. 1999).

We conclude that sufficient evidence supports EPA's decision not to designate Group A sources on a nationwide basis, and

account for these sources and protect water quality. Although we are troubled by the purely administrative basis for the distinction between facilities regulated under the Phase I Rule and the Group A facilities *860 that remain unregulated under Phase II, [38] EPA's choice of the Phase I standard for designation is not the issue before us. Before us is whether EPA acted arbitrarily in declining to designate the Group A sources on a nationwide basis under the Phase II Rule, and we cannot say that it did.

38. As discussed in footnote 37, Group A facilities were not regulated with other Phase I industrial sources based on a government coding system used to distinguish different types of industry (without reference to their similar environmental impacts). *See* 64 Fed. Reg. at 68,779.

EPA has articulated a rational connection between record facts indicating insufficient data to categorically regulate Group A facilities and its corresponding conclusion not to do so, and we defer to that decision. *See Washington v. Daley,* 173 F.3d 1158, 1169 (9th Cir. 1999). In the text of the Rule, EPA explains that the process behind its decision not to nationally designate Group A sources for Phase II regulation focused not only on the likelihood of contamination from a source category, but also on the sufficiency of national data about each category and whether pollution concerns were adequately addressed by existing environmental regulations.[39] We cannot say that EPA relied on factors Congress had not intended it to consider, that it failed to consider an important aspect of the problem, or that its rationale is implausible. *See Motor Vehicle Mfrs.,* 463 U.S. at 43, 103 S.Ct. 2856. Nor did EPA's decision run counter to the evidence before it. *Id.* The Environmental Petitioners allege

but as EPA considered evidence beyond those similarities that persuaded it not to regulate, we cannot say that EPA's decision is unsupported by the record. Nothing in § 402(p)(6) unambiguously requires EPA to evaluate the Group A source categories individually, and we defer to EPA's interpretation of the statute it is charged with administering. *See Royal Foods Co. v. RJR Holdings,* 252 F.3d 1102, 1106 (9th Cir. 2001).

39. "In identifying potential categories of sources for designation in today's notice, EPA considered designation of discharges from Group A and Group B facilities. EPA applied three criteria to each potential category in both groups to determine the need for designation: (1) The likelihood for exposure of pollutant sources included in that category, (2) whether such sources were adequately addressed by other environmental programs, and (3) whether sufficient data were available at this time on which to make a determination of potential adverse water quality impacts for the category of sources. As discussed previously, EPA searched for applicable nationwide data on the water quality impacts of such categories of facilities. . . ."

    "EPA's application of the first criterion showed that a number of Group A and B sources have a high likelihood of exposure of pollutants. . . . Application of the second criterion showed that some categories were likely to be adequately addressed by other programs.

    "After application of the third criterion, availability of nationwide data on the various storm water discharge categories, EPA concluded that available data would not support any such nationwide designations. While such data could exist on a regional or local basis, EPA believes that permitting authorities should have flexibility to regulate only those categories of sources contributing to localized water quality impairments. . . . If sufficient regional or nationwide data become available in the future, the permitting authority could at that time designate a category of sources or individual sources on a case-by-case basis." 64 Fed. Reg. at

2. Forest Roads

The Environmental Petitioners also contend that EPA arbitrarily failed to regulate forest roads under the Rule despite clear evidence in the record documenting the need for stormwater pollution control *861 of drainage from these roads. Petitioners again contend that this agency action is arbitrary, because EPA has offered an explanation for its decision that runs counter to the evidence before it.

Petitioners point to EPA's own conclusion that forest roads "are considered to be the major source of erosion from forested lands, contributing up to 90 percent of the total sediment production from forestry operations." [40] They note that both unimproved forest roads and construction sites create large expanses of non-vegetated soil subject to stormwater erosion, and argue that construction site data thus also support regulation of forest roads. Petitioners observe that EPA has cited no contrary evidence indicating that forest roads are not sources of stormwater pollutant discharges to U.S. waters, and they argue that Phase II regulation is necessary "to protect water quality," because proper planning and road design can minimize erosion and prevent stream sedimentation. Petitioners note that this court has previously held that, in the absence of such "supportable facts," EPA is not entitled to the usual assumption that it has "rationally exercised the duties delegated to it by Congress." *Natural Res. Def. Council,* 966 F.2d at 1305.

40. *Guidance Specifying Management Measures For Sources of Nonpoint Pollution in Coastal Waters,* EPA guidance paper 840-B-93-001c (Jan. 1993), *available at* http:// www.epa.gov/owow/nps/mmgi/index.html (last visited Sept. 18, 2002) ("Coastal Waters").

challenge, chiefly because, it believes, the challenge is time-barred by Clean Water Act § 509(b)(1), 33 U.S.C. § 1369(b)(1) (providing that "application for review shall be made within 120 days from the date of [agency action]"). EPA promulgated silviculture regulations in 1976 that exclude from NPDES permit requirements certain silvicultural activities that EPA determined constitute non-point source activities, including "surface drainage, or road construction and maintenance from which there is natural runoff." 40 C.F.R. § 122.27(b)(1) .[41] EPA asserts that the exclusion applies to forest roads in general, not only to "construction" and "maintenance" — an assertion disputed by Petitioners — and that any challenge to the decision not to regulate forest roads should have been brought within 120 days of the promulgation of that rule. *See* 33 U.S.C. § 1369(b)(1).

41. The provision provides in full as follows:

> Silvicultural point source means any discernible, confined and discrete conveyance related to rock crushing, gravel washing, log sorting, or log storage facilities which are operated in connection with silvicultural activities and from which pollutants are discharged into waters of the United States. The term does not include non-point source silvicultural activities such as nursery operations, site preparation, reforestation and subsequent cultural treatment, thinning, prescribed burning, pest and fire control, harvesting operations, surface drainage, or road construction and maintenance from which there is natural runoff. However, some of these activities (such as stream crossing for roads) may involve point source discharges of dredged or fill material which may require a CWA section 404 permit (See 33 CFR 209.120 and part 233)

40 C.F.R. § 122.27(b)(1).

EPA's argument might be more persuasive if Petitioners' contention could be understood essentially as a direct challenge to the 1976 silviculture regulations, but this is not the case. Even were we to assume that EPA exempted forest roads from NPDES permit requirements in 1976 under 40 C.F.R. § 122.27(b)(1) , that would not resolve the question whether EPA should have addressed forest roads in its "comprehensive program . . . to protect *862 water quality" under § 402(p)(6), because § 402(p)(6) was not enacted until 1987. Petitioners challenge EPA's decision not to regulate under the new portion of the statute, not the decision not to regulate under other provisions that were in effect earlier.

EPA argues in the alternative that Petitioners should have sought judicial review when EPA considered amending § 122.27(b)(1) — to delete the language that it asserts renders forest roads non-point sources — but then determined not to make the amendment. However, we are aware of no statute or legal doctrine providing that a party's failure to challenge an agency's decision *not* to amend its rules in one proceeding deprives the party of the right to challenge, in a contemporaneous proceeding, the promulgation of an entire new rule which could have, but did not, provide the full relief the party seeks. Assuming that EPA is correct that § 122.27(b)(1) defines forest roads as non-point sources, both the Phase II Rule proceedings and the proceedings in which the proposed amendment to § 122.27(b)(1) was considered and rejected were proper proceedings in which to raise the issue whether discharges from forest roads should be regulated. Petitioners chose to raise the issue in their comments to the proposed Phase II Rule, because they

regulation of forest roads. They did not lose their right to challenge the final Phase II Rule's failure to regulate forest roads simply because they did not also raise a challenge to EPA's failure to adopt an amendment to § 122.27(b)(1) that the agency initially proposed. (We note, incidentally, that it appears that even a successful challenge to § 122.27(b)(1) would likely not have achieved the objective the Environmental Petitioners sought: it would only have allowed case-by-case coverage for forest roads, and not for overall coverage.)

Finally, EPA suggests that Petitioners' comments during the Phase II rulemaking process were too short to create jurisdiction in this court to hear this challenge. However, EPA exaggerates the slightness of those comments, which comprised two paragraphs, with footnotes, stating objections and providing support. We also agree with Petitioners that EPA was aware of the forest road sedimentation problem at the time of the rulemaking. [42] Indeed, EPA responded to the comments without disputing that the problem is serious. 3 EPA, *Response to Public Comments* 8 (Oct. 29, 1999). Rather, the agency relied on 40 C.F.R. § 122.27(b)(1), indicating that it was barred from acting under the Phase II Rule by § 122.27(b)(1).

42. Nonpoint Source Pollution: The Nation's Largest Water Quality Problem, EPA841-F-96-004A ("Pointer # 1") ("The latest *National Water Quality Inventory* indicates that agriculture is the leading contributor to water quality impairments, degrading 60 percent of the impaired river miles and half of the impaired lake acreage surveyed by states, territories, and tribes.").

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EPA does not seriously address the merits of Petitioners'

relies almost entirely on its assertion that we lack jurisdiction to decide this question. It does, however, strongly imply that its failure to adopt its own proposed amendment in the proceeding pertaining to § 122.27(b)(1) relieves it of its obligation to consider including forest roads in the Phase II Rule proceedings. We reject any such contention. Petitioners' assertion that § 402(p)(6) requires that the Phase II Rule contain provisions regulating forest roads necessitates a response from EPA on the merits. *863

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Having concluded that the objections of the Environmental Petitioners are not time-barred, and that we have jurisdiction to hear them, but that EPA failed to consider those objections on the merits, we remand this issue to the EPA, so that it may consider in an appropriate proceeding Petitioners' contention that § 402(p)(6) requires EPA to regulate forest roads. EPA may then either accept Petitioners' arguments in whole or in part, or reject them on the basis of valid reasons that are adequately set forth to permit judicial review.

D. AFPA's Standing

The American Forestry Paper Association (AFPA), a national trade association representing the forest, pulp, paperboard, and wood products industry, is one of the two Industry Petitioners asserting the remaining claims. [43] Before considering these challenges, however, we consider whether AFPA has standing to raise them.

43. The Municipal Petitioners join in asserting the "regulatory basis" claim at Part II(F)(1).

EPA argues that AFPA lacks standing because it cannot show that it represents entities that suffer a cognizable injury under

interests of AFPA entities might have supported standing had EPA decided to regulate forest roads as Phase II stormwater dischargers, but since EPA declined to do so, none of AFPA's members are currently subject to the Rule. AFPA contends that its members have a cognizable legal interest in the Rule because they risk becoming subject to regulation at any future time under the continuing designation authority.

We agree that AFPA lacks standing.

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A claimant meeting Article III standing requirements must show that "(1) it has suffered an `injury in fact' . . .; (2) the injury is fairly traceable to the challenged action of the defendant; and (3) it is likely, as opposed to merely speculative, that the injury will be redressed by a favorable decision." *Friends of the Earth v. Laidlaw Envtl. Servs. (TOC),* 528 U.S. 167, 180-81, 120 S.Ct. 693, 145 L.Ed.2d 610 (2000). Standing requires an injury that is "actual or imminent, not `conjectural or hypothetical.'" *Lujan v. Defenders of Wildlife,* 504 U.S. 555, 560, 112 S.Ct. 2130, 119 L.Ed.2d 351 (1992). AFPA's interest in avoiding future regulation of forest roads is not actually or imminently threatened by any potential result in this case. No ripe claim about misuse of the residual authority to regulate forest road discharge, or any other kind of discharge, is before the court. Should members of AFPA become subject to Phase II regulation through subsequent administrative action, it will have standing to challenge those actions at that time. In the meanwhile, we proceed to the merits of the remaining claims on behalf of AFPA's co-petitioner, the National Association of Home Builders, which has established its standing to raise them.

E. Consultation with State and Local Officials

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The Industry Petitioners contend that EPA failed to consult with the States on the Phase II Rule as required by § 402(p)(5), which instructs EPA to conduct studies "in consultation with the States," and § 402(p)(6), which instructs the Administrator to issue regulations based on these studies "in consultation with State and local officials." 33 U.S.C. §§ 1342(p)(5)-(6). We conclude that EPA satisfied its statutory duty of consultation. *See Marsh,* 490 U.S. at 378, 109 S.Ct. 1851. *864

Petitioners concede several instances in which EPA circulated drafts of the Phase II Rule to state and local authorities, but argue that these consultations were meaningless because (1) the reports were circulated too far in advance of the actual rulemaking, (2) the rulemaking wrongfully proceeded based on other sources of input, (3) standard APA notice and comment procedures could not suffice because Congress must have intended something more when it added the consultation requirements to the language of § 402, and (4) consultation at the final stage of rulemaking was inadequate because comment was sought on the final report only after it had been submitted to Congress and the Phase II Rule had been promulgated. Petitioners provide examples of state feedback that allegedly went unheeded by EPA in its promulgation of the final Rule.

EPA maintains that it consulted extensively with States and localities in developing the Phase II Rule, discharging its obligations under §§ 402(p)(5) (6). EPA contends that the comments Petitioners cite as unheeded by EPA demonstrate

that the final rule adopted a good measure of the flexibility sought by state representatives. EPA argues that Industry Petitioners cannot complain that consultation was inadequate simply because it did not result in the adoption of Petitioners' preferred views.

EPA also disputes Petitioners' allegation that while EPA did comply with the terms of the 1999 Appropriations Act (requiring EPA to defend the proposed Phase II Rule before Congress and then publish the final report for public comment), it demonstrated its failure to adequately consult by publishing the report for public comment *after* the Phase II Rule had been formally promulgated, rendering any subsequent public comment meaningless. EPA counters that these actions do not indicate that it failed to satisfy Congress's directive that it consult with state and local officials, because EPA had engaged in extensive consultation before Congress requested the Appropriations Act report, and Congress did not require further consultation when it conditioned promulgation of the Rule only on the submission of this final report. EPA claims that while Congress required it to publish the report after its submission, public comment on the report was not required before promulgation, and that the statutory deadline structure rendered any other interpretation impossible.

We conclude that the overall record indicates EPA met its statutory duty of consultation. A draft of the first report was circulated to States, EPA regional offices, the Association of State and Interstate Water Pollution Control Administrators ("ASIWPCA"), and other stakeholders in November, 1993, and was revised based on comments received. EPA established the Urban Wet Weather Flows Federal Advisory

including representatives from States, municipalities, Tribes, commercial and industrial sectors, agriculture, and environmental and public interest groups. 64 Fed. Reg. 68,724. The 32 members of the Phase II FACA Subcommittee, reflecting the same balance of interests, met fourteen times over three years and state and municipal representatives provided substantial input regarding the draft reports, the ultimate Phase II Rule, and the supporting data. [44] *Id.* EPA *865 instituted the Phase II Subcommittee meetings in addition to the standard APA notice and comment procedures, which EPA also followed.

44. NRDC argues that this claim is not only meritless for the reasons stated by EPA, but also frivolous, since industry petitioner National Association of Home Builders, as a member of the FACA Phase II Subcommittee, participated in and affirmed that such consultation took place.

The fact that the Rule did not conform to Petitioners' hopes and expectations does not bear on whether EPA adequately consulted state and local officials. Although required to consult with States and localities, EPA was free to chart the substantive course it saw fit. EPA was not required to consult with States on the Appropriations Act report. Even if EPA should have sought further comment at that late stage, failure to do so does not outweigh the evidence demonstrating extensive consultation and cooperation with local authorities on development of the Rule.

F. Designation of Certain Small MS4s and Construction Sites

The Industry Petitioners contend that, in designating certain small MS4s and construction sites for regulation under the

regulatory basis and misinterpreted record evidence. We disagree.

1. Regulatory Basis

The Industry Petitioners and the Municipal Petitioners contend that EPA violated the statutory command to base the Phase II regulations on § 402(p)(5) studies. We review EPA's interpretation of its statutory authority under the *Chevron* standard, 467 U.S. at 842-44, 104 S.Ct. 2778, and affirm.

Petitioners argue that the studies mandated by § 402(p)(5) were intended to provide the sole substantive basis for the "comprehensive program" envisioned in § 402(p)(6), but that EPA also (and thus improperly) based its designation of small MS4s and construction sites on (1) public comment received in the aftermath of judicial invalidation of the scope of construction sites regulated by the Phase I Rule, [45] and (2) additional research discussed in the Preamble to the Phase II Rule.[46]

45. *See Natural Res. Def. Council,* 966 F.2d at 1306 (remanding EPA's decision to regulate only construction sites disturbing more than five acres, after EPA had initially proposed to regulate all sites disturbing more than one acre).

46. The Industry Petitioners contend that EPA lacked authority to issue the Phase II regulation of construction sites based on a process EPA itself characterized as "separate and distinct" from the development of the Report to Congress. 64 Fed. Reg. at 68,732. They add that the Phase II Rule was not "based on" the 1999 Report ultimately requested by Congress in the Appropriations Act, since EPA's report in response was released on the very day that the final Phase II Rule was published.

EPA contends that the statute did not require it to base its

sources in promulgating the regulations. It argues that it based the Phase II Rule on conclusions reported in the § 402(p)(5) studies, but then appropriately supported these results with data described in the additional study requested by Congress in the Appropriations Act, comments submitted during the statutorily required notice-and-comment process, and other available information. To read the authorizing statute as limiting reliance to the § 402(p)(5) studies, EPA claims, would preclude it from relying on recommendations received through the separate, post-study requirement to "consult with State and local officials" under *866 § 402(p)(6), and through the notice and comment process mandated by the APA, 5 U.S.C. § 553(b).

Respondent-intervenor NRDC adds that the Phase II Rule is consistent with the § 402(p)(5) studies reported in 1995, and moreover, that the Industry Petitioners lack standing to raise the "regulatory basis" claim because they cannot show the requisite injury. *See Friends of the Earth,* 528 U.S. at 180-81, 120 S.Ct. 693.

a. Standing. Industry Petitioners [47] contend that they have suffered injury in fact, because their members are now either automatically regulated by the permitting requirements or subject to future regulation (under the residual authority, discussed below) that otherwise would not have been authorized, and that this is a direct result of EPA's failure to adhere to the framework of the 1995 Report, which allegedly would have precluded these aspects of the Rule. NRDC contends that the Industry Petitioners lack standing because they cannot show that being subject to NPDES permitting is the causal result of the procedural injury they urge, and

may arise in the future.

47. Since we have already determined that AF PA lacks standing to raise any of its claims, *see* Section D above, this discussion pertains to the remaining Industry Petitioner, National Association of Home Builders.

NRDC argues that the injuries Petitioners allege are not consistent with the guidelines laid out in *Friends of the Earth,* 528 U.S. at 180-81, 120 S.Ct. 693 . It insists that Petitioners' only possible claims of injury from the alleged "regulatory basis" violation are purported harm to members caused by the final Phase II Rule itself or harm to members caused by EPA's alleged failure to provide adequate notice of future regulatory requirements in the 1995 Report. However, NRDC contends that Petitioners have not suffered the requisite injury, because they had actual notice that EPA might regulate small construction sites, 63 Fed. Reg. at 1583 , and they can show no chain of causation linking their alleged injury from the Rule itself to the actions challenged here.

NRDC's causation argument is complex. Although the Petitioners purport to challenge EPA's failure to follow all of the 1995 Report's recommendations in the final Phase II Rule, NRDC contends, they are really challenging the subsequent proceedings through which EPA developed the final Rule. Even if there were some unlawful variance between the 1995 report and final rule, NRDC continues, the cause of that variance would have been some failure to abide by rulemaking standards during administrative proceedings that produced the text of the final Rule — not EPA's attention to sources of input other than the 1995 Report. NRDC maintains that these intervening acts of rulemaking (e.g., Phase II Subcommittee activities and the notice-and-comment process) break the requisite chain of causation between EPA's alleged

the flaws Petitioners allege in the Phase II Rule, which NRDC claims would have been due to "purportedly unlawful EPA decisions on the merits during the subsequent administrative proceedings." *See Northside Sanitary Landfill v. Thomas,* 804 F.2d 371, 381-84 (7th Cir. 1986) (finding no standing to challenge EPA statements concerning the fate of a hazardous waste facility when subsequent state administrative acts, not EPA comments, would determine the facility's actual fate).

We note that NRDC's standing arguments apply equally to the Municipal Petitioners, who can also assert only the *867 harms resulting to members from the Rule itself or from a lack of notice, and that we are thus not only considering the standing of the Industry Petitioners but also that of the Municipal Petitioners to raise the "regulatory basis" claim. [48] That established, we find standing for both.

48. Although the issue of Municipal Petitioners' standing has not been raised by the parties, we are obliged to consider it to determine whether the case-or-controversy requirement of Article III is satisfied. *See, e.g., Boeing Co. v. Van Gemert,* 444 U.S. 472, 488 n. 4, 100 S.Ct. 745, 62 L.Ed.2d 676 (1980); *Juidice v. Vail,* 430 U.S. 327, 331, 97 S.Ct. 1211, 51 L.Ed.2d 376 (1977).

NRDC essentially argues that petitioners lack standing because (1) they cannot show that being subject to NPDES permitting is the causal result of the procedural injury they urge, (2) they cannot claim any actual notice injury from the alleged procedural wrong because notice was actually given, and (3) they cannot claim standing based on hypothetical injury that may (or may not) arise from future regulation under the residual authority. We can readily agree with the latter two contentions.

As discussed above, the "actual injury" requirement of Article III standing precludes judicial consideration of exactly the kind of hypothetical harm the Industry Petitioners allege may follow from use of Phase II authority for future designations of regional sources. *Friends of the Earth,* 528 U.S. at 180-81, 120 S.Ct. 693. If future Phase II designations cause identifiable injury to Petitioners, they will then be free to pursue that ripe claim. And because EPA clearly issued notice to all regulated parties that they may be subject to regulation under the proposed rule, 63 Fed. Reg. at 1568 (MS4s) and 1582 (construction), petitioners cannot show injury from lack of actual notice.

However, NRDC's causation argument is less persuasive. NRDC correctly argues that the petitioners cannot establish a definite chain of causation between the EPA's alleged failure to limit their regulatory basis to the § 402(p)(5) studies and the fact that they now must obtain permits. But this will almost always be true of petitions challenging an agency's failure to abide by statutory procedural requirements. Because all administrative decisionmaking following an alleged procedural irregularity could always be considered an intervening factor breaking the chain of causation, NRDC's interpretation of the requisite chain of causation would dubiously shield administrative decisions from procedural review.

For this reason, we have held that the failure of an administrative agency to comply with procedural requirements in itself establishes sufficient injury to confer standing, even though the administrative result might have been the same had proper procedure been followed. *City of Davis v. Coleman,* 521 F.2d 661, 671 (9th Cir. 1975)

Policy Act's procedural requirements constituted injury sufficient to support standing of a geographically related plaintiff regardless of potentially similar regulatory outcome). In *City of Davis,* we noted that the standing inquiry represents "a broad test, but because the nature and scope of environmental consequences are often highly uncertain before study we think it an appropriate test."

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Id. A plaintiff who shows that a causal relation is "probable" has standing, even if the chain cannot be definitively established. *Johnson v. Stuart,* 702 F.2d 193, 195-96 (9th Cir. 1983) (school students and their parents had standing to challenge a statute that limited the texts that might be selected for teaching, even *868 though it could not be shown whether any specific book had been rejected under this statute or for other reasons).

The Supreme Court has also acknowledged that standing may be established by harm resulting indirectly from the challenged acts, *Warth v. Seldin,* 422 U.S. 490, 504-05, 95 S.Ct. 2197, 45 L.Ed.2d 343 (1975), and that causation may be established if the plaintiff shows a good probability that, absent the challenged action, the alleged harm would not have occurred, *Arlington Heights v. Metro. Hous. Dev. Corp.,* 429 U.S. 252, 262-64, 97 S.Ct. 555, 50 L.Ed.2d 450 (1977).

Thus, although the petitioners cannot show with certainty that the alleged "regulatory basis" violation caused them to be wrongfully subjected to Phase II permitting requirements, we hold that they have alleged a procedural injury sufficient to support their standing to bring the claim.

b. Merits. Although we resolve the standing issue in favor of

claim that EPA violated procedural constraints implied by the authorizing statute, § 402(p)(6).

Congress intended EPA to use all sources of information in developing a comprehensive program to protect water quality to the maximum extent practicable. The statute unambiguously required EPA to base its regulations both on the § 402(p)(5) studies and on consultation with state and local officials. Congress enacted § 402 with full knowledge that EPA would also be required to take account of public comments during the notice and comment phase of administrative rulemaking prescribed by the APA. [49] ***2. MS4s in Urbanized Areas***

49. Even if the statute *were* ambiguous, we would defer to EPA's reasonable interpretation. *Chevron,* 467 U.S. at 843-44, 104 S.Ct. 2778.

The Municipal Petitioners contend that the designation of small MS4s for Phase II regulation according to Census Bureau defined areas of population density ("urbanized areas") is arbitrary and capricious. They argue that EPA has not established that the Census Bureau's designation of urbanized areas is correlated with actual levels of pollution runoff in stormwater, and that EPA adopted the designations simply for administrative convenience. We affirm, because the record reflects a reasoned basis for EPA's decision. *See Marsh,* 490 U.S. at 378, 109 S.Ct. 1851.

Conceding that the Preamble cites studies purporting to establish "a high correlation between the degree of development/urbanization and adverse impacts on receiving waters due to stormwater," 64 Fed. Reg. at 68,751, the Municipal Petitioners nevertheless contend that the record contains no "demonstrably correlated *quantified* basis on

particular population, or any population density, *per se* establishes that all urban areas having that same characteristic in gross are necessarily appropriate for inclusion as Phase II sources." Pointing to *Leather Industries of America v. EPA,* 40 F.3d 392, 401 (D.C. Cir. 1994) (rejecting as arbitrary EPA's regulation of pollutant levels in the absence of data supporting a relationship between the caps and level of risk), Petitioners argue that EPA simply assumed the relationship Congress contemplated it would establish by the § 402(p)(5) studies.

EPA responds that it extensively documented the relationship between urbanization and harmful water quality impacts from stormwater runoff, pointing to its findings that the degree of surface imperviousness in an area directly corresponds *869 to the degree of harmful downstream pollution from stormwater runoff, 64 Fed. Reg. at 68,724-27, and that it articulated a rational connection between these record facts and its decision to designate small MS4s serving areas of high population density ("urbanized areas") to protect water quality.

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We treat EPA's decision with great deference because we are reviewing the agency's technical analysis and judgments, based on an evaluation of complex scientific data within the agency's technical expertise. *See Baltimore Gas Elec. Co. v. NRDC,* 462 U.S. 87, 103, 103 S.Ct. 2246, 76 L.Ed.2d 437 (1983); *see also Chem. Mfrs. Ass'n v. EPA,* 919 F.2d 158, 167 (D.C. Cir. 1990) ("It is not the role of courts to `second-guess the scientific judgments of the EPA. . . .'"). We conclude that the record supports EPA's choice.

discharges," other than those designated in Phase I, "to be regulated to protect water quality." 33 U.S.C. § 1342(p)(6) . EPA did so, based on record evidence showing a compelling and widespread correlation between urban stormwater runoff and deleterious impacts on water quality. Petitioners' assertion that EPA failed to establish a "quantified" basis for its designation is inapposite. The statute did not require EPA to establish with pinpoint precision a numeric population threshold within urbanized areas that would justify regulation under Phase II. In areas implicating technical expertise and judgment, courts do not require "perfect stud[ies]" or data. *Sierra Club,* 167 F.3d at 662 . EPA satisfied the *Leather Industries* standard by adopting a threshold consistent with the criterion of "protecting water quality," and did not assume, but instead sufficiently documented, the relationship between urbanization and harmful stormwater discharge.

3. Small Construction Sites

Industry and Municipal Petitioners also argue that EPA's decision to regulate under Phase II all construction sites disturbing between one and five acres of land ("small construction sites") is arbitrary and unsupported by the record. We do not agree. *See Marsh,* 490 U.S. at 378, 109 S.Ct. 1851.

a. Record Evidence. Municipal Petitioners claim that EPA arrived at the one-acre standard based not on factual findings in the record but instead as a reaction to the earlier Ninth Circuit remand of the Phase I five-acre designation. They allege that the one-acre standard is no more based on supporting data than the rejected five-acre standard, and is thus quantitatively arbitrary.

regulation of *all* small construction sites, but indicate only that small construction sites, taken cumulatively, may cause effects similar to large sites in a given area. They contend that EPA's conclusion that adverse effects are possible under certain circumstances cannot support categorical designation of all small construction sites nationwide, and that the Rule is arbitrary because (1) it is based on an analysis that fails to take account of the frequency of negative impacts, (2) it fails to take account of acknowledged factors that determine whether small construction activities cumulatively cause harm (such as the degree of development in a watershed at any given time), and (3) EPA has acknowledged that the actual water quality impact of construction sites of all sizes varies widely from area to area depending on climatological, geological, geographical, *870 and hydrological influences.[50]

50. The Industrial Petitioners argue that although the Phase I authorizing statute required EPA to regulate all sources associated with "industrial activity," Congress expressly directed that the Phase II regulatory program be focused on sources that require regulation "to protect water quality." They assert that because EPA's rule ignores the variability of water quality impacts nationwide, the Rule is not appropriately targeted on the protection of water quality.

Industry Petitioners further contend that the record does not support the designation of small sites, because almost all of the technical papers EPA relied on focused on larger sites or failed to take account of size, [51] and because the lack of an adequate factual basis for nationwide regulation of small sites makes the Phase II Rule arbitrary and capricious. *Am. Petroleum Inst. v. EPA,* 216 F.3d 50, 58 (D.C. Cir. 2000) (invalidating a solid waste rule because EPA "failed to provide a rational explanation for its decision" declining to

51. Petitioners heavily critique two studies relied on by EPA that dealt specifically with the water quality impacts of small construction sites, noting that one concludes it is impossible to generalize about the impacts of small sites, Lee H. MacDonald, *Technical Justification for Regulating Construction Sites 1-5 Acres in Size,* July 22, 1997, and that the other merely concludes that small sites "can have" significant effects if erosion controls are not implemented, David W. Owens, et al., *Soil Erosion from Small Construction Sites.* Petitioners contend that the latter study was managed with no erosion controls, intentionally producing worst-case sediment runoff and unreasonable estimates of actual sediment yields for small sites nationwide. EPA vigorously defends the studies.

EPA maintains that construction sites regulated under the Phase II Rule degrade water quality across the United States and that the administrative record unambiguously documents that harm. EPA disputes Petitioners' assertion that it failed to establish the need to regulate small sites nationwide, but also contends that it is not required to base every administrative decision on a precise quantitative analysis. *See Sierra Club,* 167 F.3d at 662 ("EPA typically has wide latitude in determining the extent of data-gathering necessary to solve a problem.").

EPA also disputes petitioners' assertions that data from studies involving larger construction sites are irrelevant to the Phase II Rule. EPA explains that discharges of sediment due to erosion are the result of the interaction of several factors including soils, slope, precipitation, and vegetation:

> For construction sites that are one acre or more, none of the environmental factors contributing to sediment discharges is dependent on the size of the site disturbed. A one-acre site can have the same combination of soils, slope, degree of

> consequently can lose soil at the same rate . . . and discharge sediments in the same concentrations . . . as a 100-acre site.

EPA contends that it is thus reasonable to extrapolate data about small sites from studies of larger ones — and that such an extrapolation may even be forgiving, since small sites are currently less likely to have effective erosion and sedimentation control plans.[52] *871

52. NRDC adds that notwithstanding the clear interest of the National Association of Home Builders ("NAHB," one of the Industry Petitioners), NAHB's multi-year participation in the FACA Phase II Subcommittee Small Construction and No-Exposure Sites Work Group, and NAHB's own submission of detailed comments on the proposed Rule, NAHB failed to enter into the administrative record any study contradicting the proposition that small construction sites cause water quality problems. NRDC points to the record's showing that NAHB had itself proposed that regulation of construction sites of two acres or greater was appropriate, and contends that this is thus not a dispute over whether small construction sites should be regulated on a nationwide basis, but instead a technical disagreement over whether EPA should establish a one-acre threshold or a different threshold on a similar small scale.

Indeed, EPA argues that although adverse water quality impacts of small construction sites have been widely recognized, effective local erosion and sedimentation control programs have not been adopted in many areas.[53] Though not all watersheds are currently adversely effected by small construction sites,[54] EPA notes that the Phase II Rule acts "to protect water quality" both remedially and preventively, and argues that it need not quantify the cumulative effects of discharges from these sites or identify all watersheds that are currently harmed before acting to limit pollution from small

53. Whitney Brown and Deborah Caraco, *Controlling Stormwater Runoff Discharges from Small Construction Sites: A National Review,* Task 5 Final Report submitted by the Center for Watershed Protection to the EPA Office of Wastewater Management, March 1997, IP E.R. 633, 643.

54. EPA adds that operators of small sites in areas unlikely to suffer adverse impacts may apply for a permit waiver if little or no rainfall is expected during the period of construction (the "rainfall erosivity waiver") or if regulation is unnecessary based on a location-specific evaluation of water quality (the "water quality waiver"). 64 Fed. Reg. at 68,776.

55. EPA also implies permission to regulate for potential cumulative impacts of small sites from the past directive of this court.

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When the Phase I industrial discharge regulations were challenged, we found no record data to support that rule's exemption of construction activities on less than five acres and held that small sites did not categorically qualify for a *de minimis* exemption because "even small construction sites can have a significant impact on local water quality." *Natural Res. Def. Council,* 966 F.2d at 1306.

We reverse under the arbitrary and capricious standard only if the agency has relied on factors Congress did not intend it to consider, entirely failed to consider an important aspect of the problem, offered an explanation for its decision contrary to the evidence before the agency, or is so implausible that it could not be ascribed to a difference in view or the product of agency expertise. *Motor Vehicle Mfrs. Ass'n,* 463 U.S. at 43, 103 S.Ct. 2856 . Petitioners' contention that EPA relied on factors Congress did not intend it to consider was rejected in our earlier discussion of the regulatory basis challenge. They submit no evidence that EPA failed to consider an important

support of twenty-some-odd studies of sedimentation from construction sites that EPA reviewed in promulgating the challenged regulations, 64 Fed. Reg. 68,728-31). We could remand this aspect of the Rule only if, as the petitioners urge, EPA's explanation for its decision to regulate small construction sites were contrary to the record evidence, and it is not.

Petitioners' primary contention is that evidence in the record suggests it is not possible to provide an explicit, quantitative link between small construction sites and an adverse effect on water quality. But even if this were so, EPA's decision to regulate preventively small construction sites "to protect water quality" is not inconsistent with the record. Petitioners contend that EPA's reliance on data from studies of large construction sites is insufficient to support EPA's designation of small sites, but EPA has adequately supported its contention that experts can reasonably *872 extrapolate projected water quality impacts from large to small sites. We apply the substantial evidence standard when reviewing the factual findings of an agency, *Dickinson v. Zurko,* 527 U.S. 150, 156-58, 119 S.Ct. 1816, 144 L.Ed.2d 143 (1999),[56] and find it satisfied here.

56. The "substantial evidence" standard requires a showing of such relevant evidence as a reasonable mind might accept as adequate to support a conclusion. *Edlund v. Massanari,* 253 F.3d 1152, 1156 (9th Cir. 2001).

Moreover, EPA is not required to conduct the "perfect study." *Sierra Club,* 167 F.3d at 662.

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We defer to an agency decision not to invest the resources necessary to conduct the perfect study, and we defer to a

relationship between the means EPA uses to account for any imperfections in its data and the situation to which those means are applied. *Id.; Am. Iron Steel Inst. v. EPA,* 115 F.3d 979, 1004 (D.C. Cir. 1997). The record indicates a reasoned basis for EPA's decision that regulating small construction sites was necessary "to protect water quality" as required by § 402(p)(6).

b. Waivers. Industry Petitioners further contend that EPA's allowance of regulatory waivers for small construction sites not likely to cause adverse water quality impacts inappropriately supplements the permitting regulations.

Petitioners argue that EPA has the burden of establishing a comprehensive program to control sources as necessary to protect water quality, and that shifting the burden to individual contractors, businesses, and homeowners to prove they do not harm water quality falls short of meeting this statutory obligation. Citing *National Mining Association v. Babbitt,* 172 F.3d 906, 910 (D.C. Cir. 1999), they argue that EPA's rebuttable regulatory presumption of water quality impact from small construction activity is unreasonable because the agency has established no scientific likelihood that any given small site will affect water quality. EPA defends the waiver approach as fair and efficient, and argues that the Industrial Petitioners are confusing arguments about the limits of presumptions in evidentiary hearings conducted under the APA.[57]

57. EPA further argues that even if the waiver provision were properly characterized as an evidentiary presumption, it should be sustained because the record demonstrates that the presumed fact of the water quality impact of small sites is more likely true than not.

applicable to an evidentiary hearing, and a regulation creating exemptions by waiver is reviewed under the familiar arbitrary and capricious standard. The use of waivers to allow permit exemptions for small sites unlikely to cause adverse impacts is reasonable under that standard.

c. Consistency. Industry Petitioners also argue that EPA's decision to regulate all small construction sites under the Phase II Rule is arbitrary and capricious because EPA applied a different standard in regulating small construction projects than it applied to other potential sources of stormwater runoff subject to Phase II regulation.

Petitioners contend that EPA decided not to designate other potential sources identified in the § 402(p)(5) studies because it determined that there are not "sufficient data . . . available at this time on which to make a determination of potential adverse water quality impacts for the category of sources." 64 Fed. Reg. at 68,780. Petitioners contend this standard should have been applied to small construction sites as well, but EPA opted to *873 regulate these sources despite an alleged lack of coherent data on small site impacts as a general category.

EPA counters, once again, that it did have adequate data to regulate small construction sites. It contends that construction sites of all sizes have greater erosion rates than almost any other land use, and thus are not similarly situated to the potential polluters that EPA chose not to regulate at this time.[58] These sources include secondary industrial activities (for example, maintenance of construction equipment or local trucking for an unregulated facility such as a grocery store) and other unregulated commercial activities (for example, car and truck rental facilities). 64 Fed. Reg. at 68,779. EPA

quality impacts and on the extent to which potentially adverse water quality impacts are mitigated by existing regulations to which these sources are already subject. *Id.* at 68,780.

58. EPA notes that the Phase II Rule empowers regional permitting authorities to regulate local sources of these types known to be responsible for harmful water quality impacts via the continuing "residual designation" authority (an aspect of the Rule that Petitioners also challenge).

We find no error. *See Marsh,* 490 U.S. at 378, 109 S.Ct. 1851. EPA acted reasonably in designating all small construction sites for Phase II regulation, and Industry Petitioners point to no record evidence that the nature of pollutant contributions from small construction site discharge is sufficiently similar to pollutants from the non-regulated sources to support the analogy they seek to draw. *New Orleans Channel 20 v. FCC,* 830 F.2d 361, 366 (D.C. Cir. 1987) (an agency does not act irrationally when it treats parties differently, unless the parties are similarly situated). Sufficient evidence supports EPA's conclusion that small construction sites are not similar enough to these "other sources" to support petitioner's challenge.

G. Continuing ("Residual") Designation Authority

The Industry Petitioners argue that EPA acted improperly in retaining authority to designate future sources of stormwater pollution for Phase II regulation as needed to protect federal waters. We disagree.

The Phase II Rule preserves authority for EPA and authorized States to designate currently unregulated stormwater dischargers as requiring permits under the Rule if future circumstances indicate that they warrant regulation "to protect

122.26(a)(9). In the Phase II Preamble, EPA explains this aspect of the Rule:

> Under today's rule, EPA and authorized States continue to exercise the authority to designate remaining unregulated discharges composed entirely of stormwater for regulation on a case-by-case basis. . . . Individual sources are subject to regulation if EPA or the State, as the case may be, determines that the stormwater discharge from the source contributes to a violation of a water quality standard or is a significant contributor of pollutants to waters of the United States. This standard is based on the text of section CWA 402(p). In today's rule, EPA believes, as Congress did in drafting section CWA 402(p)(2)(E), that individual instances of stormwater discharge might warrant special regulatory attention, but do not fall neatly into a discrete, predetermined category. Today's rule preserves the regulatory authority *874 to subsequently address a source (or category of sources) of stormwater discharges of concern on a localized or regional basis.

64 Fed. Reg. 68,781 . The text of the Rule requires a discharger to obtain a permit if the NPDES permit authority determines that "stormwater controls are needed for the discharge based on wasteload allocations that are part of `total maximum daily loads' (TMDLs) [59] that address the pollutant(s) of concern" or that "the discharge, or category of discharges within a geographic area, contributes to a violation of a water quality standard or is a significant contributor of pollutants to waters of the United States." 40 C.F.R. §§ 122.26(a)(9)(i)(C)-(D).

59. TMDLs are pollutant loading limits established by

due to the presence of a pollutant. *See* 33 U.S.C. § 1313(d).

1. Statutory Authority

The Industry Petitioners contend that this "residual" designation authority, which would allow a NPDES permitting authority to require at any future time a permit from any stormwater discharge not already regulated, is *ultra vires*. Although they concede that Congress authorized case-by-case designation in § 402(p)(2)(E), [60] they argue that this authority attached only during the permitting moratorium that ended in 1994, prior to the Phase II rulemaking. They object that EPA has impermissibly designated a category of "not yet identified" sources and preserved authority to regulate them on a case-by-case basis indefinitely into the future.[61]

60. This section enables a NPDES permitting authority to designate for regulation: "[a] discharge for which the Administrator or the State, as the case may be, determines that the stormwater discharge contributes to a violation of a water quality standard or is a significant contributor of pollutants to waters of the United States." 33 U.S.C. § 1342(p)(2)(E).

61. Notably, Industry Petitioner NAHB itself took the position during Phase II Subcommittee proceedings that the power to designate additional sources survived the promulgation of the Phase II Rule. In a 1996 comment letter to EPA, NAHB asserted its understanding that "[t]he permitting authority still reserves the right to designate additional sources if they are shown to be a contributor of water quality impairment." NRDC Supplemental Excerpts of Record at 58.

Petitioners contend that § 402(p)(6) [62] cannot rescue the residual authority because it does not authorize case-by-case identification of discharges to be regulated, and that Congress, had it intended otherwise, would have included language in § 402(p)(6) similar to the case-by-case authority

*875 continuing authority to designate sources based on waste load allocations that are part of TMDLs exceeds the scope of authority in § 402(p)(2), which nowhere mentions TMDLs. Finally, they argue that the categorical designation authorized by § 402(p)(6) is only permissible when based on the § 402(p)(5) studies and carried out in consultation with state and local authorities, but that the Rule allows future designations based on agency discretion unaccompanied by adequate demonstration that the source itself is a significant threat to water quality.

62. The full text of § 402(p)(6), which specifically authorizes the Phase II program, reads: "Not later than October 1, 1993, the Administrator, in consultation with State and local officials, shall issue regulations (based on the results of the studies conducted under paragraph (5)) which designate stormwater discharges, other than those discharges described in paragraph (2), to be regulated to protect water quality and shall establish a comprehensive program to regulate such designated sources. The program shall, at a minimum, (A) establish priorities, (B) establish requirements for State stormwater management programs, and (C) establish expeditious deadlines. The program may include performance standards, guidelines, guidance, and management practices and treatment requirements, as appropriate." 33 U.S.C. § 1342(p)(6).

63. Petitioners further argue that even if EPA could preserve the case-by-case authority conferred in § 402(p)(2)(E), that section confers authority only to regulate "a discharge" determined to threaten water quality, not a category of discharges. However, we agree with respondent-intervenor NRDC's argument that § 402(p)(2)(E) does not preclude EPA from designating entire categories of sources. Petitioners' argument follows from its reliance on the fact that § 402(p)(2)(E) refers to "discharge" in the singular rather than the plural to conclude that EPA may only designate sources meeting the § 402(p)(2)(E) description on a case-by-case basis. But all five of the §

> intended for categorical regulation, like "a discharge from a municipal separate storm sewer system serving a population of 250,000 or more." 33 U.S.C. § 1342(p)(2)(C). The error in petitioners' interpretation is exposed by 1 U.S.C. § 1 , which provides that "[i]n determining the meaning of any Act of Congress, unless the context indicates otherwise — words importing the singular include and apply to several persons, parties, or things."

EPA counters that § 402(p)(6) authorized the designation, made on the basis of statutorily required sources of input and in consultation with the States, of a third class of discharges to be identified on location-specific bases by the NPDES permitting authority. EPA contends that Petitioners mistake the source of its authority for continuing designations as arising only from § 402(p)(2), discounting the full scope of its authority under § 402(p)(6). EPA argues that it permissibly interpreted § 402(p)(6) as allowing the residual designation authority because its language does not expressly preclude it, and because such authority is consistent with (and arguably required by) that section's mandate to establish a "comprehensive program" to protect water quality from adverse stormwater discharges. EPA maintains that the structure of § 402(p) reflects "Congress' intent to assure regulation of all problematic stormwater discharges as expeditiously as reasonably possible — not to limit EPA to a one-time-only opportunity to designate discharges for regulation."

We review EPA's interpretation of the statute it administers with deference, *Royal Foods Co.,* 252 F.3d at 1106 , and affirm this aspect of the Phase II Rule as a legitimate exercise of regulatory authority conferred by § 402(p). The residual designation authority is grounded both on § 402(p)(6), which broadly authorizes a comprehensive program to protect water

designation of certain polluters and categories of polluters.

While not a blank check, § 402(p)(6) authorizes a comprehensive program that allows regional designation of polluting discharges that compromise water quality locally, even if they have not been established as compromising water quality nationally at the time Phase II was promulgated. In allowing continuing designation authority, EPA permissibly designated a third category of dischargers subject to Phase II regulation — those established locally as polluting U.S. waters — following all required studies and consultation with state and local officials. EPA reasonably determined that discharges other than those from small MS4s and construction sites were likely to require regulation "to protect water quality" in satisfaction of the § 402(p)(6) mandate.

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EPA reasonably determined that, although it lacked sufficient data to support nationwide, categorical *876 designation of these sources, particularized data might support their designations on a more localized basis. EPA reasonably interpreted § 402(p)(6) as authorizing regional designation of sources and regional source categories, based on water quality standards including TMDLs.

Petitioners' § 402(p)(2)(5) argument (that EPA could not draw support for the residual designation authority from § 402(p)(2)(5) because such authority expired in 1994) is contradicted by the plain language of the statute. Respondent-intervenor NRDC correctly notes that § 402(p)(1) sets forth a permitting moratorium for stormwater discharges prior to 1994, and that § 402(p)(2) exempts certain categories of sources from that permitting moratorium, including those to

Specifically, the statute provides that the 1994 date "shall not apply" to the five categories of discharges listed in § 402(p)(2). The termination of a moratorium that "shall not apply" to the continuing designation authority under § 402(p)(2)(5) cannot rescind EPA's authority to regulate sources in that category. Nothing in § 402(p) suggests that authority to designate these sources ends at any time, and EPA remains free to designate § 402(p)(2)(E) dischargers.

Finally, although Petitioners may be legitimately concerned that a permitting authority may designate a source without adequately establishing its eligibility, this issue must be addressed in the context of an actual case or controversy. Whether a NPDES authority may impose permitting requirements on a discharger without an adequate finding of polluting activity is not yet ripe for judicial review. *Thomas v. Anchorage Equal Rights Comm'n,* 220 F.3d 1134, 1141 (9th Cir. 2000) ("A concrete factual situation is necessary to delineate the boundaries of what conduct the government may or may not regulate.").

2. Nondelegation Doctrine

Industry Petitioners contend that EPA's interpretation of § 402(p) to allow the residual designation authority must be rejected because it would render the statute unconstitutional under the nondelegation doctrine. We deny petitioners' claim, both because it is not properly raised and because it rests on an interpretation explicitly overturned by the United States Supreme Court.

Petitioners base their contention on *American Trucking Ass'ns v. EPA,* 175 F.3d 1027, 1034 (D.C. Cir. 1999),[64] in which the D.C. Circuit remanded a regulation under the nondelegation

factors in establishing the air quality standards in question, the agency had articulated no "intelligible principle" to channel its application of these factors. *Id.* Petitioners argue that if § 402(p) authorizes a NPDES permitting authority to require Phase II permitting of any stormwater source deemed to be a "significant contributor" of pollutants to U.S. waters, then that grant of authority likewise constitutes an unconstitutional delegation of legislative authority because — as did the *American Trucking* delegation — it "leaves [EPA] free to pick any point" at which a regulatory burden will attach. *Id.* at 1037.

64. This case was reversed in relevant part by the Supreme Court in *Whitman v. Am. Trucking Ass'ns,* 531 U.S. 457, 476, 121 S.Ct. 903, 149 L.Ed.2d 1 (2001).

However, in reversing *American Trucking,* the Supreme Court rejected the notion that an agency has the power to interpret a statute so as to either save it from being, or transform it into, an unconstitutional delegation. *Whitman v. Am. Trucking* *877 *Ass'ns,* 531 U.S. 457, 473, 121 S.Ct. 903, 149 L.Ed.2d 1 (2001). Whether a statute delegates legislative power "is a question for the courts, and an agency's [interpretation] has no bearing upon the answer." *Id.* Petitioner's argument to the contrary rests on the very reasoning in *American Trucking* that was overturned in *Whitman.* The relevant question is not whether EPA's interpretation is unconstitutional, but whether the statute itself is unconstitutional — a challenge Industry Petitioners do not raise.

But even if the challenge were properly raised, § 402(p) would, like the Clean Air Act standard-setting provision at issue in *Whitman,* survive constitutional review. The Supreme

Light Co. v. SEC, 329 U.S. 90, 104, 67 S.Ct. 133, 91 L.Ed. 103 (1946) (upholding statute giving SEC authority to modify corporate structures so that they are not "unduly or unnecessarily complicate[d]" and do not "unfairly or inequitably distribute voting power among security holders"); *Yakus v. United States,* 321 U.S. 414, 419-20, 423-27, 64 S.Ct. 660, 88 L.Ed. 834 (1944) (upholding statute giving agency power to set prices that "will be generally fair and equitable"). In *Yakus,* the Court held that a statutory command to "effectuate the purposes" of the overall statutory scheme withstood scrutiny. *Id.* Section 402(p)(6)'s directive "to protect water quality" summarizes the central purpose of the Clean Water Act, "to restore and maintain the chemical, physical, and biological integrity of the Nation's waters," 33 U.S.C. § 1251(a). It establishes a determinate criterion of the kind the Supreme Court upheld in *Yakus* and *American Power Light.* ***3. Notice and Comment***

Industry Petitioners also contend that, to the extent it allows the designation of entire categories of sources, rather than individual sources, the residual designation authority violates the APA, 5 U.S.C. § 553(b)(3), because EPA did not provide public notice that it was considering such a rule. *Ober v. EPA,* 84 F.3d 304, 315 (9th Cir. 1996) (invalidating EPA rule where it deviated from proposal); *Shell Oil Co. v. EPA,* 950 F.2d 741, 746-47 (D.C. Cir. 1991). Petitioners contend that while the proposed rule would have allowed case-by-case designation where an authority "determines that the discharge contributes to a violation," 63 Fed. Reg. at 1635 (proposing 40 C.F.R. § 122.26(a)(9)(i)(D)), the final rule authorizes case-by-case designation where "the discharge, or category of

EPA notes that it had proposed to promulgate continuing designation authority in some form, and points to elements in the proposed rule that explicitly envision the categorical designation of sources at the local/watershed level.[65] *878

65. "[T]oday's proposal would encourage [voluntary] control of stormwater discharges . . . unless the discharge (or category of discharges) is individually or locally designated as described in the following section. The necessary data to support designation could be available on a local, regional, or watershed basis and would allow the NPDES permitting authority to designate a category of sources or individual sources on a case-by-case basis. If sufficient nationwide data [becomes] available in the future, EPA could at that time designate additional categories of industrial or commercial sources on a national basis. EPA requests comment on the three-pronged analysis used to assess the need to designate additional industrial or commercial sources and invites suggestions regarding watershed-based designation." 63 Fed. Reg. at 1588.

According to the "logical outgrowth" standard, a final regulation must be "in character with the original proposal and a logical outgrowth of the notice and comments." *Hodge,* 107 F.3d at 712 . EPA emphasized that it was considering continuing designations based on watershed data rather than designating these sources on a national basis, and invited comment regarding this proposal. 63 Fed. Reg. at 1536. This supports the necessary relationship between the proposed and final rule.

H. Regulatory Flexibility Act

The Industry Petitioners contend that the Phase II Rule will impose substantial compliance costs on their members and other small entities, but that EPA failed to conduct the

noncompliance by falsely certifying that the Rule does not have a significant impact on a substantial number of small entities. 64 Fed. Reg. at 68,800. We are not persuaded.

1

The RFA requires a federal agency to prepare a regulatory flexibility analysis and an assessment of the economic impact of a proposed rule on small business entities, 5 U.S.C. § 604, unless the agency certifies that the proposed rule will not have a "significant economic impact on a substantial number of small entities" and provides a factual basis for that certification, *id.* at § 605; *N.W. Mining Ass'n v. Babbitt,* 5 F.Supp.2d 9, 15-16 (D.D.C. 1998).

EPA did certify that the Phase II Rule would not yield "significant impacts," 64 Fed. Reg. at 68,800, but Petitioners contend this certification is erroneous because (1) EPA treats as "not significant" costs that are in fact significant, and (2) EPA failed to account for the entire universe of small entities affected (including small home construction contractors) and all significant costs to those entities. They urge that the failure to consider a significant segment of the affected small entity community requires invalidation of the Rule, citing *North Carolina Fisheries Ass'n v. Daley,* 27 F.Supp.2d 650, 659 (E.D.Va. 1998) (certification failed to comply with RFA where agency ignored several categories of affected small entities), and *Northwest Mining,* 5 F.Supp.2d at 15 (RFA was violated where improper definition of small entity excluded analysis of affected entities).

EPA maintains that its certification was appropriate, and, moreover, that it has already voluntarily followed the additional RFA procedures that the Industry Petitioners now

the costs that the small entities they represent will bear, referring erroneously to EPA's total annual compliance costs estimates for all entities, rather than to costs estimated for small entities as defined under the RFA. EPA maintains that it did consider economic impacts on small home construction contractors who might be denied discharge permits, and that it evaluated the annual costs of Phase II compliance associated with any land disturbance between one and five acres. 64 Fed. Reg. at 68,800-01.

Respondent-intervenor NRDC contends that Petitioners' reliance on measures of the aggregate impact of the Rule on small entities to determine compliance with the threshold test under the RFA fails as a matter of law because aggregate measures are not consistent with the statutory language setting out that test. NRDC notes that the plain language of § 605(b) sets out a three-component test indicating that EPA need not perform a regulatory flexibility analysis if it finds that the proposed *879 rule will not have: (1) "a significant economic impact" on (2) "a substantial number" of (3) "small entities." 5 U.S.C. § 605(b) . NRDC contends that EPA satisfied the statutory test, and that Petitioners' interpretation, which rewrites the test to omit the "substantial number" component, is erroneous.

We believe NRDC correctly interprets the statute, *Marsh,* 490 U.S. at 378, 109 S.Ct. 1851 , and that EPA reasonably certified that the Phase II Rule would not have a significant economic impact in compliance with the Regulatory Flexibility Act. We also conclude that, even if EPA had failed to properly comply with the procedural requirements of the RFA, its actual assessment of the Rule's economic impacts renders any defective compliance harmless error. In granting

corrective action consistent with" the RFA and APA, including remand to the agency, 5 U.S.C. § 611(a)(4)(A) , but EPA has already conducted the economic analyses Petitioners seek when it convened the "Small Business Advocacy Review Panel" before publishing notice of the proposed rule. 64 Fed. Reg. at 68,801. That Panel evaluated the Rule and considered the comments of small entities on a number of issues, consistent with the procedures described in RFA § 603. *Id.* Appendix 5 of EPA's preamble to the proposed rule explained provisions that had been designed to minimize impacts on small entities, based on advice and recommendations from the Panel. 63 Fed. Reg. 1615, 64 Fed. Reg. 68,811. Modifications for small entities included alternative compliance and reporting mechanisms responsive to the resources of small entities, simplified procedures, performance rather than design standards, and waivers.

1

Any hypothetical noncompliance would thus have been harmless, since the available remedy would simply require performance of the economic assessments that EPA actually made. Like the Notice and Comment process required in administrative rulemaking by the APA, the analyses required by RFA are essentially procedural hurdles; after considering the relevant impacts and alternatives, an administrative agency remains free to regulate as it sees fit. We affirm the Rule against this challenge.[66]

66. Our consideration of the issue at all may be gratuitous, since petitioners failed to submit timely comment disputing the adequacy of EPA's consideration of economic impacts on small businesses proposed at 63 Fed. Reg. at 1605-07 . *United States v. L.A. Tucker Truck Lines,* 344 U.S. 33, 37, 73 S.Ct. 67, 97 L.Ed. 54

erred but has erred against objection made at the time appropriate under its practice.").

III. CONCLUSION

We conclude that the EPA's failure to require review of NOIs, which are the functional equivalents of permits under the Phase II General Permit option, and its failure to make NOIs available to the public or subject to public hearings contravene the express requirements of the Clean Water Act. We therefore remand these aspects of the Small MS4 General Permit option so that EPA may take appropriate action to comply with the Clean Water Act. We also remand so that EPA may consider in an appropriate proceeding the Environmental Petitioners' contention that § 402(p)(6) requires EPA to regulate forest roads. We affirm all other aspects of the Phase II Rule against the statutory, administrative, and constitutional challenges raised in this action. *880

Petitions for Review GRANTED IN PART and DENIED IN PART.

TALLMAN, Circuit Judge, concurring in part and dissenting in part:

I concur in most of the majority's opinion, but I dissent from Section II.B, which remands the Phase II Rule because its system of general permits is "arbitrary and capricious." I believe EPA's design of a system of general permits supported by notices of intent was a reasonable exercise of EPA's administrative discretion. We must give deference to EPA's interpretation of the laws it is charged with enforcing, so long as EPA's reading of those laws is permissible

Pollutant Discharge Elimination System ("NPDES") based on general permits and supported by NOIs, I respectfully dissent from the court's decision to remand this portion of the Phase II Rule.

I

As the majority concedes, we evaluate EPA's interpretation of the Clean Water Act with deference. Majority Op. 13796. If Congress's intent is unclear as to whether a system of general permits supplemented by NOIs is allowed, we simply ask "whether EPA's interpretation is permissible." *Ober v. Whitman,* 243 F.3d 1190, 1193 (9th Cir. 2001).

II

As an initial matter, then, we must ask if Congress was clear in its intent concerning the propriety of a system of general permits augmented by NOIs.

Five legislative commands guide this inquiry. First, 33 U.S.C. § 1342(p)(6) charges EPA with creating a system to regulate stormwater discharges. Plainly, nothing in this section speaks to whether EPA may utilize a general permit approach in regulating stormwater discharge.

Second, 33 U.S.C. § 1311(a) makes it illegal to discharge pollutants "except as in compliance" with several sections of the Clean Water Act. Again, nothing in this section addresses whether EPA may make use of general permits reinforced by NOIs.

Third, 33 U.S.C. § 1342 in general (as opposed to the limited charge in section 1342(p)(6) discussed above) authorizes EPA to issue NPDES permits, provided that the permits satisfy

use of a system of general permits.

Fourth, the Clean Water Act mandates that "a copy of each permit application and each permit issued under" the NPDES permitting program be made available to the public for inspection and photocopying. 33 U.S.C. § 1342(j) . The Act does not elaborate on this naked requirement. There is no explanation of the manner in which NPDES permits and applications are to be made publicly available. Nor does the Act define what constitutes a "permit" that would trigger these requirements.

And fifth, the Clean Water Act authorizes the issuance of an NPDES "permit" "after opportunity for public hearing." 33 U.S.C. § 1342(a)(1). The Act does not provide a definition of "permit," nor does it further detail what triggers the requirement of a public hearing.

In short, the Clean Water Act fails to address the propriety of a general permit system, or whether NOIs ought to be considered "permits." Therefore, we should uphold EPA's creation of a system of general permits buttressed by NOIs so long as it is "permissible." *See Chevron, U.S.A., Inc. v. Natural Resources Defense Council,* 467 U.S. 837, 843-44, 104 S.Ct. 2778, *881 81 L.Ed.2d 694 (1984). Our duty to defer to EPA in such a situation is based on sound policy. Given the overwhelming challenge and complexity of the programs administered by federal agencies today, it is sensible to trust agencies with the design of those programs so long as the programs are reasonable interpretations of congressional mandates.

The central issues regarding EPA's general permit system are whether the Clean Water Act allows such a system and

(e.g., administrative streamlining vs. robust inquiry) that is precisely what agencies are designed to do and courts are without the resources or expertise to do. "[I]f the statute is silent or ambiguous with respect to the specific issue, the question for the court is whether the agency's answer is based on a permissible construction." *Chevron,* 467 U.S. at 843, 104 S.Ct. 2778.

III

The Phase II Rule promulgates a system of general permits. EPA contemplated that these general permits will be issued on a watershed basis, with individual stormwater dischargers then filing NOIs to operate under general permits. The federal regulations implementing this system repeatedly emphasize that "[t]he use of general permits, instead of individual permits, reduces the administrative burden of permitting authorities, while also limiting the paperwork burden on regulated parties." 64 Fed. Reg. 68,722, 68,737, 68,762 (Dec. 8, 1999).

The use of a general permit system for the administration of the NPDES system has been considered and approved before. In *NRDC v. Costle,* 568 F.2d 1369 (D.C. Cir. 1977), the District of Columbia Circuit considered a challenge to EPA's regulations under the Federal Water Pollution Control Act, which was the precursor to the Clean Water Act. In *Costle,* EPA sought approval of its design for the NPDES system. EPA had issued regulations exempting broad categories of point sources from the requirement that an NPDES permit be obtained before discharging into federal waters. Part of EPA's rationale in creating the exempted categories was that

court affirmed the lower court's rejection of these exemptions because the legislation in question plainly required that all point sources obtain some kind of NPDES permit. *Id.* But in rejecting EPA's regulations, the *Costle* court discussed the options available to EPA in promulgating an NPDES system that was considerate of the enormous burden such a system could impose on EPA. *Id.* at 1380-81. In particular, the court recommended "the use of area or general permits. *The Act allows such techniques.* Area-wide regulation is one well-established means of coping with administrative exigency." *Id.* at 1381 (emphasis added).

Against this backdrop, EPA's creation of a general permit system was entirely permissible. And if the creation of a general permit system is permissible, then it does not matter whether NOIs are given a public airing.

The majority contends that the general permit system prevents EPA from fulfilling its duty to make sure that municipalities do not discharge pollutants in violation of the Clean Water Act. The majority reasons that by failing to require EPA review of NOIs, the Rule fails to ensure that a regulated MS4's stormwater pollution control program will satisfy the Clean Water Act requirement that the MS4 "reduce *882 discharges to the maximum extent practicable." Majority Op. 855. But the majority's analysis ignores the effects of the general permit. By filing an NOI, a discharger obligates itself to comply with the limitations and controls imposed by the general permit under which it intends to operate. EPA mandates that all permits (including general permits) condition their issuance on satisfaction of pollution limitations imposed by the Clean Water Act. 40 C.F.R. §

restrictions imposed by Clean Water Act section 307(a). *Id.* at § 122.44(b)(1). Therefore, the *general permit* imposes the obligations with which the discharger must comply (including applicable Clean Water Act standards), and EPA's decision not to review every NOI is not a failure to insure compliance with the Clean Water Act.

The majority also objects to EPA's general permit system because it fails to allow for sufficient public participation in the NOIs. Majority Op. 856-858. The majority's position fails to give deference to EPA and imposes the majority's own wishes instead. EPA would have been justified in creating a system entirely reliant on general or area permits. Its imposition of NOIs is an indulgence to certain policy prerogatives, namely public involvement and the collection of additional information. But the power to create a general permit system necessarily implies the power to require subordinate steps for NOIs that do not quite reach the level of inquiry associated with actual permits.

IV

We function as an adjudicator of disputes, not as a policy-making body.

1

Where an agency promulgates rules after a deliberative process, it is incumbent upon us to respect the agency's decisions or else risk trivializing the function of that agency. In this case, EPA made a permissible decision to create a general permit program supported by NOIs. Therefore, I respectfully dissent from Section II.B of the majority's opinion.

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City of Abilene v. United States Environmental Protection Agency
CITY OF ABILENE, Petitioner, v. UNITED STATES ENVIRONMENTAL PROTECTION AGENCY, Respondent. City of Irving, Petitioner, v. United States Environmental Protection Agency, Respondent.

325 F.3d 657 (2003)
Nos. 01-60894, 01-60895.
United States Court of Appeals, Fifth Circuit.
April 2, 2003.

Jim Mathews (argued), Clarence Joe Freeland, Mathews & Freeland, Austin, TX, for Petitioners.

Michael James Zevenbergen (argued), c/o NOAA DARC, U.S. Dept. of Justice, Seattle, WA, Christine T. Whitman, U.S. EPA, Washington, DC, for Respondent.

Before HIGGINBOTHAM, EMILIO M. GARZA and DENNIS, Circuit Judges.

* * *

EMILIO M. GARZA, Circuit Judge:

¶1

The Cities of Abilene and Irving, Texas ("Cities") petition this Court for review of permits issued by the Environmental Protection Agency ("EPA") imposing certain conditions on the Cities' ability to discharge pollutants from their storm sewer systems into United States waters. The challenged permit conditions require the Cities to implement a variety of programs designed to prevent the introduction of pollutants into storm sewers. The Cities contend that the EPA lacks the statutory authority to impose these conditions insofar as they require the Cities to regulate their residents according to federal standards. In the alternative, the Cities argue that the permits violate the Tenth Amendment to the United States Constitution by compelling them to administer a federal regulatory scheme. The Cities also contend that the public education requirements in their permits violate the First Amendment by compelling them to convey the EPA's message regarding the proper disposal of pollutants. Finally, the Cities argue that the permits are arbitrary and capricious. Because the record before us does not support these contentions, we deny the petitions for review.

¶2

I

"The Clean Water Act anticipates a partnership between the States and the Federal Government, animated by a shared objective: `to restore

and maintain the chemical, physical, and biological integrity of the Nation's waters.'" Arkansas v. Oklahoma, 503 U.S. 91, 101, 112 S.Ct. 1046, 117 L.Ed.2d 239 (1992) (quoting 33 U.S.C. § 1251(a)). Under the Act, an entity seeking to discharge pollutants into the waters of the United States must obtain a National Pollutant Discharge Elimination System ("NPDES") permit. 33 U.S.C. §§ 1311(a), 1342(a). NPDES permits generally impose numeric effluent limitations on the discharge of pollutants. 33 U.S.C. §§ 1311(b), 1342(a); see also 33 U.S.C. § 1362(11) (defining "effluent limitation" as "any restriction ... on quantities, rates, and concentrations of chemical, physical, biological, and other constituents which are discharged from point sources into navigable waters, the waters of the contiguous zone, or the ocean...."). An NPDES permit requiring the permittee to meet specific effluent limitations measured at the point of discharge is referred to as a "numeric end-of-pipe permit."

¶3

Because storm water inevitably contains pollutants such as sand or cellar dirt, 33 U.S.C. § 1362(6), an NPDES permit is required for the discharge of certain types of storm water into the waters of the United States. Permits for municipal and industrial storm water discharges are governed by 33 U.S.C. § 1342(p) and 40 C.F.R. § 122.26. While permits for discharges of storm water associated with industrial activity must impose effluent limitations, § 1342(p) authorizes the EPA to issue permits for discharges from municipal separate storm sewer systems ("MS4s") that effectively prohibit the introduction of non-storm water into the MS4 and establish management practices 325 F.3d 660 and other methods "to reduce the discharge of pollutants to the maximum extent practicable." 33 U.S.C. § 1342(p)(3). This more flexible type of permit is referred to as a "management permit."

¶4

The Cities, which have populations between 100,000 and 250,000, operate "medium" MS4s, 40 C.F.R. § 122.26(b)(7)(i), and were required to participate in the two-phase permit application process under 40 C.F.R. § 122.26(d). During the second phase of this process, the Cities were required to submit proposed storm water management programs ("SWMPs") describing how they would reduce the discharge of pollutants. 40 C.F.R. § 122.26(d)(2)(iv) ("Proposed [SWMPs] will be considered by the Director when developing permit conditions...."). The Cities and the EPA negotiated the terms of the SWMPs, and the EPA eventually presented the Cities with proposed management permits containing the challenged conditions. These conditions required the Cities to develop, implement, and enforce programs to prevent the discharge of pollutants into their MS4s from a variety of sources, including areas undergoing development, construction sites, sanitary sewers, landfills, hazardous waste treatment facilities, and certain industrial facilities. The conditions also required the Cities to prevent the

discharge of motor oil, household wastes, and various agricultural products into MS4s and to implement a public education program promoting proper disposal of pollutants.

¶5

The Cities filed comments objecting to these conditions, and negotiations continued until the EPA offered the Cities the option of pursuing numeric end-of-pipe permits, which would have required the Cities to satisfy specific effluent limitations rather than implement management programs. The Cities declined this offer, electing to continue negotiations on the management permits. The Cities subsequently submitted revised SWMPs, which were incorporated into the conditions of the final permits. After the Cities' requests for relief were denied by the EPA's Environmental Appeals Board, they petitioned this Court for consolidated review.

¶6

II

The Cities challenge their permits on both statutory and constitutional grounds. "[F]ederal courts have a ... duty to avoid constitutional issues that need not be resolved in order to determine the rights of the parties to the case under consideration." ACORN v. Edwards, 81 F.3d 1387, 1390-91 (5th Cir.1996) (quoting County Court of Ulster County v. Allen, 442 U.S. 140, 154, 99 S.Ct. 2213, 60 L.Ed.2d 777 (1979) (internal brackets omitted)). Accordingly, we consider the Cities' statutory challenge first.

¶7

The Cities contend that 33 U.S.C. § 1342(p) does not grant the EPA the authority to require a State or locality to regulate its residents as a condition of receiving a storm water discharge permit. They further contend that the EPA's interpretation of § 1342(p) is not entitled to deference under Chevron USA, Inc. v. Natural Resources Defense Council, 467 U.S. 837, 104 S.Ct. 2778, 81 L.Ed.2d 694 (1984), because that interpretation "invokes the outer limits of [federal] power." Solid Waste Agency of N. Cook County v. U.S. Army Corps of Eng'rs, 531 U.S. 159, 172, 121 S.Ct. 675, 148 L.Ed.2d 576 (2001). Section 1342(p) provides, in relevant part, that MS4 discharge permits "shall include a requirement to effectively prohibit non-stormwater discharges into the storm sewers" and "shall require controls to reduce the discharge of pollutants to the maximum extent practicable, including management practices, control techniques and system, design and engineering methods, and such other provisions as the Administrator 325 F.3d 661 ... determines appropriate for the control of such pollutants." 33 U.S.C. § 1342(p)(3)(B) (emphasis added). The plain language of § 1342(p) clearly confers broad discretion on the EPA to impose pollution control requirements when issuing NPDES permits. See Arkansas, 503 U.S. at 105, 112 S.Ct. 1046 ("Congress has vested in the [EPA] broad discretion to establish

conditions for NPDES permits."); Defenders of Wildlife v. Browner, 191 F.3d 1159, 1166-67 (9th Cir.1999) ("Under 33 U.S.C. § 1342(p)(3)(B)(iii), the EPA's choice to include either management practices or numeric limitations in [NPDES] permits [for MS4s] was within its discretion.").[1] Thus, even if Chevron deference is not warranted, the challenged permit conditions are within the EPA's discretion.

¶8

III

The Cities do not contend that 33 U.S.C. § 1342(p) or 40 C.F.R. § 122.26(d) are, by their own terms, unconstitutional. The Cities concede that, under the Commerce Clause, Congress may directly regulate the discharge of storm water into United States waters. The Cities have instead brought an as-applied challenge, arguing that their permits violate the Tenth Amendment by requiring them to regulate third parties within their boundaries according to federal standards.[2]

¶9

The Tenth Amendment states that "[t]he powers not delegated to the United States by the Constitution, nor prohibited by it to the States, are reserved to the States respectively, or to the people." U.S. CONST. amend. X. Although "the text of the Tenth Amendment ... is essentially a tautology," it nevertheless "confirms that the power of the Federal Government is subject to limits that may, in a given instance, reserve power to the States." New York v. United States, 505 U.S. 144, 156-57, 112 S.Ct. 2408, 120 L.Ed.2d 120 (1992). The Supreme Court has held that, under the Tenth Amendment, "the Federal Government may not compel the States to implement, by legislation or executive action, federal regulatory programs." Printz v. United States, 521 U.S. 898, 925, 117 S.Ct. 2365, 138 L.Ed.2d 914 (1997); see New York, 505 U.S. at 161, 112 S.Ct. 2408 ("Congress may not simply `commandee[r] the legislative processes of the States by directly compelling them to enact and enforce a federal regulatory program.'" (quoting Hodel v. Virginia Surface Mining & Reclamation Ass'n, Inc., 452 U.S. 264, 288, 101 S.Ct. 2352, 69 L.Ed.2d 1 (1981))). This protection extends to local

325 F.3d 662 governments such as the Cities. See Printz, 521 U.S. at 931 n. 15, 117 S.Ct. 2365 (refusing to apply the Eleventh Amendment distinction between States and municipalities to "the question of whether a governmental entity is protected by the Constitution's guarantees of federalism, including the Tenth Amendment"); West v. Anne Arundel County, Md., 137 F.3d 752, 758 n. 2 (4th Cir.1998) ("For purposes of determining whether a governmental entity is protected by constitutional guarantees of federalism, including the Tenth Amendment, the law does not distinguish between states and their political subdivisions.").

¶10

The Federal Government may, however, persuade States and localities to implement federal regulatory programs so long as the choice

of whether or not to comply lies with the residents of the State or locality acting through their respective governments. See New York, 505 U.S. at 168, 112 S.Ct. 2408 ("[Under] any ... permissible method of encouraging a State to conform to federal policy choices, the residents of the State retain the ultimate decision as to whether or not the State will comply."). When the Federal Government offers such a choice, the alternative to implementing the federal regulatory program must not unduly infringe on the sovereignty of the State or local government. Id. at 176, 112 S.Ct. 2408 ("A choice between two unconstitutionally coercive regulatory techniques is no choice at all."). Nevertheless, if the alternative to implementing a federal regulatory program does not offend the Constitution's guarantees of federalism, the fact that the alternative is difficult, expensive or otherwise unappealing is insufficient to establish a Tenth Amendment violation. See Federal Energy Regulatory Comm'n v. Mississippi, 456 U.S. 742, 766, 102 S.Ct. 2126, 72 L.Ed.2d 532 (1982) ("[I]t cannot be constitutionally determinative that the federal regulation is likely to move the States to act in a given way, or even to coerce the States into assuming a regulatory role...." (quoting Hodel, 452 U.S. at 289, 101 S.Ct. 2352 (internal quotation marks and brackets omitted))).[3]

¶11

Even assuming arguendo that the Cities' storm water discharge permits require them to implement a federal regulatory program, the Cities cannot establish a Tenth Amendment violation without demonstrating that they had no other option but to regulate according to federal standards. Here, the Cities were offered a choice between the permits at issue, which require implementation of the challenged management programs, and the numeric end-of-pipe permits, which would have required compliance with rigid effluent limitations. The Cities chose the former. Thus, the Cities' Tenth Amendment challenge fails unless the alternative numeric end-of-pipe permits presented by the EPA would also have exceeded the Federal Government's

325 F.3d 663 authority under the Constitution.[4]

¶12

In light of the Supreme Court's decision in Reno v. Condon, 528 U.S. 141, 120 S.Ct. 666, 145 L.Ed.2d 587 (2000), we conclude that the alternative numeric end-of-pipe permits do not offend the Tenth Amendment. In Condon, the Supreme Court held that the Federal Government may "regulate[] state activities" so long as it does not "seek[] to control or influence the manner in which States regulate private parties." Id. at 150, 120 S.Ct. 666 (quoting South Carolina v. Baker, 485 U.S. 505, 514-15, 108 S.Ct. 1355, 99 L.Ed.2d 592 (1988)). The Court upheld the constitutionality of the Driver's Privacy Protection Act of 1994, 18 U.S.C. §§ 2721-2725 ("DPPA"), which restricted the ability of States to disclose the personal information in their motor vehicle databases without the driver's consent. Id. at 143-44, 120 S.Ct. 666. The Court

concluded that the DPPA did not violate the Tenth Amendment because it "[did] not require the States in their sovereign capacity to regulate their own citizens." Id. at 151, 120 S.Ct. 666. Instead, "[t]he DPPA regulate[d] the States as the owners of data bases." Id. The Court also held that, because the DPPA's regulation of state activity was constitutional, the fact that compliance with the statute required legislative or administrative action on the part of the States was immaterial. Condon, 528 U.S. at 150-51, 120 S.Ct. 666 ("Any federal regulation demands compliance. That a State wishing to engage in certain activity must take administrative and sometimes legislative action to comply with federal standards regulating that activity is a commonplace that presents no constitutional defect." (quoting Baker, 485 U.S. at 514-15, 108 S.Ct. 1355)).[5]

¶13

Like the DPPA, the proposed numeric end-of-pipe permits would not have required the Cities to regulate their own residents but instead, by requiring the Cities to meet effluent limitations, would have regulated them in the same manner as other dischargers of pollutants. Because the record shows that the Cities voluntarily chose the management permits over permits that did not require the Cities to regulate according to federal standards, the Cities have not been compelled to implement a federal regulatory scheme. Accordingly, their Tenth Amendment challenge fails.

¶14

IV

The Cities also challenge their permits on First Amendment grounds, arguing 325 F.3d 664 that the public education provisions compel them to deliver the EPA's message regarding illicit discharges into MS4s and proper disposal of used motor vehicle oil, household hazardous wastes, and agricultural products. It is well established that, "[j]ust as the First Amendment may prevent the government from prohibiting speech, the Amendment may prevent the government from compelling individuals to express certain views...." United States v. United Foods, Inc., 533 U.S. 405, 410, 121 S.Ct. 2334, 150 L.Ed.2d 438 (2001) (citations omitted). As discussed above, however, the Cities have not been compelled to implement the conditions of their permits. Instead, the Cities voluntarily chose permits that contained public education requirements over permits that did not. Indeed, the specific requirements of the public education programs were proposed by the Cities in their SWMPs and were then incorporated into the permits. Thus, the Cities' permits do not violate the First Amendment.

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INTERACTIONS OF AN INSECTICIDE, HERBICIDE, AND NATURAL STRESSORS IN AMPHIBIAN COMMUNITY MESOCOSMS

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Abstract. Amphibians developing in wetlands embedded within or near agricultural lands may frequently encounter chemical mixtures. The objectives of our study were to determine the effects that post-application concentrations of an insecticide (carbaryl) and an herbicide (atrazine) have on body mass, development, and survival of two anuran species (southern leopard frog, *Rana sphenocephala*; American toad, *Bufo americanus*) and two caudate species (spotted salamander, *Ambystoma maculatum*; small-mouthed salamander, *A. texanum*) reared in outdoor cattle tank mesocosms. In one experiment, we manipulated tadpole density (low or high), carbaryl exposure (0, 3.5, 7.0 mg/L), and atrazine exposure (0 or 200 μg/L) to test for effects on development, mass, and survival of larvae. In a second experiment, we manipulated pond hydroperiod (constant or drying), carbaryl exposure (0 or 5 mg/L), and atrazine exposure (0 or 200 μg/L) to test for effects on mass, time, and survival to metamorphosis. Salamanders were virtually eliminated in carbaryl treatments, indicating that at realistic levels, this insecticide could cause population declines for salamanders in contaminated habitats. Carbaryl also had negative effects on toad survival. Exposure to atrazine had negative effects on body size, development, and time to metamorphosis in anuran species, which were associated with reduced chlorophyll levels. Both chemicals interacted significantly with density or hydroperiod, indicating that the environmental conditions could influence the impact of a contaminant. A significant atrazine-by-carbaryl interaction resulted in smaller and less developed spotted salamander larvae than in control ponds. Atrazine exposure, however, appeared to moderate negative effects of carbaryl for spotted salamanders. Our research suggests that important changes in the community's food web result from chemical exposure, which influence the susceptibility of amphibian species to contaminants.

Key words: Ambystoma; *amphibian decline; anurans; atrazine;* Bufo; *carbaryl; chemical mixtures; herbicide; insecticide;* Rana; *salamanders.*

INTRODUCTION

Environmental conditions can determine species distribution, abundance, and diversity and can influence the outcome of competitive and predatory interactions. In early ecological experiments, Park (1948) demonstrated in the laboratory and Connell (1961) in the field that the change in biotic (e.g., presence of a parasite) and abiotic (e.g., inundation) factors could reverse the outcome of competition. In amphibian communities, the role of competition, predation, and abiotic factors has been examined experimentally and these studies demonstrate how these factors, alone and in combination, influence the structure of amphibian communities (e.g., Wilbur 1972, 1987, Morin 1981, 1983).

In human-dominated landscapes, many novel stressors (e.g., exotic species, thermal pollution, chemical contaminants) can alter community structure. Because applied research on chemical contaminants has focused on single factors, the effects that multiple anthropogenic stressors have on communities is largely unexamined. If we fail to test multifactor hypotheses, we risk proposing solutions that are too simplistic, thus failing to solve environmental problems (Hilborn and Stearns 1982) at the cost of population and species extinction. Single-factor explanations simply may not be sufficient to explain widespread phenomenon such as amphibian declines.

Amphibians breeding in wetlands embedded within or near agricultural lands may experience natural stresses from competition and predation in ephemeral environments, in addition to single or multiple chemical stressors. There has been limited research on the effects of chemical mixtures on plankton and fish (Fairchild et al. 1994) and on amphibian communities (Britson and Threlkeld 1998, 2000). The weakness of some mixture studies is that the interactive effects of single chemicals in all possible combinations are not evaluated, therefore the applicability of such studies is unclear. Evaluation of contaminants occurring in mixtures in the field has proven useful for common mixtures (e.g., coal ash; Hopkins et al. 1998, 2000, Rowe et al. 2001), even if components of effects and underlying mechanisms are initially uncertain. However, such

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studies do suggest that chemical interactions could be important at expected environmental levels.

The most extensive examination of the effects of a single pesticide on amphibians has been with the insecticide carbaryl, a carbamate neurotoxin that appears to have low toxicity on amphibians (Bridges 1997, Boone and Semlitsch 2001, 2002). However, this short-lived chemical can alter survival, body mass, and time to metamorphosis for some species (Bridges 2000, Boone and Semlitsch 2001, 2002, Boone et al. 2001, Mills 2002) at realistic, post-application levels ($\leq$4.8 mg/L; Norris et al. 1983, Peterson et al. 1994). Field studies suggest that the main effect of this insecticide for amphibian communities is indirect rather than direct (Mills 2002). The indirect effect occurs mainly by reducing or eliminating zooplankton populations, which are sensitive to insecticides (Mayer and Ellersieck 1986, Hanazato and Yasuno 1990). A reduction in zooplankton causes an algal bloom that can increase survival and mass at metamorphosis for herbivores (e.g., anurans; Boone and Semlitsch 2002, Mills 2002). Conversely, carnivorous salamander larvae that feed on zooplankton and invertebrates may be negatively influenced by insecticide exposure through a reduction in food resources, although toxicology studies with caudates are rare.

While studies with carbaryl are important because they establish causal links between the effects of a pesticide on larval amphibian communities, they may underestimate the impact, because chemicals are often applied in mixtures of insecticides and herbicides in agricultural systems. The herbicide atrazine is widely used to control row-crop weeds, primarily in corn (Solomon et al. 1996). Atrazine inhibits photosynthesis and can reduce primary production, although this effect is reversible (Solomon et al. 1996). While it is generally accepted that surface waters seldom exceed 50 μg/L (Solomon et al. 1996), small wetlands within agricultural areas may frequently exceed this amount to levels up to and greater than 500 μg/L (de Noyelles et al. 1982, Howe et al. 1998). Acute toxicity from atrazine is unlikely for larval amphibians, because LC50s (the lethal concentration causing 50% mortality in a population) exceed expected environmental concentrations by orders of magnitude (e.g., LC50 of northern leopard frog [*Rana pipiens*], 47.6 mg/L; Howe et al. 1998). At concentrations above levels expected in the field, however, deformities and reduced feeding have been documented (Allran and Karasov 2001). For the above reasons, realistic sublethal concentrations or indirect effects may be more relevant to amphibian communities.

Phytoplankton, the food resources for anurans and zooplankton, are diminished by atrazine by 50–200 μg/L (Fairchild et al. 1998, Diana et al. 2000), although recovery of phytoplankton is common (Diana et al. 2000). At these levels, phytoplankton should be reduced for a time and herbivorous amphibians may be affected by lower food resources. Diana et al. (2000) found that at 200 μg/L atrazine, gray treefrogs (*Hyla versicolor*) had a smaller size and mass at metamorphosis. Atrazine, therefore, can affect anurans at these concentrations, and we anticipated that the presence of an herbicide would reduce food resources for anurans even if an insecticide could indirectly increase them. The objectives of our study were to determine the effects that expected environmental concentrations of an insecticide (carbaryl) and an herbicide (atrazine) have on body mass, development, and survival of two anuran (southern leopard frog, *Rana sphenocephala*; American toad, *Bufo americanus*) and two caudate (spotted salamander, *Ambystoma maculatum*; small-mouthed salamander, *A. texanum*) species in outdoor cattle tank mesocosms.

Methods

We collected three egg masses of southern leopard frogs (*Rana sphenocephala*) and 21 egg masses of spotted salamanders (*Ambystoma maculatum*) on 14 March and 27 March 2000, respectively, from the Basket Wildlife Area (Boone County, Ashland, Missouri, USA). We collected seven egg masses of the American toad (*Bufo americanus*) from the Forum Nature Area (Boone County, Columbia, Missouri, USA) and ~30 egg masses of small-mouth salamanders (*Ambystoma texanum*; females lay multiple groups of eggs) from the Baskett Wildlife Area on 30 March and 9 April 2001, respectively. Eggs were hatched in the laboratory at 23–25°C and held until all larvae were free-swimming. We mixed clutches within each species before use in our experiments to homogenize genetic variation.

We created aquatic communities in polyethylene cattle tank ponds (1.85 m in diameter; 1480 L volume) by adding 1000 L of tap water, 1 kg of leaf litter from a mixed, deciduous forest, and plankton from natural ponds (500 mL of plankton per pond at six different times) in mid-March 2000 and 2001. Plankton populations were well established in the ponds by the time larvae were introduced. The ponds were located in a fenced field at the University of Missouri Research Park in Columbia (Boone County), Missouri. Screen-mesh lids covered each pond to exclude incidental predators and anuran colonists. Use of outdoor, pond mesocosms increases the environmental relevance and maximizes the benefits of laboratory and field experiments by maintaining relatively controlled environments while incorporating natural elements such as sunlight and daily variation in temperature that would be present in a typical pond (Rowe and Dunson 1994). In all analyses, ponds represented the experimental unit to avoid problems of pseudoreplication (Hurlbert 1984).

Experiment I: effects of competition, atrazine, and carbaryl on larval amphibians

We experimentally manipulated three factors in a fully crossed design with three replicates (36 ponds):

competition via initial anuran density (low [20 tadpoles/1000 L] or high [60 tadpoles/1000 L]); carbaryl concentration (0, 3.5, or 7.0 mg/L); and atrazine concentration (0 or 200 μg/L). In addition, competition controls (each species alone with two densities for anurans and one density for caudates, replicated three times; nine ponds) were also established to determine if rearing species together had an effect on body mass, development, or survival. Twelve spotted salamander (*Ambystoma maculatum*) larvae were added to each pond on 28 March 2000; therefore, density effects were not determined for this species. Southern leopard frog (*Rana sphenocephala*) tadpoles were added to ponds on 4 April 2000 (day 0). We added carbaryl as liquid Sevin (21.3% carbaryl; Ortho, Columbus, Ohio, USA) at a nominal concentration of 3.5 mg/L (16.4 g Sevin) or 7.0 mg/L (32.9 g Sevin) and atrazine as liquid Aatrex (40.8% atrazine, Novartis, Greensboro, North Carolina, USA) at a nominal concentration of 200 μg/L (490 mg Aatrex) on 21 April 2000 (day 17). We selected the chemical level based on post-application, expected environmental concentrations (≤4.8 mg/L carbaryl and ≤270 μg/L atrazine; Norris et al. 1983, Peterson et al. 1994). The chemical treatment was applied by mixing the chemical(s) with 5 L of pond water and then pouring the mixture evenly across the pond surface with a watering can between 1000 and 1100 hours Central Standard Time (pond water: pH 7.9 ± 0.01, 14.6 ± 0.06°C). We added 5 L of uncontaminated pond water to control ponds to mimic the disturbance of chemical application. We did not stir pond water to minimize the potential of an algal bloom and because direct overspraying in the environment would not involve vigorous mixing. We took three 2-L samples from each of three ponds that were exposed to 7.0 mg/L carbaryl (and no atrazine) at 1, 24, 48, and 96 h following carbaryl exposure; at each time we combined samples from ponds and refrigerated 20 mL in a glass vial for chemical analyses. We also took three 2-L samples from each of three ponds exposed to 200 μg/L atrazine (and no carbaryl) at 1, 15, and 57 d following atrazine exposure; on each date, we combined these samples and refrigerated 1 L in a plastic bottle for chemical analyses. The half-life was ~4.5 d for carbaryl (based on linear regression; 1 h, 7.0 mg/L; 24 h, 5.5 mg/L; 48 h, 4.5 mg/L; 96 h, 4.2 mg/L) and 34 d for atrazine (based on linear regression; 1 d, 207 μg/L; 15 d, 200 μg/L; 57 d, 6.4 μg/L; Mississippi State Chemical Laboratory; high performance liquid chromatography [HPLC]).

The experiment was terminated over 30 May–1 June 2000 (days 56–58) before most individuals had reached metamorphosis. At the end of our experiment, we drained ponds and removed all remaining tadpoles and salamander larvae. We determined mean body mass, developmental stage (for anurans, Gosner 1960; for salamanders, Donavan 1980), snout–vent length (SVL; salamander larvae only), and pond survival for each species in each pond (i.e., each pond represented an experimental unit). Analyses for effects of carbaryl, atrazine, density (for tadpoles), and all interactions on mass, developmental stage, and SVL (salamander larvae only; mass, stage, and SVL comprised the ''multivariate response'') were performed using a multivariate analysis of covariance (MANCOVA; SAS 1988) for ponds containing both species. We used survival as a covariate for analyses of mass, developmental stage, and SVL (salamander larvae only), because there were significant differences in survival among treatment groups. Univariate analyses of covariance (ANCOVA) were used to determine which responses were the strongest contributors to the multivariate effects. Survival was analyzed with an analysis of variance (ANOVA). Because few salamanders survived in ponds exposed to 7.0 mg/L carbaryl (see *Results*), analysis of mass, stage, and SVL only included data from ponds exposed to 0 and 3.5 mg/L carbaryl for salamanders, due to problems of missing cells. We also used ANOVA to determine if there were differences in mass, SVL (salamander larvae only), developmental stage, or survival between control ponds containing both species and control ponds containing only one species. To normalize data and stabilize variances, we angularly transformed all proportion data, log transformed mass and SVL, and used a ranking procedure (PROC RANK; SAS 1988) on developmental stage data before analyses (Snedecor and Cochran 1980). Conservative pairwise comparisons for significant main effects were performed using Scheffé's multiple comparison tests (Snedecor and Cochran 1980).

Experiment II: effects of hydroperiod, atrazine, and carbaryl on amphibians reared through metamorphosis

We experimentally manipulated three factors in a fully crossed design with four replicates (32 ponds): hydroperiod (constant or drying with a movable standpipe), exposure to carbaryl (0 or 5.0 mg/L), and exposure to atrazine (0 or 200 μg/L). Because Experiment I indicated that rearing anurans and salamanders together did not influence our measured endpoints (see *Results*), we did not include competition controls in this experiment. Twelve small-mouthed salamander (*Ambystoma texanum*) larvae and 45 American toad (*Bufo americanus*) tadpoles were added to each pond on 16 April 2001 (day 0). We added carbaryl as liquid Sevin (22.5% carbaryl) at a nominal concentration of 5.0 mg/L (22.2 g Sevin; GardenTech, Lexington, Kentucky, USA) and atrazine as liquid (i.e., Aatrex; 40.8% atrazine) at a nominal concentration of 200 μg/L (490 mg Aatrex) on 24 April 2001 (day 8; pond water: pH 7.7 ± 0.03, 13.3 ± 0.04°C). We took three 2-L samples from each of three ponds that were exposed to 5.0 mg/L carbaryl (and no atrazine) at 1 and 48 h following carbaryl exposure; at each time we combined samples from ponds and refrigerated 20 mL in a glass vial for

chemical analyses. We also took three 2-L samples from each of three ponds exposed to 200 μg/L atrazine (and no carbaryl) 1 d following atrazine exposure to confirm the atrazine level; we combined water from the ponds and refrigerated 1 L in a plastic bottle for chemical analyses. Water analyses indicated that carbaryl had a half-life of ~3 d (based on linear regression; 1 h, 5.3 mg/L; 48 h, 3.4 mg/L) and confirmed the atrazine concentration (1 d, 197 μg/L; Mississippi State Chemical Laboratory, HPLC analysis).

We made daily searches for metamorphosed toads or salamanders. On 13 July 2001 (day 88), we drained ponds and removed all remaining metamorphs and larvae. Toad and salamander metamorphs were measured for mass and time to metamorphosis, and survival was determined for each species in each pond; pond means served as the experimental unit. Analyses on toads for effects of carbaryl, atrazine, hydroperiod, and all interactions on mass and time to metamorphosis (mass and time represent the ''multivariate response'') were performed using a MANCOVA (SAS 1988) with survival as the covariate. Univariate ANCOVAs were used to determine which responses were the strongest contributors to the multivariate effects. Survival was analyzed separately with ANOVA. For salamanders, the effects of carbaryl, atrazine, hydroperiod, carbaryl by hydroperiod, and atrazine by hydroperiod interactions on mass and time to metamorphosis were analyzed with a MANCOVA; survival was used as the covariate. All interactions could not be analyzed for salamanders due to missing cells resulting from no survival in ponds exposed to both carbaryl and atrazine treatments. Univariate ANCOVAs were used to determine which responses were the strongest contributors to the multivariate effects. To normalize data and stabilize variances, we angularly transformed all proportion data and log transformed mass and time to metamorphosis before analyses (Snedecor and Cochran 1980).

Chlorophyll content

In both studies, we estimated the standing crop of chlorophyll in the water column by taking a 1-L composite sample (sampled from three 2-L samples) from each pond. A subsample of 100 mL was filtered and placed in 15 mL of neutralized 90% acetone in the dark at 5°C for 24 h and then analyzed by fluorometry (Greenberg et al. 1992). Water samples were taken on four dates in 2000 (before chemical application on 19 April [day 15] and after chemical application on 26 April [day 22], 3 May [day 29], and 17 May [day 42]) and on two dates in 2001 (before chemical application on 24 April 2001 [day 8] and after chemical application on 13 June [day 50]). Chlorophyll data were analyzed with a repeated-measures ANOVA to determine the main effects and interactions of time, carbaryl, atrazine, and density (Experiment I) or hydroperiod (Experiment II).

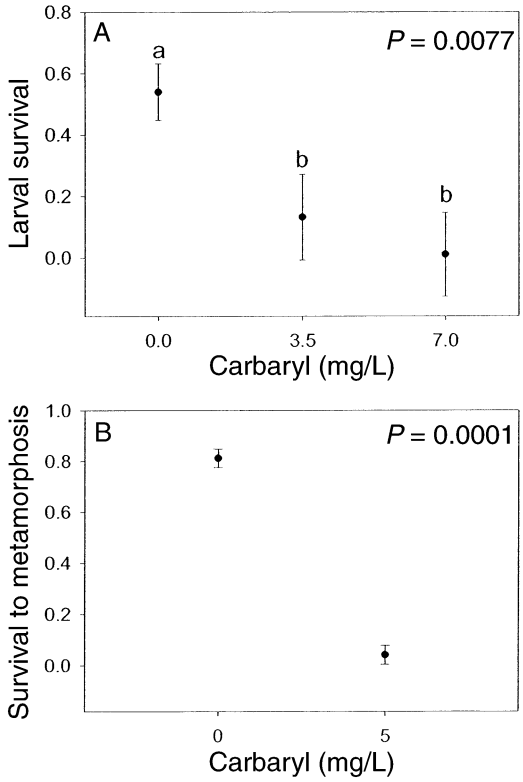

FIG. 1. Proportion of (A) spotted salamander (*Ambystoma maculatum*) larvae in Experiment I and (B) small-mouthed salamander (*A. texanum*) metamorphs in Experiment II that survived across carbaryl treatments. All amphibians used in this study were collected in Boone County, Missouri, USA. Error bars represent ±1 SE. Different lowercase letters above the data points indicate significant differences among treatments according to Scheffé's multiple comparison tests.

RESULTS

Experiment I: effects of competition, atrazine, and carbaryl on larval amphibians

Spotted salamander survival was significantly reduced by carbaryl exposure (Fig. 1A, Table 1). Multivariate analyses on salamanders indicated that carbaryl exposure and the interaction of carbaryl by atrazine exposure negatively affected mass, SVL, and developmental stage (Table 2). The carbaryl multivariate effect on larvae that survived can be attributed to its influence on all three responses resulting in significantly reduced mass (Fig. 2A), reduced SVL (Fig. 2B), and delayed development (Fig. 2C) for larvae in ponds exposed to 3.5 mg/L carbaryl compared to controls. Atrazine exposure did not influence the responses we measured for the spotted salamanders, however the significant interaction of carbaryl and atrazine indicates that the presence of atrazine ameliorated the carbaryl treatment to some degree (Tables 1 and 2; Fig. 3). This carbaryl by atrazine interaction can be ascribed to its effect on SVL (Fig. 3B); however, body mass and developmental stage of salamanders showed a similar

TABLE 1. Summary of univariate analyses of covariance (ANCOVA) of body mass, snout–vent length (SVL; for salamanders only), developmental stage (Gosner for anurans, Donavan for caudates), and larval survival for spotted salamanders (*Ambystoma maculatum*) and southern leopard frogs (*Rana sphenocephala*) from Experiment I.

Response variable	Source of variation	Sum of squares	df	*F*	*P*
Spotted salamander					
Mass	Carbaryl	1.8713	1	9.91	0.0084
	Carbaryl × atrazine	0.8290	1	4.39	0.0580
	Error	2.2648	12		
SVL	Carbaryl	0.2885	1	13.70	0.0030
	Carbaryl × atrazine	0.1446	1	6.87	0.0224
	Error	0.2526	12		
Developmental stage	Carbaryl	131.1140	1	5.91	0.0316
	Carbaryl × atrazine	102.1678	1	4.61	0.0530
	Error	266.0944	12		
Survival	Carbaryl	2.9923	2	5.86	0.0077
	Atrazine	0.0162	1	0.06	0.8029
	Carbaryl × atrazine	0.0053	2	0.01	0.9897
	Error	6.8981	27		
Southern leopard frog					
Mass	Carbaryl	0.5088	2	19.79	0.0001
	Atrazine	0.1303	1	10.13	0.0052
	Density	2.1677	1	168.51	0.0001
	Density × carbaryl	0.0139	2	0.54	0.5928
	Error	0.2315	18		
Developmental stage	Carbaryl	32.1010	2	0.45	0.6462
	Atrazine	60.9289	1	1.70	0.2089
	Density	2018.9690	1	56.29	0.0001
	Density × carbaryl	317.7967	2	4.43	0.0273
	Error	645.6355	18		
Survival	Carbaryl	0.1477	2	0.98	0.3947
	Atrazine	0.2249	1	2.97	0.1009
	Density	0.2492	1	3.29	0.0853
	Carbaryl × atrazine	0.1120	2	0.74	0.4901
	Density × carbaryl	0.1686	2	1.11	0.3485
	Density × atrazine	0.4591	1	6.07	0.0235
	Density × carbaryl × atrazine	0.0152	2	0.10	0.9050
	Error	1.4372	19		

Note: Statistics for sources of variation that were significant according to the MANCOVA for mass, SVL, and developmental stage are reported.

TABLE 2. Multivariate analysis of covariance (MANCOVA) for treatment effects and interactions on larval mass, developmental stage, and snout–vent length (SVL; for salamanders only) for larvae of spotted salamanders (*Ambystoma maculatum*) and southern leopard frogs (*Rana sphenocephala*) from Experiment I.

Source of variation	Wilks' lambda	df	*F*	*P*
Spotted salamander				
Covariate (survival)	0.9016	3, 10	0.36	0.7808
Carbaryl	0.3727	3, 10	5.61	0.0162
Atrazine	0.8159	3, 10	0.75	0.5457
Carbaryl × atrazine	0.4663	3, 10	3.82	0.0466
Southern leopard frog				
Covariate (survival)	0.7462	2, 17	2.89	0.0831
Carbaryl	0.2847	4, 34	7.43	0.0002
Atrazine	0.6367	2, 17	4.85	0.0216
Density	0.0895	2, 17	86.43	0.0001
Carbaryl × atrazine	0.8135	4, 34	0.92	0.4614
Density × carbaryl	0.5822	4, 34	2.64	0.0506
Density × atrazine	0.8864	2, 17	1.09	0.3588
Density × carbaryl × atrazine	0.8292	4, 34	0.83	0.5127

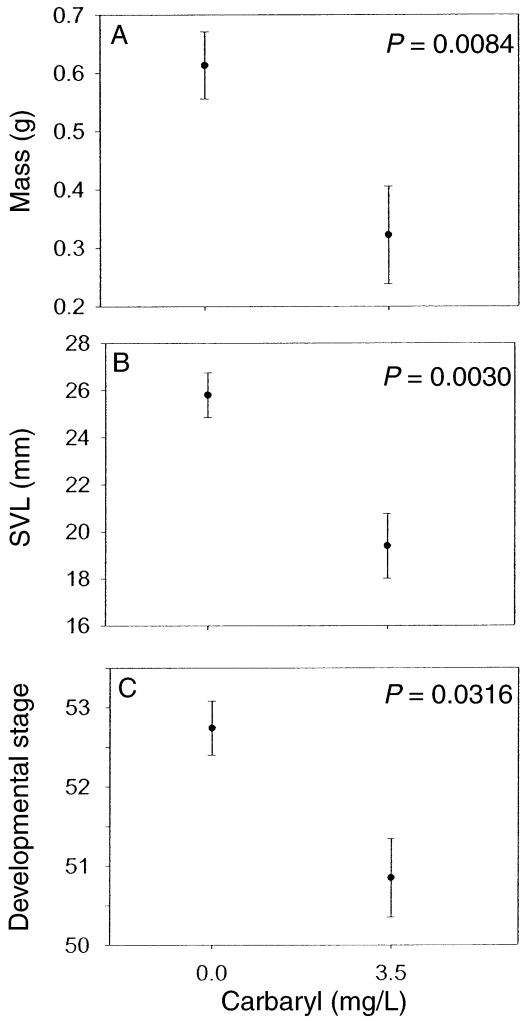

FIG. 2. (A) Mass, (B) snout–vent length (SVL), and (C) developmental stage of spotted salamander (*Ambystoma maculatum*) larvae at the end of Experiment I across carbaryl treatments. Error bars represent ±1 SE.

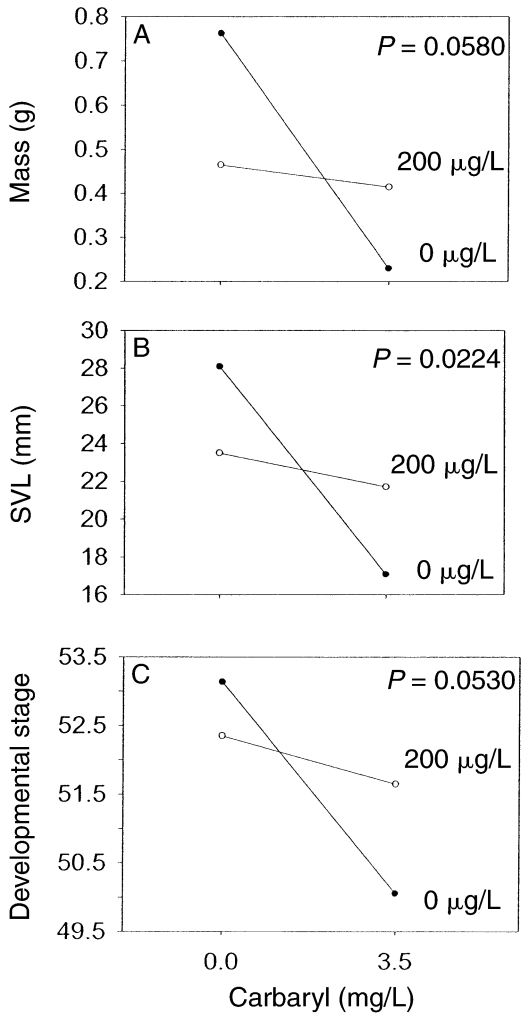

FIG. 3. (A) Mass, (B) snout–vent length (SVL), and (C) developmental stage of spotted salamander (*Ambystoma maculatum*) larvae at the end of Experiment I for salamanders exposed or not exposed to atrazine across carbaryl treatments.

trend and likely contribute to the multivariate response (Fig. 3A and C).

Survival of leopard frogs was not significantly influenced by either chemical alone (Table 1). However, leopard frog survival was significantly influenced by an atrazine by density interaction with the greatest survival in high-density control ponds and the lowest in high-density ponds exposed to atrazine; tadpoles in low-density ponds were the least affected by atrazine exposure at either concentration (Fig. 4). The multivariate responses of leopard frogs were significantly affected by carbaryl exposure, atrazine exposure, and initial tadpole density (Table 2). Leopard frog mass significantly increased with carbaryl exposure and decreased with atrazine exposure compared to controls (Table 1; Fig. 5). The interaction of carbaryl and density indicated a trend in the multivariate response, and univariate analysis showed a significant effect on de-

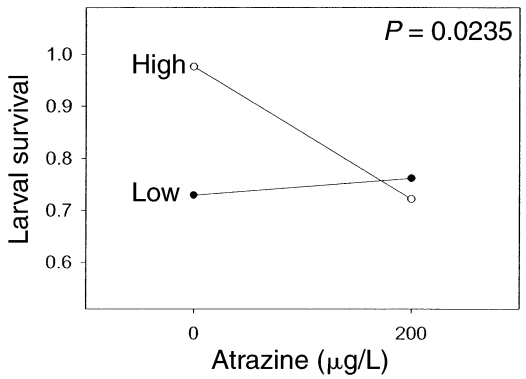

FIG. 4. Larval survival of southern leopard frog (*Rana sphenocephala*) tadpoles in Experiment I from low- and high-density ponds across atrazine treatments.

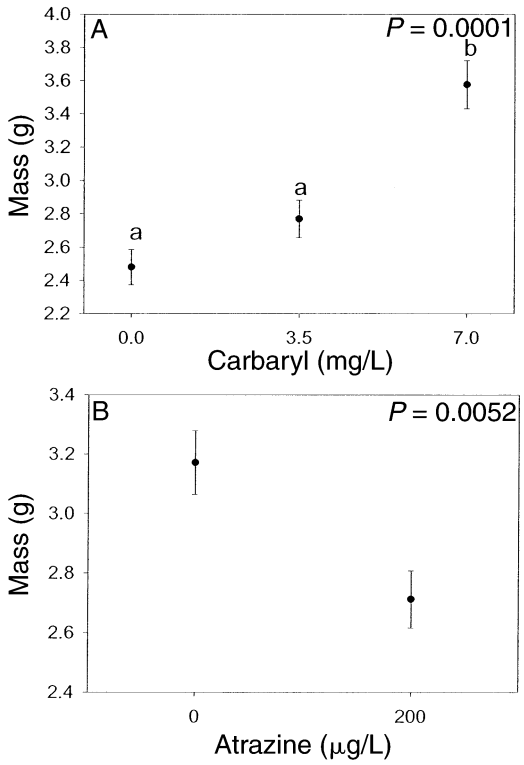

FIG. 5. Mass of southern leopard frog (*Rana sphenocephala*) tadpoles from Experiment I across (A) carbaryl and (B) atrazine treatments. Error bars represent ±1 SE. Different letters above the data points indicate significant differences among treatments according to Scheffé's multiple comparison tests.

velopmental stage (Table 1; carbaryl controls, 40.4 ± 0.5 [low density], 35.2 ± 0.5 [high density]; 3.5 mg/L, 40.4 ± 0.6 [low], 36.1 ± 0.5 [high]; 7.0 mg/L, 39.2 ± 0.6 [low], 37.6 ± 0.8 [high] Gosner stage; means ± 1 SE).

We collected a number of recently metamorphosed southern leopard frogs at the close of the experiment; however, there were not enough for statistical analysis. In low-density ponds, we collected 15 frogs in controls (containing frogs and salamanders; 1.744 ± 0.060 g), seven in competition controls (1.985 ± 0.078 g), eight exposed to atrazine only (1.431 ± 0.038 g), five exposed to 3.5 mg/L carbaryl only (2.1872 ± 0.195 g), one exposed to 7.0 mg/L carbaryl only (2.976 ± 0 g), and four exposed to atrazine and 3.5 mg/L carbaryl (1.708 ± 0.070 g); in a high-density pond, we collected one metamorph exposed to atrazine and 7.0 mg/L carbaryl (1.413 ± 0 g).

Competitive controls

Spotted salamanders reared with southern leopard frogs did not differ significantly from spotted salamanders reared alone in terms of mass ($F_{1,7}$ = 0.01, P = 0.9422), SVL ($F_{1,7}$ = 0.12, P = 0.7433), developmental stage ($F_{1,7}$ = 0.42, P = 0.5367), or survival ($F_{1,11}$ = 0.04, P = 0.8374) at the end of the experiment. Southern leopard frogs did not differ significantly in mass ($F_{1,7}$ = 0.36, P = 0.5672), developmental stage ($F_{1,7}$ = 1.35, P = 0.2830), or survival ($F_{1,8}$ = 0.30, P = 0.5979) when reared alone or with spotted salamanders. However, high density significantly reduced mass ($F_{1,7}$ = 55.02, P = 0.0001) and developmental stage ($F_{1,7}$ = 103.97, $P < 0.0001$) in both single- and mixed-species ponds.

Experiment II: effects of hydroperiod, atrazine, and carbaryl on amphibians reared through metamorphosis

Small-mouthed salamander survival to metamorphosis was significantly reduced by carbaryl exposure (Fig. 1B, Table 3). Multivariate analyses on salamanders indicated that atrazine exposure, hydroperiod, and the interaction of atrazine and hydroperiod significantly affected mass and time to metamorphosis (Table 4). The atrazine multivariate effect can be attributed mainly to increasing the time to metamorphosis for salamanders (Fig. 6A, Table 3). Atrazine interacted significantly with the hydroperiod treatment (Table 4), affecting both time (Fig. 6A) and mass to metamorphosis (Fig. 6B) and resulting in longer larval periods in constant hydroperiods and smaller mass at metamorphosis in drying hydroperiods. A drying hydroperiod affected the multivariate responses mainly through reducing salamander mass at metamorphosis (Table 3; drying, 1.00 ± 0.07 g; constant, 1.31 ± 0.09 g).

Carbaryl exposure significantly reduced survival of American toads by ~20% (Fig. 7A). Multivariate responses of toads were significantly affected by carbaryl exposure, atrazine exposure, and a carbaryl by hydroperiod interaction (Table 4). Carbaryl exposure lengthened the larval period of toads significantly (Fig. 7B). Atrazine exposure reduced toad mass at metamorphosis significantly (Fig. 8). A significant carbaryl by hydroperiod interaction may be attributed mainly to its effect on mass with toads reared in constant hydroperiods having reduced mass with carbaryl exposure; whereas in drying ponds, toad mass increased slightly with carbaryl exposure (Fig. 9).

Chlorophyll content

The amount of chlorophyll changed significantly over time in both years (Table 5). In the first experiment, density, atrazine exposure, carbaryl exposure, and a carbaryl by atrazine interaction significantly affected chlorophyll over time (Table 5). In Experiment I, atrazine exposure lead to significantly lower chlorophyll content in pond water 12 d after exposure ($F_{1,24}$ = 15.65, P = 0.0006; control, 3.88 ± 0.48 μg/L; 200 μg/L atrazine, 1.31 ± 0.48 μg/L), although there were no differences at the final measurement. Exposure to carbaryl also significantly reduced chlorophyll in the water 12 d after exposure ($F_{2,24}$ = 12.20, P = 0.0002; control ponds, 5.39 ± 0.58 μg/L; 3.5 mg/L carbaryl,

TABLE 3. Summary of univariate analyses of covariance (ANCOVA) of mass, time, and survival to metamorphosis for small-mouthed salamanders (*Ambystoma texanum*) and American toads (*Bufo americanus*) from Experiment II.

Response variable	Source of variation	Sum of squares	df	*F*	*P*
Small-mouthed salamander					
Mass	Covariate (survival)	0.0009	1	0.05	0.8321
	Atrazine	0.0218	1	1.08	0.3175
	Hydroperiod	0.1839	1	9.10	0.0099
	Atrazine × hydroperiod	0.1414	1	7.00	0.0202
	Error	0.2625	13		
Time	Covariate (survival)	0.0402	1	23.93	0.0003
	Atrazine	0.0161	1	9.61	0.0084
	Hydroperiod	0.0063	1	3.75	0.0748
	Atrazine × hydroperiod	0.0156	1	9.32	0.0093
	Error	0.0218	13		
Survival	Carbaryl	9.0337	1	176.03	0.0001
	Atrazine	0.0573	1	1.12	0.3012
	Hydroperiod	0.0255	1	0.50	0.4878
	Carbaryl × hydroperiod	0.0031	1	0.06	0.8066
	Atrazine × hydroperiod	0.0061	1	0.12	0.7335
	Carbaryl × atrazine	0.1201	1	2.34	0.1392
	Carbaryl × atrazine × hydroperiod	0.0190	1	0.37	0.5491
	Error	1.2317	24		
American toad					
Mass	Carbaryl	0.0058	1	0.35	0.5608
	Atrazine	0.1707	1	10.22	0.0040
	Carbaryl × hydroperiod	0.1017	1	6.09	0.0215
	Error	0.3842	23		
Time	Carbaryl	0.1215	1	39.93	0.0001
	Atrazine	0.0012	1	0.40	0.5321
	Carbaryl × hydroperiod	0.0001	1	0.02	0.8889
	Error	0.0700	23		
Survival	Carbaryl	0.0923	1	14.35	0.0009
	Atrazine	0.0033	1	0.51	0.4835
	Hydroperiod	0.0011	1	0.17	0.6857
	Carbaryl × hydroperiod	0.0000	1	0.00	0.9802
	Atrazine × hydroperiod	0.0180	1	2.81	0.1069
	Carbaryl × atrazine	0.0052	1	0.81	0.3766
	Carbaryl × atrazine × hydroperiod	0.0142	1	2.21	0.1503
	Error	0.1543	24		

Note: Statistics for sources of variation that were significant according to the MANCOVA for mass and time to metamorphosis are reported.

TABLE 4. Multivariate analysis of covariance (MANCOVA) for treatment effects and interactions on mass and time to metamorphosis for metamorphs of small-mouthed salamanders (*Ambystoma texanum*) and American toads (*Bufo americanus*) from Experiment II.

Source of variation	Wilks' lambda	df	*F*	*P*
Small-mouthed salamander				
Covariate (survival)	0.2945	2, 12	14.38	0.0007
Carbaryl	0.6771	2, 12	2.86	0.0964
Atrazine	0.4054	2, 12	8.80	0.0044
Hydroperiod	0.5829	2, 12	4.29	0.0392
Carbaryl × hydroperiod	0.9000	2, 12	0.67	0.5315
Atrazine × hydroperiod	0.5442	2, 12	5.02	0.0260
American toad				
Covariate (survival)	0.9548	2, 22	0.52	0.6011
Carbaryl	0.3051	2, 22	25.05	0.0001
Atrazine	0.6548	2, 22	5.80	0.0095
Hydroperiod	0.9341	2, 22	0.78	0.4724
Carbaryl × hydroperiod	0.7094	2, 22	4.51	0.0229
Atrazine × hydroperiod	0.8070	2, 22	2.63	0.0945
Carbaryl × atrazine	0.8739	2, 22	1.59	0.2271
Carbaryl × atrazine × hydroperiod	0.9493	2, 22	0.59	0.5644

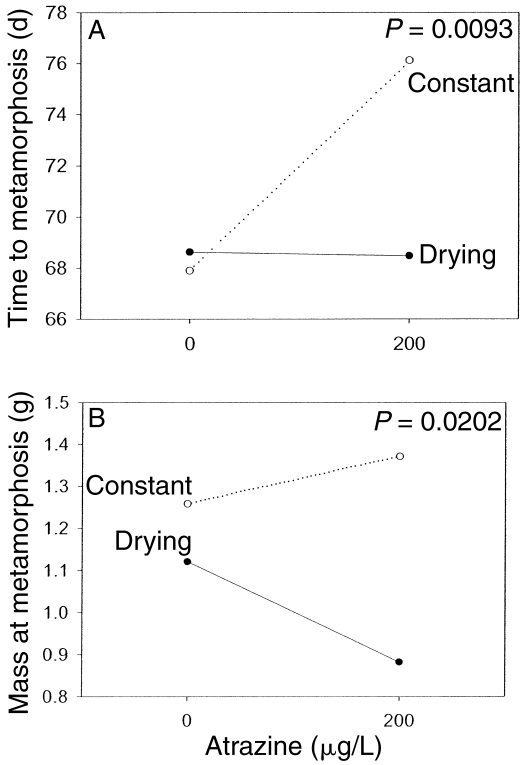

FIG. 6. Interaction of atrazine and hydroperiod on (A) time to metamorphosis and (B) mass at metamorphosis for small-mouthed salamanders (*Ambystoma texanum*) in Experiment II.

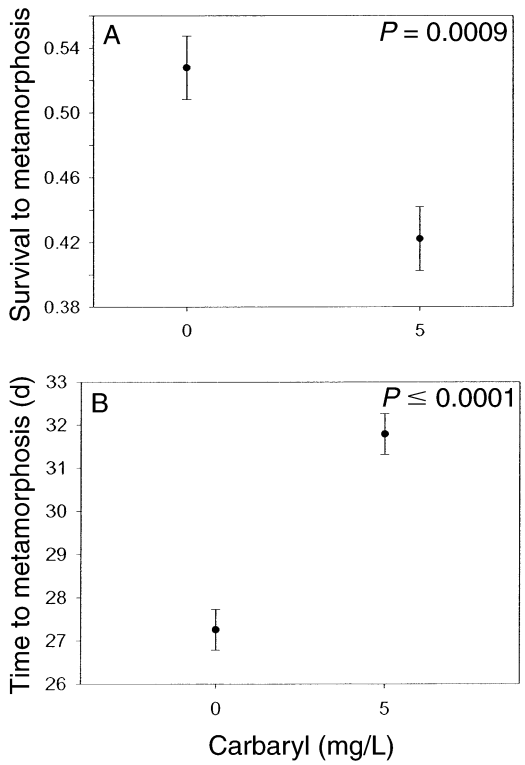

FIG. 7. (A) Survival and (B) time to metamorphosis for American toads (*Bufo americanus*) across carbaryl treatments in Experiment II. Error bars represent ±1 SE.

0.87 ± 0.58 μg/L; and 7.0 mg/L carbaryl, 1.51 ± 0.58 μg/L), although differences were not apparent at the final measurement. Chlorophyll was significantly affected by density over time with low-density ponds having greater amounts of chlorophyll ($F_{1,24}$ = 10.53, P = 0.0034; low, 1.76 ± 0.43 μg/L; high, 0.53 ± 0.43 μg/L). A significant interaction between atrazine and carbaryl over time occurred 12 d ($F_{2,24}$ = 5.77, P = 0.0090) and 25 d ($F_{2,24}$ = 3.98, P = 0.0321) after chemical exposure (Fig. 10). At 12 d after the chemical treatment was applied, control ponds had the greatest chlorophyll levels; however, 13 d later all ponds had increased chlorophyll levels with most ponds containing more chlorophyll than control ponds.

In the second experiment, a hydroperiod by carbaryl interaction significantly affected chlorophyll over time (Table 5). However this effect was attributable to the first measurement taken before chemical addition and may result from limited chlorophyll sampling in this study ($F_{1,24}$ = 6.70, P = 0.0161; on day 8, drying hydroperiod, 8.95 ± 2.88 μg/L [0 mg/L], 6.84 ± 2.88 μg/L [5 mg/L]; constant hydroperiod, 11.79 ± 2.88 μg/L [0 mg/L], 3.48 ± 2.88 μg/L [5 mg/L]).

DISCUSSION

Previous studies have shown that pesticides can alter amphibian communities in unexpected ways. Boone and Semlitsch (2001, 2002) indicated the importance of testing contaminants in realistic conditions by incorporating natural biotic and abiotic stressors that may influence organisms' reactions to chemical stressors. In our study, natural factors of density and pond hydroperiod were also important in influencing the effects that chemicals had on amphibians. Toxicological studies should incorporate complex environments into their design because very often the difference between finding a chemical effect or not can be dependent upon

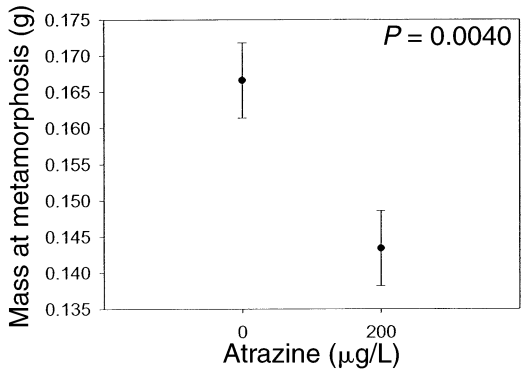

FIG. 8. Mass at metamorphosis of American toads (*Bufo americanus*) across atrazine treatments in Experiment II. Error bars represent ±1 SE.

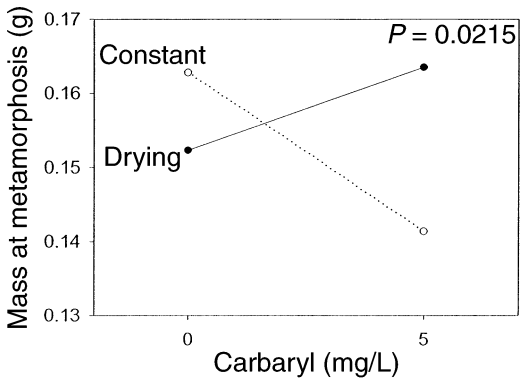

FIG. 9. Mass at metamorphosis of American toads (*Bufo americanus*) affected by a carbaryl-by-hydroperiod interaction in Experiment II.

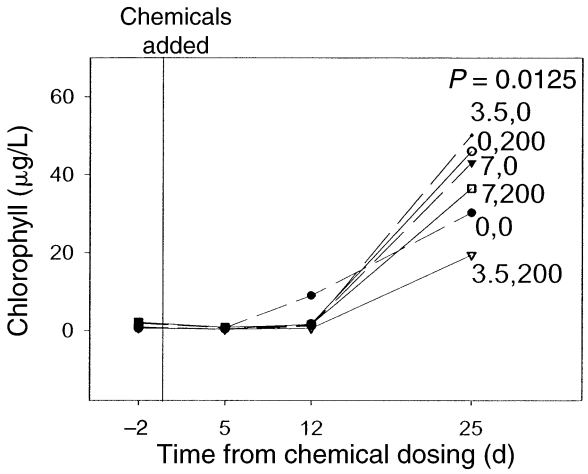

FIG. 10. Pond chlorophyll measures for an atrazine-by-carbaryl interaction over time from Experiment I. Numbers represent the concentration of carbaryl (in milligrams per liter) and atrazine (in micrograms per liter), respectively, to which the ponds were originally exposed.

natural factors like competition, predation, and pond hydroperiod that are known to be important in community processes (Semlitsch et al. 1996). However, in understanding the influence of contaminants in communities, it is also essential to create realistic chemical exposures, which means considering the effects of multiple contaminants and/or multiple exposures (e.g., Fairchild et al. 1994, Rowe et al. 1996, Boone et al. 2001). By using an insecticide and herbicide, we can consider the effects of two contaminants with different modes of action. Carbaryl, a neurotoxin, can alter the food web by eliminating small animals (i.e., invertebrates; Hanazato and Yasuno 1987, 1990, Mills 2002), while atrazine, a photosynthesis inhibitor, can alter the food web by reducing algal populations (Fairchild et al. 1994, 1998, Diana et al. 2000). Although direct toxicity of the tested concentrations should be low based on LC50 data (Howe et al. 1998, Boone and Bridges 1999, Bridges 1999), both of these chemicals have the potential to alter the food source for amphibians.

The community structure in our study was affected by contaminant exposure in ways not previously demonstrated. Both of our experiments indicated that exposure to realistic levels of carbaryl can virtually eliminate salamander larvae. Survival of the spotted and small-mouthed salamanders decreased to near zero. In contrast, toad survival dropped by ~20% while survival of the southern leopard frog was not affected by carbaryl exposure. Whether carbaryl has a positive (as in Boone and Semlitsch 2002) or negative (as in Boone and Semlitsch 2001) effect on anurans may be a function of individual, population, family, or species sen-

TABLE 5. Summary of repeated-measures ANOVA for effects of time and interactions with treatments on chlorophyll content in pond water in Experiments I and II.

Source of variation	Wilks' lambda	df	*F*	*P*
Experiment I				
Time	0.0351	3, 22	201.69	0.0001
Time × density	0.6432	3, 22	4.07	0.0193
Time × atrazine	0.6858	3, 22	3.36	0.0371
Time × carbaryl	0.5481	6, 44	2.57	0.0319
Time × density × atrazine	0.8632	3, 22	1.16	0.3466
Time × density × carbaryl	0.7334	6, 44	1.23	0.3095
Time × atrazine × carbaryl	0.4926	6, 44	3.12	0.0124
Time × density × atrazine × carbaryl	0.8057	6, 44	0.84	0.5483
Experiment II				
Time	0.1974	1, 24	97.59	0.0001
Time × hydroperiod	0.8908	1, 24	2.94	0.0992
Time × atrazine	0.9895	1, 24	0.25	0.6190
Time × carbaryl	0.9654	1, 24	0.86	0.3628
Time × hydroperiod × atrazine	0.9927	1, 24	0.18	0.6781
Time × hydroperiod × carbaryl	0.7933	1, 24	6.25	0.0196
Time × atrazine × carbaryl	0.9993	1, 24	0.02	0.8967
Time × hydroperiod × atrazine × carbaryl	0.9992	1, 24	0.02	0.8917

sitivity to contaminants (Bridges and Semlitsch 2000) or to resource availability; therefore, it is not surprising to find variation in this response among anuran species. Carnivorous salamander species, however, may have a more predictable response to insecticides if the main effect is manifested through elimination of their larval food resources (Hanazato and Yasuno 1990, Mills 2002), although our design precludes distinguishing between direct and indirect effects. Zooplankton are very sensitive to carbaryl; 48-h LC50s of carbaryl range from 6.4 to 13 μg/L (Mayer and Ellersieck 1986). Therefore, survival of most zooplankton at levels used in our study would be unlikely. Elimination of zooplankton in the ponds following carbaryl application was observed (M. D. Boone, *personal observation*) and likely resulted in the negative impacts we found with carbaryl on growth and development for the spotted salamanders that did survive. Although carbaryl exposure can be relatively short-lived (with a half-life of ~3–4 d in our experiments), it can have a long-term effect on zooplankton (Hanazato and Yasuno 1987, Mills 2002). When zooplankton populations are reduced or eliminated, insecticides could lead to reproductive failure and subsequent population declines for carnivorous amphibian species.

In contrast, the effects of carbaryl on anurans is more difficult to predict. Carbaryl had some positive effects on mass and developmental stage of leopard frogs, as found in other studies (Boone and Semlitsch 2002). However, the survival of the American toads was reduced, and the larval period was lengthened in ponds exposed to carbaryl with constant hydroperiods, which could make individuals vulnerable to aquatic predators for longer periods of time. If an anuran community was exposed to a neurotoxin early in larval development, abundance of some species may be unaffected, increased, or reduced, and this response may depend upon the sensitivity of the anurans to direct effects of the chemical as well as the community response.

The herbicide atrazine reduced chlorophyll concentrations of algal communities (documented in Experiment I) and resulted in reduced mass (for toads and leopard frogs) and lengthened larval periods (for small-mouthed salamanders). While the presence of atrazine may not cause mortality from reductions in food resources, it may reduce metamorph size. Because size at metamorphosis has been positively correlated with overwinter survival and future reproduction (Berven and Gill 1983, Smith 1987), atrazine may affect population dynamics when it reduces metamorph size. Lengthened larval periods for salamanders may be a result of atrazine increasing energy required for growth and development (e.g., Rowe et al. 1998), although the mechanism is not clear. Furthermore, recent evidence of Hayes et al. (2002) suggests that atrazine can act as an endocrine disrupter at levels used in our study; therefore atrazine may have additional effects on surviving individuals by affecting future reproduction.

Because recent experiments evince that carbaryl can indirectly have stimulatory effects on survival and mass at metamorphosis by increasing anuran food resources (Boone et al. 2001, Boone and Semlitsch 2002, Mills 2002), we anticipated that ponds simultaneously exposed to an insecticide and herbicide would eliminate this effect for anuran species. In our study, however, there was no significant interaction of the herbicide and insecticide for any anuran species, suggesting that these chemicals may act additively. Although atrazine exposure appeared to reduce chlorophyll levels, it decreased levels to the same degree whether the ponds were exposed to carbaryl or not. That is, ponds exposed to carbaryl contained higher levels of chlorophyll than control ponds because of reduced zooplankton grazers (as in Mills 2002). If atrazine is added, the chlorophyll may be reduced proportionally so that ponds exposed to carbaryl may still have more chlorophyll than control ponds. Atrazine did interact with density and influenced leopard frog survival, suggesting that atrazine reduced the food supply of leopard frog tadpoles to some extent (as demonstrated from our chlorophyll analyses) and increased the likelihood of starvation in high-density conditions where food was scarcer.

We did find a significant carbaryl by atrazine interaction that affected larval spotted salamander SVL, mass, and developmental stage. Salamander larvae in control ponds had the largest SVL, mass, and developmental stage and the lowest in ponds that contained carbaryl only. Under carbaryl control conditions, the presence of atrazine had a negative effect on the individuals that did survive, but in the presence of carbaryl, individuals reached a greater size and developmental stage (although still lower than chemical control ponds). Why atrazine would have a positive effect on salamanders in the presence of carbaryl is unclear, but it suggests there are complex chemical or food web interactions, which warrants further investigation.

Our research suggests that there are important changes in the amphibian community that ensue from chemical exposure through altering species abundances. In both studies, we found that carbaryl reduced survival of salamanders, that atrazine had negative effects on anuran mass and time to metamorphosis, and that both chemicals interacted with other natural factors. Although both chemicals used in this study may have relatively benign direct effects on anurans and salamanders, insecticides and herbicides have a real potential to alter the food base of amphibians. Because so many pesticides are used in the environment, looking at the interactions of representative chemicals on amphibians is a useful starting point in evaluating their singular and interactive effects on these communities.

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Review and Analysis of Budget Data Submitted by the Permittees for Fiscal Years 2000 – 2003

Los Angeles County Municipal Storm Water Permit

A Report to the California Regional Water Quality Control Board Los Angeles Region

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EXECUTIVE SUMMARY

There has been considerable controversy over the costs associated with compliance of the 2001 Los Angeles County Municipal Storm Water Permit (LA County MS4 Permit). This report is intended to provide the Regional Board with an analysis, performed by Regional Board staff, of the cost of compliance submitted to the Regional Board as part of Annual Report submissions by the municipal storm water permittees. Additionally, this report provides some additional information on expected costs of compliance over the life of the current permit, i.e., five years from date of adoption.

The review comes to several key conclusions. These are:

1. A substantial portion of the reported cost of compliance can be attributed to longstanding programs, e.g., street sweeping, that have been conducted by cities for many years preceding the adoption of the earliest storm water permit in 1990. The pre-existing costs are, by far, the largest component of cost for most permittees.

2. Regional Board staff cost assessments appear to validate U.S. EPA estimates for permit compliance.

3. Reported costs of compliance for the same program element vary widely from city to city and by a very great margin that cannot be explained. Attempts made by staff to validate what appear to be grossly inflated numbers were unsuccessful. Selected audits of these permittees are recommended to obtain numbers that reflect actual expenditures. If, as a result of an audit, reported numbers are found to be wholly without foundation, enforcement action may be appropriate.

4. Reports of costs of compliance not tied to specific permit requirements are being widely reported. The reports are based on assumptions that are invalid and which do not comport with the provisions of the storm water permit which is Best Management Practices (BMP)-based and which does not contain numerical effluent limits. Costs for the implementation of the least expensive BMPs that will meet water quality requirements are not well developed, if at all.

Neither the Governmental Accounting Standards Board (GASB) nor the Federal Accounting Standards Advisory Board (FASAB) has established Generally Accepted Accounting Principles (GAAP) guidelines for reporting storm water budgets.[1] Thus, the development of a standard protocol for program budget reporting in partnership with municipalities appears to be necessary to ensure that cost figures, reported to the LA Regional Board, are provided in a consistent and comparable format.

[1] The two accounting rule-making authorities for government bodies in the U.S. are the GASB for local and State government, and the FASAB for the Federal government.

1.0 INTRODUCTION

The LA County MS4 Permit covers the County of Los Angeles and 84 cities within LA County except for the City of Long Beach. The Los Angeles Regional Water Quality Control Board reissued the LA County MS4 Permit on December 13, 2001.

The Regional Board (RB) staff considered costs in crafting the 2001 LA County MS4 Permit and the requirements therein.[2] While cost is a factor, the Regional Water Board is not required to perform a detailed cost-benefit analysis. In performing the cost analysis, the RB staff relied on a number of documents: (1) *Report to Congress on the Phase II Storm Water Regulations*, EPA 833-R-99-001 (1999); (2) *NPDES Report to Congress on the Phase II Storm Water Regulations; 64 Fed. Reg. 68791-68796*; (3) Workbook: *Designing and Implementing an Effective Storm Water Management Program - Storm Water NPDES Phase II Regulations* – American Public Works Association, Kansas City, MO (2000); (4) a cost estimate document[3] submitted by the City of Los Angeles as part as its formal comment on the first draft of the LA County MS4 Permit; and, (5) other documents listed in the Administrative Record.

The U.S. EPA performed a full cost/benefit analysis before promulgating Phase II regulations. In its cost/benefit analysis, the federal agency reviewed costs data from Phase I municipalities implementing similar programs as required by the LA County MS4 permit, in order to determine the budget burden for implementation on Phase II municipalities. Costs estimates from Phase I municipalities were considered valuable since many of the cities were implementing the first or second generation permits for some time and had the opportunity to fine tune their cost expenditures for program implementation. It is important to mention that the same survey of cost implementation performed by the U.S. EPA included a Southern California MS4 program (Orange County and Cities), where three-fourths of the co-permittees have populations less than 100,000 people. It is also significant to mention that the fiscal analysis required in the Orange County MS4 Program requires that budgets be accounted for as pre-existing costs for activities performed prior to the promulgation of the storm water regulations, and new costs thereafter.

2.0 METHOD

RB staff used several methods to estimate the cost per household for implementation of the LA County MS4 Storm Water Permit.

These are:

> A. Extrapolation from U.S. EPA estimates for implementation of Phase II: National average per household estimates were adjusted for inflation and then an increment of 25 percent added to account for the cost of new programs under the 2001 permit.

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[2] See Response of the LA Regional Board to the LA County MS4 Petition for Stay (2002) at: http://www.swrcb.ca.gov/~rwqcb4/html/programs/stormwater/la_ms4_final/petition_for_stay/02_0402_LARWQCB_LA_MS4_Response.pdf

[3] Storm Water Pollution Abatement Charge - Budget Estimate for 2001-2002, 2002-2003 and Actual Budget Estimate for 2000-2001 (dated June 18, 2001)

B. Computation from budget estimates submitted by permittees: The budget-cost estimates submitted by permittees were divided by the number of households in the municipality based on the 2000 U.S. Census. The cost estimate divided by the number of households provided the estimated per household cost of implementation for each permitee. A second computation was performed dividing the countywide cost estimate by the number of households countywide to derive the mean estimated per household cost for LA County.

C. Extrapolation from City of LA Budget: The City of LA provided a budget based on a dedicated special fund, which was considered reliable because its sole purpose was to pay for the storm water program. Pre-existing program costs such as trash collection and street sweeping were excluded from this budget. RB staff then compared budget breakdown for implementation of the 1996 permit and the 2001 permit provided by the City of LA. The increase in cost for each program element was then taken to be the cost increment associated with the implementation of the 2001 permit for that program.

3.0 RESULTS AND ANALYSIS

3.1 Implementation Cost Estimates

The U.S. EPA, in its survey, determined that costs for Phase I municipalities averaged $9.08 (1998 dollars) per household per year to implement the requirements of the MS4 permits, with a median value of $2.86. U.S. EPA's cost benefit analysis identified a range of annual costs from $0.62 to $60.43 per household for the communities it surveyed.

The estimated average cost of implementation for the specific requirements of the 2001 permit lies somewhere between the U.S. EPA's estimated national cost for Phase 1, at $9.64 (adjusted for inflation), and the extrapolated figure of $17.21 per household per year from the City of LA budget data. If one were to use the budget data reported by permittees on face value, the mean household cost of compliance is between $50 and $63 per year[4], and the median cost of compliance is about $28.

[4] The difference arises based on the way the countywide per household cost is computed. Whether it is averaged based on the countywide total budget or it is averaged after summing each municipalities per household cost.

Table 1. Household cost for implementation of the LA County MS4 Permit using a selection of methods.

	Costs per Household
Computation with U.S. EPA Assumption[5]	$9.64
Assuming 25% Incremental cost[6]	$12.00
Computation with Orange County's Estimate[6]	$12.50
Extrapolation from City of LA Data[7]	$17.21
Reported Mean for LA County MS4 permittees[7]	$50.00 - $ 63.00
Reported Median for LA County MS4 permittees[7]	$28.00
CALTRANS Study[8]	$1509.00

A cursory review of the Orange County MS4 Permit Annual Report[9] budget section reveals that the amount attributable to implement the Drainage Area Management Plan (DAMP similar to Storm Water Quality Management Plan [SQMP] in the LA County MS4 Permit) is 20% of the total budget. The rest, 80% is attributable to pre-existing programs costs. Thus if we assume that cost per household is $50 and that one fifth of the sum is new cost because of the storm water program, then $10 per household is a reasonable cost estimate per household for implementation of storm water requirements. Assuming that the 2001 permit imposed a 25% incremental cost in new programs, the average cost per household cost becomes $12.50, which is very close to U.S. EPA's figure of $12.

3.2 Wide Ranging Inconsistencies

In the storm water budgets reported by LA County MS4 permittees, there was no consistency in program costs when one considers average costs, similar counts of population and similar land use. Very dissimilar costs per household with orders of magnitude differences for similar population counts were noted. Average cost per household varies from $1 to 515.[10] The median value is $28. The City of Los Angeles estimated expenditure per household at $18, which is about twice the value reported ($9.08 in 1998 dollars) by U.S. EPA for Phase I cities in its cost/benefit analysis for Phase II. Overall county average cost per household is $50 to $63 depending on the method of calculation.[11] This figure is five times the average household cost estimated in U.S. EPA's cost survey.

[5] 1998 dollars adjusted for inflation at 2% annually.
[6] Segregating pre-existing program expenditures and new costs to implement the storm water program.
[7] Not segregating between pre-existing program expenditures and new costs to implement the storm water program.
[8] Annualized cost.
[9] http://www.ocwatersheds.com/StormWater/swp_documents_annual.asp (accessed August 2002)
[10] As explained before, Vernon and City of Industry where not considered in the analysis due to their very low resident population.
[11] *Supra* footnote 4.

For example, the City of Glendale reported costs eleven times more, on average cost per household, than the City of Los Angeles[12] to implement the same permit requirements. Another example is the City of Rolling Hills when compared to the City of Hidden Hills: they have similar population and land uses, but Hidden Hills seems to spend one and a half times more than Rolling Hills does. A few additional examples follow.

Table 2. Cost per Household estimates for selected cities with similar characteristics.

City	Reported Cost per Household	Population	Households
Rolling Hills	$66	1,871	624
Hidden Hills	$109	1,875	625
San Marino	$22	12,945	4,315
Palos Verdes Estates	$300	13,340	4,447
Artesia	$5	16,380	5,460
Santa Fe Springs	$136	17,438	5,813
Culver City	$434	38,816	12,939
West Hollywood	$144	38,900	12,967
San Gabriel	$46	39,804	13,268

Some times differences among cities may be appropriate if they can be explained. Such examples are the City of Vernon and the City of Industry. These cities are unique because they are heavily industrialized with low resident populations. The annual per household cost in these cities would appear very high as a result. But in most cases the reason for differences in per household costs among cities are difficult to discern.

3.3 Incremental Cost of Permit Compliance

The 2001 permit contains a number of specific provisions that are new and will require an additional expenditure to achieve compliance. These specific provisions are identified below and an estimate of compliance cost increase is provided for each program area:

- Public Information and Involvement (Pollutant specific outreach)
- Industrial/ Commercial Inspection
- Illicit connection/ discharge elimination (Proactive identification and MS4 system mapping)

[12] City of Los Angeles has a dedicated special fund called the storm water pollution abatement charge.

- Development Planning (Standard Urban Stormwater Mitigation Plans for ministerial and discretionary projects)
- Development Construction (Local Storm Water Pollution Plans for projects 1 acre or larger)
- Public Agency (Catch-basin cleaning and trash receptacles at transit shelters)
- Monitoring (Expanded monitoring)

Table 3. Incremental cost of compliance from the 1996 permit to the 2001 permit.

LA County MS4 Storm Water Programs	2001 Permit Cost per household	1996 Permit Cost per household	Percent increase
Program Management	$1.66	$1.56	6%
Public Information and Participation	$1.38	$1.30	6%
Industrial/ Commercial Inspection	$0.99	$0.90	9%
Development Planning	$0.84	$0.79	6%
Development Construction	$0.05	$0.05	6%
Public Agency Activities	$11.50	$10.82	6%
Illicit Connection/ Discharge Elimination	$0.80	$0.75	6%
Total Cost per Household	$17.21	$16.18	6%

*The incremental costs to LA County municipalities were computed by extrapolation using the City of Los Angeles' budget information provided for 2000/2001 (1996 permit) and 2001/ 2002 (2001 permit). The City of Los Angeles has a dedicated special fund (storm water pollution abatement charge). Costs reported by the City of Los Angeles were considered most reliable.

* Costs of the monitoring program are not included because the County of Los Angeles as Principal Permittee almost exclusively conducts monitoring on behalf of the cities. If computed on a countywide basis, the cost of annual monitoring as reported by the County of Los Angeles increased from $ 0.16 to $0.24 per household.

The incremental cost of compliance under the 2001 permit was estimated to be less than ten percent, if City of LA data is extrapolated to be indicative of compliance cost to other permittees.

4.0 DISCUSSION

4.1 Overview of Budget Estimates

Permittees have provided annual budget estimates for implementing the 1996 permit, as required under the monitoring and reporting program for that permit. The estimates aggregated to $142 million and $145 million for fiscal years 2000/01 and 2001/02 respectively. Overall, the total estimated cost for compliance with 1996 permit is close to five hundred million dollars over a five-year period. However, the permittees included questionable estimates and creative accounting. For example, for the fiscal year 2000/01, the City of Glendale reported $5.6 million for public agency activities, the City of Downey reported $1.6 million for monitoring, and the City of Hermosa Beach reported $2.8 million for elimination of illicit discharges and

connections. On follow-up inquiry, City staff was unable or did not substantiate these reported expenditures.

With few exceptions, permittees failed to provide additional data regarding program costs during the permit reissuance process. One exception was a cost estimate, dated June 18, 2001, that the City of Los Angeles[13] submitted as part of its formal comments on the first draft permit. The Regional Board considered these comments, and made substantial reductions in certain requirements in the third draft, such as the frequency of sweeping streets.

Permittees' cost estimates range widely (from zero to $4.2 million) as reported for the program to eliminate illicit discharges and connections in 2000/01, vis-à-vis the illicit discharges and connections elimination activity actually reported by the permittees to have been completed. The expenditures do not appear to bear any rational relationship to illicit discharges and connections elimination efforts.

RB staff review and inquiry of municipal staff, indicates that some cities are computing their storm water budgets by estimating a percentage of each of the city's line item budget that seems to be related to MS4 permit compliance. In other words it is only a rough "guess estimate". Sometimes costs associated with complying with the general industrial storm water permit, a separate program, appear to have been included under the MS4 permit expenditures.

4.2 Pre-existing Programs

Many jurisdictions have ongoing programs and activities that are related, to some degree, to improving storm water quality. These ongoing or pre-existing programs, such as hazardous waste permitting and inspection, recycling programs, road and street maintenance, sanitary sewer maintenance, flood control channel maintenance, catch basin clean-up, street sweeping, to name a few, are already in place due to other regulatory requirements or pre-existing programs. Even for cities that were incorporated after the promulgation of storm water regulations (1990) such as Calabasas and Malibu, it cannot be claimed that the expenditures for these types of activities are due to storm water regulations in their entirety. These services were performed prior to the existence of a storm water permit under a contract with the county or another administrative entity.

Inclusion of pre-existing programs (e.g. street sweeping) cause exaggeration of permit compliance costs, possibly representing more than 50% of the estimated reported budgets in many cases. Such costs should be listed separately since they are not a true new expenditure to comply with the MS4 permit requirements. The actual new expenditures for the implementation of the storm water requirements, in excess of what cities were already spending before the introduction of storm water regulations, may be much less than 50% of the currently estimated budgets reported to the Regional Board. Street Sweeping and Trash Collection costs account for most of the Public Agency Activities Program implementation expenditures, up to 98% of a program's budget in some cases, and up to 90% of the total storm water program implementation

[13] This cost estimate includes $0.8 million for implementation of trash TMDL and $3.3 million to implement the pathogen TMDL.

expenditures for some cities. Overall, Public Agency Activities Program implementation costs amount to $122 million (including street sweeping and trash collection which are the major portion of costs in this program) and account for 85% of the total budget expenditures of $143 million. One may conclude that the permittees are spending on average $41 per household for the Public Agencies Activities alone. To implement the rest of the storm water program, cities spend no more than 15% of their reported budgets, which is around $22 million or $9 on average per household. This figure of $9 is almost identical to the U.S. EPA's cost estimate (See Table 1).

Program cost exaggeration may be a problem with other MS4 programs in the LA region as well such as the City of Long Beach and the Ventura County MS4 Program. Consider the case of the City of Long Beach (which is covered by its own MS4 permit). A review of its budget estimate indicates that street sweeping costs $10 million, which corresponds to half of the reported budget of $19 million. However, this is not a new expenditure for the City of Long Beach attributable to the storm water regulations. Street sweeping pre-dates the storm water regulations, so it cannot be considered an extra burden on the city's budget. It is not a new expense. The only instance that may qualify as a new expenditure is an increase in frequency of street sweeping due to storm water requirements in excess of normal frequencies, e.g. the increase from an existing one time per month to two times per month street sweeping in commercial areas. A closer look may reveal that several other pre-existing programs are being claimed as new expenditures to comply with the 2001 permit requirements. These may include, flood control maintenance, sewer maintenance activities, storm drain reconstruction, road maintenance, hazardous waste collection, and solid waste recycling programs. This pattern of accounting appears to be repeated in the FY 2002/03 estimated budgets. The Public Agency Activities Program estimates provided at $210 million (including street sweeping and trash collection) account for 73% of the total budget of $288 million[14], while only 27% or $78 million accounts for the cost of all the other programs combined.

The primary issue is what is the true additional financial burden for the implementation of the storm water regulations. Many of the activities performed by the cities can be listed as costs under the storm water costs budget, but they were incurred by the city before the storm water regulations, therefore they are not a true new expenditure or new burden on city revenues. In order to be accurate, only that portion of cost increase due to a new permit requirement and not otherwise already pre-existing should be identified as a new incremental in cost for the municipality. It is imperative to separate the budgets reported under the storm water requirements under pre-existing and new costs of compliance with the specific MS4 permit requirements to have a clear picture of what the true cost and burden of the storm water regulations are. Otherwise, the impression is given that the cost of compliance is huge and everything is a new burden, which is misleading. Costs to be attributed toward implementation of the MS4 permit requirements must be strictly attributable to new tasks specified in the Storm Water Management Plan.

[14] The estimated budgets for FY 2002/03 are incomplete since a number of cities reported that they were unable to estimate the costs of implementation of the new permit requirements. The data may be reconciled when cities report the expenditures actually incurred in the 2003-2004 Annual Report.

4.3 Municipal Cost Sharing.

Another problem area appears to be how the County of Los Angeles and the LA County Flood Control District budget fits into the overall cost picture. The County of Los Angeles' budget accounts for nearly 40% of the total estimated costs for all permittees combined, but it is not clear how this supports activities for all cities and how the cost is being accounted for (raising the possibility of double counting). For example, the County of Los Angeles does almost all of the monitoring required by the LA County MS4 Permit but other cities also report monitoring expenses. If these cities participate in the funding of this effort or on special projects, that may be appropriate, otherwise the cost estimate is dubious.

4.4 Comparison of Estimates with Expenditures

A review of the Annual Report for 2001/02, which covers the last six months of the 1996 permit and the first six months of the new permit, indicates that a number of cities revised upward the expenditure figures by orders of magnitude relative to the estimated budget figures provided in the previous year's fiscal analysis. Other cities reported that the amount budgeted for was the exact amount spent, and some others reported a slight decrease in expenditures versus estimated budget.

Upon closer review of the status of implementation of specific programs under the 2001 permit, it becomes apparent that most of the permittees continued to implement the 1996 permit requirements, because updated Model Programs were not available until July 2002. Therefore, the apparent significant increase in expenditures for some cities versus estimated budgets, is likely due to changes in accounting practices and not due to any new activity.

4.5 Site Education Program

Another example of accounting irregularity is the Site Visit Education program. The County of Los Angeles performed site education activities for 37 contract cities, paid for through existing funds, and as a consequence, some of the cities reported $0 expense for this task. Other cities reported an additional separate expense. Some of the cities performed the site education visits themselves, and the County of Los Angeles reimbursed them a standard amount. In some cases, it appears that these cities did not subtract the reimbursed amount from their own estimated budget cost that they reported to the Regional Board.

Furthermore, an examination of the fiscal analysis in the 2001/02 Annual Report for expenditures for the site visit program for the last six months of the 1996 permit reveal more irregularities. For the first six months of the new inspection program of the 2001 permit, no site visits or inspections have been reported as completed in the Annual Report but significant amounts of expenditures are being reported as having been incurred. It is highly unlikely that the high costs

were incurred for logistics – such as setting up a critical source database or other administrative activities without any fieldwork. Therefore, the reported expenditures are questionable.

A RB staff brief review of the Site Visit Education Program under the 1996 permit, for six cities, revealed a $2 million difference between the estimated budgets and the actual amount spent to conduct the site visit. For example, City of Glendale reported an estimated budget of $1.86 million to perform the site visits, but the actual amount spent was about $100,000. Similarly the City of Industry, for the same task, estimated a budget of $276,280 but actually spent just $35,618.

4.6 Cost of the Inspection Program

The 2001 permit upgraded the site visit program to a facility inspection. Based on RB staff review, the inspection program at industrial/commercial facilities can be performed within the existing reported budget estimates. In reality there may be a moderate increase in expenditure.

The average cost per site visit for the Site Visit Program ranged from $50 to $100 (the County of Los Angeles' reimbursement rate was $50 for industrial/commercial sites and $34 for restaurants). The time spent on each site ranged from 30 minutes to an hour (data reported by permittees). Assuming that the average cost of a site education visit was $100 per site and multiplying this figure with the total number of site visits reported during the five year permit term, the total cost of implementation of this task equals $6.5 million. Therefore, the projected budget of $8 million for inspections is only a 23% incremental cost added to the existing budget. Further, assuming that a site inspection will involve twice as much effort as a site education visit, the average unit cost per site inspection can be reasonably estimated to be in the range of $100 to $200. This new requirement to elevate the site visit education program to an inspection program at industrial/commercial facilities in the 2001 permit appears not to have been so burdensome after all.

The County of Los Angeles, the principal permittee, has estimated the cost for the industrial and commercial inspection. The inspection program was generally claimed by many permittees to be the most cost-prohibitive element of the 2001 permit. As documented in memoranda prepared by the County of Los Angeles, dated December 5, 2001 and January 3, 2002, these inspections would cost the County and the cities an estimated $8 million over the 5-year permit term. This $8 million cost annualizes to $1.6 million, and can be spread among all 84 permittees. In comparison with the estimated $15.5 million spent during the previous permit term to implement the site education visit program, the inspection cost as determined constitutes a nearly 50 percent savings. Perhaps this is so because the logistical aspects were worked out during the site visit phase and that the inspection step-up imposes only a slight increase in burden.

Noteworthy is the fact that the inspection program is estimated to cost $3.1 million (this may be the most expensive year due to start-up costs), in the FY 2002/03 fiscal analysis. The inspection requirement was identified as one of the more onerous provisions of the 2001 permit, but the cost appears to represent only 1.1% of the total estimated budget of $288 million as reported by permittees.[14] The apparent marginal cost burden to the majority of the permittees to conduct

industrial and commercial inspections might be so because the City of LA and the County of Los Angeles carry the predominant share. The City of Los Angeles has its own inspection program and accounts for approximately 50% of all industrial/commercial facilities in Los Angeles County. The County of Los Angeles covers another significant portion of the industrial/commercial base. Thus, the other 83 permittees combined have jurisdiction over no more than the remaining 20% to 30%. Many cities can and have effectively used existing inspection programs such as pretreatment, code enforcement, public works, fire department, Certified Unified Public Agencies (CUPAs) to integrate the storm water inspection requirements.

4.7 Misuse of Program Cost Estimates

Some permittees' extensive use of circumspect estimates to demonstrate how financially burdensome the implementation of the LA County MS4 Permit is disingenuous. In order to establish credibility of program costs, permittees must thoroughly review the way the budgets are built, and the relationship between budget projections and actual expenditures of activities directly related to the implementation of the LA County MS4 Permit requirements.

Also the $54 billion cost estimate cited by the California Department of Transportation (Caltrans) in June 1998 bears no relationship to the LA County MS4 permit provisions. Several municipal officials have widely cited this estimate as an annual cost that permittees will bear over the next 10 years. This is misleading because the Caltrans estimate was not prepared to meet the requirements that are specific to the LA County MS4 permit. The Caltrans estimate is invalid because of several erroneous assumptions. These include, namely that permittees are required to shift their strategy from BMPs that focus on preventing pollution at its source, to a regional treatment facility. Such a strategy would call for substantial land acquisition and capital costs to: (a) capture runoff from 1.2 inches of precipitation; and (b) construct 6 plants to treat all pollutants in the runoff, at a rate of 500 million gallons per day. This is clearly not the requirement reflected in the LA County MS4 permit, which relies upon, and provides flexibility for permittees to devise cost-effective BMPs to prevent pollutants from coming into contact with storm water and to reduce pollutants discharged in the storm water.

4.8 Comparison with Palm Beach County, FL MS4 Program

A comparison with the budget analysis of another Phase I MS4 Permit, Palm Beach County, Florida, shows similar accounting difficulties as for LA County, in the absence of clear guidelines from the U.S. EPA.

In the Palm Beach County Annual Report however, the costs under pre-existing programs is recognized. The first term Palm Beach County MS4 Permit includes the federally required inspection program at high-risk industrial/commercial sites. Looking at a comparison of scales, the population of Palm Beach County is one eighth of the population of LA County. The Palm Beach County MS4 program is funded by a combination of general funds and utility fee assessment.

Table 4. Comparison of MS4 program costs between Los Angeles County, CA and Palm Beach County, FL.

	Los Angeles County, CA	Palm Beach County, FL
Median cost per household[15]	$30	$32
Average cost per household	$50	$48
Range of cost per household	$1 to $515[16]	$3 to $526
Population	9,335,522	1,131,184
Estimated budget	$149,166,730	$23,382,702
Average cost per household largest city[17]	$18	$130

4.9 Comparison with MS4 Programs in Other U.S. Communities

There are few studies to date to provide a thorough analysis of the cost estimates for the implementation of the municipal storm water programs. The U.S. EPA performed a cost/ benefit analysis for the promulgation of Phase II Storm Water Regulations. A recent article[18] discusses the evaluation of cost estimates for the implementation of the six minimum control elements for small municipalities under Phase II rules. The author investigated two scenarios: one for a small community of 10,000 people and another for a medium sized urban area of 50,000 people. It is interesting to note that the small community scenario assumes it is adjacent to a larger city that has obtained a Phase I permit and can assist it in many of its permit responsibilities. This scenario resembles the situation in LA County urban area for many small cities.

The author concludes that the range of costs is similar to those identified by U.S. EPA in its estimate. The cost per capita was $5.63 for the medium sized city (population of 100,000 or more) for the implementation of the municipal storm water in a five-year permit term following the first permit term and $1.11 for the smaller city.

Extrapolating these figures by multiplying the per capita cost with the average number of 2.92 persons per household in Los Angeles County, we obtain a range between $3.24 and $16.43 per household for small to mid-sized cities. These findings tend to validate City of Los Angeles' average estimated cost of $18 per household as a credible estimate noting that these costs are incurred by a significantly larger municipality implementing additional elements required by Phase I regulations.

[15] Household in LA County is defined as 3 persons, in PB County is 2.34 persons
[16] Excluding cities of Vernon and Industry
[17] Los Angeles, West Palm Beach
[18] NPDES Phase II Cost Estimates by Andrew J. Reese, P.E in Proceedings for National Conference on Tools for Urban Water Resource Management and Protection (February 2000) Chicago, IL.

The author also states that based on his own experience working in over 100 communities, he estimates that comprehensive storm water programs that include advanced storm water quality programs cost between $7 to $20 per capita per year. That translates in LA County to a value of $58 average cost per household at the highest end. In contrast, the cost data reported by the municipalities in LA County show a value of $515 average cost per household at the highest end, with 24 cities (28% of the total number of permittees) well above the maximum average cost per household estimated by the author.

5.0 RESPONSE TO COMMENTS ON DRAFT REPORT

We extend our appreciation to the municipalities who responded to our draft document released in August 2002 and provided comments that enabled us to present a more in-depth analysis. The analysis should provide a basis for further discussions and help in creating a framework for how to match budget estimates with the true implementation costs for purposes of transparency and accountability.

The following summarizes RB staff responses to comments received:

Base Year for Cost Analysis – A commenter suggested that using the 2000-2001 estimates as a basis for cost analysis is flawed, and instead to use the 2002-2003 estimates, which would be the first full year of implementation under the 2001 permit. Among RB staffs' purpose during the current analysis was to review some of the previous assumptions and estimates made under the 1996 permit term and determine if the estimates truly reflected the costs of program implementation. The analysis identified a number of discrepancies and errors, and as a consequence a number of permittees updated some of their previously submitted budget figures. This is not to say that there were no municipalities that went through a thorough analysis and attempted to come up with a budget estimate as accurate as possible. Such diligence was simply very difficult to discern.

Site Education Visit Analysis – Commenters challenged the cost analysis for the implementation of the site education visits program, but no one provided hard numbers or tangible figures to dispute the facts presented in the analysis. As it stands, the analysis showed that for the site education visits implementation program, permittees spent a combined $15.5 million dollars during the second permit term. In contrast, the County of Los Angeles County estimates that under the 2001 permit, the total cost will be $8 million for the industrial/commercial inspection program.

Inspection Cost Estimate - In was suggested that the unit cost of the site inspection should be closer to the $400 per inspection estimated by the consultants performing inspections on behalf of the U.S. EPA and Regional Boards at industrial sites covered by the Industrial Storm Water General Permit. We note that there might be a significant reduction in unit cost for municipal

permittees because municipal inspectors are not required to review the Storm Water Pollution Prevention Plan (SWPPP) and monitoring data. In addition, the municipalities may have reduced overhead costs usually incurred by an outside contractor. The estimated cost range projected by the RB staff analysis is between $100 to $200 per site inspection and is a very reasonable assumption.

Equating big budgets to better compliance - It appears that some permittees infer that RB staff consider "the bigger the amount, the better the compliance" with permit requirements. A high budget estimate means a chance to "look good" on paper and not draw the attention during report review. There is a misconception that a small budget equates to a red flag indicating that the permittee is not allocating enough resources to program implementation. Quite the contrary, RB staff performed in-depth analysis. Any intentional budget inflation, when discovered through a program audit, may lead to Regional Board enforcement action.

Tiered compliance – Some permittees perceive that different tiers of efforts to comply are appropriate and acceptable even though the Maximum Extent Practicable (MEP) standard applies equally to all Permittees. Some commenters noted that some cities are aggressive in implementation and therefore spend more, and others spend excessively because of previous lawsuits. The rest, who spend significantly less, should not be compared with the former groups, simply because their effort is less aggressive, or because they were never challenged with a lawsuit. As far as the RB staff is concerned MEP applies equally to all permittees. A tiering of effort does not constitute compliance with the MEP standard.

Pre-existing Programs - One commenter suggested that the idea of pre-existing programs does not make sense any more, since the new permit carries over most of the programs established under the 1996 permit. Therefore, the true comparison should be made between pre-existing programs under the 1996 permit, and the new requirements under the new permit. We note that in surveying Phase I municipalities, to prepare its *Report to Congress on the Phase I Storm Water Regulations,* the U.S. EPA sent out a survey form to Phase 1 NPDES Municipal Storm Water permittees. The survey's purpose was to determine the costs of storm water regulations and their financial impact on Phase 2 municipalities. One of the questions on the survey was:

> "6) Please estimate (a) your agency's cost of activities from before the Phase 1 program that you now include as part of your phase 1 permit (b) your agency's new activities that you are now required to do as part of the phase 1 permit that you were not doing previously."

It is clear that the U.S. EPA intends for MS4 permittees to distinguish between pre-existing program costs prior to the inception of the storm water permit and new costs incurred since, when reporting budgets.

Inclusion of the Cost of TMDL Implementation - Some commenters contended that the cost of TMDL implementation should be included in storm water budget reporting. However, except for the trash TMDL specifically mentioned in the 2001 permit, all the other TMDLs are not described in the permit provisions and therefore, the cost of implementation is unknown. When a particular TMDL becomes part of the LA County MS4 permit requirements, then it would be an

appropriate practice to include the cost of TMDL compliance with the particular TMDL in the storm water budget estimate.

6.0 FUTURE COMPLIANCE COSTS

It is highly speculative to estimate what future permit compliance costs will be. However, future costs can be divided into two broad categories: 1) Compliance with direct permit costs and 2) compliance with receiving water limitations. The first category is specific to the costs associated with the prescriptive elements of the permit, excluding the receiving water limitations provision (Part 2 of the permit). This report has, in essence, focused on this quantifiable category of costs. Costs for compliance with the receiving water limitations have not been assessed or included in this report given that this provision of the permit has not yet been invoked and such costs, to the extent costs are incurred, will depend on the successive, iterative application of cost-effective BMPs designed to achieve water quality standards.

The "iterative process" is a mechanism by which compliance with the LA County MS4 permit's receiving water limitation provision can be achieved over time. "Receiving Water" refers to that body of water into which the discharge of storm water from the municipal separate storm sewer system is placed, i.e., a river, stream, ocean or lake. The LA County MS4 permit's receiving water limitations' language is structured so that discharges of pollutants from the municipal storm sewer do not degrade the "receiving water" quality below the quality allowed by long-established water quality standards. The water quality standards are contained primarily in the Regional Board's Basin Plan and reflect the level of water quality necessary to support aquatic life and safe human use of the water. The iterative process recognizes that degraded water quality from a storm water discharge sometimes cannot be restored to compliance with water quality standards through the application of a single round of BMPs. Rather, the concept is that a municipal permittee should develop a reasoned suite of BMPs, apply them, measure the water quality improvement achieved, and, if the original suite of BMPs have not, over time, achieved water quality standards, that they should be augmented with additional BMPs until water quality standards are achieved.

A key element of this process is the selection of BMPs by the permittees. Given that the selection of BMPs is both prospective and unknown at this time, a specific cost estimate for compliance cannot be developed. However, some general conclusions can be drawn as to the range of costs involved. Most importantly, the permit does not mandate any specific BMPs for use in the iterative process and, presumes that the most cost effective BMPs will be selected by the permittees.

Source control is one of the most important and cost effective strategies available to address storm water pollution. Clearly, if you have removed or dramatically reduced the presence of pollutants that can be discharged in storm water, the need for any downstream controls is either eliminated or dramatically reduced. Inspections of industrial sites to ensure compliance with municipal storm water ordinances (as provided in the LA County MS4 permit), therefore, becomes a very significant BMP that can reduce the presence of pollutants before they become entrained in storm water. Inspections are one of the most cost effective strategies that can be

used to reduce the presence of storm water pollutants, especially of toxic metals.

Some cost assessments have been or are being developed on the basis of applying sophisticated chemical and biological treatment to the entire flow of storm water during a major rain event. Storm water flows in Southern California produce very large volumes of water that can carry pollutants. As noted above, source control and other cost-effective BMPs can be effectively used to substantially reduce pollutant loadings in storm water and the Regional Board staff believes that these BMP approaches are the most appropriate to pursue. The collection and treatment of storm water flows in massive, high cost, and sophisticated treatment systems is not required by the LA County MS4 permit which presumes that source control and cost-effective BMPs will be effectively applied through the iterative process.

7.0 CONCLUSION

1. It is essential to identify budget items separately as "costs of pre-existing programs" vs. "new costs" due to the implementation of the storm water program, in order to determine the incremental costs of the reissued 2001 permit. However, LA County cities have never accounted for the storm water program in their budgets in this manner.

2. The average combined household cost, based on the reported budgets is in the range of $50 to $63 per year. Using the assumption of segregating the budgets into pre-existing programs and expenditures to implement the storm water program, the average cost per household per year goes down to $12.50 - $18 for implementing the new programs required by the municipal permits.

3. The 2001 LA County MS4 permit costs may involve at most a 15% to 25% overall incremental increase over the cost to implement permit requirements in the second permit term (1996-2001) in terms of average annual costs per household. This is demonstrated by the educational site visits vs. inspection program comparison (the elevation from site visits to inspection program was considered the single largest increase in expenditures). If we accept the assumption presented previously that the actual total cost of implementing the site visits was $6.5 million under the previous permit, the $8 million estimate for site inspection in the new permit, represents a 23% increase. On a recent conversation with a knowledgeable municipal representative, it was confirmed that the assumption of 15% to 25% incremental increases in costs in upgrading from site educational visits to inspections seemed reasonable. In this particular instance, a city may already be performing regulatory inspections for other programs and the storm water inspections can be readily incorporated with the other activities for efficiency. Some municipalities have expressed their intent to integrate their storm water inspection activities with other existing inspection programs such as CUPA.

4. A closer look at the budget accounting practices of municipalities reveals that their claim of excessive financial burden to comply with the MS4 permit requirements is at best exaggerated. It is also apparent that until clear accounting and budget reporting guidelines are formulated, and

financial audits are performed, budget numbers reported by the cities will be difficult to compare, as there are widely varying ways of accounting for the costs of implementation. In the absence of clear guidelines, (See U.S. General Accounting Office Report: "WATER QUALITY – Better Data and Evaluation of Urban Runoff Programs Needed to Assess Effectiveness." [2001],[19] it is difficult to determine with any certainty the cost the cities incur to implement the MS4 permit requirements and to differentiate costs between pre-existing programs and new expenditures.

5. RB staff recommends that a "Storm Water Budget Reporting Guidelines" workgroup be established. The objective of the workgroup would be to develop some generally accepted budget-reporting guidelines. The workgroup would assist in developing guidelines on how storm water budgets and costs should be reported so that its endusers, such as the public and environmental regulators, are able to determine implementation, progress, performance, and make across municipal program comparisons with a high level of confidence.

[19] The report uses the LA County MS4 Program reported estimated budgets from FY 1999 to make national comparisons.

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California Stormwater Quality Association

Stormwater Best Management Practice Handbook

New Development and Redevelopment

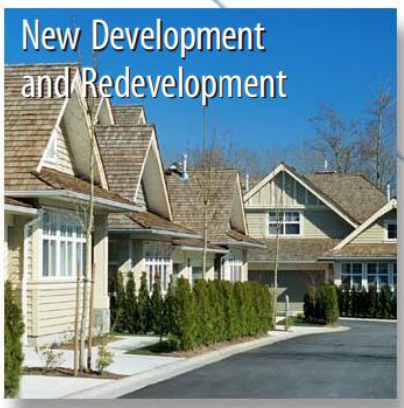

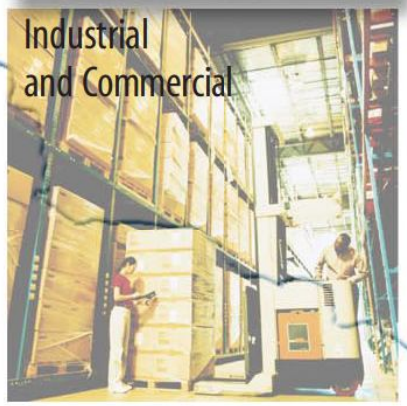

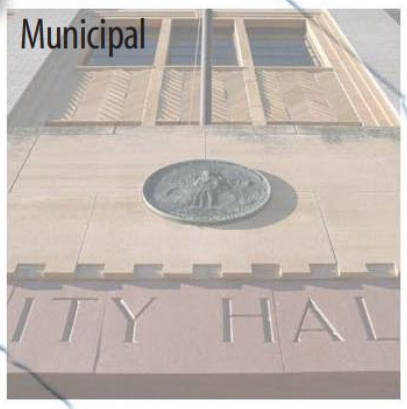

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Disclaimer

The California Stormwater Quality Handbooks are intended to provide a range of general information about stormwater quality best management practices (BMPs) and related issues. Due to the multitude of applications of BMPs, the Handbooks do not address site-specific applications. Therefore, users of the Handbooks must seek advice of a stormwater quality professional to determine the applicability of the information provided for any general use or site-specific application. Users of the Handbooks assume all liability directly or indirectly arising from use of the Handbooks.

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Section 1
Introduction

Stormwater runoff is part of a natural hydrologic process. However, human activities particularly urbanization and agriculture, can alter natural drainage patterns and add pollutants to rivers, lakes, and streams as well as coastal bays and estuaries, and ultimately, the ocean. Numerous studies have shown urban runoff to be a significant source of water pollution, causing declines in fisheries, restrictions on swimming, and limiting our ability to enjoy many of the other benefits that water resources provide. Urban runoff in this context includes all flows discharged from urban land uses into stormwater conveyance systems and receiving waters and includes both dry weather non-stormwater sources (e.g., runoff from landscape irrigation, etc.) and wet weather stormwater runoff. In this handbook, urban runoff and stormwater runoff are used interchangeably.

For many years the effort to control the discharge of stormwater focused on quantity (e.g. drainage, flood control) and only to a limited extent on quality of the stormwater (e.g. sediment and erosion control). However, in recent years awareness of the need to improve water quality has increased. With this awareness federal, state and, local programs have been established to pursue the ultimate goal of reducing pollutants contained in stormwater discharges to our waterways. The emphasis of these programs is to promote the concept and the practice of preventing pollution at the source, before it can cause environmental problems (USEPA, 1992). However, where further controls are needed, treatment of polluted runoff may be required.

1.1 Handbook Purpose and Scope

The purpose of this handbook is to provide general guidance for selecting and implementing Best Management Practices (BMPs) to reduce pollutants in runoff in newly developed areas and redeveloped areas to waters of the state. This handbook also provides guidance on developing project-specific stormwater management plans including selection and implementation of BMPs for a particular development or redevelopment project.

This handbook provides the framework for an informed selection of BMPs. However, due to the diversity in climate, receiving waters, construction site conditions, and local requirements across California, this handbook does not dictate the use of specific BMPs and therefore cannot guarantee compliance with NPDES permit requirements or local requirements specific to the user's site.

1.1.1 Users of the Handbook

This handbook provides guidance suitable for use by individuals involved in development or redevelopment site water pollution control and planning. Each user of the handbook is responsible for working within their capabilities obtained through training and experience, and for seeking the advice and consultation of appropriate experts at all times.

The target audience for this handbook includes: Developers, including their planners and engineers; contractors and subcontractors, including their engineers, superintendents, foremen, and construction staff; municipal agencies involved in site development and redevelopment

including their engineers, planners, and construction staff; regulatory agencies including permit and planning staff; and the general public with an interest in stormwater pollution control.

1.1.2 Organization of the Handbook

The handbook is organized to assist the user in selecting and implementing BMPs to reduce impacts of stormwater and non-stormwater discharges on receiving waters. The handbook consists of the following sections:

Section 1
Introduction
This section provides a general review of the sources and impacts of urban stormwater discharges and provides an overview of the Federal and state programs regulating stormwater discharges.

Section 2
Stormwater Pollution Prevention Planning for New Development and Redevelopment
This section describes typical permit requirements, planning principles, and site assessment. It also covers identifying BMPs, integrating BMPs into the project, maintaining BMPs, and preparing stormwater pollution control plans.

Section 3
Site and Facility Design for Water Quality Protection
This section describes planning approaches to reduce, eliminate, control and treat runoff from development and redevelopment, and integration of BMPS into common site, drainage, and building features.

Section 4
Source Control BMPs
BMP fact sheets presented in this section address structural source control BMPs to be considered for development and redevelopment.

Section 5
Treatment Control BMPs
BMP fact sheets presented in this section address treatment control BMPs that may be used for development/ redevelopment sites.

Section 6
Long Term BMP Maintenance
This section outlines approaches to maintain BMPs, monitor BMP effectiveness, and evaluate additional BMP requirements.

Section 7
Glossary and List of Acronyms
This section identifies terms and abbreviations used in the handbooks.

Appendix A
Channel Impacts from Watershed Changes
This appendix describes a stream balance equation affected by changes in runoff or sediment loads.

Appendix B
General Applicability of Effluent Probability Method
This appendix discusses concerns about the general applicability of this probability technique.

Appendix C
Effluent Concentrations of Additional Metals and Nutrients
This appendix compares effluent concentrations of constituents not described in Section 5.

Appendix D
Rain Intensity and BMP Sizing Curves
This appendix includes rain intensity cumulative frequency curves and volume-based BMP sizing curves.

Project Lifecycle

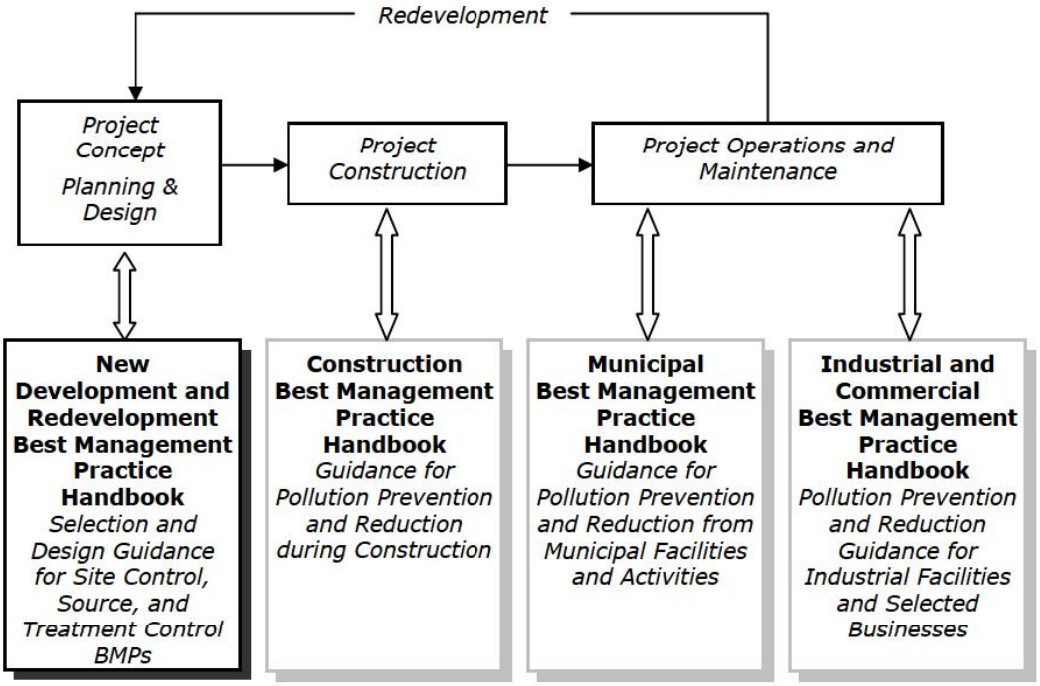

1.1.3 Relationship to Other Handbooks

This handbook is one of four handbooks developed by the California Stormwater Quality Association (CASQA) to address BMP selection. Collectively, the four handbooks address BMP selection throughout the life of a project – from planning and design – through construction – and into operation and maintenance. Individually, each handbook is geared to a specific target audience during each stage of a project.

This handbook, the New Development and Redevelopment Handbook, addresses selection and implementation of BMPs to eliminate or to reduce the discharge of pollutants associated with development and redevelopment activities.

For a comprehensive understanding of stormwater pollution control throughout the life cycle of the project, it is recommended that the reader obtain and become familiar with all four handbooks. Typically, municipal stormwater program managers, regulators, environmental organizations, and stormwater quality professionals will have an interest in all four handbooks. For a focused understanding of stormwater pollution control during a single phase of the project life cycle, a reader may obtain and become familiar with the handbook associated with the appropriate phase. Typically, contractors, construction inspectors, industrial site operators, commercial site operators, some regulators and some municipal staff may have an interest in a single handbook.

1.2 Stormwater Pollutants and Impacts on Water Quality

Stormwater runoff naturally contains numerous constituents, however, urbanization and urban activities including development and redevelopment typically increase constituent concentrations to levels that impact water quality. Pollutants associated with stormwater include sediment, nutrients, bacteria and viruses, oil and grease, metals, organics, pesticides, and trash (floatables). In addition, nutrient-rich stormwater runoff is an attractive medium for vector production when it accumulates and stands for more than 72 hours. Stormwater pollutants are described in Table 1-1.

Development and redevelopment activities can result in two types of water quality impacts: erosion and sedimentation and discharge of other pollutants during construction; and long term impacts from runoff from the completed development and associated land uses. Control of water quality impacts during construction is covered in the Construction edition of the Stormwater Best Management Practice Handbook. This handbook addresses potential water quality impacts from completed development that can include the following:

- Urban activities can result in the generation of new dry-weather runoff that may contain many of the pollutants listed above
- Impervious surfaces associated with development, such as streets, rooftops, and parking lots, prevent runoff infiltration and increase the rate and volume of stormwater runoff that may increase downstream erosion potential and associated potential water quality impairment
- Urban activities and increased impervious surfaces which can increase the concentration and/or total load of many of the pollutants listed above in wet weather stormwater runoff

Table 1-1	**Pollutant Impacts on Water Quality**
Sediment	Sediment is a common component of stormwater, and can be a pollutant. Sediment can be detrimental to aquatic life (primary producers, benthic invertebrates, and fish) by interfering with photosynthesis, respiration, growth, reproduction, and oxygen exchange in water bodies. Sediment can transport other pollutants that are attached to it including nutrients, trace metals, and hydrocarbons. Sediment is the primary component of total suspended solids (TSS), a common water quality analytical parameter.
Nutrients	Nutrients including nitrogen and phosphorous are the major plant nutrients used for fertilizing landscapes, and are often found in stormwater. These nutrients can result in excessive or accelerated growth of vegetation, such as algae, resulting in impaired use of water in lakes and other sources of water supply. For example, nutrients have led to a loss of water clarity in Lake Tahoe. In addition, un-ionized ammonia (one of the nitrogen forms) can be toxic to fish.
Bacteria and viruses	Bacteria and viruses are common contaminants of stormwater. For separate storm drain systems, sources of these contaminants include animal excrement and sanitary sewer overflow. High levels of indicator bacteria in stormwater have led to the closure of beaches, lakes, and rivers to contact recreation such as swimming.
Oil and Grease	Oil and grease includes a wide array of hydrocarbon compounds, some of which are toxic to aquatic organisms at low concentrations. Sources of oil and grease include leakage, spills, cleaning and sloughing associated with vehicle and equipment engines and suspensions, leaking and breaks in hydraulic systems, restaurants, and waste oil disposal.
Metals	Metals including lead, zinc, cadmium, copper, chromium, and nickel are commonly found in stormwater. Many of the artificial surfaces of the urban environment (e.g., galvanized metal, paint, automobiles, or preserved wood) contain metals, which enter stormwater as the surfaces corrode, flake, dissolve, decay, or leach. Over half the trace metal load carried in stormwater is associated with sediments. Metals are of concern because they are toxic to aquatic organisms, can bioaccumulate (accumulate to toxic levels in aquatic animals such as fish), and have the potential to contaminate drinking water supplies.
Organics	Organics may be found in stormwater in low concentrations. Often synthetic organic compounds (adhesives, cleaners, sealants, solvents, etc.) are widely applied and may be improperly stored and disposed. In addition, deliberate dumping of these chemicals into storm drains and inlets causes environmental harm to waterways.
Pesticides	Pesticides (including herbicides, fungicides, rodenticides, and insecticides) have been repeatedly detected in stormwater at toxic levels, even when pesticides have been applied in accordance with label instructions. As pesticide use has increased, so too have concerns about adverse effects of pesticides on the environment and human health. Accumulation of these compounds in simple aquatic organisms, such as plankton, provides an avenue for biomagnification through the food web, potentially resulting in elevated levels of toxins in organisms that feed on them, such as fish and birds.
Gross Pollutants	Gross Pollutants (trash, debris, and floatables) may include heavy metals, pesticides, and bacteria in stormwater. Typically resulting from an urban environment, industrial sites and construction sites, trash and floatables may create an aesthetic "eye sore" in waterways. Gross pollutants also include plant debris (such as leaves and lawn-clippings from landscape maintenance), animal excrement, street litter, and other organic matter. Such substances may harbor bacteria, viruses, vectors, and depress the dissolved oxygen levels in streams, lakes, and estuaries sometimes causing fish kills.
Vector Production	Vector production (e.g., mosquitoes, flies, and rodents) is frequently associated with sheltered habitats and standing water. Unless designed and maintained properly, standing water may occur in treatment control BMPs for 72 hours or more, thus providing a source for vector habitat and reproduction (Metzger, 2002).

1.3 Regulatory Requirements

The Federal Clean Water Act, as amended in 1987, is the principal legislation for establishing requirements for the control of stormwater pollutants from urbanization and related activities. However, other federal, state, and local requirements deal directly or indirectly with controlling stormwater discharges. Requirements for stormwater under some of these programs, such as Basin Planning, Total Maximum Daily Loads (TMDLs), the California Environmental Quality Act (CEQA), 401 Water Quality Certifications and Endangered Species Act (ESA) are evolving, and the user is advised to contact local regulatory and/ or municipal officials for further information.

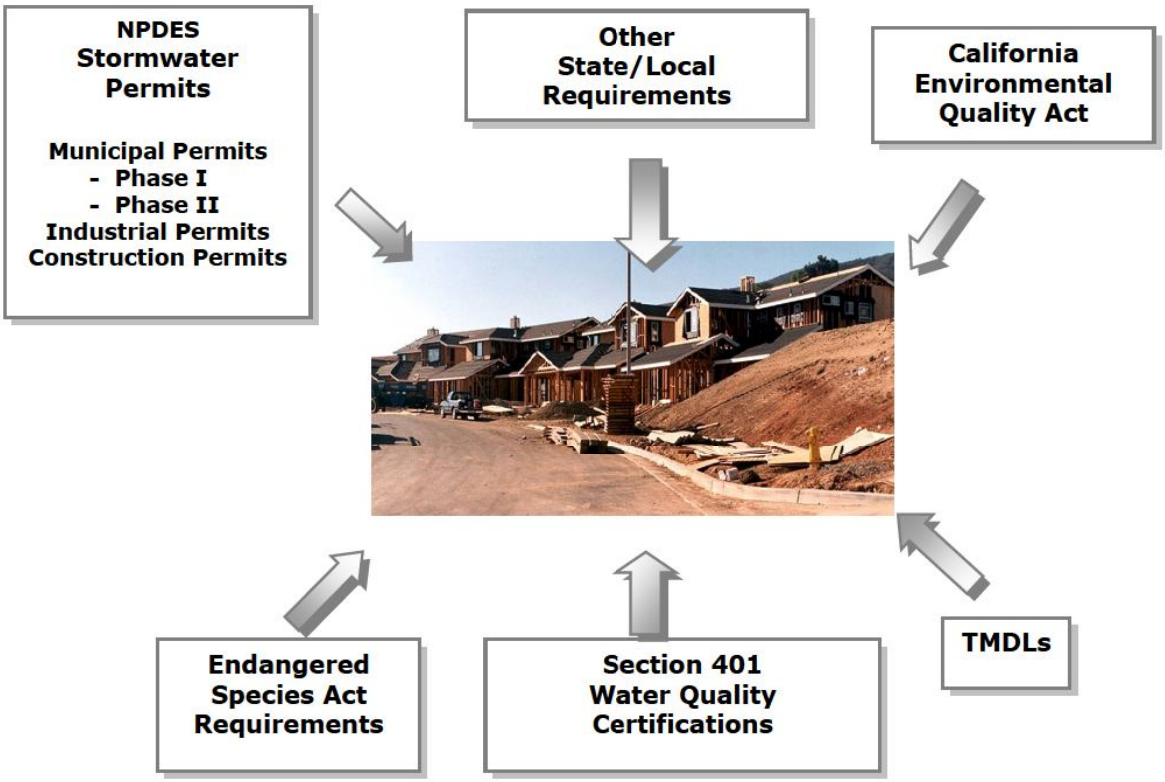

1.3.1 Federal Programs

In 1972, provisions of the Federal Water Pollution Control Act, also referred to as the Clean Water Act (CWA), were amended so that discharge of pollutants to waters of the United States from any point source is effectively prohibited, unless the discharge is in compliance with a National Pollutant Discharge Elimination (NPDES) permit. The 1987 amendments to the CWA added Section 402(p), which established a framework for regulating municipal, industrial, and construction stormwater discharges under the NPDES program. On November 16, 1990, USEPA published final regulations that established application requirements for stormwater permits for municipal separate storm sewer systems (MS4s) serving a population of over 100,000 (Phase I communities) and certain industrial facilities, including construction sites greater than 5 acres.

On December 8, 1999, USEPA published the final regulations for communities under 100,000 (Phase II MS4s) and operators of construction sites between 1 and 5 acres.

1.3.2 State Programs

The State Porter-Cologne Act (Water Code 13000, et seq.) is the principal legislation for controlling stormwater pollutants in California. The Act requires development of Basin Plans for drainage basins within California. Each plan serves as a blueprint for protecting water quality within the various watersheds. These basin plans are used in turn to identify more specific controls for discharges (e.g., wastewater treatment plant effluent, urban runoff, and agriculture drainage). Under Porter-Cologne, specific controls are implemented through permits called Waste Discharge Requirements issued by the nine Regional Water Quality Control Boards. For discharges to surface waters, the Waste Discharge Requirement also serves as NPDES permits.

1.3.3 Municipal NPDES Stormwater Programs

Phase I MS4s are required to obtain an individual NPDES stormwater permit and develop a stormwater management plan (SWMP) that is implemented by the municipality's stormwater management program. One of the elements of the municipal NPDES Stormwater Program are new development and redevelopment activities including: planning processes, design review, BMPs, outreach, and enforcement.

Smaller, Phase II communities are covered by a General Permit. Six Phase II measures are required in Phase II permits. One addresses post-construction stormwater management in new development and redevelopment, including developing, implementing, and enforcing a program to address discharges of stormwater runoff from new and redevelopment areas.

Phase I permits and the Phase II General Permit in California contain standard requirements for planning and design BMPs including minimum requirements for treatment of runoff from new development. These standards are called Standard Urban Stormwater Mitigation Plans (SUSMPs) in some permits, or equivalent terminology is used in others. These are discussed further in Section 2.

1.3.4 Other Relevant Regulatory Programs

In addition to meeting municipal stormwater program requirements under CWA section 402(p), municipalities are increasingly subject to other regulatory drivers that relate to the protection of surface water quality and beneficial uses of waterbodies in their communities. Several other regulatory programs that can significantly affect new development and redevelopment planning and design are:

- Total Maximum Daily Loads (TMDLs)
- Endangered Species Act
- CWA Section 404 Dredge and Fill Permits
- Section 401 Water Quality Certification

In the coming years, these regulatory drivers will likely have at least as much impact on the design and implementation of municipal stormwater programs and BMP selection and maintenance as current stormwater regulations.

TMDLs

TMDL's are a regulatory mechanism to identify and implement additional controls on both point and non-point source discharges in water bodies that are impaired from one or more pollutants and are not expected to be restored through normal point source controls. States identify impairments and pollutants by putting impaired water bodies on a list as required under Section 303(d) of the CWA.

Stormwater or urban runoff is listed as a suspected source for many of the waterbody pollutant combinations in the current 303(d) list. Stormwater programs must be designed not only to be in compliance with the stormwater NPDES permit regulations, but they must also be designed to implement TMDLs in which stormwater or urban runoff is named as a source.

Endangered Species Act

Like TMDLs, Endangered Species Act issues are becoming increasingly important to stormwater program design and implementation. The presence or potential presence of an endangered species impacts stormwater management programs and the selection and maintenance of BMPs. Although there are numerous endangered species that may impact the program, two that have particular impacts are salmon and steelhead trout.

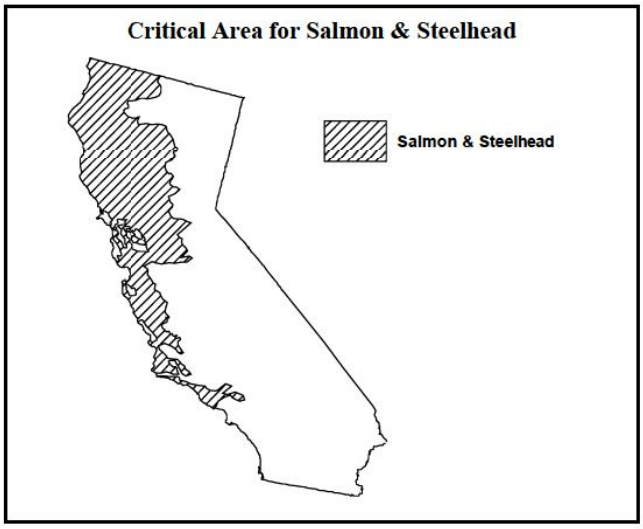

The National Marine Fisheries Service (NMFS) has designated critical habitat for salmon and steelhead trout in large areas of the north and central coast and central valley of California.

Developers or public agency intending to conduct activities in or discharge to an area that serves as a critical habitat must contact resource agencies such as NMFS, the US Fish & Wildlife Service, and the California Department of Fish & Game to learn about specific compliance requirements and actions.

CWA Section 401 Water Quality Certification

In 1972, Section 404 of the Clean Water Act (CWA) was passed. It prohibits discharging dredged or fill material into U.S. waters without a permit from the Army Corps of Engineers (USACE). Subsequent court rulings and litigation further defined "Waters of the U.S." to include virtually all surface waters, including wetlands. A 1991 Supreme Court decision eliminated federal jurisdiction

based on Commerce factors over a poorly defined set of "isolated" waters; however, such waters remain subject to state jurisdiction under the Porter-Cologne Act. Activities in waters of the United States that are regulated under this program include fills for development, water resource projects (such as dams and levees), infrastructure development (such as highways and airports), and conversion of wetlands to uplands for farming and forestry.

The basic premise of the program is that no discharge of dredged or fill material is permitted if a practicable alternative exists that is less damaging to the aquatic environment or if the nation's waters would be significantly degraded. When applying for a permit, it must be shown that:

- Steps have been taken to avoid wetland impacts where practicable.
- Potential impacts to wetlands have been minimized.
- Compensation for any remaining, unavoidable impacts through activities has been provided to restore or create wetlands.

An individual permit is usually required for potentially significant impacts. However, for most discharges that will have only minimal adverse effects, the USACE often grants up-front general permits. These may be issued on a nationwide, regional, or state basis for particular categories of activities (for example, minor road crossings, utility line backfill, and bedding) as a means to expedite the permitting process.

Anyone proposing to conduct a project that requires a federal permit (404) or involves dredge or fill activities that may result in a discharge to U.S. surface waters and/or "Waters of the State" are required to obtain a CWA Section 401 Water Quality Certification and/or Waste Discharge Requirements (Dredge/Fill Projects) from the Regional Water Quality Control Board (RWQCB), verifying that the project activities will comply with state water quality standards. The rules and regulations apply to all "Waters of the State", including isolated wetlands and stream channels that may be dry during much of the year, have been modified in the past, look like a depression or drainage ditch, have no riparian corridor, or are on private land.

Section 401 of the CWA grants each state the right to ensure that the State's interests are protected on any federally permitted activity occurring in or adjacent to "Waters of the State". In California, the nine RWQCBs are the agency mandated to ensure protection of the State's waters. If a proposed project requires a USACE, CWA Section 404 permit and has the potential to impact Waters of the State, the RWQCB will regulate the project and associated activities through a Water Quality Certification determination (Section 401), as part of the 404 process.

However, if a proposed project does not require a federal permit, but does involve dredge or fill activities that may result in a discharge to "Waters of the State", the RWQCB has the option to regulate the project under its state authority (Porter-Cologne) in the form of Waste Discharge Requirements or Waiver of Waste Discharge Requirements. In addition, California Department of Fish and Game (DFG) may regulate the project through the Streambed Alteration Agreement process. DFG issues Streambed Alteration Agreements when project activities have the potential to impact intermittent and perennial streams, rivers, or lakes.

Developers should be aware of these permits, and make arrangements with the appropriate agency to obtain a permit and comply with permit regulations.

1.4 Definitions

Many of the common definitions for stormwater control are found in the Glossary (see Section 7). Throughout the handbook the user will find references to the following terms:

MS4 is a municipality owned separate storm sewer system. Operators of MS4s are usually permitted under Phase II of the NPDES program. NPDES is an acronym for National Pollutant Discharge Elimination System. NPDES is the national program for administering and regulating Sections 307, 318, 402 and 405 of the Clean Water Act (CWA).

A ***Best Management Practice (BMP)*** is defined as any program, technology, process, siting criteria, operating method, measure, or device, which controls, prevents, removes, or reduces pollution.

Source Control BMPs are operational practices that prevent pollution by reducing potential pollutants at the source. They typically do not require maintenance or construction.

Source Control BMPs for design are planning methods and concepts that should be taken into consideration by developers during project design.

Treatment Control BMPs are methods of treatment to remove pollutants from stormwater.

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Section 2
Stormwater Quality Planning For New Development and Redevelopment

2.1 Introduction

State and Federal programs require BMPs to be implemented by developers, property owners, and public agencies engaged in new development or redevelopment activities. Understanding new development and redevelopment in the context of the project life cycle is important for proper selection and implementation of BMPs as shown in Figure 2-1. The concept, planning, and design phases of a project may be spread over a period of months to many years. BMPs incorporated into the concept, planning, and design phase are much more cost-effective than the retrofit of BMPs.

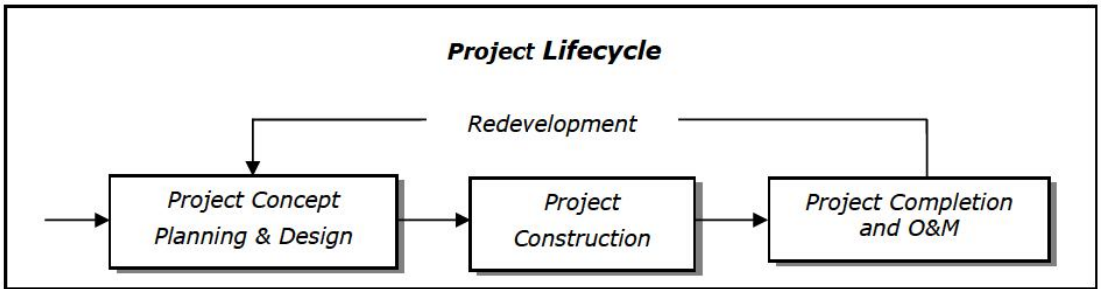

Figure 2-1
Project Lifecycle

2.2 Permit Requirements

New development BMPs are required under NPDES permits shown in Figure 2-2. The intent of incorporating BMPs in new private development and public capital projects is to prevent any net detrimental change in runoff quantity or quality resulting from new development and redevelopment.

Typical permit requirements that are now being included in all Phase I MS4 permits and are incorporated in the Phase II General Permit include:

- Specific thresholds for "Priority Projects" that must include both source and treatment control BMPs in the completed projects (typical project thresholds are shown in Figure 2-3).

NPDES Stormwater Permit Requirements

Phase I areas (large urban areas and major industries)

- Under permits since early 1990s
- Individual municipal permits all include a program element for new development or "post construction" BMPs

Phase II areas (small urban areas and additional industries)

- Under General Permit since early 2003
- Permit includes new development requirements similar to Phase II.

Figure 2-2
NPDES Stormwater Permit Requirements

Typical California Municipal Permit Thresholds for Treatment BMPs

- Residential ≥ 10 units
- Commercial ≥ 1 acre
- Parking lots, road project ≥ 5,000 square feet
- Redevelopment ≥ 5,000 square feet impervious
- Retail Gasoline Outlets
- New and Redevelopment projects above 1 acre or 10,000 square feet of impervious area.

Figure 2-3
Typical Treatment BMP Thresholds

- A list of source control (both non-structural and structural) BMPs and treatment control BMPs to be included or considered
- Specific water quality design volume and/or water quality design flow rate for treatment control BMPs
- A requirement for flow control BMPs when there is potential for downstream erosion
- Adopt a standard model or template for identifying and documenting selected BMPs including a plan for long-term operations and maintenance of BMPs

This standard model or template originated with the Los Angeles Municipal Stormwater permit and is called a Standard Urban Stormwater Mitigation Plan (SUSMP) under that and several other permits, although other terms such as Water Quality Management Plan (WQMP), Stormwater Quality Urban Impact Mitigation Plan, (SQUIMP), and C.3 Provisions have been used in other permits for equivalent programs. The SUSMPs list BMPs that are required for designated projects. Additional BMPs may be required by ordinance or code adopted by the Permittee and applied generally, or on a case-by-case basis. Private developers and public agencies must then include these SUSMP requirements in their project plans as applicable. Permittees then review and approve project plans as part of the development approved process for projects covered under SUSMP requirements.

Many of the permits also allow permittees to include the use of regional or watershed-based programs as alternatives to incorporating all of the BMPs to be on-site or project-based. Under this approach, programs would be developed and adopted that address specific water quality and pollutant concerns, achieve at least equivalent pollutant reduction that would have been required for all new development and redevelopment projects in the watershed through project-based BMPs, and can provide additional benefits by reducing impacts from existing developed areas. Where regional or watershed programs are developed, there will typically need to be a partnership between the planning agencies or permittees and the development community to clearly define the approach for satisfying the Permit requirements and evaluating choices between project-based and regional BMPs.

An effective mechanism for documenting the incorporation of stormwater quality controls into new development and redevelopment projects on a site, regional, or watershed basis is to develop a written plan known as a Stormwater Management Plan or SMP. An effective SMP clearly sets forth the means and methods for long-term stormwater quality protection. The SMP is a valuable document and can be used as part of the construction Stormwater Pollution Prevention Plan to describe post-construction stormwater management, and will also prove to

be useful during ownership transitions to convey critical stormwater quality control information to subsequent owners. Section 2.3 of this handbook describes the development of a stormwater management plan. Section 2.4 of this handbook describes planning principles appropriate for consideration during new development and redevelopment stormwater quality planning.

2.3 Developing a Stormwater Management Plan

Developing an effective stormwater management plan depends on making effective BMP choices. This section describes the basic steps and process one would go through to develop a plan with appropriate BMPs. Such a plan would include reviewing the full suite of BMPs that are available and identifying the dominant site factors that should go into the decision making process. Assessment of the regional area, specific site conditions, site constraints, site hydrology, and project type, are central to successful planning to minimize pollutants during development as well as during the life of the project. The basic steps in the stormwater management plan process are to:

- Assess site and watershed conditions
- Understand hydrologic conditions of concern
- Evaluate pollutants of concern
- Identify candidate BMPs
- Develop plan for BMP Maintenance

The specific requirements of a Stormwater Management Plan are usually specified by the local planning agency based on requirements in their MS4 permit. Typically, the following information is required:

2.3.1 Assess Site Conditions

Site and watershed assessment includes assessing and describing the pre and post-development site conditions and how the site fits into the overall watershed or drainage area. The assessment should include sufficient detail to allow for assessment of the need for and application of stormwater BMPs. Information typically required is listed below.

- Site information
  - Historic features
  - Existing features
  - Planned features
  - Drainage Patterns
  - Discharge Locations

- Vicinity information
  - Major roadways
  - Geographic features or landmarks
  - Area surrounding the site
  - General topography
  - Area drainage
- Watershed or drainage area information
  - Received waters
  - Watershed drainage

2.3.2 Understand Hydrologic Conditions of Concern

Development of impervious areas changes the landform and therefore the runoff hydrograph. Modifications to the runoff hydrograph change downstream hydrology. New development typically results in more runoff volume and higher rates of runoff. Many BMPs, such as detention basins, which detain volume, effectively remove the top part of the hydrograph, but extend the duration of flow. See Figure 2-4.

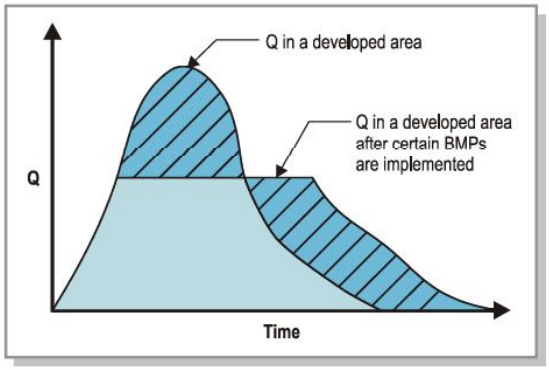

Figure 2-4
Hydraulic Alteration
After Certain BMPs are Implemented

Recent findings indicate that while such actions mitigate peak flows, the increased duration associated with these actions has impacts as well. Problems include washing out habitat, eroding streambed and banks, and changing downstream ecosystems. In addition to volume, rate, and duration, other factors such as the amount of energy in the water and peak flow impact downstream conditions.

A comprehensive understanding of these factors is necessary to develop meaningful stormwater management plans. To be effective, these solutions must be done on an individual watershed basis.

Ideally, the runoff hydrograph that exists after construction would parallel the pre-construction hydrograph. It is difficult to ask upstream developers to be concerned about what is happening several miles below them in a watershed. On the other hand, stormwater planners and policy makers must ask what can be done to make the watershed more stable, and what enhancements are needed to balance impacts to the watershed from development. A stream balance equation

can be used to make qualitative predictions concerning channel impacts due to changes in runoff or sediment loads from the watershed. This concept and the equation are described more fully in Appendix A.

The best way to resolve the watershed stability and balance issues is through a comprehensive drainage water master plan. A formal drainage study considers the project area's location in the larger watershed, topography, soil and vegetation conditions, percent impervious area, natural and infrastructure drainage features, and any other relevant hydrologic and environmental factors. A drainage study is typically prepared by a registered civil engineer. As part of the study, the drainage report includes:

- Field reconnaissance to observe downstream conditions
- Computed rainfall and runoff characteristics including a minimum of peak flow rate, flow velocity, runoff volume, time of concentration and retention volume
- Establishment of site design, source control and treatment control measures to be incorporated and maintained to address downstream conditions of concern

2.3.3 Evaluate Pollutants of Concern

The stormwater management plan should identify anticipated pollutants of concern. Pollutants frequently identified in the 303d list for specific water bodies in California include metals, nitrogen, nutrients (but often nutrients without specifying nitrogen or phosphorus), indicator bacteria (i.e., fecal coliform), pesticides, and trash. Less commonly cited pollutants include sediment, PAHs, PCBs, and dioxin. With respect to metals, typically, only the general term is used. In some cases, a specific metal is identified. The most commonly listed metals are mercury, copper, lead, selenium, zinc, and nickel. Less frequently listed metals are cadmium, arsenic, silver, chromium, molybdenum, and thallium.

As discussed in Section 2.2, some Phase I communities have developed very prescriptive urban stormwater requirements. For example, the Los Angeles SUSMP requires permittees to develop a procedure for pollutants of concern to be identified for each new development or significant redevelopment project. The procedures should include, at a minimum, consideration of:

- receiving water quality (including pollutants for which receiving waters are listed as impaired under Clean Water Act section 303(d)
- land use type of the development project and pollutants associated with that land use type
- pollutants expected to be present on site;
- changes in stormwater discharge flow rates, velocities, durations, and volumes resulting from the development project
- sensitivity of receiving waters to changes in stormwater discharge flow rates, velocities, durations, and volumes.

A general list of anticipated and potential pollutants generated by land use type is shown in Table 2-1

It is important to realize that pollutants of concern for a water body can extend beyond those pollutants listed in 303d list as causing impairment. For example, trash is a pollutant of concern in most communities, yet only a few water bodies are presently listed as impaired by trash. The key to remember is that a pollutant need not be causing an immediate impairment to be considered when developing a stormwater management plan.

2.3.4 Identify Candidate BMPs

Selecting BMPs based on pollutants of concern is a function of site constraints, constituents of concern, BMP performance, stringency of permit requirements, and watershed specific requirements such as TMDLs. Pollutants of concern are especially important in water limited stream segments and must be carefully reviewed in relationship to BMP performance. BMP performance is discussed further in Section 5.

When no specific pollutant has been targeted for removal, regulators may address pollutant removal through flow and /or volume-based requirements. Under these circumstances, cost can become an important differentiator in BMP selection. BMP specific cost information is included in Section 5.

Large reductions in treatment BMP size and investment can be made by:

- Reducing runoff that needs to be captured, infiltrated, or treated
- Controlling sources of pollutants

These two strategies are the most effective in managing stormwater. A third strategy includes implementation of treatment BMPs. The principles and methodologies for incorporating these strategies into site facility planning and design are discussed in Section 2.4 and Section 3, respectively. Fact Sheets for source control BMPs and treatment control BMPs are included in Section 4 and Section 5, respectively.

2.3.5 Determine BMP Size/Capacity

Based on the selected BMPs, the capacity and primary design sizing criteria must be established using a combination of local hydrology, project drainage characteristics (e.g., percent imperviousness or runoff coefficient), and the local permit or New Development Program numerical sizing requirements. BMPs will be either volume-based or flow-based, as discussed in more detail later in this Handbook and must be able to effectively treat the design quantity. Peak storm event flows must also be taken into account if the BMP is a flow-based BMP, or a volume-based BMP that must also safely pass the design storm (e.g., an in-line detention basin). The volume-based BMP can safely pass the design peak event while maintaining its water quality functions up to the water quality design volume.

Table 2-1 Anticipated and Potential Pollutants Generated by Land Use Type

Priority Project Categories	General Pollutant Categories								
	Pathogens	Heavy Metals	Nutrients	Pesticides	Organic Compounds	Sediments	Trash & Debris	Oxygen Demanding Substances	Oil & Grease
Detached Residential Development	X		X	X		X	X	X	X
Attached Residential Development	P		X	X		X	X	P(1)	P(2)
Commercial/ Industrial Development >100,000 ft2	P(3)		P(1)	P(5)	P(2)	P(1)	X	P(5)	X
Automotive Repair Shops		X			X(4)(5)		X		X
Restaurants	X						X	X	X
Hillside Development >5,000 ft2 In SDRWQCB			X	X		X	X	X	X
Hillside Development >100,000 ft2 In SARWQCB			X	X		X	X	X	X
Parking Lots		X	P(1)	P(2)		P(1)	X	Ps	X
Streets, Highways & Freeways		X	P(1)		X(4)	X	X	P(5)	X

X = anticipated
P = potential
(1) A potential pollutant if landscaping exists on-site
(2) A potential pollutant if the project includes uncovered parking areas
(3) A potential pollutant if land use involves food or animal waste products.
(4) Including petroleum hydrocarbons.
(5) Including solvents.

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2.3.6 Develop Plan for BMP Maintenance

BMP maintenance arrangements take place during the planning phase of development and redevelopment projects. A permittee is committed to providing for water quality protection by requiring that a mechanism for ongoing, long-term maintenance of BMPs is in place. To ensure that BMP maintenance will take place, permittees require evidence that project proponents have executed an approved method of BMP maintenance, repair, and replacement before construction approvals are issued. Mechanisms used by permittees to assign responsibility for maintenance to public and private sector project proponents include:

- Covenants
- Maintenance Agreements
- Conditional use permits
- Deed restrictions
- Other legal agreements

The permittee requires that an Operation and Maintenance (O&M plan) be prepared by the project proponents. These plans are normally attached to approved maintenance agreements and describe a designated party to manage:

- BMPs
- Employee training program and duties
- Operating schedule
- Maintenance frequency
- Routine service schedule
- Specific maintenance activities
- Copies of resource agency permits
- Funding
- Other necessary activities

Permittees often require annual inspection and servicing of all BMPs within maintenance agreements, and O&M forms documenting all required maintenance activities. The party responsible for the O&M plan is required to retain O&M forms for at least five years.

A BMP maintenance plan is particularly valuable during ownership transitions. For example, when a developer transitions maintenance to a homeowners association, or when a developer turns over maintenance to a new owner, the BMP maintenance plan is also important when

valuating properties for acquisition, allowing long-term costs associated with BMPs to be factored into the property purchase agreement.

A more extensive discussion of long-term BMP maintenance is included in Section 6.

2.4 Planning Principles

Planning and design for water quality protection employs three basic strategies in the following order of relative effectiveness: 1) reduce or eliminate post-project runoff; 2) control sources of pollutants, and 3) treat contaminated stormwater runoff before discharging it to natural water bodies. See Figure 2-5. These principles are consistent with the typical permit and local program requirements for Priority Projects that require a consideration of a combination of source control BMPs (that reduce or eliminate runoff and control pollutant sources) and treatment control BMPs with specific quantitative standards. The extent to which projects can incorporate strategies that reduce or eliminate post project runoff will depend upon the land use and local site characteristics of each project. Reduction in post project runoff offers a direct benefit by reducing the required size of treatment controls to meet the numeric standard included in the local permit. Therefore, project developers can evaluate tradeoffs between the incorporation of alternative site design and source control techniques that reduce runoff and pollutants, and the size of required treatment controls either included as part of the project or as a commitment to an offsite watershed-based program.

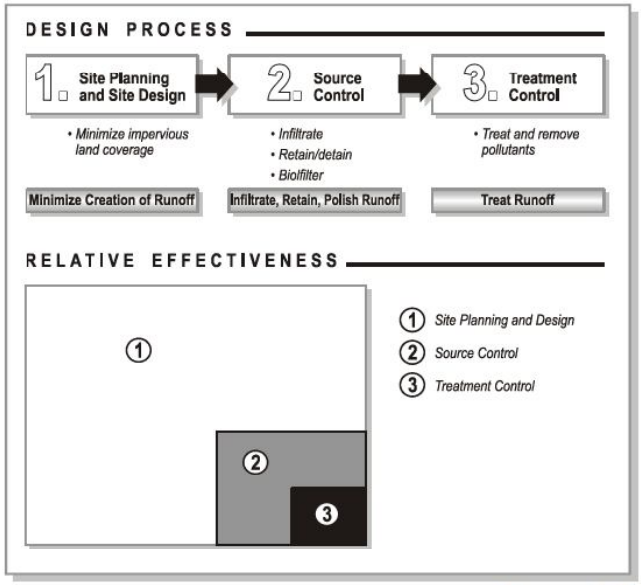

Figure 2-5
Planning Principles

2.4.1 Reduce Runoff

The principle of runoff reduction starts by recognizing that developing or redeveloping land within a watershed inherently increases the imperviousness of the areas and therefore the volume and rate of runoff and the associated pollutant load; and outlines various approaches to reduce or minimize this impact through planning and design techniques.

The extent of impervious land covering the landscape is an important indicator of stormwater quantity and quality and the health of urban watersheds. Impervious land coverage is a fundamental characteristic of the urban and suburban environment -- rooftops, roadways, parking areas and other impenetrable surfaces cover soils that, before development, allowed rainwater to infiltrate.

Without these impervious coverings, inherent watershed functions would naturally filter rainwater and prevent receiving water degradation. Impervious surfaces associated with urbanization can cause adverse receiving water impacts in four ways:

- Rainwater is prevented from filtering into the soil, adversely affecting groundwater recharge and reducing base stream flows.
- Because it cannot filter into the soil, more rainwater runs off, and runs off more quickly, causing increased flow volumes, accelerating erosion in natural channels, and reducing habitat and other stream values. Flooding and channel destabilization often require further intervention. As a result, riparian corridors are lost to channelization, further reducing habitat values.
- Pollutants that settle on the impervious pavements and rooftops are washed untreated into storm sewers and nearby stream channels, increasing pollution in receiving water bodies.
- Impervious surfaces retain and reflect heat, increasing ambient air and water temperatures. Increased water temperature negatively impacts aquatic life and reduces the oxygen content of nearby water bodies.

Techniques for reducing runoff range from land use planning on a regional scale by permittees or other local planning agencies, to methods that can be incorporated into specific projects. These techniques include actions to:

- Manage watershed impervious area
- Minimize directly connected impervious areas
- Incorporate zero discharge areas
- Include self-treatment areas
- Consider runoff reduction areas.

Brief summaries of the following techniques are presented:

Manage Watershed Impervious Area

Land use planning on the watershed scale is a powerful tool to manage the extent of impervious land coverage. This planning has two elements. First, identify open space and sensitive resource areas at the regional scale and target growth to areas that are best suited to development, and second, plan development that is compact to reduce overall land conversion to impervious surfaces and reliance on land-intensive streets and parking systems.

Impervious land coverage is a practical measure of environmental quality because:

- It is quantifiable, meaning that it can be easily recognized and calculated.

- It is integrative, meaning that it can estimate or predict cumulative water resource impacts independent of specific factors, helping to simplify the intimidating complexity surrounding non-point source pollution.

- It is conceptual, meaning that water resource scientists, municipal planners, landscape architects, developers, policy makers and citizens can easily understand it.

Water resource protection at the local and regional level is becoming more complex. A wide variety of regulatory agencies, diverse sources of non-point source pollution, and a multitude of stakeholders make it difficult to achieve a consistent, easily understandable strategy for watershed protection. Impervious land coverage is a scientifically sound, easily communicated, and practical way to measure the impacts of new development on water quality.

Impervious area reductions also provide additional benefits such as reduced urban heat island effect, resulting in less energy use to cool structures and more efficient irrigation use by plants. Reductions have also been attributed to more human-scale landscaper and higher property values.

Minimize Directly Connected Impervious Areas (DCIA)

Impervious areas directly connected to the storm drain system are the greatest contributor to non-point source pollution. The first effort in site planning and design for stormwater quality protection is to minimize the "directly connected impervious area (DCIA)" as shown in Figure 2-6.

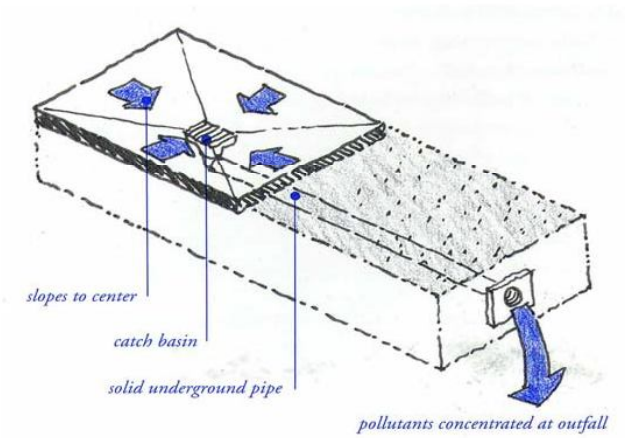

Figure 2-6
Directly Connected Impervious Area

Any impervious surface that drains into a catch basin, area drain, or other conveyance structure is a "directly connected impervious area." As stormwater runoff flows across parking lots, roadways, and paved areas, the oils, sediments, metals and other pollutants are collected and concentrated. If this runoff is collected by a drainage system and carried directly along impervious gutters or in closed underground pipes, it has no opportunity for filtering by plant material or infiltration into the soil. It also increases in speed and volume, which may cause higher peak flows downstream, and may require larger capacity storm drain systems, increasing flood and erosion potential.

Minimizing directly connected impervious areas can be achieved in two ways:

- Limiting overall impervious land coverage

- Directing runoff from impervious areas to pervious areas for infiltration, retention/detention, or filtration

Strategies for reducing impervious land coverage include:

- Cluster rather than sprawl development
- Taller narrower buildings rather than lower spreading ones
- Sod or vegetative "green roofs" rather than conventional roofing materials
- Narrower streets rather than wider ones
- Pervious pavement for light duty roads, parking lots and pathways

Example strategies for infiltration, retention/detention, and bio-filtration include:

- Vegetated swales
- Vegetated basins (ephemeral- seasonally wet)
- Constructed ponds and lakes (permanent- always wet)
- Crushed stone reservoir base rock under pavements or in sumps
- Cisterns and tanks
- Infiltration basins
- Drainage trenches
- Dry wells
- Others

Unlike conveyance storm drain systems that convey water beneath the surface and work independently of surface topography, a drainage system for stormwater infiltration can work with natural landforms and land uses to become a major design element of a site plan. Solutions that reduce DCIA prevent runoff, detain or retain surface water, attenuate peak runoff rates, benefit water quality and convey stormwater. Site plans that apply stormwater management techniques use the natural topography to suggest the drainage system, pathway alignments, optimum locations for parks and play areas, and the most advantageous locations for building sites. In this way, the natural landforms help to generate an aesthetically pleasing urban form integrated with the natural features of the site.

Incorporate Zero Discharge Areas

An area within a development project can be designed to infiltrate, retain, or detain the volume of runoff requiring treatment from that area.

The term "zero discharge" in this philosophy applies at stormwater treatment design storm volumes. For example, consider an area that functionally captures and then infiltrates the 80th

percentile storm volume. If permits require treatment of the 80th percentile storm volume, the area generates no treatment-required runoff.

Site design techniques available for designing areas that produce no treatment-required runoff include:

- Retention/Detention Ponds
- Wet Ponds
- Infiltration Areas
- Large Fountains
- Retention Rooftops
- Green roofs (roofs that incorporate vegetation) and blue roofs (roofs that incorporate detention or retention of rain).

Infiltration areas, ponds, fountains, and green/blue roofs can provide "dual use" functionality as stormwater retention measures and development amenities. Detention ponds and infiltration areas can double as playing fields or parks. Wet ponds and infiltration areas can serve dual roles when meeting landscaping requirements.

When several "zero discharge" areas are incorporated into a development design, significant reductions in volumes requiring treatment may be realized.

"Zero discharge" areas such as wet ponds, detention ponds, and infiltration areas can be designed to provide treatment over and above the storm volume captured and infiltrated. For example, after a wet pond area has captured its required storm volume, additional storm volume may be treated via settling prior to discharge from the pond. In this case, the "zero discharge" area converts automatically into a treatment device for runoff from other areas, providing settling for storm volumes beyond treatment requirements. Another example is a grassy infiltration area that converts into a treatment swale after infiltrating its area-required treatment volume. The grassy infiltration area in this example becomes a treatment swale for another area within the development.

Figure 2-7 illustrates a residential tract, and a tract incorporating Zero Discharge Area techniques (infiltration areas). The Zero Discharge Area designed tract represents a design to infiltrate (i.e., achieve zero discharge from) a portion of the tract's runoff, reducing total runoff from the tract.

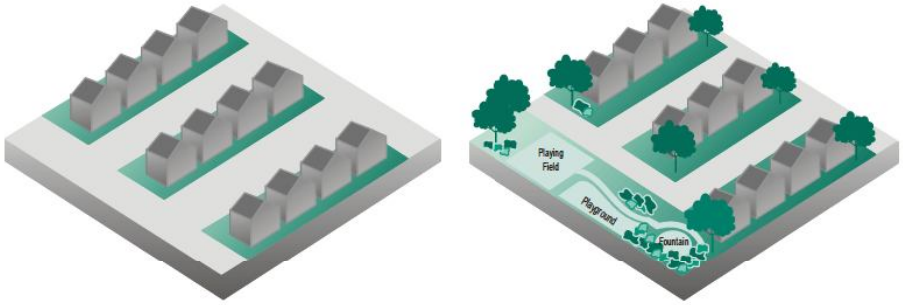

Figure 2-7
Zero Discharge Area Usage

Include Self-Treatment Areas

Developed areas may provide "self-treatment" of runoff if properly designed and drained.

Self-treating site design techniques include:

- Conserved Natural Spaces
- Large Landscaped Areas (including parks and lawns)
- Grass/Vegetated Swales
- Turf Block Paving Areas

The infiltration and bio-treatment inherent to such areas provides the treatment control necessary. These areas therefore act as their own BMP, and no additional BMPs to treat runoff should be required.

As illustrated in Figure 2-8, site drainage designs must direct runoff from self-treating areas away from other areas of the site that require treatment of runoff. Otherwise, the volume from the self-treating area will only add to the volume requiring treatment from the impervious area.

Likewise, under this philosophy, self-treating areas receiving runoff from treatment-required areas would no longer be considered self-treating, but rather would be considered as the BMP in place to treat that runoff. These areas could remain as self-treating, or partially self-treating areas, if adequately sized to handle the excess runoff addition.

Consider Runoff Reduction Areas

Using alternative surfaces with a lower coefficient of runoff or "C-Factor" may reduce runoff from developed areas. The C-Factor is a representation of the surface's ability to produce runoff. Surfaces that produce higher volumes of runoff are represented by higher C-Factors, such as impervious surfaces. Surfaces that produce smaller volumes of runoff are represented by lower C-Factors, such as more pervious surfaces. See Table 2-2 for typical C-Factor values for various surfaces during small storms.

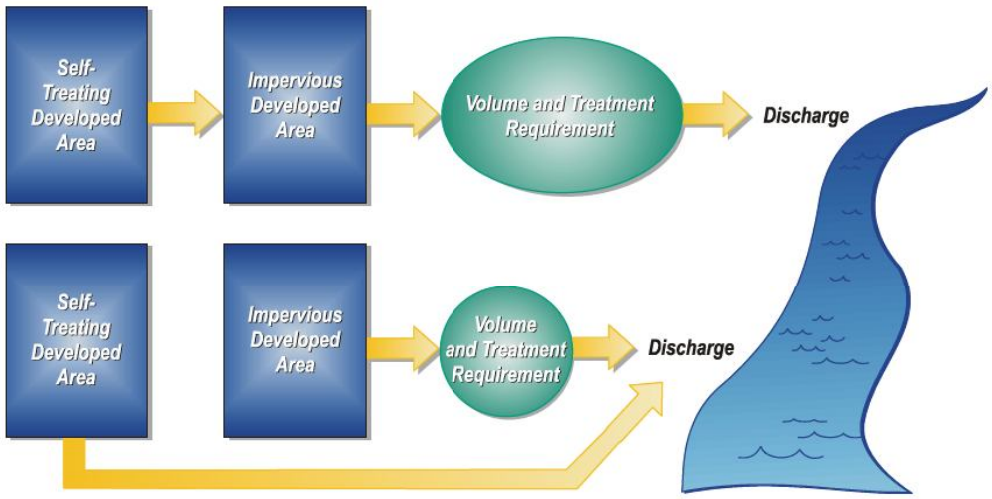

Figure 2-8
Self-Treating Area Usage

Table 2-2 Estimated C-Factors for Various Surfaces During Small Storms

Paving Surface	C-Factor
Concrete	0.80
Asphalt	0.70
Pervious Concrete	0.60
Cobbles	0.60
Pervious Asphalt	0.55
Natural Stone without Grout	0.25
Turf Block	0.15
Brick without Grout	0.13
Unit Pavers on Sand	0.10
Crushed Aggregate	0.10
Grass	0.10
Grass Over Porous Plastic	0.05
Gravel Over Porous Plastic	0.05

Note: C-Factors for small storms are likely to differ (be lower) than C-Factors developed for large, flood control volume size storms. The above C-Factors were produced by selecting the lower end of the best available C-Factor range for each paving surface. These C-Factors are only appropriate for small storm treatment design, and should not be used for flood control sizing. Where available, locally developed small storm C-Factors for various surfaces should be utilized.

Table 2-3 compares the C-Factors of conventional paving surfaces to alternative, lower C-Factor paving surfaces. By incorporating more pervious, lower C-Factor surfaces into a development (see Figure 2-9), lower volumes of runoff may be produced. Lower volumes and rates of runoff translate directly to lower treatment requirements.

Table 2-3 Conventional Paving Surface Small Storm C-Factors vs. Alternative Paving C-Factors

Conventional Paving Surface C-Factors	Reduced C-Factor Paving Alternatives
Concrete Patio/Plaza (0.80)	Decorative Unit Pavers on Sand (0.10)
Asphalt Parking Area (0.70)	Turf Block Overflow Parking Area (0.15)
	Pervious Concrete (0.60)
	Pervious Asphalt (0.55)
	Crushed Aggregate (0.10)

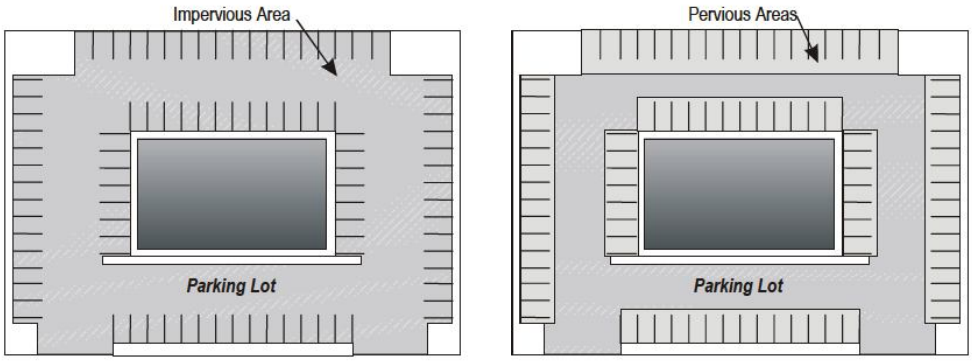

Figure 2-9
Impervious Parking Lot vs. Parking Lot with Some Pervious Surfaces

Site design techniques that incorporate pervious materials may be used to reduce the C-Factor of a developed area, reducing the amount of runoff requiring treatment. These materials include:

- Pervious Concrete
- Pervious Asphalt
- Turf Block
- Brick (un-grouted)
- Natural Stone
- Concrete Unit Pavers
- Crushed Aggregate
- Cobbles
- Wood Mulch

Other site design techniques such as disconnecting impervious areas, preservation of natural areas, and designing concave medians may be used to reduce the overall C-Factor of development areas.

Table 2-4 presents a list of site design and landscaping techniques and indicates whether they are applicable for use in Zero Discharge Areas, Self-Treating Areas, and Runoff Reduction Areas. Several different techniques may be implemented within the same design philosophy. Some techniques may be used to implement more than one design philosophy. Where feasible, combinations of multiple techniques may be incorporated into new development and redevelopment projects to minimize the amount of treatment required.

Table 2-4 Site Design and Landscaping Techniques

Site Design and Landscape Techniques	Design Criteria		Design Philosophy		
	Volume-Based Design	Flow-Based Design	Zero Discharge	Self – Treating	Runoff Reduction
Permeable Pavements					
Pervious concrete	X				X
Pervious asphalt	X				X
Turf block	X			X	X
Un-grouted brick	X				X
Un-grouted natural stone	X				X
Un-grouted concrete unit pavers	X				X
Unit pavers on sand	X				X
Crushed aggregate	X				X
Cobbles	X				X
Wood mulch	X				X
Streets					
Urban curb/swale system	X	X			X
Rural swale system	X	X			X
Dual drainage systems	X	X			X
Concave median	X	X	X		X
Pervious island	X	X			X
Parking Lots					
Hybrid surface parking lot	X				X
Pervious parking grove	X				X
Pervious overflow parking	X			X	X
Driveways					
Not directly connected impervious driveway		X			X
Paving only under wheels	X			X	X
Flared driveways	X				X
Buildings					
Dry-well	X		X		X
Cistern	X	X	X		X
Foundation planting	X	X			X
Pop-up drainage emitters		X			
Landscape					
Grass/vegetated swales	X	X		X	X
Extended detention (dry) ponds	X		X	X	X
Wet ponds	X		X	X	X
Bio-retention areas	X		X	X	X

2.4.2 Control Sources of Pollutants

There are a number of items that can be routinely designed into a project that function as source controls once a project is completed. They include such items as marking new drain inlets and posting informational signs; improving landscape planning and efficient irrigation methods; using water quality friendly building materials; implementing roof runoff controls; properly designing outdoor material and trash storage areas; and permanently protecting slopes and channels from erosion. They also include design features for specific workplace or other activity areas such as vehicle washing areas, outdoor processing areas, maintenance bays and docks, and fueling areas.

Design of BMPs to control workplace exposure to pollutants is guided by three general principles:

- Prevent water from contacting work areas. Work and storage areas should be designed to prevent stormwater runoff from passing through shipping areas, vehicle maintenance yards, and other work places before it reaches storm drains. The objective is to prevent the discharge of water laden with grease, oil, heavy metals and process fluids to surface waters or sensitive resource areas.

- Prevent pollutants from contacting surfaces that come into contact with stormwater runoff. Precautionary measures should be employed to keep pollutants from contacting surfaces that come into contact with runoff. This means controlling spills and reviewing operational practices and equipment to prevent pollutants from coming into contact with storm or wash water runoff.

- Treating water before discharging it to the storm drain. Treatment of polluted runoff should be employed as a last resort. If source control options are not possible, treatment measures that comply with NPDES permit requirements must be adopted.

Once BMPs are designed into a project, they must be appropriately operated and maintained throughout the life cycle of the project in order to accomplish the BMPs pollution control objectives. For information on post construction operation and maintenance of BMPs built into the project, the reader is referred to the Stormwater Best Management Practice Handbook – Industrial and Commercial, companions to this handbook.

2.4.3 Treat Runoff

Until recently, stormwater and street design systems were designed to achieve a single objective – to convey water off-site as quickly as possible. The primary concern of conveyance systems was to protect property from flooding during large, infrequent storms. Drainage systems designed to meet this single volume control objective fail to address the environmental effects of non-point source pollution and increases in runoff volume and velocity caused by development.

Today's drainage systems must meet multiple purposes: protect property from flooding, control stream bank erosion, and protect water quality. To achieve this, designers must integrate conventional flood control strategies for large, infrequent storms with stormwater quality control strategies.

There are several basic water quality strategies for treating runoff:

- Infiltrate runoff into the soil
- Retain/detain runoff for later release with the detention providing treatment
- Convey runoff slowly through vegetation
- Treat runoff on a flow-through basis using various treatment technologies

Solutions should be based on an understanding of the water quality and economic benefits inherent in construction of systems that utilize or mimic natural drainage patterns. Site designs should be based on site conditions and use these as the basis for selecting appropriate stormwater quality controls. The drainage system design process considers variables such as local climate, the infiltration rate and erosivity of the soils, and slope. Many of the negative impacts associated with urban development can be alleviated if policy alternatives encourage developers to protect and restore habitat quality and quantity, include measures to improve water quality, and provide buffers between development and stream corridors.

Unlike conveyance models, which are assessed by simple quantitative measures (flood control volumes and economics), water quality designs must optimize for a complex array of both quantitative and qualitative standards, including engineering worthiness, environmental benefit, horticultural sustainability, aesthetics, functionality, maintainability, economics and safety.

2.4.4 Planning Development Strategies in Practice

The importance of site planning in stormwater quality protection is illustrated in the following examples of development strategies: conventional residential subdivision (Figure 2-10, Alternative 1), conventional subdivision employing BMPs (Figure 2-11, Alternative 2), and a mixed-use transit-oriented development (Figure 2-12, Alternative 3). All three examples are intended to accommodate approximately 660 housing units on a 220-acre site adjacent to a creek.

The conventional residential subdivision (Alternative 1) accommodates 660 single-family homes on individual lots. One-sixth acre lots are accessed by a network of 40 ft wide cul-de-sac streets, with 5 ft sidewalks adjacent to the curb on each side of the street. The street and sidewalks are located within a 60 ft right-of-way, which is covered with a 40 ft wide street and two 5 ft sidewalks, or 50 ft of pavement, 100% impervious land coverage (streets only), and no room for street trees. No variation exists in housing types (all single-family).

Figure 2-10
Alternative 1: Conventional

Both the streets and the open space features lack structure or hierarchy. The few direct connections through the neighborhood result in long stretches of overly wide streets that discourage walking.

Conventional development design does not use the recreational or stormwater benefits of the available open space and does not respond to natural and topographic features. Preservation of open space is a low priority, and the setback between the development and the creek is minimal. The remaining open space character is remnant space offering residents no creek access or parks. Stormwater travels through a 15,000 ft network of drainpipes and in the absence of current permit requirements would discharge untreated runoff directly into the creek. However, applying typical permit requirements, the development would still be required to incorporate runoff treatment for the water quality design volume defined in the local permit or MS4 new development program. For example, if the permit required treatment of the runoff from 0.75 inches of rainfall, the development as planned had an overall percent impervious value of 45%, and the designer was considering the use of an extended detention basin for treatment, this would require a treatment volume of approximately 6.2 ac-ft. Based on typical detention basin design practices, this could result in the need to dedicate approximately 2-3 acres of land, or the equivalent of approximately 12-18 lots to incorporate the basin into the development near the point where drainage enters the creek. Alternatively, if a watershed or regional master plan for water quality had been adopted in which the development could participate financially, the

project would contribute financially based on its required treatment volume and the cost allocation plan for the watershed program.

The hybrid/best practices subdivision (Alternative 2) illustrates a conventional neighborhood that applies some stormwater management practices. This attempt accommodates 660 single-family homes on individual lots. Streets are narrower, with the interior access streets at 28 ft wide, while internal neighborhood collectors are 32 ft wide. All streets have detached sidewalks that accommodate street trees planted between the sidewalk and the curb. This development sets the houses 100 ft back from the creek and offers residents 12 acres of access to open space and parks. The overall imperviousness has been reduced to about 41%, thereby reducing the volume to be treated to approximately 5.6 ac-ft. A detention basin has been created in open space within the development. Nearly one fourth of the 13,000 ft network of piped stormwater drains to a detention pond.

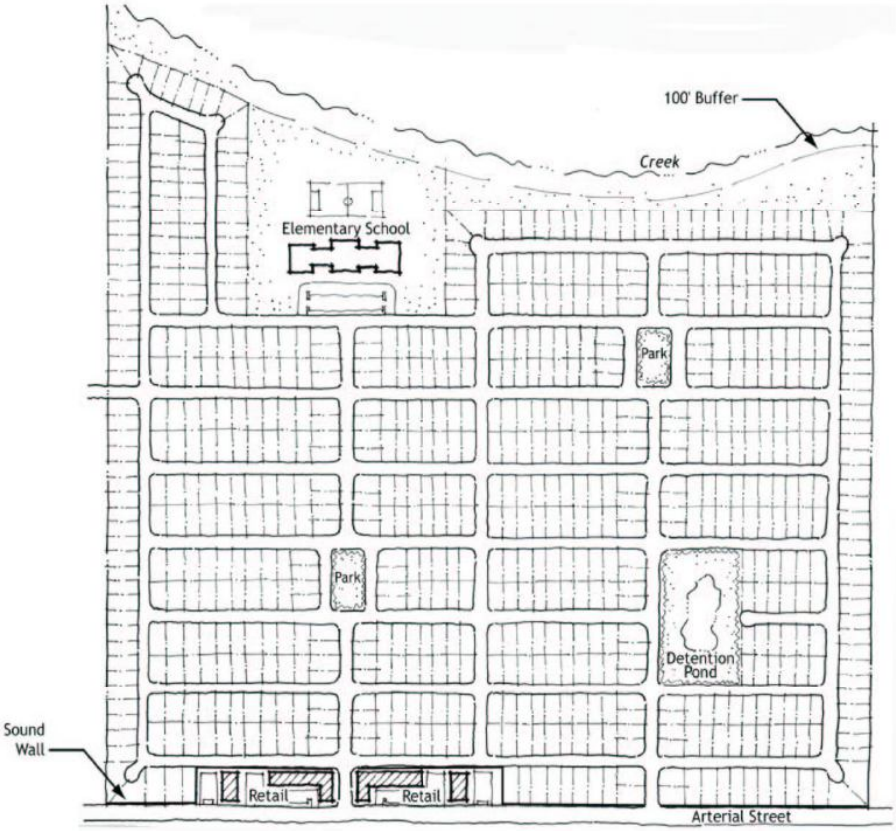

Figure 2-11
Alternative 2: Hybrid/Best Practices

By employing a hierarchy of narrower streets this neighborhood requires 1475 ft² of street per housing unit, a reduction of 19% relative to the conventional sub-division.

The neo-traditional mixed-use neighborhood is illustrated as Alternative 3. This neighborhood includes 660 housing units, but also introduces other uses: retail, office, and live-work, within a network of tree-lined streets and open space. The neighborhood drains to an open space park adjacent to the creek, naturally and efficiently filtering stormwater before it enters the creek. Bioswales along key streets capture and treat stormwater en-route to the creek, providing aesthetic appeal and recreational opportunities. Alternative 3 requires 965 ft² of street per housing unit, a reduction of 47% relative to the conventional sub-division. A strategically located transit system stops near shops and higher density housing makes transit feasible. Every dwelling unit in the neighborhood is within a 5-minute walk from shops or transit. The overall imperviousness of this site has been reduced to approximately 36%, further reducing the treatment volume. In addition, there are a variety of opportunities to incorporate treatment for all of the remaining runoff within the open space park without the need to dedicate any additional developable land.

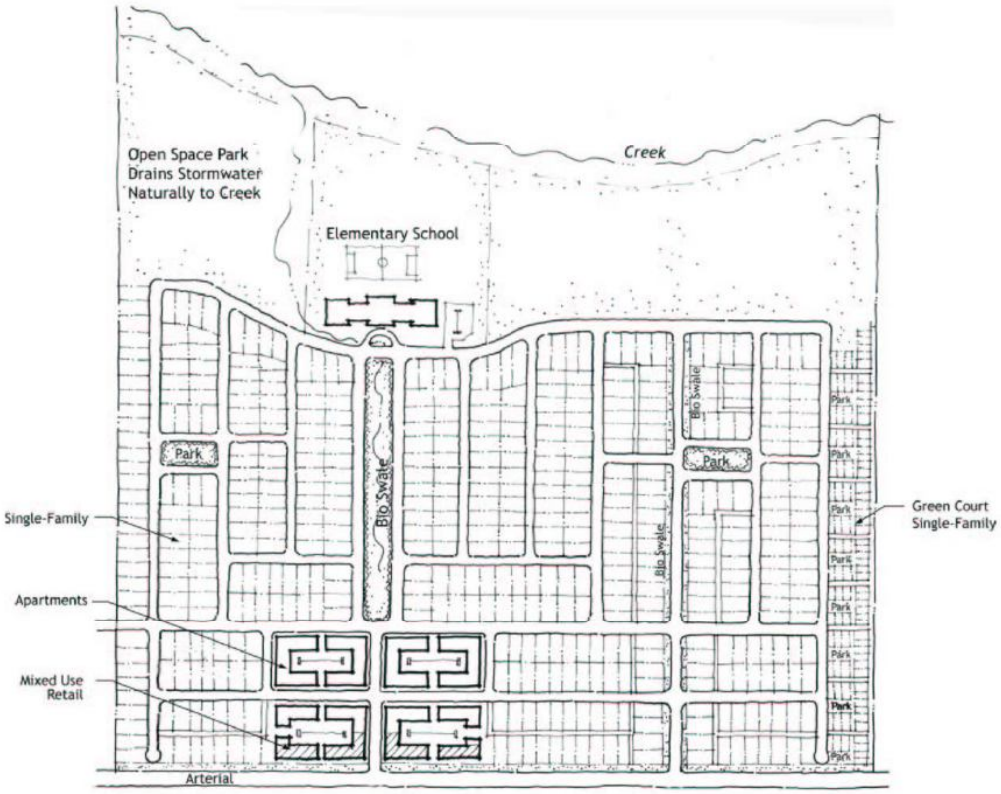

Figure 2-12
Alternative 3: Neo-Traditional

A comparison of the three alternatives is shown in Table 2-5.

Table 2-5 Comparison of Three Alternatives

	Alternative 1	Alternative 2	Alternative 3
Total Site (Ac)	220	220	220
# Of Housing Units	660	660	660
Parks & Open Space (Ac)	0	12	52
Creek Setback (Ft)	0	100	500
Impervious Land Coverage - Streets (Ac)	28	22	15
% Of Site that is Impervious - Streets Only	13%	10%	7%
% Of Site that is Impervious - Streets Only (Relative to Conventional)	100%	81%	53%
Linear Feet of Pipe	15,000	13,000	10,000
Linear Feet of Swale	0	0	4,700
Width of Major Streets (Ft)	40	32	32
Width of Minor Streets (Ft)	None	28	28

Typical lots in Alternatives 2 and 3 are illustrated in three forms: street loaded, alley fed and rural. In the street-loaded form, lot size is still approximately 1/6 acre, but the lot is narrower and deeper, thus reducing the amount of street frontage per household. The two-car garage is accessed from a front driveway. This front-loaded street accounts for 63% impervious land coverage in the 60 ft right-of-way.

Looking at a typical street, the traditional residential neighborhood reduces the number of feet of street and sidewalk per housing unit by nearly 40% compared to the conventional subdivision. This is accomplished by two means: a narrower street width (28 ft versus 40 ft), and narrower, deeper lots (60 ft versus 65 ft wide). Narrower lots mean less street frontage per lot.

In the alley-loaded form, the street right-of-way is narrowed to 50 ft, leaving 4 ft for trees between the sidewalk and curb. This form also employs the narrower street, achieving a 40% reduction in pavement dedicated to street and sidewalk. A 16 ft wide alley is provided in the back to access a garage at the rear of each lot. Additional pavement for the alley is balanced by elimination of pavement for the front driveway. This model assumes an impervious asphalt or concrete alley. Gravel alleys are feasible, and improve permeability. In this form, narrower, deeper lots are employed to accommodate the depth required for the alley.

The rural street form dramatically reduces impervious land coverage. The street is 19 ft wide with gravel shoulders for trees and parking. Pedestrians walk on the gravel shoulder or share the street with slow-moving cars.

Looking at a typical street, the rural form provides the greatest reduction in impervious land coverage. Only 570 ft^2 of pavement of street is required per housing unit, a reduction of 62% compared to the conventional sub-division.

Section 3
Site and Facility Design for Water Quality Protection

3.1 Introduction

Site and facility design for stormwater quality protection employs a multi-level strategy. The strategy consists of: 1) reducing or eliminating post-project runoff; 2) controlling sources of pollutants; and 3), if still needed after deploying 1) and 2), treating contaminated stormwater runoff before discharging it to the storm drain system or to receiving waters.

This section describes how elements 1), 2), and 3) of the strategy can be incorporated into the site and facility planning and design process, and by doing so, eliminating or reducing the amount of stormwater runoff that may require treatment at the point where stormwater runoff ultimately leaves the site. Elements 1) and 2) may be referred to as "source controls" because they emphasize reducing or eliminating pollutants in stormwater runoff at their source through runoff reduction and by keeping pollutants and stormwater segregated. Section 4 provides detailed descriptions of the BMPs related to elements 1) and 2) of the strategy. Element 3) of the strategy is referred to as "treatment control" because it utilizes treatment mechanisms to remove pollutants that have entered stormwater runoff. Section 5 provides detailed descriptions of BMPs related to element 3) of the strategy. Treatment controls integrated into and throughout the site usually provide enhanced benefits over the same or similar controls deployed only at the "end of the pipe" where runoff leaves the project site.

3.2 Integration of BMPs into Common Site Features

Many common site features can achieve stormwater management goals by incorporating one or more basic elements, either alone or in combination, depending on site and other conditions. The basic elements include infiltration, retention/detention, biofilters, and structural controls. This section first describes these basic elements, and then describes how these elements can be incorporated into common site features.

Infiltration

Infiltration is the process where water enters the ground and moves downward through the unsaturated soil zone. Infiltration is ideal for management and conservation of runoff because it filters pollutants through the soil and restores natural flows to groundwater and downstream water bodies. See Figure 3-1.

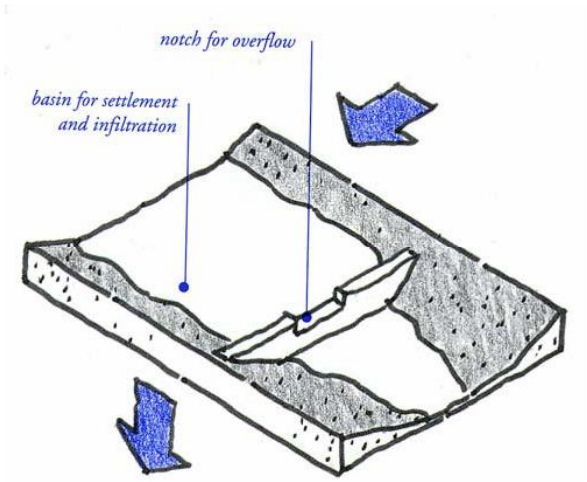

Figure 3-1
Infiltration Basin

The infiltration approach to stormwater management seeks to "preserve and restore the hydrologic cycle." An infiltration stormwater system seeks to infiltrate runoff into the soil by allowing it to flow slowly over permeable surfaces. The slow flow of runoff allows pollutants to settle into the soil where they are naturally mitigated. The reduced volume of runoff that remains takes a long time to reach the outfall, and when it empties into a natural water body or storm sewer, its pollutant load is greatly reduced.

Infiltration basins can be either open or closed. Open infiltration basins, include ponds, swales and other landscape features, are usually vegetated to maintain the porosity of the soil structure and to reduce erosion. Closed infiltration basins can be constructed under the land surface with open graded crushed stone, leaving the surface to be used for parking or other uses. Subsurface closed basins are generally more difficult to maintain and more expensive than open filtration systems, and are used primarily where high land costs demand that the land surface be reclaimed for economic use.

Infiltration systems are often designed to capture the "first flush" storm event and used in combination with a detention basin to control peak hydraulic flows. They effectively remove suspended solids, particulates, bacteria, organics and soluble metals and nutrients through the vehicle of filtration, absorption and microbial decomposition. Groundwater contamination should be considered as a potential adverse effect and should be considered where shallow groundwater is a source of drinking water. In cases where groundwater sources are deep, there is a very low chance of contamination from normal concentrations of typical urban runoff.

Retention and Detention

Retention and detention systems differ from infiltration systems primarily in intent. Detention systems are designed to capture and retain runoff temporarily and release it to receiving waters at predevelopment flow rates. Permanent pools of water are not held between storm events. Pollutants settle out and are removed from the water column through physical processes. See Figure 3-2.

Retention systems capture runoff and retain it between storms as shown in Figure 3-3. Water held in the system is displaced by the next significant rainfall event. Pollutants settle out and are thereby removed from the water column. Because the water remains in the system for a period of time, retention systems benefit from biological and biochemical removal mechanisms provided by aquatic plants and microorganisms. See Figure 3-3.

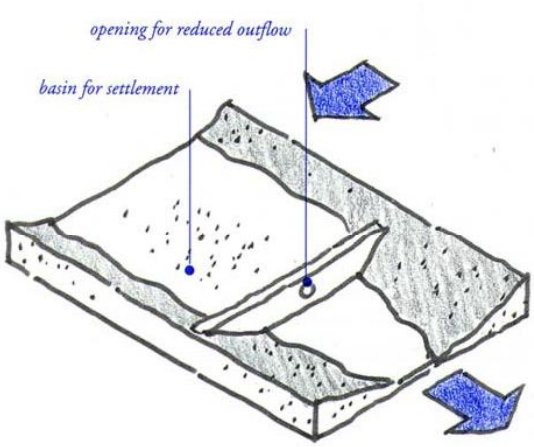

Figure 3-2
Simple Detention System

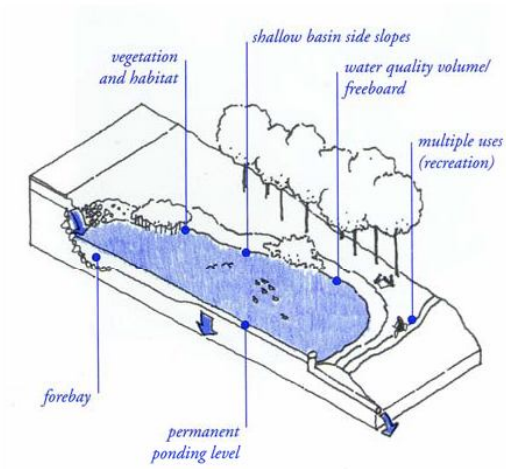

Figure 3-3
Retention System

Retention/detention systems may release runoff slowly enough to reduce downstream peak flows to their pre-development levels, allow fine sediments to settle, and uptake dissolved nutrients in the runoff where wetland vegetation is included.

Bioretention facilities have the added benefit of aesthetic appeal. These systems can be placed in parking lot islands, landscaped areas surrounding buildings, perimeter parking lots, and other open space sections. Placing bioretention facilities on land that city regulations require developers to devote to open space efficiently uses the land. An experienced landscape architect can choose plant species and planting materials that are easy to maintain, aesthetically pleasing, and capable of effectively reducing pollutants in runoff from the site.

Constructed wetland systems retain and release stormwater in a manner that is similar to retention or detention basins. The design mimics natural ecological functions and uses wetland vegetation to filter pollutants. The system needs a permanent water source to function properly and must be engineered to remove coarse sediment, especially construction related sediments, from entering the pond. Stormwater has the potential to negatively affect natural wetland functions and constructed wetlands can be used to buffer sensitive resources.

Biofilters

Biofilters, also known as vegetated swales and filter strips, are vegetated slopes and channels designed and maintained to transport shallow depths of runoff slowly over vegetation. Biofilters are effective if flows are slow and depths are shallow (3% slope max.). The slow movement of runoff through the vegetation provides an opportunity for sediments and particulates to be filtered and degraded through biological activity. In most soils, the biofilter also provides an opportunity for stormwater infiltration, which further removes pollutants and reduces runoff volumes. See Figure 3-4.

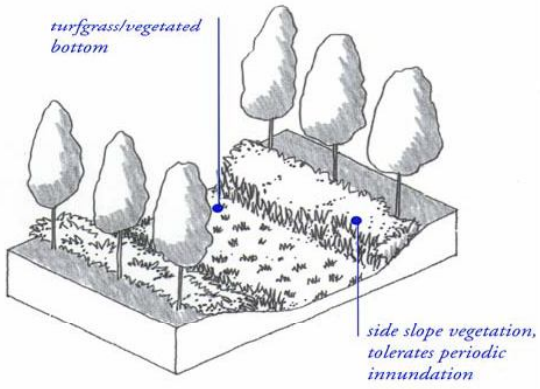

Figure 3-4
Vegetated Swale

Swales intercept both sheet and concentrated flows and convey these flows in a concentrated, vegetation-lined channel. Grass filter strips intercept sheet runoff from the impervious network of streets, parking lots, and rooftops and divert stormwater to a uniformly graded meadow, buffer zone, or small forest. Typically, the vegetated swale and grass strip-planting palette can

comprise a wide range of possibilities from dense vegetation to turf grass. Grass strips and vegetated swales can function as pretreatment systems for water entering bioretention systems or other BMPs. If biofilters are to succeed in filtering pollutants from the water column, the planting design must consider the hydrology, soils, and maintenance requirements of the site.

Appropriate plantings not only improve water quality, they provide habitat and aesthetic benefits. Selected plant materials must be able to adapt to variable moisture regimes. Turf grass is acceptable if it can be watered in the dry season, and if it is not inundated for long periods. Species such as willows, dogwoods, sedge, rush, lilies, and bulrush tolerate varying degrees of soil moisture and can provide an attractive plant palette year round.

Structural Controls

Structural controls in the context of this section include a range of measures that prevent pollutants from coming into contact with stormwater. In this context, these measures may be referred to as "structural source controls" meaning that they utilize structural features to prevent pollutant sources and stormwater from coming into contact with one another, thus reducing the opportunity for stormwater to become contaminated. Examples of structural source controls include covers, impermeable surfaces, secondary containment facilities, runoff diversion berms, and diversions to wastewater treatment plants.

3.2.1 Streets

More than any other single element, street design has a powerful impact on stormwater quality. Street and other transportation-related structures typically can comprise between 60 and 70% of the total impervious coverage in urban areas and, unlike rooftops, streets are almost always directly connected to an underground stormwater system.

Recognizing that street design can be the greatest factor in development's impact on stormwater quality, it is important that designers, municipalities and developers employ street standards that reduce impervious land coverage. Directing runoff to biofilters or swales rather than underground storm drains produces a street system that conveys stormwater efficiently while providing both water quality and aesthetic benefits.

On streets where a more urban character is desired, or where a rigid pavement edge is required, curb and gutter systems can be designed to empty into drainage swales. These swales can run parallel to the street, in the parkway between the curb and the sidewalk, or can intersect the street at cross-angles, and run between residences, depending on topography or site planning. Runoff travels along the gutter, but instead of being emptied into a catch basin and underground pipe, multiple openings in the curb direct runoff into surface swales or infiltration/detention basins.

In recent years, new street standards have been gaining acceptance that meets the access requirements of local residential streets while reducing impervious land coverage. These standards create a new class of street that is narrower and more interconnected than the current local street standard, called an "access" street. An access street is at the lowest end of the street hierarchy and is intended only to provide access to a limited number of residences.

Street design is usually mandated by local municipal standards. Officials must consider the scale of the land use as they select stormwater and water quality design solutions. Traffic volume and speeds, bicycle lane design criteria, and residential and business densities influence the willingness of decision makers to permit the narrow streets that include curbless design alternatives.

Emergency service providers often raise objections to reduced street widths. Street designs illustrated here meet national Fire Code standards for emergency access. An interconnected grid system of narrow streets also allows emergency service providers with multiple access routes to compensate for the unlikely possibility that a street may be blocked.

Many municipal street standards mandate 80 to 100% impervious land coverage in the public right-of-way, and are a principal contributor to the environmental degradation caused by development.

A street standard that allows an interconnected system of narrow access streets for residential neighborhoods has the potential to achieve several complimentary environmental and social benefits. A hierarchy of streets sized according to average daily traffic volumes yields a wide variety of benefits: improved safety from lower speeds and volumes, improved aesthetics from street trees and green parkways, reduced impervious land coverage, less heat island effect, and lower development costs. If the reduction in street width is accompanied by a drainage system that allows for infiltration of runoff, the impact of streets on stormwater quality can be greatly mitigated.

There are many examples of narrow streets, from both newly constructed and older communities, which demonstrate the impact of street design on neighborhood character and environmental quality. See Table 3-1.

Table 3-1 Adopted Narrow Street Standards (Typ. Cross-Sections, two-way traffic)

City of Santa Rosa	30 ft wide with parking permitted both sides, <1000 Average Daily Traffic (ADT) 26 – 28 ft with parking permitted one side 20 ft - no parking permitted 20 ft neck downs at intersections
City of Palmdale	28 ft wide with parking permitted both sides
City of San Jose	30 ft wide with parking permitted both sides, <21 Dwelling Units (DU) 34 ft wide with parking permitted both sides, <121 DU
City of Novato	24 ft wide with parking permitted both sides, 2-4 DU 28 ft with parking permitted both sides, 5-15 DU
County of San Mateo	19 ft wide rural pavement cross-section with parking permitted on adjacent gravel shoulders

A comparison of street cross-sections is shown in Figure 3-5.

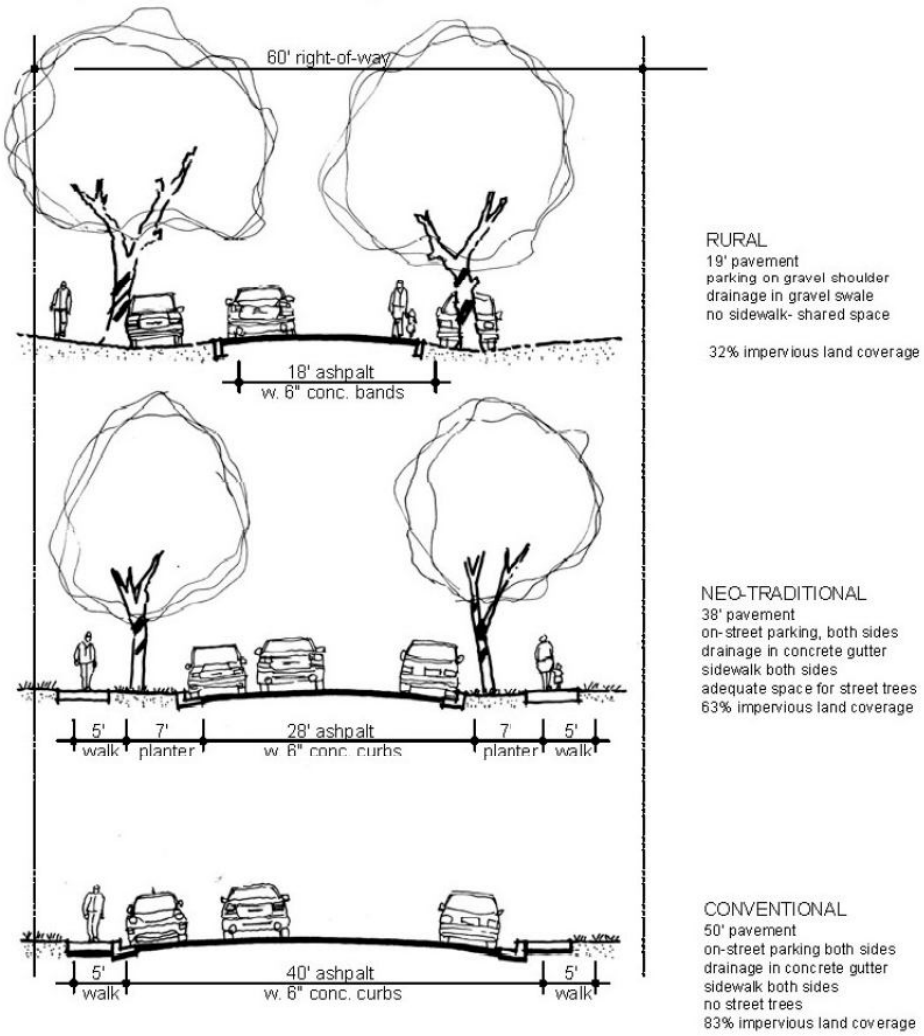

Figure 3-5
Comparison of Street Cross-Sections (two-way traffic, residential access streets)

3.2.2 Parking Lots

In any development, storage space for stationary vehicles can consume many acres of land area, often greater than the area covered by streets or rooftops. In a neighborhood of single-family homes, this parking area is generally located on private driveways or along the street. In higher density residential developments, parking is often consolidated in parking lots.

The space for storage of the automobile, the standard parking stall, occupies only 160 ft^2, but when combined with aisles, driveways, curbs, overhang space, and median islands, a parking lot can require up to 400 ft^2 per vehicle, or nearly one acre per 100 cars. Since parking is usually accommodated on an asphalt or concrete surface with conventional underground storm drain systems, parking lots typically generate a great deal of DCIA.

There are many ways to both reduce the impervious land coverage of parking areas and to filter runoff before it reaches the storm drain system.

Hybrid Parking Lot

Hybrid lots work on the principle that pavement use differs between aisles and stalls. Aisles must be designed for speeds between 10 and 20 mph, and durable enough to support the concentrated traffic of all vehicles using the lot. The stalls, on the other hand, need only be designed for the 2 or 3 mph speed of vehicles maneuvering into place. Most of the time the stalls are in use, vehicles are stationary. Hybrid lots reduce impervious surface coverage in parking areas by differentiating the paving between aisles and stalls, and combining impervious aisles with permeable stalls, as shown in Figure 3-6.

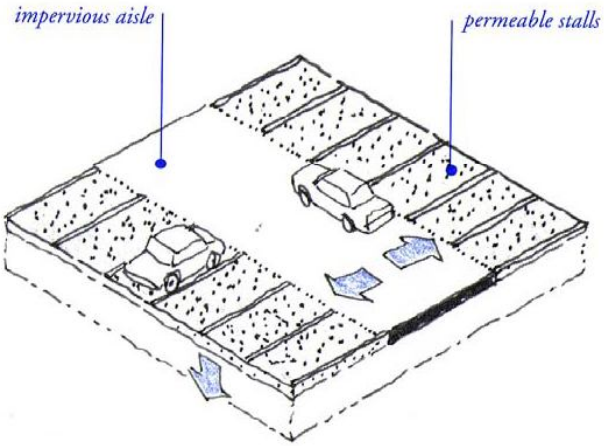

Figure 3-6
Hybrid Parking Lot

If aisles are constructed of a more conventional, impermeable material suitable for heavier vehicle use, such as asphalt, stalls can be constructed of permeable pavement. This can reduce the overall impervious surface coverage of a typical double loaded parking lot by 60% and avoid the need for an underground drainage system.

Permeable stalls can be constructed of a number of materials including pervious concrete, unit pavers such as brick or stone spaced to expose a permeable joint and set on a permeable base, crushed aggregate, porous asphalt, turf block, and cobbles in low traffic areas. Turf blocks and permeable joints are shown in Figures 3-7 and 3-8.

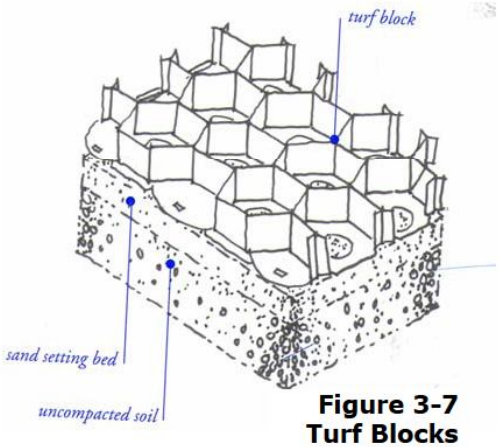

Figure 3-7
Turf Blocks

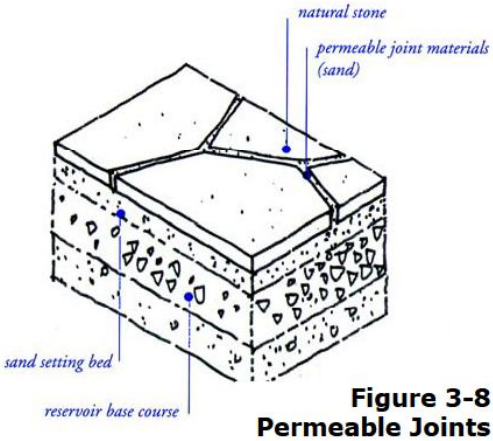

Figure 3-8
Permeable Joints

Parking Grove

A variation on the permeable stall design, a grid of trees and bollards can be used to delineate parking stalls and create a "parking grove." If the bollard and tree grids are spaced approximately 19 ft apart, two vehicles can park between each row of the grid. This 9.5 ft stall spacing is slightly more generous than the standard 8.5 to 9 ft stall, and allows for the added width of the tree trucks and bollards. A benefit of this design is that the parking grove not only shades parked cars, but also presents an attractive open space when cars are absent. Examples of parking groves are shown in Figures 3-9 and 3-10.

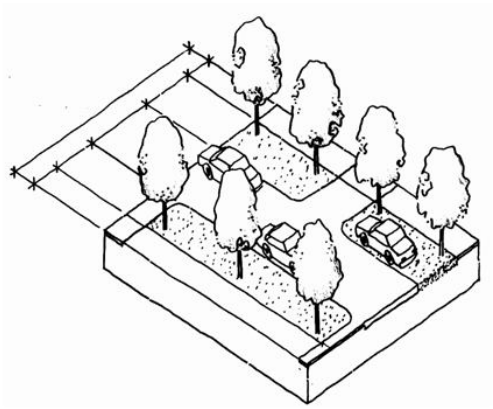

Figure 3-9
Parking Grove

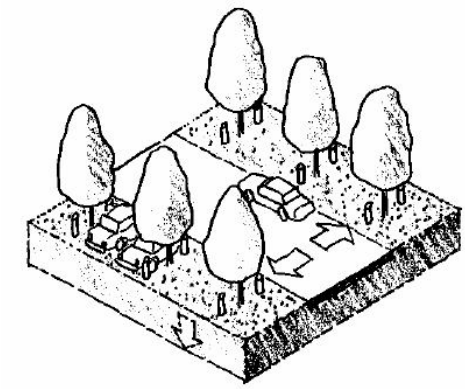

Figure 3-10
Parking Grove

Overflow Parking

Parking lot design is often required to accommodatepeak demand, generating a high proportion of impervious land coverage of very limited usefulness. An alternative is to differentiate between regular and peak parking demands, and to construct the peak parking stalls of a different, more permeable, material. This "overflow parking" area can be made of a turf block, which appears as a green lawn when not occupied by vehicles, or crushed stone or other materials. See Figure 3-11. The same concept can be applied to areas with temporary parking needs, such as emergency access routes, or in residential applications, RV, or trailer parking.

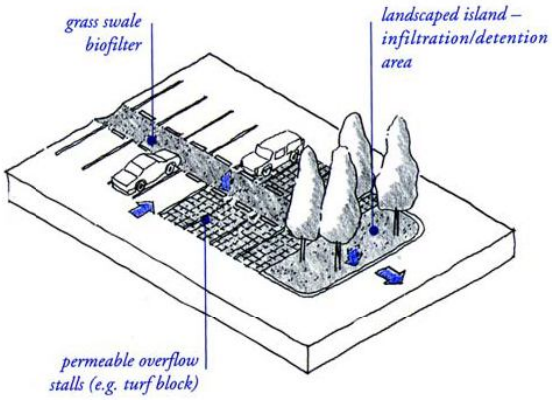

Figure 3-11
Overflows Parking

Porous Pavement Recharge Bed

In some cases, parking lots can be designed to perform more complex stormwater management functions. Constructing a stone-filled reservoir below the pavement surface and directing runoff underground by means of perforated distribution pipes can achieve subsurface stormwater storage and infiltration as shown in Figure 3-12. Subsurface infiltration basins eliminate the possibilities of mud, mosquitoes and safety hazards sometimes perceived to be associated with ephemeral surface drainage. They also can provide for storage of large volumes of runoff, and can be incorporated with roof runoff collection systems.

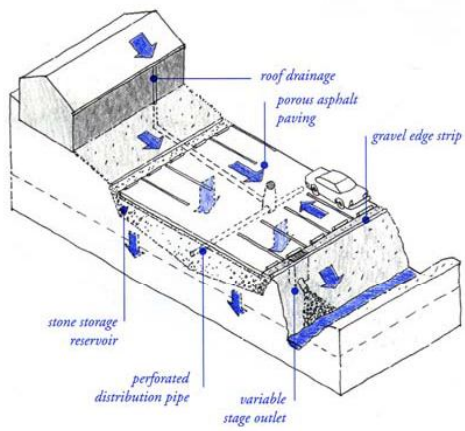

Figure 3-12
Porous Pavement Recharge Bed

3.2.3 Driveways

Driveways can comprise up to 40% of the total transportation network in a conventional development, with streets, turn-arounds, and sidewalks comprising the remaining 60%.

Driveway length is generally determined by garage setback requirements, and width is usually mandated by municipal codes and ordinances. If garages are setback from the street, long driveways are required, unless a rear alley system is included to provide garage access. If parking for two vehicles side by side is required, a 20 ft minimum width is required. Thus, if a 20 ft setback and a two-car-wide driveway are required, a minimum of 400 ft^2 of driveway will result, or 4% of a typical 10,000 ft^2 residential lot. If the house itself is compact, and the driveway is long, wide, and paved with an impervious material such as asphalt or concrete, it can become the largest component of impervious land coverage on the lot.

Municipalities can reduce the area dedicated to driveways by allowing for tandem parking (one vehicle in front of another on a narrow driveway). In addition, if shared driveways are permitted, then two or more garages can be accessed by a single driveway, further reducing required land area. Rear alley access to the garage can reduce driveway length, but overall impervious surface coverage may not be reduced if the alleys are paved with impervious materials and the access streets remain designed to conventional municipal standards.

Alternative solutions that work to reduce the impact of water quality problems associated with impervious land coverage on city streets also work on driveways. Sloping the driveway so that it drains onto an adjacent turf or groundcover area prevents driveways from draining directly to storm drain systems. This concept is shown in Figures 3-13 and 3-14. Use of turf-block or unit pavers on sand creates attractive, low maintenance, permeable driveways that filter stormwater. See Figure 3-15. Crushed aggregate can serve as a relatively smooth pavement with minimal maintenance as shown in Figure 3-16. Paving only under wheels (Figure 3-17) is a viable, inexpensive design if the driveway is straight between the garage and the street, and repaving temporary parking areas with permeable unit pavers such as brick or stone can significantly reduce the percentage of impervious area devoted to the driveway.

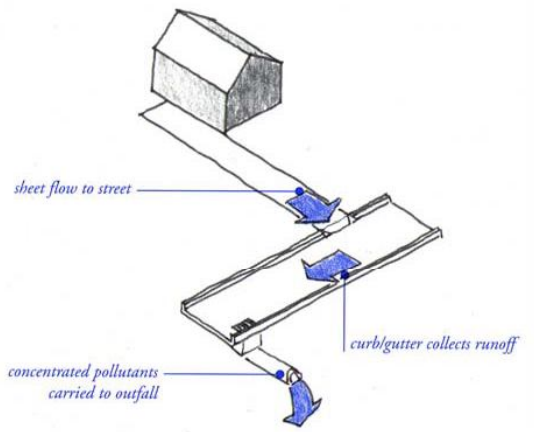

Figure 3-13
Traditional Design
Drains Flow Directly to Storm Drain

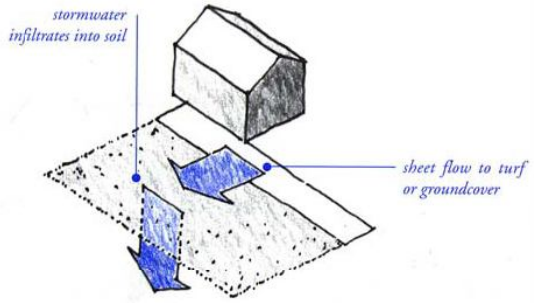

Figure 3-14
Alternative Solution
Slopes Flow to Groundcover

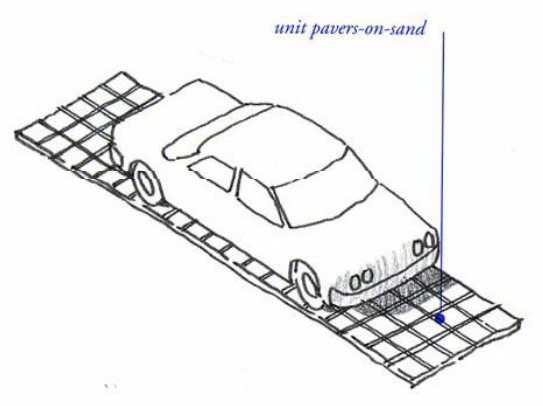

Figure 3-15
Unit Pavers

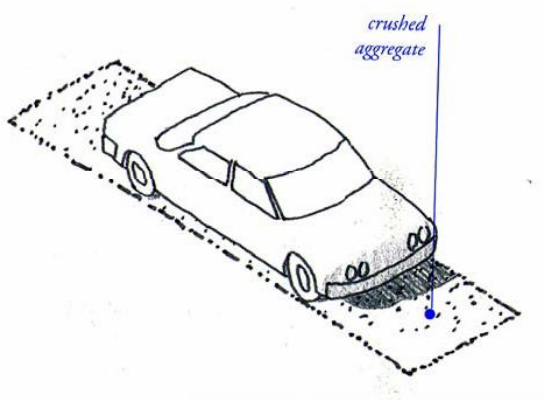

Figure 3-16
Crushed Aggregate

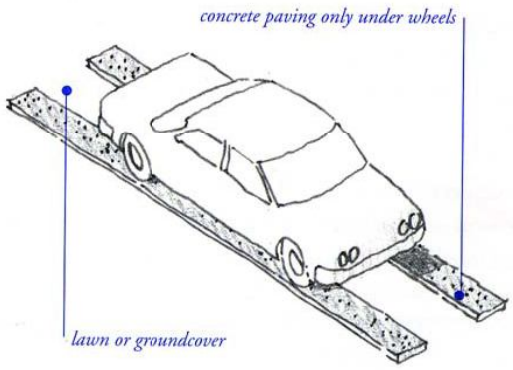

Figure 3-17
Paving Only Under Wheels

3.2.4 Landscape and Open Space

In the natural landscape, most soils infiltrate a high percentage of rainwater through a complex web of organic and biological activities that build soil porosity and permeability. Roots reach into the soil and separate particles of clay, insects excavate voids in the soil mass, roots decay leaving networks of macro pores, leaves fall and form a mulch over the soil surface, and earthworms burrow and ingest organic detritus to create richer, more porous soil. These are just a few examples of the natural processes that occur within the soil.

Maintenance of a healthy soil structure through the practice of retaining or restoring native soils where possible and using soil amendments where appropriate can improve the land's ability to filter and slowly release stormwater into drainage networks. Construction practices such as decreasing soil compaction, storing topsoil on-site for use after construction, and chipping wood for mulch as it is cleared for the land can improve soil quality and help maintain healthy watersheds. Practices that reduce erosion and help retain water on-site include incorporating organic amendments into disturbed soils after construction, retaining native vegetation, and covering soil during revegetation.

Subtle changes in grading can also improve infiltration. Landscape surfaces are conventionally graded to have a slight convex slope. This causes water to run off a central high point into a surrounding drainage system, creating increased runoff. If a landscape surface is graded to have a slightly concave slope, it will hold water. The infiltration value of concave vegetated surfaces is greater in permeable soils. Soils of heavy clay or underlain with hardpan provide less infiltration value. In these cases, concave vegetated surfaces must be designed as retention/detention basins, with proper outlets or under drains to an interconnected system.

Multiple Small Basins

Biofilters, infiltration, retention/detention basins are the basic elements of a landscape designed for stormwater management. The challenge for designers is to integrate these elements creatively and attractively in the landscape – either within a conventional landscape aesthetic or by presenting a different landscape image that emphasizes the role of water and drainage.

Multiple small basins can provide a great deal of water storage and infiltration capacity. These small basins can fit into the parkway planting strip or shoulders of street rights-of-way. If connected by culverts under walks and driveways, they can create a continuous linear infiltration system. Infiltration and retention/detention basins can be placed under wood decks, in parking lot planter islands, and at roof downspouts. Outdoor patios or seating areas can be sunken a few steps, paved with a permeable pavement such as flagstone or gravel, and designed to hold a few inches of water collected from surrounding rooftops or paved areas for a few hours after a rain.

All of these are examples of small basins that can store water for a brief period, allowing it to infiltrate into the soil, slowing its release into the drainage network, and filtering pollutants. An ordinary lawn can be designed to hold a few inches of water for a few hours after a storm, attracting birds and creating a landscape of diversity. Grass/vegetated swales can be integrated with landscaping, providing an attractive, low maintenance, linear biofilter. Extended detention (dry ponds) store water during storms, holding runoff to predevelopment levels. Pollutants

settle and are removed from the water column before discharging to streams. Wet ponds serve a similar purpose and can increase property values by providing a significant aesthetic, and passive recreation opportunity.

Plant species selection is critical for proper functioning of infiltration areas. Proper selection of plant materials can improve the infiltration potential of landscape areas. Deep-rooted plants help to build soil porosity. Plant leaf-surface area helps to collect rainwater before it lands on the soil, especially in light rains, increasing the overall water-holding potential of the landscape.

A large number of plant species will survive moist soils or periodic inundation. These plants provide a wide range of choices for planted infiltration/detention basins and drainage swales. Most inundated plants have a higher survival potential on well-drained alluvial soils than on fine textured shallow soils or clays.

Maintenance Needs for Stormwater Systems

All landscape treatments require maintenance. Landscapes designed to perform stormwater management functions are not necessarily more maintenance intensive than highly manicured conventional landscapes. A concave lawn requires the same mowing, fertilizing, and weeding as a convex one and often less irrigation because more rain is filtered into the underlying soil. Sometimes infiltration basins may require a different kind of maintenance than conventionally practiced.

Typical maintenance activities include periodic inspection of surface drainage systems to ensure clear flow lines, repair of eroded surfaces, adjustment or repair of drainage structures, soil cultivation or aeration, care of plant materials, replacement of dead plants, replenishment of mulch cover, irrigation, fertilizing, pruning and mowing. In addition, dead or stressed vegetation may indicate chemical dumping. Careful observation should be made of these areas to determine if such a problem exists.

Landscape maintenance can have a significant impact on soil permeability and its ability to support plant growth. Most plants concentrate the majority of their small absorbing roots in the upper 6 in. of the soil surface if a mulch or forest litter protects the surface. If the soil is exposed or bare, it can become so hot that surface roots will not grow in the upper 8 to 10 in. The common practice of removing all leaf litter and detritus with leaf blowers creates a hard-crusted soil surface of low permeability and high heat conduction. Proper mulching of the soil surface improves water retention and infiltration, while protecting the surface root zone from temperature extremes.

In addition to impacting permeability, landscape maintenance practices can have adverse effects on water quality. Because commonly used fertilizers and herbicides are a source of organic compounds, it is important to keep these practices to a minimum, and prevent overwatering.

When well maintained and designed, landscaped concave surfaces, infiltration basins, swales and bioretention areas can add aesthetic value while providing the framework for environmentally sound, comprehensive stormwater management systems.

Street Trees

Trees improve water quality by intercepting and storing rainfall on leaves and branch surfaces, thereby reducing runoff volumes and delaying the onset of peak flows. A single street tree can have a total leaf surface area of several hundred to several thousand ft^2, depending on species and size. This aboveground surface area created by trees and other plants greatly contributes to the water holding capacity of the land. They attenuate conveyance by increasing the soil's capacity to filter rainwater and reduce overland flow rates. By diminishing the impact of raindrops on un-vegetated soil, trees reduce soil erosion. Street trees also have the ability to reduce ambient temperature of stormwater runoff and absorb surface water pollutants.

When using street trees to achieve stormwater management goals, it is important to use tree species with wide canopies. Street tree design criteria should specify species expected to attain 20 to 30 ft canopies at maturity. Planter strips with adequate width and depth of soil volume are necessary to ensure tree vitality and reduce future maintenance. Structural soils also provide rooting space for large trees and can be specified along narrow planter strips and underneath sidewalks to enable continuous belowground soil and root connections.

3.2.5 Outdoor Work Areas

The site design and landscape details listed in previous sections are appropriate for uses where low concentrations of pollutants can be mitigated through infiltration, retention, and detention. Often in commercial and industrial sites, there are outdoor work areas in which a higher concentration of pollutants exists, and thus a higher potential of pollutants infiltrating the soil. These work areas often involve automobiles, equipment machinery, or other commercial and industrial uses, and require special consideration.

Outdoor work areas are usually isolated elements in a larger development. Infiltration and detention strategies are still appropriate for and can be applied to other areas of the site, such as parking lots, landscape areas, employee use areas, and bicycle path. It is only the outdoor work area within the development – such as the loading dock, fueling area, or equipment wash area – that requires a different drainage approach. This drainage approach is often precisely the opposite from the infiltration/detention strategy – in other words, collect and convey.

In these outdoor work areas, infiltration is discouraged and runoff is often routed directly to the sanitary sewer, not the storm drain. Because this runoff is being added to the loads normally received by the water treatment plants (publicly owned treatment works – POTWs), it raises several concerns that must be addressed in the planning and design stage. These include:

- Higher flows that could exceed the sewer system capacity
- Catastrophic spills that may cause harm to POTW operation
- A potential increase in pollutants

These concerns can be addressed at policy, management, and site planning levels.

Policy

Piping runoff and process water from outdoor work areas directly to the sanitary sewer for treatment by a downstream POTW displaces the problem of reducing stormwater pollution. Municipal stormwater programs and/or private developers can work with the local POTW to develop solutions that minimize effects on the treatment facility. It should be noted that many POTWs have traditionally prohibited the discharge of stormwater to their systems. However, these prohibitions are being reviewed in light of the benefits possible from such diversions.

Management

Commercial and industrial sites that host special activities need to implement a pollution prevention program minimizing hazardous material use and waste. For example, if restaurant grease traps are directly connected to the sanitary sewer, proper management programs can mitigate the amount of grease that escapes from the trap, clogging sewer systems and causing overflows or damage to downstream systems.

Site Planning

Outdoor work areas can be designed in particular ways to reduce their impacts on both stormwater quality and sewage treatment plants.

- Create an impermeable surface such as concrete or asphalt, or a prefabricated metal drip pan, depending on the use.
- Cover the area with a roof. This prevents rain from falling on the work area and becoming polluted runoff.
- Berm or mound around the perimeter of the area to prevent water from adjacent areas to flow on to the surface of the work area.
- Directly connect runoff. Unlike other areas, runoff from these work areas is directly connected to the sanitary sewer or other specialized containment systems. This allows the more highly concentrated pollutants from these areas to receive special treatment that removes particular constituents. Approval for this connection must be obtained from the appropriate sanitary sewer agency.
- Locate the work area away from storm drains or catch basins. If the work area is adjacent to, or directly upstream from a storm drain or landscape drainage feature (e.g., bioswales), debris or liquids from the work area can migrate into the stormwater system.
- Plan the work area to prevent run-on. This can be accomplished by raising the work area or by diverting run-on around the work area.

These design elements are general considerations for work areas. In designing any outdoor work area, evaluate local ordinances affecting the type of work area, as many local jurisdictions have specific requirements.

Some activities are common to many commercial and industrial sites. These include garbage and recycling, maintenance and storage, and loading. These activities can have a significant

negative impact on stormwater quality, and require special attention to the siting and design of the activity area.

3.2.6 Maintenance and Storage Areas

To reduce the possibility of contact with stormwater runoff, maintenance and storage areas can be sited away from drainage paths and waterways, and covered. Implementing a regular maintenance plan for sweeping, litter control, and spill cleanup also helps prevent stormwater pollution.

Specifying impermeable surfaces for vehicle and equipment maintenance areas will reduce the chance of pollutant infiltration. A concrete surface will usually last much longer than an asphalt one, as vehicle fluids can either dissolve asphalt or be absorbed by the asphalt and released later. See Figure 3-18.

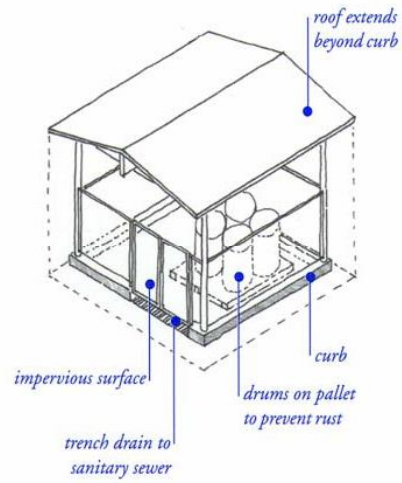

Figure 3-18
Material Storage

3.2.7 Vehicle and Equipment Washing Areas

It is generally advisable to cover areas used for regular washing of vehicles, trucks, or equipment, surround them with a perimeter berm, and clearly mark them as a designated washing area. Sumps or drain lines can be installed to collect wash water, which may be treated for reuse or recycling, or for discharge to the sanitary sewer. The POTW may require some form of pretreatment, such as a trap, for these areas.

Fueling and maintenance activities must be isolated from the vehicle washing facilities. These activities have specific requirements, described later in this section.

Storage of bulk materials, fuels, oils, solvents, other chemicals, and process equipment should be accommodated on an impervious surface covered with a roof. To reduce the chances of corrosion, materials should not be stored directly on the ground, but supported by a wire mesh or other flooring above the impervious pavement. In uncovered areas, drums or other containers can be stored at a slight angle to prevent ponding of rainwater from rusting the lids. Liquid containers should be stored in a designated impervious area that is roofed, fenced within a berm, to prevent spills from flowing into the storm drain.

If hazardous materials are being used or stored, additional specific local, state, or federal requirements may apply.

3.2.8 Loading Area

Loading areas and docks can be designed with a roof or overhang, and a surrounding curb or berm. See Figure 3-19. The area should be graded to direct flow toward an inlet with a shutoff valve or dead-end sump. The sump must be designed with enough capacity to hold a spill while the valve is closed. If the sump has a valve, it must be kept in the closed position and require an

action to open it. All sumps must have a sealed bottom so they cannot infiltrate water. Contaminated accumulated waste and liquid must not be discharged to a storm drain and may be discharged to the sanitary sewer only with the POTW's permission. If the waste is not approved for discharge to the sanitary sewer, it must be conveyed to a hazardous waste (or other offsite disposal) facility, and may require pretreatment. Some specific uses have unique requirements.

3.2.9 Trash Storage Areas

Areas designated for trash storage can be covered to protect containers from rainfall. Where covering the trash storage area is not feasible, the area can be protected from run on using grading and berms, and connected to the sanitary sewer to prevent leaks from leaving the designated trash storage area enclosure.

3.2.10 Wash Areas

Areas designated for washing of floor mats, containers, exhaust filters, and similar items can be covered and enclosed to protect the area from rainfall and from overspray leaving the area. These areas can also be connected to the sanitary sewer to prevent wash waters from leaving the designated enclosures. A benefit of covering and enclosing these areas is that vectors may be reduced and aesthetics of the area improved.

3.2.11 Fueling Areas

In all vehicle and equipment fueling areas, plans must be developed for cleaning near fuel dispensers, emergency spill cleanup, and routine inspections to prevent leaks and ensure properly functioning equipment.

If the fueling activities are minor, fueling can be performed in a designated, covered, and bermed area that will not allow run-on of stormwater or runoff of spills.

Retail gasoline outlets and vehicle fueling areas have specific design guidelines. These are described in a Best Management Practice Guide for retail gasoline outlets developed by the California Stormwater Quality Task Force, in cooperation with major gasoline corporations. The practice guide addresses standards for existing, new, or substantially remodeled facilities. In addition, some municipal stormwater permits require RGOs to provide appropriate runoff treatment.

Fuel dispensing areas are defined as extending 6.5 ft from the corner of each fuel dispenser or the length at which the hose and nozzle assembly may be operated plus 1 ft, whichever is less. These areas must be paved with smooth impervious surfaces, such as Portland cement concrete, with a 2-4% slope to prevent ponding, and must be covered. The cover must not drain onto the work area. The rest of the site must separate the fuel dispensing area by a grade break that prevents run-on of stormwater.

Within the gas station, the outdoor trash receptacle area (garbage and recycling), and the air/water supply area must be paved and graded to prevent stormwater run-on. Trash receptacles should be covered.

Section 4
Source Control BMPs

4.1 Introduction

This section describes specific source control Best Management Practices (BMPs) to be considered for incorporation into newly developed public and private infrastructure, as well as retrofit into existing facilities to meet stormwater management objectives.

4.2 BMP Fact Sheets

Source control fact sheets for design are listed in Table 4-1. The fact sheets detail planning methods and concepts that should be taken into consideration by developers during project design. The fact sheets are arranged in three categories: those that have to do with landscape, irrigation, and signage considerations; those that have to do with use of particular materials; and those that have to do with design of particular areas.

Table 4-1 Source Control BMPs for Design

Design	
SD-10	Site Design and Landscape Planning
SD-11	Roof Runoff Controls
SD-12	Efficient Irrigation
SD-13	Storm Drain System Signs
Materials	
SD-20	Pervious Pavements
SD-21	Alternative Building Materials
Areas	
SD-30	Fueling Areas
SD-31	Maintenance Bays and Docks
SD-32	Trash Enclosures
SD-33	Vehicle Washing Areas
SD-34	Outdoor Material Storage Areas
SD-35	Outdoor Work Areas
SD-36	Outdoor Processing Areas

4.3 Fact Sheet Format

A BMP fact sheet is a short document that provides information about a particular BMP. Typically, each fact sheet contains the information outlined in Figure 4-1. Supplemental information is provided if it is available. The fact sheets also contain side bar presentations with information on BMP design objectives. Completed fact sheets for each of the above activities are provided in Section 4.4.

SDxx Example Fact Sheet

Description of the BMP
Approach
Suitable Applications
Design Considerations
- Designing New Installations
- Redeveloping Existing Installations

Supplemental Information
- Examples
- Other Resources

Figure 4-1
Example Fact Sheet

4.4 BMP Fact Sheets

Source Control BMP Fact Sheets for design follow. The BMP fact sheets are individually page numbered and are suitable for photocopying and inclusion in stormwater quality management plans. Fresh copies of the fact sheets can be individually downloaded from the California Stormwater BMP Handbook website at www.cabmphandbooks.com.

Site Design & Landscape Planning SD-10

Design Objectives

- ☑ Maximize Infiltration
- ☑ Provide Retention
- ☑ Slow Runoff
- ☑ Minimize Impervious Land Coverage
- Prohibit Dumping of Improper Materials
- Contain Pollutants
- Collect and Convey

Description

Each project site possesses unique topographic, hydrologic, and vegetative features, some of which are more suitable for development than others. Integrating and incorporating appropriate landscape planning methodologies into the project design is the most effective action that can be done to minimize surface and groundwater contamination from stormwater.

Approach

Landscape planning should couple consideration of land suitability for urban uses with consideration of community goals and projected growth. Project plan designs should conserve natural areas to the extent possible, maximize natural water storage and infiltration opportunities, and protect slopes and channels.

Suitable Applications

Appropriate applications include residential, commercial and industrial areas planned for development or redevelopment.

Design Considerations

Design requirements for site design and landscapes planning should conform to applicable standards and specifications of agencies with jurisdiction and be consistent with applicable General Plan and Local Area Plan policies.

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SD-10 Site Design & Landscape Planning

Designing New Installations

Begin the development of a plan for the landscape unit with attention to the following general principles:

- Formulate the plan on the basis of clearly articulated community goals. Carefully identify conflicts and choices between retaining and protecting desired resources and community growth.
- Map and assess land suitability for urban uses. Include the following landscape features in the assessment: wooded land, open unwooded land, steep slopes, erosion-prone soils, foundation suitability, soil suitability for waste disposal, aquifers, aquifer recharge areas, wetlands, floodplains, surface waters, agricultural lands, and various categories of urban land use. When appropriate, the assessment can highlight outstanding local or regional resources that the community determines should be protected (e.g., a scenic area, recreational area, threatened species habitat, farmland, fish run). Mapping and assessment should recognize not only these resources but also additional areas needed for their sustenance.

Project plan designs should conserve natural areas to the extent possible, maximize natural water storage and infiltration opportunities, and protect slopes and channels.

Conserve Natural Areas during Landscape Planning

If applicable, the following items are required and must be implemented in the site layout during the subdivision design and approval process, consistent with applicable General Plan and Local Area Plan policies:

- Cluster development on least-sensitive portions of a site while leaving the remaining land in a natural undisturbed condition.
- Limit clearing and grading of native vegetation at a site to the minimum amount needed to build lots, allow access, and provide fire protection.
- Maximize trees and other vegetation at each site by planting additional vegetation, clustering tree areas, and promoting the use of native and/or drought tolerant plants.
- Promote natural vegetation by using parking lot islands and other landscaped areas.
- Preserve riparian areas and wetlands.

Maximize Natural Water Storage and Infiltration Opportunities Within the Landscape Unit

- Promote the conservation of forest cover. Building on land that is already deforested affects basin hydrology to a lesser extent than converting forested land. Loss of forest cover reduces interception storage, detention in the organic forest floor layer, and water losses by evapotranspiration, resulting in large peak runoff increases and either their negative effects or the expense of countering them with structural solutions.
- Maintain natural storage reservoirs and drainage corridors, including depressions, areas of permeable soils, swales, and intermittent streams. Develop and implement policies and

regulations to discourage the clearing, filling, and channelization of these features. Utilize them in drainage networks in preference to pipes, culverts, and engineered ditches.

- Evaluating infiltration opportunities by referring to the stormwater management manual for the jurisdiction and pay particular attention to the selection criteria for avoiding groundwater contamination, poor soils, and hydrogeological conditions that cause these facilities to fail. If necessary, locate developments with large amounts of impervious surfaces or a potential to produce relatively contaminated runoff away from groundwater recharge areas.

Protection of Slopes and Channels during Landscape Design

- Convey runoff safely from the tops of slopes.
- Avoid disturbing steep or unstable slopes.
- Avoid disturbing natural channels.
- Stabilize disturbed slopes as quickly as possible.
- Vegetate slopes with native or drought tolerant vegetation.
- Control and treat flows in landscaping and/or other controls prior to reaching existing natural drainage systems.
- Stabilize temporary and permanent channel crossings as quickly as possible, and ensure that increases in run-off velocity and frequency caused by the project do not erode the channel.
- Install energy dissipaters, such as riprap, at the outlets of new storm drains, culverts, conduits, or channels that enter unlined channels in accordance with applicable specifications to minimize erosion. Energy dissipaters shall be installed in such a way as to minimize impacts to receiving waters.
- Line on-site conveyance channels where appropriate, to reduce erosion caused by increased flow velocity due to increases in tributary impervious area. The first choice for linings should be grass or some other vegetative surface, since these materials not only reduce runoff velocities, but also provide water quality benefits from filtration and infiltration. If velocities in the channel are high enough to erode grass or other vegetative linings, riprap, concrete, soil cement, or geo-grid stabilization are other alternatives.
- Consider other design principles that are comparable and equally effective.

Redeveloping Existing Installations

Various jurisdictional stormwater management and mitigation plans (SUSMP, WQMP, etc.) define "redevelopment" in terms of amounts of additional impervious area, increases in gross floor area and/or exterior construction, and land disturbing activities with structural or impervious surfaces. The definition of " redevelopment" must be consulted to determine whether or not the requirements for new development apply to areas intended for redevelopment. If the definition applies, the steps outlined under "designing new installations" above should be followed.

SD-10 Site Design & Landscape Planning

Redevelopment may present significant opportunity to add features which had not previously been implemented. Examples include incorporation of depressions, areas of permeable soils, and swales in newly redeveloped areas. While some site constraints may exist due to the status of already existing infrastructure, opportunities should not be missed to maximize infiltration, slow runoff, reduce impervious areas, disconnect directly connected impervious areas.

Other Resources

A Manual for the Standard Urban Stormwater Mitigation Plan (SUSMP), Los Angeles County Department of Public Works, May 2002.

Stormwater Management Manual for Western Washington, Washington State Department of Ecology, August 2001.

Model Standard Urban Storm Water Mitigation Plan (SUSMP) for San Diego County, Port of San Diego, and Cities in San Diego County, February 14, 2002.

Model Water Quality Management Plan (WQMP) for County of Orange, Orange County Flood Control District, and the Incorporated Cities of Orange County, Draft February 2003.

Ventura Countywide Technical Guidance Manual for Stormwater Quality Control Measures, July 2002.

Roof Runoff Controls SD-11

Rain Garden

Design Objectives

- ☑ Maximize Infiltration
- ☑ Provide Retention
- ☑ Slow Runoff
- Minimize Impervious Land Coverage
- Prohibit Dumping of Improper Materials
- ☑ Contain Pollutants
- Collect and Convey

Description

Various roof runoff controls are available to address stormwater that drains off rooftops. The objective is to reduce the total volume and rate of runoff from individual lots, and retain the pollutants on site that may be picked up from roofing materials and atmospheric deposition. Roof runoff controls consist of directing the roof runoff away from paved areas and mitigating flow to the storm drain system through one of several general approaches: cisterns or rain barrels; dry wells or infiltration trenches; pop-up emitters, and foundation planting. The first three approaches require the roof runoff to be contained in a gutter and downspout system. Foundation planting provides a vegetated strip under the drip line of the roof.

Approach

Design of individual lots for single-family homes as well as lots for higher density residential and commercial structures should consider site design provisions for containing and infiltrating roof runoff or directing roof runoff to vegetative swales or buffer areas. Retained water can be reused for watering gardens, lawns, and trees. Benefits to the environment include reduced demand for potable water used for irrigation, improved stormwater quality, increased groundwater recharge, decreased runoff volume and peak flows, and decreased flooding potential.

Suitable Applications

Appropriate applications include residential, commercial and industrial areas planned for development or redevelopment.

Design Considerations

Designing New Installations

Cisterns or Rain Barrels

One method of addressing roof runoff is to direct roof downspouts to cisterns or rain barrels. A cistern is an above ground storage vessel with either a manually operated valve or a permanently open outlet. Roof runoff is temporarily stored and then released for irrigation or infiltration between storms. The number of rain

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barrels needed is a function of the rooftop area. Some low impact developers recommend that every house have at least 2 rain barrels, with a minimum storage capacity of 1000 liters. Roof barrels serve several purposes including mitigating the first flush from the roof which has a high volume, amount of contaminants, and thermal load. Several types of rain barrels are commercially available. Consideration must be given to selecting rain barrels that are vector proof and childproof. In addition, some barrels are designed with a bypass valve that filters out grit and other contaminants and routes overflow to a soak-away pit or rain garden.

If the cistern has an operable valve, the valve can be closed to store stormwater for irrigation or infiltration between storms. This system requires continual monitoring by the resident or grounds crews, but provides greater flexibility in water storage and metering. If a cistern is provided with an operable valve and water is stored inside for long periods, the cistern must be covered to prevent mosquitoes from breeding.

A cistern system with a permanently open outlet can also provide for metering stormwater runoff. If the cistern outlet is significantly smaller than the size of the downspout inlet (say ¼ to ½ inch diameter), runoff will build up inside the cistern during storms, and will empty out slowly after peak intensities subside. This is a feasible way to mitigate the peak flow increases caused by rooftop impervious land coverage, especially for the frequent, small storms.

Dry wells and Infiltration Trenches

Roof downspouts can be directed to dry wells or infiltration trenches. A dry well is constructed by excavating a hole in the ground and filling it with an open graded aggregate, and allowing the water to fill the dry well and infiltrate after the storm event. An underground connection from the downspout conveys water into the dry well, allowing it to be stored in the voids. To minimize sedimentation from lateral soil movement, the sides and top of the stone storage matrix can be wrapped in a permeable filter fabric, though the bottom may remain open. A perforated observation pipe can be inserted vertically into the dry well to allow for inspection and maintenance.

In practice, dry wells receiving runoff from single roof downspouts have been successful over long periods because they contain very little sediment. They must be sized according to the amount of rooftop runoff received, but are typically 4 to 5 feet square, and 2 to 3 feet deep, with a minimum of 1-foot soil cover over the top (maximum depth of 10 feet).

To protect the foundation, dry wells must be set away from the building at least 10 feet. They must be installed in solids that accommodate infiltration. In poorly drained soils, dry wells have very limited feasibility.

Infiltration trenches function in a similar manner and would be particularly effective for larger roof areas. An infiltration trench is a long, narrow, rock-filled trench with no outlet that receives stormwater runoff. These are described under Treatment Controls.

Pop-up Drainage Emitter

Roof downspouts can be directed to an underground pipe that daylights some distance from the building foundation, releasing the roof runoff through a pop-up emitter. Similar to a pop-up irrigation head, the emitter only opens when there is flow from the roof. The emitter remains flush to the ground during dry periods, for ease of lawn or landscape maintenance.

Roof Runoff Controls SD-11

Foundation Planting

Landscape planting can be provided around the base to allow increased opportunities for stormwater infiltration and protect the soil from erosion caused by concentrated sheet flow coming off the roof. Foundation plantings can reduce the physical impact of water on the soil and provide a subsurface matrix of roots that encourage infiltration. These plantings must be sturdy enough to tolerate the heavy runoff sheet flows, and periodic soil saturation.

Redeveloping Existing Installations

Various jurisdictional stormwater management and mitigation plans (SUSMP, WQMP, etc.) define "redevelopment" in terms of amounts of additional impervious area, increases in gross floor area and/or exterior construction, and land disturbing activities with structural or impervious surfaces. The definition of " redevelopment" must be consulted to determine whether or not the requirements for new development apply to areas intended for redevelopment. If the definition applies, the steps outlined under "designing new installations" above should be followed.

Supplemental Information

Examples

- City of Ottawa's Water Links Surface –Water Quality Protection Program
- City of Toronto Downspout Disconnection Program
- City of Boston, MA, Rain Barrel Demonstration Program

Other Resources

Hager, Marty Catherine, Stormwater, "Low-Impact Development", January/February 2003. www.stormh2o.com

Low Impact Urban Design Tools, Low Impact Development Design Center, Beltsville, MD. www.lid-stormwater.net

Start at the Source, Bay Area Stormwater Management Agencies Association, 1999 Edition

Efficient Irrigation SD-12

Design Objectives

- ☑ Maximize Infiltration
- ☑ Provide Retention
- ☑ Slow Runoff
- Minimize Impervious Land Coverage
- Prohibit Dumping of Improper Materials
- Contain Pollutants
- Collect and Convey

Description

Irrigation water provided to landscaped areas may result in excess irrigation water being conveyed into stormwater drainage systems.

Approach

Project plan designs for development and redevelopment should include application methods of irrigation water that minimize runoff of excess irrigation water into the stormwater conveyance system.

Suitable Applications

Appropriate applications include residential, commercial and industrial areas planned for development or redevelopment. (Detached residential single-family homes are typically excluded from this requirement.)

Design Considerations

Designing New Installations

The following methods to reduce excessive irrigation runoff should be considered, and incorporated and implemented where determined applicable and feasible by the Permittee:

- Employ rain-triggered shutoff devices to prevent irrigation after precipitation.
- Design irrigation systems to each landscape area's specific water requirements.
- Include design featuring flow reducers or shutoff valves triggered by a pressure drop to control water loss in the event of broken sprinkler heads or lines.
- Implement landscape plans consistent with County or City water conservation resolutions, which may include provision of water sensors, programmable irrigation times (for short cycles), etc.

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SD-12 Efficient Irrigation

- Design timing and application methods of irrigation water to minimize the runoff of excess irrigation water into the storm water drainage system.
- Group plants with similar water requirements in order to reduce excess irrigation runoff and promote surface filtration. Choose plants with low irrigation requirements (for example, native or drought tolerant species). Consider design features such as:
  - Using mulches (such as wood chips or bar) in planter areas without ground cover to minimize sediment in runoff
  - Installing appropriate plant materials for the location, in accordance with amount of sunlight and climate, and use native plant materials where possible and/or as recommended by the landscape architect
  - Leaving a vegetative barrier along the property boundary and interior watercourses, to act as a pollutant filter, where appropriate and feasible
  - Choosing plants that minimize or eliminate the use of fertilizer or pesticides to sustain growth
- Employ other comparable, equally effective methods to reduce irrigation water runoff.

Redeveloping Existing Installations

Various jurisdictional stormwater management and mitigation plans (SUSMP, WQMP, etc.) define "redevelopment" in terms of amounts of additional impervious area, increases in gross floor area and/or exterior construction, and land disturbing activities with structural or impervious surfaces. The definition of " redevelopment" must be consulted to determine whether or not the requirements for new development apply to areas intended for redevelopment. If the definition applies, the steps outlined under "designing new installations" above should be followed.

Other Resources

A Manual for the Standard Urban Stormwater Mitigation Plan (SUSMP), Los Angeles County Department of Public Works, May 2002.

Model Standard Urban Storm Water Mitigation Plan (SUSMP) for San Diego County, Port of San Diego, and Cities in San Diego County, February 14, 2002.

Model Water Quality Management Plan (WQMP) for County of Orange, Orange County Flood Control District, and the Incorporated Cities of Orange County, Draft February 2003.

Ventura Countywide Technical Guidance Manual for Stormwater Quality Control Measures, July 2002.

Storm Drain Signage SD-13

Design Objectives

- Maximize Infiltration
- Provide Retention
- Slow Runoff
- Minimize Impervious Land Coverage
- ☑ Prohibit Dumping of Improper Materials
- Contain Pollutants
- Collect and Convey

Description

Waste materials dumped into storm drain inlets can have severe impacts on receiving and ground waters. Posting notices regarding discharge prohibitions at storm drain inlets can prevent waste dumping. Storm drain signs and stencils are highly visible source controls that are typically placed directly adjacent to storm drain inlets.

Approach

The stencil or affixed sign contains a brief statement that prohibits dumping of improper materials into the urban runoff conveyance system. Storm drain messages have become a popular method of alerting the public about the effects of and the prohibitions against waste disposal.

Suitable Applications

Stencils and signs alert the public to the destination of pollutants discharged to the storm drain. Signs are appropriate in residential, commercial, and industrial areas, as well as any other area where contributions or dumping to storm drains is likely.

Design Considerations

Storm drain message markers or placards are recommended at all storm drain inlets within the boundary of a development project. The marker should be placed in clear sight facing toward anyone approaching the inlet from either side. All storm drain inlet locations should be identified on the development site map.

Designing New Installations

The following methods should be considered for inclusion in the project design and show on project plans:

- Provide stenciling or labeling of all storm drain inlets and catch basins, constructed or modified, within the project area with prohibitive language. Examples include "NO DUMPING

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– DRAINS TO OCEAN" and/or other graphical icons to discourage illegal dumping.

- Post signs with prohibitive language and/or graphical icons, which prohibit illegal dumping at public access points along channels and creeks within the project area.

Note - Some local agencies have approved specific signage and/or storm drain message placards for use. Consult local agency stormwater staff to determine specific requirements for placard types and methods of application.

Redeveloping Existing Installations

Various jurisdictional stormwater management and mitigation plans (SUSMP, WQMP, etc.) define "redevelopment" in terms of amounts of additional impervious area, increases in gross floor area and/or exterior construction, and land disturbing activities with structural or impervious surfaces. If the project meets the definition of "redevelopment", then the requirements stated under " designing new installations" above should be included in all project design plans.

Additional Information

Maintenance Considerations

- Legibility of markers and signs should be maintained. If required by the agency with jurisdiction over the project, the owner/operator or homeowner's association should enter into a maintenance agreement with the agency or record a deed restriction upon the property title to maintain the legibility of placards or signs.

Placement

- Signage on top of curbs tends to weather and fade.

- Signage on face of curbs tends to be worn by contact with vehicle tires and sweeper brooms.

Supplemental Information

Examples

- Most MS4 programs have storm drain signage programs. Some MS4 programs will provide stencils, or arrange for volunteers to stencil storm drains as part of their outreach program.

Other Resources

A Manual for the Standard Urban Stormwater Mitigation Plan (SUSMP), Los Angeles County Department of Public Works, May 2002.

Model Standard Urban Storm Water Mitigation Plan (SUSMP) for San Diego County, Port of San Diego, and Cities in San Diego County, February 14, 2002.

Model Water Quality Management Plan (WQMP) for County of Orange, Orange County Flood Control District, and the Incorporated Cities of Orange County, Draft February 2003.

Ventura Countywide Technical Guidance Manual for Stormwater Quality Control Measures, July 2002.

Pervious Pavements SD-20

Design Objectives

- ☑ Maximize Infiltration
- ☑ Provide Retention
- ☑ Slow Runoff
- ☑ Minimize Impervious Land Coverage
- Prohibit Dumping of Improper Materials
- Contain Pollutants
- Collect and Convey

Description

Pervious paving is used for light vehicle loading in parking areas. The term describes a system comprising a load-bearing, durable surface together with an underlying layered structure that temporarily stores water prior to infiltration or drainage to a controlled outlet. The surface can itself be porous such that water infiltrates across the entire surface of the material (e.g., grass and gravel surfaces, porous concrete and porous asphalt), or can be built up of impermeable blocks separated by spaces and joints, through which the water can drain. This latter system is termed 'permeable' paving. Advantages of pervious pavements is that they reduce runoff volume while providing treatment, and are unobtrusive resulting in a high level of acceptability.

Approach

Attenuation of flow is provided by the storage within the underlying structure or sub base, together with appropriate flow controls. An underlying geotextile may permit groundwater recharge, thus contributing to the restoration of the natural water cycle. Alternatively, where infiltration is inappropriate (e.g., if the groundwater vulnerability is high, or the soil type is unsuitable), the surface can be constructed above an impermeable membrane. The system offers a valuable solution for drainage of spatially constrained urban areas.

Significant attenuation and improvement in water quality can be achieved by permeable pavements, whichever method is used. The surface and subsurface infrastructure can remove both the soluble and fine particulate pollutants that occur within urban runoff. Roof water can be piped into the storage area directly, adding areas from which the flow can be attenuated. Also, within lined systems, there is the opportunity for stored runoff to be piped out for reuse.

Suitable Applications

Residential, commercial and industrial applications are possible. The use of permeable pavement may be restricted in cold regions, arid regions or regions with high wind erosion. There are some specific disadvantages associated with permeable pavement, which are as follows:

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- Permeable pavement can become clogged if improperly installed or maintained. However, this is countered by the ease with which small areas of paving can be cleaned or replaced when blocked or damaged.
- Their application should be limited to highways with low traffic volumes, axle loads and speeds (less than 30 mph limit), car parking areas and other lightly trafficked or non-trafficked areas. Permeable surfaces are currently not considered suitable for adoptable roads due to the risks associated with failure on high speed roads, the safety implications of ponding, and disruption arising from reconstruction.
- When using un-lined, infiltration systems, there is some risk of contaminating groundwater, depending on soil conditions and aquifer susceptibility. However, this risk is likely to be small because the areas drained tend to have inherently low pollutant loadings.
- The use of permeable pavement is restricted to gentle slopes.
- Porous block paving has a higher risk of abrasion and damage than solid blocks.

Design Considerations

Designing New Installations

If the grades, subsoils, drainage characteristics, and groundwater conditions are suitable, permeable paving may be substituted for conventional pavement on parking areas, cul de sacs and other areas with light traffic. Slopes should be flat or very gentle. Scottish experience has shown that permeable paving systems can be installed in a wide range of ground conditions, and the flow attenuation performance is excellent even when the systems are lined.

The suitability of a pervious system at a particular pavement site will, however, depend on the loading criteria required of the pavement.

Where the system is to be used for infiltrating drainage waters into the ground, the vulnerability of local groundwater sources to pollution from the site should be low, and the seasonal high water table should be at least 4 feet below the surface.

Ideally, the pervious surface should be horizontal in order to intercept local rainfall at source. On sloping sites, pervious surfaces may be terraced to accommodate differences in levels.

Design Guidelines

The design of each layer of the pavement must be determined by the likely traffic loadings and their required operational life. To provide satisfactory performance, the following criteria should be considered:

- The subgrade should be able to sustain traffic loading without excessive deformation.
- The granular capping and sub-base layers should give sufficient load-bearing to provide an adequate construction platform and base for the overlying pavement layers.
- The pavement materials should not crack of suffer excessive rutting under the influence of traffic. This is controlled by the horizontal tensile stress at the base of these layers.

Pervious Pavements SD-20

There is no current structural design method specifically for pervious pavements. Allowances should be considered the following factors in the design and specification of materials:

- Pervious pavements use materials with high permeability and void space. All the current UK pavement design methods are based on the use of conventional materials that are dense and relatively impermeable. The stiffness of the materials must therefore be assessed.
- Water is present within the construction and can soften and weaken materials, and this must be allowed for.
- Existing design methods assume full friction between layers. Any geotextiles or geomembranes must be carefully specified to minimize loss of friction between layers.
- Porous asphalt loses adhesion and becomes brittle as air passes through the voids. Its durability is therefore lower than conventional materials.

The single sized grading of materials used means that care should be taken to ensure that loss of finer particles between unbound layers does not occur.

Positioning a geotextile near the surface of the pervious construction should enable pollutants to be trapped and retained close to the surface of the construction. This has both advantages and disadvantages. The main disadvantage is that the filtering of sediments and their associated pollutants at this level may hamper percolation of waters and can eventually lead to surface ponding. One advantage is that even if eventual maintenance is required to reinstate infiltration, only a limited amount of the construction needs to be disturbed, since the sub-base below the geotextile is protected. In addition, the pollutant concentration at a high level in the structure allows for its release over time. It is slowly transported in the stormwater to lower levels where chemical and biological processes may be operating to retain or degrade pollutants.

The design should ensure that sufficient void space exists for the storage of sediments to limit the period between remedial works.

- Pervious pavements require a single size grading to give open voids. The choice of materials is therefore a compromise between stiffness, permeability and storage capacity.
- Because the sub-base and capping will be in contact with water for a large part of the time, the strength and durability of the aggregate particles when saturated and subjected to wetting and drying should be assessed.
- A uniformly graded single size material cannot be compacted and is liable to move when construction traffic passes over it. This effect can be reduced by the use of angular crushed rock material with a high surface friction.

In pollution control terms, these layers represent the site of long term chemical and biological pollutant retention and degradation processes. The construction materials should be selected, in addition to their structural strength properties, for their ability to sustain such processes. In general, this means that materials should create neutral or slightly alkaline conditions and they should provide favorable sites for colonization by microbial populations.

SD-20 Pervious Pavements

Construction/Inspection Considerations

- Permeable surfaces can be laid without cross-falls or longitudinal gradients.
- The blocks should be lain level
- They should not be used for storage of site materials, unless the surface is well protected from deposition of silt and other spillages.
- The pavement should be constructed in a single operation, as one of the last items to be built, on a development site. Landscape development should be completed before pavement construction to avoid contamination by silt or soil from this source.
- Surfaces draining to the pavement should be stabilized before construction of the pavement.
- Inappropriate construction equipment should be kept away from the pavement to prevent damage to the surface, sub-base or sub-grade.

Maintenance Requirements

The maintenance requirements of a pervious surface should be reviewed at the time of design and should be clearly specified. Maintenance is required to prevent clogging of the pervious surface. The factors to be considered when defining maintenance requirements must include:

- Type of use
- Ownership
- Level of trafficking
- The local environment and any contributing catchments

Studies in the UK have shown satisfactory operation of porous pavement systems without maintenance for over 10 years and recent work by Imbe et al. at 9th ICUD, Portland, 2002 describes systems operating for over 20 years without maintenance. However, performance under such regimes could not be guaranteed, Table 1 shows typical recommended maintenance regimes:

Pervious Pavements SD-20

Table 1 Typical Recommended Maintenance Regimes	
Activity	**Schedule**
■ Minimize use of salt or grit for de-icing ■ Keep landscaped areas well maintained ■ Prevent soil being washed onto pavement	Ongoing
■ Vacuum clean surface using commercially available sweeping machines at the following times: - End of winter (April) - Mid-summer (July / August) - After Autumn leaf-fall (November)	2/3 x per year
■ Inspect outlets	Annual
■ If routine cleaning does not restore infiltration rates, then reconstruction of part of the whole of a pervious surface may be required. ■ The surface area affected by hydraulic failure should be lifted for inspection of the internal materials to identify the location and extent of the blockage. ■ Surface materials should be lifted and replaced after brush cleaning. Geotextiles may need complete replacement. ■ Sub-surface layers may need cleaning and replacing. ■ Removed silts may need to be disposed of as controlled waste.	As needed (infrequent) Maximum 15-20 years

Permeable pavements are up to 25 % cheaper (or at least no more expensive than the traditional forms of pavement construction), when all construction and drainage costs are taken into account. (Accepting that the porous asphalt itself is a more expensive surfacing, the extra cost of which is offset by the savings in underground pipework etc.) (Niemczynowicz, et al., 1987)

Table 1 gives US cost estimates for capital and maintenance costs of porous pavements (Landphair et al., 2000)

Redeveloping Existing Installations

Various jurisdictional stormwater management and mitigation plans (SUSMP, WQMP, etc.) define "redevelopment" in terms of amounts of additional impervious area, increases in gross floor area and/or exterior construction, and land disturbing activities with structural or impervious surfaces. The definition of " redevelopment" must be consulted to determine whether or not the requirements for new development apply to areas intended for redevelopment. If the definition applies, the steps outlined under "designing new installations" above should be followed.

SD-20 Pervious Pavements

Additional Information

Cost Considerations

Permeable pavements are up to 25 % cheaper (or at least no more expensive than the traditional forms of pavement construction), when all construction and drainage costs are taken into account. (Accepting that the porous asphalt itself is a more expensive surfacing, the extra cost of which is offset by the savings in underground pipework etc.) (Niemczynowicz, et al., 1987)

Table 2 gives US cost estimates for capital and maintenance costs of porous pavements (Landphair et al., 2000)

Table 2 Engineer's Estimate for Porous Pavement

Porous Pavement													
Item	Units	Price	Cycles/ Year	Quant. 1 Acre WS	Total	Quant. 2 Acre WS	Total	Quant. 3 Acre WS	Total	Quant. 4 Acre WS	Total	Quant. 5 Acre WS	Total
Grading	SY	$2.00		604	$1,208	1209	$2,418	1812	$3,624	2419	$4,838	3020	$6,040
Paving	SY	$19.00		212	$4,028	424	$8,056	636	$12,084	848	$16,112	1060	$20,140
Excavation	CY	$3.60		201	$724	403	$1,451	604	$2,174	806	$2,902	1008	$3,629
Filter Fabric	SY	$1.15		700	$805	1400	$1,610	2000	$2,300	2800	$3,220	3600	$4,140
Stone Fill	CY	$16.00		201	$3,216	403	$6,448	604	$9,664	806	$12,896	1008	$16,128
Sand	CY	$7.00		100	$700	200	$1,400	300	$2,100	400	$2,800	500	$3,500
Sight Well	EA	$300.00		2	$600	3	$900	4	$1,200	7	$2,100	7	$2,100
Seeding	LF	$0.05		644	$32	1288	$64	1932	$97	2576	$129	3220	$161
Check Dam	CY	$35.00		0	$0	0	$0	0	$0	0	$0	0	$0
Total Construction Costs					**$10,105**		**$19,929**		**$29,619**		**$40,158**		**$49,798**
Construction Costs Amortized for 20 Years					**$505**		**$996**		**$1,481**		**$2,008**		**$2,490**
Annual Maintenance Expense													
Item	Units	Price	Cycles/ Year	Quant. 1 Acre WS	Total	Quant. 2 Acre WS	Total	Quant. 3 Acre WS	Total	Quant. 4 Acre WS	Total	Quant. 5 Acre WS	Total
Sweeping	AC	$250.00	6	1	$1,500	2	$3,000	3	$4,500	4	$6,000	5	$7,500
Washing	AC	$250.00	6	1	$1,500	2	$3,000	3	$4,500	4	$6,000	5	$7,500
Inspection	MH	$20.00	5	5	$100	5	$100	5	$100	5	$100	5	$100
Deep Clean	AC	$450.00	0.5	1	$225	2	$450	3	$675	3.9	$878	5	$1,125
Total Annual Maintenance Expense					**$3,960**		**$7,792**		**$11,651**		**$15,483**		**$19,370**

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SD-20 Pervious Pavements

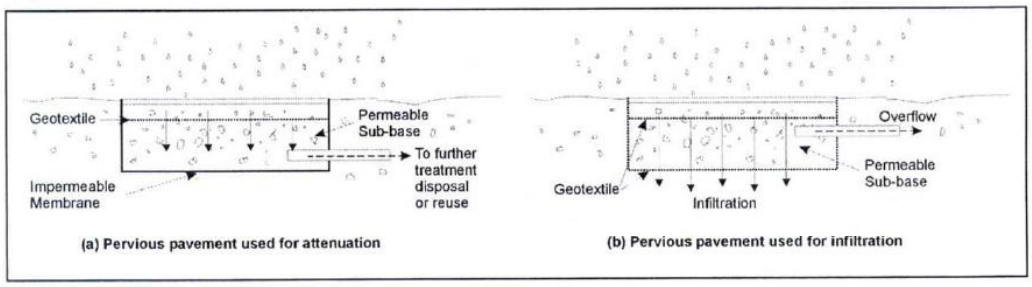

Schematics of a Pervious Pavement System

Alternative Building Materials SD-21

Design Objectives

- ☑ Maximize Infiltration
- ☑ Provide Retention
- ☑ Source Control
- Minimize Impervious Land Coverage
- Prohibit Dumping of Improper Materials
- Contain Pollutant
- Collect and Convey

Description

Alternative building materials are selected instead of conventional materials for new construction and renovation. These materials reduce potential sources of pollutants in stormwater runoff by eliminating compounds that can leach into runoff, reducing the need for pesticide application, reducing the need for painting and other maintenance, or by reducing the volume of runoff.

Approach

Alternative building materials are available for use as lumber for decking, roofing materials, home siding, and paving for driveways, decks, and sidewalks.

Suitable Applications

Appropriate applications include residential, commercial and industrial areas planned for development or redevelopment.

Design Considerations

Designing New Installations

Decking

One of the most common materials for construction of decks and other outdoor construction has traditionally been pressure treated wood, which is now being phased out. The standard treatment is called CCA, for chromated copper arsenate. The key ingredients are arsenic (which kills termites, carpenter ants and other insects), copper (which kills the fungi that cause wood to rot) and chromium (which reacts with the other ingredients to bind them to the wood). The amount of arsenic is far from trivial. A deck just 8 feet x 10 feet contains more than 1 1/3 pounds of this highly potent poison. Replacement materials include a new type of pressure treated wood, plastic and composite lumber.

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SD-21 Alternative Building Materials

There are currently over 20 products in the market consisting of plastic or plastic-wood composites. Plastic lumber is made from 100% recycled plastic, # 2 HDPE and polyethylene plastic milk jugs and soap bottles. Plastic-wood composites are a combination of plastic and wood fibers or sawdust. These materials are a long lasting exterior weather, insect, and chemical resistant wood lumber replacement for non structural applications. Use it for decks, docks, raised garden beds and planter boxes, pallets, hand railings, outdoor furniture, animal pens, boat decks, etc.

New pressure treated wood uses a much safer recipe, ACQ, which stands for ammoniacal copper quartenary. It contains no arsenic and no chromium. Yet the American Wood Preservers Association has found it to be just as effective as the standard formula. ACQ is common in Japan and Europe.

Roofing

Several studies have indicated that metal used as roofing material, flashing, or gutters can leach metals into the environment. The leaching occurs because rainfall is slightly acidic and slowly dissolved the exposed metals. Common traditional applications include copper sheathing and galvanized (zinc) gutters.

Coated metal products are available for both roofing and gutter applications. These products eliminate contact of bare metal with rainfall, eliminating one source of metals in runoff. There are also roofing materials made of recycled rubber and plastic that resemble traditional materials.

A less traditional approach is the use of green roofs. These roofs are not just green, they're alive. Planted with grasses and succulents, low- profile green roofs reduce the urban heat island effect, stormwater runoff, and cooling costs, while providing wildlife habitat and a connection to nature for building occupants. These roofs are widely used on industrial facilities in Europe and have been established as experimental installations in several locations in the US, including Portland, Oregon. Their feasibility is questionable in areas of California with prolonged, dry, hot weather.

Paved Areas

Traditionally, concrete is used for construction of patios, sidewalks, and driveways. Although it is non-toxic, these paved areas reduce stormwater infiltration and increase the volume and rate of runoff. This increase in the amount of runoff is the leading cause of stream channel degradation in urban areas.

There are a number of alternative materials that can be used in these applications, including porous concrete and asphalt, modular blocks, and crushed granite. These materials, especially modular paving blocks, are widely available and a well established method to reduce stormwater runoff.

Building Siding

Wood siding is commonly used on the exterior of residential construction. This material weathers fairly rapidly and requires repeated painting to prevent rotting. Alternative “new” products for this application include cement-fiber and vinyl. Cement-fiber siding is a masonry product made from Portland cement, sand, and cellulose and will not burn, cup, swell, or shrink.

Alternative Building Materials SD-21

Pesticide Reduction
A common use of powerful pesticides is for the control of termites. Chlordane was used for many years for this purpose and is now found in urban streams and lakes nationwide. There are a number of physical barriers that can be installed during construction to help reduce the use of pesticides.

Sand barriers for subterranean termites are a physical deterrent because the termites cannot tunnel through it. Sand barriers can be applied in crawl spaces under pier and beam foundations, under slab foundations, and between the foundation and concrete porches, terraces, patios and steps. Other possible locations include under fence posts, underground electrical cables, water and gas lines, telephone and electrical poles, inside hollow tile cells and against retaining walls.

Metal termite shields are physical barriers to termites which prevent them from building invisible tunnels. In reality, metal shields function as a helpful termite detection device, forcing them to build tunnels on the outside of the shields which are easily seen. Metal termite shields also help prevent dampness from wicking to adjoining wood members which can result in rot, thus making the material more attractive to termites and other pests. Metal flashing and metal plates can also be used as a barrier between piers and beams of structures such as decks, which are particularly vulnerable to termite attack.

Redeveloping Existing Installations

Various jurisdictional stormwater management and mitigation plans (SUSMP, WQMP, etc.) define "redevelopment" in terms of amounts of additional impervious area, increases in gross floor area and/or exterior construction, and land disturbing activities with structural or impervious surfaces. The definition of "redevelopment" must be consulted to determine whether or not the requirements for new development apply to areas intended for redevelopment. If the definition applies, the steps outlined under "designing new installations" above should be followed.

Other Resources

There are no good, independent, comprehensive sources of information on alternative building materials for use in minimizing the impacts of stormwater runoff. Most websites or other references to "green" or "alternative" building materials focus on indoor applications, such as formaldehyde free plywood and low VOC paints, carpets, and pads. Some supplemental information on alternative materials is available from the manufacturers.

Fires are a source of concern in many areas of California. Information on the flammability of alternative decking materials is available from the University of California Forest Product Laboratory (UCFPL) website at: http://www.ucfpl.ucop.edu/WDDeckIntro.htm

Fueling Areas SD-30

Photo Credit: Geoff Brosseau

Design Objectives

- Maximize Infiltration
- Provide Retention
- Slow Runoff
- Minimize Impervious Land Coverage
- Prohibit Dumping of Improper Materials
- ☑ Contain Pollutants
- ☑ Collect and Convey

Description

Fueling areas have the potential to contribute oil and grease, solvents, car battery acid, coolant and gasoline to the stormwater conveyance system. Spills at vehicle and equipment fueling areas can be a significant source of pollution because fuels contain toxic materials and heavy metals that are not easily removed by stormwater treatment devices.

Approach

Project plans must be developed for cleaning near fuel dispensers, emergency spill cleanup, containment, and leak prevention.

Suitable Applications

Appropriate applications include commercial, industrial, and any other areas planned to have fuel dispensing equipment, including retail gasoline outlets, automotive repair shops, and major non-retail dispensing areas.

Design Considerations

Design requirements for fueling areas are governed by Building and Fire Codes and by current local agency ordinances and zoning requirements. Design requirements described in this fact sheet are meant to enhance and be consistent with these code and ordinance requirements.

Designing New Installations

Covering

SD-30 Fueling Areas

Fuel dispensing areas should provide an overhanging roof structure or canopy. The cover's minimum dimensions must be equal to or greater than the area within the grade break. The cover must not drain onto the fuel dispensing area and the downspouts must be routed to prevent drainage across the fueling area. The fueling area should drain to the project's treatment control BMP(s) prior to discharging to the stormwater conveyance system. Note - If fueling large equipment or vehicles that would prohibit the use of covers or roofs, the fueling island should be designed to sufficiently accommodate the larger vehicles and equipment and to prevent stormwater run-on and runoff. Grade to direct stormwater to a dead-end sump.

Surfacing

Fuel dispensing areas should be paved with Portland cement concrete (or equivalent smooth impervious surface). The use of asphalt concrete should be prohibited. Use asphalt sealant to protect asphalt paved areas surrounding the fueling area. This provision may be made to sites that have pre-existing asphalt surfaces.

The concrete fuel dispensing area should be extended a minimum of 6.5 ft from the corner of each fuel dispenser, or the length at which the hose and nozzle assembly may be operated plus 1 ft, whichever is less.

Grading/Contouring

Dispensing areas should have an appropriate slope to prevent ponding, and be separated from the rest of the site by a grade break that prevents run-on of urban runoff. (Slope is required to be 2 to 4% in some jurisdictions' stormwater management and mitigation plans.)

Fueling areas should be graded to drain toward a dead-end sump. Runoff from downspouts/roofs should be directed away from fueling areas. Do not locate storm drains in the immediate vicinity of the fueling area.

Redeveloping Existing Installations

Various jurisdictional stormwater management and mitigation plans (SUSMP, WQMP, etc.) define "redevelopment" in terms of amounts of additional impervious area, increases in gross floor area and/or exterior construction, and land disturbing activities with structural or impervious surfaces. The definition of " redevelopment" must be consulted to determine whether or not the requirements for new development apply to areas intended for redevelopment. If the definition applies, the steps outlined under "designing new installations" above should be followed.

Additional Information

- In the case of an emergency, provide storm drain seals, such as isolation valves, drain plugs, or drain covers, to prevent spills or contaminated stormwater from entering the stormwater conveyance system.

Other Resources

A Manual for the Standard Urban Stormwater Mitigation Plan (SUSMP), Los Angeles County Department of Public Works, May 2002.

Model Standard Urban Storm Water Mitigation Plan (SUSMP) for San Diego County, Port of San Diego, and Cities in San Diego County, February 14, 2002.

Fueling Areas SD-30

Model Water Quality Management Plan (WQMP) for County of Orange, Orange County Flood Control District, and the Incorporated Cities of Orange County, Draft February 2003.

Ventura Countywide Technical Guidance Manual for Stormwater Quality Control Measures, July 2002.

Maintenance Bays & Docks SD-31

Design Objectives

- Maximize Infiltration
- Provide Retention
- Slow Runoff
- Minimize Impervious Land Coverage
- ☑ Prohibit Dumping of Improper Materials
- ☑ Contain Pollutants
- Collect and Convey

Description

Several measures can be taken to prevent operations at maintenance bays and loading docks from contributing a variety of toxic compounds, oil and grease, heavy metals, nutrients, suspended solids, and other pollutants to the stormwater conveyance system.

Approach

In designs for maintenance bays and loading docks, containment is encouraged. Preventative measures include overflow containment structures and dead-end sumps. However, in the case of loading docks from grocery stores and warehouse/distribution centers, engineered infiltration systems may be considered.

Suitable Applications

Appropriate applications include commercial and industrial areas planned for development or redevelopment.

Design Considerations

Design requirements for vehicle maintenance and repair are governed by Building and Fire Codes, and by current local agency ordinances, and zoning requirements. The design criteria described in this fact sheet are meant to enhance and be consistent with these code requirements.

Designing New Installations

Designs of maintenance bays should consider the following:

- Repair/maintenance bays and vehicle parts with fluids should be indoors; or designed to preclude urban run-on and runoff.
- Repair/maintenance floor areas should be paved with Portland cement concrete (or equivalent smooth impervious surface).

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SD-31 Maintenance Bays & Docks

- Repair/maintenance bays should be designed to capture all wash water leaks and spills. Provide impermeable berms, drop inlets, trench catch basins, or overflow containment structures around repair bays to prevent spilled materials and wash-down waters form entering the storm drain system. Connect drains to a sump for collection and disposal. Direct connection of the repair/maintenance bays to the storm drain system is prohibited. If required by local jurisdiction, obtain an Industrial Waste Discharge Permit.

- Other features may be comparable and equally effective.

The following designs of loading/unloading dock areas should be considered:

- Loading dock areas should be covered, or drainage should be designed to preclude urban run-on and runoff.

- Direct connections into storm drains from depressed loading docks (truck wells) are prohibited.

- Below-grade loading docks from grocery stores and warehouse/distribution centers of fresh food items should drain through water quality inlets, or to an engineered infiltration system, or an equally effective alternative. Pre-treatment may also be required.

- Other features may be comparable and equally effective.

Redeveloping Existing Installations

Various jurisdictional stormwater management and mitigation plans (SUSMP, WQMP, etc.) define "redevelopment" in terms of amounts of additional impervious area, increases in gross floor area and/or exterior construction, and land disturbing activities with structural or impervious surfaces. The definition of " redevelopment" must be consulted to determine whether or not the requirements for new development apply to areas intended for redevelopment. If the definition applies, the steps outlined under "designing new installations" above should be followed.

Additional Information

Stormwater and non-stormwater will accumulate in containment areas and sumps with impervious surfaces. Contaminated accumulated water must be disposed of in accordance with applicable laws and cannot be discharged directly to the storm drain or sanitary sewer system without the appropriate permit.

Other Resources

A Manual for the Standard Urban Stormwater Mitigation Plan (SUSMP), Los Angeles County Department of Public Works, May 2002.

Model Standard Urban Storm Water Mitigation Plan (SUSMP) for San Diego County, Port of San Diego, and Cities in San Diego County, February 14, 2002.

Model Water Quality Management Plan (WQMP) for County of Orange, Orange County Flood Control District, and the Incorporated Cities of Orange County, Draft February 2003.

Ventura Countywide Technical Guidance Manual for Stormwater Quality Control Measures, July 2002.

Trash Storage Areas SD-32

Design Objectives

- Maximize Infiltration
- Provide Retention
- Slow Runoff
- Minimize Impervious Land Coverage
- Prohibit Dumping of Improper Materials
- ☑ Contain Pollutants
- Collect and Convey

Description

Trash storage areas are areas where a trash receptacle (s) are located for use as a repository for solid wastes. Stormwater runoff from areas where trash is stored or disposed of can be polluted. In addition, loose trash and debris can be easily transported by water or wind into nearby storm drain inlets, channels, and/or creeks. Waste handling operations that may be sources of stormwater pollution include dumpsters, litter control, and waste piles.

Approach

This fact sheet contains details on the specific measures required to prevent or reduce pollutants in stormwater runoff associated with trash storage and handling. Preventative measures including enclosures, containment structures, and impervious pavements to mitigate spills, should be used to reduce the likelihood of contamination.

Suitable Applications

Appropriate applications include residential, commercial and industrial areas planned for development or redevelopment. (Detached residential single-family homes are typically excluded from this requirement.)

Design Considerations

Design requirements for waste handling areas are governed by Building and Fire Codes, and by current local agency ordinances and zoning requirements. The design criteria described in this fact sheet are meant to enhance and be consistent with these code and ordinance requirements. Hazardous waste should be handled in accordance with legal requirements established in Title 22, California Code of Regulation.

Wastes from commercial and industrial sites are typically hauled by either public or commercial carriers that may have design or access requirements for waste storage areas. The design criteria in this fact sheet are recommendations and are not intended to be in conflict with requirements established by the waste hauler. The waste hauler should be contacted prior to the design of your site trash collection areas. Conflicts or issues should be discussed with the local agency.

Designing New Installations

Trash storage areas should be designed to consider the following structural or treatment control BMPs:

- Design trash container areas so that drainage from adjoining roofs and pavement is diverted around the area(s) to avoid run-on. This might include berming or grading the waste handling area to prevent run-on of stormwater.
- Make sure trash container areas are screened or walled to prevent off-site transport of trash.

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SD-32 Trash Storage Areas

- Use lined bins or dumpsters to reduce leaking of liquid waste.
- Provide roofs, awnings, or attached lids on all trash containers to minimize direct precipitation and prevent rainfall from entering containers.
- Pave trash storage areas with an impervious surface to mitigate spills.
- Do not locate storm drains in immediate vicinity of the trash storage area.
- Post signs on all dumpsters informing users that hazardous materials are not to be disposed of therein.

Redeveloping Existing Installations

Various jurisdictional stormwater management and mitigation plans (SUSMP, WQMP, etc.) define "redevelopment" in terms of amounts of additional impervious area, increases in gross floor area and/or exterior construction, and land disturbing activities with structural or impervious surfaces. The definition of " redevelopment" must be consulted to determine whether or not the requirements for new development apply to areas intended for redevelopment. If the definition applies, the steps outlined under "designing new installations" above should be followed.

Additional Information

Maintenance Considerations

The integrity of structural elements that are subject to damage (i.e., screens, covers, and signs) must be maintained by the owner/operator. Maintenance agreements between the local agency and the owner/operator may be required. Some agencies will require maintenance deed restrictions to be recorded of the property title. If required by the local agency, maintenance agreements or deed restrictions must be executed by the owner/operator before improvement plans are approved.

Other Resources

A Manual for the Standard Urban Stormwater Mitigation Plan (SUSMP), Los Angeles County Department of Public Works, May 2002.

Model Standard Urban Storm Water Mitigation Plan (SUSMP) for San Diego County, Port of San Diego, and Cities in San Diego County, February 14, 2002.

Model Water Quality Management Plan (WQMP) for County of Orange, Orange County Flood Control District, and the Incorporated Cities of Orange County, Draft February 2003.

Ventura Countywide Technical Guidance Manual for Stormwater Quality Control Measures, July 2002.

Vehicle Washing Areas SD-33

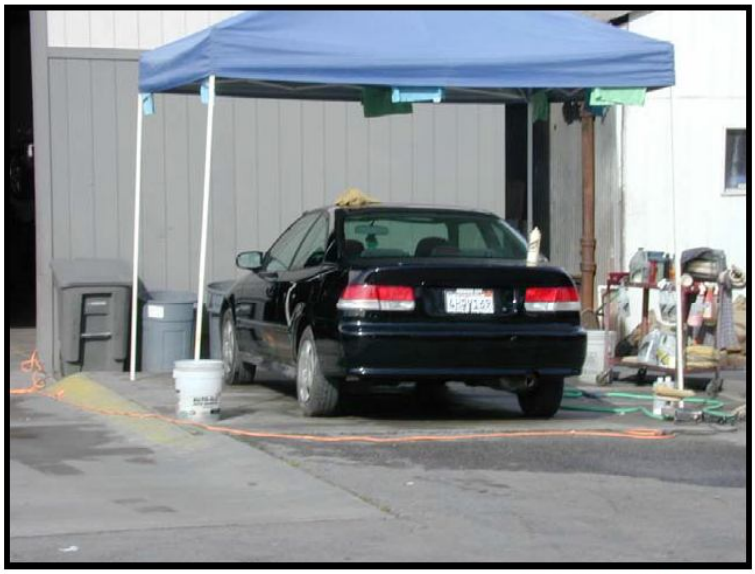

Photo Credit: Geoff Brosseau

Design Objectives

- ☑ Maximize Infiltration
- Provide Retention
- Slow Runoff
- Minimize Impervious Land Coverage
- Prohibit Dumping of Improper Materials
- ☑ Contain Pollutants
- ☑ Collect and Convey

Description

Vehicle washing, equipment washing, and steam cleaning may contribute high concentrations of metals, oil and grease, solvents, phosphates, and suspended solids to wash waters that drain to stormwater conveyance systems.

Approach

Project plans should include appropriately designed area(s) for washing-steam cleaning of vehicles and equipment. Depending on the size and other parameters of the wastewater facility, wash water may be conveyed to a sewer, an infiltration system, recycling system or other alternative. Pretreatment may be required for conveyance to a sanitary sewer.

Suitable Applications

Appropriate applications include commercial developments, restaurants, retail gasoline outlets, automotive repair shops and others.

Design Considerations

Design requirements for vehicle maintenance are governed by Building and Fire Codes, and by current local agency ordinances, and zoning requirements. Design criteria described in this fact sheet are meant to enhance and be consistent with these code requirements.

Designing New Installations

Areas for washing/steam cleaning should incorporate one of the following features:

- Be self-contained and/or covered with a roof or overhang
- Be equipped with a clarifier or other pretreatment facility
- Have a proper connection to a sanitary sewer

SD-33 Vehicle Washing Areas

- Include other features which are comparable and equally effective

CAR WASH AREAS - Some jurisdictions' stormwater management plans include vehicle-cleaning area source control design requirements for community car wash racks in complexes with a large number of dwelling units. In these cases, wash water from the areas may be directed to the sanitary sewer, to an engineered infiltration system, or to an equally effective alternative. Pre-treatment may also be required.

Depending on the jurisdiction, developers may be directed to divert surface water runoff away from the exposed area around the wash pad (parking lot, storage areas), and wash pad itself to alternatives other than the sanitary sewer. Roofing may be required for exposed wash pads.

It is generally advisable to cover areas used for regular washing of vehicles, trucks, or equipment, surround them with a perimeter berm, and clearly mark them as a designated washing area. Sumps or drain lines can be installed to collect wash water, which may be treated for reuse or recycling, or for discharge to the sanitary sewer. Jurisdictions may require some form of pretreatment, such as a trap, for these areas.

Redeveloping Existing Installations

Various jurisdictional stormwater management and mitigation plans (SUSMP, WQMP, etc.) define "redevelopment" in terms of amounts of additional impervious area, increases in gross floor area and/or exterior construction, and land disturbing activities with structural or impervious surfaces. The definition of " redevelopment" must be consulted to determine whether or not the requirements for new development apply to areas intended for redevelopment.

Additional Information

Maintenance Considerations

Stormwater and non-stormwater will accumulate in containment areas and sumps with impervious surfaces. Contaminated accumulated water must be disposed of in accordance with applicable laws and cannot be discharged directly to the storm drain or sanitary sewer system without the appropriate permit.

Other Resources

A Manual for the Standard Urban Stormwater Mitigation Plan (SUSMP), Los Angeles County Department of Public Works, May 2002.

Model Standard Urban Storm Water Mitigation Plan (SUSMP) for San Diego County, Port of San Diego, and Cities in San Diego County, February 14, 2002.

Model Water Quality Management Plan (WQMP) for County of Orange, Orange County Flood Control District, and the Incorporated Cities of Orange County, Draft February 2003.

Ventura Countywide Technical Guidance Manual for Stormwater Quality Control Measures, July 2002.

Outdoor Material Storage Areas SD-34

Design Objectives

- Maximize Infiltration
- Provide Retention
- Slow Runoff
- Minimize Impervious Land Coverage
- Prohibit Dumping of Improper Materials
- ☑ Contain Pollutant
- Collect and Convey

Description

Proper design of outdoor storage areas for materials reduces opportunity for toxic compounds, oil and grease, heavy metals, nutrients, suspended solids, and other pollutants to enter the stormwater conveyance system. Materials may be in the form of raw products, by-products, finished products, and waste products. The type of pollutants associated with the materials will vary depending on the type of commercial or industrial activity.

Approach

Outdoor storage areas require a drainage approach different from the typical infiltration/detention strategy. In outdoor storage areas, infiltration is discouraged. Containment is encouraged. Preventative measures include enclosures, secondary containment structures and impervious surfaces.

Suitable Applications

Appropriate applications include residential, commercial and industrial areas planned for development or redevelopment.

Design Considerations

Some materials are more of a concern than others. Toxic and hazardous materials must be prevented from coming in contact with stormwater. Non-toxic or non-hazardous materials do not have to be prevented from stormwater contact. However, these materials may have toxic effects on receiving waters if allowed to be discharged with stormwater in significant quantities. Accumulated material on an impervious surface could result in significant impact on the rivers or streams that receive the runoff.

Material may be stored in a variety of ways, including bulk piles, containers, shelving, stacking, and tanks. Stormwater contamination may be prevented by eliminating the possibility of stormwater contact with the material storage areas either through diversion, cover, or capture of the stormwater. Control measures may also include minimizing the storage area. Design

SD-34 Outdoor Material Storage Areas

requirements for material storage areas are governed by Building and Fire Codes, and by current City or County ordinances and zoning requirements. Control measures are site specific, and must meet local agency requirements.

Designing New Installations

Where proposed project plans include outdoor areas for storage of materials that may contribute pollutants to the stormwater conveyance system, the following structural or treatment BMPS should be considered:

- Materials with the potential to contaminate stormwater should be: (1) placed in an enclosure such as, but not limited to, a cabinet, shed, or similar structure that prevents contact with runoff or spillage to the stormwater conveyance system, or (2) protected by secondary containment structures such as berms, dikes, or curbs.
- The storage area should be paved and sufficiently impervious to contain leaks and spills.
- The storage area should slope towards a dead-end sump to contain spills and direct runoff from downspouts/roofs should be directed away from storage areas.
- The storage area should have a roof or awning that extends beyond the storage area to minimize collection of stormwater within the secondary containment area. A manufactured storage shed may be used for small containers.

Note that the location(s) of installations of where these preventative measures will be employed must be included on the map or plans identifying BMPs.

Redeveloping Existing Installations

Various jurisdictional stormwater management and mitigation plans (SUSMP, WQMP, etc.) define "redevelopment" in terms of amounts of additional impervious area, increases in gross floor area and/or exterior construction, and land disturbing activities with structural or impervious surfaces. The definition of " redevelopment" must be consulted to determine whether or not the requirements for new development apply to areas intended for redevelopment. If the definition applies, the steps outlined under "designing new installations" above should be followed.

Additional Information

Stormwater and non-stormwater will accumulate in containment areas and sumps with impervious surfaces. Contaminated accumulated water must be disposed of in accordance with applicable laws and cannot be discharged directly to the storm drain or sanitary sewer system without the appropriate permits.

Other Resources

A Manual for the Standard Urban Stormwater Mitigation Plan (SUSMP), Los Angeles County Department of Public Works, May 2002.

Model Standard Urban Storm Water Mitigation Plan (SUSMP) for San Diego County, Port of San Diego, and Cities in San Diego County, February 14, 2002.

Outdoor Material Storage Areas SD-34

Model Water Quality Management Plan (WQMP) for County of Orange, Orange County Flood Control District, and the Incorporated Cities of Orange County, Draft February 2003.

Ventura Countywide Technical Guidance Manual for Stormwater Quality Control Measures, July 2002.

Outdoor Work Areas SD-35

Photo Credit: Geoff Brosseau

Design Objectives

- Maximize Infiltration
- Provide Retention
- Slow Runoff
- Minimize Impervious Land Coverage
- Prohibit Dumping of Improper Materials
- ☑ Contain Pollutant
- ☑ Collect and Convey

Description

Proper design of outdoor work areas for materials reduces opportunity for toxic compounds, oil and grease, heavy metals, nutrients, suspended solids, and other pollutants to enter the stormwater conveyance system.

Approach

Outdoor work areas require a drainage approach different from the typical infiltration/detention strategy. In outdoor work areas, infiltration is discouraged; collection and conveyance are encouraged. In outdoor work areas, infiltration is discouraged and runoff is often routed directly to the sanitary sewer, not the storm drain. Because this runoff is being added to the loads normally received by the wastewater treatment plants, municipal stormwater programs and/or private developers must work with the local plant to develop solutions that minimize effects on the treatment facility. These concerns are best addressed in the planning and design stage of the outdoor work area.

Suitable Applications

Appropriate applications include residential, commercial, and industrial areas planned for development or redevelopment.

Design Considerations

Design requirements for outdoor work areas are governed by Building and Fire Codes, and by current local agency ordinances, and zoning requirements.

Designing New Installations

Outdoor work areas can be designed in particular ways to reduce impacts on both stormwater quality and sewage treatment plants.

- Create an impermeable surface such as concrete or asphalt, or a prefabricated metal drip pan, depending on the use.

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SD-35 Outdoor Work Areas

- Cover the area with a roof. This prevents rain from falling on the work area and becoming polluted runoff.
- Berm or perform mounding around the perimeter of the area to prevent water from adjacent areas from flowing on to the surface of the work area.
- Directly connect runoff. Unlike other areas, runoff from work areas is directly connected to the sanitary sewer or other specialized containment system(s). This allows the more highly concentrated pollutants from these areas to receive special treatment that removes particular constituents. Approval for this connection must be obtained from the appropriate sanitary sewer agency.
- Locate the work area away from storm drains or catch basins.

Redeveloping Existing Installations

Various jurisdictional stormwater management and mitigation plans (SUSMP, WQMP, etc.) define "redevelopment" in terms of amounts of additional impervious area, increases in gross floor area and/or exterior construction, and land disturbing activities with structural or impervious surfaces. The definition of " redevelopment" must be consulted to determine whether or not the requirements for new development apply to areas intended for redevelopment. If the definition applies, the steps outlined under "designing new installations" above should be followed.

Other Resources

A Manual for the Standard Urban Stormwater Mitigation Plan (SUSMP), Los Angeles County Department of Public Works, May 2002.

Model Standard Urban Storm Water Mitigation Plan (SUSMP) for San Diego County, Port of San Diego, and Cities in San Diego County, February 14, 2002.

Model Water Quality Management Plan (WQMP) for County of Orange, Orange County Flood Control District, and the Incorporated Cities of Orange County, Draft February 2003.

Ventura Countywide Technical Guidance Manual for Stormwater Quality Control Measures, July 2002.

Outdoor Processing Areas SD-36

Design Objectives

- Maximize Infiltration
- Provide Retention
- Slow Runoff
- Minimize Impervious Land Coverage
- Prohibit Dumping of Improper Materials
- ☑ Contain Pollutants
- ☑ Collect and Convey

Description

Outdoor process equipment operations such as rock grinding or crushing, painting or coating, grinding or sanding, degreasing or parts cleaning, landfills, waste piles, wastewater and solid waste treatment and disposal, and others operations may contribute a variety of toxic compounds, oil and grease, heavy metals, nutrients, suspended solids, and other pollutants to the storm conveyance system.

Approach

Outdoor processing areas require a drainage approach different from the typical infiltration/detention strategy. In outdoor process equipment areas, infiltration is discouraged. Containment is encouraged, accompanied by collection and conveyance. Preventative measures include enclosures, secondary containment structures, dead-end sumps, and conveyance to treatment facilities in accordance with conditions established by the applicable sewer agency.

Suitable Applications

Appropriate applications include commercial and industrial areas planned for development or redevelopment.

Design Considerations

Design requirements for outdoor processing areas are governed by Building and Fire codes, and by current local agency ordinances, and zoning requirements.

Designing New Installations

Operations determined to be a potential threat to water quality should consider to the following recommendations:

- Cover or enclose areas that would be the most significant source of pollutants; or slope the area toward a dead-end sump; or, discharge to the sanitary sewer system following appropriate treatment in accordance with conditions established by the applicable sewer agency.
- Grade or berm area to prevent run-on from surrounding areas.
- Do not install storm drains in areas of equipment repair.
- Consider other features that are comparable or equally effective.
- Provide secondary containment structures (not double wall containers) where wet material processing occurs (e.g., electroplating), to hold spills resulting from accidents, leaking tanks, or equipment, or any other unplanned releases (Note:

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SD-36 Outdoor Processing Areas

if these are plumbed to the sanitary sewer, they must be with the prior approval of the sewering agency.)

Redeveloping Existing Installations

Various jurisdictional stormwater management and mitigation plans (SUSMP, WQMP, etc.) define "redevelopment" in terms of amounts of additional impervious area, increases in gross floor area and/or exterior construction, and land disturbing activities with structural or impervious surfaces. The definition of " redevelopment" must be consulted to determine whether or not the requirements for new development apply to areas intended for redevelopment. If the definition applies, the steps outlined under "designing new installations" above should be followed.

Additional Information

Stormwater and non-stormwater will accumulate in containment areas and sumps with impervious surfaces. Contaminated accumulated water must be disposed of in accordance with applicable laws and cannot be discharged directly to the storm drain or sanitary sewer system without the appropriate permit.

Other Resources

A Manual for the Standard Urban Stormwater Mitigation Plan (SUSMP), Los Angeles County Department of Public Works, May 2002.

Model Standard Urban Storm Water Mitigation Plan (SUSMP) for San Diego County, Port of San Diego, and Cities in San Diego County, February 14, 2002.

Model Water Quality Management Plan (WQMP) for County of Orange, Orange County Flood Control District, and the Incorporated Cities of Orange County, Draft February 2003.

Ventura Countywide Technical Guidance Manual for Stormwater Quality Control Measures, July 2002.

Section 5
Treatment Control BMPs

5.1 Introduction

This section describes treatment control Best Management Practices (BMPs) to be considered for incorporation into newly developed public and private infrastructure, as well as retrofit into existing facilities to meet stormwater management objectives. BMP fact sheets are divided into two groups: public domain BMPs and manufactured (proprietary) BMPs. In some cases, the same BMP may exist in each group, for example, media filtration. However, treatment BMPs are typically very different between the two groups.

Brand names of manufactured BMPs are not stated. Descriptions of manufactured BMPs in this document should not be inferred as endorsement by the authors.

5.2 Treatment Control BMPs

Public domain and manufactured BMP controls are listed in Table 5-1.

Table 5-1 Treatment Control BMPs

Public Domain	Manufactured (Proprietary)
Infiltration	**Infiltration**
TC-10 Infiltration Trench TC-11 Infiltration Basin TC-12 Retention/Irrigation	
Detention and Settling	**Detention and Settling**
TC-20 Wet Pond TC-21 Constructed Wetland TC-22 Extended Detention Basin	MP-20 Wetland
Biofiltration	**Biofiltration**
TC-30 Vegetated Swale TC-31 Vegetated Buffer Strip TC-32 Bioretention	
Filtration	**Filtration**
TC-40 Media Filter	MP-40 Media Filter
Flow Through Separation	**Flow Through Separation**
TC-50 Water Quality Inlet	MP-50 Wet Vault MP-51 Vortex Separator MP-52 Drain Inserts
Other	**Other**
TC-60 Multiple Systems	

5.3 Fact Sheet Format

A BMP fact sheet is a short document that gives all the information about a particular BMP. Typically, each public domain and manufactured BMP fact sheet contains the information outlined in Figure 5-1. The fact sheets also contain side bar presentations with information on BMP design considerations, targeted constituents, and removal effectiveness (if known).

Treatment BMP performance, design criteria, and other selection factors are discussed in 5.4 – 5.6 below. BMP Fact sheets are included in 5.7.

TCxx/MPxx Example Fact Sheet

Description
California Experience
Advantages
Limitations
Design and Sizing Guidelines
Performance
Siting Criteria
Design Guidelines
Maintenance
Cost
References and Sources of Additional Information

Figure 5-1
Example Fact Sheet

5.4 Comparing Performance of Treatment BMPs

With a myriad of stormwater treatment BMPs from which to choose, a question commonly asked is "which one is best". Particularly when considering a manufactured treatment system, the engineer wants to know if it provides performance that is reasonably comparable to the typical public-domain BMPs like wet ponds or grass swales. With so many BMPs, it is not likely that they perform equally for all pollutants. Thus, the question that each local jurisdiction faces is which treatment BMPs will it allow, and under what circumstances. What level of treatment is desired or reasonable, given the cost? Which BMPs are the most cost-effective? Current municipal stormwater permits specify the volume or rate of stormwater that must be treated, but not the specific level or efficiency of treatment: These permits usually require performance to the specific maximum extent practicable (MEP), but this does not translate to an easy to apply specific design criteria.

Methodology for comparing BMP performance may need to be expanded to include more than removal effectiveness. Many studies have been conducted on the performance of stormwater treatment BMPs. Several publications have provided summaries of performance (ASCE, 1998; ASCE, 2001; Brown and Schueler, 1997; Shoemaker et al., 2000; Winter, 2001). These summaries indicate a wide variation in the performance of each type of BMP, making effectiveness comparisons between BMPs problematic.

5.4.1 Variation in Performance

There are several reasons for the observed variation.

The Variability of Stormwater Quality

Stormwater quality is highly variable during a storm, from storm to storm at a site, and between sites even of the same land use. For pollutants of interest, maximum observed concentrations commonly exceed the average concentration by a factor of 100. The average concentration of a storm, known as the event mean concentration (EMC) commonly varies at a site by a factor of 5. One aspect of stormwater quality that is highly variable is the particle size distribution (PSD) of

the suspended sediments. This results in variation in the settle ability of these sediments and the pollutants that are attached. For example, several performance studies of manufactured BMPs have been conducted in the upper Midwest and Northeast where deicing sand is commonly used. The sand, washed off during spring and summer storms, skews the PSD to larger sizes not commonly found in stormwater from California sites except in mountainous areas. Consequently, a lower level efficiency may be observed if the same treatment system is used in California.

Most Field Studies Monitor Too Few Storms

High variability of stormwater quality requires that a large number of storms be sampled to discern if there is a significant difference in performance among BMPs. The smaller the actual difference in performance between BMPs, the greater the number of storms that must be sampled to statistically discern the difference between them. For example, a researcher attempting to determine a difference in performance between two BMPs of 10% must monitor many more storms than if the interest is to define the difference within 50%. Given the expense and difficulty, few studies have monitored enough storms to determine the actual performance with a high level of precision.

Different Design Criteria

Performance of different systems within the same group (e.g., wet ponds) differs significantly in part because of differing design criteria for each system. This in turn can make it problematic to compare different groups of treatment BMPs to each other (e.g., wet ponds to vortex separators).

Differing Influent Concentrations and Analytical Variability

With most treatment BMPs, efficiency decreases with decreasing influent concentration. This is illustrated in Figure 5-2. Thus, a low removal efficiency may be observed during a study not because the device is inherently a poorer performer, but possibly because the influent concentrations for the site were unusually low. In addition, as the concentration of a particular constituent such as TSS approaches its analytical detection limit, the effect of the variability of the laboratory technique becomes more significant. This factor also accounts for the wide variability of observations on the left of Figure 5-2.

The variability of the laboratory results as the TSS approaches its analytical detection limit may also account for negative efficiencies at very low influent concentrations (e.g., TSS less than 10 mg/L). However, some negative efficiencies observed at higher concentrations may not necessarily be an artifact of laboratory analysis. The cause varies to some extent with the type of treatment BMP. Negative efficiencies may be due to the re-suspension of previously deposited pollutants, a change in pH that dissolves precipitated or sorbed pollutants, discharge of algae in the case of BMPs with open wet pools, erosion of unprotected basin side or bottom, and the degradation of leaves that entered the system the previous fall.

Different Methods of Calculating Efficiency

Researchers (1) have used different methods to calculate efficiency, (2) do not always indicate which method they have used, and (3) often do not provide sufficient information in their report to allow others to recalculate the efficiency using a common method.

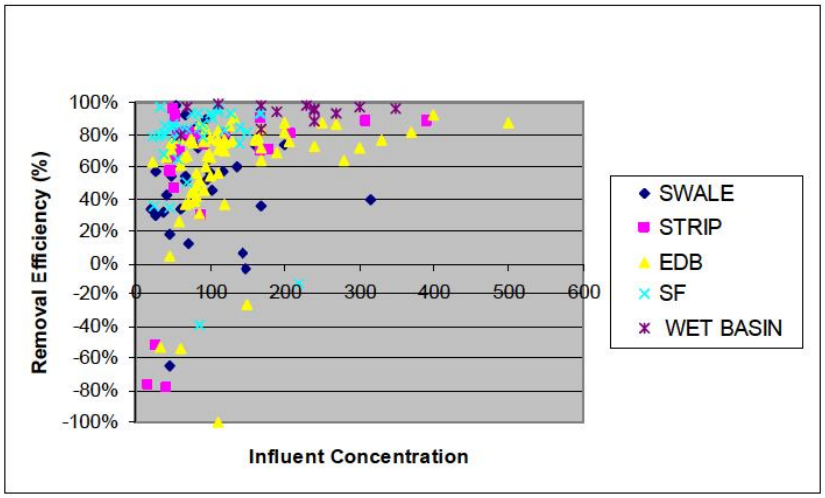

Figure 5-2
Removal Efficiency Versus Influent Concentration

One approach to quantifying BMP efficiency is to determine first if the BMP is providing treatment (that the influent and effluent mean event mean concentrations are statistically different from one another) and then examine either a cumulative distribution function of influent and effluent quality or a standard parallel probability plot. This approach is called the Effluent Probability Method. While this approach has been used in the past by EPA and ASCE, some researchers have experienced problems with the general applicability of this method. A discussion of these issues is included in Appendix B.

A second approach to comparing performance among BMPs is to compare effluent concentrations, using a box-whisker plot, the basic form of which is illustrated in Figure 5-3. The plot represents all of the data points, of one study, several studies, or of individual storms. The plots provide insight into the variability of performance within each BMP type, and possible differences in performance among the types. To explain the plot: 50% of the data points as well as the median value of all the data points is represented by the box. That is, the median falls within the 75th and 25th percentile of data (top and bottom of the box). The whisker extends to the highest point within a range of 1.5 times the difference between the first and third quartiles. Individual points beyond this range are shown as asterisks.

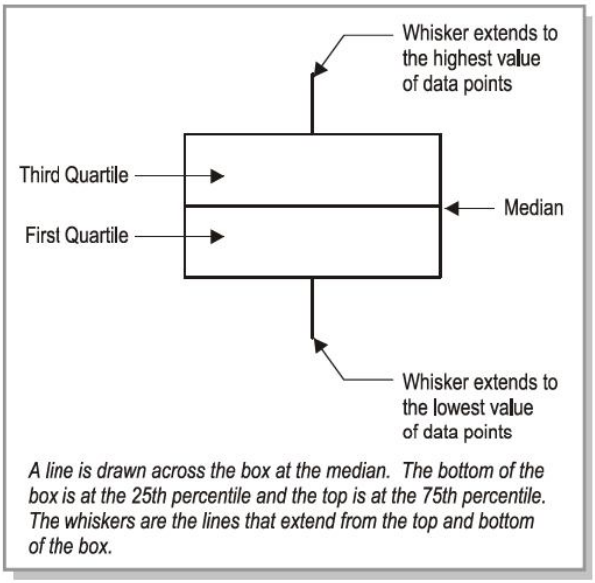

Figure 5-3
Box-Whisker Plot

Recognizing the possible effect of influent concentration on efficiency, an alternative is to compare effluent concentrations. The reasoning is that regardless of the influent concentration, a particular BMP will generate a narrower range of effluent concentrations. Figure 5-4 shows observed effluent concentrations for several different types of BMPs. These data were generated in an extensive field program conducted by the California Department of Transportation (Caltrans). As this program is the most extensive effort to date in the entire United States, the observations about performance in this Handbook rely heavily on these data. The Caltrans study is unique in that many of the BMPs were tested under reasonably similar conditions (climate, storms, freeway stormwater quality), with each type of BMP sized with the same design criteria.

An additional factor to consider when comparing BMPs is the effect of infiltration. BMPs with concrete or metal structures will have no infiltration, whereas the infiltration in earthen BMPs will vary from none to substantial. For example, in the Caltrans study, infiltration in vegetated swales averaged nearly 50%. This point is illustrated with Figure 5-4 where effluent quality of several BMPs is compared. As seen in Figure 5-4, effluent concentration for grass swales is higher than either filters or wet basins (30 vs. 10 to 15 mg/L), suggesting that swales in comparison are not particularly effective. However, surface water entering swales may infiltrate into the ground, resulting in a loading reduction (flow times concentration) that is similar to those BMPs with minimal or no infiltration.

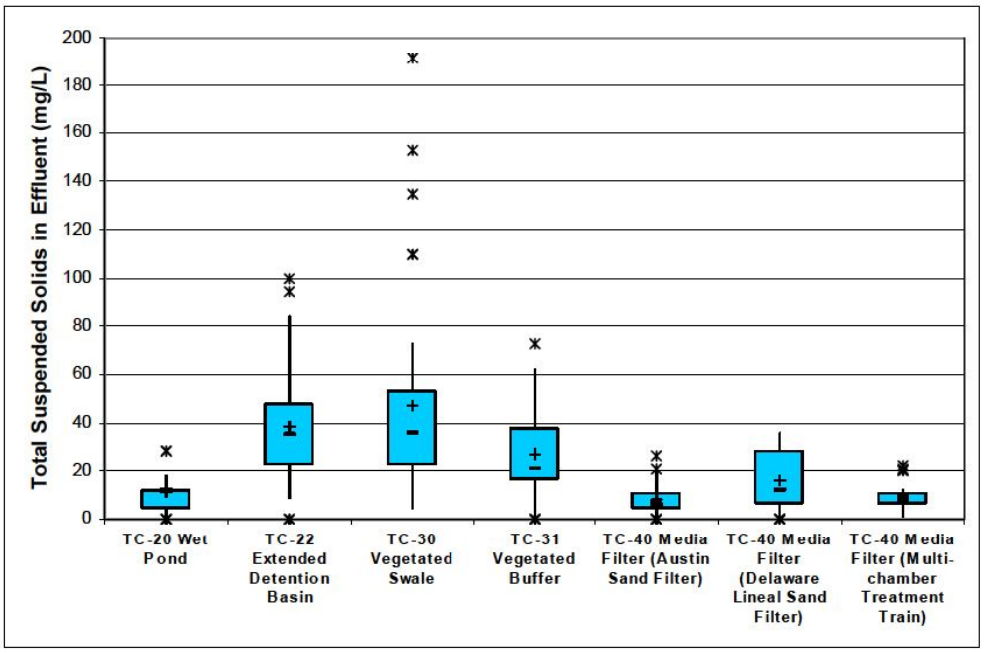

Figure 5-4
Observed Effluent Concentrations for Several Different Public Domain BMPs

With equation shown below, it is possible using the data from Figure 5-4 to estimate different levels of loading reduction as a function of the fraction of stormwater that is infiltrated.

$$\mathbf{EEC = (1\text{-}I)(EC) + (I)(GC)}$$

Where:

EEC = the effective effluent concentration

I = fraction of stormwater discharged by infiltration

EC = the median concentration observed in the effluent

GC = expected concentration of stormwater when it reaches the groundwater

To illustrate the use of the equation above, the effect of infiltration is considered on the effective effluent concentration of TSS from swales. From Figure 5-4, the median effluent concentration for swales is about 30 mg/L. Infiltration of 50% is assumed with an expected concentration of 5 mg/L when the stormwater reaches the groundwater. This gives:

$$\mathbf{EEC = (1\text{-}0.5)(30) + (0.5)(5) = 17.5\ mg/L.}$$

The above value can be compared to other BMPs that may directly produce a lower effluent concentration, but do not exhibit infiltration, such as concrete wet vaults.

5.4.2 Other Issues Related to Performance Comparisons

A further consideration related to performance comparisons is whether or not the treatment BMP removes dissolved pollutants. Receiving water standards for most metals are based on the dissolved fraction; the form of nitrogen or phosphorus of most concern as a nutrient is the dissolved fraction.

The common practice of comparing the performance of BMPs using TSS may not be considered sufficient by local governments and regulatory agencies, as there is not always a strong, consistent relationship between TSS and the pollutants of interest, particularly those identified in the 303d list for specific water bodies in California. These pollutants frequently include metals, nitrogen, nutrients (but often nutrients without specifying nitrogen or phosphorus), indicator bacteria (i.e., fecal coliform), pesticides, and trash. Less commonly cited pollutants include sediment, PAHs, PCBs, and dioxin. With respect to metals, typically, only the general term is used. In some cases, a specific metal is identified. The most commonly listed metals are mercury, copper, lead, selenium, zinc, and nickel. Less frequently listed metals are cadmium, arsenic, silver, chromium, molybdenum, and thallium. Commonly, only the general term "metals" is indicated for a water body without reference to a particular metal.

It is desirable to know how each of the treatment BMPs performs with respect to the removal of the above pollutants. Unfortunately, the performance data are non-existent or very limited for many of the cited pollutants, particularly trash, PAHs, PCBs, dioxin, mercury, selenium, and pesticides. Furthermore, the concentrations of these constituents are very low, often below the

detection limit. This prevents the determination of which BMPs are most effective. However, with the exception of trash and possibly dioxin, these pollutants readily sorb to sediments in stormwater, and therefore absent data at this time can be considered to be removed in proportion to the removal of TSS (i.e., sediment.) Therefore, in general, those treatment systems that are most effective at removing TSS will be most effective at removing pollutants noted above.

While there is little data on the removal of trash, those treatment BMPs that include a basin such as a wet pond or vault, or extended detention basin should be similarly effective at removing trash as long as the design incorporates a means of retaining the floating trash in the BMP. Whether or not manufactured products that are configured as a basin (e.g., round vaults or vortex separators) are as effective as public domain BMPs is unknown. However, their ability to retain floating debris may be limited by the fact that many of these products are relatively small and therefore may have limited storage capacity. Only one manufactured BMP is specifically designed to remove floating debris.

There are considerable amounts of performance data for zinc, copper, and lead, with a less substantial database for nickel, cadmium, and chromium. An exception is high-use freeways where metals in general are at higher concentrations than residential and commercial properties. Lead sorbs easily to the sediments in stormwater, with typically only 10% in the dissolved phase. Hence, its removal is generally in direct proportion to the removal of TSS. In contrast, zinc, copper, and cadmium are highly soluble with 50% or more in the dissolved phase. Hence, two treatment BMPs may remove TSS at the same level, but if one is capable of removing dissolved metals, it provides better treatment overall for the more soluble metals.

5.4.3 Comparisons of Treatment BMPs for Nitrogen, Zinc, Bacteria, and TSS

Presented in Figures 5-5 through 5-8 are comparisons of the effluent concentrations produced by several types of treatment BMPs for nitrogen, zinc, and fecal coliform, respectively (TSS is represented in Figure 5-4). Graphs for other metals are provided in Appendix C. These data are from the Caltrans study previously cited. Total and the dissolved effluent concentrations are shown for zinc. (Note that while box-whisker plots are used here to compare BMPs, other methodologies, such as effluent cumulative probability distribution plots, are used by others.)

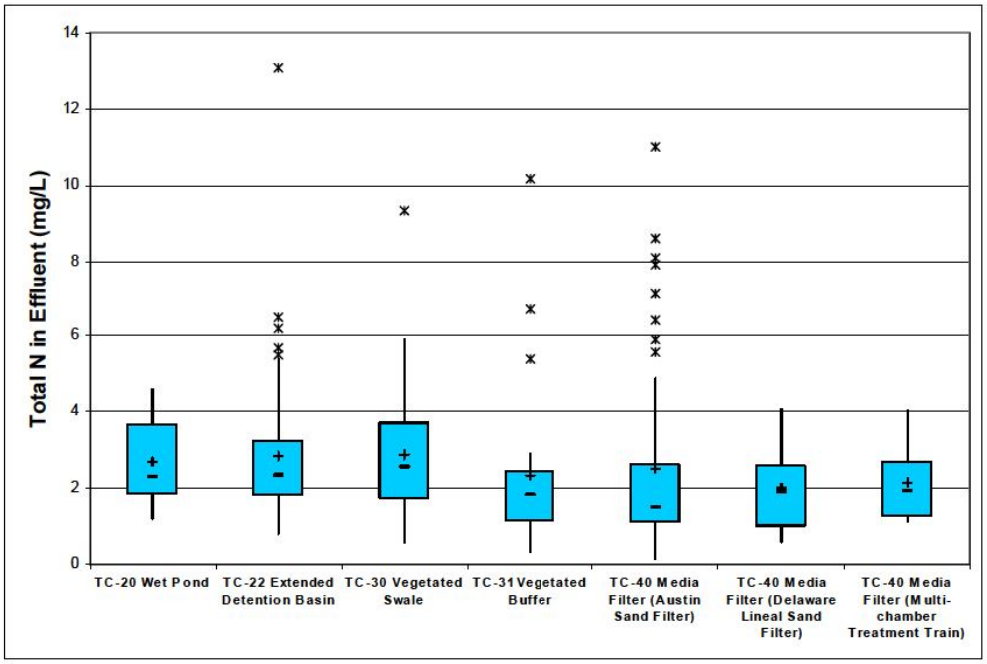

Figure 5-5
Total Nitrogen in Effluent

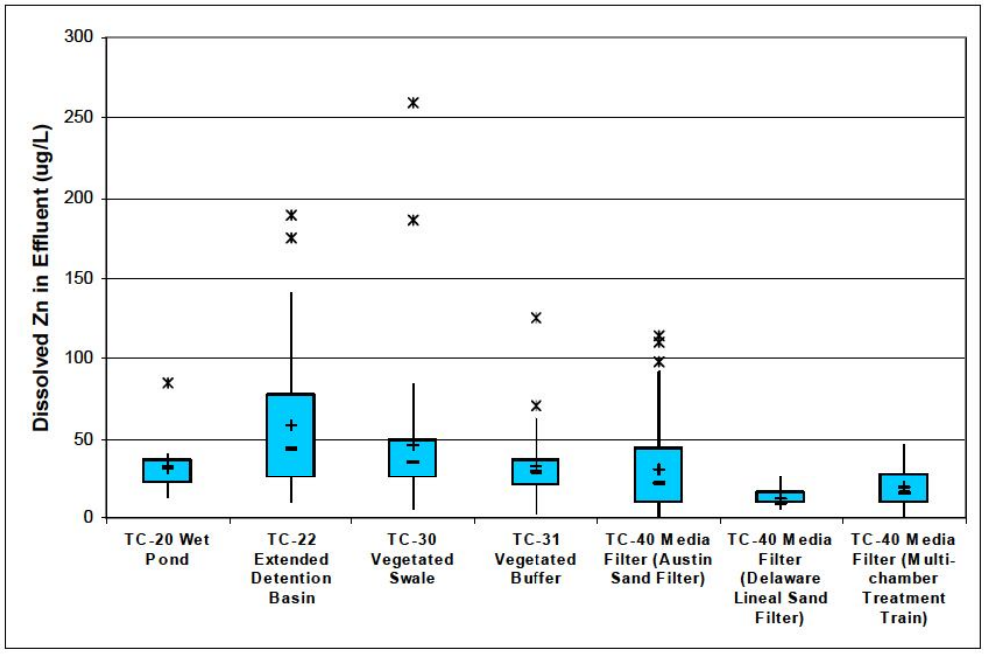

Figure 5-6
Total Dissolved Zinc in Effluent

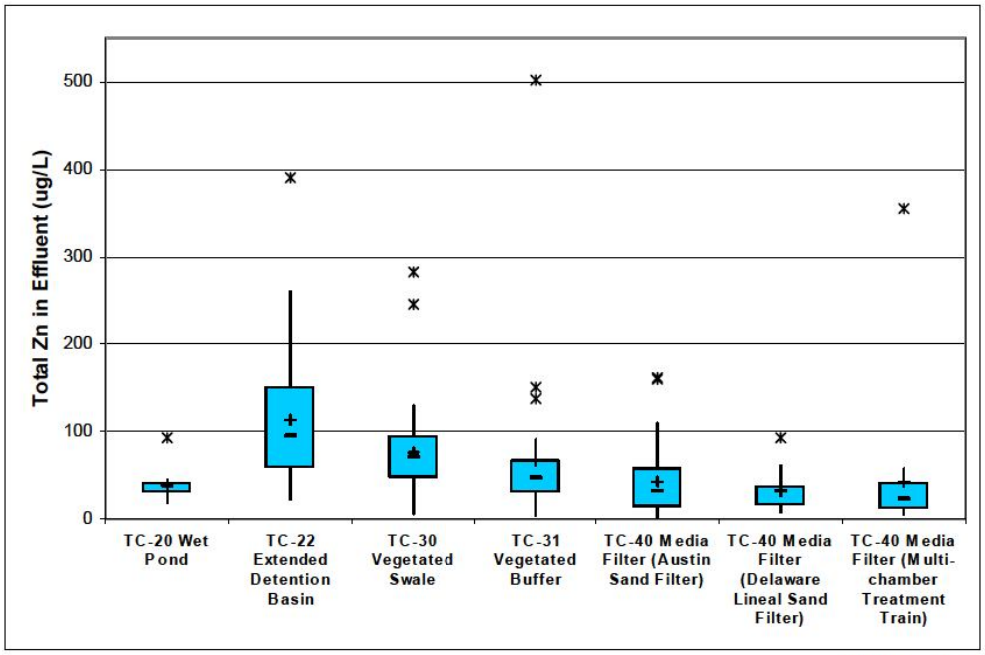

Figure 5-7
Total Zinc in Effluent

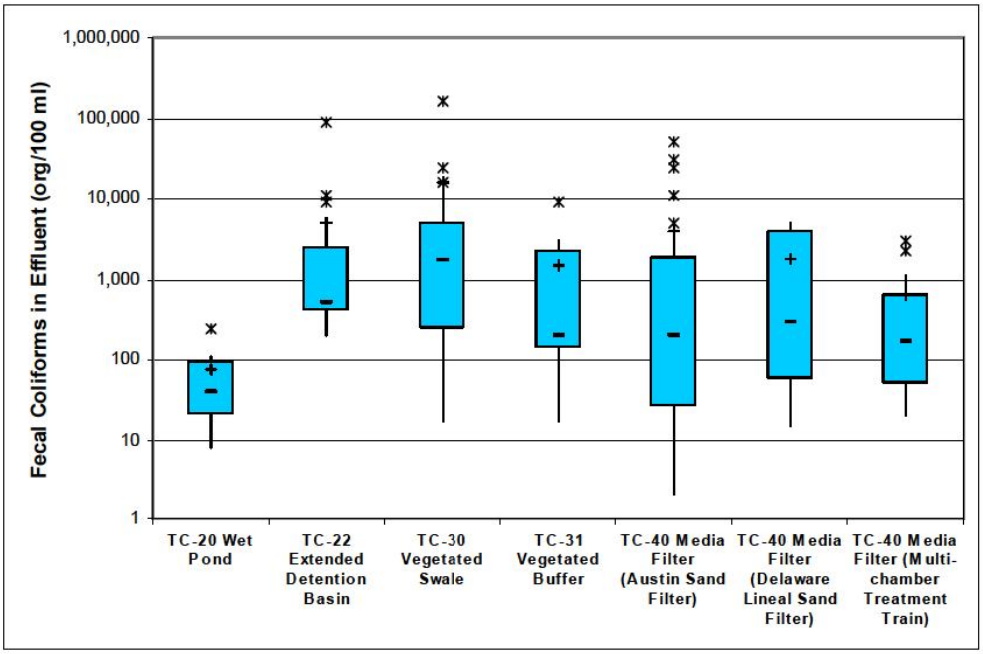

Figure 5-8
Total Fecal Coliforms in Effluent

While a figure is provided for fecal coliform, it is important to stress that the performance comparisons between BMPs is problematic. Some California BMP studies have shown excellent removal of fecal coliform through constructed wetlands and other BMPs. However, BMP comparisons are complicated by the fact that several BMPs attract wildlife and pets, thereby elevating bacteria levels. As bacteria sorb to the suspended sediments, a significant fraction may be removed by settling or filtration. A cautionary note regarding nitrogen: when comparing nitrogen removal between treatment systems it is best to use the parameter total nitrogen. It consists of Total Kjeldahl Nitrogen – TKN (organic nitrogen plus ammonia) plus nitrate. Comparing TKN removal rates is misleading in that in some treatment systems the ammonia is changed to nitrate but not removed. Examination of the performance data of many systems shows that while TKN may decrease dramatically, the nitrate concentration increases correspondingly. Hence, the overall removal of nitrogen is considerably lower than implied from looking only at Kjeldahl Nitrogen.

5.4.4 General Performance of Manufactured BMPs

An important question is how the performance of manufactured treatment BMPs compares to those in the public domain, illustrated previously in Figures 5-4 through 5-8. Figure 5-9 (and Figure 5-10 in log format) presents box-whisker plots of the removal of TSS for the manufactured systems. Data are presented for five general types of manufactured BMPs: wet vaults, drain inserts, constructed wetlands, media filters, and vortex separators. The figures indicate wide ranges in effluent concentrations, reflecting in part the different products and design criteria within each type. Comparing Figures 5-4 and 5-9 suggests that manufactured products may perform as well as the less effective publicdomain BMPs such as swales and extended detention basins (excluding the additional benefits of infiltration with the latter). Manufactured wetlands may perform as well as the most effective publicdomain BMPs; however, the plot presented in Figure 5-9 for the manufactured wetlands represents only five data points. It should be noted that each type of BMP illustrated in Figure 5-9 contains data from more than one product. Performance of particular products within that grouping may not perform as well as even the least effective publicdomain BMPs. This observation is implied by the greater spread within some boxes in Figure 5-9, for example, manufactured wet vaults and vortex separators.

Product performance within each grouping of manufactured BMPs vary as follows:

- Filters – TSS effluent concentrations range from 2 to 280 mg/L, with a median value of 29 mg/L
- Inserts - TSS effluent concentrations range from 4 to 248 mg/L with a median value of 27 mg/L
- Wetlands – TSS effluent concentrations vary little, and have a median value of 1.2 mg/L
- Vaults – TSS effluent concentrations range from 1 to 467 mg/L, with a median value of 36 mg/L
- Vortex – TSS effluent concentrations range from 13 to 359 mg/L, with a median value of 32 mg/L

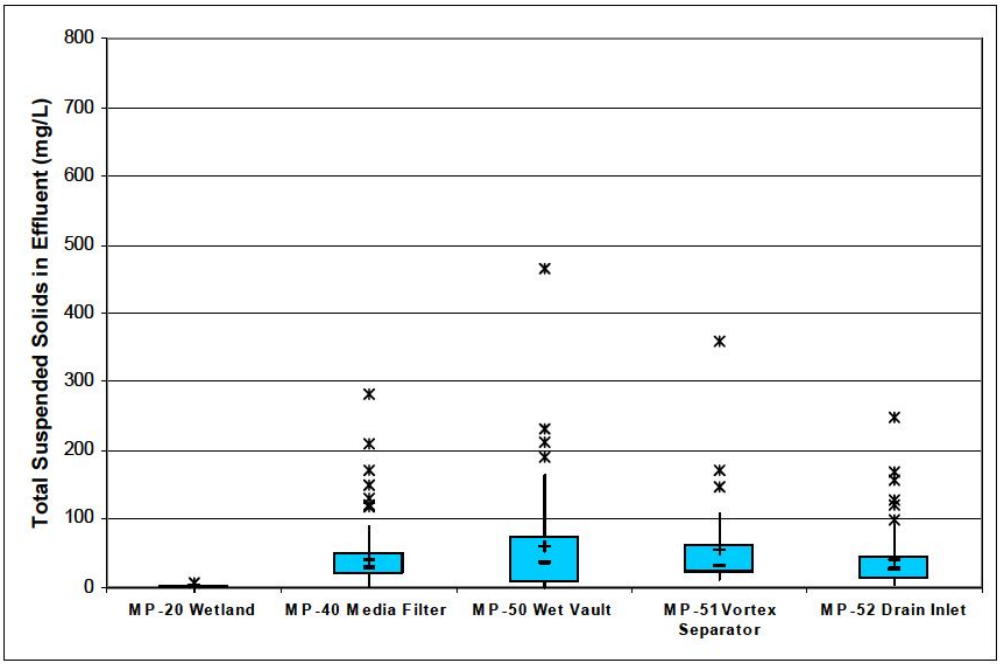

Figure 5-9
Total Suspended Solids in Effluent

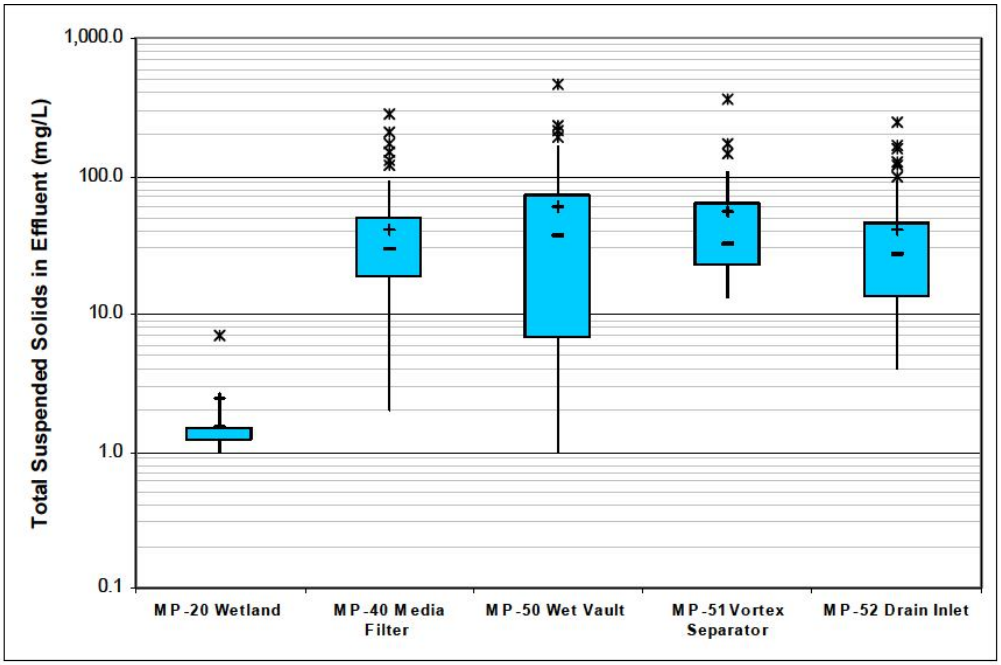

Figure 5-10
Total Suspended Solids in Effluent (log-format)

As noted earlier, performance of particular products in a grouping may be due to different design criteria within the group. For example, wet vault products differ with respect to the volume of the permanent wet pool to the design event volume; filter products differ with respect to the type of media.

5.4.5 Technology Certification

This Handbook does not endorse proprietary products, although many are described. It is left to each community to determine which proprietary products may be used, and under what circumstances. When considering a proprietary product, it is strongly advised that the community consider performance data, but only performance data that have been collected following a widely accepted protocol. Protocols have been developed by the American Society of Civil Engineering (ASCE BMP Data Base Program), and by the U.S.Environmental Protection Agency (Environmental Technology Certification Program). The local jurisdiction should ask the manufacturer of the product to submit a report that describes the product and protocol that was followed to produce the performance data.

It can be expected that subsequent to the publishing of this Handbook, new public-domain technologies will be proposed (or design criteria for existing technologies will be altered) by development engineers. As with proprietary products, it is advised that new public-domain technologies be considered only if performance data are available and have been collected following a widely accepted protocol.

5.5 BMP Design Criteria for Flow and Volume

Many municipal stormwater discharge permits in California contain provisions such as Standard Urban Stormwater Mitigation Plans, Stormwater Quality Urban Impact Mitigation Plans, or Provision C.3 New and Redevelopment Performance Standards, commonly referred to as SUSMPs, SQUIMPs, or C.3 Provisions, respectively. What these and similar provisions have in common is that they require many new development and redevelopment projects to capture and then infiltrate or treat runoff from the project site prior to being discharged to storm drains. These provisions include minimum standards for sizing these treatment control BMPs. Sizing standards are prescribed for both volume-based and flow-based BMPs.

A key point to consider when developing, reviewing, or complying with requirements for the sizing of treatment control BMPs for stormwater quality enhancement is that BMPs are most efficient and economical when they target small, frequent storm events that over time produce more total runoff than the larger, infrequent storms targeted for design of flood control facilities. The reason for this can be seen by examination of Figure 5-11 and Figure 5-12.

Figure 5-11 shows the distribution of storm events at San Jose, California where most storms produce less than 0.50 in. of total rainfall. Figure 5-12 shows the distribution of rainfall intensities at San Jose, California, where most storms have intensities of less than 0.25 in/hr. The patterns at San Jose, California are typical of other locations throughout the state. Figures 5-11 and 5-12 show that as storm sizes increase, the number of events decrease. Therefore, when BMPs are designed for increasingly larger storms (for example, storms up to 1 in. versus storms of up to 0.5 in.), the BMP size and cost increase dramatically, while the number of additional

treated storm events are small. Table 5-2 shows that doubling the design storm depth from 0.50 in. to 1.00 in. only increases the number of events captured by 23%. Similarly, doubling the design rainfall intensity from 0.25 in/hr to 0.50 in/hr only increases the number of events captured by 7%.

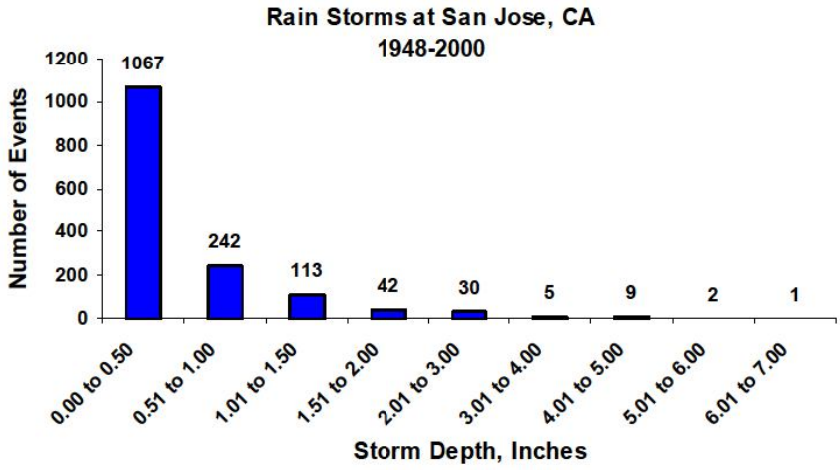

Figure 5-11
Rain Storms at San Jose, CA

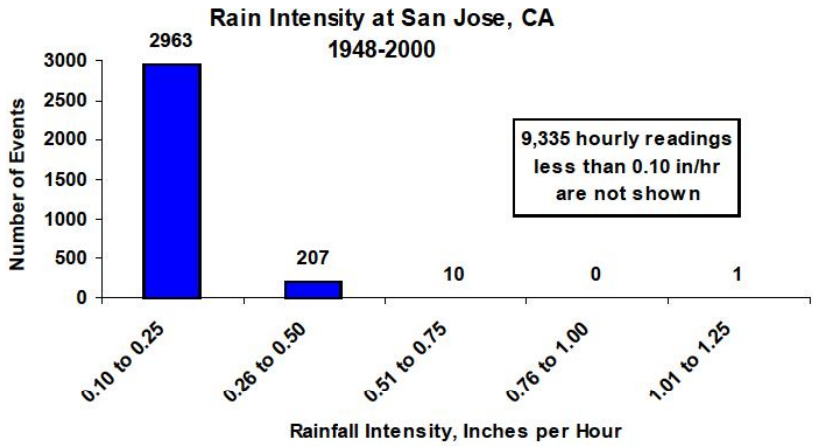

Figure 5-12
Rain Intensity at San Jose, CA

Table 5-2 Incremental Design Criteria VS Storms Treated at San Jose, CA

Proposed BMP Design Target	Number of Historical Events in Range	Incremental Increase in Design Criteria	Incremental Increase in Storms Treated
Storm Depth 0.00 to 0.50 in.	1,067	+100%	+23%
Storm Depth 0.51 to 1.00 in.	242		
Rainfall Intensity 0.10 to 0.25 in/hr	2,963	+100%	+7%
Rainfall Intensity 0.26 to 0.50 in/hr	207		

Due to economies of scale, doubling the capture and treatment requirements for a BMP are not likely to double the cost of many BMPs, but the incremental cost per event will increase, making increases beyond a certain point generally unattractive. Typically, design criteria for water quality control BMPs are set to coincide with the "knee of the curve," that is, the point of inflection where the magnitude of the event increases more rapidly than number of events captured. Figure 5-13 shows that the "knee of the curve" or point of diminishing returns for San Jose, California is in the range of 0.75 to 1.00 in. of rainfall. In other words, targeting design storms larger than this will produce gains at considerable incremental cost. Similar curves can be developed for rainfall intensity and runoff volume.

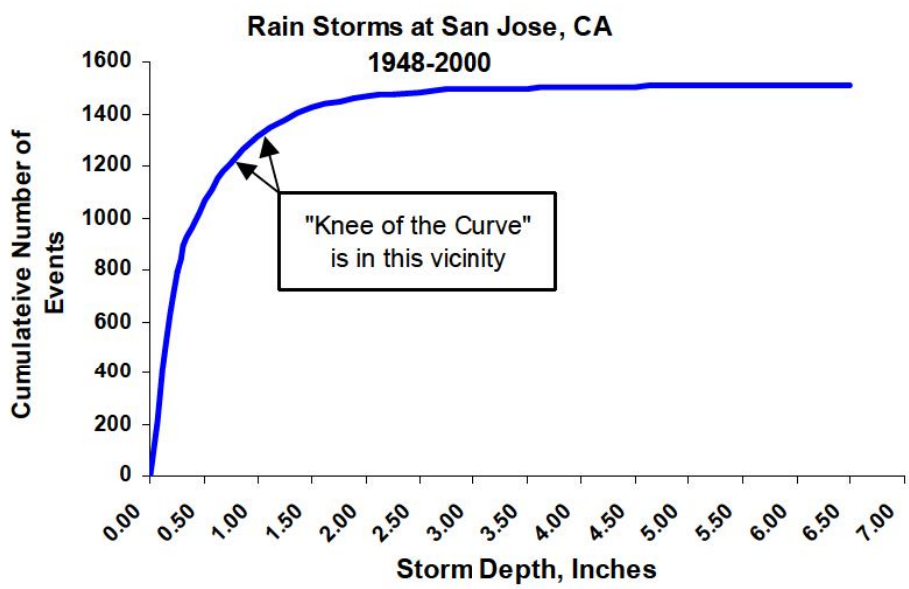

Figure 5-13
Rain Storms at San Jose, CA

It is important to note that arbitrarily targeting large, infrequent storm events can actually reduce the pollutant removal capabilities of some BMPs. This occurs when outlet structures, detention times, and drain down times are designed to accommodate unusually large volumes and high flows. When BMPs are over-designed, the more frequent, small storms that produce the most annual runoff pass quickly through the over-sized BMPs and therefore receive inadequate treatment. For example, a detention basin might normally be designed to capture 0.5 in. of runoff and to release that runoff over 48 hrs, providing a high level of sediment removal. If the basin were to be oversized to capture 1.0 in. of runoff and to release that runoff over 48 hrs, a more common 0.5 inch runoff event entering basin would drain in approximately 24 hrs, meaning the smaller, more frequent storm that is responsible for more total runoff would receive less treatment than if the basin were designed for the smaller event. Therefore, efficient and economical BMP sizing criteria are usually based on design criteria that correspond to the "knee of the curve" or point of diminishing returns.

5.5.1 Volume-Based BMP Design

Volume-based BMP design standards apply to BMPs whose primary mode of pollutant removal depends on the volumetric capacity of the BMP. Examples of BMPs in this category include detention basins, retention basins, and infiltration. Typically, a volume-based BMP design criteria calls for the capture and infiltration or treatment of a certain percentage of the runoff from the project site, usually in the range of the 75th to 85th percentile average annual runoff volume. The 75th to 85th percentile capture range corresponds to the "knee of the curve" for many sites in California for sites whose composite runoff coefficient is in the 0.50 to 0.95 range.

The following are examples of volume-based BMP design standards from current municipal stormwater permits. The permits require that volume-based BMPs be designed to capture and then to infiltrate or treat stormwater runoff equal to one of the following:

- Eighty (80) percent of the volume of annual runoff, determined in accordance with the methodology set forth in Appendix D of the California Storm Water Best Management Practices Handbook (Stormwater Quality Task Force, 1993), using local rainfall data.

- The maximized stormwater quality capture volume for the area, based on historical rainfall records, determined using the formula and volume capture coefficients set forth in Urban Runoff Quality Management (WEF Manual of Practice No. 23/ASCE Manual of Practice No. 87, (1998), pages 175-178).

The reader is referred to the municipal stormwater program manager for the jurisdiction processing the new development or redevelopment project application to determine the specific requirements applicable to a proposed project.

California Stormwater BMP Handbook Approach

The volume-based BMP sizing methodology included in the first edition of the *California Storm Water Best Management Practice Handbook* (Stormwater Quality Task Force, 1993) has been included in this second edition of the handbook and is the method recommended for use.

The California Stormwater BMP Handbook approach is based on results of a continuous simulation model, the STORM model, developed by the Hydrologic Engineering Center of the U.S. Army Corps of Engineers (COE-HEC, 1977). The Storage, Treatment, Overflow, Runoff Model (STORM) was applied to long-term hourly rainfall data at numerous sites throughout California, with sites selected throughout the state representing a wide range of municipal stormwater permit areas, climatic areas, geography, and topography. STORM translates rainfall into runoff, then routes the runoff through detention storage. The volume-based BMP sizing curves resulting from the STORM model provide a range of options for choosing a BMP sizing curve appropriate to sites in most areas of the state. The volume-based BMP sizing curves are included in Appendix D. Key model assumptions are also documented in Appendix D.

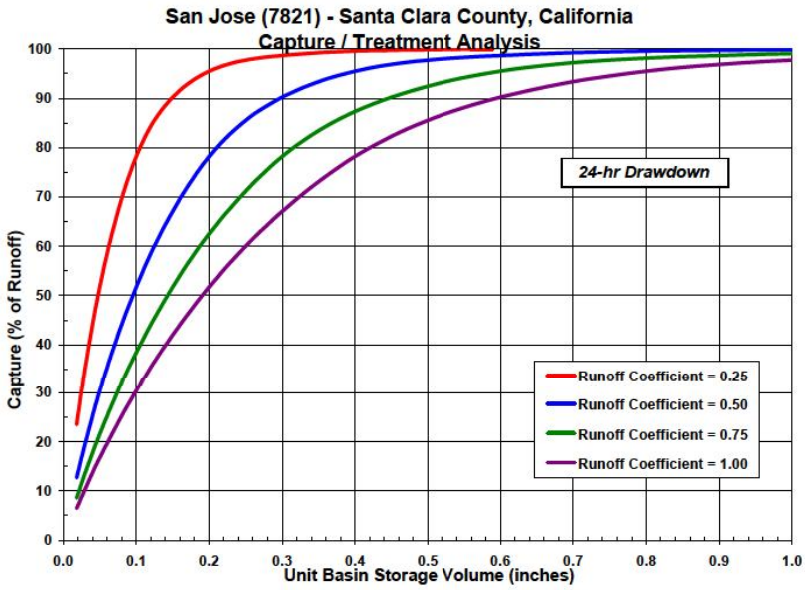

Figure 5-14
Capture/Treatment Analysis at San Jose, CA

The California Stormwater BMP Handbook approach is simple to apply, and relies largely on commonly available information about a project. The following steps describe the use of the BMP sizing curves contained in Appendix D.

1. Identify the "BMP Drainage Area" that drains to the proposed BMP. This includes all areas that will contribute runoff to the proposed BMP, including pervious areas, impervious areas, and off-site areas, whether or not they are directly or indirectly connected to the BMP.

2. Calculate the composite runoff coefficient "C" for the area identified in Step 1.

3. Select a capture curve representative of the site and the desired drain down time using Appendix D. Curves are presented for 24-hour and 48-hour draw down times. The 48-hour curve should be used in most areas of California. Use of the 24-hour curve should be limited

to drainage areas with coarse soils that readily settle and to watersheds where warming may be detrimental to downstream fisheries. Draw down times in excess of 48 hours should be used with caution, as vector breeding can be a problem after water has stood in excess of 72 hours.

4. Determine the applicable requirement for capture of runoff (Capture, % of Runoff).

5. Enter the capture curve selected in Step 3 on the vertical axis at the "Capture, % Runoff" value identified in Step 4. Move horizontally to the right across capture curve until the curve corresponding to the drainage area's composite runoff coefficient "C" determined in Step 2 is intercepted. Interpolation between curves may be necessary. Move vertically down from this point until the horizontal axis is intercepted. Read the "Unit Basin Storage Volume" along the horizontal axis. If a local requirement for capture of runoff is not specified, enter the vertical axis at the "knee of the curve" for the curve representing composite runoff coefficient "C." The "knee of the curve" is typically in the range of 75 to 85% capture.

6. Calculate the required capture volume of the BMP by multiplying the "BMP Drainage Area" from Step 1 by the "Unit Basin Storage Volume" from Step 5 to give the BMP volume. Due to the mixed units that result (e.g., ac-in., ac-ft) it is recommended that the resulting volume be converted to cubic feet for use during design.

Urban Runoff Quality Management Approach

The volume-based BMP sizing methodology described in *Urban Runoff Quality Management* (WEF Manual of Practice No. 23/ASCE Manual of Practice No. 87, (1998), pages 175-178) has been included in this edition of the handbook as an alternative to the California Stormwater BMP Handbook approach described above. The Urban Runoff Quality Management Approach is suitable for planning level estimates of the size of volume-based BMPs (WEF/ASCE, 1998, page 175).

The Urban Runoff Quality Management approach is similar to the California Stormwater BMP Handbook approach in that it is based on the translation of rainfall to runoff. The Urban Runoff Quality Management approach is based on two regression equations. The first regression equation relates rainfall to runoff. The rainfall to runoff regression equation was developed using 2 years of data from more than 60 urban watersheds nationwide. The second regression equation relates mean annual runoff-producing rainfall depths to the "Maximized Water Quality Capture Volume" which corresponds to the "knee of the cumulative probability curve". This second regression was based on analysis of long-term rainfall data from seven rain gages representing climatic zones across the country. The Maximized Water Quality Capture Volume corresponds to approximately the 85th percentile runoff event, and ranges from 82 to 88%.

The two regression equations that form the Urban Runoff Quality Management approach are as follows:

$$C = 0.858i^3 - 0.78i^2 + 0.774i + 0.04$$

$$P_o = (a \bullet C) \bullet P_6$$

Where

C = runoff coefficient

i = watershed imperviousness ratio which is equal to the percent total imperviousness divided by 100

P_o = Maximized Detention Volume, in watershed inches

a = regression constant, a=1.582 and a=1.963 for 24 and 48 hour draw down, respectively

P_6 = mean annual runoff-producing rainfall depths, in watershed inches, Table #-1. See Appendix D.

The Urban Runoff Quality Management Approach is simple to apply. The following steps describe the use of the approach.

1. Identify the "BMP Drainage Area" that drains to the proposed BMP. This includes all areas that will contribute runoff to the proposed BMP, including pervious areas, impervious areas, and off-site areas, whether or not they are directly or indirectly connected to the BMP.

2. Calculate the "Watershed Imperviousness Ratio" (i), which is equal to the percent of total impervious area in the "BMP Drainage Area" divided by 100.

3. Calculate the "Runoff Coefficient" (C) using the following equation:

$$C = 0.858i^3 - 0.78i^2 + 0.774i + 0.04$$

4. Determine the "Mean Annual Runoff" (P6) for the "BMP Drainage Area" using Table #-1 in Appendix D.

5. Determine the "Regression Constant" (a) for the desired BMP drain down time. Use a=1.582 for 24 hrs and a=1.963 for 48 hr draw down.

6. Calculate the "Maximized Detention Volume" (Po) using the following equation:

$$P_o = (a \bullet C) \bullet P_6$$

7. Calculate the required capture volume of the BMP by multiplying the "BMP Drainage Area" from Step 1 by the "Maximized Detention Volume" from Step 6 to give the BMP volume. Due to the mixed units that result (e.g., ac-in., ac-ft) it is recommended that the resulting volume be converted to ft^3 for use during design.

5.5.2 Flow-Based BMP Design

Flow-based BMP design standards apply to BMPs whose primary mode of pollutant removal depends on the rate of flow of runoff through the BMP. Examples of BMPs in this category

include swales, sand filters, screening devices, and many proprietary products. Typically, a flow-based BMP design criteria calls for the capture and infiltration or treatment of the flow runoff produced by rain events of a specified magnitude.

The following are examples of flow-based BMP design standards from current municipal stormwater permits. The permits require that flow-based BMPs be designed to capture and then to infiltrate or treat stormwater runoff equal to one of the following:

- 10% of the 50-yr peak flow rate (Factored Flood Flow Approach)
- The flow of runoff produced by a rain event equal to at least two times the 85th percentile hourly rainfall intensity for the applicable area, based on historical records of hourly rainfall depths (California Stormwater BMP Handbook Approach)
- The flow of runoff resulting from a rain event equal to at least 0.2 in/hr intensity (Uniform Intensity Approach)

The reader is referred to the municipal stormwater program manager for the jurisdiction processing the new development or redevelopment project application to determine the specific requirements applicable to a proposed project.

The three typical requirements shown above all have in common a rainfall intensity element. That is, each criteria is based treating a flow of runoff produced by a rain event of specified rainfall intensity.

In the first example, the Factored Flood Flow Approach, the design rainfall intensity is a function of the location and time of concentration of the area discharging to the BMP. The intensity in this case is determined using Intensity-Duration-Frequency curves published by the flood control agency with jurisdiction over the project or available from climatic data centers. This approach is simple to apply when the 50-yr peak flow has already been determined for either drainage system design or flood control calculations.

In the second example, the California Stormwater BMP Handbook Approach (so called because it is recommended in this handbook), the rainfall intensity is a function of the location of the area discharging to the BMP. The intensity in this case can be determined using the rain intensity cumulative frequency curves developed for this Handbook based on analysis of long-term hourly rainfall data at numerous sites throughout California, with sites selected throughout the state representing a wide range of municipal stormwater permit areas, climatic areas, geography, and topography. These rain intensity cumulative frequency curves are included in Appendix D. This approach is recommended as it reflects local conditions throughout the state. The flow-based design criteria in some municipal permits require design based on two times the 85th percentile hourly rainfall intensity. The factor of two included in these permits appears to be provided as a factor of safety: therefore, caution should be exercised when applying additional factors of safety during the design process so that over design can be avoided.

In the third example, the Uniform Intensity Approach, the rainfall intensity is specified directly, and is not a function of the location or time of concentration of the area draining to the BMP. This approach is very simple to apply, but it is not reflective of local conditions.

The three example flow-based BMP design criteria are easy to apply and can be used in conjunction with the Rational Formula, a simplified, easy to apply formula that predicts flow rates based on rainfall intensity and drainage area characteristics. The Rational Formula is as follows:

$$Q = CiA$$

where

Q = flow in ft^3/s

i = rain intensity in in/hr

A = drainage area in acres

C = runoff coefficient

The Rational Formula is widely used for hydrologic calculations, but it does have a number of limitations. For stormwater BMP design, a key limitation is the ability of the Rational Formula to predict runoff from undeveloped areas where runoff coefficients are highly variable with storm intensity and antecedent moisture conditions. This limitation is accentuated when predicting runoff from frequent, small storms used in stormwater quality BMP design because many of the runoff coefficients in common use were developed for predicting runoff for drainage design where larger, infrequent storms are of interest. Table 5-3 provides some general guidelines on use of the Rational Equation.

Table 5-3 Use of Rational Formula for Stormwater BMP Design

	Composite Runoff Coefficient, "C"			
BMP Drainage Area (Acres)	**0.00 to 0.25**	**0.26 to 0.50**	**0.51 to 0.75**	**0.76 to 1.00**
0 to 25	Caution	Yes	Yes	Yes
26 to 50	High Caution	Caution	Yes	Yes
51 to 75	Not Recommended	High Caution	Caution	Yes
76 to 100	Not Recommended	High Caution	Caution	Yes

In summary, the Rational Formula, when used with commonly tabulated runoff coefficients in undeveloped drainage areas, will likely result in predictions higher than will be experienced under actual field conditions. However, given the simplicity of the equation, its use remains

practical and is often the standard method specified by local agencies. In general, use of alternative formulas for predicting BMP design flows based on the intensity criteria above is acceptable if the formula is approved by the local flood control agency or jurisdiction where the project is being developed.

The following steps describe the approach for application of the flow-based BMP design criteria:

1. Identify the "BMP Drainage Area" that drains to the proposed BMP. This includes all areas that will contribute runoff to the proposed BMP, including pervious areas, impervious areas, and off-site areas, whether or not they are directly or indirectly connected to the BMP.

2. Determine rainfall intensity criteria to apply and the corresponding design rainfall intensity.

   a. *Factored Flood Flow Approach*: Determine the time of concentration for "BMP Drainage Area" using procedures approved by the local flood control agency or using standard hydrology methods. Identify an Intensity-Duration-Frequency Curve representative of the drainage area (usually available from the local flood control agency or climatic data center). Enter the Intensity-Duration-Frequency Curve with the time of concentration and read the rainfall intensity corresponding to the 50-yr return period rainfall event. This intensity is the "Design Rainfall Intensity."

   b. *California Stormwater BMP Handbook Approach*: Select a rain intensity cumulative frequency curve representative of the "BMP Drainage Area." See Appendix D. Read the rainfall intensity corresponding to the cumulative probability specified in the criteria, usually 85%. Multiply the intensity by the safety factor specified in the criteria, usually 2, to get the "Design Rainfall Intensity."

   c. *Uniform Intensity Approach*: The "Design Rainfall Intensity" is the intensity specified in the criteria, usually 0.2 in/hr.

3. Calculate the composite runoff coefficient" "C" for the "BMP Drainage Area" identified in Step 1.

4. Apply the Rational Formula to calculate the "BMP Design Flow"

   a. *Factored Flood Flow Approach*: Using the "BMP Drainage Area" from Step 1, the "Design Rainfall Intensity" from Step 2a, and "C" from Step 3, apply the Rational Formula and multiply the result by 0.1. The result is the "BMP Design Flow."

   b. *California Stormwater BMP Handbook Approach*: Using the "BMP Drainage Area" from Step 1, the "Design Rainfall Intensity" from Step 2b, and "C" from Step 3, apply the Rational Formula. The result is the "BMP Design Flow."

   c. *Uniform Intensity Approach*: Using the "BMP Drainage Area" from Step 1, the "Design Rainfall Intensity" from Step 2c, and "C" from Step 3, apply the Rational Formula. The result is the "BMP Design Flow."

5.5.3 Combined Volume-Based and Flow-Based BMP Design

Volume-based BMPs and flow-based BMPs do not necessarily treat precisely the same stormwater runoff. For example, an on-line volume-based BMP such as a detention basin will treat the design runoff volume and is essentially unaffected by runoff entering the basin at an extremely high rate, say from a very short, but intense storm that produces the design volume of runoff. However, a flow-based BMP might be overwhelmed by the same short, but intense storm if the storm intensity results in runoff rates that exceed the flow-based BMP design flow rate. By contrast, a flow-based BMP such as a swale will treat the design flow rate of runoff and is essentially unaffected by the duration of the design flow, say from a long, low intensity storm. However, a volume-based detention basin subjected to this same rainfall and runoff event will begin to provide less treatment or will go into bypass or overflow mode after the design runoff volume is delivered.

Therefore, there may be some situations where designers need to consider both volume-based and flow-based BMP design criteria. An example of where both types of criteria might apply is an off-line detention basin. For an off-line detention basin, the capacity of the diversion structure could be designed to comply with the flow-based BMP design criteria while the detention basin itself could be designed to comply with the volume-based criteria.

When both volume-based and flow based criteria apply, the designer should determine which of the criteria apply to each element of the BMP system, and then size the elements accordingly.

5.6 Other BMP Selection Factors

Other factors that influence the selection of BMPs include cost, vector control issues, and endangered species issues. Each of these is discussed briefly below.

5.6.1 Costs

The relative costs for implementing various public domain and manufactured BMPs based on flow and volume parameters are shown in Tables 5-4 and 5-5 below:

Table 5-4 Economic Comparison Matrix - Flow

BMP	Cost/cfs
Strip	$$
Swale	$$
Wet Vault	Not available
Media Filter	$$$$
Vortex	Not available
Drain Insert	Not available

Table 5-5 Economic Comparison Matrix - Volume

BMP	Cost/acre-ft
Austin Sand Filter Basin	$$$$
Delaware Lineal Sand Filter	$$$$
Extended Detention Basin (EDB)	$$
Multi Chamber Treatment Train (MCTT)	$$$$
Wet Basin	$$$$
Manufactured Wetland	Not available
Infiltration Basin	$
Wet Pond and Constructed Wetland	$$$$

5.6.2 Vector Breeding Considerations

The potential of a BMP to create vector breeding habitat and/or harborage should be considered when selecting BMPs. Mosquito and other vector production is a nuisance and public health threat. Mosquitoes can breed in standing water almost immediately following a BMP installation and may persist at unnaturally high levels and for longer seasonal periods in created habitats. BMP siting, design, construction, and maintenance must be considered in order to select a BMP that is least conducive to providing habitat for vectors. Tips for minimizing vector-breeding problems in the design and maintenance of BMPs are presented in the BMP fact sheets. Certain BMPs, including ponds and wetlands and those designed with permanent water sumps, vaults, and/or catch basins (including below ground installations), may require routine inspections and treatments by local mosquito and vector control agencies to suppress vector production.

5.6.3 Threatened and Endangered Species Considerations

The presence or potential presence of threatened and endangered species should also be considered when selecting BMPs. Although preservation of threatened endangered species is crucial, treatment BMPs are not intended to supplement or replace species habitat except under special circumstances. The presence of threatened or endangered species can hinder timely and routine maintenance, which in turn can result in reduced BMP performance and an increase in vector production. In extreme cases, jurisdictional rights to the treatment BMP and surrounding land may be lost if threatened or endangered species utilize or become established in the BMP.

When considering BMPs where there is a presence or potential presence of threatened or endangered species, early coordination with the California Department of Fish and Game and the U.S. Fish and Wildlife service is essential. During this coordination, the purpose and the long-term operation and maintenance requirements of the BMPs need to be clearly established through written agreements or memorandums of understanding. Absent firm agreements or understandings, proceeding with BMPs under these circumstances is not recommended.

5.7 BMP Fact Sheets

BMP fact sheets for public domain and manufactured BMPs follow. The BMP fact sheets are individually page numbered and are suitable for photocopying and inclusion in stormwater quality management plans. Fresh copies of the fact sheets can be individually downloaded from the Caltrans Stormwater BMP Handbook website at www.cabmphandbooks.com.

Infiltration Trench TC-10

Design Considerations

- Accumulation of Metals
- Clogged Soil Outlet Structures
- Vegetation/Landscape Maintenance

Description

An infiltration trench is a long, narrow, rock-filled trench with no outlet that receives stormwater runoff. Runoff is stored in the void space between the stones and infiltrates through the bottom and into the soil matrix. Infiltration trenches perform well for removal of fine sediment and associated pollutants.
Pretreatment using buffer strips, swales, or detention basins is important for limiting amounts of coarse sediment entering the trench which can clog and render the trench ineffective.

California Experience

Caltrans constructed two infiltration trenches at highway maintenance stations in Southern California. Of these, one failed to operate to the design standard because of average soil infiltration rates lower than that measured in the single infiltration test. This highlights the critical need for appropriate evaluation of the site. Once in operation, little maintenance was required at either site.

Advantages

- Provides 100% reduction in the load discharged to surface waters.
- An important benefit of infiltration trenches is the approximation of pre-development hydrology during which a significant portion of the average annual rainfall runoff is infiltrated rather than flushed directly to creeks.
- If the water quality volume is adequately sized, infiltration trenches can be useful for providing control of channel forming (erosion) and high frequency (generally less than the 2-year) flood events.

Targeted Constituents

☑	Sediment	■
☑	Nutrients	■
☑	Trash	■
☑	Metals	■
☑	Bacteria	■
☑	Oil and Grease	■
☑	Organics	■

Legend ***(Removal Effectiveness)***

● Low ■ High

▲ Medium

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- As an underground BMP, trenches are unobtrusive and have little impact of site aesthetics.

Limitations

- Have a high failure rate if soil and subsurface conditions are not suitable.
- May not be appropriate for industrial sites or locations where spills may occur.
- The maximum contributing area to an individual infiltration practice should generally be less than 5 acres.
- Infiltration basins require a minimum soil infiltration rate of 0.5 inches/hour, not appropriate at sites with Hydrologic Soil Types C and D.
- If infiltration rates exceed 2.4 inches/hour, then the runoff should be fully treated prior to infiltration to protect groundwater quality.
- Not suitable on fill sites or steep slopes.
- Risk of groundwater contamination in very coarse soils.
- Upstream drainage area must be completely stabilized before construction.
- Difficult to restore functioning of infiltration trenches once clogged.

Design and Sizing Guidelines

- Provide pretreatment for infiltration trenches in order to reduce the sediment load. Pretreatment refers to design features that provide settling of large particles before runoff reaches a management practice, easing the long-term maintenance burden. Pretreatment is important for all structural stormwater management practices, but it is particularly important for infiltration practices. To ensure that pretreatment mechanisms are effective, designers should incorporate practices such as grassed swales, vegetated filter strips, detention, or a plunge pool in series.
- Specify locally available trench rock that is 1.5 to 2.5 inches in diameter.
- Determine the trench volume by assuming the WQV will fill the void space based on the computed porosity of the rock matrix (normally about 35%).
- Determine the bottom surface area needed to drain the trench within 72 hr by dividing the WQV by the infiltration rate.

$$d = \frac{WQV + RFV}{SA}$$

- Calculate trench depth using the following equation:

where:

D = Trench depth

Infiltration Trench TC-10

WQV	=	Water quality volume
RFV	=	Rock fill volume
SA	=	Surface area of the trench bottom

- The use of vertical piping, either for distribution or infiltration enhancement shall not be allowed to avoid device classification as a Class V injection well per 40 CFR146.5(e)(4).
- Provide observation well to allow observation of drain time.
- May include a horizontal layer of filter fabric just below the surface of the trench to retain sediment and reduce the potential for clogging.

Construction/Inspection Considerations

Stabilize the entire area draining to the facility before construction begins. If impossible, place a diversion berm around the perimeter of the infiltration site to prevent sediment entrance during construction. Stabilize the entire contributing drainage area before allowing any runoff to enter once construction is complete.

Performance

Infiltration trenches eliminate the discharge of the water quality volume to surface receiving waters and consequently can be considered to have 100% removal of all pollutants within this volume. Transport of some of these constituents to groundwater is likely, although the attenuation in the soil and subsurface layers will be substantial for many constituents.

Infiltration trenches can be expected to remove up to 90 percent of sediments, metals, coliform bacteria and organic matter, and up to 60 percent of phosphorus and nitrogen in the infiltrated runoff (Schueler, 1992). Biochemical oxygen demand (BOD) removal is estimated to be between 70 to 80 percent. Lower removal rates for nitrate, chlorides and soluble metals should be expected, especially in sandy soils (Schueler, 1992). Pollutant removal efficiencies may be improved by using washed aggregate and adding organic matter and loam to the subsoil. The stone aggregate should be washed to remove dirt and fines before placement in the trench. The addition of organic material and loam to the trench subsoil may enhance metals removal through adsorption.

Siting Criteria

The use of infiltration trenches may be limited by a number of factors, including type of native soils, climate, and location of groundwater table. Site characteristics, such as excessive slope of the drainage area, fine-grained soil types, and proximate location of the water table and bedrock, may preclude the use of infiltration trenches. Generally, infiltration trenches are not suitable for areas with relatively impermeable soils containing clay and silt or in areas with fill.

As with any infiltration BMP, the potential for groundwater contamination must be carefully considered, especially if the groundwater is used for human consumption or agricultural purposes. The infiltration trench is not suitable for sites that use or store chemicals or hazardous materials unless hazardous and toxic materials are prevented from entering the trench. In these areas, other BMPs that do not allow interaction with the groundwater should be considered.

TC-10 Infiltration Trench

The potential for spills can be minimized by aggressive pollution prevention measures. Many municipalities and industries have developed comprehensive spill prevention control and countermeasure (SPCC) plans. These plans should be modified to include the infiltration trench and the contributing drainage area. For example, diversion structures can be used to prevent spills from entering the infiltration trench. Because of the potential to contaminate groundwater, extensive site investigation must be undertaken early in the site planning process to establish site suitability for the installation of an infiltration trench.

Longevity can be increased by careful geotechnical evaluation prior to construction and by designing and implementing an inspection and maintenance plan. Soil infiltration rates and the water table depth should be evaluated to ensure that conditions are satisfactory for proper operation of an infiltration trench. Pretreatment structures, such as a vegetated buffer strip or water quality inlet, can increase longevity by removing sediments, hydrocarbons, and other materials that may clog the trench. Regular maintenance, including the replacement of clogged aggregate, will also increase the effectiveness and life of the trench.

Evaluation of the viability of a particular site is the same as for infiltration basins and includes:

- Determine soil type (consider RCS soil type 'A, B or C' only) from mapping and consult USDA soil survey tables to review other parameters such as the amount of silt and clay, presence of a restrictive layer or seasonal high water table, and estimated permeability. The soil should not have more than 30 percent clay or more than 40 percent of clay and silt combined. Eliminate sites that are clearly unsuitable for infiltration.

- Groundwater separation should be at least 3 m from the basin invert to the measured ground water elevation. There is concern at the state and regional levels of the impact on groundwater quality from infiltrated runoff, especially when the separation between groundwater and the surface is small.

- Location away from buildings, slopes and highway pavement (greater than 6 m) and wells and bridge structures (greater than 30 m). Sites constructed of fill, having a base flow or with a slope greater than 15 percent should not be considered.

- Ensure that adequate head is available to operate flow splitter structures (to allow the basin to be offline) without ponding in the splitter structure or creating backwater upstream of the splitter.

- Base flow should not be present in the tributary watershed.

Secondary Screening Based on Site Geotechnical Investigation

- At least three in-hole conductivity tests shall be performed using USBR 7300-89 or Bouwer-Rice procedures (the latter if groundwater is encountered within the boring), two tests at different locations within the proposed basin and the third down gradient by no more than approximately 10 m. The tests shall measure permeability in the side slopes and the bed within a depth of 3 m of the invert.

- The minimum acceptable hydraulic conductivity as measured in any of the three required test holes is 13 mm/hr. If any test hole shows less than the minimum value, the site should be disqualified from further consideration.

Infiltration Trench TC-10

- Exclude from consideration sites constructed in fill or partially in fill unless no silts or clays are present in the soil boring. Fill tends to be compacted, with clays in a dispersed rather than flocculated state, greatly reducing permeability.
- The geotechnical investigation should be such that a good understanding is gained as to how the stormwater runoff will move in the soil (horizontally or vertically) and if there are any geological conditions that could inhibit the movement of water.

Maintenance

Infiltration trenches required the least maintenance of any of the BMPs evaluated in the Caltrans study, with approximately 17 field hours spent on the operation and maintenance of each site. Inspection of the infiltration trench was the largest field activity, requiring approximately 8 hr/yr.

In addition to reduced water quality performance, clogged infiltration trenches with surface standing water can become a nuisance due to mosquito breeding. If the trench takes more than 72 hours to drain, then the rock fill should be removed and all dimensions of the trench should be increased by 2 inches to provide a fresh surface for infiltration.

Cost

Construction Cost

Infiltration trenches are somewhat expensive, when compared to other stormwater practices, in terms of cost per area treated. Typical construction costs, including contingency and design costs, are about $5 per ft^3 of stormwater treated (SWRPC, 1991; Brown and Schueler, 1997). Actual construction costs may be much higher. The average construction cost of two infiltration trenches installed by Caltrans in southern California was about $50/$ft^3$; however, these were constructed as retrofit installations.

Infiltration trenches typically consume about 2 to 3 percent of the site draining to them, which is relatively small. In addition, infiltration trenches can fit into thin, linear areas. Thus, they can generally fit into relatively unusable portions of a site.

Maintenance Cost

One cost concern associated with infiltration practices is the maintenance burden and longevity. If improperly sited or maintained, infiltration trenches have a high failure rate. In general, maintenance costs for infiltration trenches are estimated at between 5 percent and 20 percent of the construction cost. More realistic values are probably closer to the 20-percent range, to ensure long-term functionality of the practice.

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Infiltration Trench TC-10

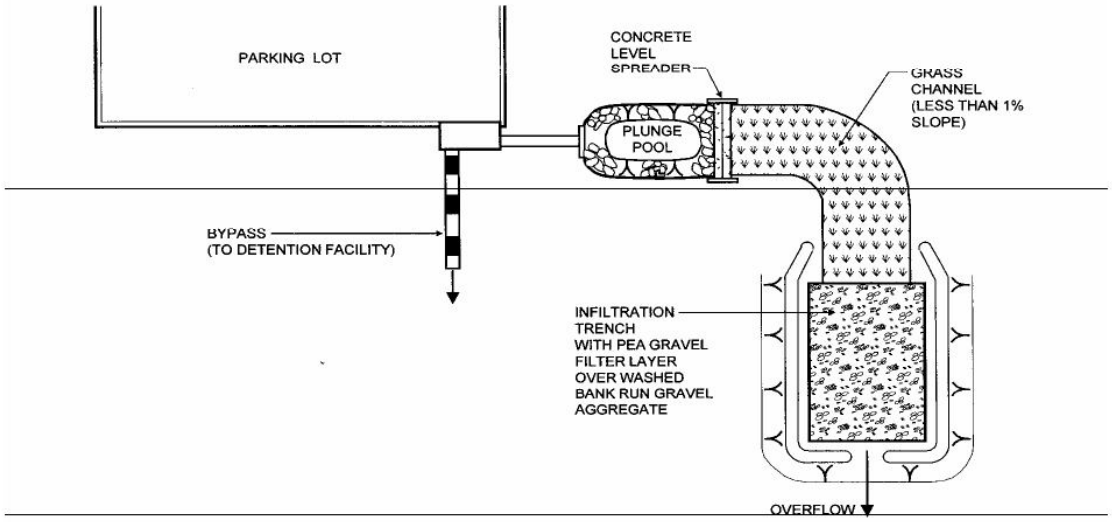

PLAN VIEW

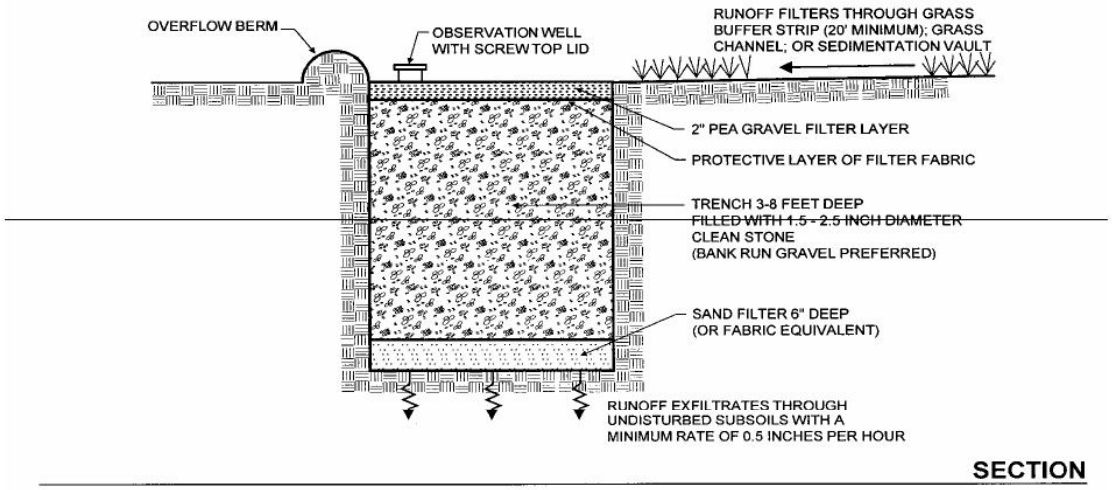

SECTION

Infiltration Basin TC-11

Design Considerations

- Soil for Infiltration
- Slope
- Aesthetics

Targeted Constituents

☑	Sediment	■
☑	Nutrients	■
☑	Trash	■
☑	Metals	■
☑	Bacteria	■
☑	Oil and Grease	■
☑	Organics	■

Legend ***(Removal Effectiveness)***

● Low ■ High

▲ Medium

Description

An infiltration basin is a shallow impoundment that is designed to infiltrate stormwater. Infiltration basins use the natural filtering ability of the soil to remove pollutants in stormwater runoff. Infiltration facilities store runoff until it gradually exfiltrates through the soil and eventually into the water table. This practice has high pollutant removal efficiency and can also help recharge groundwater, thus helping to maintain low flows in stream systems. Infiltration basins can be challenging to apply on many sites, however, because of soils requirements. In addition, some studies have shown relatively high failure rates compared with other management practices.

California Experience

Infiltration basins have a long history of use in California, especially in the Central Valley. Basins located in Fresno were among those initially evaluated in the National Urban Runoff Program and were found to be effective at reducing the volume of runoff, while posing little long-term threat to groundwater quality (EPA, 1983; Schroeder, 1995). Proper siting of these devices is crucial as underscored by the experience of Caltrans in siting two basins in Southern California. The basin with marginal separation from groundwater and soil permeability failed immediately and could never be rehabilitated.

Advantages

- Provides 100% reduction in the load discharged to surface waters.
- The principal benefit of infiltration basins is the approximation of pre-development hydrology during which a

significant portion of the average annual rainfall runoff is infiltrated and evaporated rather than flushed directly to creeks.

- If the water quality volume is adequately sized, infiltration basins can be useful for providing control of channel forming (erosion) and high frequency (generally less than the 2-year) flood events.

Limitations

- May not be appropriate for industrial sites or locations where spills may occur.
- Infiltration basins require a minimum soil infiltration rate of 0.5 inches/hour, not appropriate at sites with Hydrologic Soil Types C and D.
- If infiltration rates exceed 2.4 inches/hour, then the runoff should be fully treated prior to infiltration to protect groundwater quality.
- Not suitable on fill sites or steep slopes.
- Risk of groundwater contamination in very coarse soils.
- Upstream drainage area must be completely stabilized before construction.
- Difficult to restore functioning of infiltration basins once clogged.

Design and Sizing Guidelines

- Water quality volume determined by local requirements or sized so that 85% of the annual runoff volume is captured.
- Basin sized so that the entire water quality volume is infiltrated within 48 hours.
- Vegetation establishment on the basin floor may help reduce the clogging rate.

Construction/Inspection Considerations

- Before construction begins, stabilize the entire area draining to the facility. If impossible, place a diversion berm around the perimeter of the infiltration site to prevent sediment entrance during construction or remove the top 2 inches of soil after the site is stabililized. Stabilize the entire contributing drainage area, including the side slopes, before allowing any runoff to enter once construction is complete.
- Place excavated material such that it can not be washed back into the basin if a storm occurs during construction of the facility.
- Build the basin without driving heavy equipment over the infiltration surface. Any equipment driven on the surface should have extra-wide ("low pressure") tires. Prior to any construction, rope off the infiltration area to stop entrance by unwanted equipment.
- After final grading, till the infiltration surface deeply.
- Use appropriate erosion control seed mix for the specific project and location.

Infiltration Basin TC-11

Performance

As water migrates through porous soil and rock, pollutant attenuation mechanisms include precipitation, sorption, physical filtration, and bacterial degradation. If functioning properly, this approach is presumed to have high removal efficiencies for particulate pollutants and moderate removal of soluble pollutants. Actual pollutant removal in the subsurface would be expected to vary depending upon site-specific soil types. This technology eliminates discharge to surface waters except for the very largest storms; consequently, complete removal of all stormwater constituents can be assumed.

There remain some concerns about the potential for groundwater contamination despite the findings of the NURP and Nightingale (1975; 1987a,b,c; 1989). For instance, a report by Pitt et al. (1994) highlighted the potential for groundwater contamination from intentional and unintentional stormwater infiltration. That report recommends that infiltration facilities not be sited in areas where high concentrations are present or where there is a potential for spills of toxic material. Conversely, Schroeder (1995) reported that there was no evidence of groundwater impacts from an infiltration basin serving a large industrial catchment in Fresno, CA.

Siting Criteria

The key element in siting infiltration basins is identifying sites with appropriate soil and hydrogeologic properties, which is critical for long term performance. In one study conducted in Prince George's County, Maryland (Galli, 1992), all of the infiltration basins investigated clogged within 2 years. It is believed that these failures were for the most part due to allowing infiltration at sites with rates of less than 0.5 in/hr, basing siting on soil type rather than field infiltration tests, and poor construction practices that resulted in soil compaction of the basin invert.

A study of 23 infiltration basins in the Pacific Northwest showed better long-term performance in an area with highly permeable soils (Hilding, 1996). In this study, few of the infiltration basins had failed after 10 years. Consequently, the following guidelines for identifying appropriate soil and subsurface conditions should be rigorously adhered to.

- Determine soil type (consider RCS soil type 'A, B or C' only) from mapping and consult USDA soil survey tables to review other parameters such as the amount of silt and clay, presence of a restrictive layer or seasonal high water table, and estimated permeability. The soil should not have more than 30% clay or more than 40% of clay and silt combined. Eliminate sites that are clearly unsuitable for infiltration.

- Groundwater separation should be at least 3 m from the basin invert to the measured ground water elevation. There is concern at the state and regional levels of the impact on groundwater quality from infiltrated runoff, especially when the separation between groundwater and the surface is small.

- Location away from buildings, slopes and highway pavement (greater than 6 m) and wells and bridge structures (greater than 30 m). Sites constructed of fill, having a base flow or with a slope greater than 15% should not be considered.

- Ensure that adequate head is available to operate flow splitter structures (to allow the basin to be offline) without ponding in the splitter structure or creating backwater upstream of the splitter.

- Base flow should not be present in the tributary watershed.

Secondary Screening Based on Site Geotechnical Investigation

- At least three in-hole conductivity tests shall be performed using USBR 7300-89 or Bouwer-Rice procedures (the latter if groundwater is encountered within the boring), two tests at different locations within the proposed basin and the third down gradient by no more than approximately 10 m. The tests shall measure permeability in the side slopes and the bed within a depth of 3 m of the invert.

- The minimum acceptable hydraulic conductivity as measured in any of the three required test holes is 13 mm/hr. If any test hole shows less than the minimum value, the site should be disqualified from further consideration.

- Exclude from consideration sites constructed in fill or partially in fill unless no silts or clays are present in the soil boring. Fill tends to be compacted, with clays in a dispersed rather than flocculated state, greatly reducing permeability.

- The geotechnical investigation should be such that a good understanding is gained as to how the stormwater runoff will move in the soil (horizontally or vertically) and if there are any geological conditions that could inhibit the movement of water.

Additional Design Guidelines

(1) Basin Sizing - The required water quality volume is determined by local regulations or sufficient to capture 85% of the annual runoff.

(2) Provide pretreatment if sediment loading is a maintenance concern for the basin.

(3) Include energy dissipation in the inlet design for the basins. Avoid designs that include a permanent pool to reduce opportunity for standing water and associated vector problems.

(4) Basin invert area should be determined by the equation:

$$A = \frac{WQV}{kt}$$

where A = Basin invert area (m^2)

WQV = water quality volume (m^3)

k = 0.5 times the lowest field-measured hydraulic conductivity (m/hr)

t = drawdown time (48 hr)

(5) The use of vertical piping, either for distribution or infiltration enhancement shall not be allowed to avoid device classification as a Class V injection well per 40 CFR146.5(e)(4).

Infiltration Basin TC-11

Maintenance

Regular maintenance is critical to the successful operation of infiltration basins. Recommended operation and maintenance guidelines include:

- Inspections and maintenance to ensure that water infiltrates into the subsurface completely (recommended infiltration rate of 72 hours or less) and that vegetation is carefully managed to prevent creating mosquito and other vector habitats.
- Observe drain time for the design storm after completion or modification of the facility to confirm that the desired drain time has been obtained.
- Schedule semiannual inspections for beginning and end of the wet season to identify potential problems such as erosion of the basin side slopes and invert, standing water, trash and debris, and sediment accumulation.
- Remove accumulated trash and debris in the basin at the start and end of the wet season.
- Inspect for standing water at the end of the wet season.
- Trim vegetation at the beginning and end of the wet season to prevent establishment of woody vegetation and for aesthetic and vector reasons.
- Remove accumulated sediment and regrade when the accumulated sediment volume exceeds 10% of the basin.
- If erosion is occurring within the basin, revegetate immediately and stabilize with an erosion control mulch or mat until vegetation cover is established.
- To avoid reversing soil development, scarification or other disturbance should only be performed when there are actual signs of clogging, rather than on a routine basis. Always remove deposited sediments before scarification, and use a hand-guided rotary tiller, if possible, or a disc harrow pulled by a very light tractor.

Cost

Infiltration basins are relatively cost-effective practices because little infrastructure is needed when constructing them. One study estimated the total construction cost at about $2 per ft (adjusted for inflation) of storage for a 0.25-acre basin (SWRPC, 1991). As with other BMPs, these published cost estimates may deviate greatly from what might be incurred at a specific site. For instance, Caltrans spent about $18/ft^3 for the two infiltration basins constructed in southern California, each of which had a water quality volume of about 0.34 ac.-ft. Much of the higher cost can be attributed to changes in the storm drain system necessary to route the runoff to the basin locations.

Infiltration basins typically consume about 2 to 3% of the site draining to them, which is relatively small. Additional space may be required for buffer, landscaping, access road, and fencing. Maintenance costs are estimated at 5 to 10% of construction costs.

One cost concern associated with infiltration practices is the maintenance burden and longevity. If improperly maintained, infiltration basins have a high failure rate. Thus, it may be necessary to replace the basin with a different technology after a relatively short period of time.

TC-11 Infiltration Basin

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Infiltration Basin TC-11

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TC-11 Infiltration Basin

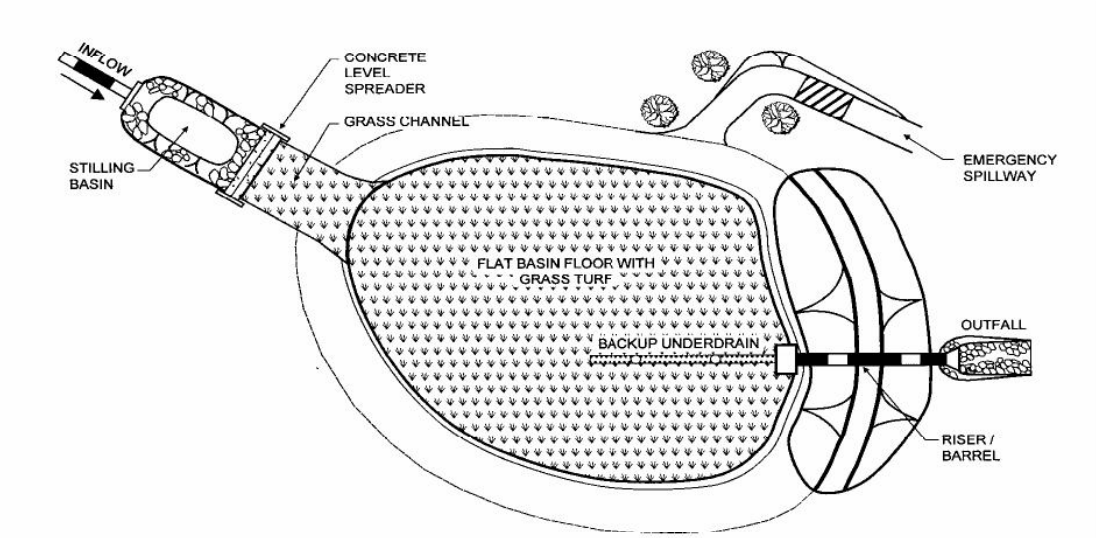

PLAN VIEW

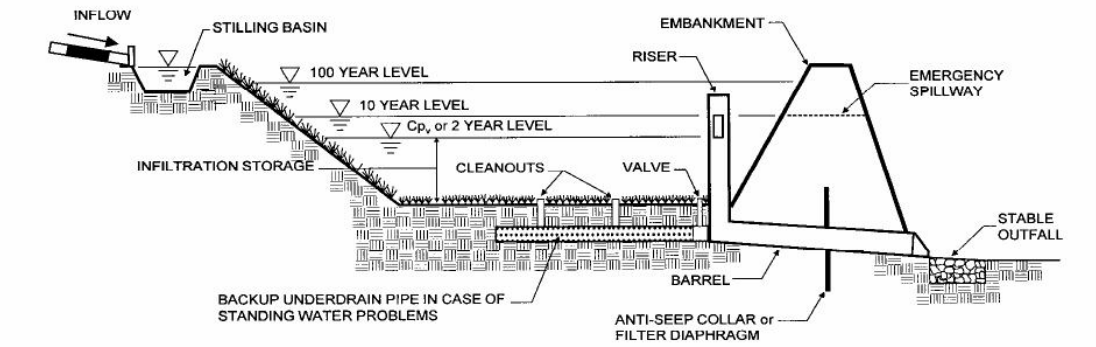

PROFILE

Retention/Irrigation TC-12

Design Considerations

- Soil for Infiltration
- Area Required
- Slope
- Environmental Side-effects

Description

Retention/irrigation refers to the capture of stormwater runoff in a holding pond and subsequent use of the captured volume for irrigation of landscape of natural pervious areas. This technology is very effective as a stormwater quality practice in that, for the captured water quality volume, it provides virtually no discharge to receiving waters and high stormwater constituent removal efficiencies. This technology mimics natural undeveloped watershed conditions wherein the vast majority of the rainfall volume during smaller rainfall events is infiltrated through the soil profile. Their main advantage over other infiltration technologies is the use of an irrigation system to spread the runoff over a larger area for infiltration. This allows them to be used in areas with low permeability soils.

Capture of stormwater can be accomplished in almost any kind of runoff storage facility, ranging from dry, concrete-lined ponds to those with vegetated basins and permanent pools. The pump and wet well should be automated with a rainfall sensor to provide irrigation only during periods when required infiltration rates can be realized. Generally, a spray irrigation system is required to provide an adequate flow rate for distributing the water quality volume (LCRA, 1998). Collection of roof runoff for subsequent use (rainwater harvesting) also qualifies as a retention/irrigation practice.

This technology is still in its infancy and there are no published reports on its effectiveness, cost, or operational requirements. The guidelines presented below should be considered tentative until additional data are available.

Targeted Constituents

☑	Sediment	■
☑	Nutrients	■
☑	Trash	■
☑	Metals	■
☑	Bacteria	■
☑	Oil and Grease	■
☑	Organics	■

Legend ***(Removal Effectiveness)***

● Low ■ High

▲ Medium

California Experience

This BMP has never been implemented in California, only in the Austin, Texas area. The use there is limited to watersheds where no increase in pollutant load is allowed because of the sensitive nature of the watersheds.

Advantages

- Pollutant removal effectiveness is high, accomplished primarily by: (1) sedimentation in the primary storage facility; (2) physical filtration of particulates through the soil profile; (3) dissolved constituents uptake in the vegetative root zone by the soil-resident microbial community.

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TC-12 Retention/Irrigation

The hydrologic characteristics of this technique are effective for simulating pre-developed watershed conditions through: (1) containment of higher frequency flood volumes (less than about a 2-year event); and (2) reduction of flow rates and velocities for erosive flow events.

- Pollutant removal rates are estimated to be nearly 100% for all pollutants in the captured and irrigated stormwater volume. However, relatively frequent inspection and maintenance is necessary to assure proper operation of these facilities.
- This technology is particularly appropriate for areas with infrequent rainfall because the system is not required to operate often and the ability to provide stormwater for irrigation can reduce demand on surface and groundwater supplies.

Limitations

- Retention-irrigation is a relatively expensive technology due primarily to mechanical systems, power requirements, and high maintenance needs.
- Due to the relative complexity of irrigation systems, they must be inspected and maintained at regular intervals to ensure reliable system function.
- Retention-irrigation systems use pumps requiring electrical energy inputs (which cost money, create pollution, and can be interrupted). Mechanical systems are also more complex, requiring skilled maintenance, and they are more vulnerable to vandalism than simpler, passive systems.
- Retention-irrigation systems require open space for irrigation and thus may be difficult to retrofit in urban areas.
- Effective use of retention irrigation requires some form of pre-treatment of runoff flows (i.e., sediment forebay or vegetated filter) to remove coarse sediment and to protect the long-term operating capacity of the irrigation equipment.
- Retention/irrigation BMPs capture and store water that, depending on design may be accessible to mosquitoes and other vectors for breeding.

Design and Sizing Guidelines

- Runoff Storage Facility Configuration and Sizing - Design of the runoff storage facility is flexible as long as the water quality volume and an appropriate pump and wet well system can be accommodated.
- Pump and Wet Well System - A reliable pump, wet well, and rainfall or soil moisture sensor system should be used to distribute the water quality volume. These systems should be similar to those used for wastewater effluent irrigation, which are commonly used in areas where “no discharge” wastewater treatment plant permits are issued.
- Detention Time - The irrigation schedule should allow for complete drawdown of the water quality volume within 72 hours. Irrigation should not begin within 12 hours of the end of rainfall so that direct storm runoff has ceased and soils are not saturated. Consequently, the length of the active irrigation period is 60 hours. The irrigation should include a cycling factor of ½, so that each portion of the area will be irrigated for only 30 hours during the

total of 60 hours allowed for disposal of the water quality volume. Irrigation also should not occur during subsequent rainfall events.

- Irrigation System - Generally a spray irrigation system is required to provide an adequate flow rate for timely distribution of the water quality volume.
- Designs that utilize covered water storage should be accessible to vector control personnel via access doors to facilitate vector surveillance and control if needed.
- Irrigation Site Criteria – The area selected for irrigation must be pervious, on slopes of less than 10%. A geological assessment is required for proposed irrigation areas to assure that there is a minimum of 12 inches of soil cover. Rocky soils are acceptable for irrigation; however, the coarse material (diameter greater than 0.5 inches) should not account for more than 30% of the soil volume. Optimum sites for irrigation include recreational and greenbelt areas as well as landscaping in commercial developments. The stormwater irrigation area should be distinct and different from any areas used for wastewater effluent irrigation. Finally, the area designated for irrigation should have at least a 100-foot buffer from wells, septic systems, and natural wetlands.
- Irrigation Area – The irrigation rate must be low enough so that the irrigation does not produce any surface runoff; consequently, the irrigation rate may not exceed the permeability of the soil. The minimum required irrigation area should be calculated using the following formula:

$$A = \frac{12 \times V}{T \times r}$$

where:

A = area required for irrigation (ft2)

V = water quality volume (ft3)

T = period of active irrigation (30 hr)

r = Permeability (in/hr)

- The permeability of the soils in the area proposed for irrigation should be determined using a double ring infiltrometer (ASTM D 3385-94) or from county soil surveys prepared by the Natural Resource Conservation Service. If a range of permeabilities is reported, the average value should be used in the calculation. If no permeability data is available, a value of 0.1 inches/hour should be assumed.
- It should be noted that the minimum area requires intermittent irrigation over a period of 60 hours at low rates to use the entire water quality volume. This intensive irrigation may be harmful to vegetation that is not adapted to long periods of wet conditions. In practice, a much larger irrigation area will provide better use of the retained water and promote a healthy landscape.

TC-12 Retention/Irrigation

Performance

This technology is still in its infancy and there are no published reports on its effectiveness, cost, or operational requirements.

Siting Criteria

Capture of stormwater can be accomplished in almost any kind of runoff storage facility, ranging from dry, concrete-lined ponds to those with vegetated basins and permanent pools. Siting is contingent upon the type of facility used.

Additional Design Guidelines

This technology is still in its infancy and there are no published reports on its effectiveness, cost, or operational requirements.

Maintenance

Relatively frequent inspection and maintenance is necessary to verify proper operation of these facilities. Some maintenance concerns are specific to the type or irrigation system practice used.

BMPs that store water can become a nuisance due to mosquito and other vector breeding. Preventing mosquito access to standing water sources in BMPs (particularly below-ground) is the best prevention plan, but can prove challenging due to multiple entrances and the need to maintain the hydraulic integrity of the system. Reliance on electrical pumps is prone to failure and in some designs (e.g., sumps, vaults) may not provide complete dewatering, both which increase the chances of water standing for over 72 hours and becoming a breeding place for vectors. BMPs that hold water for over 72 hours and/or rely on electrical or mechanical devices to dewater may require routine inspections and treatments by local mosquito and vector control agencies to suppress mosquito production. Open storage designs such as ponds and basins (see appropriate fact sheets) will require routine preventative maintenance plans and may also require routine inspections and treatments by local mosquito and vector control agencies.

Cost

This technology is still in its infancy and there are no published reports on its effectiveness, cost, or operational requirements. However, O&M costs for retention-irrigation systems are high compared to virtually all other stormwater quality control practices because of the need for: (1) frequent inspections; (2) the reliance on mechanical equipment; and (3) power costs.

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Retention/Irrigation TC-12

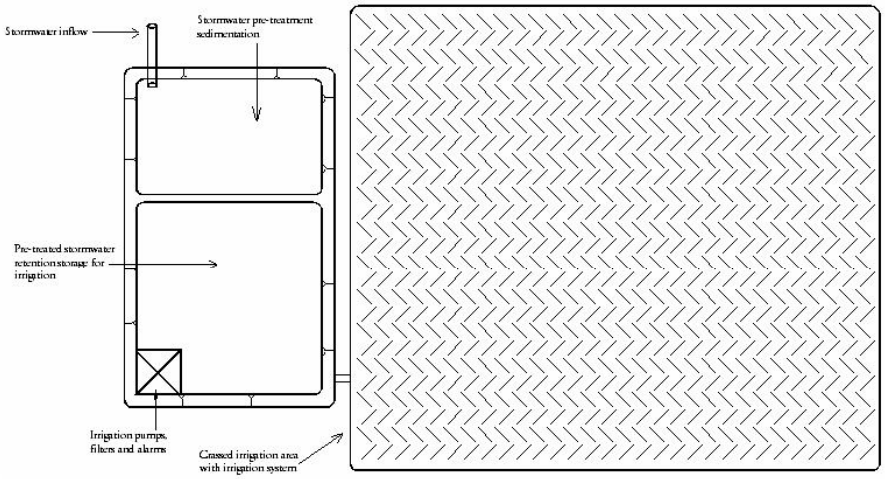

Wet Ponds TC-20

Design Considerations

- Area Required
- Slope
- Water Availability
- Aesthetics
- Environmental Side-effects

Description

Wet ponds (a.k.a. stormwater ponds, retention ponds, wet extended detention ponds) are constructed basins that have a permanent pool of water throughout the year (or at least throughout the wet season) and differ from constructed wetlands primarily in having a greater average depth. Ponds treat incoming stormwater runoff by settling and biological uptake. The primary removal mechanism is settling as stormwater runoff resides in this pool, but pollutant uptake, particularly of nutrients, also occurs to some degree through biological activity in the pond. Wet ponds are among the most widely used stormwater practices. While there are several different versions of the wet pond design, the most common modification is the extended detention wet pond, where storage is provided above the permanent pool in order to detain stormwater runoff and promote settling. The schematic diagram is of an on-line pond that includes detention for larger events, but this is not required in all areas of the state.

Targeted Constituents

☑	Sediment	■
☑	Nutrients	▲
☑	Trash	■
☑	Metals	■
☑	Bacteria	■
☑	Oil and Grease	■
☑	Organics	■

Legend *(Removal Effectiveness)*

● Low ■ High

▲ Medium

California Experience

Caltrans constructed a wet pond in northern San Diego County (I-5 and La Costa Blvd.). Largest issues at this site were related to vector control, vegetation management, and concern that endangered species would become resident and hinder maintenance activities.

Advantages

- If properly designed, constructed and maintained, wet basins can provide substantial aesthetic/recreational value and wildlife and wetlands habitat.
- Ponds are often viewed as a public amenity when integrated into a park setting.

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- Due to the presence of the permanent wet pool, properly designed and maintained wet basins can provide significant water quality improvement across a relatively broad spectrum of constituents including dissolved nutrients.
- Widespread application with sufficient capture volume can provide significant control of channel erosion and enlargement caused by changes to flow frequency relationships resulting from the increase of impervious cover in a watershed.

Limitations

- Some concern about safety when constructed where there is public access.
- Mosquito and midge breeding is likely to occur in ponds.
- Cannot be placed on steep unstable slopes.
- Need for base flow or supplemental water if water level is to be maintained.
- Require a relatively large footprint
- Depending on volume and depth, pond designs may require approval from the State Division of Safety of Dams

Design and Sizing Guidelines

- Capture volume determined by local requirements or sized to treat 85% of the annual runoff volume.
- Use a draw down time of 48 hours in most areas of California. Draw down times in excess of 48 hours may result in vector breeding, and should be used only after coordination with local vector control authorities. Draw down times of less than 48 hours should be limited to BMP drainage areas with coarse soils that readily settle and to watersheds where warming may be detrimental to downstream fisheries.
- Permanent pool volume equal to twice the water quality volume.
- Water depth not to exceed about 8 feet.
- Wetland vegetation occupying no more than 25% of surface area.
- Include energy dissipation in the inlet design and a sediment forebay to reduce resuspension of accumulated sediment and facilitate maintenance.
- A maintenance ramp should be included in the design to facilitate access to the forebay for maintenance activities and for vector surveillance and control.
- To facilitate vector surveillance and control activities, road access should be provided along at least one side of BMPs that are seven meters or less in width. Those BMPs that have shoreline-to-shoreline distances in excess of seven meters should have perimeter road access on both sides or be designed such that no parcel of water is greater than seven meters from the road.

Wet Ponds TC-20

Construction/Inspection Considerations

- In areas with porous soils an impermeable liner may be required to maintain an adequate permanent pool level.
- Outlet structures and piping should be installed with collars to prevent water from seeping through the fill and causing structural failure.
- Inspect facility after first large storm to determine whether the desired residence time has been achieved.

Performance

The observed pollutant removal of a wet pond is highly dependent on two factors: the volume of the permanent pool relative to the amount of runoff from the typical event in the area and the quality of the base flow that sustains the permanent pool. A recent study (Caltrans, 2002) has documented that if the permanent pool is much larger than the volume of runoff from an average event, then displacement of the permanent pool by the wet weather flow is the primary process. A statistical comparison of the wet pond discharge quality during dry and wet weather shows that they are not significantly different. Consequently, there is a relatively constant discharge quality during storms that is the same as the concentrations observed in the pond during ambient (dry weather) conditions. Consequently, for most constituents the performance of the pond is better characterized by the average effluent concentration, rather than the "percent reduction," which has been the conventional measure of performance. Since the effluent quality is essentially constant, the percent reduction observed is mainly a function of the influent concentrations observed at a particular site.

The dry and wet weather discharge quality is, therefore, related to the quality of the base flow that sustains the permanent pool and of the transformations that occur to those constituents during their residence in the basin. One could potentially expect a wide range of effluent concentrations at different locations even if the wet ponds were designed according to the same guidelines, if the quality of the base flow differed significantly. This may explain the wide range of concentration reductions reported in various studies.

Concentrations of nutrients in base flow may be substantially higher than in urban stormwater runoff. Even though these concentrations may be substantially reduced during the residence time of the base flow in the pond, when this water is displaced by wet weather flows, concentrations may still be quite elevated compared to the levels that promote eutrophication in surface water systems. Consequently comparing influent and effluent nutrient concentrations during wet weather can make the performance seem highly variable.

Relatively small perennial flows may often substantially exceed the wet weather flow treated. Consequently, one should also consider the load reduction observed under ambient conditions when assessing the potential benefit to the receiving water.

Siting Criteria

Wet ponds are a widely applicable stormwater management practice and can be used over a broad range of storm frequencies and sizes, drainage areas and land use types. Although they have limited applicability in highly urbanized settings and in arid climates, they have few other restrictions. Wet basins may be constructed on- or off-line and can be sited at feasible locations along established drainage ways with consistent base flow. An off-line design is preferred. Wet basins are often utilized in smaller sub-watersheds and are particularly appropriate in areas with residential land

uses or other areas where high nutrient loads are considered to be potential problems (e.g., golf courses).

Ponds do not consume a large area (typically 2–3 percent of the contributing drainage area); however, these facilities are generally large. Other practices, such as filters or swales, may be "squeezed" into relatively unusable land, but ponds need a relatively large continuous area. Wet basins are typically used in drainage basins of more than ten acres and less than one square mile (Schueler et al., 1992). Emphasis can be placed in siting wet basins in areas where the pond can also function as an aesthetic amenity or in conjunction with other stormwater management functions.

Wet basin application is appropriate in the following settings: (1) where there is a need to achieve a reasonably high level of dissolved contaminant removal and/or sediment capture; (2) in small to medium-sized regional tributary areas with available open space and drainage areas greater than about 10 ha (25 ac.); (3) where base flow rates or other channel flow sources are relatively consistent year-round; (4) in residential settings where aesthetic and wildlife habitat benefits can be appreciated and maintenance activities are likely to be consistently undertaken.

Traditional wet extended detention ponds can be applied in most regions of the United States, with the exception of arid climates. In arid regions, it is difficult to justify the supplemental water needed to maintain a permanent pool because of the scarcity of water. Even in semi-arid Austin, Texas, one study found that 2.6 acre-feet per year of supplemental water was needed to maintain a permanent pool of only 0.29 acre-feet (Saunders and Gilroy, 1997). Seasonal wet ponds (i.e., ponds that maintain a permanent pool only during the wet season) may prove effective in areas with distinct wet and dry seasons; however, this configuration has not been extensively evaluated.

Wet ponds may pose a risk to cold water systems because of their potential for stream warming. When water remains in the permanent pool, it is heated by the sun. A study in Prince George's County, Maryland, found that stormwater wet ponds heat stormwater by about 9°F from the inlet to the outlet (Galli, 1990).

Additional Design Guidelines

Specific designs may vary considerably, depending on site constraints or preferences of the designer or community. There are several variations of the wet pond design, including constructed wetlands, and wet extended detention ponds. Some of these design alternatives are intended to make the practice adaptable to various sites and to account for regional constraints and opportunities. In conventional wet ponds, the open water area comprises 50% or more of the total surface area of the pond. The permanent pool should be no deeper than 2.5 m (8 feet) and should average 1.2 – 2 m (4-6 feet) deep. The greater depth of this configuration helps limit the extent of the vegetation to an aquatic bench around the perimeter of the pond with a nominal depth of about 1 foot and variable width. This shallow bench also protects the banks from erosion, enhances habitat and aesthetic values, and reduces the drowning hazard.

The wet extended detention pond combines the treatment concepts of the dry extended detention pond and the wet pond. In this design, the water quality volume is detained above the permanent pool and released over 24 hours. In addition to increasing the residence time, which improves pollutant removal, this design also attenuates peak runoff rates. Consequently, this design alternative is recommended.

Wet Ponds TC-20

Pretreatment incorporates design features that help to settle out coarse sediment particles. By removing these particles from runoff before they reach the large permanent pool, the maintenance burden of the pond is reduced. In ponds, pretreatment is achieved with a sediment forebay. A sediment forebay is a small pool (typically about 10 percent of the volume of the permanent pool). Coarse particles remain trapped in the forebay, and maintenance is performed on this smaller pool, eliminating the need to dredge the entire pond.

There are a variety of sizing criteria for determining the volume of the permanent pool, mostly related to the water quality volume (i.e., the volume of water treated for pollutant removal) or the average storm size in a particular area. In addition, several theoretical approaches to determination of permanent pool volume have been developed. However, there is little empirical evidence to support these designs. Consequently, a simplified method (i.e., permanent pool volume equal to twice the water quality volume) is recommended.

Other design features do not increase the volume of a pond, but can increase the amount of time stormwater remains in the device and eliminate short-circuiting. Ponds should always be designed with a length-to-width ratio of at least 1.5:1, where feasible. In addition, the design should incorporate features to lengthen the flow path through the pond, such as underwater berms designed to create a longer route through the pond. Combining these two measures helps ensure that the entire pond volume is used to treat stormwater. Wet ponds with greater amounts of vegetation often have channels through the vegetated areas and contain dead areas where stormwater is restricted from mixing with the entire permanent pool, which can lead to less pollutant removal. Consequently, a pond with open water comprising about 75% of the surface area is preferred.

Design features are also incorporated to ease maintenance of both the forebay and the main pool of ponds. Ponds should be designed with a maintenance access to the forebay to ease this relatively routine (every 5–7 year) maintenance activity. In addition, ponds should generally have a drain to draw down the pond for vegetation harvesting or the more infrequent dredging of the main cell of the pond.

Cold climates present many challenges to designers of wet ponds. The spring snowmelt may have a high pollutant load and a large volume to be treated. In addition, cold winters may cause freezing of the permanent pool or freezing at inlets and outlets. Finally, high salt concentrations in runoff resulting from road salting, and sediment loads from road sanding, may impact pond vegetation as well as reduce the storage and treatment capacity of the pond.

One option to deal with high pollutant loads and runoff volumes during the spring snowmelt is the use of a seasonally operated pond to capture snowmelt during the winter and retain the permanent pool during warmer seasons. In this option, proposed by Oberts (1994), the pond has two water quality outlets, both equipped with gate valves. In the summer, the lower outlet is closed. During the fall and throughout the winter, the lower outlet is opened to draw down the permanent pool. As the spring melt begins, the lower outlet is closed to provide detention for the melt event. The manipulation of this system requires some labor and vigilance; a careful maintenance agreement should be confirmed.

Several other modifications may help to improve the performance of ponds in cold climates. Designers should consider planting the pond with salt-tolerant vegetation if the facility receives road runoff. In order to counteract the effects of freezing on inlet and outlet structures, the use of inlet and outlet structures that are resistant to frost, including weirs and larger diameter pipes, may be

useful. Designing structures on-line, with a continuous flow of water through the pond, will also help prevent freezing of these structures. Finally, since freezing of the permanent pool can reduce the effectiveness of pond systems, it is important to incorporate extended detention into the design to retain usable treatment area above the permanent pool when it is frozen.

Summary of Design Recommendations

(1) Facility Sizing – The basin should be sized to hold the permanent pool as well as the required water quality volume. The volume of the permanent pool should equal twice the water quality volume.

(2) Pond Configuration - The wet basin should be configured as a two stage facility with a sediment forebay and a main pool. The basins should be wedge-shaped, narrowest at the inlet and widest at the outlet. The minimum length to width ratio should be 1.5 where feasible. The perimeter of all permanent pool areas with depths of 4.0 feet or greater should be surrounded by an aquatic bench. This bench should extend inward 5-10 feet from the perimeter of the permanent pool and should be no more than 18 inches below normal depth. The area of the bench should not exceed about 25% of pond surface. The depth in the center of the basin should be 4 – 8 feet deep to prevent vegetation from encroaching on the pond open water surface.

(3) Pond Side Slopes - Side slopes of the basin should be 3:1 (H:V) or flatter for grass stabilized slopes. Slopes steeper than 3:1 should be stabilized with an appropriate slope stabilization practice.

(4) Sediment Forebay - A sediment forebay should be used to isolate gross sediments as they enter the facility and to simplify sediment removal. The sediment forebay should consist of a separate cell formed by an earthen berm, gabion, or loose riprap wall. The forebay should be sized to contain 15 to 25% of the permanent pool volume and should be at least 3 feet deep. Exit velocities from the forebay should not be erosive. Direct maintenance access should be provided to the forebay. The bottom of the forebay may be hardened (concrete) to make sediment removal easier. A fixed vertical sediment depth marker should be installed in the forebay to measure sediment accumulation.

(5) Outflow Structure - Figure 2 presents a schematic representation of suggested outflow structures. The outlet structure should be designed to drain the water quality volume over 24 hours with the orifice sized according to the equation presented in the Extended Detention Basin fact sheet. The facility should have a separate drain pipe with a manual valve that can completely or partially drain the pond for maintenance purposes. To allow for possible sediment accumulation, the submerged end of the pipe should be protected, and the drain pipe should be sized to drain the pond within 24 hours. The valve should be located at a point where it can be operated in a safe and convenient manner.

For on-line facilities, the principal and emergency spillways must be sized to provide 1.0 foot of freeboard during the 25-year event and to safely pass the 100-year flood. The embankment should be designed in accordance with all relevant specifications for small dams.

Wet Ponds TC-20

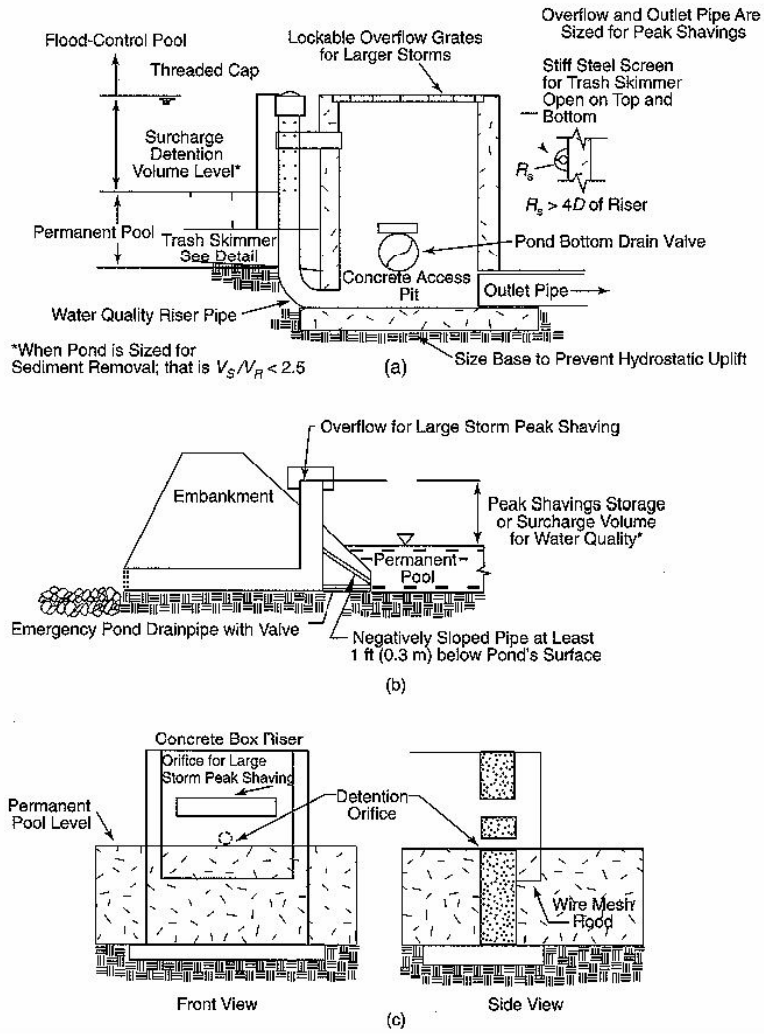

(6) Splitter Box - When the pond is designed as an off-line facility, a splitter structure is used to isolate the water quality volume. The splitter box, or other flow diverting approach, should be designed to convey the 25-year event while providing at least 1.0 foot of freeboard along pond side slopes.

(7) Vegetation - A plan should be prepared that indicates how aquatic and terrestrial areas will be vegetatively stabilized. Wetland vegetation elements should be placed along the aquatic bench or in the shallow portions of the permanent pool. The optimal elevation for planting of wetland vegetation is within 6 inches vertically of the normal pool elevation. A list of some wetland vegetation native to California is presented in Table 1.

Table 1 California Wetland Vegetation	
Botanical Name	**Common Name**
BACCHARIS SALICIFOLIA	MULE FAT
FRANKENIA GRANDIFOLIA	HEATH
SALIX GOODINGII	BLACK WILLOW
SALIX LASIOLEPIS	ARROYO WILLOW
SAMUCUS MEXICANUS	MEXICAN ELDERBERRY
HAPLOPAPPUS VENETUS	COAST GOLDENBRUSH
DISTICHIS SPICATA	SALT GRASS
LIMONIUM CALIFORNICUM	COASTAL STATICE
ATRIPLEX LENTIFORMIS	COASTAL QUAIL BUSH
BACCHARIS PILULARIS	CHAPARRAL BROOM
MIMULUS LONGIFLORUS	MONKEY FLOWER
SCIRPUS CALIFORNICUS	BULRUSH
SCIRPUS ROBUSTUS	BULRUSH
TYPHA LATIFOLIA	BROADLEAF CATTAIL
JUNCUS ACUTUS	RUSH

Maintenance

The amount of maintenance required for a wet pond is highly dependent on local regulatory agencies, particular health and vector control agencies. These agencies are often extremely concerned about the potential for mosquito breeding that may occur in the permanent pool. Even though mosquito fish (*Gambusia affinis*) were introduced into a wet pond constructed by Caltrans in the San Diego area, mosquito breeding was routinely observed during inspections. In addition, the vegetation at this site became sufficiently dense on the bench around the edge of the pool that mosquito fish were unable to enter this area to feed upon the mosquito larvae. The vegetation at this site was particularly vigorous because of the high nutrient concentrations in the perennial base flow (15.5 mg/L NO3-N) and the mild climate, which permitted growth year round. Consequently, the vector control agency required an annual harvest of vegetation to address this situation. This harvest can be very expensive.

On the other hand, routine harvesting may increase nutrient removal and prevent the export of these constituents from dead and dying plants falling in the water. A previous study (Faulkner and Richardson, 1991) documented dramatic reductions in nutrient removal after the first several years of operation and related it to the vegetation achieving a maximum density. That content then decreases through the growth season, as the total biomass increases. In effect, the total amount of

nutrients/m2 of wetland remains essentially the same from June through September, when the plants start to put the P back into the rhizomes. Therefore harvesting should occur between June and September. Research also suggests that harvesting only the foliage is less effective, since a very small percentage of the removed nutrients is taken out with harvesting.

Since wet ponds are often selected for their aesthetic considerations as well as pollutant removal, they are often sited in areas of high visibility. Consequently, floating litter and debris are removed more frequently than would be required simply to support proper functioning of the pond and outlet. This is one of the primary maintenance activities performed at the Central Market Pond located in Austin, Texas. In this type of setting, vegetation management in the area surrounding the pond can also contribute substantially to the overall maintenance requirements.

One normally thinks of sediment removal as one of the typical activities performed at stormwater BMPs. This activity does not normally constitute one of the major activities on an annual basis. At the concentrations of TSS observed in urban runoff from stable watersheds, sediment removal may only be required every 20 years or so. Because this activity is performed so infrequently, accurate costs for this activity are lacking.

In addition to regular maintenance activities needed to maintain the function of wet ponds, some design features can be incorporated to ease the maintenance burden. In wet ponds, maintenance reduction features include techniques to reduce the amount of maintenance needed, as well as techniques to make regular maintenance activities easier.

One potential maintenance concern in wet ponds is clogging of the outlet. Ponds should be designed with a non-clogging outlet such as a reverse-slope pipe, or a weir outlet with a trash rack. A reverse-slope pipe draws from below the permanent pool extending in a reverse angle up to the riser and establishes the water elevation of the permanent pool. Because these outlets draw water from below the level of the permanent pool, they are less likely to be clogged by floating debris.

Typical maintenance activities and frequencies include:

- Schedule semiannual inspections for burrows, sediment accumulation, structural integrity of the outlet, and litter accumulation.
- Remove accumulated trash and debris in the basin at the middle and end of the wet season. The frequency of this activity may be altered to meet specific site conditions and aesthetic considerations.
- Where permitted by the Department of Fish and Game or other agency regulations, stock wet ponds/constructed wetlands regularly with mosquito fish (*Gambusia spp.*) to enhance natural mosquito and midge control.
- Introduce mosquito fish and maintain vegetation to assist their movements to control mosquitoes, as well as to provide access for vector inspectors. An annual vegetation harvest in summer appears to be optimum, in that it is after the bird breeding season, mosquito fish can provide the needed control until vegetation reaches late summer density, and there is time for re-growth for runoff treatment purposes before the wet season. In certain cases, more frequent plant harvesting may be required by local vector control agencies.

- Maintain emergent and perimeter shoreline vegetation as well as site and road access to facilitate vector surveillance and control activities.
- Remove accumulated sediment in the forebay and regrade about every 5-7 years or when the accumulated sediment volume exceeds 10 percent of the basin volume. Sediment removal may not be required in the main pool area for as long as 20 years.

Cost

Construction Cost

Wet ponds can be relatively inexpensive stormwater practices; however, the construction costs associated with these facilities vary considerably. Much of this variability can be attributed to the degree to which the existing topography will support a wet pond, the complexity and amount of concrete required for the outlet structure, and whether it is installed as part of new construction or implemented as a retrofit of existing storm drain system.

A recent study (Brown and Schueler, 1997) estimated the cost of a variety of stormwater management practices. The study resulted in the following cost equation, adjusting for inflation:

$$C = 24.5^{V_{0.705}}$$

where:

C = Construction, design and permitting cost;

V = Volume in the pond to include the 10-year storm (ft^3).

Using this equation, typical construction costs are:

$45,700 for a 1 acre-foot facility

$232,000 for a 10 acre-foot facility

$1,170,000 for a 100 acre-foot facility

In contrast, Caltrans (2002) reported spending over $448,000 for a pond with a total permanent pool plus water quality volume of only 1036 m^3 (0.8 ac.-ft.), while the City of Austin spent $584,000 (including design) for a pond with a permanent pool volume of 3,100 m^3 (2.5 ac.-ft.). The large discrepancies between the costs of these actual facilities and the model developed by Brown and Schueler indicate that construction costs are highly site specific, depending on topography, soils, subsurface conditions, the local labor, rate and other considerations.

Maintenance Cost

For ponds, the annual cost of routine maintenance has typically been estimated at about 3 to 5 percent of the construction cost; however, the published literature is almost totally devoid of actual maintenance costs. Since ponds are long-lived facilities (typically longer than 20 years), major maintenance activities are unlikely to occur during a relatively short study.

Caltrans (2002) estimated annual maintenance costs of $17,000 based on three years of monitoring of a pond treating runoff from 1.7 ha. Almost all the activities are associated with the annual vegetation harvest for vector control. Total cost at this site falls within the 3-5% range reported

above; however, the construction costs were much higher than those estimated by Brown and Schueler (1997). The City of Austin has been reimbursing a developer about $25,000/yr for wet pond maintenance at a site located at a very visible location. Maintenance costs are mainly the result of vegetation management and litter removal. On the other hand, King County estimates annual maintenance costs at about $3,000 per pond; however, this cost likely does not include annual extensive vegetation removal. Consequently, maintenance costs may vary considerably at sites in California depending on the aggressiveness of the vegetation management in that area and the frequency of litter removal.

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Wet Ponds TC-20

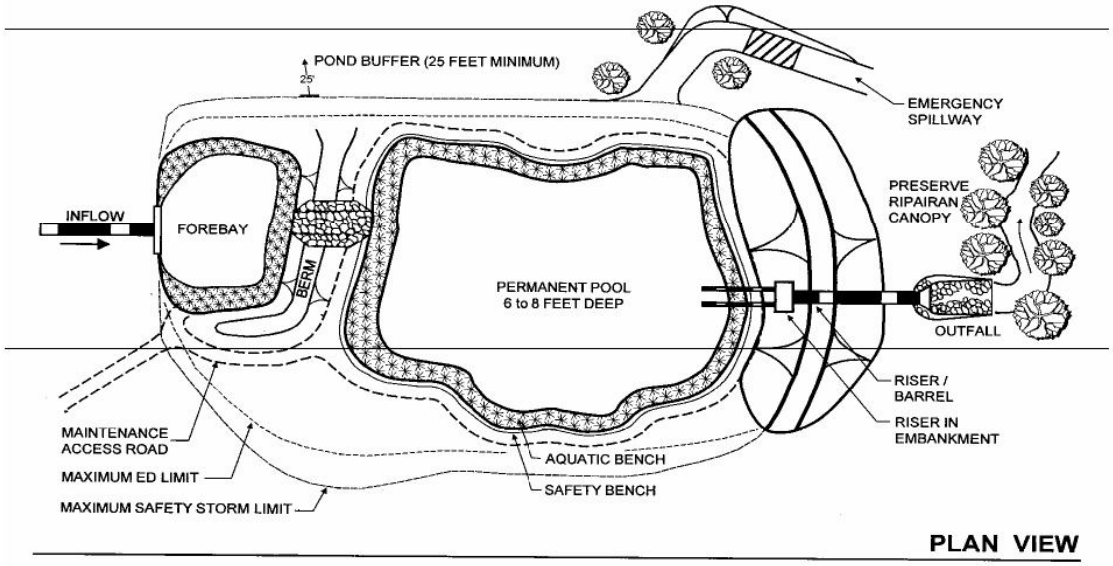

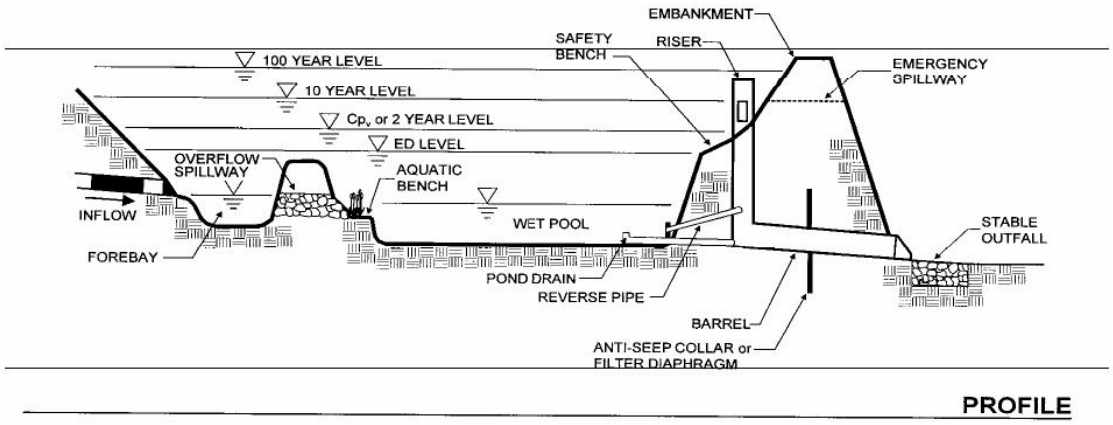

Constructed Wetlands TC-21

Design Considerations

- Area Required
- Slope
- Water Availability
- Aesthetics
- Environmental Side-effects

Description

Constructed wetlands are constructed basins that have a permanent pool of water throughout the year (or at least throughout the wet season) and differ from wet ponds primarily in being shallower and having greater vegetation coverage. The schematic diagram is of an on-line pond that includes detention for larger events, but this is not required in all areas of the state.

A distinction should be made between using a constructed wetland for storm water management and diverting storm water into a natural wetland. The latter practice is not recommended and in all circumstances, natural wetlands should be protected from the adverse effects of development, including impacts from increased storm water runoff. This is especially important because natural wetlands provide storm water and flood control benefits on a regional scale.

Wetlands are among the most effective stormwater practices in terms of pollutant removal and they also offer aesthetic value. As stormwater runoff flows through the wetland, pollutant removal is achieved through settling and biological uptake within the wetland. Flow through the root systems forces the vegetation to remove nutrients and dissolved pollutants from the stormwater.

California Experience

The City of Laguna Niguel in Orange County has constructed several wetlands, primarily to reduce bacteria concentrations in dry weather flows. The wetlands have been very successful in this regard. Even though there is not enough perennial flow to maintain the permanent pool at a constant elevation, the wetland vegetation has thrived.

Targeted Constituents

☑	Sediment	■
☑	Nutrients	▲
☑	Trash	■
☑	Metals	■
☑	Bacteria	■
☑	Oil and Grease	■
☑	Organics	■

Legend ***(Removal Effectiveness)***

● Low ■ High

▲ Medium

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TC-21 Constructed Wetlands

Advantages

- If properly designed, constructed and maintained, wet basins can provide substantial wildlife and wetlands habitat.
- Due to the presence of the permanent wet pool, properly designed and maintained wet basins can provide significant water quality improvement across a relatively broad spectrum of constituents including dissolved nutrients.
- Widespread application with sufficient capture volume can provide significant control of channel erosion and enlargement caused by changes to flow frequency relationships resulting from the increase of impervious cover in a watershed.

Limitations

- There may be some aesthetic concerns about a facility that looks swampy.
- Some concern about safety when constructed where there is public access.
- Mosquito and midge breeding is likely to occur in wetlands.
- Cannot be placed on steep unstable slopes.
- Need for base flow or supplemental water if water level is to be maintained.
- Require a relatively large footprint
- Depending on volume and depth, pond designs may require approval from the State Division of Safety of Dams

Design and Sizing Guidelines

- Capture volume determined by local requirements or sized to treat 85% of the annual runoff volume.
- Outlet designed to discharge the capture volume over a period of 24 hours.
- Permanent pool volume equal to twice the water quality volume.
- Water depth not to exceed about 4 feet.
- Wetland vegetation occupying no more than 50% of surface area.
- Include energy dissipation in the inlet design and a sediment forebay to reduce resuspension of accumulated sediment and facilitate maintenance.
- A maintenance ramp should be included in the design to facilitate access to the forebay for maintenance activities and for vector surveillance and control.
- To facilitate vector surveillance and control activities, road access should be provided along at least one side of BMPs that are seven meters or less in width. Those BMPs that have shoreline-to-shoreline distances in excess of seven meters should have perimeter road access on both sides or be designed such that no parcel of water is greater than seven meters from the road.

Constructed Wetlands TC-21

Construction/Inspection Considerations

- In areas with porous soils an impermeable liner may be required to maintain an adequate permanent pool level.
- Outlet structures and piping should be installed with collars to prevent water from seeping through the fill and causing structural failure.
- Inspect facility after first large storm to determine whether the desired residence time has been achieved.

Performance

The processes that impact the performance of constructed wetlands are essentially the same as those operating in wet ponds and similar pollutant reduction would be expected. One concern about the long-term performance of wetlands is associated with the vegetation density. If vegetation covers the majority of the facility, open water is confined to a few well defined channels. This can limit mixing of the stormwater runoff with the permanent pool and reduce the effectiveness as compared to a wet pond where a majority of the area is open water.

Siting Criteria

Wet ponds are a widely applicable stormwater management practice and can be used over a broad range of storm frequencies and sizes, drainage areas and land use types. Although they have limited applicability in highly urbanized settings and in arid climates, they have few other restrictions. Constructed wetlands may be constructed on- or off-line and can be sited at feasible locations along established drainage ways with consistent base flow. An off-line design is preferred. Constructed wetlands are often utilized in smaller sub-watersheds and are particularly appropriate in areas with residential land uses or other areas where high nutrient loads are considered to be potential problems (e.g., golf courses).

Wetlands generally consume a fairly large area (typically 4-6 percent of the contributing drainage area), and these facilities are generally larger than wet ponds because the average depth is less.

Wet basin application is appropriate in the following settings: (1) where there is a need to achieve a reasonably high level of dissolved contaminant removal and/or sediment capture; (2) in small to medium-sized regional tributary areas with available open space and drainage areas greater than about 10 ha (25 ac.); (3) where base flow rates or other channel flow sources are relatively consistent year-round; (4) in settings where wildlife habitat benefits can be appreciated.

Additional Design Guidelines

Constructed wetlands generally feature relatively uniformly vegetated areas with depths of one foot or less and open water areas (25-50% of the total area) no more than about 1.2 m (4 feet) deep, although design configuration options are relatively flexible. Wetland vegetation is comprised generally of a diverse, local aquatic plant species. Constructed wetlands can be designed on-line or off-line and generally serve relatively smaller drainage areas than wet ponds, although because of the shallow depths, the footprint of the facility will be larger than a wet pond serving the same tributary area.

TC-21 Constructed Wetlands

The extended detention shallow wetland combines the treatment concepts of the dry extended detention pond and the constructed wetland. In this design, the water quality volume is detained above the permanent pool and released over 24 hours. In addition to increasing the residence time, which improves pollutant removal, this design also attenuates peak runoff rates. Consequently, this design alternative is recommended.

Pretreatment incorporates design features that help to settle out coarse sediment particles. By removing these particles from runoff before they reach the large permanent pool, the maintenance burden of the pond is reduced. In ponds, pretreatment is achieved with a sediment forebay. A sediment forebay is a small pool (typically about 10 percent of the volume of the permanent pool). Coarse particles remain trapped in the forebay, and maintenance is performed on this smaller pool, eliminating the need to dredge the entire pond.

Effective wetland design displays "complex microtopography." In other words, wetlands should have zones of both very shallow (<6 inches) and moderately shallow (<18 inches) wetlands incorporated, using underwater earth berms to create the zones. This design will provide a longer flow path through the wetland to encourage settling, and it provides two depth zones to encourage plant diversity.

There are a variety of sizing criteria for determining the volume of the permanent pool, mostly related to the water quality volume (i.e., the volume of water treated for pollutant removal) or the average storm size in a particular area. In addition, several theoretical approaches to determination of permanent pool volume have been developed. However, there is little empirical evidence to support these designs. Consequently, a simplified method (i.e., permanent pool volume equal to twice the water quality volume) is recommended.

Design features are also incorporated to ease maintenance of both the forebay and the main pool of ponds. Ponds should be designed with a maintenance access to the forebay to ease this relatively routine (every 5–7 year) maintenance activity. In addition, ponds should generally have a drain to draw down the pond for vegetation harvesting or the more infrequent dredging of the main cell of the pond.

Summary of Design Recommendations

(1) Facility Sizing – The basin should be sized to hold the permanent pool as well as the required water quality volume. The volume of the permanent pool should equal twice the water quality volume.

(2) Pond Configuration - The wet basin should be configured as a two stage facility with a sediment forebay and a main pool. The basins should be wedge-shaped, narrowest at the inlet and widest at the outlet. The minimum length to width ratio should be 1.5 where feasible. The depth in the center of the basin should be about 4 feet deep to prevent vegetation from encroaching on the pond open water surface.

(3) Pond Side Slopes - Side slopes of the basin should be 3:1 (H:V) or flatter for grass stabilized slopes. Slopes steeper than 3:1 should be stabilized with an appropriate slope stabilization practice.

(4) Sediment Forebay - A sediment forebay should be used to isolate gross sediments as they enter the facility and to simplify sediment removal. The sediment forebay

should consist of a separate cell formed by an earthen berm, gabion, or loose riprap wall. The forebay should be sized to contain 15 to 25% of the permanent pool volume and should be at least 3 feet deep. Exit velocities from the forebay should not be erosive. Direct maintenance access should be provided to the forebay. The bottom of the forebay may be hardened (concrete) to make sediment removal easier. A fixed vertical sediment depth marker should be installed in the forebay to measure sediment accumulation.

(5) Splitter Box - When the pond is designed as an off-line facility, a splitter structure is used to isolate the water quality volume. The splitter box, or other flow diverting approach, should be designed to convey the 25-year event while providing at least 1.0 foot of freeboard along pond side slopes.

(6) Vegetation - A plan should be prepared that indicates how aquatic and terrestrial areas will be vegetatively stabilized. Wetland vegetation elements should be placed along the aquatic bench or in the shallow portions of the permanent pool. The optimal elevation for planting of wetland vegetation is within 6 inches vertically of the normal pool elevation. A list of some wetland vegetation native to California is presented in the wet pond fact sheet.

Maintenance

The amount of maintenance required for a constructed wetland is highly dependent on local regulatory agencies, particular health and vector control agencies. These agencies are often extremely concerned about the potential for mosquito breeding that may occur in the permanent pool.

Routine harvesting of vegetation may increase nutrient removal and prevent the export of these constituents from dead and dying plants falling in the water. A previous study (Faulkner and Richardson, 1991) documented dramatic reductions in nutrient removal after the first several years of operation and related it to the vegetation achieving a maximum density. Vegetation harvesting in the summer is recommended.

Typical maintenance activities and frequencies include:

- Schedule semiannual inspections for burrows, sediment accumulation, structural integrity of the outlet, and litter accumulation.
- Remove accumulated trash and debris in the basin at the middle and end of the wet season. The frequency of this activity may be altered to meet specific site conditions and aesthetic considerations.
- Where permitted by the Department of Fish and Game or other agency regulations, stock wet ponds/constructed wetlands regularly with mosquito fish (*Gambusia spp.*) to enhance natural mosquito and midge control.
- Introduce mosquito fish and maintain vegetation to assist their movements to control mosquitoes, as well as to provide access for vector inspectors. An annual vegetation harvest in summer appears to be optimum, in that it is after the bird breeding season, mosquito fish can provide the needed control until vegetation reaches late summer density, and there is

time for re-growth for runoff treatment purposes before the wet season. In certain cases, more frequent plant harvesting may be required by local vector control agencies.

- Maintain emergent and perimeter shoreline vegetation as well as site and road access to facilitate vector surveillance and control activities.
- Remove accumulated sediment in the forebay and regrade about every 5-7 years or when the accumulated sediment volume exceeds 10 percent of the basin volume. Sediment removal may not be required in the main pool area for as long as 20 years.

Cost

Construction Cost

Wetlands are relatively inexpensive storm water practices. Construction cost data for wetlands are rare, but one simplifying assumption is that they are typically about 25 percent more expensive than storm water ponds of an equivalent volume. Using this assumption, an equation developed by Brown and Schueler (1997) to estimate the cost of wet ponds can be modified to estimate the cost of storm water wetlands using the equation:

$$C = 30.6^{V_{0.705}}$$

where:

C = Construction, design, and permitting cost;

V = Wetland volume needed to control the 10-year storm (ft3).

Using this equation, typical construction costs are the following:

$ 57,100 for a 1 acre-foot facility

$ 289,000 for a 10 acre-foot facility

$ 1,470,000 for a 100 acre-foot facility

Wetlands consume about 3 to 5 percent of the land that drains to them, which is relatively high compared with other storm water management practices. In areas where land value is high, this may make wetlands an infeasible option.

Maintenance Cost

For ponds, the annual cost of routine maintenance has typically been estimated at about 3 to 5 percent of the construction cost; however, the published literature is almost totally devoid of actual maintenance costs. Since ponds are long-lived facilities (typically longer than 20 years), major maintenance activities are unlikely to occur during a relatively short study.

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Constructed Wetlands TC-21

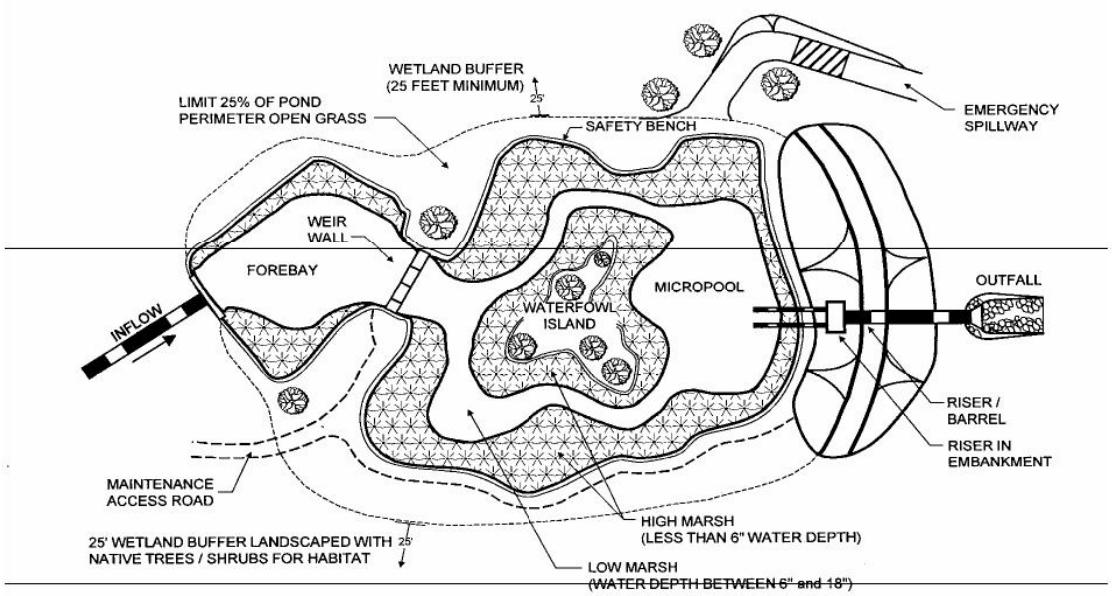

PLAN VIEW

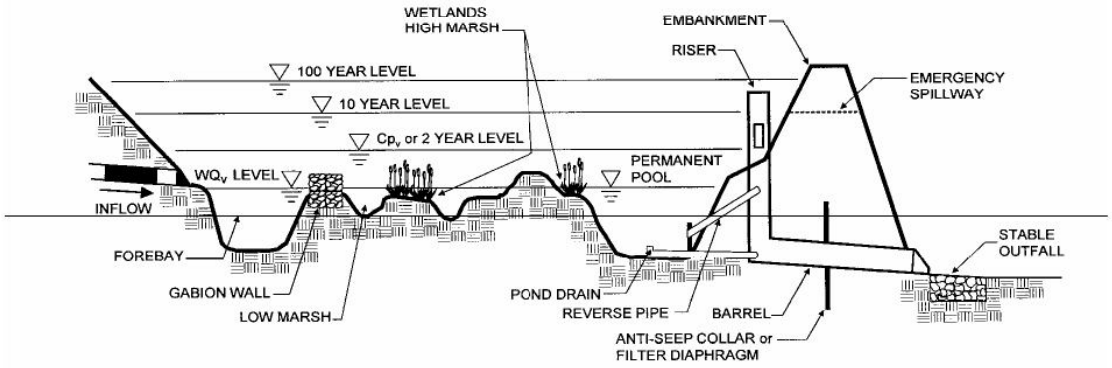

PROFILE

Extended Detention Basin TC-22

Design Considerations

- Tributary Area
- Area Required
- Hydraulic Head

Description

Dry extended detention ponds (a.k.a. dry ponds, extended detention basins, detention ponds, extended detention ponds) are basins whose outlets have been designed to detain the stormwater runoff from a water quality design storm for some minimum time (e.g., 48 hours) to allow particles and associated pollutants to settle. Unlike wet ponds, these facilities do not have a large permanent pool. They can also be used to provide flood control by including additional flood detention storage.

California Experience

Caltrans constructed and monitored 5 extended detention basins in southern California with design drain times of 72 hours. Four of the basins were earthen, less costly and had substantially better load reduction because of infiltration that occurred, than the concrete basin. The Caltrans study reaffirmed the flexibility and performance of this conventional technology. The small headloss and few siting constraints suggest that these devices are one of the most applicable technologies for stormwater treatment.

Advantages

- Due to the simplicity of design, extended detention basins are relatively easy and inexpensive to construct and operate.
- Extended detention basins can provide substantial capture of sediment and the toxics fraction associated with particulates.
- Widespread application with sufficient capture volume can provide significant control of channel erosion and enlargement caused by changes to flow frequency

Targeted Constituents

☑	Sediment	▲
☑	Nutrients	●
☑	Trash	■
☑	Metals	▲
☑	Bacteria	▲
☑	Oil and Grease	▲
☑	Organics	▲

Legend ***(Removal Effectiveness)***

● Low ■ High

▲ Medium

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relationships resulting from the increase of impervious cover in a watershed.

Limitations

- Limitation of the diameter of the orifice may not allow use of extended detention in watersheds of less than 5 acres (would require an orifice with a diameter of less than 0.5 inches that would be prone to clogging).
- Dry extended detention ponds have only moderate pollutant removal when compared to some other structural stormwater practices, and they are relatively ineffective at removing soluble pollutants.
- Although wet ponds can increase property values, dry ponds can actually detract from the value of a home due to the adverse aesthetics of dry, bare areas and inlet and outlet structures.

Design and Sizing Guidelines

- Capture volume determined by local requirements or sized to treat 85% of the annual runoff volume.
- Outlet designed to discharge the capture volume over a period of hours.
- Length to width ratio of at least 1.5:1 where feasible.
- Basin depths optimally range from 2 to 5 feet.
- Include energy dissipation in the inlet design to reduce resuspension of accumulated sediment.
- A maintenance ramp and perimeter access should be included in the design to facilitate access to the basin for maintenance activities and for vector surveillance and control.
- Use a draw down time of 48 hours in most areas of California. Draw down times in excess of 48 hours may result in vector breeding, and should be used only after coordination with local vector control authorities. Draw down times of less than 48 hours should be limited to BMP drainage areas with coarse soils that readily settle and to watersheds where warming may be determined to downstream fisheries.

Construction/Inspection Considerations

- Inspect facility after first large to storm to determine whether the desired residence time has been achieved.
- When constructed with small tributary area, orifice sizing is critical and inspection should verify that flow through additional openings such as bolt holes does not occur.

Performance

One objective of stormwater management practices can be to reduce the flood hazard associated with large storm events by reducing the peak flow associated with these storms. Dry extended detention basins can easily be designed for flood control, and this is actually the primary purpose of most detention ponds.

Extended Detention Basin TC-22

Dry extended detention basins provide moderate pollutant removal, provided that the recommended design features are incorporated. Although they can be effective at removing some pollutants through settling, they are less effective at removing soluble pollutants because of the absence of a permanent pool. Several studies are available on the effectiveness of dry extended detention ponds including one recently concluded by Caltrans (2002).

The load reduction is greater than the concentration reduction because of the substantial infiltration that occurs. Although the infiltration of stormwater is clearly beneficial to surface receiving waters, there is the potential for groundwater contamination. Previous research on the effects of incidental infiltration on groundwater quality indicated that the risk of contamination is minimal.

There were substantial differences in the amount of infiltration that were observed in the earthen basins during the Caltrans study. On average, approximately 40 percent of the runoff entering the unlined basins infiltrated and was not discharged. The percentage ranged from a high of about 60 percent to a low of only about 8 percent for the different facilities. Climatic conditions and local water table elevation are likely the principal causes of this difference. The least infiltration occurred at a site located on the coast where humidity is higher and the basin invert is within a few meters of sea level. Conversely, the most infiltration occurred at a facility located well inland in Los Angeles County where the climate is much warmer and the humidity is less, resulting in lower soil moisture content in the basin floor at the beginning of storms.

Vegetated detention basins appear to have greater pollutant removal than concrete basins. In the Caltrans study, the concrete basin exported sediment and associated pollutants during a number of storms. Export was not as common in the earthen basins, where the vegetation appeared to help stabilize the retained sediment.

Siting Criteria

Dry extended detention ponds are among the most widely applicable stormwater management practices and are especially useful in retrofit situations where their low hydraulic head requirements allow them to be sited within the constraints of the existing storm drain system. In addition, many communities have detention basins designed for flood control. It is possible to modify these facilities to incorporate features that provide water quality treatment and/or channel protection. Although dry extended detention ponds can be applied rather broadly, designers need to ensure that they are feasible at the site in question. This section provides basic guidelines for siting dry extended detention ponds.

In general, dry extended detention ponds should be used on sites with a minimum area of 5 acres. With this size catchment area, the orifice size can be on the order of 0.5 inches. On smaller sites, it can be challenging to provide channel or water quality control because the orifice diameter at the outlet needed to control relatively small storms becomes very small and thus prone to clogging. In addition, it is generally more cost-effective to control larger drainage areas due to the economies of scale.

Extended detention basins can be used with almost all soils and geology, with minor design adjustments for regions of rapidly percolating soils such as sand. In these areas, extended detention ponds may need an impermeable liner to prevent ground water contamination.

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The base of the extended detention facility should not intersect the water table. A permanently wet bottom may become a mosquito breeding ground. Research in Southwest Florida (Santana et al., 1994) demonstrated that intermittently flooded systems, such as dry extended detention ponds, produce more mosquitoes than other pond systems, particularly when the facilities remained wet for more than 3 days following heavy rainfall.

A study in Prince George's County, Maryland, found that stormwater management practices can increase stream temperatures (Galli, 1990). Overall, dry extended detention ponds increased temperature by about 5°F. In cold water streams, dry ponds should be designed to detain stormwater for a relatively short time (i.e., 24 hours) to minimize the amount of warming that occurs in the basin.

Additional Design Guidelines

In order to enhance the effectiveness of extended detention basins, the dimensions of the basin must be sized appropriately. Merely providing the required storage volume will not ensure maximum constituent removal. By effectively configuring the basin, the designer will create a long flow path, promote the establishment of low velocities, and avoid having stagnant areas of the basin. To promote settling and to attain an appealing environment, the design of the basin should consider the length to width ratio, cross-sectional areas, basin slopes and pond configuration, and aesthetics (Young et al., 1996).

Energy dissipation structures should be included for the basin inlet to prevent resuspension of accumulated sediment. The use of stilling basins for this purpose should be avoided because the standing water provides a breeding area for mosquitoes.

Extended detention facilities should be sized to completely capture the water quality volume. A micropool is often recommended for inclusion in the design and one is shown in the schematic diagram. These small permanent pools greatly increase the potential for mosquito breeding and complicate maintenance activities; consequently, they are not recommended for use in California.

A large aspect ratio may improve the performance of detention basins; consequently, the outlets should be placed to maximize the flowpath through the facility. The ratio of flowpath length to width from the inlet to the outlet should be at least 1.5:1 (L:W) where feasible. Basin depths optimally range from 2 to 5 feet.

The facility's drawdown time should be regulated by an orifice or weir. In general, the outflow structure should have a trash rack or other acceptable means of preventing clogging at the entrance to the outflow pipes. The outlet design implemented by Caltrans in the facilities constructed in San Diego County used an outlet riser with orifices

Figure 1
Example of Extended Detention Outlet Structure

sized to discharge the water quality volume, and the riser overflow height was set to the design storm elevation. A stainless steel screen was placed around the outlet riser to ensure that the orifices would not become clogged with debris. Sites either used a separate riser or broad crested weir for overflow of runoff for the 25 and greater year storms. A picture of a typical outlet is presented in Figure 1.

The outflow structure should be sized to allow for complete drawdown of the water quality volume in 72 hours. No more than 50% of the water quality volume should drain from the facility within the first 24 hours. The outflow structure can be fitted with a valve so that discharge from the basin can be halted in case of an accidental spill in the watershed.

Summary of Design Recommendations

(1) Facility Sizing - The required water quality volume is determined by local regulations or the basin should be sized to capture and treat 85% of the annual runoff volume. See Section 5.5.1 of the handbook for a discussion of volume-based design.

Basin Configuration – A high aspect ratio may improve the performance of detention basins; consequently, the outlets should be placed to maximize the flowpath through the facility. The ratio of flowpath length to width from the inlet to the outlet should be at least 1.5:1 (L:W). The flowpath length is defined as the distance from the inlet to the outlet as measured at the surface. The width is defined as the mean width of the basin. Basin depths optimally range from 2 to 5 feet. The basin may include a sediment forebay to provide the opportunity for larger particles to settle out.

A micropool should not be incorporated in the design because of vector concerns. For online facilities, the principal and emergency spillways must be sized to provide 1.0 foot of freeboard during the 25-year event and to safely pass the flow from 100-year storm.

(2) Pond Side Slopes - Side slopes of the pond should be 3:1 (H:V) or flatter for grass stabilized slopes. Slopes steeper than 3:1 (H:V) must be stabilized with an appropriate slope stabilization practice.

(3) Basin Lining – Basins must be constructed to prevent possible contamination of groundwater below the facility.

(4) Basin Inlet – Energy dissipation is required at the basin inlet to reduce resuspension of accumulated sediment and to reduce the tendency for short-circuiting.

(5) Outflow Structure - The facility's drawdown time should be regulated by a gate valve or orifice plate. In general, the outflow structure should have a trash rack or other acceptable means of preventing clogging at the entrance to the outflow pipes.

The outflow structure should be sized to allow for complete drawdown of the water quality volume in 72 hours. No more than 50% of the water quality volume should drain from the facility within the first 24 hours. The outflow structure should be fitted with a valve so that discharge from the basin can be halted in case of an accidental spill in the watershed. This same valve also can be used to regulate the rate of discharge from the basin.

The discharge through a control orifice is calculated from:

$$Q = CA(2gH-H_o)^{0.5}$$

where:
- Q = discharge (ft^3/s)
- C = orifice coefficient
- A = area of the orifice (ft^2)
- g = gravitational constant (32.2)
- H = water surface elevation (ft)
- H_o= orifice elevation (ft)

Recommended values for C are 0.66 for thin materials and 0.80 when the material is thicker than the orifice diameter. This equation can be implemented in spreadsheet form with the pond stage/volume relationship to calculate drain time. To do this, use the initial height of the water above the orifice for the water quality volume. Calculate the discharge and assume that it remains constant for approximately 10 minutes. Based on that discharge, estimate the total discharge during that interval and the new elevation based on the stage volume relationship. Continue to iterate until H is approximately equal to H_o. When using multiple orifices the discharge from each is summed.

(6) Splitter Box - When the pond is designed as an offline facility, a splitter structure is used to isolate the water quality volume. The splitter box, or other flow diverting approach, should be designed to convey the 25-year storm event while providing at least 1.0 foot of freeboard along pond side slopes.

(7) Erosion Protection at the Outfall - For online facilities, special consideration should be given to the facility's outfall location. Flared pipe end sections that discharge at or near the stream invert are preferred. The channel immediately below the pond outfall should be modified to conform to natural dimensions, and lined with large stone riprap placed over filter cloth. Energy dissipation may be required to reduce flow velocities from the primary spillway to non-erosive velocities.

(8) Safety Considerations - Safety is provided either by fencing of the facility or by managing the contours of the pond to eliminate dropoffs and other hazards. Earthen side slopes should not exceed 3:1 (H:V) and should terminate on a flat safety bench area. Landscaping can be used to impede access to the facility. The primary spillway opening must not permit access by small children. Outfall pipes above 48 inches in diameter should be fenced.

Maintenance

Routine maintenance activity is often thought to consist mostly of sediment and trash and debris removal; however, these activities often constitute only a small fraction of the maintenance hours. During a recent study by Caltrans, 72 hours of maintenance was performed annually, but only a little over 7 hours was spent on sediment and trash removal. The largest recurring activity was vegetation management, routine mowing. The largest absolute number of hours was associated with vector control because of mosquito breeding that occurred in the stilling basins (example of standing water to be avoided) installed as energy dissipaters. In most cases, basic housekeeping practices such as removal of debris accumulations and vegetation

management to ensure that the basin dewaters completely in 48-72 hours is sufficient to prevent creating mosquito and other vector habitats.

Consequently, maintenance costs should be estimated based primarily on the mowing frequency and the time required. Mowing should be done at least annually to avoid establishment of woody vegetation, but may need to be performed much more frequently if aesthetics are an important consideration.

Typical activities and frequencies include:

- Schedule semiannual inspection for the beginning and end of the wet season for standing water, slope stability, sediment accumulation, trash and debris, and presence of burrows.
- Remove accumulated trash and debris in the basin and around the riser pipe during the semiannual inspections. The frequency of this activity may be altered to meet specific site conditions.
- Trim vegetation at the beginning and end of the wet season and inspect monthly to prevent establishment of woody vegetation and for aesthetic and vector reasons.
- Remove accumulated sediment and regrade about every 10 years or when the accumulated sediment volume exceeds 10 percent of the basin volume. Inspect the basin each year for accumulated sediment volume.

Cost

Construction Cost

The construction costs associated with extended detention basins vary considerably. One recent study evaluated the cost of all pond systems (Brown and Schueler, 1997). Adjusting for inflation, the cost of dry extended detention ponds can be estimated with the equation:

$$C = 12.4V^{0.760}$$

where: C = Construction, design, and permitting cost, and
V = Volume (ft^3).

Using this equation, typical construction costs are:

$ 41,600 for a 1 acre-foot pond

$ 239,000 for a 10 acre-foot pond

$ 1,380,000 for a 100 acre-foot pond

Interestingly, these costs are generally slightly higher than the predicted cost of wet ponds (according to Brown and Schueler, 1997) on a cost per total volume basis, which highlights the difficulty of developing reasonably accurate construction estimates. In addition, a typical facility constructed by Caltrans cost about $160,000 with a capture volume of only 0.3 ac-ft.

An economic concern associated with dry ponds is that they might detract slightly from the value of adjacent properties. One study found that dry ponds can actually detract from the

perceived value of homes adjacent to a dry pond by between 3 and 10 percent (Emmerling-Dinovo, 1995).

Maintenance Cost

For ponds, the annual cost of routine maintenance is typically estimated at about 3 to 5 percent of the construction cost (EPA website). Alternatively, a community can estimate the cost of the maintenance activities outlined in the maintenance section. Table 1 presents the maintenance costs estimated by Caltrans based on their experience with five basins located in southern California. Again, it should be emphasized that the vast majority of hours are related to vegetation management (mowing).

Table 1 Estimated Average Annual Maintenance Effort

Activity	Labor Hours	Equipment & Material ($)	Cost
Inspections	4	7	183
Maintenance	49	126	2282
Vector Control	0	0	0
Administration	3	0	132
Materials	-	535	535
Total	**56**	**$668**	**$3,132**

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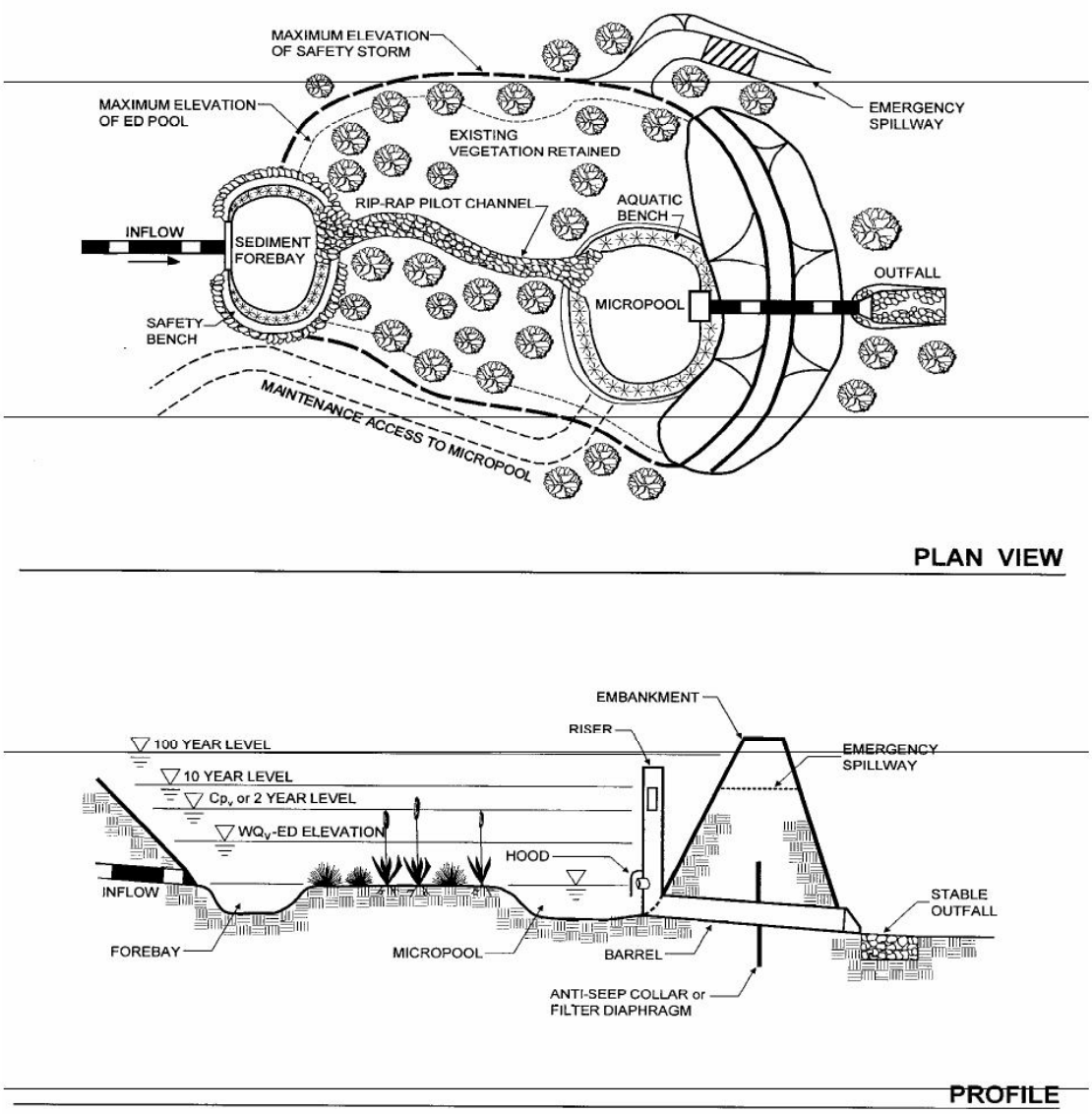

Schematic of an Extended Detention Basin (MDE, 2000)

Vegetated Swale TC-30

Design Considerations

- Tributary Area
- Area Required
- Slope
- Water Availability

Description

Vegetated swales are open, shallow channels with vegetation covering the side slopes and bottom that collect and slowly convey runoff flow to downstream discharge points. They are designed to treat runoff through filtering by the vegetation in the channel, filtering through a subsoil matrix, and/or infiltration into the underlying soils. Swales can be natural or manmade. They trap particulate pollutants (suspended solids and trace metals), promote infiltration, and reduce the flow velocity of stormwater runoff. Vegetated swales can serve as part of a stormwater drainage system and can replace curbs, gutters and storm sewer systems.

Targeted Constituents

☑	Sediment	▲
☑	Nutrients	●
☑	Trash	●
☑	Metals	▲
☑	Bacteria	●
☑	Oil and Grease	▲
☑	Organics	▲

Legend ***(Removal Effectiveness)***

● Low ■ High

▲ Medium

California Experience

Caltrans constructed and monitored six vegetated swales in southern California. These swales were generally effective in reducing the volume and mass of pollutants in runoff. Even in the areas where the annual rainfall was only about 10 inches/yr, the vegetation did not require additional irrigation. One factor that strongly affected performance was the presence of large numbers of gophers at most of the sites. The gophers created earthen mounds, destroyed vegetation, and generally reduced the effectiveness of the controls for TSS reduction.

Advantages

- If properly designed, vegetated, and operated, swales can serve as an aesthetic, potentially inexpensive urban development or roadway drainage conveyance measure with significant collateral water quality benefits.

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- Roadside ditches should be regarded as significant potential swale/buffer strip sites and should be utilized for this purpose whenever possible.

Limitations

- Can be difficult to avoid channelization.
- May not be appropriate for industrial sites or locations where spills may occur
- Grassed swales cannot treat a very large drainage area. Large areas may be divided and treated using multiple swales.
- A thick vegetative cover is needed for these practices to function properly.
- They are impractical in areas with steep topography.
- They are not effective and may even erode when flow velocities are high, if the grass cover is not properly maintained.
- In some places, their use is restricted by law: many local municipalities require curb and gutter systems in residential areas.
- Swales are mores susceptible to failure if not properly maintained than other treatment BMPs.

Design and Sizing Guidelines

- Flow rate based design determined by local requirements or sized so that 85% of the annual runoff volume is discharged at less than the design rainfall intensity.
- Swale should be designed so that the water level does not exceed 2/3rds the height of the grass or 4 inches, which ever is less, at the design treatment rate.
- Longitudinal slopes should not exceed 2.5%
- Trapezoidal channels are normally recommended but other configurations, such as parabolic, can also provide substantial water quality improvement and may be easier to mow than designs with sharp breaks in slope.
- Swales constructed in cut are preferred, or in fill areas that are far enough from an adjacent slope to minimize the potential for gopher damage. Do not use side slopes constructed of fill, which are prone to structural damage by gophers and other burrowing animals.
- A diverse selection of low growing, plants that thrive under the specific site, climatic, and watering conditions should be specified. Vegetation whose growing season corresponds to the wet season are preferred. Drought tolerant vegetation should be considered especially for swales that are not part of a regularly irrigated landscaped area.
- The width of the swale should be determined using Manning's Equation using a value of 0.25 for Manning's n.

Vegetated Swale TC-30

Construction/Inspection Considerations

- Include directions in the specifications for use of appropriate fertilizer and soil amendments based on soil properties determined through testing and compared to the needs of the vegetation requirements.
- Install swales at the time of the year when there is a reasonable chance of successful establishment without irrigation; however, it is recognized that rainfall in a given year may not be sufficient and temporary irrigation may be used.
- If sod tiles must be used, they should be placed so that there are no gaps between the tiles; stagger the ends of the tiles to prevent the formation of channels along the swale or strip.
- Use a roller on the sod to ensure that no air pockets form between the sod and the soil.
- Where seeds are used, erosion controls will be necessary to protect seeds for at least 75 days after the first rainfall of the season.

Performance

The literature suggests that vegetated swales represent a practical and potentially effective technique for controlling urban runoff quality. While limited quantitative performance data exists for vegetated swales, it is known that check dams, slight slopes, permeable soils, dense grass cover, increased contact time, and small storm events all contribute to successful pollutant removal by the swale system. Factors decreasing the effectiveness of swales include compacted soils, short runoff contact time, large storm events, frozen ground, short grass heights, steep slopes, and high runoff velocities and discharge rates.

Conventional vegetated swale designs have achieved mixed results in removing particulate pollutants. A study performed by the Nationwide Urban Runoff Program (NURP) monitored three grass swales in the Washington, D.C., area and found no significant improvement in urban runoff quality for the pollutants analyzed. However, the weak performance of these swales was attributed to the high flow velocities in the swales, soil compaction, steep slopes, and short grass height.

Another project in Durham, NC, monitored the performance of a carefully designed artificial swale that received runoff from a commercial parking lot. The project tracked 11 storms and concluded that particulate concentrations of heavy metals (Cu, Pb, Zn, and Cd) were reduced by approximately 50 percent. However, the swale proved largely ineffective for removing soluble nutrients.

The effectiveness of vegetated swales can be enhanced by adding check dams at approximately 17 meter (50 foot) increments along their length (See Figure 1). These dams maximize the retention time within the swale, decrease flow velocities, and promote particulate settling. Finally, the incorporation of vegetated filter strips parallel to the top of the channel banks can help to treat sheet flows entering the swale.

Only 9 studies have been conducted on all grassed channels designed for water quality (Table 1). The data suggest relatively high removal rates for some pollutants, but negative removals for some bacteria, and fair performance for phosphorus.

Table 1 Grassed swale pollutant removal efficiency data

Removal Efficiencies (% Removal)							
Study	**TSS**	**TP**	**TN**	**NO_3**	**Metals**	**Bacteria**	**Type**
Caltrans 2002	77	8	67	66	83-90	-33	dry swales
Goldberg 1993	67.8	4.5	-	31.4	42–62	-100	grassed channel
Seattle Metro and Washington Department of Ecology 1992	60	45	-	-25	2–16	-25	grassed channel
Seattle Metro and Washington Department of Ecology, 1992	83	29	-	-25	46–73	-25	grassed channel
Wang et al., 1981	80	-	-	-	70–80	-	dry swale
Dorman et al., 1989	98	18	-	45	37–81	-	dry swale
Harper, 1988	87	83	84	80	88–90	-	dry swale
Kercher et al., 1983	99	99	99	99	99	-	dry swale
Harper, 1988.	81	17	40	52	37–69	-	wet swale
Koon, 1995	67	39	-	9	-35 to 6	-	wet swale

While it is difficult to distinguish between different designs based on the small amount of available data, grassed channels generally have poorer removal rates than wet and dry swales, although some swales appear to export soluble phosphorus (Harper, 1988; Koon, 1995). It is not clear why swales export bacteria. One explanation is that bacteria thrive in the warm swale soils.

Siting Criteria

The suitability of a swale at a site will depend on land use, size of the area serviced, soil type, slope, imperviousness of the contributing watershed, and dimensions and slope of the swale system (Schueler et al., 1992). In general, swales can be used to serve areas of less than 10 acres, with slopes no greater than 5 %. Use of natural topographic lows is encouraged and natural drainage courses should be regarded as significant local resources to be kept in use (Young et al., 1996).

Selection Criteria (NCTCOG, 1993)

- Comparable performance to wet basins
- Limited to treating a few acres
- Availability of water during dry periods to maintain vegetation
- Sufficient available land area

Research in the Austin area indicates that vegetated controls are effective at removing pollutants even when dormant. Therefore, irrigation is not required to maintain growth during dry periods, but may be necessary only to prevent the vegetation from dying.

Vegetated Swale TC-30

The topography of the site should permit the design of a channel with appropriate slope and cross-sectional area. Site topography may also dictate a need for additional structural controls. Recommendations for longitudinal slopes range between 2 and 6 percent. Flatter slopes can be used, if sufficient to provide adequate conveyance. Steep slopes increase flow velocity, decrease detention time, and may require energy dissipating and grade check. Steep slopes also can be managed using a series of check dams to terrace the swale and reduce the slope to within acceptable limits. The use of check dams with swales also promotes infiltration.

Additional Design Guidelines

Most of the design guidelines adopted for swale design specify a minimum hydraulic residence time of 9 minutes. This criterion is based on the results of a single study conducted in Seattle, Washington (Seattle Metro and Washington Department of Ecology, 1992), and is not well supported. Analysis of the data collected in that study indicates that pollutant removal at a residence time of 5 minutes was not significantly different, although there is more variability in that data. Therefore, additional research in the design criteria for swales is needed. Substantial pollutant removal has also been observed for vegetated controls designed solely for conveyance (Barrett et al, 1998); consequently, some flexibility in the design is warranted.

Many design guidelines recommend that grass be frequently mowed to maintain dense coverage near the ground surface. Recent research (Colwell et al., 2000) has shown mowing frequency or grass height has little or no effect on pollutant removal.

Summary of Design Recommendations

1) The swale should have a length that provides a minimum hydraulic residence time of at least 10 minutes. The maximum bottom width should not exceed 10 feet unless a dividing berm is provided. The depth of flow should not exceed 2/3rds the height of the grass at the peak of the water quality design storm intensity. The channel slope should not exceed 2.5%.

2) A design grass height of 6 inches is recommended.

3) Regardless of the recommended detention time, the swale should be not less than 100 feet in length.

4) The width of the swale should be determined using Manning's Equation, at the peak of the design storm, using a Manning's n of 0.25.

5) The swale can be sized as both a treatment facility for the design storm and as a conveyance system to pass the peak hydraulic flows of the 100-year storm if it is located "on-line." The side slopes should be no steeper than 3:1 (H:V).

6) Roadside ditches should be regarded as significant potential swale/buffer strip sites and should be utilized for this purpose whenever possible. If flow is to be introduced through curb cuts, place pavement slightly above the elevation of the vegetated areas. Curb cuts should be at least 12 inches wide to prevent clogging.

7) Swales must be vegetated in order to provide adequate treatment of runoff. It is important to maximize water contact with vegetation and the soil surface. For general purposes, select fine, close-growing, water-resistant grasses. If possible, divert runoff (other than necessary irrigation) during the period of vegetation

establishment. Where runoff diversion is not possible, cover graded and seeded areas with suitable erosion control materials.

Maintenance

The useful life of a vegetated swale system is directly proportional to its maintenance frequency. If properly designed and regularly maintained, vegetated swales can last indefinitely. The maintenance objectives for vegetated swale systems include keeping up the hydraulic and removal efficiency of the channel and maintaining a dense, healthy grass cover.

Maintenance activities should include periodic mowing (with grass never cut shorter than the design flow depth), weed control, watering during drought conditions, reseeding of bare areas, and clearing of debris and blockages. Cuttings should be removed from the channel and disposed in a local composting facility. Accumulated sediment should also be removed manually to avoid concentrated flows in the swale. The application of fertilizers and pesticides should be minimal.

Another aspect of a good maintenance plan is repairing damaged areas within a channel. For example, if the channel develops ruts or holes, it should be repaired utilizing a suitable soil that is properly tamped and seeded. The grass cover should be thick; if it is not, reseed as necessary. Any standing water removed during the maintenance operation must be disposed to a sanitary sewer at an approved discharge location. Residuals (e.g., silt, grass cuttings) must be disposed in accordance with local or State requirements. Maintenance of grassed swales mostly involves maintenance of the grass or wetland plant cover. Typical maintenance activities are summarized below:

- Inspect swales at least twice annually for erosion, damage to vegetation, and sediment and debris accumulation preferably at the end of the wet season to schedule summer maintenance and before major fall runoff to be sure the swale is ready for winter. However, additional inspection after periods of heavy runoff is desirable. The swale should be checked for debris and litter, and areas of sediment accumulation.

- Grass height and mowing frequency may not have a large impact on pollutant removal. Consequently, mowing may only be necessary once or twice a year for safety or aesthetics or to suppress weeds and woody vegetation.

- Trash tends to accumulate in swale areas, particularly along highways. The need for litter removal is determined through periodic inspection, but litter should always be removed prior to mowing.

- Sediment accumulating near culverts and in channels should be removed when it builds up to 75 mm (3 in.) at any spot, or covers vegetation.

- Regularly inspect swales for pools of standing water. Swales can become a nuisance due to mosquito breeding in standing water if obstructions develop (e.g. debris accumulation, invasive vegetation) and/or if proper drainage slopes are not implemented and maintained.

Vegetated Swale TC-30

Cost

Construction Cost

Little data is available to estimate the difference in cost between various swale designs. One study (SWRPC, 1991) estimated the construction cost of grassed channels at approximately \$0.25 per ft^2. This price does not include design costs or contingencies. Brown and Schueler (1997) estimate these costs at approximately 32 percent of construction costs for most stormwater management practices. For swales, however, these costs would probably be significantly higher since the construction costs are so low compared with other practices. A more realistic estimate would be a total cost of approximately \$0.50 per ft^2, which compares favorably with other stormwater management practices.

Table 2 Swale Cost Estimate (SEWRPC, 1991)

Component	Unit	Extent	Unit Cost			Total Cost		
			Low	Moderate	High	Low	Moderate	High
Mobilization / Demobilization-Light	Swale	1	$107	$274	$441	$107	$274	$441
Site Preparation								
Clearing[b].....	Acre	0.5	$2,200	$3,800	$5,400	$1,100	$1,900	$2,700
Grubbing[c].....	Acre	0.25	$3,800	$5,200	$6,600	$950	$1,300	$1,650
General Excavation[d].....	Yd^3	372	$2.10	$3.70	$5.30	$781	$1,376	$1,972
Level and Till[e].....	Yd^2	1,210	$0.20	$0.35	$0.50	$242	$424	$605
Sites Development								
Salvaged Topsoil Seed, and Mulch[f]..	Yd^2	1,210	$0.40	$1.00	$1.60	$484	$1,210	$1,936
Sod[g].....	Yd^2	1,210	$1.20	$2.40	$3.60	$1,452	$2,904	$4,356
Subtotal	--	–	--	–	--	$5,116	$9,388	$13,660
Contingencies	Swale	1	25%	25%	25%	$1,279	$2,347	$3,415
Total	--	–	--	–	--	$6,395	$11,735	$17,075

Source: (SEWRPC, 1991)

Note: Mobilization/demobilization refers to the organization and planning involved in establishing a vegetative swale.

[a] Swale has a bottom width of 1.0 foot, a top width of 10 feet with 1:3 side slopes, and a 1,000-foot length.

[b] Area cleared = (top width + 10 feet) x swale length.

[c] Area grubbed = (top width x swale length).

[d] Volume excavated = (0.67 x top width x swale depth) x swale length (parabolic cross-section).

[e] Area tilled = $\left(\text{top width} + \frac{8(\text{swale depth}^2)}{3(\text{top width})}\right) \times$ swale length (parabolic cross-section).

[f] Area seeded = area cleared x 0.5.

[g] Area sodded = area cleared x 0.5.

Table 3 Estimated Maintenance Costs (SEWRPC, 1991)

Component	Unit Cost	Swale Size (Depth and Top Width)		Comment
		1.5 Foot Depth, One-Foot Bottom Width, 10-Foot Top Width	3-Foot Depth, 3-Foot Bottom Width, 21-Foot Top Width	
Lawn Mowing	$0.85 / 1,000 ft^2/ mowing	$0.14 / linear foot	$0.21 / linear foot	Lawn maintenance area=(top width + 10 feet) x length. Mow eight times per year
General Lawn Care	$9.00 / 1,000 ft^2/ year	$0.18 / linear foot	$0.28 / linear foot	Lawn maintenance area = (top width + 10 feet) x length
Swale Debris and Litter Removal	$0.10 / linear foot / year	$0.10 / linear foot	$0.10 / linear foot	--
Grass Reseeding with Mulch and Fertilizer	$0.30 / yd^2	$0.01 / linear foot	$0.01 / linear foot	Area revegetated equals 1% of lawn maintenance area per year
Program Administration and Swale Inspection	$0.15 / linear foot / year, plus $25 / inspection	$0.15 / linear foot	$0.15 / linear foot	Inspect four times per year
Total	--	**$0.58 / linear foot**	**$ 0.75 / linear foot**	--

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Maintenance Cost

Caltrans (2002) estimated the expected annual maintenance cost for a swale with a tributary area of approximately 2 ha at approximately $2,700. Since almost all maintenance consists of mowing, the cost is fundamentally a function of the mowing frequency. Unit costs developed by SEWRPC are shown in Table 3. In many cases vegetated channels would be used to convey runoff and would require periodic mowing as well, so there may be little additional cost for the water quality component. Since essentially all the activities are related to vegetation management, no special training is required for maintenance personnel.

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Vegetated Swale TC-30

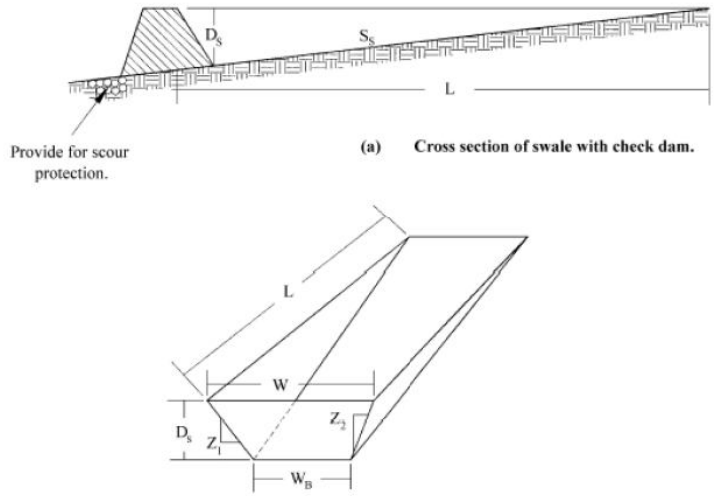

(a) Cross section of swale with check dam.

(b) Dimensional view of swale impoundment area.

Notation:

L = Length of swale impoundment area per check dam (ft)
D_S = Depth of check dam (ft)
S_S = Bottom slpe of swale (ft/ft)
W = Top width of check dam (ft)
W_B = Bottom width of check dam (ft)
$Z_{1\&2}$ = Ratio of horizontal to vertical change in swale side slope (ft/ft)

Vegetated Buffer Strip TC-31

Design Considerations

- Tributary Area
- Slope
- Water Availability
- Aesthetics

Description

Grassed buffer strips (vegetated filter strips, filter strips, and grassed filters) are vegetated surfaces that are designed to treat sheet flow from adjacent surfaces. Filter strips function by slowing runoff velocities and allowing sediment and other pollutants to settle and by providing some infiltration into underlying soils. Filter strips were originally used as an agricultural treatment practice and have more recently evolved into an urban practice. With proper design and maintenance, filter strips can provide relatively high pollutant removal. In addition, the public views them as landscaped amenities and not as stormwater infrastructure. Consequently, there is little resistance to their use.

Targeted Constituents

☑	Sediment	■
☑	Nutrients	●
☑	Trash	▲
☑	Metals	■
☑	Bacteria	●
☑	Oil and Grease	■
☑	Organics	▲

Legend ***(Removal Effectiveness)***

● Low ■ High

▲ Medium

California Experience

Caltrans constructed and monitored three vegetated buffer strips in southern California and is currently evaluating their performance at eight additional sites statewide. These strips were generally effective in reducing the volume and mass of pollutants in runoff. Even in the areas where the annual rainfall was only about 10 inches/yr, the vegetation did not require additional irrigation. One factor that strongly affected performance was the presence of large numbers of gophers at most of the southern California sites. The gophers created earthen mounds, destroyed vegetation, and generally reduced the effectiveness of the controls for TSS reduction.

Advantages

- Buffers require minimal maintenance activity (generally just erosion prevention and mowing).
- If properly designed, vegetated, and operated, buffer strips can provide reliable water quality benefits in conjunction with high aesthetic appeal.

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- Flow characteristics and vegetation type and density can be closely controlled to maximize BMP effectiveness.
- Roadside shoulders act as effective buffer strips when slope and length meet criteria described below.

Limitations

- May not be appropriate for industrial sites or locations where spills may occur.
- Buffer strips cannot treat a very large drainage area.
- A thick vegetative cover is needed for these practices to function properly.
- Buffer or vegetative filter length must be adequate and flow characteristics acceptable or water quality performance can be severely limited.
- Vegetative buffers may not provide treatment for dissolved constituents except to the extent that flows across the vegetated surface are infiltrated into the soil profile.
- This technology does not provide significant attenuation of the increased volume and flow rate of runoff during intense rain events.

Design and Sizing Guidelines

- Maximum length (in the direction of flow towards the buffer) of the tributary area should be 60 feet.
- Slopes should not exceed 15%.
- Minimum length (in direction of flow) is 15 feet.
- Width should be the same as the tributary area.
- Either grass or a diverse selection of other low growing, drought tolerant, native vegetation should be specified. Vegetation whose growing season corresponds to the wet season is preferred.

Construction/Inspection Considerations

- Include directions in the specifications for use of appropriate fertilizer and soil amendments based on soil properties determined through testing and compared to the needs of the vegetation requirements.
- Install strips at the time of the year when there is a reasonable chance of successful establishment without irrigation; however, it is recognized that rainfall in a given year may not be sufficient and temporary irrigation may be required.
- If sod tiles must be used, they should be placed so that there are no gaps between the tiles; stagger the ends of the tiles to prevent the formation of channels along the strip.
- Use a roller on the sod to ensure that no air pockets form between the sod and the soil.

Vegetated Buffer Strip TC-31

- Where seeds are used, erosion controls will be necessary to protect seeds for at least 75 days after the first rainfall of the season.

Performance

Vegetated buffer strips tend to provide somewhat better treatment of stormwater runoff than swales and have fewer tendencies for channelization or erosion. Table 1 documents the pollutant removal observed in a recent study by Caltrans (2002) based on three sites in southern California. The column labeled "Significance" is the probability that the mean influent and effluent EMCs are not significantly different based on an analysis of variance.

The removal of sediment and dissolved metals was comparable to that observed in much more complex controls. Reduction in nitrogen was not significant and all of the sites exported phosphorus for the entire study period. This may have been the result of using salt grass, a warm weather species that is dormant during the wet season, and which leaches phosphorus when dormant.

Another Caltrans study (unpublished) of vegetated highway shoulders as buffer strips also found substantial reductions often within a very short distance of the edge of pavement. Figure 1 presents a box and whisker plot of the concentrations of TSS in highway runoff after traveling various distances (shown in meters) through a vegetated filter strip with a slope of about 10%. One can see that the TSS median concentration reaches an irreducible minimum concentration of about 20 mg/L within 5 meters of the pavement edge.

Table 1 Pollutant Reduction in a Vegetated Buffer Strip

Constituent	Mean EMC		Removal %	Significance
	Influent (mg/L)	Effluent (mg/L)		P
TSS	119	31	74	<0.000
NO_3-N	0.67	0.58	13	0.367
TKN-N	2.50	2.10	16	0.542
Total N[a]	3.17	2.68	15	-
Dissolved P	0.15	0.46	-206	0.047
Total P	0.42	0.62	-52	0.035
Total Cu	0.058	0.009	84	<0.000
Total Pb	0.046	0.006	88	<0.000
Total Zn	0.245	0.055	78	<0.000
Dissolved Cu	0.029	0.007	77	0.004
Dissolved Pb	0.004	0.002	66	0.006
Dissolved Zn	0.099	0.035	65	<0.000

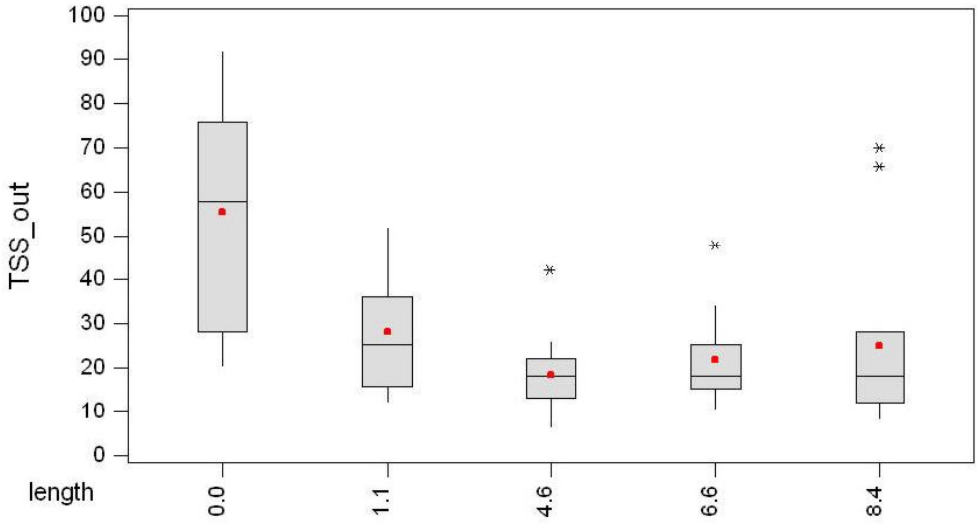

Filter strips also exhibit good removal of litter and other floatables because the water depth in these systems is well below the vegetation height and consequently these materials are not easily transported through them. Unfortunately little attenuation of peak runoff rates and volumes (particularly for larger events) is normally observed, depending on the soil properties. Therefore it may be prudent to follow the strips with another practice than can reduce flooding and channel erosion downstream.

Siting Criteria

The use of buffer strips is limited to gently sloping areas where the vegetative cover is robust and diffuse, and where shallow flow characteristics are possible. The practical water quality benefits can be effectively eliminated with the occurrence of significant erosion or when flow concentration occurs across the vegetated surface. Slopes should not exceed 15 percent or be less than 1 percent. The vegetative surface should extend across the full width of the area being drained. The upstream boundary of the filter should be located contiguous to the developed area. Use of a level spreading device (vegetated berm, sawtooth concrete border, rock trench, etc) to facilitate overland sheet flow is not normally recommended because of maintenance considerations and the potential for standing water.

Filter strips are applicable in most regions, but are restricted in some situations because they consume a large amount of space relative to other practices. Filter strips are best suited to treating runoff from roads and highways, roof downspouts, small parking lots, and pervious surfaces. They are also ideal components of the "outer zone" of a stream buffer or as pretreatment to a structural practice. In arid areas, however, the cost of irrigating the grass on the practice will most likely outweigh its water quality benefits, although aesthetic considerations may be sufficient to overcome this constraint. Filter strips are generally impractical in ultra-urban areas where little pervious surface exists.

Some cold water species, such as trout, are sensitive to changes in temperature. While some treatment practices, such as wet ponds, can warm stormwater substantially, filter strips do not

are not expected to increase stormwater temperatures. Thus, these practices are good for protection of cold-water streams.

Filter strips should be separated from the ground water by between 2 and 4 ft to prevent contamination and to ensure that the filter strip does not remain wet between storms.

Additional Design Guidelines

Filter strips appear to be a minimal design practice because they are basically no more than a grassed slope. In general the slope of the strip should not exceed 15fc% and the strip should be at least 15 feet long to provide water quality treatment. Both the top and toe of the slope should be as flat as possible to encourage sheet flow and prevent erosion. The top of the strip should be installed 2-5 inches below the adjacent pavement, so that vegetation and sediment accumulation at the edge of the strip does not prevent runoff from entering.

A major question that remains unresolved is how large the drainage area to a strip can be. Research has conclusively demonstrated that these are effective on roadside shoulders, where the contributing area is about twice the buffer area. They have also been installed on the perimeter of large parking lots where they performed fairly effectively; however much lower slopes may be needed to provide adequate water quality treatment.

The filter area should be densely vegetated with a mix of erosion-resistant plant species that effectively bind the soil. Native or adapted grasses, shrubs, and trees are preferred because they generally require less fertilizer and are more drought resistant than exotic plants. Runoff flow velocities should not exceed about 1 fps across the vegetated surface.

For engineered vegetative strips, the facility surface should be graded flat prior to placement of vegetation. Initial establishment of vegetation requires attentive care including appropriate watering, fertilization, and prevention of excessive flow across the facility until vegetation completely covers the area and is well established. Use of a permanent irrigation system may help provide maximal water quality performance.

In cold climates, filter strips provide a convenient area for snow storage and treatment. If used for this purpose, vegetation in the filter strip should be salt-tolerant (e.g., creeping bentgrass), and a maintenance schedule should include the removal of sand built up at the bottom of the slope. In arid or semi-arid climates, designers should specify drought-tolerant grasses to minimize irrigation requirements.

Maintenance

Filter strips require mainly vegetation management; therefore little special training is needed for maintenance crews. Typical maintenance activities and frequencies include:

- Inspect strips at least twice annually for erosion or damage to vegetation, preferably at the end of the wet season to schedule summer maintenance and before major fall run-off to be sure the strip is ready for winter. However, additional inspection after periods of heavy run-off is most desirable. The strip should be checked for debris and litter and areas of sediment accumulation.

- Recent research on biofiltration swales, but likely applicable to strips (Colwell et al., 2000), indicates that grass height and mowing frequency have little impact on pollutant removal;

consequently, mowing may only be necessary once or twice a year for safety and aesthetics or to suppress weeds and woody vegetation.

- Trash tends to accumulate in strip areas, particularly along highways. The need for litter removal should be determined through periodic inspection but litter should always be removed prior to mowing.
- Regularly inspect vegetated buffer strips for pools of standing water. Vegetated buffer strips can become a nuisance due to mosquito breeding in level spreaders (unless designed to dewater completely in 48-72 hours), in pools of standing water if obstructions develop (e.g. debris accumulation, invasive vegetation), and/or if proper drainage slopes are not implemented and maintained.

Cost

Construction Cost

Little data is available on the actual construction costs of filter strips. One rough estimate can be the cost of seed or sod, which is approximately 30¢ per ft^2 for seed or 70¢ per ft^2 for sod. This amounts to between $13,000 and $30,000 per acre of filter strip. This cost is relatively high compared with other treatment practices. However, the grassed area used as a filter strip may have been seeded or sodded even if it were not used for treatment. In these cases, the only additional cost is the design. Typical maintenance costs are about $350/acre/year (adapted from SWRPC, 1991). This cost is relatively inexpensive and, again, might overlap with regular landscape maintenance costs.

The true cost of filter strips is the land they consume. In some situations this land is available as wasted space beyond back yards or adjacent to roadsides, but this practice is cost-prohibitive when land prices are high and land could be used for other purposes.

Maintenance Cost

Maintenance of vegetated buffer strips consists mainly of vegetation management (mowing, irrigation if needed, weeding) and litter removal. Consequently the costs are quite variable depending on the frequency of these activities and the local labor rate.

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Vegetated Buffer Strip TC-31

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TC-31 Vegetated Buffer Strip

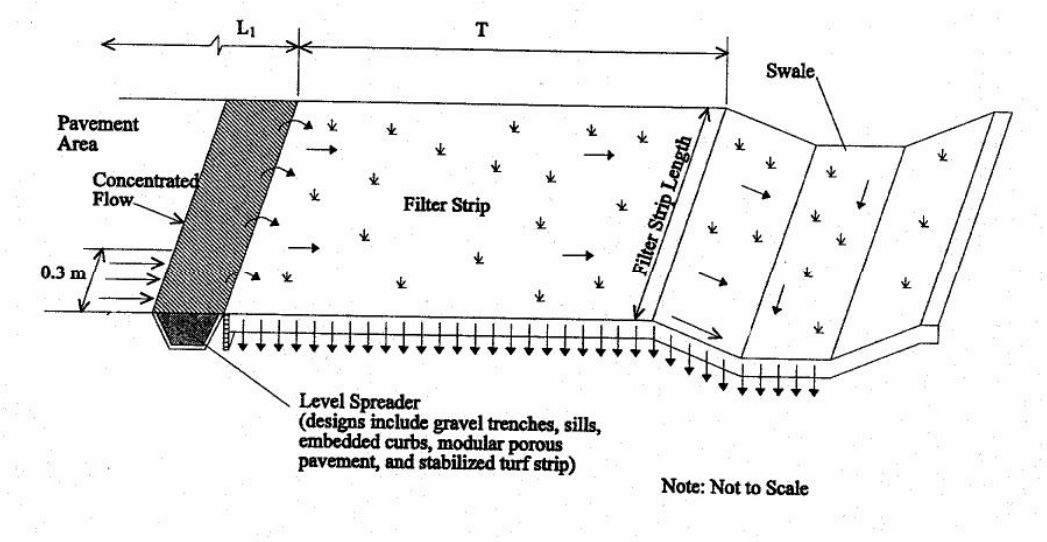

Bioretention TC-32

Design Considerations

- Soil for Infiltration
- Tributary Area
- Slope
- Aesthetics
- Environmental Side-effects

Description

The bioretention best management practice (BMP) functions as a soil and plant-based filtration device that removes pollutants through a variety of physical, biological, and chemical treatment processes. These facilities normally consist of a grass buffer strip, sand bed, ponding area, organic layer or mulch layer, planting soil, and plants. The runoff's velocity is reduced by passing over or through buffer strip and subsequently distributed evenly along a ponding area. Exfiltration of the stored water in the bioretention area planting soil into the underlying soils occurs over a period of days.

Targeted Constituents

☑	Sediment	■
☑	Nutrients	▲
☑	Trash	■
☑	Metals	■
☑	Bacteria	■
☑	Oil and Grease	■
☑	Organics	■

Legend ***(Removal Effectiveness)***

● Low ■ High

▲ Medium

California Experience

None documented. Bioretention has been used as a stormwater BMP since 1992. In addition to Prince George's County, MD and Alexandria, VA, bioretention has been used successfully at urban and suburban areas in Montgomery County, MD; Baltimore County, MD; Chesterfield County, VA; Prince William County, VA; Smith Mountain Lake State Park, VA; and Cary, NC.

Advantages

- Bioretention provides stormwater treatment that enhances the quality of downstream water bodies by temporarily storing runoff in the BMP and releasing it over a period of four days to the receiving water (EPA, 1999).
- The vegetation provides shade and wind breaks, absorbs noise, and improves an area's landscape.

Limitations

- The bioretention BMP is not recommended for areas with slopes greater than 20% or where mature tree removal would

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be required since clogging may result, particularly if the BMP receives runoff with high sediment loads (EPA, 1999).

- Bioretention is not a suitable BMP at locations where the water table is within 6 feet of the ground surface and where the surrounding soil stratum is unstable.
- By design, bioretention BMPs have the potential to create very attractive habitats for mosquitoes and other vectors because of highly organic, often heavily vegetated areas mixed with shallow water.
- In cold climates the soil may freeze, preventing runoff from infiltrating into the planting soil.

Design and Sizing Guidelines

- The bioretention area should be sized to capture the design storm runoff.
- In areas where the native soil permeability is less than 0.5 in/hr an underdrain should be provided.
- Recommended minimum dimensions are 15 feet by 40 feet, although the preferred width is 25 feet. Excavated depth should be 4 feet.
- Area should drain completely within 72 hours.
- Approximately 1 tree or shrub per 50 ft^2 of bioretention area should be included.
- Cover area with about 3 inches of mulch.

Construction/Inspection Considerations

Bioretention area should not be established until contributing watershed is stabilized.

Performance

Bioretention removes stormwater pollutants through physical and biological processes, including adsorption, filtration, plant uptake, microbial activity, decomposition, sedimentation and volatilization (EPA, 1999). Adsorption is the process whereby particulate pollutants attach to soil (e.g., clay) or vegetation surfaces. Adequate contact time between the surface and pollutant must be provided for in the design of the system for this removal process to occur. Thus, the infiltration rate of the soils must not exceed those specified in the design criteria or pollutant removal may decrease. Pollutants removed by adsorption include metals, phosphorus, and hydrocarbons. Filtration occurs as runoff passes through the bioretention area media, such as the sand bed, ground cover, and planting soil.

Common particulates removed from stormwater include particulate organic matter, phosphorus, and suspended solids. Biological processes that occur in wetlands result in pollutant uptake by plants and microorganisms in the soil. Plant growth is sustained by the uptake of nutrients from the soils, with woody plants locking up these nutrients through the seasons. Microbial activity within the soil also contributes to the removal of nitrogen and organic matter. Nitrogen is removed by nitrifying and denitrifying bacteria, while aerobic bacteria are responsible for the decomposition of the organic matter. Microbial processes require oxygen and can result in depleted oxygen levels if the bioretention area is not adequately

aerated. Sedimentation occurs in the swale or ponding area as the velocity slows and solids fall out of suspension.

The removal effectiveness of bioretention has been studied during field and laboratory studies conducted by the University of Maryland (Davis et al, 1998). During these experiments, synthetic stormwater runoff was pumped through several laboratory and field bioretention areas to simulate typical storm events in Prince George's County, MD. Removal rates for heavy metals and nutrients are shown in Table 1.

Table 1 Laboratory and Estimated Bioretention Davis et al. (1998); PGDER (1993)

Pollutant	Removal Rate
Total Phosphorus	70-83%
Metals (Cu, Zn, Pb)	93-98%
TKN	68-80%
Total Suspended Solids	90%
Organics	90%
Bacteria	90%

Results for both the laboratory and field experiments were similar for each of the pollutants analyzed. Doubling or halving the influent pollutant levels had little effect on the effluent pollutants concentrations (Davis et al, 1998).

The microbial activity and plant uptake occurring in the bioretention area will likely result in higher removal rates than those determined for infiltration BMPs.

Siting Criteria

Bioretention BMPs are generally used to treat stormwater from impervious surfaces at commercial, residential, and industrial areas (EPA, 1999). Implementation of bioretention for stormwater management is ideal for median strips, parking lot islands, and swales. Moreover, the runoff in these areas can be designed to either divert directly into the bioretention area or convey into the bioretention area by a curb and gutter collection system.

The best location for bioretention areas is upland from inlets that receive sheet flow from graded areas and at areas that will be excavated (EPA, 1999). In order to maximize treatment effectiveness, the site must be graded in such a way that minimizes erosive conditions as sheet flow is conveyed to the treatment area. Locations where a bioretention area can be readily incorporated into the site plan without further environmental damage are preferred. Furthermore, to effectively minimize sediment loading in the treatment area, bioretention only should be used in stabilized drainage areas.

Additional Design Guidelines

The layout of the bioretention area is determined after site constraints such as location of utilities, underlying soils, existing vegetation, and drainage are considered (EPA, 1999). Sites with loamy sand soils are especially appropriate for bioretention because the excavated soil can be backfilled and used as the planting soil, thus eliminating the cost of importing planting soil.

The use of bioretention may not be feasible given an unstable surrounding soil stratum, soils with clay content greater than 25 percent, a site with slopes greater than 20 percent, and/or a site with mature trees that would be removed during construction of the BMP.

Bioretention can be designed to be off-line or on-line of the existing drainage system (EPA, 1999). The drainage area for a bioretention area should be between 0.1 and 0.4 hectares (0.25 and 1.0 acres). Larger drainage areas may require multiple bioretention areas. Furthermore, the maximum drainage area for a bioretention area is determined by the expected rainfall intensity and runoff rate. Stabilized areas may erode when velocities are greater than 5 feet per second (1.5 meter per second). The designer should determine the potential for erosive conditions at the site.

The size of the bioretention area, which is a function of the drainage area and the runoff generated from the area is sized to capture the water quality volume.

The recommended minimum dimensions of the bioretention area are 15 feet (4.6 meters) wide by 40 feet (12.2 meters) long, where the minimum width allows enough space for a dense, randomly-distributed area of trees and shrubs to become established. Thus replicating a natural forest and creating a microclimate, thereby enabling the bioretention area to tolerate the effects of heat stress, acid rain, runoff pollutants, and insect and disease infestations which landscaped areas in urban settings typically are unable to tolerate. The preferred width is 25 feet (7.6 meters), with a length of twice the width. Essentially, any facilities wider than 20 feet (6.1 meters) should be twice as long as they are wide, which promotes the distribution of flow and decreases the chances of concentrated flow.

In order to provide adequate storage and prevent water from standing for excessive periods of time the ponding depth of the bioretention area should not exceed 6 inches (15 centimeters). Water should not be left to stand for more than 72 hours. A restriction on the type of plants that can be used may be necessary due to some plants' water intolerance. Furthermore, if water is left standing for longer than 72 hours mosquitoes and other insects may start to breed.

The appropriate planting soil should be backfilled into the excavated bioretention area. Planting soils should be sandy loam, loamy sand, or loam texture with a clay content ranging from 10 to 25 percent.

Generally the soil should have infiltration rates greater than 0.5 inches (1.25 centimeters) per hour, which is typical of sandy loams, loamy sands, or loams. The pH of the soil should range between 5.5 and 6.5, where pollutants such as organic nitrogen and phosphorus can be adsorbed by the soil and microbial activity can flourish. Additional requirements for the planting soil include a 1.5 to 3 percent organic content and a maximum 500 ppm concentration of soluble salts.

Soil tests should be performed for every 500 cubic yards (382 cubic meters) of planting soil, with the exception of pH and organic content tests, which are required only once per bioretention area (EPA, 1999). Planting soil should be 4 inches (10.1 centimeters) deeper than the bottom of the largest root ball and 4 feet (1.2 meters) altogether. This depth will provide adequate soil for the plants' root systems to become established, prevent plant damage due to severe wind, and provide adequate moisture capacity. Most sites will require excavation in order to obtain the recommended depth.

Planting soil depths of greater than 4 feet (1.2 meters) may require additional construction practices such as shoring measures (EPA, 1999). Planting soil should be placed in 18 inches or greater lifts and lightly compacted until the desired depth is reached. Since high canopy trees may be destroyed during maintenance the bioretention area should be vegetated to resemble a terrestrial forest community ecosystem that is dominated by understory trees. Three species each of both trees and shrubs are recommended to be planted at a rate of 2500 trees and shrubs per hectare (1000 per acre). For instance, a 15 foot (4.6 meter) by 40 foot (12.2 meter) bioretention area (600 square feet or 55.75 square meters) would require 14 trees and shrubs. The shrub-to-tree ratio should be 2:1 to 3:1.

Trees and shrubs should be planted when conditions are favorable. Vegetation should be watered at the end of each day for fourteen days following its planting. Plant species tolerant of pollutant loads and varying wet and dry conditions should be used in the bioretention area.

The designer should assess aesthetics, site layout, and maintenance requirements when selecting plant species. Adjacent non-native invasive species should be identified and the designer should take measures, such as providing a soil breach to eliminate the threat of these species invading the bioretention area. Regional landscaping manuals should be consulted to ensure that the planting of the bioretention area meets the landscaping requirements established by the local authorities. The designers should evaluate the best placement of vegetation within the bioretention area. Plants should be placed at irregular intervals to replicate a natural forest. Trees should be placed on the perimeter of the area to provide shade and shelter from the wind. Trees and shrubs can be sheltered from damaging flows if they are placed away from the path of the incoming runoff. In cold climates, species that are more tolerant to cold winds, such as evergreens, should be placed in windier areas of the site.

Following placement of the trees and shrubs, the ground cover and/or mulch should be established. Ground cover such as grasses or legumes can be planted at the beginning of the growing season. Mulch should be placed immediately after trees and shrubs are planted. Two to 3 inches (5 to 7.6 cm) of commercially-available fine shredded hardwood mulch or shredded hardwood chips should be applied to the bioretention area to protect from erosion.

Maintenance

The primary maintenance requirement for bioretention areas is that of inspection and repair or replacement of the treatment area's components. Generally, this involves nothing more than the routine periodic maintenance that is required of any landscaped area. Plants that are appropriate for the site, climatic, and watering conditions should be selected for use in the bioretention cell. Appropriately selected plants will aide in reducing fertilizer, pesticide, water, and overall maintenance requirements. Bioretention system components should blend over time through plant and root growth, organic decomposition, and the development of a natural

soil horizon. These biologic and physical processes over time will lengthen the facility's life span and reduce the need for extensive maintenance.

Routine maintenance should include a biannual health evaluation of the trees and shrubs and subsequent removal of any dead or diseased vegetation (EPA, 1999). Diseased vegetation should be treated as needed using preventative and low-toxic measures to the extent possible. BMPs have the potential to create very attractive habitats for mosquitoes and other vectors because of highly organic, often heavily vegetated areas mixed with shallow water. Routine inspections for areas of standing water within the BMP and corrective measures to restore proper infiltration rates are necessary to prevent creating mosquito and other vector habitat. In addition, bioretention BMPs are susceptible to invasion by aggressive plant species such as cattails, which increase the chances of water standing and subsequent vector production if not routinely maintained.

In order to maintain the treatment area's appearance it may be necessary to prune and weed. Furthermore, mulch replacement is suggested when erosion is evident or when the site begins to look unattractive. Specifically, the entire area may require mulch replacement every two to three years, although spot mulching may be sufficient when there are random void areas. Mulch replacement should be done prior to the start of the wet season.

New Jersey's Department of Environmental Protection states in their bioretention systems standards that accumulated sediment and debris removal (especially at the inflow point) will normally be the primary maintenance function. Other potential tasks include replacement of dead vegetation, soil pH regulation, erosion repair at inflow points, mulch replenishment, unclogging the underdrain, and repairing overflow structures. There is also the possibility that the cation exchange capacity of the soils in the cell will be significantly reduced over time. Depending on pollutant loads, soils may need to be replaced within 5-10 years of construction (LID, 2000).

Cost

Construction Cost

Construction cost estimates for a bioretention area are slightly greater than those for the required landscaping for a new development (EPA, 1999). A general rule of thumb (Coffman, 1999) is that residential bioretention areas average about $3 to $4 per square foot, depending on soil conditions and the density and types of plants used. Commercial, industrial and institutional site costs can range between $10 to $40 per square foot, based on the need for control structures, curbing, storm drains and underdrains.

Retrofitting a site typically costs more, averaging $6,500 per bioretention area. The higher costs are attributed to the demolition of existing concrete, asphalt, and existing structures and the replacement of fill material with planting soil. The costs of retrofitting a commercial site in Maryland, Kettering Development, with 15 bioretention areas were estimated at $111,600.

In any bioretention area design, the cost of plants varies substantially and can account for a significant portion of the expenditures. While these cost estimates are slightly greater than those of typical landscaping treatment (due to the increased number of plantings, additional soil excavation, backfill material, use of underdrains etc.), those landscaping expenses that would be required regardless of the bioretention installation should be subtracted when determining the net cost.

Bioretention TC-32

Perhaps of most importance, however, the cost savings compared to the use of traditional structural stormwater conveyance systems makes bioretention areas quite attractive financially. For example, the use of bioretention can decrease the cost required for constructing stormwater conveyance systems at a site. A medical office building in Maryland was able to reduce the amount of storm drain pipe that was needed from 800 to 230 feet - a cost savings of $24,000 (PGDER, 1993). And a new residential development spent a total of approximately $100,000 using bioretention cells on each lot instead of nearly $400,000 for the traditional stormwater ponds that were originally planned (Rappahanock,). Also, in residential areas, stormwater management controls become a part of each property owner's landscape, reducing the public burden to maintain large centralized facilities.

Maintenance Cost

The operation and maintenance costs for a bioretention facility will be comparable to those of typical landscaping required for a site. Costs beyond the normal landscaping fees will include the cost for testing the soils and may include costs for a sand bed and planting soil.

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TC-32 Bioretention

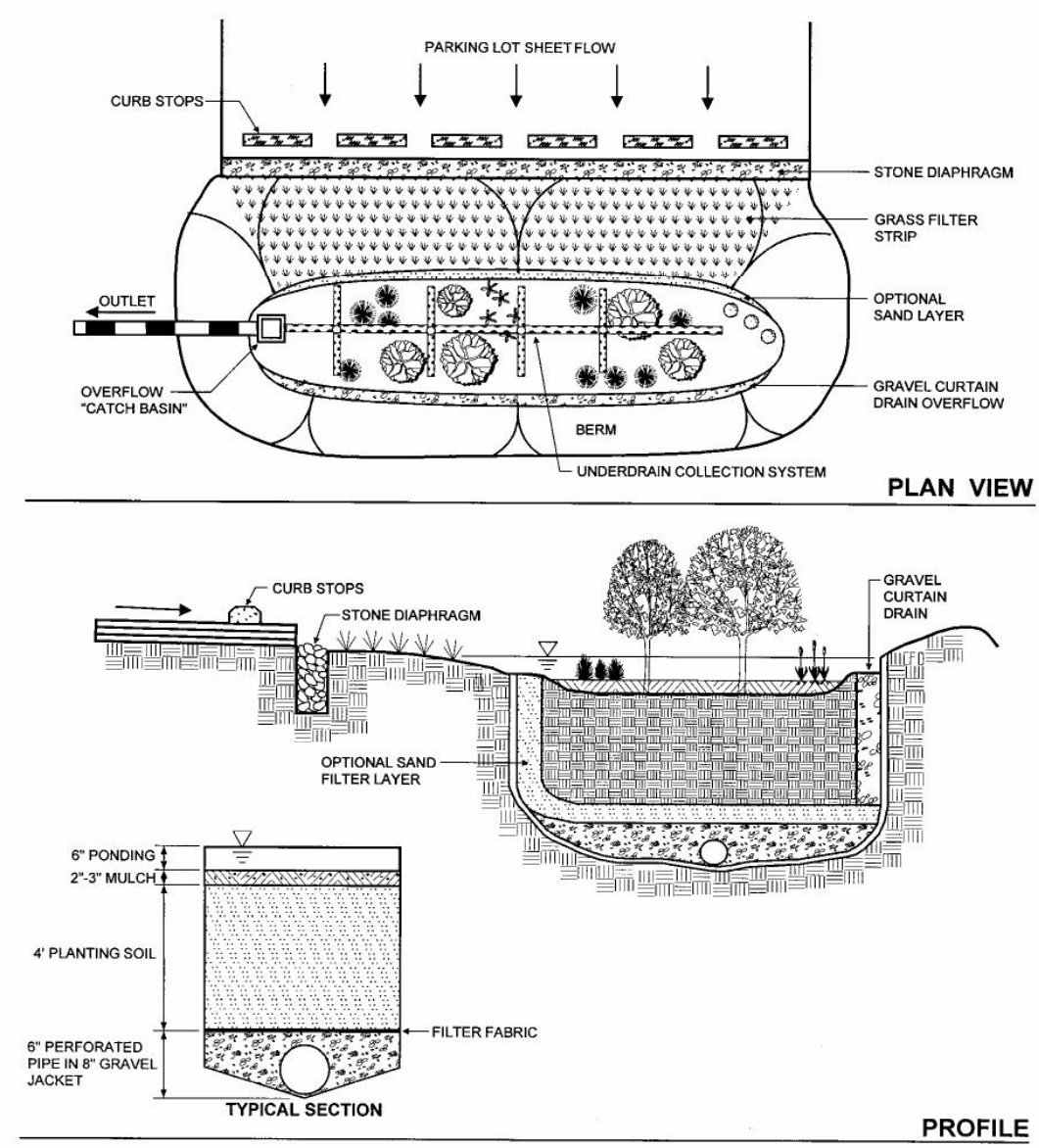

Schematic of a Bioretention Facility (MDE, 2000)

Media Filter TC-40

Design Considerations

- Aesthetics
- Hydraulic Head

Description

Stormwater media filters are usually two-chambered including a pretreatment settling basin and a filter bed filled with sand or other absorptive filtering media. As stormwater flows into the first chamber, large particles settle out, and then finer particles and other pollutants are removed as stormwater flows through the filtering media in the second chamber. There are a number of design variations including the Austin sand filter, Delaware sand filter, and multi-chambered treatment train (MCTT).

Targeted Constituents

☑	Sediment	■
☑	Nutrients	●
☑	Trash	■
☑	Metals	■
☑	Bacteria	▲
☑	Oil and Grease	■
☑	Organics	■

Legend ***(Removal Effectiveness)***

● Low ■ High

▲ Medium

California Experience

Caltrans constructed and monitored five Austin sand filters, two MCTTs, and one Delaware design in southern California. Pollutant removal was very similar for each of the designs; however operational and maintenance aspects were quite different. The Delaware filter and MCTT maintain permanent pools and consequently mosquito management was a critical issue, while the Austin style which is designed to empty completely between storms was less affected. Removal of the top few inches of sand was required at 3 of the Austin filters and the Delaware filter during the third year of operation; consequently, sizing of the filter bed is a critical design factor for establishing maintenance frequency.

Advantages

- Relatively high pollutant removal, especially for sediment and associated pollutants.
- Widespread application with sufficient capture volume can provide significant control of channel erosion and enlargement caused by changes to flow frequency relationships resulting from the increase of impervious cover in a watershed.

Limitations

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- More expensive to construct than many other BMPs.
- May require more maintenance that some other BMPs depending upon the sizing of the filter bed.
- Generally require more hydraulic head to operate properly (minimum 4 feet).
- High solids loads will cause the filter to clog.
- Work best for relatively small, impervious watersheds.
- Filters in residential areas can present aesthetic and safety problems if constructed with vertical concrete walls.
- Certain designs (e.g., MCTT and Delaware filter) maintain permanent sources of standing water where mosquito and midge breeding is likely to occur.

Design and Sizing Guidelines

- Capture volume determined by local requirements or sized to treat 85% of the annual runoff volume.
- Filter bed sized to discharge the capture volume over a period of 48 hours.
- Filter bed 18 inches thick above underdrain system.
- Include energy dissipation in the inlet design to reduce resuspension of accumulated sediment.
- A maintenance ramp should be included in the design to facilitate access to the sedimentation and filter basins for maintenance activities (particularly for the Austin design).
- Designs that utilize covered sedimentation and filtration basins should be accessible to vector control personnel via access doors to facilitate vector surveillance and controlling the basins if needed.

Construction/Inspection Considerations

- Tributary area should be completely stabilized before media is installed to prevent premature clogging.

Performance

The pollutant removal performance of media filters and other stormwater BMPs is generally characterized by the percent reduction in the influent load. This method implies a relationship between influent and effluent concentrations. For instance, it would be expected that a device that is reported to achieve a 75% reduction would have an effluent concentration equal to 25% of the influent concentrations. Recent work in California (Caltrans, 2002) on various sand filter designs indicates that this model for characterizing performance is inadequate. Figure 4 presents a graph relating influent and effluent TSS concentrations for the Austin full sedimentation design.

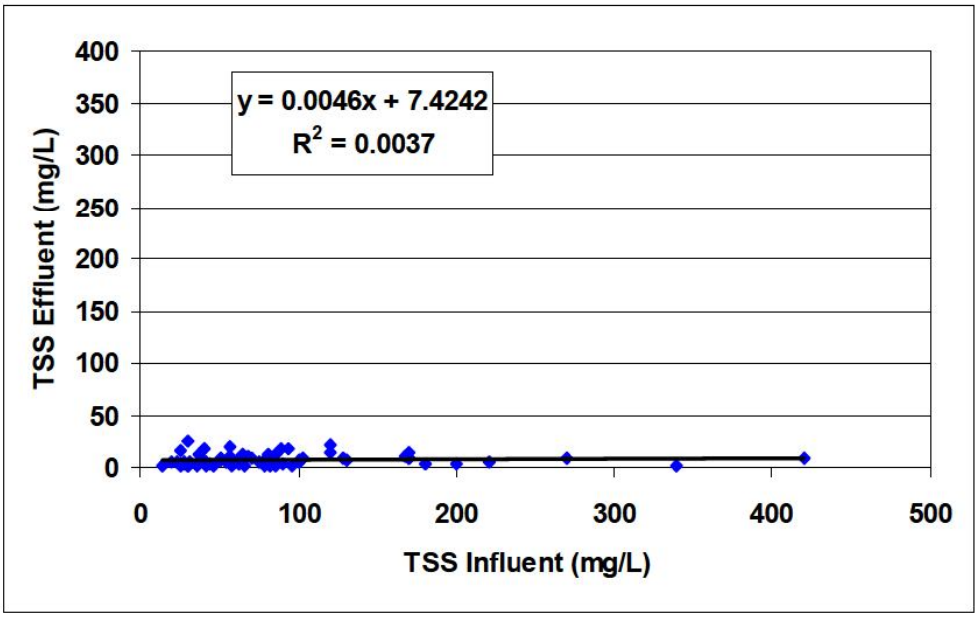

Figure 4
Comparison of Influent and Effluent Concentrations for TSS

It is clearly evident that the effluent concentration is relative constant and independent of influent concentration. Consequently, the performance is more accurately characterized by the effluent concentration, which is about 7.5 mg/L. Constant effluent concentrations also are observed for all other particle related constituents such as particulate metals (total - dissolved) and particulate phosphorus.

The small uncertainty in the estimate of the mean effluent concentration highlights the very consistent effluent quality for TSS produced by sand filters. In addition, it demonstrates that a calculated percent reduction for TSS and other constituents with similar behavior for Austin sand filters is a secondary characteristic of the device and depends primarily on the specific influent concentrations observed. The distinction between a constant effluent quality and a percent reduction is extremely important to recognize if the results are to be used to estimate effluent quality from sand filters installed at other sites with different influent concentrations or for estimating compliance with water quality standards for storms with high concentrations of particulate constituents.

If the conventionally derived removal efficiency (90%) were used to estimate the TSS concentrations in the treated runoff from storms with high influent concentrations, the estimated effluent concentration would be too high. For instance, the storm with the highest observed influent concentration (420 mg/L) would be expected to have a concentration in the treated runoff of 42 mg/L, rather than the 10 mg/L that was measured. In fact, the TSS effluent concentrations for all events with influent concentrations greater than 200 mg/L were 10 mg/L or less.

The stable effluent concentration of a sand filter under very different influent TSS concentrations implies something about the properties of the influent particle size distribution. If one assumes that

only the smallest size fraction can pass through the filter, then the similarity in effluent concentrations suggests that there is little difference in the total mass of the smallest sized particles even when the total TSS concentration varies greatly. Further, the difference in TSS concentration must then be caused by changes in the relative amount of the larger size fractions. Further research is necessary to determine the range of particle size that is effectively removed in the filter and the portion of the size fraction of suspended solids that it represents in urban stormwater.

Sand filters are effective stormwater management practices for pollutant removal. Conventional removal rates for all sand filters and organic filters are presented in Table 1. With the exception of nitrates, which are always exported from filtering systems because of the conversion of ammonia and organic nitrogen to nitrate, they perform relatively well at removing pollutants.

Table 1 Sand filter removal efficiencies (percent)

	Sand Filter (Glick et al, 1998)	Compost Filter System		Multi-Chamber Treatment Train		
		Stewart, 1992	Leif, 1999	Pitt et al., 1997	Pitt, 1996	Greb et al., 1998
TSS	89	95	85	85	83	98
TP	59	41	4	80	-	84
TN	17	-	-	-	-	-
Nitrate	-76	-34	-95	-	14	-
Metals	72 86	61 88	44 75	65 90	91 100	83 89
Bacteria	65	-	-	-	-	-

From the few studies available, it is difficult to determine if organic filters necessarily have higher removal efficiencies than sand filters. The MCTT may have high pollutant removal for some constituents, although an evaluation of these devices by the California Department of Transportation indicated no significant difference for most conventional pollutants.

In addition to the relatively high pollutant removal in media filters, these devices, when sized to capture the channel forming storm volume, are highly effective at attenuating peak flow rates and reducing channel erosion.

Siting Criteria

In general, sand filters are preferred over infiltration practices, such as infiltration trenches, when contamination of groundwater with conventional pollutants is of concern. This usually occurs in areas where underlying soils alone cannot treat runoff adequately - or ground water tables are high. In most cases, sand filters can be constructed with impermeable basin or chamber bottoms, which help to collect, treat, and release runoff to a storm drainage system or directly to surface water with no contact between contaminated runoff and groundwater. In regions where evaporation exceeds rainfall and a wet pond would be unlikely to maintain the required permanent pool, a sand filtration system can be used.

Media Filter TC-40

The selection of a sand filter design depends largely on the drainage area's characteristics. For example, the Washington, D.C. and Delaware sand filter systems are well suited for highly impervious areas where land available for structural controls is limited, since both are installed underground. They have been used to treat runoff from parking lots, driveways, loading docks, service stations, garages, airport runways/taxiways, and storage yards. The Austin sand filtration system is more suited for large drainage areas that have both impervious and pervious surfaces. This system is located at grade and is used to treat runoff from any urban land use.

It is challenging to use most sand filters in very flat terrain because they require a significant amount of hydraulic head (about 4 feet), to allow flow through the system. One exception is the perimeter sand filter, which can be applied with as little as 2 feet of head.

Sand filters are best applied on relatively small sites (up to 25 acres for surface sand filters and closer to 2 acres for perimeter or underground filters). Filters have been used on larger drainage areas, of up to 100 acres, but these systems can clog when they treat larger drainage areas unless adequate measures are provided to prevent clogging, such as a larger sedimentation chamber or more intensive regular maintenance.

When sand filters are designed as a stand-alone practice, they can be used on almost any soil because they can be designed so that stormwater never infiltrates into the soil or interacts with the ground water. Alternatively, sand filters can be designed as pretreatment for an infiltration practice, where soils do play a role.

Additional Design Guidelines

Pretreatment is a critical component of any stormwater management practice. In sand filters, pretreatment is achieved in the sedimentation chamber that precedes the filter bed. In this chamber, the coarsest particles settle out and thus do not reach the filter bed. Pretreatment reduces the maintenance burden of sand filters by reducing the potential for these sediments to clog the filter. When pretreatment is not provided designers should increase the size of the filter area to reduce the clogging potential. In sand filters, designers should select a medium sand as the filtering medium. A fine aggregate (ASTM C-33) that is intended for use in concrete is commonly specified.

Many guidelines recommend sizing the filter bed using Darcy's Law, which relates the velocity of fluids to the hydraulic head and the coefficient of permeability of a medium. The resulting equation, as derived by the city of Austin, Texas, (1996), is

$$Af = WQV\, d/[k\, t\, (h+d)]$$

Where:

Af = area of the filter bed (ft^2);

d = depth of the filter bed (ft; usually about 1.5 feet, depending on the design);

k = coefficient of permeability of the filtering medium (ft/day);

t = time for the water quality volume to filter through the system (days; usually assumed to be 1.67 days); and

h = average water height above the sand bed (ft; assumed to be one-half of the maximum head).

Typical values for k, as assembled by CWP (1996), are shown in Table 2.

Table 2 Coefficient of permeability values for stormwater filtering practices (CWP, 1996)

Filter Medium	Coefficient of Permeability (ft/day)
Sand	3.5
Peat/Sand	2.75
Compost	8.7

The permeability of sand shown in Table 2 is extremely conservative, but is widely used since it is incorporated in the design guidelines of the City of Austin. When the sand is initially installed, the permeability is so high (over 100 ft/d) that generally only a portion of the filter area is required to infiltrate the entire volume, especially in a "full sedimentation" Austin design where the capture volume is released to the filter basin over 24 hours.

The preceding methodology results in a filter bed area that is oversized when new and the entire water quality volume is filtered in less than a day with no significant height of water on top of the sand bed. Consequently, the following simple rule of thumb is adequate for sizing the filter area. If the filter is preceded by a sedimentation basin that releases the water quality volume (WQV) to the filter over 24 hours, then

$$Af = WQV/18$$

If no pretreatment is provided then the filter area is calculated more conservatively as:

$$Af = WQV/10$$

Typically, filtering practices are designed as "off-line" systems, meaning that during larger storms all runoff greater than the water quality volume is bypassed untreated using a flow splitter, which is a structure that directs larger flows to the storm drain system or to a stabilized channel. One exception is the perimeter filter; in this design, all flows enter the system, but larger flows overflow to an outlet chamber and are not treated by the practice.

The Austin design variations are preferred where there is sufficient space, because they lack a permanent pool, which eliminates vector concerns. Design details of this variation are summarized below.

Summary of Design Recommendations

(1) Capture Volume - The facility should be sized to capture the required water quality volume, preferably in a separate pretreatment sedimentation basin.

(2) Basin Geometry – The water depth in the sedimentation basin when full should be at least 2 feet and no greater than 10 feet. A fixed vertical sediment depth marker should be installed in the sedimentation basin to indicate when 20% of the basin volume has been lost because of sediment accumulation. When a pretreatment sedimentation basin is provided the minimum average surface area for the sand filter (Af) is calculated from the following equation:

$$Af = WQV/18$$

If no pretreatment is provided then the filter area is calculated as:

$$Af = WQV/10$$

(3) Sand and Gravel Configuration - The sand filter is constructed with 18 inches of sand overlying 6 inches of gravel. The sand and gravel media are separated by permeable geotextile fabric and the gravel layer is situated on geotextile fabric. Four-inch perforated PVC pipe is used to drain captured flows from the gravel layer. A minimum of 2 inches of gravel must cover the top surface of the PVC pipe. Figure 5 presents a schematic representation of a standard sand bed profile.

(4) Sand Properties – The sand grain size distribution should be comparable to that of "washed concrete sand," as specified for fine aggregate in ASTM C-33.

(5) Underdrain Pipe Configuration – In an Austin filter, the underdrain piping should consist of a main collector pipe and two or more lateral branch pipes, each with a minimum diameter of 4 inches. The pipes should have a minimum slope of 1% (1/8 inch per foot) and the laterals should be spaced at intervals of no more than 10 feet. There should be no fewer than two lateral branch pipes. Each individual underdrain pipe should have a cleanout access location. All piping is to be Schedule 40 PVC. The maximum spacing between rows of perforations should not exceed 6 inches.

(6) Flow Splitter - The inflow structure to the sedimentation chamber should incorporate a flow-splitting device capable of isolating the capture volume and bypassing the 25-year peak flow around the facility with the sedimentation/filtration pond full.

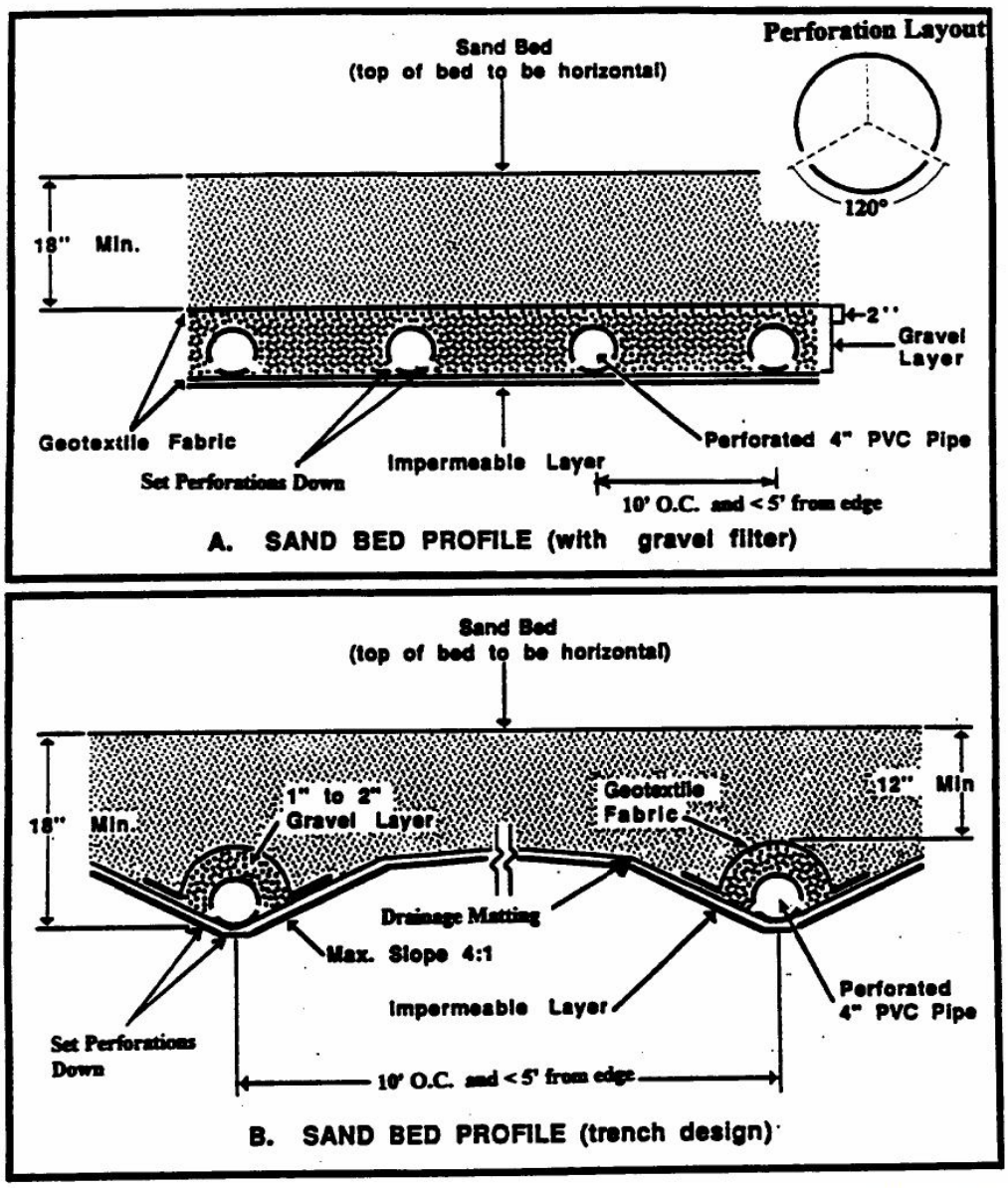

Figure 5
Schematic of Sand Bed Profile

(7) Basin Inlet – Energy dissipation is required at the sedimentation basin inlet so that flows entering the basin should be distributed uniformly and at low velocity in order to prevent resuspension and encourage quiescent conditions necessary for deposition of solids.

(8) Sedimentation Pond Outlet Structure - The outflow structure from the sedimentation chamber should be (1) an earthen berm; (2) a concrete wall; or (3) a rock gabion. Gabion outflow structures should extend across the full width of the facility such that no short-circuiting of flows can occur. The gabion rock should be 4 inches in diameter. The

receiving end of the sand filter should be protected (splash pad, riprap, etc.) such that erosion of the sand media does not occur. When a riser pipe is used to connect the sedimentation and filtration basins (example in Figure 6), a valve should be included to isolate the sedimentation basin in case of a hazardous material spill in the watershed. The control for the valve must be accessible at all times, including when the basin is full. The riser pipe should have a minimum diameter of 6 inches with four 1-inch perforations per row. The vertical spacing between rows should be 4 inches (on centers).

(9) Sand Filter Discharge – If a gabion structure is used to separate the sedimentation and filtration basins, a valve must installed so that discharge from the BMP can be stopped in case runoff from a spill of hazardous material enters the sand filter. The control for the valve must be accessible at all times, including when the basin is full.

Maintenance

Even though sand filters are generally thought of as one of the higher maintenance BMPs, in a recent California study an average of only about 49 hours a year were required for field activities. This was less maintenance than was required by extended detention basins serving comparable sized catchments. Most maintenance consists of routine removal of trash and debris, especially in Austin sand filters where the outlet riser from the sedimentation basin can become clogged.

Most data (i.e. Clark, 2001) indicate that hydraulic failure from clogging of the sand media occurs before pollutant breakthrough. Typically, only the very top of the sand becomes clogged while the rest remains in relative pristine condition as shown in Figure 7. The rate of clogging has been related to the TSS loading on the filter bed (Urbonas, 1999); however, the data are quite variable. Empirical observation of sites treating urban and highway runoff indicates that clogging of the filter occurs after 2 – 10 years of service. Presumably, this is related to differences in the type and amount of sediment in the catchment areas of the various installations. Once clogging occurs the top 2 – 3 inches of filter media is removed, which restores much, but not all, of the lost permeability. This removal of the surface layer can occur several times before the entire filter bed must be replaced. The cost of the removal of the surface layer is not prohibitive, generally ranging between $2,000 (EPA Fact Sheet) and $4,000 (Caltrans, 2002) depending on the size of the filter.

Media filters can become a nuisance due to mosquito and midge breeding in certain designs or if not regularly maintained. "Wet" designs (e.g., MCTT and Delaware filter) are more conducive to vectors than others (e.g., Austin filters) because they maintain permanent sources of standing water where breeding is likely to occur. Caltrans successfully excluded mosquitoes and midges from accessing the permanent water in the sedimentation basin of MCTT installations through use of a tight-fitting aluminum cover to seal vectors out. However, typical wet designs may require routine inspections and treatments by local mosquito and vector control agencies to suppress mosquito production. Vector habitats may also be created in "dry" designs when media filters clog, and/or when features such as level spreaders that hold water over 72 hours are included in the installation. Dry designs such as Austin filters should dewater completely (recommended 72 hour residence time or less) to prevent creating mosquito and other vector habitats. Maintenance efforts to prevent vector breeding in dry designs will need to focus on basic housekeeping practices such as removal of debris accumulations and vegetation management (in filter media) to prevent clogs and/or pools of standing water.

TC-40 Media Filter

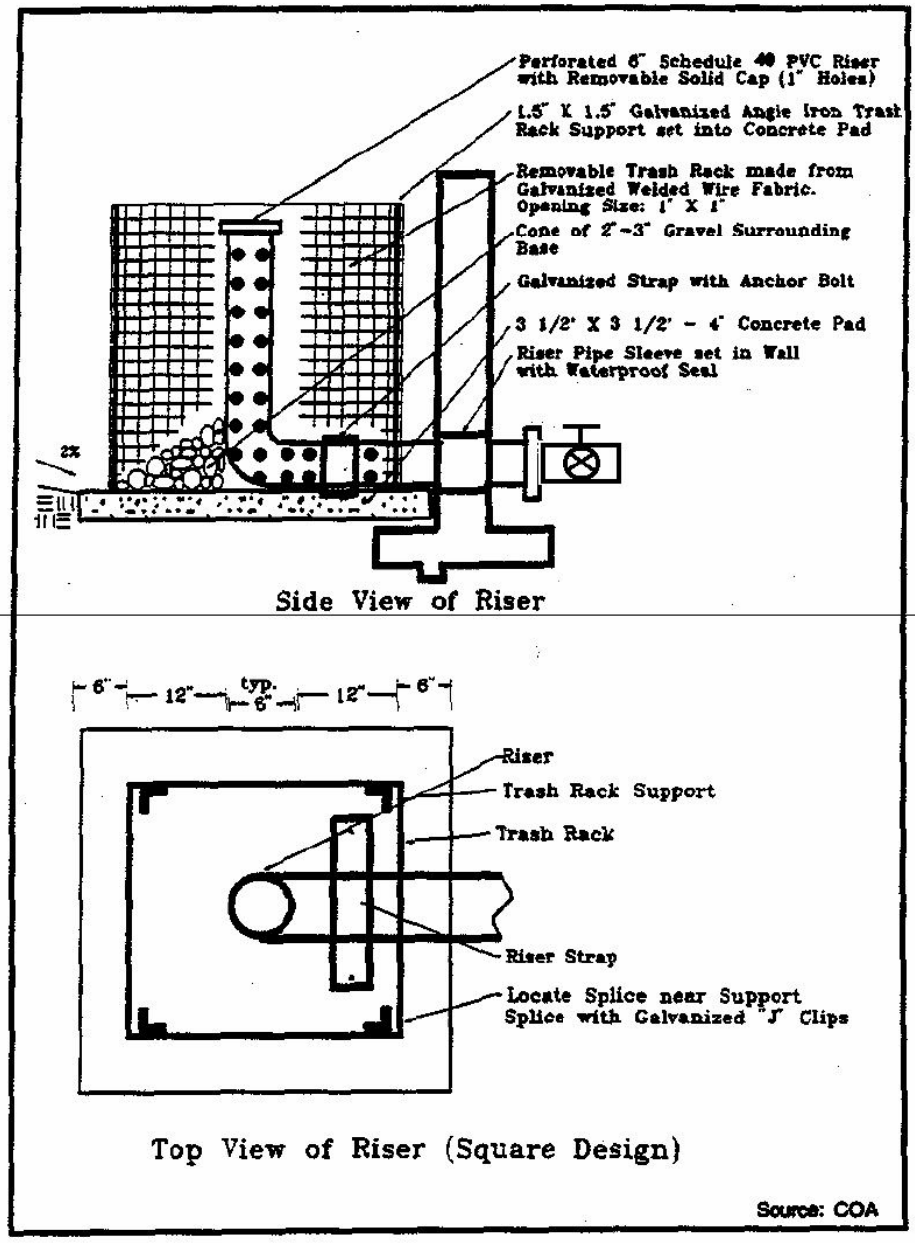

Figure 6
Detail of Sedimentation Riser Pipe

Figure 7
Formation of Clogging Crust on Filter Bed

Recommended maintenance activities and frequencies include:

- Inspections semi-annually for standing water, sediment, trash and debris, and to identify potential problems.
- Remove accumulated trash and debris in the sedimentation basin, from the riser pipe, and the filter bed during routine inspections.
- Inspect the facility once during the wet season after a large rain event to determine whether the facility is draining completely within 72 hr.
- Remove top 50 mm (2 in.) of sand and dispose of sediment if facility drain time exceeds 72 hr. Restore media depth to 450 mm (18 in.) when overall media depth drops to 300 mm (12 in.).
- Remove accumulated sediment in the sedimentation basin every 10 yr or when the sediment occupies 10 percent of the basin volume, whichever is less.

Cost

Construction Cost

There are few consistent published data on the cost of sand filters, largely because, with the exception of Austin, Texas, Alexandria, Virginia, and Washington, D.C., they have not been widely used. Furthermore, filters have such varied designs that it is difficult to assign a cost to filters in general. A study by Brown and Schueler (1997) was unable to find a statistically valid relationship between the volume of water treated in a filter and the cost of the practice. The EPA filter fact sheet indicates a cost for an Austin sand filter at $18,500 (1997 dollars) for a 0.4 hectare- (1 acre-)

drainage area. However, the same design implemented at a 1.1 ha site by the California Department of Transportation, cost $240,000. Consequently, there is a tremendous uncertainty about what the average construction cost might be.

It is important to note that, although underground and perimeter sand filters can be more expensive than surface sand filters, they consume no surface space, making them a relatively cost-effective practice in ultra-urban areas where land is at a premium.

Given the number of facilities installed in the areas that promote their use it should be possible to develop fairly accurate construction cost numbers through a more comprehensive survey of municipalities and developers that have implemented these filters.

Maintenance Cost

Annual costs for maintaining sand filter systems average about 5 percent of the initial construction cost (Schueler, 1992). Media is replaced as needed, with the frequency correlated with the solids loading on the filter bed. Currently the sand is being replaced in the D.C. filter systems about every 2 years, while an Austin design might last 3-10 years depending on the watershed characteristics. The cost to replace the gravel layer, filter fabric and top portion of the sand for D.C. sand filters is approximately $1,700 (1997 dollars).

Caltrans estimated future maintenance costs for the Austin design, assuming a device sized to treat runoff from approximately 4 acres. These estimates are presented in Table 3 and assume a fully burdened hourly rate of $44 for labor. This estimate is somewhat uncertain, since complete replacement of the filter bed was not required during the period that maintenance costs were recorded.

Table 3 Expected Annual Maintenance Costs for an Austin Sand Filter

Activity	Labor Hours	Equipment and Materials ($)	Cost
Inspections	4	0	176
Maintenance	36	125	1,706
Vector Control	0	0	0
Administration	3	0	132
Direct Costs	-	888	888
Total	43	$1,013	**$2,902**

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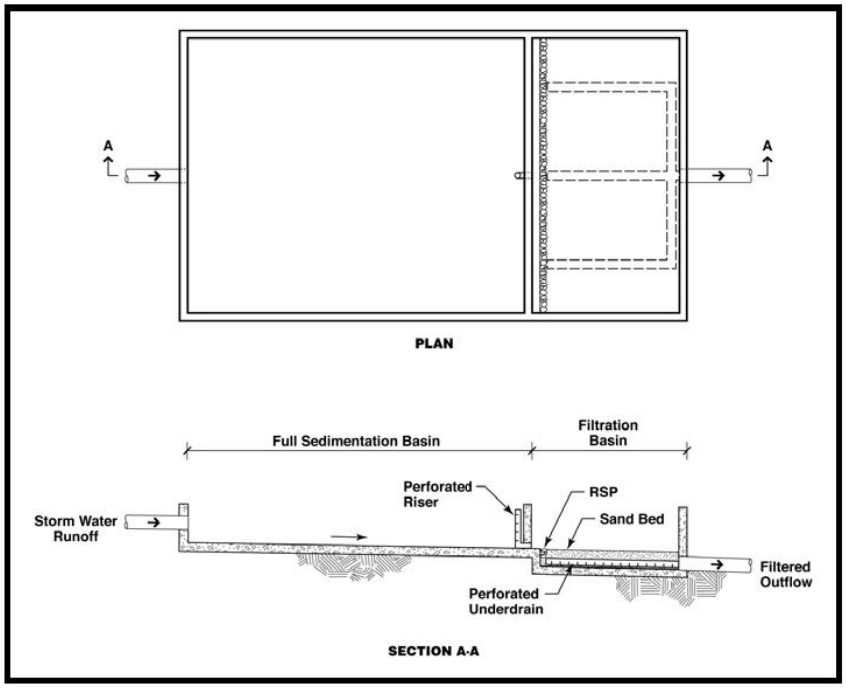

Schematic of the "Full Sedimentation" Austin Sand Filter

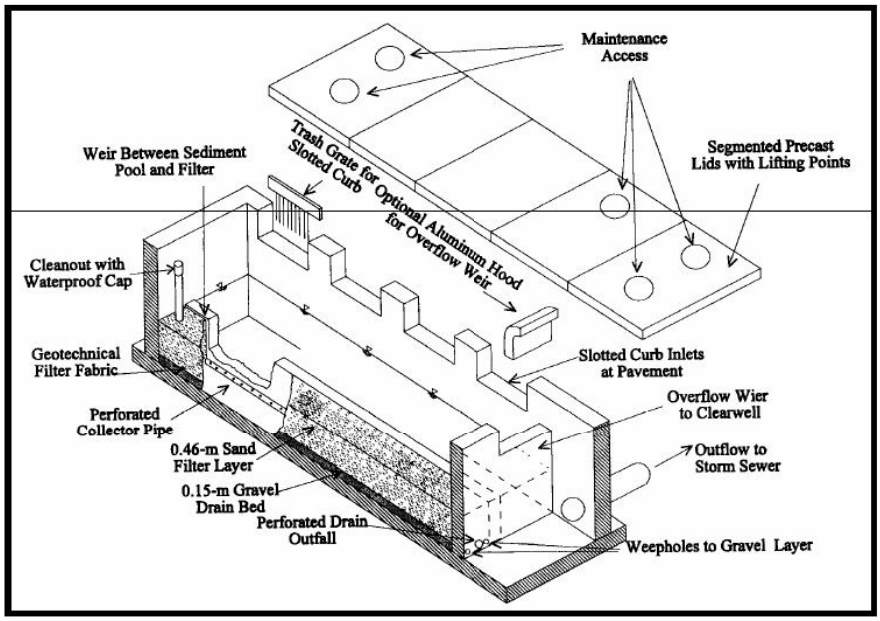

Schematic of a Delaware Sand Filter (Young et al., 1996)

Media Filter TC-40

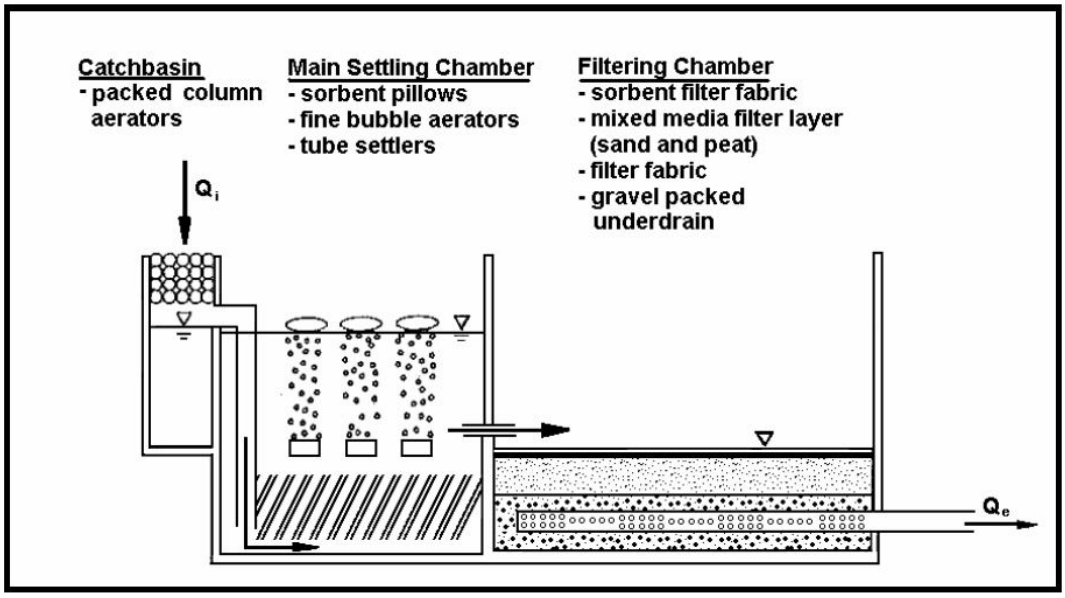

Schematic of a MCTT (Robertson et al., 1995)

Water Quality Inlet TC-50

Description

Water quality inlets (WQIs), also commonly called trapping catch basins, oil/grit separators or oil/water separators, consist of one or more chambers that promote sedimentation of coarse materials and separation of free oil (as opposed to emulsified or dissolved oil) from stormwater. Some WQIs also contain screens to help retain larger or floating debris, and many of the newer designs also include a coalescing unit that helps promote oil/water separation. A typical WQI, as shown in the schematic, consists of a sedimentation chamber, an oil separation chamber, and a discharge chamber.

These devices are appropriate for capturing hydrocarbon spills, but provide very marginal sediment removal and are not very effective for treatment of stormwater runoff. WQIs typically capture only the first portion of runoff for treatment and are generally used for pretreatment before discharging to other best management practices (BMPs).

California Experience

Caltrans investigated the use of coalescing plate oil/water separators at maintenance stations in Southern California. Twenty-two maintenance stations were originally considered for implementation of this technology; however, only one site appeared to have concentrations that were sufficiently high to warrant installation of an oil-water separator. Concentrations of free oil in stormwater runoff observed during the course of the study even from this site were too low for effective operation of this technology, and no free oil was ever captured by the device.

Advantages

- Can provide spill control.

Limitations

- WQIs generally provide limited hydraulic and residuals storage. Due to the limited storage, WQIs do not provide substantial stormwater improvement.
- Standing water in the devices can provide a breeding ground for mosquitoes.
- Certain designs maintain permanent sources of standing water where mosquito and other vector breeding may to occur.

Design and Sizing Guidelines

- Water quality inlets are most effective for spill control and should be sized accordingly.

Design Considerations

- Area Required

Targeted Constituents

☑	Sediment	●
☑	Nutrients	●
☑	Trash	▲
☑	Metals	●
☑	Bacteria	●
☑	Oil and Grease	▲
☑	Organics	●

Legend ***(Removal Effectiveness)***

● Low ■ High

▲ Medium

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- Designs that utilize covered sedimentation and filtration basins should be accessible to vector control personnel via access doors to facilitate vector surveillance and controlling the basins if needed.

Performance

WQIs are primarily utilized to remove sediment from stormwater runoff. Grit and sediment are partially removed by gravity settling within the first two chambers. A WQI with a detention time of 1 hour may expect to have 20 to 40 percent removal of sediments. Hydrocarbons associated with the accumulated sediments are also often removed from the runoff through this process. The WQI achieves slight, if any, removal of nutrients, metals and organic pollutants other than free petroleum products (Schueler, 1992).

A 1993 MWCOG study found that an average of less than 5 centimeters (2 inches) of sediments (mostly coarse-grained grit and organic matter) were trapped in the WQIs. Hydrocarbon and total organic carbon (TOC) concentrations of the sediments averaged 8,150 and 53,900 milligrams per kilogram, respectively. The mean hydrocarbon concentration in the WQI water column was 10 milligrams per liter. The study also indicated that sediment accumulation did not increase over time, suggesting that the sediments become re-suspended during storm events. The authors concluded that although the WQI effectively separates oil and grease from water, re-suspension of the settled matter appears to limit removal efficiencies. Actual removal only occurs when the residuals are removed from the WQI (Schueler 1992).

A 1990 report by API found that the efficiency of oil and water separation in a WQI is inversely proportional to the ratio of the discharge rate to the unit's surface area. Due to the small capacity of the WQI, the discharge rate is typically very high and the detention time is very short. For example, the MWCOG study found that the average detention time in a WQI is less than 0.5 hour. This can result in minimal pollutant settling (API, 1990). However, the addition of coalescing units in many current WQI units may increase oil/water separation efficiency. Most coalescing units are designed to achieve a specific outlet concentration of oil and grease (for example, 10-1 5m/L oil and grease).

Pollutant removal in stormwater inlets can be somewhat improved using inserts, which are promoted for removal of oil and grease, trash, debris, and sediment. Some inserts are designed to drop directly into existing catch basins, while others may require extensive retrofit construction.

Siting Criteria

Oil/water separation units are often utilized in specific industrial areas, such as airport aprons, equipment washdown areas, or vehicle storage areas. In these instances, runoff from the area of concern will usually be diverted directly into the unit, while all other runoff is sent to the storm drain downstream from the oil/water separator. Oil/water separation tanks are often fitted with diffusion baffles at the inlets to prevent turbulent flow from entering the unit and resuspending settled pollutants.

Additional Design Guidelines

Prior to WQI design, the site should be evaluated to determine if another BMP would be more cost-effective in removing the pollutants of concern. WQIs should be used when no other BMP is feasible. The WQI should be constructed near a storm drain network so that flow can be easily diverted to the WQI for treatment (NVPDC, 1992). Any construction activities within the

drainage area should be completed before installation of the WQI, and the drainage area should be revegetated so that the sediment loading to the WQI is minimized.

WQIs are most effective for small drainage areas. Drainage areas of 0.4 hectares (1 acre) or less are often recommended. WQIs are typically used in an off-line configuration (i.e., portions of runoff are diverted to the WQI), but they can be used as on-line units (i.e., receive all runoff). Generally, off-line units are designed to handle the first 1.3 centimeters (0.5 inches) of runoff from the drainage areas. Upstream isolation/diversion structures can be used to divert the water to the off-line structure (Schueler, 1992). On-line units receive higher flows that will likely cause increased turbulence and resuspension of settled material, thereby reducing WQI performance.

Oil/water separation tanks are often fitted with diffusion baffles at the inlets to prevent turbulent flow from entering the unit and resuspending settled pollutants. WQIs are available as pre-manufactured units or can be cast in place. Reinforced concrete should be used to construct below-grade WQIs. The WQIs should be water tight to prevent possible ground water contamination.

Maintenance

Typical maintenance of WQIs includes trash removal if a screen or other debris capturing device is used, and removal of sediment using a vactor truck. Operators need to be properly trained in WQI maintenance. Maintenance should include keeping a log of the amount of sediment collected and the date of removal. Some cities have incorporated the use of GIS systems to track sediment collection and to optimize future catch basin cleaning efforts.

One study (Pitt, 1985) concluded that WQIs can capture sediments up to approximately 60 percent of the sump volume. When sediment fills greater than 60 percent of their volume, catch basins reach steady state. Storm flows can then resuspend sediments trapped in the catch basin, and will bypass treatment. Frequent clean-out can retain the volume in the catch basin sump available for treatment of stormwater flows.

At a minimum, these inlets should be cleaned at least twice during the wet season. Two studies suggest that increasing the frequency of maintenance can improve the performance of catch basins, particularly in industrial or commercial areas. One study of 60 catch basins in Alameda County, California, found that increasing the maintenance frequency from once per year to twice per year could increase the total sediment removed by catch basins on an annual basis (Mineart and Singh, 1994). Annual sediment removed per inlet was 54 pounds for annual cleaning, 70 pounds for semi-annual and quarterly cleaning, and 160 pounds for monthly cleaning. For catch basins draining industrial uses, monthly cleaning increased total annual sediment collected to six times the amount collected by annual cleaning (180 pounds versus 30 pounds). These results suggest that, at least for industrial uses, more frequent cleaning of catch basins may improve efficiency.

BMPs designed with permanent water sumps, vaults, and/or catch basins (frequently installed below-ground) can become a nuisance due to mosquito and other vector breeding. Preventing mosquito access to standing water sources in BMPs (particularly below-ground) is the best prevention plan, but can prove challenging due to multiple entrances and the need to maintain the hydraulic integrity of the system. BMPs that maintain permanent standing water may require routine inspections and treatments by local mosquito and vector control agencies to

suppress mosquito production. Standing water in oil/water separators may contain sufficient floating hydrocarbons to prevent mosquito breeding, but this is not a reliable control alternative to vector exclusion or chemical treatment.

Cost

A typical pre-cast catch basin costs between $2,000 and $3,000; however, oil/water separators can be much more expensive. The true pollutant removal cost associated with catch basins, however, is the long-term maintenance cost. A vactor truck, the most common method of catch basin cleaning, costs between $125,000 and $150,000. This initial cost may be high for smaller Phase II communities. However, it may be possible to share a vactor truck with another community. Typical vactor trucks can store between 10 and 15 cubic yards of material, which is enough storage for three to five catch basins. Assuming semi-annual cleaning, and that the vactor truck could be filled and material disposed of twice in one day, one truck would be sufficient to clean between 750 and 1,000 catch basins. Another maintenance cost is the staff time needed to operate the truck. Depending on the regulations within a community, disposal costs of the sediment captured in catch basins may be significant.

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Water Quality Inlet TC-50

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TC-50 Water Quality Inlet

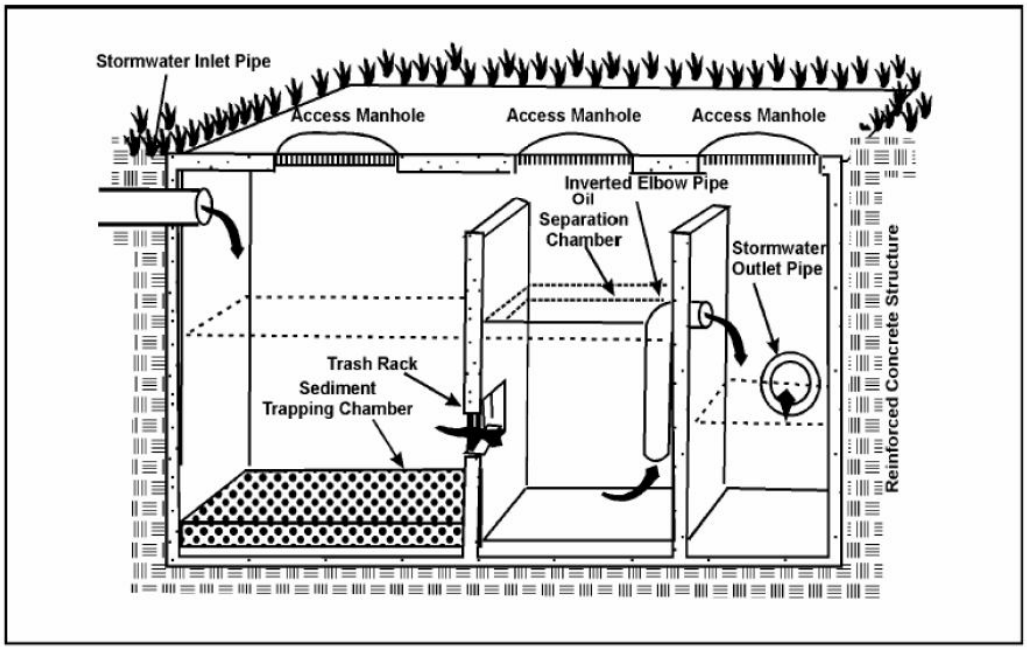

Multiple System Fact Sheet TC-60

Description

A multiple treatment system uses two or more BMPs in series. Some examples of multiple systems include: settling basin combined with a sand filter; settling basin or biofilter combined with an infiltration basin or trench; extended detention zone on a wet pond.

California Experience

The research wetlands at Fremont, California are a combination of wet ponds, wetlands, and vegetated controls.

Advantages

- BMPs that are less sensitive to high pollutant loadings, especially solids, can be used to pretreat runoff for sand filters and infiltration devices where the potential for clogging exists.
- BMPs which target different constituents can be combined to provide treatment for all constituents of concern.
- BMPs which use different removal processes (sedimentation, filtration, biological uptake) can be combined to improve the overall removal efficiency for a given constituent.
- BMPs in series can provide redundancy and reduce the likelihood of total system failure.

Limitations

- Capital costs of multiple systems are higher than for single devices.
- Space requirements are greater than that required for a single technology.

Design and Sizing Guidelines

Refer to individual treatment control BMP fact sheets.

Performance

- Be aware that placing multiple BMPs in series does not necessarily result in combined cumulative increased performance. This is because the first BMP may already achieve part of the gain normally achieved by the second BMP. On the other hand, picking the right combination can often help optimize performance of the second BMP since the influent to the second BMP is of more consistent water quality, and thus more consistent performance, thereby allowing the BMP to achieve its highest performance.

Design Considerations

- Area Required
- Slope
- Water Availability
- Hydraulic Head
- Environmental Side-effects

Targeted Constituents

☑	Sediment	■
☑	Nutrients	●
☑	Trash	■
☑	Metals	■
☑	Bacteria	▲
☑	Oil and Grease	■
☑	Organics	■

Legend ***(Removal Effectiveness)***

● Low ■ High

▲ Medium

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TC-60 Multiple System Fact Sheet

- When addressing multiple constituents through multiple BMPs, one BMP may optimize removal of a particular constituent, while another BMP optimizes removal of a different constituent or set of constituents. Therefore, selecting the right combination of BMPs can be very constructive in collectively removing multiple constituents.

Siting Criteria

Refer to individual treatment control BMP fact sheets.

Additional Design Guidelines

- When using two or more BMPs in series, it may be possible to reduce the size of BMPs.
- Existing pretreatment requirements may be able to be avoided when using some BMP combinations.

Maintenance

Refer to individual treatment control BMP fact sheets.

Cost

Refer to individual treatment control BMP fact sheets.

Resources and Sources of Additional Information

Refer to individual treatment control BMP fact sheets.

Wetland MP-20

Description

A manufactured wetland is similar to public domain stormwater wetlands. In a manufactured wetland, gravel substrate and subsurface flow of the stormwater through the root systems force the vegetation to remove nutrients and dissolved pollutants from the stormwater.

Only one company currently manufactures a pre-engineered wetland: It consists of a standard module, about 9.5 feet in diameter and 4 feet in height. The module is constructed of recycled polyethylene. The number of units is varied to meet the design volume of the site.

California Experience

There are currently only a few installations in California.

Advantages

- Constructed wetlands remove dissolved pollutants unlike many of the other treatment technologies, whether manufactured or in the public domain.
- Gravel substrate and subsurface flow of the stormwater through the root systems forces the vegetation to remove nutrients and dissolved pollutants from the stormwater.
- Unlike standard constructed wetlands (TC-21), there is no standing water in the manufactured wetland between storms (after emptying with each storm). This minimizes but does not entirely eliminate the opportunity for mosquito breeding.
- Can be incorporated into the landscaping of the development.
- The gravel substrate likely provides a good environment for bacteria, facilitating the removal of nitrogen and the degradation of oil and greases, and other organic compounds.
- The gravel substrate can be augmented with media that is specifically effective at removing dissolved pollutants, increasing further the performance of the system.
- Vegetation is more easily harvested in comparison to a wet pond or standard constructed wetland (TC-21).
- Provides modest habitat for insects and other small invertebrates which in turn provide food for birds and other small animals.

Design Considerations

- Drainage Area Size
- Potential Pretreatment Requirements

Targeted Constituents

- ☑ Sediment
- ☑ Nutrients
- ☑ Trash
- ☑ Metals
- ☑ Bacteria
- ☑ Oil and Grease
- ☑ Organics

Removal Effectiveness

See New Development and Redevelopment Handbook-Section 5.

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Limitations

- Not likely suitable for drainage areas greater than an acre due to the number of units that is required for larger sites.
- May attract invasive wetland species
- May require irrigation during the dry season
- With an emptying time as much as 5 days, a breeding ground for mosquitoes may occur during and immediately following each storm
- If site development requirements of local government also includes detention for flow control, the drawdown characteristics of the system must be compatible with the detention system.
- Where many units are required, the pattern of circular plastic covers of the center wells may not be appealing.

Design and Sizing Guidelines

The unit consists of two concentric chambers, analogous to a doughnut. The inner chamber is open whereas the outer chamber is filled with gravel in which the wetland plants reside. The water enters a center well, moving in a circular motion around nearly the entire circumference of the well. Via floating surface skimmers the water then enters the outer chamber. The flow rate is controlled at the outlet with a valve. The substrate for the vegetation is small gravel. Gravel substrate encourages the wetland vegetation to use nutrients and metals in the stormwater. The concept of subsurface flow through gravel has its parentage with subsurface flow constructed wetlands used to treat wastewater.

The unit includes a burlap bag over the inlet to remove debris, and screens within the center well for the same purpose. However, the upstream drainage system is considered the primary remover of coarse solids and debris. If the drainage system lacks drain inlets with sumps where coarse sediments and floatables are removed, it is desirable to include a pretreatment unit for this purpose such as a manhole or wet vault of suitable size.

Table 1 Supplemental Media

Targeted Pollutant	Alternative Media	References
Complex organics (e.g., pesticides)	Activated carbon	Metcalf and Eddy (2002), Minton (2002)
Petroleum hydrocarbons	Activated carbon, organoclay, granular polymer	Minton (2002)
Dissolved metals	Zeolite, activated carbon	Minton (2002), Groffman, et al. (1997), Netzer and Hughes (1984), Stormwater Management Inc. technical memos
Dissolved phosphorus	Blast furnace slag, iron-ore, iron wool, limestone, aluminum oxide, dolomite, iron-infused resin	James, et al. (1992), Minton (2002), Shapiro (1999), Ayoub, et al. (2001), Storm-water Management Inc memos

Wetland MP-20

The design water quality volume is determined by local governments or sized so that 85% of the annual runoff volume is treated.

Construction/Inspection Considerations

Refer to manufacturer guidelines.

Performance

There is little operating data for the manufactured wetland, although these data indicate very high removal efficiencies, similar to created stormwater wetlands. An advantage of wet ponds and standard constructed wetlands over most other treatment technologies is the removal of dissolved pollutants. However, this occurs only to the extent that the stormwater pollutants are able to diffuse into the soil where they are removed by the soil or the plants. Except for non-rooted plants, pollutant uptake by vegetation does not occur in the overlying wet pool (Minton, 2002). Placement of wetland plants in gravel with the stormwater flowing directly through the root system forces uptake by the vegetation. To maintain performance therefore requires annual or harvesting of the vegetation (See Maintenance). However, the removal of dissolved phosphorus, metals, and complex organics like pesticides in earthen-lined ponds and wetlands is primarily by chemical sorption or precipitation with the soil, not uptake by plants (Minton, 2002). Gravel substrate does not provide ideal conditions for these chemical processes. There are currently no operating data for the manufactured wetland with respect to the removal of dissolved pollutants and therefore whether uptake solely by plants is sufficient is unknown. It may be desirable to augment the gravel with media capable of removing dissolved pollutants. The supplemental media can be specific for the pollutant that is to be removed. Table 1 lists media that have been evaluated in either stormwater or wastewater constructed wetlands or filtration systems.

The gravel substrate likely provides a good environment for bacteria, facilitating the removal of nitrogen (its primary mechanism of removal) and the degradation of petroleum and other organic compounds. While this has been confirmed to occur in the manufactured product discussed here, experience with constructed wetlands used for wastewater treatment (Minton, 2002) suggests that it likely occurs

Siting Criteria

While not stated by the manufacturer, the system is likely most appropriate for small drainage areas of an approximately an acre or less, given the number of units required per acre.

Additional Design Guidelines

As noted previously, the number of units installed is the function of the volume of water to be treated: multiple units are installed in parallel with incoming stormwater split via a manifold. The storage volume of one unit is approximately 185 ft3. The recommended emptying rate is 0.25 gallons per minute (average). To illustrate sizing, assume a development site of one acre and the design event is 0.75 inches. The total volume of the design event is 2,722 cubic feet. Thus, a minimum of 15 units is required, ignoring throughput during the storm. At this rate, a unit drains in approximately 3.8 days.

However, the emptying time must be considered with respect to the inter-event time between storms. If the emptying time is too great there is a statistical probability of some water being present in the units when the next storm occurs. If so, the full volume of the design event is not treated over the long term. The manufacturer currently does not provide a design method that

considers this factor. The recommended approach is to use the method presented in TC-22 for Extended Detention systems inasmuch as the Storm Treat is a "fill-and-draw" system that functions like Extended Detention and should be expected to capture and treat the same stormwater volume over time.

Fewer units are possible if the upstream drainage system is able to store water, although this extends the emptying time. If a detection facility is required for flow control, it can provide the necessary storage and the number of wetland units is reduced, but not substantially given the need to drain the system in a timely fashion. Furthermore, if a detention facility is included it must control the release rate, not the manufactured wetland. This may require a more rapid release rate than recommended by the manufacturer. However, there are no data relating emptying rate with performance. Since the system also functions in effect as a horizontal filter, throughput rates higher than what is recommended by the manufacturer may be possible without a significant reduction in performance.

Maintenance

To maximize the benefits of wetland vegetation in its removal of pollutants, the vegetation must be harvested each growth season. Harvesting is particularly important with respect to the removal of phosphorus and metals, less so nitrogen. Harvesting should occur by mid-summer before the plants begin to transfer phosphorus from the aboveground foliage to subsurface roots, or begin to lose metals that desorb during plant die-off. While not stated by the manufacturer, it is also desirable that every few years the entire plant mass including roots is harvested. This is because the belowground biomass constitutes a significant reservoir (possibly half) of the nutrients and metals that are removed from the stormwater by plants (Minton, 2002). Annual maintenance is typical.

If debris and floatable material is not effectively removed in the pretreatment unit, premature clogging of the debris bag may occur.

- Crop vegetation near end of each growth season to capture the nutrients and pollutants removed by the wetland vegetation.
- Inspect periodically to ensure that invasive species of wetland plants is not occurring
- Conduct inspection during the dry season to determine if irrigation of plants is necessary
- Clean center well periodically.

Cost

Manufacturers provide costs for the units including delivery. Installation costs are generally on the order of 50 to 100 % of the manufacturer's cost.

Cost Considerations

- If the drainage system lacks drain inlets with sumps where coarse sediments and floatables are removed, it is desirable to include a pretreatment unit for this purpose such as a manhole or wet vault of suitable size. This should be factored in the cost-analysis when comparing to other treatment BMPs. If already a requirement of the local government, a detention facility for flow control can serve this purpose.

Wetland MP-20

- In comparison to public domain wet ponds (TC-20) and constructed wetlands (TC-21), vegetation harvesting is simpler, and therefore less costly.

References and Sources of Additional Information

Ayoub, G.M., B. Koopman, and N. Pandya, 2001, Iron and aluminum hydroxy (oxide) coated filter media for low-concentration phosphorus removal, Water Environ. Res., 73, 7, 478

Groffman, A., S. Peterson, D. Brookins, 1997, The removal of lead and other heavy metals from wastewater streams using zeolites, zeocarb, and other natural materials as a sorption media, presented to the 70th Annual Conference, Water Environment Federation, Alexandria, Virginia

James, B.R., M.C. Rabvenhorst, and G.A. Frigon, 1992, Phosphorus sorption by peat and sand amended with iron oxides or steel wool, Water Environ. Res., 64, 699. Manufacturer's literature Metcalf and Eddy, Inc., 2002, Wastewater Engineering: Treatment, Disposal, Reuse, McGraw-Hill, New York, New York. Minton, G.R., 2002, Stormwater Treatment: Biological, Chemical, and Engineering Principles, RPA Press, Seattle, Washington, 416 pages. Netzer, A., and D.E. Hughes, 1984, Adsorption of copper, lead, and cobalt by activated carbon, Water Res., 18, 927. Shapiro and Associates and the Bellevue Utilities Department, 1999, Lakemont stormwater treatment facility monitoring report, Bellevue, Washington.

Media Filter MP-40

Description

Stormwater media filters are usually two-chambered including a pretreatment settling basin and a filter bed filled with sand or other absorptive filtering media. As stormwater flows into the first chamber, large particles settle out, and then finer particles and other pollutants are removed as stormwater flows through the filtering media in the second chamber.

There are currently three manufacturers of stormwater filter systems. Two are similar in that they use cartridges of a standard size. The cartridges are placed in vaults; the number of cartridges a function of the design flow rate. The water flows laterally (horizontally) into the cartridge to a centerwell, then downward to an underdrain system. The third product is a flatbed filter, similar in appearance to sand filters.

California Experience

There are currently about 75 facilities in California that use manufactured filters.

Advantages

- Requires a smaller area than standard flatbed sand filters, wet ponds, and constructed wetlands.
- There is no standing water in the units between storms, minimizing but does not entirely eliminate the opportunity for mosquito breeding.
- Media capable of removing dissolved pollutants can be selected.
- One system utilizes media in layers, allowing for selective removal of pollutants.
- The modular concept allows the design engineer to more closely match the size of the facility to the design storm.

Limitations

- As some of the manufactured filter systems function at higher flow rates and/or have larger media than found in flatbed filters, the former may not provide the same level of performance as standard sand filters. However, the level of treatment may still be satisfactory.
- As with all filtration systems, use in catchments that have significant areas of non-stabilized soils can lead to premature clogging.

Design Considerations

- Design Storm
- Media Type
- Maintenance Requirement

Targeted Constituents

- ☑ Sediment
- ☑ Nutrients
- ☑ Trash
- ☑ Metals
- Bacteria
- ☑ Oil and Grease
- ☑ Organics

Removal Effectiveness

See New Development and Redevelopment Handbook-Section 5.

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MP-40 Media Filter

Design and Sizing Guidelines

There are currently three manufacturers of stormwater filter systems.

Filter System A: This system is similar in appearance to a slow-rate sand filter. However, the media is cellulose material treated to enhance its ability to remove hydrocarbons and other organic compounds. The media depth is 12 inches (30 cm). It operates at a very high rate, 20 gpm/ft2 at peak flows. Normal operating rates are much lower assuming that the stormwater covers the entire bed at flows less than the peak rate. The system uses vortex separation for pretreatment. As the media is intended to remove sediments (with attached pollutants) and organic compounds, it would not be expected to remove dissolved pollutants such as nutrients and metals unless they are complexed with the organic compounds that are removed.

Filter System B: It uses a simple vertical filter consisting of 3 inch diameter, 30 inch high slotted plastic pipe wrapped with fabric. The standard fabric has nominal openings of 10 microns. The stormwater flows into the vertical filter pipes and out through an underdrain system. Several units are placed vertically at 1 foot intervals to give the desired capacity. Pretreatment is typically a dry extended detention basin, with a detention time of about 30 hours. Stormwater is retained in the basin by a bladder that is automatically inflated when rainfall begins. This action starts a timer which opens the bladder 30 hours later. The filter bay has an emptying time of 12 to 24 hours, or about 1 to 2 gpm/ft2 of filter area. This provides a total elapsed time of 42 to 54 hours. Given that the media is fabric, the system does not remove dissolved pollutants. It does remove pollutants attached to the sediment that is removed.

Filter System C: The system use vertical cartridges in which stormwater enters radially to a center well within the filter unit, flowing downward to an underdrain system. Flow is controlled by a passive float valve system, which prevents water from passing through the cartridge until the water level in the vault rises to the top of the cartridge. Full use of the entire filter surface area and the volume of the cartridge is assured by a passive siphon mechanism as the water surface recedes below the top of the cartridge. A balance between hydrostatic forces assures a more or less equal flow potential across the vertical face of the filter surface. Hence, the filter surface receives suspended solids evenly. Absent the float valve and siphon systems, the amount of water treated over time per unit area in a vertical filter is not constant, decreasing with the filter height; furthermore, a filter would clog unevenly. Restriction of the flow using orifices ensures consistent hydraulic conductivity of the cartridge as a whole by allowing the orifice, rather than the media, whose hydraulic conductivity decreases over time, to control flow.

The manufacturer offers several media used singly or in combination (dual- or multi-media). Total media thickness is about 7 inches. Some media, such as fabric and perlite, remove only suspended solids (with attached pollutants). Media that also remove dissolved include compost, zeolite, and iron-infused polymer. Pretreatment occurs in an upstream unit and/or the vault within which the cartridges are located.

Water quality volume or flow rate (depending on the particular product) is determined by local governments or sized so that 85% of the annual runoff volume is treated.

Construction/Inspection Considerations

- Inspect one or more times as necessary during the first wet season of operation to be certain that it is draining properly.

Media Filter MP-40

Performance

The mechanisms of pollutant removal are essentially the same as with public domain filters (TC -40) if of a similar design. Whether removal of dissolved pollutants occurs depends on the media. Perlite and fabric do not remove dissolved pollutants, whereas for examples, zeolites, compost, activated carbon, and peat have this capability.

As most manufactured filter systems function at higher flow rates and have larger media than found in flatbed filters, they may not provide the same level of performance as standard sand filters. However, the level of treatment may still be satisfactory.

Siting Criteria

There are no unique siting criteria.

Additional Design Guidelines

Follow guidelines provided by the manufacturer.

Maintenance

- Maintenance activities and frequencies are specific to each product. Annual maintenance is typical.
- Manufactured filters, like standard filters (TC-40), require more frequent maintenance than most standard treatment systems like wet ponds and constructed wetlands, typically annually for most sites.
- Pretreatment systems that may precede the filter unit should be maintained at a frequency specified for the particular process.

Cost

Manufacturers provide costs for the units including delivery. Installation costs are generally on the order of 50 to 100 % of the manufacturer's costs.

Cost Considerations

- Filters are generally more expensive to maintain than swales, ponds, and basins.
- The modularity of the manufactured systems allows the design engineer to closely match the capacity of the facility to the design storm, more so than with most other manufactured products.

References and Sources of Additional Information

Minton, G.R., 2002, Stormwater Treatment: Biological, Chemical, and Engineering Principles, RPA Press, 416 pages.

Vortex Separator MP-51

Description

Vortex separators: (alternatively, swirl concentrators) are gravity separators, and in principle are essentially wet vaults. The difference from wet vaults, however, is that the vortex separator is round, rather than rectangular, and the water moves in a centrifugal fashion before exiting. By having the water move in a circular fashion, rather than a straight line as is the case with a standard wet vault, it is possible to obtain significant removal of suspended sediments and attached pollutants with less space. Vortex separators were originally developed for combined sewer overflows (CSOs), where it is used primarily to remove coarse inorganic solids. Vortex separation has been adapted to stormwater treatment by several manufacturers.

California Experience

There are currently about 100 installations in California.

Advantages

- May provide the desired performance in less space and therefore less cost.
- May be more cost-effective pre-treatment devices than traditional wet or dry basins.
- Mosquito control may be less of an issue than with traditional wet basins.

Limitations

- As some of the systems have standing water that remains between storms, there is concern about mosquito breeding.
- It is likely that vortex separators are not as effective as wet vaults at removing fine sediments, on the order 50 to 100 microns in diameter and less.
- The area served is limited by the capacity of the largest models.
- As the products come in standard sizes, the facilities will be oversized in many cases relative to the design treatment storm, increasing the cost.
- The non-steady flows of stormwater decreases the efficiency of vortex separators from what may be estimated or determined from testing under constant flow.
- Do not remove dissolved pollutants.

Design Considerations

- Service Area
- Settling Velocity
- Appropriate Sizing
- Inlet Pipe Diameter

Targeted Constituents

☑	Sediment	▲
☑	Nutrients	●
☑	Trash	
☑	Metals	●
	Bacteria	
☑	Oil and Grease	
☑	Organics	

Legend ***(Removal Effectiveness)***

● Low ■ High

▲ Medium

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- A loss of dissolved pollutants may occur as accumulated organic matter (e.g., leaves) decomposes in the units.

Design and Sizing Guidelines

The stormwater enters, typically below the effluent line, tangentially into the basin, thereby imparting a circular motion in the system. Due to centrifugal forces created by the circular motion, the suspended particles move to the center of the device where they settle to the bottom. There are two general types of vortex separation: free vortex and dampened (or impeded) vortex. Free vortex separation becomes dampened vortex separation by the placement of radial baffles on the weir-plate that impede the free vortex-flow pattern

It has been stated with respect to CSOs that the practical lower limit of vortex separation is a particle with a settling velocity of 12 to 16.5 feet per hour (0.10 to 0.14 cm/s). As such, the focus for vortex separation in CSOs has been with settleable solids generally 200 microns and larger, given the presence of the lighter organic solids. For inorganic sediment, the above settling velocity range represents a particle diameter of 50 to 100 microns. Head loss is a function of the size of the target particle. At 200 microns it is normally minor but increases significantly if the goal is to remove smaller particles.

The commercial separators applied to stormwater treatment vary considerably with respect to geometry, and the inclusion of radial baffles and internal circular chambers. At one extreme is the inclusion of a chamber within the round concentrator. Water flows initially around the perimeter between the inner and outer chambers, and then into the inner chamber, giving rise to a sudden change in velocity that purportedly enhances removal efficiency. The opposite extreme is to introduce the water tangentially into a round manhole with no internal parts of any kind except for an outlet hood. Whether the inclusion of chambers and baffles gives better performance is unknown. Some contend that free vortex, also identified as swirl concentration, creates less turbulence thereby increasing removal efficiency. One product is unique in that it includes a static separator screen.

- Sized is based on the peak flow of the design treatment event as specified by local government.
- If an in-line facility, the design peak flow is four times the peak of the design treatment event.
- If an off-line facility, the design peak flow is equal to the peak of the design treatment event.
- Headloss differs with the product and the model but is generally on the order of one foot or less in most cases.

Construction/Inspection Considerations

No special considerations.

Performance

Manufacturer's differ with respect to performance claims, but a general statement is that the manufacturer's design and rated capacity (cfs) for each model is based on and believed to achieve an aggregate reduction of 90% of all particles with a specific gravity of 2.65 (glacial sand) down to 150 microns, and to capture the floatables, and oil and grease. Laboratory tests of

two products support this claim. The stated performance expectation therefore implies that a lesser removal efficiency is obtained with particles less than 150 microns, and the lighter, organic settleables. Laboratory tests of one of the products found about 60% removal of 50 micron sand at the expected average operating flow rate

Experience with the use of vortex separators for treating combined sewer overflows (CSOs), the original application of this technology, suggests that the lower practical limit for particle removal are particles with a settling velocity of 12 feet per hour (Sullivan, 1982), which represents a particle diameter of 100 to 200 microns, depending on the specific gravity of the particle. The CSO experience therefore seems consistent with the limited experience with treating stormwater, summarized above

Traditional treatment technologies such as wet ponds and extended detention basins are generally believed to be more effective at removing very small particles, down to the range of 10 to 20 microns. Hence, it is intuitively expected that vortex separators do not perform as well as the traditional wet and dry basins, and filters. Whether this matters depends on the particle size distribution of the sediments in stormwater. If the distribution leans towards small material, there should be a marked difference between vortex separators and, say, traditional wet vaults. There are little data to support this conjecture

In comparison to other treatment technologies, such as wet ponds and grass swales, there are few studies of vortex separators. Only two of manufactured products currently available have been field tested. Two field studies have been conducted. Both achieved in excess of 80% removal of TSS. However, the test was conducted in the Northeast (New York state and Maine) where it is possible the stormwater contained significant quantities of deicing sand. Consequently, the influent TSS concentrations and particle size are both likely considerably higher than is found in California stormwater. These data suggest that if the stormwater particles are for the most part fine (i.e., less than 50 microns), vortex separators will not be as efficient as traditional treatment BMPs such as wet ponds and swales, if the latter are sized according to the recommendations of this handbook.

There are no equations that provide a straightforward determination of efficiency as a function of unit configuration and size. Design specifications of commercial separators are derived from empirical equations that are unique and proprietary to each manufacturer. However, some general relationships between performance and the geometry of a separator have been developed. CSO studies have found that the primary determinants of performance of vortex separators are the diameters of the inlet pipe and chamber with all other geometry proportional to these two.

Sullivan et al. (1982) found that performance is related to the ratios of chamber to inlet diameters, D_2/D_1, and height between the inlet and outlet and the inlet diameter, H_1/D_1, shown in Figure 3. The relationships are: as D_2/D_1 approaches one, the efficiency decreases; and, as the H_1/D_1 ratio decreases, the efficiency decreases. These relationships may allow qualitative comparisons of the alternative designs of manufacturers. Engineers who wish to apply these concepts should review relevant publications presented in the References.

Siting Criteria

There are no particularly unique siting criteria. The size of the drainage area that can be served by vortex separators is directly related to the capacities of the largest models.

MP-51 Vortex Separator

Additional Design Guidelines

Vortex separators have two capacities if positioned as in-line facilities, a treatment capacity and a hydraulic capacity. Failure to recognize the difference between the two may lead to significant under sizing; i.e., too small a model is selected. This observation is relevant to three of the five products. These three technologies all are designed to experience a unit flow rate of about 24 gallons/square foot of separator footprint at the peak of the design treatment event. This is the horizontal area of the separator zone within the container, not the total footprint of the unit. At this unit flow rate, laboratory tests by these manufacturers have established that the performance will meet the general claims previously described. However, the units are sized to handle 100 gallons/square foot at the peak of the hydraulic event. Hence, in selecting a particular model the design engineer must be certain to match the peak flow of the design event to the stated treatment capacity, not the hydraulic capacity. The former is one-fourth the latter. If the unit is positioned as an off-line facility, the model selected is based on the capacity equal to the peak of the design treatment event.

Maintenance

Maintenance consists of the removal of accumulated material with an eductor truck. It may be necessary to remove and dispose the floatables separately due to the presence of petroleum product.

Maintenance Requirements

Remove all accumulated sediment, and litter and other floatables, annually, unless experience indicates the need for more or less frequent maintenance.

Cost

Manufacturers provide costs for the units including delivery. Installation costs are generally on the order of 50 to 100 % of the manufacturer's cost. For most sites the units are cleaned annually.

Cost Considerations

The different geometry of the several manufactured separators suggests that when comparing the costs of these systems to each other, that local conditions (e.g., groundwater levels) may affect the relative cost-effectiveness.

References and Sources of Additional Information

Field, R., 1972, The swirl concentrator as a combined sewer overflow regulator facility, EPA/R2-72-008, U.S. Environmental Protection Agency, Washington, D.C.

Field, R., D. Averill, T.P. O'Connor, and P. Steel, 1997, Vortex separation technology, Water Qual. Res. J. Canada, 32, 1, 185

Manufacturers technical materials

Sullivan, R.H., et al., 1982, Design manual – swirl and helical bend pollution control devices, EPA-600/8-82/013, U.S. Environmental Protection Agency, Washington, D.C.

Sullivan, R.H., M.M. Cohn, J.E. Ure, F.F. Parkinson, and G. Caliana, 1974, Relationship between diameter and height for the design of a swirl concentrator as a combined sewer overflow regulator, EPA 670/2-74-039, U.S. Environmental Protection Agency, Washington, D.C.

Vortex Separator MP-51

Sullivan, R.H., M.M. Cohn, J.E. Ure, F.F. Parkinson, and G. Caliana, 1974, The swirl concentrator as a grit separator device, EPA670/2-74-026, U.S. Environmental Protection Agency, Washington, D.C.

Sullivan, R.H., M.M. Cohn, J.E. Ure, F.F. Parkinson, and G. Caliana, 1978, Swirl primary separator device and pilot demonstration, EPA600/2-78-126, U.S. Environmental Protection Agency, Washington, D.C.

Wet Vault MP-50

Design Considerations

- Hydraulic Capacity
- Sediment Accumulation

Description

A wet vault is a vault with a permanent water pool, generally 3 to 5 feet deep. The vault may also have a constricted outlet that causes a temporary rise of the water level (i.e., extended detention) during each storm. This live volume generally drains within 12 to 48 hours after the end of each storm.

California Experience

There are currently several hundred stormwater treatment facilities in California that use manufactured wet vaults currently in operation in California.

Advantages

- Internal baffling and other design features such as bypasses may increase performance over traditional wet vaults and/or reduce the likelihood of resuspension and loss of sediments or floatables during high flows.
- Head loss is modest.

Targeted Constituents

- ☑ Sediment
- ☑ Nutrients
- ☑ Trash
- ☑ Metals
- Bacteria
- ☑ Oil and Grease
- ☑ Organics

Removal Effectiveness

See New Development and Redevelopment Handbook-Section 5.

Limitations

- Concern about mosquito breeding in standing water
- The area served is limited by the capacity of the largest models.
- As the products come in standard sizes, the facilities will be oversized in many cases relative to the design treatment storm, increasing the cost.
- Do not remove dissolved pollutants.
- A loss of dissolved pollutants may occur as accumulated organic matter (e.g., leaves) decomposes in the units.

Design and Sizing Guidelines

Water quality volume or flow rate (depending on the particular product) is determined by local governments or sized so that 85% of the annual runoff volume is treated. There are three general configurations of wet vaults currently available, differing with the particular manufacturer.

Vault System A: This system consists of two standard precast manholes, the size varying to achieve the desired capacity. Stormwater enters the first (primary) manhole where coarse solids are removed. The stormwater flows from the first to the second (storage) manhole, carrying floatables where they are captured and retained. Further sedimentation occurs in this second manhole. The off-line serves as a storage reservoir for

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floatables as stormwater flows though at flow rates less than the design flow. A patented device controls the flow into the storage manhole. All flows above the stated treatment flow rate bypass through the device. The bypass prevents resuspension or loss of sediment and floatables that have accumulated in the second manhole. It is important to recognize that has storage of accumulated sediment occurs directly in the operating area of the manholes; treatment efficiency will decline over time given the reduction in treatment volume

The manufacturer currently provides 4 models, with treatment capacities (flow rate above which bypass occurs) from 2.4 to 21.8 cfs. The hydraulic capacities range from 10 to 100 cfs. As such, all stormwater achieves at least partial treatment through essentially all but the most extreme storm flows since some settling occurs in the first manhole. The manufacturer provides information on the total system (water) volume, sediment capacity, and floatable capacities. The size of the storage manhole can be varied with each of the four models to increase storage capacity as desired, following recommendations of the manufacturer. The footprint of this system ranges from about 200 to 350 ft2, with heights of about 11.5 to 13.5 feet (excluding minimum soil cover and access port extenders), depending on the model. Head loss ranges from 5 to 12 inches, depending on the model. Sediment and floatable capacities range up to 201 cf and 150 gallons, respectively. The recommended point of maintenance is when about 25% of the wet pool volume is supplanted by sediment. The affect of the accumulation of sediment on performance is not given

Vault System B: This wet vault has outward appearance of a standard, rectangular wet vault, but with its own unique design for internal baffles. Included is an entrance baffle, presumably to reduce the energy of the flow entering the unit. Baffles are also affixed to the floor, purportedly to reduce resuspension of settled sediments improve performance. A floating sorbent pad may be placed near the outlet to remove free oil floating on the surface. The vault includes both a permanent wet pool, 3 feet in depth, and live storage volume that is filled during each storm. The live storage volume is accomplished by restricting the outlet. The system is modular: that is, it consists of standard units that are added to increase the length, thereby providing the desired volume. Presumably for very large sites there is a practical total length. Further capacity could be accomplished by having two or more vaults in parallel. The capacity of the system is therefore essentially unlimited, Being modular may allow the design engineer to more closely match facility size to the design event.

Vault System C: This system is like System A, but differs in two primary respects. The Stormceptor module consists of only one circular structure. Hence, standard precast manholes can be used for the smaller models but larger models are non-standard sizes. Like System A, System C has an internal bypass, involving a unique design. The purpose of the bypass is to prevent resuspension of previously suspended material. All stormwater up to the bypass rate is diverted downward into the center well where removal occurs. Flows in excess of the treatment capacity are diverted directly across the top of the device to the outlet. According to the manufacturer there is also some storage capacity for floatables immediately beneath the bypass structure.

Twelve models are available. The treatment capacity of each is not indicated for the Stormceptor as it is a function of the removal efficiency specified by the designer. The manufacturer provides a methodology for the calculation of efficiency as a function of flow rate (see Design Guidelines). Hydraulic capacities range up to approximately 63 cfs. The head requirement is a function of the model and desired hydraulic flow rate, ranging up to 21 inches.

Wet Vault MP-50

Diameters range from 4 to 12 feet, and minimum heights up to about 13 feet plus the diameter of the incoming pipe. Sediment and floatable capacities range up to 1,470 cf and 3,055 gallons, respectively. The recommended point of maintenance is when about 15% of the wet pool volume is supplanted by sediment. The affect of the accumulation of sediment on performance is not given but can be estimated using the manufacturer's sizing methodology.

Construction/Inspection Considerations

Refer to guidelines provided by the manufacturer.

Performance

A manufactured wet vault can be expected to perform similarly to large catch basins in that its wet volume (dead storage) is similar to that determined by methodology provided in TC-20 for wet ponds. Hence, the engineer should compare the volume of the model s/he intends to select to what the volume of a constructed wet vault would be for the site. Conceivably, manufactured vaults may give better performance than standard catch basins, given the inclusion of design elements that are intended to minimize resuspension. Given this benefit, it could be argued that manufactured wet vaults can be smaller than traditional catch basins, to achieve similar performance. However, there are no data indicating the incremental benefit of the particular design elements of each manufactured product.

Siting Criteria

There are no unique siting criteria. The size of the drainage area that can be served by a manufactured wet vault is directly related to the capacities of the largest models.

Additional Design Guidelines

Refer to guidelines of the manufacturers.

Maintenance

Maintenance consists of the removal of accumulated material with an eductor truck. It may be necessary to remove and dispose the floatables separately due to the presence of petroleum product. Annual maintenance is typical.

It is important to recognize that as storage of accumulated sediment occurs directly in the operating area of the wet vault, treatment efficiency will decline over time given the reduction in treatment volume. Whether this is significant depends on the design capacity. If the total volume of the wet pool is similar to that determined by the method on TC-20, the effect on performance is minor.

Maintenance Requirements

- Each manufacturer provides storage capacities with respect to sediments and floatables, with recommendations on the frequency of cleaning as a function of the percentage of the volume in the unit that has been filled by these materials.

- The recommended frequency of cleaning differs with the manufacturer, ranging from one to two years. It is prudent to inspect the unit twice during the first wet season of operation, setting the cleaning frequency accordingly.

MP-50 Wet Vault

Cost

Manufacturers provide costs for the units including delivery. Installation costs are generally on the order of 50 to 100 % of the manufacturer's cost.

Cost Considerations

- The different geometries of the several manufactured separators suggest that when comparing the costs of these systems to each other, that local conditions (e.g., groundwater levels) may affect the relative cost-effectiveness.
- Subsurface facilities are more expensive to construct than surface facilities of similar size. However, the added cost of construction is in many developments offset by the value of continued use of the land.
- Some of the manufactured vaults may be less expensive to maintain than public domain vaults as the former may be cleaned without the need for confined space entry.
- Subsurface facilities do not require landscaping, reducing maintenance costs accordingly.

References and Sources of Additional Information

Manufacturers literature.

Drain Inserts MP-52

Description

Drain inserts are manufactured filters or fabric placed in a drop inlet to remove sediment and debris. There are a multitude of inserts of various shapes and configurations, typically falling into one of three different groups: socks, boxes, and trays. The sock consists of a fabric, usually constructed of polypropylene. The fabric may be attached to a frame or the grate of the inlet holds the sock. Socks are meant for vertical (drop) inlets. Boxes are constructed of plastic or wire mesh. Typically a polypropylene "bag" is placed in the wire mesh box. The bag takes the form of the box. Most box products are one box; that is, the setting area and filtration through media occur in the same box. Some products consist of one or more trays or mesh grates. The trays may hold different types of media. Filtration media vary by manufacturer. Types include polypropylene, porous polymer, treated cellulose, and activated carbon.

California Experience

The number of installations is unknown but likely exceeds a thousand. Some users have reported that these systems require considerable maintenance to prevent plugging and bypass.

Advantages

- Does not require additional space as inserts as the drain inlets are already a component of the standard drainage systems.
- Easy access for inspection and maintenance.
- As there is no standing water, there is little concern for mosquito breeding.
- A relatively inexpensive retrofit option.

Limitations

Performance is likely significantly less than treatment systems that are located at the end of the drainage system such as ponds and vaults. Usually not suitable for large areas or areas with trash or leaves than can plug the insert.

Design and Sizing Guidelines

Refer to manufacturer's guidelines. Drain inserts come any many configurations but can be placed into three general groups: socks, boxes, and trays. The sock consists of a fabric, usually constructed of polypropylene. The fabric may be attached to a frame or the grate of the inlet holds the sock. Socks are meant for vertical (drop) inlets. Boxes are constructed of plastic or wire mesh. Typically a polypropylene "bag" is placed in the wire mesh box. The bag takes the form of the box. Most box products are

Design Considerations

- Use with other BMPs
- Fit and Seal Capacity within Inlet

Targeted Constituents

- ☑ Sediment
- ☑ Nutrients
- ☑ Trash
- ☑ Metals
- Bacteria
- ☑ Oil and Grease
- ☑ Organics

Removal Effectiveness

See New Development and Redevelopment Handbook-Section 5.

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one box; that is, the setting area and filtration through media occurs in the same box. One manufacturer has a double-box. Stormwater enters the first box where setting occurs. The stormwater flows into the second box where the filter media is located. Some products consist of one or more trays or mesh grates. The trays can hold different types of media. Filtration media vary with the manufacturer: types include polypropylene, porous polymer, treated cellulose, and activated carbon.

Construction/Inspection Considerations

Be certain that installation is done in a manner that makes certain that the stormwater enters the unit and does not leak around the perimeter. Leakage between the frame of the insert and the frame of the drain inlet can easily occur with vertical (drop) inlets.

Performance

Few products have performance data collected under field conditions.

Siting Criteria

It is recommended that inserts be used only for retrofit situations or as pretreatment where other treatment BMPs presented in this section area used.

Additional Design Guidelines

Follow guidelines provided by individual manufacturers.

Maintenance

Likely require frequent maintenance, on the order of several times per year.

Cost

- The initial cost of individual inserts ranges from less than $100 to about $2,000. The cost of using multiple units in curb inlet drains varies with the size of the inlet.
- The low cost of inserts may tend to favor the use of these systems over other, more effective treatment BMPs. However, the low cost of each unit may be offset by the number of units that are required, more frequent maintenance, and the shorter structural life (and therefore replacement).

References and Sources of Additional Information

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Interagency Catch Basin Insert Committee, Evaluation of Commercially-Available Catch Basin Inserts for the Treatment of Stormwater Runoff from Developed Sites, 1995

Larry Walker Associates, June 1998, NDMP Inlet/In-Line Control Measure Study Report

Manufacturers literature

Santa Monica (City), Santa Monica Bay Municipal Stormwater/Urban Runoff Project - Evaluation of Potential Catch basin Retrofits, Woodward Clyde, September 24, 1998

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Woodward Clyde, June 11, 1996, Parking Lot Monitoring Report, Santa Clara Valley Nonpoint Source Pollution Control Program.

Section 6
Long-term Maintenance of BMPs

6.1 Introduction

The long-term performance of BMPs hinges on ongoing and proper maintenance. In order for this to occur, detailed maintenance plans are needed that include specific maintenance activities and frequencies for each type of BMP. In addition, these should include indicators for assessing when "as needed" maintenance activities are required. The fact sheets included in this volume contain the basic information needed to develop these maintenance plans, but municipalities and other regulatory agencies also need to identify the responsible party and potentially to address funding requirements. The following discussion is based primarily on data developed by Horner et al. (1994) and information available at http://www.stormwatercenter.net/

6.2 Critical Regulatory Components

Critical regulatory components identified by Horner et al. (1994) include:

- Regulations should officially designate a responsible party, frequently the development site owner, to have ultimate responsibility for the continued maintenance of stormwater facilities. This official designation provides the opportunity for appropriate preparation and budgeting prior to actually assuming responsibilities. It also facilitates enforcement or other legal remedies necessary to address compliance or performance problems once the facility has been constructed.

- Regulations should clearly state the inspection and maintenance requirements. Inspection and maintenance requirements should also comply with all applicable statutes and be based on the needs and priorities of the individual measure or facility. A clear presentation will help owners and builders comply, and inspectors enforce requirements.

- Regulations should contain comprehensive requirements for documenting and detailing maintenance. A facility operation and maintenance manual should be prepared containing accurate and comprehensive drawings or plans of the completed facility and detailed descriptions and schedules of inspection and maintenance.

- The regulations should delineate the procedure for maintenance noncompliance. This process should provide informal, discretionary measures to deal with periodic, inadvertent noncompliance and formal and severe measures to address chronic noncompliance or performance problems. In either case, the primary goal of enforcement is to maintain an effective BMP – the enforcement action should not become an end in itself.

- Regulations should also address the possibility of total default by the owner or builder by providing a way to complete construction and continue maintenance. For example, the public might assume maintenance responsibility. If so, the designated public agency must be alerted and possess the necessary staffing, equipment, expertise, and funding to assume this responsibility. Default can be addressed through bonds and other performance

guarantees obtained before the project is approved and construction begins. These bonds can then be used to fund the necessary maintenance activities.

- The regulations must recognize that adequate and secure funding is needed for facility inspection and maintenance, and provide for such funding.

6.3 Enforcement Options

A public agency will sometimes need to compel those responsible for facility construction or maintenance to fulfill their obligations. Therefore, the maintenance program must have enforcement options for quick corrective action. Rather than a single enforcement measure, the program should have a variety of techniques, each with its own degree of formality and legal weight. The inspection program should provide for nonconforming performance and even default, and contain suitable means to address all stages.

Prior to receiving construction approval, the developer or builder can be forced to provide performance guarantees. The public agency overseeing the construction can use these guarantees, usually a performance bond or other surety in an amount equal to some fraction of the facility's construction cost, to fund maintenance activities.

Enforcement of maintenance requirements can be accomplished through a stormwater maintenance agreement, which is a formal contract between a local government and a property owner designed to guarantee that specific maintenance functions are performed in exchange for permission to develop that property (http://www.stormwatercenter.net/). Local governments benefit from these agreements in that responsibility for regular maintenance of the BMPs can be placed upon the property owner or other legally recognized party, allowing agency staff more time for plan review and inspection.

6.4 Maintenance Agreements

Maintenance agreements can be an effective tool for ensuring long-term maintenance of on-site BMPs. The most important aspect of creating these maintenance agreements is to clearly define the responsibilities of each party entering into the agreement. Basic language that should be incorporated into an agreement includes the following:

1. Performance of Routine Maintenance

Local governments often find it easier to have a property owner perform all maintenance according to the requirements of a Design Manual. Other communities require that property owners do aesthetic maintenance (i.e., mowing, vegetation removal) and implement pollution prevention plans, but elect to perform structural maintenance and sediment removal themselves.

2. Maintenance Schedules

Maintenance requirements may vary, but usually governments require that all BMP owners perform at least an annual inspection and document the maintenance and repairs performed. An annual report must then be submitted to the government, who may then choose to perform an inspection of the facility.

3. Inspection Requirements

Local governments may obligate themselves to perform an annual inspection of a BMP, or may choose to inspect when deemed necessary instead. Local governments may also wish to include language allowing maintenance requirements to be increased if deemed necessary to ensure proper functioning of the BMP.

4. Access to BMPs

The agreement should grant permission to a local government or its authorized agent to enter onto property to inspect BMPs. If deficiencies are noted, the government should then provide a copy of the inspection report to the property owner and provide a timeline for repair of these deficiencies.

5. Failure to Maintain

In the maintenance agreement, the government should repeat the steps available for addressing a failure to maintain situation. Language allowing access to BMPs cited as not properly maintained is essential, along with the right to charge any costs for repairs back to the property owner. The government may wish to include deadlines for repayment of maintenance costs, and provide for liens against property up to the cost of the maintenance plus interest.

6. Recording Of The Maintenance Agreement

An important aspect to the recording of the maintenance agreement is that the agreement be recorded into local deed records. This helps ensure that the maintenance agreement is bound to the property in perpetuity.

Finally, some communities elect to include easement requirements into their maintenance agreements. While easement agreements are often secured through a separate legal agreement, recording public access easements for maintenance in a maintenance agreement reinforces a local government's right to enter and inspect a BMP.

Examples of maintenance agreements include several available on the web at http://www.stormwatercenter.net/

6.5 Public Funding Sources

If local agencies are willing to assume responsibility for stormwater BMPs, it is essential to identify the long-term funding sources. Several of these are described below:

General Tax Revenues

Tax revenues are an obvious source of funding, particularly for the long-term inspection and maintenance of existing runoff and drainage facilities. The benefits and protection to the public from continued safe and effective operation of the facility justifies using revenues from general funds.

To use tax revenues, particularly from a general fund, the inspection and maintenance program must annually compete with all other programs included in the government's annual operating budget. This inconsistent and unreliable funding makes securing a long-term financial

commitment to inspection and maintenance difficult and subject to political pressures. Nevertheless, tax revenues remain a popular funding source because the collection and disbursement system is already in place and familiar.

Utility Charges

Using utility charges to fund inspection and maintenance is a somewhat recent application of an already established financing technique. In addition, several municipalities and counties throughout the country have runoff management, drainage, and flood control authorities or districts to provide residents with runoff related services.

Using utility charge financing has several advantages. By addressing only runoff needs and benefits, utility funding avoids competing with other programs and needs. Utility funding also demonstrates a direct link between the funding and the services it provides. This approach can require an entirely new operating system and organization that needs legal authorization to exist, operate, and assess charges. The effort required to create such an entity can deter many, although the continued success of established authorities and growth of new ones have done much to allay concerns over the effort required.

In a runoff utility, the user charges are often based on the need for services rather than the benefits derived from them. While charges are based on actual costs to inspect and maintain runoff facilities and measures within the service area, the assessed rate structure should relate to site characteristics. These include property area size, extent of impervious coverage, and other factors with a direct and demonstrable effect on runoff. To be fair, the rate structure should also remain simple and understandable to the ratepayer.

To finance the stormwater utility in Prince William County, Virginia, residential and nonresidential owners of developed property pay based on the amount of impervious area (rooftops, paved areas, etc.) on their property. Residents pay $10.38 billed twice a year ($20.76 total annual fee) for detached singe-family homes. Town home and condominium owners will pay $7.785 billed twice a year ($15.57 total annual fee). Nonresidential property owners pay $0.84 per 1,000 ft2 of impervious area per month. Fee adjustments or credits may be available if a stormwater management system is already in place. The fee will be on the real estate bills.

Fees for the stormwater utility in Austin, Texas are higher with residential users billed $5.79/mo, while commercial users pay $94.62/mo/acre of impervious cover. These fees cover not only maintenance of existing BMPs, but also capital improvement projects related to the drainage infrastructure.

Permit Fees

Collecting permit fees to finance runoff inspection and maintenance is a long standing funding procedure. Most governmental entities, local, county, and state, can establish and collect fees and other charges to obtain operating funds for programs and services. Many inspection services, most notably the construction inspection of both ESC measures and permanent drainage and runoff management facilities, are financed at least in part through fees collected by permitting agencies. Unlike taxes or some utility charges, inspection costs are borne by those who need them.

The permit fee collection program should have a demonstrable link to the runoff management or drainage systems. The public agency should demonstrate a direct link between the permit fees collected and the permitted project. One method is using dedicated accounts for individual projects and facilities. Finally, the rate structure should reflect site characteristics such as area size or imperviousness that directly relate to the measure or facility by affecting runoff or erosion.

Dedicated Contributions

Public agencies at times have used developer contributions to fund long-term facility maintenance. This approach is particularly appropriate in single-family residential subdivisions, where numerous individual property owners served by a single runoff facility can result in confusion over who has maintenance responsibility.

The exact funding technique depends on many factors, including community attitude and knowledge, economic and political viability, and program needs and costs. Some techniques, including permit fees and dedicated contributions, may be more appropriate for short-term activities, such as construction inspection. Other utility charges and specialized tax revenues may apply to all phases of an inspection and maintenance program but require considerable effort and special legal authorization to operate.

Section 7
Glossary and List of Acronyms
7.1 Glossary

303(d) Listed: Water bodies listed as impaired as per Section 303(d) of the 1972 Clean Water Act.

Best Management Practices (BMPs): Includes schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent, eliminate, or reduce the pollution of waters of the receiving waters. BMPs also include treatment requirements, operating procedures, and practices to control plant site runoff spillage or leaks, sludge or waste disposal, or drainage from raw material storage.

Catch Basin (Also known as Inlet): Box-like underground concrete structure with openings in curbs and gutters designed to collect runoff from streets and pavement.

Clean Water Act (CWA): (33 U.S.C. 1251 et seq.) requirements of the NPDES program are defined under Sections 307, 402, 318 and 405 of the CWA.

Construction Activity: Includes clearing, grading, excavation, and contractor activities that result in soil disturbance.

Construction General Permit: A National Pollutant Discharge Elimination System (NPDES) permit issued by the State Water Resources Control Board for the discharge of stormwater associated with construction activity from soil disturbance of five acres or more. Threshold lowered to one acre beginning October 10, 2003. Construction General Permit No. CAS000002.

Denuded: Land stripped of vegetation or land that has had its vegetation worn down due to the impacts from the elements or humans.

Detention: The capture and subsequent release of stormwater runoff from the site at a slower rate than it is collected, the difference being held in temporary storage.

Discharge: A release or flow of stormwater or other substance from a conveyance system or storage container. Broader – includes release to storm drains, etc.

Effluent Limits: Limitations on amounts of pollutants that may be contained in a discharge. Can be expressed in a number of ways including as a concentration, as a concentration over a time period (e.g., 30-day average must be less than 20 mg/l), or as a total mass per time unit, or as a narrative limit.

Erosion: The wearing away of land surface by wind or water. Erosion occurs naturally from weather or runoff but can be intensified by land-clearing practices related to farming, new development, redevelopment, road building, or timber cutting.

Facility: Is a collection of industrial processes discharging stormwater associated with industrial activity within the property boundary or operational unit.

Grading: The cutting or filling of the land surface to a desired slope or elevation.

Hazardous Waste: A waste or combination of wastes that, because of its quantity, concentration, or physical, chemical or infectious characteristics, may either cause or significantly contribute to an increase in mortality or an increase in serious irreversible illness; or pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, disposed of or otherwise managed. Possesses at least one of four characteristics (ignitability, corrosivity, reactivity, or toxicity) or appears on special EPA or state lists. Regulated under the federal Resource Conservation and Recovery Act and the California Health and Safety Code.

Illicit Discharges: Any discharge to a municipal separate storm sewer that is not in compliance with applicable laws and regulations as discussed in this document.

Industrial General Permit: A National Pollutant Discharge Elimination System (NPDES) Permit (No. CAS000001) issued by the State Water Resources Control Board for discharge of stormwater associated with industrial activity. Board Order 97-03-DWQ.

Inlet: An entrance into a ditch, storm drain, or other waterway.

Integrated Pest Management (IPM): An ecosystem-based strategy that focuses on long-term prevention of pests or their damage through a combination of techniques such as biological control, habitat manipulation, modification of cultural practices, and use of resistant varieties. Pesticides are used only after monitoring indicates they are needed according to established guidelines, and treatments are made with the goal of removing only the target organism.

Municipal Separate Storm Sewer System (MS4): A conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, or storm drains): (i) designed or used for collecting or conveying storm water; (ii) which is not a combined sewer; and (iii) which is not part of a Publicly Owned Treatment Works (POTW) as defined at Title 40 of the Code of Federal Regulations (CFR) 122.2. A "Small MS4" is defined as an MS4 that is not a permitted MS4 under the Phase I regulations. This definition of a Small MS4 applies to MS4 operated within cities and counties as well as governmental facilities that have a system of storm sewers.

Non-Stormwater Discharge: Any discharge to municipal separate storm sewer that is not composed entirely of stormwater.

Nonpoint Source Pollution: Pollution that does not come from a point source. Nonpoint source pollution originates from aerial diffuse sources that are mostly related to land use.

Notice of Intent (NOI): A formal notice to SWRCB submitted by the owner of an industrial site or construction site that said owner seeks coverage under a General Permit for discharges associated with industrial and construction activities. The NOI provides information on the

owner, location, type of project, and certifies that the owner will comply with the conditions of the construction General Permit.

Notice of Termination (NOT): Formal notice to SWRCB submitted by owner/ developer that a construction project is complete.

NPDES Permit: NPDES is an acronym for National Pollutant Discharge Elimination System. NPDES is the national program for administering and regulating Sections 307, 318, 402, and 405 of the Clean Water Act (CWA). In California, the State Water Resources Control Board (SWRCB) has issued a General Permit for stormwater discharges associated with industrial activities (see Appendix A).

Outfall: The end point where storm drains discharge water into a waterway.

Point Source: Any discernible, confined, and discrete conveyance from which pollutants are or may be discharged. This term does not include return flows from irrigated agriculture or agricultural stormwater runoff.

Pollutant: Generally, any substance introduced into the environment that adversely affects the usefulness of a resource.

Pollution Prevention (P2): Practices and actions that reduce or eliminate the generation of pollutants.

Precipitation: Any form of rain or snow.

Pretreatment: Treatment of waste stream before it is discharged to a collection system.

Reclaim (water reclamation): Planned use of treated effluent that would otherwise be discharged without being put to direct use.

Retention: The storage of stormwater to prevent it from leaving the development site.

Reuse (water reuse): (see Reclaim)

Runoff: Water originating from rainfall, melted snow, and other sources (e.g., sprinkler irrigation) that flows over the land surface to drainage facilities, rivers, streams, springs, seeps, ponds, lakes, and wetlands.

Run-on: Off site stormwater surface flow or other surface flow which enters your site.

Scour: The erosive and digging action in a watercourse caused by flowing water.

Secondary Containment: Structures, usually dikes or berms, surrounding tanks or other storage containers, designed to catch spilled materials from the storage containers.

Sedimentation: The process of depositing soil particles, clays, sands, or other sediments that were picked up by runoff.

Sediments: Soil, sand, and minerals washed from land into water, usually after rain, that collect in reservoirs, rivers, and harbors, destroying fish nesting areas and clouding the water, thus preventing sunlight from reaching aquatic plants. Farming, mining, and building activities without proper implementation of BMPs will expose sediment materials, allowing them to be washed off the land after rainfalls.

Significant Materials: Includes, but not limited to, raw materials; fuels; materials such as solvents, detergents, and plastic pellets; finished materials such as metallic products; raw materials used in food processing or production; hazardous substances designed under Section 101(14) of CERLCA; any chemical the facility is required to report pursuant to Section 313 of Title III of SARA; fertilizers; pesticides; and waste products such as ashes, slag, and sludge that have the potential to be released with stormwater discharges.

Significant Quantities: The volume, concentrations, or mass of a pollutant in stormwater discharge that can cause or threaten to cause pollution, contamination, or nuisance that adversely impact human health or the environment and cause or contribute to a violation of any applicable water quality standards for receiving water.

Source Control BMPs: Operational practices that reduce potential pollutants at the source.

Source Reduction (also source control): The technique of stopping and/ or reducing pollutants at their point of generation so that they do not come into contact with stormwater.

Storm Drains: Above- and below-ground structures for transporting stormwater to streams or outfalls for flood control purposes.

Stormwater: Defined as urban runoff and snowmelt runoff consisting only of those discharges, which originate from precipitation events. Stormwater is that portion of precipitation that flows across a surface to the storm drain system or receiving waters.

Stormwater Discharge Associated with Industrial Activity: Discharge from any conveyance which is used for collecting and conveying stormwater from an area that is directly related to manufacturing, processing, or raw materials storage activities at an industrial plant.

Stormwater Pollution Control Plan (SWPCP): A less formal plan than the SWPPP that addresses the implementation of BMPs at facilities/businesses not covered by a general permit but that have the potential to discharge pollutants.

Stormwater Pollution Prevention Plan (SWPPP): A written plan that documents the series of phases and activities that, first, characterizes your site, and then prompts you to select and carry out actions which prevent the pollution of stormwater discharges.

Treatment Control BMPs: Treatment methods to remove pollutants from stormwater.

Toxicity: Adverse responses of organisms to chemicals or physical agents ranging from mortality to physiological responses such as impaired reproduction or growth anomalies.

Turbidity: Describes the ability of light to pass through water. The cloudy appearance of water caused by suspended and colloidal matter (particles).

7.2 Acronyms

AASHTO	American Association of State Highway and Transportation Officials
AC	Asphalt Concrete
ADL	Aerially Deposited Lead
AIMP	Impervious Area
AINF	Infiltration Area
ANSI	American National Standards Institute
APHA	American Public Health Association
APWA	American Public Works Association
ARS	Agricultural Research Service
AQMD	Air Quality Management District
ASTM	American Society for Testing Materials
AWWA	American Water Works Association
BAT	Best Available Technology (economically available)
BCT	Best Conventional Technology (pollution control)
BFP	Bonded Fiber Matrix
BMPs	Best Management Practices
BOD	Biological Oxygen Demand
CA	Contractor Activities
CAL-EPA	California Environmental Protection Agency
CAL-OSHA	California Division of Occupational Safety and Health Administration
CASQA	California Stormwater Quality Association
CCR	California Code of Regulations

CCS	Cellular Confinement System
CEQA	California Environmental Quality Act
CERCLA	Comprehensive Environmental Response Compensation and Liability Act
CFR	Code of Federal Register
CMA	Congestion Management Program
COE	U.S. Army Corps of Engineers
CPI	Coalescing Plate Interceptor
CWA	Clean Water Act (Federal Water Pollution Control Act of 1972 as amended in 1987)
DCIA	Directly Connected Impervious Area
DTSC	California Department of Toxic Substances Control
EEC	Effect Effluent Concentration
EIR	Environmental Impact Report
EMC	Event Mean Concentration
EOS	Equivalent Opening Size
ESA	Environmentally Sensitive Area
ESC	Erosion and Sedimentation Control
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
GIS	Geographical Information System
Hazmat	Hazardous Material
HSG	Hydrologic Soil Groups
IPM	Integrated Pest Management
JURMP	Jurisdictional Urban Runoff Management Program
MEP	Maximum Extent Practicable

MS4	Municipal Separate Storm Sewer System
MSDS	Material Safety Data Sheet
MSHA	Mine Safety and Health Administration
NMFS	National Marine Fisheries Service
NOAA	National Oceanographic and Atmospheric Administration
NOI	Notice of Intent
NPDES	National Pollution Discharge Elimination System
NPS	Nonpoint Source
NRC	National Response Center
NRCS	Natural Resources Conservation Service
NSF	National Science Foundation
NURP	National Urban Runoff Program
O&G	Oil and Grease
O&M	Operations and Maintenance
OSDS	On-site Disposal System
OSHA	Occupational Safety and Health Administration
P2	Pollution Prevention
PAHs	Polyaromatic Hydrocarbons
PAM	Polyacrylamide
PCBs	Polychlorinated Biphenyls
PCC	Portland Concrete Cement
PPT	Pollution Prevention Team
POTW	Publicly Owned Treatment Works
PSD	Particle Size Distribution
RCRA	Resource Conservation and Recovery Act

RWQCB	Regional Water Quality Control Board
SAP	Sampling and Analysis Plan
SARA	Superfund Amendments and Reauthorization Act
SIC	Standard Industrial Classification
SPCC	Spill Prevention Control and Countermeasure
SUSMP	Standard Urban Stormwater Mitigation Plan
SWMP	Stormwater Management Program
SWPCP	Stormwater Pollution Control Plan
SWPPP	Stormwater Pollution Prevention Plan
SWRCB	State Water Resource Control Board
TMDL	Total Maximum Daily Load
TOC	Total Organic Carbon
TSS	Total Suspended Solids
UFC	Uniform Fire Code
USACE	United States Army Corps of Engineers
USDA	United States Department of Agriculture
USDOT	United States Department of Transportation
USEPA	United States Environmental Protection Agency
WEF	Water Environment Federation

Appendix A
Channel Impacts from Watershed Changes

Appendix A
Channel Impacts from Watershed Changes

Channels are formed, maintained, and altered by the water and sediment they carry.

Channel equilibrium involves the interplay of four basic factors:

- Sediment discharge (**Q_S**)
- Sediment particle size (**D_{50}**)
- Streamflow (**Q_W**)
- Stream slope (**S**)

Lane (1955) showed this relationship qualitatively as:

$$Q_s \bullet D_{50} \propto Q_w \bullet S$$

This equation is shown here as a balance with sediment load on one weighing pan and streamflow on the other.

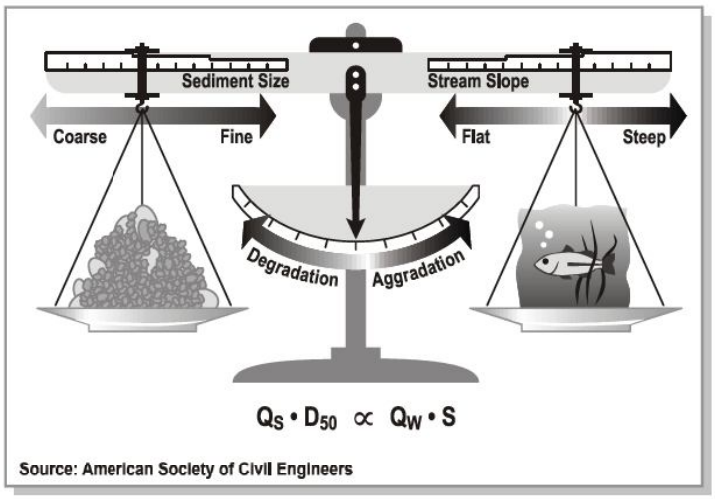

Source: American Society of Civil Engineers

The hook holding the sediment pan can slide along the horizontal arm to adjust according to sediment size. The hook holding the streamflow side can adjust according to stream slope.

Channel equilibrium occurs when all four variables are in balance. If a change occurs, the balance will temporarily be tipped and equilibrium lost. If one variable changes, one or more of the other variables must increase or decrease proportionally if equilibrium is to be maintained. For example, if channel slope is increased (e.g., by channel straightening) and streamflow remains the same, either the sediment load or the size of the particles must also increase. Likewise, if flow is increased (e.g., by an inter-basin transfer) and the slope stays the same, sediment load or sediment particle size has to increase to maintain channel equilibrium. Under these examples' conditions, a stream seeking a new equilibrium will tend to erode more of its banks and bed, transporting larger particle sizes and a greater sediment load.

Alluvial streams that are free to adjust to changes in these four variables generally do so and re-establish new equilibrium conditions. Non-alluvial streams such as bedrock or artificial, concrete channels are unable to follow Lane's relationship because of their inability to adjust the sediment size and quantity variables.

The stream balance equation is useful for making qualitative predictions concerning channel impacts due to changes in runoff or sediment loads from the watershed. Quantitative

predictions, however, require the use of more complex equations. Sediment transport equations, for example, are used to compare sediment load and energy in the stream. If excess energy is left over after the load is moved, channel adjustment occurs as the stream picks up more load by eroding its banks or scouring its bed.

Appendix B
General Applicability of Effluent Probability Method

Appendix B
General Applicability of Effluent Probability Method

Some researchers have experienced concerns about the general applicability of this technique and whether or not it should be considered the standard approach for quantifying BMP efficiency. To illustrate potential issues, plots have been developed for TSS from Austin style sand filters.

Figure 1 (Scale is a little unusual in that divisions are 10, 25, 50, 100, 250...) is a plot of the TSS data, which implies that one could expect an effluent concentration of about 25 mg/L, when the influent concentration is about 400 mg/L, or 1 mg/L when the influent concentration is about 25 mg/L. This would be equivalent to a constant percent removal of about 94%. This interpretation is based on the implied relationship between influent and effluent quality that the rank order of influent and effluent concentrations is highly correlated as indicated by the arrows in Figure 1. That is, the highest influent concentration is from the same event as the highest effluent concentration.

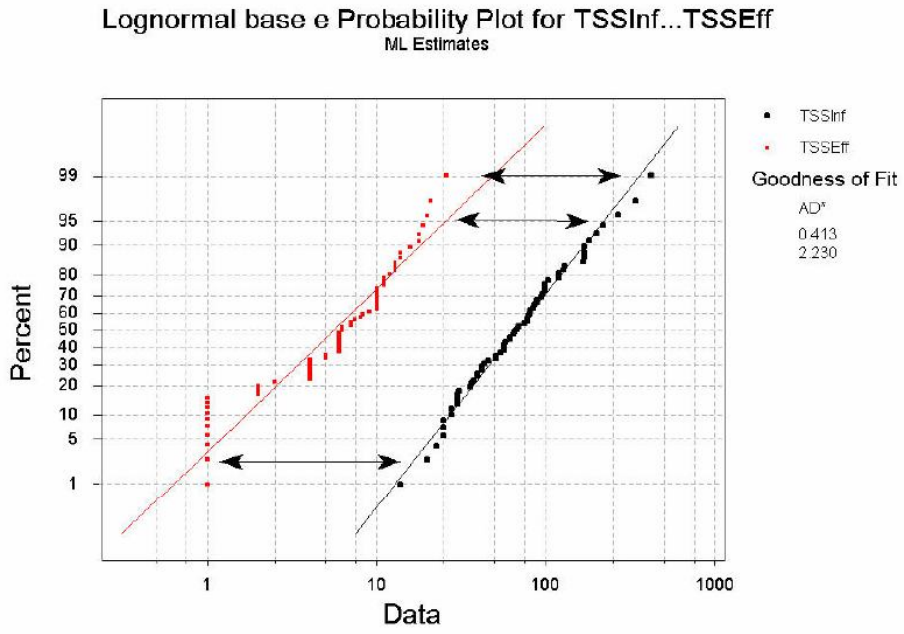

Figure 1
Implied Meaning of the Probability Plot Method

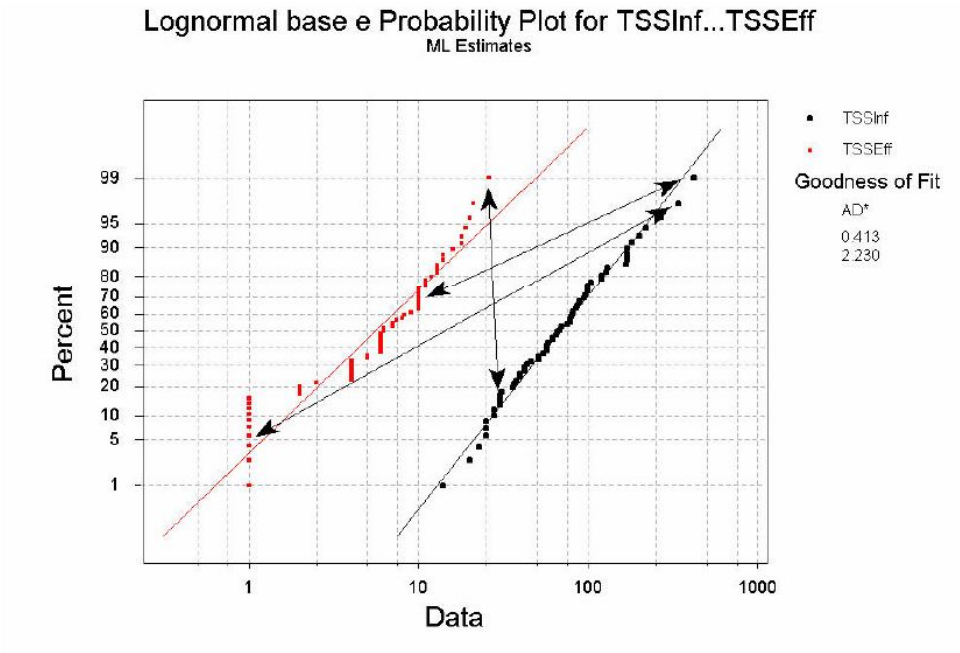

Figure 2
Probability Plot showing Actual Paired Values

This assumption is not valid for this data set. As shown in Figure 2, the arrows connect the actual paired values, so that one can see that high influent concentrations may be associated with effluent concentrations that are at or near the lowest levels observed in the study.

The paired values are plotted in Figure 3, which indicates no statistical relationship between influent and effluent concentrations – not unusual for sand filters. This type of plot indicates much more clearly that the effluent concentration is relatively constant at about 7.5 mg/L, regardless of influent concentration. This regression on EMCs, which is similar to the ROL described in the protocol seems to meet most of the requirements for linear regression, concerning residuals, etc., and better defines the expected behavior. It may be more suitable to perform the regression on concentrations, since the impact of amount of infiltration, which is a function of storm volume and antecedent moisture conditions is eliminated. In the past, the rejection of regression as a potential methodology was based on the results of single study, rather than widespread application on a number of technologies and sites. In this example, regression has been applied to a number of Caltrans BMP technologies and sites. An example where influent and effluent concentrations are correlated is shown in Figure 4 for TKN (with 90% confidence interval for mean and individual predictions).

(Note: 95% statistical certainty is a common threshold in studies to determine significance; however, because of the high variability in stormwater and the paucity of data, a 90% confidence interval has been used. It may be appropriate to raise that level as more data become available for analysis.)

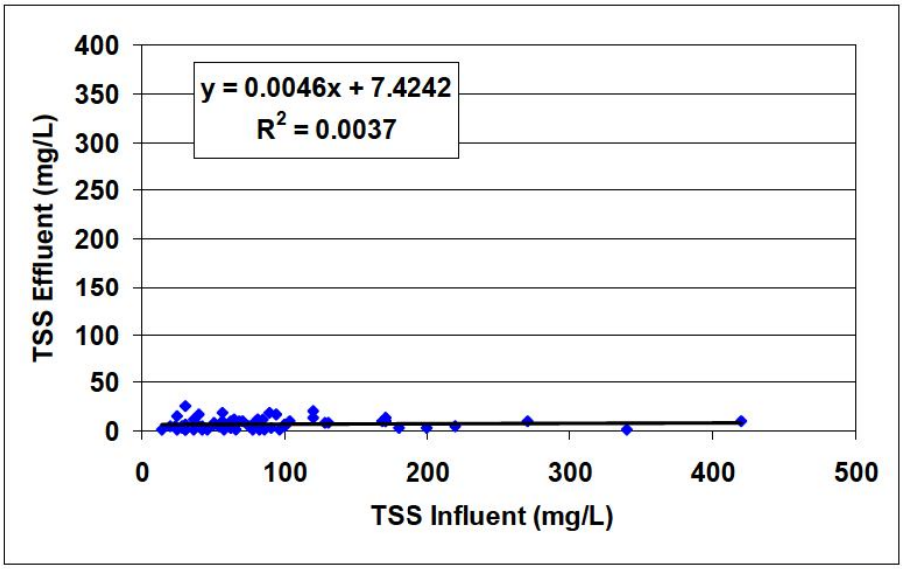

Figure 3
Relationship between Influent and Effluent TSS Concentrations

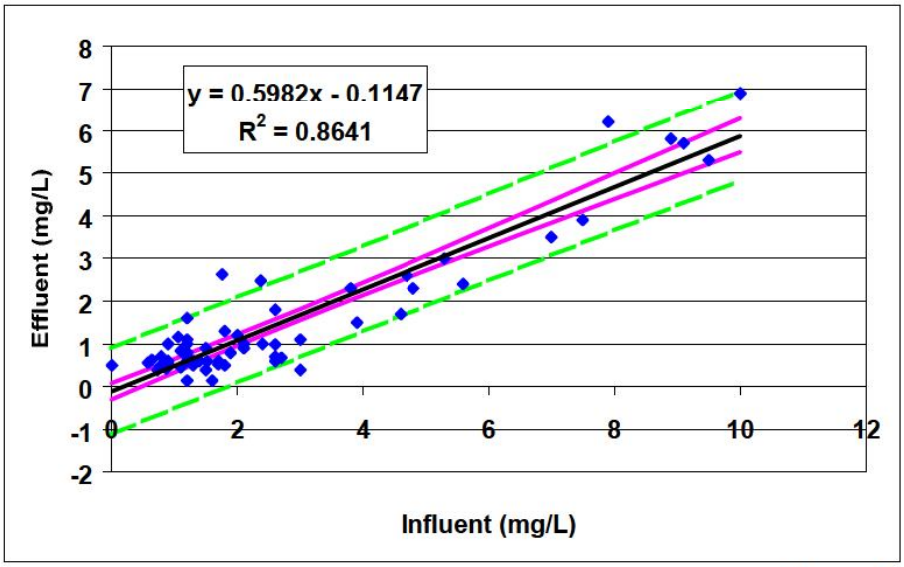

Figure 4
Relationship between Influent and Effluent TKN Concentrations

Another concern is that the effluent probability plot alone does not necessarily provide sufficient information for BMP selection. In Texas and other areas, there are regulations that require removal of 80% of the TSS resulting from development. Using the effluent probability plot alone, it may be difficult to see how one would determine if a BMP was capable of meeting this standard or other performance standard.

Appendix C
Comparison of Effluent Concentrations of Additional Metals

Appendix C
Comparison of Effluent Concentrations of Additional Metals

Graphs comparing effluent concentrations produced by several types of treatment BMPs for TSS, Nitrogen, Zinc, and Fecal Coliform, are included in 5.3.1. Graphs for other metals and phosphorus are provided below.

Appendix C
Comparison of Effluent Concentrations of Additional Metals

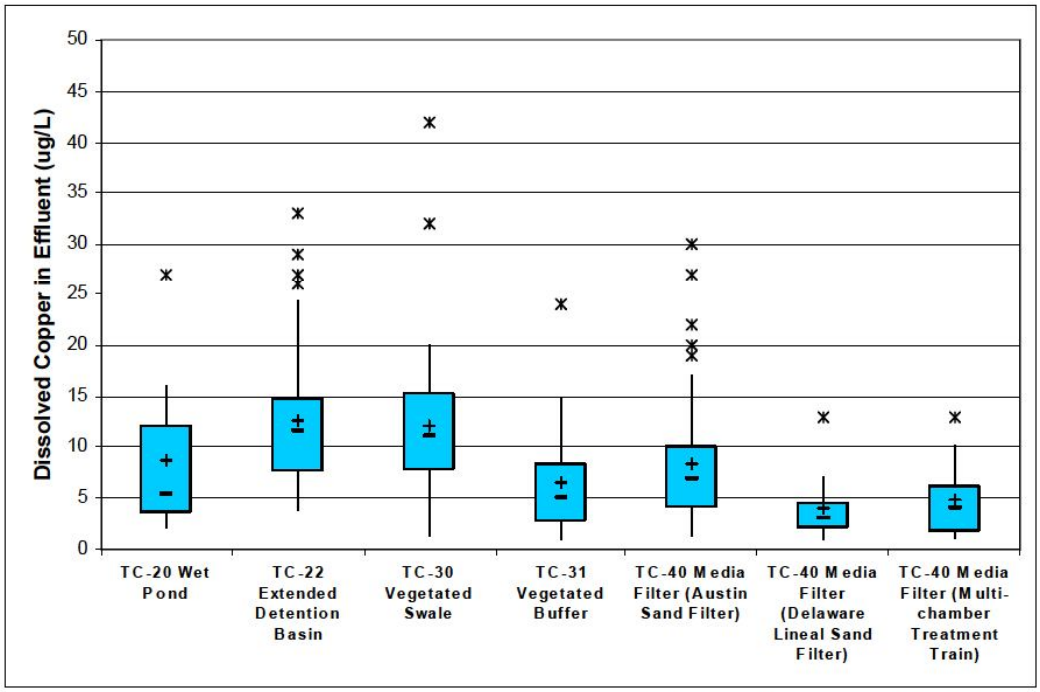

Dissolved Copper in Effluent

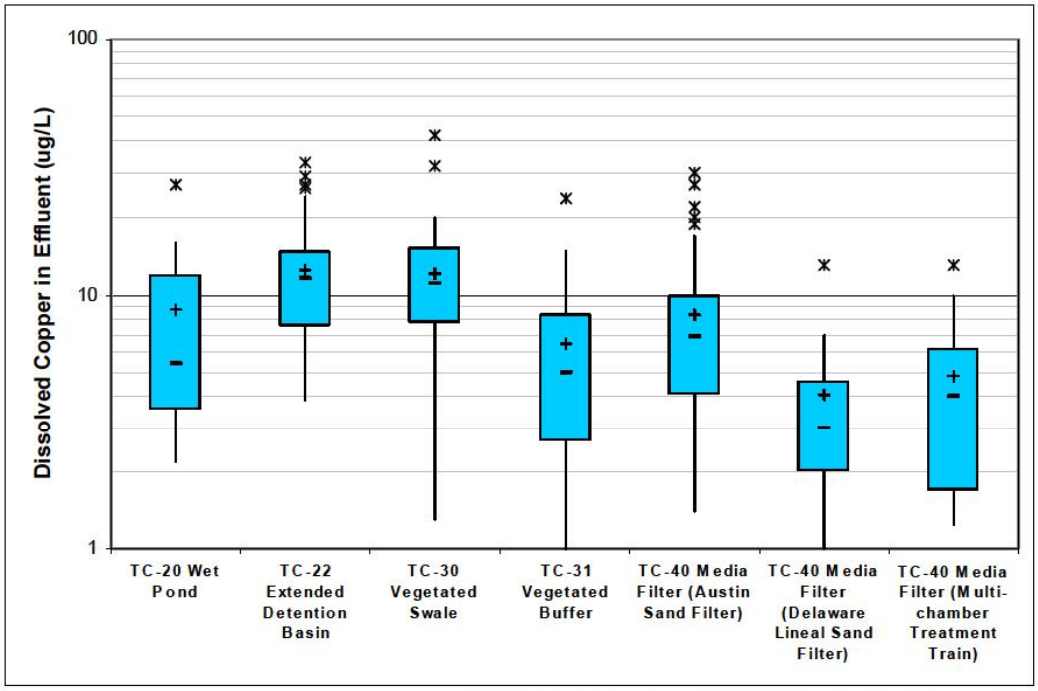

Dissolved Copper in Effluent (log format)

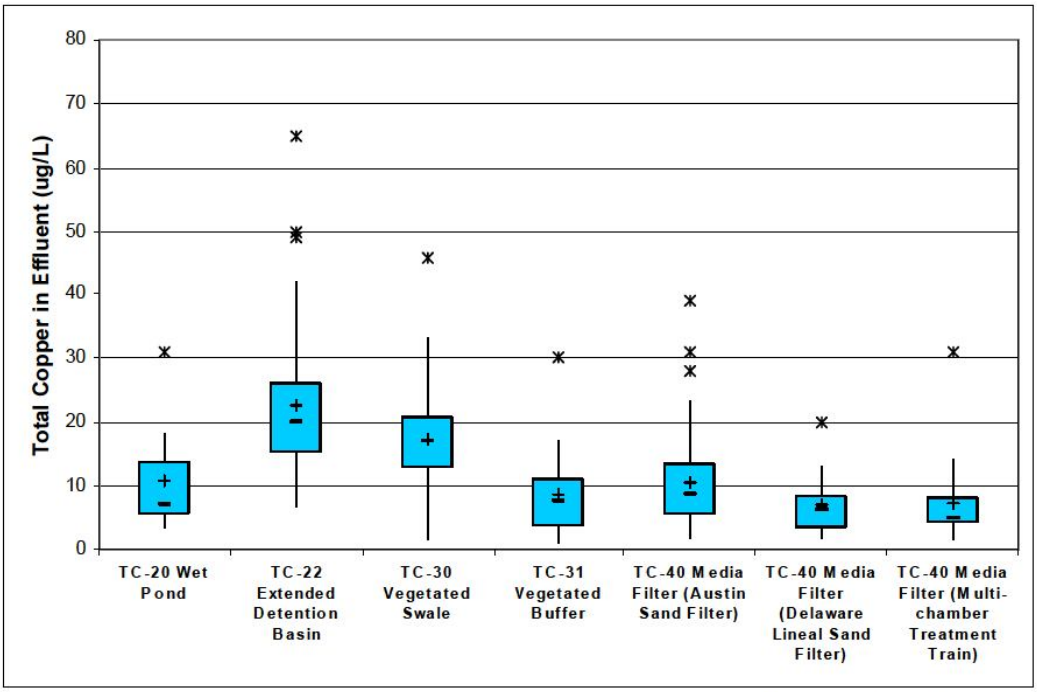

Total Copper in Effluent

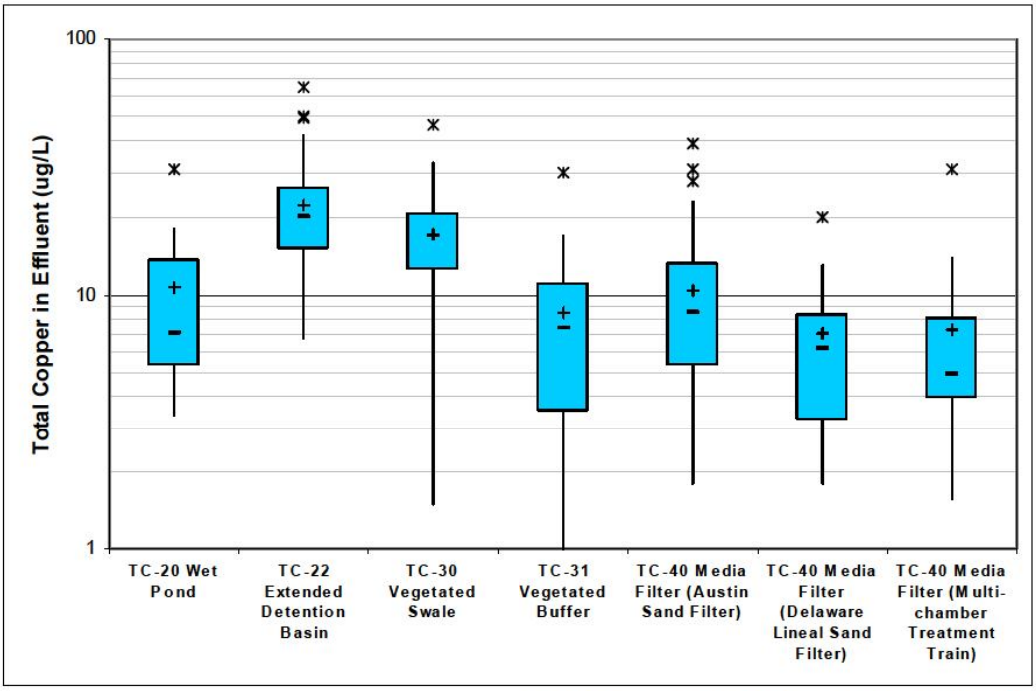

Total Copper in Effluent (log format)

Appendix C
Comparison of Effluent Concentrations of Additional Metals

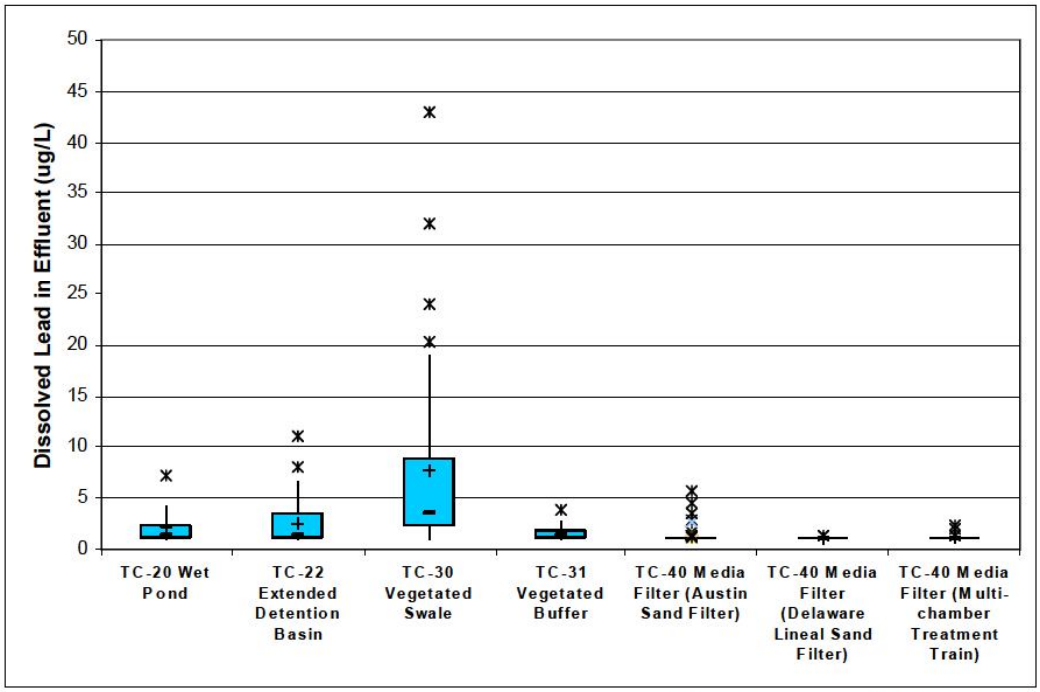

Dissolved Lead in Effluent

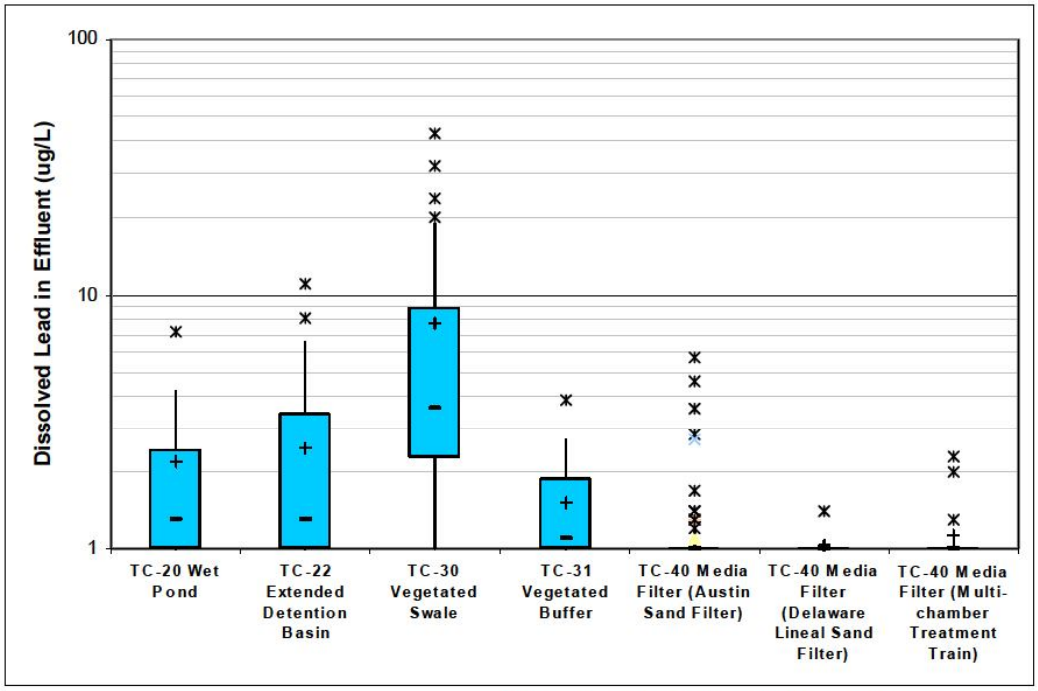

Dissolved Lead in Effluent (log format)

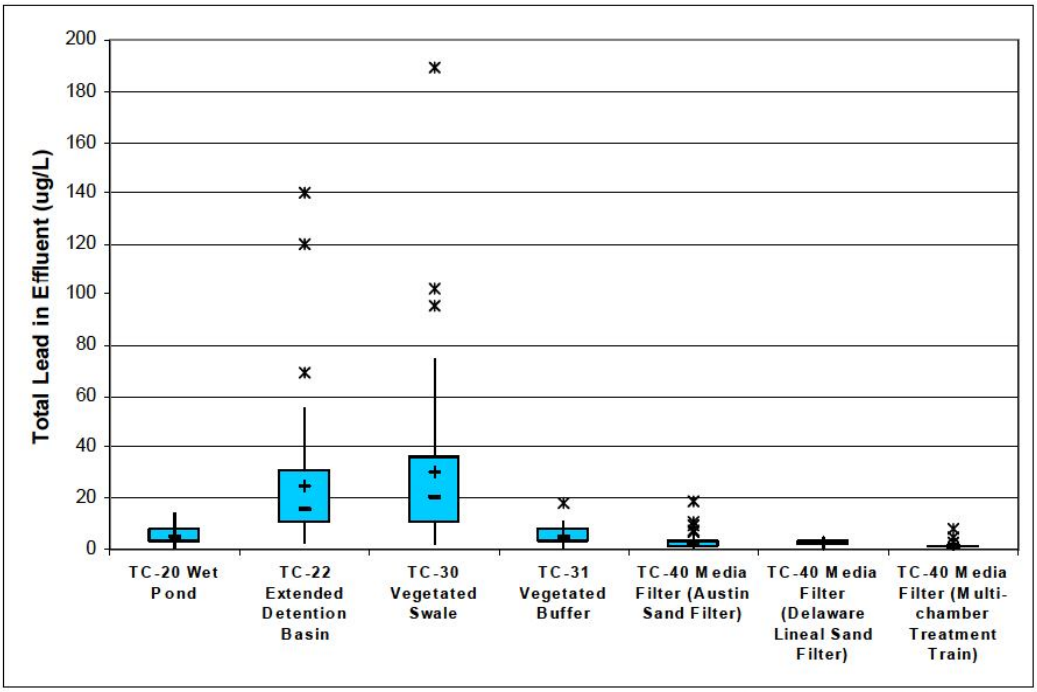

Total Lead in Effluent

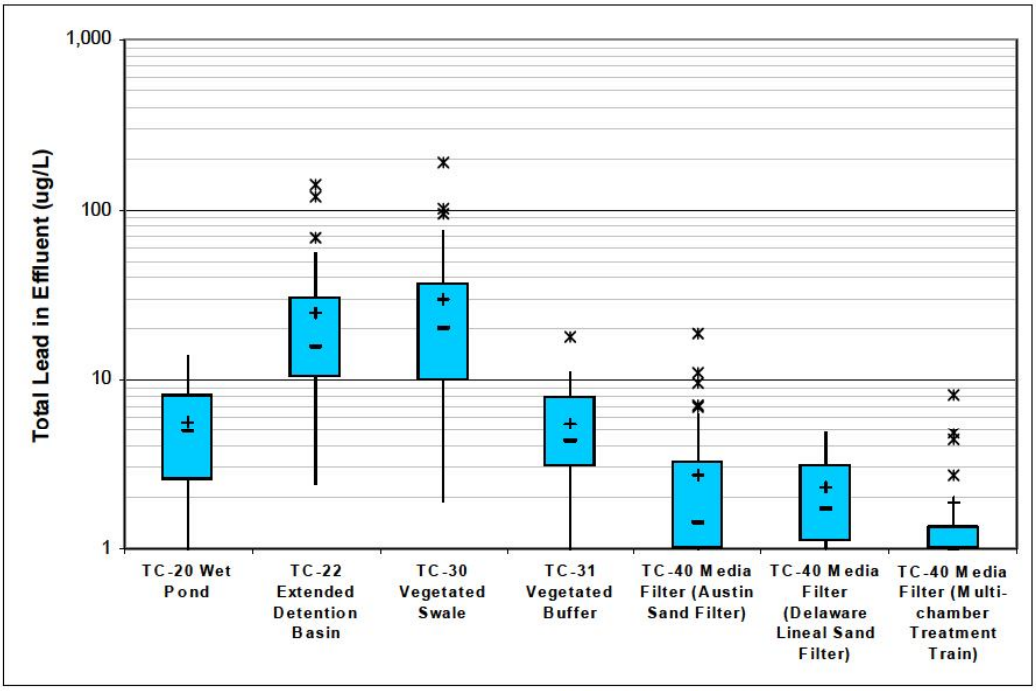

Total Lead in Effluent (log format)

Appendix C
Comparison of Effluent Concentrations of Additional Metals

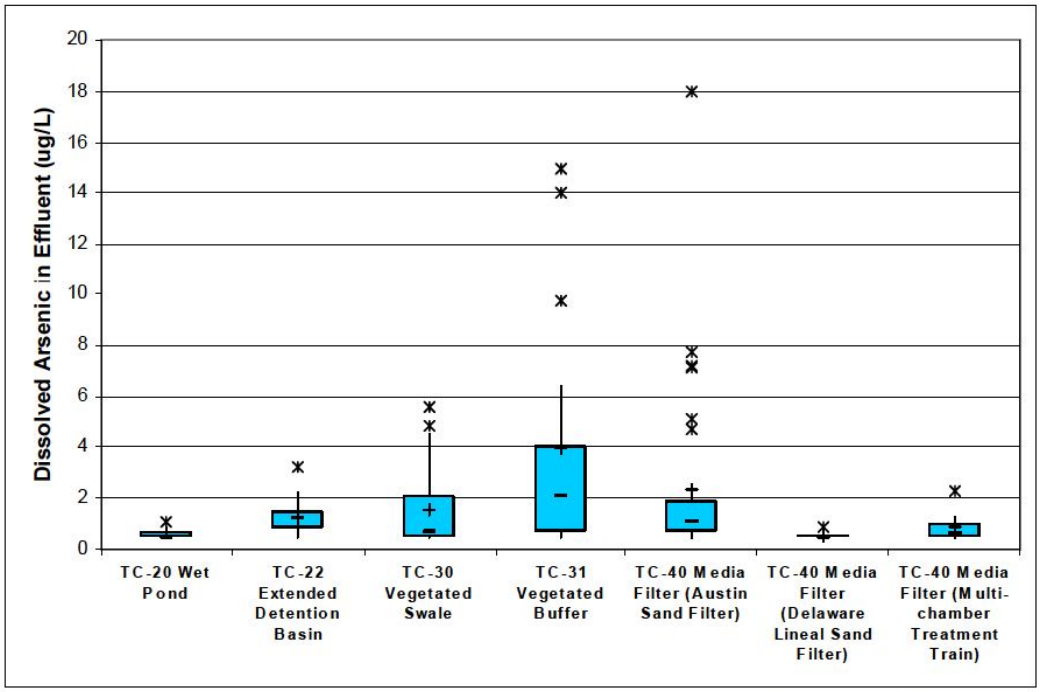

Dissolved Arsenic in Effluent

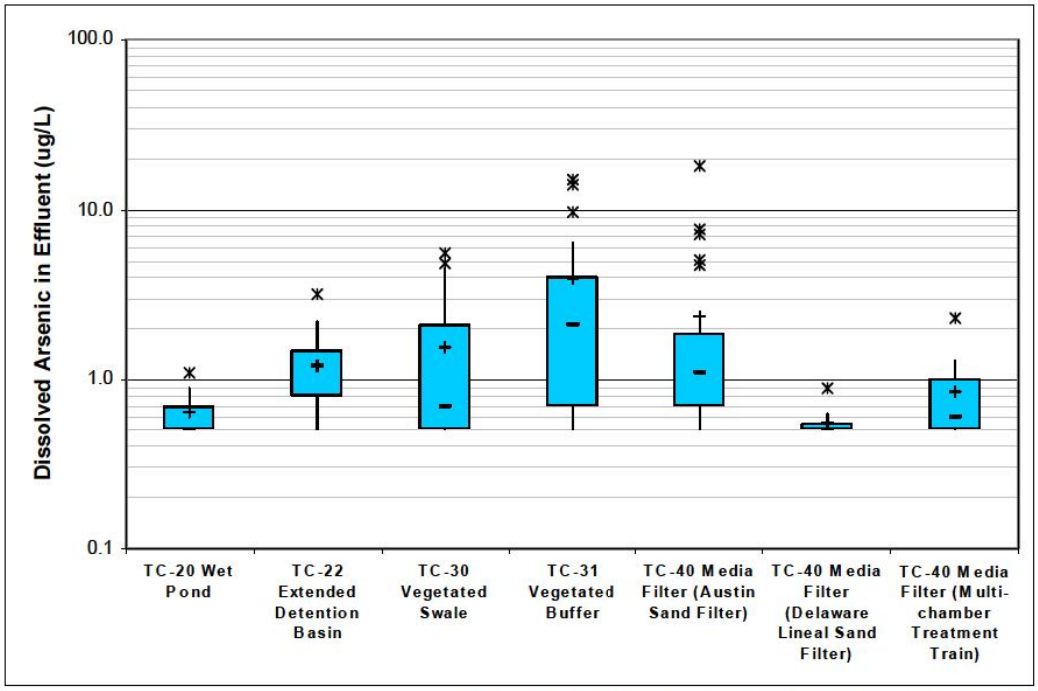

Dissolved Arsenic in Effluent (log format)

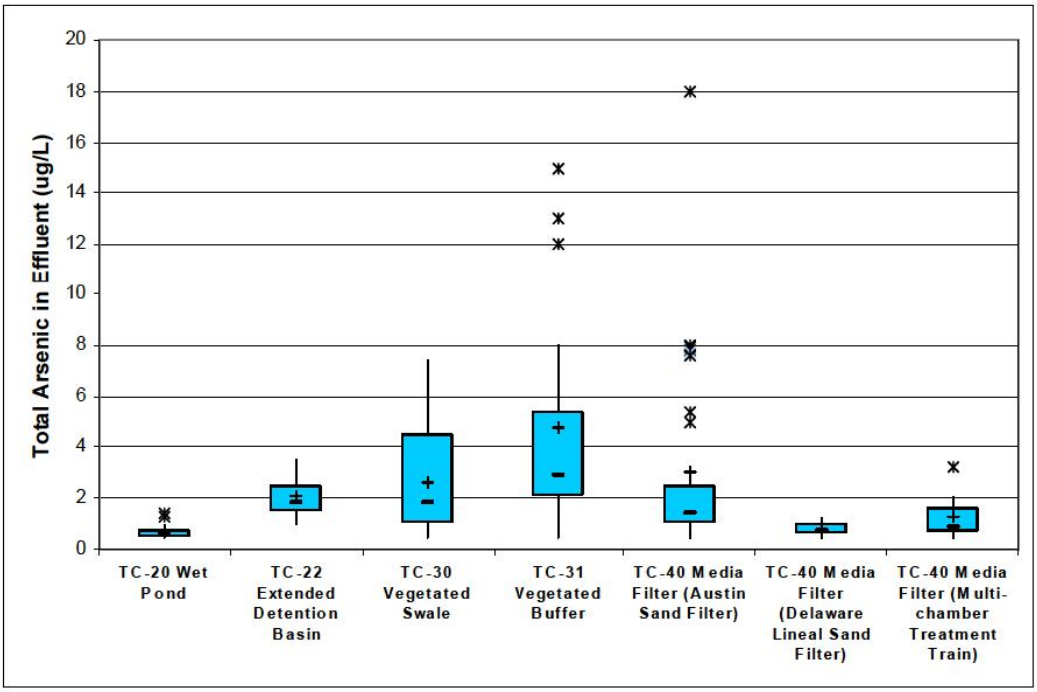

Total Arsenic in Effluent

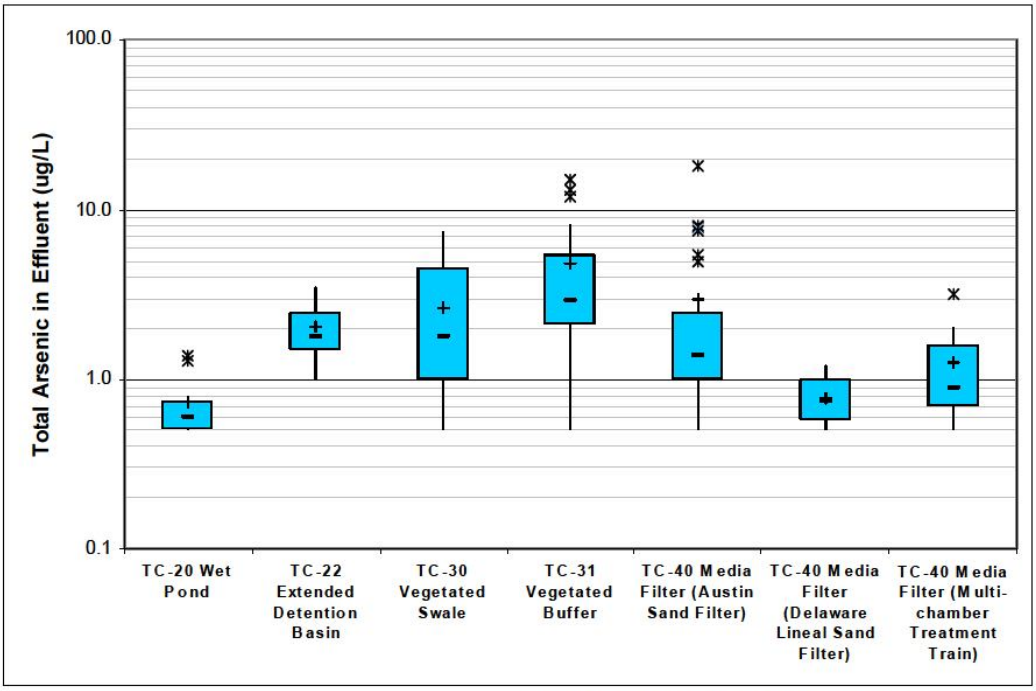

Total Arsenic in Effluent (log format)

Appendix C
Comparison of Effluent Concentrations of Additional Metals

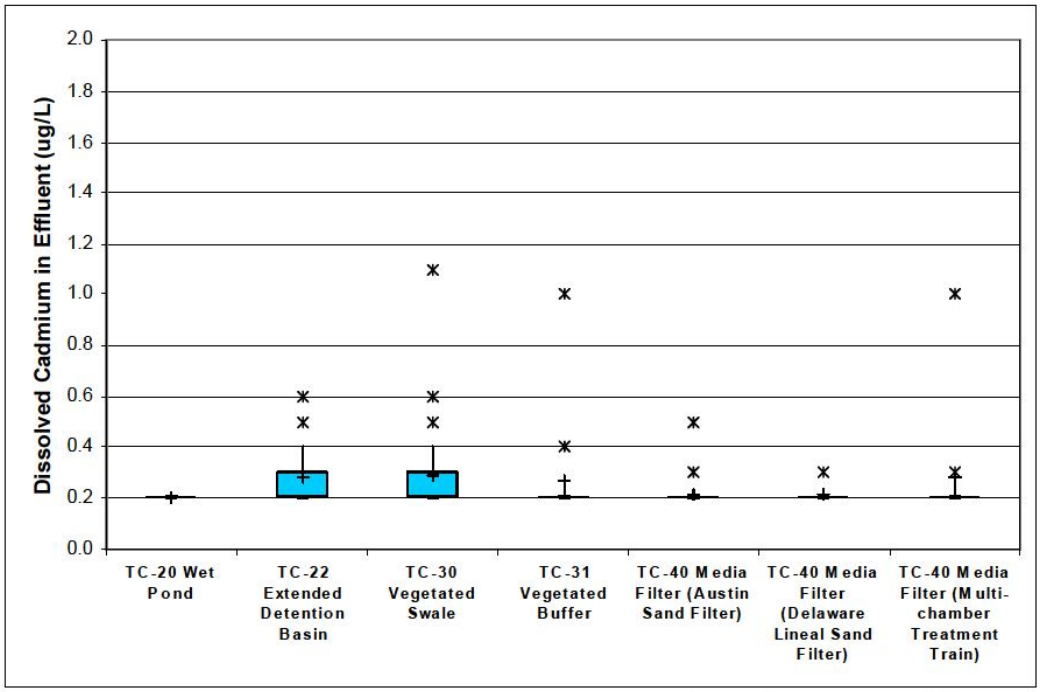

Dissolved Cadmium in Effluent

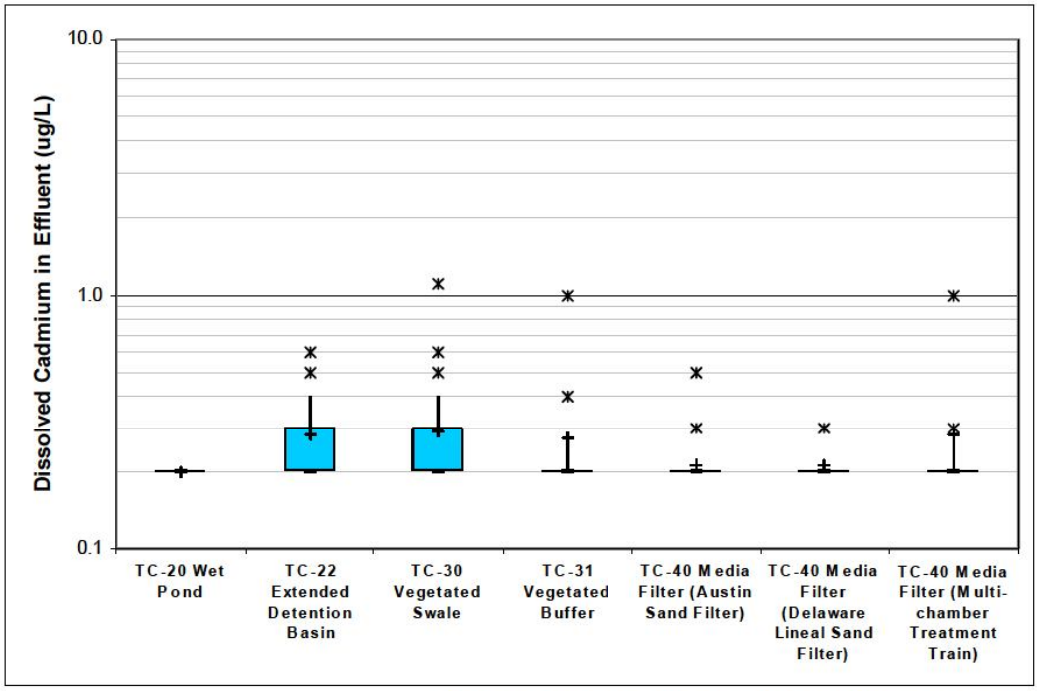

Dissolved Cadmium in Effluent (log format)

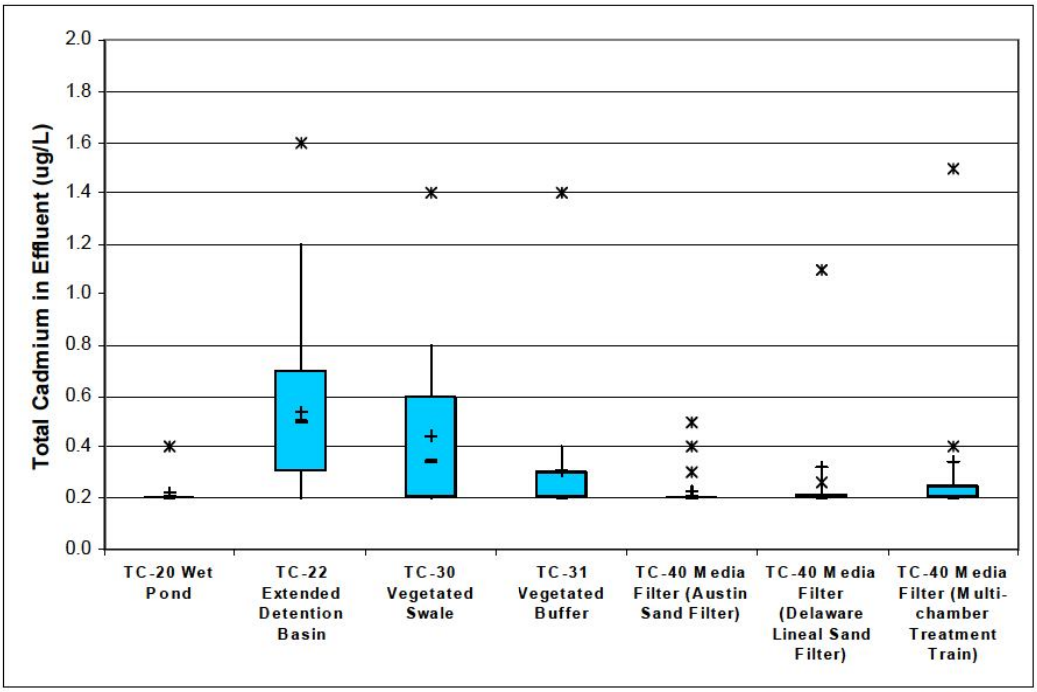

Total Cadmium in Effluent

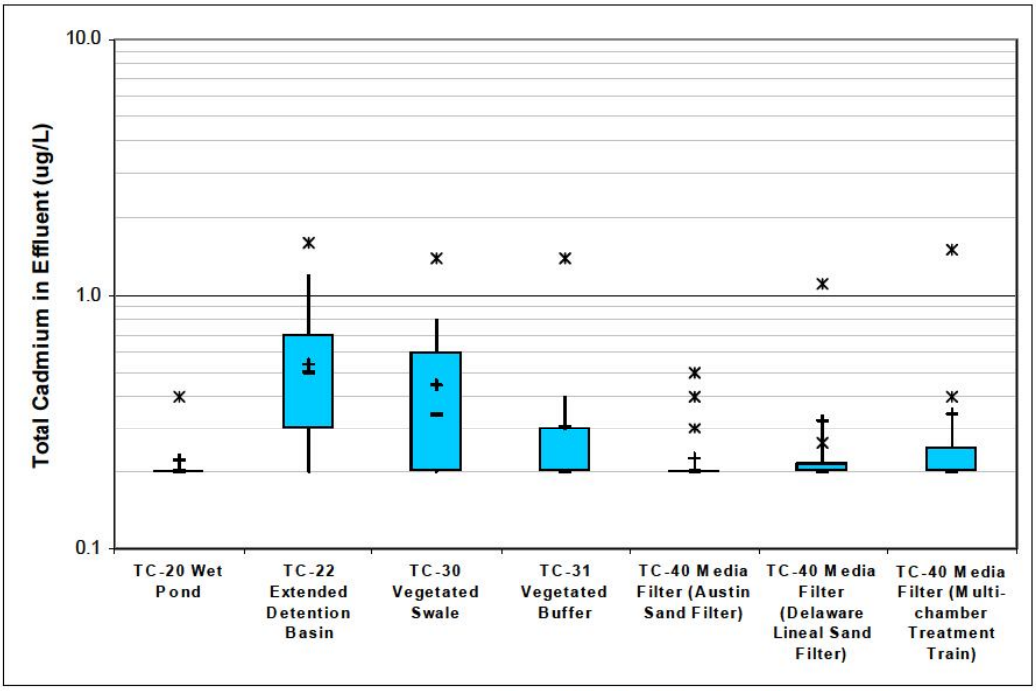

Total Cadmium in Effluent (log format)

Appendix C
Comparison of Effluent Concentrations of Additional Metals

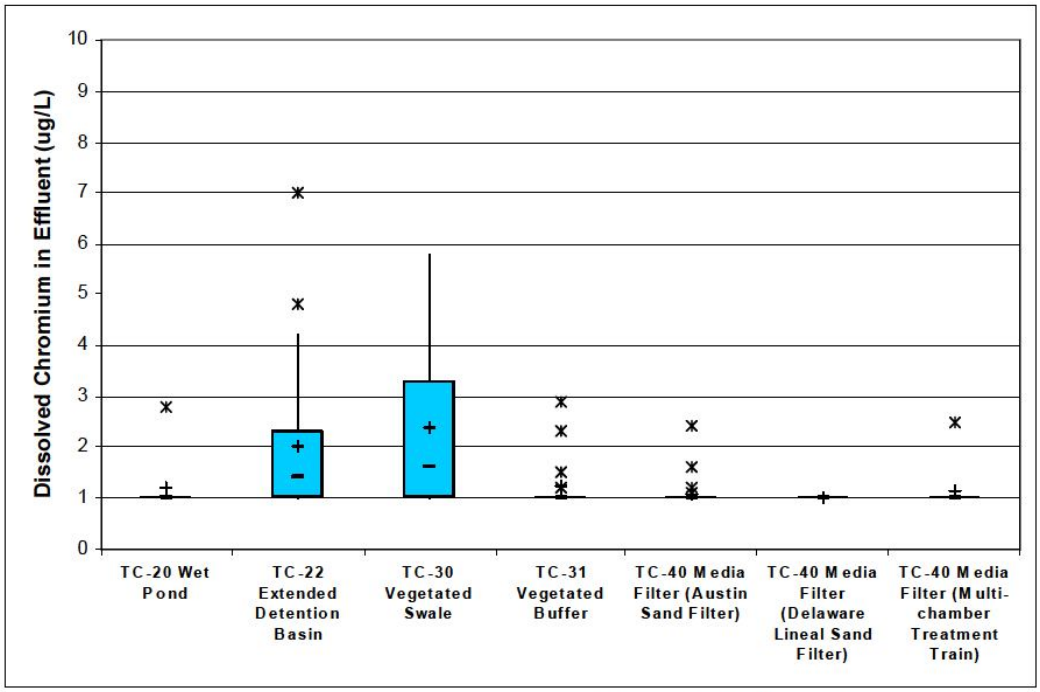

Dissolved Chromium in Effluent

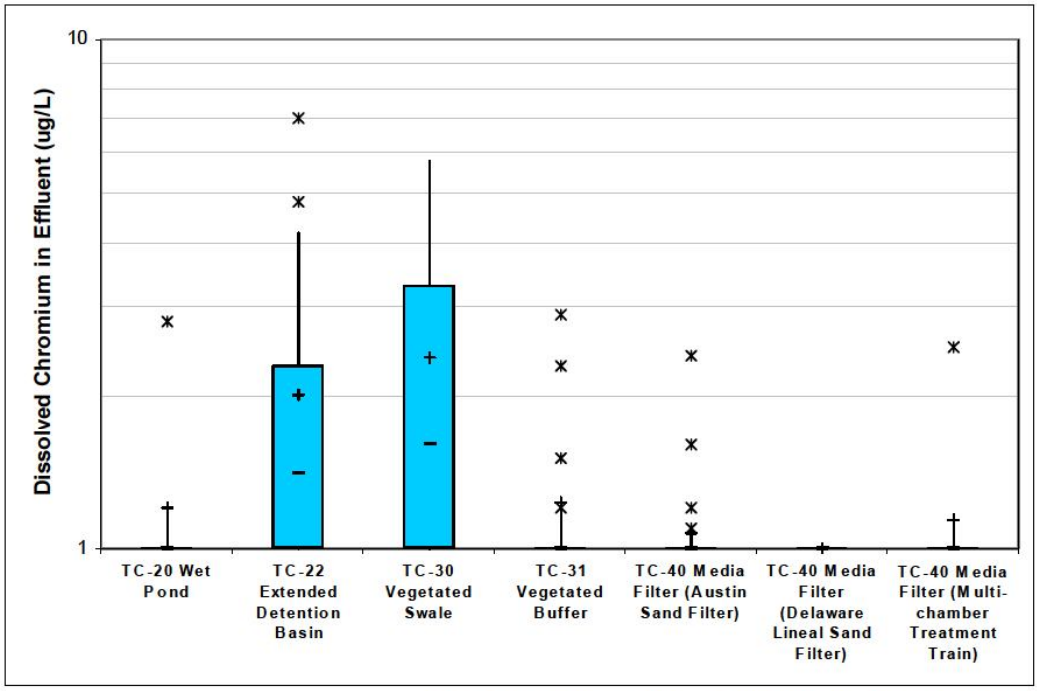

Dissolved Chromium in Effluent (log format)

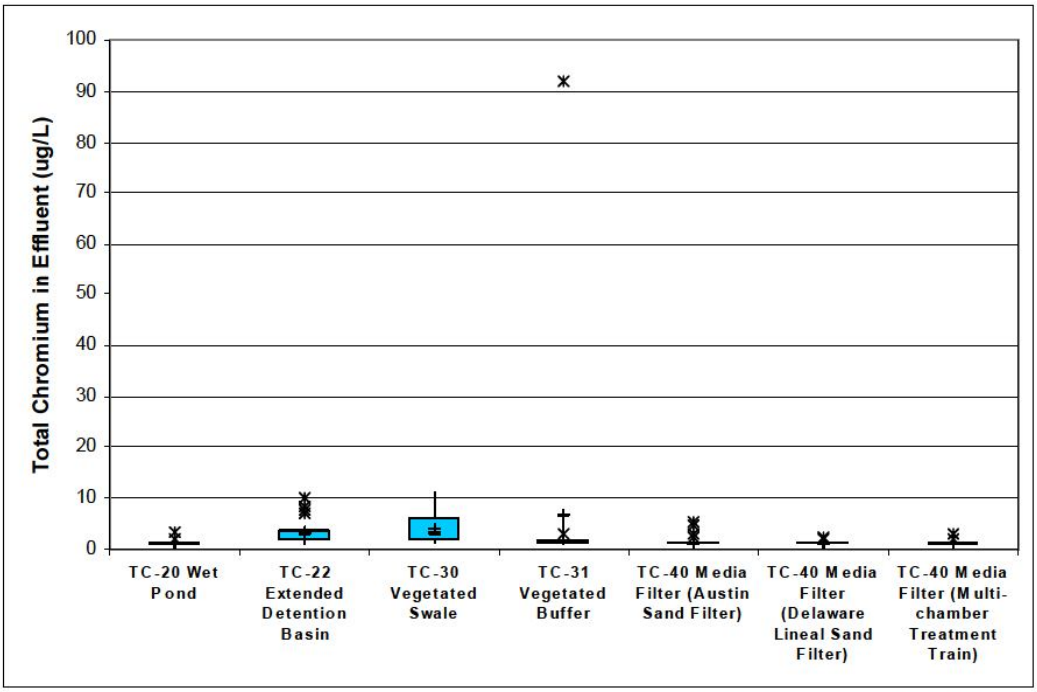

Total Chromium in Effluent

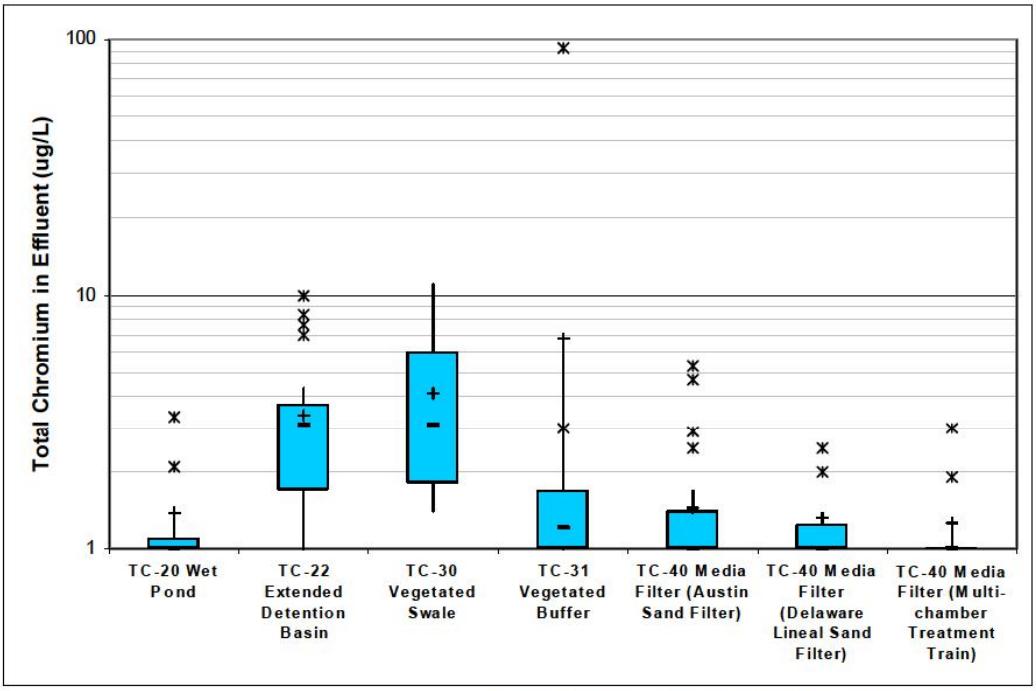

Total Chromium in Effluent (log format)

Appendix C
Comparison of Effluent Concentrations of Additional Metals

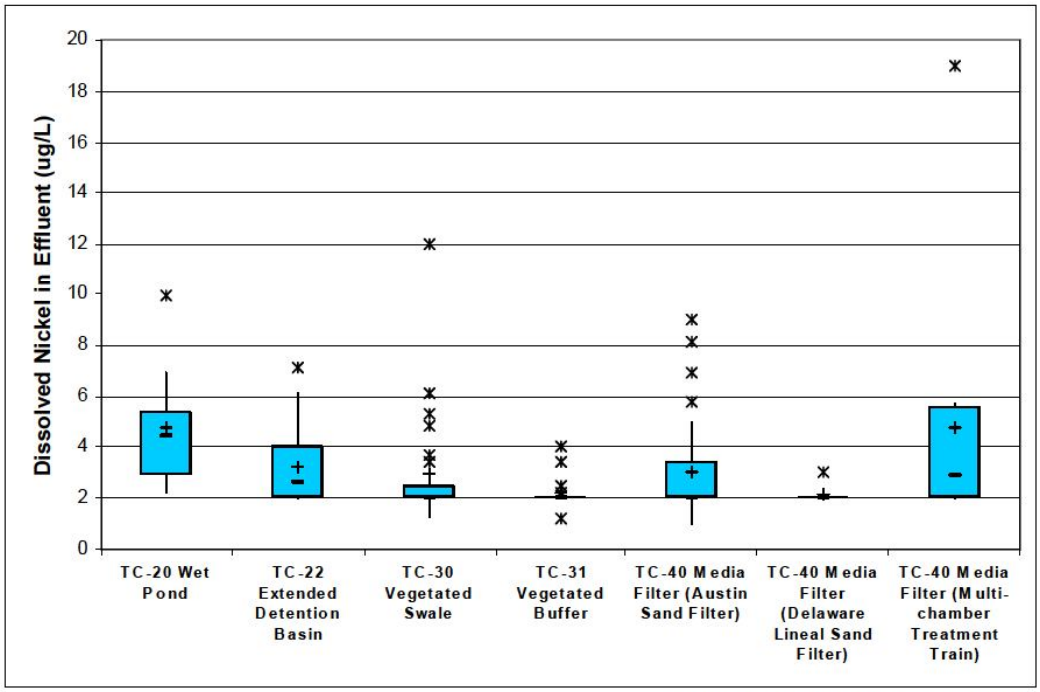

Dissolved Nickel in Effluent

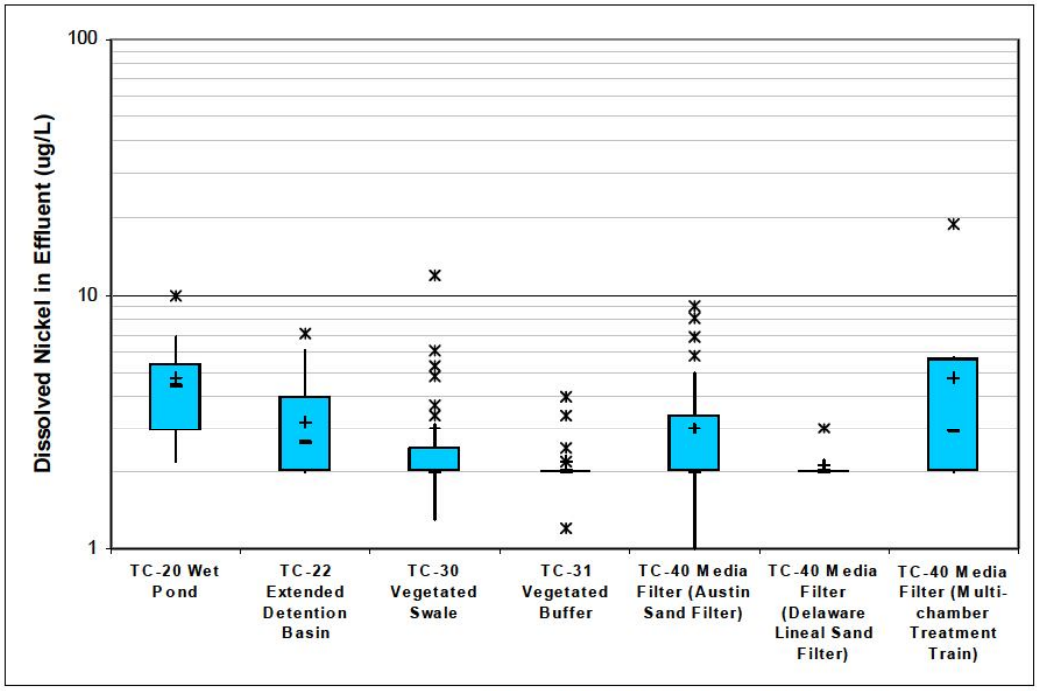

Dissolved Nickel in Effluent (log format)

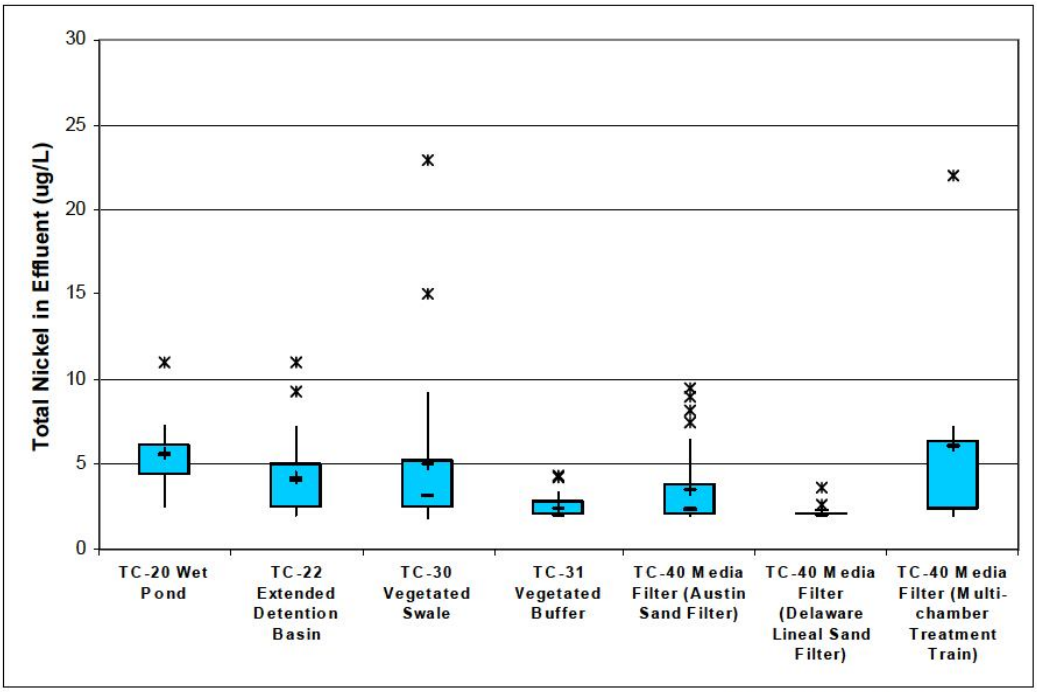

Total Nickel in Effluent

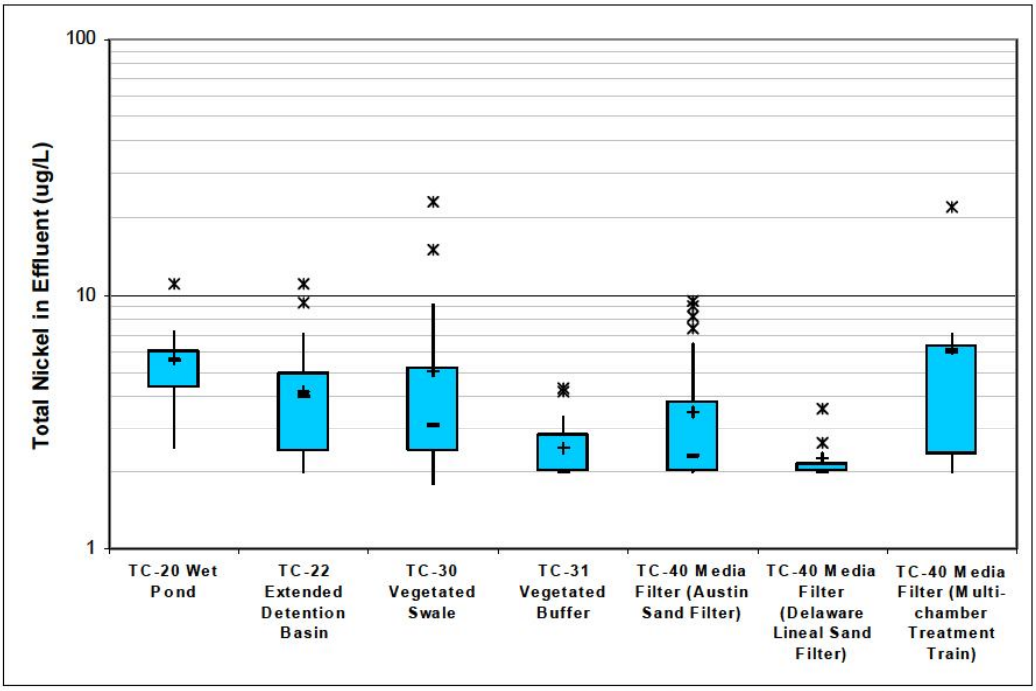

Total Nickel in Effluent (log format)

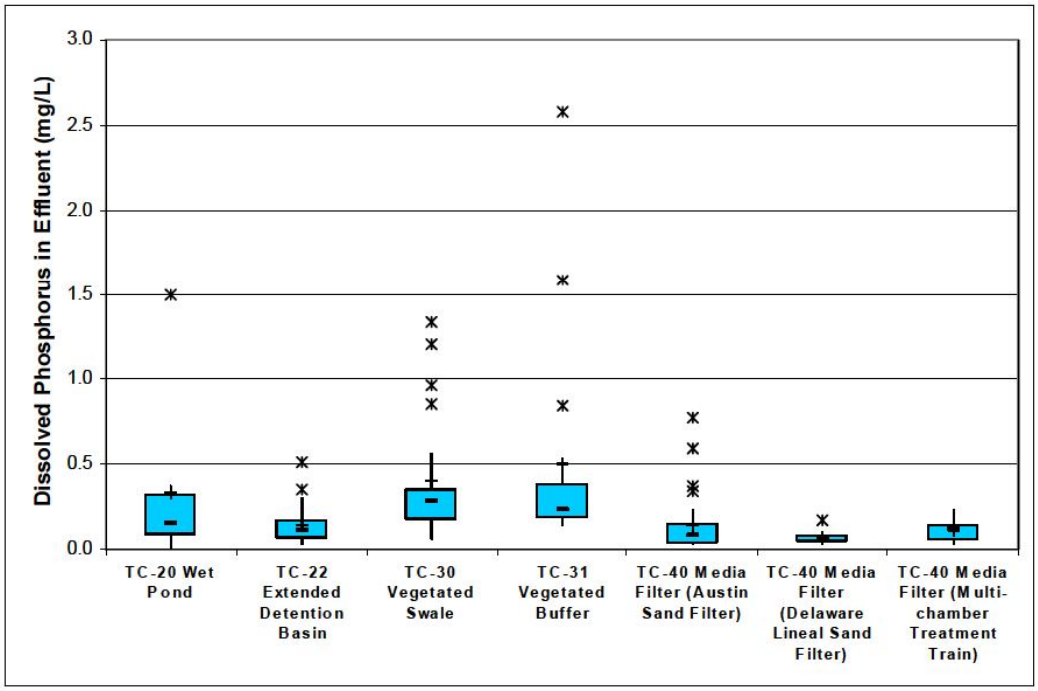

Dissolved Phosphorus in Effluent

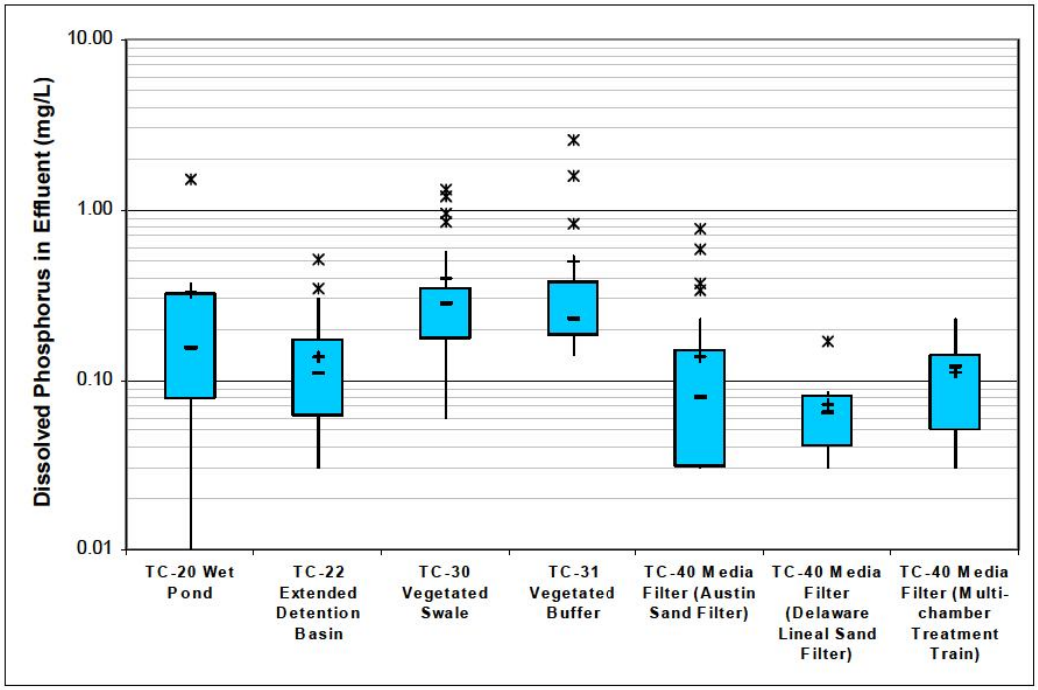

Dissolved Phosphorus in Effluent (log format)

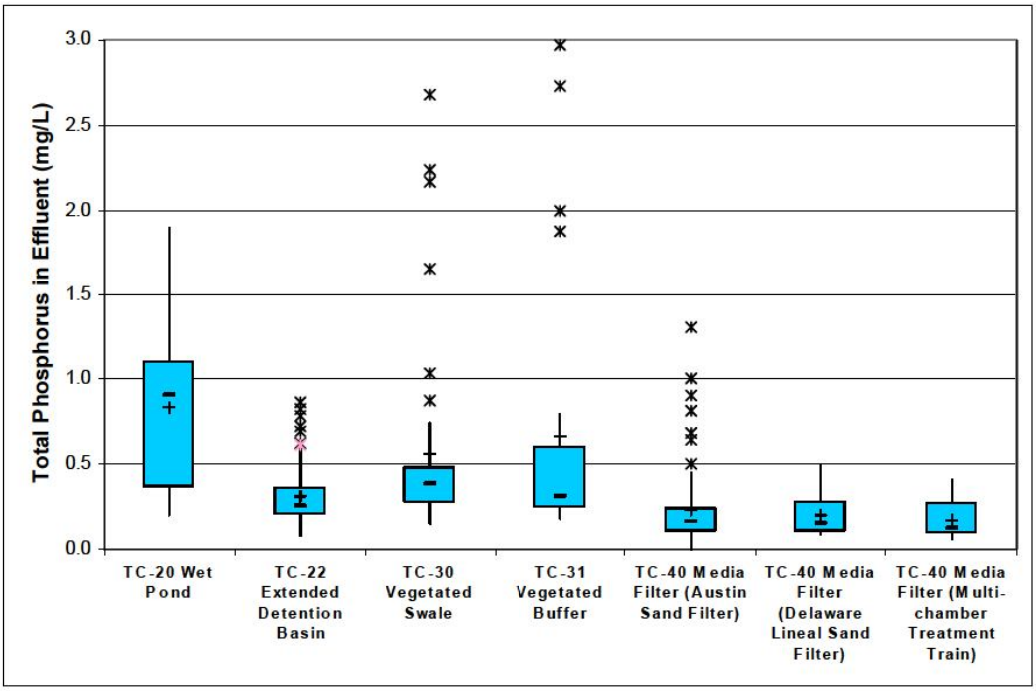

Total Phosphorus in Effluent

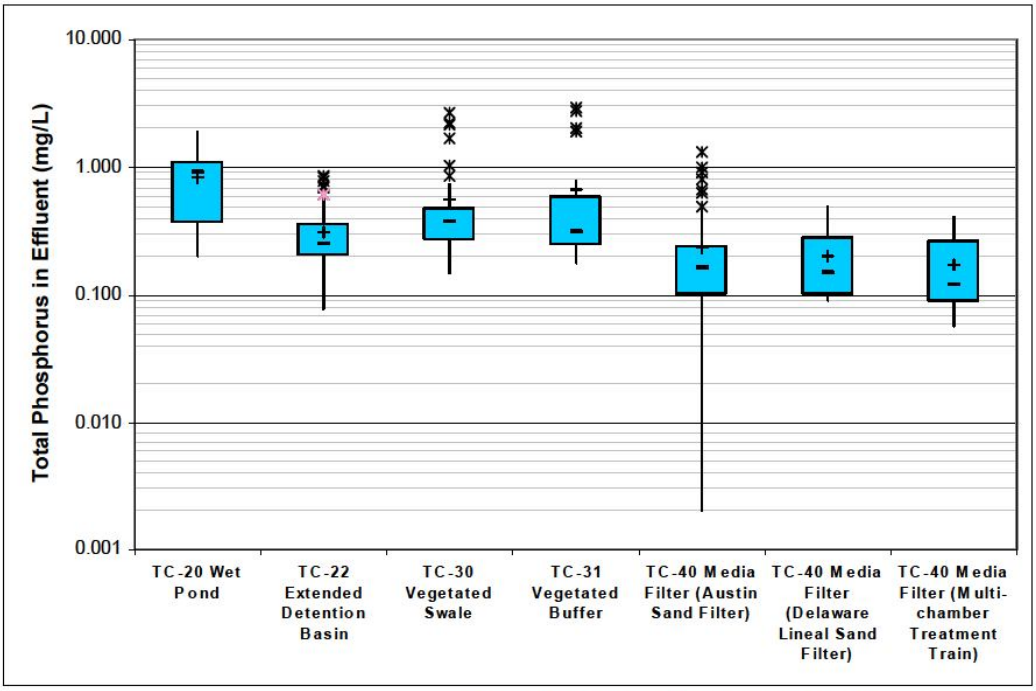

Total Phosphorus in Effluent (log format)

Appendix D
Selected Rain Gauge Index

Appendix D

Selected Rain Gauge Index

This appendix contains hydrologic data needed for BMP design in accordance with volume-based and flow-based BMP design criteria included in many MS4 permits. For information on volume-based and flow-based BMP design criteria, refer to Section 5.5 of this handbook.

This appendix contains the following information.

Rain Gauge Index Map

The rain gauge index map provides a visual index for selecting a rain gage closest to the site where volume-based or flow-based BMP design criteria will be applied. The index map is for quick reference only: selection of a specific gauge for use in design should be based on the rain gauge data table which provides additional information about each rain gauge, such as latitude, longitude, elevation, and rainfall statistics, which should be considered when identifying a gauge most representative of the project site.

Rain Gauge Data Table

The rain gauge data table provides important information about the rain gauges included in this appendix. Rain gauges analyzed and included in this appendix represent a wide range of municipal stormwater permit areas, climatic areas, geography, and topography across California. Using the station location, latitude, longitude, elevation, and rainfall statistics, it should be possible to identify a gauge that is sufficiently representative of most sites in California, as there is generally less variation among sites across the State when the comparisons are made based on the frequent, small storms used for BMP design as opposed to the infrequent, large storms used for flood control design.

The rain gauge data table also tabulates estimates of mean storm depths (P_6). P_6 is used for volume design using the Urban Runoff Quality Management approach discussed in Section 5.5.1 of this handbook. The values in the table were extrapolated and approximated from the map included in the document, Urban Runoff Quality Management (WEF Manual of Practice No. 23/ASCE Manual of Practice No. 87, (1998), pages 176). Urban Runoff Quality Management references the document, *Analysis of Storm Events, Characteristics for Selected Rain Gauges Throughout the United States* (Driscoll, E.D., et al., 1989, U.S. EPA) for the source information. A future addition to this handbook may be an analysis of the data set for the tabulated gauges to determine site-specific values of P_6 for inclusion in this handbook.

Analysis of Rain Gauge Data

The rain gauge data for the stations identified in the range gauge table were analyzed to determine the basin volumes required to capture various percentages of annual runoff, and to determine various percentiles of hourly rainfall intensities. The basin-volume analysis is part of the California Stormwater BMP Handbook approach for volumetric-based design of BMPs (See

Section 5.5.1). The hourly rainfall intensities analysis is part of the California Stormwater BMP Handbook approach for flow-based design of BMPs (See Section 5.5.2)

California Stormwater BMP Handbook Approach – Volume-Based Design

For each rain gauge, two charts (48-hour and 24-hour draw down times) contain four curves (Runoff Coefficient 0.25, 0.50, 0.75, and 1.00) each that show the Unit Basin Storage Volume required for various levels Capture of average annual runoff.

The charts are developed using a continuous simulation model, the STORM model, developed by the Hydrologic Engineering Center of the U.S. Army Corps of Engineers (COE-HEC, 1977). The version used for this study utilized the NetSTORM user interface. The Storage, Treatment, Overflow, Runoff Model (STORM) was applied to long-term hourly rainfall data at each site. STORM translates rainfall into runoff, then routes the runoff through detention storage. Key model assumptions are:

- Drainage Area = 100 acres
- Depression Storage = 0.06 inches
- Evaporation Rate = 0.15 inches/day
- Inter-event Time = 24 hours and 48 hours
- Time to Empty = 24 or 48 hrs
- Runoff Coefficients = 0.25, 0.50, 0.75, 1.00

The model results are presented on a unit basis, and are sufficient for use on most projects. Projects with drainage areas larger than 100 acres should be broken down into sub-areas and the method applied to each sub-area.

For more detail on the STORM model, use key words HEC and STORM on any major browser to locate numerous documents and publications related to the STORM model.

California Stormwater BMP Handbook Approach – Flow-Based Design

For each rain gauge, a cumulative hourly rainfall intensity chart is provided. The chart shows the percentile associated with each measured hourly rainfall intensity for the period of record. A key assumption is:

- Recorded values less than or equal to 0.01 inches per hour were not included in the analysis

A few gauges have incomplete data or data extrapolated by algorithm. No attempt was made to fill in completely missing data. Where accumulated data were available and extrapolated by algorithm, the extrapolated data were used. This situation occurs when a gauge that normally

reports hourly data is unable to report hourly data for a short period, but is able to report reliable accumulated data. A few gauges only reported rainfall in 0.1 inches per hour increments. These data were used directly without adjustment, and may result in a stair-step cumulative hourly rainfall intensity curve.

Given the number of years of record, the quality of data used overall is considered to be of sufficient quality for stormwater quality design.

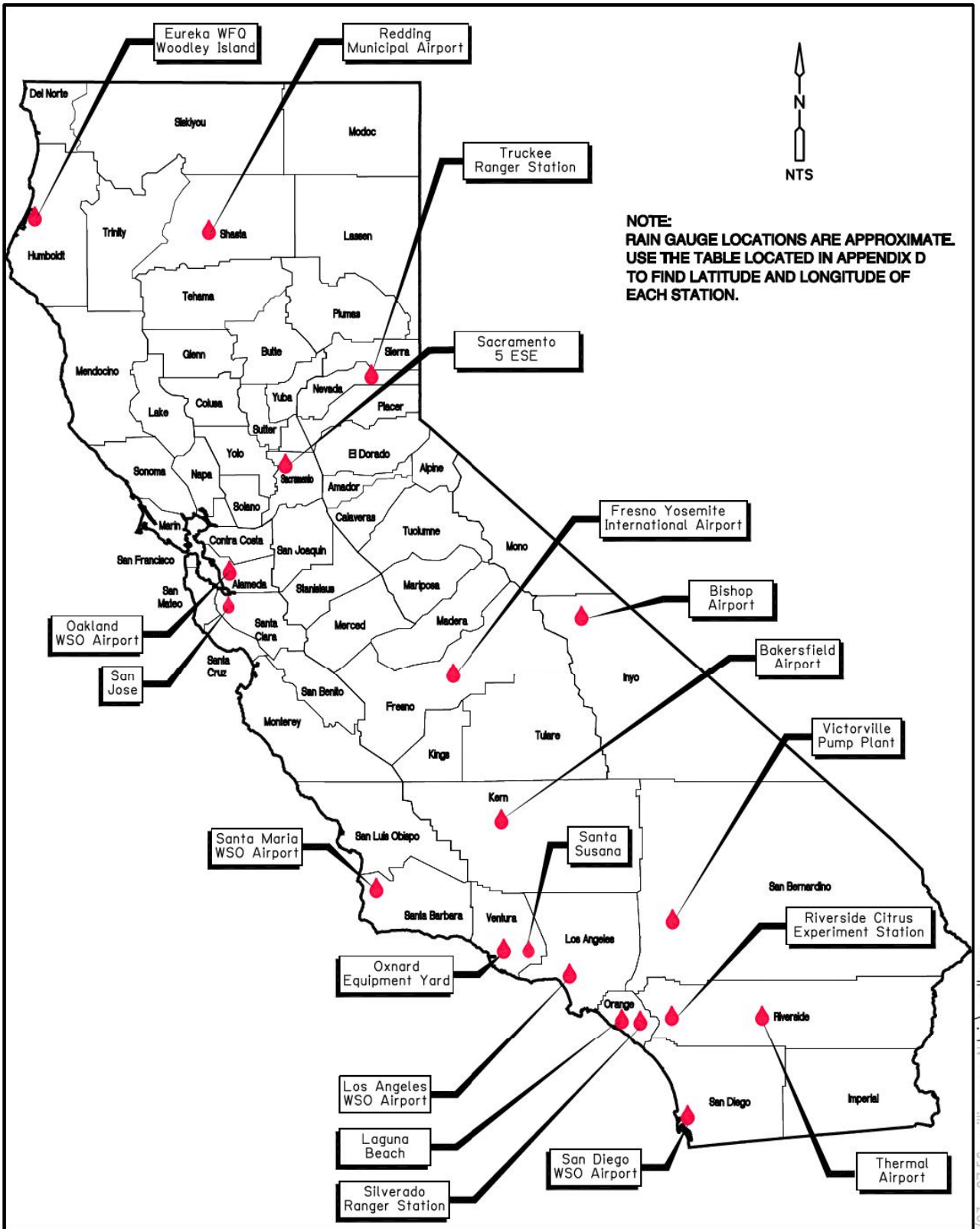

CASQA California Stormwater Quality Association

California Stormwater BMP Handbook

Selected Rain Gauge Index

Appendix D

caltrans 03/27/03 07:56 williamscm N:\hris\ caltrans

RAIN GAGE DATA TABLE

GENERAL INFORMATION			LOCATION INFORMATION			
STATION NAME	NAME USED IN HANDBOOK	STATION ID	COUNTY	LAT	LONG	ELEV FT MSL
EUREKA WFO WOODLEY IS	EUREKA WFO WOODLEY ISLAND	2910	HUMBOLDT	40:48:00	124:09:00	20
REDDING MUNICIPAL AP	REDDING MUNICIPAL AIRPORT	7304	SHASTA	40:30:00	122:17:00	497
OAKLAND WSO AP	OAKLAND WSO AIRPORT	6335	ALAMEDA	37:44:00	122:12:00	6
SAN JOSE	SAN JOSE	7821	SANTA CLARA	37:21:00	121:54:00	67
SACRAMENTO 5 ESE	SACRAMENTO 5 ESE	7633	SACRAMENTO	38:33:00	121:25:00	38
TRUCKEE RS	TRUCKEE RANGER STATION	9043	NEVADA	39:19:00	120:11:00	6,020
FRESNO YOSEMITE INTL	FRESNO YOSEMITE INTERNATIONAL AIRPORT	3257	FRESNO	36:46:00	119:43:00	333
BAKERSFIELD AP	BAKERSFIELD AIRPORT	442	KERN	35:26:00	119:03:00	489
BISHOP AP	BISHOP AIRPORT	822	INYO	37:22:00	118:21:00	4,102
SANTA MARIA WSO ARPT	SANTA MARIA WSO AIRPORT	7946	SANTA BARBARA	34:54:00	120:27:00	254
LOS ANGELES WSO ARPT	LOS ANGELES WSO AIRPORT	5114	LOS ANGELES	33:56:00	118:24:00	100
LAGUNA BEACH 2	LAGUNA BEACH	4650	ORANGE	33:33:00	117:48:00	210
SILVERADO RANGER STN	SILVERADO RANGER STATION	8243	ORANGE	33:44:00	117:39:00	1,095
RIVERSIDE CITRUS EXP ST	RIVERSIDE CITRUS EXPERIMENT STATION	7473	RIVERSIDE	33:58:00	117:21:00	986
VICTORVILLE PUMP PLANT	VICTORVILLE PUMP PLANT	9325	SAN BERNARDINO	34:32:00	117:18:00	2,858
SAN DIEGO WSO AIRPORT	SAN DIEGO WSO AIRPORT	7740	SAN DIEGO	32:44:00	117:10:00	15
THERMAL AIRPORT	THERMAL AIRPORT	48892	RIVERSIDE	33:38:N	116:10:W	-112
OXNARD EQUIPMENT YARD	OXNARD EQUIPMENT YARD	168	VENTURA	34:12.0	119:12.1	35
SANTA SUSANA	SANTA SUSANA	193	VENTURA			

RAIN GAGE DATA TABLE

GENERAL INFORMATION			RECORD INFORMATION			
STATION NAME	NAME USED IN HANDBOOK	STATION ID	PRECIP INCREMENT	START YEAR	END YEAR	# OF YEARS
EUREKA WFO WOODLEY IS	EUREKA WFO WOODLEY ISLAND	2910	60Min Sum	1948	2001	54
REDDING MUNICIPAL AP	REDDING MUNICIPAL AIRPORT	7304	60Min Sum	1986	2001	16
OAKLAND WSO AP	OAKLAND WSO AIRPORT	6335	60Min Sum	1948	1986	37
SAN JOSE	SAN JOSE	7821	60Min Sum	1948	2001	54
SACRAMENTO 5 ESE	SACRAMENTO 5 ESE	7633	60Min Sum	1936	2001	66
TRUCKEE RS	TRUCKEE RANGER STATION	9043	60Min Sum	1948	2001	54
FRESNO YOSEMITE INTL	FRESNO YOSEMITE INTERNATIONAL AIRPORT	3257	60Min Sum	1948	2001	54
BAKERSFIELD AP	BAKERSFIELD AIRPORT	442	60Min Sum	1948	2001	54
BISHOP AP	BISHOP AIRPORT	822	60Min Sum	1948	2001	49
SANTA MARIA WSO ARPT	SANTA MARIA WSO AIRPORT	7946	60Min Sum	1948	2001	54
LOS ANGELES WSO ARPT	LOS ANGELES WSO AIRPORT	5114	60Min Sum	1948	2001	54
LAGUNA BEACH 2	LAGUNA BEACH	4650	60Min Sum	1948	2001	54
SILVERADO RANGER STN	SILVERADO RANGER STATION	8243	60Min Sum	1948	2001	53
RIVERSIDE CITRUS EXP ST	RIVERSIDE CITRUS EXPERIMENT STATION	7473	60Min Sum	1948	2001	54
VICTORVILLE PUMP PLANT	VICTORVILLE PUMP PLANT	9325	60Min Sum	1948	2001	54
SAN DIEGO WSO AIRPORT	SAN DIEGO WSO AIRPORT	7740	60Min Sum	1948	2001	54
THERMAL AIRPORT	THERMAL AIRPORT	48892		1950	2002	
OXNARD EQUIPMENT YARD	OXNARD EQUIPMENT YARD	168		1956	1996	40
SANTA SUSANA	SANTA SUSANA	193		1956	1998	42

RAIN GAGE DATA TABLE

GENERAL INFORMATION			RAINFALL STATISTICS			
STATION NAME	NAME USED IN HANDBOOK	STATION ID	AVG IN.	MAX IN.	MIN IN.	P6 IN
EUREKA WFO WOODLEY IS	EUREKA WFO WOODLEY ISLAND	2910	38.34	67.21	21.71	0.65
REDDING MUNICIPAL AP	REDDING MUNICIPAL AIRPORT	7304				0.55
OAKLAND WSO AP	OAKLAND WSO AIRPORT	6335	18.35	29.37	8.64	0.55
SAN JOSE	SAN JOSE	7821	14.4	31.49	6.12	0.60
SACRAMENTO 5 ESE	SACRAMENTO 5 ESE	7633	19.1	34.71	6.6	0.55
TRUCKEE RS	TRUCKEE RANGER STATION	9043	23.67	55.2	11.82	0.45
FRESNO YOSEMITE INTL	FRESNO YOSEMITE INTERNATIONAL AIRPORT	3257	10.94	21.61	5.96	0.50
BAKERSFIELD AP	BAKERSFIELD AIRPORT	442	5.94	12.72	1.87	0.55
BISHOP AP	BISHOP AIRPORT	822	5.48	17.09	1.82	0.38
SANTA MARIA WSO ARPT	SANTA MARIA WSO AIRPORT	7946	12.9	27	3.3	0.65
LOS ANGELES WSO ARPT	LOS ANGELES WSO AIRPORT	5114	12.19	29.46	4.19	0.60
LAGUNA BEACH 2	LAGUNA BEACH	4650	10.75	26	2.3	0.58
SILVERADO RANGER STN	SILVERADO RANGER STATION	8243	14.85	35.1	2.39	0.55
RIVERSIDE CITRUS EXP ST	RIVERSIDE CITRUS EXPERIMENT STATION	7473	8.93	22.99	1.52	0.50
VICTORVILLE PUMP PLANT	VICTORVILLE PUMP PLANT	9325	4.23	12.9	0.69	0.47
SAN DIEGO WSO AIRPORT	SAN DIEGO WSO AIRPORT	7740	9.83	19.41	3.41	0.57
THERMAL AIRPORT	THERMAL AIRPORT	48892				0.47
OXNARD EQUIPMENT YARD	OXNARD EQUIPMENT YARD	168				0.65
SANTA SUSANA	SANTA SUSANA	193				0.55

P6 is mean storm depth. Refer to Urban Runoff Quality Management (WEF/ASCE, 1998, Page 176)

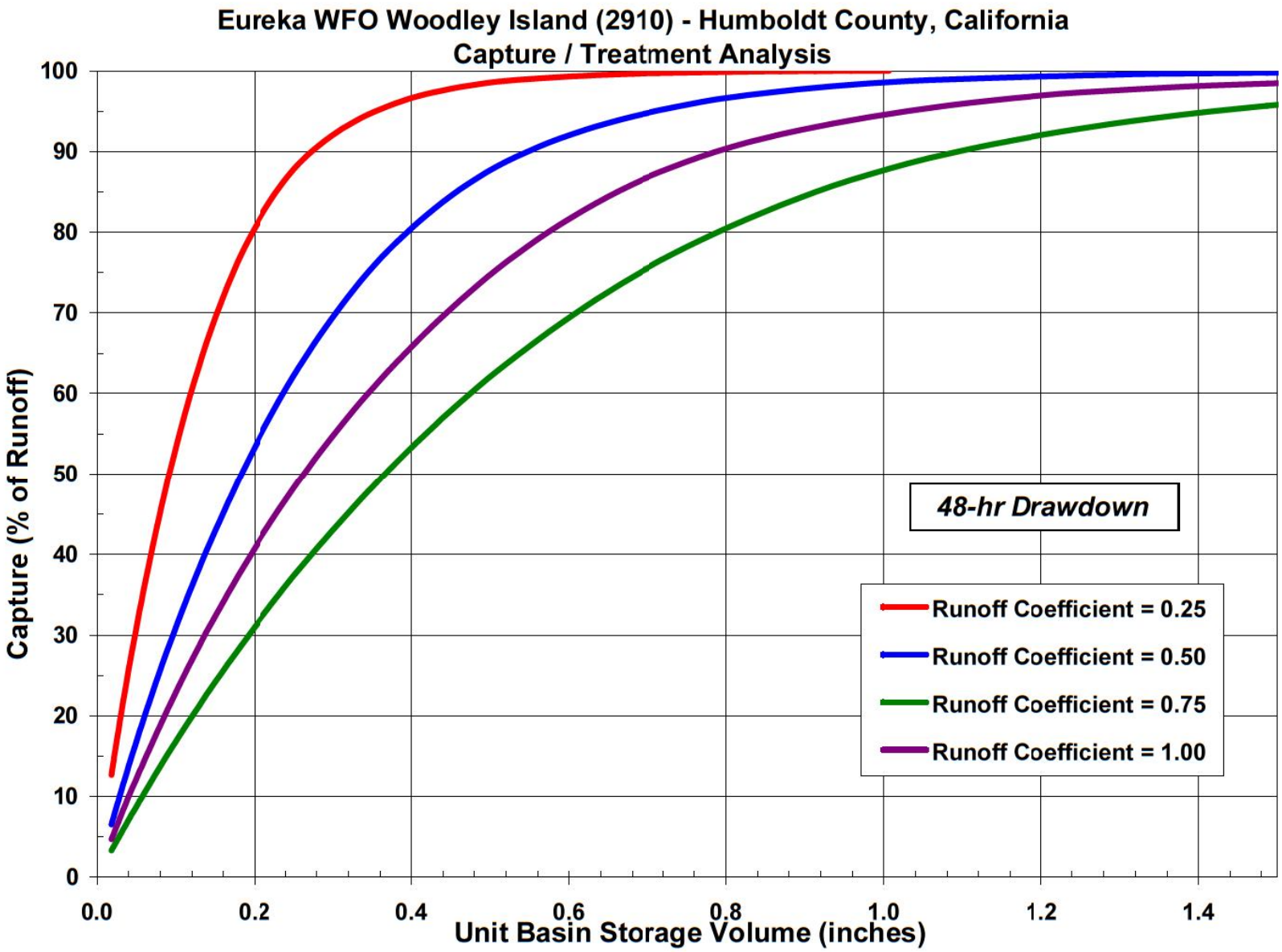
Eureka WFO Woodley Island (2910) - Humboldt County, California
Capture / Treatment Analysis
Capture (% of Runoff)
Unit Basin Storage Volume (inches)
0
10
20
30
40
50
60
70
80
90
100
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
48-hr Drawdown
Runoff Coefficient = 0.25
Runoff Coefficient = 0.50
Runoff Coefficient = 0.75
Runoff Coefficient = 1.00

013462

013463

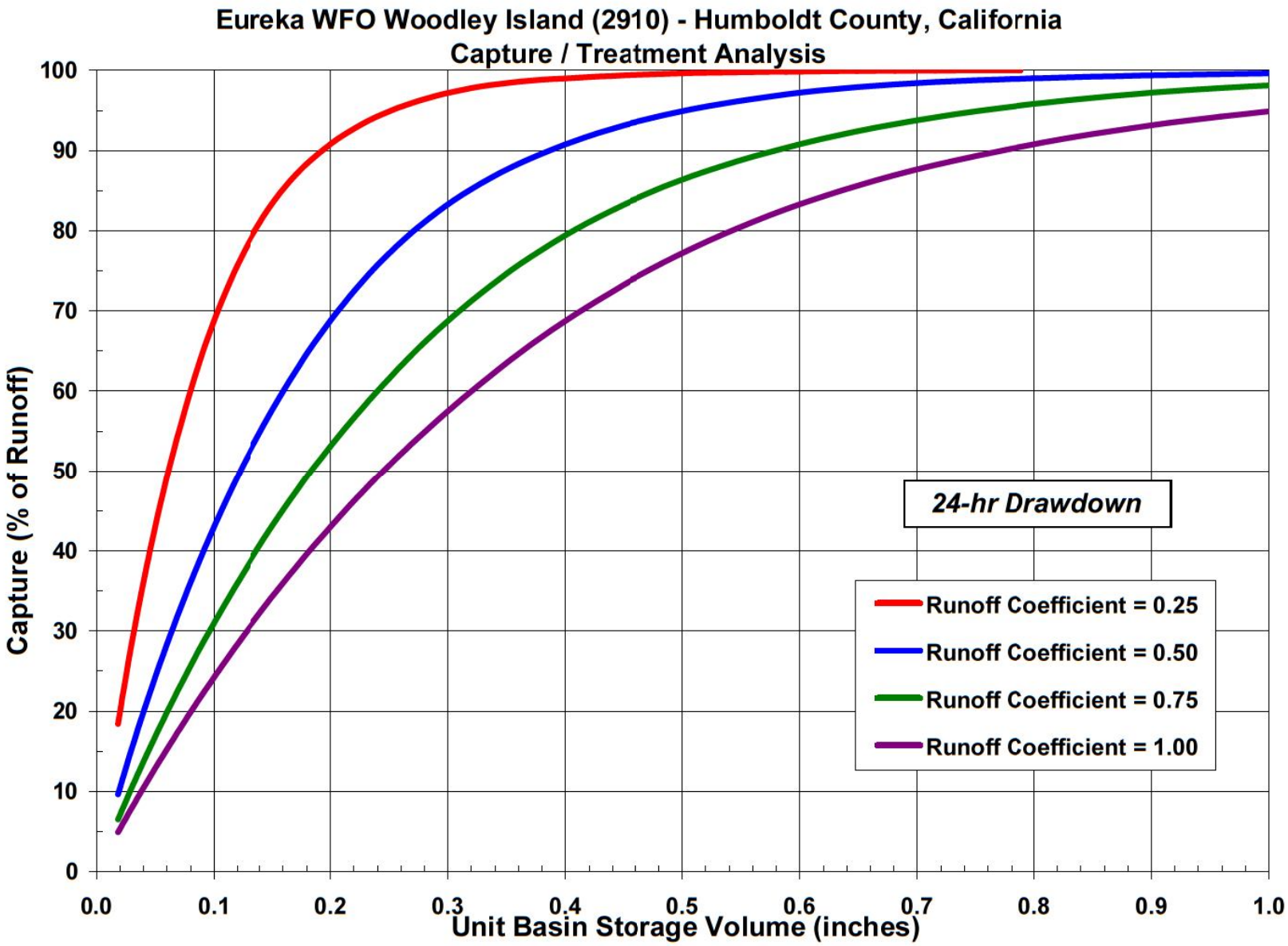
Eureka WFO Woodley Island (2910) - Humboldt County, California
Capture / Treatment Analysis
Capture (% of Runoff)
Unit Basin Storage Volume (inches)
0
10
20
30
40
50
60
70
80
90
100
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
24-hr Drawdown
Runoff Coefficient = 0.25
Runoff Coefficient = 0.50
Runoff Coefficient = 0.75
Runoff Coefficient = 1.00

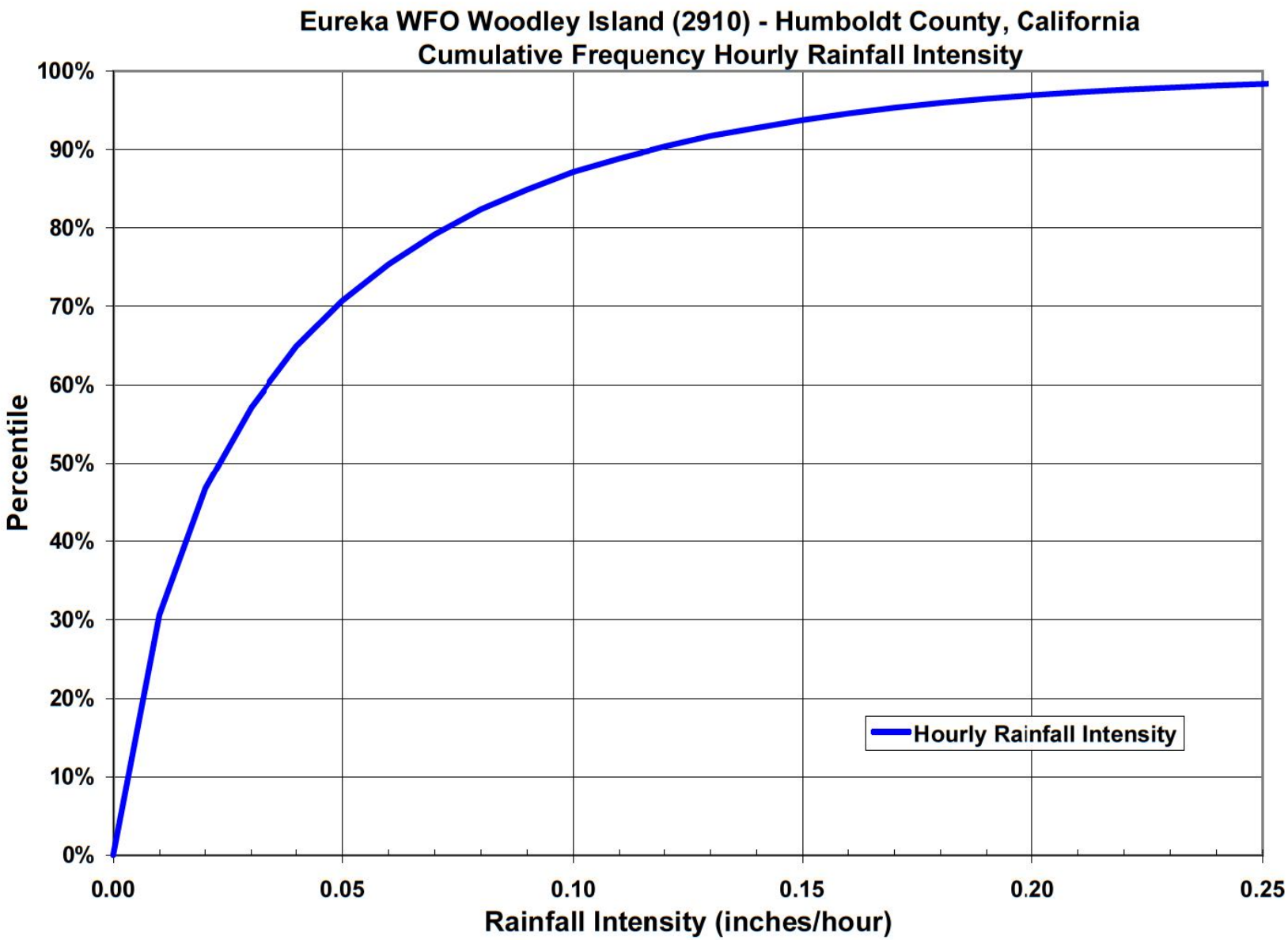
Eureka WFO Woodley Island (2910) - Humboldt County, California
Cumulative Frequency Hourly Rainfall Intensity
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Percentile
0.00
0.05
0.10
0.15
0.20
0.25
Rainfall Intensity (inches/hour)
Hourly Rainfall Intensity

013464

013465

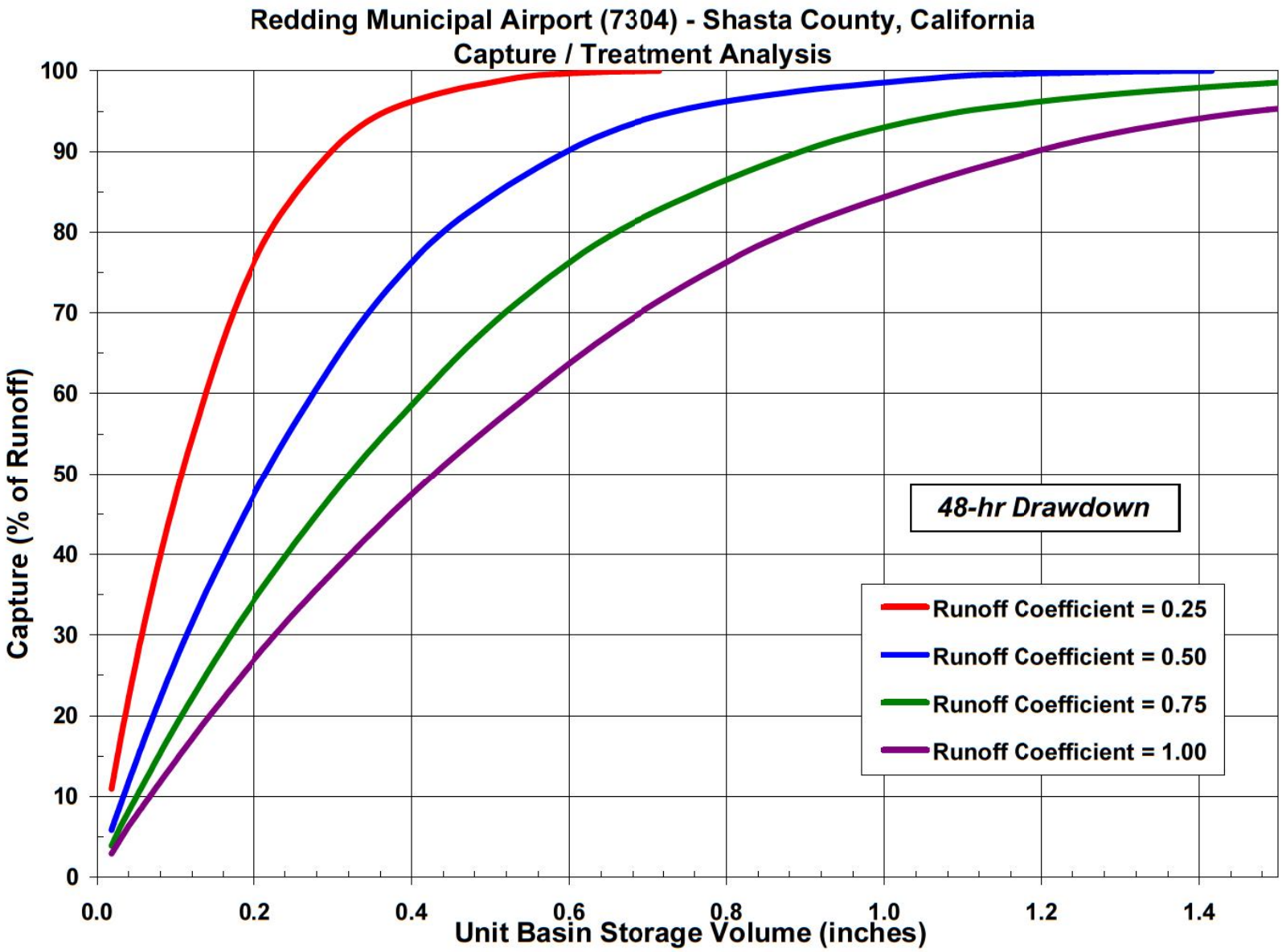
Redding Municipal Airport (7304) - Shasta County, California
Capture / Treatment Analysis
Capture (% of Runoff)
Unit Basin Storage Volume (inches)
0
10
20
30
40
50
60
70
80
90
100
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
48-hr Drawdown
Runoff Coefficient = 0.25
Runoff Coefficient = 0.50
Runoff Coefficient = 0.75
Runoff Coefficient = 1.00

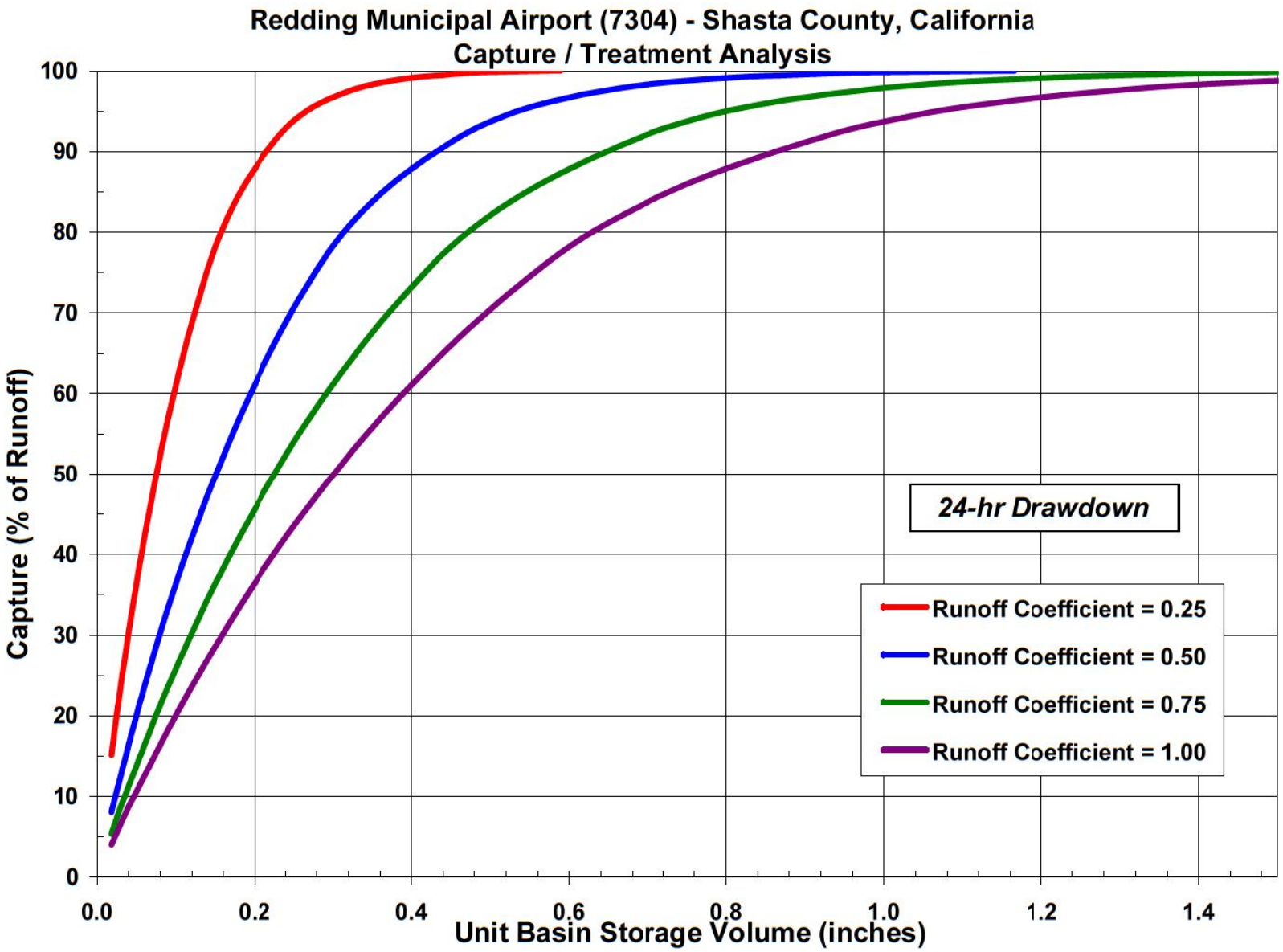
Redding Municipal Airport (7304) - Shasta County, California
Capture / Treatment Analysis
Capture (% of Runoff)
Unit Basin Storage Volume (inches)
0
10
20
30
40
50
60
70
80
90
100
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
24-hr Drawdown
Runoff Coefficient = 0.25
Runoff Coefficient = 0.50
Runoff Coefficient = 0.75
Runoff Coefficient = 1.00

013466

013467

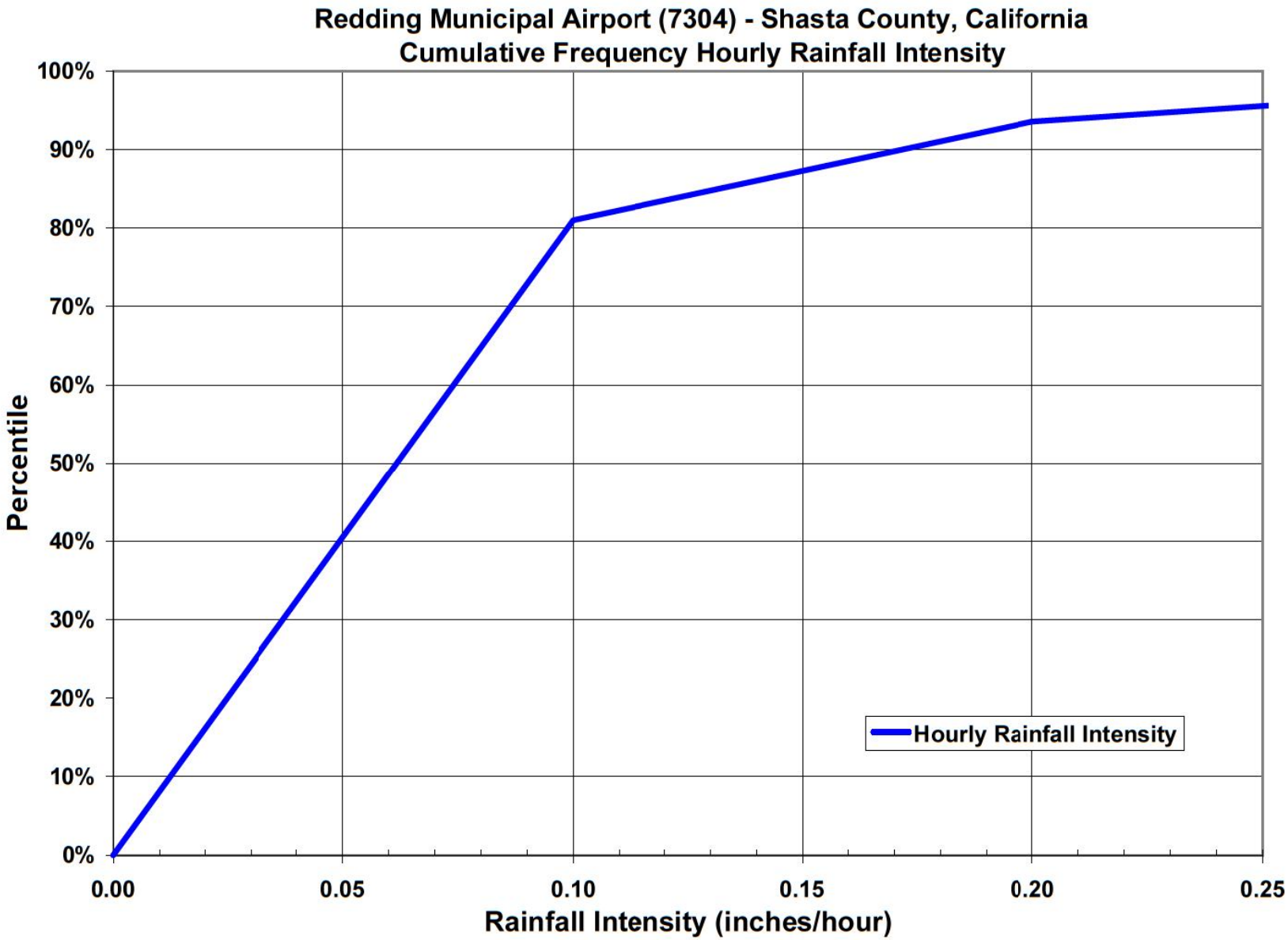
Redding Municipal Airport (7304) - Shasta County, California
Cumulative Frequency Hourly Rainfall Intensity
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Percentile
0.00
0.05
0.10
0.15
0.20
0.25
Rainfall Intensity (inches/hour)
Hourly Rainfall Intensity

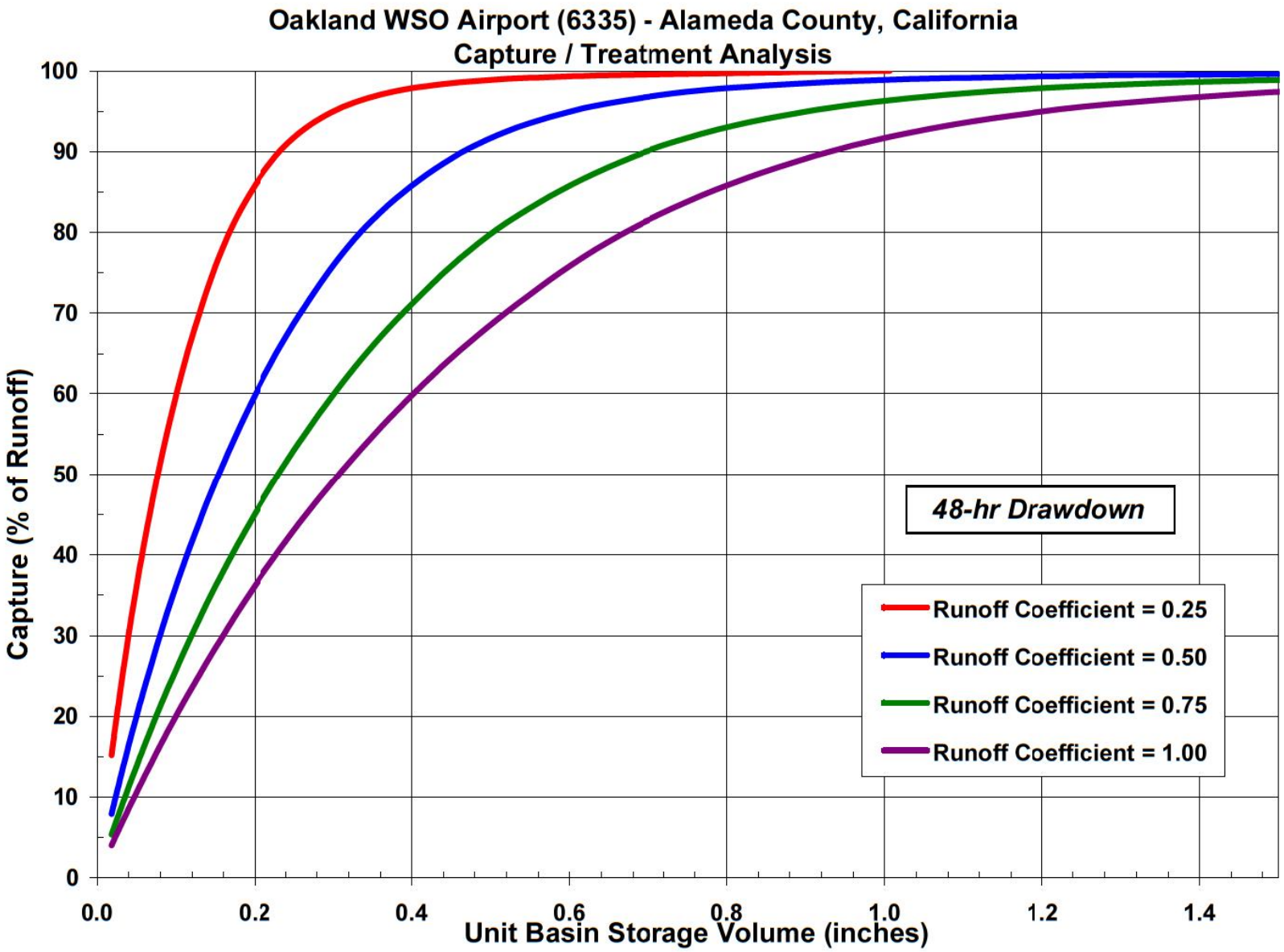
Oakland WSO Airport (6335) - Alameda County, California
Capture / Treatment Analysis
Capture (% of Runoff)
Unit Basin Storage Volume (inches)
0
10
20
30
40
50
60
70
80
90
100
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
48-hr Drawdown
Runoff Coefficient = 0.25
Runoff Coefficient = 0.50
Runoff Coefficient = 0.75
Runoff Coefficient = 1.00

013468

013469

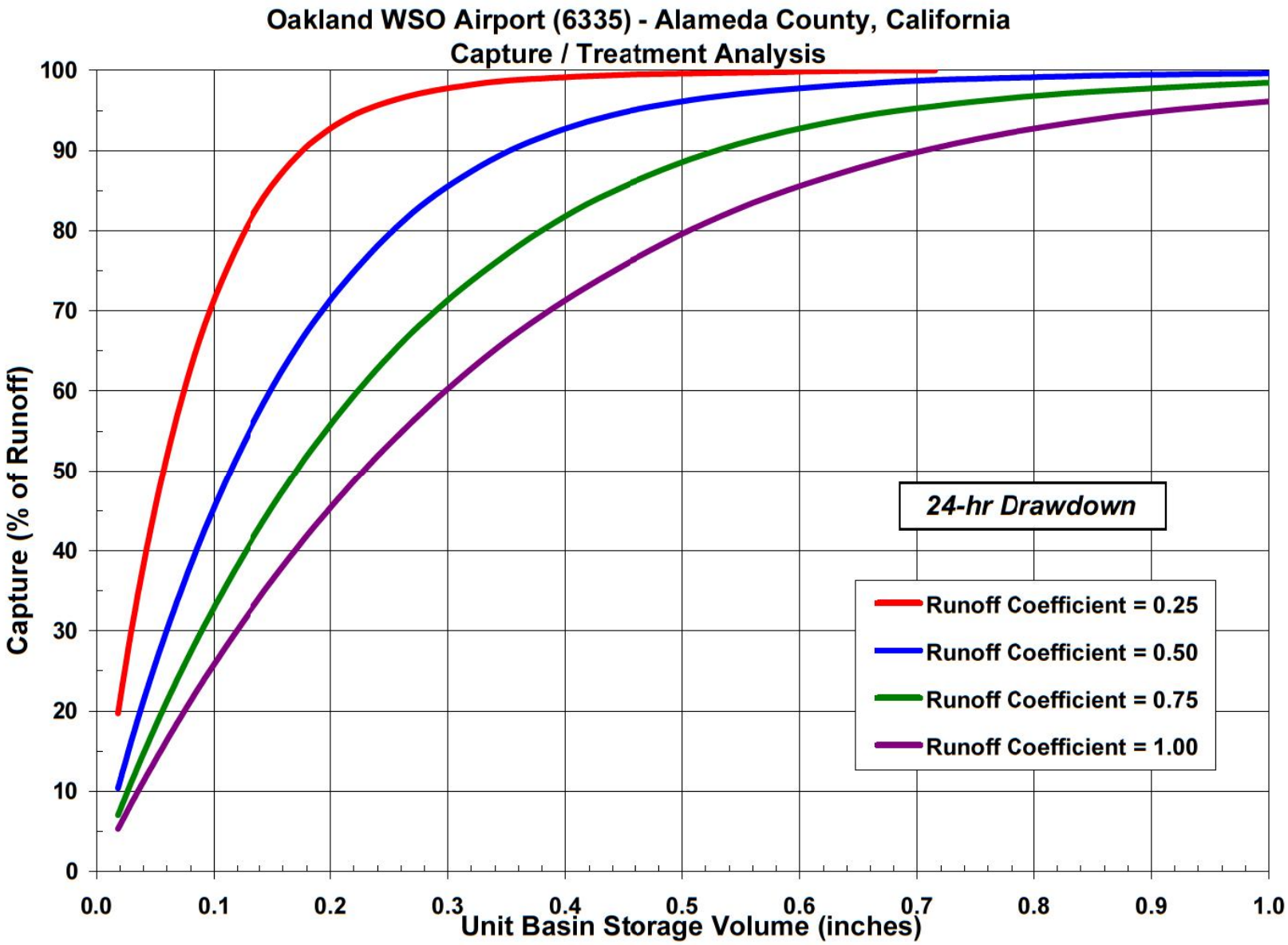
Oakland WSO Airport (6335) - Alameda County, California
Capture / Treatment Analysis
Capture (% of Runoff)
Unit Basin Storage Volume (inches)
0
10
20
30
40
50
60
70
80
90
100
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
24-hr Drawdown
Runoff Coefficient = 0.25
Runoff Coefficient = 0.50
Runoff Coefficient = 0.75
Runoff Coefficient = 1.00

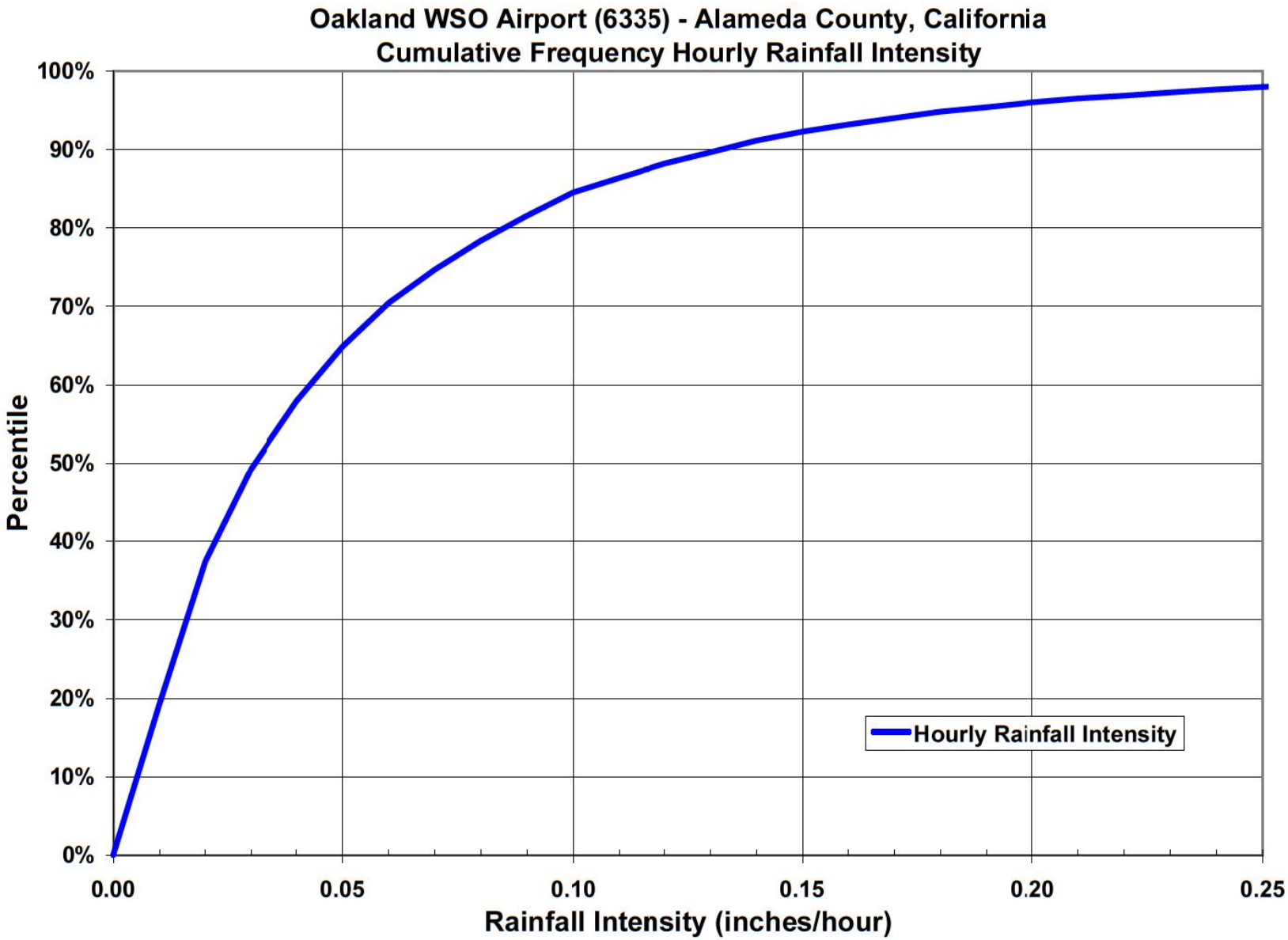
Oakland WSO Airport (6335) - Alameda County, California
Cumulative Frequency Hourly Rainfall Intensity
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Percentile
0.00
0.05
0.10
0.15
0.20
0.25
Rainfall Intensity (inches/hour)
Hourly Rainfall Intensity

013470

013471

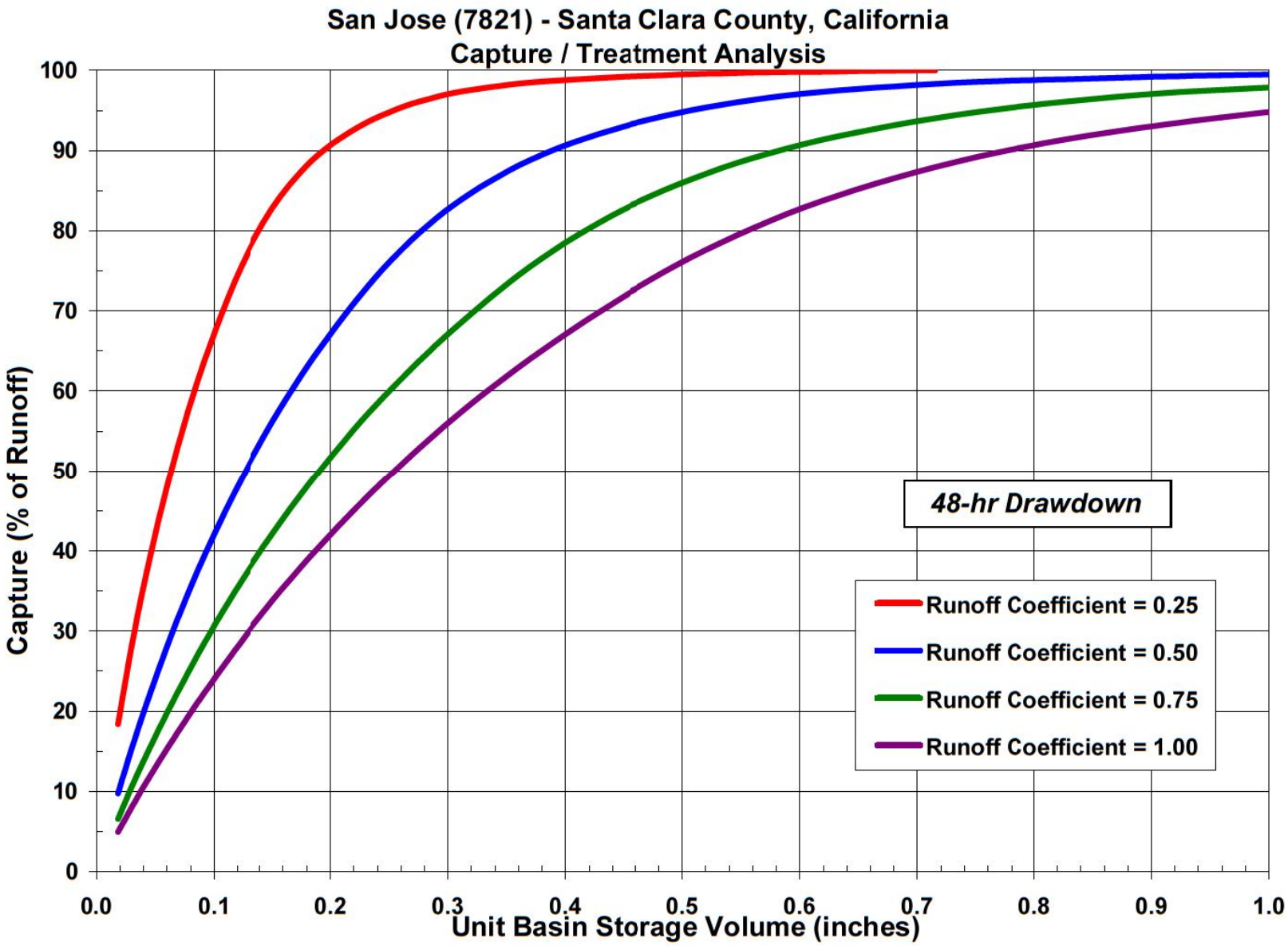
San Jose (7821) - Santa Clara County, California
Capture / Treatment Analysis
Capture (% of Runoff)
Unit Basin Storage Volume (inches)
0
10
20
30
40
50
60
70
80
90
100
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
48-hr Drawdown
Runoff Coefficient = 0.25
Runoff Coefficient = 0.50
Runoff Coefficient = 0.75
Runoff Coefficient = 1.00

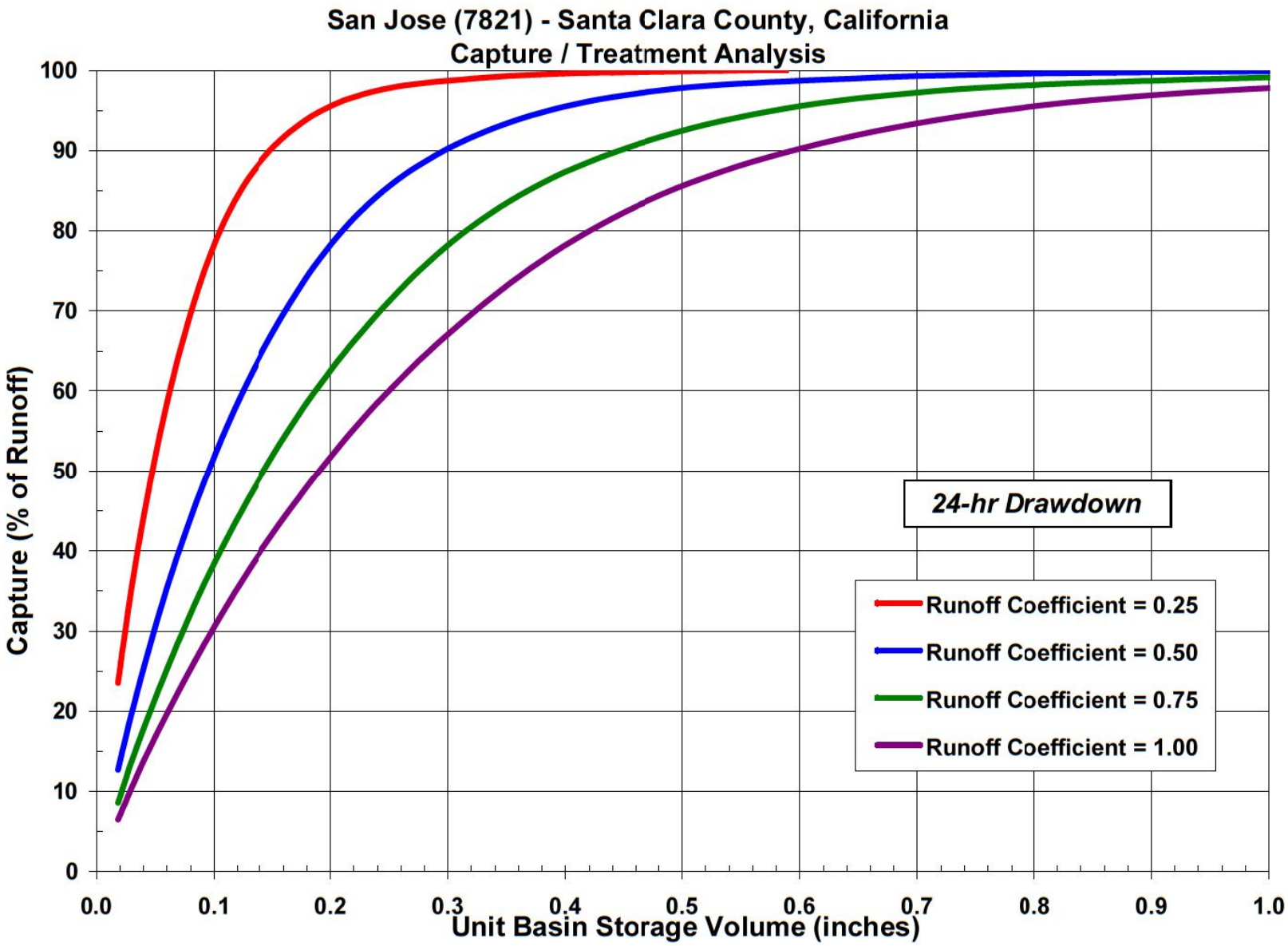
San Jose (7821) - Santa Clara County, California
Capture / Treatment Analysis
Capture (% of Runoff)
Unit Basin Storage Volume (inches)
0
10
20
30
40
50
60
70
80
90
100
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
24-hr Drawdown
Runoff Coefficient = 0.25
Runoff Coefficient = 0.50
Runoff Coefficient = 0.75
Runoff Coefficient = 1.00

013472

013473

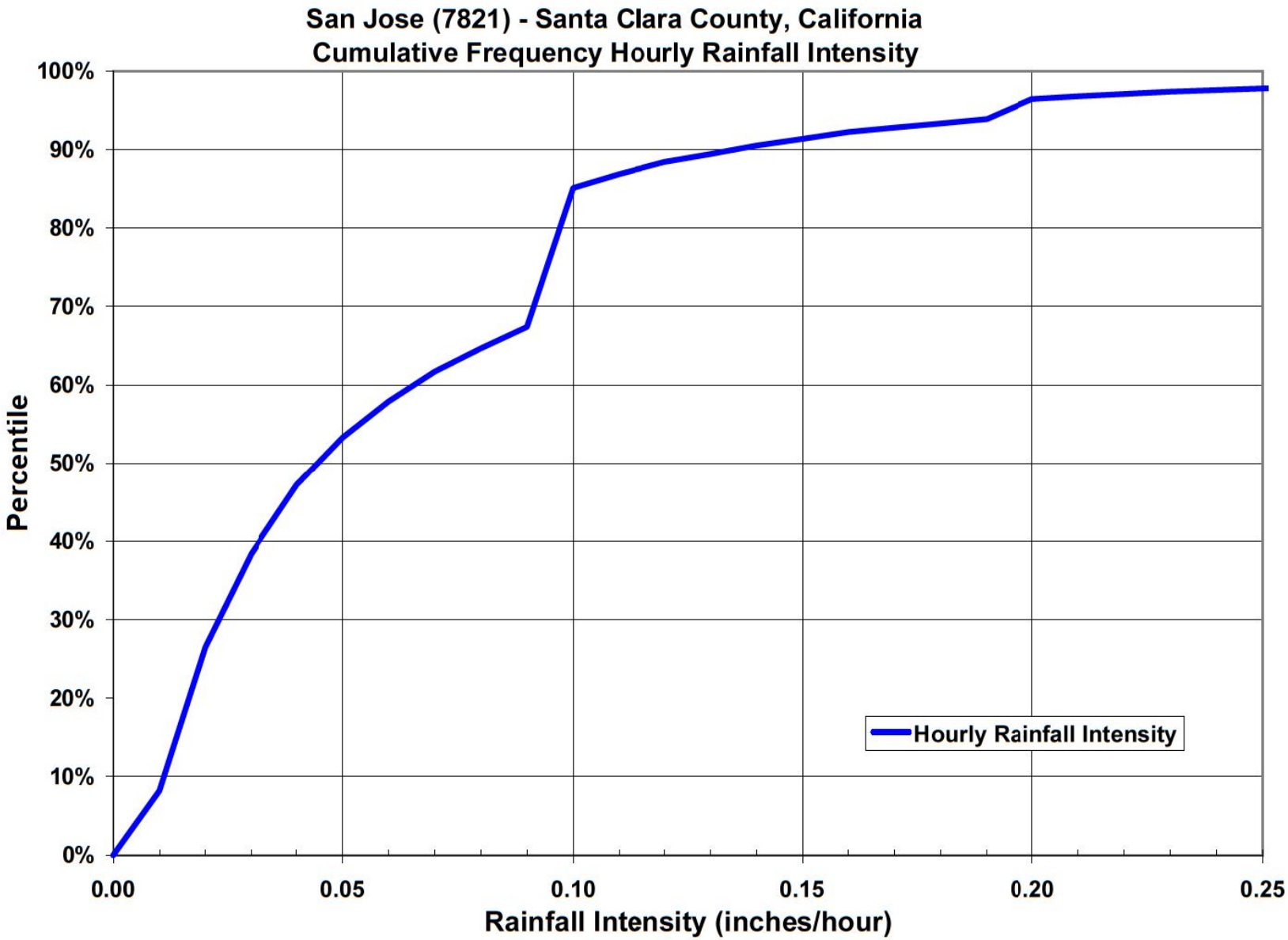
San Jose (7821) - Santa Clara County, California
Cumulative Frequency Hourly Rainfall Intensity
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Percentile
0.00
0.05
0.10
0.15
0.20
0.25
Rainfall Intensity (inches/hour)
Hourly Rainfall Intensity

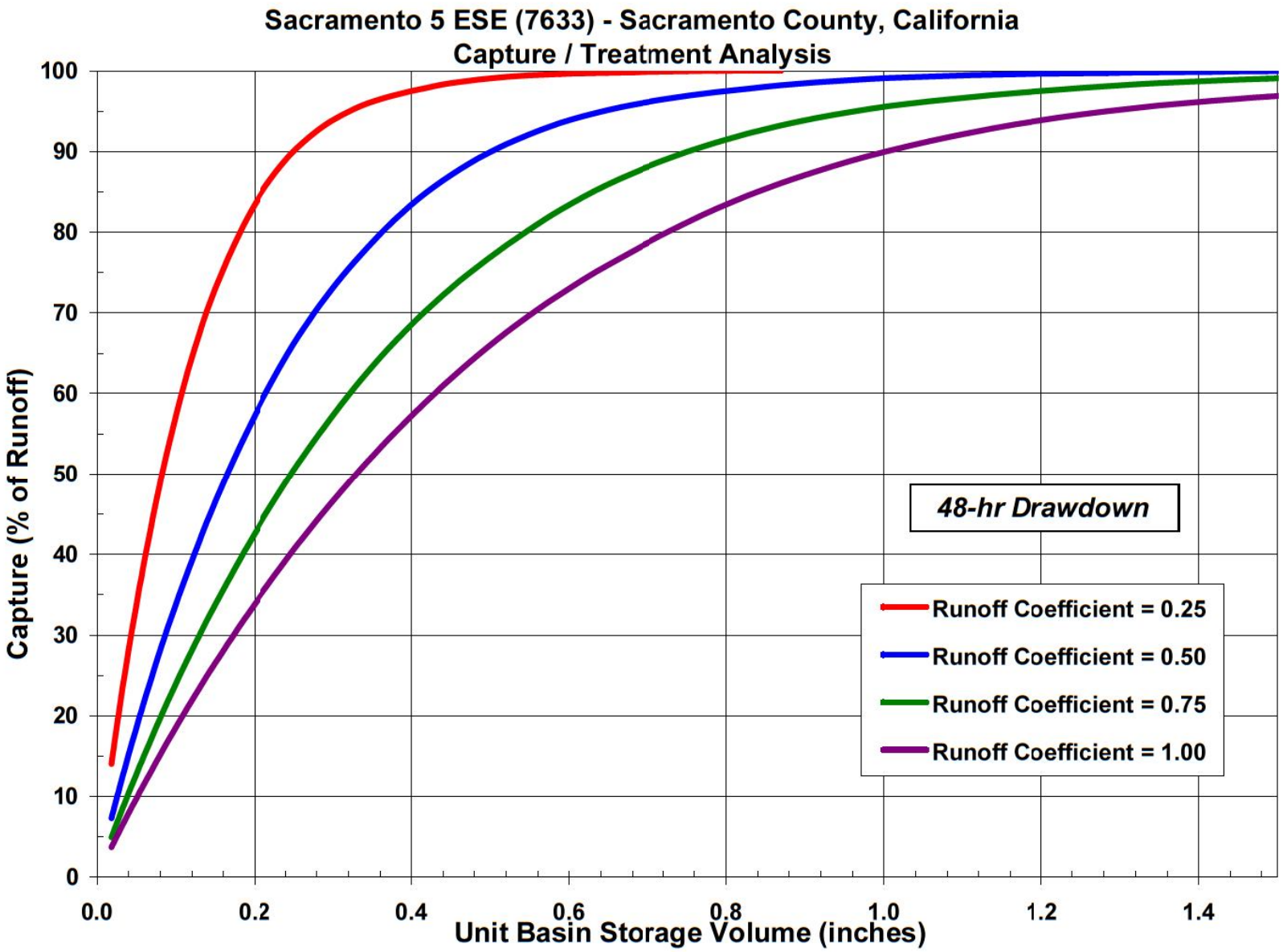
Sacramento 5 ESE (7633) - Sacramento County, California
Capture / Treatment Analysis
Capture (% of Runoff)
Unit Basin Storage Volume (inches)
0
10
20
30
40
50
60
70
80
90
100
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
48-hr Drawdown
Runoff Coefficient = 0.25
Runoff Coefficient = 0.50
Runoff Coefficient = 0.75
Runoff Coefficient = 1.00

013474

013475

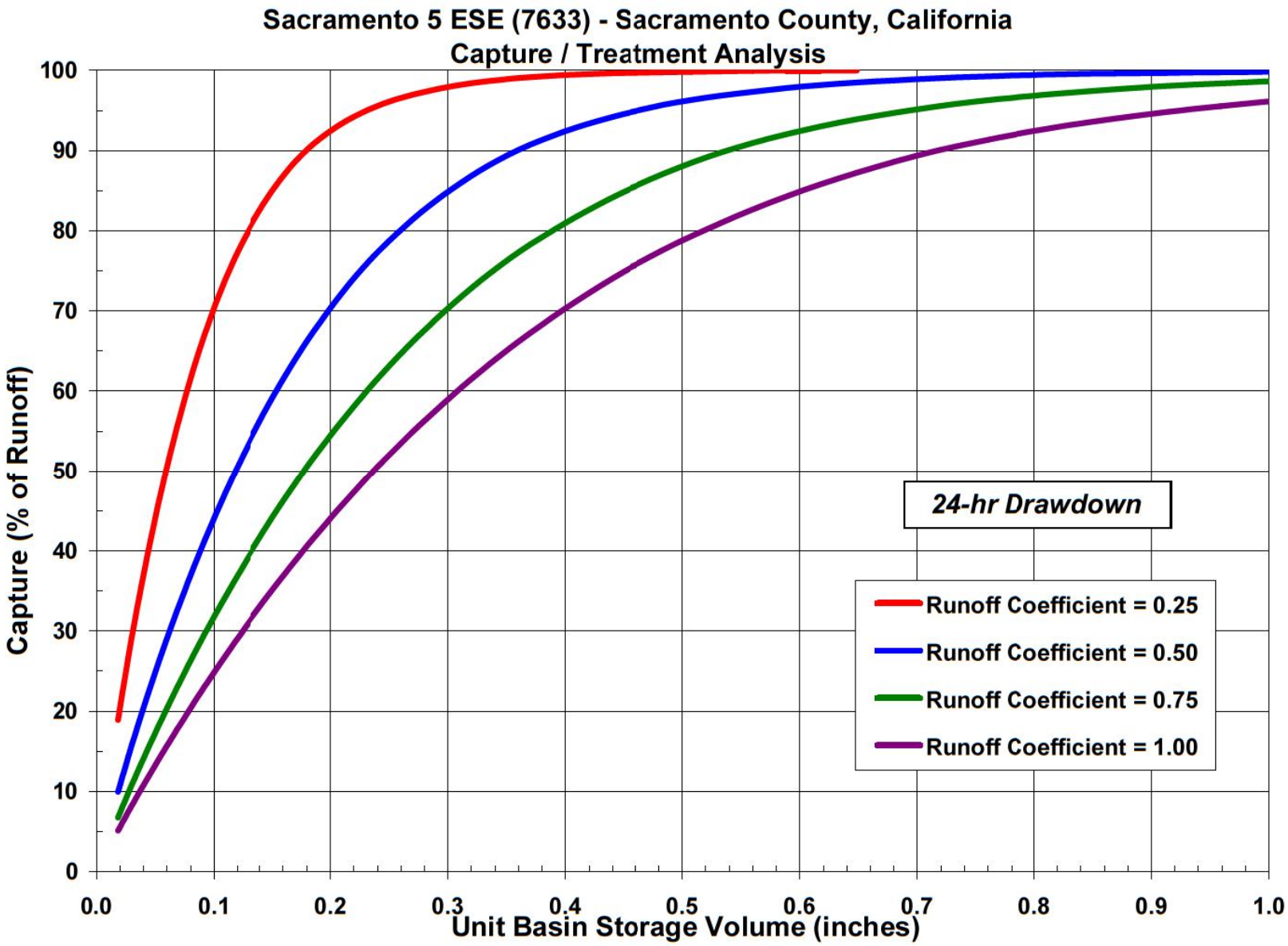
Sacramento 5 ESE (7633) - Sacramento County, California
Capture / Treatment Analysis
Capture (% of Runoff)
Unit Basin Storage Volume (inches)
0
10
20
30
40
50
60
70
80
90
100
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
24-hr Drawdown
Runoff Coefficient = 0.25
Runoff Coefficient = 0.50
Runoff Coefficient = 0.75
Runoff Coefficient = 1.00

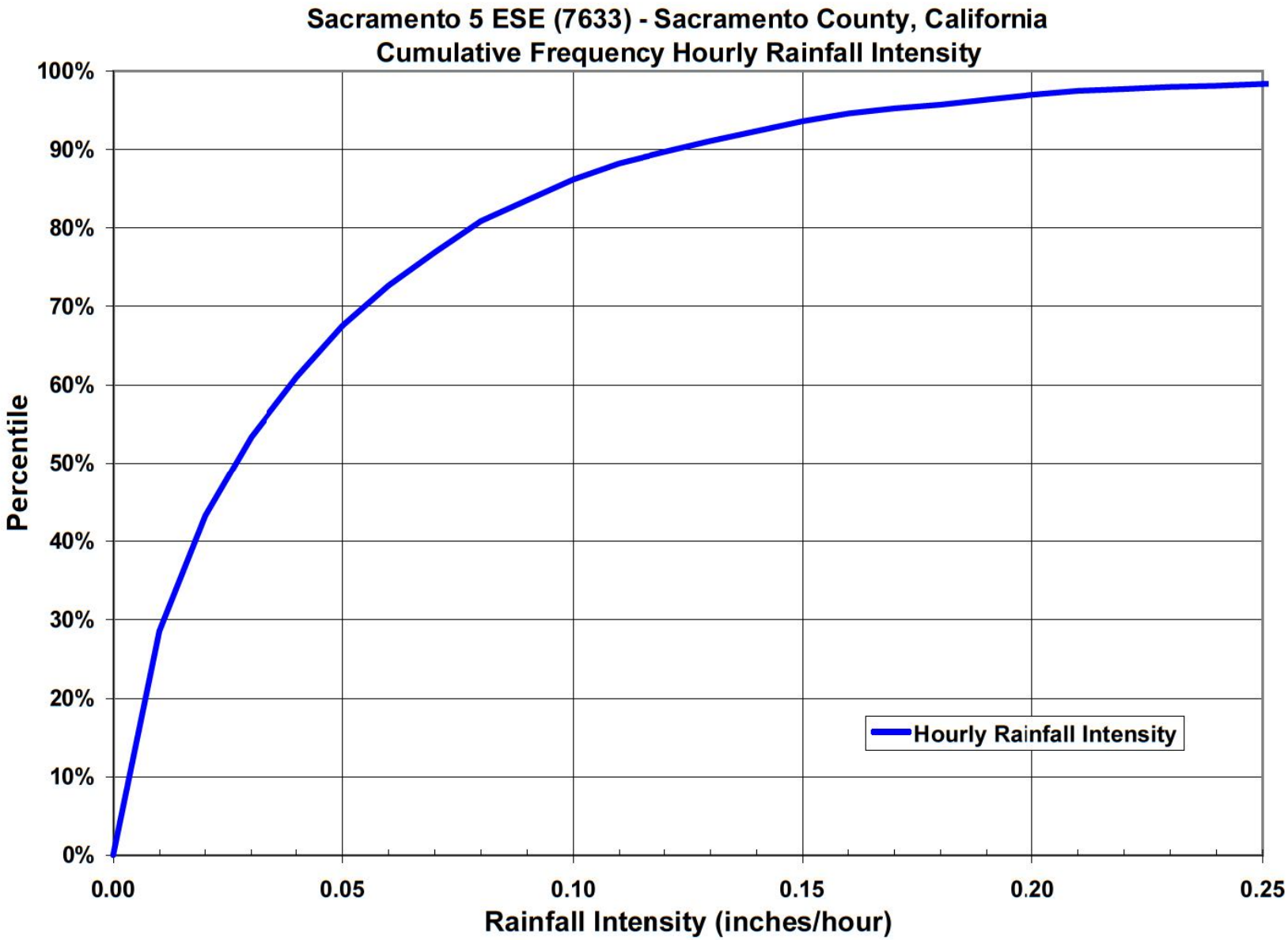
Sacramento 5 ESE (7633) - Sacramento County, California
Cumulative Frequency Hourly Rainfall Intensity
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Percentile
0.00
0.05
0.10
0.15
0.20
0.25
Rainfall Intensity (inches/hour)
Hourly Rainfall Intensity

013476

013477

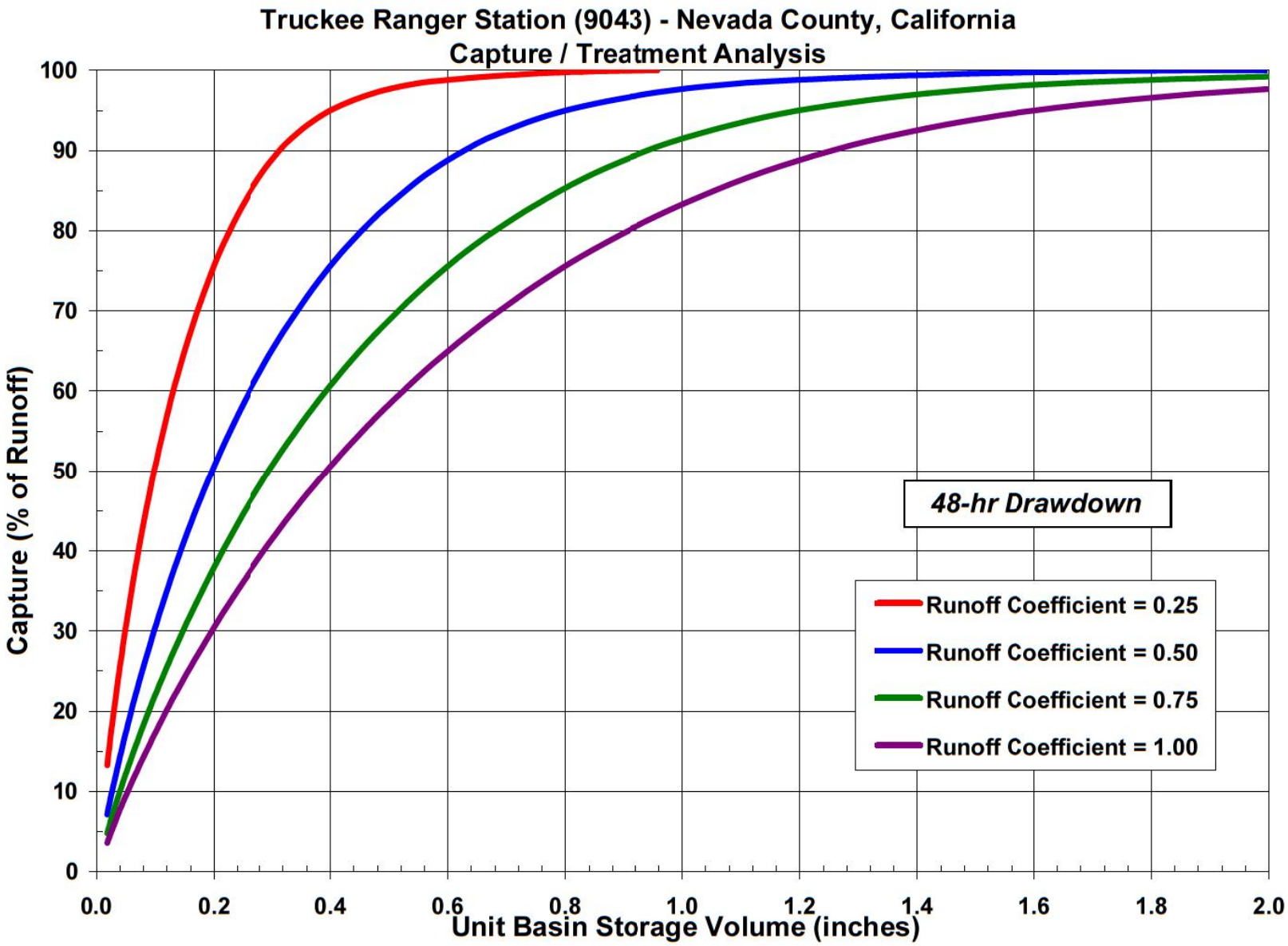
Truckee Ranger Station (9043) - Nevada County, California
Capture / Treatment Analysis
Capture (% of Runoff)
Unit Basin Storage Volume (inches)
0
10
20
30
40
50
60
70
80
90
100
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6
1.8
2.0
48-hr Drawdown
Runoff Coefficient = 0.25
Runoff Coefficient = 0.50
Runoff Coefficient = 0.75
Runoff Coefficient = 1.00

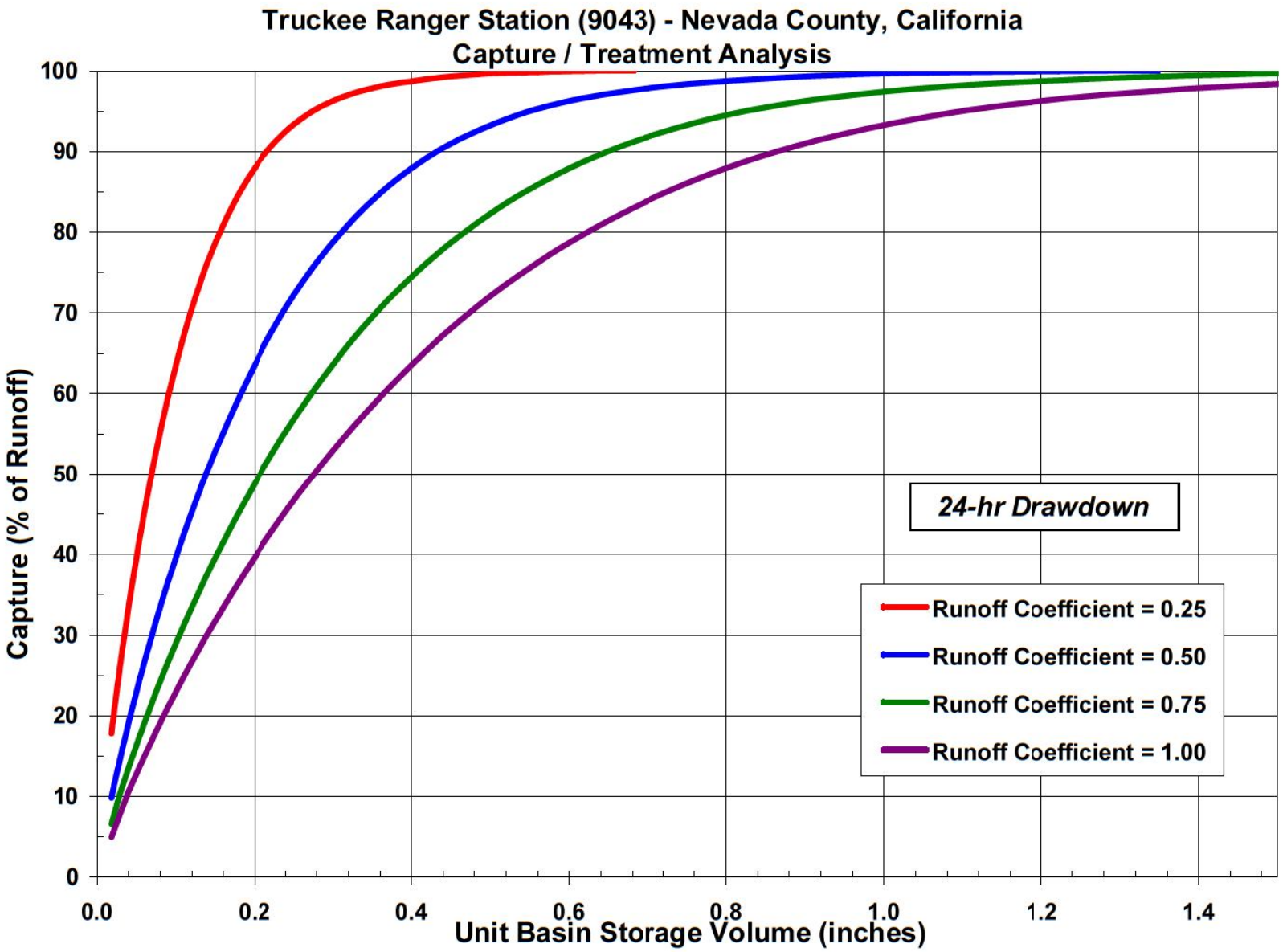
Truckee Ranger Station (9043) - Nevada County, California
Capture / Treatment Analysis
Capture (% of Runoff)
Unit Basin Storage Volume (inches)
0
10
20
30
40
50
60
70
80
90
100
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
24-hr Drawdown
Runoff Coefficient = 0.25
Runoff Coefficient = 0.50
Runoff Coefficient = 0.75
Runoff Coefficient = 1.00

013478

013479

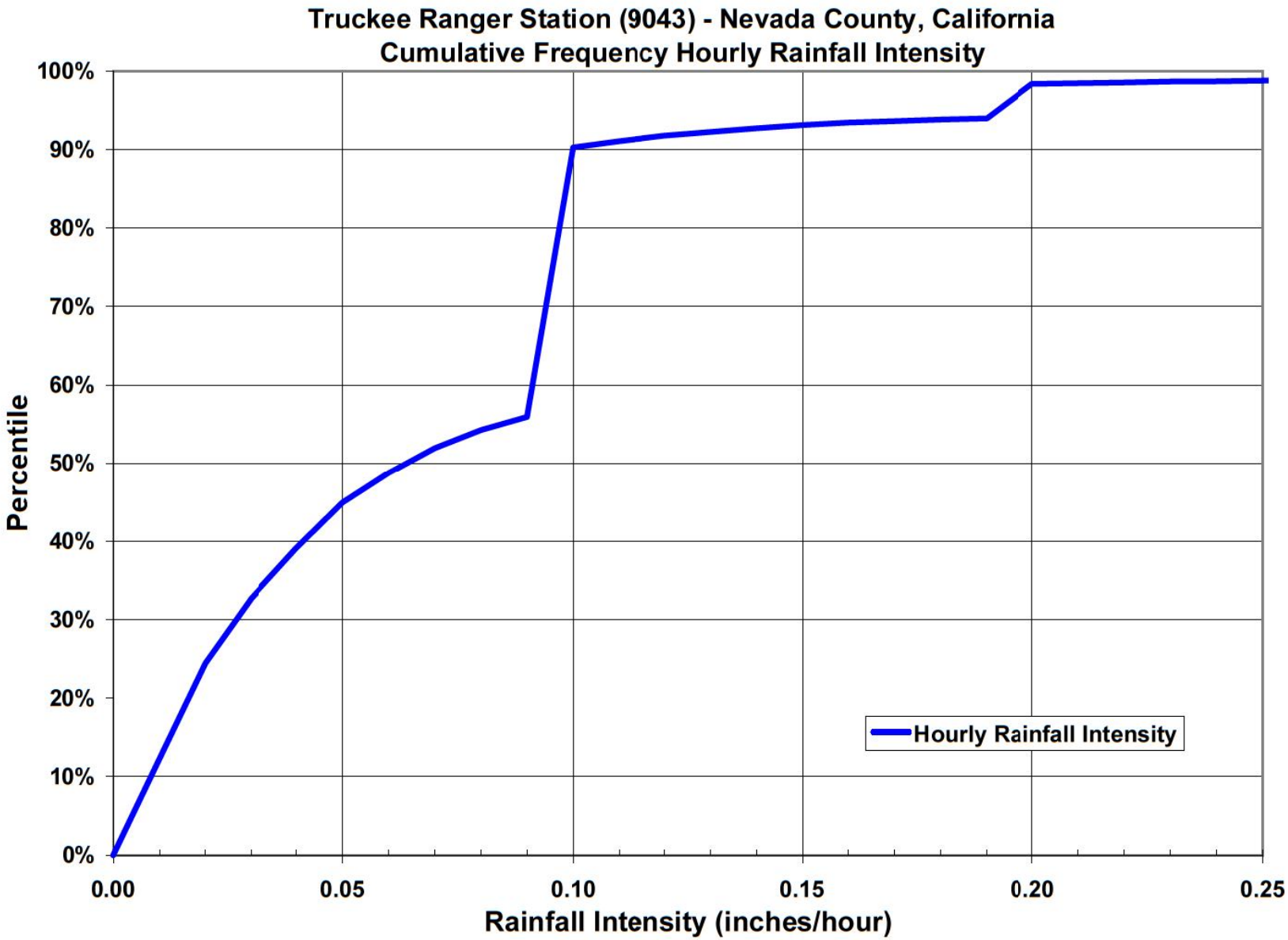
Truckee Ranger Station (9043) - Nevada County, California
Cumulative Frequency Hourly Rainfall Intensity
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Percentile
0.00
0.05
0.10
0.15
0.20
0.25
Rainfall Intensity (inches/hour)
Hourly Rainfall Intensity

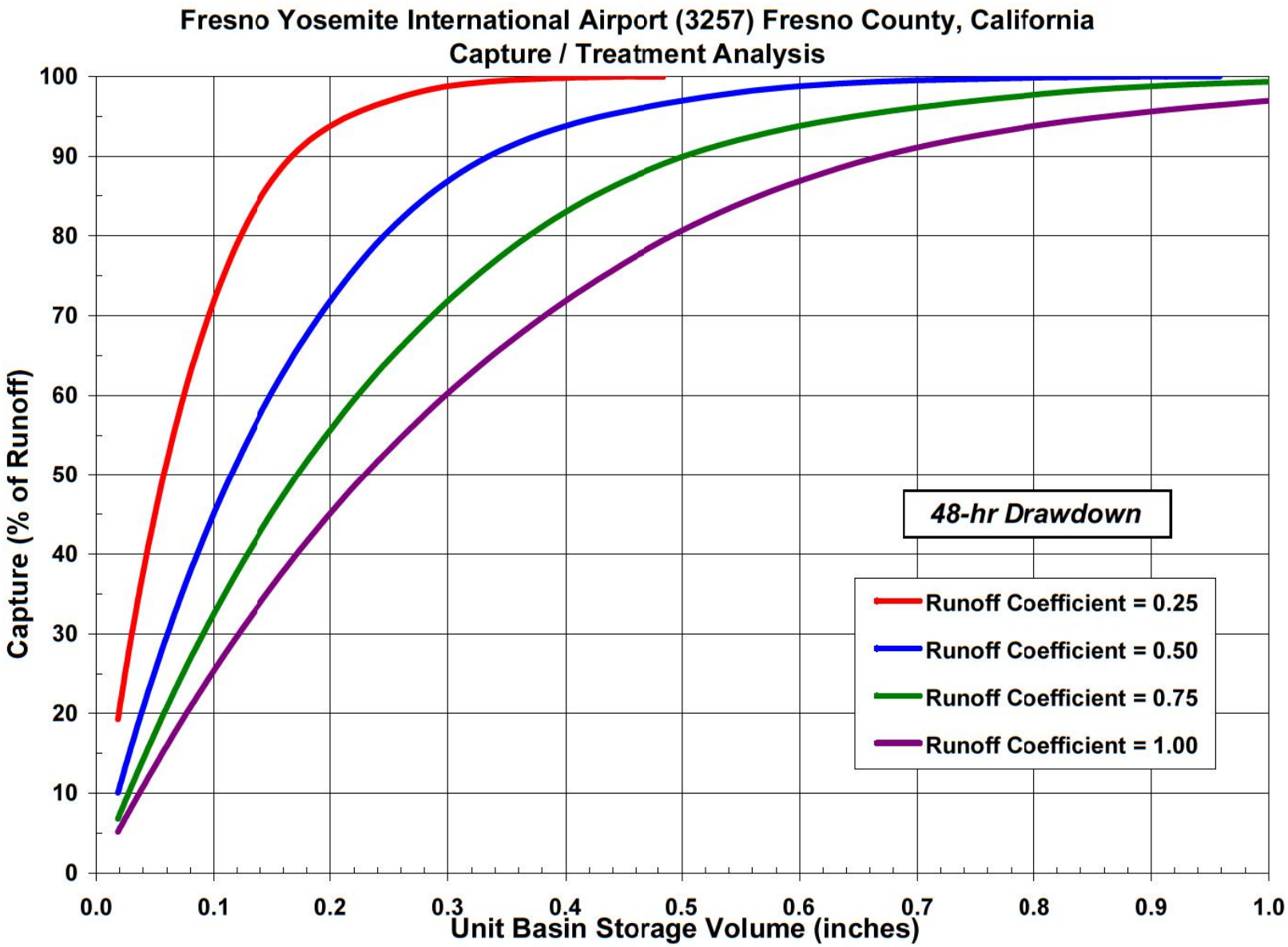
Fresno Yosemite International Airport (3257) Fresno County, California
Capture / Treatment Analysis
Capture (% of Runoff)
Unit Basin Storage Volume (inches)
0
10
20
30
40
50
60
70
80
90
100
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
48-hr Drawdown
Runoff Coefficient = 0.25
Runoff Coefficient = 0.50
Runoff Coefficient = 0.75
Runoff Coefficient = 1.00

013480

013481

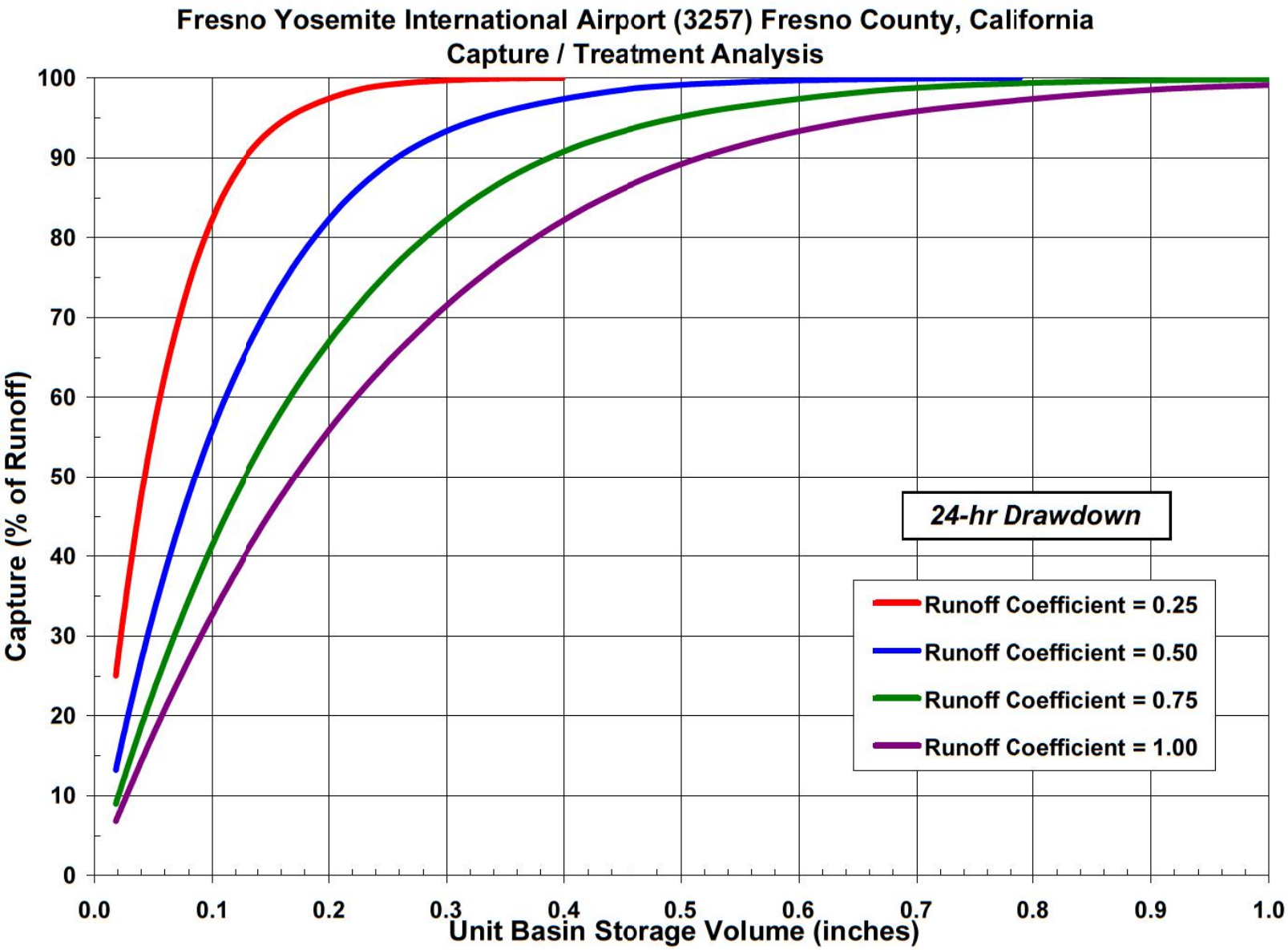
Fresno Yosemite International Airport (3257) Fresno County, California
Capture / Treatment Analysis
Capture (% of Runoff)
Unit Basin Storage Volume (inches)
0
10
20
30
40
50
60
70
80
90
100
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
24-hr Drawdown
Runoff Coefficient = 0.25
Runoff Coefficient = 0.50
Runoff Coefficient = 0.75
Runoff Coefficient = 1.00

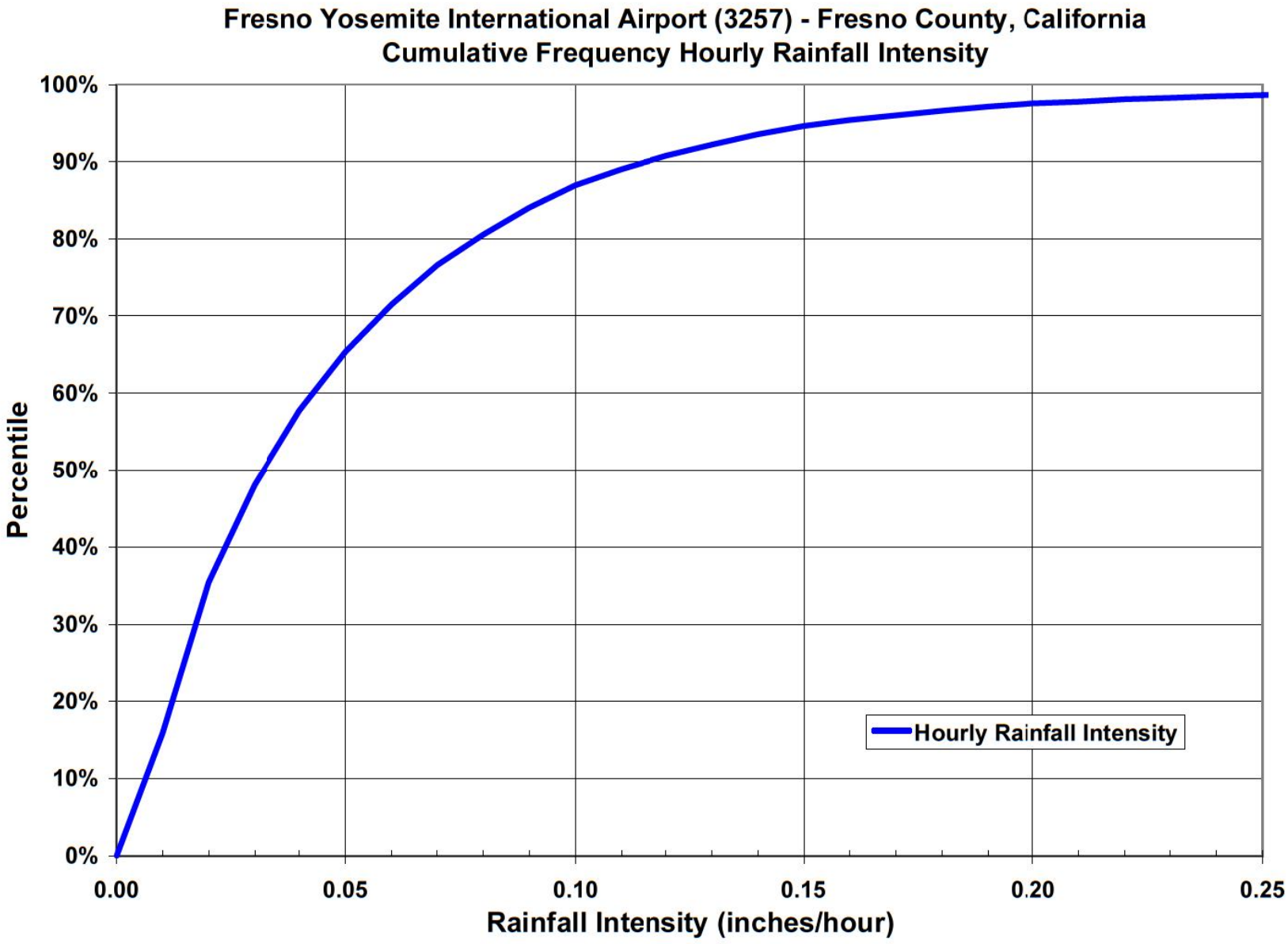
Fresno Yosemite International Airport (3257) - Fresno County, California
Cumulative Frequency Hourly Rainfall Intensity
Percentile
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
0.00
0.05
0.10
0.15
0.20
0.25
Rainfall Intensity (inches/hour)
Hourly Rainfall Intensity

013483

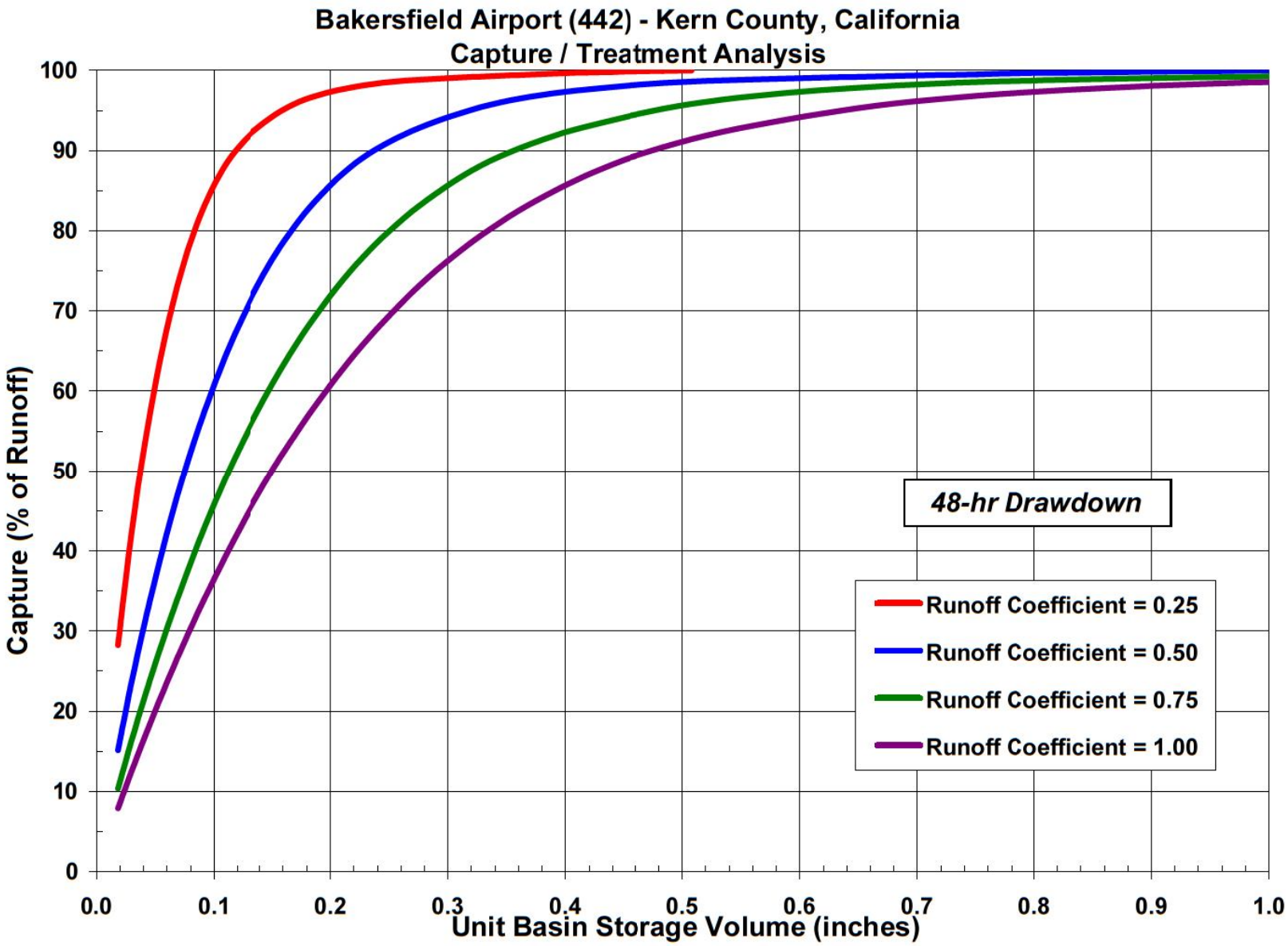
Bakersfield Airport (442) - Kern County, California
Capture / Treatment Analysis
Capture (% of Runoff)
Unit Basin Storage Volume (inches)
0
10
20
30
40
50
60
70
80
90
100
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
48-hr Drawdown
Runoff Coefficient = 0.25
Runoff Coefficient = 0.50
Runoff Coefficient = 0.75
Runoff Coefficient = 1.00

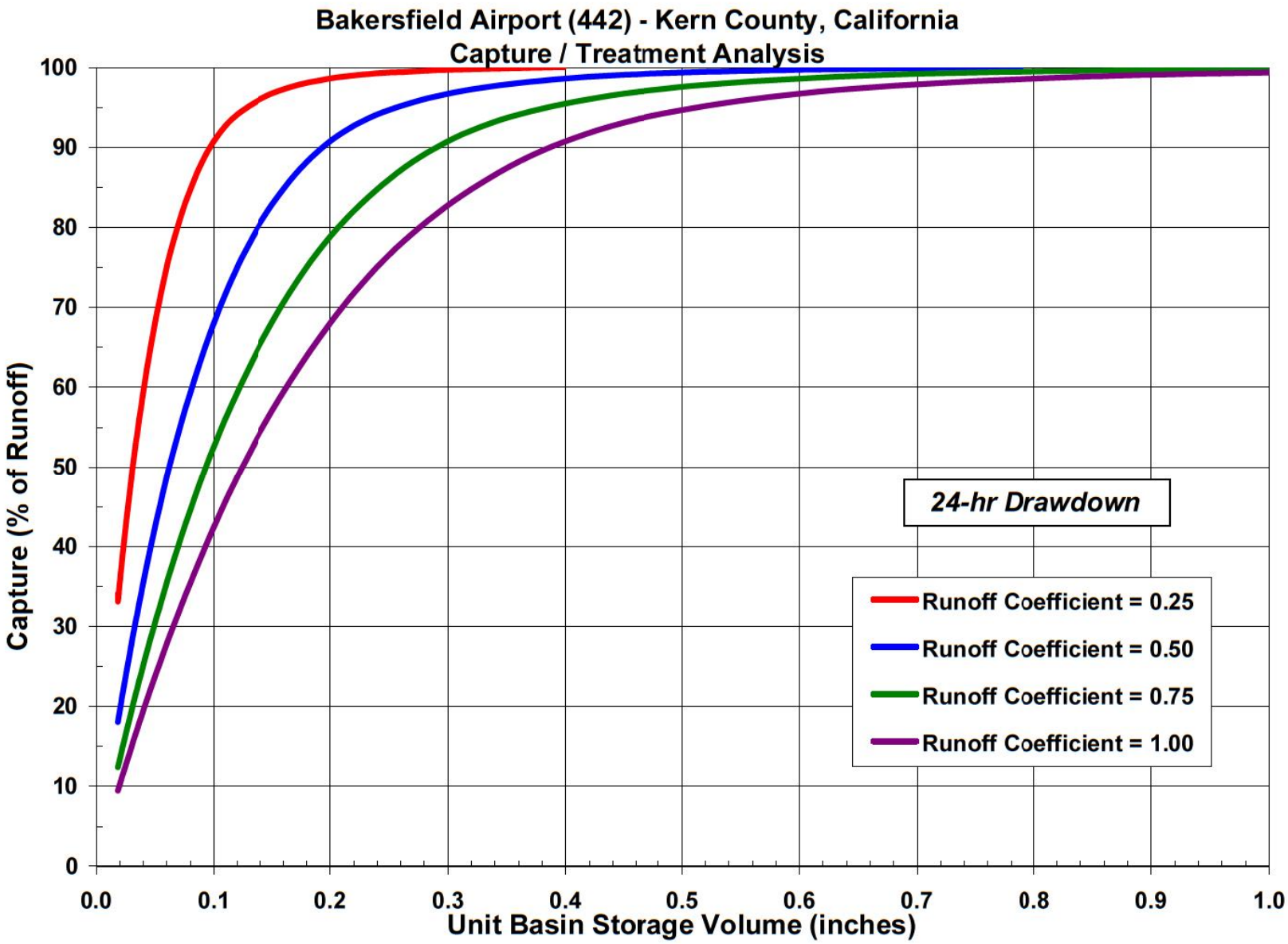
Bakersfield Airport (442) - Kern County, California
Capture / Treatment Analysis
Capture (% of Runoff)
Unit Basin Storage Volume (inches)
0
10
20
30
40
50
60
70
80
90
100
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
24-hr Drawdown
Runoff Coefficient = 0.25
Runoff Coefficient = 0.50
Runoff Coefficient = 0.75
Runoff Coefficient = 1.00

013485

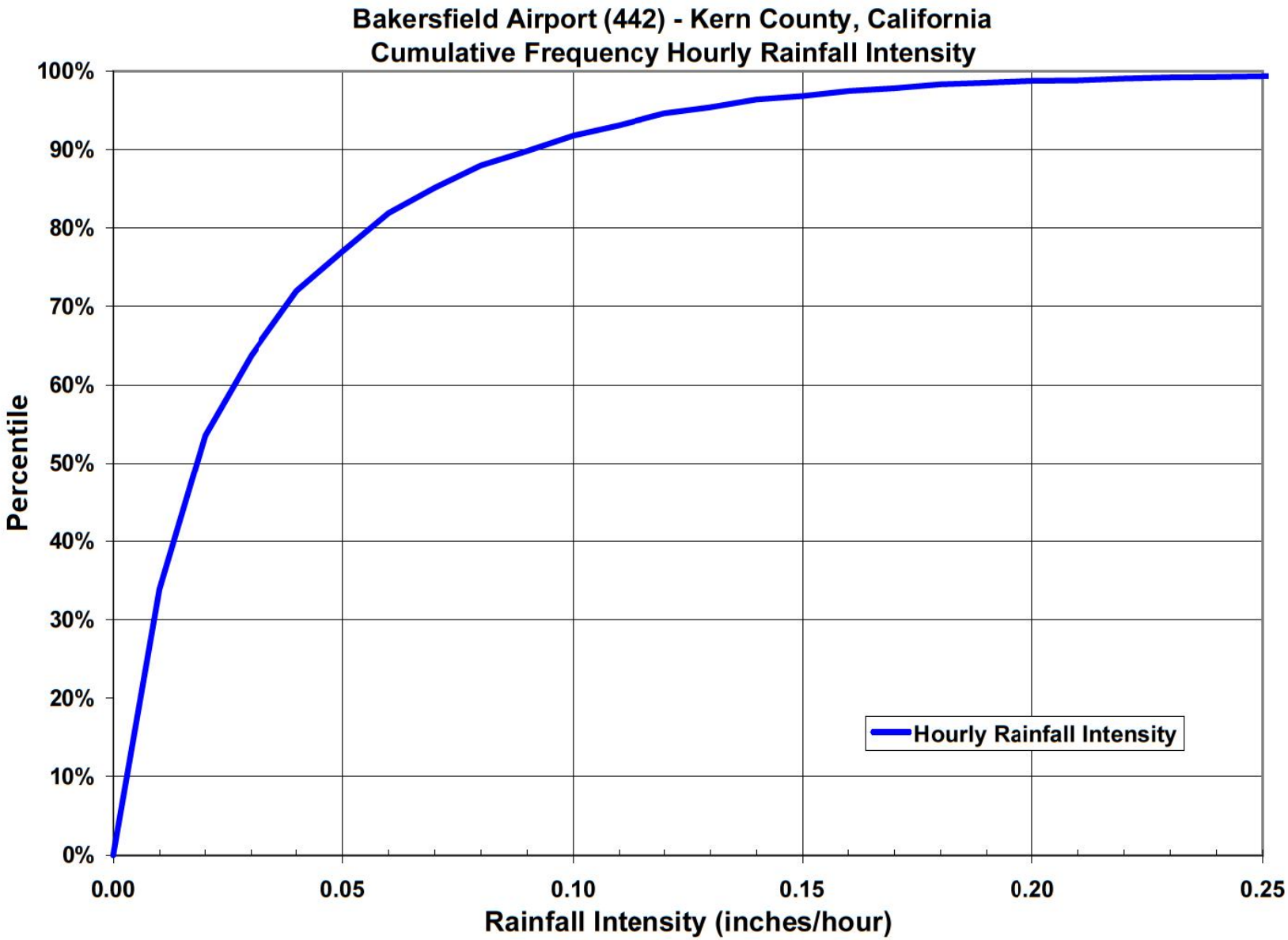
Bakersfield Airport (442) - Kern County, California
Cumulative Frequency Hourly Rainfall Intensity
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Percentile
0.00
0.05
0.10
0.15
0.20
0.25
Rainfall Intensity (inches/hour)
Hourly Rainfall Intensity

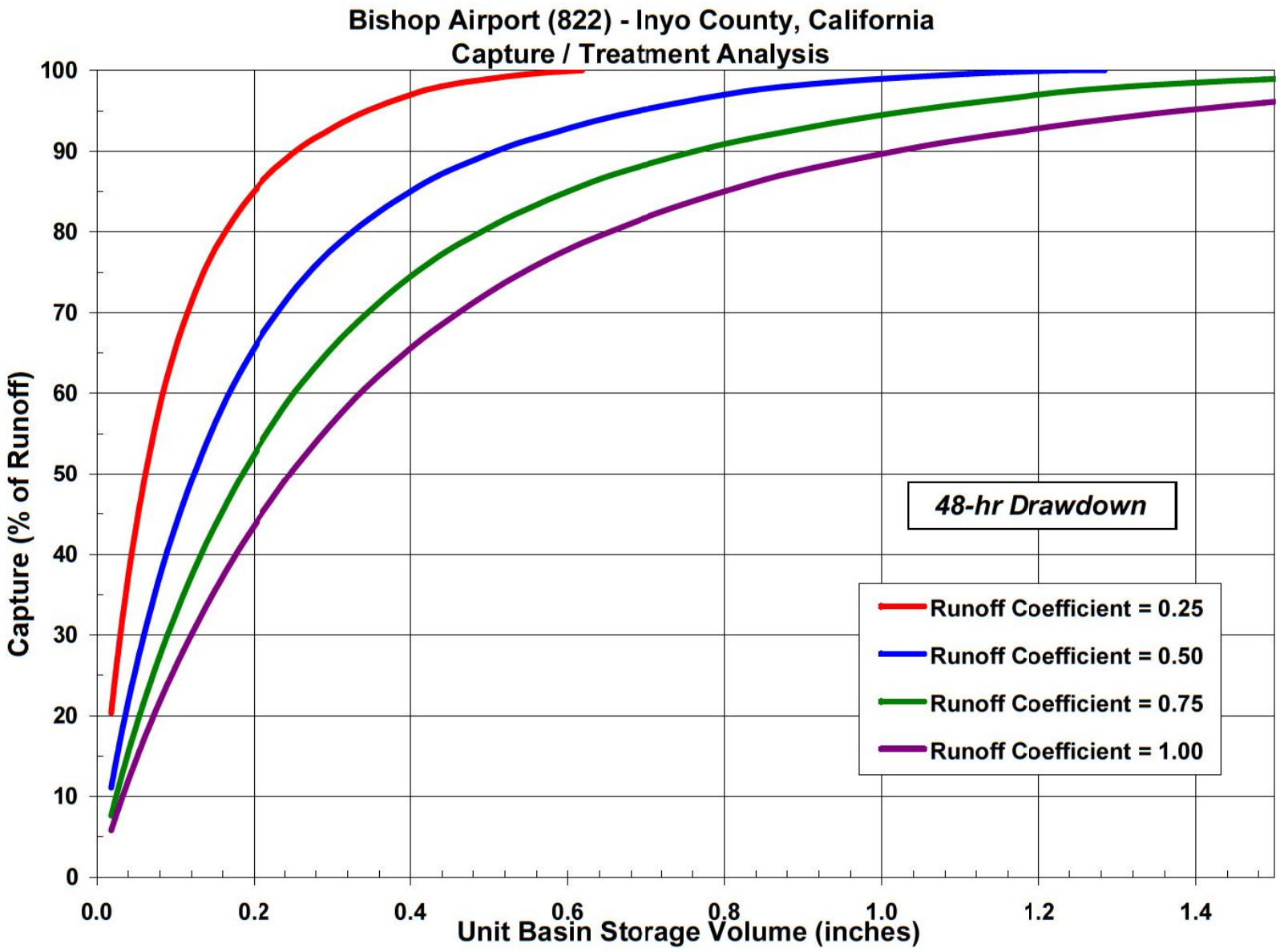
Bishop Airport (822) - Inyo County, California
Capture / Treatment Analysis
Capture (% of Runoff)
Unit Basin Storage Volume (inches)
0
10
20
30
40
50
60
70
80
90
100
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
48-hr Drawdown
Runoff Coefficient = 0.25
Runoff Coefficient = 0.50
Runoff Coefficient = 0.75
Runoff Coefficient = 1.00

013486

013487

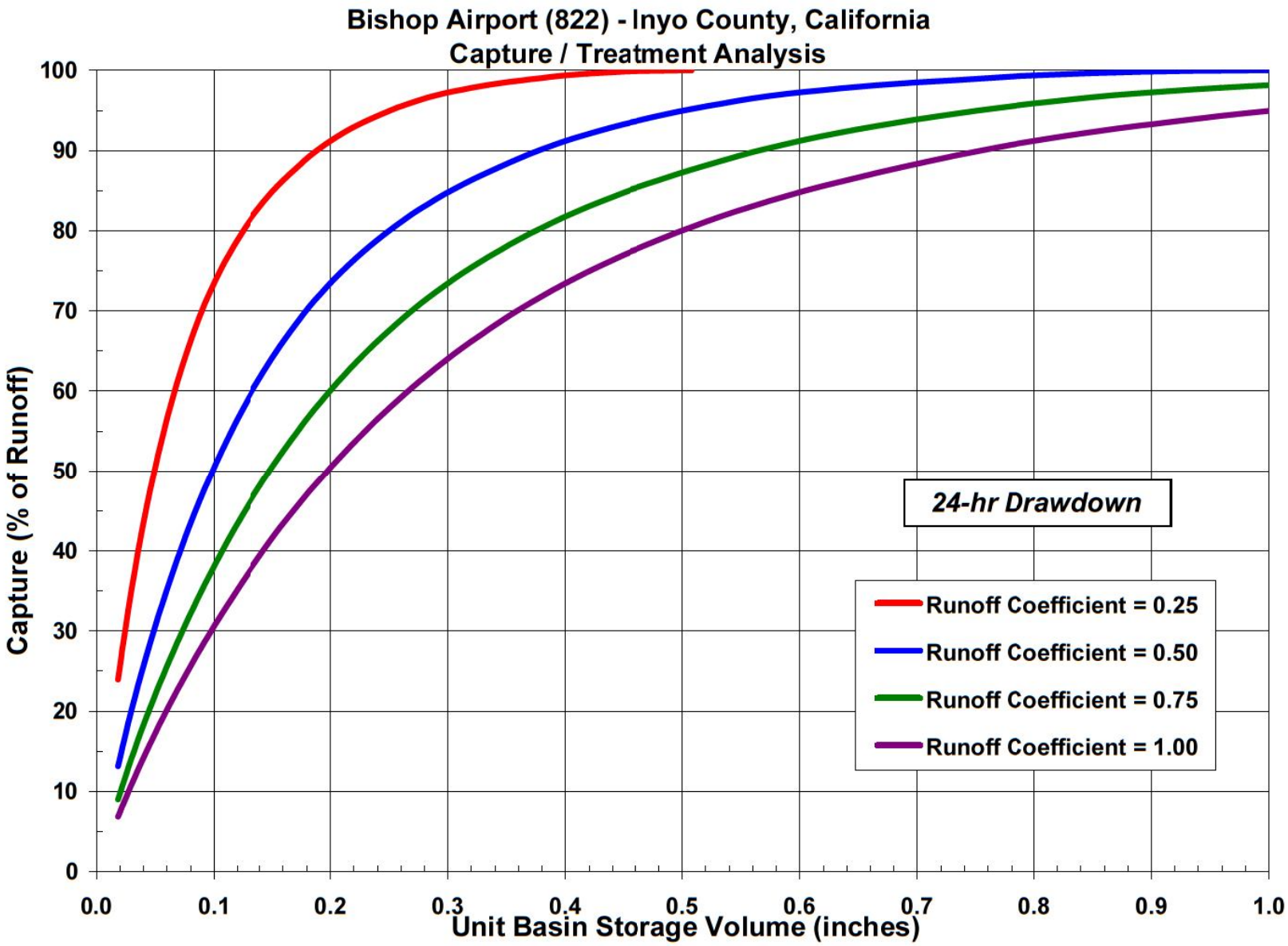
Bishop Airport (822) - Inyo County, California
Capture / Treatment Analysis
Capture (% of Runoff)
Unit Basin Storage Volume (inches)
0
10
20
30
40
50
60
70
80
90
100
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
24-hr Drawdown
Runoff Coefficient = 0.25
Runoff Coefficient = 0.50
Runoff Coefficient = 0.75
Runoff Coefficient = 1.00

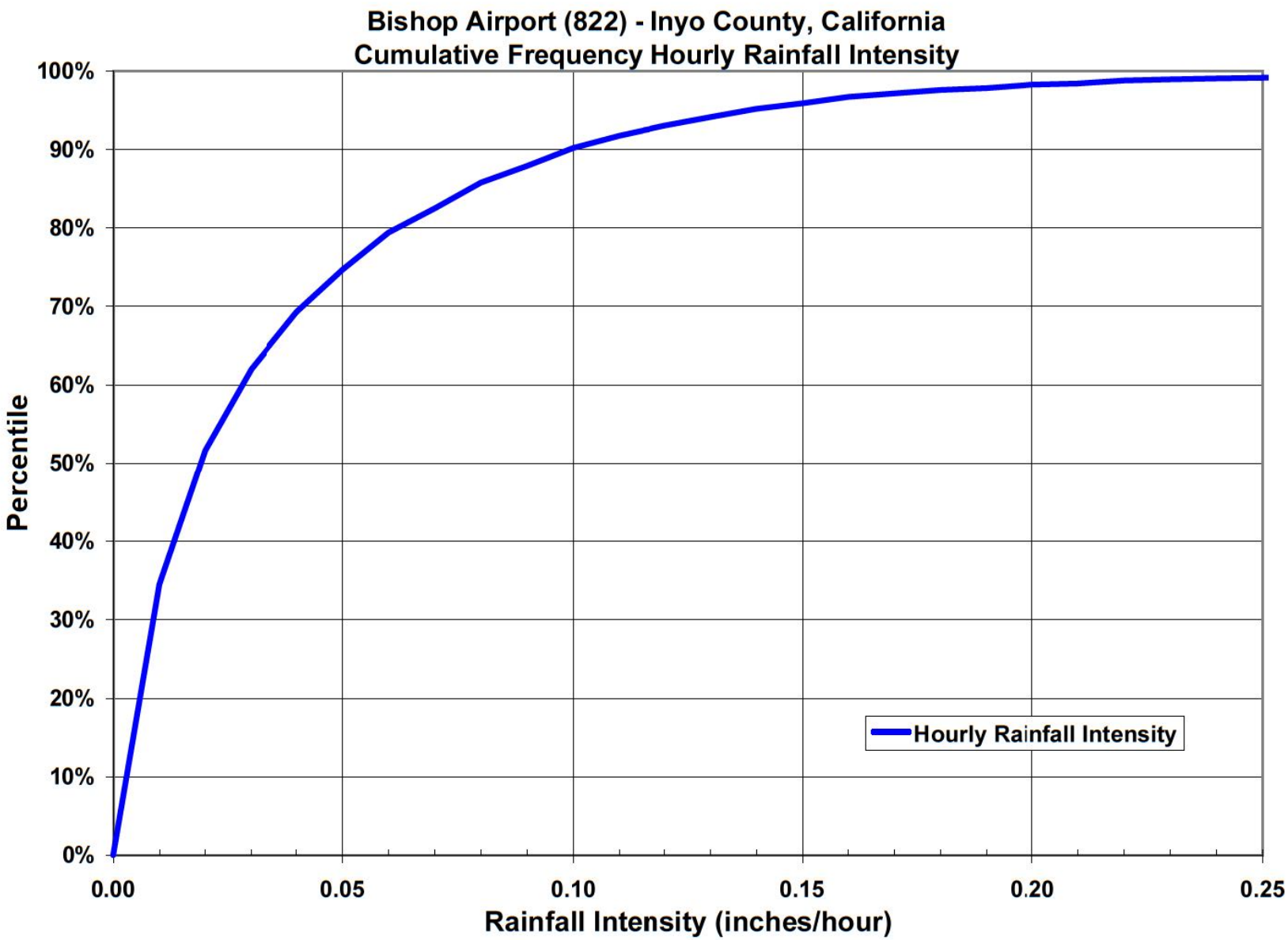
Bishop Airport (822) - Inyo County, California
Cumulative Frequency Hourly Rainfall Intensity
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Percentile
0.00
0.05
0.10
0.15
0.20
0.25
Rainfall Intensity (inches/hour)
Hourly Rainfall Intensity

013488

013489

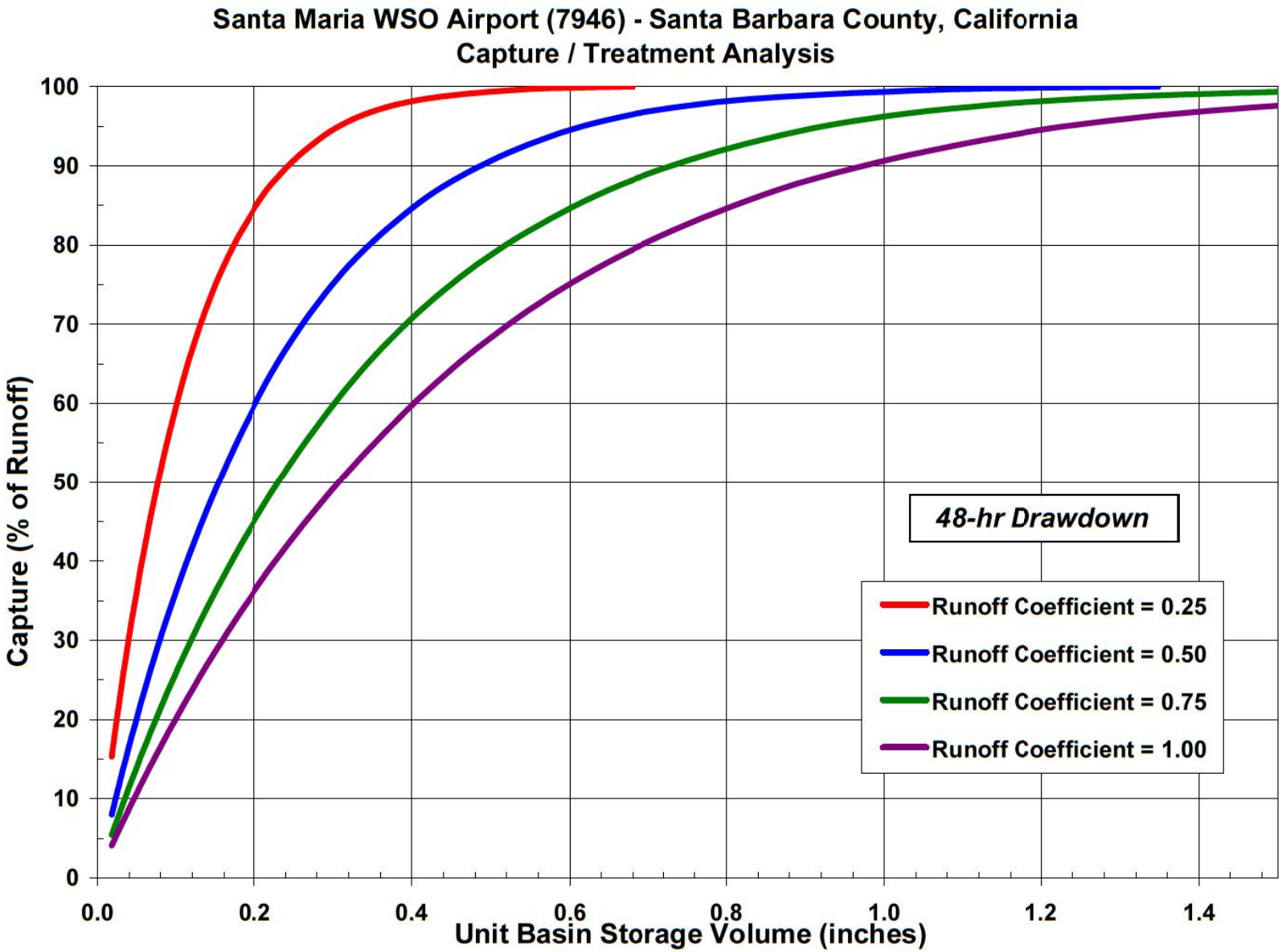
Santa Maria WSO Airport (7946) - Santa Barbara County, California
Capture / Treatment Analysis
Capture (% of Runoff)
Unit Basin Storage Volume (inches)
0
10
20
30
40
50
60
70
80
90
100
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
48-hr Drawdown
Runoff Coefficient = 0.25
Runoff Coefficient = 0.50
Runoff Coefficient = 0.75
Runoff Coefficient = 1.00

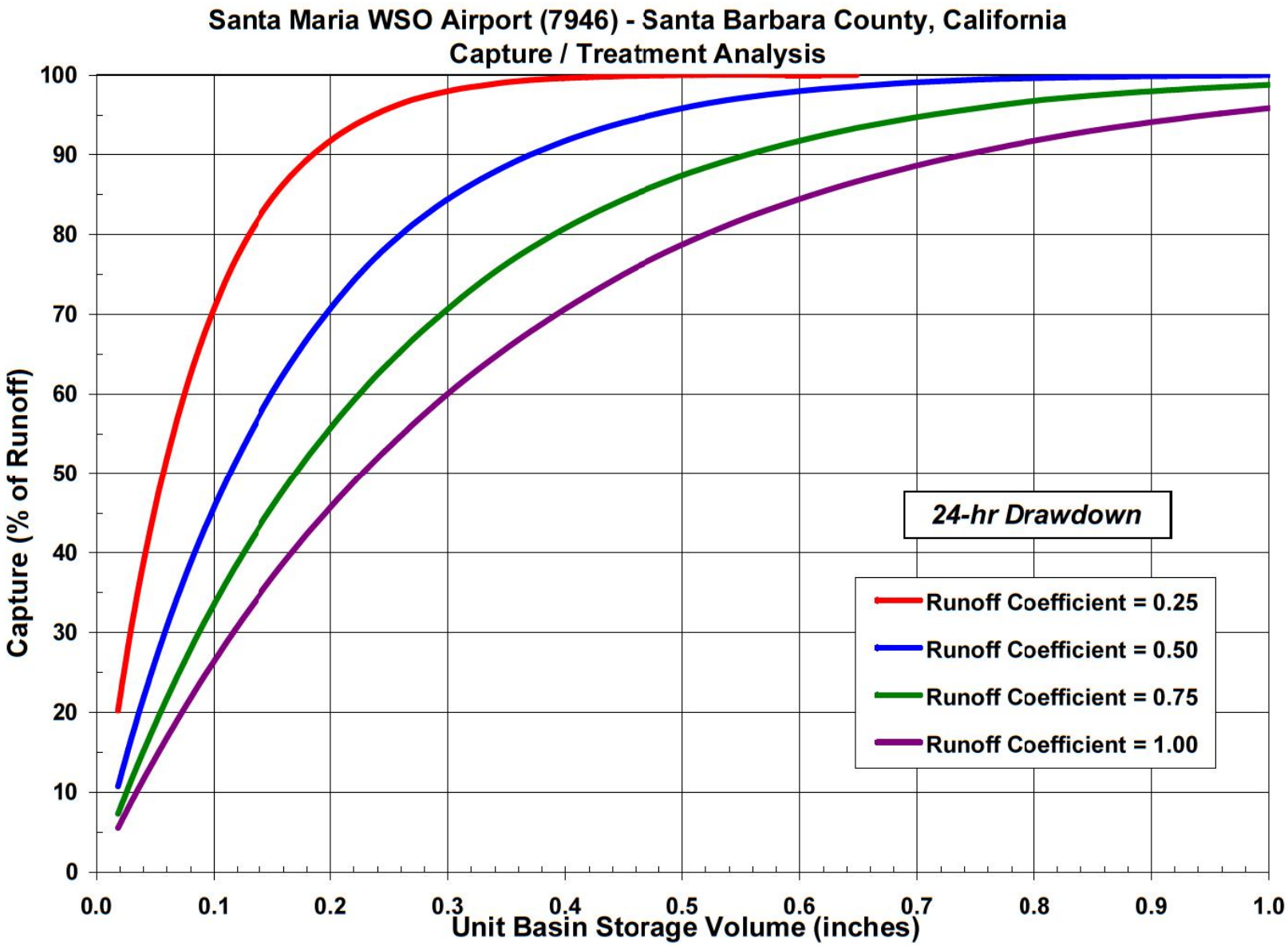
Santa Maria WSO Airport (7946) - Santa Barbara County, California
Capture / Treatment Analysis
Capture (% of Runoff)
Unit Basin Storage Volume (inches)
0
10
20
30
40
50
60
70
80
90
100
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
24-hr Drawdown
Runoff Coefficient = 0.25
Runoff Coefficient = 0.50
Runoff Coefficient = 0.75
Runoff Coefficient = 1.00

013490

013491

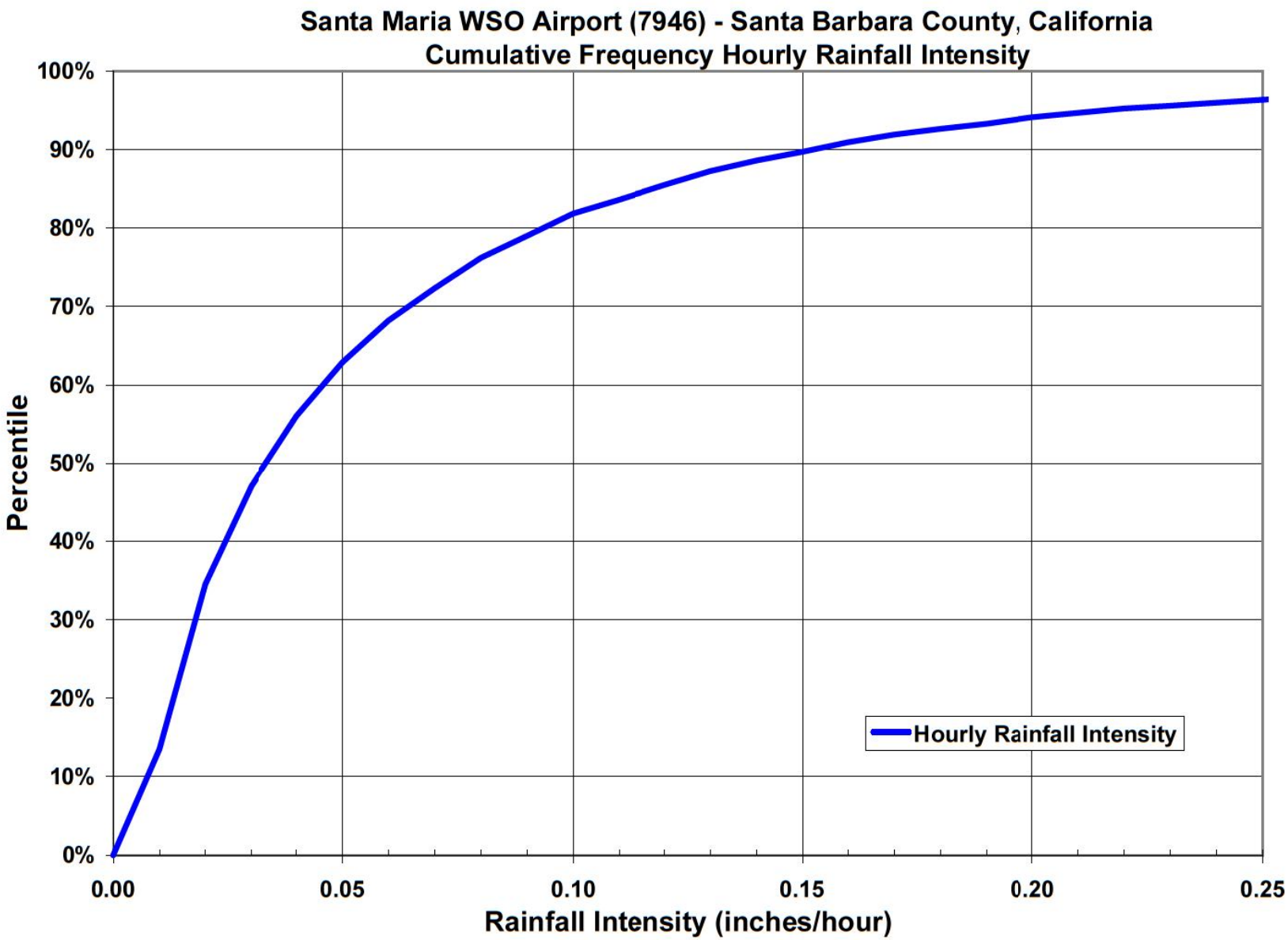
Santa Maria WSO Airport (7946) - Santa Barbara County, California
Cumulative Frequency Hourly Rainfall Intensity
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Percentile
0.00
0.05
0.10
0.15
0.20
0.25
Rainfall Intensity (inches/hour)
Hourly Rainfall Intensity

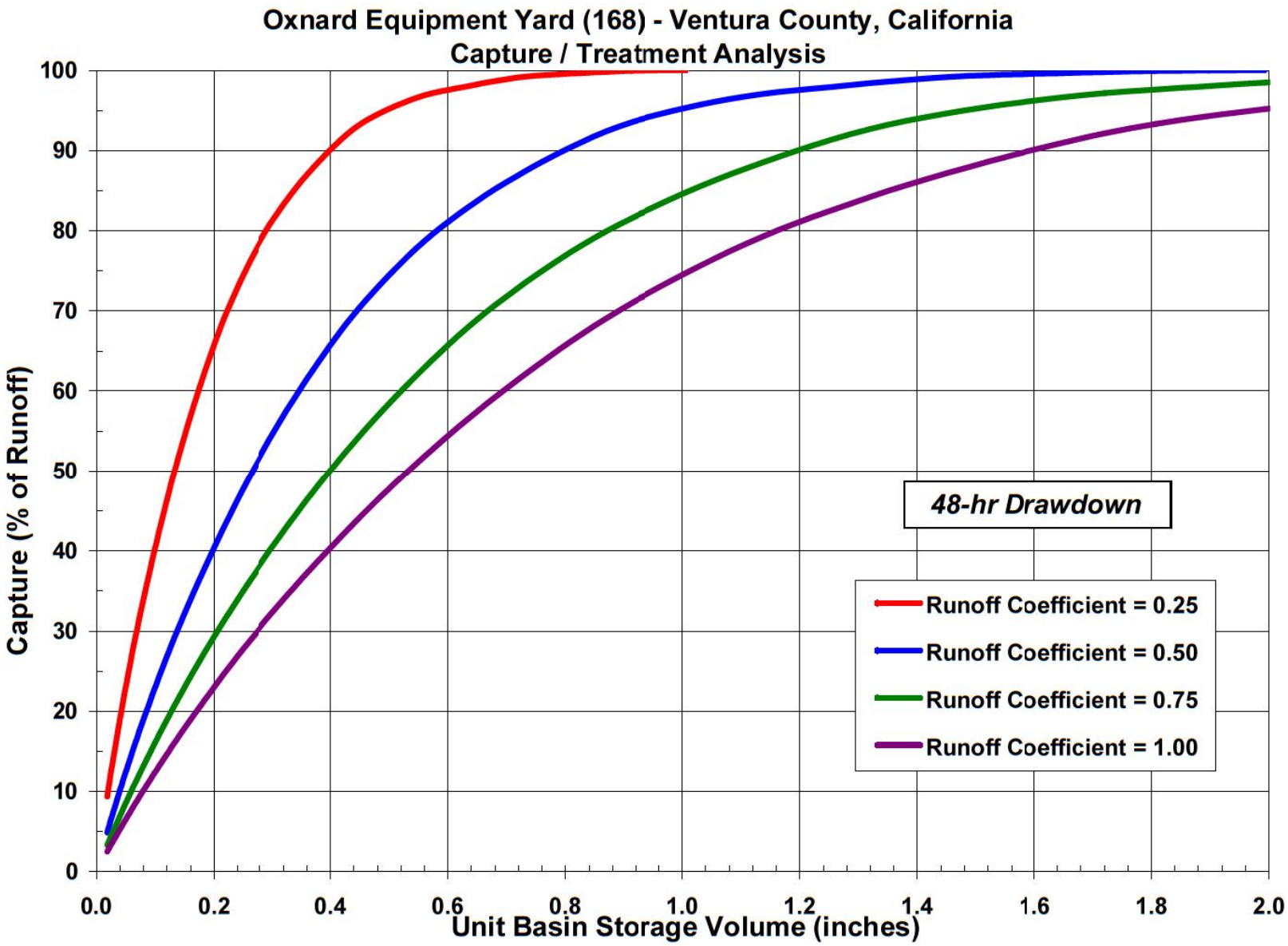
Oxnard Equipment Yard (168) - Ventura County, California
Capture / Treatment Analysis
Capture (% of Runoff)
Unit Basin Storage Volume (inches)
0
10
20
30
40
50
60
70
80
90
100
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6
1.8
2.0
48-hr Drawdown
Runoff Coefficient = 0.25
Runoff Coefficient = 0.50
Runoff Coefficient = 0.75
Runoff Coefficient = 1.00

013492

013493

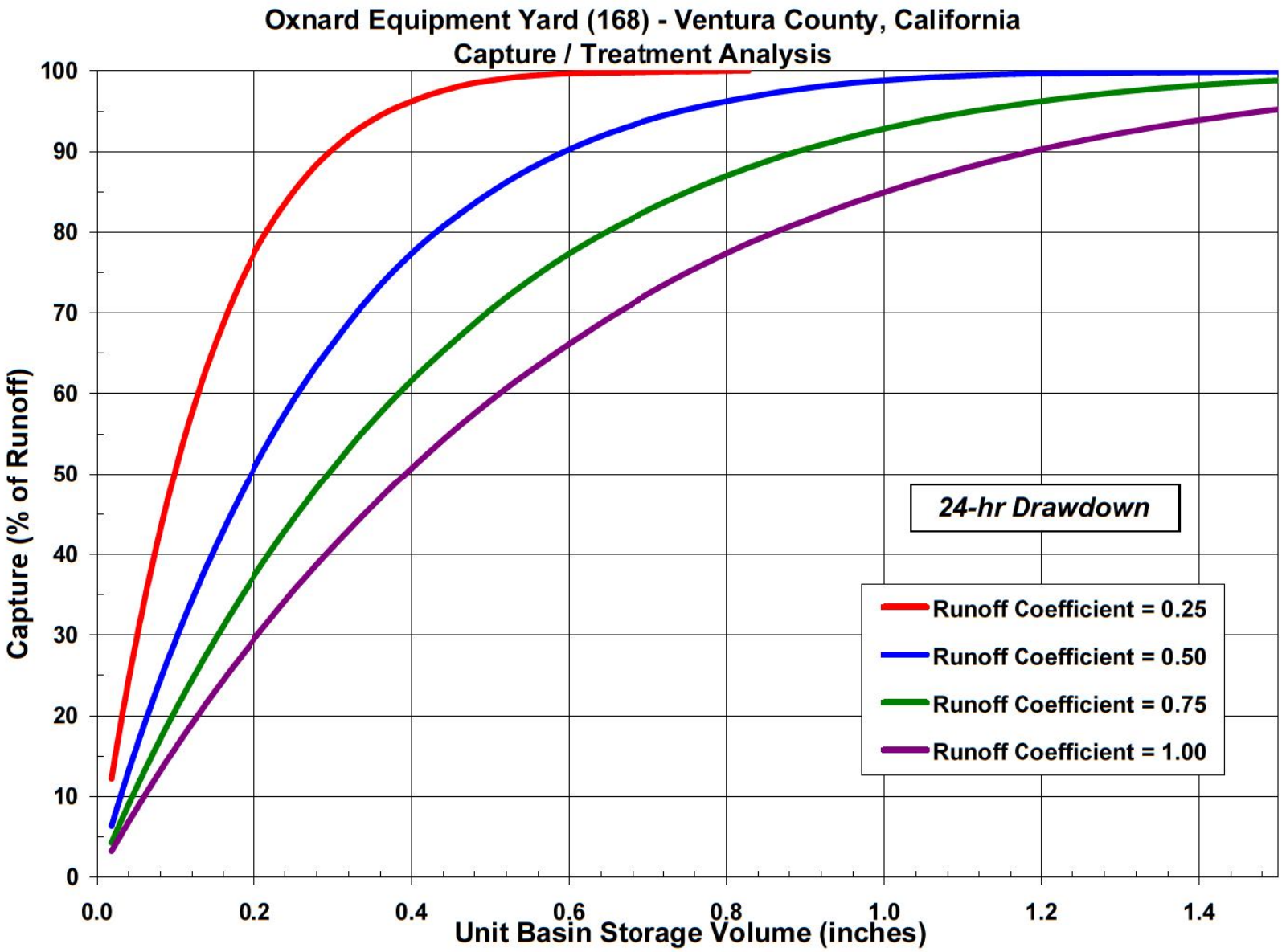
Oxnard Equipment Yard (168) - Ventura County, California
Capture / Treatment Analysis
Capture (% of Runoff)
Unit Basin Storage Volume (inches)
0
10
20
30
40
50
60
70
80
90
100
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
24-hr Drawdown
Runoff Coefficient = 0.25
Runoff Coefficient = 0.50
Runoff Coefficient = 0.75
Runoff Coefficient = 1.00

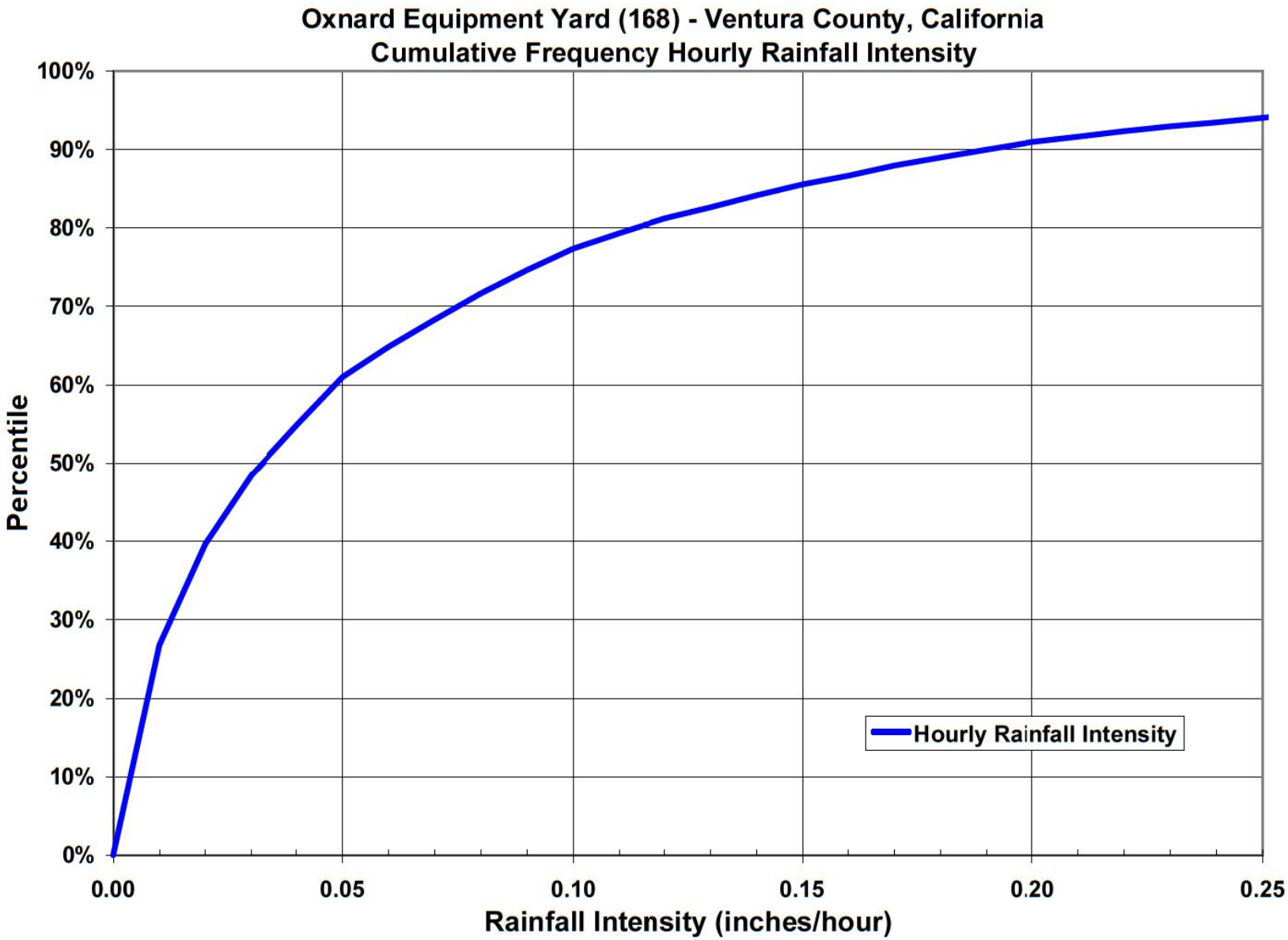
Oxnard Equipment Yard (168) - Ventura County, California
Cumulative Frequency Hourly Rainfall Intensity
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Percentile
0.00
0.05
0.10
0.15
0.20
0.25
Rainfall Intensity (inches/hour)
Hourly Rainfall Intensity

013494

013495

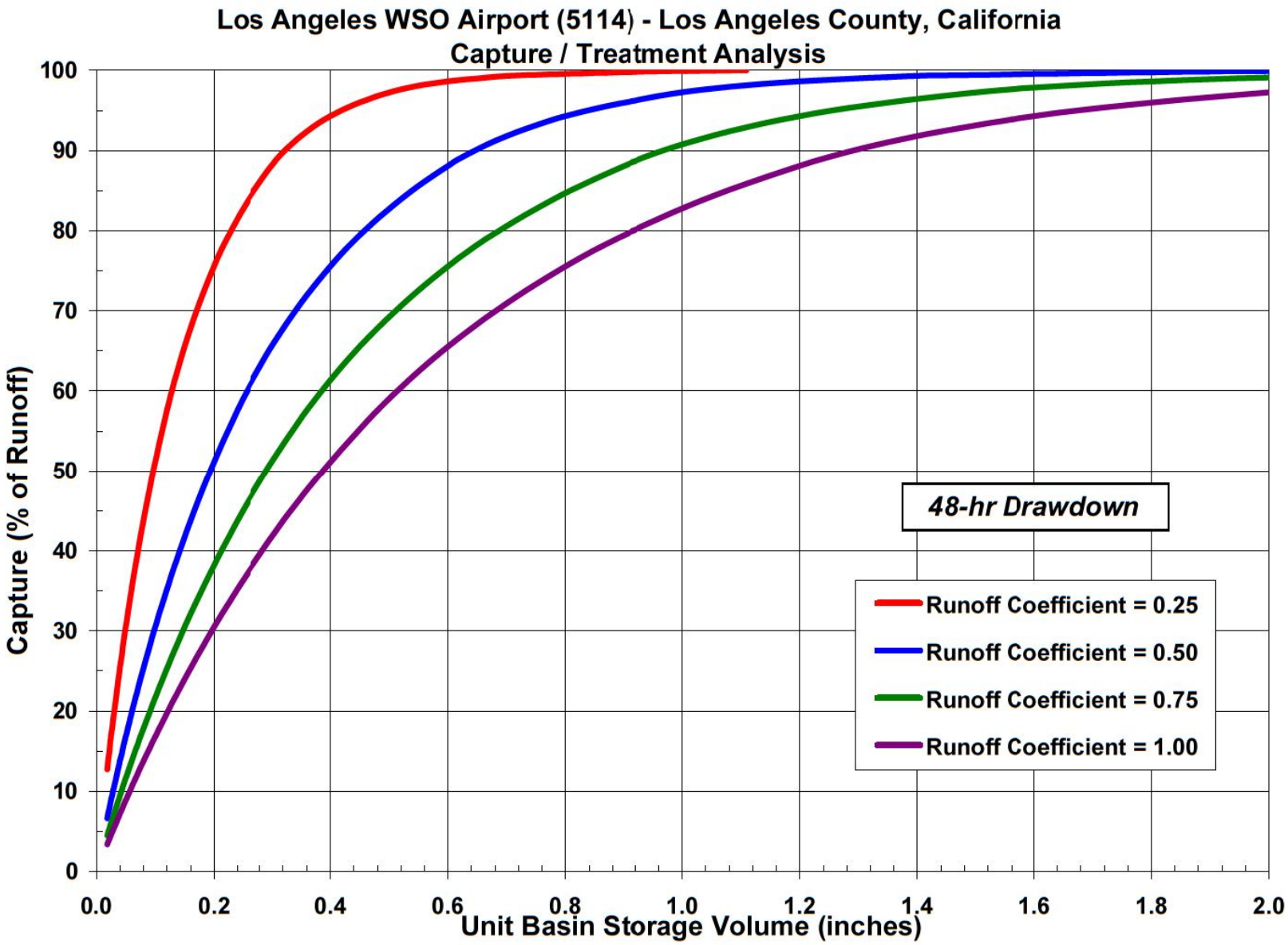
Los Angeles WSO Airport (5114) - Los Angeles County, California
Capture / Treatment Analysis
Capture (% of Runoff)
Unit Basin Storage Volume (inches)
0
10
20
30
40
50
60
70
80
90
100
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6
1.8
2.0
48-hr Drawdown
Runoff Coefficient = 0.25
Runoff Coefficient = 0.50
Runoff Coefficient = 0.75
Runoff Coefficient = 1.00

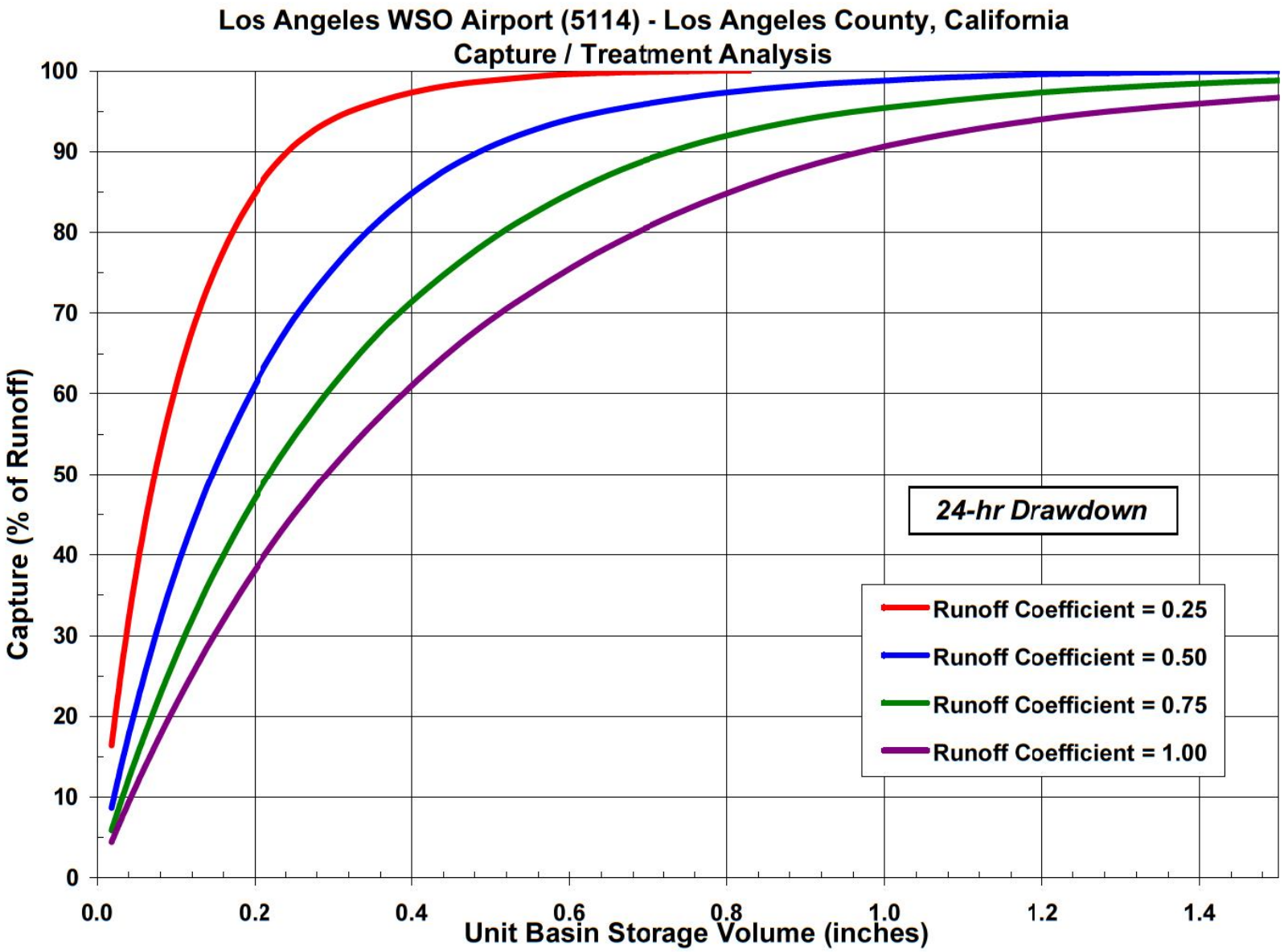
Los Angeles WSO Airport (5114) - Los Angeles County, California
Capture / Treatment Analysis
Capture (% of Runoff)
Unit Basin Storage Volume (inches)
0
10
20
30
40
50
60
70
80
90
100
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
24-hr Drawdown
Runoff Coefficient = 0.25
Runoff Coefficient = 0.50
Runoff Coefficient = 0.75
Runoff Coefficient = 1.00

013496

013497

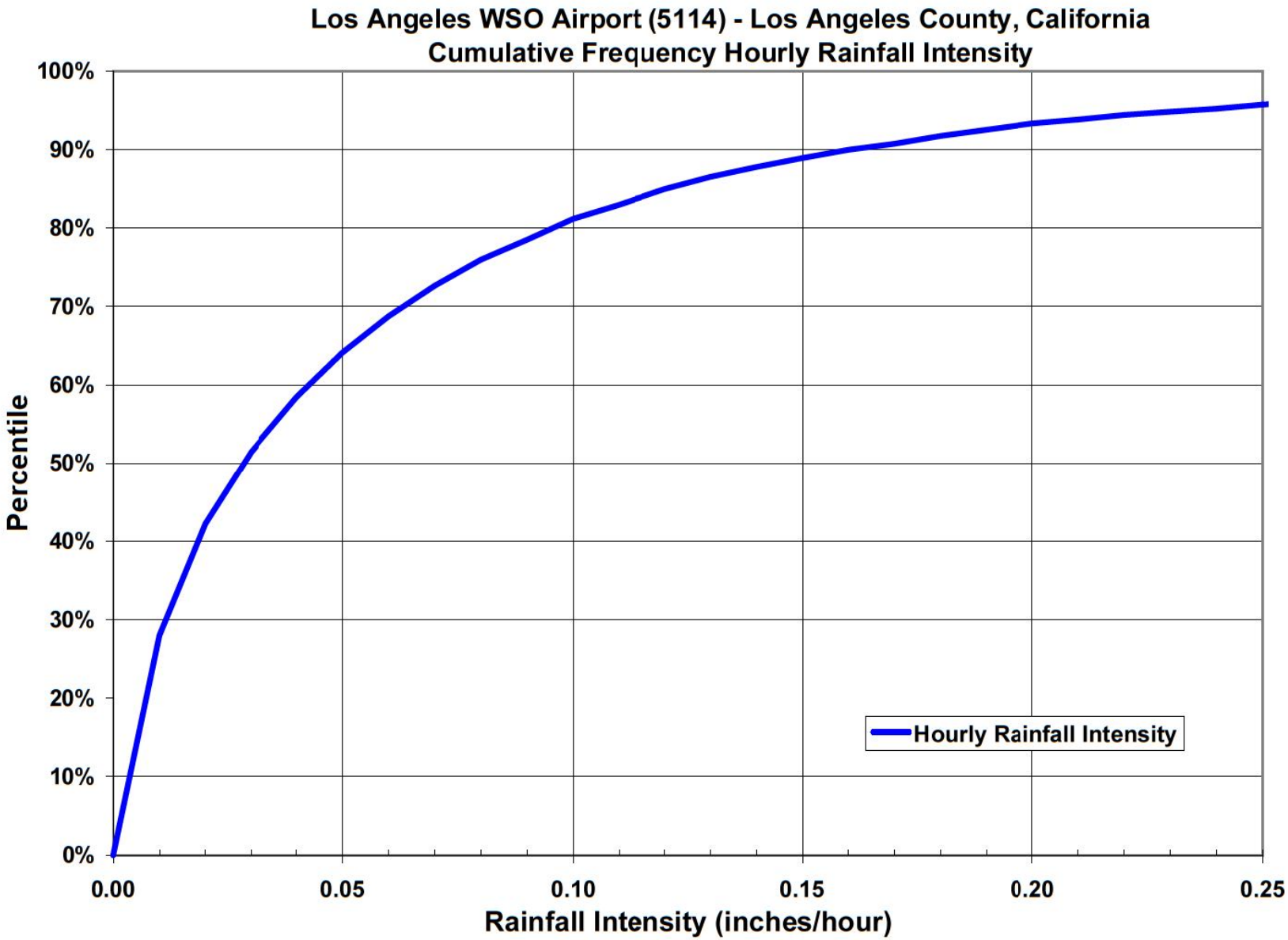
Los Angeles WSO Airport (5114) - Los Angeles County, California
Cumulative Frequency Hourly Rainfall Intensity
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Percentile
0.00
0.05
0.10
0.15
0.20
0.25
Rainfall Intensity (inches/hour)
Hourly Rainfall Intensity

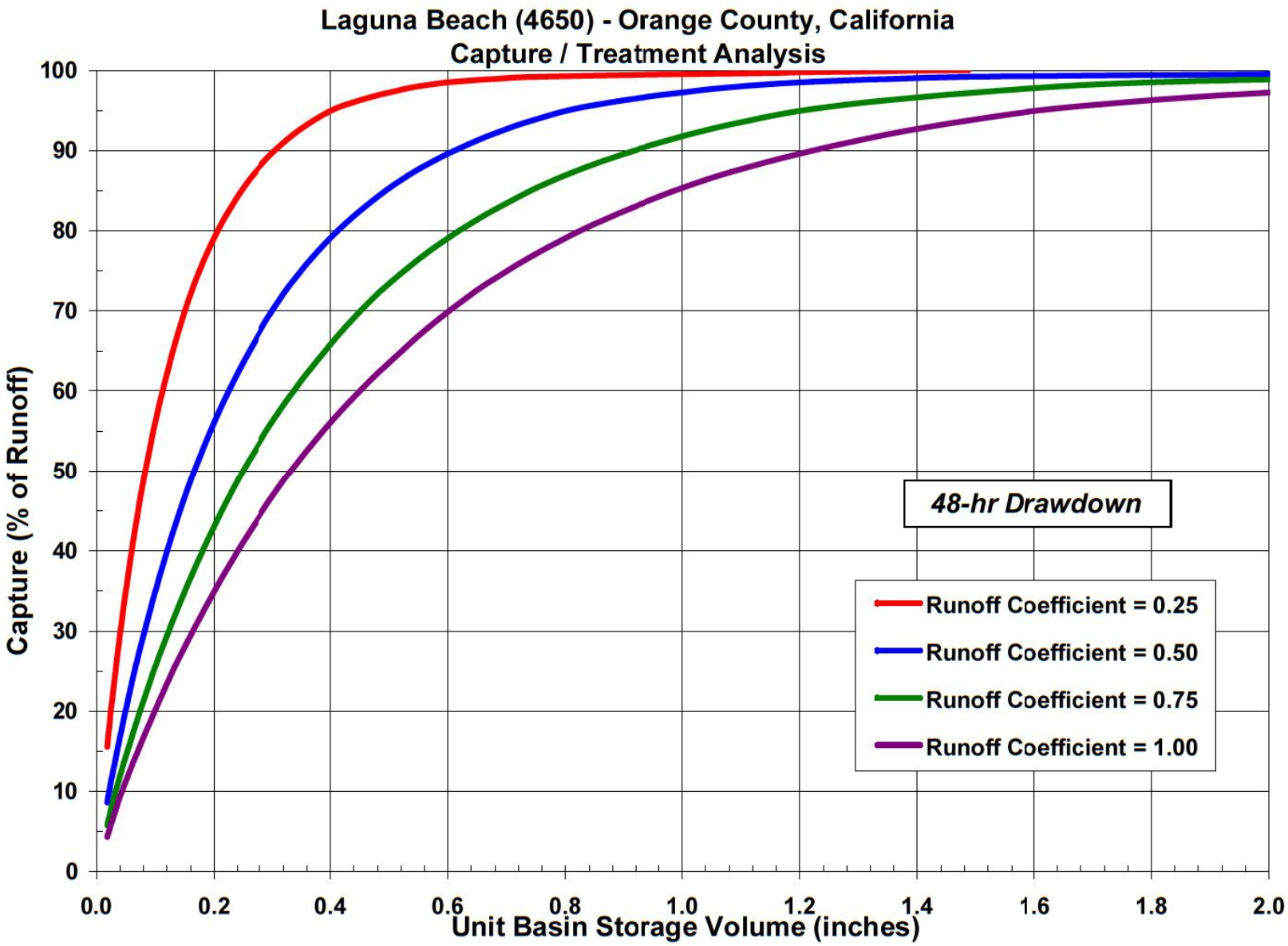
Laguna Beach (4650) - Orange County, California
Capture / Treatment Analysis
Capture (% of Runoff)
Unit Basin Storage Volume (inches)
0
10
20
30
40
50
60
70
80
90
100
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6
1.8
2.0
48-hr Drawdown
Runoff Coefficient = 0.25
Runoff Coefficient = 0.50
Runoff Coefficient = 0.75
Runoff Coefficient = 1.00

013498

013499

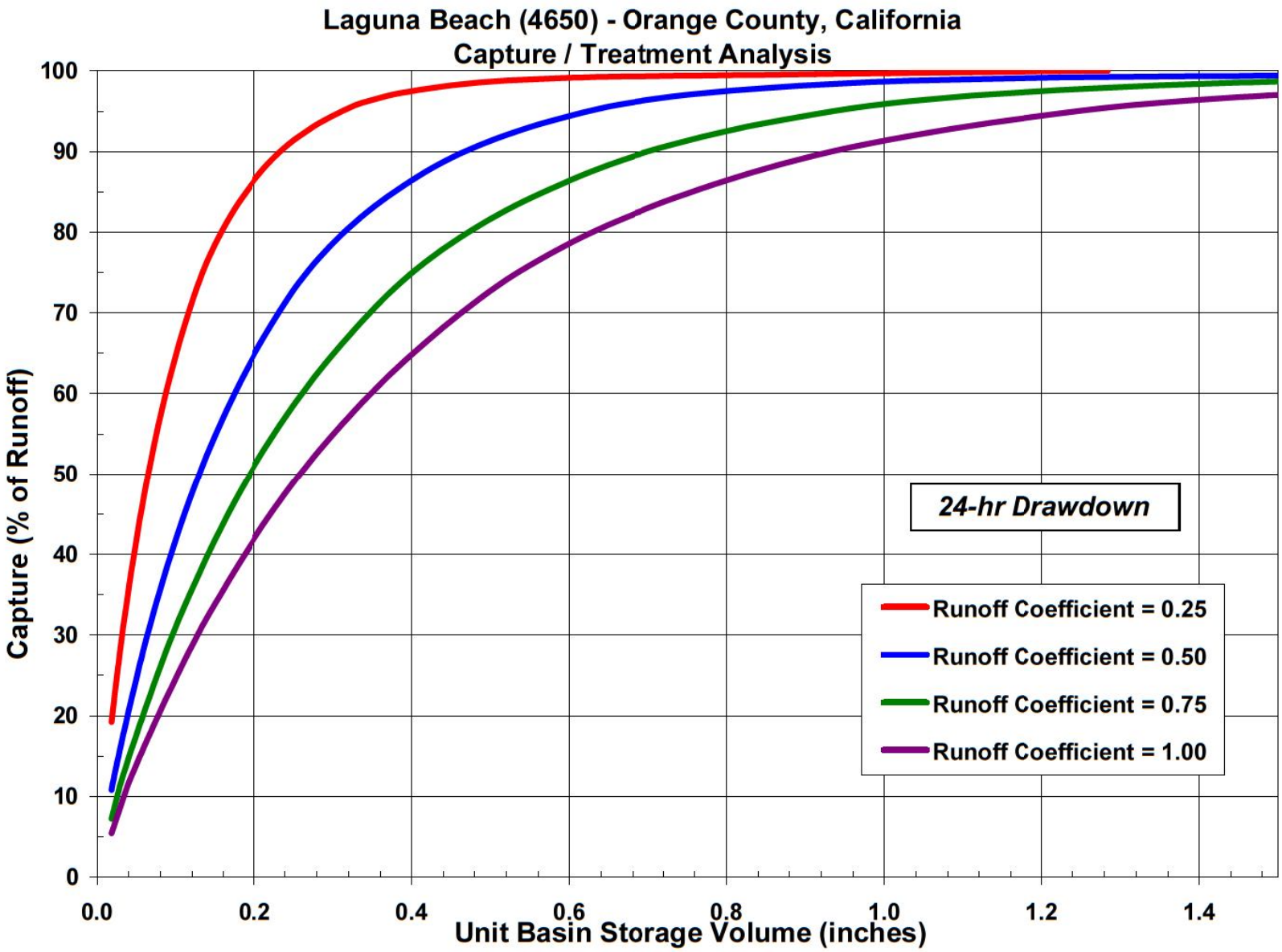
Laguna Beach (4650) - Orange County, California
Capture / Treatment Analysis
Capture (% of Runoff)
Unit Basin Storage Volume (inches)
0
10
20
30
40
50
60
70
80
90
100
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
24-hr Drawdown
Runoff Coefficient = 0.25
Runoff Coefficient = 0.50
Runoff Coefficient = 0.75
Runoff Coefficient = 1.00

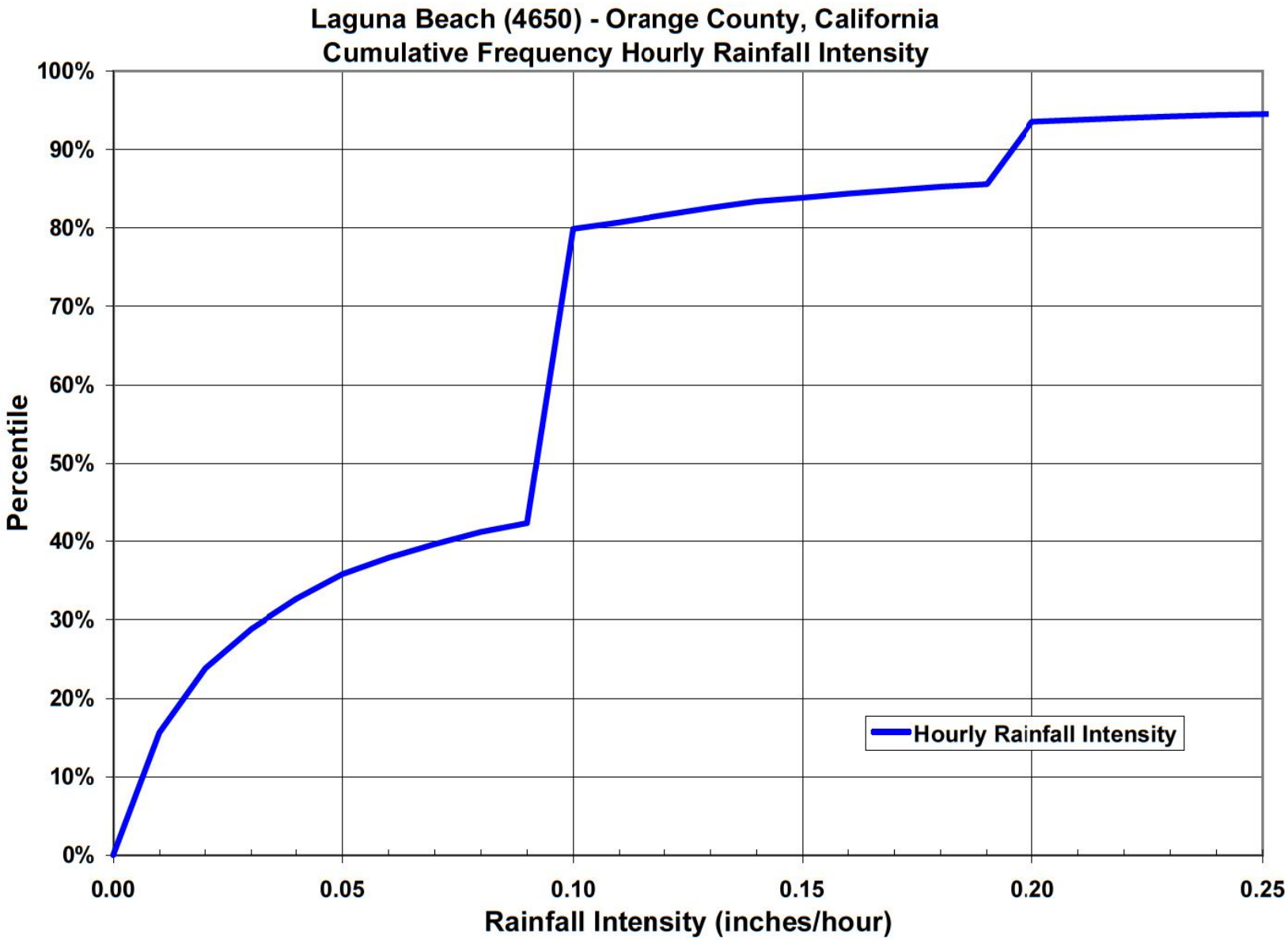
Laguna Beach (4650) - Orange County, California
Cumulative Frequency Hourly Rainfall Intensity
Percentile
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
0.00
0.05
0.10
0.15
0.20
0.25
Rainfall Intensity (inches/hour)
Hourly Rainfall Intensity

013500

013501

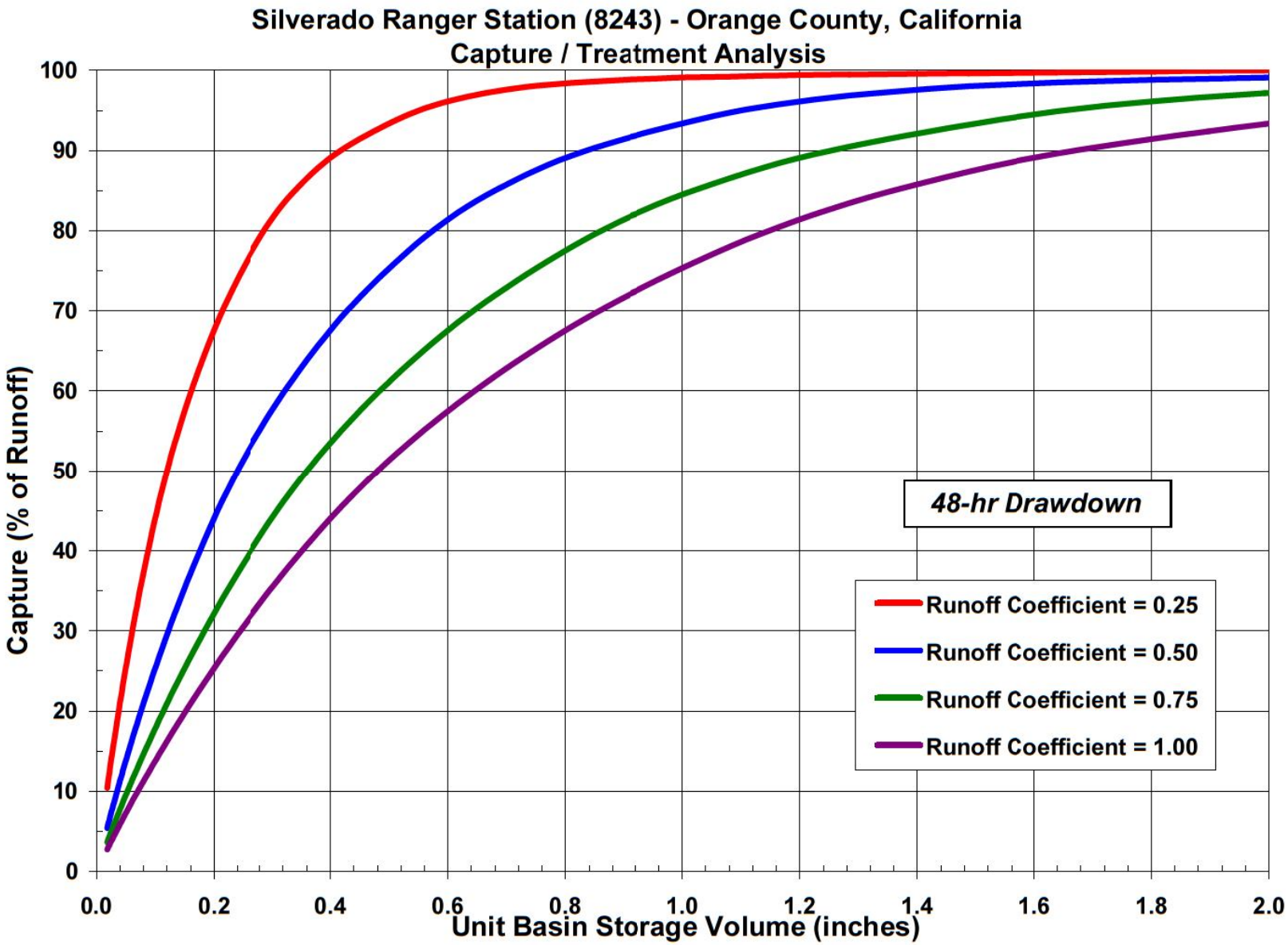
Silverado Ranger Station (8243) - Orange County, California
Capture / Treatment Analysis
Capture (% of Runoff)
Unit Basin Storage Volume (inches)
0
10
20
30
40
50
60
70
80
90
100
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6
1.8
2.0
48-hr Drawdown
Runoff Coefficient = 0.25
Runoff Coefficient = 0.50
Runoff Coefficient = 0.75
Runoff Coefficient = 1.00

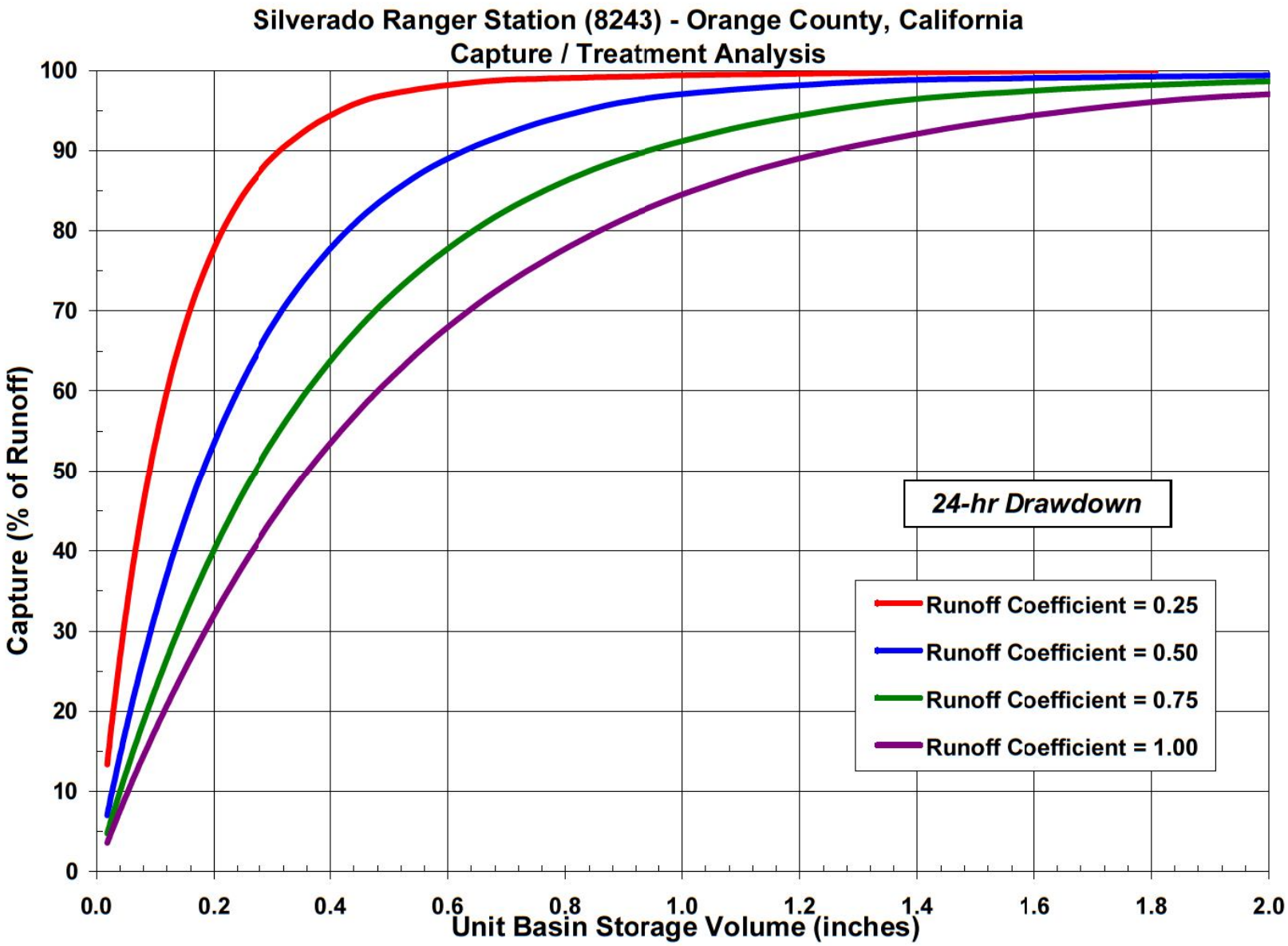
Silverado Ranger Station (8243) - Orange County, California
Capture / Treatment Analysis
Capture (% of Runoff)
Unit Basin Storage Volume (inches)
0
10
20
30
40
50
60
70
80
90
100
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6
1.8
2.0
24-hr Drawdown
Runoff Coefficient = 0.25
Runoff Coefficient = 0.50
Runoff Coefficient = 0.75
Runoff Coefficient = 1.00

013502

013503

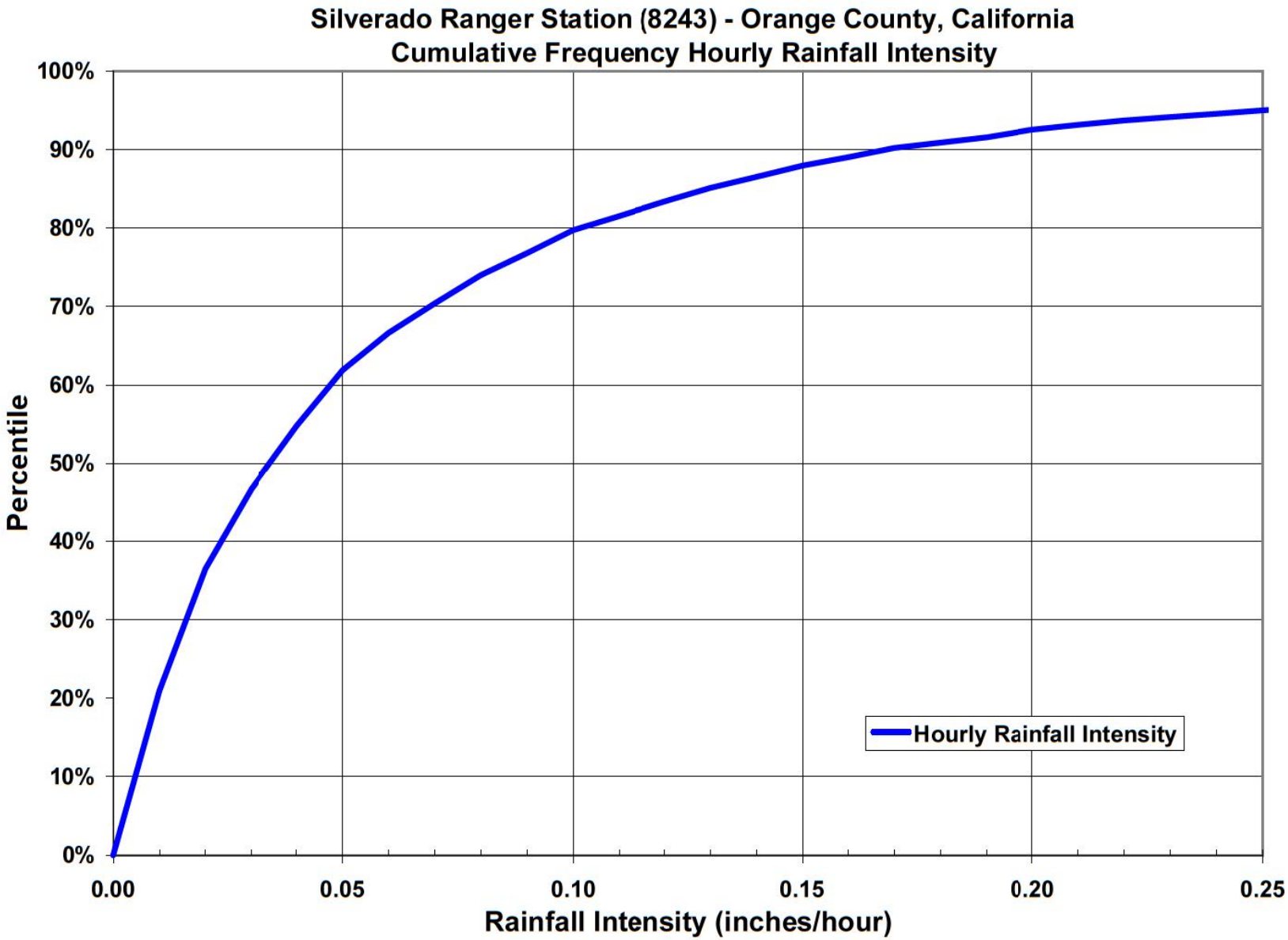
Silverado Ranger Station (8243) - Orange County, California
Cumulative Frequency Hourly Rainfall Intensity
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Percentile
0.00
0.05
0.10
0.15
0.20
0.25
Rainfall Intensity (inches/hour)
Hourly Rainfall Intensity

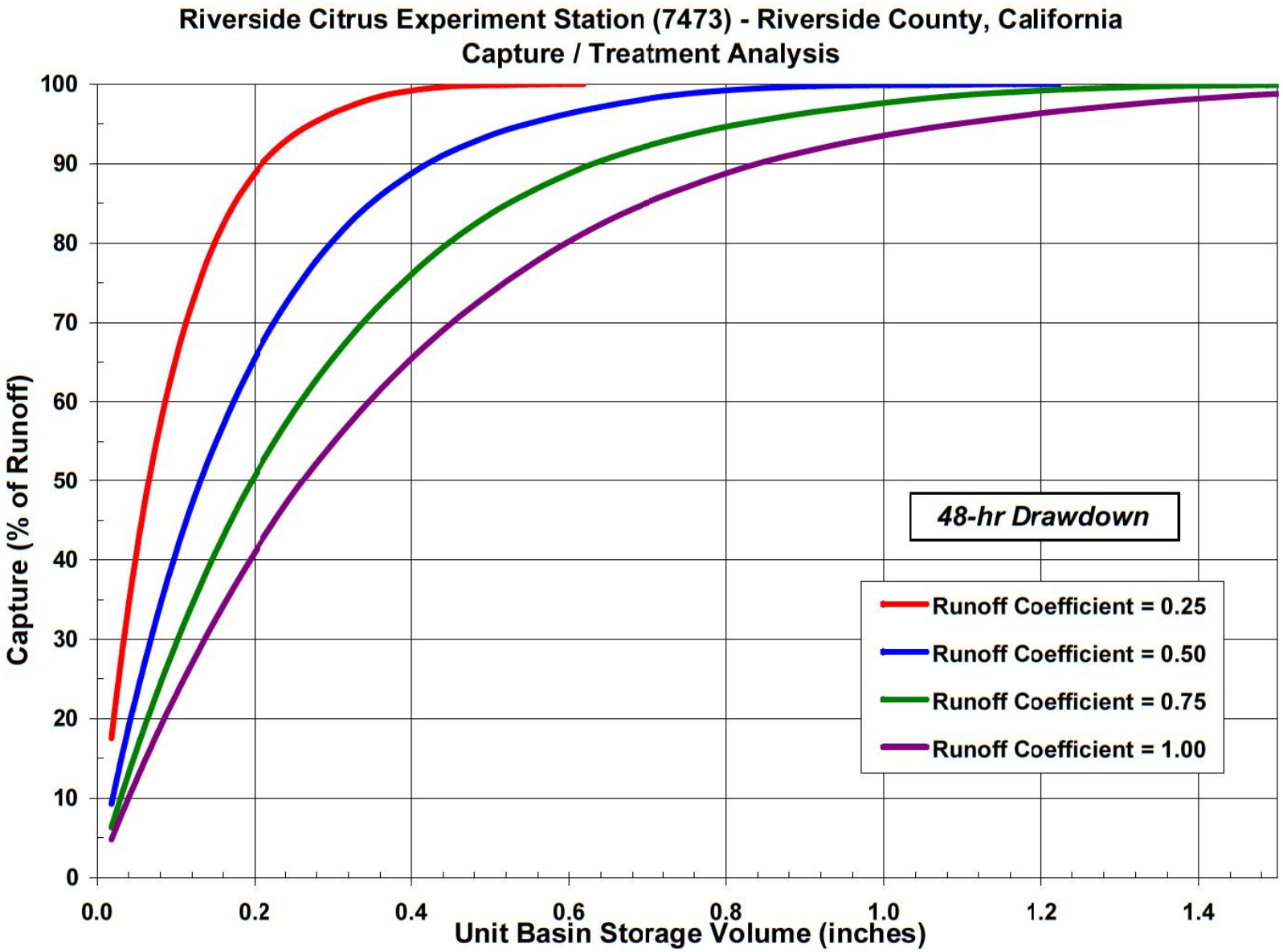
Riverside Citrus Experiment Station (7473) - Riverside County, California
Capture / Treatment Analysis
Capture (% of Runoff)
Unit Basin Storage Volume (inches)
0
10
20
30
40
50
60
70
80
90
100
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
48-hr Drawdown
Runoff Coefficient = 0.25
Runoff Coefficient = 0.50
Runoff Coefficient = 0.75
Runoff Coefficient = 1.00

013504

013505

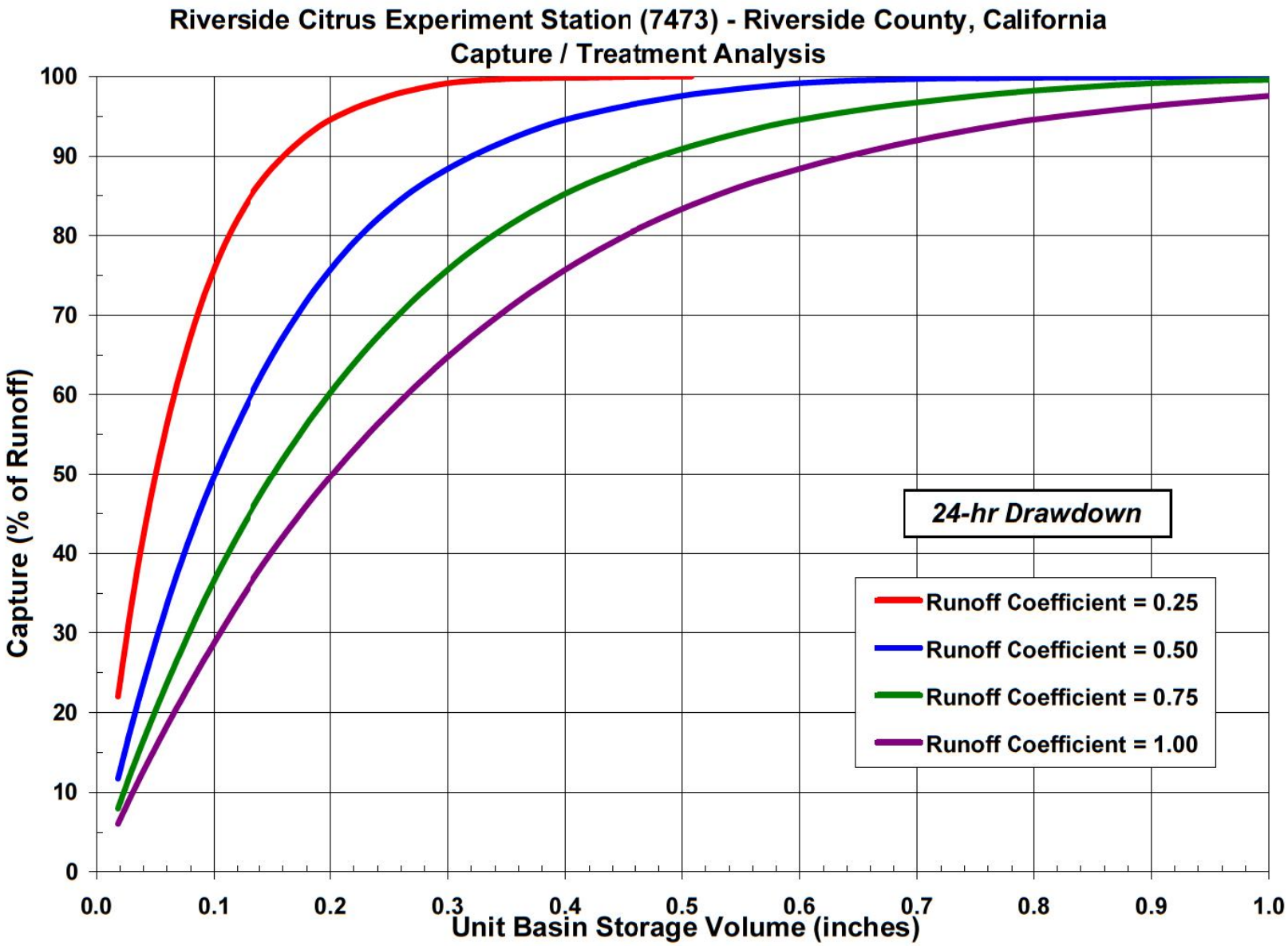
Riverside Citrus Experiment Station (7473) - Riverside County, California
Capture / Treatment Analysis
Capture (% of Runoff)
Unit Basin Storage Volume (inches)
0
10
20
30
40
50
60
70
80
90
100
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
24-hr Drawdown
Runoff Coefficient = 0.25
Runoff Coefficient = 0.50
Runoff Coefficient = 0.75
Runoff Coefficient = 1.00

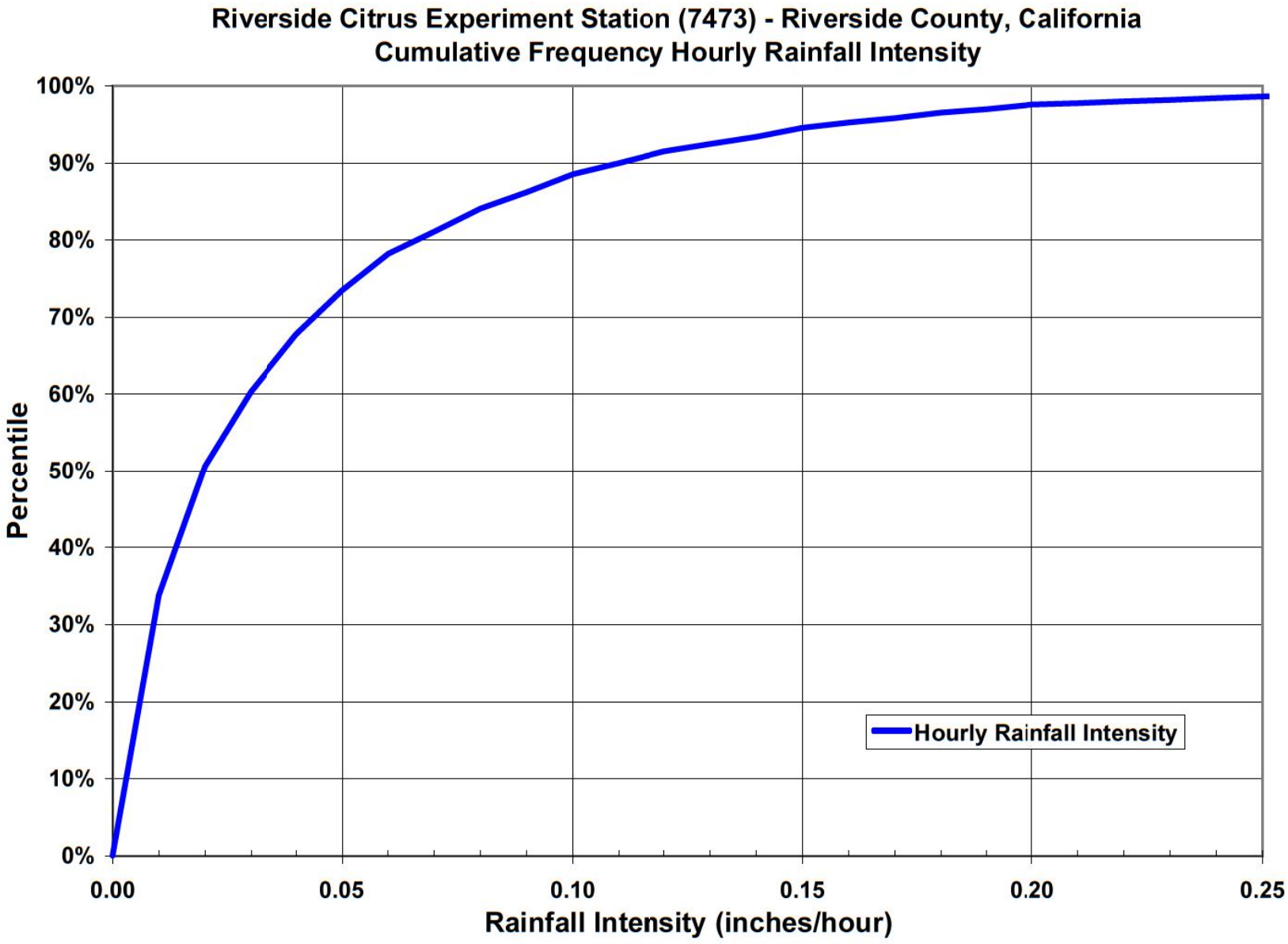
Riverside Citrus Experiment Station (7473) - Riverside County, California
Cumulative Frequency Hourly Rainfall Intensity
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Percentile
0.00
0.05
0.10
0.15
0.20
0.25
Rainfall Intensity (inches/hour)
Hourly Rainfall Intensity

013506

013507

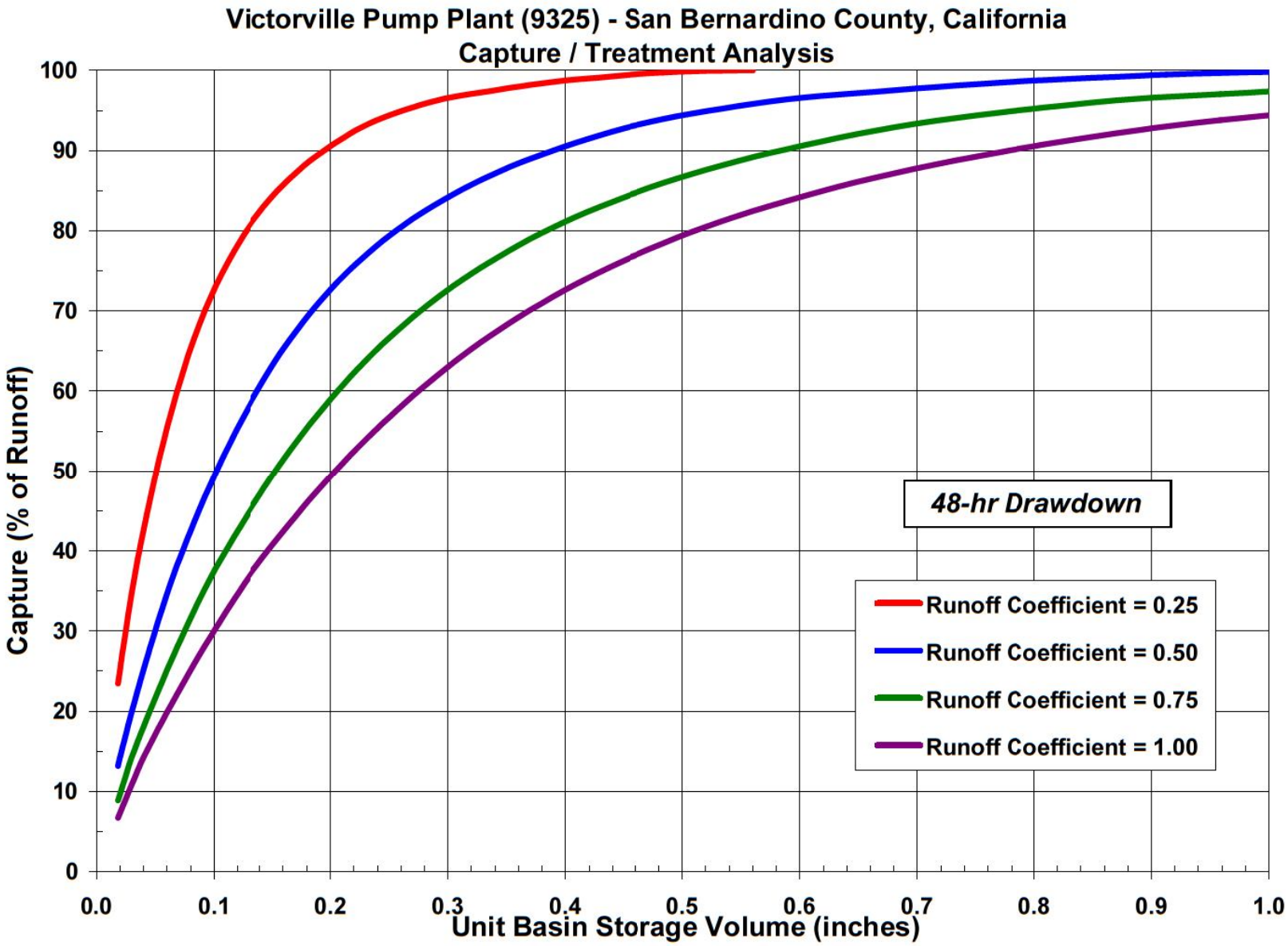
Victorville Pump Plant (9325) - San Bernardino County, California
Capture / Treatment Analysis
Capture (% of Runoff)
Unit Basin Storage Volume (inches)
0
10
20
30
40
50
60
70
80
90
100
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
48-hr Drawdown
Runoff Coefficient = 0.25
Runoff Coefficient = 0.50
Runoff Coefficient = 0.75
Runoff Coefficient = 1.00

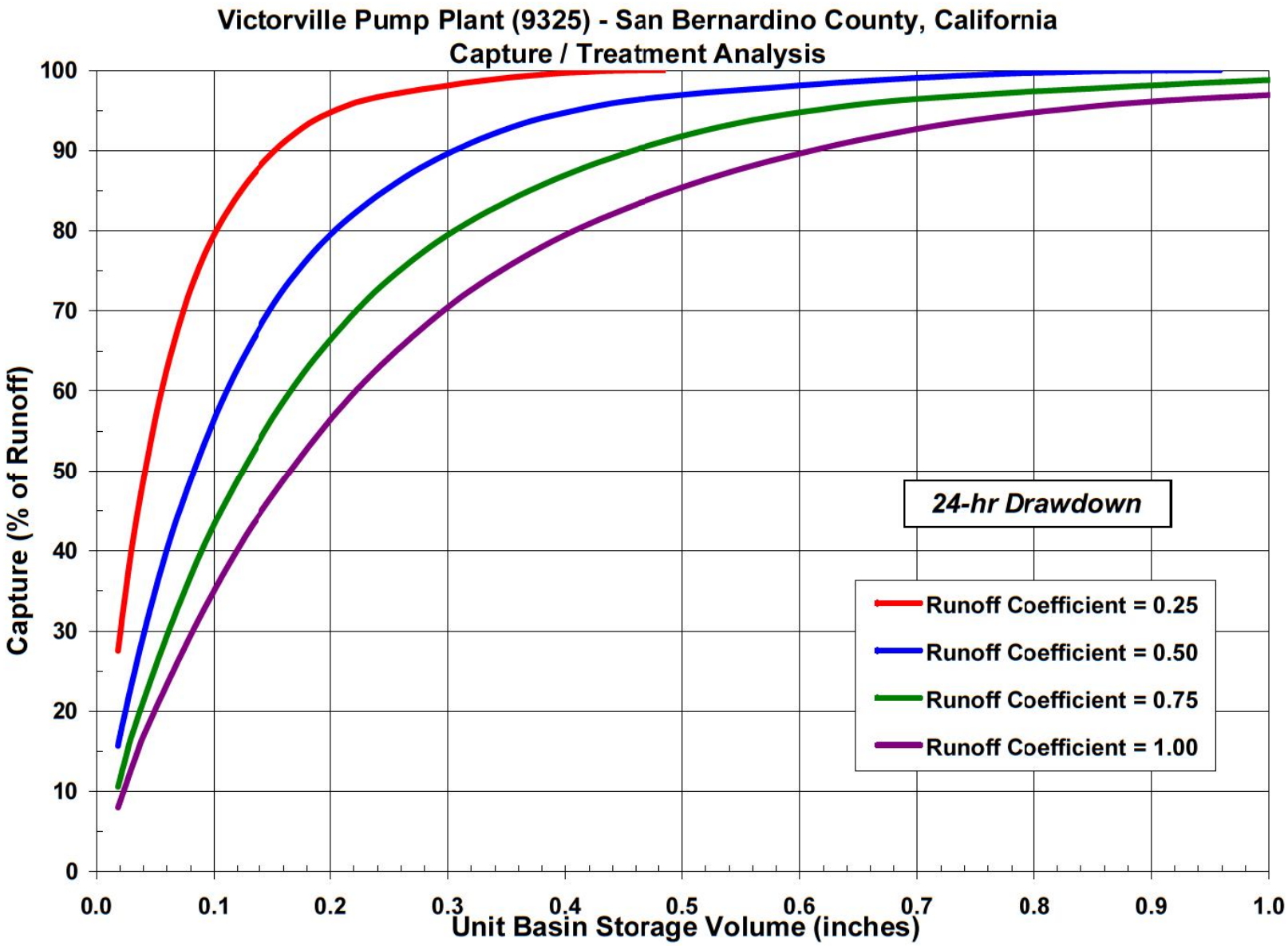
Victorville Pump Plant (9325) - San Bernardino County, California
Capture / Treatment Analysis
Capture (% of Runoff)
Unit Basin Storage Volume (inches)
0
10
20
30
40
50
60
70
80
90
100
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
24-hr Drawdown
Runoff Coefficient = 0.25
Runoff Coefficient = 0.50
Runoff Coefficient = 0.75
Runoff Coefficient = 1.00

013508

013509

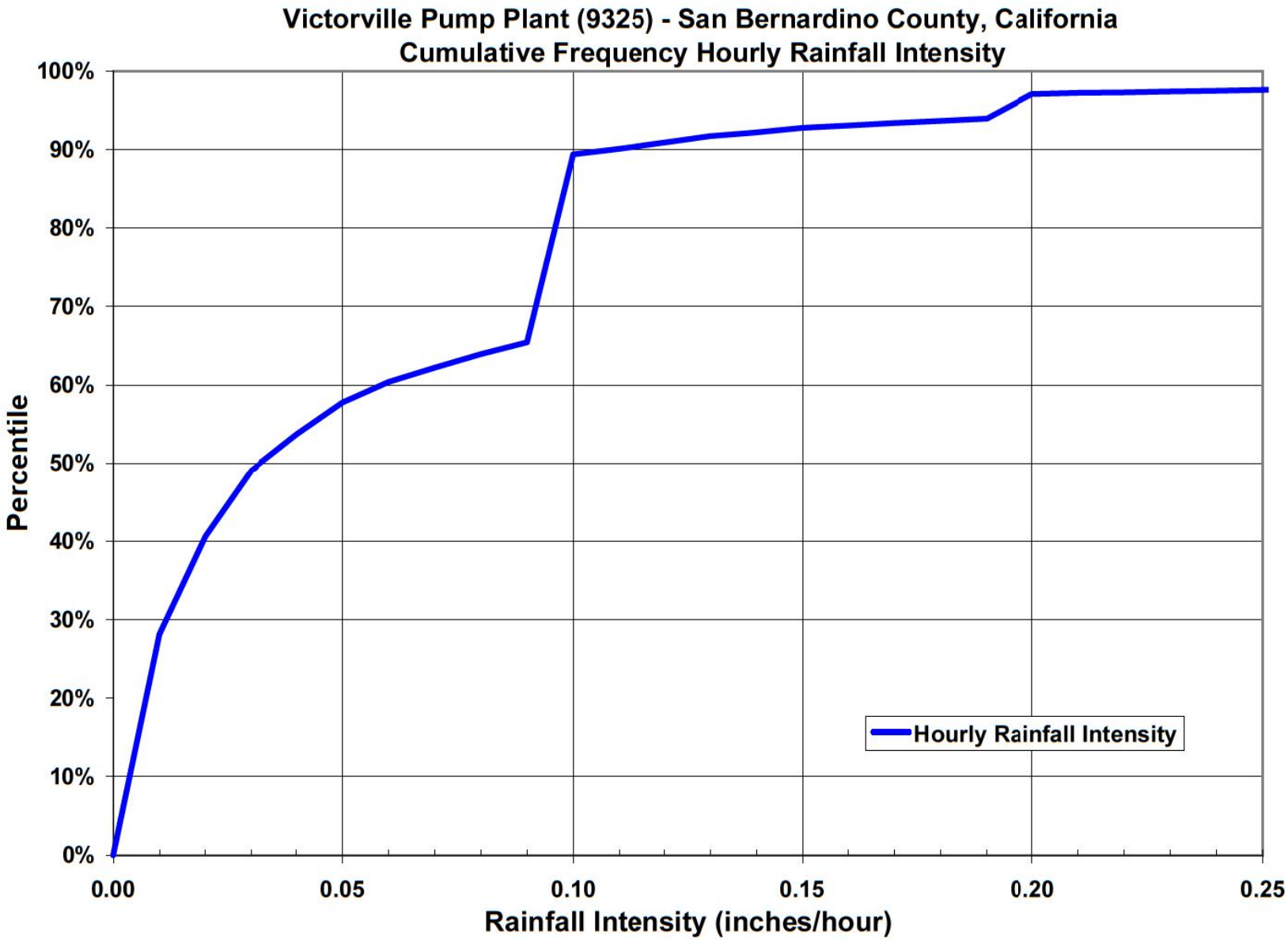
Victorville Pump Plant (9325) - San Bernardino County, California
Cumulative Frequency Hourly Rainfall Intensity
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Percentile
0.00
0.05
0.10
0.15
0.20
0.25
Rainfall Intensity (inches/hour)
Hourly Rainfall Intensity

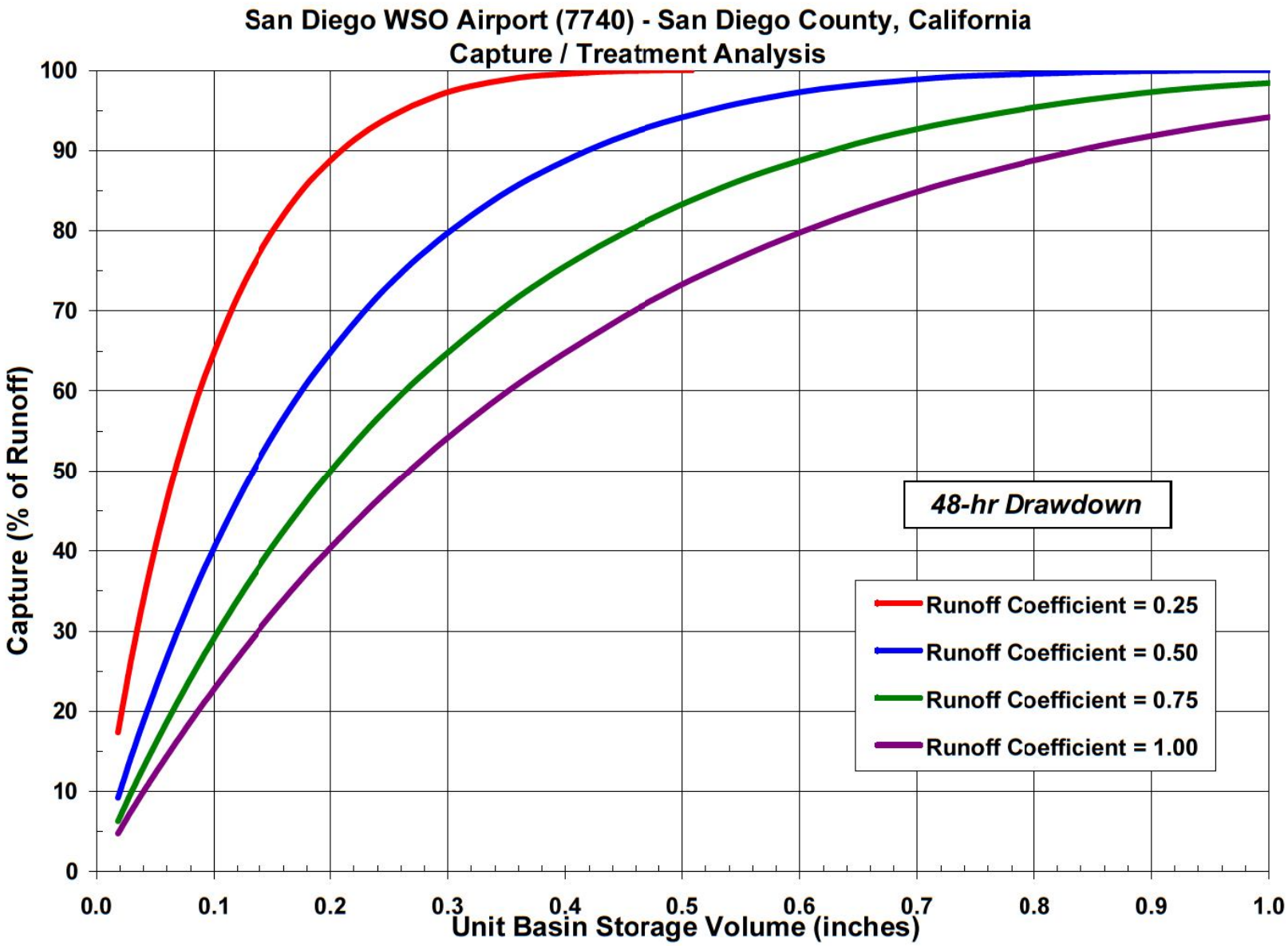
San Diego WSO Airport (7740) - San Diego County, California
Capture / Treatment Analysis
Capture (% of Runoff)
Unit Basin Storage Volume (inches)
0
10
20
30
40
50
60
70
80
90
100
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
48-hr Drawdown
Runoff Coefficient = 0.25
Runoff Coefficient = 0.50
Runoff Coefficient = 0.75
Runoff Coefficient = 1.00

013510

013511

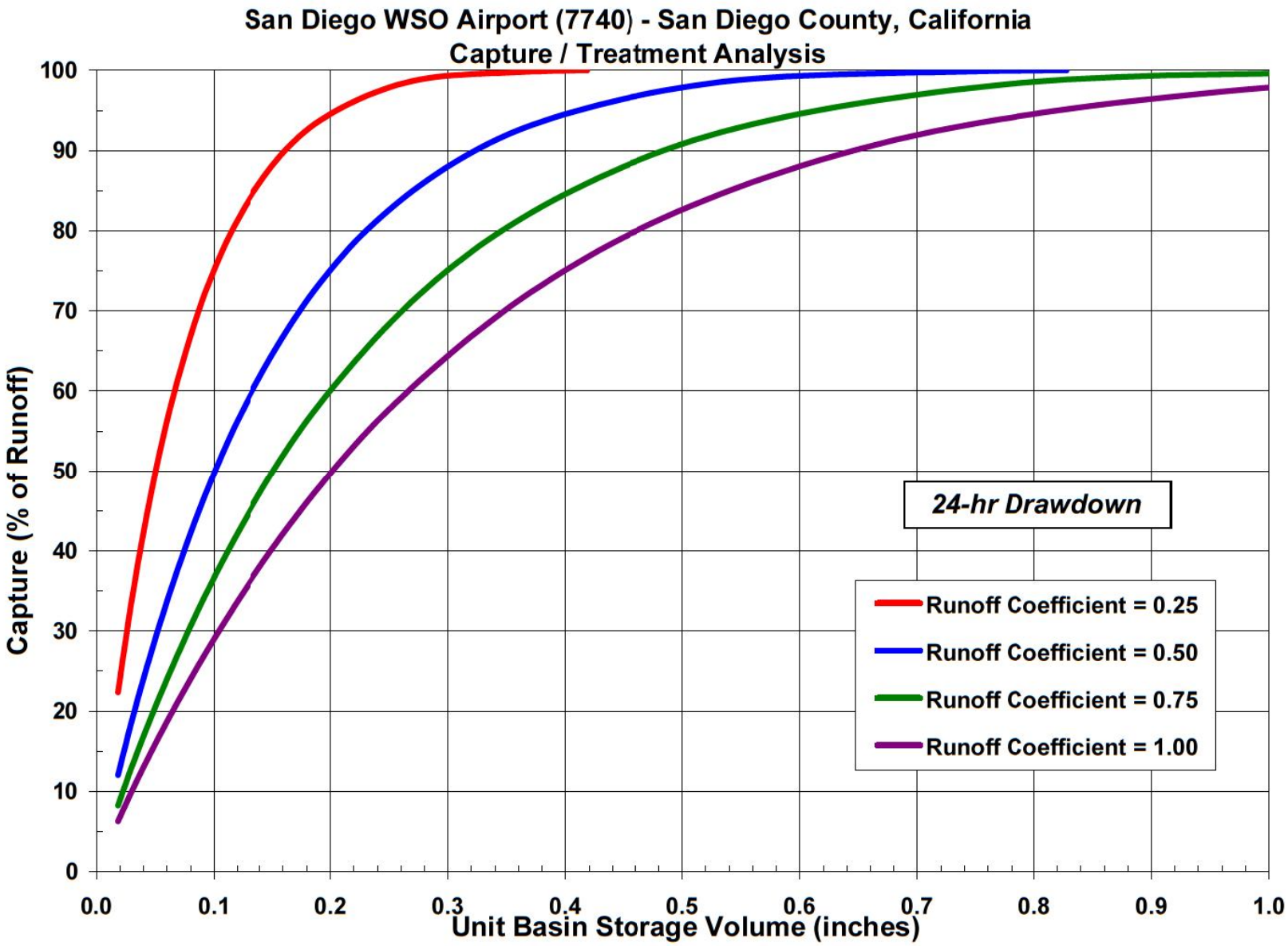
San Diego WSO Airport (7740) - San Diego County, California
Capture / Treatment Analysis
Capture (% of Runoff)
Unit Basin Storage Volume (inches)
0
10
20
30
40
50
60
70
80
90
100
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
24-hr Drawdown
Runoff Coefficient = 0.25
Runoff Coefficient = 0.50
Runoff Coefficient = 0.75
Runoff Coefficient = 1.00

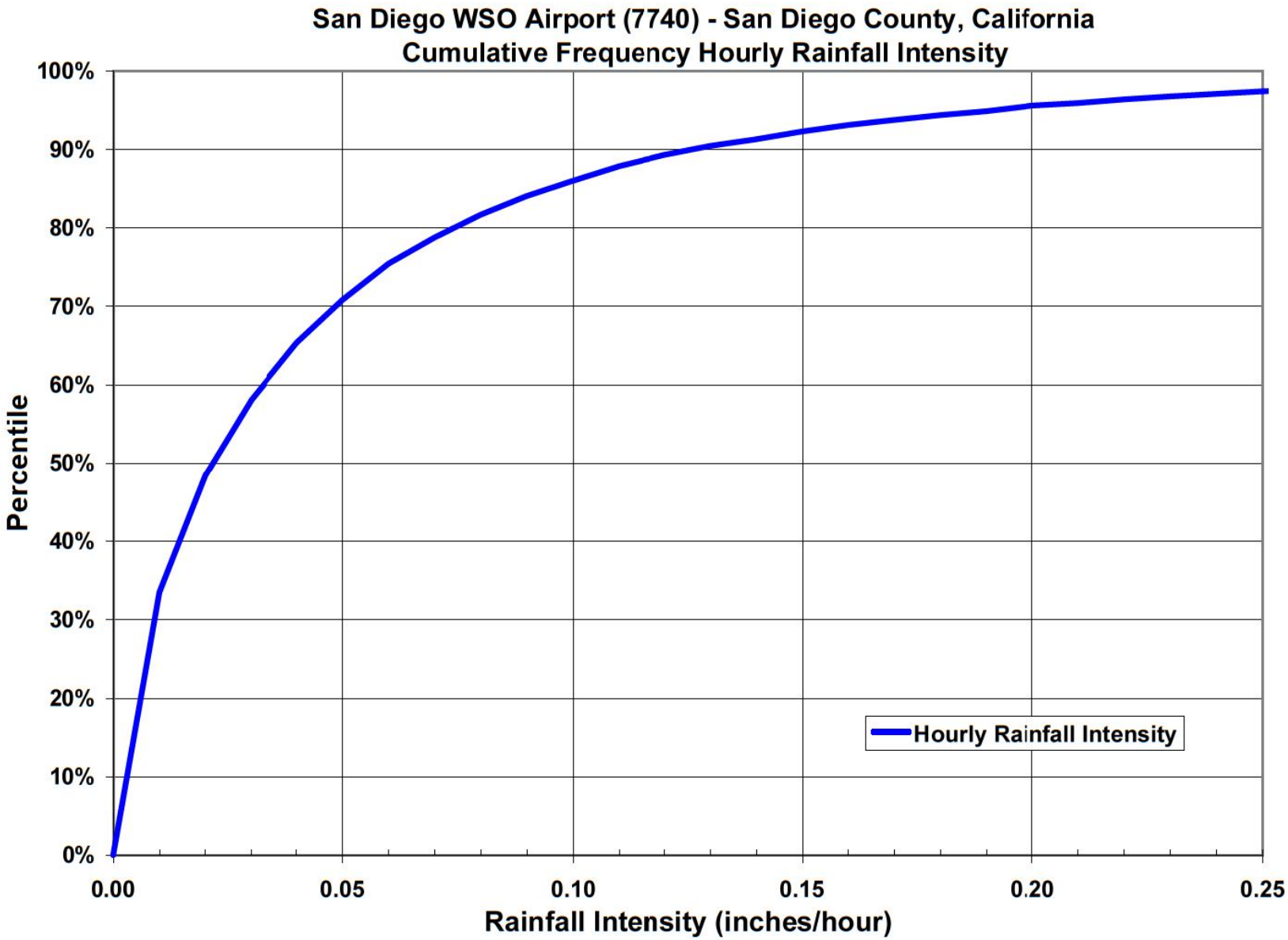
San Diego WSO Airport (7740) - San Diego County, California
Cumulative Frequency Hourly Rainfall Intensity
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Percentile
0.00
0.05
0.10
0.15
0.20
0.25
Rainfall Intensity (inches/hour)
Hourly Rainfall Intensity

013512

013513

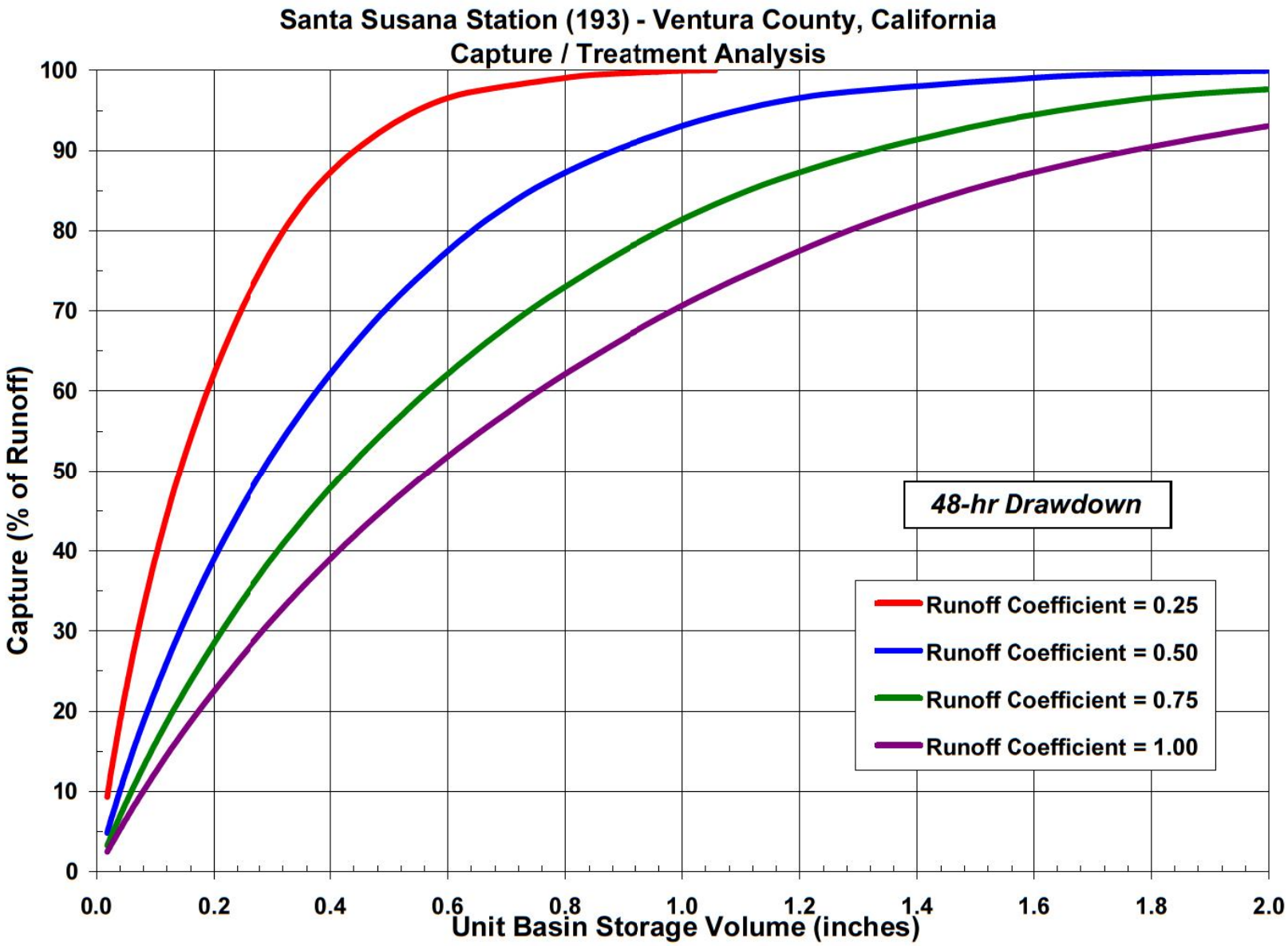
Santa Susana Station (193) - Ventura County, California
Capture / Treatment Analysis
Capture (% of Runoff)
Unit Basin Storage Volume (inches)
0
10
20
30
40
50
60
70
80
90
100
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6
1.8
2.0
48-hr Drawdown
Runoff Coefficient = 0.25
Runoff Coefficient = 0.50
Runoff Coefficient = 0.75
Runoff Coefficient = 1.00

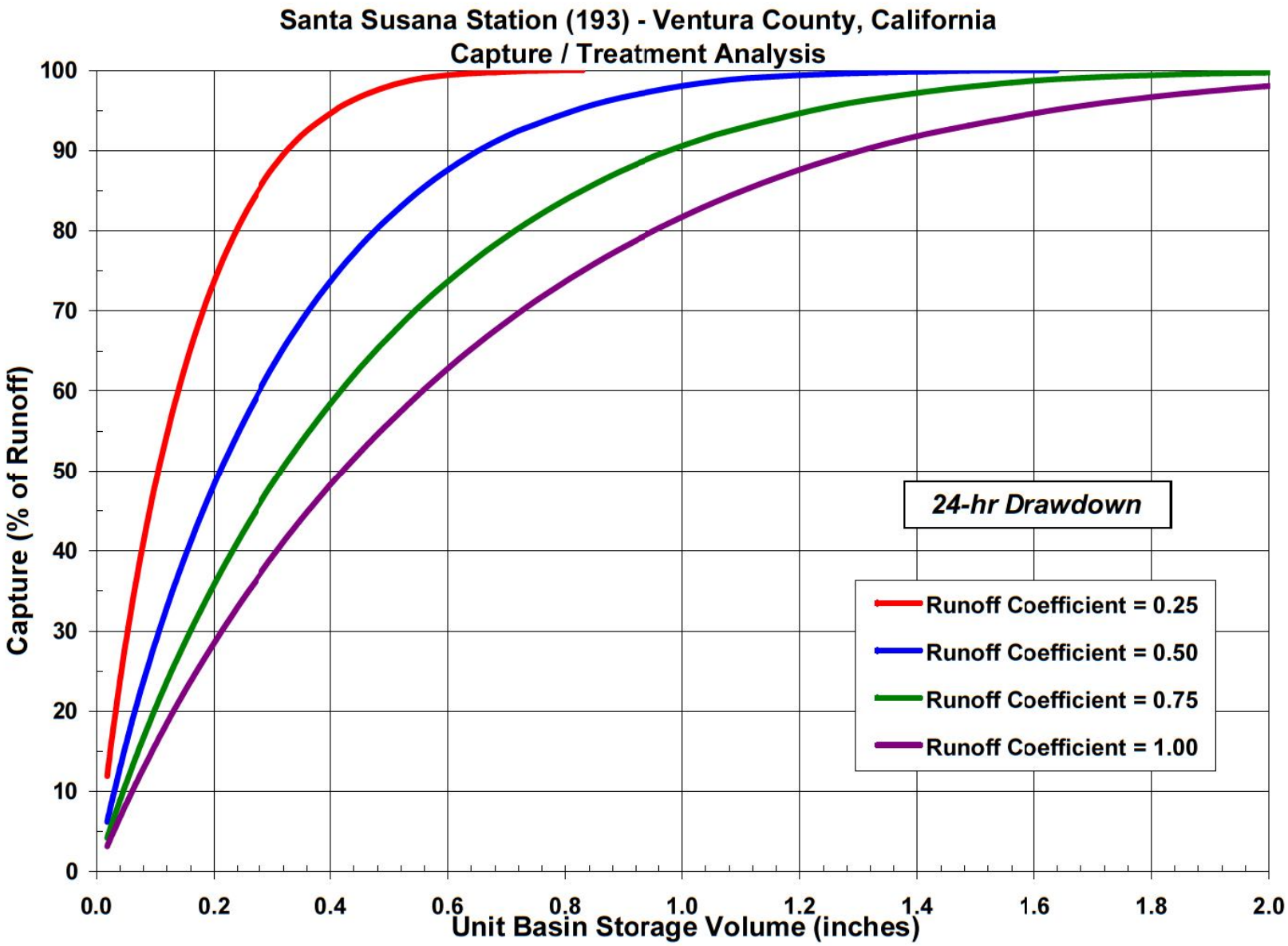
Santa Susana Station (193) - Ventura County, California
Capture / Treatment Analysis
Capture (% of Runoff)
Unit Basin Storage Volume (inches)
0
10
20
30
40
50
60
70
80
90
100
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6
1.8
2.0
24-hr Drawdown
Runoff Coefficient = 0.25
Runoff Coefficient = 0.50
Runoff Coefficient = 0.75
Runoff Coefficient = 1.00

013514

013515

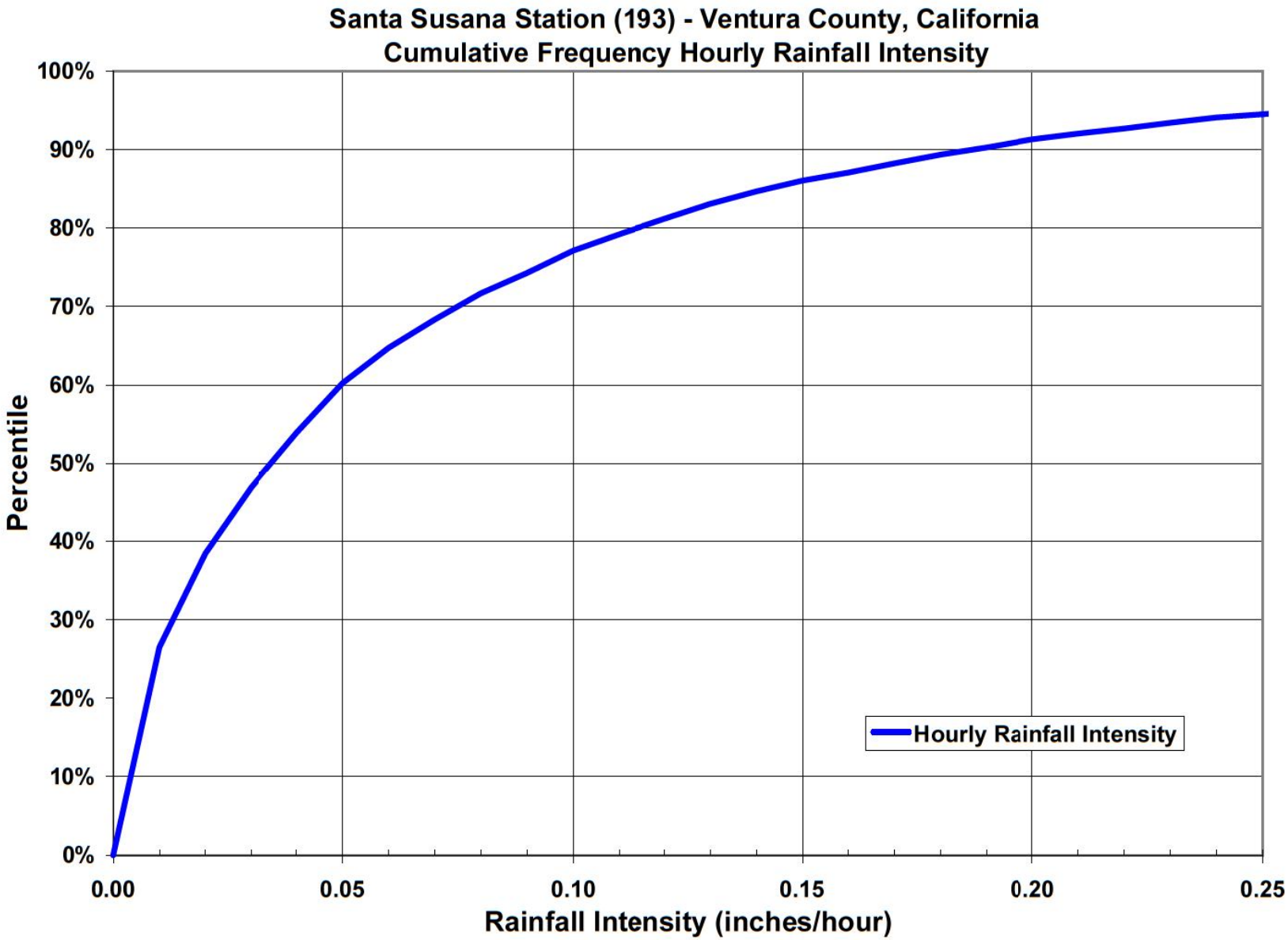
Santa Susana Station (193) - Ventura County, California
Cumulative Frequency Hourly Rainfall Intensity
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Percentile
0.00
0.05
0.10
0.15
0.20
0.25
Rainfall Intensity (inches/hour)
Hourly Rainfall Intensity

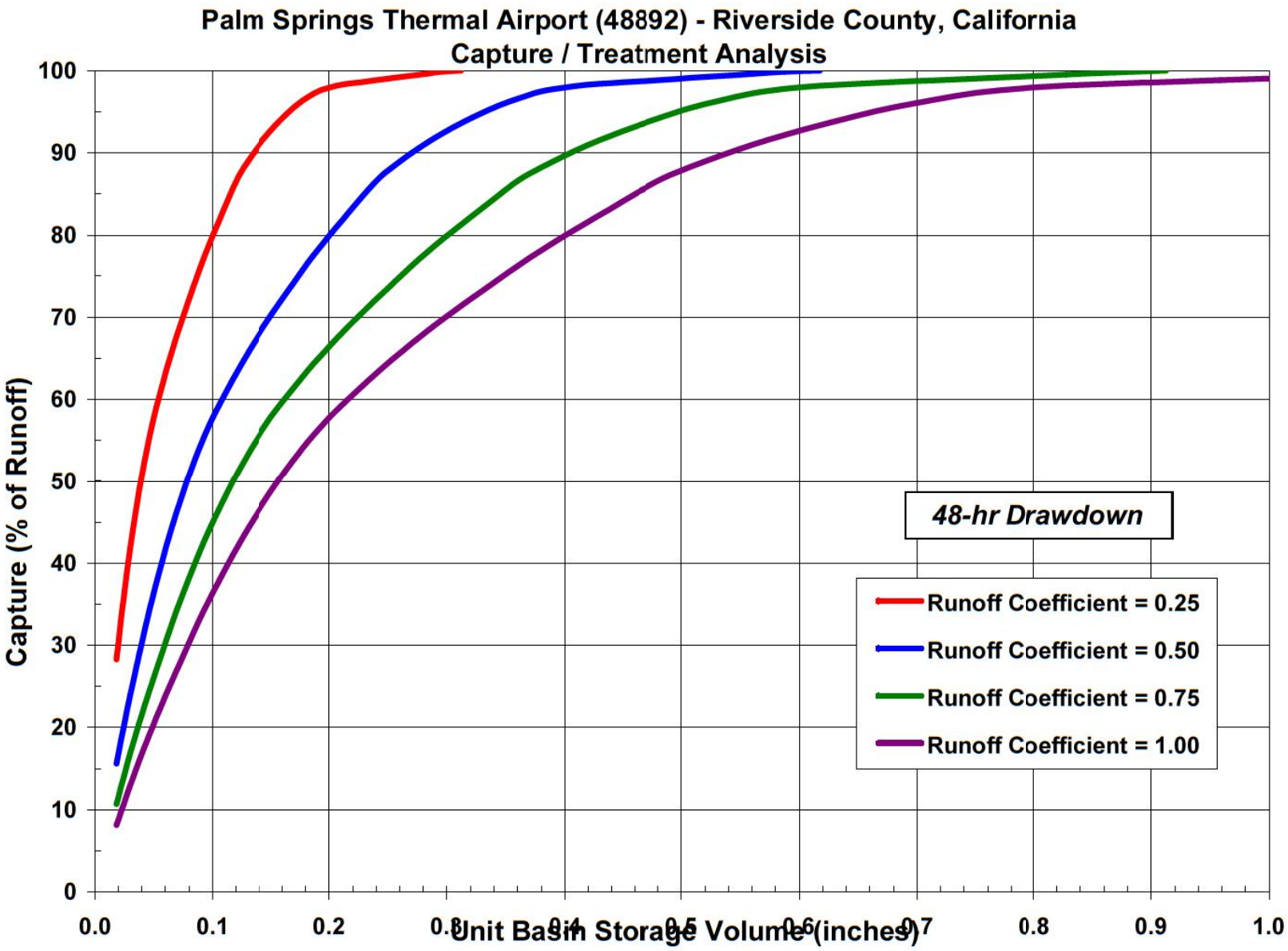
Palm Springs Thermal Airport (48892) - Riverside County, California
Capture / Treatment Analysis
Capture (% of Runoff)
Unit Basin Storage Volume (inches)
48-hr Drawdown
Runoff Coefficient = 0.25
Runoff Coefficient = 0.50
Runoff Coefficient = 0.75
Runoff Coefficient = 1.00
0
10
20
30
40
50
60
70
80
90
100
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0

013516

013517

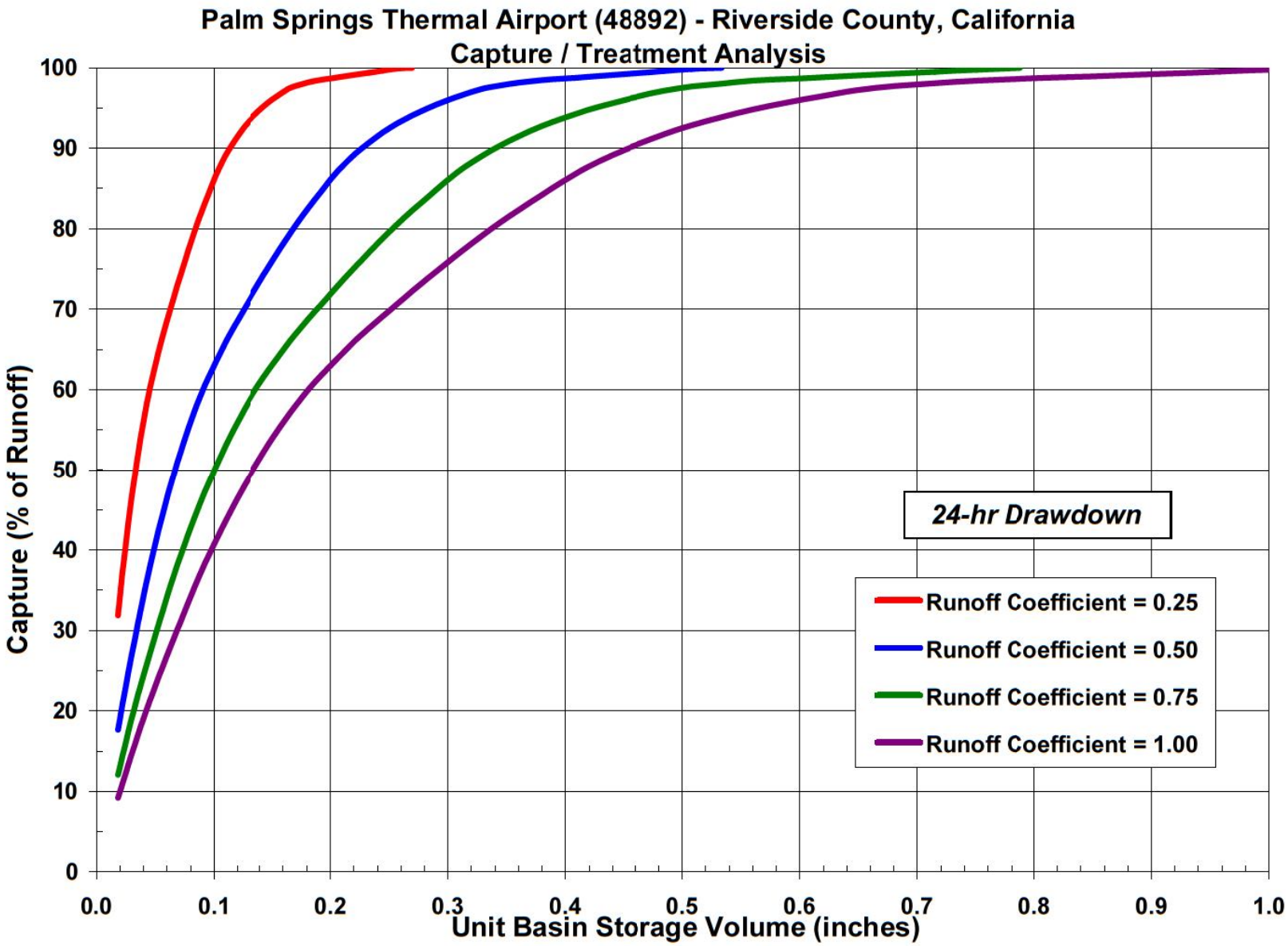
Palm Springs Thermal Airport (48892) - Riverside County, California
Capture / Treatment Analysis
Capture (% of Runoff)
Unit Basin Storage Volume (inches)
0
10
20
30
40
50
60
70
80
90
100
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
24-hr Drawdown
Runoff Coefficient = 0.25
Runoff Coefficient = 0.50
Runoff Coefficient = 0.75
Runoff Coefficient = 1.00

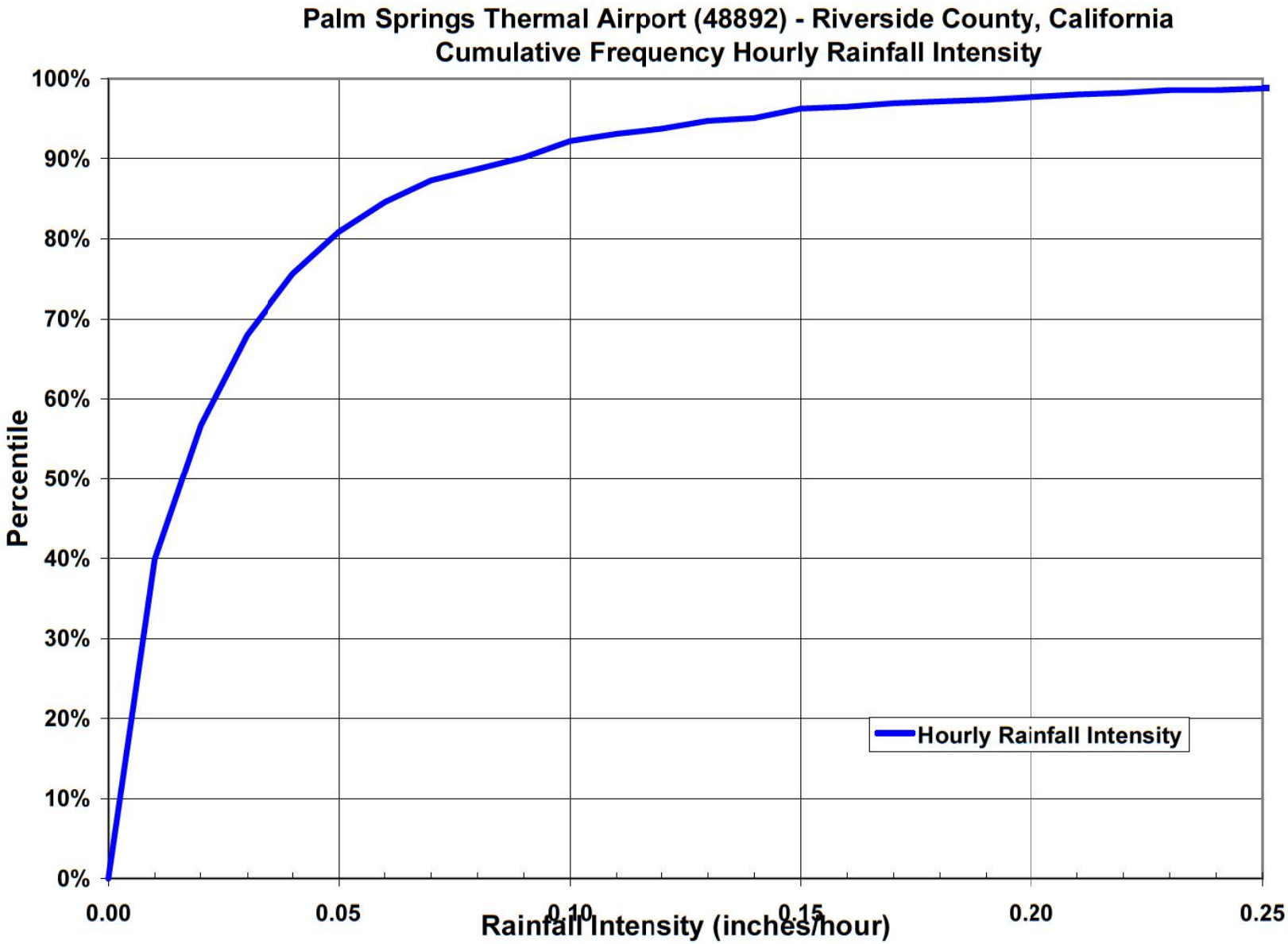
Palm Springs Thermal Airport (48892) - Riverside County, California
Cumulative Frequency Hourly Rainfall Intensity
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Percentile
0.00
0.05
0.10
0.15
0.20
0.25
Rainfall Intensity (inches/hour)
Hourly Rainfall Intensity

013518

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN FRANCISCO BAY REGION
ALAMEDA COUNTYWIDE NPDES MUNICIPAL STORMWATER PERMIT

ORDER R2-2003-0021
NPDES PERMIT NO. CAS0029831

FOR THE CITIES OF ALAMEDA, ALBANY, BERKELEY, DUBLIN, EMERYVILLE, FREMONT, HAYWARD, LIVERMORE, NEWARK, OAKLAND, PIEDMONT, PLEASANTON, SAN LEANDRO, UNION CITY, ALAMEDA COUNTY (UNINCORPORATED AREA), THE ALAMEDA COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT, AND ZONE 7 OF THE ALAMEDA COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT, WHICH HAVE JOINED TOGETHER TO FORM THE ALAMEDA COUNTYWIDE CLEAN WATER PROGRAM.

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN FRANCISCO BAY REGION
ALAMEDA COUNTYWIDE NPDES MUNICIPAL STORMWATER PERMIT

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CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN FRANCISCO BAY REGION

ORDER R2-2003-0021
NPDES PERMIT NO. CAS0029831

REISSUING WASTE DISCHARGE REQUIREMENTS FOR:

THE CITIES OF ALAMEDA, ALBANY, BERKELEY, DUBLIN, EMERYVILLE, FREMONT, HAYWARD, LIVERMORE, NEWARK, OAKLAND, PIEDMONT, PLEASANTON, SAN LEANDRO, UNION CITY, ALAMEDA COUNTY (UNINCORPORATED AREA), THE ALAMEDA COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT, AND ZONE 7 OF THE ALAMEDA COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT, WHICH HAVE JOINED TOGETHER TO FORM THE ALAMEDA COUNTYWIDE CLEAN WATER PROGRAM

The California Regional Water Quality Control Board, San Francisco Bay Region, (hereinafter referred to as the Regional Board) finds that:

FINDINGS

Finding 1: Incorporation of Fact Sheet

1. The Fact Sheet for the Alameda Countywide Clean Water Program NPDES Permit Reissuance includes cited references and additional explanatory information in support of the requirements of this Permit. This information, including any supplements thereto, and any future response to comments on the Revised Tentative Order, is hereby incorporated by reference.

Findings 2-3: Existing Permit

2. The Cities of Alameda, Albany, Berkeley, Dublin, Emeryville, Fremont, Hayward, Livermore, Newark, Oakland, Piedmont, Pleasanton, San Leandro, Union City, Alameda County (Unincorporated area), the Alameda County Flood Control and Water Conservation District, and Zone 7 of the Alameda County Flood Control and Water Conservation District (hereinafter collectively referred to as the Permittees and individually as the Permittee) have joined together to form the Alameda Countywide Clean Water Program (hereinafter referred to as the Program).
3. The Permittees are currently subject to National Pollutant Discharge Elimination System (NPDES) Permit No. CAS0029831 issued by Order No. 97-030 on February 19, 1997, and modified by Order No. 99-049 on July 21, 1999.

Findings 4-5: Permit Coverage

4. The Permittees each have jurisdiction over and/or maintenance responsibility for their respective municipal separate storm drain systems and/or watercourses in Alameda County. (See Attachment C: Municipalities and Major Open Creeks and Waterbodies in Alameda County)
5. Federal, state or regional entities within the Permittees' boundaries, not currently named in this Order, operate storm drain facilities and/or discharge stormwater to the storm drains and watercourses covered by this Order. The Permittees may lack jurisdiction over these entities. Consequently, the Regional Board recognizes that the Permittees should not be held responsible for such facilities and/or discharges. The Regional Board will consider such facilities for coverage in 2003 under its NPDES permitting scheme pursuant to United States Environmental

Protection Agency (US EPA) Phase II stormwater regulations. Under Phase II, the Regional Board intends to permit these federal, state, and regional entities either directly, or potentially through use of a Statewide Phase II NPDES General Permit.

Findings 6-8: Permit Background

6. On August 6, 2001, the Permittees and the Program submitted a permit re-application package that included a completed Application/Report of Waste Discharge for reissuance of waste discharge requirements under the NPDES permit referenced in Finding 3 (hereinafter referred to as the Permit) to discharge stormwater runoff from storm drains and watercourses under the Permittees' jurisdictions.

7. The application requirements that the Regional Board has determined to be applicable to the Permittees include submittal of a proposed Stormwater Quality Management Plan to reduce the discharge of pollutants in stormwater to the maximum extent practicable (MEP) and to effectively prohibit non-stormwater discharges into municipal storm drain systems and watercourses within the Permittees' jurisdictions.

8. The application incorporated by reference the Program's 2001-2008 Stormwater Quality Management Plan. The intent of the Stormwater Quality Management Plan is to reduce the discharge of pollutants in stormwater to the maximum extent practicable, and in a manner designed to achieve compliance with water quality standards and objectives, and effectively prohibit non-stormwater discharges into municipal storm drain systems and watercourses within the Permittees' jurisdictions. The Stormwater Quality Management Plan fulfills the Regional Board's permit application requirements, and it will be improved and revised in accordance with the provisions of this Order.

Findings 9-15: Stormwater Quality Management Plan

9. The Stormwater Quality Management Plan describes a framework for management of stormwater discharges during the term of the Permit. The title page and table of contents of the Program's 2001-2008 Stormwater Quality Management Plan (Management Plan) are appended to this Order as Attachment A. The Management Plan describes the Program's goals and objectives and the annual reporting and program evaluation process. Performance Standards, which represent the baseline level of effort required of each of the Permittees, are contained in Section 5 of the Management Plan. The Performance Standards serve as a reference point upon which to base effectiveness evaluations and consideration of opportunities for improving them.

10. The Management Plan, including the Performance Standards, is incorporated in the Permit by reference and enforceable as such, and is considered an enforceable component of this Order.

11. Program activities are focused on the following components:

    - Regulatory Compliance, Planning, Program Management
    - Annual Reporting and Evaluation
    - Watershed Assessment
    - Monitoring and Special Studies
    - Pollutants of Concern
    - Public Information and Participation
    - Municipal Maintenance Activities
    - Illicit Discharge Controls

- Industrial and Commercial Discharge Controls
- New Development, Significant Redevelopment, and Construction Controls

12. Through the Public Information and Participation (PIP) component, the Program provides information to residents in order to educate them about stormwater pollution and change behaviors that adversely affect water quality. PIP activities are conducted locally, countywide and in collaboration with other regional agencies. The Management Plan states that, at a minimum, annual PIP efforts must include general outreach, targeted outreach (including outreach to municipal staff within each Permittees' jurisdictions), educational programs, and citizen participation activities. The Management Plan also states that one of the PIP component objectives is to evaluate component effectiveness of the PIP activities and make improvements so as to increase effectiveness.

13. The Management Plan contains Performance Standards and supporting documents to address the post-construction and construction phase impacts of new development and significant redevelopment projects on stormwater quality.

14. The goal of the Industrial and Commercial Discharge Controls component is to reduce or eliminate adverse water quality impacts from activities conducted at any industrial and commercial site within the Permittees' jurisdictions that have a potential for significant urban runoff pollution. The Management Plan requires each Permittee to develop a five-year Illicit Discharge Control Action Plan (Action Plan) to reduce, control and/or otherwise address sources of discharges. The Action Plan will ensure that each Permittee identifies high-priority areas for inspection and investigation, regularly surveys those areas at a specified frequency, identifies which staff within each Permittee will be responsible for completing field surveys, identifies how illicit discharge control activities are documented, and ensures that appropriate enforcement is taken for problem discharges. In short, it will serve as the framework document for each Permittee to appropriately control illicit discharges.

15. The Program and the Permittees are committed to a process of evaluating the effectiveness and improving the Performance Standards and plans contained in the Management Plan, which includes seeking new opportunities to control stormwater pollution and to protect beneficial uses. Changes and updates to control measures, Best Management Practices, and Performance Standards will be documented in the Annual Report and, following Regional Board approval, will be considered part of the Management Plan and an enforceable component of this Order.

Finding 16: Cooperative Effort Among Entities

16. The Program participates in, and contributes to, joint efforts with other entities, including regulatory agencies, public benefit corporations, universities, and citizens' groups. These entities may take a lead role in addressing particular sources because they are regional, statewide or national in scope, because they have different skills or expertise, or because they have appropriate regulatory authority.

Finding 17: Annual Reviews

17. The Regional Board staff will perform, in coordination with the Permittees and interested persons, an annual performance review and evaluation of the Program, the Permittees and their compliance activities. The reviews are a useful means of evaluating overall Program

effectiveness, implementation of Performance Standards, and improvement opportunities. The following areas will be evaluated:

a. Overall Program and Permittee effectiveness and compliance;

b. Performance Standard improvements;

c. Permittees' coordination and implementation of watershed-based management actions (e.g., flood management, new development and construction, industrial source controls, public information/participation, monitoring);

d. Partnership opportunities with other Bay Area stormwater programs; and

e. Consistency in meeting maximum extent practicable measures within the Program and with other regional, statewide, and national municipal stormwater management programs.

Findings 18-25: Applicable Federal, State and Regional Regulations

18. Section 402(p) of the federal Clean Water Act (CWA), as amended by the Water Quality Act of 1987, requires NPDES permits for stormwater discharges from separate municipal storm drain systems, stormwater discharges associated with industrial activity (including construction activities), and designated stormwater discharges which are considered significant contributors of pollutants to waters of the United States. On November 16, 1990, US EPA published regulations (40 CFR Part 122) which prescribe permit application requirements for municipal separate storm drain systems pursuant to Section 402(p) of the CWA. On May 17, 1996, US EPA published an Interpretive Policy Memorandum on Reapplication Requirements for Municipal Separate Storm Sewer Systems (MS4s), which provided guidance on permit application requirements for regulated MS4s.

19. The Regional Board adopted a revised Water Quality Control Plan for the San Francisco Bay Basin (Basin Plan) on June 21, 1995, which was approved by the State Water Resources Control Board and the Office of Administrative Law on July 21 and November 13 of 1995, respectively. This updated and consolidated plan represents the Regional Board's master water quality control planning document. The Urban Runoff Management, Comprehensive Control Program section of the Basin Plan requires the Permittees to address existing water quality problems and prevent new problems associated with urban runoff through the development and implementation of a comprehensive control program focused on reducing current levels of pollutant loading to storm drains to the maximum extent practicable. The Basin Plan comprehensive program requirements are designed to be consistent with federal regulations (40 CFR Parts 122-124) and are implemented through issuance of NPDES permits to owners and operators of storm drain systems. A summary of the regulatory provisions is contained in Title 23 of the California Code of Regulations at Section 3912. The Basin Plan identifies beneficial uses and establishes water quality objectives for surface waters in the Region, as well as effluent limitations and discharge prohibitions intended to protect those uses. This Order implements the plans, policies, and provisions of the Regional Board's Basin Plan.

20. The State Water Resources Control Board (State Board) has issued NPDES general permits for the regulation of stormwater discharges associated with industrial activities and construction activities. To effectively implement the New Development (and significant redevelopment) and Construction Controls, Illicit Discharge Controls, and Industrial and Commercial Discharge Controls components of the Management Plan, the Permittees will conduct investigations and

local regulatory activities at industries and construction sites covered by these general permits. However, under the Clean Water Act, the Regional Board cannot delegate to the Permittees its own authority to enforce these general permits. Therefore, Regional Board staff intend to work cooperatively with the Permittees to ensure that industries and construction sites within the Permittees' jurisdictions are in compliance with applicable general permit requirements and are not subject to uncoordinated stormwater regulatory activities.

21. The beneficial uses of Central, Lower and South San Francisco Bay, its tributary streams and contiguous water bodies, and other water bodies within the drainage basin are listed in the Basin Plan.

22. The Regional Board considers stormwater discharges from urban and developing areas in the San Francisco Bay Region, such as Alameda County, to be significant sources of certain pollutants in waters of the Region that may be causing or threatening to cause or contribute to water quality impairment. Furthermore, as delineated on the CWA Section 303(d) list, the Regional Board has found that there is a reasonable potential that municipal stormwater discharges may cause or contribute to an excursion above water quality standards for: mercury, PCBs, dioxins, furans, diazinon, dieldrin, chlordane, DDT, copper, and selenium in Central San Francisco Bay; diazinon in all urban creeks in Alameda County; and trash and low dissolved oxygen in Lake Merritt. In accordance with CWA Section 303(d), the Regional Board is required to establish Total Maximum Daily Loads (TMDLs) for these pollutants to these waters in order to gradually eliminate impairment and attain water quality standards. Therefore, certain early actions and/or further assessments by the Permittees are warranted and required pursuant to this Order.

23. The Regional Board considers the Management Plan an essential component of an urban watershed management plan for urbanized portions of Alameda County, and the portions of Alameda County that are currently being developed. The Management Plan is intended to provide a framework for protection and restoration of Alameda County watersheds and the Central, Lower and South San Francisco Bay in part through effective and efficient implementation of appropriate control measures for sources of pollutants within the watersheds.

24. The San Francisco Estuary Project, established pursuant to CWA Section 320, culminated in June 1993 with completion of its Comprehensive Conservation and Management Plan (CCMP) for the preservation, restoration, and enhancement of the San Francisco Bay-Delta Estuary. The CCMP includes recommended actions in the areas of aquatic resources, wildlife, wetlands, water use, pollution prevention and reduction, dredging and waterway modification, land use, public involvement and education, and research and monitoring. Recommended actions which may, in part, be addressed through implementation of the Permittees' Management Plan include, but are not limited to, the following:

    a. Action PO-2.1: Pursue a mass emissions strategy to reduce pollutant discharges into the Estuary from point and nonpoint sources and to address the accumulation of pollutants in estuarine organisms and sediments.

    b. Action PO-2.4: Improve the management and control of urban runoff from public and private sources.

    c. Action PO-2.5: Develop control measures to reduce pollutant loadings from energy and transportation systems.

d. Action LU-1.1: Local General Plans should incorporate watershed protection plans to protect wetlands and stream environments and reduce pollutants in runoff.

e. Action LU-3.1: Prepare and implement Watershed Management Plans that include the following complementary elements: 1) wetlands protection, 2) stream environment protection, and, 3) reduction of pollutants in runoff.

f. Action LU-3.2: Develop and implement guidelines for site planning and Best Management Practices.

g. Action PI-2.3: Work with educational groups, interpretive centers, decision-makers, and the general public to build awareness, appreciation, knowledge, and understanding of the Estuary's natural resources and the need to protect them. This would include how these natural resources contribute to and interact with social and economic values.

25. This action to adopt an NPDES permit is exempt from the provisions of the California Environmental Quality Act (Division 13 of the Public Resources Code, Chapter 3, Section 21100, et. seq.) in accordance with Section 13389 of the California Water Code.

Findings 26-30: Nature of Discharges and Sources of Pollutants

26. The discharge consists of the surface runoff generated from various land uses in all the hydrologic sub basins in the basin which discharge into watercourses, which in turn flow into Central, Lower and South San Francisco Bay.

27. The quality and quantity of runoff discharges varies considerably and is affected by hydrology, geology, land use, season, and sequence and duration of hydrologic event. Pollutants of concern in these discharges are certain heavy metals, excessive sediment production from erosion due to anthropogenic activities, petroleum hydrocarbons from sources such as used motor oil, microbial pathogens of domestic sewage origin from illicit discharges, certain pesticides associated with the risk of acute aquatic toxicity, excessive nutrient loads which may cause or contribute to the depletion of dissolved oxygen and/or toxic concentrations and dissolved ammonia, trash which impairs beneficial uses including but not limited to support for aquatic life, and other pollutants which may cause aquatic toxicity in the receiving waters.

28. Certain pollutants present in stormwater and/or urban runoff may be derived from extraneous sources that the Permittees have limited or no direct jurisdiction over. Examples of such pollutants and their respective sources are polycyclic aromatic hydrocarbons (PAHs) which are products of internal combustion engine operation and other sources; heavy metals, such as copper from brake pad wear and zinc from tire wear; dioxins as products of combustion; mercury resulting from atmospheric deposition; and natural-occurring minerals from local geology. All of these pollutants, and others, may be deposited on paved surfaces, rooftops, and other impervious surfaces as fine airborne particles, thus yielding stormwater runoff pollution that is unrelated to the particular activity associated with a given new or redevelopment project.

29. It may be more efficient to manage airborne pollutants at their sources of release and/or through reformulating pollutant-generating products rather than through treatment of stormwater. However, unless restricted by jurisdictional limitations, Permittees can implement structural treatment control measures, or require developers to implement structural treatment control measures to reduce entry of these pollutants into stormwater and their discharge to receiving waters.

30. Retail gasoline outlets (RGOs), commonly referred to as "gas stations," are sources for pollutants of concern in stormwater and have been widely documented as such. The most common pollutants of concern in stormwater runoff from RGOs are heavy metals, petroleum hydrocarbons (such as Polycyclic Aromatic Hydrocarbons (PAHs)), and oil and grease.[1] RGOs fall within the new development and significant redevelopment projects subject to Provision C.3 of this Order, when they meet the impervious surface thresholds within that Provision. Pursuant to Provision C. 3., as with any other project meeting the thresholds of that Provision, RGOs are required to incorporate appropriate source controls and design measures, and to appropriately treat stormwater runoff prior to discharge to the storm drain or local water. As with any commercial and/or industrial activity within the Permittees' jurisdictions that has the potential to discharge pollutants in stormwater runoff, RGOs may also be subject to regulation under other sections of the Permit and Management Plan, including the Illicit Discharge Control and Industrial and Commercial Discharge Control sections.

Findings 31-41 in Support of Provision C.3: New Development and Redevelopment Performance Standards

31. Urban Development Increases Pollutant Load, Volume, and Velocity of Runoff: During urban development two important changes occur. First, natural vegetated pervious ground cover is converted to impervious surfaces such as paved highways, streets, rooftops, and parking lots. Natural vegetated soil can both absorb rainwater and remove pollutants providing a very effective natural purification process. Because pavement and concrete can neither absorb water nor remove pollutants, the natural purification characteristics of the land are lost. Secondly, urban development creates new pollution sources as human population density increases and brings with it proportionately higher levels of car emissions, car maintenance wastes, municipal sewage, pesticides, household hazardous wastes, pet wastes, trash, etc., which can be washed into the municipal separate storm sewer system. As a result of these two changes, the runoff leaving the developed urban area is significantly greater in volume, velocity and pollutant load than the pre-development runoff from the same area.

32. The pollutants found in urban runoff can have damaging effects on both human health and aquatic ecosystems. In addition, the increased flows and volumes of stormwater discharged from new impervious surfaces resulting from new development and redevelopment can significantly impact beneficial uses of aquatic ecosystems due to physical modifications of watercourses, such as bank erosion and widening of channels.

33. Water Quality Degradation Increases with Percent Imperviousness: The increased volume and velocity of runoff from developed urban areas can greatly accelerate the erosion of downstream natural channels. A number of studies have demonstrated a direct correlation between the degree of imperviousness of an area and the degradation of beneficial uses of downstream receiving waters. Significant declines in the biological integrity and physical habitat of streams and other receiving waters have been found to occur with as little as a 10% conversion from natural to impervious surfaces. Typical medium-density single-family home projects range between 25 to 60% impervious. Even at very low densities, such as 1-2 housing units per acre,

[1] *Retail Gasoline Outlets: New Development Design Standards for Mitigation of Stormwater Impacts* – California Water Quality Control Board, Los Angeles Region, and California Water Quality Control Board, San Diego Region, Technical Report, prepared by Radulescu, Swamikannu, and Hammer, 2001.

standard subdivision designs can exceed the 10% imperviousness threshold that, as noted above, is theorized to be the threshold for degradation of streams and other waters with increasing imperviousness of their catchment.[2] Studies on the impacts of imperviousness on beneficial uses of waters include "Urbanization of aquatic systems: Degradation thresholds, stormwater detection, and the limits of mitigation," Derek B. Booth and C. Rhett Jackson, Journal of the American Water Resources Association 33(5), Oct. 1997, pp. 1077-1089; "Urbanization and Stream Quality Impairment," Richard D. Klein, Water Resources Bulletin 15(4), Aug. 1979, pp. 948-963; "Stream channel enlargement due to urbanization," Thomas R. Hammer, Water Resources Research 8(6), Dec. 1972, pp. 1530- 1540; and, summaries of work on the impacts of imperviousness, including "The Importance of Imperviousness," in Watershed Protection Techniques 1(3), Fall 1994, pp. 100-111, and "Impervious surface coverage: The emergence of a key environmental indicator," Chester L. Arnold et al., Journal of the American Planning Association 62(2), Spring 1996, pp.243-259.

34. The Permittees have encouraged developers to minimize increases in impervious surfaces through a number of techniques such as those described in the Bay Area Stormwater Management Agencies Association's (BASMAA's) "Start at the Source Design Guidance Manual for Stormwater Quality Protection," 1999 edition (Start at the Source). One of the techniques recommended by Start at the Source is to use permeable pavements to infiltrate stormwater while still providing a stable load-bearing surface. For purposes of this Order, the Program may submit guidelines for use of these techniques for minimizing increases in impervious surfaces described in Start at the Source, implementation of which techniques will provide that such areas will not count toward the creation or replacement of impervious surfaces, or may be modeled differently for the purposes of sizing post-construction stormwater treatment controls, for approval of the Regional Board's Executive Officer.

35. Because land use planning is where urban development begins, it is the phase in which the greatest and most cost-effective opportunities to protect water quality in new and redevelopment exist. When a Permittee incorporates policies and principles designed to safeguard water resources into its General Plan and development project approval processes, it has taken a far-reaching step towards the preservation of local water resources for future generations.

36. Provision C.3 is written with the assumption that the Permittees are responsible for considering potential stormwater impacts when making planning and land use decisions. The goal of these requirements is to address pollutant discharges and changes in runoff flows from new development and significant redevelopment projects, through implementation of post-construction and treatment measures, source control, and site design measures, to the maximum extent practicable. Neither Provision C.3 nor any of its requirements are intended to restrict or control local land use decision-making authority.

37. For the purposes of this Order, the term "Redevelopment" is defined as a project on a previously developed site that results in the addition or replacement of impervious surface, and the term "brownfield site" means real property, the expansion, redevelopment, or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant.

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[2] A discussion of imperviousness based on type of development and time of construction is provided in Heaney, J.B., Pitt, R, and Field, R. **Innovative Urban Wet-Weather Flow Management Systems**, 1999. USEPA Doc. No. EPA/600/R-99/029 (Chapter 2).

38. Opportunities to address stormwater pollution and hydrograph modification can be limited by current local design standards and guidance. For example, such standards and guidance may reduce or prohibit opportunities to minimize impervious surfaces, minimize directly connected impervious area, provide for small-scale detention, and implement other management measures. Revision of current standards and guidance can result in a significantly increased ability for project designers to minimize project impacts and can also enhance local property values, neighborhood character, and overall quality of life. Further, revision of standards and guidance can allow implementation of site design measures in projects to meet or help meet the numeric sizing criteria in Provision C.3.d and/or the hydrograph modification limitation in Provision C.3.f.

39. Certain control measures implemented or required by Permittees for urban runoff management may create a habitat for vectors (e.g., mosquitoes and rodents) if not properly designed or maintained. Close collaboration and cooperative effort among Permittees, local vector control agencies, Regional Board staff, and the State Department of Health Services is necessary to minimize potential nuisances and public health impacts resulting from vector breeding.

40. Provision C.3.f requires the Permittees to prepare a Hydrograph Modification Management Plan (HMP), for approval by the Regional Board, to manage impacts from changes to the volume and velocity of stormwater runoff from new development and significant redevelopment projects, where these changes can cause excessive erosion damage to downstream watercourses. Transit village type developments within ¼ to within ½ mile of transit stations and/or intermodal facilities, and projects within "Redevelopment Project Areas" (as defined by Health and Safety Code Section 33000, et seq.) that redevelop an existing brownfield site or create housing units affordable to persons of low or moderate income as defined by Health and Safety Code Section 50093, are excepted from the requirements of C.3.f and the HMP. Significant change in impervious surface or significant change in stormwater runoff volume or timing is unlikely in these redevelopment circumstances, because these developments would be within a largely already paved catchment, and on a site that is largely already paved or otherwise impervious.

    Similarly, as specified in Provision C.3.g.v, an exemption without the requirement for alternate, equivalent offsite treatment is allowed for the following redevelopment projects after impracticability of including onsite treatment measures is established, where such projects are built as redevelopment projects as defined in Finding 14, and it is clearly demonstrated that cost of participation in alternate, equivalent offsite treatment through a regional treatment or other equivalent water quality benefit project fund will unduly burden the project: creation of housing units affordable to persons of low or moderate income as defined by Health and Safety Code Section 50093, brownfield sites, and/or transit village type developments within 1/4 mile of transit stations and/or intermodal facilities. Not only is significant change in impervious surface or significant change in stormwater runoff volume or timing unlikely in these redevelopment circumstances, but these redevelopment projects are also likely to provide reduced water quality impacts and/or other environmental benefits in their own right.

41. The Regional Board recognized in its "Policy on the Use of Constructed Wetlands for Urban Runoff Pollution Control" (Resolution No. 94-102) that urban runoff treatment wetlands that are constructed and operated pursuant to that Resolution and are constructed outside of a creek or other receiving water, are stormwater treatment systems and, as such, are not waters of the

United States subject to regulation pursuant to Sections 401 or 404 of the federal Clean Water Act. Regional Board staff is working with the California Department of Fish and Game (CDFG) and U.S. Fish and Wildlife Service (USFWS) to identify how maintenance for stormwater treatment controls required under permits such as this Permit can be appropriately streamlined, given CDFG and USFWS requirements, and particularly those that address special status species. The Permittees are expected to work diligently and in good faith with the appropriate agencies to obtain any approvals necessary to complete maintenance activities for treatment controls. If the Permittees have done so, when necessary and where maintenance approvals are not granted, the Permittees shall be considered by the Regional Board to be in compliance with Provision C.3.e of this Order.

Finding in Support of Provision C.4: Public Information and Participation Performance Standards

42. The implementation of a public information and participation program is a critical component of a stormwater management program. An informed and knowledgeable community is critical to the success of a stormwater program because it helps ensure greater support for the program as the public gains a greater understanding for stormwater pollution issues. An informed community also ensures greater compliance with the program as the public becomes aware of the personal responsibilities expected of them and others in the community, including the individual actions they can take to protect or improve the quality of area waters.

Finding in Support of Provision C.5: Performance Standards for Municipal Maintenance

43. Provision C.5 requires the Permittees to implement the municipal maintenance Performance Standards as set forth in the Management Plan, including, but not limited to, activities as described below. The work of municipal maintenance personnel is vital to minimize stormwater pollution, because personnel work directly on municipal storm drains and other municipal facilities (e.g., roads, parking lots, sidewalks, parks, landscaping, etc.). Through work such as inspecting and cleaning storm drain drop inlets and pipes and appropriately conducting municipal construction and maintenance activities upstream of the storm drain, municipal maintenance personnel are directly responsible for preventing and removing pollutants from the storm drain. Maintenance personnel also play an important role in educating the public and in reporting and cleaning up illicit discharges.

Finding in Support of Provision C.6: Performance Standard for Rural Public Works Maintenance and Support

44. Provision C.6 requires the Permittees to create an effective Best Manangement Practice (BMP) approach for the following rural public works maintenance and support activities: a) management and/or removal of large woody debris and live vegetation from stream channels; b) streambank stabilization projects; c) road construction, maintenance, and repairs in rural areas to prevent and control road-related erosion; and d) environmental permitting for rural public works activities. Road construction and other activities can disturb the soil and drainage patterns to streams in undeveloped areas, causing excess runoff and thereby erosion and the release of sediment. In particular, poorly designed roads can act as man-made drainages that carry water and sediment into natural streams, impacting water quality. In addition, other rural public works activities, including those the BMP approach would address, have the potential to significantly affect sediment discharge and transport within streams and other waterways, which can degrade

the beneficial uses of those waterways. This Provision would help ensure these impacts are appropriately controlled.

Findings 45-46: Monitoring

45. Provision C.8 requires the annual and multi-year submittal and implementation of a Monitoring Program Plan, to include monitoring of receiving waters, in accordance with 40 CFR Parts 122.44(I) and 122.48. The purpose of the Monitoring Program Plan is to demonstrate the effectiveness of the Program's Management Plan and accordingly, demonstrate compliance with the conditions of the Permit. On April 15, 1992, the Regional Board adopted Resolution No. 92-043 directing the Executive Officer to implement the Regional Monitoring Program for San Francisco Bay. Subsequent to a public hearing and various meetings, Board staff requested major permit holders in the Region, under authority of Section 13267 of California Water Code, to report on the water quality of the Estuary. These permit holders, including the Permittees, responded to this request by participating in a collaborative effort through the San Francisco Estuary Institute. This effort has come to be known as the San Francisco Estuary Regional Monitoring Program for Trace Substances (RMP). The RMP involves collection and analysis of data on pollutants and toxicity in water, sediment and biota of the Estuary. The Permittees should continue to report on the water quality of the estuary, as presently required. Compliance with the requirement through participation in the RMP is considered to be adequate compliance. Alternatively, the Permittees may submit and implement an acceptable alternative monitoring plan. Annual reports from the RMP are referenced elsewhere in this Order.

46. The Regional Board has received the Program's draft Watershed Assessment and Monitoring Strategy for Fiscal Years 2002-2008, appended to this Order as Attachment B. The goal of this monitoring strategy is to support the development and implementation of the Management Plan and demonstrate its effectiveness along with showing the results of the Program's related monitoring work.

Finding in Support of Provision C.9

47. Provision C.9 requires identification of the non-prohibited types of discharges that the Permittees wish to exempt from Prohibition A. For conditionally exempted discharges which are pollutant sources, the Provision requires the Permittees to identify and incorporate into the Management Plan control measures to minimize the adverse impact of such sources. This Provision also establishes a mechanism to authorize under the Permit non-stormwater discharges owned or operated by the Permittees. The Program has developed a list of BMPs to eliminate adverse impacts of conditionally exempt discharges such as uncontaminated pumped groundwater, foundation drains, water from crawl spaces pumps, footing drains and planned and unplanned discharges from potable water sources, and water line and hydrant flushing.

Finding in Support of Provision C.10: Water Quality-Based Requirements for Specific Pollutants of Concern

48. This Provision requires the Permittees to implement programs to control pollutants that have the reasonable potential to cause or contribute to exceedances of water quality standards, including programs for copper, mercury, pesticides, polycholorinated biphenyls (PCBs) and dioxin-like compounds, and sediment, pursuant to the schedule provided in the Order. In addition, pursuant to Provision C.1 of this Order, if exceedances of water quality objectives persist notwithstanding implementation of Provisions C.2 through C.8 of this Order and the Plan, a Permittee shall report

to the Regional Board on the control measures that are being implemented to reduce the amount of pollutants, and develop a plan to further address the pollutants that cause impairment over time. In response to prior Provision C.1 submissions, the Regional Board is including additional requirements in Provision C.10 of this Order to continue implementation of previously delineated pollutant specific control measures and identification and implementation of additional control measures necessary to prevent or reduce discharges of pollutants that are causing or contributing to the exceedance of water quality standards.

Findings 49-50: Mercury

49. In 1998, the Regional Board met in a public hearing and adopted a CWA Section 303(d) list that classified all of San Francisco Bay as impaired due to mercury. The Permit requires Permittees to control mercury, which has been found by the Regional Board to have the reasonable potential to cause or contribute to exceedances of water quality standards, to the maximum extent practicable.

50. To reduce levels of mercury in stormwater discharges, the Permittees have begun to implement a Mercury Pollutant Reduction Plan (Mercury Plan).

Finding 51: Pesticides

51. The Program conducted pioneering studies starting in 1994, determining that diazinon from urban runoff was responsible for toxicity in urban creeks. The Permit requires the Permittees to address pesticides, which have been found by the Regional Board to have the reasonable potential to cause or contribute to exceedances of water quality standards. The Program has submitted a proactive Diazion Pollutant Reduction Plan, hereafter referred to as the "Pesticide Plan." The goals of the Pesticide Plan and of its resulting implementing actions are to reduce or substitute pesticide use (especially diazinon use) with less toxic alternatives.

Findings 52-55: PCBs and Dioxins

52. US EPA lists PCBs as a potential carcinogen. In addition, PCBs are suspected of having negative impacts on the human immune system, reproductive system, nervous system, endocrine system, and digestive system. Although their manufacture is now banned in the United States, PCBs continue to pose a serious risk due to their persistence in the environment. PCBs accumulate in fatty tissue. This is important to human health in that several of the more common food fishes in the Bay (e.g., striped bass, white croaker) are marked by relatively high fat content. The California Office of Environmental Health and Hazard Assessment issued an interim fish consumption advisory for all of San Francisco Bay, partly based on PCB concentrations found in Bay fishes.

53. Urban runoff is highly likely to be a conveyance mechanism associated with the impairment of San Francisco Bay for PCBs.

54. The Permit requires Permittees to control PCBs, which have been found by the Regional Board to have the reasonable potential to cause or contribute to exceedances of water quality standards, to the maximum extent practicable. The Program has submitted a PCBs Pollutant Reduction Plan. This Plan includes surveys of stream sediments to assess concentrations and loadings of PCBs, assesses potential for ongoing discharges of PCBs, and develops a plan to reduce discharges of PCBs in runoff.

55. Dioxins are persistent, bioaccumulative, toxic compounds that are produced from the combustion of organic materials in the presence of chlorine. Dioxins enter the air through fuel and waste emissions, including diesel and other motor vehicle exhaust fumes and trash incineration, and are carried in rain and contaminate soil. Dioxins bioaccumulate in fat and most human exposure occurs through the consumption of animal fats, including those from fish.

Findings 56-58: Implementation

56. It is the Regional Board's intent that this Order shall ensure attainment of applicable water quality objectives and protection of the beneficial uses of receiving waters and associated habitat. This Order therefore includes standard requirements to the effect that discharges shall not cause exceedances of water quality objectives nor shall they cause certain conditions to occur which create a condition of nuisance or water quality impairment in receiving waters. Accordingly, the Regional Board is requiring that these standard requirements be addressed through the implementation of technically and economically feasible control measures to reduce pollutants in stormwater discharges to the maximum extent practicable as provided in Provisions C.1 through C.10 of this Order. Compliance with the Discharge Prohibition, Receiving Water Limitations, and Provisions of this Order is deemed compliance with the requirements of this Order. If these measures, in combination with controls on other point and nonpoint sources of pollutants, do not result in attainment of applicable water quality objectives, the Regional Board may invoke Provision C.1 and may reopen this Permit pursuant to Provisions C.1 and C.13 of this Order to impose additional conditions which require implementation of additional control measures.

57. It is generally not considered feasible at this time to establish numeric effluent limitations for pollutants in municipal stormwater discharges. Instead, the provisions of this permit require implementation of BMPs to the maximum extent practicable to control and abate the discharge of pollutants in stormwater discharges.

58. The Program is organized, coordinated, and implemented based upon the “Agreement for Implementation of the Alameda County Urban Runoff Clean Water Program,” now Alameda Countywide Clean Water Program, and referred to in this Order as the Program. The agreement is provided as Appendix A of the Management Plan. The roles and responsibilities of the Permittees are, in part, as follows:

    a. The Management Committee, which includes representatives from all of the Permittees, is the decision making body of the Program. It operates within the budget and policies established by the Permittees’ governing boards and councils to decide matters of budget and policy necessary to implement the Management Plan, and provides direction to the Program Manager and staff. The Management Committee has established subcommittees to assist in planning and implementation of the Management Plan, and may add, modify, or delete such groups as deemed necessary.

    b. Each of the Permittees is individually responsible for adoption and enforcement of ordinances and policies, implementation of assigned control measures/ BMPs needed to prevent or reduce pollutants in stormwater, and for providing funds for the capital, operation, and maintenance expenditures necessary to implement such control measures/BMPs within its jurisdiction. Each Permittee is also responsible for its share of the costs of the area-wide component of the Program as specified in the Agreement. Except for area-wide components of the Program, enforcement actions concerning this

Order will be pursued only against the individual Permittee(s) responsible for specific violations of this Order.

Findings 59-64: Public Process

59. Regional Board staff has worked in cooperation with the Program to develop a Tentative Order and the Performance Standards in the Management Plan. Regional Board staff conducted a series of meetings with the Stormwater Quality Management Plan (SWQMP) coordinating committee, a subgroup of the Program. These meetings included Regional Board staff and representatives of the Permittees. Through this process, the SWQMP coordinating committee attempted to identify, prioritize, and resolve issues related to the Permittees' and Program's performance, the Management Plan, and this Order, and attempted to develop a consensus concerning the requirements reflected herein.

60. The following is a brief summary of public meetings and comment periods on versions of the Permit's Tentative Order. Regional Board staff met with the SWQMP coordinating committee on February 22, March 22, April 26, and May 23, 2002. The administrative draft was released on June 6, 2002, and comments on the draft were received until June 27, 2002. Regional Board staff met with a workgroup consisting of representatives of the Permittees on July 17, July 25, August 5, and October 28, 2002, and with representatives of the Natural Resources Defense Council (NRDC) on July 18, 2002. The Permittees and Regional Board staff together conducted three outreach workshops on the portions of the Tentative Order addressing new development and redevelopment. Workshops were held on July 18, 2002, in Hayward; on July 25, 2002, in Oakland; and on July 29, 2002, in Pleasanton; and were attended by Permittee staff and other interested parties, including consultants and builders. Regional Board staff also met on dates including April 23, May 22, and October 30, 2002, with representatives of the Coastal Region Vector Control Agencies, including representatives of the Alameda County Mosquito Abatement District and the State Department of Health Services. On December 18, 2002, and January 22, 2003, the Regional Board heard testimony from the Dischargers and interested public on the Revised Tentative Order. On January 17 and 31, and February 7 and 14, 2003, Regional Board staff conducted public meetings on the Revised Tentative Order.

    The Tentative Order was released for public comments on August 21, 2002, by surface mail, electronic mails and posting on the Regional Board website. Comments on the Tentative Order were accepted until October 9, 2002. Based on comments received, appropriate changes were made and submitted to the Regional Board as a Revised Tentative Order for its consideration on December 18, 2002. From December 20, 2002 to January 10, 2003, the comment period was reopened by the Regional Board to allow additional submittals relative to projected cost of the amendment of Order No. 99-058 to both the Dischargers and the development community.

61. The Regional Board has notified the Permittees and interested agencies and interested persons of its intent to prescribe reissued waste discharge requirements and a reissued NPDES permit for this discharge and has provided them with an opportunity for a public hearing and an opportunity to submit their written views and recommendations.

62. The Regional Board, through public testimony in public meetings and in written form, has received and considered all comments pertaining to this Order.

63. The Regional Board will notify interested agencies and interested persons of the availability of reports, plans, and schedules, including Annual Reports, Work Plans, Performance Standards, and the Management Plan, and will provide interested persons with an opportunity for a public hearing and/or an opportunity to submit their written views and recommendations. The Regional Board will consider all comments and may modify the reports, plans, or schedules or may modify this Order in accordance with applicable law. All submittals required by this Order conditioned with acceptance by the Regional Board will be subject to these notification, comment, and public hearing procedures.

64. This Order supercedes and rescinds Order Nos. 97-030 and 99-049.

65. This Order serves as a NPDES permit, pursuant to CWA Section 402, or amendments thereto, and shall become effective fifty days after the date of its adoption provided the Regional Administrator, US EPA, Region IX, has no objections.

IT IS HEREBY ORDERED that the Permittees, in order to meet the provisions contained in Division 7 of the California Water Code and regulations adopted hereunder and the provisions of the Clean Water Act as amended and regulations and guidelines adopted hereunder, shall comply with the following:

A. DISCHARGE PROHIBITION

The Permittees shall, within their respective jurisdictions, effectively prohibit the discharge of non-stormwater (materials other than stormwater) into the storm drain systems and watercourses. NPDES permitted discharges are exempt from this prohibition. Compliance with this prohibition shall be demonstrated in accordance with Provision C.1 and C.9 of this Order. Provision C.9 describes a tiered categorization of non-stormwater discharges based on potential for pollutant content, which may be discharged upon adequate assurance that the discharge contains no pollutants of concern, at concentrations that will impact beneficial uses or cause exceedances of water quality standards.

B. RECEIVING WATER LIMITATIONS

1. The discharge shall not cause the following conditions to create a condition of nuisance or to adversely affect beneficial uses of waters of the State:

a. Floating, suspended, or deposited macroscopic particulate matter, or foam;

b. Bottom deposits or aquatic growths;

c. Alteration of temperature, turbidity, or apparent color beyond present natural background levels;

d. Visible, floating, suspended, or deposited oil or other products of petroleum origin; and/or

e. Substances present in concentrations or quantities which will cause deleterious effects on aquatic biota, wildlife, or waterfowl, or which render any of these unfit for human consumption.

2. The discharge shall not cause or contribute to a violation of any applicable water quality standard for receiving waters. If applicable water quality objectives are adopted and approved by the State Board after the date of the adoption of this Order, the Regional Board may revise and modify this Order as appropriate.

C. PROVISIONS

1. Water Quality Standards Exceedances

The Permittees shall comply with Discharge Prohibition A and Receiving Water Limitations B.1 and B.2 through the timely implementation of control measures and other actions to reduce pollutants in the discharge in accordance with the Management Plan and other requirements of this permit, including any modifications. The Management Plan shall be designed to achieve compliance with Receiving Water Limitations B.1 and B.2. If exceedance(s) of water quality standards or water quality objectives (collectively, WQSs) persist notwithstanding implementation of the Management Plan, a Permittee shall assure compliance with Discharge Prohibition A and Receiving Water Limitations B.1 and B.2 by complying with the following procedure:

a. Upon a determination by either the Permittee(s) or the Regional Board that discharges are causing or contributing to an exceedance of an applicable WQS, the Permittee(s) shall promptly notify and thereafter submit a report to the Regional Board that describes BMPs that are currently being implemented and additional BMPs that will be implemented to prevent or reduce any pollutants that are causing or contributing to the exceedance of WQSs. The report may be incorporated in the annual update to the Management Plan unless the Regional Board directs an earlier submittal. The report shall include an implementation schedule. The Regional Board may require modifications to the report;

b. Submit any modifications to the report required by the Regional Board within 30 days of notification;

c. Within 30 days following approval of the report described above by the Regional Board, the Permittees shall revise the Management Plan and monitoring program to incorporate the approved modified control measures that have been and will be implemented, the implementation schedule, and any additional monitoring required; and,

d. Implement the approved revised Management Plan and monitoring program in accordance with the approved schedule.

As long as Permittees have complied with the procedures set forth above and are implementing the revised Management Plan, they do not have to repeat the same procedure for continuing or recurring exceedances of the same receiving water limitations unless directed by the Regional Board to develop additional control measures and BMPs.

2. Stormwater Quality Management Plan and Performance Standards

a. The Permittees shall implement control measures/BMPs to reduce pollutants in stormwater discharges to the maximum extent practicable. The Management Plan shall serve as the framework for identification, assignment, and implementation of practices of such control measures/BMPs. The Management Plan contains Performance Standards that address the following Program components: Public Information and Participation, Municipal Maintenance, New Development and Significant Redevelopment, Construction Site Controls, Illicit Discharge Controls, and Industrial and Commercial Discharge Controls. Performance Standards are defined as the level of implementation necessary to demonstrate the control of pollutants in stormwater to the maximum extent practicable. The Permittees shall implement the Management Plan, and shall subsequently demonstrate its effectiveness and provide for necessary and appropriate revisions, modifications, and improvements to reduce pollutants in

stormwater discharges to the maximum extent practicable and as required by Provisions C.1 through C.11 of this Order.

b. The Management Plan shall be revised to adopt and incorporate any new Performance Standards developed by the Permittees or any revised Performance Standard identified by the Permittees through the Program's process for evaluating and improving its effectiveness or other means described in Provision C.1. Performance Standards shall be developed or revised through a process which includes 1) opportunities for public participation, 2) appropriate external technical input and criteria for the applicability, economic feasibility, design, operation, and maintenance, and 3) measures for evaluation of effectiveness so as to achieve pollutant reduction or pollution prevention benefits to the maximum extent practicable. New or revised Performance Standards may be based upon special studies or other activities conducted by the Permittees, literature review, or special studies conducted by other programs or Permittees. New or revised Performance Standards shall include the baseline components to be accomplished and the method to be used to verify that the Performance Standard has been achieved. The Permittees shall incorporate newly developed or updated Performance Standards, acceptable to the Executive Officer, into applicable annual revisions to the Management Plan and adhere to implementation of the new/revised Performance Standard(s). In addition to the annual Management Plan revisions, the Permittees shall submit a compilation of all annual Management Plan revisions by three years after Board adoption of this Order, which shall serve in part as the re-application package for the next Permit. The draft Annual Workplan required in Provision C.6 shall identify Performance Standards that will be developed or revised for the upcoming fiscal year. Following the addition/revision of a Performance Standard, acceptable to the Executive Officer, the Permittees for which the Performance Standard is applicable shall adhere to its implementation.

3. New Development and Redevelopment Performance Standards

The Permittees will continue to implement the new development and redevelopment Performance Standards contained in the Management Plan and improve them to achieve the control of stormwater pollutants to the maximum extent practicable in accordance with the following sections:

a. Performance Standard Implementation

The Dischargers shall continue to implement and improve, as necessary and appropriate, the performance standards for new development and redevelopment controls detailed on Pages B-ND-1 through B-ND-6 of the July 1996 Management Plan.

b. Development Project Approval Process

The Permittees shall modify their project review processes as needed to incorporate the requirements of Provision C.3. Each Permittee shall include conditions of approval in permits for applicable projects, as defined in Provision C.3.c, to ensure that stormwater pollutant discharges are reduced by incorporation of treatment measures and other appropriate source control and site design measures, and increases in runoff flows are managed in accordance with Provision C.3.f, to the maximum extent practicable. Such conditions shall, at a minimum, address the following goals:

i. Require a project proponent to implement site design/landscape characteristics where feasible which maximize infiltration (where appropriate), provide retention or detention,

slow runoff, and minimize impervious land coverage, so that post-development pollutant loads from a site have been reduced to the maximum extent practicable; and

ii. For new and redevelopment projects that discharge directly (not mixed with runoff from other developed sites) to water bodies listed as impaired by a pollutant(s) pursuant to CWA Section 303(d), ensure that post project runoff does not exceed pre-project levels for such pollutant(s), through implementation of the control measures addressed in this provision, to the maximum extent practicable, in conformance with Provision C.1.

Modification of project review processes shall be completed by February 15, 2005.

c. Applicable Projects – New and Redevelopment Project Categories

New development and significant redevelopment projects that are subject to Provision C.3 are grouped into two categories based on project size. While all projects regardless of size should consider incorporating appropriate source control and site design measures that minimize stormwater pollutant discharges to the maximum extent practicable, new and redevelopment projects that do not fall into Group 1 or Group 2 are not subject to the requirements of Provision C.3. Provision C.3 shall also not apply to projects for which a privately-sponsored development application has been deemed complete by a Permittee or, with respect to public projects, for which funding has been committed and for which construction is scheduled by February 15, 2005.

i. Group 1 Projects

Permittees shall require Group 1 Projects to implement appropriate source control and site design measures and to design and implement stormwater treatment measures, to reduce the discharge of stormwater pollutants to the maximum extent practicable. Implementation of this requirement shall begin February 15, 2005. Group 1 Projects consist of all public and private projects in the following categories:

1. Commercial, industrial, or residential developments that create one acre (43,560 square feet) or more of impervious surface, including roof area, streets and sidewalks. This category includes any development of any type on public or private land, which falls under the planning and building authority of the Permittees, where one acre or more of new impervious surface, collectively over the entire project site, will be created.

   Construction of one single-family home, which is not part of a larger common plan of development, with the incorporation of appropriate pollutant source control and design measures, and using landscaping to appropriately treat runoff from roof and house-associated impervious surfaces (e.g., runoff from roofs, patios, driveways, sidewalks, and similar surfaces), would be in substantial compliance with Provision C.3.

2. Streets, roads, highways, and freeways that are under the Permittees' jurisdiction and that create one acre (43,560 square feet) or more of new impervious surface. This category includes any newly constructed paved surface used primarily for the transportation of automobiles, trucks, motorcycles, and other motorized vehicles. Excluded from this category are sidewalks, bicycle lanes, trails, bridge accessories, guardrails, and landscape features.

3. Significant Redevelopment projects. This category is defined as a project on a previously developed site that results in addition or replacement, which combined total 43,560 sq ft or more of impervious surface on such an already developed site ("Significant Redevelopment"). Where a Significant Redevelopment project results in an increase of, or replacement of, more than fifty percent of the impervious surface of a previously existing development, and the existing development was not subject to stormwater treatment measures, the entire project must be included in the treatment measure design. Conversely, where a Significant Redevelopment project results in an increase of, or replacement of, less than fifty percent of the impervious surface of a previously existing development, and the existing development was not subject to stormwater treatment measures, only that affected portion must be included in treatment measure design. Excluded from this category are interior remodels and routine maintenance or repair. Excluded routine maintenance and repair includes roof or exterior surface replacement, pavement resurfacing, repaving and road pavement structural section rehabilitation, within the existing footprint, and any other reconstruction work within a public street or road right-of-way where both sides of that right-of-way are developed.

ii. Group 2 Projects

The Group 2 Project definition is in all ways the same as the Group 1 Project definition above, except that the size threshold of impervious area for new and Significant Redevelopment projects is reduced from one acre (43,560 sq ft) of impervious surface to 10,000 square feet. Permittees shall require Group 2 Projects to implement appropriate source control and site design measures and to design and implement appropriate stormwater treatment measures to reduce stormwater pollution to the maximum extent practicable. Projects consisting of one single family home not part of a larger common plan of development are excluded from the Group 2 Project definition, and therefore excluded from the requirement to implement appropriate stormwater treatment measures. Implementation of this requirement shall begin by August 15, 2006, at which time the definition of Group 1 Projects is changed to include all Group 2 Projects.

iii. Proposal for Alternative Group 2 Project Definition

The Program and/or any Permittee may propose, for approval by the Regional Board, an Alternative Group 2 Project definition, with the goal that any such alternative definition aim to ensure that the maximum created impervious surface area is treated for the minimum number of projects subject to Permittee review. Any such proposal shall contain supporting information about the Permittees' development patterns, and sizes and numbers of proposed projects for several years, that demonstrates that the proposed definition would be substantially as effective as the Group 2 Project definition in Provision C.3.c.ii. Proposals may include differentiating projects subject to the Alternative Group 2 Project definition by land use, by focusing solely on the techniques recommended by Start at the Source for documented low pollutant loading land uses, and/or by optimum use of landscape areas required by Permittees under existing codes as treatment measures. Proposals may be submitted anytime, with the understanding that the Group 2 Project definition, as described in Provision C.3.c.ii will be upheld as the default in the absence of an approved Alternative Group 2 Project definition.

d. Numeric Sizing Criteria For Pollutant Removal Treatment Systems

All Permittees shall require that treatment measures be constructed for applicable projects, as defined in Provision C.3.c, that incorporate, at a minimum, the following hydraulic sizing design criteria to treat stormwater runoff. As appropriate for each criterion, the Permittees shall use or appropriately analyze local rainfall data to be used for that criterion.

i. Volume Hydraulic Design Basis

Treatment measures whose primary mode of action depends on volume capacity, such as detention/retention units or infiltration structures, shall be designed to treat stormwater runoff equal to:

1. The maximized stormwater quality capture volume for the area, based on historical rainfall records, determined using the formula and volume capture coefficients set forth in Urban Runoff Quality Management, WEF Manual of Practice No. 23/ ASCE Manual of Practice No. 87, (1998), pages 175-178 (e.g., approximately the 85th percentile 24-hour storm runoff event); or
2. The volume of annual runoff required to achieve 80 percent or more capture, determined in accordance with the methodology set forth in Appendix D of the California Stormwater Best Management Practices Handbook (1993), using local rainfall data.

ii. Flow Hydraulic Design Basis

Treatment measures whose primary mode of action depends on flow capacity, such as swales, sand filters, or wetlands, shall be sized to treat:

1. 10% of the 50-year peak flow rate; or
2. The flow of runoff produced by a rain event equal to at least two times the 85th percentile hourly rainfall intensity for the applicable area, based on historical records of hourly rainfall depths; or
3. The flow of runoff resulting from a rain event equal to at least 0.2 inches per hour intensity.

e. Operation and Maintenance of Treatment Measures

All treatment measures shall be adequately operated and maintained by complying with the process described below. Beginning July 1, 2004, each Permittee shall implement a treatment measures operation and maintenance (O&M) verification program (O&M Program), which shall include the following:

i. Compilation of a list of properties (public and private) and responsible operators for, at a minimum, all treatment measures implemented from the date of adoption of this Order. Information on the location of all stormwater treatment measures shall be sent to the Alameda County Mosquito Abatement District. In addition, the Permittees shall inspect a subset of prioritized treatment measures for appropriate O&M, on an annual basis, with appropriate follow-up and correction.

ii. Verification and access assurance at a minimum shall include: where a private entity is responsible for O&M, the entity's signed statement accepting responsibility for maintenance until the responsibility is legally transferred to another entity, and access permission to the extent allowable by law for representatives of the Permittee, local vector control district, and

Regional Board staff strictly for the purpose of O&M verification for the specific stormwater treatment system to the extent allowable by law; and, for all entities, either:

1. A signed statement from the public entity assuming post-construction responsibility for treatment measure maintenance and that the treatment measures meet all local agency design standards; or
2. Written conditions in the sales or lease agreement requiring the buyer or lessee to assume responsibility for O&M consistent with this provision, which conditions, in the case of purchase and sale agreements, shall be written to survive beyond the close of escrow; or
3. Written text in project conditions, covenants and restrictions (CCRs) for residential properties assigning O&M responsibilities to the home owners association for O&M of the treatment measures; or
4. Any other legally enforceable agreement or mechanism that assigns responsibility for the maintenance of treatment measures.

iii. O&M Reporting: the Permittees shall report on their O&M Program in each Annual Report, starting with the Annual Report to be submitted September 2005. The Annual Report shall contain a description of the organizational structure of the Permittee's O&M Program; an evaluation of that O&M Program's effectiveness; summary of any planned improvements in O&M Program; and a list or summary of treatment measures that have been inspected that year with inspection results.

iv. The Program shall submit by June 1, 2004, a vector control plan for Executive Officer approval, after consultation with the appropriate vector control agencies. The plan shall include design guidance for treatment measures to prevent the production of vectors, particularly mosquitoes, and provide guidance on including vector abatement concerns in O&M and verification inspection activities.

v. The Permittees are expected to work diligently and in good faith with the appropriate state and federal agencies to obtain any approvals necessary to complete maintenance activities for stormwater treatment measures. If the Permittees have done so, and maintenance approvals are not granted, where necessary, the Permittees shall be deemed by the Regional Board to be in compliance with this Provision.

f. Limitation on Increase of Peak Stormwater Runoff Discharge Rates

i. The Permittees shall manage increases in peak runoff flow and increased runoff volume, for all Group 1 Projects where such increased flow and/or volume is likely to cause increased erosion of creek beds and banks, silt pollutant generation, or other impacts to beneficial uses. Such management shall be through implementation of a Hydrograph Modification Management Plan (HMP). The HMP, once approved by the Regional Board, shall be implemented so that post-project runoff shall not exceed estimated pre-project rates and/or durations, where the increased stormwater discharge rates and/or durations will result in increased potential for erosion or other significant adverse impacts to beneficial uses, attributable to changes in the amount and timing of runoff. The term duration in this Provision is defined as the period that flows are above a threshold that causes significant sediment transport and may cause excessive erosion damage to creeks and streams.

ii. Provision C.3.f.i does not apply to new development and significant redevelopment projects where the project discharges stormwater runoff into creeks or storm drains where the potential for erosion or other impacts to beneficial uses, is minimal. Such situations may include discharges into creeks that are concrete-lined or significantly hardened (e.g., with rip-rap, sackrete, etc.) downstream to their outfall in San Francisco Bay, underground storm drains discharging to the Bay, and construction of infill projects in highly developed watersheds, where the potential for single-project and/or cumulative impacts is minimal. Guidelines for identification of such situations shall be included as a part of the HMP. However, plans to restore a creek reach may re-introduce the applicability of HMP controls, and would need to be addressed in the HMP.

iii. The HMP may identify conditions under which some increases in runoff may not have a potential for increased erosion or other impacts to beneficial uses. Reduced controls or no controls on peak stormwater runoff discharge rates and/or durations may be appropriate in those cases, subject to the conditions in the HMP. In the absence of information demonstrating that changes in post-development runoff discharge rates and durations will not result in increased potential for erosion or other adverse impacts to beneficial uses, the HMP requirements shall apply.

iv. The HMP proposal, at a minimum, shall include:

1. A review of pertinent literature;
2. A protocol to evaluate potential hydrograph change impacts to downstream watercourses from proposed projects;
3. An identification of the rainfall event below which these standards and management requirements apply, or range of rainfall events to which these requirements apply;
4. A description of how the Permittees will incorporate these requirements into their local approval processes, or the equivalent; and,
5. Guidance on management practices and measures to address identified impacts.

The Permittees may prioritize which individual watersheds the HMP would initially apply to, if it were demonstrated in the HMP that such prioritization is appropriate.

The Permittees may work appropriately with the Santa Clara Valley Urban Runoff Pollution Prevention Program and/or other Bay Area stormwater programs as part of completing these requirements. For example, the Permittees may wish to expand on the literature review being completed by the Santa Clara Valley Urban Runoff Program under its permit, rather than authoring their own literature review from scratch. While such cooperation is encouraged, it shall not be grounds for delaying compliance beyond the schedule set forth herein.

v. The identified maximum rainfall event or rainfall event range may be different for specific watersheds, streams, or stream reaches. Individual Permittees may utilize the protocol to determine a site- or area-specific rainfall event or event range standard.

vi. The HMP's evaluation protocols, management measures, and other information may include the following:

1. Evaluation of the cumulative impacts of urbanization of a watershed on stormwater discharge and stream morphology in the watershed;

2. Evaluation of stream form and condition, including slope, discharge, vegetation, underlying geology, and other information, as appropriate;
3. Implementation of measures to minimize impervious surfaces and directly connected impervious area in new development and redevelopment projects;
4. Implementation of measures including stormwater detention, retention, and infiltration;
5. Implementation of land use planning measures (e.g., stream buffers and stream restoration activities, including restoration-in-advance of floodplains so that floodplains will be able to handle the anticipated increased flows, revegetation, use of less-impacting facilities at the point(s) of discharge, etc.) to allow expected changes in stream channel cross sections, stream vegetation, and discharge rates, velocities, and/or durations without adverse impacts to stream beneficial uses;
6. A mechanism for pre- vs. post-project assessment to determine the effectiveness of the HMP and to allow amendment of the HMP, as appropriate; and,
7. Other measures, as appropriate.

vii. Equivalent limitation of peak flow impacts: The Permittees may develop an equivalent limitation protocol, as part of the HMP, to address impacts from changes in the volumes, velocities, and/or durations of peak flows through measures other than control of those volumes and/or durations. The protocol may allow increases in peak flow and/or durations, subject to the implementation of specified design, source control, and/or treatment control measures and land planning practices that take into account expected stream change (e.g., increases in the cross-sectional area of stream channel) resulting from changes in discharge rates and/or durations, while maintaining or improving beneficial uses of waters.

viii. The Permittees as a group shall complete the HMP according to the schedule below. All required documents shall be submitted for approval by the Executive Officer, based on the criteria set forth in this Order, except the HMP, which shall be submitted for approval by the Regional Board. Development and implementation status shall be reported in the Permittees' Annual Reports, which shall also provide a summary of projects incorporating measures to address this Provision and the measures used.

1. February 15, 2004: Submit a detailed workplan and schedule for completion of the literature review, development of a protocol to identify an appropriate limiting storm, development of guidance materials, and other required information;
2. February 15, 2004: Submit literature review;
3. November 15, 2004: Submit a draft HMP, including the analysis that identifies the appropriate limiting storm and the identified limiting storm event(s) or event range(s);
4. May 15, 2005: Submit the HMP for Regional Board approval; and,
5. Upon approval by the Regional Board, implement the approved HMP, which shall include the requirements of this Provision. Prior to approval of the HMP by the Regional Board, the early implementation of measures likely to be included in the HMP shall be encouraged by the Permittees.

g. Alternative Compliance Based on Impracticability and Requiring Compensatory Mitigation

i. The Permittees may establish a program under which a project proponent may request alternative compliance with the requirement in Provision C.3.c. to install treatment measures onsite for a given project, upon an appropriate showing of impracticability, and with a provision to treat offsite an equivalent surface area, pollutant loading or quantity of stormwater runoff, or provide other equivalent water quality benefit, such as stream restoration or other activities that limit or mitigate impacts from excessive erosion or sedimentation. The offsite location of this equivalent stormwater treatment, or water quality benefit, shall be where no other requirement in Provision C.3.c for treatment exists, and within the same stormwater runoff drainage basin and treating runoff discharging to the same receiving water, where feasible. Under this Provision, enhancements of existing mitigation projects are acceptable. The Permittees should specifically define the basis for impracticability or infeasibility, which may include situations where onsite treatment is technically feasible, but excessively costly, as determined by set criteria.

ii. **Regional Solutions**: The alternative compliance may allow a project proponent to participate in a regional or watershed-based stormwater treatment facility, without a showing of impracticability at the individual project site, if the regional or watershed- based stormwater treatment facility discharges into the same receiving water, where feasible.

iii. The Program is encouraged to propose a model alternative compliance program on behalf of the Permittees, for approval by the Regional Board, and for potential adoption and implementation by the Permittees.

iv. The alternative compliance program proposal should state the criteria for granting alternatives from the requirement to install treatment measures onsite; criteria for determining impracticability or infeasibility; and criteria for use of regional or watershed-based stormwater treatment facilities. The proposal should also describe how the project sponsor will provide equivalent water quality benefits or credit to an alternative project or to a regional or watershed treatment facility and tracking mechanisms to support the reporting requirements set forth in Provision C.3.g.vi below.

v. An exemption without the requirement for alternate, equivalent offsite treatment is allowed for the following redevelopment projects after impracticability of including onsite treatment measures is established, where such projects are built as redevelopment projects as defined in Finding 14, and it is clearly demonstrated that cost of participation in alternate, equivalent offsite treatment through a regional treatment or other equivalent water quality benefit project fund will unduly burden the project: creation of housing units affordable to persons of low or moderate income as defined by Health and Safety Code Section 50093, brownfield sites, and/or transit village type developments within 1/4 mile of transit stations and/or intermodal facilities.

vi. **Reporting**: Each year, as part of its Annual Report, each Permittee shall provide a list of alternative projects and exemptions it granted. For each project and exemption, the following information shall be provided:

1. Name and location of the project for which the alternative project or exemption was granted;
2. Project type (e.g., restaurant, residence, shopping center) and size;

3. Area or percent of impervious surface in the project's final design;
4. Reason for granting the alternative project or exemption, including, for those projects granted an exemption without the requirement for alternate, equivalent offsite treatment, a demonstration that cost of such equivalent offsite treatment unduly burdened the project;
5. Terms of the alternative project or exemption; and,
6. The offsite stormwater treatment project receiving the benefit, and the date of completion of the project.

vii. Interim Alternative Compliance Program: In the event that an alternative compliance program has not been proposed by the Program and/or a Permittee, approved by the Regional Board, or implemented by a particular Permittee by the date of implementation of Group 1 Projects, provision for an interim alternative to the requirement to install treatment measures onsite may be granted by a Permittee. An interim alternative compliance project may be granted if the project proponent (1) demonstrates onsite impracticability due to extreme limitations of space for treatment and lack of below grade surface treatment options, and (2) presents sufficient assurance of providing equivalent offsite stormwater pollutant and/or volume treatment at another location within the drainage basin, for which construction of stormwater treatment measures is not otherwise required, discharging into the same receiving water, where feasible. The Permittee shall be responsible for assuring that equivalent offsite treatment has occurred for any use of this interim alternative compliance, within six months of project construction, and shall report the basis of onsite impracticability and the nature of equivalent offsite treatment for each project in its Annual Report. Any equivalent offsite treatment that does not include construction of stormwater treatment measures must be approved by the Executive Officer, based on the criteria set forth in this Order. This interim alternative compliance clause will be void when Regional Board approves the alternative compliance program described in Provision C3.g.i-iv, above.

h. Alternative Certification of Adherence to Design Criteria for Stormwater Treatment Measures

In lieu of conducting detailed review to verify the adequacy of measures required pursuant to Provisions C.3.d, a Permittee may elect to accept a signed certification from a Civil Engineer or a Licensed Architect or Landscape Architect registered in the State of California, or another Permittee that has overlapping jurisdictional project permitting authority, that the plan meets the criteria established herein. The Permittee should verify that each certifying person has been trained on treatment measure design for water quality not more than three years prior to the signature date, and that each certifying person understands the groundwater protection principles applicable to the project site (see Provision C.3.i: Limitations on Use of Infiltration Treatment Measures). Training conducted by an organization with stormwater treatment measure design expertise (e.g., a university, American Society of Civil Engineers, American Society of Landscape Architects, American Public Works Association, or the California Water Environment Association) may be considered qualifying.

i. Limitations on Use of Infiltration Treatment Measures - Infiltration and Groundwater Protection

In order to protect groundwater from pollutants that may be present in urban runoff, treatment measures that function primarily as infiltration devices (such as infiltration basins and infiltration trenches not deeper than their maximum width) shall meet, at a minimum, the following conditions:

i. Pollution prevention and source control measures shall be implemented at a level appropriate to protect groundwater quality at sites where infiltration devices are to be used;

ii. Use of infiltration devices shall not cause or contribute to degradation of groundwater water quality objectives;

iii. Infiltration devices shall be adequately maintained to maximize pollutant removal capabilities;

iv. The vertical distance from the base of any infiltration device to the seasonal high groundwater mark shall be at least 10 feet. Note that some locations within the Permittees' jurisdiction are characterized by highly porous soils and/or a high groundwater table; in these areas treatment measure approvals should be subject to a higher level of analysis (e.g., considering the potential for pollutants such as on-site chemical use, the level of pretreatment to be achieved, and similar factors);

v. Unless stormwater is first treated by a means other than infiltration, infiltration devices shall not be recommended as treatment measures for areas of industrial or light industrial activity; areas subject to high vehicular traffic (25,000 or greater average daily traffic on main roadway or 15,000 or more average daily traffic on any intersecting roadway); automotive repair shops; car washes; fleet storage areas (bus, truck, etc.); nurseries; and other high threat to water quality land uses and activities as designated by each Permittee; and,

vi. Infiltration devices shall be located a minimum of 100 feet horizontally from any water supply wells.

j. Site Design Measures Guidance and Standards Development

i. The Permittees shall review their local design standards and guidance for opportunities to make revisions that would result in reduced impacts to water quality and beneficial uses of waters. In this event, the Permittees shall make any such revisions and implement the updated standards and guidance, as necessary.

Areas of site design that may be appropriate to address include the following, which are offered as examples:

1. Minimize land disturbance;
2. Minimize impervious surfaces (e.g., roadway width, driveway area, and parking lot area), especially directly connected impervious areas;
3. Minimum-impact street design standards for new development and redevelopment, including typical specifications (e.g., neo-traditional street design standards and/or street standards recently revised in other cities, including Portland, Oregon, and Vancouver, British Columbia);

4. Minimum-impact parking lot design standards, including parking space maximization within a given area, use of landscaping as a stormwater drainage feature, use of pervious pavements, and parking maxima;
5. Clustering of structures and pavement;
6. Typical specifications or "acceptable design" guidelines for lot-level design measures, including:
   - Disconnected roof downspouts to splash blocks or "bubble-ups;"
   - Alternate driveway standards (e.g., wheelways, unit pavers, or other pervious pavements); and,
   - Microdetention, including landscape detention and use of cisterns (may also be considered treatment measures);
7. Preservation of high-quality open space;
8. Maintenance and/or restoration of riparian areas and wetlands as project amenities, including establishing vegetated buffer zones to reduce runoff into waterways, allow for stream channel change as a stream's contributing watershed urbanizes, and otherwise mitigate the effects of urban runoff on waters and beneficial uses of waters (may also be considered treatment measures); and,
9. Incorporation of supplemental controls to minimize changes in the volume, flow rate, timing, and duration of runoff, for a given precipitation event or events. These changes include cumulative hydromodification caused by site development. Measures may include landscape-based measures or other features to reduce the velocity of, detain, and/or infiltrate stormwater runoff (may also be considered treatment measures).

ii. The standards and guidance review shall be completed according to the schedule below. A summary of review, revision, and implementation status shall be submitted for acceptance by the Executive Officer and reported in the Permittees' Annual Reports, beginning with the Annual Report due September 15, 2005.

1. No later than August 15, 2003: The Permittees shall submit a detailed workplan and schedule for completion of the review of standards and guidelines, any proposed revisions thereto and any implementation of revised standards and guidance;
2. No later than November 15, 2004: The Permittees shall submit a draft review and analysis of local standards and guidance, opportunities for revision, and any proposed revised standards and guidance; and,
3. No later than November 15, 2005: The Permittees shall incorporate any revised standards and guidance into their local approval processes and shall fully implement the revised standards and guidance.

k. Source Control Measures Guidance Development

The Permittees shall, as part of their improvement process, submit enhanced new development and significant redevelopment Performance Standards, which summarize source control requirements for such projects to limit pollutant generation, discharge, and runoff, to the maximum extent practicable. Examples of source control measures may include the following, which are offered as examples:

i. Indoor mat/equipment wash racks for restaurants, or covered outdoor wash racks plumbed to the sanitary sewer;

ii. Covered trash and food compactor enclosures with a sanitary sewer connection for dumpster drips and designed such that run-on to trash enclosure areas is avoided;

iii. Sanitary sewer drains for swimming pools;

iv. Sanitary drained outdoor covered wash areas for vehicles, equipment, and accessories;

v. Sanitary sewer drain connections to take fire sprinkler test water;

vi. Storm drain system stenciling;

vii. Landscaping that minimizes irrigation and runoff, promotes surface infiltration where appropriate, minimizes the use of pesticides and fertilizers, and where feasible removes pollutants from stormwater runoff; and,

viii. Appropriate covers, drains, and storage precautions for outdoor material storage areas, loading docks, repair/maintenance bays, and fueling areas.

A model enhanced new development and significant redevelopment source control Performance Standard and proposed workplan for its implementation shall be submitted by August 15, 2004. Implementation shall begin no later than February 15, 2005, and the status shall thereafter be reported in the Permittees' Annual Reports beginning with the Annual Report due September 15, 2005, which shall also provide appropriate detail on projects reflecting the application of the enhanced Performance Standards consistent with Provision C.3.b, above.

l. Update General Plans

At the next scheduled update/revision of its General Plan, each Permittee shall confirm that it has incorporated water quality and watershed protection principles and policies into its General Plan or equivalent plan, to the extent necessary, to require implementation of the measures required by Provision C.3 for applicable development projects. These principles and policies shall be designed to protect natural water bodies, reduce impervious land coverage, slow runoff, and where feasible, maximize opportunities for infiltration of rainwater into soil. Such water quality and watershed protection principles and policies may include the following, which are offered as examples:

i. Minimize the amount of impervious surfaces and directly connected impervious surfaces in areas of new development and redevelopment and where feasible maximize on-site infiltration of runoff;

ii. Implement pollution prevention methods supplemented by pollutant source controls and treatment. Use small collection strategies located at, or as close as possible to, the source (i.e., the point where water initially meets the ground) to minimize the transport of urban runoff and pollutants offsite and into a municipal separate storm sewer system;

iii. Preserve, and where possible, create or restore areas that provide important water quality benefits, such as riparian corridors, wetlands, and buffer zones. Encourage land acquisition and/or conservation easement acquisition of such areas;

iv. Limit disturbances of natural water bodies and natural drainage systems caused by development including roads, highways, and bridges;

v. Prior to making land use decisions, utilize methods available to estimate increases in pollutant loads and flows resulting from projected future development. Require incorporation of structural and non-structural treatment measures to mitigate the projected increases in pollutant loads and flows;

vi. Avoid development of areas that are particularly susceptible to erosion and sediment loss; or establish development guidance that identifies these areas and protects them from erosion and sediment loss; and,

vii. Reduce pollutants associated with vehicles and increased traffic resulting from development.

If amendments of General Plans are determined to be legally necessary to allow for implementation of any aspect of Provision C.3, such amendments shall occur by the implementation date of the corresponding component of the Provision. If legally necessary General Plan amendments cannot occur by the implementation date because of CEQA requirements or other constraints imposed by the laws applicable to amending General Plans, the Permittee shall report this to the Executive Officer as soon as possible, and no later than in the Annual Report due more than six months in advance of the implementation date. Should changes to implementation dates to enable a Permittee to comply with CEQA and General Plan legal requirements be necessary, the Permittee shall recommend a new implementation date for approval by the Regional Board.

m. Water Quality Review Processes

When Permittees conduct environmental review of projects in their jurisdictions, the Permittees shall evaluate water quality effects and identify appropriate mitigation measures. This requirement shall be implemented by May 15, 2004. Questions that evaluate increased pollutants and flows from the proposed project include the following, which are offered as examples:

i. Would the proposed project result in an increase in pollutant discharges to receiving waters? Consider water quality parameters such as temperature, dissolved oxygen, turbidity and other typical stormwater pollutants (e.g., heavy metals, pathogens, petroleum derivatives, synthetic organics, sediment, nutrients, oxygen-demanding substances, and trash).

ii. Would the proposed project result in significant alteration of receiving water quality during or following construction?

iii. Would the proposed project result in increased impervious surfaces and associated increased runoff?

iv. Would the proposed project create a significant adverse environmental impact to drainage patterns due to changes in runoff flow rates or volumes?

v. Would the proposed project result in increased erosion in its watershed?

vi. Is the project tributary to an already impaired water body, as listed on the CWA Section 303(d)? If so, will it result in an increase in any pollutant for which the water body is already impaired?

vii. Would the proposed project have a potentially significant environmental impact on surface water quality, to marine, fresh, or wetland waters?

viii. Would the proposed project have a potentially significant adverse impact on groundwater quality?

ix. Will the proposed project cause or contribute to an exceedance of applicable surface or groundwater receiving water quality objectives or degradation of beneficial uses?

x. Will the project impact aquatic, wetland, or riparian habitat?

n. Reporting, including Pesticide Reduction Measures

The Permittees shall demonstrate compliance with the requirements of Provision C.3 by providing in their Annual Reports the information described in Table 1, beginning with the dates shown in Table 1 and continuing thereafter. In addition, the following information shall be collected for Annual Report submittal, beginning upon the date of adoption of this Order.

i. For all new development and significant redevelopment projects which meet the Group 1 or Group 2 definitions in Provision C.3.c, collect and report the name or other identifier, type of project (using the categories in Provision C.3.c), site acreage or square footage, and square footage of new impervious surface.

ii. For projects that must implement treatment measures, report which treatment measures were used and numeric-sizing criteria employed, the O&M responsibility mechanism including responsible party, site design measures used, and source control measures required. This information shall also be reported to the appropriate local vector control district, with additional information of access provisions for vector control district staff. This reporting shall begin in the Annual Report following the implementation date specified in Provision C.3.c.

iii. A summary of the types of pesticide reduction measures required for those new development and significant redevelopment projects to be addressed under Provision C.3.c, and the percentage of such new development and significant redevelopment projects for which pesticide reduction measures were included. These measures are required under Provision C.10.c, and relate directly to Provision C.3 requirements.

The Permittees may utilize their Annual Reports to highlight their budget constraints and suggest reprioritization of any Program activities in order to achieve the most cost effective overall Program.

o. Implementation Schedule

The Permittees shall implement the requirements of Provisions C.3.b through C.3.n according to the schedule in Table 2.

4. Public Information and Participation Performance Standards

The Program shall develop a specific workplan with the Permittees based on Section 3. Task 5 of the PIP component of the Management Plan to evaluate the effectiveness of the PIP component and

report on this on-going evaluation starting September 2004 for the 2003-2004 Annual Report, and annually thereafter. Effectiveness may be measured through direct or indirect means, such as observation of behavior; surveys; and/or analysis of available data on public involvement in or in response to PIP activities.

5. Performance Standards for Municipal Maintenance

The Program shall implement municipal maintenance performance standards as set forth in the Management Plan.

6. Performance Standard for Rural Public Works Maintenance and Support

For the purpose of this provision, rural means any watershed or portion thereof that remains undeveloped or with primarily agricultural, grazing or open space uses, and drains to unchannelized streams. The Program shall develop, within one year after the adoption of this Order, Performance Standards, appropriate training and technical assistance requirements, and annual reporting requirements for the following rural public works maintenance and support activities: a) management and/or removal of large woody debris and live vegetation from stream channels; b) streambank stabilization projects; and, c) road construction, maintenance, and repairs in rural areas to prevent and control road-related erosion. In addition, Permittees shall develop: d) education and guidance on permitting requirements for rural public works activities so as to stress the importance of proper planning and construction.

7. Annual Reports and Workplans

a. Annual Reports

The Permittees shall submit an Annual Report to the Regional Board by September 15 of each year, documenting the status of the Program's and the Permittees' activities during the previous fiscal year, including the results of a qualitative assessment of activities implemented by the Permittees, and the performance of tasks contained in the Management Plan.

The Annual Report shall include a compilation of deliverables and milestones completed during the previous twelve-month period, as described in the Management Plan. In either the Annual Reports or the Workplans, the Permittees shall propose pertinent updates, improvements, or revisions to the Management Plan, which shall be complied with under this Order unless disapproved by the Executive Officer or acted upon in accordance with Provision C.12. As part of the Annual Report process, each Permittee shall evaluate the effectiveness of the activities completed during the reporting period.

Direct and indirect measures of effectiveness may include, but are not limited to, conformance with established Performance Standards, quantitative monitoring to assess the effectiveness of control measures, measurements or estimates of pollutant load reductions, detailed accounting of Program accomplishments, funds expended, or staff hours utilized. Methods to improve effectiveness in the implementation of tasks and activities, including development of new, or modification of existing, Performance Standards, shall be identified through the Program's review and improvement process, where appropriate. The Annual Report information shall be

adequate to describe each Permittee's compliance status with respect to the provisions of this Order, and the required actions under the Management Plan and the Annual Workplans.

i. Enhanced Annual Reporting Requirements for Public Information and Participation
The level of implementation of PIP activities shall be reported annually. The Program will report on the implementation of its specific workplan to evaluate effectiveness of the PIP component starting in September 2004 for the 2003-2004 Annual Report, and annually thereafter. This evaluation will be included in the General Program deliverables for General Program activities and in the deliverables by Permittees for activities that were conducted by individual Permittees.

ii. Enhanced Annual Reporting Requirements for Illicit Discharge Controls
The goal of the Illicit Discharge Controls component is to identify and eliminate non-permissible non-stormwater discharges associated with illegal dumping or illicit connections to the storm drain system.

Enhanced annual reporting for this Program component shall, at a minimum, include:

1. Training and coordination of staff most likely to encounter illicit discharges; and

2. Identification and follow-up for all illicit discharges and problem areas identified within each Permittee's jurisdiction, including number of responses to reports of potential impacts to water quality, complaints, spills, and other similar reports. These should be, at a minimum, characterized as to report source, nature of the report, location of the event, reported source of pollutants, and follow-up and investigation, if any. For any actual non-compliance or threatened non-compliance noted during the investigation of the report, the nature of follow-up will be reported, through resolution of the noted issue, up to and including enforcement action.

iii. Enhanced Annual Reporting Requirements for Industrial and Commercial Discharge Controls
The goal of the Industrial and Commercial Discharge Controls component is to reduce or eliminate adverse water quality impacts from activities conducted at any industrial and commercial site within the Permittees' jurisdictions that have a potential for significant urban runoff pollution. Performance measures for this Program component are in the Management Plan.

Frequency of inspection of a given site or category of industry or commercial business with a potential to impact stormwater may vary depending upon known or anticipated threats to water quality, but should not be less frequent than once in five years. Inspection frequency can be reduced for sites that demonstrate a history of compliance or exhibit little threat to water quality, and increased for sites that demonstrate non-compliance, or exhibit significant threat to water quality.

Permittees shall report a summary of inspection activity for any non-compliance noted during an inspection, the nature of follow-up through resolution of the noted issue, up to and including enforcement action.

b. Annual Workplans and Updates

By 100 days from the adoption of this order and on March 1st of each year thereafter,, the Permittees shall submit draft Workplans and Updates that describe the proposed implementation of the Management Plan for the next fiscal year in areas described below.

The Workplans and Updates shall consider the status of implementation of current year activities and actions of the Permittees, problems encountered, and proposed solutions, and shall address any comments received from the Executive Officer on the previous year's Annual Report. The Workplans and Updates shall include clearly defined tasks, responsibilities, and schedules for implementation of Program and Permittee actions for the next fiscal year.

The Workplans and Updates shall be deemed to be final and incorporated into the Management Plan and this Order as of June 1 unless previously determined to be unacceptable by the Executive Officer. The Permittees shall address any comments or conditions of acceptability received from the Executive Officer on their draft Workplans and Updates prior to the submission of their Annual Report on September 15, at which time the modified Workplans and Updates shall be deemed to be incorporated into the Management Plan and this Order unless disapproved of by the Executive Officer.

i. Performance Standards and Monitoring Plan Updates

Any proposal for development of new, or modification of existing, Performance Standards in accordance with Provision C.2.b, as well as alternative monitoring activities as required in Provision C.8, shall be reported in the workplans.

ii. Public Information and Participation

By 100 days from the adoption of this order, the Program shall submit a specific workplan to evaluate the effectiveness of the PIP component.

iii. Industrial and Commercial Discharge Controls Program

Each Permittee, except the Alameda County Flood Control and Water Conservation District and Zone 7 of the Alameda County Flood Control District, shall submit an annual update to its five-year Industrial and Commercial Business Inspection Plan (Inspection Plan) with the following information:

1. Estimated number of facilities to be inspected listed by type of business or geographical sector as outlined in the Inspection Plan; and,
2. Estimated number of high priority facilities to be inspected on a yearly basis based on priorities described in Inspection Plan.

The range of industrial and commercial businesses that will require regular inspection is not limited to those industrial sites that are required to obtain coverage under the State Board's Industrial Stormwater NPDES General Permit.

c. One-time Reports and Five-Year Inspection and Illicit Discharge Control Action Plans

In addition to Annual Reports and Annual Updates, the Permittees shall provide the following information by 100 days of adoption of this order:

i. Illicit Discharge Controls

Each Permittee will develop a five-year Illicit Discharge Control Action Plan to reduce, control and/or otherwise address sources of discharge. Performance measures for this program area are in the Management Plan.

Permittees shall describe the specific procedures they use to follow-up on non-compliance.

Permittees shall identify an alternate publicized number to report illicit discharges in addition to 911.

Proposed changes to the five-year Illicit Discharge Control Action Plan shall be submitted annually through subsequent workplans.

ii. Industrial and Commercial Discharge Controls Program

Each Permittee, except the Alameda County Flood Control and Water Conservation District and Zone 7 of the Alameda County Flood Control District, shall submit a five-year Industrial and Commercial Business Inspection Plan (Inspection Plan) containing the following information:

1. Estimate of total number of Industrial and Commercial sites requiring inspection, within each Permittee's jurisdiction, for the five-year period;
2. A list of types of business within the Permittee's jurisdiction with an estimate of the number of businesses in each category;
3. A description of the process for prioritizing inspections and rationale for inspecting a business or business type more frequently or before another business or business type. Each Permittee will explain criteria used for designating a business as high priority. If any geographical areas are to be targeted for yearly inspections because of their high potential for stormwater pollution, these areas should be indicated in the Inspection Plan, with optional maps indicating priority zoning, if any, in each Permittees' jurisdiction;
4. A description of Permittee's procedures for follow-up inspections, enforcement actions or referral to another agency, including appropriate time periods of action; and,
5. An Annual Update detailing inspection activities for the next fiscal year shall be due by March 1 of the year following the submission of each Annual Report. The Annual Update shall be subject to the due dates and Executive Officer approvals stated in Provision C.7.b and reporting requirements further listed in Provision C.7.b.iii.

Each Permittee shall also submit a description of a data management system that the Permittee maintains to track changes in industrial and commercial sites, as well as inspection and enforcement activity of these sites.

8. Monitoring Program

a. The Permittees shall implement a Monitoring Program that supports the development and implementation and demonstrates the effectiveness of the Management Plan and related work conducted by the Program among other goals. The Monitoring Program shall be a multi-year receiving waters monitoring plan designed to achieve the following objectives:

- Characterization of representative drainage areas and stormwater discharges, including land-use characteristics pollutant concentrations and mass loadings;
- Assessment of existing or potential adverse impacts on beneficial uses caused by pollutants of concern in stormwater discharges, including an evaluation of representative receiving waters;
- Identification of potential sources of pollutants of concern found in stormwater discharges; and,
- Evaluation of effectiveness of representative stormwater pollution prevention or control measures.

The Monitoring Program shall include the following:

i. Provision for conducting and reporting the results of special studies conducted by the Permittees which are designed to determine effectiveness of BMPs or control measures, define a Performance Standard or assess the adverse impacts of a pollutant or pollutants on beneficial uses.

ii. Provisions for conducting watershed monitoring activities including: identification of major sources of pollutants of concern; evaluation of the effectiveness of control measures and BMPs; and use of physical, chemical and biological parameters and indicators as appropriate.

iii. Identification and justification of representative sampling locations, frequencies and methods, suite of pollutants to be analyzed, analytical methods, and quality assurance procedures. Alternative monitoring methods in place of these (special projects, financial participation in regional, state, or national special projects or research, literature review, visual observations, use of indicator parameters, recognition and reliance on special studies conducted by other programs, etc.) may be proposed with justification.

b. Multi-Year Monitoring and Assessment Plan. In conjunction with the submissions required by Provision C.10, the Permittees shall submit, by 100 days of adoption of this order, a multi-year monitoring plan, acceptable to the Executive Officer, designed to comply with these Monitoring Program requirements. The monitoring and assessment plan shall include provisions for monitoring Central and South/Lower San Francisco Bay by participating in the San Francisco Estuary Regional Monitoring Program for Trace Substances or an acceptable alternative monitoring program.

c. Annual Monitoring Program Plan. The Permittees shall submit, by 100 days from the adoption of this order and on March 1st of each year thereafter, an annual monitoring program plan, acceptable to the Executive Officer, that includes clearly defined tasks, responsibilities, and schedules for implementation of monitoring activities for the next fiscal year designed to comply with these Monitoring Program requirements.

9. Non-Stormwater Discharges

a. Exempted Discharges

In carrying out Prohibition A of this Order, the following non-stormwater discharges are not prohibited unless they are identified by the Permittees or the Executive Officer as sources of pollutants to receiving waters:

i. Flows from riparian habitats or wetlands;
ii. Diverted stream flows;
iii. Springs;
iv. Rising ground waters; and
v. Uncontaminated groundwater infiltration.

If any of the above categories of discharges, or sources of such discharges, are identified as sources of pollutants to receiving waters, then such categories or sources shall be addressed as conditionally exempted discharges in accordance with Provision C.9.b.

b. Conditionally Exempted Discharges

The Program has developed control measures to eliminate adverse impacts of certain conditionally exempted discharges as listed in the Findings (uncontaminated pumped groundwater, foundation drains, water from crawl spaces pumps, footing drains and planned and unplanned discharges from potable water sources, and water line and hydrant flushing). The following non-stormwater discharges are not prohibited if they are identified by either the Permittees (and incorporated into the Management Plan) or the Executive Officer as not being sources of pollutants to receiving waters or if appropriate control measures to prevent or eliminate adverse impacts of such sources are developed and implemented under the Management Plan in accordance with Provision C.9.c:

i. Uncontaminated pumped groundwater;
ii. Foundation drains;
iii. Water from crawl space pumps;
iv. Footing drains;
v. Air conditioning condensate;
vi. Irrigation water;
vii. Landscape irrigation;
viii. Lawn or garden watering;
ix. Planned and unplanned discharges from potable water sources;
x. Water line and hydrant flushing;
xi. Individual residential car washing; and
xii. Discharges or flows from emergency fire fighting activities;

The Permittees shall identify and describe the categories of discharges listed in Provision C.9.b that they wish to exempt from Prohibition A in periodic submissions to the Executive Officer. For each such category, the Permittees shall identify and describe as necessary and appropriate to the category either documentation that the discharges are not sources of pollutants to receiving waters or circumstances in which they are not found to be sources of pollutants to receiving waters. Otherwise, the Permittees shall describe control measures to eliminate adverse impacts of such sources, procedures and Performance Standards for their implementation, procedures for notifying the Regional Board of these discharges, and procedures for monitoring and record

management. Permittees shall resubmit appropriate revised and/or additional control measures whenever there is a change in the quality of the discharge. For example, the use of recycled water for irrigation shall lead to the implementation of additional control measures in order to reduce chlorine levels before releasing the discharge to the storm drain system. Such submissions shall be deemed to be incorporated into the Management Plan unless disapproved by the Executive Officer or acted on in accordance with Provision C.12 and the NPDES permit regulations.

c. Permit Authorization for Exempted Discharges

i. Discharges of non-stormwater from sources owned or operated by the Permittees are authorized and permitted by this Order, if they are in accordance with the conditions of this Provision and the Management Plan.

ii. The Regional Board may require dischargers of non-stormwater other than the Permittees to apply for and obtain coverage under an NPDES permit and comply with the control measures developed by the Permittees pursuant to this Provision. Non-stormwater discharges that are in compliance with such control measures may be accepted by the Permittees and are not subject to Prohibition A.

iii. The Permittees may propose, as part of their annual updates to the Management Plan under Provision C.7 of this Order, additional categories of non-stormwater discharges to be included in the exemption to Prohibition A. Such proposals are subject to approval by the Regional Board in accordance with the NPDES permit regulations.

10. Water Quality-Based Requirements for Specific Pollutants of Concern

In accordance with Provision C.1 and Finding 22 of this Order, the Permittees shall implement control programs for pollutants that have the reasonable potential to cause or contribute to exceedances of water quality standards. These control programs shall include the following:

a. Control Program for Copper

The Permittees have submitted a Copper Pollutant Reduction Plan (PRP) that includes a general strategy to monitor the concentration of copper in stormwater runoff and lists BMPs that may be used to reduce copper discharges. The program will further refine the Copper PRP by providing detailed descriptions of activities in each fiscal year. The refined PRP shall be included in the Program's submittal of the Annual Workplan by 100 days of adoption of this Order, and evaluations and results shall be reported in the Annual Reports.

b. Control Program for Mercury

The Mercury Pollutant Reduction Plan (Mercury Plan) shall be refined to include all of the following:

i. Development and adoption of policies, procedures, and/or ordinances calling for:

- The reduction of mercury from controllable sources in urban runoff to the maximum extent practicable, including the identification of mercury-containing products used by the Permittees and a schedule for their timely phase out where appropriate; and

- Coordination with solid waste management agencies to ensure maximum recycling of fluorescent lights and/or establishment of "take back" programs for the public collection of mercury-containing household products (potentially including thermometers and other gauges, batteries, fluorescent and other lamps, switches, relays, sensors and thermostats);

ii. A schedule for assisting the Regional Board staff in conducting an assessment of the contribution of air pollution sources to mercury in the Permittees' urban runoff (potentially including an identification of significant mercury air emission sources, an inventory of relevant mercury air emissions and a review of options for reducing or eliminating mercury air emissions);

iii. Assessment of the sediment mercury concentrations and percentage of fine material at the base of key watersheds, above the tide line;

iv. A public education, outreach and participation program designed to reach residential, commercial and industrial users or sources of mercury-containing products or emissions; and,

v. Participation with other organizations to encourage the electric light bulb manufacturing industry to reduce mercury associated with the disposal of fluorescent lights through product reformulation.

The Mercury Plan shall be refined and incorporated in the Program's submittal of the Annual Workplan by 100 days of adoption of this order. The Mercury Plan shall refine the schedule for implementation that Permittees are currently working under. To facilitate the development of the actions specified above, the Permittees may coordinate with publicly owned treatment works and other agencies to develop cooperative plans and programs.

c. Control Program for Pesticides

To address the impairment of urban streams by diazinon and other pesticides, the Permittees shall continue to implement and refine the previously submitted Diazinon Pollutant Reduction Plan (Pesticide Plan) to address their own use of pesticides including diazinon, other lower priority pesticides no longer in use such as chlordane, dieldrin and DDT, and the use of such pesticides by other sources within their jurisdictions. The Permittees may coordinate with agencies and organizations such as the Bay Area Stormwater Management Agencies Association or the Urban Pesticide Committee. The Pesticide Plan shall include a schedule for implementation and a mechanism for reviewing and amending the plan, as necessary, in subsequent years. The refined Pesticide Plan shall be resubmitted for approval to the Executive Officer by 100 days of adoption of this order .

i. Pesticide Use by Permittees

The Pesticide Plan shall include a program to quantitatively identify each Permittee's pesticide use by preparing a periodically updated inventory of pesticides used by all internal departments, divisions, and other operational units as applicable to each Permittee. Schools and special district operations shall be included in the Pesticide Plan to the full extent of each Permittee's authority. The Permittees shall adopt and verifiably implement policies, procedures, and/or ordinances requiring the minimization of pesticide use and the use of integrated pest management (IPM) techniques in the Permittees' operations if they have not

already done so. The policies, procedures, and/or ordinances shall include: 1) commitments to reduce use, phase-out, and ultimately eliminate use of pesticides that cause impairment of surface waters, and 2) commitments to not increase the Permittees' use of organophosphate pesticides without justifying the necessity and minimizing adverse water quality impacts. The Permittees shall implement training programs for their employees who use pesticides, including pesticides available over the counter. These programs shall address pesticide-related surface water toxicity, proper use and disposal of such pesticides, and least toxic methods of pest prevention and control, including IPM. The Pesticide Plan shall be subject to updating via the Permittees' improvement process.

ii. Other Pesticide Sources

To address other pesticide users within the Permittees' jurisdictions (including schools and special district operations that are not owned or operated by the Permittees), the Pesticide Plan shall include the following elements:

1. Public education and outreach programs. Such programs shall be designed for residential and commercial pesticide users and pest control operators. These programs shall provide targeted information concerning proper pesticide use and disposal, potential adverse impacts on water quality, and alternative, least toxic methods of pest prevention and control, including IPM. These programs shall also target pesticide retailers to encourage the sale of least toxic alternatives and to facilitate point-of-sale public outreach efforts. These programs may also recognize local least toxic pest management practitioners.
2. Mechanisms to discourage pesticide use at new development sites. Such mechanisms shall encourage the consideration of pest-resistant landscaping and design features, minimization of impervious surfaces, and incorporation of stormwater detention and retention techniques in the design, landscaping, and/or environmental reviews of proposed development projects. Education programs shall target individuals responsible for these reviews and focus on factors affecting water quality impairment.
3. Coordination with household hazardous waste collection agencies. The Permittees shall support, enhance, and help publicize programs for proper pesticide disposal.

iii. Other Pesticide Activities

The Permittees shall work with municipal stormwater management agencies in the Bay Area and other parties with interest in or responsibilities for reducing pesticide-related toxicity in surface water (for example, with the Urban Pesticide Committee) to assess which pesticide products, uses and past uses pose the greatest risks to surface water quality. Along with incorporating this information into the programs described above, the Permittees shall encourage US EPA, the California Department of Pesticide Regulation (DPR), and pesticide manufacturers to understand the adverse impacts of pesticides on urban creeks, monitor US EPA and DPR activities related to the registration of diazinon products and uses, and actively encourage US EPA, DPR, and pesticide manufacturers to eliminate, reformulate, or otherwise curtail, to the extent possible, the sale and use of pesticides that pose substantial risks to surface water quality (e.g., when there is a high potential for runoff).

The Program shall also work with the Regional Board and other agencies in developing a TMDL for diazinon in impaired urban creeks. The Program will participate in stakeholder forums and collaborative technical studies necessary to assist the Regional Board in completing the TMDL. These studies may include, but shall not be limited to, additional diazinon monitoring and toxicity testing.

d. Control Program for Polychlorinated Biphenyls (PCBs) and Dioxin Compounds

The Permittees shall work with other municipal stormwater management agencies in the Bay Area to implement a plan to identify, assess, and manage controllable sources of PCBs and dioxin-like compounds found in urban runoff (PCBs/Dioxin Plan). The PCBs/Dioxin Plan shall include actions to:

i. Characterize the representative distribution of PCBs and dioxin-like compounds in the urban areas of Alameda County to determine: a) what concentrations and what types of PCBs and dioxin-like compounds are present in urban runoff, b) how such PCBs or dioxin-like compounds are distributed in urban areas, and c) whether storm drains or other surface drainage pathways are sources of PCBs or dioxin-like compounds in themselves, or whether there are specific locations within urban watersheds where prior or current uses result in land sources contributing to discharges of PCBs or dioxin-like compounds to San Francisco Bay via urban runoff conveyance systems;

ii. Provide information to allow calculation of PCBs and dioxin-like compound loads to San Francisco Bay from urban runoff conveyance systems;

iii. Identify control measures and/or management practices to eliminate or reduce discharges of PCBs or dioxin-like compounds conveyed by urban runoff conveyance systems in Alameda County;

iv. Implement actions to eliminate or reduce discharges of PCBs or dioxin-like compounds from urban runoff conveyance systems from controllable sources (if any); and,

v. Develop a long-term management plan for eliminating and reducing PCB discharges.

vi. Action Plan: The PCBs/Dioxin Plan shall describe specific steps to be taken by the Permittees for implementing any emission reduction strategies to the MEP standard. The Plan shall note the specific actions to be taken, identify the agency(ies) responsible for implementation, and include a timeline for the completion of each action item. The portion of the PCB/Dioxin Plan addressing action areas d.i and d.ii shall be implemented forthwith for PCBs. The workplan that was submitted for PCBs addressing action areas d.i, d.ii, and d.iii, including a schedule for implementation, shall be refined and submitted, acceptable to the Executive Officer, by June 1, 2003. A workplan addressing areas d.i and d.ii for dioxin-like compounds shall be submitted, acceptable to the Executive Officer, by March 1, 2004. The portion of the PCB/Dioxin Plan addressing action area d.iv, including a schedule for implementation, shall be submitted, acceptable to the Executive Officer, within one year after adoption of this Order for PCBs and within eighteen months after adoption of this Order for dioxin-like compounds; implementation shall begin no later than one year and six months after adoption of this Order for PCBs and two years after adoption of this Order for dioxin-like compounds, although implementation of early action priorities should take place before that date. The Permittees may coordinate with other stormwater programs and/or other

organizations to implement cooperative plans and programs to facilitate implementation of the specified actions.

e. Control Program for Sediment

The Permittees shall conduct an analysis of excess sediment impairment in urban streams and assess management practices that are currently being implemented and additional management practices that will be implemented to prevent or reduce excess sediment impairment in urban creeks, and implement any additional management practices necessary to prevent or reduce excess sediment impairment in urban creeks.

11. Watershed Management

The Permittees shall implement watershed management measures based on identification of relevant watershed characteristics (land imperviousness, conditions of creeks, land uses, etc.) and identification of control measures and other actions in the Management Plan that are appropriately implemented on a watershed basis with the recognition that there may be unique values, problems, goals, and strategies specific to individual watersheds. Watershed management measures also seek to develop and implement the most cost effective approaches to solving identified problems and to coordinate these activities with other related programs.

a. The Permittees shall submit to the Regional Board, within a year after adoption of this Order, a report concerning the integration of watershed management activities into the Management Plan. The Program may submit this report on behalf of the Permittees. The report shall, at a minimum:

   i. Identify the watersheds that are relevant to each Permittee;

   ii. Identify key characteristics related to urban runoff in each watershed and program elements related to such characteristics;

   iii. Provide a priority listing of watersheds to be assessed and a schedule for conducting such assessments, including: 1) investigating beneficial uses and causes of impairment, 2) reviewing, compiling, and disseminating environmental data, and 3) developing and implementing strategies for controlling adverse impacts of land use on beneficial uses;

   iv. Assess each Permittee's implementation of watershed management activities; and,

   v. Outline steps needed for improvement in addressing priorities within each watershed.

b. The Program should also work with Regional Board staff to apply a regulatory strategy that allows the Permittees to find ways to coordinate with other agencies within a specific watershed to protect beneficial uses.

12. Modifications to the Management Plan

It is anticipated that the Management Plan may need to be modified, revised, or amended from time to time to respond to changed conditions and to incorporate more effective approaches to pollutant control. Requests for changes may be initiated by the Executive Officer or by the Permittees. Minor changes may be made with the Executive Officer's approval and will be brought to the Regional Board as information items and the Permittees and interested parties will be notified accordingly. If proposed changes imply a major revision of the Program, the Executive Officer shall bring such changes before the Regional Board as permit amendments and notify the Permittees and interested parties accordingly.

13. Modifications to this Order

This Order may be modified, or alternatively, revoked or reissued, prior to the expiration date as follows:

a. To address significant changed conditions identified in the technical reports required by the Regional Board that were unknown at the time of the issuance of this Order;

b. To incorporate applicable requirements of statewide water quality control plans adopted by the State Board or amendments to the Basin Plan approved by the State Board; or

c. To comply with any applicable requirements, guidelines, or regulations issued or approved under Section 402(p) of the CWA, if the requirement, guideline, or regulation so issued or approved contains different conditions or additional requirements not provided for in this Order. The Order as modified or reissued under this paragraph shall also contain any other requirements of the CWA then applicable.

14. Each of the Permittees shall comply with all parts of the Standard Provisions contained in Appendix A of this Order.

15. This Order expires on February 19, 2008, five years from the date of adoption of this Order by the Regional Board. The Permittees must file a Report of Waste Discharge in accordance with Title 23, California Code of Regulations, not later than 180 days in advance of such date as application for reissuance of waste discharge requirements.

16. Order Nos. 97-030 and 99-049 are hereby rescinded.

I, Loretta K. Barsamian, Executive Officer, do hereby certify that the foregoing is a full, true, and correct copy of an Order adopted by the California Regional Water Quality Control Board, San Francisco Bay Region, on February 19, 2003.

_____
Loretta K. Barsamian
Executive Officer

APPENDIX A - STANDARD PROVISIONS
APPENDIX B- PROVISION C.3 REQUIREMENTS:
Table 1. Summary of Annual and One-Time Reporting Requirements
Table 2. Implementation Schedule

ATTACHMENT A - Alameda Countywide Clean Water Program Stormwater Quality Management Plan - Title Page and Table of Contents

ATTACHMENT B - Watershed Assessment and Monitoring Strategy for Fiscal Years 2002-2008

ATTACHMENT C - Municipalities and Major Open Creeks and Waterbodies in Alameda County

Extended Detention Basin TC-22

Design Considerations

- Tributary Area
- Area Required
- Hydraulic Head

Description

Dry extended detention ponds (a.k.a. dry ponds, extended detention basins, detention ponds, extended detention ponds) are basins whose outlets have been designed to detain the stormwater runoff from a water quality design storm for some minimum time (e.g., 48 hours) to allow particles and associated pollutants to settle. Unlike wet ponds, these facilities do not have a large permanent pool. They can also be used to provide flood control by including additional flood detention storage.

California Experience

Caltrans constructed and monitored 5 extended detention basins in southern California with design drain times of 72 hours. Four of the basins were earthen, less costly and had substantially better load reduction because of infiltration that occurred, than the concrete basin. The Caltrans study reaffirmed the flexibility and performance of this conventional technology. The small headloss and few siting constraints suggest that these devices are one of the most applicable technologies for stormwater treatment.

Advantages

- Due to the simplicity of design, extended detention basins are relatively easy and inexpensive to construct and operate.
- Extended detention basins can provide substantial capture of sediment and the toxics fraction associated with particulates.
- Widespread application with sufficient capture volume can provide significant control of channel erosion and enlargement caused by changes to flow frequency

Targeted Constituents

☑	Sediment	▲
☑	Nutrients	●
☑	Trash	■
☑	Metals	▲
☑	Bacteria	▲
☑	Oil and Grease	▲
☑	Organics	▲

Legend *(Removal Effectiveness)*

● Low ■ High

▲ Medium

CASQA
CALIFORNIA STORMWATER QUALITY ASSOCIATION

relationships resulting from the increase of impervious cover in a watershed.

Limitations

- Limitation of the diameter of the orifice may not allow use of extended detention in watersheds of less than 5 acres (would require an orifice with a diameter of less than 0.5 inches that would be prone to clogging).
- Dry extended detention ponds have only moderate pollutant removal when compared to some other structural stormwater practices, and they are relatively ineffective at removing soluble pollutants.
- Although wet ponds can increase property values, dry ponds can actually detract from the value of a home due to the adverse aesthetics of dry, bare areas and inlet and outlet structures.

Design and Sizing Guidelines

- Capture volume determined by local requirements or sized to treat 85% of the annual runoff volume.
- Outlet designed to discharge the capture volume over a period of hours.
- Length to width ratio of at least 1.5:1 where feasible.
- Basin depths optimally range from 2 to 5 feet.
- Include energy dissipation in the inlet design to reduce resuspension of accumulated sediment.
- A maintenance ramp and perimeter access should be included in the design to facilitate access to the basin for maintenance activities and for vector surveillance and control.
- Use a draw down time of 48 hours in most areas of California. Draw down times in excess of 48 hours may result in vector breeding, and should be used only after coordination with local vector control authorities. Draw down times of less than 48 hours should be limited to BMP drainage areas with coarse soils that readily settle and to watersheds where warming may be determined to downstream fisheries.

Construction / Inspection Considerations

- Inspect facility after first large to storm to determine whether the desired residence time has been achieved.
- When constructed with small tributary area, orifice sizing is critical and inspection should verify that flow through additional openings such as bolt holes does not occur.

Performance

One objective of stormwater management practices can be to reduce the flood hazard associated with large storm events by reducing the peak flow associated with these storms. Dry extended detention basins can easily be designed for flood control, and this is actually the primary purpose of most detention ponds.

Dry extended detention basins provide moderate pollutant removal, provided that the recommended design features are incorporated. Although they can be effective at removing some pollutants through settling, they are less effective at removing soluble pollutants because of the absence of a permanent pool. Several studies are available on the effectiveness of dry extended detention ponds including one recently concluded by Caltrans (2002).

The load reduction is greater than the concentration reduction because of the substantial infiltration that occurs. Although the infiltration of stormwater is clearly beneficial to surface receiving waters, there is the potential for groundwater contamination. Previous research on the effects of incidental infiltration on groundwater quality indicated that the risk of contamination is minimal.

There were substantial differences in the amount of infiltration that were observed in the earthen basins during the Caltrans study. On average, approximately 40 percent of the runoff entering the unlined basins infiltrated and was not discharged. The percentage ranged from a high of about 60 percent to a low of only about 8 percent for the different facilities. Climatic conditions and local water table elevation are likely the principal causes of this difference. The least infiltration occurred at a site located on the coast where humidity is higher and the basin invert is within a few meters of sea level. Conversely, the most infiltration occurred at a facility located well inland in Los Angeles County where the climate is much warmer and the humidity is less, resulting in lower soil moisture content in the basin floor at the beginning of storms.

Vegetated detention basins appear to have greater pollutant removal than concrete basins. In the Caltrans study, the concrete basin exported sediment and associated pollutants during a number of storms. Export was not as common in the earthen basins, where the vegetation appeared to help stabilize the retained sediment.

Siting Criteria

Dry extended detention ponds are among the most widely applicable stormwater management practices and are especially useful in retrofit situations where their low hydraulic head requirements allow them to be sited within the constraints of the existing storm drain system. In addition, many communities have detention basins designed for flood control. It is possible to modify these facilities to incorporate features that provide water quality treatment and/or channel protection. Although dry extended detention ponds can be applied rather broadly, designers need to ensure that they are feasible at the site in question. This section provides basic guidelines for siting dry extended detention ponds.

In general, dry extended detention ponds should be used on sites with a minimum area of 5 acres. With this size catchment area, the orifice size can be on the order of 0.5 inches. On smaller sites, it can be challenging to provide channel or water quality control because the orifice diameter at the outlet needed to control relatively small storms becomes very small and thus prone to clogging. In addition, it is generally more cost-effective to control larger drainage areas due to the economies of scale.

Extended detention basins can be used with almost all soils and geology, with minor design adjustments for regions of rapidly percolating soils such as sand. In these areas, extended detention ponds may need an impermeable liner to prevent ground water contamination.

The base of the extended detention facility should not intersect the water table. A permanently wet bottom may become a mosquito breeding ground. Research in Southwest Florida (Santana et al., 1994) demonstrated that intermittently flooded systems, such as dry extended detention ponds, produce more mosquitoes than other pond systems, particularly when the facilities remained wet for more than 3 days following heavy rainfall.

A study in Prince George's County, Maryland, found that stormwater management practices can increase stream temperatures (Galli, 1990). Overall, dry extended detention ponds increased temperature by about 5°F. In cold water streams, dry ponds should be designed to detain stormwater for a relatively short time (i.e., 24 hours) to minimize the amount of warming that occurs in the basin.

Additional Design Guidelines

In order to enhance the effectiveness of extended detention basins, the dimensions of the basin must be sized appropriately. Merely providing the required storage volume will not ensure maximum constituent removal. By effectively configuring the basin, the designer will create a long flow path, promote the establishment of low velocities, and avoid having stagnant areas of the basin. To promote settling and to attain an appealing environment, the design of the basin should consider the length to width ratio, cross-sectional areas, basin slopes and pond configuration, and aesthetics (Young et al., 1996).

Energy dissipation structures should be included for the basin inlet to prevent resuspension of accumulated sediment. The use of stilling basins for this purpose should be avoided because the standing water provides a breeding area for mosquitoes.

Extended detention facilities should be sized to completely capture the water quality volume. A micropool is often recommended for inclusion in the design and one is shown in the schematic diagram. These small permanent pools greatly increase the potential for mosquito breeding and complicate maintenance activities; consequently, they are not recommended for use in California.

A large aspect ratio may improve the performance of detention basins; consequently, the outlets should be placed to maximize the flowpath through the facility. The ratio of flowpath length to width from the inlet to the outlet should be at least 1.5:1 (L:W) where feasible. Basin depths optimally range from 2 to 5 feet.

The facility's drawdown time should be regulated by an orifice or weir. In general, the outflow structure should have a trash rack or other acceptable means of preventing clogging at the entrance to the outflow pipes. The outlet design implemented by Caltrans in the facilities constructed in San Diego County used an outlet riser with orifices

Figure 1
Example of Extended Detention Outlet Structure

sized to discharge the water quality volume, and the riser overflow height was set to the design storm elevation. A stainless steel screen was placed around the outlet riser to ensure that the orifices would not become clogged with debris. Sites either used a separate riser or broad crested weir for overflow of runoff for the 25 and greater year storms. A picture of a typical outlet is presented in Figure 1.

The outflow structure should be sized to allow for complete drawdown of the water quality volume in 72 hours. No more than 50% of the water quality volume should drain from the facility within the first 24 hours. The outflow structure can be fitted with a valve so that discharge from the basin can be halted in case of an accidental spill in the watershed.

Summary of Design Recommendations

(1) Facility Sizing - The required water quality volume is determined by local regulations or the basin should be sized to capture and treat 85% of the annual runoff volume. See Section 5.5.1 of the handbook for a discussion of volume-based design.

Basin Configuration – A high aspect ratio may improve the performance of detention basins; consequently, the outlets should be placed to maximize the flowpath through the facility. The ratio of flowpath length to width from the inlet to the outlet should be at least 1.5:1 (L:W). The flowpath length is defined as the distance from the inlet to the outlet as measured at the surface. The width is defined as the mean width of the basin. Basin depths optimally range from 2 to 5 feet. The basin may include a sediment forebay to provide the opportunity for larger particles to settle out.

A micropool should not be incorporated in the design because of vector concerns. For online facilities, the principal and emergency spillways must be sized to provide 1.0 foot of freeboard during the 25-year event and to safely pass the flow from 100-year storm.

(2) Pond Side Slopes - Side slopes of the pond should be 3:1 (H:V) or flatter for grass stabilized slopes. Slopes steeper than 3:1 (H:V) must be stabilized with an appropriate slope stabilization practice.

(3) Basin Lining – Basins must be constructed to prevent possible contamination of groundwater below the facility.

(4) Basin Inlet – Energy dissipation is required at the basin inlet to reduce resuspension of accumulated sediment and to reduce the tendency for short-circuiting.

(5) Outflow Structure - The facility's drawdown time should be regulated by a gate valve or orifice plate. In general, the outflow structure should have a trash rack or other acceptable means of preventing clogging at the entrance to the outflow pipes.

The outflow structure should be sized to allow for complete drawdown of the water quality volume in 72 hours. No more than 50% of the water quality volume should drain from the facility within the first 24 hours. The outflow structure should be fitted with a valve so that discharge from the basin can be halted in case of an accidental spill in the watershed. This same valve also can be used to regulate the rate of discharge from the basin.

The discharge through a control orifice is calculated from:

$$Q = CA(2g(H-H_0))^{0.5}$$

where: Q = discharge (ft^3/s)
C = orifice coefficient
A = area of the orifice (ft^2)
g = gravitational constant (32.2)
H = water surface elevation (ft)
H_0= orifice elevation (ft)

Recommended values for C are 0.66 for thin materials and 0.80 when the material is thicker than the orifice diameter. This equation can be implemented in spreadsheet form with the pond stage/volume relationship to calculate drain time. To do this, use the initial height of the water above the orifice for the water quality volume. Calculate the discharge and assume that it remains constant for approximately 10 minutes. Based on that discharge, estimate the total discharge during that interval and the new elevation based on the stage volume relationship. Continue to iterate until H is approximately equal to H_0. When using multiple orifices the discharge from each is summed.

(6) Splitter Box - When the pond is designed as an offline facility, a splitter structure is used to isolate the water quality volume. The splitter box, or other flow diverting approach, should be designed to convey the 25-year storm event while providing at least 1.0 foot of freeboard along pond side slopes.

(7) Erosion Protection at the Outfall - For online facilities, special consideration should be given to the facility's outfall location. Flared pipe end sections that discharge at or near the stream invert are preferred. The channel immediately below the pond outfall should be modified to conform to natural dimensions, and lined with large stone riprap placed over filter cloth. Energy dissipation may be required to reduce flow velocities from the primary spillway to non-erosive velocities.

(8) Safety Considerations - Safety is provided either by fencing of the facility or by managing the contours of the pond to eliminate dropoffs and other hazards. Earthen side slopes should not exceed 3:1 (H:V) and should terminate on a flat safety bench area. Landscaping can be used to impede access to the facility. The primary spillway opening must not permit access by small children. Outfall pipes above 48 inches in diameter should be fenced.

Maintenance

Routine maintenance activity is often thought to consist mostly of sediment and trash and debris removal; however, these activities often constitute only a small fraction of the maintenance hours. During a recent study by Caltrans, 72 hours of maintenance was performed annually, but only a little over 7 hours was spent on sediment and trash removal. The largest recurring activity was vegetation management, routine mowing. The largest absolute number of hours was associated with vector control because of mosquito breeding that occurred in the stilling basins (example of standing water to be avoided) installed as energy dissipaters. In most cases, basic housekeeping practices such as removal of debris accumulations and vegetation

management to ensure that the basin dewaters completely in 48-72 hours is sufficient to prevent creating mosquito and other vector habitats.

Consequently, maintenance costs should be estimated based primarily on the mowing frequency and the time required. Mowing should be done at least annually to avoid establishment of woody vegetation, but may need to be performed much more frequently if aesthetics are an important consideration.

Typical activities and frequencies include:

- Schedule semiannual inspection for the beginning and end of the wet season for standing water, slope stability, sediment accumulation, trash and debris, and presence of burrows.
- Remove accumulated trash and debris in the basin and around the riser pipe during the semiannual inspections. The frequency of this activity may be altered to meet specific site conditions.
- Trim vegetation at the beginning and end of the wet season and inspect monthly to prevent establishment of woody vegetation and for aesthetic and vector reasons.
- Remove accumulated sediment and re-grade about every 10 years or when the accumulated sediment volume exceeds 10 percent of the basin volume. Inspect the basin each year for accumulated sediment volume.

Cost

Construction Cost

The construction costs associated with extended detention basins vary considerably. One recent study evaluated the cost of all pond systems (Brown and Schueler, 1997). Adjusting for inflation, the cost of dry extended detention ponds can be estimated with the equation:

$$C = 12.4V^{0.760}$$

where: C = Construction, design, and permitting cost, and
V = Volume (ft^3).

Using this equation, typical construction costs are:

$ 41,600 for a 1 acre-foot pond

$ 239,000 for a 10 acre-foot pond

$ 1,380,000 for a 100 acre-foot pond

Interestingly, these costs are generally slightly higher than the predicted cost of wet ponds (according to Brown and Schueler, 1997) on a cost per total volume basis, which highlights the difficulty of developing reasonably accurate construction estimates. In addition, a typical facility constructed by Caltrans cost about $160,000 with a capture volume of only 0.3 ac-ft.

An economic concern associated with dry ponds is that they might detract slightly from the value of adjacent properties. One study found that dry ponds can actually detract from the

perceived value of homes adjacent to a dry pond by between 3 and 10 percent (Emmerling-Dinovo, 1995).

Maintenance Cost

For ponds, the annual cost of routine maintenance is typically estimated at about 3 to 5 percent of the construction cost (EPA website). Alternatively, a community can estimate the cost of the maintenance activities outlined in the maintenance section. Table 1 presents the maintenance costs estimated by Caltrans based on their experience with five basins located in southern California. Again, it should be emphasized that the vast majority of hours are related to vegetation management (mowing).

Table 1 Estimated Average Annual Maintenance Effort

Activity	Labor Hours	Equipment & Material ($)	Cost
Inspections	4	7	183
Maintenance	49	126	2282
Vector Control	0	0	0
Administration	3	0	132
Materials	-	535	535
Total	**56**	**$668**	**$3,132**

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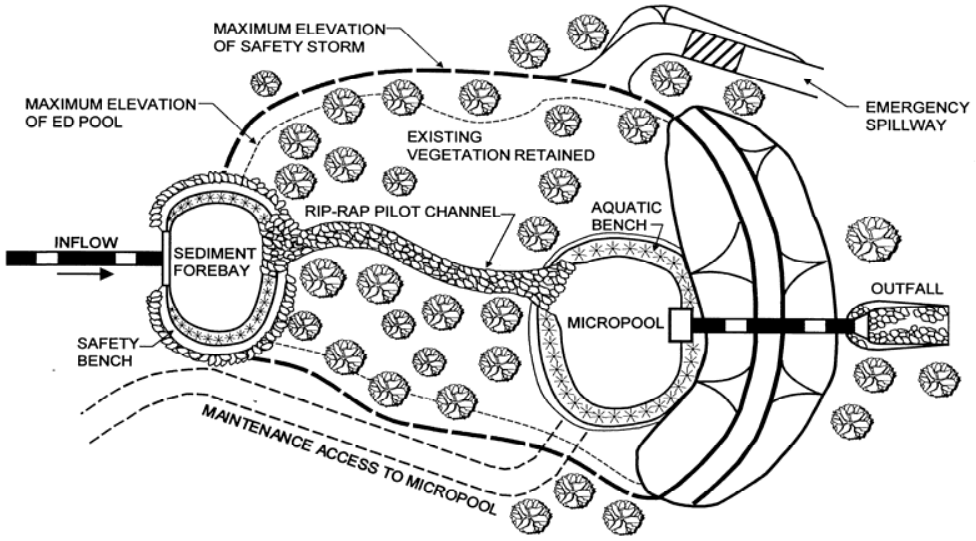

PLAN VIEW

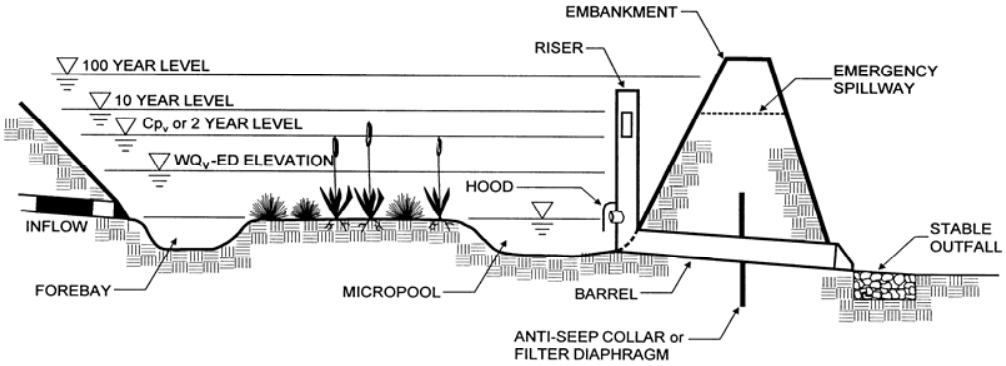

PROFILE

Schematic of an Extended Detention Basin (MDE, 2000)

Comments for the EPA Water Docket

OW-2002-0050

Advance Notice of Proposed Rulemaking on the Clean Water Act Regulatory Definition of "Waters of the United States"

April 16, 2003

Submitted by:

American Rivers
Appalachian Center for the Economy and the Environment
Audubon Society
Clean Water Action
Defenders of Wildlife
Earthjustice
Environmental Defense
National Wildlife Federation
NRDC
Sierra Club
The Ocean Conservancy

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PART ONE – Response to ANPRM

I. INTRODUCTION

These comments, along with the attached exhibits, represent the views of the National Wildlife Federation, Natural Resources Defense Council, Earthjustice, American Rivers, Sierra Club, Ocean Conservancy, Defenders of Wildlife, Appalachian Center for the Economy and the Environment, National Audubon Society, Environmental Defense, and Clean Water Action in response to the questions and requests for comment contained in the Advance Notice of Proposed Rulemaking on the Clean Water Act Regulatory Definition of "Waters of the United States," (hereafter "ANPRM"), 68 Fed. Reg. 1991, January 15, 2003[1/] published by the Environmental Protection Agency and the Department of the Army, Corps of Engineers (hereinafter "the agencies"), ID No. OW–2002–0050.

It is customary when submitting comments in response to an ANPRM or proposed rulemaking to state appreciation for the opportunity to comment on the matter at hand. However, in this instance we think it is important to state at the outset that our organizations do not view this comment process as a welcome "opportunity" but instead as an unwelcome necessity created by the agencies' unnecessary initiation of a process to rewrite the rules of the Clean Water Act.

Congress passed the Clean Water Act more than 30 years ago to "restore and maintain the chemical, physical and biological integrity of the nation's waters." While the law has had many successes, an enormous amount of work remains to be done before our country meets this important and common sense goal. Rather than seizing on the task at hand, the agencies responsible for protecting the nation's waters have instead presented the American public with the absurd suggestion that the jurisdictional scope of the Clean Water Act should be narrowed by creating a regulatory category of so-called "isolated" waters and leaving those waters outside the protections of the Act.

This proposal is flatly contrary to the letter, purpose and original intent of Congress in 1972 and in subsequent Congresses that amended the Act but reaffirmed its scope. It represents terrible public health, environmental and economic policy, and is scientifically indefensible. It is not justified by the agencies' legal arguments that cannot withstand honest scrutiny. It would set environmental policy back by decades, as it is the most sweeping effort to restrict Clean Water Act protections made by any administration since the law was passed.

We begin our comments with a discussion debunking the claim made in the January 15 notice that a rulemaking is necessitated by the U.S. Supreme Court's decision in *Solid Waste Agency of Northern Cook County v. U.S. Army Corps of Engineers* (hereafter "*SWANCC*") 531 U.S. 159 (2001). In fact, nothing in the *SWANCC* decision compels any change to the longstanding

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[1] The comment deadline was extended from March 3 to April 16, 2003 by notice in 68 Fed. Reg. 9613 (February 28, 2003).

definition of waters of the United States used by both EPA and the Corps, as the U.S. Department of Justice has argued consistently in briefs filed in federal courts in the two years since the *SWANCC* decision. We also seek to correct the skewed presentation of post-*SWANCC* case law that is contained in the January 15 ANPRM and attached Guidance. Our comments make clear that both the ANPRM and Guidance go far beyond any change in law or policy necessitated by the narrow holding in *SWANCC*.

We next provide a short summary of the legislative history of the Clean Water Act illustrating the well-established fact that Congress intended the 1972 amendments to the Federal Water Pollution Control Act to broadly protect waters of the United States, and rejected a proposal to narrow the scope of § 404 of the Act in 1977.

We then provide responses to the questions and requests for information that we have identified in the ANPRM.

Following the responses to those questions and requests for information, we discuss the potential implications of the changes being considered for the effectiveness of several of the key provisions of the Clean Water Act, as well as other statutes including the Safe Drinking Water Act and the Endangered Species Act. We then look at the implications of withdrawing Clean Water Act protection for two important ecological regions – Alaska's North Slope and the Appalachian highlands.

Finally, in Part Two of these comments, we provide comment on the Guidance for EPA and Corps field staff included as an attachment to the ANPRM.

We hope that EPA and the Corps will consider these comments, as well as the tens of thousands of comments from the public, state agencies, hunters and anglers, scientists and others opposing a rulemaking and will abandon this misguided and monumentally destructive project at the earliest possible date.

II. THERE IS NO NEED FOR RULE CHANGES

A. THE ADVANCED NOTICE OF PROPOSED RULEMAKING AND GUIDANCE, NOT *SWANCC*, CREATE UNCERTAINTY IN CWA JURISDICTION

The central premise of the ANPRM is that although the scope of *SWANCC* is clear on its face, it somehow "calls into question whether CWA jurisdiction over isolated, intrastate, non-navigable waters could now be predicated on the other factors listed in the 'Migratory Bird Rule' or other rationales of 33 C.F.R. § 328.3(a)(3)(i)-(iii)." 68 Fed. Reg. 1993. Contrary to the ANPRM's assertion, neither *SWANCC* itself, earlier or subsequent judicial decisions, nor EPA's now long-standing and consistent interpretations of *SWANCC*, create any uncertainty over the scope of the CWA's jurisdiction. The only uncertainty that has been introduced since the *SWANCC* decision was issued is the issuance of the ANPRM and its accompanying Guidance and a handful of aberrant judicial decisions, all of which EPA has opposed and/or appealed. Because the

definition of waters of the United States used by both EPA and the Corps, as the U.S. Department of Justice has argued consistently in briefs filed in federal courts in the two years since the *SWANCC* decision. We also seek to correct the skewed presentation of post-*SWANCC* case law that is contained in the January 15 ANPRM and attached Guidance. Our comments make clear that both the ANPRM and Guidance go far beyond any change in law or policy necessitated by the narrow holding in *SWANCC*.

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ANPRM and the new Guidance do not further the public's interest in clarifying what waters are subject to CWA jurisdiction and instead create uncertainty not projected by *SWANCC*, the environmental commenters request that EPA take no further rulemaking action and that EPA and the Corps withdraw the informal Guidance.

EPA's contention that *SWANCC* invites the agency to reconsider its longstanding definition of "waters of the United States" to include intrastate waters which could affect interstate or foreign commerce is not supported by *SWANCC*'s analysis. In *SWANCC*, the Supreme Court applied the CWA's definition of waters to a specific set of facts. It is clear that, in those specific facts — "isolated," intrastate, non-navigable waters only used by migratory birds — the CWA does not apply. However, it also is clear that the CWA does apply to any waters that fall within EPA's and Corps' published definition of "waters of the United States." Indeed, it remains possible that even the "isolated" ponds in *SWANCC* are waters governed by the CWA. *SWANCC*, 2001 WL 312372*1 (7th Cir. 2001). Thirty years of remarkably consistent case law and administrative decisions create a jurisdictional certainty perhaps unparalleled in environmental law. For EPA to proceed with a rulemaking that turns its back on those many decisions will be the only real source of uncertainty regarding the CWA's jurisdictional scope.

1. <u>*SWANCC* Does Not Call Into Question The CWA's Jurisdiction Over "Isolated," Intrastate, Non-Navigable Waters Based On 33 C.F.R. § 328.3(a)(3)(i)-(iii) Or 40 C.F.R. § 122.2</u>

The Court in *SWANCC* limited its holding to the facts before it: "We hold that 33 C.F.R. § 328.3(a)(3) (1999), as clarified and applied to petitioner's balefill site pursuant to the 'Migratory Bird Rule,' 51 Fed. Reg. 41217 (1986), exceeds the authority granted to respondents [the Army Corps of Engineers] under §404(a) of the CWA." 121 S. Ct. at 684. *SWANCC* does not question in any way CWA jurisdiction if regulatory bases *other than* use by migratory birds are present. *United States v. Krilich*, 152 F. Supp.2d 983, 988 (N.D. Ill. 2001), *aff'd* 209 F.3d 968 (7th Cir. 2000). *See Laguna Gatuna, Inc. v. United States*, 50 Fed. Cl. 336, 343 (2001). Nor does *SWANCC* necessarily foreclose CWA jurisdiction based upon use by migratory birds where other connections to "navigable waters" may also generally be present. Hence, *SWANCC* does not question any of the published criteria set forth at 33 C.F.R. § 328.3(a)(3)(i)-(iii).

The Supreme Court's concern that the presence of migratory birds on isolated, nonnavigable, intrastate waters was insufficient to fall within "navigable waters" as defined by the CWA does not touch on subparagraphs (i) through (iii) of 33 C.F.R. § 328.3(a)(3)(i)-(iii) or its EPA counterpart at 40 C.F.R. § 122.2 ("waters of the United States"). Neither of those provisions define waters of the United States based solely on their use by migratory birds. As discussed below, the reasoning of both *Riverside Bayview* and *SWANCC*, and the underlying CWA, clearly support the Corps' and EPA's inclusion as "waters of the United States" those waters actually or potentially used by interstate and foreign travelers for recreational purposes; by persons engaged in fishing or harvesting shellfish that may be sold outside the state where the harvesting occurred or; by interstate industries for industrial or other purposes. Indeed, there is no indication that any other use besides migratory birds was made of the ponds at issue in *SWANCC*. 121 S. Ct. at 678-79. Thus, had the Corps produced evidence of actual or potential use of those ponds by out-of-

state hunters or anglers, there is nothing in *SWANCC*'s rationale that would preclude CWA jurisdiction. This was recognized by the Seventh Circuit's remand of the decision back down to the district court. *SWANCC*, 2001 WL 312372*1 (7th Cir. 2001) ("If the district court concludes that the Corps' authority in this case rests solely on the Migratory Bird Rule, it must dismiss the action. If it finds another proper basis for jurisdiction, then it shall conduct further proceedings . . ."). As a result, EPA and the Corps should leave 33 C.F.R. § 328.3(a)(3)(i)-(iii) as is, as currently implemented by existing cases and agency decisions.

2. <u>*SWANCC* Does Not Call Into Question The CWA's Jurisdiction Over Non-Navigable Tributaries To Navigable Waters</u>

Although the ANPRM does not initially suggest that the *SWANCC* decision creates uncertainty regarding CWA jurisdiction over non-navigable tributary waters, the ANPRM subsequently hints at such an impact in the Guidance and by requesting comments on whether to define "isolated waters" and impacts to implementing TMDLs. 68 Fed. Reg. 1994, 1995, 1997. Despite those hints, *SWANCC* does not question CWA jurisdiction over any non-navigable, tributary waters. *SWANCC* does not question 33 C.F.R. § 328.3(a)(5) or the well-settled case law holding that CWA jurisdiction extends to tributaries of navigable waters as well as wetlands adjacent to such tributaries. Indeed, by reconfirming *United States v. Riverside Bayview Homes, Inc.*, 474 U.S. 121 (1985), the Supreme Court remains clear that tributary waters, even if they are non-navigable wetlands, are "waters of the United States."

Since the issuance of the *SWANCC* decision, case law is essentially unanimous in holding that non-navigable tributaries that ultimately flow, albeit for long distances and through natural and man-made channels, are waters of the United States governed by the CWA. *See Headwaters, Inc. v. Talent*, 243 F.3d 526, 533-34 (9th Cir. 2001); *California Sportfishing Protection Alliance v. Diablo Grande, Inc.*, 209 F. Supp.2d 1059, 1074-76 (2002); *United States v. Buday*, 138 F. Supp.2d 1282, 1295 (D. Mont. 2001); *Idaho Rural Council v. Bosma*, 143 F. Supp.2d 1169, 1178 (D. Idaho 2001); *Community Ass'n for Restoration of the Env't v. Henry Bosma Dairy*, 305 F.3d 943, 954-55 (9th Cir. 2002); *United States v. Interstate Gen'l Co.*, 152 F. Supp.2d 843, 847 (D.Md. 2001), *aff'd* 2002 WL 1421411 (4th Cir. July 2, 2002) (unpublished decision) [*on remand from United States v. Wilson*, 133 F.3d 251 (4th Cir. 1997)]; *Aiello v. Town of Brookhaven*, 136 F.Supp.2d 81, 119 (E.D.N.Y. 2001); *United States v. Lamplight Equestrian Center, Inc.*, 2002 WL 360652*5 (N.D.Ill. March 8, 2002); *Fisher v. Chestnut Mountain Resort, Inc.*, 2002 WL 433144 (N.D.Ill. March 19, 2002). These many cases continue the jurisprudence that existed prior to *SWANCC*. *See United States v. Texas Pipe Line Co.*, 611 F.2d 345, 347 (10th Cir. 1979); *United States v. Eidson*, 108 F.3d 1336 (11th Cir. 1997); *United States v. Ashland Oil & Transp. Co.*, 504 F.2d 1317 (6th Cir. 1974).

The few district court decisions that have expanded the concept of "adjacent waters" to exclude non-navigable, tributary waters improperly expand the holding in *SWANCC* and fail to appreciate that decision's reading of *Riverside Bayview*. In *Riverside Bayview*, the Supreme Court held that, in addition to other waters, waters that "tend to drain" into navigable waters are adjacent waters. 474 U.S. at 134. By definition, all tributaries not only "tend to drain" into adjacent navigable waters, they in fact drain into such waters. Nor can it rationally be argued

that a tributary is not adjacent to the waters into which it drains. More than "adjacent," those waters are, in fact, one and the same.

It also is clear from *Riverside Bayview* that such waters need not, in fact, drain pollutants into downstream navigable waters in order for jurisdiction to attach. *Id*. Indeed, the whole purpose of jurisdiction and the issuance of a CWA permit, whether it be a dredge and fill permit or a NPDES permit, is to prevent any such discharge. *See id*. at 134 ("wetlands may serve to filter and purify water draining into adjacent bodies of water"); 133 (quoting S. Rep. No. 92-414, p. 77 (1972) ("it is essential that discharge of pollutants be controlled at the source").

Hence, the four district court judges who have chosen to read *SWANCC* beyond its actual holding are inconsistent with *Riverside Bayview* and numerous other decisions, as EPA itself has held and argued numerous times to date. *See United States v. Rapanos*, 190 F. Supp.2d 1011 (E.D.Mich. 2002), appeal pending, Case No. 02-1377 (6th Cir.); *United States v. Newdunn Assoc.*, 195 F. Supp.2d 751 (E.D.Va. 2002), appeal pending (4th Cir.); *In re James Hamilton Needham*, 279 B.R. 515 (W.D.La.Bank.Ct. 2001), *aff'd United States of America v. Needham*, 2002 WL 1162790 (W.D.La. Jan. 22, 2002); *United States v. RGM Corp.*, 222 F. Supp.2d 780 (E.D. Va. 2002); *FD&P Enterprises, Inc. v. United States Army Corps of Engineers*, No. 99-3500 (HAA), slip op. (Jan. 15, 2003). In addition, there is one Circuit Court of Appeals decision misconstruing *SWANCC*. See Rice v. Harken, 250 F.3d 264 (5th Cir. 2001) (*rehearing denied*, 263 F.3d 167 (2002)). This aberrant ruling was opposed by the Department of Justice, which sought a rehearing of the decision.

EPA should not alter the course evidenced by its existing administrative rulings and court briefs. EPA should not proceed with any rulemaking reconsidering either 33 C.F.R. § 328.3(a)(5) or the CWA's jurisdiction in general over all tributary waters.

3. The ANPRM's Suggestion That *SWANCC* Creates Uncertainty Over The CWA's Jurisdiction Beyond Its Express Holding Is Contrary To EPA's Administrative Rulings And Litigation Positions

To date, with the exception of the ANPRM and the ill-considered Guidance, EPA has repeatedly determined through numerous formal adjudications and litigation briefs that no uncertainty regarding the scope of the CWA's jurisdiction was left in the wake of *SWANCC*. Time and time again, EPA correctly has determined that the Supreme Court's *SWANCC* decision was limited to the specific facts of that case and did not call into question either the jurisdictional bases identified in EPA's and the Corps' regulations or previous court rulings regarding CWA jurisdiction over tributary and other waters. *See, e.g. In the Matter of Bricks Inc.*, 2002 WL 31357038 (Office of the Administrator, Oct.9, 2002); *In the Matter of Wolco, Inc.*, 2002 WL 31264259 (Office of the Administrator, Sept. 9, 2002); *In the Matter of Ray and Jeanette Veldhuis*, 2002 WL 1493840 (Office of the Administrator, June 10, 2002); *In re: Larry Richner/Nancy Sheepbouwer & Richway Farms*, CWA Appeal No. 01-01 (EPA Envt'l Appeals Board, July 22, 2002); *In the Matter of C.L. "Butch" Otter*, 2001 WL 388944 (E.A.B. Apr. 9, 2001); *In the Matter of C.W. Smith et al.*, 2002 WL 257696 (EPA Office of the Administrator, Feb. 6, 2002); *In the Matter of Crown Central Petroleum Corp*, 2002 WL 56519 (Office of the

Administrator, Jan. 8, 2002). Likewise, each of the outlier district court decisions that have attempted to read a broader ruling into *SWANCC* have done so over the express objection of EPA and/or the Corps. *See* Government's Briefing in *Rapanos*, *Newdunn Assoc.*, *RGM Corp.*; *FD&P Enterprises, Inc*.

4. Any Rule Attempting To Expand The *SWANCC* Decision Beyond Its Explicit Holding Will Not Clarify CWA Jurisdiction And Will Invite Uncertainty

EPA's ANPRM and Guidance unfortunately embolden dischargers' attorneys into the false belief that *SWANCC* may go beyond its explicit holding. Because it is clear that the Supreme Court's decision is limited to the specific facts of *SWANCC* and the Court's precisely stated ruling, the very act of publishing the ANPRM and Guidance has undermined the goal to which EPA claims to ascribe — regaining purportedly lost clarity on the scope of the CWA's jurisdiction. Although it cannot be denied that *SWANCC* has limited the jurisdiction of the CWA, that limitation only extends to the precise waters and rationales addressed by *SWANCC*. Even while implying uncertainty, EPA obviously understands the limited extent of the *SWANCC* decision. 68 Fed. Reg. 1994. However, by now suggesting that *SWANCC* casts doubt on other jurisdictional bases under the CWA to the extent that a proposed rulemaking may be necessary to "clarify CWA jurisdiction," EPA already is taking a position that will further undermine the clarity that now exists. 68 Fed. Reg. 1994.

As *SWANCC* demonstrates, neither EPA nor the Corps is the final arbiter of the scope of the CWA's jurisdiction. Were the agencies to change their long-settled rulings on CWA jurisdiction that were not addressed by *SWANCC* and that have been upheld by numerous other judicial decisions, it would simply encourage conflicting decisions amongst the many district courts and perhaps the courts of appeals. Most courts presumably would not defer to EPA's latest interpretation and instead follow existing case law. However, as EPA has seen, such a decision would encourage some district courts to judicial activism in an effort to improperly restrict application of the CWA. In any event, it is certain that, rather than clarity, a course to alter the current regulations would result in even more litigation and more uncertainty over the CWA's jurisdiction for an indefinite period of time. That scenario will be to the great detriment of EPA's ability to enforce the CWA. It also will place much greater burdens on EPA, the Corps and state agencies to implement the CWA. It likely will be even to industry's disadvantage, encouraging costly litigation that may or may not prove successful.

Just as it is improper for a lower court to base its rulings on implicit holdings of higher courts or by drawing "inferences from opinions which did not address the question at issue," it would be equally disingenuous of EPA or the Corps to begin implying hidden meanings in the *SWANCC* decision or proceeding with amendments to long standing rules upheld on numerous occasions by the courts based on perceived inferences in *SWANCC* that did not address those rules. *Texas v. Cobb*, 121 S. Ct. 1335, 1341 (2001). Certainly, such a course of action would create a relative avalanche of uncertainty well beyond the alleged uncertainty over issues not addressed by *SWANCC* that purportedly has been generated by a handful of mistaken district court decisions and self-serving interpretations of *SWANCC* offered up by the discharger community.

5. EPA's Guidance Creates Uncertainty That is Not Otherwise Present

Unfortunately, EPA and the Corps already have taken a step to promote uncertainty by issuing their new Guidance. Dropping any pretense, the Guidance asserts, contrary to every ruling of EPA and the agency's position in numerous pending lawsuits that "in light of *SWANCC*, it is uncertain whether there remains any basis for jurisdiction under the other rationales of § 328.3(a)(3)(i)-(iii) . . . ." 68 Fed. Reg. at 1996. In order to justify this new interpretation of the effect of *SWANCC*, EPA and the Corps appear to rely on the few district court decisions which they themselves have appealed as claimed bases of alleged uncertainty stemming from *SWANCC*. The government's own administrative decisions and court briefs make clear that it does not agree with the main premise of the Guidance, *i.e.*, that *SWANCC* creates uncertainty. The notion that a Guidance would rely on decisions that the guiding agencies are appealing for any rationale, nevermind the raison d'etre of the Guidance, is entirely inconsistent and arbitrary. The apparent deference afforded by EPA's Guidance to the minority of court rulings attempting to expand *SWANCC*'s analysis is contrary to EPA's administrative rulings and litigation positions, not to mention numerous pre- and post-*SWANCC* court decisions. By undermining its own well-established positions, EPA and the Corps create, rather than limit, uncertainty. As a result, the best way for EPA to promote certainty is to withdraw the "clarifying" Guidance and abandon its consideration of a new rulemaking defining "waters of the United States."

B. THE LEGISLATIVE HISTORY DEMONSTRATES CONGRESS' INTENT THAT THE CWA APPLY FULLY TO ALL TRIBUTARIES TO NAVIGABLE WATERS, HEADWATER STREAMS, AND "ISOLATED" WATERS

1. The 1972 Act

The ANPRM suggests revisions to the existing Clean Water Act definition of "waters of the U.S." that are entirely inconsistent with the letter, purpose, and scope of the 1972 Clean Water Act. That law was enacted with the purpose of eliminating pollution of the nation's waters – a purpose that can only be effectuated if the law is comprehensive, as Congress clearly recognized 30 years ago. The existing and long-standing regulations defining the jurisdictional scope of the Act implement this congressional purpose. Any effort to limit the scope of the Act by administrative action is inconsistent with the law and would leave waters Congress clearly meant to include outside the scope of Clean Water Act protection.

a. In passing the Clean Water Act in 1972, Congress established broad new authority to restore and protect all waters, and articulated equally broad new jurisdictional authority to do so

The Clean Water Act was adopted in 1972 as the Federal Water Pollution Control Act Amendments of 1972.[2/] With the passage of the Clean Water Act, the United States made a national commitment to comprehensively control water pollution.

2 Pub. L. No. 92-500, 86 Stat. 816 (1972).

Before the Clean Water Act, Congress passed the original Federal Water Pollution Control Act (FWPCA).[3/] Its first efforts were limited to providing technical assistance to states, partial financing of municipal sewage treatment works and authority to bring public nuisance lawsuits to abate interstate water pollution when all other means failed. States were left to establish treatment requirements for pollution sources and to enforce them.

By the 1960s the deterioration of the nation's waters was alarmingly evident. Symbolic of their disastrous state was the Cuyahoga River, running through Cleveland, Ohio into Lake Erie. It became so polluted with industrial waste in the 1960s that it caught fire on more than one occasion. Lake Erie itself became so polluted from municipal and industrial waste and agricultural runoff that it supported algae blooms forty miles long and was projected to become biologically dead. Spills off the coast of California blanketed hundreds of miles of coastline with oil. Waterways in many cities across the country were reduced to sewage receptacles for industrial and municipal waste. The rate of wetlands loss was approximately 450,000 acres per year.[4/] Leaving the problem to individual states to resolve was not working.

Public outcry demanded a strong response. There was a general – and accurate – perception that past approaches relying on state-by-state water quality standards alone was not cleaning up the waters and, indeed, waters were becoming more polluted. There was clearly a need for a broader federal role to address water pollution.

The 1972 Act, passed as an amendment to the existing FWPCA, was universally described as the first truly comprehensive federal water pollution legislation.[5/] As stated by Senator Randolph, Chairman of the Senate Committee on Public Works: "It is perhaps the most comprehensive legislation that the Congress of the United States has ever developed in this particular field of the environment."[6/] Congressman Blatnik, Chairman of the House Public Works Committee characterized it as a "landmark in the history of environmental legislation."[7/]

The law's comprehensive nature was largely in recognition that existing state and federal attempts to address pollution were wholly inadequate. As Senator Edmund Muskie, the floor manager of the bill in the Senate, told the Senate when introducing the bill that was to become the new Clean Water Act:

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3 Pub. L. No. 80-845, 62 Stat. 1155 (1948).

4 Frayer et.al. Status and Trends of Wetlands and Deepwater Habitats in the Conterminous United States, 1950sto 1970s," USFWS National Wetlands Inventory (April 1983)

5 S. Rep. No. 92-414, p. 95 (1971).

6 2 Legislative History of the Water Pollution Control Act Amendments of 1972 (Committee Print compiled for the Senate Committee on Public Works by the Library of Congress) Ser. No. 93-1, p. 1269 (1973).

7 *Id.*

> The committee on Public Works, after 2 years of study of the Federal water pollution control program, concludes that the national effort to abate and control water pollution is inadequate in every vital aspect.[8]

b. The Goals and Purposes of the Act Indicate Congressional Intent to Assert Federal Authority to the Full Extent Allowed by the Commerce Clause

With the passage of the Clean Water Act, Congress articulated one of the broadest ecosystem restoration and protection aspirations in all of environmental law. This objective, to reverse the many years of degradation of the nation's waters and to make them again capable of supporting aquatic life and recreation, is far removed from the limited goal of protecting navigation as in earlier laws like the Rivers and Harbors Act of 1899,[9] or largely limiting itself to pollution in interstate waters as in the earlier iterations of the Federal Water Pollution Control Act.[10] The very first sentence of the 1972 statute states "The objective of this chapter is to restore and maintain the chemical, physical, and biological integrity of the Nation's waters."[11]

"To achieve this objective,"[12] Congress listed seven goals, each of which indicates concern for values other than navigability. The goals of the law, including "protection and propagation of fish, shellfish, and wildlife," "recreation in and on the water," elimination of "the discharge of toxic pollutants in toxic amounts," and "programs for the control of nonpoint source pollution" are mentioned.[13] Moreover, both the House and Senate report evinced their intent to restore aquatic ecosystems as closely as possible to their natural state – an intent which clearly extends beyond the traditional intent to provide for navigation.[14]

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8 117 Cong. Rec. 17397 (daily ed. Nov. 2, 1971).

9 Rivers and Harbors Act of 1899, 33 U.S.C. § 401 *et seq*. (1994).

10 Federal Water Pollution Control Act, Pub. L. No. 80-845, 62 Stat. 1155 (1948).

11 33 U.S.C. § 1251.

12 33 U.S.C. § 1251(a).

13 *See* 33 U.S.C. § 1251.

14 The Senate report stated, "Maintenance of such integrity requires that any changes in the environment resulting in a physical, chemical or biological change in a pristine waterbody be of a temporary nature, such that by natural processes, within a few hours, days or weeks, the aquatic ecosystem will return to a state functionally identical to the original." 1972 U.S.C.C.A.N. at 3742. Similarly the House report explains "The word 'integrity'… is intended to convey a concept that refers to a condition in which the natural structure and function of ecosystems is maintained." H.R. Rep. No. 92-911 at 76-77 (1972).

c. The Clean Water Act's Structure Further Indicates Congressional Intent to Assert Jurisdiction Broadly Over "Waters of the U.S."

The structure as well as the letter of the law reveals that the drafters of the 1972 Clean Water Act understood that discrete components of aquatic ecosystems cannot be viewed in isolation, and must be more properly viewed as interrelated parts of connected hydrological and ecological systems and cycles.

The Act commands agencies to give "due regard" to "improvements which are necessary to conserve such waters for the protection and propagation of fish and aquatic life and wildlife [and] recreational purposes."[15/] And generally, Congress directed federal agencies in § 102 to "develop comprehensive programs for preventing, reducing or eliminating the pollution of the navigable waters and ground waters and improving the sanitary condition of surface and underground waters.[16/]

In passing the Clean Water Act of 1972, Congress targeted its statutory amendments at the broadest of goals, and the scope of statutory jurisdiction must be read with these purposes and objectives in mind. The purposes for which the Clean Water Act was passed, and the structure of the Act itself clearly indicate that Congress was concerned with protecting all waters of the United States, not merely those used or implicated by navigation. This understanding of the scope of the Act is additionally supported by the legislative history of the definition of the term "navigable waters."

d. The Legislative History of the Term "Navigable Waters" Indicates Congressional Intent to Broadly Cover Waters of the United States, Not Just Traditionally Navigable Waters

Congress chose to broadly define the waters covered by the Act. Congress accomplished this goal by redefining the operative term "navigable waters," which it borrowed from the Rivers and Harbors Act, in a manner that reached far beyond the limited category of traditionally navigable waters. As both the statute and the legislative history make clear, "navigable waters" was broadly defined by Congress and intended to be interpreted that way in order to achieve the numerous objectives articulated throughout the Act that do not pertain to navigability. Congress accomplished this jurisdictional expansion by deleting the term "navigable" from the existing definition of "navigable waters."

Both the House and Senate versions of the bills to amend the FWPCA were written to expand federal authority to control and ultimately eliminate discharges of all types of water pollution across the country.[17/] Both the House and Senate sought to restructure the nation's federal

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15 33 U.S.C. § 1252.

16 *Id.*

17 H.R. 11896, 92nd Cong. (1971); S. 2770 92nd Cong (1971).

authority to control water pollution while drawing upon much of the structure and language of earlier versions of the FWPCA as well as the Rivers and Harbors Act. Thus, in their respective bills, both bodies borrowed the term "navigable waters" from the RHA, and included a definition that itself used the term "navigable."[18] However, in the reports discussing their respective versions of the legislation, both the House and Senate expressed concern about potential narrow interpretations of what waters they intended to be covered by the Act.

The House Public Works Committee stated its concern as follows: "The Committee is reluctant to define the term 'navigable waters.' This is based on the fear that any interpretation would be read narrowly. This is not the Committee's intent. The Committee fully intends the term 'navigable waters' be given the broadest possible constitutional interpretation unencumbered by agency determinations which have been made or may be made for administrative purposes."[19]

The Senate Committee on Public Works stated, "Through a narrow interpretation of the definition of interstate waters the implementation of 1965 Act was severely limited. Water moves in hydrologic cycles and it is essential that discharges of pollutants be controlled at the source."[20]

While the House report focused upon the need for a broad constitutional interpretation of the Act's scope, and the Senate report spoke to the scientific reality of waters being interconnected, both bodies signaled their desire not to constrain the reach of the Act to those waters previously protected solely on the grounds of navigability.

When the House and Senate met in conference committee, they took an additional step to ensure that the definition of "navigable waters" did not result in unduly narrow interpretations. As discussed in the report of the Conference Committee, the House version of the definition was accepted into the final bill, but the word "navigable" was deleted from the definition. Thus, the new definition read as follows: "The term 'navigable waters' means ~~navigable~~ waters of the United States, including the territorial seas."[21]

The Conference report spoke to this change, using the exact terminology of the earlier House Public Works Committee report in confirming that the term "must be given the broadest constitutional interpretation," and expressing that the interpretation of this definition must be

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18 In the Senate, the definition read "the term navigable waters means the navigable waters of the United States, portions thereof, and the tributaries thereof, including the territorial seas and the Great Lakes. S. 2770, 92nd Cong. 502(h) (1971). The House bill's definition read "The term 'navigable waters' means the navigable waters of the United States, including the territorial seas." H.R. 11896, 92nd Cong. 502(8)(1971).

19 H.R. Rep. No. 92-911 at 76-77 (1972).

20 S. Rep No. 92-414, 92nd Cong. 77 (1971).

21 S. Rep. No. 92-1236, 92nd Cong.144 (1971).

"unencumbered by agency determinations which have been made or may be made for administrative purposes."[22]

Finally, the debate in Congress on final passage of the Act confirmed the conference report's intent that the law be given broad application. For example, Congressman John Dingell, who reported the conference committee bill to the House explained the definition in his statement:

> The conference bill defines the term "navigable waters" broadly for water quality purposes. It means all "the waters of the United States" in a geographical sense. It does not mean "navigable waters of the United States" in the technical sense as we sometimes see in some laws.

After reviewing the broad extent of the Commerce Clause authority, Rep. Dingell went on to state:

> Thus, this new definition clearly encompasses all water bodies, including main streams and their tributaries, for water quality purposes. No longer are the old, narrow definitions of navigability, as determined by the Corps of Engineers, going to govern matters covered by this bill. Indeed, the conference report states on page 144: The conferees fully intend that the term navigable waters be given the broadest possible constitutional interpretation unencumbered by agency determinations which have been made or may be made for administrative purposes."[23]

Congress expanded the Act's jurisdictional scope in 1972 because of the new ambitious goals of the Act. For this reason, Congress chose not to retain the traditional definition of the jurisdictional term "navigable waters" from the Rivers and Harbors Act or limit its jurisdictional reach as in earlier versions of the FWCPA. Instead, Congress deleted the word "navigable" from the "navigable waters" definition of the 1972 Act, thereby asserting federal jurisdiction over all "waters of the United States."[24] Congress chose to adopt a new, broader definition to encompass "waters of the United States," as necessary to achieve its stated objectives to rid the nation's waters of pollution.

2. <u>The *Callaway* Case and the Corps' Definition of "Waters of the United States"</u>

Prior to the 1972 amendments to the Federal Water Pollution Control Act, the Army Corps of Engineers had the authority to require permits for discharges into navigable waters and their

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22 *Id*.

23 *See* House consideration of the report of the Conference Committee, Oct. 4, 1972, compiled in Legislative History of the Water Pollution Control Act Amendments of 1972, Ser. No. 93-1, 93rd Cong. (1973), at 250-251.

24 The definition of "navigable water" in earlier version of the FWCPA had made express reference to navigability." 211 80 Stat. 1253.

tributaries under the Rivers and Harbors Act of 1899. After passage of the 1972 amendments, the Corps proposed revisions to its existing permitting regulations to incorporate the new authority and responsibilities it was given under § 404. The Corps proposed revisions on May 10, 1973 and finalized those revisions on April 3, 1974.

The Corps' first regulatory definition of "navigable waters[25] for purposes of implementing the 404 program was extremely narrow, applying only to traditionally navigable waters.[26] On June 19, 1974, EPA Administrator Russell Train wrote to the Corps, objecting to the Corps' narrow interpretation of navigable waters and asserting that it was inconsistent with Congress' intent in the 1972 amendments, stating, "Our interpretation of 'navigable waters' within the meaning of the FWPCA does not conform to the Corps' recently issued regulation. We firmly believe that the Conference Committee deleted 'navigable' from the FWPCA definition of 'navigable waters' in order to free pollution control from jurisdictional restrictions based on 'navigability.'" [27] On August 16, 1974, NRDC and NWF sued the Corps, arguing that the Corps' regulations failed to broadly protect waters of the United States as Congress intended. The United States District Court for the District of Columbia agreed that the Corps' definition was too narrow and not what Congress intended. The court ordered the Corps to rescind the part of its regulation "which limits the permit (§ 404) jurisdiction of the Corps by definition or otherwise to other than the waters of the United States." The court also ordered the Corps to expeditiously propose regulations which reflected the broad mandate to protect all waters of the United States, as provided by Congress in 1972. *NRDC v. Callaway,* 392 F.Supp 685 (D.D.C. 1975).

Pursuant to the court's order in *Callaway*, the Corps proposed four alternative definitions of "navigable waters" under the 404 program in May 1975, and issued an "interim final regulation" with an expanded definition of "navigable waters" in July 1975.

The interim final regulation defined the term 'navigable waters' to include: coastal waters, wetlands, mudflats, swamps, and similar areas, freshwater lakes, rivers, and streams that are used, were used in the past, or are susceptible to use to transport interstate commerce, including all tributaries to these waters; interstate waters, certain specified intrastate waters, the pollution of which would affect interstate commerce; and freshwater wetlands including marshes, shallows, swamps, and similar areas that are contiguous or adjacent to the above described lakes, rivers, and streams, and that are periodically inundated and normally characterized by the

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[25] The Corps did not alter its regulatory nomenclature to define the term "waters of the United States" until its final rule in July, 1977. See 42 FR 37127.

[26] "The term 'navigable waters of the United States' and 'navigable waters,' as used herein mean those waters of the United States which are subject to the ebb and flow of the tide, and/or are presently or have been in the past, or may be in the future susceptible for use for purposes of interstate or foreign commerce (See 33 C.F.R. § 209.260 for a more complete definition of these terms)."

[27] Letter from Russell E. Train to General William G. Gribble, Chief, Army Corps of Engineers. June 19, 1974.

prevalence of vegetation that requires saturated soil conditions for growth and reproduction.

The July 1975 rule adopted a plan to regulate these categories of waters in three phases. "Phase one began immediately upon publication of the regulation and included all waters subject to the ebb and flow of the tide and/or waters that are, were, or are susceptible to use for commercial navigation purposes (waters already being regulated by the Corps) plus all adjacent wetlands to these waters…. Phase II became effective on September 1, 1976 (originally scheduled for July 1, 1976, but postponed for 60 days by Presidential action), and included primary tributaries to the Phase I waters and lakes greater than five acres in surface area, plus wetlands adjacent to these waters. Phase III, requiring permits for discharges of dredged or fill material into all waters of the United States, became effective on July 1, 1977."[28/]

The 1977 final regulations consolidated the nine categories of waters comprising the "navigable waters" in the 1975 rule down to four categories:

Category 1 – Coastal and inland waters, lakes, rivers and streams that are navigable waters of the United States, including adjacent wetlands.

Category 2 – Tributaries to navigable waters of the U.S., including adjacent wetlands.

Category 3 – Interstate waters and their tributaries, including adjacent wetlands.

Category 4 – All other waters of the United States not identified in Categories 1-3, such as isolated lakes and wetlands, intermittent streams, prairie potholes, and other waters that are not part of a tributary system to interstate waters or to navigable waters of the United States, the degradation or destruction of which could affect interstate commerce.

The Corps stated in the preamble to the 1977 final rule:

> "Waters that fall within categories 1, 2, and 3 are obvious candidates for inclusion as waters to be protected under the Federal government's broad powers to regulate interstate commerce. Other waters are also used in a manner that makes them part of a chain or connection to the production, movement, and/or use of interstate commerce even though they are not interstate waters or part of a tributary system to navigable waters of the United States. The condition or quality of water in these other bodies of water will have an effect on interstate commerce.
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> The 1975 definition identified certain of these waters. These included waters used:
> - By interstate travelers for water-related recreational purposes;
> - For the removal of fish that are sold in interstate commerce;
> - For industrial purposes by industries in interstate commerce; and
> - In the production of agricultural commodities sold or transported in interstate commerce.

[28] *Quoting* the July 19, 1977 preamble's historical background discussion at 42 FR 37124.

> We recognized, however, that this list was not all inclusive, as some waters may be involved as links to interstate commerce in a manner that is not readily established by the listing of a broad category. The 1975 regulation, therefore, gave the District Engineer authority to assert jurisdiction over 'other waters' such as intermittent rivers, streams, tributaries and perched wetlands, to protect water quality. Implicit in this assertion of jurisdiction over these other waters was the requirement that some connection to interstate commerce be established, even though that requirement was not clearly expressed in the 1975 definition.[29/]

Thus, the basic approach to defining waters of the United States broadly, as envisioned by Congress in 1972, was adopted into regulations by mid-1975 and received additional clarification and refinement by mid-1977. As we discuss below, the legislative history makes clear that Congress was well aware of the *Callaway* case and the Corps' efforts to adopt a rule defining "waters of the United States." Indeed, the litigation and subsequent rulemaking provide the critical context for understanding the importance and centrality of the congressional debate over the proper scope of the 404 program during the 1977 amendments to the Clean Water Act.

3. The 1977 Amendments

The period during which Congress considered and debated amendments to the Clean Water Act in 1976 and 1977 closely followed the period when the scope and contour of the Corps' regulations for implementing the 404 program were litigated and revised. During the 1977 reauthorization process, the regulatory battle over the Corps' rules was mirrored by two competing approaches to amending the 404 program that were considered by the Congress.

The first approach was that taken in the bill reported out of the Senate Environment and Public Works Committee, which sought to address concerns about the implementation of the 404 program by refining and clarifying several elements of the program. The key amendments adopted by the committee included: authorizing the Corps to establish a general permit program for categories of activities involving discharges that would have minimal adverse impact on the environment (individually and cumulatively) (404(e)); clarifying a set of activities whose discharges were exempt from 404 permit requirements including "normal farming, silviculture, and ranching activities such as plowing, seeding, cultivating" and other activities (404(f)); creating a provision for delegation of administration of the 404 program, for those waters that were not "traditionally navigable," to states with adequate programs(404(g)).

During the Senate's floor debate on the 1977 amendments, Senator Bentsen offered an amendment to the Environment and Public Works Committee's bill that would have amended the Act to limit the scope of § 404 to only traditionally navigable waters and their adjacent wetlands (essentially those waters that the Corps initially intended to regulate prior to the *Callaway* decision).

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[29] *Quoting* 42 FR 37127-37128, (July 19, 1977)

The Congressional Record contains a long debate held before the full Senate voted whether to accept or reject the Bentsen plan to narrow the scope of the Clean Water Act protections for wetlands and other waters from discharges of dredge and fill material. It is clear from the debate that both sides agreed that the scope of the Act since 1972 had reached all waters of the United States, and that the Environment and Public Works Committee's approach would not reduce the scope of protection for all waters of the United States.

As Senator Bentsen himself stated: "The committee has failed to recommend any reduction in the scope of the § 404 permit program….The program would still cover all waters of the United States, including small streams, ponds, isolated marshes, and intermittently flowing gullies. (Congressional Record, August 4, 1977, page 26711) (emphasis added).

Senator John Tower of Texas, a supporter of the Bentsen amendment, referred to the *Callaway* case and the Corps' subsequent regulations when he stated: "A court decision, coupled with an administrative decision, is causing us to be faced with a regulatory scheme which covers not just the rivers of the Nation but all surface waters and wetlands of the United States." (Congressional Record, August 4, 1977, pp. 26721-26722) (emphasis added).

Opponents of Senator Bentsen's amendment readily acknowledged that the EPW Committee's bill maintained the broad jurisdiction enacted in 1972, and argued why Senator Bentsen's amendment to reduce jurisdiction of the Act should be rejected.

Senator Gary Hart of Colorado spoke at length on the shortcomings of the approach advocated by Senator Bentsen:

> The Senator from Texas has a very appealing approach because it is very simple; but, like most simple approaches to difficult problems, it is wrong, and it seeks to limit the treatment available by saying we can only control pollutants if they occur at a certain place, and not another place, even though all those places are interrelated from an ecological and environmental point of view. The difficulty with the Bentsen amendment is that it takes a meat ax approach; and, like most other amendments that take a meat ax approach, it destroys more than it corrects….
>
> There is a Federal and national interest in the waterways of this country. There is a national and Federal interest in waterways other than those on which a ship can be floated. That is essentially the issue here today….
>
> The Congress can capitulate. The Congress can abandon the national interest. The Congress can permit activities of a dredge-and-fill nature to go forward on those small streams, marshes, wetlands, and swamps which will make their way into the bigger waterways of this country and have a tremendous adverse effect on the people of this country and on their welfare, on their crops, on many of their activities. Or we can establish a program of the sort the committee has established, which will protect all of those water systems; which will protect all of the elements of those systems, which will

> not permit dredge and fill activities to deposit very toxic materials into those waterways." (Congressional Record, August 4, 1977, page 26713) (emphasis added).

Senator Robert Stafford of Vermont explained how the EPW committee sought to remedy concerns about the 404 program without reducing the broad jurisdiction established in 1972:

> The 1972 Federal Water Pollution Control Act exercised comprehensive jurisdiction over the Nation's waters to control pollution. This decision was the result of extensive and careful study and debate. In its report on that legislation, the Senate Public Works committee stated 'waters move in hydrologic cycles and it is essential that discharge of pollutants be controlled at the source.'...After extensive deliberation, the committee amendment rejects the redefinition of navigable waters. Instead, the committee amendment insures continued protection of the Nation's waters, but allows States to assume the primary responsibility for protecting those lakes, rivers, streams, swamps, marshes and similar areas that lie outside the Corps program in the so-called 'Phase I waters.'" (Congressional Record, August 4, 1977, page 26714) (emphasis added).

Senator Chafee spoke passionately about the value of wetlands for the whole country and why Senator Bentsen's proposal for eliminating broad federal protection for intrastate waters should be rejected:

> I think it is important to bear in mind that marshes and wetlands are not a parochial responsibility or an asset; they are not a local asset; they are a national asset. They are not just confined within boundaries which happen to exist for any one of our States. The wetlands perform a vital part of the food chain for our wildlife. … I should like to stress that these wetlands are not something that belong to Louisiana or Rhode Island or Michigan or Minnesota. They belong to all the citizens. They are much too valuable to be abandoned to some unstable, fragmentary kind of protection. We must bear in mind that these wetlands are part of this larger system. They are not independent. They do not belong only to Minnesota, so that if Minnesota wants to fill them in, it is too bad for the Nation. We have to remember that it affects everything else downstream. There is a linkage between wetlands and streams and estuaries and rivers, and they all must live in harmony, through wise management." (Congressional Record, August 4, 1977, pp. 26716-26717) (emphasis added).

Senator Howard Baker argued that both the EPW committee and courts recognized and were effectuating the common scientific understanding of hydrological linkage between all types of waters:

> The statutory language authorizing the 404 program requires the cooperation of the Corps and EPA to insure that discharges of dredged material and fill material will not have unacceptable adverse effects on municipal water supplies, shellfish beds, fisheries, wildlife, and recreation. A fundamental element of the Water Act is broad jurisdiction over water for pollution control purposes… Comprehensive jurisdiction is necessary not only to protect the natural environment but also to avoid creating unfair competition.

> Unless Federal jurisdiction is uniformly implemented for all waters, dischargers located on nonnavigable tributaries upstream from the larger rivers and estuaries would not be required to comply with the same procedural and substantive standards imposed upon their downstream competitors. Thus, artificially limiting the jurisdiction can create a considerable competitive disadvantage for certain discharges…..It is important to understand that toxic substances threaten the aquatic environment when discharged into small streams or into major waterways. Similarly, pollutants are available to degrade water and attendant biota when discharged in marshes and swamps, both below and above the mean and ordinary high water marks….Continuation of the comprehensive coverage of this program is essential for the protection for the aquatic environment. The once seemingly separable types of aquatic systems are, we now know, interrelated and interdependent. We cannot expect to preserve the remaining qualities of our water resources without providing appropriate protection for the entire resource." (Congressional Record, August 4, 1977, page 26718)(emphasis added).

Senator Bentsen's amendment was defeated by a vote of the full Senate. Although the House had passed legislation amending the Act along the lines of the Bentsen amendment, when the House and Senate met in conference, the Senate approach was accepted and no reduction in the scope of the Act's jurisdiction was enacted.

Thus, the idea of reducing the scope of the Clean Water Act's jurisdiction, which EPA and the Corps are contemplating, and numerous industry groups are promoting, was already rejected by Congress more than twenty-five years ago.

III. THE FACTORS LISTED IN 33 C.F.R. 328.3(a)(3)(i)-(iii) MUST BE RETAINED AS BASES FOR CLEAN WATER ACT JURISDICTION

The ANPRM requests comments as to whether, and if so, under what circumstances, the factors listed in 33 C.F.R. 328.3(a)(3)(i)-(iii) ("the (a)(3) factors") or any other factors provide a basis for determining Clean Water Act jurisdiction over what the ANPRM describes as "isolated, intrastate, non-navigable waters." 68 Fed. Reg. at 1994.

The language, purpose, and legislative history of the Clean Water Act make it clear that waters meeting the tests described in the (a)(3) factors are covered by the statute. As is discussed in detail above, the Supreme Court's decision in *SWANCC* does not support any change to these factors or to any other element of the existing regulatory definition of "waters of the United States."

As a result, any attempt to limit or remove Clean Water Act jurisdiction from waters meeting the tests described by the (a)(3) factors – including from the waters that the ANPRM refers to as "isolated" – would not withstand judicial scrutiny. These and other factors identified in the

existing Clean Water Act regulations as providing a basis for establishing jurisdiction must remain in place.[30]

A. THE CLEAN WATER ACT AND SOUND NATIONAL POLICY REQUIRE THE RETENTION OF THE JURISDICTIONAL TESTS SET FORTH IN THE (A)(3) FACTORS

The purpose and clear language of the Clean Water Act demonstrate that the Act is to be applied to all waters that support recreation, fishing, shellfishing, and commercial uses – the precise uses described by the (a)(3) factors. Protecting waters that the ANPRM describes as "isolated, intrastate, non-navigable" that meet the tests of the (a)(3) factors is essential to achieve the goals of the Clean Water Act and is sound national policy.

1. Retention of the Jurisdictional Tests Set Forth in the (a)(3) Factors is Mandated by the Purpose and Clear Language of the Clean Water Act

Both the purpose and language of the Clean Water Act make clear that Congress intended that protections be developed and provided to all waters protected by the current regulations, including specifically those used for fishing, shellfishing, recreation, and commercial uses.

The purpose – and explicit intent – of the Clean Water Act is to "restore and maintain the chemical, physical, and biological integrity of the Nation's waters." 33 U.S.C. § 1251(a). To help achieve this purpose, the Clean Water Act further establishes an interim goal aimed directly at waters used for the purposes described in the (a)(3) factors: "it is the national goal that wherever attainable, an interim goal of water quality which provides for the protection and propagation of fish, shellfish, and wildlife and provides for recreation in and on the water be achieved by July 1, 1983." *Id.*

The purpose, interim goal, and structure of the Act make it clear that Congress was establishing a comprehensive regulatory scheme that was designed to protect and preserve aquatic ecosystems and their values, including providing habitat for fish, shellfish, and support for recreation.

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[30] It is important to note that the factors enumerated in this Question 1 – the use of waters by interstate or foreign travelers for recreational or other purposes, the presence of fish or shellfish that could be taken and sold in interstate commerce, and the use of waters for industrial purposes by industries in interstate commerce – are illustrative only. The long standing regulations being questioned by the ANPRM state clearly that intrastate, nonnavigable waters are protected if "the use, degradation or destruction of [the water] could affect interstate or foreign commerce including any such waters" used for recreation, fish or shellfish, or industry, as described. 33 C.F.R. § 328(a)(3) (emphasis added); see also 40 C.F.R..230.3(s)(3) and substantively similar regulatory definitions at 40 C.F.R. §§ 110.1, 112.2, 116.3, 117.1, 122.2, 232.2, 300.5, Part 300, 302.3 and 401.11. That is, the three specific factors listed in the regulations are illustrative, not exhaustive as implied by the form of this first Question posed by the ANPRM.

The Clean Water Act contains numerous additional directives focused on protecting and restoring waters used for recreation, fishing, shellfishing, and commercial use. For example:

a. Section 102 directs the Administrator of EPA to prepare or develop comprehensive programs for preventing, reducing, or eliminating pollution that give "due regard" to the "improvements which are necessary to conserve such waters for the protection and propagation of fish and aquatic life and wildlife, recreational purposes, and the withdrawal of such waters for public water supply, agricultural, industrial, and other purposes." 33 U.S.C. § 1252.

b. Section 104 directs the Administrator to "conduct and promote, and encourage contributions to, continuing comprehensive studies of the effects of pollution, including sedimentation, in the estuaries and estuarine zones of the United States on fish and wildlife, on sport and commercial fishing, on recreation, on water supply and water power, and on other beneficial uses." 33 U.S.C. § 1254(n)(1). Section 104 also authorizes the Administrator to make grants to "conduct basic research into the structure and function of fresh water aquatic ecosystems, and to improve understanding of the ecological characteristics necessary to the maintenance of the chemical, physical, and biological integrity of freshwater aquatic ecosystems." 33 U.S.C. § 1254).

c. Section 119 directs the Administrator (through delegation) to conduct or commission studies necessary for strengthening the implementation of a comprehensive management plan for the Long Island Sound including "water quality requirements to sustain fish, shellfish, and wildlife populations, and the use of indicator species to assess environmental quality." 33 U.S.C. § 1269(c)(2)(G).

d. Section 120 directs the development of a pollution prevention, control and restoration plan for Lake Champlain that identifies "corrective actions and compliance schedules addressing point and nonpoint sources of pollution necessary to restore and maintain the chemical, physical, and biological integrity of water quality, a balanced indigenous population of shellfish, fish and wildlife, recreational, and economic activities in and on the lake." 33 U.S.C. § 1270(e)(2)(A).

e. Section 303 directs the Administrator to ensure the promulgation of State water quality standards applicable to interstate and intrastate waters. "Such standards shall be established taking into consideration their use and value for public water supplies, propagation of fish and wildlife, recreational purposes, and agricultural, industrial, and other purposes . . . ." 33 U.S.C. §§ 1313(a) and (c).

f. Section 303 further directs the Administrator to ensure the promulgation of Total Maximum Daily Loads and Total Maximum Daily Thermal Loads for all waters for which other Clean Water Act controls are "not stringent enough to implement any water quality standard applicable to such waters." 33 U.S.C. § 1313(d). Total Maximum Daily Thermal Loads are specifically required to be developed for waters where "controls on thermal dischargers under section 1311 of this title are not stringent enough to assure

protection and propagation of a balanced indigenous population of shellfish, fish, and wildlife." Id. Such Total Maximum Daily Thermal Loads are to be established at levels that will "assure protection and propagation of a balanced, indigenous population of shellfish, fish and wildlife." Id.

g. Section 304 directs the Administrator to develop, publish, and update "criteria for water quality accurately reflecting the latest scientific knowledge (A) on the kind and extent of all identifiable effects on health and welfare including, but not limited to, plankton, fish, shellfish, wildlife, plant life, shorelines, beaches, esthetics, and recreation which may be expected from the presence of pollutants . . . ." 33 U.S.C. § 1314(a). This section also directs the Administrator to develop, publish, and update information on "the factors necessary for the protection and propagation of shellfish, fish, and wildlife for classes and categories of receiving waters and to allow recreational activities in and on the water." Id. Section 304 further directs the Administrator, to "develop and publish information on the factors necessary for the protection of public water supplies, and the protection and propagation of a balanced indigenous population of shellfish, fish and wildlife, and to allow recreational activities, in and on the water." *Id.* at § 1314 (5)(B); see also § 1314(5)(A) (requiring publication of the same factors but excluding the word "indigenous" in connection with shellfish).

h. Section 304 also requires the Administrator to ensure promulgation of a list of waters within the State which, after application of required effluent limitations, "cannot reasonably be anticipated to attain or maintain . . . that water quality which shall assure protection of public health, public water supplies, agricultural and industrial uses, and the protection and propagation of a balanced population of shellfish, fish and wildlife, and allow recreational activities in and on the water." 33 U.S.C. § 1314(l)(A).

i. Section 316 authorizes the Administrator to impose effluent limitations for thermal discharges "that will assure the protection and propagation of a balanced, indigenous population of shellfish, fish, and wildlife in and on that body of water." 33 U.S.C. § 1326(a).

j. Section 402 establishes the National Pollutant Discharge Elimination System, a permit program applicable to point source discharges into the Nation's waters that is specifically designed to reduce the amount of pollution entering the Nation's waters from, among other things, industrial and commercial enterprises. 33 U.S.C. § 1342. Discharges of pollutants into surface waters are caused primarily by industrial and commercial operations, including manufacturing, construction, resource extraction, land development, agriculture, and waste disposal. See, e.g., 40 C.F.R. Parts 403-610 (EPA effluent guidelines for 73 categories of industrial activities, filling over 1500 pages of the Code of Federal Regulations).

k. Section 404 directs EPA to establish guidelines for the disposal of dredged and fill material that "shall be based upon criteria comparable to the criteria" used in § 403(c). 33 U.S.C. § 1344(b) (emphasis added). The means that the § 403 marine-related

criteria quoted below were to be adapted for waters – including intrastate, nonnavigable waters – that could be impacted by the issuance of § 404 permits. The § 403 criteria require the Administrator to promulgate guidelines for determining degradation to marine waters that "shall include", inter alia:

> (A) the effect of disposal of pollutants on human health or welfare, including but not limited to plankton, fish, shellfish, wildlife, shorelines, and beaches;
>
> (B) the effect of disposal of pollutants on marine life including the transfer, concentration, and dispersal of pollutants or their byproducts through biological, physical, and chemical processes; changes in marine ecosystem diversity, productivity, and stability; and species and community population changes;
>
> (c) the effect of disposal, of pollutants on esthetic, recreation, and economic values;

* * *

> (G) the effect on alternative uses of the oceans, such as mineral exploitation and scientific study.

33 U.S.C. § 1343(c).

l. Section 404(c) authorizes the Administrator to prohibit specification of a disposal site whenever the Administrator determines that "the discharge of such materials into such area will have an unacceptable adverse effect on municipal water supplies, shellfish beds and fishery areas (including spawning and breeding areas), wildlife, or recreational areas." 33 U.S.C. § 1344(c).

In 1987, Congress further demonstrated its intent to cover waters identified by the (a)(3) factors when it directed the Administrator to "conduct research on the harmful effects on the health and welfare of persons caused by pollutants in water" which research "shall include, and shall place special emphasis on, the effect that bioaccumulation of these pollutants in aquatic species has upon reducing the value of aquatic commercial and sport industries." 33 U.S.C. § 1254a.

Congress also demonstrated its concerns with the effects of water pollution on fish and other aquatic life, recreational uses, drinking water, public health, agricultural and industrial uses in almost 25 years worth of predecessor legislation to the Clean Water Act. E.g., 1948 Federal Water Pollution Control Act, Pub..L. No. 80-845, 62 Stat. 1155, Chapter 758, June 30, 1948 (authorizing development of federal plans for eliminating or reducing pollution giving due regard to improvements necessary to conserve waters needed for public water supplies, fish and aquatic life propagation, recreational purposes, agricultural purposes, and industrial purposes); Clean Water Authority Act of 1966, Pub..L. No. 89-753, 62 Stat. 1155 (1966) (authorizing procedures for abating domestic pollution that damages the health or welfare of citizens in foreign countries); Water Quality Improvement Act of 1970, Pub..L. No. 91-224, Part 1 (1970)

(authorizing the President to determine the quantities of oil which would be harmful to the public health or welfare of the United States including, but not limited to, fish, shellfish, and wildlife, public and private property, shorelines and beaches).

2. Retention of the Jurisdictional Tests Set Forth in the (a)(3) Factors is Necessary to Achieve the Goals of the Clean Water Act

The Clean Water Act creates a comprehensive regulatory scheme to "restore and maintain the chemical, physical, and biological integrity of the Nation's waters." 33 U.S.C. § 1251(a). That scheme includes an explicit goal of attaining a level of water quality that "provides for the protection and propagation of fish, shellfish, and wildlife and provides for recreation in and on the water." 33 U.S.C. § 1251(a)(2).

Activities that degrade or destroy waters identified by the (a)(3) factors prevent the attainment of these goals for both the specific waters being harmed, and for the Nation's waters as a whole. As is discussed in detail below, the hydrological, chemical, and biological interconnectedness of the Nation's waters makes it clear that the Act's goals cannot be met without protecting all of the waters covered by the current regulations. These goals certainly cannot be met without protecting the intrastate waters identified by the (a)(3) factors. As a result, the jurisdictional tests set forth in the (a)(3) factors must be retained.

3. Retention of the Jurisdictional Tests Set Forth in the (a)(3) Factors is Mandated by the Clean Water Act's Assertion of Commerce Clause Jurisdiction Over the Nation's Waters

On their face, the (a)(3) factors are limited to providing a basis for jurisdiction only where waters are used for purposes that could affect interstate commerce. As discussed in detail below, the activities described in the (a)(3) factors fall squarely within the scope of the Commerce Clause and do not in any way push the limits of congressional authority or power to regulate. Those activities are well recognized to have, and in fact have, a significant affect on interstate commerce. Because the Clean Water Act has repeatedly been found to assert Commerce Clause jurisdiction over the Nation's waters, the (a)(3) factors must be retained as a basis for determining jurisdiction, including over those waters described by the ANPRM as "isolated, intrastate, non-navigable."

Courts have consistently held that through the Act, Congress asserted federal jurisdiction over the Nation's waters to the maximum extent permissible under the Commerce Clause of the Constitution. E.g., United States v. Edison, 108 F.3d 1336, 1341-42 (11th Cir. 1997); Quivira Mining Co. v. EPA, 765 F.2d 126, 129-30 (10th Cir 1985); United States v. Lambert, 695 F.2d 536, 538 (11th Cir. 1983); United States v. Texas Pipe Line Co., 611 F.2d 345, 347 (10th Cir. 1979); United States v. Earth Sciences, Inc., 599 F.2d 368 (10th Cir. 1979); Leslie Salt Co. v. Froehlke, 578 F.2d 742, 744-45 (9th Cir. 1978); United States v. Ashland Oil and Transp. Co., 504 F.2d 1317, 1325 (6th Cir. 1974); Natural Resources Defense Council v. Callaway, 392 F. Supp. 685, 685 (D.D.C. 1975); see also United States v. Riverside Bayview Homes Inc, 474 U.S. 121, 133 (1985) ("The Act's definition of "navigable waters" as "the waters of the United States" makes it clear that the term "navigable" as used in the Act is of limited import. In

adopting this definition of "navigable waters," Congress evidently intended to repudiate limits that had been placed on federal regulation by earlier water pollution control statutes and to exercise its powers under the Commerce Clause to regulate at least some waters that would not be deemed "navigable" under the classical understanding of that term.")

These decisions are based, in part, on the legislative history of the Clean Water Act, which makes it clear that Congress intended that Clean Water Act jurisdiction be asserted to the maximum extent permitted under the Commerce Clause. That legislative history explicitly states that the definition of navigable waters is intended to "be given the broadest possible constitutional interpretation." S. Rep. No.1236, 96th Cong., 2d Sess., 144 (1972), *reprinted in* 1 Leg. Hist. 327. The legislative history of the Act is discussed in detail above.

The *SWANCC* Court's brief footnote suggesting the possibility of a less expansive reading of the Clean Water Act's legislative history is mere dictum, and does not alter the Act's reach. See *SWANCC*, 531 U.S. at 168 n.3. *SWANCC* is based on the Court's decision that the plain language of Clean Water Act § 404(a) was unambiguous as applied to "petitioner's balefill site pursuant to the 'Migratory Bird Rule.'" *SWANCC*, 531 U.S. at 172, 174. It is well settled that where a court finds that the statutory language is clear, the court's inquiry is at an end, and legislative history will not be considered. E.g., Toibb v. Radloff, 501 U.S. 157, 162 (1991). As a result, the *SWANCC* Court's statement in footnote 3 concerning the Act's legislative history is neither essential nor germane to the disposition of any issues in *SWANCC*. Consequently, that statement is dictum, and is not binding. E.g., Toibb, 501 U.S. at 162; Central Green Co. v. United States, 531 U.S. 425, 431 (2001); Tyler v. Cain, 533 U.S. 656, 663 n.4 (2001). That statement also cannot form the basis of a lower court decision, as constitutional issues cannot be defined by "inferences from opinions which did not address the question at issue." Texas v. Cobb, 532 U.S. 162, 169 (2001). It would be equally improper for EPA and the Corps to revise the long standing rules setting forth the (a)(3) factors – rules upheld on numerous occasions – based on any perceived inferences regarding the *SWANCC* dictum.

4. Retention of the Jurisdictional Tests Set Forth in the (a)(3) Factors is Sound National Policy

Protecting all waters covered by the current regulations, including the waters described by the (a)(3) factors, through the Clean Water Act is sound National policy.

It is well documented that healthy waters are vital for the health, safety, and welfare of the American people. Healthy waters also are essential to the Nation's economic well-being. Indeed, as EPA reported in May 2000, "the U.S. economy depends on clean water." U.S. Environmental Protection Agency, *Liquid Assets 2000: America's Water Resources at a Turning Point*, EPA-840-B-00-01 (May 2000) ("Liquid Assets") at 2.

Waters that contribute to health, safety, welfare, and a vital National economy are not limited to those that either cross state borders, are traditionally navigable, or are adjacent to traditionally navigable waters. To the contrary, intrastate, non-navigable waters identified by the (a)(3)

factors directly and substantially contribute to the Nation's welfare and economic vitality both in their own right and as contributors to the ecological health of all our Nation's waters.

As discussed in detail below, the Nation's waters are hydrologically, chemically, and biologically connected. As a result, failing to protect some of the Nation's waters has an adverse impact on the ecological health of the rest of the Nation's waters. Thus, all waters covered by the current regulations must be protected to achieve the Clean Water Act's goal of restoring and maintaining the chemical, physical, and biological integrity of the Nation's waters.

The economic, health, safety, welfare, esthetic, and recreational services provided by the Nation's waters, including intrastate waters protected by the current regulations, include (but are by no means limited to) the following:

a. Waters of the United States support and are used for numerous activities that affect the Nation's economic well-being, including: (1) as sites for transportation and infrastructure development; and for residential, commercial, and municipal construction and site development; (2) industrial production and the discharge of pollutants for industrial production; (3) agricultural production and irrigation; (4) silviculture; (5) municipal uses; (6) resource extraction; (7) energy production; and (8) fishing and shellfishing.

b. Waters of the United States provide critical habitat for fish, birds, waterfowl, and other wildlife, and support at least the following recreational activities that are enjoyed by millions of people in the United States: (1) fishing; (2) waterfowl hunting; (3) hunting and trapping; (4) bird watching; (5) boating, canoeing, rafting, and kayaking; (6) hiking; and (7) photography and other graphic arts. These activities, along with associated travel, generate billions of dollars of income each year for the travel, tourism, recreation, and sporting sectors of the economy of the United States.

c. Waters of the United States support and provide safe and adequate drinking water supplies. Small streams, wetlands and other waters filter water and recharge surface and subsurface drinking water supplies, and filter and remove pollutants from surface run-off before that water is released to groundwater or surface waters or is taken up by plants and animals and widely dispersed throughout the food chain. Millions of people in the United States depend on intrastate waters for these services.

d. Clean, safe, and ample water supplies promote economic growth and human health. A 2000 *Money* magazine survey found that clean water and clean air are two of the most important factors Americans consider in choosing a place to live. *Liquid Assets* at 2, 16.

e. Degradation of waters of the United States can contaminate drinking water sources, and waters used for recreation. Such contamination increases both risks to human health and health care costs. Contaminated rivers and closed beaches also cause lost revenue for local businesses that serve tourists, anglers, and recreationists. For

example, EPA reports that "at least a half-million cases of illness annually can be attributed to microbial contamination in drinking water," and that in 1998, "2,506 fish consumption advisories or bans were issued in areas where fish were too contaminated to eat." *Liquid Assets* at 2.

f. Degradation of waters of the United States can increase the risk of floods, threatening lives, homes, and businesses, and increasing flood damages and emergency response costs.

g. Degradation of waters of the United States can decrease the ability of waters to collect, store, and filter surface water run-off. Among other damages, this can significantly increase the amount of sediment entering navigation channels, causing increased costs to federal taxpayers and the navigation industry to maintain navigation.

B. THE JURISDICTIONAL TESTS DESCRIBED BY THE (A)(3) FACTORS MUST BE RETAINED BECAUSE THEY ARE CLEARLY AUTHORIZED BY THE COMMERCE CLAUSE

For at least the reasons discussed above, the (a)(3) factors must be retained as a basis for determining jurisdiction over waters, including those described by the ANPRM as "isolated, intrastate, non-navigable." Retention of these factors is authorized by the broad jurisdictional reach of the Commerce Clause of the U.S. Constitution, which clearly covers the activities set forth in the (a)(3) factors.

Waters identified by the (a)(3) factors are clearly covered by the Commerce Clause because the factors are limited on their face to providing a basis for jurisdiction only where waters are used for purposes that could affect interstate commerce; the activities described in the (a)(3) factors undeniably do have a significant affect on interstate commerce; and applying the Clean Water Act to waters identified by the (a)(3) factors – including to those referred to by the ANPRM as "isolated" – is necessary to effectuate the Clean Water Act's comprehensive regulatory scheme.

1. The Commerce Clause Grants Power to Regulate Economic Activities that Pollute or Otherwise Harm the Nation's Waters, Including Those Described by the (a)(3) Factors

Article I, § 8 of the Constitution grants the federal government power to "regulate Commerce . . . among the several States." The regulatory power granted by the Commerce Clause is "plenary" and as such is "'complete in itself, may be exercised to its utmost extent, and acknowledges no limitations, other than are prescribed in the constitution.'" Hodel v. Virginia Surface Mining Reclamation Ass'n, 452 U.S. 264, 276 (1981) (*Quoting* Gibbons v. Ogden, 22 U.S. (9 Wheat.) 1, 196 (1824)).

The U.S. Supreme Court has made clear that the Commerce Clause empowers Congress to regulate "activities causing air or water pollution, or other environmental hazards that may have effects in more than one State." Hodel, 452 U.S. at 282. As Justice Stevens noted in his dissent

to *SWANCC*, the Clean Water Act "is a paradigm of environmental regulation" that is "an accepted exercise of federal power." 531 U.S. at 191 (citing Hodel, 452 U.S. at 282).

Pursuant to the Commerce Clause, Congress may regulate (1) channels of interstate commerce; (2) instrumentalities of interstate commerce, or persons or things in interstate commerce; and (3) activities that "substantially affect" interstate commerce. United States v. Lopez, 514 U.S. 549, 558-59 (1995); see *SWANCC*, 514 U.S. at 174. The term "commerce" has long been broadly construed to encompass "every species of commercial intercourse" that "concerns more States than one." Gibbons, 22 U.S. (9 Wheat.) at 193.

Activities can "substantially affect" interstate commerce even if those activities are conducted wholly within one state. The Supreme Court has ruled repeatedly that even "'activity that is purely intrastate in character may be regulated by Congress, where the activity, combined with like conduct by others similarly situated, affects commerce among the States or with foreign nations.'" Hodel, 452 U.S. at 277 (*Quoting* Fry v. Untied States, 421 U.S. 542, 547 (1975)).

Since 1937, the U.S. Supreme Court has upheld congressional regulation of a broad variety of economic activities that are themselves conducted wholly within one state, but that in the aggregate have a substantial affect on interstate commerce. E.g., NLRB v. Jones & Laughlin Steel Corp., 301 U.S. 1 (1937) (management of a steel plant); Wickard v. Filburn, 317 U.S. 111 (1942) (cultivation of wheat for personal consumption); Katzenbach v. McClung, 379 U.S. 294 (1964) (operation of a small family restaurant); Perez v. United States, 402 U.S. 146 (1971) (participation in extortionate credit transactions); and Hodel, 452 U.S. 264 (coal mining).

Importantly, activities may be regulated under the Commerce Clause even where they may have little or no affect on interstate commerce when considered in isolation. As the Supreme Court recently affirmed, "where a general regulatory statute bears a substantial relation to commerce, the de minimis character of individual instances arising under that statute is of no consequence." United States v. Lopez, 514 U.S. 549, 558 (1995) (citation omitted); see also United States v. Morrison, 529 U.S. 598, 609 (2000) (confirming the Commerce Clause analysis framework described in Lopez); Hodel, 452 U.S. at 277 (permitting regulation of activity which "combined with like conduct by others similarly situated, affects commerce among the several States") (citation omitted); Wickard, 317 U.S. at 127-28 (regulating personal growth and consumption of wheat). Thus, where a specific activity is one of a class of activities properly regulated under the Commerce Clause, the courts will not exclude the specific activity from regulation because its individual impact is "trivial". Perez v. United States, 402 U.S. 146, 154 (1971); Maryland v. Wirtz, 392 U.S. 183, 192 (1968); U.S. v, Pozsgai, 999 F.2d 719, 734 (3rd Cir. 1993).

Where economic activities are regulated, it is clear that their impacts may be aggregated to determine whether there is a substantial affect on interstate commerce. United States v. Morrison, 529 U.S. at 610. The Clean Water Act regulates activities that are obviously and overwhelmingly economic in nature, and these activities both standing on their own and when aggregated, clearly have a substantial affect on interstate commerce.

Discharges of pollutants into surface waters are caused primarily by industrial and commercial operations, including manufacturing, construction, resource extraction, land development, agriculture, and waste disposal. See, e.g., 40 C.F.R. Parts 403-610 (EPA effluent guidelines for 73 categories of industrial activities, filling over 1500 pages of the Code of Federal Regulations). Discharges of dredge or fill material under § 404 of the Clean Water Act also are overwhelmingly economic in nature, as illustrated by Federal cases involving § 404 permits issued by the Corps. E.g., Riverside Bayview Homes, 474 U.S. at 124 (addressing permit to fill 80 acres of wetlands to prepare for construction of a housing development); Wetlands Action Network v. U.S. Army Corps of Engineers, 222 F.3d 1105, 1110 (9th Cir. 2000), cert. denied, 534 U.S. 815 (2001) (addressing permit to develop 1,000 acres that would include residential areas, a marina, hotels, and retail establishments); United States v. Deaton, 209 F.3d 331, 333 (4th Cir. 2000) (addressing permit to develop a residential subdivision); see also V. Albrecht & B. Goode, Wetland Regulation in the Real World (1994) (demonstrating, based on a sampling of § 404 permit applications in 1992, that the overwhelming majority of acreage for which § 404 permits are sought is intended for commercial, industrial, or other economic use).

The fact that it may be possible to identify potential instances where the discharge of pollutants or the discharge of dredge and fill material may be done for non-economic reasons has no impact on the proper jurisdictional reach of the Clean Water Act under the Commerce Clause. As discussed above, it is well settled that "where the class of activities is regulated and that class is within the reach of federal power, the courts have no power to excise as trivial, individual instances of the class." Perez v. United States, 402 U.S. 146, 154 (1971) (internal quotation marks omitted).

The Supreme Court's decision in *SWANCC* did not alter any of these long standing Commerce Clause principles. In *SWANCC*, the Supreme Court expressly declined to address the reach of Commerce Clause jurisdiction. See 531 U.S. at 174; Rancho Viejo, LLC v. Norton, __ F.3d. __, 2003 WL 1699326 (D.C. Cir. 2003) (observing that in *SWANCC*, the Supreme Court "expressly declined to reach" the Commerce Clause question).

2. Regulation of Waters Identified in 33 C.F.R. 328.3(a)(3)(i)-(iii) is Clearly Authorized by the Commerce Clause as Such Regulation is Necessary to Effectuate the Clean Water Act's Comprehensive Regulatory Scheme

As discussed above, the Clean Water Act establishes a comprehensive regulatory scheme designed to "restore and maintain the chemical, physical, and biological integrity of the Nation's waters." 33 U.S.C. § 1251(a). Also as discussed throughout this section, that scheme clearly has a very substantial impact on interstate commerce.

Under such circumstances, "Congress has the authority under the Constitution, through the intersection of the *Commerce Clause* and the *Necessary and Proper Clause*, to regulate an intrastate activity that it could not reach standing alone, if the regulation is essential or integral to the maintenance of a larger regulatory scheme properly governing interstate commerce." GDF Realty Investments, Ltd. v. Norton, __F.3d__, 2003 U.S. App. LEXIS 5818 *57 (5th Cir. Mar. 26, 2003) (Denis, concurring op.). See, e.g., United States v. Lopez, 514 U.S. 549, 561 (1995)

(finding that regulation at issue was "not an essential part of a larger regulation of economic activity, in which the regulatory scheme could be undercut unless the intrastate activity were regulated"); Hodel v. Indiana, 452 U.S. 314, 329 n.17 (finding that a complex regulatory scheme "can survive a Commerce Clause challenge without showing that every single facet of the program is independently and directly related to a valid congressional goal. It is enough that the challenged provisions are an integral part of the regulatory program and that when considered as a whole satisfies [the substantial effect] test."); Maryland v. Wirtz, 392 U.S. 183, 192-93 (1968) (refusing to excise as trivial individual instances of regulation because the effect of such an excision would be to undermine the effectiveness of the regulatory program); United States v. Wrightwood Dairy Co., 315 U.S. 110, 121 (1942) (stating that Congress has the power to enact such regulations of intrastate activity as are "necessary and appropriate" to make the regulation of interstate commerce effective).

As discussed in detail below, the chemical, physical, and biological integrity of the Nation's waters cannot be restored and maintained without Clean Water Act regulation of all waters protected by the current regulations – including those identified by the (a)(3) factors. Because regulation of such waters is essential to the efficacy of (i.e., is necessary and proper to) the Clean Water Act's comprehensive scheme, Congress can regulate any waters meeting the tests described in the (a)(3) factors, including those identified by the ANPRM as "isolated, intrastate, non-navigable waters." 68 Fed. Reg. at 1994.

As a result, the (a)(3) factors, and other Commerce Clause factors, must be retained as providing a basis for Clean Water Act jurisdiction over intrastate and other waters.

3. Regulation of Waters Identified in 33 C.F.R. 328.3(a)(3)(i)-(iii) is Clearly Authorized by the Commerce Clause Because the (a)(3) Factor Activities Substantially Affect Interstate Commerce

As discussed above, the waters identified by the (a)(3) factors fall squarely within the scope of the Commerce Clause because: (1) the factors are limited on their face to providing a basis for jurisdiction only where waters are used for purposes that could affect interstate commerce; and (2) the factor activities are well recognized as having a substantial affect on interstate commerce.

The location – or in the case of the Clean Water Act, the character of the water – in which the activities take place has no bearing on whether those activities have a substantial affect on interstate commerce. If economic activities or a class of economic activities, wherever they occur, substantially affect interstate commerce, the Commerce Clause authorizes jurisdiction. As a result, the character of the water has no bearing on the authority to regulate under the Commerce Clause. See, e.g., Ho v. United States, 311 F.3d 589 (5th Cir. 2002) (approving regulation of a single asbestos removal project under the Commerce Clause because such projects affect the interstate market for commercial real estate and asbestos removal); Wickard, 317 U.S. 111 (1942) (approving regulation of subsistence wheat farming under the Commerce Clause because farming substantially affects interstate agricultural markets).

Consequently, Clean Water Act regulation is justified for any water meeting the criteria set forth in the (a)(3) factors, regardless of the classification placed on it.

We note that as agencies of the Federal government, EPA and the Corps have ready access to a significant set of data demonstrating that the activities in the (a)(3) factors have a substantial affect on interstate commerce. We request that the agencies explore that data in detail. The effects data presented below is merely illustrative.

C. DISCUSSION OF COMMERCE CLAUSE FACTORS

1. Use by Interstate or Foreign Travelers for Recreation or Other Purposes

Waters of the United States, including the intrastate waters described in 33 C.F.R. 328.3(a)(3), play an important role in supporting the substantial commerce associated with fishing, hunting, wildlife watching, and recreation. These waters provide areas necessary to recreational activities such as boating, canoeing, kayaking, and swimming; and provide vital habitat and sustenance for fish, waterfowl, birds (including migratory birds), and wildlife (whether at healthy population levels, or threatened or endangered or otherwise of concern).

Numerous courts have found that such activities have a substantial affect on interstate commerce. E.g., National Association of Home Builders v. Babbitt, 130 F.3d 1041, 1052 n.11 (D.C. Cir. 1997) (travel by tourists, students, and scientists to study or observe wildlife and threatened or endangered species has substantial effect on interstate or foreign commerce); Utah v. Marsh, 740 F.2d 799, 803-04 (10th Cir. 1984) (finding that intrastate lake was used for recreation including fishing, hunting, camping, and wildlife observation, with 2% of visitors coming from out of state); Palila v. Hawaii Dep't of Natural Resources, 471 F. Supp. 985 (D. Haw. 1979), aff'd, 639 F.2d 495 (9th Cir. 1981) (travel by tourists, students, and scientists to study or observe wildlife and threatened or endangered species has substantial effect on interstate or foreign commerce); United States v. Byrd, 609 F.2d 1024, 1210 (7th Cir. 1979) (finding that the recreational use of inland lakes has a significant impact on interstate commerce, based in part on the number of out-of-state visitors visiting the lake at issue).

The economic value of recreational use of the Nation's waters is significant. For example:

a. "In 2001 over 80 million Americans 16 years old and older, 39% of the U.S. population, enjoyed some recreational activity relating to fish and wildlife. Expenditures by this group were $110 billion, which was about 1.1% of the nation's Gross Domestic Product (GDP)." U.S. Fish and Wildlife Service, 2001 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation National Overview, Preliminary Findings ("FWS 2001 Survey") at 4.

b. "Almost 38 million people fished and hunted in 2001. They spent $70 billion on their activities, including $20 billion on trip expenses, nearly $41 billion on equipment, and $9 billion on licenses and fees, magazines, membership dues and contributions, and

land leasing and ownership. On average, each sportsperson spent $1,851 in 2001." FWS 2001 Overview at 4.

c. "Fishing continues to be a favorite pastime in the United States. In 2001, 16% of the U.S. population 16 years old and older, 34 million anglers, spent an average of 16 days fishing. Freshwater fishing was the most popular type of fishing with over 28 million anglers devoting nearly 467 million angler-days to the sport. . . . Anglers spent more than $35 billion on trips, equipment, licenses, and other items to support their fishing activities in 2001. The average expenditure per angler was $1,046." FWS 2001 Survey at 4.

d. "Freshwater fishing was the most popular type of fishing. In 2001, 28.4 million Americans fished 467 million days and took 365 million trips. Their expenditures for trips and equipment totaled $21.3 billion." FWS 2001 Survey at 10.

e. "Observing, feeding, or photographing wildlife was enjoyed by 66.1 million people 16 years old and older in 2001. Among this group, 21.8 million people took trips away from home . . . for the purpose of enjoying wildlife . . . . In 2001, wildlife-watching participants spent $38.4 billion" on trips, equipment, magazines, membership dues, and contributions made to conservation or wildlife-related organizations." FWS 2001 Survey at 5.

f. "Of all the wildlife watching in the United States, bird watching attracted the biggest following. Forty-six million people observed birds around the home and on trips in 2001. A large majority, 88 percent (40 million) observed birds around the home while 40 percent, 18 million, took birdwatching trips." FWS 2001 Survey at 36.

g. In 1996, sales of kayaks and canoes exceeded $99 million. Liquid Assets at 6.

2. Taking of Fish or Shellfish For Sale in Interstate or Foreign Commerce

Waters of the United States, including the intrastate waters described in 33 C.F.R. 328.3(a)(3), play an important role in supporting the substantial commerce associated with the sale of fish and shellfish in interstate or foreign commerce. As EPA has acknowledged, "commercial fishing and shellfishing industries need clean wetlands and coastal waters to stay in business." Liquid Assets at 2. The Supreme Court has ruled that Congress has the power to regulate the taking of fish in state waters that affect interstate commerce. Douglas v. Seacoast Prods. Inc., 431 U.S. 265, 281-82 (1977) (regulation of fishing in state waters); cf. Hughes v. Oklahoma, 441 U.S. 322 (1979) (finding intrastate harvest of minnows within reach of dormant Commerce Clause). Such an effect is quite direct when the fish and shellfish are sold directly in interstate commerce. See, e.g., Wickard, 317 U.S. 111 (approving regulation of wheat farming for personal consumption under the Commerce Clause because wheat farming substantially affects interstate agricultural markets).

The economic value of fish and shellfishing sold in interstate commerce, and of healthy waters that support those activities is substantial. For example:

a. "Wetlands provide critical habitat during various life cycle phases for about 70 percent of all commercial fish species." Liquid Assets at 7.

b. "Every year, the Great Lakes, Gulf of Mexico, and coastal areas produce more than 10 billion pounds of fish and shellfish." Liquid Assets at 2.

c. In 1998, degradation of the Nation's waters resulted in 2,506 fish consumption advisories or bans in areas where fish were too contaminated to eat. Liquid Assets at 2.

d. "Following a three-year analysis of the salmon decline, the California Legislature recently concluded that rebuilding salmon runs to twice their depressed 1980s levels would provide economic benefits to the state of $150 million a year. Full implementation of the doubling effort over several years would yield $6 billion in net profits to the state, $1 billion in profits to small businesses." In 1993, Congress appropriated $70 million towards restoration of just the Northwest salmon watersheds. Kier, W. (1994), *Fisheries, Wetlands, and Jobs*, *The Value of Wetlands to America's Fisheries*, Prepared for the Campaign to Save California Wetlands at 6.

3. Use for Industrial Purposes by Industries in Interstate Commerce

Waters of the United States, including the intrastate waters described in 33 C.F.R. 328.3(a)(3), play an important role: in industrial production and the discharge of pollutants for industrial production; as sites for commercial construction and site development; in resource extraction; and in energy production.

The significant use of waters for industrial production is perhaps best exemplified by the National Pollutant Discharge Elimination System, a permit program applicable to point source discharges into the Nation's waters that is specifically designed to reduce the amount of pollution entering the Nation's waters from, among other things, industrial and commercial enterprises. 33 U.S.C. § 1342. Discharges of pollutants into surface waters are caused primarily by industrial and commercial operations, including manufacturing, construction, resource extraction, land development, agriculture, and waste disposal. See, e.g., 40 C.F.R. Parts 403-610 (EPA effluent guidelines for 73 categories of industrial activities, filling over 1500 pages of the Code of Federal Regulations).

Intrastate waters used to produce goods or products sold in interstate or foreign commerce have been found to be subject to Clean Water Act jurisdiction. See United States v. Earth Sciences, Inc., 599 F.2d 368, 375 (10th Cir. 1979) (finding Clean Water Act jurisdiction over intrastate stream flowing into reservoir used to irrigate crops sold in interstate commerce); Utah v. Marsh, 740 F.2d 799, 803-04 (10th Cir. 1984) (finding Clean Water Act jurisdiction over waters of intrastate lake used for crop irrigation).

The impact on interstate commerce of industrial uses of the Nation's waters by industries in interstate commerce is significant. For example,

a. "Manufacturers use about nine trillion gallons of fresh water every year. The soft drink manufacturing industry alone uses more than 12 billion gallons of water annually to produce products valued at almost $58 billion." Liquid Assets at 2.

b. While the "size and nature of American industries vary widely . . . nearly all of them share a common need – a reliable source of water to support operations." Liquid Assets at 8.

c. In 1993, the United States produced 612,000 metric tons of peat with a value of $16.8 million. Peat is harvested directly from wetlands, and is both exported and sold in interstate commerce. McClaskey, J.A. and S.D. Smith. 1995. Survey Methods and Statistical Summary of Nonfuel Minerals – 1993. U.S. Department of Interior, Bureau of Mines.

D. MANY OTHER FACTORS ESTABLISH CLEAN WATER ACT JURISDICTION, BUT NO RULEMAKING IS REQUIRED TO ENSURE CLEAN WATER ACT JURISDICTION BASED ON THESE FACTORS

Many other Commerce Clause factors support Clean Water Act jurisdiction, but no rulemaking is required to ensure Clean Water Act jurisdiction based on such other factors. Because the Clean Water Act asserts Commerce Clause jurisdiction, any factors that fall within the scope of the Commerce Clause already provide a basis for jurisdiction regardless of whether they are specifically listed in regulation.

Examples of "other" factors that clearly fall within the Commerce Clause include: use as habitat for threatened and endangered species; use for agriculture and silviculture; use for flood control; pollution control; and to ensure and provide clean and safe water, including drinking water. The clear Commerce Clause connections with some of these factors are described below.

1. Use as Habitat for Threatened and Endangered Species

The Commerce Clause authority of Congress to regulate activities that affect threatened and endangered species is well-established.[31] Waters of the United States, including the waters

[31] See Gibbs v. Babbitt, 214 F.3d 483 (4th Cir. 2000) (regulation of 'take' of red wolves on intrastate federal and private lands is a valid exercise of Commerce Clause power because of potential economic activities that would substantially affect interstate commerce); National Association of Homebuilders (NAHB) v. Babbitt, 130 F.3d 1041 (D.C. Cir. 1997), cert. denied, 118 S. Ct. 2340 (1998) (applying the ESA's 'take' provision to a private company's development of a city intersection is valid under the Commerce Clause because the "substantially affects" test is met); GDF Realty Investments, Ltd. v. Norton, No. 01-51099, 2003

described in 33 C.F.R. § 328.3(a)(3), provide vital habitat (e.g., use for breeding, rearing, feeding) for numerous threatened and endangered species of birds, fish, amphibians, mammals, reptiles, clams, snails, and plants, to name a few. Thus, healthy waters play an important role in supporting the substantial commerce associated with threatened and endangered species. And measures to regulate activities that affect those waters prevent the disruption of interstate commerce that would flow from species extinctions and by preserving the opportunity for such commerce to continue into the future. "[T]he power to regulate commerce among the several States necessarily includes and properly includes the power to preserve the natural resources that generate such commerce." Gibbs v. Babbitt, 214 F.3d at 506.

Several courts have sustained federal measures to protect wildlife or its habitat under the Commerce Clause based upon interstate commerce in wildlife-related study and tourism.[32/] Extinction of such wildlife species would substantially affect interstate commerce by foreclosing the opportunity for continued availability of a wide variety of species to commerce. See

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U.S. App. LEXIS 5818 (5th Cir. March 26, 2003) (intrastate takes of listed species may be aggregated with other takes, having a substantial effect on interstate commerce); Rancho Viejo v. Norton, No. 01-5373, 2003 U.S. App. LEXIS 6218 (D.C. Cir. April 1, 2003) (applying NAHB rationale in upholding federal authority under Commerce Clause); Shields v. Babbitt, 229 F. Supp. 2d 638 (W.D. Tex. 2000) (rejecting private landowner's claim that regulating 'take' of an endangered species found exclusively within Texas was beyond the reach of the Commerce Clause power); Bldg. Indus. Ass'n of Superior California v. Babbitt, 979 F. Supp. 893, 906-08 (D.D.C. 1997), appeal dismissed, 161 F.3d 740 (D.C. Cir. 1998) (FWS listing of fairy shrimp species, possibly found exclusively in California, found to be constitutional under the Commerce Clause) (citing NAHB and Palila v. Hawaii Dept. of Land and Natural Resources, 471 F. Supp. 985 (D. Hawaii 1979), aff'd, 639 F.2d 495 (9th Cir. 1985)). Cf. United States v. Bramble, 103 F.3d 1475 (9th Cir. 1997) (application of the Bald Eagle Protection Act to purely intrastate activities is valid under the Commerce Clause because the threatened extinction of eagles substantially affects commerce).

[32] See, e.g., Gibbs v. Babbitt, 214 F.3d at 497 ("The protection of the red wolf on both federal and private land substantially affects interstate commerce through tourism, trade, scientific research, and other potential economic activities."); Bramble, 103 F.3d at 1481 ("[E]xtinction of the eagle would substantially affect interstate commerce by foreclosing any possibility of . . . future interstate travel for the purpose of observing or studying eagles."); Utah v. Marsh, 740 F.2d 799, 803 (10th Cir. 1984) (sustaining application of CWA to intrastate lake under Commerce Clause based upon interstate movement of travelers "to observe, photograph, and appreciate a variety of bird and animal life"); United States v. Byrd, 609 F.2d 1204, 1210 (7th Cir. 1979) (same based upon "number of out-of-state visitors" drawn to lake by the abundance of fish and other wildlife inhabiting them"); Palila v. Hawaii Dept. of Land and Natural Resources, 471 F. Supp. 985, 995 (D. Hawaii 1979), aff'd, 639 F.2d 495 (9th Cir. 1985) ("[A] national program to protect and improve the natural habitats of endangered species preserves the possibilities of . . . interstate movement of persons, such as amateur students of nature or professional scientists who come to a state to observe and study these species, that would otherwise by lost by state inaction.").

National Ass'n of Homebuilders, 130 F.3d at 1054 ("[R]egulation of the 'taking' of endangered animals is within [the] Commerce Clause power because such takings, if permitted, would have a substantial effect on interstate commerce by depriving commercial actors of access to an important natural resources - biodiversity."). This extends to species both known and unknown to generate interstate commerce. While impossible to quantify the economic impact represented by the loss of any particular species not presently used for commercial purposes, "[i]n the aggregate, however, we can be certain that the extinction of species and the attendant decline in biodiversity will have a real and predictable effect on interstate commerce." Id. at 1053-54. See also GDF Realty Investments, 2003 U.S. App. LEXIS 5818, at *52 ("the link between species loss and a substantial commercial effect is not attenuated").

Of course, many diverse species directly provide readily measurable economic benefits. For example:

** Coho salmon "have been targeted in recreational and commercial fisheries since the early 1800s," 62 Fed. Reg. 24588 (1997), and intermittent streams are important refuge for juvenile coho, Leslie M. Reid and Robert R. Ziemer, *Evaluating the Biological Significance of Intermittent Streams*, USDA Forest Service, Pacific Southwest Research Station (1994), available at http://www.rsl/psw.fs.fed.us/projects/water/2IntermitStr.htm .

** In 1996, endangered and threatened species helped to fuel a national wildlife-related recreational industry that generated $29.2 billion in expenditures from wildlife watching alone. USFWS, 1996 National and State Economic Impacts of Wildlife Watching 2 (1998); see also Michael Milstein, Call of the Wild a Boon to Tiny Town, Billings Gazette, July 23, 1995, at D1 (describing economic boom associated with gray wolf reintroduction).

** "[N]ortheastern North Carolina could see an increase of between $39.61 and $183.65 million per year in tourism-related activities, and that the Great Smoky Mountains National Park could see an increase of between $132.09 and $354.50 million per year." Gibbs, 214 F. 3d at 493-94.

** "According to some estimates, plant extinctions alone will cause a potential loss to the United States of more than $3 billion in lost medicines by the year 2000." at http://www.defenders.org/pubs/save04.html (citing Norman R. Farnsworth, *The Role of Ethnopharmacology in Drug Development*, in Bioactive Compounds from Plants (Ciba Foundation Symposium, 1990)).

** "Small communities and local economies benefit most from America's passion for wildlife. The annual migration of the sandhill crane and whooping crane brings 80,000 tourists and $15 million to Nebraska's Platte River region each year. At Tennessee's Reelfoot Lake, bald eagle tours alone earn more than $2 million annually. Roosting bald eagles draw 50,000 visitors to tiny Sauk City, Wisconsin, pumping more than $1 million into the county." *Saving America's*

Wildlife: Renewing the Endangered Species Act, Section 1, *available at* http://www.defenders.org/pubs/save04.html .[33]

** "Salmon and steelhead fishing was once a very valuable industry to the west coast economy. As recently at 1988, according to independent economic studies, salmon and steelhead fishing in Oregon, Washington, Idaho and Northern California brought in $1.25 billion to the regional economy and supported an estimated 62,750 family wage jobs. Since then, many salmon runs have declined because of a combination of many factors including too many dams and widespread habitat loss." Facts About Pesticides, Salmon, and the Endangered Species Act, *available at* http://www.pesticide.org/Salmonfactsheet.html (*Quoting* "The Economic Imperative of Protecting Riverine Habitat in the Pacific Northwest," Pacific Rivers Council Research Report No. 5 (January, 1992)). "[I]ntermittent channels are important winter refuge for juvenile coho and steelhead." See Reid and Ziemer, supra at 3.

2. Flood Control

Intrastate and other wetlands, small streams, and waters play a major role in reducing flood damage. The cumulative loss of wetlands has been found to result in increased runoff and consequent flooding. Wetlands help ameliorate floods by helping to store floodwaters and prevent or reduce run off. When wetlands are destroyed they often are replaced by structures or impermeable paving that increases runoff.

It is well established that the Commerce Clause extends to flood control. United States v. Appalachian Electric Power Co., 311 U.S. 377, 426 (1940); Oklahoma v. Atkinson Co., 313 U.S. 508, 525 (1941) ("There is no constitutional reason why Congress cannot, under the commerce power, treat the watersheds as a key to flood control on navigable streams and their tributaries.").

Economic impacts associated with losing flood control capabilities are significant. For example:

a. Flood prone areas of the United States cover approximately 15,000 square miles and put at least 9.6 million homes and $390 billion in property at risk. Federal Interagency Floodplain Management Task Force. 1994. A Unified National Program for Floodplain Management. Federal Emergency Management Agency at 3.

b. In Fiscal Year 1998, direct flood damages in the United States were estimated at $8.73 billion and 98 lives were lost. National Oceanic and Atmospheric Administration,

[33] The Sandhills, wetlands and wet meadows in north-central and northwestern Nebraska, are among three major wetland resource areas in Nebraska that provide spring staging areas, breeding areas, migration and wintering habitat for the whooping crane and bald eagle. See Tiner, R.W., H. C. Bergquist, G. P. DeAlessio, and M. J. Starr. 2002. Geographically Isolated Wetlands: A Preliminary Assessment of their Characteristics and Status in Selected Areas of the United States. U.S. Department of the Interior, Fish and Wildlife Service, Northeast Region, Hadley, MA, available at < http://wetlands.fws.gov/Pubs_Reports/isolated/report.htm >.

National Weather Service, Hydrologic Information Center. 1998. Flood losses: Compilation of Flood Loss Statistics.

3. Clean and Safe Water, Including Drinking Water

Small streams, wetlands and other waters – including intrastate waters – filter water and recharge surface and subsurface drinking water supplies, and filter and remove pollutants from surface run-off before that water is released to groundwater or surface waters or is taken up by plants and animals and widely dispersed throughout the food chain. Millions of people in the United States depend on intrastate waters for these services.

Contaminated water has a substantial and significant affect on interstate commerce. For example:

a. "Currently EPA estimates that at least a half-million cases of illness annually can be attributed to microbial contamination in drinking water." Liquid Assets at 2.
b. "Seventeen states reported 37 recreational water outbreaks caused by microorganisms in the latest (1995-1996) available data from the Centers for Disease Control." Liquid Assets at 2.
c. "In 1998 about one-third of the 1,062 beaches reporting to the U.S. Environmental Protection Agency (EPA) had at least one health advisory or closing". Liquid Assets at 2.
d. "In 1998 2,506 fish consumption advisories or bans were issued in areas where fish were too contaminated to eat." Liquid Assets at 2.

4. Use by Migratory Birds

Wetlands and other waters play a critical role in providing habitat for migratory birds and other types of wildlife. According to the U.S. Fish and Wildlife Service ("FWS"), all migratory waterfowl and nearly half of all threatened or endangered species depend on wetlands and associated habitat for their survival. The FWS has also found that the loss of wetland and associated upland habitat is the most significant problem facing North American Migratory bird populations. U.S. Fish and Wildlife Service. 1994. 1994 Update to the North American Waterfowl Management Plan at 20. Washington, D.C.

Protection of migratory birds has been a long-standing concern and obligation of the Federal government. North Dakota v. United States, 460 U.S. 300, 309 (1983). In addition to protections provided by other environmental and wildlife protection statutes, Congress has passed numerous laws that focus specifically on protecting migratory birds, including but by no means limited to: the Airborne Hunting Act, the Bald Eagle Protection Act, the Migratory Bird Hunting and Conservation Stamp Act, the Migratory Bird Treat Act, and the Migratory Bird Hunting Stamp Act.

The U.S. Supreme Court has recognized that migratory birds and other wildlife are articles of interstate and foreign commerce that can be protected under the Commerce Clause. Andrus v.

Allard, 444 U.S. 51, 63 n.19 (1979) (recognizing commerce power to protect migratory wildlife); Missouri v. Holland, 252 U.S. 416, 433 (1920) ("It is obvious that there may be matters of the sharpest exigency for the national well-being that an act of Congress could not deal with, but that a treaty followed by such an act could."). Courts have also found that the "Commerce Clause power, and thus the Clean Water Act, is broad enough to extend . . . jurisdiction to local waters which may provide habitat to migratory birds and endangered species." Leslie Salt v. United States, 896 F.2d 345, 360 (9th Cir. 1990), cert. denied, 498 U.S. 1126 (1991) (remanding the case for a factual determination of the sufficiency of the property's connections to interstate commerce).

The economic value of healthy migratory bird populations is significant. For example:

- In 2001, 3 million Americans hunted migratory birds. "They spent 29 million days hunting birds such as waterfowl and dove. Their trip and equipment expenditures totaled $1.4 billion." This is 7 percent of the total hunting expenditures nationwide. FWS 2001 Survey at 22, 23.

- The 3 million migratory bird hunters in 2001 took "24 million trips for hunting birds such as doves, ducks, and geese. Migratory bird hunters spent an average of 10 days hunting for the year." FWS 2001 Survey at 25.

- Of the $1.4 billion spent by migratory bird hunters in 2001, "$657 million was spent on hunting trips, including $280 million on food and lodging (43 percent of trip related expenses), and $247 million on transportation (38 percent of all trip costs). Other trip expenses amounted to $130 million—20 percent of the total trip-related expenditures for migratory bird hunters." FWS 2001 Survey at 25.

- "Migratory bird hunters purchased nearly $732 million worth of equipment in 2001. They spent $534 million on hunting equipment (guns, ammunition, etc.). Another $68 million was spent by migratory bird hunters on auxiliary equipment (camping equipment, binoculars, etc.), and $130 million was spent on special equipment (vans, trail bikes, etc.)." FWS 2001 Survey at 25.

- "Among those hunting migratory birds, 1.6 million enthusiasts hunted duck on 18 million days. Nearly 1.5 million participants hunted dove on 9 million days. On 11 million days, 1 million hunters hunted geese in 2001. Other migratory bird species attracted 210 thousand people who hunted on 1.5 million days." FWS 2001 Survey at 26.

IV. THERE IS NO NEED TO DEFINE THE TERM "ISOLATED WATERS" AS FEW, IF ANY WATERS ARE ACTUALLY "ISOLATED"

Question #2 asks "Should regulations define "isolated waters," and if so, what factors should be considered in determining whether a water is or is not isolated for jurisdictional purposes."

The long-standing regulatory definition of "waters of the United States" should not be re-written to exclude an undefined, administratively-created category of waters called "isolated" by the EPA and Corps. The questions posed by the ANPRM signal an intent by the agencies to redefine "waters of the United States" to try to remove federal Clean Water Act jurisdiction from so-called "isolated" non-navigable, intrastate waters, including wetlands, natural ponds, ephemeral and intermittent streams, and potentially larger non-navigable tributaries as well.

These waters, protected by the Clean Water Act and its regulations since 1972, serve critical functions in the environment important to public health, drinking water supplies, flood prevention and control, habitat for fish and wildlife species, recreation, industrial purposes and many other uses. (See below in this section for further discussion of the connectivity of all waters, as well as the discussion of "Functions and Values," below).

In addition, few if any of these waters are in fact "isolated." They are integral parts of the entire hydrologic and biologic environment. Headwater streams, non-navigable tributaries, wetlands and other such waters are not "isolated" from the rest of the environment, and should not be so treated by the federal agencies charged by law with protecting these vital resources through some regulatory rewrite of definitions that has no basis in science, fact or law.

The following comments summarize the specific ways in which wetlands and small streams, particularly those that are ephemeral and intermittent, may appear to be "isolated," but are in fact intimately and inextricably connected - hydrologically, chemically, and biologically - with larger streams, rivers, and other waters.

A. HEADWATER STREAMS CANNOT BE SEPARATED FROM DOWNSTREAM WATERS

Starting with the clearest case, the concept of "isolation" can have no conceivable application to streams. By their nature, streams are not simply individual water courses, but parts of an interconnected and inseparable network. As some of the nation's leading stream scientists have noted in comments submitted to the docket (Aquatic scientists' comment letter to the docket, 2003):

> "Rivers are networks, and their downstream navigable portions are inextricably linked to small headwaters just as fine roots are an essential part of the root structure of a tree or our own circulatory system is dependent on the function of healthy capillaries. The small ephemeral stream is not isolated from the mighty river."

The key to understanding stream ecosystems is the "river continuum concept," first introduced by Vannote and others nearly a quarter-century ago. The basic concept is that a river system, from headwaters to mouth, comprises a continuous gradient of physical factors, formed by the drainage network, that explain much of the biological linkages and other river dynamics (Vannote *et al.* 1980). Scientists now view stream ecology as a three-dimensional system of energy, material and organisms consisting of: (1) the longitudinal (downstream) dimension, (2) lateral transfers between channel, banks, and floodplain, and (3) vertical transfers between stream and groundwater. Although each of these dimensions is essential to river health, upstream-downstream connections are dominant (Meyer and Wallace 2001). As noted by leading stream and wetland ecologists in a draft publication on headwaters streams:

> "Each stream network is part of a watershed, the contributing land area from which waters and other materials collect and flow into streams and larger river channels. Channels are the routes along which water, sediment, organic matter, nutrients, and other solutes are carried out of the watershed; channel size is a continuum, and hence only arbitrary distinctions can be made between very small streams and the network of larger downstream channels." (Meyer *et al.* In preparation).

Further, because small streams are extensive and inseparably bound up with the entire river system, changes to headwaters streams and their watersheds have an enormous impact on the physical and hydrological, chemical and biological integrity of downstream waters.

1. <u>Streams Have Hydrologic Connections to Other Waters</u>

Streams that under natural conditions run dry periodically or during droughts, or that carry surface water flows only briefly during periods of precipitation (such as some ephemeral streams in arid regions), may appear superficially to be "disconnected" from other perennially flowing reaches of the same system. However, scientific research has revealed essential, consistent hydrologic connections that prove that these systems are rarely, if ever, disconnected even when there is no visible flow at the surface.

a. Intermittent and Ephemeral Surface Connections

By well-accepted definition (Alley *et al.* 1999), the term "stream" includes many waters that do not flow year round. These "intermittent" and "ephemeral" streams are still considered in science and in law to be hydrologically connected - through surface flows during wet periods and sub-surface flows at other times - to downstream waters that flow perennially. Intermittent and ephemeral streams are the vast majority of all streams, both in numbers and stream miles, and they have their own unique and important physical, chemical, and biological properties.

According to an analysis conducted for American Rivers by USGS National Hydrographical Database staff using coarse resolution data (1:100,000 scale), there are approximately 1,594,359 miles of intermittent and 899,347 miles of perennial streams in 49 states, excluding Alaska (Paul Wiese, USGS National Mapping Division, personal communication). In other words, for every mile of perennial stream, there are approximately 1.77 miles of intermittent streams. These

figures significantly understate the true extent of intermittent and ephemeral streams (Meyer and Wallace 2001). In some states, particularly those in the arid West, as much as 96 percent of streams (Arizona) are intermittent. Even in humid, high-rainfall states, such as Georgia, 44,000 of the state's reported 70,000 total stream miles are intermittent (U.S. EPA 2000). Even at times where there may be no visible surface flow, such streams can continue to flow within their beds, moving water, nutrients, biota and other material downstream (Aquatic scientists' comment to the docket 2003).

b. Ground-surface Water Connections

Groundwater and surface water are in constant interaction. Some streams gain water from groundwater inflow, some streams lose water outflow to groundwater, many streams do both, gaining in some reaches and losing in other reaches (Alley *et al.* 1999). As the USGS notes in one of its main reports on groundwater:

> "Streams and other surface-water bodies may either gain water from ground water or lose (recharge) water to ground water. Streams commonly are a significant source of recharge to ground water downstream from mountain fronts and steep hillslopes in arid and semiarid areas and in karst terrains (areas underlain by limestone and other soluble rocks)…The top of the subsurface ground-water body, the water table, is a surface, generally below the land surface, that fluctuates seasonally and from year to year in response to changes in recharge from precipitation and surface-water bodies (Alley *et al.* 1999)."

Because of this interaction, groundwater can contribute a significant proportion of the surface flow in streams and rivers, depending on region, season, and stream characteristics. While groundwater contributions to stream flow vary widely according to these factors, USGS estimates that between 40 to 50 percent of streamflow on average comes from groundwater, with as much as 40 percent of flows in large rivers coming from groundwater nationally (Alley *et al.* 1999). Small streams are a main source of these groundwater flows, which may be discharging groundwater drawn from vast distances away from the stream channel itself. As USGS describes the process: "Under natural conditions, ground water moves along flow paths from areas of recharge to areas of discharge at springs or along streams, lakes, and wetlands…The areal extent of ground-water-flow systems varies from a few square miles or less to tens of thousands of square miles (Alley *et al.* 1999)."

In fact, it can be difficult to determine whether a stream is naturally perennial or intermittent, as leading stream ecologists have pointed out in their comments on the ANPRM:

> "Groundwater withdrawal for irrigation and other human uses has resulted in significant lowering of the water table in many areas, which can affect headwater streams by making perennial streams ephemeral (Postel 1999). Channels without water can extend far downstream; for example, a channel of the Santa Cruz River near Tucson, Arizona, was dry for several decades because of groundwater pumping (Grimm *et al.* 1997). As more of the landscape is covered with impervious surface, groundwater recharge is reduced, leading to lower baseflows which can lead to intermittent flow (Paul and Meyer 2001). In contrast,

> some intermittent streams have become perennial because of the continuous addition of effluent from municipal wastewater treatment plants (Paul and Meyer 2001). These common situations further illustrate the difficulty and illogic in trying to define some waters as "isolated" based on flows; it will be difficult even to properly determine whether a stream is naturally perennial or intermittent" (Aquatic scientists' comment to the docket, 2003).

A second type of surface-subsurface exchange occurs in the hyporheic zone, the transition zone between groundwater and the stream itself.[34] This area has unique properties, performing essential functions for the local stream and downstream ecosystems. In the hyporheic zone, surface and ground waters are virtually indistinguishable, representing "a hydrological continuum, preventing a clear separation." (Brunke and Gonser 1997) The hyporheic zone can extend a significant distance from the stream channel itself, and the area does not require visible surface water in the river to remain chemically and biologically active. Thus, even without apparent surface flows in a stream at a given time, important ecological functions and ecosystem services are occurring that are based on hidden hydrologic interactions (Brunke and Gonser 1997).

c. Small Streams Sustain Natural Flows and Water Supplies

Small streams cannot be separated from downstream waters because they literally provide much of the water balance upon which those systems depend. In the Great Lakes Basin, for example, USGS estimates that over 31 percent of the water entering Lake Michigan comes from indirect groundwater discharges to streams that then flow into the lake (Grannemann *et al.* 2000). For the other Great Lakes, the percentage of indirect ground-water discharge from streams is also quite high, ranging from 22 percent for Lake Erie, 33 percent for Lake Superior, and 42 percent for both Lake Huron and Lake Ontario (Holtschlag and Nicholas 1998). As the USGS comments in its report: "Ground water is a major natural resource in the Great Lakes Region that helps to link the Great Lakes and their watershed (Grannemann *et al.* 2000)." Of course, this would not be the case without the connection provided by small streams between groundwater and the lakes themselves.

In the Chesapeake Bay Basin, nearly 100,000 miles of interconnected streams, rivers, wetlands and their riparian areas serve as a "circulatory system" for the Chesapeake Bay. Collectively, this network of small streams supplies 90 percent of the freshwater flow that drives the health of the nation's largest estuary (CWP and NEETF 2002a). USGS has done extensive research on water quality and quantity of streamflow into the Bay. It estimates that of the 50 billion gallons of water that reaches the Chesapeake Bay each day, nearly 27 billion gallons is from groundwater base flow, i.e, water that infiltrates into the aquifer and discharges as groundwater into small streams (Bachmann *et al.* 1998). Again, without these small streams and wetlands, these

[34] A general definition of the hyporheic zone proposed by White (1993, as cited in Brunke and Gonser, 1997) is the area of saturated pores beneath the stream bed , and into the stream banks, that contain some proportion of channel water, or that have been altered by surface water infiltration.

groundwater and other flows would not reach the Bay with the timing, amounts, and chemical composition that they do today.

Even the contribution of low-flow streams, such as those with annual average flows of five cubic feet per second (cfs) or less, is essential to downstream flows and water supplies. In the Chesapeake Bay watershed, for example, as much as 65 percent of first, second, and third order streams may fall below a 5 cfs threshold (Thomas Schueler, Center for Watershed Protection, personal communication). In Kansas, the U.S. Geological Survey (USGS) determined that 40 percent of the 2,232 stream segments on the Kansas surface water register had median flows less than 1 cfs over the available hydrologic record (Perry *et al.* 2002).

As ecologist Bruce Wallace commented at a U.S. Fish and Wildlife Service symposium on the value of headwater streams:

> "Another myth is that only flows greater than 5 cfs are streams. Only a lawyer would debate this question. How much is 5 cfs? -- over 1 billion gallons of water per year. The average city in the US uses 100/gal/day/per capita for personal use. In other words, if you looked at this in terms of how many people's water needs this could supply in a year, it's 32,300 people. Or, it would supply the personal and industrial needs of 16,000 people (U.S. FWS 2000)."

The value of these small freshwater flows is enormous. One study calculated the average value of freshwater for navigation alone to be $146 per acre-foot for the entire U.S. (Frederick, *et al.* 1996, as cited in VA Dept. of Conservation and Recreation 2001). A small stream flowing as little as 1 cfs per day carries a volume of two acre-feet of water (CWP and NEETF 2002b). Thus, for the Chesapeake Bay, where 100,000 streams produce 90 percent of the fresh water flowing into the Bay, small streams are producing an annual value of $9.5 billion in flows for navigation *alone*.[35]

d. Small Streams Provide Natural Protection Against Downstream Flooding

The process of natural flood storage and attenuation is often described as temporary storage of flood water on wide floodplains associated with higher-order streams. However, the geomorphology of small headwater channels can be an important influence on smaller, more frequent floods. Five-year to 50-year flood discharges are strongly influenced by channel size and shape. During floods, small streams transfer water into storage through infiltration into the channel bed and banks, recharging the hyporheic zone and surrounding groundwater, and diminishing peak discharges (Meyer *et al.* In preparation).

When small headwater channels are lost, flood frequency in the basin increases, with the stream equaling or exceeding bankfull at 10-20 times its previous frequency. Impervious surfaces and storm drains together deliver water from the basin to downstream channels much more rapidly

[35] Assumes: 100,000 streams producing 90% of fresh water flow, at 2 acre-ft. per stream per day flowing an average of 1cfs, at a value of $146 per acre-foot.

than intact headwater streams (Meyer and Wallace, 2001). As Poff *et al.* (1997) note in their landmark article on the "natural flow regime" of rivers, small stream networks provide natural flood attenuation:

> "As one proceeds downstream within a watershed, river flow reflects the sum of flow generation and routing processes operating in multiple small tributary watersheds. The travel time of flow down the river system, combined with nonsynchronous tributary inputs and larger downstream channel and floodplain storage capacities, act to attenuate and to dampen flow peaks."

2. Streams Have Chemical Connections to Other Waters

a. Sediment Retention and Capture

While the greatest volume of sediment in any particular location is on large floodplains of higher-order streams, the *cumulative* sediment storage in headwaters channels and vegetated riparian zones is significant, due to the total stream length and watershed area represented by headwater streams (Meyer *et al.* In preparation). Many small headwater streams are easily obstructed by woody debris, and such features increase the potential for storage of sediment as well as organic matter and nutrients (Meyer and Wallace 2001). In small headwater streams, even relatively small woody debris jams can be important to sediment retention (Gomi *et al.* 2002).

A study in Corvallis, Oregon showed that even ephemeral streams were effective in removing from the water column suspended sediment generated from forest roads over a 80-yard headwaters stream reach (Dieterich and Anderson 1998, as cited in Meyer *et al.* In preparation). The filtration efficiency of ephemeral headwater streams results from the shallow water column combined with the large number of retentive structures – both organic debris and living plants – and, more importantly, from the pattern of lateral and longitudinal expansion and contraction in response to rainfall. In small headwaters, stream levels peak shortly after the heaviest rain and lasts only briefly before receding. During expansion, water movement is mostly into the soil. Therefore, much of the sediment in the stream water is actually filtered through the soil rather than flushed downstream (Dieterich and Anderson 1998, as cited in Meyer *et al.* In preparation).

As headwater areas are subjected to commercial and residential development, impervious surfaces replace natural lands that once absorbed and infiltrated precipitation, and natural stream channels are often replaced with storm sewers. These hard surfaces and artificial channels increase runoff rates and volumes, causing downstream stream channels to enlarge and become incised in response to the increased energy of the urban runoff. This begins a chain reaction in which downstream natural water attenuation and storage capacity is also degraded, causing higher, more rapid flood peaks. Sediments that might otherwise have been trapped by debris and leaf litter in small streams and vegetated riparian zones are now mobilized and transported downstream. Higher velocity discharges exacerbate the problem, scouring stream channels and adding still more to downstream sediment loads (Meyer *et al.* In preparation).

These sediment loads can be substantial. In San Diego, extensive channel erosion contributed two-thirds of the in-stream sediment load and resulted in loss of valuable urban land (Trimble 1997). A Pennsylvania study showed that in just a one-quarter mile stream reach in a 160-acre urbanizing watershed, channel erosion can generate 50,000 cubic feet (2,500 tons) of sediment, equivalent to five years sediment production in a non-urban watershed of the same size (Leopold 1968).

Sediments no longer held by headwaters streams and additional sediment scoured out of stream channels by increased flow peaks are carried downstream where they harm navigation, reservoir capacity, commercial and sport fishing, water recreation, and aquatic habitats and organisms. Dredging of commercial waters is extremely expensive; for example, it costs $10 to $11.5 million annually to dredge and dispose of sediments deposited into Baltimore Harbor to keep it navigable (Chesapeake Bay Program 1998, as cited in Virginia Department of Conservation and Recreation 2001). It would cost an estimated $333,000 to remove the 50,000 cubic feet of sediments produced by the small watershed Leopold studied, based on an estimated cost of $20 per cubic yard to dredge, transport, and dispose of such sediments (Virginia Department of Conservation and Recreation 2001).

Suspended sediments and contaminants that may attach to soil particles are also a significant cost to water filtration plants. A study of treatment costs associated with turbidity in Texas water filtration plants found that every one percent reduction in a unit of turbidity (NTU, or nephelometric turbidity unit) resulted in a 0.27 percent reduction in treatment chemical costs (Dearmont *et al.* 1998, cited in USEPA 2002b).

The release into the water column of suspended sediments and mobilized contaminants can devastate the aquatic ecosystem at all trophic levels. Suspended sediments reduce light penetration through the water column, reducing photosynthesis and primary production. Reduced photosynthesis weakens and can eliminate submerged aquatic vegetation, rendering the vegetation unable to contribute to sediment stabilization, to dissolved oxygen levels, and to primary productivity. (See, e.g., 40 C.F.R. §230.21).

When sediment disrupts production of the periphyton and aquatic macrophytes that form the base of the food chain, benthic and other invertebrates decline. Sediment resuspension and deposition also directly reduce productivity and species diversity among macroinvertebrates. Sediment suspension and deposition smother critical benthic habitat and reduce the availability of food and oxygen to benthic organisms. When suspended sediments settle on attached or buried eggs, the eggs are smothered because they lose access to oxygenated water. (See, e.g. 40 C.F.R. 230.31). Macroinvertebrates, in turn, are a key food source for fish. Macroinvertebrate declines stress fish populations.

In addition to reducing their food supplies, suspended sediments harm fish and crustacea, smothering spawning and nursery habitat, and directly cutting off oxygen to eggs and fry. Resuspended sediments also harm sight-feeding fish, shellfish, and wildlife by reducing water clarity and reducing feeding ability. Reduced food levels and lower feeding rates limit growth

and lower disease resistance. High suspended sediment levels can also cause fish kills (Newcombe and MacDonald 1991).

b. Nutrient Recycling

The basic chemical composition of unpolluted streams draining a landscape is largely established in headwater streams. Headwater streams are also sites of efficient retention and transformation of nutrients. Just as human capillaries are the vessels in most intimate contact with metabolizing tissues, headwater streams are the channels of the drainage network in closest contact with the soil and are the sites of extensive chemical and biological activity that impact water quality downstream (Meyer *et al.* In preparation).

Recent research has demonstrated that small streams in the network are the sites of the most active uptake, transformation, and retention of nutrients. Small streams are shallow, and water spends a longer time in contact with biologically and chemically reactive substrates in small, shallow channels than in large deep rivers. The average distance traveled by a molecule before being removed from the water column is called its uptake length (Newbold *et al.* 1981). As stream size (and discharge) increases, so does nutrient uptake length (Alexander *et al.* 2000, Peterson *et al.* 2001). Uptake lengths have been measured for nutrients in many streams, and the shortest measures of uptake length are for small headwater streams (Stream Solute Workshop 1990, as cited in Meyer *et al.* In preparation). Peterson *et al.* (2001) studied the regulation of water chemistry by stream systems and found small streams to be far more efficient in recycling nutrients. In a study of the Mississippi River's nitrogen loads to the Gulf of Mexico and attendant hypoxia problems, Alexander et al (2000) found that small streams throughout the Basin were most efficient at recycling nitrogen:

> "Headwater streams retain and transform important amounts of inorganic nitrogen, frequently more than 50% of the inputs from their watersheds…Despite the long travel times, many watersheds located on large rivers more than 2,500 kilometres [1,500 miles] from the Gulf deliver significantly larger fractions of their exported nitrogen (some more than 90%) to coastal waters than watersheds located on smaller streams less than a few hundred kilometers from the Gulf."

Uptake length for both phosphorus and ammonium are less than 65 feet in headwater streams in the Southern Appalachians (Webster *et al.* 2000, as cited in Meyer *et al.* In preparation). Thus, an average nutrient molecule travels less than 65 feet downstream before being removed from the water column in a small shallow stream, where there is extensive contact between the water column and benthic algae and microbes in surface sediments and the hyporheic zone. Meyer and Wallace (2001) modeled the practical effect of loss of small streams on downstream nutrient loading of soluble reactive phosphorus (S.P.) using data from field experiments at the Coweeta Hydrologic Laboratory in Western North Carolina. When phosphorus loads are modeled with first-order streams intact, 63 percent of phosphorus entering the streams is retained. When first-order streams are replaced with pipes (i.e., no S.P. removed through natural processes), the total amount of phosphorus exported downstream increases 179 percent.

In addition to the nutrient removal that occurs in headwater streams, the chemical and biological transformations that occur there (e.g. denitrification, microbial uptake, transformation to organic nitrogen) reduce the biological availability of nutrients that are exported downstream. Biofilms in small headwater channels are also sites of active uptake of inorganic (e.g. heavy metals) and organic (e.g. PCBs) pollutants (Schorer and Symader 1998, as cited in Meyer *et al.* In preparation).

Hence the presence of small streams in the network results in less downstream transport of nutrients and contaminants. If, due to a redefinition of "waters of the U.S., headwater streams were compromised or eliminated from the network, more of the nutrients being applied to farm fields or lawns would be delivered to receiving systems downstream, which are less efficient at retaining and transforming them. Downstream waterways, such as navigable rivers, lakes, estuaries, and coastal waters, may respond to the resulting high nutrient concentrations with eutrophication, and potential nuisance algal blooms, deoxygenation of the water column, and fish kills (Meyer *et al.* 2003). Federal, state, and local agencies are spending considerable sums of money implementing best management practices to reduce non-point source inputs of nutrients because these are a major threat to water quality. Maintaining the nutrient removal capacity of small headwater streams is an essential component of these efforts to reduce the impacts of non-point source nutrient loading to downstream ecosystems.

c. Other Organic Material

Plants and other organic material within the stream channel, including leaf litter and woody debris from riparian vegetation, are the origin of substantial energy inputs into river systems. Among other inputs to headwater streams are dissolved organic carbon (DOC) from groundwater. While groundwater tends to have low DOC concentrations, a two- to three-fold increase in DOC over distances ranging from 33 to 330 feet has been reported for spring seeps as the groundwater flows over accumulated detritus and living organisms (Kaplan *et al.* 1980, Meyer *et al.* 1998, as cited in Meyer *et al.* In preparation). The dramatic increases in DOC concentrations reflect the highly productive nature of spring seeps. These broad, shallow aquatic environments that are depressions in the forest floor have immediate and obvious terrestrial and benthic connections.

Headwater streams tend to be highly retentive of the large amounts of organic matter they receive. There are three primary reasons: (1) the inputs to headwater streams consist disproportionately of leaves and woody debris, neither of which are readily transported; (2) the flows are small and therefore do not easily suspend particles and (3) as a result of the previous two factors, headwater streams accumulate debris dams, which trap other organic matter and hence further enhance the retention (Webster *et al.* 1999, Fetherston et. al. 1995, Webster *et al.* 1994, Bilby and Likens 1980, Bilby 1981, Speaker *et al.* 1984, Swanson *et al.* 1982, as cited in Meyer *et al.* in preparation). Webster and Meyer (1997) found that concentrations of benthic organic matter in eight headwater forested streams to be over four times greater than in 14 higher order streams.

By intensively processing organic matter, and ultimately converting much of it to carbon dioxide, the headwater streams perform their second major ecosystem service. The accumulations of organic matter in the form of debris dams and leaf packs provide habitat for benthic macroinvertebrates (Reice 1978, Dobson and Hildrew 1992, Dobson *et al.* 1992, Richardson 1992, as cited in Meyer *et al.* In preparation), while the processing of leaves and woody debris by fungi and bacteria convert these inputs to high quality, more nitrogen-rich, food for macroinvertebrates and higher trophic levels (Kaushik and Hynes 1971, Triska and Sedell 1976, Ward and Cummins 1979, Elwood *et al.* 1981, as cited in Meyer *et al.* In preparation). If headwater streams were unable to retain and process these organic inputs, the resulting organic loading would represent a significant stress on the downstream ecosystems and water quality (Meyer *et al.* In preparation). Meyer and Wallace (2001) estimated an average turnover length of 10 miles for all of the streams in a forested fifth-order basin in North Carolina. They then estimated that if one third of total first-order stream length were removed, the average turnover length would double to 20 miles.

Although much of the organic inputs to headwater streams are oxidized before reaching downstream ecosystems, the organic carbon that is delivered to higher order streams and rivers plays a vital role in support of downstream metabolism, representing a third major ecosystem service provided by headwaters. In this respect, the headwater ecosystems not only moderate the quantity of organic carbon delivered downstream but also—and just as importantly—control its form, quality, and timing. Inputs consisting of large particles (leaves and woody debris) are reduced in size to fine, easily suspended organic particles and to dissolved organic matter. Inputs of relatively low nutritional value (high carbon to nitrogen ratios) are converted via microbial processing to more nutritious forms. Inputs that arrive in the headwaters in pulses (autumn leaf drop, storm-delivered inputs) are processed and slowly released over long periods of time (Meyer *et al.* In preparation).

3. Streams have Biological Connections to Other Waters

Freshwater species are among the most threatened on Earth, with projected extinction rates for North American freshwater species in the same range as that projected for tropical rainforests (Ricciardi and Rasmussen 1999). We discuss in greater detail later in these comments the functions and values of headwaters streams in sustaining the biological diversity of plants and animals, including for permanent habitat, spawning and breeding, and movement corridors.

Biological connectivity associated with headwater streams occurs in many ways. Headwater streams provide water, nutrients, organic material, habitat structure, and food sources downstream, and are essential to the survival of individual species and entire biological systems. Small streams are linked with other waters in the watershed as species move from one habitat to another. This biological connectivity role occurs in obvious as well as subtle ways. As Reid and Ziemer (1994) note:

> "Intermittent channels and associated riparian zones provide an important source of food and water for hillslope ecosystems, they may function as travel corridors, and they provide a microclimatic refuge for hillslope animals during times of moisture and temperature stress.

> The distinctive vegetation and higher moisture content of these sites can modify fire behavior, so their distribution might affect the patchiness of large burns. In addition, microclimatic differences provided by intermittent channels may contribute to genetic diversity by maintaining a variety of site types. For example, Campbell (1979) demonstrates genetic differences between Douglas firs growing in different microhabitats near to one another."

Small headwaters streams, including intermittent and ephemeral streams, are abundant with life, including microbes, algae, plants, aquatic insects, mollusks, crustaceans, other invertebrates, amphibians, reptiles, fish, birds, and mammals. A typical headwater stream supports hundreds to thousands of species across these plant and animal groups (Meyer *et al.* In preparation). This diversity and abundance of aquatic life is particularly notable in arid areas. The National Academy of Sciences (Committee on Riparian Zone Functioning and Strategies for Management 2002) states that in the Pacific Coast ecoregion a large proportion of wildlife species are riparian "obligates" requiring access to riparian habitat to complete all or a portion of their life cycle, including 60 percent of amphibians and 34 percent of birds. Headwaters are essential to the health of biological communities, even those far distant from the headwater stream itself.

Insects – Aquatic insects are the dominant macroinvertebrates in most headwater streams, often occurring at densities greater than 10,000 per square yard (Meyer *et al.* in preparation). Dieterich and Anderson (2000) found surprisingly diverse and abundant macroinvertebrates in summer-dry streams in western Oregon. They concluded that these organisms preferred intermittent over perennial streams because (1) the proximity to refugia prevented wash-out during rain events, (2) reduced predator pressure, and (3) lack of competition by snails and other dominant competitors. Muchow and Richardson (1999) found twice the number of individuals in intermittent streams than perennial stream sites in British Columbia. They also observed that "Even in the smallest streams with intermittent flow, true aquatic insects with 1-year life cycles were found emerging, even in periods when no flow was perceptible."

Not only do insects perform many of the important functions of organic matter processing in headwaters, but they export that energy as a valuable food source for amphibians, fish, birds, and other animals downstream. Wipfli and Gregovich (2002) found that forested, fishless headwaters in Alaska provided abundant food sources for salmon populations, and "may be important food conduits for downstream food webs, potentially subsidising several trophic levels and in turn aquatic production of larger streams."

Amphibians – Reid and Ziemer (1994) note that amphibians, while often requiring open water to breed, are heavily dependent on intermittent and ephemeral streams:

> "Intermittent streams may be particularly important as nursery areas for amphibians because these sites support fewer predators than perennial channels. Young salamanders may rear in the intermittent channels and then move downstream when they grow large enough to protect themselves (H. Welsh, USDA Forest Service Pacific Southwest Research Station, unpublished data). Some amphibians, such as the Pacific tree frog (*Hyla regilla*), may rear in ephemeral pools and then move away from the channels when pools dry up. Juvenile black

salamanders (*Aneides flavipunctatus*) may remain for several years in moist sites, such as those commonly found near intermittent channels, moving away to the forest floor only as they mature."

Fish – Headwater streams provide important spawning sites for salmonids and other fish species. Staff with Washington Trout observed 95 adult Coho salmon in 200 lineal feet of a small-order tributary of Cherry Creek in December 2002. Neither the perennial, spring-fed stream, nor the tributary streams feeding to it, are shown on USGS 1:24,000 scale topographic maps (Kurt Beardslee, Washington Trout, personal communication). Reid and Ziemer (1994) note that intermittent channels are important to fish as seasonal sources of water, nutrients, sediment, and wood delivered downstream to preferred habitats, noting that "Productivity of perennial channels depends on delivery of materials from intermittent channels during at least part of the season."

Intermittent streams also serve as feeding and spawning grounds for many migratory minnows, salmonids, and other fish, particularly in arid regions. Erman and Hawthorne (1976) observed extensive spawning by rainbow trout in intermittent tributaries of streams, with three times as many fish spawning in an intermittent stream than in nearby permanently flowing tributaries. They also found that one-third to one-half the trout production in some Sierra Nevada systems is from intermittent channels. They hypothesize that these waters were more attractive to the fish due to their abundant food source and lack of competition with brook trout.

Birds – Reid and Ziemer (1994) note that both perennial and intermittent streams are important to bird species: "A few birds, such as dippers (*Cinclus mexicanus*) and willow flycatchers (*Empidonax traillii*), are aquatic or riparian specialists. Others use the riparian zone primarily during the breeding season or immediately after. Riparian areas along both perennial and intermittent channels are particularly rich in insects and fruit, so these areas are important food sources. Many species thus include a patch of riparian vegetation as a part of their territory, even if they do not depend fully upon it."

Mammals – Reid and Ziemer (1994) also note that riparian areas are important movement, feeding, and resting areas for many mammals: "Forest mammals use riparian areas for food sources and denning, and they may also use them as travel corridors within and between watersheds…Bats are even more closely associated with riparian areas because they require pools of water to drink from, they eat insects associated with aquatic and riparian environments, and they usually roost near their foraging sites."

4. Man-made Conveyances Do Not Eliminate Connectivity of Streams

There has been some suggestion by EPA, the Corps, and industry that streams flowing through man-made conveyances, such as pipes, culverts, ditches, canals, and other man-made structures as well as waters above these points, should no longer be considered "waters of the U.S." (Izzo and Fabricant 2002). This notion is appalling. First, it would create a perverse incentive to force as many streams into such structures as possible to avoid regulation of the altered reach or the natural stream above it. Excluding waters flowing through man-made conveyances is of

particular concern because under the Corps' 404 Nationwide 43 general permit, no special permission is required for discharges that cause the loss of less than 300 linear feet of an intermittent stream bed, such as putting streams underground in pipes, culverts, or concrete channels (U.S. Army Corps of Engineers 2002).

Second, while the physical and biological damage caused by such extreme alterations to natural streams are severe, having a portion of a stream altered in this fashion does not eliminate all functions and values provided by the entire connected stream system. Water flow, organic material, and organisms all continue to pass through these conveyances downstream, and in some instances, upstream. (Note: in some cases culverts, pipes and ditches make passage impossible for fish and other organisms, or exposes them to altered temperature, oxygen and other chemical states, and higher-than-normal predation.)

Numerous courts have held that manmade waterways are waters of the United States subject to the Clean Water Act. *See, e.g., Community Association For Restoration of the Environment v. Henry Bosma Dairy*, 305 F.3d 953 (9th Cir. 2002) (holding that ditches carrying liquid waste from a CAFO constitute a point source); *Headwaters, Inc. v. Talent Irrigation District*, 243 F.3d 526, 534 (9th Cir. 2001) (irrigation district required to secure permit coverage to discharge pollutants to its irrigation canals). In *Talent Irrigation*, the Ninth Circuit explained that the canal was a water of the United States despite the fact that the defendant apparently had the ability to isolate the canal in question, and that it flowed only periodically to other waterways. 243 F.3d at 534. Other circuits are in accord. *See United States v. Eidson*, 108 F.3d 1336, 1342 (11th Cir. 1997) (holding that a drainage ditch connected to a sewer drain and running into a canal eventually leading to Tampa Bay was a "water of the United States"); *United States v. Texas Pipe Line Co.*, 611 F.2d. 345, 347 (10th Cir, 1979) (oil spill into tributary involved "waters of the United States," "even though there was no evidence that streams that connected the tributary with navigable waters were running at time of spill"); *United States v. Ashland Oil and Transp. Co.*, 504 F.2d 1317, 1329 (6th Cir. 1974) (to establish a violation of the Clean Water Act it is enough to show that defendant discharged pollutants into a tributary that is "water of the United States;" there is no threshold requirement to prove "that, in fact, the [pollutant] reached and polluted the navigable river.").

B. WETLANDS ARE NOT ISOLATED FROM OTHER WATERS

Wetlands perform their myriad of beneficial functions in ways that are functionally inseparable from all of the other chemical, physical and biological processes that take place within watersheds. Meyer *et al.* (In preparation) provide a useful description of the connectivity of wetlands:

> "Wetlands are arrayed along a continuum of hydrologic connectivity, and distinctions amongst degree of isolation of wetlands are similarly arbitrary...Whether considering riparian wetlands adjacent to a river or depressional wetlands connected to other water bodies only via underground pathways, their roles of recharging groundwater, improving water quality,

and providing critical habitat are essential to the physical, chemical and biotic integrity of our nation's waters."

1. Wetlands Are Connected to Other Waters Through Hydrology and Chemical Processes

a. Surface and groundwater interaction

Surface water in wetlands interacts with groundwater flowing near and through the wetland. Chemical transformation of water flowing through wetlands is partially a function of the amount of contact time in the surface and groundwater interaction. As noted by Winter *et al.* (1998):

> "Ground-water chemistry and surface-water chemistry cannot be dealt with separately where surface and subsurface flow systems interact. The movement of water provides a major pathway for chemical transfer between terrestrial and aquatic systems. This transfer of chemicals affects the supply of carbon, oxygen, nutrients such as nitrogen and phosphorus, and other chemical constituents that enhance biogeochemical processes on both sides of the interface. This transfer can ultimately affect the biological and chemical characteristics of aquatic systems downstream."

Examples of Surface and Groundwater Interactions in Certain Wetland Types

Fens - The interaction of surface and groundwater is substantial and immediate and relatively constant in wetlands such as fens, as these systems are defined by the characteristic of groundwater discharging at or near the surface and seeping continuously through the root zone of the vegetation. A comprehensive analysis of the abundance, distribution, and ecological characteristics and significance of these unique systems by Bedford and Godwin (In press), "Fens of the United States: Distribution, Characteristics, and Scientific Connection versus Legal Isolation," provides an important contribution to the understanding of these wetlands. As the authors demonstrate, "the hydrogeologic settings in which fens occur, always where groundwater discharges to the surface, guarantee their strong influence on the physical and chemical properties of surface water." Fens occur in diverse topographic and geologic settings where climate allows the soil surface to remain saturated by groundwater discharge. Fens are nutrient-poor, with high concentrations of calcium, iron or aluminum in the soil and water, elements which provide the capacity for adsorption of phosphorus from groundwater inflows. And the high carbon content in the soil creates the potential for denitrification. Bedford and Godwin (In press) cite one study (Drexler *et al.* 1999a) of a New York fen which showed significant nitrate removal from groundwater entering the fen below adjacent cropland.

Fens also modulate the temperature of groundwater as it discharges, cooling subsurface flows to streams in summer and warming them in winter. Where the groundwater discharge from fens is persistent and strong, it serves an important water quality function by contributing inflows to cold-water, low-nutrient streams, required by trout species (Meyer *et al.* In preparation).

The physical and chemical properties of fens allow them to support a uniquely high biological diversity, especially of plant species. Bedford and Godwin (In press) note that the degree of hydrologic connectivity of fens strikes a delicate balance:

> "In a landscape context, the functional characteristics and significance of fens depend oddly on both their isolation from and connection to other waters. While their biological diversity is controlled in large part by their connection to ground water flows and to the chemistry of ground water (Almendinger and Leete 1998b, Drexler *et al.* 1999b), it also depends in part on a kind of isolation from other surface waters, i.e. on an environment that is usually saturated by ground water but seldom flooded by nearby surface waters (Stewart *et al.* 1993, Amon *et al.* 2002). Nutrient loads would be higher, thus promoting production of higher biomass and probably reducing species diversity (Grace 1999). Regular flooding also would eliminate many plant species intolerant of such conditions, thus further reducing species diversity."

Bogs - The montane bogs and depressional wetlands and associated ephemeral streams of Hawaii's volcanic islands are another example of more immediate groundwater-surface water connectivity. Surface water infiltrates readily through these systems and is discharged down-gradient into springs and streams, in turn discharging to ocean waters (U.S. FWS 2003).

Potholes - Prairie potholes vary widely in their hydrologic processes, depending on topographic as well as other factors. The tendency for up-gradient potholes to provide subsurface discharge to lower-gradient potholes has been well-documented. Surface water interaction with groundwater has also been shown to involve flows in both directions concurrently.

Subsurface connection can occur on a periodic basis when groundwater tables are high as a result of seasonally high precipitation. Depressional wetlands of South Carolina's Coastal Plain, including Pocosins, Carolina bays, cypress and gum ponds, and bottomland hardwoods, are all hydrologically linked for some periods of the year when the groundwater table reaches to a foot below the soil surface (Rob Mikell, South Carolina Coastal Program, personal communication, April 2003).

b. Surface overflow

All wetlands interact with the surrounding landscape and other waters, to some degree, as a result of surface overflow from precipitation and stormwater runoff. As Winter *et al.* (1998) observe, the chemical composition of water exchanged by wetlands with their surroundings is in part a function of the frequency and magnitude of the exchange, which is in turn determined by the presence or absence of a direct stream connection.

> "The magnitude of surface-water inflow and outflow also affects the retention of nutrients in wetlands. If lakes or wetlands have no stream outflow, retention of chemicals is high. The tendency to retain nutrients usually is less in wetlands that are flushed substantially by through-flow of surface water. In general, as surface-water inputs increase, wetlands vary from those that strongly retain nutrients to those that both

> import and export large amounts of nutrients. Furthermore, wetlands commonly have a significant role in altering the chemical form of dissolved constituents. For example, wetlands that have throughflow of surface water tend to retain the chemically oxidized forms and release the chemically reduced forms of metals and nutrients."

The frequency and magnitude of surface overflows varies according to wetland type, but also as a function of landscape position. As Meyer *et al.* (in preparation) note, depressional wetlands, even in close proximity, can have distinctly different hydrologic conditions. The frequency and magnitude of overflows from prairie potholes are intimately related to their individual landscape positioning. While prairie potholes normally store some portion of inflows from precipitation and groundwater, at some their storage capacity is exceeded and they overflow. When overflows occur, potholes connect with each other and with nearby streams during flood events. Intermittent surface-water connections between prairie potholes during flooding events have been documented, as summarized in a recent study by Leibowitz and Vining (2003), which explores the connectivity of prairie potholes within a complex by analyzing the evidence of intermittent spillover from one to another. The authors note that intermittent overflows from potholes are an indication that wetter conditions are exceeding the normal storage capacity of the pothole. The study used the testing of conductance in nearby pothole wetlands to measure the dynamics and timing of the flooding-induced spillover from the higher-gradient pothole to the lower one within a pothole complex. The authors also conducted a spatial analysis showing that an estimated 28 percent of the pothole wetlands within the study region in central North Dakota were intermittently hydrologically connected by surface-water to at least one other pothole during a period of flooding in the subsequent year. The connectivity the authors observed is associated with wetter conditions in a 20-year wet-dry cycle in the region. As a result, surface-water connections between potholes should be considered a probability event occurring over time and space. In addition, Leibowitz and Vining (2003) suggest that temporary, infrequent connectivity could provide a mechanism for the dispersal of organisms, potentially supporting metapopulations.

Overflows connecting waters of depressional wetlands to other surface waters occur in a wide variety of wetland systems, landscape positions and ecoregional contexts. The oxbows of many river systems, such as the Southern Platte River in Colorado and Nebraska and Alaska's Yukon River, are periodically linked directly to the river system by floodwaters.

The pocosins and Carolina bays of the southeastern Coastal Plain, while apparently "isolated" wetlands, are hydrologically connected by surface overflows and higher groundwater tables during precipitation events. In a recent summary of findings regarding the ecosystem functions of pocosins, Richardson (In press) describes them as "the headwaters of large areas of Coastal Plain and are a source of sheet flow for the region." Pocosins are connected also by groundwater linkages, and form part of a wetland-lake-stream-coastal estuary system (Richardson In press, citing Daniels, 1981).

Hydrologically, headwater wetlands behave differently from depressional systems. Headwater wetlands are the temporarily or seasonally flooded wetlands occuring where groundwater surfaces to form the head of a stream. Headwater wetlands, unlike depressional wetlands, are

open, hydrologically, which results in chemical transformation processes that are more influenced by minerals in the subsoil than by organic matter, and that generally involve less retention of chemical inputs such as nutrients.

2. Wetlands Are Connected to Other Waters Through Biological Connectivity and The Metapopulation Dynamics of Various Species

Temporary wetlands, whether or not they have a surface connection to other flowing waters, provide critical support for the biodiversity of the nation's birds, fish, wildlife and plant species.

In many instances, and on different scales, the role of small, temporary wetlands in providing biodiversity support must be considered as part of a highly productive complex of wetlands distributed in close proximity at a high density. The large and highly productive wetlands complexes of the Central Flyway -- most prominently, the Prairie Pothole Region, the Playa Lakes Region and the Rainwater Basin -- can themselves be seen as biologically connected, supporting different life stages of migrating birds.

Many apparently “isolated” wetlands function on a smaller scale as components of "wetland mosaics" which, as a system, sustain multiple local populations, or metapopulations, of wetland-dependent species. Research on metapopulations of amphibian, herpetofaunal and other species, by Semlitsch and Bodie (1998) and Gibbs (2000), and others has demonstrated how the regional survival of a metapopulation of a wetland-dependent species depends on the abundance and proximity of small wetlands, rather than on any size threshold of the wetlands. Viability of metapopulations is related to the ability to repopulate an area and to recruit juveniles into the breeding population.

Studies have also shown that a diversity of hydrologic conditions within a complex of wetlands positively influences the biological diversity of wetland dependent species. A recent study by Whiles (1998) of amphibian communities within a network of sloughs near a portion of Nebraska's central Platte River found smaller species of frogs more successful in the more intermittent and fishless of the sites, but recruitment did not occur to these sloughs in a drier year.

Significant research in recent years has documented the metapopulation dynamics of specific species. The following species profiles of the Copperbelly watersnake, the Blanding's turtle, the Spotted turtle, and bird species provide examples of the biological connection of temporary wetlands with each other and other surface waters in supporting populations of these organisms.

Examples of Biological Connectivity and Metapopulation Dynamics for Specific Wetland Species

Copperbelly Water Snake, *Nerodia erythrogaster neglectar*

The Copperbelly Water Snake is a highly vagile species with a life history requiring frequent among-wetland movements, use of multiple wetlands, and a reliance on surrounding upland habitats for significant portions of the year:

> Movements to multiple wetlands are an important component of the biology of this species. Movements are important for meeting the more immediate needs of feeding, mating, and refugia. Movements or dispersal to other wetlands allows the copperbelly to respond to changing environmental conditions such as changing water levels, shifts in prey abundance associated with drying wetlands, predation, desiccation, and heat stress.

Small wetlands are important to copperbellies as foraging sites. Copperbellies tend to predominantly eat amphibians, especially frogs. Fish-free wetlands such as "isolated" and ephemeral wetlands are where most species of frog experience their greatest reproductive success. The fact that they dry down over time makes them attractive foraging sites for the snakes.

Small wetlands are also important as stopovers for travel to more distant wetlands. In recent study by Roe et. al. (2002), 80% of all wetland movements by copperbellies in their study were to wetlands less than one ha in size. Also, nearly 70% of their study animals used four or more wetlands, and approximately 50% used five or more wetlands. Loss of small wetlands would reduce the number of wetlands available to the copperbelly, thus reducing available resources, and would consequently reduce population densities.

Since copperbellies rely on movements among wetlands, they would be less likely to persist in remnant low-wetland density landscapes. Loss of wetlands would increase distances between remaining wetlands. This would result in a decrease in the likelihood of successful dispersal or migration due to the increasing distance between resources.

Movement between "isolated" and navigable waters is routine. In both river floodplain habitats and in more upland environments involving "perched" depressional wetlands, copperbellies regularly travel between different types of wetlands. By their day-to-day activities, they link wetlands biologically that may or may not have navigable connectivity.

The copperbelly's propensity to use multiple wetlands and to frequently move between them leads to a susceptibility to changes in the spatial distribution of wetlands. Individual copperbellies may be either forced to confine movements to fewer wetlands and smaller areas if neighboring wetlands become too distant. Also, they may attempt to continue movement among wetlands at considerable costs. Continuing to move among multiple wetlands after wetland losses would likely require snakes to move more extensive distances and enlarge their area use (e. g. Home Range), both of which may increase individuals susceptibility to predation, increase

energy expenditure, decrease time for other activities, such as feeding, thermoregulating, and mating, all of which may directly or indirectly influence the individual's survival and fitness as well as long-term persistence of the population. Restricting to smaller sites may come with exclusion from important resources such as foraging sites, or alteration of metapopulation dynamics through isolation.

Blanding's Turtle, *Emydoidea Blandingii*

The Blanding's turtle utilizes a wide variety of habitats throughout its range, but has an affinity for wetland (marshes and shallow ponds) complexes and their surrounding upland habitats. These wetlands may be isolated areas, dependent on seasonal precipitation, or they may be directly supported from nearby river and stream systems:

Utilization of multiple wetlands is an important component of Blanding's turtle biology and has been documented in many studies (Rowe 1987, Ross 1989, Rowe and Moll 1991, Pappas and Brecke 1992, Graham and Butler 1993, Hermann *et al.* 1994, Dorff 1995, Joyal 1996, Linck and Moriarty 1997, Barlow 1999, Kingsbury 1999, Piepgras and Lang 2000, Joyal *et al.* 2001). Multiple wetlands are utilized by Blanding's turtles to fulfill basic requirements such as basking, feeding, aestivation, breeding, and overwintering (Graham and Butler 1993, Joyal 1996, Pappas and Brecke 1992, Dorff 1995, Linck and Moriarty 1997, Herman et al 1994).

Blanding's turtles are a highly vagile turtle species, perhaps the most vagile in North America. Blanding's turtles appear to move longer distances and more frequently than other species (Congdon *et al.* 1983, Piepgras and Lang 2000). Extensive terrestrial movements in turtles have been attributed to reproductive tactics (Morreale *et al.* 1984, Congdon *et al.* 1983, Link *et al.* 1989, Rowe and Moll 1991, Butler and Graham 1995, Joyal 1996, Linck and Moriarty 1997, Piepgras and Lang 2000), thermoregulation (Sajwaj and Lang 2000), aestivation (Joyal 1996, Rowe 1987), searching for nesting sites (Congdon *et al.* 1983) or hibernation sites (Sexton 1959), responses to droughts (Gibbons et al 1983), and to an increase in foraging opportunities (Pluto and Bellis 1988).

Shallow, stable wetlands are integral to the survival of Blanding's turtles, especially amongst the juvenile age class. Juveniles are most closely associated with extremely shallow water, typically less than 10 cm (4"), such as wet meadows. This has been documented for Blanding's turtles and other turtle species as well (Pappas and Brecke 1992, Hammer 1969, Waters 1974, Moll and Legler 1971, Congdon *et al.* 1992).

Over the season, and over their lifetimes, Blanding's turtles use a variety of water depths, thus to sustain the species, an area must have diverse wetlands. In their day-to-day activities, adult Blanding's turtles display flexibility in wetland utilization, using a variety of types, with varying associated depths. However, overall, wetland use is largely dependent on age class. As just mentioned, the smallest turtles use extremely shallow water. However, there is a positive correlation between turtle size and average foraging depth, such that the largest individuals use water that averages about 50 cm in depth, like shallow ponds and streams (Kingsbury 1999, Barlow 1999). All age classes are also dependent on shallow areas for hibernation.

Blanding's turtles utilize "isolated" wetlands. Several studies have noted the importance of widely spaced vernal pools, and both small ephemeral wetlands and permanent wetlands as basking, feeding, aestivating and overwintering sites (Graham and Butler 1993, Joyal 1996, Pappas and Brecke 1992, Dorff 1995, Linck and Moriarty 1997, Herman et al 1994). Joyal *et al.* (2001) noted that the Blanding's turtles in her study frequently used small wetlands, often less than 0.04ha in size, as foraging and thermoregulation sites.

Due to the Blanding's turtle's reliance on multiple wetlands, their frequent movements between them, and their high degree of site fidelity, changes to the spatial distribution of wetlands utilized by Blanding's turtles may threaten existing populations. A single population of Blanding's turtles is frequently spread over multiple wetlands of many different types, and movements between these wetlands are common (Ross 1989, Rowe and Moll 1991, Joyal 1996, Joyal et al 2001). Blanding's turtles also display site fidelity (Gibbons 1968, Rowe 1987, Barlow 1999). This means that they often follow the same patterns of movement year after year and they may also return to the same wetlands to hibernate, and to the same nesting areas (Congdon et al 1983, Barlow 1999, Standing et al 1999, Lang 2002). Disruptions to hibernation, and nesting areas would seriously impact a population. Physical barriers, such as large tracts of land between wetlands, which may come about after smaller connecting wetlands are removed, may inhibit the movements of turtles (Rowe 1987). Movements may then be restricted to smaller areas, with fewer resources, or they may be continued with higher costs and risks. Decreased movements may also impede gene flow between adjacent populations (Kiester et al 1982).

Spotted Turtle, *Clemmys guttata*

Spotted turtles display a high affinity for shallow wetland complexes and surrounding upland habitats throughout its range. Multiple wetland use is common. Numerous studies have documented the movements of spotted turtles between multiple wetlands (eg. Ernst 1976, Lovich 1990, Graham 1995, Joyal 1996, Barlow 1999). These movements can be both aquatic and/or overland and can be quite extensive. Such movements in turtles have been documented to be important for reproductive tactics (Morreale et al 1984), searching for nesting sites (Congdon et al 1983) or hibernation sites (Sexton 1959), responses to droughts (Gibbons et al 1983), and to increase foraging opportunities (Pluto and Bellis 1988). Kiester et al (1982) has also suggested that large movements by male turtles would promote gene flow between adjacent populations.

Shallow heterogenous wetland complexes, as well as small "isolated" wetlands are important habitat for spotted turtles. Across part of their range, spotted turtles utilize shallow, heterogenous wetland complexes (Capler and Moll 1988, McGee et al 1989, Barlow 1999), which may exist in close association with river or stream systems (Ernst 1976, Barlow 1999). In other parts of their range, spotted turtles utilize small "isolated" wetlands such as vernal pools, and ponds (Creighton and Graham 1993, Graham 1995, Joyal 1996). Regardless of their range, spotted turtles require shallow wetlands (<50cm deep) for all or part of their lives (Barlow 1999).

Small "isolated" wetlands and non-"isolated" wetlands are frequently used. Seasonal movements between "isolated" and non-"isolated" wetlands have been documented by Ward *et al.* (1976), Graham (1995), and Joyal (1996). These seasonal movements are important behavioral

adaptations for thermoregulation, foraging, and the avoidance of desiccation and predators. During these seasonal movements spotted turtles may utilize flooded areas in fields and woods, marshes, decaying vegetation in wooded areas, as well as shallow wetlands and vernal pools.

Upland habitats are vitally important. Spotted turtles aestivate in terrestrial locations, often well away from wetlands (Creighton and Graham 1995, Graham 1995, Barlow 1999). They also frequently use these upland habitats as movement corridors, and nesting sites.

Bird Species

Wetlands are important for numerous bird species. Numerous species, notably migratory species, provide excellent examples of the interconnectivity of wetlands, both within complexes, and those distant from one another in the landscape. Numerous and diverse wetlands, both interconnected and otherwise, are important for bird diversity.

Many species, including the shorebirds, wading birds, and waterfowl like ducks and geese, make use of multiple wetlands, which may be quite spatially dispersed (Haig *et al.* 1998, Naugle *et al.* 2001). Wetlands are used as foraging sites, resting areas during migration, and in some cases nesting sites (Skagen and Knopf 1994, Naugle *et al.* 2000, Naugle *et al.* 2001). For example, black terns are documented to nest and forage in prairie wetlands (Naugle *et al.* 2000).

Heterogenous wetland complexes, that support multiple wetlands of various sizes, provide more suitable habitat, both for nesting and foraging (Gibbs 1991, Naugle *et al.* 2000, Naugle *et al.* 2001), when compared to "isolated" wetlands. Because wetlands, and wetland complexes in particular are so variable (both in structure and in vegetative components), they are attractive for many different species of birds (Naugle *et al.* 2000, Naugle *et al.* 2001), and generally support greater species richness (Brown and Dinsmore 1986). Birds are able to exploit the available habitat and capitalize on the multiple foraging opportunities, while reducing energy expenditure (Naugle *et al.* 2001).

Heterogenous wetland landscapes provide alternative habitat when adverse conditions arise at one site, for example during periods of flooding, or drought (Skagen and Knopf 1994, Haig *et al.* 1998). Plissner and Haig (1997, discussed in Haig et al 1998) provide an excellent example to highlight this point in which populations of Piping plovers were observed to relocate to more suitable habitat provided by nearby wetlands after flooding occurred on habitats they were utilizing along the Missouri River.

Small seasonal wetlands within areas that support high wetland densities are also important. These temporary wetlands provide foraging, as well as nesting habitat for many highly vagile migrating species. For example, Northern Pintails are particularly at risk from the loss of small seasonal wetlands as they depend on these habitats for breeding before moving their broods to more permanent, larger wetland habitats (Naugle et. al 2001). Interestingly, Naugle *et al.* (2001) also found that the suitability of larger wetlands (for providing suitable habitat, especially for species such as the Northern Pintail) decreased when the smaller wetlands surrounding them were removed.

Connectivity between wetland habitats is paramount. Within-season movements among numerous sites are important, especially for many species of waterbirds (Haig *et al.* 1998). Movements among breeding areas have been documented to enhance reproductive success by providing an opportunity to assess nesting territory and feeding-area quality in current and future years (Haig *et al.* 1998). Maintaining connectivity between wetland complexes will also provide vital linkages between breeding areas and breeding populations. Wetland availability in the greater landscape context will also determine its "usability," with less isolated complexes being more likely to be used than more isolated complexes (Naugle *et al.* 2001).

Additional families or pathways -- In their recent article on intermittent hydrologic connectivity among prairie potholes, Leibowitz and Vining comment on the fact that research into metapopulation dynamics has, thus far, tended to address movements of species between wetlands either over land or in flight. The authors suggest that flooding-induced, intermittent surface-water connections between potholes, and between other depressional wetlands, may serve as a mechanism for individuals of a species to migrate. They cite a recent study of wetlands in Florida (Babbitt and Tanner 2000, cited in Leibowitz and Vining) which found that temporary, surface-water connections between wetlands and drainage ditches, resulting from flooding conditions, caused an increase in the relative abundance of amphibians adapted to fish predation.

V. FUNCTIONS AND VALUES OF HEADWATER STREAMS AND THEIR ADJACENT WETLANDS AND NON-ADJACENT WETLANDS

Above, we describe the many linkages between headwater streams and so-called "isolated" wetlands to other waters. However, the waters described also have inherent value in the unique functions they provide – functions that establish such waters as integral and inseparable features of the landscape. An examination of these functions will not only further establish the connectivity of these waters to other waters, but also provide a compelling case for continuing to protect them under the Clean Water Act.

The major ecological functions of headwater streams and small, apparently "isolated" wetlands and other waters, are described below. The following discussion responds to the invitation in the ANPR to address "the functions and values of wetlands and other waters;" it summarizes the critically important services provided by these waters, and concludes by outlining the serious potential consequences of narrowing federal protection for them.

A. THE INTRINSIC VALUE OF HEADWATER STREAMS

Headwater streams make up the vast majority of the entire stream network, and are inseparably bound up with other waters in the surrounding watershed and downstream. They provide essential functions and values themselves, and are critical to the hydrological, chemical, and biological health and integrity of downstream waters. As U.S. EPA's own recently-released research and literature review on headwaters streams states emphatically:

> Headwater streams make up the majority of our stream resource. Although it is difficult to get reliable estimates of perennial, intermittent and ephemeral stream lengths, the case studies that are available indicate the proportion of the total stream length that could be intermittent, even in more humid regions, is significant (a range of 17 to 34%). The extent of ephemeral headwater streams is even larger (a range of 22 to 55%). We should be very wary of any attempt to downgrade the value or importance of headwater streams, especially as they relate to the aquatic life use in these streams and the role these headwater streams play in the overall stream network. Doing so would put the majority of our freshwater aquatic stream resource at risk, as well as severely limiting our ability to protect downstream waters (U.S. EPA 2003).

1. Streams Can Be Defined in Several Ways

There are generally accepted definitions for small streams, and some measurements of their extent, although no single definitive or accurate data set exists of headwaters streams (Meyer and Wallace 2001). Generally accepted definitions of the term *headwaters* refer to the smallest streams in the network and, in particular, the source(s) of a river. They may include ephemeral streams, those that flow at the surface only periodically and usually in response to a specific rainfall event. Headwaters may also include intermittent streams, those that have flow several months in an average year. Such streams are distinguished from perennial streams, which flow at all times of the year (Meyer *et al.* In preparation). Some hydrologists use the term zero-order streams to refer to swales or unchannelized hollows. These waters are important conduits of water, sediment, nutrients and other materials during rain and snowmelt events, but are not considered to be stream channels because they lack distinct stream banks (Meyer *et al.* In preparation). Other states employ various definitions for ephemeral, intermittent, and perennial streams that include parameters other than hydrology. For example, Pennsylvania considers a stream "perennial" if it supports two aquatic macroinvertebrate taxa, regardless of whether there is continuous surface flow (U.S. EPA 2003).

Stream order is another way of classifying streams by relative size of channels in the stream network. In the stream order system, first order streams are the smallest identifiable channels having no tributary branches. Second order streams are formed where two first-order channels merge, third order streams are formed by the combination of second-order streams, and so on (Horton 1945, as cited in Meyer *et al.* In preparation). Scientists generally agree with these definitions, however, some resource management agencies have developed their own definitions. For example, Ohio EPA considers headwaters streams to be "the very small swales, creeks, and streams that are the origin of most rivers." And it defines "primary headwater" streams as those with watersheds of less than one square mile (Ohio EPA 2001).

2. Headwater Streams Perform Ecosystem Functions

Headwaters streams provide a wide array of functions and environmental services whose value, though estimated to be enormous, to date cannot even be fully calculated. The Ohio Environmental Protection Agency's (2001) fact sheet on headwaters streams notes the value of these small systems:

> Because of their small size, headwater streams in some locations have been treated as mere water "conveyances" and have been ditched, channelized, moved or even buried in pipes. Historically they have not been appreciated for their contribution to water quality. By their sheer numbers, however, they have important ecological and economic functions. They affect the ecological and economic viability of downstream rivers through the regulation of flood waters, the maintenance of safe and high quality drinking water, pollution prevention, and numerous other ecosystem services.

The major ecosystem functions of headwater streams are described briefly below. This discussion augments the characterization of the processes, characteristics and functions of headwater streams described above.

a. Flood control and maintenance of water supplies

During heavy precipitation and floods, water soaks into floodplains, stream channel beds and banks, and into groundwater tables. This transfer of water into "storage" significantly delays and diminishes flood peaks. During dry periods, release of this stored water along with groundwater seepage ensures a steady flow of water, or "baseflow," in the channel and downstream. (Meyer *et al.* In preparation) Streams receive, on average, 50 percent of their flow from groundwater (Alley *et al.* 1999), and headwater streams are a primary point of groundwater discharge into surface waters, particularly during dry and other low flow periods. (Cohen 2003)

b. Sediment storage

Headwater streams provide the connection between sediment production from hill slopes and sediment transport to larger streams, rivers, lakes, ponds, and coastal waters. Thus, they are the first line of defense against high sediment loads in large streams and rivers. These excess sediment loads damage aquatic wildlife habitat and degrade human uses of water – for drinking water supplies, fishing, and recreation. Headwaters are highly effective in capturing and filtering out sediments, as well as organic material and excess nutrients. (Meyer *et al.* In preparation)

c. Maintaining water quality through nutrient uptake and transformation

The basic chemical composition of unpolluted streams and rivers is largely established in headwater streams. Recent research has demonstrated that small streams are the sites of the most active uptake, transformation, and retention of nutrients. In addition to the nutrient removal that occurs in headwater streams, the chemical and biological transformations that occur there (e.g. denitrification, microbial uptake, transformation to organic nitrogen) reduce the biological availability of nutrients that are exported downstream. This capacity for nutrient retention and transformation reduces the loading of nutrients to downstream ecosystems. Riparian forests and wetlands associated with headwater streams can also be efficient in nutrient removal. (Meyer *et al.* In preparation)

3. Streams Provide Wildlife Habitat and Help Maintain Biodiversity

Headwater streams and their riparian zones are regions of high species diversity. Individual headwater streams support hundreds of species from a wide range of biological groups from bacteria to bats. Headwaters serve as the primary habitat for some fish species, but also provide essential support in the form of spawning, nursery, feeding, and thermal refuge areas for fish living in larger streams, rivers, and lakes. Small headwater streams provide essential nutrients to salmon species spawning and nesting downstream; salmonid reproduction occurs even in ephemeral portions of streams in the Pacific Northwest. (Poff *et al.* 1997) Many headwater fish species are rare, declining, or extinct. Amphibians are common in intermittent as well as perennial streams, and are usually more abundant in streams too small or remote to support large predatory fish. Only a few species of birds actually live in small streams, but many depend on headwaters for food, water, habitat, or movement corridors. Headwaters are important habitats for many mammals, which use headwater habitats for shelter, food, drinking water, or movement corridors. (Meyer *et al.* In preparation)

B. INTRINSIC VALUE OF HEADWATER AND "ISOLATED" WETLANDS

1. Headwater and So-called "Isolated" Wetlands Are Important on an Ecosystem Scale

In 1995, National Research Council (NRC) addressed the question of whether headwater and "isolated" wetlands should receive less protection, and found the scientific basis for doing so to be "weak" (NRC 1995). The NRC's conclusion was based on ample evidence that headwater and so-called "isolated" wetlands provide essential ecosystem services to the water environment. The term "isolated," itself, has a weak scientific basis. As noted by Tiner et. al. in the recent USFWS study, *Geographically Isolated Wetlands*, "There is no single, ecologically or scientifically accepted definition of isolated wetland, because this issue is more a matter of perspective than scientific fact." (Tiner *et al.* 2002) Not only are headwater and so-called "isolated" wetlands intrinsically of critical ecological importance, but, as noted above, they function integrally with the chemical, physical and biological processes within watersheds. A full consideration of how headwater and so-called "isolated" wetlands function in the environment underscores the inapplicability of the "isolated" characterization. In addition, contributions to the understanding of the complex functioning of headwater and so-called "isolated" wetlands since the NRC study was published underscore the NRC's conclusion regarding their relative importance for conservation.

The ecosystem services provided by wetlands, including headwater and so-called "isolated" wetlands, are essentially grouped as hydrologic, biogeochemical, and habitat functions.

2. Headwater and So-called "Isolated" Wetlands Perform Specific Functions

a. Hydrology

Irrespective of their landscape position or degree of connectivity to other surface waters, wetlands perform hydrologic and water quality functions by "modifying or controlling the quality and quantity of water moving through the wetland," as described by Carter (1996). The hydrologic and water quality functions of wetlands, including headwater and so-called "isolated" wetlands, are complex and varied, and are dependent on a range of factors, including:

Landscape position
Topographic location
Presence or absence of vegetation
Type of vegetation
Type of soil
The relative amounts of water flowing in and out of the wetland
Local climate
The hydrogeologic framework
The geochemistry of surface and ground water

The hydrologic functions performed by wetlands, which vary according to the above factors, include: flood storage and moderation of storm flows; groundwater recharge and discharge, including discharge to stream flows; alterations of precipitation and evaporation; maintenance of water quality and estuarine balance; and reduction in erosion.

The complexity of differentiating between different types of freshwater wetland systems according to their ecological functions and regimes is addressed by Misch and Gosselink (1993). In categorizing the ecosystem functions of freshwater, non-forested wetlands, the authors differentiate between peat-forming systems, such as bogs and fens, and freshwater marshes which are non-peat-forming. Included in the category of freshwater marshes are smaller systems such as riverine marshes in floodplain and headwater areas, prairie potholes and sandhill marshes, vernal pools and playa lakes, along with larger systems including the marshes fringing the Great Lakes and the Everglades. Misch and Gosselink note that "[T]he critical factors that determine the character of these wetlands are the presence of excess water and sources of water other than direct precipitation." Marshes, the authors note, are like fens, in that "they generally have a water source in addition to precipitation," those potential sources being groundwater and surface flows. In addition, because all water sources to freshwater marshes are dependent on precipitation, their water regimes can vary greatly over time. In their landmark study of the pothole region, Stewart and Kantrud (1971) showed that precipitation patterns can alter prairie potholes from ephemeral to seasonally ponded to permanently ponded conditions over a period of years (cited, e.g., in Hubbard 1988).

The degree to which wetlands perform the above-mentioned hydrologic functions varies from wetland to wetland, especially in the case of depressional wetlands, which show a high degree of beta diversity, or variation from one to another. For example, as described by Meyer et. al.

(2003), two prairie pothole wetlands in central Wisconsin, located 400 m apart, are distinctly different hydrologically as well as biologically.

Depressional wetlands generally, and particularly those lacking "natural outlets," or surface connections to other waters, typically intercept and store runoff, and moderate the velocity and volume of floodwaters. (Carter 1996) As noted by Tiner et. al. (2002), in areas where "isolated" wetlands are present in the thousands, the capacity to store surface water can be "enormous."

The strong correlation between the size of flood peaks and the amount of storage capacity provided by wetlands and lakes is well documented. (Carter 1996) The classic study of the Devil's Lake basin in North Dakota, by Ludden et. al. (1983) found that prairie potholes can store as much as 72 percent of the total runoff from a 2-year storm event and 41 percent of the runoff from a storm that occurs once every 100 years (cited in Tiner *et al.* 2002) Similarly, an Illinois study found that increasing the amount of wetland storage area in a basin by 1 percent decreased both peak and total flood flows and increased low flows. (Demissie, 1993 cited in Levin 2002) Additional studies have shown the critical floodwater collection and storage function played by the playa lakes of the Southern High Plains. (Haukos. In preparation) Pocosins are also recognized as "significant water storage systems," which receive and slowly release precipitation and stormwater runoff to downstream freshwater and estuarine waters. (Richardson. In preparation)

Water stored temporarily, seasonally and permanently in wetlands provides an important source of water to bird, fish and wildlife (Tiner *et al.* 2002).

Some portion of the water collected and stored by freshwater wetlands, including marshes and bogs, is typically discharged to groundwater where it replenishes aquifers and maintains instream flows. A significant proportion of recharge flows to groundwater can be provided by infiltration from depressional wetlands. Weller (1981), for example, showed that small wetlands contribute significantly to regional groundwater recharge. (cited in Misch and Gosselink 1993)

Groundwater recharge by small wetlands is important to replenishment of regional aquifers in the semi-arid northern prairie region (van der Kamp and Hayashi 1998). Much of the recharge of water to the Ogallala aquifer is provided by the 20,000 to 30,000 playa lakes of the Southern High Plains of West Texas and New Mexico. As Loren Smith describes in a forthcoming publication, *Playas of the Great Plains*, significant scientific debate, now resolved, surrounded the question of whether the impermeable clay soils lining playas, and the underlying layer of caliche, a dense geological formation, could allow infiltration. Subsequent research by Nativ and Riggio (1989) and Zartman et. al. (1994, 1996) has established conclusively not only that focused recharge from the playa lakes, rather than more diffuse infiltration from the surrounding landscape, recharges to the groundwater, but also that in the Southern High Plains, playas represent the sole source of recharge to the Ogallala. More recent studies of other depressional systems have shown that infiltration of surface waters occurs primarily through the permeable soils around the edges of depressional wetlands and that the ratio of the edge to the wetland volume tends to determine the amount of infiltration. (Misch and Gosselink 1993) Contributions to recharge have been documented in several other regions. The cypress domes of Florida have

also been shown to contribute to aquifer recharge. (Carter 1996) Phillips and Shedlock (1993) documented the role of Delmarva bays in collecting and storing water from precipitation during the winter and spring, as well as stormflows from surrounding uplands, and recharging it to the aquifer. (cited in USFWS comments to DOI 2003) The Montane bogs and other depressional wetlands of Hawaii are also recognized as providing aquifer recharge. (USFWS comments to DOI 2003)

In addition to recharging aquifers, water infiltrating to groundwater through depressional wetlands flows down-gradient to streams. Headwater and so-called "isolated" wetlands can play a significant role in maintaining baseflows in streams. Delmarva bays, for example, help to maintain baseflows through recharging groundwater. Drainage or filling of wetlands that provide groundwater recharge can result in reductions in baseflow of streams, with additional impacts to downstream ecosystems. (Winter 1999)

b. Water quality

Wetlands, including headwater and so-called "isolated" wetlands, perform important water purifying functions that benefit the ecosystem overall. The transformation of chemicals in water inflows is a function of four principal components of the wetland: the substrate or wetland soil, water, vegetation, and microbes (Carter 1996). These components are common to all wetlands.

As noted earlier, wetlands trap, transform, and recycle the chemical constituents in water inflows through biological and chemical processes (Winter 1998). Many wetlands serve as nutrient sinks, removing nutrients, from inflows and recycling them through plant uptake or biological processing. Misch and Gosselink (1993) provide a review of findings over the 1970-1992 period concerning various wetland types and their roles as sources and sinks of nutrients. They note that inadequate measurement techniques may have affected some of the findings, and observe that the results varied according to whether the study addressed inorganic or organic nutrients. They conclude, with certainty, that "many wetlands act as sinks for particular inorganic nutrients and many are sources of organic material to downstream or adjacent ecosystems."

The National Research Council recognized the value of headwater riparian wetlands in protecting water quality, in their recent study of the effectiveness of wetlands mitigation, *Compensating for Wetland Losses under the Clean Water Act* (2002), noting their effectiveness in buffering streams from influxes of nutrients and sediments. The NRC found that headwater riparian wetlands, to varying degrees depending on morphology and other factors, also remove nutrients from groundwater flows to streams. They cited the characterization by Gilliam *et al.* (1996) of headwater riparian wetlands as "the most important factor controlling nonpoint source pollution in humid areas." The relative importance of riparian wetlands associated with low order streams in removing phosphorus was demonstrated in a 1996 study of eight watersheds. The authors modeled the nutrient load reduction performed by riparian areas, and found that the riparian wetlands of first- through fourth-order streams contributed significantly to phosphorus removal, and the wetlands associated with the first-order streams accounted for most of the total load reduction attributed to wetlands. (Weller1996, cited in Meyer *et al.* In preparation)

Depressional wetlands, including so-called "isolated" wetlands, have been shown to effectively remove pollutants from waters overflowing the wetland or discharging to groundwater. A study by Davis et. al. (1981) measured the levels of nitrogen and phosphorus in influent and effluent to a prairie marsh, and found that all runoff was retained in three dry years, while in the wet year, more than 75% of the inorganic nitrogen was removed from water flowing out of the marsh (cited in Hubbard 1988).

The role of wetlands in trapping sediments and serving as sinks for heavy metals and other chemical constituents is also well established in the literature.[36/]

c. Maintain Biodiversity and species populations and distributions

Tiner et.al. (2002) have noted recently, "From an ecological standpoint, isolated wetlands are among the country's most significant biological resources." The biological significance of ephemeral and other apparently "isolated" wetlands is their role in providing the habitat and energy sources that are critical to supporting the abundance and biodiversity of the nation's birds, fish, wildlife and plant populations. In some instances, ephemeral wetlands complement non-"isolated" systems in providing habitat for wetland-dependent species. In other instances, they provide specialized habitat conditions that are required to support regional biodiversity. In certain instances, as Meyer et. al. (In preparation) have described, "ephemeral wetlands contribute to global biodiversity and the disappearance of ephemeral wetlands would mean the loss of highly specialized taxa."

Characterizing the ecological role of apparently "isolated" wetlands, Tiner (2002) observed:

> "In some areas, isolation has led to the evolution of endemic species vital for the conservation of biodiversity. In other cases, their isolation and sheer numbers in a given locality have made these wetlands crucial habitats for amphibian breeding and survival (e.g., woodland vernal pools and cypress domes) or for waterfowl and waterbird breeding (e.g., potholes). In arid and semi-arid regions, many isolated wetlands are veritable oases -- watering places and habitats vital to many wildlife that use them for breeding, feeding and resting, or for their primary residence. Many of these wetlands may be small in size, but their value to wildlife is far greater than their size alone would suggest."

Tiner *et al.* (2002), as well as a recent report by the National Wildlife Federation and the Natural Resources Defense Council *Wetlands at Risk* , profiling wetland types and their wildlife contributions by region, detail the wide diversity and richness of wetlands sometimes classified as "isolated." These systems sustain many species populations, and their distribution, safeguard biodiversity locally, regionally or globally, and serve as the sole line of defense against extinction in a large number of instances.

[36/] See, e.g. Hubbard, Daniel E., *Glaciated Prairie Wetland Functions and Values: A Synthesis of the Literature*, U.S. Fish and Wildlife Service Biological Report 88(43), p. 19.

(1) Maintenance of populations and regional abundance
The roles of some wetland types in supporting wildlife populations, for example duck production of the Prairie Pothole Region and the role of the Rainwater basin and Playa Lakes Region as critical wintering and stopover grounds for a wide range of migratory birds, are well understood and documented. Other systems have received relatively little research attention to date, and in some instances, species populations are being identified even as development threats bear down on the remaining wetlands of the type. An example is the Citronelle Ponds of the Gulf Coast reported in *Wetlands at Risk*. Since that publication, additional species of copepods and fairy shrimp have been identified, along with a potentially unnamed *Streptocephalus* (George Folkerts, personal communication, April, 2003).

Many wetland-dependent species are non-specializing, relying on diverse wetland habitat. For such species, apparently "isolated" wetlands may help to sustain their regional abundance. For example, the Illinois Natural History Survey study conducted in 2002 showed that a sizeable proportion of the wildlife in Illinois is dependent on, or closely associated with wetlands, and that "isolated" wetlands make up 60 percent of the total number of remaining wetlands (Levin *et al.*, 2002). The following are the reported number and percentages of wetland-dependent and associated native species reported:

Group of organisms	Number	% of native species	% threatened /endangered
Plants	862	42	18
Birds	105	38	29
Amphibians	37	90	19
Reptiles	13	22	46
Mammals	6	10	33

The study also reported that amphibians are especially, and in some instances exclusively, dependent on "fish-free isolated wetlands" for survival.

(2) Biodiversity support for specialized species
Biodiversity support by vernal pools, and other seasonal wetlands that may be considered "isolated," occurs on local, regional and global levels.

Ephemeral wetlands provide global biodiversity support to a number of highly specialized families of organisms. (Meyer *et al.*, In preparation) provide a listing of ancient vascular plant and crustacean species, associated with ephemeral wetlands since at least the Tertiary period , that are found on most or all continents. These groups have local species but generally also some individual species that have very wide distributions.

The playa lakes of the Southern High Plains provide regional biodiversity support to a number of families of wildlife species in addition to waterfowl, including mammals, other birds, invertebrates and flora (Haukos, In preparation).

A study by Zedler *et al.* (1993) of plant species found in vernal pools in San Diego County, California illustrates local biodiversity support. Of the 78 vascular plant species found in the study site, 25 are common to the vernal pools and surrounding chaparral, while 25 of the species are unique to vernal pools, and some of those are endemic to the region. As a result, loss of vernal pools in the area would threaten local biodiversity (cited in Meyer *et al.* In preparation). Meyer *et al.* (In preparation) also report that 44, or nearly one-tenth, of the plant species found in California vernal pools are found only in vernal pools and only in California.

Another example of specializing organisms are the very small land snails found in fens. Although not well-studied, about 42 different species of land snails have been found in fens in Iowa, Wisconsin, Minnesota and New York. One of the rarest species is limited to fens, and has been found at only about two dozen sites (Bedford In press).

(3). Profiles of Amphibian Species

The habitat functions of depressional wetlands and their importance for assuring continued survival of dependent species are well-illustrated by amphibians. The following are profiles of amphibians and their use of wetland habitat.

Amphibians are generally slow moving and small-bodied with a physiology that requires them to remain near moist refugia (documented by Larson *et al.* 1984, cited in Gibbs 1998). A majority of them must also use wetlands for breeding. As a result, destruction of wetland habitats have the potential to seriously impact amphibian populations.

Many adult amphibians use aquatic habitats for reproduction, i.e., mating and egg laying. These habitats are also important for the recruitment of juveniles into the adult population. Not only does breeding and egg-laying occur there, but larval (tadpole) development until metamorphosis also typically takes place in these aquatic environs (Duellman and Trueb 1986, Dodd and Cade 1998, Semlitsch 1998). Aquatic habitats may also be very important in affording protection from extreme physical conditions, such as desiccation (Gill 1978).

Breeding habitats are frequently highly specific - breeding will only be successful in aquatic habitats with suitable physical and biological conditions. For example, studies conducted by Karns (1992) on the Blue-spotted salamander (*Ambystoma laterale*), and by Sadinski and Dunson (1992) on Jefferson salamanders (*Ambystoma jeffersonianum*) documented that embryonic development was significantly extended and in some cases failed under low pH conditions. Also, many species of salamanders, especially those that are small bodied or have small clutch sizes, will only breed in aquatic areas that are devoid of fish (Hecnar and M'Closkey 1997, Petranka 1998). Avoidance of ponds containing fish has also been documented with Wood Frogs (*Rana sylvatica*) (Hopey and Petranka 1994). Adult salamanders may also show site fidelity, returning to the same breeding ponds year after year (Gill 1978, Semlitsch *et al.* 1996).

Temporary ponds are important breeding sites for many amphibians and these sites may support a rich diversity of species. Studies supporting these findings include Hecnar and M'Closkey (1996) and Snodgrass *et al.* (2000). Dodd and Cade (1998) also report that there are a number of

amphibian species of critical conservation concern that only breed in temporary wetlands: *Ambystoma cingulatum* (Flatwoods salamander), *Notophthalmus perstriatus* (Striped newt), *Rana capito* (Gopher Frog). There are also many other species that are dependent on small wetlands. For example, in a study conducted by Gill (1978) on the Red-spotted newt (*Notophthalmus viridescens*) he found that breeding adults used numerous, small, isolated, woodland ponds whose hydrology was solely dependent on precipitation.

Diversity in the hydroperiod of wetlands within complexes is required to buffer unpredictable environmental variation. Because many amphibian species utilize aquatic habitats with varying hydroperiods, they are greatly influenced by stochastic events, such as droughts. For many species of amphibians, especially those that rely on seasonally ephemeral wetlands, years of drought may result in a reduction of recruitment into the adult population as larvae are unable to complete metamorphosis, or in extreme cases, it may result in an absence of breeding. A long-term study, conducted over 16 years, by Semlitsch *et al.* (1996), found that years with short hydroperiods resulted in complete, or nearly complete amphibian reproductive failure. Their study highlighted the vulnerability of some amphibian species that may be unable to survive multiple years of conditions unfavorable for reproduction. For these species, the authors note that, barring rescue from immigration, they would probably become locally extinct as a direct result of mortality exceeding reproduction.

Terrestrial habitats surrounding breeding sites are important areas for foraging and hibernation. During the non-breeding season, many amphibian species live in the terrestrial habitats that surround breeding sites (Hecnar & M'Closkey 1996, Semlitsch 1998). This surrounding terrestrial habitat provides dispersal corridors for the movement of amphibians between sites. Dispersal between sites is important for many amphibian populations as it provides for genetic exchange, as well as for the recolonization of populations that may have become extinct at distant sites (Semlitsch 1998). Another important point to note is that amphibians have been found to utilize terrestrial habitat at considerable distance from wetlands. For example, Semlitsch (1998) summarized movement data from numerous studies on salamanders and found that of the six species he included in his analysis, adults were found an average of 125.3m from the edge of aquatic habitats, and they may be found up to 625m from wetland edges.

Due to the filling of many vernal pools across the US, many populations of pond-breeding salamanders are becoming ever more "isolated." Petranka (1998, p. 16) speculates that in many areas, salamander populations "…are at the point at which recolonization of ponds following local extinction is becoming increasingly unlikely."

Examples of salamander species that are dependent on aquatic wetland habitats in the US include (the following information is loosely paraphrased from Petranka,1998):

Ringed salamander (*Ambystoma annulatum*). This species breeds in fish-free habitats such as woodland pools, and seasonally ephemeral ponds adjoining forests (Brussock and Brown 1982; McMillian and Wilkinson 1972; Peterson et al 1991; Spotila and Beumer 1970; Trapp 1956). The species also uses pools in low-lying areas as well as along ridge tops, where the hydrology is mostly precipitation dependent.

California Tiger salamander (*Ambystoma californiense*). Generally breeds in fish-free seasonally ephemeral ponds. During years of drought, ponds may not form, and populations may not breed (Barry & Shaffer 1994).

Flatwoods salamander (*Ambystoma cingulatum*). Documented to breed in seasonally ephemeral habitats such as marshy pasture ponds, swamps, and cypress and black gum swamps (Anderson and Williamson 1976, Mecham and Hellman 1952). This species has been identified as an amphibian species of critical conservation concern.

Northwestern salamander (*Ambystoma gracile*). Observed breeding in both permanent and semi-permanent habitats, for example, small shallow ponds to large, deep lakes.

Jefferson salamander (*Ambystoma jeffersonianum*). This species typically breeds in seasonally ephemeral woodland pools and farm ponds, but may also use permanent habitats (Bishop 1941a; Douglas and Monroe 1981). They may also breed in upland ponds on ridges.

Blue-spotted salamander (*Ambystoma laterale*). Blue-spotted salamanders breed in variety of habitats devoid of fish, including pools along lakeshores, springs in pastures, quarry ponds, marshes, both seasonally ephemeral and permanent woodland pools (Anderson and Giacosie 1967; Bleakney 1957; Piersol 1910a; Stille 1954; Van Buskirk and Smith 1991; Weller et al 1978).

Mabee's salamander (*Ambystoma mabeei*). This species prefers habitats devoid of fish including semi-permanent farm ponds, vernal ponds in river bottomlands, Carolina bays and cypress-tupelo ponds in pinewoods.

Long-toed salamander (*Ambystoma macrodactylum*). This species is known to breed in seasonally ephemeral and permanent lakes, ponds, and flooded meadows. A small percentage of individuals may also breed in slowly-moving streams (Beneski *et al.* 1986).

Spotted salamander (*Ambystoma maculatum*). Spotted salamanders normally breed in seasonally ephemeral habitats devoid of fish such as vernal ponds, swamps, roadside ditches, and they may occasionally use permanent ponds (Figiel & Semlitsch 1990; Harris 1984; Husting 1965). Petranka (1998) discusses that woodland vernal pools are the primary breeding sites of spotted salamanders.

Marbled salamander (*Ambystoma opacum*). Although the Marbled salamander is a terrestrial breeder, it nests in dried beds of temporary ponds or along the margins of reduced ponds, and the eggs do not hatch until the pond is flooded.

Mole salamander (*Ambystoma talpoideum*). This species breeds in a wide variety of temporary and permanent habitats, but avoids ponds with large predatory fish. Many local populations have been lost as forests and the seasonally ephemeral wetlands they contain have been destroyed.

Small-mouthed salamander (*Ambystoma texanum*). Small-mouthed salamanders are found in bottomland forests and associated wetlands in or adjoining floodplains. They are known to breed in seasonally ephemeral lentic habitats, including woodland ponds, oxbow ponds, flooded field, prairie ponds, and swamps (Bailey 1943; Petranka 1982a; Ramsey & Forsyth 1950). The species may also occasionally breed in sluggish streams or pools in headwater tributaries. They show a strong affinity for fish-free breeding sites. Many populations have been eliminated and reduced as floodplain forests have been cleared for agriculture.

Tiger salamander (*Ambystoma tigrinum*). Tiger salamanders breed in temporary and permanent ponds (Bishop 1941a; Collins 1981). Populations in southeastern US have been declining due to loss of wetland and surrounding forest habitats.

Three-lined salamander (*Eurycea guttolineata*). The Three-lined salamander breeds in cypress bays, vernal bogs, and bogs, as well as sluggish streams, and seeps (Petranka 1998).

Dwarf salamander (*Eurycea quadridigitata*). The Dwarf salamander is found in coastal plain habitats of the southeastern US. Breeding occurs in woodland pools, seepages, roadside ditches, Carolina bays, as well as other standing bodies of water (Petranka 1998).

Four-toed salamander (*Hemidactylium scutatum*). Four-toed salamanders breed in swamps, bogs, marshes, vernal ponds and other fish-free habitats within forested areas.

Many-lined salamander (*Stereochilus marginatus*). This species breeds in woodland ponds, as well as sluggish streams.

Black-spotted newts (*Notophthalmus meridionalis*). Black-spotted newts inhabit both seasonally ephemeral and permanent habitats across their range.

Striped newt (*Notophthalmus perstriatus*). This species has been observed to breed in the following habitats: small ponds, drainage ditches, and other bodies of standing or sluggish water. Striped newts may also be found in habitats that exist in close association with rivers and streams (Dodd & LaClaire 1995).

Eastern newt (*Notophthalmus viridescens*). Eastern newts are known to breed in permanent and semi-permanent bodies of water, such as lakes, reservoirs, marshes, ditches, and sluggish streams (Bishop 1941a; Gates & Thompson 1982).

Rough-skinned newt (*Taricha granulosa*). This species has been documented to breed in seasonally ephemeral ponds as well as permanent habitats, such as lakes, ditches, sluggish streams (Evenden 1948; Garber and Garber 1978; Stebbins 1951).

Two-toed Amphiuma (*Amphiuma means*). Two-toed amphiumas are found in coastal plain habitats. They occur in or near swamps, cypress bays, ditches, temporary ponds, sloughs, and sluggish streams. Petranka (1998) states that widespread loss of wetlands across the southeastern US has undoubtedly eliminated many local populations.

One-toed Amphiuma (*Amphiuma pholeter*). This species inhabits floodplain swampy terrace streams and swamps of streams.

Three-toed Amphiuma (*Amphiuma tridacylum*). The Three-toed Amphiuma also inhabits coastal plain habitats, and prefers semi-permanent or permanent habitats across this range. Habitats include: swamps, sloughs, sluggish streams, as well as permanent ponds (Baker 1945; Cagle 1948; Chaney 1951).

Southern Dwarf Siren (*Pseudobranchus axanthus*). Southern Dwarf Sirens can be found in cypress ponds, swamps, ditches, marshes, and other permanent and semi-permanent aquatic habitats in peninsular Florida (Moler & Kezer 1993). While little information currently exists on this species, Petranka (1998) notes that populations have undoubtedly been eliminated as a result of wetland destruction.

Northern Dwarf Siren (*Psedobranchus striatus*). This Siren species has been documented to live in cypress swamps, flooded ditches, marshes, and other permanent and semi-permanent aquatic habitats (Harper 1935; Martof 1972).

Lesser Siren (*Pseudobranchus intermedia*). Lesser Sirens inhabit a variety of permanent and semipermanent habitats. These habitats may include: marshes, swamps, farm ponds, ditches, canals, sloughs, sluggish creeks. Many local populations have been destroyed by loss of wetlands (eg. Bury et al 1980).

Greater Siren (*Pseudobranchus lacertia*). This species inhabits a variety of permanent and semi-permanent aquatic habitats, including ditches, canals, marshes, farm ponds, rice fields, lakes, as well as sluggish streams and rivers which may often be choked with aquatic plants (Duellman and Schwartz 1958; Martof 1973).

C. THE ENVIRONMENTAL REPERCUSSIONS OF WITHDRAWING FEDERAL PROTECTION FROM HEADWATER STREAMS AND OTHER SO-CALLED "ISOLATED" WATERS WOULD BE SEVERE

1. The Scope of Streams at Risk

As described above, the ecosystem value of headwaters streams is enormous. These streams are the vast majority of all streams, measured either in numbers or length in miles. No comprehensive study of headwaters streams exists for the U.S., but Leopold *et al.* (1964) estimated that 95 percent of the stream channels and 73 percent of the total stream channel length is composed of first- and second-order streams. Leopold based this classic estimate on the best source available, USGS 1:24,000 scale topographic maps, yet he knew at the time that these maps were notoriously inaccurate and underestimated the actual extent of small streams networks.

Ohio EPA found in a survey of its own waters that only 21,048 miles of streams were shown on USGS 7.5-minute (1:24,000 scale) maps, yet 115,206 miles were identified and classified by

Ohio EPA as primary headwater streams. Furthermore, a large number of streams shown as intermittent on topographic maps were found to be high-quality perennial cold spring-fed streams (OH EPA 2002). This points not only to the inadequacy of existing maps and surveys of streams, but also to the difficulty in accurately drawing distinctions among streams based on parameters like flow frequency.

A detailed long-term study of the Coweeta Creek watershed in western North Carolina also shows the extent of headwaters streams that are often not captured on existing maps. Less than 15 miles of streams are indicated on a 1:24,000 scale map, while 33.6 miles appear on 1:7200 scale maps. Similarly, in the Chattanooga River basin, ground surveys revealed that 1:24,000 scale maps identify only 21 percent of the existing stream channel length (Meyer and Wallace 2001).

Widely accepted scientific models in use today that estimate the proportion of small streams within a particular river network show that, for example, in a 5th-order basin, first and second order headwater streams should account for approximately 95% of the total number of streams, 75% of the total stream length, and 40% of the total streambed area (Meyer *et al.* In preparation).

Further, given well-documented inadequacies in accurately mapping stream lengths, as discussed above, many intermittent and ephemeral stream reaches are never even identified. In a February 2003 literature review conducted by U.S. EPA at its Wheeling Lab the following example of this problem was noted:

> Hansen (2001) explored the scale issue and tried to categorize stream types when he surveyed streams within the Chattanooga River watershed in the Blue Ridge Mountains of Georgia, South Carolina and North Carolina…A computer based mapping exercise that used contour crenulations with field verification estimated 1300 km [kilometers] of perennial streams. Of the 1300 km identified, the topographic maps indicated only 50-75 % of the total perennial length, depending on scale. Approximately 59% of the total stream length was made up of first-order streams…Of the total 4666 km of total streams identified, only 28% were considered perennial based on the presence of a defined channel and certain indicator macroinvertebrate taxa. The remainder of the stream length was intermittent (17%) or ephemeral (55%).

American Rivers and Earthjustice also investigated streams data published by U.S. EPA in its *1998 National Water Quality Inventory* (305(b) report), the last biennial report for which this data is compiled and published in one place for all states. EPA reports a total of 3,662,255 total miles of streams, and 1,298,134 miles of perennial streams, or 35 percent of total streams. Simple arithmetic would suggest that the remainder, 65 percent are non-perennial, however, EPA reports 1,594,672 miles of non-perennial streams, or 44 percent of total stream miles (U.S. EPA 2000). We assume that this discrepancy is due to deficiencies in state data reported, as many states did not report non-perennial streams and instead EPA estimated them based on very

coarse resolution map data.[37] For the reasons outlined above this number vastly underestimates the actual extent of intermittent and ephemeral streams.

EPA's national stream network characterization analysis shows that in every one of the 19 ecoregions studied, all first and second order streams are intermittent, and in numerous regions, third and fourth order streams also are intermittent. Further, the analysis shows that the vast majority of first-to fourth order streams miles are intermittent in all ecoregions, with some regions having no perennial streams in their average fourth-order stream watersheds (U.S. EPA 2002a).

Two maps for Wisconsin and New Mexico visually depict the extent of intermittent streams in river networks, developed based on seamless GIS-based layers (see Exhibits 1 and 2, attached). Though these maps are based on hydrography data at different scales, both clearly show how integral non-perennial waters are to the entire river network. In short, it is not possible to "disconnect" non-perennial streams from the downstream waters into which they flow without making artificial distinctions that have no basis in science.

Headwater streams dominate the drainage network of most river networks. For example, headwaters in the Chesapeake Bay watershed comprise more than 65 percent of the total mileage of streams and rivers that drain to the Bay, supplying 90 percent of the freshwater flow, as well as nutrients, sediments, and pollutant loads that drives the health of the nation's largest estuary. However, many of these streams are inadequately protected and are being degraded or completely obliterated. Despite their importance, nearly 20 percent of all streams in the Chesapeake Bay watershed have been ditched, channelized, or enclosed in pipes, concrete channels and culverts to accommodate development (CWP and NEETF 2002a).

Rock Creek in Maryland provides a classic study of the loss of headwaters to urbanization. Surveys showed the creek lost 58 percent its drainage density (stream length in a square kilometer) between 1913 and 1968 (Meyer and Wallace 2001). Studies in the Upper Chattachoochee River watershed show that one-third of stream length has been lost, primarily small headwater streams, and is undoubtedly an underestimate because the study estimated stream loss using 1:24,000 maps, which do not adequately display the smallest streams (Meyer and Wallace 2001). Similar examples can be found throughout the country. Other activities, such as mountain-top removal and valley fill mining techniques practiced in Appalachia, buried nearly 870 miles of streams between 1986 and 1998, with over 450 miles of streams buried in West Virginia alone (Meyer and Wallace 2001).

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[37] Note: where state data was unavailable or insufficient, EPA reported data for states based on its Reach File V.3, or RF3, database that uses 1:100,000 scale information. EPA itself admits that: "Direct evaluation using only EPA's RF1 and RF3 hydrologic stream coverages would grossly undercount the number of streams…" (U.S. Environmental Protection Agency, *Environmental Assessment for Proposed Effluent Guidelines and Standards for the Construction and Development Category*, Appendix B: Inventorying of Streams Potentially Impacted By Construction Activities, EPA-821-R-02-009, June 2002, p. B-6)

Using data on acres developed, distribution of perennial and intermittent streams, and stream length by ecoregion, EPA estimated that roughly 10,000 perennial stream miles and 36,000 intermittent stream miles *annually* are potentially affected by construction site runoff across the nation, based on national data on average acres developed annually, distribution of perennial and intermittent streams, and stream length by ecoregion (U.S. EPA 2002). This gives a sobering picture of impacts of development to small streams.

As the nation's leading aquatic ecologists note in their comment letter to the docket:

> The loss of headwater streams has profoundly altered the structure and function of stream networks. Elimination of small tributaries from Clean Water Act jurisdiction would lead to further loss and degradation of these systems to the detriment of the physical, chemical and biotic integrity of ecosystems downstream.

2. Nature of Environmental Threats

The removal of protections from filling, ditching and draining, and discharging pollutants into supposedly "isolated" wetlands, ponds and streams would likely result in losses and degradation of many of these waters. The intrinsic values of many of these waters would be compromised, and their important ecosystem services to downstream waters would be reduced or eliminated.

a. Loss of Flood Storage, and Aggravated Flooding Conditions

Several prominent studies have linked increased flooding conditions or frequency with losses of wetlands and their flood storage capacity. Additional evidence is available from Minnesota, where the more stable flows of the Rainy River basin are attributed to the existence of more ponds and wetlands upstream. In their primer on Minnesota rivers, Renwick and Eden (1999) compare the stability of the Rainy River basin with the Red River basin, which is more flood-prone due to the channelization of streams and draining of upland areas and prairie marshes. The costs of flood damage in the Red River basin in 1997 totaled over $830 million. (www.shorelandmanagement.org/depth/rivers/10.html).

Removing protections from depressional wetlands that store floodwaters could result in higher flood peaks. Few studies are available which explore this relationship, however, a 1987 Soil Conservation Service report on the Indian Creek and the Butterfield Creek watersheds in the vicinity of Chicago, Illinois addresses the link directly (Bartels 1987). The existing flood storage capacity of the depressional wetlands in the two watersheds is estimated, and the effects of future development on future flood peaks are estimated, assuming different rates of stormwater detention, calculated with and without loss of the natural storage. Projected future flood peaks are substantially higher than existing levels when natural storage is removed.

b. Loss of Groundwater Recharge

The comments of the Director of USFWS to the Department of the Interior regarding the ANPRM note concern over the potential loss of wetlands and streams that are critical to

replenishing groundwater aquifers and sustaining baseflows in streams. The sedimentation that has already occurred from disturbances to some playa lakes has resulted in reduced recharge capacity (Haukos In preparation).

c. Groundwater Contamination

Discharges of waste from Confined Animal Feeding Lots has already resulted in contamination of water infiltrating to groundwater from playas. (Haukos In preparation)

d. Streambank Erosion and Sedimentation

As previously discussed, headwater streams and wetlands store and release flood flows, limiting erosion of streambanks and the resulting sedimentation. Removal of protection from these waters would promote increased ditching, channelization and filling-in of headwater streams and wetlands, leading to increased channel instability, degraded water quality and aquatic habitat.

e. Surface Water Quality Degradation

Filling or draining of depressional wetlands such as pocosins eliminates their runoff filtering role in the watershed, resulting in degraded water quality in freshwater and estuarine receiving waters (Richardson 2003). The impacts of gravel mining and nearby development have resulted in degraded water quality and altered hydrology of fens (Bedford 2003).

f. Loss of habitat

Reduced protection for small wetlands and headwater streams would seriously impact a wide range of species. Specialized species populations that rely on these waters for essential life stage needs would be especially vulnerable, and increased endangerment would be likely (USFWS comments to DOI 2003).

VI. NO OTHER CHANGES ARE NEEDED TO THE DEFINITION OF "WATERS OF THE U.S."

The ANPRM specifically invites commenters' views "as to whether any other revisions are needed to the existing regulations on which waters are jurisdictional under the CWA." 68 FR 1994. This open-ended invitation is troubling, as it indicates that the EPA and Corps may consider changes to the existing regulations even beyond those covered by the specific questions in the Federal Register notice.

Industry groups and those who represent them (or are funded by them) are already contending that the jurisdictional regulations should be changed to exclude all but traditionally navigable waters and wetlands directly adjacent to traditionally navigable waters from the protections afforded by the Clean Water Act. For example, in its comments submitted to the docket, the Pacific Legal Foundation claims: "Waters of the United States should be confined to those that

are navigable, could be made so through reasonable efforts, or those that are inseparably bound up with and immediately abut navigable waters." This is preposterous and completely at odds with the Clean Water Act.

Any effort to limit the jurisdictional reach of the Clean Water Act by amending the definition of "waters" should be rejected, including those suggested by the EPA and Corps in the questions about the (a)(3) factors and defining so-called "isolated" waters as well as any other revisions recommended by commenters in response to this open-ended question. No changes are needed to the existing definition of waters of the United States.

The existing regulations are consistent with the Clean Water Act and, indeed, are necessary if the goals of the Act are to be met. The Act's central goals are "to restore and maintain the chemical, physical, and biological integrity of our Nation's waters" and make all surface waters safe for fishing, swimming and other uses. Congress intended to achieve these goals by enacting a comprehensive regulatory program to control and eliminate the discharge of pollutants be controlled at the source.[38/] The current regulations on jurisdiction effectuate the scope and purposes of the Act.

Arguments that revisions to the definition of "waters" must be made to respond to the Court's decision in *SWANCC* are fully refuted above. In addition, the Department of Justice has now filed dozens of briefs in federal court about the validity of the existing jurisdictional regulations post-*SWANCC* on behalf of the EPA and the Corps of Engineers.

Rather than finding that the definition of waters of the U.S. needs to be changed by a new rulemaking, as the ANPRM suggests, the DOJ has consistently argued that the agencies' existing definition of waters of the United States remains sound and, indeed, is required to achieve the purposes of the Clean Water Act. The DOJ's arguments make the suggestions by EPA, the Corps, and other administration officials that *SWANCC* somehow requires or justifies changes in the existing jurisdictional regulations even more transparently false.

The Department of Justice has consistently argued that the *SWANCC* decision was limited to invalidating the policy of using migratory bird habitat as the sole basis for asserting Clean Water Act jurisdiction over so-called "isolated," non-navigable, intrastate waters.

> The only question addressed in *SWANCC* was whether the Corps could exercise regulatory jurisdiction over *hydrologically isolated*, nonnavigable, intrastate ponds under 33 C.F.R. 328.3 (a)(3), based solely on the use of those ponds as habitat for migratory birds….The Court did not … opine on the Corps' authority under subsection (a)(5) or any of the other subsections of the regulatory definition of 'waters of the United States.'[39/]

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38 *See* S. Rep. No. 92-414, at 77 (1971)*, reprinted in* 1972 U.S.C.C.A.N. 3668, 3742.

39 *Rice v. Harken,* Supplemental Amicus Curiae Brief of United States, U.S. Department of Justice, May 2001at 7-8. (emphasis in brief).

In the brief for the United States in *U.S. v. Newdunn* before the Fourth Circuit, the Justice Department argued that "federal regulations reasonably construe the [Clean Water Act] term "waters of the United States" to include wetlands adjacent to all tributaries, not just primary tributaries, to traditional navigable waters.[40/]

Seeking to overturn the district court's holding, the DOJ's *Newdunn* brief argues that a narrower construction of jurisdiction would be inconsistent with the Act itself. The DOJ points out that the lower court:

> . . . fails to explain why or how Congress could have intended to regulate discharges into all primary tributaries but not secondary tributaries, regardless of their significance to the traditional navigable waters into which they flow, directly or indirectly. In contrast, the agencies have made a persuasive and compelling determination that if the CWA is to achieve its goal, it is essential to include all tributaries of traditional navigable waters and their adjacent wetlands in the permitting system.[41/]
>
> The regulations have consistently construed the Act to encompass wetlands adjacent to tributaries to traditional navigable waters – be they primary, secondary, tertiary, etc. – since 1975, a construction that comports with Congress's intent to control pollution at its source and broadly protect the integrity of the aquatic environment.[42/]

According to the Department of Justice (DOJ), interpreting *SWANCC* as limiting Clean Water Act jurisdiction to wetlands adjacent only to traditional navigable waters and their primary tributaries would effect a "radical contraction of CWA jurisdiction."[43/]

The brief for the United States in *U.S. v. Rapanos* before the Court of Appeals for the Sixth Circuit emphasizes the limits of the *SWANCC* decision:

> *SWANCC* does not limit the coverage of the CWA to navigable-in-fact waters and wetlands adjacent thereto. To the contrary, the *SWANCC* Court specifically characterized as 'plausible' the argument made by the petitioners that "Congress simply wanted to include all waters adjacent to 'navigable waters,' such as non-navigable tributaries and stream," with the Act's scope. The Court also quoted with approval its prior holding that "Congress' concern for the protection of water quality and aquatic

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40 *United States v. Newdunn,* Opening Brief of United States, August 2002, at 28.

41 *Id.* at 48 (emphasis added).

42 *Id.* at 29(emphasis added).

43 *Id.* at 26.

> ecosystems indicated its intent to regulate wetlands 'inseparably bound up with 'waters' of the United States."[44]

The Department of Justice has described in detail in many briefs how limiting the jurisdiction of the Act to only navigable waters and waters directly adjacent thereto would disserve the purposes and goals of the Clean Water Act. For example, in *Rapanos* the brief for the United States says that:

> To exclude non-navigable tributaries and their adjacent wetlands from the coverage of the Act would disserve the recognized policies underlying the Act, since pollution of non-navigable tributaries and their adjacent wetlands can have deleterious effects on traditionally navigable waters.[45]

In *United States v. Interstate General Co,* the Department argues that the "logical result" of treating certain waters as unprotected by the Clean Water Act:

> . . . could be that oil, hazardous substances, or other pollutants could be discharged without a CWA permit into any stream, creek or river, so long as it was not traditionally navigable, and those pollutants could reach and foul traditional navigable waters without the United States being able to take action under the CWA to prevent it. Likewise, entities currently discharging into traditional navigable waters under NPDES permits could change their outfall points to non-navigable creeks in an effort to avoid treatment requirements under the CWA. Had the Supreme Court in *SWANCC* intended to work such a change in the Clean Water Act, it would doubtless have stated that purpose explicitly."[46]

These briefs provide additional strong evidence that no changes to the Clean Water Act regulations are required and that such changes would radically rewrite the longstanding interpretation of the law, contradict the purposes of the Act, and threaten communities and wildlife that depend on clean water for survival.

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44 *United States v. Rapanos,* Opening Brief of United States, July 2002 at 23 (internal citations omitted).

45 *Id.* (emphasis added.)

46 *United States v. Interstate General Co*., Brief of United States, U.S. Department of Justice, October 2001 at 43.

VII. STATE AND OTHER FEDERAL REGULATORY PROGRAMS ARE INSUFFICIENT TO "BACKSTOP" FEDERAL CLEAN WATER ACT PROTECTIONS FOR OUR NATION'S WATERS.

A. INTRODUCTION AND BACKGROUND

The ANPRM solicits "information and data…on the availability and effectiveness of other Federal and State programs for the protection of aquatic resources and practical experience with their implementation." As noted in the register notice, various other federal and state regulatory, acquisition, and restoration programs offer some level of protection to some types of waters. However, these programs are clearly inadequate to "backstop" protections provided waters under the CWA. Furthermore, it is highly unlikely that sufficient new efforts, or expansions of existing efforts, could ever fill the gaps left by withdrawal of federal CWA protection over some categories of waters.

The majority of Federal and State efforts to protect or restore waters have been developed over the past 30 years to complement, not replace, the Clean Water Act. As a result, even with the array of federal, state and private efforts available, large gaps in protection from pollution and physical modification exist for many types of waters. Indeed, despite 30 years of broad Clean Water Act jurisdiction and the supplemental protection provided by other federal, state, local and private efforts, 40 percent of the nation's waters are still too polluted to support fishing or swimming. Despite numerous programs dedicated to restoring wetlands, the National Wetlands Inventory still reported net losses of nearly 58,000 acres per year between 1987 and 1997, estimates widely considered to be overly optimistic. Additionally, the Status and Trends report noted a decline in wetland functioning. Similarly, "the available scientific evidence clearly demonstrates that the length of headwater streams in the landscape has been significantly reduced…." (Meyer, Wallace, et. al. 2001).

B. STATE LEVEL BACKSTOPS ARE INSUFFICIENT

The very premise that states have the capability and desire to independently protect wetlands and headwaters is a flawed one. The reality is that states serious about protecting these waters almost invariably prefer to do so in partnership with the Corps and EPA enforcing the CWA. Withdrawal of CWA jurisdiction will mean, in reality, elimination of all regulation of so-called "isolated" wetlands and headwaters.

1. The CWA's Federal-State Partnership Framework Offers States Ample Opportunity to Independently Protect Wetlands and Headwaters, Yet Only Two States Have Chosen to "Go It Alone."

The CWA is structured and administered as a partnership between the EPA and the States. Because water pollution and aquatic habitat impacts do not recognize state boundaries, the CWA and EPA establish minimum standards -- a federal floor -- that ensure a base level of protection from the harmful effects that the pollution and wetland destruction in one state may have on the

water quality, flood control, and wildlife in another state. Efforts to clean up the Chesapeake Bay offer but one graphic example. Four states and the District of Columbia share the Bay watershed and all of them must work to control wetland losses and restrict chemical pollution if water quality degradation in the Bay is to be reversed. Uniform federal standards and active federal involvement are prerequisites to any chances of clean up success.

Uniform federal standards also protect the interests of federal taxpayers in each state from the fiscal impacts of poor water resource decisions in other states because "their federal taxes help pay the bill when federal assistance is required through increased public healthcare costs, flood protection, emergency relief and environmental cleanups when wetlands are not allowed to do their job." *SWANCC*, supra, Amicus Curiae Brief of the States of California, Iowa, Maine, New Jersey, Oklahoma, Oregon, Vermont, and Washington, at 21 ("States' *SWANCC* Brief"). The CWA's federal floor also "levels the playing field" and prevents the proverbial "race to the bottom" so that states that do act to protect their waters from pollution and destruction are not placed at a competitive disadvantage by those states who choose not to do so. The CWA and its federal enforcement thus provide both a prod and a safety net to undergird the efforts of states that want to be good stewards of the environment. Testimony of Patrick Parenteau, Professor of Law, Vermont Law School (House of Representatives Committee on Government Reform, September 19, 2002, "Hearing Regarding Implications of the Supreme Court's *SWANCC* Decision").

While the CWA and federal oversight and enforcement provide the federal floor, the CWA partnership framework acknowledges that the specific means and priorities and pollution threats are likely to differ state by state and drainage basin by drainage basin, and that state governments are best positioned to identify and implement water pollution controls at the state level that will achieve the CWA goals and standards. So, for example, the CWA requires states to adopt state water quality standards consistent with federal CWA water quality criteria and guidance. State water quality standards can be tailored to provide additional protection to outstanding resource waters and to water resources of particular concern, including wetlands.

Among all the other reasons why reinterpreting “waters of the U.S.” as applying only to navigable-in-fact waters and adjacent wetlands (as industry proponents suggest) is illegal and environmentally irresponsible, it would directly conflict with the requirements of the CWA. Several of the Act’s provision give rights to downstream states to protect their waters from upstream discharges that violate state water quality standards. For example, § 402(b) gives the downstream state notice, the opportunity for comment, and the opportunity for a hearing on the upstream state’s permit application. 33 U.S.C. § 1342(b). Such rights would, or course, become meaningless if the upstream state were no longer required to obtain a permit. *See generally*, *Arkansas v. Oklahoma*, 503 U.S. 91, 105 (1992) (EPA has the statutory authority to require an upstream discharger to meet the water quality standards of the downstream state.).
See also 40 C.F.R. § 122.4(d) (prohibiting permit issuance when imposition of conditions cannot ensure compliance with applicable water quality requirements of all affected States).

In addition, § 401(a)(2) prohibits the issuance of any federal license or permit over the objection of an affected State unless compliance with the affected State’s water quality requirements can

be ensured. 33 U.S.C. § 1341(a)(2); *Arkansas v. Oklahoma*, 503 U.S. at 103. This right would also be lost with respect not only to NPDES permits, but also every other federal license or permit authorizing a discharge into waters whose protection had been abandoned.

One of the most important aquatic resource protection tools the CWA provides the States is the States' water quality standards certification authority under § 401, 33 U.S.C. § 1341. This authority allows states to condition or, if necessary, bar federal permits, including CWA § 404 dredge and fill permits, to ensure that federally permitted activities comply with the State's water quality standards. Since 1972, most states have relied exclusively on their CWA § 401 certification authority to protect their wetlands, lakes, streams, and other surface waters from activities that involve discharges of dredged or fill material into those waters. A rollback of CWA jurisdiction from so-called "isolated" wetlands and headwaters will mean that federal CWA permits will no longer be issued in these waters and most states will thus be stripped of their only avenue for restricting discharges of dredged and fill material in these waters.

The CWA partnership framework also offers states the opportunity to assume control of federal CWA § 402 (National Pollution Elimination Discharge System (NPDES)) and § 404 permitting programs. To assume these permitting programs and effectively step into the permitting shoes of the EPA (and the Corps for § 404), states must enact state statutes and rules, and provide the necessary program resources, to establish standards and programs as stringent as the federal CWA standards and programs. EPA provides continuing financial and technical resources to states that assume these programs, as well as providing continuing oversight to ensure compliance with CWA standards.

Forty-five of the 50 states have now assumed most or all of the NPDES program from EPA, and are now applying their own state laws and regulations to restrict pollution discharges from point sources into state waters. It is telling, though, that only two of the 50 states, Michigan and New Jersey, have elected to assume the CWA § 404 permitting program.

Numerous states, including Florida, Maryland, Pennsylvania, Minnesota, and Wisconsin, have considered and rejected state assumption of § 404. Many states concluded that the financial and technical resources, and the political capital, required to effectively administer their own comprehensive dredge and fill permitting program without the under-girding of the federal CWA program were simply prohibitive. Instead of assuming the CWA § 404 program, these states have elected to protect their waters from dredge and fill discharge activities through state-federal partnerships through which they share with EPA and the Corps the considerable permitting and enforcement responsibilities, resources, and expertise required to effectively protect wetlands and other non-navigable waters from dredge and fill activity.

As state and federal permitting programs have evolved over the last twenty years, in particular, many states have developed efficient and effective means of combining tools such as CWA § 401 certification, CWA § 404 state programmatic general permits (SPGPs), and Corps-state joint permit applications and review procedures that streamline federal and state permitting while efficiently leveraging Corps and EPA financial and technical resources made available through the CWA permitting program. See, States' *SWANCC* Brief at 25-26. A CWA rollback from so-

called "isolated" wetlands and headwaters will remove the federal CWA under-girding for these state efforts and, in most cases, remove protection from these waters from dredge and fill activities completely. As the States remarked in their *SWANCC* Brief, "If they are to be 'laboratories for experimentation,' the States' freedom to innovate should include the opportunity to coordinate the management of their natural resources with the federal government." Id. at 26-27.

2. Thirty-Two States Have No Independent State Permitting Program to Protect So-Called "Isolated" Wetlands from Drainage, Dredging, and Filling Activities.

At most, 18 states now have programs regulating wetland alterations in at least some "isolated" wetlands and other waters. Thirty-two states -- about two thirds of the United States -- currently lack regulatory programs to fill the gap that would be left by a CWA rollback from so-called "isolated" wetlands. A CWA rollback from so-called "isolated" waters will leave these waters completely vulnerable to uncontrolled dredging, drainage, and filling in these 32 states. Little or no state protection is provided in the states with some of the largest seasonal wetland acreages, including Alaska, Louisiana, Texas, North Dakota, South Dakota, South Carolina, Georgia, Kansas, and Mississippi. See, Kusler, Jon, The *SWANCC* Decision and State Regulation of Wetlands (2001) (http://aswm.org/fwp/*SWANCC*/aswm-int.pdf) at 9. Information about the existing programs in 13 of the 32 states that lack "isolated" wetlands protection is provided below. These selected state-by-state summaries demonstrate the inability of the vast majority of states to fill the regulatory gap left by a rollback of CWA jurisdiction.

a. Mid-Atlantic Region

Delaware

While Delaware has an independent state tidal wetlands permitting program, its jurisdiction extends only to tidal wetlands and very large (400 or more acres) freshwater wetland systems. To the extent Delaware is regulating freshwater wetland drainage, dredging, and filling it is doing so through its CWA § 401 certification authority. Withdrawal of federal CWA jurisdiction will likely leave many Delaware freshwater wetlands and headwater tributaries unprotected. The removal of federal CWA authority over so-called "isolated" wetlands and other waters, and "upstream" tributaries such as ditches, ephemeral streams and intermittent streams, will remove state 401 certification authority over CWA § 404 dredge and fill activities in these waters.

Delaware's Department of Natural Resources and Environmental Control (DNREC) appears to have some legal authority under state law to enforce its water quality standards in broadly defined waters of the State, including wetlands, and to require permits for discharges in state waters and on submerged lands. However, these authorities are not actively applied through a state permitting program, and establishing such a program would require additional rulemaking and scarce resources. Wetland-specific water quality standards would likely be one important rulemaking addition necessary to effectively fill the regulatory gap left by federal withdrawal of CWA § 404 permit authority. Like most states, Delaware is struggling with a significant budget

shortfall, making regulatory program expansion highly unlikely. Governing Magazine (May 2002).

Even if these administrative and financial obstacles could be overcome to launch such a regulatory initiative, serious regulatory gaps would likely remain due to existing state exemptions from regulation for channelized streams and drainage ditches. The majority of Delaware's 2,600 miles of natural and ditched streams would likely be exempt from regulation if CWA jurisdiction is withdrawn from these waters. At risk wetlands in South New Castle County may enjoy some protection by county ordinance, but no other counties have such protections in place, nor does it appear that they will in the foreseeable future. Absent either a state or federal regulatory floor, even the South New Castle County ordinance would seem to be politically vulnerable.

In response to *SWANCC*, a bill was introduced in the legislature's 2002 session (HB 340 and HS 1 amendment) to protect up to 30,000 acres of identified and mapped "isolated" freshwater wetlands eliminated from CWA jurisdiction after *SWANCC*. This bill was opposed by "pro-growth" groups including the Delaware Homebuilders and failed to pass.

An estimated 33% of Delaware's freshwater wetlands may be in jeopardy due to withdrawal of CWA jurisdiction. The percentage of wetlands at risk could be even higher if drainage ditch connections fail to qualify wetlands as tributary or adjacent to regulated waters.

b. Southeast Region

Alabama

Alabama has no independent state permitting program that regulates discharges of dredged or fill material into freshwater wetlands or headwaters. Alabama's only wetland protection program is for wetlands located in designated coastal areas. Alabama does regulate certain more geographically-isolated wetlands within these designated coastal areas (Mobile or Baldwin County) under the Alabama Coastal Area Management Program (ACAMP). In Alabama, "isolated" wetlands in coastal areas include "grady" ponds and "depressional" wetlands (typically found in relic beach and dune systems). Furthermore, Alabama does not appear to actively use its CWA § 401 certification tool to restrict dredge and fill activities in the state's freshwater wetlands.

Alabama probably could enforce its water quality standards in many of the state's freshwater wetlands and streams under state law. However, Alabama's "waters of the state" excludes waters that are "entirely confined and retained completely" on a single owner's property "unless such waters are used in interstate commerce." This exclusion would likely leave some more "isolated" waters unprotected under state law, particularly if groundwater connections and uses in interstate commerce are not recognized.

In addition, Alabama's water quality standards and NPDES program rules seems to both preclude their application to "dredged or fill material which is subject to regulation under

FWPCA [Federal Water Pollution Control Act]." Alabama's water quality standards also lack designated uses or narrative standards specific to wetlands or to dredge and fill discharges into waters of the State.

Consequently, any initiative to create a state freshwater wetlands permitting program would require, at a minimum, wetland water quality standards, additional rulemaking, and additional resources. Alabama is also struggling with a significant budget shortfall, making regulatory program expansion highly unlikely. Governing Magazine (May 2002).

Georgia

Georgia has no independent state permitting program that regulates discharges of dredged or fill material into freshwater wetlands or headwaters. Georgia's only wetland protection program is for tidal wetlands. Furthermore, Georgia does not appear to actively use its CWA § 401 certification tool to restrict dredge and fill activities in state freshwater wetlands.
Like Alabama, Georgia's water quality standards probably could be enforced to protect many of the state's freshwater wetlands and streams, including so-called "isolated" wetlands and ponds, except where those waters are entirely confined to a single owner's private property. This exception would likely leave some more "isolated" waters unprotected under state law, particularly if groundwater connections are not recognized. In addition, Georgia's water quality standards do not include designated uses or narrative standards specific to wetlands or to dredge and fill discharges into waters of the State.

Any initiative to create a state freshwater wetlands permitting program would require, at a minimum, wetland water quality standards, additional rulemaking, and additional resources. Georgia is struggling with at least a $500 million budget shortfall, making regulatory program expansion highly unlikely. Governing Magazine (May 2002).

c. Eastern Central and Great Lakes Region

Illinois

Illinois has no independent state permitting program to regulate dredge and fill activities in its wetlands and headwaters. To the extent Illinois is regulating freshwater wetland drainage, dredging, and filling it is doing so through its CWA § 401 certification authority. Withdrawal of federal CWA jurisdiction will likely leave many Illinois wetlands and headwaters unprotected. The removal of federal CWA authority over so-called "isolated" wetlands and other waters, and "upstream" tributaries such as ditches, ephemeral streams and intermittent streams, will remove state 401 certification authority over CWA § 404 dredge and fill activities in these waters.

Illinois' Pollution Control Board (Board) and Environmental Protection Agency (EPA) appear to have legal authority to enforce state water quality standards -- including antidegradation standards -- in broadly defined waters of the State, including wetlands. However, these authorities are not actively applied through a state permitting program, and establishing such a program would require additional rulemaking and scarce resources. Wetland-specific water

quality standards would likely be one important rulemaking addition necessary to effectively fill a regulatory gap left by federal withdrawal of CWA § 404 permit authority. Thus far, neither the Board nor the EPA have taken steps to establish any such permitting program. Illinois is struggling with at least a $250 million budget shortfall, making regulatory program expansion highly unlikely. Governing Magazine (May 2002).

In response to *SWANCC*, Illinois conservation groups tried to pass legislation in 2002 to put a state permitting program in place that would cover all activities affecting wetlands for which no federal or other state permit had been obtained. The bill failed after intense lobbying efforts from homebuilders, realtors, farm bureaus, chamber of commerce and others shut it down. Filling the regulatory gaps left by *SWANCC* -- and any additional post-*SWANCC* CWA rollback -- is now a matter of debate at legislative study meetings in Illinois. In the absence of state action, three Illinois counties have adopted wetland protection ordinances, and a fourth county may do so soon.

In 2001, the Illinois Department of Natural Resources estimated that about 150,000 acres of Illinois wetlands have lost CWA protection as a result of *SWANCC*. Corps figures from 2002 showed that the Corps was issuing on average at least one "no jurisdiction" call per working day in the Chicago area since the *SWANCC* decision in early 2001.

Indiana

Indiana has historically relied heavily on its CWA § 401 certification authority to protect state wetlands, including so-called “isolated” wetlands, from draining, dredging, and filling. Absent CWA jurisdiction covering "isolated" waters and headwaters, Indiana will lose the § 401 regulatory tool with respect to these at risk waters, and many of them will lose both state and federal protection.

On paper, the Indiana Water Pollution Control Board (Board) has statutory authority to adopt rules and require permits to enforce its water quality standards and otherwise control and prevent pollution in "*any of the streams or waters of Indiana,*" including *all* accumulations of water, surface and underground, natural and artificial, public and private, with the exception of certain "private ponds." The Board and the Indiana Department of Environmental Management (IDEM) have been in the process of promulgating new wetland water quality standards toward this end. After *SWANCC*, the Board and IDEM proposed to extend this permitting authority to the "isolated" waters the Corps was no longer regulating, relying on existing state permitting authority.

Importantly, though, these attempts to fill the post-*SWANCC* regulatory gap were immediately challenged both in court and in the legislature. The legal challenge is still pending in the Indiana Supreme Court. Indiana Department of Environmental Management v. Twin Eagle, Civ. No. 49S00-0204-CV-00237 (Notice of Appeal filed February 15, 2002). Now, in the 2003 legislative session, the Indiana Homebuilders and other regulated community interests are pressing for legislation that, like Ohio's, will likely exempt most “isolated” wetlands. In addition, Indiana has a huge budget deficit and is highly unlikely to support regulatory program

expansion in the current fiscal environment. Governing Magazine (May 2002). For both political and budgetary reasons, it will be very difficult for Indiana to fill the regulatory gap left by a CWA rollback.

IDEM has conducted a relatively detailed GIS study of its wetlands and determined that more than 30% could be considered "isolated" and in jeopardy due to withdrawal of CWA jurisdiction. The percentage of wetlands at risk could be even higher if drainage ditch connections and intermittent streams fail to qualify wetlands as tributary or adjacent to regulated waters.

d. Southwest Region

Arizona

Arizona's only wetland/dredge and fill permitting program is its CWA § 401 water quality certification program. The contemplated rollback of CWA jurisdiction over so-called “isolated” wetlands and other waters, and headwater tributaries such as ditches, ephemeral streams and intermittent streams, will also remove the state § 401 certification authority over these waters. As there is no analogous protection under state law, these waters will be unprotected from dredge and fill activity at both the federal and state levels.

The Arizona Department of Environmental Quality (ADEQ) has the legal authority to adopt state water quality standards and enforce them through the Arizona Pollution Discharge Elimination System (AZPDES) permitting and § 401 certification programs. These water quality standards include antidegradation standards and a requirement to protect designated uses in "surface waters," including wetlands and intermittent and ephemeral streams. However, both the water quality standards and the AZPDES permitting rules apply only to "surface waters" or "navigable waters," defined in state law as coextensive with "waters of the United States." Consequently, it is likely that a withdrawal of federal CWA jurisdiction over certain wetlands and headwater tributaries will be followed by a similar withdrawal of state jurisdiction.

The AZPDES program was authorized and established under state law in 2002 in order to allow state assumption of the federal CWA NPDES/§ 402 program, and the authorizing statute expressly precludes "any requirement that is more stringent than" those mandated by the CWA. See Section 6. Consequently, any rollback in CWA jurisdiction will lead automatically to a commensurate reduction in state-level regulatory protections.

Even if Arizona could overcome these statutory and rulemaking limitations, Arizona is struggling with a budget deficit of over $1 billion and is, for this reason alone, clearly incapable of taking on additional regulatory responsibilities at this time. Governing Magazine (May 2002).

Texas

Texas’ only wetland regulatory program is its CWA § 401 water quality certification program. Any rollback of CWA jurisdiction over so-called “isolated” wetlands and other waters will also

remove the state § 401 certification authority over activities in these waters. These waters will thus be unprotected at both the federal and state levels.

The Texas Commission on Environmental Quality (TCEQ) appears to have legal authority to enforce water quality standards in broadly defined waters of the state, expressly including wetlands. The water quality standards expressly require the protection of existing uses of all state waters and, in particular, wetland water quality functions. However, Texas has no existing permitting program to enforce its water quality standards. The Texas Pollution Discharge Elimination System (TPDES) program may be weakened in at risk waters in the absence of federal CWA oversight and assistance.

In addition, the TCEQ permitting programs do not apply to oil and gas industry discharges. Oil and gas industry discharges are regulated by the Texas Railroad Commission and its pollution permitting program may also be weakened in at risk waters in the absence of federal CWA oversight and assistance.

e. Pacific West Region

Washington

Washington State has historically relied primarily on its CWA § 401 certification program to protect most of its freshwater wetlands, including "isolated" wetlands and headwaters, from drainage, dredging, and filling. A CWA rollback of authority over so-called “isolated” wetlands and ephemeral and intermittent streams would remove Washington's 401 certification authority and would leave these waters largely unregulated at both the federal and state level. However, both the Washington Department of Ecology and the Department of Fish and Wildlife have some independent state authority to protect these at risk waters, and these agencies could fill the regulatory gap if they could successfully build an effective permitting and enforcement program based on their existing regulatory authority. Unfortunately, there are considerable programmatic, budgetary, and political obstacles to their doing so.

The Department of Ecology has signaled that it may attempt to use its authority to protect so-called “isolated” wetlands, but there are several obstacles to its success. First, Washington’s water quality standards are generally viewed as weak, and while they apply to wetlands, they do not include specific wetland standards. The primary means for the protection of wetlands is through the antidegradation requirements, but the antidegradation provisions simply prohibit further degradation that would interfere with beneficial uses, without any specific reference to beneficial uses for wetlands. A generic statement notes that “in addition to designated uses [of which there appear to be none], wetlands may have existing beneficial uses that are to be protected that include ground water exchange, shoreline stabilization, and storm water attenuation.” This lack of clearly designated beneficial uses for wetlands makes enforcement of water quality standards in wetlands more difficult.

Second, in the absence of CWA § 401 authority, the Department of Ecology lacks a clear permitting vehicle and instead issues “orders” that notify the applicant that the proposed wetland

fill will violate state law by violating state water quality standards, and that they can resolve the potential violation by providing specified mitigation. This approach seems to at best mitigate for wetland loss, not prevent it. Moreover, the Department of Ecology has virtually no resources devoted to enforcement. Thus, if a developer fails to notify the Department of its intent to fill an "isolated" wetland, it is highly unlikely that they will take any action on it. Absent CWA jurisdiction, the Ecology Department is not likely to be informed of many wetland fills, and so even the requirements for mitigation are not likely to be enforced. There is simply no mechanism by which the Department can look for or follow up on potential violations. The Department of Ecology also seems to have sufficient legal authority to extend its state regulatory program into ephemeral and intermittent streams, but it is unlikely to do because of lack of resources.

The Department of Fish and Wildlife can also protect so-called “isolated” wetlands and waters and ephemeral and intermittent streams using its permitting authority for any work that will “use, divert, obstruct, or change” the natural flow or bed of any waters in the state, presumably including these at risk waters. However, the WDFW has not historically used its permit authority aggressively, and when it was recently convinced to do so, the state legislature immediately took up consideration of bills to limit its authority under the code.

In addition, Washington has a $2 billion budget shortfall. The Department of Ecology is already strained by budget cuts and coming budget cuts will strain it further. Washington simply will not have the resources to expand its wetlands and headwater regulatory programs. In sum, political and funding constraints make it highly unlikely that Washington State will be able to fill the regulatory gap left by a CWA rollback.

In Washington State, 60%-80% of the wetland acreage in the Spokane area would be defined as “isolated” and redefined out of existence under this proposed rule; 30%-60% of all eastern Washington wetlands and 10%-20% of all western Washington wetlands would be “isolated” and unprotected. In Washington, approximately 80% of all duck production occurs in seasonal and “isolated” wetlands like those in the Columbia basin.

California

California has no independent wetland permitting or dredge and fill permitting program. California does not even have a standard definition or inventory of state wetlands. California also lacks state wetland water quality standards that designate wetland beneficial uses to protect wetland functions. California relies on the federal CWA § 401 water quality certification authority as its primary wetlands protection tool. Without § 401 authority, California will be unable to protect its wetlands and headwaters from draining, dredging, and filling. See, State Water Resources Control Board, Comment on Advanced Notice of Proposed Rulemaking on Definition of "Waters of the United States" (March 13, 2003; Docket ID No. OW-2002-0050) at 9 ("California ANPR Comment Letter").

In fact, California actually does have statutory authority to require permits for activities in wetlands, but state agencies have never developed a permitting program to enforce this law.

California recognizes that many of its unique and biologically diverse "isolated" wetland areas are now at risk, and that it needs to take action to protect these vital resources. Nevertheless, California recognizes that expanding its existing programs in the foreseeable future is unlikely because of the state's budget crisis. California is struggling with a budget deficit exceeding $1 billion. Governing Magazine (May 2002). Even with funding, California states that "preparing environmental documentation for and adopting regulations and policy to establish a State wetland program would take several years because of the controversial nature of this issue." California ANPR Comment Letter at 9-10.

In the 2002 legislative session, an attempt was made to amend the California Environmental Quality Act (CEQA) to explicitly require review of activities proposed in "isolated" wetlands. This attempt failed and the legislature is currently forming a committee to study a potential *SWANCC* fix for California waters.

Alaska

Generally speaking, Alaska has neither a functioning dredge and fill permitting program nor an NPDES permitting program. Alaska has not assumed the federal NPDES program. The state defines waters broadly to include the "at risk" waters that may be exempted by the Corps and EPA, but has no point source permitting program to protect these waters. Certain types of activities, such as the discharge of domestic and non-domestic wastewater and dewatering of excavations, are subject to some state permitting requirements. Those requirements do not generally intersect with CWA requirements. Fills in fish-bearing streams are regulated, as are fills within the Alaska coastal management zone (under the Alaska Coastal Management Program). However, the criteria for fills in both programs are less stringent than those found in the CWA § 404 program, and it is unlikely either will encompass many, if any, "at risk" waters. In addition, the current Alaska administration and legislature are actively hostile to wetlands protection. The legislature has consistently narrowed the range of plaintiffs able to challenge Alaska Coastal Management Program decisions. Protection for "at risk" waters in Alaska would be dramatically weakened by withdrawal of CWA jurisdiction.

f. Mountain States

Wyoming

Wyoming does not currently have an independent state permitting program that will protect "at risk" wetlands and waters from dredge and fill discharges. Instead, it has relied on its CWA § 401 certification authority to do so. Absent CWA jurisdiction over so-called "isolated" wetlands, headwaters and their adjacent wetlands, and intermittent and ephemeral streams, these waters will likely be left unregulated at both the state and federal level.

Wyoming has sufficient legal authority under state law to enforce its water quality standards -- including antidegradation standards -- in broadly defined waters of the state. Wyoming's broad definition of state waters expressly encompasses "at risk" waters such as "isolated" wetlands, headwaters, and intermittent and ephemeral streams. The water quality standards also expressly

require compensatory mitigation for the fill of natural wetlands. Fills of all wetlands must be done in accordance with Wyoming's best management practices for non-point sources. However, Wyoming does not presently have a permitting process independent of CWA § 401 certification for enforcing these wetland water quality standards. Even if it did, Wyoming's wetland water quality standards fail to require the more protective impact avoidance and minimization standards employed by the § 404(b)(1) guidelines. At best, the Wyoming standards require only compensatory mitigation. In addition, unlike federal law, the Wyoming standards distinguish between "natural" and "man-made" wetlands and do not require mitigation for the latter.

The Wyoming Department of Environmental Quality states that it is drafting a general NPDES permit or permits to regulate fill discharges in most "at risk" waters currently regulated by the Corps. These general permits, if adopted, would likely apply to all "at risk" natural wetlands and "at risk" man-made wetlands which provide compensation for other wetland fills. The prospective general permit(s) should provide a mechanism for requiring compensatory mitigation as required by state law.

Establishing such a general permit program will require additional rulemaking and scarce resources that may not be available in the current fiscal environment. Moreover, even if a general permit is adopted, it is unlikely to provide even adequate compensatory mitigation for affected wetlands and other waters because a general permit scheme does not require site-specific environmental review.

Idaho

Idaho does not have an independent state permitting program regulating discharges of dredged and fill material. Moreover, its water pollution control laws expressly forbid extending protection to Idaho waters beyond that provided by the federal Clean Water Act. If "at risk" waters are not regulated under the CWA, they will not be regulated by the state of Idaho.

Utah

Utah has no state wetland/dredge and fill permitting program and does not use its CWA § 401 water quality certification program to protect wetlands or streams from dredging and filling. The removal of federal CWA § 404 authority over so-called "isolated" wetlands and other waters, and headwater tributaries such as ditches, ephemeral streams and intermittent streams, will leave these waters unprotected from dredge and fill activity at both the federal and state levels.

The Utah Department of Environmental Quality (UDEQ) and the Utah Water Quality Board have the legal authority to enforce water quality standards -- including antidegradation standards and protection of designated uses -- in waters of the state, including wetlands. Utah could use its Utah Pollution Discharge Elimination System (UPDES) permitting program to enforce its water quality standards in wetlands. However, Utah has indicated no intention to do so. In addition, Utah's water programs are already considered under-funded and Utah is currently struggling with

a budget deficit. Program expansion to fill regulatory gaps left by a CWA rollback seem highly unlikely at this time.

In addition, Utah's definition of waters of the State excludes "bodies of water confined to and retained within the limits of private property." This exclusion seems to preclude state regulation of discharges of dredged and fill material into many smaller and seasonal wetlands and waters located on private property. The UPDES program regulating pollutant discharges still applies to these confined waters as long as they are "waters of the United States" under the CWA. However, the UPDES program may not apply to these waters if CWA jurisdiction is rolled back.

3. Only A Few of These 32 States Have Any Independent State Coverage for Adjacent Wetlands and Headwaters

Only a few of the 32 states lacking "isolated" wetlands permitting programs have any independent state authority to regulate dredge and fill activity in tributaries and adjacent wetlands. Such authority is found in various state zoning, land use, drainage, and water pollution control laws, and is generally not comprehensive in scope. California, Delaware, Hawaii, Indiana, Nebraska, North Dakota, South Carolina, and Washington may have some limited regulatory authority to protect some tributaries and their adjacent wetlands. See, Kusler, Jon, The *SWANCC* Decision and State Regulation of Wetlands (2001) (http://aswm.org/fwp/*SWANCC*/aswm-int.pdf) at 9; Delaware, Indiana and Washington summaries, supra.

A CWA rollback will leave many adjacent wetlands and headwater tributaries, as well as "isolated" wetlands, vulnerable to drainage, dredging, channelization, and filling, even in these states with limited permitting authority. The EPA estimate of headwater stream miles, supra at IV-C-1, demonstrates that, on average, 54% of the Nation's stream miles are 1st order streams, and 80% are 1st and 2nd order streams. All of these streams and their adjacent wetlands are placed at risk by the ANPRM proposal to roll back CWA jurisdiction.

4. Even States that Have Independent Dredge and Fill Permitting Programs that Cover "Isolated" Wetlands and Headwaters Are Not Capable of Protecting All Wetlands and Waters Removed from CWA Jurisdiction.

Most of the 18 states with independent permitting programs that ostensibly include "isolated" waters and headwaters within their scope of regulation still lack the authority and/or the capability to fully protect many of the wetlands and waters they would be put at risk by a CWA jurisdictional rollback. These states are: Maine, New Hampshire, Vermont, Massachusetts, Connecticut, Rhode Island, New York, New Jersey, Pennsylvania, Maryland, Virginia, Florida, Michigan, Minnesota, Oregon, Wisconsin, North Carolina, and Ohio.

Many of these state permitting programs are limited in scope because of statutory and regulatory exemptions that exclude certain waters and/or certain activities in those waters from regulation. For example, New York generally only protects wetlands larger than 12.4 acres in size, leaving many smaller, seasonal wetlands at risk. Michigan dredge and fill laws generally exempt lakes

and ponds with a surface area less than 5 acres, exempt virtually all noncontiguous wetlands located in counties with populations less than 100,000, and exempt virtually all noncontiguous wetlands that are 5 acres in size or less. Minnesota exempts certain agricultural dredge and fill activities and fills to certain seasonal and shallow water wetlands, depending upon the federal program to regulate these discharges.

A second critical limitation is the vulnerability of both existing and emerging state permitting programs to political and legal attack by development interests, including road builders, home builders, agriculture, and mining interests, in the absence of a CWA federal floor. Ohio's new wetlands law was rendered largely ineffective during the legislative process that led to its enactment. North Carolina's wetlands program has been under attack in the courts ever since it was promulgated. Remarkably, a bill has been introduced in the current legislative session to eliminate the positions of the two most experienced regulators in the North Carolina permitting program. Virginia's new wetlands law was immediately challenged in court.

A related limitation is "no more stringent than" provisions in state law or policies that preclude the state from promulgating regulatory controls that are more stringent than those required by the CWA. Even though these provisions generally should not preclude regulation in waters of the state that are no longer considered "waters of the United States," these provisions will be used as a political tool for a state rollback of regulatory authority that mirrors the CWA rollback. See subsection 7, below. In Michigan, one of two states that have assumed the federal CWA § 404 program, a CWA jurisdictional rollback based on *SWANCC* has already limited the federal leverage that existed pre-*SWANCC* to convince Michigan to close its "isolated" waters loophole in order to make its assumed program fully consistent with the CWA.

Perhaps the most significant limitation on the effectiveness of all these programs, particularly in the current economic environment, is a lack of financial and technical resources to mount effective permit review, monitoring, and enforcement. In Minnesota, for example, severe budget cuts to eliminate a very sizable state budget deficit have resulted in extreme cuts in state wetlands regulatory program resources. The withdrawal of Corps and EPA funding and staffing from these states will only exacerbate the resource scarcity in these programs. Ohio's new wetlands program was inadequately funded from the outset due to budget constraints and will almost surely lose additional resources because the program is funded from general funds and the state is facing a huge budget deficit.

The selected state-by-state summaries presented below demonstrate that many of the 18 states with independent wetlands regulatory programs are unlikely to be able to fully fill the regulatory gap left by a CWA rollback.

a. Northeast Region

New York

While many of New York's wetlands and streams will not be left completely unprotected, many of the state's smaller wetlands, the wetlands most likely to be left out of federal protection, are at

high risk of being developed. The state of New York generally protects only wetlands that are larger than 12.4 acres and some smaller wetlands of unusual local importance. Wetlands greater than one acre in size are protected within the Adirondack State Park. Agricultural drainage is generally exempt from New York's wetland protection law. Many New York State wetlands previously regulated under the CWA will be left vulnerable to development and pollution if CWA jurisdiction is rolled back. A CWA rollback will also remove the federal "floor" that supports New York's wetlands protection program and expose that program to political attempts to weaken state protections.

New York law requires a permit for dredge, fill, and other bed and bank disturbances in its "protected streams," i.e., those with higher use classifications. However, New York law appears to leave some streams without protection from dredge, fill, and other bed and bank disturbances. Moreover, state dredge and fill protections for certain streams are not aggressively enforced. Absent the CWA § 404 permitting requirement, which alerts project proponents to the need for a state permit, many of these dredge and fill activities would likely go unregulated.

Though New York has programs in place to protect certain wetlands and streams, the state budget is limited already and New York is grappling with a budget deficit of at least $1 billion. Governing Magazine (May 2002). Taking on additional regulatory responsibilities to protect those wetlands and headwaters left vulnerable by a CWA rollback is not likely. In fact, the state of New York will lose 50 of its 350 regulatory staff in the next year due to budget cuts.

Pennsylvania

Pennsylvania's Clean Streams Law and Dam Safety and Encroachments Act, and accompanying regulations, provide broad authority to the Pennsylvania Department of Environmental Protection (DEP) to regulate discharges of pollutants, including dredge and fill material, as well as other activities, in all waters of the Commonwealth, including “isolated” wetlands, ponds, springs, ditches, and ephemeral and intermittent streams. The Dam Safety and Waterways Management program incorporates wetland water quality standards, and the water quality standards incorporate the permitting standards from the Dam Safety and Waterways Management program. Those permitting standards are similar to those required by the CWA.

Weaknesses in Pennsylvania's wetlands and waterways protection program lie in the implementation of permitting standards. One particular concern is DEP's reliance on the state-sponsored Wetland Replacement Fund (Fund) to compensate for wetland losses from smaller projects. The Fund collects an average of $10,939 per wetland acre impacted, where the average mitigation design and installation cost is an estimated $58,000 per acre, and is roughly $85,000 per acre for forested wetlands. The fees charged by the Fund are not sufficient to provide for land acquisition, in particular, which limits the ability of DEP to provide for proper siting and design of mitigation projects. In addition, DEP subsidizes the Fund, creating a strong disincentive for project proponents to either avoid wetland impacts altogether, or undertake more costly, but more ecologically beneficial, project-specific compensatory mitigation. While the individual impacts of these smaller projects may be small, the cumulative loss of wetlands and

wetlands function is considerable, and these losses are not being adequately compensated for through the Fund.

Pennsylvania's water programs are also weakened by exemptions ("waivers") and general permits for certain activities. In particular, "waiver 2" in the Dam Safety and Waterways regulations exempts stream encroachment activities in streams and floodways with a drainage area of 100 acres or less. These unregulated activities have resulted in significant damage to headwater streams, particularly in areas of the Commonwealth experiencing intense development pressures. Developers expand the buildable area of land parcels by burying segments of streams. Stream channelization and culverting is being done under this waiver to build road and bridge crossings. Similarly, the Dam Safety and Waterways regulations relax permitting procedures and standards for private residential construction in wetlands through general permit 15.

Another weakness in the Pennsylvania state program is its delegation of responsibility to county conservation districts (CCDs) without sufficient funding and support to ensure adequate CCD resources and expertise to effectively protect Pennsylvania's at risk waters. While DEP presently limits its CCD delegation to general permit activities, it could expand its delegation in the future.

Finally, Pennsylvania has at least a $500 million budget deficit that make it unlikely that the state will fund additional resources that would allow the DEP to effectively compensate for the loss of Corps and EPA resources attendant to a CWA rollback. Governing Magazine (May 2002).

b. Great Lakes Region

Ohio

Ohio's wetlands regulatory program has historically been based on its CWA § 401 water quality certification program. State water quality standards recognized all waters, including all wetlands. In the wake of *SWANCC*, the Ohio Environmental Protection Agency (OEPA) attempted to assert independent state jurisdiction over so-called “isolated” wetlands. The agency found that the state had the legal authority to issue rules that would create a permitting program for “isolated” wetlands impacts independent of its CWA § 401 authority, and that until such rules were in place, no impacts could occur to “isolated” waters. Rather than support state wetlands jurisdiction, the regulated community challenged OEPA's authority and sought the help of the state legislature. The state legislature quickly passed an “isolated” wetlands bill which weakened existing protection for “isolated” wetlands in July 2001.

The new “isolated” wetlands law, heavily influenced in the legislature by the regulated community, ostensibly creates an independent state permitting program for “isolated” wetlands where a CWA § 404 permit and a § 401 certification are not required, but actually weakens the previously existing CWA protections for “isolated” wetlands by requiring the approval of most “isolated” wetland fills of ½ acre or less through a general permit. The law also categorizes wetlands according to ecological significance and requires significantly weaker permit review

and permit criteria for many wetlands based on ecological category and size. The methodology being used to categorize wetlands tends to give low value scores (and therefore almost no real protection) to so-called "isolated" wetlands based on their typically smaller size and the very fact that they lack an obvious surface water connection. Consequently, while on paper Ohio has a wetlands program that regulates discharges in so-called "isolated" wetlands, in reality Ohio offers very minimal protection for these at risk waters.

Even if Ohio were inclined to fill the regulatory gap left by a CWA rollback, its wetlands and waters programs are inadequately funded to do so. OEPA believed it needed seven full time equivalent (FTE) positions to adequately staff this program in fiscal year 2002, yet it only had funding for four FTE's. In its first annual report on its "isolated" wetlands permitting program, OEPA reported that, "with only four FTEs available to conduct reviews, work efforts within the program are being hampered and review times for projects are increasing." The agency also reported that, "due to staffing levels, budget constraints and statutory review time requirements, the program was unable to follow up on the majority of these [thirty-eight illegal fill] complaints. A limited number of complaints regarding isolated wetlands were investigated."

The report notes that 60 percent of the cost of the program comes from the General Revenue Fund (GRF), leaving the wetlands program highly dependent on state tax revenues that have declined in FY 2002 and 2003, and highly vulnerable to GRF funding cuts. Prospects for FY 2004 are even worse. Ohio is facing a budget deficit that exceeds $500 million. Governing Magazine (May 2002). OEPA does not currently have adequate resources to staff its permitting program for "isolated" wetlands and all indications point to cuts in this program in FY 2004 and FY 2005.

Michigan

Michigan is one of only two states to assume the CWA § 404 dredge and fill permitting program from the Corps of Engineers and EPA. Consequently, Michigan has an independent state dredge and fill permitting program that generally covers wetlands, lakes, and streams. However, the Michigan dredge and fill laws generally exempt lakes and ponds with a surface area less than 5 acres, exempt virtually all noncontiguous wetlands located in counties with populations less than 100,000, and exempt virtually all noncontiguous wetlands that are 5 acres in size or less.

In addition to these exemptions of certain wetlands, lakes, and ponds, Michigan law includes exemptions for agriculture, silviculture, ranching, iron and copper processing, drainage ditches, utility lines, and oil and gas pipelines that are broader than exemptions provided for under § 404 of the CWA. These exemptions leave many smaller Michigan wetlands, lakes, and ponds vulnerable to dredging and filling.

Withdrawal of federal CWA § 404 jurisdiction will remove the federal "floor" supporting the current Michigan dredge and fill program and will likely expose it to attempts to further weaken state dredge and fill protections. Indeed, in the process of reviewing Michigan's assumed § 404 program before the *SWANCC* decision, EPA was urging Michigan to close its existing "isolated" waters loophole to make the program more fully consistent with the CWA. *SWANCC* weakened

the federal leverage to urge these program improvements; a broader CWA rollback would eliminate it altogether. See, 68 Fed. Reg. 772 (January 7, 2003).

In addition, Michigan's dredge and fill program has suffered in the past from staff reductions and reduced enforcement and is unlikely to fully recover from those cut backs now when the state is struggling with a budget deficit in excess of $1 billion. Governing Magazine (May 2002).

Wisconsin

Wisconsin has had for some time a strong wetlands permitting program based on state water quality standards for wetlands and the state's CWA § 401 water quality certification authority. Recognizing that *SWANCC* would severely limit its § 401 authority over so-called "isolated" wetlands, Wisconsin responded quickly to *SWANCC*, enacting new legislation in May 2001 extending its pre-existing water quality certification program to "non-federal" wetlands. Wisconsin's new law essentially maintains the wetland protection status quo in the state, extending the state's certification authority only to those "non-federal wetlands" over which the Corps no longer takes § 404 jurisdiction based on the *SWANCC* decision.

While Wisconsin seems to have a relatively effective program for protecting its wetlands now, it is unclear whether Wisconsin will have the resources and commitment to further expand its state program if CWA jurisdiction is withdrawn from additional waters. Wisconsin is dealing with a budget deficit in excess of $250 million and may not be able to fund further regulatory program expansion. Governing Magazine (May 2002).

Minnesota

Minnesota has its own state wetlands law independent of its CWA § 401 certification authority. Ostensibly, Minnesota's Wetlands Conservation Act (WCA) regulates the full range of wetlands in the state, including "isolated"wetlands. However, WCA and its regulations exempt a number of activities that often occur in so-called "isolated" wetlands. These exemptions were put in place at least in part because the Corps was requiring a CWA § 404 permit for these activities in wetlands, including "isolated" wetlands. After *SWANCC*, the Corps is no longer regulating these activities in "isolated" wetlands, and Minnesota cannot, leaving a gap in regulation of so-called "isolated" wetlands.

Minnesota's Board of Soil and Water Resources (BWSR), which administers WCA, has conducted its own analysis of post-*SWANCC* regulatory gaps and concluded that absent federal CWA jurisdiction, many of Minnesota's small, seasonal wetlands will be left unregulated, particularly in the Prairie Pothole Region and other regions of the state with the greatest historical wetland losses. These wetland losses will be even more pronounced if intermittent streams and their adjacent wetlands are assumed to no longer qualify as waters of the United States. In 2001, BWSR presented an informal proposal to modify its exemptions and close this regulatory gap. The proposal was tabled in light of resistance from regulated interests.

In addition to WCA's exemptions, WCA program effectiveness is limited by political and resource constraints. First, WCA is administered by local government units with state agency oversight. Many of these local governmental units lack the staff expertise and resources to conduct careful permit review and impose sufficiently protective permit conditions. Second, the state's budget crisis has severely cut funding for wetland and stream permitting programs at both the state and the local level. Minnesota is currently cutting BWSR funding to address a budget deficit in excess of $25 million. Governing Magazine (May 2002).

c. Pacific Northwest Region

Oregon

Oregon has a strong statutory and regulatory regime that should allow it to protect "isolated" wetlands and smaller streams in the absence of federal regulation. Under the 1989 state wetlands law, local governments are encouraged to prepare local wetlands conservation plans, plans which are approved by the state Division of State Lands under specified statutory criteria. Permits are required from the state for the removal or fill of wetlands in any area subject to such a plan. The statute requires that such proposals must be consistent with applicable wetlands conservation plans, be designed to minimize impacts, and fully replace impacted resources through mitigation. There appears to be no minimum size threshold for regulated wetlands, so even small seasonal wetlands appear to be regulated. Oregon's permitting program requires compensatory mitigation for any wetlands impacts and includes permitting standards that are similar to CWA § 404. Oregon is considering assumption of the CWA § 404 program from EPA and the Corps. In addition, the Corps and EPA are delegating to Oregon responsibility for dealing with wetlands under 2 acres in size under a programmatic general permit.

However, regular hostile legislative initiatives, barriers to citizen enforcement, and a state budget crisis raise questions about the effectiveness of Oregon's permitting program in the absence of a federal regulatory floor. While there is currently no law in Oregon that caps state standards to the limit of federal law, such bills are regularly introduced in the state legislature. In addition, Oregon is in an economic crisis and there is significant pressure to loosen environmental regulations that are seen as constraining job growth. For example, the state cattlemen's associations have been promoting a bill to repeal all state regulation over wetlands. Another pending bill would remove state jurisdiction over any wetland smaller than one acre.

While Oregon does provide for citizen enforcement of many of its wetlands and waters provisions, the law now makes unsuccessful citizen groups liable for the attorneys' fees of the defendants. This single act has significantly curtailed citizen enforcement of state water resources law. The state Attorney General's office has also begun to take the position in litigation that only those entities with a direct economic interest in a permit have standing to enforce it, which would preclude most enforcement actions from conservation groups or concerned citizens.

Finally, enforcement at the state agency level is typically under-funded and a low priority. Unless a development activity poses a very serious environmental problem, or there are

numerous citizen complaints, enforcement of permit violations is said to be rare. Oregon is also facing a budget deficit in excess of $500 million and seemingly unlikely to expand its state programs to regulate additional waters left unregulated by the Corps and EPA. Governing Magazine (May 2002).

Much of eastern Oregon is high desert, and hence virtually all of the water resources in the Eastern part of the state could be classified as "isolated" or "intermittent." Such streams and wetlands are of great ecological importance in a desert environment. Despite what seems to be a strong state regulatory program, the CWA federal floor is needed to ensure protection of these valuable water resources.

d. Southeast Region

Virginia

Virginia has historically relied on its CWA § 401 certification program to regulate discharges to its non-tidal wetlands. In 2000, the Virginia General Assembly removed the dependence of the state nontidal wetlands program on its CWA authority, enabling the Department of Environmental Quality (DEQ) to independently regulate activities in wetlands, including "isolated" wetlands, even when the Corps does not regulate them under CWA § 404. The regulations implementing this new law came into full effect October 1, 2001.

However, the effectiveness of the Virginia regulatory program is limited by court challenges, political controversy, and limited resources. The new state law was almost immediately challenged in both state and federal court. Despite the unambiguous legislative approval of independent state wetlands regulation with broader jurisdiction than that afforded by the CWA after *SWANCC*, the U.S. District Court for the Eastern District of Virginia effectively negated the intent of the Virginia law by erroneously concluding that it is limited to "coextensive jurisdiction" with federal law. This conclusion is completely contrary to the language, goals, and history of the 2000 legislation, and is currently on appeal in the Fourth Circuit U.S. Court of Appeals. United States v. Newdunn Associates, 195 F. Supp. 2d 751 (E.D. Va. 2002), *appeal pending,* No. 02-1594 and 02-1480 (4th Cir.). Meanwhile, conservation groups are concerned that DEQ is not requiring the avoidance and minimization of wetland impacts, but simply requiring mitigation.

Budget constraints are also a concern, since Virginia is grappling with a budget deficit in excess of $1 billion. Governing Magazine (May 2002). Even if Virginia's wetland program can overcome its legal and political hurdles, it is unlikely that Virginia will fund an expansion of program resources to address a CWA rollback beyond the minimum dictated by *SWANCC*.

North Carolina

North Carolina now appears to have an independent state wetlands regulatory program that protects so-called "isolated" wetlands, though its regulatory authority and effectiveness are by no means a foregone conclusion. In 1996, North Carolina promulgated wetland water quality

standards and procedures applicable to its CWA § 401 water quality certifications, especially for Corps § 404 permits. The state attorney general determined that North Carolina's Environmental Management Commission (EMC) has independent authority to enforce its wetland water quality standards where CWA § 401 water quality certifications are not required. North Carolina's wetlands rules were immediately challenged by development and farming interests, who took their challenge all the way to the North Carolina Supreme Court. The North Carolina Court of Appeals rejected the rules challenge in late 2002 and the North Carolina Supreme Court followed suit in late March 2003.

Following *SWANCC*, the EMC expressly extended the state wetlands rules to "isolated" wetlands by promulgating temporary "isolated" wetland rules that became effective in October 2001. The EMC made these "isolated" wetlands and waters rules permanent in the fall of 2002, subject to legislative approval in early 2003. Until then, the temporary "isolated" wetlands and waters rules remain in effect.

Most recently, a North Carolina legislator introduced a bill targeting by name two of the most experienced regulators in the North Carolina wetlands permitting program, requiring the elimination of their jobs. Bruce Henderson, Charlotte Observer (April 10, 2003). The North Carolina wetlands program can hardly be effective in the face of such attacks. A CWA federal floor helps to shield state programs from such political vulnerability. A CWA rollback from so-called "isolated" wetlands and headwaters will result in increasing state program vulnerability to this type of legislative attack.

In addition to legal and legislative challenges, North Carolina's wetlands permitting program is hampered by limited resources. North Carolina is dealing with a budget deficit in excess of $500 million. Governing Magazine (May 2002). Already understaffed state environmental agencies are being asked now for up to 3 percent additional cuts for the current budget year. Even in a state like North Carolina where some legal jurisdiction over so-called "isolated" waters and headwaters has been upheld, the resources to enforce that jurisdiction is sorely lacking.

Florida

Florida retains considerable state statutory authority to implement wetland permitting programs to protect "at risk" waters. Florida's Department of Environmental Protection (DEP) has considerable legal authority to enforce water quality standards -- including antidegradation standards -- in broadly defined waters of the state, expressly including wetlands and "isolated" wetlands. Florida also has independent state authority to require permits for pollution discharges in state waters and on its submerged lands.

Weaknesses in Florida's permitting programs include a broad exemption from wetland regulation in the Florida Panhandle counties. In response to *SWANCC*, Escambia County in the Florida Panhandle acted on its own to close the Panhandle wetlands exemption, adopting an ordinance requiring additional county review of building plans in wetlands, including "isolated" wetlands. Florida law also exempts various agriculture, silviculture, and horticulture activities, as well as certain activities deemed to be minimal in individual and cumulative environmental impact.

The effectiveness of Florida's permitting programs is further reduced by the delegation of permitting authority to Florida's five water management districts, which have their own permitting rules and which vary in program implementation. While the St. Johns River Water Management District (WMD) is viewed as implementing a relatively comprehensive and protective program applicable to virtually all wetlands and streams, including intermittent streams, the same is not said for the other water management districts. Florida law also permits delegation of permitting authority to local governments.

Florida's mitigation requirements, as applied by several of the WMDs, are also viewed as less protective than those required by the Corps and EPA under the CWA. In particular, unlike the Corps and EPA, Florida's WMDs typically do not require permit applicants to pursue practicable alternatives to site development in wetlands. Florida permitting rules also provide little protection for uplands surrounding wetlands habitat used by threatened and endangered species.

The weaknesses in Florida's permitting programs are exacerbated by a daunting budget deficit in excess of $1 billion. Governing Magazine (May 2002).

5. States Are Unlikely to Effectively Harness Existing Authority Or Enact New Authority to Protect Wetlands and Headwaters In the Wake of a Federal CWA Rollback.

The 32 states that currently lack any independent state permitting programs protecting "isolated" waters are highly unlikely to launch effective programs in the wake of the *SWANCC* decision and the ANPRM. While many states have latent authority to enforce water quality standards or other state water pollution control statutes, most of them have relied exclusively on the CWA-based § 401 certification and § 402 NPDES permitting programs to enforce these underlying state laws. Without CWA § 401 jurisdiction, few states will be able to establish a permitting program to limit dredge and fill activity in waters withdrawn from CWA jurisdiction.

States that attempt to launch independent state permitting programs to enforce their existing water quality standards and other state water pollution control laws are being challenged legally and politically at every turn in attempts to ensure that any CWA rollback constitutes a state rollback as well. There is every indication that this trend will continue when and if additional states chart this course. Efforts to thwart regulatory gap-filling efforts in both Indiana and North Carolina illustrate this trend.

States are finding it even more difficult to enact entirely new wetlands and waters permitting statutes to fill the regulatory gaps left by *SWANCC* and likely to be left by any new Corps and EPA rulemaking. As discussed above, wetlands bills introduced to fill regulatory gaps in the aftermath of *SWANCC* have already failed in several states, including California, Illinois, and Delaware.

As discussed in state summaries above, budget constraints are another key reason why it is highly unlikely that states will fill the regulatory gap left by a CWA rollback.

6. State Capability to Protect Wetlands, Headwaters, and Downstream Waters from Pollutant Discharges Will Be Substantially Weakened If CWA Jurisdiction is Removed from Wetlands and Headwaters.

Most state surface water pollution permitting programs are closely linked to the CWA NPDES/402 authority. While they are based on independent state statutes and regulations, those statutes and regulations were in many cases enacted or amended to ensure that they met CWA NPDES standards. In some states, such as Arizona and Idaho discussed above, the waters to be regulated under the state program are expressly limited to federal "waters of the United States." Any withdrawal of CWA jurisdiction will almost certainly be followed immediately by a withdrawal of state PDES regulation as well. Additional state PDES permitting programs are subject to "no more stringent than federal law" provisions that arguably could limit the waters protected under the state program. See subsection 7, below.

Even where independent state authority to regulate broader waters of the State is clear, the absence of a federal CWA "floor" exposes state pollution control standards to attacks from pollutant dischargers seeking to limit state regulation to those waters still regulated as "waters of the United States" under the CWA.

7. "No More Stringent" Laws Turn Federal Baselines Into State Ceilings, Further Limiting States' Capacity to Fill the Regulatory Gaps Left By a CWA Rollback.

In addition to the other limitations on state regulatory authority and resources described above, many states have statutes or regulations that either prevent or limit the ability of state resource protection agencies from adopting environmental standards more stringent than the minimum required by federal environmental statutes and regulations. Such provisions could, in some instances, be used to limit the waters protected under the state program, turning what was intended under the Clean Water Act to be the federal "floor" of protection into the "ceiling."

Examples of many of these "No More Stringent" laws are provided below.[47] In many cases, these state laws are not retroactive (or do not appear to be so), or they otherwise may not result in an automatic restriction in the waters protected by state law and regulations even if EPA and the Corps attempt to limit the waters covered by federal regulations.

But even where independent state authority to regulate broader waters of the state is clear, polluters and development interests will almost certainly renew their attacks on states' regulatory authority and seek to limit state regulation to those waters still defined as "waters of the United States" under federal regulations. This would likely restart the "race to the bottom" among states that the Clean Water Act itself was meant to end when it came to protection of the country's water resources.

[47] For another discussion of state "no more stringent" laws, see Environmental Law Institute "Enforceable State Mechanisms for the Control of Nonpoint Source Water Pollution," 1997, Appendix A (available at http://www.epa.gov/nps/elistudy/).

Broad "No More Stringent" Laws

Although some state "No More Stringent" laws are media- or resource-specific (e.g., restricting enactment of more stringent hazardous air pollutant standards than the federal standards), the laws in several states generally prohibit their state environmental agencies from enacting any regulation more stringent than the federal laws or regulations.[48]

Some states have enacted legislation unconditionally restricting their agencies from promulgating any environmental regulations more stringent that federally required. South Dakota's law prohibits the state from enacting rules that are either more stringent than federal required or that cover "an essentially similar subject or issue."[49] This law not only covers all areas of federal environmental regulation, but it is so broad that it could be read to try to block any state regulation in an area where a federal program exists on an issue even if it is entirely voluntary. Alaska law provides that state regulations addressing areas governed by federal laws or regulations may not be more stringent than most federal laws and regulations. [50] Kentucky limits agency authority to promulgate regulations to only when such regulations are "required by federal law" and any then "shall be no more stringent than the federal law or regulations."[51] Tennessee invalidated all environmental requirements placed upon municipalities or counties that are more stringent than federal rules.[52]

Water-Pollution Related "No More Stringent" Laws

Arizona Rev. Stat. Ann. § 49-255.01, which establishes the state's pollutant discharge elimination system program, prohibits the director from promulgating rules more stringent than those found either in that statute itself or in the Clean Water Act. Virginia prohibits its state water pollution rules from being more stringent than federal regulations under the Clean Water Act.[53] Florida has a similar provision, but includes a procedure for granting exceptions.[54] In addition to its more general probation on state regulations more stringent than federal, Kentucky

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[48] Jerome M. Organ, Limitations on State Agency Authority to Adopt Environmental Standards More Stringent than Federal Standards: Policy Considerations and Interpretive Problems, 54 Md. L. Rev. 1373, 1376 (1995).

[49] South Dakota Cod. Laws. Ann. 1-40-4.1.

[50] AK Stat. Ann. § 46.03.365.

[51] Ky Rev. Stat. Ann. § 13A.120(1) (Baldwin 1988 & Supp. 1994).

[52] Tenn. Code Ann. § 4-5-225.

[53] Va. Code Ann. § 62.1-44.15:1 (Michie 1993).

[54] Fla. Stat. Ann. § 403.804(2) (West 1993).

law specifically prohibits "any effluent limitation, monitoring requirement, or other condition which is more stringent than" federally required.[55]

North Carolina prohibits effluent standards applicable to animal or poultry feeding operations from exceeding federal minimums.[56] While Iowa prohibits state effluent standards from being more stringent than a federal effluent standard, the state allows agencies to establish standards for sources that the EPA has not.[57] Oregon bars its agencies from restricting effluent limitations upon nonpoint sources of pollutant discharge resulting from forest operations unless mandated under the federal Clean Water Act.[58] Idaho restricts its agencies from creating water pollution regulations more stringent than the Clean Water Act.[59]

Both Arkansas[60] and Iowa[61] authorize their state agencies to impose more stringent source-specific standards than the Clean Water Act, but only to the extent necessary to assure compliance with the Act's water quality standards. Nebraska has a "no more stringent" statute regarding the Safe Drinking Water Act[62] and Alabama restricts state regulations regarding wellhead protection areas from being more stringent that EPA standards.[63]

Exceptions to the State's Own "No More Stringent" Law

Some states only allow their agencies to promulgate or adopt environmental regulations more stringent than those federally required if they meet heightened evidentiary burdens or special procedures.

Montana provides an exception to its "no more stringent" restrictions if there is a finding after public hearing and detailed study that such rules are necessary.[64] Maine requires a more detailed and complex set of justifications and more procedural review if the state intends to adopt more

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[55] Ky. Rev. Stat. § 224.16-050.

[56] N.C. Gen. Stat. 143-215.

[57] Ia. Code Ann. 455B.173.

[58] Ore. Rev. Stat. 468B.110(2).

[59] Id. Code 39-3601.

[60] Ark. Code Ann. § 8-4-207(1)(A) (1989).

[61] Iowa Code Ann. § 455B.173.2 (1993).

[62] Neb. Rev. St. § 81-1505 (22).

[63] Ala. Code § 22-36-7 (1993).

[64] Mont. Code Ann. 75-5-203, -309, 80-15-110.

stringent regulations than the federal requirements.[65] Florida has a similar provision, and further requires approval by the governor and cabinet after review of a cost/benefit analysis.[66]

Oklahoma requires an economic impact analysis for environmental rules more stringent than corresponding federal requirements.[67] Ohio requires more disclosure and review for restrictions above the federal minimums.[68] Pennsylvania and Maryland have Executive Orders requiring a compelling state interest or an independent legislative justification to support any deviation from federal standards.[69] Wisconsin has a similar policy promulgated by its Natural Resources Board and Utah has a similar legislative requirement.[70]

North Dakota prohibits agencies from adopting rules more "stringent than corresponding federal regulations or adopt rules where there are no corresponding federal regulations" unless there is a written finding after public comment and hearing based upon evidence in the record, that corresponding federal regulations are not adequate to protect public health and the environment of the state."[71]

Mississippi has a "no more stringent" rule relating to water quality and discharge guidance, but allows a state agency to promulgate regulations in the absence of federal standards when "necessary to protect human health, welfare or the environment."[72] West Virginia allows for the Division of Environmental Protection to promulgate more stringent rules than the counterpart federal rule or program "reasonably necessary to protect, preserve or enhance the quality of West Virginia's environment or human health or safety."[73] However, "[i]n the absence of a federal rule, the adoption of a state rule shall not be construed to be more stringent than a federal rule, unless the absence of a federal rule is the result of a specific federal exemption."[74]

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[65] 38 Maine Rev. Stat. Ann. 341-D.

[66] Fla. Stat. 403.061(7)(31), 403.804(2) (1993).

[67] Okla. Stat. Tit. 27A, § 1-1-206.

[68] Ohio Rev. Stat. 121.39.

[69] Penn. Exec. Order 1996-1.

[70] Wis. Board Pol. 1.52(3) and Utah Code Ann. 19-5-195.

[71] N.D. Code § 23-01-04.1.1; see 54 Md. L. Rev. 1373, 1386.

[72] Mississippi Code 49-17-34(2).

[73] W. Va. Code § 22-1-31 (1994).

[74] *Id.*

Utah has several media-specific statutes prohibiting promulgation of regulations "more stringent than the corresponding federal regulations" absent "a written finding after public comment and hearing, . . . that the corresponding federal regulation is not adequate to protect public safety and the environment."[75] The Tennessee Government Operations Committee has the authority to invalidate rules that impose "environmental requirements or restrictions on municipalities or counties that are more stringent than federal statutes or rules on the same subject, and that result in increased expenditure requirements on municipalities or counties beyond those required to meet federal requirements unless" funds have been appropriated to cover the increased expenditures.[76]

Colorado allows water quality controls to be more stringent than the "corresponding enforceable federal requirements" only if it is demonstrated at a public hearing and there is a written finding with scientific or technical evidence showing that more stringent state rules are necessary to protect the public health, beneficial use of water, or the environment of the state.[77] Iowa only places limitations on the state agency's authority to promulgate more stringent water quality controls when the EPA has promulgated "an effluent or pretreatment standard pursuant to §§ 301, 306 or 307 of the federal Water Pollution Control Act."[78]

C. OTHER FEDERAL REGULATORY AND INCENTIVE-BASED PROGRAMS OFFER LITTLE PROTECTION TO FILL GAPS LEFT BY LOSS OF CWA JURISDICTION.

While there are numerous incentive-based programs on the national level that promote the acquisition, protection, restoration, or enhancement of certain types of waters, these programs were never contemplated as replacements to broad, federal regulatory protection. As a result, the programs are insufficiently funded, usually limited to certain types of waters, and not comprehensive in their protections.

1. Swampbuster

One Federal program that prevents a significant amount of wetland conversion (though it does nothing to halt point source discharges of pollutants and does little to protect streams) is Swampbuster. A "disincentive" provision included in the Food Security Act of 1985, and re-authorized as part of every Farm Bill since, Swampbuster requires producers who receive farm subsidies, loans, or certain other benefits to refrain from continued drainage of wetlands on farms they own or operate. Violators risk the loss of their program benefits. Since the Food Security Act contains its own definition of "wetlands," the *SWANCC* decision has had no effect on Swampbuster implementation. However, there are many limitations to the effectiveness of

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[75] Utah Code Ann. § 19-5- 105(1), (2) (1993).

[76] Tenn. Code Ann. § 4-5-225 (1994).

[77] Colo. Rev. Stat. Ann. § 25-8-202(8)(a) (1994).

[78] Iowa Code Ann. § 455B.173.2 (1990).

Swampbuster as a "backstop" to loss of Clean Water Act protections. These are discussed below.

Applies Only to Agricultural Activities

One of the major limits to Swampbuster as a backstop to loss of Federal Clean Water Act protections is that, even if it were completely successful at halting conversion of wetlands to agriculture (which it isn't), it would still only apply to agricultural conversions of wetlands. The most recent U.S. Fish and Wildlife Service publication, "Status and Trends of Wetlands in the Conterminous United States 1986 to 1997," estimates that only 26 percent of freshwater wetland losses were due to agriculture, while 51 percent were due to urban or rural development (Dahl, 2000). Swampbuster can do nothing to halt the 74 percent of wetland losses that are not caused by agricultural activities.

Applies Only to Wetland Conversion

Swampbuster does little to halt the destruction of non-wetland waters for agricultural purposes. Producers are free to channelize, pipe and/or armor streams or ditches without incurring violations of Swampbuster. Further, as a wetland conservation program, Swampbuster does not address point source discharges of pollutants or oil spill liability in any type of waters.

Many Loopholes

Pressure from producers for "flexibility" in implementation of Swampbuster led to amendments in the 1990 and 1996 farm bills to allow producers to drain wetlands under certain "minimal effects" and "minimal effects with mitigation" exemptions. These special exemptions were designed to allow producers to drain so-called "nuisance" wetlands -- wetlands that were preventing them from turning their tractor around, entering certain fields, etc. However, as implemented, the minimal effects exemptions are quite broad. Reliance on "mitigation" of wetland impacts through restoration of wetlands elsewhere is likely resulting in a significant net loss of wetlands as NRCS has little experience with wetland mitigation and anecdotal evidence seems to indicate that mitigation projects mostly involve creation of ponds in upland areas.

Lack of Enforcement

Very few producers have lost federal benefits for violations of Swampbuster. That does not mean to imply that violations do not occur. In fact one of the biggest complaints associated with the Swampbuster program is that it is not well enforced, leaving "cheaters" to benefit and those who abide by the restriction at a competitive disadvantage. The penalties for violating the provision are not severe enough to serve as a disincentive to many producers. Since 1990, if a producer converts a wetland for the purpose of crop production, they may lose USDA program benefits only until the wetland functions are "restored." If the Farm Service Agency determines that the violation was made unintentionally, they may grant a "good faith" exemption. If such an exemption is granted, then the NRCS will help the landowner develop an acceptable mitigation plan to restore the wetland functions, which must be completed within one year. If correctly

implemented and all conditions are met, the landowner will not lose program benefits. A soon to be released study by the General Accounting Office will examine the effectiveness of Swampbuster. It is widely expected to reveal a dismal record of compliance and enforcement.

Is Not Tied to All Federal Benefits

A damaging legislative precedent was set in 1999, when Congress passed a four-year, more than $ 6 billion crop insurance subsidy bill which did not require recipients to comply with Swampbuster. This de-coupling of Swampbuster compliance from crop insurance subsidies created a perverse incentive for producers to convert wetlands to production -- even wetlands which would otherwise not prove economically viable to convert. The desire by many in Congress and the Administration to move producers away from direct subsidies to agricultural producers puts in question the future of Swampbuster, as crop insurance and potentially other de-linked programs become the major delivery mechanisms for assistance to producers.

2. Wetlands Reserve Program

The Wetland Reserve Program (WRP), offers landowners the means and the opportunity to protect, restore and enhance wetlands on their property through a voluntary program administered by the USDA Natural Resource Conservation Agency.

The WRP was mandated by § 1237 of the Food Security Act of 1985(PL99-198) and amended by subsequent farm bills in 1990, 1996 and 2002. Since its enactment, the program has made a major contribution toward restoring wetlands and contributing to the goal of "no net loss" of wetlands. At the close of FY 2002 1,276,619 acres, involving 6,791 projects were under easement. However, actual wetland acres protected may be significantly less because program rules permit up to 6 acres of non-wetland buffer area for each acre of wetland.

We are fully supportive of WRP and urge continued increases in program levels. However, despite WRP's value in allowing restoration of formerly drained wetlands, we take exception to the suggestion that the program will provide significant protection to those "isolated" wetlands under the threat of destruction. We offer the following points:

The majority of acres enrolled in WRP were areas that were not previously subject to 404 permit requirements. They are areas that had been significantly manipulated for agricultural production prior to 1985, have lost much of their wetland values, and, in fact, are no longer classified as wetlands. On balance WRP has become a wetland restoration program rather than one that protects current wetlands needing no restoration or enhancement. WRP acres and 404 permit acres in the majority of cases are different areas. Consequently, WRP has little impact on protecting "isolated" wetlands.

Funding levels are inadequate. The Administration's proposed budget for FY 2004 caps the enrollment acres at 178,000. This is 72,000 acres less that authorized in the 2002 farm bill. In FY 2002, 4 eligible acres were offered for every acre enrolled, amounting to over 700,000 acres

of potential easements that went unfunded. Interest in the program is high but limited funds and a low probability of getting acres enrolled is discouraging program participation.

Land offered for WRP tend only to be areas that are limited in their economic value. They tend to be marginal farming areas producing limited income. They are not those wetland that are most threatened by development. WRP cannot compete in the market where land values significantly exceed agricultural values.

The average WRP contract exceeded 180 acres in FY 2002. Larger areas are given preference in order to control administrative and future oversight demands to assure proper operation and maintenance. It is understood that some of these large areas may include several small wetland strung together in a single contract. The fact remains that the huge number of small wetlands representing an extremely important waterfowl habitat but limited acreage is not being addressed by WRP.

Most WRP acreage is land that was drained for agriculture, but failed to become productive for agriculture. It is much more cost effective and ecologically desirable to prevent such wetlands from being drained in the first place than to pay farmers to restore them later.

Not all wetlands restored under the WRP program are protected in perpetuity. Currently, 77 percent are in permanent easements, 16 percent in 30-year easements, and 7 percent in 15-year agreements (Harry Slaughter - NRCS, personal communication).

3. Other Farm Bill Conservation Programs

Several other Farm Bill conservation programs provide incentives to restore or protect wetlands. The Wildlife Habitat Incentives Program provides some funding for cost-share agreements to restore wetlands and in-stream habitats, however only about 10 percent of the funds for this program are used for aquatic habitats. The Conservation Reserve Program and Conservation Reserve Enhancement Program (along with the state CREP match) provide some funding for the restoration and enrolment of wetlands and some riparian habitats in conservation easements. However, the majority of CRP funds are spent on upland habitats and most easements in these programs are short-term. The Continuous sign-up Conservation Reserve program also provides funding for riparian restoration, however agreements are for only 10-15 years. None of these programs protects waters from point-source discharges of pollutants, though some are designed to reduce non-point source pollution. These programs, while supported by our organizations for their value in providing some wildlife habitat and filtration of run-off, are of little value as backstops to loss of Clean Water Act protections.

4. Partners for Fish and Wildlife

This program, administered by the U.S. Fish and Wildlife Service has helped to restore 574,800 acres of wetlands and 4,190 miles of streamside and in-stream habitat since 1987 (Martha Naley – USFWS, personal communication). While we are highly supportive of the program, and hope that it receives the requested $9.6 million increase in funding for the FY04 budget, wetlands and

streams restored through this program are not usually protected by a legal mechanism, thus are vulnerable to future development projects. Additionally, none are protected from point-source discharges of pollutants. As such, the program, even if given additional funding, will never serve as a significant backstop for loss of regulatory protection.

5. Coastal Wetlands Restoration Program

The Coastal Wetlands Conservation grant program has awarded $32 million to 23 coastal States and 1 U.S. Territory. Through this grant program 40,000 acres of coastal wetlands have, or will be, acquired, protected, or restored. However these are coastal wetlands that are hopefully not at risk of losing jurisdiction under the Federal Clean Water Act, therefore it provides no backstop to the loss of Clean Water Act protections for nontidal waters. Further, with a major movement underway to raise federal funding to restore coastal Louisiana, it is important to ensure that any public investment in this worthy effort is not undermined by accelerated drainage of wetlands and channelization of streams in the upper reaches of the Mississippi River or within Louisiana itself – which maintains no state level program to protect wetlands independent of Clean Water Act authority.

6. National Estuary Program

The National Estuary Program was established by Congress in 1987 to improve the quality of estuaries of national importance. The Clean Water Act, § 320 directs EPA to develop plans for attaining or maintaining water quality in an estuary. This includes protection of public water supplies and the protection and propagation of a balanced, indigenous population of shellfish, fish, and wildlife, and allows recreational activities, in and on water, requires that control of point and nonpoint sources of pollution to supplement existing controls of pollution. Several funding mechanisms are available. This significant and valuable public investment in restoring and maintaining the health of our nation's estuaries will be significantly undermined if upstream waters that provide fresh water to these estuaries are contaminated or degraded.

7. National Wildlife Refuge System

The National Wildlife Refuge System, in its 100 years of operation has protected some very key wetland habitats across the nation as refuges and waterfowl production areas. Nationally, about 35-40 percent of the refuge system's 95 million acres (including waterfowl production areas) is some type of aquatic habitat (Ken Grannemann – USFWS, personal communication). However, new acquisition is not proceeding very rapidly as full funding of the Land and Water Conservation Fund has yet to occur. In fact, the President's budget request for FY 04 represents about a 60 percent cut in funding for refuge acquisition despite his promise to fully fund the LWCF (Jim Waltman – The Wilderness Society, personal communication). Chronic under-funding of refuge operations and maintenance programs also prevents many refuge-owned areas from being restored as wetlands, though the President's request for an increase in this funding level for FY04 is certainly welcomed by our groups.

While the wetlands already protected within the refuge system enjoy fairly good protection from dredge and fill activities, it is not anticipated that new acquisitions will increase significantly within the next few years, nor do we anticipate that the small, scattered wetlands and headwater streams most at risk from a change in Clean Water Act rulemaking will be targeted for acquisition within the refuge system due to the difficulty in managing such scattered units. Additionally, due to resource extraction activities on refuges and lack of protection for many upstream waters, refuge waters could be increasingly vulnerable to pollution. Indeed, according to the personal experience of National Wildlife Federation Board Member, Gerome Ringo, (personal communication) many Louisiana refuges are being contaminated with oil leaking from wells on the refuges. Without § 311 or OPA protections for these waters, liability for cleanup of these spills would lie with the taxpayers.

8. 5 Star Restoration Program

With average grants that run about $10,000 per project, the 5 Star Restoration Program is more effective at leveraging local funding and labor for stream and wetland restoration and clean up programs than it is a major force for long term conservation of aquatic systems. While the program has achieved impressive results with small amounts of funding, no long-term protection mechanisms are required to ensure that the progress is not eventually reversed.

9. North American Wetlands Conservation Act

Through the North American Wetlands Conservation Act, approximately 3.5 million acres of wetlands and associated uplands have been affected across the United States since 1989. Of these, about 978,130 acres have been acquired through fee title transactions and another 796,844 acres are under easement, and the rest not protected by any long term mechanism. Exact records are not available regarding how much of the total acreage affected is wetland or other aquatic habitat (as opposed to "associated upland"). However the Fish and Wildlife Service estimates that about 25 percent of the acreage affected is aquatic habitat, with the remaining 75 percent in associated uplands. Thus about 244,532 acres of wetlands and other aquatic habitats have been acquired and another 199,211 acres of wetlands are under some type of easement. About 205,072 acres of wetlands/aquatic habitats have been restored and 275,00 acres of wetlands/aquatic habitats have been enhanced for waterfowl use (Joe Moteo – USFWS, email and personal communications 4/10/03). While still impressive, these numbers are easily undermined by past and anticipated accelerated future losses of wetlands and other aquatic habitats to development and agriculture and their potential pollution from point and non-point source discharges of pollution.

Like other programs, including the Western Hemisphere Shorebird Reserve Network, that target waterbird conservation within the United States, the NAWCA emphasizes the protection of areas that receive seasonally large concentrations of birds, even though many species make routine use of small, "isolated" wetlands. These areas are frequently single sites found along migratory routes (Haig *et al.* 1998). Even though many species make use of multiple, smaller wetlands, protection is rarely afforded to these smaller complexes. Birds are highly mobile, and move, often relatively frequently, between multiple sites. Haig *et al.* (1998) discusses that protecting

only one single wetland (which is frequently the case with both NAWMP and WHSRN) ignores that fact that individuals make frequent movements between sites. Additionally, most areas are managed specifically for target species, thus the entire range of wetland functions, or even habitats, is not considered. Furthermore, few streams are protected through this funding.

D. CONCLUSION - FEDERAL AND STATE PROGRAMS ARE INADEQUATE BACKSTOPS

As documented above, there is not – by any stretch of the imagination – a serviceable safety net to backstop protections provided by the Clean Water Act to all our nation's waters. The extremely spotty protections that exist on the state and federal level are wholly insufficient to prevent a backslide of the progress we have made as a nation over the past 30 years in cleaning up the nations waters. Furthermore, without a sea change in state and other federal programs, there is no prospect for such a safety net to develop any time in the foreseeable future. Any contraction of jurisdiction under the Clean Water Act will have measurable, deleterious effects on the health of our nation's waters.

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VIII. IMPLICATIONS OF THE CONTEMPLATED JURISDICTIONAL ROLLBACK FOR FEDERAL REGULATORY PROGRAMS

The hitherto unquestioned jurisdictional reach of the CWA provides the legal bedrock on which a great number of federal regulatory programs are founded. Some of these are authorized by other provisions of the CWA, others have independent statutory bases. In all the cases discussed below, any retrenchment of CWA jurisdiction can be demonstrated to lead inexorably to reductions in environmental and/or human health protection in other regulatory programs.

A. CLEAN WATER ACT PROGRAMS

1. Oil Pollution Prevention and Response Under CWA § 311 and the Oil Pollution Act

a. Overview of oil pollution protections under the Clean Water Act

Preventing oil pollution from damaging the nation's waters and harming public health, wildlife, and the economy has been a concern of Congress since long before passage of the Clean Water Act in 1972. The Rivers and Harbors Act of 1899 prohibited the discharge of oil and other refuse matter from vessels. The Oil Pollution Act of 1924 prohibited "discharges of oil by any method…into or upon the coastal waters of the United States," unless permitted as not "deleterious" to health or seafood in regulations issued by the Secretary of War. Prior versions of the Federal Water Pollution Control Act dating back to 1966 also contained prohibitions on the discharge of oil into the navigable waters of the U.S.

On June 22, 1969, a floating oil slick on the Cuyahoga River was ignited by welding sparks and burst into flames, damaging two railroad trestles. This particular fire on the Cuyahoga captured public attention and galvanized national support for passage of the Clean Water Act in 1972.[79]

b. Section 311 of the Clean Water Act

The centerpiece of § 311 is the congressional declaration that "it is the policy of the United States that there should be no discharges of oil or hazardous substances into or upon the navigable waters of the United States, adjoining shorelines, or into or upon the waters of the contiguous zone."[80] In order to implement this policy, Congress enacted a prohibition on discharges of oil or hazardous substances into waters of the U.S. "in such quantities as may be harmful as determined by the President." 311(b)(3). The amount of spilled oil necessary to be harmful to the environment is very small. It includes discharges that "(a) Violate applicable water quality standards; or (b) Cause a film or sheen upon or discoloration of the surface of the water or adjoining shorelines or cause a sludge or emulsion to be deposited beneath the surface of the water or upon adjoining shorelines."[81] In addition, Congress mandated a series of oil spill planning, prevention and cleanup measures.

Key provisions in §311 include:

- Mandatory self-reporting of any discharge of oil or a hazardous substance by the owner or operator of a discharging facility or vessel. § 311(b)(5)
- Authorization for the assessment of administrative penalties against the owner or operator of a discharging facility who fails to comply with cleanup provisions of § 311 (311(b)(6));
- A non-discretionary duty for the President to "issue regulations …establishing procedures, methods, and equipment and other requirements for equipment to prevent discharges of oil and hazardous substances from vessels and from onshore facilities and offshore facilities, and to contain such discharges…" § 311(j)(1) This provision is the source of EPA's authority for requiring subject facilities to develop, maintain and update Spill Prevention, Control and Countermeasure (SPCC) Plans.

In addition, under § 311, Congress established the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), the federal government's blueprint for responding to both oil

[79] A fire on the Cuyahoga in 1952 caused $1.5 million in damages. Property damage was not the only threat posed by river fires caused by floating oil slicks. In 1952, a low hanging kerosene lamp on a tugboat ignited vapors "lying above an extensive accumulation of petroleum products spread over the surface" of the Schuylkill River, killing a sailor aboard the tug. See Kernan v. American Dredging, 355 U.S. 426, 427 78 S.Ct. 394, 395, 2 L.Ed.2d 382 (1958).

[80] Section 311 of the 1972 amendments to the FWPCA was largely drawn from the Water Quality Improvement Act of 1970.

[81] 40 C.F.R. § 110.3

spills and hazardous substances releases.[82]" The NCP "has given rise to regional and local plans that govern in some detail the official response to oil and hazardous substance spill contingencies."[83]

Section 311(d) authorizes the U.S. to take summary action "whenever a marine disaster in or upon the navigable waters of the United States has created a substantial threat of pollution hazard to the public health or welfare of the United States, including, but not limited to, fish, shellfish, wildlife and the public and private shorelines and beaches. In addition, § 311(e) authorizes the President to require the U.S. attorney in the relevant judicial district to seek judicial relief to abate any "imminent and substantial threat." Finally, §§ 311 (f) and (g) provide for the allocation of cleanup costs to the responsible owner or operator of a facility, including natural resource damages.

c. The Oil Pollution Act of 1990

In January 1988, a 4-million gallon oil storage tank split apart and collapsed at an Ashland oil storage facility in Floreffe, Pennsylvania. Approximately 1 million gallons of the released diesel oil ran into an uncapped storm drain that emptied directly into the Monongahela River. The spill moved through Pennsylvania, West Virginia and Ohio, polluting both the Monongahela and Ohio River ecosystems. Drinking water sources for an estimated 1 million people in Pennsylvania, West Virginia and Ohio were temporarily contaminated. Thousands of birds and fish were killed as a result of the spill.[84]

In March 1989 the Exxon Valdez spilled 10.8 million gallons of crude oil in Prince William Sound Alaska, killing an estimated 250,000 seabirds, 2,800 sea otters, 300 harbor seals, 250 bald eagles, up to 22 killer whales, and billions of salmon and herring eggs,[85] and costing hundreds of millions of dollars in damages to sportsfishing and tourism.[86]

Chiefly in response to these disasters, Congress passed the Oil Pollution Act of 1990 ("OPA 90"). OPA 90 both amended and supplemented § 311 of the Clean Water Act. The law increased EPA's authority to pursue administrative, judicial and criminal penalties for violations of the regulations and for discharges of oil and hazardous substances. In addition, OPA 90 requires certain facilities to develop plans for responding to a worse case discharge or the

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[82] See EPA's Oil Program website at http://www.epa.gov/cgi-bin/epaprintonly.cgi.

[83] William H. Rodgers, Jr., *Environmental Law: Air and Water* (1986), p 521.

[84] *See* the GAO report requested by Senator Arlen Specter, Inland Oil Spills: Stronger Regulation and Enforcement Needed to Avoid Future Incidents (February 1989) GAO/RCED-89-65.

[85] Q&A from the Exxon Valdez Oil Spill Trustee Council (http://www.oilspill.state.ak.us/facts/qanda.html)

[86] *Id.*

substantial threat of such a discharge. This requirement lead to the development of regulations for Facility Response Plans (FRPs).[87]

OPA 90 also created a unified federal fund, called the Oil Spill Liability Trust Fund (OSLTF), to pay for the cleanup and other costs of federal oil spill response authorized at $1 billion, far higher than any of the other funds previously authorized. The Fund makes payments to federal, state and Indian tribe trustees to carry out natural resource damage assessments and develop plans to restore, rehabilitate, replace or acquire equivalent natural resources; as well as pay claims for uncompensated removal costs and damages. The Fund is administered by the Coast Guard's National Pollution Funds Center.

Although the Valdez and Ashland spills were the high profile spills that pushed Congress to act to strengthen protections for the nation's waters against oil pollution, they were only two of the thousands of spills that had occurred in the previous years. Between 1980 and 1986, some 80 to 91 million gallons of oil spilled into U.S. waters[88] and according to GAO, between 1980 and 1989 there were 3,910 oil spills form land-based pipelines that released nearly 20 million gallons of petroleum into U.S. waters, nearly twice as much as was released by the Exxon Valdez spill.[89] Congress had full knowledge of the scope of oil spills across the country and acted accordingly in strengthening the Clean Water Act in order to improve the federal capability to implement the existing prohibitions on unpermitted discharges of oil into the nation's waters or onto their shorelines. Congress took no steps to restrict the historic understanding of the scope of the Clean Water Act in 1990, nor to reverse court decisions that interpreted the scope of § 311 broadly to include small, non-navigable and non-perennial streams and tributaries.[90]

d. Courts have interpreted the scope of §311 of the Clean Water Act broadly

While the Cuyahoga River, Prince William Sound and Monangahela River are all traditionally navigable waters, the phenomenon of oil spills, and their damage to water quality and wildlife has never been limited to these waters. And, as courts have found repeatedly over the years, Congress did not intend to limit the protective scope of the Clean Water Act only to discharges of oil directly into traditionally navigable waters.

In United States v. Ashland Oil and Transportation Co., 364 F. Supp. 349 (1973), Ashland was charged with failing to report a discharge of 3,200 gallons of crude oil from a pipeline into a small non-navigable stream, tributary to Little Cypress Creek, under 311(b)(5). Ashland argued that the stream was not "waters of the United States" because it was not navigable and it did not

[87] 59 FR 34070 (July 1, 1994).

[88] NRDC, "No Safe Harbor: Tanker Safety in America's Ports" (1990).

[89] GAO Pollution from Pipelines: DOT Lacks Prevention Program and Information for Timely Response, (January 1991) GAO/RCED-91-60.

[90] See U.S. v. Ashland Oil and Transportation Co., 504 F.2d 1317 (1974); United States v. Texas Pipe Line Co., 611 F.2d 345 (1979).

have a sufficient connection to interstate commerce to be regulated by the federal government under the Commerce Clause. The district court rejected Ashland's argument, stating:

> "The facts before this Court clearly indicate that the discharge of pollutants into this stream, and the water quality of the stream itself, have a substantial effect upon and connection with interstate commerce. However, this Court is of the opinion that in prosecutions under this Act, the government is not required to establish the effect on interstate commerce of any particular discharge or of any particular stream. The legislative history of the Act is laden with reports, references and statements supporting the widely accepted conclusion that water pollution is a national problem severely affecting the health of our people, the welfare of the nation and the efficient conduct of interstate commerce.

With knowledge of this problem firmly in mind, Congress legislated a regulatory scheme for *"all waters* in the United States…" Ashland 364 F.Supp at 351 (emphasis in original)

The district court was upheld by the Court of Appeals for the Sixth Circuit. The court relied heavily upon the extensive stipulation of facts filed by the parties. The stipulation stated that Little Cypress Creek was a tributary to Cypress Creek which was itself a tributary to Pond River and Pond River was, in turn tributary to the Green River, a navigable-in-fact water. The parties further stipulated that the quality of water in Little Cypress Creek affected the produce of the farms that it drains and to which it supplies water. U.S. v. Ashland Oil and Transportation Co., 504 F.2d 1317, 1320 (1974).

In an extended and thorough discussion of the entire Clean Water Act and its legislative history, the Court of Appeals concluded that "Congress' clear intention as revealed in the Act itself was to effect marked improvement in the quality of the total water resources of the United States, regardless of whether that water was at the point of pollution a part of a navigable stream." Ashland Oil, 505 F.2d 1317, 1323. The court also carefully examined the serious impacts pollution from upstream, non-navigable sources can ultimately have on traditionally navigable waters. "Obviously water pollution is a health threat to the water supply of the nation. It endangers our agriculture by rendering water unfit for irrigation. It can end the public use and enjoyment of our magnificent rivers and lakes for fishing, for boating, and for swimming. These health and welfare concerns are, of course, proper subjects for congressional attention because of their many impacts upon interstate commerce generally. But water pollution is also a direct threat to navigation – the first interstate commerce system in this country's history and still a very important one." Ashland at 1325-1326.

The court took judicial notice of repeated fires on both the Rouge and Cuyahoga Rivers and observed: "Such pollution is an obvious hazard to navigation which Congress has every right to seek to abate under its interstate commerce powers." The court made clear its understanding of the connection between "upstream" pollution of non-navigable waters and their impacts on downstream navigable waters: "It would, of course, make a mockery of those powers if its authority to control pollution was limited to the bed of the navigable stream itself. The tributaries which join to form the river could then be used as open sewers as far as federal

regulation was concerned. The navigable part of the river could become a mere conduit for upstream waste." Ashland at 1326

A similar issue was addressed in United States v. Texas Pipe Line Company, 528 F. Supp. 728 (1978). That case involved the spilling of 575 barrels into an unnamed tributary of Caney Creek in Atoka County, Oklahoma. Texas Pipe Line challenged its liability for the discharge, in part, on the grounds that the discharge of oil was not into "navigable waters of the United States" within the meaning of the Clean Water Act.

The district court noted that Caney Creek joins Clear Boggy Creek which in turn drains into the Red River. Although the record indicated that the unnamed tributary that received the discharge was flowing at the time of the discharge, it was not established whether Caney Creek, Clear Boggy Creek or the Red River were flowing at the time of the discharge. Texas Pipe Line, 528 F.Supp at 731. Texas Pipe Line contended that for the discharge to be jurisdictional under the Act, the government had to prove that the unnamed tributary, Caney Creek, Clear Boggy Creek and the Red River were all flowing into each other at the time of the discharge into the unnamed tributary.

The court rejected defendant's claim, finding that the Act's provisions applied to "the tributaries of navigable waters and this is so regardless of whether there is a continuous flow of water from the point of an oil spill, through any intermediate tributaries and eventually into navigable waters at the specific time of the spill."

The district court's decision was upheld by the Court of Appeals for the Tenth Circuit, holding that "it makes no difference that a stream was or was not at the time of the spill discharging water continuously into a river navigable in the traditional sense." United States v. Texas Pipe Line Co., 611 F.2d 345, 347 (1979).

Thus, in the context of oil spill pollution, federal courts have long held that discharges into non-navigable tributaries, including intermittent or ephemeral tributaries, are subject to the jurisdiction of the Clean Water Act. The judicial opinions by the Courts of Appeals discussed above are still good law. There is nothing in the holding of *SWANCC* to suggest that the Supreme Court intended, in ruling narrowly on an assertion of jurisdiction based solely upon use by migratory birds, to sweep away thirty years of jurisprudence addressing Congress' intent or authority to prohibit and prevent discharges of oil and other pollutants into waters of the United States, including those that are non-navigable, intermittent or ephemeral, man-made, or lacking a direct surface connection to downstream waters.

e. An Ongoing Flood of Oil Spills

The few reported cases involving discharges of oil into waters of the United States are just the tip of the iceberg in considering how many such spills actually take place around the country. EPA recently estimated in testimony before Congress that there are approximately 24,000 oil spills each year, and "well over half" of those occur within the inland zone. In addition, the agency estimated that "[o]n average, one spill of greater than 100,000 gallons occurs every

month from oil storage facilities and the entire transportation network."[91] Many of these spills are into or near waters placed at risk for loss of Clean Water Act protection by a rulemaking or already improperly abandoned under the direction of the Guidance.

The principal source for tracking the number, type, location and effects of oil spills across the country is the Emergency Response Notification System or "ERNS" database. The ERNS database is limited in several fundamental respects: it is based upon initial reports of spills and is rarely updated or amended based upon later information; because the information is typically provided by the owner or operator of the facility, there is some incentive to downplay the seriousness of the spill. Nevertheless, even the imperfect anecdotal information provided by ERNS provides a useful snapshot of the types of oil spills that persist across the nation, and the importance and value of the Clean Water Act's requirements for SPCC plans and Facility Response plans as well as the liability trust fund for states, federal authority to recover cleanup costs from liable owners or operators of facilities, and federal authority to collect penalties and conduct facility inspections.

Here are just three of the spills described in the ERNS database from 2002[92]:

On December 19, 2002, 7,500 gallons of Number 2-D fuel oil discharged from an oil/water separator when a tank truck operator accidentally filled the oil/water separator instead of the facility's holding tank. 3,000 gallons of the material entered French Creek in Avon, Ohio.

On January 10, 2002, 1,300 gallons of number two fuel oil was spilled in Memphis, TN. The material was in a generator fuel tank, when the inline fuel filter popped off and allowed the material to release. The material overflowed secondary containment, flowed across a parking lot, and proceeded to enter a storm drain, which drains into the Loosahatchi River.

On January 9, 2002, 2,500 gallons of number two fuel oil were discovered to have spilled from a storage tank when the valve malfunctioned. The failed valve caused one tank to pump into a second tank, which caused the second tank and secondary containment to overflow. An unknown amount of the material has entered the storm drain, which drains into the Old Muggy River.

The ERNS database also contains reports that illustrate the benefits of the Clean Water Act's requirements for SPCC plans, secondary containment structures, and facility response plans. For example, in Galesburg, Illinois, on January 28 of this year, 40,000 gallons of fuel oil was

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[91] Testimony of Timothy Fields, Jr. Assistant Administrator, Office of Solid Waste and Emergency Response before the Subcommittee on Water Resources and the Environment of the Committee on Transportation and Infrastructure, U.S. House of Representatives, February 9, 2000.

[92] Reports from the ERNS database can be viewed at the website of the National Response Center as National Response Team Incident Summaries. *See* http://www.nrc.uscg.mil/insum.

released from a storage tank due to a pipe failure. All the material was reportedly released into secondary containment and there were no offsite impacts.

One of the most prominent weaknesses of the ERNS database and the National Response Summaries is that they rarely report on the damages to water, land, wildlife and public health caused by the spills. To our knowledge, no comprehensive repository of such damage assessments is available. Nevertheless, it is well understood that the consequences of oil spills for wildlife can be devastating. According to EPA, "in the United States there are more than 70 spills reported on an average day. When oil spills occur, plants and animals will be contaminated and some will be unable to survive. Whether they occur in oceans, estuaries, rivers, lakes, ponds, or on land, they can affect algae, plants, invertebrates, fish, amphibians and reptiles, birds, and mammals. These species and communities are at risk of smothering, hydrocarbon toxicity, hypothermia, and chronic long-term effects."[93]

However, it is possible to gain insight into the costs of a small number of spills by consulting alternative sources including the EPA Oil Spill Program's own Oil Spill Program Update. The newsletter includes reports of some of the spills reported from EPA's regional offices across the country. These reports sometimes contain descriptions of fish kills and other harm to wildlife, threats to drinking water supplies and, occasionally injury or death to nearby citizens. For an example of the latter, see the July and October 1999 Updates, describing three fatalities resulting from the Olympic pipeline leak of 277,000 gallons of fuel and subsequent explosion along Whatcom Creek in Bellingham, Washington on June 10, 1999.

In addition, we believe that each of EPA's regional offices is likely to have many spill reports, photographs and other records that would themselves paint a powerful portrait of the extent to which oil spills pose a persistent threat to the integrity of the nation's waters as well as their harm to public health and wildlife.

In short, 30 years after the passage of the Clean Water Act, there is an ongoing epidemic of oil spills across the country. Spills into wetlands, seasonal streams and non-navigable tributaries continue to harm public health and the environment. In light of this reality, it defies common sense or understanding that the agencies would even contemplate withdrawal of existing Clean Water Act protections from any of the nation's waters.

f. Current Legal Challenges to the New SPCC Rules

SPCC plans are the regulatory centerpiece of the Oil Program's effort to meet the goal of § 311 to prevent oil spills from storage facilities into (or near) the nation's waters. The initial regulations requiring certain facilities to develop Spill Prevention, Containment and Countermeasure (SPCC) plans to prevent any discharge of oil into or upon navigable waters of

[93] EPA Office of Emergency and Remedial Response, "Understanding Oil Spills and Oil Response" p.21, (December 1999) EPA 540-K-99-007

the United States or adjoining shorelines date from 1973.[94] Although proposed revisions and clarifications were published by EPA in 1980, 1991, 1993 and 1997[95], an update to the original SPCC rules was only finalized in July 2002.[96] For a facility to be subject to the SPCC rule it must 1) be non-transportation-related; 2) must have an aggregate aboveground storage capacity greater than 1,320 gallons or a completely buried storage capacity greater than 42,000 gallons; and 3) there must be a reasonable expectation of a discharge into or upon navigable waters of the United States or adjoining shorelines.[97]

In addition to the written spill prevention plans, SPCC regulations contain provisions for covered facilities to use various methods of preventing and controlling oil spills including: tank leak detection systems, spill/overfill protection, pipe external protection, secondary containment, as well as formal training of employees.

EPA has determined that a facility's compliance with even one of four SPCC provisions: (1) tank leak detection systems; (2) spill/overfill protection systems; (3) pipe external protection; and (4) secondary containment "had a significant effect on reducing the annual number of oil spills, the annual total volume of oil spilled, the annual total costs of cleaning up the spilled oil, and the degree of off-site migration."[98]

The American Petroleum Institute (API), Marathon Oil, and the Petroleum Marketers Association have filed legal challenges against the July 17, 2002 SPCC rule. In their complaints, both API and Marathon Oil argue that the revised SPCC rule reaches too far, regulating facilities that are outside the scope of the Clean Water Act. In its complaint, API argues that, "[u]nder the reasoning of the Supreme Court, necessary to its decision in *SWANCC*, the term 'navigable waters' extend only to waters that are, have been, or could reasonably be made, navigable in fact ('traditional navigable waters') and wetlands adjacent to traditional navigable waters." API further asserts that, because the definition of "navigable waters" in the 2002 SPCC rule includes waters that "lie across the border of two states" or whose "'use'" could affect interstate or foreign commerce, it is in excess of the Administrator's authority under the Clean Water Act.

Marathon Oil does not base its assertion that EPA has overstepped its jurisdictional authority on the *SWANCC* decision. Rather, it simply asserts that the definition of "navigable waters" "extends only to waters that are, have been, or could reasonably be made, navigable in fact

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[94] 38 FR 34164 (December 11, 1973).

[95] 56 FR 54612 (October 22, 1991), 58 FR 8824 (February 17, 1993), 62 FR 63812 (December 2, 1997).

[96] 67 FR 47042 (July 17, 2002).

[97] US EPA, *Spill Prevention, Control and Countermeasure (SPCC) Regulation: A Facility Owner/Operator's Guide to Oil Pollution Prevention* (undated).

[98] US EPA, *Results of 1995 Survey of Oil Storage Facilities (July 1996), "Analysis of the Effectiveness of EPA's SPCC Program on Spill Risk*" p. 4.

('traditionally navigable waters') and wetlands adjacent to navigable waters." Marathon then asserts that because the definition of "navigable waters" in the SPCC rule reaches beyond traditionally navigable waters and their adjacent wetlands, that the rule exceeds the Administrator's authority under the Clean Water Act.

Thus, API and Marathon Oil are reading the Supreme Court's holding regarding the assertion of jurisdiction over intrastate, non-navigable, "isolated" waters solely upon their use by migratory birds as justification for removing all federal protections from oil spills for all waters that are not traditionally navigable, including interstate waters. This is, of course, an extreme and absurd reading of both the *SWANCC* decision and the intent of Congress.

Perhaps even more troubling than the legal claims filed by API and Marathon Oil concerning the jurisdiction of the CWA is the fact that EPA has taken comment upon a proposal to postpone the compliance deadline for the regulatory provisions of the 2002 SPCC rule for at least one year, and entered settlement discussions with the plaintiffs that could, among other things, "resolve" the issue of the SPCC rule's jurisdiction.

If the argument of API, Marathon Oil, and all the other regulated industries that seek to escape the Clean Water Act's requirements, is accepted by EPA and the Corps in settlement discussions, or in the course of a rulemaking on the definition of "waters of the United States," or by a federal court as a result of litigation, the effectiveness of the oil spill provisions of the Clean Water Act will be dramatically curtailed as previously regulated facilities abandon or fail to adopt spill prevention measures and response plans. In addition, the oil spill cleanup and restoration costs for states could increase, as they arguably would no longer have access to the oil spill trust fund to reimburse cleanup costs for spills into waters that are no longer considered "waters of the United States."

The jurisdictional claims of API and Marathon Oil are without merit. EPA should vigorously contest the oil industry's challenge to the agency's jurisdiction under the Clean Water Act.

g. Potential Impacts of Withdrawing Jurisdiction for Prevention of Oil Spills: Some Questions to Consider

We are concerned that EPA has not thoroughly considered the potential consequences of withdrawing Clean Water Act authority, including the provisions of § 311, from currently-protected waters. Considering only the withdrawal of provisions of § 311 from any of the waters that have historically been protected under the Act raises significant questions. For example, for spills into waters no longer protected (or their adjoining shorelines), will mandatory reporting requirements still apply? If not, is there a substitute mechanism in place to ensure that some state or federal authority is notified of the spill? Will EPA retain authority to conduct cleanups that pose an imminent and substantial hazard as it currently does under § 311(d)? Will EPA retain the authority to recover cleanup costs, including natural resource damages, from owners or operators for discharges into non-jurisdictional waters?

Will states and tribes be able to obtain reimbursement through the OSLTF for the costs of clean up and restoration of waters (including natural resource damages) polluted by oil spills that are no longer considered "waters of the United States?" Will EPA retain authority to levy administrative penalties, or collect civil or criminal penalties for future discharges into non-jurisdictional waters? Will EPA have inspection authority for facilities that are no longer sufficiently close to jurisdictional waters to pose a reasonably likely threat of discharge? How will the national, regional and local contingency planning structures be affected by withdrawal of jurisdiction from a large class of the nation's waters?

Based upon the litigation discussed above, we anticipate that any change to the existing rules governing jurisdiction of § 311 will result in aggressive litigation by the oil industry and others to interpret the "new" definition of "waters of the United States" as narrowly as possible. The regulated community could argue that, for any spills that occur in waters no longer considered "waters of the United States," none of the provisions of 311 apply. Has EPA thoroughly considered the consequences for the environment of opening up this Pandora's box?

What will be the likely effects on the economy and the environment from increased and unregulated oil spills? What harm does the agency anticipate for the public, either via fires and explosions from oil on our waters, or from poisoning of drinking water supplies? What will be the impacts to wildlife, including threatened and endangered species of increased oil spills? How will water-dependent businesses and local, state, regional and national economies be affected by oil spills threatening the viability of recreational waters, waters containing fish and shellfish, and waters that draw tourism?

What will be the costs paid by the American taxpayer? In our view, it seems likely that taxpayers could suffer at both the state and federal levels. Federal authority to recover cleanup costs directly from the owner or operator responsible for spills into waters of the United States could shrink along with the scope of the definition of waters of the U.S. As a result, the citizens whose water may increasingly be fouled by oil spills will be required to foot more of the bill for cleaning up those oil spills into "isolated" waters.

We urge EPA to consider these questions seriously and fully evaluate the potential consequences of withdrawing existing Clean Water Act protections from oil spills for an unspecified number of the nation's waters.

h. Oil Pollution in the United States: Back to the Future?

If EPA abandons protection from oil spills for an undetermined class of wetlands, streams, ponds and other waters, oil pollution in traditionally navigable waters is sure to increase. Future spills into headwaters, intermittent streams, non-navigable tributaries or wetlands, whether or not they are arbitrarily and unscientifically classified as "isolated" by EPA and the Corps, will ultimately flow back down into the pseudo-protected "traditionally navigable waters." Eventually, the oil will reach the Cuyahoga, Rouge and Monangahela Rivers and hundreds of other navigable rivers, bays and other waters, possibly even Prince William Sound. There they will poison drinking water, kill wildlife and, possibly, burst into flame. We will have come full circle.

2. Implications for Clean Water Act § 401 Certification Program

Prior to enactment of the Federal Water Pollution Control Act (FWPCA) Amendments of 1972, federal efforts to control water pollution primarily centered on assisting states in the identification and attainment of water quality standards. Difficulties in establishing scientifically reliable and legally defensible abatement requirements for point sources led Congress to shift the focus of water pollution control efforts to technology-based effluent limitations. The pre-1972 water quality standards system was preserved, however, both as a measure of program effectiveness and as a guide to the extensive water quality planning process established by the CWA. Water quality standards also serve as a secondary tool for regulating point source discharges.

Section 401 fits into this scheme by requiring "any applicant for a Federal license or permit for conducting any activity . . . which may result in any discharge to the navigable waters" to secure from the state in which the discharge originates a certification that the discharge will comply with several provisions of the CWA related to effluent discharge limitations and water quality standards. If the state denies water quality certification, the federal permitting agency may not, regardless of other considerations, grant the applicant a permit for the proposed activity. The states' most important role in the § 401 certification process – because the states may not impose their own technology based effluent limitations and performance standards unless they are more stringent than EPA's requirements – is to determine whether an applicant for a federal license or permits has demonstrated compliance with state water quality standards and, if not, to deny or "condition" certification so that the activity will comply with those standards.

In addition to dramatically limiting the reach of the 402, 404, and TMDL programs, restricting the jurisdiction of the Act will cripple the states' ability to manage their waters when affected by federally permitted or licensed activities. And the states covet their § 401 authority. Last summer, for instance, the Western Governors' Association unanimously passed a policy resolution which makes it abundantly clear how much the Western states rely on their ability to condition federally permitted projects to prevent state water quality standards from being violated by federal activities.[99/] As the Western Governors noted last summer in response to proposed amendments to the CWA that would have limited the reach of § 401:

> [s]tate involvement in administration of the Clean Water Act is essential to assure that local goals are met at the same time that water quality is protected. States consider land use, economic development, and other locally-adopted policies in their decisions regarding the allocation of the privilege to discharge waste. Normally, no one discharger is given the privilege to use up all the capacity of a water body to assimilate potential discharges; to do so would result in prohibitive pollution-abatement costs for other potential dischargers, thereby curtailing much desired development. . . .
> . . . .

[99/] Western Governors' Association, Policy Resolution 02-04, *State Authority Regarding the Federal Hydropower Licensing Process*, June 25, 2002.

> Congress should refrain from weakening or removing a vital tool for states to influence [federally permitted and licensed activities] within their borders and upon their waters. ***Section 401 of the CWA is operating as it was intended and should be retained without amendment.***
>
> ***Certification authority under § 401 of the CWA is especially important at this time***. Our states are working closely with federal and private partners to restore fish populations under the Endangered Species Act and, in the face of consent decrees, to develop total maximum daily (pollutant) loads (TMDLs) for discharges into state waters so as to bring them into compliance with water quality standards. It almost goes without saying that by eliminating coverage under 401 for so called "isolated" waters and wetlands or for intermittent and ephemeral waters and wetlands, the administration will undermine the states' ability to restore endangered fish species and balance pollutant loadings under the CWA's TMDL program. But it hasn't gone without saying: the Western Governors have clearly signaled in this unanimous, non-partisan resolution that maintaining the reach and authority of § 401 is a very high priority for them.

But the importance of the water quality certification authority is not limited to the Western states. The National Association of Attorneys General adopted a resolution in the spring of 1998 in response to proposed amendments to the CWA's § 401, and could not have been more clear, resolving that the National Association of Attorneys General:

> Reaffirms NAAG's support as expressed in the 1991 resolution for the States' broad authority in certifying federally licensed projects' compliance with state programs authorized under the Clean Water Act;
>
> Supports legislation that preserves the current scope of the Clean Water Act, assuring that the States may continue their comprehensive administration of their authorized water quality programs;
>
> **Opposes any legislation which would limit or hinder the States' authority and application of ¶ 401 of the Clean Water Act** . . . . [100/]

It would be especially incongruous for EPA to pull the rug from under the states on this score, given that during the prior Bush administration, it went to great lengths to *stimulate* the use of § 401 by the states to protect wetlands. In its publication *Wetlands and 401 Certification, Opportunities and Guidelines for States and Eligible Indian Tribes* (April 1989), EPA stressed the importance of the 401 process to states and eligible tribes, urging them to take advantage of federal water quality certification to protect their wetlands. It recommends a host of actions and provides a wealth of information to aid them in doing so, including advice on jurisdiction, the

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[100/] National Association of Attorneys General, *Resolution Supporting the States' Authority under Section 401 of the Clean Water Act* 2 (Spring Meeting, March 11-13, 1998, Washington, D.C.).

scope of review, appropriate conditions, and developing 401 regulations. The agency couldn't have been more emphatic about the critical role of 401:

> *Clearly, the integrity of waters of the U.S. cannot be protected by an exclusive focus on wastewater effluents in open waters*. While the federal § 404 program addresses many discharges into wetlands, and other federal agencies have environmental review programs which (sic) benefit wetlands, these do not substitute for a State's responsibilities under § 401. A State's authority under § 401 includes consideration of a broad range of chemical, physical, and biological impacts. The State's responsibility includes acting upon the recognition that wetlands are critical components of healthy, functioning aquatic systems.
>
> . . . .
>
> In States without a wetlands regulatory program, the water quality certification process may be the only way in which a State can exert any direct control over projects in or affecting wetlands. It is thus critical for these States to develop a program that fully includes wetlands in their water quality certification process.
>
> But even in States which (sic) have their own wetlands regulatory programs, the water quality certification process can be an extremely valuable tool to protect wetlands. First, most State wetland regulatory laws are more limited in the wetlands that are subject to regulation than is the Clean Water Act. The Clean Water Act covers all interstate wetlands; wetlands adjacent to other regulated waters; and all other wetlands, the use, degradation or destruction of which *could* affect interstate or foreign commerce. ***This definition is extremely broad and one would be hard pressed to find a wetland for which it could be shown that its use or destruction clearly would not affect interstate commerce***. Federal jurisdiction extends beyond that of States which (sic) regulate only coastal and/or shoreline wetlands, for instance. And in States that regulate inland wetlands, often size limitations prevent States from regulating wetlands that are subject to federal jurisdiction.[101/]

We cannot say it better than the states or EPA. "Clearly, the integrity of waters of the U.S. cannot be protected by an exclusive focus on wastewater effluents in open waters," and the states cannot protect their water quality standards if federally permitted or licensed activities affecting so called "isolated" wetlands or intermittent or ephemeral streams can go forward without review and conditioning authority by the states.

3. Implications for Clean Water Act § 402 Permitting Programs

Changing the definition of "waters of the United States" would have devastating impacts on the NPDES program, the principal CWA regulatory program to control discharges of pollutants into waterways. The NPDES program is viewed as the most successful of CWA programs, estimated

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[101/] Environmental Protection Agency, *Wetlands and 401 Certification: Opportunities and Guidelines for States and Eligible Indian Tribes* (Office of Water (A-104F)(April 1989), at 6, 9 (footnotes omitted; emphasis in bold added, other emphasis in original).

by EPA in 1989 as responsible for reducing discharges by point sources of toxic organic pollutants by 99% and of toxic metals by 98%.[102] More recent EPA data contained in its draft Effluent Guidelines Strategy estimate that Clean Water Act technology standards implemented through the NPDES permitting program:

> Prevent discharge of almost 700 billion pounds of pollutants each year. Of this total over 1 billion pounds are toxic pollutants such as heavy metals, over 470 billion pounds are nonconventional pollutants such as nutrients and salts, and almost 220 billion pounds are conventional pollutants such as suspended solids. These pollutants include chemicals known to cause or contribute to cancer, impact reproductive health, hinder mental and motor development in children, impact the central nervous system, and damage major organs such as the liver and kidney.[103]

There are several ways in which the NPDES program is linked to the definition of waters of the United States, including in the definition of "discharge of a pollutant," 33 U.S.C. § 1362(12), which then links with the prohibition on unpermitted discharges in § 301(a) and with the permitting authority in § 402(a). 33 U.S.C. §§ 1311(a), 1342(a).

There is currently no systematic way to link current NPDES permit holders (or even major dischargers) to the types of waters that are at risk of losing protection in a federal rulemaking. That information could be made available by the federal government through linking USGS's National Hydrography Database with the Permit Compliance System (PCS) or, even better, the Enforcement and Compliance History Online (ECHO) database that is available on-line and searchable by the public, but the federal government has not yet done so. EPA should analyze and make public all information available through federal databases that would identify NPDES dischargers into waterbodies that may lose protection as a result of a rulemaking. Since a number of industries argue that the definition of waters of the United States should be limited to navigable-in-fact waters and immediately abutting wetlands,[104] information on NPDES dischargers into all other types of waters should be collected and made public in a searchable database.

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[102] EPA, *Report to Congress: Water Quality Improvement Study*, Office of Water Regulation and Standards (1989), pp. 7-8.

[103] U.S. EPA, *Draft Strategy for National Clean Water Industrial Regulations,* www.epa.gov/guide.strategy.

[104] See., e.g, V.S. Albrecht and S.M. Nickelsburg, "Could *SWANCC* be Right? A New Look at the Legislative History of the Clean Water Act," 32 ELR 11042 (Sept. 2002); Comments of Pacific Legal Foundation, "Regarding the United States Environmental Protection Agency and United States Army Corps of Engineers' Advance Notice of Proposed Rulemaking on the Clean Water Act Regulatory Definition of "Waters of the United States," April 17, 2003 [sic].

While we therefore cannot begin to estimate the full environmental and human health impacts of abandoning these waters to unlimited pollutant discharges, we certainly know that doing so will pollute those waters and everything to which they are hydrologically connected with toxic pollution, oil and grease, oxygen depleting substances, and other substances that will adversely impact human health and the environment.

Based on the limited information we have so far, however, there are thousands of NPDES permit holders authorized to discharge into waters that are potentially affected by this rulemaking, including intermittent and ephemeral streams, nontidal non-adjacent wetlands, creeks that are not navigable in fact, natural ponds, manmade conveyances, etc. For example, the state of Missouri estimates that 82.5% of its NPDES permittees discharge into unclassified streams that are intermittent or ephemeral.[105/] Missouri also notes that "many headwater and intermittent streams have regulated sewage discharge permits associated with them."[106/] California notes that "many [municipal, industrial, stormwater, and confined animal] discharges are to ephemeral and intermittent ("effluent –dominated") streams," and that "any effluent discharged into an ephemeral or intermittent stream will eventually drain to navigable waters."[107/] In addition, an employee of the California Regional Water Quality Board (based on this individual's expertise, but not speaking for the agency as a whole) identifies the California Mojave River Fish Hatchery, Victor Valley Wastewater Reclamation Authority, and several phase II stormwater communities (County of San Bernadino, City of Victorville, County of Los Angeles, and City of Lancaster) as current NPDES dischargers that will be potentially outside the scope of Clean Water Act protection under this rulemaking.

We provide detailed information on one type of NPDES discharge that will almost certainly be affected by a rule change -- concentrated animal feeding operations.

Environmental and Public Health Impacts of Discharges from CAFOs

Today, large-scale industrial animal factories, which raise millions of animals and produce over 500 million tons of waste annually, dominate animal production in the United States.[108/] The proliferation of concentrated animal feeding operations (CAFOs) has resulted in significant environmental degradation and threats to public health.

[105/] Comments of Missouri Department of Natural Resources on OW-2002-0050 (March 5, 2003), p.1.

[106/] Comments of Missouri Department of Conservation on OW-2002-0050 (March 12, 2003), p. 3.

[107/] Comments of California State Water Resources Control Board on OW-2002-0050 (March 14, 2003), p. 9.

[108/] *See* preamble, *National Pollutant Discharge Elimination System Permit Regulation and Effluent Limitation Guidelines and Standards for Concentrated Animal Feeding Operations (CAFOs)*; Final Rule, 68 Fed. Reg. 7176, 7179 (February 12, 2003).

Nutrient pollution threatens the future of this country's waterways. Excessive nutrients are responsible for almost twenty percent (20%) of reported water quality problems in impaired rivers and streams and fifty percent (50%) of impaired lake acres.[109] Nutrients in animal manure cause eutrophication and toxic algal blooms that harm recreational waters, kill fish, and alter the species composition of our coastal fisheries.[110] CAFOs contribute to water pollution when waste lagoons break, spill, or fail, releasing wastewater into rivers, lakes, and streams.[111] In fact, over 1,000 spills occurred at feedlots in just ten states between 1995 and 1998, resulting in the death of more than 13 million fish.[112] In addition, outbreaks of the toxic microbe, *Pfiesteria piscicida*, have been linked to nutrient pollution from animal waste in North Carolina and Maryland.[113] *Pfiesteria* has killed over a billion fish in coastal waters in North Carolina alone.[114] Discharges of animal waste from CAFOs also contribute to the "dead zone" in the Gulf of Mexico, more than 8,000 square miles of water devoid of sufficient oxygen to support aquatic life.[115]

Many CAFOs were established without an adequate land base to make environmentally sound use of manure as nutrient inputs for agricultural operations. As a result, CAFOs often chronically over-apply nutrients, salts, and other waste components, leading to significant surface and ground water degradation and soil deterioration.[116] The Natural Resources

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[109] *See* U.S. Environmental Protection Agency, *National Water Quality Inventory*: *2000 Report to Congress* (2002).

[110] *See generally*, Robbin Marks, *Cesspools of Shame. How Factory Farm Lagoons and Sprayfields Threaten Environmental and Public Health*, NRDC and the Clean Water Network (July 2001).

[111] *See generally*, Merritt Frey et al, *Spilling Swill*, Clean Water Network (1999).

[112] *See* Merritt Frey, *Spills and Kills, Manure Pollution and America's Livestock Feedlots*, Clean Water Network. August 2000.

[113] *See* Minority Staff of the U.S. Senate Committee on Agriculture, Nutrition and Forestry, *Animal Waste Pollution in America: An Emerging National Problem*, Washington, D.C. (December 1997), at 10.

[114] *See* Southern Environmental Law Center, "*Industrial Hog Production: North Carolina*," http://www.southernenvironment.org/act_hogs_background.html.

[115] *See* Mark Schleifstein, "*Gulf's dead zone has gone Godzilla, expert says; Oxygen-deprived area reaches record size*," *The Times-Picayune* (New Orleans), July 27, 2001.

[116] *See* Laura Jackson & E. Gilbert, *Swine Manure Management Plans in North-Central Iowa: Nutrient Loading and Policy Implications*, *Journal of Soil & Water Conservation*, vol. 55, no. 2 (2000)(study of a six square mile area of Hamilton County, Iowa, found that the land area required for agronomic application of phosphorous was 9.4 times the amount of land that was being used and 6.2 times the available land); *see also* J. Schimmel, R. Levins, & D. Keeney, *Phosphorous Balance in Minnesota Feedlot Permitting*, Generic Environmental Impact

Conservation Service has identified numerous areas around the country where the nutrient load from animal production is significantly out of balance with the available land base.[117] Furthermore, ammonia emissions from open-air lagoons and sprayfields redeposit nitrogen on land and waterbodies, adding to nutrient pollution.[118]

Withdrawing Jurisdiction over Some Set of Waters Could Legalize Discharges of Animal Wastes from CAFOs.

The Clean Water Act prohibits the discharge of any pollutant except under the terms of a permit.[119] "Discharge of pollutants" is defined as any addition of pollutants from a point source into navigable waters.[120] The Clean Water Act defines a point source as "any discernable, confined and discrete conveyance, including but not limited to any ... *concentrated animal feeding operation*, or vessel or other floating craft, from which pollutants are or may be discharged."[121] Thus, when a discharge comes from a CAFO, it is a point source discharge.

Large-scale hog, dairy, chicken, and beef operations across the country discharge into traditionally navigable rivers, lakes, and streams, but they also discharge into non-navigable, intrastate waters, including wetlands, natural ponds, ephemeral and intermittent streams, and larger non-navigable tributaries. While the ANPRM contemplates redefining many of these waterways as "isolated" waters, and thereby considers pushing these waterways outside the protective ambit of the Clean Water Act, by no means are such waterways "isolated." In fact, they serve as integral parts of watersheds, performing essential functions affecting the health of water systems. Furthermore, in many areas of the country, CAFOs do not discharge directly to

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Statement on Animal Agriculture in Minnesota: Final Technical Working Paper on Economic Structures, Profitability and External Costs. State of Minnesota Environmental Quality Board (June 29, 2001) (analysis of 3,607 Minnesota feedlot permits indicated that the larger the operations, the greater the excess phosphorous per acre, Minnesota feedlots are currently over-applying 1.4 million pounds of surplus phosphorous every year.). California's 1998 Clean Water Act § 305(b) report listed 41 California ground water basins impaired by salinity, chlorides, and/or total dissolved solids from animal operations. State Water Resources Control Board, 1998 California State Water Resources Control Board (May 1999).

[117] *See* Neal Gollehon *et al.*, *Confined Animal Production and Manure Nutrients*, USDA Agriculture Information Bulletin No. 771 (June 2001); Robert Kellog, *et al.*, Manure Nutrients Relative to the Capacity of the Cropland and Pastureland to Assimilate Nutrients, USDA Pub. No. NPS 00-0579 (December 2000).

[118] *See* Eldridge R. Collins, Jr., *Ammonia Emissions From a Large Swine Production Complex*, The American Society of Agricultural Engineers, Chicago, Illinois (December 18-20, 1990).

[119] *See* 33 U.S.C. § 1311(a).

[120] 33 U.S.C. § 1362(12)(A).

[121] 33 U.S.C. § 1362(14) (emphasis added)

surface water, but rather discharge to groundwater that is hydrologically connected to surface water.[122/] Other CAFOs discharge to man-made conveyances such as culverts, dams, canals, and agricultural ditches, which drain into larger rivers, lakes and streams and thus can contribute substantial pollution loads to our nation's waterways.

Federal courts have recognized that discharges from CAFOs to man-made conveyances violate the CWA.[123/] Courts have also recognized that CWA jurisdiction extends to discharges from CAFOs into groundwater that is hydrologically connected to surface water.[124/] Clearly, redefining the scope of navigable "waters of the United States" under the CWA could undermine federal regulation oversight of these facilities and the ability to both prevent discharges to ditches, canals, and groundwater that are connected to surface waters, as well as force compliance with no discharge requirements through federal and citizen enforcement action.

Under current EPA regulations and federal case law defining waters of the U.S., very few CAFOs are able to demonstrate that they do not discharge from the production area or land application area to waters of the U.S. or to groundwater that is hydrologically connected to waters of the U.S. Thus, most CAFOs are required to obtain NPDES permits to control and prevent water pollution. However, in the event EPA weakens its definition of waters of the U.S. as contemplated in the ANPRM and explicitly redefines man-made conveyances, such as agricultural ditches and canals, as "isolated" waters, a greater number of CAFOs could escape NPDES permitting requirements. As a result, many large-scale CAFOs that are substantially contributing to the impairment of our waterways will continue to operate without any federal oversight of their activities.

In addition to those entities that currently discharge toxins, manure, sewage, industrial effluent and other pollutants into currently protected waters that may lose Clean Water Act protection, it is important to keep in mind as well that other currently permitted dischargers would try to take advantage of the huge loophole that would be created by excluding manmade conveyances, such as canals, to exempt themselves from Clean Water Act coverage. Facilities could change the configuration of their discharges so that the "receiving water" was a canal, non-adjacent wetland, or perhaps even a pipe so that they could argue that they no longer discharged into waters of the U.S. and were no longer required to have a permit or to meet Clean Water Act treatment or water quality standards. Currently, prosecutors bring criminal actions against entities that use such mechanisms to evade Clean Water Act regulation, but if this rulemaking proceeds, enforcement entities might become powerless to prevent even such blatant circumvention of minimum Clean Water Act standards.

[122/] See, *e.g.* B. Katz and H. Hornsby, *A Preliminary Assessment of Sources of Nitrate in Springwater in Suwanee River Basin, Florida,* U.S.G.S. Report 98-69 (1998)

[123/] *See e.g., Community Association For Restoration of the Environment v. Henry Bosma Dairy*, 305 F.3d 943 (9th Cir. 2002); *Idaho Rural Council v. Bosma*, 143 F. Supp. 2d 1169, 1179 (D. Idaho 2001).

[124/] *See Idaho Rural Council v. Bosma*, 143 F. Supp. 2d 1169 (D. Id. 2001).

As recognized by several of the states that have already filed comments, changes to the scope of the Clean Water Act would be detrimental not only to drinking water quality, surface water quality, water quantity, wildlife habitat, flooding control regimes, etc., but it would even be detrimental to the interests of all those NPDES permitted entities who continue to discharge into navigable-in-fact waters. Those dischargers can expect to have increasingly stringent water-quality based effluent limitations with which to comply since the receiving water would be getting dirtier, the headwaters and wetlands would no longer be filtering the pollution, and the universe of responsible parties would shrink. They would be left holding the bag.

4. Implications for Clean Water Act Antidegradation Program

The goal of the CWA "is to restore and maintain the chemical, physical, and biological integrity of the Nation's waters." 33 U.S.C. § 1251. The integrity of rivers and streams (including navigable rivers) depends on the complex interrelationship between headwaters and the larger streams they serve.

Specific existing functions of headwaters streams with a direct and immediate effect on downstream waters include but are not limited to: hydrologic retention capacity and contribution to the base flows of larger streams; reduction of frequency and intensity of flooding; retention of sediment and improvement of aquatic habitat; temperature maintenance of downstream waters; establishing base-level chemical composition of the overall watershed; nutrient and energy retention and measured export downstream; buffering of nonpoint source pollution; supplying food resources to riparian and downstream ecosystems; providing a thermal refuge at critical life history stages or during critical times of the year for aquatic life; providing vital spawning habitats and habitat for juvenile fishes; and providing critical habitat for a range of unique and threatened species.

Thus, healthy and intact headwaters play a critical role in the success and vigor of the larger watershed and ecosystem. The protection of ephemeral, intermittent, and other headwater tributaries is crucial to the protection of the chemical, physical, and biological integrity of downstream waters. Clean Water Act jurisdiction has been the foundation of that protection. In particular, States must establish water quality standards in order to "protect the public welfare," "enhance the quality of water," and "taking into consideration their use and value for public water supplies, propagation of fish and wildlife, recreational purposes….taking into consideration their use and value for navigation." 33 U.S.C. § 1313(b)(2)(A). One of these standards, antidegradation policy and implementation procedures, requires states to assess activities that may lower the quality of the states' waters. 33 U.S.C. § 1313(d)(4)(B); 40 C.F.R. §§ 131.6(d), 131.12(a). This assessment relies on an accurate and predictable knowledge of baseline water quality and upstream sources of pollution. A jurisdictional change would undermine any attempt to accurately assess baseline water quality. Upstream activities would unpredictably discharge any amount of pollutant, toxin, dirt, rock, or contaminated fill – the sources unidentified and unmonitored – creating huge unanticipated declines in water quality. These discharges would not only devastate headwater streams but also undermine attempts to write permits protective of water quality downstream.

The federal antidegradation policy establishes three levels of water quality protection: Tier 1, Tier 2, and Tier 3. Tier 1 protection establishes the minimum protection for all waters and requires that "[e]xisting instream water uses and the level of water quality necessary to protect the existing uses shall be maintained and protected." 40 C.F.R. § 131.12(a)(1). Obviously, eliminating key antidegradation existing use protections for ephemeral, intermittent, and other headwater tributaries would destroy the public uses of these streams for recreation, support of aquatic and other wildlife life, and, in some rural communities, drinking water.

However, as described above, the existing uses of ephemeral, intermittent, and other headwater tributaries do not exist in a vacuum but are an essential part of the health and maintenance of the larger watershed and navigable rivers. EPA recognizes this connection and in jurisdictional waters requires "[in] designating uses of a water body and the appropriate criteria for those uses, the State shall take into consideration the water quality standards of downstream waters and shall ensure that its water quality standards provide for the attainment and maintenance of the water quality standards of downstream waters." 40 C.F.R. § 131.10 (b). Thus, eliminating existing and designated uses protections for the headwaters jeopardizes the antidegradation and use protections guaranteed for all waters through 40 C.F.R. § 131.12(a)(1).

Tier 2 antidegradation protection provides that, where the water quality of a water body exceeds that necessary to support aquatic life and recreation, that level of water quality shall be maintained unless the state determines that "allowing lower water quality is necessary to accommodate important economic or social development in the area in which the waters are located." 40 C.F.R. § 131.12(a)(2). In addition, "the State shall assure that there shall be achieved the highest statutory and regulatory requirements for all new and existing point sources and all cost-effective and reasonable best management practices for nonpoint source control." Id.

Eliminating Tier 2 protections from high quality headwater streams would eliminate the need to conduct a rigorous and open public review process to assure that the economic and social benefits of the proposed activity outweigh the costs of degrading the water. It would also eliminate the need to consider less degrading alternatives to the discharge. Ultimately, discharges could take place even in the face of obvious and devastating public harm (including harm to navigable waters involved in interstate or foreign commerce) or if reasonable no discharge or less degrading alternatives existed.

Eliminating Tier 2 protections in headwaters streams would significantly impact Tier 2 reviews downstream by reducing a stream's assimilative capacity to a greater degree than would have occurred with upstream antidegradation protection in place. The reduction in assimilative capacity would reduce or *eliminate* the number of socially beneficial projects allowed to proceed without a violation of water quality standards and without prematurely triggering prohibitions on discharges that "cause, have the reasonable potential to cause, or contribute to an excursion above any State water quality standard." 40 C.F.R. § 122.44 (d). In essence discharges outside the jurisdiction of the Clean Water Act would be able to use a valuable public resource – public waterways - at their discretion for private gain at public expense.

Tier 3 protection provides that, "[w]here high quality waters constitute[s] an outstanding National resource, such as waters of National and State parks and wildlife refuges and waters of exceptional recreational or ecological significance, that water quality shall be maintained and protected." 40 C.F.R. § 131.12(a)(3). Failure to absolutely protect headwater tributaries would lead to serious and significant degradation of Outstanding Natural Resource Waters for the many reasons outlined for Tier 1 and 2 protections. As some of the most valuable water resources in the country, their future and very existence could not be assured.

5. Implications for federal assistance to state water pollution control programs

In addition to actually running NDPES programs or portions of state NPDES programs in a number of states and running the § 404 program in most states (every state except NJ and Michigan), the federal government provides financial and technical assistance to all states in designing and implementing their programs to protect waters of the United States from pollution under the Clean Water Act.

Water pollution control program grants: Water pollution control program grants (§ 106 grants) provide financial assistance to states for permitting, pollution control activities, surveillance, monitoring, training and public information, and enforcement. Many of those activities will no longer be authorized under the CWA for waters that are no longer considered to be waters of the US. It seems likely, therefore that the available funding for these purposes will be reduced substantially as well. The President has requested $200,400,000 for § 106 grants for FY 04. Funding in the FY 03 appropriation for § 106 grants is $192,500,000.

Clean Water State Revolving Fund and Nonpoint program funding: Clean Water State Revolving Fund money can be spent on three types of projects (33 U.S.C. § 1383(c)) – construction of publicly-owned treatment works, implementation of a nonpoint management program under § 319, and development and implementation of an estuary plan under § 329. The President has requested $850,000,000 in state revolving fund money in FY 04. The congressionally approved budget for this fund in FY 03 was $1,350,000.

While there does not appear to be a statutory link between the definition of "navigable waters" and the construction of publicly-owned treatment works, federal permits for such facilities would no longer be required under federal law if they discharge into waters that are no longer waters of the U.S. While not necessarily required by law, it seems likely that the funding for construction of such facilities (including decentralized wastewater and distributed stormwater approaches that are probably most likely to discharge into excluded waters) would be reduced substantially since those activities would no longer be Clean Water Act programs.

State nonpoint management programs are "for controlling pollution added from nonpoint sources to the navigable waters within the State and improving the quality of such waters." 33 U.S.C. § 1329(b)(1). Thus, funds would not appear to be available to control nonpoint pollution into waters that are no longer navigable waters under the CWA. In addition to the SRF money identified above, the President has requested $238,000,000 in § 319 funding for FY 2004 and Congress appropriated $240,000,000 in § 319 funding for FY 2003.

State revolving funds have been used to pay for a variety of nonpoint source related activities, including drinking water source protection, wetlands restoration, decentralized wastewater treatment, and agricultural best management practices. Funding for all of those activities may be threatened where they relate to protecting waters that are no longer covered by the state's management plan since they are no longer considered to be waters of the U.S.

In addition, EPA can provide technical assistance to states, upon their request, to develop a management program "for those portions of the navigable waters requested by such State." 33 U.S.C. § 1329(f). EPA technical assistance is, therefore, limited to programs for navigable waters.

B. OTHER FEDERAL ENVIRONMENTAL PROGRAMS

1. Implications for Endangered Species Act Programs

Narrowing the scope of the CWA frustrates the policies and purposes not only of the CWA, but also of the Endangered Species Act (ESA). Elimination of the endangered species rationale from the MBR effectively denies ESA protection to endangered species and their habitat, because many habitat-disturbing actions receive ESA review only because a CWA permit is required – thus triggering the ESA's consultation requirement. The Supreme Court in *SWANCC* has not called into question the other factors of the MBR; only this Administration has. EPA and the Corps must, and can, retain the factor relating to use of waters by threatened and endangered species as habitat.

So-called "isolated" waters support numerous threatened and endangered plant and animal species. Examples of such species, and the wetlands upon which they depend, include vernal pool complexes with endangered tadpole shrimp and delta green ground beetle; desert springs that provide habitat for endangered big horn sheep, Owens pupfish, Devils Hole pupfish, and Warm Springs pupfish; Nebraska sandhills that are habitat for whooping crane and bald eagle; sinkholes that harbor the northeastern bulrush, swamp pink and Virginia sneezeweed; and dune swales, frequented by the St. Andrew beach mouse. See "The U.S. Supreme Court Limits Federal Regulation of Wetlands: Implications of the *SWANCC* Decision," California Research Board (February 2002), available at < http://www.library.ca.gov/crb/02/03/02-003.pdf >; Tiner, R.W., H. C. Bergquist, G. P. DeAlessio, and M. J. Starr. 2002. Geographically Isolated Wetlands: A Preliminary Assessment of their Characteristics and Status in Selected Areas of the United States. U.S. Department of the Interior, Fish and Wildlife Service, Northeast Region, Hadley, MA, available at < http://wetlands.fws.gov/Pubs_Reports/isolated/report.htm >.

If the Administration were to persist with its interpretation as in the Guidance Memorandum, that the *SWANCC* Court struck down all factors of the Migratory Bird Rule, including even "isolated" waters known to be habitat for a threatened or endangered species, the EPA and Corps would lose jurisdiction over those waters, further imperiling threatened and endangered species. The Fish and Wildlife Service (FWS) reviews activities impacting threatened and endangered species that are federally executed, funded, or authorized. See 16 U.S.C. § 1536(a)(2). If there

is no federal permit -- e.g., no Corps jurisdiction -- the Endangered Species Act (ESA) has no provision that triggers FWS review of a project that may jeopardize listed species.

Using the *SWANCC* decision to justify removal of jurisdiction based on habitat use by endangered species will not only cripple future application of the CWA, but will also undermine the ESA. Such a reading will result in the reduced FWS involvement in projects involving "isolated" wetlands outside of Corps and EPA jurisdiction. Thus, a project adversely affecting so-called "isolated waters" which harbor listed species may escape review under the ESA, 16 U.S.C. §§ 1531 *et seq*. The loss of ESA protections to a significant amount of endangered species habitat will further harm numerous species, making our duty to recover these species even more challenging.

2. Implications for Federal Safe Drinking Water Act Program

In enacting the FWPCA, Pub. L. 92-500, 86 Stat. 816 *et seq*., and the 1977 Clean Water Act, Pub. L. 95-217, 91 Stat. 1567 *et seq*., Congress was acutely aware that there are substantial public health implications to the pollution of the nation's waters. Congress clearly stated that its objective was to restore and maintain the chemical, physical, and biological integrity of the Nation's waters. 33 U.S.C. § 1251(a). As the Act's legislative history repeatedly demonstrates, one of the key reasons for congressional concern about the need to restore and maintain the integrity of the nation's waterways was to protect public health, both from drinking, and from coming into contact with contaminated water.

In enacting the FWPCA in 1972, Congress reacted to water quality crises such as the Cuyahoga River catching fire. The Senate Committee drafting the legislation noted that the Committee became increasingly concerned during 1970 with the effects of pollution on public health. S. Rep. 92-414, *reprinted at* 1972 U.S.C.C.A.N. 3668, 3670 (October 28, 1971). The Committee noted that the Act is intended to implement the interim goal, by 1981, wherever attainable, a standard of water quality which provides for the protection and propagation of fish, shellfish, and wildlife and provides for recreation in an on the water, and *also assures that public water supplies will be protected*. *Id.,* at 3712.

Any effort to use the *SWANCC* decision as an excuse for failing to control pollution discharges and filling of non-traditionally navigable waters such as intrastate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds, would have profound public health implications. As elementary school earth sciences classes learn, these waters generally are all interconnected through the hydrologic cycle. One third of all surface waters derive from groundwater, the recharge of which industry argues should not be protected because they are often "isolated" wetlands. Moreover, many intermittent streams recharge groundwater, and of course often provide base flow for larger rivers, and also recharge lakes. In addition, it is an elementary hydrogeological principle that all rivers have headwaters, much or all of which would be excluded from coverage under the approach industry urges upon EPA (i.e. allowing protection only of waters that are traditionally navigable by a boat).

Unregulated contamination of non-traditionally navigable waters by sewage, industrial point source pollution, discharges of oil or hazardous materials, or other pollution could spell disaster for the nation's drinking water supplies. We learned this lesson when pollution of the Milwaukee River contaminated the city of Milwaukee's drinking water supply (which reportedly was in compliance with all EPA drinking water regulations at the time) with the waterborne chlorine-resistant parasite *Cryptosporidium*, sickening over 400,000 people and killing 50 to 100.[125/] More recently, in 1999, more than 1,000 people at a county fair in upstate New York were stricken by an extremely virulent strain of *E. coli* (the same bacteria that we have come to associate with bad meat) after drinking water contaminated by polluted runoff from a stream at a nearby cattle farm that contaminated a well using shallow groundwater. On that occasion, over 1,000 people became ill, and a three-year-old girl and an elderly man died of acute kidney failure when their bodies could not fight off the pathogen.[126/]

Each year, the Centers for Disease Control and Prevention (CDC) counts a dozen or more significant waterborne disease outbreaks attributable to contaminated drinking water, and this is widely viewed as a serious undercount.[127/] Recent estimates published by EPA and independent researchers estimate that *each year,* about 7.1 million Americans become mildly to moderately ill from tap water, including 520,000 to 690,000 moderate to severe cases, triggering about 1,200 deaths.[128/]

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125 W. R. MacKenzie, *et. al.*, A Massive Outbreak in Milwaukee of *Cryptosporidium* Infection Transmitted Through the Public Water Supply, *New England Journal of Medicine*, 1994, 331: 161B167. The precise number of people killed by the Milwaukee outbreak is not known with certainty. A count by the *Milwaukee Journal* put the number at over 100, while the official state and local health department count was a minimum of 50 deaths. See Marilyn Marchione. Deaths continued after crypto outbreak: State report attributes a minimum of 50 deaths from '93 to '95. *The Milwaukee Journal Sentinel*, May 27, 1996.

126 1061 suspected *E. coli* Cases in New York Outbreak, *Infectious Disease News* (October 1999), *available online at* www.infectiousdiseasenews.com/199910/frameset.asp?article=ecoli.asp; Centers for Disease Control and Prevention, Public health dispatch: Outbreak of *Escherichia coli* O157:H7 and *Campylobacter* among attendees of the Washington County Fair, New York, Morbidity and Mortality Weekly Report (*MMWR)*, 1999, 48(36): 803.

127 *See*, CDC-EPA Biennial Reports on Waterborne Disease Outbreaks in *MMWR*.

128 R. Levin and W. Harrington, Infectious Waterborne Disease and Disinfection Byproducts in the US: Costs of Disease, *printed in* E.G. Reichard and G.A. Zapponi, Assessing and Managing Health Risks from Drinking Water Contamination: Approaches and Applications at 305 (IAS, Rome, Publication No. 233, 1994).

There are over 11,400 community public water systems (PASS), serving over 178,000,000 Americans, that use surface water as their primary source for their tap water.[129] Most of these water systems use World War I-era technologies for water treatment, including coagulation, sedimentation, and (generally sand) filters to remove some of the larger particles in the water.[130] Some surface water systems, such as Boston, New York, and parts of the Seattle and San Francisco systems, and some smaller systems, use no filtration at all, hoping that protection of their watersheds will be sufficient to protect their citizens. Many other water suppliers use filtration that is of questionable efficacy against even the most basic pathogens. Only about 10% of even the larger, more sophisticated surface water systems have any form of advanced treatment designed to remove inorganic chemicals such as arsenic or synthetic organic chemicals such as pesticides and industrial chemicals.[131] Thus, primary reliance upon treatment of drinking water supplies for protection of public health is extremely risky, and likely to be disastrous.

In addition, most of the over 42,000 groundwater-supplied drinking water systems, which in total serve about 86,000,000 Americans with their tap water, have little or no treatment, with the exception in many cases of chlorine treatment. There is essentially no safety net for most of these systems; as waterborne disease and water contamination statistics show, these generally untreated or minimally treated waters, once contaminated, pose a serious threat to public health.

Thus, any rollback in EPA's jurisdiction over waters of the United States is likely to wreak havoc with watershed and aquifer protection efforts. Contamination of headwaters and of "isolated" wetlands that recharge groundwater connected to drinking water will pose substantial threats to public health. Any EPA action with this impact would not only pose a major public health risk, but would directly contravene congressional intent to protect public health and the source waters of public water supplies.

IX. IMPLICATIONS OF THE CONTEMPLATED JURISDICTIONAL ROLLBACK FOR SELECTED ECOLOGICAL REGIONS

A. ALASKA'S NORTH SLOPE

1. Wetlands in Alaska Are a Resource of Regional and National Importance.

America's largest state is also its wettest. The U.S. Fish and Wildlife Service estimates that there are almost 175,000,000 acres of wetlands in Alaska.[132] With nearly two-thirds of the nation's

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[129] EPA, OGWDW, *Factoids: Drinking Water and Ground Water Statistics for 2000* at 1 (2001), available online at http://www.epa.gov/safewater/data/00factoids.pdf

[130] NRDC, *Victorian Water Systems Enter the 21st Century* (1995).

[131] *Id*.

[132] Hall, Jonathan V., W.E. Frayer, and Bill O.Wilen, Status of Alaska Wetlands 3 (1994).

wetlands, Alaska boasts many of the most diverse and critical wetland habitats on the continent. Coastal estuaries, saltwater lagoons, river corridors, marshes, muskegs, bogs, and wet tundra support an astounding variety of fish and wildlife species.

Wetlands in Alaska provide nesting, rearing, and staging habitat for millions of waterfowl and shorebirds important to hunters and birdwatchers throughout the nation. Thirty-four species of waterfowl nest in Alaska's wetlands that nest nowhere else in the United States. Eighty percent of the world's trumpeter swans and 50 percent of all tundra swans nest there. Ten million ducks, 750,000 geese, and 80,000 swans migrate annually from nesting grounds in Alaska to wintering areas in the Lower 48, Canada, Mexico, and Asia. Another two million ducks and 300,000 geese depend on Alaska's wetlands as critical staging areas. Alaska's wetlands support up to 60 percent of North America's northern pintails, 25 percent of widgeon, and nearly 20 percent of scaup and canvasbacks. Seventeen percent of all geese and 11 percent of all ducks harvested in North America are reared in Alaska's wetlands.

No natural ecosystem has a greater influence on Alaska's economy than wetlands. Wetlands provide critical habitat for fish such as salmon that support a multi-billion dollar commercial fishing industry. Annual gross revenues from salmon harvests alone exceed $1.5 billion and provide more than 70,000 jobs. Sport fishing is a significant and growing industry whose health depends on Alaska's wetlands. Sport fishing generates more then 5,000 full-time jobs and $350 million in revenues. Hunting also depends on wildlife species sustained by wetlands and contributes more than $80 million in gross revenues. Tourism is Alaska's largest growth industry, generating more than $1 billion in revenues and 13,500 jobs. Wildlife is one of the state's key visitor attractions. Many wildlife species are dependent upon wetlands habitats for at least part of their life cycle, including brown bears, caribou, moose, muskoxen, wolves, wolverines, foxes, river otters, beavers, mink and muskrats.

Subsistence use of wetlands resources in Alaska is extensive. Nearly all of Alaska's rural Native villages are located in or near wetlands because their subsistence-based economies depend on fish and wildlife that are sustained by wetlands.[133/] Fish and wildlife resources harvested for subsistence use that are dependent on wetlands include five species of Pacific salmon, shellfish, ducks, geese, beaver, and otter. Plant materials frequently collected from wetlands include blueberries, cranberries, Labrador tea, and willow.

While the hydrologic and water quality functions of Alaska wetlands are often poorly understood, studies have shown that these wetlands offer many of the same values as Lower 48 wetlands. For instance, black spruce wetlands are prominent features of taiga landscapes and have been widely portrayed as having relatively little value. However, studies have shown that black spruce wetlands perform several substantial water quality functions. According to the U.S. Environmental Protection Agency, the peat and peat-forming vegetation of these wetlands

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[133] Ellanna, L.J., and P.C. Wheeler, Subsistence Use of Wetlands in Alaska (1986) (in The Environmental Institute, Alaska Regional Wetland Functions – Proceedings of a Workshop 85-103).

compete for nutrients and form a sediment-trapping microtopography in bogs. Some vegetation responds to nutrient input with increased uptake. Peat accumulation sequesters nutrients and contaminants.[134]

2. North Slope wetlands are not "isolated."

Approximately 1,542,000 acres of wetlands (83 percent of the land surface) are found on Alaska's North Slope.[135] An additional five percent of the area is lacustrine (lake) habitat. The wetlands areas range from temporary flooded willow areas along streams to saturated moist tundra dominated by cottongrass, sedge, and low shrubs.

The mosaic of vegetated wetlands, ponds, and lakes of the coastal plain forms a nearly continuous cover stretching from tidal areas to the foothills of the Brooks Range. Non-wetlands habitats are limited to well-drained terraces along rivers, some small dune areas near the coast, bluffs, and pingos. Precipitation is the dominant source of water for the wetlands ecosystems in the region. Although annual precipitation amounts are very low, wetlands hydrology is maintained by the presence of a permafrost table near the soil surface and low rates of evapotranspiration.

The land surface of the arctic coastal plain slopes gently toward the Beaufort Sea. During the spring snow melt period, large volumes of water move across the land surface as sheet flow toward the sea. In areas of slightly rolling terrain, the water flows directly into streams that lead to rivers. All of these rivers flow northward and eventually empty into the Beaufort Sea. There are few closed basins that are isolated from this regional movement of water from south to north.[136] Thus, wetlands and other waters on Alaska's North Slope are adjacent or hydrologically connected to the Beaufort Sea, a water that is navigable in fact.

EPA and the Corps have long recognized that the broad goals of the Clean Water Act require a systemic approach to maintaining and improving water quality. Indeed, a key factor in the Supreme Court's decision in Riverside Bayview Homes was the Corps' determination that wetlands near lakes, rivers, streams, and other bodies of water may be integral parts of a larger ecosystem: "The regulation of activities that cause water pollution cannot rely on . . . artificial lines . . . but must focus on all waters that together form the entire aquatic ecosystem. Water moves in hydrological cycles, and the pollution of this part of the aquatic system, regardless of whether it is above or below an ordinary high water mark, or mean high tide line, will affect the water quality of the other waters within that aquatic system." Riverside Bayview Homes, 474 U.S. at 134 (*Quoting* 42 Fed. Reg. 37128 (1977)).

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[134] Post, Roger A., for U.S. Environmental Protection Agency, Functional Profile of Black Spruce Wetlands in Alaska 130 (1996).

[135] Hall (1994).

[136] Hall, Jonathan V., (personal communication) (April 2, 2003).

Wetlands on the North Slope are part of a larger aquatic ecosystem that includes the Beaufort Sea and the rivers and streams that drain into the sea. These waters are hydrologically connected and functionally interdependent. For example, the Beaufort Sea, a water that is inarguably subject to federal jurisdiction, depends on the wetlands of the coastal plain for flood and erosion buffering, nutrient discharge, and pollution control. Moreover, the value of the Beaufort Sea for wildlife is greatly enhanced by the fact that coastal plain wetlands are part of the larger ecosystem. The bottom line is that wetlands on the North Slope are not isolated. They are part of a vast complex of wetlands that are adjacent to the Beaufort Sea, inseparably bound to that water through myriad hydrologic and ecologic connections. In fact, by most standards, the wetlands of the North Slope are more closely tied to the Beaufort Sea than the wetlands in Riverside Bayview Home were to the Black River. See Riverside Bayview Homes, 474 U.S. at 131.

3. North Slope wetlands perform numerous critical environmental functions.

Although North Slope wetlands are physically and hydrologically connected to the Beaufort Sea, and are therefore not affected by the SWANCC decision, it is important to acknowledge the critical functions and values of these waters. In particular, it should be emphasized that arctic wetlands as a whole perform the same wetlands functions as temperate wetlands in the Lower 48 states.

A. Hydrologic Functions

Although arctic wetlands are not sites of discharge or recharge of subpermafrost aquifers, suprapermafrost groundwater can influence wetland communities below arctic slopes in ways comparable to aquifer discharge in temperate regions. For instance, these wetlands provide storage for flood and storm waters and are integral to natural drainage patterns.[137/]

During the summer, wetlands on the coastal plain are an effective means of flow regulation. Thaw thickens the active layer and evapotranspiration lowers the water table. Both events increase the capacity of wetlands to store precipitation. Regulation of flow is evident when wetlands trap and hold incident precipitation, lowering hydrographic peaks. The mechanisms for flow regulation and storage in these wetlands are ice-free voids and cracks, absorption by dehydrated moss and peat, low relief, subsurface flow, and thaw pond storage.[138/] Although groundwater discharge may regulate streamflow in permafrost-free areas, tundra streams on the North Slope are entirely fed by surface or near-surface wetland discharge.[139/]

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137 Oceanographic Institute of Washington, for U.S. Army Corps of Engineers, Alaska North Slope Wetlands Study IV–26 (1979) (attached).

138 Racine, Charles H., for U.S. Army Corps of Engineers, Current Issues in Alaska Wetland Management 7 (1994) (attached).

139 Post, Roger A., Alaska Department of Fish and Game, Effects of Petroleum Operations in Alaska Wetlands: A Critique 13 (1990) (attached).

Arctic-tundra wetlands also stabilize sediment and anchor shorelines, as well as maintain the thermal equilibrium of ice-rich soils. Some North Slope wetlands dissipate mechanical erosive forces and anchor shorelines because aquatic vegetation and shallow water absorb wave energy. For instance, coastal plain lakes may be many kilometers long and capable of generating waves that cause mechanical erosion. However, *Carex aquatilis* and *Arctophila fulva* are dominant vascular plants in these freshwater habitats, forming belted patterns around ponds and lakes which anchor the shorelines and dissipate mechanical erosive forces.[140/] Removal of the surface wetland vegetation cover in the arctic has been shown to result in thermokarst and extensive erosion.[141/]

B. Water Quality Functions

Wetlands on the North Slope purify water by trapping sediments and by transforming or retaining nutrients and toxicants. The physical structure of tundra streams, particularly the smaller drainages, consists of a series of "beads" (small thermokarst ponds) connected by narrow, deep channels. At breakup, beaded streams flood adjacent tundra creating extensive wetlands complexes. Later in the summer, when beaded streams are confined to their channels and discharges may be intermittent, water velocities are typically very low on the flat coastal plain providing ample opportunity for quiescent settling of particulates.[142/]

Sediment can also be trapped by riparian wetlands along large arctic rivers such as the Colville and Sagavanirktok. For instance, the Sagavanirktok River has a braided pattern and a broad floodplain with many vegetated and unvegetated islands. At breakup, turbid water covers the floodplain, inundating the complex of channels, islands, and riparian wetlands. Zones of low water velocity are created by the increased cross-sectional area of the inundated floodplain, frictional resistance of flooded vegetation, and low wetlands gradients, allowing settling of particulates. As river discharge diminishes, pools in high-water channels and microtopographic depressions retain water, trapping sediment.[143/]

North Slope wetlands also play an important role in nutrient uptake and contaminant removal. Tundra pond wetlands, which cover a significant area of the Arctic coastal plain, are reasonably productive and actually contain fine sediments that have high cation exchange and buffering capacity, particularly in relation to phosphate. In addition, studies show that tundra vegetation is biologically active at low temperatures and rapidly takes up phosphorus in response to

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140 Post at 14.

141 Racine at 7.

142 Post at 16.

143 Post at 17.

fertilization.[144] Vascular plants, plankton, and soil microflora of arctic-tundra wetlands either respond, or have the potential to respond, to nutrient input with increased growth. The period of high productivity coincides with the period of potential nutrient or contaminant input, enhancing the water purification function of these wetlands.[145]

C. Habitat Functions

The extraordinary habitat functions of North Slope wetlands are well established, especially with respect to birds. These wetlands support large numbers of breeding and postbreeding loons, geese, ducks, gulls, terns, and shorebirds. Interspersed upland tundra habitats are used by passerines, ptarmigan, and raptors.[146] Some 135 bird species have been recorded on the coastal plain of the Arctic National Wildlife Refuge, of which 70 are regular nesters. Birds come from all 50 states, Mexico, Central and South America, the mid- and South Pacific Islands, Asia, and even Africa and Antarctica.[147] Distribution of waterfowl on the North Slope during spring and summer clearly reflects the relative abundance of water with major concentrations occurring near Peard Bay, Dease Inlet, Harrison Bay (including Teshekpuk Lake), and the Colville Delta.[148]

In spring, birds from several groups, but particularly waterfowl, shorebirds, and songbirds, arrive on the coastal plain via coastal and inland migration routes. At the same time, large areas of the plain are inundated with water due to melting of snow and ice and the poor drainage characteristics due to the continuous layer of permafrost. North Slope wetlands are important for early production of invertebrate populations and provide waterfowl and shorebirds with an early source of food and open water habitat while the majority of lake and pond basins are still frozen. Wetlands remain important areas for waterfowl and shorebird utilization throughout the summer although some species disperse to adjacent lakes and ponds when they thaw for foraging and breeding purposes.[149]

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144 Racine at 8.

145 Post at 22.

146 Derksen, Dirk V., Thomas C. Rothe, and William D. Eldridge, U.S. Fish and Wildlife Service, Use of Wetland Habitats by Birds in the National Petroleum Reserve-Alaska (1981).

147 Whitten, Ken, for National Wildlife Federation, The Arctic National Wildlife Refuge Wildlife Values 16 (2002) (attached).

148 Lensink, Calvin J. and Thomas C. Rothe, Values of Alaskan Wetlands for Waterfowl 7 (1986) (attached).

149 Oceanographic Institute of Washington at IV-15 (1979).

While there are other extensive areas of moist tundra in Alaska, the northern coastal plain is unique in its geographic position, its climate regime, and its possible importance to birds moving in east-west migration. Moreover, recognition of the importance of the coastal plain to usually nonbreeding species of waterfowl, such as pintails, has increased with the knowledge that drought-displaced prairie ducks often migrate to northern habitats. [150]

Wetlands on Alaska's North Slope also provide crucial habitat for a number of mammal species.[151] Mammals found to forage or den in these wetlands include brown lemmings, collared lemmings, moose, masked shrews, arctic foxes, red foxes, least weasels, ermine, gray wolves, and grizzly bears.[152] These wetlands also host one of the greatest wildlife spectacles in North America: the annual migration of caribou. Each year, over 100,000 caribou migrate to the Arctic coastal plain from wintering grounds to the south and east in Alaska, the Yukon, and Northwest Territories of Canada. The vast wetlands complexes of the North Slope provide ideal calving ground for the caribou as well as superior forage and a place to escape predators and insects. In addition, polar bears and muskoxen can be found in the Arctic coastal plain in any season of the year.[153]

D. Recreation Functions

Few places on the globe possess the untrammeled expanses of arctic landscapes. These landscapes and the wetlands they contain provide unique recreation and heritage values. Consequently, there are more people visiting areas like the Arctic Refuge and they are staying longer than the average tourist at road accessible areas such as Prudhoe Bay. In 1989, there were 1,289 personal-use days in the wetlands of the arctic coastal plain. Many of these visits involved guided or unguided river raft trips or backpacking trips. The remaining wetlands use came from sport hunters and unreported private use. Recreational use of some rivers in the Arctic Refuge have reached such a magnitude as to require regulation of commercial operations.[154]

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150 Bergman, Robert D., Robert L. Howard, Kenneth F. Abraham, and Milton W. Weller, U.S. Fish and Wildlife Service, Water Birds and their Wetlands Resources in Relation to Oil Development at Storkersen Point, Alaska, 35-36 (1977).

151 Post at 26-27.

152 Oceanographic Institute of Washington at IV-21 (1979).

153 Whitten at 9-15 (2002).

154 Post at 28-29 (1990).

4. The degradation or destruction of North Slope wetlands would have substantial effects on interstate and foreign commerce.

Unlike the abandoned sand and gravel pit at issue in *SWANCC*, the vast wetlands of Alaska's North Slope are among the most pristine, scenic, and biologically productive waters in the entire country. There is no question that failure to regulate activities in these waters could substantially affect interstate and foreign commerce and that these activities are therefore well within Clean Water Act jurisdiction. For example, loss of wetlands on the North Slope could have harmful effects on the 123,000-strong Porcupine caribou herd. Over a dozen Native villages in two nations depend on these animals for subsistence and cultural identity. The Porcupine caribou herd is so important that in 1987 the United States signed an agreement with Canada on the Conservation of the Porcupine Caribou Herd. The agreement's objectives include protecting caribou habitat and ensuring continued opportunities for subsistence hunters. The International Porcupine Caribou Board, established to advise the two nations on managing and protecting the caribou, has identified the coastal plain of the Arctic Refuge as sensitive habitat for calving and summer grazing.[155/]

B. MOUNTAINTOP REMOVAL COAL MINING IN APPALACHIA

If the definition of "waters of the United States" was redefined to no longer include intermittent and ephemeral streams, central Appalachian streams would receive significantly less protection than they currently have. Indeed, the filling of many hundreds of miles of streams that is currently regulated by the U.S. Army Corps of Engineers would no longer be regulated at all by the federal agencies.

Most of the streams filled and destroyed by coal companies in central Appalachia are intermittent or ephemeral in nature, although hundreds of miles of perennial streams have also been filled by strip mines in the region. If the Corps were to stop regulating activities on intermittent and ephemeral streams, these streams would lose important protections provided by Section 404 of the Clean Water Act and NEPA. The 404(b)(1) guidelines currently provide the most important protections to streams filled by these mines. Without the protection of the 404(b)(1) guidelines, the fills will be much larger, more stream miles will be filled and the mitigation currently required will be lost. Also, because there would no longer be federal permits at issue, NEPA protections would no longer be available.

The loss of 404 and NEPA protection for these streams would be devastating. In addition to avoidance minimization and mitigation, Section 404 requires analysis of individual and cumulative impacts before permit issuance. In central Appalachia, the cumulative impacts of these mines are devastating. For example, in West Virginia, more than 40% of the upper reaches of the Mud River watershed have been filled. In just three counties in West Virginia more than 400 miles of ephemeral and intermittent stream have been filed by these mines. Protecting the

155 Whitten at 4-5 (2002).

upper reaches of these streams is essential to protecting the ecology of the lower reaches, because the lower stream reaches and rivers that depend on such tributaries are dependent on the energy exported from upper reaches. (Wallace 2001; Stout 1999). If the cumulative impacts of the hundreds of fills in the region are not analyzed and limited, the ecology of the region's streams and rivers will be devastated.

Additionally, the Corps' jurisdiction to authorize fills in intermittent and ephemeral streams provides cover to State agencies with NPDES primacy to certify 404 permits pursuant to Section 401 of the Clean Water Act. If the Corps loses its authority to permit fills under Section 404, the fills would then actually violate state clean water laws because the discharge of pollutants currently covered by and certified pursuant the 404 permit would not be certifiable by state agencies that do not have delegated 404 authority. In other words, because "waters of the state" would still include ephemeral and intermittent stream segments, any discharge of rock and dirt (pollutants) would have to be certified. If there were no 404 permit, such discharges could not comply with water quality standards and would be impermissible under state law.

The devastation of the Appalachian region by mountaintop removal coal mining is already extensive. What is desperately needed is greater enforcement of environmental protection laws, like the federal Clean Water Act – not attempts to weaken federal statutes or their regulations to leave communities, like those harmed by mountaintop removal mining, with even fewer protections.

PART TWO
Critique of Fabricant/Morello "Guidance Document"

Introduction

Attached to the Advanced Notice of Proposed Rulemaking on the Clean Water Act Regulatory Definition of "Waters of the United States" published on January 15, 2003, the EPA and the Army Corps of Engineers issued a "Guidance Document" or "Joint Memorandum." Its stated purpose is to provide "clarifying guidance" regarding the *SWANCC* decision and Clean Water Act jurisdiction issues that had arisen since *SWANCC*. The authors of the guidance are the General Counsels of EPA and the Department of the Army.

The guidance has two parts. First, it establishes what effectively amount to new rules for circumstances under which the agencies claim there is no longer jurisdiction under the Clean Water Act. This is done, however, without any public notice or rulemaking procedures. It is done without any compliance with the National Environmental Policy Act. Instead, the guidance automatically changes the jurisdictional rule based on the agencies' new interpretation of a two-year-old Supreme Court case, *SWANCC*. By characterizing the *SWANCC* opinion as far broader than it is, the authors of the guidance simply set forth new rules on jurisdiction that become effective immediately, but have no basis in fact or law and bypass all procedural requirements.

Second, the guidance opines about the status of traditional navigable waters and adjacent wetlands and tributary systems and adjacent wetlands. To support the lack of jurisdiction under the Clean Water Act, the authors repeatedly cite U.S. District Court decisions that are currently under appeal by the authors' own agencies -- EPA and the Army Corps of Engineers. They conclude, however, that jurisdictional and permitting decisions should proceed on a case-by-case basis.

New Rules for "No Jurisdiction" Determinations

The guidance announces what amounts to a new rule for the EPA and the Army Corps of Engineers. First, the new rule in the guidance improperly expands the "no jurisdiction" rule from one factor to three factors. Second, the new rule creates a process for declining to assert jurisdiction over an even broader category of waters, requiring agency personnel to get Headquarters' permission before asserting jurisdiction over these waters. Third, the new rule violates laws of administrative rulemaking and environmental procedure.

The *SWANCC* opinion is clearly articulated and very narrow, and summarized by the 5 to 4 majority as follows: "We hold that 33 C.F.R. §328.3(a)(3) (1999), as clarified and applied to petitioner's balefill site pursuant to the 'Migratory Bird Rule,' 51 Fed. Reg. 41217 (1986), exceeds the authority granted to respondents under § 404(a) of the CWA." *SWANCC*, 531 U.S. at 174. It is meant to apply only to that section of the "Migratory Bird Rule" that applied to petitioner's balefill site – use of waters as habitat for migratory birds that cross state lines in their migrations.

The authors of the guidance, however, take great liberties with the *SWANCC* opinion. They disregard the limitations of the stated holding and now claim that the Supreme Court in *SWANCC* raised questions about all the factors under the Migratory Bird Rule, 51 Fed. Reg. 41217 (i.e., use of the water as habitat for birds protected by Migratory Bird Treaties; use of the water as habitat for Federally protected endangered or threatened species; or use of the water to irrigate crops sold in interstate commerce). The guidance claims that *SWANCC* "calls into question whether CWA jurisdiction over "isolated," intrastate, non-navigable waters would now be predicated on the other factors listed in the Migratory Bird Rule." Guidance, at p. 25. That is simply false. Nowhere in the *SWANCC* opinion is there even a mention of its holding being broader than the stated habitat for migratory birds.

Under this new rule, no person in those agencies may assert Clean Water Act jurisdiction over so-called "isolated," intrastate, non-navigable waters, where the sole basis available for asserting jurisdiction rests on "any of the factors listed in the 'Migratory Bird Rule.'" Guidance, at p. 25 (emphasis added). Therefore, effective January 15, 2003, the rule on jurisdiction was instantaneously expanded from no jurisdiction based on habitat for migratory birds to (1) no jurisdiction based on habitat for migratory birds, (2) use of water as habitat for Federally protected endangered or threatened species and (3) use of the water to irrigate crops sold in interstate commerce. Such an expansion of no jurisdiction is not based on the Supreme Court law; neither is it pursuant to administrative or environmental procedural statutes.

In addition to the automatic "no jurisdiction" rule, the guidance also contains general instructions for another, broader category of jurisdictional factors. The guidance provides: "In addition, in view of the uncertainties after *SWANCC* concerning jurisdiction over isolated waters that are both intrastate and non-navigable based on other grounds listed in 33 C.F.R. § 328.3(a)(3)(i)-(iii), field staff should seek formal project-specific Headquarters approval prior to asserting jurisdiction over such waters, including permitting and enforcement actions." Guidance, at p. 25. The statement on its face reflects, again, the misreading of *SWANCC* to have caused such "uncertainties,'' when the Supreme Court made clear what its holding was. *SWANCC*, 531 U.S. at 174. And, similar to the rest of the guidance, this creates a new rule without any administrative or environmental procedural compliance

Such a rule by the General Counsels of EPA and the Army Corps of Engineers would certainly have a chilling effect on assertions of jurisdiction from the field and, indeed, appears to be designed to achieve precisely that result. Field staff are directed to call headquarters for instructions *only* when they plan to assert jurisdiction over this undefined category of "isolated" waters. If they plan to ignore the Clean Water Act and *not* assert jurisdiction, they do not have to ask permission or even inform headquarters. Further, the guidance says that "generally speaking" the agencies will continue to protect tributaries of navigable waters and their adjacent wetlands. (The exceptions to this "generally speaking" policy are not spelled out in the "guidance.") Once again, jurisdiction over these waters was not at issue in the Supreme Court's decision.

This vaguely-worded "guidance" will open the way for developers, mining companies, and other polluters to argue with the Corps and EPA that all kinds of wetlands, small streams, non-

navigable ponds or other waters – perhaps even some tributaries – are "isolated." The case-by-case determination portion of the guidance does little to guide or instruct. It provides no advice on how to handle any specific situation. It merely recommends that where questions remain, "the regulated community should seek assistance from the agencies on questions of jurisdiction." The guidance will be used to try to allow destruction and pollution of waters that have been protected by the Clean Water Act and its regulations for 30 years.

Finally, the guidance comes into existence without any procedural and administrative legality. Although the agencies promise full APA rulemaking and National Environmental Policy Act (NEPA) compliance under the ANPRM, they do not hesitate to implement an entire new "no jurisdiction" rule under the guidance without satisfying either the APA or NEPA. The APA was promulgated so that federal agencies would be required to go through formal rulemaking, with an opportunity for public notice and comment, before thrusting a new rule upon members of the public. Under the guidance, however, the APA was ignored. A new jurisdictional rule was promulgated, and there was no opportunity for any member of the public to comment. NEPA was promulgated so that a decisionmaker would understand the environmental effects of his or her decision and to keep the public informed about decisionmaking. In promulgating their guidance, EPA and the Army Corps of Engineers gave no opportunity for the agencies to weigh the environmental consequences of their decision. It is particularly noteworthy that it will be hard for any member of the public to ever know what waters have been deemed as "non-jurisdictional" under the guidance, given that there is no way to determine which waters have been declared not under Clean Water Act jurisdiction since January 2003.

Discussion of the Case Law

In addition to announcing the new "no jurisdiction rule," the guidance also contemplates just how broadly *SWANCC* could be interpreted. The guidance talks broadly about different courts' decisions. Unfortunately, the guidance does little to distinguish between the cases that are currently under appeal by the government, and those that are settled law, and tends to speak of both types of cases as comparable even though the overwhelming majority of post-*SWANCC* decisions have supported the Department of Justice's position that the Supreme Court's decision does not require any change in existing rules. It does, however, appear that most -- if not all – of the cases favoring an expanded reading of *SWANCC* are currently under appeal. Therefore, the position of the United States, representing the EPA and Army Corps of Engineers, is that these lower court rulings were in error. That makes the citation of these district court cases for any other proposition somewhat disingenuous.

The conclusion of the discussion is that "[f]ield staff should continue to assert jurisdiction over traditional navigable water (and adjacent wetlands) and, generally speaking, their tributary systems (and adjacent wetlands)." Guidance, at p. 31. It is silent, however, about what law to apply. In fact, it simply lists out factors to be considered, including the "guidance, applicable regulations, and any additional relevant court decisions." Id.

Overall, the Guidance Document unlawfully issues a new "no jurisdiction" rule based on a misreading of Supreme Court law, violates the procedural requirements of the APA and NEPA, and portends even further erosion of federal environmental rules.

CONCLUSION

For the foregoing reasons, we urge EPA and the Corps not to go forward with a proposed rulemaking and to withdraw the Guidance attached to the ANPRM immediately.

Respectfully submitted,

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STATE WATER RESOURCES CONTROL BOARD (SWRCB)
WATER QUALITY ORDER NO. 2003 – 0005 – DWQ

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)
GENERAL PERMIT NO. CAS000004

WASTE DISCHARGE REQUIRMENTS (WDRS)
FOR
STORM WATER DISCHARGES FROM
SMALL MUNICIPAL SEPARATE STORM SEWER SYSTEMS (GENERAL PERMIT)

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BACKGROUND

In 1972, the federal Water Pollution Control Act (also referred to as the Clean Water Act [CWA]) was amended to provide that the discharge of pollutants to waters of the United States from any point source is unlawful unless the discharge is in compliance with a NPDES permit. The 1987 amendments to CWA added section 402(p), which established a framework for regulating storm water discharges under the NPDES Program. Subsequently, in 1990, the U.S. Environmental Protection Agency (U.S. EPA) promulgated regulations for permitting storm water discharges from industrial sites (including construction sites that disturb five acres or more) and from municipal separate storm sewer systems (MS4s) serving a population of 100,000 people or more. These regulations, known as the Phase I regulations, require operators of medium and large MS4s to obtain storm water permits. On December 8, 1999, U.S. EPA promulgated regulations, known as Phase II, requiring permits for storm water discharges from Small MS4s and from construction sites disturbing between one and five acres of land. This General Permit regulates storm water discharges from Small MS4s.

An "MS4" is a conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, or storm drains): (i) designed or used for collecting or conveying storm water; (ii) which is not a combined sewer; and (iii) which is not part of a Publicly Owned Treatment Works (POTW). [See Title 40, Code of Federal Regulations (40 CFR) §122.26(b)(8).]

A "Small MS4" is an MS4 that is not permitted under the municipal Phase I regulations, and which is "owned or operated by the United States, a State, city, town, borough, county, parish, district, association, or other public body (created by or pursuant to State law) having jurisdiction over disposal of sewage, industrial wastes, storm water, or other wastes, including special districts under State law such as a sewer district, flood control district or drainage district, or similar entity…." (40 CFR §122.26(b)(16)). Small MS4s *include systems similar to separate storm sewer systems in municipalities, such as systems at military bases, large hospital or prison complexes, and highways and other thoroughfares, but do not include separate storm sewers in*

very discrete areas, such as individual buildings. This permit refers to MS4s that operate throughout a community as "traditional MS4s" and MS4s that are similar to traditional MS4s but operated at a separate campus or facility as "non-traditional MS4s."

Federal regulations allow two permitting options for storm water discharges (individual permits and general permits). SWRCB elected to adopt a statewide general permit for Small MS4s in order to efficiently regulate numerous storm water discharges under a single permit. In certain situations a storm water discharge may be more appropriately and effectively regulated by an individual permit, a region-specific general permit, or by inclusion in an existing Phase I permit. In these situations, the Regional Water Quality Control Board (RWQCB) Executive Officer will direct the Small MS4 operator to submit the appropriate application, in lieu of a Notice of Intent (NOI) to comply with the terms of this General Permit. In these situations, the individual or regional permits will govern, rather than this General Permit.

NINTH CIRCUIT COURT RULING

On January 14, 2003, the Ninth Circuit Court issued its decision in *Environmental Defense Center v. EPA*. This ruling upheld the Phase II regulations on all but three of the 20 issues contested. In summary, the court determined that applications for general permit coverage (including the NOI and Storm Water Management Program [SWMP]) must be made available to the public, the applications must be reviewed and determined to meet the Maximum Extent Practicable standard by the permitting authority before coverage commences, and there must be a process to accommodate public hearings. This General Permit is consistent with the ruling. Should the ruling be revised or vacated in the future, SWRCB may modify the General Permit.

ENTITIES SUBJECT TO THIS GENERAL PERMIT

This General Permit regulates discharges of storm water from "regulated Small MS4s." A "regulated Small MS4" is defined as a Small MS4 that discharges to a water of the United States (U.S.) or to another MS4 regulated by an NPDES permit, and which is designated in one of the following ways:

1. Automatically designated by U.S. EPA pursuant to 40 CFR section 122.32(a)(1) because it is located within an urbanized area defined by the Bureau of the Census (see Attachment 1); or

2. Traditional Small MS4s that serve cities, counties, and unincorporated areas that are designated by SWRCB or RWQCB after consideration of the following factors:

    a. High population density – High population density means an area with greater than 1,000 residents per square mile. Also to be considered in this definition is a high density created by a non-residential population, such as tourists or commuters.

    b. High growth or growth potential – If an area grew by more than 25 percent between 1990 and 2000, it is a high growth area. If an area anticipates a growth rate of more than 25 percent over a 10-year period ending prior to the end of the first permit term, it has high growth potential.

c. Significant contributor of pollutants to an interconnected permitted MS4 – A Small MS4 is interconnected with a separately permitted MS4 if storm water that has entered the Small MS4 is allowed to flow directly into a permitted MS4. In general, if the Small MS4 discharges more than 10 percent of its storm water to the permitted MS4, or its discharge makes up more than 10 percent of the other permitted MS4's total storm water volume, it is a significant contributor of pollutants to the permitted MS4. In specific cases, the MS4s involved or third parties may show that the 10 percent threshold is inappropriate for the MS4 in question.

d. Discharge to sensitive water bodies – Sensitive water bodies are receiving waters, which are a priority to protect. They include the following:

- those listed as providing or known to provide habitat for threatened or endangered species;
- those used for recreation that are subject to beach closings or health warnings; or
- those listed as impaired pursuant to CWA section 303(d) due to constituents of concern in urban runoff (these include biochemical oxygen demand [BOD], sediment, pathogens, petroleum hydrocarbons, heavy metals, floatables, polycyclic aromatic hydrocarbons [PAHs], trash, and other constituents that are found in the MS4 discharge).

Additional criteria to qualify as a sensitive water body may exist and may be determined by SWRCB or RWQCB on a case-by-case basis.

e. Significant contributor of pollutants to waters of the U.S. – Specific conditions presented by the MS4 may lead to significant pollutant loading to waters of the U.S. that are otherwise unregulated or inadequately regulated. An example of such a condition may be the presence of a large transportation industry.

These factors are to be considered when evaluating whether a Small MS4 should be regulated pursuant to this General Permit. An MS4 and the population that it serves need not meet all of the factors to be designated. SWRCB designates a number of Small MS4s according to these criteria through this General Permit (see Attachment 2).

Non-traditional Small MS4s may also be designated to seek permit coverage. These include non-traditional MS4s that are located within or discharge to a permitted MS4 and those that pose significant water quality threats. In general, these are storm water systems serving public campuses (including universities, community colleges, primary schools, and other publicly owned learning institutions with campuses), military bases, and prison and hospital complexes within or adjacent to other regulated MS4s, or which pose significant water quality threats. SWRCB considered designating non-traditional Small MS4s when adopting this General Permit. However, the *Environmental Defense Center* ruling requires that SWRCB and RWQCBs change their procedures for implementing this General Permit. In compliance with that decision, each

NOI and SWMP must be reviewed and approved, and in some cases considered in a public hearing, prior to the Small MS4 obtaining coverage under the General Permit. Therefore, SWRCB is delaying making these designations and the General Permit does not designate any non-traditional MS4s. A list of non-traditional MS4s that are anticipated to be designated within this permit term is included in Attachment 3 of this General Permit. These or other non-traditional MS4s may be designated by SWRCB or RWQCB at any time subsequent to the adoption of this General Permit.

The criteria selected to designate Small MS4s to be regulated are based on the potential to impact water quality due to conditions influencing discharges into their system or due to where they discharge. Some of the definitions provide "cut-off numbers." Although there is no regulatory standard that mandates which numbers to use, dividing lines must be established in order to effectively use them as criteria.

Specifically, the high growth factor uses 25 percent growth over ten years. The average growth (based on county data from the Census) in California between 1990 and 2000 was 15.8 percent. The standard deviation was 9.9. Growth rates outside one standard deviation are more than 25.7 percent. The standard deviation is generally an indication of the spread of data. In defining the high growth factor, the standard deviation was used because it sets the limits within which most areas of California fall. County data was used because it was consistently available, whereas 1990 populations for several of the cities and places were not readily available. Additionally, county data gives a broader picture of the growth dynamics in California. Because the data is not normally distributed, 68 percent of the data points do not necessarily fall within one standard deviation of the mean. It does, however, provide a number in which to compare city and place growth rates to the average growth rate of California. The number was rounded to 25 percent for ease of application and with the understanding that it is an approximation.

The significant contributor of pollutants to an interconnected permitted MS4 definition uses a volume value of 10 percent, with the assumption that storm water contains pollutants. This is meant to capture flows that may affect water quality or the permit compliance status of another MS4, but exclude incidental flows between communities.

APPLICATION REQUIREMENTS

Regulated Small MS4s, automatically designated because they are within an urbanized area (Attachment 1), must submit to the appropriate RWQCB by August 8, 2003 a complete application package. A complete package includes an NOI (Attachment 7), a complete SWMP (one hard copy and one electronic copy in Word or PDF format), and an appropriate fee.

The August 8, 2003 deadline is an administrative deadline to comply with the General Permit. Section 122.33(c)(1) of 40 CFR required automatically designated Small MS4s to submit an application by March 10, 2003. Those applications received from Small MS4s that submitted applications to comply with the federal deadline will be considered as an application to meet the requirements of this General Permit. If the application package is deemed complete by the RWQCB staff, it will be posted on the internet and made available for public review and public hearing if requested subsequent to permit adoption.

Regulated Small MS4s that are traditional MS4s designated by the SWRCB or RWQCB must submit to the appropriate RWQCB, within 180 days of notification of designation (or at a later

date stated by SWRCB or RWQCB), an NOI (Attachment 7), a complete SWMP (one hard copy and one electronic copy in Word or PDF format), and an appropriate fee. Those traditional MS4s identified in Attachment 2 of this General Permit are being notified of their designation by SWRCB upon adoption of this General Permit. They must, therefore, submit their NOI and SWMP by October 27, 2003.

Regulated Small MS4s that are non-traditional MS4s designated by SWRCB or RWQCB, including those in Attachment 3, must submit to the appropriate RWQCB, within 180 days of notification of designation (or at a later date stated by SWRCB or RWQCB), an NOI (Attachment 7), a complete SWMP (one hard copy and one electronic copy in Word or PDF format), and an appropriate fee.

Regulated Small MS4s relying entirely on Separate Implementing Entities (SIEs) that are also permitted, to implement their entire storm water programs are not required to submit a SWMP if the SIE being relied on has an approved SWMP. Proof of SWMP approval, such as a copy of the RWQCB letter, must be submitted to the RWQCB by the applying Small MS4, along with the NOI and an appropriate fee.

Regulated Small MS4s that fail to obtain coverage under this General Permit or another NPDES permit for storm water discharges will be in violation of the CWA and the Porter-Cologne Water Quality Control Act.

Receipt of applications deemed complete by RWQCB staff will be acknowledged on SWRCB's website at http://www.swrcb.ca.gov/stormwtr/index.html for a minimum of 60 days. When a SWMP is received by an RWQCB, those members of the public that have indicated they would like to receive notice, will receive an email from RWQCB staff that a SWMP has been received. During this 60-day public review period, a member of the public may request a copy of the SWMP and request that a public hearing be held by RWQCB. If a public hearing is requested, the hearing itself will be public noticed for a minimum of 30 days. If no hearing is requested, the RWQCB Executive Officer will notify the regulated MS4 that it has obtained permit coverage only after RWQCB staff has reviewed the SWMP and has determined that the SWMP meets the MEP standard established in this permit.

Attachment 8 lists RWQCB contact information for questions and submittals.

GENERAL PERMIT REQUIREMENTS

Prohibitions

This General Permit effectively prohibits the discharge of materials other than storm water that are not "authorized non-storm water discharges" (see General Permit § D.2.c) or authorized by a separate NPDES permit. This General Permit also incorporates discharge prohibitions contained in Statewide Water Quality Control Plans and Regional Water Quality Control Plans (Basin Plans).

Effluent Limitations

Permittees must implement Best Management Practices (BMPs) that reduce pollutants in storm water runoff to the technology-based standard of Maximum Extent Practicable (MEP) to protect water quality. In accordance with 40 CFR section 122.44(k)(2), the inclusion of BMPs in lieu of numeric effluent limitations is appropriate in storm water permits.

Discharges shall not contain reportable quantities of hazardous substance as established at 40 CFR section 117.3 or 40 CFR section 302.4.

Preparation of SWMP

This General Permit requires regulated Small MS4s to:

1. Develop and implement a SWMP that describes BMPs, measurable goals, and timetables for implementation in the following six program areas (Minimum Control Measures):

   Public Education
   The Permittee must educate the public in its permitted jurisdiction about the importance of the storm water program and the public's role in the program.

   Public Participation
   The Permittee must comply with all State and local notice requirements when implementing a public involvement/participation program.

   Illicit Discharge Detection and Elimination
   The Permittee must adopt and enforce ordinances or take equivalent measures that prohibit illicit discharges. The Permittee must also implement a program to detect illicit discharges.

   Construction Site Storm Water Runoff Control
   The Permittee must develop a program to control the discharge of pollutants from construction sites greater than or equal to one acre in size within its permitted jurisdiction. The program must include inspections of construction sites and enforcement actions against violators.

   Post Construction Storm Water Management
   The Permittee must require long-term post-construction BMPs that protect water quality and control runoff flow, to be incorporated into development and significant redevelopment projects. Post-construction programs are most efficient when they stress (i) low impact design; (ii) source controls; and (iii) treatment controls.

   For non-traditional MS4s that seek coverage under this Permit, implementation of this

control measure will not require redesign of projects under active construction at the time of designation or for K-12 school or community college facilities that have been submitted to the Department of General Services, Division of the State Architect before adoption of the permit, and which receive final approval from the State Allocation Board or the Public Works Board, as appropriate on or before December 31, 2004. SWMP must, however, specify how the control measure will be implemented within five years of designation.

Pollution Prevention/Good Housekeeping for Municipal Operations

The Permittee must examine its own activities and develop a program to prevent the discharge of pollutants from these activities. At a minimum, the program must educate staff on pollution prevention, and minimize pollutant sources.

2. Reduce its discharge of pollutants to the MEP.

3. Annually report on the progress of SWMP implementation.

Development and Implementation of SWMP

SWMP must describe how pollutants in storm water runoff will be controlled and describe BMPs that address the six Minimum Control Measures. Each BMP must have accompanying measurable goals that will be achieved during the permit term, or within five years of designation if designated subsequent to permit adoption, as a means of determining program compliance and accomplishments and as an indicator of potential program effectiveness. The measurable goals should be definable tasks such as number of outreach presentations to make, number of radio spots to purchase, or percentage of pollutant loading to reduce (other examples of measurable goals can be found on U.S. EPA's web-site at http://cfpub.epa.gov/npdes/stormwater/measurablegoals/index.cfm). This approach provides the flexibility to target an MS4's problem areas while working within the existing organization.

It is not anticipated that the SWMP be fully implemented upon submittal with the NOI. It is the intent of this General Permit that SWMPs submitted with the NOI contain sufficient information such that RWQCB staff and interested parties understand the BMPs that will be implemented or will be developed and implemented over the course of the General Permit term or, for Small MS4s designated subsequent to permit adoption, over a five–year period from designation. It is also expected that SWMPs will protect water quality, contain measurable goals and schedules, and assign responsible parties for each BMP. It is anticipated that the SWMP initially submitted may be revised or modified based on review of RWQCB staff or on comments provided by interested parties in accordance with Provisions G and H.19 of the General Permit.

For example, it may be proposed that a storm water logo be developed (or an existing one modified) by the end of the first year; an ordinance prohibiting non-storm water discharges be adopted by the end of the second year; a survey of non-storm water discharges throughout the city be completed by the end of the second year; a brochure targeting the restaurant community regarding proper practices to eliminate non-storm water discharges be developed or obtained by the end of the fourth year; and the brochure be distributed to 25 percent of the restaurants

within the city during health department inspections by the end of the fifth year. (This example mentions only one activity each year. In fact, numerous activities will occur throughout the permit term that ensure that a SWMP addressing all six Minimum Control Measures is implemented by the end of the permit term, or within five years of designation for Small MS4s designated subsequent to adoption of the Permit.)

The main goal of this General Permit is to protect water quality from the impacts of storm water runoff from Small MS4s. The intent is that storm water quality impacts will be considered in all aspects of a municipality's activities and that multiple departments within the municipality will work together to implement storm water BMPs. For instance, the planning department may work with the public works department when considering projects and their potential storm water impacts. Also, the health department can work with public works in a complementary manner to spread a consistent message about illicit discharges.

Many of the activities that a municipality already does can be recognized as a benefit to storm water or can be modified to add a storm water quality twist. A critical element of SWMP development is an assessment of activities already being conducted. For example, many communities already have a household hazardous waste program, which can be assumed to reduce illicit discharges to the MS4. Likewise, they examine potential flooding impacts of new development. This process can be modified to also examine water quality impacts as well as quantity.

Similarly, the Minimum Control Measures emphasize working with the public to prevent pollution during their everyday activities as well as to gain support for program funding. The MS4 has the flexibility to target specific segments of its residential or employee population in ways that are most appropriate for that particular segment. Taken together, the suite of public education approaches an MS4 takes can create a robust multimedia campaign that has a single message, which is threaded throughout the community through implementation of BMPs in the six program areas.

For links to information on how to implement each of the Minimum Control Measures, including sample ordinances that address the respective Minimum Control Measures, please see SWRCB's internet site at http://www.swrcb.ca.gov/stormwtr/municipal.html. Additionally, in accordance with 40 CFR section 122.34(d)(2), SWRCB provides U.S. EPA's menu of BMPs to consider when developing a SWMP. This menu is available on U.S. EPA's internet site at http://cfpub1.epa.gov/npdes/stormwater/swphase2.cfm?program_id=6. The menu provides examples of BMPs and associated measurable goals; however, other BMPs and measurable goals may be used.

MEP

MEP is the technology-based standard established by Congress in CWA section 402(p)(3)(B)(iii) that municipal dischargers of storm water must meet. Technology-based standards establish the level of pollutant reductions that dischargers must achieve. MEP is generally a result of emphasizing pollution prevention and source control BMPs as the first lines of defense in

combination with structural and treatment methods where appropriate serving as additional lines of defense. The MEP approach is an ever evolving, flexible, and advancing concept, which considers technical and economic feasibility. As knowledge about controlling urban runoff continues to evolve, so does that which constitutes MEP. The individual and collective activities elucidated in the MS4's SWMP become its proposal for reducing or eliminating pollutants in storm water to the MEP. The way in which MEP is met may vary between communities.

The MEP standard applies to all regulated MS4s, including those in Phase I and Small MS4s regulated by this General Permit. Consistent with U.S. EPA guidance, the MEP standard in California is applied so that a first-round storm water permit requires BMPs that will be expanded or better-tailored in subsequent permits. In choosing BMPs, the major focus is on technical feasibility, but cost, effectiveness, and public acceptance are also relevant. If a Permittee chooses only the most inexpensive BMPs, it is likely that MEP has not been met. If a Permittee employs all applicable BMPs except those that are not technically feasible in the locality, or whose cost exceeds any benefit to be derived, it would meet the MEP standard. MEP requires Permittees to choose effective BMPs, and to reject applicable BMPs only where other effective BMPs will serve the same purpose, the BMPs are not technically feasible, or the cost is prohibitive. (See SWRCB Order WQ 2000-11, http://www.swrcb.ca.gov/resdec/wqorders/2000/00wqo.html.)

Generally, in order to meet MEP, communities that have greater water quality impacts must put forth a greater level of effort. Alternatively, for similar water quality conditions, communities should put forth an equivalent level of effort. However, because larger communities have greater resources (both financial resources as well as existing related programs that can help in implementing storm water quality programs), it may appear that they have more robust storm water programs. Additionally, because storm water programs are locally driven and local conditions vary, some BMPs may be more effective in one community than in another. A community that has a high growth rate would derive more benefit on focusing on construction and post-construction programs than on an illicit connection program because illicit connections are more prevalent in older communities.

In accordance with the Ninth Circuit Court ruling, prior to obtaining permit coverage, SWMPs will be evaluated for compliance with the MEP standard by the RWQCB Executive Officer or, if requested, considered for approval in a public hearing conducted by RWQCB.

Many Phase I MS4s have been permitted under storm water regulations for more than ten years and have had that time to develop programs intended to reduce pollutants in their storm water discharge to MEP. It is understood that storm water quality programs and regulations are new to the entities that will be regulated under this General Permit. Therefore, it is anticipated that this General Permit term will serve as a "ramping-up" period and that programs implemented by Phase II communities will not necessarily conform to programs implemented by Phase I communities. Despite this understanding, however, many of the lessons learned and information developed by Phase I communities is available to smaller communities as a guide and may be used by Phase II communities.

<u>Supplemental Provisions for Larger and Fast Growing Regulated Small MS4s</u>

By the expiration date of this General Permit, traditional and non-traditional Small MS4s serving a population of 50,000 people or more, or that are subject to high growth, must require specific design standards as part of their post-construction program (as outlined in Attachment 4 of this General Permit, or a functionally equivalent program that is acceptable to the appropriate RWQCB), and they must comply with water quality standards through implementing better-tailored BMPs in an iterative process. These more stringent requirements are applied to communities that are larger and, therefore, capable of a more extensive storm water program, and to communities that are fast growing, and therefore may have greater impacts on storm water runoff associated with construction and the loss of pervious lands. Studies have found the amount of impervious surface in a community is strongly correlated with the community's water quality. New development and redevelopment result in increased impervious surfaces in a community. The design standards in Attachment 4 focus on mitigating the impacts caused by increased impervious surfaces through establishing minimum BMP requirements that stress (i) low impact design; (ii) source controls; and (iii) treatment controls. The design standards include minimum sizing criteria for treatment controls and establish maintenance requirements.

BMPs that may be used to comply with the design standards can be found in U.S. EPA's Toolbox of BMPs at http://cfpub1.epa.gov/npdes/stormwater/swphase2.cfm?program_id=6. Additionally, some RWQCBs may have lists of approved references and resources.

Small MS4s designated subsequent to permit adoption have five years from designation to achieve compliance with the Supplemental Provisions. Attachment 5 provides a list of communities that SWRCB anticipates being subject to the provisions in Attachment 4.

Receiving Water Limitations

Attachment 4 establishes receiving water limitations that apply to larger and fast-growing regulated Small MS4s that are required to comply with Supplemental Provisions of this General Permit. This permit allows regulated Small MS4s up to five years to fully implement their SWMPs. Therefore, regulated Small MS4s must begin to comply with the receiving water limitations iterative process once their plans are fully implemented. The receiving water limitation language provided in this General Permit is identical to the language established in SWRCB Water Quality Order WQ-99-05 adopted by SWRCB on June 17, 1999. As interpreted in SWRCB Water Quality Order WQ-2001-15, adopted by SWRCB on November 15, 2001, the receiving water limitations in this General Permit do not require strict compliance with water quality standards. SWRCB language requires that SWMPs be designed to achieve compliance with water quality standards over time, through an iterative approach requiring improved BMPs. Upon full implementation of the SWMP, exceedances of water quality standards must be addressed through the iterative process.

Reporting Requirements

The Permittee must track and assess its program to ensure BMP effectiveness and must conform to other monitoring requirements that may be imposed by RWQCB.

The Permittee is required to submit annual reports to the appropriate RWQCB by September 15th of each year (for Small MS4s designated with the adoption of this permit, the first annual report is to be submitted in 2004), or as otherwise required by the RWQCB Executive Officer. Among other things, the Permittee shall evaluate its compliance with permit conditions, evaluate and assess the effectiveness of its BMPs, summarize the results of any monitoring performed, summarize the activities planned for the next reporting cycle, and, if necessary, propose changes to SWMP.

Monitoring

Inspections, as a form of visual monitoring, are important to a storm water program. Inspections of storm water runoff and infrastructure (such as drop inlets, basins, and gutters) can say a lot about the effectiveness and needs of a storm water program. Through inspections, non-storm water discharges can be discovered and subsequently stopped, maintenance needs can be identified, and visual pollutants and erosion problems can be detected. Inspections of facilities are also important for public education and outreach, to ensure proper BMP implementation and maintenance, and to detect non-storm water discharges. Additionally, chemical monitoring can be used to involve the public through citizen monitoring groups, detect pollutants, identify and target pollutants of concern, illustrate water quality improvements and permit compliance, and participate in total maximum daily load (TMDL) development and implementation.

Monitoring environmental indicators through bio-assessments or other less technical methods may also be a key component of a program. Although it may be more challenging, it is also very valuable because it is the "final product," not just for a storm water program but for the broader environmental health of a community.

More specifically, the objectives of a monitoring program may include:

- Assessing compliance with this General Permit;
- Measuring and improving the effectiveness of SWMP;
- Assessing the chemical, physical, and biological impacts on receiving waters resulting from urban runoff;
- Characterizing storm water discharges;
- Identifying sources of pollutants; and
- Assessing the overall health and evaluating long-term trends in receiving water quality.

While only inspections of construction sites, as part of the Construction Site Storm Water Runoff Control Minimum Control Measure, are specifically required, as elucidated above, other monitoring tasks may be appropriate in a storm water program. Also, the RWQCB can require additional monitoring.

Termination of Coverage

A Permittee may terminate coverage if: a new operator has assumed responsibility for the regulated Small MS4; the Permittee has ceased operation of its MS4; or all discharge of runoff from the Small MS4 has been eliminated. To terminate coverage, the Permittee must submit to RWQCB a written request for permit termination.

Reliance on a SIE

A Permittee may rely on a separate entity to implement one or more of the six Minimum Control Measures, if the separate entity can appropriately and adequately address the storm water issues of the Permittee. To do this, both entities must agree to the arrangement, and the Permittee must comply with the applicable parts of the SIE's program. The arrangement is subject to the approval of the RWQCB Executive Officer.

In accordance with section 122.35(a)(3), the Permittee remains responsible for compliance with its permit obligations if SIE fails to implement the control measure(s) (or component thereof). Therefore, the entities are encouraged to enter into a legally binding agreement to minimize any uncertainty about compliance with the permit.

If the Permittee relies on an SIE to implement all six Minimum Control Measures and SIE also has a storm water permit, the Permittee relying on SIE must still submit an NOI, appropriate fee, proof that SIE's SWMP has been approved by RWQCB or its staff, and certification of the arrangement. However, the Permittee is not required to develop or submit a SWMP or annual reports, unless requested to do so by the RWQCB Executive Officer. The arrangement is subject to the approval of the RWQCB Executive Officer.

School districts present an example of where an SIE arrangement may be appropriate, either by forming an agreement with a city or with an umbrella agency, such as the County Office of Education. Because schools provide a large audience for storm water education, as part of the agreement, the two entities may coordinate an education program. An individual school or a school district may agree to provide a one-hour slot for all the second and fifth grade classes during which the city would bring in its own storm water presentation. Alternatively, the school could agree to teach a lesson in conjunction with an outdoor education science project, which may also incorporate a public involvement component. Additionally, the school and the city or Office of Education may arrange to have the school's maintenance staff attend the other entity's training sessions.

Retention of Records

The Permittee is required to retain records of all monitoring information and copies of all reports required by this General Permit for a period of at least five years from the date generated. This period may be extended by request of SWRCB or RWQCB.

Role of RWQCBs

RWQCBs and their staff will review and decide whether to approve SWMPs and, where requested, conduct public hearings on NOIs and SWMPs. Upon approval, they will notify Permittees that they have obtained permit coverage. They will also oversee implementation and compliance with this General Permit. As appropriate, they will review reports, require modification to SWMPs and other submissions, impose region-specific monitoring requirements, conduct inspections, take enforcement actions against violators of this General Permit, and make additional designations of regulated Small MS4s pursuant to this General Permit. They may also issue individual permits to regulated Small MS4s, and alternative general permits to categories of regulated Small MS4s. Upon issuance of such permits by an RWQCB, this General Permit shall no longer regulate the affected Small MS4s.

The Permittee and RWQCB are encouraged to work together to accomplish the goals of the storm water program. Specifically, they can coordinate the oversight of construction and industrial sites. For example, Permittees are required to implement a construction program. This program must include procedures for construction site inspection and enforcement. Construction sites disturbing an acre of land or more are also subject to inspections by RWQCB under the Statewide General Permit for Discharges of Storm Water Associated with Construction Activity. U.S. EPA intended to provide a structure that requires permitting through the federal CWA while at the same time achieving local oversight of construction projects. A structured plan review process and field enforcement at the local level, which is also required by this General Permit, were cited in the preamble to the Phase II regulations as the most effective components of a construction program.

Similarly, as part of the illicit discharge detection and elimination program, the Permittee may inspect facilities that are permitted by the Statewide General Permit for Discharges of Storm Water Associated with Industrial Activity and subject to RWQCB inspections.

The Small MS4 and RWQCB are encouraged to coordinate efforts and use each of their enforcement tools in the most effective manner. For instance, the Small MS4 may identify a construction site operator that is not in compliance with the local requirements and the Construction General Permit. The Small MS4 may establish a fee for re-inspection if a site is out of compliance. If education efforts and the inspection fee fail to bring the site into compliance, the Small MS4 may contact RWQCB and arrange a dual inspection and start enforcement procedures under the CWA if compliance is not achieved.

Relationship Between the Small MS4 Permit and the General Permit for Discharges of Storm Water Associated with Industrial Activity (Industrial Permit)

Some MS4 operators may also have facilities that are subject to the Industrial Permit. While the intent of both of these permits is to reduce pollutants in storm water, neither permit's requirements totally encompass the other. This General Permit requires that MS4 operators address six Minimum Control Measures, while the Industrial Permit requires the development and implementation of Storm Water Pollution Prevention Plans (SWPPP) for certain "industrial" activities as well as requiring specific visual and chemical monitoring. In the Preamble to the Phase II regulations, U.S. EPA notes that for a combination permit to be acceptable, it must contain all of the requirements for each permit. Further, "when viewed in its entirety, a

combination permit, which by necessity would need to contain all elements of otherwise separate industrial and MS4 permit requirements, and require NOI information for each separate industrial activity, may have few advantages when compared to obtaining separate MS4 and industrial general permit coverage."

Where the permits do overlap, one program may reference the other. More specifically, the Good Housekeeping for Municipal Operations Minimum Control Measure requires evaluation of municipal operations, some of which may be covered under the Industrial Permit. The development and implementation of SWPPP under the Industrial Permit will likely satisfy the Good Housekeeping requirements for those industrial activities. SWMP may incorporate by reference the appropriate SWPPP.

There may be instances where a non-traditional MS4 has, under the Industrial Permit, obtained coverage for the entire facility (rather than only those areas where industrial activities occur) and has developed a SWPPP that addresses the six Minimum Control Measures required by this General Permit. In these instances, the non-traditional Small MS4 is not required to obtain coverage under this General Permit. The entity should, in such cases, provide to the appropriate RWQCB documentation that its SWPPP addresses the six Minimum Control Measures.

STATE WATER RESOURCES CONTROL BOARD (SWRCB)
WATER QUALITY ORDER NO. 2003 - 0005 – DWQ

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)
GENERAL PERMIT NO. CAS00000X

WASTE DISCHARGE REQUIREMENTS (WDRs)
FOR
STORM WATER DISCHARGES FROM SMALL MUNICIPAL SEPARATE STORM SEWER SYSTEMS (MS4s) (GENERAL PERMIT)

SWRCB finds that:

1. Urban runoff is a leading cause of pollution throughout California.

2. Pollutants of concern found in urban runoff include sediments, non-sediment solids, nutrients, pathogens, oxygen-demanding substances, petroleum hydrocarbons, heavy metals, floatables, polycyclic aromatic hydrocarbons (PAHs), trash, and pesticides and herbicides.

3. During urban development, two important changes occur. First, where no urban development has previously occurred, natural vegetated pervious ground cover is converted to impervious surfaces such as paved highways, streets, rooftops, and parking lots. Natural vegetated soil can both absorb rainwater and remove pollutants providing a very effective purification process. Because pavement and concrete can neither absorb water nor remove pollutants, the natural purification characteristics of the land are lost. Second, urban development creates new pollutant sources as human population density increases and brings with it proportionately higher levels of vehicle emissions, vehicle maintenance wastes, municipal sewage, pesticides, household hazardous wastes, pet wastes, trash, etc., which can be washed into the MS4. As a result of these two changes, the runoff leaving a developed urban area may be significantly greater in volume, velocity, and/or pollutant load than pre-development runoff from the same area.

4. A higher percentage of impervious area correlates to a greater pollutant loading, resulting in turbid water, nutrient enrichment, bacterial contamination, organic matter loads, toxic compounds, temperature increases, and increases of trash or debris.

5. Pollutants present in storm water can have damaging effects on both human health and aquatic ecosystems. In addition, the increased flows and volumes of storm water discharged from impervious surfaces resulting from development can significantly impact beneficial uses of aquatic ecosystems due to physical modifications of watercourses, such as bank erosion and widening of channels.

6. When water quality impacts are considered during the planning stages of a project, new development and many redevelopment projects can more efficiently incorporate measures to protect water quality.

7. On December 8, 1999, the U.S. Environmental Protection Agency (EPA) promulgated regulations under authority of the Clean Water Act (CWA) section 402(p)(6). These regulations require SWRCB to issue NPDES storm water permits to operators of small municipal separate storm sewer systems (Small MS4s) that discharge to waters of the U.S.

8. Of the Small MS4s defined by federal regulations, only "regulated Small MS4s" must obtain a permit. Title 40 of the Code of Federal Regulations (40 CFR) section 122.32(a) describes regulated Small MS4s as those traditional Small MS4s located within an urbanized area as determined by the latest Decennial Census by the Bureau of the Census and other Small MS4s that are designated by the permitting authority in accordance with designation criteria in Findings 10 and 11 below. Traditional Small MS4s within urbanized areas (Attachment 1) are automatically designated and are not subject to the designation criteria provided in Finding 10.

9. Section 123.35(b) of 40 CFR requires SWRCB to develop a process, as well as criteria, to designate Small MS4s as regulated Small MS4s.

10. In developing the designation criteria, factors were chosen to include parameters that may affect water quality. The following criteria will be considered in designating Small MS4s operated within a city or county as regulated Small MS4s.

    a. <u>High population density</u> – High population density means an area with greater than 1,000 residents per square mile. Also to be considered in this definition is a high density created by a non-residential population, such as tourists or commuters.

    b. <u>High growth or growth potential</u> – If an area grew by more than 25 percent between 1990 and 2000, it is a high growth area. If an area anticipates a growth rate of more than 25 percent over a 10-year period ending prior to the end of the first permit term, it has high growth potential.

    c. <u>Significant contributor of pollutants to an interconnected permitted MS4</u> – A Small MS4 is interconnected with a separately permitted MS4 if storm water that has entered the Small MS4 is allowed to flow directly into a permitted MS4. In general, if the Small MS4 discharges more than 10 percent of its storm water to the permitted MS4, or its discharge makes up more than 10 percent of the other permitted MS4's total storm water volume, it is a significant contributor of pollutants to the permitted MS4. In specific cases, the MS4s involved or third parties may show that the 10 percent threshold is inappropriate for the MS4 in question.

    d. <u>Discharge to sensitive water bodies</u> – Sensitive water bodies are receiving waters, which are a priority to protect. They include the following:

- those listed as providing or known to provide habitat for threatened or endangered species;

- those used for recreation that are subject to beach closings or health warnings; or

- those listed as impaired pursuant to CWA section 303(d) due to constituents of concern in urban runoff (these include biochemical oxygen demand (BOD), sediment, pathogens, oil and grease, and other constituents that are found in the MS4 discharge).

Additional criteria to qualify as a sensitive water body may exist and may be used by SWRCB or RWQCB on a case-by-case basis.

e. Significant contributor of pollutants to waters of the United States (U.S.) – Specific conditions presented by the MS4 may lead to significant pollutant loading to waters of the U.S. that are otherwise unregulated or inadequately regulated. An example of such a condition may be the presence of a large transportation industry.

This General Permit serves as notice to those Small MS4s on Attachment 2 that they are designated as regulated Small MS4s by the SWRCB at the time of permit adoption.

11. Section 122.26(b)(16)(iii) of 40 CFR defines systems that are similar to separate storm sewer systems in cities and counties, such as systems at military bases, large hospital or prison complexes, and highways and other thoroughfares as Small MS4s. In this General Permit these types of Small MS4s are referred to as non-traditional MS4s that may be designated as regulated Small MS4s and required to seek coverage under this General Permit or coverage under a separate permit. Non-traditional MS4s often operate storm sewers that are similar to traditional MS4s operated by cities or counties and discharge the same types of pollutants that are typically associated with urban runoff.

12. This permit does not designate any non-traditional MS4s. SWRCB or RWQCB may designate non-traditional MS4s at any time subsequent to the adoption of this General Permit. Non-traditional MS4s that may be designated at a future date include, but are not limited to, those listed in Attachment 3 of this General Permit.

13. Non-traditional Small MS4 entities that are designated, but whose entire facilities are subject to the NPDES General Permit for the Discharge of Storm Water Associated with Industrial Activities and whose Storm Water Pollution Prevention Plan (SWPPP) addresses all six Minimum Control Measures described in this General Permit, are not required to obtain coverage under this General Permit. Such entities must present documentation to the appropriate RWQCB, showing that they meet the requirements for exclusion from coverage.

14. This General Permit requires regulated Small MS4s (Permittees) to develop a Storm Water Management Program (SWMP) designed to reduce the discharge of pollutants to the Maximum Extent Practicable (MEP) and to protect water quality. Upon approval of SWMP by the Regional Water Quality Control Board (RWQCB) or its Executive Officer,

the Permittees obtain coverage under this General Permit. This General Permit requires implementation of SWMP.

15. SWMP will be available for public review and comment and may be subject to a public hearing if requested prior to approval.

16. Permittees can satisfy the requirements through effective implementation of a SWMP, which must contain Best Management Practices (BMPs) that address six Minimum Control Measures. SWMP must incorporate measurable goals and time schedules of implementation.

17. The MEP standard is an ever-evolving, flexible, and advancing concept, which considers technical and economic feasibility. As knowledge about controlling urban runoff continues to evolve, so does that which constitutes MEP. Reducing the discharge of storm water pollutants to MEP in order to protect beneficial uses requires review and improvement, which includes seeking new opportunities. To do this, the Permittee must conduct and document evaluation and assessment of each relevant element of its program and revise activities, control measures, BMPs, and measurable goals, as necessary to meet MEP.

18. This General Permit includes Supplemental Provisions that apply to traditional and non-traditional Small MS4s serving a population of 50,000 people or more, or that are subject to high growth. These requirements address post-construction requirements and compliance with water quality standards. These Supplemental Provisions are similar to requirements for Medium and Large MS4s (Phase I), and are appropriate because larger Small MS4s are able to have more robust storm water programs and fast-growing Small MS4s may cause greater impacts to water quality.

19. The Receiving Water Limitations language contained in Attachment 4 is identical to the language established in SWRCB Water Quality Order WQ-99-05 adopted by the SWRCB on June 17, 1999. As interpreted in SWRCB Water Quality Order WQ-2001-15, adopted by the SWRCB on November 15, 2001, the receiving water limitations in this General Permit do not require strict compliance with water quality standards, but instead require compliance with water quality standards over time, through an iterative approach requiring improved BMPs.

20. The post-construction requirements, or Design Standards, contained in Attachment 4 are consistent with Order WQ-2000-11 adopted by SWRCB on October 5, 2000.

21. The purpose of the annual performance review is to evaluate (1) SWMP's effectiveness; (2) the implementation of SWMP (3) status of measurable goals; (4) effectiveness of BMPs; and (5) improvement opportunities to achieve MEP.

22. To apply for permit coverage authorizing storm water discharges to surface waters pursuant to this General Permit, the Permittees must submit a complete application package to the appropriate RWQCB. An application package includes a Notice of Intent

(NOI) to comply with the terms of this General Permit, appropriate fee (in accordance with the most recent fee schedule[1]), and SWMP. Permittees relying entirely on separately permitted Separate Implementing Entities (SIEs) to implement their entire programs are not required to submit a SWMP if the SIE being relied on has an approved SWMP. Attachment 8 gives contact information for each RWQCB.

23. Upon receipt of a complete permit application, the application will be public noticed for thirty days on SWRCB's website. During the public notice period, a member of the public may request that a public hearing be conducted by RWQCB. If no public hearing is requested, the application may be approved by the RWQCB Executive Officer. Permittees obtain coverage under the General Permit only after the SWMP has been approved.

24. Each Permittee is individually responsible for adoption and enforcement of ordinances and/or policies, implementation of identified control measures/BMPs needed to prevent or reduce pollutants in storm water, and for allocation of funds for the capital, operation and maintenance, and enforcement expenditures necessary to implement and enforce such control measures/BMPs within its jurisdiction. Enforcement actions concerning this General Permit will be pursued only against the individual Permittee responsible for specific violations of this General Permit.

25. In accordance with 40 CFR section 122.28(b)(3), a RWQCB may issue an individual MS4 NPDES Permit to a Permittee otherwise subject to this General Permit, or adopt an alternative general permit that covers storm water discharges regulated by this General Permit. The applicability of this General Permit is automatically terminated on the effective date of the individual permit or the date of approval for coverage under the alternative general permit.

26. Certain BMPs implemented or required by Permittees for urban runoff management may create a habitat for vectors (e.g., mosquitoes and rodents) if not properly designed or maintained. Close collaboration and cooperative effort between the Permittees, local vector control agencies, RWQCB staff, and the State Department of Health Services is necessary to identify and implement appropriate vector control measures that minimize potential nuisances and public health impacts resulting from vector breeding.

27. This General Permit may be reopened and modified if the decision *in Environmental Defense Center v. EPA* is revised or vacated.

28. This NPDES Permit is consistent with the antidegradation policies of 40 CFR section 131.12, SWRCB Resolution 68-16, and RWQCBs' individual Basin Plans. Implementing storm water quality programs that address the six Minimum Control Measures in previously unregulated areas will decrease the pollutant loading to the receiving waters and improve water quality.

[1] California Code of Regulations. Title 23. Division 3. Chapter 9 Waste Discharge Reports and Requirements. Article 1 Fees.

29. Following public notice in accordance with State and federal laws and regulations, SWRCB, in public hearings on December 2, 2002 and April 30, 2003, heard and considered all comments. SWRCB has prepared written responses to all significant comments.

30. This action to adopt an NPDES Permit is exempt from the provisions of the California Environmental Quality Act (Public Resources Code § 21100, et seq.) in accordance with section 13389 of the Porter-Cologne Water Quality Control Act (Porter-Cologne) (Division 7 of the California Water Code).

31. This NPDES Permit is in compliance with Part 402 of CWA and shall take effect 100 days after adoption by SWRCB. Once in effect, RWQCBs shall enforce the provisions herein.

IT IS HEREBY ORDERED that operators of Small MS4s subject to this General Permit shall comply with the following:

A. APPLICATION REQUIREMENTS

1. Deadlines for Application

a. By August 8, 2003, all Permittees automatically designated (see Attachment 1) must either apply for coverage under this General Permit (either individually or as a co-permittee), submit an application for an individual or alternative general Small MS4 permit (if applicable), or submit a joint application for modification of an existing large or medium MS4 permit (40 CFR §122.33(c)(1)).

Permittees that submitted complete application packages prior to the adoption of this General Permit to meet the federal regulation March 10, 2003 deadline have complied with this requirement and are not required to submit a duplicate application package.

b. By October 27, 2003, traditional Small MS4s designated according to Finding 10 (see Attachment 2), must either apply for coverage under this General Permit (either individually or as a co-permittee), submit an application for an individual or alternative general Small MS4 permit, or submit a joint application for modification of an existing large or medium MS4 permit (40 CFR §122.33(c)(2)). Written notices will be sent to designated parties subsequent to adoption of this General Permit.

c. Non-traditional Small MS4s, or other Small MS4s, which are designated by RWQCB or SWRCB after adoption of this General Permit must apply for coverage under this General Permit (either individually or as a co-

permittee), submit a complete application for an individual or alternative general Small MS4 permit, or submit a joint application for modification of an existing large or medium MS4 permit (40 CFR §122.33(c)(2)). Applications must be submitted within 180 days of designation unless a later date is provided in the designation letter.

2. General Permit Application

To obtain coverage under this General Permit, submit to the appropriate RWQCB a completed NOI (Attachment 7), a complete SWMP (one hard copy and one electronic copy in Word or PDF format), and appropriate fee. SWMP shall meet all the requirements of Section D of this General Permit. Permittees relying entirely on SIEs pursuant to Provision D.6 and permitted under the NPDES program are not required to submit a SWMP.

3. General Permit Coverage

Permit coverage will be in effect upon the completion of the following:

a. The Permittee has submitted a complete permit application to the appropriate RWQCB,

b. Receipt of a complete application is noticed for a minimum of 60 days and copies provided to the public for review and comment upon request,

c. The proposed SWMP has been reviewed by RWQCB staff, and

d. SWMP has been approved by the RWQCB Executive Officer, or approved by RWQCB in a public hearing, if requested.

B. DISCHARGE PROHIBITIONS

1. Discharges of waste that are prohibited by Statewide Water Quality Control Plans or applicable Regional Water Quality Control Plans (Basin Plans) are prohibited.

2. Discharges from the MS4s regulated under this General Permit that cause or threaten to cause nuisance are prohibited.

3. Discharges of material other than storm water to waters of the U.S. or another permitted MS4 must be effectively prohibited, except as allowed under Provision D.2.c, or as otherwise authorized by a separate NPDES permit.

C. EFFLUENT LIMITATIONS

1. Permittees must implement BMPs that reduce pollutants in storm water to the technology-based standard of MEP.

2. Storm water discharges regulated by this General Permit shall not contain a hazardous substance in amounts equal to or in excess of a reportable quantity listed in 40 CFR Part 117 or 40 CFR Part 302.

D. STORM WATER MANAGEMENT PROGRAM REQUIREMENTS

The Permittee shall maintain, implement, and enforce an effective SWMP, and develop adequate legal authority to implement and enforce the SWMP, designed to reduce the discharge of pollutants from the permitted MS4 to MEP and to protect water quality. SWMP shall serve as the framework for identification, assignment, and implementation of control measures/BMPs. The Permittee shall implement SWMP and shall subsequently demonstrate its effectiveness and provide for necessary and appropriate revisions, modifications, and improvements to reduce pollutants in storm water discharges to the MEP. SWMP shall be fully implemented by the expiration of this General Permit, or within five years of designation for Small MS4s designated subsequent to Permit adoption, with reasonable progress made towards implementation throughout the term of the General Permit. Existing programs that have storm water quality benefits can be identified in the SWMP and be a part of a Permittee's storm water program.

SWMP shall be revised to incorporate any new or modified BMPs or measurable goals developed through the Permittee's annual reporting process. The Permittee shall incorporate changes required by or acceptable to the RWQCB Executive Officer into applicable annual revisions to SWMP and adhere to its implementation.

1. The Permittee shall maintain, implement, and enforce an effective SWMP designed to reduce the discharge of pollutants from the regulated Small MS4 to the MEP and to protect water quality.

2. SWMP must describe BMPs, and associated measurable goals, that will fulfill the requirements of the following six Minimum Control Measures.

   a. **Public Education and Outreach on Storm Water Impacts**
   The Permittee must implement a public education program to distribute educational materials to the community or conduct equivalent outreach activities about the impacts of storm water discharges on water bodies and the steps that the public can take to reduce pollutants in storm water runoff. For non-traditional Permittees, the employee/user population may serve as "the public" to target for outreach and involvement.

Non-traditional Small MS4s that discharge into medium and large MS4 may integrate public education and outreach program with the existing MS4 public education and outreach programs.

b. **Public Involvement/Participation**
The Permittee must at a minimum comply with State and local public notice requirements when implementing a public involvement/participation program.

c. **Illicit Discharge Detection and Elimination**
The Permittee must:

1) Develop, implement, and enforce a program to detect and eliminate illicit discharges (as defined at 40 CFR §122.26(b)(2)) into the regulated Small MS4;

2) Develop, if not already completed, a storm sewer system map, showing the location of all outfalls and the names and locations of all waters of the U.S. that receive discharges from those outfalls;

3) To the extent allowable under State or local law, effectively prohibit, through ordinance, or other regulatory mechanism, non-storm water discharges into the MS4 and implement appropriate enforcement procedures and actions;

4) Develop and implement a plan to detect and address non-storm water discharges, including illegal dumping, to the system that are not authorized by a separate NPDES permit;

5) Inform public employees, businesses, and the general public of the hazards that are generally associated with illegal discharges and improper disposal of waste; and

6) Address the following categories of non-storm water discharges or flows (i.e., authorized non-storm water discharges) only where they are identified as significant contributors of pollutants to the Small MS4:

1. water line flushing;
2. landscape irrigation;
3. diverted stream flows;
4. rising ground waters;
5. uncontaminated ground water infiltration (as defined at 40 CFR §35.2005(20)) to separate storm sewers;
6. uncontaminated pumped ground water;
7. discharges from potable water sources;
8. foundation drains;
9. air conditioning condensation;
10. irrigation water;
11. springs;
12. water from crawl space pumps;
13. footing drains;
14. lawn watering;
15. individual residential car washing;
16. flows from riparian habitats and wetlands; and
17. dechlorinated swimming pool discharges.

Discharges or flows from fire fighting activities are excluded from the effective prohibition against non-storm water and need only be addressed where they are identified as significant sources of pollutants to waters of the U.S.

If a RWQCB Executive Officer determines that any individual or class of non-storm water discharge(s) listed above may be a significant source of pollutants to waters of the U.S. or physically interconnected MS4, or poses a threat to water quality standards (beneficial uses), the RWQCB Executive Officer may require the appropriate Permittee(s) to monitor and submit a report and to implement BMPs on the discharge.

d. **Construction Site Storm Water Runoff Control**

The Permittee must develop, implement, and enforce a program to reduce pollutants in any storm water runoff to the Small MS4 from construction activities that result in a land disturbance of greater than or equal to one acre. Reduction of storm water discharges from construction activity disturbing less than one acre must be included in your program if that construction activity is part of a larger common plan of development or sale that would disturb one acre or more. The program must include the development and implementation of, at a minimum:

1) An ordinance or other regulatory mechanism to require erosion and sediment controls, as well as sanctions, or other effective mechanisms, to ensure compliance, to the extent allowable under State, or local law;

2) Requirements for construction site operators to implement appropriate erosion and sediment control BMPs;

3) Requirements for construction site operators to control waste such as discarded building materials, concrete truck washout, chemicals, litter, and sanitary waste at the construction site that may cause adverse impacts to water quality;

4) Procedures for site plan review which incorporate consideration of potential water quality impacts;

5) Procedures for receipt and consideration of information submitted by the public; and

6) Procedures for site inspection and enforcement of control measures.

e. **Post-Construction Storm Water Management in New Development and Redevelopment**
The Permittee must:

1) Develop, implement, and enforce a program to address storm water runoff from new development and redevelopment projects that disturb greater than or equal to one acre, including projects less than one acre that are part of a larger common plan of development or sale, that discharge into the Small MS4 by ensuring that controls are in place that would prevent or minimize water quality impacts;

2) Develop and implement strategies, which include a combination of structural and/or non-structural BMPs appropriate for your community;

3) Use an ordinance or other regulatory mechanism to address post-construction runoff from new development and redevelopment projects to the extent allowable under State or local law For those Small MS4s described in Supplemental Provision E below, the requirements must at least include the design standards contained in Attachment 4 of this General Permit or a functionally equivalent program that is acceptable to the appropriate RWQCB; and

4) Ensure adequate long-term operation and maintenance of BMPs.

The General Permit does not require redesign of K-12 school or community college facilities that have been submitted to the Department of General Services, Division of the State Architect before adoption of the permit, and which receive final approval from the State Allocation Board or the Public Works Board, as appropriate, on or before December 31, 2004.

f. **Pollution Prevention/Good Housekeeping for Municipal Operations**
The Permittee must:

1) Develop and implement an operation and maintenance program that includes a training component and has the ultimate goal of preventing or reducing pollutant runoff from municipal operations; and

2) Using training materials that are available from U.S. EPA, the State, or other organizations, the program must include employee training to prevent and reduce storm water pollution from activities such as park and open space maintenance, fleet building maintenance, new construction and land disturbances, and storm water system maintenance.

3. SWMP must identify the measurable goals for each of the BMPs, including, as appropriate, the months and years for scheduled actions, including interim milestones and the frequency of the action.

4. SWMP must identify the person or persons who will implement or coordinate SWMP, as well as each Minimum Control Measure.

5. Termination of coverage

A Permittee may terminate coverage if a new operator has assumed responsibility for the MS4, the Permittee has ceased operation of the MS4, or the Permittees has eliminated discharges from the MS4. To terminate coverage, the Permittee must submit a written request to the RWQCB.

6. Reliance on a SIE

The Permittee may rely on a SIE to satisfy one or more of the permit obligations, if the separate entity can appropriately and adequately address the storm water issues of the Permittee. The Permittee must describe the arrangement in the SWMP and the arrangement is subject to the approval of the RWQCB Executive Officer. The other entity must agree to implement the control measure(s), or components thereof, to achieve compliance with the General Permit. The Permittee remains responsible for compliance with this General Permit if the SIE fails to implement the control measure(s).

If the Permittee relies on an SIE to implement all six Minimum Control Measures and the SIE also has a storm water permit issued by SWRCB or RWQCB, the Permittee relying on the SIE must still submit an NOI, appropriate fee, and certification of the arrangement. The Permittee must note this fact in the NOI and provide proof that the SIE has an approved SWMP, but is not required to maintain a SWMP nor submit annual reports.

7. Outfalls not identified in the storm sewer system map required by Provision D.2.c.2), but constructed within the permitted area during the term of this General Permit to receiving waters identified in the NOI, shall not be considered a material change in character, location, or volume of the permitted discharge, and shall be allowed under the terms of this General Permit without permit application or permit modification, provided that the following information be provided in the subsequent annual report:

   a. Receiving water name;

   b. Storm sewer system map of added area;

   c. Certification that SWMP shall be amended to include the drainage area.

E. SUPPLEMENTAL PROVISIONS

Those regulated traditional and non-traditional Small MS4s serving a population over 50,000 or that are subject to high growth (at least 25 percent over ten years) must comply with the requirements in Attachment 4 of this General Permit. Compliance is required upon full implementation of the Small MS4s' storm water management plan.

Attachment 5 provides a list of communities that SWRCB anticipates being subject to the provisions in Attachment 4.

F. REPORTING REQUIREMENTS AND MONITORING

1. Reporting

The Permittee must submit annual reports to the appropriate RWQCB by September 15th of each year (for Small MS4s designated with the adoption of this permit, the first annual report is to be submitted in 2004), or as otherwise required by the RWQCB Executive Officer, unless exempted under Provision D.6. The report shall summarize the activities performed throughout the reporting period (July 1 through June 30) and must include:

   a. The status of compliance with permit conditions;

   b. An assessment of the appropriateness and effectiveness of the identified BMPs;

   c. Status of the identified measurable goals;

   d. Results of information collected and analyzed, including monitoring data, if any, during the reporting period;

e. A summary of the storm water activities the Permittee plans to undertake during the next reporting cycle;

f. Any proposed change(s) to SWMP along with a justification of why the change(s) are necessary; and

g. A change in the person or persons implementing and coordinating SWMP.

2. RWQCB may impose additional monitoring requirements, which may include a reporting component. RWQCBs may adopt such requirements on an individual or group basis.

3. Recordkeeping

The Permittee must keep records required by this General Permit for at least five years or the duration of the General Permit if continued. The RWQCB Executive Officer may specify a longer time for record retention. The Permittee must submit the records to the RWQCB Executive Officer upon request. The Permittee must make the records, including the permit and SWMP, available to the public during regular business hours.

G. RWQCB AUTHORITIES

RWQCBs will review and approve SWMPs prior to permit coverage being in effect and will conduct public hearings of individual permit applications upon request. Where there is no hearing, the Executive Officer may approve the SWMP. RWQCBs will also oversee compliance with this General Permit. Oversight may include, but is not limited to, reviewing reports, requiring modification to SWMPs and other submissions, imposing region-specific monitoring requirements, conducting inspections, taking enforcement actions against violators of this General Permit, and making additional designations of Permittees pursuant with the criteria described in this General Permit and Fact Sheet. The RWQCBs may also issue individual permits to regulated Small MS4s, and alternative general permits to categories of regulated Small MS4s. Upon issuance of such permits by an RWQCB, this General Permit shall no longer regulate the affected Small MS4(s).

H. STANDARD PROVISIONS

1. General Authority

Three of the minimum control measures (illicit discharge detection and elimination, and the two construction-related measures) require enforceable controls on third party activities to ensure successful implementation of the measure. Some non-traditional operators, however, may not have the necessary legal regulatory authority to adopt these enforceable controls. As in the case of

local governments that lack such authority, non-traditional MS4s are expected to utilize the authority they do possess and to seek cooperative arrangements.

2. Duty to Comply

The Permittee must comply with all of the conditions of this General Permit. Any permit noncompliance constitutes a violation of CWA and the Porter-Cologne and is grounds for enforcement action and/or removal from General Permit coverage. In the event that the Permittee is removed from coverage under the General Permit, the Permittee will be required to seek coverage under an individual or alternative general permit.

3. General Permit Actions

This General Permit may be modified, revoked and reissued, or terminated for cause. The filing of a request by the Permittee for a General Permit modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance does not nullify any General Permit condition.

If any toxic effluent standard or prohibition (including any schedule of compliance specified in such effluent standard or prohibition) is promulgated under section 307(a) of CWA for a toxic pollutant which is present in the discharge and that standard or prohibition is more stringent than any limitation on the pollutant in this General Permit, this General Permit shall be modified or revoked and reissued to conform to the toxic effluent standard or prohibition and Permittee so notified.

4. Noncompliance Reporting

Permittees who cannot certify compliance and/or who have had other instances of noncompliance shall notify the appropriate RWQCB within 30 days. Instances of noncompliance resulting in emergencies (i.e., that endanger human health or the environment) shall be reported orally to the RWQCB within 24 hours from the time the discharger becomes aware of the circumstance and in writing to the RWQCB within five days of the occurrence. The notification shall identify the noncompliance event and an initial assessment of any impact caused by the event, describe the actions necessary to achieve compliance, and include a time schedule indicating when compliance will be achieved. The time schedule and corrective measures are subject to modification by the RWQCB Executive Officer.

5. Need to Halt or Reduce Activity Not a Defense

It shall not be a defense for the Permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this General Permit.

6. Duty to Mitigate

   The Permittee shall take all responsible steps to minimize or prevent any discharge in violation of this General Permit that has a reasonable likelihood of adversely affecting human health or the environment.

7. Proper Operation and Maintenance

   The Permittee shall at all times properly operate and maintain any facilities and systems of treatment and control (and related appurtenances) which are installed or used by the Permittee to achieve compliance with the conditions of this General Permit and with the requirements of SWMP. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures. Proper operation and maintenance may require the operation of backup or auxiliary facilities or similar systems installed by the Permittee when necessary to achieve compliance with the conditions of this General Permit.

8. Property Rights

   This General Permit does not convey any property rights of any sort or any exclusive privileges, nor does it authorize any injury to private property or any invasion of personal rights, nor does it authorize any infringement of federal, State, or local laws or regulations.

9. Duty to Provide Information

   The Permittee shall furnish RWQCB, SWRCB, or U.S. EPA, during normal business hours, any requested information to determine compliance with this General Permit. The Permittee shall also furnish, upon request, copies of records required to be kept by this General Permit.

10. Inspection and Entry

    The Permittee shall allow RWQCB, SWRCB, U.S. EPA, or an authorized representative of RWQCB, SWRCB, or U.S. EPA, upon the presentation of credentials and other documents as may be required by law, to:

    a. Enter upon the Permittee's premises during normal business hours where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of this General Permit;

    b. Access and copy, during normal business hours, any records that must be kept under the conditions of this General Permit within a reasonable time from notification;

c. Inspect during normal business hours any municipal facilities; and

d. Sample or monitor at reasonable times for the purpose of assuring General Permit compliance.

11. Signatory Requirements

All NOIs, SWMPs, certifications, reports, or other information prepared in accordance with this General Permit submitted to SWRCB or RWQCB shall be signed by either a principal executive officer, ranking elected official, or duly authorized representative. The principal executive officer of a Federal agency includes the chief executive officer of the agency or the senior executive officer having responsibility for the overall operations of a principal geographic unit of the agency (e.g., Regional Administrator of U.S. EPA).

12. Certification

Any person signing documents under Section H.11 above shall make the following certification:

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, to the best of my knowledge and belief, the information submitted is true, accurate, and complete.

I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

13. Anticipated Noncompliance

The Permittee will give advance notice to the RWQCB and local storm water management agency of any planned changes in the regulated Small MS4 activity that may result in noncompliance with General Permit requirements.

14. Penalties for Falsification of Reports

Section 309(c)(4) of CWA provides that any person who knowingly makes any false material statement, representation, or certification in any record or other document submitted or required to be maintained under this General Permit, including reports of compliance or noncompliance, shall upon conviction, be punished by a fine of not more than $10,000 or by imprisonment for not more than two years or by both.

15. Penalties for Violations of Permit Conditions

    a. Part 309 of CWA provides significant penalties for any person who violates a permit condition implementing Parts 301, 302, 306, 307, 308, 318, or 405 of CWA or any permit condition or limitation implementing any such section in a permit issued under Part 402. Any person who violates any permit condition of this General Permit is subject to a civil penalty not to exceed $27,500 per calendar day of such violation, as well as any other appropriate sanction provided by Part 309 of CWA.

    b. Porter-Cologne also provides for administrative, civil, and criminal penalties, which in some cases are greater than those under CWA.

16. Oil and Hazardous Substance Liability

    Nothing in this General Permit shall be construed to preclude the institution of any legal action against the Permittee or relieve the Permittee from any responsibilities, liabilities, or penalties to which the Permittee is or may be subject to under Part 311 of CWA.

17. Severability

    The provisions of this General Permit are severable; and, if any provision of this General Permit or the application of any provision of this General Permit to any circumstance is held invalid, the application of such provision to other circumstances and the remainder of this General Permit shall not be affected thereby.

18. Reopener Clause

    This General Permit may be modified, revoked and reissued, or terminated for cause due to promulgation of amended regulations, or otherwise in accordance with 40 CFR sections 122.62, 122.63, 122.64, and 124.5.

19. Availability

    A copy of this General Permit and SWMP shall be made available for public review.

20. Transfers

    This General Permit is not transferable. A Permittee must submit written notification to the appropriate RWQCB to terminate coverage of this General Permit.

21. Continuation of Expired Permit

This General Permit expires five years from the date of adoption. This General Permit continues in force and in effect until a new General Permit is issued or the SWRCB rescinds this General Permit. Only those Small MS4s authorized to discharge under the expiring General Permit are covered by the continued General Permit.

CERTIFICATION

The undersigned, Clerk to the Board, does hereby certify that the foregoing is a full, true, and correct copy of an order duly and regularly adopted at a meeting of SWRCB held on April 30, 2003.

AYE: Arthur G. Baggett, Jr.
Peter S. Silva
Richard Katz
Gary M. Carlton

NO: None

ABSENT: None

ABSTAIN: None

Maureen Marché
Clerk to the Board

Operators of Municipal Separate Storm Sewer Systems that serve areas within urbanized areas are automatically designated as regulated Small MS4s. These include the following areas. (For cities, the permit area boundary is the city boundary. For counties, permit boundaries must at least be inclusive of urbanized areas. The boundaries must be proposed in the permit application and may be developed in conjunction with the applicable regional water quality control board.)

Region 1
City of Cotati
Graton, County of Sonoma
City of Healdsburg
City of Rohnert Park
City of Sebastapool
Town of Windsor
County of Sonoma

Region 2
City of Belvedere
City of Benicia
Black Point-Green Point, County of Marin
Town of Corte Madera
Town of Fairfax
City of Larkspur
Lucas Valley-Marinwood, County of Marin
City of Mill Valley
City of Napa
City of Novato
City of Petaluma
Town of Ross
Town of San Anselmo
City of San Francisco (those areas not served by a CSO)
City of San Rafael
City of Sausalito
City of Tamalpais-Homestead Valley
City of Tiburon
Woodacre, County of Marin
County of Napa
County of Marin
County of Solano
County of Sonoma
County of San Francisco (those areas not served by a CSO)

Region 3
Aptos, County of Santa Cruz
City of Atascadero
Ben Lomand, County of Santa Cruz
Boulder Creek, County of Santa Cruz

City of Capitola
City of Carmel-by-the-Sea
Carmel Valley Village, County of Monterey
City of Carpinteria
Castroville, County of Monterey
Coralitos, County of Santa Cruz
City of Del Ray Oaks
Felton, County of Santa Cruz
City of Gilroy
Goleta, County of Santa Barbara
Isla Vista, County of Santa Barbara
Las Lomas, County of Santa Cruz
Live Oak, County of Santa Cruz
City of Lompoc
City of Marina
Montecito, County of Santa Barbara
City of Monterey
City of Morgan Hill
Nipomo, County of San Luis Obispo
Orcutt, County of Santa Barbara
City of Pacific Grove
Pajaro, County of Monterey
City of Paso Robles
Pebble Beach, County of Monterey
Prunedale, Count of Monterey
City of San Luis Obispo
City of Sand City
San Martin, County of Santa Clara
City of Santa Barbara
City of Santa Cruz
City of Santa Maria
City of Scotts Valley
City of Seaside
Soquel, County of Santa Cruz
Summerland, County of Santa Cruz
City of Watsonville
Templeton, County of San Luis Obispo
Vandenberg Village, County of Santa Barbara
County of Monterey
County of San Luis Obispo
County of Santa Barbara
County of Santa Clara
County of Santa Cruz

Region 5
City of Anderson
City of Atwater
City of Auburn

Bondelle Ranchos, County of Madera
City of Ceres
City of Chico
City of Davis
City of Delhi
El Dorado Hills, County of El Dorado
Empire, County of Stanislaus
City of Exeter
City of Farmersville
French Camp, County of San Joaquin
Goshen, County of Tulare
Granite Bay, County of Placer
City of Hughson
Kennedy, County of San Joaquin
Keyes, County of Stanislaus
City of Lathrop
Linda, County of Yuba
City of Lodi
Town of Loomis
City of Madera
Madera Acres, County of Madera
City of Manteca
City of Marysville
City of Merced
Morada, County of San Joaquin
North Auburn, County of Placer
North Woodbridge, County of San Joaquin
Olivehurst, County of Yuba
City of Porterville
City of Redding
City of Ripon
City of Riverbank
City of Rocklin
City of Roseville
Salida, County of Stanislaus
City of Shasta Lake
Strathmore, County of Tulare
South Yuba City, County of Sutter
City of Tracy
City of Turlock
City of Vacaville
City of Visalia
City of West Sacramento
City of Winton
City of Yuba City
County of Butte
County of Madera
County of Merced

County of Placer
County of San Joaquin
County of Shasta
County of Solano
County of Stanislaus
County of Sutter
County of Tulare
County of Yolo
County of Yuba

Region 6
City of Apple Valley
City of Hesperia
City of Lancaster
City of Palmdale
City of Victorville
County of San Bernadino
County of Los Angeles

Region 7
City of El Centro
Heber, County of Imperial
City of Imperial
County of Imperial

Operators of Municipal Separate Storm Sewer Systems that serve areas that are designated by the State Water Resources Control Board or Regional Water Quality Control Board in accordance with the designation criteria contained in the General Permit are regulated Small MS4s. These include, but are not limited to, the following areas. (For cities, the permit area boundary is the city boundary. For counties, permit boundaries must at least be inclusive of urbanized areas. The boundaries must be proposed in the permit application and may be developed in conjunction with the applicable regional water quality control board.)

Region 1

Area	Justification	Details
City of Arcata	• Discharge Into A Sensitive Water Body • High Population Density	• Mad River which is on the 303(d) list for sediment/turbidity • Urban cluster
City of Eureka	• Discharge Into A Sensitive Water Body • High Population Density	• Elk River and Freshwater Creek which are listed on the 303(d) list for sedimentation/siltation • Urban cluster
City of Fort Bragg	• Discharge Into A Sensitive Water Body • High Population Density	• Noyo River which is listed for sedimentation/siltation • Urban cluster
City of Fortuna	• Discharge Into A Sensitive Water Body • High Population Density	• Eel River which is on the 303(d) list for sedimentation/siltation and temperature • Urban cluster
McKinleyville, County of Humboldt	• Discharge Into A Sensitive Water Body • High Population Density	• Mad River which is on the 303(d) list for sedimentation/siltation and turbidity • Urban cluster
City of Ukiah	• Discharge Into A Sensitive Water Body • High Population Density	• Russian River which is listed for sedimentation/siltation • Urban cluster
County of Mendocino	• Discharge Into A Sensitive Water Body • High Population Density	• Russian River which is listed for sedimentation/siltation • Urban cluster •

Region 2

Area	Justification	Details
City of Calistoga	• Discharge Into A Sensitive Water Body • High Population Density	• Napa River, which is on the 303(d) list for sediment, nutrients, and pathogens • Urban cluster
City of St. Helena	• Discharge Into A Sensitive Water Body • High Population Density	• Napa River, which is on the 303(d) list for sediment, nutrients, and pathogens • Urban cluster
City of Sonoma	• Discharge Into A Sensitive Water Body • High Population Density	• Sonoma Creek, which is on the 303(d) list for sediment, nutrients, and pathogens • Urban cluster
Town of Yountville	• Discharge Into A Sensitive Water Body • High Population Density	• Napa River, which is on the 303(d) list for sediment, nutrients, and pathogens • Urban cluster

Region 3

Area	Justification	Details
City of Arroyo Grande	• High Population Density	• Tourism, Urban cluster
Baywood-Los Osos, County of San Luis Obispo	• Discharge Into A Sensitive Water Body • High Population Density	• Morro Bay which is on the 303(d) list for sediments • Urban cluster
City of Buellton	• Discharge Into A Sensitive Water Body • High Population Density	• Santa Ynez River, which is on the 303(d) list for nutrients and sediment • Urban cluster
Cambria, County of San Luis Obispo	• Discharge Into A Sensitive Water Body • High Population Density	• Marine Sanctuary • Urban cluster
City of Greenfield	• Discharge Into A Sensitive Water Body • High Growth Rate • High Population Density	• Salinas River, which is listed for sediment and salinity/TDS/chlorides • 68.6% over 10 years • Urban cluster
City of Grover Beach	• High Population Density	• Tourism, Urban cluster
City of Hollister	• Discharge Into A Sensitive Water Body • High Growth Rate • High Population Density	• San Benito River, which is listed for sediment • 79.1% over 10 years • Urban cluster
City of King City	• Discharge Into A Sensitive	• Salinas River, which is listed

	Water Body • High Growth Rate • High Population Density	for sediment and salinity/TDS/chlorides • 45.3% over 10 years • Urban cluster
	•	•
Los Olivos, County of Santa Barbara	• Discharge Into A Sensitive Water Body • High Population Density	• Santa Ynez River, which is on the 303(d) list for nutrients and sediment • Urban Cluster
City of Morro Bay	• Discharge Into A Sensitive Water Body • High Population Density	• Morro Bay, which is on the 303(d) list for sediments • Urban cluster
Oceano, County of San Luis Obispo	• High Population Density	• Tourism, Urban cluster
City of Pismo Beach	• High Population Density	• Tourism, Urban cluster
Santa Ynez, County of Santa Barbara	• Discharge Into A Sensitive Water Body • High Population Density	• Santa Ynez River, which is on the 303(d) list for nutrients and sediment • Urban cluster
Shell Beach, County of San Luis Obispo	• High Population Density	• Tourism
City of Soledad	• Discharge Into A Sensitive Water Body • High Growth Rate • High Population Density	• Salinas River, which is listed for sediment and salinity/TDS/chlorides • 57.6% over 10 years • Urban cluster
City of Solvang	• Discharge Into A Sensitive Water Body • High Population Density	• Santa Ynez River, which is on the 303(d) list for nutrients and sediment • Urban cluster • Tourism

<u>Region 5</u>

Area	Justification	Details
City of Clearlake	• Discharge Into A Sensitive Water Body • High Population Density	• Clear Lake which is on the 303(d) list for mercury and nutrients • Urbanized cluster
City of Dixon	• High Growth Or Growth Potential • High Population Density	• 54.8% over 10 years • Urban cluster
City of Grass Valley	• Discharge To Sensitive Water Bodies • High Growth Potential	• Receiving waters support threatened and endangered species

	• High Population Density	• Urban cluster
City of Hanford	• Urbanized Area in corrected census data	• Urbanized Area in corrected census data
City of Kingsburg	• Discharge To Sensitive Water Bodies • High Population Density	• Kings River, used for recreation and agriculture supply • Urban cluster
City of Lakeport	• Discharge To Sensitive Water Bodies • High Population Density	• Clear Lake which is on the 303(d) list for mercury and nutrients • Urban cluster
City of Lemoore	• Urbanized Area in corrected census data	• Urbanized Area in corrected census data
City of Lincoln	• Discharge To Sensitive Water Bodies • High Growth And Growth Potential • High Population Density	• Receiving waters support threatened and endangered species • 54.6% over 10 years and continuing at 15% per year • Urban cluster
City of Los Baños	• Discharge Into A Sensitive Water Body • High Growth • High Population Density	• Los Baños Canal which is used for agriculture supply and flows into a water of the U.S. • 78.2% growth over 10 years • Urban cluster
City of Oakdale	• Discharge To Sensitive Water Body • High Growth • High Population Density	• Stanislaus River which is on the 303(d) list for pesticides and unknown toxicity • 29.6% over 10 years • Urban cluster
City of Patterson	• Discharge To Sensitive Water Body • High Growth • High Population Density	• San Joaquin river which is on the 303(d) list for pesticides, and unknown toxicity • 34.5% over 10 years • Urban cluster
City of Placerville	• Discharge To Sensitive Water Body • High Population Density	• Receiving waters support threatened and endangered species • Urban cluster
City of Reedley	• Discharge Into Sensitive Water Body • High Population Density	• Kings River, used for recreation and agriculture supply • Urban cluster
City of Rio Vista	• Discharge To Sensitive Water Body	• Sacramento River, Delta, which is on the 303(d) list

	• High Population Growth Potential • High Population Density	for pesticides, mercury, and unknown toxicity • 210% projected growth between 2000 and 2010 • Urban cluster
City of Selma	• Discharge To Sensitive Water Bodies • High Population Density	• Discharge to Consolidated Irrigation Canal, which is tributary to Kings River, used for recreation and agriculture supply • Urban cluster
City of Tulare	• High Growth • Contributor Of Pollutants To Waters Of The U.S. • High Population Density	• 32.3% growth over 10 years • High population, approaching "urbanized area" • Urban cluster
City of Woodland	• Significant Contributor Of Pollutants To Waters Of The U.S. • High Population Density • Discharge To Sensitive Water Bodies	• 49,151 people at the time of the census, essentially the same threat as an urbanized area • Urban cluster • Contact recreation
County of Kings	• Urbanized Area in corrected census data	• Urbanized Area in corrected census data
County of Lake	• Discharge To Sensitive Water Bodies • High Population Density	• Clear Lake which is on the 303(d) list for mercury and nutrients • Urban cluster

<u>Region 7</u>

Area	Justification	Details
City of Brawley	• Discharge To Sensitive Water Body • High Population Density	• New River which is on the 303(d) list for bacteria, nutrients, pesticides, and sedimentation • Urban cluster
City of Calexico	• Discharge To Sensitive Water Body • High Population Density	• New River which is on the 303(d) list for bacteria, nutrients, pesticides, and sedimentation • Urban cluster

Non-Traditional Small MS4s

Attachment 3
WQO# 2003 – 0005 – DWQ

Non-traditional Small MS4s anticipated to be designated in the future will include the following entities.

Region	Agency	Facility	Address	City, State, ZIP
1	California Community Colleges	College of the Redwoods	7351 Tompkins Hill Road	Eureka, CA 95501-9301
1	California Community Colleges	Mendocino College	1000 Hensley Creek Rd. PO Box 3000	Ukiah, CA 95482-0300
1	California Community Colleges	Santa Rosa Junior College - Santa Rosa Campus	1501 Mendocino Avenue	Santa Rosa, CA 95401-4395
1	California State University	Humboldt State University	1 Harpst Street	Arcata, CA 95521-8299
1	California State University	Sonoma State University	1801 East Cotati Ave.	Rohnert Park, CA 94928-3609
1	District Agricultural Association	Humboldt County Fairgrounds	3750 Harris Street	Eureka, CA
1	District Agricultural Association	Mendocino County Fairgrounds	1055 North State Street	Ukiah, CA
1	School District, Alexander Valley Union Elementary		8511 Hwy. 128	Healdsburg, CA 95448-9020
1	School District, Arcata Elementary		1435 Buttermilk Lane	Arcata, CA 95521-
1	School District, Bellevue Union Elementary		3223 Primrose Ave.	Santa Rosa, CA 95407-7723
1	School District, Bennett Valley Union Elementary		2250 Mesquite Dr.	Santa Rosa, CA 95405-8310
1	School District, Cotati-Rohnert Park Unified		1601 E Cotati Ave.	Rohnert Park, CA 94928-3606
1	School District, Eureka City Unified		3200 Walford Ave.	Eureka, CA 95503-4887
1	School District, Fieldbrook Elementary		4070 Fieldbrook Road	Arcata, CA 95521-9709
1	School District, Fort Bragg Unified		312 S. Lincoln St.	Fort Bragg, CA 95437-4416
1	School District, Fortuna Union Elementary		843 L St.	Fortuna, CA 95540-1921
1	School District, Fortuna Union High		379 12th St.	Fortuna, CA 95540-2357
1	School District, Freshwater Elementary		75 Greenwood Heights Dr.	Eureka, CA 95503-9569
1	School District, Garfield Elementary		2200 Freshwater Road	Eureka, CA 95503-9562
1	School District, Gravenstein Union Elementary		3840 Twig Ave.	Sebastopol, CA 95472-5750
1	School District, Healdsburg Unified		925 University St.	Healdsburg, CA 95448-3528
1	School District, Mark West Union Elementary		305 Mark West Springs Road	Santa Rosa, CA 95404-1101
1	School District, McKinleyville Union Elementary		2275 Central Ave.	McKinleyville, CA 95519-3611
1	School District, Oak Grove Union Elementary		5285 Hall Road	Santa Rosa, CA 95401-5566
1	School District, Pacific Union Elementary		3001 Janes Road	Arcata, CA 95521-4701
1	School District, Piner-Olivet Union Elementary		3450 Coffey Lane	Santa Rosa, CA 95403-1919
1	School District, Rincon Valley Union Elementary		1000 Yulupa Ave.	Santa Rosa, CA 95405-7020
1	School District, Rohnerville Elementary		3850 Rohnerville Road	Fortuna, CA 95540-3122
1	School District, Roseland Elementary		950 Sebastopol Road	Santa Rosa, CA 95407-6829
1	School District, Santa Rosa Elementary		211 Ridgway Ave.	Santa Rosa, CA 95401-4320
1	School District, Santa Rosa High		211 Ridgway Ave.	Santa Rosa, CA 95401-4320
1	School District, Sebastopol Union Elementary		7905 Valentine Ave.	Sebastopol, CA 95472-3214
1	School District, South Bay Union Elementary		5248 Vance Ave.	Eureka, CA 95503-6351
1	School District, Twin Hills Union Elementary		700 Water Trough Road	Sebastopol, CA 95472-3917
1	School District, Ukiah Unified		925 N. State St.	Ukiah, CA 95482-3411
1	School District, West Side Union Elementary		1201 Felta Road	Healdsburg, CA 95448-9476
1	School District, West Sonoma County Union High		462 Johnson St.	Sebastopol, CA 95472-

Region	Agency	Facility	Address	City, State, ZIP
1	School District, Windsor Unified		9291 Old Redwood Hwy. #300 C	Windsor, CA 95492-9217
1	School District, Wright Elementary		4385 Price Ave.	Santa Rosa, CA 95407-6550
2	Bureau of Prisons	FCI Dublin	5701 8th Street - Camp Parks	Dublin, CA 94568
2	California Air National Guard	129th Rescue Wing	PO Box 103	Moffett Airfield, CA 94035-5006
2	California Community Colleges	Canada College	4200 Farm Hill Boulevard	Redwood City, CA 94061-1099
2	California Community Colleges	Chabot College	25555 Hesperian Blvd PO Box 5001	Hayward, CA 94545-5001
2	California Community Colleges	City College of San Francisco	50 Phelan Avenue, E200	San Francisco, CA 94112-1898
2	California Community Colleges	College of Alameda	555 Atlantic Avenue	Alameda, CA 94501-2109
2	California Community Colleges	College of San Mateo	1700 West Hillsdale Boulevard	San Mateo, CA 94402-3784
2	California Community Colleges	Contra Costa College	2600 Mission Bell Drive	San Pablo, CA 94806-3195
2	California Community Colleges	DeAnza College	21250 Stevens Creek Boulevard	Cupertino, CA 95014-5797
2	California Community Colleges	Diablo Valley College	321 Golf Club Road	Pleasant Hill, CA 94523-1544
2	California Community Colleges	Evergreen Valley College	3095 Yerba Buena Road	San Jose, CA 95135-1598
2	California Community Colleges	Foothill College	12345 El Monte Road	Los Altos Hills, CA 94022-4599
2	California Community Colleges	Laney College	900 Fallon Street	Oakland, CA 94607-4893
2	California Community Colleges	Las Positas College	3033 Collier Canyon Road	Livermore, CA 94550-7650
2	California Community Colleges	Los Medanos College	2700 East Leland Road	Pittsburg, CA 94565-5197
2	California Community Colleges	Merritt College	12500 Campus Drive	Oakland, CA 94619-3196
2	California Community Colleges	Mission College	3000 Mission College Boulevard	Santa Clara, CA 95054-1897
2	California Community Colleges	Napa Valley College	2277 Napa Vallejo Highway	Napa, CA 94558-6236
2	California Community Colleges	Ohlone College	43600 Mission Boulevard	Fremont, CA 94539-0911
2	California Community Colleges	San Jose City College	2100 Moorpark Avenue	San Jose, CA 95128-2799
2	California Community Colleges	Santa Rosa Junior College - Petaluma Campus	680 Sonoma Mountain Parkway	Petaluma, CA 94952
2	California Community Colleges	Skyline College	3300 College Drive	San Bruno, CA 94066-1662
2	California Community Colleges	Solano Community College	4000 Suisun Valley Road	Suisun City, CA 94585-3197
2	California Community Colleges	Vista College	2020 Milvia Street	Berkeley, CA 94704-1183
2	California Community Colleges	West Valley College	14000 Fruitvale Avenue	Saratoga, CA 95070-5699
2	California State University	California State University Hayward	25800 Carlos Bee Blvd	Hayward, CA 94542
2	California State University	California State University Maritime	200 Maritime Academy Drive	Vallejo, CA 94590
2	California State University	CSU Maritime Academy	200 MARITIME	Vallejo, CA
2	California State University	SF State University	1600 Holloway Avenue	San Francisco, CA 94132
2	Corrections, Dept of	San Quentin State Prison		San Quentin, CA 94964
2	Defense, Department of	Camp Parks	Bldg 790 Reserve Forces Training Area	Dublin, CA 94568-5201
2	Defense, Department of	Concord Naval Weapons Station	10 Delta St	Concord, CA 94520-5100
2	Defense, Department of	Oakland Army Base		, CA
2	Defense, Department of	Onizuka Air Station	1080 Lockheed Martin Way Box 41	Sunnyvale, CA 94089-1237
2	Defense, Department of	San Bruno Naval Facility	900 Commodore Drive	San Bruno, CA 94066-5006
2	Defense, Department of	Santa Clara Naval Reserve Center	500 Shenandoah Plaza, P.O. Box 128, M	Mountain View, CA 94035-0128
2	Defense, Department of	Travis Air Force Base	60 Support Group	Travis AFB, CA 94535-5049
2	Developmental Services, Dept of	Agnews Devolopmental Center East & West	3500 Zanker Road	San Jose, CA
2	District Agricultural Association	Napa County Fairgrounds	575 Third Street	Napa, CA
2	District Agricultural Association	Sonoma-Marin Fair	Fairgrounds Dr	Petaluma, CA

Region	Agency	Facility	Address	City, State, ZIP
2	Education, Dept of	Calif. School for the Blind	500 Walnut Ave.	Fremont, CA 94536-4365
2	Education, Dept of	Calif. School for the Deaf	39350 Gallaudet Dr.	Fremont, CA 94538-2308
2	Energy, Dept of	Sandia National Labs., CA Pgms.	P.O. Box 969, MS-9221	Livermore, CA 94550
2	Health Services, Dept of	Fairfield Animal Facility	6250 Lambie Road	Suisun City, CA
2	Menatl Health, Dept of	Napa State Hospital	2100 Napa-Vallejo Hwy	Napa, CA
2	NASA	Moffett Federal Air Field	NASA - AMES, MS 218-1	Moffett Airfield, CA 94035
2	Port of Oakland		530 Water Street	Oakland, CA 94607
2	Presido Trust		34 Graham Street PO Box 29052	San Franciso, CA 94129-0052
2	Rehabilitation, Dept of	Center for the Blind	400 Adams Street	Albany, CA
2	San Mateo Union High School District		650 N. Delaware St.	San Mateo, CA 94401-1795
2	School District, Acalanes Union High		1212 Pleasant Hill Road	Lafayette, CA 94549-2623
2	School District, Alameda City Unified		2200 Central Ave.	Alameda, CA 94501-4450
2	School District, Albany City Unified		904 Talbot Ave.	Albany, CA 94706-2020
2	School District, Alum Rock Union Elementary		2930 Gay Ave.	San Jose, CA 95127-2322
2	School District, Bayshore Elementary		1 Martin St.	Daly City, CA 94014-1603
2	School District, Belmont-Redwood Shores Elementary		2960 Hallmark Dr.	Belmont, CA 94002-2943
2	School District, Benicia Unified		350 East K St.	Benicia, CA 94510-3437
2	School District, Berkeley Unified		2134 Martin Luther King, Jr. W	Berkeley, CA 94704-1109
2	School District, Berryessa Union Elementary		1376 Piedmont Road	San Jose, CA 95132-2427
2	School District, Brisbane Elementary		1 Solano St.	Brisbane, CA 94005-1342
2	School District, Burlingame Elementary		1825 Trousdale Dr	Burlingame, CA 94010-4509
2	School District, Cabrillo Unified		498 Kelly Ave.	Half Moon Bay, CA 94019-1636
2	School District, Calistoga Joint Unified		1520 Lake St.	Calistoga, CA 94515-1605
2	School District, Cambrian Elementary		4115 Jacksol Dr.	San Jose, CA 95124-3312
2	School District, Campbell Union Elementary		155 N. Third St.	Campbell, CA 95008-2044
2	School District, Campbell Union High		3235 Union Ave.	San Jose, CA 95124-2009
2	School District, Canyon Elementary		187 Pinehurst Road	Canyon, CA 94516-0187
2	School District, Castro Valley Unified		4430 Alma Ave.	Castro Valley, CA 94546-0146
2	School District, Cinnabar Elementary		286 Skillman Lane	Petaluma, CA 94975-0399
2	School District, Cupertino Union Elementary		10301 Vista Dr.	Cupertino, CA 95014-2040
2	School District, Dixie Elementary		380 Nova Albion Way	San Rafael, CA 94903-3523
2	School District, Dublin Unified		7471 Larkdale Ave.	Dublin, CA 94568-1500
2	School District, Dunham Elementary		4111 Roblar Road	Petaluma, CA 94952-9202
2	School District, East Side Union High		830 N. Capitol Ave.	San Jose, CA 95133-1316
2	School District, Emery Unified		4727 San Pablo Ave.	Emeryville, CA 94608-3035
2	School District, Evergreen Elementary		3188 Quimby Road	San Jose, CA 95148-3022
2	School District, Fairfield-Suisun Unified		1975 Pennsylvania Ave.	Fairfield, CA 94533-
2	School District, Franklin-McKinley Elementary		645 Wool Creek Dr.	San Jose, CA 95112-2617
2	School District, Fremont Unified		4210 Technology Dr.	Fremont, CA 94537-5008
2	School District, Fremont Union High		589 W. Fremont Ave.	Sunnyvale, CA 94087-
2	School District, Hayward Unified		24411 Amador St.	Hayward, CA 94540-0001
2	School District, Hillsborough City Elementary		300 El Cerrito Ave.	Hillsborough, CA 94010-6818

Region	Agency	Facility	Address	City, State, ZIP
2	School District, Jefferson Elementary		101 Lincoln Ave.	Daly City, CA 94015-3934
2	School District, Jefferson Union High		699 Serramonte Blvd.,Suite 100	Daly City, CA 94015-4132
2	School District, John Swett Unified		341 #B (Selby)	Crockett, CA 94525-
2	School District, La Honda-Pescadero Unified		620 North St	Pescadero, CA 94060-0189
2	School District, Lafayette Elementary		3477 School St.	Lafayette, CA 94549-1029
2	School District, Laguna Joint Elementary		3286 Chileno Valley Road	Petaluma, CA 94952-9428
2	School District, Laguna Salada Union Elementary		375 Reina del Mar	Pacifica, CA 94044-3052
2	School District, Lakeside Joint Elementary		19621 Black Road	Los Gatos, CA 95030-9522
2	School District, Larkspur Elementary		230 Doherty Dr.	Larkspur, CA 94939-
2	School District, Las Lomitas Elementary		1011 Altschul Ave.	Menlo Park, CA 94025-6706
2	School District, Liberty Elementary		170 Liberty Road	Petaluma, CA 94952-1074
2	School District, Lincoln Elementary		1300 Hicks Valley Road	Petaluma, CA 94952-9407
2	School District, Livermore Valley Joint Unified		685 E. Jack London Blvd.	Livermore, CA 94550-1800
2	School District, Loma Prieta Joint Union Elementary		23800 Summit Road	Los Gatos, CA 95033-4054
2	School District, Los Altos Elementary		201 Covington Road	Los Altos, CA 94024-4030
2	School District, Los Gatos Union Elementary		15766 Poppy Lane	Los Gatos, CA 95030-3228
2	School District, Los Gatos-Saratoga Joint Union High		17421 Farley Road West	Los Gatos, CA 95030-3308
2	School District, Luther Burbank Elementary		4 Wabash Ave.	San Jose, CA 95128-1931
2	School District, Martinez Unified		921 Susana St.	Martinez, CA 94553-1848
2	School District, Menlo Park City Elementary		181 Encinal Ave.	Atherton, CA 94027-3102
2	School District, Mill Valley Elementary		411 Sycamore Ave.	Mill Valley, CA 94941-2231
2	School District, Millbrae Elementary		555 Richmond Dr.	Millbrae, CA 94030-1600
2	School District, Milpitas Unified		1331 E. Calaveras Blvd.	Milpitas, CA 95035-5707
2	School District, Montebello Elementary		15101 Montebello Road	Cupertino, CA 95014-5431
2	School District, Moraga Elementary		1540 School St.	Moraga, CA 94556-0158
2	School District, Moreland Elementary		4710 Campbell Ave.	San Jose, CA 95130-1709
2	School District, Mountain View-Los Altos Union High		1299 Bryant Ave.	Mountain View, CA 94040-4527
2	School District, Mountain View-Whisman Elementary		750 A San Pierre Way	Mountain View, CA 94043-
2	School District, Mt. Diablo Unified		1936 Carlotta Dr.	Concord, CA 94519-1358
2	School District, Mt. Pleasant Elementary		3434 Marten Ave.	San Jose, CA 95148-
2	School District, Napa Valley Unified		2425 Jefferson St.	Napa, CA 94558-4931
2	School District, New Haven Unified		34200 Alvarado-Niles Road	Union City, CA 94587-4402
2	School District, Newark Unified		5715 Musick Ave.	Newark, CA 94560-0385
2	School District, Novato Unified		1015 Seventh St.	Novato, CA 94945-2205
2	School District, Oak Grove Elementary		6578 Santa Teresa Blvd.	San Jose, CA 95119-1204
2	School District, Oakland Unified		1025 Second Ave.	Oakland, CA 94606-2212
2	School District, Old Adobe Union Elementary		845 Crinella Dr.	Petaluma, CA 94954-4450
2	School District, Orchard Elementary		921 Fox Lane	San Jose, CA 95131-
2	School District, Orinda Union Elementary		8 Altarinda Road	Orinda, CA 94563-2603
2	School District, Palo Alto Unified		25 Churchill Ave.	Palo Alto, CA 94306-1005
2	School District, Petaluma City Elementary		200 Douglas St.	Petaluma, CA 94952-2575
2	School District, Petaluma Joint Union High		200 Douglas St.	Petaluma, CA 94952-2575

Region	Agency	Facility	Address	City, State, ZIP
2	School District, Piedmont City Unified		760 Magnolia Ave.	Piedmont, CA 94611-4047
2	School District, Pittsburg Unified		2000 Railroad Ave.	Pittsburg, CA 94565-3830
2	School District, Pleasanton Unified		4665 Bernal Ave.	Pleasanton, CA 94566-7449
2	School District, Portola Valley Elementary		4575 Alpine Road	Portola Valley, CA 94028-8040
2	School District, Ravenswood City Elementary		2160 Euclid Ave.	East Palo Alto, CA 94303-1703
2	School District, Redwood City Elementary		750 Bradford St.	Redwood City, CA 94063-1727
2	School District, Reed Union Elementary		105A Avenida Miraflores	Tiburon, CA 94920-
2	School District, Ross Elementary		Lagunitas and Allen Aves.	Ross, CA 94957-1058
2	School District, Ross Valley Elementary		46 Green Valley Court	San Anselmo, CA 94960-1112
2	School District, San Bruno Park Elementary		500 Acacia Ave.	San Bruno, CA 94066-4298
2	School District, San Carlos Elementary		826 Chestnut St.	San Carlos, CA 94070-3802
2	School District, San Francisco Unified		135 Van Ness Ave.	San Francisco, CA 94102-5207
2	School District, San Jose Unified		855 Lenzen Ave.	San Jose, CA 95126-2736
2	School District, San Leandro Unified		14735 Juniper St.	San Leandro, CA 94579-1222
2	School District, San Lorenzo Unified		15510 Usher St.	San Lorenzo, CA 94580-
2	School District, San Mateo-Foster City Elementary		300 28th Ave.	San Mateo, CA 94402-0058
2	School District, San Rafael City Elementary		310 Nova Albion Way	San Rafael, CA 94903-
2	School District, San Rafael City High		310 Nova Albione	San Rafael, CA 94903-3500
2	School District, San Ramon Valley Unified		699 Old Orchard Dr.	Danville, CA 94526-4331
2	School District, Santa Clara Unified		1889 Lawrence Road	Santa Clara, CA 95052-0397
2	School District, Saratoga Union Elementary		20460 Forrest Hills Dr.	Saratoga, CA 95070-6020
2	School District, Sausalito Elementary		630 Nevada St.	Sausalito, CA 94965-1654
2	School District, Sequoia Union High		480 James Ave.	Redwood City, CA 94062-1041
2	School District, Sonoma Valley Unified		721 W. Napa St.	Sonoma, CA 95476-6412
2	School District, St. Helena Unified		465 Main St.	St. Helena, CA 94574-2159
2	School District, Sunnyvale Elementary		819 W. Iowa Ave.	Sunnyvale, CA 94088-3217
2	School District, Sunol Glen Unified		Main & Bond Sts.	Sunol, CA 94586-0569
2	School District, Tamalpais Union High		395 Doherty Dr.	Larkspur, CA 94977-0605
2	School District, Two Rock Union Elementary		5001 Spring Hill Road	Petaluma, CA 94952-9639
2	School District, Union Elementary		5175 Union Ave.	San Jose, CA 95124-5434
2	School District, Union Joint Elementary		5300 Red Hill Road	Petaluma, CA 94952-
2	School District, Vallejo City Unified		211 Valle Vista	Vallejo, CA 94590-3256
2	School District, Walnut Creek Elementary		960 Ygnacio Valley Road	Walnut Creek, CA 94596-3892
2	School District, Waugh Elementary		880 Maria Dr.	Petaluma, CA 94954-6837
2	School District, West Contra Costa Unified		1108 Bissell Ave.	Richmond, CA 94801-3135
2	School District, Wilmar Union Elementary		3775 Bodega Ave.	Petaluma, CA 94952-8023
2	School District, Woodside Elementary		3195 Woodside Road	Woodside, CA 94062-2552
2	Transportation, Department of	Alameda Coast Guard Integrated Support Command	MLCP "VS" Bldg 50-8, Coast Guard Isla	Alameda, CA 94501
2	Transportation, Department of	Petaluma Coast Guard Training Center	599 Tomales Rd	Petaluma, CA 94952-5000
2	University of California	Berkeley Laboratory	1 Cyclotron Road MS-65	Berkeley, CA 94720
2	University of California	Lawrence Livermore National Laboratory	7000 East Ave.	Livermore, CA 94550-9234
2	University of California	The University of California, San Francisco		San Francisco, CA 94143

Region	Agency	Facility	Address	City, State, ZIP
2	University of California	University of California Berkeley	Department/Office Name	Berkeley, CA 94720
2	Veteran Affairs	Martinez Center for Rehab & Extended Care	150 Muir Rd.	Martinez, CA 94553
2	Veteran Affairs	San Francisco VA Medical Center	4150 Clement Street	San Francisco, CA 94121-1598
2	Veteran Affairs	VA Northern California Health Care System	150 Muir Rd.	Martinez, CA 94553
2	Veteran Affairs	VA Palo Alto Health Care System	3801 Miranda Avenue	Palo Alto, CA 94304-290
3	Bureau of Prisons	FCI Lompoc	3600 Guard Road	Lompoc, CA 93436
3	Bureau of Prisons	USP Lompoc	3901 Klein Boulevard	Lompoc, CA 93436
3	California Army National Guard	Camp Roberts	ATTN: CACR-DIS	Camp Roberts, CA 93451-5000
3	California Army National Guard	Camp San Luis Obispo	PO Box 4360	San Luis Obispo, CA 93403-4360
3	California Community Colleges	Allan Hancock College	800 South College Drive	Santa Maria, CA 93454-6368
3	California Community Colleges	Cabrillo College	6500 Soquel Drive	Aptos, CA 95003-3119
3	California Community Colleges	Cuesta College	PO Box 8106	San Luis Obispo, CA 93403-8106
3	California Community Colleges	Gavilan College	5055 Santa Teresa Blvd.	Gilroy, CA 95020-9599
3	California Community Colleges	Hartnell College	156 Homestead Avenue	Salinas, CA 93901-1697
3	California Community Colleges	Monterey Peninsula College	980 Fremont Street	Monterey, CA 93940-4799
3	California Community Colleges	Santa Barbara City College	721 Cliff Drive	Santa Barbara, CA 93109-2394
3	California State University	California Polytechnic State University	1 Grand Ave.	San Luis Obispo, CA 93407
3	California State University	California State Monerey Bay	100 Canpus Center	Seaside, CA 93955
3	California Youth Authority	Ben Lomond Youth Conservation Camp	13575 Empire Grade	Santa Cruz, CA
3	California Youth Authority	El Paso de Robles Youth Correctional Facility	Airport Road	Paso Robles, CA
3	Corrections, Dept of	California Men's Colony	Highway 1	San Luis Obispo, CA 93409-8101
3	Corrections, Dept of	Correctional Training Facility	Highway 101 North	Soledad, CA 93960-0686
3	Corrections, Dept of	Salinas Valley State Prison	PO Box 1020	Soledad, CA 93960-1020
3	Defense, Department of	Camp San Luis Obispo	PO Box 4360	San Luis Obispo, CA 93403-4360
3	Defense, Department of	Defense Language Institute Foreign Language Center and	Bldg 4463 Giggling Rd.	Presido of Monterey, CA 93941-5777
3	Defense, Department of	Fort Hunter Liggett	AFRC-FMH-CDR	Fort Hunter Liggett, CA 93928-7000
3	Defense, Department of	Naval Postgraduate School Monterey Bay	1 University Circle	Monterey, CA 93943-5001
3	Defense, Department of	Vandenberg Air Force Base	30 CES/CEZ, 806 13th St. Suite 116	Vandenberg Air Force Base, CA 93437-5242
3	District Agricultural Association	Earl Warren Showgrounds (National Horse Show)	3400 Calle Real	Santa Barbara, CA
3	District Agricultural Association	Monterey County Fairgrounds	2004 Fairground Road	Monterey, CA
3	District Agricultural Association	San Luis Obispo County Fairgrounds	2198 Riverside Avenue	Paso Robles, CA
3	District Agricultural Association	Santa Cruz County Fairgounds	2601 Eest Lake Avenue	Watsonville, CA
3	District Agricultural Association	Santa Maria Fairpark	937 S Thornburg Street	Santa Maria, CA
3	Mental Health, Dept of	Atascadero State Hospital	10333 El Camino Real	Atascadero, CA
3	School District, Alisal Union Elementary		1205 E. Market St.	Salinas, CA 93905-2831
3	School District, Atascadero Unified		5601 West Mall	Atascadero, CA 93422-4234
3	School District, Ballard Elementary		2425 School St.	Solvang, CA 93463-9709
3	School District, Bitterwater-Tully Union Elementary		Lonoak Rt.	King City, CA 93930-
3	School District, Blochman Union Elementary		4949 Foxen Canyon Road	Santa Maria, CA 93454-9666
3	School District, Bonny Doon Union Elementary		1492 Pine Flat Road	Santa Cruz, CA 95060-9711

Region	Agency	Facility	Address	City, State, ZIP
3	School District, Buellton Union Elementary		301 Second St.	Buellton, CA 93427-0075
3	School District, Carmel Unified		4380 Carmel Valley Road	Carmel, CA 93922-2700
3	School District, Carpinteria Unified		1400 Lindon Ave.	Carpinteria, CA 93013-1414
3	School District, Cayucos Elementary		2950 Santa Rosa Creek Road	Cambria, CA 93428-3506
3	School District, Cienega Union Elementary		11936 Cienega Road	Hollister, CA 95023-9697
3	School District, Coast Unified		2950 Santa Rosa Creek Road	Cambria, CA 93428-3506
3	School District, Cold Spring Elementary		2243 Sycamore Canyon Road	Santa Barbara, CA 93108-1909
3	School District, College Elementary		3325 Pine St.	Santa Ynez, CA 93460-0188
3	School District, Gilroy Unified		7810 Arroyo Circle	Gilroy, CA 95020-7313
3	School District, Goleta Union Elementary		401 N. Fairview Ave.	Goleta, CA 93117-1732
3	School District, Graves Elementary		15 McFadden Road	Salinas, CA 93908-
3	School District, Greenfield Union Elementary		493 El Camino Real	Greenfield, CA 93927-
3	School District, Happy Valley Elementary		3125 Branciforte Dr.	Santa Cruz, CA 95065-9775
3	School District, Hollister School District		2690 Cienega Rd	Hollister, CA 95023-
3	School District, Hope Elementary		3970 la Colina Road	Santa Barbara, CA 93110-1563
3	School District, King City Joint Union High		800 Broadway	King City, CA 93930-3326
3	School District, King City Union Elementary		800 Broadway	King City, CA 93930-2984
3	School District, Lagunita Elementary		975 San Juan Grade Road	Salinas, CA 93907-8438
3	School District, Live Oak Elementary		984-1 Bostwick Lane	Santa Cruz, CA 95062-1756
3	School District, Live Oak Unified		2201 Pennington Road	Live Oak, CA 95953-2469
3	School District, Lompoc Unified		1301 North A St.	Lompoc, CA 93438-8000
3	School District, Los Olivos Elementary		2540 Alamo Pintado Ave.	Los Olivos, CA 93441-0208
3	School District, Lucia Mar Unified		602 Orchard St.	Arroyo Grande, CA 93420-4000
3	School District, Mission Union Elementary		36825 Foothill Road	Soledad, CA 93960-9656
3	School District, Montecito Union Elementary		385 San Ysidro Road	Santa Barbara, CA 93108-2131
3	School District, Monterey Peninsula Unified		700 Pacific St.	Monterey, CA 93942-1031
3	School District, Morgan Hill Unified		15600 Concord Circle	Morgan Hill, CA 95037-7110
3	School District, Mountain Elementary		3042 Old San Jose Road	Soquel, CA 95073-9752
3	School District, North County Joint Union Elementary		500 Spring Grove Road	Hollister, CA 95023-9366
3	School District, Nuestro Elementary		3934 Broadway Road	Live Oak, CA 95953-9401
3	School District, Orcutt Union Elementary		Soares & Dyer Sts.	Orcutt, CA 93457-2310
3	School District, Pacific Grove Unified		555 Sinex Ave.	Pacific Grove, CA 93950-4320
3	School District, Pajaro Valley Joint Unified		294 Greenvalley Rd	Watsonville, CA 95076-
3	School District, Paso Robles Joint Unified		800 Niblick Road	Paso Robles, CA 93447-7010
3	School District, Salinas City Elementary		431 W. Alisal St.	Salinas, CA 93901-1624
3	School District, Salinas Union High		431 W. Alisal St.	Salinas, CA 93901-1624
3	School District, San Benito High		1220 Monterey St.	Hollister, CA 95023-4708
3	School District, San Lorenzo Valley Unified		6134 Hwy. 9	Felton, CA 95018-9704
3	School District, San Luis Coastal Unified		1500 Lizzie St.	San Luis Obispo, CA 93401-3099
3	School District, Santa Barbara Elementary		720 Santa Barbara St.	Santa Barbara, CA 93101-
3	School District, Santa Barbara High		720 Santa Barbara St.	Santa Barbara, CA 93101-
3	School District, Santa Cruz City Elementary		2931 Mission St.	Santa Cruz, CA 95060-

Region	Agency	Facility	Address	City, State, ZIP
3	School District, Santa Cruz City High		2931 Mission St.	Santa Cruz, CA 95060-5709
3	School District, Santa Maria Joint Union High		2560 Skyway Dr.	Santa Maria, CA 93455-
3	School District, Santa Maria-Bonita Elementary		708 S. Miller St.	Santa Maria, CA 93454-6230
3	School District, Santa Rita Union Elementary		57 Russell Road	Salinas, CA 93906-4325
3	School District, Santa Ynez Valley Union High		2975 E. Hwy. 246	Santa Ynez, CA 93460-
3	School District, Scotts Valley Unified		4444 Scotts Valley Dr., Ste 5B	Scotts Valley, CA 95066-4529
3	School District, Soledad Unified		335 Market St.	Soledad, CA 93960-
3	School District, Solvang Elementary		565 Atterdag Road	Solvang, CA 93463-2690
3	School District, Soquel Union Elementary		620 Monterey Ave.	Capitola, CA 95010-3618
3	School District, Southside Elementary		4991 Southside Road	Hollister, CA 95023-9637
3	School District, Templeton Unified		960 Old County Road	Templeton, CA 93465-9419
3	School District, Washington Union Elementary		43 San Benancio Canyon Rd	Salinas, CA 93908-
3	University of California	UC Santa Barbara		Santa Barbara, CA 93106
3	University of California	University of California, Santa Cruz	1156 High Street	Santa Cruz, CA 95064
4	Bureau of Prisons	CCM Long Beach	535 N. Alameda Street	Los Angeles, CA 90012
4	Bureau of Prisons	FCI Terminal Island	1299 Seaside Avenue	Terminal Island, CA 90731
4	California Air National Guard	Channel Island Air National Guard Base	100 Mulcahey Dr	Port Hueneme, CA 93041-4002
4	California Community Colleges	Cerritos College	11110 Alondra Boulevard	Norwalk, CA 90650-6269
4	California Community Colleges	Citrus College	1000 West Foothill Boulevard	Glendora, CA 91741-1899
4	California Community Colleges	College Of The Canyons	26455 N. Rockwell Canyon Road	Santa Clarita, CA 91355-1899
4	California Community Colleges	Compton College	1111 East Artesia Boulevard	Compton, CA 90221-5393
4	California Community Colleges	East Los Angeles College	1301 Avenida Cesar Chavez	Monterey Park, CA 91754-6099
4	California Community Colleges	El Camino College	16007 Crenshaw Boulevard	Torrance, CA 90506-0002
4	California Community Colleges	Glendale Community College	1500 North Verdugo Road	Glendale, CA 91208-2894
4	California Community Colleges	Long Beach City College	4901 East Carson Street	Long Beach, CA 90808-1706
4	California Community Colleges	Los Angeles City College	855 North Vermont Avenue	Los Angeles, CA 90029-3590
4	California Community Colleges	Los Angeles Harbor College	1111 Figueroa Place	Wilmington, CA 90744-2397
4	California Community Colleges	Los Angeles Mission College	13356 Eldridge Avenue	Sylmar, CA 91342-3200
4	California Community Colleges	Los Angeles Pierce College	6201 Winnetka Avenue	Woodland Hills, CA 91371-0001
4	California Community Colleges	Los Angeles Southwest College	1600 West Imperial Highway	Los Angeles, CA 90047-4899
4	California Community Colleges	Los Angeles Trade-Tech College	400 West Washington Boulevard	Los Angeles, CA 90015-4108
4	California Community Colleges	Los Angeles Valley College	5800 Fulton Avenue	Van Nuys, CA 91401-4096
4	California Community Colleges	Moorpark College	7075 Campus Road	Moorpark, CA 93201-1695
4	California Community Colleges	Mt. San Antonio College	1100 North Grand Avenue	Walnut, CA 91789-1399
4	California Community Colleges	Oxnard College	4000 South Rose Avenue	Oxnard, CA 93033-6699
4	California Community Colleges	Pasadena City College	1570 East Colorado Boulevard	Pasadena, CA 91106-2003
4	California Community Colleges	Rio Hondo College	3600 Workman Mill Road	Whittier, CA 90601-1699
4	California Community Colleges	Santa Monica College	1900 Pico Boulevard	Santa Monica, CA 90405-1628
4	California Community Colleges	Ventura College	4667 Telegraph Road	Ventura, CA 93003-3899
4	California Community Colleges	West Los Angeles College	4800 Freshman Drive	Culver City, CA 90230-3500
4	California State University	California State Polytechnic University, Pomona	3801 West Temple Avenue	Pomona, CA 91768
4	California State University	California State University Channel Islands	One University Drive	Camarillo, CA 93012

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4	California State University	California State University Dominguez Hills	1000 E. Victoria Street	Carson, CA 90747
4	California State University	California State University Long Beach	1250 Bellflower Blvd.	Long Beach, CA 90840
4	California State University	California State University Los Angeles	5151 State University Drive	Los Angeles, CA 90032-4226
4	California State University	California State University Northridge	18111 Nordhoff Street	Northridge, CA 91330
4	California Youth Authority	Fred C. Nelles Youth Correcitonal Facility	11850 E Whittier	Whittier, CA
4	California Youth Authority	Southern Youth Correctional Reception Center and Clinic	13200 S Bloomfield Ave	Norwalk, CA
4	California Youth Authority	Ventura Youth Correctional Facility	3100 Wright Rd	Camarillo, CA
4	Defense, Department of	Corona Naval Station	P.O. Box 5000	Corona, CA 92878-5000
4	Defense, Department of	Los Angeles Air Force Base	61 ABG/CEZV, 2420 Vela Way Suite 14	El Segundo, CA 90245
4	Defense, Department of	Naval Auxiliary Landing Field, San Clemente Island	33000 Nixie Way Bldg 50, Suite 326	San Diego, CA 92147-5110
4	Defense, Department of	Naval Base Ventura County		, CA
4	Defense, Department of	Port Hueneme Naval Facility	4363 Missile Way	Port Hueneme, CA 93043-4307
4	Defense, Department of	San Nicholas Island Naval Facility	NAWS-890000E	Point Mugu, CA 93042-5001
4	Devlopmental Services, Dept of	Lanterman Developmental Center	3530 West Pomona Blvd	Pomona, CA
4	District Agricultural Association	Ventura County Fairgrounds	10 West Harbor Blvd	Ventura, CA
4	Mental Health, Dept of	Metropolitan State Hospital	11401 Bloomfield Avenue	Norwalk, CA
4	School District, ABC Unified		16700 Norwalk Blvd.	Cerritos, CA 90703-1838
4	School District, Acton-Agua Dulce Unified		32248 N. Crown Valley Road	Acton, CA 93510-0068
4	School District, Alhambra City Elementary		15 W. Alhambra Road	Alhambra, CA 91802-2110
4	School District, Alhambra City High		15 W. Alhambra Road	Alhambra, CA 91802-2110
4	School District, Arcadia Unified		234 Campus Dr.	Arcadia, CA 91007-6902
4	School District, Azusa Unified		546 S. Citrus Ave.	Azusa, CA 91702-0500
4	School District, Baldwin Park Unified		3699 N. Holly Ave.	Baldwin Park, CA 91706-5397
4	School District, Bassett Unified		904 N. Willow Ave.	La Puente, CA 91746-1615
4	School District, Bellflower Unified		16703 S. Clark Ave.	Bellflower, CA 90706-5203
4	School District, Beverly Hills Unified		255 S. Lasky Dr.	Beverly Hills, CA 90212-3644
4	School District, Bonita Unified		115 W. Allen Ave.	San Dimas, CA 91773-1437
4	School District, Briggs Elementary		14438 W. Telegraph Road	Santa Paula, CA 93060-3088
4	School District, Burbank Unified		1900 W Olive Ave	Burbank, CA 91506
4	School District, Castaic Union Elementary		28131 Livingston Ave.	Valencia, CA 91355-
4	School District, Centinela Valley Union High		14901 S. Inglewood Ave.	Lawndale, CA 90260-1251
4	School District, Charter Oak Unified		20240 Cienega Ave.	Covina, CA 91723-0009
4	School District, Claremont Unified		2080 N. Mountain Ave.	Claremont, CA 91711-2643
4	School District, Compton Unified		604 S. Tamarind Ave.	Compton, CA 90220-3826
4	School District, Conejo Valley Unified		1400 E. Janss Road	Thousand Oaks, CA 91362-2133
4	School District, Covina-Valley Unified		519 E. Badillo St.	Covina, CA 91723-0269
4	School District, Culver City Unified		4034 Irving Pl.	Culver City, CA 90232-2810
4	School District, Downey Unified		11627 Brookshire Ave.	Downey, CA 90241-7017
4	School District, Duarte Unified		1620 Huntington Dr.	Duarte, CA 91010-2534
4	School District, East Whittier City Elementary		14535 E. Whittier Blvd.	Whittier, CA 90605-2130
4	School District, El Monte City Elementary		3540 N. Lexington Ave.	El Monte, CA 91731-2684
4	School District, El Monte Union High		3537 Johnson Ave.	El Monte, CA 91731-3290

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4	School District, El Rancho Unified		9333 Loch Lomond Dr.	Pico Rivera, CA 90660-2913
4	School District, El Segundo Unified		641 Sheldon St.	El Segundo, CA 90245-3036
4	School District, Fillmore Unified		627 Sespe Ave.	Fillmore, CA 93016-0697
4	School District, Garvey Elementary		2730 N. del Mar	Rosemead, CA 91770-3026
4	School District, Glendale Unified		223 N. Jackson St.	Glendale, CA 91206-4334
4	School District, Glendora Unified		500 N. Loraine Ave.	Glendora, CA 91741-2964
4	School District, Hacienda la Puente Unified		15959 E. Gale Ave.	City Of Industry, CA 91716-
4	School District, Hawthorne Elementary		14120 S. Hawthorne Blvd.	Hawthorne, CA 90250-
4	School District, Hermosa Beach City Elementary		1645 Valley Dr.	Hermosa Beach, CA 90254-2921
4	School District, Hueneme Elementary		205 North Ventura Road	Port Hueneme, CA 93041-3065
4	School District, Inglewood Unified		401 S. Inglewood Ave.	Inglewood, CA 90301-2501
4	School District, La Canada Unified		5039 Palm Dr.	La Canada, CA 91011-1518
4	School District, Las Virgenes Unified		4111 N. Las Virgenes Road	Calabasas, CA 91302-1929
4	School District, Lawndale Elementary		4161 W. 147th St.	Lawndale, CA 90260-1709
4	School District, Lennox Elementary		10319 S. Firmona Ave.	Lennox, CA 90304-1419
4	School District, Little Lake City Elementary		10515 S. Pioneer Blvd.	Santa Fe Springs, CA 90670-3703
4	School District, Long Beach Unified		1515 Hughes Way	Long Beach, CA 90810-1839
4	School District, Los Angeles Unified		450 N. Grand Ave.	Los Angeles, CA 90012-2100
4	School District, Los Nietos Elementary		8324 S. Westman Ave., Whittier	Whittier, CA 90606-
4	School District, Lowell Joint		11019 Valley Home Ave.	Whittier, CA 90603-3042
4	School District, Lynwood Unified		11321 Bullis Road	Lynwood, CA 90262-3600
4	School District, Manhattan Beach Unified		1230 Rosecrans Suite 400	Manhattan Beach, CA 90266-2478
4	School District, Mesa Union Elementary		3901 N. Mesa School Road	Somis, CA 93066-9734
4	School District, Monrovia Unified		325 E. Huntington Dr.	Monrovia, CA 91016-3585
4	School District, Montebello Unified		123 S. Montebello Blvd.	Montebello, CA 90640-4729
4	School District, Moorpark Unified		30 Flory Ave.	Moorpark, CA 93021-1862
4	School District, Mountain View Elementary		3320 Gilman Road	El Monte, CA 91732-3226
4	School District, Mupu Elementary		4410 N. Ojai Road	Santa Paula, CA 93060-9681
4	School District, Newhall Elementary		25375 Orchard Village, Ste. 200	Valencia, CA 91355-3055
4	School District, Norwalk-La Mirada Unified		12820 Pioneer Blvd.	Norwalk, CA 90650-2894
4	School District, Ocean View Elementary		2382 Etting Road	Oxnard, CA 93033-6864
4	School District, Ojai Unified		414 E. Ojai Ave.	Ojai, CA 93024-0878
4	School District, Oxnard Elementary		1051 South A St.	Oxnard, CA 93030-7442
4	School District, Oxnard Union High		309 South K St.	Oxnard, CA 93030-5212
4	School District, Palos Verdes Peninsula Unified		3801 Via la Selva	Palos Verdes Estates, CA 90274-1119
4	School District, Paramount Unified		15110 California Ave.	Paramount, CA 90723-4320
4	School District, Pasadena Unified		351 S. Hudson Ave.	Pasadena, CA 91101-3507
4	School District, Pleasant Valley Elementary		600 Temple Ave.	Camarillo, CA 93010-4835
4	School District, Pomona Unified		800 S. Garey Ave	Pomona, CA 91769-2900
4	School District, Redondo Beach Unified		1401 Inglewood Ave.	Redondo Beach, CA 90278-3912
4	School District, Rio Elementary		3300 Cortez St.	Oxnard, CA 93030-1309

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4	School District, Rosemead Elementary		3907 Rosemead Blvd.	Rosemead, CA 91770-2041
4	School District, Rowland Unified		1830 Nogales St.	Rowland Heights, CA 91748-
4	School District, San Gabriel Unified		102 E. Broadway	San Gabriel, CA 91776-4500
4	School District, San Marino Unified		1665 West Dr.	San Marino, CA 91108-2594
4	School District, Santa Clara Elementary		20030 E. Telegraph Road	Santa Paula, CA 93060-9691
4	School District, Santa Monica-Malibu Unified		1651 16th St.	Santa Monica, CA 90404-3891
4	School District, Santa Paula Elementary		201 S. Steckel Dr.	Santa Paula, CA 93061-0710
4	School District, Santa Paula Union High		500 E. Santa Barbara St.	Santa Paula, CA 93060-2633
4	School District, Saugus Union Elementary		24930 Avenue Stanford .	Santa Clarita, CA 91355-1272
4	School District, Simi Valley Unified		875 E. Cochran	Simi Valley, CA 93065-0999
4	School District, Somis Union Elementary		5268 North St.	Somis, CA 93066-0900
4	School District, South Pasadena Unified		1020 El Centro St.	South Pasadena, CA 91030-3118
4	School District, South Whittier Elementary		10120 Painter Ave.	Whittier, CA 90605-0037
4	School District, Sulphur Springs Union Elementary		17866 Sierra Hwy.	Canyon Country, CA 91351-1671
4	School District, Temple City Unified		9700 Las Tunas Drive	Temple City, CA 91780-
4	School District, Torrance Unified		2335 Plaza del Amo	Torrance, CA 90501-3420
4	School District, Valle Lindo Elementary		1431 N. Central Ave.	South El Monte, CA 91733-3388
4	School District, Ventura Unified		120 E. Santa Clara St.	Ventura, CA 93001-2716
4	School District, Walnut Valley Unified		880 S. Lemon Ave.	Walnut, CA 91789-2931
4	School District, West Covina Unified		1717 W. Merced Ave.	West Covina, CA 91790-3406
4	School District, Whittier City Elementary		7211 S. Whittier Ave.	Whittier, CA 90602-1123
4	School District, Whittier Union High		9401 S. Painter Ave.	Whittier, CA 90605-2798
4	School District, William S. Hart Union High		21515 Redview Dr.	Santa Clarita, CA 91350-2948
4	School District, Wiseburn Elementary		13530 Aviation Blvd.	Hawthorne, CA 90250-6462
4	Science Center, California	California Science Center	700 State Drive	Los Angeles, CA
4	University of California	UCLA	405 Hilgard Avenue Box 951361	Los Angeles, CA 90095-1361
4	Veteran Affairs	Long Beach VA Medical Center	5901 E. 7th Street	Long Beach, CA 90822
4	Veteran Affairs	VA Greater Los Angeles Healthcare System (GLA)	11301 Willshire Boulevard	Los Angeles, CA 90073
5F	Bureau of Prisons	USP Atwater	PO Box 019000	Atwater, CA 95301
5F	California Air National Guard	144th Fighter Wing	5323 East McKinley Avenue	Fresno, CA 93727-2199
5F	California Air National Guard	Fresno Air National Guard Base	5323 E McKinley Ave	Fresno, CA 93727
5F	California Community Colleges	Bakersfield College	1801 Panorama Drive	Bakersfield, CA 93305-1299
5F	California Community Colleges	College of the Sequoias	915 South Mooney Boulevard	Visalia, CA 93277-2234
5F	California Community Colleges	Fresno City College	1101 E. University Avenue	Fresno, CA 93741-0001
5F	California Community Colleges	Merced College	3600 M Street	Merced, CA 95348-2898
5F	California Community Colleges	Porterville College	100 East College Avenue	Porterville, CA 93257-5901
5F	California Community Colleges	Reedley College	995 N. Reed Avenue	Reedley, CA 93654-2099
5F	California State University	California State University Bakersfield	9001 Stockdale Highway	Bakersfield, CA 93311-1099
5F	Defense, Department of	Lemoore Naval Air Station	751 Enterprise Ave	Lemoore NAS, CA 93246
5F	Developmental Services, Dept of	Porterville Developmental Center	26501 AVE 140	Porterville, CA
5F	District Agricultural Association	Kern County Fairgrounds	1142 South P Street	Bakersfield, CA
5F	District Agricultural Association	Kings County Fairgrounds	810 S 10th Ave	Hanford, CA

Region	Agency	Facility	Address	City, State, ZIP
5F	District Agricultural Association	Madera County Fairgournds	1850 W Cleveland	Madera, CA
5F	District Agricultural Association	Merced County Fairgrounds	900 Martin Luther King	Merced, CA
5F	District Agricultural Association	The Big Fresno Fair	1121 Chance Ave	Fresno, CA
5F	District Agricultural Association	Tulare County Fairgrounds	215 Martin Luther King	Tulare, CA
5F	School District, Alta Vista Elementary		2293 E. Crabtree Ave.	Porterville, CA 93257-5225
5F	School District, American Union Elementary		2801 W. Adams Ave.	Fresno, CA 93706-9601
5F	School District, Atwater Elementary		1401 Broadway Ave.	Atwater, CA 95301-
5F	School District, Bakersfield City Elementary		1300 Baker St.	Bakersfield, CA 93305-4326
5F	School District, Beardsley Elementary		1001 Roberts Lane	Bakersfield, CA 93308-4503
5F	School District, Buena Vista Elementary		21660 Road 60	Tulare, CA 93274-9470
5F	School District, Burton Elementary		264 N. Westwood St.	Porterville, CA 93257-2542
5F	School District, Central Unified		4605 N. Polk Ave.	Fresno, CA 93722-5334
5F	School District, Central Union Elementary		15783 18th Ave.	Lemoore, CA 93245-9742
5F	School District, Citrus South Tule Elementary		31374 Success Valley Dr.	Porterville, CA 93257-9638
5F	School District, Clay Joint Elementary		12449 S. Smith Ave.	Kingsburg, CA 93631-9717
5F	School District, Clovis Unified		1450 Herndon Ave.	Clovis, CA 93611-0567
5F	School District, Delhi Unified		9715 Hinton Ave.	Delhi, CA 95315-0338
5F	School District, Delta View Joint Union Elementary		1201 Lacey Blvd.	Hanford, CA 93230-9306
5F	School District, Edison Elementary		9600 Eucalyptus Dr.	Bakersfield, CA 93306-6781
5F	School District, Exeter Union Elementary		134 South E St.	Exeter, CA 93221-
5F	School District, Exeter Union High		134 South E St.	Exeter, CA 93221-
5F	School District, Fairfax Elementary		1500 S. Fairfax Road	Bakersfield, CA 93307-3151
5F	School District, Farmersville Unified		281 S. Farmersville Blvd.	Farmersville, CA 93223-1833
5F	School District, Fresno Unified		Ed. Cntr., Tulare & M Sts	Fresno, CA 93721-
5F	School District, Fruitvale Elementary		7311 Rosedale Hwy.	Bakersfield, CA 93308-5738
5F	School District, General Shafter Elementary		1316 Shafter Road	Bakersfield, CA 93313-9766
5F	School District, Golden Valley Unified		37479 Avenue 12	Madera, CA 93638-
5F	School District, Greenfield Union Elementary		1624 Fairview Road	Bakersfield, CA 93307-5512
5F	School District, Hanford Elementary		714 N. White St.	Hanford, CA 93232-
5F	School District, Hanford Joint Union High		120 E. Grangeville Road	Hanford, CA 93230-3067
5F	School District, Hope Elementary		816 W. Teapot Dome Ave.	Porterville, CA 93257-9465
5F	School District, Island Union Elementary		7799 21st Ave.	Lemoore, CA 93245-9673
5F	School District, Kern Union High		5801 Sundale Ave	Bakersfield, CA 93309-2924
5F	School District, Kings Canyon Joint Unified		675 W. Manning Ave.	Reedley, CA 93654-2427
5F	School District, Kings River Union Elementary		3961 Ave. 400	Kingsburg, CA 93631-9660
5F	School District, Kings River-Hardwick Union Elementary		10300 Excelsior Ave.	Hanford, CA 93230-9108
5F	School District, Kingsburg Joint Union Elementary		1310 Stroud Ave.	Kingsburg, CA 93631-1000
5F	School District, Kingsburg Joint Union High		1900 18th Ave.	Kingsburg, CA 93631-1629
5F	School District, Kit Carson Union Elementary		9895 Seventh Ave.	Hanford, CA 93230-8802
5F	School District, Lakeside Union Elementary		9100 Jersey Ave.	Hanford, CA 93230-9560
5F	School District, Lakeside Union School		14535 Old River Rd.	Bakersfield, CA 93311-9756
5F	School District, Lemoore Union Elementary		100 Vine St.	Lemoore, CA 93245-3418

Region	Agency	Facility	Address	City, State, ZIP
5F	School District, Lemoore Union High		101 E. Bush St.	Lemoore, CA 93245-3601
5F	School District, Liberty Elementary		11535 Ave. 264	Visalia, CA 93277-9483
5F	School District, Los Banos Unified		1717 S. 11th St.	Los Banos, CA 93635-4800
5F	School District, Madera Unified		1902 Howard Road	Madera, CA 93637-5123
5F	School District, McSwain Union Elementary		926 N. Scott Road	Merced, CA 95340-8893
5F	School District, Merced City Elementary		444 W. 23rd St.	Merced, CA 95340-3723
5F	School District, Merced Union High		Olive Ave. & G St.	Merced, CA 95344-0147
5F	School District, Monroe Elementary		11842 S. Chestnut Ave.	Fresno, CA 93725-9618
5F	School District, Norris Elementary		6940 Calloway Dr.	Bakersfield, CA 93312-9005
5F	School District, Oak Valley Union Elementary		24500 Road 68	Tulare, CA 93274-9607
5F	School District, Orange Center Elementary		3530 S. Cherry Ave.	Fresno, CA 93706-5615
5F	School District, Outside Creek Elementary		26452 Road 164	Visalia, CA 93292-9740
5F	School District, Pacific Union Elementary		2065 E. Bowles Ave.	Fresno, CA 93725-9630
5F	School District, Palo Verde Union Elementary		9637 Ave. 196	Tulare, CA 93274-9529
5F	School District, Panama Buena Vista Union Elementary		4200 Ashe Road	Bakersfield, CA 93313-2029
5F	School District, Pioneer Union Elementary		8810 14th Ave.	Hanford, CA 93230-9677
5F	School District, Plainsburg Union Elementary		3708 S. Plainsburg Road	Merced, CA 95340-9557
5F	School District, Pleasant View Elementary		14004 Road 184	Porterville, CA 93257-9214
5F	School District, Porterville Unified		600 West Grand Ave.	Porterville, CA 93257-2029
5F	School District, Rio Bravo-Greeley Union Elementary		6521 Enos Lane	Bakersfield, CA 93312-8721
5F	School District, Rockford Elementary		14983 Road 208	Porterville, CA 93257-9318
5F	School District, Rosedale Union Elementary		2553 Old Farm Road	Bakersfield, CA 93312-3531
5F	School District, Selma Unified		3036 Thompson Ave.	Selma, CA 93662-2497
5F	School District, Standard Elementary		1200 N. Chester Ave.	Bakersfield, CA 93308-3521
5F	School District, Stone Corral Elementary		15590 Ave. 383	Visalia, CA 93292-9545
5F	School District, Strathmore Union Elementary		23024 Ave. 198	Strathmore, CA 93267-0247
5F	School District, Strathmore Union High		22568 Ave. 196	Strathmore, CA 93267-0114
5F	School District, Sundale Union Elementary		13990 Ave. 240	Tulare, CA 93274-9563
5F	School District, Sunnyside Union Elementary		21644 Ave. 196	Strathmore, CA 93267-9795
5F	School District, Tulare City Elementary		600 N. Cherry Ave.	Tulare, CA 93274-2920
5F	School District, Tulare Joint Union High		426 N. Blackstone	Tulare, CA 93274-4449
5F	School District, Vineland Elementary		14713 Weedpatch Hwy.	Bakersfield, CA 93307-9653
5F	School District, Visalia Unified		5000 W Cypress Ave.	Visalia, CA 93277-8300
5F	School District, Washington Colony Elementary		130 E. Lincoln Ave.	Fresno, CA 93706-6043
5F	School District, Washington Union High		6041 S. Elm Ave.	Fresno, CA 93706-6099
5F	School District, Waukena Joint Union Elementary		19113 Road 28	Tulare, CA 93274-
5F	School District, Weaver Union Elementary		3076 E. Childs Ave.	Merced, CA 95340-9583
5F	School District, West Fresno Elementary		2888 S. Ivy St.	Fresno, CA 93706-5513
5F	School District, West Park Elementary		2695 S. Valentine Ave.	Fresno, CA 93706-9042
5F	School District, Woodville Elementary		16541 Road 168	Porterville, CA 93257-9205
5F	University of California	University of California, Merced	1170 W. Olive Avenue Suite I	Merced, CA 95348-1959
5F	Veteran Affairs	VA Central California Health Care System	2615 E. Clinton Avenue	Fresno, CA 93703

Region	Agency	Facility	Address	City, State, ZIP
5R	California Community Colleges	Shasta College	11555 Old Oregon Trail PO Box 496006	Redding, CA 96049-6006
5R	California State University	California State University Chico	400 West First Street	Chico, CA 95929
5R	District Agricultural Association	Shasta County Fairgrounds	1890 Briggs Street	Anderson, CA
5R	District Agricultural Association	Silver Dollar Fairgrounds	2357 Fair Street	Chico, CA
5R	School District, Anderson Union High		1471 Ferry St.	Anderson, CA 96007-3313
5R	School District, Cascade Union Elementary		1645 W. Mill St.	Anderson, CA 96007-3226
5R	School District, Chico Unified		1163 E. Seventh St.	Chico, CA 95928-5903
5R	School District, Columbia Elementary		10142 Old Oregon Trail Road	Redding, CA 96003-7995
5R	School District, Durham Unified		9420 Putney Dr.	Durham, CA 95938-0300
5R	School District, Enterprise Elementary		1155 Mistletoe Lane	Redding, CA 96002-0749
5R	School District, Gateway Unified		4411 Mountain Lakes Blvd.	Redding, CA 96003-1446
5R	School District, Grant Elementary		8835 Swasey Dr.	Redding, CA 96001-9722
5R	School District, Happy Valley Union Elementary		16300 Cloverdale Road	Anderson, CA 96007-
5R	School District, Pacheco Union Elementary		7433 Pacheco Rd	Redding, CA 96002-4603
5R	School District, Redding Elementary		5885 E. Bonnyview Road	Redding, CA 96099-2418
5R	School District, Shasta Union High		2200 Eureka way Suite B	Redding, CA 96001-
5S	California Air National Guard	162nd Combat Communications Group	3900 Roseville Road	North Highlands, CA 95660-5794
5S	California Community Colleges	American River College	4700 College Oak Drive	Sacramento, CA 95841-4286
5S	California Community Colleges	Cosumnes River College	8401 Center Parkway	Sacramento, CA 95823-5799
5S	California Community Colleges	Modesto Junior College	435 College Avenue	Modesto, CA 95350-5800
5S	California Community Colleges	Sacramento City College	3835 Freeport Boulevard	Sacramento, CA 95822-1386
5S	California Community Colleges	San Joaquin Delta College	5151 Pacific Avenue	Stockton, CA 95207-6370
5S	California Community Colleges	Sierra College	5000 Rocklin Road	Rocklin, CA 95677-3397
5S	California Community Colleges	Yuba College	2088 North Beale Road	Marysville, CA 95901-7699
5S	California State University	California State University Sacramento	6000 J Street	Sacramento, CA 95819
5S	California State University	California State University Stanislaus	801 West Monte Vista Ave	Turlock, CA 95382
5S	California Youth Authority	Northern California Youth Correctional Center	7650 Newcastle Rd	Stockton, CA
5S	California Youth Authority	Northern Youth Correctional Reception Center and Clinic	3001 Ramona Ave	Sacramento, CA
5S	Corrections, Dept of	California Medical Facility	1600 California Dr	Vacaville, CA 95696-2000
5S	Corrections, Dept of	CSP, Sacramento	PO Box 29	Represa, CA 95671
5S	Corrections, Dept of	CSP, Solano County	2100 Peabody Road	Vacaville, CA 95696-4000
5S	Corrections, Dept of	Deuel Vocational Institution	23500 Kasson Road	Tracy, CA 95378-0004
5S	Corrections, Dept of	Folsom State Prison	300 Prison Road	Represa, CA 95671
5S	Corrections, Dept of	Northern California Women's Facility	7150 East Arch Road	Stockton, CA 95213-9006
5S	Defense, Department of	Beale Air Force Base	9 CES/CEV 6601 B Street	Beale AFB, CA 95903-1708
5S	Defense, Department of	Defense Distribution San Joaquin	PO Box 960001	Stockton, CA 95296-0002
5S	Defense, Department of	McClellan Air Force Base	3237 Peacekeeper Way Suite 1	McClellan AFB, CA 95652-1044
5S	Defense, Department of	Stockton Naval Communications Station	305 Fyffe Ave	Stockton, CA 95203-4920
5S	District Agricultural Association	Contra Costa County Fairgrounds	1201 West 10th Street	Antioch, CA
5S	District Agricultural Association	Dixon May Fair	655 S First Street	Dixon, CA
5S	District Agricultural Association	Gold Country Fairgrounds	1273 High Street	Auburn, CA
5S	District Agricultural Association	Lake County Fairgrounds	401 Martin Street	Lakeport, CA

Region	Agency	Facility	Address	City, State, ZIP
5S	District Agricultural Association	Nevada County Fairgrounds	11228 McCourtney Road	Grass Valley, CA
5S	District Agricultural Association	San Joaquin County Fairgrounds	1658 S Airport Way	Stockton, CA
5S	District Agricultural Association	Stanislaus County Fairgrounds	900 N Broadway	Turlock, CA
5S	District Agricultural Association	Sutter County Fairgrounds	442 Franklin Ave	Yuba City, CA
5S	District Agricultural Association	Yolo County Fairgrounds	Hwy 113 & Gibson Rd	Woodland, CA
5S	Exposition & State Fair, California	California Exposition & State Fair	1600 Exposition Blvd	Sacramento, CA
5S	School District, Ackerman Elementary		13777 Bowman Road	Auburn, CA 95603-3147
5S	School District, Antioch Unified		510 G St.	Antioch, CA 94509-0904
5S	School District, Arcohe Union Elementary		11755 Ivie Road	Herald, CA 95638-0093
5S	School District, Auburn Union Elementary		55 College Way	Auburn, CA 95603-
5S	School District, Brentwood Union Elementary		255 Guthrie Lane	Brentwood, CA 94513-1610
5S	School District, Center Joint Unified		8408 Watt Ave.	Antelope, CA 95843-9116
5S	School District, Ceres Unified		2503 Lawrence St	Ceres, CA 95307-0307
5S	School District, Chatom Union Elementary		7201 Clayton Ave.	Turlock, CA 95380-9352
5S	School District, Chicago Park Elementary		15725 Mt Olive Road	Grass Valley, CA 95945-7906
5S	School District, Clear Creek Elementary		17700 McCourtney Road	Grass Valley, CA 95949-7636
5S	School District, Davis Joint Unified		526 B St.	Davis, CA 95616-3811
5S	School District, Del Paso Heights Elementary		3780 Rosin Court, Suite 270	Sacramento, CA 95834-1646
5S	School District, Dixon Unified		305 N. Almond St.	Dixon, CA 95620-2702
5S	School District, Dry Creek Joint Elementary		9707 Cook Riolo Road	Roseville, CA 95747-9793
5S	School District, El Dorado Union High		4675 Missouri Flat Road	Placerville, CA 95619-
5S	School District, Elk Grove Unified		9510 Elk Grove-Florin Road	Elk Grove, CA 95624-1801
5S	School District, Elverta Joint Elementary		8920 Elwyn Ave.	Elverta, CA 95626-9217
5S	School District, Empire Union Elementary		116 N. McClure Road	Modesto, CA 95357-1329
5S	School District, Eureka Union Elementary		5477 Eureka Road	Granite Bay, CA 95746-8808
5S	School District, Folsom-Cordova Unified		125 East Bidwell St.	Folsom, CA 95630-3241
5S	School District, Franklin Elementary		332 N. Township Road	Yuba City, CA 95993-9629
5S	School District, Galt Joint Union Elementary		1018 C St. Suite 210	Galt, CA 95632-
5S	School District, Galt Joint Union High		145 N. Lincoln Way	Galt, CA 95632-1720
5S	School District, Gold Oak Union Elementary		3171 Pleasant Valley Road	Placerville, CA 95667-7836
5S	School District, Gold Trail Union Elementary		1575 Old Ranch Road	Placerville, CA 95667-8929
5S	School District, Grant Joint Union High		1333 Grand Ave.	Sacramento, CA 95838-3697
5S	School District, Grass Valley Elementary		10840 Gilmore Way	Grass Valley, CA 95945-5409
5S	School District, Hart-Ransom Union Elementary		3920 Shoemake Ave.	Modesto, CA 95358-8577
5S	School District, Holt Union Elementary		1545 S. Holt Road	Stockton, CA 95206-9618
5S	School District, Hughson Unified		7419 East Whitmore Ave.	Hughson, CA 95326-
5S	School District, Jefferson Elementary		7500 W. Linne Road	Tracy, CA 95376-9278
5S	School District, Keyes Union Elementary		5465 Seventh St.	Keyes, CA 95328-0549
5S	School District, Knightsen Elementary		1923 Delta Road	Knightsen, CA 94548-0265
5S	School District, Lakeport Unified		100 Lange St.	Lakeport, CA 95453-3297
5S	School District, Lammersville Elementary		16555 W. Von Sosten Road	Tracy, CA 95376-7220
5S	School District, Liberty Union High		20 Oak St.	Brentwood, CA 94513-1379

Region	Agency	Facility	Address	City, State, ZIP
5S	School District, Lincoln Unified		2010 W. Swain Road	Stockton, CA 95207-4055
5S	School District, Lodi Unified		1305 E. Vine St.	Lodi, CA 95240-3148
5S	School District, Loomis Union Elementary		3290 Humphrey Road	Loomis, CA 95650-9043
5S	School District, Manteca Unified		2901 E. Louise Ave.	Manteca, CA 95336-0032
5S	School District, Marysville Joint Unified		1919 B St.	Marysville, CA 95901-3731
5S	School District, Modesto City Elementary		426 Locust St.	Modesto, CA 95351-2631
5S	School District, Modesto City High		426 Locust St.	Modesto, CA 95351-2631
5S	School District, Mother Lode Union Elementary		3783 Forni Road	Placerville, CA 95667-6207
5S	School District, Natomas Unified		1515 Sports Dr., Suite 1	Sacramento, CA 95834-1905
5S	School District, Nevada Joint Union High		11645 Ridge Road	Grass Valley, CA 95945-5024
5S	School District, New Jerusalem Elementary		31400 S. Koster Road	Tracy, CA 95376-8824
5S	School District, North Sacramento Elementary		670 Dixieanne Ave.	Sacramento, CA 95815-3023
5S	School District, Oakdale Joint Unified		168 S. Third Ave.	Oakdale, CA 95361-3935
5S	School District, Oakley Union Elementary		91 Mercedes Lane	Oakley, CA 94561-
5S	School District, Paradise Elementary		3361 California Ave.	Modesto, CA 95358-8337
5S	School District, Patterson Joint Unified		200 N. Seventh St.	Patterson, CA 95363-0547
5S	School District, Placer Union High		13000 New Airport Road	Auburn, CA 95604-5048
5S	School District, Placerville Union Elementary		1032 Thompson Way	Placerville, CA 95667-5713
5S	School District, Pleasant Ridge Union Elementary		22580 Kingston Lane	Grass Valley, CA 95949-7706
5S	School District, Plumas Elementary		2743 Plumas-Arboga Road	Marysville, CA 95901-9638
5S	School District, Rio Linda Union Elementary		627 L St.	Rio Linda, CA 95673-3430
5S	School District, Ripon Unified		304 N. Acacia Ave.	Ripon, CA 95366-2404
5S	School District, River Delta Joint Unified		445 Montezuma	Rio Vista, CA 94571-1651
5S	School District, Riverbank Unified		6715 7th St.	Riverbank, CA 95367-2345
5S	School District, Robla Elementary		5248 Rose St.	Sacramento, CA 95838-1633
5S	School District, Rocklin Unified		5035 Meyers St.	Rocklin, CA 95677-2811
5S	School District, Roseville City Elementary		1000 Darling Way	Roseville, CA 95678-4341
5S	School District, Roseville Joint Union High		1750 Cirby Way	Roseville, CA 95661-5520
5S	School District, Sacramento City Unified		520 Capitol Mall	Sacramento, CA 95812-2271
5S	School District, Salida Union Elementary		5250 Tamara Way	Salida, CA 95368-9226
5S	School District, San Juan Unified		3738 Walnut Ave.	Carmichael, CA 95609-0477
5S	School District, Shiloh Elementary		6633 Paradise Road	Modesto, CA 95358-9253
5S	School District, Stanislaus Union Elementary		3601 Carver Road	Modesto, CA 95356-0926
5S	School District, Stockton City Unified		701 N. Madison St.	Stockton, CA 95202-1634
5S	School District, Sylvan Union Elementary		605 Sylvan Ave.	Modesto, CA 95350-1517
5S	School District, Tracy Joint Unified		315 East Eleventh St.	Tracy, CA 95376-4095
5S	School District, Turlock Joint Elementary		1574 E Canal Dr.	Turlock, CA 95381-1105
5S	School District, Turlock Joint Union High		1574 E Canal Dr.	Turlock, CA 95381-1105
5S	School District, Union Hill Elementary		10879 Bartlett Dr.	Grass Valley, CA 95945-8730
5S	School District, Vacaville Unified		751 School St.	Vacaville, CA 95688-3945
5S	School District, Washington Unified		930 West Acres Road	West Sacramento, CA 95691-3224
5S	School District, Western Placer Unified		810 J Street	Lincoln, CA 95648-1825

Region	Agency	Facility	Address	City, State, ZIP
5S	School District, Woodland Joint Unified		630 Cottonwood St.	Woodland, CA 95695-3615
5S	School District, Yuba City Unified		750 Palora Ave.	Yuba City, CA 95991-3627
5S	University of California	The University of California, Davis	One Shields Avenue	Davis, CA 95616
5S	Veteran Affairs	Sacramento Medical Center @ Mather	10535 Hospital Way	Sacramento, CA 95655
6A	School District, Lake Tahoe Unified		1021 Al Tahoe Blvd.	South Lake Tahoe, CA 96150-4426
6B	Bureau of Prisons	FCI Victorville	PO Box 5400	Adelanto, CA 92301
6B	California Community Colleges	Antelope Valley College	3041 West Avenue K	Lancaster, CA 93536-5426
6B	California Community Colleges	Victor Valley College	18422 Bear Valley Road	Victorville, CA 92392-5849
6B	Corrections, Dept of	CSP, Los Angeles County	44750 60th Street West	Lancaster, CA 93536-7620
6B	Defense, Department of	Production Flight Test Installation, Air Force Plant 42	2503 East Avenue P	Palmdale, CA 93550-2196
6B	District Agricultural Association	San Bernardino County Fairgrounds	14800 Seventh Street	Victorville, CA
6B	School District, Antelope Valley Union High		44811 North Sierra Hwy.	Lancaster, CA 93534-3226
6B	School District, Apple Valley Unified		22974 Bear Valley Road	Apple Valley, CA 92308-7423
6B	School District, Eastside Union Elementary		6742 E. Avenue H	Lancaster, CA 93535-7849
6B	School District, Hesperia Unified		9144 Third St.	Hesperia, CA 92345-3643
6B	School District, Lancaster Elementary		44711 N. Cedar Ave.	Lancaster, CA 93534-3210
6B	School District, Palmdale Elementary		39139 10th St. East.	Palmdale, CA 93550-3419
6B	School District, Victor Elementary		15579 Eighth St.	Victorville, CA 92392-3348
6B	School District, Victor Valley Union High		16350 Mojave Dr.	Victorville, CA 92392-3655
6B	School District, Westside Union Elementary		46809 N. 70th St. West	Lancaster, CA 93535-7836
6B	School District, Wilsona Elementary		18050 East Ave. O	Palmdale, CA 93591-3800
7	California Community Colleges	College of the Desert	43 500 Monterey Avenue	Palm Desert, CA 92260-2499
7	School District, Banning Unified		161 W. Williams St.	Banning, CA 92220-4746
7	School District, Brawley Elementary		261 D St.	Brawley, CA 92227-1912
7	School District, Brawley Union High		480 N. Imperial Ave.	Brawley, CA 92227-1625
7	School District, Calexico Unified		901 Andrade Ave.	Calexico, CA 92232-0792
7	School District, Central Union High		1001 Brighton Ave.	El Centro, CA 92243-3110
7	School District, Coachella Valley Unified		87-225 Church St.	Thermal, CA 92274-0847
7	School District, Desert Sands Unified		47-950 Dune Palms Rd	La Quinta, CA 92253-4000
7	School District, El Centro Elementary		1256 Broadway	El Centro, CA 92243-2317
7	School District, Imperial Unified		219 North E Street	Imperial, CA 92254
7	School District, Palm Springs Unified		333 S. Farrell Dr.	Palm Springs, CA 92262-7905
8	California Air National Guard	163rd Air Refueling Wing	1620 Graeber Street, #6	March Field, CA 92518-1614
8	California Army National Guard	Los Alamitos AFRC	Lexington Dr	Los Alamitos, CA 90720
8	California Community Colleges	Chaffey College	5885 Haven Avenue	Rancho Cucamonga, CA 91737-3002
8	California Community Colleges	Coastline Community College	11460 Warner Avenue	Fountain Valley, CA 92708-2597
8	California Community Colleges	Crafton Hills College	11711 Sand Canyon Road	Yucaipa, CA 92399-1799
8	California Community Colleges	Cypress College	9200 Valley View Street	Cypress, CA 90630-5897
8	California Community Colleges	Fullerton College	321 East Chapman Avenue	Fullerton, CA 92832-2095
8	California Community Colleges	Golden West College	15744 Goldenwest Street	Huntington Beach, CA 92647 0592
8	California Community Colleges	Irvine Valley College	5500 Irvine Center Drive	Irvine, CA 92720-4399

Region	Agency	Facility	Address	City, State, ZIP
8	California Community Colleges	Mt. San Jacinto College	1499 North State Street	San Jacinto, CA 92583-2399
8	California Community Colleges	Orange Coast College	2701 Fairview Road PO Box 5005	Costa Mesa, CA 92628-5005
8	California Community Colleges	Riverside Community College	4800 Magnolia Avenue	Riverside, CA 92506-1293
8	California Community Colleges	San Bernardino Valley College	701 S. Mt. Vernon Avenue	San Bernardino, CA 92410-2798
8	California Community Colleges	Santa Ana College	1530 W. 17th Street	Santa Ana, CA 92706-3398
8	California Community Colleges	Santiago Canyon College	8045 E. Chapman Avenue	Orange, CA 92869-4512
8	California State University	California State University Fullerton	P.O. Box 34080	Fullerton, CA 92834
8	California State University	California State University San Bernardino	5500 University Parkway	San Bernardino, CA 92407
8	California Youth Authority	Heman G. Stark Youth Correctional Facility	15180 Eculid Ave	Chino, CA
8	Corrections, Dept of	California Institution for Men	14901 Central Avenue	Chino, CA 91710
8	Corrections, Dept of	California Institution for Women	16756 Chino-Corona Road	Corona, CA 92878-6000
8	Corrections, Dept of	California Rehabilitation Center	5th & Western	Norco, CA 91760
8	Defense, Department of	March Air Reserve Base	2145 Graeber St, Ste 117	March ARB, CA 92518-1671
8	Defense, Department of	Naval Warfare Assessment Sation	2300 Fifth St	Norco, CA 91760
8	Defense, Department of	Seal Beach Naval Weapons Station	800 Seal Beach Blvd	Seal Beach, CA 90740-5000
8	Developmental Services, Dept of.	Fairview Developmental Center	2501 Harbor Blvd	Cotsa Mesa, CA
8	District Agricultural Association	Orange County Fairgrounds	88 Fair Drive	Costa Mesa, CA
8	Education, Dept of	Calif. School for the Deaf	3044 Horace St.	Riverside, CA 92506-4498
8	Mental Health, Dept of	Patton State Hospital	3102 e Highland Ave	Patton, CA
8	School District, Alta Loma Elementary		9340 Baseline Road	Alta Loma, CA 91701-5821
8	School District, Alvord Unified		10365 Keller Ave	Riverside, CA 92505-1349
8	School District, Anaheim Elementary		1001 S. East St.	Anaheim, CA 92805-5749
8	School District, Anaheim Union High		501 Crescent Way	Anaheim, CA 92803-3520
8	School District, Bear Valley Unified		42271 Moonridge Road	Big Bear Lake, CA 92315-1529
8	School District, Beaumont Unified		500 Grace Ave.	Beaumont, CA 92223-0187
8	School District, Brea-Olinda Unified		Number One Civic Cntr.	Brea, CA 92821-9990
8	School District, Buena Park Elementary		6885 Orangethorpe Ave.	Buena Park, CA 90620-1348
8	School District, Central Elementary		10601 Church St., Suite 112	Rancho Cucamonga, CA 91730-6863
8	School District, Centralia Elementary		6625 la Palma Ave.	Buena Park, CA 90620-2859
8	School District, Chaffey Joint Union		211 W. Fifth St.	Ontario, CA 91762-1698
8	School District, Chino Valley Unified		5130 Riverside Dr.	Chino, CA 91710-4130
8	School District, Colton Joint Unified		1212 Valencia Dr.	Colton, CA 92324-1798
8	School District, Corona-Norco Unified		2820 Clark Ave.	Norco, CA 91760-1903
8	School District, Cucamonga Elementary		8776 Archibald Ave.	Rancho Cucamonga, CA 91730-4698
8	School District, Cypress Elementary		9470 Moody St.	Cypress, CA 90630-2919
8	School District, Etiwanda Elementary		6061 East Ave.	Etiwanda, CA 91739-0248
8	School District, Fontana Unified		9680 Citrus Ave.	Fontana, CA 92335-5571
8	School District, Fountain Valley Elementary		17210 Oak St.	Fountain Valley, CA 92708-3405
8	School District, Fullerton Elementary		1401 W. Valencia Dr.	Fullerton, CA 92633-3938
8	School District, Fullerton Joint Union High		1051 W. Bastanchury Road	Fullerton, CA 92833-2247

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8	School District, Garden Grove Unified		10331 Stanford Ave.	Garden Grove, CA 92840-6351
8	School District, Hemet Unified		2350 W. Latham Ave.	Hemet, CA 92545-3632
8	School District, Huntington Beach City Elementary		20451 Craimer Lane	Huntington Beach, CA 92646-0071
8	School District, Huntington Beach Union High		10251 Yorktown Ave.	Huntington Beach, CA 92646-2999
8	School District, Irvine Unified		5050 Barranca Parkway	Irvine, CA 92604-4652
8	School District, Jurupa Unified		3924 Riverview Dr.	Riverside, CA 92509-6611
8	School District, La Habra City Elementary		500 N. Walnut St.	La Habra, CA 90633-0307
8	School District, Lake Elsinore Unified		545 Chaney St.	Lake Elsinore, CA 92530-2723
8	School District, Los Alamitos Unified		10293 Bloomfield St.	Los Alamitos, CA 90720-2264
8	School District, Magnolia Elementary		2705 W. Orange Ave.	Anaheim, CA 92804-3203
8	School District, Menifee Union Elementary		30205 Menifee Road	Menifee, CA 92584-8109
8	School District, Moreno Valley Unified		25634 Alessandro Blvd.	Moreno Valley, CA 92553-4306
8	School District, Mountain View Elementary		2585 S. Archibald Ave.	Ontario, CA 91761-8146
8	School District, Newport-Mesa Unified		2985-A Bear St.	Costa Mesa, CA 92626-
8	School District, Nuview Union Elementary		29780 Lakeview Ave.	Nuevo, CA 92567-9261
8	School District, Ocean View Elementary		17200 Pinehurst Lane	Huntington Beach, CA 92647-5569
8	School District, Ontario-Montclair Elementary		950 West D St.	Ontario, CA 91762-3026
8	School District, Orange Unified		1401 N. Handy St.	Orange, CA 92856-
8	School District, Perris Elementary		143 E. First St.	Perris, CA 92570-2113
8	School District, Perris Union High		155 E. Fourth St.	Perris, CA 92570-2124
8	School District, Placentia-Yorba Linda Unified		1301 E. Orangethorpe Ave.	Placentia, CA 92670-5302
8	School District, Redlands Unified		20 W. Lugonia	Redlands, CA 92373-1508
8	School District, Rialto Unified		182 E. Walnut Ave.	Rialto, CA 92376-3530
8	School District, Riverside Unified		3380 14th St.	Riverside, CA 92516-2800
8	School District, Romoland Elementary		25900 Leon Road	Homeland, CA 92548-
8	School District, San Bernardino City Unified		777 North F St.	San Bernardino, CA 92410-3017
8	School District, San Jacinto Unified		2045 S. San Jacinto Ave.	San Jacinto, CA 92583-5626
8	School District, Santa Ana Unified		1601 E. Chestnut Ave.	Santa Ana, CA 92701-6322
8	School District, Savanna Elementary		1330 S. Knott Ave.	Anaheim, CA 92804-4711
8	School District, Tustin Unified		300 South C St.	Tustin, CA 92780-3695
8	School District, Upland Unified		390 N. Euclid Ave.	Upland, CA 91785-1239
8	School District, Val Verde Unified		975 E. Morgan Road	Perris, CA 92571-3103
8	School District, Westminster Elementary		14121 Cedarwood Ave.	Westminster, CA 92683-4482
8	School District, Yucaipa-Calimesa Jt. Unified		12797 Third St.	Yucaipa, CA 92399-4544
8	University of California	University of California, Irvine		Irvine, CA 92697
8	University of California	University of California, Riverside	900 University Avenue	Riverside, CA 92521
8	Veteran Affairs	Jerry L. Pettis Memorial VA Medical Center	11201 Benton Street	Loma Linda, CA 92357
9	Bureau of Prisons	MCC San Diego	808 Union Street	San Diego, CA 92101-6078
9	California Community Colleges	Cuyamaca College	900 Rancho San Diego Parkway	El Cajon, CA 92019-4304
9	California Community Colleges	Grossmont College	8800 Grossmont College Drive	El Cajon, CA 92020-1799
9	California Community Colleges	MiraCosta College	1 Barnard Drive	Oceanside, CA 92056-3899
9	California Community Colleges	Palomar College	1140 West Mission Road	San Marcos, CA 92069-1487

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9	California Community Colleges	Saddleback College	28000 Marguerite Parkway	Mission Viejo, CA 92692-3699
9	California Community Colleges	San Diego City College	1313 12th Avenue	San Diego, CA 92101-4787
9	California Community Colleges	San Diego Mesa College	7250 Mesa College Drive	San Diego, CA 92111-4996
9	California Community Colleges	San Diego Miramar College	10440 Black Mountain Road	San Diego, CA 92126-2999
9	California Community Colleges	Southwestern College	900 Otay Lakes Road	Chula Vista, CA 91910-7299
9	California State University	California State University San Marcos	333 S. Twin Oaks Valley Rd.	San Marcos, CA 92096
9	California State University	San Diego State University	5500 Campanile Drive	San Diego, CA 92182
9	Corrections, Dept of	R J Donovan Correctional Facility at Rock Mountain	480 Alta Road	San Diego, CA 92179
9	Defense, Department of	Camp Pendleton Marine Corps Base	PO Box 555010	Camp Pendleton, CA 92055-5010
9	Defense, Department of	Fleet & Industrial Supply Center, Pt. Loma	937 N Harbor Dr	San Diego, CA 92132-0002
9	Defense, Department of	Fleet and Industrial Supply Center, Broadway Complex	33000 Nixie Way Bldg 50, Suite 326	San Diego, CA 92147-5110
9	Defense, Department of	Fleet Anti-Submarine Warfare Training Center, Pacific	33000 Nixie Way Bldg 50, Suite 326	San Diego, CA 92147-5110
9	Defense, Department of	Fleet Combat Training Center, Pacific	33000 Nixie Way Bldg 50, Suite 326	San Diego, CA 92147-5110
9	Defense, Department of	Magnetic Silencing Facility	33000 Nixie Way Bldg 50, Suite 326	San Diego, CA 92147-5110
9	Defense, Department of	Miramar Marine Corps Air Station	PO Box 452013	San Diego, CA 92145
9	Defense, Department of	Mission Gorge Recreational Facility	33000 Nixie Way Bldg 50, Suite 326	San Diego, CA 92147-5110
9	Defense, Department of	Naval Air Station, North Island	33000 Nixie Way Bldg 50, Suite 326	San Diego, CA 92147-5110
9	Defense, Department of	Naval Amphibious Base, Coronado	33000 Nixie Way Bldg 50, Suite 326	San Diego, CA 92147-5110
9	Defense, Department of	Naval Medical Center, San Diego	34800 Bob Wilson Drive	San Diego, CA 92134
9	Defense, Department of	Naval Outlying Landing Field, Imperial Beach	33000 Nixie Way, Building 50, Suite 326	San Diego, CA 92147-5110
9	Defense, Department of	Naval Radio Receiving Facility	33000 Nixie Way, Building 50, Suite 326	San Diego, CA 92147-5110
9	Defense, Department of	Naval Station, San Diego	3455 Senn Rd	San Diego, CA 92136-5084
9	Defense, Department of	Naval Submarine Base, San Diego	140 Sylvester Rd	San Diego, CA 92106-5200
9	Defense, Department of	Naval Weapon Station, Fallbrook	700 Ammunition Rd	Fallbrook, CA 92028-3187
9	Defense, Department of	Navy Public Works Center, Taylor Street Facility	33000 Nixie Way Bldg 50, Suite 326	San Diego, CA 92147-5110
9	Defense, Department of	San Diego Marine Corps Recruit Depot	1600 Henderson Ave #120	San Diego, CA 92140-5001
9	Defense, Department of	Space and Naval Warfare Systems Center, Old Town Cam		San Diego, CA
9	Defense, Department of	Space and Naval Warfare Systems Center, Point Loma Ca		San Diego, CA
9	District Agricultural Association	San Diego County Fairgrounds	2260 Jimmy Durante Blvd	Del Mar, CA
9	School District, Alpine Union Elementary		1323 Administration Way	Alpine, CA 91901-2104
9	School District, Bonsall Union Elementary		31505 Old River Road	Bonsall, CA 92003-5112
9	School District, Cajon Valley Union Elementary		189 Roanoke Road	El Cajon, CA 92022-1007
9	School District, Capistrano Unified		32972 Calle Perfecto	San Juan Capistrano, CA 92675-4706
9	School District, Carlsbad Unified		801 Pine Ave.	Carlsbad, CA 92008-2430
9	School District, Chula Vista Elementary		84 East J St.	Chula Vista, CA 91910-6115
9	School District, Coronado Unified		555 D Ave.	Coronado, CA 92118-1714
9	School District, Dehesa Elementary		4612 Dehesa Road	El Cajon, CA 92019-2922
9	School District, Del Mar Union Elementary		225 Ninth St.	Del Mar, CA 92014-2716
9	School District, Encinitas Union Elementary		101 South Rancho Santa Fe Road	Encinitas, CA 92024-4308
9	School District, Escondido Union Elementary		1330 E. Grand Ave.	Escondido, CA 92027-3099
9	School District, Escondido Union High		302 N. Midway Dr.	Escondido, CA 92027-2741

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9	School District, Fallbrook Union Elementary		321 N. Iowa St.	Fallbrook, CA 92088-0698
9	School District, Fallbrook Union High		S. Mission Road & Stage Coach L	Fallbrook, CA 92088-0368
9	School District, Grossmont Union High		1100 Murray Dr.	La Mesa, CA 91944-1043
9	School District, Jamul-Dulzura Union Elementary		14581 Lyons Valley Road	Jamul, CA 91935-3324
9	School District, Julian Union Elementary		1704 Hwy. 78	Julian, CA 92036-0337
9	School District, Julian Union High		1656 Hwy. 78	Julian, CA 92036-0417
9	School District, La Mesa-Spring Valley		4750 Date Ave.	La Mesa, CA 91941-5214
9	School District, Laguna Beach Unified		550 Blumont St.	Laguna Beach, CA 92651-2356
9	School District, Lakeside Union Elementary		12335 Woodside Ave.	Lakeside, CA 92040-0578
9	School District, Lemon Grove Elementary		8025 Lincoln St.	Lemon Grove, CA 91945-2515
9	School District, Mountain Empire Unified		3291 Buckman Springs Road	Pine Valley, CA 91962-4003
9	School District, Murrieta Valley Unified		41870 McAlby ct	Murrieta, CA 92562-7021
9	School District, National Elementary		1500 N Ave.	National City, CA 91950-4827
9	School District, Oceanside Unified		2111 Mission Ave.	Oceanside, CA 92054-2326
9	School District, Poway Unified		13626 Twin Peaks Road	Poway, CA 92064-3034
9	School District, Ramona City Unified		720 Ninth St.	Ramona, CA 92065-2348
9	School District, Rancho Santa Fe Elementary		5927 la Granada	Rancho Santa Fe, CA 92067-0809
9	School District, Saddleback Valley Unified		25631 Peter A Hartman Way	Mission Viejo, CA 92691-
9	School District, San Diego City Unified		4100 Normal St.	San Diego, CA 92103-2653
9	School District, San Dieguito Union High		710 Encinitas Blvd.	Encinitas, CA 92024-3357
9	School District, San Marcos Unified		1 Civic Center Dr., Suite 300	San Marcos, CA 92069-
9	School District, San Pasqual Union Elementary		16666 San Pasqual Valley Road	Escondido, CA 92027-7001
9	School District, San Ysidro Elementary		4350 Otay Mesa Road	San Ysidro, CA 92173-1617
9	School District, Santee Elementary		9625 Cuyamaca St.	Santee, CA 92071-2674
9	School District, Solana Beach Elementary		309 N. Rios Ave.	Solana Beach, CA 92075-1241
9	School District, South Bay Union Elementary		601 Elm Ave.	Imperial Beach, CA 91932-2029
9	School District, Spencer Valley Elementary		4414 Hwys. 78 and 79	Santa Ysabel, CA 92070-0159
9	School District, Sweetwater Union High		1130 Fifth Ave.	Chula Vista, CA 91911-2812
9	School District, Temecula Valley Unified		31350 Rancho Vista Road	Temecula, CA 92592-6202
9	School District, Vallecitos Elementary		5211 Fifth St.	Fallbrook, CA 92028-9795
9	School District, Valley Center-Pauma Unified		28751 Cole Grade Rd.	Valley Center, CA 92082-6599
9	School District, Vista Unified		1234 Arcadia Ave.	Vista, CA 92084-3404
9	School District, Warner Unified		30951 Hwy. 79	Warner Springs, CA 92086-0008
9	University of California	University of California, San Diego	9500 Gilman Dr.	La Jolla, CA 92093
9	Veteran Affairs	VA San Diego Healthcare System	3350 La Jolla Village Drive	San Diego, CA 92161

Areas subject to high growth or serving a population of at least 50,000 must comply with the following provisions (for counties this threshold population applies to the population within the permit area).

A. RECEIVING WATER LIMITATIONS

1. Discharges shall not cause or contribute to an exceedance of water quality standards contained in a Statewide Water Quality Control Plan, the California Toxics Rule (CTR), or in the applicable RWQCB Basin Plan.

2. The permittees shall comply with Receiving Water Limitations A.1 through timely implementation of control measures and other actions to reduce pollutants in the discharges in accordance with the SWMP and other requirements of this permit including any modifications. The SWMP shall be designed to achieve compliance with Receiving Water Limitations A.1. If exceedance(s) of water quality objectives or water quality standards (collectively, WQS) persist notwithstanding implementation of the SWMP and other requirements of this permit, the permittees shall assure compliance with Receiving Water Limitations A.1 by complying with the following procedure:

   a. Upon a determination by either the permittees or the RWQCB that discharges are causing or contributing to an exceedance of an applicable WQS, the permittees shall promptly notify and thereafter submit a report to the RWQCB that describes BMPs that are currently being implemented and additional BMPs that will be implemented to prevent or reduce any pollutants that are causing or contributing to the exceedance of WQSs. The report may be incorporated in the annual update to the SWMP unless the RWQCB directs an earlier submittal. The report shall include an implementation schedule. The RWQCB may require modifications to the report.

   b. Submit any modifications to the report required by the RWQCB within 30 days of notification.

   c. Within 30 days following approval of the report described above by the RWQCB, the permittees shall revise the SWMP and monitoring program to incorporate the approved modified BMPs that have been and will be implemented, implementation schedule, and any additional monitoring required.

   d. Implement the revised SWMP and monitoring program in accordance with the approved schedule.

   So long as the permittees have complied with the procedures set forth above and are implementing the revised SWMP, the permittees do not have to repeat the same procedure for continuing or recurring exceedances of the same receiving water limitations unless directed by the RWQCB to develop additional BMPs.

B. DESIGN STANDARDS

Regulated Small MS4s subject to this requirement must adopt an ordinance or other document to ensure implementation of the Design Standards included herein or a functionally equivalent program that is acceptable to the appropriate RWQCB. The ordinance or other document must be adopted and effective prior to the expiration of this General Permit or, for Small MS4s designated subsequent to the Permit adoption, within five years of designation as a regulated Small MS4.

All discretionary development and redevelopment projects that fall into one of the following categories are subject to these Design Standards. These categories are:

- Single-Family Hillside Residences
- 100,000 Square Foot Commercial Developments
- Automotive Repair Shops
- Retail Gasoline Outlets
- Restaurants
- Home Subdivisions with 10 or more housing units
- Parking lots 5,000 square feet or more or with 25 or more parking spaces and potentially exposed to storm water runoff

1. Conflicts With Local Practices
   Where provisions of the Design Standards conflict with established local codes or other regulatory mechanism, (e.g., specific language of signage used on storm drain stenciling), the Permittee may continue the local practice and modify the Design Standards to be consistent with the code or other regulatory mechanism, except that to the extent that the standards in the Design Standards are more stringent than those under local codes or other regulatory mechanism, such more stringent standards shall apply.

2. Design Standards Applicable to All Categories

   a. Peak Storm Water Runoff Discharge Rates
      Post-development peak storm water runoff discharge rates shall not exceed the estimated pre-development rate for developments where the increased peak storm water discharge rate will result in increased potential for downstream erosion.

   b. Conserve Natural Areas
      If applicable, the following items are required and must be implemented in the site layout during the subdivision design and approval process, consistent with applicable General Plan and Local Area Plan policies:

      1) Concentrate or cluster Development on portions of a site while leaving the remaining land in a natural undisturbed condition.
      2) Limit clearing and grading of native vegetation at a site to the minimum amount needed to build lots, allow access, and provide fire protection.
      3) Maximize trees and other vegetation at each site by planting additional vegetation, clustering tree areas, and promoting the use of native and/or drought tolerant plants.

4) Promote natural vegetation by using parking lot islands and other landscaped areas.
5) Preserve riparian areas and wetlands.

c. Minimize Storm Water Pollutants of Concern
Storm water runoff from a site has the potential to contribute oil and grease, suspended solids, metals, gasoline, pesticides, and pathogens to the storm water conveyance system. The development must be designed so as to minimize, to the maximum extent practicable, the introduction of pollutants of concern that may result in significant impacts, generated from site runoff of directly connected impervious areas (DCIA), to the storm water conveyance system as approved by the building official. Pollutants of concern consist of any pollutants that exhibit one or more of the following characteristics: current loadings or historic deposits of the pollutant are impacting the beneficial uses of a receiving water, elevated levels of the pollutant are found in sediments of a receiving water and/or have the potential to bioaccumulate in organisms therein, or the detectable inputs of the pollutant are at concentrations or loads considered potentially toxic to humans and/or flora and fauna.

In meeting this specific requirement, "minimization of the pollutants of concern" will require the incorporation of a BMP or combination of BMPs best suited to maximize the reduction of pollutant loadings in that runoff to the Maximum Extent Practicable. Those BMPs best suited for that purpose are those listed in the *California Storm Water Best Management Practices Handbook*s; *Caltrans Storm Water Quality Handbook: Planning and Design Staff Guid*e; *Manual for Storm Water Management in Washington Stat*e; *The Maryland Stormwater Design Manua*l; *Florida Development Manual: A Guide to Sound Land and Water Managemen*t; Denver *Urban Storm Drainage Criteria Manual, Volume 3 – Best Management Practices* and *Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters* , USEPA Report No. EPA-840-B-92-002, as "likely to have significant impact" beneficial to water quality for targeted pollutants that are of concern at the site in question. However, it is possible that a combination of BMPs not so designated, may in a particular circumstance, be better suited to maximize the reduction of the pollutants.

d. Protect Slopes and Channels
Project plans must include BMPs consistent with local codes, ordinances, or other regulatory mechanism and the Design Standards to decrease the potential of slopes and/or channels from eroding and impacting storm water runoff:

1) Convey runoff safely from the tops of slopes and stabilize disturbed slopes.
2) Utilize natural drainage systems to the maximum extent practicable.
3) Stabilize permanent channel crossings.
4) Vegetate slopes with native or drought tolerant vegetation, as appropriate.
5) Install energy dissipaters, such as riprap, at the outlets of new storm drains, culverts, conduits, or channels that enter unlined channels in accordance with applicable specifications to minimize erosion, with the approval of all agencies

with jurisdiction, e.g., the U.S. Army Corps of Engineers and the California Department of Fish and Game.

e. Provide Storm Drain System Stenciling and Signage
Storm drain stencils are highly visible source controls that are typically placed directly adjacent to storm drain inlets. The stencil contains a brief statement that prohibits the dumping of improper materials into the storm water conveyance system. Graphical icons, either illustrating anti-dumping symbols or images of receiving water fauna, are effective supplements to the anti-dumping message. All storm drain inlets and catch basins within the project area must be stenciled with prohibitive language (such as: "NO DUMPING – DRAINS TO OCEAN") and/or graphical icons to discourage illegal dumping.· Signs and prohibitive language and/or graphical icons, which prohibit illegal dumping, must be posted at public access points along channels and creeks within the project area.· Legibility of stencils and signs must be maintained.

f. Properly Design Outdoor Material Storage Areas
Outdoor material storage areas refer to storage areas or storage facilities solely for the storage of materials. Improper storage of materials outdoors may provide an opportunity for toxic compounds, oil and grease, heavy metals, nutrients, suspended solids, and other pollutants to enter the storm water conveyance system. Where proposed project plans include outdoor areas for storage of materials that may contribute pollutants to the storm water conveyance system, the following Structural or Treatment BMPs are required:

1) Materials with the potential to contaminate storm water must be: (1) placed in an enclosure such as, but not limited to, a cabinet, shed, or similar structure that prevents contact with runoff or spillage to the storm water conveyance system; or (2) protected by secondary containment structures such as berms, dikes, or curbs.
2) The storage area must be paved and sufficiently impervious to contain leaks and spills.
3) The storage area must have a roof or awning to minimize collection of storm water within the secondary containment area.

g. Properly Design Trash Storage Areas
A trash storage area refers to an area where a trash receptacle or receptacles (dumpsters) are located for use as a repository for solid wastes. Loose trash and debris can be easily transported by the forces of water or wind into nearby storm drain inlets, channels, and/or creeks. All trash container areas must meet the following Structural or Treatment Control BMP requirements (individual single family residences are exempt from these requirements):

1) Trash container areas must have drainage from adjoining roofs and pavement diverted around the area(s).
2) Trash container areas must be screened or walled to prevent off-site transport of trash.

h. Provide Proof of Ongoing BMP Maintenance

Improper maintenance is one of the most common reasons why water quality controls will not function as designed or which may cause the system to fail entirely. It is important to consider who will be responsible for maintenance of a permanent BMP, and what equipment is required to perform the maintenance properly. As part of project review, if a project applicant has included or is required to include, Structural or Treatment Control BMPs in project plans, the Permittee shall require that the applicant provide verification of maintenance provisions through such means as may be appropriate, including, but not limited to legal agreements, covenants, CEQA mitigation requirements and/or Conditional Use Permits.

For all properties, the verification will include the developer's signed statement, as part of the project application, accepting responsibility for all structural and treatment control BMP maintenance until the time the property is transferred and, where applicable, a signed agreement from the public entity assuming responsibility for Structural or Treatment Control BMP maintenance. The transfer of property to a private or public owner must have conditions requiring the recipient to assume responsibility for maintenance of any Structural or Treatment Control BMP to be included in the sales or lease agreement for that property, and will be the owner's responsibility. The condition of transfer shall include a provision that the property owners conduct maintenance inspection of all Structural or Treatment Control BMPs at least once a year and retain proof of inspection. For residential properties where the Structural or Treatment Control BMPs are located within a common area which will be maintained by a homeowner's association, language regarding the responsibility for maintenance must be included in the project's conditions, covenants and restrictions (CC&Rs). Printed educational materials will be required to accompany the first deed transfer to highlight the existence of the requirement and to provide information on what storm water management facilities are present, signs that maintenance is needed, how the necessary maintenance can be performed, and assistance that the Permittee can provide. The transfer of this information shall also be required with any subsequent sale of the property.

If Structural or Treatment Control BMPs are located within a public area proposed for transfer, they will be the responsibility of the developer until they are accepted for transfer by the County or other appropriate public agency. Structural or Treatment Control BMPs proposed for transfer must meet design standards adopted by the public entity for the BMP installed and should be approved by the County or other appropriate public agency prior to its installation.

i. Design Standards for Structural or Treatment Control BMPs
The Permittees shall require that post-construction treatment control BMPs incorporate, at a minimum, either a volumetric or flow based treatment control design standard, or both, as identified below to mitigate (infiltrate, filter or treat) storm water runoff:

1) Volumetric Treatment Control BMP

a) The 85th percentile 24-hour runoff event determined as the maximized capture storm water volume for the area, from the formula recommended in Urban Runoff Quality Management, WEF Manual of Practice No. 23/ ASCE Manual of Practice No. 87, (1998); or
b) The volume of annual runoff based on unit basin storage water quality volume, to achieve 80 percent or more volume treatment by the method recommended in California Stormwater Best Management Practices Handbook – Industrial/ Commercial, (2003); or
c) The volume of runoff produced from a historical-record based reference 24-hour rainfall criterion for "treatment" that achieves approximately the same reduction in pollutant loads achieved by the 85th percentile 24-hour runoff event.

2) Flow Based Treatment Control BMP
   a) The flow of runoff produced from a rain event equal to at least two times the 85th percentile hourly rainfall intensity for the area; or
   b) The flow of runoff produced from a rain event that will result in treatment of the same portion of runoff as treated using volumetric standards above.

Limited Exclusion
Restaurants and Retail Gasoline Outlets, where the land area for development or redevelopment is less than 5,000 square feet, are excluded from the numerical Structural or Treatment Control BMP design standard requirement only.

3. Provisions Applicable to Individual Priority Project Categories

a. 100,000 Square Foot Commercial Developments

1) Properly Design Loading/Unloading Dock Areas
Loading/unloading dock areas have the potential for material spills to be quickly transported to the storm water conveyance system. To minimize this potential, the following design criteria are required:

a) Cover loading dock areas or design drainage to minimize run-on and runoff of storm water.
b) Direct connections to storm drains from depressed loading docks (truck wells) are prohibited.

2) Properly Design Repair/Maintenance Bays
Oil and grease, solvents, car battery acid, coolant and gasoline from the repair/maintenance bays can negatively impact storm water if allowed to come into contact with storm water runoff. Therefore, design plans for repair bays must include the following:

a) Repair/maintenance bays must be indoors or designed in such a way that doesn't allow storm water runon or contact with storm water runoff.
b) Design a repair/maintenance bay drainage system to capture all washwater, leaks and spills. Connect drains to a sump for collection and disposal. Direct connection of the repair/maintenance bays to the storm drain system is prohibited. If required by local jurisdiction, obtain an Industrial Waste Discharge Permit.

3) Properly Design Vehicle/Equipment Wash Areas
The activity of vehicle/equipment washing/steam cleaning has the potential to contribute metals, oil and grease, solvents, phosphates, and suspended solids to the storm water conveyance system. Include in the project plans an area for washing/steam cleaning of vehicles and equipment. The area in the site design must be:

a) Self-contained and/ or covered, equipped with a clarifier, or other pretreatment facility, and
b) Properly connected to a sanitary sewer or other appropriately permitted disposal facility.

b. Restaurants

1) Properly Design Equipment/Accessory Wash Areas
The activity of outdoor equipment/accessory washing/steam cleaning has the potential to contribute metals, oil and grease, solvents, phosphates, and suspended solids to the storm water conveyance system. Include in the project plans an area for the washing/steam cleaning of equipment and accessories. This area must be:

a) Self-contained, equipped with a grease trap, and properly connected to a sanitary sewer.
b) If the wash area is to be located outdoors, it must be covered, paved, have secondary containment, and be connected to the sanitary sewer or other appropriately permitted disposal facility.

c. Retail Gasoline Outlets

1) Properly Design Fueling Area
Fueling areas have the potential to contribute oil and grease, solvents, car battery acid, coolant and gasoline to the storm water conveyance system. The project plans must include the following BMPs:

a) The fuel dispensing area must be covered with an overhanging roof structure or canopy. The canopy's minimum dimensions must be equal to or greater than the area within the grade break. The canopy must not drain onto the fuel dispensing area, and the canopy downspouts must be routed to prevent drainage across the fueling area.

b) The fuel dispensing area must be paved with Portland cement concrete (or equivalent smooth impervious surface), and the use of asphalt concrete shall be prohibited.
c) The fuel dispensing area must have a 2% to 4% slope to prevent ponding, and must be separated from the rest of the site by a grade break that prevents run-on of storm water to the extent practicable.
d) At a minimum, the concrete fuel dispensing area must extend 6.5 feet (2.0 meters) from the corner of each fuel dispenser, or the length at which the hose and nozzle assembly may be operated plus 1 foot (0.3 meter), whichever is less.

d. Automotive Repair Shops

1) Properly Design Fueling Area
Fueling areas have the potential to contribute oil and grease, solvents, car battery acid, coolant and gasoline to the storm water conveyance system. Therefore, design plans, which include fueling areas, must contain the following BMPs:

a. The fuel dispensing area must be covered with an overhanging roof structure or canopy. The canopy's minimum dimensions must be equal to or greater than the area within the grade break. The canopy must not drain onto the fuel dispensing area, and the canopy downspouts must be routed to prevent drainage across the fueling area.
b. The fuel dispensing area must be paved with Portland cement concrete (or equivalent smooth impervious surface), and the use of asphalt concrete shall be prohibited.
c. The fuel dispensing area must have a 2% to 4% slope to prevent ponding, and must be separated from the rest of the site by a grade break that prevents run-on of storm water to the extent practicable.
d. At a minimum, the concrete fuel dispensing area must extend 6.5 feet (2.0 meters) from the corner of each fuel dispenser, or the length at which the hose and nozzle assembly may be operated plus 1 foot (0.3 meter), whichever is less.

2) Properly Design Repair/Maintenance Bays
Oil and grease, solvents, car battery acid, coolant and gasoline from the repair/maintenance bays can negatively impact storm water if allowed to come into contact with storm water runoff. Therefore, design plans for repair bays must include the following:

a) Repair/maintenance bays must be indoors or designed in such a way that doesn't allow storm water run-on or contact with storm water runoff.
b) Design a repair/maintenance bay drainage system to capture all wash-water, leaks and spills. Connect drains to a sump for collection and disposal. Direct connection of the repair/maintenance bays to the storm drain system is

prohibited. If required by local jurisdiction, obtain an Industrial Waste Discharge Permit.

3) Properly Design Vehicle/Equipment Wash Areas
The activity of vehicle/equipment washing/steam cleaning has the potential to contribute metals, oil and grease, solvents, phosphates, and suspended solids to the storm water conveyance system. Include in the project plans an area for washing/steam cleaning of vehicles and equipment. This area must be:

   a) Self-contained and/or covered, equipped with a clarifier, or other pretreatment facility, and properly connected to a sanitary sewer or other appropriately permitted disposal facility.

4) Properly Design Loading/Unloading Dock Areas
Loading/unloading dock areas have the potential for material spills to be quickly transported to the storm water conveyance system. To minimize this potential, the following design criteria are required:

   a) Cover loading dock areas or design drainage to minimize run-on and runoff of storm water.
   b) Direct connections to storm drains from depressed loading docks (truck wells) are prohibited.

e. Parking Lots

1) Properly Design Parking Area
Parking lots contain pollutants such as heavy metals, oil and grease, and polycyclic aromatic hydrocarbons that are deposited on parking lot surfaces by motor-vehicles. These pollutants are directly transported to surface waters. To minimize the offsite transport of pollutants, the following design criteria are required:

   a) Reduce impervious land coverage of parking areas.
   b) Infiltrate or treat runoff.

2) Properly Design To Limit Oil Contamination and Perform Maintenance
Parking lots may accumulate oil, grease, and water insoluble hydrocarbons from vehicle drippings and engine system leaks:

   a) Treat to remove oil and petroleum hydrocarbons at parking lots that are heavily used (e.g. fast food outlets, lots with 25 or more parking spaces , sports event parking lots, shopping malls, grocery stores, discount warehouse stores).
   b) Ensure adequate operation and maintenance of treatment systems particularly sludge and oil removal, and system fouling and plugging prevention control.

4. Waiver

A Permittee may, through adoption of an ordinance, code, or other regulatory mechanism incorporating the treatment requirements of the Design Standards, provide for a waiver from the requirement if impracticability for a specific property can be established. A waiver of impracticability shall be granted only when all other Structural or Treatment Control BMPs have been considered and rejected as infeasible. Recognized situations of impracticability include, (i) extreme limitations of space for treatment on a redevelopment project, (ii) unfavorable or unstable soil conditions at a site to attempt infiltration, and (iii) risk of ground water contamination because a known unconfined aquifer lies beneath the land surface or an existing or potential underground source of drinking water is less than 10 feet from the soil surface. Any other justification for impracticability must be separately petitioned by the Permittee and submitted to the appropriate RWQCB for consideration. The RWQCB may consider approval of the waiver justification or may delegate the authority to approve a class of waiver justifications to the RWQCB EO. The supplementary waiver justification becomes recognized and effective only after approval by the RWQCB or the RWQCB EO. A waiver granted by a Permittee to any development or redevelopment project may be revoked by the RWQCB EO for cause and with proper notice upon petition.

5. Limitation on Use of Infiltration BMPs

Three factors significantly influence the potential for storm water to contaminate ground water. They are (i) pollutant mobility, (ii) pollutant abundance in storm water, (iii) and soluble fraction of pollutant. The risk of contamination of groundwater may be reduced by pretreatment of storm water. A discussion of limitations and guidance for infiltration practices is contained in, *Potential Groundwater Contamination from Intentional and Non-Intentional Stormwater Infiltration, Report No. EPA/600/R-94/051, USEPA (1994).*

In addition, the distance of the groundwater table from the infiltration BMP may also be a factor determining the risk of contamination. A water table distance separation of ten feet depth in California presumptively poses negligible risk for storm water not associated with industrial activity or high vehicular traffic.

Site specific conditions must be evaluated when determining the most appropriate BMP. Additionally, monitoring and maintenance must be provided to ensure groundwater is protected and the infiltration BMP is not rendered ineffective by overload. This is especially important for infiltration BMPs for areas of industrial activity or areas subject to high vehicular traffic [25,000 or greater average daily traffic (ADT) on main roadway or 15,000 or more ADT on any intersecting roadway]. In some cases pretreatment may be necessary.

6. Alternative Certification for Storm Water Treatment Mitigation

In lieu of conducting detailed BMP review to verify Structural or Treatment Control BMP adequacy, a Permittee may elect to accept a signed certification from a Civil Engineer or a Licensed Architect registered in the State of California, that the plan meets

the criteria established herein. The Permittee is encouraged to verify that certifying person(s) have been trained on BMP design for water quality, not more than two years prior to the signature date. Training conducted by an organization with storm water BMP design expertise (e.g., a University, American Society of Civil Engineers, American Society of Landscape Architects, American Public Works Association, or the California Water Environment Association) may be considered qualifying.

Attachment 5
WQO# 2003 – 0005 – DWQ

Communities Anticipated to be Subject to Supplemental Provisions

RWQCB	Area	Reason/Population
1	Windsor	High Growth
2	Clayton	High Growth
2	Marin County	58563
2	Napa	72585
2	Petaluma	54548
2	San Francisco	776733
2	San Rafael	56063
3	Greenfield	High Growth
3	Hollister	High Growth
3	King City	High Growth
3	Morgan Hill	High Growth
3	Nipomo	High Growth
3	Prunedale	High Growth
3	Santa Barbara	92325
3	Santa Barbara County	140453
3	Santa Cruz	54593
3	Santa Cruz County	116783
3	Santa Maria	77423
3	Soledad	High Growth
3	Watsonville	High Growth
5F	Hanford	High Growth
5F	Lemoore	High Growth
5F	Los Banos	High Growth
5F	Madera	High Growth
5F	Merced	63893
5F	Visalia	91565
5R	Chico	59954
5R	Chico	High Growth
5R	Redding	80865
5S	Davis	60308
5S	Dixon	High Growth
5S	El Dorado Hills	High Growth
5S	Lathrop	High Growth
5S	Lincoln	High Growth
5S	Oakley	High Growth
5S	Placer County	75262
5S	Ripon	High Growth
5S	Riverbank	High Growth
5S	Rocklin	High Growth

RWQCB	Area	Reason/Population
5S	Roseville	79921
5S	Roseville	High Growth
5S	Salida	High Growth
5S	South Yuba City	High Growth
5S	Stanislaus County	67145
5S	Tracy	56929
5S	Tracy	High Growth
5S	Turlock	55810
5S	Vacaville	88625
6	Apple Valley	54239
6	Hesperia	62582
6	Lancaster	118718
6	Palmdale	116670
6	Victorville	64029
6B	Lake Los Angeles	High Growth
6B	Palmdale	High Growth
6B	Rosamond	High Growth
6B	Victorville	High Growth
7	Calexico	High Growth
7	Rancho Mirage	High Growth
5S	Lodi	56999

Attachment 6
To WQO 2003-0005-DWQ

INSTRUCTIONS FOR COMPLETING THE NOTICE OF INTENT TO COMPLY WITH THE TERMS OF THE GENERAL PERMIT FOR STORM WATER DISCHARGES FROM SMALL MS4s (WATER QUALITY ORDER NO. 2003 – 0005 - DWQ)

I. NOI STATUS

Check box "1" if this is a new NOI submittal. Check box "2" if you are reporting changes to the NOI (e.g., new contact person, phone number, mailing address). Include the facility WDID number and highlight all the information that has been changed. The appropriate official must sign the form, certifying the changes.

II. AGENCY INFORMATION

A. Enter the name of the agency applying for coverage.
B. Enter the first and last name of the person familiar with the permit and responsible for permit compliance.
C. Enter the Title of the person listed in "B".
D. Enter the agency's mailing address.
E. Enter if necessary the 2nd address line.
F. Enter the agency's mailing address city.
G. Enter the agency's mailing address zip code.
H. Enter the county in which the agency is located. If the agency is located in more than one county, list all applicable counties. Attach additional sheets if necessary.
I. Enter the phone number where the contact person can be reached.
J. Enter the FAX number where the contact person can be reached.
K. Enter the email address where the contact person can be reached.
L. Check the box that corresponds to the agency owner.

III. Permit Area

General name of the permit area, such as the Sacramento Metropolitan Area

IV. Boundaries of Coverage

Describe the boundaries of the area to be permitted and include a site map. For a city, this would be the established city boundaries. For a county, unless the entire county is designated, the permitted area should be inclusive of the area of concern and rely on simplified boundaries for each general direction, such as rivers, major roads or highways, or an adjoining city's boundary. For non-traditional Small MS4s, in general, the property line shall serve as the permit boundary.

V. Billing Information

A. Enter the name of the agency applying for coverage.
B. Enter the first and last name of the person familiar with the permit and responsible for permit compliance.
C. Enter the Title of the person listed in "B".
D. Enter the agency's mailing address.
E. Enter if necessary the 2nd address line.
F. Enter the agency's mailing address city.

G. Enter the agency's mailing address zip code.
H. Enter the county in which the agency is located.
I. Enter the phone number where the contact person can be reached.
J. Enter the FAX number where the contact person can be reached.
K. Enter the email address where the contact person can be reached.
L. Enter the average daily-user population of the applicant's permitted area. This is not the combined permit area of co-permittees. Submit the amount indicated by the current fee schedule (California Code of Regulations, Title 23, Division 3, Chapter 9, Article 1.) with the NOI package to the Regional Board. The fee schedule may be found at www.swrcb.ca.gov/stormwtr/municipal.html. School districts are exempt from MS4 permit fees.

VI. Permit Type

Check the box that corresponds to the permitting option you wish to apply for:

Check box 1 if applying for individual general permit coverage.

Check box 2 if applying for a permit with one or more co-permittees. If you are applying to be a co-permittee, an appropriate official representing each agency who will participate in the area-wide permit must sign on the lines provided certifying the agency will be a co-permittee with the other agencies listed to implement a storm water program in the combined designated areas of each of the agency's jurisdiction. The agency to act as the Lead Agency (the entity responsible for being the main contact with the RWQCB for permit administration) shall start the list. If more than four agencies will act as co-permittees, continue the list on a separate page. The NOI must have original signatures.

Check box 3 if designating a Separate Implementing Entity and enter agency information.

A. Enter the name of the agency applying for coverage.
B. Enter the first and last name of the person familiar with the permit and responsible for permit compliance.
C. Enter the title of person in "B".
D. Enter the agency's mailing address phone number where the contact person can be reached.
E. Enter if necessary the 2nd address line.
F. Enter the agency's mailing address city.
G. Enter the agency's mailing address zip code.
H. Enter the county in which the agency is located. If the agency is located in more than one county, list all applicable counties. Attach additional sheets if necessary.
I. Enter the phone number where the contact person can be reached.
J. Enter the FAX number where the contact person can be reached.
K. Enter the email address where the contact person can be reached.
L. Check the box that corresponds to the agency owner.
M. List all of the Minimum Control Measure(s) that will be implemented by the SIE.
N. Certification by an appropriate SIE official that the SIE agrees to include the agency in implementing the SWMP. For a municipality, State, Federal, or other public agency the appropriate official would be a principal executive officer, ranking elected official or duly authorized representative. The principal executive officer of

a Federal agency includes the chief executive officer of the agency or the senior executive officer having responsibility for the overall operations of a principal geographic unit of the agency (e.g., Regional Administrator of USEPA).

For multiple agencies implementing different Minimum Control Measures please use a separate form for each Minimum Control Measures. A photocopy of the 2nd page of the NOI is adequate, but must have original signatures.

VII. STORM WATER MANAGEMENT PROGRAM

The SWMP must be submitted with the NOI. Check the box if the SWMP is completed and attached to the NOI. If a SIE is implementing all of the Minimum Control Measures it is not necessary to submit a SWMP.

VIII. CERTIFICATION

A. Print the name of the appropriate official. For a municipality, State, Federal, or other public agency this would be a principal executive officer, ranking elected official, or duly authorized representative. The principal executive officer of a Federal agency includes the chief executive officer of the agency or the senior executive officer having responsibility for the overall operations of a principal geographic unit of the agency (e.g., Regional Administrator of USEPA).
B. Enter the professional title of the person signing the NOI.
C. The person whose name is printed in box IV.A must sign the NOI.
D. Provide the date on which the Information Sheet was signed.

State Water Resources Control Board
NOTICE OF INTENT
TO COMPLY WITH THE TERMS OF THE GENERAL PERMIT FOR
STORM WATER DISCHARGES FROM
SMALL MUNICIPAL SEPARATE STORM SEWER SYSTEMS
(WATER QUALITY ORDER NO. 2003 – 0005 - DWQ)

I. NOI Status

Mark Only One Item	1. [ ]New Permittee	2. [ ]Change of Information WDID #:_____

II. Agency Information

A. Agency			
B. Contact Person		C. Title	
D. Mailing Address		E. Address (Line 2)	
F. City	State **CA**	G. Zip	H. County
I. Phone	J. FAX	K. Email Address	
L. Operator Type (check one) 1. [ ] City 2. [ ] County 3. [ ] State 4. [ ] Federal 5. [ ] Special District 6. [ ] Government Combination			

III. Permit Area

_____

IV. Boundaries of Coverage (include a site map with the submittal)

_____

_____

_____

_____

V. Billing Information

A. Agency			
B. Contact Person		C. Title	
D. Mailing Address		E. Address (Line 2)	
F. City	State **CA**	G. Zip	H. County
I. Phone	J. FAX	K. Email Address	

Fees are based on the daily population served by the Small MS4. To determine your fee, consult the current fee schedule (California Code of Regulations, Title 23, Division 3, Chapter 9 Article 1), which can be viewed at www.swrcb.ca.gov/stormwtr/municipal.html.

L. Population_____

Fee _____

Check(s) should be made payable to the SWRCB and submitted to the appropriate RWQCB.

SWRCB Tax ID is: 68-0281986

VI. Discharger Information (check applicable box(es) and complete corresponding information)

1. [ ] Applying for Individual General Permit Coverage

2. [ ] Applying for a permit with one or more co-permittees

The undersigned agree to work as co-permittees in implementing a complete small MS4 storm water program. The program must comply with the requirements found in Title 40 of the Code of Federal Regulations, parts 122.32. Attach additional sheets if necessary. Each co-permittee must complete an NOI.	
Lead Agency	Signature
Agency	Signature
Agency	Signature
Agency	Signature

3. [ ] Separate Implementing Entity (SIE)

A. Agency			
B. Contact Person		C. Title	
D. Mailing Address		E. Address (Line 2)	
F. City	State **CA**	G. Zip	H. County
I. Phone	J. FAX	K. Email Address	

H. Operator Type (check one)
1. [ ] City 2. [ ] County 3. [ ] State 4. [ ] Federal 5. [ ] Special District 6. [ ] Government Combination

Minimum Control Measures being implemented by the SIE (check all that apply)

[ ] Public Education [ ] Public Involvement [ ] Illicit Discharge/Elimination
[ ] Construction [ ] Post Construction [ ] Good Housekeeping

"I agree to coordinate with the agency identified in Section III of this form and comply with its qualifying storm water program. I certify under penalty of law that this document and all attachments were prepared under my direction and supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, to the best of my knowledge and belief, the information submitted is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment. Additionally, I certify that the provisions of the permit, including the development and implementation of a Storm Water Management Program, will be complied with."

_____ _____
N. Signature of Official Date

VII. Storm Water Management Plan (check box)

[ ] As per section A.2. of this General Permit, the SWMP is attached.

VIII. Certification

"I certify under penalty of law that this document and all attachments were prepared under my direction and supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, to the best of my knowledge and belief, the information submitted is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment. Additionally, I certify that the provisions of the permit, including the development and implementation of a Storm Water Management Program, will be complied with."

A. Printed Name:_____

B. Title:_____

C. Signature:_____ D. Date: _____

STATE WATER RESOURCES CONTROL BOARD

Division of Water Quality
Attention: Storm Water Section
P.O. Box 1977
Sacramento, CA 95812-1977
(916) 341-5539 FAX: (916) 341-5543
Web Page: http://www.swrcb.ca.gov/stormwtr/index.html
Email: stormwater@dwq.swrcb.ca.gov

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARDS

NORTH COAST REGION (1)
5550 Skylane Blvd., Ste. A
Santa Rosa, CA 95403
(707) 576-2220 FAX: (707) 523-0135
Web Page: http://www.swrcb.ca.gov/rwqcb1

SAN FRANCISCO BAY REGION (2)
1515 Clay Street, Ste. 1400
Oakland, CA 94612
(510) 622-2300 FAX: (510) 622-2460
Web Page: http://www.swrcb.ca.gov/rwqcb2

CENTRAL COAST REGION (3)
895 Aerovista Place, Suite 101
San Luis Obispo, CA 93401
(805) 549-3147 FAX: (805) 543-0397
Web Page: http://www.swrcb.ca.gov/rwqcb3

LOS ANGELES REGION (4)
320 W. 4th Street, Ste. 200
Los Angeles, CA 90013
(213) 576-6600 FAX: (213) 576-6640
Web Page: http://www.swrcb.ca.gov/rwqcb4

CENTRAL VALLEY REGION (5S)
3443 Routier Road, Ste. A
Sacramento, CA 95827-3098
(916) 255-3000 FAX: (916) 255-3015
Web Page: http:// www.swrcb.ca.gov/rwqcb5

FRESNO BRANCH OFFICE (5F)
1685 "E" Street
Fresno, CA 93706-2020
(559) 445-5116 FAX: (559) 445-5910
Web Page: http:// www.swrcb.ca.gov/rwqcb5

REDDING BRANCH OFFICE (5R)
415 Knollcrest Drive, Ste. 100
Redding, CA 96002
(530) 224-4845 FAX: (530) 224-4857
Web Page: http:// www.swrcb.ca.gov/rwqcb5

LAHONTAN REGION (6 SLT)
2501 Lake Tahoe Blvd.
South Lake Tahoe, CA 96150
(530) 542-5400 FAX: (530) 544-2271
Web Page: http:// www.swrcb.ca.gov/rwqcb6

VICTORVILLE BRANCH OFFICE (6V)
15428 Civic Drive, Ste. 100
Victorville, CA 92392-2383
(760) 241-6583 FAX: (760) 241-7308
Web Page: http:// www.swrcb.ca.gov/rwqcb6

COLORADO RIVER BASIN REGION (7)
73-720 Fred Waring Dr., Ste. 100
Palm Desert, CA 92260
(760) 346-7491 FAX: (760) 341-6820
Web Page: http:// www.swrcb.ca.gov/rwqcb7

SANTA ANA REGION (8)
California Tower
3737 Main Street, Ste. 500
Riverside, CA 92501-3339
(909) 782-4130 FAX: (909) 781-6288
Web Page: http://www.swrcb.ca.gov/rwqcb8

SAN DIEGO REGION (9)
9174 Sky Park Court, Suite 100
San Diego, CA 92123
(858) 467-2952 FAX: (858) 571-6972
Web Page: http://www.swrcb.ca.gov/rwqcb9

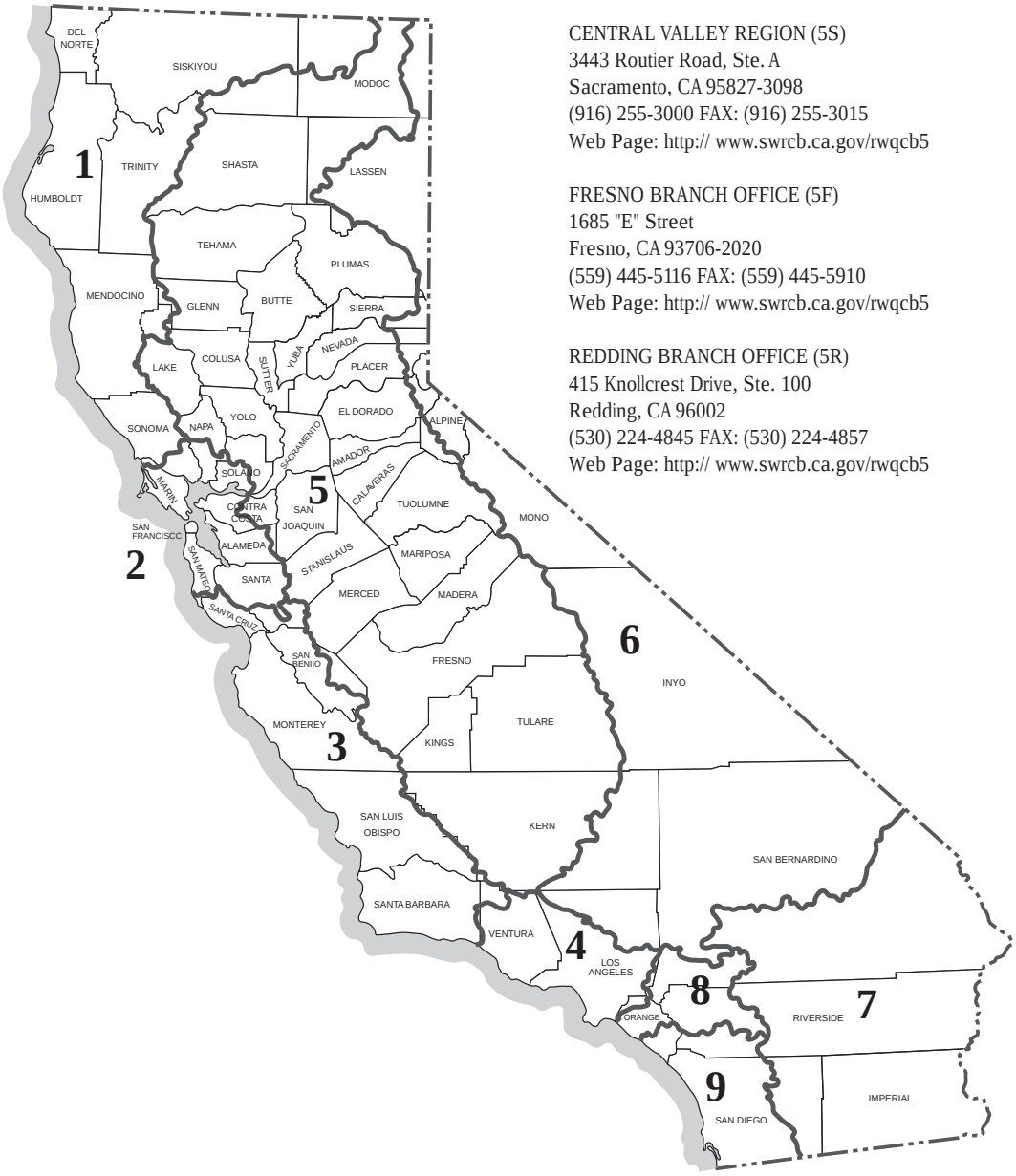

STATE OF CALIFORNIA
Gray Davis, Governor

CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY
Winston H. Hickox, Secretary

STATE WATER RESOURCES CONTROL BOARD
Arthur Baggett Jr., Chair

Definition of Terms

1. **100,000 Square Foot Commercial Development** - 100,000 Square Foot Commercial Development means any commercial development that creates at least 100,000 square feet of impermeable area, including parking areas.

2. **Automotive Repair Shop** - Automotive Repair Shop means a facility that is categorized in any one of the following Standard Industrial Classification (SIC) codes: 5013, 5014, 5541, 7532-7534, or 7536-7539.

3. **Authorized Non-Storm Water Discharges** – Authorized non-storm water discharges are certain categories of discharges that are not composed entirely of storm water but are not found to pose a threat to water quality. They include: water line flushing; landscape irrigation; diverted stream flows; rising ground waters; uncontaminated ground water infiltration (as defined at 40 CFR §35.2005(20)) to separate storm sewers; uncontaminated pumped ground water; discharges from potable water sources; foundation drains; air conditioning condensate; irrigation water; springs; water from crawl space pumps; footing drains; lawn watering; individual residential car washing; flows from riparian habitats and wetlands; dechlorinated swimming pool discharges; and discharges or flows from emergency fire fighting activities. If any of the above authorized non-storm water discharges (except flows from fire fighting activities) are found to cause or contribute to an exceedance of water quality standards or cause or threaten to cause a condition of nuisance or pollution, the category of discharge must be prohibited.

4. **Best Management Practices (BMPs)** – Best management practices means schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the pollution of ’waters of the United States.” BMPs also include treatment requirements, operating procedures, and practices to control plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage. (40 CFR §122.2)

5. **Commercial Development** - Commercial Development means any development on private land that is not heavy industrial or residential. The category includes, but is not limited to: hospitals, laboratories and other medical facilities, educational institutions, recreational facilities, plant nurseries, multi-apartment buildings, car wash facilities, mini-malls and other business complexes, shopping malls, hotels, office buildings, public warehouses and other light industrial complexes.

6. **Directly Connected Impervious Area (DCIA)** - DCIA is the acronym for directly connected impervious areas and means the area covered by a building, impermeable pavement, and/ or other impervious surfaces, which drains directly into the storm drain without first flowing across permeable land area (e.g. lawns).

7. **Discretionary Project** - Discretionary Project means a project which requires the exercise of judgement or deliberation when the public agency or public body decides to approve or disapprove a particular activity, as distinguished from situations where the public agency or body merely has to determine whether there has been conformity with applicable statutes, ordinances, or regulations.

8. **Greater than (>) 9 unit home subdivision** - Greater than 9 unit home subdivision means any subdivision being developed for 10 or more single-family or multi-family dwelling units.

9. **Hillside -** Hillside means property located in an area with known erosive soil conditions, where the development contemplates grading on any natural slope that is twenty-five percent or greater.

10. **Infiltration -** Infiltration means the downward entry of water into the surface of the soil.

11. **Measurable Goal –** Measurable goals are definable tasks or accomplishments that are associated with implementing best management practices.

12. **Minimum Control Measure –** A minimum control measure is a storm water program area that must be addressed (best management practices implemented to accomplish the program goal) by all regulated Small MS4s. The following six minimum control measures are required to be addressed by the regulated Small MS4s: Public Education and Outreach on storm Water Impacts, Public Involvement/Participation, Illicit Discharge Detection and Elimination, construction Site Storm Water Runoff Control, Post-Construction Storm Water Management in New Development and Redevelopment, and Pollution Prevention/Good Housekeeping for Municipal Operations.

13. **New Development -** New Development means land disturbing activities; structural development, including construction or installation of a building or structure, creation of impervious surfaces; and land subdivision.

14. **Offsite Facility -** An offsite facility is a geographically non-adjacent or discontinuous site that serves, or is secondary to, the primary facility and has the same owner as the primary facility. Storm water discharges from an offsite facility must be permitted if it meets the definition of a regulated Small MS4 itself. The offsite facility may satisfy this permitting requirement if the SWMP of the primary facility addresses the offsite facility, such that the permitted area of the primary facility includes the offsite area.

15. **Outfall –** A point source at the point where a municipal separate storm sewer discharges to waters of the United States and does not include open conveyances connecting two municipal separate storm sewers, or pipes, tunnels or other conveyances which connect segments of the same stream or other waters of the United States and are used to convey waters of the United States. (40 CFR §122.26(b)(9))

16. **Parking Lot -** Parking Lot means land area or facility for the temporary parking or storage of motor vehicles used personally, for business or for commerce with a lot size of 5,000 square feet or more, or with 25 or more parking spaces.

17. **Point Source –** Any discernible, confined, and discrete conveyance, including but not limited to, any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, landfill leachate collection system, vessel or other floating craft from which pollutants are or may be discharged. This term does not include return flows from irrigated agriculture or agricultural storm water runoff. (40 CFR §122.2)

18. **Regulated Small MS4** – A regulated Small MS4 is a Small MS4 that is required to be permitted for discharging storm water through its MS4 to waters of the U.S. and is designated either automatically by the U.S. EPA because it is located within an urbanized area, or designated by the SWRCB or RWQCB in accordance with the designation criteria listed at Finding 11 of the General Permit.

19. **Redevelopment** - Redevelopment means, on an already developed site, the creation or addition of at least 5,000 square feet of impervious area. Redevelopment includes, but is not limited to: the expansion of a building footprint or addition of a structure; structural development including an increase in gross floor area and/ or exterior construction or remodeling; and land disturbing activities related with structural or impervious surfaces. Where redevelopment results in an increase of less than fifty percent of the impervious surfaces of a previously existing development, and the existing development was not subject to these Design Standards, the Design Standards apply only to the addition, and not to the entire development.

20. **Restaurant** - Restaurant means a stand-alone facility that sells prepared foods and drinks for consumption, including stationary lunch counters and refreshment stands selling prepared foods and drinks for immediate consumption. (SIC code 5812).

21. **Retail Gasoline Outlet** - Retail Gasoline Outlet means any facility engaged in selling gasoline and lubricating oils.

22. **Small Municipal Separate Storm Sewer System (Small MS4)** – A conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, or storm drains) that are:
    - (i) Owned or operated by the United States, a State, city, town, boroughs, county, parish, district, association, or other public body (created by or pursuant to State law) having jurisdiction over disposal of sewage, industrial wastes, storm water, or other wastes, including special districts under State law such as a sewer district, flood control district or drainage district, or similar entity, or an Indian tribe or an authorized Indian tribal organization, or designated and approved management agency under section 208 of the CWA that discharges to waters of the United States.
    - (ii) Not defined as “large” or “medium” municipal separate storm sewer systems
    - (iii) This term includes systems similar to separate storm sewer systems in municipalities, such as systems at military bases, large hospital or prison complexes, and highways and other thoroughfares. The term does not include separate storm sewers in very discrete areas, such as individual buildings. (40 CFR §122.26(b)(16))

23. **Separate Implementing Entity (SIE)** – A Separate Implementing Entity is an entity, such as a municipality, agency, or special district, other than the entity in question, that implements parts or all of a storm water program for a Permittee. The SIE may also be permitted under 40 CFR Part 122. Arrangements of one entity implementing a program for another entity is subject to approval by the Regional Water Quality Control Board Executive Officer.

24. **Source Control BMP** - Source Control BMP means any schedules of activities, prohibitions of practices, maintenance procedures, managerial practices or operational practices that aim to prevent storm water pollution by reducing the potential for contamination at the source of pollution.

25. **Storm Event** - Storm Event means a rainfall event that produces more than 0.1 inch of precipitation and that, which is separated from the previous storm event by at least 72 hours of dry weather.

26. **Structural BMP** - Structural BMP means any structural facility designed and constructed to mitigate the adverse impacts of storm water and urban runoff pollution (e.g. canopy, structural enclosure). The category may include both Treatment Control BMPs and Source Control BMPs.

27. **Treatment** - Treatment means the application of engineered systems that use physical, chemical, or biological processes to remove pollutants. Such processes include, but are not limited to, filtration, gravity settling, media adsorption, biodegradation, biological uptake, chemical oxidation and UV radiation.

28. **Treatment Control BMP** - Treatment Control BMP means any engineered system designed to remove pollutants by simple gravity settling of particulate pollutants, filtration, biological uptake, media adsorption or any other physical, biological, or chemical process.

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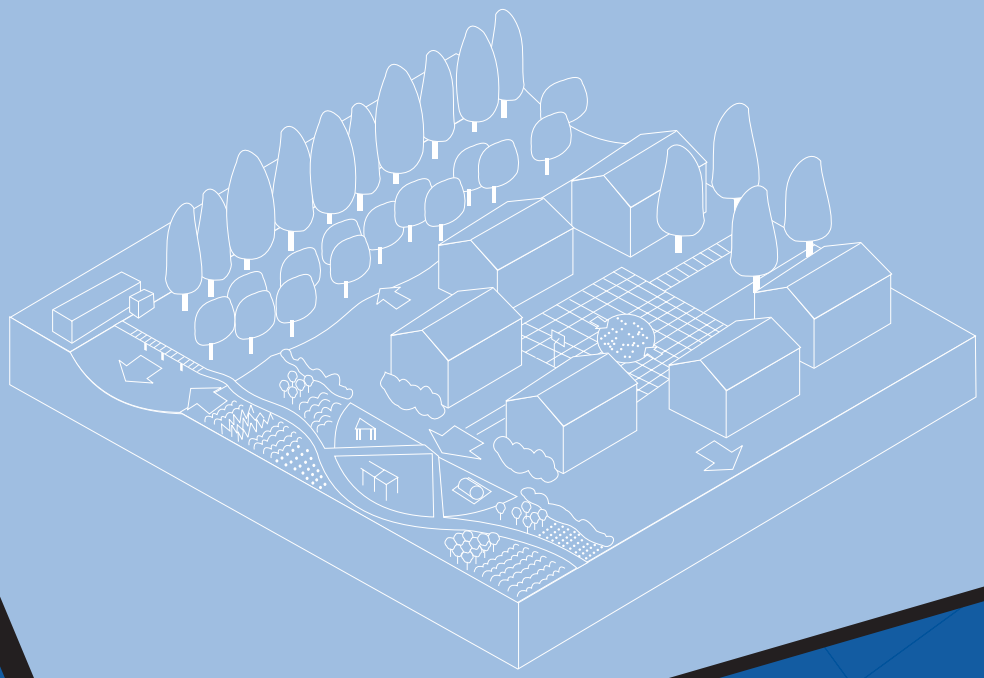

Using Site Design Techniques to Meet Development Standards for Stormwater Quality

A Companion Document to Start at the Source

May 2003

Bay Area Stormwater Management Agencies Association

B A S M A A
Bay Area Stormwater Management Agencies Association

CDM

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1 Introduction

1.1 Start at the Source Approach

To address stormwater quality during the planning and design phase of new development and redevelopment projects, the Bay Area Stormwater Management Agencies Association (BASMAA) developed *Start at the Source – Residential Site Planning and Design Guidance Manual for Stormwater Quality Protection* (BASMAA, 1997). This first edition introduced design concepts that could reduce the impact of new development and redevelopment on water quality by addressing pollutants at their source. The manual focused on implementation of Best Management Practices (BMPs) for complying with *qualitative* land development requirements contained within first and second generation NPDES stormwater permits. In 1999, BASMAA prepared a second edition titled *Start at the Source – Design Guidance Manual for Stormwater Quality Protection*. This second edition expanded on the first edition in two ways – by covering industrial/commercial and institutional development, and by providing more detailed technical information.

Recent stormwater permits have evolved to include more specific *quantitative* requirements regarding development and redevelopment. This document demonstrates ways to utilize the techniques described in BASMAA's second edition of *Start at the Source* to help comply with these quantitative permit requirements.

The development and redevelopment planning process involves not only planning, engineering, and landscape architect professionals, but also staff and elected and appointed officials from cities, counties, and local agencies. To address stormwater quality issues during the process, the *Start at the Source* approach aims to convey basic stormwater management concepts that can be adapted to site and project specific conditions.

Development and redevelopment projects that incorporate site design techniques such as detention, retention, and infiltration of runoff, like concave medians, permeable pavements, and conservation of natural areas, exhibit reduced runoff volumes and rates when compared to projects of similar magnitude where the techniques are not utilized. The runoff volume and rate reductions achieved with site design techniques translate directly to reductions in the amount of runoff that must be treated to comply with permit requirements and managed to protect streams from erosion. See Figure 1-1.

1.2 More Information

This manual does not provide detailed information on how to select or size specific site design techniques or other stormwater treatment measures. Sources for stormwater quality design information to supplement this manual include:

- California Stormwater Best Management Practice Handbooks (California Stormwater Quality Association, 2003)
- Urban Runoff Quality Management, WEF Manual of Practice No. 23, ASCE Manual and Report on Engineering Practice No. 87, 1998

These sources will help you complete the design calculations discussed in this document.

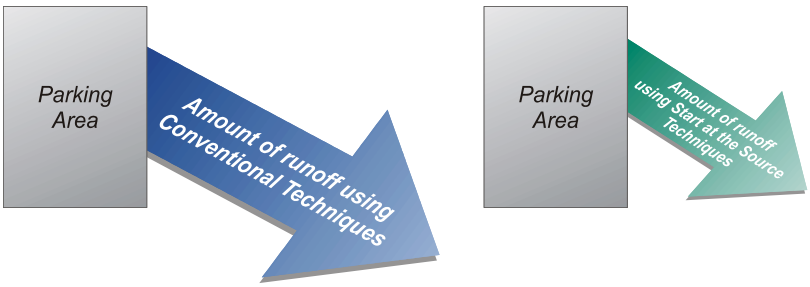

Figure 1-1
***Start at the Source* Reduces Post Development Runoff Volumes**

2 Current Land Development Requirements

2.1 Overview of General Requirements

Recently issued municipal stormwater discharge permits now contain quantitative requirements regarding stormwater controls for new development and redevelopment. Most new development and redevelopment projects must now treat runoff prior to being discharged to storm drains. The requirements set forth minimum standards for sizing newly constructed treatment controls. Sizing standards are prescribed for both:

- Volume-Based BMPs
- Flow-Based BMPs

Volume-based BMP design standards generally call for the capture and infiltration and/or treatment of the 80th to 85th percentile runoff volume. While this requirement may seem as if it calls for capturing the runoff from large, infrequent storms, in most areas it merely amounts to capturing the runoff from relatively small storms that occur several times per year. Such small storms produce more total runoff than larger more infrequent storms. See Figure 2-1. Local development requirements should be referenced for the specific percentile runoff volume that must be addressed.

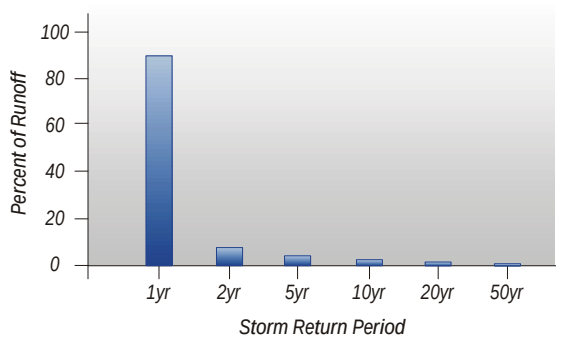

Figure 2-1
Small Storms Add Up

Flow-based BMP design standards generally call for the capture and infiltration and/or treatment of runoff flows produced by the 85th percentile hourly rainfall intensity plus a safety factor. As mentioned above, this requires treating flows from only small, frequent storm events.

Start at the Source provides many site design techniques directly applicable to meeting these land development requirements.

2.2 Volume-Based BMP Design Standards

According to current municipal permits, treatment BMPs whose primary mode of action depends on volume capacity to remove pollutants, such as retention or infiltration structures, shall be designed to treat a volume of stormwater runoff equal to:

- The maximized stormwater quality capture volume for the area, based on historical rainfall records, determined using the formula and volume capture coefficients set forth in Urban Runoff Quality Management, WEF Manual of Practice No. 23/ASCE Manual of Practice No. 87, (1998), pages 175-178; or
- 80 percent of the volume of annual runoff, determined by using local rainfall data in accordance with methodology set forth in Appendix D of the California Stormwater Best Management Practices New Development and Redevelopment Handbook (2003). The BMP Handbooks have recently been revised.

2.3 Flow Based BMP Design Standards

Current municipal stormwater permits also require that treatment BMPs whose primary mode of action depends on flow capacity, such as swales, sand filters, or wetlands, be sized to treat:

- 10% of the 50-year design flow rate; or
- The flow of runoff produced by a rain event equal to at least two times the 85th percentile hourly rainfall intensity for the applicable area, based on historical records of hourly rainfall depths; or
- The flow of runoff resulting from a rain event equal to at least 0.2 inches per hour intensity.

2.4 Which Design Approach to Use?

Some BMPs are designed based on volume, flow, or a combination of both. The design basis is dependent upon the primary mode of action for the specific BMP. For example, the design of extended detention (dry) ponds requires a volume-based design approach, vegetated swales require a flow-based design approach, and concave medians require a combination of volume-based and flow-based design approaches. Table 3-1 lists various site design and landscape techniques and indicates whether a volume-based approach, flow-based approach, or both, is appropriate for the design of each technique.

In determining which design approach to use, apply the locally approved design standards to the BMP design guidance found in the references noted in Section 1.2.

3 Site Design for Stormwater Quality Protection

3.1 Site Design for Stormwater Quality Protection

Reducing the amount of runoff required to be captured and infiltrated and/or treated may be achieved by applying the following design philosophies during the planning and design stage of development:

- **Zero Discharge Areas** – areas that have been designed to infiltrate or retain the volume of runoff requiring treatment
- **Self-Treating Areas** – areas that have been designed to provide "self-treatment" without additional BMPs
- **Runoff Reduction Areas** – areas that have been designed using alternative materials or surfaces that may reduce the volume of runoff

Figure 3-1 conceptually illustrates how these philosophies may be used to reduce treatment requirements during development and redevelopment. The design philosophies are explained in detail in the following sections.

The site design techniques do not require radical changes in design methods or development planning. The techniques may simply be incorporated into the standard features of a development, requiring only small changes or refinements in design. For example, an area reserved to meet landscaping requirements can also be used to meet stormwater treatment requirements. The key is to incorporate these changes early on in the planning and design process. Appropriately applied, these techniques can reduce runoff volume and flow rate, which reduces the infrastructure necessary to treat and convey stormwater.

Table 3-1 presents a list of site design and landscaping techniques and indicates whether they are applicable for use in Zero Discharge Areas, Self-Treating Areas, and Runoff Reduction Areas. Several different techniques may be implemented within the same design philosophy. Some techniques may be used to implement more than one design philosophy. Where feasible, combinations of multiple techniques may be incorporated into new development and redevelopment projects to minimize the amount of treatment required.

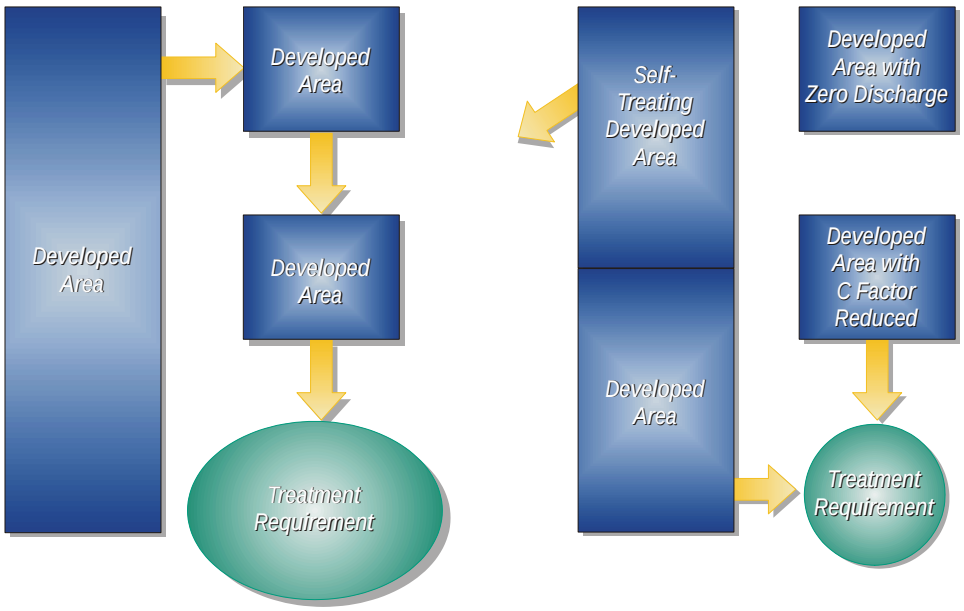

Conventional Design Approach **_Start at the Source_ Design Approach**

Figure 3-1
Reducing the Size of Treatment Requirements

Table 3-1
Site Design and Landscaping Techniques

	Design Criteria		Design Philosophy [1,2]		
Site Design and Landscape Techniques	**Volume-Based Design**	**Flow-Based Design**	**Zero Discharge**	**Self – Treating**	**Runoff Reduction**
Permeable pavements					
Pervious concrete	X				X
Pervious asphalt	X				X
Turf block	X			X	X
Un-grouted brick [3]	X				X
Un-grouted natural stone [3]	X				X
Un-grouted concrete unit pavers [3]	X				X
Unit pavers on sand	X				X
Crushed aggregate	X				X
Cobbles	X				X
Wood mulch	X				X
Streets					
Urban curb/swale system	X	X			X
Rural swale system	X	X			X
Dual drainage systems	X	X			X
Concave median	X	X	X	X	X
Pervious island	X	X		X	X
Parking lots [4]					
Hybrid surface parking lot	X				X
Pervious parking grove	X				X
Pervious overflow parking	X			X	X
Driveways [4]					
Not directly connected impervious driveway		X			X
Paving only under wheels	X			X	X
Flared driveways	X				X
Buildings					
Dry-well	X		X	X	X
Cistern	X	X	X	X	X
Foundation planting	X	X			X
Pop-up drainage emitters		X			X
Blue roofs [5]	X		X	X	X
Green roofs [5]	X		X	X	X
Landscape					
Grass/vegetated swales	X	X		X	X
Extended detention (dry) ponds	X		X	X	X
Wet ponds	X		X	X	X
Bio-retention areas	X		X	X	X
Fountains	X		X		

Notes:
(1) The above site design and landscape techniques may be applicable to more than one design philosophy; for example, turf block may be used as part of a self-treating area or runoff reduction area.
(2) These techniques must be designed and located properly to achieve the desired treatment requirement reduction.
(3) The open area between brick, stone, and pavers design techniques is critical, as the spaces provide perviousness.
(4) Options for parking lot and driveway surface treatments are covered under permeable pavements. See Start at the Source for details.
(5) Green roofs are vegetative, landscaped rooftops. Blue roofs are rooftops designed to detain or retain stormwater.

4 Zero Discharge Areas

4.1 Design Philosophy

An area within a development or redevelopment project can be designed to infiltrate or retain the volume of runoff requiring treatment from that area.

The term "zero discharge" in this philosophy applies at stormwater treatment design storm volumes. For example, consider an area that functionally captures and then infiltrates the 80th percentile storm volume. If permits require treatment of the 80th percentile storm volume, the area generates no *treatment-required* runoff.

Site design techniques available for designing areas that produce no treatment-required runoff include:

- Retention Ponds
- Wet Ponds
- Infiltration Areas
- Large Fountains
- Retention Rooftops
- Green and / or Blue Roofs

Infiltration areas, ponds, fountains, and green / blue roofs can provide "dual use" functionality as stormwater retention measures and development amenities. Retention ponds and infiltration areas can double as playing fields or parks. Wet ponds and infiltration areas can serve dual roles when meeting landscaping requirements.

When several "zero discharge" areas are incorporated into a development design, significant reductions in volumes requiring treatment may be realized.

"Zero discharge" areas such as wet ponds, retention ponds, and infiltration areas can be designed to provide treatment over and above the storm volume captured and infiltrated. For example, after a wet pond area has captured its required storm volume, additional storm volume may be treated via settling prior to discharge from the pond. In this case, the "zero discharge" area converts automatically into a treatment device for runoff from other areas, providing settling for storm volumes beyond treatment requirements. Another example is a grassy infiltration area that converts into a treatment swale after infiltrating its area-required treatment volume. The grassy infiltration area in this example becomes a treatment swale for another area within the development.

Figure 4-1 illustrates a residential tract, and a tract incorporating Zero Discharge Area techniques (infiltration areas). The Zero Discharge Area designed tract represents a design to infiltrate (i.e., achieve zero discharge from) a portion of the tract's runoff, reducing total runoff from the tract.

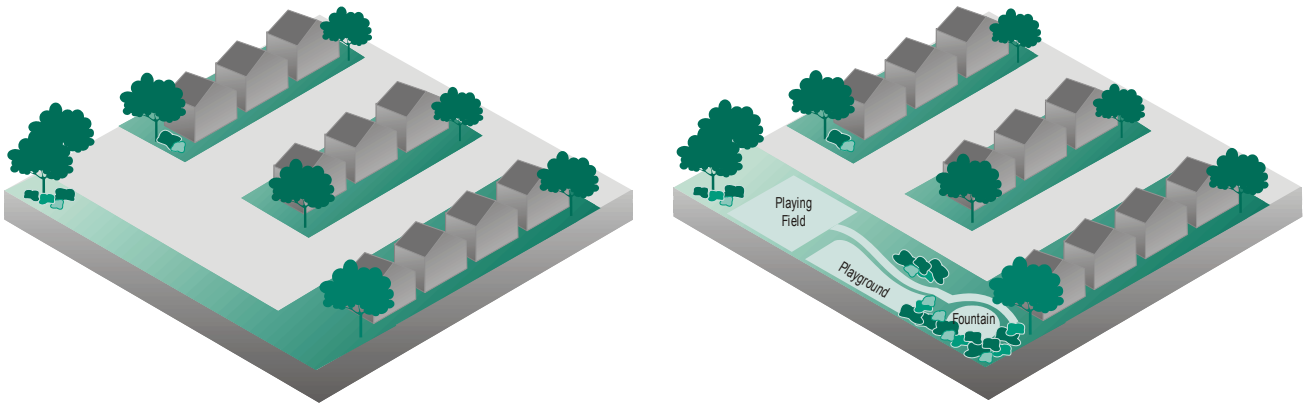

Conventional Design Approach **Start at the Source Design Approach**

Figure 4-1
Zero Discharge Area Usage

4.2 Zero Discharge Area Example

The following example problem compares sizing a retention basin using conventional design methods, to sizing the basin using *Start at the Source* design techniques. Figure 4-2 represents a conventionally designed residential tract with a retention basin.

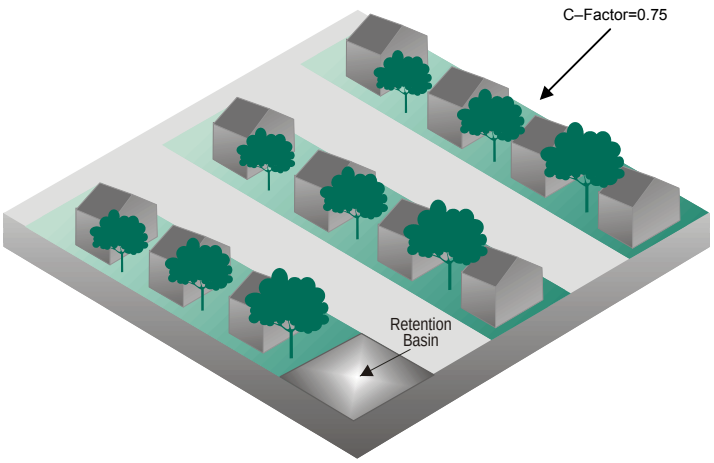

Figure 4-2
Conventional Design

Conventionally Designed Residential Tract:
Assume a 10-acre residential tract has a coefficient of runoff (C-Factor) of C=0.75

Start at the Source Designed Residential Tract:

- Redesign the 10-acre residential tract using the Zero Discharge Area *Start at the Source* technique. Figure 43 represents the residential tract with a 2-acre Zero Discharge Area incorporated into the development. To accommodate the Zero Discharge Area, the residential units were constructed at a higher density, resulting in a C-factor increase in the remaining 8-acre portion of the tract. Assume the redesign is comprised of:

- 2-acre portion with Zero Discharge Areas (fountains, playgrounds, wetlands, parks) with a runoff coefficient of C = 0.00

- 8-acre portion with a runoff coefficient of C = 0.85

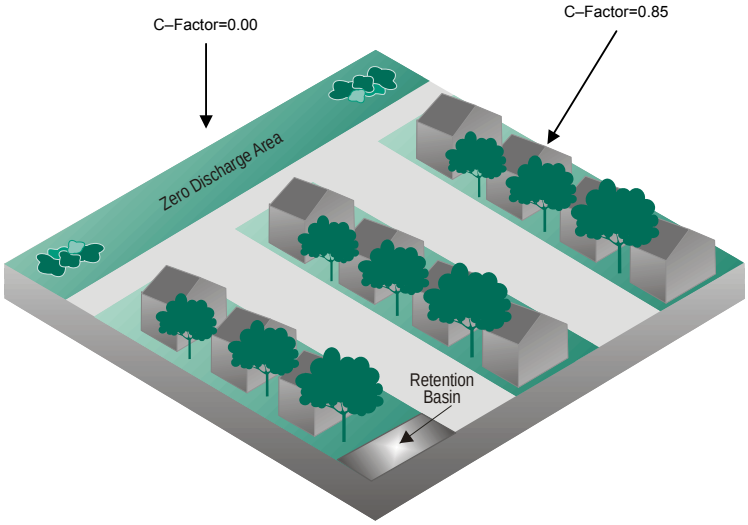

Figure 4-3
Start at the Source Design Approach

Calculating Retention Basin Size – Conventional Design:
Using Figure 4-4, San Jose Capture Curve developed using techniques set forth in the California Storm Water BMP Handbooks (CDM, et al. 2003):

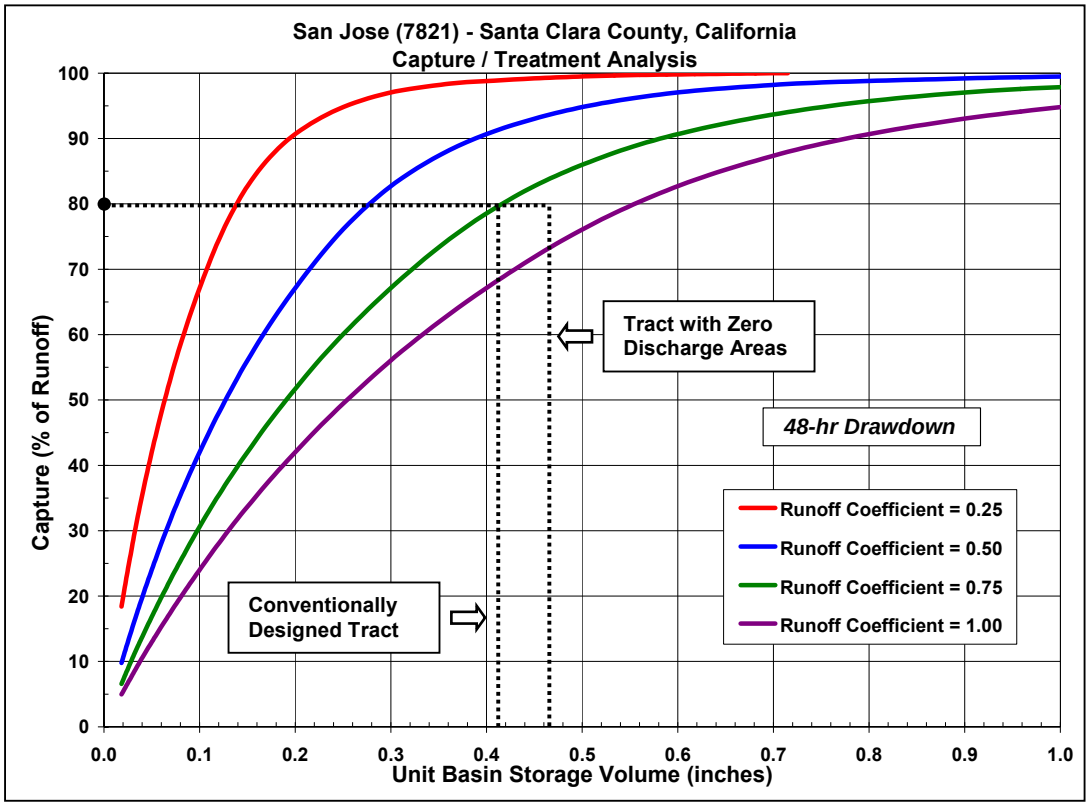

Figure 4-4
San Jose Capture Curve (California Stormwater BMP Handbooks)

By choosing the curve corresponding to a runoff coefficient of C=0.75, the Unit Basin Storage Volume is determined to be 0.41 inches, at the 80th percentile capture. Calculate the capacity of the retention basin required to treat runoff from the 10-acre residential tract:

Volume: $\forall_{Basin} = 10 \text{ acres} \times 0.41 \text{ inches} = 4.10 \text{ acre-inches}$

Calculating Retention Basin Size – *Start at the Source* Design:
Using Figure 4-4 San Jose Capture Curve, by interpolation, the appropriate curve corresponding to a runoff coefficient of C = 0.85, would lie between the C=0.75 curve and the C=1.0 curve. For the 80th percentile capture, the Unit Basin Storage Volume is 0.46 inches.

Though use of the *Start at the Source* design technique has increased the required Unit Basin Storage Volume from 0.41 inches to 0.46 inches, the technique has reduced the total acreage of the residential tract that will produce treatment-required runoff from 10 acres to 8 acres.

Calculate the capacity of the retention basin required to treat runoff from the 8-acre portion of the tract (2-acres has zero treatment-required runoff).

Volume: $\forall_{Basin} = 8 \text{ acres} \times 0.46 \text{ inches} = 3.68 \text{ acre-inches}$

By designing the 10-acre residential parcel using the *Start at the Source* design approach, a **10.2% reduction in treatment requirement** can be achieved.

5 Self-Treating Areas

5.1 Design Philosophy

Developed areas may provide "self-treatment" of runoff if properly designed and drained.

Self-treating site design techniques include:

- Conserved Natural Spaces
- Large Landscaped Areas (including parks and lawns)
- Grass / Vegetated Swales
- Turf Block Paving Areas

The infiltration and bio-treatment inherent to such areas provides the treatment control necessary. These areas therefore act as their own BMP, and no additional BMPs to treat runoff should be required.

As illustrated in Figure 5-1, site drainage designs must direct runoff from self-treating areas away from other areas of the site that require treatment of runoff. Otherwise, the volume from the self-treating area will only add to the volume requiring treatment from the impervious area.

Likewise under this philosophy, self-treating areas receiving runoff from treatment-required areas would no longer be considered self-treating, but rather would be considered as the BMP in place to treat that runoff. These areas could remain as self-treating, or partially self-treating areas, if adequately sized to handle the excess runoff addition.

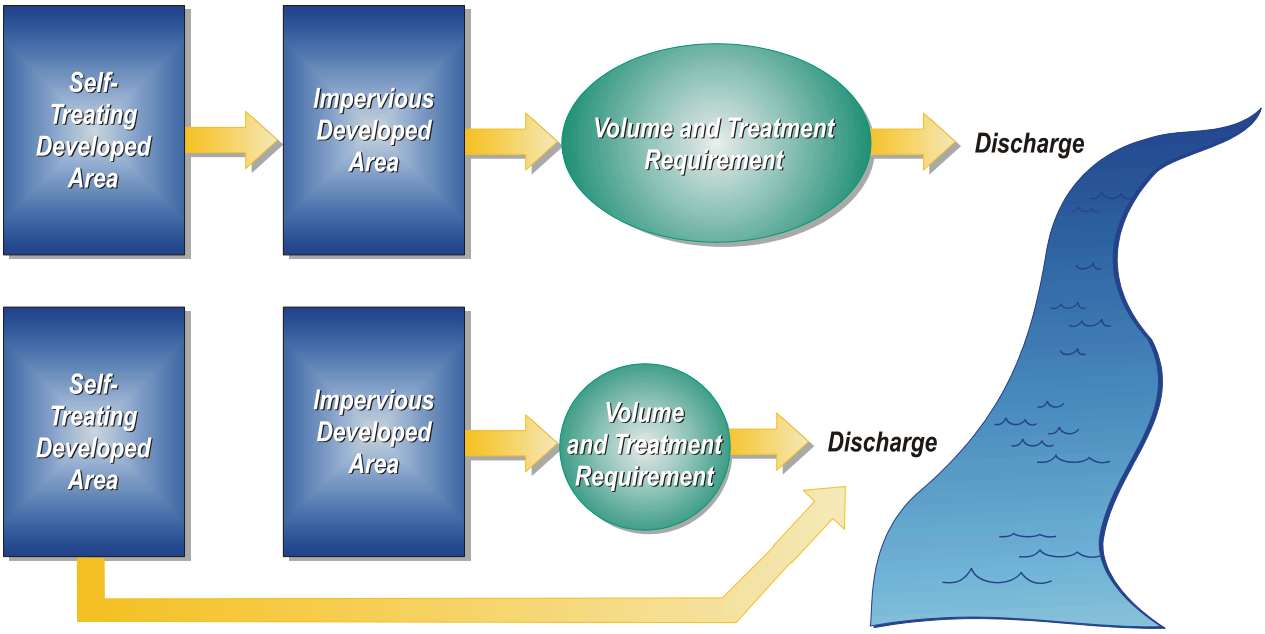

Figure 5-1
Self-Treating Area Usage

5.2 Self-Treating Area Example

The following example problem compares sizing a retention basin using conventional design methods, to sizing the basin using *Start at the Source* design techniques. Figure 5-2 represents a conventionally designed commercial/industrial lot and a commercial/industrial lot designed using the Self-Treating Area *Start at the Source* design approach. Assume the example lot is one of many similar lots making up a 100-acre commercial industrial site.

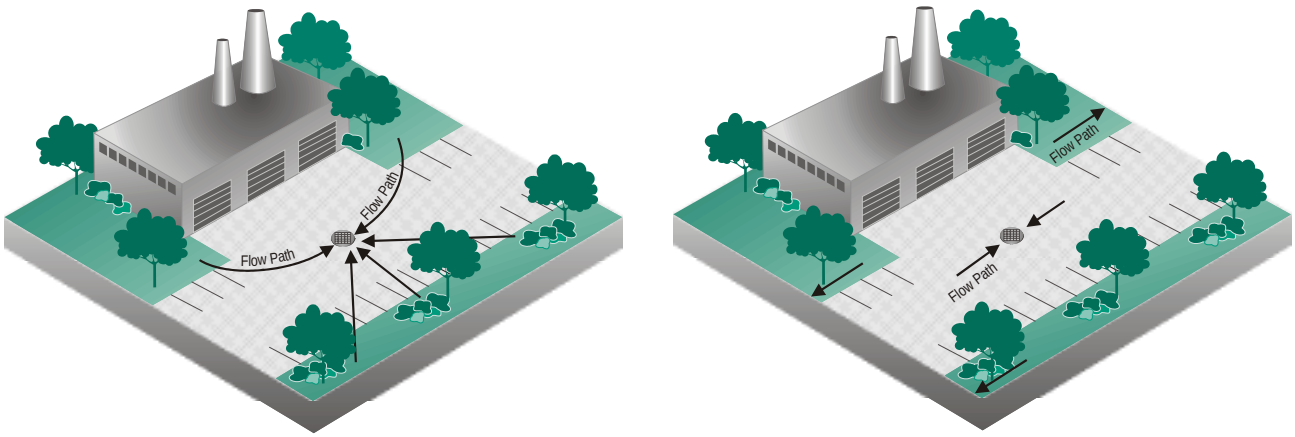

Conventional Design Approach **Start at the Source Design Approach**

Figure 5-2
Commercial/Industrial Site vs. Commercial/Industrial Site with Self-Treating Areas

Conventionally Designed Commercial/Industrial Site:
Assume a 100-acre commercial/industrial area comprised of:

- 80 acres with a runoff coefficient of 0.95 (roofs, parking lots, etc.)
- 20 acres with a runoff coefficient of 0.50 (landscape areas)

$$C_{combined} = \frac{(80 \text{ acres} \times 0.95) + (20 \text{ acres} \times 0.50)}{100 \text{ acres}} = 0.86$$

Commercial/Industrial Site Using *Start at the Source* Techniques (Self-Treating Areas):
100-acre commercial/industrial area comprised of:

- 80 acres with a runoff coefficient of 0.95 (roofs, parking lots, etc.)
- 20 acres of self-treating areas (landscape buffers, grassy areas, etc.) Note: These 20-acres do not drain to the retention basin as they are self treating. All runoff draining to the retention basin is from roofs, parking lots, etc.

Calculating Retention Basin Size – Conventional Design:
Using Figure 5-3, San Jose Capture Curve developed using techniques set forth in the California Storm Water BMP Handbooks (CDM, et al. 2003):

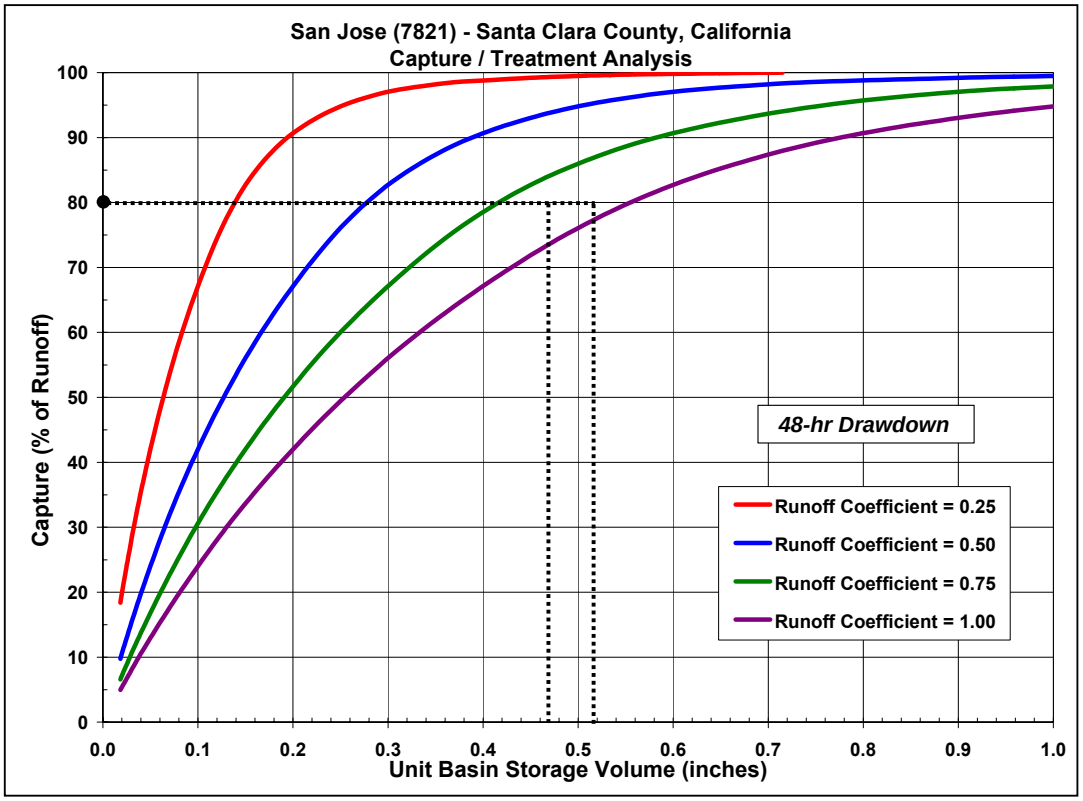

Figure 5-3
San Jose Capture Curve (California Stormwater BMP Handbooks)

By interpolation, the appropriate curve corresponding to a runoff coefficient of C combined = 0.86, would lie between the C=1.0 curve and the C=0.75 curve. For the 80th percentile runoff capture, the Unit Basin Storage Volume is 0.47 inches.

The capacity of the retention basin required to treat runoff from the 100-acre commercial/industrial area is calculated as follows:

$$\forall_{Basin} = 100 \text{ acres} \times 0.47 \text{ inches} = 47 \text{ acre-inches}$$

Calculating Retention Basin Size – *Start at the Source* Design:
Using Figure 5-3, San Jose Capture Curve:

By interpolation, the appropriate curve corresponding to a runoff coefficient of 0.95, would lie between the C=1.0 curve and the C=0.75 curve. For the 80th percentile runoff capture, the Unit Basin Storage Volume is 0.52 inches.

The capacity of the retention basin required to treat runoff from the 80-acre commercial/industrial area (excludes the 20-acres of self-treating areas) is calculated as follows:

$$\forall_{Basin} = 80 \text{ acres} \times 0.52 \text{ inches} = 41.6 \text{ acre-inches}$$

By designing the 100-acre commercial/industrial area using the *Start at the Source* design approach, an **11.5% reduction in treatment requirement** can be achieved.

6 Runoff Reduction Areas

6.1 Design Philosophy

Using alternative surfaces with a lower coefficient of runoff or "C-Factor" helps reduce runoff from developed areas. The C-Factor is a representation of a surface's ability to produce runoff. Surfaces that produce higher volumes of runoff are represented by higher C-Factors, such as impervious surfaces. Surfaces that produce smaller volumes of runoff are represented by lower C-Factors, such as more pervious surfaces. See Table 6-1 for typical C-Factor values for various surfaces during small storms.

Table 6-2 compares the C-Factors of conventional paving surfaces to alternative, lower C-Factor paving surfaces. By incorporating more pervious, lower C-Factor surfaces into a development, lower volumes of runoff are produced. Lower volumes and rates of runoff translate directly to lower treatment requirements.

Site design techniques may be used to reduce the C-Factor of a developed area, reducing the amount of runoff requiring treatment, including:

- Pervious Concrete
- Pervious Asphalt
- Turf Block
- Brick (un-grouted)
- Natural Stone
- Concrete Unit Pavers
- Crushed Aggregate
- Cobbles
- Wood Mulch

Other site design techniques such as disconnecting impervious areas, preservation of natural areas, and designing concave medians may be used to reduce the overall C-Factor of development areas.

Table 6-1
Estimated C-Factors for Various Surfaces During Small Storms

Paving Surface	*C-Factor*
Concrete	0.80
Asphalt	0.70
Pervious Concrete	0.60
Cobbles	0.60
Pervious Asphalt	0.55
Natural Stone without Grout	0.25
Turf Block	0.15
Brick without Grout	0.13
Unit Pavers on Sand	0.10
Crushed Aggregate	0.10
Grass	0.10
Grass Over Porous Plastic	0.05
Gravel Over Porous Plastic	0.05

Note: C-Factors for frequent small storms used to size water quality BMPs are likely to differ (be lower) than C-Factors developed for infrequent, large storms used to size flood control facilities. The above C-Factors were produced by selecting the lower end of the best available C-Factor range for each paving surface. These C-Factors are only appropriate for small storm treatment design, and should not be used for flood control sizing. Where available, locally developed small storm C-Factors for various surfaces should be utilized.

Table 6-2
Conventional Paving Surface Small Storm C-Factors vs. Alternative Paving C-Factors

Conventional Paving Surface C-Factors	*Reduced C-Factor Paving Alternatives*
Asphalt Parking Area (0.70)	Crushed Aggregate (0.10)
Concrete Patio/Plaza (0.80)	Decorative Unit Pavers on Sand (0.10)
	Turf Block Overflow Parking Area (0.15)
	Pervious Asphalt (0.55)
	Pervious Concrete (0.60)

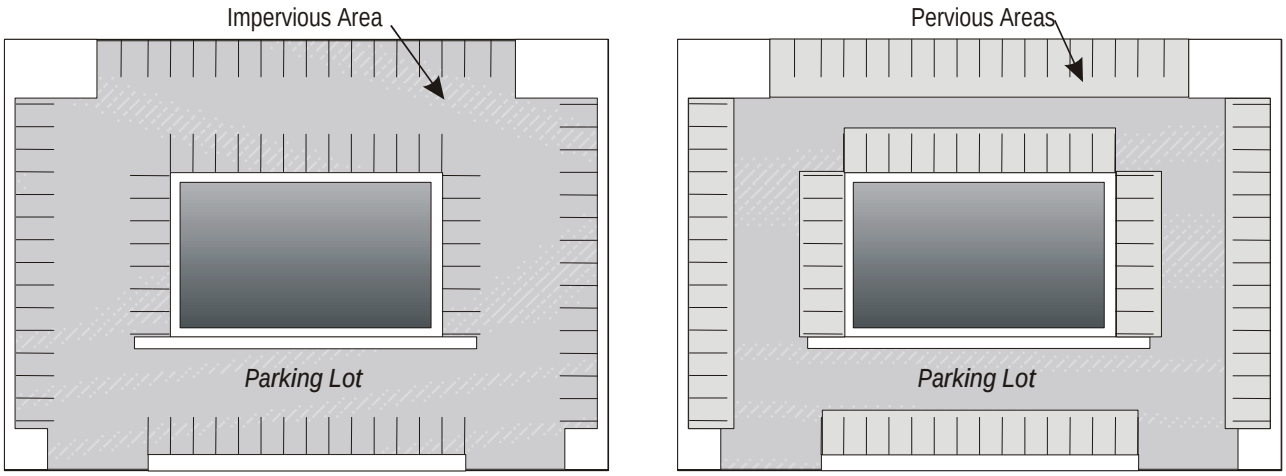

Figure 6-1
Impervious Parking Lot vs. Parking Lot with Some Pervious Surfaces

6.2 Runoff Reduction Area Example

The following example problem compares sizing a treatment swale using conventional design methods, to sizing the swale using *Start at the Source* design techniques.

Conventionally Designed Paved Parking Lot:
1-acre parking lot with a C-Factor of 0.80

Paved Parking Lot Using *Start at the Source* Techniques (Porous Pavement – See Figure 6-2):
1-acre parking lot with a C-Factor of 0.60

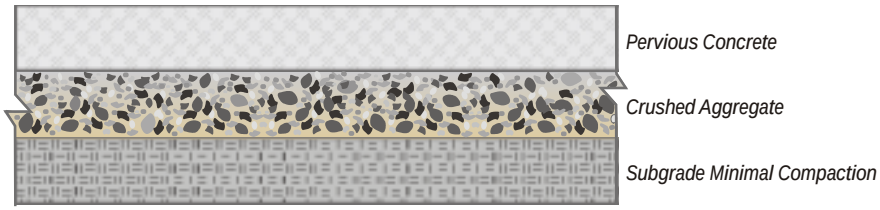

Figure 6-2
Porous Pavement

Calculating Swale Size:
Using the Urban Runoff Quality Management ASCE / WEF Manual guidelines for Selection and Design of Passive Treatment Controls:

Step 1: Determine Runoff
Using the Rational Method Q = CIA to solve for Q, given a rainfall intensity of 0.2 inches / hour

Where Q = Flow (cubic feet / second, cfs)

C = Runoff Coefficient

I = Rainfall Intensity (inch / hour)

A = Total Site Area (acres)

Calculating Runoff – Conventional Design:

Q = CIA
= 0.80 × 0.2 inches/hour × 1 acre
= 0.16 cubic feet/second

Calculating Runoff – *Start at the Source* Design:

Q = CIA
= 0.60 × 0.2 inches/hour × 1 acre
= 0.12 cubic feet/second

Step 2: Determine swale slope
Assume 1% or 0.01

Step 3: Select vegetation cover
Assume grass-lined swale

Step 4: Determine vegetation height
Assume 2 inches or 0.17 feet

Step 5: Select Manning's n value
Manning's n = 0.20, for routinely mowed grass-lined channels

Step 6: Select cross-sectional shape of swale
A typical swale cross-section is parabolic or trapezoidal in shape. The 2-inch (0.17 ft) flow depth in this example allows a rectangular cross-sectional approximation.

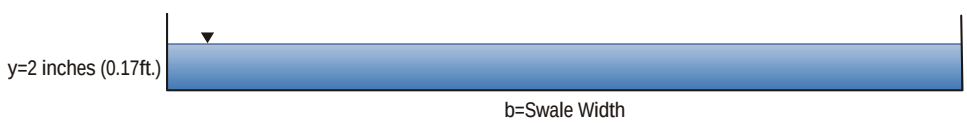

Step 7 Use Manning's equation to determine swale width
Manning's equation: $Q = 1.49 / n \times R^{2/3} \times S^{1/2} \times A$

Where Q = Flow

n = Manning's n

R = Hydraulic Radius = A / (b + 2y) for rectangular channels

S = Slope of swale

A = Cross-sectional Area = b × y for rectangular channels

y = Flow Depth = Vegetation Height for Treatment Swale

b = Swale Width

Using Manning's equation to solve for Swale Width, b:

Swale Width = 4.3 feet (Conventional Design)

Swale Width = 3.3 feet (*Start at the Source* Design)

Step 8: Determine flow velocity

Flow Velocity – Conventional Design:

Velocity = Runoff / Cross-sectional Area
= Q / A
= 0.16 cfs / (0.17 feet × 4.3 feet)
= 0.22 feet/second

Flow Velocity – *Start at the Source* Design:

Velocity = Runoff / Cross-sectional Area
= Q / A
= 0.12 cfs / (0.17 feet × 3.3 feet)
= 0.21 feet/second

Step 9: Determine swale length

Using Urban Runoff Quality Management Manual guidelines (p195), assume swale detention time of 7 minutes = 420 seconds

Swale Length – Conventional Design:

Length = Velocity × Detention Time
= 0.22 feet/second × 420 seconds
= 92.4 feet

Swale Length – *Start at the Source* Design:

Length = Velocity × Detention Time
= 0.21 feet/second × 420 seconds
= 88.2 feet

Step 10: Determine swale size (surface area)

Swale Size – Conventional Design:

Swale Size = Swale Length × Swale Width
= 92.4 feet × 4.3 feet
= 397 square feet

Swale Size – *Start at the Source* Design:

Swale Size = Swale Length × Swale Width
= 88.2 feet × 3.3 feet
= 291 square feet

By designing the parking lot using the *Start at the Source* design approach, a **27% reduction in treatment requirement** can be achieved**.**

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The Practice of Low Impact Development

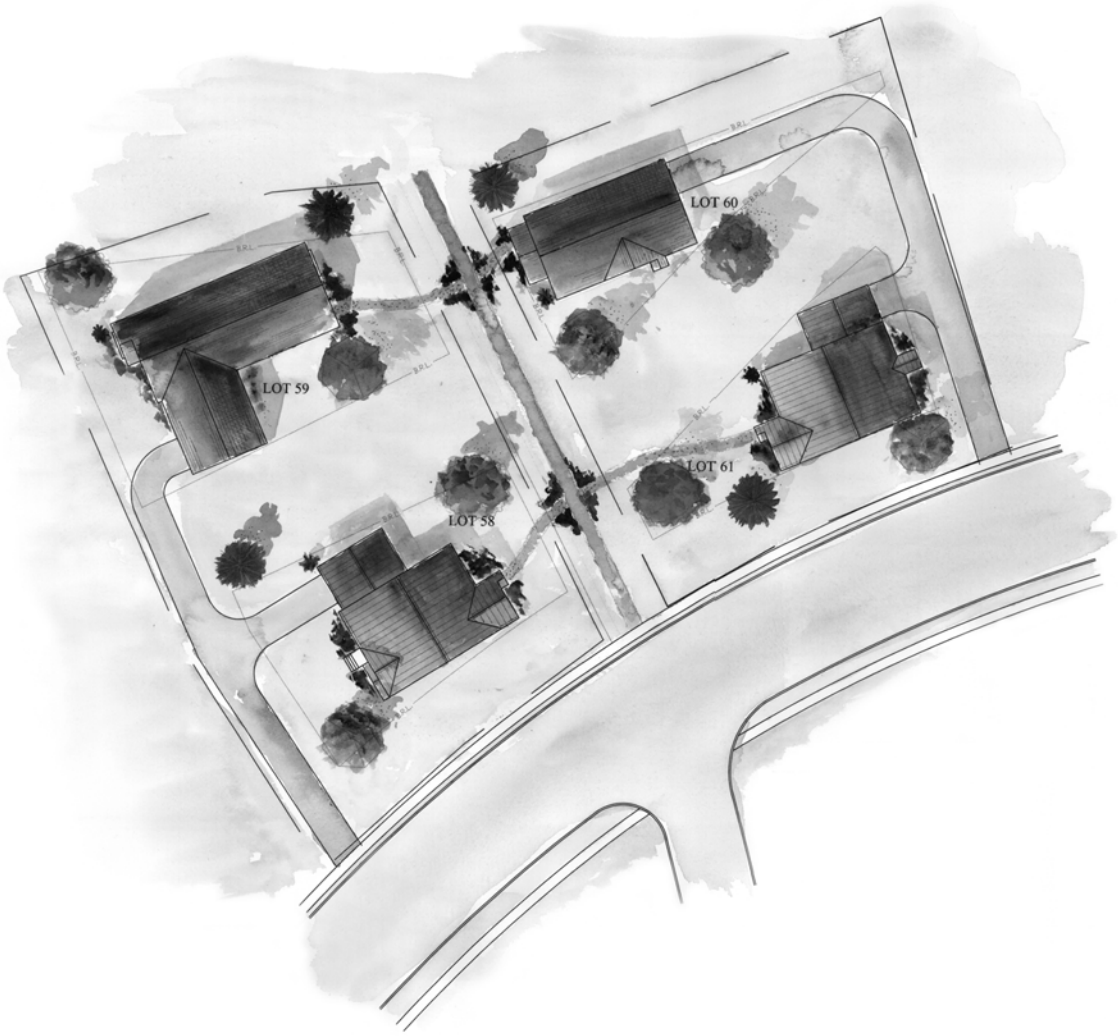

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The Practice of Low Impact Development

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PREFACE

This U.S. Department of Housing and Urban Development (HUD) document, *The Practice of Low Impact Development (LID)*, is intended to assist the housing industry during the land development process. It complements the 1993 HUD publication *Model Land Development Standards and Accompanying Model State Enabling Legislation*, which simultaneously promoted safe, high-quality housing and eliminated needless requirements that add to a home's final cost.

The HUD Office of Policy Development and Research (PD&R) supports the Department's overall mission of helping to create affordable housing and assisting communities with meeting their development needs. In particular, PD&R is responsible for monitoring the nation's housing needs, conducting research on significant community development issues, and providing reliable and objective analysis to our nation's policymakers. This publication underscores PD&R's commitment to delivering timely and accurate research to our nation's housing professionals.

The document focuses specifically on technologies that affect both the cost impacts and environmental issues associated with land development. It provides a brief introduction to low impact development and discusses conventional and alternative techniques and technologies that developers can integrate into their existing land development practices. By continually examining the land development process, the home building industry can continue to provide America with built environments that enhance the natural environment.

EXECUTIVE SUMMARY

Building professionals and municipal planning officials each have numerous goals and try to satisfy many needs during land development. Private developers are interested in profitable business ventures that also effectively address environmental concerns and meet regulatory requirements. Public sector officials ensure that development projects mesh with applicable zoning ordinances and help improve the surrounding community. This publication is intended to assist these groups by 1) providing basic conventional and innovative land development technology information, and 2) encouraging the amendment of existing development codes to facilitate the use of those technologies.

In an effort to help meet both groups' needs, the publication provides ways to simultaneously incorporate economic and environmental considerations into the land development process. This approach to land development, called Low Impact Development (LID), uses various land planning and design practices and technologies to simultaneously conserve and protect natural resource systems and reduce infrastructure costs. LID still allows land to be developed, but in a cost-effective manner that helps mitigate potential environmental impacts. LID is best suited for new, suburban development.

Some developers are already using some LID technologies in their projects, however this publication can help building professionals and municipal officials who are interested in learning more about LID. Lastly, developers do not have to incorporate all of the LID technologies noted herein into every development, rather, it is suggested developers carefully select the technologies appropriate to a site's unique regulatory, climatic, and topographic conditions. Some of the key LID recommendations are presented below.

Project Planning & Design

While the LID approach can result in a myriad of benefits for the developer, the municipality, and the environment, the proposed use of LID is likely to spawn questions during the development process. However, careful project planning, close collaboration with the local municipality, and education programs can minimize the challenges and effectively answer the questions.

Developers who have used LID practices and technologies have indicated that one of the keys to a successful project is to invest additional time and money in the initial planning stages of development. While this idea may be unpopular because of increased up-front costs, the expenditures are often recouped in the form of rapid home sales, enhanced community marketability, and higher lot yields.

Storm Water Management

Conventional storm water management systems rely on collection and conveyance systems to remove water safely from developed areas and to protect life, property, and health. The systems are engineered and designed according to estimates of post-development storm water flows and volumes from pervious and impervious areas.

Low impact development storm water management systems can reduce development costs through the reduction or elimination of conventional storm water conveyance and collection systems. LID systems can reduce the need for paving, curb and gutter, piping, inlet structures, and storm water ponds by treating water at its source instead of at the end of the pipe. However, developers are not the only parties to benefit from the use of LID storm water management techniques. Municipalities also benefit in the long term through reduced maintenance costs.

Wastewater Management

Wastewater can affect natural resources; all wastewater coming from a home must be sent to an effective treatment site or public treatment system in order to limit adverse environmental and health impacts. Nitrogen and phosphorus are two nutrients in wastewater that, either in excess or through cumulative effect, can adversely affect receiving waterbodies. When septic systems fail to operate as designed, excess nutrients in untreated wastewater can enter the environment.

In most cases, either municipal sewer or private on-site wastewater treatment systems (i.e., septic systems) can handle wastewater treatment needs. However, there are exceptions. For instance, in some circumstances, sewer systems cannot be used because of cost considerations; it might be too costly to run pipes long distances to link a proposed development's wastewater system to existing municipal sewer connections. In other cases, a municipality might have specific health or environmental concerns that make the use of septic systems unacceptable. Via the LID approach, developers can consider a variety of on-site wastewater treatment system options either as alternatives or enhancements to conventional septic systems. Some on-site treatment alternatives to conventional systems, such as recirculating sand filters and evapotranspiration systems, are "add-ons" to a traditional septic tank system. The additional treatment unit is connected in-line with the septic tank and provides an extra level of treatment.

Circulation & Design

As the struggle to decrease nonpoint source pollution in our nation's waters continues, municipalities have begun to reexamine the connection between circulation design and storm water management practices. New designs for streets, sidewalks, and driveways can maintain the functions of circulation while helping to reduce expanses of impervious surfaces that can alter local hydrology and degrade water quality. In turn, new street designs can influence the layout of lots and help to increase the volume of open space in new residential developments.

When coupled with narrower, open-section streets, a well-designed street layout can eliminate hundreds of square feet of impervious surface. Depending on the density, location, and type of subdivision, different types of street layouts may easily lend themselves to a cluster arrangement, conserving natural features, maintaining open space, and protecting water quality.

INTRODUCTION

What if you could simultaneously reduce your residential development and infrastructure costs, conserve and protect the environment, increase the marketability of your projects, and improve housing affordability? It may sound too good to be true, but many developers throughout the nation have been able to meet these ambitious goals. How? By incorporating a growing collection of innovative practices and technologies into their existing land development processes and practices.

Low Impact Development (LID) is an approach to land development that uses various land planning and design practices and technologies to simultaneously conserve and protect natural resource systems and reduce infrastructure costs. LID still allows land to be developed, but in a cost-effective manner that helps mitigate potential environmental impacts.

There are numerous design practices and technologies developers can use through the LID approach. For instance, developers can work together with municipal officials and the general public during the initial planning stages of development to identify environmental protection opportunities. Examples of opportunities include saving trees on the site, not building on designated sensitive areas, orienting roads and lots to allow for passive solar orientation of homes, and enhancing the effectiveness of on-site wastewater treatment systems. Such efforts have resulted in rapid home sales, enhanced community marketability, and higher-than-average lot yields.

This publication often refers to "technologies." For the purposes of the discussion, an LID technology can be structural or nonstructural. Equipment such as a sand filter is an example of a structural technology used to treat wastewater. Nonstructural LID technologies often use natural features or are land use strategies. An example of a nonstructural technology is the disconnection of rain gutters from storm water drains and redirection of rainwater toward rain gardens or grass swales.

To developers, LID can offer both infrastructure savings and a way to respond to increasingly stringent environmental regulations. For municipalities, LID can help contain burgeoning street and storm water management costs. For community residents, LID can encourage local environmental stewardship. And, for the environment, the benefits speak for themselves.

Definition of LID

Low Impact Development (LID) is an approach to land development that uses various land planning and design practices and technologies to simultaneously conserve and protect natural resource systems and reduce infrastructure costs. LID still allows land to be developed, but in a cost-effective manner that helps mitigate potential environmental impacts.

SCOPE

In 1993, the U.S. Department of Housing and Urban Development published *Proposed Model Land Development Standards and Accompanying Model State Enabling Legislation* to support its mission of providing decent, safe, and suitable living environments for all Americans. This important publication focused on the identification and elimination of unnecessary land development practices that add to a home's final cost. Many of the standards also offered ancillary environmental benefits. As an indication of the publication's impact on land development, the volume led many states and municipalities to consider, and in the case of New Jersey directly adopt, some of the standards. Indeed, the publication's recommendations are as applicable today as they were in 1993. Appendix D contains the 1993 publication's Table of Contents. HUD USER (Telephone: 800-245-2691) can provide the entire 1993 publication to anyone interested in obtaining it.

> **1993 HUD Publication**
>
> In 1993, the U.S. Department of Housing and Urban Development published *Proposed Model Land Development Standards and Accompanying Model State Enabling Legislation* to support its mission of providing decent, safe, and suitable living environments for all Americans. This important publication focused on the identification and elimination of unnecessary land development practices that add to a home's final cost.

This current effort by HUD's Office of Policy Development and Research is intended to complement and build on the information presented in the 1993 HUD document. It provides users with state-of-the-art information on relevant technologies that can help address both economic and environmental issues related to land development. Specifically, this document is designed to:

- Increase developer and public official awareness of LID opportunities;
- Discuss the alternative technologies available to developers;
- Encourage flexibility in local development codes;
- Continue to promote housing affordability; and
- Reduce land development's environmental impacts.

While LID may benefit all types of development, it is best suited for new, suburban residential development. Moreover, the LID practices and technologies are best integrated into a developer's existing land development process and practices. With some planning, the technologies described in this document can be integrated into today's land development projects. Based on a comprehensive site analysis (see Section 1.5.3), developers can decide which technology or combination of technologies will offer the best cost and environmental benefits taking into account the local ordinances. Developers do not have to incorporate all of the LID technologies noted herein into every development, rather, it is suggested developers carefully select the technologies appropriate to a site's unique regulatory, climatic, and topographic conditions.

HOW TO USE THIS DOCUMENT

This publication consists of two parts (see Table 1). Part I outlines the objectives of LID and explains how the approach can be easily integrated into a developer's project planning and design process. Part II presents the alternative practices and technologies that can be integrated into the land development process. In accordance with project objectives, site designers should explore the application of either an individual technology or a combination of technologies. For instance, planning for the conservation and protection of water resources on a project site may involve the integration of both storm water and wastewater management technologies. In sum, developers can first learn the objectives of LID (Part I) and then identify the practices and technologies (Part II) that can maximize the project's economic and environmental goals.

Part II of the document contains the following sections: Storm Water Management, Wastewater Treatment, and Circulation and Design, each of which was selected for its potential to offer the greatest LID benefits. Lastly, Appendix A contains a glossary, while Appendix B contains case studies that provide builders with real-world success stories of projects that used LID, Appendix C provides a list of references, and Appendix D provides the 1993 US HUD publication *Proposed Model Land Development Standards and Accompanying Model State Enabling Legislation's* table of contents.

The Practice of Low Impact Development		
Introduction	Part I	Part II
Definition of LID Relationship to 1993 Publication	LID Objectives Project Planning and Site Design	Alternative Technologies • Storm Water Management • Wastewater Treatment • Circulation and Design

TABLE 1. OVERVIEW OF DOCUMENT

AUDIENCE

This document is intended primarily for residential building professionals as they work through the initial stages of project planning and design. In addition, municipal planning officials benefit as the document can help them during various stages of the project development process.

Building professionals such as builders/developers, engineers, planners, and landscape architects using the LID approach indicate that successful projects require meticulous planning and design. Consulting this document before initiating the planning process can help building professionals identify and implement a range of LID practices and technologies and thus maximize a project's potential.

Municipal planning officials can also benefit from the use of this document. Reference to the document during the review and permitting stages of development can help officials understand the use of LID practices and technologies. Municipal planning officials are often responsible for drafting and enforcing local development codes and reviewing and approving preliminary site plans. Therefore, in addition to helping to educate municipal officials on the LID approach, the document can help encourage the amendment of existing development codes to facilitate the use of LID practices and technologies.

Section 1.4 discusses the challenges involved in implementing LID. The success of developments such as the Somerset community in Prince George's County, Maryland, and the Kensington Estates community in Pierce County, Washington, proves that developers and public officials can work together to integrate LID practices and technologies into today's projects. These communities have received praise for reducing strains on land, water, air, and soil resources.

PART I:
PROJECT PLANNING AND DESIGN

SECTION 1. LOW IMPACT DEVELOPMENT (LID) PRIMER

The LID approach to land development uses various land planning and design practices and technologies to simultaneously conserve and protect natural resource systems and reduce infrastructure costs.

1.1 OVERVIEW

In the mid 1990s, the Prince George's County, Maryland, Department of Environmental Resources outlined an approach for addressing suburban storm water management. That approach, termed Low Impact Development (LID), uses certain technology-based practices to ensure that a site's post-development hydrologic functions mimic those in its pre-development state. These functions include groundwater recharge, infiltration, and frequency and volume of discharges.

For the purposes of this document, we have expanded the concept of LID to include site planning and design considerations as well as wastewater management considerations.

1.2 BENEFITS OF LOW IMPACT DEVELOPMENT

LID reexamines traditional development practices and technologies and focuses on identifying project-specific site solutions that benefit the municipality, the developer, the home buyer, and the environment. Elements of the approach are also known by other names, such as conservation design, environmentally friendly design, resource-efficient design, and better site design. In addition to the fact that LID makes good sense, low impact development techniques can offer many benefits to a variety of stakeholders (see Table 2).

1.3 GOALS OF LOW IMPACT DEVELOPMENT

Many developers are aware that incorporating low impact development into their existing practices helps them systematically balance environmental and cost issues. In particular, residential building professionals using the LID approach seek to do the following:

Preserve Open Space and Minimize Land Disturbances

Successful LID communities recognize the value of open space, mature landscapes, and native vegetation. Open-space tracts incorporated into community designs and planned as components of larger, contiguous areas are highly desirable; in fact, homeowners frequently seek assurances that their community enjoys easy access to undeveloped areas located nearby. Minimizing land disturbance helps dampen the impacts to ecological and biological processes both on and off the site.

Protect Sensitive Natural Features and Natural Processes

Protection of a site’s sensitive natural features and natural processes is paramount to planning for LID. Judicious application of information gained in a site analysis can help identify developable and nondevelopable areas of a site and minimize impacts to air, water, soil, and vegetation (see Section 1.5.3).

Identify and Link On- and Off-Site “Green Infrastructure”

Green infrastructure represents the planned and managed network of wilderness, parks, greenways, conservation easements, and working lands with conservation value that support native species, maintain natural ecological processes, and sustain air and water

resources. Site planners should strive to identify on-site opportunities to support and expand regional green infrastructure.

Developers
• Reduces land clearing and grading costs • Reduces infrastructure costs (streets, curbs, gutters, sidewalk) • Reduces storm water management costs • Increases lot yields and reduces impact fees • Increases lot and community marketability
Municipalities
• Protects regional flora and fauna • Balances growth needs with environmental protection • Reduces municipal infrastructure and utility maintenance costs (streets, curbs, gutters, sidewalks, storm sewers) • Fosters public/private partnerships
Home Buyer
• Protects site and regional water quality by reducing sediment, nutrient, and toxic loads to waterbodies • Preserves and protects amenities that can translate into more salable homes and communities • Provides shading for homes and properly orients homes to help decrease monthly utility bills
Environment
• Preserves integrity of ecological and biological systems • Protects site and regional water quality by reducing sediment, nutrient, and toxic loads to waterbodies • Reduces impacts to local terrestrial and aquatic plants and animals • Preserves trees and natural vegetation

TABLE 2. BENEFITS TO STAKEHOLDERS

Incorporate Natural Features (Wetlands, Riparian Corridors, Mature Forests) into Site Designs

LID takes advantage of natural resources for both their functional and aesthetic qualities. For instance, when designed correctly, wetlands and pond systems can provide storm water management solutions as well as aesthetic and recreational benefits for the entire community, thus increasing lot and community marketability.

Customize Site Design According to the Site Analysis

Planning for LID communities relies on the performance of a thorough site analysis. Site planners can use the information gathered during the site analysis to create the best balance between development and the conservation of natural resources. By identifying buildable and nonbuildable areas of a site, planners can direct development into areas that will experience the least impacts on air, soil, and water.

Decentralize and Micromanage Storm Water at Its Source

Understanding the difference between pre- and post-development hydrologic patterns is critical to LID. The use of best management practices to reduce the amount of impervious surfaces, disconnect flow paths (i.e., downspouts connected to storm sewers), and treat storm water at its source all help minimize the impacts to local hydrology. Attainment of these goals can lead to the protection of water quality, reduction of impervious surfaces, increased open space, protection of trees, reduced land disturbance, decrease in infrastructure costs, and reduced homeowner energy bills.

Associated Benefits of LID

Protection of Water Quality
Reduction of Impervious Surfaces
Increased Open Space
Protection of Trees
Reduced Land Disturbance
Decrease in Infrastructure Costs
Reduced Homeowner Energy Bills

1.4 CHALLENGES TO USING LOW IMPACT DEVELOPMENT

While the LID approach can result in a myriad of benefits for the developer, the municipality, and the environment, the proposed use of LID is likely to spawn questions during the development process. Two of the most frequent challenges facing developers who contemplate the use of LID center around restrictive local ordinances and local officials' and citizens' opposition to the approach. However, careful project planning, close collaboration with the local municipality, and education programs can reduce the challenges. Appendix B includes several case studies that developers can use to support their decisions to use LID.

Local ordinances guide the design and construction of new development. Often, a community drafted and adopted its ordinances years ago such that the regulations no longer reflect today's development practices, especially those of LID. In many cases, developers wishing to use LID may have to obtain some type of variance or waiver from their local planning agency until local codes are updated to reflect current practice. Unfortunately, variances can create delays in the approval and permitting process, and those delays often translate into more debt service on the loans secured for the original land purchase.

As a pure business decision, it usually does not make sense for a developer to go through the potentially time consuming steps of the variance process. One way to address this issue is to have municipalities reword their zoning ordinances in order to allow LID in residential land development projects. One thing that would help facilitate the ordinance revision process is the development of a nationwide database containing information on ordinances supporting the use of LID. This database would provide the entire development industry, including local planning officials, with a centralized resource that would provide examples of ordinances

Helping Communities Permit the Use of LID

Developers work within the local land development regulations. If a municipality would like developers use the LID approach in future projects, then the zoning ordinances should encourage such a change. However, municipal officials are looking for information on how to best provide flexibility in the local development regulations. Municipal officials have asked for a nationwide database containing information on sample zoning ordinances that support the use of LID. Since such a database does not currently exist, creating and updating an information clearinghouse would address one of the significant challenges in front of people interested in using the LID approach.

that encourage the LID approach.

Ideally, the time to obtain permit approval for an innovative land design should be at least equal to the time needed to develop that same parcel of land under the provisions of existing regulations. Developers incorporating LID practices and technologies into their projects should ask for expedited permitting or pre-development assurances that review and permitting times will not be extended. In fact, public officials that want developers to use LID technologies can tie incentives, such as expedited permitting process times, to developments incorporating those technologies. Until development ordinances are amended to allow innovative practices and technologies by-right, other incentives, such as density bonuses and reduced impact, application, or development fees can also be negotiated between developers and municipal officials to help offset additional costs. .

Local citizens may also show resistance to accepting the proposed use of LID within their communities. Misconceptions and minimal data regarding the safety and long-term viability of LID systems have led to questions concerning the practices' and technologies' efficacy, particularly in terms of flood control and public health and safety. To help homeowners, and sometimes even municipal officials, understand the benefits of LID techniques, developers may find it helpful to prepare brief educational presentations or publications on LID for both the general public and municipal officials. Studies have shown that once residents understand the benefits to local water quality, they are more likely to support and accept alternative technologies. Often, homeowners view practices such as bioretention cells as extra builder landscaping.

1.5 PLANNING FOR LOW IMPACT DEVELOPMENT

Proper team development and collaboration, (see Section 1.5.1), careful coordination with the public reviewing agency (see Section 1.5.2), and the performance of a thorough site analysis (see Section 1.5.3) are essential ingredients for successfully incorporating LID concepts into development plans.

Table 3 highlights some of the ways in which LID differs from conventional development. Developers who have used LID practices and technologies have indicated that one of the keys to a successful project is to invest additional time and money in the initial planning stages of development. While this idea may be unpopular, the expenditures are often recouped in the form of rapid home sales, enhanced community marketability, and higher lot yields.

Due to the iterative and phased nature of construction, both the collaboration and ordinance review/outreach phases should be conducted continuously from project commencement through completion. For example, changes to one aspect of the project (e.g., lot layout) can affect other aspects of the project (e.g., storm water management). During site construction, the site should be continuously monitored for potential impacts to vegetation, soils, or sensitive water features such that appropriate protective measures can be implemented.

	Collaboration	→	Ordinance Review/Outreach	→	Site Review and Analysis
Traditional Practice	• Often uses an engineering team and one or two other experts. • Uses experts sequentially, i.e., conducts one phase of development process and then passes project details to the next expert.		• Limits interaction with public officials to permitting meetings. • Does not actively seek out public's input on design options. • Meets existing ordinances. • Uses pre-development meetings to review preliminary site plans.		• Analyzes the land use ordinances to identify regulatory barriers. • Conducts review with the goal of developing one design plan. • Meets the regulatory requirements.
Low Impact Development Practice	• Uses experts such as landscape architects, engineers, hydrologists, geologists, and biologists to collaborate, perform site analysis, and identify innovative solutions. • Encourages collaborative effort among all site design professionals to maximize natural resource benefits.		• Proactively seeks public officials' input in pre-development meetings to identify project opportunities. • Works with the community to include its interests in project design. • Conducts resource analysis first to determine what the site offers. Reviews the ordinances to determine potential barriers to proposed designs. Design must meet ordinances or developer obtains a variance.		• Analyzes the land and ordinances to identify resource opportunities and constraints. • Reviews all inputs to create multiple land design options for consideration. • Works together with public officials to gain flexibility in the design phase.

TABLE 3. COMPARISON BETWEEN LOW IMPACT DEVELOPMENT AND TRADITIONAL LAND DEVELOPMENT PROCESSES

1.5.1 COLLABORATION

Historically, engineers have assumed primary responsibility for identifying a site's natural resources and integrating them into project designs. These professionals, however, may or may not have undergone the specialized training necessary to carry out their assigned tasks in the context of the LID approach. Engineers working on LID projects have benefited from the input of a variety of natural resource and land development professionals, including planners, architects, landscape architects, biologists, ecologists, and hydrologists.

Conducting the site planning process with the assistance of the above professionals increases the likelihood that the design process will disclose all opportunities for low

impact development. For instance, a site located in a headwaters area for sensitive wetlands may need the assistance of a hydrologist to identify strategies to protect local water resources. A landscape architect could help orient houses and lots to take advantage of passive solar heating. Section 1.6 discusses the process of incorporating these opportunities into project goals during the project design phase.

Developers' use of these professionals should obviously reflect a project's size and budget. In fact, the expertise offered by the above professionals may be available from several sources other than the professionals themselves. For instance, project engineers can consult the Internet, periodicals, and local governments to gain insights into efficient natural resource use and land planning practices.[1]

1.5.2 ORDINANCE REVIEW/OUTREACH

Before commencing work on any site design, developers committed to integrating LID practices and technologies into their designs should meet with local officials to review current development ordinances. Ordinance review meetings between developers and planning staff can help identify ways in which the public and private sectors can work together to build communities that minimize development impacts. Similar to the pre-development meetings that are now required in many municipalities throughout the country, ordinance review meetings should focus on the ways in which LID practices and technologies can further the intent of current ordinances. Developers should not view the meetings as opportunities for local municipalities to exert added regulatory control, but rather as forums in which the two parties can work together to identify mutually beneficial solutions.

Items to Consider During an Ordinance Review/Outreach Meeting
• Street Design and Parking Requirements
• Lot Layout and Setback Requirements
• Storm Water Management and Wastewater Treatment Practices and Technologies
• Bonus Densities or Other Development Incentives
• Options for Waivers or Variances

TABLE 4. ITEMS TO CONSIDER

Before the ordinance review meetings, developers should familiarize themselves with the relevant local regulations and the specific LID practices and technologies that they wish to implement. For instance, even though current zoning and storm water management regulations may prohibit the LID approach, a developer might be interested in integrating open-section roadways and grassed swales into a development. At the ordinance review meeting, the developer and the municipality might negotiate a compromise that will allow the developer to implement the practice on certain local streets in exchange for setting aside additional stream buffers elsewhere on the site. Developers can then apply for a variance that will likely be looked upon favorably by municipal officials since it was negotiated earlier between the developer and public official. This win-win situation

[1] Additional resources are listed at the end of each section in Part II.

reduces the developer's street construction costs and storm water management burden and increases municipal protections for riparian systems.

1.5.3 SITE ANALYSIS

Highly attractive and marketable developments begin with a thorough site analysis that takes into consideration a site's natural features. A site analysis is a process by which a developer or one or more members of the development team inventories a site's natural features and attributes to identify development opportunities and constraints. Soils, water resources, vegetative patterns, topography, microclimate, solar orientation, viewsheds, and access are just a few of the site attributes that go into a thorough analysis. Many may view the site analysis as a way to identify and plan for potential constraints that can sideline a project or increase development time or costs. However, as environmental awareness continues to increase, developers have realized that identifying and strengthening potential opportunities can be just as important. Table 5 provides some site analysis considerations that relate to Part II.

Storm Water Management
• Topography (low points, high points, ridgelines, swales)
• Hydrology (natural drainage patterns, surface and groundwater, wetlands, sensitive water resources)
• Vegetation (existing vegetation, tree-save areas, aquatic buffers)
Wastewater Management
• Soils (porosity, depth to bedrock, groundwater table)
• Topography (slopes conducive to drain fields)
• Natural Water Features/Sensitive Waterbodies
• Aesthetics (siting)
• Vegetation (sensitive areas)
Circulation and Design
• Hydrology (natural drainage)
• Topography (ridgelines/steep slopes)
• Natural Features (viewsheds, waterbodies, forested areas)
• Soils (hydric)

TABLE 5. SITE ANALYSIS CONSIDERATIONS FOR TECHNOLOGIES DISCUSSED IN PART II

Before even purchasing a piece of property, a developer usually conducts or commissions some type of feasibility study to identify possible physical, legal, or political barriers to developing the site. A feasibility study differs from a site analysis in that it is not usually conducted to assist in site design. In many instances, lending institutions may require an environmental assessment to identify any potential for site contamination that could increase liability for remediation and raise development costs. The data collected for a feasibility study should by no means be considered complete. Many other sources of public and private information are available (see Table 6). Information gathered from different sources should be synthesized into a single, usable map and taken to the site for

verification, especially given that many public maps do not accurately reflect current local site conditions.

However, a site analysis is about more than just preparing a base map and verifying site conditions. A good site analysis can help site designers integrate the built and natural environments into a functioning whole while ensuring identification of the processes, both natural and man-made, that occur on and off site. Armed with an understanding of a site's various attributes and functions, site designers can create developments that enhance the site's ecological integrity.

One of the first concepts to understand about the site analysis is that it can rarely be completed during one site visit. If time permits, the process should involve several site visits at different times to observe the effects of seasonal and climatologic changes on the property. For instance, site hydrology may change drastically from the spring to the summer or views may differ radically during the winter months when trees shed their leaves. Designers should also examine on- and off-site connections such as wildlife corridors, riparian areas, or valley systems. The value of these systems should be considered in terms of both their intrinsic value and their connection to their counterparts in the regional environment. Site analysis usually brings together three primary areas of interest: water, vegetation, and soils/topography as discussed below.

Possible Sources of Information for a LID Site Analysis
• City/County/State/Federal Maps
• National Flood Insurance Program (NFIP) Floodplain Maps
• Aerial Photographs
• National Wetlands Inventory (NWI) Maps
• Topography/Soils (U.S. Geological Survey/Soil Conservation Service / Natural Resources Conservation Service - USGS/SCS/NRCS)
• Local Tax/Plat Maps
• Seismic Maps
• Hazard Maps
• Coastal Zone Management Maps

TABLE 6. SOURCES OF INFORMATION

Water

Increasingly, public officials are evidencing concern over water quality and quantity. When properly protected and enhanced, water features can make a project highly marketable. Studies indicate that homebuyers will pay premiums not only for waterfront lots but also for lots with water views or lots in communities with desirable water features such as lakes or streams.

Many different water resources can exist on a given site, and all should be inventoried and their hydrologic relationships understood. It is important to keep in mind that the connectivity of hydrologic systems means that impacts to one resource may affect

another. For instance, sheetflow regime changes may affect a wetlands system, which may in turn affect both groundwater recharge rates and baseflows to streams.

In addition to surface water sources such as streams, rivers, and lakes, other less evident sources of water are equally important and must be identified and protected. Wetlands, seeps, and springs are groundwater-based sources that in most instances fall under the jurisdiction of the federal Clean Water Act. Since they are fed by groundwater, these features may ultimately determine the location of roads, lots, structures, and on-site storm water management or wastewater treatment systems.

Site designers should consider sheetflow characteristics and seasonally inundated areas. Sheetflow is the movement of rainwater across the surface of landscape or, in other words, how the site drains. Flow paths should be identified and natural channels inventoried and protected. Seasonally inundated areas, which are temporarily ponded shallow depressions that exist during rainy seasons, provide habitat for aquatic and migratory species and should be protected.

Vegetation

Tree-save areas are areas preserved on a development tract to meet tree ordinance requirements and/or to protect healthy vegetation from site development activities.

Trees can be valuable resources on project sites. They can significantly increase the value of individual lots by moderating temperatures within and outside structures, acting as wind buffers, and benefiting water quality. Vegetated riparian buffers and forested areas have the capacity to reduce storm water volumes, remove pollutants, and slow erosive flows. Current national trends indicate that buyers seek lots with mature vegetation. Builders now realize that the preservation of mature trees and stands of trees can mean more attractive communities. Viable tree areas should be inventoried and protected by a comprehensive tree preservation plan implemented before site clearing and grading. Most municipalities now mandate some form of tree protection and may offer credits for preservation of existing stands. Tree-save areas should be incorporated into both buildable and nonbuildable areas of a site.

Soils/Topography

Soils and topographic studies can help determine the placement of streets, lots, buildings, wells, drainfields, and other site amenities. A thorough analysis of all related soils information, including percolation and other geotechnical studies, is an essential component of the site analysis. Given that federal government soil surveys are highly generalized, planners should not rely on them for site-specific soils information. Hydric, or wetland soils, should be delineated by a certified wetlands professional and verified by the local U.S. Army Corps of Engineers field office.

1.6 SITE DESIGN FOR LOW IMPACT DEVELOPMENT

Once the planning phase is complete, the resultant information can be used in the formulation of the final site design. Often, standardized residential templates are overlaid on a site without regard to a site's natural features and environmental sensitivities. These "forced" patterns cause unnecessary impacts to local water, vegetation, and soils and can artificially inflate the infrastructure costs associated with clearing and grading.

Given that land development projects vary as widely as the parcels of land to be developed, it is difficult to prescribe an exact design process for every situation. The three topics discussed below, site area classification, circulation design, and infrastructure and natural resources design, are part of an LID approach that should embrace the various design determinants and variables identified in Figure 1. The list of design determinants and variables identified in the figure is by no means exhaustive. Site designers should identify a complete list of these items based on each site's characteristics.

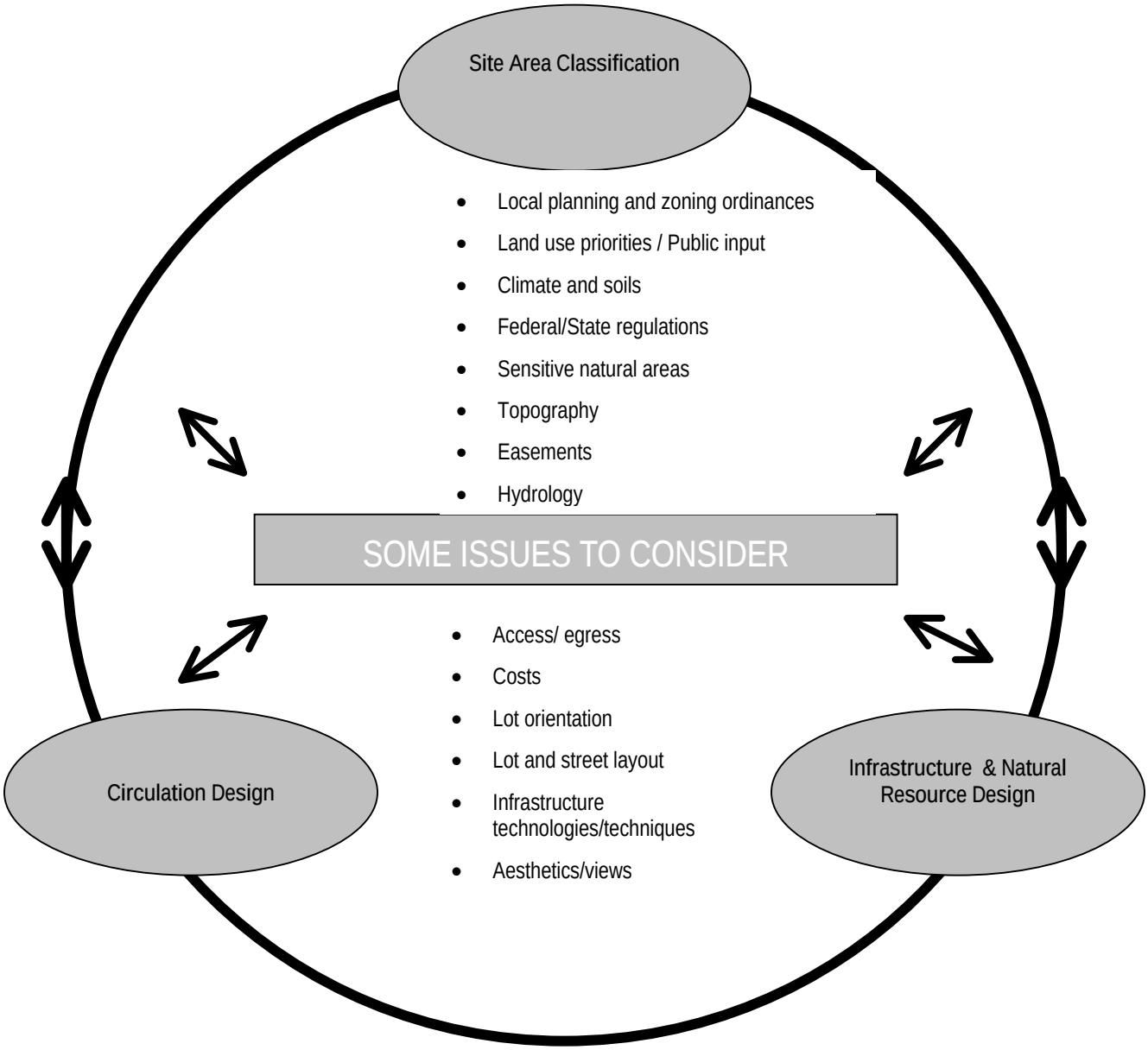

FIGURE 1. LOW IMPACT DEVELOPMENT SITE DESIGN

1.6.1 SITE AREA CLASSIFICATION

Once the site analysis is complete, site designers should analyze and classify areas of the site by suitability of use. During the process of site area classification, it is important to keep in mind that maximizing a site's development potential does not necessarily mean that the entire site needs to be developed. Compact forms of development make it possible to conserve open space and protect habitat and water quality while promoting housing affordability and a sense of community.

Even though open, nonvegetated areas are usually seen as prime development areas, site designers should remain flexible and take into account all natural resource information collected during the site analysis. For instance, a field might serve as a headwaters area for sensitive wetlands or be better developed into recreational fields for a park system.

Buildable Areas

Buildable areas of a site are the areas that are optimal for conversion into finished lots. Buildable areas usually have the fewest limitations in terms of access, regulatory restrictions, sensitive natural features, and zoning concerns. The process of identifying a site's buildable areas may point to the advisability of clustering development into several small areas rather than spreading it throughout one large area. While clustering can protect sensitive site features, it can contribute to infrastructure costs by increasing the excavation and construction costs for streets and utility lines. Yet, narrower streets and rights-of-way and smaller lot sizes mean that less land needs to be developed, permitting the achievement of lower development costs.

Nonbuildable Areas

Nonbuildable areas of a site should remain undeveloped in response to regulatory, natural resource, planning, or other development concerns. These areas can easily be incorporated into either community open space or larger regional systems. During site construction, nonbuildable areas should be protected with silt or tree protection fences, and equipment and materials should not be stored in them. Even though the areas are intended to remain undeveloped, site designers should examine opportunities to use the areas to accommodate the innovative technologies discussed in Part II (see Section 1.5.3 for additional information on the integration of infrastructure and natural resources).

1.6.2 CIRCULATION DESIGN

As discussed in Section 4 - Circulation and Design, a well-designed pedestrian and vehicular circulation system is critical to the success of a development project. The construction of roads is typically one of the largest infrastructure expenses for land development projects. It is estimated that the cost of paving a road averages $15 per square yard (The Center for Watershed Protection, 1999). The use of efficient road layouts, street types, and pavement treatments can significantly reduce the cost of roadway construction, decrease the quantity of runoff from a site, potentially increase lot yield and open space amounts, and protect natural resources.

After identifying buildable and nonbuildable areas, site designers should lay out an efficient circulation system that provides for access, parking, and circulation. To

minimize the amount of impervious surfaces, plans should maximize lot frontages and minimize pavement widths.

To minimize grading and to protect riparian channels, roadways should be located on topographic high points and should follow the natural contours of the land, within safe grade tolerances. Grade changes and curves in roadways can add visual interest to streets and communities and to help slow traffic. For additional road design standards, refer to AASHTO's *Green Book* (AASHTO, 1994).

1.6.3 INFRASTRUCTURE AND NATURAL RESOURCES DESIGN

The efficient blending of infrastructure and natural resources on a development site requires a thorough understanding of the natural processes that characterize the site and the infrastructure practices and technologies proposed as part of the land development process. Use of many of the practices and technologies discussed in Part II may allow for an entirely different set of site planning and design considerations. For instance, alternative wastewater treatment systems that use smaller drainfields may permit smaller lot sizes, which in turn can affect lot, road, and open-space layouts. All of the alternative practices and technologies discussed in this publication, whether related to storm water, wastewater, or circulation, affect water, soils, and vegetation. Site designers should use the best combination of systems based on individualized natural resource objectives for a given site.

PART II:
PROJECT TOOLS/REFERENCES

SECTION 2: STORM WATER MANAGEMENT

Implementing nontraditional, decentralized methods for handling storm water can significantly reduce site development costs, regional expenditures for storm water and planning, construction, and maintenance outlays while protecting the environment.

2.1 INTRODUCTION

Planning for storm water management in the initial stages of land development can yield significant cost and environmental benefits for developers, municipalities, and residents. Traditionally approached during site development as an obligation to satisfy state and federal regulatory requirements, storm water management has increasingly come under reexamination in light of its potential to function as a project opportunity and site design element. When correctly planned for and accommodated, storm water management systems can simultaneously satisfy regulatory requirements, act as site design elements, protect the environment, and reduce infrastructure costs—all the attributes of low-impact development.

The development of land, whenever and wherever it occurs, affects soils, vegetation, and water. After land is developed, rainwater that would have infiltrated into the ground, been absorbed by plant roots and transpired, or evaporated into the air instead becomes surface runoff. Runoff often picks up urban pollutants such as grease, oil, nutrients, metals, and debris and deposits them into local waterbodies. In addition to water quality impacts, post-development storm water runoff has other impacts, including changes to the peak flow characteristics of streams, degradation of habitat and aquatic species, and fluctuations in local groundwater tables.

> **Definition of LID**
>
> Low Impact Development (LID) is an approach to land development that uses various land planning and design practices and technologies to simultaneously conserve and protect natural resource systems and reduce infrastructure costs. LID still allows land to be developed, but in a cost-effective manner that helps mitigate potential environmental impacts.

Stricter federal water quality requirements under the Clean Water Act have caused both municipalities and developers to seek out more environmentally efficient, cost-effective storm water management alternatives that are compatible with hydrologic and watershed objectives. At the same time, traditional methods for addressing storm water management have brought to the fore other considerations such as cost and maintenance issues, liability issues, and the need for education and outreach programs for local officials and residents.

History of Low Impact Development

Initially developed and implemented by Prince George's County, Maryland, in the early 1990s as an innovative way to handle storm water runoff, LID techniques have rapidly spread across the country. The overall goal of LID storm water treatment is to mimic pre-development hydrologic conditions through the use of a variety of structural and nonstructural practices that detain, retain, percolate, and evaporate storm water. This publication is not intended as a comprehensive guide to LID storm water treatment strategies but merely aims at providing an overview of alternative storm water

> Prince George's County, Maryland has pioneered several new tools and practices in LID. The Prince George's County Maryland Department of Environmental Resources Programs and Planning Division (PGDER) created two publications: 1) *Low-Impact Development Design Strategies An Integrated Design Approach* (EPA 841-B-00-003), and 2) *Low-Impact Development Hydrologic Analysis* (EPA 841-B-00-002). These publications describe how LID can achieve storm water control through the creation of a hydrologically functional landscape that mimics the natural hydrologic regime.

management practices and technologies. For a comprehensive look at the LID process, readers should consult the Prince George's County, Maryland, Department of Environmental Resources for copies of its LID publications (Telephone: 301-883-5810).

Cost Benefits

Low impact development storm water management systems can reduce development costs through the reduction or elimination of conventional storm water conveyance and collection systems. LID systems can reduce the need for paving, curb and gutter, piping, inlet structures, and storm water ponds by treating water at its source instead of at the end of the pipe. However, developers are not the only parties to benefit from the use of LID storm water management techniques. Although more data is needed on the maintenance of LID technologies, recent history has indicated that municipalities may also benefit in the long term through reduced maintenance costs.

Environmental Benefits

As storm water drains from urban areas, it picks up nutrients and pollutants such as nitrogen, phosphorus, oil, grease, heavy metals, and trash. These pollutants impair water quality and degrade the riparian systems that many plant and animal species depend on for survival. LID practices remove pollutants from storm water naturally and restore a site's pre-development hydrology. The alternative practices discussed later can recharge local groundwater tables, reduce domestic water use for lawns and vegetation, and provide habitat for a variety of species.

Storm Water Management Techniques

This section briefly discusses the different conventional and alternative storm water management techniques available to site designers, briefly highlighting the environmental and economic benefits that each can offer. It is important to keep in mind that regional differences in land characteristics, climatologic conditions, soils, and local ordinances will dictate the availability, type, and effectiveness of options for a given site. Regardless of the practices and technologies ultimately chosen, developers should ensure that they are consistent with the goals of regional storm water management plans. Table 7 lists objectives for alternative storm water management techniques.

LID Practices can Reduce Development Costs by:

Reducing the use of roadways, curbs and gutters, and sidewalks
Decreasing the use of traditional storm sewer appurtenances
Eliminating the use of or downsizing storm water ponds

Finally, designers should remember that an integrated site storm water management system can use several combinations of conventional and alternative techniques to meet site environmental and watershed objectives. Given that each development site has its own characteristics and constraints, the value of a thorough site analysis and conceptual design phase should not be underestimated. While the complete decentralization of storm water operations is the

Decentralizing Storm Water Management Involves:

Reducing storm water quantities
Disconnecting hydrologic elements, such as downspouts and storm drains
Treating storm water at its source by using alternative techniques

most desirable option for cost savings and environmental benefits, designers may still wish to rely on conventional systems such as wetlands or ponds to promote aesthetic or recreational opportunities.

Objective 1 Reduce the amount of impervious surfaces on the development site. Objective 2 Manage storm water at the source instead of at centralized collection points. Objective 3: Use “chains” of natural treatment systems to reduce storm water quantities and pollutant loadings.

TABLE 7. STORM WATER MANAGEMENT OBJECTIVES

2.2 CONVENTIONAL APPROACHES TO STORM WATER MANAGEMENT

Conventional storm water management systems rely on collection and conveyance systems to remove water safely from developed areas and to protect life, property, and health. The systems are engineered and designed according to estimates of post-development storm water flows and volumes from pervious and impervious areas.

Conveyance Systems

Conveyance systems comprise curbs and gutters, inlet and outlet structures, and buried concrete (or other) piping systems that move water from source areas to centralized control areas. Costs for installing a conventional drainage system extend to material, labor, planning, and design costs. Research has indicated that the cost of a conventional conveyance system typically ranges between $40 and $50 per linear foot (MNCBIA, 2001). Assuming $45 per linear foot as an average, the elimination of one mile of curb and gutter can decrease infrastructure and storm conveyance costs by approximately $230,000.

Collection Systems

Collection systems consist of wet and dry ponds that retain and detain storm flows until they can be safely discharged into local receiving waters. While these systems have functioned well, other strategies for managing storm water that use ecological approaches are gaining popularity. Moreover, traditional ponds are increasingly seen as expensive to design, construct, and maintain. In one residential community in Prince George’s County, Maryland, one developer (and, ultimately, residents) saved nearly $300,000 when the use of individual-lot bioretention practices alleviated the need for a pond. Table 8 provides a summary of some of the current pond types used in residential developments.

It is estimated that storm water ponds in new, suburban developments consume approximately 10 percent of a project’s developed land area (England et al, 2000). The elimination of ponds, however, can permit the preservation of additional land as permanent open space or allow for the platting of additional lots. In the example from Prince George’s County, the developer was able to recover six lots that would have been lost to the area required for the storm water pond. Beyond the environmental benefits,

studies have indicated that residents are willing to pay premiums for the enjoyment of living next to permanent water bodies, even storm water ponds. At one condominium community in Virginia, the developer was able to receive premiums of up to $10,000 for waterfront lots (Friends of the Rappahannock, 2000).

Type of Pond	Cost	Advantages	Disadvantages
Dry Retention	Approximately $25,000 per acre of pond. Maintenance costs $100 to $500 per mowed acre.	High pollutant removal efficiencies. Groundwater recharge.	Proper design and construction critical to success. Periodic maintenance costs can be high.
Wet Detention	Approximately $90,000 per acre of pond. Maintenance costs variable.	Proper design can increase community and property values.	Large land areas needed to accommodate pond. Nitrogen and phosphorus removal capacities limited.
Wet Detention with Filtration	$100,000 per acre of pond. Maintenance costs variable.	Underdrain pipes with sand filters offer good removal of suspended solids and attached pollutants.	Significant maintenance required. Poor nitrogen and phosphorus removal.

Source: England et al, 2000.

TABLE 8. TYPES OF PONDS CURRENTLY USED IN RESIDENTIAL DEVELOPMENTS

2.3 ALTERNATIVES TO CONVENTIONAL SYSTEMS

Hydrologic alternatives to conventional storm water management systems can result in economic and environmental savings. Instead of piping the water to a central location, these alternatives try to treat the water at its source by infiltrating it into the ground. Some of the alternatives discussed include infiltration systems, filtering systems, alternate conveyance systems, and a few non-structural practices. Often used in support of site design principles that advocate the reduction of impervious surfaces, alternatives aim to mimic natural hydrologic cycles characteristic of forests and woodlands. In fact, hydrologic alternatives help decentralize storm water treatment thereby eliminating the need for expensive conveyance and collection systems such as pipes and ponds (see Table 9).

Hydrologic alternatives to conventional storm water management treat storm water at its source with small, cost-effective cells that use a combination of engineered soils and vegetation to evaporate, transpire, and percolate the storm water. Though significantly less costly to design, install, and maintain than conventional systems, the alternatives are also effective in filtering urban pollutants, recharging groundwater, and maintaining pre-development flows.

Description	Storm water Management Pond/Curb and Gutter Design	Bioretention System
Engineering Redesign	$0	$110,000
Land Reclamation (6 lots x $40,000 net)	$0	($240,000)
Total Costs	$2,457,843	$1,541,461
Total Costs--Land Reclamation *plus* Redesign Costs	$2,457,843	$1,671,461
Total Cost Savings = $916,382		
Cost Savings per Lot = $4,604		

Source: Derek Winogradoff, 2003.

TABLE 9. COST COMPARISON: CLOSED (CONVENTIONAL) SYSTEM VERSUS BIORETENTION

2.3.1 INFILTRATION SYSTEMS

Infiltration systems encourage the downward movement of water into the underlying soil to reduce the total quantity of overland runoff and pollutants from impervious surfaces. The systems discussed include trenches, drainfields, drywells, bioretention systems, and level spreaders. In comparison with conventional conveyance systems, infiltration systems are inexpensive to design and construct. Their use can reduce the amount and size of storm piping, inlet and outlet structures, and pond systems. However, as is the case with any LID technology, infiltration systems must be carefully engineered to the site's conditions. Table 10 provides a partial list of pollutant removal effectiveness. It is important to keep in mind that these systems are designed primarily for water infiltration and not necessarily for pollutant removal. For vegetated swales and filter/buffer strips there are situations where those systems are not always effective in removing pollutants, and can in fact increase the levels of phosphorus. In fact, a study conducted for the National Association of Home Builders (NAHB) indicates that those system's pollutant removal efficiencies are highly variable (NAHB, 2002b). Thus, building professionals should look at the site's climatic, soil, and other conditions to determine if a certain technology is right for the application.

> "First flush" pollutants are higher-concentration pollutant loadings that initially run off impervious areas. As the duration of the rainfall event increases, pollutant loadings usually decrease as compared to the "first flush" levels.

Infiltration Trenches

Infiltration trenches are excavated trenches that are backfilled with an aggregate material to permit the filtration and percolation of water into subsoils. Storm water from impervious areas, including rooftops, parking areas, and driveways, is routed into the trenches for treatment (see Figure 2). Infiltration trenches are usually most effective at treating "first-flush" pollutant loadings in storm water and are extremely effective in recharging groundwater tables that contribute to stream baseflows. It is estimated that the trenches can remove between 80 and 100 percent of total suspended solids, zinc, and lead

from storm water as well as between 40 and 60 percent of total phosphorus and nitrogen. (Prince George's County, 2001). In areas with high concentrations of pollutants such as sediment, oil, grease, or grit, pretreatment mechanisms such as grassed filter strips should be installed upstream of the system to filter such pollutants before they enter the trench. This linked system concept is considered a "treatment train" approach to storm water management.

System	Total Suspended Solids (TSS)	Total Phosphorus (P)	Total Nitrogen (N)	Zinc	Lead
Bioretention	-	81	43	99	99
Dry Well	80–100	40–60	40–60	80–100	80–100
Infiltration Trench	80–-100	40–60	40–60	80–100	80–100
Filter/Buffer Strip	20–100	0–60	0–60	20–200	20–200
Vegetated Swale	30-65	10–25	0–15	20–50	20–50
Infiltration Swale	90	65	50	80–90	80–90
Wet Swale	80	20	40	40–70	40-70
Rain Barrel	NA	NA	NA	NA	NA
Cistern	NA	NA	NA	NA	NA

Source: Prince George's County Bioretention Manual, 2001.

TABLE 10. REPORTED POLLUTANT REMOVAL EFFICIENCY OF BEST MANAGEMENT PRACTICE (BMP)

Infiltration Drainfields

An infiltration drainfield is generally the same as an infiltration trench except that it functions in a manner similar to a drainfield for a septic system. It consists of a pretreatment structure , a perforated manifold-type arrangement of drain lines, and a permeable drainfield. The drainfield itself consists of layers of topsoil, aggregate stone, sand, and filter fabric. An observation well is usually located in one corner of the system to permit the monitoring of flows. Infiltration drainfields are extremely effective in maintaining hydrologic functions such as infiltration and groundwater recharge and in improving water and stream quality by filtering pollutants and attenuating runoff volumes.

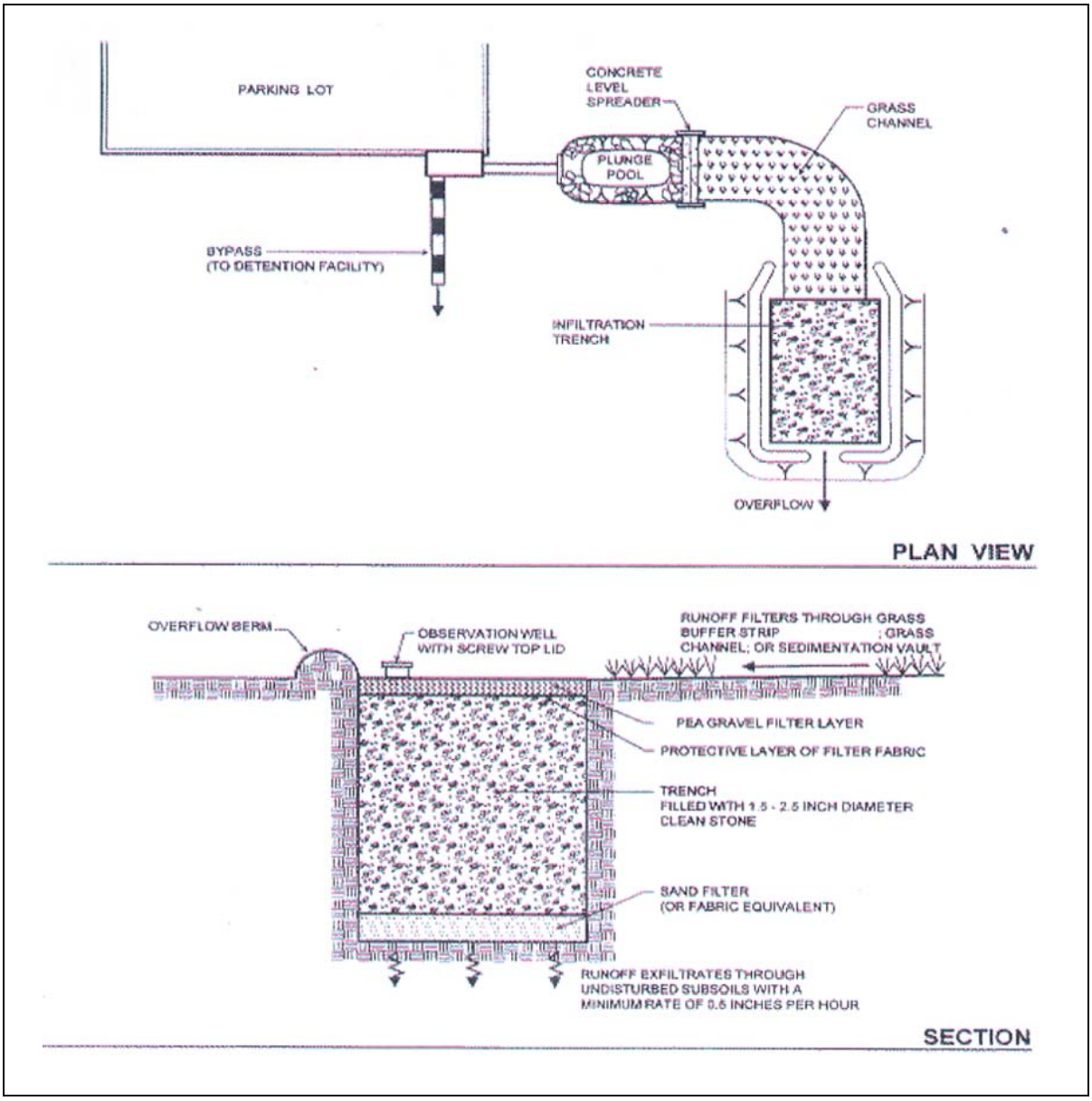

FIGURE 2. INFILTRATION TRENCH

Dry Wells

In residential communities, rooftops account for a significant source of runoff from impervious surfaces. Dry wells, sometimes referred to as "French drains," are usually sited near downspouts to manage rooftop runoff by infiltrating it into the ground (see Figure 3). Dry wells are excavated pits filled with aggregate stone to hold water until it can infiltrate into the ground. Similar to infiltration trenches, dry wells should be designed with emergency overflow structures that drain to public storm water conveyances to accommodate runoff from major storms. The drainage pathways should be well maintained and stabilized to prevent erosion.

Dry wells are extremely effective in removing sediment, zinc, and lead from storm water and mildly effective in reducing quantities of nitrogen and phosphorus. During construction, developers should take care to avoid excessive compaction of soils around the trenches and the accumulation of silt around the drainfield. Depending on the type of pollutants filtered, drainfields need to be maintained regularly for optimum performance.

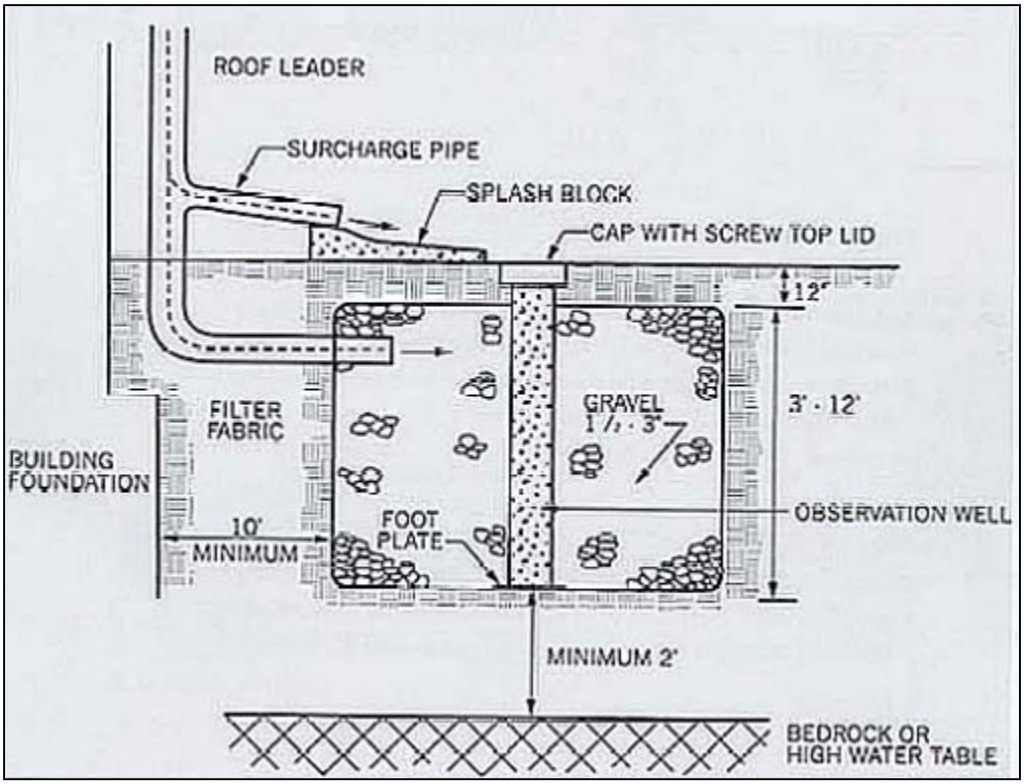

FIGURE 3. DRY WELL

Bioretention

Bioretention is possibly one of the most recognized alternative storm water management practices. Used in residential, commercial, and certain industrial settings, bioretention has the potential to offer developers significant cost savings and environmental benefits over conventional storm water management systems. Bioretention areas are shallow, topographic depressions filled with engineered soils and vegetation that retain, treat, and infiltrate water. Figure 4 depicts a typical bioretention area.

Bioretention systems are designed for the temporary storage of rainwater. They successfully remove pollutants through increased contact time with soils and plant materials. As compared with conventional storm water management systems, bioretention areas more closely mimic the natural hydrologic cycle, allowing soils and plants to filter pollutants from storm water and permitting the processes of infiltration, evaporation, and transpiration to occur. The systems can also create wildlife habitat, minimize erosion, and recharge local groundwater supplies.

In parking lots, storm water should be conveyed directly to the bioretention area through a system of grassed swales. For residential applications, treatment areas are generally located some distance away from houses to increase flow paths and treat runoff from rooftops and driveways. In either case, bioretention systems route storm water to bioretention areas that are designed to accumulate water to depths not exceeding six to12 inches. In the event that storm water volumes exceed treatment capacities, bioretention areas are usually equipped with overflow drop inlets routed to municipal storm water systems. In certain industrial and commercial areas, pollutant loadings may be too concentrated for the successful use of bioretention areas. In such areas, termed "hotspots," the use of structural practices to infiltrate storm water may be deleterious to groundwater supplies. In these instances, designers are advised to use alternative practices, such as exfiltration trenches, to convey filtered water into a conventional storm water management system for proper treatment.

On average, bioretention costs approximately $3 to $4 per square foot of size, depending on the quantity of water to be treated and excavation costs. Plant materials are approximately $6.40 per cubic foot of storm water treated.

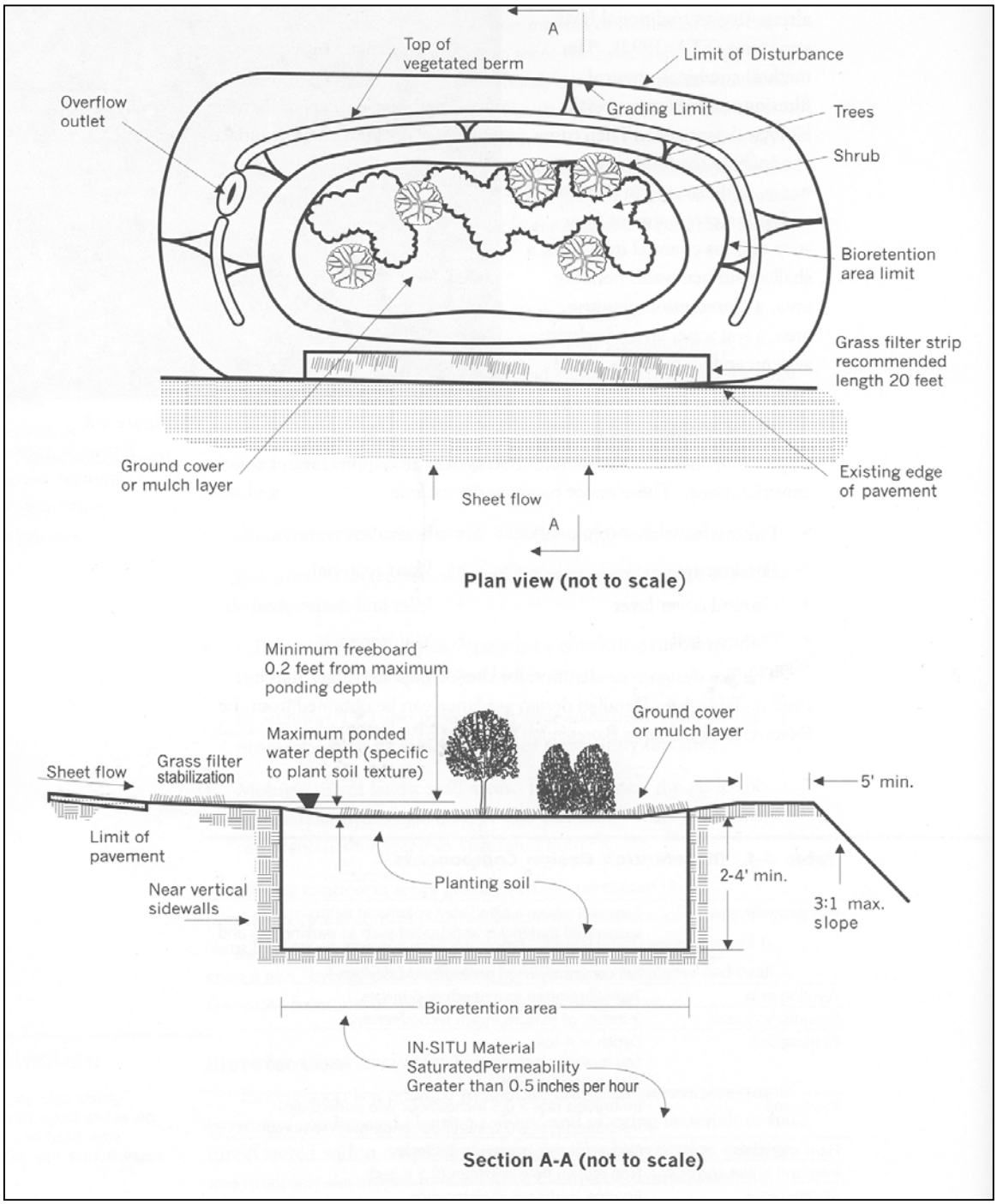

Source: Prince George's County Bioretention Manual, 2001.

FIGURE 4. TYPICAL BIORETENTION AREA

Level Spreaders

Level spreaders are mechanisms that convert concentrated runoff into sheetflow and slow the erosive velocities of storm water. Constructed by excavating a wide, shallow trench and filling it with crushed stone, a level spreader must be built with its lower edge

completely flat to ensure the even disbursement of water. Level spreaders are most effective in helping to convey sheetflow to bioretention areas. While not typically viewed as treatment mechanisms, level spreaders can help increase detention storage and time of concentrations and thus assist with pollutant and sediment removal functions. They should be used as part of an integrated, decentralized storm water management system.

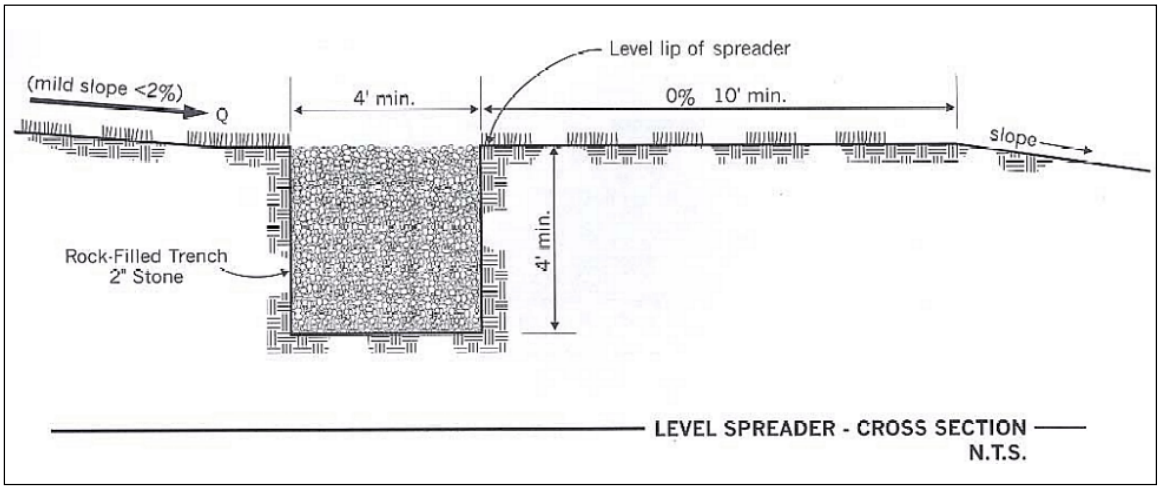

FIGURE 5. LEVEL SPREADER

2.3.2 FILTERING SYSTEMS

Filtering systems use soils and vegetation to remove pollutants from storm water. They function mainly as pre-treatment devices to remove sediment before water enters infiltration devices such as bioretention areas.

Filter Strips

Filter strips are low-grade vegetated areas that permit sediment deposition during sheetflow (see Figure 6). Usually used as one component of a storm water management system, filter strips are considered pre-treatment devices, meaning that water is routed through them before entering systems such as bioretention areas. For the systems to be fully effective, slopes should be minimal (0 to 2 percent), with channelized flows eliminated. Pollutant removal efficiency depends largely on the quantity of water treated, flow path and length, type of vegetation, and the soil infiltration rate. Depending on the amount and type of vegetation planted and the need for replacement or amendment of soils, filter strips can be inexpensive to construct and maintain.

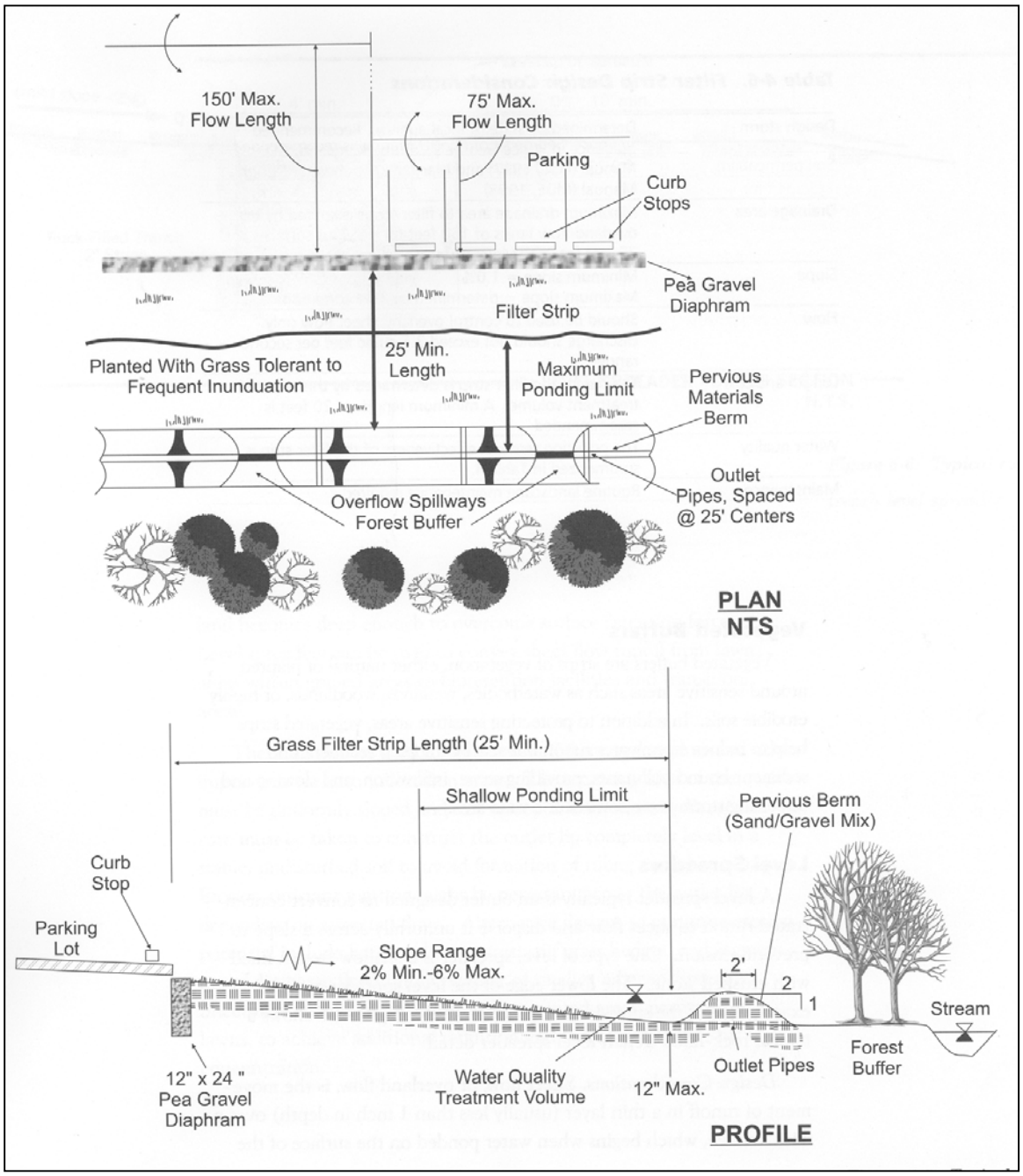

Source: Prince George's County Bioretention Manual, 2001.

FIGURE 6. TYPICAL GRASS FILTER STRIP

Exfiltration Trench/Dry Swale

Exfiltration trenches function in a manner similar to infiltration trenches except for an underdrain system built into the bottom of the trench (see Figure 7). After water has percolated through the soil media and pollutants have been removed, the water enters perforated drain tile and is conveyed to a local storm water drain system.

Exfiltration trenches are low-cost, low-maintenance systems that are highly effective in removing pollutants, especially sediment, from storm water. The perforated underdrain in the system protects groundwater supplies from contamination in areas with high pollutant loadings. These areas, usually termed “storm water hotspots,” are usually located in industrial or commercial areas dominated by vehicular traffic.

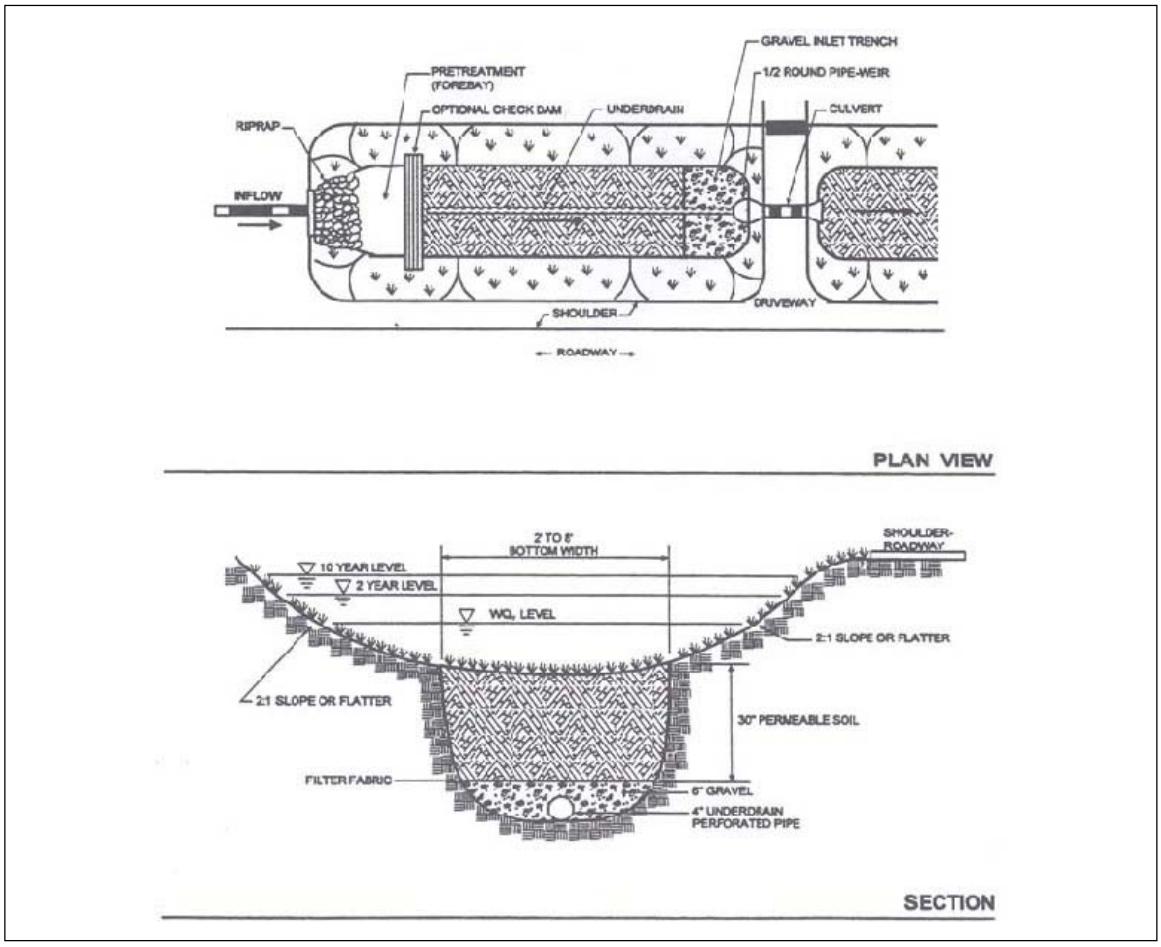

FIGURE 7. EXFILTRATION TRENCH/DRY SWALES

Wetlands

Constructed wetlands systems use soils, vegetation, and hydrology to remove pollutants from storm water. The systems are effective in attenuating flood flows, reducing pollutant loadings, and providing wildlife habitat (see Figure 8). From a community design standpoint, wetlands systems can create open space, offer improved aesthetics over traditional treatment systems, and provide recreational and educational opportunities.

Most natural and artificial wetlands systems are regulated by the Clean Water Act and fall under the jurisdictional authority of the U.S. Army Corps of Engineers (Corps). A recent U.S. Supreme Court decision concerning isolated wetlands has limited the jurisdiction of the Corps to navigable waters, their tributaries, and wetlands adjacent to these navigable waters and their tributaries.

Similar to their natural counterparts, constructed wetlands types can vary from seasonally inundated to year-round, open-water systems. To optimize pollutant removal capacities, design engineers usually aim to maximize flow paths through wetlands systems to prolong exposure to soils and vegetation, thereby facilitating nutrient and pollutant uptake, retention, and settling. Given the delicate hydrologic balance of wetlands systems, unmanaged storm water should never be discharged into jurisdictional wetlands, or wetlands under the direct control of the Corps. Therefore, constructed wetlands should be designed with water quality and quantity pre-treatment mechanisms, such as sediment forebays or gabion walls, which attenuate storm flows and protect sensitive wetlands vegetation.

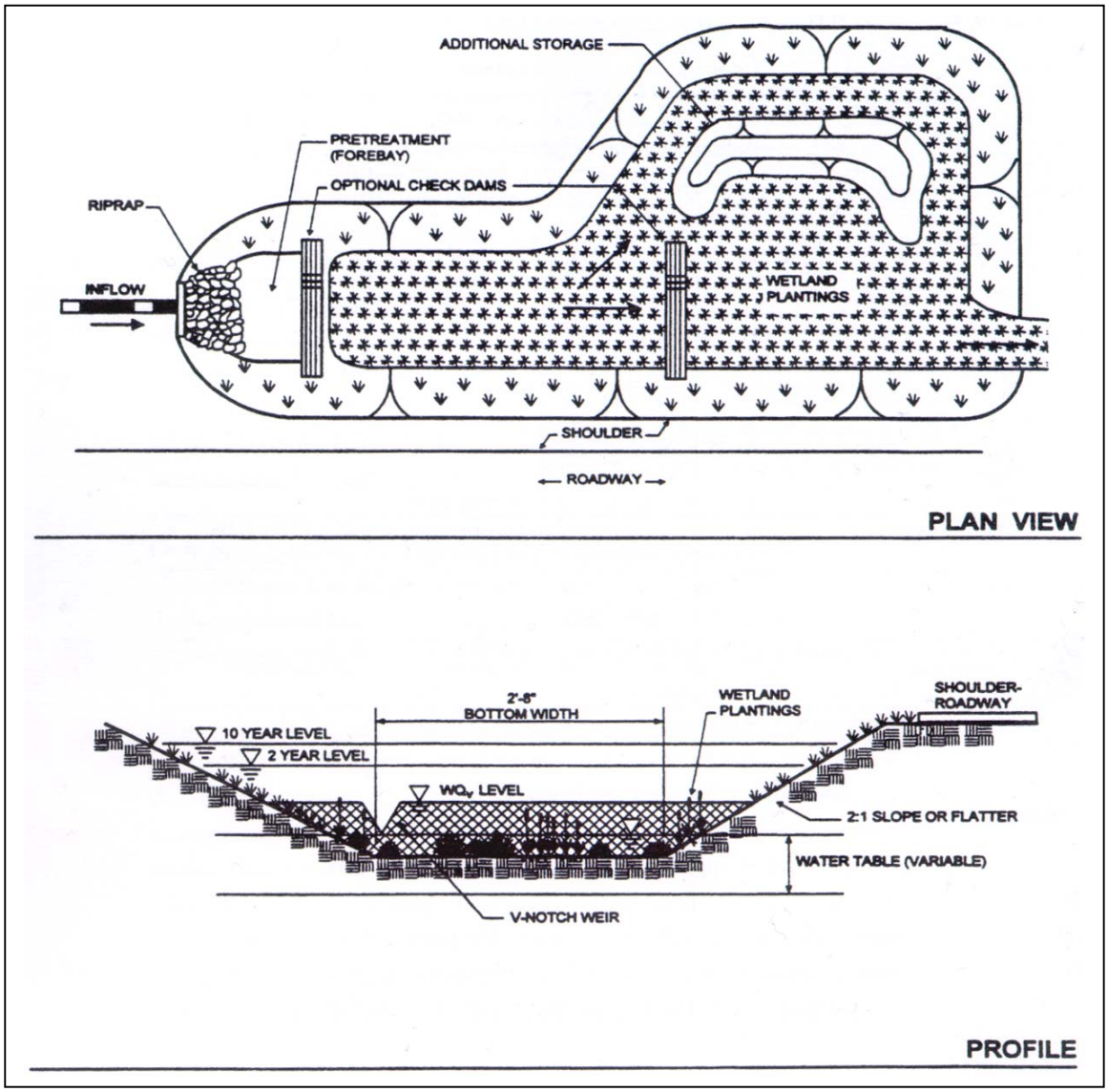

FIGURE 8. STORM WATER WETLANDS

As compared with other alternative systems, construction costs for wetlands systems may be high. The cost of a constructed storm water wetlands can exceed $300,000 per acre (JSPPOH, 2001), although shallow groundwater levels, shallow depth to bedrock, and

sloping topography can drive up construction costs further. In instances where the depth to groundwater is shallow, a clay liner should be used to prevent contamination of local aquifers. The quality and quantity of imported soils and plant material are also a factor when considering the total cost of built systems. However, while construction costs may be higher for constructed wetlands than for other BMP systems, operation and maintenance costs may be relatively low.

2.3.3 CONVEYANCE SYSTEMS

Alternate conveyance systems, such as vegetated channels and grassed swales, carry water to areas for treatment. Unlike conventional conveyance systems, such as curbs and gutters, these systems slow the erosive velocity of storm water, increase time of concentrating, and filter pollutants such as sediment.

Vegetated Channels/Grassed Swales

> Curb and gutter can cost upwards of $12.50 per linear foot.
>
> *Source: Friends of the Rappahannock Study, 2000.*

Vegetated channel systems and grassed swales are low-cost alternatives for conveying water away from streets, downspouts, and structures. They are low-cost alternatives to conventional conveyance systems, such as curbs or concrete channels. These alternatives reduce storm water velocities and allow sediment and pollutants contained within storm water to be filtered.

In residential settings, swales are an effective way to convey water to bioretention areas sited a short distance away from structures and foundations. When used in conjunction with bioretention areas, swales function as pre-treatment mechanisms that filter sediments from storm water. For health, safety, and maintenance reasons, minimum longitudinal slopes on swales should be 1 percent to avoid stagnation of water and to ensure proper drainage.

Wet swale systems are variants of dry swales and function similarly to a wetlands system. Slightly more expensive to construct than a vegetated channel or dry swale, wet swales are designed with a permanent pool structure and planted with wetlands vegetation for pollutant treatment. Due to health and safety concerns over potential mosquito breeding, wet swales have limited applicability in residential or commercial settings.

2.3.4 OTHER SYSTEMS

Rain Barrels

Rain barrels are low-cost retention devices placed below roof downspouts to collect water during storms (see Figure 9). Although rain barrels offer no primary pollutant removal benefits during collection times, they act as quantity controls and can help reduce the cumulative effects of storm water on downstream systems. As an example, one 42-gallon rain barrel can provide storage for 0.5 inch of runoff from a rooftop measuring 133 square feet (Prince George's County, 2001).

> One inch of rain on a 1,000-square-foot roof yields approximately 623 gallons of water.

During dry periods, water from the barrels can be used to irrigate lawns and vegetation. Rain barrels should be equipped with some type of overflow device that routes overflow to a bioretention area for treatment during major storms. Rain barrels can be purchased online from a variety of municipal natural resources departments and environmental organizations. They are available in a variety of colors and sizes to match architectural styles.

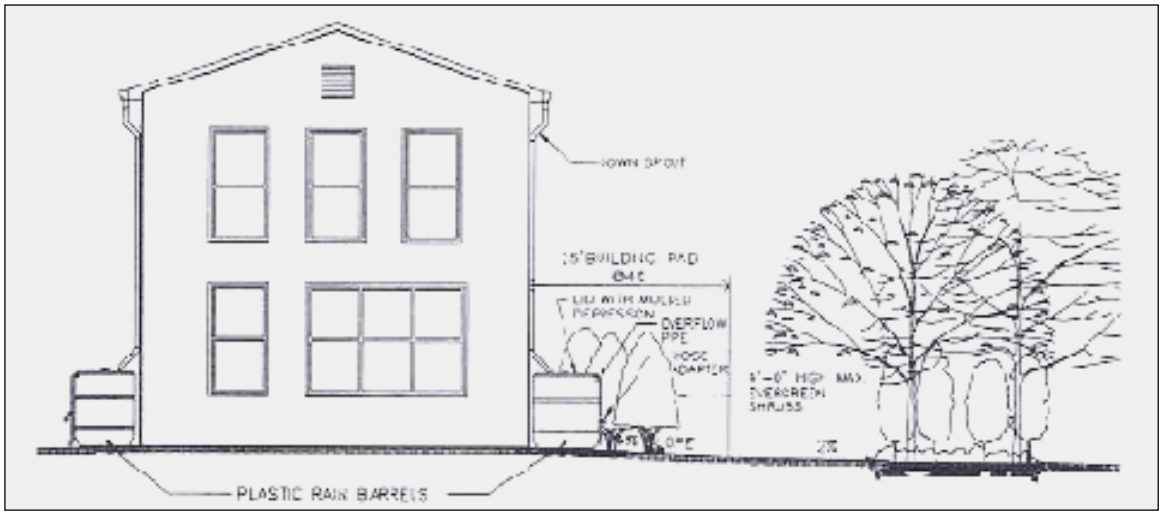

FIGURE 9. RAIN BARRELS

Cisterns

Cisterns are premolded plastic storage devices that are usually sited underground in proximity to rooftop downspouts. They function in a manner similar to rain barrels but offer storage capacities from 100 to 1,400 gallons. Water from cisterns is stored and released during dry periods, promoting water conservation for lawn and garden irrigation.

2.4 ADDITIONAL RESOURCES

Additional resources that provide detail on individual storm water management topics are listed below. The resources are not provided as endorsements, merely as educational and reference tools. Given regional variations in climate and land development needs, we have tried to include region- specific resources. It is important to note, however, that addresses, especially Internet links, are subject to change. This list contains the latest links and addresses as of the date of this publication.

Storm Water Management Manuals and Best Management Practices

City of Alexandria, Virginia
http://ci.alexandria.va.us/solidwaste/stormwater.html
Information on Virginia storm water ordinances and directions on acquiring publications such as *The Alexandria Supplement to the Northern Virginia BMP Handbook* and *The Virginia Storm Water Management Manual*.

City of Austin, Texas
http://www.ci.austin.tx.us/watercon/default.htm
Details of the city of Austin's Water Conservation Program as well as information about the city's rain barrel program (follow links to Single-family, Multi-family, and Commercial).

Friends of Bassett Creek, Minnesota
http://www.mninter.net/~stack/bassett/gardens.html
A comprehensive guide to the creation of rain gardens for runoff management, habitat creation, and aesthetic value is provided with design and construction information and recommendations on plant material.

F.X. Browne, Inc.
http://www.fxbrowne.com/html/gs-facts/gs_primers.htm
A fact sheet entitled *Bioretention Systems for Storm Water Management* is available for downloading at the homepage of the F.X. Browne environmental consulting firm.

National Association of Home Builders
http://www.toolbase.org/tertiaryT.asp?TrackID=&CategoryID=1438&DocumentID=2007
An online report from the association's Technology Inventory entitled *Bioretention Sites for Storm Water Management* includes installation details, a short benefit/cost analysis, and a short list of bioretention links.

Pennsylvania Association of Conservation Districts
http://www.pacd.org/products/bmp/bioretention.htm
A Web site devoted to providing information on the bioretention BMPs for storm water pollution prevention.

Prince George's County, Maryland
http://www.epa.gov/nps/lid/index.html
The Prince George's County Maryland Department of Environmental Resources Programs and Planning Division (PGDER) created two publications with assistance from the U.S. Environmental Protection Agency (EPA): 1) *Low-Impact Development Design Strategies An Integrated Design Approach* (EPA 841-B-00-003), and 2) *Low-Impact Development Hydrologic Analysis* (EPA 841-B-00-002).

State of Maryland Department of Environment
http://www.mde.state.md.us/environment/wma/stormwatermanual/
This link provides updates on Maryland's Storm Water Management Program, including information on obtaining copies of *The 2000 Maryland Storm Water Design Manual (Vols. I & II).*

State of Massachusetts Bureau of Resource Protection
http://www.state.ma.us/dep/brp/ww/wwpubs.htm#storm
Downloadable versions of *Massachusetts Storm Water Policy Handbook*, *Storm Water Technical Handbook*, and *Storm water Management Policy*.

Storm Water Center
http://www.stormwatercenter.net/Assorted%20Fact%20Sheets/Tool6_Storm

water_Practices/Filtering%20Practice/Bioretention.htm
A comprehensive document entitled *Storm Water Management Fact Sheet: Bioretention* provides detailed information on bioretention practices, including applicability, design considerations, and benefit/cost analysis.

Texas Natural Resources Conservation Service
http://www.txnpsbook.org
Texas Nonpoint Sourcebook, a site designed to provide storm water management information to public works professionals and other interested parties both in Texas and elsewhere, provides information ranging from basic to technical.

University of Washington Center for Urban Water Resources Management
http://depts.washington.edu/cuwrm/
A downloadable version of a publication from a research project investigating the use of permeable pavement entitled *The University of Washington Permeable Pavement Demonstration Project--Background and First-Year Results* is available under the Land Cover and Imperviousness section of the research link at the center's homepage.

U.S. Environmental Protection Agency
http://www.epa.gov/owm/mtbfact.htm
The Office of Wastewater Management in the Office of Water provides downloadable fact sheets on BMPs for urban storm water management, including bioretention, porous pavement, wet detention ponds, and more.

Washington State Department of Ecology
http://www.ecy.wa.gov/biblio/9911.html
The *Storm Water Management Manual for Western Washington* describes the storm water management standard for all new development and redevelopment projects in the Puget Sound area.

Organizations and Internet Resources

American Forests
http://www.americanforests.org/
The American Forests home page includes news, links, publications, and information on the use of trees to protect the environment. Included in the site is a link to the Trees, Cities and Sprawl section, which contains information and resources on urban forestry and resource protection.

American Society of Civil Engineers
http://www.bmpdatabase.org
The society and the U.S. Environmental Protection Agency provide an online, searchable database of over 90 studies evaluating the effectiveness of various storm water BMPs for surface water quality protection.

Center for Watershed Protection's Storm Water Center
http://www.stormwatercenter.net/
The Storm Water Center offers resources to assist decision makers and the public on storm water management issues. Resources include publications and manuals, slide shows, ordinance information, monitoring and assessment methods, and BMP fact sheets.

One publication, *Better Site Design: A Handbook for Changing Development Rules in Your Community*, could prove useful to municipal officials interested in revising their zoning ordinances.

Friends of the Rappahannock
http://for.communitypoint.org/pages/LID.htm
Friends of the Rappahannock, a nonprofit organization, highlights five existing commercial projects in the Fredericksburg, Virginia, area that were redesigned on paper to incorporate LID practices.

Low Impact Development Center, Inc.
http://www.lowimpactdevelopment.org
The Low Impact Development Center is a nonprofit water resources research group with a mission of conducting research and training on low impact development and sustainable storm water management. Publications, pictures, and other resources are available on the site.

Pennsylvania Housing Research/Resource Center
http://www.engr.psu.edu/phrc
Part of the Resource Center's work is in conducting research related to "smart growth" and sustainable site design. A workshop conducted March 2003 by Scott Brown entitled, "Understanding Management Practices for Post Construction Storm Water Control" provided information on the impact of development on runoff response.

Urban Land Institute
http://www.uli.org
The home page of the Urban Land Institute, an organization committed to providing responsible leadership in the use of land toward enhancing the environment, offers design resources for housing, retail, office, and transportation development.

U.S. Department of the Navy, Environmental Department
http://www.nfesc.navy.mil
A list of links to the Navy's pollution prevention program includes information about equipment, implementation, and planning. Also included is the Joint Service Pollution Prevention Library, a searchable database of prevention documents.

U.S. Environmental Protection Agency
http://www.epa.gov/OW/index.html
The Office of Water provides an immense amount of information on the protection and conservation of our nation's water resources.

Regional-Specific Resources

Northeastern United States

Cornell Cooperative Extension of Onondaga County
http://www.cce.cornell.edu/onondaga/fingerlakeslan/default.htm
The Web site presents information and design suggestions for landscaping property in a manner that reduces the risk of pollution to surface waters. The information is oriented to the Finger Lakes, New York region but is applicable to many other areas.

Minnesota Pollution Control Agency
http://www.mnerosion.org/tools.html
A comprehensive manual available online entitled *Protecting Water Quality in Urban Areas* highlights technical information about BMPs for protecting lakes, streams, and groundwater from storm water-related pollution.

New York State Department of Environmental Conservation
http://www.dec.state.ny.us/website/dow/swmanual/swmanual.html
The *New York State Storm Water Management Design Manual* provides designers with a general overview on how to size, design, select, and locate storm water management practices at a development site in compliance with state storm water performance standards.

Southeastern United States

Mississippi State University Agricultural and Biological Engineering Department
http://abe.msstate.edu/csd/NRCS-BMPs/pdf/water/quality/bioretentsys.pdf
A downloadable, two-page fact sheet providing descriptions and diagrams of a shallow-depression bioretention system.

Northern Virginia Regional Commission
http://www.novaregion.org/es_pubs.htm
A list of publications for purchase and downloading, including documents on BMPs such as *The Northern Virginia BMP Handbook* and *Nonstructural Urban BMP Handboo*k and publications on Virginia's watersheds.

NRDC's Storm Water Strategies: Strategies in the Southeast
http://www.main.nc.us/riverlink/content/07chap/chap07.htm
Case studies for addressing storm water management techniques in new development and redevelopment.

Western United States

Built Green Colorado
http://www.builtgreen.org/sites/green.htm
The Built Green Colorado Web page with links to many green building resources. Built Green Colorado is a public/private partnership created to encourage home builders to use technologies, products, and practices that enhance energy efficiency, reduce pollution, provide healthier indoor air, reduce water usage, preserve natural resources, improve durability, and reduce maintenance.

Caltrans Storm Water Management Program
http://www.dot.ca.gov/hq/env/stormwater/index.htm
Information on current monitoring studies, publications, conferences, and links are presented in the context of California's Storm Water Management Program. The site is oriented to reducing the impact of California roadways on aquatic resources.

City of Seattle
http://www.ci.seattle.wa.us/util/surfacewater/bmp/default.htm
Information on simple and effective BMPs for homeowners and businesses provided by

Seattle Public Utilities. The information includes everyday tips for protecting surface water.

U.S. Environmental Protection Agency Region 10
http://www.epa.gov/region10
The Region 10 home page provides general information on the region's resources as well as links to its programs. This site also includes regularly updated information on environmental issues in the local news.

Utah Association of Conservation Districts
http://www.ci.north-logan.ut.us/Information/Low%20Impact%20Report/Low%20Impact%20Report.html
The community of North Logan developed LID roadway design standards. The site includes documentation of the process, exhibits, standards, and specifications.

Southwestern United States

Arizona Department of Water Resources
http://www.adwr.state.az.us/
A variety of information on all aspects of water resources for the state of Arizona.

Pima County Department of Environmental Quality
http://www.deq.co.pima.az.us/water/storm.htm

Provides information on Tucson and the surrounding area's storm water management program and components.

Pima County Flood Control District
http://www.dot.co.pima.az.us/flood/wh/index.html
Methods for collecting, storing, and distributing rainwater to reduce residential runoff loads as well as information on harvesting system maintenance.

SECTION 3: WASTEWATER TREATMENT

Properly designed, installed, and maintained on-site wastewater treatment systems can cost effectively treat wastewater and protect the watershed from pollutant overloads.

3.1 INTRODUCTION

Section 2 addressed storm water management issues and explained how rainwater could be used as an asset instead of viewed as a liability in new developments. As we mentioned in Part I, we have expanded LID to include wastewater management. We now turn to the methods and systems that developers can use for effectively treating wastewater generated at residential sites.

It is becoming increasingly popular to protect the nation's surface water and groundwater and prevent further stress from a variety of pollution sources. Approximately 300,000 miles of rivers and shorelines and approximately 5 million acres of lakes are polluted by harmful microorganisms, sediment, and excess nutrients. (http://www.epa.gov/owow/tmdl/overviewfs.html). Wastewater can contain nutrients (e.g., nitrogen, phosphorus), pathogens (e.g., disease organisms), and chemicals (e.g., ammonia, medical byproducts). Thus, developers must ensure that equipment and management methods effectively treat wastewater before it is released into the environment.

Table 11 lists current conventional wastewater management practices and technologies and the alternative systems discussed in this chapter. The 1993 *HUD Proposed Model Land Development Standards and Accompanying Model State Enabling Legislation* publication addressed some of the conventional technologies, which are briefly noted below. To put current technology use into perspective, Figure 10 shows that a vast majority of homes in the United States rely on municipal sewer systems.

Wastewater Management Options Discussed in Chapter	
Conventional	Alternative
Municipal Sewer Single Septic Community Septic Combined On-Site Systems and Sewer Storage and Removal	Aerobic Sand Filters Mound Trickling Filter Evapotranspiration Low-Pressure Pipe

TABLE 11. WASTEWATER MANAGEMENT OPTIONS

Although only 23 percent of homes in the United States are on individual septic systems, such systems can be a significant source of water pollution. Moreover, the average age of a home with a septic system exceeds 30 years. Further, of those homes on septic systems, an estimated 403,000 experienced system breakdowns in a three-month period in 1997 (Bureau of the Census, 1999).

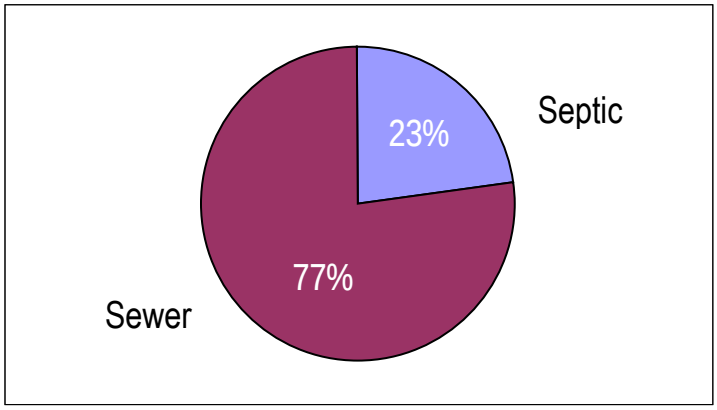

FIGURE 10. HOW HOMES HANDLE WASTEWATER

The management of residential wastewater is a process fraught with technological and regulatory issues. For instance, some communities limit the use of traditional septic systems because improperly maintained systems can release untreated effluent into the soils; in other instances, communities have experienced a number of system malfunctions. Effluent contains excess nutrients and harmful organisms that can adversely affect water quality. Regulatory officials respond to the need to protect our water by adopting progressively stringent wastewater treatment regulations. More specifically, in some cases, communities turn to rigorous regulation of conventional systems as a means of curtailing development, yet they fail to recognize that water quality issues can be addressed by using alternative wastewater management systems.

It is important to keep in mind that septic systems are still used effectively and approved throughout the country. However, in response to the problems noted above, private industry continues to develop alternative systems designed to overcome some of the issues that can plague the performance of conventional septic systems.

This chapter briefly describes the environmental, cost, and regulatory issues associated with wastewater treatment. It then explains how conventional residential developments deal with wastewater management. The last part of the chapter discusses some of the more common alternative means of wastewater management. Table 12 presents the chapter's overall objectives.

Objective 1:
Explain how the use of alternative systems and combinations of systems can reduce on-site infrastructure costs and loadings to municipal sewer systems.
Objective 2:
Demonstrate alternative lot and site layouts to accommodate a variety of system types.
Objective 3:
Show how the use of alternative systems and combinations of systems can reduce pollutant loadings to waterways.

TABLE 12. WASTEWATER MANAGEMENT OBJECTIVES

3.1.1 ENVIRONMENTAL ISSUES

LID is an approach that uses technologies to simultaneously conserve and protect natural resource systems and reduce infrastructure costs. Wastewater can affect natural resources; all wastewater coming from a home must be sent to an effective treatment site or public treatment system in order to limit adverse environmental and health impacts. One of the reasons that public officials prefer to rely on municipal sewer systems for wastewater treatment is that many of the systems are operated by trained technicians who continuously monitor the treatment process to ensure that discharge waters meet local permit or other regulatory requirements.

- Heavy Equipment--Heavy-duty trucks and other equipment passing over a septic system or drainfield may damage the pipes or system parts.
- Clogging--Systems are designed to keep solids, e.g., sludge and scum, out of the final effluent. However, if those elements make it to the drainage field, they can cause premature soil clogging such that the effluent from the septic tank has trouble percolating into the soil and can pond.
- Roots--Tree and bush roots can enter the system. It is essential to keep large plants away from the septic system.
- Improper Sizing/Design--The system must be large enough for the load and installed in suitable soils as well as in as shallow a trench as possible so that it does not interfere with groundwater.
- Improper/Lack of Maintenance--Septic systems need routine maintenance, including tank pumping and cleaning and inspection by a licensed professional. Properly maintaining a tank keeps solids from accumulating and clogging the leach field.

TABLE 13. COMMON REASONS FOR SEPTIC SYSTEM FAILURE

In most cases, wastewater treatment can be handled by one of the four conventional methods noted in Table 11. However, there are exceptions. For instance, in some circumstances, sewer systems cannot be used because of cost considerations; it might be too costly to run pipes long distances to link a proposed development's wastewater system to existing municipal sewer connections. In other cases, a municipality might have specific health or environmental concerns that make the use of septic systems unacceptable.

Nitrogen and phosphorus are two nutrients in wastewater that, either in excess or through cumulative effect, can adversely affect receiving waterbodies. When septic systems fail to operate as designed, excess nutrients in untreated wastewater can enter the environment. Excess nitrogen in streams, lakes, and estuaries stimulates the growth of plants (algae and phytoplankton). Algae in turn consume oxygen, and the decomposition of dense algal blooms leads to anoxia (no oxygen) and hypoxia (low oxygen). Eventually, the aging process of the waterbody is accelerated through a complex chain of events known as eutrophication. Indicators of eutrophic conditions include odors, poor water clarity, stressed marine organisms, and, in severe cases, dead fish.

From a public health point of view, conventional septic system failure is one of the main reasons for increased interest in alternative on-site wastewater treatment systems. Table 13 lists some common causes of septic system failure. Conventional septic system failures potentially can contaminate groundwater and surface water with bacteria harmful

to humans. Further, septic systems with poor nitrogen removal can overload nearby waterways, resulting in algal blooms and adverse impacts on aquatic life.

Numerous communities nationwide are attempting to address general water contamination and, in particular, nitrogen loading. For instance, when studies showed that septic systems were threatening groundwater supplies in the Los Angeles area, the Los Angeles Regional Water Quality Control Board voted in 1999 to prohibit the installation of any new septic systems in Ventura County and required the use of septic systems to cease by January 1, 2008 (California EPA Press Release, August 17, 1999). Studies showed that the prohibition was necessary to safeguard the public health and protect the local water supply; community drinking water is pumped from groundwater beneath the discharge area of the septic systems. As part of its overall water conservation plan, Milford, New Hampshire, prohibits septic system use near waterbodies (http://www.ci.milford.nh.us/conservation/streams.html). The Chesapeake Bay watershed is an area greatly affected by water pollutants. The Chesapeake Bay Program, which is designed to protect the bay, determined that between 55 and 85 percent of the nitrogen entering an on-site wastewater treatment system could be discharged into groundwater (U.S. Environmental Protection Agency, 1993). As noted in a U.S. Environmental Protection Agency (EPA) report, "Hydraulically functioning systems can create health and ecological risks when multiple treatment units are installed at densities that exceed the capacity of local soils to assimilate pollutant loads" (U.S. Environmental Protection Agency, 2002). Thus, the concern over septic systems extends to both the inability of septic systems to remove nitrogen and the increased number of septic tanks installed in any one area.

Phosphorus is another nutrient that, if discharged from septic systems, can lead to eutrophication of nearby waterbodies, although it is considered less of a threat than nitrogen to groundwater and surface contamination via conventional septic systems. Septic systems are generally effective in adequately removing phosphorus; furthermore, soil particles adequately adsorb soluble phosphorus and extract soluble phosphorus compounds from septic tank effluent as it leaches through the soil profile, thus limiting the movement of phosphorus through the soil.

3.1.2 COST ISSUES

Municipal Sewer Connection Fees

In addition to environmental issues, economic factors play a role in the selection of an appropriate wastewater treatment system. To connect a home or community to a municipal sewer system, developers must pay certain fees. A community that operates a municipal sewer system often combines the potable water tap fee with the sewer connection fee. In addition, communities sometimes charge developers impact fees to help offset new homeowner impacts on community resources.

Impact fees are not new; they have existed since enactment of the Standard Planning Enabling Act of 1922. However, both the number and dollar amount of impact and connection fees have risen dramatically since the early 1900s. In some communities, sewer connection fees have risen to help municipalities pay for system operation and maintenance costs and system expansions. Fees can range from $1,500 per house to over $14,000 per house. Fee increases have exacerbated the affordable housing problem

currently plaguing portions of the United States. In a related matter, some communities report that their wastewater treatment facility is at or near capacity, hindering further residential development until facility expansion can accommodate additional growth. In response, HUD's Office of Policy Development and Research created the Regulatory Barriers Clearinghouse to examine how impact fees and other issues affect the creation and maintenance of affordable housing (http://www.huduser.org/rbc/).

Conventional Septic Installation and Maintenance Costs

The cost of installing septic systems depends on system size, treatment capacity, occupancy, and land issues such as the type of on-site soil. For example, in Minnesota, the costs of installing a septic system can range from $2,000 to $7,000. The average cost to pump the tank's sludge ranges from $75 to $150. Pumping the tank at the appropriate frequency is less costly than replacing the system's leach field, which would be needed if solids enter the field from an overloaded septic tank. If a septic system and corresponding leach field need to be replaced in Minnesota, the costs are equal to that of installing a new system - http://www.extension.unm.edu/distribution/naturalresources/components/DD6946c.html.

3.1.3 REGULATORY ISSUES

Currently, most local regulations are prescriptive and limit the introduction and use of alternative on-site wastewater treatment systems (OWTS). Public health officials, however, can facilitate the use of alternative OWTSs by revising the applicable codes.

The use of alternative systems can reduce the capacity strain on an existing wastewater treatment facility. In fact, some local officials may be willing to allow alternative OWTSs on some but not all lots within a parcel. For instance, some lots may have the appropriate soil composition for the use of conventional septic systems while the soils on other lots in the development may not lend themselves to such systems. Thus, a community that needs to increase the capacity of the local wastewater treatment system could allow a mix of alternative and traditional OWTSs on a single site instead of relying exclusively on alternative systems. This is an example of how LID is flexible in its application.

3.1.4 GENERAL PERFORMANCE STANDARDS

In general, wastewater treatment systems take in wastewater, treat it, and release it to the environment. It is difficult, however, for prescriptive codes to specify the full range of technological options appropriate for a given site and anticipate the different sensitivities of the site's water and land resources. Although the topic is beyond the scope of this publication, public officials could use performance codes to address site-specific natural resource needs while meeting health requirements.

In 2002, the National On-Site Wastewater Recycling Association (NOWRA) received a grant to develop draft national on-site performance standards (http://www.nowra.org/model_code.html). The underlying issue and impetus for the project is that local wastewater regulations are usually prescriptive. Although alternative OWTSs have worked elsewhere in the country, local code officials are often reluctant to approve the use of these systems in their jurisdiction when a site does not meet the

prescriptive requirements. The goal of the NOWRA project is to create a set of national OWTS standards that local officials could use for approving the use of innovative systems (Small Flows Quarterly, Winter 2002).

The U.S. EPA states in a March 28, 2003 Federal Register notice regarding Voluntary National Guidelines for Management of On-site and Cluster (Decentralized) Wastewater Treatment Systems, "State agencies report that some of these systems have failed because of inappropriate siting or design or inadequate long-term maintenance. Historically high failure rates in some areas indicate a need for better management of these systems to protect public health and water quality." U.S. EPA has thus developed the Management Guidelines that are designed to enhance system performance through improving the quality of management programs (Federal Register, 2003). You may access this Federal Register notice electronically through the EPA Internet under the Federal Register listings at http://www.epa.gov/fedrgstr/T.

3.2 CONVENTIONAL APPROACHES TO WASTEWATER TREATMENT

Developers typically have four options regarding residential wastewater treatment systems: tying into a municipal or public sewer system, providing homeowners with an on-site septic system, using a community septic system, or using a combination of on-site systems and tying into the municipal system. Centralized municipal systems, often available in urban and many suburban areas, are often the most cost-effective option when municipal system connections are proximate to the land to be developed. Municipal systems consist of a series of pipes and pump stations leading to a wastewater treatment facility. The facility treats the water before releasing it to a body of water. In many instances, however, homes in a development cannot connect to a municipal treatment system. It may be cost-prohibitive to connect to a municipal system because of distance to conveyance pipes, or a municipal system already at capacity cannot treat additional effluent. In these cases, developers have traditionally turned to septic systems.

A conventional septic system normally treats a home's wastewater in an underground septic tank located on the property. The life of septic systems depends on the quality of the installation, correct usage, and the frequency of maintenance. With appropriate maintenance, many systems can last for 20 years or more.

Two primary factors in a septic system's successful operation include proper installation and appropriate operation and maintenance. Assuming proper installation, homeowners must ensure that the tank is pumped out as frequently as needed. In addition, given that the bacteria within the tank are sensitive to the wastewater inputs, homeowners should not use the system for the disposal of chemicals such as turpentine, alcohol, and bleach as well as for large volumes of grease and animal fats; such items can clog the system. Developers should provide homeowners with a list of "things to do and not to do". The National Small Flows Clearinghouse sells *The Homeowner On-Site System Recordkeeping Folder* (Item #WWBLPE37) and the *Homeowner Septic Tank Information Package* (Item #WWPKPE28) to help homeowners record and store information about their septic system and to educate homeowners on system care and system (http://www.nesc.wvu.edu/nsfc/nsfc_septicnews.htm#septic). In addition, the U.S. EPA has created a free, one-page Homeowner Septic System Checklist to highlight the homeowner's septic system maintenance needs (U.S. EPA, 2003).

Another wastewater management option sometimes used by developers is a communitywide wastewater treatment system. Although the vast majority of today's homes either use single septic systems or are connected to public sewer, some developers have installed communitywide septic systems. The systems treat wastewater for a group of homes in a manner similar to a septic system for a single home. Small community cluster systems often try to take the best attributes of municipal sewers and septic systems and use them to reduce wastewater treatment system installation costs while meeting environmental goals. The systems transport wastewater from homes via sewer pipes to either a conventional treatment plant or a pre-treatment facility. The effluent is then discharged to soils similar to those required in the last stage of a single septic system's treatment process.

Some communities install a centrally located package wastewater treatment plant that connects each home in that community to the plant. The package system is similar to public wastewater treatment facility except that the effluent from the homes travels to a privately owned and operated treatment plant located in the community (sometimes referred to as "small community sewer" or "distributed sewer").

A small number of jurisdictions are using natural open spaces, golf courses, and soccer fields as areas for drip irrigation of semitreated effluent. Such uses of open space allow effluent to be effectively disposed of across large areas. Another benefit of is that the systems can be created as needed. The developer can calculate how much effluent the entire development will likely generate and then phase in the system as homes are built. The system's potential drawbacks include a perception that odor will be a problem or that public health will be compromised.

In several communities, community systems have proven themselves a feasible alternative. For example, in Warren Village, Vermont, nearby streams had become polluted in part because of a combination of dense development, small lot sizes, and failed single septic systems. When residents determined that a municipal sewer system was too expensive, the town used two parcels--a soccer field and a vacant lot-- as common leaching fields with a total capacity of 30,000 gallons per day. Homeowners whose lots lacked adequate wastewater disposal capacity could pay the newly formed wastewater management district $250 per user per year to discharge to the community system (http://www.daylor.com/projects/Gloucester/CommunityWastwater.htm).

Community systems can also facilitate the use of smaller house lots. Single septic systems need an adequate land area for the leach field. With community systems, the final treatment location is consolidated into one large leach field instead of relegated to several individual fields. Allowing for smaller lots can help the developer preserve open space, furthering the goals of low-impact development.

Some instances warrant a combination of sewer hook-up and septic system installation. . For example, a municipal sewer system may be able to serve only an additional 50 homes, yet a proposed development calls for 200 homes. Public officials and the developer might agree to hook up 50 of the new homes to the public system and serve the rest of the homes with an on-site septic tank system.

A combination system might also be warranted when soils on part of the development are not suitable for septic tank installation. In this instance, the lots that cannot accommodate

septic systems could be connected to the municipal system while the rest of the lots could be served by septic systems or municipal connections.

Clearly, each parcel of land is often suited to a variety of options available to the developer. Developers can help create cost-effective developments by weighing all the wastewater management options and determining which will yield the best performance at the least cost. The LID approach helps increase the number of wastewater management system options available to the developer.

3.3 ALTERNATIVES TO CONVENTIONAL SYSTEMS

Table 14 contains a brief description of the OWTSs highlighted in this chapter. Listed below are expanded explanations of the alternative systems that provide secondary treatment and that might allow for on-site wastewater treatment (U.S. Environmental Protection Agency, 2002).

OWTS Type	Key Components	Situations Where Its Use Might Be Appropriate
Sand Filters	• Septic tank, sand filter, and sometimes a recirculation tank	• Where soil conditions do not allow for percolative beds/trenches • High groundwater
Mound	• Pre-treatment unit(s), dosing (pumping) chamber, and elevated mound	• Slow- or fast-permeability soils • Shallow rock cover over creviced or porous bedrock • High groundwater
Trickling Filter	• Circular bed of coarse or plastic material and rotating distributor	• High concentrations of organic material in wastewater
Evapotranspiration	• Pre-treatment unit, evapotranspiration sand bed, bed liner, fill material, monitoring, overflow protection, and surface cover	• Annual evaporation rate exceeds annual rate of precipitation and wastewater applied
Low-Pressure Pipe	• Septic tank, pumping (dosing) chamber, and small-diameter pipes	• Where soils would become clogged as a result of localized overloading • High groundwater • Anaerobic conditions due to continuous saturation
Aerobic	• Aeration compartment, settling chamber, pre-treatment compartment (optional)	• Where septic systems have failed • Where lot size is not sufficiently large to accommodate a standard septic system drainfield
Proprietary Systems	• Varied	• Where conventional septic systems or sewer hook-ups are not feasible

TABLE 14. ON-SITE WASTEWATER TREATMENT SYSTEM ALTERNATIVES

Alternative systems can use anaerobic bacterial action, i.e., the bacteria decomposes waste in the absence of oxygen, while other systems need oxygen (i.e., aerobic) to operate properly. In addition, hybrid systems use a combination of aerobic and anaerobic processes.

Developers can consider a variety of on-site wastewater treatment system options either as alternatives or enhancements to conventional septic systems. By using the LID approach, developers often uncover information and options that can help facilitate the development approval process.

While municipal sewer or on-site septic systems may be the most recognized wastewater treatment options, some sites might lack both sewer access *and* the ability to accommodate a septic system. Some of the limiting factors for septic systems include lot size (an ample soil absorption field is necessary), groundwater level, depth of bedrock, and on-site soil types. For example, dense clay or rocky soils can inhibit the use of septic systems. Recognition of various limitations has led to increased interest in and the development of alternative on-site wastewater treatment systems.

Alternative on-site wastewater treatment systems range from adding treatment steps (e.g., intermittent sand filter) to a conventional septic system to the reliance on proprietary systems that omit the use of traditional septic tanks. In fact, as technology grows more sophisticated, , it is often more important to establish an operation and maintenance plan for an alternative OWTSs than for an ordinary septic system.

Examples Where a Septic System May Not Be Allowed on a Lot

Lot size too small
Wrong types of soils
High groundwater level
Shallow soils/Depth of bedrock
Steep slopes
Soil does not percolate

When lots cannot be developed to take advantage of conventional wastewater management techniques (e.g., municipal sewer or on-site septic systems), the use of alternative OWTSs (discussed below) can make those lots suitable for development. Before using an alternative OWTS, however, developers are advised to familiarize themselves with the local public health criteria related to wastewater effluent and to recognize that, as opposed to municipal sewer systems, which are usually regulated by codes at the state level, local public health officials regulate on-site systems. The lack of information on the systems and absence of third-party verification of alternative system performance make public health officials reluctant to alternative OWTS. In general, public officials are most concerned with ensuring a certain level of public health, not with facilitating land development; therefore, officials often need to be educated about the efficacy of alternative systems.

On a related note, some public officials and environmental groups have expressed concern that the use of septic and/or alternative OWTSs will foster sprawl. The use of OWTSs by themselves does not lead to unchecked growth; indeed, the best way to manage growth effectively is through prudent zoning, not by eliminating potential wastewater treatment solutions or creating barriers for the adoption of alternative technologies related to development.

3.3.1 PROCESS FOR IDENTIFYING POTENTIAL ON-SITE WASTEWATER TREATMENT SYSTEM ALTERNATIVES

Each parcel of land is unique in terms of its size, shape, and soil types. If public health officials indicate that an alternative OWTS is a feasible option, then developers should consider several factors to identify the types of systems that might be used. For instance, OWTSs are more complex than septic systems and thus require a higher level of maintenance and supervision and may need additional excavation during installation to accommodate the various systems' several components. Table 15 briefly describes the various factors to be considered.

Costs can vary for different OWTS options. For instance, community wastewater treatment systems that rely on gravity to transport wastewater can require deep and thus costly excavations, but the use of pressurized systems with small-diameter plastic pipes can minimize excavation costs.

Some OWTS alternatives to conventional systems, such as recirculating sand filters and evapotranspiration systems, are "add-ons" to a traditional septic tank system. The additional treatment unit is connected in-line with the septic tank and provides an extra level of treatment. Although it may seem more costly to add another layer of treatment, alternative treatment systems may be less costly if conventional wastewater management methods require the hauling of extra fill material or the construction of a retaining wall.

As for other cost issues, alternative OWTSs may need electricity to operate the pumps that are sometimes required as part of the treatment system itself and that are sometimes needed to move wastewater from the house to the treatment area. In addition, the inclusion of other features such as recirculation piping, aeration, and an increased need for cleaning/pumping may increase an alternative system's operation and maintenance costs.

Another economic issue associated with the use of an alternative OWTS is the long-term operation and maintenance (O&M) costs and related organizational framework required

- Aesthetics--Both the general public and public officials will be most aware of aesthetic concerns. In short, potential insect problems and odor issues must be addressed and mitigated.
- Capacity--The system must be able to handle the home's capacity; the approval process will consider both rate and volume of sewage flow. In addition, public officials may want the system to be able to handle more than the current load to accommodate changing uses of the home.
- Cost--The upfront costs of alternative OWTSs can often be higher than the costs of traditional septic systems. In addition, the complexity of alternative systems yield somewhat higher operation and maintenance costs (e.g., the alternative systems usually need electricity to treat waste).
- Efficiency and Reliability--The community at large will be interested in any third-party reports and data indicating how well the proposed systems treat or remove potentially harmful wastewater components. In addition, the system must have adequate safeguards to warn the occupant of system failure.
- Environmental and Public Health--A system must maintain or improve environmental quality and adequately address public health issues.
- Operation and Maintenance (O&M)--As an emerging issue in the on-site wastewater treatment field, OWTSs require more monitoring than standard septic systems; thus, the local jurisdiction or a third party must ensure the proper maintenance of equipment.
- Siting--Soil type and lot size are often determining factors when siting OWTSs. For instance, only about one-third of the land area in the United States has soils suitable for conventional subsurface soil absorption fields.

Source: U.S. EPA, 2002.

TABLE 15. FACTORS TO CONSIDER WHEN EVALUATING ON-SITE WASTEWATER TREATMENT SYSTEMS

with the systems. Given that innovative systems usually require more frequent and ongoing O&M than conventional systems, developers, public officials, and communities must work together to develop an O&M plan and establish an entity that will ensure

effective system performance. Such an entity can oversee O&M activities, reduce liabilities, and establish service boundaries (Jones et al., 2001).

The following list offers criteria for determining situations in which an alternative OWTS could be most helpful:

- **When sewer is not located nearby.** If a given plot of land is not located close to existing infrastructure, thus making it costly to establish public sewer connections, then OWTS might be an effective option.
- **When the wastewater treatment facility is at capacity.** In some locales, the wastewater treatment facility is at capacity and cannot accept any more connections. In these instances, either a new facility will have to be built or the existing facility will have to be expanded. Either option will require the public's investment and time and will potentially delay land development.
- **When a lot is too small.** If local ordinances dictate that a lot is too small to accommodate a septic field, an alternative OWTS might help reduce the size of the required absorption field.
- **When a watershed requires higher-quality effluent.** In some instances, a watershed has effluent requirements that exceed the effluent characteristics normally produced by septic systems. Once again, the enhanced wastewater treatment available with some alternative OWTSs may help provide a solution.
- **When groundwater supply is limited.** Instead of pumping water off site through a sewer, an OWTS keeps water on the site; properly treated effluent from an alternative OWTS can help recharge the local groundwater aquifer.
- **When deep excavation is needed for a septic system.** Some alternative systems do not require as much excavation as septic systems, thus reducing initial costs.

Another way to look at the system selection process is through a variety of stakeholders' lenses. Figure 11 provides an overview of some of the groups interested in the process of selecting an appropriate OWTS and their relevant concerns (U.S. Environmental Protection Agency, 1997).

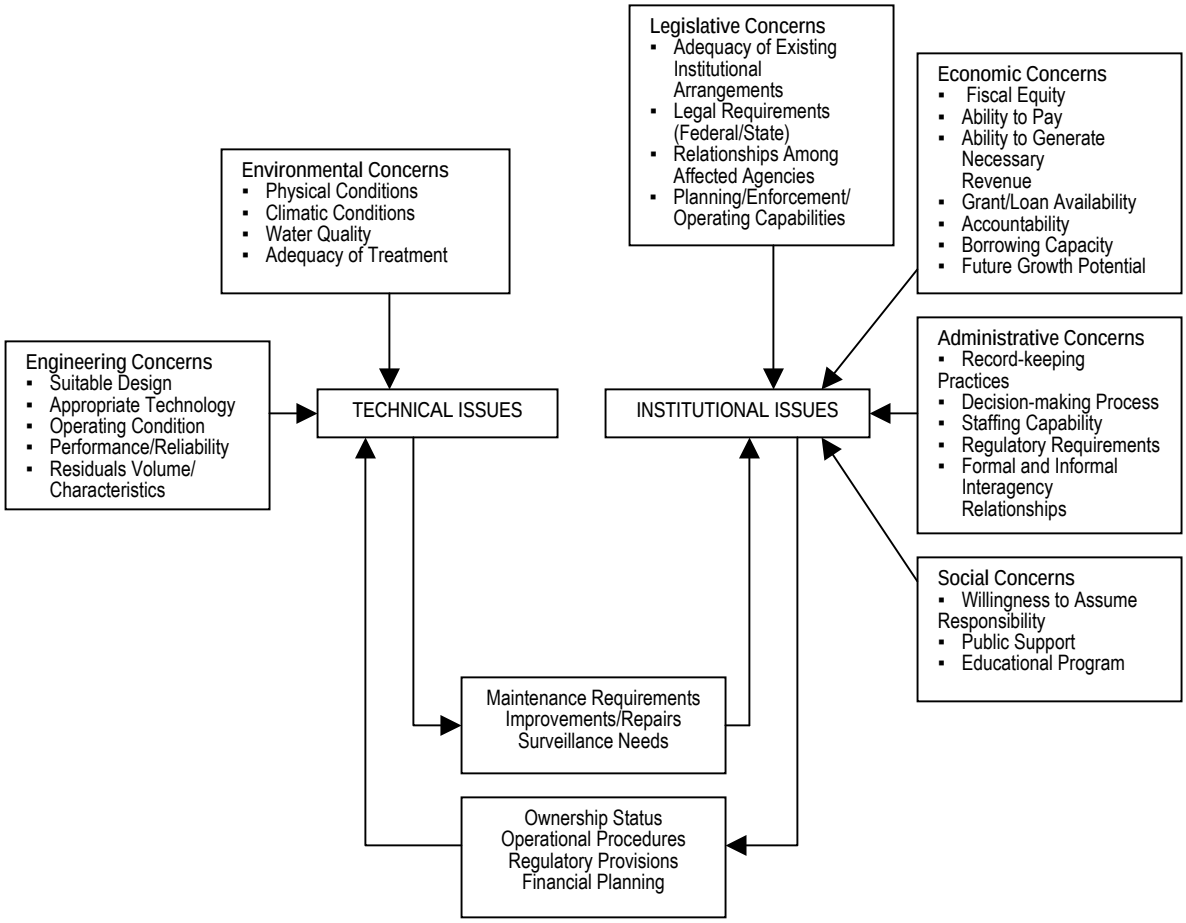

Source: Response to Congress On Use of Decentralized Wastewater Treatment Systems, http://www.epa.gov/owm/decent/response.

FIGURE 11. OVERVIEW OF PARTIES INTERESTED IN WASTEWATER TREATMENT DECISION MAKING

In some situations, conditions do not permit the installation of septic systems, particularly if soils are not appropriate or lot sizes are not sufficiently large to support a leach field. For example, the Floyd County, Kentucky, Plan Commission recently proposed a zoning ordinance amendment that would use soil conditions to dictate how many homes could be built per acre with septic systems (*The Courier-Journal*, Louisville, KY, May, 2002). In the worst soil and topographic conditions, the proposed amendment would limit development to one house with a septic system per 20 acres.

As previously noted, there are a variety of alternative systems available to developers. Below are descriptions of the different systems. Also included are considerations developers can take into account when deciding which systems to include in a new development.

3.3.2 SAND FILTERS

Intermittent Sand Filters

Sand filter systems treat the effluent downstream from a conventional septic tank. Two of the more common sand filter systems are the single-pass system (i.e., intermittent) and the recirculating system. In the single-pass system, the wastewater first undergoes primary treatment in a septic tank. The effluent is then applied intermittently to the top of a bed of sand (or other suitable media) that sits on an impermeable liner and percolates through the sand into drains located at the bottom of the bed (see Figure 12). As the wastewater passes through the sand filter, both physical and chemical processes treat the effluent, although microorganisms attached to the fixed media primarily treat the effluent. The effluent is then piped to the leach field for further treatment and disposal. Bottomless systems have no impermeable liner and do not discharge to a drainfield but rather to the soil below the filter.

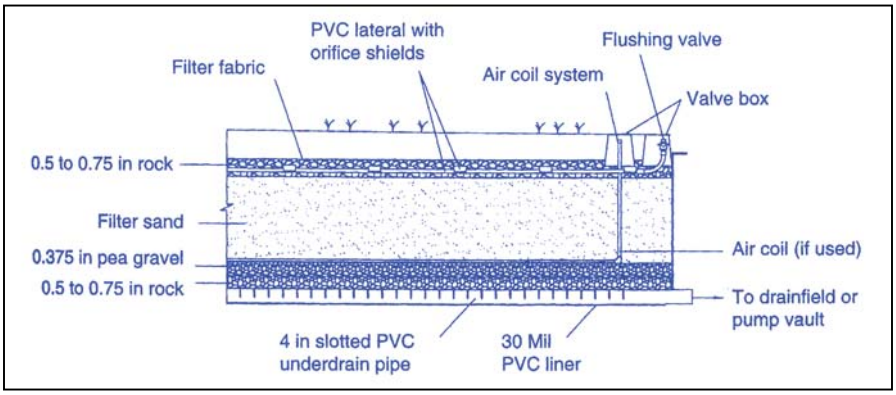

Source: National Small Flows Clearinghouse Fact Sheet, 1998.

FIGURE 12. TYPICAL CROSS-SECTION OF AN INTERMITTENT SAND FILTER

Intermittent sand filters produce a high-quality effluent by removing a high percentage of contaminants. The filter's ability to perform adequately depends on the filter's design and composition and, hence, the biodegradability of the wastewater and the environmental factors within the filter. The most important environmental factors include media re-aeration and temperature. Re-aeration makes oxygen available for the wastewater's aerobic decomposition. Temperature directly affects the rate of microbial growth, chemical reactions, and other factors that contribute to the stabilization of wastewater within the system.

System pumps and controls should be checked every three months while the sludge build-up in the septic tank should be checked as needed. Installation costs of intermittent sand filters, including labor and materials, generally range from $7,000 to $10,000. Daily energy costs for pumping the wastewater onto the filter bed run between $0.03 and $0.06.

Recirculating Sand Filters

In situations without sufficient land area for a single-pass filter system, recirculating sand filter systems are an option. In a recirculating system, wastewater first undergoes treatment in a septic tank. The pre-treated effluent then flows into a recirculation tank

along with some of the water that has already passed through the sand filter. A pump transports the wastewater mixture from the tank to the sand filter, where microorganisms attached to the filter media carry out treatment. The treated effluent collects at the bottom of the filter; some of the effluent is sent back to the recirculation tank for further treatment and some is sent out for disposal or another type of treatment disinfection. In this type of system, the sand is periodically changed (see Figure 13).

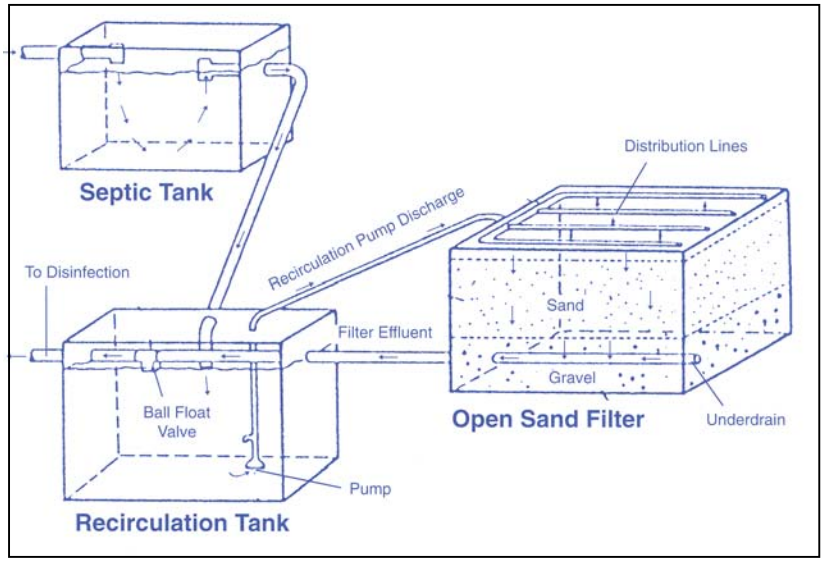

Source: National Small Flows Clearinghouse Fact Sheet, 1998.

FIGURE 13. TYPICAL RECIRCULATING SAND FILTER SYSTEM

Recirculating sand filters are relatively low-maintenance systems whose operating costs are generally modest. Operation and maintenance costs were under $5,000 for a 135-home septic tank system in Elkton, Oregon, including $780 for electricity and 25 to 30 labor hours per month. The replacement of the media represents one of the system's most expensive maintenance items. Thus, it is prudent to use locally available materials. For example, the capital cost (land not included) for a 5,000 gallon per day system with black beauty™ sand media that was not locally available totaled about $68,600. That same system cost $36,000 with standard sand media.

- Peat Filters--Organic particles and suspended solids are removed by passing wastewater through a peat bed.
- Batch Reactors--To increase nitrogen-removal efficacy, batch reactors alternate between oxygen-rich and oxygen-poor cycles and treat one batch of wastewater at a time.
- Activated Sludge Systems and Aerobic Treatment--Biooxidation (aerating wastewater) and oxygen-poor settling areas improve treatment.

TABLE 16. SECONDARY TREATMENT

Other types of filters provide secondary wastewater treatment (see Table 16).

3.3.3 MOUND

On lots with high water tables or soils unsuited to septic systems, a mound of suitable soils is placed on top of the soils that do not permit the use of a septic system. The primary treatment takes place in the septic tank. The wastewater from the tank passes

through a filter (to eliminate additional solids) and discharges to a dosing chamber. The effluent is then spread uniformly on the mound, which acts as an elevated or above-ground drain field. Typically, a mound system requires a pump that sends the effluent from the septic tank upward into perforated pipes that are located in the mound within a layer of fabric-covered coarse-gravel aggregate. The mound is often a soil cover that can support vegetation (see Figure 14).

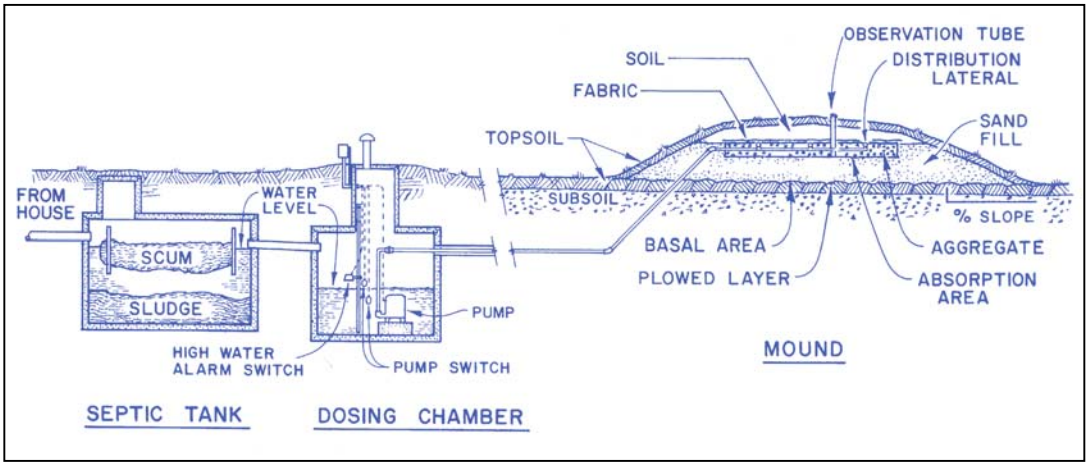

Source: National Small Flows Clearinghouse Fact Sheet, 1998.

FIGURE 14. SCHEMATIC OF A WISCONSIN MOUND SYSTEM

The mound's height should be sufficient to treat the effluent effectively before it reaches the limiting soils, bedrock, or high water table. In general, codes require a mound height between one and four feet. Mound slopes can be up to 25 percent. Mounds should be sited well away from flood plains, drainage ways, or depressions unless flood protection is provided.

Sand suitable for a mound system should contain 20 percent or less material greater than 2.0 mm and 5 percent or less finer than 0.053 mm. Mound design depends on several additional factors, including the number of rooms in a home; up to 150 gallons per day per bedroom are allowed. In addition, to minimize the number of solids entering the mound filter, the septic tank and dosing chamber must be watertight. In Wisconsin, the mound system success rate is more than 95 percent.

A typical mound system in Wisconsin costs approximately $9,000 to construct, with another $750 in site evaluation, design, and permitting costs. The operation and maintenance costs range from $125 to $200 per year.

3.3.4 TRICKLING FILTER

Trickling filters are effective in removing nitrogen from wastewater. They trickle wastewater over a fixed medium (coarse stones or plastic material) covered with a bacterial mat that removes nitrogen from the effluent. A rotating distributor, which is a rotating pipe containing several holes, evenly distributes the wastewater from above the filter medium. Microorganisms on the medium break down the organic materials in the wastewater as it passes through the medium (see Figure 15).

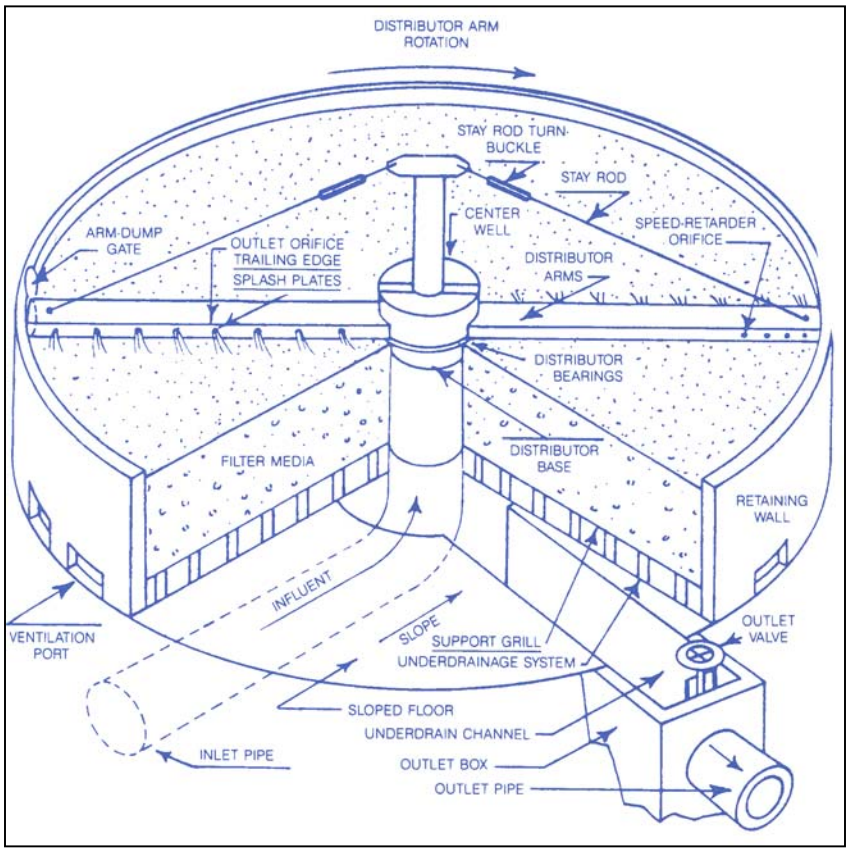

Source: National Small Flows Clearinghouse Fact Sheet, 1998.

FIGURE 15. SCHEMATIC OF A TRICKLING FILTER

Trickling filter systems are especially effective when the receiving waterbodies are highly sensitive to nitrogen loading. The filters successfully remove ammonia nitrogen by oxidizing it to nitrate nitrogen. The nitrate nitrogen is then converted into nitrogen gas that is vented to the atmosphere. The filters can accomplish ammonia nitrogen removal in one- or two-stage systems. In a single-stage unit, carbon oxidation (removal of organic material) and nitrification occur in the same unit. In two-stage systems, separate stages operate independently to complete the organic removal and nitrification steps. Trickling filters are highly sensitive to how much oxygen is available and to nitrogen loading rates.

3.3.5 EVAPOTRANSPIRATION

The two primary types of evapotranspiration (ET) systems are the standard ET system and an ET/absorption system (ETA). The more common is the ET system, which comprises a septic tank, an ET sand bed with wastewater distribution piping, a bed liner, fill material, monitoring wells, overflow protection, and a surface cover. Vegetation grows on the cover to facilitate the transpiration process.

Evapotranspiration systems are especially important on sites in need of surface and groundwater protection. An ET system can operate solely as a system that disposes of wastewater into the atmosphere through evaporation from the soil surface and/or transpiration by plants, or it can combine such treatment with seepage.

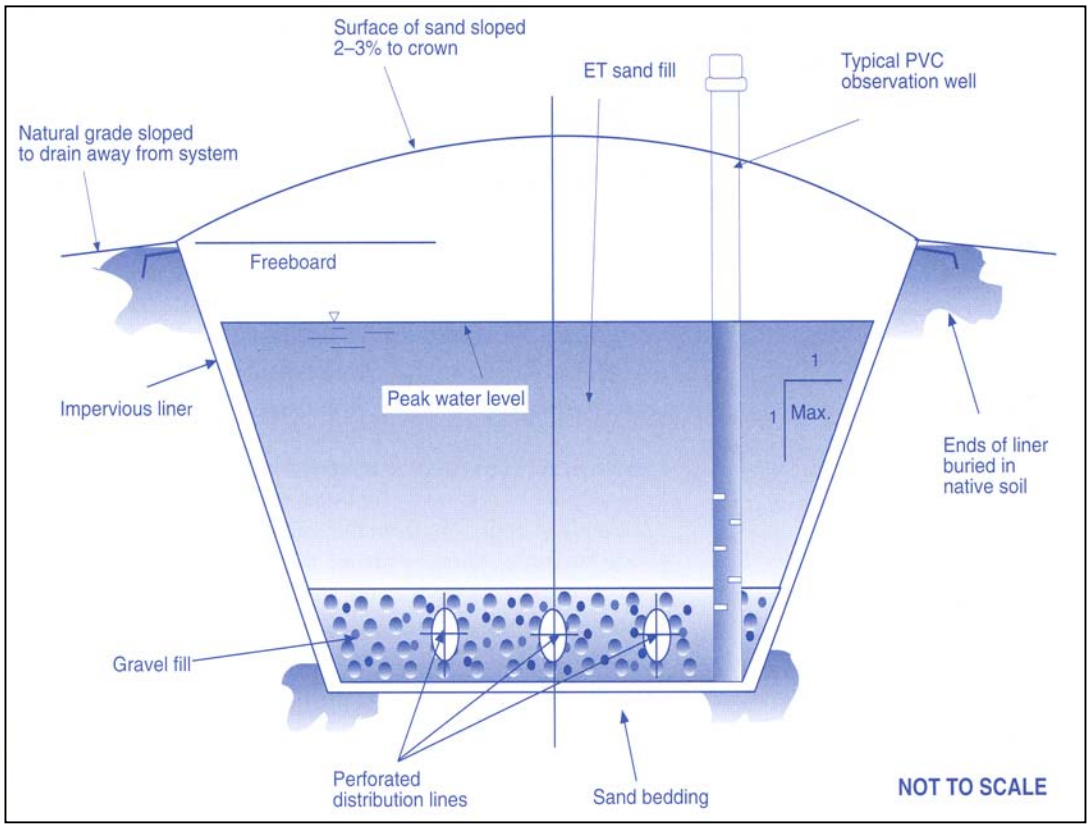

Source: National Small Flows Clearinghouse Fact Sheet, 1998.

FIGURE 16. CROSS-SECTION OF A TYPICAL EVAPOTRANSPIRATION BED

In a system that does not seep, the effluent flows from the septic tank into the lower portion of the sealed ET bed, which contains continuous impermeable liners and sand. Capillary action in the fine sand causes the wastewater to rise to the surface and escape into the atmosphere via evaporation. At the same time, vegetation brings wastewater from plant roots to the leaves, where it is transpired. An ET incorporates an unsealed bed, which allows for evaporation, transpiration, and percolation (see Figure 16).

To prevent overloading (with undersized systems) or excessive capital costs (with oversized systems), the design of ET systems requires accurate estimates of wastewater flow rates. The availability of land can limit the size of ET systems: up to 4,000 to 6,000 square feet of area is typically needed for a single-family home. However, the most important factor for ET systems is climate. Precipitation, humidity, wind speed, temperature, and the amount of solar radiation must are important considerations. For instance, system overloading can occur if large amounts of rainfall enter the system over a short period of time. Thus, ET systems are most suitable for use in arid to semi-arid locations such as the western and southwestern parts of the United States. The typical minimum cost for an ET system for a three-bedroom residence is $10,000.

3.3.6 LOW-PRESSURE PIPE

A low-pressure pipe (LPP) system is a shallow, pressure-dosed soil absorption system with a network of small-diameter perforated pipes placed in narrow trenches (see Figure

17). LPP systems can be used to address septic system issues such as soil clogging from localized overloading, mechanical sealing of the soil trench during construction, anaerobic conditions resulting from continuous saturation, and a high water table.

A typical LPP system consists of a septic tank for primary treatment. Partially treated effluent then flows by gravity to a pumping chamber, where it is stored until it reaches the level of the upper float control. Once the water reaches that level, the pump turns on and usually sends one to two batches of wastewater per day to the trenches via the distribution pipes. During each dosing cycle, the depth of wastewater in the trenches does not exceed two to three inches of the total trench depth.

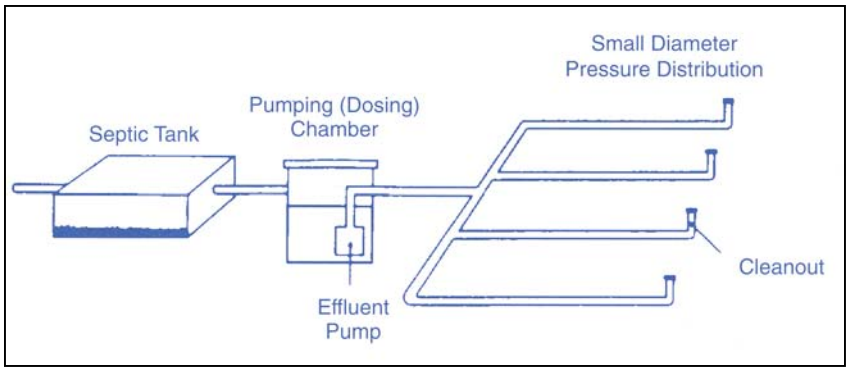

Source: National Small Flows Clearinghouse Fact Sheet, 1998.

FIGURE 17. LOW-PRESSURE PIPE SYSTEM

Two critical factors affecting LLP system performance are the dosing and distribution of the effluent. The dosing must be correct to maintain aerobic conditions in the trench, and effluent must be evenly distributed to avoid localized overloading.

A properly designed and installed LPP system needs little maintenance. For instance, North Carolina requires LPP systems to be inspected at least once every six months. The septic tank and pumping chamber should be checked periodically for sludge and scum build-up as needed. Watertight pumping tanks are necessary to ensure that drainfields do not inadvertently become hydraulically overloaded.

In a 1989 study of LPP use in North Carolina, the average cost to install an LPP system for a three-bedroom home was $2,600. The more LPP systems used in a county, the less is the average cost per system. In counties with several systems, the cost was approximately $1,500 per system as compared with $5,000 per system in counties with few LPP systems.

3.3.7 AEROBIC SYSTEMS

Similar to conventional septic systems, aerobic systems also use natural processes to treat wastewater. However, septic treatment does not require oxygen (anaerobic), whereas aerobic treatment does need oxygen. Thus, aerobic units include a device that injects air into and circulates it inside the treatment tank.

According to U.S Environmental Protection Agency, aerobic treatment units can range in size from 400 to 1,500 gallons and usually include an aeration compartment and a settling

chamber. Some units also include a pre-treatment compartment to remove garbage and grease (U.S. Environmental Protection Agency, 2000b). In addition, electrical service is required for the aeration equipment and pumps.

The two types of aerobic systems most often used for single-family homes are fixed-film and suspended-growth systems. Fixed-film systems are not available commercially and, as proprietary devices, are not described in detail here. Suspended-growth systems use microorganisms suspended in the waste stream to break down the wastes.

An aerobic system's application is limited primarily by soil conditions and topography. A site should have a percolation rate of less than 60 minutes per inch, its depth to the water table or bedrock should be two to four feet, and it should have level or slightly sloping topography.

Aerobic systems vary in cost, from $2,500 to $9,000 installed. In addition, the units must be maintained more frequently than a septic system. The recommended quarterly servicing costs about $350 per year.

3.3.8 PROPRIETARY SYSTEMS

Proprietary technologies are designed to provide turnkey solutions to developers' wastewater treatment needs.

Below are brief descriptions of the proprietary systems available today as well as the latest Web sites containing more information on the systems.

- Alascan--http://www.alascanofmn.com/

Alascan offers a variety of wastewater treatment options and systems to meet different needs, including source separation systems that separate blackwater from greywater and low-flush toilets that, according to the manufacturer, can reduce a home's water usage by 40 to 80 percent.

- Bio-Microbics, Inc.--http://www.biomicrobics.com/

Bio-Microbics, Inc., has created a Fixed Activated Sludge Treatment (FAST®) process. suited for use in single-family dwellings, clustered residential developments, and subdivisions. It can also be used to retrofit a failed conventional septic system.

- Cromaglass-- http://www.americanpump.com/croma3.htm

One of the more notable Cromaglass systems is the Cromaglass Batch Treat Process. The manufacturer claims that biological oxygen demand (BOD) and total suspended solid (TSS) removal rates exceed 90 percent and that independent laboratory research verifies system efficacy.

- E/One Sewer Systems--http://www.eone.com/sewer/intro/index.html

E/One offers several wastewater treatment systems sized to meet a customer's unique conditions. For instance, the GP 2010 is designed for single-family homes, whereas the GP 2016 is suited for multiple dwellings. The Web site provides brief case studies.

- Global Water Systems-- http://www.globalwater.com/encampment.htm

Global's source separation systems treat greywater for reuse in toilet flushing or irrigation.

- Blackwater-- Toilet wastes in wastewater
- Greywater--Washwater excluding toilet wastes

- MicroSepTec, Inc.-- http://www.microseptec.com/

The MicroSepTec (MST) system is an on-site wastewater treatment system that can be used for residential applications. In addition, MicroSepTec, Inc., is a full-service septic solution provider and will assist with permits, engineering, project management, maintenance, and monitoring.

- Orenco Systems, Inc.--http://www.orenco.com/

Orenco Systems® offers on-site (decentralized) treatment solutions for many types of residential properties for small flows and large flows, household-strength waste and high-strength waste, poor soils, and high groundwater. The company provides a variety of package solutions.

- Waterloo Biofilter Systems, Inc.--http://www.waterloo-biofilter.com/

The Waterloo Biofilter ® is a patented trickle-filter–type treatment system that uses a filter medium to treat residential and industrial wastewater. Wastewater is sprayed intermittently onto the medium and allowed to drain through by gravity.

3.4 ADDITIONAL RESOURCES

Additional resources with more detail on wastewater treatment are included below. They are not provided as endorsements, merely as educational and reference tools. Given regional variations in climate and land development needs, we have tried to include region-specific resources. It is important to note, however, that addresses, especially Internet links, are subject to change. This list contains the latest links and addresses as of the printing of this publication.

Wastewater Manuals and Best Management Practices

National On-Site Demonstration Program
http://www.nesc.wvu.edu/nodp/nodp_index.htm
The National On-Site Demonstration Program (NODP), established in 1993, was developed to encourage the use of alternative on-site wastewater treatment technologies to protect the public health, ensure water quality, and sustain the environment in small and rural communities. Funded through the U.S. Environmental Protection Agency (EPA) and directed by the National Environmental Services Center of the National Research Center for Coal and Energy at West Virginia University, the NODP provides communities throughout the country with information on cost-effective alternatives to centralized wastewater treatment systems.

U.S. Environmental Protection Agency
http://www.epa.gov/ORD/NRMRL/Pubs/625R00008/625R00008.htm

The 2002 *On-site Wastewater Treatment Systems Manual* is the U.S. Environmental Protection Agency's latest publication covering on-site wastewater technologies. As an update of the 1980 *On-Site Wastewater Treatment and Disposal Systems,* it provides supplemental and new information for wastewater treatment professionals in the public and private sectors. This manual is not intended to replace the previous manual but rather to explore further and discuss recent developments in treatment technologies, system design, and long-term system management.

Washington State Department of Ecology
http://www.ecy.wa.gov/biblio/9911.html
Washington's *Storm Water Management Manual for Western Washington* describes the storm water management standard for all new development and redevelopment projects in the Puget Sound region.

Organizations and Internet Resources

Canadian Housing Information Center (CHIC)
http://www.cmhc-schl.gc.ca/publications/en/rh-pr/tech/01-138-E.htm
Innovative On-Site Wastewater Treatment
The Canadian Housing Information Center has researched problems with residential septic systems across Canada and found surface breakouts, back-ups into houses, and contamination of groundwater supplies as evidence of system failures. Such problems arise from excessive water usage and lack of maintenance; inadequate site assessment, especially in marginal soils; outdated design practices; or poor construction.
http://www.cmhc-schl.gc.ca/en/imquaf/himu/wacon/wacon_001.cfm
Water conservation has been at the forefront of resource efficiency issues in Canada. In an effort to reduce water consumption, CMHC has conducted research into residential water reuse and innovative wastewater treatment technologies. Case Study of the Month presents water projects either supported by CMHC or undertaken by the private sector.

Hazen and Sawyer
http://www.co.sarasota.fl.us/environmental_services/pcssrp/pdfs/40075r048.pdf
Evaluation of On-site Wastewater Treatment and Wastewater Collection System Alternatives (TM No.7)
An assessment of available and applicable OWTS and collection system technologies determines the technologies' ability to improve current wastewater treatment and disposal practices in the Sarasota, Florida area.

NAHB Research Center
http://www.toolbase.org/tertiaryT.asp?TrackID=&DocumentID=3789&CategoryID=1843
On-site wastewater treatment systems can allow the construction of new homes on otherwise vacant infill lots in neighborhoods whose centralized wastewater treatment systems are beyond capacity. To find the best and most cost-effective aerobic treatment system, the Research Center is working with Anne Arundel County, Maryland, and will monitor the installation of several innovative on-site aerobic wastewater treatment systems on residential field sites. Approximately 25 percent of all homes in the county use on-site wastewater treatment systems, most of which are septic tanks.

Rocky Mountain Institute
http://www.rmi.org/images/other/W-ComDecMakWstwtrSys.pdf
Case Studies of Economic Analysis and Community Decision Making for Decentralized Wastewater Systems
The Rocky Mountain Institute is conducting an 18-month project to increase understanding of how communities consider and value the benefits and costs of different-scale wastewater facility options (on-site, cluster, and centralized options) in dollar or other terms. The project also is examining the driving issues, motivations, thought processes, and decision-making methods of stakeholders relative to choices of wastewater system scale.

Small Flows Quarterly
http://www.nesc.wvu.edu/nsfc/nsfc_index.htm
The National Small Flows Clearinghouse (NSFC), funded by the U.S. Environmental Protection Agency, helps America's small communities and homeowners solve their wastewater problems and thereby protect the public health and the environment. The successful long-term operation of wastewater systems protects drinking water sources from contaminants and natural systems from pollutants. The NSFC assists in planning, operating, financing, and managing new or existing sewage systems, both for individual households and communities of less than 10,000 people. One of the *Small Flows Quarterly*'s most recent peer-reviewed articles, "Proposed National On-Site Standards: A Broad Assessment of Their Relative Benefits to Industry," proposes ideas about on-site wastewater treatment management in small communities. In most states, regulatory systems dominated by prescriptive codes restrict the activities of on-site wastewater treatment system manufacturers and suppliers.

The Home Inspection and Construction Information Website
http://www.inspect-ny.com/septic/lockwood.htm
Septic Systems--An Engineer's View
The Home Inspection and Construction Information Web site describes septic systems, their operation, and the reasons for system failure. Contributed by Lockwood, Dietershagen Associates Licensed Professional Engineers, Clifton Park, New York.

U.S. Environmental Protection Agency
http://www.epa.gov/OW/index.html
The Office of Water provides an immense amount of information on the protection and conservation of our nation's water resources.

Regional-Specific Resources

Northeastern United States

Cornell Local Government Program
http://www.cardi.cornell.edu/clgp/septics/Exec_Summ.PDF
Increasingly, rural communities, unsewered subdivisions, and responsible agencies are aware of issues and concerns associated with treating and managing human waste products with on-site wastewater treatment systems (OWTSs or septic systems). This guide provides an information framework for those seeking change.

The New England Interstate Water Pollution Control Commission Regulatory Cooperation Project
http://www.neiwpcc.org/iatech.html
An interstate effort to evaluate innovative/alternative (I/A) on-site technologies capable of protecting the public health and the environment. The project provides states with an efficient review process for I/A technologies. By bringing together the interests of regulators and end users, the effort facilitates independent evaluation of environmental technology performance.

Southeastern United States

Commonwealth of Virginia State Board of Health
http://www.vdh.state.va.us/formfeed/VDH88.PDF
Regulations Governing Application Fees for Construction Permits for On-Site Sewage Disposal Systems and Private Wells

W*estern United States*

City of Oregon City--Development Services Department Engineering Division
http://www.orcity.org/public-works/design-standards/sewer/index.html
Sanitary Sewer Design Standards
Oregon City Development Services (Oregon) created sewer design standards to provide a consistent policy under which certain physical aspects of sanitary sewer design will be implemented.

Orenco Systems Incorporated
http://www.orenco.com/ccs/ccs_caseStudy.asp
Orenco Case Study--Diamond Lake, Washington: 12-Year-Old Effluent Sewer Requires Little Maintenance
The community of Diamond Lake, in northeast Washington, protected an 800-acre lake by replacing all the community's old, leaking septic tanks and inadequate disposal systems with watertight tanks and an Orenco effluent sewer system.

SECTION 4: CIRCULATION AND DESIGN

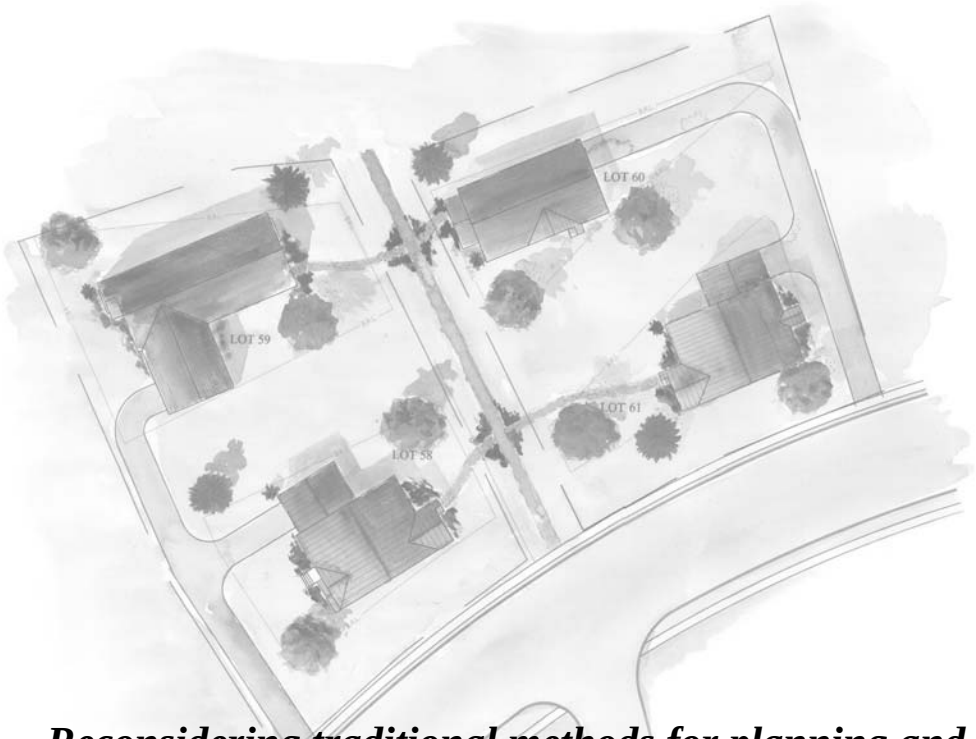

Reconsidering traditional methods for planning and accommodating pedestrian and vehicular circulation is part of a cadre of better site design techniques that can simultaneously reduce development costs, protect the environment, and create win-win situations for builders, municipalities, and residents.

4.1 INTRODUCTION

As the struggle to decrease nonpoint source pollution in our nation's waters continues, municipalities have begun to reexamine the connection between circulation design and storm water management practices. New designs for streets, sidewalks, and driveways can maintain the functions of circulation while helping to reduce expanses of impervious surfaces that can alter local hydrology and degrade water quality. In turn, new street designs can influence the layout of lots and help to increase the volume of open space in new residential developments. These considerations all contribute to creating low impact developments. This section examines alternative street and lot layouts and their associated environmental and cost benefits.

Vehicular and pedestrian circulation systems have always played an important role in organizing and defining residential communities. Traditionally, residential or local streets have been designed with a focus on accommodating community access, circulation, and parking. In the years before World War II, older, close-in suburban neighborhoods were designed with narrow streets that were wide enough for one travel lane and parking on one side of the street.

- Mobility--A measure of long-distance travel at relatively higher speeds. Mobility usually characterizes highways.
- Access--A measure of service to origins and destinations. Access usually relates to local streets.

In the years after World War II, suburbanization and highway construction grew at a rapid pace. As reliance on the automobile increased, transportation planners identified the need for a hierarchy of safe and efficient transportation routes linking suburban residences with urban employment centers, retail concentrations, and recreation opportunities. They developed a hierarchy of highways, arterials, collectors, and local streets. The classification system sought to strike a balance between providing mobility and access.

Unfortunately, at some point during post-war suburban expansion, the classes within the hierarchy blurred. Communities started to design local streets according to standards more appropriate to arterial road and highway construction. Many areas of the country saw pavement widths widened to accommodate increased vehicle trips, ensure access for larger emergency vehicles, and provide parking spaces on both sides of the street (even though most neighborhoods accommodate off-street parking in driveways). The larger impervious areas created by wide streets have led to increased storm water runoff, reduced water quality, and riparian habitat and species degradation. They have also translated into increased design, construction, and maintenance costs for both developers and municipalities. Low impact development practices can help to alleviate these concerns.

What is the cost of an excessively wide street?		
Not only do excessive street widths affect the livability of a community, but they also give rise to additional costs that must be paid by homeowners. The figures cited here are for 2001 based on unit costs of contractor services for a project in northern California. For this project, a section of street 100 feet long would cost about $9,500 to build to a width of 24 feet compared with $13,500 for a 36-foot-wide street. Paving widths are 20 feet and 32 feet, respectively, with an additional two-foot gutter on each side. Moreover, in this area where lots sell for $300,00 per acre, land costs exceed street construction costs, even for narrower streets. Total land and construction costs for a 100-foot section of a 36-foot-wide street amount to almost $40,000 compared with $26,000 for a narrower 24-foot-wide street.		
Cost per 100 Feet of Street		
	24 Feet	36 Feet
5-Inch Asphalt Paving/6-Inch Base	$6,800	$10,880
6-Inch Curb and Gutter	$1,265	$1,265
4-Inch Sidewalk	$1,400	$1,400
Total Construction Costs	$9,465	$13,545
Land (at $300,000 per acre)	$16,800	$25,200
Total Cost	$26,265	$38,745

TABLE 17. TYPICAL STREET CONSTRUCTION COSTS

This chapter begins by providing a brief overview of the environmental and economic benefits of LID circulation and design. It briefly discusses conventional approaches to circulation and design and then concludes by considering some alternatives to conventional approaches. Table 18 provides some overall objectives of community circulation and design systems.

Objective 1:
Maximize open space by using alternative street and lot layouts.
Objective 2:
Reduce impervious surfaces by considering alternative street widths, types, and amenities.
Objective 3:
Site lots and houses to maximize solar orientation, reduce vehicular trips, and create a sense of community.

TABLE 18. CIRCULATION AND DESIGN OBJECTIVES

4.1.1 ENVIRONMENTAL BENEFITS

Properly designed and sited streets and street systems can conserve and protect site and regional environmental systems and resources. Most street standards are the result of compromises among engineers, planning staffs, and local emergency management professionals (police and fire and rescue services). To provide two travel lanes, access for emergency vehicles, and parking on both sides of the street, communities have long required streets that are much wider than necessary. However, research and experience show that compact street layouts, narrower street widths, and alternative pavement edge treatments can minimize clearing and grading, reduce storm water runoff, and protect

water quality while providing ample access for emergency vehicles, residential vehicles, and parking.

Paved streets create impervious surfaces that prevent storm water from infiltrating into the ground. As storm water travels across streets and other impervious areas, it picks up motor oils, grease, fuel residues, nutrients, and sediment, all of which are then carried to local receiving waterbodies where they adversely affect aquatic species and their habitats. Impervious areas are major contributors to the urban nonpoint source pollution problems that impair the nation's water quality.

4.1.2 ECONOMIC BENEFITS

Where density and zoning allow, redesigned vehicular and pedestrian circulation routes can reduce final infrastructure and development costs by limiting street lengths and the expanse of pavement. At the same time, reworked street types and layouts can mean reduced costs associated with planning and design, clearing and grading, and storm water management. Table 4-3 provides information on various subdivision development costs.

Subdivision Improvement	Unit Cost
Roads, Grading	$22.00 per linear foot
Roads, Paving (26-foot width)	$71.50 per linear foot
Roads, Curb and Gutter	$12.50 per linear foot
Total Cost of Road	$106.00 per linear foot
Sidewalks	$10.00 per linear foot
Storm Sewer (24 inches)	$23.50 per linear foot
Driveway Aprons	$500 per apron
Parking Spaces	$1,100 per parking space ($2.75 per square foot)
Clearing (forest)	$4,000 per acre
Sediment Control	$800 per acre
Storm water Management	$5,000 to $60,000 per impervious acre
Water/Sewer	$5,000 per lot (variable)
Well/Septic	$5,000 per lot (variable)

Source: Center for Watershed Protection, 1998.

TABLE 19. UNIT COST ESTIMATES OF TYPICAL SUBDIVISION DEVELOPMENT

4.2 CONVENTIONAL APPROACHES TO CIRCULATION AND DESIGN

4.2.1 RIGHTS-OF-WAY

A street right-of-way is a measure of the total width needed to accommodate the street pavement, sidewalk(s), drainage, street trees, and utility easements. Current street rights-of-way range from 30 feet to over of 60 feet to accommodate parking and sidewalks on both sides of the street. Excessive rights-of-way create wide and often visually uninteresting streets that promote speeding and undermine safety. Wider street rights-of-

way require land to be set aside to accommodate street systems, leaving less land available for lots and community open space. At the same time, given that safety and maintenance concerns require the removal of vegetation and trees within the right-of-way, road construction results in the removal of many mature trees and vegetation, potentially leading to soil erosion and siltation problems in local waterways.

Street rights-of-way should be the minimum width necessary to accommodate the pavement, sidewalk(s), street trees, and utilities. Where zoning and density allow, communities should permit open-section roadways with sidewalks on one side of the roadway only. Open-section roadways consist of a variable-width gravel shoulder, usually wide enough to accommodate a parked car, and an adjoining grassed swale that conveys storm water. Street pavements should be adjusted accordingly depending on off-street parking availability and shoulder requirements. To encourage the preservation of existing vegetation, only those trees within approximately five feet of the pavement edge should be cleared. Utilities should be located under street pavements to eliminate conflicts with tree roots, grassed swales, and bioretention areas. In northern climates, the right-of-way should be wide enough to accommodate snow storage.

4.2.2 STREETS

Besides rooftops and driveways, residential streets account for an enormous share of a community's impervious surfaces. A reevaluation of residential street standards to address the expanse of impervious surfaces and enhance the environment can also reduce infrastructure costs, improve pedestrian and vehicular safety, and increase community aesthetics. Many municipalities have already begun the difficult process of reevaluating their residential street standards. The process requires the involvement of many different stakeholders, including emergency personnel (police and fire and rescue services)(See Table 20), public works departments, school boards, homeowner associations, and safety advocates. Indeed, disagreements can be easily resolved by examining the current research on the use of narrower streets.

Width (feet)	Source
18 to 20	U.S. Fire Administration
24 (on-street parking) 16 (no on-street parking)	Baltimore County, Maryland
18 (minimum)	Virginia State Fire Marshal
20	Prince George's County, Maryland
18 (on-street parking on one side) 26 (parking both sides)	Portland, Oregon

Source: Center for Watershed Protection, 1998.

TABLE 20. MINIMUM STREET WIDTHS FOR FIRE VEHICLES

Most municipalities' standards for street pavement widths usually specify streets at least 36 feet wide—a width that usually accommodates two travel lanes and parking on both sides of the street (see Table 21). Given that most homes are built with either garages and/or driveways that accommodate up to three cars, municipalities should consider eliminating one or both of a street's seven-foot-wide parking lanes. Even a new street width of 22 feet can still accommodate parking on one side of the roadway and leave

ample room for a safe travel lane that is generous enough to accommodate most fire trucks, school buses, and garbage trucks. Consistent with low impact development practices, the new standards reduce infrastructure construction and maintenance costs while reducing impervious surfaces within the community (See Section 4.3.2 on queuing streets for additional information).

Local Streets	
No On-Street Parking	18 feet
Parking on One Side	22 to 24 feet
Parking on Both Sides	24 to 26 feet
Collector Streets	
	32 to 36 feet

Source: Residential Streets, NAHB, 2001.

TABLE 21. SUGGESTED PAVEMENT WIDTHS

Where density and zoning allow, open-section roadways can reduce the need for costly curb and gutter sections and encourage the filtering and infiltration of storm water. Open-section roadways consist of a variable-width gravel shoulder, usually wide enough to accommodate a parked car, and an adjoining grassed swale that conveys storm water. The grassed swales are usually pitched at a minimum of 1 percent to prevent standing water and end at a drop-inlet storm structure or waterbody. Historically, improperly designed swales posed health concerns because they served as breeding areas for insects and caused flooding. However, if communities follow current engineering standards for the design of swales, they no longer have to concern themselves with the associated health and flooding issues (see Section 2.3.3.1 for additional information on grassed swales).

4.2.3 INTERSECTIONS

A curb radius is the radius of the circle formed by the curve of the curb at the intersection corners.

Intersections create large areas of impervious surface within residential subdivisions. Reducing the overall size and width of intersections can decrease the volume of storm water runoff. Depending on the class of street entering the intersection, the number of travel lanes, and the dimensions of the curb radii, intersection diameters can become overly wide. The larger the curb radii, the larger the intersection. Recommended ranges for curb radii are contained in Table 22. Smaller, tighter radii can slow turning traffic and make the intersection safer for pedestrians while limiting the expanse of impervious surface.

Type of Intersections	Curb Radius (in feet)
Local/Local	10 to15
Local/Collector	15 to 20
Collector/Collector	15 to 25

Source: AASHTO.

TABLE 22: RECOMMENDED RANGES FOR CURB RADII

One of the best ways to reduce the impacts of impervious areas within intersections is to incorporate a traffic circle into the middle of the intersection. A traffic circle in the center of an intersection serves a variety of functions. First, it can slow traffic through the intersection and community, making the area safer for pedestrians and vehicles. Second, storm water generated by the impervious areas of the intersection can be routed to a bioretention area sited in the center of the traffic circle where it is detained and treated. Finally, traffic circles can add character to a neighborhood and create visual interest along the streetscape.

Traffic circles are usually smaller than their counterparts, the traffic roundabout. While traffic circles are more appropriate for lower-speed, smaller-volume residential intersections, roundabouts are better suited for collector streets that serve higher traffic volumes. Generally, traffic circles are 15 to 20 feet in diameter and require no additional street space than standard intersections. The center can be planted with a variety of native plants that are well suited for harsher street conditions and whose root structures will tolerate periodic inundation with water and provide superior nutrient uptake.

4.2.4 CUL-DE-SACS

Cul-de-sacs are dead-end streets that terminate in bulb-shaped paved areas, with lots cited around the perimeter of the street (see Figure 18). Given homebuyer preferences for residential cul-de-sac properties, many developers try to incorporate as many cul-de-sacs as possible into new developments. Depending on a subdivision's lot size and street frontage requirements, five to ten houses can usually be located around a standard cul-de-sac perimeter. The bulb shape allows vehicles up to a certain turning radius to navigate the circle. To allow emergency vehicles to turn around, cul-de-sac radii can vary from as narrow as 30 feet to upwards of 60 feet, with right-of-way widths usually extending ten feet beyond these lengths.

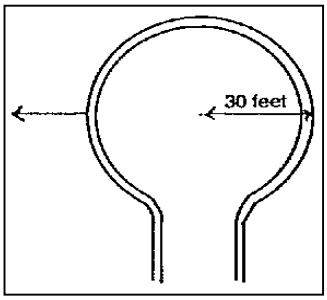

FIGURE 18. STANDARD CUL-DE-SAC

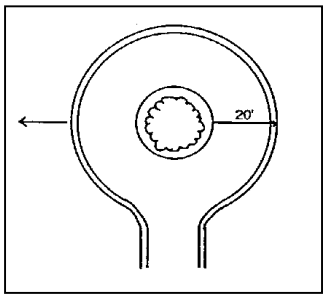

FIGURE 19. STANDARD BIORETENTION CUL-DE-SAC

Unfortunately, cul-de-sacs create excessive amounts of pavement that generate large volumes of storm water runoff. However, to reduce the expanse of paved surface and treat the runoff from the remaining pavement, cul-de-sacs can be designed with center vegetated islands (see Figure 19). As with intersections, the islands can be constructed as bioretention areas that detain storm water and filter urban pollutants such as grease, oils, hydrocarbons, and nutrients. For safety reasons, bioretention areas should be designed with underdrain and emergency overflow systems that safely convey peak flows into conventional storm drains.

Cul-de-sac designs with center bioretention islands should, at a minimum, retain 18-foot pavement widths around the island. To accommodate emergency vehicles, school buses, and sport utility vehicles, the portion of the travel way at the top of the island, which is directly opposite the entry, may be widened by several feet. Curb aprons can replace curb and gutter systems for the islands and allow water from the street to enter the system easily.

For dead-end streets serving fewer than ten houses, another option for reducing the expanse of impervious surface is "T-" or "Y-"turnarounds or auto courts (see Figure 20). These designs function much as cul-de-sacs but, due to a reduction in the area of paved surface, cannot accommodate bioretention areas in their centers. However, given that a standard 60-foot by 20-foot T- or Y-turnaround yields a paved area only 43 percent as large as the smallest (30-foot radius) circular turnaround, the turnaround generates much less storm water runoff (National Association of Home Builders, 2001) than that associated with traditional cul-de-sacs. Runoff could even undergo treatment in curbside swales located within the right-of-way.

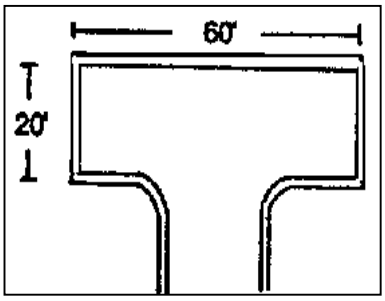

FIGURE 20. STANDARD “T-”TURNAROUND

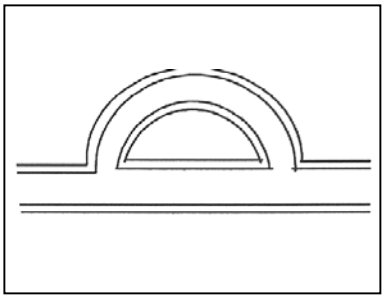

FIGURE 21. STANDARD LOOP TURNAROUND

An auto court is a functional automobile and pedestrian area that is surrounded by a cluster of homes and usually paved with decorative brick or stone pavers. Individual shortened driveways or garages are located immediately off the court. Auto courts use permeable paving systems, allowing runoff to percolate into and undergo filtration by the subsoil underlying the pavers. The systems help recharge local groundwater tables and reduce the need for conventional storm water management improvements. It should be noted, however, that the labor and material costs associated with the individually placed pavers exceed the cost of conventional asphalt paving. Costs may also be incurred for regular maintenance to remove any sediment and silt that accumulate in spaces between the pavers.

Looped turnarounds (see Figure 21) are another option for providing access to a small number of lots while limiting the expanse of impervious surface. Looped roads offer the same private and emergency vehicle access as standard cul-de-sacs, but without the added asphalt and construction costs. Similar to cul-de-sacs with center bioretention areas, the pavement width on a loop road should be no less than 18 feet to accommodate buses, emergency vehicles, and sport utility vehicles.

4.2.5 PARKING

No other decision can affect the final width of streets and ultimately the generation of storm water runoff as much as parking requirements. Most local ordinances require at

least 2 to 2.5 parking spaces per residence, either accommodated in a garage, in a driveway, or on the street. Current residential street standards tend to accommodate street parking on both sides of the street when in fact, the houses served by the street usually provide ample parking either in a driveway or garage. Most on-street parking spaces are 8 feet by 20 feet, resulting in long, underused street sections outside the general path of travel and excessively wide streets that are both expensive to construct and generate considerable quantities of storm water runoff. It is estimated that each seven- to eight-foot on-street parking lane can increase a street's impervious cover by 25 percent (Sykes, 1989). Given that most municipalities require post-development stormflows not to exceed pre-development flows, compliance with parking standards can translate into added costs for storm inlets, piping, and detention basin sizing.

From a water quality standpoint, water temperature can increase as storm water runoff moves across heated asphalt. As elevated-temperature water flows to a waterbody, it can damage sensitive aquatic environments, especially cold-water fisheries. The reduction of on-street parking, however, allows for narrower streets that can take advantage of the cooling effects of shade trees.

4.3 ALTERNATIVE APPROACHES TO CIRCULATION AND DESIGN

4.3.1 ALTERNATIVE DESIGN CONSIDERATIONS

Just as alternative street types and pavements can reduce infrastructure costs and environmental impacts, so, too, can alternative residential street layouts. When coupled with narrower, open-section streets, a well-designed street layout can eliminate hundreds of square feet of impervious surface. Depending on the density, location, and type of subdivision, different types of street layouts may easily lend themselves to a cluster arrangement, conserving natural features, maintaining open space, and protecting water quality.

Rethinking traditional circulation designs within residential subdivisions can result in:

- Decreased storm water quantities and nonpoint source pollution;
- Increased groundwater recharge; and
- Increases in community open space.

Traditional grid, curvilinear, and hybrid street patterns each have different characteristics that affect traffic movement, environmental values, and community aesthetics (see Figure 22). Grid patterns are typical of older, densely settled urban areas and are particularly effective in expediting traffic flow. Yet, research has indicated that they require 20 to 25 percent greater total street length than traditional, suburban curvilinear patterns and are most appropriate for flat sites with several access points. Given that densities in grid areas are often high, parking is generally needed on at least one side of the street.

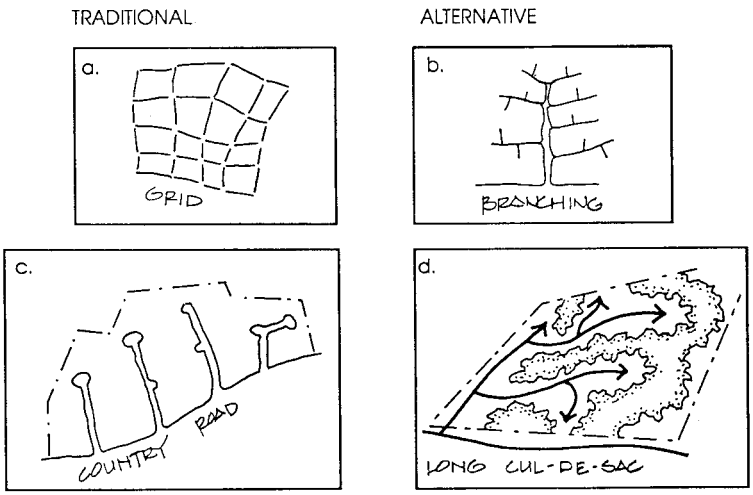

FIGURE 22. STREET LAYOUT EXAMPLES

Curvilinear patterns are best suited for larger-lot communities or communities with undulating topography. They are most popular in suburban settings and usually maximize the use of long cul-de-sacs that concentrate clusters of houses around natural resource areas, such as waterbodies. While the use of longer, winding streets and cul-de-sacs translates into greater expanses of impervious surface, communities can narrow their streets by limiting parking to only on one side of the street.

Possibly the best choice for suburban systems are hybrid layouts. Hybrid systems provide a balance between conventional grid and curvilinear patterns and are well suited to developments characterized by a mix of housing types and styles. They also permit the creation of open space. Hybrid systems can minimize the need for clearing and grading and help protect forests, wetlands, and trees.

Traffic Calming

Traffic calming refers to a set of measures designed to mitigate the effects of unmanaged traffic on urban and suburban roadways. While the use of traffic calming as a traffic mitigation strategy is beyond the scope of this publication, the practice is discussed here in terms of its relationship to low impact development and storm water management.

Certain traffic-calming measures, such as roundabouts or traffic islands, can be designed as vegetated bioretention islands that retain and treat street runoff. A traffic roundabout is a circle centered in an intersection; it slows traffic entering the intersection and directs it to exit points around the circle. Usually, a roundabout is raised and includes curbs and areas planted with grass or vegetation. Where street grades allow, roundabouts can be converted into bioretention areas.

Bioretention areas can be bordered by either curb cuts or flush-mount curbs that allow water to exit an intersection efficiently and enter the treatment system. Either treatment method allows for a transition between the street pavement and vegetated and mulched areas. As storm water enters the system, specially selected vegetation and engineered

soils retain and treat it. For reasons of safety, roundabouts designed for bioretention should incorporate underdrains and/or emergency overflow areas to prevent excessive ponding or flooding.

Clustering

With respect to lot layout, developers can turn to methods such as clustering to preserve open space, reduce infrastructure costs, and accommodate growth. This strategy concentrates small pockets of homes around the site in the least environmentally sensitive areas. In a clustered community, homes may be built on lots as small as 8,000 square feet, allowing developers to preserve unique land forms, trees, and vistas. Developers may need to work with local zoning officials to allow the use of clustering, if current zoning ordinances do not allow it. In addition, potential homeowners may need to be persuaded that cluster development creates a community that offers ample amounts of open space within walking distance of their homes.

> More than half of the 1,350 real estate agents surveyed by Bank of America thought that trees have a positive impact on potential buyers' impressions of homes and neighborhoods. In addition, 84 percent of agents indicated that a home with trees would be as much as 20 percent more salable than a home without trees.
> *Source: Building Greener Neighborhoods.*

Tree-Save Areas

Many parcels of land offer an array of natural resources that ingenious developers can capitalize on and transform into desirable design features. While most of this section of the publication has focused on ways to protect the water supply and thus enhance the environment, trees are a feature that homeowners value for their aesthetic and environmental benefits. Trees can shade homes, streets, parking areas, sidewalks, and paths, adding to the visual appeal of communities and helping to reduce heat island effects. Developers are beginning to recognize that lots with mature trees often sell for more than comparable lots without such trees.

> Native trees should be identified during a project's planning stage. The Building *With* Trees (BWT) program offers more details on how best to preserve appropriate trees. The National Arbor Day Foundation, with support from the National Association of Home Builders, created the BWT program to help developers streamline the process of saving natural resources during land development. Program details can be found at http://www.arborday.org/programs/buildingwithtrees/

Solar Orientation

In an effort to maximize energy efficiency for homeowners, some developers are building resource-efficient communities by orienting streets and lots to take advantage of passive solar design. Passive solar design optimally uses the sun's energy for heating and cooling. During the design process, builders aim to orient as many lots as possible to take advantage of solar benefits. The optimum position for maximum passive solar orientation is to orient the façade of the house directly south, however, the axis can vary within 20 degrees of true south with minimal detrimental effect on solor gain. Streets should be oriented on an east-west axis.

4.3.2 ALTERNATIVE STREET TYPES

To meet the multiple and sometimes competing goals of creating affordable, environmentally friendly, and aesthetically pleasing communities, developers are incorporating alternative street designs into their plans. Each alternative street and path type has unique characteristics that help it fit into one part of the community, but not the other. One street type does not fit all situations.

Queuing Streets

Prairie Crossing, a development near Chicago, focused on creating a community that embraces environmental protection, a sense of place, and resource conservation. Sales for Prairie Crossing homes are at a 40 percent premium over comparable homes nearby.

Queuing streets are narrower street types that contain one parallel parking lane and a travel lane sufficiently wide to accommodate the passage of larger emergency and service vehicles. In instances where cars park along the roadway, queuing streets require one car to wait temporarily in "queue" until the oncoming car passes (see Figure 23). Traditionally used in older, closer-in suburban neighborhoods, queuing streets are enjoying a renaissance

Typically, queuing streets range between 20 and 26 feet wide, with a 12- to 13-foot travel lane and a seven-foot parallel parking lane. Compared to a typical 36-foot-wide street, queuing streets can reduce planning and design costs as well as other infrastructure costs, such as those associated with storm water management. It has been estimated that the elimination of parking on one side of the street can reduce storm water runoff by 25 percent (Center for Watershed Protection, 1998).

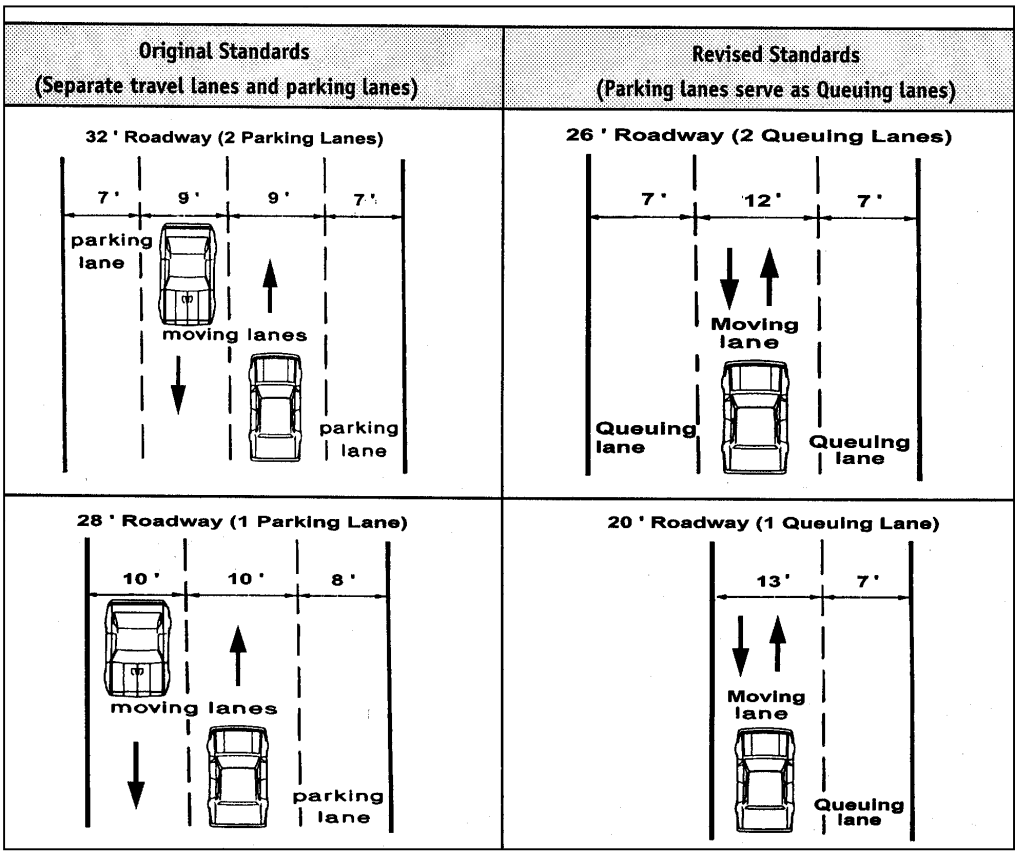

Source: Portland (OR) Office of Transportation, 1994.

FIGURE 23. A COMPARISON OF QUEUING STREETS VERSUS TRADITIONAL STREETS

From an environmental standpoint, narrower street rights-of-way can limit the amount of land areas subject to clearing and grading, make more land available for open space, and protect natural resource areas. Smaller streets also provide safer environments for pedestrians, which encourages walking and reduces dependence on the automobile.

Alleys

Alleys are considered a neotraditional design element that can be incorporated into residential designs to provide garage access and parking while accommodating functions such as utility maintenance and refuse collection. Alleys can also alleviate the need for on-street parking, which can increase street widths and the expanse of impervious surface. To limit the expanse of impervious surface, alleys should be no wider than 12 feet and constructed without curbs. An inverted crown that channels water to the center of the alley and then to either a storm drain or bioretention area can accommodate drainage.

Open-Section Streets

Instead of sending storm water to curbs and gutters, open-section roads drain storm water into grassed swales, where vegetation and soils treat pollutants. It has been estimated that, compared with any other residential design feature, streets contribute the highest volume of pollutants to urban storm water (Bannerman et al., 1993). Accordingly, where

density and traffic flow allow, streets with curb and gutter sections should be designed as open-section roadways.

For public works departments in most communities, maintenance concerns dictate a preference for curb and gutter roads in place of grassed swales. Grassed swales are more likely to be damaged by cars, erosion, and so forth while curb and gutter streets are easier to clean and provide a clear transition between pavement and lawn. However, in many localities, curbs and gutters drain directly to streams, lakes, and rivers, where they deposit harmful urban pollutants.

Open-section streets are less expensive to construct than curb and gutter systems. One study for a project in northern California in 2001 suggested that each linear foot of six-inch curb and gutter added approximately $12.65 to street construction costs (NAHB Residential Streets, 2001).

4.3.3 SHARED DRIVEWAYS

Shared driveways, sometimes referred to as pipestems, are another design tool that can help reduce the expanse of impervious surfaces. Driveways account for as much as 20 percent of the impervious cover in a residential subdivision (Center for Watershed Protection, 1995). Similar to a cul-de-sac, a shared driveway provides access to several houses from a single egress point off the local street. However, unlike cul-de-sacs, shared driveways terminate at the last house served instead of at a large impervious turnaround area. Table 23 provides several objectives for reducing impervious areas in driveways.

- Shorten driveway length through reduced front yard setback requirements.
- Reduce driveway widths or encourage driveway sharing between two or more homes.
- Use permeable pavements or a two-track surface with grass in between to facilitate water infiltration.

TABLE 23. DRIVEWAY CONSIDERATIONS FOR REDUCING IMPERVIOUS AREA

Where used in the appropriate situation and correctly designed, shared driveways can be functional, attractive, and environmentally friendly. In fact, alternative pavement materials such as bricks or pavers can further reduce a shared driveway's storm water runoff.

4.3.4 SIDEWALKS AND PATHS

While sidewalks and paths are an integral part of a community's transportation and circulation design, their impervious surface nonetheless contributes to the community's overall volume of storm water runoff (see Table 24). Depending on the density of the community and the type of street classification, sidewalks on only one side of the street might be appropriate; in the case of rural residential streets (250 average daily trips, sidewalks might not be needed at all. In rural residential instances, rights-of-way with a sufficiently wide gravel path can accommodate pedestrian and bicycle travel. Where used in combination with open-section roadways, sidewalks should be located several feet back from the outside crest of the grassed swale to allow for maintenance of the

swale and snow storage. Sidewalks should be horizontally sloped to drain toward roadside grassed swales and away from front yards.

- Shorten sidewalk length from the house to the street by reducing front yard setback requirements.
- Maximize sidewalk widths at four feet, depending on density.
- Increase the distance between the street and sidewalk to increase the likelihood that the grassy strip will be able to capture and absorb sheetflow from the sidewalk. Similarly, grade the sidewalk such that runoff drains toward the front yard and not the street.
- Place sidewalks in areas with pedestrian traffic.

TABLE 24. SIDEWALK CONSIDERATIONS FOR IMPERVIOUS AREAS

To reduce further the total expanse of a site's impervious surface, the use of pervious materials for sidewalks and paths might be considered in place of traditional concrete or asphalt. When properly maintained, alternative materials such as brick, compacted stone dust, and wood chips all accommodate safe passage of pedestrians and bicycles and, in most cases, still meet Americans with Disabilities Act (ADA) requirements. Permeable materials reduce the volume of slow runoff, allowing it to recharge groundwater.

4.3.5 ALTERNATIVE PAVEMENTS

Alternative pavements for streets, alleys, sidewalks, paths, and driveways should be considered along with traditional asphalt and concrete. Brick, block, concrete, and stone pavers reduce the percentage of site's impervious surface as well as the demand for conventional storm water management facilities. Unlike conventional pavements, pavers encourage groundwater recharge and reduce the runoff of pollutants such as oil, grease, hydrocarbons, and nutrients. A variety of alternative pavements can also meet different traffic, regulatory, climatologic, and aesthetic concerns. In addition to their environmental benefits, alternative pavements such as brick can add visual appeal and character to residential properties.

Material	Initial Cost	Maintenance Cost	Water Quality Benefits
Asphalt/Concrete	Medium	Low	Low
Pervious Concrete	High	High	High
Porous Asphalt	High	High	High
Turf Block	Medium	High	High
Brick	High	Medium	Medium
Natural Stone	High	Medium	Medium
Concrete Unit Paver	Medium	Medium	Medium
Gravel	Low	Medium	High
Wood Mulch	Low	Medium	High
Cobbles	Low	Medium	Medium

Source: Bay Area Storm Water Management Agencies Association (BASMAA), Start at the Source: Residential Site Planning & Design Guidance Manual for Storm Water Quality Protection*, 1997.*

TABLE 25. FUNCTIONAL COMPARISON OF VARIOUS TYPES OF ALTERNATIVE PAVEMENTS

Compared with conventional paving systems, material and installation costs can be higher for alternative paving systems (see Table 25). It is estimated that, while asphalt paving costs between $0.50 and $1.00 per square foot installed, interlocking concrete paving blocks can range anywhere from $5.00 to $10.00 per square foot. However, given that porous asphalts can help reduce overall storm water infrastructure costs, the total costs of site development can be significantly reduced, especially when considering the savings associated with potentially eliminating storm water management ponds. Clearly, any comparison of the costs of alternative versus traditional pavements should factor in total land development costs.

Some manufacturers are now producing pervious concrete products that decrease runoff and encourage infiltration. Pervious pavement such as porous asphalt or concrete can also decrease storm water conveyance costs and increase environmental quality. It is estimated that pervious pavements such as porous asphalt cost approximately 10 percent more that conventional nonporous asphalts. To maintain their efficiency and porosity, pervious pavements and pavers require regular maintenance to remove accumulated sediment and dirt.

4.3.6 ALTERNATIVE LOT SHAPES

Individual house lots are usually regularly shaped, that is, rectangular or square, and each lot has direct access to the street. In their attempt to conserve open space and reduce developed areas, low impact developments sometimes call for alternative lot shapes, including flag, zero-lot-line, Z- and angled Z-, or zipper lots. Figure 24 provides basic diagrams of alternative lot designs.

Flag lots, sometimes referred to as pipestem lots, mesh well with the concept of shared driveways. They accommodate a house or houses built behind another house, with one common driveway leading to the street. Flag lots are sometimes used to give developers

access to unused, landlocked spaces that are not preferred agricultural or conservation areas. The Center for Urban Policy Research defines a flag lot as a large lot not meeting minimum road frontage requirements and where access to the public road is by a narrow, private right-of-way or driveway. Zero-lot-line lots provide for greater usable yard space on each lot. The lots locate one side of the house on the lot line while the other side of the house faces the usable space. Interspersing various innovative lot types in a community can help developers incorporate passive solar design into house designs.

Z- or angled Z-lots are similar to zero-lot-line lots except that they are angled by about 30 to 40 degrees, allowing developers to alternate side- and front-loaded garages. In a zipper lot, the minimum rear setback is zero, and the rear yard depth varies to concentrate usable space on the side of the lot.

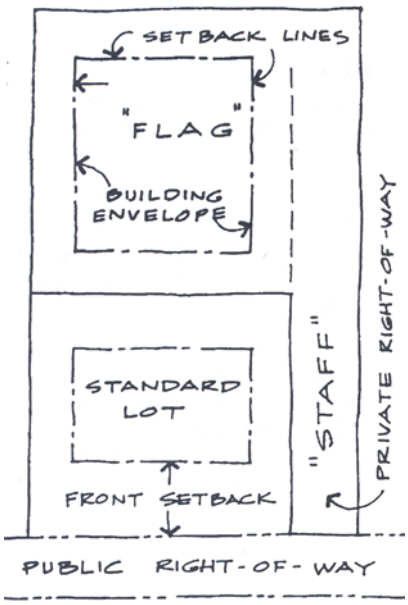

FLAG LOT

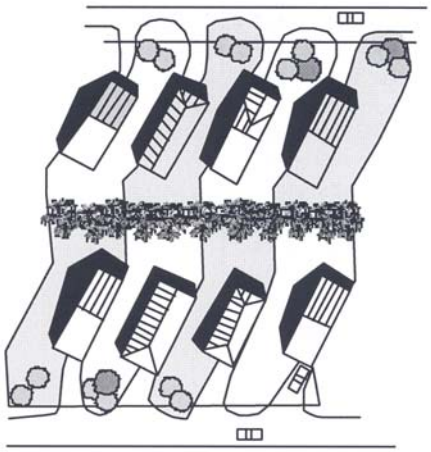

Z- OR ANGLED Z-LOT

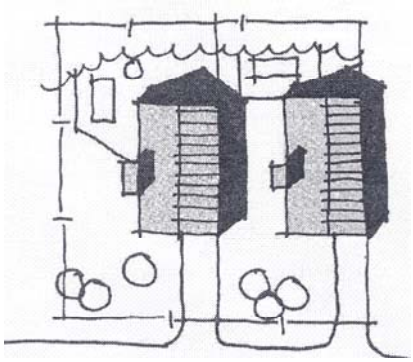

ZERO-LOT-LINE LOT

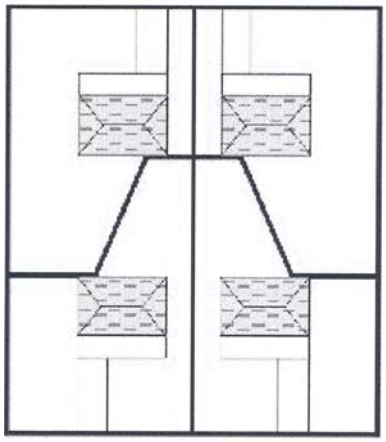

ZIPPER LOT

FIGURE 24. ALTERNATIVE LOT DESIGNS

4.4 ADDITIONAL RESOURCES

Additional resources that provide more detail on circulation and design are listed below. The resources are not provided as endorsements, merely as educational and reference tools. Given regional variations in climate and land development needs, we have included regional-specific resources. It is important to note, however, that addresses, especially Internet links, are subject to change. This list contains the latest links and addresses as of the printing of this publication.

Circulation Design and Resources

City of Portland Department of Transportation
http://www.trans.ci.portland.or.us/trafficcalming/devices/skinnystreets.
Information on Portland's Skinny Streets Program, including local traffic streets, queuing streets, and traffic-calming measures.

Geometric Design Practices for European Roads
http://international.fhwa.dot.gov/Pdfs/Geometric_Design.pdf
Practices and procedures in roadway geometric design and contextual design that seek a balance among safety, mobility, and community interests.

Sierra Club
http://www.sierraclub.org/sprawl/articles/narrow.asp
Web site discusses the value of narrow streets for slowing traffic, reducing vehicular crashes, and increasing neighborhood safety.

Organizations and Internet Resources

Center for Livable Communities
http://lgc.org/clc
Guidebook on how to implement designs for safe, efficient, and aesthetically pleasing streets.

Institute of Transportation Engineers
http://www.ite.org
Publications focusing on traditional neighborhood design and circulation patterns, including street space, connectivity, emergency access, parking, safety, and geometric design.

Local Government Commission
http://lgc.org/clc/
Publication on local communities' insight into how to implement local street.initiatives.

The Conservation Fund
http://www.conservationfund.org/
In partnership with the Urban Land Institute (http://www.uli.org), a workshop entitled "The Practice of Environmentally Sensitive Development" covers the full range of project planning, design, and construction.

Walkable Communities, Inc.
http://walkable.org
A nonprofit group that helps Florida communities become more walkable and pedestrian-friendly.

Publications

Longmont, Colorado, Street Study
A study by Swift and Associates correlating 20,000 accident reports over an eight-year period with 13 variables associated with the street. http://members.aol.com/phswi/swift-street.html

Residential Streets
A comprehensive design publication for residential streets published jointly by the National Association of Home Builders (NAHB), American Society of Civil Engineers (ASCE), and the Urban Land Institute (ULI). (800) 321-8050.
http://www.builderbooks.com

Roundabouts: An Informational Guide
A comprehensive source of information on modern roundabouts and their uses. (301) 577-0818.

Street Design Guidelines for Healthy Neighborhoods
http://lgc.org/clc
A publication of the Center for Liveable Communities to help communities implement guidelines for safe, efficient, and aesthetically pleasing streets for vehicular and pedestrian traffic.

Traditional Neighborhood Development Design Guidelines: Recommended Practice
A publication of the Institute of Transportation Engineers on neighborhood and street design, including sections on street space, connectivity, emergency access, parking, safety, and geometric design.

Regional-Specific Resources

Northeastern United States

Conservation Law Foundation
"Take Back Your Streets" focuses on the history of road design and its legal aspects in New England. (617) 350-0990.

Southeastern United States

Montgomery County, Maryland
Residential traffic-calming program to help reduce speeding and improve the residential environment.
http://www.dpwt.com/TraffPkgDiv/triage.htm

Walkable Communities
A 12-step program by the Florida Department of Transportation to encourage safe travel

for pedestrians and vehicles.
http://www.sustainable.doe.gov/pdf/walkable.pdf

Western United States

Citizens for Sensible Transportation
http://cfst.org/
A nonprofit group in Oregon that offers several publications on traffic calming and neighborhood livability.

Reclaiming Our Streets Task Force
http://www.trans.ci.portland.or.us/trafficcalming/reports/ArterialProgram/cover.htm
Community action plan to implement neighborhood transportation- calming techniques in the Portland, Oregon, area.

APPENDIX A - GLOSSARY

Aerobic--Having molecular oxygen as a part of the environment or growing or occurring only in the presence of molecular oxygen, as in aerobic microorganisms.

Anaerobic--Characterized by the absence of molecular oxygen or growing in the absence of molecular oxygen (as in anaerobic bacteria).

Best Management Practice (BMP)--A structural device or practice designed to mitigate the effects of storm water runoff to attenuate flooding, reduce erosion, and reduce pollution. BMPs include a variety of **Low impact development** practices such as bioretention, sand filters, and infiltration trenches.

Bioretention--A structural storm water practice that uses soils and vegetation to treat pollutants in urban runoff and to encourage infiltration of storm water into the ground.

Buffer--Area in its natural state left between development and a shoreline, wetlands, or stream to protect water quality. Development is restricted in a buffer zone.

Community Wastewater Treatment System--Term commonly used to describe an aerobic treatment unit serving multiple dwellings or an education, health care, or other large facility.

Cul-de-Sac--A residential street terminating in a closed, circular dead end that allows vehicles to turn around.

Curvilinear Street Pattern--A street layout that follows the natural contours of the site and relies on curving roadways and cul-de-sacs to reduce vehicle speeds and cut-through traffic.

Environmentally Sensitive Development--Development intended to conserve, protect, and enhance a site's natural resource systems through careful planning and design of site elements.

Eutrophication--A phenomenon caused by excessive plant nutrients in which waterbodies are deprived of oxygen and become uninhabitable for aquatic life. Streams and lakes receive excessive amounts of plant nutrients (primarily phosphorus, nitrogen, and carbon) in various ways. Runoff from agricultural fields, field lots, urban lawns, and golf courses are common sources of the nutrients. Untreated or partially treated domestic sewage is another major source.

Green Infrastructure--A strategically planned and managed network of wilderness, parks, greenways, conservation easements, and working lands with conservation value that supports native species, maintains natural ecological processes, sustains air and water resources, and contributes to the health and quality of life for America's communities and people (see http://www.greeninfrastructure.net/Intro/Definition.htm).

Groundwater--Water that is underground in cracks and spaces in soil, sand, and rocks. The layers of soil, sand, and rocks are also known as aquifers. Groundwater is used for drinking water by more than 50 percent of the U.S. population, including almost all residents of rural areas.

Hybrid Street Network--A street layout that is a mix between a traditional grid pattern and a curvilinear pattern. It can reduce a community's overall street length while still providing the functions of access, circulation, and parking.

Impervious Area--Any area in the landscape that cannot effectively allow the absorption and infiltration of rainwater into the ground.

Impervious Cover--Any surface in the built environment that prohibits the percolation and infiltration of rainwater into the ground.

Jurisdictional Wetlands--A wetlands or other water of the United States regulated under the Clean Water Act.

Low Impact Development (LID)--An approach to land development that uses various land planning and design practices and technologies for simultaneously conserving and protecting natural resource systems and reducing infrastructure costs.

Nonpoint Source Pollution--Water pollution caused by rainfall washing over and through land surfaces and carrying with it pollutants from the human environment. The Clean Water Act regulates nonpoint source pollution, which differs from point-source pollution.

Open-Section Roadway--A roadway that is constructed with gravel shoulders and grassed swale systems, instead of with curb and gutter systems, to convey storm water.

Open Space--Land set aside to remain undeveloped for a community's public use and enjoyment.

On-Site Wastewater Treatment System (OWTS)--A system that relies on natural processes and/or mechanical components to collect, treat, and disperse/discharge wastewater from individual dwellings or buildings.

Queuing Street--A street sufficiently wide for one travel lane and one parking lane that forces one of two passing automobiles to yield temporarily. These streets accommodate all the functions of normal streets, including emergency access, and reduce impervious areas and therefore storm water runoff.

Resource-Efficient Development (RED)--An innovative land development approach that incorporates environmental considerations into the land planning and design process to minimize impacts on local resources.

Right-of-Way--The width of the total land area required for street paving, curb and gutter, utilities, sidewalks, and street trees. Right-of-way widths should be the smallest measurement possible that accommodates these uses.

Riparian--Of or pertaining to stream systems or stream corridors. Riparian areas usually include a stream channel, its banks, the floodplain, and associated vegetated buffers.

Sand Filter--A packed-bed filter of sand or other granular material used to provide advanced secondary treatment of settled wastewater or septic tank effluent. Sand/media filters consist of a lined (e.g., impervious PVC liner on sand bedding) excavation or structure filled with uniform washed sand that is placed over an underdrain system. The wastewater is dosed onto the surface of the sand through a distribution network and allowed to percolate through the sand to the underdrain system, which collects the filter effluent for further processing or discharge.

Sedimentation--The transport, deposit, and accumulation of soil material by wind and water. Sedimentation is usually associated with the accumulation of soil material in waterbodies.

Septic Tank--A buried tank, designed to be watertight, that is constructed to receive and partially treat raw wastewater. The tank separates and retains settleable and floatable solids suspended in the raw wastewater. Settleable solids form a sludge layer at the tank bottom. Grease and other light materials float to the top to form a scum layer. The removed solids are stored in the tank, where they undergo liquefaction, which partially breaks down organic solids into dissolved fatty acids and gases. Gases generated during liquefaction are normally vented through a building's plumbing stack vent.

Setback--The minimum distance that design elements must be placed from other elements. For example, houses usually have front, side, and rear yard setbacks from streets and other buildings.

Sheetflow--The movement of rainwater across the surface of the landscape in response to topographic conditions.

Storm water Management--An integrated system of practices and techniques for managing the safe and efficient handling of post-development rainwater.

Subdivision--The process of dividing land into smaller parcels to accommodate housing, roads, open spaces, and utilities.

Swale--A small, linear topographic depression used to move water from one location to another.

Variance--A request to a zoning authority to deviate from the approved development ordinances of a particular area. For instance, a variance might be requested to waive a 40-foot front yard setback so that houses might be sited closer to the street.

Wastewater Treatment Facility--A wastewater treatment facility collects waste streams from residential, commercial, and industrial sources through sewer systems and treats the water to prescribed levels before release into a waterbody.

Zoning--Regulations governing the use, placement, spacing, and size of land and structures within a specific area.

APPENDIX B—CASE STUDIES

Appendix B contains the following case studies:

- Chancery on the Lake
- Duke Street Square
- Kensington Estates
- Phillippi Creek Septic System Replacement Program
- Ron Tyne and Associates
- Somerset Community

CHANCERY ON THE LAKE

Chancery on the Lake is a condominium development centered around a 14-acre wet pond. The lake is marketed as a feature of the development, resulting in an increased sales pace relative to that of competitors. In fact, the developer realizes a premium of $7,000 to $10,000per lakefront unit.

VIEW OF THE WALKWAY, PICNIC AREA, AND LAKE

Specifics

- Seven-acre, 170-unit condominium development in Alexandria, Virginia, centered around a large urban runoff pond.
- Prices for the condominiums range from $129,990 to $139,990 (Frederick et al., 1995).
- 14-acre pond surrounded by picnic tables, a gazebo, and a walking trail, with a fishing pier planned for construction (Frederick et al., 1995).
- $7,000 to $10,000 premium for condominiums fronting on the lake (Flora, 1997).
- Above-average sales pace for the area and the condominium market; a significant number of sales from buyers who shopped around and then were attracted to Chancery because of the lake (Flora, 1997).
- Pond marketed as a selling point (Flora, 1997).
- Lake constructed by damming an existing creek, with some excavation of the surrounding area to achieve the desired shape and volume.
- No maintenance required other than mowing grassed areas, visual inspections of the dam and lake, and sediment removal from the rip-rap outfall structure (Scalia, 1997).

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- Vic Scalia, Halle Enterprises. Silver Spring, MD. (301) 495-1520, personal communication.

DUKE STREET SQUARE

Duke Street Square uses a sand filter, which is a best management practice, to filter pollutants out of storm water runoff. At this urban site, buildable land was at a premium. An underground sand filter satisfied storm water management requirements without consuming buildable land area. The developer was able to add five to seven townhomes that would have been lost to land for a pond.

VIEW OF THE INSIDE OF A SAND FILTER SIMILAR TO THE ONE INSTALLED AT DUKE STREET SQUARE

Specifics

- 40-unit townhouse development in Alexandria, Virginia.
- Off-line sand filter system serves 1.38 impervious acres.
- Parking lot designed with grate inlets connected to underground pipes that carry storm water to the sand filter. Flows in excess of 0.5 inches of rainfall in a single event are diverted to the city sewer system.
- The filter's concrete chamber was cast in place (Keller, 1997).
- Underdrains transport filtered water to the city storm sewer system (Keller, 1997).
- Northern Virginia land prices of approximately $40 per square foot make it costly to install dry ponds, wet ponds, or storm water wetlands (Bell, 1997); the sand filter system uses no buildable area.
- Townhouse total includes between five and seven townhouses that normally would have been lost to land needed for a dry pond (Teets, 1997).

Cost Data

- Construction of the sand filter totaled $41,030, including the dry vault sand filter, two monitoring manholes, pipes with connections, and the sand filter itself ($35,197). The entire system cost $29,732 per impervious acre while the sand filter alone cost $25,505 per impervious acre.

- Filter's sand bed will need replacement approximately every five years.
- System will need periodic inspection and removal of accumulated trash from grate inlets, pre-treatment structure, and filter bed.

Community Acceptance

- The homeowner association has set aside money for routine and nonroutine maintenance.

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- Glenn Teets, Project Manager, Wills Company. Vienna, VA. (703) 760-9600.
- R.J. Keller, L.S. Project Manager, R.C. Fields, Jr., and Associates, P.C. Alexandria, VA. (703) 549-6422.
- Warren Bell, City Engineer, City of Alexandria. Alexandria, VA. (703) 838-4327.

KENSINGTON ESTATES

At Kensington Estates the use of LID technologies in a conventional, 103-lot single-family development planned on 24 acres in unincorporated Pierce County were evaluated. The site was characterized by poor soils. The development took advantage of the new Western Washington Storm Hydrology Model (WWHM) to illustrate the full range of LID technologies in the site's redesign.

Specifics

- Maintained lot yield of 103 lots.
- Designed a roadway system adequate for emergency vehicles.
- Achieved "zero" effective impervious surfaces.
- Incorporated full range of LID techniques, including soil rehabilitation, rain gardens, bioretention, and pervious pavement;
- Provided adequate off-street parking.
- Reduced total project impervious pavement.
- Minimized piped conveyance.

Cost Data

A cost evaluation of the redesign further illustrated the potential benefits of LID. Overall, the LID project permitted construction cost savings of over 20 percent over the conventional project. It achieved the largest share of savings by reducing the size of the storm pond structures and eliminating catchments and piped storm conveyance. Excavation and erosion control costs were also significantly reduced.

Even though the LID design called for a roadway width of 20 feet, the proposed use of porous paving material and of "looped" cul-de-sac clusters designed for emergency vehicle access made the costs associated with roadways and utilities roughly equal to or slightly higher than the costs for conventional materials and design.

PHILLIPPI CREEK SEPTIC SYSTEM REPLACEMENT PROGRAM

In Sarasota, Florida, available and applicable on-site wastewater treatment and collection technologies were evaluated (see Figure 25) to determine their potential for improving current wastewater treatment and disposal practices in Phillippi Creek.

Specifics

- Available technologies were grouped into three major categories for evaluation: natural systems (e.g., conventional septic tank and subsurface wastewater infiltration systems [SWIS] and septic tank and subsurface drip irrigation [SDI] systems); engineered biological systems (e.g., suspended growth systems, submerged biofilters, and unsaturated biofilters); and waste segregation systems (e.g., nonwater carriage toilets and on-site greywater treatment systems).
- Based on the number of connections, total flow, and available treatment plant and transmission capacities, the project area was previously divided into sixteen (16) manageable areas referred to as Wastewater Project Improvement Areas (WPIA).
- The cost analysis addressed natural systems and engineered biological systems but, because of a variety of implementation problems, including community acceptance, did not address waste segregation systems.

FIGURE 25. EVALUATION PROCESS FOR COMPARING COLLECTION AND ON-SITE WASTEWATER TREATMENT SYSTEM ALTERNATIVES

Cost Data

- The capital cost of a septic tank with a mound with 12-inch fill was $6,000.
- The capital cost of a septic tank with subsurface drip irrigation with 12-inch fill was $7,900.
- In terms of uniform annual cost, the septic tank with SWIS mound was the most cost-effective alternative in a low-density area. In medium- and high- density areas, the vacuum sewer system was the most cost-effective alternative.

RON TYNE AND ASSOCIATES

Terry Paff, president of Metropolitan Realty and Development in Sherwood, Arkansas, wanted to create a development that appealed to both the general public and permitting and review officials. He approached Ron Tyne of Tyne & Associates with his idea and hired the consultant to redesign a conventional site plan developed for a 130-acre parcel. The case study underscores two important points. First, at project inception, developers must formulate a vision of what they want to achieve. They then need to communicate that vision to everyone involved in and affected by the project. Second, by reducing infrastructure costs and collaborating with public officials, a developer can realize a net increase in a project's lot yield.

Specifics

- The new design worked with the land's features. For instance, streets flowed with the terrain, minimizing excavation needs; drainage areas were preserved and buffered by greenbelts.
- Existing drainage courses form a network of green spaces called greenbelts that are connected by neighborhood hiking trails.
- Maximizing the number of lots that backed up to the greenbelts addressed concerns about privacy.
- The original plan's collector street was changed to include green space buffers and traffic-calming circles, thus allowing the developer to reduce street widths from 36 to 27 feet. In addition, trees were allowed to stay close to the curb line.
- The site uses native vegetation such as buffalo grass. Cleared trees were transformed into mulch.
- The original plan preserved 1.5 acres of green space while the revised plan saved 23.5 acres.
- Some of the development cost savings went to fund a neighborhood park with picnic facilities, a pavilion, and ball fields.

Cost Data

- Overall, the developer made an additional profit of $2.2 million on the project by using the practices above.

References:

- "Bridging the Gap: Developers Can See Green," *Land Development Magazine*, Spring/Summer 2000, pp. 27-31.
- The ToolBase PATH Technology Inventory provides information on low impact development: http://www.toolbase.org/tertiaryT.asp?CategoryID=1008&DocumentID=2007

SOMERSET COMMUNITY

In a typical suburban development in Prince George's County, MD, the developer incorporated shallow landscaped depressions called bioretention areas, also known as rain gardens (see Figure 26), into each lot to control storm water quantity and quality. The bioretention areas eliminated the need for a storm water pond, allowed the development of six extra lots, and resulted in a cost savings of more than $4,000 per lot.

A TYPICAL BIORETENTION AREAIN SOMERSET

Specifics

- 80-acre site in Prince George's County, Maryland, undergoing development into 199 homes on 10,000-square-foot lots.
- Prices begin at $160,000.
- Bioretention areas range between 300 and 400 square feet, with one to two bioretention areas per lot (Daniels, 1995).
- Bioretention areas located at low points on lots (see Figure 27).
- Water allowed to pool to a depth of six inches in the bioretention areas after each rain event; complete infiltration of ponded water achieved within 48 hours (Daniels, 1995).
- Bioretention areas combined with grassed swales to replace curbs and-gutters.
- Total cost approximately $100,000 compared with nearly $400,000 for the storm water ponds originally planned (Daniels, 1995).
- Six more lots added to the development, thus increasing revenue (Daniels, 1995).
- Eliminated traditional curbs and gutters and storm water pond by using the less expensive alternative of bioretention areas and grassed swales.
- Development marketed as environmentally friendly. When told that they were helping preserve the Chesapeake Bay, homeowners and potential buyers became excited and interested in helping (Coffman, 1997).
- Bioretention areas perceived by homeowners as free landscaping (Coffman, 1997).
- Total cost for each bioretention area is $500 ($150 for excavation and $350 for plants) (Daniels, 1995).

INDIVIDUAL BIORETENTION AREA

Cost Data

Description	Storm water Management Pond/Curb and Gutter Design	Bioretention System
Engineering Redesign	$0	$110,000
Land Reclamation (6 lots x $40,000 net)	$0	<$240,000>
Total Costs	$2,457,843	$1,541,461
Total Costs--Land Reclamation *plus* Redesign Costs	$2,457,843	$1,671,461
Total Cost Savings = $916,382		
Cost Savings per Lot = $4,604		

Source: Winogradoff, 1997.

Table 26. Cost Comparison of Conventional Storm Water System versus Bioretention

Community Acceptance

Somerset residents have enthusiastically accepted their bioretention areas. Homeowners are actively maintaining them and have lodged few complaints. Only one bioretention area has experienced functional problems, which probably resulted from the diversion of too much water. Safety issues or mosquitoes have not been a problem.

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CEQA The California Environmental Quality Act

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BUILDING INDUSTRY ASSOCIATION OF SAN DIEGO COUNTY et al., Plaintiffs and Appellants, v. STATE WATER RESOURCES CONTROL BOARD et al., Defendants and Respondents; SAN DIEGO BAYKEEPER et al., Interveners and Respondents.

D042385

COURT OF APPEAL OF CALIFORNIA, FOURTH APPELLATE DISTRICT, DIVISION ONE

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n1 Pursuant to California Rules of Court, rule 976.1, this opinion is certified for publication with the exception of Discussion parts III, IV, V, VI and VII.

SUBSEQUENT HISTORY: Modified by, Rehearing denied by Building Industry Assn. v. State Water Resources Control Bd., 2005 Cal. App. LEXIS 7 (Cal. App. 4th Dist., Jan. 4, 2005)
Time for Granting or Denying Review Extended Building Industry Assn. of San Diego v. Calif Regional Water Qlty Bd., 2005 Cal. LEXIS 2502 (Cal., Feb. 24, 2005)
Review denied by, Request denied by Building Industry Association of San Diego County v. California Regional Water Quality Control Board, 2005 Cal. LEXIS 3489 (Cal., Mar. 30, 2005)

PRIOR HISTORY: Superior Court of San Diego County, No. GIC 780263, Wayne L. Peterson, Judge.

COUNSEL: Latham & Watkins, David L. Mulliken, Eric M. Katz, Paul N. Singarella, Kelly E. Richardson and Daniel P. Brunton for Plaintiffs and Appellants.

Bill Lockyer, Attorney General, Mary Hackenbracht, Assistant Attorney General, Carol A. Squire, David Robinson and Deborah Fletcher, Deputy Attorneys General, for Defendants and Respondents.

David S. Beckman, Heather L. Hoecherl, Anjali I. Jaiswal and Dan L. Gildor for Interveners and Respondents.

Marco Gonzalez for Intervener and Respondent San Diego BayKeeper.

Law Offices of Rory Wicks and Rory R. Wicks for Surfrider Foundation, Waterkeeper Alliance, The Ocean Conservancy, Heal the Bay, Environmental Defense Center, Santa Monica BayKeeper, Orange County CoastKeeper, Ventura CoastKeeper, Environmental

Health Coalition, CalBeach Advocates, San Diego Audubon Society, Endangered Habitats League and Sierra Club as Amici Curiae on behalf of Defendants and Respondents and Interveners and Respondents.

JUDGES: Haller, J., with Benke, Acting P. J., and Aaron, J., concurring.

OPINIONBY: HALLER

OPINION: HALLER, J.--This case concerns the environmental regulation of municipal storm sewers that carry excess water runoff to lakes, lagoons, rivers, bays, and the ocean. The waters flowing through these sewer systems have accumulated numerous harmful pollutants that are then discharged into the water body without receiving any treatment. To protect against the resulting water quality impairment, federal and state laws impose regulatory controls on storm sewer discharges. In particular, municipalities and other public entities are required to obtain, and comply with, a regulatory permit limiting the quantity and quality of water runoff that can be discharged from these storm sewer systems.

In this case, the California Regional Water Control Board, San Diego Region, (Regional Water Board) conducted numerous public hearings and then issued a comprehensive municipal storm sewer permit governing 19 local public entities. Although these entities did not bring an administrative challenge to the permit, one business organization, the Building Industry Association of San Diego County (Building Industry), filed an administrative appeal with the State Water Resources Control Board (State Water Board). After making some modifications to the permit, the State Water Board denied the appeal. Building Industry then petitioned for a writ of mandate in the superior court, asserting numerous claims, including that the permit violates state and federal law because the permit provisions are too stringent and impossible to satisfy. Three environmental groups intervened as defendants in the action. After a hearing, the trial court found Building Industry failed to prove its claims and entered judgment in favor of the administrative agencies (the Water Boards) and the intervener environmental groups.

(1) On appeal, Building Industry's main contention is that the regulatory permit violates federal law because it allows the Water Boards to impose municipal storm sewer control measures more stringent than a federal standard known as "maximum extent practicable." (See 33 U.S.C. § 1342(p)(3)(B)(iii).) n2 In the published portion of this opinion, we reject this contention, and conclude the Water Boards had the authority to include a permit provision requiring compliance with state water quality standards. In the unpublished portion of the opinion, we find Building Industry's additional contentions to be without merit. We affirm the judgment.

n2 Further statutory references are to title 33 of the United States Code, unless otherwise specified.

RELEVANT BACKGROUND INFORMATION

I. *Summary of Relevant Clean Water Act Provisions*

Before setting forth the factual background of this particular case, it is helpful to summarize the federal and state statutory schemes for regulating municipal storm sewer discharges. n3

n3 The systems that carry untreated urban water runoff to receiving water bodies are known as "[m]unicipal separate storm sewer" systems (40 C.F.R. § 122.26(b)(8)), and are often referred to as "MS4s" (see 40 C.F.R. § 122.30). For readability, we will identify these systems as municipal storm sewers. To avoid confusion in this case, we

will generally use descriptive names, rather than initials or acronyms, when referring to parties and concepts.

A. *Federal Statutory Scheme*

When the United States Congress first enacted the Federal Water Pollution Control Act in 1948, the Congress relied primarily on state and local enforcement efforts to remedy water pollution problems. (*Middlesex Cty. Sewerage Auth. v. Sea Clammers* (1981) 453 U.S. 1, 11 [69 L. Ed. 2d 435, 101 S. Ct. 2615]; *Tahoe-Sierra Preservation Council v. State Water Resources Control Bd.* (1989) 210 Cal. App. 3d 1421, 1433 [259 Cal. Rptr. 132].) However, by the early 1970's, it became apparent that this reliance on local enforcement was ineffective and had resulted in the "accelerating environmental degradation of rivers, lakes, and streams ... ." (*Natural Resources Defense Council, Inc. v. Costle* (D. C. Cir. 1977) 568 F.2d 1369, 1371 (*Costle*); see *EPA v. State Water Resources Control Board* (1976) 426 U.S. 200, 203 [48 L. Ed. 2d 578, 96 S. Ct. 2022].) In response, in 1972 Congress substantially amended this law by mandating compliance with various minimum technological effluent standards established by the federal government and creating a comprehensive regulatory scheme to implement these laws. (See *EPA v. State Water Resources Control Board*, *supra*, 426 U.S. at pp. 204-205.) The objective of this law, now commonly known as the Clean Water Act, was to "restore and maintain the chemical, physical, and biological integrity of the Nation's waters." (§ 1251(a).)

(2) The Clean Water Act employs the basic strategy of prohibiting pollutant emissions from "point sources" n4 unless the party discharging the pollutants obtains a permit, known as an NPDES n5 permit. (See *EPA v. State Water Resources Control Board*, *supra*, 426 U.S. at p. 205.) It is "unlawful for any person to discharge a pollutant without obtaining a permit and complying with its terms." (*Ibid.*; see § 1311(a); *Costle, supra,* 568 F.2d at p. 1375.) An NPDES permit is issued by the United States Environmental Protection Agency (EPA) or by a state that has a federally-approved water quality program. (§ 1342(a), (b); *EPA v. State Water Resources Control Board*, *supra*, 426 U.S. at p. 209.) Before an NPDES is issued, the federal or state regulatory agency must follow an extensive administrative hearing procedure. (See 40 C.F.R. § § 124.3, 124.6, 124.8, 124.10; see generally, Wardzinski, et al., *National Pollutant Discharge Elimination System Permit Application and Issuance Procedures* in The Clean Water Act Handbook (Evans, edit., 1994) pp. 72-74 (Clean Water Act Handbook).) NPDES permits are valid for five years. (§ 1342(b)(1)(B).)

n4 The Clean Water Act defines a "point source" to be "any discernible, confined and discrete conveyance, including but not limited to any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, or vessel or other floating craft, from which pollutants are or may be discharged." (§ 1362(14).)

n5 NPDES stands for National Pollution Discharge Elimination System.

(3) Under the Clean Water Act, the proper scope of the controls in an NPDES permit depends on the applicable state water quality standards for the affected water bodies. (See *Communities for a Better Environment v. State Water Resources Control Bd.* (2003) 109 Cal.App.4th 1089, 1092 [1 Cal. Rptr. 3d 76].) Each state is required to develop water quality standards that establish " 'the desired condition of a waterway.' " (*Ibid*.) A water quality standard for any given water segment has two components: (1) the designated beneficial uses of the water body; and (2) the water quality criteria sufficient to protect those uses. (*Ibid*.) As enacted in 1972, the Clean Water Act mandated that an NPDES permit require compliance with state water quality standards and that this goal be met by setting forth a specific "effluent limitation," which is a restriction on the amount of pollutants that may be discharged at the point source. (§ § 1311, 1362(11).)

Shortly after the 1972 legislation, the EPA promulgated regulations exempting most municipal storm sewers from the NPDES permit requirements. (*Costle, supra,* 568 F.2d at p. 1372; see *Defenders of Wildlife v. Browner* (9th Cir. 1999) 191 F.3d 1159, 1163 (*Defenders of Wildlife*).) When environmental groups challenged this exemption in federal court, the Ninth Circuit held a storm sewer is a point source and the EPA did not have the authority to exempt categories of point sources from the Clean Water Act's NPDES permit requirements. (*Costle, supra*, 568 F.2d at pp. 1374-1383.) The *Costle* court rejected the EPA's argument that effluent-based storm sewer regulation was administratively infeasible because of the variable nature of storm water pollution and the number of affected storm sewers throughout the country. (*Id.* at pp. 1377-1382.) Although the court acknowledged the practical problems relating to storm sewer regulation, the court found the EPA had the flexibility under the Clean Water Act to design regulations that would overcome these problems. (*Id.* at pp. 1379-1383.)

During the next 15 years, the EPA made numerous attempts to reconcile the statutory requirement of point source regulation with the practical problem of regulating possibly millions of diverse point source discharges of storm water. (*Defenders of Wildlife*, *supra*, 191 F.3d at p. 1163; see Gallagher, *Clean Water Act* in Environmental Law Handbook (Sullivan, edit., 2003) p. 300 (Environmental Law Handbook); Eisen, *Toward a Sustainable Urbanism: Lessons from Federal Regulation of Urban Stormwater Runoff* (1995) 48 Wash. U. J. Urb. & Contemp. L. 1, 40-41 (Regulation of Urban Stormwater Runoff).)

(4) Eventually, in 1987, Congress amended the Clean Water Act to add provisions that specifically concerned NPDES permit requirements for storm sewer discharges. (§ 1342(p); see *Defenders of Wildlife, supra,* 191 F.3d at p. 1163; *Natural Resources Defense Counsel v. U.S. E.P.A.* (1992) 966 F.2d 1292, 1296.) In these amendments, enacted as part of the Water Quality Act of 1987, Congress distinguished between industrial and municipal storm water discharges. With respect to *industrial* storm water discharges, Congress provided that NPDES permits "shall meet all applicable provisions of this section and section 1311 [requiring the EPA to establish effluent limitations under specific timetables] ... ." (§ 1342(p)(3)(A).) With respect to *municipal* storm water discharges, Congress clarified that the EPA had the authority to fashion NPDES permit requirements to meet water quality standards without specific numerical effluent limits and instead to impose "controls to reduce the discharge of pollutants to the maximum extent practicable ... ." (§ 1342(p)(3)(B)(iii); see *Defenders of Wildlife, supra,* 191 F.3d at p. 1163.) Because the statutory language pertaining to municipal storm sewers is at the center of this appeal, we quote the relevant portion of the statute in full:

"(B) ... Permits for discharges from municipal storm sewers--

"(i) may be issued on a system-or jurisdiction-wide basis;

"(ii) shall include a requirement to effectively prohibit non-stormwater discharges into the storm sewers; and

"(iii) shall require controls to reduce the discharge of pollutants to the maximum extent practicable, including management practices, control techniques and system, design and engineering methods, and such other provisions as the Administrator or the State determines appropriate for the control of such pollutants." (§ 1342(p)(3)(B).)

To ensure this scheme would be administratively workable, Congress placed a moratorium on many new types of required stormwater permits until 1994 (§ 1342(p)(1)), and created a phased approach to necessary municipal stormwater permitting depending on the size of the municipality (§ 1342(p)(2)(D)). (See *Environmental Defense Center, Inc. v. U.S. E.P.A.* (9th Cir. 2003) 344 F.3d 832, 841-842.)

B. *State Statutory Scheme*

Three years before the 1972 Clean Water Act, the California Legislature enacted its own water quality protection legislation, the Porter-Cologne Water Quality Control Act (Porter-Cologne Act), seeking to "attain the highest water quality which is reasonable ... ." (Wat. Code, § 13000.) The Porter-Cologne Act created the State Water Board to formulate statewide water quality policy and established nine regional boards to prepare water quality

plans (known as basin plans) and issue permits governing the discharge of waste. (Wat. Code, § § 13100, 13140, 13200, 13201, 13240, 13241, 13243.) The Porter-Cologne Act identified these permits as "waste discharge requirements," and provided that the waste discharge requirements must mandate compliance with the applicable regional water quality control plan. (Wat. Code, § § 13263, subd. (a), 13377, 13374.)

Shortly after Congress enacted the Clean Water Act in 1972, the California Legislature added Chapter 5.5 to the Porter-Cologne Act, for the purpose of adopting the necessary federal requirements to ensure it would obtain EPA approval to issue NPDES permits. (Wat. Code, § 13370, subd. (c).) As part of these amendments, the Legislature provided that the state and regional water boards "shall, as required or authorized by the [Clean Water Act], issue waste discharge requirements ... which apply and ensure compliance with all applicable provisions [of the Clean Water Act], together with any more stringent effluent standards or limitations necessary to implement water quality control plans, or for the protection of beneficial uses, or to prevent nuisance." (Wat. Code, § 13377.) Water Code section 13374 provides that "[t]he term 'waste discharge requirements' as referred to in this division is the equivalent of the term 'permits' as used in the [Clean Water Act]."

(5) California subsequently obtained the required approval to issue NPDES permits. (*WaterKeepers Northern California v. State Water Resources Control Bd.* (2002) 102 Cal.App.4th 1448, 1453 [126 Cal. Rptr. 2d 389].) Thus, the waste discharge requirements issued by the regional water boards ordinarily also serve as NPDES permits under federal law. (Wat. Code, § 13374.)

II. *The NPDES Permit at Issue in this Case*

Under its delegated authority and after numerous public hearings, in February 2001 the Regional Water Board issued a 52-page NPDES permit and Waste Discharge Requirements (the Permit) governing municipal storm sewers owned by San Diego County, the San Diego Unified Port District, and 18 San Diego-area cities (collectively Municipalities). n6 The first 10 pages of the Permit contain the Regional Water Board's detailed factual findings. These findings describe the manner in which San Diego-area water runoff absorbs numerous harmful pollutants and then is conveyed by municipal storm sewers into local waters without any treatment. The findings state that these storm sewer discharges are a leading cause of water quality impairment in the San Diego region, endangering aquatic life and human health. The findings further state that to achieve applicable state water quality objectives, it is necessary not only to require municipalities to comply with existing pollution-control technologies, but also to require compliance with applicable "receiving water limits" (state water quality standards) and to employ an "iterative process" of "development, implementation, monitoring, and assessment" to improve existing technologies.

n6 Under the Clean Water Act, entities responsible for NPDES permit conditions pertaining to their own discharges are referred to as "copermittees." (40 C.F.R. § 122.26(b)(1).) For clarity and readability, we shall refer to these entities as Municipalities.

Based on these factual findings, the Regional Water Board included in the Permit several overall prohibitions applicable to municipal storm sewer discharges. Of critical importance to this appeal, these prohibitions concern two categories of restrictions. First, the Municipalities are prohibited from discharging those pollutants "which have not been reduced to the *maximum extent practicable ...* ." n7 (Italics added). Second, the Municipalities are prohibited from discharging pollutants "which cause or contribute to exceedances of receiving water quality objectives ... " and/or that "cause or contribute to the violation of water quality standards ... ." This second category of restrictions (referred to in this opinion as the Water Quality Standards provisions) essentially provide that a Municipality may not discharge pollutants if those pollutants would cause the receiving water body to exceed the applicable water quality standard. It is these latter restrictions that are challenged by Building Industry in this appeal.

n7 The Permit does not precisely define this phrase, and instead, in its definition section, contains a lengthy discussion of the variable nature of the maximum extent practicable concept, referred to as "MEP." A portion of this discussion is as follows: "[T]he definition of MEP is dynamic and will be defined by the following process over time: municipalities propose their definition of MEP by way of their [local storm sewer plan]. Their total collective and individual activities conducted pursuant to the [plan] becomes their proposal for MEP as it applies both to their overall effort, as well as to specific activities (e.g., MEP for street sweeping, or MEP for municipal separate storm sewer maintenance). In the absence of a proposal acceptable to the [Regional Water Board], the [Regional Water Board] defines MEP." The definition also identifies several factors that are "useful" in determining whether an entity has achieved the maximum extent practicable standard, including "Effectiveness," "Regulatory Compliance," "Public Acceptance," "Cost," and "Technical Feasibility."

Part C of the Permit (as amended) qualifies the Water Quality Standards provisions by detailing a procedure for enforcing violations of those standards through a step-by-step process of "timely implementation of control measures ...," known as an "iterative" process. Under this procedure, when a Municipality "caus[es] or contribute[s] to an exceedance of an applicable water quality standard," the Municipality must prepare a report documenting the violation and describing a process for improvement and prevention of further violations. The Municipality and the Regional Water Board must then work together at improving methods and monitoring progress to achieve compliance. But the final provision of Part C states that "Nothing in this section shall prevent the [Regional Water Board] from enforcing any provision of this Order while the [Municipality] prepares and implements the above report."

In addition to these broad prohibitions and enforcement provisions, the Permit requires the Municipalities to implement, or to require businesses and residents to implement, various pollution control measures referred to as "best management practices," which reflect techniques for preventing, slowing, retaining or absorbing pollutants produced by stormwater runoff. These best management practices include structural controls that minimize contact between pollutants and flows, and non-structural controls such as educational and public outreach programs. The Permit also requires the Municipalities to regulate discharges associated with new development and redevelopment and to ensure a completed project will not result in significantly increased discharges of pollution from storm water runoff.

III. *Administrative and Trial Court Challenges*

After the Regional Water Board issued the Permit, the Building Industry, an organization representing the interests of numerous construction-related businesses, filed an administrative challenge with the State Water Board. Although none of the Municipalities joined in the administrative appeal, Building Industry claimed its own independent standing based on its assertion that the Permit would impose indirect obligations on the regional building community. (See Wat. Code, § 13320 [permitting any "aggrieved person" to challenge Regional Water Board action].) Among its numerous contentions, Building Industry argued that the Water Quality Standards provisions in the Permit require strict compliance with state water quality standards beyond what is "practicable" and therefore violate federal law.

In November 2001, the State Water Board issued a written decision rejecting Building Industry's appeal after making certain modifications to the Permit. (State of California Water Resources Control Board Order WQ2001-15 (Nov. 15, 2001).) Of particular relevance here, the State Water Board modified the Permit to make clear that the iterative enforcement process applied to the Water Quality Standards provisions in the Permit. But the State Water Board did not delete the Permit's provision stating that the Regional Water Board retains the authority to enforce the Water Quality Standards provisions even if a Municipality is engaged in this iterative process.

Building Industry then brought a superior court action against the Water Boards, challenging the Regional Board's issuance of the Permit and the State Water Board's denial of Building Industry's administrative challenge. n8 Building Industry asserted numerous legal claims, including that the Water Boards: (1) violated the Clean Water Act by imposing a standard greater than the "maximum extent practicable" standard; (2) violated state law by failing to consider various statutory factors before issuing the Permit; (3) violated the California Environmental Quality Act (CEQA) by failing to prepare an environmental impact report (EIR); and (4) made findings that were factually unsupported.

n8 Several other parties were also named as petitioners: Building Industry Legal Defense Foundation, California Business Properties Association, Construction Industry Coalition for Water Quality, San Diego County Fire Districts Association, and the City of San Marcos. However, because these entities were not parties in the administrative challenge, the superior court properly found they were precluded by the administrative exhaustion doctrine from challenging the administrative agencies' compliance with the federal and state water quality laws. Although these entities were named as appellants in the notice of appeal, they are barred by the exhaustion doctrine from asserting appellate contentions concerning compliance with federal and state water quality laws. However, as to any other claims (such as CEQA), these entities are proper appellants. For ease of reference and where appropriate, we refer to the appellants collectively as Building Industry.

Three environmental organizations, San Diego BayKeeper, National Resources Defense Council, and California CoastKeeper (collectively Environmental Organizations), requested permission to file a complaint in intervention, seeking to uphold the Permit and asserting a direct and substantial independent interest in the subject of the action. Over Building Industry's objections, the trial court permitted these organizations to file the complaint and enter the action as parties-interveners.

After reviewing the lengthy administrative record and the parties' briefs, and conducting an oral hearing, the superior court ruled in favor of the Water Boards and Environmental Organizations (collectively respondents). Applying the independent judgment test, the court found Building Industry failed to meet its burden to establish the State Water Board abused its discretion in approving the Permit or that the administrative findings are contrary to the weight of the evidence. In particular, the court found Building Industry failed to establish the Permit requirements were "impracticable under federal law or unreasonable under state law," and noted that there was evidence showing the Regional Water Board considered many practical aspects of the regulatory controls before issuing the Permit. Rejecting Building Industry's legal arguments, the court also stated that under federal law the Water Boards had the discretion "to require strict compliance with water quality standards" or "to require less than strict compliance with water quality standards." The court also sustained several of respondents' evidentiary objections, including to documents relating to the legislative history of the Clean Water Act.

Building Industry appeals, challenging the superior court's determination that the Permit did not violate the federal Clean Water Act. In its appeal, Building Industry does not reassert its claim that the Permit violates state law, except for its contentions pertaining to CEQA.

DISCUSSION

I. *Standard of Review*

(6) A party aggrieved by a final decision of the State Water Board may obtain review of the decision by filing [a superior court] petition for writ of mandate in the superior court. (Wat. Code, § 13330, subd. (a).) Code of Civil Procedure section 1094.5 governs the proceedings, and the superior court must exercise its independent judgment in examining the evidence and resolving factual disputes. (Wat. Code, § 13330, subd. (d).) "In exercising its independent judgment, a trial court must afford a strong presumption of correctness concerning the administrative findings, and the party challenging the administrative decision

bears the burden of convincing the court that the administrative findings are contrary to the weight of the evidence." (*Fukuda v. City of Angels* (1999) 20 Cal.4th 805, 817 [85 Cal. Rptr. 2d 696, 977 P.2d 693].)

(7) In reviewing the trial court's factual determinations on the administrative record, a Court of Appeal applies a substantial evidence standard. (*Fukuda v. City of Angels, supra,* 20 Cal.4th at p. 824.) However, in reviewing the trial court's legal determinations, an appellate court conducts a de novo review. (See *Alliance for a Better Downtown Millbrae v. Wade* (2003) 108 Cal.App.4th 123, 129 [133 Cal. Rptr. 2d 249].) Thus, we are not bound by the legal determinations made by the state or regional agencies or by the trial court. (See *Yamaha Corp. of America v. State Bd. of Equalization* (1998) 19 Cal.4th 1, 7-8 [78 Cal. Rptr. 2d 1, 960 P.2d 1031].) But we must give appropriate consideration to an administrative agency's expertise underlying its interpretation of an applicable statute. n9 (*Ibid*.)

n9 We note that in determining the meaning of the Clean Water Act and its amendments, federal courts generally defer to the EPA's statutory construction if the disputed portion of the statute is ambiguous. (See *Chevron U.S.A. v. Natural Res. Def. Council, Inc.* (1984) 467 U.S. 837, 842-844 [81 L. Ed. 2d 694, 104 S. Ct. 2778] (*Chevron*).) However, the parties do not argue this same principle applies to a *state agency's* interpretation of the Clean Water Act. Nonetheless, under governing state law principles, we do consider and give due deference to the Water Boards' statutory interpretations in this case. (See *Yamaha Corp. of America v. State Bd. of Equalization, supra,* 19 Cal.4th at pp. 7-8.)

II. *Water Boards' Authority to Enforce Water Quality Standards in NPDES Permit*

Building Industry's main appellate contention is very narrow. Building Industry argues that two provisions in the Permit (the Water Quality Standards provisions) violate federal law because they prohibit the Municipalities from discharging runoff from storm sewers if the discharge would cause a water body to exceed the applicable water quality standard established under state law. n10 Building Industry contends that under federal law the "maximum extent practicable" standard is the "exclusive" measure that may be applied to municipal storm sewer discharges and a regulatory agency may not require a Municipality to comply with a state water quality standard if the required controls exceed a "maximum extent practicable" standard.

n10 These challenged Permit provisions state "Discharges from [storm sewers] which cause or contribute to exceedances of receiving water quality objectives for surface water or groundwater are prohibited" (Permit, § A.2), and "Discharges from [storm sewers] that cause or contribute to the violation of water quality standards ... are prohibited" (Permit, § C.1).

In the following discussion, we first reject respondents' contentions that Building Industry waived these arguments by failing to raise a substantial evidence challenge to the court's factual findings and/or to reassert its state law challenges on appeal. We then focus on the portion of the Clean Water Act (§ 1342(p)(3)(B)(iii)) that Building Industry contends is violated by the challenged Permit provisions. On our de novo review of this legal issue, we conclude the Permit's Water Quality Standards provisions are proper under federal law, and Building Industry's legal challenges are unsupported by the applicable statutory language, legislative purpose, and legislative history.

A. *Building Industry Did Not Waive the Legal Argument*

Respondents (the Water Boards and Environmental Organizations) initially argue that Building Industry waived its right to challenge the Permit's consistency with the maximum extent practicable standard because Building Industry did not challenge the trial court's

factual findings that Building Industry failed to prove any of the Permit requirements were "impracticable" or "unreasonable."

In taking this position, respondents misconstrue the nature of Building Industry's appellate contention challenging the Water Quality Standards provisions. Building Industry's contention concerns the scope of the authority given to the Regional Water Board under the Permit terms. Specifically, Building Industry argues that the Regional Water Board does not have the authority to require the Municipalities to adhere to the applicable water quality standards because federal law provides that the "maximum extent practicable" standard is the exclusive standard that may be applied to storm sewer regulation. This argument--concerning the proper scope of a regulatory agency's authority--presents a purely legal issue, and is not dependent on the court's factual findings regarding the practicality of the specific regulatory controls identified in the Permit.

Respondents alternatively contend that Building Industry waived its right to challenge the propriety of the Water Quality Standards provisions under federal law because the trial court found the provisions were valid under state law and Building Industry failed to reassert its state law challenges on appeal. Under the particular circumstances of this case, we conclude Building Industry did not waive its rights to challenge the Permit under federal law.

(8) Although it is well settled that the Clean Water Act authorizes states to impose water quality controls that are more stringent than are required under federal law (§ 1370; see *PUD No. 1 of Jefferson Cty. v. Washington Dept. of Ecology* (1994) 511 U.S. 700, 705 [128 L. Ed. 2d 716, 114 S. Ct. 1900]; *Northwest Environmental Advocates v. Portland* (9th Cir. 1995) 56 F.3d 979, 989), and California law specifically allows the imposition of controls more stringent than federal law (Wat. Code, § 13377), the Water Boards made a tactical decision in the superior court to assert the Permit's validity based solely on federal law, and repeatedly made clear they were not seeking to justify the Permit requirements based on the Boards' independent authority to act under state law. On appeal, the Water Boards continue to rely primarily on federal law to uphold the Permit requirements, and their assertions that we may decide the matter based solely on state law are in the nature of asides rather than direct arguments. On this record, it would be improper to rely solely on state law to uphold the challenged Permit provisions.

B. *The Water Quality Standards Requirement Does Not Violate Federal Law*

We now turn to Building Industry's main substantive contention on appeal-- that the Permit's Water Quality Standards provisions (fn. 10, *ante*) violate federal law. Building Industry's contention rests on its interpretation of the 1987 Water Quality Act amendments containing NPDES requirements for municipal storm sewers. The portion of the relevant statute reads: "(B) ... Permits for discharges from municipal storm sewers ... [P] ... [P] (iii) shall require controls to reduce the discharge of pollutants to the *maximum extent practicable*, *including* management practices, control techniques and system, design and engineering methods, and such other provisions as the [EPA] Administrator or the State determines appropriate for the control of such pollutants." (§ 1342(p)(3)(B)(iii), italics added.)

1. *Statutory Language*

Focusing on the first 14 words of subdivision (iii), Building Industry contends the statute means that the maximum extent practicable standard sets the upper limit on the type of control that can be used in an NPDES permit, and that each of the phrases following the word "*including*" identify examples of "maximum extent practicable" controls. (§ 1342(p)(3)(B)(iii), italics added.) Building Industry thus reads the final "and such other provisions" clause as providing the EPA with the authority only to include *other* types of "maximum extent practicable" controls in an NPDES storm sewer permit.

Respondents counter that the term "including" refers only to the three identified types of pollution control procedures--(1) "management practices"; (2) "control techniques"; and (3) "system, design and engineering methods"--and that the last phrase, "*and such other provisions as the Administrator or the State determines appropriate for the control of such pollutants*," provides the EPA (or the approved state regulatory agency) the specific authority to go beyond the maximum extent practicable standard to impose effluent limitations or

water-quality based standards in an NPDES permit. In support, respondents argue that because the word "system" in section 1342(p)(3)(B)(iii) is singular, it necessarily follows from parallel-construction grammar principles that the word "system" is part of the phrase "system, design and engineering methods" rather than the phrase "control techniques and system." Under this view and given the absence of a comma after the word "techniques," respondents argue that the "and such other provisions" clause cannot be fairly read as restricted by the "maximum extent practicable" phrase, and instead the "and such other provisions" clause is a separate and distinct clause that acts as a second direct object to the verb "require" in the sentence. (§ 1342(p)(3)(B)(iii).)

Building Industry responds that respondents' proposed statutory interpretation is "not logical" because if the "and such other provisions" phrase is the direct object of the verb "require," the sentence would not make sense. Building Industry states that "permits" do not generally "require" provisions; they "include" or "contain" them.

(9) As a matter of grammar and word choice, respondents have the stronger position. The second part of Building Industry's proposed interpretation--"control techniques and system, design and engineering methods"--without a comma after the word "techniques" does not logically serve as a parallel construct with the "and such other provisions" clause. Moreover, we disagree that the "and such other provisions" clause cannot be a direct object to the word "require." (§ 1342(p)(3)(B)(iii).) Although it is not the clearest way of articulating the concept, the language of section 1342(p)(3)(B)(iii) does communicate the basic principle that the EPA (and/or a state approved to issue the NPDES permit) retains the discretion to impose "appropriate" water pollution controls in addition to those that come within the definition of " 'maximum extent practicable.' " (See *Defenders of Wildlife, supra,* 191 F.3d at pp. 1165-1167.) We find unpersuasive Building Industry's reliance on several statutory interpretation concepts, *ejusdem generis, noscitur a sociis*, and *expressio unius est exclusion alterius*, to support its narrower statutory construction.

2. *Purpose and History of Section 1342(p)(3)(B)(iii)*

(10) Further, "[w]hile punctuation and grammar should be considered in interpreting a statute, neither is controlling unless the result is in harmony with the clearly expressed intent of the Legislature." (*In re John S.* (2001) 88 Cal.App.4th 1140, 1144, fn. 1 [106 Cal. Rptr. 2d 476]; see *Estate of Coffee* (1941) 19 Cal.2d 248, 251 [120 P.2d 661].) If the statutory language is susceptible to more than one reasonable interpretation, a court must also "look to a variety of extrinsic aids, including the ostensible objects to be achieved, the evils to be remedied, the legislative history, public policy, contemporaneous administrative construction, and the statutory scheme of which the statute is a part." (*Nolan v. City of Anaheim* (2004) 33 Cal.4th 335, 340 [14 Cal. Rptr. 3d 857, 92 P.3d 350].)

(11) The legislative purpose underlying the Water Quality Act of 1987, and section 1342 (p) in particular, supports that Congress intended to provide the EPA (or the regulatory agency of an approved state) the discretion to require compliance with water quality standards in a municipal storm sewer NPDES permit, particularly where, as here, that compliance will be achieved primarily through an iterative process.

Before section 1342(p) was enacted, the courts had long recognized that the EPA had the authority to require a party to comply with a state water quality standard even if that standard had not been translated into an effluent limitation. (See *EPA v. State Water Resources Control Board*, *supra*, 426 U.S. at p. 205, fn. 12; *PUD No. 1 of Jefferson Cty. v. Washington Dept. of Ecology, supra,* 511 U.S. at p. 715; *Northwest Environmental Advocates v. Portland* (9th Cir. 1995) 56 F.3d 979, 987; *Natural Resources Defense Counsel v. U.S.E.P.A.* (9th Cir. 1990) 915 F.2d 1314, 1316.) Specifically, section 1311(b)(1)(C) gave the regulatory agency the authority to impose "any more stringent limitation, including those necessary to meet water quality standards," and section 1342(a)(2) provided that "[t]he [EPA] Administrator shall prescribe conditions for [NPDES] permits to assure compliance" with requirements identified in section 1342(a)(1), which encompass state water quality standards. The United States Supreme Court explained that when Congress enacted the 1972 Clean Water Act, it retained "[w]ater quality standards ... as a supplementary basis for effluent limitations, ... so that numerous point sources despite individual compliance with

effluent limitations, may be further regulated to prevent water quality from falling below acceptable levels. ... " (*EPA v. State Water Resources Control Board*, *supra,* 426 U.S. at p. 205, fn. 12; see also *Arkansas v. Oklahoma* (1992) 503 U.S. 91, 101 [117 L. Ed. 2d 239, 112 S. Ct. 1046].)

There is nothing in section 1342(p)(3)(B)(iii)'s statutory language or legislative history showing that Congress intended to eliminate this discretion when it amended the Clean Water Act in 1987. To the contrary, Congress added the NPDES storm sewer requirements to strengthen the Clean Water Act by making its mandate correspond to the practical realities of municipal storm sewer regulation. As numerous commentators have pointed out, although Congress was reacting to the physical differences between municipal storm water runoff and other pollutant discharges that made the 1972 legislation's blanket effluent limitations approach impractical and administratively burdensome, the primary point of the legislation was to address these administrative problems while giving the administrative bodies the tools to meet the fundamental goals of the Clean Water Act in the context of stormwater pollution. (See Regulation of Urban Stormwater Runoff, *supra*, at pp. 44-46; Environmental Law Handbook, *supra*, at p. 300; Clean Water Act Handbook, *supra*, at pp. 62-63.) In the 1987 congressional debates, the Senators and Representatives emphasized the need to prevent the widespread and escalating problems resulting from untreated storm water toxic discharges that were threatening aquatic life and creating conditions dangerous to human health. (See Remarks of Sen. Durenberger, 133 Cong. Rec. 1279 (Jan. 14, 1987); Remarks of Sen. Chaffee, 133 Cong. Rec. S738 (daily ed. Jan 14, 1987); Remarks of Rep. Hammerschmidt, 133 Cong. Rec. 986 (Jan. 8, 1987); Remarks of Rep. Roe, 133 Cong. Rec. 1006, 1007 (Jan. 8, 1987); Remarks of Sen. Stafford, 132 Cong. Rec. 32381, 32400 (Oct. 16, 1986).) This legislative history supports that in identifying a maximum extent practicable standard Congress did not intend to substantively bar the EPA/state agency from imposing a more stringent water quality standard if the agency, based on its expertise and technical factual information and after the required administrative hearing procedure, found this standard to be a necessary and workable enforcement mechanism to achieving the goals of the Clean Water Act.

To support a contrary view, Building Industry relies on comments by Minnesota Senator David Durenberger during the lengthy congressional debates on the 1987 Water Quality Act amendments. n11 (132 Cong. Rec. 32400 (Oct. 16, 1986); 133 Cong. Rec. S752 (daily ed. Jan. 14, 1987.) In the cited portions of the Congressional Record, Senator Durenberger states that NPDES permits "shall require controls to reduce the discharge of pollutants to the maximum extent practicable. Such controls include management practices, control techniques and systems, design and engineering methods, and such other provisions, as the Administrator determines appropriate for the control of pollutants in the stormwater discharge." (*Ibid.*) When viewing these statements in context, it is apparent that the Senator was merely paraphrasing the words of the proposed statute and was not intending to address the issue of whether the maximum extent practicable standard was a regulatory ceiling or whether he believed the proposed amendments limited the EPA's existing discretion. n12

n11 We agree with Building Industry that the trial court's refusal to consider this legislative history on the basis that it was not presented to the administrative agencies was improper. However, this error was not prejudicial because we apply a de novo review standard in interpreting the relevant statutes.

n12 In the cited remarks, Senator Durenberger in fact expressed his dissatisfaction with the EPA's prior attempts to regulate municipal storm sewers. He pointed out, for example, that "[r]unoff from municipal separate storm sewers and industrial sites contain significant values of both toxic and conventional pollutants," and that despite the Clean Water Act's "clear directive," the EPA "has failed to require most stormwater point sources to apply for permits which would control the pollutants in their discharge." (133 Cong. Rec. 1274, 1279-1280 (daily ed. Jan. 14, 1987).)

Building Industry's reliance on comments made by Georgia Representative James Rowland, who participated in drafting the 1987 Water Quality Act amendments, is similarly unhelpful. During a floor debate on the proposed amendments, Representative Rowland noted that cities have "millions of" stormwater discharge points and emphasized the devastating financial burden on cities if they were required to obtain a permit for each of these points. (133 Cong. Rec. 522 (daily ed. Feb. 3, 1987).) Representative Rowland then explained that the amendments would address this problem by "allow[ing] communities to obtain far less costly single jurisdictionwide permits." (*Ibid.*) Viewed in context, these comments were directed at the need for statutory provisions permitting the EPA to issue jurisdiction-wide permits thereby preventing unnecessary administrative costs to the cities, and do not reflect a desire to protect cities from the cost of complying with strict water quality standards when deemed necessary by the regulatory agency.

3. *Interpretations by the EPA and Other Courts*

(12) Our conclusion that Congress intended section 1342(p)(3)(B)(iii) to provide the regulatory agency with authority to impose standards stricter than a "maximum extent practicable" standard is consistent with interpretations by the EPA and the Ninth Circuit. In its final rule promulgated in the Federal Register, the EPA construed section 1342(p)(3)(B)(iii) as providing the administrative agency with the authority to impose water-quality standard controls in an NPDES permit if appropriate under the circumstances. Specifically, the EPA stated this statutory provision requires "controls to reduce the discharge of pollutants to the maximum extent practicable, *and where necessary water quality-based controls* ... ." (55 Fed.Reg. 47990, 47994 (Nov. 16, 1990), italics added.) We are required to give substantial deference to this administrative interpretation, which occurred after an extensive notice and comment period. (See *ibid*.; *Chevron, supra,* 467 U.S. at pp. 842-844.)

The only other court that has interpreted the "such other provisions" language of section 1342(p)(3)(B)(iii) has reached a similar conclusion. (*Defenders of Wildlife*, *supra*, 191 F.3d at pp. 1166-1167.) In *Defenders of Wildlife*, environmental organizations brought an action against the EPA, challenging provisions in an NPDES permit requiring several Arizona localities to adhere to various best management practice controls without requiring numeric effluent limitations. (*Id.* at p. 1161.) The environmental organizations argued that section 1342(p) did not allow the EPA to issue NPDES permits without requiring strict compliance with effluent limitations. (*Ibid*.) Rejecting this argument, the Ninth Circuit found section 1342 (p)(3)(B)(iii)'s statutory language "unambiguously demonstrates that Congress did not require municipal storm-sewer discharges to comply strictly" with effluent limitations. (*Defenders of Wildlife*, *supra*, at p. 1164.)

But in a separate section of the opinion, the *Defenders of Wildlife* court additionally rejected the reverse argument made by the affected municipalities (who were the interveners in the action) that "the EPA may not, under the [Clean Water Act], require strict compliance with state water-quality standards, through numerical limits or otherwise." (*Defenders of Wildlife*, *supra*, 191 F.3d at p. 1166.) The court stated: "Although Congress did not require municipal storm-sewer discharges to comply strictly with [numerical effluent limitations], § 1342(p)(3)(B)(iii) states that '[p]ermits for discharges from municipal storm sewers ... shall require ... *such other provisions as the Administrator ... determines appropriate for the control of such pollutants.*' (Emphasis added.) That provision gives the EPA discretion to determine what pollution controls are appropriate. ... [P] *Under that discretionary provision, the EPA has the authority to determine that ensuring strict compliance with state water-quality standards is necessary to control pollutants.* The EPA also has the authority to require less than strict compliance with state water-quality standards ... . Under 33 U.S.C. § 1342(p)(3)(B)(iii), the EPA's choice to include either management practices or numeric limitations in the permits was within its discretion. [Citations.]" (*Defenders of Wildlife, supra,* 191 F.3d at pp. 1166-1167, second italics added.) Although dicta, this conclusion reached by a federal court interpreting federal law is persuasive and is consistent with our independent analysis of the statutory language. n13

n13 Building Industry's reliance on two other Ninth Circuit decisions to support a contrary statutory interpretation is misplaced. (See *Natural Res. Def. Council, Inc. v. U.S.E.P.A., supra*, 966 F.2d at p. 1308; *Environmental Defense Center, Inc. v. U.S. E.P.A.* (9th cir. 2003) 344 F.3d 832.) Neither of these decisions addressed the issue of the scope of a regulatory agency's authority to exceed the maximum extent practicable standard in issuing NPDES permits for municipal storm sewers.

To support its interpretation of section 1342(p)(3)(B)(iii), Building Industry additionally relies on the statutory provisions addressing nonpoint source runoff (a diffuse runoff not channeled through a particular source), which were also part of the 1987 amendments to the Clean Water Act. (§ 1329.) In particular, Building Industry cites to section 1329(a)(1)(C), which states, "The Governor of each State shall ... prepare and submit to the [EPA] Administrator for approval, a report which ... [P] ... [P] describes the process ... for identifying best management practices and measures to control each [identified] category ... of nonpoint sources and ... to reduce, to the *maximum extent practicable*, the level of pollution resulting from such category ... ." (Italics added.) Building Industry argues that because this "nonpoint source" statutory language expressly identifies only the maximum extent practicable standard, we must necessarily conclude that Congress meant to similarly limit the storm sewer point source pollution regulations to the maximum extent practicable standard.

The logic underlying this analogy is flawed because the critical language in the two statutory provisions is different. In the nonpoint source statute, Congress chose to include only the maximum extent practicable standard (§ 1329(a)(1)(C)); whereas in the municipal storm sewer provisions, Congress elected to include the "and such other provisions" clause (§ 1342(p)(3)(B)(iii)). This difference leads to the reasonable inference that Congress had a different intent when it enacted the two statutory provisions. Moreover, because of a fundamental difference between point and nonpoint source pollution, Congress has historically treated the two types of pollution differently and has subjected each type to entirely different requirements. (See *Pronsolino v. Nastri* (9th Cir. 2002) 291 F.3d 1123, 1126-1127.) Given this different treatment, it would be improper to presume Congress intended to apply the same standard in both statutes. Building Industry's citation to comments during the 1987 congressional debates regarding nonpoint source regulation does not support Building Industry's contentions.

4. *Contention that it is "Impossible" for Municipalities to Meet Water Quality Standards*

We also reject Building Industry's arguments woven throughout its appellate briefs, and emphasized during oral arguments, that the Water Quality Standards provisions violate federal law because compliance with those standards is "impossible." The argument is not factually or legally supported.

(13) First, there is no showing on the record before us that the applicable water quality standards are unattainable. The trial court specifically concluded that Building Industry failed to make a factual showing to support this contention, and Building Industry does not present a proper appellate challenge to this finding sufficient to warrant our reexamining the evidence. All judgments and orders are presumed correct, and persons challenging them must affirmatively show reversible error. **(14)** (*Walling v. Kimball* (1941) 17 Cal.2d 364, 373 [110 P.2d 58].) A party challenging the sufficiency of evidence to support a judgment must summarize (and cite to) *all* of the material evidence, not just the evidence favorable to his or her appellate positions. (*In re Marriage of Fink* (1979) 25 Cal.3d 877, 887-888 [160 Cal. Rptr. 516, 603 P.2d 881]; *People v. Dougherty* (1982) 138 Cal. App. 3d 278, 282 [188 Cal. Rptr. 123].) Building Industry has made no attempt to comply with this well-established appellate rule in its briefs.

In a supplemental brief, Building Industry attempted to overcome this deficiency by asserting that "[t]he record clearly establishes that [the Water Quality Standards provisions] are unattainable during the period the permit is in effect." This statement, however, is not supported by the proffered citation or by the evidence viewed in the light most favorable to the respondents. Further, the fact that many of the Municipalities' storm sewer discharges currently violate water quality standards does not mean that the Municipalities cannot comply

with the standards during the five-year term of the Permit. Additionally, Building Industry's assertions at oral argument that the trial court never reached the "impossibility" issue and/or that respondents' counsel conceded the issue below are belied by the record, including the trial court's rejection of Building Industry's specific challenge to the proposed statement of decision on this very point. n14

n14 Because we are not presented with a proper appellate challenge, we do not address the trial court's factual determinations in this case concerning whether it is possible or practical for a Municipality to achieve any specific Permit requirement.

(15) We reject Building Industry's related argument that it was respondents' burden to affirmatively show it is feasible to satisfy each of the applicable Water Quality Standards provisions. The party challenging the scope of an administrative permit, such as an NPDES, has the burden of showing the agency abused its discretion or its findings were unsupported by the facts. (See *Fukuda v. City of Angels, supra,* 20 Cal.4th at p. 817; *Huntington Park Redevelopment Agency v. Duncan* (1983) 142 Cal. App. 3d 17, 25 [190 Cal. Rptr. 744].) Thus, it was not respondents' burden to affirmatively demonstrate it was possible for the Municipalities to meet the Permit's requirements.

Building Industry alternatively contends it was not required to challenge the facts underlying the trial court's determination that the Permit requirements were feasible because the court's determination was wrong as a matter of law. Specifically, Building Industry asserts that a Permit requirement that is more stringent than a "maximum extent practicable" standard is, by definition, "not practicable" and therefore "technologically impossible" to achieve under any circumstances. Building Industry relies on a dictionary definition of "practicable," which provides that the word means " 'something that can be done; feasible,' " citing the 1996 version of "Webster's Encyclopedic Unabridged Dictionary."

(16) This argument is unpersuasive. The federal maximum extent practicable standard it is not defined in the Clean Water Act or applicable regulations, and thus the Regional Water Board properly included a detailed description of the term in the Permit's definitions section. (See *ante*, fn. 7.) As broadly defined in the Permit, the maximum extent practicable standard is a highly flexible concept that depends on balancing numerous factors, including the particular control's technical feasibility, cost, public acceptance, regulatory compliance, and effectiveness. This definition conveys that the Permit's maximum extent practicable standard is a term of art, and is not a phrase that can be interpreted solely by reference to its everyday or dictionary meaning. Further, the Permit's definitional section states that the maximum extent practicable standard "considers economics and is generally, but not necessarily, *less* stringent than BAT." (Italics added.) BAT is an acronym for "best available technology economically achievable," which is a technology-based standard for industrial storm water dischargers that focuses on reducing pollutants by treatment or by a combination of treatment and best management practices. (See *Texas Oil & Gas Ass'n v. U.S. E.P.A.* (5th Cir. 1998) 161 F.3d 923, 928.) If the maximum extent practicable standard is generally "less stringent" than another Clean Water Act standard that relies on available technologies, it would be unreasonable to conclude that anything more stringent than the maximum extent practicable standard is necessarily impossible. In other contexts, courts have similarly recognized that the word "practicable" does not necessarily mean the most that can possibly be done. (See *Nat. Wildlife Federation v. Norton* (E.D. Cal. 2004) 306 F. Supp. 2d 920, 928, fn. 12 ["[w]hile the meaning of the term 'practicable' in the [Endangered Species Act] is not entirely clear, the term does not simply equate to 'possible' "]; *Primavera Familienstiftung v. Askin* (S.D.N.Y. 1998) 178 F.R.D. 405, 409 [noting that "impracticability does not mean impossibility, but rather difficulty or inconvenience"].)

We additionally question whether many of Building Industry's "impossibility" arguments are premature on the record before us. As we have explained, the record does not support that any required control is, or will be, impossible to implement. Further, the Permit allows the Regional Water Board to enforce water quality standards during the iterative process, but does not impose any obligation that the board do so. Thus, we cannot determine with any

degree of certainty whether this obligation would ever be imposed, particularly if it later turns out that it is not possible for a Municipality to achieve that standard.

Finally, we comment on Building Industry's repeated warnings that if we affirm the judgment, all affected Municipalities will be in immediate violation of the Permit because they are not now complying with applicable water quality standards, subjecting them to immediate and substantial civil penalties, and leading to a potential "shut down" of public operations. These doomsday arguments are unsupported. The Permit makes clear that Municipalities are required to adhere to numerous specific controls (none of which are challenged in this case) and to comply with water quality standards through "timely implementation of control measures" by engaging in a cooperative iterative process where the Regional Water Board and Municipality work together to identify violations of water quality standards in a written report and then incorporate approved modified best management practices. Although the Permit allows the regulatory agencies to enforce the water quality standards during this process, the Water Boards have made clear in this litigation that they envision the ongoing iterative process as the centerpiece to achieving water quality standards. Moreover, the regulations provide an affected party reasonable time to comply with new permit requirements under certain circumstances. (See 40 C.F.R. § 122.47.) There is nothing in this record to show the Municipalities will be subject to immediate penalties for violation of water quality standards.

We likewise find speculative Building Industry's predictions that immediately after we affirm the judgment, citizens groups will race to the courthouse to file lawsuits against the Municipalities and seek penalties for violation of the Water Quality Standards provisions. n15 As noted, the applicable laws provide time for an affected entity to comply with new standards. Moreover, although we do not reach the enforcement issue in this case, we note the Permit makes clear that the iterative process is to be used for violations of water quality standards, and gives the Regional Water Board the discretionary authority to enforce water quality standards during that process. Thus, it is not at all clear that a citizen would have standing to compel a municipality to comply with a water quality standard despite an ongoing iterative process. (See § 1365(a)(1)(2).)

n15 The Clean Water Act allows a citizen to sue a discharger to enforce limits contained in NPDES permits, but requires the citizen to notify the alleged violator, the state, and the EPA of its intention to sue at least 60 days before filing suit, and limits the enforcement to nondiscretionary agency acts. (See § 1365(a)(1)(2).)

III.-VII. *[NOT CERTIFIED FOR PUBLICATION]

*See footnote, *ante*, page 866.

DISPOSITION

Judgment affirmed. Appellants to pay respondents' costs on appeal.

Benke, Acting P. J., and Aaron, J., concurred.

013992

Alternative Approaches to Stormwater Quality Control

Prepared for the Los Angeles Regional Water Quality Control Board

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EXECUTIVE SUMMARY

Background

A recent, widely debated study entitled *An Economic Impact Evaluation of Proposed Storm Water Treatment for Los Angeles County* projects extremely high costs for compliance with stormwater quality regulations (Gordon et al., 2002). These estimates followed from the study's fundamental assumption that the only way to comply with water quality regulations is to capture most or all of the flow and subject it to advanced treatment, and to do so at rates equal to peak runoff rates. *In contrast, this report shows that there are far less expensive approaches available that, should they be implemented, will achieve high levels of compliance with current federal water quality standards.*

Alternatives Considered

This report reviews present federal and state regulations and regulatory policy to determine whether advanced ultrafiltration treatment of the entire runoff flow is required to meet water quality standards, or whether compliance can be achieved through the widespread adoption of the various "best management practices" (BMPs) more commonly used for runoff quality control. The work identified and analyzed alternative measures that can be employed to meet present federal and state water quality standards. Particular attention was paid to strategies that concern ground water recharge, pollutant source control, and runoff detention, capture, and BMP treatment.

The report reviews possible approaches for controlling runoff water quality in the Los Angeles Region (the jurisdiction of the Los Angles Regional Water Quality Control Board) and presents a conceptual regional plan, including rough cost estimates. The study pursued a broad approach, providing an evaluation of total costs and benefits for the region, including those for municipalities, businesses, and individuals. The objective of the study was to outline a complete solution to stormwater quality problems, i.e., the plan is intended to meet the requirements of the stormwater permit and Total Maximum Daily Loads and provide acceptable water quality for the area. The alternatives of best management practices (BMPs) for control of individual pollutants (source control), and if necessary, a regional system of wetlands and infiltration facilities to provide final treatment and groundwater replenishment were chosen. These will be much cheaper than advanced treatment plants, and will provide benefits whose value exceeds costs.

Assumptions Made for Determining Costs

Following the review of possible remedial actions for stormwater pollution, a conceptual plan for the Los Angeles Region was developed. It was predicated on the following assumptions:

Because source control is always cheaper than cleaning polluted water, efforts should begin with preventing the release of pollutants to runoff. This includes measures like litter control, improved street cleaning, improved industrial housekeeping and others. Such approaches may constitute sufficient control for runoff coming from residential areas, so that these areas will require no further action.

For new residential development, anecdotal information indicates that landscaping that captures and infiltrates the first-flush storm will be of comparable cost to traditional landscaping, and should therefore be used. For commercial construction, costs may be higher, and adequate regional facilities might be substituted.

Where non-structural BMPs will not be adequate, or where implementation is very expensive, efforts must expand to include regional wetlands and stormwater parks (multiple-use infiltration basins).

Large portions of the Los Angeles Region are already built out to various degrees, constraining available stormwater management solutions. This report assumes that 1000 square miles can be characterized as "low density", and that these regions can be served by a combination of source control, treatment wetlands, and infiltration systems. Another 1000 square miles is "high density" and can be served by source control and infiltration systems. About 50 square miles are "extremely high density" (such as downtown areas) and will require more sophisticated infiltration or treatment devices that occupy smaller areas.

Estimated Costs

Total costs for compliance with runoff water quality regulations were predicted to be between $2.8 billion (if non-structural systems are sufficient for the entire region) to between $5.7 billion and $7.4 billion (if regional treatment or infiltration systems must also be constructed throughout the entire area). It is likely that regional systems will be required for at least some, but not all, of the area, so that the final costs will be somewhere between these extremes.

- Enforcement of littering, pet waste, and chemical use ordinances is expected to cost about $9 million per year.

- Public education will cost about $5 million per year. A program to detect and prevent illicit discharges to the system will cost about $80 million per year at first, but can be reduced to much lower levels as compliance is achieved.

- Increased cleaning of storm drains will be needed if regional solutions are not used, and will cost about $27 million per year.

- Trash discharges to receiving waters can be controlled by installing screening devices on catch basins, enforcing litter laws, and improving street cleaning services. Estimates are that the immediate cost of instituting these measures will be about $600 million over the Los Angeles Region.

- During periods of low flow, runoff water should be diverted to existing wastewater treatment plants. Construction costs for this effort will be about $28 million.

- Trash control and removal of particulates and their associated pollutants can be facilitated by improved street cleaning. It is expected that this will cost $7.5 million per year more than current street cleaning programs, with a present worth of $250 million.

- On-site BMPs required for individual firms might cost about $240 million. Costs associated with compliance with the ¾-inch rule for new construction will be a modest fraction of construction costs.

- With regard to structural BMPs, total costs (regional wetlands and infiltration systems) were first estimated by determining the costs per square mile of drainage area incurred at other sites, and multiplying by the area over which they will be applied. Wetlands for the "low density" areas were estimated to cost $420,000 per square mile of drainage area, for a total cost of $420 million. Infiltration systems for the "high density" areas were estimated to cost $3.7 million per square mile of drainage, for a total cost of $3.7 billion. More sophisticated treatment BMPs (such as sediment traps and oil adsorbers) for the "extremely dense" areas were estimated to cost $33 million per square mile of drainage, for a total of $1.7 billion. Thus total new facilities costs are $5.8 billion.

- A second method for estimating structural BMP costs utilized costs per acre-foot of retention capacity as determined by the Los Angeles County Department of Public Works Sun Valley Project. Presuming that runoff from a ¾-inch storm must be captured in the low-density, high density, and extremely high density areas with runoff coefficients of 0.4, 0.6, and 1.0, costs are $53,000, $98,000, and $470,000 per acre-foot, respectively. The overall facilities cost estimate using this method is $4.0 billion.

Estimated Benefits

There are substantial benefits to the examined approaches that extend beyond the value of stormwater quality control. Reductions in pollutant releases will improve public health and neighborhood livability. Restoration of the hydrologic cycle will replenish groundwater reservoirs, reduce flood risks, and provide greenspace for recreation and wildlife habitat. It was determined that the total value of benefits from the alternatives for runoff quality control described will exceed the costs. Total benefits for the non-structural stormwater quality control programs in the Los Angeles Region are estimated at $5.6 billion. Implementation of the non-structural and regional measures throughout the Los Angeles Region would have benefits worth $18 billion.

- Reduced need for flood control is expected to save about $400 million.

- Property value increases from additional greenspace and bodies of water are expected to amount to $5 billion over the Los Angeles region.

- Additional groundwater supplies created by infiltration will have a current worth of about $7.2 billion.

- "Willingness to pay" surveys in similar circumstances suggest that the public amenity value of avoiding stormwater pollution of local bodies of water is about $2.5 billion.

- Cleaner streets are worth about $950 million.

- Improved beach tourism will bring in about $100 million.

- Preservation of the nature's services in the marine coastal zone, such as nutrient recycling and chemical maintenance of the atmosphere, is worth about $2 billion.

- Reduction of sedimentation in local harbors will save $330 million.

- Improvements in public health associated with reduced exposure to fine particles from streets are likely significant, but could not be quantified.

Recommendations for Immediate Action

Municipalities that have the responsibility for meeting runoff quality regulations should take some immediate steps.

- Outreach programs, explaining to citizens the need for runoff quality control and discouraging illegal discharges such as littering, should begin.

- Data should be collected on the stormwater discharges from subwatersheds to determine what BMPs are workable, and general plans should be updated to include policies that promote stormwater control.

- An administrative structure should be established which includes the relevant stakeholders and funding agencies for each watershed (such as watershed councils).

- Funding plans should be developed.

- Building codes that work against runoff quality control should be changed immediately—in particular, all parking lots built from now on should also be stormwater infiltration systems.

- All new street cleaning equipment should be high-quality vacuuming systems. Appropriate agencies should be encouraged to use the latest microbiological

techniques to investigate sources of pathogenic organisms in runoff, so that mitigation efforts can be optimally designed.

INTRODUCTION

This report identifies and analyzes alternatives for control of stormwater runoff in Los Angeles County. A recent, widely debated study entitled, *An Economic Impact Evaluation of Proposed Storm Water Treatment for Los Angeles County* projects extremely high costs for compliance with stormwater quality regulations (Gordon et al., 2002). These estimates followed from the study's fundamental assumption that the only way to comply with water quality regulations is to capture most or all of the flow and subject it to advanced treatment, and to do so at rates equal to peak runoff rates. As this report shows, however, there are far less expensive approaches that, if implemented, can achieve high levels of compliance with current federal water quality standards.

A broad approach was taken: an evaluation was made of total costs and benefits for the region, including those for municipalities, businesses, and individuals. A complete solution to stormwater quality problems was considered—that is, the plan is intended to meet the requirements of the stormwater permit and Total Maximum Daily Load and provide acceptable water quality for the area. The recommendations for steps to be taken are not limited to the Los Angeles Regional Water Quality Control Board (LA Regional Water Board). Action by other governmental agencies will also be required. The study begins with a brief description of runoff sources and contaminants. A review of present federal and state regulations and regulatory policy to was done to determine whether advanced ultrafiltration treatment of the entire runoff flow will be required, or whether compliance can be achieved through the widespread adoption of the various "best management practices" (BMPs) more commonly used for runoff quality control. The study then identifies and analyzes alternative measures that can be employed to meet present federal and state water quality standards. Particular attention is paid to strategies that facilitate ground water recharge, source control measures, storm water detention and capture, and BMP treatment. While prevailing uncertainties make an overall cost estimate only approximate at this time, costs of specific approaches are illustrated with examples. Financial benefits, such as those regarding groundwater replenishment, more appealing beach environments, improved public health, and the creation of additional urban green space, are also addressed in the report. Clearly, water is a scarce resource in this region of the country, and economic evaluations of different management techniques for stormwater runoff must also consider the benefits of improved water quality and water supply as well as flood control. Prior to reviewing federal and state water quality regulation and policy, this study provides an overview of more general policy and regulation theory.

Runoff

The bulk of urban runoff is generated during rainfall events, and can properly be termed stormwater. This flow is extremely irregular, especially in Southern California, where most days are dry, and measurable rain occurs on average of only 32 days per year. Total rainfall in the area is modest, averaging about 16 inches per year. A large storm in this area might drop as much as three inches of rainfall in 24 hours, but this is still much less intense than typical rainfall events in other states, such as those on the East Coast.

Even so, high flows and flooding do occur in Southern California because of the topography. Water from large watersheds drains into local rivers, and slopes are steep, so that rainfall is rapidly collected and concentrated.

Water also enters the storm drains from non-rainfall sources. Sprinklers left on overnight, car washing, and hoses used to clean sidewalks and driveways generate smaller streams sometimes called nuisance flows. These flow in the storm drain system all year, and with residual stream flows (and in a some areas, recycled wastewater), constitute dry-weather flow. The terms "stormwater" and "runoff" are often used interchangeably. However, it is important in some cases to recognize the difference—stormwater arrives suddenly in huge amounts, while nuisance flows are much smaller and run all year.

Urbanization of the landscape substantially changes the amount and composition of runoff. Because less water infiltrates (percolates) into soils, the total amount of runoff is increased. Because the water runs off pavement more rapidly, it is concentrated to make peak flows higher. Recharge of groundwater is reduced, and the shallow groundwater that feeds some streams dries up, so surface flows decrease in some areas. Surface flows may increase during dry weather in other areas because of nuisance flows from over-irrigation and car washing. In general, the storage and buffering effects of soils and groundwater reservoirs are reduced. Runoff flowing through vegetation, or entering and leaving shallow groundwater, is subject to the effects of filtration and biodegradation, which has a considerable purifying effect. Water runoff from pavement is not cleaned, and indeed is contaminated by whatever dirt and pollutants are on the pavement.

Pollutants

The cities of Southern California use "separate" systems, meaning stormwater is collected apart from the wastewater generated by toilets and showers. The wastewater enters a closed network of pipes and is carried to treatment plants. Stormwater may initially flow in underground conduits, but eventually passes to open flood control channels, rivers, and the ocean. This storm water drainage system is called a Municipal Separate Storm Sewer System (MS4). Runoff pollutants are different in nature from those in sewage. Pathogens are present, but in far smaller concentrations, as are nutrients such as phosphorus and nitrogen. There may be more petroleum hydrocarbons, dust, sediments, and settled air pollutants in runoff, but total organic content in runoff is usually much lower than in wastewater.

The pollutant load of stormwater varies greatly with location. The water contains pollutants that wash off rooftops, parking lots, industrial facilities, and the streets. Pollutants may also be discharged illegally, when individuals pour motor oil into the storm drains or industries release toxic pollutants.

Water flowing in the streets picks up trash, dust, dirt and other materials that have been deposited on the pavement. The dust includes fine particles of rubber from tire wear, settled air pollutants, trace metals from brake pads and other mechanical sources, and pet feces. Cars drip motor oil onto the pavement and the early flows of fall may carry a petroleum sheen.

Stormwater quality protection measures may be placed in three general categories. Infiltration allows percolation of the water into the ground, relying on the soil to remove pollutants from the replenishing groundwater and eliminating the discharge to runoff.

Source control measures prevent the release of pollutants, so that the water is never contaminated. Treatment systems remove the pollutants from the stormwater before it reaches the ocean.

Runoff Sources and Quality

Stormwater and runoff come from a great variety of sources and carry a varied suite of pollutants. There are many approaches to the task of protecting receiving waters, and the best choice depends on stormwater source and quality. Runoff from a residential area of single-family homes, for example, is unlikely to carry industrial pollutants, but may have small amounts of oil and grease from roads, microbiological contamination from pet feces., and dissolved nutrients from fertilizers. These are readily removed by filtration in soil, so groundwater recharge, with its additional benefit of replenishing aquifers, is a good choice. Runoff from construction sites is less likely to carry harmful microorganisms, but may have heavy loads of sediment. The best choice here is to use dikes, detention ponds, and other measures to allow the sediment to settle out of the water before it is percolated to groundwater or released to storm drains. The dispersed and difficult-to-control pollutants of urban commercial areas may best be dealt with by providing regional solutions, such as parkland designed to serve simultaneously as a flood control basin, a groundwater recharge site, and a sedimentation basin for large amounts of water.

Streets

Streets, particularly those in dense commercial areas, are the most difficult source of urban runoff to manage. They receive litter, dust and dirt, air pollutant particulates, pet feces, occasional human waste, trace metals and oil from cars, various illegal discharges, and other pollutants. Because they are the first part of the stormwater collection and transport system, they receive and pass on pollutants that are carried away from parking lots, commercial establishments, and industries.

Exposed Commercial Activity

Manufacturing and other commercial activities, even those dealing with hazardous materials, have no effect on stormwater quality if the work is carried out under cover. However, for some large-scale activities, such as oil refining, this is not practical. Rain falling on machinery, materials, or contaminated surfaces can pick up pollutants. Measures can be taken to cover individual activities, or treatment systems can be installed to clean the water before release.

Construction Sites

Frequently, the first step taken in construction of new facilities is to clear the land of vegetation and pavement. The exposed soil is highly vulnerable to erosion by rainfall, and the movement of trucks and machinery can “track” soil to the adjacent streets.

Residences

Single-family homes are a source of some pollutants. Roof runoff will contain dust, bird feces and settled air pollutants. Runoff from gardens may contain pesticides and fertilizers. Occasionally, homeowners will (illegally) dispose motor oil or paint waste into storm drains. For the most part, however, runoff from neighborhoods of

single-family homes is relatively less polluted (if household toxics such as pesticides are properly used). Multiple-family residences produce many of the same pollutants, but typically have a higher ratio of rooftop and impervious surface to permeable landscaping, so that more water runs off.

Commercial Rooftops

Roof runoff from commercial facilities may be slightly polluted with air pollutant dusts, bird droppings, hydrocarbons from roof tar, and occasionally, some trace metals from rooftop machinery. The contaminants present may be very similar to those found on residential roofs, but handling the runoff may be more difficult because commercial areas have a high ratio of roof area to land area, and often have little landscaping.

Parking Lots and Landscaping

A significant fraction of urban land is devoted to parking lots. Parking lots are commonly polluted by litter, heavy metals from auto-parts and road wear, and by oil leaking from cars. Spilled food is present near establishments that sell food, and pet feces, bird droppings, and settled air pollutants will also be present, and all of these can be washed away in the runoff. Virtually all parking lots are designed for rapid drainage to the street or storm drain. Indeed, where grass or other plantings are present, these are commonly surrounded by curbs that prevent flow of the water from the lot into the soil. Many designs, in fact, promote runoff from the vegetation to the pavement.

ASSESSMENT OF REGULATORY POLICY

Overview of Policy and Regulation Theory

This report, in identifying and assessing BMPs, takes a strategic regulatory planning approach to managing stormwater runoff in Los Angeles County. Strategic regulatory planning involves a close examination of the legislative goals concerning the given policy. The ultimate end of strategic regulatory planning is to control behavior through methods that agree with legislative goals and societal values regarding the issues at hand. Thus, a strategic approach demands careful consideration first of whether enforcement is appropriate; and second, if enforcement is appropriate, to what degree should the parties involved be pressured to comply; and third, how coercive should the regulatory devices be? Compliance with existing laws and regulations, in this case the provisions of the federal Clean Water Act and state law, is a major goal of the strategic regulatory planning process.

How compliance is defined can vary markedly depending upon the actors involved and the policymaking context. In this sense "compliance" means the degree to which members of a target group conform to the directives of an agency, court, legislative body, or some other governmental agency. One way to determine whether members of a target group are in compliance with an environmental law is to monitor levels of pollution on a regular basis. We assume that the greater the number of individuals and firms that are in compliance with rules, the more likely pollution will decrease in a given locality.

When legislators pass laws, they generally expect them to be vigorously enforced and fully obeyed. Only idealists, however, actually believe that this is possible or even necessary in all cases. Political and economic factors usually force policymakers to take a more realistic approach to enforcement by setting a desired and attainable level of compliance prior to program implementation. At this stage, policymakers must consider whether 100 percent compliance is necessary. If not, they must determine what degree of compliance is needed in order to meet environmental quality goals. While the desired degree of compliance is often only a rough estimate, several factors must be kept in mind. Policymakers must take into account, for example, the extent to which members of a target group are making a “reasonable” effort to change their behavior and follow the law.

If it is either unrealistic or undesirable to aim for total compliance on the part of the target population, a clear decision rule must be formulated concerning enforcement priorities. In a policy area where polluters vary a great deal in size and how much they pollute, for example, it is commonly most prudent to concentrate enforcement efforts on the largest polluters. If firms are roughly the same size and pollute about the same amount, however, alternative guidelines for identification and discrimination must be set. For example, will businesses be selected randomly for monitoring and inspection? Is systematic enforcement, perhaps based on location, possible? Or, is self-regulation the preferable approach? The decision rule should relate to the strategic goals, resources, and motivations of all those involved. Further considerations include the legal authority for enforcement, the resources of the enforcement agency, and the fragmentation of the enforcement agency (or agencies).

In the ex post review/revision stage, policymakers determine the effectiveness of the regulatory program after it has been implemented. Feedback and evaluation are used to assess program performance. Legislative goals are used as a guide in determining whether regulatory approaches are succeeding or failing.

If policymakers determine that the program goals are still desirable, they will continue the same course of action. If they determine that the goals are being met, they will either maintain present enforcement levels or perhaps decrease enforcement efforts. The latter decision should only be made if policymakers believe they can save time and money and feel reasonably certain that compliance rates will not suffer. Appropriate and immediate action is required, of course, if the objectives are no longer desirable or if the objectives are not being achieved. In nearly every case, the aim of policy revision will be improvement in compliance and environmental quality. According to Ingram, the implementation phase of a statutory program "should contribute toward policy improvement or the evolution toward more tractable problems for which there are more doable and agreeable responses." (1990:476) Realization of the statutory goal, therefore, is not the only way to gauge the success of program implementation.

The conceptual perspective for the selection of BMPs analyzed in this report relies on Lowi's (1964) policy classification scheme, with further elaboration by Salisbury (1968). Lowi classifies policies as distributive (non zero-sum policies in which nearly everyone benefits), redistributive (policies that approach zero-sum, in which some benefit and some lose), and regulatory (policies that also tend toward zero-sum, and in which government prescribes rules of behavior for particular groups). Salisbury added a critical dimension to Lowi's typology by identifying self-regulation policies as a fourth policy type. Self-regulation policies are frequently offered as a noncoercive alternative by sectors of society targeted for external regulation, and they are invariably non zero-sum. These policies also impose constraints upon a group, but are perceived only to increase, not decrease, the beneficial options to a particular segment of the population.

Under this classification scheme, policies are *either* self-regulatory *or* regulatory. Thus, the Lowi and Salisbury typologies suggest that regulatory policies are either noncoercive (through self-regulation) or coercive (through direct command-and-control regulation). In the real world, however, regulatory devices tend to fall at different points along a continuum of coerciveness. In other words, devices intended to control behavior tend to vary according to their restrictiveness. Non-coercive approaches (through self-regulation) occupy one end of the continuum while coercive approaches (through direct command-and-control regulation) occupy the other end.

Conceptualizing regulation in these terms provides water quality policymakers a flexible framework in which to assess alternative regulatory mechanisms. Water quality policymakers have a menu of regulatory approaches from which to choose, and careful thought must be given as to which regulatory devices are best suited to control stormwater runoff without being unnecessarily harsh. If members of the target population (e.g., citizens, small businesses, municipalities, etc.) unanimously believe that stormwater regulations and deadlines are too restrictive and unfair, they will likely ignore what they are being told to do. At the same time, if regulatory devices are too weak and not sufficiently coercive to lead to improvement in water quality, then efforts to control stormwater runoff will fail. Water quality policymakers, therefore, must be familiar with

the target population and possess considerable information before they select the most appropriate regulatory mechanisms that embody the level of coercion necessary to achieve an optimum degree of compliance.

Cost is a second dimension that characterizes regulatory mechanisms. Cost here refers to the amount of money government must spend to administer a particular regulatory approach (cost to the regulated community will be considered later). In general, the most coercive activities (e.g., imprisoning polluters) require the greatest government involvement and therefore are more expensive to administer than the least coercive activities (e.g., economic incentives). Limited government revenues obviously make this an important variable. This is especially the case in current government efforts to control stormwater pollution.

The total cost and coerciveness of the selected regulatory program represent the overall government effort necessary to attain compliance and control water pollution. Compliance can be achieved in varying degrees and is best conceptualized along a continuum ranging from avoidance to adherence. Under optimal conditions (e.g., a harmonious political environment), policymakers will be able to use the least coercive enforcement techniques (e.g., reporting by firms and municipalities and formal compliance tracking) at the least cost to achieve full compliance. The expectation is that least coercive mechanisms are always preferable to more coercive mechanisms if only because the former devices are more cost-effective. In contrast, extremely restrictive enforcement arrangements (e.g., court injunctions) will necessitate direct government involvement and thus require substantial cost. Under ideal conditions, therefore, policymakers will select regulatory devices that are the least coercive and least costly and that lead to compliant behavior.

Unfortunately for policymakers, optimal conditions are rare. Many times the conditions that do exist (e.g., a lack of agency funds or a small staff) tend to diminish the effectiveness of the least coercive approaches, often to the point where the outcomes are in danger of moving toward avoidance behavior. In order to prevent outcomes from moving in this direction, policymakers must select techniques, either singularly or in combination, that are affordable and sufficiently coercive to produce compliant behavior.

Naturally, policymaking is a dynamic process and circumstances tend to change over time. Decision makers are continuously gauging the potential impact of given conditions on regulatory mechanisms and making adjustments as they see fit. Eventually, they may be forced to adopt expensive and restrictive approaches that will result in compliant behavior in an attempt to prevent outcomes from moving toward avoidance behavior. When accurate information is available and incorporated into deliberations, policymakers usually will achieve the greatest level of compliance possible with the least effort and expense regardless of the conditions that exist at the time. This underscores the importance of obtaining the most accurate data available as changes occur over time.

In a pluralist, multi-level system like the United States, some communities may favor avoidance behavior in the face of unpopular regulations. While such situations may arise from time to time, in most cases policymakers will want their regulatory devices to achieve the highest level of compliance possible under given conditions.

Stormwater Regulation and Regulatory Intent

The federal Clean Water Act utilizes two approaches to managing water quality: technology-based requirements and national water quality standards. Section 303(d) of the Act integrates these two approaches by stipulating that states make a list of water bodies that are not attaining standards after the technology-based rules are implemented. For water bodies on this list, as well as where the U.S. Environmental Protection Agency (EPA) Administrator believes appropriate, the states are to formulate TMDLs which must account for all sources of the contaminants that forced the listing of the water bodies. Under federal law, TMDLs must account for contributions from point sources (federally permitted discharges) and pollution from nonpoint sources. The U.S. EPA must review and approve the list of contaminated waters and every TMDL. In the event that the U.S. EPA does not approve the list of impaired water bodies or a TMDL, the Agency must establish them for the state. (www.swrcb.ca.gov/tmdl/background.html, July 15, 2003)

The Clean Water Act does not specifically require the adoption of TMDLs. Instead, Section 303(d), Section 303(e), and their provisions stipulate TMDLs be included in water quality plans. The U.S. EPA has adopted rules (40 CFR 122) requiring that the National Pollutant Discharge Elimination System (NPDES) permits be modified to be consistent with all approved TMDLs. An NPDES permit outlines specific limits of pollution for a particular discharger. Nearly all the states, including California, are permitted to administer the NPDES permit program. (U.S. EPA administers the permit system in the remaining states.) Implementation plans are to be formulated along with the TMDLs.

California Law

California effectuates the provisions under the Clean Water Act principally through institutions and procedures set out in certain provisions of the California Water Code, including those of the California Porter-Cologne Water Quality Control Act. These provisions established the State Water Resources Control Board (SWRCB) within the California Environmental Protection Agency to develop and implement state policy for water quality control.

The Porter-Cologne Act also established nine California Regional Water Quality Control Boards that operate under the authority of the SWRCB. Each Regional Board is comprised of nine members and an executive officer appointed by the members of each board. The Regional Boards develop and adopt water quality control plans for all areas within their region. The SWRCB formulates, adopts, and revises general procedures for the development, adoption, and execution of water quality plans by the Regional Boards. It reviews these plans and either approves them or returns them for revision and resubmission. Water quality plans do not become effective until the SWRCB endorses the plans, followed by approval by the California Office of Administrative Law.

The Evolution of Water Pollution Control

During the 1970s, policymakers considered point source pollution to be the biggest threat to the water quality of the nation's inland lakes, rivers, and streams. (www.swrcb.ca.gov/tmdl/background.html, July 15, 2003) The Clean Water Act established a number of programs to address point sources of pollution, and most federal money went to formulate and implement point source controls. California pursued the

same approach in its effort to improve the state's water quality. In addition, the State and Regional Boards implement smaller scale corrective actions for nonpoint source pollution as permitted under the Porter-Cologne Act.

A major goal of the Clean Water Act was to expand treatment of wastewaters. According to Rosenbaum (2002), all treatment plants in operation before July 1, 1977 were required to have "secondary treatment" levels. All treatment facilities, regardless of age, were required to have "the best practicable treatment technology" by July 1, 1983. The Act also appropriated 18 billion dollars between 1973 and 1975 to assist local communities in building necessary wastewater treatment facilities. The federal government paid for 75 percent of the capital cost for building the new facilities. Programs focusing on treatment facilities resulted in significant improvements in water quality by the late 1980s.

Concerns over the nation's water quality arose again due to the growing impacts of nonpoint source pollution, and environmental groups looked to the TMDL requirements to ameliorate continuing water quality problems. A series of lawsuits ensued to force regulators to adopt an aggressive approach to TMDL development. Thus far, over 40 lawsuits have been filed throughout the nation, most of them by environmental groups. (www.swrcb.ca.gov/tmdl/background.html, July 15, 2003) The lawsuits are commonly filed against the U.S. EPA due to its responsibility to approve TMDLs. Several of them have led to negotiated settlements and consent decrees that are overseen by the courts. At present, California is operating under three consent decrees covering most of the North Coast Region, the entire Los Angeles Region, and Newport Bay and its tributaries in the Santa Ana Region.

TMDLs in California are established either by the Regional Boards or by the U.S. EPA. Those established by the Regional Boards are designed as Basin Plan amendments and include implementation rules. Those formulated by the U.S. EPA normally contain the total waste load allocations as required by Section 303(d), but do not include extensive implementation rules, primarily because U.S. EPA implementation of nonpoint source pollution control strategies are generally confined to education and outreach in accordance with CWA Section 319. (www.swrcb.ca.gov/tmdl/background.html, July 15, 2003) Presently, TMDLs are required for all waters and pollutants on the 303(d) list and must consider and include allocations to both point sources and nonpoint sources of contaminants. The limitations in a TMDL may be other than "daily load" limits. There also can be multiple TMDLs on a specific body of water, or there can be one TMDL that focuses on many contaminants. Current examples of TMDLs in the Los Angeles Region include the trash TMDLs for the Ballona Creek and Wetland, Los Angeles River Watershed, and East Fork San Gabriel River, and the wet-weather bacteria TMDL for the Santa Monica Bay Beaches. At this time the Section 303(d) list contains over 1,400 water body/pollutant combinations. Based on this list, the State Board estimates that about 800 TMDLs are needed. The Regional Boards are now developing over 120 TMDLs, with several addressing multiple pollutants. (www.swrcb.ca.gov/tmdl/background.html, July 15, 2003)

Concerns over implementation have become a significant issue in the formulation of TMDLs. (www.swrcb.ca.gov/tmdl/background.html, July 15, 2003) Although these concerns generally fall outside the provisions of Section 303(d), they are nevertheless

important to achieving water quality improvements as a result of the establishment of TMDLs. While it is possible to conduct technical assessments of total load without considering implementation issues, one must address the possible mechanisms by which pollution can be reduced in determining allocations to various sources. Considering different implementation options can help analysts avoid adopting allocation schemes that are far more costly than necessary or, even worse, unachievable. The TMDL strategy in California seeks to engage the public and cultivate an understanding of watershed issues. It relies on an adaptive process that matches management capabilities with scientific knowledge and information.

The Stormwater Permit

The Los Angeles Regional Water Quality Control Board (LA Regional Water Board) has adopted a NPDES permit containing waste discharge requirements for MS4 discharges within the County of Los Angeles (with the City of Long Beach excluded because it is covered under a separate MS4 permit). The main intent of the Permit is to reduce significantly the amount of various pollutants contained in stormwater runoff. The County of Los Angeles has identified seven critical industrial and commercial sources of contamination: 1. wholesale trade (scrap recycling, automobile dismantling), 2. automotive repair/parking, 3. fabricated metal products, 4. motor freight, 5. chemical and allied products, 6. automotive dealers/gasoline stations, and 7. primary metal products. The priority industrial sectors and automobile repair facilities/ gas stations (two of the commercial sectors) on the list contribute substantial concentrations of heavy metals to stormwater. Overall, the Permit is intended to establish and implement a timely, comprehensive, cost-effective stormwater pollution control program to reduce the discharge of pollutants in stormwater to the Maximum Extent Practicable (MEP) from the permitted regions in the County of Los Angeles to the waters of the U.S. subject to the jurisdiction of the Permittees and also meet water quality standards. BMPs must be identified and implemented to reduce the discharge of pollutants in stormwater to the MEP and also meet water quality standards.

The Permit has established an iterative process that allows municipalities in Los Angeles County to measure noncompliance, test alternative BMPs, and consult County and regional water quality authorities. Thus, the Permit provides a mechanism to make adjustments to the required BMPs as necessary to ensure their adequate performance. According to the U.S. EPA, "Water quality-based effluent limits for NPDES-regulated stormwater discharges that implement wasteload allocations in TMDLs *may* be expressed in the form of BMPs under specified circumstances….If BMPs alone adequately implement wasteload allocations, then additional controls are not necessary." (U.S. EPA, Memorandum, November 22, 2002, p.2)

Regulatory Mechanisms

Pollution control regulations can range from programs that prescribe very specifically what the regulated community is to do, to programs that only set goals and leave the community to find the best methods to reach the goals. Programs of the first kind are often criticized by the regulated community for lack of flexibility—the standard complaint is "This approach does not work well for our particular case. We could do this in another way and accomplish the goals for a lower price". Programs of the second kind

provide flexibility, but are often criticized for vagueness: "We don't know how to do this. We are not sure what we have to do to come into compliance".

The stormwater management program is clearly of the second type, and it should be so. Stormwater quality control is an extremely complex issue, influencing, if not everything under the sun, then everything under the rain. The best means of compliance will certainly differ from city to city, depending on land uses, land prices, and a host of physical characteristics of the landscape. It is likely that, as the nation engages the problem, new approaches will be developed. Entrepreneurs will develop new devices and methods as others are tried and discarded. Strict specification of methods at this time might well eliminate approaches that are more economical and effective, so a flexible approach is best.

However, an inevitable side effect of maintaining flexibility is that the regulated community faces an unsettling level of uncertainty. Mayors and city councils faced with planning future infrastructure and future budgets are understandably uncomfortable facing mandatory water quality goals without specified means of reaching those goals. This level of uncertainty will decline as plans are developed and experience with water quality control measures accumulates.

There is a historical precedent for this approach in the program for control of air pollution in Southern California. Like stormwater pollution, it is generated by a very large number of sources with varying compositions and emissions rates. Many of the sources are difficult to monitor and regulate. Implementation of pollution controls has been accompanied by intense political controversy. Even so, air pollution control efforts have been relatively successful—pollution levels and their associated health effects have declined. While costs have been high and some high-polluting marginally profitable businesses have closed or left the area, it is also clearly true that the economy of the area has not collapsed, as some predicted. Few people would suggest that we should return to days when taking a deep breath was literally painful.

Policy Implementation

Our research indicates that the LA Regional Water Board is strongly committed to abating pollution from stormwater runoff as effectively and inexpensively as possible. The U.S. EPA supports the LA Regional Water Board's efforts to require individual municipalities in Los Angeles County to adopt necessary BMPs to control stormwater runoff. Federal and state policymakers along with environmental group leaders believe that BMPs, if widely and strategically implemented, can significantly reduce stormwater pollution and improve water quality throughout Los Angeles County. Given the proven effectiveness of BMPs in different areas of the country (and the world), the LA Regional Water Board does not envision the need to build new advanced treatment plants throughout the region, and indeed has expressed the specific intent that such plants should not be required. Advanced treatment is viewed as an absolute last resort given the huge expense it would entail and the confidence policymakers and environmental leaders have in the ability of BMPs to reduce pollution significantly and allow the region to meet federal clean water standards. The authors of this report concur with this position. Some municipal leaders in Los Angeles County have asked why they should be forced to adopt BMPs when there is a possibility that advanced wastewater treatment plants will

ultimately be required. Even if advanced treatment plants are necessary in the future, which is highly unlikely, the adoption of BMPs will dramatically reduce the amount of water and the mass of pollutants these plants will treat. This will reduce pollution treatment costs and improve the effectiveness and ability of plants to handle large volumes of water during heavy rain periods. That is, BMPs will be used as part of any program to build advanced treatment plants because the much cheaper BMPs will reduce the costs of the very expensive advanced treatment plants. Implementing BMPs now will be a good investment even in the unlikely event that an advanced treatment plant is required.

The LA Regional Water Board has focused some efforts on reducing trash in stormwater runoff, and it has adopted a "zero trash" rule to achieve this goal. The Board does not expect all communities to eliminate every single piece of trash from inclusion in stormwater runoff. Instead, the Board policy is that communities in Los Angeles County make reasonable efforts to prevent trash from entering storm drains. "Trash" is defined as materials larger than ½ cm, so municipalities can comply with this regulation by installing ½-cm screening devices on their catch basins, by enforcing litter laws already on the books and by conducting street sweeping in areas where trash tends to accumulate. Public education about littering and the installation and maintenance of catch basin devices can provide substantial progress in preventing garbage from entering storm drains.

In order to avoid a costly court battle with state water pollution policymakers, the County and City of Los Angeles have recently agreed to spend $168 million to reduce by half the amount of trash that collects in the 51-mile-long Los Angeles River (McGreevy and Weiss, 2003). In addition, the City of Los Angeles agreed to drop its lawsuit against state policymakers over the overall plan to abate polluted stormwater runoff. The agreement settles a lawsuit filed by the city and county that opposed the LA Regional Water Board's requirement to reduce trash entering the river 10 percent annually over the next 10 years. The LA Regional Water Board officials negotiated the deal, which requires the city and county to reduce rubbish going into the river and Ballona Creek 50 percent by September 2008, at which point state regulators will consider whether further rules are necessary. The agreement also provides local officials more flexibility in trying less-costly approaches of reducing trash. Environmental groups such as Heal the Bay, Santa Monica BayKeeper, and Friends of the L.A. River applauded the agreement. Rather than spend money on litigation, county and city officials will allocate funds to improve water quality.

Clearly, all communities in Los Angeles County will have to share the financial burden in helping to reduce contamination from stormwater runoff. This may require many communities to modify their budget priorities.

As long as communities make a reasonable, good faith effort to address stormwater pollution issues, it is unlikely that federal and state officials will take legal action. Thus far, this has been the case. Failure to make such an effort, however, will certainly result in legal action against violators. Moreover, environmental groups can choose to file lawsuits against federal and state officials if they do not continue to pursue polluters. Such action will lead to costly delays in meeting federal water quality

standards and will likely lead to even more draconian measures given present federal and state law and previous judicial decisions.

Previous Actions by the LA Regional Water Board

The impacts on water quality and the heightened risks to public health from MS4 discharges that affect receiving waters across the U.S. and in Los Angeles County and its coastline have been well studied and documented. Accordingly, the LA Regional Water Board has taken a number of significant actions to control such discharges (LARWQCB, 2001)

In 1990, the LA Regional Water Board adopted Order No. 90-079, the Los Angeles County MS4 Permit. That permit required the Los Angeles County Flood Control District, the County of Los Angeles, and the incorporated municipalities in Los Angeles County to implement stormwater pollution controls including updating ordinances, optimizing existing pollutant controls such as street sweeping, construction site controls, and others. The Regional Board required all Permittees to adopt at least 13 specific BMPs for consistency across the County. The 1990 permit was executed on a system wide basis due to the highly interconnected storm drain system serving a population substantially larger than 100,000 residents. At this point, the region was committed to MEP standards—cleaning up stormwater to the maximum extent practicable.

On July 15, 1996 the LA Regional Water Board issued Order No. 96-054 that updated the 1990 permit. The 1996 Los Angeles County MS4 permit required model programs be formulated and implemented by the Permittees for Public Information and Public Participation, Industrial/Commercial Activities, Development Construction, Illicit Connections and Illicit Discharges, Public Agency Activities, and Development Planning. These model programs will change with time as more data on stormwater impacts are collected and become available.

On January 31, 2001 the Los Angeles County Department of Public Works formerly requested to renew their MS4 permit in the form of an ROWD for the County of Los Angeles and the incorporated cities, except the City of Long Beach. This request began the process of reissuance of the permit, which entered into its third permit term. On the same day the Los Angeles County Flood Control District submitted an ROWD. The Regional Board staff invested considerable time and effort in providing opportunities for public participation and comment. Over 30 meetings, two workshops, and many outreach activities were conducted to allow the public, Permittees, and other interested parties enough opportunity to participate in the development of permit requirements and language prior to consideration by the Regional Board for adoption. The reissued MS4 permit committed the region to meeting water quality standards based on the State Water Resources Control Board's precedential Orders.

Implementation of the MS4 permit requirements should reduce pollutants in stormwater in a cost-effective manner. The adoption of BMPs should also reduce pollutant discharges and enhance the quality of surface water.

The final steps of the regulatory process are now under way—TMDLs for the various impaired water bodies of the region are being promulgated.

Overall, it is clear that the LA Regional Water Board does not intend to require that municipalities build advanced treatment plants: indeed, they have publicly expressed the sentiment that they oppose this solution.

Implementation of Regional Solutions

A regional infiltration and BMP treatment system, in combination with source control of trash, pesticides, and trace metals, can substitute for individual site controls on land parcels within the drainage area. This could take the form of "Local Equivalent Area Drainages", implementing regional solutions that would achieve better results than the application of new source controls, which, in built up areas, will have significant effects only over the long term during which existing structures are rebuilt.

Funding for regional solutions may pose a challenge because of Proposition 13 and other restrictions on tax policy. The challenge however is not insurmountable if property-owners and voters become adequately informed and educated. Nevertheless, regional solutions may significantly shift administrative and cost burdens for water quality protection from businesses and development firms to local government.

Trading Schemes

"Cap and trade" systems, in which regulatory agencies set a cap on the amount of pollution allowable and allow trading of discharge rights within the constraints of the cap, have been successful in several fields. A group of municipalities, for example, might assign discharge rights to landowners within a watershed such that total releases meet the constraints of the TMDLs. They could then allow trading in the discharge rights, so that those who can reduce discharges at least cost are the first to do so, and the overall cost of meeting the TMDL is minimized. Municipalities themselves, as owners of parks and open space, might be able to develop regional solutions and fund them through sales of discharge rights to others.

Stormwater pollution control may be particularly amenable to this approach because the costs of control are highly site-specific. In many cases, there may be considerable economy in applying regional solutions in the best possible sites rather than controlling every site individually.

DESCRIPTION OF ALTERNATIVE APPROACHES

Infiltration

Before the City of Los Angeles was established, most of the rain that fell in the region evaporated or percolated into the soil. The groundwater was continually replenished and runoff flows were small. As population grew, impermeable surfaces such as paved roads, parking lots, and rooftops covered more and more of the land. Residences, commercial facilities, and roads were designed to shed water as rapidly as possible. Historical measurements of discharges to the Los Angeles River at Firestone Boulevard indicate that runoff has increased from 5% to 45% of rainfall. This change adversely affected stormwater quality in two ways. First it increased the amount of stormwater flow, magnifying the cost of any measures to control quality (and also requiring ever more costly flood control measures). Second, water that flowed directly to streams and the ocean no longer benefited from the purifying action of soil and vegetation, which can remove particulates through physical filtering, sequester some chemicals by adsorption, and destroy organic and biological contaminants by biodegradation.

Any program for remediation of stormwater contamination should reverse this trend, reducing the load of both water and pollutants on other parts of the system. At the same time, pollution of groundwater must be avoided. However, infiltration will benefit from the very considerable capacity of soils to filter particles, adsorb contaminants, and biodegrade organic materials. A relative estimate of the magnitude of the problem may be made by comparison with examples of leaking underground storage tanks at gasoline stations. In many cases, spills of tens or hundreds of gallons of gasoline are now being handled by "intrinsic remediation"—allowing natural biodegradation to degrade the hydrocarbons. The acceptability of this approach has been supported by extensive research. Hydrocarbon infiltration with stormwater will involve far lower concentrations of hydrocarbon, and will mostly be the higher-molecular-weight compounds that are much less mobile in soils than gasoline.

We can also compare stormwater infiltration to the effects of septic tanks. These systems infiltrate sewage that has received only a modest degree of treatment. Yet they are still in use in the Los Angeles Region, and indeed are the primary waste disposal method for 15% of households in the U.S. Groundwater contamination from septic tanks has occurred, but most are considered effective and safe waste disposal systems.

This comparison suggests that the relatively low concentrations of pollutants in common stormwater, with appropriate controls on sources of specific contaminants, will not pose a significant threat to groundwater quality.

The permeability of soils in the Los Angeles basin varies from place to place. Beneath the Whittier Narrows spreading basins, for example, sand and gravel deposits allow very high rates of infiltration. In other areas, clay-rich soils reduce rates of infiltration. However, the historically low rates of runoff indicate that infiltration is capable of handling the bulk of the rainfall in the Los Angeles Region. Many areas routinely considered as having poor infiltration rates will never the less be useful as multi-purpose infiltration systems. A soccer field, for example, can be used as an

infiltration basin at little additional cost, and will make a valuable contribution even if infiltration rates are low in comparison to those in spreading basins.

Source Control

Industrial Releases

Industrial discharges can be controlled by a vigorous program of source identification and control. Businesses have a fundamental responsibility to do their work without contaminating their neighborhoods, and in the great majority of cases can do so without significant interference with their activities.

Trash Management

Many businesses and some homeowners contribute a disproportionate amount of trash to the urban burden. Paper waste often accumulates in the parking lots of fast food outlets and strip malls, where it can wash into the street during rainstorms. Inadequate dumpsters and garbage cans are overloaded so that trash spills into the streets. Poorly covered trucks can allow trash to fly out on the streets. In addition, citizens throw trash from their cars onto the streets (it has been estimated that as much as 60% of trash on freeways by weight is cigarette butts). All of these practices are illegal, but enforcement is currently rare and weak. While perfect compliance with anti-litter laws is not expected, there could certainly be major improvements through enforcement. Much of the cost of such efforts could be recovered through fines, with the satisfying result that those causing the problem would be paying for cleaning it up.

Municipalities are responsible for the trash deposited on their streets, and most will respond by installing screens on catch basins. These are sometimes referred to as catch basin "inserts". They will have half-centimeter openings and will be designed to collect trash during periods of low or modest flow, but to bypass the flow during heavy storms or if they are clogged. This will avoid local flooding that would be caused by clogging.

Street Cleaning

Trash that escapes enforcement efforts can be collected by street cleaning before it reaches the storm drains. Enhanced street cleaning is likely to be necessary as cities install half-centimeter screens on their catch basins. Trash that is now washed out of sight (at least until it reaches the beaches) will accumulate on the screens and possibly clog them. More effective and more frequent street cleaning will reduce this problem.

A major fraction of the pollutants in stormwater runoff are adsorbed on particles—this is particularly true of trace metals and pesticides, which are significant contributors to impairment of the receiving waters. Some of this particulate matter can be removed from streets by higher-quality street vacuuming equipment, which collects the dirt much as a vacuum cleaner does. This equipment is more expensive to purchase and operate, but it would make a significant contribution to reducing chemical pollutants in stormwater.

The Port of Seattle has tested high-quality street sweepers as a cleanup method in its container storage area (FHWA, 2003). The approach was successful, removing one-third to one-half of particulates and their associated pollutants. While the equipment is somewhat more expensive than simple sweepers to purchase, operations costs are about

the same. The fine particles carry a significant portion of the pollutants, but they constitute only a small portion of the total mass of material on the streets, so their collection and disposal does not significantly increase costs. Such street cleaning may be more effective in Southern California, where the long dry season allows dust to accumulate for many months.

As explained in detail later, there would be substantial secondary benefits associated with improved street cleaning. Neighborhoods would look better, and residents would be exposed to less resuspended road dust, which dirties buildings and may have significant negative health effects.

Some investigators have also proposed street washing, using recycled water. If this were done during dry weather, and all of the dry-weather flow were being collected for treatment in wastewater treatment plants, street pollutants would be kept out of the rivers.

Pesticide Substitutions

Many of the receiving waters in the Los Angeles Region are impaired by pesticides, particularly Diazinon and Chlorpyrifos. The approach to this pollution should be the same as it has been historically for other pesticides that threatened environmental quality. None has ever been dealt with by treating contaminated waters. Those who use the pesticides should be responsible for ensuring that no water pollution results from that use. Pesticides that cannot be properly managed by appropriate use protocols such as labeling or use rules enforcement and which have an inherent tendency to persist in the environment should be banned. Pesticide controls are instituted by the state and federal governments, so additional political effort will be needed if a bans on specific compounds are required.

We presume that these pesticides are used in many cases because they are currently the most economical approach to insect control, and that substitution of another method would involve some cost. However, there are many possible alternatives, including use of more readily degraded pesticides, insect-resistant strains of plants, biological control with natural insect predators, and others. There are many examples of success with such integrated pest management (IPM), particularly at golf courses (NRDC, 1999). In some cases owners were pleased to find that costs actually declined when they switched from pesticide-dominated approaches to IPM.

Trace Metals

Trace metals enter stormwater as rain drains from industrial operations, transportation land uses, and other sources. Brake pad wear on cars produces a fine dust of copper. Zinc is released when galvanized equipment contacts the water. Trace metals in stormwater can be controlled by covering machinery and materials that release trace metals, by capturing and treating runoff from large industrial operations and transportation land uses, and by developing alternative materials for brake pads (research is currently under way on this objective).

Control of Automotive-Related Sources

Motor vehicles and related facilities are the source of many types of runoff pollutants, including hydrocarbons from oil and fuel leaks, and road wear. Vacuum street cleaning is effective in dealing with particle-bound hydrocarbons left on the street,

and infiltration can effectively deal with hydrocarbons that are transported or deposited off the street surface.

Control of Bacteria

Bacterial contamination in stormwater is typically measured as counts of "coliform" bacteria, a category that contains many species of bacteria. While very few of the coliforms cause disease, some of these species are very abundant in human waste, and so detection of the group has long been used as a marker for sewage pollution. Efforts to interrupt the fecal-oral transmission of disease have commonly taken the elimination of coliforms from water as a surrogate for judging efforts to prevent the spread of the microorganisms that do cause disease. Where coliform counts in drinking water have been reduced (in much of the industrialized world) transmission of water-borne disease has indeed been largely eliminated. Thus the use of coliform counts as a marker for disease control has been remarkably successful. In some cases, a more specific test for "fecal coliforms" is used, because the test is an indicator of contamination by warm-blooded animals, including humans. While we have always counted coliforms, the real concern is pathogens—microorganisms that can cause disease. For sewage pollution, the association between the two has been strong, and controlling coliforms has been equivalent to controlling disease. The situation for stormwater, however, may be far more complex. Because there are many non-human sources of coliforms, it is possible that the test for their presence may be positive even when no human pathogens are present.

The sources of the coliforms found in stormwater remain uncertain. Pet wastes certainly include bacteria that test positive as coliforms, but the degree to which pet wastes constitute a disease threat is uncertain. Wild mammals, such as raccoons, possums, skunks and coyotes, may contribute when their wastes are left on paved surfaces. It has been proposed that fecal matter from homeless people denied access to restrooms may be a source, but there has been no study confirming this. In less developed areas with poor soil infiltration conditions, it is likely that poorly operated septic tanks and illegal disposal of gray water are contributing to the coliform counts detected in runoff. If septic tanks are the source, strict enforcement of waste control ordinances is appropriate. If homeless people are the source, provision of restroom facilities would be far cheaper than any imaginable stormwater treatment system (as well as being more humane). If pet feces are the source, the only approach is, through public outreach and enforcement, to press people to clean up after their pets. It must be expected, however, that such an approach will not be 100% effective. The contribution of wild animals seems uncontrollable.

Because the sources and significance of the coliform counts remain uncertain, it is important that research on the topic be pursued immediately. The recent development of genetic techniques for precise and rapid identification of bacterial species now provides the tool needed to provide the information needed to develop effective policies.

Coliforms, and presumably the associated human pathogens, are substantially reduced in treatment wetlands. Infiltration of course removes them from runoff flows, and adsorption on soils and biodegradation are effective at protecting groundwater. Water storage, because it holds coliforms in an environment for which they are not adapted, and because it allows settling of particles to which they may be attached, has

some beneficial effect. Disinfection, using chlorine, chloramines, or ultraviolet light is possible, but relatively expensive.

Water Quality Control Board Rules allow for 17 exceedences of the coliform limit per year. There are about 32 days per year of significant rainfall in the region, so it has been anticipated that exceedences during the heavy winter storms will be difficult to control, and will be allowed.

Improved Enforcement

It is important that source control efforts include genuine and credible enforcement. Rules that are widely ignored, of course, will not help clean up runoff water, and a considerable fraction of runoff contaminants come from illicit discharges or disposal. Trash is an obvious example—littering is already illegal, so 100% of the trash in stormwater represents illegal release.

The Environmental Protection agency describes an example in which improved enforcement of existing law was effective (USEPA, 1999):

"…during a 12-month period, the Houston, Texas, Public Utilities Department identified 132 sources of discharges leading to Buffalo Bayou, the local drinking water source, with estimated flow rates ranging from 0.3 to 31.5 liters per second. Houston's program involved monthly sampling from bridge crossings; analysis of samples for carbonaceous biochemical oxygen demand, ammonia and nitrate nitrogen, pH, TSS, DO, temperature, fecal coliform, and chlorine residual; comparison of samples to baseline flow concentrations; weekly sampling of temperature, dissolved oxygen (DO), and fecal coliform in stream reaches suspected of contamination; boat sampling to identify the contaminating outfalls along the reach; and, finally, a land-based search to pinpoint the source. Of the flows identified during the program, 85% were due to broken or clogged wastewater lines and 10% were due to illicit connections (Glanton et al., 1992). Eight months after an illicit discharge detection and elimination program began, fecal bacteria log mean concentration was reduced from 20,000 colonies/100mL to 2,000 colonies/100ml."

Thus, in this example, a 90% reduction in bacterial contamination resulted from a careful enforcement program alone.

Detention and BMP Treatment

Stormwater Detention Basins

Many of the problems of stormwater management are associated with its very irregular rate of flow. During dry periods runoff flow rates are so low that the water can be handled by existing sanitary wastewater treatment systems. During rainstorms, the water comes so fast that municipalities have had difficulty doing anything beyond avoiding floods.

The first step toward dealing with this problem is to increase infiltration—substantial reductions in the peak flow rates are possible. The second approach is to provide storage systems that will hold water back during the peak flow periods. Detention basins will reduce peak flows, collect trash, provide quiet water for settlement of particles and their associated pollutants, and promote infiltration. Analysis of the

National BMP Database (Strecker et al., 2003) shows that detention basins infiltrate an average of 30% of the water they receive.

The primary difficulty with this approach is the shortage of available sites to construct large reservoirs. The topography of the Los Angeles area does not include any deep canyons in lower reaches of the rivers that could easily be made into reservoirs. Moreover, virtually all of the land is already occupied by other uses and would accordingly be very expensive to acquire.

This means that detention basins must be conceived as a distributed network of smaller systems, with each serving multiple uses. A useful model is the Sepulveda Dam Recreational Area, which retains water during storms to prevent downstream flooding. For the great majority of the days in the year, the basin is mostly empty, and serves as a park and a wildlife refuge.

A rough estimate of the general feasibility of a regional-park-based approach can be calculated. The City of Los Angeles currently has about 5% of its area in parks (Wolch et al., 2002) and it is reasonable to presume that at least a similar fraction is park throughout the LA Region. Thus, moving the rainfall from adjacent developed areas to the parks would constitute concentration of the flow by a factor of 20 (20 acres of land would drain to 1 acre of park). If the runoff coefficient for the developed areas is 0.5, a rainfall of ¾ inch would thus put 8 inches of water in the parks. This is less than the 24-inch depth of flooding assumed for the stormwater parks planned in the Sun Valley project, suggesting that this approach is feasible on the large scale in terms of the amount of land required.

This calculation is quite approximate: the runoff coefficient is uncertain, and several other factors are poorly known. Never the less, the calculation suggests that a joint program could simultaneously provide the region with needed parks and needed stormwater infiltration capacity.

Sanitary Treatment of Dry Weather Flows

During dry weather, small flows are present in the stormwater system as a result of overwatering of lawns, car washing, and other discharges. This modest amount of water can be collected and passed through existing wastewater treatment plants, which commonly have more than enough excess capacity for this purpose. Because the dry season in Southern California is very long, this would prevent runoff pollution of the oceans for much of the year.

Where this is done, street washing with recycled water would be possible. Collecting and treating the contaminants during dry periods would leave the streets clean for the rainstorms, when the water cannot be collected.

Treatment Wetlands

Wetlands remove many pollutants from the water that passes through them. The low flow velocities allow sediments to settle, removing particulates and any pollutants that are adsorbed on them. Algae and rooted plants absorb nitrate and phosphate as they grow. Vigorous microbiological activity degrades organic chemicals, as microbial predators consume disease organisms. These observations suggest that wetlands can be constructed to serve as treatment systems for stormwater and dry weather runoff. While

this approach requires dedication of land, it has the considerable secondary benefit of providing riparian wildlife habitat and esthetic values.

A system of treatment wetlands has been designed for the San Diego Creek Watershed that drains to Newport Bay, in Orange County, California. The system will serve an area of 120 square miles, and is expected to cost in the low tens of millions of dollars. It is expected to meet the low-flow nitrogen TMDL, the phosphorus TMDL during most years, and the fecal coliform TMDL during low flows.

A similar system has been constructed to provide stormwater quality protection for the Ballona Wetlands Watershed in the City of Los Angeles.

BMP Treatment of Flows from Problem Watersheds such as Industrial Areas

If source control is not successful for some industrial areas, it may be necessary to collect the runoff water and use more sophisticated BMP treatment. These might best be constructed as private facilities serving a consortium of local industries, and funded by them for the purpose. A public/private partnership could be created, perhaps with public loan guarantees. Past experience with business improvement districts could serve as a model.

Partial Treatment in Curbside Units

Many proprietary devices have been developed for treatment of runoff as it enters curbside catch basins. These generally remove trash from the flow, and may also collect sediments. Some include adsorbants to remove hydrocarbons and trace metals. They have the disadvantage that they are designed to bypass during higher volume wet-weather flows. All require some degree of maintenance, and some are expensive to install. Trash and sediment must be removed on a regular basis, and adsorbants must be replaced when they are exhausted. Never the less, they may be useful for treatment of problem dry weather flows in specific areas, such as industrial or commercial zones.

Public Outreach and Education

Much of the pollution in runoff water arises from actions of individuals—litter is discarded in the street, for example, or pesticides are used carelessly in a residential garden. This pollutant load can be reduced by educating citizens and urging them to behave in a way that protects water quality.

An effort in Oregon, conducted by the Tillamook Bay Rural Clean Water Project, was made to educate local farmers about the steps they could take to protect local streams. This involved personal visits, tours of successful BMPs, newsletters, and presentations (USEPA, 1999). Four years after the program began, bacterial concentrations dropped 40% to 60% in Tillamook Bay and 50% to 80% in local rivers. Thus in some cases significant progress can be made at very low cost through public education.

Good Housekeeping for Municipal Operations

While the behavior of individual citizens may be difficult to control, municipalities have far more control over their own operations. Efforts can be made to avoid careless use of pesticides and fertilizers on municipal facilities. Such steps have modest, but measurable impacts. An EPA report notes (USEPA, 1999):

> "…the City of Bellevue, Washington, found that street cleaning three times a week removed about only 10% of urban runoff pollutants; catch basin cleaning twice a year was estimated to be about 25% effective" (Pitt and Bissonnette, 1984).

Combined Approaches for Stormwater Quality Management

A general classification of rainfall receivers and appropriate methods for dealing with runoff they produce is shown in Figure 1. While the approach it describes is quite general, and other mixes of alternatives are possible, it shows one set of measures that can be used to control stormwater pollution.

Streets

The first step in reducing pollutants on streets is to restrict pollutant discharges from adjacent properties. Source control measures should prevent the release of industrial pollutants and construction sites should be managed to contain sediments. Litter laws and pet dropping collection laws should be enforced, although it must be acknowledged that it is not possible to prevent these inputs entirely. To stop litter from entering the storm drains, cities should install half-centimeter screens on their catch basins. The use of such screens will require diligent street cleaning, to ensure that the drains are not blocked during storms. In Southern California, rains mostly occur during a well-defined season, and frequently weather reports give two or three days warning of major storms. Cities should develop contingency plans for rapid-response street cleaning when storms are coming, to minimize stormwater contamination and the chances of flooding caused by clogged screens.

In some areas, where runoff water quality is relatively good, the streets themselves might be used as groundwater recharge facilities, by converting unused alleys to park/detention basins or by using permeable pavements.

It remains likely, however, that much street runoff will be of marginal quality. For the immediate future, it is also likely that a major portion of runoff from other sources will be initially discharged to streets, so that efforts to make use of stormwater as a water resource will require collection, and a degree of treatment before infiltration.

In most cases, this can be done with regional solutions. Water from storm drains can be collected in detention basins and wetlands, where sedimentation and biological activity will reduce pollutant load, and groundwater recharge can occur. The detention basins will serve as parks during the greater part of the year when water is not present, and the wetlands will double as much-needed wildlife habitat.

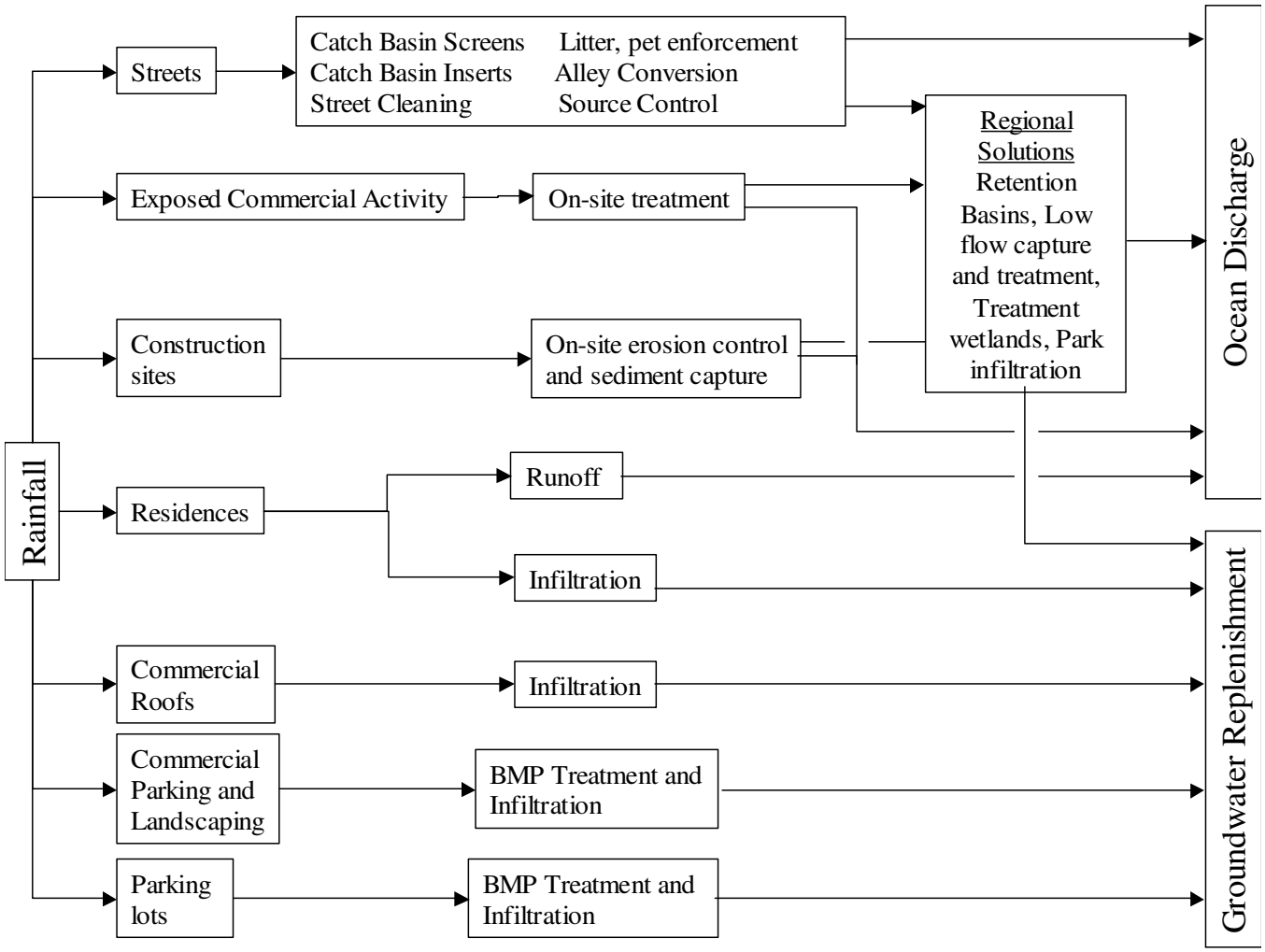

Figure 1. Stormwater quality control solutions for Southern California

Alleys for Public Use and Infiltration

Some alleys in urban areas are no longer necessary for access purposes. Indeed, many have become nuisance areas because of illicit trash disposal and criminal activity. Many of these could be gated and converted to small parks, with keys provided for local residents. They could simultaneously serve as infiltration facilities or as bioswales. There are currently 2.3 square miles of alleys in Los Angeles, for example. While many must be retained for access purposes, the fraction that could be converted could constitute a significant stormwater retention and infiltration resource. Alleys maintained for access might be candidates for partial or permeable pavements.

Similar approaches could be used for power line rights-of-way.

Exposed Commercial Activity

Very often the cheapest approach to stormwater quality control for exposed commercial activities is simply to cover them. Stormwater will thereafter come in contact only with the rooftop, and runoff will be much less polluted and more easily dealt with. However, for some large-scale activities, such as oil refining, it is not physically possible to provide a roof. For others, such as auto dismantling, the large area needed and the relatively low value of the activity may mean that a roof is not financially possible. Such facilities must be required to collect and treat runoff from their facilities, and indeed this is already being done in many cases. While there certainly are costs involved, it has generally proven possible, through a combination of better housekeeping, substitution of non-polluting materials, and simple on-site treatment processes, to solve these problems. Requirements for on-site treatment are advantageous because the cost of such treatment is borne by the business that produces the pollutant, providing incentives for conversion to less-polluting products and methods. Consequently, green manufacturing will become increasingly common.

Construction Sites

Release of sediments from construction sites can be ameliorated if the construction crew provides erosion control measures, such as maintaining vegetation or spraying exposed soil with polymer stabilizers, and an adequate on-site retention pond for rainfall, along with dikes, silt fences, and appropriate vehicle entrance construction to prevent runoff. Detention allows the sediments to settle out and the exposed soils can function effectively for groundwater recharge. It is anticipated that the costs of these measures will be small in comparison to construction costs. A more detailed list of best management practices for construction sites appears in Appendix I.

Residences

In most cases, homes and the surrounding landscaping have been designed to facilitate rapid runoff. It is necessary that water not pool in depths sufficient to flood houses, and ponding is viewed with irritation, even if it is harmless and temporary. However, single-family homes typically are surrounded with a significant area of land that could serve well for infiltration. Commonly, the land is planted or covered with

grass. The runoff from landscaping and residential rooftops typically contains only small amounts of pollutants that are readily removed by percolation through the root zone.

Landscaping for the typical single-family home could be arranged to infiltrate all of the rainfall that it receives (except, perhaps, in the most severe storms). Lawns a few inches below surrounding sidewalks could serve as infiltration ponds, gardens could receive roof runoff, and downspouts could conduct runoff to dry wells. Because the water would have had very little contact with pollutants, such infiltration would be an excellent addition to groundwater resources.

However, very few residences are arranged in this manner and, indeed, building codes often specify features that promote rapid runoff to the street. Building codes should be changed to utilize single-family homes as recharge sites. It is anticipated, however, that the effect on runoff will be seen only slowly in built-up areas as old homes are gradually replaced. Retrofit of existing homes will be expensive and politically difficult, but for new construction, single-family homes could be made to produce essentially zero discharge at little or no additional cost.

Xeriscaping—planting with native and other drought-tolerant plants—can also help to provide space for water infiltration, and it reduces watering and therefore the chance of irrigation runoff. Such landscaping also requires less fertilizer and pesticide, and so reduces incidental contamination.

In many cases, cities may be able to take interim steps to reduce runoff from homes. They have control over the "city strip" land that lies between the sidewalk and the gutter. It would be possible to institute a program of replacing the lawns after minor excavation, so that these areas would lie below the sidewalk and curb and serve as runoff detention and percolation basins.

Where infiltration is not possible, much residential runoff may be acceptable for direct discharge to the ocean, as long as it is not contaminated first by passing through polluted streets. More contaminated water can be conveyed to regional water cleanup and recharge facilities.

Low-flow Treatment in Wastewater Treatment Plants

Wastewater treatment plants are built with excess capacity in order to handle increased flow during rainy weather. While sanitary systems are designed to exclude stormwater, holes in manhole covers, leaks in piping, and illegal connections all allow the entry of some water during rainstorms. The flow is a very small portion of the rainwater, but can produce a significant increase in the much smaller sanitary flows—sometimes up to 50%. Treatment plants are designed with excess capacity to handle these peak loads.

This excess capacity can be used to treat dry weather runoff during periods when there is no rain. While these flows are not, by definition, stormwater, and indeed are governed by a separate set of regulations, dry weather runoff is often a significant contributor to impairment of receiving waters and its treatment would contribute to the objectives of stormwater control. It is also possible to use this capacity in concert with "street washing". In this approach, tank trucks filled with recycled water could be used to wash the streets, particularly in the months before the first rain of the fall. Contaminants removed from the streets and drains by the washing would be treated in the wastewater

plants, leaving the streets far cleaner when the rains came. At present, municipal street cleaning is a prohibited activity where it results in flows to the storm drain system.

This treatment approach for dry weather runoff could also treat runoff from small rainstorms.

It is likely that all of dry weather runoff could be treated for much of the Los Angeles Region. Such a step would eliminate essentially all runoff pollutants in the areas where this is possible. Because this approach uses capacity that is already in place, the cost for this alternative is low.

This approach would be particularly significant for control of coliforms. Sanitary treatment of dry weather flows would eliminate coliforms through much of the year. Rain occurs during only 32 days of the year, on average (Some of these storms are so small that the runoff could still be treated. On the other hand, untreatably high levels of runoff typically continue for a few days after a major storm). The LA Regional Water Board allows variances for 17 days of wet weather flow during the year. Thus it seems likely that dry weather runoff treatment at wastewater treatment plants, plus some degree of source control, plus the variances, will be sufficient to bring most areas into compliance with the bacteria rules. Further study, including some basic research on the sources of coliforms, is necessary to confirm this.

In considering the acceptability of this approach, it is important to note that beach use declines during wet weather, so that closures during the variance days would have a small effect on overall beach use and public health.

Capture and Use of Rooftop Runoff

In many cases, the pollutants from commercial rooftops, like those from residential roofs, could be readily removed by soil infiltration. With appropriate controls to avoid specific pollutants from commercial activities, roof runoff could be used for groundwater recharge. Designs exist for infiltration planters, in which the planter has high sides that allow it to function as a reservoir, and an open bottom that allows infiltrating water to pass into the soil. Risks of groundwater pollution could be mitigated through the use of biologically active and adsorbant soils. Commercial rooftops are commonly associated with large parking areas, which could be adapted for infiltration. Such efforts will be more difficult than those for homes, because most commercial facilities have a higher ratio of roof area to land area. In some cases it may be possible to store runoff for future irrigation use.

The Washington State Department of Ecology (2001) has developed a decision tree for dealing with downspout discharges. For lots larger than 22,000 square feet, it specifies either dispersion or infiltration systems for runoff. For smaller lots on suitable soil, infiltration systems are required. Where soils do not readily accept infiltration, surface dispersion may be appropriate. If water quality is good and infiltration and dispersal are not possible, disposal to the storm drains is accepted.

Parking Lots and Landscaping

Parking areas occupy a very large amount of land in Southern California, and accordingly represent a significant opportunity for improvement in stormwater management. Construction costs for parking lots are far smaller per square foot than

those for buildings, so that alterations are cheaper. They are reconstructed more frequently, so that requirements applying to new construction or reconstruction will propagate through the parking lot inventory much more rapidly than those for buildings.

In most cases, parking lots could serve as sites for rainwater infiltration. Trash can be collected on grates and be disposed of properly by the lot owners. The curbs around plantings (which are often necessary to avoid damage to the plants from cars) can be slotted so that water passes through them to infiltrate in the planter soils. Planted areas must be below grade, so that they collect and temporarily store water, and could be expanded, utilizing more space where cars don't actually park, such as the areas between and behind the parking bumpers. In some areas, permeable pavements could be used. Collected water could be passed to leach fields built under the parking lot.

An example of this sort of development is provided by the 6-acre parking lot of the Oregon Museum of Science and Industry (NRDC, 1999). It had originally been proposed as a traditional design, with water draining to catch basins, storm drains, and eventually the Willamette River. At the request of the Portland Bureau of Environmental Services, it was redesigned to use vegetated medians and landscaping as swales and linear wetlands. The parking lot is now able to infiltrate the water from a storm of 0.83 inches in 24 hours. Overall construction costs for the revised design were actually lower, because of the reduced costs for catch basins and drains.

Pervious pavements have also been developed so that even the space where cars are parked can be used for infiltration.

There is some concern over whether infiltration from parking lots will pollute underlying aquifers. Sediments, hydrocarbons, and trace metals are likely to be present in parking lot runoff from ordinary commercial establishments. But all of these are generally well retained on soils, particularly if the soils are selected to serve this purpose. Adsorbent materials might be added as a surface layer, to further retain hydrocarbons and trace metals.

It will be necessary to develop new guidelines for parking lots. The public and lot owners will not tolerate flooding that requires them to wade to their cars, so detention and infiltration systems will have to be carefully designed. Overflow will occur in extreme storms, and the lot and remediation areas should be designed so that the excess water flows to the street without impeding access to parked vehicles. Redesigned lots can be required for any new construction or for major renovations, but complete retrofit of all lots is likely to be too expensive for political acceptance.

This will require some additional maintenance. If adsorbants are included in the recharge areas to help control hydrocarbon infiltration, for example, these will have to be renewed from time to time. Regular trash collection will be required.

It is anticipated that most parking lots could become zero runoff areas, contributing substantially to water conservation and pollutant remediation. Further, very large parking lots, such as those at "big box" stores and shopping malls, could be reconstructed as stormwater infiltration facilities serving surrounding neighborhoods. In a cap and trade system, the lots would become financial opportunities for the retailers.

River Greening

The Los Angeles Region has become infamous for its historical conversion of rivers to concrete-lined flood control channels. While these have served the purpose of moving water rapidly to the ocean and avoiding flooding, they have also prevented infiltration in the riverbed. For this and many other reasons, advocates have proposed "greening" the river. This would involve widening the river at some points and replacing the steep concrete walls with gently sloping vegetated shores. Parks and wildlife habitat could be developed alongside the river, designed such that they would flood when the river is high. This would allow infiltration to occur, and by providing temporary storage, would decrease peak flood flows. In many areas it may be possible to replace the concrete bottoms of rivers with permeable surfaces.

The Sepulveda Dam Recreation Area is an excellent example of such a facility. It stores water during heavy rains, but serves as a park and wildlife refuge during the greater part of the year when it is not flooded. It promotes infiltration of water during rain events.

Certainly, any such modifications of the rivers must be designed carefully so that flood risk is not increased. But this is clearly possible. Indeed, increased infiltration and storage capacity along the river will reduce peak flows and therefore the frequency of floods, and reduce the associated costs.

Infiltration in Residential Streets

Many areas in Southern California are primarily residential, and runoff from these areas is only moderately polluted—it could be used for direct infiltration without treatment. In newly developed areas, homes could be designed so the runoff is near zero. However, many areas are currently already built out. In these, preventing runoff to the street would be expensive. In many cases, it may be possible to install infiltration devices in the public streets.

Infiltration in Parks

Public parks, in most cases consisting predominantly of grassy areas, are already contributing to groundwater infiltration. However, some portions still contribute to runoff, and could be regraded to collect water rather than shedding it. Indeed, many could be rebuilt to serve as groundwater infiltration systems serving surrounding areas. Playgrounds could be sunk below surrounding areas in order to collect water during rainfall events. Designs would have to include provision for infiltration at acceptable rates—water left standing for days could become a nuisance. In some areas, soil conditions might preclude this approach.

During the few days after water is collected and before it percolates, that area of the park will be unavailable for other uses. However, parks are little used during rainy weather in any case, and detention will only occur on a few days each year, so the interference will be minimal.

Public Facilities

Runoff from public facilities could be reduced by many of the measures previously discussed. Parking lots could be used for infiltration and rooftop runoff could go to planters serving as infiltration systems. Retrofit of government facilities could begin more quickly than for individual homes, as part of the effort required to meet regulations.

PRIMARY BENEFITS OF RUNOFF QUALITY CONTROL

The immediate purpose of runoff quality control is protection of the receiving waters. In the Los Angeles Region, this refers primarily to rivers, coastal wetlands, bays, and the ocean. Many benefits are definable.

Fishing

Pollutants in stormwater can adversely affect fishing. Commercial fishing is a small and declining industry in the waters local to Southern California, but sportfishing remains a significant activity, bringing income to coastal businesses and providing recreational opportunity for many people. Cleanup of stormwater will preserve and enhance this activity by ensuring that fish are safe for consumption and by preserving fish breeding grounds in estuaries.

Swimming

Ocean swimming, as part of a visit to the beach, is a recreational activity enjoyed by millions of people each year in Southern California. It attracts tourists who contribute substantially to coastal economies. It is discouraged if trash litters the beach or if fear of disease discourages water contact. It is prevented entirely in the event of beach closures, which are a common result of polluted stormwater runoff.

Boating

Powerboats and sailboats are widely used in Southern California and represent a substantial industry in manufacture, maintenance, provision of slips, and various associated shoreside activities. Polluted waters, particularly in the form of trash, can significantly degrade the quality of the boating experience.

Noncontact Recreation and Nonconsumptive Wildlife Uses

Some recreational activities involve bodies of water without contact: sitting or bicycle riding along rivers or lake shores are examples. These activities are seriously degraded if the water produces bad odors or is littered with trash. A stormwater quality program will protect and enhance these uses.

Observation of wildlife is often a valuable part of the outdoor experience. Continuation of this activity requires water quality sufficient to support birds and animals and the plants and insects that they eat. Many migratory birds are dependent on local bodies of water for their sustenance during their yearly movements.

Reduced Illness from Contaminated Seafood

Some illnesses are transmitted through consumption of contaminated seafood. Control of the microbiological quality of runoff waters will reduce the extent of such illnesses.

Reduced Illness from Swimming in Contaminated Waters

Recent studies have indicated that people swimming near storm drains are more likely to contract waterborne diseases than those swimming far from storm drains. Microbiological control of runoff quality, particularly through sanitary treatment of dry weather flows, could reduce the incidence of these diseases.

Enhanced Esthetic Values

The trash cleanup associated with stormwater quality control will improve the appearance of our harbors, rivers, streets, and commercial establishments. Esthetic enjoyment of wildlife habitats such as wetlands, in particular, is hindered if trash is present.

Preservation of Natural Ecosystems

Polluted urban runoff damages natural ecosystems in many ways: toxic material can sicken or kill organisms, trash can choke marine mammals or birds, additional turbidity can prevent the penetration of light necessary for seaweed growth, sediment can bury habitats and prevent attachment of organisms to rocky surfaces, and nutrients can fertilize overgrowth of mosses and plankton. This damage can be prevented by stormwater quality control, and is one of the prime reasons for the program.

SECONDARY BENEFITS OF STORMWATER QUALITY CONTROL

Urban runoff comes from a huge variety of sources and contacts much of the environment around us. The efforts made to clean up runoff, which have the primary purpose of preventing water pollution in receiving waters, will have many secondary benefits and these should be included in any cost-benefit analysis. Indeed, some of these benefits are so substantial that they suggest the agencies responsible for the resources in question should also be providing financial support for runoff quality control efforts.

Groundwater Restoration

Total rainfall in the Los Angeles basin in an average year is equal to about half of the amount used for drinking water supply. It is strange indeed that we pollute this water and discharge it to the ocean even as we import ecologically, politically, and financially expensive water from the Colorado River, Northern California, and the Owens Valley. The primary difficulty in making productive use of this water is the lack of storage capacity. Rainfalls are infrequent but intense: most of the time there is no rainfall available for use, but occasionally it is so abundant that it causes flooding. Surface water reservoirs are the traditional solution to this problem—water is stored during the rainy season to prevent floods and becomes available for valuable uses the weather is dry. But there are few workable sites for large, year-round surface water reservoirs in the Los Angeles area. Groundwater aquifers, however, can also serve as water reservoirs, being drawn down in the dry season and replenished during the wet season. Infiltration will constitute a use of this storage capacity, reducing future dependence on outside sources of water and avoiding expensive alternatives like desalination of seawater. Because environmental and political factors may make increasing water imports impossible at any price, better utilization of local rainfall through the use of the groundwater reservoirs may be necessary for future growth.

Improvement of groundwater supplies within Southern California would save money now spent on imported water, and would save the concomitant external costs of the environmental impact on source areas. It would also reduce political friction with source areas. Ultimately, it may be the only economically and politically feasible method by which the water supply in Southern California can be increased, and as such, it may be the key to continued development in the area.

Flood Control

As the fraction of the Los Angeles Region occupied by impermeable surface has increased, the amount of water runoff has also increased, putting an ever-growing load on the flood control system. A recent project improved flood control for the lower Los Angeles River by increasing the height of the dikes on the channels, at a cost of about $200 million. Future increases in channel capacity would be even more expensive—not only will the walls have to be made higher, several bridges will have to be raised. Increased infiltration will reduce runoff, reducing the maintenance costs on the system and eliminating the need for further capacity increases.

The possible magnitude of the impact can be judged by considering the case of the San Gabriel Valley. Runoff from the valley is mostly captured in spreading basins in the Whittier Narrows area and used for groundwater recharge. This makes the runoff coefficient for the valley overall 5%. In the urbanized areas of Los Angeles, the value is about 40%. Thus if the urbanized area were as well controlled as the San Gabriel Valley, runoff could decrease by a factor of eight. Flood risks would essentially disappear.

Increased Parkland and Wildlife Habitat

The regional alternatives for stormwater quality control include the development of parks and wetlands. The parks would serve as detention basins and infiltration facilities, but would be used for that purpose only during rainy periods, which comprise about 32 days per year in Southern California. During the rest of the year, these areas could serve the typical purposes for which parks are built, acting as recreational sites, playgrounds, soccer and baseball fields, and wildlife habitat. Because people are less likely to engage in these activities during rainstorms in any case, the conflict between the uses will be small. The Los Angeles area is notably short of public parks in comparison to other major cities, particularly in its poorer neighborhoods (Wolch et al., 2002). Because it is likely that residents will demand more park space in the future, the development of areas for dual use is particularly valuable. Ideally, the cost of development could be borne by both agencies intent on improving stormwater quality and by those responsible for parks and recreation. The planned redevelopment of the Corn Fields site in Los Angeles, for example, might provide a detention basin as well as the new park that is being planned.

Wetlands must be kept wet all year, but can withstand flooding during the rainy season. Thus reestablishment of these habitats, which have been largely lost in the Los Angeles Region, could simultaneously serve the purposes of wildlife restoration, flood control, and stormwater quality control. In many cases, it will be possible to develop wetlands within existing channels, reducing the need for additional land purchases.

Some of the parks and wetlands could be created as a part of river greening projects, and so would also serve the purposes of reestablishing esthetically appealing naturalistic rivers.

Improved Property Values from Trash Control

Often one of the most powerful visual cues that gives a visitor the perception of a "bad" neighborhood is the presence of trash on the streets. One approach to reducing pollutant discharge to storm drains will be improved enforcement of litter laws and additional street cleaning. These will have the secondary benefit of improving the appearance and livability of streets throughout the area. The "broken windows" campaigns of many police departments—indicating that improving the appearance of neighborhoods reduces crime—suggests that apparently cosmetic changes can have substantial benefits for neighborhoods. Certainly property values in a neighborhood with clean streets will be higher than they would if the streets are routinely littered with trash.

Reduction in Harbor Sedimentation

Sediments carried by runoff are moved because the water moves rapidly, and because small particles remain suspended in the low-salt-content chemical environment of fresh water. When runoff enters bays and harbors, however, the velocity of the water is slowed, allowing the particles to settle to the bottom. The higher salt content of marine waters promotes flocculation of the small particles, so that most of them will also settle to the bottom. The deposited sediment fills channels, blocking the passage of ships and recreational boats, and filling areas set aside for preservation of aquatic ecosystems. Ultimately, harbor dredging is required, and frequently the collected sediment has been contaminated, so that it requires special handling. Dredging associated with storm drains in Los Angeles Harbor, for example, costs between $1 million and $3 million per year. Sedimentation in Upper Newport Bay is considered a significant threat to its function as a wildlife refuge. Stormwater quality control measures would avoid sediments discharges or remove it from the runoff, ameliorating these problems for downstream communities.

Improved Public Health

A significant portion of exposure to particulate air pollutants arises when small particles are resuspended from roadways by traffic and wind. Tire dust, settled air pollutant particles, pet feces, particles with adsorbed trace metals and trash are pounded into fine powder and lifted into the air. Such resuspension includes an ultrafine particle fraction, which is most dangerous to human health. More frequent street cleaning, particularly using vacuum bag type cleaners, would reduce public exposure to fine materials carrying trace metals, hydrocarbons, and microorganisms. Some public health improvement is likely, but its magnitude cannot be estimated.

REGIONAL PROGRAMS DESIGNED FOR STORMWATER QUALITY CONTROL

While there has been a substantial amount of work on individual facilities for runoff quality control, such as detention ponds and grassy swales, there have been only a few studies that have tried to determine the regional cost and effectiveness for a system of these "green solutions". It is important to ask whether it is possible to create an overall program within realistic constraints of land availability and costs that will bring the watershed into compliance with regulations.

We have sought descriptions of example projects that include overall costs and the area of land that drains to the facility, so that cost per square mile of area served can be calculated. In a few cases, these are area-wide systems that are the best evidence that an overall solution is possible. In others, they are single installations, for which we make the assumption that duplication is possible—ten facilities like the one described could be built to serve ten times the area. Because economies of scale are important in determining facility design and even regulatory policy, we have taken special interest in some sources that describe how the size of the drainage area (and the necessary BMP treatment facility) affects cost per square mile. Finally, we have included examples that have actually been built and tested, and others that have only been designed. While data for the latter may be less reliable, most systems perform as designed, and these designed-but-not-built systems provide some of the most useful results.

The chosen examples are described briefly below, and listed in Table 2. Results useful for determining the relationship between facility size and cost per square mile are plotted in Figures 2 and 3.

Area-Wide Systems

Sun Valley

The Sun Valley project was funded by Los Angeles County to develop an alternative approach for flood control and runoff quality management for the Sun Valley district. This is an urbanized area with considerable industrial development that currently does not have storm drains. It is consequently frequently plagued with flooding. The project was undertaken to determine whether there was an approach to flood control other than simply building storm drains.

Four alternative plans were produced, designed to maximize infiltration, to maximize water conservation and wildlife habitat, to maximize stormwater reuse by industry, and emphasizing conveyence to traditional storm drains. Notably, an alternative that maximized the use of onsite BMPs was rejected as too expensive. The components of the plans included industrial reuse, infiltration basins in parks, tree planting and mulching, infiltration in parking lots, and infiltration in vaults beneath the streets.

Because the emphasis of this project was flood control rather than water quality control, the hydraulic control objectives were quite stringent: the system was designed to collect and infiltrate all of the water produced by a 50-year, 96 hour storm. This means that the runoff from the area, if the project is built, will be reduced to near zero. Thus, this project, which includes flood control and water quality control, constitutes an "upper

bound" estimate on the costs for water quality control. Achieving such complete collection and infiltration would certainly substantially exceed water quality goals, and costs for a stormwater quality control system in an area with storm drains already in place would certainly be lower.

San Diego Creek

A project supported by the Irvine Ranch Water District and Orange County and performed by Geosyntec Consultants has developed a plan for natural treatment systems—wetlands and stormwater detention ponds—for the San Diego Creek watershed. This watershed occupies 120 square miles of developed land that drains into Newport Bay. Newport Bay has been designated as impaired, requiring that stormwater discharges be cleaned up.

Geosyntec proposed a plan consisting of 44 facilities, including ponds and wetlands constructed within existing drainage channels or built outside. These are typically facilities with both deeper open water and shallow water supporting emergent vegetation (such as cattails).

Water quality improvements expected from the system are described in the report (Strecker et al., 2002): "The NTS Plan is estimated to achieve total nitrogen (TN) TMDL for base flows and reduce in-stream TN concentration below current standards at most locations. Total phosphorous TMDL targets would be met in all but the wettest years. The fecal coliform TMDL would be met during the dry season, but not all wet season base flow conditions, and not under storm conditions. The NTS Plan is not designed to meet the sediment TMDL, but would capture, on average, about 1,9000 tons/yr (1,724,000 kg/yr) of sediment from urban areas. The wetlands are estimated to remove 11% of the total copper and lead, and 18% of the total zinc in storm runoff. The NTS provides a cost-effective alternative to routing dry-weather flows to the sanitary treatment system."

While final budget numbers were not provided, it was anticipated that the first 13 treatment sites would be constructed for $12 million, and that the overall cost would be substantially less that the $60 million anticipated for low-flow sanitary treatment. This value is listed as the upper bound of cost in Table 2. For comparison of cost vs. unit drainage area size, it was presumed that the average area served by each of the 44 facilities was 120 mi^2/44 = 2.7 mi^2.

Constructed wetlands will collect any trash that enters the storm drain, and should be effective at reducing concentrations of coliform organisms, hydrocarbons, particles, and the suite of pollutants associated with particles. They may constitute a complete control system if they are combined with vigorous source control for metals and pesticides and storm drain screens to minimize the trash loading.

Murray City, Utah, Golf Course and Wetlands

Officials in Murray City recognized an opportunity when the interstate highway I-215 was being built. They agreed to take soil from the excavation and runoff water from the freeway to make a golf course. The links, with an associated string of settling ponds, accept and treat all of the drain water from the eastbound lanes of 4.5 miles of the freeway (NRDC, 1999; Hill, 2003). The golf course has been a commercial success, and now produces $900,000 in revenue against $450,000 in operating and maintenance costs

each year. The city has created other treatment wetlands for essentially all of the runoff from the City and from the westbound lanes of the freeway. The total cost of these wetlands has been less than $1,000,000. Overall, if the golf course infiltration system and the other wetlands are considered as a single stormwater control system, it pays for itself. Because this is an unusual circumstance, for calculation we ignored the income from the golf course, and presume the wetlands cost $1,000,000 and serve the area of Murray City, which is 9.5 mi^2.

Fresno Metropolitan Flood Control District

The Fresno Metropolitan Flood Control District serves the area including and surrounding the city of Fresno. It operates 130 infiltration basins that drain a region of about 120 square miles devoted to agriculture, residential areas, and urban landscape (NRDC, 1999; Pomaville, 2003). Some of the basins are turfed and serve as parks, while others are bare and serve seasonal infiltration needs. The basins succeed in infiltrating 80% to 90% of the stormwater in their drainage areas, and only 2% enters a receiving water without receiving some degree of treatment. To protect groundwater, the District also instituted a program of industrial inspections. While monitoring is still done to check for pollution of the San Joaquin River, the District anticipates no additional infrastructure will be necessary to meet water quality control regulations. For calculations, the unit area for each basin was assumed to be 1 mi^2.

Individual Systems

Long Lake Retrofit, Littleton, Massachusetts

Geosyntec Consultants also designed a low-impact-development program for Littleton, Massachusetts (Roy et al., 2003). The 1.5-square-mile watershed that contains the town drains into Long Lake, which has been subject to eutrophication and other water quality problems associated with urban runoff. The storm drain system collects water at 200 catch basins and releases it to the lake through 18 outfalls. The plan for mitigation of the problem includes a treatment wetland, grass and vegetated swales, bioretention cells (swales with underdrains), rain gardens, rain barrels, and an outreach program to promote source control for fertilizers.

The total budget for the project is estimated at $630,000, or $420,000 per square mile.

Tule Pond, Alameda, California

The Tule Ponds project is a group of three treatment wetlands that was constructed using information developed in the Demonstration Urban Storm Water Treatment Marsh in the early 1980s. It receives urban runoff, passing it through the three ponds in series and discharging it to an existing natural pond. It serves a drainage area of 0.8 square miles and cost $360,000, for a cost of $450,000 per square mile.

Treasure lsland, San Francisco Bay

Treasure Island is an artificial island of 403 acres in San Francisco Bay that was used for many years as a Navy base. It has recently been converted to residential use. A treatment wetland is planned as the means for stormwater quality control. It is anticipated that wetland construction will cost $800,000 to $ 1,100,000 (Bachand, 2003), or $1.2

million to $1.7 million per square mile. However, the island is a tourist destination, and it has been estimated that the increase in visitor spending associated with the wetland could be $4 million to $11 million (Fine, 2003). It was also estimated that the overall value of the project could be twice these values.

Herrerra Study of Stormwater Regulations Costs

As a part of the effort to determine the costs of complying with stormwater regulations in Western Washington, Herrerra Environmental Consultants (2001) prepared designs for typical projects needed to contain and treat stormwater on site in small projects of new construction. In both cases, the systems were planned for a 1.7-inch rainfall. The first hypothetical project was a ten-acre residential development with 40 individual home sites. It was presumed that runoff from the homes would be collected in a detention pond. Construction of the permanent facilities was determined to cost $240,000 to $230,000, depending on the quality of soils. This is about $15 million per square mile.

The second hypothetical site was a restaurant built on a one-acre site, with the area not occupied by the building used as a parking lot. Runoff was to be collected in subsurface infiltration vaults. Costs were determined to be $280,000 or $570,000, depending on the permeability of the soil, or $175 million to $356 million.

Dover Mall, Delaware

The Dover Mall has 30 acres of parking lot or otherwise impermeable surface. Runoff drains to a wetland that is sized to retain a 1-inch rainfall (NRDC, 1999). It includes a forebay that allows containment of exceptional spills. The total project cost was $171,000 (although much of this was defrayed by in-kind donations). The wetland is considered a considerable esthetic resource. The cost was $3.5 million per square mile.

Oakland Park Industrial Area, Florida

A BMP treatment system was developed for five acres of Oakland Park that included auto repair shops, paint shops and plating facilities. A short treatment train was developed, including a trash removal basin and absorbent media. The system cost $261,000, and was successful in removing 71% to 95% of oil and grease, along with all trash and most sediment. Costs were $33 million per square mile of drainage.

Clear Lake Packed Bed Wetland Filter System

Clear Lake, in Orlando, Florida, receives runoff water from 121 acres of nearby urban land and water quality in the lake has deteriorated significantly as a result of pollution. Packed beds, consisting of 10 filter beds composed of crushed concrete or granite media with growing aquatic plants, allow removal of sediments and nutrients. An initial wet detention pond is used to contain the first flush. The system cost $917,646. In calculations, the system was considered a single installation treating 121 acres of drainage. Costs were $4.6 million per square mile.

Sand Filters in Alexandria, Virginia

Two sand filters were built to treat runoff from an airport parking lot near National Airport in Alexandria, Virginia. The area drained was 1.95 acres, and the filters cost $40,000. While some initial problems with anaerobic conditions were encountered,

the filters eventually achieved good treatment. The cost, calculated from the data reported by FHWA (2003), was $12.9 million per square mile.

Compost Filter Facility, Hillsboro, Oregon

A compost filter was constructed to decontaminate water upstream of a grassy swale. The treatment train received water from a five-lane highway, draining a total area of 74 acres. The 1200-square-foot filter contained 120 cubic yards of compost and was constructed and filled for $13,700. The cost, not including the swale, was thus $110,000 per square mile of drainage area.

Infiltration Trenches

The Federal Highway Administration (FHWA 2003) has estimated the costs for constructing infiltration trenches as $C_A = 1317 \times V^{(0.63)}$ where C is the cost in dollars and V is the volume in cubic meters. Calculations for this report are made assuming the need to provide detention for a ¾-inch storm. For one square mile (2.6×10^6 m^2), a ¾-in rainstorm will produce 5×10^4 m^3 of water. The cost per square mile is equal to the cost for each trench divided by the drainage area it serves, or $C_{mi2} = C_A/A = (1/A) \times 1317 \times V^{(0.63)} = 1.2 \times 10^6 \times A^{(-0.37)}$. The total cost for these systems thus declines as each system becomes larger—there are economies of scale. Costs for land are not included, but it is likely that trenches could be installed in land also used for other purposes. In some cases it might be necessary to collect more than ¾ inch of rain. On the other hand, the calculation assumes that no infiltration occurs in the trench during the storm. Also, this presumes that the runoff coefficient for the area served is 1.0—thus the typical systems described could treat a ¾-inch storm on totally impervious area or a 1.5-inch storm on an area with a runoff coefficient of 0.5, which is a commonly observed value. Thus the total seems a reasonable approximation.

Infiltration Basins

The Federal Highway Administration (FHWA 2003) has estimated costs for construction of open infiltration basins (dry basins) as $C = (V/0.02832)^{(0.69)}$, where C is the cost in dollars and V is the volume in cubic meters. As for the infiltration trenches, it is assumed the basins will be designed to treat a ¾-inch storm in an impervious drainage. Thus the cost per square mile is $C_{mi2} = C_A/A = (1/A) \times (V/0.02832)^{(0.69)} = 204{,}000 \times A^{(-0.31)}$. Costs for land are not included, and would be substantial. However, the basins could be used for other purposes for much of the year. Again, the systems assumed could treat a 1.5-inch storm in a drainage area with a runoff coefficient of 0.5.

Bioretention Areas

Stormwater can be collected in areas filled with highly permeable soils and planted with trees and other vegetation. Water that infiltrates is filtered by contact with the soils and may continue to move downward to replenish the groundwater. Much of it will also be taken up by the vegetation and returned to the atmosphere through evapotranspiration. The FHWA (2003) cost estimate for these bioretention areas is $10,000 per impervious acre, or $6.2 million per square mile of impervious watershed. Bioretention areas can readily serve multiple purposes as wildlife habitat and parks.

Detention and Retention Wetlands

The Federal Highway Commission Report (FHWA, 2003) has provided a general formula describing the cost of detention ponds as a function of size. Costs were estimated as $C_A = 168 \times V^{(0.699)}$, where C_A is the cost in dollars and V is the volume of the pond in cubic meters. The cost per square mile is $C_{mi2} = C_A/A = (1/A) \times 168 \times V^{(0.699)} = 324{,}000 \times A^{(-0.301)}$. Land costs are not included, but these areas can serve other purposes during the larger part of the year when the weather is dry—they can be parks, wildlife areas, and playing fields.

Detention Vaults

In highly urbanized areas, water can be detained in underground vaults, which may be made of concrete or of corrugated steel pipe. Such systems primarily store water to avoid flooding or excessive hydraulic load on downstream systems, but some sedimentation may occur. This provides marginal treatment, but also requires that the vaults be cleaned out on a regular basis. The FHWA estimate for costs of such systems is $C = 38.1 \times (V/0.02832)^{(0.6816)}$. Cost per square mile of drainage area is $C_{mi2} = (1/A) \times 38.1 \times (V/0.02832)^{(0.6816)} = 690{,}000 \times A^{(-0.3184)}$.

Underground Sand Filters

Sand filters are quite effective at removing particulates from urban stormwater, and are commonly employed upstream of other systems in order to protect them from excessive sedimentation. They can be installed underground in densely urban areas, but are correspondingly expensive. The FHWA estimate for such systems is $10,000 to $14,000 per impervious acre served, or $8.7 million per square mile. Here we have chosen the upper estimate because costs are likely to be high in the Los Angeles area.

Surface Sand Filters

Sand filters may also be constructed at the surface, which reduces their cost. However, they occupy a relative large amount of land area, and cannot contribute to a secondary use. There are strong economies of scale. For facilities serving more than 5 impervious acres, the FHWA estimate of cost is $3,400 per acre or $2.1 million per square mile.

Dry Swales and Filter Strips

A vegetated dry swale is an area of land shaped so that stormwater flows through it in a broad, relative flat stream. Flow through the grass removes sediments from the water. At the same time, significant amounts of infiltration may occur. It may be necessary to prepare the soils to maximize infiltration before the grass is planted. Swales can be used for other purposes during the periods when it is not raining. The FHWA estimate of construction costs for swales is $1500 per impervious acre, or $930,000 per square mile.

Filter strips are similar installations, in which the water flows as a flat sheet. The FHWA estimate of constructions costs for filter strips is $2000 per acre or $1,240,000 per square mile.

Results from the ASCE-EPA BMP Database

A cooperative effort of the American Society of Civil Engineers and the U.S. Environmental Protection Agency has compiled data on the success of best management

practices. Data were carefully vetted, put as much as possible in common format, and arranged so that they could be searched according to several parameters. Several searches of the database were done to gather data for this study.

A search for dry detention basins, serving watersheds of 0-100,000 acres, with 0-30 in annual rainfall, produced 17 responses, of which only four included cost data. All of the four were associated with freeways and served small watersheds of 1-14 acres. This may be the reason why costs were exceptionally high.

A search for wetlands, serving watersheds of 0-100,000 acres, with 0-30 in annual rainfall, produced 10 responses, only one of which included cost data. Costs for this facility were exceptionally low. It was described as a "natural" wetland, perhaps implying that much of the system was already in place before construction was done.

A search for wetlands, draining 0-100,000 acres, with 0-30 in annual rainfall, produced 9 responses, including 6 with cost data. These also served very small watersheds, and costs per square mile were very high.

A search for hydrodynamic devices serving 0-100,000 acres, in areas of 0-30 in annual rainfall, produced 12 responses, including 8 with cost data. Costs ranged from $344,000 per square mile to $86 million per square mile, showing very strong economies of scale.

A search for grassy swales serving 0-100,000 acres, in areas of 0-30 in rainfall, produced 26 responses, including 7 with cost data. The cost per square mile ranged from $12 million to $341 million, and showed strong economies of scale. This was a surprising result—grassy swales are very simple and cheaply constructed systems—but it reflects the fact that each installation serves only very small areas.

ESTIMATES OF COSTS AND RECOMMENDED APPROACH

Ultimately, stormwater pollution is a symptom of two anthropogenic changes: we are releasing pollutants into our local environment, and we have disrupted the hydrologic cycle of the Los Angeles Region by covering the soil with impervious surfaces. These changes have other symptoms as well. Local pollution impairs health, damages the esthetic quality of life, and reduces property values. Reducing infiltration increases runoff rates and the risk of flooding, and at the same time, reduces recharge of groundwater resources. Finally, impervious surfaces cannot support vegetation, and we suffer the loss of natural habitat, recreational areas, and aesthetic value of green space.

Cost Estimates

The solution proposed in the report by Gordon et al. (2002)—advanced treatment plants to clean up stormwater after it has entered the storm drains—constitutes treatment of a single symptom without correction of the fundamental problem. It is expensive, and has little benefit beyond the single objective of protecting receiving waters. A more fundamental approach—eliminating pollutant releases and restoring the hydrologic cycle—is cheaper. Further, because it will mitigate all of the effects of pollution and hydrologic disruption, it will have benefits whose value exceeds the costs.

While a rudimentary cost-benefit analysis is attempted here, the limitations of such an approach should be kept in mind. Many costs and benefits are difficult to evaluate—the psychological benefit to citizens who live on a clean street rather than a trashy one, for example, or the long term effects on local business of a general perception of regulatory burdens. In past cost-benefit analyses, it has been common that costs and benefits that are difficult to measure have been assumed to be zero, certainly producing misleading results. It remains true that two good-faith investigators can produce quite different cost-benefit results, especially for a complex problem like stormwater quality control. Assumptions may depend greatly on the value system of the investigators. A recent cost-benefit study was criticized, for example, because it put a lower value on the lives of elderly persons. This is reasonable in the sense that the death of and older person represents fewer years of life lost, and less loss of earnings, and it is a common presumption in cost-benefit studies. However, there was outrage among those who felt that this approach was offensive to the elderly and the general principle that we all have equal rights.

In this particular study, because the costs and expenditures are of many different kinds, it was necessary to use a variety of estimation methods. The results are necessarily approximate, and comparisons among them must be viewed with caution. To use technical terms, contingent valuation studies are included with benefits transfer estimates, and results from various investigators are combined. We anticipate that these steps may be criticized, but we hope that we can provide a framework approach that can be improved and refined as further research is done.

Finally, cost-benefit analysis frequently ignores the issues that arise because the costs and benefits are not borne by the same parties. One might suggest that pollution should not be cleaned up if the cost of doing so exceeds the benefits of relief from the pollution. But it is commonly the case that the polluter who is saving money is not the

same person who is suffering from the effects of the pollution. Does your neighbor have the right to throw his trash in your yard if he can show that it saves him more money than it costs you? The principle of "polluter pays" has a satisfying moral aspect and it also puts the incentives right—the parties with the ability to reduce pollution are given the motivation to find a way to do so.

For these reasons, and because in this short study the numbers are particularly only estimates, we present our cost benefit analysis with the caution that more precise and detailed assessments are desperately needed.

Cost estimates have been prepared by examining case studies. Reports were chosen where information was available for both the total cost of the system described and the land area served, or the initial stormwater retention volume, in order to calculate the cost of stormwater management per square mile of watershed. Several assumptions and caveats must be observed:

1. In the cost-per-square-mile calculations, no attempt was made to adjust costs on the basis of the amount of rainfall in the watershed. Sufficient data were generally not available for this purpose. In most cases, data came from areas where annual rainfalls are greater than in Los Angeles, and this may cause the cost estimates to be high.
2. In the cost-per-square mile calculation, the cost data were not available in a uniform format. It was not possible to calculate an accurate "present worth" including operations and maintenance costs for each case. In some cases operations and maintenance data were included, while in others they were not. In most cases operations and maintenance costs are low in comparison to installation costs, and they would be further reduced by discounting to present worth. Never the less, this may cause the cost estimates to be low.
3. Installation costs may vary depending on the slope of the land, the nature of the soils, depth to water table, local labor costs, and a wide variety of other factors that change with locality. No attempt was made to adjust the costs for these factors, and this may make the estimates high or low.
4. It is presumed that the systems described will be sufficient, in conjunction with source control efforts, to comply with water quality regulations. There was no case reported in which the quality control efforts were described as failing, or for which regulators asked for additional measures after the systems were complete. However, few data were shown for after-construction water quality, and most of the systems have not been in place for enough time to allow long-term assessment. The degree of success for source control efforts, while likely to be substantial, cannot be guaranteed.
5. Several of the projects described have been designed, but not implemented. It is assumed that they will perform as designed. In the case of the Federal Highway Administration formulas, these are regression results rather than individual case results.
6. It is likely that implementation in the Los Angeles area would involve projects that are larger than most of those listed. There likely will be economies of scale. This may cause the cost estimates to be high.

Summary of Case Study Project Costs
"I or D" refer to Implemented or Designed

Project	I or D	Description	Unit Size, square miles	Cost, $M	Cost, $M per square mile
Infiltration Systems					
Fresno Metropolitan Flood Control District Regional Infiltration Basins (NRDC, 1999; Dave Pomaville, 2003)	I	130 turfed or unturfed infiltration basins serving residential areas. Treats or infiltrates 98% of runoff over area of 120 square miles	1		2.5 to 3.7
Study of Stormwater Regulations Cost (Herrerra Environmental Consultants, 2001)	D	Hypothetical calculation of costs for new residential development	0.016	.24	15
Study of Stormwater Regulations Cost (Herrerra Environmental Consultants, 2001)	D	Hypothetical calculation of costs for new commercial development	0.0016	0.28 to 0.57	175 to 356
Wetlands					
Tule Pond, Alameda (Wetzig, 1999)	I	Stormwater treatment pond for urban runoff	0.8	0.36	0.45
Treasure Island, San Francisco Bay (NRDC, 1999: Galvanis, 2003)	D	Wetland treatment system for local runoff	0.65	0.8 to 1.1	1.2 to 1.7
Long Lake Retrofit, Littleton, Mass. (Roy et al., 2003)	I	Swales, constructed wetlands, bioretention cells, outreach	1.5	0.63	0.42
San Diego Creek Natural Treatment System Master Plan (Strecker et al., 2003)	D	Network of open-water ponds and wetlands in Newport Bay drainage, 120 square mile area	2.7	<60	<0.5
Murray City, Utah (NRDC 1999: Hill, 2003)	I	Golf course and wetlands treat runoff from 4.5 miles of I-215 and the city	9.5	1.0	0.11
Dover Mall,	I	Wetland installed on mall	0.048	0.17	3.5

Delaware, (NRDC 1999)		grounds drains 30 acres of 100% impervious cover			
Sun Valley Project, Los Angeles County	D	Combination of various measures for flood and quality control in L.A. Basin	4.4	172 to 297	39 to 68
BMP Treatment Processes					
Oakland Park, Fla, industrial area (NRDC 1999)	I	Oil, grease, sediment, and trash removal by sedimentation and absorbance	0.008	0.261	33
Clear Lake Packed Bed Wetland Filter System (NRDC 1999: FHWA, 2003)	I	Oil, grease, nutrients, trace metal removal for water entering Clear lake	0.2	0.92	4.6
Compost Filter Facility, Hillsboro, Or. (FHWA, 2003)	I	Oil, grease, removal and filtration for highway runoff	0.12	0.12	0.11
Alexandria, Va, airport parking lot	I	Sand filters installed along the borders of a 1.95-acre parking lot	0.003	0.04	12.9
Bioretention Areas, FHWA cost estimate	D	Areas of highly permeable soil planted with trees and other vegetation			6.2
Underground Sand Filters	D	Porous medium filters placed in underground vaults, appropriate for highly urban areas			8.7
Dry Swales	D	Broad, shallow vegetated drainways covered with vegetation, usually grass			0.93
Surface Sand Filters	D	Porous medium filters installed at the surface			2.1
Filter Strips	D	Flat vegetated drainways covered with vegetation, usually grass			1.2
Port of Seattle container area cleanup	I	High quality street sweeping with sediment trap catch basins			3.1
Cost:Area Formulas from FHWA					
Infiltration trenches, FHWA cost estimate	D	Gravel-filled trenches. Infiltration eliminates runoff discharge.	$C_{mi2} = C_A/A$ $= (1/A)\times 1317\times V^{(0.63)}$ $= 1.2\times 10^6\times A^{(-0.37)}$		

Infiltration basins, FHWA cost estimate	D	Open basins, dry at most times, store and infiltrate runoff. Infiltration eliminates runoff discharge.	$C_{mi2} = C_A/A$ $= (1/A)\times(V/0.02832)^{(0.69)}$ $= 204{,}000\times A^{(-0.31)}$		
Detention and retention wetlands, FHWA cost estimate	D	Wetlands used for treating stormwater, with storage capacity available	$C_{mi2} = C_A/A$ $= (1/A)\times 168\times V^{(0.699)}$ $= 324{,}000\times A^{(-0.301)}$		
Detention vaults, FHWA cost estimate	D	Underground reservoirs for storage of runoff to reduce peak flows	$C_{mi2} =$ $(1/A)$ $\times 38.1\times(V/0.02832)^{(0.6816)}$ $= 690{,}000\times A^{(-0.3184)}$		
Results from ASCE-EPA BMP Database					
Dry Detention Basins					
I-605/SR-91 EDB	I		0.0013	0.077	60
I-5/Manchester (East)	I		0.0077	0.33	43
I-5 SR 6	I		0.0085	0.14	17
I-75/SR-78 EDB	I		0.022	0.82	38
Wetlands					
Swift Run Wetland	I		1.95	0.049	0.025
Sand Filters					
I-5/SR-78 P&R	I		0.0013	0.22	170
Escondido MS	I		0.0013	0.45	348
Eastern Eastern Regional MS	I		0.0024	0.34	141
Foothill MS (Sand Filter)	I		0.0029	0.48	164
Termination P&R	I		0.0045	0.46	102
LaCosta P&R	I		0.0045	0.23	49
Hydrodynamic Devices					
Jensen Precast (UVA)-Phase II	I		0.00045	0.039	86
I-210/Orcas Avenue	I		0.0018	0.04	22
Jensen Precast, (Sacramento)	I		0.0032	0.062	19
I-210/Filmore Street	I		0.0040	0.05	12
Charlottesville Stormceptor	I		0.0040	0.017	4.2
Sunset Park Baffle Box	I		0.040	0.023	0.57
Indian River Lagoon CDS Unit	I		0.098	0.055	0.56

Austin Rec Center OSTC	I		0.15	0.05	0.34
Grassy Swales					
I-650/SR-91 Swale	I		0.00032	0.11	341
Cerrito MS	I		0.00065	0.06	93
1-605/DelAmo	I		0.0011	0.13	115
I5/I-605 Swale	I		0.0011	0.073	64
Monticello High School	I		0.0013	0.015	11
SR-78 Melrose Dr	I		0.0039	0.13	34
I-5 North of Palomar Airport Road	I		0.0074	0.14	18
I-650/SR-91 Swale	I		0.00032	0.11	341

Economies of Scale

The costs listed in Table 2 reflect the cost for an individual facility ("Cost, $M" and "Cost, $M/mi^2") and associate it with the drainage area served, referred to as the "Unit Size". The costs per square mile for the individual units can be plotted to determine the effects of unit size (Figures 1 and 2). While there is a great deal of scatter in the data, it is clear that there is considerable economy of scale. Units serving drainages of a half square mile are typically 30% more expensive that those serving 1 square mile. Those serving drainages of one-tenth square mile are twice as expensive and small installations are extremely expensive in dollars per square mile. The most notable example of this is grassy swales: while each unit is relatively inexpensive, their small service areas make them very expensive per square mile served.

For some of the BMPs there are not sufficient data to judge the economies of scale, and as described, all of the data must be taken as approximate. Never the less, it seems that there is a good case to suggest that regional systems for handling runoff water will be most economical. This is clearly true of wetlands and infiltration basins, which are likely to be the most widely used approaches in the Los Angeles Region as a whole. This supports the position that the best solution will be a wetland or an infiltration basin also serving as a park, playing filed, or wildlife habitat as the stormwater management unit for a neighborhood of a square mile or greater.

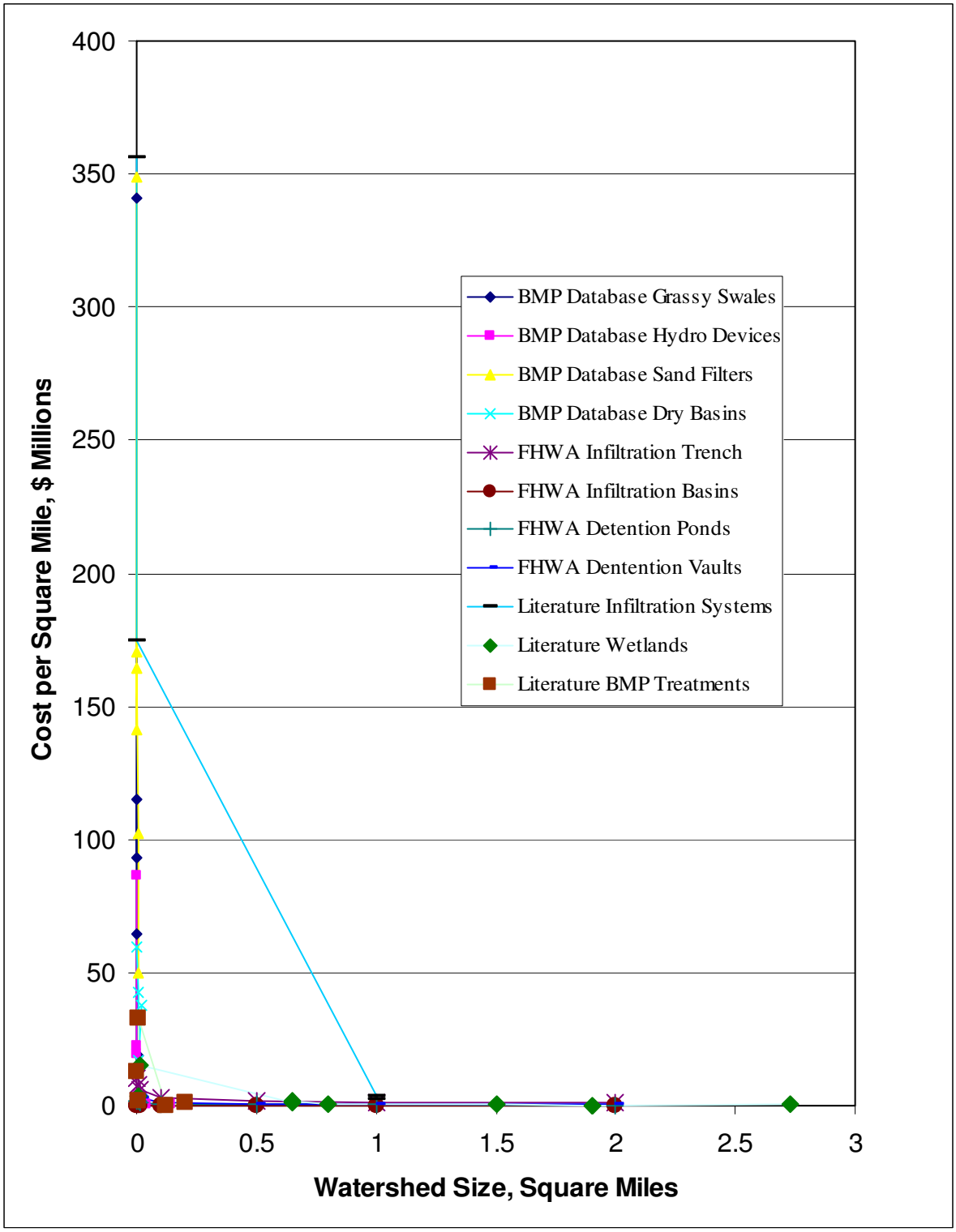

Figure 1. Plot of data for which costs per square mile and unit areas are known.

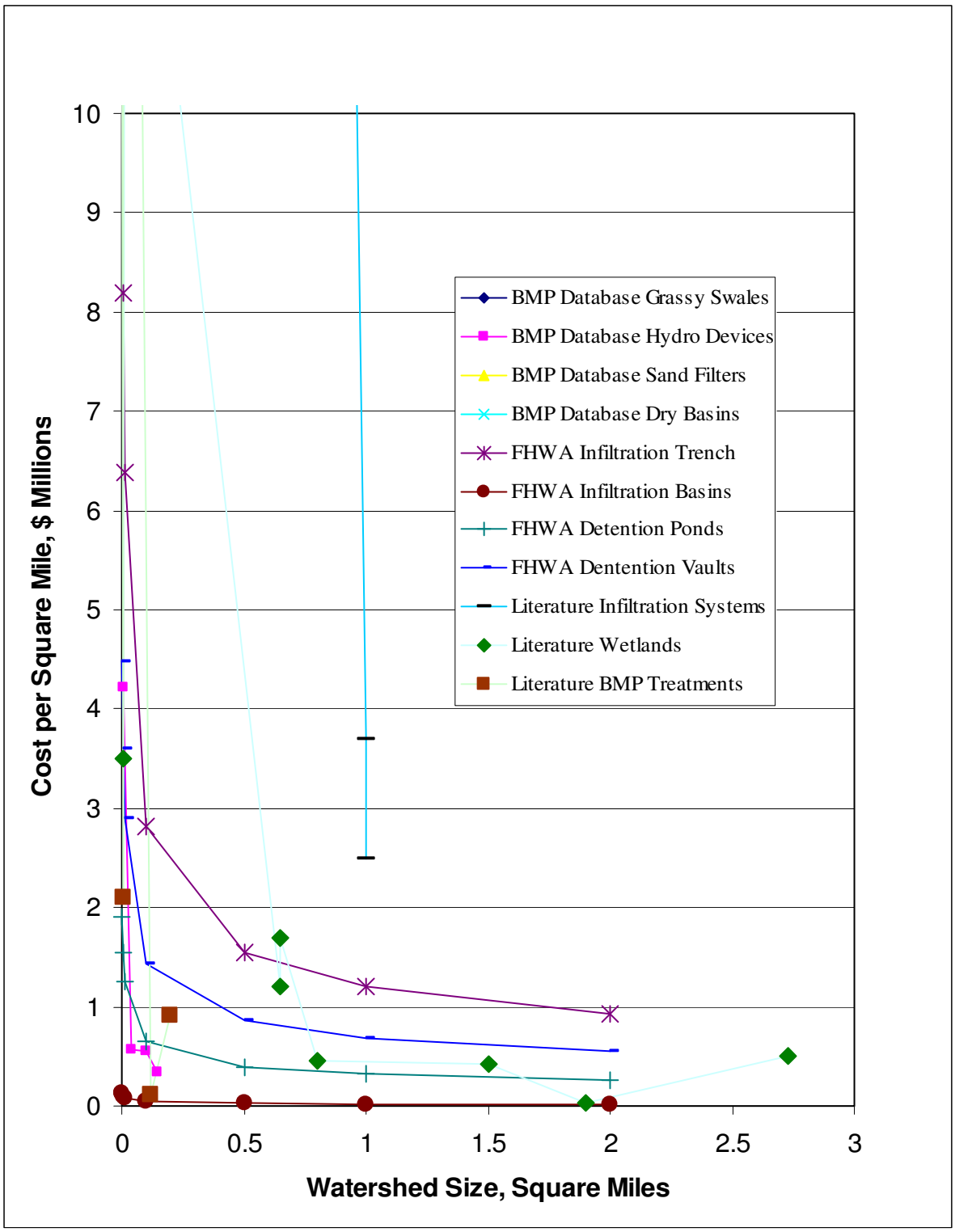

Figure 2. Cost per square mile versus unit size. Data are the same as those shown in Figure 1, but the axes have been magnified to show detail near the origin. Many data points fall outside of the plot.

Overall Costs of Stormwater Quality Control

It remains very difficult to produce an estimate of the total costs for complying with regulations in the Los Angeles Region. While there is substantial information on individual units that have been designed or implemented elsewhere, local factors are likely to make costs different in the Region. In most cases, it seems likely that costs in the Los Angeles Region will be higher than those reported elsewhere because land and labor costs are higher. Therefore, where a range of values is given, we have chosen the higher numbers.

This difficulty is compounded by the great variability in the data reported. To give just one example, the Federal Highway Administration formula estimates the cost of an infiltration basin needed to serve one square mile as $200,000. At the other extreme, the Herrerra Consultants report said that a detention/infiltration system for a residential area would cost $15 million per square mile. In preparing our total estimate, we have avoided using data that seem like outliers in comparison to the general run of the data.

The results compiled suggest two possible scenarios for stormwater quality control. The first approach is to rely on non-structural BMPs, such as programs to reduce littering, control pet waste, collect trash, prevent release of pollutants, and clean existing drains. This approach is less expensive because it involves no construction. However, there remains considerable doubt whether it will be sufficient to meet stormwater quality goals expressed as TMDLs (Total Maximum Daily Loads). Control of pollutant release will be only partial—we cannot expect that everyone will comply with the rules—and the amount of runoff will be reduced only slightly.

The second scenario presumes implementation of non-structural BMPs (except storm drain cleaning) and construction of a network of wetlands and infiltration basins sufficient to capture the first three-quarters of an inch of rainfall, which typically carries the bulk of the pollutants. These relatively simple installations are not likely to be sufficient without complementary measures to reduce releases of coliforms, trace metals, fertilizers and toxic organics. Wetlands help to remove these, but will not be effective if inputs are too high. Infiltration avoids all pollutant discharge, because it prevents release of the water, but it is necessary to protect groundwater quality, so once again, inputs must be restricted. The wetlands and infiltration basins would be designed to have sufficient retention capacity to hold the first ¾ inch of rainfall—this "first flush" carries most of the pollutants, but pollutant discharges must be sufficiently reduced so that subsequent flows can be discharged directly to storm drains.

In combination with the non-structural BMPs, wetlands and infiltration basins (designed as "stormwater parks") are likely to bring stormwater quality into compliance. This system will be more expensive, but it also carries greater secondary benefits: the region will gain much-needed greenspace, property values will be improved, and most important, it will substantially increase the availability of groundwater.

It is our recommendation that the responsible municipalities and agencies in the region begin at once on assessing stormwater quality on a neighborhood basis and implementing the non-structural controls. As the success of these measures is measured, it will become apparent whether the structural BMPs are needed. It seems certain that

they will be needed in some areas, but they may not be needed throughout the region. Thus our estimate of costs ranges from a minimum budget needed for the non-structural BMPs to a maximum representing the cost of an area-wide system of wetlands and infiltration basins. The following section provides the details of how the cost estimates were prepared.

Non-structural BMPs

An estimate of costs for non-structural BMPs has been prepared by the American Public Works Association (APWA, 1992). They defined five levels of BMPs that might be workable, with the appropriate level depending on the stringency of discharge requirements and the success of the individual measures. Their analysis included ten source control measures with cost data, and has been used as the starting point for the analysis here. Our treatment of each measure is described in the following paragraphs.

No littering ordinance. Litter laws are in place in the region, but there is a need for far more vigorous public education and enforcement. The APWA study determined that each municipality would spend $20,000 to put an enforcement program in place, and hire a half time person to manage the program ($30,000 per year). There are about a hundred municipalities in the Los Angeles Region, so this implies a startup cost of $200,000 and yearly costs of $3 million. Some officers will be necessary, but it is assumed that their pay will be covered by revenue from fines. Total costs are estimated to be $3 million plus the present worth of $3 million per year at 3%, or $103 million.

Pet waste ordinance. APWA predicted that the effort to control pet waste would be similar to that for litter, and estimated the same costs.

Chemical use and storage ordinance. APWA determined that a program to control the use and storage of chemicals would be similar is scope and cost to that for litter or pet waste. The same costs are estimated here. This would include the cost of programs to bring auto dismantlers and other local businesses into compliance.

Recycling programs. APWA predicted less trash would be discarded if convenient recycling programs were in place. Because these currently exist in most Los Angeles Region cities, and are justified by other concerns, no additional costs are estimated for this purpose.

Public education programs. Developing public support for stormwater quality control and explaining the need for citizen action will be vital to its success. The APWA determined a program costing $275,000 in each municipality would be necessary. However, it would be confusing and unnecessarily duplicative to have each of the one hundred municipalities in the Los Angeles Region conduct its own program. We instead assume a single program will be funded at the level of $5 million per year, which is approximately the current rate of expenditure. It also seems likely that education will not be needed indefinitely—to the degree that the message is successful, it will certainly become ingrained after perhaps ten years of advertising. We therefore estimate a total of $50 million for public education.

Vacant lot cleanup programs. This function will be part of the improved trash collection program, so funds are not separately allocated.

Spill prevention ordinance. APWA determined a separate program would be necessary to reduce the frequency of chemical spills and facilitate their rapid cleanup.

This function has largely been overtaken by hazardous waste management regulations, and so is estimated to require no additional costs here.

Program to prevent illicit discharges. APWA determined that vigorous efforts would be needed to find and eliminate illicit discharges to the storm drain system. We agree that this will be necessary to avoid loads of non-biodegradable pollutants, such as trace metals, on treatment wetlands and infiltration basins, and to prevent excessive loading of organic contaminants and coliforms. APWA predicted a cost of $4 per acre of watershed to start, and $50 per acre per year thereafter in order to deploy and monitor sampling devices and to trace down points of discharge. For the 2,050 square miles in which stormwater protection is needed, this amounts to $6.5 million in capital expenses and $80 million per year in ongoing costs. We expect however, that many illicit connections will be found at first, and that after these are eliminated, only a small program will be needed to detect new illicit connections. We therefore estimate that the ongoing costs will continue for only five years, totaling $407 million.

Improved cleaning of storm drains. During dry periods, storm drains collect trash from illicit dumping and wind blown litter (we expect no trash will enter through the catch basins because screens will be installed). Sediments also accumulate in the channels. Releases to the rivers and ocean could be reduced by a summer program of storm drain cleaning. The APWA estimates such a program can be put in place for $21 per acre per year, or about $27 million per year over the area of concern. The present worth of $27 million per year is $900 million (assuming an interest rate of 3%). No storm drain cleaning is expected for the wetlands and infiltration scenarios, on the presumption that trash and sediments will be removed from the water before it enters the drains.

Trash control. Trash must be removed from the runoff. A settlement agreement on Trash TMDL between the LA Regional Water Board and the City of Los Angeles includes spending of $168 million to reduce trash releases by 50% in five years. Cleaning up the region required removing all of the trash from an urban area more than twice the size of the city. Thus the estimate of $600 million seems reasonable.

Low flow treatment. One of the best steps, in terms of water quality benefits per dollar, is to use excess capacity in the wastewater treatment plants for treatment of low flows. This will keep the rivers and oceans clean for most of the year at little additional cost. The City of Los Angeles estimates the cost of building the necessary diversion structures at $14 million (Kharaghani, 2003). The urban region is about twice the size of the city, so we have estimated a total cost of $28 million. This does not include operation costs. While there will be modest cost increases associated with the greater flows, the biggest costs are associated with the installed treatment capacity, which is already in place.

Improved street sweeping. The APWA report determined that sweeping should be improved by increasing its frequency. Research results developed since the APWA report suggest that more frequent sweeping with traditional brush machines produces only a modest improvement. However, changing to vacuum sweepers is effective, and can remove up to 50% of particulate pollutants.

The upgrade of street sweeping in the region will require purchasing new vacuum-type sweepers to replace those currently in use. There are about 400 street sweeping

machines in use, which must be replaced once every four years, so 100 machines will be purchased each year. Vacuum machines cost about $150,000 rather than the $75,000 for standard machines. Thus the additional costs of higher quality sweeping are $75,000 per machine or about $7.5 million per year. Assuming an interest rate of 3%, this has a present worth of about $250 million.

Costs for on-site BMPs for private firms. It is anticipated that application of non-structural BMPS will include requirements that businesses make efforts to reduce pollution and runoff from their facilities. Efforts are likely to be highly variable: an accounting firm whose work is all done in offices might need to do no more that redirect its roof runoff to landscaping areas. A manufacturing facility might install sand filters and oil-water separators. Parking lots may be remodeled. It is difficult to provide an estimate for these efforts, but a general approximation for the total can be approached if firms are considered by size (Table 3). Data on the number of firms within chosen size ranges, measured by the number of employees, have been compiled for Los Angeles County by the California Employment Development Department (2001). Again, this area is not the same as the Los Angeles Region governed by LA Regional Water Board, but there is substantial overlap and the demographics are similar.

Table 3. Estimate of On-site BMP Costs for Los Angeles County Firms by Size Class

Number of Employees	Number of Firms	Average Cost per Firm	Total Costs
0-4	219,974	10	$2,199,740
5-9	37,125	500	18,562,500
10-19	25,366	1,000	25,366,000
20-49	19,682	2,000	39,364,000
50-99	7,745	5,000	38,725,000
100-249	4,239	10,000	42,390,000
250-499	1,138	25,000	28,450,000
500-999	408	50,000	20,400,000
1000+	260	100,000	26,000,000
Totals	315,937		241,457,240
		Average cost per firm	$764

Most small firms will not spend any money, so the average cost per firm is expected to be very low. A few might be required to improve trash disposal methods or reroute their rooftop drainage. At the other extreme, the largest companies might improve trash disposal and materials handling methods, build infiltration system planters, install oil-water separators, institute parking lot and work area sweeping. Companies that install new parking lots or reconstruct old ones may incur significant costs.

Costs for compliance with the "3/4-inch rule". The SUSMP regulations promulgated by the LA Regional Water Board require that new developments larger than one acre and redevelopment must provide for infiltration or minimal treatment of runoff from the first ¾-inch of rainfall from a storm event. It is difficult to determine how much this will cost. Proponents have suggested the costs will be minimal, while opponents have predicted high costs. Experts contacted during this study were of the general opinion that landscaping designed to infiltrate the runoff from a ¾-inch storm would be different, but not significantly more expensive, than traditional landscaping. On the other hand, engineers in the discipline believe that most builders are choosing treatment systems rather than infiltration. The stormwater control costs will likely be a small fraction of building costs. Ultimately, we have concluded that there are not sufficient data to make a numerical cost estimate. The costs are therefore described here only as "modest", and further study is recommended.

Wetlands and Infiltration Basins: Estimate Based on Cost per Square Mile of Watershed

The land within the Los Angeles Region varies from lightly settled areas, like the upper reaches of the Santa Clara River Watershed or the Santa Monica Mountains, through neighborhoods of single family homes with yards, to the extremely dense development of downtown Los Angeles or the Wilshire District. There are about 1,375 square miles of incorporated cities in Los Angeles County. The region of the LA Regional Water Board includes parts of Ventura County, and parts of both counties that are not incorporated are never the less populated. To evaluate the possible alternatives for runoff control, we have conceptually divided the 3,100-square-mile region that is under the jurisdiction of the Los Angeles Regional Water Quality Control Board into four parts 1000 square miles is estimated to be of "low density", requiring some runoff BMP treatment, but having sufficient land for development of treatment wetlands or infiltration systems. 1,000 square miles is estimated to be "high density" requiring infiltration systems but excluding wetlands. 50 square miles is estimated to be extremely dense downtown development, requiring some more sophisticated BMP treatment systems. The remainder of the region is considered rural, and we presume the only cost is for source control outreach and enforcement. These definitions and numbers are approximate, but there is also flexibility in the applicability of the various technologies.

For the low density urban areas, we assume some combination of infiltration systems and treatment wetlands will be constructed. The range of reported costs for treatment wetlands runs from $110,000 per square mile for Murray City, Utah, to $1.7 million per square mile for the Treasure Island wetland in San Francisco. The San Diego Creek wetland system seems an excellent example—it is designed for a populated region of Orange County that is quite similar to many areas in Los Angeles County. However, it is specifically designed to treat low flows only, and the total cost of the system has not been provided (except that it is less than $500,000 per square mile). The Long Lake retrofit also seems like an appropriate example. It uses a mix of wetland, infiltration and biological BMPs in an urban residential area, and has a well-established cost of $420,000 per square mile. We have therefore used this value in our total estimate of $420 million for the low density areas.

In areas of high density housing, where yards are small, or in industrial areas with large roof and parking areas, runoff coefficients are higher and there is less land available.

Here it seems likely that infiltration systems will be necessary. The best example for comparison is the Fresno Metropolitan Flood Control District, which installed 130 basins over an area of 120 square miles, with many of the facilities dedicated to multiple uses as parks and playing fields. Cost estimates for the system range from $2.5 million to $3.7 million per square mile. While a similar system built in the Los Angeles Region could take advantage of existing parks, power line rights-of-way, parking lots, and other available land, it seems appropriate to use the higher number because land here will be more expensive. Thus we estimate cost in these areas to be $3.7 million per square mile for a total of $3.7 billion.

In extremely dense areas, neither wetlands nor infiltration systems will be possible. Pollutant loads, despite source control efforts, will be considerable in the near future. Underground sand filters, sediment traps, oil and grease adsorbants and other more elaborate treatment BMPs will be needed. The lowest-cost processes are filter strips, dry swales and bioretention areas, but these require space that is unlikely to be available (the Hillsboro, Oregon compost filter, at $110,000 per square mile is considered an outlier). Even the Alexandria, Virginia airport parking lot solution is unlikely to be workable because so much of the parking area is in multi-level structures in downtown areas. This combination of more pollutants and less space suggests that the Oakland Park, Florida system for treating industrial runoff is the best case example. Its cost was equivalent to $33 million per square mile, for a total of $1.65 billion over the extremely dense urban area.

Together, this approach estimates that the total BMP facilities cost will be about $5.7 billion.

Wetlands and Infiltration Basins: Estimate Based on Needed Retention Capacity

Investigators working on the Sun Valley Project (Los Angeles County Department of Public Works, 2003, Figure 4-3 of page 4-8) have designed several BMPs and provided carefully calculated cost estimates. These are recent figures, reduced to present worth, and reflecting the local conditions in the urban Los Angeles Region. They provide costs in terms of dollars per acre-foot of stormwater storage capacity for several BMPs. Three examples have been chosen for consideration here: Stonehurst Park and Wentworth Park (which simply lower the park level to two feet below the surrounding area so that they serve as infiltration basins, or "stormwater parks"), and storage in below-street infiltration vaults. A system that stores the runoff from a ¾-inch storm will comply with SUSMP requirements. In the low density areas, it is estimated that the runoff coefficient is 0.4. In the high density areas, it is estimated to be 0.6, and in the extremely dense areas it is estimated to be 1.0.

We estimate that the low-density areas can be served at the Stonehurst Park price, the high density areas can be served at the Wentworth Park price, and the extremely dense areas can be served by street infiltration vaults. This approach to estimating the total cost is completely independent of the first approach, but the final estimate of $4.0 billion for BMP facilities is reasonably similar.

Wetlands and Infiltration Basins: Estimation of Total Costs from the APWA Study

The APWA study produced total estimates for costs for the nation for five scenarios for stormwater quality control. One estimate was for a system of detention

basins and wetlands, as is being proposed for the structural BMPs described here. They estimated that a national system would cost $91 billion. For 260 million people in the United States, this is about $350 per capita. For the 10 million people in the Los Angeles Region, this produces an estimate of $3.5 billion. The APWA anticipated maintenance costs for detention and retention basins at about 1% of the construction cost per year. Discounted to present worth, this increases the total cost by 33%, or $1.2 billion. APWA numbers thus indicate a total cost of $4.7 billion. This estimate is similar to those shown for the entries in Table 3 for facilities costs for alternatives B and C.

Wetlands and Infiltration Basins: An "Upper Bound" Provided by the Sun Valley Study

The Sun Valley study developed a detailed design for a 4.4 square mile watershed that currently has no storm drains. It was designed to contain the water from a 50-year, 3-day storm—14.8 inches of rain—using stormwater parks and below-street infiltration vaults. Because this approach will infiltrate essentially all of the rain that runs off from the area, and because the design criterion of 14.8 inches greatly exceeds the ¾ inch assumed here, it unquestionably constitutes a plan that would overcomply with the strictest imaginable stormwater quality control regulations. Further, because it is a complete and detailed design, it is essentially certain that it can be built for the cost estimated. Figures are recent, and reflect the costs of construction in the Southern California area.

The costs determined can therefore serve as an "upper bound" multiple benefit expenditure that a municipality could imaginable be required to incur—while there is every reason to suppose that the easier goal of stormwater quality control can be done for a much lower cost. The low cost alternative described was $171 million for 4.4 square miles, or $39 million per square mile. For the 1050 square miles of the high density and extremely dense urban Los Angeles Region, this would result in a cost of $41 billion. Wetlands for the low-density areas and trash control for the entire region would add about $1 billion more. Thus we can say with great certainty that no alternative more expensive than $42 billion will be needed.

Overall Benefits of Stormwater Quality Control

The Esthetic Value of a Clean Ocean

Much of the value of living near clean streams and a pollution-free ocean is difficult to quantify. People enjoy the view, they like watching wildlife, and they prefer vegetation and sand and water to pavement. Some efforts to place a dollar value on these benefits have been made by the EPA (1999) and others (Kramer, 2003; Soderqvist, 2000; Whitehead, et al., 2000).

Soderqvist asked residents in the area of the Stockholm archipelago how much they were willing to pay in order to reduce eutrophication of the nearby ocean. The effects of oceanic eutrophication are relatively subtle—less obvious than floating trash or debris washed up on the beach. He determined the willingness to pay to be between $54 and $90 per person.

Whitehead investigated resident willingness to pay for reduction of eutrophication of the Neuse River Basin in North Carolina. He found 44,000 landowners were willing to pay about $76 each for the water quality improvement.

Kramer surveyed people in the area of the Catawba River in North and South Carolina, asking about willingness to pay for improved water. The average result was $139 per taxpayer.

The EPA surveyed people across the U.S., asking about their willingness to pay for the various services associated with improvements in fresh water quality. They found people willing to pay $210 per household for improvement of water quality sufficient to support boating, $158 for the further improvement sufficient to support fishing, $177 for further improvement sufficient to allow swimming, and $158 for improvement sufficient to support natural aquatic life. Of the total of $703, however, only 67% was ascribed to local water quality improvement, while the rest was associated with improvement nationwide. Assuming 2.5 persons per household, this results in an estimate of $188 per person for willingness to pay for local freshwater improvements, similar to the estimate by Kramer for the Catawba River.

We have chosen the EPA estimate for freshwater improvements: the higher estimate seems reasonable because freshwater resources in the LA basin are generally in very poor condition, and because we have ignored the national effect (their results indicated that people throughout the nation were willing to pay for improvements throughout the nation—we are not counting the willingness of people outside the LA Region to pay for improvements here, and that number is not zero). Adding this to a mid-range value of the Soderqvist estimate for improvements in ocean water quality produces a result of $260 per person. This seems a quite reasonable value. 9.5 million people live in the Los Angeles Region, so this value indicates a total willingness to pay, based solely on the value of living in a region of clean waters, of about $2.5 billion.

Larsen and Kew (2003) have surveyed residents of California to determine their total willingness to pay for removing all impairments from bodies of water in the state. They determined that the average willingness to pay was $15.46 per month. Assuming 2.5 persons per household, this is $6.18 per person per month. For 9.5 million residents in the Los Angeles Region, this is $58.7 million per month, with a present worth of $23 billion. This represents the value of removing all impairments—including those caused by wastewater pollution, shoreside development, pollution from boats, and others. Our estimate for stormwater pollution alone is about one-tenth of this. Thus the Larsen and Kew results suggest our estimate is reasonable and conservative.

General support for these numbers was found in a survey done for the Packard Foundation performed by Mark Baldassare (Weisse, 2003). He determined that seven of ten Californians are concerned about the decline in coastal resources. Sixty-nine percent said the condition of the coastline is very important to their quality of life, and 75% visit the coast at least several times each year. Seventy-two percent favor reducing stormwater pollution, even if the cost leads to higher utility bills.

Ecosystem Services

A primary purpose of stormwater quality control is protection of nearshore marine ecosystems. These ecosystems provide humanity with a wide variety of services, ranging from educational opportunity to fish resources to chemical maintenance of the atmosphere. While the effort to value such ecosystem services is necessarily difficult and approximate, some studies have been made. Costanza, et al. (1997) in an article published in the respected journal *Nature*, assessed the value of coastal ecosystems at $12

trillion per year worldwide. The World Resources Institute estimates that there are 1.6 million kilometers of coastline (measured at a resolution of 1 kilometer). If we assume that stormwater discharges from the Los Angeles Region affect about 100 miles, or 160 kilometers of coastline, this is 0.01% of the world's total, suggesting that the value of local coastal resources is $1.2 billion per year. Assuming an interest rate of 3%, this income stream has a present worth of $40 billion. Finally, we can make the general approximation that stormwater pollution reduces the services provided by the local coastal ecosystem by 5%. This suggests that the value of lost services is $2 billion.

This number is quite approximate. It must secondly be interpreted thoughtfully because it includes services such as nutrient cycling and maintenance of the atmosphere, which are of undoubted value to the world, but which do not show up in the daily budgets of local citizens or local municipalities. The services are nevertheless quite real and quite valuable, and should be included in the accounting.

Additional Water Supply

Infiltration of stormwater will add to area groundwater reserves. These are a valuable resource that currently provides a substantial fraction of the Los Angeles Region water supply. Water that is infiltrated from the stormwater quality control system will add to local resources, reducing the need for imported water. We assumed that water will be collected from 2050 square miles. Rainfall ranges from 12 to 16 inches per year in the region, and infiltration is from 2 to 8 inches per year. It is conservative to assume that installation of a distributed system of infiltration basins will increase infiltration in this area by an average of 3 inches per year, corresponding to collection of four storms of ¾ inches (or a larger number of smaller storms). Thus total infiltration will be 300,000 acre-feet per year. Some of this may be unrecoverable, having entered contaminated or otherwise unusable aquifers. However, even this will contribute to reducing the problems of seawater intrusion. We estimate that about 90% or 270,000 acre-feet of the infiltrated water will be available.

Current importation costs are about $450 per acre-foot. However, current supply shortages are forcing serious consideration of desalination as an alternative source because political and environmental factors preclude significant increases in importation. We predict that continued growth in the Los Angeles Region will require that water be obtained from such high-cost sources, so we have used $800 per acre-foot as the value of the infiltrated ground water. Further, even if water is available for $450 per-acre foot, this is only the marginal financial cost of import—the true life cycle cost, including environmental impacts in source areas, is surely much higher. 270,000 acre-feet of water per year at $800 per acre-foot amounts to $216 million per year. The present worth of this income stream is $7.2 billion.

The appropriate number is highly dependent on assumptions: if conservation measures are effective and growth is slow, desalination might not be necessary. However if we include the costs of political friction with source areas, and the environmental impact of water transfers on those areas—that is, the full life-cycle cost of imported water, even the cost estimate of $800 per acre-foot may be low.

Flood Control

The flood control system in Los Angeles County is currently designed to cope with runoff from areas with a runoff coefficient on the order of 0.5. Stormwater quality control measures could substantially reduce this number—currently the coefficient for the San Gabriel Valley, measured below the spreading grounds at Whittier Narrows, is 0.05. Calculations suggest that the recent Army Corps of Engineers project that raised the embankments along the lower Los Angeles River have eliminated the 100-year flood plain for now, and property owners have correspondingly been relieved of flood insurance costs of $20 million or $30 million per year. However, if development continues to increase the runoff coefficient of the region, progressively more expensive projects will be required—it is likely that further protection would require rebuilding many bridges. Alternatively, flood insurance will once again be necessary, and uninsured properties will be at risk. It is perhaps reasonable to presume that infiltration systems will avoid the cost of the next embankment project, which could easily costs twice as much as the one just completed, or $400 million.

A second estimate can be developed this way: The National Flood Insurance Program says there are 25,620 policies held in Los Angeles County with an average premium of $550, for a total yearly cost of $14 million. The present worth at 3% is $466 million. Presumably, most but not all of this could be avoided with a complete stowmwater quality control system. Thus the estimate of $400 million seems reasonable.

Property Value Improvements from Greenspace and Water

Certainly additional parks and other greenspace would add to property values. Developers frequently add central lakes or greenspace to large developments, demonstrating their belief that the value of the land for additional housing is less than its value as an amenity. In a study compiled in 1995, the U.S. EPA said (U.S. EPA, 1995):

> "People have a strong emotional attachment to water, arising from its aesthetic qualities--tranquility, coolness, and beauty. As a result, most waterbodies within developments can be used as marketing tools to set the tone for entire projects (Tourbier and Westmacott, 1992). A recent study conducted by the National Association of Home Builders indicates that "whether a beach, pond, or stream, the proximity to water raises the value of a home by up to 28 percent." A 1991 American Housing Survey conducted by the Department of Housing and Urban Development and the Department of Commerce also concurs that "when all else is equal, the price of a home located within 300 feet from a body of water increases by up to 27.8 percent" (NAHB, 1993). Dick Dillingham, President of the National Association of Realtors' Residential Sales Council, declares, "Water makes a difference . . . there is such a very small supply of properties that can claim a water location and it is something you cannot add" (Lehman, 1994)."

Homes overlooking the new wetlands and greenspace will see the greatest increase in property values. Those farther away will appreciate less. A study reported by Fairfax County, Virginia, (Environmental Coordinating Committee, 2003) interpreted the EPA results and concluded that an aesthetically valuable pond raises the value of nearby houses by $10,000 each. In Los Angeles County, the median home is valued at about $400,000, so a $10,000 increase is about 2.5%, which seems a reasonable number.

Demographic data for Los Angeles County (This is not the same as the Los Angeles Region governed by the Water Quality Control Board, but there is considerable overlap, and the demographics are quite similar) indicate there are 3.27 million homes, of which 47.9%, or 1.55 million, are owner-occupied. We expect that about one-third of these, or 500,000 homes, would benefit from additional greenspace in a complete stormwater control system (the others could be too remote, or might already have sufficient greenspace). Increasing the value of each home by $10,000 provides a total benefit of $5 billion.

Improved Property Values from Trash Control

Enforcement of litter laws and improved street cleaning would improve the appearance of our neighborhoods. It is believed that the esthetic improvement would have a value to individuals at least equal to the esthetic benefits of a cleaner ocean, so we have valued this at $100 per person, for a total of $950 million.

Cost Savings from Reduced Dredging

Costs for sediment dredging and disposal in area harbors range from about $10 per ton, when the sediment is clean and a nearby disposal site is available, to $30 per ton when the sediment is contaminated or the disposal site is distant. Disposal of sediments classified as toxic may cost $100 per ton. Personnel at Los Angeles Harbor estimate that about 40% of currently dredged sediment is contaminated, and occasional loads are toxic. In general, acceptable disposal sites are becoming harder to find, so distant sites are likely to be the rule. Thus, an estimate for future sediment removal of $30 per ton is reasonable. The Environmental Protection Agency has estimated overall costs and effectiveness for sediment control at construction sites, and the results indicate that preventing the runoff of a ton of sediment costs from $69 to $86 (Appendix II). Therefore, the savings associated with alleviation of harbor sedimentation alone offset about a third of the costs of construction site measures. Savings for Los Angeles Harbor will be about $3 million per year. Regional savings will be about $10 million, with a present worth of $330 million.

To cite another example, it is estimated that the San Joaquin Marsh wetland preserve collects 50,000 tons of sediment per year. Assuming a removal cost of $30 per ton, the benefit for Newport Bay, which is just downstream, is $1.5 million per year.

Cost Savings from Improved Public Health

Sufficient data do not exist for estimating the value of benefits from reduced exposure to air pollutants. Certainly fine particles are an important part of the causes of health impairment, and experts agree that resuspension of road dust is an important contributor to fine particle exposure at street level where we live. They also contribute substantially to settlement of dust and dirt on buildings, requiring cleaning expenses. However, estimates of the magnitude of this effect are not currently possible.

Summary of predicted costs and benefits

Table 3 presents a summary of the estimated costs and benefits. Three estimates are included. In the first (A), non-structural BMPs are presumed to be the only measures employed. In the second (B), wetlands and infiltration basins are assumed, and the costs are estimated on a cost-per-square-mile basis. The third set of columns (C) again describes the wetlands and infiltration basins scenario, but makes cost estimates on a per-

acre-foot-detention basis. The second and third estimates also presume implementation of the non-structural BMPs, except for storm drain cleaning.

Benefits differ because implementation on non-structural BMPs does not produce property increases associated with greenspace, does not significantly increase groundwater supply, and does not reduce harbor sedimentation.

The costs of stormwater quality control are significant. Non-structural BMPs alone will cost $2.6 billion. Structural systems, including wetlands and infiltration basins, will cost between $5.7 billion and $7.4 billion. However, it should be noted that these costs will be borne over a period of many years—probably ten years at least. More importantly, the benefits of these expenditures considerably exceed their costs. For the non-structural BMPs alone, the benefit-to-cost ratio is 1.9. For the structural approach the estimates are 2.5 and 3.3. Control of pollution and reestablishment of the hydrologic cycle will produce a greener city with higher property values, better esthetics, cleaner rivers and a cleaner ocean, and a larger and more stable water supply.

Table 2. Overall Cost Estimate for Stormwater Quality Control in the Los Angeles Region

Sums are rounded to two significant figures

		A. Non-Structural BMPs, modified from APWA			B. Wetlands and Infiltration Basins, watershed area basis		C. Wetlands and Infiltration Basins, detention volume basis		
Regions and BMPs	**Area, sq. miles**	**Capi-tal Cost $M**	**O&M Costs $M**	**Total $M**	**Cost / square mile, $M**	**Cost or Bene-fit $M**	**Acre-feet initial flow**	**Cost per acre-foot**	**Cost or Bene-fit, $M**
Costs for Non-Structural BMPs									
No Littering Ordinance		2.5	3	103		103			103
Pet Waste Ordinance		2.5	3	103		103			103
Chemical Use and Storage		2.5	3	103		103			103
Public Education			5	50		50			50
Illicit Discharge Program		6.5	80	407		407			407
Increased Cleaning of Drains			27	900					
Trash Control				608		608			608
Low Flow Sanitary Treatment				28		28			28
Improved Street Cleaning	2050			250		250			250
Private On-site BMPs		241		241		241			241
New construction rules				Mod-est		Mod-est			Mod-est
Total N-S BMPs				2791		1891			1891
Costs for Structural BMPs									
Rural	1050					0			0
Low Density, Industrial (C=0.4)	1000				0.42	420	15,500	0.053	822
High Density (C=0.6)	1000				3.70	3,700	23,250	0.098	2,279
Extremely Dense (C=1.0)	50				33.00	1,650	1,938	0.470	911
Total Facilities Costs						5,770			4,011
Total Cost, LA Region				**2550**		**7420**			**5661**
Benefits									
Flood Control						400			400
Greenspace, Water Property Values						5,000			5,000
Clean Ocean Esthetics				2500		2,500			2,500
Clean Streets Esthetics				950		950			950
Groundwater Replenishment						7,200			7,200
Improved Beach Tourism				100		100			100
Preservation of Ocean Ecosystems				2000		2,000			2,000
Reduced Harbor Sedimentation						330			330
Improved Health, Cleaner Buildings, Reduced Exposure to Particulates						Sig-nificant			Sig-nificant
Total Benefits, LA Region				**5600**		**18,000**			**18,000**

Recommendations for Action

The results developed here indicate that a distributed approach to stormwater quality control, employing non-structural BMPS with a system of wetlands and infiltration basins will achieve stormwater quality compliance and will be far cheaper than advanced treatment plants. It is recommended that the responsible organizations begin immediately with the non-structural measures, analyze their effectiveness, and add wetlands and infiltration systems as necessary to achieve the goal of protecting the rivers and coastal zones of the Los Angeles Region. Our results indicate that the benefit-to-cost ratio for the non-structural BMPs is about two, and for the larger effort is about 3. Thus both the beginning effort and the full response represent good investments for the people of the region.

Outreach

Municipalities that are finding themselves responsible for stormwater cleanup should act immediately to lay the groundwork for comprehensive programs. Outreach programs should be developed to inform the public of the problems and of what they can do to help with the solution. Vigorous efforts to reduce littering, for example, will reduce costs in subsequent steps as programs develop. Current regulations controlling release of sediments from construction sites should be enforced and supplemented with contractor education efforts.

Data Collection and Planning

Municipalities should immediately begin the process of determining the extent and nature of their individual stormwater quality problems. Many may find, for example, that stormwater from neighborhoods of single-family homes can be discharged to rivers or infiltrated with little or no treatment. Early identification and elimination of problem sources might greatly reduce later expenditures on treatment systems—the programs of thorough data collection and vigorous enforcement described earlier were notably effective at reducing pollutant concentrations in discharges and cost very little. It will certainly be a tragedy if we build expensive treatment systems to solve a problem that can be eliminated with a citation.

Municipalities should also immediately assess their property holdings. Cities frequently own substantial amounts of land, and some of this will be appropriate for stormwater control facilities. Purchasing programs should be developed immediately, so that cities can take advantage of opportunities for economical land acquisition as they arise.

Administrative Structure

Adding to the daunting technical and financial problems, the distributed approach for stormwater control requires that problems be solved by a holistic effort for each sub-watershed. The boundaries of sub-watersheds do not correspond to political boundaries, and cities will be forced to cooperate in ways that have never been required before. Further, controlling local pollution releases and restoring the hydrologic cycle involve issues that have traditionally be dealt with by an astonishing variety of agencies. If we imagine controlling the runoff quality of a sub-watershed by installing a park/infiltration system with associated wetlands, for example, efforts should include the sanitation

districts for the cities overlapping the sub-watershed (because of stormwater quality control), the Water Replenishment District (because of groundwater infiltration), the County Flood Control District (because the park will contribute to flood control and reduce the cost of downstream facilities), parks departments (because a recreational area will result), and wildlife agencies (governing the habitat created). It is reasonable to expect, moreover, that each of these agencies will contribute to the funding necessary for construction and maintenance. It is likely that, with appropriate apportionment, such a facility will have a favorable cost/benefit ratio for each of the agencies involved. It is certain that gaining the cooperation and contributions of all of these agencies will be extremely difficult. It may be appropriate that legislation be passed at the state level to provide a means for bringing these agencies together.

Funding

While runoff quality can be controlled by methods significantly cheaper than the massive construction of advanced treatment plants, the cost remains significant, and comes at a time when state and local governments are desperately short of funds. It is reasonable to suggest that funding should come from those who contribute to the problem, so that the taxation system mimics a market—assigning costs to the activity that generates them. Hundreds of municipal stormwater utilities, for example, have instituted a tax that is proportional to the number of square feet of impermeable surface on the land. An extension to this approach is to give property-owners fee rebates for installing BMPs that lower runoff quantity or increase water quality. This approach, or others that encourage owners to reduce their runoff, could fund the solution even as they reduce the magnitude of the problem. Certainly fines for littering should be used to fund litter law enforcement in the way that parking fines fund parking enforcement. Efforts to control illegal discharges could be at least partially supported by fines of those making the discharges. All of these approaches would be consistent with the principle that the polluter should pay, and would provide incentives that would contribute to stormwater cleanup.

A “cap and trade” system would be one means of approaching the funding dilemma. If all landowners were given the choice of either purchasing tradable discharge allowances or cleaning up runoff, a free-market trading system would allow owners to trade these allowances and in the process assign stormwater runoff reduction to owners who are able to cheaply install BMPs. This system, or a combined stormwater utility fee with BMP credits, would tend to produce the lowest cost solution overall. A study under way in Cincinnati, Ohio, suggests that such systems could be successful (Thurston et al., 2003).

Changes in Building Codes

This study indicates that parking lots constitute a significant resource for promoting stormwater infiltration. Building codes should be amended immediately to require that all new or reconstructed parking lots be designed to infiltrate the water that they collect. While there will be costs associated with the infiltration systems, the work described above indicates that much—and often all—of these costs can be offset by reduced costs for curbs and drainage systems.

Very large facilities, such as those for malls, should be considered sites for installation of subsurface infiltration vaults that could receive water from surrounding areas as well. These could be installed in sections, to minimize disruption to the commercial establishments. A mechanism could be established by which the site owners are compensated for the costs of handling the runoff.

Other building codes should be changed to encourage on-site infiltration of water rather than rapid drainage to the street. It may also be appropriate to consider limitations on the use of architectural copper sheeting, which can release copper ions to stormwater, and on the use of galvanized materials, which can release zinc.

Purchase of High-Efficiency Street Sweeping Equipment

Improved street sweeping seems very likely to be an important part of future stormwater programs. It can remove 30 to 50 percent of the particulate-associated pollutants, substantially reducing the load on downstream systems. It will have the secondary benefits of improving neighborhood appearance and reducing the exposure to air pollutants at street level. Municipalities should make the decision now to purchase only high-efficiency vacuum sweepers as they make routine replacements of their street cleaning machinery.

Investigation of Coliform Sources

Additional studies, particularly employing newly available methods for rapid identification of microorganisms, should be done to determine the sources of pathogenic organisms in stormwater.

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APPENDIX I.
BEST MANAGEMENT PRACTICES FOR CONSTRUCTION SITES

(Adapted from the Washington State Department of Ecology Water Quality Program, 2001).

The **12 Elements** of Storm Water Pollution Prevention Plan (SWPPP):

Mark Clearing Limits

Prior to beginning land disturbing activities all clearing limits, sensitive areas and their buffers, and trees that are to be preserved shall be clearly marked, both in the field and on the plans, to prevent damage and offsite impacts.

Preserving Natural Vegetation

The purpose of preserving natural vegetation is to reduce erosion wherever practicable. Limiting site disturbance is the single most effective method for reducing erosion.

Buffer Zones

An undisturbed area or strip of natural vegetation or an established suitable planting will provide a living filter to reduce soil erosion and runoff velocities.

High Visibility Plastic or Metal Fence, Stake and Wire Fence

Fencing is intended to: (1) restrict clearing to approved limits; (2) prevent disturbance of sensitive areas, their buffers; (3) limit construction traffic to designated construction entrances or roads; and, (4) protect areas where marking with survey tape may not provide adequate protection.

Establish Construction Access

To minimize the tracking of sediment onto public roads and into surface waters:

Stabilized Construction Entrance

Construction entrances are stabilized to reduce the amount of sediment transported onto paved roads by vehicles or equipment by constructing a stabilized pad of quarry spalls at entrances to construction sites.

Wheel Wash

Wheel washes reduce the amount of sediment transported onto paved roads by motor vehicles.

Construction Road/Parking Area Stabilization

Stabilizing subdivision roads, parking areas, and other onsite vehicle transportation routes immediately after grading reduces erosion caused by construction traffic or runoff.

Control Flow Rates

Properties and waterways downstream from development sites shall be protected from erosion due to increases in the volume, velocity, and peak flow rate of stormwater runoff from the project site.

Sediment Trap

A sediment trap is a small temporary ponding area with a gravel outlet used to collect and store sediment from sites cleared and/or graded during construction.

Temporary Sediment Pond

Sediment ponds remove sediment from runoff originating from disturbed areas of the site. Sediment ponds are typically designed to remove sediment no smaller than medium silt (0.02 mm).

Install Sediment Controls

Straw Bale Barrier

To decrease the velocity of sheet flows and intercept and detain small amounts of sediment from disturbed areas of limited extent, preventing sediment from leaving the site.

Brush Barrier

The purpose of brush barriers is to reduce the transport of coarse sediment from a construction site by providing a temporary physical barrier to sediment and reducing the runoff velocities of overland flow.

Gravel Filter Berm

A gravel filter berm is constructed on rights-of-way or traffic areas within a construction site to retain sediment by using a filter berm of gravel or crushed rock.

Silt Fence

Use of a silt fence reduces the transport of coarse sediment from a construction site by providing a temporary physical barrier to sediment and reducing the runoff velocities of overland flow.

Vegetated Strip

Vegetated strips reduce the transport of coarse sediment from a construction site by providing a temporary physical barrier to sediment and reducing the runoff velocities of overland flow.

Straw Wattles

Straw wattles are temporary erosion and sediment control barriers consisting of straw that is wrapped in biodegradable tubular plastic or similar encasing material. They reduce the velocity and can spread the flow of rill and sheet runoff, and can capture and retain sediment.

Sediment Trap

A sediment trap is a small temporary ponding area with a gravel outlet used to collect and store sediment from sites cleared and/or graded during construction.

Temporary Sediment Pond

Sediment ponds remove sediment from runoff originating from disturbed areas of the site. Sediment ponds are typically designed to remove sediment no smaller than medium silt (0.02 mm).

Construction Stormwater Chemical Treatment

Turbidity is difficult to control once fine particles are suspended in stormwater runoff from a construction site. Sedimentation ponds are effective at removing larger particulate matter by gravity settling, but are ineffective at removing smaller particulates such as clay and fine silt. Sediment ponds are typically designed to remove sediment no smaller than medium silt (0.02 mm). Chemical treatment may be used to reduce the turbidity of stormwater runoff.

Construction Stormwater Filtration

Filtration removes sediment from runoff originating from disturbed areas of the site.

Stabilize Soils

Exposed and unworked soils shall be stabilized by application of effective BMPs that protect the soil from the erosive forces of raindrops, flowing water, and wind.

Temporary and Permanent Seeding

Seeding is intended to reduce erosion by stabilizing exposed soils. A well-established vegetative cover is one of the most effective methods of reducing erosion.

Mulching

The purpose of mulching soils is to provide immediate temporary protection from erosion. Mulch also enhances plant establishment by conserving moisture, holding fertilizer, seed, and topsoil in place, and moderating soil temperatures.

Nets and Blankets

Erosion control nets and blankets are intended to prevent erosion and hold seed and mulch in place on steep slopes and in channels so that vegetation can become well established. In addition, some nets and blankets can be used to permanently reinforce turf to protect drainage ways during high flows.

Plastic Covering

Plastic covering provides immediate, short-term erosion protection to slopes and disturbed areas.

Sodding

The purpose of sodding is to establish permanent turf for immediate erosion protection and to stabilize drainage ways where concentrated overland flow will occur.

Topsoiling

Addition of topsoil will provide a suitable growth medium for final site stabilization with vegetation. While not a permanent cover practice in itself, topsoiling is an integral component of providing permanent cover in those areas where there is an unsuitable soil surface for plant growth. Native soils and disturbed soils that have been organically amended not only retain much more stormwater, but they also serve as effective biofilters for urban pollutants and, by supporting more vigorous plant growth, reduce the water, fertilizer and pesticides needed to support installed landscapes. Topsoil does not include any subsoils but only the material from the top several inches, including organic debris.

Polyacrylamide for Soil Erosion Protection

Polyacrylamide (PAM) is used on construction sites to prevent soil erosion. Applying PAM to bare soil in advance of a rain event significantly reduces erosion and controls sediment in two ways. First, PAM increases the soil's available pore volume, thus increasing infiltration through flocculation and reducing the quantity of stormwater runoff. Second, it increases flocculation of suspended particles and aids in their deposition, thus reducing stormwater runoff turbidity and improving water quality.

Surface Roughening

Surface roughening aids in the establishment of vegetative cover, reduces runoff velocity, increases infiltration, and provides for sediment trapping through the provision of a rough soil surface.

Gradient Terraces

Gradient terraces reduce erosion damage by intercepting surface runoff and conducting it to a stable outlet at a non-erosive velocity.

Dust Control

Dust control prevents wind transport of dust from disturbed soil surfaces onto roadways, drainage ways, and surface waters.

Small Project Construction Stormwater Pollution Prevention

To prevent the discharge of sediment and other pollutants to the maximum extent practicable from small construction projects.

Protect Slopes

Design, construct, and phase cut and fill slopes in a manner that will minimize erosion, considering soil type and its potential for erosion.

Temporary and Permanent Seeding

Seeding is intended to reduce erosion by stabilizing exposed soils. A well-established vegetative cover is one of the most effective methods of reducing erosion.

Surface Roughening

Surface roughening aids in the establishment of vegetative cover, reduces runoff velocity, increases infiltration, and provides for sediment trapping through the provision of a rough soil surface.

Gradient Terraces

Gradient terraces reduce erosion damage by intercepting surface runoff and conducting it to a stable outlet at a non-erosive velocity.

Interceptor Dike and Swale

Provide a ridge of compacted soil, or a ridge with an upslope swale, at the top or base of a disturbed slope or along the perimeter of a disturbed construction area to convey stormwater. Using the dike and/or swale to intercept the runoff from unprotected areas and direct it to areas where erosion can be controlled. This can prevent storm runoff from entering the work area or sediment-laden runoff from leaving the construction site.

Grass-Lined Channels

Channels lined with grass can convey runoff without erosion, and will provide some degree of treatment and infiltration.

Pipe Slope Drains

Piping can be used to convey stormwater anytime water needs to be diverted away from or over bare soil to prevent gullies, channel erosion, and saturation of slide-prone soils.

Subsurface Drains

Drains below the surface can intercept, collect, and convey ground water to a satisfactory outlet. These can be a perforated pipe or conduit below the ground surface. The perforated pipe provides a dewatering mechanism to drain excessively wet soils, provide a stable base for construction, improve stability of structures with shallow foundations, or to reduce hydrostatic pressure to improve slope stability.

Level Spreader

To provide a temporary outlet for dikes and diversions consisting of an excavated depression constructed at zero grade across a slope. To convert concentrated runoff to sheet flow and release it onto areas stabilized by existing vegetation or an engineered filter strip.

Check Dams

Construction of small dams across a swale or ditch reduces the velocity of concentrated flow and dissipates energy at the check dam.

Triangular Silt Dike (Geotextile-Encased Check Dam)

Triangular silt dikes may be used as check dams, for perimeter protection, for temporary soil stockpile protection, for drop inlet protection, or as a temporary interceptor dike.

Protect Drain Inlets

Storm drain inlets operable during construction shall be protected so that stormwater runoff does not enter the conveyance system without first being filtered or treated to remove sediment.

Storm Drain Inlet Protection

To prevent coarse sediment from entering drainage systems prior to permanent stabilization of the disturbed area:

Stabilize Channels And Outlets

Temporary on-site conveyance channels shall be designed, constructed, and stabilized to prevent erosion from the expected flow velocity of a 2-year, 24-hour frequency storm for the developed condition.

Channel Lining

Lining will protect erodible channels by providing a channel liner using either blankets or riprap.

Outlet Protection

Outlet protection prevents scour at conveyance outlets and minimizes the potential for downstream erosion by reducing the velocity of concentrated stormwater flows.

Control Pollutants

All pollutants, including waste materials and demolition debris, that occur on site during construction shall be handled and disposed of in a manner that does not cause contamination of stormwater.

Concrete Handling

Concrete work can generate process water and slurry that contain fine particles and high pH, both of which can violate water quality standards in the receiving water. Concrete handling is intended to minimize and eliminate concrete process water and slurry from entering waters of the state.

Sawcutting and Surfacing Pollution Prevention

Sawcutting and surfacing operations generate slurry and process water that contain fine particles and high pH (concrete cutting), both of which can violate the water quality standards in the receiving water. Collection of this water is intended to minimize and eliminate process water and slurry from entering waters of the State.

Control De-Watering

Foundation, vault, and trench de-watering water shall be discharged into a controlled conveyance system prior to discharge to a sediment pond.

Maintain BMPs

Temporary and permanent erosion and sediment control BMPs shall be maintained and repaired as needed to assure continued performance of their intended function. Maintenance and repair shall be conducted in accordance with BMPs.

Manage the Project

Development projects shall be phased where feasible in order to prevent, to the maximum extent practicable, the transport of sediment from the development site during construction. Revegetation of exposed areas and maintenance of that vegetation shall be an integral part of the clearing activities for any phase.

APPENDIX II. ESTIMATION OF COSTS FOR CONTROLLING SEDIMENT RELEASES AT CONSTRUCTION SITES

EPA described the costs of the Phase II program in Chapter 4 of the economic analysis (U.S. EPA, 1995). This appendix is a summary of that description, and the figures presented come from that document. The costs were divided into 4 categories: municipal costs, construction costs, federal costs and state costs. Each of these was considered separately.

Construction costs:

Construction costs were described in parts 4-8 to 4-25. All the cost calculations are based on 1998 dollar value.

Because the Phase II program targets construction areas of 1 to 5 acres of land, the cost analysis are done for these land sizes. EPA divided the construction costs into two parts. The first part requires the owners and operators of construction sites disturbing one to five acres of land to plan and implement erosion and sediment control BMPs. The second part requires the implementation of post-construction stormwater runoff controls on construction sites located in Phase II municipalities.

Erosion and sediment control costs

EPA developed a national level cost estimate for implementing erosion and sediment controls on sites that disturb between one and 5 acres. EPA estimated a per site compliance cost for sites of one, three, and five acres and multiplied the cost by the total number of Phase II construction starts expected to incur incremental cost in these size categories to obtain a national cost estimate. EPA used construction start data from fourteen municipalities and 1994 Census Bureau construction permit data to estimate the number of construction starts disturbing between one and five acres of land. Of the estimated 129,675 construction starts likely to incur incremental costs, EPA expects that 110,223 (85%) will require erosion and sediment controls to comply with the regulation.

Exhibit 4–4. Summary Characteristics of Municipalities Where Construction Start Data was Collected

Municipality	Population 1996 (Estimates)[1]	Population Growth 1990 to 1996	Median Household Income (1989)	Area (Sq. Mi.)
Austin, TX	541,278	+14.7%	$25,414	217.8
Baltimore County, MD	720,662	+4.1%	$38,837	599.0
Cary, NC	75,676	+70.5%	$46,259	31.2
Fort Collins, CO	104,196	+19.1%	$28,826	41.2
Lacey, WA	27,381	+42.0%	$29,726	10.1
Loudoun County, VA	133,493	+54.9%	$52,064	520.0
New Britain, CT	71,512	–5.3%	$30,121	13.3
Olympia, WA	39,006	+15.6%	$27,785	16.1
Prince George's County, MD	770,633	+5.6%	$43,127	486.0
Raleigh, NC	243,835	+15.0%	$32,451	88.1
South Bend, IN	102,100	–3.2%	$24,131	36.4
Tallahassee, FL	136,751	+9.6%	$34,764	63.3
Tucson, AZ	449,002	+9.1%	$21,748	156.3
Waukesha, WI	60,197	+5.8%	$36,192	17.3
United States	265 million	+6.6%	$35,225	

Source: US Department of Commerce, Bureau of the Census. [http://www.census.gov].
[1] US Census Bureau Data (1996).

Per-Site Compliance Costs: Installation and O&M.

EPA used standard cost estimates from R.S. Means (R.S. Means, 1997a and 1997b) and the WEF database to estimate construction BMP costs for 27 model sites of typical site conditions in the United States. The model sites included three different site sizes (one, three, and five acres), three slope variations (3%, 7%, and 12%), and three soil erosivity conditions (low, medium, and high). EPA used the WEF database to determine BMP combinations appropriate to the model site conditions. For example, sites with shallow slopes and a low erosivity require few BMPs, while larger, steeper, and more erosive sites required more BMPs. Detailed site plans, assumptions, and BMPs that could be used are presented in Appendices B–2 and B–3. Based on the assumption that any combination of site factors is equally likely to occur on a given site, EPA averaged the matrix of estimated costs to develop an average cost for one-, three-, and five-acre starts for all soil erodibilities and slopes.

Exhibit 4–6. BMPs Used for the Model Sites

Site Size (acres)	Soil Erodibility	Slope		
		3%	7%	12%
1	low	a	a,b	a,c,e
	med	a,b	a,c,e	a,c,e
	high	a,c,e	a,c,e	c,e,f,g1
3	low	a,b	a,c,e	c,d,e,f,g2
	med	a,c,e	a,c,e	c,d,e,f,g2
	high	a,c,e	c,d,e,f,g2	c,d,e,f,g2
5	low	a,c,d,e	c,d,e,f,g3	c,d,e,f,g3
	med	a,c,d,e	c,d,e,f,g3	c,d,e,f,g3
	high	c,d,e,f,g3	c,d,e,f,g3	c,d,e,f,g3

a = silt fence
b = mulch
c = seed and mulch
d = stabilized construction entrance
e = stone check dam
f = earthen dike directing runoff to sediment trap
g = sediment trap (1=1,800 cf, 2=5,400 cf, 3=9,000 cf)

Costs related to each BMP and the description of the BMP were shown in Exhibit 4-7 of the original document.

Exhibit 4–8. Estimated Cost of BMPs for the Model Sites (1998 dollars)

Site Size (acres)	Soil Erodibility	Cost by Slope			Average Cost
		3%	7%	12%	
1	low	$317	$814	$1,422	$1,206
	med	$814	$1,422	$1,422	
	high	$1,422	$1,422	$1,799	
3	low	$1,978	$3,804	$6,047	$4,598
	med	$3,804	$3,804	$6,047	
	high	$3,804	$6,047	$6,047	
5	low	$6,245	$9,334	$9,519	$8,709
	med	$6,245	$9,334	$9,519	
	high	$9,334	$9,334	$9,519	

Per-Site Compliance Costs: Administrative.

EPA then estimated administrative costs per construction site for the following elements required under the Phase II rule: submittal of a notice of intent (application) for permit coverage; notification to municipalities; development of a stormwater pollution prevention plan (SWPPP); record retention; and submittal of a notice of termination. The average total administrative cost per site was estimated to be $937.

Exhibit 4–10. Estimated Other Administrative Phase II Construction Costs Per Site (1998 Dollars)

Administrative Requirement	Cost
NOI	$126.50
Municipal Notification	$17.10
SWPPP	$772.25
Record Retention	$4.51
NOT	$17.10
Estimated Total Cost (per site)	$937.46

Summing the average BMP costs and the administrative costs yields a total compliance cost of $2,143 for sites disturbing between one and two acres of land, $5,535 for sites disturbing between two and four acres of land, and $9,646 for sites disturbing between four and five acres of land. To estimate national level incremental annual costs for Phase II construction starts, EPA multiplied the total costs of compliance for one to two acre, two to four acre, and four to five acre sites by the total number of Phase II construction starts within each of those size categories. This yielded an estimated annual compliance cost of approximately $499.8 million (based on 110,223 construction starts in 1998).

EPA anticipates that 19,452 (15%) of the estimated Phase II incremental construction universe will qualify for a waiver from program requirements by meeting one of two conditions. Construction sites can be waived if they are either located in areas with low rainfall potential or if water quality analyses show that there is no need for regulation. EPA estimates the incremental administrative cost associated with preparing and submitting a waiver to be approximately $665,000 (1998). Total costs (national compliance and waiver costs) resulting from implementation of the Phase II erosion and sediment control provision are estimated to be **$500.4 million**.

Exhibit 4–11. Estimated National Phase II Construction Compliance Costs by Climatic Zones for Year 1998 (1998 Dollars)

Climatic Zone	Representative City	Number of Starts 1–2 Acres	Number of Starts 2–4 Acres	Number of Starts 4–5 Acres	Total Starts	Costs for Starts 1–2 Acres	Costs for Starts 2–4 Acres	Costs for Starts 4–5 Acres	Total Costs
A	Portland, OR	1,683	1,471	659	3,813	$3,608,528	$8,141,052	$6,360,054	$18,356,897
B	Boise, ID	1,508	1,345	576	3,429	$3,232,932	$7,443,548	$5,556,280	$16,455,088
C	Fresno, CA	2,388	2,018	974	5,380	$5,118,068	$11,171,812	$9,400,679	$26,039,422
D	Las Vegas, NV	7,154	6,256	3,035	16,445	$15,335,047	$34,628,344	$29,276,500	$80,306,157
E	Denver, CO	1,787	1,613	636	4,036	$3,829,714	$8,928,128	$6,135,764	$18,893,606
F	Bismarck, ND	560	469	156	1,185	$1,199,916	$2,595,370	$1,508,877	$5,304,163
G	Helena, MT	1,067	921	348	2,336	$2,287,796	$5,098,377	$3,354,650	$10,740,823
H	Amarillo, TX	3,295	2,838	1,152	7,285	$7,063,767	$15,708,383	$11,110,516	$33,882,666
I	San Antonio, TX	1,105	960	414	2,479	$2,368,045	$5,314,569	$3,997,033	$11,679,647
K	Duluth, MN	2,957	1,796	326	5,078	$6,339,106	$9,939,565	$3,141,089	$19,419,760
M	Des Moines, IA	9,335	7,599	2,695	19,629	$20,009,581	$42,063,182	$26,002,165	$88,074,928
N	Nashville, TN	5,801	4,707	1,705	12,212	$12,434,357	$26,052,990	$16,445,128	$54,932,475
P	Atlanta, GA	5,157	2,956	1,127	9,241	$11,054,430	$16,364,835	$10,875,252	$38,294,517
R	Hartford, CT	6,909	5,324	2,116	14,348	$14,808,848	$29,468,120	$20,412,901	$64,689,869
T	Charleston, SC	1,194	675	263	2,132	$2,560,342	$3,736,824	$2,535,496	$8,832,662
V	Hawaii	504	423	218	1,145	$1,080,648	$2,340,928	$2,099,447	$5,521,023
W,X,Y	Alaska	22	20	8	50	$47,885	$112,127	$72,563	$232,575
Total		52,426	41,389	16,408	110,223	$112,379,010	$229,108,154	$158,284,394	$499,771,558

Note: Number of sites include only those where storm water BMPs are not currently required by Federal or State programs. Totals may not add because of rounding.

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Exhibit 4–12. Phase II Erosion and Sediment Control Annual Costs

Construction Costs	Universe	Estimated Total National Annual Costs (1998 dollars)
Compliance Costs	110,223	$499,771,558
Waiver Costs*	19,452	$665,064
Total	129,675	$500,436,622

*Based on an engineering assistant's wage of $34.19 per hour. U.S. Department of Labor, 1996.

EPA also estimated incremental costs attributable to the post-construction runoff control measures. The Phase II municipal program requires municipalities to develop, implement, and enforce a program that addresses stormwater runoff from new development and redevelopment sites on which land disturbance is greater than one acre and that discharge into a regulated MS4. To develop a cost estimate associated with this measure, EPA estimated a per site BMP cost, including operation and maintenance, for 12 model sites of varying size (1, 3, 5, and 7 acres) and imperviousness (35%, 65%, and 85%). The per site BMP cost was then multiplied by the total number of multi-family, institutional, and commercial construction starts that are located in Phase II urbanized areas to obtain a national cost estimate. Using this total of 13,364 postconstruction starts, EPA estimated a range of national costs associated with this measure from $44.6 to $178.3 million (see Appendix B–4). EPA estimates total annual costs to construction operators, including implementation of erosion and sediment controls and post-construction controls, to be between **$545.0 – $678.7 million.**

Exhibit 4–15. Estimated Post-Construction Runoff Control Costs

Area	35% Impervious (Multi-Family Residential)	65% Impervious (Multi-Family/ Commercial/ Institutional)	85% Impervious (Commercial)	Total Cost (1998 dollars)
1 Acre	$503,163	$14,318,035	$25,530,478	$40,351,676
3 Acres	$1,486,961	$29,571,535	$29,588,931	$60,647,426
5 Acres	$2,001,641	$11,835,630	$9,151,038	$22,988,309
7 Acres	$3,863,272	$23,910,571	$26,494,414	$54,268,258
Total Cost	$7,855,037	$79,635,771	$90,764,861	$178,255,669

Summary of results of the total costs of the phase II program are shown below:

Exhibit 4–21. Potential Annual Costs for Phase II Storm Water Regulation

Phase II Element	Universe	Estimated Total National Annual Costs (1998 dollars)
Municipal	32,458,000 Households	$297,318,623
Construction	129,675 Erosion & Sediment Control Starts and 13,364 Post-Construction Starts	$545,000,539 – $678,692,291
Federal and State	53 States and Territories	$5,318,668
Total		$847,637,830 – $981,329,582

Reduced Sediment Delivery From Construction Starts:

To estimate reduced sediment delivery from Phase II construction starts, the US ACE developed a model based on EPA's 27 model sites to estimate sediment loads from construction starts with and without Phase II controls (US ACE, 1998). The US ACE model uses the construction site version of the Revised Universal Soil Loss Equation (RUSLE) to generate sediment delivery estimates for 15 climatic regions with each of the following variations: three site sizes (one, three, and five acres), three soil erodibility levels (low, medium, and high), three slopes (3%, 7%, and 12%), and the BMP combinations from EPA's 27 model sites. The 15 climatic regions represent the various rainfall and temperature conditions throughout the United States. Sediment delivery represents the quantity of sediment that BMPs placed at the base of the hill slope are unable to capture. EPA estimated that the average reduction in soil loss from the model sites implementing BMPs would be 89.6 tons per site. (Calculations in Exhibit 4-24)

To determine the reduction in soil loss using the estimated 80% effectiveness rate, EPA multiplied the weighted average soil loss per start (89.6 tons) by 80%. This resulted in an estimated reduction in soil loss of 71.7 tons per site. Multiplying this reduction by the 110,223 construction starts expected to implement erosion and sediment controls for the year 1998, results in an estimated 7.9 million ton reduction in soil loss annually.

Exhibit 4–25. National Reduction Estimates for Municipalities and Construction Starts (tons/year)

Phase II Element	20% Reduction	80% Reduction
Municipal TSS Loading	639,115	4,062,815
Soil loss from Construction Sites	1,975,196	7,900,785

Summary

EPA has not presented the total cost of prevention of sediments leaving the site per ton of the sediment. ES.11 (in executive summary) describes only the costs effectiveness related to the Municipal TSS loading reduction. It seems that by a simple

calculation from the two former exhibits (4-24 and 4-25) that the total cost assuming 80% reduction in the sediments would be between $69 - $86 per ton of sediment.

014085

NPDES Stormwater Cost Survey

Prepared For:

California State Water Resources Control Board

Prepared by:

Office of Water Programs
California State University, Sacramento

January 2005

Includes Appendix H:

Alternative Approaches to Stormwater Control

Prepared by:

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Contract: 02-189-250-0

NPDES Stormwater Cost Survey
Final Report

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EXECUTIVE SUMMARY

This report is funded by the California State Water Resources Control Board under contract 02-189-250-0, "Survey of Costs to Develop, Implement, Maintain and Monitor Municipal Separate Storm Sewer System (MS4) Storm Water Management Programs and Description of Alternatives for Control of Stormwater Quality in Los Angeles County."

BACKGROUND

The current costs to implement best management practices (BMPs) have been the basis for lawsuits and petitions challenging the California stormwater regulatory program. Additionally, some permittees contend that current MS4 permits necessitate the use of advanced water treatment to meet water quality standards, which would drastically escalate costs above current levels. This contention is presented in the report titled "An Economic Impact Evaluation of Proposed Storm Water Treatment for Los Angeles County" (Gordon, 2002). This project addresses these issues through two tasks.

Task A – Documenting Stormwater Program Costs

Five California municipalities and one metropolitan area with stormwater programs that are demonstrating meaningful progress toward maximum extent practicable (MEP) compliance as identified by Regional Water Quality Control Board (RWQCB) staff were surveyed for the most recent stormwater compliance costs. Demonstrating meaningful progress is defined in this report as implementing activities specifically presented in the Storm Water Management Plans (SWMPs). Because permits use an iterative approach that increases requirements until water quality objectives are met, current levels of implementation may not be the ultimate MEP standard. This report does not address the benefits of permit compliance activities. Some scenarios addressing ultimate compliance cost are addressed in Task B. Task A was accomplished by the Office of Water Programs (OWP) at California State University, Sacramento (CSUS).

Task B – Alternative Approaches to Stormwater Quality Control

Task B is an assessment of regulatory policy to determine the intent of stormwater regulation regarding advanced treatment. Alternatives for stormwater quality control that are believed to comply with the intent of the regulations are described. Costs were estimated for the Los Angeles Regional Water Quality Control Board (LARWQCB) area. Task B was accomplished by the University of Southern California (USC) and the University of California at Los Angeles (UCLA).

RESULTS

Cost Survey (Task A)

Annual cost per household for the six stormwater programs surveyed ranged from $18 to $46, as seen in Table 1.

EXECUTIVE SUMMARY

Table 1. Stormwater Costs per Household for the California Cost Survey (Task A)

Municipalities	Municipality Description	Cost/Household ($)
City of Encinitas	Coastal tourism, small city	46
City of Fremont	Bay Area, moderately integrated countywide program	45
City of Santa Clarita	Tourism and industrial	39
City of Corona	Industrial	32
City of Sacramento	Pumped stormwater, large city	29
Fresno-Clovis Metropolitan Area	65-90% infiltration, fully integrated multi-city program	18

The Fresno-Clovis Metropolitan Area (FCMA) had substantially lower cost per household. The following factors are thought to contribute to the FCMA costs limit costs being lower than the other survey results:

- flood control and stormwater quality basins are combined,
- land was set aside for water projects,
- climate helps infiltration due to infrequent storms and low annual rainfall,
- lower land cost compared to other cities,
- FMFCD owned land needed for basins prior to storm water permits requirements,
- topography lends to drainage of urban areas to post-construction BMPs, and
- highly permeable soils allow extensive use of infiltration.

These factors are unique or more prevalent for FCMA than for the other cities surveyed. Excluding the FCMA as an ideal situation, the range of cost is $29 to $46 per household.

The results of the survey are compared to values from the USEPA report "Economic Analysis of the Final Phase II Stormwater Rule." This report contains a summary of costs from two separate efforts to estimate Phase II cost per household. The first is the results of a survey stormwater costs for 56 Phase II municipalities performed by the National Association of Flood and Stormwater Management Agencies (NAFSMA). The NAFSMA survey represents the six minimum measures of the Phase II regulations because two measures seemed to have been combined: 1) Public Education and Outreach and 2) Public Involvement and Participation.

The second effort presented in the USEPA report is the results of a review by USEPA of annual stormwater reports from 26 Phase I municipalities. These municipalities were chosen were smaller Phase I cities, were nearly in the first permit term, and had reported cost in their annual reports. The California survey results for the cost categories corresponding to the six minimum measures were extracted to compare to the NAFSMA survey and the EPA review. The results of this comparison are in Table 2.

EXECUTIVE SUMMARY

Table 2. Stormwater Costs per Household for Six[1] Minimum Measures from the California Survey, the NAFSMA[2] Phase II Survey, and the USEPA review of Phase I Annual Reports (USEPA, 1999)

Study	Median (50%) ($)	Mean ($)	Max ($)
Adjusted California Survey[3]	24	26	35
NAFSMA Phase II Survey[4]	4.63	10	61
EPA Phase I Survey[5]	3.16	10	67

1. Public Education and Outreach and Public Involvement and Participation were assumed combined for the NAFSMA survey.
2. NAFSMA: National Association of Flood and Stormwater Management Agencies
3. Based only on costs from cost categories that correspond to the six minimum measures
4. NAFSMA survey based on 56 Phase II respondents to a survey on stormwater costs for five minimum measures. Values adjusted to 2003 dollars.
5. EPA results based on a review of 26 annual reports for smaller Phase I cities that were nearly in their first NPDES term so that costs would be more representative of Phase II programs. Values adjusted to 2003 dollars.

In some cases, programs in the California survey appeared to go beyond the minimum requirements of the permit. The cost of this additional effort was not included when it could be identified or estimated, such as street sweeping in Sacramento that was above the permit required frequency. Including the total cost of the street sweeping program the cost per household for Sacramento would increase $1.69. In some cases the additional effort could not be estimated. This was particularly true when stormwater activities were combined with activities that occurred more frequently than the permit requirement for the stormwater activities, such as when stormwater construction inspections for Santa Clarita were performed at every construction permit inspection and these permit inspections occurred more frequently than the permit requirement.

Description of Alternatives for Control of Stormwater Quality (Task B)

The alternatives for control of stormwater quality focus on source control and runoff reduction. The principle strategy for runoff reduction is by infiltration and evapotranspiration, using common BMPs. Based on this approach, costs for two scenarios are estimated for the area under LARWQCB jurisdiction. One scenario assumes source control BMPs are sufficient to comply with regulations. The other scenario assumes treatment using wetlands and infiltration basins. Two costs were estimated for the treatment scenario based on two different sources of unit costs. These scenarios do not include advanced treatment costs. Equivalent annual costs per household were calculated to compare to cost estimates from other studies. Table 3 compares the cost estimates of the two scenarios to the estimated current stormwater cost for the Los Angeles area.

Current level of effort in the Los Angeles area has only made limited progress in implementing the scenarios described in Task B (Devinny, 2004). If there are cases where discharge from these BMPs still requires advanced treatment, the cost of stormwater treatment would be much less than if advanced treatment was solely used because runoff reductions would reduce the size of treatment plant requirements.

EXECUTIVE SUMMARY

Table 3. Equivalent Cost Per Household For Task B Alternatives

Cost Scenario for the Los Angeles Area	Equivalent Annual Cost, $/household
Current Effort	18
Alternative to Advanced Treatment: Pollution Prevention Scenario (Present worth 2.8 billion)[1]	27
Alternative to Advanced Treatment: Wetlands and Infiltration Basins Scenario, calculated using cost per area (Present worth 5.7 billion)[1]	55
Alternatives to Advanced Treatment: Wetlands and Infiltration Basins Scenario, calculated using cost per capture volume (present worth 7.4 billion)[1]	71

1. Little progress has been made in implementing these scenarios (Devinny, pers. comm., 9/14/04). These costs may be added to the current effort if existing programs continue to be required. Costs based on Devinny et. al. (Appendix H), see Table G-6 for equivalent annual cost calculation.

Table 4 compares several cost estimates in terms of equivalent annual cost per household.

Table 4. Equivalent Annual Cost per Household Comparisons between California Cost Survey Results and Los Angeles Area Future Cost Estimates[1]

Range of Current Cost from the California Survey		Range of Cost Estimates for Alternatives for Control of Stormwater Quality[2]		Maximum TMDL Estimates[3]		Statewide Clean Water Willingness To Pay[4]
				Ballona Creek Metals	L.A. River Trash	
18	46	27	71	75	141	180

1. Calculations are presented in Appendix G and are based on the following sources for each column respectively: survey results in Section 9, Devinny et al (Appendix H), RWQCB, Los Angeles (2004), LARQCB (2001), and Larsen and Lew (2003).
2. Calculated from Task B in Appendix H. Low range is the cost for attaining full compliance using only source control. High range is the cost for attaining full compliance using only treatment BMPs (low tech) estimated on capture volume. It is estimated that this is in addition to the current level of spending in the Los Angeles area.
3. TMDL costs apply to all sources, not just MS4 stormwater sources.
4. Responses were not received from 40% of the mailed surveys. The survey question was for restoring water quality for all waters throughout the state from all impairment, not just within a city or region and not just for impairment from stormwater pollution.

The costs developed by Gordon et al. (2002) were based on capture, collection and advanced treatment of various percentages of the annual runoff volume. An annual runoff capture volume of 70 percent (0.5-inch storm) was selected to compare to the Los Angeles Standard Urban Stormwater Mitigation Plan (SUSMP) capture standards of around 85 percent (0.75-inches). Unfortunately, the next highest capture volume analyzed by Gordon was the 1.25-inch storm. The resulting equivalent annual cost per household using the 0.5-inch storm and assuming a treatment scenario of 65 large regional treatment plants is $459/household. This cost only estimates cost that the cities in Los Angeles County would incur, so they may not directly comparable to the total watershed costs developed in the Total Maximum Daily Load (TMDL) plans because TMDL costs are not restricted to stormwater quality control.

Since some advanced treatment may be required, the future cost will lie between the alternative scenarios estimate and the advanced treatment estimate. Based on the assumption used by the Devinny study, future costs for the Los Angeles area appear to hinge on the ability to reduce stormwater runoff volumes and on the ability to control pollutants through source control.

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This report is funded by the California State Water Resources Control Board (SWRCB) under contract 02-189-250-0, "Survey of Costs to Develop, Implement, Maintain and Monitor Municipal Separate Storm Sewer System (MS4) Storm Water Management Programs and Description of Alternatives for Control of Stormwater Quality in Los Angeles County."

1.1 BACKGROUND

The 1987 amendments to the federal Clean Water Act (CWA) added Section 402(p), which defined stormwater discharges from industrial activities and municipal systems as point sources subject to the National Pollutant Discharge Elimination System (NPDES) Permit Program. The CWA directed the United States Environmental Protection Agency (USEPA) to publish regulations to define the discharges subject to NPDES permits and to establish a framework for regulating these discharges. The stormwater regulations promulgated by USEPA established a two-phase approach for municipal systems. The first phase began in 1990 and addressed discharges from (MS4s) that serve populations greater than 100,000 people. The second phase began in 1999 and addressed discharges from MS4s that serve populations less than 100,000 and are located in urbanized areas. The State Water Resources Control Board and the Regional Water Quality Control Boards (RWQCBs) can apply the Phase I or Phase II rules to areas with smaller populations as needed to protect water quality.

The CWA and federal stormwater regulations require MS4s subject to NPDES permits to reduce the pollutants in stormwater discharges to the maximum extent practicable (MEP). The regulations require the implementation of best management practices (BMPs) to meet the MEP discharge standard. BMPs include both source controls and treatment measures. MS4s are to implement an effective combination of these BMPs to reduce pollutants in stormwater discharges. In California, MS4 permits also require permittees to reduce the discharge of pollutants so that water quality standards are met. However, the permits do not specify strict compliance with numeric water quality standards. Rather, the MS4 permits require the compliance with standards through an iterative approach. Permittees implement BMPs according to storm water management plans. (If the current level of effort does not achieve water quality standards, additional BMPs are implemented until compliance has been achieved).

The current costs to implement BMPs have been the basis for lawsuits and petitions challenging the California stormwater regulatory program. Additionally, some permittees contend that current MS4 permits necessitate the use of advanced water treatment to meet water quality standards, which would drastically escalate costs above current levels (Gordon, 2001). Neither the USEPA nor the SWRCB has estimated costs for the development and implementation of MS4 stormwater programs to achieve MEP. The SWRCB and RWQCBs wish to respond to the contention that the intent of the California stormwater program is to require all stormwater discharges to be treated with advanced treatment devices. This project addresses these issues through two tasks.

Task A – Documenting Stormwater Program Costs

Documenting costs of a subset of California MS4 stormwater programs that were identified by RWQCB staff as demonstrating meaningful progress toward MEP compliance will aid in approximating costs of permit compliance statewide. Making meaningful progress is considered implementing activities specifically presented in the SWMPs. Stormwater program expenditures by those municipalities were compiled. The cost data was analyzed and normalized to identify potential cost factors that can be used to estimate costs for other municipalities to achieve permit compliance. Although compliance with construction and industrial permits is discussed in stormwater permits, the compliance costs for these permits are not included in this report. This report does not address the benefits of permit compliance activities[1].

Only municipal costs are documented; total societal costs are not. There are additional costs borne by developers (passed onto homeowners), businesses, industries and residents that are not addressed in Task A. The Task A was accomplished by personnel from the Office of Water Programs at CSUS.

Task B – Alternative Approaches to Stormwater Quality Control

Task B is an assessment of regulatory policy to determine the intent of stormwater regulation regarding advanced treatment. Alternatives for stormwater quality control that are believed to comply with the intent of the regulations are described and costs are estimated for the Los Angeles Regional Water Quality Control Board (LARWQCB) area. The intent of the regulation was determined by speaking with LARWQCB staff and reviewing past regulatory action. Task B was accomplished by faculty from the University of Southern California and the University of California Los Angeles. This task assumes the MS4 permitting process as it stands presently, using an iterative process of enhancing implementation of BMPs. This scenario may overlap with the Total Maximum Daily Load (TMDL) process, but it is not necessarily the same since the TMDL process address pollution sources other than stormwater.

1.2 REPORT ORGANIZATION

Task A is addressed in Sections 2 through 9. Section 2 presents the methodology for gathering, analyzing, and presenting cost information. Sections 3 through 8 present the NPDES-related stormwater costs and other relevant characteristics for the six municipal areas surveyed. The raw cost data and description of how program costs were developed are shown in Appendices A through F. In Section 9, normalized costs for each major stormwater program element are presented and compared between cities. Explanations for the observed differences are also offered. Appendix G contains the backup calculations for Section 9. Section 10 presents

[1] A subcommittee of the California Stormwater Quality Association (CASQA) is working on developing guidelines for program effectiveness evaluation, which has an ultimate goal of quantifying changes in receiving water quality (the benefit) due to stormwater activities.

recommendations for further cost reporting and analysis. References are in Section 11. Task B is included as Appendix H.

The method for data collection, organization, and quality evaluation is presented in this section. Data sources are also described. Methodology and assumption for Task B are reviewed in the Executive Summary of the report found in Appendix H.

2.1 TECHNICAL ADVISORY GROUP

A technical advisory group (TAG) was formed to assist in the execution of this project. The TAG was comprised of one representative from USEPA, one from RWQCB, three from universities not associated with executing the study, one consultant, and one representative from the California Stormwater Quality Association (CASQA)[2]. TAG members reviewed and commented on each major phase of the study, including the initial city selection, initial scope of the study, initial results from the first city, and the interim draft report. A description of the TAG and their comments are included in Appendix K. The TAG did not review the work done for Task B (Appendix H).

2.2 CITY SELECTION

The following criteria were used in the selection process:

- nominated by RWQCB staff as having a good stormwater program,
- a variety of geographic and hydrologic areas within California,
- have a stormwater fund or equivalent that required the cities to track stormwater costs,
- a variety of populations, with at least one city below 100,000, and
- a variety of income per population or household.

Initial nominations and selection recommendations were presented in a memorandum to the SWRCB (Appendix I). Subsequent discussion with cities and RWQCB staff refined the list. One nominee, Corona, was considered after the memorandum was submitted. All the cities nominated for the inland area of Southern California were not able to participate, so the RWQCB then nominated Corona. Corona was not initially considered because of a lack of familiarity with the progress of their stormwater program. Subsequent review established Corona as a nominee.

The following municipalities were selected and agreed to participate in the cost survey:

- Corona
- Encinitas
- Fremont
- Fresno-Clovis Metropolitan Area
- Sacramento
- Santa Clarita

[2] CASQA is a non-profit organization with mostly municipality membership. CASQA advises the California SWRCB on stormwater issues.

The locations of the participating municipalities are shown in Figure 2-1.

2.3 COST SURVEY CATEGORIES

The Cost Survey Categories were based on the USEPA six minimum measures for Phase II stormwater programs because cities often report cost in annual reports for several of these categories (http://cfpub.epa.gov/npdes/stormwater/menuofbmps/menu.cfm). The six categories initially considered in this study were:

- Public Education and Outreach,
- Public Involvement and Participation,
- Illicit Discharge Detection and Elimination (a.k.a. Illicit Connection and Illicit Discharge),
- Construction Site Stormwater Runoff Control,
- Post Construction Stormwater Management in New Development and Redevelopment, and
- Pollution Prevention and Good Housekeeping for Municipal Operations.

Figure 2-1. Location of Municipal Areas Selected for the Cost Survey

For several cities, Public Education and Outreach and the Public Involvement and Participation costs were not tracked separately. Consequently, differentiating costs between these two categories was often impractical. For these cities, these costs are reported in a "Public Education, Outreach, Involvement, and Participation" category.

Review of the stormwater permits of the selected cities and consultation with SWRCB staff resulted in these additional categories:

- Industrial and Commercial Management Programs,
- Overall Stormwater Program Management,
- Water Quality Monitoring, and
- Watershed Management.

The industrial and commercial management programs were combined because most of the selected cities did not differentiate between the costs associated with industrial sites and commercial sites.

The Watershed Management category includes costs associated with participation in total maximum daily load (TMDL) development processes and watershed management addressing

303(d)[3] pollutants. Most of the cities are not actively implementing TMDLs and costs reported in this category do not include TMDL implementation activities. Furthermore, existing TMDLs suggest stormwater compliance will be through enhancement to current permit compliance activities such as post-construction BMPs.

2.4 IDENTIFYING NEW, EXISTING, AND ENHANCED COSTS

All costs were identified as new, existing, or enhanced according to the extent that the activities existed before the first stormwater permit. New costs are for activities that are exclusively a result of compliance efforts with the stormwater permit. Existing costs are for activities that predated stormwater permits. Enhanced costs are for existing activities that were increased due to permit requirements. Enhanced costs are the total cost for impacted activities. It is not the increase in cost due to permit requirements. This number would have to be developed from 1990 baseline costs, and this is beyond the scope of this project.

2.5 DATA COLLECTION

Because costs for the 2003/2004 fiscal year were not available at the start of this survey, costs for the 2002/2003 fiscal year were collected.

Initially, a questionnaire was developed to facilitate the data collection effort. Questions were developed to capture cost data and descriptions of the stormwater program activities for each city. The questionnaire was organized by cost category and included questions for individual activities or BMPs within each cost category. The questionnaire was given to the city of Sacramento as a test case, but it proved difficult to use as the cost information and description of activities/BMPs available to city staff did not match well with those in the questionnaire. Consequently, the questionnaire was abandoned as the primary data collection tool, though it was shared with other cities as a guide to help staff understand what type of information was being sought.

The data collection methodology is depicted in Figure 2-2. City staff members were contacted by email and with follow-up telephone conversations in which the purpose and scope of the study were described. As mentioned above, a copy of the questionnaire was sent as guidance material. City staff then submitted cost and activity data in whatever format was available. The documents that usually contained the most useful information were the city's annual stormwater report, cost spreadsheets submitted by city staff, the NPDES stormwater permit, and SWMPs, or Stormwater Quality Improvement Plans (SQIPs), or Drainage Area Master Plans (DAMPs).

The next step was to fit the information provided into the cost survey categories. This wasn't always straightforward as there were significant differences among cities in the format and

[3] The term 303(d) pollutants are used here to describe the pollutants in specific waters for which TMDLs are being developed according to Section 303(d) of the CWA.

content of annual stormwater reports. For example, the annual stormwater report for one city was divided into two separate submittals, each covering one half of the year. The study team combined data from each section to represent the whole year. In another example, the annual stormwater reports of two cities did not contain costs. In these cases, cost and activity data was assembled from multiple alternate sources. After working through a variety of reporting formats, costs were allocated among the cost survey categories and entered into tables similar to Table 2-1. These tables were returned to the surveyed cities to give them an opportunity to comment on the allocation of costs. Follow up inquiries were also made when data was incomplete or missing. Data collection, cost allocation, and coordination with the surveyees' continued until all substantial questions were answered. Coordination with city staff members usually resulted in adjustments that more accurately accounted for those stormwater activities related to permit compliance.

Table 2-1. Example of Cost Information Collected for Each Cost Survey Category

Cost Category: Construction Site Stormwater Runoff Control[1]

Activity Names	External Contract	Relation to Permit[2]	Dollar Amount	Activity Statistics	Notes or Units	
Activity 1						
Activity 2						
Activity 3						

1. This example format was repeated within the table for the other cost categories.
2. This column indicates whether required activities were being performed prior to stormwater permits. In some cases activities were enhanced due to permit requirements.

Information was also collected on cost factors that might explain observed differences in costs. These factors were used to "normalize" costs by dividing the cost by the cost factors (activity statistics). Some cost factors were physical characteristics such as population or area. These were collected from census sources, city websites, and through personal communication. Others cost factors, such as number of construction site inspections, reflected stormwater program activities. Cost factors specific to individual activities or cost categories were found in the annual stormwater reports or reported in personal communications from city staff. Identical cost factors were not available for every city because cities often tracked accomplishments differently. For example, one city counted miles of drainage channel cleaned while another measured the weight of trash and debris removed during channel cleaning. As with the costs, the activity statistics were verified by city staff before being entered into tables similar to Table 2-1 under the "Activity Statistics" column.

The TAG suggested that certain fines and penalties from enforcement of ordinances relating to stormwater compliance are available to offset the cost of stormwater programs. Examples include parking tickets to accommodate street sweeping, fines for littering, construction practice violations, commercial facility operations, etc. The net revenue associated with enforcement of city ordinances that support stormwater activities was not available, partly because the cost of enforcement and penalty collection by the municipalities for stormwater violations is not known. Regardless, this does not change the cost of compliance; enforcement only seeks to identify alternative funding sources.

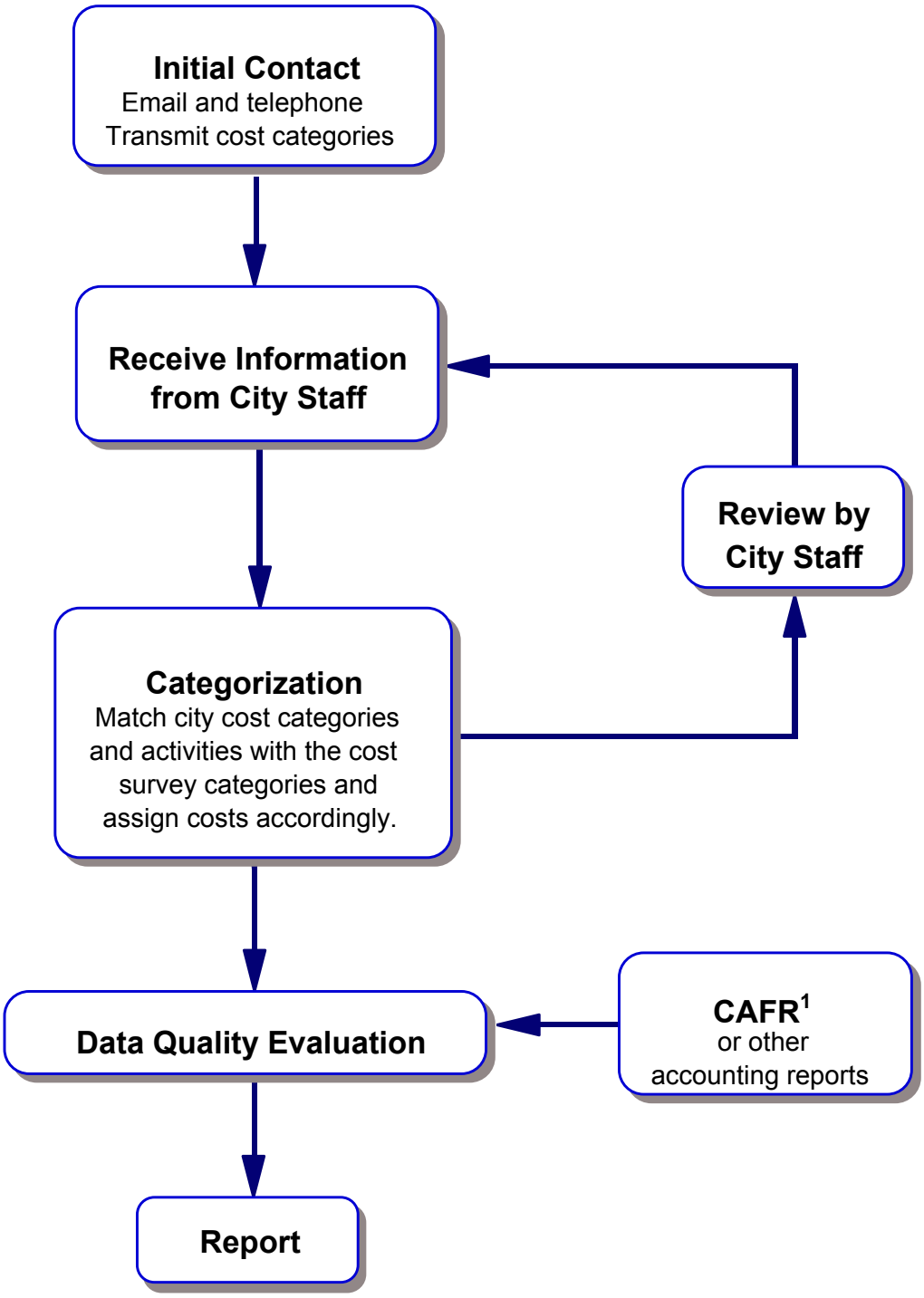

1. CAFR: Comprehensive Annual Financial Report

Figure 2-2. Data Collection Methodology Flow Chart

2.6 DATA QUALITY EVALUATION

After data collection, an assessment was made to assign an appropriate level of confidence in the data. The following confidence levels and criteria were used:

High – Costs were submitted in the form of reports generated by city accounting systems.

Moderately High – Costs were submitted in spreadsheets or other written form and could be checked against stormwater cost entries in the city's Comprehensive Annual Financial Report[4] (CAFR), or other accounting system reports. If a city has established a fund to account for stormwater related financial transactions, confidence was determined by comparing the cost figures found in the CAFR (or accounting system reports) and the data submitted by city stormwater staff. The costs reported in the CAFR should not be less than the staff-reported costs because the CAFR may include costs for stormwater activities not required for permit compliance. If costs submitted by stormwater staff were higher than reported CAFR costs, the inconsistency reduces the level of confidence in the data and casts doubt on the accuracy of the submitted costs.

Moderate – Costs were submitted in spreadsheets or other written form, but comparisons with CAFR stormwater funds or other accounting system reports could not be made.

Low – Costs were submitted verbally through personal communication or major costs for required programs were not available or estimated.

The goal of the data evaluation process was to assign a single confidence level to a city's overall data set. In most cases all of the data submitted by city staff received the same level of confidence because the sources were similar in nature. Where there were differences in data quality because of different data sources, the overall quality was based on the quality of the data representing the majority of the costs. A judgment was also made on the completeness of the data. For example, if major costs are missing, the confidence would be low even though the quality of the data submitted might be high. A commentary on data quality is included in the report sections corresponding to each of the cities surveyed.

2.7 INHERENT LIMITATIONS

As in all cost surveys, this study contains some inherent limitations. The most important of these is the almost complete dependence by the study team on the city staff members to assure the accuracy and completeness of the data provided. While some checks were made against alternate sources (e.g., the CAFRs) and common sense, it was outside the scope of this project for the study team to independently check the quality of each city's stormwater accounting information. Errors can creep into any exercise of this kind. Inherent in the process of recording data are data entry errors such as mistyped numbers. Though unintentional, these errors are

[4] A CAFR is an annual report provides information regarding all funds and account groups under the jurisdiction of a government reporting entity.

sometimes not identified and resolved. Another potential source of error is an incomplete record. Sometimes things are forgotten and overall data quality suffers.

The study team thanks the staff members of the participating cities for their efforts to assure that the data provided are as correct and complete as possible. What errors may have crept into the data are certainly unintentional, and are not believed to be large enough to affect the major findings of the study.

2.8 DATA COMPARISONS TO OTHER STUDIES

A review of literature revealed several sources of cost information throughout the United States. The primary sources reviewed were the Rouge River Watershed project in Michigan, the National Association of Flood and Stormwater Management Agencies (NAFSMA) survey of Phase II municipalities, and the USEPA review of Phase I costs (USEPA, 2004). These costs are discussed in Section 9.6.

The city of Corona is a moderately-sized city located inland in southern California with a population of 124,966 (www.census.gov). It is traditionally an agricultural city. The city is in the Santa Ana River watershed at the junction of State Route 91 and Interstate 15. The stormwater program is coordinated by personnel from the Department of Public Works. Descriptive characteristics for Corona are shown in Table 3-1. Primary personal communication was with Michele Colbert from the city of Corona. The city of Corona costs for 2002/2003 were for complying with their 2002 stormwater permit (RWQCB, Santa Ana, 2002).

Table 3-1. Select Characteristics of the City of Corona

Description	Characteristic	Reference
Mean Income Per Person, $	21,001	www.census.gov
Area, (sq. miles)	35	www.census.gov
Population	124,966	www.census.gov
Curb Miles Swept	20,877	Colbert, pers. comm., 3/12/04
Active Construction Sites	41	Colbert, pers. comm., 3/12/04
Industrial and Commercial Sites	3,050	Colbert, pers. comm., 3/12/04
Households	39,271	www.census.gov
City Actual General Fund Revenue, $	78,413,063	Corona, 2003a.
Annual Rainfall (cm)	29	www.wrcc.dri.edu
Years Since Incorporation	108	www.ci.corona.ca.us

3.1 DATA SOURCES

The following describes the information available from the data sources.

Cost Spreadsheets Submitted by City Staff

A spreadsheet was provided from the city of Corona, which included labor and direct cost information for their stormwater program broken down into different categories by activity (Appendix A, Table A-2). This spreadsheet contained the majority of the city's stormwater program cost. Also, spreadsheets containing cost and other data were submitted for street sweeping and hazardous materials pick-up such as spills from vehicles involved in accidents. (Appendix A, Tables A-10 and A-11).

City of Corona Santa Ana Watershed Annual Reporting Forms 2002/03

This report provided activity statistics (e.g. curb miles swept) for various city stormwater programs. These statistics were used to normalize costs to allow comparison with other cities.

Personal Communication: Interviews, Phone Calls, E-Mail

Personal communication with city of Corona staff provided additional stormwater program costs that augmented the data submitted in their cost spreadsheet. Through personal communication, city staff elaborated on what was accomplished for each cost submitted in their spreadsheet and commented on the allocation of costs among the cost survey categories.

Comprehensive Annual Financial Report (CAFR) 2002/03

The city of Corona has not established a fund to account for overall stormwater transactions, therefore no cost comparisons were made to CAFR figures.

Santa Ana Regional Drainage Area Management Plan (SAR-DAMP) 1993

This document describes the overall stormwater management strategies planned by the municipalities in the Santa Ana drainage area of Riverside County (Corona SAR-DAMP). While no cost figures were obtained from this document, it was used to verify that an activity was required by the permit.

3.2 COST DATA SUMMARY

Table 3-2 summarizes the costs for each survey category. Figure 3-1 shows the relative distribution of costs among the categories. Stormwater staff labor costs were not distributed among survey categories, but were 100 percent allocated to the Overall Stormwater Program Management category. This will make Overall Stormwater Program Management costs appear higher compared to cities that allocate stormwater staff costs to their various programs. According to city staff, the industrial stormwater program is just getting started so costs of that program probably do not represent a mature industrial program (Colbert, personal communication, 3/12/04).

Table 3-2. City of Corona Cost Assigned to Cost Survey Categories

Cost Survey Category	*Costs ($)*
Construction Site Stormwater Runoff Control	53,382
Illicit Discharge Detection and Elimination	20,628
Industrial and Commercial Management Programs	89,916
Overall Stormwater Program Management	317,800
Pollution Prevention and Good Housekeeping for Municipal Operations	720,222
Post Construction Stormwater Management in New Development and Redevelopment	13,509
Public Education, Outreach, Involvement, and Participation	28,409
Water Quality Monitoring	7,000
Watershed Management	0
Total	**1,250,866**

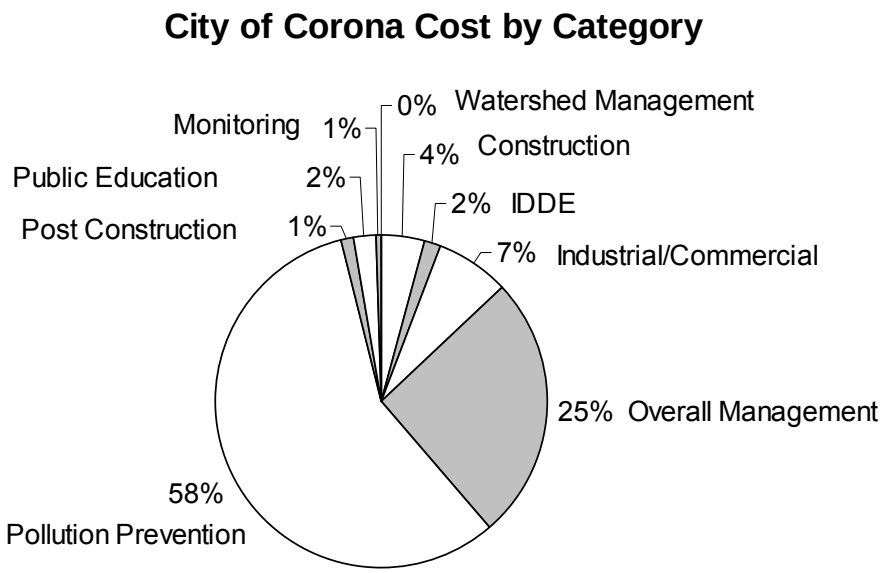

Figure 3-1. Distribution of Corona Stormwater Costs among the Cost Survey Categories.

3.2.1 Discussion of Costs for Each Survey Category

This section presents the major activities for each cost survey category. Further cost breakdown and calculations for each survey category are included in Appendix A. The costs for each survey category are discussed in this section in alphabetical order.

Construction Site Stormwater Runoff Control

The construction program cost was $53,382, which was 4 percent of total stormwater cost. The construction program oversaw 41 active construction sites and performed 564 inspections (Colbert, personal communication, 3/12/04). Including the cost for vehicles, phone usage, training, and stormwater staff labor, the average cost was $95 per inspection and $1,302 per active construction site.

Illicit Discharge Detection and Elimination (IDDE)

The IDDE program cost was $20,628, which was 2 percent of total stormwater cost. The largest cost attributed to this program was for the stormwater share of inspections performed by wastewater staff. The average cost per inspection was $157. Also, new development illicit connection inspections were conducted, which added to the cost of this program (Colbert, personal communication, 3/12/04).

Industrial and Commercial Management Programs

The industrial and commercial program cost was $89,916, which was 7 percent of total stormwater cost. The industrial program had 600 inspections at an average cost of $134 per inspection.

Overall Stormwater Program Management

The overall management program cost was $317,800, which was 25 percent of total stormwater cost. The city was unable to distribute the staff cost among the cost survey categories so all of the stormwater staff cost was assigned to this category. Administrative service charges account for 25 percent of this category's cost. The staff costs represent approximately 62 percent of the costs assigned to this category and 16 percent of total stormwater cost. The remaining 23 percent are for office supplies, reporting, and NPDES fee.

Pollution Prevention and Good Housekeeping for Municipal Operations

The municipal operations program cost was $720,222, which was 58 percent of total stormwater cost. The two primary activities in this category were street sweeping and drain line/channel cleaning. The average cost was $20 per curb mile swept and $8 per linear foot of drain lines and channels cleaned. Street sweeping and drain line and channel cleaning account for 33 percent and 20 percent of total stormwater cost respectively. City staff labor associated with these activities is reported in this category.

Post Construction Stormwater Management in New Development and Redevelopment

The post construction program cost was $13,509, which was 1 percent of total stormwater cost. Post construction cost was primarily for professional consulting services for BMP selection. Also, installation and maintenance of 8 storm drain inlet inserts cost $4,500, averaging $562 per insert per year.

Public Education, Outreach, Involvement, and Participation

The public education program cost was $28,409, which was 2 percent of total stormwater cost. Public education and outreach activities often incorporated public involvement and participation activities. This made differentiating cost between the categories impractical. Because of this, the two programs were combined.

Water Quality Monitoring

The monitoring program cost was $7,000, which was 0.6 percent of total stormwater cost. This cost was associated with the illicit discharge detection and elimination program.

The city of Corona did not allocate any cost to this category. The effort was captured under other programs such as Overall Stormwater Program Management.

3.3 CONFIDENCE IN THE DATA

For the city of Corona, confidence in the data was moderate because most of the cost data submitted was via spreadsheets built, maintained, and updated by the city. However, as with most of the cities selected, the program costs provided could not be verified by city accounting system reports.

Since the city did not have a fund in place to account for overall stormwater related transactions, comparison of stormwater costs submitted by city staff with CAFR cost figures was not possible. This limited the level of confidence in the data to 'moderate.'

The city of Encinitas represents the smallest city selected for the survey with a population of just over 58,000 (www.census.gov). The area of the city is about 20 square miles and is located 25 miles north San Diego. Encinitas is situated along six miles of rugged coastline; characterized by beaches, cliffs, and rolling hills (www.ci.encinitas.ca.us). The stormwater program is coordinated by the Engineering Services Department. Descriptive characteristics for the Encinitas are shown in Table 4-1. Primary personal communication was with Kathy Weldon from the city of Encinitas and Meleah Ashford of Ashford Engineering. The city of Encinitas costs for 2002/2003 were for complying with their 2001 stormwater permit (RWQCB, San Diego, 2001).

Table 4-1. Select Characteristics of the City of Encinitas

Description	Characteristic	Reference
Mean Income Per Person, $	34,336	www.census.gov
Area (sq. miles)	20	www.census.gov
Population	58,014	www.census.gov
Curb Miles Swept	5,832	Encinitas, 2003b
Active Construction Sites	40	Encinitas, 2003b
Industrial and Commercial Sites	417	Encinitas, 2003b, Weldon, pers. comm., 4/2/04
Households	23,843	www.census.gov
City Actual General Fund Revenue, $	42,592,755	Encinitas, 2003a
Annual Rainfall (cm)*	26	www.wrcc.dri.edu
Years Since Incorporation	20	www.ci.encinitas.ca.us
*Rainfall for Oceanside Marina was used.		

4.1 DATA SOURCES

The following describes the information available from the data sources.

Cost Spreadsheets Submitted by City Staff

A spreadsheet was provided by the city of Encinitas that included cost information broken down by activity (Appendix B, Table B-2). The city also submitted another spreadsheet, which allocated the labor, supplies, travel, equipment, and vehicle cost to each stormwater program (Appendix B, Table B-3). The remaining cost data submitted was for public works department costs related to stormwater activities (Appendix B, Table B-4).

Jurisdictional Urban Runoff Management Program (JURMP) Annual Report, FY 2002-2003

This report provided descriptions of the activities and accomplishments of the city's stormwater program (Encinitas, 2003b). Activity statistics (e.g. number of industrial inspections) were provided in this report as well. Stormwater costs were normalized by these statistics. While no

cost figures were obtained from this document, it was used to verify that an activity was required for compliance with the permit.

Personal Communication: Interviews, Phone Calls, E-mail

Personal communication with the city of Encinitas staff provided additional stormwater program costs that augmented the data submitted in their cost spreadsheet. These costs were for stormwater activities performed by the department of public works. They also provided allocations of labor, supplies, travel, equipment, and vehicle to cost survey categories based on estimated percentages. Also, city staff elaborated on what was accomplished for each cost submitted in their spreadsheet and commented on the allocation of costs among the cost survey categories.

Comprehensive Annual Financial Report (CAFR) 2002/03

The city of Encinitas has not established a fund to account for overall stormwater transactions, so no comparisons on cost were made to CAFR figures. During fiscal year 2003/04, the city has since created such a fund (Ashford, personal communication, 4/2/04).

4.2 COST DATA SUMMARY

Table 4-2 summarizes the costs for each survey category. Figure 4-1 shows the relative distribution of costs among the categories. The costs in Table 4-2 include an allocation of stormwater staff time used to develop, oversee, and, in some cases, implement activities within each program.

The backup calculations and source data for these costs are presented and discussed in Appendix B.

Table 4-2. City of Encinitas Cost Assigned to Cost Survey Categories

Cost Survey Category	Costs ($)
Construction Site Stormwater Runoff Control	169,751
Illicit Discharge Detection and Elimination	49,378
Industrial and Commercial Management Programs	65,596
Overall Stormwater Program Management	128,159
Pollution Prevention and Good Housekeeping for Municipal Operations	528,252
Post Construction Water Management in New Development and Redevelopment	15,344
Public Education, Outreach, Involvement, and Participation	41,898
Water Quality Monitoring	76,262
Watershed Management	12,400
Total	**1,087,038**

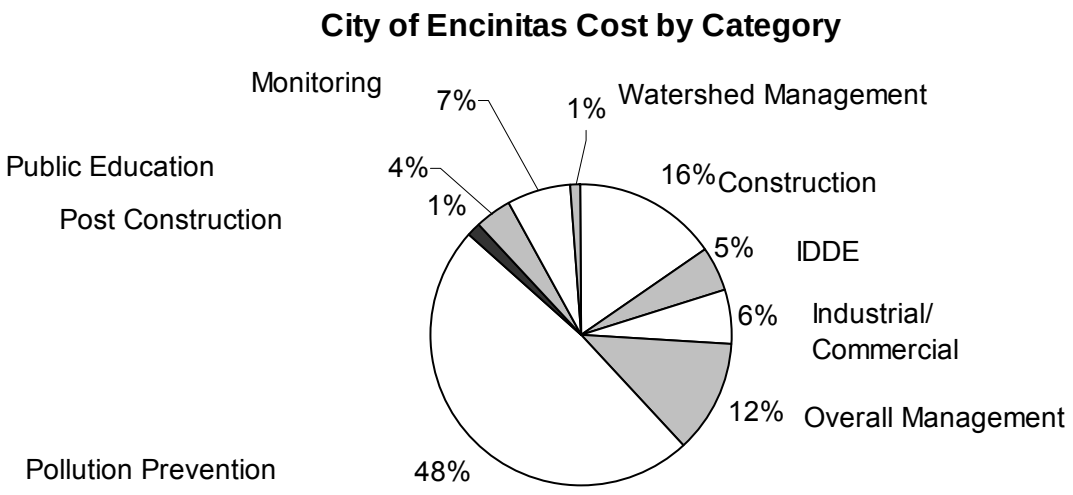

Figure 4-1. Distribution of Encinitas Stormwater Costs Among the Cost Survey Categories.

4.2.1 Discussion of Costs for Each Survey Category

Cost breakdown and calculations for each survey category are found in Appendix B, Table B-1. The costs for each survey category are discussed in this section.

Construction Site Stormwater Runoff Control

The construction program cost was $169,751, which was 16 percent of total stormwater cost. The construction program oversaw 40 active construction sites and performed 401 inspections (Encinitas, 2003b). Including the cost of stormwater staff for oversight and follow-up activities, the average cost was $423 per inspection and $4,244 per active construction site. The normalized cost for Encinitas may be high compared to other cities because the cost includes non-inspection activities such as contractor and inspector training, wet weather monitoring, and BMP manual updating. Stormwater staff also reviewed five SWPPPs, performed general enforcement, issued 13 notices of violation, updated the city BMP manual, educated and trained engineering inspectors with regard to stormwater management and BMP implementation, monitored weather patterns and storms in the Pacific through the National Weather Service, conducted construction education, disseminated brochures and mailings, and held a construction workshop (City of Encinitas, 2003b).

Illicit Discharge Detection and Elimination

The IDDE program cost was $49,378, which was 4 percent of total stormwater cost. The IDDE program conducted 172 education, enforcement, and/or clean-up activities. Using overall IDDE

cost, the average cost per activity was $287. From informal visual inspections, city staff received 76 "complaints," and another 96 complaints were received via the city's stormwater hotline.

Industrial and Commercial Management Programs

The industrial and commercial program cost was $65,596, which was 6 percent of total stormwater cost. This program had 266 inspections at an average cost of $247 per inspection. The normalized cost for Encinitas may be high compared to other cities because the cost includes non-inspection activities such as website updating, facility inventory, education, and enforcement actions (City of Encinitas, 2003b). The city has three industrial sites and 348 commercial sites. Stormwater staff updated the commercial facility inventory, provided BMP manuals and guidance, educated facility staff in regard to stormwater requirements and minimum BMPs, developed a grease program, and issued several enforcement actions (City of Encinitas, 2003b).

Overall Stormwater Program Management

The overall management program cost was $128,159, which was 12 percent of total stormwater cost. Developing a "clean water fee" cost $35,000 (Weldon, personal communication, 4/2/04). This fee pays for stormwater costs and is similar to stormwater fees assessed by other cities. This cost accounts for approximately 27 percent of this category's cost. The other activities in this program were annual reporting and legal support for developing ordinances and plaintiff attorney fees. Costs in this category identified as possibly one-time were for the stormwater fee development, legal fees (ordinances and plaintiff attorneys), and grant writing.

Pollution Prevention and Good Housekeeping for Municipal Operations

The municipal operations program cost was $528,252, which was 49 percent of total stormwater cost. This category had three primary public works activities: cleaning sumps, inlets, and manholes; street sweeping; and cleaning drain lines and channels. Activity statistics were only available for street sweeping which was contracted out with minimal oversight (Weldon, personal communication, 4/2/04). The average cost was $20 per curb mile swept. The street sweeping cost is about 11 percent of total stormwater cost. Street sweeping cost does not include labor of the stormwater staff. This was because stormwater staff time was allocated to all municipal operations for stormwater and not to individual activities (e.g. street sweeping vs. channel cleaning). Other activities included in this program were trash pick-up, sediment disposal, and consulting services for oversight, strategic planning, and management.

Post Construction Stormwater Management in New Development and Redevelopment

The post construction program cost was $15,344, which was 1 percent of total stormwater cost. Post-construction cost was primarily for consulting and oversight of a special project to treat discharge to Moonlight Beach for bacteria. Also, installation and maintenance of 16 storm drain inserts cost $1,908, averaging $119 per insert per year. The cost associated with the "Moonlight Beach" project was possibly a one-time cost.

Public Education, Outreach, Involvement, and Participation

The public education program cost was $41,898, which was 4 percent of total stormwater cost. Public education and outreach activities often incorporated public involvement and participation activities. This made differentiating cost between the categories impractical. Because of this, the two programs were combined. The city of Encinitas had three watershed and beach clean-up activities (City of Encinitas, 2003b). Because the cost of outreach was not available separately and impression statistics were not available, outreach costs were not normalized.

Water Quality Monitoring

The monitoring program cost was $76,262, which was 7 percent of total stormwater cost. The cost was for collection, analysis, and contractor oversight of 48 dry weather bacteria samples (Weldon, personal communication, 4/2/04).

Watershed Management

The cost of this category was $12,400, which was 1 percent of total stormwater cost. These costs were for developing a one time watershed plan and participating in and hosting regional watershed meetings and workshops (Weldon, personal communication, 4/2/04).

4.3 CONFIDENCE IN THE DATA

For the city of Encinitas, confidence in the data was moderately high. This was because only a few cost figures submitted were verbal estimates without backup. Most of the cost data submitted was via spreadsheets built, maintained, and updated by the city. However, as with most of the cities selected, the program costs were provided but could not be verified by city accounting system reports.

For the fiscal year 2002/03, the city did not have a fund in place to account for overall stormwater related transactions. As such, comparison of stormwater costs submitted by city staff with CAFR cost figures was not possible, which did not allow for a higher level of confidence in the data.

Fremont was the third largest city selected and has a population of about 203,000 (www.census.gov). The city is located in Alameda County on the southeast side of the San Francisco Bay between San Jose and Oakland. The stormwater program is coordinated by the Environmental Services Department. Descriptive characteristics for Fremont are shown in Table 5-1. Primary personal communication was with Barbara Silva from the city of Fremont. The FCMA costs for 2002/2003 were for complying with their 2003 stormwater permit (RWQCB, San Francisco Bay, 2003).

Table 5-1. Select Characteristics of the City of Fremont

Description	Characteristic	Reference
Mean Income Per Person, $	31,411	www.census.gov
Area, (sq. miles)	97	Silva, pers. comm., 4/5/04
Population	203,413	www.census.gov
Curb Miles Swept	31,405	Silva, pers. comm., 9/22/04
Active Construction Sites	24	Silva, pers. comm., 4/5/04
Industrial and Commercial Sites	1,028	Silva, pers. comm., 4/5/04
Households	69,452	www.census.gov
City Actual General Fund Revenue, $	98,456,011	Fremont, 2003a
Annual Rainfall (cm)	37	www.wrcc.dri.edu
Years Since Incorporation	48	www.ci.fremont.ca.us

5.1 DATA SOURCES

The following describes the information available from the data sources.

Cost Spreadsheets Submitted by City Staff

The city of Fremont provided a cost spreadsheet that included labor and cost figures for stormwater activities (Appendix C, Table C-2). A further breakdown of one of these cost figures was also provided (Appendix C, Table C-3). A further breakdown of Union Sanitation District[5] (USD) cost is presented in Appendix C, Table C-4. Appendix Table C-5 presents a breakdown of city of Fremont contributions to the Alameda Countywide Clean Water Program (ACCWP).

Alameda Countywide Clean Water Program Fiscal Year 2002/03 Annual Report

The city of Fremont is a member of the ACCWP, so the 2002/03 Annual Report was consulted to obtain activity statistics, descriptions of activities, and accomplishments specifically pertaining

[5] The Union Sanitation District is a special district that provides wastewater collection, treatment and disposal services to the residents and businesses of the city of Fremont, Newark and Union City, in Southern Alameda County in California (www.unionsanitary.com).

to the city of Fremont. As with other cities where relevant activity statistics were available, cost normalization was performed.

Personal Communication: Phone Calls, E-mail

Through personal communication, city staff provided detailed information regarding cost figures. City staff elaborated on what was accomplished for each cost submitted in their spreadsheet and commented on the allocation of costs among the cost survey categories.

Comprehensive Annual Financial Report (CAFR) 2002/03

During the 2002/03 fiscal year, the city of Fremont had a fund in place to account for overall stormwater related transactions. This fund is called the "Urban Runoff/Clean Water" fund (Fremont, 2003a). The cost figures in this fund were used for comparison purposes with costs submitted by city stormwater staff.

Alameda Countywide Clean Water Program, SWMP, July 2001-June 2008

The SWMP provided information regarding the structure, accomplishments, and recent developments of the program. It also gave information regarding objectives and tasks of each program component and specific tasks that the member agencies are required to perform (Fremont, 2003c). While no cost figures were obtained from this document, it was used to verify that an activity was required for compliance with the permit.

5.2 COST DATA SUMMARY

Table 5-2 summarizes the costs for each survey category. Figure 5-1 shows the relative distribution of costs among the categories. Stormwater staff labor costs for the city of Fremont were not distributed among survey categories, but were allocated to Overall Stormwater Program Management. This will make the costs in this category appear higher compared to cities that allocate stormwater staff costs to their various programs. Survey categories (excluding Overall Stormwater Program Management) that include costs or discussion in regard to "stormwater staff labor" only concerns ACCWP labor cost allocated to the city of Fremont. Fremont funded the USD to accomplish portions of the IDDE, industrial/commercial, construction, overall management, and public education programs.

Table 5-2. City of Fremont Cost Assigned to Cost Survey Categories

Cost Survey Category	Costs ($)
Construction Site Stormwater Runoff Control	17,715
Illicit Discharge Detection and Elimination (IDDE)	5,917
Industrial and Commercial Management Programs	210,027
Overall Stormwater Program Management	453,872
Pollution Prevention and Good Housekeeping for Municipal Operations	2,128,175
Post Construction Stormwater Management in New Development and Redevelopment	35,083
Public Education, Outreach, Involvement, and Participation	101,717
Water Quality Monitoring	131,326
Watershed Management	17,610
Total	**3,101,442**

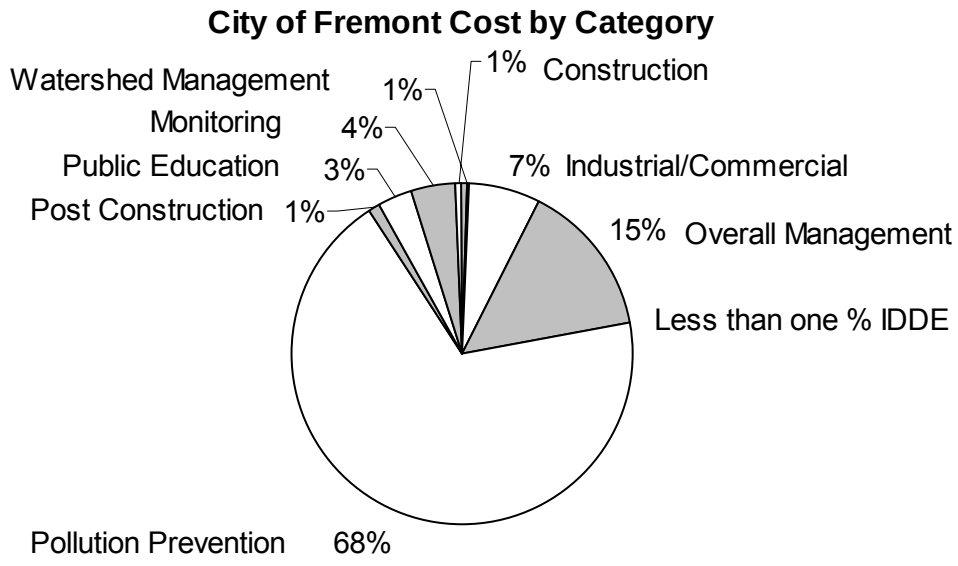

Figure 5-1. Distribution of Fremont Stormwater Costs Among the Cost Survey Categories.

5.2.1 Discussion of Costs for Each Survey Category

Cost breakdown and calculations for each survey category are found in Appendix C, Table C-1. The costs for each survey category are discussed in this section.

Construction Site Stormwater Runoff Control

The construction program (performed by USD), cost was $17,715, which was 1 percent of total stormwater cost. The construction program oversaw 24 active construction sites equal to or greater than five acres (Silva, personal communication, 4/5/04). All of the cost for the program was attributable to inspections (Silva, personal communication, 4/5/04). The program cost,

normalized by construction sites, was $738 per active construction site greater than or equal to five acres.

Illicit Discharge Detection and Elimination

The IDDE program cost was $5,917, which was less than one percent of total stormwater cost. Most of the cost (86 percent) was for assistance to eliminate non-stormwater discharges and reporting. Stormwater staff labor cost represented the remaining 14 percent.

Industrial and Commercial Management Programs

The industrial and commercial program cost was $210,027, which was 7 percent of total stormwater cost. This program was performed by the USD, who performed 482 inspections with 91 follow-up actions of which 81 were enforcement actions. Not including documentation cost, the cost per inspection was $334.

Overall Stormwater Management Program

The overall management program cost was $453,872, which was 15 percent of total stormwater cost. Stormwater staff labor costs are included in this category. The labor costs (including overhead) represent about 69 percent of the cost attributed to this program. The other costs were for administrative services and supplies, permit fees, informational systems, and USD services.

Pollution Prevention and Good Housekeeping for Municipal Operations

The municipal operations program cost was $2,128,175, which was 69 percent of total stormwater cost. The two primary activities of this category were street sweeping, and litter and debris removal. The average cost was $61 per curb mile swept. For this category, street sweeping accounted for approximately 90 percent of the cost and 9 percent was attributable to litter debris and removal. Other activities performed by the city included cleaning drain lines and channels, inlets, cross culverts, and conduits, but costs were not available for these activities.

Post Construction Stormwater Management in New Development and Redevelopment

The post construction program cost was $35,083, which was 1 percent of total stormwater cost. This cost was for engineering, planning, and other city staff to research, track, and report information for the annual stormwater report. It was also for task force meetings to develop strategies for compliance with their permit regarding new development and redevelopment, brochure printing, and stormwater staff labor.

Public Education, Outreach, Involvement, and Participation

The public education program cost was $101,717, which was 3 percent of total stormwater cost. Program activities included production and distribution of citywide newsletters, 28 school outreach presentations, stormwater staff participation in public events, and distribution of

brochures and fliers (Fremont, 2003b). USD was funded $25,897 to provide additional public education outreach services. Outreach materials promote an Integrated Pest Management program that provided businesses and nurseries with shelf displays and fact sheets.

Water Quality Monitoring

The monitoring program cost was $131,326, which was 4 percent of total stormwater cost. This cost was for multiple water quality sampling at two locations. Both chronic and acute toxicity tests were performed (Silva, personal communication, 4/5/04).

Watershed Management

The watershed management program cost was $17,610, which was 1 percent of total stormwater cost. Costs in this category were for developing a watershed study framework, assessment of pilot project activities, and stormwater staff labor (including overhead).

5.3 CONFIDENCE IN THE DATA

For the city of Fremont, confidence in the data was moderately high. Most of the cost data submitted was via spreadsheets built, maintained, and updated by the city. Approximately one-third of the city costs could be corroborated by the 2003/2004 CAFR figures.

The city of Fremont had a fund (Urban Runoff/Clean Water) presented in the CAFR that accounted for stormwater expenditures except street sweeping and litter/debris removal (Cote, 2004). Total expenditures and transfers out for the Urban Runoff/Clean Water fund were $1,234,790. Total stormwater costs submitted by city staff were $3,101,442 but this included $2,115,000 in street sweeping and litter/debris removal costs (Cote, 2004). Subtracting out $2,115,000 leaves $986,442 in stormwater costs compared to the $1,234,790 in the Urban Runoff/Clean Water fund. Because of water conveyance projects, it is expected that compliance costs would be less than this fund reports. The $2,115,000 could not be verified by CAFR figures because it was financed out of larger funds that did not have available breakdown. This cost was about 68 percent of the total stormwater cost.

The Fresno-Clovis Metropolitan Area (FCMA) has a population of 778,000, but a population of nearly 695,000 is used for comparison of normalized costs because this is approximately the population under the jurisdiction of the Fresno Metropolitan Flood Control District (FMFCD), which is the lead agency for compliance efforts. The FCMA is the largest area considered in this cost survey. Fresno is located in the San Joaquin Valley near the Sierra Nevada. Surrounded by agricultural land, the area includes the city of Fresno, the city of Clovis, and other metropolitan areas of Fresno County. The stormwater program is coordinated by the Environmental Services Department. Descriptive characteristics for FCMA and the other agencies, excluding California State University, Fresno (CSUF) are shown in Table 6-1. Primary personal communication was with Daniel Rourke and David Pomaville from the FMFCD. The FCMA costs for 2002/2003 were for complying with their 2002 stormwater permit (RWQCB, Central Valley, 2002a).

Table 6-1. Select Characteristics of the Fresno Metropolitan Area

Description	Fresno-Clovis Area	City of Clovis	County of Fresno	City of Fresno	Reference
Mean Income Per Person, $	*	18,690	15,495	15,010	www.census.gov
Area, (sq. miles)	*	17	6,017	105	www.census.gov
Population	561,120	68,468	65,000***	427,652	www.fresnofloodcontrol.org
Curb Miles Swept	142,411	47,430	21	94,495	FMFCD, 2003b
Active Construction Sites	N/A	N/A	N/A	N/A	N/A
Industrial and Commercial Sites	N/A	N/A	N/A	N/A	N/A
Households**	195,311	25,250	21,036	149,025	www.census.gov
City Actual General Fund Revenue, $	216,089,323	37,707,095	0	178,382,228	Respective CAFRs
Annual Rainfall (cm)	28	28	28	28	www.wrcc.dri.edu
Years Since Incorporation	119	92	N/A	119	www.ci.fresno.ca.us

* Approximately equal to county.
**County of Fresno number of households obtained by dividing the population covered by the stormwater permit by the average number of households in the county according to census 2000. Population provided via personal communication (Pomaville, 6/10/04).
*** County population is only that portion outside the cities but also covered by the FMFCD.

6.1 DATA SOURCES

The following describes the information available from the data sources.

Cost Spreadsheets Submitted by City Staff

The FMFCD provided a spreadsheet generated from an accounting system report. This detailed spreadsheet provided individual expenditures for stormwater except for labor and office supplies (Appendix D, Table D-7).

Fresno-Clovis Storm Water Quality Management Program, Annual Report FY 2002/2003

This report provided descriptions of the activities and accomplishments of the stormwater program. Activity statistics (e.g. number of construction site inspections) were provided in this report, but in most cases numbers were not available for each agency.

Fresno-Clovis Storm Water Quality Management Program (SWQMP), February 1999

The SWQMP presents information regarding objectives and tasks of each program component and specific tasks that the member agencies are required to perform. The report contained budgeted costs incurred by the cities, county, and university in lieu of actual expenditures. These costs were summarized in Appendix D, Table D-3. The cost figures were budgeted amounts and not actual expenditures. The document was also used to verify that an activity was required for compliance with the permit.

Personal Communication: Phone Calls, E-mail

Personal communication with the FMFCD staff provided additional stormwater program costs that augmented the data submitted in their cost spreadsheet. These costs were for labor, office supplies, and street sweeping (Appendix Table D-8). They also provided advice on how to allocate the submitted costs to the cost survey categories. FMFCD staff also advised on where the best available costs were compiled for the other agencies.

Comprehensive Annual Financial Report (CAFR) 2002/03 for the FMFCD, City of Clovis, City of Fresno, and County of Fresno

Except for the FMFCD, the Fresno area agencies had not established a fund to account for overall stormwater transactions, so no comparisons on cost were made to CAFR figures. The CAFR figures were used to determine the general fund revenue, which is considered a potential cost factor.

6.2 COST DATA SUMMARY

Table 6-2 summarizes the stormwater program costs for each cost survey category. Figure 6-1 shows the relative distribution of costs among the categories. Labor cost for the FMFCD staff to develop, oversee, and administer these programs was allocated to the Overall Stormwater Program Management category. The labor costs for the other agencies were allocated to the cost categories.

Table 6-2. Fresno-Clovis Metropolitan Area Cost Assigned to Cost Survey Categories

Cost Survey Category	Costs ($)
Construction Site Stormwater Runoff Control	81,800
Illicit Discharge Detection and Elimination (IDDE)	13,176
Industrial and Commercial Management Programs	47,780
Overall Stormwater Program Management	570,495
Pollution Prevention and Good Housekeeping for Municipal Operations	2,240,605
Post Construction Stormwater Management in New Development and Redevelopment	57,539
Public Education, Outreach, Involvement, and Participation	210,716
Water Quality Monitoring	252,918
Watershed Management	0
Total	**3,475,029**

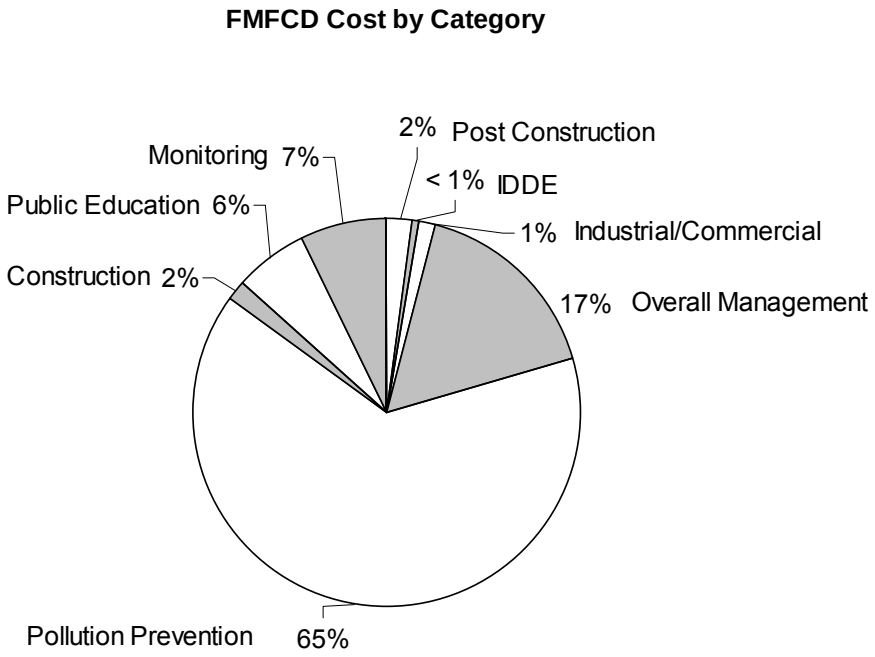

Figure 6-1. Distribution of Fresno-Clovis Metro Area Stormwater Costs Among the Cost Survey Categories

6.2.1 Discussion of Costs for Each Category

Cost breakdown and calculations for each survey category are found in Appendix D, Table D-1. The costs for each survey category are discussed in this section.

Construction Site Stormwater Runoff Control

The construction program cost was $81,800, which was 2 percent of total stormwater cost. The annual stormwater report did not contain the number of inspections for the city of Fresno, so cost could not be normalized by this factor. The number of construction sites was only tracked for the FMFCD so this factor was not used. (FMFCD, 2003b).

Illicit Discharge Detection and Elimination (IDDE)

The IDDE program cost was $13,176, which was less than one percent of total stormwater cost. The number of inspections was not available.

Industrial and Commercial Management Programs

The industrial and commercial program cost was $47,480, which was 1 percent of total stormwater cost. Facilities in the Fresno-Clovis metropolitan area are primarily inspected by Fresno County hazardous waste inspectors, city of Fresno industrial wastewater inspectors, and city of Clovis fire inspectors (FMFCD, 2003b). The number of inspections was only available for the FMFCD so cost could not be normalized on this factor.

Overall Stormwater Program Management

The overall stormwater program management cost was $570,495, which was 16 percent of total stormwater cost. This cost includes the FMFCD staff costs for stormwater (does not include other FMFCD activities such as flood control), which accounted for 98 percent of the cost of this category. The staff costs attributed to stormwater activities were estimated as 11 percent of the total personnel expenses for the FMFCD. The same percentage was applied to obtain office administration costs (Pomaville, 2004). Other costs were for office expenses, office administration, training, and travel.

Pollution Prevention and Good Housekeeping for Municipal Operations

The cost of this program was $2,240,605, which was 64 percent of total stormwater cost. This includes $2,193,296 reported by the city of Clovis and city of Fresno for street sweeping 141,769 of the 142,411 curb miles swept by the agencies (FMFCD, 2003b).

Post Construction Stormwater Management in New Development and Redevelopment

The post construction program cost was $57,539, which was 2 percent of total stormwater cost. This cost was for contracting for maintenance of 8 basins, resulting in an average annual cost of $7,200 per basin.

Public Education, Outreach, Involvement, and Participation

The cost of this program was $210,716, which was 6 percent of total stormwater cost. The Public Education and Outreach category was combined with the Public Involvement and Participation category because the county of Fresno and city of Clovis costs were combined (FMFCD, 1999). There was not a consistently reported activity statistic that could be used for normalization. FCMA agencies were involved in many outreach and participation activities such as public service announcements, brochures, BMP fact sheets, volunteer stenciling, special events, articles, clean-up activities, hotline, school programs, and business outreach (FMFCD, 2003b).

Water Quality Monitoring

The monitoring program cost was $252,918, which was 7 percent of total stormwater cost. The program funded monitoring plan development, sample collection, analysis, reporting, and a Water Environment Research Foundation (WERF) contribution. Only FMFCD reported monitoring costs.

Watershed Management

The Fresno area agencies did not allocate any cost to this category. This effort was captured under other programs such as Overall Stormwater Program Management.

6.3 CONFIDENCE IN THE DATA

For the Fresno-Clovis metropolitan area, confidence in the data was moderate because costs for the other agencies were taken from budgeted numbers out of the SWQMP (FMFCD, 1999). Additionally, baseline labor costs for the cities and county were less than $90,000 (Appendix D, Table D-3), which is approximately the annual cost of one person (salary and overhead). It seems unreasonable that this cost sufficiently covers the pre-existing stormwater labor cost in 1999 for these entities. The street sweeping costs provided for the city of Clovis were corroborated by the city's 2002/03 CAFR within 1 percent.

Surrounded by largely agricultural land, California's capital city is located in the central valley at the conjunction of the Sacramento and American rivers. The city of Sacramento has a population just exceeding 400,000 (www.census.gov). The stormwater program is coordinated by the Department of Utilities. Descriptive characteristics for the city of Sacramento are shown in Table 7-1. Primary personal communication was with Bill Busath from the city of Sacramento. The city of Sacramento costs for 2002/2003 were for complying with their 2002 stormwater permit (RWQCB, Central Valley, 2002b).

Table 7-1. Select Characteristics of the City of Sacramento

Description	Characteristic	Reference
Mean Income Per Person, $	18,721	www.census.gov
Area, (sq. miles)	99	www.census.gov
Population	407,018	www.census.gov
Curb Miles Swept	26,450	Table E-6
Active Construction Sites	417	Sacramento, 2003b
Industrial and Commercial Sites	N/A	N/A
Households	163,957	www.census.gov
City Actual General Fund Revenue, $	267,464,000	Sacramento, 2003a
Annual Rainfall (cm)	46	www.wrcc.dri.edu
Years Since Incorporation	154	www.cityofsacramento.org
*Reporting these numbers started in fiscal year 2004/05 (Sacramento, 2003b)		

7.1 DATA SOURCES

The following describes the information available from the data sources.

Cost Spreadsheets Submitted by City Staff

The staff provided two spreadsheets, which included cost data. One spreadsheet contained direct costs while the other contained labor costs. These spreadsheets represent the entirety of the city's stormwater costs except for the verbal estimates for street sweeping and pump station cleaning activities. The direct and labor cost spreadsheets are presented in Appendix E, Tables E-2 and E-8 respectively. The labor costs as assigned to cost survey categories are presented in Table E-7.

City of Sacramento, Stormwater Management Program, 2002/03 Annual Report

This report provided activity statistics (e.g. curb miles swept) for various city stormwater programs. These statistics were used to normalize costs to allow comparison with other cities.

Personal Communication: Interviews, Phone Calls, E-Mail

Through personal communication, city staff elaborated on what was accomplished for each cost submitted in their spreadsheet and commented on the allocation of costs among the cost survey categories. Also, verbal cost estimates for street sweeping and pump station cleaning activities were provided.

Comprehensive Annual Financial Report (CAFR) 2002/03

During the 2002/03 fiscal year, the city of Sacramento had a fund in place to account for overall stormwater related transactions. This fund is called the "Storm Drainage" fund (Sacramento, 2003a). The cost figures in this fund were used for comparison purposes with costs submitted by city stormwater staff.

City of Sacramento, Stormwater Quality Improvement Plan (SQIP) July 2003

While no cost figures were obtained from this document, it was used to verify that an activity was required for compliance with the permit.

7.2 COST DATA SUMMARY

Table 7-2 summarizes the stormwater program costs for each cost category. Figure 7-1 shows the relative distribution of costs among the categories. These cost figures include labor costs for the stormwater staff.

Table 7-2. City of Sacramento Cost Assigned to Cost Survey Categories

Cost Survey Category	Costs ($)
Construction Site Stormwater Runoff Control	261,716
Illicit Discharge Detection and Elimination (IDDE)	37,507
Industrial and Commercial Management Programs	42,318
Overall Stormwater Program Management	281,502
Pollution Prevention and Good Housekeeping for Municipal Operations	3,510,806
Post Construction Water Management in New Development and Redevelopment	38,517
Public Education, Outreach, Involvement, and Participation	361,440
Water Quality Monitoring	494,577
Watershed Management	31,591
Total	**5,059,973**

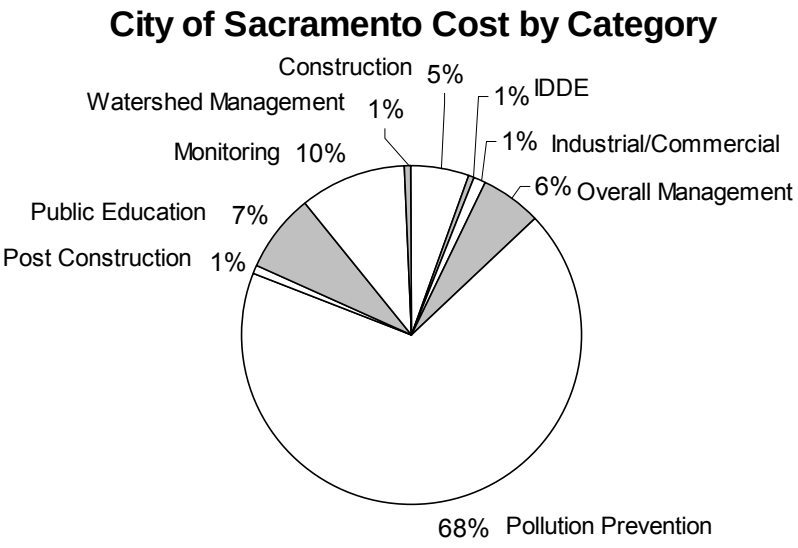

Figure 7-1. Distribution of Sacramento Stormwater Costs Among the Cost Survey Categories

7.2.1 Discussion of Costs for Each Survey Category

Cost breakdown and calculations for each survey category are found in Appendix E, Table E-1. The costs for each survey category are discussed in this section.

Construction Site Stormwater Runoff Control

The construction program cost was $261,716, which was 5 percent of overall stormwater cost. The construction program oversaw 417 active construction sites (Sacramento, 2003b) and performed 6,375 inspections. The average cost was $29 per inspection and $628 per active construction site.

Illicit Discharge Detection and Elimination

The IDDE program cost was $37,507, which was less than 1 percent of total stormwater cost. This cost is the only item attributed to this program and represents stormwater staff labor.

Industrial and Commercial Management Programs

The industrial and commercial management program cost was $42,318, which was less than 1 percent of total stormwater cost. The only cost attributable to this program was for the development of BMP handbooks and labor to do inspections.

Overall Stormwater Program Management

The overall management program cost was $281,501, which was 6 percent of total stormwater cost. Costs in this program were for office products, annual reporting, planning, mailing, CASQA fees, NPDES fee, and legal fees.

Pollution Prevention and Good Housekeeping for Municipal Operations

The municipal operations program cost was $3,510,806, which was 69 percent of total stormwater cost. The two primary activities for this category were street sweeping and pump station cleaning. The average cost was $50 per curb mile swept. Street sweeping and pump station costs are about 38 percent and 12 percent of total stormwater cost respectively. These percentages are based on the estimates provided by city staff and do not include labor cost allocated to oversee this program. Street sweeping costs were discounted because the city performed additional sweeping in their downtown area that was not permit required. This may be an unfair comparison to other permits that are vaguer about the sweeping requirements. In these programs (see Fresno-Clovis Metropolitan Area as an example), all sweeping costs were included because it was assumed that all sweeping was in compliance with the permit. The discounted amount for Sacramento's street sweeping costs was $277,252.

Post Construction Stormwater Management in New Development and Redevelopment

The post construction program cost was $38,517, which was less than 1 percent of total stormwater cost. Post construction cost was primarily for stormwater staff labor and student intern labor associated with working with developers to assure deployment of appropriate post construction BMPs. In addition, $2,500 was spent for the development of BMP handbooks.

Public Education, Outreach, Involvement, and Participation

The public education and outreach program cost was $361,440, which was 7 percent of total stormwater cost. The largest cost for this program was labor, which included both stormwater staff and student internship labor. The total labor cost was approximately 45 percent of the total public education and outreach program cost. The cost of development of integrated pest management (IPM) was about 11 percent and television and newspaper advertisements constituted 19 percent and 5 percent, respectively.

Water Quality Monitoring

The monitoring program cost was $494,577, which was 10 percent of total stormwater cost. Modeling and data analysis accounted for $131,688. Sample collection and lab cost accounted for $303,077. Stormwater staff and student labor accounted for $59,812.

Watershed Management

The cost of this category was $31,591, which was less than 1 percent of total stormwater cost. The primary cost attributed to this category was for stormwater staff labor.

7.3 CONFIDENCE IN THE DATA

For the city of Sacramento, confidence in the data was moderate. Several factors were considered in this assessment. The costs for street sweeping and pump station cleaning were estimated and represent approximately 34 percent of total stormwater program cost for the city. Since 34 percent of total stormwater cost was based on estimates, a higher level of confidence in the data could not be allowed. Secondly, the labor and direct cost data was submitted in spreadsheets built, maintained, and updated by the city staff with the labor costs being based on accounting system generated cost figures. The confidence in the data for Sacramento would be noticeably increased if 2003/04 data were considered (Busath, personal communication, 11/23/04). The city of Sacramento had a fund (Storm Drainage) set up to account for overall stormwater expenditures. Total expenditures for the Storm Drainage fund were $30,926,000[6] (City of Sacramento, 2003a), while total stormwater costs submitted by city staff were $5,046,157. This difference is attributed to the expense for flood control and conveyance work not required by the NPDES permit. Differentiation of stormwater costs in the CAFR was not possible.

[6] This figure represents the sum of operating expenses, interest expense, amortization of deferred charges, loss on disposition of fixed assets, and transfers out.

The city of Santa Clarita is a small to medium-sized city with a population of 151,088 (www.census.gov). The city lies approximately 25 miles from the Pacific coastline in the Santa Clara River watershed. The stormwater program is coordinated by the Field Services Department. Descriptive characteristics for the city of Santa Clarita are shown in Table 8-1. Primary personal communication was with Oliver Cramer and Travis Lange from the city of Santa Clarita. The city of Santa Clarita costs for 2002/2003 were for complying with their 2001 stormwater permit (RWQCB, Los Angeles, 2001).

Table 8-1. Select Characteristics of the City of Santa Clarita

Description	Characteristic	Reference
Mean Income Per Person, $	26,841	www.census.gov
Area, (sq. miles)	48	www.census.gov
Population	151,088	www.census.gov
Curb Miles Swept	46,800	Cramer, pers. comm., 4/22/04
Active Construction Sites	64	Santa Clarita, 2003b
Industrial and Commercial Sites	1,071	Santa Clarita, 2003b
Households	52,442	www.census.gov
City Actual General Fund Revenue, $	61,659,874	Santa Clarita, 2003a
Annual Rainfall (cm)[1]	33	www.wrcc.dri.edu
Years Since Incorporation	17	www.santa-clarita.com

1. Dry Canyon Reservoir rain gage was used.

8.1 DATA SOURCES

The following describes the information available from the data sources.

Los Angeles County Municipal Storm Water Permit (Order 01-182) Individual Annual Report Form, Attachment U-4

This report was the primary source of cost data for the city of Santa Clarita. The report contained labor and direct cost information for the city's stormwater program broken down into categories (Appendix F, Table F-1). The labor cost is described as "Administrative Costs" and were assigned to the Overall Stormwater Management category because the city was unable to distribute these costs among the programs. This report also provided activity statistics (e.g. curb miles swept) for various city stormwater programs. These statistics were used to normalize costs to allow comparison with other cities.

Personal Communication: Interviews, Phone Calls, E-Mail

Through personal communication, city staff elaborated on what was accomplished for each cost submitted in their spreadsheet and commented on the allocation of costs among the cost survey categories.

During the 2002/03 fiscal year, the city of Santa Clarita had a fund in place to account for overall stormwater related transactions. This fund is called the "Stormwater Utility" fund (Santa Clarita, 2003a). The cost figures in this fund were used for comparison purposes with costs submitted by city stormwater staff.

8.2 COST DATA SUMMARY

Table 8-2 summarized the stormwater program costs for each cost category. Figure 8-1 shows the relative distribution of costs among the categories. Since the city staff was unable to distribute stormwater staff labor cost among the programs, it has been captured under Overall Stormwater Program Management.

Table 8-2. City of Santa Clarita Cost Assigned to Cost Survey Categories

Cost Survey Category	Costs ($)
Construction Site Stormwater Runoff Control	74,995
Illicit Discharge Detection and Elimination (IDDE)	114,831
Industrial and Commercial Management Programs	12,600
Overall Stormwater Program Management	515,352
Pollution Prevention and Good Housekeeping for Municipal Operations	859,754
Post Construction Water Management in New Development and Redevelopment	106,925
Public Education, Outreach, Involvement, and Participation	49,130
Water Quality Monitoring	3,300
Watershed Management	332,949
Total	**2,069,836**

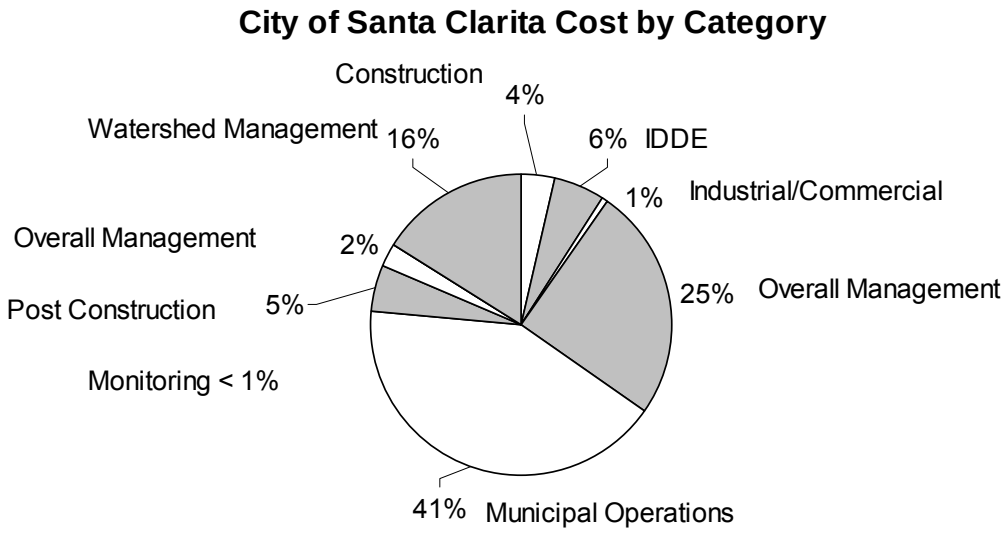

Figure 8-1. Distribution of Santa Clarita Stormwater Costs Among the Cost Survey Categories.

8.2.1 Discussion of Costs for Each Survey Category

Cost breakdown and calculations for each survey category are found in Appendix F, Table F-1. The costs for each survey category are discussed in this section.

Construction Site Stormwater Runoff Control

The construction program cost was $74,995, which was 4 percent of total stormwater cost. The construction program oversaw 64 active construction sites (City of Santa Clarita, 2003b). The average cost was $1,172 per active construction site. The city performed 11,746 inspections, but this reflects all inspections whether or not stormwater inspections were performed. Therefore, it is not appropriate to normalize against number of inspections or compare the number of inspections with other cities. (City of Santa Clarita, 2003b)

The cost of $74,995 was based on the assumption that all construction site inspections averaged a percentage of time for stormwater inspections. This was applied to the cost of all 11,746 inspections whether or not stormwater issues were addressed in all 11,746, but since an average was applied it was not necessary to eliminate non-stormwater inspections for cost estimation. The cost of $74,995 is the best estimate available for the unknown number of stormwater inspections performed in 2002/03.

The city provided an estimate of what the minimum effort might cost should stormwater inspections be performed exclusively and not more often than what is required in the permit (Cramer, personal communication, 6/24/04). Based on 64 sites, $99.21/hr for an inspector and vehicle, and 2 hrs per site including travel, the minimum cost for all inspections was calculated to be $12,699. This cost is not presented in the report, it is only presented to indicate that some cities that perform stormwater inspections concurrently with other inspections are exceeding the minimum requirements of the permit.

Illicit Discharge Detection and Elimination

The IDDE program cost was $114,831, which was 6 percent of total stormwater cost. The cost for this program was attributable to investigations. The average cost per investigation was $311.

Industrial and Commercial Management Programs

The industrial program cost was $12,600, which was less than 1 percent of total stormwater cost. The industrial program had 110 inspections at an average cost of $115 per inspection.

Overall Stormwater Program Management

The overall management program cost was $515,352, which was 25 percent of total stormwater cost. All of the stormwater staff cost was assigned to this category. The staff costs (including overhead allocation) represent approximately 85 percent of the costs assigned to this category and 21 percent of total stormwater cost. The other cost was $76,520 for development planning.

Pollution Prevention and Good Housekeeping for Municipal Operations

The municipal operations program cost was $859,754, which was 42 percent of total stormwater cost. The two primary activities for this category were street sweeping and catch basin cleaning. The average cost was $12 per curb mile swept and $170 per basin cleaning. Street sweeping cost and catch basin cleaning cost are approximately 27 percent and 12 percent of total stormwater cost respectively.

Post Construction Stormwater Management in New Development and Redevelopment

The post construction program cost was $106,925, which was 5 percent of total stormwater cost. Post construction cost was primarily for capital costs, which included purchase of vehicles for catch basin cleaning and ICID equipment (Cramer, personal communication, 6/24/04).

Public Education, Outreach, Involvement, and Participation

The public education program cost was $49,130, which was 2 percent of total stormwater cost. Public education and outreach activities often incorporated public involvement and participation activities. This made differentiating cost between the categories impractical. Because of this, the two programs were combined.

Water Quality Monitoring

The monitoring program cost was $3,300, which was less than 1 percent of total stormwater cost. The total cost of monitoring was $3,300, which was for monitoring for diazinon at a single location (Cramer, personal communication, 6/24/04).

Watershed Management

The watershed management program cost was $332,949, which was 16 percent of total stormwater cost. This cost was for the stormwater share of GIS costs.

8.3 CONFIDENCE IN THE DATA

For the city of Santa Clarita, confidence in the data was high. The cost data was found in the annual reporting forms. Through personal communication (Cramer, personal communication, 4/22/04) with city staff, a couple of adjustments to these numbers were made. These figures were later verified by accounting system reports and comparisons to the CAFR.

Since the city of Santa Clarita had a fund (Stormwater Utility) set up to account for overall stormwater expenditures, the level of confidence in the data was increased. This was because a comparison could be made between CAFR cost figures and those submitted by city staff. Total expenditures for the Stormwater Utility fund were $2,869,025, while total stormwater costs submitted by city staff in the annual reporting forms were $2,219,860. Non-stormwater compliance activities totaled $649,205, which exactly accounts for the difference. Because of this match with CAFR expenditures, the level of confidence in the data was increased.

Analysis of the cost survey results and comparisons to costs published independent of this survey are presented in this section. Backup calculations for the analysis presented in this section are in Appendix G. Costs are analyzed by aggregating costs for all cities and by comparing costs between individual cities.

Aggregate cost is the sum of all costs for all cities in this survey. Aggregating costs results in one cost number for total stormwater costs for all programs surveyed. This number is normalized by the number of households for all cities to calculate an average cost per household. Aggregate costs are broken down into each cost category in Section 9.2. Aggregate costs are presented by cost category and by whether they were enhanced, new, or existed prior to the first stormwater permit.

To take into account the size of the city when making comparisons, costs are normalized by number of households. Number of households was used to normalize costs in other studies. Households were selected because it is the most common cost factor from other studies. Quantitative analysis of cost factors that may affect cost per household are presented in Appendix G.

Section 9.4 presents a breakdown of both aggregate costs and individual city costs into the cost classifications of new, existing, and enhanced.

9.1 COST PER HOUSEHOLD

Table 9-1 presents the number of households for the cities surveyed.

Table 9-1. Number of Households for Surveyed Areas

Area	Households
City of Corona	39,271
City of Encinitas	23,843
City of Fremont	69,452
Fresno-Clovis Metropolitan Area[1]	195,311
City of Sacramento	163,957
City of Santa Clarita	52,442

1. The sum of the number of households for city of Clovis, city of Fresno, and the portion of Fresno County served by the FMFCD, which was calculated using the population of Fresno County served by the district, 65,000 (Pomaville, e-mail communication, 9/13/04), and average persons per household for the county (www.census.gov).

Normalized costs are presented in Table 9-2. Annual total cost per household ranged from $18 to $46 for the six cities. The small data set limits the statistical conclusions which may be drawn. Some anecdotal observations are presented below. These costs, ordered by the size of the city, are displayed in Figure 9-1.

The "true" mean in Table 9-2 is based on the sample of all households in the surveyed municipalities. It is calculated by dividing the total stormwater costs of all cities by the number of households of all cities in this survey. This gives a true average cost per household, while averaging the six cost per household values assigns equal weight to each city regardless of how many households are in each city.

Table 9-2. Summary of Normalized Stormwater Costs for Municipalities

Municipalities	Municipality Description	Cost/Household ($)
City of Encinitas	Coastal tourism, small city	46
City of Fremont	Bay Area, moderately integrated countywide program	45
City of Santa Clarita	Tourism and industrial	39
City of Corona	Industrial	32
City of Sacramento	Pumped stormwater, large city	29
Fresno-Clovis Metropolitan Area	65-90% infiltration, fully integrated multi-city program	18
Summary Statistics		
Mean of the six values for each city		35
Median of the six values for each city		36
Standard Deviation of the six values for each city		11
True Mean[1]		29

1. The "true" mean is the aggregate stormwater cost for all cities surveyed divided by the aggregate number of households

9.1.1 Going Beyond Minimum Requirements

In some cases, programs in the California survey appeared to go beyond the minimum requirements of the permit. The cost of this additional effort was not included when it could be identified or estimated, such as street sweeping in Sacramento that was above the permit required frequency. Including the total cost of the street sweeping program the cost per household for Sacramento would increase $1.69. In some cases the additional effort could not be estimated. This was particularly true when stormwater activities were combined with activities that occurred more frequently than the permit requirement for the stormwater activities, such as when stormwater construction inspections for Santa Clarita were performed at every construction permit inspection and these permit inspections occurred more frequently than the permit requirement.

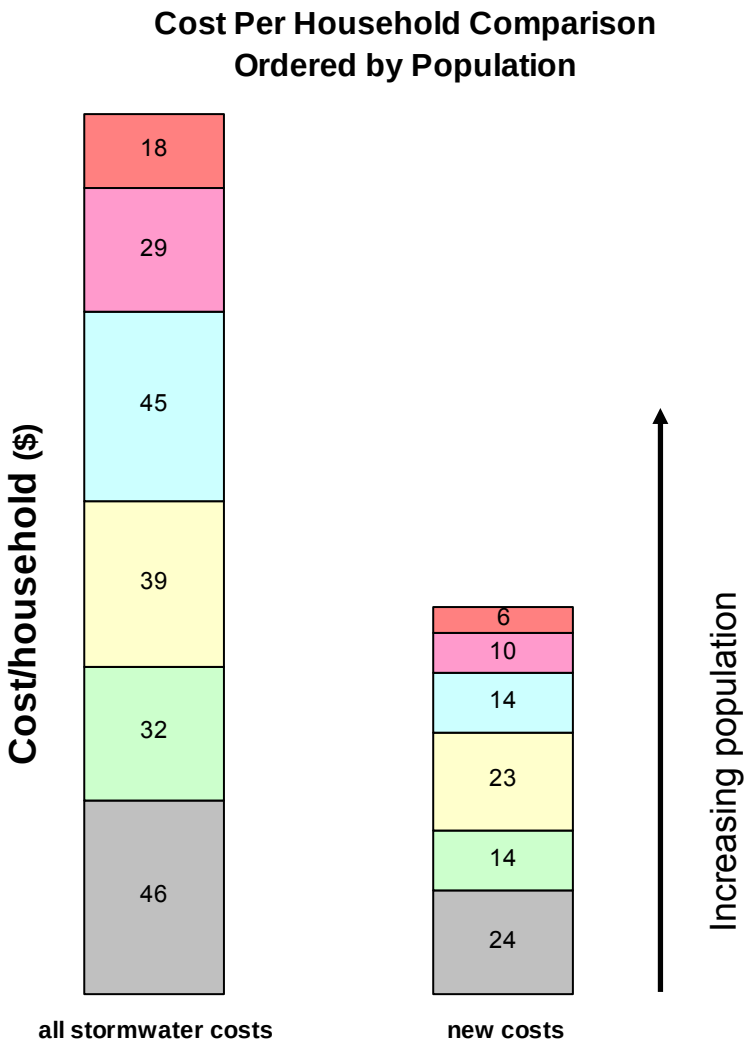

Figure 9-1. Cost per Household Comparison of Each Surveyed City.

9.1.2 Qualitative Discussion of Costs per Households

Qualitative discussion is provided here because quantitatively explaining the variation of costs per households was not successful (see Appendix G for quantitative analyses).

The FCMA had the lowest cost per household. The actual range of costs may be a smaller than what is reported in Table 9-2 because FCMA is at the bottom of this range and FCMA may not have accounted for all cost as well as other survey participants. Recall that the costs for the cities of Fresno and Clovis were based on budgeted numbers. Though the FCMA cost data collected is within the quality expectations of the study team, accounting of actual expenditures may have increased the cost for the FCMA, and decreased the range of costs found in this

survey. However, even if such increases were found, FCMA costs per household would remain substantially lower than the other cities. The following factors are thought to contribute to the FCMA costs limit costs being lower than the other survey results:

- flood control and stormwater quality basins are combined,
- land was set aside for water projects,
- climate helps infiltration due to infrequent storms and low annual rainfall,
- lower land cost compared to other cities,
- FMFCD owned land needed for basins prior to storm water permits requirements,
- topography lends to drainage of urban areas to post-construction BMPs, and
- highly permeable soils allow extensive use of infiltration.

These factors are unique or more prevalent for FCMA than for the other cities surveyed. Excluding the FCMA as an ideal situation, the range of cost is tighter, $29 to $46 per household.

As see in Table 9-2, variation in cost from the other cities is not obviously explainable by the factors of size, location, tourism, and integrated co-permittee programs. These factors are discussed in the following:

Size: Size does not seem to be important as the large cities of Fremont and Sacramento occupy opposite sides of the cost range. Further, Encinitas, population 58,014, and Fremont, population 203,413, had almost identical cost per household. The affect of size on cost per household is shown in Figure 9-1.

Location: Northern versus southern parts of the state do not seem important; however, though it may be coincidental with such a small sample size, the highest cost per household, Encinitas, was adjacent to coastal waters and the next highest, Fremont, is adjacent to South San Francisco Bay.

Tourism: A high dependence on tourism may increase visibility of stormwater problems, such as beach closures and litter. This may not be a very important cost factor because Fremont and Encinitas have very similar cost per household, and yet Encinitas seems to have a far greater reliance on tourism.

Integrated programs: An integrated program is one in which an overseeing agency establishes a common approach in implementing stormwater activities. Certainly in the case of FCMA, an integrated program seems to be an important factor. No other city surveyed had a program in which a single agency implemented a comprehensive plan for post-construction stormwater control for all permittees as did FMFCD for the FCMA. This integration may contribute to relatively low cost per household; however, on the other extreme of the cost range was Fremont, who participates in the Alameda County Clean Water Program.

Not all qualitative factors could be discussed here. Cyre (1983) reports on other qualitative factors that often affect how much a city spends on stormwater activities. Besides the factors discussed above, perceived equity, public acceptance (i.e. willingness-to-pay), and jurisdictional considerations are expected to have an influence on costs.

9.2 AGGREGATE COST BREAKDOWN BY COST CATEGORIES

The distribution of total stormwater costs among the cost categories is shown in Figure 9-2. Note that pollution prevention costs are subdivided into the percent of cost attributed to street sweeping and the percent for all other pollution prevention activities.

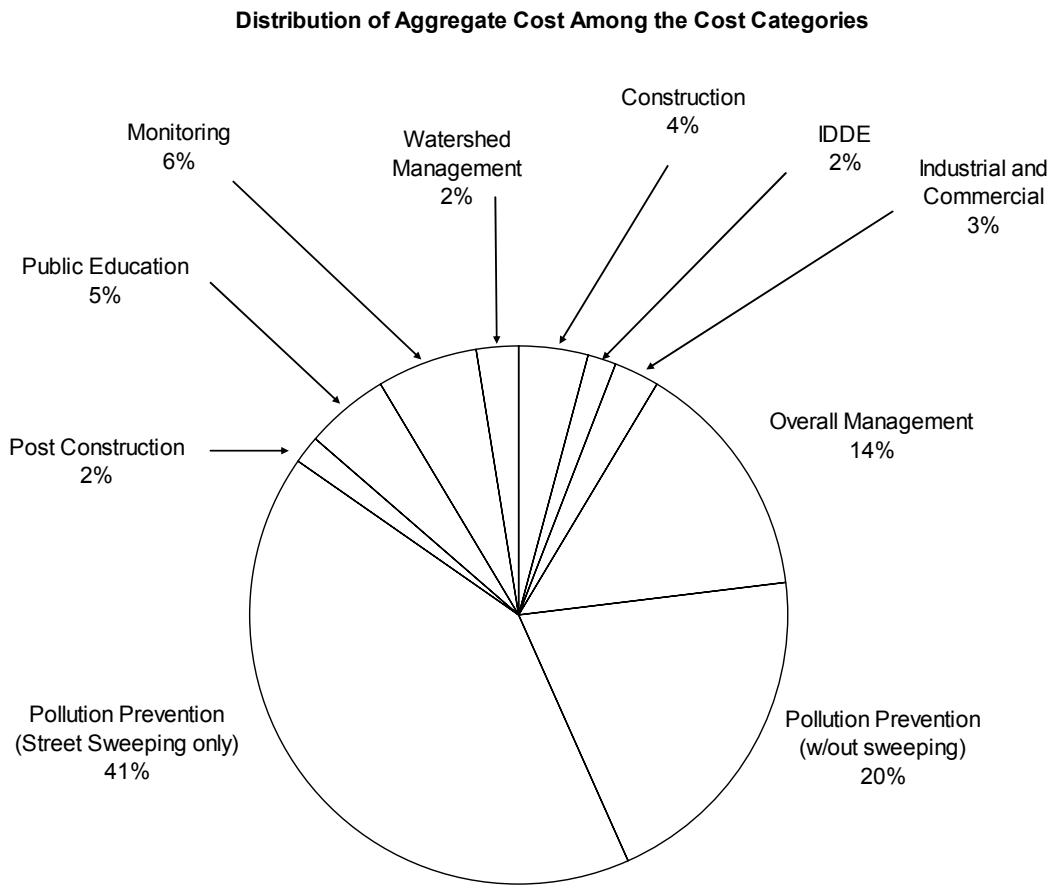

Figure 9-2. Distribution of Aggregate Costs among Cost Categories

9.3 NEW, EXISTING, AND ENHANCED COSTS

Costs for all stormwater activities were identified as new, existing, or enhanced according to the extent that the activity existed before the first stormwater permit. New costs are for activities that are exclusively a result of compliance efforts with the stormwater permit.

Understanding Enhanced Costs

Some stormwater activities preexisted stormwater permits, but permit requirements caused an increase in effort. Enhanced costs include all costs of these impacted activities, and not just the additional amount due to the increase in activities.

Existing costs are for activities that predated stormwater permits. Enhanced costs are for existing activities that were increased due to permit requirements. Street sweeping is a common example of an enhanced activity. Enhanced costs really consist of an unknown fraction of existing and new costs. In the street sweeping case, it seems that the majority, if not all street sweeping costs for some cities, preexisted stormwater permits. Other cases may be similar. Enhanced costs include street sweeping, drain and channel cleaning, and pump station cleaning. Enhanced costs are the total costs for the impacted activities, and not just the increase in cost. Table 9-3 shows the percentage of stormwater costs attributed to new, existing, and enhanced for each city. The distribution of aggregate cost among these classifications is shown in Figure 9-3.

Distribution of Aggregate Cost Between New, Enhanced, and Existing Costs

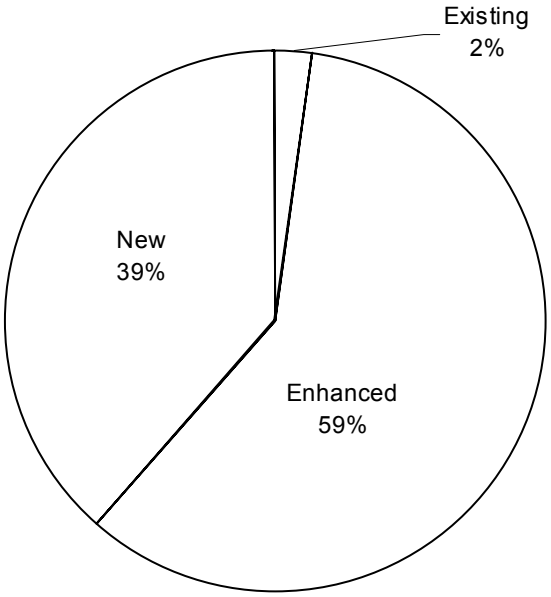

New , Enhanced, and Existing are determined by w hether the cost existed prior to the first stormw ater permit. Enhanced cost existed, but permit requirements caused an increase in cost. Enhanced costs are the total cost for the impacted activities, and not just the increase in cost.

Figure 9-3. Breakdown of Aggregate Costs into New, Existing, and Enhanced Costs

It was proposed in meetings of the TAG that cities with utility fees for stormwater may be less likely to have a high percentage of enhanced costs. This was not observed in the cities surveyed. In fact, cities with a stormwater fee happen to have a larger percentage of ‘enhanced’ costs, but the observation is not conclusive due to limited sample size. This observation is shown in Table 9-3.

Table 9-3. New, Existing, and Enhanced Cost for Each City

Municipality or Area	Existing	% Ex.	Enhanced	% En.	New	% New	Total	Utility Fee
City of Corona	37,651	3%	651,850	52%	561,365	45%	1,250,866	no
City of Encinitas	16,250	1%	490,786	45%	580,002	53%	1,087,038	no
City of Fremont	200,000	6%	1,915,836	62%	985,605	32%	3,101,442	yes
Fresno-Clovis Area	57,539	2%	2,211,196	63%	1,206,295	35%	3,475,029	yes
City of Sacramento	0	0%	3,257,674	68%	1,562,299	32%	4,819,973	yes
City of Santa Clarita	50,403	2%	809,351	39%	1,210,082	59%	2,069,836	yes
Total	**361,842**		**9,336,694**		**6,105,648**		**15,804,184**	

All the enhanced cost activities are under the Pollution Prevention cost category. Of the 59 percent of aggregate cost attributable to enhanced costs, 70 percent was for street sweeping. Figure 9-4 shows the distribution of enhanced cost among the pollution prevention activities.

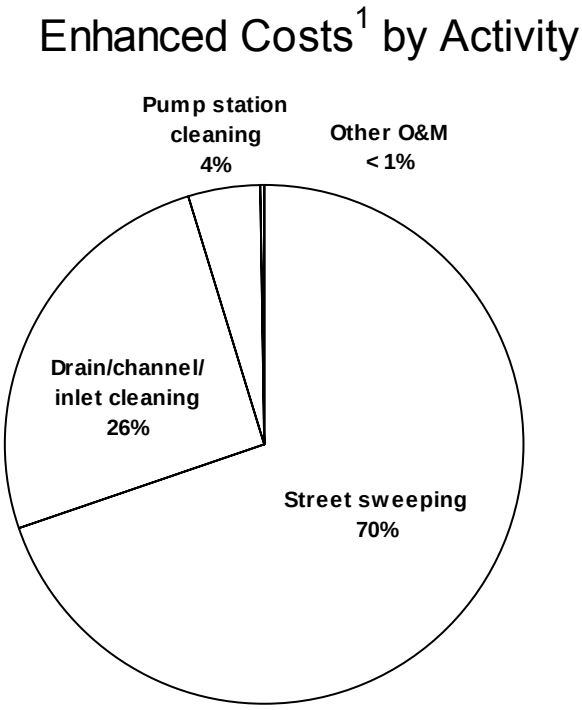

1. Enhanced costs, which is 58% of all costs, has an unknown breakdown between new and exisiting costs

Figure 9-4. Breakdown of Enhanced Costs by Stormwater Activity

Existing costs, while only two percent of all cost, are mostly pollution prevention costs as seen in Figure 9-5. A single activity for one city, litter and debris removal for the city of Encinitas, accounts for 66 percent of the existing pollution prevention cost for all cities.

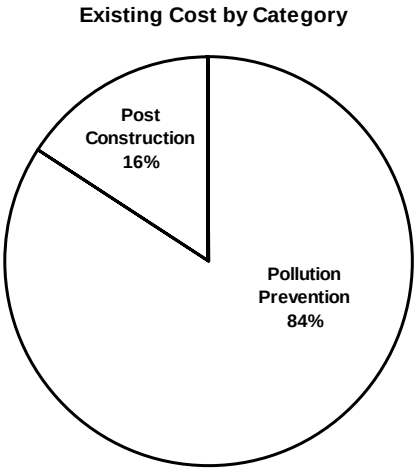

Figure 9-5. Breakdown of Existing Costs by Cost Category

New costs include cost from all categories. One hundred percent of all categories under "new" were identified as new cost, except for post construction and pollution prevention. Figure 9-6 shows the distribution of new costs among the cost categories.

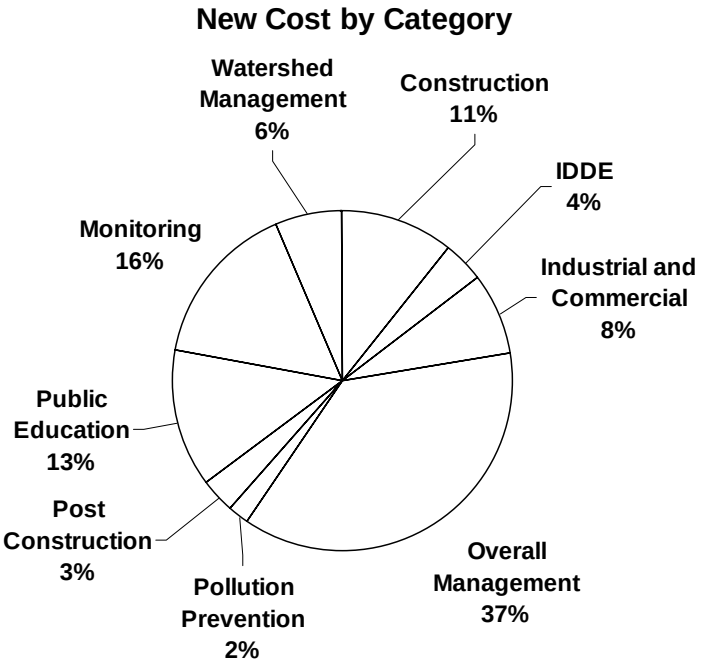

Figure 9-6. Breakdown of New Costs by Cost Category

The distribution, among new, existing, and enhanced, of aggregate cost for all cost categories is shown in Table 9-4. Figure 9-7 shows average cost per household for all stormwater costs and for only new stormwater costs.

Table 9-4. Distribution of Aggregate Cost Category between New, Existing, and Enhanced Classifications[1]

	% New	% Existing	% Enhanced[2]
Construction	100%	0%	0%
IDDE	100%	0%	0%
Industrial and Commercial	100%	0%	0%
Overall Management	100%	0%	0%
Pollution Prevention	1%	3%	96%
Post Construction	78%	22%	0%
Public Education	100%	0%	0%
Monitoring	100%	0%	0%
Watershed Management	100%	0%	0%

1. New, Enhanced, and Existing are determined by whether the cost existed prior to the first stormwater permit. Enhanced cost existed, but permit requirements caused an increase in cost.
2. Enhanced costs are the total cost for the impacted activities, and not just the increase in cost and as such, enhanced costs are made of unknown distribution between new and existing costs.

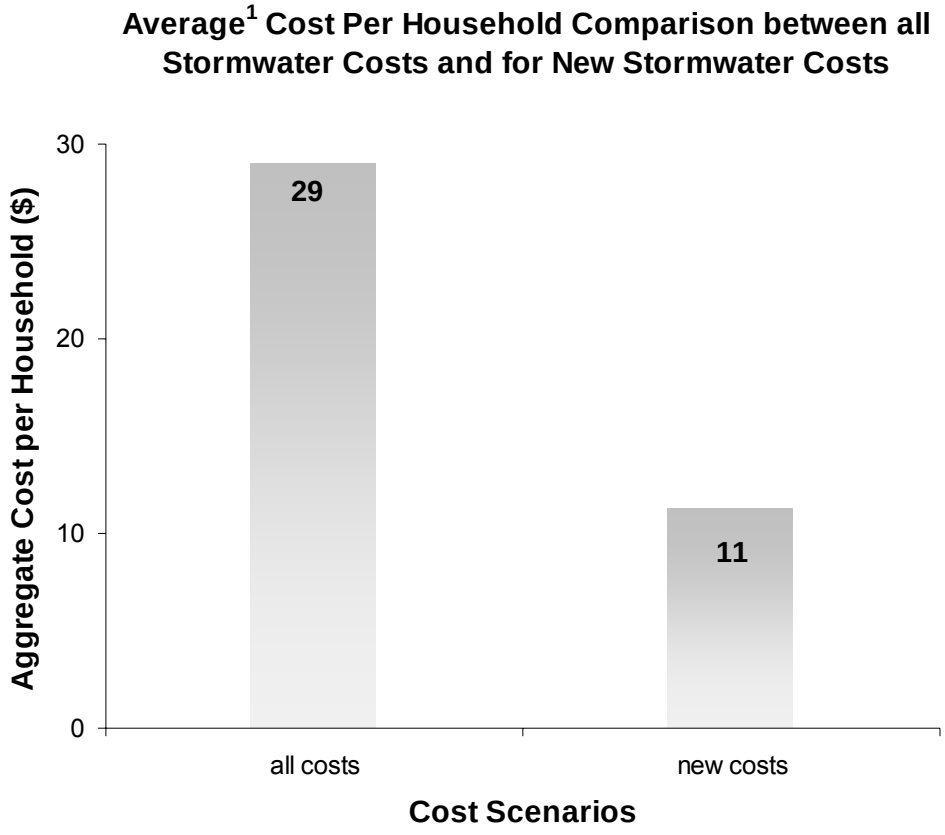

1. Average cost per household is the aggregate cost divided by the aggregate number of households.

Figure 9-7. Comparison of Aggregate Cost per Household for All Costs and for New Costs

9.4 DISCUSSION OF STORMWATER COSTS FOR SELECTED COST CATEGORIES

Noteworthy observations of costs for select categories are presented in this section. Only a qualitative discussion is warranted due to insufficient data.

Overall Stormwater Management: This category included legal fees. Appellant fees are excluded, but legal advice on program implementation and response to citizen suits are included. It is assumed that if legal fees are incurred, it is a cost of running a stormwater program. Legal costs were always less than 18 percent of the total cost of this category.

Pollution Prevention: Street sweeping accounts for 68 percent of the cost of this category as seen in Figure 9-8. The unit cost of street sweeping was a commonly asked question during TAG reviews. A summary of street sweeping statistics is presented in Table 9-5. No explanation was identified for the variation in street sweeping costs, though it does not exceed the estimated cost

from the Rouge River study (see Section 9-6 for comparisons). One suggestion not observed in the data is that frequency has an effect on unit cost because more frequent sweeping increase cost efficiency. Table 9-5 shows unit cost of street sweeping and approximate frequency sorted by unit cost. Clearly, differences in street sweeping practices, such as sweeper speed, will affect costs.

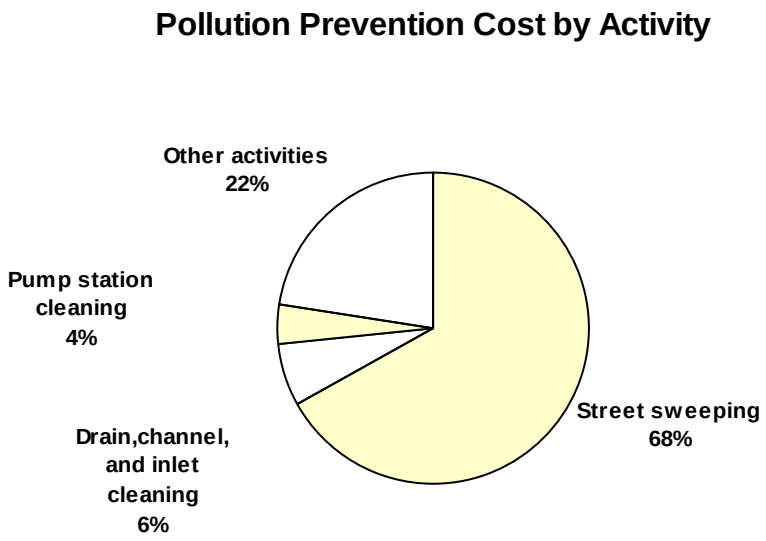

Figure 9-8. Breakdown of Pollution Prevention Costs by Activity.

Table 9-5. Street Sweeping Statistics for Municipalities

Municipality	Street Sweeping Costs ($)	Annual Curb Miles Swept	Cost Per Curb Mile Swept ($/curb mile)	Estimated Annual Frequency[2]
Fremont	1,915,000	31,405	61	12
Sacramento	1,322,748	26,450	50	12
Encinitas	117,962	5,832	20	12
Corona	414,215	20,877	20	26
Fresno-Clovis Area[1]	2,193,296	142,411	15	12
Santa Clarita	557,443	46,800	12	50

1. A breakdown of costs and number of miles swept for the cities of Fresno and Clovis can be found in Appendix Table D-5. Frequency for the city of Fresno was found at http://www.fresno.gov/public_utilities/sanitation/cleanup_street_clean.asp.
2. When an average frequency was not available, frequency was taken as the frequency for residential areas.

Post Construction: Post Construction costs are expected to increase dramatically as cities move into full implementation of SUSMP type requirements for new development and redevelopment.

The reported costs are particularly misleading for cost projection purposes since the research coincides with the start of SUSMP type requirements implementation.

9.5 LIMITATIONS

The information presented is anecdotal. It should not be used to establish a measure of compliance because of the lack of quantitative explanations for the observed variability in cost per household.

9.6 COMPARISONS TO OTHER STUDIES AND SURVEYS

The normalized costs from this cost survey were compared to outside literature (e.g. studies, professional papers, conference proceedings, etc.). Other cost sources include, the NAFSMA survey of Phase II costs, the USEPA review of cost submitted in Phase I permits, the Rouge River National Wet Weather Demonstration Project, street sweeping costs for the city of San Antonio, and projected cost (based on actual expenditures) for the city of Los Angeles. It is important to recognize that the study team did not establish the quality of this other data. However, in some cases literature data could be excluded based on the available information. For example, flow conveyance costs were not included in the California survey; but in some cases they were reported as stormwater costs in other studies, such as the Black and Veach "stormwater utility" survey (2002). This could be because stormwater cost estimates are used to develop a single fee that is used to fund both conveyance and NPDES permit compliance activities.

9.6.1 Current Los Angeles Cost Estimate

Staff of the Los Angeles Regional Water Quality Control Board estimated the cost to comply with the Los Angeles County municipal storm water permit. Using the estimation method believed to be most reliable, Radulescu and Swamikannu (2003) estimated cost per household to be $18. It does not appear that stormwater conveyance costs were included in these costs.

9.6.2 National Association of Flood and Stormwater Management Agencies (NAFSMA) Survey

The USEPA report "Economic Analysis of the Final Phase II Stormwater Rule" contains a summary of costs from two separate efforts to estimate Phase II cost per household. The first is the results of a survey stormwater costs for 56 Phase II municipalities performed by NAFSMA. The NAFSMA survey of five cost measures represents the six minimum measures of the Phase II regulations because two measures seemed to have been combined: 1) Public Education and Outreach and 2) Public Involvement and Participation.

The second effort presented in the USEPA report is that of a review, performed by USEPA, of 26 Phase I municipalities. These 26 municipalities were chosen they were relatively small Phase

I cities, they were nearly in the first permit term, and they had cost published in their annual reports.

The California survey results for the same five minimum measures were extracted to compare to the NAFSMA survey and the EPA review in Table 9-6. The costs were adjusted to 2003 dollars using the Consumer Price Index Urban (U.S. Bureau of Labor Statistics, 2005).

Table 9-6. Stormwater Costs per Household for Six[1] Minimum Measures from the California Survey, the NAFSMA[2] Phase II Survey, and the USEPA review of Phase I Annual Reports (USEPA, 1999)

Study	Median (50%) ($)	Mean ($)	Max ($)
Adjusted California Survey[3]	24	26	35
NAFSMA Phase II Survey[4]	4.63	10	61
EPA Phase I Survey[5]	3.16	10	67

1. Public Education and Outreach and Public Involvement and Participation were assumed combined for the NAFSMA survey.
2. NAFSMA: National Association of Flood and Stormwater Management Agencies
3. Based only on costs from cost categories that correspond to the six minimum measures
4. NAFSMA survey based on 56 Phase II respondents to a survey on stormwater costs for five minimum measures. Values adjusted to 2003 dollars.
5. EPA results based on a review of 26 annual reports for smaller Phase I cities that were nearly in their first NPDES term so that costs would be more representative of Phase II programs. Values adjusted to 2003 dollars.

9.6.3 Rouge River National Wet Weather Demonstration Project (Furguson, 1997)[7]

This study collected cost information for stormwater runoff controls. Total stormwater costs for municipalities in the Rouge River project were not reported. Costs were available for municipal operations and for public education. These costs are not presented here because further information is needed to indicate how the California cities compare to the Rouge River programs. First, municipal operations often include flood conveyance costs and without further information, cost comparisons are not appropriate. Second, without knowing the total stormwater cost of these cities, comparison to individual programs are not presented because cities may focus on different stormwater programs (different cost categories) based on local concerns. This may be especially true of public education costs.

Costs were also available for street sweeping. The Plymouth Township street sweeping costs were reported at $78/curb mile. This number can be compared to the range of cost per curb mile in the California survey, which was $12 to $61 per curb mile. Also, the reported cost range for contracted street sweeping costs for the Rouge River project was from $149 to $172 per curb mile. It was not investigated why contracted street sweeping is so much higher.

[7] All Rouge River costs were presented in 1997 dollars and these were converted to 2003 dollars.

9.6.4 San Antonio Street Sweeping Costs

The city of San Antonio is reported to spend $3.5 million on street sweeping (Brazozowski, 2004). The city of San Antonio estimates that around 45,000 curb miles were swept (Martinez, 2004). This results in a cost per mile swept of $78. The highest cost per mile from the California survey was $61, indicating costs per mile from the survey are reasonable despite a wide range.

This section discusses the significance of cost survey results and suggests standards for reporting cost and activities performed. These suggestions are meant to build the dataset necessary to make management decisions on stormwater program implementation.

10.1 SIGNIFICANCE OF SURVEYED STORMWATER COSTS IN CALIFORNIA

The range of 2002/03 fiscal year stormwater costs for the six municipal areas[8] surveyed was $18 to $46 per household. This only provides a snap shot of costs in 2002/2003 of good California Stormwater programs. Costs will change as requirements change with each new permit.

A specific example of increasing permit requirements is TMDL compliance. TMDL costs are sometimes addressed within the implementation plans or the cost to achieve water quality objectives may already be addressed in 305 (b) reports[9]. Since TMDL requirements will be added to stormwater permits, these cost estimates are an indication of how permit compliance costs will be increasing. However, TMDL allocations may be distributed to a variety of sources besides stormwater, thus stormwater treatment will not bear the entire burden of restoring beneficial use to impaired waters.

Another factor affecting cost in the near term is the increased level of attention given to Standard Urban Stormwater Mitigation Plans (SUSMPs). Post-construction costs in particular are expected to increase significantly, but that cost may be borne by developers and contractors rather than municipalities.

Although compliance with construction and industrial permits is discussed in stormwater permits, the costs for municipalities to comply with these permits are not addressed in this report.

10.2 SUGGESTIONS FOR REPORTING COSTS AND ACCOMPLISHMENTS

Current variability in the organization and content of the data submitted by the cities indicates standards for reporting costs and stormwater activities are needed to allow accurate cost comparisons to be made between stormwater activities. This cost information is crucial in making management decisions regarding which stormwater activities should be implemented.

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[8] The Fresno-Clovis Metropolitan Area includes the stormwater costs of the cities of Fresno and Clovis.

[9] Even if TMDL plans do not address cost, Section 305 (b) states "each State shall prepare and submit….a report which shall include…an estimate of the environmental impact, the economic and social costs necessary to achieve the objective of this chapter in such State, including an estimate of the costs of implementing such programs". First, assuming all 303 (d) listed waters are a subset of 305 (b) waters, it could be assumed that the CWA requires a cost analysis for TMDL implementation plans (which is interpreted as "each State shall prepare…". Otherwise it seems to be required in the State's "305(b) report". Either way, analysis of the cost to restore water quality may be an ongoing requirement.

The following recommendations for cost reporting are only the first step in the process of developing consistent cost reporting. This process includes notifying cities of reporting goals, receiving feedback and data from the cities, reviewing reported costs for quality and consistency, and providing feedback to the cities.

10.2.1 Current Variability

In this survey, there seemed be inconsistent reporting and tracking of stormwater activities and associated costs. This could be from differences in the reporting requirements for each permit. The reasons for these differences were not investigated; however, some possibilities are discussed. One reason may be that interest in cost may vary between RWQCB jurisdictions. Also, cost tracking systems used by the cities may not be designed to accurately track stormwater costs by activity. According to a survey conducted in 2001-2002, only 50 percent of 122 surveyed stormwater utilities said that their accounting system permitted cost tracking by operating activity (e.g. inlet cleaning) (Black and Veatch, 2002). Also, Radulescu and Swamikannu (2003) note that current governmental accounting standards do not require a distinction of stormwater costs. This was confirmed by a review of these standards by the study team.

10.2.2 Proposed Data Tracking and Reporting

A separate fund to account for stormwater related expenditures would provide cities with a starting point for stormwater cost collection. Cities would be able to use this fund for stormwater related expenditures needed for annual stormwater report preparation. It is important that the fund distinguish between stormwater permit compliance costs and stormwater conveyance costs. Having a fund in place also means that the costs reported in the fund would be subject to independent audit on a yearly basis, which would increase the level of confidence in reported cost figures. Stormwater costs should be further broken down into stormwater programs.

Caution for Template Reporting Requirements

Some of the templates used in annual reports reviewed during the survey had yes/no questions for stormwater activities that discouraged quantification of accomplishments.

For all programs, there are several costs that should be tracked for each cost category discussed below. The cost for labor of stormwater staff and benefits should be tracked for each program or allocated to each program on a reasonable basis. Direct costs (e.g. phone, field and office supplies, etc.) and depreciation costs (e.g. vehicles and equipment) should also be tracked for each program. Finally, overhead allocation for the entire stormwater program should be distributed to each cost category. Overhead allocation is often estimated by the cities as a straight percentage of labor cost and includes building fees, payroll, human resources, legal, administration, and other costs that provide ancillary support for stormwater activities.

As with costs, accomplishments should be tracked to support stormwater management decisions. The ultimate goal is to be able to compare cost benefit between stormwater programs and

activities[10]. Reporting accomplishments in terms of receiving water quality benefit is ideal, but currently unrealistic.

Suggested cost categories and what activities they cover are discussed in the following sections.

Construction Site Stormwater Runoff Control

Stormwater permits require cities to implement construction programs that minimize the negative impacts of construction on MS4 stormwater quality. This is commonly accomplished by establishing city ordinances that give the city the legal authority to implement to program. This is a parallel and separate effort from the statewide construction permit issued by the SWRCB. The construction program assists contractors and developers in following appropriate USEPA guidelines for construction sites. Cities accomplish this by instituting ordinances, inspecting sites and providing training to contractors and city inspectors. The USEPA activities that apply to construction sites are divided into four different categories: runoff control, sediment control, erosion control, and good housekeeping. Runoff control activities include minimizing clearing, stabilizing drainage ways, and installing check dams, berms, grass-lined channels, and riprap. The sediment control category includes installing perimeter controls, installing sediment trapping devices, installing drain inlet protection. Erosion control activities include stabilizing exposed soils, permanent seeding, installing sod, soil roughening, protecting steep slopes, geotextiles, gradient terraces, soil retention, temporary slope drain, protecting waterways, temporary stream crossings, vegetated buffers, phase construction, construction sequencing, and dust control (USEPA, 2004).

Cost of stormwater inspections at construction sites, the number of inspections performed, and the number of active construction sites should be tracked. Only inspections should be tracked when stormwater issues are being addressed by a part of the inspection. It is suspected that some building inspectors still count inspections toward stormwater for latter phases of projects, such as interior building work, that has little impact on stormwater. This should be avoided.

Cost of training provided to inspectors and contractors should be tracked, including the cost for the participating inspectors to attend the training. The number of person-hours trained should be tracked for stormwater staff inspectors because the city must pay for each city staff member attending training. For contractor training, the number of training hours provided (regardless of group size) should be reported because the cities do not pay for the contractors to attend as they do for city staff.

Illicit Discharge Detection and Elimination

The IDDE program seeks to identify and eliminate illicit discharges to the storm sewer system. This is done by inspecting connections to the storm sewer system and requiring landowners to remediate illegal discharges. Common IDDE problems include failing septic systems,

[10] A subcommittee of the California Stormwater Quality Association (CASQA) is working on developing guidelines for program effectiveness evaluation.

industrial/business connections, recreational sewage, and sanitary sewer overflows. Costs relating to the activities of identifying illicit connections, wastewater connections to the storm drain system, and illegal dumping should be reported in this category (USEPA, 2004).

For the IDDE program, the cost of inspections for illicit connections and discharges to the stormwater drainage system and the number of inspections should be tracked. Like construction, it is difficult to account for stormwater costs because many activities performed by inspectors serve other purposes, such as inspection of the sanitary sewer system.

Cost of training provided to inspectors should be tracked, including the cost for the participating inspectors to attend the training. The number of person-hours trained should be tracked for stormwater staff inspectors in order to effectively allocate overhead cost.

Industrial and Commercial Management Programs

Similar to the construction program, the industrial and commercial program uses the development and enforcement of city ordinances to minimize pollution of MS4 stormwater. Examples of practices employed by facilities include good housekeeping such as covered material storage, emergency spill equipment, facility sweeping, no “hosing off” into storm drains, and secondary containment of industrial materials.

For the industrial and commercial program, the cost of inspections should be tracked as well as the number of industrial and commercial facilities. Also, the cost of training provided to inspectors should be tracked, including the cost for the participating inspectors to attend the training. The number of person-hours trained should be tracked for stormwater staff inspectors.

Overall Stormwater Program Management

The costs in this category are for stormwater staff costs that could not be allocated to the other cost categories. It includes costs associated with development and oversight of the entire stormwater program. Also, costs for management plans, NPDES fees, reporting, mail, legal support, travel, conferences, printing, producing manuals and handbooks, and other non-labor costs are included that could not be allocated. Normalization for this category is not practical because of the wide variety of activities, and because very few of these activities can be numerically quantified.

Pollution Prevention and Good Housekeeping for Municipal Operations

This program includes costs for source control activities relating to pet waste collection, automobile maintenance, vehicle washing, illegal dumping control, landscaping and lawn care, pest control, parking lot and street cleaning, roadway and bridge maintenance, septic system controls, storm drain system cleaning, and alternative discharge options for chlorinated water. Costs for materials management would be for alternative products, hazardous materials storage, road salt application and storage, spill response and prevention, used oil recycling, and materials management (USEPA, 2004).

For this program, the cost for street sweeping and the number of curb miles swept should be tracked. Also, the cost for drain line and channel cleaning, pump station cleaning, and similar activities along with their associated activity statistics (e.g. lbs. of debris removed) should be tracked.

Post Construction Stormwater Management in New Development and Redevelopment

This program assures that private developers implement post-construction BMPs (treatment BMPs[11] and permanent source control BMPs). This program also includes maintenance of post-construction BMPs on city-owned property. This cost is included, because unlike the construction and industrial programs, post-construction requirements are not regulated by a separate permit.

Treatment BMPs include ponds, dry extended detention ponds, wet ponds, infiltrations practices, basins, trenches, porous pavement, filtration practices, bio-retention, sand and organic filters, vegetative practices, stormwater wetland, grassed swales and filter strips, runoff pretreatment practices, catch basins and inserts, in-line storage, and manufactured products for stormwater inlets. Source control[12] or source reduction BMPs include the following activities: experimental practices, alum injection, on-lot treatment, better site design, buffer zones, open space design, urban forestry, conservation easements, infrastructure planning, narrower residential streets, eliminating curbs and gutters, green parking, alternative turnarounds and pavers, BMP inspection and maintenance, ordinances for post construction runoff, and zoning (USEPA, 2004). If the city performs these activities in-house, the costs should be included in this category.

Public Education, Outreach, Involvement, and Participation

Education and outreach to homeowners would cover topics such as lawn and garden care, water conservation practices, pet waste, trash management, and proper disposal of hazardous waste. General outreach would include outreach relating to commercial activities, tailoring outreach programs to minority and disadvantaged communities and children, classroom education, and educational materials. Outreach relating to new development and existing development would include low impact development, educational displays, pamphlets, booklets, and utility stuffers, media, promotional giveaways, and pollution prevention for businesses. Relating to public involvement and participation, activities would include storm drain marking, stream cleanup and monitoring, volunteer monitoring, reforestation programs, wetland plantings, adopt-a-stream programs, watershed organization, stakeholder meetings, attitude surveys, and community hotlines (USEPA, 2004).

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[11] Treatment BMPs have been called structural BMPs, but the term 'treatment BMP' is preferred since source control BMPs often have structural components.

[12] The USEPA defines these as "nonstructural", but some source controls such as berms and material covers and many erosion controls are structural so the term source control or source reduction is used in this report.

It is unclear at this time of the utility of tracking specific costs of this program and how they may be related to water quality improvements.

Water Quality Monitoring

The program tracks costs related to monitoring or both stormwater and receiving water quality. These costs cover preparation of monitoring plans, sample collection, sampling equipment, laboratory analysis, data analysis, and reporting.

Watershed Management

This program can be used to track cost for watershed meetings, meeting with stakeholders, and development of watershed management plans. It may also be an appropriate category for coordination costs for TMDL planning.

Conclusion on Category Recommendations

It may prove that costs cannot be reported as suggested. Flexibility in compliance is an important aspect to cost effectiveness, however, too much flexibility in reporting requirements generates a useless dataset. At a minimum, it is suggested that annual reports throughout the state follow a standard format for cost reporting, whether the one suggested here is followed or not.

10.3 TAG RECOMMENDATIONS FOR COST TRACKING

The TAG proposes that if the permittees have a correct cost accounting/reporting system, they would be granted an additional quantity of points towards their receipt of a grant under a state/federal program; for example, Section 319(h) grants are evaluated on a point ranking system that is established by a state. If the cost accounting/reporting information were tabulated pursuant to the state's suggested format, that applicant would receive a bonus allotment equal to a boost in total points of approximately 15 percent. This would alert permittees to the benefit in competing for these grants as a prerequisite to establishing the appropriate cost accounting system. The proposed system would benefit from review and acceptance by the California League of Cities.

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ACCWP: Alameda Countywide Clean Water Program

BMP: best management practice[13]

CAFR: Comprehensive Annual Financial Report

CASQA: California Stormwater Quality Association

CFR: Code of Federal Regulations

CPR: Coalition for Practical Regulation

CSUF: California State University, Fresno

CSUS: California State University, Sacramento

CWA: Clean Water Act

DAMP: Drainage Area Master Plan

FCMA: Fresno-Clovis Metropolitan Area

FMFCD: Fresno Metropolitan Flood Control District

GIS: Geographic Information System

IDDE: Illicit Discharge Detection and Elimination

IPM: integrated pest management

JURMP: Jurisdictional Urban Runoff Management Program

LAFCD: Los Angeles Flood Control District

LARWQCB: Los Angeles Regional Water Quality Control Board

MEP: maximum extent practicable

MS4: Municipal Separate Storm Sewer System

NAFSMA: National Association of Flood and Stormwater Management Agencies

NPDES: National Pollutant Discharge Elimination System

[13] BMP, as used in this report, refers to conventional BMPs that operate without power or operators. It does not include advanced treatment.

OWP: Office of Water Programs

RWQCB: Regional Water Quality Control Board

SAR-DAMP: Santa Ana Regional Drainage Area Management Plan

SQIP: Stormwater Quality Improvement Plan

SUSMP: Standard Urban Storm Water Mitigation Plan

SWMP: Storm Water Management Plan

SWPPP: Storm Water Pollution Prevention Plan

SWRCB: State Water Resource Control Board

TAG: technical advisory group

TMDL: total maximum daily load

UCLA: University of California, Los Angeles

USC: University of Southern California

USD: Union Sanitation District

USEPA: United States Environmental Protection Agency

WERF: Water Environment Research Foundation

The backup calculations for the cost for each cost survey category in Section 3 and the sources of the cost data are presented in this appendix. Tables generally are presented by sequentially increasing levels of detail. Figure A-1 illustrates how data is shared throughout the tables.

Table A-1 contains all costs organized into the various standard cost survey categories. The subtotals for each cost category are also presented in Section 3, Table 3-2. The remaining tables (A-2 through A-12) present the detailed back-up information for the numbers in Table A-1. Table A-1 is linked to the back-up tables by the table and item numbers in the 'Source' column. Most of the cost information provided by city staff is listed in Table A-2. Item numbers corresponding to the subtotals in Table A-2 were added to the left hand column to easily show how the numbers are pulled forward to Table A-1. The right hand column in Table A-2 was added to show how costs were allocated to the cost survey categories. Table A-1 entries that were not taken directly from Table A-2 are found in Tables A-3 through A-12.

Table A-1 also provides statistics describing the level of effort for certain activities by numerically representing what or how much was accomplished. References are provided within Table A-1 for the activity statistics. Where relevant statistics are available, normalized costs are calculated in Table A-1. Normalized costs are calculated by dividing the cost of the category or activity by the activity statistic.

For the city of Corona, labor costs of the stormwater staff are not distributed among the cost survey categories. Instead, it is all captured under Overall Stormwater Program Management. Thus, comparing costs with other municipalities where such costs are distributed, Corona's Overall Stormwater Management Program costs will be higher.

Detailed descriptions of how the costs were developed are contained in the following paragraphs.

Construction Site Stormwater Runoff Control

The total cost of this category was $53,382. The costs of the construction runoff control category include labor and vehicle usage expenses for inspections and meetings, vehicle usage expense for stormwater staff for follow-up visits, training stormwater staff for construction, and phone costs by stormwater staff. The labor and vehicle cost for inspections was taken directly from Table A-2. These inspections were performed by the Inspection Division of the Public Works Department (Michele Colbert, personal communication, city of Corona, 3/12/04).

The construction site inspectors also had weekly meetings that covered stormwater issues. City staff estimated that an average of 10 minutes per meeting were spent covering stormwater issues (Michele Colbert, pers. comm., 3/12/04). Table A-8 calculates the cost associated with covering stormwater issues in these meetings, assuming 50 meetings per year.

Follow-up visits for coordination and advisement were performed by the stormwater staff. As mentioned before, these labor costs are not allocated to the construction category because it was

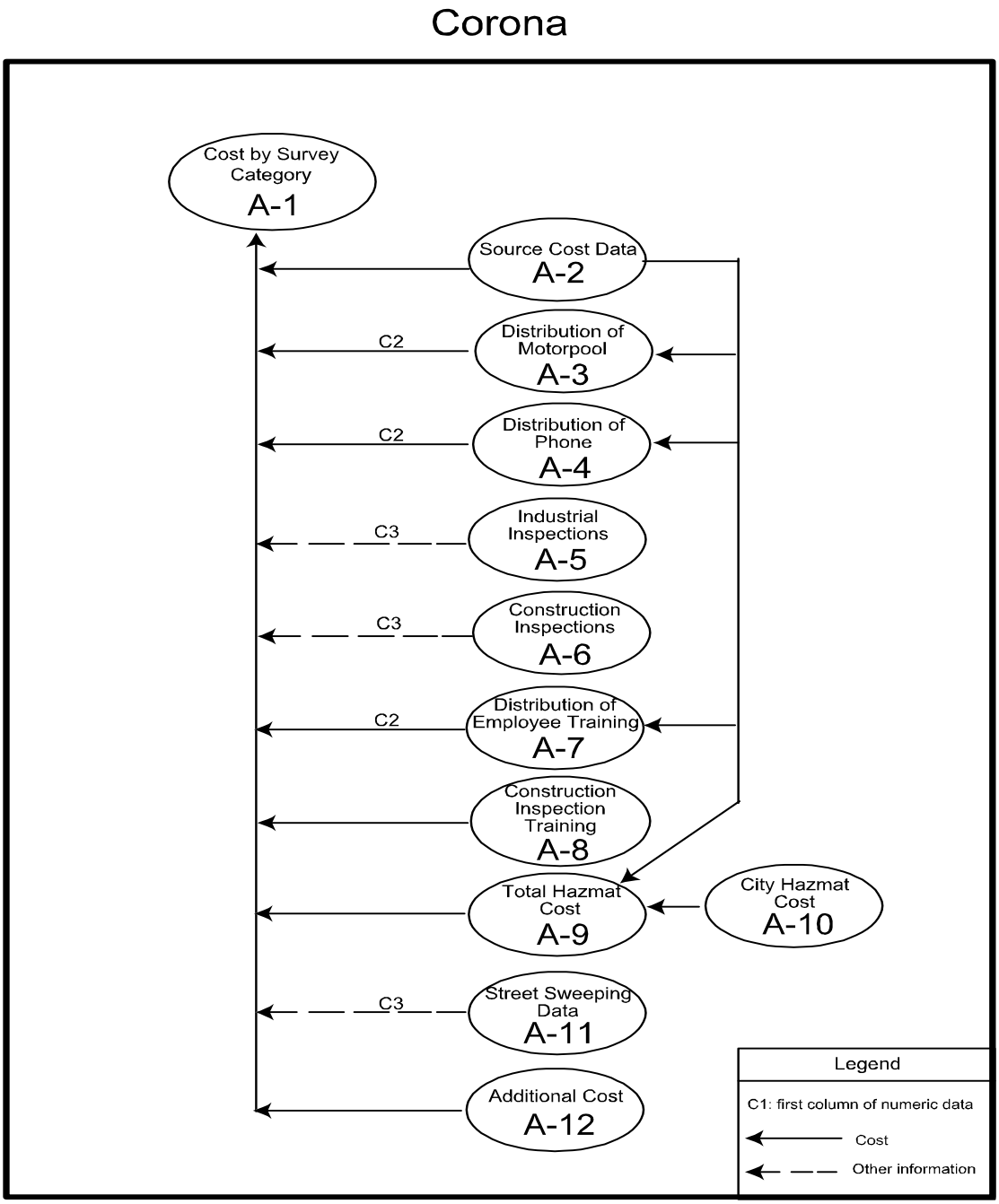

Figure A-1. Corona Flowchart of Cost Tables

difficult for city staff to estimate the distribution of stormwater staff time to the various categories. The allocation of vehicle usage by stormwater staff was estimated by percentages provided by city staff (Michele Colbert, pers. comm., 3/12/04). This information was used in Table A-3 in conjunction with the total cost in Table A-2 to estimate the cost of the vehicle for the construction category. Likewise, the phone charges used on these visits were allocated to construction in Table A-4.

The city of Corona incurred employee training costs (item 26, Table A-2) that had a portion allocated to the construction category in Table A-7 according to percentages provided by city staff (Michele Colbert, pers. comm., 3/12/04).

City staff provided information regarding construction site inspections, which were summarized in Table A-6. Total inspections were calculated in Table A-6 to be 564. The overall normalized cost, calculated by dividing the total cost of the category by the number of inspections is $95/inspection.

Illicit Discharge Detection and Elimination (IDDE)

The total cost of this category was $20,628. The IDDE program was implemented by the source control division and public works inspection division of the city of Corona. The costs attributed to this category were for the stormwater share of inspections performed by source control staff and inspection staff for other illicit connections at industrial, commercial, and new development sites (Table A-2). The source control inspection cost was developed by estimating how much time inspectors took looking for illicit discharges while doing regular inspections of industrial and commercial sites (3,050). Seventy such inspections were made during the 2002/03 fiscal year. The normalized cost calculated by dividing the total cost of the category by the number of inspections, is $295/inspection.

Industrial and Commercial Management Programs

The total cost of this category was $89,916. This program used public works department staff to perform inspections. This cost was taken directly from Table A-2.

As in the construction category, the stormwater staff had vehicle and phone usage expenses to perform follow-up inspections and meetings for industrial facilities. These costs were based on Table A-2, items 14 and 15 and the allocations were calculated in Tables A-3 and A-4.

Training of stormwater staff for this program was allocated according to Table A-7.

Overall Stormwater Program Management

The total cost of this category was $317,800. As discussed previously, stormwater staff costs were not distributed to the other categories. Stormwater staff labor costs are found in Table A-2, items 18 through 21. These costs are loaded costs that include salary, benefits, insurance, etc. Office supplies, telephone, and postage are taken directly from Table A-2, items 24 and 25. The cost of reporting was taken from Table A-2, item 34. Reporting costs paid for updating the Drainage Area Master Plan (DAMP). While not specifically required in the permit the information contained in the report is. For example, the city must address flow velocity and runoff value increases for new development (Permit, R8-2002-0011 section VIII.8-e). The information in the DAMP also allows the city to track spills and identify regional BMPs. The "administration services" charge is taken from Table A-2, item 27. This charge includes the allocation to stormwater for buildings, payroll, accounting, legal, and other overhead charges (Michele Colbert, pers. comm., 3/12/04).

Pollution Prevention and Good Housekeeping for Municipal Operations

The total cost of this category was $720,222. The city of Corona contracted for street sweeping services for 2002/03. These costs are shown in Table A-2, items 1 and 2. The number of curb miles swept was provided by city staff as a stand-alone worksheet. This worksheet is reproduced in Table A-11. The personnel cost of $14,000 (Table A-2, item 2) represents labor cost for the city of Corona to oversee the street sweeping contractor. The cost per curb mile swept ($20) is calculated based on total street sweeping costs.

Drain line and channel cleaning was performed in-house. The equipment rental, labor, and vehicle rental costs are presented in Table A-2 (items 3, 4, and 5 respectively). The normalized cost for this activity is based on the sum of these three costs and the total linear feet of maintained channels and drain lines. The costs for each type of facility could not be separated. Twenty-nine percent of the total linear feet was drain pipe and 71 percent was channels (Corona, 2003a).

Corona also incurred costs for hazardous material spill response. Public works and fire departments incurred costs implementing this program. These costs are calculated in Table A-9 and are based on a stand-alone worksheet provided by city staff reproduced as Table A-10. The normalized costs for hazmat responses ($465/response) are based on the total costs divided by the total number of responses.

Cost for the maintenance of the storm drain geographic information system (GIS) was taken directly from Table A-2.

The allocation of stormwater staff training expenses related to this category are calculated in Table A-7, based on Table A-2, item 26.

The cost incurred by the fire department for implementing SWPPPs for its nine fire stations are taken directly from Table A-2, item 23.

Post Construction Stormwater Management in New Development and Redevelopment

The total cost of this category was $13,509. The city staff identified two costs for this category. Both are taken directly from Table A-2. The professional services costs were for a consultant that advised the city on selection of post-construction BMPs. The drain inlet insert maintenance cost was for 8 drain inlet inserts. The normalized cost calculation gives an approximate cost per drain inlet insert of $563/insert. This normalized value is not expected to be useful in comparing program costs as part of this cost survey.

Public Education and Outreach and Public Involvement and Participation

The total cost of these categories was $28,409. The city did not track these costs separately and dividing the costs would be an artificial exercise (Michele Colbert, pers. comm., 3/12/04). All the costs for these two categories were taken directly from Tables A-2 and A-12. The descriptions for these categories in the annual report did not contain statistics that would be

useful for normalizing the costs of these categories. This was confirmed in the meetings with city staff.

Water Quality Monitoring

The total cost of this category was $7,000. The cost incurred for monitoring was for ad hoc testing in support of the IDDE program. This cost can be found in Table A-2, item 31.

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Table A-1. Corona Cost Organized by Cost Survey Category

Cost Survey Categories

Activity Descriptions

Construction Site Stormwater Runoff Control

Description	External Contract	Relation to Permit[a]	Dollar Amount	Source	% of Category	Activity Statistic	Notes/Units	Reference	Normalized Cost	Notes/Units
Inspections by Public Works department		New	46,184.00	Table A-2, Item 13	86.5%	564	inspections	Table A-6	81.89	$/inspection
Share of stormwater issues in weekly inspector meetings		New	6,013.50	Table A-8	11.3%	9	person days	Calculation	641.44	$/person day
Share of vehicle used by stormwater staff for construction		New	419.40	Table A-3	0.8%					
Share of phone used by stormwater staff for construction		New	28.25	Table A-4	0.1%					
Share of training for stormwater staff for construction	x	New	736.67	Table A-7	1.4%	9	person days	Calculation	78.58	$/person day
Total			53,381.82		4.3%	of total stormwater cost				

Overall Cost Category Normalizations					
total category $ per inspection	564	inspections	Table A-6	94.65	total $/inspection
total category $ per active construction site	41	active construction sites	Colbert, pers. comm., 3/12/04	1,302.00	total $/active construction site

Illicit Discharge Detection and Elimination

Description	External Contract	Relation to Permit	Dollar Amount	Source	% of Category	Activity Statistic	Notes/Units	Reference	Normalized Cost	Notes/Units
Stormwater share of inspections by wastewater staff		New	11,007.00	Table A-2, Item 22	53.4%	70	inspections	Colbert, pers. comm., 4/28/04	157.24	$/inspection
Illicit connection inspections		New	9,621.00	Table A-12	46.6%	20	inspections	Colbert, pers. comm., 4/28/04	481.05	$/inspection
Total			20,628.00		1.6%	of total stormwater cost			294.69	total $/sw inspection

Industrial and Commercial Management Programs

Description	External Contract	Nature	Dollar Amount	Source	% of Category	Activity Statistic	Notes/Units	Reference	Normalized Cost	Notes/Units
Inspections		New	80,674.00	Table A-2, Item 11	89.7%	600	inspections	Table A-5	134.46	$/inspection
Share of vehicle used by stormwater staff for industrial programs		New	7,968.60	Table A-3	8.9%					
Share of phone used by stormwater staff for industrial programs		New	536.75	Table A-4	0.6%					
Share of training for industrial programs		New	736.67	Table A-7	0.8%					
Total			89,916.02		7.2%	of total stormwater cost				

Overall Stormwater Program Management

Description	External Contract	Relation to Permit	Dollar Amount	Source	% of Category	Activity Statistic	Notes/Units	Reference	Normalized Cost	Notes/Units
100% Public Works staff		New	94,476.00	Table A-2, Item 18	29.7%					
50% Public Works staff		New	59,938.00	Table A-2, Item 19	18.9%					
30% Public Works staff		New	34,874.00	Table A-2, Item 20	11.0%					
10% Public Works staff		New	6,196.00	Table A-2, Item 21	1.9%					
Office supplies and publications		New	730.00	Table A-2, Item 24	0.2%					
Telephone and postage		New	1,200.00	Table A-2, Item 25	0.4%					
Administrative service charges		New	79,367.00	Table A-2, Item 27	25.0%					
NPDES fee		New	18,516.00	Table A-2, Item 28	5.8%					
Reporting-Drainage Master Plan		New	22,503.00	Table A-2, Item 34	7.1%					
Total			317,800.00		25.4%	of total stormwater cost				

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Table A-1. Continued.

Pollution Prevention and Good Housekeeping for Municipal Operations

Description	External Contract	Relation to Permit	Dollar Amount	Source	% of Category	Activity Statistic	Notes/Units	Reference	Normalized Cost	Notes/Units
Street Sweeping						20,877	curb miles swept	Table A-11	19.84	$/curb mile swept
Street sweeping contract	x	Enhanced	400,215.00	Table A-2, Item 1	55.6%					
Oversight of street sweeping		New	14,000.00	Table A-2, Item 2	1.9%					
Drain lines/channel cleaning						30,305	linear feet inspected	Corona, 2003b	8.30	$/linear foot
Equipment rental		Enhanced	36,211.00	Table A-2, Item 3	5.0%					
Personnel		Enhanced	188,856.00	Table A-2, Item 4	26.2%					
Vehicle rental		Enhanced	26,568.00	Table A-2, Item 5	3.7%					
Hazmat Response						41	responses	Table A-10	465.15	$/response
Public Works		Existing	9,621.10	Table A-9	1.3%					
Fire		Existing	9,450.00	Colbert, 2004	1.3%	47	responses	Colbert, pers. comm., 6/16/04	201.06	$/response
GIS maintenance for storm drains		New	6,300.00	Table A-2, Item 33	0.9%					
Share of training for municipal operations	x	New	736.67	Table A-7	0.1%					
Fire department cost for SWPPP implementation		New	9,685.00	Table A-2, Item 23	1.3%	9	fire stations	Colbert, pers. comm., 4/28/04	1,076.11	$/station
Disposal costs for hazardous waste	x	Existing	12,101.68	Table A-12	1.7%					
Hazmat waste operator training classes	x	Existing	6,478.00	Table A-12	0.9%					
Total			720,222.45		57.6%	of total stormwater cost				

Post Construction Stormwater Management in New Development and Redevelopment

Description	External Contract	Relation to Permit	Dollar Amount	Source	% of Category	Activity Statistic	Notes/Units	Reference	Normalized Cost	Notes/Units
Professional services (consultant)	x	New	9,009.00	Table A-2, Item 29	66.7%					
Drain inlet insert maintenance		New	4,500.00	Table A-2, Item 35	33.3%	8	inserts	Colbert, pers. comm., 3/12/04	562.50	$/insert
Total			13,509.00		1.1%	of total stormwater cost				

Public Education, Outreach, Involvement, and Participation

Description	External Contract	Relation to Permit	Dollar Amount	Source	% of Category	Activity Statistic	Notes/Units	Reference	Normalized Cost	Notes/Units
Contribution to regional clean air public education program		New	4,000.00	Table A-2, Item 7	14.1%					
Contribution to countywide public education program		New	12,063.00	Table A-2, Item 8	42.5%					
Response to public stormwater complaints		New	8,700.00	Table A-2, Item 12	30.6%					
Share for stormwater education in new business brochures		New	300.00	Table A-2, Item 30	1.1%					
Household Hazardous Waste Collection Event		New	3,346.00	Table A-12	11.8%					
Total			28,409.00		2.3%	of total stormwater cost				

Water Quality Monitoring

Description	External Contract	Relation to Permit	Dollar Amount	Source	% of Category	Activity Statistic	Notes/Units	Reference	Normalized Cost	Notes/Units
Laboratory testing for illicit discharge program	x	New	7,000.00	Table A-2, Item 31	100.0%					
Total			7,000.00		0.6%	of total stormwater cost				

Total Stormwater Costs	1,250,866.28

a. This column indicates whether required activities were being performed prior to stormwater permits. In some cases activities were enhanced due to permit requirements.

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Table A -2. Primary Cost Data for Corona

Item #	City of Corona Category	Total Cost	Cost Survey Category[1]
	Street Cleaning/Sweeping		
1	Annual Street Sweeping Contract Cost	400,215	Pollution Prevention
2	Personnel Cost	14,000	Pollution Prevention
	Storm Drain Cleaning		
3	Equipment Rental	36,211	Pollution Prevention
4	Personnel Cost	188,856	Pollution Prevention
5	Motor Pool Rental	26,568	Pollution Prevention
	Public Education		
6	Personnel Time	0	
7	WRCOG - Clean Cities	4,000	Public Education
8	County Implementation Agreement	12,063	Public Education
	Hazmat Reponse		
9	Cost for Fire Dept.	5,000	Pollution Prevention
	Plan Check Activity		
10	Plan Check Activity	0	
	Ordinance Enforcement Activities		
11	Industrial/Commercial Inspection & Follow-Up	80,674	Industrial
12	Residential	8,700	Public Education
13	Construction (Inspection Costs)	46,184	Construction
14	Motorpool (Explorer)	8,388	See Table A-3
15	Phone	565	See Table A-4
	Code Compliance		
16	Code Compliance	0	
	Permit Administration		
17	Personnel Expenses:	0	
18	Michele (100%)	94,476	Management
19	Nabil (50%)	59,938	Management
20	Ati (30%)	34,874	Management
21	Tracy (10%)	6,196	Management
22	Source Control (10%)	11,007	Illicit Discharge
23	Fire Dept. (10%)	9,685	Pollution Prevention
24	Office Supplies and Publications	730	Management
25	Telephone and Postage	1,200	Management
26	Employee Training and Conference	2,210	See Table A-7
27	Administrative Service Charges	79,367	Management
28	Regional Water Quality Control Board	18,516	Management
29	Professional Services	9,009	Post Construction
30	Public Education and Information	300	Public Education
31	Laboratory Testing	7,000	Monitoring
32	Structural BMP	0	
33	GIS Citywide Storm Drain System	6,300	Pollution Prevention
34	Drainage Master Plan	22,503	Management
	NPDES Facilities Mitigation		
35	Facilities Mitigation	4,500	Post Construction
	Total	1,199,235	

(Source: Colbert, pers. comm., 3/12/04)

1. Cost Categories Abbreviated According to the Following:
   - Construction: Construction Site Stormwater Runoff Control
   - Illicit Discharge: Illicit Discharge Detection and Elimination
   - Industrial: Industrial and Commercial Management Programs
   - Management: Overall Stormwater Program Management

Table A – 2. Continued.

Pollution Prevention: Pollution Prevention and Good Housekeeping for Municipal Operations
Post Construction: Post Construction Water Management in New Development and Redevelopment
Public Education: Public Education, Outreach, Involvement, and Participation
Monitoring: Water Quality Monitoring
Watershed: Watershed Management

Table A-3. Distribution of Motorpool (Explorer) between Construction and Industrial/Commercial Programs

Cost	Source	Percent Allocation	Category	Reference	Allocated Cost
8,388.00	Table 2, Item 14	95%	Industrial/Commercial	Colbert, pers. comm., 4/28/04	7,968.60
8,388.00	Table 2, Item 14	5%	Construction	Colbert, pers. comm., 4/28/04	419.40
Total		100%			8,388.00

Table A-4. Distribution of Phone between Construction and Industrial/Commercial Programs

Cost	Source	Percent Allocation	Category	Reference	Allocated Cost
565.00	Table 2, Item 15	95%	Industrial/Commercial	Colbert, pers. comm., 4/28/04	536.75
565.00	Table 2, Item 15	5%	Construction	Colbert, pers. comm., 4/28/04	28.25
Total		100%			565.00

Table A-5. Calculation of Inspections for Industrial Management Programs

Site Type	Source	Annual Inspections	Reference	Inspections	
High Priority	600	1	Colbert, pers. comm., 3/12/04	600	
Medium Priority	540	0.5	Colbert, pers. comm., 3/12/04	0	*
Low Priority	1,910	0.2	Colbert, pers. comm., 4/28/04	0	*
Totals	3,050			600	

* inspections started in 03/04, not inspected in 02/03

Table A-6. Calculation of Inspections for Construction Site Stormwater Runoff Control Programs

Site Type	Number	Annual Inspections	Reference	Inspections
High Priority	6	24	Colbert, pers. comm., 3/12/04	144
Low Priority	35	12	Colbert, pers. comm., 3/12/04	420
Totals	41			564

Table A-7. Distribution of Employee Training Among

Cost	Source	Percent Allocation	Category	Allocated Cost
2,210.00	Table 2, Item 26	33%	Construction	736.67
2,210.00	Table 2, Item 26	33%	Industrial/Commercial	736.67
2,210.00	Table 2, Item 26	33%	Municipal	736.67
Total		100%		2,210.00

(Source: Colbert, pers. comm., 3/12/04)

Table A-8. Cost of Fraction of Construction Inspectors Weekly Meetings Dedicated to Stormwater Issues

Description	Dollar Amount or Statistic	Reference
Meetings per year	50	Corona, 2003b
Minutes per meeting for stormwater issues	10	Colbert, pers. comm., 3/12/04
Number of person hours	9	Calculation
Overhead Rate	$ 80.18	Colbert, pers. comm., 3/12/04
Labor Cost	$ 6,013.50	Calculation

Table A-9. Calculation of Hazmat Response Cost for Municipal Operations Program

Cost Type	Amount	Source
Fire Department	5,000.00	Table A-2, Item 9
Equipment	1,040.88	Table A-10
Materials	171.42	Table A-10
Labor	3,408.80	Table A-10
Total	9,621.10	

Table A-10. Hazardous Materials Worksheet Submitted by City of Corona Staff

Actvity PHAZM	Haz Mat Cleaned Up
Number of jobs	41
Labor Hours	129.75
Labor Cost	3,408.80
Equipment Hours	69.82
Equipment Cost	1,040.88
Materials Cost	171.42
Total Cost	**4,621.10**
Average Cost/Job	112.71
Average Labor Hours/Job	3.16
Average Equipment Hours/Job	1.70

(Source: Colbert, pers. comm., 3/12/04)

Table A-11. Street Sweeping Analysis Submitted by City of Corona Staff

Service Type	Curb Miles	Services/Year	Annual Miles	Percentage	
Residential	655	26	17,019	82%	84%
Alleys (Residential)	38	12	450	2%	
Commercial	54	52	2,786	13%	16%
Medians/Inter (Commercial)	52	12	622	3%	
Totals	797		20,877	100%	100%

(Source: Colbert, pers. comm., 3/12/04)

Table A-12. Additional Costs Identified and Submitted by the City of Corona Staff

Activity Description	Cost	Stormwater Program
Planning and labor for Household Hazardous Waste Collection Event	3,346.00	Public Education
Disposal costs for hazardous waste	12,101.68	Pollution Prevention
Hazmat waste operator training classes	6,478.00	Pollution Prevention
Illicit connection inspections	9,621.00	Ilicit Discharge
Total	31,546.68	

(Source: Colbert, pers. comm., 5/18/04)

The backup calculations for the cost for each cost survey category in Section 4 and the sources of the cost data are presented in this appendix. Tables are generally presented by sequentially increasing levels of detail. Figure B-1 illustrates how data is shared throughout the tables.

Table B-1 contains all costs organized into the various standard cost survey categories. The subtotals for each cost category are also presented in Section 4, Table 4-2. The remaining tables (B-2 through B-6) present the detailed back-up information for the numbers in Table B-1. Table B-1 is linked to the back-up tables by the table and item numbers in the 'Source' column. Most of the cost information provided by city staff is listed in Table B-2. Item numbers corresponding to the subtotals in Table B-2 were added to the left hand column to easily show how the numbers are pulled forward to Table B-1. The right hand column in Table B-2 was added to show how costs were allocated to the cost survey categories. Table B-1 entries that were not taken directly from Table B-2 are found in Tables B-3 through B-6.

For the city of Encinitas, labor, supplies, travel, equipment, and vehicle costs are distributed among the various survey categories according to estimates provided by city staff (Table B-3). Thus, comparing costs with other municipalities where such costs are not distributed, Encinitas's Overall Stormwater Management Program costs will be lower.

City staff has projected new capital projects and labor that will immediately increase their costs over the next few years. Additional labor costs will relate to engineering inspections, planning, and plan checking. Capital project costs will include installation of filter inserts, fire station wash facilities, and a storm drain. Additional operation and maintenance costs will be incurred relating to these capital projects as well.

Detailed descriptions of how the costs were developed are contained in the following paragraphs.

Construction Site Stormwater Runoff Control

The total cost of this category was $169,751. The city of Encinitas Building Department staff performed all 401 inspections during the wet season spanning from October 1, 2002 to April 30, 2003 (Encinitas, 2003b). The normalized cost, calculated by dividing the total cost of the category by the number of inspections, is $423/inspection. The stormwater staff also conducted the following activities in the construction category (descriptions obtained from annual stormwater report):

- Reviewed 5 SWPPPs
- General enforcement
- Issued 13 Notices of Violation
- Monitored weather patterns and storms in the Pacific through the National Weather Service

The costs presented in Table B-1 for the construction category include all of these activities and does not solely represent the cost for inspections. This should be considered when comparing the normalized cost per inspection for the city of Encinitas to other cities.

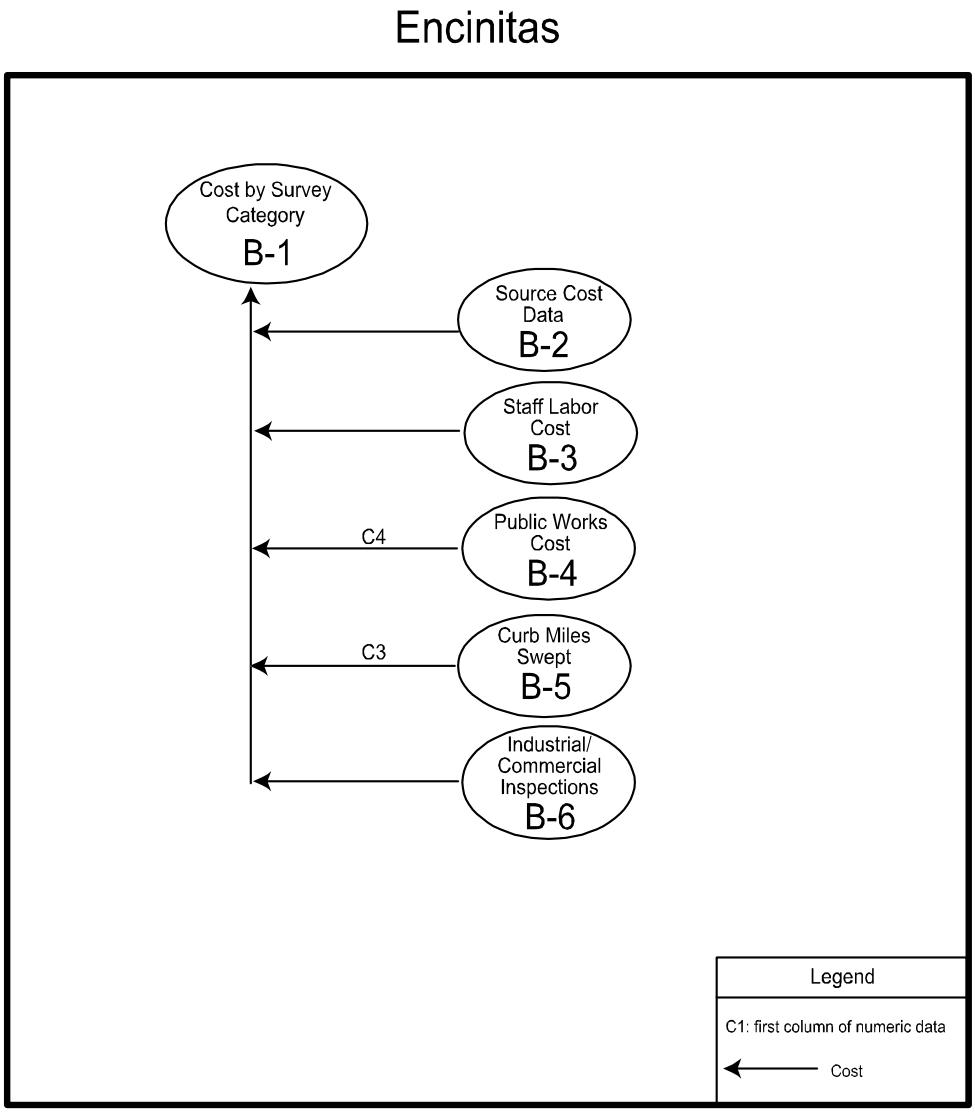

Figure B-1. Encinitas Flowchart of Cost Tables

Illicit Discharge Detection and Elimination (IDDE)

The total cost of this category was $49,378. The IDDE program was implemented by the stormwater staff. The program consists of dry weather monitoring, investigating complaints, and looking for illicit connections during regular inspections and visual inspections of the MS4 (Encinitas, 2003b). The number of inspections for the IDDE program was not available because city staff did not have a formal inspection program. However, 76 "complaints" were filed by city staff from the informal visual inspections. Another 96 complaints were received via the city's stormwater hotline. There were 172 follow up actions to these complaints. (Encinitas, 2003b).

Consequently, cost is normalized by dividing the total cost of the category by the number of follow-up activities resulting in a normalized cost of $287 per follow-up action.

Industrial and Commercial Management Programs

The total cost of this category was $65,596. Costs for this category included consultant administration services and costs for inspections. During 2002/2003, the city performed 266 industrial and commercial inspections (Table B-6). The normalized cost per inspection was $247. The city is planning on increasing inspections to 400 per year (Weldon, pers. comm., 4/2/04), which means this cost will significantly increase. Monitoring is performed at each industrial facility on an on-going basis (Encinitas, 2003b). Activities performed by the stormwater staff relating to the commercial component of this category are as follows (descriptions obtained from the annual stormwater report):

- Updated commercial facility inventory
- Provided BMP manuals and guidance
- Educated facility staff in regard to stormwater requirements and minimum BMPs
- Began development of a grease program
- Issued several enforcement actions

The costs presented in Table B-1 for this category include the cost for all of these activities and do not solely represent the cost for inspections. This should be considered when comparing the normalized cost per inspection for the city of Encinitas to other cities.

Overall Stormwater Program Management

The total cost of this category was $128,159. The city had a cost of $35,000 for developing a stormwater fee. The other activities in this category were for annual reporting and legal support for developing ordinances and plaintiff attorney fees.

Pollution Prevention and Good Housekeeping for Municipal Operations

The total cost of this category was $528,252. The largest cost of this category was street sweeping, which cost $117,962. Drain line and channel cleaning cost was $114,711 while sump, inlet, and manhole cleaning cost was $258,113. Additional activities performed were as follows (descriptions obtained from annual stormwater report):

- Engineering services for oversight, strategic planning, and management
- Trash pick-up
- Disposal of sediment
- Performed capital projects
- Updated municipal inventory

Tables B-1 and B-4 contain a breakdown of costs.

Post Construction Stormwater Management in New Development and Redevelopment

The total cost for this category was $15,344. This cost includes storm drain insert installation and maintenance costs (Weldon, pers. comm., 4/2/04). Also, professional services for UV consulting, administration, report preparation, and presentations were acquired in regard to the Moonlight Beach project.

Public Education and Outreach and Public Involvement and Participation

The total cost of these categories was $41,898. These categories were combined for the city of Encinitas due to major overlap between the two. All direct costs came directly from the data in Tables B-2 and B-4. Statistics were only available for the number of posters distributed. Activities in this category included the following (descriptions obtained from annual stormwater report):

- Dissemination of general stormwater brochures
- Stencils placed at all inlets
- Updated city website with stormwater related information
- Dissemination of door hangers
- Design, purchase, and dissemination of promotional key chains
- Dissemination of pens
- Published 9 local newspaper articles with information regarding the city's Clean Water Program and its accomplishments
- Production and dissemination of a general stormwater poster at public events
- Training of city staff
- Made two presentations to the city council and public attendees; an estimated 20 people were present at each meeting
- Printed materials were provided to contractors and developers via brochures
- Held a 2-hour construction workshop to inform the construction and development community about stormwater regulations and BMP requirements; 50 people attended
- Sent two special mailings relating to stormwater issues were sent to developers and contractors
- Special mailers were sent to restaurants and automotive businesses
- Held a workshop with the local nursery constituency to present nursery BMPs
- Held "garden care" type workshops; approximately 46 people attended
- Performed stormwater sampling with a 5th grade class and made a presentation

- Presented the watershed model to a 3rd grade class; approximately 200 children participated in the presentation
- Initiated a collaborative workgroup of several cities in the North County to develop educational outreach products and approaches on a watershed basis
- Held commercial business workshops
- Participated in a public opinion survey
- Held several community events

Water Quality Monitoring

The total cost for this category was $76,262. Costs were not normalized because they vary according to type of water quality analysis performed.

Watershed Management

The total cost for this category was $12,400. These costs consisted of watershed plan development costs and stormwater staff labor costs.

References

City of Encinitas, 2003. "City of Encinitas Stormwater Annual Report" 2003

Table B-1. Encinitas Cost Organized by Cost Survey Category

Cost Survey Categories

Activity Description

Construction Site Stormwater Runoff Control

Description	External Contract	Relation to Permit[a]	Dollar Amount	Source	% of Category	Activity Statistic	Notes/Units	Reference	Normalized Cost	Notes/Units
Construction inspections		New	150,000.00	Table B-2, Item 28	88.4%	401	inspections	Encinitas 2003b	374.06	$/inspection
Allocated labor		New	19,751.20	Table B-3	11.6%					
Total			169,751.20		15.6%	of total stormwater cost				

Overall Cost Category Normalizations					
total category $ per inspection	401	inspections	Encinitas 2003b	423.32	total $/inspection
total category $ per active construction site	40	active construction sites	Encinitas 2003b	4,243.78	total $/active constructtion site

Illicit Discharge Detection and Elimination

Description	External Contract	Relation to Permit	Dollar Amount	Source	% of Category	Activity Statistic	Notes/Units	Reference	Normalized Cost	Notes/Units
Allocated labor		New	49,378.00	Table B-3	100.0%	172	follow-up activities	Encinitas 2003b	287.08	$/follow-up activitiy
Total			49,378.00		4.5%	of total stormwater cost				

Industrial and Commercial Management Programs

Description	External Contract	Relation to Permit	Dollar Amount	Source	% of Category	Activity Statistic	Notes/Units	Reference	Normalized Cost	Notes/Units
Inspections						266	inspections	Table B-6	246.60	$/inspection
D-Max	x	New	43,600.00	Table B-2, Item 13	66.5%					
Ashford Engineering	x	New	12,120.00	Table B-2, Item 14	18.5%					
Allocated labor		New	9,875.60	Table B-3	15.1%					
Total			65,595.60		6.0%	of total stormwater cost				

Overall Stormwater Program Management

Description	External Contract	Relation to Permit	Dollar Amount	Source	% of Category	Activity Statistic	Notes/Units	Reference	Normalized Cost	Notes/Units
Annual reporting (ashford)	x	New	25,080.00	Table B-2, Item 23	19.6%					
Storm water fee development		New	35,000.00	Table B-2, Item 29	27.3%					
Miscellaneous		New	520.73	Table B-2, Item 27	0.4%					
NPDES fee		New	3,750.00	Table B-2, Item 5	2.9%					
Legal fees-ordinances	x	New	11,915.50	Table B-2, Item 25	9.3%					
Legal fees-plaintiff attorneys	x	New	9,950.00	Table B-2, Item 26	7.8%					
Grant writing		New	2,440.00	Table B-2, Item 24	1.9%					
Allocated labor		New	39,502.40	Table B-3	30.8%					
Total			128,158.63		11.8%	of total stormwater cost				

Pollution Prevention and Good Housekeeping for Municipal Operations

Description	External Contract	Relation to Permit	Dollar Amount	Source	% of Category	Activity Statistic	Notes/Units	Reference	Normalized Cost	Notes/Units
Ashford Engineering	x	New	8,840.00	Table B-2, Item 7	1.7%	4	inspections	Encinitas 2003b	2,210.00	$/inspection
Trash pick-up		Existing	2,850.00	Table B-2, Item 12	0.5%					
Trash pick-up (public works)		Existing	13,400.00	Table B-4	2.5%					
Disposal of sediment		New	2,500.00	Table B-2, Item 8	0.5%					
Allocated labor		New	9,875.60	Table B-3	1.9%					
Sumps, inlets, manholes		Enhanced	258,113.00	Table B-4	48.9%					
Drain lines and channels		Enhanced	114,711.00	Table B-4	21.7%					
Street sweeping		Enhanced	117,962.00	Table B-4	22.3%	5,832	curb miles swept	Table B-5	20.23	$/curb mile swept
Total			528,251.60		48.6%	of total stormwater cost				

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Table B-1. Continued.

Post Construction Water Management in New Development and Redevelopment

Description	External Contract	Relation to Permit	Dollar Amount	Source	% of Category	Activity Statistic	Notes/Units	Reference	Normalized Cost	Notes/Units
Overall Storm Drain Inserts Maintenance						16	inserts installed	Encinitas, 2003b	119.25	$/insert installed
Storm drain inserts		New	1,240.00	Table B-2, Item 9	8.1%					
Storm drain inserts		New	668.01	Table B-2, Item 10	4.4%					
Ashford Engineering (moonlight)	x	New	3,560.00	Table B-2, Item 11	23.2%					
Allocated labor		New	9,875.60	Table B-3	64.4%					
Total			15,343.61		1.4%	of total stormwater cost				

Public Education, Outreach, Involvement, and Participation

Description	External Contract	Relation to Permit	Dollar Amount	Source	% of Category	Activity Statistic	Notes/Units	Reference	Normalized Cost	Notes/Units
Surveys and posters		New	3,292.47	Table B-2, Item 20	7.9%					
Surveys and posters		New	2,000.00	Table B-2, Item 21	4.8%					
UC Extension workshop with nurseries.		New	2,374.00	Table B-2, Item 15	5.7%					
Ashford engineering	x	New	14,480.00	Table B-2, Item 22	34.6%					
Allocated labor		New	19,751.20	Table B-3	47.1%					
Total			41,897.67		3.9%	of total stormwater cost				

Water Quality Monitoring

Description	External Contract	Relation to Permit	Dollar Amount	Source	% of Category	Activity Statistic	Notes/Units	Reference	Normalized Cost	Notes/Units
Wet weather monitoring		New	25,186.00	Table B-2, Item 6	33.0%					
ICID dry weather monitoring		New	14,893.00	Table B-2, Item 16	19.5%					
ICID dry weather monitoring		New	3,161.00	Table B-2, Item 17	4.1%					
ICID dry weather monitoring		New	3,395.00	Table B-2, Item 18	4.5%					
Allocated labor		New	29,626.80	Table B-3	38.8%					
Total			76,261.80		7.0%	of total stormwater cost				

Watershed Management

Description	External Contract	Relation to Permit	Dollar Amount	Source	% of Category	Activity Statistic	Notes/Units	Reference	Normalized Cost	Notes/Units
Watershed plan development		New	2,524.00	Table B-2, Item 19	20.4%					
Allocated labor		New	9,875.60	Table B-3	79.6%					
Total			12,399.60		1.1%	of total stormwater cost				

Total stormwater costs	1,087,037.71

a. This column indicates whether required activities were being performed prior to stormwater permits. In some cases activities were enhanced due to permit requirements.

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Table B-2. Source Data Table Submitted by City of Encinitas (cost survey categories added)

Item #	City of Encinitas Category	Cost	Cost Survey Category[1]
1	Staff Salary	147,760.00	See Table B-3
2	Contract Staff	41,743.00	See Table B-3
3	Supplies/Travel/Equipment	5,409.00	See Table B-3
4	Vehicle	2,600.00	See Table B-3
	Permit Fees:		
5	State Water Resources Control Board	3,750.00	Management
6	Copermittee MOU Fees	25,186.00	Monitoring
	Municipal Programs:		
	Miscellaneous Contracting		
7	Ashford Engineering	8,840.00	Pollution Prevention
8	AMEC	2,500.00	Pollution Prevention
9	BMP Implementation & Maintenance	1,240.00	Post Construction
10	Downstream Services	668.01	Post Construction
11	Ashford Engineering (Moonlight)	3,560.00	Post Construction
12	Clean Up/Abatement Programs	2,850.00	Pollution Prevention
	Industrial/Commercial Programs:		
	Inspections		
13	D-Max	43,600.00	Industrial
14	Ashford Engineering	12,120.00	Industrial
	Nursery Program:		
	Inspections		
15	Education Activities (UC Regents)	2,374.00	Public Education
	Construction Programs:	0.00	
	IC/ID Program:		
	Source Tracking/Spills/Inspections	0.00	
	Water Quality Monitoring:		
16	Encina	14,893.00	Monitoring
17	Del Mar Analytical	3,161.00	Monitoring
18	San Elijo JPA	3,395.00	Monitoring
	Watershed Urban Runoff Management:		
19	Ashford Engineering	2,524.00 [2]	Watershed
20	City of Oceanside (survey& posters)	3,292.47	Public Education
21	City of Carlsbad (survey)	2,000.00	Public Education
	Education:		
22	Ashford Engineering	14,480.00	Public Education
	Reporting (JURMP/WURMP Annual Report):		
23	Ashford Engineering	25,080.00	Management
24	Grant Writing:	2,440.00	Management
	Legal Fees:		
25	Glenn Sabine	11,915.50	Management
26	Marco Gonzalez	9,950.00	Management
27	Misc.: BMP Cottonwood Creek & San Elijo Outlet	520.73	Management
28	Construction	150,000.00	Construction
29	Appropriation for Stormwater Fee Vote	35,000.00 [3]	Management
30	B&D Construction	35,887.00 [4]	Unallocated
	Total Expenditures	618,738.71	

(Source: Weldon, pers. comm., 4/2/04)

1. Cost Categories Abbreviated According to the Following:
   - Construction: Construction Site Stormwater Runoff Control
   - Illicit Discharge: Illicit Discharge Detection and Elimination
   - Industrial: Industrial and Commercial Management Programs
   - Management: Overall Stormwater Program Management

Table B-2. Continued.

Pollution Prevention: Pollution Prevention and Good Housekeeping for Municipal Operations
Post Construction: Post Construction Water Management in New Development and Redevelopment
Public Education: Public Education, Outreach, Involvement, and Participation
Monitoring: Water Quality Monitoring
Watershed: Watershed Management

2. Per personal communication with Kathy Weldon, this number was reduced to $2,524 from $12,880.
3. Per personal communication with Meleah Ashford, this number was reduced to $35,000 from $100,000.
4. Construction of storm drain was not attibuted to permit compliance.

Table B-3. Distribution of Labor ($189,503) and Supplies/Travel/Equipment/Vehicle ($8,009) Costs Submitted by City of Encinitas Staff

Category	Percent All Clean Water Program Staff	Cost Allocated by Percentages
Public Outreach	5%	9,875.60
Public Involvement	5%	9,875.60
ICID	25%	49,378.00
Construction	10%	19,751.20
Post Construction (SUSMP)	5%	9,875.60
Industrial	5%	9,875.60
Pollution Prevention for Municipal	5%	9,875.60
Monitoring	15%	29,626.80
Overall Stormwater Management	20%	39,502.40
Watershed Management	5%	9,875.60
Total	100%	197,512.00

(Source: Ashford, pers. comm., 4/15/04)

Table B-4. Public Works Cost Data Submitted by City of Encinitas Staff

Description	Cost Type Labor	Equipment	Contract	Total
Sumps, inlets, manholes	101,404.00	72,968.00	83,741.00	258,113.00
Drain lines and channels	101,405.00	13,306.00	0.00	114,711.00
Trash pick-up	0.00	0.00	13,400.00	13,400.00
Street sweeping	0.00	0.00	117,962.00	117,962.00
Total	202,809.00	86,274.00	215,103.00	504,186.00

(Source: Ashford, pers. comm., 4/15/04)

Table B-5. Calculation of Number of Curb Miles Swept

Street Miles Swept	Frequency (yearly)	Reference	Annual Street Miles Swept	Annual Curb Miles Swept[1]
243	12	Encinitas, 2003b	2,916	5,832

1. Calculated by multiplying the "annual street miles swept" by 2.

Table B-6. Calculation of Industrial/Commercial Inspections

Type	Number	Reference
Industrial	3	Encinitas, 2003b
Commercial (DMAX)	202	Encinitas, 2003b
Commercial, nurseries	5	Encinitas, 2003b
Complaint driven (Ashford)	56	Encinitas, 2003b
Total	266	

The backup calculations for the cost for each cost survey category in Section 5 and the sources of the cost data are presented in this appendix. Tables generally are presented by sequentially increasing levels of detail. Figure C-1 illustrates how data is shared throughout the tables.

Table C-1 contains all costs organized into the various standard cost survey categories. The subtotals for each cost category are also presented in Section 5, Table 5-2. The remaining tables (C-2 through C-5) present the detailed back-up information for the numbers in Table C-1. Table C-1 is linked to the back-up tables by the table and item numbers in the 'Source' column. Most of the cost information provided by city staff is listed in Table C-2. Item numbers corresponding to the subtotals in Table C-2 were added to the left hand column to easily show how the numbers are pulled forward to Table C-1. The right hand column in Table C-2 was added to show how costs were allocated to the cost survey categories. Table C-1 entries that were not taken directly from Table C-2 are found in Tables C-3 through C-5.

Table C-1 also provides statistics describing the level of effort for certain activities by numerically representing what or how much was accomplished. References are provided within Table C-1 for the activity statistics. Where relevant statistics are available, normalized costs are calculated in Table C-1. Normalized costs are calculated by dividing the cost of the category or activity by the activity statistic.

For the city of Fremont, labor costs of the stormwater staff are not distributed among the various survey categories. Instead, it is all captured under Overall Stormwater Program Management. Thus, comparing costs with other municipalities where such costs are distributed, Fremont's Overall Stormwater Management Program costs will be higher.

The Union Sanitation District (USD) is under contract with the city of Fremont to provide facility and illicit discharge services, construction inspections, public education, countywide clean water program meeting participation, reports, database, and vehicles. The breakdown of the USD cost is presented in Table C-4.

The contribution made to the Alameda County Clean Water Program (ACCWP) was allocated according to Table C-5. Table C-5 has the total cost of the ACCWP broken into stormwater program categories. ACCWP supports subcommittee meetings, legal advice, regulatory advice, agency education and information sharing. On the bottom of the table is the dollar amounts contributed from each of the participating agencies. Fremont contributed $339,990 out of the total ACCWP expenses of $2,342,113. The ratio of Fremont contribution to the total ACCWP program cost was used to determine the contribution Fremont made to the individual programs. This calculation is in the far right column of Table C-5.

Detailed descriptions of how the costs were developed are contained in the following paragraphs.

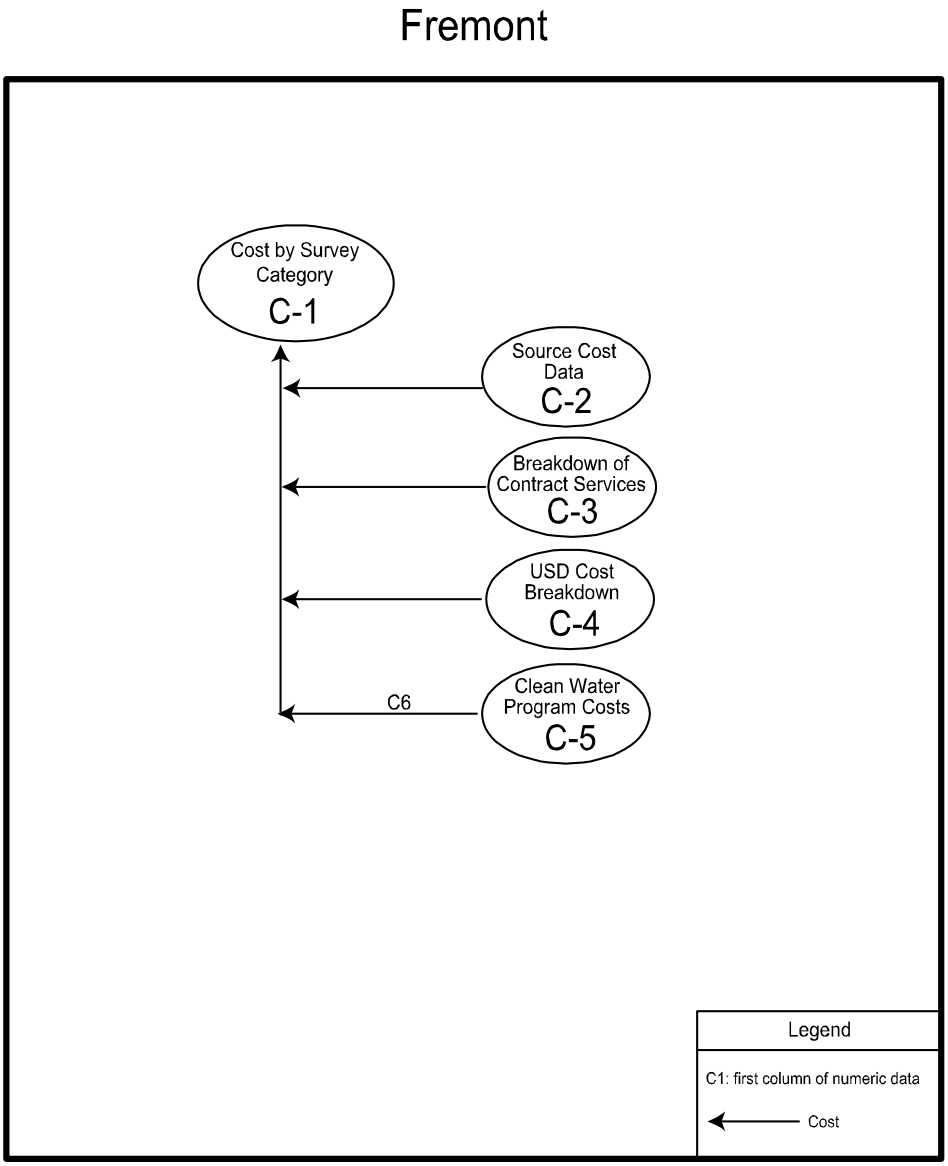

Figure C-1. Fremont Flowchart

Construction Site Stormwater Runoff Control

The total cost of this category was $17,715. The costs of this category were for inspection of active construction sites and for plan checking to verify appropriate post construction BMPs were being used (Fremont, 2003b). Employee training and 58 erosion control inspections were conducted (Fremont, 2003b). USD performed 139 general stormwater inspections.

Illicit Discharge Detection and Elimination (IDDE)

The total cost of this category was $5,917. All of the costs in this category represent contributions to the ACCWP for assistance in eliminating non-stormwater discharges, analyzing

findings, reporting, and staff labor. During the year, 118 follow-up activities were conducted (Fremont, 2003b).

Industrial and Commercial Management Programs

The total cost of this category was $210,027. Most of the activities for this category were performed by USD. A cost breakdown by activity was not provided. The total number of inspections was 482, which includes 91 re-inspections. The city had 81 enforcement actions in 2002/03 and identified and abated 32 "Potential Exposure" and 18 "Non-Stormwater" discharges. (Fremont, 2003b). Inspection documentation costs amounted to $31,697. Though USD also performed some construction inspections, this cost was included here because the majority of inspections were for the industrial/commercial program. Inspection costs were $160,861 resulting in a cost of $436/inspection.

Contributions to the ACCWP totaled $17,469 and were for outreach, refining guidelines, training, and reporting.

Overall Stormwater Program Management

The total cost of this category was $453,872. Sixty-nine percent of the cost allocated to this category was for the stormwater staff labor and allocation of overhead cost. The city staff was unable to distribute the labor costs among the survey categories. Other costs in this category were for USD services, NPDES fees, consultant services, and various administrative costs. USD staff participated in ACCWP subcommittees at a cost of $12,928, $7,659 in reporting costs, $6,107 for meeting attendance, and $135 for mitigation work. The mitigation work was a minor cost and therefore allocated to this cost category rather than investigate for a description of the work.

Contributions to the ACCWP totaled $95,560 and were for regulatory advising, instituting improvements, support committees, legal advice, website, newsletters, dues, permit fees, business water quality incentives, miscellaneous expenses, and staff labor.

Pollution Prevention and Good Housekeeping for Municipal Operations

The total cost of this category was $2,128,175. Of this amount, 85 percent was for street sweeping. The costs for this category were for the activities of street sweeping, litter/debris removal, and GIS. The city performed other activities but was unable to provide the associated costs. These activities were cleaning drain lines and channels, inlets, cross culverts, and conduits (Silva, pers. comm., 9/22/04). Additional activities obtained from the annual stormwater report included employee training, maintenance staff attendance at maintenance subcommittee meetings, mailing information packets to new businesses, workshops, partnered with USD to develop, print, and mail a newsletter (Fremont, 2003b).

Contributions to the ACCWP totaled $13,175 and were for performance standard development and updating, and staff labor.

Post Construction Stormwater Management in New Development and Redevelopment

The total cost of this category was $19,746. This cost was for engineering, planning, and city staff to research, track, and report information for the annual stormwater report. It was also for task force meetings to develop strategies for compliance with their permit regarding new development and redevelopment. The source table (C-2) describes this cost as a "quasi-external expenditure" because it is the amount that was transferred to engineering and other departments to cover stormwater related activities.

Contributions to the ACCWP totaled $15,337 and were for controls guidance, watershed inventory, construction activities, performance standards, coordination, brochures, and staff labor.

Public Education and Outreach and Public Involvement and Participation

The total cost allocated to these categories was $101,717. Advertising costs (including billboards and newsletters) were for public education and outreach. Creek clean-up had both public involvement, participation, and outreach components. Due to this overlap, the programs were combined for the city of Fremont. Approximately 70 percent of the creek clean-up was done by city staff and volunteers accounted for 30 percent of the effort (Silva, pers. comm., 9/22/04). Other activities in these categories included the following (descriptions obtained from the annual stormwater report):

- 24 school outreach presentations to 5th grade classrooms
- 4 school outreach presentations at middle school "special day" classes
- Stormwater staff participated in a Safety Fair at Gomez Elementary by doing a watershed demonstration and distributing pamphlets
- Stormwater staff participated in several public events including the Fremont Festival of the Arts, Good Neighbor Day, Boston Scientific Health and Wellness Fair, and National Night Out
- Rock Steady Juggling performance to 1,490 students who were educated about urban runoff issues
- Educated 680 students about urban runoff issues at the Caterpillar Puppet show
- Participated in and helped fund the "Kids in Creek" workshops
- A city of Fremont staff member served as a panelist at California State University Hayward's "Careers in the Environmental Sciences". The staff member discussed career opportunities in the stormwater field with students.
- Distributed brochures and fliers to Devry University
- The city of Fremont Environmental Services Department funded Math/Science Nucleus (MSN) and city of Fremont Park and Recreation Department to develop and lead field trips to educate 140 students and 26 parents about urban runoff issues. The city also

funded Irvington Academy High School to educate students about urban runoff issues. (Fremont, 2003)

USD provided $25,897 worth of public education services, accounting for 51 percent of the cost in this category. USD provides a website with BMP fact sheets for citizens and business owners and participates in school outreach activities. The materials promote Integrated Pest Management and the Bay Area-wide campaign called Our Water/Our World. USD also provides brochures and facility inspection checklists for businesses such as restaurants and printer shops.

Contributions to the ACCWP totaled $50,796 and were for effectiveness evaluations, staff training, implementation assistance, educational outreach for organized activities and events, community stewardship grants, elementary education, environmental education at a fair, and staff labor.

Water Quality Monitoring

The total cost of this category was $131,326. Of this cost, $7,200 was for water quality sampling at two locations. Both chronic and acute toxicity tests were performed (Silva, pers. comm., 9/22/04).

Contributions to the ACCWP totaled $124,126 and were for regional state board annual fees, mercury testing, watershed inventory, data management, GIS assistance, fishery assessment, contract recreation, litter and leaf control, TMDL compliance tasks, diazinon grant, analytical services, a monitoring project, and staff labor.

Watershed Management

The total cost of this category was $17,610. All of the costs in this category represent contributions to the ACCWP for development of a watershed study framework, assessment of pilot project activities, and staff labor.

References

City of Fremont, 2003. "Alameda Countywide Clean Water Program Fiscal Year 2002/03 Annual Report". Volume III of IV.

Table C- 1. Fremont Cost Organized by Cost Survey Category

Cost Survey Categories

Activity Description

Construction Site Stormwater Runoff Control

Description	External Contract	Relation to Permit[a]	Dollar Amount	Source	% of Category	Activity Statistic	Notes/Units	Reference	Normalized Cost	Notes/Units
Construction inspections by USD		New	17,715	Table C-4	100%	197	inspections[b]	Fremont, 2004b	89.93	$/inspection
Total			17,715		0.6%	of total stormwater cost				

Illicit Discharge Detection and Elimination

Description	External Contract	Relation to Permit	Dollar Amount	Source	% of Category	Activity Statistic	Notes/Units	Reference	Normalized Cost	Notes/Units
Assistance to eliminate non-stormwater discharges, analyze findings, reporting		New	5,081	Table C-5, Item 8.1	85.9%					
Staff labor (including overhead)		New	836	Table C-5, Item 8.2	14.1%					
Total			5,917		0.2%	of total stormwater cost				

Industrial and Commercial Management Programs

Description	External Contract	Relation to Permit	Dollar Amount	Source	% of Category	Activity Statistic	Notes/Units	Reference	Normalized Cost	Notes/Units
Business inspection		New	160,861	Table C-4	76.6%	482	inspections	Silva, pers. comm. 9/22/04	333.74	$/inspection
Inspection documentation		New	31,697	Table C-4	15.1%					
Inspections, outreach activity, track findings, refine guidelines, training, reporting		New	16,694	Table C-5, Item 9.1	7.9%					
Staff labor (including overhead)		New	775	Table C-5, Item 9.2	0.4%					
Total			210,027		6.8%	of total stormwater cost				
Overall Cost Category Normalizations										
total category $ per inspection						482	inspections	Silva, pers. comm. 9/22/04	435.74	total $/inspection

Overall Stormwater Program Management

Description	External Contract	Relation to Permit	Dollar Amount	Source	% of Category	Activity Statistic	Notes/Units	Reference	Normalized Cost	Notes/Units
Labor for city stormwater staff		New	171,047	Table C-2, Items 1,2,3, and 4	37.7%					
Office supplies		New	558	Table C-2, item 7	0.1%					
Periodicals		New	469	Table C-2, item 8	0.1%					
Printing		New	1,688	Table C-2, item 9	0.4%					
Collection fee		New	11,777	Table C-2, Item 11	2.6%					
NPDES fee		New	8,750	Table C-2, Item 16	1.9%					
Telephone		New	13	Table C-2, item 19	0.0%					
Postage		New	75	Table C-2, item 20	0.0%					
Travel expenses		New	403	Table C-2, item 21	0.1%					
Training		New	840	Table C-2, item 22	0.2%					
Technical training		New	1,750	Table C-2, item 23	0.4%					
Office machines<$5k		New	350	Table C-2, item 28	0.1%					
Informational systems		New	19,375	Table C-2, Item 33	4.3%					
Worker's comp		New	590	Table C-2, item 34	0.1%					
General liability		New	3,058	Table C-2, item 35	0.7%					
Overhead allocation		New	110,737	Table C-2, Item 37	24.4%					
ACCWP participation		New	12,928	Table C-4	2.8%					
Reporting		New	7,659	Table C-4	1.7%					
Meeting		New	6,107	Table C-4	1.3%					
Mitigation		New	136	Table C-4	0.0%					
Regulatory advising, institute improvements, support committees, legal advice, website, and newsletter		New	32,372	Table C-5, Item 2.1	7.1%					

014198

Table C – 1. Continued.

Dues for regional stormwater representation groups and tasks of regional benefit		New	10,887	Table C-5, Item 2.2	2.4%					
NPDES permit fee (ACCWP)		New	2,903	Table C-5, Item 2.3	0.6%					
Program contingency		New	10,670	Table C-5, Item 2.4	2.4%					
Contribution to support business-water quality incentives program		New	2,903	Table C-5, Item 2.5	0.6%					
Miscellaneous		New	5,081	Table C-5, Item 2.6	1.1%					
Staff labor for ACCWP (including overhead)		New	30,745	Table C-5, Item 2.8	6.8%					
Total			453,872		14.6%	of total stormwater cost				

Pollution Prevention and Good Housekeeping for Municipal Operations

Description	External Contract	Relation to Permit	Dollar Amount	Source	% of Category	Activity Statistic	Notes/Units	Reference	Normalized Cost	Notes/Units
Street Sweeping Program						31,405	curb miles swept	Silva, pers. comm., 9/22/04	60.98	$/curb mile swept
Street sweeping		Enhanced	115,000	Table C-2, Item 30	5.4%					
Street sweeping		Enhanced	1,800,000	Table C-2, Item 31	84.6%					
Litter/debris removal		Existing	200,000	Table C-2, Item 32	9.4%					
Performance standard updating and development		New	12,339	Table C-5, Item 6.1	0.6%					
Staff labor (including overhead)		Enhanced	836	Table C-5, Item 6.2	0.0%					
Total			2,128,175		68.6%	of total stormwater cost				

Table C1 continued

Post Construction Stormwater Management in New Development and Redevelopment

Description	External Contract	Relation to Permit	Dollar Amount	Source	% of Category	Activity Statistic	Notes/Units	Reference	Normalized Cost	Notes/Units
Quasi external expenditure		New	19,746	Table C-2, Item 36	56.3%					
Controls guidance, watershed inventory, consruction activities, performance standards, coordination		New	11,613	Table C-5, Item 7.1	33.1%					
Reprographic services (brochures)		New	2,177	Table C-5, Item 7.2	6.2%					
Staff labor (including overhead)		New	1,546	Table C-5, Item 7.3	4.4%					
Total			35,083		1.1%	of total stormwater cost				

Public Education, Outreach, Involvement, and Participation

Description	External Contract	Relation to Permit	Dollar Amount	Source	% of Category	Activity Statistic	Notes/Units	Reference	Normalized Cost	Notes/Units
Creek clean-up		New	5,200	Table C-2, Item 6	5.1%					
Advertising		New	310	Table C-2, Item 24	0.3%					
Storage space rental		New	210	Table C-2, Item 25	0.2%					
Math Science Nucleus (MSN) Environmental Education		New	6,803	Table C-3	6.7%					
Citywide newsletter		New	12,500	Table C-3	12.3%					
Public Education		New	25,897	Table C-4	25.5%					
Effectiveness evaluation, staff training, implemenation assistance		New	6,532	Table C-5, Item 5.2	6.4%					
Educational outreach for organized activities and events		New	4,355	Table C-5, Item 5.3	4.3%					
Community stewardship grants, implementation assistance		New	13,282	Table C-5, Item 5.4	13.1%					
Baysavers elementary education curriculum and implemenation		New	8,129	Table C-5, Item 5.5	8.0%					
Bay area environmental education resource fair		New	363	Table C-5, Item 5.6	0.4%					
General outreach		New	7,258	Table C-5, Item 5.7	7.1%					
Staff labor (including overhead)		New	10,876	Table C-5, Item 5.8	10.7%					
Total			101,717		3.3%	of total stormwater cost				

014199

Table C – 1. Continued.

Water Quality Monitoring

Description	External Contract	Relation to Permit	Dollar Amount	Source	% of Category	Activity Statistic	Notes/Units	Reference	Normalized Cost	Notes/Units
Water quality sampling		New	7,200	Table C-3	5.5%					
Regional state board annual fee		New	20,323	Table C-5, Item 4.1	15.5%					
Murcury testing		New	9,436	Table C-5, Item 4.2	7.2%					
Watershed inventory, data management, and GIS asstistance		New	20,323	Table C-5, Item 4.3	15.5%					
Fishery assessment, contract recreation, litter and leaf control		New	18,871	Table C-5, Item 4.4	14.4%					
Contribution to TMDL compliance tasks		New	23,226	Table C-5, Item 4.5	17.7%					
Diazinon grant		New	1,452	Table C-5, Item 4.6	1.1%					
Analytical services		New	6,678	Table C-5, Item 4.7	5.1%					
Monitoring project		New	5,807	Table C-5, Item 4.8	4.4%					
Staff labor (inlcuding overhead)		New	18,011	Table C-5, Item 4.10	13.7%					
Total			131,326		4.2%	of total stormwater cost				

Watershed Management

Description	External Contract	Relation to Permit	Dollar Amount	Source	% of Category	Activity Statistic	Notes/Units	Reference	Normalized Cost	Notes/Units
Development of watershed study framework, assessment of pilot project activities		New	9,435.65	Table C-5, Item 3.2	53.6%					
Staff labor (including overhead)		New	8,173.96	Table C-5, Item 3.4	46.4%					
Total			17,609.60		0.6%	of total stormwater cost				

Total Stormwater Costs 3,101,442

a. This column indicates whether required activities were being performed prior to stormwater permits. In some cases activities were enhanced due to permit requirements.
b. Inspections for construction includes 58 erosion control inspections and 157 construction site inspections.

014200

Table C-2. Source Data Table Submitted by City of Fremont (cost survey categories added)

Item #	City of Fremont Category	Total Cost	Cost Survey Category[1]
1	Salaries	115,954.72	Management
2	Benefits	37,413.57	Management
3	Overtime	928.78	Management
4	Part time salaries	16,750.10	Management
5	Promotional Materials	0.00	
6	Misc Operating Supplies	5,199.59	Public Education
7	Office Supplies	558.25	Management
8	Periodicals	469.06	Management
9	Printing	1,687.98	Management
10	Legal	0.00	
11	Consultant Services	11,777.40	Management
12	Contractual Services	26,503.39	See Table C-3
13	Photographic Services	0.00	
	Governmental Services[2]		
14	Union Sanitary District	263,000.00	See Table C-4
15	Alameda Countywide Clean Water Program	339,990.00	3 See Table C-5
16	State Water Resource Control Board	8,750.00	Management
	Media Purchase/Advertising		
18	Other Professional Services	0.00	
19	Telephone	12.96	Management
20	Postage	75.00	Management
21	Travel Expenses	403.43	Management
22	Training	840.29	Management
23	Technical Training	1,750.00	Management
24	Advertising development	310.00	Public Education
25	Space Rental	210.00	Public Education
26	Equipment Rental	0.00	
27	Office Machines > $5k	0.00	
28	Office Machines<$5k	350.00	Management
29	Office Furniture	0.00	
30	Interfund Transfers	115,000.00	Pollution Prevention
31	Interfund Transfers	1,800,000.00	Pollution Prevention
32	Interfund Transfers	200,000.00	Pollution Prevention
33	Info Systems	19,375.20	Management
	Transfer to Veh Repl Rund		
34	Worker's Comp	590.42	Management
35	General Liability	3,058.22	Management
36	Quasi-External Expenditure	19,746.31	Post Construction
37	Overhead Allocation	110,737.00	Management
	Total	3,101,441.67	

(Source: Silva, pers. comm., 4/5/04)

1. Cost Categories Abbreviated According to the Following:
   Construction: Construction Site Stormwater Runoff Control

Table C-2. Continued.

Illicit Discharge: Illicit Discharge Detection and Elimination
Industrial: Industrial and Commercial Management Programs
Management: Overall Stormwater Program Management
Pollution Prevention: Pollution Prevention and Good Housekeeping for Municipal Operations
Post Construction: Post Construction Water Management in New Development and Redevelopment
Public Education: Public Education, Outreach, Involvement, and Participation
Monitoring: Water Quality Monitoring
Watershed: Watershed Management

2. The original total submitted for total governmental services was $611,417. This figure was changed per email from Barbara Silva on 6/10/04 to 611,750 as shown by the breakdown between Union Sanitary District, Alameda Countywide Clean Water Program, and State Water Resource Control Board.

3. This number was adjusted down from $340,000 upon reciept of contract breakdown (see Table C-5).

Table C-3. Breakdown of Contractual Services (Table C-2, Item 12)

Description	Cost	Cost Survey Category
Math Science Nucleus (MSN) Environmental Education	6,803	Public Education
Water quality sampling (Pacific Eco Risk)	7,200	Monitoring
Citywide newsletter	12,500	Public Education
Total	26,503	

(Source: Silva, pers. comm., 4/15/04)

Table C-4. Breakdown of Union Sanitation District (USD) Cost (Table C-2, Item 14)

Description	Cost	Cost Survey Category
Public education	25,897	Public Education
ACCWP participation	12,928	Management
Reporting	7,659	Management
Meeting	6,107	Management
Inspection documentation	31,697	Industrial
Mitigation	136	Management
Construction inspection	17,715	Construction
Business inspection	160,861	Industrial
	263,000	

(Source: Silva, pers. comm., 4/15/04)

Table C-5. ACCWP Cost Breakdown

GENERAL CLEAN WATER PROGRAM 2002-2003

Budget Unit 50201 **F15W81** **PROGRAM MANAGER: Jim Scanlin**

2. PLANNING AND REGULATORY COMPLIANCE

MAKE ENTRIES IN YELLOW BOXES

						GENERAL PROGRAM AMOUNT	% of Grand Total	Fremont Contribution
1	**EISENBERG OLIVIERI ASSOCIATES**	E01				$223,000	10%	32,372
	Regulatory Advising, Institute Improvements, Support Committees, Legal Advice, Website, and Newsletter							
2	**PARTICIPATION IN REGIONAL STORMWATER EFFORTS**	J11				$75,000	3%	10,887
	Dues for Regional Stormwater Representation Groups and tasks of regional benefit							
3	**NPDES PERMIT FEE**	J11				$20,000	1%	2,903
	Fee for Countywide Clean Water Program Permit - Required by Regional Water Board							
4	**CONTINGENCY**					$73,500	3%	10,670
	Program Contingency Amount							
5	**GREEN BAY BUSINESS PROGRAM**	J11				$20,000	1%	2,903
	Contribution to Support Business - Water Quality Incentives Program							
6	**SPECIAL DEPARTMENTAL ACCOUNT**					$35,000	1%	5,081
	Dan will tell us what this covers							
7	**CONTRACT**					$0	0%	0
	To fulfill Total Maximum Daily Load (TMDL) requirements							
8	**STAFF --**					$211,793	9%	30,745
	R. HALE	J01	300	85.00	$25,500			
	J. SCANLIN	J02	1,332	80.00	$106,560			
	G. SHAWLEY	J02	145	63.00	$9,135			
	LABOR OVERHEAD				$70,598			
				TOTAL PROGRAM ADMINISTRATION		**$658,293**	28%	95,560
		CLEAN WATER DIV. STAFF HRS.	1,777					

3. FOCUSED WATERSHED STUDIES

1	**CONTRACTOR TO BE DETERMINED**	E03				$0	0%	0
	Watershed Activities in Watersheds Tributary to Lake Merritt and Laguna Creek							
2	**APPLIED MARINE SCIENCES**	E03				$65,000	3%	9,436
	Develop Watershed Study Framework, Assess Pilot Project Activities							
3	**NAME OF CONTRACTOR**							
	Dexcription of service							
4	**STAFF**					$56,309	2%	8,174
	E. DA COSTA	J03	29	58.00	$1,682			
	A. FENG	J03	399	63.00	$25,137			
	J. SCANLIN	J03	134	80.00	$10,720			
	LABOR OVERHEAD				$18,770			
				TOTAL FOCUSED WATERSHED STUDIES		**$121,309**	5%	17,610
		HRS.	562					

4. WATER QUALITY MONITORING

							% of Grand Total	Fremont Contribution
1	**REGIONAL WATER BOARD FEE FOR REGIONAL MONITORING PROGRAM**	E04				$140,000	6%	20,323
	Annual Fee Required by Regional Water Board to Monitor and Report on Health (Water Quality) of San Francisco Bay Estuary							
2	**APPLIED MARINE SCIENCES (AMS)**	E04				$65,000	3%	9,436
	Mercury Testing							
3	**ENVIRONMENTAL IMPACT PLANNING CORP. (EIP)**	E04				$140,000	6%	20,323
	Watershed Inventory, Data Management, and Geographical Information Systems Assistance							
4	**URS CONSULTANTS**	E04				$130,000	6%	18,871
	Assess Fisheries, Contact Recreation, Litter and Leaf Control							
5	**REQUIRED CONTRIBUTION TO WATER QUALITY ATTAINMENT STRATEGIES**	E04				$160,000	7%	23,226
	Contribution to MOU-based Total Maximum Daily Load compliance tasks.							
6	**DIAZINON GRANT**	E04				$10,000	0%	1,452
	DiazInon Grant							
7	**SYSTECH ENGINEERING**					$46,000	2%	6,678
	Analytical Services							
8	**CLEAN WATER AGENCIES TMDL COPPER-NICKEL MONITORING PROJECT**					$40,000	2%	5,807
	Dexcription of service							
9	**NAME OF CONTRACTOR**							
	Dexcription of service							
10	**STAFF**					$124,077	5%	18,011
	E. DA COSTA	J04	20	58.00	$1,160			
	A. FENG	J04	956	63.00	$60,228			
	S. MILLER	J04	300	43.00	$12,900			
	TRAINEE	J04	40	26.00	$1,040			
	J. SCANLIN	J04	53	80.00	$4,240			
	G. SHAWLEY	J04	50	63.00	$3,150			
	LABOR OVERHEAD				$41,359			
				TOTAL WATER QUALITY MONITORING		**$855,077**	37%	124,126
		HRS.	1,419					

5. PUBLIC INFORMATION/PARTICIPATION

			GENERAL PROGRAM AMOUNT	% of Grand Total	Fremont Contribution
1	**TARGETED OUTREACH / REGIONAL ADVERTISING**	E05	$0	0%	0
	Targeted Outreach to Meet Public Information Requirements - REGIONAL ADVERTISING				
2	**EISENBERG OLIVIERI ASSOCIATES (EOA)**	E05	$45,000	2%	6,532
	Evaluate Effectiveness, Clean Water City and County Staff Training, Assist Implementation				

Table C-5. Continued.

3	**ESTUARY ACTION CHALLENGE**	E05				$30,000	1%	4,355
	Educational Outreach for Organized Activities and Events							
4	**AQUATIC OUTREACH INST. (AOI) Kids in Creeks**	E05				$91,500	4%	13,282
	Community Stewardship Grants, Educ.Outreach (Kids in Creeks, Gardens, Marshes & Workshops) Assist Implementation							
5	**RESOURCE CONSERVATION DIST. (RCD) - Baysavers**	E05				$56,000	2%	8,129
	Educational Support - Baysavers Elementary Education Curriculum and Implementation							
6	**BAY AREA ENVIRONMENTAL EDUCATION RESOURCE FAIR (BAEER FAIR)**	E05				$2,500	0%	363
	Educational Support							
7	**CONTRACTOR TO BE DETERM. GEN'L OUTREACH**					$50,000	2%	7,258
	Reinforce Message in Communities							
8	**STAFF**					$74,925	3%	10,876
	L. CERVANTES	J05	850	53.00	$45,050			
	S. GOSSELIN	J05	70	70.00	$4,900			
	LABOR OVERHEAD				$24,975			
					TOTAL PUBLIC INFORMATION / PARTICIPATION	**$349,925**	15%	50,796
		HRS.	920					

6. MUNICIPAL MAINTENANCE PRACTICES

							% of Grand Total	Fremont Contribution
1	**EISENBERG OLIVIERI ASSOCIATES (EOA)**	E06				$85,000	4%	12,339
	Update and Develop Perform. Stds, Coordinate Maint Actvties, ID Struct Controls, Maint. Data Mgmt, Maint. Outreach, Maint Component Mgmt.							
2	**STAFF**					$5,760	0%	836
	J. SCANLIN	J06	48	80.00	$3,840			
	LABOR OVERHEAD				$1,920			
					TOTAL MUNICIPAL MAINTENANCE	**$90,760**	4%	13,175
		HRS.	48					

7. NEW DEVELOPMENT AND CONSTRUCTION SITE CONTROLS

1	**EISENBERG OLIVIERI ASSOCIATES (EOA)**	E07				$80,000	3%	11,613
	Guidance on Stormwtr Controls, Constr. Actvties, Outreach, Perf. Stds. Wshed Inventry, Coord. w/ District, Component Mgmt.							
2	**REPROGRAPHIC SVCS. ALCOLINK (Brochures)**					$15,000	1%	2,177
	Dexcription of service							
3	**STAFF**					$10,650	0%	1,546
	D. BACH	J07	100	47.00	$4,700			
	J. SCANLIN	J07	30	80.00	$2,400			
	LABOR OVERHEAD				$3,550			
					TOTAL NEW DEVELOPMENT AND CONSTRUCTION SITE CONTROLS	**$105,650**	5%	15,337
		HRS.	130					

8. ILLICIT DISCHARGE CONTROLS

1	**EISENBERG OLIVIERI ASSOCIATES (EOA)**	E08				$35,000	1%	5,081
	Assist to Eliminate Non-Stormwater Discharges, Analyze Illicit Discharge Findings, Share Information on Non-Stormwater Discharges, Illicit Discharge Reporting							
2	**STAFF**					$5,760	0%	836
	J. SCANLIN	J08	48	80.00	$3,840			
	LABOR OVERHEAD				$1,920			
					TOTAL ILLICIT DISCHARGE CONTROLS	**$40,760**	2%	5,917
		HRS.	48					

9. INDUSTRIAL INSPECTION PROGRAM

1	**EISENBERG OLIVIERI ASSOCIATES (EOA)**	E09				$115,000	5%	16,694
	Conduct Insp & Outreach Activtes, Track Findings, Share Info on Facilites, Refine Indus BMP Guidelilnes, Insp Training, Insp Reporting							
2	**STAFF**					$5,340	0%	775
	J. SCANLIN	J09	45	80.00	$3,560			
	LABOR OVERHEAD				$1,780			
					TOTAL INDUSTRIAL INSPECTION PROGRAM	**$120,340**	5%	17,469
		CLEAN WATER DIV. STAFF HRS.	45					

TOTAL GENERAL PROGRAM	**$2,342,113**	100%	339,990

MAKE ENTRIES IN YELLOW SHADED CELLS ONLY

To change revision date, go to tab entitled ALTERNATIVES - STAFFING & COSTS

REVISION: 2/3/02

STAFF	HRS	AMOUNT
D. Bach	100	$4,700
L. Cervantes	850	$45,050
E. da Costa	49	$2,842
A. Feng	1,355	$85,365
S. Gosselin	70	$4,900
R. Hale	300	$25,500
S. Miller	300	$12,900
J. Scanlin	1,690	$135,160
G. Shawley	195	$12,285
Trainee	40	$1,040
TOTAL HOURS	4,949	
TOTAL BURDENED LABOR		$329,742
TOTAL STAFF with overhead		**$494,613**

FUNDING

AVAILABLE FUND BALANCE

$242,113 (for current fiscal year)

CONTRIBUTIONS		**PROPORTION**	
5083	$83,580	0.03980	ALAMEDA
5084	$21,000	0.01000	ALBANY
5085	$107,310	0.05110	BERKELEY
5086	$49,350	0.02350	DUBLIN
5087	$21,000	0.01000	EMERYVILLE
5088	$339,990	0.16190	FREMONT
5089	$235,410	0.11210	HAYWARD
5090	$123,270	0.05870	LIVERMORE
5091	$57,750	0.02750	NEWARK
5092	$462,420	0.22020	OAKLAND
5093	$21,000	0.01000	PIEDMONT
5094	$114,030	0.05430	PLEASANTON
5096	$104,160	0.04960	SAN LEANDRO
5097	$104,790	0.04990	UNION CITY
5082	$254,940	0.12140	UNINCORPORATED AREA (from F15W82 spread)
TOTAL CONTRIBUTIONS	$2,100,000	1.00000	**TOTAL SHARES**
TOTAL FUNDING	**$2,342,113**		

PROGRAM DETAILS:

STAFF WITH OVERHEAD	$494,613
SPECIALIZED SERVICES	$1,752,500
OTHER EXPENSES (fees, etc.)	$95,000
PROGRAM TOTAL:	**$2,342,113**

DETAIL:	MULTI-TASK CONSULTANTS
EOA TOTAL	$583,000
AMS TOTAL	$130,000

(Source: Hale, pers. comm., 7/15/04)

Appendix D Fresno-Clovis Metropolitan Area

This appendix contains backup calculations for each cost survey category in Section 6 and the sources of the cost data. The Fresno-Clovis Metropolitan Area (FCMA) covers the area served by the Fresno Metropolitan Flood Control District (FMFCD). Stormwater permittees in this area include the County of Fresno, city of Fresno, city of Clovis, and the California State University at Fresno (CSUF). The FMFCD was the lead agency for communication on this project. Figure D-1 illustrates how data is shared throughout the tables.

Table D-1 contains all costs from all copermittees organized into the cost survey categories and the remaining tables provide backup to the numbers in Table D-1. The relationship of these tables is described below and presented in figure D-1. Table D-2 contains FMFCD cost organized by survey category but with added detail than what is provided in Table D-1. The cost figures in Table D-2 were summarized from the FMFCD accounting system cost summary (Table D-7).

Table D-3 summarizes the costs for the city of Clovis, Fresno County, city of Fresno, and CSUF respectively. These costs include budgeted costs and actual street sweeping costs, which are subtotaled for each cost survey category.

Table D-4 presents the allocation of city staff labor cost to the stormwater program. Table D-5 presents street sweeping data while Table D-6 presents a recreated portion of an FMFCD financial statement which was used for comparison to stormwater costs submitted by city staff.

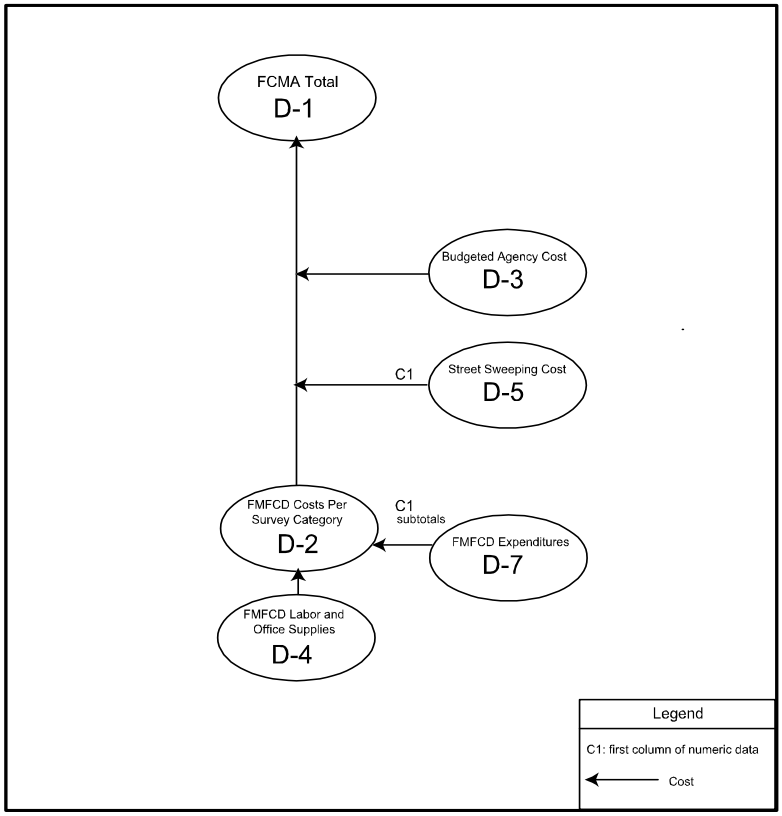

Figure D-1. Fresno-Clovis Metropolitan Area Flowchart

Other Agency Breakdown

Table D-3 contains the budgeted costs contained in the SWQMP report (FMFCD, 1999). These costs are subtotaled for each cost survey category and the subtotals are brought forward to Table D-1. Except for the FMFCD, which submitted actual costs, the costs were taken from the 00/01 budget for the other agencies as presented in the SWMP published in 1999 (FMFCD, 1999). The 00/01 year was used because the implementation of the program under the new permit was delayed for two years. The SWMP assumed the permit would be adopted in 1999 and the first fiscal year of the new program would be 99/00. The permit was not adopted until 2001 and the first fiscal year implementing the new stormwater permit was 00/01. In 02/03, the program only had one year of development. Thus, the second year costs were taken from the SWMP to represent 02/03 costs on the advice of FMFCD staff. Table D-3 includes a 'baseline' cost element. This is for the staff labor of the programs as they already existed at the start of the new permit (Rourke, pers. comm., 6/25/04). Table D-3 also contains an added line item for actual street sweeping costs pulled forward from Table D-5.

Table D-5 contains the street sweeping data collected for the FCMA. Table D-9 also calculates street sweeping cost per mile and estimated sweeping frequency. It should be noted that the estimated frequency for the city of Clovis is nearly four times a week for all streets. This seemed high and it could not be verified with the city. The cost per mile was relatively low ($13), which indicates the costs may be accurate and only the total miles swept is in question.

Notes on Labor Cost

For the FMFCD, the labor costs of the stormwater staff is not distributed among the various programs. Instead, it is all captured under Overall Stormwater Program Management. However, the labor costs from the other agencies within the FMFCD were able to distribute their labor among various programs. This should be considered when comparing costs to other municipalities where such costs are distributed.

Detailed descriptions of how the costs were developed are contained in the following paragraphs.

The reason we allocate FMFCD cost, but not other overall program costs for other cities is because the services provided by outside agencies (e.g. ACCWP to Fremont) are paid for by Fremont. FMFCD gets funds for stormwater directly from households "user fees", "utility bills". If FMFCD did not provide this "free" service, the cities would have to pay for them.

For agencies other than FMFCD, external contracting was not determined for each cost. It is only presented in the text of this appendix on a case-by-case basis. For FMFCD this information is presented in Table D-2.

Construction Site Stormwater Runoff Control

The total cost of this category was $81,800. The costs allocated for this category were only from the city of Clovis (Table D-2), county of Fresno (Table D-3), and the city of Fresno (Table D-4). No statistics were available that described the activity except for the city of Clovis. Clovis conducted 713 inspections at a cost of $29,600, which averages to $42 per inspection. The primary activities performed by each agency were plan reviews, site inspections, enforcement, and employee training. Other activities performed were as follows (source: annual stormwater report, FMFCD, 2003b):

- Identified 163 private detention basins and mailed pond maintenance and vector control fact sheets to pond owners
- Conducted 9 stormwater training workshops and safety tailgate sessions for general contractors, construction site superintendents, field inspectors, plan designers, and municipal regulators
- Increased construction sire inspections and follow-up inspection referrals to the District
- Reviewed construction site guidelines
- Sent out an "Action Alert" notifying area construction sites and companies of new Phase II regulations and schedules
- Included new regulations in training courses and site visits
- Modified the SWPPP to include sampling and analysis guidance
- The District conducted 48 inspections at 15 construction sites

Illicit Discharge Detection and Elimination (IDDE)

The total cost of this category was $13,176. This cost was for investigation, inspection and enforcement. The costs for the FMFCD, county of Fresno, the city of Clovis, and the city of Fresno accounted for two percent, eight percent, eighty-two percent, and eight percent of the IDDE costs, respectively. Activities in this category included the following (source: annual stormwater report, FMFCD, 2003b):

- Field inspectors were trained to identify and report illegal disposals
- Fifty thousand paint sticks were distributed at 17 paint retailers throughout the permit area
- Recharged irrigation waters and nuisance flows
- Participated in Water Awareness Committee and P2 Committee
- Reviewed and revised referral procedures between the District and Copermittees
- Conducted inspector training via workshops and tailgates
- Conducted firefighter training

- The County sponsored the California Conservation Corp to stencil 527 storm drain inlets in Clovis
- Students stenciled 73 storm drain inlets in the city of Clovis
- The District conducted 71 complaint inspections in response to citizen or Copermittee referrals
- The Clovis Fire Department responded to 82 hazardous waste spills
- The District developed and aired water conservation theater advertisement slides at two major movie theaters with over 30 screens and sent out 23,000 utility bill inserts to Clovis households in their monthly water bill
- The city of Clovis sent out notices to 22,360 customers reminding them of the outdoor watering rules and what they can to reduce runoff
- In Fresno County, the emergency response team program documented over 289 units of filed activity involving hazardous waste, which included complaints and follow-up enforcement inspections

Industrial and Commercial Management Programs

The cost for this category was $47,480. FMFCD activities include the purchase of phone complaint forms employee training of the other agencies. Other activities in this category included (source: annual stormwater report, FMFCD, 2003b):

- Held industrial training workshops
- Distributed over 65 model SWPPPs
- Coordinated with County Hazardous Waste and Fresno Industrial Waste inspectors to review inspection and referral procedures
- Conducted audits of 5 Copermittee corporation yards
- The District conducted 14 complaint-driven commercial and industrial inspections and 42 routine industrial inspections at NPDES permitted facilities

Overall Stormwater Program Management

The total cost of this category was $560,495. FMFCD accounted for approximately 98 percent of this category's cost. Most of this was labor cost (see Table D-7 for details). The other costs for this category were attributable to the following activities:

- Travel
- Meetings and conferences
- Dues and fees
- Food
- Printing

- Office supplies
- SWRCB fees
- Handbooks

Pollution Prevention and Good Housekeeping for Municipal Operations

The total cost for this category was $2,240,605. Clovis accounted for 28% and the city of Fresno accounted for 70% due primarily to street sweeping costs (Table D-9).

Other agency costs were for road maintenance, street cleaning, corporation yard guidance, and staff labor.

Other specific activities attributed to this category included (source: annual stormwater report, FMFCD, 2003b):

- Completed digitizing the District's stormwater conveyance system into the District's GIS system
- Developed, organized, and facilitated stormwater pollution prevention training courses for parks and open space maintenance personnel
- The District removed accumulated sediments from their retention basins
- Training of employees

Post Construction Stormwater Management in New Development and Redevelopment

The total cost of this category was $57,539. Most of the cost for this category was for the detention and retention basin operation and maintenance funded by FMFCD. The following detention and retention maintenance activities were performed:

- Cleaned 35 basins
- Rodent control
- Tree care
- Sediment removal and disposal
- Equipment rental
- Vegetation removal and recycling
- Vaccum truck cleaning
- Reviewed monitoring studies
- Completed standards research
- The District incorporated post construction standards in its Code of Requirements
- Soil monitoring

- Fence repair

The other agencies had no cost attributable to this category.

Public Education and Outreach and *Public Involvement and Participation*

The total cost of this category was $210,716. Most of the $208,016 paid by FMFCD was for professional services, newspaper advertisements, utility bill inserts, and other miscellaneous costs. The other agency costs were for school education, staff labor, and coordination with other programs. Other activities performed were (source: annual stormwater report, FMFCD, 2003b):

- Developed and aired three new Public Service Announcements (English and Spanish) targeting pollution prevention and water awareness
- Completed seven Clean Storm Water Grants to community organizations focused on stormwater education
- Continued implementation of a community wide integrated pest management program
- Conducted numerous presentations to community groups and school programs
- Produced a new brochure
- Participated in the local Pollution Prevention Committee
- Provided training for local inspectors
- The District maintained active membership with WERF, participated with the National Association of Flood and Storm Water Managers Association, provided $10,000 to WERF for stormwater research initiatives, and provided comments to EPA though the Storm Water Quality Task Force
- Participated in 18 community and public education events
- Provided a public education display illustrating ways to manage solid waste to incorporated cities throughout the County
- Conducted tours of the American Avenue Landfill for fourth grade to college level students
- Developed training manuals, theater slides, bus signage, pond maintenance fact sheets, mosquito abatement, control, and home owner fact sheets to promote BMPs and the SWQMP program
- Updated public education and technical assistance outreach materials
- Developed and implemented IPM Point of Purchase program
- Awarded 20 grants totaling $20,000
- Provided teacher workshops

Water Quality Monitoring

The total cost of this category was $252,918. The costs were for the FMFCD for the following activities:

- Monitoring
- Consulting
- Phone usage
- Communications
- WERF subscription

The other agencies had no cost attributable to this category.

References

FMFCD. 2003. "Annual Report FY 2002-2003, Fresno-Clovis Storm Water Quality Management Program" Volume 1: Program Evaluations.

Table D-1. Fresno-Clovis Metropolitan Area Costs Organized by Cost Survey Category

Cost Survey Categories

Activity Description

Construction Site Stormwater Runoff Control

Description	Relation to Permit[a]	Dollar Amount	Source	% of Category
FMFCD		0	N/A	0.0%
City of Clovis	New	29,600	Table D-3	36.2%
County of Fresno	New	6,900	Table D-3	8.4%
City of Fresno	New	45,300	Table D-3	55.4%
CSUF		0	N/A	0.0%
Total		81,800		2.4% *

Illicit Discharge Detection and Elimination

Description	Relation to Permit	Dollar Amount	Source	% of Category
FMFCD	New	76	Table D-2	0.6%
City of Clovis	New	10,100	Table D-3	76.7%
County of Fresno	New	1,000	Table D-3	7.6%
City of Fresno	New	1,000	Table D-3	7.6%
CSUF	New	1,000	Table D-3	7.6%
Total		13,176		0.4% *

Industrial and Commercial Management Programs

Description	Relation to Permit	Dollar Amount	Source	% of Category
FMFCD	New	22,180	Table D-2	46.4%
City of Clovis	New	6,100	Table D-3	12.8%
County of Fresno	New	8,200	Table D-3	17.2%
City of Fresno	New	10,400	Table D-3	21.8%
CSUF	New	900	Table D-3	1.9%
Total		47,780		1.4% *

Overall Stormwater Program Management

Description	Relation to Permit	Dollar Amount	Source	% of Category
FMFCD	New	560,895	Table D-2	98.3%
City of Clovis	New	1,600	Table D-3	0.3%
County of Fresno	New	3,200	Table D-3	0.6%
City of Fresno	New	3,200	Table D-3	0.6%
CSUF	New	1,600	Table D-3	0.3%
Total		570,495		16.4% *

Table D-1. Continued.

Pollution Prevention and Good Housekeeping for Municipal Operations

Description	Relation to Permit	Dollar Amount	Source	% of Category
FMFCD	New	29,409	Table D-2	1.3%
City of Clovis	Enhanced	631,696	Table D-3	28.2%
County of Fresno	Enhanced	5,300	Table D-3	0.2%
City of Fresno	Enhanced	1,572,500	Table D-3	70.2%
CSUF	Enhanced	1,700	Table D-3	0.1%
Total		2,240,605		64.5% *

Post Construction Stormwater Management in New Development and Redevelopment

Description	Relation to Permit	Dollar Amount	Source	% of Category
FMFCD	Existing	57,539	Table D-2	100.0%
City of Clovis		0	N/A	0.0%
County of Fresno		0	N/A	0.0%
City of Fresno		0	N/A	0.0%
CSUF		0	N/A	0.0%
Total		57,539		1.7% *

Public Education, Outreach, Involvement, and Participation

Description	Relation to Permit	Dollar Amount	Source	% of Category
FMFCD	New	208,016	Table D-2	98.7%
City of Clovis	New	200	Table D-3	0.1%
County of Fresno	New	2,500	Table D-3	1.2%
City of Fresno		0	N/A	0.0%
CSUF		0	N/A	0.0%
Total		210,716		6.1% *

Water Quality Monitoring

Description	Relation to Permit	Dollar Amount	Source	% of Category
FMFCD	New	252,918	Table D-2	100.0%
City of Clovis		0	N/A	0.0%
County of Fresno		0	N/A	0.0%
City of Fresno		0	N/A	0.0%
CSUF		0	N/A	0.0%
Total		252,918		7.3% *

Total Stormwater Cost	**3,475,029**

a. This column indicates whether required activities were being performed prior to stormwater permits. In some cases activities were enhanced due to permit requirements.

* This percentage is calculated by dividing the total "cost survey category" cost by the "total stormwater cost".

Table D-2. FMFCD Costs Organized by Cost Survey Category

Cost Survey Categories

Activity Description

Construction Site Stormwater Runoff Control

Description	External Contract	Relation to Permit[a]	Dollar Amount	Source	% of Category	Activity Statistic	Notes/Units	Reference	Normalized Cost	Notes/Units
			0							
Total			0			of total FMFCD stormwater program costs				

Illicit Discharge Detection and Elimination

Description	External Contract	Relation to Permit	Dollar Amount	Source	% of Category	Activity Statistic	Notes/Units	Reference	Normalized Cost	Notes/Units
Investigation, Inspection, Enforcement		New	76	Table D-7, Item 39	100%					
Total			76		0.0%	of total FMFCD stormwater program costs				

Industrial and Commercial Management Programs

Description	External Contract	Relation to Permit	Dollar Amount	Source	% of Category	Activity Statistic	Notes/Units	Reference	Normalized Cost	Notes/Units
Phone complaints		New	333	Table D-7, Item 58	1.5%					
Geosyntec services	x	New	21,791	Table D-7, Items 15 & 16	98.2%					
Miscellaneous		New	56	Table D-7, Item 17	0.3%					
Total			22,180		2.0%	of total FMFCD stormwater program costs				

Table D-1 continued

Overall Stormwater Program Management

Description	External Contract	Relation to Permit	Dollar Amount	Source	% of Category	Activity Statistic	Notes/Units	Reference	Normalized Cost	Notes/Units
Travel		New	2,382	Table D-7, Items 10 & 50	0.4%					
Meetings and conferences		New	1,508	Table D-7, Items 11& 51	0.3%					
Dues and fees		New	10,000	Table D-7, Item 12	1.8%					
Training		New	1,261	Table D-7, Items 13 & 53	0.2%					
Miscellaneous expenses		New	7,519	Table D-7, Items 14 & 56	1.3%					
Food		New	341	Table D-7, Item 45	0.1%					
Printing		New	622	Table D-7, Item 47	0.1%					
Office supplies		New	172	Table D-7, Item 48	0.0%					
SWRCB fees		New	17,750	Table D-7, Item 49	3.2%					
Handbooks		New	66	Table D-7, Item 54	0.0%					
Program expenses		New	112	Table D-7, Item 57	0.0%					
Personnel expenses		New	498,300	Table D-4	88.8%					
Office administration		New	20,864	Table D-4	3.7%					
Total			560,895		49.6%	of total FMFCD stormwater program costs				

014214

Table D-2. Continued.

Pollution Prevention and Good Housekeeping for Municipal Operations

Description	External Contract	Relation to Permit	Dollar Amount	Source	% of Category	Activity Statistic	Notes/Units	Reference	Normalized Cost	Notes/Units
BMP Hanbook Update		New	10,000	Table D-7, Item 2	34.0%					
Geosyntec services	x	New	1,996	Table D-7, Item 3	6.8%					
Truck cleaning		New	15,749	Table D-7, Items 33 & 35	53.6%					
Utility expense		New	1,007	Table D-7, Item 36	3.4%					
Fresno Pipeline		New	657	Table D-7, Item 34	2.2%					
Total			29,409		2.6%	of total FMFCD stormwater program costs				

Table D-7 continued

Post Construction Stormwater Management in New Development and Redevelopment

Description	External Contract	Relation to Permit	Dollar Amount	Source	% of Category	Activity Statistic	Notes/Units	Reference	Normalized Cost	Notes/Units
Basin maintenance		Existing	8,174	Table D-7, Item 19	14.2%	8	basins	FMFCD, 2003b	7,192.34	category $/basin
Wild agreement	x	Existing	2,460	Table D-7, Item 20	4.3%					
Rodent control		Existing	1,380	Table D-7, Item 21	2.4%					
Tree care		Existing	290	Table D-7, Item 22	0.5%					
Spruce Ave		Existing	3,439	Table D-7, Item 23	6.0%					
Miscellaneous expenses		Existing	2,237	Table D-7, Item 24	3.9%					
Fuel expense		Existing	1,230	Table D-7, Item 25	2.1%					
Matt and sons agreement	x	Existing	16,989	Table D-7, Item 26	29.5%					
Equipment rental		Existing	433	Table D-7, Item 27	0.8%					
Greenwaste		Existing	2,365	Table D-7, Item 28	4.1%					
Vaccum truck cleaning		Existing	1,015	Table D-7, Item 29	1.8%					
Matt and sons	x	Existing	2,129	Table D-7, Item 30	3.7%					
Cerutti agreement	x	Existing	1,825	Table D-7, Item 31	3.2%					
Emmetts agreement	x	Existing	2,560	Table D-7, Item 32	4.4%					
Fence repair		Existing	584	Table D-7, Item 37	1.0%					
Soil monitoring		Existing	10,428	Table D-7, Item 38	18.1%					
Total			57,539		5.1%	of total FMFCD stormwater program costs				

014215

Table D-2. Continued.

Public Education, Outreach, Involvement, and Participation

Description	External Contract	Relation to Permit	Dollar Amount	Source	% of Category	Activity Statistic	Notes/Units	Reference	Normalized Cost	Notes/Units
Panagraph Inc.	x	New	47,008	Table D-7, Item 7	22.6%					
Panagraph services	x	New	39,177	Table D-7, Item 8	18.8%					
Miscellaneous expenses		New	96,690	Table D-7, Items 9, 18, & 46	46.5%					
Utility bill inserts		New	2,525	Table D-7, Item 55	1.2%					
Newspaper description		New	15,095	Table D-7, Item 59	7.3%					
Grant		New	7,521	Table D-7, Item 52	3.6%					
Total			208,016		18.4%	of total stormwater cost				

Table D-1 continued

Water Quality Monitoring

Description	External Contract	Relation to Permit	Dollar Amount	Source	% of Category	Activity Statistic	Notes/Units	Reference	Normalized Cost	Notes/Units
Geosyntec monitoring	x	New	44,334	Table D-7, Item 1	17.5%					
Sheit, Handon and Hall	x	New	298	Table D-7, Item 4	0.1%					
LWA monitoring	x	New	156,663	Table D-7, Items 5 & 40	61.9%					
LWA services	x	New	40,258	Table D-7, Items 6 & 43	15.9%					
Phone expense		New	282	Table D-7, Item 41	0.1%					
Communication expense		New	1,083	Table D-7, Item 42	0.4%					
WERF		New	10,000	Table D-7, Item 44	4.0%					
Total			252,918		22.4%	of total FMFCD stormwater program costs				

Total FMFCD Stormwater Cost **1,131,033**

a. This column indicates whether required activities were being performed prior to stormwater permits. In some cases activities were enhanced due to permit requirements.

014216

Table D-3. Summary of Budgeted Stormwater Costs for Fresno Agencies

Item #	Program	Description	City of Clovis	County of Fresno	City of Fresno	CSUF
	Public Involvement and Education	Coordinate with other programs	0	400	0	0
	Public Involvement and Education	Maintain and promote school education	200	0	0	0
	Public Involvement and Education	Baseline costs	0	2,100	0	0
1	**Subtotal**		**200**	**2,500**	**0**	**0**
	Illicit Discharge	Implement inspector training	3,200	0	0	0
	Illicit Discharge	Train response personnel	3,200	0	0	0
	Illicit Discharge	Baseline costs	3,700	1,000	1,000	1,000
2	**Subtotal**		**10,100**	**1,000**	**1,000**	**1,000**
	Operations and Maintenance	Implement guidance for road maintenance activities	700	0	0	0
	Operations and Maintenance	Implement street cleaning practices (see 'Actual' costs)	100	0	0	0
	Operations and Maintenance	Implement corporation yard operation guidance	2,500	0	0	0
	Operations and Maintenance	Baseline costs	3,300	5,300	4,300	1,700
	Operations and Maintenance	*Actual street sweeping cost*	625,096	0	1,568,200	0
3	**Subtotal**		**631,696**	**5,300**	**1,572,500**	**1,700**
	Construction and Development	Review plans, inspect sites, enforce control requirement	19,100	2,600	13,700	0
	Construction and Development	Train agency personnel and development community	100	1,100	10,500	0
	Construction and Development	Baseline costs	10,100	3,200	19,000	0
	Construction and Development	Consider standard requirements	300	0	0	0
	Construction and Development	Implement construction site guidelines	0	0	2,100	0
4	**Subtotal**		**29,600**	**6,900**	**45,300**	**0**
	Commercial and Industrial	Implement inspection and enforcement procedures	0	100	0	0
	Commercial and Industrial	Train employees	1,600	100	0	0
	Commercial and Industrial	Baseline costs	4,500	8,000	10,400	900
5	**Subtotal**		**6,100**	**8,200**	**10,400**	**900**
6	***Overall Stormwater Program Man.*** [1]	Administration and management	**1,600**	**3,200**	**3,200**	**1,600**
	Total		**679,296**	**27,100**	**1,632,400**	**5,200**

Source: Fresno-Clovis Storm Water Quality Management Program, 00/01 budget (Fresno, 1999)

1. The program title was assigned and did not come from the reference.

014217

Table D-4. Calculation of Labor and Office Supply Costs for Stormwater

CAFR Description	Amount	Allocation to Stormwater	Reference	Stormwater Cost
Personnel expense[1]	$4,529,998	11%	Palmoville, pers. comm., 6/10/04	$ 498,299.78
Office Administration[1]	$189,671	11%	Palmoville, pers. comm., 6/10/04	$ 20,863.81

1. From page 20 of FMFCD CAFR, Statement of Revenues, Expenditures and Changes in Fund Balance - Government Funds and Reconcilliation to the Statement of Activities

Table D-5. Street Sweeping Data Submitted by City Staff and Normalization

Entity	Cost[1]	Curb Miles Swept[2]	Cost Per Mile Swept	Approximate City Street Miles
City of Fresno	1,568,200	94,495	16.60	
City of Clovis	625,096	47,430	13.18	235
CSUF	N/A	465	N/A	
County of Fresno	N/A	21	N/A	
Total	2,193,296	142,411	15.40	

1. (Source: Rourke, pers. comm., 8/02/04)
2. (Source: FMFCD, 2003b)

Table D-6. Recreated Portion of FMFCD Financial Statement

Fresno Metropolitan Flood Control District
Statement of Activities
for the year ended June 30, 2003

Functions/Programs	Expenses
General government	$6,388,084
Flood control system	4,010,377
Storm water quality	611,870
Interest on long-term debt	1,010,490
Total	12,020,821

(Source: FMFCD, 2003a.)

Table D-7. Source Data Table Submitted by FMFCD (cost survey categories added)

FMFCD Category	Item Number	DESC	APDesc	GL_Amt	Cost Survey Category[1]
Municipal NPDES Program Development 7030-7036					
		Consulting Services			
	1	GeoSyntec Consultants	2001-2002 SWQM	4,575.17	Monitoring
	1	GeoSyntec Consultants	2001-2002 Stormwater Quality M	952.22	Monitoring
	2	San Bernardino County	Updated Best Mgmt Practice Han	10,000.00	Pollution Prevention
	3	GeoSyntec Consultants	Service through 12/03/2002	683.78	Pollution Prevention
	3	GeoSyntec Consultants Inc	Service thru 01/07/2003	230.94	Pollution Prevention
	1	GeoSyntec Consultants Inc	03/2003 SWQ Monitoring	7,029.84	Monitoring
	1	GeoSyntec Consultants Inc	03/2003 SWQ Monitoring	2,343.45	Monitoring
	3	GeoSyntec Consultants Inc	05/2002 Communication Fee	0.30	Pollution Prevention
	1	GeoSyntec Consultants Inc	4/2003 Storm Water Monitoring	8,262.75	Monitoring
	1	GeoSyntec Consultants Inc	02-03 Storm Water Monitoring	7,302.26	Monitoring
	1	GeoSyntec Consultants Inc	02-03 Stormwater Quality Monit	4,867.72	Monitoring
	3	GeoSyntec Consultants Inc	Service thru 06/30/03	1,081.33	Pollution Prevention
	1	GeoSyntec Consultants Inc	02-03 Stormwater Monitoring	9,000.47	Monitoring
	Item Number		**Total Consulting Services**	**56,330.23**	
Subtotals	1		GeoSWQM7031	44,333.88	Monitoring
	2		SanBMPHan7031	10,000.00	Pollution Prevention
	3		GeoService7031	1,996.35	Pollution Prevention
			Total	56,330.23	
			Difference	0.00	
		Monitoring			
	4	Scheidt Haydon & Hall	SWQM BM02-01 6/26/02-7/02/02 W	298.06	Monitoring
	5	Larry Walker Associates Inc	Storm Water Quality Monitoring	3,530.00	Monitoring
	5	Larry Walker Associates Inc	2001-2002 Stormwater Monitorin	1,680.00	Monitoring
	5	Larry Walker Associates Inc	2001-2002 Stormwater Monitorin	1,680.00	Monitoring
	6	Larry Walker Associates Inc	09/01/02-09/18/02 Professional	173.25	Monitoring
	5	Larry Walker Associates Inc	2002-2003 SWQ Monitoring	132.00	Monitoring
	5	Larry Walker Associates Inc	02-03 Stormwater Quality Monit	2,262.50	Monitoring
	5	Larry Walker Associates Inc	02-03 Stormwater Monitoring	3,515.00	Monitoring
	Item Number		**Total Monitoring**	**13,270.81**	
Subtotals	4		SHHSWQM7033	298.06	Monitoring
	5		LWASWQM7033	12,799.50	Monitoring
	6		LWAProf7033	173.25	Monitoring
			Total	13,270.81	
			Difference	0.00	
		Public Information			
	9	Bank of America	Horizon	25.28	Public Education
	7	Panagraph Inc	07/2002 SWQMP Public Informati	3,831.50	Public Education
	9	Reed & Graham Inc	Bags of Gravel	42.83	Public Education
	7	Panagraph Inc	2002-2003 SWQMP Public Info &	1,636.25	Public Education
	7	Panagraph Inc	2001-2002 SWQMP Public Info &	8,227.38	Public Education
	7	Panagraph Inc	2002-2003 SWQMP Education	5,100.00	Public Education
	7	Panagraph Inc	2001-2002 SWQMP Education	1,713.50	Public Education
	7	Panagraph Inc	10/2002 SWQMP Public Info	4,250.00	Public Education
	9	Bank of America	Water Education Foundation	218.43	Public Education
	8	Panagraph Inc	Service through 10/31/2002	2,677.50	Public Education
	8	Panagraph Inc	Service thru 01/2003	3,271.54	Public Education
	8	Panagraph Inc	Services thru 12/2002	4,160.33	Public Education
	7	Panagraph Inc	2002-2003 SWQMP	5,876.97	Public Education
	8	Panagraph Inc	Services thru 03/2003	9,220.35	Public Education
	7	Panagraph Inc	SWQMP Public Info & Education	16,372.78	Public Education
	8	Panagraph Inc	02-03 Public Info & Education	15,036.32	Public Education
	8	Panagraph Inc	06/2003 Services SWQMP Info	4,810.73	Public Education
	Item Number		**Total Public Information**	**86,471.69**	
Subtotals	7		PanSWQMP7034	47,008.38	Public Education
	8		PanServices7034	39,176.77	Public Education
	9		Misc7034	286.54	Public Education
			Total	86,471.69	
			Difference	0.00	

Table D-7. Continued.

		General Expenses			
	10	Bank of America	Hyatt Regency	180.00	Management
	10	Bank of America	Hertz	93.13	Management
	10	Bank of America	City of Fresno Airport	6.00	Management
	10	David J Pomaville	Travel Reimbursement	5.32	Management
	10	Bank of America	Host Airport Hotel	124.75	Management
	10	Bank of America	Hertz	155.50	Management
	10	Bank of America	City of Fresno Parking	12.00	Management
	10	David J Pomaville	Travel Reimbursement	4.00	Management
	10	Doug Harrison	Travel Reimbursement	32.79	Management
	10	Doug Harrison	Travel Reimbursement	40.00	Management
	10	IMPAC Government Services	Radisson Hotel Sacramento	58.96	Management
	14	IMPAC Government Services	Maguire's Chevron	4.75	Management
	10	IMPAC Government Services	Hertz	81.30	Management
	14	IMPAC Government Services	Flag City	9.55	Management
	11	Calif Stormwater Quality Tas	SWQTF September Meeting Fee	40.00	Management
	10	Bank of America	Doubletree Hotel	108.31	Management
	10	Bank of America	City of Fresno Airport Parking	16.00	Management
	10	Bank of America	The Broiler Restaurant	31.37	Management
	10	Bank of America	Hertz Rent A Car	75.60	Management
	10	David J Pomaville	Reimbursement for Parking	7.00	Management
	11	Groundwater Resources Assoc	Nitrate in Groundwater Conf Re	150.00	Management
	12	SWQTF	2002/2003 Annual Dues	10,000.00	Management
	11	Beck & Duke Travel Service	SWQTF Conference-Ontario	526.00	Management
	10	Bank of America	Holiday Inn on the Bay	109.40	Management
	10	Bank of America	Hertz Rent a Car	63.00	Management
	11	California Storm Water Quali	CASQA Annual Board Meeting	40.00	Management
	10	Bank of America	Oakland Intl Airport Parking	12.00	Management
	10	Bank of America	City of Fresno Airport Parking	8.00	Management
	10	Bank of America	Hertz Rental Car	87.02	Management
	11	Beck & Duke Travel Service	Storm Water Quality Conf San D	374.00	Management
	10	David J Pomaville	Reimbursement Circle K Fuel	12.33	Management
	10	Bank of America	Anthony's Fish Grotto-San Dieg	22.88	Management
	10	Bank of America	Holiday Inn on the Bay	244.88	Management
	10	David J Pomaville	Meal Reimb-Cafe Care Ole'	5.00	Management
	10	David J Pomaville	Meal Reimbursement	15.00	Management
	10	David J Pomaville	Orange Cab-San Diego	12.00	Management
	10	Bank of America	Holiday Inn on the Bay	-109.40	Management
	13	Calif Storm Water Quality As	CASQA BMP Training	480.00	Management
	10	Bank of America	Hertz Rent a Car	-63.00	Management
	13	Calif Storm Water Quality As	CASWA CA BMP Training	480.00	Management
	11	Bank of America	CASQA & APWA Mtgs-Oakland Intl	25.00	Management
	11	Bank of America	CASQA & APWA Mtgs-Union 76	10.82	Management
	11	Bank of America	CASQA & APWA Mtgs-Hertz	152.55	Management
	11	Bank of America	CASQA & APWA Mtgs-City of Fres	16.00	Management
	11	David J Pomaville	CASQA Meeting	62.00	Management
	10	Bank of America	CASQA - Hyatt Regency	155.72	Management
	10	Bank of America	CASQA Meeting-Fresno Parking	16.00	Management
	10	Bank of America	CASQA - Hertz	152.19	Management
	10	Bank of America	CASQA - City of Sacto Parking	5.25	Management
	Item Number		**Total General Expenses**	**14,150.97**	
Subtotals	10		Travel7035	1,780.30	Management
	11		Meetings/Conferences7035	1,396.37	Management
	12		Dues/Fees7035	10,000.00	Management
	13		Training7035	960.00	Management
	14		Misc7035	14.30	Management
			Total	14,150.97	
			Difference	0.00	

Table D-7. Continued.

Industrial NPDES Prog Development 7040-7046

	Item Number				
		Consulting Services			
	15	GeoSyntec Consultants	2001-2002 Stormwater Monitorin	518.75	Industrial
	15	GeoSyntec Consultants	2001-2002 SWQM	20.75	Industrial
	15	GeoSyntec Consultants	2001-2002 SWQ Monitoring	2,488.20	Industrial
	16	GeoSyntec Consultants	Service through 12/03/2002	2,842.11	Industrial
	15	GeoSyntec Consultants Inc	03/2003 SWQ Monitoring	1,258.50	Industrial
	17	GeoSyntec Consultants Inc	05/2002 Communication Fee	56.16	Industrial
	15	GeoSyntec Consultants Inc	4/2003 Storm Water Monitoring	8,106.58	Industrial
	15	GeoSyntec Consultants Inc	02-03 Storm Water Monitoring	1,320.00	Industrial
	16	GeoSyntec Consultants Inc	Service thru 06/30/03	3,465.00	Industrial
	15	GeoSyntec Consultants Inc	02-03 Stormwater Monitoring	1,771.00	Industrial
			Total Consulting Services	**21,847.05**	
Subtotal	15		GeoSWQM7041	15,483.78	Industrial
	16		GeoService7041	6,307.11	Industrial
	17		Misc7041	56.16	Industrial
			Total	21,847.05	
			Difference	0.00	
Public Information					
	18	Bank of America	Albertson-PIE Meeting	26.16	Public Education

SWQM Operations & Maintenance 7050-7057

		SWQM Detention Basin Operations and Maintenance			
	20	Wildlife Control Technology	Agreement #2002-04	60.00	Post Construction
	20	Wildlife Control Technology	Agreement #2002-04	60.00	Post Construction
	20	Wildlife Control Technology	Agreement #2002-04	60.00	Post Construction
	20	Wildlife Control Technology	Agreement #2002-04	60.00	Post Construction
	20	Wildlife Control Technology	Agreement #2002-04	60.00	Post Construction
	20	Wildlife Control Technology	Agreement #2002-04	60.00	Post Construction
	20	Wildlife Control Technology	Agreement #2002-04	60.00	Post Construction
	24	R/C Mow-N-Edge Corporation		136.51	Post Construction
	20	Wildlife Control Technology	Agreement #2002-04	60.00	Post Construction
	24	Mow-N-Edge Corporation	Dev Unit II	136.51	Post Construction
	21	Wildlife Control Technology	2003 Rodent Control Srvc	60.00	Post Construction
	24	Pacific Gas & Electric Compa	Line Extension Deficiency	403.86	Post Construction
	19	Mow-N-Edge Corporation	2003 Developed Basin Maint Uni	136.51	Post Construction
	21	Wildlife Control Technology	4/2003 Rodent Control	60.00	Post Construction
	24	Cobb's Tree Care	Agreement 2003-12	320.00	Post Construction
	19	Mow-N-Edge Corporation	2003 Developed Basin Maint Uni	136.51	Post Construction
	21	Wildlife Control Technology	5/2003 Rodent Control	60.00	Post Construction
	19	Mow-N-Edge Corporation	6/03 Dev Basin Maint-Unit 2	136.51	Post Construction
	19	Mow-N-Edge Corporation	6/03 Dev Basin Maint-Unit 2	-150.00	Post Construction
	21	Wildlife Control Technology	6/2003 Rodent Control	60.00	Post Construction
	20	Wildlife Control Technology	Agreement #2002-04	60.00	Post Construction
	20	Wildlife Control Technology	Agreement #2002-04	60.00	Post Construction
	21	Wildlife Control Technology	2003 Rodent Control Srvc	60.00	Post Construction
	21	Wildlife Control Technology	4/2003 Rodent Control	40.00	Post Construction
	21	Wildlife Control Technology	5/2003 Rodent Control	40.00	Post Construction
	21	Wildlife Control Technology	6/2003 Rodent Control	40.00	Post Construction
	19	Lucas Weed Control, LLC	07/2002 Undeveloped Basin Main	106.37	Post Construction
	19	Lucas Weed Control, LLC	08/2002 Undeveloped Basin Main	106.37	Post Construction
	20	Wildlife Control Technology	Agreement #2002-04	60.00	Post Construction
	20	Wildlife Control Technology	Agreement #2002-04	60.00	Post Construction
	19	Lucas Weed Control, LLC	09/2002 Undeveloped Basin Main	106.37	Post Construction
	20	Wildlife Control Technology	Agreement #2002-04	60.00	Post Construction
	19	Lucas Weed Control, LLC	10/2002 Undeveloped Basin Main	106.37	Post Construction
	19	Lucas Weed Control, LLC	11/2002 Undeveloped Basin Main	106.37	Post Construction
	20	Wildlife Control Technology	Agreement #2002-04	60.00	Post Construction
	19	Lucas Weed Control, LLC	12/2002 Undeveloped Basin Main	106.37	Post Construction

Table D-7. Continued.

20	Wildlife Control Technology	Agreement #2002-04	60.00	Post Construction
19	Irly-Bird Landscape Company	01/2003 Undev Basin Maint	82.89	Post Construction
20	Wildlife Control Technology	Agreement #2002-04	60.00	Post Construction
19	Irly-Bird Landscape Company	2003 Undev Basin Maint Unit II	82.89	Post Construction
20	Wildlife Control Technology	Agreement #2002-04	60.00	Post Construction
21	Wildlife Control Technology	2003 Rodent Control Srvc	60.00	Post Construction
19	Irly-Bird Landscape Company	3/03 Undev Basin Maint Unit II	82.89	Post Construction
21	Wildlife Control Technology	4/2003 Rodent Control	60.00	Post Construction
19	Irly-Bird Landscape Company	4/03 Undev Basin Maint Unit II	82.89	Post Construction
21	Wildlife Control Technology	5/2003 Rodent Control	60.00	Post Construction
21	Wildlife Control Technology	6/2003 Rodent Control	60.00	Post Construction
22	Cobb's Tree Care	Agreement #2002-12	290.00	Post Construction
20	Wildlife Control Technology	Agreement #2002-04	60.00	Post Construction
24	Mow-N-Edge Corporation	2002 SWQM Detention Basin O &	562.49	Post Construction
19	Lucas Weed Control, LLC	07/02 Undev Basin Maint-Extra	80.00	Post Construction
20	Wildlife Control Technology	Agreement #2002-04	60.00	Post Construction
23	City of Fresno	6302 W Spruce Ave	1,329.68	Post Construction
19	Mow-N-Edge Corporation	2002 Developed Basin Maint	562.49	Post Construction
19	Mow-N-Edge Corporation	2002 Developed Basin Maint	49.00	Post Construction
20	Wildlife Control Technology	Agreement #2002-04	60.00	Post Construction
19	Mow-N-Edge Corporation	09/2002 Developed Basin Mainte	562.49	Post Construction
20	Wildlife Control Technology	Agreement #2002-04	60.00	Post Construction
23	City of Fresno	6302 W Spruce Ave	1,048.86	Post Construction
19	Mow-N-Edge Corporation	10/2002 Developed Basin Mainte	562.49	Post Construction
19	Mow-N-Edge Corporation	11/2002 Developed Basin Mainte	562.49	Post Construction
20	Wildlife Control Technology	Agreement #2002-04	60.00	Post Construction
23	City of Fresno	6302 W Spruce Ave	223.42	Post Construction
19	Mow-N-Edge Corporation	12/2002 Developed Basin Mainte	562.49	Post Construction
20	Wildlife Control Technology	Agreement #2002-04	60.00	Post Construction
20	Wildlife Control Technology	Agreement #2002-04	60.00	Post Construction
19	Mow-N-Edge Corporation	01/2003 Developed Basin Mainte	573.73	Post Construction
19	Mow-N-Edge Corporation	2003 Developed Basin Maint Uni	573.73	Post Construction
23	City of Fresno	6302 W Spruce Ave	115.62	Post Construction
20	Wildlife Control Technology	Agreement #2002-04	60.00	Post Construction
24	Mow-N-Edge Corporation	Dev Unit II Extra Work	104.13	Post Construction
24	Mow-N-Edge Corporation	Dev Unit II	573.73	Post Construction
21	Wildlife Control Technology	2003 Rodent Control Srvc	60.00	Post Construction
23	City of Fresno	6302 W Spruce Ave	128.46	Post Construction
19	Mow-N-Edge Corporation	2003 Developed Basin Maint Uni	573.73	Post Construction
21	Wildlife Control Technology	4/2003 Rodent Control	60.00	Post Construction
19	Mow-N-Edge Corporation	2003 Developed Basin Maint Uni	573.73	Post Construction
21	Wildlife Control Technology	5/2003 Rodent Control	60.00	Post Construction
23	City of Fresno	6302 W Spruce Ave	592.84	Post Construction
19	Mow-N-Edge Corporation	6/03 Dev Basin Maint-Unit 2	573.73	Post Construction
21	Wildlife Control Technology	6/2003 Rodent Control	60.00	Post Construction
19	Lucas Weed Control, LLC	07/2002 Undeveloped Basin Main	102.50	Post Construction
20	Wildlife Control Technology	Agreement #2002-04	60.00	Post Construction
19	Lucas Weed Control, LLC	08/2002 Undeveloped Basin Main	102.50	Post Construction
20	Wildlife Control Technology	Agreement #2002-04	60.00	Post Construction
20	Wildlife Control Technology	Agreement #2002-04	60.00	Post Construction
19	Lucas Weed Control, LLC	09/2002 Undeveloped Basin Main	102.50	Post Construction
20	Wildlife Control Technology	Agreement #2002-04	60.00	Post Construction
19	Lucas Weed Control, LLC	10/2002 Undeveloped Basin Main	102.50	Post Construction
19	Lucas Weed Control, LLC	11/2002 Undeveloped Basin Main	102.50	Post Construction
20	Wildlife Control Technology	Agreement #2002-04	60.00	Post Construction
19	Lucas Weed Control, LLC	12/2002 Undeveloped Basin Main	102.50	Post Construction
20	Wildlife Control Technology	Agreement #2002-04	60.00	Post Construction
19	Irly-Bird Landscape Company	01/2003 Undev Basin Maint	68.95	Post Construction
20	Wildlife Control Technology	Agreement #2002-04	60.00	Post Construction
19	Irly-Bird Landscape Company	2003 Undev Basin Maint Unit II	68.95	Post Construction
20	Wildlife Control Technology	Agreement #2002-04	60.00	Post Construction
21	Wildlife Control Technology	2003 Rodent Control Srvc	60.00	Post Construction
19	Irly-Bird Landscape Company	3/03 Undev Basin Maint Unit II	68.95	Post Construction
21	Wildlife Control Technology	4/2003 Rodent Control	60.00	Post Construction
19	Irly-Bird Landscape Company	4/03 Undev Basin Maint Unit II	68.95	Post Construction

Table D-7. Continued.

	21	Wildlife Control Technology	5/2003 Rodent Control	60.00	Post Construction
	21	Wildlife Control Technology	6/2003 Rodent Control	60.00	Post Construction
	19	Lucas Weed Control, LLC	07/2002 Undeveloped Basin Main	38.68	Post Construction
	20	Wildlife Control Technology	Agreement #2002-04	60.00	Post Construction
	19	Lucas Weed Control, LLC	08/2002 Undeveloped Basin Main	38.68	Post Construction
	20	Wildlife Control Technology	Agreement #2002-04	60.00	Post Construction
	20	Wildlife Control Technology	Agreement #2002-04	60.00	Post Construction
	19	Lucas Weed Control, LLC	09/2002 Undeveloped Basin Main	38.68	Post Construction
	20	Wildlife Control Technology	Agreement #2002-04	60.00	Post Construction
	19	Lucas Weed Control, LLC	10/2002 Undeveloped Basin Main	38.68	Post Construction
	19	Lucas Weed Control, LLC	11/2002 Undeveloped Basin Main	38.68	Post Construction
	20	Wildlife Control Technology	Agreement #2002-04	60.00	Post Construction
	19	Lucas Weed Control, LLC	12/2002 Undeveloped Basin Main	38.68	Post Construction
	20	Wildlife Control Technology	Agreement #2002-04	60.00	Post Construction
	19	Irly-Bird Landscape Company	01/2003 Undev Basin Maint	2.94	Post Construction
	20	Wildlife Control Technology	Agreement #2002-04	60.00	Post Construction
	19	Irly-Bird Landscape Company	2003 Undev Basin Maint Unit II	2.94	Post Construction
	20	Wildlife Control Technology	Agreement #2002-04	60.00	Post Construction
	21	Wildlife Control Technology	2003 Rodent Control Srvc	60.00	Post Construction
	19	Irly-Bird Landscape Company	3/03 Undev Basin Maint Unit II	2.94	Post Construction
	21	Wildlife Control Technology	4/2003 Rodent Control	60.00	Post Construction
	19	Irly-Bird Landscape Company	4/03 Undev Basin Maint Unit II	2.94	Post Construction
	21	Wildlife Control Technology	5/2003 Rodent Control	60.00	Post Construction
	21	Wildlife Control Technology	6/2003 Rodent Control	60.00	Post Construction
Item Number			**Total SWQM Detention Basins Operations & Maintenance**	**17,980.16**	
Subtotal	19		Undev/DevBasinMaint7051	8,174.05	Post Construction
	20		WildAgree2002-047051	2,460.00	Post Construction
	21		RodentControl7051	1,380.00	Post Construction
	22		CobbAgree2002-127051	290.00	Post Construction
	23		CitySpruceAve7051	3,438.88	Post Construction
	24		Misc7051	2,237.23	Post Construction
			Total	17,980.16	
			Difference	0.00	

	SWQM Retention Basin Operations and Maintenance			
	Seibert's Oil Company Inc	07/2002 Diesel Fuel	114.50	Post Construction
	Seibert's Oil Company Inc	07/2002 Diesel Fuel	117.90	Post Construction
	Seibert's Oil Company Inc	07/2002 Diesel Fuel	115.33	Post Construction
	Seibert's Oil Company Inc	08/2002 Diesel Fuel	80.27	Post Construction
	Matthews & Son	Agreement #2002-01	1,630.50	Post Construction
	Matthews and Sons	Agreement #2002-01	35.00	Post Construction
	Safety Network	Equipment Rental	180.00	Post Construction
	Safety Network	7/21/02-8/02/02 Equip Rental	253.00	Post Construction
	Chevron	Fuel	9.86	Post Construction
	Cardlock Fuels System Inc	Fuel through 5/31/03	33.41	Post Construction
	Matthews and Sons	Agreement #2002-01	280.00	Post Construction
	R/C Matthews & Son		455.00	Post Construction
	Cardlock Fuels System Inc	07/31/2002 Fuel	9.53	Post Construction
	Matthews and Sons	Agreement #2002-01	4,345.13	Post Construction
	Video Inspection Specialists	Cleaning w/ Vacuum Truck	435.00	Post Construction
	R/C Matthews and Sons		273.75	Post Construction
	R/C Matthews and Sons		542.50	Post Construction
	Cerutti & Sons Transportatio	Agreement #2002-09	290.55	Post Construction
	Matthews and Sons	Agreement #2002-01	180.84	Post Construction
	Emmetts Excavation Grading &	Agreement #2002-18	770.00	Post Construction
	Cardlock Fuels System Inc	08/2002 Pump Fuel	68.49	Post Construction
	Cardlock Fuels System Inc	09/2002 Diesel	59.49	Post Construction
	Cardlock Fuels System Inc	10/15/2002 Pump Fuel/Truck Fue	28.27	Post Construction
	Cardlock Fuels System Inc	10/31/2002 Diesel Fuel	15.02	Post Construction
	Cerutti & Sons Transportatio	Agreement #2002-09	961.05	Post Construction
	Matthews and Sons	Agreement #2002-01	180.83	Post Construction
	Emmetts Excavation Grading &	Agreement #2002-18	770.00	Post Construction
	Cardlock Fuels System Inc	08/2002 Pump Fuel	62.98	Post Construction
	Cardlock Fuels System Inc	08/2002 Truck Fuel	7.14	Post Construction

Table D-7. Continued.

		Cardlock Fuels System Inc	09/2002 Diesel Fuel	40.49	Post Construction
		Cardlock Fuels System Inc	09/2002 Diesel	389.47	Post Construction
		Cardlock Fuels System Inc	10/15/2002 Pump Fuel/Truck Fue	28.26	Post Construction
		Cardlock Fuels System Inc	10/31/2002 Diesel Fuel	20.16	Post Construction
		Cardlock Fuels System Inc	09/2002 Diesel Fuel	29.62	Post Construction
		R/C Matthews & Son		350.00	Post Construction
		R/C Matthews and Sons		245.00	Post Construction
		Matthews and Sons	Agreement #2002-01	1,487.50	Post Construction
		Video Inspection Specialists	Cleaning w/ Vacuum Truck	580.00	Post Construction
		R/C Matthews and Sons		262.50	Post Construction
		E & J Gallo Winery	Greenwaste Deliveries	1,155.00	Post Construction
		Matthews and Sons	Agreement #2002-01	7,731.25	Post Construction
		Matthews and Sons	Agreement #2002-01	326.26	Post Construction
		E & J Gallo Winery	09/2002 Greenwaste Deliveries	1,195.00	Post Construction
		Matthews and Sons	Agreement #2002-01	611.25	Post Construction
		E & J Gallo Winery	11/2002 Greenwaste	15.00	Post Construction
		Cerutti & Sons Transportatio	Agreement #2002-09	573.65	Post Construction
		Matthews and Sons	Agreement #2002-01	180.83	Post Construction
		Emmetts Excavation Grading &	Agreement #2002-18	1,020.00	Post Construction
	Item Number		**Total SWQM Retention Basin O&M**	**28,546.58**	
Subtotal	25		Fuel7052	1,230.19	Post Construction
	26		M&SAgree2002-017052	16,989.39	Post Construction
	27		EquipRental7052	433.00	Post Construction
	28		Greenwaste7052	2,365.00	Post Construction
	29		CleaningVacuumTruck7052	1,015.00	Post Construction
	30		M&SBlank7052	2,128.75	Post Construction
	31		CeruttiAgree2002-097052	1,825.25	Post Construction
	32		EmmettsAgree2002-187052	2,560.00	Post Construction
			Total	28,546.58	
			Difference	0.00	
		SWQM Structures Operations and Maintenance			
	33	Video Inspection Specialists	12/2002 Vacuum Truck Cleaning	24.17	Pollution Prevention
	33	Video Inspection Specialists	12/2002 Vacuum Truck Cleaning	290.00	Pollution Prevention
	33	Video Inspection Specialists	11/2002 Vacuum Cleaning	435.00	Pollution Prevention
	33	Video Inspection Specialists	11/2002 Vacuum Cleaning	330.00	Pollution Prevention
	33	Video Inspection Specialists	11/2002 Cleaning & Root Cuttin	330.00	Pollution Prevention
	33	Video Inspection Specialists	10/2002 Vacuum Cleaning	217.50	Pollution Prevention
	33	Video Inspection Specialists	Cleaning w/ Vacuum Truck	362.50	Pollution Prevention
	33	Video Inspection Specialists	Clean w/Vacuum Truck	1,550.00	Pollution Prevention
	33	Video Inspection Specialists	12/2002 Vacuum Truck Cleaning	217.50	Pollution Prevention
	33	Video Inspection Specialists	12/2002 Vacuum Truck Cleaning	145.00	Pollution Prevention
	33	Video Inspection Specialists	12/2002 Vacuum Truck Cleaning	24.17	Pollution Prevention
	33	Video Inspection Specialists	11/2002 Vacuum Cleaning	290.00	Pollution Prevention
	33	Video Inspection Specialists	Clean w/Vacuum Truck & TV Insp	2,195.00	Pollution Prevention
	34	City of Fresno	7/02-3/03 Pipeline Maint	288.10	Pollution Prevention
	34	City of Fresno	7/02-3/03 Pipeline Maint	296.10	Pollution Prevention
	33	Video Inspection Specialists	10/2002 Vacuum Cleaning	217.50	Pollution Prevention
	33	Video Inspection Specialists	12/2002 Vacuum Truck Cleaning	145.00	Pollution Prevention
	33	Video Inspection Specialists	12/2002 Vacuum Truck Cleaning	24.16	Pollution Prevention
	34	City of Fresno	7/02-3/03 Pipeline Maint	72.36	Pollution Prevention
	33	Video Inspection Specialists	12/2002 Vacuum Cleaning	362.50	Pollution Prevention
	33	Video Inspection Specialists	10/2002 Vacuum Cleaning	217.50	Pollution Prevention
	33	Video Inspection Specialists	03/2003 Vacuum Truck Cleaning	310.00	Pollution Prevention
	33	Video Inspection Specialists	11/2002 Vacuum Cleaning	145.00	Pollution Prevention
	33	Video Inspection Specialists	11/2002 Vacuum Cleaning	580.00	Pollution Prevention
	33	Video Inspection Specialists	11/2002 Cleaning & Root Cuttin	290.00	Pollution Prevention
	33	Video Inspection Specialists	12/2002 Vacuum Cleaning	507.50	Pollution Prevention
	33	Video Inspection Specialists	Clean w/Vacuum Truck	310.00	Pollution Prevention
	Item Number		**Total SWQM Structures O&M**	**10,176.56**	
Subtotal	33		VISTruckCleaning7054	9,520.00	Pollution Prevention
	34		FresnoPipeline7054	656.56	Pollution Prevention
			Total	10,176.56	
			Difference	0.00	

Table D-7. Continued.

		SWQM Pump Operations and Maintenance			
	35	Video Inspection Specialists	Clean w/Vacuum Truck	155.00	Pollution Prevention
	35	Video Inspection Specialists	7/2002 Pump Station Vacuum Cle	580.00	Pollution Prevention
	35	Video Inspection Specialists	7/2002 Pump Station Vacuum Cle	507.50	Pollution Prevention
	35	Video Inspection Specialists	11/2002 Cleaning & Root Cuttin	742.50	Pollution Prevention
	35	Video Inspection Specialists	Clean w/Vacuum Truck	787.50	Pollution Prevention
	35	Video Inspection Specialists	11/2002 Vacuum Cleaning	253.75	Pollution Prevention
	35	Video Inspection Specialists	Clean w/Vacuum Truck	310.00	Pollution Prevention
	35	Video Inspection Specialists	11/2002 Cleaning & Root Cuttin	330.00	Pollution Prevention
	35	Video Inspection Specialists	Clean w/Vacuum Truck	232.50	Pollution Prevention
	35	Video Inspection Specialists	03/2003 Vacuum Truck Cleaning	290.00	Pollution Prevention
	35	Video Inspection Specialists	11/2002 Vacuum Cleaning	217.50	Pollution Prevention
	35	Video Inspection Specialists	10/2002 Vacuum Cleaning	217.50	Pollution Prevention
	35	Video Inspection Specialists	10/2002 Vacuum Cleaning	290.00	Pollution Prevention
	35	Video Inspection Specialists	10/2002 Vacuum Cleaning	72.50	Pollution Prevention
	35	Video Inspection Specialists	10/2002 Vacuum Cleaning	580.00	Pollution Prevention
	35	Video Inspection Specialists	10/2002 Vacuum Cleaning	72.50	Pollution Prevention
	36	Pacific Gas & Electric Compa	10/03/02-11/18/02 Service	49.49	Pollution Prevention
	36	Pacific Gas & Electric Compa	Service through 12/17/2002	32.56	Pollution Prevention
	36	Pacific Gas & Electric Compa	Service thru 10/12/02-01/03/03	51.17	Pollution Prevention
	36	Pacific Gas & Electric Compa	Service thru 04/17/03	7.67	Pollution Prevention
	36	Pacific Gas & Electric Compa	Service thru 05/12/03 Pump Sit	28.67	Pollution Prevention
	36	Pacific Gas & Electric Compa	Service through 7/18/03	86.03	Pollution Prevention
	36	Pacific Gas & Electric Compa	Service through 6/18/03	86.03	Pollution Prevention
	36	Pacific Gas & Electric Compa	07/03/02-08/02/02 Service	10.80	Pollution Prevention
	36	Pacific Gas & Electric Compa	08/02/02-09/03/02 Service	10.80	Pollution Prevention
	36	Pacific Gas & Electric Compa	09/03/02-10/02/02 Service	10.80	Pollution Prevention
	36	Pacific Gas & Electric Compa	10/02/02-10/31/02 Service	10.80	Pollution Prevention
	36	Pacific Gas & Electric Compa	10/31/02-11/27/02 Service	11.50	Pollution Prevention
	36	Pacific Gas & Electric Compa	Service thru 10/12/02-01/03/03	12.98	Pollution Prevention
	36	Pacific Gas & Electric Compa	10/12/02-01/03/03 Service	14.22	Pollution Prevention
	36	Pacific Gas & Electric Compa	03/2003 Site Pump Utilities	12.47	Pollution Prevention
	36	Pacific Gas & Electric Compa	Service thru 04/10/03 Pump Sit	11.94	Pollution Prevention
	36	Pacific Gas & Electric Compa	Service thru 05/12/03 Pump Sit	11.91	Pollution Prevention
	36	Pacific Gas & Electric Compa	Service thru 06/11/03 Pump Sit	22.37	Pollution Prevention
	36	Pacific Gas & Electric Compa	Service thru 7/11/03	10.29	Pollution Prevention
	36	Pacific Gas & Electric Compa	07/03/02-08/02/02 Service	126.05	Pollution Prevention
	36	Pacific Gas & Electric Compa	08/02/02-09/03/02 Service	79.22	Pollution Prevention
	36	Pacific Gas & Electric Compa	09/03/02-10/02/02 Service	76.74	Pollution Prevention
	36	Pacific Gas & Electric Compa	10/02/02-10/31/02 Service	57.03	Pollution Prevention
	36	Pacific Gas & Electric Compa	10/31/02-11/27/02 Service	24.12	Pollution Prevention
	36	Pacific Gas & Electric Compa	Service thru 10/12/02-01/03/03	10.29	Pollution Prevention
	36	Pacific Gas & Electric Compa	10/12/02-01/03/03 Service	11.36	Pollution Prevention
	36	Pacific Gas & Electric Compa	03/2003 Site Pump Utilities	10.65	Pollution Prevention
	36	Pacific Gas & Electric Compa	Service thru 04/10/03 Pump Sit	10.65	Pollution Prevention
	36	Pacific Gas & Electric Compa	Service thru 05/12/03 Pump Sit	11.39	Pollution Prevention
	36	Pacific Gas & Electric Compa	Service thru 06/11/03 Pump Sit	13.46	Pollution Prevention
	36	Pacific Gas & Electric Compa	Service thru 7/11/03	83.81	Pollution Prevention
	35	Video Inspection Specialists	10/2002 Vacuum Cleaning	145.00	Pollution Prevention
	35	Video Inspection Specialists	11/2002 Vacuum Cleaning	108.75	Pollution Prevention
	35	Video Inspection Specialists	11/2002 Vacuum Cleaning	181.25	Pollution Prevention
	35	Video Inspection Specialists	Clean w/Vacuum Truck	155.00	Pollution Prevention
	Item Number		**Total SWQM Pump O&M**	**7,236.02**	
Subtotal	35		VISTruckCleaning7055	6,228.75	Pollution Prevention
	36		PGEService7055	1,007.27	Pollution Prevention
			Total	7,236.02	
			Difference	0.00	
SWQM Other Operations and Maintenance					
	37	Melco Fence	02/2003 Fence Repair	584.00	Post Construction
		SWQM Soil Monitoring			
	38	BSK Analytical Laboratories	Low Level Lead Profile	297.00	Post Construction
	38	BSK Analytical Laboratories	07/10/2002 Low Level Lead Prof	99.00	Post Construction
	38	BSK Analytical Laboratories	Low Level Lead Profile	396.00	Post Construction
	38	BSK Analytical Laboratories	07/2002 Low Level Lead Profile	363.00	Post Construction
	38	BSK Analytical Laboratories	07/2002 Low Level Lead Profile	264.00	Post Construction
	38	BSK Analytical Laboratories	07/03/2002 Low Level Lead Prof	198.00	Post Construction
	38	BSK Analytical Laboratories	Low Level Lead Profile	363.00	Post Construction
	38	BSK Analytical Laboratories	08/2002 Low Level Lead Profile	99.00	Post Construction
	38	BSK Analytical Laboratories	Low Level Lead Profile	198.00	Post Construction
	38	BSK Analytical Laboratories	07/03/2002 Low Level Lead Prof	66.00	Post Construction
	38	BSK Analytical Laboratories	Low Level Lead Profile	132.00	Post Construction
	38	BSK Analytical Laboratories	07/10/2002 Low Level Lead Prof	99.00	Post Construction
	38	BSK Analytical Laboratories	07/11/2002 Low Level Lead Prof	396.00	Post Construction
	38	BSK Analytical Laboratories	07/15/2002 Low Level Lead Prof	396.00	Post Construction
	38	BSK Analytical Laboratories	Low Level Lead Profile	396.00	Post Construction
	38	BSK Analytical Laboratories	Low Level Lead Profile	198.00	Post Construction
	38	BSK Analytical Laboratories	07/10/2002 Low Level Lead Prof	99.00	Post Construction
	38	BSK Analytical Laboratories	07/10/2002 Low Level Lead Prof	99.00	Post Construction
	38	BSK Analytical Laboratories	07/2002 Low Level Lead Profile	132.00	Post Construction
	38	BSK Analytical Laboratories	07/2002 Low Level Lead Profile	99.00	Post Construction
	38	BSK Analytical Laboratories	Low Level Lead Profile-II3	165.00	Post Construction
	38	BSK Analytical Laboratories	07/2002 Low Level Lead Profile	396.00	Post Construction
	38	BSK Analytical Laboratories	08/2002 Low Level Lead Profile	264.00	Post Construction
	38	BSK Analytical Laboratories	Low Level Lead Profile	198.00	Post Construction

Table D-7. Continued.

38	BSK Analytical Laboratories	Low Level Lead Profile	198.00	Post Construction
38	BSK Analytical Laboratories	10/2002 Low Level Lead Profile	396.00	Post Construction
38	BSK Analytical Laboratories	11/2002 Low Level Lead Profile	99.00	Post Construction
38	BSK Analytical Laboratories	10/2002 Low Level Lead Profile	99.00	Post Construction
38	BSK Analytical Laboratories	11/2002 Low Level Lead Profile	99.00	Post Construction
38	BSK Analytical Laboratories	07/2002 Low Level Lead Profile	99.00	Post Construction
38	BSK Analytical Laboratories	09/2002 Low Level Lead Profile	297.00	Post Construction
38	BSK Analytical Laboratories	09/2002 Low Level Lead Profile	231.00	Post Construction
38	BSK Analytical Laboratories	08/2002 Low Level Lead Profile	396.00	Post Construction
38	BSK Analytical Laboratories	08/2002 Low Level Lead Profile	198.00	Post Construction
38	BSK Analytical Laboratories	09/2002 Low Level Lead Profile	198.00	Post Construction
38	BSK Analytical Laboratories	07/2002 Low Level Lead Profile	396.00	Post Construction
38	BSK Analytical Laboratories	07/2002 Low Level Lead Profile	297.00	Post Construction
38	BSK Analytical Laboratories	08/2002 Low Level Lead Profile	279.00	Post Construction
38	BSK Analytical Laboratories	Low Level Lead Profile-Bal Due	18.00	Post Construction
38	BSK Analytical Laboratories	07/10/2002 Low Level Lead Prof	231.00	Post Construction
38	BSK Analytical Laboratories	07/2002 Low Level Lead Profile	231.00	Post Construction
38	BSK Analytical Laboratories	08/2002 Low Level Lead Profile	66.00	Post Construction
38	BSK Analytical Laboratories	09/2002 Low Level Lead Profile	198.00	Post Construction
38	BSK Analytical Laboratories	05/2002 Low Level Lead Profile	165.00	Post Construction
38	BSK Analytical Laboratories	08/2002 Low Level Lead Profile	297.00	Post Construction
38	BSK Analytical Laboratories	10/2002 Low Level Lead Profile	99.00	Post Construction
38	BSK Analytical Laboratories	11/2002 Low Level Lead Profile	99.00	Post Construction
38	BSK Analytical Laboratories	05/2002 Low Level Lead Profile	165.00	Post Construction
38	BSK Analytical Laboratories	05/2002 Low Level Lead Profile	165.00	Post Construction
Item Number				
38		**Total SWQM Soil Monitoring**	10,428.00	Post Construction
Municipal NPDES Program Implementation 7060-7066				
	Investigation, Inspection, Enforcement			
39	Fotech Color Labs	08/2002 Photos	6.00	Illicit Discharge
39	Fotech Color Labs	07/2002 Photos	16.66	Illicit Discharge
39	Fotech Color Labs	Photo Developing	53.83	Illicit Discharge
Item Number				
39		**Total Investigation, Inspection, Enforcement**	76.49	Illicit Discharge
	Monitoring			
42	AirLink Communications	08/2002 IP Activation Fee	45.00	Monitoring
41	AT&T Wireless Services	07/14/2002-08/13/2002 Services	26.18	Monitoring
40	Larry Walker Associates Inc	Storm Water Quality Monitoring	10,552.33	Monitoring
41	AT&T Wireless Services	08/14/02-09/13/02 Service Peri	23.76	Monitoring
42	AirLink Communications	07/24/02-08/23/02 Telemetry Fe	58.06	Monitoring
40	Larry Walker Associates Inc	2002-2003 Stormwater Monitorin	1,823.85	Monitoring
40	Larry Walker Associates Inc	2001-2002 Stormwater Monitorin	8,756.96	Monitoring
40	Larry Walker Associates Inc	2001-2002 Stormwater Monitorin	3,192.74	Monitoring
42	AirLink Communications	10/2002 Telemetry Monthly Fee	98.00	Monitoring
41	AT&T Wireless Services	09/14/02-10/13/02 Service	23.35	Monitoring
42	Airlink Communications Inc	09/24/02-10/23/02 Monthly Fee	98.00	Monitoring
41	AT&T Wireless Services	10/14/02-11/13/02 Service	23.98	Monitoring
43	Larry Walker Associates Inc	10/01/02-10/31/02 Professional	7,816.19	Monitoring
43	Larry Walker Associates Inc	09/01/02-09/18/02 Professional	4,692.12	Monitoring
40	Larry Walker Associates Inc	2002-2003 SWQ Monitoring	18,662.34	Monitoring
42	Airlink Communications Inc	Service through 11/23/2002	98.00	Monitoring
41	AT&T Wireless Services	Service through 12/13/2002	23.56	Monitoring
41	AT&T Wireless Services	Service thru 01/15/2003	23.46	Monitoring
43	Larry Walker Associates Inc	Service thru 12/31/2002	27,576.10	Monitoring
42	Airlink Communications Inc	Services thru 12/23/2002	98.00	Monitoring
41	AT&T Wireless Services	Service thru 02/13/03	25.75	Monitoring
40	Larry Walker Associates Inc	2002-2003 SWQ Monitoring	17,728.24	Monitoring
42	Airlink Communications Inc	Service thru 01/23/03	98.00	Monitoring
42	Airlink Communications Inc	02/23/03 Monthly Fee	98.00	Monitoring
41	AT&T Wireless Services	03/15/03 Billing	23.61	Monitoring
40	Larry Walker Associates Inc	02/2003 SWQ Monitoring	14,544.32	Monitoring

Table D-7. Continued.

	41	AT&T Wireless Services	Service thru 04/13/03	21.18	Monitoring
	40	Larry Walker Associates Inc	02-03 Storm Water Monitoring	14,464.70	Monitoring
	42	Airlink Communications Inc	IP Local - Unlimited	98.00	Monitoring
	42	Airlink Communications Inc	IP Local Unlimited	98.00	Monitoring
	41	AT&T Wireless Services	Service Through 5/13/2003	23.24	Monitoring
	40	Larry Walker Associates Inc	02-03 Storm Water Monitoring	17,532.15	Monitoring
	44	Water Env Research Foundatio	03/04 Subscription to WERF	10,000.00	Monitoring
	40	Larry Walker Associates Inc	02-03 Stormwater Quality Monit	12,274.56	Monitoring
	42	Airlink Communications Inc	IP Usage through 6/23/03	98.00	Monitoring
	42	Airlink Communications Inc	IP Local Service through 5/23/	98.00	Monitoring
	41	AT&T Wireless Services	Service through 6/15/2003	22.42	Monitoring
	41	AT&T Wireless Services	Service through 7/13/03	21.50	Monitoring
	40	Larry Walker Associates Inc	02-03 Stormwater Monitoring	24,331.20	Monitoring
	Item Number		**Total Monitoring**	**195,312.85**	
Subtotal	40		LWASWQM7063	143,863.39	Monitoring
	41		ATTService7063	281.99	Monitoring
	42		AirlinkIP7063	1,083.06	Monitoring
	43		LWAProf7063	40,084.41	Monitoring
	44		WERF7063	10,000.00	Monitoring
			Total	195,312.85	
			Difference	0.00	
		Public Information			
	45	Cash	Vons	10.70	Management
	46	David J Pomaville	Clean Water Award Reimbursemen	22.62	Public Education
	46	Pro Image Video LLC	Transfer PSA from VHS to Digit	276.97	Public Education
	48	Bank of America	Office Depot	55.16	Management
	46	Pro Image Video LLC	08/2002 Duplicate PSA VHS Tape	21.58	Public Education
	46	Fotech Color Labs	Dev & Prints	18.72	Public Education
	52	River Parkway Trust	Reimbursement Storm Water Gran	1,920.00	Public Education
	45	Cash	Casa Valadez Mexican Restauran	12.40	Management
	46	Panagraph Inc	2002-2003 SWQMP Public Info &	255.00	Public Education
	47	Fotech Color Labs	09/2002 Dev & Print	7.51	Management
	48	Fresno Ag Hardware	09/2002 Supplies	4.80	Management
	46	San Joaquin River Parkway	Clean Storm Water Grant Reimb	1,899.45	Public Education
	45	Bank of America	Vons Grocery Store	11.49	Management
	45	Bank of America	Vons Grocery Store	24.33	Management
	48	Cash	Orchard Supply	5.18	Management
	45	Cash	Riverfest 2002 Food	15.50	Management
	47	Prestige Printing	10/2002 Letterheads-Storm Wate	606.26	Management
	48	Bank of America	Office Max	28.80	Management
	56	San Joaquin River Parkway Tr	Fresno City Parks & Rec CSW Gr	1,000.00	Management
	46	City Press	10/2002 Action Alert Flyers	625.00	Public Education
	46	City Press	10/2002 Action Alert Flyers	49.22	Public Education
	45	Bank of America	Vons	44.98	Management
	49	SWRCB	Waste Discharge Req Annual Fee	1,500.00	Management
	49	SWRCB	Waste Discharge Req Annual Fee	10,000.00	Management
	49	SWRCB	Waste Discharge Req Annual Fee	2,500.00	Management
	49	SWRCB	Waste Discharge Req Annual Fee	3,750.00	Management
	46	Bank of America	Kinko's	224.10	Public Education
	48	Bank of America	OfficeMax	37.65	Management
	45	Bank of America	Bobby Salazar's	29.35	Management
	56	Bank of America	Env-Sol-Com	203.00	Management
	52	River Parkway Trust	Clean Storm Water Grant Reimb	50.00	Public Education
	50	Daniel P Rourke	Mileage Reimbursement	85.05	Management
	46	Pro Image Video LLC	12/2002 Public Information	149.08	Public Education
	45	Bank of America	Bobby Salazars	37.87	Management
	56	Bank of America	Amazon.Com	232.20	Management
	50	Bank of America	Hyatt Regency Monterey	297.68	Management
	45	Cash	SaveMart Supermarkets	9.14	Management
	50	Daniel P Rourke	Ineligible Portion-Hyatt	-4.28	Management
	51	Daniel P Rourke	CWEA Conference-Peninsula Rest	22.50	Management
	50	Daniel P Rourke	CWEA Conference Mileage Reimb	115.20	Management
	51	Daniel P Rourke	CWEA Conference-Goomba's Kitch	19.00	Management
	51	Daniel P Rourke	CWEA Conference-Jugem Japanese	13.89	Management

Table D-7. Continued.

46	Panagraph Inc	Service thru 01/2003	2,015.13	Public Education
46	City Press	02/2003 Storm Water Pollution	1,048.39	Public Education
51	Daniel P Rourke	03/2003 WRPPN Meetings-040-LJX	11.50	Management
51	Daniel P Rourke	WRPPN Committee Meeting-Zocalo	12.50	Management
51	Daniel P Rourke	03/2003 WRPPN Meetings-Hamburg	13.04	Management
51	Daniel P Rourke	WRPPN Committee Meeting-Hungry	7.50	Management
46	Panagraph Inc	2002-2003 SWQMP	382.50	Public Education
45	Bank of America	Fresno Audio Visual - Vons	24.70	Management
56	Bank of America	Fresno Audio Visual - Cinnamon	141.25	Management
56	Bank of America	Fresno Audio Visual - Mariscos	24.92	Management
45	Bank of America	Fresno Audio Visual - Food 4 L	2.85	Management
56	Bank of America	OSH-Brass Grommet	25.94	Management
56	Bank of America	Fresno Audio Visual - DiCiccos	65.59	Management
56	Bank of America	Fresno Audio Visual - Cinnamon	47.00	Management
45	Bank of America	Fresno Audio Visual - Vons	17.85	Management
56	Bank of America	Fresno Audio Visual - Draper S	18.32	Management
56	Cash	Fresno Pollution Prevention Gr	16.53	Management
52	Central Unified School Distr	2003 Clean Storm Water Grant	1,527.49	Public Education
48	Fresno Ag Hardware	Devoe Traffic Gal/Pail/Bucket	40.27	Management
52	Liberty Elementary	2003 Clean Storm Water Grant	52.00	Public Education
54	Daniel P Rourke	CASQA-BMP Handbook Workshop	27.40	Management
52	Liberty Elementary	Clean Storm Water Grant	68.00	Public Education
56	Bank of America	Vons-Me n Eds-Intergrated Pest	50.65	Management
46	Panagraph Inc	Services thru 03/2003	616.25	Public Education
56	Asian Pacific American Herit	Booth Space/Sponsorship	250.00	Management
47	Cash	Aerial Photocopies	2.00	Management
46	Zoo Lynx	2003 Earth Day Ad & Clean Up	965.00	Public Education
47	Airport Blueprint Inc	Aerial Photos	5.83	Management
55	Consolidated Printworks	Utility Bill Inserts	316.00	Public Education
46	Panagraph Inc	SWQMP Public Info & Education	38,102.22	Public Education
52	UC Regents	Clean Storm Water Grant	2,000.00	Public Education
54	Bank of America	El Pollo-CASQA BMP Handbook Mt	6.80	Management
54	Bank of America	CASQA BMP Handbook Workshop	25.00	Management
53	Bank of America	Hertz-SWQ BMP Training	152.95	Management
53	Bank of America	Hyatt-SWQ BMP Training	95.58	Management
56	Bank of America	The Upper Crust-SWQ BMP Traini	13.21	Management
56	Bank of America	The Thai House-GeoSyntec Meeti	49.00	Management
56	Bank of America	NTIS-EPA-Document	56.00	Management
54	Bank of America	Mariscos-CASQA BMP Handbook Mt	7.01	Management
53	Bank of America	Hyatt-SWQ BMP Training-Parking	12.00	Management
53	Bank of America	Hyatt-SWQ BMP Training-Meals	40.09	Management
55	City Press	Utility Bill Inserts	1,097.74	Public Education
56	Cash	Fresno Audio Visual	21.04	Management
56	Cash	Costco-Open Space Const	67.39	Management
51	Cash	Vons-Phase II Meeting	11.83	Management
56	Solon Manufacturing Co Inc	Paint Paddles	6,829.59	Management
52	Central High School-Env Scie	2003 Clean Storm Water Grant	1,823.87	Public Education
55	City Press	Utility Bill Inserts	1,111.18	Public Education
56	City Press	Stormwater Pollution Packets	878.60	Management
56	City Press	Gardening Tips Bill Insert Cre	-296.05	Management
50	Daniel P Rourke	Mileage Reimbursement	108.36	Management
56	State of CA-WRCB		-2,500.00	Management
56	Consolidated Printworks	Watering Schedule Insert	222.93	Management
46	Panagraph Inc	02-03 Public Info & Education	44,846.40	Public Education
56	Bank of America	City of Fresno-Zoning Ordinanc	25.00	Management
45	Bank of America	Bobby Salazars-Lunch Meeting	64.52	Management
56	Bank of America	OSH-Garden Sprayer	21.62	Management
45	Bank of America	Javiers-Business Lunch	35.00	Management
46	Bank of America	Sir Speedy Printing-Clovis Zon	20.55	Public Education
56	Bank of America	Paper Plus-Environmental Fact	40.93	Management
46	City of Fresno Parks & Recre	2002 Clean Storm Water Grant	1,000.00	Management
46	Jack Nadel, Inc	#2 Pencils/Screen Set Up Charg	1,350.41	Management
46	Linda Jacobsen	Clean Storm Water Grant Reimb	43.11	Management
46	Panagraph Inc	06/2003 Services SWQMP Info	2,445.61	Management
52	San Joaquin River Parkway &	2003 Clean Storm Water Grant	80.00	Management

Table D-7. Continued.

	Item Number				
			Total Public Information	**133,892.99**	
Subtotal	45		Food7064	340.68	Management
	46		PublicEducation7064	96,377.31	Public Education
	47		Printing7064	621.60	Management
	48		OfficeSupplies7064	171.86	Management
	49		SWRCBFees7064	17,750.00	Management
	50		Travel7064 (Mileage, Hotels)	602.01	Management
	51		ConferenceMeetings7064	111.76	Management
	52		Grant7064	7,521.36	Public Education
	53		Training7064	300.62	Management
	54		Handbooks7064	66.21	Management
	55		UtilityBill7064	2,524.92	Public Education
	56		Misc7064	7,504.66	Management
			Total	133,892.99	
			Difference	0.00	
		General Expenses		0.00	
		Program Expenses			
	57	Quercus Publications	Streams of the SJV Book	55.50	Management
	57	Bank of America	NTIS-Groundwater Contamination	56.00	Management
	Item Number				
	57		**Total Program Expenses**	**111.50**	Management
Industrial NPDES Program Implementation 7070-7076					
		Investigation, Inspection, Enforcement			
	58	City Press	Phone Complaints - Forms	332.96	Industrial
		Monitoring		0.00	
		Public Information			
	59	The Business Journal	Newspaper Subscription	88.00	Public Education
	59	EXCAL Visual Communications	08/2002 Storm Water Training K	1,013.50	Public Education
	59	Panagraph Inc	Services thru 12/2002	13,993.30	Public Education
	Item Number				
	59		**Total Public Information**	**15,094.80**	Public Education
(Source: Rourke, pc, 3/23/04			**Total of Subtotals**	**$ 611,843.66**	

1. Cost Categories Abbreviated According to the Following:
   - Construction: Construction Site Stormwater Runoff Control
   - Illicit Discharge: Illicit Discharge Detection and Elimination
   - Industrial: Industrial and Commercial Management Programs
   - Management: Overall Stormwater Program Management
   - Pollution Prevention: Pollution Prevention and Good Housekeeping for Municipal Operations
   - Post Construction: Post Construction Water Management in New Development and Redevelopment
   - Public Education: Public Education, Outreach, Involvement, and Participation
   - Monitoring: Water Quality Monitoring
   - Watershed: Watershed Management

The backup calculations for the cost for each cost survey category in Section 7 and the sources of the cost data are presented in this appendix. Tables are generally presented by sequentially increasing levels of detail. Figure E-1 illustrates how data is shared throughout the tables.

Table E-1 contains all costs organized into the various standard cost survey categories. The subtotals for each cost category are also presented in Section 7, Table 7-2. The remaining tables (E-2 through E-9) present the detailed back-up information for the numbers in Table E-1. Table E-1 is linked to the back-up tables by the table and item numbers in the 'Source' column. Most of the cost information provided by city staff is listed in Table E-2. Item numbers corresponding to the subtotals in Table E-2 were added to the left hand column to easily show how the numbers are pulled forward to Table E-1. The right hand column in Table E-2 was added to show how costs were allocated to the cost survey categories. Table E-1 entries that were not taken directly from Table E-2 are found in Tables E-3 through E-9.

For the city of Sacramento, labor costs are distributed among the various cost survey categories according to labor cost spreadsheets provided by city staff (Table E-7). Thus, comparing costs with other municipalities where such costs are not distributed, Sacramento's Overall Stormwater Management Program costs will be lower.

Detailed descriptions of how the costs were developed are contained in the following paragraphs.

Construction Site Stormwater Runoff Control

The total cost for this category was $261,716. The costs for this category include labor, which was broken down into three categories: inspections, student interns, and all other activities. There was also cost identified for developing BMP handbooks (one time annual cost, but may occur at a time later than one year). Other activities performed included (descriptions obtained from annual stormwater report):

- Issued 144 grading permits
- Reviewed 68 SWPPPs
- Issued 384 enforcement actions
- Sent winterization letters to property owners with active construction sites to remind contractors to prepare their construction sites for the rainy season and to submit winterization certifications
- Developed a Microsoft Access database to track all stormwater inspections and enforcement actions for private development construction sites

Sacramento

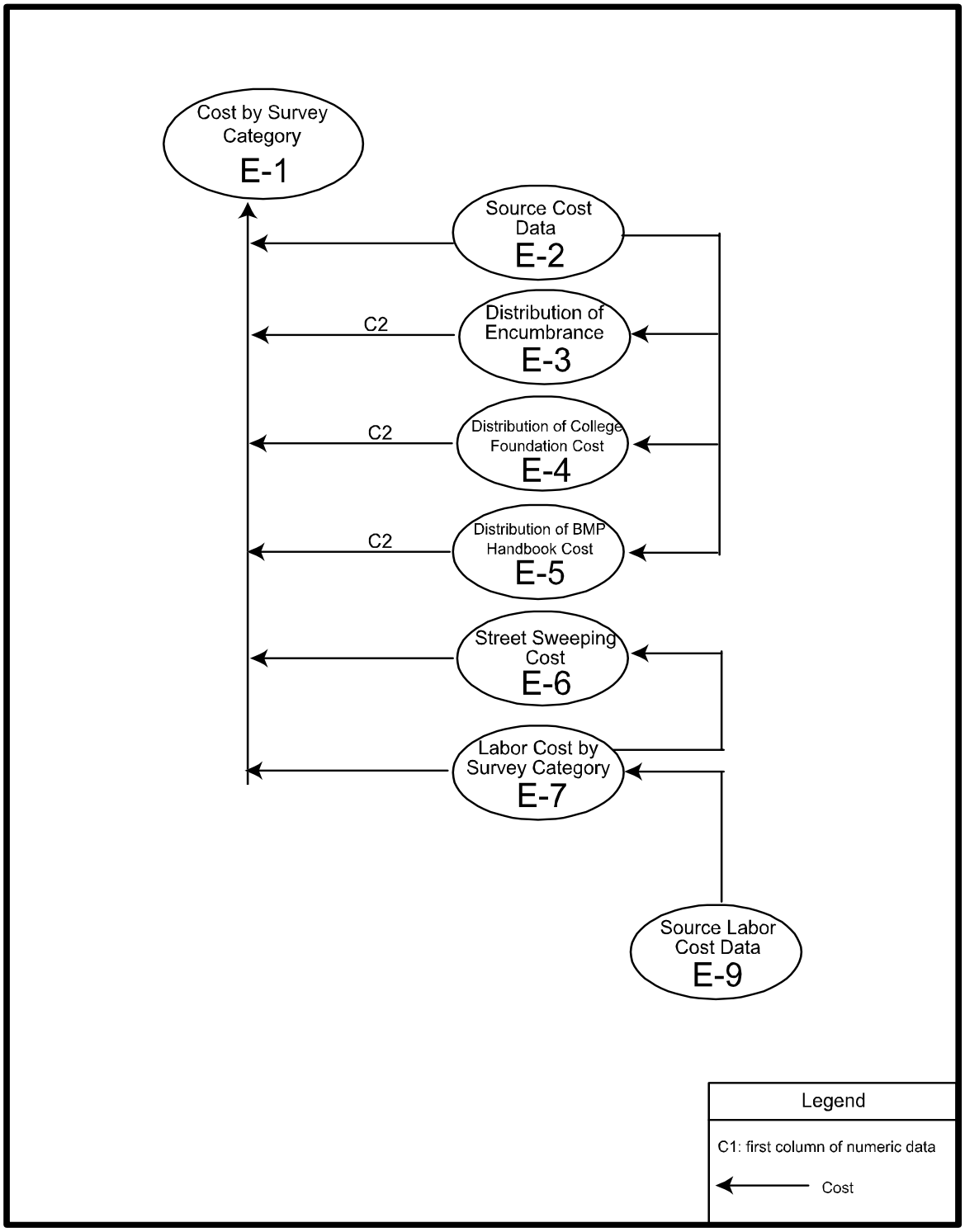

Figure E-1. Sacramento Flowchart

Illicit Discharge Detection and Elimination (IDDE)

The total cost for this category was $37,507. Labor cost is the only cost allocated to this category. Activities performed included issuance of 55 enforcement actions and investigation of all 83 calls received involving suspected illicit discharge (Sacramento, 2003b).

Industrial and Commercial Management Programs

The total cost for this category was $42,318. Approximately 94 percent of the cost was for stormwater staff labor. The other identified cost was for developing BMP handbooks (one time annual cost, but may occur at a time later than one year). Other activities included issuance of 41 enforcement actions, development of BMP brochures for the auto body, auto washing, and auto repair industry, and creation of a Clean Water Business Partner program for the mobile pressure washing industry (Sacramento, 2003b).

Overall Stormwater Program Management

The total cost for this category was $281,501. Activities in this program were as follows:

- Office products
- Planning
- Annual reporting
- CASQA membership fees
- Mailing
- NPDES fees
- Legal fees
- Miscellaneous
- Stormwater staff labor

Pollution Prevention and Good Housekeeping for Municipal Operations

The total cost for this category was $3,270,806. Most of the cost for this category was for the activities of street sweeping (40 percent), drainage system maintenance (46 percent), and pump station cleaning (13 percent).

Street sweeping costs were also estimated by city staff. Street sweeping cost was estimated at $1.6 million. Street sweeping costs included the cost of sweeping 3 percent of the core downtown area 7 extra times a month which is beyond the city's permit requirement (Busath, pers. comm., 11/21/04). Due to this an annual required compliance cost was calculated for the city based on the $1.6 million estimate and permit required street sweeping frequencies (Table E-7). The calculated annual required compliance cost was $1,322,748.

Sump, drain inlet, manhole, and drain line and channel cleaning performed by city staff was reported under the Field Services labor category in Table E-8. Equipment costs for this effort was not available, but was roughly estimated as 75 percent of the labor costs as a result of consultation with city staff. This brings the total cost for drainage system maintenance to $1,514,926.

Lastly, $2,500 was attributable to this category for development of BMP handbooks (one time cost, but may occur less frequent than annually due to updates). The city also performed inspection and maintenance of parking lots (Sacramento, 2003b).

Due to inaccurate use of labor codes by city personnel for pump station cleaning, these costs were estimated by the city of Sacramento staff rather than relying on accounting record reports (Busath, pers. comm., 11/21/03). The reported labor cost of $22,552 from Table E-8 was not used in this report. Pump station cleaning, including equipment costs, was estimated at $420,000 (Busath, pers. comm., 1/11/05).

Post Construction Stormwater Management in New Development and Redevelopment

The total cost of this category was $38,517. The labor costs for this category were broken down in the same way as the Construction Site Stormwater Runoff Control category. There was also cost identified for development of BMP handbooks (one time annual cost, but may occur at a time later than one year)

Public Education, Outreach, Involvement, and Participation

The total cost of this category was $361,440. The costs associated with this category were for the following activities:

- Developing Integrated Pest Management (IPM)
- Television
- Radio
- Billboard
- Newspaper
- Mailings
- Participation in public events
- Water Education Foundation grant
- Project development
- Agriculture outreach
- Pet outreach
- Elementary education

- Student intern labor
- Stormwater staff labor
- University grant

Where activity statistics were available, normalized costs were calculated. Activity statistics were not available for each activity. Therefore, normalization based on total cost was not possible.

Water Quality Monitoring

The total cost of this category was $494,577. Modeling and data analysis accounted for $131,688. Sample collection and lab cost was $303,077 and stormwater staff and student labor cost was $59,812.

Watershed Management

The total cost of this category was $31,591, which was primarily for stormwater staff labor.

References

City of Sacramento. 2003. "Stormwater Management Program 2002/2003 Annual Report"

Table E - 1. Sacramento Costs Organized by Cost Survey Category

Cost Survey Categories

Activity Description

Construction Site Stormwater Runoff Control

Description	External Contract	Relation to Permit[a]	Dollar Amount	Source	% of Category	Activity Statistic	Notes/Units	Reference	Normalized Cost	Notes/Units
Overall Program										
College Foundation costs		New	12,475.20	Table E-4	4.8%					
BMP handbooks (CASQA)		New	2,500.00	Table E-5	1.0%					
Other constuction element		New	64,778.39	Table E-7, Item 1	24.8%					
Construction inpections		New	181,962.17	Table E-7, Item 2	69.5%	6,375	inspections	Sacramento, 2003b	28.54	$/inspection
Total			261,715.76		5.4%	of total stormwater cost				
Overall Cost Category Normalizations										
total category $ per inspection						6,375	inspections	Sacramento, 2003b	41.05	$/inspection
total category $ per active construction site						417	active construction sites	Sacramento, 2003b	627.62	$/active construction site

Illicit Discharge Detection and Elimination

Description	External Contract	Relation to Permit	Dollar Amount	Source	% of Category	Activity Statistic	Notes/Units	Reference	Normalized Cost	Notes/Units
Illegal discharge inspection		New	13,816.15	Table E-7, Item 8	36.8%					
Other iillegal discharge		New	23,690.64	Table E-7, Item 7	63.2%					
Total			37,506.79		0.8%	of total stormwater cost				

Industrial and Commercial Management Programs

Description	External Contract	Relation to Permit	Dollar Amount	Source	% of Category	Activity Statistic	Notes/Units	Reference	Normalized Cost	Notes/Units
BMP Handbooks (CASQA)		New	2,500.00	Table E-5	5.9%					
Industrial inspections		New	1,823.89	Table E-7, Item 6	4.3%	39	inspections	Sacramento, 2003b	46.77	$/inspection
Other industrial		New	37,993.92	Table E-7, Item 5	89.8%					
Total			42,317.81		0.9%	of total stormwater cost				

Overall Stormwater Program Management

Description	External Contract	Relation to Permit	Dollar Amount	Source	% of Category	Activity Statistic	Notes/Units	Reference	Normalized Cost	Notes/Units
Planning-Bill Crooks	x	New	13,550.00	Table E-2, Item 38	4.8%					
NPDES fee		New	10,000.00	Table E-2, Item 40	3.6%					
Legal Fees	x	New	29,585.00	Table E-2, Item 43	10.5%					
Federal Express		New	110.00	Table E-2, Item 44	0.0%					
Legal Fees	x	New	915.00	Table E-2, Item 45	0.3%					
Petty cash		New	1,527.00	Table E-2, Item 48	0.5%					
Viking office products		New	324.00	Table E-2, Item 51	0.1%					
Annual Reporting-Wendy Alexander	x	New	2,480.00	Table E-2, Item 54	0.9%					
CASQA		New	5,000.00	Table E-2, Item 55	1.8%					
Miscellaneous expenses		New	1,108.00	Table E-2, Item 56	0.4%					
General stormwater activiites		New	52,696.90	Table E-7, Item 3	18.7%					
Program management		New	160,161.19	Table E-7, Item 28	56.9%					
Program management		New	4,044.41	Table E-7, Item 29	1.4%					
Total			281,501.50		5.8%	of total stormwater cost				

Table E-1 continued

Pollution Prevention and Good Housekeeping for Municipal Operations

Description	External Contract	Relation to Permit	Dollar Amount	Source	% of Category	Activity Statistic	Notes/Units	Reference	Normalized Cost	Notes/Units
Pump stations		Enhanced	420,000.00	Busath, 2004	12.8%		includes equipment and labor	Busath, pers. comm., 1/12/05		
Street sweeping		Enhanced	1,322,748.02	Table E-6	40.4%	26,450	adjusted curb miles swept	Table E-6	50.01	$/curb mile swept
BMP handbooks (CASQA)		New	2,500.00	Table E-5	0.1%					

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Table E – 1. Continued

Field services (drainage system maintenance)		Enhanced	865,672.17	Table E-7	26.5%		equipment estimated below	Busath, pers. comm., 1/12/05		
Water waste activities		New	896.73	Table E-7, Item 27	0.0%					
Other municipal operations		New	9,735.09	Table E-7, Item 15	0.3%					
Equipment (drainage system maintenance)		Enhanced	649,254.13	Busath, 2004	19.8%		calculated as 75% of field services	Busath, pers. comm., 1/12/05		(no backup available)
Total			3,270,806.13		67.9%	of total stormwater cost				

Post Construction Stormwater Management in New Development and Redevelopment

Description	External Contract	Relation to Permit	Dollar Amount	Source	% of Category	Activity Statistic	Notes/Units	Reference	Normalized Cost	Notes/Units
New development		New	29,779.10	Table E-7, Item 4	77.3%					
College Foundation costs		New	6,237.60	Table E-4	16.2%					
BMP handbooks (CASQA)		New	2,500.00	Table E-5	6.5%					
Total			38,516.70		0.8%	of total stormwater cost				

Public Education, Outreach, Involvement, and Participation

Description	External Contract	Relation to Permit	Dollar Amount	Source	% of Category	Activity Statistic	Notes/Units	Reference	Normalized Cost	Notes/Units
Develop IPM	x	New	4,710.00	Table E-2, Item 9	1.3%					
Develop IPM	x	New	34,812.00	Table E-2, Item 11	9.6%					
Develop IPM	x	New	577.00	Table E-2, Item 12	0.2%					
Television						201	days	Sacramento, 2003b	331.79	subtotal $/day
Univsion 19	x	New	13,010.00	Table E-2, Item 19	3.6%					
Comcast	x	New	26,284.00	Table E-2, Item 4	7.3%					
KCRA	x	New	24,000.00	Table E-2, Item 6	6.6%					
KXTV	x	New	3,396.00	Table E-2, Item 8	0.9%					
Radio						64	days	Sacramento, 2003b	92.25	subtotal $/day
Clear Channel	x	New	4,374.00	Table E-2, Item 3	1.2%					
KSSJ	x	New	1,530.00	Table E-2, Item 7	0.4%					
Billboards						1	days	Sacramento, 2003b	5,208.00	subtotal $/day
Sign Effects	x	New	2,578.00	Table E-2, Item 16	0.7%					
Brownies	x	New	2,630.00	Table E-2, Item 39	0.7%					
Newspaper						34	days	Sacramento, 2003b	601.32	subtotal $/day
Sac Bee	x	New	736.00	Table E-2, Item 13	0.2%					
Z.C. Optimal Solutions	x	New	18,781.00	Table E-2, Item 22	5.2%					
Sacramento Business Journal	x	New	928.00	Table E-2, Item 23	0.3%					
Mailing						34,488	impressions	Sacramento, 2003b	0.06	subtotal $/impression
Vitali-gage Communic	x	New	1,522.00	Table E-2, Item 21	0.4%					
Auto Mailing		New	653.00	Table E-2, Item 37	0.2%					
Public Event Participation										
Pacific Rim		New	100.00	Table E-2, Item 1	0.0%					
Sac Zoo		New	7,000.00	Table E-2, Item 15	1.9%					
Other Activities										
Wayne Neilsen	x	New	1,717.00	Table E-2, Item 52	0.5%					
Jack Nadel	x	New	10,406.00	Table E-2, Item 5	2.9%					
Safe Designs	x	New	764.00	Table E-2, Item 49	0.2%					
Water ED Found Grant										
Water Edu Found		New	2,500.00	Table E-2, Item 18	0.7%					
Grant		New	2,500.00	Table E-2, Item 10	0.7%					
Project Development										
David John Darold	x	New	1,756.00	Table E-2, Item 42	0.5%					
Lee Pitt	x	New	419.00	Table E-2, Item 46	0.1%					
Linda Taylor	x	New	43.00	Table E-2, Item 47	0.0%					
ATV video Center	x	New	387.00	Table E-2, Item 2	0.1%					
UC Regents	x	New	3,589.00	Table E-2, Item 17	1.0%					
Misc encumbrance		New	15,500.00	Table E-3	4.3%					

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Table E – 1. Continued.

Urban creeks		New	750.00	Table E-2, Item 20	0.2%					
Agriculture outreach (cures)		New	2,639.00	Table E-2, Item 34	0.7%					
Pet outreach (doggie bags)		New	4,149.00	Table E-2, Item 35	1.1%					
Elementary Education (sac theatre co)		New	5,100.00	Table E-2, Item 14	1.4%					
Public education		New	93,986.89	Table E-7, Item 9	26.0%					
School outreach		New	23,465.49	Table E-7, Item 10	6.5%					
Landscape grant		New	6,676.64	Table E-7, Item 12	1.8%					
Clean Water Business Partnership		New	2,279.54	Table E-7, Item 13	0.6%					
Grants to agencies within city jurisdiction		New	2,500.00	Table E-2, Item 41	0.7%					
Storm drain stenciling program		New	1,503.76	Table E-7, Item 11	0.4%					
College Foundation costs		New	31,188.00	Table E-4	8.6%					
Total			361,440.32		7.5%	of total stormwater cost				

Table E-1 continued

Water Quality Monitoring

Description	External Contract	Relation to Permit	Dollar Amount	Source	% of Category	Activity Statistic	Notes/Units	Reference	Normalized Cost	Notes/Units
Modeling and Data Analysis										
Kathy Russick	x	New	76,017.00	Table E-2, Item 27	15.4%					
LWA	x	New	43,748.00	Table E-2, Item 29	8.8%					
Geosyntec	x	New	4,690.00	Table E-2, Item 32	0.9%					
CSUS foundation		New	7,233.00	Table E-2, Item 31	1.5%					
Implementation: Sample Collection and Lab Analysis										
Aerospeed	x	New	167.70	Table E-2, Item 24	0.0%					
Caltest	x	New	37,197.00	Table E-2, Item 25	7.5%					
County	x	New	247,274.00	Table E-2, Item 26	50.0%					
Kinetic Labs	x	New	2,938.00	Table E-2, Item 28	0.6%					
Project Development		New	15,500.00	Table E-3	3.1%					
General monitoring		New	27,291.38	Table E-7, Item 19	5.5%					
NPDES compliance monitoring		New	9,525.69	Table E-7, Item 20	1.9%					
BMP effectiveness monitoring		New	341.74	Table E-7, Item 21	0.1%					
Special monitoring studies		New	409.30	Table E-7, Item 22	0.1%					
Coordinated monitoring program		New	390.75	Table E-7, Item 23	0.1%					
Coordinated monitoring program		New	368.56	Table E-7, Item 24	0.1%					
Coordinated monitoring program		New	617.52	Table E-7, Item 25	0.1%					
Coordinated monitoring program		New	8,392.24	Table E-7, Item 26	1.7%					
College Foundation costs		New	12,475.20	Table E-4	2.5%					
Total			494,577.08		10.3%	of total stormwater cost				

Watershed Management

Description	External Contract	Relation to Permit	Dollar Amount	Source	% of Category	Activity Statistic	Notes/Units	Reference	Normalized Cost	Notes/Units
Acchibald and Wallberg	x	New	9,595.00	Table E-2, Item 33	30.4%					
Brake Pad Patnership		New	2,500.00	Table E-2, Item 36	7.9%					
Watershed stewardship		New	5,565.92	Table E-7, Item 14	17.6%					
Target pollutant		New	13,930.08	Table E-7, Item 18	44.1%					
Total			31,591.00		0.7%	of total stormwater cost				

Total Stormwater Costs	4,819,973.09

a. This column indicates whether required activities were being performed prior to stormwater permits. In some cases activities were enhanced due to permit requirements.

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Table E-2. Source Data Table Submitted by City of Sacramento (cost survey categories added)

Item #	City of Sacramento Category	Cost	Cost Survey Category[1]
	Public Outreach		
1	Pacific Rim	100	Public Education
2	ATV video Center	387	Public Education
3	Clear Channel	4,374	Public Education
4	Comcast	26,284	Public Education
5	Jack Nadel	10,406	Public Education
6	KCRA	24,000	Public Education
7	KSSJ	1,530	Public Education
8	KXTV	3,396	Public Education
9	Mark McCarthy	4,710	Public Education
10	Grant	2,500	Public Education
11	Ogilvy	34,812	Public Education
12	Rooney Design	577	Public Education
13	Sac Bee	736	Public Education
14	Sac Theater Co	5,100	Public Education
15	Sac Zoo	7,000	Public Education
16	Sign Effects	2,578	Public Education
17	UC Regents	3,589	Public Education
18	Water Edu Found	2,500	Public Education
19	Univision 19	13,010	Public Education
20	Urban Creeks	750	Public Education
21	Vitali-gage Communic	1,522	Public Education
22	Z.C. Optimal Solutions	18,781	Public Education
23	Sac Business Jour	928	Public Education
	Monitoring		
24	Aerospeed	168	Monitoring
25	Caltest	37,197	Monitoring
26	County	247,274	Monitoring
27	Kathy Russick	76,017	Monitoring
28	Kinetic Labs	2,938	Monitoring
29	LWA	43,748	Monitoring
30	Sequoia Analytical	0	
31	CSUS foundation	7,233	Monitoring
32	Geosyntec	4,690	Monitoring

Table E-2. Continued.

	Target Pollutant		
33	Acchibald and Wallberg	9,595	Watershed
34	Cures	2,639	Public Education
35	Doggie Bags	4,149	Public Education
36	Brake Pad Patnership	2,500	Watershed
	Misc		
37	Auto Mailing	653	Public Education
38	Bill Crooks	13,550	Management
39	Brownies	2,630	Public Education
40	NPDES fee	10,000	Management
41	CSUS	2,500	Public Education
42	David John Darold	1,756	Public Education
43	Downey Brand	29,585	Management
44	Fedex	110	Management
45	George & Shapiro	915	Management
46	Lee Pitt	419	Public Education
47	Linda Taylor	43	Public Education
48	Petty cash	1,527	Management
49	Safe Designs	764	Public Education
50	BMP handbooks	10,000	See Table E-5
51	Viking Office Prods	324	Management
52	Wayne Neilsen	1,717	Public Education
53	Misc encumbrance	31,000	See Table E-3
54	Wendy Alexander	2,480	Management
55	CASQA	5,000	Management
56	Misc Expenses	1,108	Management
	Students		
57	College Foundation	62,376	See Table E-4
	Total	786,175	

(Source: Busath, pers. comm., 11/21/03)

1. Cost Categories Abbreviated According to the Following:
   - Construction: Construction Site Stormwater Runoff Control
   - Illicit Discharge: Illicit Discharge Detection and Elimination
   - Industrial: Industrial and Commercial Management Programs
   - Management: Overall Stormwater Program Management
   - Pollution Prevention: Pollution Prevention and Good Housekeeping for Municipal Operations
   - Post Construction: Post Construction Water Management in New Development and Redevelopment
   - Public Education: Public Education, Outreach, Involvement, and Participation
   - Monitoring: Water Quality Monitoring
   - Watershed: Watershed Management

Table E-3. Distribution of Miscellaneous Encumbrance Between Public Education and Monitoring

Cost	Source	Percent Allocation	Category	Reference	Allocated Cost
31,000.00	Table 2, Item 53	50%	Public Education	Busath, pers. comm., 1/22/04	15,500.00
31,000.00	Table 2, Item 53	50%	Monitoring	Busath, pers. comm., 1/22/04	15,500.00
Total		100%			31,000.00

Table E-4. Distribution of College Foundation Costs for Student Internship Program

Cost	Source	Percent Allocation	Category	Reference	Allocated Cost
62,376.00	Table E-2, Item 57	50%	Public Education	Busath, pers. comm., 1/22/04	31,188.00
62,376.00	Table E-2, Item 57	20%	Construction	Busath, pers. comm., 1/22/04	12,475.20
62,376.00	Table E-2, Item 57	20%	Monitoring	Busath, pers. comm., 1/22/04	12,475.20
62,376.00	Table E-2, Item 57	10%	Post Construction	Busath, pers. comm., 1/22/04	6,237.60
Total		100%			62,376.00

Table E-5. Distribution of BMP Handbooks (CASQA) between Industrial, Municipal, New Development, and Construction

Cost	Source	Percent Allocation	Category	Reference	Allocated Cost
10,000.00	Table E-2, Item 50	25%	Industrial/Commercial	Busath, pers. comm., 1/22/04	2,500.00
10,000.00	Table E-2, Item 50	25%	Municipal	Busath, pers. comm, 1/22/04	2,500.00
10,000.00	Table E-2, Item 50	25%	Post Construction	Busath, pers. comm, 1/22/04	2,500.00
10,000.00	Table E-2, Item 50	25%	Construction	Busath, pers. comm, 1/22/04	2,500.00
Total		100%			10,000.00

Table E-6. Calculation of Street Sweeping Cost

Description	Dollar Amount of Statistic	Reference
Actual Cost	1,600,000.00	Busath, pers. comm., 1/22/04
monthly req. miles	2,200	Sacramento, 2003b
6/year req. miles	0	Sacramento, 2003b
1/year req. miles	50	Sacramento, 2003b
annual required	26,450	Calculation
monthly actual est. mi.	2,662	Busath, pers. comm., 1/22/04
6/year actual est. mi.	0	Sacramento, 2003b
1/year actual est. mi.	50	Sacramento, 2003b
annual actual est. mi.	31,994	Calculation
annual req. cost est.	1,322,748.02	Calculation

Table E-7. Labor Allocations for Sacramento Categories with Corresponding Cost Survey Categories

Item #	Sacramento Category	City Labor Code	Labor Cost	Cost Survey Category
1	Construction Element	HA	64,778.39	Construction
2	Construction Inspections	HA1	181,962.17	Construction
3	General Stormwater Actvities	HAA	52,696.90	Management
4	New Development Element	HB	29,779.10	Post Construction
5	Industrial Element	HC	37,993.92	Industrial
6	Industrial Inspection	HC1	1,823.89	Industrial
7	Illegal Discharge Program	HD	23,690.64	Illicit Discharge
8	Illegal Discharge Inspection	HD1	13,816.15	Illicit Discharge
9	Public Education Program	HE	93,986.89	Public Education
10	School Outreach Program	HE1	23,465.49	Public Education
11	Stormdrain Stenciling Program	HE2	1,503.76	Public Education
12	NN Landscape Grant	HE3	6,676.64	Public Education
13	CWBP	HE4	2,279.54	Public Education
14	Watershed Stewardship	HF	5,565.92	Watershed
15	Municipal Operations	HG	9,735.09	Pollution Prevention
16	Plant Services Stormwater Activities	HH	22,552.19	See Table E-1, pump stations
17	Field Services Stormwater Activities	HI	865,672.17	Pollution Prevention
18	Target Pollutant	HJ	13,930.08	Watershed
19	Monitoring	HK	27,291.38	Monitoring
20	NPDES Compliance Monitoring	HK1	9,525.69	Monitoring
21	BMP Effectiveness Monitoring	HK2	341.74	Monitoring
22	Special Monitoring Studies	HK3	409.30	Monitoring
23	Coordinated Monitoring Program	HK4	390.75	Monitoring
24	Coordinated Monitoring Program	HK5	368.56	Monitoring
25	Coordinated Monitoring Program	HK6	617.52	Monitoring
26	Coordinated Monitoring Program	HK7	8,392.24	Monitoring
27	Water Waste Activities	HL	896.73	Pollution Prevention
28	Program Management	HM	160,161.19	Management
29	Program Management	PM	4,044.41	Management
	Total		1,664,348.44	

(Source: Table E-8)

Table E-8. Labor Cost Data as Submitted by City of Sacramento Staff

City of Sacramento
Department of Utilities
Project Accounting Management System (PAMS)

Job #	Description	Org	Rept Catg	Total Employee Expense	Indiv Hourly Expense
21233	NPDES PROGRAM	3322	HH	665.49	95.1
		3323	HH	4,122.06	64.4
			HH	1,410.18	58.8
			HH	3,508.67	48.7
			HH	1,944.98	44.2
			HH	1,766.04	31.5
			HH	1,124.38	70.3
			HA1	108,293.85	63.9
			HH	868.3	64.3
			HH	1,023.82	64
			HH	930.52	58.2
			HH	198.42	49.6
			HH	448.59	64.1
			HH	384.49	64.1
			HH	656.76	41
			HH	283.2	35.4
			HH	1,122.86	70.2
		3331	HH	2,009.09	24.8
			HH	84.34	42.2
			HA	2,371.26	25.9
			HA1	6,658.08	26.4
			HAA	2,949.16	26.4
			HAA	1,463.31	41.8
			HD	49.61	24.8
			HE	655.9	25.7
			HE1	1,916.75	26.1
			HE2	417.95	26.1
			HF	99.23	24.8
			HK	244.3	27.1
			HK3	198.43	24.8
		3332	HAA	6,475.21	89.9
			HE	2,116.34	90.1
			HE1	1,461.61	89.5
			HG	8,302.14	90.2
			HJ	11,187.93	89.6

Table E-8. Continued.

			HK	17,265.87	89.4
			HK1	4,597.83	89
			HK2	162.9	89
			HK4	266.5	88.8
		3333	HK5	368.56	0
			HK6	617.52	65
			HK7	8,392.24	88.8
21233	NPDES PROGRAM	3333	HA	7,712.62	61.2
			HA	52,918.39	89
			HA	1,776.12	44.4
			HA1	5,602.74	62.3
			HA1	61,407.50	43.6
			HAA	12,504.88	61.9
			HAA	13,331.24	66.7
			HAA	12,627.60	89.2
			HAA	3,345.50	65
			HB	4,303.02	62.4
			HB	25,476.08	88.5
			HC	1,745.21	62.3
			HC	35,847.63	66.5
			HC	401.08	89.1
			HC1	248.44	62.1
			HC1	1,575.45	65.6
			HD	23,193.44	66.6
			HD	447.59	89.5
			HD1	13,816.15	68.2
			HE	11,310.88	62.3
			HE	156.04	62.4
			HE	928.86	88.5
			HE	78,818.87	69.4
			HE1	4,083.84	67.5
			HE1	4,279.00	89.1
			HE1	11,724.29	67.6
			HE2	1,085.81	67.9
			HE3	6,676.64	65.5
			HE4	2,279.54	67.4
			HF	62.43	62.4
			HF	987.49	89.8
			HF	4,416.77	63.1
			HG	1,164.59	68.5
			HG	268.36	89.5
			HJ	1,133.19	100.7
			HJ	1,608.96	67
			HK	804.75	100.6
			HK	1,499.54	68.2
			HK	7,266.64	89.2

Table E-8. Continued.

			HK	210.28	70.1
			HK1	4,927.86	55.7
			HK2	178.84	89.4
21233	NPDES PROGRAM	3333	HK3	210.87	38.3
			HK4	124.25	62.1
			HL	800.31	66.7
			HL	96.42	48.2
			HM	160,070.30	100.4
			HM	90.89	29.5
			PM	4,044.41	101.1
		3342	HI	1,440.10	53.3
		3343	HI	2,252.63	56.3
			HI	205.78	51.4
			HI	16,387.75	46.6
			HI	29,009.49	45.6
			HI	53,108.99	54.6
			HI	945.65	43
			HI	2,059.16	51.5
			HI	1,486.70	41.3
			HI	46,709.55	50
			HI	60,251.76	55.9
			HI	421.01	52.6
			HI	23,368.00	44.3
			HI	11,685.67	46.6
			HI	24,722.55	44
			HI	1,420.81	52.6
			HI	1,197.95	33.3
			HI	33,694.50	48.8
			HI	25,045.38	42.7
			HI	12,318.28	50.3
			HI	15,905.71	44.8
			HI	28,123.15	56
			HI	43,011.80	55.8
			HI	77,791.72	49.9
			HI	6,085.05	56.9
			HI	89,605.65	62.8
			HI	84,737.98	55.3
			HI	2,041.63	51
			HI	4,134.41	51.7
			HI	61,389.23	40.7
			HI	510.55	63.8
			HI	22,888.86	48.5
			HI	1,291.63	47.8
			HI	80,423.09	54.1
			Total	1664348.44	59.92

(Source: Busath, pers. comm., 11/21/03)

The backup calculations for the cost for each cost survey category in Section 8 and the sources of the cost data are presented in this appendix. Tables are generally presented by sequentially increasing levels of detail. Figure F-1 illustrates how data is shared throughout the tables.

Table F-1 contains all costs organized into the various standard cost survey categories. The subtotals for each cost category are also presented in Section 8, Table 8-2. The remaining tables (F-2 through F-7) present the detailed back-up information for the numbers in Table F-1. Table F-1 is linked to the back-up tables by the table and item numbers in the 'Source' column. Most of the cost information provided by city staff is listed in Table F-2. Item numbers corresponding to the subtotals in Table F-2 were added to the left hand column to easily show how the numbers are pulled forward to Table F-1. The right hand column in Table F-2 was added to show how costs were allocated to the cost survey categories. Table F-1 entries that were not taken directly from Table F-2 are found in Tables F-3 through F-7.

For the city of Santa Clarita, labor costs of the stormwater staff are not distributed among the various survey categories. Instead, it is all captured under Overall Stormwater Program Management. Thus, comparing costs with other municipalities where such costs are distributed, Santa Clarita's Overall Stormwater Management Program costs will be higher.

Detailed descriptions of how the costs were developed are contained in the following paragraphs.

Construction Site Stormwater Runoff Control

The total cost of this category was $74,995. The only cost attributed to this category was for inspections. The city conducted 11,746 inspections, but this number reflects multiple inspections for various construction activities at the same site (Santa Clarita, 2003b). Since this number does not solely represent stormwater inspections, this should be considered when comparing these inspection statistics with that of the other cities. Therefore, cost was normalized per active construction site (64) (Santa Clarita, 2003b). Other activities in this category included:

- Development of pollution prevention handouts directly related to specific construction functions
- The city's Environmental, Building and Safety, and Public Works inspectors completed site visits on a daily basis
- Cited contractors in the event of illicit connection detection

Santa Clarita

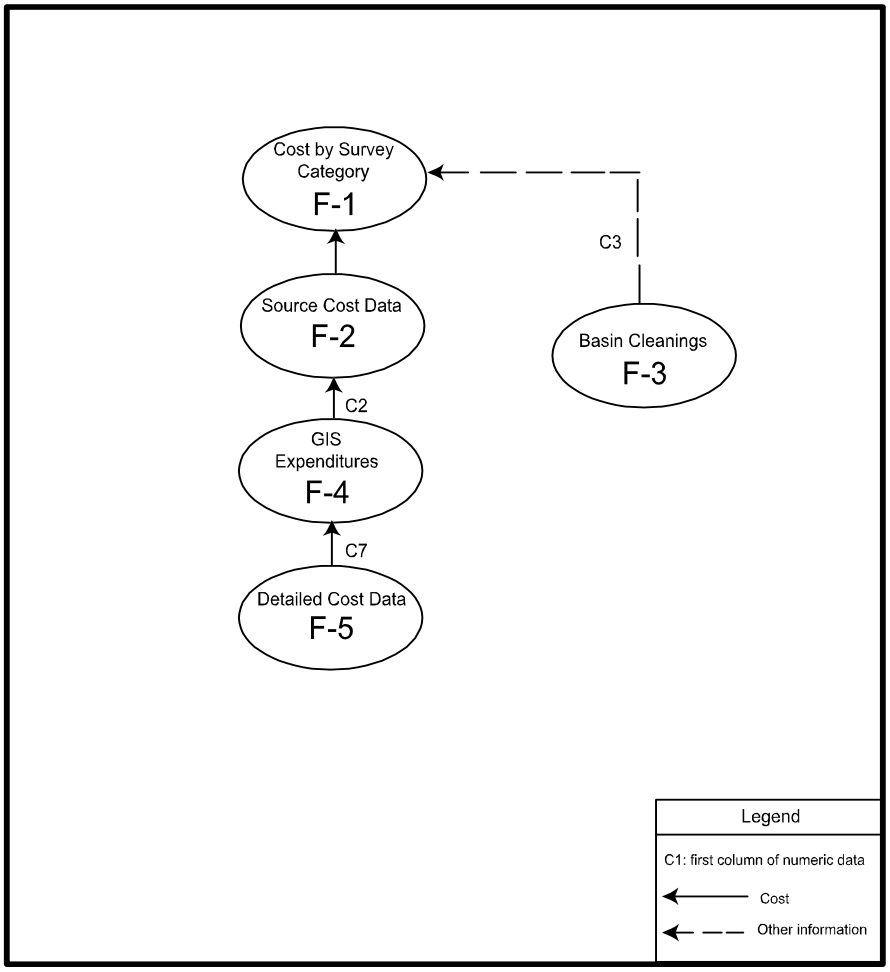

Figure F-1. Santa Clarita Flowchart

Illicit Discharge Detection and Elimination (IDDE)

The total cost of this category was $114,831. Though the city labeled this cost as operation and maintenance activities, activities were specific to identification and elimination of illicit connections and discharges.

The Los Angeles Flood Control District (LAFCD) owns and maintains 122,354 feet of open channel all of which was screened for illicit connections during the 2002/03 fiscal year. Out of the 20 illicit connections that were identified by screening, all were investigated, terminated, removed, and resulted in enforcement action (Santa Clarita, 2003b).

Also, 349 illicit discharges were reported. Of these, 291 were discontinued/cleaned up voluntarily through enforcement and the source identified, 2 were cleaned up with no source identified, 50 resulted in no evidence of discharge, 27 were determined to be conditionally

exempt, and 305 resulted in enforcement action. (Santa Clarita, 2003b). Normalized cost is $311 per investigation of both illicit connections and illicit discharges (20+349). This includes all associated follow up activities performed by the city as described above.

Industrial and Commercial Management Programs

The total cost of this category was $12,600. The only cost for this category was for inspection of industrial and commercial facilities. The city inspection staff performed 110 inspections during 2002/03. The city of Santa Clarita contracts with Los Angeles County of perform these inspections but are done by city staff (Cramer, pers. comm., 4/22/04). Enforcement actions were issued which included 17 verbal warnings and 4 notices to comply. (Santa Clarita, 2003b).

Overall Stormwater Program Management

The total cost for this category was $515,352. These costs are for administrative activities and development planning. Stormwater staff time (including overhead allocation) used to oversee or implement the activities in the other cost categories accounted for $438,832. Overhead allocation (other supporting city functions, building, etc.) was $253,073. This number is described in the footnote to Table F-2. Development planning cost was $76,520. These costs were for activities the city does to insure developers are following SUSMP[1] standards. Maintenance of the stormwater section of city's website was also performed.

Pollution Prevention and Good Housekeeping for Municipal Operations

The total cost for this category was $859,754. Activities performed in this category were for catch basin cleaning, trash pick-up, and street sweeping. The cost attributed to catch basin cleaning was $251,908. During 2002/03, 1,482 catch basins were cleaned (Table F-3). The cost attributed to street sweeping was $557,443. The city sweeps all streets once a week (Santa Clarita, 2003b). A total of 900 curb miles were swept per week in 2002/03 (Cramer, pers. comm., 4/22/04). Trash pick-up costs were $50,403 for the household hazardous waste program.

Post Construction Stormwater Management in New Development and Redevelopment

The adjusted cost of this category was $106,925. The total cost for this category submitted by the city of Santa Clarita was $256,950. Of the cost, $97,813 was for vehicles for catch basin cleaning (Cramer, pers. comm., 4/22/04). These capital costs were recurring for other projects at an unknown interval and were assumed to be annual for the purposes of this survey. The remaining $9,112 was for maintenance and conveyance of one detention basin (Cramer, pers. comm., 4/22/04).

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[1] SUSMP: Standard Urban Storm Water Mitigation Plans (SUSMPs) are often referenced by permits. They set treatment requirements for new construction and redevelopment. (www.swrcb.ca.gov)

Public Education and Outreach and Public Involvement and Participation

The total cost for these categories was $49,130. These categories were combined for the city of Santa Clarita. This cost includes employee training to administer these categories. Activities in this category included:

- Storm drain stenciling: Out of the city owned 440 drain inlets, 45 were marked with a no dumping message
- Maintained stormwater hotline: The city received approximately 30 calls per day relating to trash, household hazardous waste, and stormwater (Cramer, pers. comm., 4/22/04)
- Print, television, radio, and other media: Approximately 5 million impressions were made (for the entire permitted area). A breakdown for Santa Clarita was not available
- School outreach: An environmental mascot visited schools and public events to educate attendees on stormwater issues. Children's activity books were distributed at appearances. Flyers were distributed to promote the River Rally event
- Cooperated with the principal permittee to develop specific outreach programs to target pollutants in their area
- Distributed pollutant-specific materials
- Developed and distributed brochures and door hangers to specific residents
- Attended 4 workshop/community events to discuss stormwater pollution

Programs supported by the principal permittee were funded in part by a contribution from the city of Santa Clarita in the amount of $45,822. The remaining activities were performed by stormwater staff and that cost breakdown was not available.

Water Quality Monitoring

The total cost of this category was $3,300 (Table F-2). This included monitoring for diazinon multiple times at one site (Cramer, pers. comm., 4/22/04).

Watershed Management

The total cost of this category was $332,949. This cost was allocated to this category based on estimates from city staff. The staff estimated that 50 percent of GIS cost was attributable to stormwater activities (Table F-4).

References

City of Santa Clarita. 2003. "Los Angeles County Municipal Storm Water Permit (Order 01-182) Individual Annual Reporting Form, Attachment U-4"

Table F - 1. Santa Clarita Cost Organized by Cost Category

Cost Survey Categories

Activity Description

Construction Site Stormwater Runoff Control

Description	External Contract	Relation to Permit[a]	Dollar Amount	Source	% of Category	Activity Statistic	Notes/Units	Reference	Normalized Cost	Notes/Units
Construction inspections		New	74,995.00	Table F-2, Item 9	100%	64	active construction sites	Santa Clarita, 2003b	1,171.80	$/active construction site
Total			74,995.00		3.6%	of total stormwater cost				

Illicit Discharge Detection and Elimination

Description	External Contract	Relation to Permit	Dollar Amount	Source	% of Category	Activity Statistic	Notes/Units	Reference	Normalized Cost	Notes/Units
Operations and maintenance		New	114,831.05	Table F-2, Item 16	100%	369	investigations	Santa Clarita, 2003b	311.20	$/investigation
Total			114,831.05		5.5%	of total stormwater cost				

Industrial and Commercial Management Programs

Description	External Contract	Relation to Permit	Dollar Amount	Source	% of Category	Activity Statistic	Notes/Units	Reference	Normalized Cost	Notes/Units
Industrial/Commercial site visit activities		New	12,600.00	Table F-2, Item 7	100%	110	inspections	Santa Clarita, 2003b	114.55	$/inspection
Total			12,600.00		0.6%	of total stormwater cost				

Overall Stormwater Program Management

Description	External Contract	Relation to Permit	Dollar Amount	Source	% of Category	Activity Statistic	Notes/Units	Reference	Normalized Cost	Notes/Units
Administrative costs		New	438,832.00	Table F-2, Item 1	85.2%					
Development planning		New	76,519.55	Table F-2, Item 8	14.8%					
Total			515,351.55		24.9%	of total stormwater cost				

Pollution Prevention and Good Housekeeping for Municipal Operations

Description	External Contract	Relation to Permit	Dollar Amount	Source	% of Category	Activity Statistic	Notes/Units	Reference	Normalized Cost	Notes/Units
Catch basin cleaning		Enhanced	251,907.99	Table F-2, Item 12	29.3%	1,482	basin cleanings	Table F-3	169.98	$/basin cleaning
Trash pick-up		Existing	50,402.55	Table F-2, Item 13	5.9%					
Street sweeping		Enhanced	557,443.16	Table F-2, Item 11	64.8%	46,800	curb miles swept	Cramer, pers. comm., 4/22/04	11.91	$/curb mile swept
Total			859,753.70		41.5%	of total stormwater cost				

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Table F – 1. Continued.

Post Construction Stormwater Management in New Development and Redevelopment

Description	External Contract	Relation to Permit	Dollar Amount	Source	% of Category	Activity Statistic	Notes/Units	Reference	Normalized Cost	Notes/Units
BMP maintenance		New	9,111.93	Table F-2, Item 10	8.5%					
Capital costs		New	97,813.00	Table F-2, Item 14	91.5%					
Total			106,924.93		5.2%	of total stormwater cost				

Public Education, Outreach, Involvement, and Participation

Description	External Contract	Relation to Permit	Dollar Amount	Source	% of Category	Activity Statistic	Notes/Units	Reference	Normalized Cost	Notes/Units
Public education and outreach		New	45,821.98	Table F-2, Item 3	93.3%					
Employee training		New	3,308.39	Table F-2, Item 4	6.7%					
Total			49,130.37		2.4%	of total stormwater cost				

Water Quality Monitoring

Description	External Contract	Relation to Permit	Dollar Amount	Source	% of Category	Activity Statistic	Notes/Units	Reference	Normalized Cost	Notes/Units
Monitoring		New	3,300.00	Table F-2, Item 18	100%					
Total			3,300.00		0.2%	of total stormwater cost				

Watershed Management

Description	External Contract	Relation to Permit	Dollar Amount	Source	% of Category	Activity Statistic	Notes/Units	Reference	Normalized Cost	Notes/Units
Watershed management		New	332,949.00	Table F-2, Item 19	100%					
Total			332,949.00		16.1%	of total stormwater cost				

Total Stormwater Costs	2,069,835.60

a. This column indicates whether required activities were being performed prior to stormwater permits. In some cases activities were enhanced due to permit requirements.

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Table F-2. Source Data Table Submitted by City of Santa Clarita in their Annual Report Form for Los Angeles County Municipal Stormwater Permit (cost survey categories added)

Item #	City of Santa Clarita Category	Cost	Cost Survey Category[1]
	Program Mangement		
1	Administrative Costs	438,832.00	2 Management
2	Capital Costs	0.00	
	Public Information and Participation		
3	Public Outreach/Education	45,821.98	Public Education
4	Employee Training	3,308.39	Public Education
5	Corporate Outreach	0.00	
6	Business Assistance	0.00	
7	Industrial/Commercial Inspection/Site Visit Actvities	12,600.00	Industrial
8	Development Planning	76,519.55	Management
	Development Construction		
9	Construction Inspections	74,995.00	Construction
	Public Agency Activities		
10	Maintenance of structural and treatment control BMPs	9,111.93	Post Construction
11	Municipal Street Sweeping	557,443.16	Pollution Prevention
12	Catch Basin Cleaning	251,907.99	Pollution Prevention
13	Trash Collection/Recycling	50,402.55	Pollution Prevention
14	Capital Costs	97,813.00	3 Post Construction
15	Other	0.00	
	IC/ID Program		
16	Operations and Maintenance	114,831.05	Illicit Discharge
17	Capital Costs	0.00	
18	Monitoring	3,300.00	Monitoring
19	Other (Watershed Management)	332,949.00	4 Watershed
	Total	2,069,835.60	

(Source: Santa Clarita 2003b)

1. Cost Categories Abbreviated According to the Following:
   - Construction: Construction Site Stormwater Runoff Control
   - Illicit Discharge: Illicit Discharge Detection and Elimination
   - Industrial: Industrial and Commercial Management Programs
   - Management: Overall Stormwater Program Management
   - Pollution Prevention: Pollution Prevention and Good Housekeeping for Municipal Operations
   - Post Construction: Post Construction Water Management in New Development and Redevelopment
   - Public Education: Public Education, Outreach, Involvement, and Participation
   - Monitoring: Water Quality Monitoring
   - Watershed: Watershed Management

2. Cost reported in the annual report form was $184,710. Per personal communication with Dan Smith, this number was adjusted up to $185,759 because of $1,049 in previously unallocated labor for stormwater staff. Another $253,073 was also added as the cost of overhead allocation. Overhead allocation was not included in the annual report and it pays for support by other departments such a payroll, human resources, etc. as well as a fraction of building costs.

3. $137,784 was adjusted down to $97,813 after a more thorough review by city finance staff. The city suggested we add $150,025 for the curb line and gutter maintenance program, but this cost could not be established as a stormwater compliance cost.

4. From Table 7-3.

Table F-3. Calculation of Number of Basin Cleanings

Type	Number	Reference	Frequency (yearly)	Reference	Total Cleanings
Priority A	65	Santa Clarita, 2003b	3	Santa Clarita, 2003b	195
Priority B	180	Santa Clarita, 2003b	3	Santa Clarita, 2003b	540
Priority C	249	Santa Clarita, 2003b	3	Santa Clarita, 2003b	747
Total	494				1,482

Table F-4. Calculation of GIS Expenditures Relating to Stormwater

Amount	Source	Percent Allocation	Category	Reference	Allocated Cost
665,897.12	Table F-5	50%	Watershed Management	Cramer, pers. comm., 6/9/04	332,948.56
665,897.12	Table F-5	50%	Not Related to Stormwater	Cramer, pers. comm., 6/9/04	332,948.56
Total		100%			665,897.12

Table F-5. Financial Cost Data Submitted by City of Santa Clarita

STORMWATER UTILITY FINANCIAL PROJECTIONS
Financial History

		1996-97 Actuals	1997-98 Actuals	1998-99 Actuals	1999-00 Actuals	2000-01 Actuals	2001-02 Actuals	2002-03 Actuals
REVENUES:								
	User Fee	1,847,538	2,149,920	2,527,683	1,925,118	2,101,130	1,954,966	2,251,307
	(Supplemental Refund)							
	Interest Income	42,104	58,193	79,913	86,125	143,197	96,382	81,505
	Misc. Revenues		103	1,811			103,285	147,464
	Sale of Maps & Publications			140	1,792	1,696	2,597	1,929
	Operating Transfers In			53,633	125,028	277,836	323,142	289,765
Total Revenues		**1,889,642**	**2,208,216**	**2,663,179**	**2,138,063**	**2,523,859**	**2,480,373**	**2,771,971**
OPERATING EXPENDITURES:								
2314	GIS	965,352	327,471	213,712	232,334	486,642	504,794	665,897
4311	Stormwater Engineering				56,652	17,924		
5720	Stormwater Utility Admin		312,673	323,391	691,677	539,508	1,561,987	554,823
5740	Stormwater Field Activities	572,534	601,604	627,845	688,919	740,401	994,760	928,992
8140	Stormwater Attorney Services							
	Transfers Out							
	Overhead Allocation - 11% of Rev	197,820	197,820	197,820	197,820	197,820	203,895	253,073
	Audit Adj - AR Allowance							
TOTAL OPERATING EXPENDITURES		**1,735,706**	**1,439,567**	**1,362,768**	**1,867,401**	**1,982,295**	**3,265,435**	**2,402,785**
CAPITAL PROJECTS:								
	1996-97 Access Ramp	0	18,636	6,364				
	1997-98 Curb Gutter & Flowline			115,000				
	1999-00 Stormdrain Repairs					0		
	1999-00 Curb Gutter Flowline				157,415			
	Storm Drain Repairs			(97,660)	110,170	17,500		
M0031	Annual Curb Gutter Flowline						151,766	
M0032	Storm Drain Transfer Program						73,428	316,215
M0037	Annual Curb Gutter Flowline			190,668				150,025
	Water Discharge Retrofit			16,683				
	Galeton Street Improvements			18,850				
	2000-01 Curb Gutter Flowline					177,000		
	Annual Stormdrain Repairs					0		
TOTAL CAPITAL PROJECTS		**0**	**18,636**	**249,905**	**267,585**	**194,500**	**225,194**	**466,240**
Total Expenditures		**1,735,706**	**1,458,203**	**1,612,673**	**2,134,987**	**2,176,795**	**3,490,629**	**2,869,025**
EXCESS (DEFICIENCY) REVENUES OVER		**153,936**	**750,013**	**1,050,506**	**3,077**	**347,065**	**(1,010,256)**	**(97,054)**
FUND BALANCE - BEGINNING OF YEAR		**$ 898,435**	**$ 1,052,371**	**$ 1,802,383**	**$ 2,852,890**	**$ 2,855,966**	**$ 3,203,031**	**$ 2,192,775**
FUND BALANCE - END OF YEAR		**$ 1,052,371**	**$ 1,802,383**	**$ 2,852,890**	**$ 2,855,966**	**$ 3,203,031**	**$ 2,192,775**	**2,095,721**
Reserve For Vehicle Replacement				**47,998**	**65,183**	**83,039**	**115,776**	**175,000**
C.	**RECEIVABLE - NON PAYING CUSTOMERS**						**$ 84,658**	
D.	**REMAINING SCHOOL RECEIVABLES**						**$ 535,611**	
Unreserved Fund Balance		**$ 1,052,371**	**$ 1,802,383**	**$ 2,804,892**	**$ 2,790,783**	**$ 3,119,992**	**$ 1,456,730**	**$ 1,920,721**

Appendix G Calculations and Comparisons

Section G-1 of this appendix contains backup calculations for certain results in Section 9 and additional cost analysis that did not prove useful, but is presented here to demonstrate their lack of utility (Section G-1). This is particularly true of regressions of normalized cost versus cost factors. Section G-2 of this appendix contains analysis of future cost to compare various cost scenarios using equivalent annual cost.

To compare costs from years greater than a year different from the year of this study (2003 dollars), the Consumer Price Index Urban (CPIU) was used (U.S. Bureau of Labor Statistics, 2005). CPIU was used because it is a common measure of inflation, it was similar to the Engineering News Review Construction Cost Index (CCI) from the Engineering News Record (ENR), yet CPIU reflects more broadly on how inflation than the CCI. As an example of similarity between the two indices, the CPIU adjustment factor from 1998 to 2003 agreed with the CCI to three significant figures. Because CPIU was similar to the ENR CCI and for consistency, CPIU was used to adjust both construction costs (e.g. treatment plant) and city stormwater costs that fund mostly non-construction activities such as inspection programs and maintenance of city infrastructure.

G.1 COST SURVEY ANALYSIS

This section contains costs normalized by both number of households and population. Since cost per households is the most common in the literature, several regressions against this parameter are also presented in this section.

Survey Category Costs per Household

Table G-1 presents survey category costs normalized by households.

Table G-1. Survey Category Costs Per Household

	Const.	IDDE	Ind/Com	Overall Man.	Pollution Prevention	Post. Con.	Pub. Ed.	Mon.	W. Man.
Entity	$/HH	$/HH	$/HH	$/HH	$/HH	$/HH	$/HH	$/HH	$/HH
City of Corona	1.36	0.53	2.29	8.09	18.34	0.34	0.72	0.18	0.00
City of Encinitas	7.12	2.07	2.75	5.38	22.16	0.64	1.76	3.20	0.52
City of Fremont	0.26	0.09	3.02	6.54	30.64	0.51	1.46	1.89	0.25
Fresno-Clovis Area	0.42	0.07	0.24	2.92	11.47	0.29	1.08	1.29	0.00
City of Sacramento	1.60	0.23	0.26	1.72	21.41	0.23	2.20	3.02	0.19
City of Santa Clarita	1.43	2.19	0.24	9.83	16.39	2.04	0.94	0.06	6.35
Average	2.03	0.86	1.47	5.74	20.07	0.68	1.36	1.61	1.22
Median	1.39	0.38	1.27	5.96	19.88	0.42	1.27	1.59	0.22
Minimum	0.26	0.07	0.24	1.72	11.47	0.23	0.72	0.06	0.00
Maximum	7.12	2.19	3.02	9.83	30.64	2.04	2.20	3.20	6.35

Survey Category Costs Per Capita

Table G-2 presents survey category costs normalized by population.

Table G-2. Survey Category Costs Per Capita

	Const.	IDDE	Indust.	Overall Man.	Pollution Prevent.	Post. Con.	Pub. Ed.	Mon.	W. Man.
	$/capita								
City of Corona	0.43	0.17	0.72	2.54	5.76	0.11	0.23	0.06	0.00
City of Encinitas	2.93	0.85	1.13	2.21	9.11	0.26	0.72	1.31	0.21
City of Fremont	0.09	0.03	1.03	2.23	10.46	0.17	0.50	0.65	0.09
Fresno-Clovis Area	0.15	0.02	0.09	1.02	3.99	0.10	0.38	0.45	0.00
City of Sacramento	0.64	0.09	0.10	0.69	8.04	0.09	0.89	1.22	0.08
City of Santa Clarita	0.50	0.76	0.08	3.41	5.69	0.71	0.33	0.02	2.20
Average	0.79	0.32	0.53	2.02	7.27	0.24	0.51	0.62	0.43
Median	0.46	0.13	0.41	2.22	7.19	0.14	0.44	0.55	0.08
Minimum	0.09	0.02	0.08	0.69	3.99	0.09	0.23	0.02	0.00
Maximum	2.93	0.85	1.13	3.41	10.46	0.71	0.89	1.31	2.20

Construction Program Cost Normalizations

Table G-3 presents construction program costs normalized by several cost factors. In some cases, activity statistics were not available and, as such, normalization was not possible. In such instances, the average and median statistics are only based on the data available. Construction costs were normalized by number of active construction sites and inspections. The large variability in normalized cost may be a result of inconsistent reporting of these cost factors.

Table G-3. Construction Program Unit Costs

Entity	Construction Cost	Active Sites	Construction $/active site	Inspections	Construction $/inspection
City of Corona	53,382	41	1,302	564	95
City of Encinitas	169,751	40	4,244	401	423
City of Fremont	17,715	24	738	197	90
Fresno-Clovis Area	81,800	N/A	N/A	N/A	N/A
City of Sacramento	261,716	417	628	6,375	41
City of Santa Clarita	74,995	64	1,172	N/A	N/A
Average			1,617		162
Median			1,172		92

Industrial and Commercial Program Cost Normalizations

Table G-4 presents industrial and commercial program costs normalized by several cost factors. In some cases, activity statistics were not available and as such, normalization was not possible. In such instances, the average and median statistics are only based on the data available. Industrial and commercial program costs were normalized by population, number of industrial and commercial sites, and number of inspections.

Table G-4. Industrial and Commercial Program Units

Entity	Program Cost	Sites	Industrial $/site	Inspections	Industrial $/inspection
City of Corona	89,916	3,050	29	600	150
City of Encinitas	65,596	417	157	266	247
City of Fremont	210,027	1,028	204	482	436
Fresno-Clovis Metropolitan Area	47,780	N/A	N/A	N/A	N/A
City of Sacramento	42,318	N/A	N/A	39	N/A
City of Santa Clarita	12,600	1,071	12	110	115
Average			101		406
Median			93		247

Additional Regression Analysis

Many of the following regressions have outer and inner confidence limits. Though practically useless, they are displayed to indicate how much inaccuracy results from the regressions. The inner limits are the 90 percent confidence interval for the mean cost from the total population of

"good" stormwater programs in California. The outer limits are the 90 percent confidence interval for cost of any one "good" California stormwater program.

Mean personal income appears to be the best indicator of total cost per household, but as a model not very useful because the predicted value nearly doubles when considering the confidence limits. Cost per household versus mean personal income is displayed in Figure G-1.

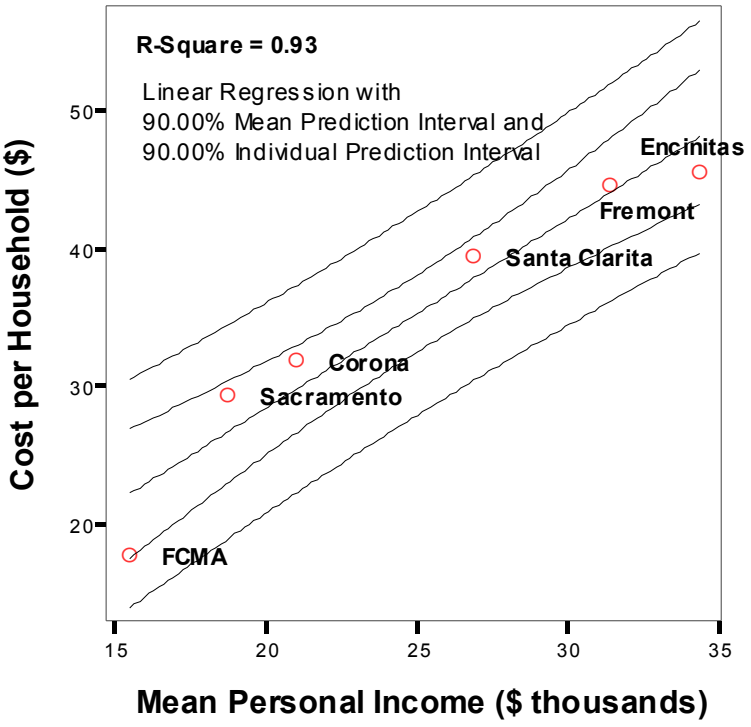

Figure G-1. Cost Per Household versus Mean Personal Income

In the regression of total cost per household verses income per household the theory is that the more money households bring in, the more a city would be able to collect for stormwater activities. However, this may not indicate more is accomplished because of higher cost for areas of higher income may limit how much can be accomplished. Cost per household versus mean household income is displayed in Figure G-2.

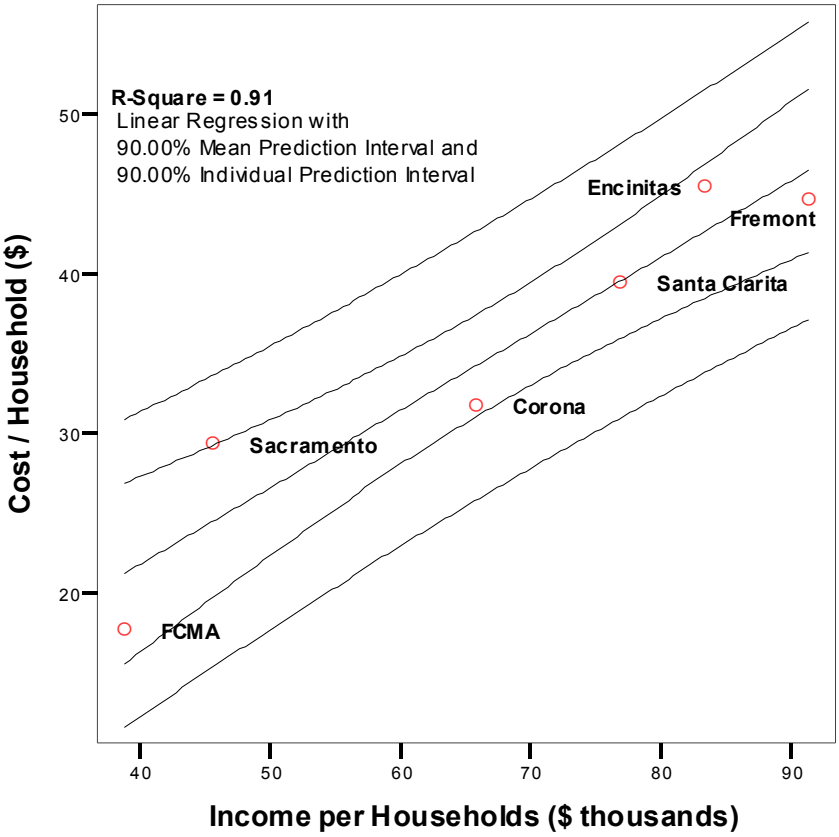

Figure G-2. Cost Per Household verses Income Per Household

As graphically demonstrated in Figure G-3, Fremont and Corona costs are particularly not well behaved in the regression of cost per household verses population. The conclusion is that city size is not a good predictor of stormwater cost per household (this is also discussed in Section 9.1). This is also demonstrated by the regression in Figure G-7.

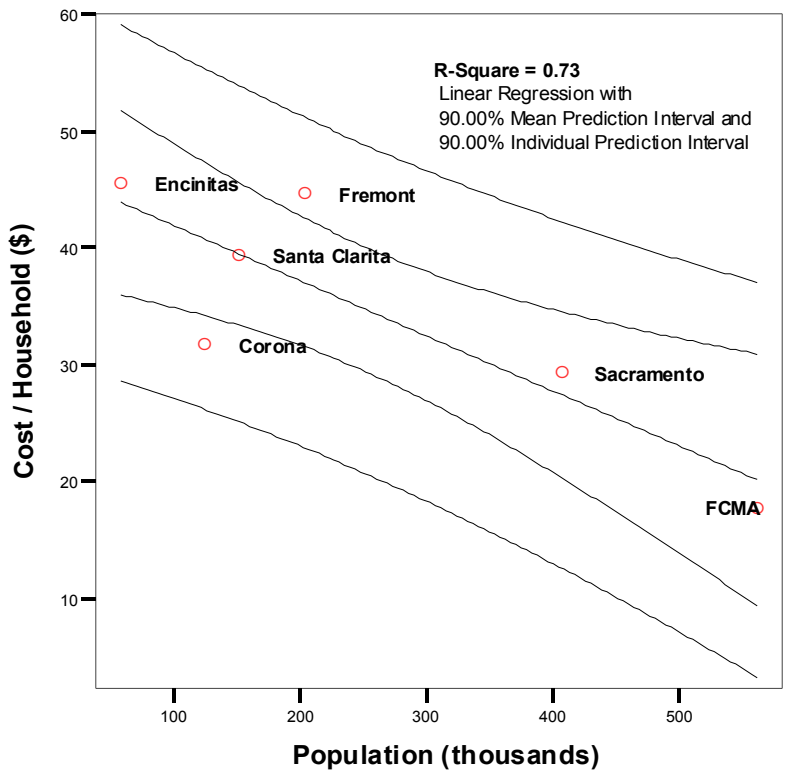

Figure G-3. Cost Per Household verses Population

Figures G-4 through G-7 show regressions using cost factors that are not useful in explaining costs. They are presented because there was some logic that they may be useful, and perhaps with more data they may prove to be helpful in more complicated models. However, they do not seem as important as the factors discussed qualitatively in Section 9.2 of the report. Each factor-years since incorporation, rainfall, income density, and incorporated area were considered for the following reasons:

- Years Since Incorporation was thought to increase cost because older cities would have higher maintenance costs
- Rainfall was thought to increase maintenance costs because of higher pollutant loads and a higher need for inspections
- Income Density was thought to generate a higher tax base for a given area. This would translate into more money available for stormwater.
- Area merely reflects the size of the city much like population. Area was considered because some activities, like street sweeping, may have been more dependent on area than population.

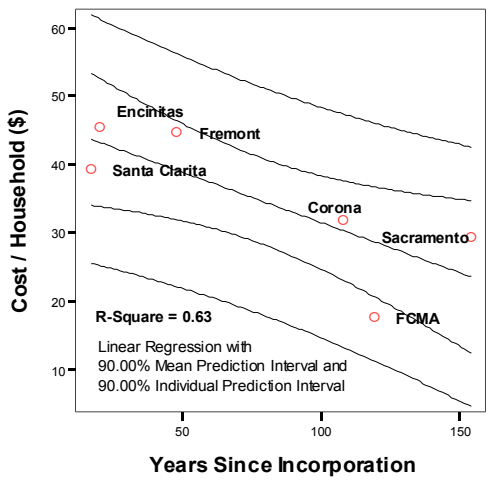

Figure G-4. Cost Per Household versus Years Since Incorporation

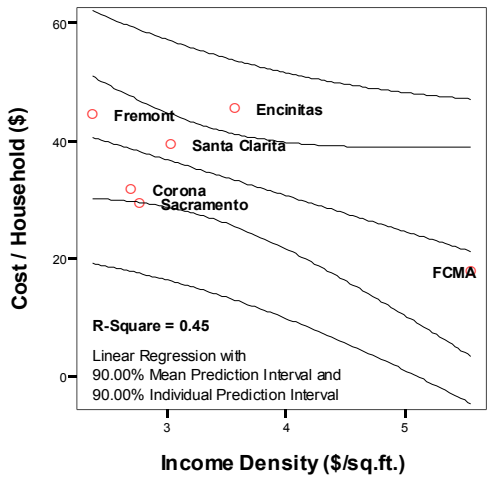

Figure G-5. Cost Per Household versus Annual Rainfall

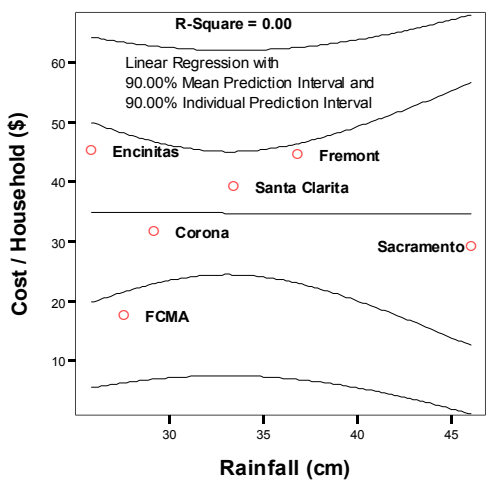

Figure G-6. Cost Per Household versus Income Density

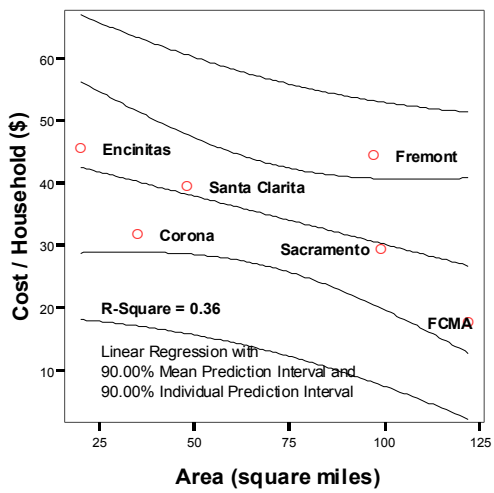

Figure G-7. Cost Per Household versus Area

Figure G-8 demonstrates that even though street sweeping is the highest cost activity, curb miles swept is not a very good predictor of stormwater costs. This is not surprising given the wide variability in street sweeping unit cost.

Another possible cost factor is type of land use but this could not be investigated due to land use data being inconsistent, or in several cases not available.

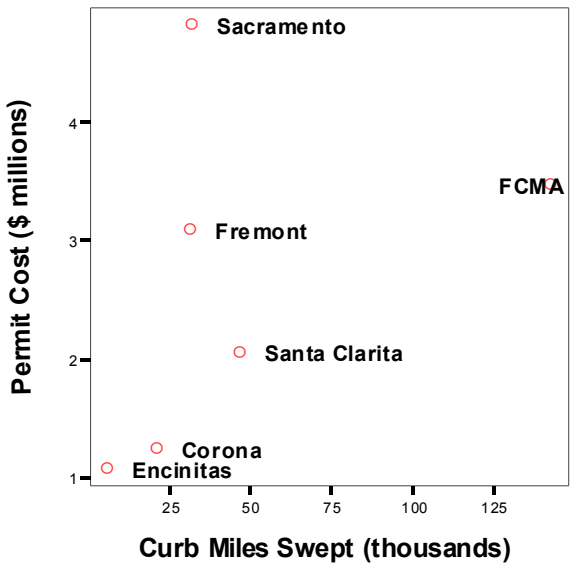

Figure G-8. Permit Cost verses Curb Mile Swept

G.2. FUTURE COST ESTIMATES FOR THE LOS ANGELES AREA

Examples of future costs are restricted to the Los Angeles area where the future compliance cost has been a source of continued controversy. Costs estimates were taken from USC studies, the Los Angeles River Trash TMDL, the Ballona Creek and Estuary Metals TMDL, and the city of Los Angeles. TMDL estimates are for control of all sources of the pollutant, not just stormwater sources. These costs are presented since future permits will reflect TMDL requirements of the TMDL costs will be attributable to stormwater quality management.

To compare these cost estimates with each other, equivalent annual cost was calculated. Equivalent annual cost is calculated by taking the present worth of all capital and annual costs and then multiplying by 3 percent to get an infinite series of annual payments. Observations on these comparisons are discussed in the following sections. Use caution when comparing costs. Each type of cost addresses certain pollutant and source scenarios. TMDLs address sources other than stormwater and also address specific pollutants. Conversely, the USC studies focus solely on stormwater pollution control but address all pollutants causing impairment to water bodies.

Costs from the Description of Alternatives for Control of Stormwater Quality in the Los Angeles County (Devinny et.al., Task B: Appendix H)

Task B is an assessment of regulatory policy to determine the intent to stormwater regulation regarding advanced treatment. Alternatives to advanced treatment that may comply with the intent of the regulations are described and costs are estimated. Task B was accomplished by faculty from the University of Southern California and the University of California Los Angeles and it is included as Appendix H.

The alternatives to advanced treatment focus on runoff reduction. The principle strategy is to reduce runoff by infiltration. The remaining runoff could be treated by conventional post-construction BMPs that are less expensive than advanced treatment. If certain discharges from these conventional BMPs still require advanced treatment, the cost of stormwater would be much less than if advanced treatment exclusively for stormwater pollution control. Based on this approach, costs for several alternatives are estimated for the area under jurisdiction by the LARWQCB. These alternatives do not include cost estimates for cases where advanced treatment is required because this need is assumed to be greatly limited. To compare these cost estimates with cost estimates from other studies, equivalent annual cost was calculated.

If source control[1] BMPs are sufficient to comply with regulations, the present worth cost is estimated at $2.8 billion ($84 million equivalent annual cost). The present worth cost, including low-tech treatment BMPs applied regionally, is between $5.7 billion and $7.4 billion ($171 million to $222 million equivalent annual cost) depending on whether cost per acre or cost per volume, respectively, were used in the estimates. Current level of effort in the Los Angeles area has only made limited progress in implementing the ideas described in Task B (Devinny, 2004). The current annual estimate of this effort is estimated at $18 per household (Radulescu and Swamikannu, 2003).

Table G-5. Equivalent Annual Cost Per Household for Task B Alternatives

Cost Scenario for the Los Angeles Area	Equivalent Annual Cost, $/household
Current Effort	18
Alternative to Advanced Treatment: Pollution Prevention Scenario (Present worth 2.8 billion)[1]	27
Alternative to Advanced Treatment: Wetlands and Infiltration Basins Scenario, calculated using cost per area (Present worth 5.7 billion)[1]	55
Alternatives to Advanced Treatment: Wetlands and Infiltration Basins Scenario, calculated using cost per capture volume (present worth 7.4 billion)[1]	71

1. Little progress has been made in implementing these scenarios (Devinny, pers. comm., 9/14/2004). These costs may be added to the current effort if existing programs continue to be required. Costs based on Devinny et. al. (Appendix H), see Table G-6 for equivalent annual cost calculation.

[1] The term "Non-structural BMP" was used by Devinny et. al. in Appendix H.

Table G-6. Calculation of Equivalent Annual Cost Per Household for Task B Alternatives

	Present Worth, 10^9	Equivalent Annual Cost, 10^6	Los Angeles County Households	Normalized Equivalent Annual Cost, $/Household
Pollution Prevention[1]	2.8	84.00	3,133,774	26.80
Wetlands and Infiltration Basins, based on unit cost per watershed area	5.7	171.00	3,133,774	54.57
Wetlands and Infiltration Basins, based on unit cost per detention volume	7.4	222.00	3,133,774	70.84

1. The pollution prevention scenario may include a small fraction of what cities are currently spending.

City of Los Angeles Bond Initiative and Future Bond Cost Estimates

On July 8, 2004, the Los Angeles Times reported that the council members of the city of Los Angeles agreed to place a $500 million bond on the November ballot to clean up local surface waters in compliance with the federal Clean Water Act. The bond revenue would pay for the first five years of projects to help the city comply with certain Clean Water Act regulations. City officials estimate they will need an additional $435 million and $750 million to fully comply with requirements to reduce pollutants including bacteria. (Garrison, 2004) Using the total compliance costs ($500, $435, and $750 million) results in $40/household[2] in equivalent annual costs.

Los Angeles River Trash TMDL

There are three cost estimates to comply with this TMDL (RWQCB, Los Angeles, 2001). Using catch basin inserts would have annual recurring costs of $66 million ($51/household), small separation units would have annual recurring costs of $183 million ($140/household), and large separation units would have annual recurring costs of $18 million ($14/household). It was not investigated why the cost of larger units is an order of magnitude less than smaller units.

Table G-7 presents the calculation worksheet for converting cost in the TMDL to equivalent annual cost per household.

[2] A discount rate of 3% and 1,275,412 households were used to calculate equivalent annual costs per household.

Table G-7. Cost Calculations for Los Angeles River Trash TMDL[1]

Scenario	2001 dollars		2003 dollars				
	Capital Cost, 10^6	Recurring O&M, 10^6	Capital Cost, 10^6	Recurring O&M, 10^6	Annualized Capital Cost[2], 10^6	Total Annual Cost, 10^6	Cost Per Household[3], $
Catch Basin Inserts Only	120	60	125	62.3	3.7	66.1	51
Small Separation Units	945	148	982	154	29.5	183	140
Large Separation Units	332	7.4	345	7.7	10.3	18.0	14

1. 2001 costs were adjusted for inflation to obtain 2003 cost figures (in millions, except cost per household).
2. A rate of 3 percent was used to calculate these costs.
3. Based on 1,300,000 households in the Los Angeles River watershed.

Ballona Creek and Estuary Metals TMDL

The Ballona Creek watershed covers 128 square miles in Los Angeles County. Open space comprises 17.5 square miles and water comprises 0.75 square miles of the Ballona Creek watershed. Cost estimates are based on the remaining 110 square miles.

Infiltration trenches and sand filters were assumed to cover 40 percent of the urbanized portion. The remaining costs were an estimate of approaches including source control and pollution prevention measures (RWQCB, Los Angeles, 2004). The equivalent annual cost per household in the watershed are estimated to be between $70 and $75.

It is noted in the TMDL that the retrofit cost per area for these devices in the Caltrans BMP Retrofit Pilot Study was nearly 10 times greater for stand alone retrofit projects. It is expected that cost will be reduced if BMPs are installed within larger reconstruction projects (Caltrans, 2004).

Table G-8 provides cost information relating to compliance with this TMDL. Annualized construction costs were calculated by multiplying the construction cost by three percent. Ranges of total annual cost were determined based on the estimates. The low side of the range includes the FHWA annualized construction cost and the USEPA recurring maintenance cost. The high side of the range includes the USEPA annualized construction cost and the recurring maintenance cost. It was assumed that 40 percent of the urbanized portion of the watershed would need to be treated by structural BMPs. Of this 40 percent, infiltration trenches would treat 20 percent of the watershed and sand filters would treat the other 20 percent. The remaining 60 percent would include enhanced pollution prevention activities (e.g. street sweeping).

Table G-8. Cost Calculations for Ballona Creek and Estuary Metals TMDL

Cost Basis	Construction Cost	Recurring Maintenance Cost	Annualized Construction Cost[2]	Total Annual Cost[3]	Cost Per Household
USEPA estimate (1999)	336	36	10.1	46.1	75
FHWA estimate (1994)	245	not reported	7.4	43.4	70

1. Dollars in millions (except cost per household).
2. A rate of 3 percent was used to calculate these costs.
3. Total cost for the FHWA includes their annualized construction cost and the USEPA recurring maintenance cost.

California Willingness to Pay for Statewide Clean Water

According to a survey (Larsen and Lew, 2003), California residents are willing to pay on average $180 per year to remove all impairments from all water bodies in the state (not just urban areas). Potential limitations with this estimate are discussed here.

This assumes cleaning water from all sources of contaminants, not just urban stormwater sources so this may not be directly compared to the cost of stormwater programs. Also, the cost of stormwater programs is only what the cities pay per household. It does not include other cost passed along to the household or individual. These costs are not incurred by the cities but by developers complying with the construction permit and Standard Urban Stormwater Mitigation Plan (SUSMPs) and industries complying with the industrial permit and businesses and individuals complying with the stormwater permit.

The survey also had 40% non-responders. This may overestimate the willingness to pay based on the assumption the people that do not respond to an environmental survey are less likely to care about environmental issues and people that do not care are less willing to pay for water quality improvement. It does not appear that these issues were addressed by the study.

The study did adjust the willingness to pay based on the average education of Californians. The sample population surveyed had a longer education than average Californians and a statistically significant correlation was found between willingness to pay and years of education. However, it is unclear from the report if the correlation was extrapolated to years of education below that of the surveyed population. This would assume that the relationship between education and willingness is the same for lower years of education.

Comparing Task B Alternatives to Advanced Treatment and TMDL Cost Estimates

The 'alternatives' described in Task B are meant to address all pollutants, while the metals or trash TMDLs only address single type pollutants yet the cost estimate is higher. In both cases, advanced treatment is not considered and common BMP costs are used. This comparison indicates the variability in cost estimates for similar stormwater scenarios. Comparing the two TMDL maximum cost estimates also demonstrate the sensitivity of cost estimates to BMP deployment scenarios. Metals are more difficult to remove than litter and thus it is expected the cost would be less, however, the metals TMDL assumed only 40% of the watershed would be retrofitted with treatment BMPs while the trash TMDL assumed 100% deployment of litter removal BMPs. A major cause of variation in these estimates is that the unit cost used in these

estimates vary from study to study. For example, the TMDL estimates use BMP unit cost that are around 10 percent of the unit cost reported by Caltrans, but the Caltrans experience was in a fully developed watershed (Los Angeles and San Diego urban areas) where utility conflicts and space limitations are common. An additional factor is that the Caltrans experience was in a stand-alone retrofit environment which likely caused cost increases over projects integrated into larger projects (Caltrans, 2004). This indicates that costs are extremely site specific and estimating regional cost is very difficult.

Table G-9 compares current costs from the California survey with various estimates to meet certain stormwater management goals. Table G-9 also includes a comparison to the California willingness-to-pay.

Table G-9. Equivalent Annual Cost per Household Comparisons between California Cost Survey Results and various estimates for water quality Los Angeles Area Future Cost Estimates[1]

Range of Current Cost from Six Surveyed California Cities		Range of Alternatives to Advanced Treatment[2]		Maximum TMDL Estimates		City of Los Angeles Bond Estimates	Statewide Clean Water Willingness To Pay Estimate[3]
				Ballona Creek Metals	L.A. River Trash		
18	46	27	71	75	141	40	180

1. Calculations are presented in Tables G-10 through G-12 and are based on the following sources for each column respectively: survey results, Devinny et al (2004), Gordon et al (2002), LARQCB (2004), LARQCB (2001), Garrison (2004), and Larsen (2003).

2. Calculated from Task B in Appendix H. Low range is the cost for attaining full compliance using only source control. High range is the cost for attaining full compliance using only treatment BMPs (low tech) estimated on capture volume.

3. Responses were not received from 40% of the mailed surveys. The survey question was for restoring water quality for all waters throughout the state from all impairment, not just within a city or region and not just for impairment from stormwater pollution (Larsen and Lew, 2003).

Cost of Advanced Treatment (Gordon et.al.)

This study presents a comprehensive analysis of the potential costs required to meet new and emerging stormwater regulations in the Los Angeles area. It assumes that advanced treatment of storm flows will be required to meet current and anticipated federal and state water quality standards. The study presents three scenarios in treatment plant size and distribution among 65 sub-basins. These scenarios are 480 plants per sub-basin, one plant per sub-basin, or one plant per city. Three runoff quantity scenarios (0.5 inch, 1.25 inch, and 2.25 inch storms) were assumed for each treatment plant scenario. The least expensive alternative for the 0.5 inch storm was using 480 plants per sub-basin. This storm depth was chosen because it was closest to the 0.75 inch storm required for treatment in the Los Angeles SUSMP. Table G-10 calculates the equivalent annual cost per household for two treatment plant scenarios for treating the 0.5 inch storm.

Table G-10. Equivalent Annual Cost Calculation for Costs from Gordon et al.

70% Capture of Annual Rainfall (0.5 inch capture volume)	Capital Cost, $\$10^9$	O&M Cost, $\$10^6$	Equivalent Annual Cost (EAC)[1], $\$10^6$	EAC/Household, $
130 small plants	48	91	1,540	491
65 large plants	44	127	1,439	459

1. Cost includes collection system and land cost and maintenance of the collection system (Gordon et al. p. 40-41, 2002).

Comparing Alternatives to Advanced Treatment to Advanced Treatment Estimates

Since some advanced treatment may be required, the future cost will lie between the alternative scenarios estimate and the advanced treatment estimate. Based on the assumption used by the Devinny study, future costs for the Los Angeles area appear to hinge on the ability to reduce stormwater runoff volumes and on the ability to control pollutants through source control.

Significance of Future Compliance Cost Estimates

The range of cost estimates presented for the Los Angeles area should not be used for other areas of California. TMDL compliance, and thus ultimate permit compliance, is only addressed for certain pollutant types in the Los Angeles area. TMDL implementation plans will vary in complexity, pollutant being addressed, other non-stormwater sources, and watershed size. Some watersheds may not have a TMDL. Determining future cost for other California communities is a case-by-case exercise.

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Alternative Approaches to Stormwater Quality Control

Prepared for the Los Angeles Regional Water Quality Control Board

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EXECUTIVE SUMMARY

Background

A recent, widely debated study entitled *An Economic Impact Evaluation of Proposed Storm Water Treatment for Los Angeles County* projects extremely high costs for compliance with stormwater quality regulations (Gordon et al., 2002). These estimates followed from the study's fundamental assumption that the only way to comply with water quality regulations is to capture most or all of the flow and subject it to advanced treatment, and to do so at rates equal to peak runoff rates. *In contrast, this report shows that there are far less expensive approaches available that, should they be implemented, will achieve high levels of compliance with current federal water quality standards.*

Alternatives Considered

This report reviews present federal and state regulations and regulatory policy to determine whether advanced ultrafiltration treatment of the entire runoff flow is required to meet water quality standards, or whether compliance can be achieved through the widespread adoption of the various "best management practices" (BMPs) more commonly used for runoff quality control. The work identified and analyzed alternative measures that can be employed to meet present federal and state water quality standards. Particular attention was paid to strategies that concern ground water recharge, pollutant source control, and runoff detention, capture, and BMP treatment.

The report reviews possible approaches for controlling runoff water quality in the Los Angeles Region (the jurisdiction of the Los Angles Regional Water Quality Control Board) and presents a conceptual regional plan, including rough cost estimates. The study pursued a broad approach, providing an evaluation of total costs and benefits for the region, including those for municipalities, businesses, and individuals. The objective of the study was to outline a complete solution to stormwater quality problems, i.e., the plan is intended to meet the requirements of the stormwater permit and Total Maximum Daily Loads and provide acceptable water quality for the area. The alternatives of best management practices (BMPs) for control of individual pollutants (source control), and if necessary, a regional system of wetlands and infiltration facilities to provide final treatment and groundwater replenishment were chosen. These will be much cheaper than advanced treatment plants, and will provide benefits whose value exceeds costs.

Assumptions Made for Determining Costs

Following the review of possible remedial actions for stormwater pollution, a conceptual plan for the Los Angeles Region was developed. It was predicated on the following assumptions:

Because source control is always cheaper than cleaning polluted water, efforts should begin with preventing the release of pollutants to runoff. This includes measures like litter control, improved street cleaning, improved industrial housekeeping and others. Such approaches may constitute sufficient control for runoff coming from residential areas, so that these areas will require no further action.

For new residential development, anecdotal information indicates that landscaping that captures and infiltrates the first-flush storm will be of comparable cost to traditional landscaping, and should therefore be used. For commercial construction, costs may be higher, and adequate regional facilities might be substituted.

Where non-structural BMPs will not be adequate, or where implementation is very expensive, efforts must expand to include regional wetlands and stormwater parks (multiple-use infiltration basins).

Large portions of the Los Angeles Region are already built out to various degrees, constraining available stormwater management solutions. This report assumes that 1000 square miles can be characterized as "low density", and that these regions can be served by a combination of source control, treatment wetlands, and infiltration systems. Another 1000 square miles is "high density" and can be served by source control and infiltration systems. About 50 square miles are "extremely high density" (such as downtown areas) and will require more sophisticated infiltration or treatment devices that occupy smaller areas.

Estimated Costs

Total costs for compliance with runoff water quality regulations were predicted to be between $2.8 billion (if non-structural systems are sufficient for the entire region) to between $5.7 billion and $7.4 billion (if regional treatment or infiltration systems must also be constructed throughout the entire area). It is likely that regional systems will be required for at least some, but not all, of the area, so that the final costs will be somewhere between these extremes.

- Enforcement of littering, pet waste, and chemical use ordinances is expected to cost about $9 million per year.

- Public education will cost about $5 million per year. A program to detect and prevent illicit discharges to the system will cost about $80 million per year at first, but can be reduced to much lower levels as compliance is achieved.

- Increased cleaning of storm drains will be needed if regional solutions are not used, and will cost about $27 million per year.

- Trash discharges to receiving waters can be controlled by installing screening devices on catch basins, enforcing litter laws, and improving street cleaning services. Estimates are that the immediate cost of instituting these measures will be about $600 million over the Los Angeles Region.

- During periods of low flow, runoff water should be diverted to existing wastewater treatment plants. Construction costs for this effort will be about $28 million.

- Trash control and removal of particulates and their associated pollutants can be facilitated by improved street cleaning. It is expected that this will cost $7.5 million per year more than current street cleaning programs, with a present worth of $250 million.

- On-site BMPs required for individual firms might cost about $240 million. Costs associated with compliance with the ¾-inch rule for new construction will be a modest fraction of construction costs.

- With regard to structural BMPs, total costs (regional wetlands and infiltration systems) were first estimated by determining the costs per square mile of drainage area incurred at other sites, and multiplying by the area over which they will be applied. Wetlands for the "low density" areas were estimated to cost $420,000 per square mile of drainage area, for a total cost of $420 million. Infiltration systems for the "high density" areas were estimated to cost $3.7 million per square mile of drainage, for a total cost of $3.7 billion. More sophisticated treatment BMPs (such as sediment traps and oil adsorbers) for the "extremely dense" areas were estimated to cost $33 million per square mile of drainage, for a total of $1.7 billion. Thus total new facilities costs are $5.8 billion.

- A second method for estimating structural BMP costs utilized costs per acre-foot of retention capacity as determined by the Los Angeles County Department of Public Works Sun Valley Project. Presuming that runoff from a ¾-inch storm must be captured in the low-density, high density, and extremely high density areas with runoff coefficients of 0.4, 0.6, and 1.0, costs are $53,000, $98,000, and $470,000 per acre-foot, respectively. The overall facilities cost estimate using this method is $4.0 billion.

Estimated Benefits

There are substantial benefits to the examined approaches that extend beyond the value of stormwater quality control. Reductions in pollutant releases will improve public health and neighborhood livability. Restoration of the hydrologic cycle will replenish groundwater reservoirs, reduce flood risks, and provide greenspace for recreation and wildlife habitat. It was determined that the total value of benefits from the alternatives for runoff quality control described will exceed the costs. Total benefits for the non-structural stormwater quality control programs in the Los Angeles Region are estimated at $5.6 billion. Implementation of the non-structural and regional measures throughout the Los Angeles Region would have benefits worth $18 billion.

- Reduced need for flood control is expected to save about $400 million.

- Property value increases from additional greenspace and bodies of water are expected to amount to $5 billion over the Los Angeles region.

- Additional groundwater supplies created by infiltration will have a current worth of about $7.2 billion.

- "Willingness to pay" surveys in similar circumstances suggest that the public amenity value of avoiding stormwater pollution of local bodies of water is about $2.5 billion.

- Cleaner streets are worth about $950 million.

- Improved beach tourism will bring in about $100 million.

- Preservation of the nature's services in the marine coastal zone, such as nutrient recycling and chemical maintenance of the atmosphere, is worth about $2 billion.

- Reduction of sedimentation in local harbors will save $330 million.

- Improvements in public health associated with reduced exposure to fine particles from streets are likely significant, but could not be quantified.

Recommendations for Immediate Action

Municipalities that have the responsibility for meeting runoff quality regulations should take some immediate steps.

- Outreach programs, explaining to citizens the need for runoff quality control and discouraging illegal discharges such as littering, should begin.

- Data should be collected on the stormwater discharges from subwatersheds to determine what BMPs are workable, and general plans should be updated to include policies that promote stormwater control.

- An administrative structure should be established which includes the relevant stakeholders and funding agencies for each watershed (such as watershed councils).

- Funding plans should be developed.

- Building codes that work against runoff quality control should be changed immediately—in particular, all parking lots built from now on should also be stormwater infiltration systems.

- All new street cleaning equipment should be high-quality vacuuming systems. Appropriate agencies should be encouraged to use the latest microbiological

techniques to investigate sources of pathogenic organisms in runoff, so that mitigation efforts can be optimally designed.

INTRODUCTION

This report identifies and analyzes alternatives for control of stormwater runoff in Los Angeles County. A recent, widely debated study entitled, *An Economic Impact Evaluation of Proposed Storm Water Treatment for Los Angeles County* projects extremely high costs for compliance with stormwater quality regulations (Gordon et al., 2002). These estimates followed from the study's fundamental assumption that the only way to comply with water quality regulations is to capture most or all of the flow and subject it to advanced treatment, and to do so at rates equal to peak runoff rates. As this report shows, however, there are far less expensive approaches that, if implemented, can achieve high levels of compliance with current federal water quality standards.

A broad approach was taken: an evaluation was made of total costs and benefits for the region, including those for municipalities, businesses, and individuals. A complete solution to stormwater quality problems was considered—that is, the plan is intended to meet the requirements of the stormwater permit and Total Maximum Daily Load and provide acceptable water quality for the area. The recommendations for steps to be taken are not limited to the Los Angeles Regional Water Quality Control Board (LA Regional Water Board). Action by other governmental agencies will also be required. The study begins with a brief description of runoff sources and contaminants. A review of present federal and state regulations and regulatory policy to was done to determine whether advanced ultrafiltration treatment of the entire runoff flow will be required, or whether compliance can be achieved through the widespread adoption of the various "best management practices" (BMPs) more commonly used for runoff quality control. The study then identifies and analyzes alternative measures that can be employed to meet present federal and state water quality standards. Particular attention is paid to strategies that facilitate ground water recharge, source control measures, storm water detention and capture, and BMP treatment. While prevailing uncertainties make an overall cost estimate only approximate at this time, costs of specific approaches are illustrated with examples. Financial benefits, such as those regarding groundwater replenishment, more appealing beach environments, improved public health, and the creation of additional urban green space, are also addressed in the report. Clearly, water is a scarce resource in this region of the country, and economic evaluations of different management techniques for stormwater runoff must also consider the benefits of improved water quality and water supply as well as flood control. Prior to reviewing federal and state water quality regulation and policy, this study provides an overview of more general policy and regulation theory.

Runoff

The bulk of urban runoff is generated during rainfall events, and can properly be termed stormwater. This flow is extremely irregular, especially in Southern California, where most days are dry, and measurable rain occurs on average of only 32 days per year. Total rainfall in the area is modest, averaging about 16 inches per year. A large storm in this area might drop as much as three inches of rainfall in 24 hours, but this is

still much less intense than typical rainfall events in other states, such as those on the East Coast.

Even so, high flows and flooding do occur in Southern California because of the topography. Water from large watersheds drains into local rivers, and slopes are steep, so that rainfall is rapidly collected and concentrated.

Water also enters the storm drains from non-rainfall sources. Sprinklers left on overnight, car washing, and hoses used to clean sidewalks and driveways generate smaller streams sometimes called nuisance flows. These flow in the storm drain system all year, and with residual stream flows (and in a some areas, recycled wastewater), constitute dry-weather flow. The terms "stormwater" and "runoff" are often used interchangeably. However, it is important in some cases to recognize the difference—stormwater arrives suddenly in huge amounts, while nuisance flows are much smaller and run all year.

Urbanization of the landscape substantially changes the amount and composition of runoff. Because less water infiltrates (percolates) into soils, the total amount of runoff is increased. Because the water runs off pavement more rapidly, it is concentrated to make peak flows higher. Recharge of groundwater is reduced, and the shallow groundwater that feeds some streams dries up, so surface flows decrease in some areas. Surface flows may increase during dry weather in other areas because of nuisance flows from over-irrigation and car washing. In general, the storage and buffering effects of soils and groundwater reservoirs are reduced. Runoff flowing through vegetation, or entering and leaving shallow groundwater, is subject to the effects of filtration and biodegradation, which has a considerable purifying effect. Water runoff from pavement is not cleaned, and indeed is contaminated by whatever dirt and pollutants are on the pavement.

Pollutants

The cities of Southern California use "separate" systems, meaning stormwater is collected apart from the wastewater generated by toilets and showers. The wastewater enters a closed network of pipes and is carried to treatment plants. Stormwater may initially flow in underground conduits, but eventually passes to open flood control channels, rivers, and the ocean. This storm water drainage system is called a Municipal Separate Storm Sewer System (MS4). Runoff pollutants are different in nature from those in sewage. Pathogens are present, but in far smaller concentrations, as are nutrients such as phosphorus and nitrogen. There may be more petroleum hydrocarbons, dust, sediments, and settled air pollutants in runoff, but total organic content in runoff is usually much lower than in wastewater.

The pollutant load of stormwater varies greatly with location. The water contains pollutants that wash off rooftops, parking lots, industrial facilities, and the streets. Pollutants may also be discharged illegally, when individuals pour motor oil into the storm drains or industries release toxic pollutants.

Water flowing in the streets picks up trash, dust, dirt and other materials that have been deposited on the pavement. The dust includes fine particles of rubber from tire wear, settled air pollutants, trace metals from brake pads and other mechanical sources, and pet feces. Cars drip motor oil onto the pavement and the early flows of fall may carry a petroleum sheen.

Stormwater quality protection measures may be placed in three general categories. Infiltration allows percolation of the water into the ground, relying on the soil to remove pollutants from the replenishing groundwater and eliminating the discharge to runoff. Source control measures prevent the release of pollutants, so that the water is never contaminated. Treatment systems remove the pollutants from the stormwater before it reaches the ocean.

Runoff Sources and Quality

Stormwater and runoff come from a great variety of sources and carry a varied suite of pollutants. There are many approaches to the task of protecting receiving waters, and the best choice depends on stormwater source and quality. Runoff from a residential area of single-family homes, for example, is unlikely to carry industrial pollutants, but may have small amounts of oil and grease from roads, microbiological contamination from pet feces., and dissolved nutrients from fertilizers. These are readily removed by filtration in soil, so groundwater recharge, with its additional benefit of replenishing aquifers, is a good choice. Runoff from construction sites is less likely to carry harmful microorganisms, but may have heavy loads of sediment. The best choice here is to use dikes, detention ponds, and other measures to allow the sediment to settle out of the water before it is percolated to groundwater or released to storm drains. The dispersed and difficult-to-control pollutants of urban commercial areas may best be dealt with by providing regional solutions, such as parkland designed to serve simultaneously as a flood control basin, a groundwater recharge site, and a sedimentation basin for large amounts of water.

Streets

Streets, particularly those in dense commercial areas, are the most difficult source of urban runoff to manage. They receive litter, dust and dirt, air pollutant particulates, pet feces, occasional human waste, trace metals and oil from cars, various illegal discharges, and other pollutants. Because they are the first part of the stormwater collection and transport system, they receive and pass on pollutants that are carried away from parking lots, commercial establishments, and industries.

Exposed Commercial Activity

Manufacturing and other commercial activities, even those dealing with hazardous materials, have no effect on stormwater quality if the work is carried out under cover. However, for some large-scale activities, such as oil refining, this is not practical. Rain falling on machinery, materials, or contaminated surfaces can pick up pollutants. Measures can be taken to cover individual activities, or treatment systems can be installed to clean the water before release.

Construction Sites

Frequently, the first step taken in construction of new facilities is to clear the land of vegetation and pavement. The exposed soil is highly vulnerable to erosion by rainfall, and the movement of trucks and machinery can “track” soil to the adjacent streets.

Residences

Single-family homes are a source of some pollutants. Roof runoff will contain dust, bird feces and settled air pollutants. Runoff from gardens may contain pesticides

and fertilizers. Occasionally, homeowners will (illegally) dispose motor oil or paint waste into storm drains. For the most part, however, runoff from neighborhoods of single-family homes is relatively less polluted (if household toxics such as pesticides are properly used). Multiple-family residences produce many of the same pollutants, but typically have a higher ratio of rooftop and impervious surface to permeable landscaping, so that more water runs off.

Commercial Rooftops

Roof runoff from commercial facilities may be slightly polluted with air pollutant dusts, bird droppings, hydrocarbons from roof tar, and occasionally, some trace metals from rooftop machinery. The contaminants present may be very similar to those found on residential roofs, but handling the runoff may be more difficult because commercial areas have a high ratio of roof area to land area, and often have little landscaping.

Parking Lots and Landscaping

A significant fraction of urban land is devoted to parking lots. Parking lots are commonly polluted by litter, heavy metals from auto-parts and road wear, and by oil leaking from cars. Spilled food is present near establishments that sell food, and pet feces, bird droppings, and settled air pollutants will also be present, and all of these can be washed away in the runoff. Virtually all parking lots are designed for rapid drainage to the street or storm drain. Indeed, where grass or other plantings are present, these are commonly surrounded by curbs that prevent flow of the water from the lot into the soil. Many designs, in fact, promote runoff from the vegetation to the pavement.

ASSESSMENT OF REGULATORY POLICY

Overview of Policy and Regulation Theory

This report, in identifying and assessing BMPs, takes a strategic regulatory planning approach to managing stormwater runoff in Los Angeles County. Strategic regulatory planning involves a close examination of the legislative goals concerning the given policy. The ultimate end of strategic regulatory planning is to control behavior through methods that agree with legislative goals and societal values regarding the issues at hand. Thus, a strategic approach demands careful consideration first of whether enforcement is appropriate; and second, if enforcement is appropriate, to what degree should the parties involved be pressured to comply; and third, how coercive should the regulatory devices be? Compliance with existing laws and regulations, in this case the provisions of the federal Clean Water Act and state law, is a major goal of the strategic regulatory planning process.

How compliance is defined can vary markedly depending upon the actors involved and the policymaking context. In this sense "compliance" means the degree to which members of a target group conform to the directives of an agency, court, legislative body, or some other governmental agency. One way to determine whether members of a target group are in compliance with an environmental law is to monitor levels of pollution on a regular basis. We assume that the greater the number of individuals and firms that are in compliance with rules, the more likely pollution will decrease in a given locality.

When legislators pass laws, they generally expect them to be vigorously enforced and fully obeyed. Only idealists, however, actually believe that this is possible or even necessary in all cases. Political and economic factors usually force policymakers to take a more realistic approach to enforcement by setting a desired and attainable level of compliance prior to program implementation. At this stage, policymakers must consider whether 100 percent compliance is necessary. If not, they must determine what degree of compliance is needed in order to meet environmental quality goals. While the desired degree of compliance is often only a rough estimate, several factors must be kept in mind. Policymakers must take into account, for example, the extent to which members of a target group are making a “reasonable” effort to change their behavior and follow the law.

If it is either unrealistic or undesirable to aim for total compliance on the part of the target population, a clear decision rule must be formulated concerning enforcement priorities. In a policy area where polluters vary a great deal in size and how much they pollute, for example, it is commonly most prudent to concentrate enforcement efforts on the largest polluters. If firms are roughly the same size and pollute about the same amount, however, alternative guidelines for identification and discrimination must be set. For example, will businesses be selected randomly for monitoring and inspection? Is systematic enforcement, perhaps based on location, possible? Or, is self-regulation the preferable approach? The decision rule should relate to the strategic goals, resources, and motivations of all those involved. Further considerations include the legal authority

for enforcement, the resources of the enforcement agency, and the fragmentation of the enforcement agency (or agencies).

In the ex post review/revision stage, policymakers determine the effectiveness of the regulatory program after it has been implemented. Feedback and evaluation are used to assess program performance. Legislative goals are used as a guide in determining whether regulatory approaches are succeeding or failing.

If policymakers determine that the program goals are still desirable, they will continue the same course of action. If they determine that the goals are being met, they will either maintain present enforcement levels or perhaps decrease enforcement efforts. The latter decision should only be made if policymakers believe they can save time and money and feel reasonably certain that compliance rates will not suffer. Appropriate and immediate action is required, of course, if the objectives are no longer desirable or if the objectives are not being achieved. In nearly every case, the aim of policy revision will be improvement in compliance and environmental quality. According to Ingram, the implementation phase of a statutory program "should contribute toward policy improvement or the evolution toward more tractable problems for which there are more doable and agreeable responses." (1990:476) Realization of the statutory goal, therefore, is not the only way to gauge the success of program implementation.

The conceptual perspective for the selection of BMPs analyzed in this report relies on Lowi's (1964) policy classification scheme, with further elaboration by Salisbury (1968). Lowi classifies policies as distributive (non zero-sum policies in which nearly everyone benefits), redistributive (policies that approach zero-sum, in which some benefit and some lose), and regulatory (policies that also tend toward zero-sum, and in which government prescribes rules of behavior for particular groups). Salisbury added a critical dimension to Lowi's typology by identifying self-regulation policies as a fourth policy type. Self-regulation policies are frequently offered as a noncoercive alternative by sectors of society targeted for external regulation, and they are invariably non zero-sum. These policies also impose constraints upon a group, but are perceived only to increase, not decrease, the beneficial options to a particular segment of the population.

Under this classification scheme, policies are *either* self-regulatory *or* regulatory. Thus, the Lowi and Salisbury typologies suggest that regulatory policies are either noncoercive (through self-regulation) or coercive (through direct command-and-control regulation). In the real world, however, regulatory devices tend to fall at different points along a continuum of coerciveness. In other words, devices intended to control behavior tend to vary according to their restrictiveness. Non-coercive approaches (through self-regulation) occupy one end of the continuum while coercive approaches (through direct command-and-control regulation) occupy the other end.

Conceptualizing regulation in these terms provides water quality policymakers a flexible framework in which to assess alternative regulatory mechanisms. Water quality policymakers have a menu of regulatory approaches from which to choose, and careful thought must be given as to which regulatory devices are best suited to control stormwater runoff without being unnecessarily harsh. If members of the target population (e.g., citizens, small businesses, municipalities, etc.) unanimously believe that stormwater regulations and deadlines are too restrictive and unfair, they will likely ignore what they are being told to do. At the same time, if regulatory devices are too weak and not sufficiently coercive to lead to improvement in water quality, then efforts to control

stormwater runoff will fail. Water quality policymakers, therefore, must be familiar with the target population and possess considerable information before they select the most appropriate regulatory mechanisms that embody the level of coercion necessary to achieve an optimum degree of compliance.

Cost is a second dimension that characterizes regulatory mechanisms. Cost here refers to the amount of money government must spend to administer a particular regulatory approach (cost to the regulated community will be considered later). In general, the most coercive activities (e.g., imprisoning polluters) require the greatest government involvement and therefore are more expensive to administer than the least coercive activities (e.g., economic incentives). Limited government revenues obviously make this an important variable. This is especially the case in current government efforts to control stormwater pollution.

The total cost and coerciveness of the selected regulatory program represent the overall government effort necessary to attain compliance and control water pollution. Compliance can be achieved in varying degrees and is best conceptualized along a continuum ranging from avoidance to adherence. Under optimal conditions (e.g., a harmonious political environment), policymakers will be able to use the least coercive enforcement techniques (e.g., reporting by firms and municipalities and formal compliance tracking) at the least cost to achieve full compliance. The expectation is that least coercive mechanisms are always preferable to more coercive mechanisms if only because the former devices are more cost-effective. In contrast, extremely restrictive enforcement arrangements (e.g., court injunctions) will necessitate direct government involvement and thus require substantial cost. Under ideal conditions, therefore, policymakers will select regulatory devices that are the least coercive and least costly and that lead to compliant behavior.

Unfortunately for policymakers, optimal conditions are rare. Many times the conditions that do exist (e.g., a lack of agency funds or a small staff) tend to diminish the effectiveness of the least coercive approaches, often to the point where the outcomes are in danger of moving toward avoidance behavior. In order to prevent outcomes from moving in this direction, policymakers must select techniques, either singularly or in combination, that are affordable and sufficiently coercive to produce compliant behavior.

Naturally, policymaking is a dynamic process and circumstances tend to change over time. Decision makers are continuously gauging the potential impact of given conditions on regulatory mechanisms and making adjustments as they see fit. Eventually, they may be forced to adopt expensive and restrictive approaches that will result in compliant behavior in an attempt to prevent outcomes from moving toward avoidance behavior. When accurate information is available and incorporated into deliberations, policymakers usually will achieve the greatest level of compliance possible with the least effort and expense regardless of the conditions that exist at the time. This underscores the importance of obtaining the most accurate data available as changes occur over time.

In a pluralist, multi-level system like the United States, some communities may favor avoidance behavior in the face of unpopular regulations. While such situations may arise from time to time, in most cases policymakers will want their regulatory devices to achieve the highest level of compliance possible under given conditions.

Stormwater Regulation and Regulatory Intent

The federal Clean Water Act utilizes two approaches to managing water quality: technology-based requirements and national water quality standards. Section 303(d) of the Act integrates these two approaches by stipulating that states make a list of water bodies that are not attaining standards after the technology-based rules are implemented. For water bodies on this list, as well as where the U.S. Environmental Protection Agency (EPA) Administrator believes appropriate, the states are to formulate TMDLs which must account for all sources of the contaminants that forced the listing of the water bodies. Under federal law, TMDLs must account for contributions from point sources (federally permitted discharges) and pollution from nonpoint sources. The U.S. EPA must review and approve the list of contaminated waters and every TMDL. In the event that the U.S. EPA does not approve the list of impaired water bodies or a TMDL, the Agency must establish them for the state. (www.swrcb.ca.gov/tmdl/background.html, July 15, 2003)

The Clean Water Act does not specifically require the adoption of TMDLs. Instead, Section 303(d), Section 303(e), and their provisions stipulate TMDLs be included in water quality plans. The U.S. EPA has adopted rules (40 CFR 122) requiring that the National Pollutant Discharge Elimination System (NPDES) permits be modified to be consistent with all approved TMDLs. An NPDES permit outlines specific limits of pollution for a particular discharger. Nearly all the states, including California, are permitted to administer the NPDES permit program. (U.S. EPA administers the permit system in the remaining states.) Implementation plans are to be formulated along with the TMDLs.

California Law

California effectuates the provisions under the Clean Water Act principally through institutions and procedures set out in certain provisions of the California Water Code, including those of the California Porter-Cologne Water Quality Control Act. These provisions established the State Water Resources Control Board (SWRCB) within the California Environmental Protection Agency to develop and implement state policy for water quality control.

The Porter-Cologne Act also established nine California Regional Water Quality Control Boards that operate under the authority of the SWRCB. Each Regional Board is comprised of nine members and an executive officer appointed by the members of each board. The Regional Boards develop and adopt water quality control plans for all areas within their region. The SWRCB formulates, adopts, and revises general procedures for the development, adoption, and execution of water quality plans by the Regional Boards. It reviews these plans and either approves them or returns them for revision and resubmission. Water quality plans do not become effective until the SWRCB endorses the plans, followed by approval by the California Office of Administrative Law.

The Evolution of Water Pollution Control

During the 1970s, policymakers considered point source pollution to be the biggest threat to the water quality of the nation's inland lakes, rivers, and streams. (www.swrcb.ca.gov/tmdl/background.html, July 15, 2003) The Clean Water Act established a number of programs to address point sources of pollution, and most federal money went to formulate and implement point source controls. California pursued the same approach in its effort to improve the state's water quality. In addition, the State and

Regional Boards implement smaller scale corrective actions for nonpoint source pollution as permitted under the Porter-Cologne Act.

A major goal of the Clean Water Act was to expand treatment of wastewaters. According to Rosenbaum (2002), all treatment plants in operation before July 1, 1977 were required to have "secondary treatment" levels. All treatment facilities, regardless of age, were required to have "the best practicable treatment technology" by July 1, 1983. The Act also appropriated 18 billion dollars between 1973 and 1975 to assist local communities in building necessary wastewater treatment facilities. The federal government paid for 75 percent of the capital cost for building the new facilities. Programs focusing on treatment facilities resulted in significant improvements in water quality by the late 1980s.

Concerns over the nation's water quality arose again due to the growing impacts of nonpoint source pollution, and environmental groups looked to the TMDL requirements to ameliorate continuing water quality problems. A series of lawsuits ensued to force regulators to adopt an aggressive approach to TMDL development. Thus far, over 40 lawsuits have been filed throughout the nation, most of them by environmental groups. (www.swrcb.ca.gov/tmdl/background.html, July 15, 2003) The lawsuits are commonly filed against the U.S. EPA due to its responsibility to approve TMDLs. Several of them have led to negotiated settlements and consent decrees that are overseen by the courts. At present, California is operating under three consent decrees covering most of the North Coast Region, the entire Los Angeles Region, and Newport Bay and its tributaries in the Santa Ana Region.

TMDLs in California are established either by the Regional Boards or by the U.S. EPA. Those established by the Regional Boards are designed as Basin Plan amendments and include implementation rules. Those formulated by the U.S. EPA normally contain the total waste load allocations as required by Section 303(d), but do not include extensive implementation rules, primarily because U.S. EPA implementation of nonpoint source pollution control strategies are generally confined to education and outreach in accordance with CWA Section 319. (www.swrcb.ca.gov/tmdl/background.html, July 15, 2003) Presently, TMDLs are required for all waters and pollutants on the 303(d) list and must consider and include allocations to both point sources and nonpoint sources of contaminants. The limitations in a TMDL may be other than "daily load" limits. There also can be multiple TMDLs on a specific body of water, or there can be one TMDL that focuses on many contaminants. Current examples of TMDLs in the Los Angeles Region include the trash TMDLs for the Ballona Creek and Wetland, Los Angeles River Watershed, and East Fork San Gabriel River, and the wet-weather bacteria TMDL for the Santa Monica Bay Beaches. At this time the Section 303(d) list contains over 1,400 water body/pollutant combinations. Based on this list, the State Board estimates that about 800 TMDLs are needed. The Regional Boards are now developing over 120 TMDLs, with several addressing multiple pollutants.
(www.swrcb.ca.gov/tmdl/background.html, July 15, 2003)

Concerns over implementation have become a significant issue in the formulation of TMDLs. (www.swrcb.ca.gov/tmdl/background.html, July 15, 2003) Although these concerns generally fall outside the provisions of Section 303(d), they are nevertheless important to achieving water quality improvements as a result of the establishment of TMDLs. While it is possible to conduct technical assessments of total load without

considering implementation issues, one must address the possible mechanisms by which pollution can be reduced in determining allocations to various sources. Considering different implementation options can help analysts avoid adopting allocation schemes that are far more costly than necessary or, even worse, unachievable. The TMDL strategy in California seeks to engage the public and cultivate an understanding of watershed issues. It relies on an adaptive process that matches management capabilities with scientific knowledge and information.

The Stormwater Permit

The Los Angeles Regional Water Quality Control Board (LA Regional Water Board) has adopted a NPDES permit containing waste discharge requirements for MS4 discharges within the County of Los Angeles (with the City of Long Beach excluded because it is covered under a separate MS4 permit). The main intent of the Permit is to reduce significantly the amount of various pollutants contained in stormwater runoff. The County of Los Angeles has identified seven critical industrial and commercial sources of contamination: 1. wholesale trade (scrap recycling, automobile dismantling), 2. automotive repair/parking, 3. fabricated metal products, 4. motor freight, 5. chemical and allied products, 6. automotive dealers/gasoline stations, and 7. primary metal products. The priority industrial sectors and automobile repair facilities/ gas stations (two of the commercial sectors) on the list contribute substantial concentrations of heavy metals to stormwater. Overall, the Permit is intended to establish and implement a timely, comprehensive, cost-effective stormwater pollution control program to reduce the discharge of pollutants in stormwater to the Maximum Extent Practicable (MEP) from the permitted regions in the County of Los Angeles to the waters of the U.S. subject to the jurisdiction of the Permittees and also meet water quality standards. BMPs must be identified and implemented to reduce the discharge of pollutants in stormwater to the MEP and also meet water quality standards.

The Permit has established an iterative process that allows municipalities in Los Angeles County to measure noncompliance, test alternative BMPs, and consult County and regional water quality authorities. Thus, the Permit provides a mechanism to make adjustments to the required BMPs as necessary to ensure their adequate performance. According to the U.S. EPA, "Water quality-based effluent limits for NPDES-regulated stormwater discharges that implement wasteload allocations in TMDLs *may* be expressed in the form of BMPs under specified circumstances….If BMPs alone adequately implement wasteload allocations, then additional controls are not necessary." (U.S. EPA, Memorandum, November 22, 2002, p.2)

Regulatory Mechanisms

Pollution control regulations can range from programs that prescribe very specifically what the regulated community is to do, to programs that only set goals and leave the community to find the best methods to reach the goals. Programs of the first kind are often criticized by the regulated community for lack of flexibility—the standard complaint is "This approach does not work well for our particular case. We could do this in another way and accomplish the goals for a lower price". Programs of the second kind provide flexibility, but are often criticized for vagueness: "We don't know how to do this. We are not sure what we have to do to come into compliance".

The stormwater management program is clearly of the second type, and it should be so. Stormwater quality control is an extremely complex issue, influencing, if not everything under the sun, then everything under the rain. The best means of compliance will certainly differ from city to city, depending on land uses, land prices, and a host of physical characteristics of the landscape. It is likely that, as the nation engages the problem, new approaches will be developed. Entrepreneurs will develop new devices and methods as others are tried and discarded. Strict specification of methods at this time might well eliminate approaches that are more economical and effective, so a flexible approach is best.

However, an inevitable side effect of maintaining flexibility is that the regulated community faces an unsettling level of uncertainty. Mayors and city councils faced with planning future infrastructure and future budgets are understandably uncomfortable facing mandatory water quality goals without specified means of reaching those goals. This level of uncertainty will decline as plans are developed and experience with water quality control measures accumulates.

There is a historical precedent for this approach in the program for control of air pollution in Southern California. Like stormwater pollution, it is generated by a very large number of sources with varying compositions and emissions rates. Many of the sources are difficult to monitor and regulate. Implementation of pollution controls has been accompanied by intense political controversy. Even so, air pollution control efforts have been relatively successful—pollution levels and their associated health effects have declined. While costs have been high and some high-polluting marginally profitable businesses have closed or left the area, it is also clearly true that the economy of the area has not collapsed, as some predicted. Few people would suggest that we should return to days when taking a deep breath was literally painful.

Policy Implementation

Our research indicates that the LA Regional Water Board is strongly committed to abating pollution from stormwater runoff as effectively and inexpensively as possible. The U.S. EPA supports the LA Regional Water Board's efforts to require individual municipalities in Los Angeles County to adopt necessary BMPs to control stormwater runoff. Federal and state policymakers along with environmental group leaders believe that BMPs, if widely and strategically implemented, can significantly reduce stormwater pollution and improve water quality throughout Los Angeles County. Given the proven effectiveness of BMPs in different areas of the country (and the world), the LA Regional Water Board does not envision the need to build new advanced treatment plants throughout the region, and indeed has expressed the specific intent that such plants should not be required. Advanced treatment is viewed as an absolute last resort given the huge expense it would entail and the confidence policymakers and environmental leaders have in the ability of BMPs to reduce pollution significantly and allow the region to meet federal clean water standards. The authors of this report concur with this position. Some municipal leaders in Los Angeles County have asked why they should be forced to adopt BMPs when there is a possibility that advanced wastewater treatment plants will ultimately be required. Even if advanced treatment plants are necessary in the future, which is highly unlikely, the adoption of BMPs will dramatically reduce the amount of water and the mass of pollutants these plants will treat. This will reduce pollution

treatment costs and improve the effectiveness and ability of plants to handle large volumes of water during heavy rain periods. That is, BMPs will be used as part of any program to build advanced treatment plants because the much cheaper BMPs will reduce the costs of the very expensive advanced treatment plants. Implementing BMPs now will be a good investment even in the unlikely event that an advanced treatment plant is required.

The LA Regional Water Board has focused some efforts on reducing trash in stormwater runoff, and it has adopted a "zero trash" rule to achieve this goal. The Board does not expect all communities to eliminate every single piece of trash from inclusion in stormwater runoff. Instead, the Board policy is that communities in Los Angeles County make reasonable efforts to prevent trash from entering storm drains. "Trash" is defined as materials larger than ½ cm, so municipalities can comply with this regulation by installing ½-cm screening devices on their catch basins, by enforcing litter laws already on the books and by conducting street sweeping in areas where trash tends to accumulate. Public education about littering and the installation and maintenance of catch basin devices can provide substantial progress in preventing garbage from entering storm drains.

In order to avoid a costly court battle with state water pollution policymakers, the County and City of Los Angeles have recently agreed to spend $168 million to reduce by half the amount of trash that collects in the 51-mile-long Los Angeles River (McGreevy and Weiss, 2003). In addition, the City of Los Angeles agreed to drop its lawsuit against state policymakers over the overall plan to abate polluted stormwater runoff. The agreement settles a lawsuit filed by the city and county that opposed the LA Regional Water Board's requirement to reduce trash entering the river 10 percent annually over the next 10 years. The LA Regional Water Board officials negotiated the deal, which requires the city and county to reduce rubbish going into the river and Ballona Creek 50 percent by September 2008, at which point state regulators will consider whether further rules are necessary. The agreement also provides local officials more flexibility in trying less-costly approaches of reducing trash. Environmental groups such as Heal the Bay, Santa Monica BayKeeper, and Friends of the L.A. River applauded the agreement. Rather than spend money on litigation, county and city officials will allocate funds to improve water quality.

Clearly, all communities in Los Angeles County will have to share the financial burden in helping to reduce contamination from stormwater runoff. This may require many communities to modify their budget priorities.

As long as communities make a reasonable, good faith effort to address stormwater pollution issues, it is unlikely that federal and state officials will take legal action. Thus far, this has been the case. Failure to make such an effort, however, will certainly result in legal action against violators. Moreover, environmental groups can choose to file lawsuits against federal and state officials if they do not continue to pursue polluters. Such action will lead to costly delays in meeting federal water quality standards and will likely lead to even more draconian measures given present federal and state law and previous judicial decisions.

Previous Actions by the LA Regional Water Board

The impacts on water quality and the heightened risks to public health from MS4 discharges that affect receiving waters across the U.S. and in Los Angeles County and its coastline have been well studied and documented. Accordingly, the LA Regional Water Board has taken a number of significant actions to control such discharges (LARWQCB, 2001)

In 1990, the LA Regional Water Board adopted Order No. 90-079, the Los Angeles County MS4 Permit. That permit required the Los Angeles County Flood Control District, the County of Los Angeles, and the incorporated municipalities in Los Angeles County to implement stormwater pollution controls including updating ordinances, optimizing existing pollutant controls such as street sweeping, construction site controls, and others. The Regional Board required all Permittees to adopt at least 13 specific BMPs for consistency across the County. The 1990 permit was executed on a system wide basis due to the highly interconnected storm drain system serving a population substantially larger than 100,000 residents. At this point, the region was committed to MEP standards—cleaning up stormwater to the maximum extent practicable.

On July 15, 1996 the LA Regional Water Board issued Order No. 96-054 that updated the 1990 permit. The 1996 Los Angeles County MS4 permit required model programs be formulated and implemented by the Permittees for Public Information and Public Participation, Industrial/Commercial Activities, Development Construction, Illicit Connections and Illicit Discharges, Public Agency Activities, and Development Planning. These model programs will change with time as more data on stormwater impacts are collected and become available.

On January 31, 2001 the Los Angeles County Department of Public Works formerly requested to renew their MS4 permit in the form of an ROWD for the County of Los Angeles and the incorporated cities, except the City of Long Beach. This request began the process of reissuance of the permit, which entered into its third permit term. On the same day the Los Angeles County Flood Control District submitted an ROWD. The Regional Board staff invested considerable time and effort in providing opportunities for public participation and comment. Over 30 meetings, two workshops, and many outreach activities were conducted to allow the public, Permittees, and other interested parties enough opportunity to participate in the development of permit requirements and language prior to consideration by the Regional Board for adoption. The reissued MS4 permit committed the region to meeting water quality standards based on the State Water Resources Control Board's precedential Orders.

Implementation of the MS4 permit requirements should reduce pollutants in stormwater in a cost-effective manner. The adoption of BMPs should also reduce pollutant discharges and enhance the quality of surface water.

The final steps of the regulatory process are now under way—TMDLs for the various impaired water bodies of the region are being promulgated.

Overall, it is clear that the LA Regional Water Board does not intend to require that municipalities build advanced treatment plants: indeed, they have publicly expressed the sentiment that they oppose this solution.

Implementation of Regional Solutions

A regional infiltration and BMP treatment system, in combination with source control of trash, pesticides, and trace metals, can substitute for individual site controls on land parcels within the drainage area. This could take the form of "Local Equivalent Area Drainages", implementing regional solutions that would achieve better results than the application of new source controls, which, in built up areas, will have significant effects only over the long term during which existing structures are rebuilt.

Funding for regional solutions may pose a challenge because of Proposition 13 and other restrictions on tax policy. The challenge however is not insurmountable if property-owners and voters become adequately informed and educated. Nevertheless, regional solutions may significantly shift administrative and cost burdens for water quality protection from businesses and development firms to local government.

Trading Schemes

"Cap and trade" systems, in which regulatory agencies set a cap on the amount of pollution allowable and allow trading of discharge rights within the constraints of the cap, have been successful in several fields. A group of municipalities, for example, might assign discharge rights to landowners within a watershed such that total releases meet the constraints of the TMDLs. They could then allow trading in the discharge rights, so that those who can reduce discharges at least cost are the first to do so, and the overall cost of meeting the TMDL is minimized. Municipalities themselves, as owners of parks and open space, might be able to develop regional solutions and fund them through sales of discharge rights to others.

Stormwater pollution control may be particularly amenable to this approach because the costs of control are highly site-specific. In many cases, there may be considerable economy in applying regional solutions in the best possible sites rather than controlling every site individually.

DESCRIPTION OF ALTERNATIVE APPROACHES

Infiltration

Before the City of Los Angeles was established, most of the rain that fell in the region evaporated or percolated into the soil. The groundwater was continually replenished and runoff flows were small. As population grew, impermeable surfaces such as paved roads, parking lots, and rooftops covered more and more of the land. Residences, commercial facilities, and roads were designed to shed water as rapidly as possible. Historical measurements of discharges to the Los Angeles River at Firestone Boulevard indicate that runoff has increased from 5% to 45% of rainfall. This change adversely affected stormwater quality in two ways. First it increased the amount of stormwater flow, magnifying the cost of any measures to control quality (and also requiring ever more costly flood control measures). Second, water that flowed directly to streams and the ocean no longer benefited from the purifying action of soil and vegetation, which can remove particulates through physical filtering, sequester some chemicals by adsorption, and destroy organic and biological contaminants by biodegradation.

Any program for remediation of stormwater contamination should reverse this trend, reducing the load of both water and pollutants on other parts of the system. At the same time, pollution of groundwater must be avoided. However, infiltration will benefit from the very considerable capacity of soils to filter particles, adsorb contaminants, and biodegrade organic materials. A relative estimate of the magnitude of the problem may be made by comparison with examples of leaking underground storage tanks at gasoline stations. In many cases, spills of tens or hundreds of gallons of gasoline are now being handled by "intrinsic remediation"—allowing natural biodegradation to degrade the hydrocarbons. The acceptability of this approach has been supported by extensive research. Hydrocarbon infiltration with stormwater will involve far lower concentrations of hydrocarbon, and will mostly be the higher-molecular-weight compounds that are much less mobile in soils than gasoline.

We can also compare stormwater infiltration to the effects of septic tanks. These systems infiltrate sewage that has received only a modest degree of treatment. Yet they are still in use in the Los Angeles Region, and indeed are the primary waste disposal method for 15% of households in the U.S. Groundwater contamination from septic tanks has occurred, but most are considered effective and safe waste disposal systems.

This comparison suggests that the relatively low concentrations of pollutants in common stormwater, with appropriate controls on sources of specific contaminants, will not pose a significant threat to groundwater quality.

The permeability of soils in the Los Angeles basin varies from place to place. Beneath the Whittier Narrows spreading basins, for example, sand and gravel deposits allow very high rates of infiltration. In other areas, clay-rich soils reduce rates of infiltration. However, the historically low rates of runoff indicate that infiltration is capable of handling the bulk of the rainfall in the Los Angeles Region. Many areas routinely considered as having poor infiltration rates will never the less be useful as multi-purpose infiltration systems. A soccer field, for example, can be used as an

infiltration basin at little additional cost, and will make a valuable contribution even if infiltration rates are low in comparison to those in spreading basins.

Source Control

Industrial Releases

Industrial discharges can be controlled by a vigorous program of source identification and control. Businesses have a fundamental responsibility to do their work without contaminating their neighborhoods, and in the great majority of cases can do so without significant interference with their activities.

Trash Management

Many businesses and some homeowners contribute a disproportionate amount of trash to the urban burden. Paper waste often accumulates in the parking lots of fast food outlets and strip malls, where it can wash into the street during rainstorms. Inadequate dumpsters and garbage cans are overloaded so that trash spills into the streets. Poorly covered trucks can allow trash to fly out on the streets. In addition, citizens throw trash from their cars onto the streets (it has been estimated that as much as 60% of trash on freeways by weight is cigarette butts). All of these practices are illegal, but enforcement is currently rare and weak. While perfect compliance with anti-litter laws is not expected, there could certainly be major improvements through enforcement. Much of the cost of such efforts could be recovered through fines, with the satisfying result that those causing the problem would be paying for cleaning it up.

Municipalities are responsible for the trash deposited on their streets, and most will respond by installing screens on catch basins. These are sometimes referred to as catch basin "inserts". They will have half-centimeter openings and will be designed to collect trash during periods of low or modest flow, but to bypass the flow during heavy storms or if they are clogged. This will avoid local flooding that would be caused by clogging.

Street Cleaning

Trash that escapes enforcement efforts can be collected by street cleaning before it reaches the storm drains. Enhanced street cleaning is likely to be necessary as cities install half-centimeter screens on their catch basins. Trash that is now washed out of sight (at least until it reaches the beaches) will accumulate on the screens and possibly clog them. More effective and more frequent street cleaning will reduce this problem.

A major fraction of the pollutants in stormwater runoff are adsorbed on particles—this is particularly true of trace metals and pesticides, which are significant contributors to impairment of the receiving waters. Some of this particulate matter can be removed from streets by higher-quality street vacuuming equipment, which collects the dirt much as a vacuum cleaner does. This equipment is more expensive to purchase and operate, but it would make a significant contribution to reducing chemical pollutants in stormwater.

The Port of Seattle has tested high-quality street sweepers as a cleanup method in its container storage area (FHWA, 2003). The approach was successful, removing one-third to one-half of particulates and their associated pollutants. While the equipment is somewhat more expensive than simple sweepers to purchase, operations costs are about

the same. The fine particles carry a significant portion of the pollutants, but they constitute only a small portion of the total mass of material on the streets, so their collection and disposal does not significantly increase costs. Such street cleaning may be more effective in Southern California, where the long dry season allows dust to accumulate for many months.

As explained in detail later, there would be substantial secondary benefits associated with improved street cleaning. Neighborhoods would look better, and residents would be exposed to less resuspended road dust, which dirties buildings and may have significant negative health effects.

Some investigators have also proposed street washing, using recycled water. If this were done during dry weather, and all of the dry-weather flow were being collected for treatment in wastewater treatment plants, street pollutants would be kept out of the rivers.

Pesticide Substitutions

Many of the receiving waters in the Los Angeles Region are impaired by pesticides, particularly Diazinon and Chlorpyrifos. The approach to this pollution should be the same as it has been historically for other pesticides that threatened environmental quality. None has ever been dealt with by treating contaminated waters. Those who use the pesticides should be responsible for ensuring that no water pollution results from that use. Pesticides that cannot be properly managed by appropriate use protocols such as labeling or use rules enforcement and which have an inherent tendency to persist in the environment should be banned. Pesticide controls are instituted by the state and federal governments, so additional political effort will be needed if a bans on specific compounds are required.

We presume that these pesticides are used in many cases because they are currently the most economical approach to insect control, and that substitution of another method would involve some cost. However, there are many possible alternatives, including use of more readily degraded pesticides, insect-resistant strains of plants, biological control with natural insect predators, and others. There are many examples of success with such integrated pest management (IPM), particularly at golf courses (NRDC, 1999). In some cases owners were pleased to find that costs actually declined when they switched from pesticide-dominated approaches to IPM.

Trace Metals

Trace metals enter stormwater as rain drains from industrial operations, transportation land uses, and other sources. Brake pad wear on cars produces a fine dust of copper. Zinc is released when galvanized equipment contacts the water. Trace metals in stormwater can be controlled by covering machinery and materials that release trace metals, by capturing and treating runoff from large industrial operations and transportation land uses, and by developing alternative materials for brake pads (research is currently under way on this objective).

Control of Automotive-Related Sources

Motor vehicles and related facilities are the source of many types of runoff pollutants, including hydrocarbons from oil and fuel leaks, and road wear. Vacuum street cleaning is effective in dealing with particle-bound hydrocarbons left on the street,

and infiltration can effectively deal with hydrocarbons that are transported or deposited off the street surface.

Control of Bacteria

Bacterial contamination in stormwater is typically measured as counts of "coliform" bacteria, a category that contains many species of bacteria. While very few of the coliforms cause disease, some of these species are very abundant in human waste, and so detection of the group has long been used as a marker for sewage pollution. Efforts to interrupt the fecal-oral transmission of disease have commonly taken the elimination of coliforms from water as a surrogate for judging efforts to prevent the spread of the microorganisms that do cause disease. Where coliform counts in drinking water have been reduced (in much of the industrialized world) transmission of water-borne disease has indeed been largely eliminated. Thus the use of coliform counts as a marker for disease control has been remarkably successful. In some cases, a more specific test for "fecal coliforms" is used, because the test is an indicator of contamination by warm-blooded animals, including humans. While we have always counted coliforms, the real concern is pathogens—microorganisms that can cause disease. For sewage pollution, the association between the two has been strong, and controlling coliforms has been equivalent to controlling disease. The situation for stormwater, however, may be far more complex. Because there are many non-human sources of coliforms, it is possible that the test for their presence may be positive even when no human pathogens are present.

The sources of the coliforms found in stormwater remain uncertain. Pet wastes certainly include bacteria that test positive as coliforms, but the degree to which pet wastes constitute a disease threat is uncertain. Wild mammals, such as raccoons, possums, skunks and coyotes, may contribute when their wastes are left on paved surfaces. It has been proposed that fecal matter from homeless people denied access to restrooms may be a source, but there has been no study confirming this. In less developed areas with poor soil infiltration conditions, it is likely that poorly operated septic tanks and illegal disposal of gray water are contributing to the coliform counts detected in runoff. If septic tanks are the source, strict enforcement of waste control ordinances is appropriate. If homeless people are the source, provision of restroom facilities would be far cheaper than any imaginable stormwater treatment system (as well as being more humane). If pet feces are the source, the only approach is, through public outreach and enforcement, to press people to clean up after their pets. It must be expected, however, that such an approach will not be 100% effective. The contribution of wild animals seems uncontrollable.

Because the sources and significance of the coliform counts remain uncertain, it is important that research on the topic be pursued immediately. The recent development of genetic techniques for precise and rapid identification of bacterial species now provides the tool needed to provide the information needed to develop effective policies.

Coliforms, and presumably the associated human pathogens, are substantially reduced in treatment wetlands. Infiltration of course removes them from runoff flows, and adsorption on soils and biodegradation are effective at protecting groundwater. Water storage, because it holds coliforms in an environment for which they are not adapted, and because it allows settling of particles to which they may be attached, has

some beneficial effect. Disinfection, using chlorine, chloramines, or ultraviolet light is possible, but relatively expensive.

Water Quality Control Board Rules allow for 17 exceedences of the coliform limit per year. There are about 32 days per year of significant rainfall in the region, so it has been anticipated that exceedences during the heavy winter storms will be difficult to control, and will be allowed.

Improved Enforcement

It is important that source control efforts include genuine and credible enforcement. Rules that are widely ignored, of course, will not help clean up runoff water, and a considerable fraction of runoff contaminants come from illicit discharges or disposal. Trash is an obvious example—littering is already illegal, so 100% of the trash in stormwater represents illegal release.

The Environmental Protection agency describes an example in which improved enforcement of existing law was effective (USEPA, 1999):

"…during a 12-month period, the Houston, Texas, Public Utilities Department identified 132 sources of discharges leading to Buffalo Bayou, the local drinking water source, with estimated flow rates ranging from 0.3 to 31.5 liters per second. Houston's program involved monthly sampling from bridge crossings; analysis of samples for carbonaceous biochemical oxygen demand, ammonia and nitrate nitrogen, pH, TSS, DO, temperature, fecal coliform, and chlorine residual; comparison of samples to baseline flow concentrations; weekly sampling of temperature, dissolved oxygen (DO), and fecal coliform in stream reaches suspected of contamination; boat sampling to identify the contaminating outfalls along the reach; and, finally, a land-based search to pinpoint the source. Of the flows identified during the program, 85% were due to broken or clogged wastewater lines and 10% were due to illicit connections (Glanton et al., 1992). Eight months after an illicit discharge detection and elimination program began, fecal bacteria log mean concentration was reduced from 20,000 colonies/100mL to 2,000 colonies/100ml."

Thus, in this example, a 90% reduction in bacterial contamination resulted from a careful enforcement program alone.

Detention and BMP Treatment

Stormwater Detention Basins

Many of the problems of stormwater management are associated with its very irregular rate of flow. During dry periods runoff flow rates are so low that the water can be handled by existing sanitary wastewater treatment systems. During rainstorms, the water comes so fast that municipalities have had difficulty doing anything beyond avoiding floods.

The first step toward dealing with this problem is to increase infiltration—substantial reductions in the peak flow rates are possible. The second approach is to provide storage systems that will hold water back during the peak flow periods. Detention basins will reduce peak flows, collect trash, provide quiet water for settlement of particles and their associated pollutants, and promote infiltration. Analysis of the

National BMP Database (Strecker et al., 2003) shows that detention basins infiltrate an average of 30% of the water they receive.

The primary difficulty with this approach is the shortage of available sites to construct large reservoirs. The topography of the Los Angeles area does not include any deep canyons in lower reaches of the rivers that could easily be made into reservoirs. Moreover, virtually all of the land is already occupied by other uses and would accordingly be very expensive to acquire.

This means that detention basins must be conceived as a distributed network of smaller systems, with each serving multiple uses. A useful model is the Sepulveda Dam Recreational Area, which retains water during storms to prevent downstream flooding. For the great majority of the days in the year, the basin is mostly empty, and serves as a park and a wildlife refuge.

A rough estimate of the general feasibility of a regional-park-based approach can be calculated. The City of Los Angeles currently has about 5% of its area in parks (Wolch et al., 2002) and it is reasonable to presume that at least a similar fraction is park throughout the LA Region. Thus, moving the rainfall from adjacent developed areas to the parks would constitute concentration of the flow by a factor of 20 (20 acres of land would drain to 1 acre of park). If the runoff coefficient for the developed areas is 0.5, a rainfall of ¾ inch would thus put 8 inches of water in the parks. This is less than the 24-inch depth of flooding assumed for the stormwater parks planned in the Sun Valley project, suggesting that this approach is feasible on the large scale in terms of the amount of land required.

This calculation is quite approximate: the runoff coefficient is uncertain, and several other factors are poorly known. Never the less, the calculation suggests that a joint program could simultaneously provide the region with needed parks and needed stormwater infiltration capacity.

Sanitary Treatment of Dry Weather Flows

During dry weather, small flows are present in the stormwater system as a result of overwatering of lawns, car washing, and other discharges. This modest amount of water can be collected and passed through existing wastewater treatment plants, which commonly have more than enough excess capacity for this purpose. Because the dry season in Southern California is very long, this would prevent runoff pollution of the oceans for much of the year.

Where this is done, street washing with recycled water would be possible. Collecting and treating the contaminants during dry periods would leave the streets clean for the rainstorms, when the water cannot be collected.

Treatment Wetlands

Wetlands remove many pollutants from the water that passes through them. The low flow velocities allow sediments to settle, removing particulates and any pollutants that are adsorbed on them. Algae and rooted plants absorb nitrate and phosphate as they grow. Vigorous microbiological activity degrades organic chemicals, as microbial predators consume disease organisms. These observations suggest that wetlands can be constructed to serve as treatment systems for stormwater and dry weather runoff. While this approach requires dedication of land, it has the considerable secondary benefit of providing riparian wildlife habitat and esthetic values.

A system of treatment wetlands has been designed for the San Diego Creek Watershed that drains to Newport Bay, in Orange County, California. The system will serve an area of 120 square miles, and is expected to cost in the low tens of millions of dollars. It is expected to meet the low-flow nitrogen TMDL, the phosphorus TMDL during most years, and the fecal coliform TMDL during low flows.

A similar system has been constructed to provide stormwater quality protection for the Ballona Wetlands Watershed in the City of Los Angeles.

BMP Treatment of Flows from Problem Watersheds such as Industrial Areas

If source control is not successful for some industrial areas, it may be necessary to collect the runoff water and use more sophisticated BMP treatment. These might best be constructed as private facilities serving a consortium of local industries, and funded by them for the purpose. A public/private partnership could be created, perhaps with public loan guarantees. Past experience with business improvement districts could serve as a model.

Partial Treatment in Curbside Units

Many proprietary devices have been developed for treatment of runoff as it enters curbside catch basins. These generally remove trash from the flow, and may also collect sediments. Some include adsorbants to remove hydrocarbons and trace metals. They have the disadvantage that they are designed to bypass during higher volume wet-weather flows. All require some degree of maintenance, and some are expensive to install. Trash and sediment must be removed on a regular basis, and adsorbants must be replaced when they are exhausted. Never the less, they may be useful for treatment of problem dry weather flows in specific areas, such as industrial or commercial zones.

Public Outreach and Education

Much of the pollution in runoff water arises from actions of individuals—litter is discarded in the street, for example, or pesticides are used carelessly in a residential garden. This pollutant load can be reduced by educating citizens and urging them to behave in a way that protects water quality.

An effort in Oregon, conducted by the Tillamook Bay Rural Clean Water Project, was made to educate local farmers about the steps they could take to protect local streams. This involved personal visits, tours of successful BMPs, newsletters, and presentations (USEPA, 1999). Four years after the program began, bacterial concentrations dropped 40% to 60% in Tillamook Bay and 50% to 80% in local rivers. Thus in some cases significant progress can be made at very low cost through public education.

Good Housekeeping for Municipal Operations

While the behavior of individual citizens may be difficult to control, municipalities have far more control over their own operations. Efforts can be made to avoid careless use of pesticides and fertilizers on municipal facilities. Such steps have modest, but measurable impacts. An EPA report notes (USEPA, 1999):

> "…the City of Bellevue, Washington, found that street cleaning three times a week removed about only 10% of urban runoff pollutants; catch basin cleaning

twice a year was estimated to be about 25% effective" (Pitt and Bissonnette, 1984).

Combined Approaches for Stormwater Quality Management

A general classification of rainfall receivers and appropriate methods for dealing with runoff they produce is shown in Figure 1. While the approach it describes is quite general, and other mixes of alternatives are possible, it shows one set of measures that can be used to control stormwater pollution.

Streets

The first step in reducing pollutants on streets is to restrict pollutant discharges from adjacent properties. Source control measures should prevent the release of industrial pollutants and construction sites should be managed to contain sediments. Litter laws and pet dropping collection laws should be enforced, although it must be acknowledged that it is not possible to prevent these inputs entirely. To stop litter from entering the storm drains, cities should install half-centimeter screens on their catch basins. The use of such screens will require diligent street cleaning, to ensure that the drains are not blocked during storms. In Southern California, rains mostly occur during a well-defined season, and frequently weather reports give two or three days warning of major storms. Cities should develop contingency plans for rapid-response street cleaning when storms are coming, to minimize stormwater contamination and the chances of flooding caused by clogged screens.

In some areas, where runoff water quality is relatively good, the streets themselves might be used as groundwater recharge facilities, by converting unused alleys to park/detention basins or by using permeable pavements.

It remains likely, however, that much street runoff will be of marginal quality. For the immediate future, it is also likely that a major portion of runoff from other sources will be initially discharged to streets, so that efforts to make use of stormwater as a water resource will require collection, and a degree of treatment before infiltration.

In most cases, this can be done with regional solutions. Water from storm drains can be collected in detention basins and wetlands, where sedimentation and biological activity will reduce pollutant load, and groundwater recharge can occur. The detention basins will serve as parks during the greater part of the year when water is not present, and the wetlands will double as much-needed wildlife habitat.

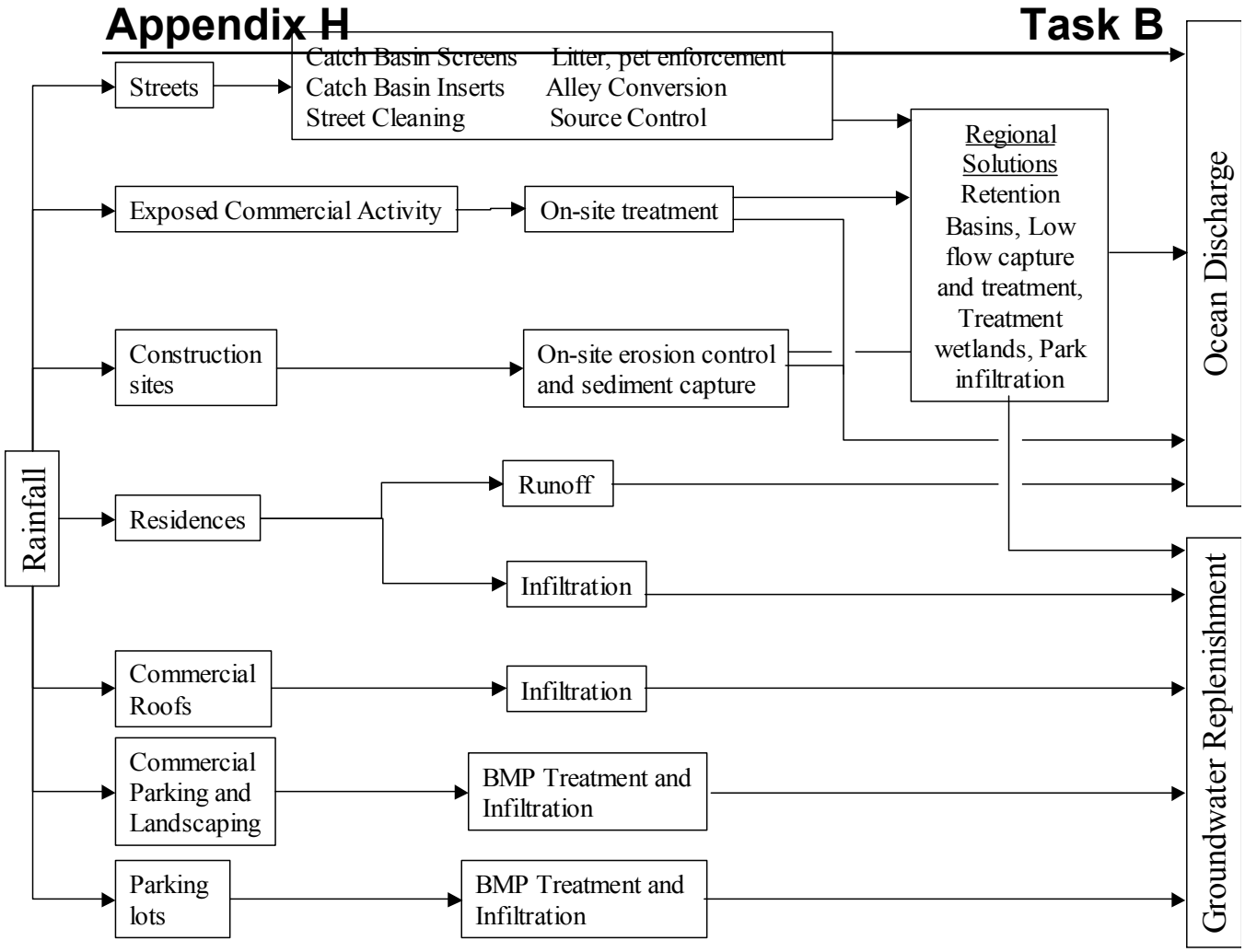

Figure 1. Stormwater quality control solutions for Southern California

Alleys for Public Use and Infiltration

Some alleys in urban areas are no longer necessary for access purposes. Indeed, many have become nuisance areas because of illicit trash disposal and criminal activity. Many of these could be gated and converted to small parks, with keys provided for local residents. They could simultaneously serve as infiltration facilities or as bioswales. There are currently 2.3 square miles of alleys in Los Angeles, for example. While many must be retained for access purposes, the fraction that could be converted could constitute a significant stormwater retention and infiltration resource. Alleys maintained for access might be candidates for partial or permeable pavements.

Similar approaches could be used for power line rights-of-way.

Exposed Commercial Activity

Very often the cheapest approach to stormwater quality control for exposed commercial activities is simply to cover them. Stormwater will thereafter come in contact only with the rooftop, and runoff will be much less polluted and more easily dealt with. However, for some large-scale activities, such as oil refining, it is not physically possible to provide a roof. For others, such as auto dismantling, the large area needed and the relatively low value of the activity may mean that a roof is not financially possible. Such facilities must be required to collect and treat runoff from their facilities, and indeed this is already being done in many cases. While there certainly are costs involved, it has generally proven possible, through a combination of better housekeeping, substitution of non-polluting materials, and simple on-site treatment processes, to solve these problems. Requirements for on-site treatment are advantageous because the cost of such treatment is borne by the business that produces the pollutant, providing incentives for conversion to less-polluting products and methods. Consequently, green manufacturing will become increasingly common.

Construction Sites

Release of sediments from construction sites can be ameliorated if the construction crew provides erosion control measures, such as maintaining vegetation or spraying exposed soil with polymer stabilizers, and an adequate on-site retention pond for rainfall, along with dikes, silt fences, and appropriate vehicle entrance construction to prevent runoff. Detention allows the sediments to settle out and the exposed soils can function effectively for groundwater recharge. It is anticipated that the costs of these measures will be small in comparison to construction costs. A more detailed list of best management practices for construction sites appears in Appendix I.

Residences

In most cases, homes and the surrounding landscaping have been designed to facilitate rapid runoff. It is necessary that water not pool in depths sufficient to flood houses, and ponding is viewed with irritation, even if it is harmless and temporary. However, single-family homes typically are surrounded with a significant area of land that could serve well for infiltration. Commonly, the land is planted or covered with

grass. The runoff from landscaping and residential rooftops typically contains only small amounts of pollutants that are readily removed by percolation through the root zone.

Landscaping for the typical single-family home could be arranged to infiltrate all of the rainfall that it receives (except, perhaps, in the most severe storms). Lawns a few inches below surrounding sidewalks could serve as infiltration ponds, gardens could receive roof runoff, and downspouts could conduct runoff to dry wells. Because the water would have had very little contact with pollutants, such infiltration would be an excellent addition to groundwater resources.

However, very few residences are arranged in this manner and, indeed, building codes often specify features that promote rapid runoff to the street. Building codes should be changed to utilize single-family homes as recharge sites. It is anticipated, however, that the effect on runoff will be seen only slowly in built-up areas as old homes are gradually replaced. Retrofit of existing homes will be expensive and politically difficult, but for new construction, single-family homes could be made to produce essentially zero discharge at little or no additional cost.

Xeriscaping—planting with native and other drought-tolerant plants—can also help to provide space for water infiltration, and it reduces watering and therefore the chance of irrigation runoff. Such landscaping also requires less fertilizer and pesticide, and so reduces incidental contamination.

In many cases, cities may be able to take interim steps to reduce runoff from homes. They have control over the "city strip" land that lies between the sidewalk and the gutter. It would be possible to institute a program of replacing the lawns after minor excavation, so that these areas would lie below the sidewalk and curb and serve as runoff detention and percolation basins.

Where infiltration is not possible, much residential runoff may be acceptable for direct discharge to the ocean, as long as it is not contaminated first by passing through polluted streets. More contaminated water can be conveyed to regional water cleanup and recharge facilities.

Low-flow Treatment in Wastewater Treatment Plants

Wastewater treatment plants are built with excess capacity in order to handle increased flow during rainy weather. While sanitary systems are designed to exclude stormwater, holes in manhole covers, leaks in piping, and illegal connections all allow the entry of some water during rainstorms. The flow is a very small portion of the rainwater, but can produce a significant increase in the much smaller sanitary flows—sometimes up to 50%. Treatment plants are designed with excess capacity to handle these peak loads.

This excess capacity can be used to treat dry weather runoff during periods when there is no rain. While these flows are not, by definition, stormwater, and indeed are governed by a separate set of regulations, dry weather runoff is often a significant contributor to impairment of receiving waters and its treatment would contribute to the objectives of stormwater control. It is also possible to use this capacity in concert with "street washing". In this approach, tank trucks filled with recycled water could be used to wash the streets, particularly in the months before the first rain of the fall. Contaminants removed from the streets and drains by the washing would be treated in the

wastewater plants, leaving the streets far cleaner when the rains came. At present, municipal street cleaning is a prohibited activity where it results in flows to the storm drain system.

This treatment approach for dry weather runoff could also treat runoff from small rainstorms.

It is likely that all of dry weather runoff could be treated for much of the Los Angeles Region. Such a step would eliminate essentially all runoff pollutants in the areas where this is possible. Because this approach uses capacity that is already in place, the cost for this alternative is low.

This approach would be particularly significant for control of coliforms. Sanitary treatment of dry weather flows would eliminate coliforms through much of the year. Rain occurs during only 32 days of the year, on average (Some of these storms are so small that the runoff could still be treated. On the other hand, untreatably high levels of runoff typically continue for a few days after a major storm). The LA Regional Water Board allows variances for 17 days of wet weather flow during the year. Thus it seems likely that dry weather runoff treatment at wastewater treatment plants, plus some degree of source control, plus the variances, will be sufficient to bring most areas into compliance with the bacteria rules. Further study, including some basic research on the sources of coliforms, is necessary to confirm this.

In considering the acceptability of this approach, it is important to note that beach use declines during wet weather, so that closures during the variance days would have a small effect on overall beach use and public health.

Capture and Use of Rooftop Runoff

In many cases, the pollutants from commercial rooftops, like those from residential roofs, could be readily removed by soil infiltration. With appropriate controls to avoid specific pollutants from commercial activities, roof runoff could be used for groundwater recharge. Designs exist for infiltration planters, in which the planter has high sides that allow it to function as a reservoir, and an open bottom that allows infiltrating water to pass into the soil. Risks of groundwater pollution could be mitigated through the use of biologically active and adsorbant soils. Commercial rooftops are commonly associated with large parking areas, which could be adapted for infiltration. Such efforts will be more difficult than those for homes, because most commercial facilities have a higher ratio of roof area to land area. In some cases it may be possible to store runoff for future irrigation use.

The Washington State Department of Ecology (2001) has developed a decision tree for dealing with downspout discharges. For lots larger than 22,000 square feet, it specifies either dispersion or infiltration systems for runoff. For smaller lots on suitable soil, infiltration systems are required. Where soils do not readily accept infiltration, surface dispersion may be appropriate. If water quality is good and infiltration and dispersal are not possible, disposal to the storm drains is accepted.

Parking Lots and Landscaping

Parking areas occupy a very large amount of land in Southern California, and accordingly represent a significant opportunity for improvement in stormwater

management. Construction costs for parking lots are far smaller per square foot than those for buildings, so that alterations are cheaper. They are reconstructed more frequently, so that requirements applying to new construction or reconstruction will propagate through the parking lot inventory much more rapidly than those for buildings.

In most cases, parking lots could serve as sites for rainwater infiltration. Trash can be collected on grates and be disposed of properly by the lot owners. The curbs around plantings (which are often necessary to avoid damage to the plants from cars) can be slotted so that water passes through them to infiltrate in the planter soils. Planted areas must be below grade, so that they collect and temporarily store water, and could be expanded, utilizing more space where cars don't actually park, such as the areas between and behind the parking bumpers. In some areas, permeable pavements could be used. Collected water could be passed to leach fields built under the parking lot.

An example of this sort of development is provided by the 6-acre parking lot of the Oregon Museum of Science and Industry (NRDC, 1999). It had originally been proposed as a traditional design, with water draining to catch basins, storm drains, and eventually the Willamette River. At the request of the Portland Bureau of Environmental Services, it was redesigned to use vegetated medians and landscaping as swales and linear wetlands. The parking lot is now able to infiltrate the water from a storm of 0.83 inches in 24 hours. Overall construction costs for the revised design were actually lower, because of the reduced costs for catch basins and drains.

Pervious pavements have also been developed so that even the space where cars are parked can be used for infiltration.

There is some concern over whether infiltration from parking lots will pollute underlying aquifers. Sediments, hydrocarbons, and trace metals are likely to be present in parking lot runoff from ordinary commercial establishments. But all of these are generally well retained on soils, particularly if the soils are selected to serve this purpose. Adsorbent materials might be added as a surface layer, to further retain hydrocarbons and trace metals.

It will be necessary to develop new guidelines for parking lots. The public and lot owners will not tolerate flooding that requires them to wade to their cars, so detention and infiltration systems will have to be carefully designed. Overflow will occur in extreme storms, and the lot and remediation areas should be designed so that the excess water flows to the street without impeding access to parked vehicles. Redesigned lots can be required for any new construction or for major renovations, but complete retrofit of all lots is likely to be too expensive for political acceptance.

This will require some additional maintenance. If adsorbants are included in the recharge areas to help control hydrocarbon infiltration, for example, these will have to be renewed from time to time. Regular trash collection will be required.

It is anticipated that most parking lots could become zero runoff areas, contributing substantially to water conservation and pollutant remediation. Further, very large parking lots, such as those at "big box" stores and shopping malls, could be reconstructed as stormwater infiltration facilities serving surrounding neighborhoods. In a cap and trade system, the lots would become financial opportunities for the retailers.

River Greening

The Los Angeles Region has become infamous for its historical conversion of rivers to concrete-lined flood control channels. While these have served the purpose of moving water rapidly to the ocean and avoiding flooding, they have also prevented infiltration in the riverbed. For this and many other reasons, advocates have proposed "greening" the river. This would involve widening the river at some points and replacing the steep concrete walls with gently sloping vegetated shores. Parks and wildlife habitat could be developed alongside the river, designed such that they would flood when the river is high. This would allow infiltration to occur, and by providing temporary storage, would decrease peak flood flows. In many areas it may be possible to replace the concrete bottoms of rivers with permeable surfaces.

The Sepulveda Dam Recreation Area is an excellent example of such a facility. It stores water during heavy rains, but serves as a park and wildlife refuge during the greater part of the year when it is not flooded. It promotes infiltration of water during rain events.

Certainly, any such modifications of the rivers must be designed carefully so that flood risk is not increased. But this is clearly possible. Indeed, increased infiltration and storage capacity along the river will reduce peak flows and therefore the frequency of floods, and reduce the associated costs.

Infiltration in Residential Streets

Many areas in Southern California are primarily residential, and runoff from these areas is only moderately polluted—it could be used for direct infiltration without treatment. In newly developed areas, homes could be designed so the runoff is near zero. However, many areas are currently already built out. In these, preventing runoff to the street would be expensive. In many cases, it may be possible to install infiltration devices in the public streets.

Infiltration in Parks

Public parks, in most cases consisting predominantly of grassy areas, are already contributing to groundwater infiltration. However, some portions still contribute to runoff, and could be regraded to collect water rather than shedding it. Indeed, many could be rebuilt to serve as groundwater infiltration systems serving surrounding areas. Playgrounds could be sunk below surrounding areas in order to collect water during rainfall events. Designs would have to include provision for infiltration at acceptable rates—water left standing for days could become a nuisance. In some areas, soil conditions might preclude this approach.

During the few days after water is collected and before it percolates, that area of the park will be unavailable for other uses. However, parks are little used during rainy weather in any case, and detention will only occur on a few days each year, so the interference will be minimal.

Public Facilities

Runoff from public facilities could be reduced by many of the measures previously discussed. Parking lots could be used for infiltration and rooftop runoff could

go to planters serving as infiltration systems. Retrofit of government facilities could begin more quickly than for individual homes, as part of the effort required to meet regulations.

PRIMARY BENEFITS OF RUNOFF QUALITY CONTROL

The immediate purpose of runoff quality control is protection of the receiving waters. In the Los Angeles Region, this refers primarily to rivers, coastal wetlands, bays, and the ocean. Many benefits are definable.

Fishing

Pollutants in stormwater can adversely affect fishing. Commercial fishing is a small and declining industry in the waters local to Southern California, but sportfishing remains a significant activity, bringing income to coastal businesses and providing recreational opportunity for many people. Cleanup of stormwater will preserve and enhance this activity by ensuring that fish are safe for consumption and by preserving fish breeding grounds in estuaries.

Swimming

Ocean swimming, as part of a visit to the beach, is a recreational activity enjoyed by millions of people each year in Southern California. It attracts tourists who contribute substantially to coastal economies. It is discouraged if trash litters the beach or if fear of disease discourages water contact. It is prevented entirely in the event of beach closures, which are a common result of polluted stormwater runoff.

Boating

Powerboats and sailboats are widely used in Southern California and represent a substantial industry in manufacture, maintenance, provision of slips, and various associated shoreside activities. Polluted waters, particularly in the form of trash, can significantly degrade the quality of the boating experience.

Noncontact Recreation and Nonconsumptive Wildlife Uses

Some recreational activities involve bodies of water without contact: sitting or bicycle riding along rivers or lake shores are examples. These activities are seriously degraded if the water produces bad odors or is littered with trash. A stormwater quality program will protect and enhance these uses.

Observation of wildlife is often a valuable part of the outdoor experience. Continuation of this activity requires water quality sufficient to support birds and animals and the plants and insects that they eat. Many migratory birds are dependent on local bodies of water for their sustenance during their yearly movements.

Reduced Illness from Contaminated Seafood

Some illnesses are transmitted through consumption of contaminated seafood. Control of the microbiological quality of runoff waters will reduce the extent of such illnesses.

Reduced Illness from Swimming in Contaminated Waters

Recent studies have indicated that people swimming near storm drains are more likely to contract waterborne diseases than those swimming far from storm drains. Microbiological control of runoff quality, particularly through sanitary treatment of dry weather flows, could reduce the incidence of these diseases.

Enhanced Esthetic Values

The trash cleanup associated with stormwater quality control will improve the appearance of our harbors, rivers, streets, and commercial establishments. Esthetic enjoyment of wildlife habitats such as wetlands, in particular, is hindered if trash is present.

Preservation of Natural Ecosystems

Polluted urban runoff damages natural ecosystems in many ways: toxic material can sicken or kill organisms, trash can choke marine mammals or birds, additional turbidity can prevent the penetration of light necessary for seaweed growth, sediment can bury habitats and prevent attachment of organisms to rocky surfaces, and nutrients can fertilize overgrowth of mosses and plankton. This damage can be prevented by stormwater quality control, and is one of the prime reasons for the program.

SECONDARY BENEFITS OF STORMWATER QUALITY CONTROL

Urban runoff comes from a huge variety of sources and contacts much of the environment around us. The efforts made to clean up runoff, which have the primary purpose of preventing water pollution in receiving waters, will have many secondary benefits and these should be included in any cost-benefit analysis. Indeed, some of these benefits are so substantial that they suggest the agencies responsible for the resources in question should also be providing financial support for runoff quality control efforts.

Groundwater Restoration

Total rainfall in the Los Angeles basin in an average year is equal to about half of the amount used for drinking water supply. It is strange indeed that we pollute this water and discharge it to the ocean even as we import ecologically, politically, and financially expensive water from the Colorado River, Northern California, and the Owens Valley. The primary difficulty in making productive use of this water is the lack of storage capacity. Rainfalls are infrequent but intense: most of the time there is no rainfall available for use, but occasionally it is so abundant that it causes flooding. Surface water reservoirs are the traditional solution to this problem—water is stored during the rainy season to prevent floods and becomes available for valuable uses the weather is dry. But there are few workable sites for large, year-round surface water reservoirs in the Los Angeles area. Groundwater aquifers, however, can also serve as water reservoirs, being drawn down in the dry season and replenished during the wet season. Infiltration will constitute a use of this storage capacity, reducing future dependence on outside sources of water and avoiding expensive alternatives like desalination of seawater. Because environmental and political factors may make increasing water imports impossible at any price, better utilization of local rainfall through the use of the groundwater reservoirs may be necessary for future growth.

Improvement of groundwater supplies within Southern California would save money now spent on imported water, and would save the concomitant external costs of the environmental impact on source areas. It would also reduce political friction with source areas. Ultimately, it may be the only economically and politically feasible method by which the water supply in Southern California can be increased, and as such, it may be the key to continued development in the area.

Flood Control

As the fraction of the Los Angeles Region occupied by impermeable surface has increased, the amount of water runoff has also increased, putting an ever-growing load on the flood control system. A recent project improved flood control for the lower Los Angeles River by increasing the height of the dikes on the channels, at a cost of about $200 million. Future increases in channel capacity would be even more expensive—not only will the walls have to be made higher, several bridges will have to be raised. Increased infiltration will reduce runoff, reducing the maintenance costs on the system and eliminating the need for further capacity increases.

The possible magnitude of the impact can be judged by considering the case of the San Gabriel Valley. Runoff from the valley is mostly captured in spreading basins in

the Whittier Narrows area and used for groundwater recharge. This makes the runoff coefficient for the valley overall 5%. In the urbanized areas of Los Angeles, the value is about 40%. Thus if the urbanized area were as well controlled as the San Gabriel Valley, runoff could decrease by a factor of eight. Flood risks would essentially disappear.

Increased Parkland and Wildlife Habitat

The regional alternatives for stormwater quality control include the development of parks and wetlands. The parks would serve as detention basins and infiltration facilities, but would be used for that purpose only during rainy periods, which comprise about 32 days per year in Southern California. During the rest of the year, these areas could serve the typical purposes for which parks are built, acting as recreational sites, playgrounds, soccer and baseball fields, and wildlife habitat. Because people are less likely to engage in these activities during rainstorms in any case, the conflict between the uses will be small. The Los Angeles area is notably short of public parks in comparison to other major cities, particularly in its poorer neighborhoods (Wolch et al., 2002). Because it is likely that residents will demand more park space in the future, the development of areas for dual use is particularly valuable. Ideally, the cost of development could be borne by both agencies intent on improving stormwater quality and by those responsible for parks and recreation. The planned redevelopment of the Corn Fields site in Los Angeles, for example, might provide a detention basin as well as the new park that is being planned.

Wetlands must be kept wet all year, but can withstand flooding during the rainy season. Thus reestablishment of these habitats, which have been largely lost in the Los Angeles Region, could simultaneously serve the purposes of wildlife restoration, flood control, and stormwater quality control. In many cases, it will be possible to develop wetlands within existing channels, reducing the need for additional land purchases.

Some of the parks and wetlands could be created as a part of river greening projects, and so would also serve the purposes of reestablishing esthetically appealing naturalistic rivers.

Improved Property Values from Trash Control

Often one of the most powerful visual cues that gives a visitor the perception of a "bad" neighborhood is the presence of trash on the streets. One approach to reducing pollutant discharge to storm drains will be improved enforcement of litter laws and additional street cleaning. These will have the secondary benefit of improving the appearance and livability of streets throughout the area. The "broken windows" campaigns of many police departments—indicating that improving the appearance of neighborhoods reduces crime—suggests that apparently cosmetic changes can have substantial benefits for neighborhoods. Certainly property values in a neighborhood with clean streets will be higher than they would if the streets are routinely littered with trash.

Reduction in Harbor Sedimentation

Sediments carried by runoff are moved because the water moves rapidly, and because small particles remain suspended in the low-salt-content chemical environment of fresh water. When runoff enters bays and harbors, however, the velocity of the water

is slowed, allowing the particles to settle to the bottom. The higher salt content of marine waters promotes flocculation of the small particles, so that most of them will also settle to the bottom. The deposited sediment fills channels, blocking the passage of ships and recreational boats, and filling areas set aside for preservation of aquatic ecosystems. Ultimately, harbor dredging is required, and frequently the collected sediment has been contaminated, so that it requires special handling. Dredging associated with storm drains in Los Angeles Harbor, for example, costs between $1 million and $3 million per year. Sedimentation in Upper Newport Bay is considered a significant threat to its function as a wildlife refuge. Stormwater quality control measures would avoid sediments discharges or remove it from the runoff, ameliorating these problems for downstream communities.

Improved Public Health

A significant portion of exposure to particulate air pollutants arises when small particles are resuspended from roadways by traffic and wind. Tire dust, settled air pollutant particles, pet feces, particles with adsorbed trace metals and trash are pounded into fine powder and lifted into the air. Such resuspension includes an ultrafine particle fraction, which is most dangerous to human health. More frequent street cleaning, particularly using vacuum bag type cleaners, would reduce public exposure to fine materials carrying trace metals, hydrocarbons, and microorganisms. Some public health improvement is likely, but its magnitude cannot be estimated.

REGIONAL PROGRAMS DESIGNED FOR STORMWATER QUALITY CONTROL

While there has been a substantial amount of work on individual facilities for runoff quality control, such as detention ponds and grassy swales, there have been only a few studies that have tried to determine the regional cost and effectiveness for a system of these "green solutions". It is important to ask whether it is possible to create an overall program within realistic constraints of land availability and costs that will bring the watershed into compliance with regulations.

We have sought descriptions of example projects that include overall costs and the area of land that drains to the facility, so that cost per square mile of area served can be calculated. In a few cases, these are area-wide systems that are the best evidence that an overall solution is possible. In others, they are single installations, for which we make the assumption that duplication is possible—ten facilities like the one described could be built to serve ten times the area. Because economies of scale are important in determining facility design and even regulatory policy, we have taken special interest in some sources that describe how the size of the drainage area (and the necessary BMP treatment facility) affects cost per square mile. Finally, we have included examples that have actually been built and tested, and others that have only been designed. While data for the latter may be less reliable, most systems perform as designed, and these designed-but-not-built systems provide some of the most useful results.

The chosen examples are described briefly below, and listed in Table 2. Results useful for determining the relationship between facility size and cost per square mile are plotted in Figures 2 and 3.

Area-Wide Systems

Sun Valley

The Sun Valley project was funded by Los Angeles County to develop an alternative approach for flood control and runoff quality management for the Sun Valley district. This is an urbanized area with considerable industrial development that currently does not have storm drains. It is consequently frequently plagued with flooding. The project was undertaken to determine whether there was an approach to flood control other than simply building storm drains.

Four alternative plans were produced, designed to maximize infiltration, to maximize water conservation and wildlife habitat, to maximize stormwater reuse by industry, and emphasizing conveyence to traditional storm drains. Notably, an alternative that maximized the use of onsite BMPs was rejected as too expensive. The components of the plans included industrial reuse, infiltration basins in parks, tree planting and mulching, infiltration in parking lots, and infiltration in vaults beneath the streets.

Because the emphasis of this project was flood control rather than water quality control, the hydraulic control objectives were quite stringent: the system was designed to collect and infiltrate all of the water produced by a 50-year, 96 hour storm. This means that the runoff from the area, if the project is built, will be reduced to near zero. Thus, this project, which includes flood control and water quality control, constitutes an "upper

bound" estimate on the costs for water quality control. Achieving such complete collection and infiltration would certainly substantially exceed water quality goals, and costs for a stormwater quality control system in an area with storm drains already in place would certainly be lower.

San Diego Creek

A project supported by the Irvine Ranch Water District and Orange County and performed by Geosyntec Consultants has developed a plan for natural treatment systems—wetlands and stormwater detention ponds—for the San Diego Creek watershed. This watershed occupies 120 square miles of developed land that drains into Newport Bay. Newport Bay has been designated as impaired, requiring that stormwater discharges be cleaned up.

Geosyntec proposed a plan consisting of 44 facilities, including ponds and wetlands constructed within existing drainage channels or built outside. These are typically facilities with both deeper open water and shallow water supporting emergent vegetation (such as cattails).

Water quality improvements expected from the system are described in the report (Strecker et al., 2002): "The NTS Plan is estimated to achieve total nitrogen (TN) TMDL for base flows and reduce in-stream TN concentration below current standards at most locations. Total phosphorous TMDL targets would be met in all but the wettest years. The fecal coliform TMDL would be met during the dry season, but not all wet season base flow conditions, and not under storm conditions. The NTS Plan is not designed to meet the sediment TMDL, but would capture, on average, about 1,9000 tons/yr (1,724,000 kg/yr) of sediment from urban areas. The wetlands are estimated to remove 11% of the total copper and lead, and 18% of the total zinc in storm runoff. The NTS provides a cost-effective alternative to routing dry-weather flows to the sanitary treatment system."

While final budget numbers were not provided, it was anticipated that the first 13 treatment sites would be constructed for $12 million, and that the overall cost would be substantially less that the $60 million anticipated for low-flow sanitary treatment. This value is listed as the upper bound of cost in Table 2. For comparison of cost vs. unit drainage area size, it was presumed that the average area served by each of the 44 facilities was 120 $mi^2/44 = 2.7\ mi^2$.

Constructed wetlands will collect any trash that enters the storm drain, and should be effective at reducing concentrations of coliform organisms, hydrocarbons, particles, and the suite of pollutants associated with particles. They may constitute a complete control system if they are combined with vigorous source control for metals and pesticides and storm drain screens to minimize the trash loading.

Murray City, Utah, Golf Course and Wetlands

Officials in Murray City recognized an opportunity when the interstate highway I-215 was being built. They agreed to take soil from the excavation and runoff water from the freeway to make a golf course. The links, with an associated string of settling ponds, accept and treat all of the drain water from the eastbound lanes of 4.5 miles of the freeway (NRDC, 1999; Hill, 2003). The golf course has been a commercial success, and now produces $900,000 in revenue against $450,000 in operating and maintenance costs each year. The city has created other treatment wetlands for essentially all of the runoff

from the City and from the westbound lanes of the freeway. The total cost of these wetlands has been less than $1,000,000. Overall, if the golf course infiltration system and the other wetlands are considered as a single stormwater control system, it pays for itself. Because this is an unusual circumstance, for calculation we ignored the income from the golf course, and presume the wetlands cost $1,000,000 and serve the area of Murray City, which is 9.5 mi^2.

Fresno Metropolitan Flood Control District

The Fresno Metropolitan Flood Control District serves the area including and surrounding the city of Fresno. It operates 130 infiltration basins that drain a region of about 120 square miles devoted to agriculture, residential areas, and urban landscape (NRDC, 1999; Pomaville, 2003). Some of the basins are turfed and serve as parks, while others are bare and serve seasonal infiltration needs. The basins succeed in infiltrating 80% to 90% of the stormwater in their drainage areas, and only 2% enters a receiving water without receiving some degree of treatment. To protect groundwater, the District also instituted a program of industrial inspections. While monitoring is still done to check for pollution of the San Joaquin River, the District anticipates no additional infrastructure will be necessary to meet water quality control regulations. For calculations, the unit area for each basin was assumed to be 1 mi^2.

Individual Systems

Long Lake Retrofit, Littleton, Massachusetts

Geosyntec Consultants also designed a low-impact-development program for Littleton, Massachusetts (Roy et al., 2003). The 1.5-square-mile watershed that contains the town drains into Long Lake, which has been subject to eutrophication and other water quality problems associated with urban runoff. The storm drain system collects water at 200 catch basins and releases it to the lake through 18 outfalls. The plan for mitigation of the problem includes a treatment wetland, grass and vegetated swales, bioretention cells (swales with underdrains), rain gardens, rain barrels, and an outreach program to promote source control for fertilizers.

The total budget for the project is estimated at $630,000, or $420,000 per square mile.

Tule Pond, Alameda, California

The Tule Ponds project is a group of three treatment wetlands that was constructed using information developed in the Demonstration Urban Storm Water Treatment Marsh in the early 1980s. It receives urban runoff, passing it through the three ponds in series and discharging it to an existing natural pond. It serves a drainage area of 0.8 square miles and cost $360,000, for a cost of $450,000 per square mile.

Treasure lsland, San Francisco Bay

Treasure Island is an artificial island of 403 acres in San Francisco Bay that was used for many years as a Navy base. It has recently been converted to residential use. A treatment wetland is planned as the means for stormwater quality control. It is anticipated that wetland construction will cost $800,000 to $ 1,100,000 (Bachand, 2003), or $1.2 million to $1.7 million per square mile. However, the island is a tourist destination, and it has been estimated that the increase in visitor spending associated with

the wetland could be $4 million to $11 million (Fine, 2003). It was also estimated that the overall value of the project could be twice these values.

Herrerra Study of Stormwater Regulations Costs

As a part of the effort to determine the costs of complying with stormwater regulations in Western Washington, Herrerra Environmental Consultants (2001) prepared designs for typical projects needed to contain and treat stormwater on site in small projects of new construction. In both cases, the systems were planned for a 1.7-inch rainfall. The first hypothetical project was a ten-acre residential development with 40 individual home sites. It was presumed that runoff from the homes would be collected in a detention pond. Construction of the permanent facilities was determined to cost $240,000 to $230,000, depending on the quality of soils. This is about $15 million per square mile.

The second hypothetical site was a restaurant built on a one-acre site, with the area not occupied by the building used as a parking lot. Runoff was to be collected in subsurface infiltration vaults. Costs were determined to be $280,000 or $570,000, depending on the permeability of the soil, or $175 million to $356 million.

Dover Mall, Delaware

The Dover Mall has 30 acres of parking lot or otherwise impermeable surface. Runoff drains to a wetland that is sized to retain a 1-inch rainfall (NRDC, 1999). It includes a forebay that allows containment of exceptional spills. The total project cost was $171,000 (although much of this was defrayed by in-kind donations). The wetland is considered a considerable esthetic resource. The cost was $3.5 million per square mile.

Oakland Park Industrial Area, Florida

A BMP treatment system was developed for five acres of Oakland Park that included auto repair shops, paint shops and plating facilities. A short treatment train was developed, including a trash removal basin and absorbent media. The system cost $261,000, and was successful in removing 71% to 95% of oil and grease, along with all trash and most sediment. Costs were $33 million per square mile of drainage.

Clear Lake Packed Bed Wetland Filter System

Clear Lake, in Orlando, Florida, receives runoff water from 121 acres of nearby urban land and water quality in the lake has deteriorated significantly as a result of pollution. Packed beds, consisting of 10 filter beds composed of crushed concrete or granite media with growing aquatic plants, allow removal of sediments and nutrients. An initial wet detention pond is used to contain the first flush. The system cost $917,646. In calculations, the system was considered a single installation treating 121 acres of drainage. Costs were $4.6 million per square mile.

Sand Filters in Alexandria, Virginia

Two sand filters were built to treat runoff from an airport parking lot near National Airport in Alexandria, Virginia. The area drained was 1.95 acres, and the filters cost $40,000. While some initial problems with anaerobic conditions were encountered, the filters eventually achieved good treatment. The cost, calculated from the data reported by FHWA (2003), was $12.9 million per square mile.

Compost Filter Facility, Hillsboro, Oregon

A compost filter was constructed to decontaminate water upstream of a grassy swale. The treatment train received water from a five-lane highway, draining a total area of 74 acres. The 1200-square-foot filter contained 120 cubic yards of compost and was constructed and filled for $13,700. The cost, not including the swale, was thus $110,000 per square mile of drainage area.

Infiltration Trenches

The Federal Highway Administration (FHWA 2003) has estimated the costs for constructing infiltration trenches as $C_A = 1317 \times V^{(0.63)}$ where C is the cost in dollars and V is the volume in cubic meters. Calculations for this report are made assuming the need to provide detention for a ¾-inch storm. For one square mile (2.6×10^6 m^2), a ¾-in rainstorm will produce 5×10^4 m^3 of water. The cost per square mile is equal to the cost for each trench divided by the drainage area it serves, or $C_{mi2} = C_A/A = (1/A) \times 1317 \times V^{(0.63)} = 1.2 \times 10^6 \times A^{(-0.37)}$. The total cost for these systems thus declines as each system becomes larger—there are economies of scale. Costs for land are not included, but it is likely that trenches could be installed in land also used for other purposes. In some cases it might be necessary to collect more than ¾ inch of rain. On the other hand, the calculation assumes that no infiltration occurs in the trench during the storm. Also, this presumes that the runoff coefficient for the area served is 1.0—thus the typical systems described could treat a ¾-inch storm on totally impervious area or a 1.5-inch storm on an area with a runoff coefficient of 0.5, which is a commonly observed value. Thus the total seems a reasonable approximation.

Infiltration Basins

The Federal Highway Administration (FHWA 2003) has estimated costs for construction of open infiltration basins (dry basins) as $C = (V/0.02832)^{(0.69)}$, where C is the cost in dollars and V is the volume in cubic meters. As for the infiltration trenches, it is assumed the basins will be designed to treat a ¾-inch storm in an impervious drainage. Thus the cost per square mile is $C_{mi2} = C_A/A = (1/A) \times (V/0.02832)^{(0.69)} = 204{,}000 \times A^{(-0.31)}$. Costs for land are not included, and would be substantial. However, the basins could be used for other purposes for much of the year. Again, the systems assumed could treat a 1.5-inch storm in a drainage area with a runoff coefficient of 0.5.

Bioretention Areas

Stormwater can be collected in areas filled with highly permeable soils and planted with trees and other vegetation. Water that infiltrates is filtered by contact with the soils and may continue to move downward to replenish the groundwater. Much of it will also be taken up by the vegetation and returned to the atmosphere through evapotranspiration. The FHWA (2003) cost estimate for these bioretention areas is $10,000 per impervious acre, or $6.2 million per square mile of impervious watershed. Bioretention areas can readily serve multiple purposes as wildlife habitat and parks.

Detention and Retention Wetlands

The Federal Highway Commission Report (FHWA, 2003) has provided a general formula describing the cost of detention ponds as a function of size. Costs were estimated as $C_A = 168\times V^{(0.699)}$, where C_A is the cost in dollars and V is the volume of the pond in cubic meters. The cost per square mile is $C_{mi2} = C_A/A = (1/A) \times 168 \times V^{(0.699)} =$

$324{,}000 \times A^{(-0.301)}$. Land costs are not included, but these areas can serve other purposes during the larger part of the year when the weather is dry—they can be parks, wildlife areas, and playing fields.

Detention Vaults

In highly urbanized areas, water can be detained in underground vaults, which may be made of concrete or of corrugated steel pipe. Such systems primarily store water to avoid flooding or excessive hydraulic load on downstream systems, but some sedimentation may occur. This provides marginal treatment, but also requires that the vaults be cleaned out on a regular basis. The FHWA estimate for costs of such systems is $C = 38.1 \times (V/0.02832)^{(0.6816)}$. Cost per square mile of drainage area is $C_{mi2} = (1/A) \times 38.1 \times (V/0.02832)^{(0.6816)} = 690{,}000 \times A^{(-0.3184)}$.

Underground Sand Filters

Sand filters are quite effective at removing particulates from urban stormwater, and are commonly employed upstream of other systems in order to protect them from excessive sedimentation. They can be installed underground in densely urban areas, but are correspondingly expensive. The FHWA estimate for such systems is $10,000 to $14,000 per impervious acre served, or $8.7 million per square mile. Here we have chosen the upper estimate because costs are likely to be high in the Los Angeles area.

Surface Sand Filters

Sand filters may also be constructed at the surface, which reduces their cost. However, they occupy a relative large amount of land area, and cannot contribute to a secondary use. There are strong economies of scale. For facilities serving more than 5 impervious acres, the FHWA estimate of cost is $3,400 per acre or $2.1 million per square mile.

Dry Swales and Filter Strips

A vegetated dry swale is an area of land shaped so that stormwater flows through it in a broad, relative flat stream. Flow through the grass removes sediments from the water. At the same time, significant amounts of infiltration may occur. It may be necessary to prepare the soils to maximize infiltration before the grass is planted. Swales can be used for other purposes during the periods when it is not raining. The FHWA estimate of construction costs for swales is $1500 per impervious acre, or $930,000 per square mile.

Filter strips are similar installations, in which the water flows as a flat sheet. The FHWA estimate of constructions costs for filter strips is $2000 per acre or $1,240,000 per square mile.

Results from the ASCE-EPA BMP Database

A cooperative effort of the American Society of Civil Engineers and the U.S. Environmental Protection Agency has compiled data on the success of best management practices. Data were carefully vetted, put as much as possible in common format, and arranged so that they could be searched according to several parameters. Several searches of the database were done to gather data for this study.

A search for dry detention basins, serving watersheds of 0-100,000 acres, with 0-30 in annual rainfall, produced 17 responses, of which only four included cost data. All

of the four were associated with freeways and served small watersheds of 1-14 acres. This may be the reason why costs were exceptionally high.

A search for wetlands, serving watersheds of 0-100,000 acres, with 0-30 in annual rainfall, produced 10 responses, only one of which included cost data. Costs for this facility were exceptionally low. It was described as a "natural" wetland, perhaps implying that much of the system was already in place before construction was done.

A search for wetlands, draining 0-100,000 acres, with 0-30 in annual rainfall, produced 9 responses, including 6 with cost data. These also served very small watersheds, and costs per square mile were very high.

A search for hydrodynamic devices serving 0-100,000 acres, in areas of 0-30 in annual rainfall, produced 12 responses, including 8 with cost data. Costs ranged from $344,000 per square mile to $86 million per square mile, showing very strong economies of scale.

A search for grassy swales serving 0-100,000 acres, in areas of 0-30 in rainfall, produced 26 responses, including 7 with cost data. The cost per square mile ranged from $12 million to $341 million, and showed strong economies of scale. This was a surprising result—grassy swales are very simple and cheaply constructed systems—but it reflects the fact that each installation serves only very small areas.

ESTIMATES OF COSTS AND RECOMMENDED APPROACH

Ultimately, stormwater pollution is a symptom of two anthropogenic changes: we are releasing pollutants into our local environment, and we have disrupted the hydrologic cycle of the Los Angeles Region by covering the soil with impervious surfaces. These changes have other symptoms as well. Local pollution impairs health, damages the esthetic quality of life, and reduces property values. Reducing infiltration increases runoff rates and the risk of flooding, and at the same time, reduces recharge of groundwater resources. Finally, impervious surfaces cannot support vegetation, and we suffer the loss of natural habitat, recreational areas, and aesthetic value of green space.

Cost Estimates

The solution proposed in the report by Gordon et al. (2002)—advanced treatment plants to clean up stormwater after it has entered the storm drains—constitutes treatment of a single symptom without correction of the fundamental problem. It is expensive, and has little benefit beyond the single objective of protecting receiving waters. A more fundamental approach—eliminating pollutant releases and restoring the hydrologic cycle—is cheaper. Further, because it will mitigate all of the effects of pollution and hydrologic disruption, it will have benefits whose value exceeds the costs.

While a rudimentary cost-benefit analysis is attempted here, the limitations of such an approach should be kept in mind. Many costs and benefits are difficult to evaluate—the psychological benefit to citizens who live on a clean street rather than a trashy one, for example, or the long term effects on local business of a general perception of regulatory burdens. In past cost-benefit analyses, it has been common that costs and benefits that are difficult to measure have been assumed to be zero, certainly producing misleading results. It remains true that two good-faith investigators can produce quite different cost-benefit results, especially for a complex problem like stormwater quality control. Assumptions may depend greatly on the value system of the investigators. A recent cost-benefit study was criticized, for example, because it put a lower value on the lives of elderly persons. This is reasonable in the sense that the death of and older person represents fewer years of life lost, and less loss of earnings, and it is a common presumption in cost-benefit studies. However, there was outrage among those who felt that this approach was offensive to the elderly and the general principle that we all have equal rights.

In this particular study, because the costs and expenditures are of many different kinds, it was necessary to use a variety of estimation methods. The results are necessarily approximate, and comparisons among them must be viewed with caution. To use technical terms, contingent valuation studies are included with benefits transfer estimates, and results from various investigators are combined. We anticipate that these steps may be criticized, but we hope that we can provide a framework approach that can be improved and refined as further research is done.

Finally, cost-benefit analysis frequently ignores the issues that arise because the costs and benefits are not borne by the same parties. One might suggest that pollution should not be cleaned up if the cost of doing so exceeds the benefits of relief from the pollution. But it is commonly the case that the polluter who is saving money is not the

same person who is suffering from the effects of the pollution. Does your neighbor have the right to throw his trash in your yard if he can show that it saves him more money than it costs you? The principle of "polluter pays" has a satisfying moral aspect and it also puts the incentives right—the parties with the ability to reduce pollution are given the motivation to find a way to do so.

For these reasons, and because in this short study the numbers are particularly only estimates, we present our cost benefit analysis with the caution that more precise and detailed assessments are desperately needed.

Cost estimates have been prepared by examining case studies. Reports were chosen where information was available for both the total cost of the system described and the land area served, or the initial stormwater retention volume, in order to calculate the cost of stormwater management per square mile of watershed. Several assumptions and caveats must be observed:

1. In the cost-per-square-mile calculations, no attempt was made to adjust costs on the basis of the amount of rainfall in the watershed. Sufficient data were generally not available for this purpose. In most cases, data came from areas where annual rainfalls are greater than in Los Angeles, and this may cause the cost estimates to be high.
2. In the cost-per-square mile calculation, the cost data were not available in a uniform format. It was not possible to calculate an accurate "present worth" including operations and maintenance costs for each case. In some cases operations and maintenance data were included, while in others they were not. In most cases operations and maintenance costs are low in comparison to installation costs, and they would be further reduced by discounting to present worth. Never the less, this may cause the cost estimates to be low.
3. Installation costs may vary depending on the slope of the land, the nature of the soils, depth to water table, local labor costs, and a wide variety of other factors that change with locality. No attempt was made to adjust the costs for these factors, and this may make the estimates high or low.
4. It is presumed that the systems described will be sufficient, in conjunction with source control efforts, to comply with water quality regulations. There was no case reported in which the quality control efforts were described as failing, or for which regulators asked for additional measures after the systems were complete. However, few data were shown for after-construction water quality, and most of the systems have not been in place for enough time to allow long-term assessment. The degree of success for source control efforts, while likely to be substantial, cannot be guaranteed.
5. Several of the projects described have been designed, but not implemented. It is assumed that they will perform as designed. In the case of the Federal Highway Administration formulas, these are regression results rather than individual case results.
6. It is likely that implementation in the Los Angeles area would involve projects that are larger than most of those listed. There likely will be economies of scale. This may cause the cost estimates to be high.

Summary of Case Study Project Costs
"I or D" refer to Implemented or Designed

Project	I or D	Description	Unit Size, square miles	Cost, $M	Cost, $M per square mile
Infiltration Systems					
Fresno Metropolitan Flood Control District Regional Infiltration Basins (NRDC, 1999; Dave Pomaville, 2003)	I	130 turfed or unturfed infiltration basins serving residential areas. Treats or infiltrates 98% of runoff over area of 120 square miles	1		2.5 to 3.7
Study of Stormwater Regulations Cost (Herrerra Environmental Consultants, 2001)	D	Hypothetical calculation of costs for new residential development	0.016	.24	15
Study of Stormwater Regulations Cost (Herrerra Environmental Consultants, 2001)	D	Hypothetical calculation of costs for new commercial development	0.0016	0.28 to 0.57	175 to 356
Wetlands					
Tule Pond, Alameda (Wetzig, 1999)	I	Stormwater treatment pond for urban runoff	0.8	0.36	0.45
Treasure Island, San Francisco Bay (NRDC, 1999: Galvanis, 2003)	D	Wetland treatment system for local runoff	0.65	0.8 to 1.1	1.2 to 1.7
Long Lake Retrofit, Littleton, Mass. (Roy et al., 2003)	I	Swales, constructed wetlands, bioretention cells, outreach	1.5	0.63	0.42
San Diego Creek Natural Treatment System Master Plan (Strecker et al., 2003)	D	Network of open-water ponds and wetlands in Newport Bay drainage, 120 square mile area	2.7	<60	<0.5
Murray City, Utah (NRDC 1999: Hill,	I	Golf course and wetlands treat runoff from 4.5 miles of I-215	9.5	1.0	0.11

2003)		and the city			
Dover Mall, Delaware, (NRDC 1999)	I	Wetland installed on mall grounds drains 30 acres of 100% impervious cover	0.048	0.17	3.5
Sun Valley Project, Los Angeles County	D	Combination of various measures for flood and quality control in L.A. Basin	4.4	172 to 297	39 to 68
BMP Treatment Processes					
Oakland Park, Fla, industrial area (NRDC 1999)	I	Oil, grease, sediment, and trash removal by sedimentation and absorbance	0.008	0.261	33
Clear Lake Packed Bed Wetland Filter System (NRDC 1999: FHWA, 2003)	I	Oil, grease, nutrients, trace metal removal for water entering Clear lake	0.2	0.92	4.6
Compost Filter Facility, Hillsboro, Or. (FHWA, 2003)	I	Oil, grease, removal and filtration for highway runoff	0.12	0.12	0.11
Alexandria, Va, airport parking lot	I	Sand filters installed along the borders of a 1.95-acre parking lot	0.003	0.04	12.9
Bioretention Areas, FHWA cost estimate	D	Areas of highly permeable soil planted with trees and other vegetation			6.2
Underground Sand Filters	D	Porous medium filters placed in underground vaults, appropriate for highly urban areas			8.7
Dry Swales	D	Broad, shallow vegetated drainways covered with vegetation, usually grass			0.93
Surface Sand Filters	D	Porous medium filters installed at the surface			2.1
Filter Strips	D	Flat vegetated drainways covered with vegetation, usually grass			1.2
Port of Seattle container area cleanup	I	High quality street sweeping with sediment trap catch basins			3.1
Cost:Area Formulas from FHWA					
Infiltration trenches, FHWA cost estimate	D	Gravel-filled trenches. Infiltration eliminates runoff discharge.	$C_{mi2} = C_A/A$ $= (1/A)\times 1317\times V^{(0.63)}$ $= 1.2\times 10^6\times A^{(-0.37)}$		

Infiltration basins, FHWA cost estimate	D	Open basins, dry at most times, store and infiltrate runoff. Infiltration eliminates runoff discharge.	$C_{mi2} = C_A/A$ $= (1/A)\times(V/0.02832)^{(0.69)}$ $= 204{,}000\times A^{(-0.31)}$		
Detention and retention wetlands, FHWA cost estimate	D	Wetlands used for treating stormwater, with storage capacity available	$C_{mi2} = C_A/A$ $= (1/A)\times 168\times V^{(0.699)}$ $= 324{,}000\times A^{(-0.301)}$		
Detention vaults, FHWA cost estimate	D	Underground reservoirs for storage of runoff to reduce peak flows	$C_{mi2} =$ $(1/A)$ $\times 38.1\times(V/0.02832)^{(0.6816)}$ $= 690{,}000\times A^{(-0.3184)}$		
Results from ASCE-EPA BMP Database					
Dry Detention Basins					
I-605/SR-91 EDB	I		0.0013	0.077	60
I-5/Manchester (East)	I		0.0077	0.33	43
I-5 SR 6	I		0.0085	0.14	17
I-75/SR-78 EDB	I		0.022	0.82	38
Wetlands					
Swift Run Wetland	I		1.95	0.049	0.025
Sand Filters					
I-5/SR-78 P&R	I		0.0013	0.22	170
Escondido MS	I		0.0013	0.45	348
Eastern Eastern Regional MS	I		0.0024	0.34	141
Foothill MS (Sand Filter)	I		0.0029	0.48	164
Termination P&R	I		0.0045	0.46	102
LaCosta P&R	I		0.0045	0.23	49
Hydrodynamic Devices					
Jensen Precast (UVA)-Phase II	I		0.00045	0.039	86
I-210/Orcas Avenue	I		0.0018	0.04	22
Jensen Precast, (Sacramento)	I		0.0032	0.062	19
I-210/Filmore Street	I		0.0040	0.05	12
Charlottesville Stormceptor	I		0.0040	0.017	4.2
Sunset Park Baffle Box	I		0.040	0.023	0.57
Indian River Lagoon CDS Unit	I		0.098	0.055	0.56
Austin Rec Center	I		0.15	0.05	0.34

OSTC					
Grassy Swales					
I-650/SR-91 Swale	I		0.00032	0.11	341
Cerrito MS	I		0.00065	0.06	93
1-605/DelAmo	I		0.0011	0.13	115
I5/I-605 Swale	I		0.0011	0.073	64
Monticello High School	I		0.0013	0.015	11
SR-78 Melrose Dr	I		0.0039	0.13	34
I-5 North of Palomar Airport Road	I		0.0074	0.14	18
I-650/SR-91 Swale	I		0.00032	0.11	341

Economies of Scale

The costs listed in Table 2 reflect the cost for an individual facility ("Cost, $M" and "Cost, $M/mi^2") and associate it with the drainage area served, referred to as the "Unit Size". The costs per square mile for the individual units can be plotted to determine the effects of unit size (Figures 1 and 2). While there is a great deal of scatter in the data, it is clear that there is considerable economy of scale. Units serving drainages of a half square mile are typically 30% more expensive that those serving 1 square mile. Those serving drainages of one-tenth square mile are twice as expensive and small installations are extremely expensive in dollars per square mile. The most notable example of this is grassy swales: while each unit is relatively inexpensive, their small service areas make them very expensive per square mile served.

For some of the BMPs there are not sufficient data to judge the economies of scale, and as described, all of the data must be taken as approximate. Never the less, it seems that there is a good case to suggest that regional systems for handling runoff water will be most economical. This is clearly true of wetlands and infiltration basins, which are likely to be the most widely used approaches in the Los Angeles Region as a whole. This supports the position that the best solution will be a wetland or an infiltration basin also serving as a park, playing filed, or wildlife habitat as the stormwater management unit for a neighborhood of a square mile or greater.

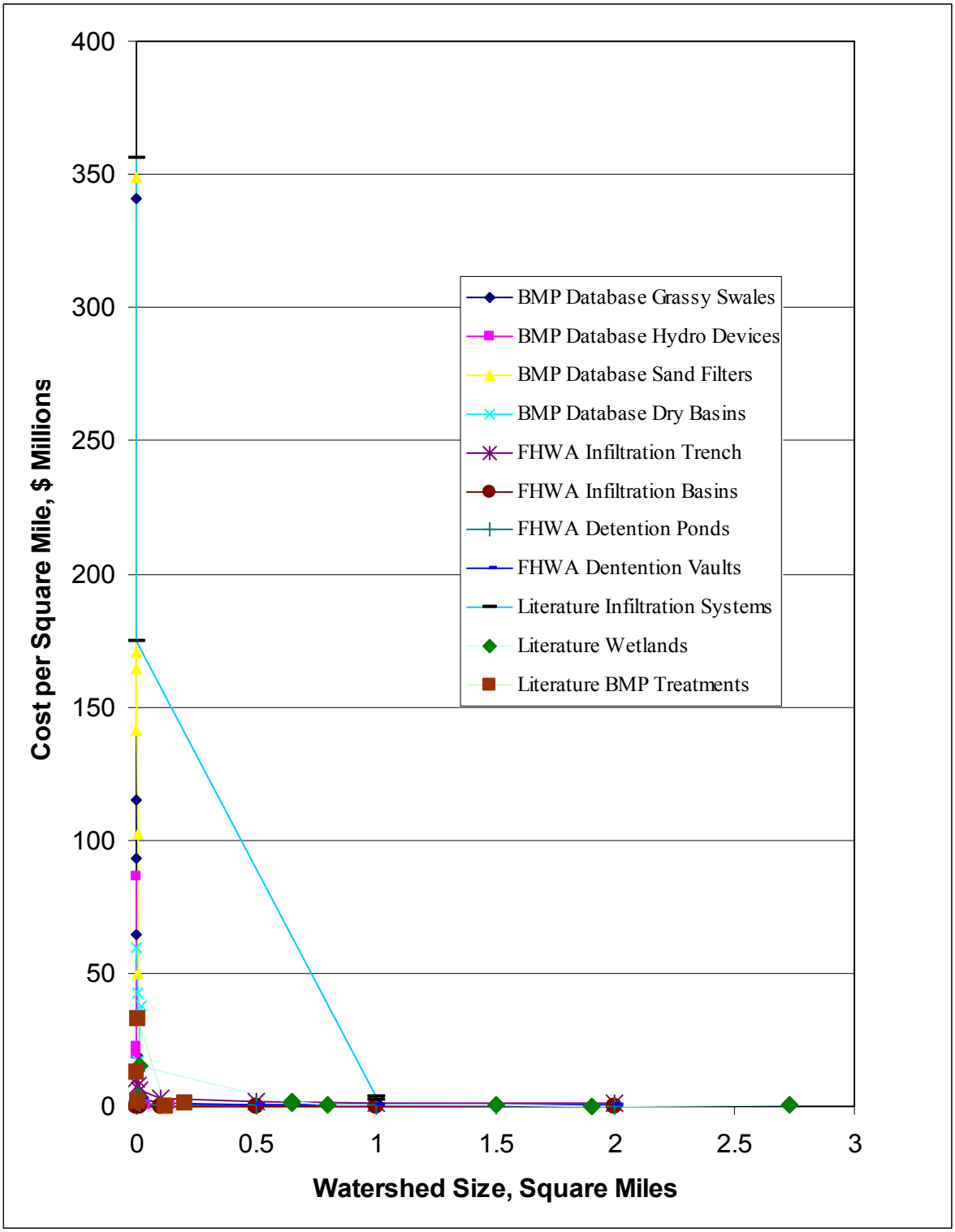

Figure 1. Plot of data for which costs per square mile and unit areas are known.

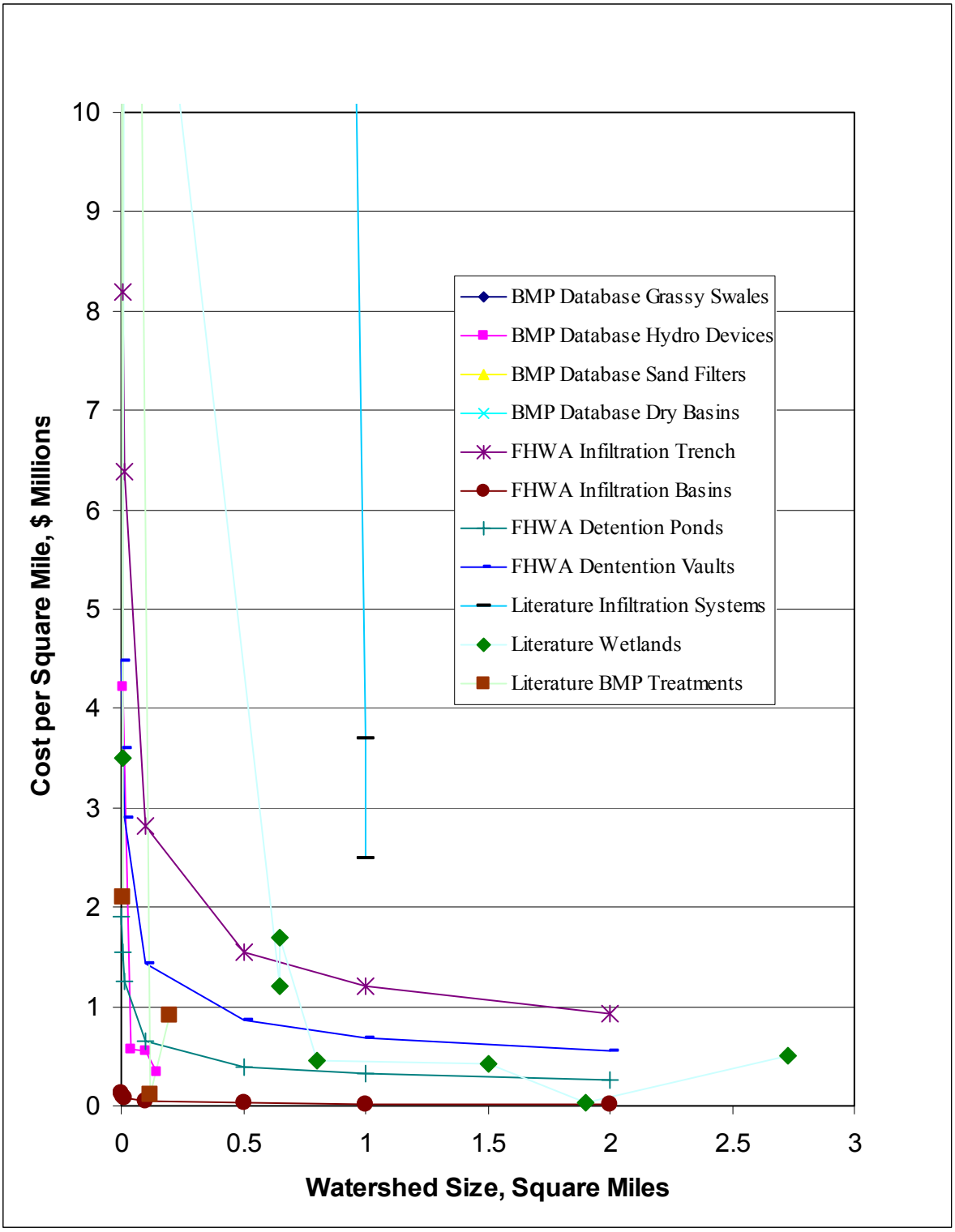

Figure 2. Cost per square mile versus unit size. Data are the same as those shown in Figure 1, but the axes have been magnified to show detail near the origin. Many data points fall outside of the plot.

Overall Costs of Stormwater Quality Control

It remains very difficult to produce an estimate of the total costs for complying with regulations in the Los Angeles Region. While there is substantial information on individual units that have been designed or implemented elsewhere, local factors are likely to make costs different in the Region. In most cases, it seems likely that costs in the Los Angeles Region will be higher than those reported elsewhere because land and labor costs are higher. Therefore, where a range of values is given, we have chosen the higher numbers.

This difficulty is compounded by the great variability in the data reported. To give just one example, the Federal Highway Administration formula estimates the cost of an infiltration basin needed to serve one square mile as $200,000. At the other extreme, the Herrerra Consultants report said that a detention/infiltration system for a residential area would cost $15 million per square mile. In preparing our total estimate, we have avoided using data that seem like outliers in comparison to the general run of the data.

The results compiled suggest two possible scenarios for stormwater quality control. The first approach is to rely on non-structural BMPs, such as programs to reduce littering, control pet waste, collect trash, prevent release of pollutants, and clean existing drains. This approach is less expensive because it involves no construction. However, there remains considerable doubt whether it will be sufficient to meet stormwater quality goals expressed as TMDLs (Total Maximum Daily Loads). Control of pollutant release will be only partial—we cannot expect that everyone will comply with the rules—and the amount of runoff will be reduced only slightly.

The second scenario presumes implementation of non-structural BMPs (except storm drain cleaning) and construction of a network of wetlands and infiltration basins sufficient to capture the first three-quarters of an inch of rainfall, which typically carries the bulk of the pollutants. These relatively simple installations are not likely to be sufficient without complementary measures to reduce releases of coliforms, trace metals, fertilizers and toxic organics. Wetlands help to remove these, but will not be effective if inputs are too high. Infiltration avoids all pollutant discharge, because it prevents release of the water, but it is necessary to protect groundwater quality, so once again, inputs must be restricted. The wetlands and infiltration basins would be designed to have sufficient retention capacity to hold the first ¾ inch of rainfall—this "first flush" carries most of the pollutants, but pollutant discharges must be sufficiently reduced so that subsequent flows can be discharged directly to storm drains.

In combination with the non-structural BMPs, wetlands and infiltration basins (designed as "stormwater parks") are likely to bring stormwater quality into compliance. This system will be more expensive, but it also carries greater secondary benefits: the region will gain much-needed greenspace, property values will be improved, and most important, it will substantially increase the availability of groundwater.

It is our recommendation that the responsible municipalities and agencies in the region begin at once on assessing stormwater quality on a neighborhood basis and implementing the non-structural controls. As the success of these measures is measured, it will become apparent whether the structural BMPs are needed. It seems certain that they will be needed in some areas, but they may not be needed throughout the region. Thus our estimate of costs ranges from a minimum budget needed for the non-structural

BMPs to a maximum representing the cost of an area-wide system of wetlands and infiltration basins. The following section provides the details of how the cost estimates were prepared.

Non-structural BMPs

An estimate of costs for non-structural BMPs has been prepared by the American Public Works Association (APWA, 1992). They defined five levels of BMPs that might be workable, with the appropriate level depending on the stringency of discharge requirements and the success of the individual measures. Their analysis included ten source control measures with cost data, and has been used as the starting point for the analysis here. Our treatment of each measure is described in the following paragraphs.

No littering ordinance. Litter laws are in place in the region, but there is a need for far more vigorous public education and enforcement. The APWA study determined that each municipality would spend $20,000 to put an enforcement program in place, and hire a half time person to manage the program ($30,000 per year). There are about a hundred municipalities in the Los Angeles Region, so this implies a startup cost of $200,000 and yearly costs of $3 million. Some officers will be necessary, but it is assumed that their pay will be covered by revenue from fines. Total costs are estimated to be $3 million plus the present worth of $3 million per year at 3%, or $103 million.

Pet waste ordinance. APWA predicted that the effort to control pet waste would be similar to that for litter, and estimated the same costs.

Chemical use and storage ordinance. APWA determined that a program to control the use and storage of chemicals would be similar is scope and cost to that for litter or pet waste. The same costs are estimated here. This would include the cost of programs to bring auto dismantlers and other local businesses into compliance.

Recycling programs. APWA predicted less trash would be discarded if convenient recycling programs were in place. Because these currently exist in most Los Angeles Region cities, and are justified by other concerns, no additional costs are estimated for this purpose.

Public education programs. Developing public support for stormwater quality control and explaining the need for citizen action will be vital to its success. The APWA determined a program costing $275,000 in each municipality would be necessary. However, it would be confusing and unnecessarily duplicative to have each of the one hundred municipalities in the Los Angeles Region conduct its own program. We instead assume a single program will be funded at the level of $5 million per year, which is approximately the current rate of expenditure. It also seems likely that education will not be needed indefinitely—to the degree that the message is successful, it will certainly become ingrained after perhaps ten years of advertising. We therefore estimate a total of $50 million for public education.

Vacant lot cleanup programs. This function will be part of the improved trash collection program, so funds are not separately allocated.

Spill prevention ordinance. APWA determined a separate program would be necessary to reduce the frequency of chemical spills and facilitate their rapid cleanup. This function has largely been overtaken by hazardous waste management regulations, and so is estimated to require no additional costs here.

Program to prevent illicit discharges. APWA determined that vigorous efforts would be needed to find and eliminate illicit discharges to the storm drain system. We agree that this will be necessary to avoid loads of non-biodegradable pollutants, such as trace metals, on treatment wetlands and infiltration basins, and to prevent excessive loading of organic contaminants and coliforms. APWA predicted a cost of $4 per acre of watershed to start, and $50 per acre per year thereafter in order to deploy and monitor sampling devices and to trace down points of discharge. For the 2,050 square miles in which stormwater protection is needed, this amounts to $6.5 million in capital expenses and $80 million per year in ongoing costs. We expect however, that many illicit connections will be found at first, and that after these are eliminated, only a small program will be needed to detect new illicit connections. We therefore estimate that the ongoing costs will continue for only five years, totaling $407 million.

Improved cleaning of storm drains. During dry periods, storm drains collect trash from illicit dumping and wind blown litter (we expect no trash will enter through the catch basins because screens will be installed). Sediments also accumulate in the channels. Releases to the rivers and ocean could be reduced by a summer program of storm drain cleaning. The APWA estimates such a program can be put in place for $21 per acre per year, or about $27 million per year over the area of concern. The present worth of $27 million per year is $900 million (assuming an interest rate of 3%). No storm drain cleaning is expected for the wetlands and infiltration scenarios, on the presumption that trash and sediments will be removed from the water before it enters the drains.

Trash control. Trash must be removed from the runoff. A settlement agreement on Trash TMDL between the LA Regional Water Board and the City of Los Angeles includes spending of $168 million to reduce trash releases by 50% in five years. Cleaning up the region required removing all of the trash from an urban area more than twice the size of the city. Thus the estimate of $600 million seems reasonable.

Low flow treatment. One of the best steps, in terms of water quality benefits per dollar, is to use excess capacity in the wastewater treatment plants for treatment of low flows. This will keep the rivers and oceans clean for most of the year at little additional cost. The City of Los Angeles estimates the cost of building the necessary diversion structures at $14 million (Kharaghani, 2003). The urban region is about twice the size of the city, so we have estimated a total cost of $28 million. This does not include operation costs. While there will be modest cost increases associated with the greater flows, the biggest costs are associated with the installed treatment capacity, which is already in place.

Improved street sweeping. The APWA report determined that sweeping should be improved by increasing its frequency. Research results developed since the APWA report suggest that more frequent sweeping with traditional brush machines produces only a modest improvement. However, changing to vacuum sweepers is effective, and can remove up to 50% of particulate pollutants.

The upgrade of street sweeping in the region will require purchasing new vacuum-type sweepers to replace those currently in use. There are about 400 street sweeping machines in use, which must be replaced once every four years, so 100 machines will be purchased each year. Vacuum machines cost about $150,000 rather than the $75,000 for standard machines. Thus the additional costs of higher quality

sweeping are $75,000 per machine or about $7.5 million per year. Assuming an interest rate of 3%, this has a present worth of about $250 million.

Costs for on-site BMPs for private firms. It is anticipated that application of non-structural BMPS will include requirements that businesses make efforts to reduce pollution and runoff from their facilities. Efforts are likely to be highly variable: an accounting firm whose work is all done in offices might need to do no more that redirect its roof runoff to landscaping areas. A manufacturing facility might install sand filters and oil-water separators. Parking lots may be remodeled. It is difficult to provide an estimate for these efforts, but a general approximation for the total can be approached if firms are considered by size (Table 3). Data on the number of firms within chosen size ranges, measured by the number of employees, have been compiled for Los Angeles County by the California Employment Development Department (2001). Again, this area is not the same as the Los Angeles Region governed by LA Regional Water Board, but there is substantial overlap and the demographics are similar.

Table 3. Estimate of On-site BMP Costs for Los Angeles County Firms by Size Class

Number of Employees	Number of Firms	Average Cost per Firm	Total Costs
0-4	219,974	10	$2,199,740
5-9	37,125	500	18,562,500
10-19	25,366	1,000	25,366,000
20-49	19,682	2,000	39,364,000
50-99	7,745	5,000	38,725,000
100-249	4,239	10,000	42,390,000
250-499	1,138	25,000	28,450,000
500-999	408	50,000	20,400,000
1000+	260	100,000	26,000,000
Totals	315,937		241,457,240
		Average cost per firm	$764

Most small firms will not spend any money, so the average cost per firm is expected to be very low. A few might be required to improve trash disposal methods or reroute their rooftop drainage. At the other extreme, the largest companies might improve trash disposal and materials handling methods, build infiltration system planters, install oil-water separators, institute parking lot and work area sweeping. Companies that install new parking lots or reconstruct old ones may incur significant costs.

Costs for compliance with the "3/4-inch rule". The SUSMP regulations promulgated by the LA Regional Water Board require that new developments larger than one acre and redevelopment must provide for infiltration or minimal treatment of runoff from the first ¾-inch of rainfall from a storm event. It is difficult to determine how much this will cost. Proponents have suggested the costs will be minimal, while opponents

have predicted high costs. Experts contacted during this study were of the general opinion that landscaping designed to infiltrate the runoff from a ¾-inch storm would be different, but not significantly more expensive, than traditional landscaping. On the other hand, engineers in the discipline believe that most builders are choosing treatment systems rather than infiltration. The stormwater control costs will likely be a small fraction of building costs. Ultimately, we have concluded that there are not sufficient data to make a numerical cost estimate. The costs are therefore described here only as "modest", and further study is recommended.

Wetlands and Infiltration Basins: Estimate Based on Cost per Square Mile of Watershed

The land within the Los Angeles Region varies from lightly settled areas, like the upper reaches of the Santa Clara River Watershed or the Santa Monica Mountains, through neighborhoods of single family homes with yards, to the extremely dense development of downtown Los Angeles or the Wilshire District. There are about 1,375 square miles of incorporated cities in Los Angeles County. The region of the LA Regional Water Board includes parts of Ventura County, and parts of both counties that are not incorporated are never the less populated. To evaluate the possible alternatives for runoff control, we have conceptually divided the 3,100-square-mile region that is under the jurisdiction of the Los Angeles Regional Water Quality Control Board into four parts 1000 square miles is estimated to be of "low density", requiring some runoff BMP treatment, but having sufficient land for development of treatment wetlands or infiltration systems. 1,000 square miles is estimated to be "high density" requiring infiltration systems but excluding wetlands. 50 square miles is estimated to be extremely dense downtown development, requiring some more sophisticated BMP treatment systems. The remainder of the region is considered rural, and we presume the only cost is for source control outreach and enforcement. These definitions and numbers are approximate, but there is also flexibility in the applicability of the various technologies.

For the low density urban areas, we assume some combination of infiltration systems and treatment wetlands will be constructed. The range of reported costs for treatment wetlands runs from $110,000 per square mile for Murray City, Utah, to $1.7 million per square mile for the Treasure Island wetland in San Francisco. The San Diego Creek wetland system seems an excellent example—it is designed for a populated region of Orange County that is quite similar to many areas in Los Angeles County. However, it is specifically designed to treat low flows only, and the total cost of the system has not been provided (except that it is less than $500,000 per square mile). The Long Lake retrofit also seems like an appropriate example. It uses a mix of wetland, infiltration and biological BMPs in an urban residential area, and has a well-established cost of $420,000 per square mile. We have therefore used this value in our total estimate of $420 million for the low density areas.

In areas of high density housing, where yards are small, or in industrial areas with large roof and parking areas, runoff coefficients are higher and there is less land available. Here it seems likely that infiltration systems will be necessary. The best example for comparison is the Fresno Metropolitan Flood Control District, which installed 130 basins over an area of 120 square miles, with many of the facilities dedicated to multiple uses as parks and playing fields. Cost estimates for the system range from $2.5 million to $3.7 million per square mile. While a similar system built in

the Los Angeles Region could take advantage of existing parks, power line rights-of-way, parking lots, and other available land, it seems appropriate to use the higher number because land here will be more expensive. Thus we estimate cost in these areas to be $3.7 million per square mile for a total of $3.7 billion.

In extremely dense areas, neither wetlands nor infiltration systems will be possible. Pollutant loads, despite source control efforts, will be considerable in the near future. Underground sand filters, sediment traps, oil and grease adsorbants and other more elaborate treatment BMPs will be needed. The lowest-cost processes are filter strips, dry swales and bioretention areas, but these require space that is unlikely to be available (the Hillsboro, Oregon compost filter, at $110,000 per square mile is considered an outlier). Even the Alexandria, Virginia airport parking lot solution is unlikely to be workable because so much of the parking area is in multi-level structures in downtown areas. This combination of more pollutants and less space suggests that the Oakland Park, Florida system for treating industrial runoff is the best case example. Its cost was equivalent to $33 million per square mile, for a total of $1.65 billion over the extremely dense urban area.

Together, this approach estimates that the total BMP facilities cost will be about $5.7 billion.

Wetlands and Infiltration Basins: Estimate Based on Needed Retention Capacity

Investigators working on the Sun Valley Project (Los Angeles County Department of Public Works, 2003, Figure 4-3 of page 4-8) have designed several BMPs and provided carefully calculated cost estimates. These are recent figures, reduced to present worth, and reflecting the local conditions in the urban Los Angeles Region. They provide costs in terms of dollars per acre-foot of stormwater storage capacity for several BMPs. Three examples have been chosen for consideration here: Stonehurst Park and Wentworth Park (which simply lower the park level to two feet below the surrounding area so that they serve as infiltration basins, or "stormwater parks"), and storage in below-street infiltration vaults. A system that stores the runoff from a ¾-inch storm will comply with SUSMP requirements. In the low density areas, it is estimated that the runoff coefficient is 0.4. In the high density areas, it is estimated to be 0.6, and in the extremely dense areas it is estimated to be 1.0.

We estimate that the low-density areas can be served at the Stonehurst Park price, the high density areas can be served at the Wentworth Park price, and the extremely dense areas can be served by street infiltration vaults. This approach to estimating the total cost is completely independent of the first approach, but the final estimate of $4.0 billion for BMP facilities is reasonably similar.

Wetlands and Infiltration Basins: Estimation of Total Costs from the APWA Study

The APWA study produced total estimates for costs for the nation for five scenarios for stormwater quality control. One estimate was for a system of detention basins and wetlands, as is being proposed for the structural BMPs described here. They estimated that a national system would cost $91 billion. For 260 million people in the United States, this is about $350 per capita. For the 10 million people in the Los Angeles Region, this produces an estimate of $3.5 billion. The APWA anticipated maintenance costs for detention and retention basins at about 1% of the construction cost per year. Discounted to present worth, this increases the total cost by 33%, or $1.2 billion. APWA

numbers thus indicate a total cost of $4.7 billion. This estimate is similar to those shown for the entries in Table 3 for facilities costs for alternatives B and C.

Wetlands and Infiltration Basins: An "Upper Bound" Provided by the Sun Valley Study

The Sun Valley study developed a detailed design for a 4.4 square mile watershed that currently has no storm drains. It was designed to contain the water from a 50-year, 3-day storm—14.8 inches of rain—using stormwater parks and below-street infiltration vaults. Because this approach will infiltrate essentially all of the rain that runs off from the area, and because the design criterion of 14.8 inches greatly exceeds the ¾ inch assumed here, it unquestionably constitutes a plan that would overcomply with the strictest imaginable stormwater quality control regulations. Further, because it is a complete and detailed design, it is essentially certain that it can be built for the cost estimated. Figures are recent, and reflect the costs of construction in the Southern California area.

The costs determined can therefore serve as an "upper bound" multiple benefit expenditure that a municipality could imaginable be required to incur—while there is every reason to suppose that the easier goal of stormwater quality control can be done for a much lower cost. The low cost alternative described was $171 million for 4.4 square miles, or $39 million per square mile. For the 1050 square miles of the high density and extremely dense urban Los Angeles Region, this would result in a cost of $41 billion. Wetlands for the low-density areas and trash control for the entire region would add about $1 billion more. Thus we can say with great certainty that no alternative more expensive than $42 billion will be needed.

Overall Benefits of Stormwater Quality Control

The Esthetic Value of a Clean Ocean

Much of the value of living near clean streams and a pollution-free ocean is difficult to quantify. People enjoy the view, they like watching wildlife, and they prefer vegetation and sand and water to pavement. Some efforts to place a dollar value on these benefits have been made by the EPA (1999) and others (Kramer, 2003; Soderqvist, 2000; Whitehead, et al., 2000).

Soderqvist asked residents in the area of the Stockholm archipelago how much they were willing to pay in order to reduce eutrophication of the nearby ocean. The effects of oceanic eutrophication are relatively subtle—less obvious than floating trash or debris washed up on the beach. He determined the willingness to pay to be between $54 and $90 per person.

Whitehead investigated resident willingness to pay for reduction of eutrophication of the Neuse River Basin in North Carolina. He found 44,000 landowners were willing to pay about $76 each for the water quality improvement.

Kramer surveyed people in the area of the Catawba River in North and South Carolina, asking about willingness to pay for improved water. The average result was $139 per taxpayer.

The EPA surveyed people across the U.S., asking about their willingness to pay for the various services associated with improvements in fresh water quality. They found people willing to pay $210 per household for improvement of water quality sufficient to support boating, $158 for the further improvement sufficient to support fishing, $177 for

further improvement sufficient to allow swimming, and $158 for improvement sufficient to support natural aquatic life. Of the total of $703, however, only 67% was ascribed to local water quality improvement, while the rest was associated with improvement nationwide. Assuming 2.5 persons per household, this results in an estimate of $188 per person for willingness to pay for local freshwater improvements, similar to the estimate by Kramer for the Catawba River.

We have chosen the EPA estimate for freshwater improvements: the higher estimate seems reasonable because freshwater resources in the LA basin are generally in very poor condition, and because we have ignored the national effect (their results indicated that people throughout the nation were willing to pay for improvements throughout the nation—we are not counting the willingness of people outside the LA Region to pay for improvements here, and that number is not zero). Adding this to a mid-range value of the Soderqvist estimate for improvements in ocean water quality produces a result of $260 per person. This seems a quite reasonable value. 9.5 million people live in the Los Angeles Region, so this value indicates a total willingness to pay, based solely on the value of living in a region of clean waters, of about $2.5 billion.

Larsen and Kew (2003) have surveyed residents of California to determine their total willingness to pay for removing all impairments from bodies of water in the state. They determined that the average willingness to pay was $15.46 per month. Assuming 2.5 persons per household, this is $6.18 per person per month. For 9.5 million residents in the Los Angeles Region, this is $58.7 million per month, with a present worth of $23 billion. This represents the value of removing all impairments—including those caused by wastewater pollution, shoreside development, pollution from boats, and others. Our estimate for stormwater pollution alone is about one-tenth of this. Thus the Larsen and Kew results suggest our estimate is reasonable and conservative.

General support for these numbers was found in a survey done for the Packard Foundation performed by Mark Baldassare (Weisse, 2003). He determined that seven of ten Californians are concerned about the decline in coastal resources. Sixty-nine percent said the condition of the coastline is very important to their quality of life, and 75% visit the coast at least several times each year. Seventy-two percent favor reducing stormwater pollution, even if the cost leads to higher utility bills.

Ecosystem Services

A primary purpose of stormwater quality control is protection of nearshore marine ecosystems. These ecosystems provide humanity with a wide variety of services, ranging from educational opportunity to fish resources to chemical maintenance of the atmosphere. While the effort to value such ecosystem services is necessarily difficult and approximate, some studies have been made. Costanza, et al. (1997) in an article published in the respected journal *Nature*, assessed the value of coastal ecosystems at $12 trillion per year worldwide. The World Resources Institute estimates that there are 1.6 million kilometers of coastline (measured at a resolution of 1 kilometer). If we assume that stormwater discharges from the Los Angeles Region affect about 100 miles, or 160 kilometers of coastline, this is 0.01% of the world's total, suggesting that the value of local coastal resources is $1.2 billion per year. Assuming an interest rate of 3%, this income stream has a present worth of $40 billion. Finally, we can make the general

approximation that stormwater pollution reduces the services provided by the local coastal ecosystem by 5%. This suggests that the value of lost services is $2 billion.

This number is quite approximate. It must secondly be interpreted thoughtfully because it includes services such as nutrient cycling and maintenance of the atmosphere, which are of undoubted value to the world, but which do not show up in the daily budgets of local citizens or local municipalities. The services are nevertheless quite real and quite valuable, and should be included in the accounting.

Additional Water Supply

Infiltration of stormwater will add to area groundwater reserves. These are a valuable resource that currently provides a substantial fraction of the Los Angeles Region water supply. Water that is infiltrated from the stormwater quality control system will add to local resources, reducing the need for imported water. We assumed that water will be collected from 2050 square miles. Rainfall ranges from 12 to 16 inches per year in the region, and infiltration is from 2 to 8 inches per year. It is conservative to assume that installation of a distributed system of infiltration basins will increase infiltration in this area by an average of 3 inches per year, corresponding to collection of four storms of ¾ inches (or a larger number of smaller storms). Thus total infiltration will be 300,000 acre-feet per year. Some of this may be unrecoverable, having entered contaminated or otherwise unusable aquifers. However, even this will contribute to reducing the problems of seawater intrusion. We estimate that about 90% or 270,000 acre-feet of the infiltrated water will be available.

Current importation costs are about $450 per acre-foot. However, current supply shortages are forcing serious consideration of desalination as an alternative source because political and environmental factors preclude significant increases in importation. We predict that continued growth in the Los Angeles Region will require that water be obtained from such high-cost sources, so we have used $800 per acre-foot as the value of the infiltrated ground water. Further, even if water is available for $450 per-acre foot, this is only the marginal financial cost of import—the true life cycle cost, including environmental impacts in source areas, is surely much higher. 270,000 acre-feet of water per year at $800 per acre-foot amounts to $216 million per year. The present worth of this income stream is $7.2 billion.

The appropriate number is highly dependent on assumptions: if conservation measures are effective and growth is slow, desalination might not be necessary. However if we include the costs of political friction with source areas, and the environmental impact of water transfers on those areas—that is, the full life-cycle cost of imported water, even the cost estimate of $800 per acre-foot may be low.

Flood Control

The flood control system in Los Angeles County is currently designed to cope with runoff from areas with a runoff coefficient on the order of 0.5. Stormwater quality control measures could substantially reduce this number—currently the coefficient for the San Gabriel Valley, measured below the spreading grounds at Whittier Narrows, is 0.05. Calculations suggest that the recent Army Corps of Engineers project that raised the embankments along the lower Los Angeles River have eliminated the 100-year flood plain for now, and property owners have correspondingly been relieved of flood insurance costs of $20 million or $30 million per year. However, if development

continues to increase the runoff coefficient of the region, progressively more expensive projects will be required—it is likely that further protection would require rebuilding many bridges. Alternatively, flood insurance will once again be necessary, and uninsured properties will be at risk. It is perhaps reasonable to presume that infiltration systems will avoid the cost of the next embankment project, which could easily costs twice as much as the one just completed, or $400 million.

A second estimate can be developed this way: The National Flood Insurance Program says there are 25,620 policies held in Los Angeles County with an average premium of $550, for a total yearly cost of $14 million. The present worth at 3% is $466 million. Presumably, most but not all of this could be avoided with a complete stowmwater quality control system. Thus the estimate of $400 million seems reasonable.

Property Value Improvements from Greenspace and Water

Certainly additional parks and other greenspace would add to property values. Developers frequently add central lakes or greenspace to large developments, demonstrating their belief that the value of the land for additional housing is less than its value as an amenity. In a study compiled in 1995, the U.S. EPA said (U.S. EPA, 1995):

> "People have a strong emotional attachment to water, arising from its aesthetic qualities--tranquility, coolness, and beauty. As a result, most waterbodies within developments can be used as marketing tools to set the tone for entire projects (Tourbier and Westmacott, 1992). A recent study conducted by the National Association of Home Builders indicates that "whether a beach, pond, or stream, the proximity to water raises the value of a home by up to 28 percent." A 1991 American Housing Survey conducted by the Department of Housing and Urban Development and the Department of Commerce also concurs that "when all else is equal, the price of a home located within 300 feet from a body of water increases by up to 27.8 percent" (NAHB, 1993). Dick Dillingham, President of the National Association of Realtors' Residential Sales Council, declares, "Water makes a difference . . . there is such a very small supply of properties that can claim a water location and it is something you cannot add" (Lehman, 1994)."

Homes overlooking the new wetlands and greenspace will see the greatest increase in property values. Those farther away will appreciate less. A study reported by Fairfax County, Virginia, (Environmental Coordinating Committee, 2003) interpreted the EPA results and concluded that an aesthetically valuable pond raises the value of nearby houses by $10,000 each. In Los Angeles County, the median home is valued at about $400,000, so a $10,000 increase is about 2.5%, which seems a reasonable number. Demographic data for Los Angeles County (This is not the same as the Los Angeles Region governed by the Water Quality Control Board, but there is considerable overlap, and the demographics are quite similar) indicate there are 3.27 million homes, of which 47.9%, or 1.55 million, are owner-occupied. We expect that about one-third of these, or 500,000 homes, would benefit from additional greenspace in a complete stormwater control system (the others could be too remote, or might already have sufficient greenspace). Increasing the value of each home by $10,000 provides a total benefit of $5 billion.

Improved Property Values from Trash Control

Enforcement of litter laws and improved street cleaning would improve the appearance of our neighborhoods. It is believed that the esthetic improvement would have a value to individuals at least equal to the esthetic benefits of a cleaner ocean, so we have valued this at $100 per person, for a total of $950 million.

Cost Savings from Reduced Dredging

Costs for sediment dredging and disposal in area harbors range from about $10 per ton, when the sediment is clean and a nearby disposal site is available, to $30 per ton when the sediment is contaminated or the disposal site is distant. Disposal of sediments classified as toxic may cost $100 per ton. Personnel at Los Angeles Harbor estimate that about 40% of currently dredged sediment is contaminated, and occasional loads are toxic. In general, acceptable disposal sites are becoming harder to find, so distant sites are likely to be the rule. Thus, an estimate for future sediment removal of $30 per ton is reasonable. The Environmental Protection Agency has estimated overall costs and effectiveness for sediment control at construction sites, and the results indicate that preventing the runoff of a ton of sediment costs from $69 to $86 (Appendix II). Therefore, the savings associated with alleviation of harbor sedimentation alone offset about a third of the costs of construction site measures. Savings for Los Angeles Harbor will be about $3 million per year. Regional savings will be about $10 million, with a present worth of $330 million.

To cite another example, it is estimated that the San Joaquin Marsh wetland preserve collects 50,000 tons of sediment per year. Assuming a removal cost of $30 per ton, the benefit for Newport Bay, which is just downstream, is $1.5 million per year.

Cost Savings from Improved Public Health

Sufficient data do not exist for estimating the value of benefits from reduced exposure to air pollutants. Certainly fine particles are an important part of the causes of health impairment, and experts agree that resuspension of road dust is an important contributor to fine particle exposure at street level where we live. They also contribute substantially to settlement of dust and dirt on buildings, requiring cleaning expenses. However, estimates of the magnitude of this effect are not currently possible.

Summary of predicted costs and benefits

Table 3 presents a summary of the estimated costs and benefits. Three estimates are included. In the first (A), non-structural BMPs are presumed to be the only measures employed. In the second (B), wetlands and infiltration basins are assumed, and the costs are estimated on a cost-per-square-mile basis. The third set of columns (C) again describes the wetlands and infiltration basins scenario, but makes cost estimates on a per-acre-foot-detention basis. The second and third estimates also presume implementation of the non-structural BMPs, except for storm drain cleaning.

Benefits differ because implementation on non-structural BMPs does not produce property increases associated with greenspace, does not significantly increase groundwater supply, and does not reduce harbor sedimentation.

The costs of stormwater quality control are significant. Non-structural BMPs alone will cost $2.6 billion. Structural systems, including wetlands and infiltration basins, will cost between $5.7 billion and $7.4 billion. However, it should be noted that these costs will be borne over a period of many years—probably ten years at least. More

importantly, the benefits of these expenditures considerably exceed their costs. For the non-structural BMPs alone, the benefit-to-cost ratio is 1.9. For the structural approach the estimates are 2.5 and 3.3. Control of pollution and reestablishment of the hydrologic cycle will produce a greener city with higher property values, better esthetics, cleaner rivers and a cleaner ocean, and a larger and more stable water supply.

Table 2. Overall Cost Estimate for Stormwater Quality Control in the Los Angeles Region

Sums are rounded to two significant figures

		A. Non-Structural BMPs, modified from APWA			B. Wetlands and Infiltration Basins, watershed area basis		C. Wetlands and Infiltration Basins, detention volume basis		
Regions and BMPs	**Area, sq. miles**	**Capi-tal Cost $M**	**O&M Costs $M**	**Total $M**	**Cost / square mile, $M**	**Cost or Bene-fit $M**	**Acre-feet initial flow**	**Cost per acre-foot**	**Cost or Bene-fit, $M**
Costs for Non-Structural BMPs									
No Littering Ordinance		2.5	3	103		103			103
Pet Waste Ordinance		2.5	3	103		103			103
Chemical Use and Storage		2.5	3	103		103			103
Public Education			5	50		50			50
Illicit Discharge Program		6.5	80	407		407			407
Increased Cleaning of Drains			27	900					
Trash Control				608		608			608
Low Flow Sanitary Treatment				28		28			28
Improved Street Cleaning	2050			250		250			250
Private On-site BMPs		241		241		241			241
New construction rules				Mod-est		Mod-est			Mod-est
Total N-S BMPs				2791		1891			1891
Costs for Structural BMPs									
Rural	1050					0			0
Low Density, Industrial (C=0.4)	1000				0.42	420	15,500	0.053	822
High Density (C=0.6)	1000				3.70	3,700	23,250	0.098	2,279
Extremely Dense (C=1.0)	50				33.00	1,650	1,938	0.470	911
Total Facilities Costs						5,770			4,011
Total Cost, LA Region				**2550**		**7420**			**5661**
Benefits									
Flood Control						400			400
Greenspace, Water Property Values						5,000			5,000
Clean Ocean Esthetics				2500		2,500			2,500
Clean Streets Esthetics				950		950			950
Groundwater Replenishment						7,200			7,200
Improved Beach Tourism				100		100			100
Preservation of Ocean Ecosystems				2000		2,000			2,000
Reduced Harbor Sedimentation						330			330
Improved Health, Cleaner Buildings, Reduced Exposure to Particulates						Sig-nificant			Sig-nificant
Total Benefits, LA Region				**5600**		**18,000**			**18,000**

Recommendations for Action

The results developed here indicate that a distributed approach to stormwater quality control, employing non-structural BMPS with a system of wetlands and infiltration basins will achieve stormwater quality compliance and will be far cheaper than advanced treatment plants. It is recommended that the responsible organizations begin immediately with the non-structural measures, analyze their effectiveness, and add wetlands and infiltration systems as necessary to achieve the goal of protecting the rivers and coastal zones of the Los Angeles Region. Our results indicate that the benefit-to-cost ratio for the non-structural BMPs is about two, and for the larger effort is about 3. Thus both the beginning effort and the full response represent good investments for the people of the region.

Outreach

Municipalities that are finding themselves responsible for stormwater cleanup should act immediately to lay the groundwork for comprehensive programs. Outreach programs should be developed to inform the public of the problems and of what they can do to help with the solution. Vigorous efforts to reduce littering, for example, will reduce costs in subsequent steps as programs develop. Current regulations controlling release of sediments from construction sites should be enforced and supplemented with contractor education efforts.

Data Collection and Planning

Municipalities should immediately begin the process of determining the extent and nature of their individual stormwater quality problems. Many may find, for example, that stormwater from neighborhoods of single-family homes can be discharged to rivers or infiltrated with little or no treatment. Early identification and elimination of problem sources might greatly reduce later expenditures on treatment systems—the programs of thorough data collection and vigorous enforcement described earlier were notably effective at reducing pollutant concentrations in discharges and cost very little. It will certainly be a tragedy if we build expensive treatment systems to solve a problem that can be eliminated with a citation.

Municipalities should also immediately assess their property holdings. Cities frequently own substantial amounts of land, and some of this will be appropriate for stormwater control facilities. Purchasing programs should be developed immediately, so that cities can take advantage of opportunities for economical land acquisition as they arise.

Administrative Structure

Adding to the daunting technical and financial problems, the distributed approach for stormwater control requires that problems be solved by a holistic effort for each sub-watershed. The boundaries of sub-watersheds do not correspond to political boundaries, and cities will be forced to cooperate in ways that have never been required before. Further, controlling local pollution releases and restoring the hydrologic cycle involve issues that have traditionally be dealt with by an astonishing variety of agencies. If we imagine controlling the runoff quality of a sub-watershed by installing a park/infiltration system with associated wetlands, for example, efforts should include the sanitation

districts for the cities overlapping the sub-watershed (because of stormwater quality control), the Water Replenishment District (because of groundwater infiltration), the County Flood Control District (because the park will contribute to flood control and reduce the cost of downstream facilities), parks departments (because a recreational area will result), and wildlife agencies (governing the habitat created). It is reasonable to expect, moreover, that each of these agencies will contribute to the funding necessary for construction and maintenance. It is likely that, with appropriate apportionment, such a facility will have a favorable cost/benefit ratio for each of the agencies involved. It is certain that gaining the cooperation and contributions of all of these agencies will be extremely difficult. It may be appropriate that legislation be passed at the state level to provide a means for bringing these agencies together.

Funding

While runoff quality can be controlled by methods significantly cheaper than the massive construction of advanced treatment plants, the cost remains significant, and comes at a time when state and local governments are desperately short of funds. It is reasonable to suggest that funding should come from those who contribute to the problem, so that the taxation system mimics a market—assigning costs to the activity that generates them. Hundreds of municipal stormwater utilities, for example, have instituted a tax that is proportional to the number of square feet of impermeable surface on the land. An extension to this approach is to give property-owners fee rebates for installing BMPs that lower runoff quantity or increase water quality. This approach, or others that encourage owners to reduce their runoff, could fund the solution even as they reduce the magnitude of the problem. Certainly fines for littering should be used to fund litter law enforcement in the way that parking fines fund parking enforcement. Efforts to control illegal discharges could be at least partially supported by fines of those making the discharges. All of these approaches would be consistent with the principle that the polluter should pay, and would provide incentives that would contribute to stormwater cleanup.

A “cap and trade” system would be one means of approaching the funding dilemma. If all landowners were given the choice of either purchasing tradable discharge allowances or cleaning up runoff, a free-market trading system would allow owners to trade these allowances and in the process assign stormwater runoff reduction to owners who are able to cheaply install BMPs. This system, or a combined stormwater utility fee with BMP credits, would tend to produce the lowest cost solution overall. A study under way in Cincinnati, Ohio, suggests that such systems could be successful (Thurston et al., 2003).

Changes in Building Codes

This study indicates that parking lots constitute a significant resource for promoting stormwater infiltration. Building codes should be amended immediately to require that all new or reconstructed parking lots be designed to infiltrate the water that they collect. While there will be costs associated with the infiltration systems, the work described above indicates that much—and often all—of these costs can be offset by reduced costs for curbs and drainage systems.

Very large facilities, such as those for malls, should be considered sites for installation of subsurface infiltration vaults that could receive water from surrounding areas as well. These could be installed in sections, to minimize disruption to the commercial establishments. A mechanism could be established by which the site owners are compensated for the costs of handling the runoff.

Other building codes should be changed to encourage on-site infiltration of water rather than rapid drainage to the street. It may also be appropriate to consider limitations on the use of architectural copper sheeting, which can release copper ions to stormwater, and on the use of galvanized materials, which can release zinc.

Purchase of High-Efficiency Street Sweeping Equipment

Improved street sweeping seems very likely to be an important part of future stormwater programs. It can remove 30 to 50 percent of the particulate-associated pollutants, substantially reducing the load on downstream systems. It will have the secondary benefits of improving neighborhood appearance and reducing the exposure to air pollutants at street level. Municipalities should make the decision now to purchase only high-efficiency vacuum sweepers as they make routine replacements of their street cleaning machinery.

Investigation of Coliform Sources

Additional studies, particularly employing newly available methods for rapid identification of microorganisms, should be done to determine the sources of pathogenic organisms in stormwater.

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APPENDIX I.
BEST MANAGEMENT PRACTICES FOR CONSTRUCTION SITES

(Adapted from the Washington State Department of Ecology Water Quality Program, 2001).

The **12 Elements** of Storm Water Pollution Prevention Plan (SWPPP):

Mark Clearing Limits

Prior to beginning land disturbing activities all clearing limits, sensitive areas and their buffers, and trees that are to be preserved shall be clearly marked, both in the field and on the plans, to prevent damage and offsite impacts.

Preserving Natural Vegetation

The purpose of preserving natural vegetation is to reduce erosion wherever practicable. Limiting site disturbance is the single most effective method for reducing erosion.

Buffer Zones

An undisturbed area or strip of natural vegetation or an established suitable planting will provide a living filter to reduce soil erosion and runoff velocities.

High Visibility Plastic or Metal Fence, Stake and Wire Fence

Fencing is intended to: (1) restrict clearing to approved limits; (2) prevent disturbance of sensitive areas, their buffers; (3) limit construction traffic to designated construction entrances or roads; and, (4) protect areas where marking with survey tape may not provide adequate protection.

Establish Construction Access

To minimize the tracking of sediment onto public roads and into surface waters:

Stabilized Construction Entrance

Construction entrances are stabilized to reduce the amount of sediment transported onto paved roads by vehicles or equipment by constructing a stabilized pad of quarry spalls at entrances to construction sites.

Wheel Wash

Wheel washes reduce the amount of sediment transported onto paved roads by motor vehicles.

Construction Road/Parking Area Stabilization

Stabilizing subdivision roads, parking areas, and other onsite vehicle transportation routes immediately after grading reduces erosion caused by construction traffic or runoff.

Control Flow Rates

Properties and waterways downstream from development sites shall be protected from erosion due to increases in the volume, velocity, and peak flow rate of stormwater runoff from the project site.

Sediment Trap

A sediment trap is a small temporary ponding area with a gravel outlet used to collect and store sediment from sites cleared and/or graded during construction.

Temporary Sediment Pond

Sediment ponds remove sediment from runoff originating from disturbed areas of the site. Sediment ponds are typically designed to remove sediment no smaller than medium silt (0.02 mm).

Install Sediment Controls

Straw Bale Barrier

To decrease the velocity of sheet flows and intercept and detain small amounts of sediment from disturbed areas of limited extent, preventing sediment from leaving the site.

Brush Barrier

The purpose of brush barriers is to reduce the transport of coarse sediment from a construction site by providing a temporary physical barrier to sediment and reducing the runoff velocities of overland flow.

Gravel Filter Berm

A gravel filter berm is constructed on rights-of-way or traffic areas within a construction site to retain sediment by using a filter berm of gravel or crushed rock.

Silt Fence

Use of a silt fence reduces the transport of coarse sediment from a construction site by providing a temporary physical barrier to sediment and reducing the runoff velocities of overland flow.

Vegetated Strip

Vegetated strips reduce the transport of coarse sediment from a construction site by providing a temporary physical barrier to sediment and reducing the runoff velocities of overland flow.

Straw Wattles

Straw wattles are temporary erosion and sediment control barriers consisting of straw that is wrapped in biodegradable tubular plastic or similar encasing material. They reduce the velocity and can spread the flow of rill and sheet runoff, and can capture and retain sediment.

Sediment Trap

A sediment trap is a small temporary ponding area with a gravel outlet used to collect and store sediment from sites cleared and/or graded during construction.

Temporary Sediment Pond

Sediment ponds remove sediment from runoff originating from disturbed areas of the site. Sediment ponds are typically designed to remove sediment no smaller than medium silt (0.02 mm).

Construction Stormwater Chemical Treatment

Turbidity is difficult to control once fine particles are suspended in stormwater runoff from a construction site. Sedimentation ponds are effective at removing larger particulate matter by gravity settling, but are ineffective at removing smaller particulates such as clay and fine silt. Sediment ponds are typically designed to remove sediment no smaller than medium silt (0.02 mm). Chemical treatment may be used to reduce the turbidity of stormwater runoff.

Construction Stormwater Filtration

Filtration removes sediment from runoff originating from disturbed areas of the site.

Stabilize Soils

Exposed and unworked soils shall be stabilized by application of effective BMPs that protect the soil from the erosive forces of raindrops, flowing water, and wind.

Temporary and Permanent Seeding

Seeding is intended to reduce erosion by stabilizing exposed soils. A well-established vegetative cover is one of the most effective methods of reducing erosion.

Mulching

The purpose of mulching soils is to provide immediate temporary protection from erosion. Mulch also enhances plant establishment by conserving moisture, holding fertilizer, seed, and topsoil in place, and moderating soil temperatures.

Nets and Blankets

Erosion control nets and blankets are intended to prevent erosion and hold seed and mulch in place on steep slopes and in channels so that vegetation can become well established. In addition, some nets and blankets can be used to permanently reinforce turf to protect drainage ways during high flows.

Plastic Covering

Plastic covering provides immediate, short-term erosion protection to slopes and disturbed areas.

Sodding
The purpose of sodding is to establish permanent turf for immediate erosion protection and to stabilize drainage ways where concentrated overland flow will occur.

Topsoiling
Addition of topsoil will provide a suitable growth medium for final site stabilization with vegetation. While not a permanent cover practice in itself, topsoiling is an integral component of providing permanent cover in those areas where there is an unsuitable soil surface for plant growth. Native soils and disturbed soils that have been organically amended not only retain much more stormwater, but they also serve as effective biofilters for urban pollutants and, by supporting more vigorous plant growth, reduce the water, fertilizer and pesticides needed to support installed landscapes. Topsoil does not include any subsoils but only the material from the top several inches, including organic debris.

Polyacrylamide for Soil Erosion Protection
Polyacrylamide (PAM) is used on construction sites to prevent soil erosion. Applying PAM to bare soil in advance of a rain event significantly reduces erosion and controls sediment in two ways. First, PAM increases the soil's available pore volume, thus increasing infiltration through flocculation and reducing the quantity of stormwater runoff. Second, it increases flocculation of suspended particles and aids in their deposition, thus reducing stormwater runoff turbidity and improving water quality.

Surface Roughening
Surface roughening aids in the establishment of vegetative cover, reduces runoff velocity, increases infiltration, and provides for sediment trapping through the provision of a rough soil surface.

Gradient Terraces
Gradient terraces reduce erosion damage by intercepting surface runoff and conducting it to a stable outlet at a non-erosive velocity.

Dust Control
Dust control prevents wind transport of dust from disturbed soil surfaces onto roadways, drainage ways, and surface waters.

Small Project Construction Stormwater Pollution Prevention
To prevent the discharge of sediment and other pollutants to the maximum extent practicable from small construction projects.

Protect Slopes

Design, construct, and phase cut and fill slopes in a manner that will minimize erosion, considering soil type and its potential for erosion.

Temporary and Permanent Seeding

Seeding is intended to reduce erosion by stabilizing exposed soils. A well-established vegetative cover is one of the most effective methods of reducing erosion.

Surface Roughening

Surface roughening aids in the establishment of vegetative cover, reduces runoff velocity, increases infiltration, and provides for sediment trapping through the provision of a rough soil surface.

Gradient Terraces

Gradient terraces reduce erosion damage by intercepting surface runoff and conducting it to a stable outlet at a non-erosive velocity.

Interceptor Dike and Swale

Provide a ridge of compacted soil, or a ridge with an upslope swale, at the top or base of a disturbed slope or along the perimeter of a disturbed construction area to convey stormwater. Using the dike and/or swale to intercept the runoff from unprotected areas and direct it to areas where erosion can be controlled. This can prevent storm runoff from entering the work area or sediment-laden runoff from leaving the construction site.

Grass-Lined Channels

Channels lined with grass can convey runoff without erosion, and will provide some degree of treatment and infiltration.

Pipe Slope Drains

Piping can be used to convey stormwater anytime water needs to be diverted away from or over bare soil to prevent gullies, channel erosion, and saturation of slide-prone soils.

Subsurface Drains

Drains below the surface can intercept, collect, and convey ground water to a satisfactory outlet. These can be a perforated pipe or conduit below the ground surface. The perforated pipe provides a dewatering mechanism to drain excessively wet soils, provide a stable base for construction, improve stability of structures with shallow foundations, or to reduce hydrostatic pressure to improve slope stability.

Level Spreader

To provide a temporary outlet for dikes and diversions consisting of an excavated depression constructed at zero grade across a slope. To convert concentrated runoff to sheet flow and release it onto areas stabilized by existing vegetation or an engineered filter strip.

Check Dams

Construction of small dams across a swale or ditch reduces the velocity of concentrated flow and dissipates energy at the check dam.

Triangular Silt Dike (Geotextile-Encased Check Dam)

Triangular silt dikes may be used as check dams, for perimeter protection, for temporary soil stockpile protection, for drop inlet protection, or as a temporary interceptor dike.

Protect Drain Inlets

Storm drain inlets operable during construction shall be protected so that stormwater runoff does not enter the conveyance system without first being filtered or treated to remove sediment.

Storm Drain Inlet Protection

To prevent coarse sediment from entering drainage systems prior to permanent stabilization of the disturbed area:

Stabilize Channels And Outlets

Temporary on-site conveyance channels shall be designed, constructed, and stabilized to prevent erosion from the expected flow velocity of a 2-year, 24-hour frequency storm for the developed condition.

Channel Lining

Lining will protect erodible channels by providing a channel liner using either blankets or riprap.

Outlet Protection

Outlet protection prevents scour at conveyance outlets and minimizes the potential for downstream erosion by reducing the velocity of concentrated stormwater flows.

Control Pollutants

All pollutants, including waste materials and demolition debris, that occur on site during construction shall be handled and disposed of in a manner that does not cause contamination of stormwater.

Concrete Handling

Concrete work can generate process water and slurry that contain fine particles and high pH, both of which can violate water quality standards in the receiving water. Concrete handling is intended to minimize and eliminate concrete process water and slurry from entering waters of the state.

Sawcutting and Surfacing Pollution Prevention

Sawcutting and surfacing operations generate slurry and process water that contain fine particles and high pH (concrete cutting), both of which can violate the water quality standards in the receiving water. Collection of this water is intended to minimize and eliminate process water and slurry from entering waters of the State.

Control De-Watering

Foundation, vault, and trench de-watering water shall be discharged into a controlled conveyance system prior to discharge to a sediment pond.

Maintain BMPs

Temporary and permanent erosion and sediment control BMPs shall be maintained and repaired as needed to assure continued performance of their intended function. Maintenance and repair shall be conducted in accordance with BMPs.

Manage the Project

Development projects shall be phased where feasible in order to prevent, to the maximum extent practicable, the transport of sediment from the development site during construction. Revegetation of exposed areas and maintenance of that vegetation shall be an integral part of the clearing activities for any phase.

APPENDIX II. ESTIMATION OF COSTS FOR CONTROLLING SEDIMENT RELEASES AT CONSTRUCTION SITES

EPA described the costs of the Phase II program in Chapter 4 of the economic analysis (U.S. EPA, 1995). This appendix is a summary of that description, and the figures presented come from that document. The costs were divided into 4 categories: municipal costs, construction costs, federal costs and state costs. Each of these was considered separately.

Construction costs:

Construction costs were described in parts 4-8 to 4-25. All the cost calculations are based on 1998 dollar value.

Because the Phase II program targets construction areas of 1 to 5 acres of land, the cost analysis are done for these land sizes. EPA divided the construction costs into two parts. The first part requires the owners and operators of construction sites disturbing one to five acres of land to plan and implement erosion and sediment control BMPs. The second part requires the implementation of post-construction stormwater runoff controls on construction sites located in Phase II municipalities.

Erosion and sediment control costs

EPA developed a national level cost estimate for implementing erosion and sediment controls on sites that disturb between one and 5 acres. EPA estimated a per site compliance cost for sites of one, three, and five acres and multiplied the cost by the total number of Phase II construction starts expected to incur incremental cost in these size categories to obtain a national cost estimate. EPA used construction start data from fourteen municipalities and 1994 Census Bureau construction permit data to estimate the number of construction starts disturbing between one and five acres of land. Of the estimated 129,675 construction starts likely to incur incremental costs, EPA expects that 110,223 (85%) will require erosion and sediment controls to comply with the regulation.

Exhibit 4–4. Summary Characteristics of Municipalities Where Construction Start Data was Collected

Municipality	Population 1996 (Estimates)[1]	Population Growth 1990 to 1996	Median Household Income (1989)	Area (Sq. Mi.)
Austin, TX	541,278	+14.7%	$25,414	217.8
Baltimore County, MD	720,662	+4.1%	$38,837	599.0
Cary, NC	75,676	+70.5%	$46,259	31.2
Fort Collins, CO	104,196	+19.1%	$28,826	41.2
Lacey, WA	27,381	+42.0%	$29,726	10.1
Loudoun County, VA	133,493	+54.9%	$52,064	520.0
New Britain, CT	71,512	–5.3%	$30,121	13.3
Olympia, WA	39,006	+15.6%	$27,785	16.1
Prince George's County, MD	770,633	+5.6%	$43,127	486.0
Raleigh, NC	243,835	+15.0%	$32,451	88.1
South Bend, IN	102,100	–3.2%	$24,131	36.4
Tallahassee, FL	136,751	+9.6%	$34,764	63.3
Tucson, AZ	449,002	+9.1%	$21,748	156.3
Waukesha, WI	60,197	+5.8%	$36,192	17.3
United States	265 million	+6.6%	$35,225	

Source: US Department of Commerce, Bureau of the Census. [http://www.census.gov].
[1] US Census Bureau Data (1996).

Per-Site Compliance Costs: Installation and O&M.

EPA used standard cost estimates from R.S. Means (R.S. Means, 1997a and 1997b) and the WEF database to estimate construction BMP costs for 27 model sites of typical site conditions in the United States. The model sites included three different site sizes (one, three, and five acres), three slope variations (3%, 7%, and 12%), and three soil erosivity conditions (low, medium, and high). EPA used the WEF database to determine BMP combinations appropriate to the model site conditions. For example, sites with shallow slopes and a low erosivity require few BMPs, while larger, steeper, and more erosive sites required more BMPs. Detailed site plans, assumptions, and BMPs that could be used are presented in Appendices B–2 and B–3. Based on the assumption that any combination of site factors is equally likely to occur on a given site, EPA averaged the matrix of estimated costs to develop an average cost for one-, three-, and five-acre starts for all soil erodibilities and slopes.

Exhibit 4–6. BMPs Used for the Model Sites

Site Size (acres)	Soil Erodibility	Slope 3%	Slope 7%	Slope 12%
1	low	a	a,b	a,c,e
	med	a,b	a,c,e	a,c,e
	high	a,c,e	a,c,e	c,e,f,g1
3	low	a,b	a,c,e	c,d,e,f,g2
	med	a,c,e	a,c,e	c,d,e,f,g2
	high	a,c,e	c,d,e,f,g2	c,d,e,f,g2
5	low	a,c,d,e	c,d,e,f,g3	c,d,e,f,g3
	med	a,c,d,e	c,d,e,f,g3	c,d,e,f,g3
	high	c,d,e,f,g3	c,d,e,f,g3	c,d,e,f,g3

a = silt fence
b = mulch
c = seed and mulch
d = stabilized construction entrance
e = stone check dam
f = earthen dike directing runoff to sediment trap
g = sediment trap (1=1,800 cf, 2=5,400 cf, 3=9,000 cf)

Costs related to each BMP and the description of the BMP were shown in Exhibit 4-7 of the original document.

Exhibit 4–8. Estimated Cost of BMPs for the Model Sites (1998 dollars)

Site Size (acres)	Soil Erodibility	Cost by Slope 3%	Cost by Slope 7%	Cost by Slope 12%	Average Cost
1	low	$317	$814	$1,422	$1,206
	med	$814	$1,422	$1,422	
	high	$1,422	$1,422	$1,799	
3	low	$1,978	$3,804	$6,047	$4,598
	med	$3,804	$3,804	$6,047	
	high	$3,804	$6,047	$6,047	
5	low	$6,245	$9,334	$9,519	$8,709
	med	$6,245	$9,334	$9,519	
	high	$9,334	$9,334	$9,519	

Per-Site Compliance Costs: Administrative.

EPA then estimated administrative costs per construction site for the following elements required under the Phase II rule: submittal of a notice of intent (application) for permit coverage; notification to municipalities; development of a stormwater pollution prevention plan (SWPPP); record retention; and submittal of a notice of termination. The average total administrative cost per site was estimated to be $937.

Exhibit 4–10. Estimated Other Administrative Phase II Construction Costs Per Site (1998 Dollars)

Administrative Requirement	Cost
NOI	$126.50
Municipal Notification	$17.10
SWPPP	$772.25
Record Retention	$4.51
NOT	$17.10
Estimated Total Cost (per site)	$937.46

Summing the average BMP costs and the administrative costs yields a total compliance cost of $2,143 for sites disturbing between one and two acres of land, $5,535 for sites disturbing between two and four acres of land, and $9,646 for sites disturbing between four and five acres of land. To estimate national level incremental annual costs for Phase II construction starts, EPA multiplied the total costs of compliance for one to two acre, two to four acre, and four to five acre sites by the total number of Phase II construction starts within each of those size categories. This yielded an estimated annual compliance cost of approximately $499.8 million (based on 110,223 construction starts in 1998).

EPA anticipates that 19,452 (15%) of the estimated Phase II incremental construction universe will qualify for a waiver from program requirements by meeting one of two conditions. Construction sites can be waived if they are either located in areas with low rainfall potential or if water quality analyses show that there is no need for regulation. EPA estimates the incremental administrative cost associated with preparing and submitting a waiver to be approximately $665,000 (1998). Total costs (national compliance and waiver costs) resulting from implementation of the Phase II erosion and sediment control provision are estimated to be **$500.4 million**.

Exhibit 4–11. Estimated National Phase II Construction Compliance Costs by Climatic Zones for Year 1998 (1998 Dollars)

Climatic Zone	Representative City	Number of Starts 1–2 Acres	Number of Starts 2–4 Acres	Number of Starts 4–5 Acres	Total Starts	Costs for Starts 1–2 Acres	Costs for Starts 2–4 Acres	Costs for Starts 4–5 Acres	Total Costs
A	Portland, OR	1,683	1,471	659	3,813	$3,608,528	$8,141,052	$6,360,054	$18,356,897
B	Boise, ID	1,508	1,345	576	3,429	$3,232,932	$7,443,548	$5,556,280	$16,455,088
C	Fresno, CA	2,388	2,018	974	5,380	$5,118,068	$11,171,812	$9,400,679	$26,039,422
D	Las Vegas, NV	7,154	6,256	3,035	16,445	$15,335,047	$34,628,344	$29,276,500	$80,306,157
E	Denver, CO	1,787	1,613	636	4,036	$3,829,714	$8,928,128	$6,135,764	$18,893,606
F	Bismarck, ND	560	469	156	1,185	$1,199,916	$2,595,370	$1,508,877	$5,304,163
G	Helena, MT	1,067	921	348	2,336	$2,287,796	$5,098,377	$3,354,650	$10,740,823
H	Amarillo, TX	3,295	2,838	1,152	7,285	$7,063,767	$15,708,383	$11,110,516	$33,882,666
I	San Antonio, TX	1,105	960	414	2,479	$2,368,045	$5,314,569	$3,997,033	$11,679,647
K	Duluth, MN	2,957	1,796	326	5,078	$6,339,106	$9,939,565	$3,141,089	$19,419,760
M	Des Moines, IA	9,335	7,599	2,695	19,629	$20,009,581	$42,063,182	$26,002,165	$88,074,928
N	Nashville, TN	5,801	4,707	1,705	12,212	$12,434,357	$26,052,990	$16,445,128	$54,932,475
P	Atlanta, GA	5,157	2,956	1,127	9,241	$11,054,430	$16,364,835	$10,875,252	$38,294,517
R	Hartford, CT	6,909	5,324	2,116	14,348	$14,808,848	$29,468,120	$20,412,901	$64,689,869
T	Charleston, SC	1,194	675	263	2,132	$2,560,342	$3,736,824	$2,535,496	$8,832,662
V	Hawaii	504	423	218	1,145	$1,080,648	$2,340,928	$2,099,447	$5,521,023
W,X,Y	Alaska	22	20	8	50	$47,885	$112,127	$72,563	$232,575
Total		52,426	41,389	16,408	110,223	$112,379,010	$229,108,154	$158,284,394	$499,771,558

Note: Number of sites include only those where storm water BMPs are not currently required by Federal or State programs. Totals may not add because of rounding.

Exhibit 4–12. Phase II Erosion and Sediment Control Annual Costs

Construction Costs	Universe	Estimated Total National Annual Costs (1998 dollars)
Compliance Costs	110,223	$499,771,558
Waiver Costs*	19,452	$665,064
Total	129,675	$500,436,622

*Based on an engineering assistant's wage of $34.19 per hour. U.S. Department of Labor, 1996.

EPA also estimated incremental costs attributable to the post-construction runoff control measures. The Phase II municipal program requires municipalities to develop, implement, and enforce a program that addresses stormwater runoff from new development and redevelopment sites on which land disturbance is greater than one acre and that discharge into a regulated MS4. To develop a cost estimate associated with this measure, EPA estimated a per site BMP cost, including operation and maintenance, for 12 model sites of varying size (1, 3, 5, and 7 acres) and imperviousness (35%, 65%, and 85%). The per site BMP cost was then multiplied by the total number of multi-family, institutional, and commercial construction starts that are located in Phase II urbanized areas to obtain a national cost estimate. Using this total of 13,364 postconstruction starts, EPA estimated a range of national costs associated with this measure from $44.6 to $178.3 million (see Appendix B–4). EPA estimates total annual costs to construction operators, including implementation of erosion and sediment controls and post-construction controls, to be between **$545.0 – $678.7 million.**

Exhibit 4–15. Estimated Post-Construction Runoff Control Costs

Area	35% Impervious (Multi-Family Residential)	65% Impervious (Multi-Family/ Commercial/ Institutional)	85% Impervious (Commercial)	Total Cost (1998 dollars)
1 Acre	$503,163	$14,318,035	$25,530,478	$40,351,676
3 Acres	$1,486,961	$29,571,535	$29,588,931	$60,647,426
5 Acres	$2,001,641	$11,835,630	$9,151,038	$22,988,309
7 Acres	$3,863,272	$23,910,571	$26,494,414	$54,268,258
Total Cost	$7,855,037	$79,635,771	$90,764,861	$178,255,669

Summary of results of the total costs of the phase II program are shown below:

Exhibit 4–21. Potential Annual Costs for Phase II Storm Water Regulation

Phase II Element	Universe	Estimated Total National Annual Costs (1998 dollars)
Municipal	32,458,000 Households	$297,318,623
Construction	129,675 Erosion & Sediment Control Starts and 13,364 Post-Construction Starts	$545,000,539 – $678,692,291
Federal and State	53 States and Territories	$5,318,668
Total		$847,637,830 – $981,329,582

Reduced Sediment Delivery From Construction Starts:

To estimate reduced sediment delivery from Phase II construction starts, the US ACE developed a model based on EPA's 27 model sites to estimate sediment loads from construction starts with and without Phase II controls (US ACE, 1998). The US ACE model uses the construction site version of the Revised Universal Soil Loss Equation (RUSLE) to generate sediment delivery estimates for 15 climatic regions with each of the following variations: three site sizes (one, three, and five acres), three soil erodibility levels (low, medium, and high), three slopes (3%, 7%, and 12%), and the BMP combinations from EPA's 27 model sites. The 15 climatic regions represent the various rainfall and temperature conditions throughout the United States. Sediment delivery represents the quantity of sediment that BMPs placed at the base of the hill slope are unable to capture. EPA estimated that the average reduction in soil loss from the model sites implementing BMPs would be 89.6 tons per site. (Calculations in Exhibit 4-24)

To determine the reduction in soil loss using the estimated 80% effectiveness rate, EPA multiplied the weighted average soil loss per start (89.6 tons) by 80%. This resulted in an estimated reduction in soil loss of 71.7 tons per site. Multiplying this reduction by the 110,223 construction starts expected to implement erosion and sediment controls for the year 1998, results in an estimated 7.9 million ton reduction in soil loss annually.

Exhibit 4–25. National Reduction Estimates for Municipalities and Construction Starts (tons/year)

Phase II Element	20% Reduction	80% Reduction
Municipal TSS Loading	639,115	4,062,815
Soil loss from Construction Sites	1,975,196	7,900,785

Summary

EPA has not presented the total cost of prevention of sediments leaving the site per ton of the sediment. ES.11 (in executive summary) describes only the costs effectiveness related to the Municipal TSS loading reduction. It seems that by a simple

calculation from the two former exhibits (4-24 and 4-25) that the total cost assuming 80% reduction in the sediments would be between $69 - $86 per ton of sediment.

Appendix I Scoping Memo

MEMORANDUM

OFFICE OF WATER PROGRAMS
CSU SACRAMENTO
7801 Folsom Boulevard, Suite 102
Sacramento, CA 95826

Date: **August 15, 2003**
To: **Pamela Barksdale, State Water Resource Control Board**
From: **Brian Currier**
Subject: **Scope for the storm water cost survey**

This memorandum presents additional information and recommendations in order to proceed with Task A of the "Survey of Costs to Develop, Implement, Maintain and Monitor Municipal Separate Storm Sewer System (MS4) Stormwater Management Programs (SWMP) and Description of Alternatives for Control of Stormwater Quality in Los Angeles County" (See Attachment A). A presentation of candidate municipalities, corresponding demographics, and recommendations for the six municipalities to be surveyed are presented herein.

Nomination of Municipalities

The identification of candidate municipalities began with a conference call on June 23, 2003 with the State Water Resources Control Board and representatives from interested Regional Water Quality Control Boards. The scope and intent of the study was shared with the conference call participants. The Regional Boards then nominated municipalities within their jurisdiction that appear are complying with their permits and are taking appropriate steps toward meeting water quality objectives. Some nominees were subsequently eliminated upon further discussion with either the municipality or the regional board. The remaining municipalities are presented in Table 1 along with a limited set of city characteristics.

Table 1. Nominated Municipalities for the Stormwater Cost Survey

CITY	TOTAL POPULATION	AREA (Sq. Miles)	MEDIAN INCOME/ HOUSEHOLD ($)	MEAN INCOME ($)	INCOME DENSITY ($/ft^2)	STORM WATER DRAINAGE SYSTEM FUND
CALIFORNIA	33,871,648	163,696	47,493	22,711	0.2	
Los Angeles	3,694,820	498	36,687	20,671	5.5	Yes
Fresno	427,652	105	32,236	15,010	2.2	Yes
Sacramento	407,018	99	37,049	18,721	2.8	Yes
Oakland	399,484	78	40,055	21,936	4.0	Yes
Anaheim	328,014	50	47,122	18,266	4.3	Yes
Fremont	203,413	87	76,579	31,411	2.6	No[1]
Huntington Beach	189,594	32	64,824	31,964	6.9	Yes
Ontario	158,007	50	42,452	14,244	1.6	Yes
Santa Clarita	151,088	48	66,717	26,841	3.0	Yes
Salinas	150,724	19	43,720	14,495	4.1	Yes
Santa Monica	84,084	16	50,714	42,874	8.1	Yes
Encinitas	58,014	20	63,954	34,336	3.5	No
Poway	48,044	39	71,708	29,788	1.3	Yes
San Clemete	49,861	18	63,507	34,169	3.3	Yes

Selection Criteria

In order to present compliance costs that are representative of the widest range of California environments, a diverse selection of municipalities from the nominees is recommended. The primary factors considered are location, population, income, rainfall, and whether a stormwater drainage system (SDS) fund exists. Location is given the highest priority to ensure that the results of this survey have the widest statewide applicability. A comment from the conference call participants was to place a high priority on whether a city had a separate storm water fund. This is an indication that the city currently accounts for stormwater related expenses, allowing for further analysis of those costs. Population and income are both considered important factors, but their relative importance is unknown at this time. To make the study results more useful to other communities, it is generally sought to include both large and small cities and include cities with a variety of income parameters. Including at least one municipality with a population smaller than 100,000 will help in understanding cost for smaller cities (including NPDES Phase II municipalities). Income is a consideration as higher income communities generate a higher tax base. This may not directly relate to stormwater expenditures, but at this point it should not be ignored if it proves to be a factor. Rainfall was not a major consideration. Selecting cities by location (different geographical areas) adequately represent the range of rainfall. The range of rainfall of the candidate cities is 10 to 23 inches per year.

[1] Footnote added 1/20/05: Fremont does have a drainage fund; the original memorandum was incorrect.

Selection Recommendations

In considering location, the state can be divided into three sections: north, central, and south. For this exercise, the dividing lines are roughly south of San Jose and north of Santa Clarita. Each section is further distinguished between coastal and inland areas. Thus, one coastal and one inland municipality can be recommended from each section.

For Northern California, Fremont, Oakland, and Sacramento are nominated. Sacramento is the only inland city and it has a storm water fund. For coastal areas, Oakland has the advantage over Fremont because of its storm water fund. Oakland also offers a higher population density compared to Sacramento and Fremont. Based on these observations Sacramento and Oakland are recommended for the cost survey, if Oakland can overcome some timing issues regarding availability of staff time to support this project. If not Fremont could be substituted.

For Central California, Salinas and Fresno are nominated. They are ideal for location (coastal vs. inland), size (151,000 vs. 428,000), and income density (4$/ft^2 vs. 2$/ft^2). Therefore, Salinas and Fresno are recommended for the cost survey.

For Southern California, the selection is a bit more complex. San Clemente, Anaheim, Huntington Beach, Ontario, Santa Clarita, Santa Monica, Encinitas and Poway are nominated. Because smaller size communities have not been selected anywhere in California it is recommended that one of the two municipalities in Southern California be smaller (i.e. San Clemente, Santa Monica, Encinitas, or Poway). Encinitas (pop 58,000), is recommended based on their small size and upon the strong recommendation by the San Diego Regional Board. Ontario is the furthest inland, followed by Santa Clarita. The Regional Board highly recommends Ontario, and it also has a stormwater fund. Ontario's willingness to participate has not been confirmed, but their staff that was initially contacted suggested participation may not be a problem. Encinitas and Ontario are recommended for the cost survey.

Although it was not used as a criterion in the above process, income characteristics vary adequately among the recommended municipalities.

Final selection of municipalities will be made after further consultation with you and the Technical Advisory Group.

Please call me with any comments or questions at (916) 278-8109.

Appendix J TAG Comments

This appendix contains a description of the Technical Advisory Group (TAG), written TAG comments, and action items from the final meeting with the TAG. In the action items, the study team condensed all applicable TAG comments each affected section of the report. Additional notes that did not result in changes to the report are listed after the action items.

TECHNICAL ADVISORY GROUP MEMBERS

Dr. Steven Frates is a Senior Fellow at the Rose Institute of State and Local Government at Claremont McKenna College. Dr. Frates has extensive experience in public policy analysis, with particular emphasis on local government finance. He has served as an assistant in municipal government, as the executive director of a major metropolitan taxpayer association, and on the California Constitutional Revision Commission. Dr. Frates has been a faculty member at the University of Colorado and the University of Southern California, and has lectured at other universities and colleges.

Dr. Jay Lund, is Professor of Civil and Environmental Engineering at the University of California in Davis. Dr. Lund's research involves application of systems analysis, economic, and management methods to infrastructure and public works problems. His recent work is primarily in water resources and environmental system engineering. While most of this work involves the application of economics, optimization, and simulation modeling, his interests also include more qualitative policy, planning, and management studies. His work has applied contemporary methods in cost-effectiveness and benefit-cost analysis to evaluate stormwater quality control measures, including both their costs and their likely water quality benefits. Dr. Lund is a past editor of the ASCE Journal of Water Resources Planning and Management and is a member of the International Water Academy.

Dr. Bowman Cutter is a professor of water resources management at U.C. Riverside in the Department of Environmental Sciences. His research examines cost-effective water pollution regulation, environmental federalism, and state and local environmental enforcement efforts. Current projects examine the effect of water pricing on water pollution and analyzing the cost-effectiveness of using stormwater to recharge Los Angeles area aquifers. He currently serves on the Southern California Association of Government's Water Policy Task Force.

Eugene Bromley is an environmental engineer with the Environmental Protection Agency. Mr. Bromley has 25 years experience in water quality protection. As stormwater coordinator in EPA Region 9, Mr. Bromley provides expertise to the stormwater programs in California, Arizona, Nevada, and Hawaii. In California, he participates with the California Stormwater Quality Association, giving updates on EPA policy and projects that could affect the members of CASQA.

Dan Radulescu is a senior engineer with the L.A. Regional Water Quality Control Board, MS4 stormwater permit coordinator. Mr. Radulescu has a P.E. registration in civil engineering with the state of California. Mr. Radulescu has extensive experience with stormwater implementation costs and levels of compliance. He was the primary author of a report that reviewed and analyzed stormwater budget data submitted to the Regional Board by L.A. Region permittees.

Robert Hale is a Supervising Scientist for the Alameda County Public Works, Clean Water Division. Mr. Hale is on the Board of Directors for the California Stormwater Quality Association, where he also serves as an Executive Program Committee member. He has many years of experience with stormwater programs, from his work with Alameda County and from his participation and consultation with other stormwater programs throughout the state.

Steven Sedgwick is an environmental engineer with Camp Dresser & McKee Inc. Mr. Sedgwick has more than 35 years of experience in comprehensive drainage and stormwater planning, stormwater utility evaluations, feasibility studies, pilot plant investigations, regional water resources planning, river basin planning, water and wastewater facilities design, land application and site-specific studies, value engineering and engineering assistance during construction.

TECHNICAL ADVISORY GROUP COMMENTS

- GENERAL COMMENTS: For the 2002-3 data, I think that you did an excellent job of collecting and analyzing fragmented and somewhat non-commensurate data in order to look at the costs from two years ago. I also appreciate the depth of thought that went into your discussion of possible future costs (regardless of the shortcomings mentioned above). The nature of the available information has, I think, necessarily limited your ability to predict accurately the magnitude of costs associated with the recently added permit requirements. As a result, the report would seem to be most useful as a baseline or starting point for future cost documentation efforts. (Hale)
- GENERAL COMMENTS: First, we want to commend the research team for their outstanding job to find, if not some definitive answers, at least the right questions regarding this difficult subject of the relationship between costs and the MS4 permits implementation. It is difficult because MEP is not a clearly defined standard, MS4 permits language depend strongly on the local conditions and the willingness of the local communities to implement those requirements to protect water quality in the existing fiscal conditions. There is little guidance, if any, on this subject, and the estimates on the stormwater program implementation varies wildly depending on the initial premises for the study. Another difficult component is to determine a direct relationship between costs and water quality improvements. If we have any comments, they are triggered by the complex nature of the subject and not necessarily because of any shortcomings of the research itself. As we said, very few nationwide studies are focusing on this subject and even U.S. EPA has provided very little guidance on the subject. We also want to point out that this study focuses on the costs, and not necessarily on the benefits in water quality from the measures implemented due to MS4 permits. Therefore the reader of the study must keep in mind that there is an additional dimension of the economic equation when assessing the implications of MS4 permits costs to give a balanced view of the whole issue. (Dan)
- GENERAL COMMENTS: Due to inherent limitations, the research did not evaluate the impact in funding options, Stormwater Utility Fee vs. General Fund. Cities that rely on the General Fund to cover costs of compliance face different challenges than those with a separate, stable and dedicated funding mechanism. It is also true that municipalities funding their storm water MS4 permit costs through General Fund have a higher tendency to apply pre-existing programs, such as street sweeping, trash collection, storm

drain maintenance, etc., and their costs to the mandatory costs of compliance. In their case, it is even more difficult to discern the origin of costs in pre-existing, new, enhanced, in the absence of clear guidelines. In extreme instances, in some cases of municipalities depending on General Fund and pre-existing programs, contingent on how the requirements of the permit and costs are interpreted, the cost of compliance can vary from low hundreds of thousand dollars to a high dozen million dollars (!) per year for the same small municipality. A number of municipalities even pointed out this discrepancy, based on different interpretations, in their annual reports. This lack of guidance also fuels the debate of the correct impact of MS4 permit compliance costs that can vary from single to hundreds of dollars(!) per household per year. Obviously there is a significant difference from manageable to exorbitant costs. Unless there are clear guidelines and transparency on how to determine the correct compliance costs with MS4 permit requirements we will face this debate from reasonable to exorbitant for years to come.

- WATER QUALITY (Sect. 3) Review major water quality problems that SW Program addresses for each city (Lund)
- IDENTIFYING TRUE COSTS: Establish a 1990 costs baseline and then determine what are the true additional costs due to the stormwater regulations by comparing the 1990 baseline with the data investigated (2002-03). One example is to use per capita costs: if in 1990, the city was spending $10/y/capita for street sweeping, in 2002 the cost (in dollars adjusted for inflation) would be (e.g.)$14/y/capita. Then determine the portion attributable to the SWMP implementation and MS4 permit compliance. Only this type of transparent analysis will reveal the true additional costs, new financial burden, mandated by the existing MS4 permits. This type of analysis may add new findings to the one identified presently in the study. This approach should be used for street sweeping, catch basins and storm drain system, trash collection, hazardous waste recycling programs, flood control component of the city's overall stormwater management, etc…

  How these facts impact the conclusion of the research?

  These types of observations are very important since they reveal the significant importance of such expenditures, such as street sweeping, in the make up of the attributed costs for compliance with the MS4 permits.

  This is even more necessary for cities that depend solely on General Fund money to comply with the MS4 permit requirements. Many pre-existing, well-established programs, in some cities, count now as "exorbitant" MS4 permit costs compliance, when the only change was to move the expense from one column into another in the cities financial reports. (Dan)
- COST/DATA REPORTING: We suggest that a better option for reporting is to use GASB or similar standardized approaches to costs and infrastructure inventory may be a better way to assure transparency. The ways suggested by the research to report cost data seem reasonable, but if this effort can be tied to an existing standardized approach, such as GASB, that may be very valuable since it will provide for consistency statewide and even nationwide. It may be that GASB does not cover all reporting categories. The reporting may use a hybrid between the existing GASB itemization and the approach suggested by the research. An additional approach maybe to lobby the GAS Board to make changes in the accounting rules to allow for water quality itemization. (Dan)

- COST ALLOCATION BY CATEGORY: I would replace the regressions with the interesting analyses contained in appendix G as a starting point. First look at how much the variation in the cost of each program component contributes to the overall cost variation. It appears that the variation in the Municipal category is the biggest driver. However, what I am not sure is whether that is because categories are not consistent across cities and different cities place different costs in the municipal category. Please comment on that possibility. It looks like the variation in overall management is the second biggest driver of the overall cost variation. Again, please comment on whether this is due to "true" cost differences or category-confusion. A very rough statistical methodology to tease this out is to find out the correlation coefficients between each of these two categories and each of the other categories. If you find some strong negative correlations, this is an indicator that really the cost differences are just due to category confusion. In the end this may be a topic that calls for a more qualitative answer. I would like to see a discussion of, taking into account what you know about data quality, whether you think the high cost/household cities tend to have higher costs across the board, or whether their higher costs are generally due to having higher costs in one category or another. From the data, the latter appears to be true, but I don't have a sense of the data quality and how the categories are affected by cost-shifting. (Cutter)
- BUDGET/COST ALLOCATION: (table 6.2) Can percentages of cost assignment add up to 100% to show how the total budget is allocated? (Lund)
- INDUSTRIAL PROGRAM COST PER INSPECTION AND SITE, AND THE EQUIVALENT NUMBERS FOR THE CONSTRUCTION PROGRAM COSTS. Both these programs have almost order of magnitude differences in costs. Please write up the reasons for these differences more thoroughly. I suspect that some of the reason for these large cost differences is cost-category confusion. You should indicate whether you think that is the case, and then indicate which citie(s)' normalized inspection costs you judge to be most satisfactory and why. I know this is going out on a limb, but few observations call for a more qualitative analysis. The large cost ranges diminishes the amount of information in the report and an indication of where the cost numbers likely lie for your best data cases would add quite a bit. (Cutter)
- STREET SWEEPING COSTS: Another possible angle to examine the overall cost range is to break out street-sweeping vs. non-street-sweeping expenditures, since street sweeping seems to be the largest element of the biggest category, and see what the cost/household ranges are in this breakdown. Then you could comment on whether street-sweeping costs are the big driver behind cost differences. Further, you could remark on whether it appears that some communities are doing more street-sweeping than necessary to comply with their permit (do we have a curb miles swept and total curb miles for each city?).(Cutter)
- STREET SWEEPING COSTS: (Table 9.3) Explain street sweeping unit and $cost/curb mile swept variability, in particular the low/high values. (Lund)
- STREET SWEEPING COSTS: On page 52, the paragraph just above the Table 9-5, states: "cost savings can be realized if cities are allowed to focus on the most cost effective programs rather the following overly prescriptive permit requirements." For example, since street sweeping is the most significant share of the stormwater costs maybe it

should be determined if this program is also cost effective the way it is performed presently. This is one avenue to improve the cost-effectiveness relationship. Why spend a significant amount of money if the impact may be insignificant? Some studies in the literature suggest that fact. Secondly, the permits are "overly prescriptive" in many instances due to Permittees specific request to the Regional Board for clarification and guidance in the permits on what they are required to accomplish, when and how. (Dan)

- WATERSHED MANAGEMENT COSTS (Sect. 8 ,Pg. 44) Elaborate on watershed management cost (Lund)
- TMDL COSTS: We strongly recommend the inclusion of TMDL portion of the report in a separate attachment or appendix. The TMDLs cost review were not part of this proposal. The costs vary in a wide range, based on various assumptions and scenarios, none of the cities are currently implementing TMDLs via a MS4 permit. We believe that the inclusion of TMDL discussion in the body of the main report will confuse things. The job of accurately estimating TMDLs implementation costs is complex and open to many interpretations. It is opportune to present various ranges and costs under the research done up to date but we are a long way to agreeing on one set of values. Therefore we believe that the TMDL research on future costs should be included in an Appendix to the report. (Dan)
- TMDL COSTS: p.55 section headed Adding future costs…This is pretty unclear, either expand it or drop it. I think you mean to say something like if current cost estimates are X, and TMDL estimated costs are Y, total costs should be something less than X+Y since current and TMDL expenditures overlap. But I am not quite sure that is what you mean. (Cutter)
- LAND ACQUISITION COSTS: The Advanced Treatment (Gordon, et al.) discussion mentions that land costs were included in that $37 billion cost estimate. However, Section 9 draws in part from Appendix H. Most of the discussions of treatment system examples in the Appendix do not make it clear whether land acquisition costs were included in the cost figures given. In my view, this omission tends to weaken the credibility of the figures used. In the case of the Tule Ponds (the one with which I am most familiar) the $360,000 cost figure does not include any consideration of land costs. The site was, and is owned by the Flood Control District so no purchase price is included. The Authors do touch on the subject when they mention in some examples how land necessary for other purposes (e.g., parking lots) can be put to dual use for stormwater treatment (which makes land acquisition unnecessary). However, the dollar figures given for the various systems need to include mention of whether land costs were included and what they might be if the were not. This is especially true (as you point out) in densely populated urban areas. In the Tule Ponds case, if land were to be purchased on the open market in the center of Fremont, the total cost of the project would be an order of magnitude higher. On the issue of land costs being lower in less densely populated areas (a point that the report makes). In the San Francisco Bay Area, the need for treatment is greatest in densely urbanized areas and almost non-existent in rural areas. In our area, population density tends to increase as one moves toward the Bay. Since stormwater can't really be pumped uphill to treatment facilities, our need for such facilities tends to

be greatest exactly where land prices are highest. This limits our flexibility in locating treatment facilities based on land costs. (Hale)

- DUAL BENEFITS: It is not clear how to account for dual benefit activities. In the case of city of Sacramento, pump station cleaning may be attributable also to maintaining the hydraulic integrity of the system, a water quantity, flood control issue, not necessarily due to water quality concerns. (Dan)
- DATA ANALYSIS: More can be done on the attempts to define what factors lead to higher or lower costs for total costs as well as element by element. The first step is to relegate the various regression analyses to appendices or to drop them altogether. Seven observations are not sufficient for a statistical analysis. This is evidenced by the confidence intervals in Figure 1, which appear to be below zero for three cities. However, there is even less information in this regression than it first appears. Comparing aggregate stormwater spending to aggregate household income is somewhat misleading because they are both driven simply by the overall size of the city. A better regression would be per-household stormwater spending on household mean or median income. I suspect the R2 would be quite a bit less and the confidence intervals correspondingly greater. My recommendation is to simply drop the regressions from the body of the report. (Cutter)
- DATA ANALYSIS: (Section 9.1) Analysis seems simplistic. Should cost be related to the problem, which might be proportional to population or level of economic activity? Cost/ HH values need to be further explained. (Lund)
- DATA ANALYSIS: p.52 2nd par. Sentence beginning with: The present worth cost… please explain this sentence further, why is there such a large cost range? Explain to the reader why the cost-per-acre and cost-per-volume estimated difference and the range in the land prices. You can do this in a footnote. (Cutter)
- DATA ANALYSIS: Explain rainfall as the best indicator for cost (Lund)
- VARIABILITY IN COSTS AMONG CITIES: I would like a final summing up in the report of why the overall cost/household range is large. Again, this will probably have to be more qualitative, but I think that is fine. I would like the reader to come away with a sense of why one city has costs almost three times larger on a per-household basis. That qualitative analysis should think through the following questions: 1) even within the category of cities with good stormwater programs are some cities doing a lot more activities than others?; 2) If so, is the extra activity necessitated by say, greater amounts of construction or other factors? Are some cities in the midst of infrastructure activities so that you would expect say a three year average of stormwater costs to be in a much closer range? Perhaps you will conclude that the cost differences are really inexplicable given what you know. If so, that in itself is interesting and you should suggest further avenues for research into hypotheses suggested by your experience in this project and explain why this research does not give insight into the reasons behind the large cost range. (Cutter)

TAG MEETING NOTES FROM DECEMBER 14, 2004:

Action Items

1. Clarify that, beyond the objectives identified in the report and contract, this report also serves as a step toward establishing cost numbers to be used in budgeting and cost/benefit evaluations. Note that this report does not address the benefits of those permit required stormwater activities that are assumed to improve water quality. Note that the reports use as a budgeting tool may only be timely for Phase II permittees. **Location of Change: pg ES-1, Section "Task A"; Section 1, section "Task A"**

2. Double check consistency of classifying costs (e.g. existing, enhanced, new). Add discussion defining these terms and discuss the likelihood that enhanced cost is, for the most part, pre-existing. Display graphically. Note any differences between the accounting practices of cities with a SW utility fee and those without, especially regarding the amount of the costs that are 'existing' or 'enhanced'. If apparent from the study, discuss the relative importance of having a fee versus having a designated fund, without a fee to fund it. **Location of Change: Figure 9.4 and Section 2.5 and additions to Section 9.1, p49.**

3. Replace the regressions in report with qualitative discussion on cost differences between cities. List major water quality control strategies and affected water bodies for each city. This may help explain some cost variation. Explain differences in cost between cities qualitatively. (e.g. Fresno low because joint use facilities, permeable soils, available land). Note any large infrastructure campaigns of the cities. Move regressions to appendix with the note that we tried various correlations but a model was not successfully developed, partly due to the small sample size. Only do regressions on normalized cost, not aggregate costs, which are only a surrogate for city size. Include a note in the body of the report that the failure of the regressions was expected due to small sample size and that the regressions are presented in an appendix as anecdotal information.
   Location of Change: Discussion additions and modifications to Section 9.1, Deleted regression figures in ES and section 9.

4. Move TMDL and future cost discussion from Section 9 to an appendix. Add a note to the appendix and executive summary that Task B research was done assuming the MS4 permitting process as it stands presently, using an iterative process of enhancing implementation of BMPs. This scenario may overlap with TMDL process, but it is not necessarily the same. TMDLs may be folded in MS4 permit as allocations, as appropriate, depending on the impairments to receiving waters. Note that the costs for LA may be specific for LA only and are difficult to extend to other areas with

different characteristics. **Location of Change: Note added to Introduction and modified discussion moved to appendix G**

5. Downplay comparisons between TMDL costs, which are future costs that are variously estimated, and MS4 permit compliance costs incurred by the cities surveyed costs. TMDL cost estimates are total costs and not the cost to the cities exclusively. Similarly, note that Gordon costs are city-only costs. Take Gordon costs out of table in Executive Summary and discuss in the text.
   Location of Change: Section 9 future cost discussion, including TMDLs, modified and moved to Appendix G. Gordon costs taken from ES table and moved to text

6. Add TAG comment section in Section 10 on cost tracking benefits. Propose that if the permittees have a correct cost accounting/reporting system, they would be granted an additional quantity of points towards their receipt of a grant under a state/federal program; for example, Section 319(h) grants are evaluated on a point ranking system that is established by a state. If the cost accounting/reporting information were tabulated pursuant to the state's suggested format, that applicant would receive a bonus allotment equal to a boost in total points of approximately 15 percent. This would alert that permittee to the benefit in competing for these grants as a pre-requisite to establishing the appropriate cost accounting system. The proposed system would benefit from review and acceptance by the California League of Cities. Note the process in developing consistent cost reporting in the region and the associated benefit to the city with developing and justifying stormwater utility fees. Note that our recommendations for cost reporting are only the first step in this process of developing consistent cost reporting. This process includes notifying cities of reporting goals, identifying whether costs are minor and local and applicable to other cities, review reported costs for quality and consistency, and provide feedback to the cities. Identify appropriate categories with definitions to allow clarification between differences; with appropriate definitions, the individual entities could probably better assist the permittees to understand the benefit of reporting costs in a correct fashion. For example, a reported cost item may be illegal discharge elimination and would have clarified definitions to differentiate between end-of-pipe actions, in-pipe actions, source identification, and source detection. **Location of Change: Discussion added to Section 10.2 and 10.3, pages 51 and 56. Regressions moved to Appendix G.**

7. Make sure legal fees are properly discussed. Appellant fees are excluded, but legal advice on program implementation and response to citizen suits are included. We assume that if legal fees are incurred, it is part of the cost of doing business. This is not an assumption that all lawsuits are frivolous and therefore attorney fees are justified expenses. Neither is it an assumption that all legal advice is to challenge the lawsuit rather than to acquiesce to the demands of the lawsuit. **Location of Change: See discussion in section 9.5**

8. Append all written TAG comments to the report. **Location of Change: See Appendix J.**

9. Report cost without existing and enhanced 'big-ticket' items such as street sweeping trash collection, storm drain maintenance, drain line cleaning, channel cleaning, and pump station cleaning, recycling, hazardous waste roundups, etc. Note that an unknown portion of an "enhanced" cost is appropriate to count toward the additional financial burden of permit compliance. Also, include a suggestion that a three years average, 1987-1990, may be used as a baseline cost to figure out "enhancement" portion costs based on the post 1990 MS4 permit requirements and caveat that unit cost for sweeping varies. Note that sweeping is an enhanced cost and the majority of effort pre-existed the first stormwater permits. Also caveat that all programs may still have hidden costs that could not be identified by the cities. An example is backup equipment for street sweeping, but note that these costs are also preexisting. **Location of Change: See section 9.4 for added discussion of existing and enhanced costs and see Section 2.5 for discussion of using baseline costs.**

10. Consider using pie charts for each city to show distribution of costs among categories. **Location of Change: See individual city sections (sections 3-8)**

11. Note that Post Construction costs are expected to increase as cities move into full implementation of SUSMP type requirements for new development and redevelopment. Note that the reported costs are particularly misleading for cost projection purposes since the research coincides with the start of SUSMP type requirements implementation. **Location of Change: Section 9.5, Qualitative Discussion of Stormwater Costs for Selected Cost Categories**

Additional meeting notes

1. Cities may try to push as much general fund expenses as possible to stormwater a fee, but public response to fees helps balance cost. [I believed we discussed that cities successful in passing a SW fee were very transparent in the process, limited in scope, and going to great lengths to tie the SW fee to activities and capital investments related directly to water quality enhancements and benefits. Probably is not a bad idea to put some positive "lessons learned" from those successful cases in passing a SW fee.] (Dan)
2. GASB 34 may not be a realistic method to encourage cost reporting, especially on the short term. [is there a way to move this idea at a national level? That GASB can develop some standards for such a purpose, or add to an existing one?] (Dan).
3. Hamilton County, Ohio costs were not captured till 2001, for Phase II non-Cincinnati areas. Took two years to establish more consistent cost reporting. The cost had been

accounted for from 2001 through 2003 for Phase II cities, but that even these costs were "too vague" to allow appropriate interpretation by all 44 permittees. When CDM conducted the next evaluation required to establish a charge for these functional activities, CDM had to more precisely define the activities and quantify the level of effort for each action (Steve).

4. Wisconsin and Florida: cities are given points for having a fee, points awarded if utility charges are above $3.50 (80), below (40), and none (0). Points are a criterion for grant applications. Expand the last sentence to read “This approach would assure that permittees competing for grants would receive between 15 and 20 percent bonus points in the priority ranking system utilized by these states to award grants” (Steve).
5. Average cost per billing unit is $2.92/month for all stormwater including flood. Only for cities with stormwater fund/fee. Insert “Based upon evaluations conducted for stormwater utilities charging a stormwater user fee as of December 31, 2003, the total monthly charge per residential dwelling unit was $2.92/month. The services provided for this fee included all components that a given jurisdiction was incorporating into the stormwater management program, but could have been augmented/supplemented with additional monies from other sources that weren't clear in the writer's review. However, greater than 75 percent of those systems reviewed included some costs for quantity management in this fee.” (Steve). [See my comment at first point, it seems that a focused SW quality fee will be on average much less that $3/month/billing unit. city of LA with its current $18/yr/household seems to be right there, at the average.] (Dan)

United States
Environmental
Protection Agency

Region 9 Ground Water
Office (WTR-9)

draft
month 2002

Municipal Storm Water and Ground Water Discharge Regulations in California

Inside:

- **Do I need to get a Permit?**
- **How do I Comply?**

GUIDELINES FOR RULE AUTHORIZATION

1. All wastes are managed.
2. Dilution is not a method of treatment.
3. All disposal points are known.
4. All receiving waters are known.
5. Safe operation of well(s) is assured with routine inspection, maintenance and monitoring.
6. Close wells which cannot demonstrate compliance.

According to the 1996 National Water Quality Inventory, a biennial summary of State surveys of water quality, approximately 40 percent of surveyed U.S. waterbodies are impaired by pollution and do not meet water quality standards. A leading source of this impairment is polluted runoff. To reduce the impacts of polluted runoff, the Environmental Protection Agency (EPA) Storm Water program has developed a series of rules for municipalities and construction sites, requiring prevention of contamination of runoff, and retention of runoff where possible.

Urban and construction-related runoff has been documented to contain numerous substances known to have toxic or pathogenic properties, such as motor vehicle fluids, pesticides, heavy metals, and fecal coliform. Spilled fuel, solvents, waste oil, paints, and other maintenance fluids pose a risk to the environment but may be especially harmful if they enter someone's drinking water supply. Small amounts of some substances may cumulatively degrade an aquifer, if a significant proportion of contaminated runoff is percolated to the water table.

The percolation of contaminated runoff can cause unacceptable consequences to ground water resources. To prevent the trading of pollution from surface water to ground water, EPA Region 9 has prepared this fact sheet for municipalities contemplating the use of injection wells as a means of managing storm water.

The UIC regulations were promulgated to regulate subsurface disposal of fluids through drains, pipes, and other constructed conveyances that are intended to permanently emplace fluid below ground surface. Drywells, unlined sumps, seepage pits, and infiltration galleries are some of the terms used to describe the subcategory of injection wells known as shallow Class V injection wells. Municipalities who utilize injection wells as a means of storm water management need to be cognizant of the regulations applicable to this practice.

Storm water wells can be a community asset or liability. One incident of contamination could cause millions of dollars of damage to the public water system and to the local economy. Complying with the regulation may be as simple as reporting the number of wells you operate. Implementing additional management measures could prevent pollution and protect precious water resources.

What is a Class V injection well?

STORM WATER MANAGEMENT DEVICES

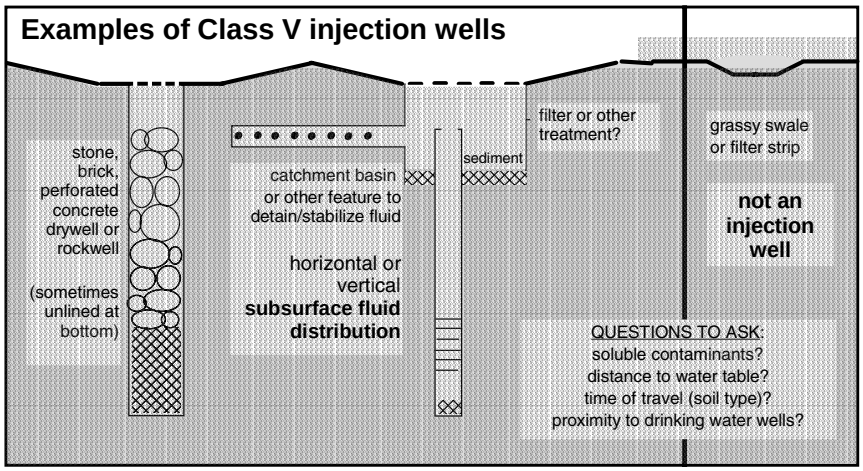

All percolation, deep or shallow, poses some environmental risk. Best management practices, pretreatment, and exposure to the elements all have a role in reducing storm water conntaminants, but they provide no guarantee. Storm water programs can't eliminate risk, but they can significantly reduce it.

What are the requirements in California for owners and operators of Class V injection wells?

1. **Submit an Inventory Form** to EPA for all Class V injection wells. The inventory form registers the ownership and liability for the wells and notes their approximate location. Complying with the inventory requirement means you are "authorized by rule" to continue injecting unless EPA requires more information, a permit, or closure of your well(s). For a copy of the inventory form, contact EPA Region 9. *40 CFR 144.26*

2. Respond to requests for additional information about your well(s). If EPA suspects that your well(s) may be threatening an underground source of drinking water, it may require you to further investigate the location and use of your well(s) relevant to area aquifers and land uses. *40 CFR 144.27*

3. If requested by EPA, apply for and comply with an injection permit. *40 CFR 144.25*

4. Close any wells that are suspected or likely to cause contamination of underground sources of drinking water. 40 *CFR part 144.89*

5. No owner or operator shall construct, operate, maintain, convert, plug, abandon, or conduct any other injection activity in a manner that allows the movement of fluid containing any contaminant into underground sources of drinking water, if the presence of that contaminant may cause a violation of any drinking water regulation under 40 CFR part 142 or may otherwise adversely affect the health of persons. *40 CFR 144.12*

...FROM THE REGULATIONS

(Injection) Well means: A bored, drilled, or driven shaft whose depth is greater than the largest surface dimension; or, a dug hole whose depth is greater than the largest surface dimension; or, an improved sinkhole; or, a subsurface fluid distribution system.

Subsurface fluid distribution system means an assemblage of perforated pipes, drain tiles, or other similar mechanisms intended to distribute fluids below the surface of the ground. *40 CFR 144.3*

DO I NEED A PERMIT?

EPA is the direct implementation agency for Class V injection wells in California. This means that they have the responsibility for collecting inventory data and determining which wells pose a risk that warrants further federal action, up to and including closure of endangering wells. The EPA office in San Francisco collects and maintains a database of all submitted inventory information.

Currently EPA does not have any permits for municipal storm water injection wells in California. This fact sheet is the first step in alerting municipalities of their legal obligations. Factors influencing EPA's decision to require a permit could include whether or not area ground water is a drinking water supply; its hydrogeologic susceptibility; land use practices and population density; or any documented contamination incidents linked to storm water injection wells.

Although California does not have delegation for the UIC program (like the NPDES program), the Water Code enables the Regional Water Quality Control Boards to prepare Waste Discharge Requirements for any discharge that may impair beneficial uses of waters of the state.

Local governments may set standards that are more stringent than EPA regulations.

Evaluating Storm Drain Failure

Injection/infiltration contaminates receiving ground water or surface water. Possible causes: receives human or animal waste, or chemical waste, through normal road use or illicit disposal. Constructed in a manner that there is inadequate time of travel between the "bottom" of the injection well/infiltration device and the receiving water body. Not maintained, so that heavily contaminated sediment from dry weather flow is flushed to the water table when wet season begins. Constructed hydrogeologically close to water body (inadequate setbacks.)

Clogs/doesn't percolate. Possible causes: Not maintained, clogged with solids. Illicit use for grease trap, waste oil or other viscous substance disposal. Constructed in soils with percolation rates less than 0.5 minutes per inch. Heavy clay, silty, or saturated soils. Constructed with too little setback to other fluid sources such as septic systems, leaking sewer lines, or "losing" streams (where surface water recharges ground water.)

IF AN INJECTION WELL NEEDS TO BE CLOSED:

The regulations specify minimum requirements for closure of an injection well: §144.89. You must plug or otherwise close the well in a manner that complies with the prohibition of fluid movement standard in §144.12 and summarized in §144.82(a). If the Regional Water Quality Control Board or other local agency has more stringent closure requirements, you should comply with those requirements as well. You must dispose or otherwise manage any soil, gravel, sludge, liquids, or other materials removed from or adjacent to your well in accordance with all applicable Federal, State, and local regulations and requirements, as in §144.82 (b).

EPA Region 9 requires that site characterization and closure of shallow injection wells where hazardous or toxic materials may be present be overseen and approved by a hazardous materials regulator from the local or state government (or EPA) and be performed by a qualified environmental professional.

Federal closure guidance is available. Contact EPA Region 9's Ground Water Office (see back page for numbers.)

Best Management Practices

Standard program elements recommended for storm drains leading to surface waters include:

- Public education and public involvement
- Illicit discharge detection and elimination
- Construction/post-construction site runoff control
- Pollution prevention/Good housekeeping

The same concepts apply to ground water discharges; **the cleaner the runoff, the safer the disposal.** Additional considerations for protecting underground sources of drinking water should be based on the value and vulnerability of the resource.

Is ground water a source of drinking water, through wells or through discharge to a surface water body that is tapped? Has the area been designated as a wellhead protection area, sole source aquifer, or source water area by the public water system?

Structural BMPs:

EPA has no design requirements for storm water injection wells that inject into or above the water table. Deeper injection through and below drinking water supply aquifers generally requires a permit to insure mechanical integrity and pollution prevention.

Shallow infiltration is generally environmentally safer than deep, but it is no guarantee that contamination will be prevented.

Pretreatment is needed where soluble contaminants are a concern. Sedimentation and absorbent materials may not remove dissolved pesticides, solvents, and some motor vehicle fluids.

Every injection well and infiltration device should be accessible for routine inspection and maintenance.

Non-structural BMPs

Evaluate the soils, geology, and water table. Develop an understanding of how much water can safely be land-applied to reflect natural recharge patterns. Account for other sources of infiltration that might affect subterranean flow and cause "breakouts" in low spots, or landslides.

Establish setbacks that provide sufficient time of travel in unsaturated soils for pollutant removal (and/or capture if materials spill occurs.)

Map all injection wells/infiltration devices; keep design and maintenance records for each one. Layer maps with land uses, sewer maps, and other data that might influence drainage system performance.

Assess regional or watershed impacts from injected/infiltrated fluid through monitoring programs. Depending on the proximity of drained areas to drinking water wells, collaborate with drinking water suppliers to analyze raw well water quality for early detection of runoff impacts.

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For more information:

EPA National Stormwater NPDES program:
http://cfpub.epa.gov/npdes/stormwater/swfinal.cfm?program_id=6 **or**
http://www.epa.gov/npdes/menuofbmps/

BMPs specifically for ground water:
http://www.epa.gov/reg3wapd/uic/pdf/stormwater.pdf

Drinking Water Source Protection BMPs:
http://www.epa.gov/safewater/protect/swpbmp.html

For 1999 EPA summary of stormwater injection practices nationally:
http://www.epa.gov/safewater/uic/classv/volume3.pdf

For EPA's Environmental Technology Verification (ETV) project, which is testing stormwater treatment technologies:
http://www.epa.gov/etv/index.htm

California State Water Resources Control Board website: www.swrcb.ca.gov

To obtain EPA inventory form, write to EPA at the return address below, or forms can be emailed: send email to janes.elizabeth@epa.gov

Questions about this guidance?
Call (415) 972-3537

WHAT IF IT'S NOT THE DEPARTMENT'S INJECTION WELL?

Injection wells on private property (except for those strictly intended for roof runoff, or less than 2000 gpd sewage treatment) are subject to these regulations. Injection wells have been used at certain facilities to evade sewer pretreatment restrictions and other discharge limits. If you know or suspect of ground water problems arising from illicit (or hazardous) injection wells, please call the number above or your local/county hazardous materials agency. City departments are also recommended to seek their own authority to require abatement of such systems.

U.S. Environmental Protection Agency, Region 9
Underground Injection Control Program (WTR-9)
75 Hawthorne Street
San Francisco, California 94105-3109
OFFICIAL BUSINESS - PENALTY FOR PRIVATE USE $300

FIRST CLASS MAIL
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FISH INVASIONS IN CALIFORNIA WATERSHEDS: TESTING HYPOTHESES USING LANDSCAPE PATTERNS

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Abstract. An important goal of invasion biology is to identify physical and environmental characteristics that may make a region particularly receptive to invasions. The inland waters of California (USA) are highly invaded, particularly by fishes, although there is wide variation in numbers of nonnative fishes across the state's watersheds. Here we examine patterns of fish invasions in California watersheds and their associations with natural environmental characteristics, native fish diversity, and various measures of human habitat disturbance. Our analysis is based on an extensive data set on the distribution of freshwater fishes across California's watersheds and on GIS land-use coverages for the entire state. We used canonical correspondence analysis to examine associations between environmental characteristics and the distributions of both native and nonnative fish species. We then employed an information–theoretic model-selection approach to rank hypothesized models derived from the fish invasion literature with regard to how well they predicted numbers of nonnative fishes in California watersheds. Our results indicate that pervasive, anthropogenic, landscape-level changes (particularly the extent of urban development, small-scale water diversions, aqueducts, and agriculture) influenced spatial patterns of invasion. In addition, we find that deliberately stocked fishes have different habitat associations, including a strong association with the presence of dams, than other introduced fishes. In our analysis, watersheds with the most native species also contain the most nonnative species. We find no evidence that existing watershed protection helps to prevent fish invasions in California, but we suggest that restoration of natural hydrologic processes may reduce invasion impacts.

Key words: Akaike information criterion (AIC_c); aquatic invasions; aqueducts; California fishes; dams; disturbance; fish stocking; information–theoretic approach; introduced fishes; nonindigenous species; watershed protection.

INTRODUCTION

Biologists have long noted that certain regions and habitats appear to be particularly susceptible to invasions (Elton 1958). Identifying just what makes these regions so invasible is necessary to assist in the management of invasive species as well as in the restoration of native species (Lodge 1993, Vermeij 1996). Much of the literature in this area deals with plants, birds, and insects because of their economic importance and well-documented introduction histories (e.g., Case 1996, Lonsdale 1999, Holway et al. 2002). However, fish invasions have major impacts on freshwater environments (Huston 1994), and invasions are typically cited as the first or second most important threat to the conservation of freshwater diversity (Allan and Flecker 1993, Richter et al. 1997, Kolar and Lodge 2000). Understanding the factors leading to successful invasions of fresh water is important for protecting native species diversity as well as for developing management strategies, risk analyses, and prevention and eradication measures.

Case (1991) suggests that invasions are most likely in places having either low environmental resistance or low biological resistance. Site characteristics hypothesized to favor successful invasion include (1) similar environment to native range of invader, (2) low to moderate environmental variability, (3) high degree of disturbance, especially by human activity, and (4) low native species richness (Elton 1958, Orians 1986, Lodge 1993). In freshwater systems, the number of nonnative species has been linked to hydrologic alteration (the presence of dams, reservoirs, water diversions, and aqueducts) and alteration of the landscape by human activity, especially by urbanization and agriculture, but rarely have these links been examined quantitatively (e.g., Moyle and Light 1996*a*, Gido and Brown 1999, Kolar and Lodge 2000). On theoretical and experimental grounds, ecosystems with high species richness are hypothesized to be much less invasible than those with low species richness (Elton 1958, Til-

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man 1997, Chapin et al. 1998). However, the evidence for such biotic resistance in freshwater systems is mixed, with studies finding both negative and positive correlations between native and nonnative fish species diversity (Gido and Brown 1999, Ross et al. 2001). Similar mixed findings in recent studies of plants have sparked a lively debate on the relationship between diversity of native and nonnative species (Lonsdale 1999, Stohlgren et al. 1999, 2003, Naeem et al. 2000, Kennedy et al. 2002, Rejmanek 2003).

The diversity of invasive species and invaded habitats and the complexity of the invasion process indicate that the success or failure of biotic invasions is highly idiosyncratic. The observation that ''any species can invade and any environment can be invaded'' (Moyle and Light 1996*b*, Marchetti et al. 2004) suggests that a search for generalities useful in making predictions may be challenging. Kolar and Lodge (2001) and D'Antonio et al. (2001) argue that more quantitative approaches (including meta-analysis of diverse sources of information) are likely to result in useful predictions. Part of the prediction difficulty may lie in the scale at which analyses of invasions have been performed. In order to generate numbers large enough to be analyzed using multivariate statistics, invasion patterns are generally studied either at continental/global scales (e.g., Gido and Brown 1999, Lockwood 1999, Rahel 2000) or at small regional areas which are studied intensively (Ross et al. 2001). These two scales of analysis may be inappropriate to effectively answer questions regarding landscape patterns.

Here we examine landscape-level patterns of freshwater fish invasions in California and their associations with measures of watershed disturbance, environmental characteristics, and native fish diversity. The detailed distributional information on California fishes in Moyle (2002) allows us to consider invasion patterns at what we feel is an appropriate scale of resolution, the individual watersheds of California. California is large enough (over 411 000 km^2) and long enough (spanning 10° of latitude) to encompass a diversity of environments, from arid desert to coastal temperate rainforest, which contain a wide variety of aquatic habitats (Moyle and Ellison 1991). The state is geographically complex, containing distinct zoogeographic regions and numerous watersheds that are isolated from one another so that each can be treated as an independent invasion site. California also has a history of rapid development of its water resources (its modern history essentially begins with the Gold Rush of 1849), resulting in highly disturbed aquatic environments statewide, as well as a history of frequent introductions. At the watershed scale, we therefore sample enough variance in both natural and anthropogenic watershed features to detect patterns structuring fish assemblages. This analysis should also help to answer questions about watersheds as the most appropriate unit for aquatic conservation in California as suggested by Moyle and Yoshiyama (1994).

Many of the nonnative fishes now common in California were introduced deliberately by fisheries managers during the late 19th and early to mid-20th centuries. Because many of these introductions were made into altered habitats, particularly reservoirs, the past behavior of fisheries managers may significantly influence the present distribution of nonnative fishes in California in a way that is not independent of the distribution of certain types of disturbed habitat. Fishes which are deliberately stocked are often matched to their receiving environments, introduced in much larger numbers than other introduced fishes and introduced repeatedly over time; all of which may contribute to their initial success and subsequent spread (Marchetti et al. 2004). Kolar and Lodge (2000) suggest that intentional stocking efforts will have a strong association with nonnative fish diversity. We examine this possibly confounding factor in a portion of our analysis by separately considering fishes that were initially introduced due to deliberate, officially sanctioned stocking for sport, food, or related purposes vs. those that arrived via other means, such as incidental transfer with stocked fishes, bait releases, biocontrol releases, conservation transfers, illegal stocking by individuals, ballast water transfers, aquaculture escapes, and aquarium releases.

This paper specifically addresses the following questions: (1) Do native and nonnative species show different patterns of association with watershed properties? (2) How are watershed properties, specifically measures of hydrologic disturbance, land-use disturbance, natural environmental characteristics, and native fish diversity related to the number of nonnative species present in the watershed? (3) Do deliberately stocked fishes differ from other nonnative fishes in their associations with these watershed properties? (4) Is there evidence that habitat protection can reduce the degree of invasion in watersheds? Our predictions are, first, that native and nonnative fishes will show distinct patterns of association with measures of natural habitat quality and anthropogenic disturbance, with nonnative species being more closely associated with measures of disturbance than native species; and second, that nonnative species diversity will be greatest in watersheds that have been heavily altered by hydrologic and land-use disturbance. Based on the predictions of Moyle and Light (1996*a*, *b*), we further expect to see no evidence of biotic resistance, i.e., no relationship between native and nonnative species diversity. We expect different watershed associations, particularly a greater degree of association with dams and reservoirs, for intentionally stocked fishes than for other nonnative fishes. Finally, because land protection has historically paid little attention to aquatic environments and watershed boundaries, we expect no reduction in nonna-

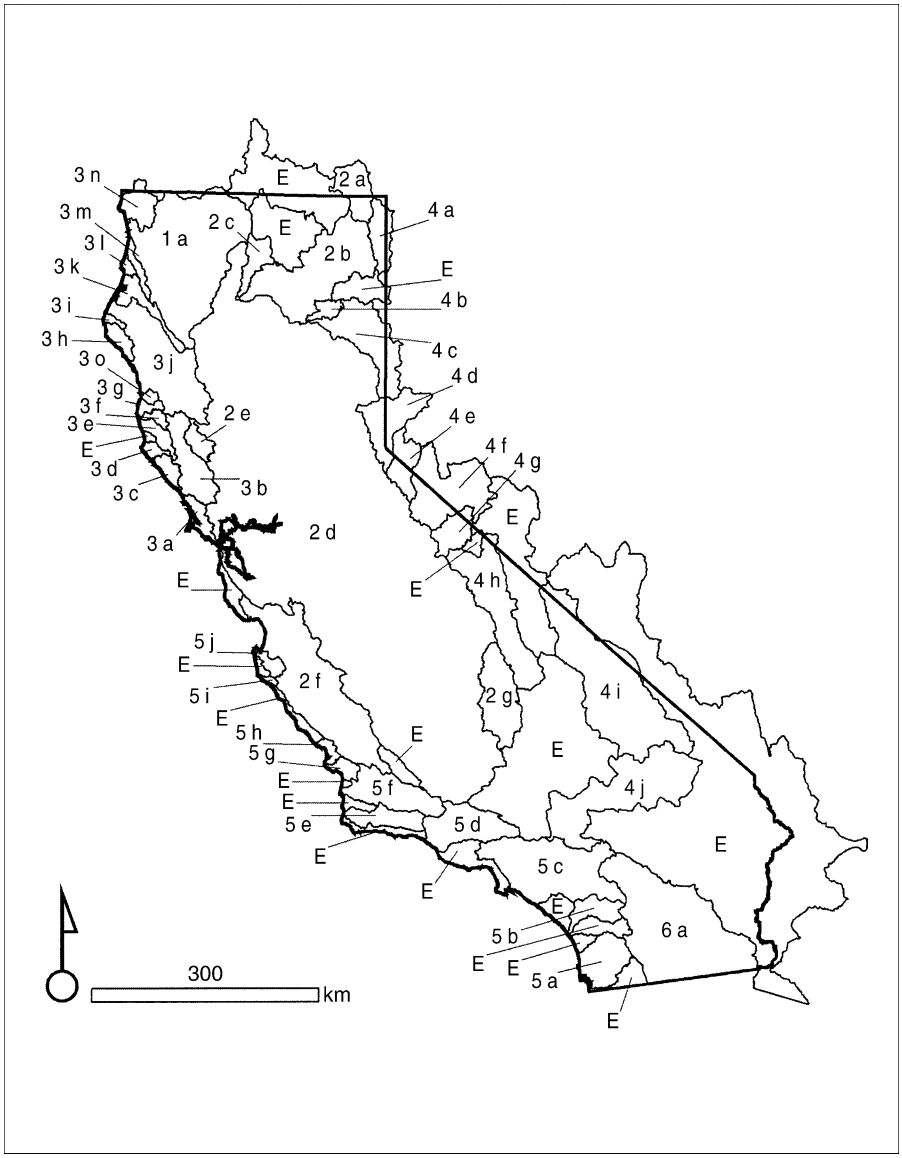

FIG. 1. Watersheds of California. See Table 1 for watershed codes. Watersheds marked ''E'' were excluded from the analysis (see *Methods* for details).

tive species richness in watersheds with a high proportion of protected land.

METHODS

Fish abundance data

We gathered presence/absence data on every freshwater fish species inhabiting California watersheds ($N = 44$; Fig. 1) as of January 2000 (Moyle 2002). From these data two measures of fish species abundance were tallied for each watershed: historic (pre-1850) species richness (which includes present native species plus extinct native species), and number of established nonnative species (both from outside California and intrastate introductions; Table 1). A full accounting of the species presence/absence by watershed data can be found in Moyle (2002). Some watersheds within the state were excluded from the analysis either because there are no fish in the watershed, or because the watershed extended significantly outside the state boundaries (Fig. 1).

Measurement of watershed-scale habitat data

A geographic information system and digital map data were used to measure eleven habitat attributes for the 44 watersheds included in the analysis (Table 2). We examined variables related to hydrologic alteration (dams, reservoir area, ditch density, and aqueduct density), land use (proportion developed, proportion ag-

TABLE 1. Diversity of native and nonnative fish species in California watersheds.

Watershed	Watershed code	Original native fish diversity	Nonnative fish diversity	Proportion of nonnative species from stocking
Lower Klamath River	1a	20	14	0.80
Goose Lake	2a	8	11	1.00
Pit River	2b	13	15	0.87
McCloud River	2c	7	4	1.00
Sacramento/San Joaquin River	2d	29	41	0.67
Clear Lake	2e	14	18	0.78
Monterey	2f	19	20	0.80
Kern River	2g	4	7	0.91
Tomales	3a	11	7	0.57
Russian River	3b	21	19	0.71
Gualala River	3c	8	0	
Garcia River	3d	8	0	
Navarro River	3e	9	0	
Big River	3f	8	0	
Noyo River	3g	5	0	
Matolle River	3h	8	0	
Bear River	3i	9	0	
Eel River	3j	14	10	0.50
Mad River	3k	14	8	0.88
Little	3l	9	0	
Redwood	3m	12	6	0.67
Smith River	3n	12	0	
Ten Mile Creek	3o	7	0	
Surprise Valley	4a	3	2	1.00
Eagle Lake	4b	5	2	1.00
Susan River	4c	8	7	1.00
Truckee River	4d	8	15	0.88
Carson River	4e	8	14	0.86
Walker River	4f	8	13	0.92
Mono Lake	4g	0	6	0.50
Owens River	4h	4	14	0.93
Amargosa River	4i	3	2	0.50
Mojave River	4j	1	23	0.61
San Diego	5a	7	26	0.69
Santa Margarita	5c	9	12	0.83
Los Angeles	5d	12	34	0.62
Santa Clara	5e	7	24	0.48
Santa Inez	5f	6	16	0.75
Santa Maria	5g	7	8	0.63
San Luis Obispo	5h	7	8	0.63
Morro	5i	8	10	0.50
Big Sur	5j	6	0	
Carmel River	5k	5	12	0.75
Salton Sea	6a	1	24	0.65

riculture, and proportion with high protection status), and natural environmental characteristics (mean elevation, mean rainfall, and watershed area). Several other variables examined early in the study were excluded due to their high correlations ($r > 0.7$) with retained variables. For example, we excluded road density (highly correlated with proportion developed), mean latitude (highly correlated with mean rainfall), and elevational range (highly correlated with watershed area). In each case, we retained the variable that seemed more inclusive (watershed area, development) or more likely to be directly related to fish diversity in California (rainfall). Variables were scaled to watershed area where appropriate and transformed for (approximate) normality as indicated in Table 2.

Canonical correspondence analysis

To investigate the association between species presence/absence and watershed-scale habitat data, we used direct gradient analysis (canonical correspondence analysis, CCA) employing the CANOCO 4.02 program developed by ter Braak and Smilauer (1999). CCA aids in the recognition and description of patterns in multivariate data. In particular, it describes how a suite of species simultaneously responds to environmental or habitat factors at multiple sites by correlating environmental variables with sample scores (ter Braak and Verdonschot 1995). In CCA biplots, each vector for an environmental variable defines a synthetic axis, and species scores are projected onto that axis (Jongman et al. 1995). In the CCA biplot, each environmental

TABLE 2. Name, description, and transformations of variables used in the models.

Variable	Description	Transformation
dams	Number of dams per 1000 km^2; includes dams >7.6 m in height or with storage capacity of ≥61 681 m^3	square root (x + 1)
res area	Total surface area of reservoirs per watershed area (100 m^2/km^2)	arcsine square-root (x)
ditch	Total length of ditches and unlined canals per watershed area (m/km^2)	log(x + 1)
aqued	Total length of aqueducts per watershed area (m/km^2)	log(x + 1)
develop	Proportion of watershed developed: commercial, industrial, urban, suburban, transportation, mines, and quarries	arcsine square-root (x)
agri	Proportion of watershed in agriculture: cropland, pasture, feeding lots, orchards, groves, vineyards, and nurseries	arcsine square-root (x)
protect	Proportion of watershed with high protection status: U.S. Forest Service Wilderness Areas or Research Natural Areas; National Park Service National Parks, Preserves, Monuments, Seashores, and Wilderness Areas; Bureau of Land Management Wilderness Areas; State Park Wilderness Areas and Reserves; State Fish and Game Ecological Reserves; University of California Natural Reserves; Nature Conservancy preserves; and Audubon Sanctuaries	arcsine square-root (x)
elev	Mean elevation of watershed (m)	log(x)
rain	Mean annual rainfall (mm), averaged spatially and temporally (1961–1990)	log(x)
streams	Total length of natural streams per watershed area (m/km^2)	none
ws area	Total area of watershed, including portions of watershed outside California (km^2)	log(x)
diversity	Original number of fishes in watershed, including present native fishes plus extinct native fishes	none

Notes: Full normality could not be achieved for the following variables: dams, reservoir area, ditch density, aqueduct density, developed, agriculture, protected, and elevation (Shapiro-Wilk W test, $P < 0.05$ in all cases).

variable therefore has a direction and length; the direction indicates positive values for that variable, while the length of the vector is an indication of its relative importance. The species scores in the biplot indicate each species' relative association with the environmental variables (Jongman et al. 1995). If a species is near a vector, that species is generally associated with the particular environmental variable. Our use of CCA follows recommendations in ter Braak (1986), Palmer (1993), and ter Braak and Verdonschot (1995).

Eleven variables (Table 2, excluding diversity) were initially included in the ordination. We tested these variables for significance by forward selection utilizing the Monte Carlo test ($\alpha = 0.1$, with 99 random permutations) provided by CANOCO. For species data (see Appendix) we used presence/absence information across the 44 watersheds. Following a stepwise procedure, we retained only those environmental variables chosen by forward selection as contributing significant variation to the ordination. We used species ordination biplots to visually assess how native and nonnative species respond to the environmental variables.

Invasions of watersheds: model building

We used the information-theoretic model selection approach of Burnham and Anderson (2002) to evaluate a set of a priori hypotheses regarding the effects of watershed characteristics on the degree of invasion of California watersheds. Our hypotheses were drawn from published sources and our own knowledge of the system; each was expressed as a linear regression model including various combinations of the predictor variables (Table 3). A priori model development is advocated by Burnham and Anderson (2002) among others (e.g., Franklin et al. 2000) to avoid the data dredging approach common with multiple regression analyses. While this approach does not necessarily lead to the ''best'' model in an absolute sense, it allows explicit comparisons among multiple models and for robust estimation of model parameters using model averaging (Burnham and Anderson 2002).

Models for the degree of invasion of watersheds (number of nonnative fishes in each watershed) were intended to test the relative importance of natural environmental variables and human disturbance variables including hydrologic alteration and land-use disturbance. We explicitly test the importance of native diversity by including or excluding it from models in most categories. Most models include the covariate watershed area as an ''a priori obvious'' variable: that is, we expected watershed area (which varies from tiny coastal drainages to the enormous Sacramento–San Joaquin drainage) to be strongly associated with the number of nonnative species. We include a global model (required by this statistical approach; model 1) and 12 single-variable models to assess the individual effects of each explanatory variable (models 2–13; Table 3). The remaining models are based on the following hypotheses: (1) Degree of invasion of watersheds is related to natural watershed characteristics (models 14, 15); (2) Degree of invasion is related to general disturbance, and may or may not be affected by protected status (models 16–18); (3) Degree of invasion is related to hydrologic alteration (models 19, 20); (4) Degree of invasion is related to watershed disturbance (land use), again testing the importance of protected status (models

TABLE 3. Variables included in each model describing the number of fish species introduced to California watersheds.

Model	Model category	Water development				Land use			Natural environment				
		dams	res area	ditch	aqued	develop	agri	protect	rain	elev	streams	ws area	diversity
1	G	1	1	1	1	1	1	1	1	1	1	1	1
2	S	1	0	0	0	0	0	0	0	0	0	0	0
3	S	0	1	0	0	0	0	0	0	0	0	0	0
4	S	0	0	1	0	0	0	0	0	0	0	0	0
5	S	0	0	0	1	0	0	0	0	0	0	0	0
6	S	0	0	0	0	1	0	0	0	0	0	0	0
7	S	0	0	0	0	0	1	0	0	0	0	0	0
8	S	0	0	0	0	0	0	1	0	0	0	0	0
9	S	0	0	0	0	0	0	0	1	0	0	0	0
10	S	0	0	0	0	0	0	0	0	1	0	0	0
11	S	0	0	0	0	0	0	0	0	0	1	0	0
12	S	0	0	0	0	0	0	0	0	0	0	1	0
13	S	0	0	0	0	0	0	0	0	0	0	0	1
14	N	0	0	0	0	0	0	0	1	1	1	1	1
15	N	0	0	0	0	0	0	0	1	1	1	1	0
16	D	1	1	1	1	1	1	1	0	0	0	1	0
17	D	1	1	1	1	1	1	0	0	0	0	1	0
18	D	1	1	1	1	1	1	0	0	0	0	1	1
19	W	1	1	1	1	0	0	0	0	0	0	1	0
20	W	1	1	1	1	0	0	0	0	0	0	1	1
21	L	0	0	0	0	1	1	1	0	0	0	1	0
22	L	0	0	0	0	1	1	0	0	0	0	1	0
23	L	0	0	0	0	1	1	0	0	0	0	1	1
24	ML	1	0	0	1	1	1	0	1	0	0	1	0
25	ML	1	0	0	1	1	1	0	1	0	0	1	1
26	GB	1	0	0	0	0	0	0	0	0	0	1	1
27	GB	0	1	0	0	0	0	0	1	0	0	0	1
28	KL	1	0	0	1	1	1	0	0	0	0	0	0
29	KL	1	0	0	1	1	1	0	0	0	0	0	1
30	KL	1	0	0	1	1	1	0	0	0	0	1	0
31	KL	1	0	0	1	1	1	0	0	0	0	1	1
17a	*D*	*0*	*0*	*1*	*0*	*1*	*0*	*0*	*0*	*0*	*0*	*1*	*0*
18a	*D*	*0*	*0*	*1*	*1*	*1*	*0*	*0*	*0*	*0*	*0*	*1*	*1*
18b	*D*	*0*	*0*	*1*	*1*	*1*	*0*	*0*	*1*	*1*	*0*	*0*	*1*
25a	*ML*	*1*	*0*	*0*	*1*	*1*	*0*	*0*	*1*	*0*	*0*	*1*	*1*
31a	*KL*	*1*	*0*	*0*	*1*	*1*	*0*	*0*	*0*	*0*	*0*	*1*	*1*
20a	*W*	*1*	*0*	*1*	*1*	*0*	*0*	*0*	*0*	*0*	*0*	*1*	*1*

Notes: The number 1 indicates that the variable is included in the model; 0 indicates that it is not included. Data in italic type at end of table are post hoc and should be considered tentative. Model categories: G, global model; S, single-variable models; N, natural watershed characteristics models; D, general disturbance models; W, hydrologic disturbance models; L, watershed disturbance models; ML, Moyle and Light (1996*a*, *b*) models; GB, Gido and Brown (1999) models; KL, Kolar and Lodge (2000) models. Descriptions of variables are given in Table 2.

21–23); (5) Degree of invasion is positively associated with both hydrologic alteration and watershed disturbance (specifically dams, aqueducts, development, and agriculture) and low environmental severity (high rainfall in California; Moyle and Light 1996*a*, *b*; models 24, 25); (6) Degree of invasion is positively associated with dams and watershed area and negatively with native diversity (Gido and Brown 1999; model 26); (7) Degree of invasion is positively associated with reservoir area and native diversity, and negatively with rainfall (Gido and Brown 1999; model 27); and (8) Degree of invasion is positively associated with dams, waterworks (aqueducts), urbanization (development) and agriculture (Kolar and Lodge 2000; models 28–31). Because of the large number of potential interactions in the data set and the lack of explicit predictions in the literature regarding interactions among the factors we examined, we did not consider interactions among predictor variables in any models.

Model fitting and evaluation

The information–theoretic approach to model selection involves ranking the models using Akaike's Information Criterion (AIC) in order to gauge the relative support (given the data) for each model (Burnham and Anderson 2002). We first evaluated diagnostics from a multiple linear regression fit of the global model (model 1). These indicated a reasonable fit to the data with no deviations from the underlying regression assumptions, and showed no evidence of over dispersion as measured by the variance inflation factor (Burnham and Anderson 2002). We then ranked the models using a small-sample variant of Akaike's Information Criterion (AIC_c), which accounts for the bias introduced into the analysis by our relatively small sample size ($N = 44$) and large number of independent variables (12). From AIC_c, we calculated the difference between each AIC_c value and the ''best'' model AIC_c value (ΔAIC_c) and the Akaike

weight (w_i) for each model. The Akaike weight is the relative likelihood of each model, given the data (calculated as the ratio of each model's likelihood to the sum of all the model likelihoods). (See Burnham and Anderson [2002] and Franklin et al. [2000] for derivations and formulas.)

We inspected the model ranking to determine whether more than one model had reasonable support. We considered models as having substantial support where ΔAIC_c was ≤ 2 and some support where ΔAIC_c was between 2 and 7 (Burnham and Anderson 2002). We determined the regression coefficients and their 95% confidence limits (based on standardized data) and model-averaged regression coefficients for this reduced set of models to evaluate the relative support for each parameter in the models (Burnham and Anderson 2002). We computed variances and confidence intervals for the model-averaged regression coefficients using the methods suggested by Burnham and Anderson (2002). Using the full set of a priori models, we calculated cumulative Akaike weights, a measure of variable importance (Burnham and Anderson 2002), for each variable by summing the Akaike weights for each model containing that variable. We then ranked the variables as strongly supported, somewhat supported, and not supported by our models based on the model-averaged regression parameters, significance of variables in the top models (AIC $\leq$ 2), and cumulative Akaike weights. Specifically, we termed a variable strongly supported if its model-averaged confidence intervals did not include zero and its cumulative Akaike weight was >0.75, as somewhat supported if its confidence interval in at least one of the top models (AIC $\leq$ 2) did not include zero, regardless of cumulative Akaike weight, and not supported if none of these criteria was met.

We also explicitly compared the relative support for different subsets of models based on their positions in the rankings. In particular, we were interested in the relative influence of hydrologic alteration, land-use disturbance, and natural watershed characteristics on the number of nonnative fishes in each watershed. We made comparisons on the basis of rankings of both multivariate and single-variable models. In addition, we compare the relative rankings of the subsets of variables associated with hydrologic disturbance and land-use disturbance using cumulative Akaike weights.

On a post hoc basis, we examined each of the top models to determine whether fit could be improved or additional insights gained by minor modifications. For each model we explored (1) dropping variables which did not add to the fit of the model, based on AIC_c values; (2) replacing the variable dams with the moderately correlated ($r = 0.62$) variable reservoir area; and (3) deleting the ''a priori obvious'' variable watershed area to see if this allowed other effects to enter the models. We retained all post hoc models that were within seven ΔAIC_c units of the (new) top model, and recalculated the model-averaged regression parameters, variances, and confidence intervals. Using the full set of models (including a priori models), we then recalculated the cumulative Akaike weights for each variable. Conclusions from these post hoc analyses should be considered tentative.

Stocked vs. non-stocked nonnative fishes

We examined the lists of introduced fishes in California watersheds and determined the number and proportion of fishes in each watershed which originally reached the state, or were transferred within the state, due to officially sanctioned stocking efforts. We explicitly exclude from this total fishes released for biological control and conservation transfers because we did not expect their distribution patterns to be similar to those of fishes released for sport, food, or forage. Because accurate records on the locations of individual stocking events are either lacking or difficult to obtain, we did not attempt to determine whether a given fish had been deliberately stocked into individual watersheds. Our figures may therefore overestimate the numbers of stocked fish per watershed by including some natural or angler-aided dispersal events. In order to examine the possibility of different associations of stocked and otherwise-introduced fishes with watershed properties, we then repeated the above information–theoretic analyses separately with the two subsets of fishes (intentionally stocked and otherwise-introduced species), using the same models as before (Table 3). We present here only summary data on the relative rankings of top models for each subset, as well as the relative rankings of individual variables based on their cumulative Akaike weights.

Results

Canonical correspondence analysis

Nine environmental variables contributed to the ordination: mean elevation, watershed area, reservoir area, ditch density, aqueduct density, proportion developed, proportion agriculture, stream density, and mean annual rainfall. The first two canonical axes explain 48.1% of the variation in species distribution (26.8 and 21.3%, respectively). The first canonical axis represents gradients in natural environmental habitat attributes (rainfall, watershed area, and stream density) while the second canonical axis represents gradients in anthropogenic habitat attributes (aqueduct density, proportion developed, proportion in agriculture; Fig. 2).

The ordination results for the individual species scores suggest that the fishes of the state respond to the environmental variation among watersheds; the majority of native species show affinity to the natural environmental variation along CCA axis 1 (higher rainfall, changes in elevation, smaller watershed area, and changes in stream density) while the majority of nonnative species show affinity to the anthropogenic hab-

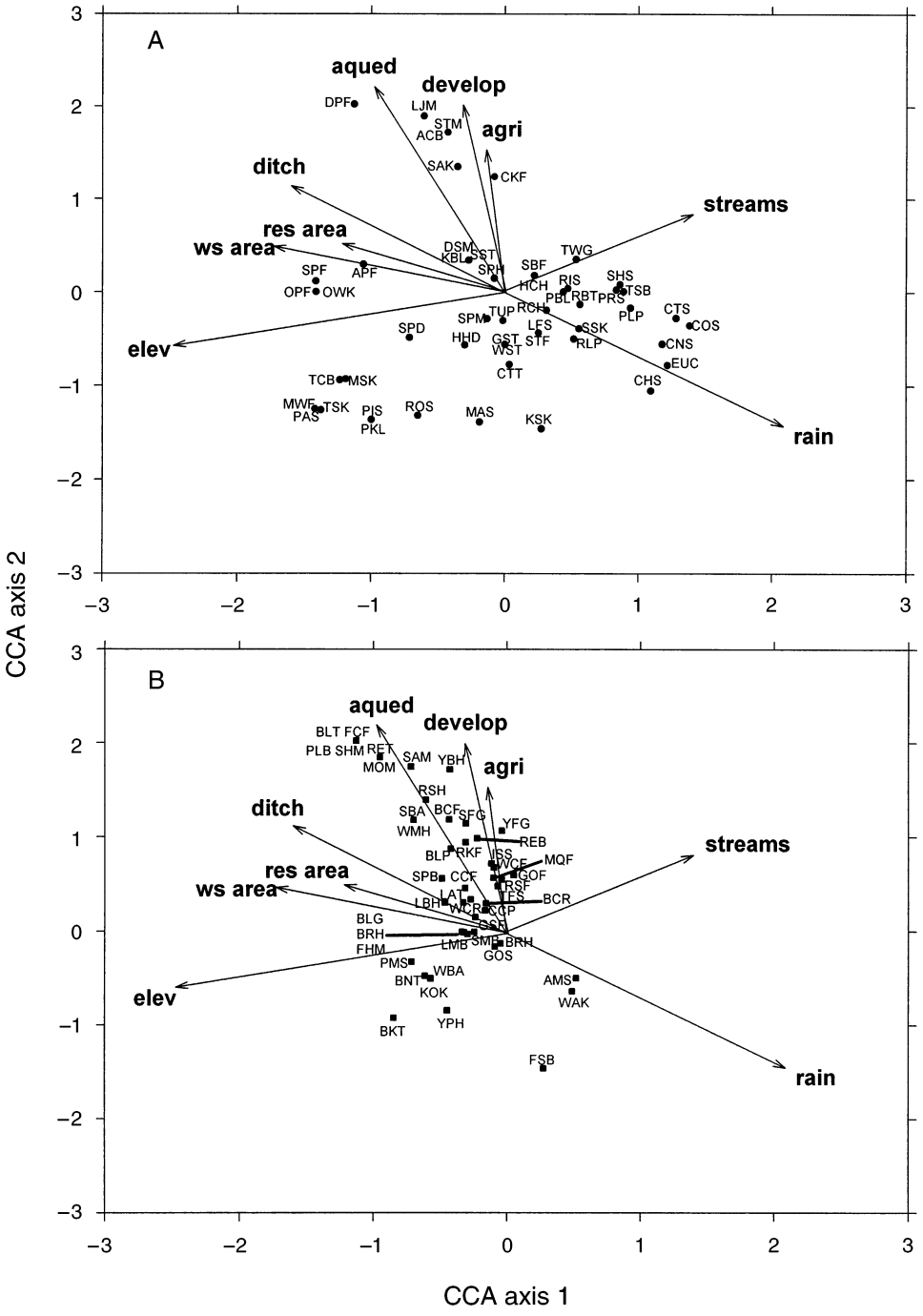

FIG. 2. Bi-plots of the species scores on the first two canonical axes from canonical correspondence analysis (CCA) indicating the influence of environmental variables on individual fish species. The bi-plots have been separated into (A) native species and (B) nonnative species for ease of interpretation. The arrows represent the correlation of the physical variables with the two canonical axes and can be interpreted as such. Points represent each individual species' relative association with the environmental variables. Common and scientific names for the three-letter species codes can be found in the Appendix. Eigenvalues (lambda) are 0.447 and 0.356 for the first two canonical axes, respectively. See Table 2 for environmental variable information.

TABLE 4. Summary of model selection statistics for the set of candidate models for number of species introduced per watershed.

Model	Model category	Adjusted R^2	K	AIC_c	ΔAIC_c	w_i	Post hoc ΔAIC_c	Post hoc w_i
17a	*D*	*0.798*	*5*	136.081	···	···	*0.000*	*0.313*
18a	*D*	*0.812*	*7*	136.086	···	···	*0.004*	*0.314*
18b	*D*	*0.813*	*8*	137.761	···	···	*1.680*	*0.135*
25a	*ML*	*0.807*	*8*	139.103	···	···	*3.022*	*0.069*
31a	*KL*	*0.795*	*7*	140.028	···	···	*3.946*	*0.043*
30	KL	0.790	7	140.994	0.000	0.2274	*4.912*	*0.027*
31	KL	0.795	8	141.764	0.770	0.1547	*5.683*	*0.019*
17	D	0.803	9	142.040	1.046	0.1348	*5.959*	*0.016*
25	ML	0.802	9	142.267	1.273	0.1203	*6.186*	*0.014*
18	D	0.810	10	142.537	1.543	0.1051	*6.456*	*0.012*
22	L	0.765	5	142.762	1.768	0.0940	*6.680*	*0.011*
20a	*W*	*0.781*	*7*	142.846	···	···	*6.765*	*0.011*
24	ML	0.785	8	143.900	2.906	0.0532	*7.819*	*0.006*
23	L	0.761	6	145.019	4.026	0.0304	*8.938*	*0.004*
21	L	0.759	6	145.377	4.383	0.0254	*9.296*	*0.003*
16	D	0.797	10	145.397	4.403	0.0252	*9.316*	*0.003*
20	W	0.777	8	145.447	4.454	0.0245	*9.366*	*0.003*
19	W	0.750	7	148.722	7.728	0.0048	*12.641*	*0.001*
1	G	0.801	14	155.166	14.172	0.0002	*19.084*	*<0.0001*
26	GB	0.656	5	159.472	18.478	<0.0001	*23.390*	*<0.0001*
27	GB	0.630	5	162.644	21.650	<0.0001	*26.563*	*<0.0001*
29	KL	0.632	7	165.708	24.714	<0.0001	*29.626*	*<0.0001*
4	S	0.566	3	166.842	25.848	<0.0001	*30.761*	*<0.0001*
28	KL	0.575	6	170.337	29.343	<0.0001	*34.256*	*<0.0001*
14	N	0.589	7	170.554	29.560	<0.0001	*34.473*	*<0.0001*
12	S	0.512	3	172.030	31.036	<0.0001	*35.949*	*<0.0001*
15	N	0.544	6	177.709	36.716	<0.0001	*41.628*	*<0.0001*
3	S	0.437	3	178.319	37.325	<0.0001	*42.237*	*<0.0001*
6	S	0.346	3	184.916	43.922	<0.0001	*48.835*	*<0.0001*
5	S	0.332	3	185.858	44.864	<0.0001	*49.776*	*<0.0001*
7	S	0.329	3	186.058	45.064	<0.0001	*49.976*	*<0.0001*
2	S	0.241	3	191.463	50.470	<0.0001	*55.382*	*<0.0001*
13	S	0.170	3	195.374	54.380	<0.0001	*59.293*	*<0.0001*
10	S	0.148	3	196.516	55.522	<0.0001	*60.434*	*<0.0001*
9	S	0.127	3	197.596	56.602	<0.0001	*61.514*	*<0.0001*
11	S	−0.023	3	204.582	63.588	<0.0001	*68.500*	*<0.0001*
8	S	−0.024	3	204.618	63.624	<0.0001	*68.536*	*<0.0001*

Notes: The table gives adjusted R^2 for comparison with the less familiar AIC_c and its derived values. See Table 3 for complete model and model category descriptions. Post hoc models, and the ΔAIC_c and w_i values for all models in the post hoc analyses (because the addition of new models changes these values), are shown in italics. K is the number of parameters in each model (number of variables included plus 2). ΔAIC_c is the difference between the AIC_c value for each model and that of the ''best'' model. The Akaike weight (w_i) is the relative likelihood that each model is the best of the tested models, given the data. The ΔAIC_c post hoc and w_i post hoc columns are the revised model selection statistics based on the addition of the six post hoc models. Note that the addition of new models changes the ΔAIC_c post hoc and w_i post hoc values.

itat variation along CCA axis 2 (more aqueducts, increased development, increased agriculture and more ditches; Fig. 2).

Degree of invasion of watersheds

The best single model describing the number of nonnative species in a watershed was the model drawn from Kolar and Lodge (2000) (model 30), which included dams, aqueducts, development, and agriculture, modified by the addition of watershed area. However, five other models had strong support ($\Delta AIC_c < 2$, Table 4): the above model with the addition of native diversity (model 31); the general disturbance model (model 17), which included all measures of hydrologic and watershed disturbance as well as watershed area; the Moyle and Light (1996*a*, *b*) model variant which included native diversity (model 25); the general disturbance model including diversity (model 18); and the land-use disturbance model (model 22). An additional five models had moderate support ($2 < \Delta AIC_c < 7$; Table 4).

Individual model and model-averaged regression coefficients for dams, ditch density, aqueduct density, development, agriculture, native diversity, and watershed area were consistently positive (Table 5), consistent with the positive associations of each of these variables with nonnative fish numbers in the univariate models. However, strong support exists in the selected multivariate models only for the effects of development and watershed area. Each of these variables had model-averaged regression coefficients whose 95% confidence intervals did not include zero as well as cumulative Akaike weights close to 1, indicating that they significantly added to the fit of virtually all the high-ranked

TABLE 5. Standardized regression coefficients (95% confidence limits) for the top-ranked models for number of nonnative fishes per watershed by variable.

Model, category	Variable				
	dams	res area	ditch	aqueducts	developed
30 KL	0.174 (0.000, 0.348)			0.171 (−0.009, 0.350)	0.262† (0.063, 0.461)
31 KL	0.170 (−0.002, 0.343)			0.222† (0.029, 0.414)	0.246† (0.048, 0.445)
17 D	0.156 (−0.051, 0.363)	−0.069 (−0.305, 0.168)	0.224† (0.003, 0.445)	0.144 (−0.047, 0.335)	0.278† (0.084, 0.472)
25 ML	0.147 (−0.025, 0.320)			0.241† (0.050, 0.433)	0.236† (0.041, 0.432)
18 D	0.153 (−0.051, 0.357)	−0.073 (−0.306, 0.160)	0.231† (0.013, 0.448)	0.198 (−0.002, 0.399)	0.261† (0.069, 0.453)
22 L					0.422† (0.257, 0.587)
24 ML	0.176 (−0.001, 0.353)			0.177 (−0.010, 0.365)	0.261† (0.059, 0.463)
23 L					0.425† (0.259, 0.592)
21 L					0.420† (0.252, 0.587)
16 D	0.154 (−0.061, 0.368)	−0.068 (−0.309, 0.173)	0.225† (0.000, 0.449)	0.145 (−0.049, 0.339)	0.277† (0.080, 0.474)
20 W	0.268† (0.066, 0.470)	−0.072 (−0.322, 0.178)	0.235† (0.012, 0.458)	0.340† (0.152, 0.529)	
Mean	0.141 (−0.070, 0.353)	−0.021 (−0.191, 0.150)	0.066 (−0.325, 0.458)	0.165 (−0.069, 0.398)	0.276† (0.044, 0.509)
Cum. w_i	0.850	0.295	0.295	0.850	0.971

Notes: The model-averaged regression coefficients and confidence intervals were calculated as suggested in Burnham and Anderson (2002). Cumulative Akaike weights (''Cum. w_i''), a measure of variable importance (Burnham and Anderson 2002), were calculated by summing the Akaike weights for all models containing that variable. Elevation and stream density did not appear in any of the top-ranked models. Explanations of variables are given in Table 2. Model numbers and categories are defined in Table 3.

† The 95% confidence limits for these data do not include zero.

models. The effects of ditch density, aqueduct density, agriculture, and native diversity have moderate support based on these models, and other predictors have little or no support (Table 5).

The post hoc analyses identified six models with stronger support than the related models from the initial analysis (Tables 3 and 4). Three were variants of the general disturbance models (17a, 18a, 18b), one was a variant of the Moyle and Light (with native diversity; model 25a), one was a variant of the Kolar and Lodge (with diversity; model 31a), and the last was a variant of the hydrologic disturbance (with diversity; model 20a). Watershed size and development again had strong support based on their model-averaged regression parameters and high cumulative Akaike weights, and the variables ditch density, aqueduct density, native diversity, and rainfall had moderate support (Table 6).

Models examining land-use disturbance (models 16, 17) were ranked higher than models examining hydrologic alteration (models 19, 20), however, the general disturbance models (models 21–23) were ranked higher still, suggesting that both land use and water development contribute to the number of nonnative fishes in watersheds (Table 5). The five highest ranked models included effects from both categories. The global model and natural environment models, in contrast, were ranked close to the bottom of the list of multivariate models suggesting little association of the number of nonnative species with the natural environmental variables we measured (other than watershed area, which appeared in all of the strongest models). The cumulative Akaike weight for the two-variable combination development and agriculture (land-use disturbance) was 0.97, while dams and aqueduct density (which appeared together in all models testing the effects of hydrologic disturbance) had a somewhat smaller cumulative Akaike weight of 0.85 (Table 5). In the post hoc models (Table 6), however, the less significant of these variable pairs dropped out of the top models, giving an overall ranking of watershed disturbance variables of: development (cumulative $w_i = 0.99$), ditch density (0.80), aqueduct density (0.67), dams (0.22), agriculture (0.11), and reservoir area (0.03).

All four univariate models examining measures of hydrologic alteration (dams, reservoirs, ditches, and aqueducts) had positive associations ($P < 0.001$ in each case) with the degree of invasions (individual univariate correlations are as follows: dams = 0.508, reservoir area = 0.671, ditches = 0.759, and aqueducts = 0.589). The two univariate models of watershed disturbance (development and agriculture) also had positive associations ($P < 0.0001$ in each case) with the degree of invasions (individual univariate correlations are as follows: development = 0.601 and agriculture

TABLE 5. Extended.

Variable				
agriculture	protected	rain	ws area	diversity
0.158			0.519†	
(−0.013, 0.328)			(0.355, 0.683)	
0.098			0.478†	0.128
(−0.093, 0.288)			(0.305, 0.651)	(−0.059, 0.314)
0.105			0.440†	
(−0.073, 0.282)			(0.239, 0.641)	
0.108		−0.207	0.342†	0.323†
(−0.207, 0.232)		(−0.487, 0.073)	(0.092, 0.592)	(0.002, 0.644)
0.039			0.394†	0.136
(−0.155, 0.234)			(0.188, 0.601)	(−0.044, 0.317)
0.187†			0.578†	
(0.011, 0.363)			(0.416, 0.740)	
0.157		0.023	0.527†	
(−0.016, 0.330)		(−0.143, 0.190)	(0.351, 0.703)	
0.159			0.567†	0.057
(−0.041, 0.358)			(0.399, 0.734)	(−0.128, 0.242)
0.183†	−0.020		0.584†	
(0.002, 0.364)	(−0.180, 0.139)		(0.413, 0.754)	
0.104	−0.008		0.442†	
(−0.078, 0.285)	(−0.159, 0.143)		(0.235, 0.648)	
			0.351†	0.201†
			(0.132, 0.571)	(0.030, 0.371)
0.121	−0.00	−0.024	0.470†	0.080
(−0.084, 0.325)	(−0.036, 0.035)	(−0.310, 0.263)	(0.234, 0.706)	(−0.250, 0.410)
0.971	0.051	0.174	1.000	0.435

= 0.587). Of the natural watershed characteristics, rainfall was negatively associated with the degree of invasions ($P = 0.01$: univariate correlation = −0.384), and positive associations included elevation ($P < 0.01$: univariate correlation = 0.410), watershed area ($P < 0.0001$: univariate correlation = 0.723), and native diversity ($P < 0.005$: univariate correlation = 0.435).

Stocked vs. nonstocked nonnative fishes

Only 30% of the nonnative fishes established in California (including native fishes that have been transferred among basins) originally derived from deliberate stocking for sport, food fisheries, or forage. However, these include many of the most widespread fishes in the state, so at the level of individual watersheds stocked fishes account for 48–100% (mean 75%) of the nonnative fishes present (Table 1; figures exclude watersheds with no nonnative fishes).

Both stocked and nonstocked fishes were associated with measures of watershed disturbance, however, the top models differed strikingly for each group. The best a priori model for stocked fishes was the hydrologic disturbance model (model 20) that included native diversity. This model, with an Akaike weight of 0.614, had no close competitors, with the next closest models having Akaike weights of 0.122 and below and ΔAIC_c values >3 (Table 7). The top a priori models ($\Delta AIC_c \leq 2$) for nonstocked fishes included two land-use disturbance models and the Kolar and Lodge (2000) model including dams, aqueduct density, development, agriculture, and watershed size. At least some of the post hoc models for both groups of fishes included variables associated with both hydrologic disturbance and land-use disturbance, but the specific variables that emerged as important differed between groups, with dams and ditch density strongly supported in the models for stocked fishes, while aqueducts and development were strongly supported in models for nonstocked fishes.

In the analysis of a priori models for stocked fishes, all four variables measuring hydrologic disturbance (dams, reservoir area, ditches, and aqueducts) had high cumulative Akaike weights (0.93–0.99, Table 8), reflecting the high rankings of the hydrologic disturbance models for this group. In contrast, measures of land-use disturbance (development and agriculture) in this analysis, had cumulative Akaike weights of only 0.26 (Table 8). In the analysis of a priori models for nonstocked fishes, land-use disturbance variables had cumulative Akaike weights of 1.00, while hydrologic disturbance variables ranked lower with cumulative Akaike weights of 0.03–0.45 (Table 8).

When we examine the post hoc model variants, the general ranking of variables having at least some support in the models for stocked fishes was: watershed size (cumulative $w_i = 1.00$), dams (1.00), ditch density (0.98), native diversity (0.67), development (0.65), and aqueduct density (0.37) (Table 8). The comparable variable ranking for models of nonstocked fishes was: watershed size (cumulative $w_i = 1.00$), proportion developed (1.00), aqueduct density (0.74), and native diversity (0.44) (Table 8).

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TABLE 6. Standardized regression coefficients (95% confidence limits) for the top-ranked models for number of nonnative fishes per watershed by variable, including post hoc model variants.

Model, category	Variable			
	dams	ditch	aqueducts	developed
17a D		0.332† (0.138, 0.527)		0.412† (0.264, 0.560)
18a D		0.285† (0.092, 0.478)	0.158 (−0.027, 0.344)	0.330† (0.163, 0.496)
18b D		0.200 (−0.017, 0.417)	0.196† (0.012, 0.380)	0.307† (0.130, 0.484)
25a ML	0.148 (−0.022, 0.318)		0.244† (0.060, 0.428)	0.237† (0.045, 0.429)
31a KL	0.186† (0.016, 0.356)		0.237† (0.048, 0.427)	0.261† (0.065, 0.457)
30 KL	0.174 (0.000, 0.348)		0.171 (−0.009, 0.350)	0.262† (0.063, 0.461)
22 L				0.422† (0.257, 0.587)
20a W	0.235† (0.070, 0.399)	0.229† (0.009, 0.449)	0.320 (0.147, 0.493)	
Mean	0.028 (−0.290, 0.345)	0.241 (−0.037, 0.520)	0.121 (−0.141, 0.382)	0.339† (0.133, 0.546)
Cum. w_i	0.223	0.804	0.670	0.986

Notes: The model-averaged regression coefficients, confidence intervals, and variable importance were calculated as suggested in Burnham and Anderson (2002). Reservoir area, protection, and stream density did not appear in any of these models. Explanations of variables are given in Table 2. Models and categories are given in Table 3.

† The 95% confidence limits for these data do not include zero.

DISCUSSION

Patterns of native and nonnative species occurrence (CCA)

The ordination results generally support our predictions that nonnative fishes will be most strongly aligned with measures of habitat alteration, while most native fishes are associated with measures of natural environmental variation. Some of the variation in species associations we see in the ordinations is related to background biogeographic patterning such as north–south gradients of rainfall and species diversity (M. P. Marchetti, *unpublished data*). Yet some of this natural variation in native species associations is swamped by the pervasive habitat and water-development changes across California. Water diversions and altered hydrologic patterns have changed the forces that structure aquatic assemblages and created habitat that is positively associated with a suite of nonnative fishes. This suite includes slow-water fishes (tilapia, mollies, catfishes, etc.) and lake-associated sport fishes (basses and sunfishes). This is not surprising given the fact that a majority of habitat alterations (dams, aqueducts, canals, and ditches) across the state have created lentic habitat from lotic habitat, and the new nonnative species assemblages reflect this change.

Despite this overall pattern, there are some anomalous species associations. There are six native species strongly associated with human disturbance (positive values on CCA axis 2; Fig. 2A): the longjawed mudsucker (*Gillichthys mirabilis*, LJM), striped mullet (*Mugil cephalus*, STM), California killifish (*Fundulus parvipinnis*, CKF), arroyo chub (*Gila orcutti*, ACB), Santa Ana sucker (*Catostomus santaanae*, SAK), and desert pupfish (*Cyprinodon macularius*, DPF). The reasons for their positive loadings on the second CCA axis (anthropogenic disturbance) are likely a result of all six species having spatially limited native distribution patterns in aquatic environments which are highly modified. Estuaries in California are heavily impacted by human disturbance (primarily through exports of fresh water), and the first three species above are estuarine species that occasionally venture into fresh water. The arroyo chub, Santa Ana sucker, and desert pupfish are all from small Southern California watersheds, and are all at risk of extinction in their native range (the Santa Ana sucker is listed as threatened and the pupfish is listed as endangered). In general, forces of anthropogenic disturbance (urban development, water diversion) are strongly associated with these species' restricted natural habitats in Southern California.

In addition, there are nine nonnative species strongly associated with low levels of human disturbance (negative values on CCA axis 2; Fig. 2B): brook trout (*Salvelinus fontialis*, BKT), brown trout (*Salmo trutta*, BNT), kokanee salmon (*Oncorhynchus nerka*, KOK), brook stickleback (*Culaea inconstans*, FSB), yellow perch (*Perca flavescens*, YPH), wakasagi (*Hypomesus nipponensis*, WAK), pumpkinseed (*Lepomis gibbosus*, PMS), American shad (*Alosa sapidissima*, AMS), and white bass (*Morone chrysops*, WBA). The reasons for these negative associations are varied, but in general, these nonnative species are found in relatively undisturbed habitat around the state. The first three (salmonids) have been widely introduced into mid- to high-

TABLE 6. Extended.

Variable				
agriculture	rain	elevation	ws area	diversity
			0.43†	
			(0.246, 0.617)	
			0.356†	0.158
			(0.165, 0.548)	(−0.001, 0.317)
	−0.293†	0.174		0.466*
	(−0.491,−0.095)	(−0.006, 0.354)		(0.272, 0.660)
	−0.216		0.358†	0.335†
	(−0.451, 0.019)		(0.123, 0.593)	(0.096, 0.574)
			0.487†	0.172†
			(0.315, 0.659)	(0.007, 0.338)
0.158			0.519†	
(−0.013, 0.328)			(0.355, 0.683)	
0.187†			0.578†	
(0.011, 0.363)			(0.416, 0.740)	
			0.331†	0.197†
			(0.125, 0.536)	(0.028, 0.365)
0.007	−0.059	0.026	0.343†	0.157
(−0.324, 0.338)	(−0.530, 0.412)	(−0.303, 0.354)	(0.038, 0.648)	(−0.229, 0.544)
0.114	0.224	0.135	0.865	0.621

elevation lakes, reservoirs, and streams of the Sierra Nevada mountains that are surrounded by relatively undeveloped terrestrial habitats. Most of the lakes and streams were fishless prior to the introductions. American shad are found in the less-altered Klamath and Russian River regions in the northeastern part of the state as well as the highly modified Sacramento–San Joaquin watershed. The other five species have restricted distributions (mainly in reservoirs) in northern California, and their negative associations are likely a result of their distributions being limited to these few, relatively unaltered watersheds.

Disturbance and invasions

Fish invasions in California are clearly related both to altered hydrology and to watershed disturbance, with top-ranked models including variables from both categories. In particular, our analysis points to the importance of development, aqueducts, ditches, agriculture, and possibly dams in predicting numbers of nonnative fishes in California watersheds. Many authors have listed these factors among others as related to invasibility of freshwater systems (e.g., Moyle and Light 1996*b*, Moyle 1999, Gido and Brown 1999, Kolar and Lodge 2000, Rahel 2002). Notably, the entirely verbal models of Kolar and Lodge (2000) and Moyle and Light (1996*b*) had more support given the data used in our analysis than the more rigorously derived models of Gido and Brown (1999). This may suggest that the factors associated with fish invasions in California watersheds differ from those affecting North American watersheds as a whole. However, we do not believe this to be the case. The fit of Gido and Brown's models to our data was better than the fit of their models to their own (North American) data (adjusted R^2 = 0.66 and 0.63 for the California data vs. 0.40 and 0.26 for the North American data). Given the importance of various measures of land-use development in our models, it seems more likely that the lack of variables related to these forms of development in Gido and Brown's (1999) analysis contributed to the differences in our results.

The strong association between development and number of nonnative species may be partly a human population effect, rather than solely an effect of land-use disturbance per se. Although we were unable to obtain population data for our watersheds because of the lack of correspondence between watershed boundaries and political boundaries, the proportion of developed land is likely a good estimator of human population density. Several studies of plants have identified human population size as the most important predictor of nonnative plant species richness (Chown et al. 1998, McKinney 2001, Rejmanek 2003). In addition, McKinney (2001) found that human population size was associated with nonnative fish diversity in U.S. states.

Hydrologic disturbance encompasses several types of anthropogenic change believed to favor nonnative fishes in California: the stabilization of flow regimes of naturally variable rivers and streams (Baltz and Moyle 1993, Marchetti and Moyle 2001, May and Brown 2002, Brown and Ford 2002); the creation of new types of habitat (reservoirs and ditches) which favor nonnative fishes adapted to lentic conditions (Moyle 2002, May and Brown 2002); and increased connectivity among watersheds due to the construction of large-scale water diversions and aqueducts (Moyle 1999, Kolar and Lodge 2000). Previous studies of Putah Creek suggest that in some instances the success of nonnative species may be reversible if a natural flow regime is restored (Marchetti and Moyle 2000, 2001). Similarly, Trexler et al. (2000) found that most non-

TABLE 7. Model rankings for the top models of number of stocked vs. other nonnative fish species per watershed.

Model, category	Variables	Adjusted R^2	K	AIC_c	ΔAIC_c	w_i	Post hoc ΔAIC_c	Post hoc w_i
Stocked								
18a D	d,dt,dv,w,nd	*0.810*	*7*	*−64.373*	···	···	*0.000*	*0.350*
17a D	d,dt,dv,w	*0.800*	*6*	*−63.906*	···	···	*0.467*	*0.277*
20a W	d,dt,a,w,nd	*0.806*	*7*	*−63.431*	···	···	*0.941*	*0.219*
20 W	d,r,dt,a,w,nd	0.803	8	−60.967	0.000	0.614	*3.406*	*0.064*
19a W	d,dt,a,w	*0.781*	*6*	*−59.752*	···	···	*4.621*	*0.035*
25a ML	d,a,rf,w,nd	*0.782*	*7*	*−58.321*	···	···	*6.052*	*0.017*
18 D	d,r,dt,a,dv,ag,w,nd	0.807	10	−57.741	3.226	0.122	*6.632*	*0.013*
19 W	d,r,dt,a,w	0.779	7	−57.687	3.279	0.119	*6.686*	*0.012*
17 D	d,r,dt,a,dv,ag,w	0.791	9	−56.421	4.546	0.063	*7.952*	*0.007*
31 KL	d,a,dv,ag,w,nd	0.746	8	−54.956	6.872	0.020	*9.417*	*0.003*
Other nonnatives								
31a KL	a,dv,w,nd	*0.651*	*6*	*−39.322*	···	···	*0.000*	*0.378*
30a KL	a,dv,w	*0.631*	*5*	*−38.501*	···	···	*0.821*	*0.251*
22a L	dv,w	*0.605*	*4*	*−36.972*	···	···	*2.350*	*0.117*
22 L	dv,ag,w	0.613	5	−36.360	0.000	0.330	*2.962*	*0.086*
30 KL	d,a,dv,ag,w	0.633	7	−35.477	0.883	0.212	*3.845*	*0.055*
21 L	dv,ag,p,w	0.610	6	−34.465	1.895	0.128	*4.857*	*0.033*
31 KL	d,a,dv,ag,w,nd	0.638	8	−34.156	2.204	0.110	*5.165*	*0.029*
23 L	dv,ag,w,nd	0.604	6	−33.755	2.605	0.090	*5.566*	*0.023*
24 ML	d,a,dv,ag,r,w	0.626	8	−32.835	3.525	0.057	*6.486*	*0.015*
25 ML	d,a,dv,ag,r,w	0.633	9	−31.635	4.725	0.031	*7.687*	*0.008*
17 D	d,r,dt,a,dv,ag,w	0.623	9	−30.500	5.860	0.018	*8.822*	*0.005*

Notes: Post hoc models, and the ΔAIC_c and w_i values for all models in the post hoc analyses, are in italics. Variables included in each model are listed: d, dams; r, reservoirs; dt, ditch density; a, aqueduct density; dv, development; ag, agriculture; p, proportion protected; rf, rainfall; w, watershed area; and nd, native diversity.

native fishes were not well adapted for persisting in the least disturbed but highly fluctuating freshwater marshes within the Florida Everglades. The ever increasing alteration of waterways worldwide, related to increasing human populations, led Kolar and Lodge (2002) to urge strong measures to prevent more introductions into fresh waters because of increased probabilities of success and detrimental impacts.

A close look at some of the most widely introduced fishes in California lends support to the importance of disturbance, particularly hydrologic alteration, in promoting successful introductions. Many species of salmonids and centrarchids are favored game fish and have been widely stocked across most of California during the last century. Almost all habitat with the potential to contain these species has received them (Moyle 2002), but despite their ubiquity of introduction, not all habitats have maintained their populations. Centrarchids in particular tend to be most common and abundant in highly disturbed areas where natural flow regimes have been altered (Moyle 2002). This and much other research across the state suggests a positive relationship between hydrologic disturbance and invasion success in fishes (Moyle and Nichols 1974, Baltz and Moyle 1993, Marchetti and Moyle 2001).

Invasions and native diversity

Our study found no evidence of biotic resistance to fish invasions in California, and in fact detected a moderate positive univariate correlation (0.435) between native and nonnative fish diversity at the watershed scale. This correlation may be due to other watershed variables which covary with native diversity (e.g., watershed area and habitat diversity), as has been suggested for plants (Shea and Chesson 2002, Rejmanek 2003, Stohlgren et al. 2003). Shea and Chesson (2002) suggest that at large spatial scales, these covarying factors will overwhelm the underlying negative relationship between native and nonnative species diversity predicted by niche theory. In the current study, the addition of native diversity improved the fit of several (though not all) models containing watershed area as well as other natural environmental variables (Table 4), possibly suggesting that not all relevant covariates were included in our study. However, in all models the sign of the regression coefficient for native diversity remained positive, giving no hint of any underlying negative relationship between native and nonnative species diversity.

For fish, as for plants (Levine 2000), the richness–invasibility relationship may be related to the scale of the study. Ross et al. (2001) and Gido and Brown (1999) both suggest that large regions (states and watersheds, respectively) in North America with high species richness were less invaded than those with low richness. However, Gido and Brown's (1999) analysis strongly suggests this is an artifact of the larger species pool of North American fishes available to be easily introduced to the more species-depauperate watersheds. When they removed North American species from their analysis they actually found a positive relationship between native and nonnative fish diversity

TABLE 8. Ranking of variable importance, based on cumulative Akaike weights, for the models of all nonnative fish species and models of number of stocked vs. other nonnative fishes per watershed.

	All nonnative fishes		Stocked		Not stocked	
	A priori	Post hoc	A priori	Post hoc	A priori	Post hoc
Dams	0.85	0.22	0.99	1.00	0.45	0.11
Reservoir area	0.29	0.03	0.93	0.10	0.03	0.00
Ditch density	0.29	0.80	0.93	0.98	0.03	0.00
Aqueduct density	0.85	0.67	0.99	0.37	0.45	0.74
Proportion developed	0.97	0.99	0.26	0.65	1.00	1.00
Proportion agriculture	0.97	0.11	0.26	0.02	1.00	0.25
Proportion protected	0.05	0.01	0.02	0.00	0.13	0.03
Mean rainfall	0.17	0.22	0.02	0.02	0.09	0.02
Mean elevation	0.00	0.13	0.00	0.00	0.00	0.00
Stream density	0.00	0.00	0.00	0.00	0.00	0.00
Watershed area	1.00	0.87	1.00	1.00	0.99	1.00
Original diversity	0.44	0.62	0.78	0.67	0.25	0.44

Note: Weights are based on both the a priori and post hoc models given in Table 7.

(Gido and Brown 1999). On local or regional scales, species richness may have little relevance to invasion success. Caley and Schluter (1997), for example, provide evidence that most local faunas are not saturated with species, including freshwater fish faunas. Moyle and Light (1996*b*) suggest that at the local scale, all freshwater systems are highly invasible, regardless of local species richness, depending on availability of resources at the time of invasion.

Protected status

We found no evidence that land protection, as it is currently practiced, reduces the number of nonnative fish species in watersheds. This variable had the weakest univariate relationship with the number of nonnative species (model 8, Table 4) and also failed to add to the fit of any multivariate models. Major reasons for this may be that protected areas are typically at higher elevations, are generally focused on terrestrial ecosystems, and therefore pay little attention to watershed boundaries (Moyle and Yoshiyama 1994). Most of the waters in protected areas were historically fishless and introductions of sport fishes have consequently been widespread (Moyle 2002). This suggests that strategies to protect native fishes and other aquatic organisms have to be focused on some combination of restoring ecosystem processes, prevention of further introductions, eradication of local populations of alien species, and special management of lakes and streams that are still dominated by native fishes (Moyle and Yoshiyama 1994).

Human interest

One common difficulty with the study of invasions is that the underlying mechanisms facilitating the invasion are often hidden by our reliance on ''natural experiments'' (Blackburn and Duncan 2001*a*). In order to draw rigorous conclusions regarding characteristics of successfully invaded regions, taxa would need to be introduced across a landscape at random and in varying numbers (Blackburn and Duncan 2001*a*, *b*). This is clearly not the case in California. Fish species have been introduced for a variety of reasons in the state, both deliberately and as a by-product of other human activity (Moyle 2002). Each introduction method carries a bias in terms of numbers of individuals introduced (propagule pressure) and localities of introduction. For example, forage and game species are likely to be released in high numbers across large areas (particularly into reservoirs) while bait and aquarium fish releases are likely to involve small numbers in localized areas. Therefore it is not reasonable to assume that all species had the same opportunities for establishment across the state, although aqueducts and rapid transport by humans do promote biotic homogenization.

We demonstrate elsewhere (Marchetti et al. 2004) that propagule pressure is an important contributing factor to the spread and integration of nonnative fishes in California. Human interest clearly plays a large role in determining the fate of introductions; more interest generally equals more propagules, which means greater success over larger areas (Marchetti et al. 2004). In cases where habitat alteration precedes an introduction it becomes difficult to assess whether the alteration or human desire (e.g., stocking pressure) is the true driving force behind a species success, or whether it is really a synergistic interaction between the two forces. Unfortunately the data on total stocking pressure for California watersheds is either not available, or not comparable across taxa and/or watersheds. However, our separate analyses of stocked and nonstocked introduced fishes gives some idea of the influence of human interest on the relationship of nonnative fishes with measures of habitat alteration.

Although only a third of the nonnative and translocated native fishes in California were initially introduced for fisheries-related stocking purposes, these widespread fishes often represent the majority of nonnative fishes in individual watersheds. When considering these fishes separately from those introduced by

other means, important details emerge which are obscured in the larger overall analysis. Stocked fishes were strongly associated with measures of hydrologic disturbance, particularly the presence of dams and ditches, while other nonnative fishes were strongly associated with measures of land-use disturbance, particularly development, and secondarily with the presence of aqueducts.

The relationship of dams to the presence of stocked fishes is intuitive given the wide variety of sport and forage fishes that are routinely stocked in reservoirs. The importance of ditch density in both the analysis of stocked fishes and the overall analysis, however, is a bit obscure. The density of ditches (which include all unlined canals and other water diversions) may simply reflect an overall level of hydrologic alteration. Such diversions are likely to be particularly common in stream reaches downstream of dams which are used to deliver irrigation water. These systems typically have highly altered hydrology, with winter flood flows reduced or lacking, and summer (irrigation season) flows much higher than prealtered levels. These streams tend to support large numbers of nonnative sportfishes such as sunfishes, basses, and catfishes, which may be unable to persist in the more fluctuating flows common in unaltered California streams (Brown 2000, Marchetti and Moyle 2001).

In contrast, the diversity of other nonnative fishes (e.g., goldfish *Carassius auratus*, sailfin molly *Poecilia latipinna*, and shimofuri goby *Tridentiger bifasciatus*), has very little association with the variable dams, which is probably why this variable did not receive strong support in the overall analysis. Instead, land-use disturbance, particularly development, was the most important predictor (along with watershed size) of number of non-stocked introduced fishes in watersheds. As pointed out above, the amount of developed land area in a watershed may serve as a surrogate for human population density, which is likely a contributing factor in several important vectors of fish introductions, including aquarium releases, bait-bucket releases, biocontrol releases, and even ballast-water transfers.

Conclusions

The invasion process is inherently complex. A successful invader must survive a series of events: transport to the invasion site, initial establishment, spread to a broad area, and then integration into the existing biotic community (Moyle and Light 1996*b*, Kolar and Lodge 2001). Not surprisingly, most invasions fail (Moyle and Light 1996*b*, Williamson 1996). Success of invaders in the face of such low odds is often related to frequent invasion attempts (i.e., introductions by humans), release from natural enemies (predators, competitors, disease, parasites) and the presence of novel, unusually favorable environments (generally created by humans; Elton 1958, Sax and Brown 2000). The current analysis supports the idea that altered environments play a key role in this process. Our results suggest that human disturbance (particularly urbanization and water development) promotes the successful establishment and spread of nonnative species in California watersheds. Biotic resistance from native fish species, on the other hand, seems to have little influence on the invasion process. Instead, we find a generally positive relationship between native and nonnative fish diversity. Human interest in particular species is clearly a factor for invasion success, as evidenced by the wide distribution of most intentionally stocked species. Stocked fishes are also more likely to be associated with the presence of certain types of altered habitat, particularly reservoirs, than are other nonnative fishes, suggesting that the habitat associations of nonnative fishes are not independent of the behavior of fisheries managers.

What can be done to stem the tide of fish invasions into freshwater systems? This study unfortunately found little evidence that land protection, as currently practiced in California, reduces the diversity of nonnative species in watersheds. Managing protected lands at the watershed or bioregional scale, and for native fish assemblages and natural hydrologies, would likely be more successful in this regard (Moyle and Yoshiyama 1994). Given the close association of nonnative fishes with hydrologically altered habitats, the restoration of natural processes in aquatic systems can be expected to minimize the establishment of alien fishes while helping to maintain native fish populations (Marchetti and Moyle 2000, 2001, Trexler et al. 2000). Addressing the human activities most likely to result in further introductions, whether through regulation or education, will also be important. Although deliberate fish stocking has declined in California in the last few decades (Dill and Cordone 1997), worldwide it is on the rise due to increasing human populations and economic pressures (Kolar and Lodge 2000). Other activities associated with fish introductions, including the aquarium trade, baitfishing, and international shipping, continue to increase in California, as elsewhere (Moyle 2002). Understanding the roles of these vectors in fish invasion patterns, as well as their interactions with the pervasive habitat alterations explored in this paper, will be an important avenue of future research.

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APPENDIX

Common and scientific names of fish species utilized in the analyses.

Common name	Scientific name	Abbreviation	Status	Vector
Amargosa pupfish	*Cyprinodon nevadensis*	APF	N	con
American Shad	*Alosa sapidissima*	AMS	E	sto
Arroyo chub	*Gila orcutti*	ACB	N	con
Bigscale logperch	*Percina macrolepida*	BLP	E	inc
Black bullhead	*Ameiurus melas*	LBH	E	sto
Black crappie	*Pomoxis nigromaculatus*	BCR	E	sto
Blue catfish	*Ictalurus furcatus*	BCF	E	sto
Blue tilapia	*Oreochromis aurea*	BLT	E	sto
Bluegill	*Lepomis macrochirus*	BLG	E	sto
Brook stickleback	*Culea inconstans*	FSB	E	bat
Brook trout	*Salvelinus fontinalis*	BKT	E	sto
Brown bullhead	*Ameiurus nebulosus*	BRH	E	sto
Brown trout	*Salmo trutta*	BNT	E	sto
California killifish	*Fundulus parvipinnis*	CKF	N	not
California roach	*Lavinia symmetricus*	RCH	N	bat
Channel catfish	*Ictalurus punctatus*	CCF	E	sto
Chinook salmon	*Oncorhynchus tshawytscha*	CNS	N	not
Chum salmon	*Oncorhynchus keta*	CHS	N	not
Coastrange sculpin	*Cottus aleuticus*	CTS	N	not
Coho salmon	*Oncorhynchus kisutch*	COS	N	sto
Common carp	*Cyprinus carpio*	CCP	E	sto
Cutthroat trout	*Oncorhynchus clarki*	CTT	N	sto
Delta smelt	*Hypomesus transpacificus*	DSM	N	not
Desert pupfish	*Cyprinodon macularius*	DPF	N	con
Eulachon	*Thaleichthys pacificus*	EUC	N	not
Fathead minnow	*Pimephales promelas*	FHM	E	sto
Golden shiner	*Notemigonus crysoleucas*	GOS	E	bat
Goldfish	*Carassius auratus*	GOF	E	aqu
Green sturgeon	*Acipenser medirostris*	GST	N	not
Green sunfish	*Lepomis cyanellus*	GSF	E	sto
Hardhead	*Mylopharodon conocephalus*	HHD	N	not
Hitch	*Lavinia exilicauda*	HCH	N	bat
Inland silverside	*Menidia beryllina*	ISS	E	bio
Kern brook lamprey	*Lampetra hubbsi*	KBL	N	not
Klamath small scale sucker	*Catostomus rimiculus*	KSK	N	not
Kokanee	*Oncorhynchus nerka*	KOK	E	sto
Lahontan redside	*Richardsonius egregius*	LRS	N	bat
Lake trout	*Salvelinus namaycush*	LAT	E	sto
Largemouth bass	*Micropterus salmoides*	LMB	E	sto

APPENDIX. Continued.

Common name	Scientific name	Abbreviation	Status	Vector
Longfin smelt	*Spirinchus thaleichthys*	LFS	N	not
Longjaw mudsucker	*Gillichthys mirabilis*	LJM	N	sto
Marbled sculpin	Cottus klamathensis	MAS	N	not
Mountain sucker	*Catostomus platyrhynchus*	MSK	N	wat
Mountain whitefish	*Prosopium williamsoni*	MWF	N	not
Mozambique mouthbrooder	*Oreochromis mossambica*	MOM	E	aqu
Owens pupfish	*Cyprinodon radiosus*	OPF	N	not
Owens sucker	*Catostomus fumeiventris*	OWK	N	wat
Pacific brook lamprey	*Lampetra richardsoni*	PBL	N	not
Pacific lamprey	*Lampetra tridentata*	PLP	N	not
Paiute sculpin	*Cottus beldingi*	PAS	N	not
Pit Klamath brook lamprey	*Lampetra lethophaga*	PKL	N	not
Pit sculpin	*Cottus pitensis*	PIS	N	not
Porthole livebearer	*Poeciliopsis gracilis*	PLB	E	aqu
Prickly sculpin	*Cottus asper*	PRS	N	wat
Pumpkinseed	*Lepomis gibbosus*	PMS	E	sto
Rainbow trout	*Oncorhynchus mykiss*	RBT	N	sto
Rainwater killifish	*Lucania parva*	RKF	E	inc
Red shiner	*Cyprinella lutrensis*	RSH	E	sto
Redbelly tilapia	*Tilapia zilli*	RET	E	sto
Redear sunfish	*Lepomis microlophus*	RSF	E	sto
Redeye bass	*Micropterus coosae*	REB	E	sto
Riffle sculpin	*Cottus gulosus*	RIS	N	not
River lamprey	*Lampetra ayersi*	RLP	N	not
Rough sculpin	*Cottus asperrimus*	ROS	N	not
Sacramento blackfish	*Orthodon microlepidotus*	SBF	N	sto-i
Sacramento perch	*Archoplites interruptus*	SPH	N	sto
Sacramento pikeminnow	*Ptychocheilus grandis*	SPM	N	sto-i
Sacramento splittail	*Pogonichthys macrolepidotus*	SST	N	not
Sacramento sucker	*Catostomus occidentalis*	SSK	N	wat
Sailfin molly	*Poecilia latipinna*	SAM	E	aqu
Salt Creek pupfish	*Cyprinodon salinus*	SPF	N	con
Santa Ana sucker	*Catostomus santaanae*	SAK	N	inc
Shimofuri goby	*Tridentiger bifasciatus*	SFG	E	shp
Shortfin molly	*Poecilia mexicana*	SHM	E	aqu
Smallmouth bass	*Micropterus dolomieu*	SMB	E	sto
Speckled dace	*Rhinichthys osculus*	SPD	N	bat
Spotted bass	*Micropterus punctulatus*	SPB	E	sto
Staghorn sculpin	*Leptocottus armatus*	SHS	N	not
Starry flounder	*Platichthys stellatus*	STF	N	not
Striped bass	*Morone saxatilis*	SBA	E	sto
Striped mullet	*Mugil cephalus*	STM	N	sto
Tahoe sucker	*Catostomus tahoensis*	TSK	N	bat
Threadfin shad	*Dorosoma petenense*	TFS	E	sto
Threespine stickleback	*Gasterosteus aculeatus*	TSB	N	inc
Tidewater goby	*Eucyclogobius newberryi*	TWG	N	not
Tui chub	*Siphateles bicolor*	TCB	N	bat
Tule perch	*Hysterocarpus traski*	TUP	N	wat
Wakasagi	*Hypomesus nipponensis*	WAK	E	sto
Warmouth	*Lepomis gulosus*	WMH	E	sto
Western mosquitofish	*Gambusia affinis*	MQF	E	bio
White bass	*Morone chrysops*	WBA	E	sto
White catfish	*Ameiurus catus*	WCF	E	sto
White crappie	*Pomoxis annularis*	WCR	E	sto
White sturgeon	*Acipenser transmontanus*	WST	N	not
Yellow bullhead	*Ameiurus natalis*	YBH	E	sto
Yellow perch	*Perca flavescens*	YPH	E	sto
Yellowfin goby	*Acanthogobius flavimanus*	YFG	E	shp

Notes: Abbreviations refer to the CCA biplots. Status refers to whether the species is native to California (N) or exotic (E). See Moyle (2002) for full details of presence/absence in each California watershed. Predominant vectors by which the species reached California or was transferred among basins within California are indicated in the last column: con, conservation transfer; sto, legally stocked for fisheries or forage; sto–i, illegally stocked; inc, unintentionally stocked with other species; aqu, aquarium release (in some cases from commercial facilities); wat, water transfer (aqueduct or canal); bio, biocontrol release; shp, shipping (mainly ballast water); bat, bait fish or bait bucket transfers; not, fish species was not introduced or transferred among basins.

SAN DIEGO COUNTY MUNICIPAL STORM WATER PERMIT REISSUANCE ANALYSIS SUMMARY

California Regional Water Quality Control Board, San Diego Region
July 26, 2004

I. INTRODUCTION

Prior to beginning the process for reissuance of the San Diego County Municipal Storm Water Permit (Order No. 2001-01), the California Regional Water Quality Control Board, San Diego Region (Regional Board) has aimed to identify the permitting approach which will best protect water quality for the next permit term while also satisfying the interests of the various stakeholders. It is anticipated that the permitting approach sought by the Regional Board will serve as a starting point which will focus the efforts of the Regional Board and stakeholders during the re-issuance process. The current permit expires on February 21, 2006; therefore it is anticipated that the next permit will be re-issued prior to that date.

This report summarizes the analysis undertaken by the Regional Board to identify its preferred permitting approach for the next storm water permit for San Diego County. The Regional Board's preferred permitting approach for the next permit is identified and discussed in section IV of this report.

II. BACKGROUND

A. Current Regulatory Approach - Order No. 2001-01

Order No. 2001-01 regulates the 21 Phase I municipal storm water Copermittees located within 10 major watersheds of San Diego County. This permit holds the local government accountable for the impacts of its land use decisions on water quality. The permit recognizes that each of the three major stages in the urbanization process (development planning, construction, and the use or operational stage) is controlled by and must be authorized by the local government. Accordingly, the permit focuses on measures that the local government must implement, or require others to implement, to reduce pollutant discharges during each of the three stages of urbanization.

The responsibilities of the Copermittees under Order No. 2001-001, however, are not limited to addressing the water quality impacts of urbanization within their jurisdiction. Each Copermittee is responsible for working with the other Copermittees on water quality issues within their shared watersheds. This is because urban runoff generated in various Copermittee jurisdictions does not follow jurisdictional boundaries, but rather travels through many jurisdictions while flowing through and to receiving waters. Collectively, the Copermittees within a watershed each contribute to the cumulative pollutant load that is conveyed in urban runoff by their interconnected municipal separate storm sewer systems

(MS4s) to the receiving waters. Therefore, each Copermittee has shared responsibility for the impacts of its urbanization on the watershed in which it is located.

The existing permit, by including watershed-based requirements, calls for the Copermittees to address water quality issues on a watershed basis in addition to their jurisdictional activities. The Copermittees are required to identify and prioritize major water quality problems in the watersheds and the likely sources of the problems; develop an implementation schedule of short- and long-term activities necessary to address the highest priority water quality problems; and identify the Copermittee(s) responsible for implementing each activity. Public participation, watershed-based land use planning, education, and long-term effectiveness assessment are also activities which are required on a watershed basis.

B. New Paradigm for Storm Water Permits

In recent years, addressing water quality issues from a watershed perspective has increasingly gained attention. Regarding watershed-based permitting, the United States Environmental Protection Agency (EPA) Watershed-Based NPDES Permitting Policy Statement issued on Jan. 7, 2004 states the following:

EPA continues to support a holistic watershed approach to water quality management. The process for developing and issuing NPDES permits on a watershed basis is an important tool in water quality management. EPA believes that developing and issuing NPDES permits on a watershed basis can benefit all watershed stakeholders, from the NPDES permitting authority to local community members. A watershed-based approach to point source permitting under the NPDES program may serve as one innovative tool for achieving new efficiencies and environmental results. EPA believes that watershed-based permitting can:

- *lead to more environmentally effective results;*
- *emphasize measuring the effectiveness of targeted actions on improvements in water quality;*
- *provide greater opportunities for trading and other market based approaches;*
- *reduce the cost of improving the quality of the nation's waters;*
- *foster more effective implementation of watershed plans, including total maximum daily loads (TMDLs); and*
- *realize other ancillary benefits beyond those that have been achieved under the Clean Water Act (e.g., facilitate program integration including integration of Clean Water Act and Safe Drinking Water Act programs).*

Watershed-based permitting is a process that ultimately produces NPDES permits that are issued to point sources on a geographic or watershed basis. In establishing point source controls in a watershed-based permit, the permitting authority may focus on watershed goals, and consider multiple pollutant sources and stressors, including the level of nonpoint source control that is practicable. In general, there are numerous

permitting mechanisms that may be used to develop and issue permits within a watershed approach.

This EPA guidance is in line with State Water Resources Control Board (SWRCB) and Regional Board watershed management goals. For example, the SWRCB's Urban Runoff Technical Advisory Committee (TAC) recommends watershed-based water quality protection, stating "Municipal permits should have watershed specific components." The TAC further recommends that "All NPDES permits and Waste Discharge Requirements should be considered for reissuance on a watershed basis."

In addition, the San Diego Region Basin Plan states that "public agencies and private organizations concerned with water resources have come to recognize that a comprehensive evaluation of pollutant contributions on a watershed scale is the only way to realistically assess cumulative impacts and formulate workable strategies to truly protect our water resources. Both water pollution and habitat degradation problems can best be solved by following a basin-wide approach."

In light of EPA's policy statement and the SWRCB's and Regional Board's watershed management goals, the Regional Board seeks to expand watershed management in the regulation of urban runoff. Watershed-based MS4 permits can provide for more effective receiving water quality protection. The entire watershed for the receiving water can be assessed, allowing for critical areas and practices to be targeted for corrective actions. Known sources of pollutants of concern can be investigated for potential water quality impacts. Problem areas can then be addressed, leading to eventual improvements in receiving water quality. Management of urban runoff on a watershed basis allows for specific water quality problems to be targeted so that efforts result in maximized water quality improvements.

C. Other Watershed-based Storm Water Permitting Efforts

Surprisingly, not all the Regional Boards in California have watershed management elements in the MS4 permits that they have adopted. Equally surprising, the Regional Board found that some storm water permits in other parts of the country that are considered watershed-based permits are not as comprehensive, prescriptive, and as advanced in terms of a watershed approach as the current storm water permit for San Diego County. The existing storm water permit already is a progressive, watershed-based permit compared to some other so-called watershed-based permits in place elsewhere.

Of particular note, however, the Oregon Department of Environmental Quality has recently issued a permit which collectively regulates four wastewater facilities and a MS4 located within a single watershed. This permit allows for trading of pollutant credits among point sources covered by the permit in an attempt to bring the entire watershed into compliance with water quality standards. Issuance of this permit was eased by the fact that all point sources within the watershed are owned by a single entity.

III. METHODOLOGY

A. Initial Screening

The Regional Board started its evaluation of the reissuance of the next storm water permit for San Diego County by identifying various permitting approaches which can be pursued. Six representative alternatives were initially identified: 1) continue with current MS4 permit; 2) enhance the Watershed Urban Runoff Management Program (WURMP) section of the current MS4 permit; 3) establish one MS4 permit for the San Diego Region; 4) establish one MS4 permit for each permittee; 5) establish MS4 permits based upon current TMDLs/impaired waterbodies; and 6) establish permits based on watersheds. These alternatives were intended to encompass the broad range of permit options available while not considering all possible permutations of each alternative.

These six alternatives were then preliminarily screened based on such basic factors as meeting Regional Board goals, watershed management effectiveness, and ease of implementation. The initial screening resulted in the elimination of several of the alternatives, due to their failure to forward the Regional Board's general goal of addressing water quality problems on a watershed basis. Other alternatives were eliminated due to issues such as difficulty in administration or lack of adequate supporting data.

B. Options Analyzed

Following this initial screening of the alternatives, two alternatives for municipal storm water regulation were identified which could best promote watershed management within the region and support stakeholder interests, while also meeting other program constraints. These two alternatives were considered for this analysis: 1) establish a MS4 permit for San Diego County with an enhanced watershed requirement section and 2) establish MS4 permits in San Diego County based on watersheds for as many as eight watersheds. These alternatives are described in more detail below.

<u>Alternative A</u>

Alternative A is essentially the current San Diego County MS4 Permit with an enhanced and expanded WURMP section. This alternative would continue to include a Jurisdictional Urban Runoff Management Program (JURMP) component, which would serve as a baseline level of effort that all Copermittees must implement across all watersheds. This JURMP section could potentially be slightly less stringent than the current JURMP section, in order to compensate for the expanded WURMP section. The WURMP section would contain increased detail and specificity, identifying water quality problems in each watershed, together with a focus on best management practice (BMP) requirements targeting the identified water quality problems. Formalized participation in WURMP efforts would also be required.

Alternative B

Alternative B is the regulation of San Diego County MS4s through the issuance of several permits based on watersheds or groups of watersheds. These permits would not include a JURMP section; instead, JURMP-type requirements would be incorporated into the WURMP sections of the permits. In these permits, each watershed would have a different set of requirements for each of its land use types (commercial, industrial, residential, etc.) These requirements would be based on the prominent water quality problems within the watershed. Since each watershed would have different requirements, there would not be a set of baseline requirements required of all Copermittees in all watersheds. Formalized participation in WURMP efforts would also be required.

C. Factors to be Considered in the Analysis

The Regional Board identified factors to be used to assess the two permit alternatives. The factors represent different issues which can be affected by the next San Diego County storm water permit. For ease during analysis, these factors were grouped under the following key categories: 1) Water Quality; 2) Regional Board; 3) Copermittees; and 4) Other Stakeholders. The factors considered in the analysis are described below, together with information on the premises and inferences which were necessary to conduct the analysis.

Water Quality

For the Water Quality category, the Regional Board evaluated each of the two permit alternatives in terms of the following factors: ability to obtain short-term water quality improvements, ability to obtain long-term water quality improvements, ability to facilitate efforts to address water quality problems which go beyond storm water discharges, ability to improve pollution prevention programs, and ability to address water quality impairments without TMDL implementation. Inferences that were used when evaluating the factors for each alternative were based on the Regional Board's knowledge of the implementation and effectiveness of current storm water programs. This included consideration of compliance evaluation findings, as well as information found in annual reports and monitoring reports.

Regional Board

Under this category, the Regional Board evaluated the potential impact of the two permit alternatives on Regional Board resources, programs and activities, as well as the two permit alternatives' consistency with SWRCB and Regional Board plans and policies. The evaluation of the two permit alternatives' impacts on Regional Board resources focused on the time and effort it would take to prepare the permit(s), conduct report reviews, conduct inspections, investigate complaints, handle cases, manage the program, and conduct enforcement under either permit alternative. In determining Regional Board staff time needed for the above mentioned tasks, unit cost factors developed by the SWRCB were used.

Other factors affecting the Regional Board which were assessed include each permit alternative's effect on Regional Board institutional resistance, Regional Board overall efficiency, Regional Board staff organization, Regional Board consistency with its Strategic Plan, Regional Board ability to address water quality impairments without TMDL implementation, Regional Board GIS compatibility, Regional Board compliance assurance, other Regional Board programs, potential watershed-based NPDES permits, and statewide consistency. Evaluations of these factors were based on informal staff surveys and interviews and the collective experience of the Regional Board.

Copermittees

The Copermittee category assessed the Copermittees' likely acceptance of either alternative, potential impacts to Copermittee resources, regional and statewide consistency, permit flexibility, and Copermittee willingness to collaborate. Inferences that were necessary when evaluating the factors for each permit alternative were based on current Copermittee behavior and program implementation. Consideration was also given to the ability of a single Copermittee to develop multiple and different storm water regulations for each watershed within their jurisdiction; the desire on the part of Copermittees for consistent storm water programs; and the current financial climate.

Other Stakeholders

The Other Stakeholders category (all interested parties other than the Copermittees) assessed each of the two alternatives' potential impacts on stakeholder involvement, stakeholder support, and ability to attract financial assistance to the region. The Other Stakeholders category included consideration of environmental, watershed, construction and industry, political, and public stakeholder groups. Inferences that were used when evaluating the factors for each alternative were based on currently understood stakeholder activities and positions.

D. Analysis

Each of the two permit alternatives were assessed for each factor discussed above. Based on this assessment, it was attempted to identify a preferred alternative for each factor when adequate information was known. However, it is important to note that it was sometimes difficult to identify a preferred alternative for some factors, due to lack of information or similarity between the two permit alternatives for a given factor.

Once the preferred alternative was identified for each factor where possible, each of the two permit alternatives was assessed to determine how often it was identified as the preferred alternative. Based on the number of times each permit alternative was identified as the preferred alternative, as well as the relative importance of the factors for which an alternative was preferred, a final overall preferred alternative was identified (discussed below). Due to occasional lack of adequate information and factors for which the two permit alternatives were largely indistinguishable, the final preferred alternative

was identified based upon those factors where adequate information existed and a relatively clear distinction between the alternatives was possible.

IV. CONCLUSIONS

An overall review of the various factors which were considered indicates that Alternative A is the most appropriate permit alternative for the next San Diego County storm water permit. Alternative A is the permitting approach which will continue the use of the current jurisdictional requirements, but will also expand the watershed-based requirements of the permit. Alternative A was identified as the preferred permitting approach for more factors than Alternative B. In addition, Alternative A was more frequently identified as the preferred permit alternative for factors which were considered most important.

In terms of the Water Quality category of factors, Alternative A is the most appropriate permit alternative over the short-term, while Alternative B appears to be the more appropriate permit alternative long-term. Alternative A is also the best permit alternative for both the Regional Board and Copermittee categories of factors. However, for the Other Stakeholder category of factors, Alternative B appears to be the more appropriate permit alternative. These findings are discussed below.

A. Water Quality

Of the factors considered which pertain to water quality, the key factors considered were the two permit alternatives' potential impacts on short- and long-term water quality. Alternative A promises to result in greater short term water quality improvements, while Alternative B over a longer time frame would be expected to result in greater long-term water quality benefits.

Both Alternatives A and B, in implementing a watershed approach in the implementation of storm water programs, are expected to result in water quality improvements within watersheds. Also, both permit alternatives are expected to result in permanent, long-term improvements. The advantage of Alternative A is that current ongoing efforts by Copermittees to improve water quality most likely will proceed uninterrupted. Copermittees under Alternative A will be required to expand and improve existing watershed efforts, which will allow for program continuity. Implementation of Alternative B, on the other hand, would likely divert Copermittee resources away from some current work to abate storm water pollution while the Copermittees reorganize their programs based on watersheds. For these reasons, it is anticipated that Alternative A is the best permit approach in terms of short-term water quality.

Over the long-term, the Alternative B watershed permits are believed to have greater potential for water quality improvements due to their ability to focus directly on specific water quality problems. However, implementation of Alternative A at this time does not preclude the implementation of Alternative B as a long-term step in the future. In fact, Alternative A can serve as a logical interim step before implementing watershed-based

permits. In addition, while Alternative B could have a more overall positive long-term impact on water quality than Alternative A, the Regional Board is not as confident about this as we are about the short-term benefits associated with Alternative A. It is also important to note that Alternative A includes significant expansion and improvement of existing watershed-based requirements by simply incorporating these additional watershed-based requirements into the current regulatory framework.

Moreover, the Regional Board can continue to assess watershed permits as a long-term strategy while implementing the interim step of expanded watershed-based permit requirements found in Alternative A. For example, Copermittee monitoring programs are currently watershed-based, and continued monitoring over the next permit cycle may provide sufficient data to determine trends and issues that should be addressed in future watershed-based permits.

Therefore, the Regional Board finds that Alternative A is the most prudent permitting approach for the protection of water quality at this time.

B. Regional Board

Of the factors considered which pertain to the Regional Board, the key factors considered dealt with the two permit alternatives' potential impacts on Regional Board resources. Alternative A is the preferred permitting approach because it is anticipated that it will result in Regional Board resources being used more efficiently. It is estimated that it will cost the Regional Board an additional 0.75 to 2.1 PYs to prepare the multiple watershed permits necessary under Alternative B versus the single permit under Alternative A. In addition, it is estimated that management of the permits under Alternative B will cost an additional 0.8 PYs per year. These additional resources necessary to prepare and manage the permits will reduce Regional Board efforts in report reviews, inspections, complaint investigations, and enforcement activities in the municipal, construction, and industrial storm water programs.

While implementation of Alternative A is expected to be more efficient in the short term, Alternative B could be more efficient in the long run depending upon its effectiveness. For example, Alternative B could facilitate TMDL implementation or facilitate development of comprehensive watershed-based NPDES permits that regulate all point source discharges within given watersheds. However, these potential future benefits are outweighed by the more likely near-term benefits of Alternative A. Alternative A does not necessitate a reduction in current Regional Board compliance activities, which would be detrimental to maintaining the progress made by the Copermittees in developing storm water management programs. In addition, Alternative A allows for the continuance of providing important feedback to the Copermittees that results from report reviews, inspections, attending meetings, and enforcement actions. These activities are critical at this point in the logical growth of the storm water regulatory program.

For these reasons, Alternative A is the best permitting approach for the Regional Board at this time.

C. Copermittees

Alternative A allows Copermittees to continue the efforts they started with Order No. 2001-01; limits the number of significant changes to their programs; allows them to still be treated equally; and allows them to apply the same regulations throughout their jurisdictions. Copermittees are still working on implementing all of the requirements of the current storm water permit and may be more receptive to an enhanced WURMP section rather than a watershed permit. For these reasons, Alternative A appears to be the permitting approach which would meet Copermittee needs and receive their support.

D. Other Stakeholders

Alternative B appears to be the Alternative which best meets the interests of other stakeholders (all interested parties other than the Copermittees). Alternative B would most likely generate more stakeholder interest, because of its potential to draw interest to issues typically outside of storm water. Though it is difficult to determine which approach would actually receive greater support from stakeholders as a whole, Alternative B would most likely facilitate other Regional Board interests and goals. For example, generation of funding for water quality projects in the region could be enhanced under Alternative B. While the benefits of Alternative B regarding other stakeholders could be significant, Alternative A also provides important benefits for other stakeholders, though perhaps to a lesser extent. In light of this, the benefits of Alternative B for other stakeholders, while important, are found to be less significant than the benefits of Alternative A for the Water Quality, Regional Board, and Copermittee categories of factors.

V. RECOMMENDATIONS

The Regional Board should implement Alternative A for the next permit cycle. This will increase the focus on watershed-based water quality problems and facilitate implementation of Alternative B in the future.

1. If Alternative A is implemented, the Regional Board needs to significantly change how the Regional Board currently oversees the municipal storm water program. The Regional Board's focus should significantly shift from, but not ignore, JURMP implementation to an enhanced WURMP implementation.

2. For the current San Diego County MS4 permit's reissuance, the Regional Board could use the application process as an opportunity to develop watershed-based permit conditions, regardless of which alternative is selected.

3. If a group of Copermittees within a watershed wish to pursue a watershed-based permit for their specific watershed, the Regional Board should attempt to accommodate their request. In such an instance, the resultant watershed-based permit could serve as a pilot permit which could be evaluated for future watershed

permitting efforts.

4. The Regional Board should, within the next permit cycle, evaluate the progress made by the Copermittees in implementing the enhanced WURMP-based programs and determine whether the Alternative B approach is a viable approach for all or some of the Copermittees in the future.

ATTACHMENT 1
for
San Diego County Municipal Storm Water Permit
Reissuance Analysis Summary

This attachment provides background information on the analysis conducted in the report titled "San Diego County Municipal Storm Water Permit Reissuance Analysis Summary." In section III.C of the report, various factors used by the Regional Board to assess the two permit alternatives for the next San Diego Municipal Storm Water Permit are identified. Section III.D of the report then discusses the steps that were taken to analyze the two permit alternatives in terms of the identified factors. Section IV of the report contains a discussion of the analysis of the two permit alternatives and the conclusions that were drawn regarding the alternatives.

This attachment provides support and background information for the analysis and conclusions found in Section IV of the report. It identifies the individual factors that were used to assess the two permit alternatives. These individual factors are grouped into four categories: Water Quality, Regional Board, Copermittees, and Other Stakeholders. The assessment conducted with each of the individual factors is outlined below according to these categories. The primary factors that were considered are first listed as questions, together with the assumption that was used as the basis for the analysis. The two permit alternatives are then assessed in terms of each factor in the corresponding table.

The assessments conducted using each factor were then compiled to cumulatively develop the final analysis and conclusions found in section IV of the report. In many cases, section IV of the report expands on the assessments discussed in this attachment in order to develop the final analysis and conclusions found in the report. As such, this attachment is meant to provide background information for the final analysis and conclusions found in the report, and should only be considered in conjunction with the information found in the report.

It is important to note that it was sometimes difficult to identify a preferred alternative for some individual factors, due to lack of adequate information or occasional similarities between the two permit alternatives. Where this was the case, best professional judgment and Regional Board experience was used where possible to identify a preferred alternative for an individual factor.

A. WATER QUALITY FACTOR ANALYSIS

1. Short-term Water Quality - Will the alternative result in greater short-term water quality benefits/improvements? Assumption: It would be advantageous for the alternative to generate short-term water quality benefits and improvements.

Evaluation of Short-term Water Quality		
Criteria	**Alternative A**	**Alternative B**
In the first 5 years of the permit reissuance, water quality of storm water discharges would improve.	It is difficult to predict measurable differences in discharge quality from the two alternatives in the first five years of the permit reissuance. Alternative A, however, would allow Copermittees to continue current efforts to reduce pollutants in storm water discharges.	It is difficult to predict measurable differences in discharge quality from the two alternatives in the first five years of the permit reissuance. In attempting Alternative B, some resources of the Copermittees would probably be diverted from continuing efforts to reduce pollutants in storm water discharges in order to reorganize by watersheds.
In the first 5 years of the permit reissuance, receiving water quality impacted by storm water discharges would improve.	It is difficult to predict measurable differences in receiving water quality from the two alternatives in the first five years of the permit reissuance. Alternative A, however, would allow Copermittees to continue efforts to improve receiving water quality impacted by storm water discharges.	It is difficult to predict measurable differences in receiving water quality from the two alternatives in the first five years of the permit reissuance. In attempting Alternative B, some resources of the Copermittees would probably be diverted from efforts to improve receiving water quality in order to reorganize by watersheds.
Assessment	In the short-term Copermittees would most likely spend considerable time reorganizing on a watershed basis under Alternative B. Alternative B would probably divert resources from continuing efforts to reduce pollutants in storm water dischargers and improve receiving water quality.	

2. Long-term Water Quality - Will the alternative result in greater long-term water quality benefits/improvements? Assumption: It would be advantageous for the alternative to generate long-term and lasting water quality benefits and improvements.

Evaluation of Long-term Water Quality Improvements		
Criteria	**Alternative A**	**Alternative B**
Beyond the first 5 years of the permit reissuance, water quality of storm water discharges would improve.	Implementation of this alternative would result in improved storm water discharge quality beyond the first five years.	Implementation of this alternative might result in greater long-term improvements to discharge quality than Alternative A.
Beyond the first 5 years of the permit reissuance, receiving water quality would improve.	Implementation of this alternative would result in improved receiving water quality beyond the first five years.	Implementation of this alternative might result in greater long-term improvements to receiving water quality than Alternative A.
Assessment	Five years beyond the initial permit reissuance, Alternative B, in better targeting specific water quality problems and promoting greater coordination and cooperation of Copermittees in watersheds, might result in greater long-term improvements in quality of storm water discharges and receiving waters.	

3. Addressing a Wider Range of Water Quality Problems – see section B, item 9.

4. Pollution Prevention - Will the alternative result in greater pollution prevention? Assumption: It would be positive for the alternative to encourage and accelerate efforts to prevent pollutants from being generated and discharged to surface waters.

Evaluation of Pollution Prevention		
Criteria	**Alternative A**	**Alternative B**
The alternative would accelerate efforts to prevent storm water related pollutants from being generated and discharged to receiving waters.	This alternative would emphasize the implementation of an effective pollution prevention program.	Greater that Alternative A, this alternative would ensure a coordinated pollution prevention program within a watershed.
Assessment	To the extent that Alternative B results in greater Copermittee targeting of specific water quality problems and coordination and cooperation within a watershed, Alternative B would better ensure a coordinated pollution prevention program within a watershed.	

5. Addressing Water Quality Impairments without TMDLs – see section B, item 6.

B. REGIONAL BOARD FACTOR ANALYSIS

1. Regional Board Resources – Will the alternative require greater or lesser Regional Board resources to develop and administer? Assumption: The fewer Regional Board resources that it would take to draft and oversee MS4 permits the better.

Evaluation of Regional Board Resources		
Criteria	**Alternative A**	**Alternative B**
Permit Preparation	a. Order No. 2001-01 requires the Copermittees to submit Reports of Waste Discharge (RWDs) in August 2005. The information needed in the RWDs is described in the federal regulations. b. Staff will review and process one application. c. Draft one tentative Order, with some identification of water quality issues specific to watersheds and some development of specific BMP requirements d. One comment period and hearing series e. Possible appeal of one Order Assessment: Using the unit cost factor for large MS4 permit, the permitting process will take 1350 hours	a. Additional resources will be needed for staff to notify and work with the Copermittees so that the Copermittees are able to submit multiple RWDs describing specific storm water programs for each watershed. b. Staff must review and process multiple applications. c. Draft several tentative Orders, with identification of water quality issues specific to watersheds and development of specific BMP requirements d. Multiple comment periods and hearing series e. Possible appeal of multiple Orders. Assessment: Based upon our experience with the Riverside and Orange Counties MS4 permits and the unit cost factor for a

		medium MS4 permit, our estimate is : 2 permits - 1800 hours 3 permits - 2200 hours 4 permits - 2600 hours 5 permits - 3000 hours 6 permits - 3400 hours 7 permits - 3800 hours 8 permits - 4200 hours 9 permits - 4600 hours 10 permits -5000 hours
Report Reviews	- 21 Individual JURMPs - One unified JURMP - 10 WURMPs - One Unified WURMP - One receiving water report - 21 individual annual reports Assessment: Using cost factors, approx. 1100 hrs per year	- Up to 10 unified JURMPs and WURMPs - 10 receiving water reports - Up to 43 individual annual reports Assessment: Using unit cost factors, approx. 1350 hrs per year
Inspections	Assume 6 full evaluations and 18 inspections using unit cost factors for large MS4 program. Assessment: 930 hours per year	Additional time will be necessary to evaluate programs on a watershed basis rather than a jurisdictional basis, since requirements may not be as explicit and programs could be more complex. Assessment: 1280 hours per year
Complaint Investigation	More complaints and requests for investigations occur as the public becomes more aware of the MS4 program. Assessment: 20-30 investigations a year for 120-180 hours	Alternative B will create more stakeholder involvement resulting in more public awareness and requests for investigations. Assessment: 30-40 investigations a year for 180- 240 hours
Case Handling	845 hours per major permit	Based upon unit cost factors, 68 hours for each additional permit. (for 10 watershed permits, 845 + (9 x 68) = 1457 hours)
Program Management	Unit cost factor for program management is based upon number of personnel years (PYs). This should be the same for both alternatives.	
Enforcement	One Cleanup and Abatement Order (CAO) in the last five years. Assessment: 135 hours per year	Expenditure of resources may be slightly higher as standard enforcement actions may have to be issued to the same agency for similar violations under 2 or more MS4 permits, with permits being more complex. Assessment: Assume 1 CAO, Average 150 hours per year
Assessment	Alternative B will cost approximately 0.75 – 2.1 PYs more to prepare permits and 0.8 PYs more per year to manage than Alternative A	

2. Institutional Resistance – Will the alternative generate institutional resistance within the Regional Board? Assumption: The less internal resistance to the alternative the better.

Evaluation of Institutional Resistance		
Criteria	**Alternative A**	**Alternative B**
What potential internal resistance or support is there to the alternative?	Support by those who consider the JURMP component of the program to be critical at this time.	Support by those who consider the future of the WURMP component of the program to be critical at this time.
Assessment	No known significant internal opposition or support for either alternative at this time.	

3. Efficiency – Will the alternative increase Regional Board efficiency? Assumption: The more the alternative provides an opportunity to produce equivalent results with less resources, or greater results with equivalent resources, the better.

Evaluation of Efficiency		
Criteria	**Alternative A**	**Alternative B**
Costs	As presented under No.1 (Evaluation of Regional Board Resources), because it will require more MS4 permits, Alternative B will require the Regional Board to direct PYs away from current storm water activities and towards additional permit writing, report reviews and case handling activities. These resources would be made up by doing less of something else (i.e. construction storm water inspections, designating agencies under Phase II, etc.).	
Benefits	From a program "bean counting" standpoint, Alternative B would result in more outputs in terms of permits produced, reports reviewed, and cases handled (meetings attended, outreach efforts, workshops, etc.); but would also result in less outputs in terms of audits, inspections, complaint investigations, and enforcement actions.	
Assessment	From a traditional program management standpoint (bean counting), Alternative A is preferred. From a non-traditional standpoint, the assessment of efficiency depends upon whether watershed permits will encourage sufficient initiative by the Copermittees to compensate for the use of less traditional compliance tools by the Regional Board.	

4. Staff Reorganization – Will the alternative require Regional Board staff reorganization that is not currently planned? Assumption: The more the alternative is consistent with future plans for staff reorganization the better.

Evaluation of Staff Reorganization		
Criteria	**Alternative A**	**Alternative B**
Assuming the office will in time be reorganized into watershed teams, which permit alternative will better facilitate that change?	Assigning the Permit to multiple watershed units could make management of the permit more complex. Questions such as which unit is responsible for updating the permit, attending Copermittee meetings, and being the primary contact will need to be resolved.	Watershed permits can be easily assigned to watershed units.
Assessment	Any impact on staff reorganization is minor at this time.	

5. Strategic Plan – Will the alternative be consistent with the Regional Board Strategic Plan? Assumption: The more the alternative is consistent with the Strategic Plan the better.

Evaluation of Strategic Plan		
Criteria	**Alternative A**	**Alternative B**
Organizations are effective, innovative, and responsive	Alternative B is more innovative than Alternative A.	
Surface waters are safe for drinking, fishing, and swimming, and support healthy ecosystems and other beneficial uses	This is assessed in Item A of this attachment.	
Individuals and other stakeholders support our efforts	This is assessed in Item D of this attachment.	
Water quality is comprehensively measured	This is assessed in Item A of this attachment.	
Assessment	There is little difference between the alternatives in terms of consistency with the Strategic Plan.	

6. TMDL Implementation – Will the alternative address water quality impairments, thereby decreasing the need for numerous TMDLs? Assumption: The more the alternative provides an opportunity to correct water quality impairments without conducting a TMDL the better.

Evaluation of TMDL Implementation		
Criteria	**Alternative A**	**Alternative B**
How would the alternative require necessary special studies?	Either as part of the WURMP section or under special studies in the Monitoring and Reporting program.	A requirement for special studies could be specified anywhere in the permit.
How would the alternative require watershed-based monitoring for pollutants of concern?	Either as part of the WURMP section or under special studies in the Monitoring and Reporting program.	As part of the receiving water monitoring program.
How would the alternative require mass loading reductions?	As part of the WURMP component or receiving water limitations section.	As part of the receiving water limitations section.
How would the alternative require reductions from sources other than urban runoff , such as from Phase II entities, Indian Reservations, etc.?	Not known if it can be done.	If other sources can be named as Copermittees in the watershed MS4 permit.
Assessment	Because TMDLs are for sources of pollutants within a watershed, Alternative B may better provide incentive for addressing water quality impairments without a TMDL.	

7. GIS Compatibility – Will the alternative be compatible with GIS implementation and promote and enhance its use? Assumption: The more the alternative is conducive to GIS use the better.

Evaluation of GIS Compatibility		
Criteria	**Alternative A**	**Alternative B**
Assessment	Any difference between alternatives should be minor.	

8. Enforceability/Compliance – Will the alternative promote assessment of compliance and also be enforceable? Assumption: The easier it is to assess compliance under an alternative the better.

Evaluation of Enforcement/Compliance		
Criteria	**Alternative A**	**Alternative B**
Has the alternative proven to be effective?	Alternative A has proven successful in ensuring that Copermittees implement or require implementation of BMPs under their JURMPs.	Less resources will be available for using traditional compliance and enforcement tools. By using Alternative B, reliance is placed in nontraditional compliance methods. Information is not known to be available to document success of nontraditional methods.
Assessment	Alternative A, which is based upon explicit requirements and is easier to enforce, should result in better compliance.	

9. Other Programs (Construction Storm Water, Industrial Storm Water, CalTrans Storm Water, TMDL Implementation, POTW, etc.) – Will the alternative promote and enhance other Regional Board programs? Assumption: The more the alternative can result in coordination with other programs the better.

Evaluation of Other Programs		
Criteria	**Alternative A**	**Alternative B**
Basin Planning & Water Quality Standards	Alternative B may facilitate coordination with these programs more than Alternative A by providing a convenient forum to exchange ideas, identify common concerns and activities, develop priorities, and coordinate schedules for actions.	
Non-point Source		
Grants		
TMDLs		
Industrial Programs	The current focus is to coordinate industrial storm water activities of the Regional Board with the Copermittees' JURMP activities.	If resources need to be diverted to manage more MS4 permits, Alternative B may negatively impact this program.
Phase II SW Programs	The current focus is to integrate Phase II program work into Phase I program work.	If resources need to be diverted to manage more MS4 permits, Alternative B may negatively impact this program.
CalTrans	The current focus is to integrate CalTrans program activities into MS4 program activities.	If resources need to be diverted to manage more MS4 permits, Alternative B may negatively impact this program.
Construction Storm Water	The current focus is to ensure adequate BMPs are being implemented at construction sites.	If resources need to be diverted to manage more MS4 permits, Alternative B may negatively impact this program.
Compliance Assurance	The current focus is to assess Copermittee JURMP activities and provide feedback. This includes compliance assurance activities to ensure that Copermittees are requiring and implementing adequate BMPs during the	If resources need to be diverted to manage more MS4 permits, Alternative B may negatively impact this program.

	planning and construction phases of development, as well as at existing municipal, commercial and industrial facilities.	
Site Mitigation/UST	No effect on program	
Land Disposal	No effect on program	
Assessment	Alternative B may negatively impact other storm water programs, but could support Basin Planning & Water Quality Standards, Non-point Source, and Grants.	

10. Watershed-based NPDES Permits – Will the alternative promote and enhance the issuance of watershed-based NPDES permits? Assumption: The more the alternative will promote and enhance watershed-based NPDES permits the better.

Evaluation of Watershed-based NPDES Permits		
Criteria	**Alternative A**	**Alternative B**
One vision for future NPDES permitting is that there would be one master NPDES permit for all point source storm water and non-storm water discharges in a watershed.	Alternative A would be a small step in this direction.	Alternative B would be a larger step in this direction, but could be even greater if all Phase II entities, Caltrans and industrial/ construction dischargers were included.
Assessment	Alternative B may provide a bigger boost to developing comprehensive watershed permits in the future, if there are no legal barriers to including other types of dischargers.	

11. Statewide Consistency - Will the alternative be consistent with other Regional Board MS4 permits? Assumption: The more the format is consistent with other Regional Board MS4 permit formats the better, provided the format ensures protection of water quality.

Evaluation of Statewide Consistency		
Criteria	**Alternative A**	**Alternative B**
Is the alternative consistent with other Regional Board MS4 permits?	Alternative B is more inconsistent with other MS4 permits than Alternative A. However the goals of both alternatives are consistent with the goals of MS4 permits adopted by other Regional Boards, i.e. reducing pollutants to MEP and requiring compliance with receiving water objectives. Both alternatives are also consistent with all State Board precedential decisions on MS4 permits.	
Assessment	Because Alternative A is consistent with previous permits and is more similar to MS4 permits issued by other Regional Boards, there is less reason for appeal of the permits to the State Board.	

C. COPERMITTEE FACTOR ANALYSIS

1. Acceptance – Will the alternative be viewed positively and with acceptance by the Copermittees? Assumption: Acceptance and a positive attitude will facilitate permit implementation and result in fewer challenges of the permit requirements.

Evaluation of Acceptance		
Criteria	**Alternative A**	**Alternative B**
Copermittees support the alternative as the correct, next step in addressing storm water issues?	Unknown. Based on informal discussions, Copermittees do expect a move towards watershed permitting, but they have not stated their opinion of this.	
Copermittees willingness to change?	Alternative A would result in similar program structure and implementation, with a change in focus to support watershed activities.	Alternative B could result in Copermittees within more than one watershed regulating areas of their City differently from other areas. Therefore, Copermittees are less likely to support this alternative.
Will this alternative result in legal challenges?	Alternative A may not result in legal challenges as this is more of a continuation of the current program.	Alternative B may result in legal challenges as this would be a "new" set of rules.
Assessment	Alternative A would be preferred as it is more similar to the current program and Copermittees could continue to treat all entities within their boundaries the same.	

2. Copermittee Resources – Will the alternative positively or negatively affect Copermittee resources? Assumption: The fewer Copermittee resources that it would take to implement all MS4 permit requirements the better.

Evaluation of Copermittee Resources		
Criteria	**Alternative A**	**Alternative B**
Reporting requirements	10 WURMPs and 1 Unified WURMP, in addition to JURMPs, annual reports, monitoring report	2-8 separate watershed reports, no JURMP required, annual reports, monitoring reports
Monitoring	Costs shared based on population.	Likely to increase costs due to multiple monitoring efforts and data analysis.
Program Implementation	Little difference for Copermittees and principal permittee, as program requirements may be similar.	Likely to increase costs as more coordination is required (dependent on number of watersheds).
Coordination/Meetings	May be a slight increase in costs as a greater emphasis is placed on watershed activities; Copermittees are not currently as focused on WURMP as JURMP actions.	Significant increase over costs of Alternative A, as Copermittees' participation in meetings, monitoring, and reporting is expected to increase (dependent upon number of watersheds).
Assessment	While Alternative B appears to result in significant cost increases, it is more likely that the Copermittees will spend the same amount of money on the entire program and instead allocate the dollars differently. This could result in poor program performance in some areas. Alternative A would retain the positive gains of the JURMP, while increasing watershed activities.	

3. Collaboration – Will the alternative support and enhance collaboration among the Copermittees? Assumption: Increasing collaboration among Copermittees can make better use of their resources while addressing storm water issues.

Evaluation of Collaboration		
Criteria	**Alternative A**	**Alternative B**
Which alternative will better generate collaboration?	Alternative A will require an increase in collaboration within a watershed, but will not require collaboration on all program elements; Copermittees will still be individually responsible for JURMP implementation.	Alternative B will require collaboration on all aspects of program implementation.
How have the Copermittees worked together in the past on WURMP efforts?	The County of San Diego provides overall guidance.	County of San Diego guidance may be limited in some watersheds based on land holdings.
Legal limitations to collaboration	Unknown	Unknown
What level of collaboration will be required?	Alternative A requires increased collaboration, but not to the level of Alternative B.	Alternative B requires Copermittees to think outside of jurisdictional boundaries and implement programs outside of jurisdictional boundaries that will benefit water quality within jurisdictional boundaries.
Assessment	While Alternative B would require greater collaboration among Copermittees, they have not currently demonstrated an eagerness to collaborate and jointly address storm water issues at such a scale. Alternative A would increase the level of collaboration while still recognizing individual programs.	

4. Flexibility – Does the alternative provide the Copermittees with flexibility in implementing their programs? Assumption: A more flexible permit would be preferred by the Copermittees, as this would allow them more choices in achieving compliance.

Evaluation of Flexibility		
Criteria	**Alternative A**	**Alternative B**
Will the alternative more readily allow changes to the permit/program?	Changes may be more contested as each change would affect all of the Copermittees.	Changes may be easier as they would be limited to the watershed that requires the change.
Will the alternative allow the Copermittees greater flexibility in meeting permit requirements?	There is little difference between the two alternatives. Both would contain specific detailed permit requirements.	There is little difference between the two alternatives. Both would contain specific detailed permit requirements.
Assessment	Alternative B may be slightly preferred because it may be easier to amend.	

5. Reporting Requirements – Will the alternative increase reporting requirements? Assumption: A permit that reduces the reporting requirements would be preferred by the Copermittees over one that keeps the requirements the same or increases the requirements.

Evaluation of Reporting Requirements		
Criteria	**Alternative A**	**Alternative B**
Number of reports	JURMP, WURMP, JURMP annual report, WURMP annual report, monitoring report	Watershed plans, watershed annual reports, monitoring reports, possible special watershed reports
Reporting effort	Less effort than Alternative B, because the required reports and formats have already been developed.	More effort than Alternative A, because new reports and formats would need to be developed.
Assessment	Alternative A would likely necessitate development of more reports, but Alternative B would likely require greater reporting effort. Therefore, there is likely little difference between the two alternatives in terms of resources expended on reporting.	

6. Statewide Consistency – Is the alternative consistent with other MS4 permits within the state? Assumption: The Copermittees will favor an alternative that is consistent with other permits in the State rather than having to develop a new type of program.

Evaluation of Statewide Consistency		
Criteria	**Alternative A**	**Alternative B**
Consistent with other MS4 permits in state?	More consistent with other permits.	Less consistent with other permits.
Is consistency necessary to achieve clean water?	Equal - permits would have requirements necessary to address regional water quality issues.	
Assessment	Alt A would be preferred by Copermittees as it is similar to other programs already in the state and region.	

7. Regional Consistency – Is the alternative consistent with other MS4 permits within the region? Assumption: The Copermittees will favor an alternative that is consistent with other permits in the region rather than having to develop a new type of program.

Evaluation of Regional Consistency		
Criteria	**Alternative A**	**Alternative B**
Consistent with other permits in region?	More consistent with other permits.	Less consistent with other permits.
Is consistency necessary to achieve clean water?	Equal - permits would have requirements necessary to address regional water quality issues.	
Assessment	Alt A would be preferred by Copermittees as it is similar to other programs already in the state and region.	

D. STAKEHOLDER FACTOR ANALYSIS

1. Stakeholder Involvement - Will the alternative be effective in generating active stakeholder involvement? Assumption: Stakeholder involvement is positive, because greater involvement can generate a better work product and more public awareness.

Evaluation of Stakeholder Involvement		
Criteria	**Alternative A**	**Alternative B**
Which alternative would generate more active stakeholder involvement from environmental groups?	Unknown, most likely negligible difference between the two alternatives.	Unknown, most likely negligible difference between the two alternatives.
Which alternative would generate more active stakeholder involvement from watershed groups?	This approach would generate stakeholder involvement from watershed groups, but less so than Alternative B.	This alternative would most likely generate more stakeholder involvement from watershed groups, because essentially all activities would be conducted at the watershed level.
Which alternative would generate more active stakeholder involvement from construction and other industry groups?	Unknown, most likely negligible difference between the two alternatives.	Unknown, most likely negligible difference between the two alternatives.
Which alternative would generate more active stakeholder involvement from political groups?	Unknown, most likely negligible difference between the two alternatives.	Unknown, most likely negligible difference between the two alternatives.
Which alternative would generate more active stakeholder involvement from the general public?	This approach would generate stakeholder involvement from the general public, but less so than Alternative B.	This alternative would most likely generate more stakeholder involvement from the general public, because watershed efforts would most likely be more prominent and visible to the public.
Assessment	Two of the identified stakeholder groups would most likely be more involved if Alternative B were used, while the reaction of the other identified stakeholder groups is unknown. Therefore, it appears that Alternative B would be the recommended alternative for this factor.	

2. Stakeholder Support - Will the alternative be supported by a majority of the stakeholders? Assumption: Stakeholder support is positive, because it increases the probability that implementation will occur and be effective.

Evaluation of Stakeholder Support		
Criteria	**Alternative A**	**Alternative B**
Environmental groups would support which alternative?	Environmental groups would most likely support this alternative, but less so than Alternative B.	This alternative would most likely be preferred by environmental groups, because it can focus more directly on specific water quality problems which they may be interested in.
Watershed groups would support which alternative?	Watershed groups would most likely support this alternative, but less so than Alternative B.	This alternative would most likely be preferred by watershed groups, because it can focus more directly on specific water quality problems which they may be interested in.
Construction and other industry groups would support which alternative?	Construction and other industry groups would not like this approach, but would prefer it over Alternative B.	Construction and other industry groups would oppose this approach, because of its potential for different standards in different

		watersheds.
Political groups would support which alternative?	Political groups would most likely not like this approach, but would prefer it over Alternative B.	Political groups would most likely oppose this approach, because of the difficulty in using inter-jurisdictional efforts.
The general public would support which alternative?	Unknown which alternative would be preferred.	Unknown which alternative would be preferred.
Assessment	Two identified types of stakeholder groups would most likely prefer Alternative A, two would most likely prefer Alternative B, and one's preference is unknown. Assuming that each type of stakeholder group is of equal importance, it appears that neither Alternative would be supported by stakeholders more than the other.	

3. Financial Assistance – Will the alternative attract financial assistance? Assumption: The ability to attract financial assistance is positive, because financial assistance can result in projects which improve water quality.

Evaluation of Financial Assistance		
Criteria	**Alternative A**	**Alternative B**
Will the alternative attract financial assistance from grants?	While this alternative could attract financial assistance from grants, Alternative B would most likely be more effective at attracting financial assistance from grants.	This alternative would most likely be more effective at attracting financial assistance from grants, because well established watershed efforts are usually more effective in attracting grant money.
Will the alternative attract financial assistance from other sources such as watershed groups, conservancies, and private parties?	Unknown	Unknown
Assessment	Alternative B is the preferred alternative for the Financial Assistance factor.	

Applied Polymer Systems, Inc.
519 Industrial Drive
Woodstock, GA 30189
www.siltstop.com

Soil Specific Polymer Blend Applications and Corresponding BMPs

Steven R. Iwinski

Environmental Scientist

University of Central Florida

Stormwater Management Academy
"Managed Stormwater is Good Water"

Senior Associate

H2O4U

The Winner

1999 TRI – 1 Billion Pounds of Toxins released to the environment

C&EN April 2001

014430

Aquatic Toxicity Issues of (PAM), Polyacrylamide, PAM Blends and Cationic Polymers

Toxicities Result from:

1) Acrylamide Monomer (PAM)

2) Cationic Polymers

3) Non-Specific Lithology Applications

4) Improper Site Applications

1) Acrylamide monomer in PAM is regulated for water treatment and soil polymers.

When Non-Specific Lithology Applications Occur

Results are:

1) Excess polymer material is used

2) Water viscosity increases

3) Poor soil binding occurs

4) Poor water quality results

Examples of Improper Site Applications are:

1) Excess Usage of PAM, polymers

2) Uneven coverage when applied

3) Incorrect form or type of PAM, polymer or blend is used

4) *Not used in conjunction with other BMPs

Why Cationic PAMs and polymers are

Toxic to Aquatic Respiration

014437

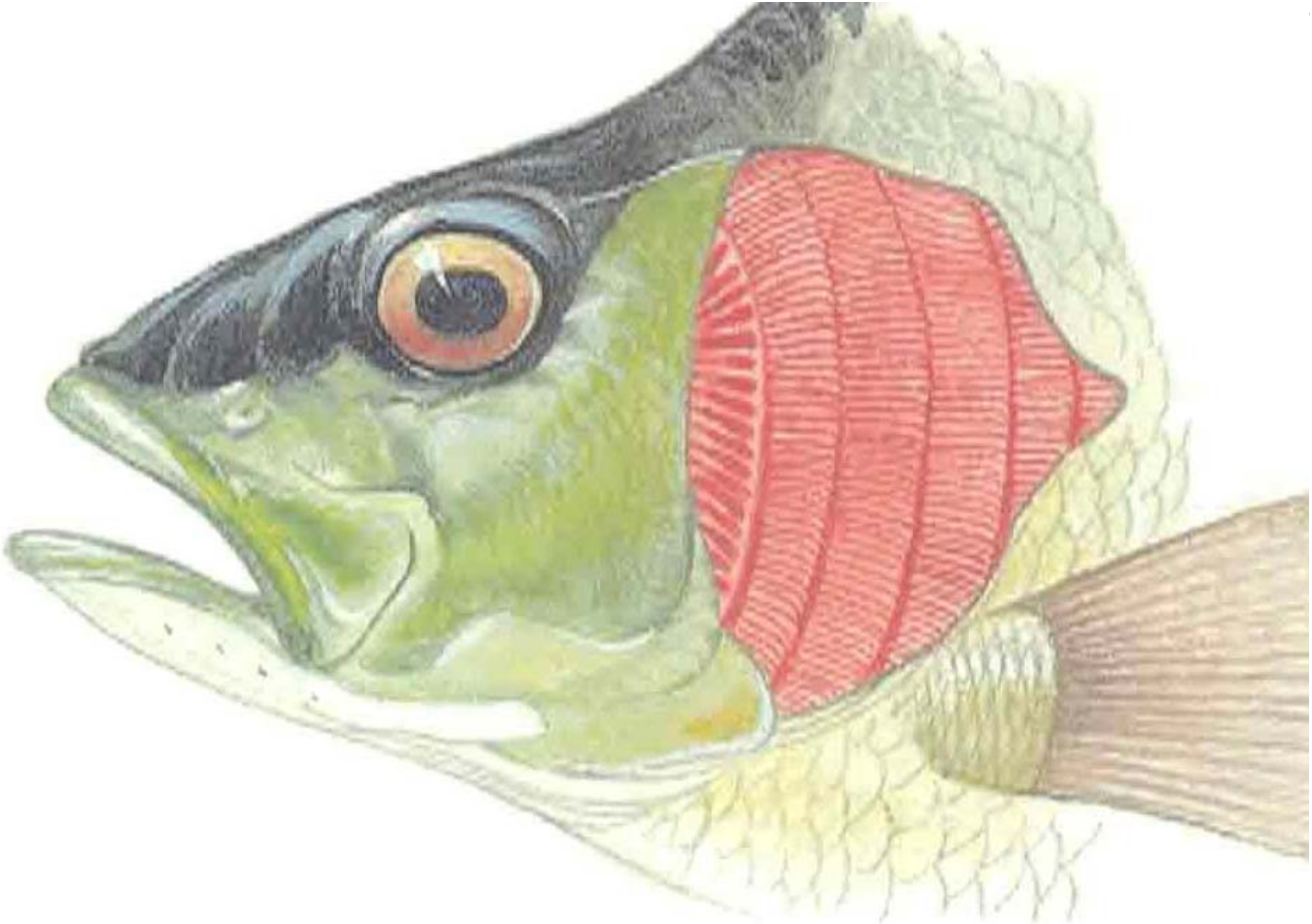

014438

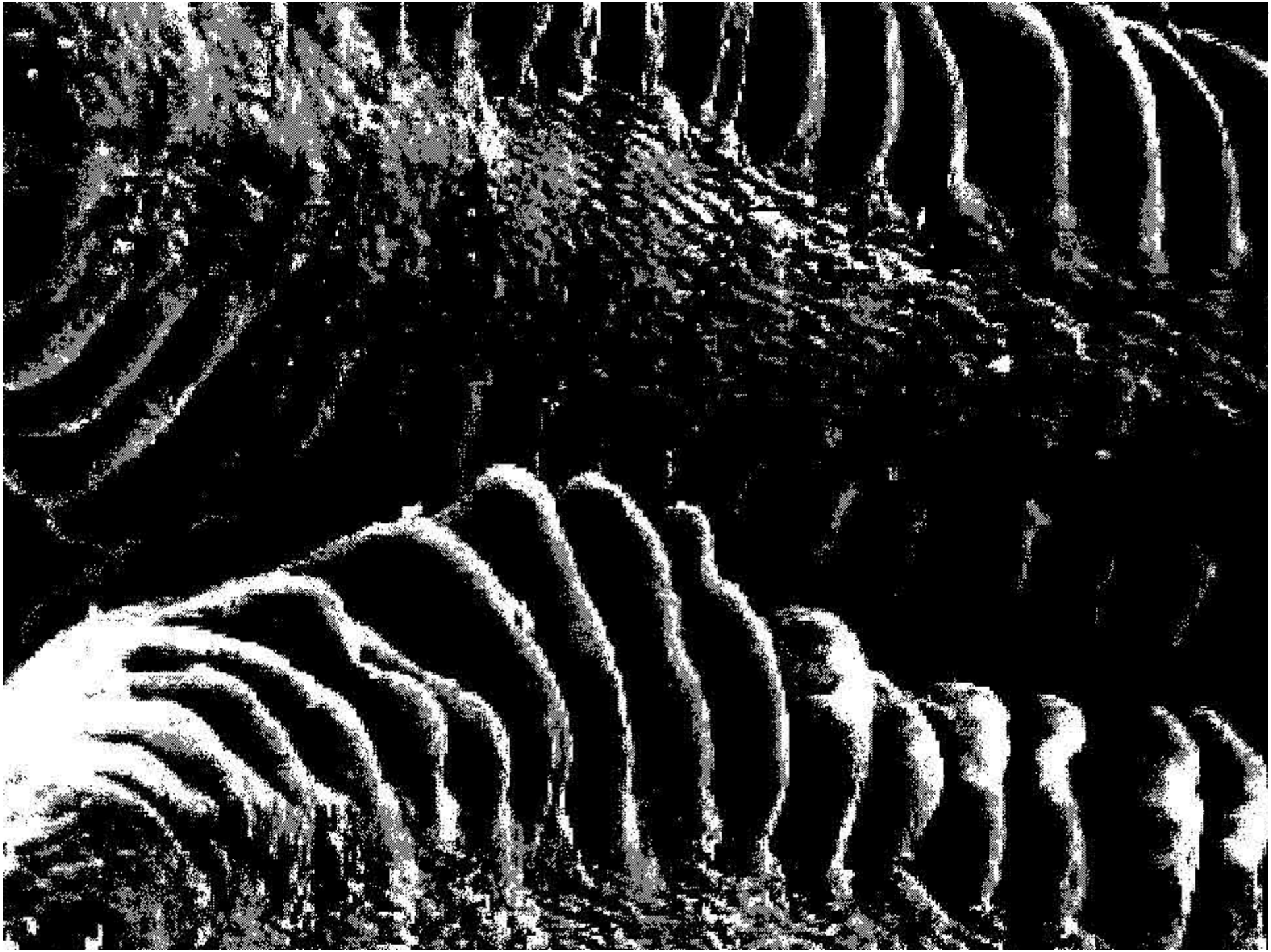

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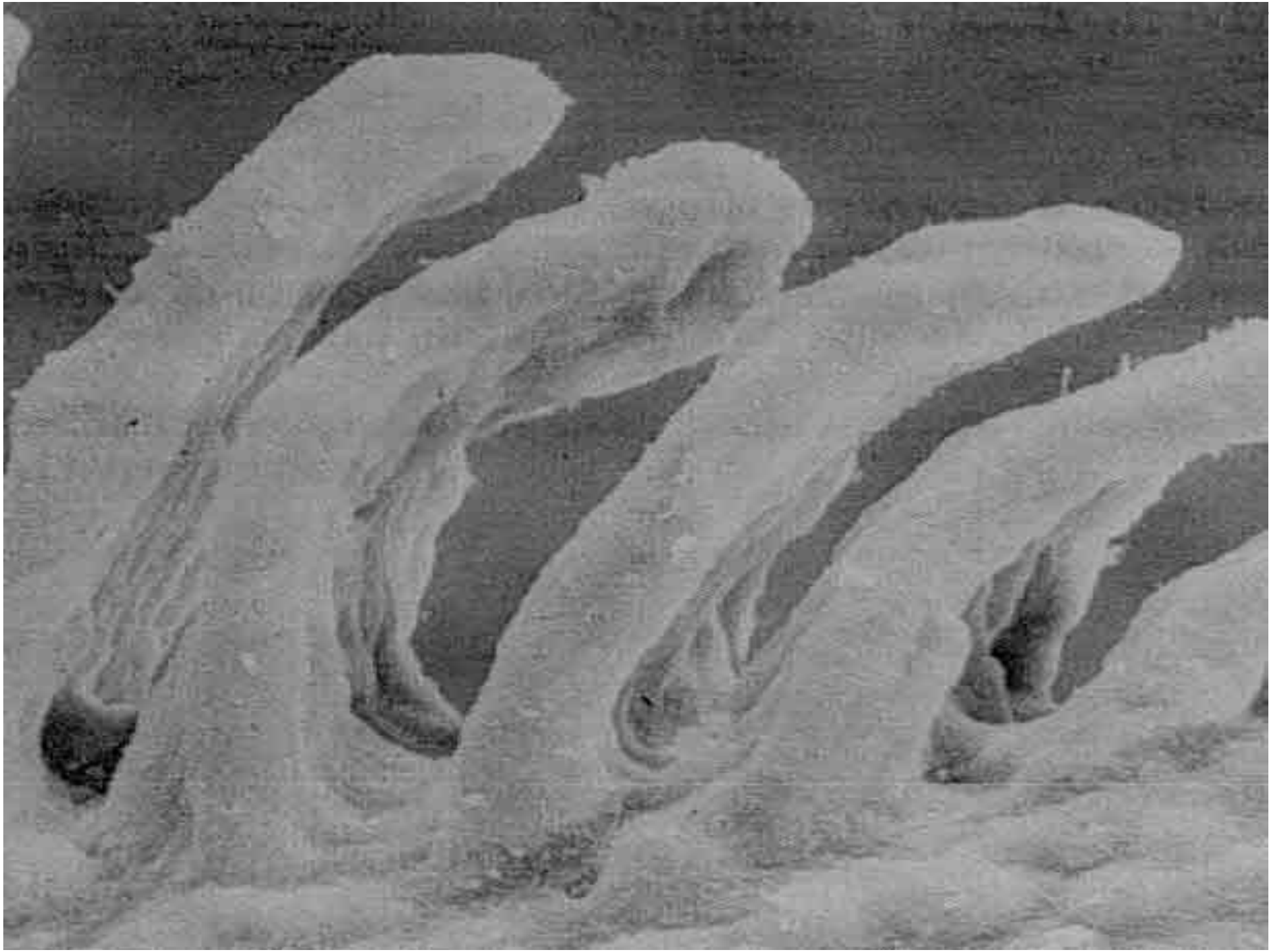

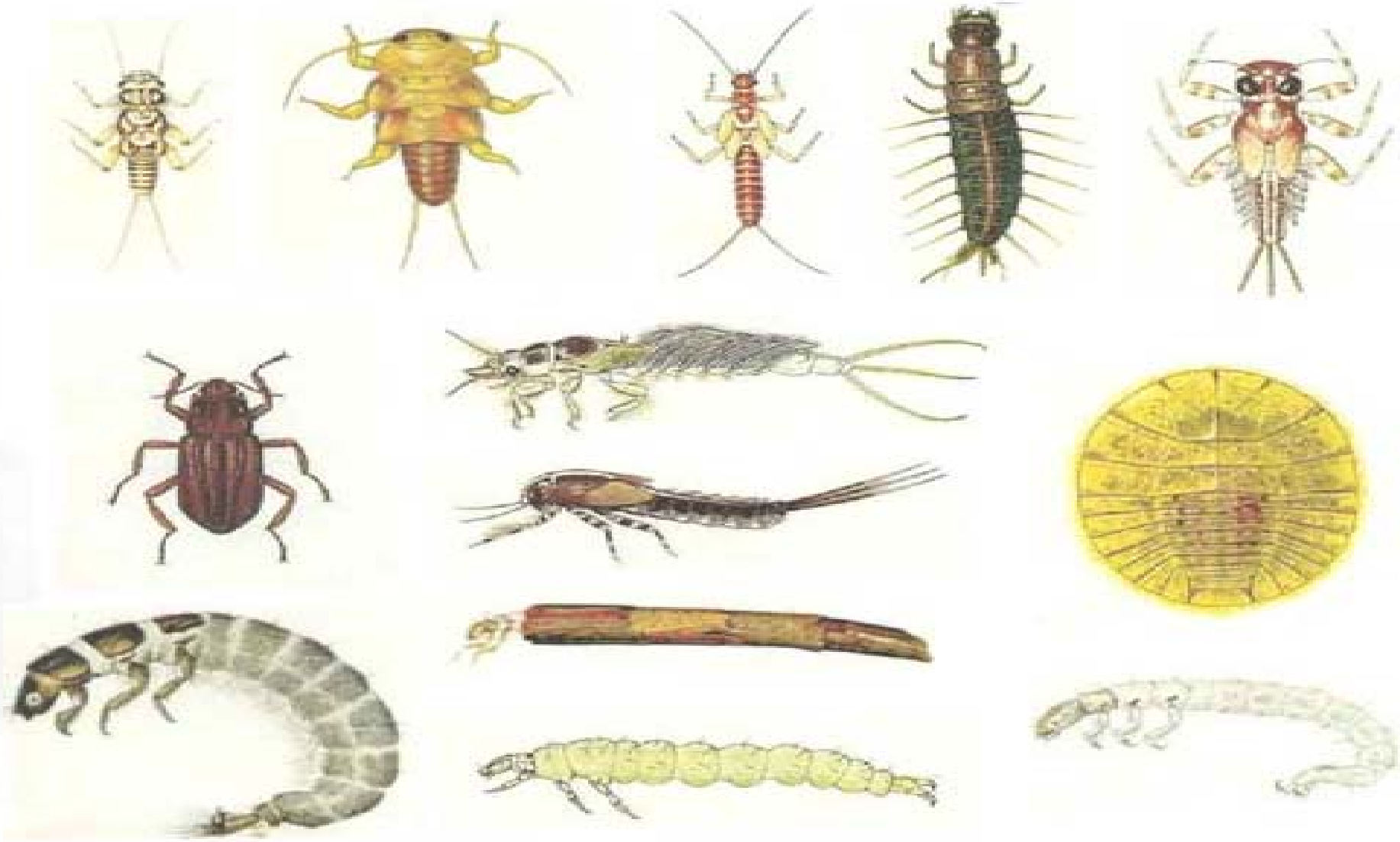

Common Stonefly Nymphs, Roachlike Stonefly Nymphs, Slender Winter Stonefly Nymphs, Brush-Legged Mayfly Nymph, Flatheaded Mayfly Nymphs, Burrowing Mayfly Nymph, Net-spinning Caddisfly Larvae, Fingernet Caddis Larva, Case-Making Caddisfly larva, Free-living Caddisfly Larvae, Dobsonfly Larva, Water Penny, Riffle Beetle.

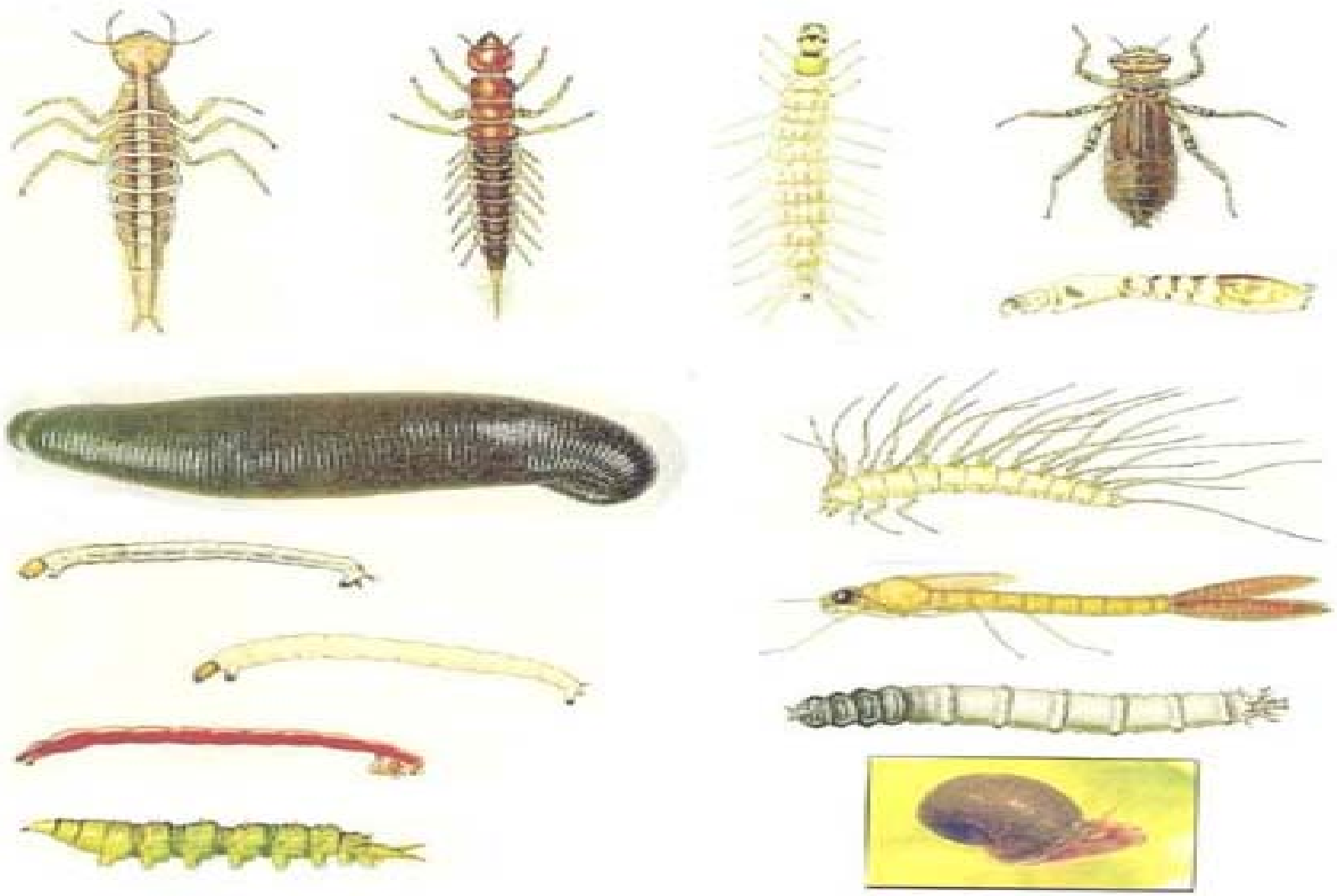

Dragonfly Nymphs, Damselfly Nymph, Watersnipe Fly Larvae, Alderfly Larva, Cranefly Larva, Crawling Water Beetle Larvae, Predaceous Diving Beetle Larvae, Whirling Beetle Larva, Midge Larvae, Blackfly Larvae, Planorbid Snail, Leech.

Toxicity Studies for (Poly-N-acetyl--D-glucosamine) Chitosan

Data Source

PAN Pesticide Database, 2000-2004

Common Name	Scientific Name	Avg Species LC_{50} (ug/L)	LC_{50} Std Dev	Number of Studies	Avg Species Rating	Outlier Result for Organism Group?
Fish						
Channel catfish	Ictalurus punctatus	64.5	27.5	2	Very Highly Toxic	
Rainbow trout, donaldson trout	Oncorhynchus mykiss	44.0	6.00	2	Very Highly Toxic	

Reference:
Citation: S. Orme and S. Kegley, *PAN Pesticide Database,* Pesticide Action Network, North America (San Francisco, CA. 2004), http:www.pesticideinfo.org.
© 2000-2004 Pesticide Action Network, North America. All rights reserved.
Information found at: http://www.pesticideinfo.org/Detail_Chemical.jsp?Rec_Id=PC34013#Ecotoxicity

Data Source

Protech Services, 2004 StormCon Conference

Polymer LC50 Values (mg/L)

Polymer	Daphnia Magna 48 hr	Rainbow Trout 96 hr	Fathead Minnow 96 hr
$Al_2Cl(OH)_5$	>5000	390	517
DADMAC	17.5	0.49	1.65
Mimosa Bark	258	N/A	1.3
Chitosan	13.7	1.1	6.4

Not that the $Al_2Cl(OH)_5$, a synthetic polymer, is by far the least toxic, and is in fact less toxic than many household cleaners. Chitosan is approximately equal in toxicity to DADMAC with regards to rainbowtrout, which is generally considered a sensitive species. Note also, for example that the Chitosan is considered a hazardous substance according to federal Resource Conservation and Recovery Act (RCRA) standards (due to acidity, at a pH of about 4), while many synthetic polymers such as DADMAC are not RCRA hazardous.

Reference:
Protech General Contracting Services, Inc., Technical Report July 2004 (Polymer Coagulants and Flocculants For Stormwater Applications)
Protec General Contracting Services, Inc., 61 Glenwood Drive, Napa, CA 94559
Phone: 800-433-6040 Fax:707-226-1526 www.protech-services-inc.com

Data Source

US EPA 1993, 2000

Scientific Name, Common Name	Endponit	Effect	Effect Measure	Trend / Effect %	Media Type	Duration	Conc (ug/L)	Signif / Level	Response Site / BCF	Ref#
Oncorhynchus mykiss, Rainbow trout	LC50	Mortality	Mortality	INC	FW	48 hr	A 50, 41 –62		-----	4175
Oncorhynchus mykiss, Rainbow trout	LC50	Mortality	Mortality	INC	FW	48	A 38, 33 - 43		-----	4175

Reference Number: 4175
Author(s): Waller, D.L., J.J. Rach, W.G. Cope, L.L. Marking, S.W. Fisher, and H. Dabrowska
Publication Year: 1993
Title: Toxicity of Candidate Molluscicides to Zebra Mussels (Dreissena polymorpha) and Selected Nontarget Organisms
Reference Source: J.Gt.Lakes Res. 19(4):695-702
Reference Number: 59766
Author(s); Bullock, G., V. Blazer, S. Tsukuda, and S. Summerfelt
Publication Year: 2000
Title: Toxicity of Acidified Chitosan for Cultured Rainbow Trout (Oncorhynchus mykiss)
Reference Source: Aquaculture 185(3/4):273-280
This information can be found on the US EPA Website At: http://www.epa.gov/medecotx/searches/aquatic-1-101504-1546511.htm

8 min., 16 sec.
with 0.001% Chitosan

APS 703d#3 Floc Log

	Pimephales promelas		Pimephales promelas	Ceriodaphnia dubia
	Survival	Growth		
703D#3 Floc Log	IC_{25} (ppm)[b] / NOEC	IC_{25} (ppm)[b] / NOEC	LC_{50} (ppm)[b]	LC_{50} / NOAEC (ppm)[b]
Chronic	77.8 / 52.5	50.1 / 52.5		
96 hour Acute			499	
48 hour Acute				673 / 420

APS 703d Floc Log

	Pimephales promelas		Ceriodaphnia dubia
	Survival	Growth	
703D Floc Log	IC_{25} (ppm)[b] / NOEC	IC_{25} (ppm)[b] / NOEC	LC_{50} / NOAEC (ppm)[b]
Chronic	110 / 105	130 / 105	
96 hour Acute			
48 hour Acute			383 / 105

APS 706b Floc Log

	Pimephales promelas		Pimephales promelas	Ceriodaphnia dubia
	Survival	Growth		
706b Floc Log	IC_{25} (ppm)[b] / NOEC	IC_{25} (ppm)[b] / NOEC	LC_{50} / NOAEC (ppm)	LC_{50} (ppm)
Chronic	>1,680 / 1680	>1680 / 1680		
96 hour Acute			637 / 420	
48 hour Acute				>420

APS 712 Silt Stop powder

	Pimephales promelas	Pimephales promelas	Ceriodaphnia dubia
712 Silt Stop powder	LC_{50}[b] / NOAEC[c] (ppm)	LC_{50}[b] / NOAEC[c] (ppm)	LC_{50}[b] / NOAEC[c] (ppm)
96 hour Acute	>6720 / 6720		
48 hour Acute		>6720 / 6720	
48 hour Acute			1617 / 840

\

Current Erosion Control Practices, not using soil specific PAMs or polymers result in habitat and ecosystem destruction

NO DUMPING!
DRAINS TO BAY

014447

014448

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014451

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STOP WORK
ORDER
NO FURTHER
Filling, Excavating, Grading,
Construction, Demolition Or
Alterations Without Permission
Of The
CITY OF CLEVELAND
BUILDING OFFICIAL
423-479-1913

Water Quality, Sediment and Erosion Control BMPs require Balance!

Polyacrylamide Blends (PAMs) for Land and Water applications

Hydroseeding over soft armor using “Soil Specific”high chelating Anionic PAM blends

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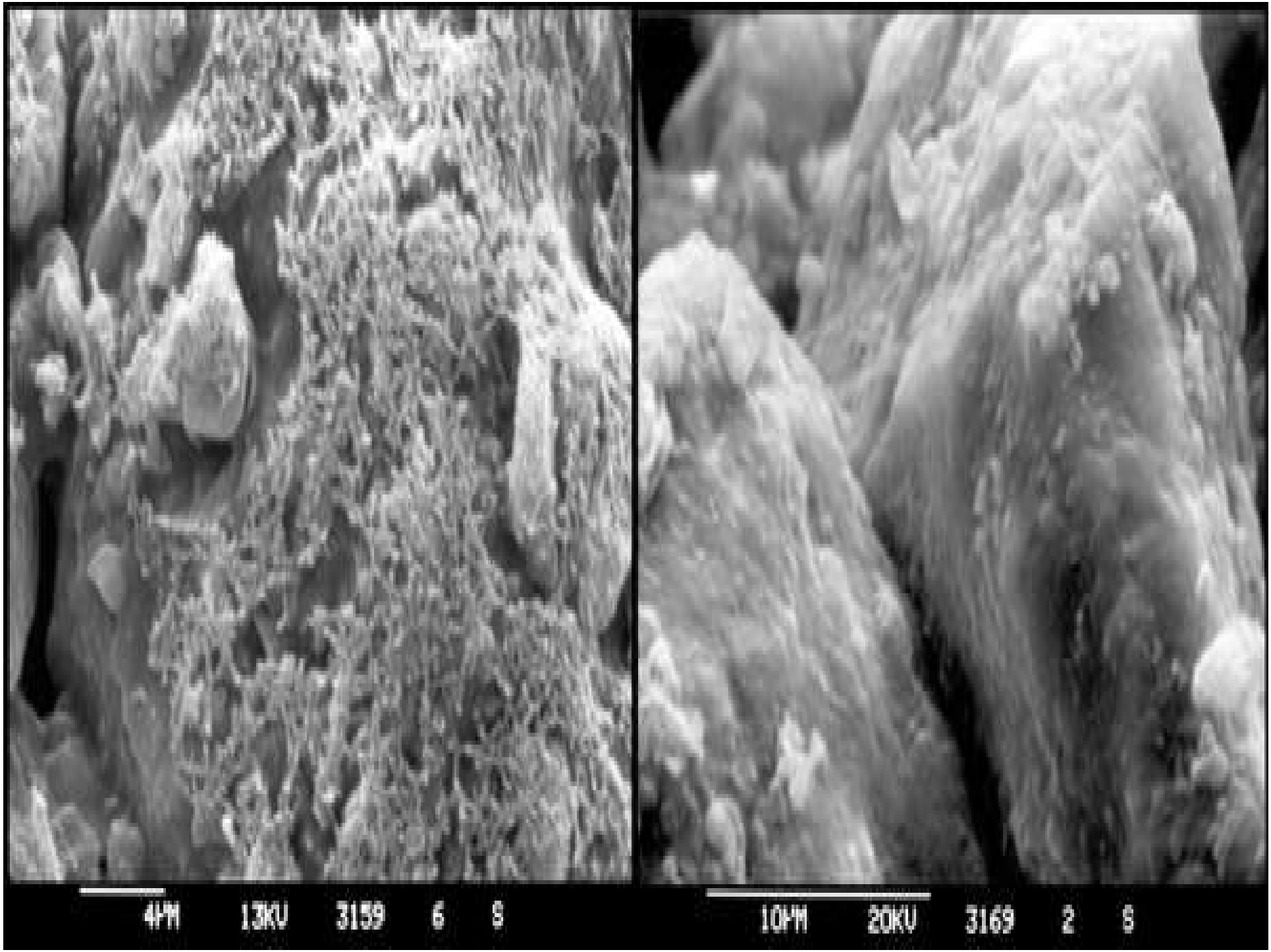

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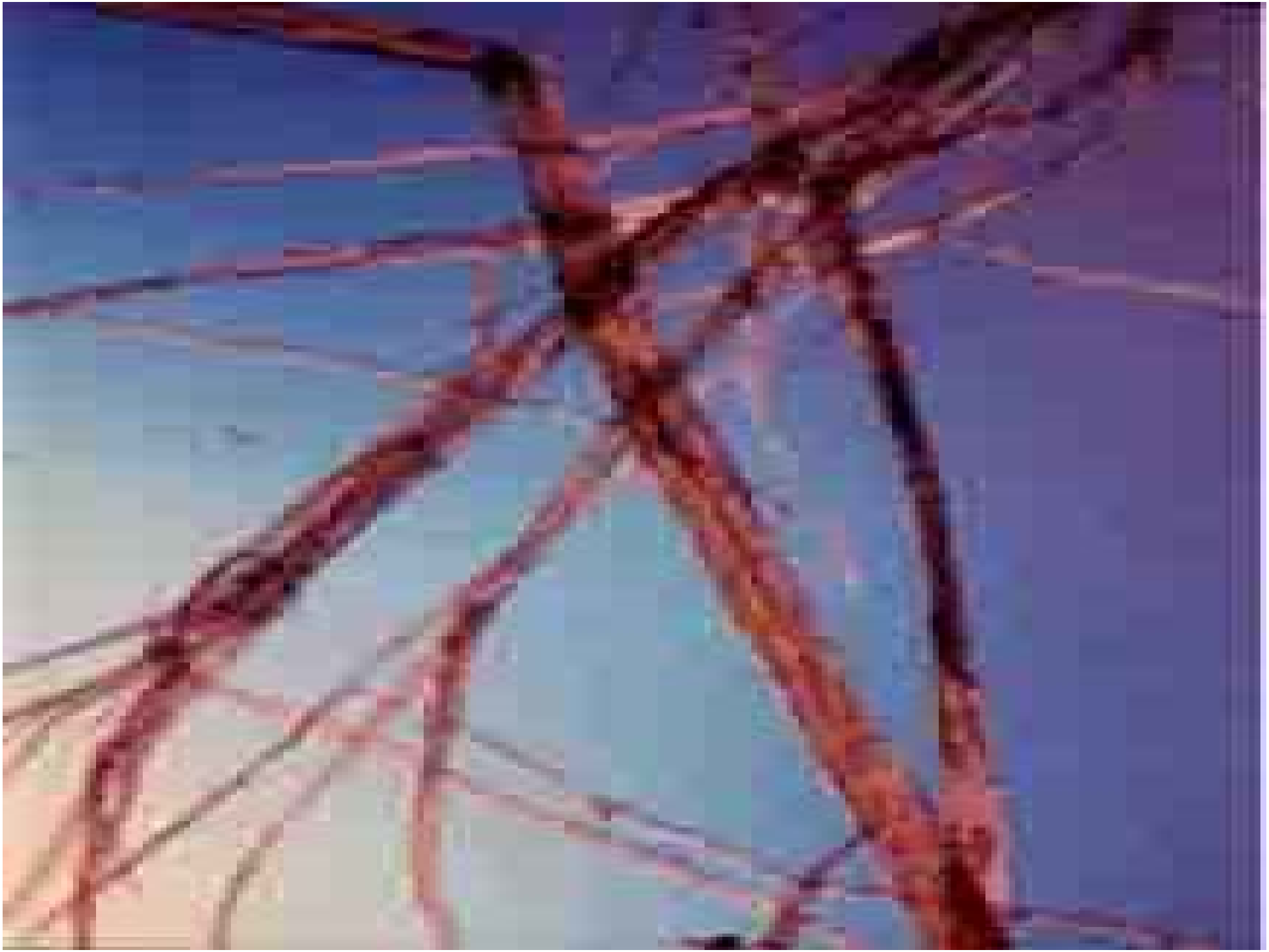

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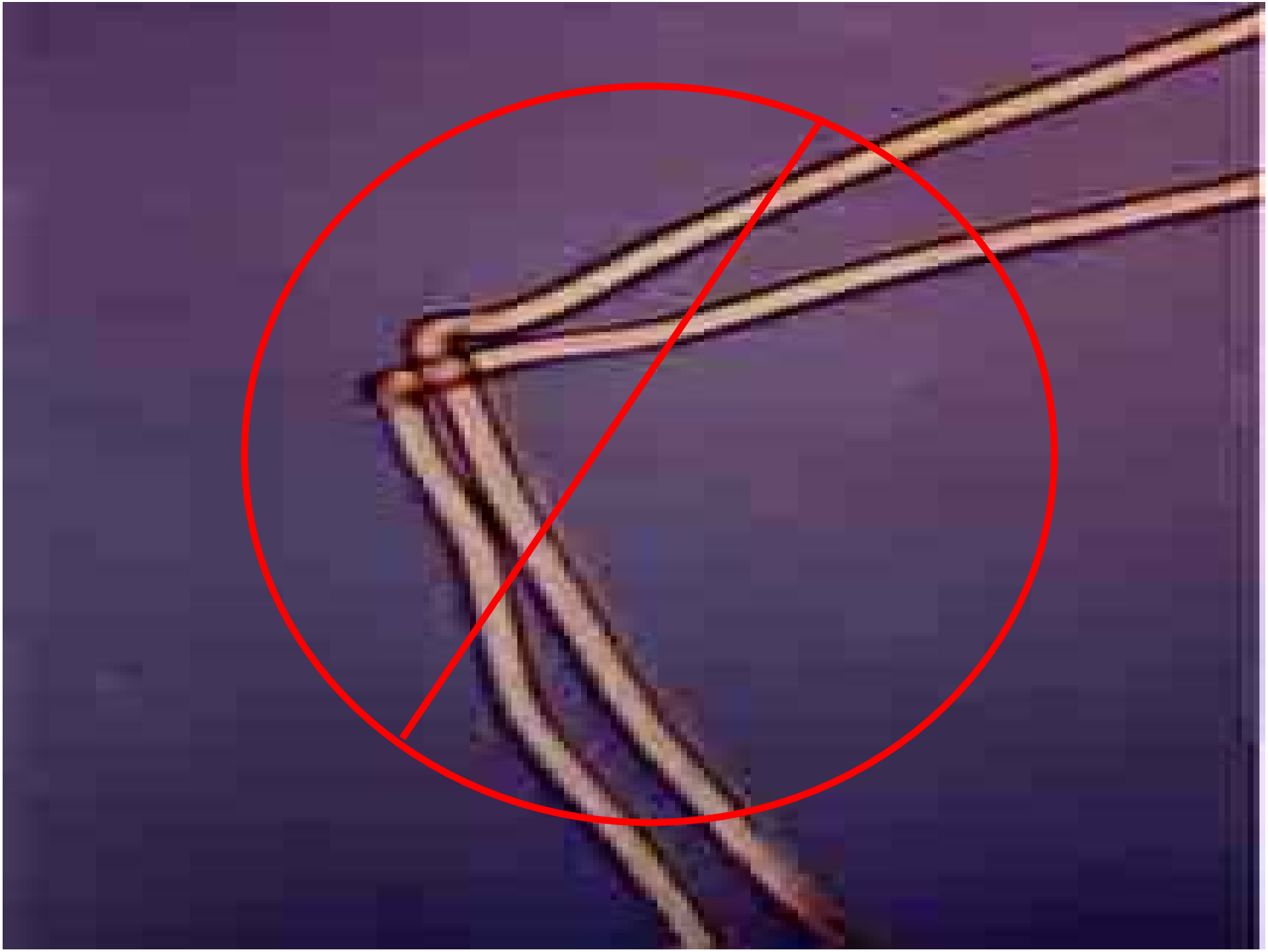

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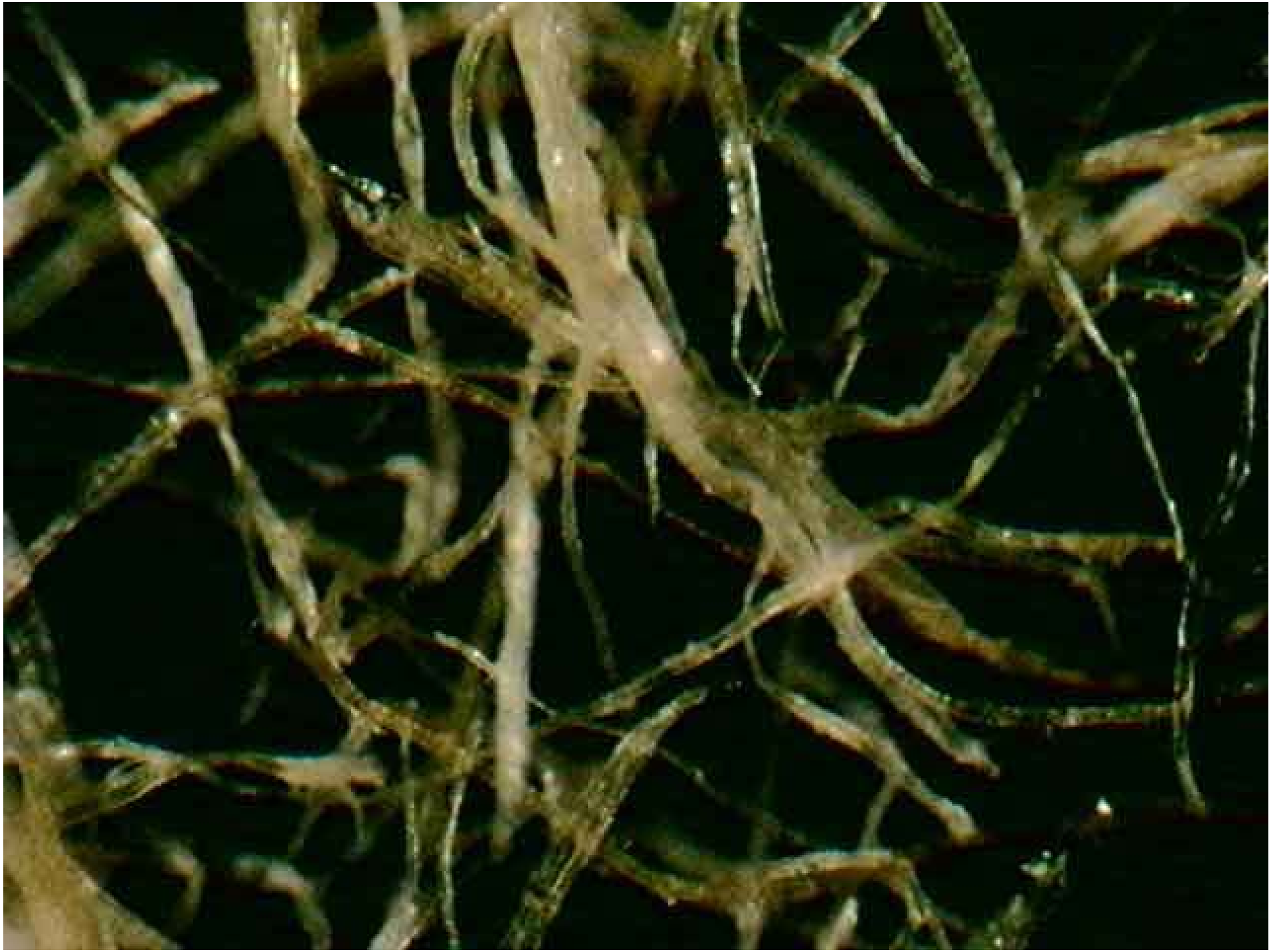

014477

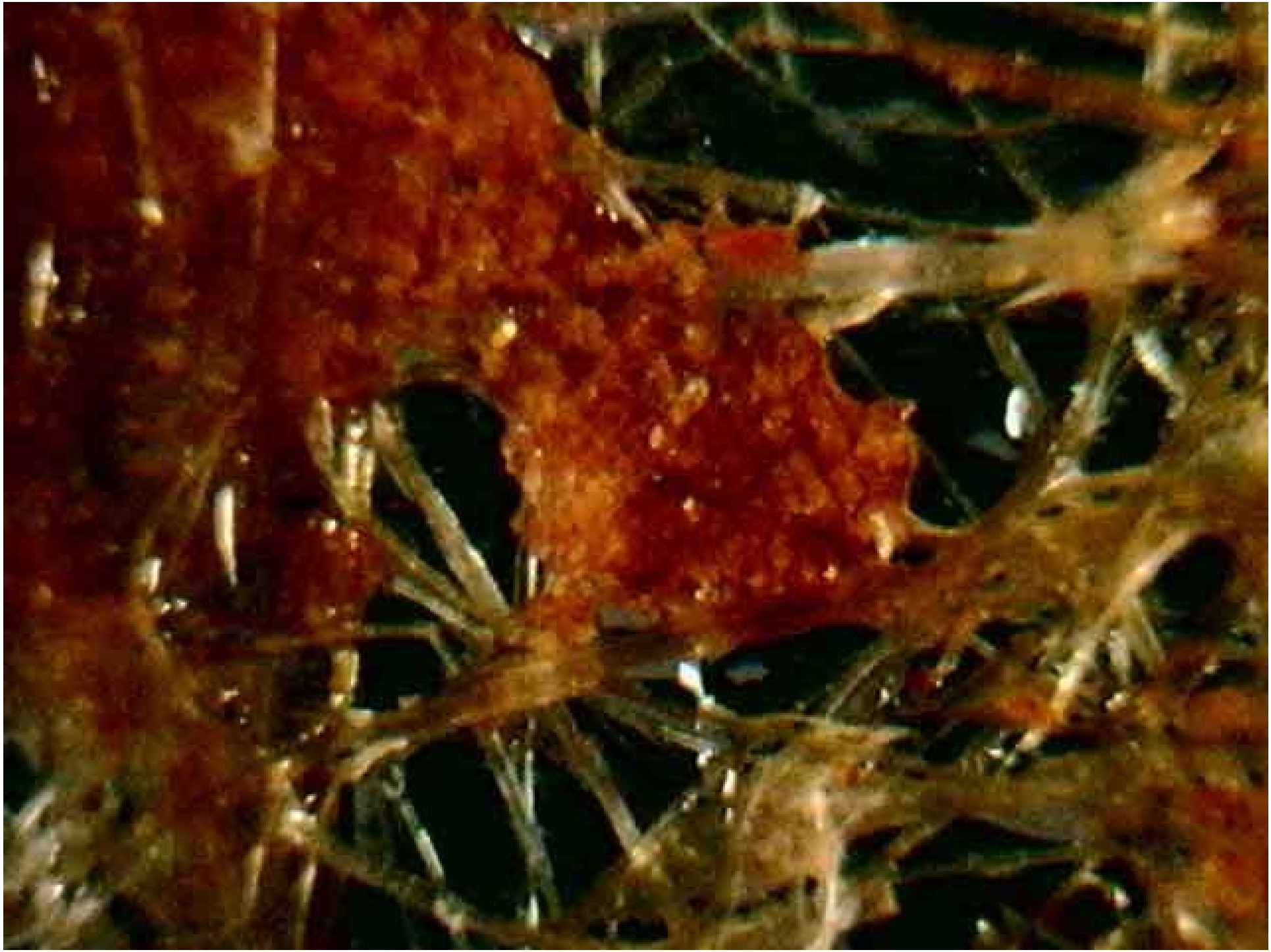

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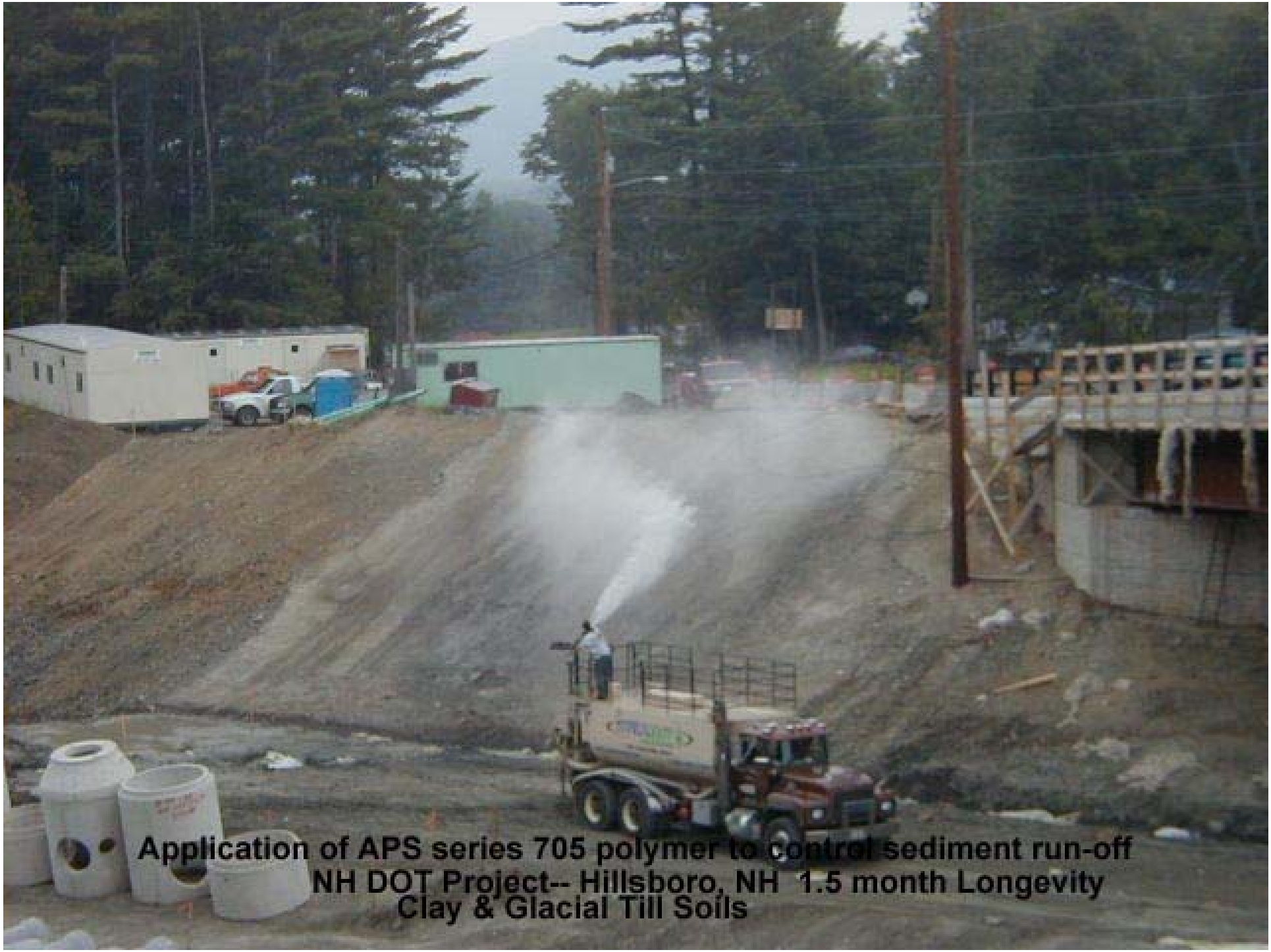
Application of APS series 705 polymer to control sediment run-off
NH DOT Project-- Hillsboro, NH 1.5 month Longevity
Clay & Glacial Till Soils

014486

Storm Water Clarification using Floc Log enhanced Baffle Grids

FLOC LOG
FLOC LOG
FLOC LOG

Samples are taken from entire site to match SiltStop polymer to the soil type

High organic top soils and clayey sob soils often require two different
Silt Stop polymers.

Excavation for Baffle Grid

Baffle Grid Panel placement

014493

Silt Stop treated soil is covered with overlaping Baffle Grid Panels

Jute woven mat has best effective adheasive properties

Baffle Grid frames showing overlap installation

Baffle Grid size is based on 25 year storm event

Charging the Grid with APS Silt Stop polymer

Completed Baffle Grid

014499

NOTICE
VEHICLES TRACKING MUD ONTO THE STREET ARE IN VIOLATION OF THE CODE OF ORDINANCES FOR THE CITY OF ROSWELL, GEORGIA. VIOLATORS WILL BE PROSECUTED WITH A FINE UP TO $1,000.00 AND 180 DAYS OF LABOR IN PUBLIC WORKS DEPT. OR ANY COMBINATION THEREOF, WITH EACH OCCURANCE. USE WATERHOSE PROVIDED TO WASH MUD FROM YOUR TIRES PRIOR TO LEAVING THE CONSTRUCTION SITE EXIT.
THANK YOU

014501

Floc Logs must be kept
moist for best results

014503

014504

Correct Floc Log creates particle adheasion to the Baffle Grid panels

Effluent water discharged for the Baffle Grid

014506

014507

DATE	NTU-IN	NTU-OUT	RIVER
3-Aug	3468	19.2	28.6
11-Aug	2856	17.9	25.2
19-Aug	2288	12.9	17.7
27-Aug	1992	14.7	11.2
1-Sep	868	22.8	14.6
21-Sep	566	18.2	16.3

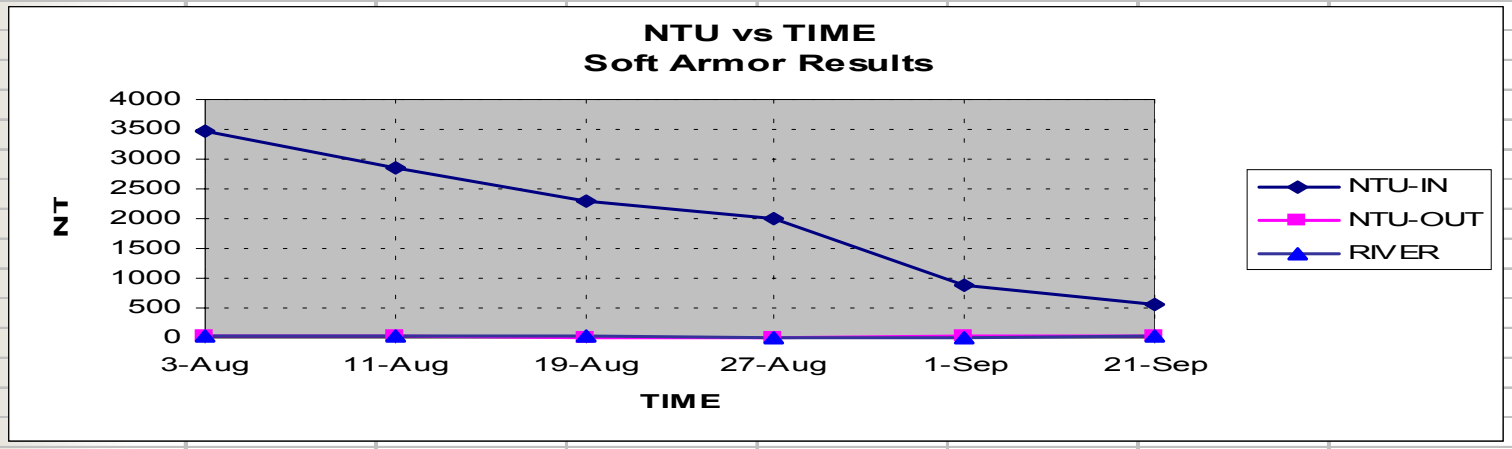

DATE	NTU-OUT	RIVER
3-Aug	19.2	28.6
11-Aug	17.9	25.2
19-Aug	12.9	17.7
27-Aug	14.7	11.2
1-Sep	22.8	14.6
21-Sep	18.2	16.3

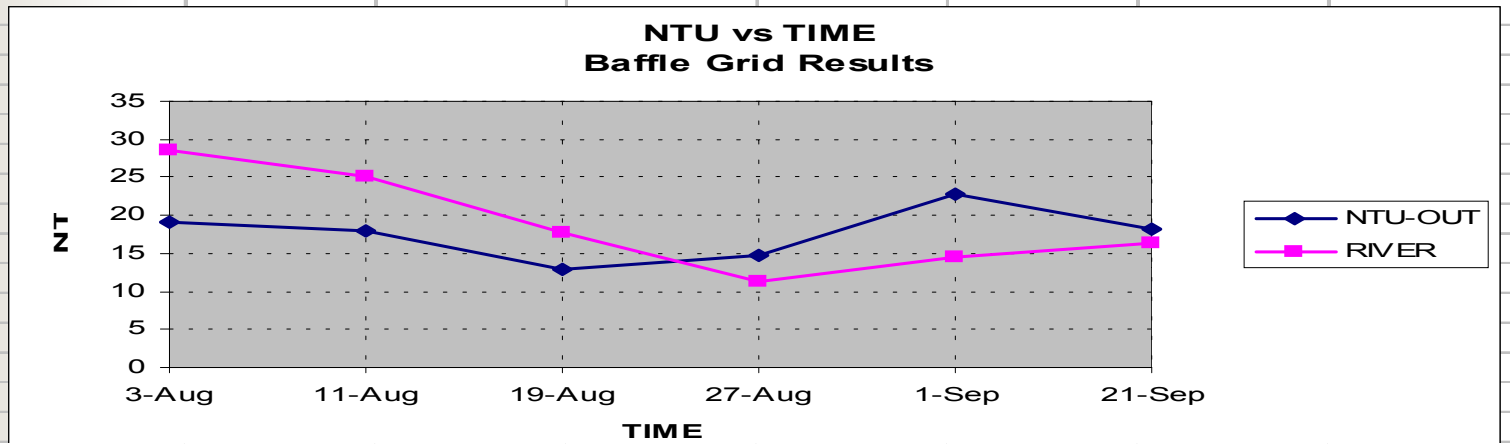

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Active (pumping) Baffle Grid applications

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Florida soft armor applications for high velocity flow, erosion control and increased water quality

014532

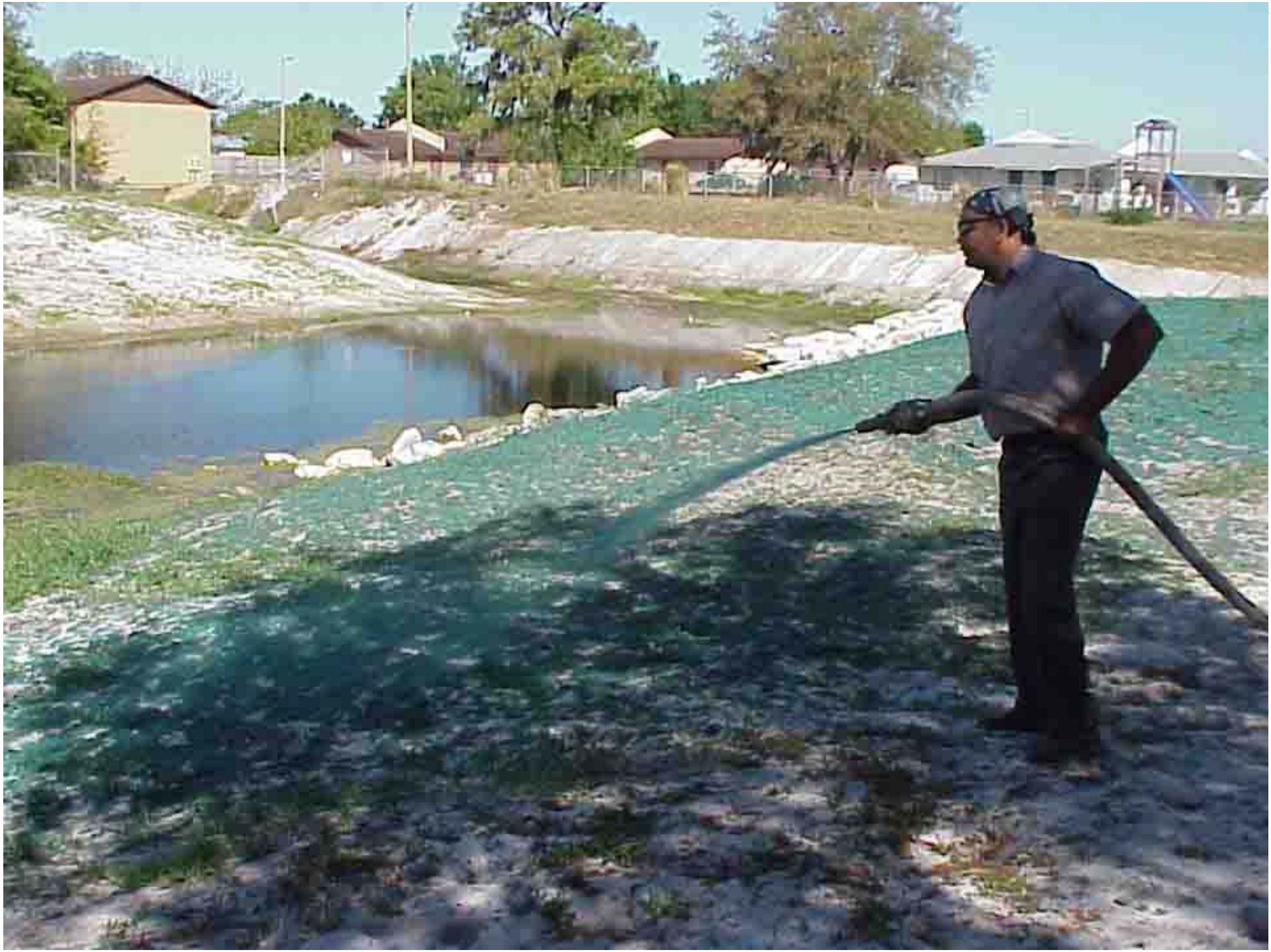

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04/22/2004

014543

Standard hydroseeding using “soil specific” PAM, polymer blends as a tackifier / growth additive

014545

014546

Air Drop Hydroseeding after forest fires on hydrophobic soils using site specific PAM blends

014548

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Fine sediment capture using the Floc Log and Particle Curtains

014554

014555

014556

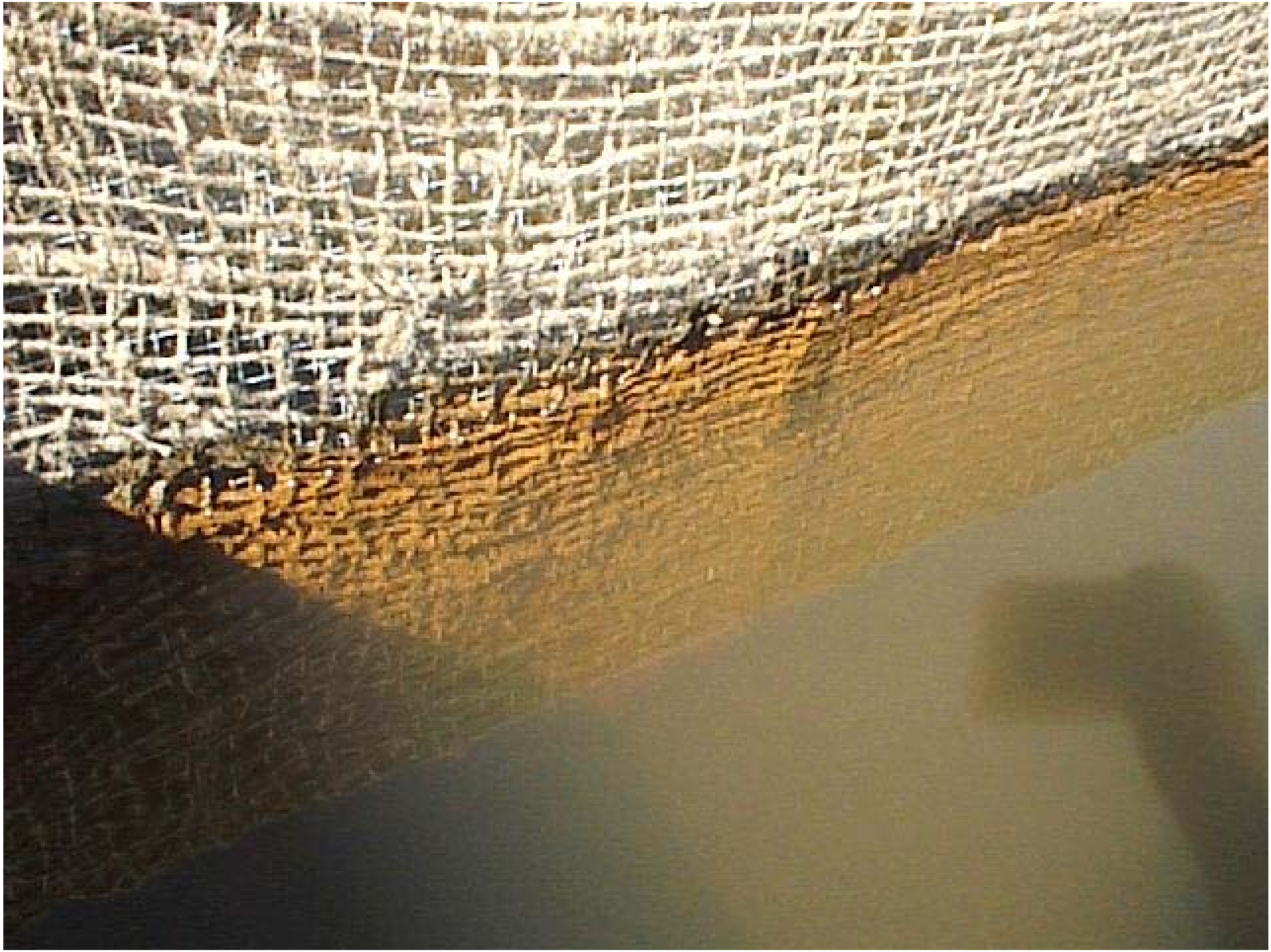

014557

Detention or Sediment pond water clarification and dewatering

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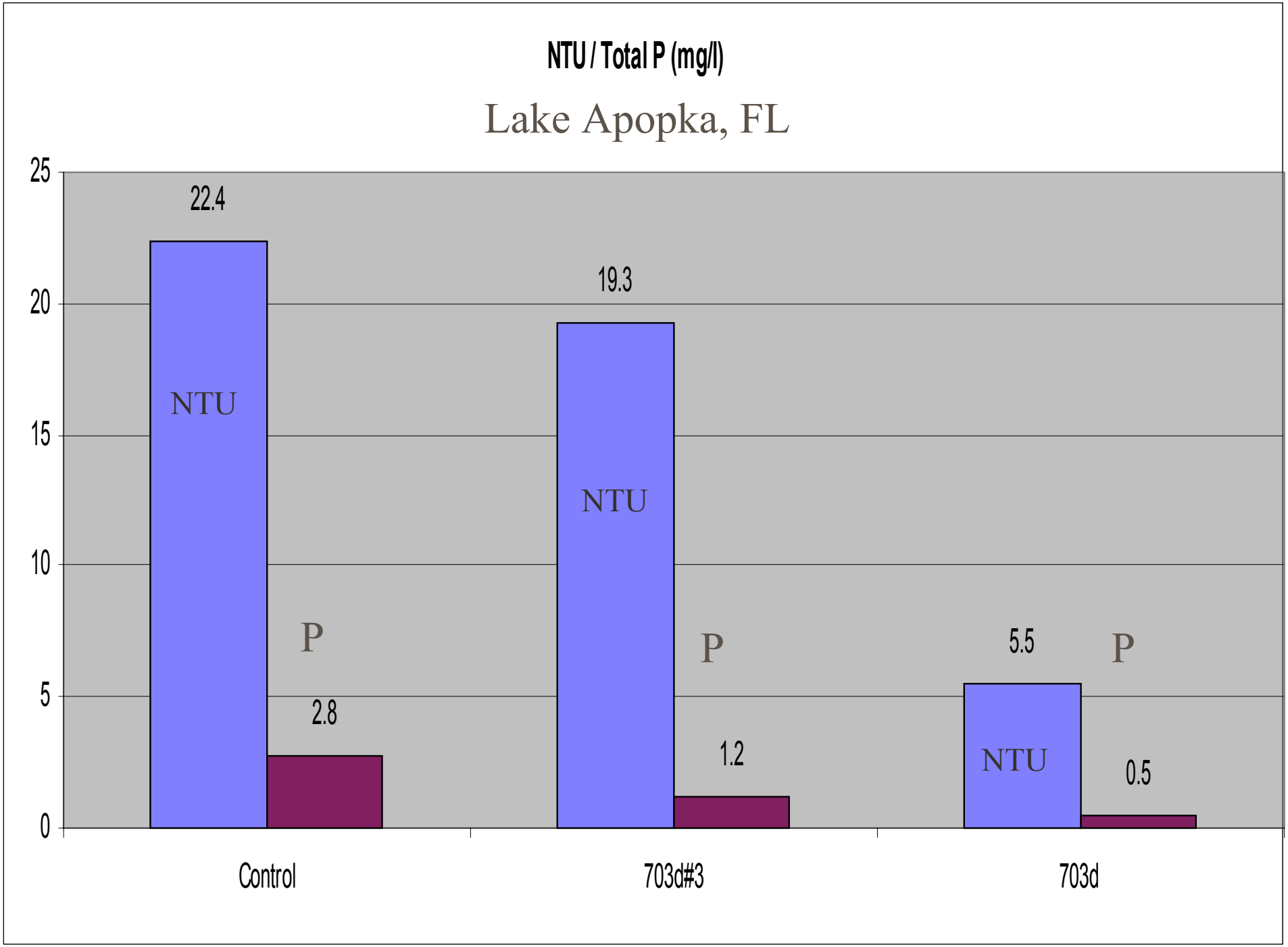
NTU / Total P (mg/l)
Lake Apopka, FL
25
20
15
10
5
0
22.4
NTU
P
2.8
19.3
NTU
P
1.2
5.5
NTU
P
0.5
Control
703d#3
703d

Florida Lakes

Total Phosphorus P

vs

Total Phosphorus P after Floc Log Treatment

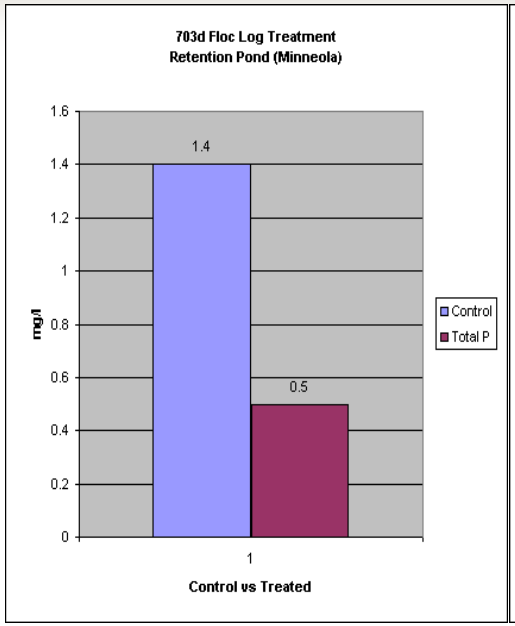

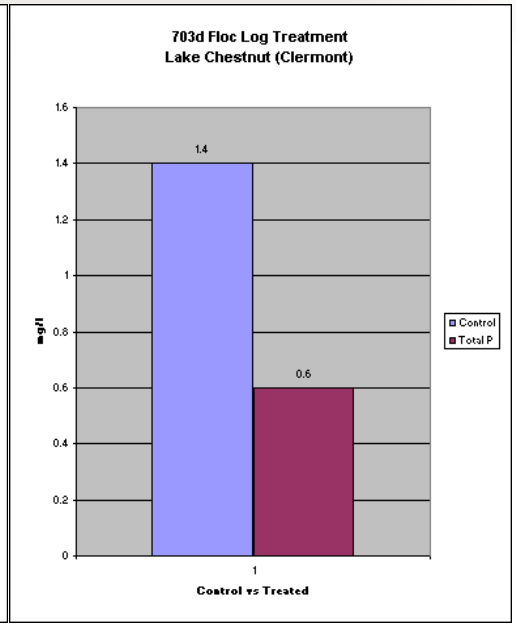

Total Reaction Time < 45 Seconds

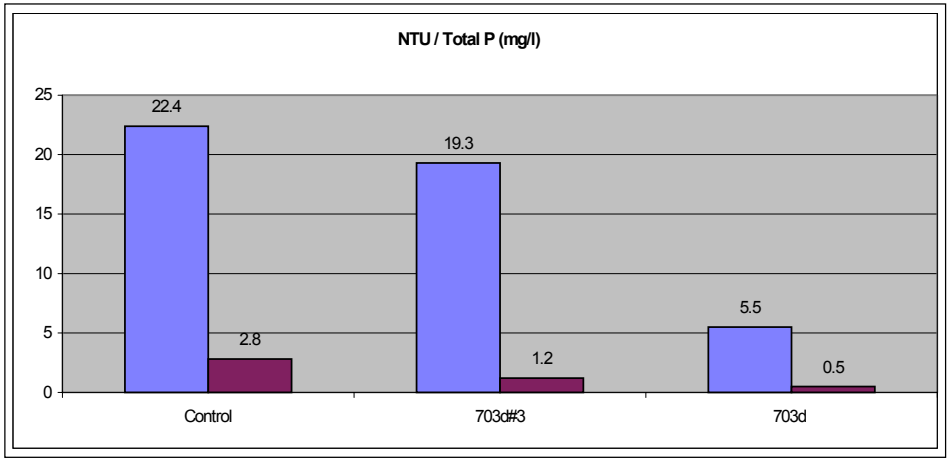

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014581

PAM blend Application @ 30#/Acre + >2000# of Mulch cover.

Published with US Forest Service, KGCMC Juneau, AK 1995.

014583

014584

014585

014586

014587

PAM WEB SITES

http://kimberly.ars.usda.gov/pampage.shtml

http://kimberly.ars.usda.gov/Pamprim.shtml

www.siltstop.com

www.cabmphandbooks.com (California)

(EC-13 Polyacrylamide)

(SE-11 Chemical Treatment)

Advanced Treatment Systems Research in the Tahoe Basin

Philip Bachand[1] and John Reuter[2]

[1]Bachand & Associates, phil@swampthing.org; [2]University of California Tahoe Research Group, jereuter@ucdavis.edu

Outline

- Current projects at Lake Tahoe
  - What they are?
  - Who is involved?
- Approach
- Constituents of Concern (COCs)
- Discussion of Our Current Projects

AT Projects in the Tahoe Basin

Project	Goal	Organizations	Funders
Low Intensity Chemical Dosing (LICD) for P and Fine Particle Removal	Integrating wetlands/basin with chemical treatment to improve stormwater treatment	B&A, UCD CE, UCD TRG, USGS/CSUS	Caltrans/OWP, USDA FS, City of SLT
Enhancing P removal with Adsorptive Media	Investigating locally available adsorptive media for application in basins and wetlands	UCD TRG, B&A	USDA FS, Placer Co.
Apalachee Phase I Erosion Control Project	Investigate innovative BMPs for stormwater control	CSUS OWP; UCD TRG, CE & Ecotox; B&A	
Meyers Station Experimental Station	Investigate chemical dosing and adsorptive technologies for highway runoff treatment	CSUS OWP, Eco-logic	Caltrans
Caltrans Demonstration Projects	Demonstration system using filtration basins and different adsorptive media to improve stormwater quality	CSUS OWP	Caltrans

Involved Researchers (in no particular order)

Abbreviation	Organization	Principal[1]
B&A	Bachand & Associates	Philip Bachand, Ph.D.
UCD CE	UC Davis Civil and Env. Eng.	Professor Jeannie Darby
USGS	USGS Water Resources Dept, Sacramento	Roger Fujii, Ph.D *and Brian Bergamaschi, Ph.D.*
UCD TRG	UC Davis, Tahoe Research Group	John Reuter, Ph.D. and Alan Heyvaert, Ph.D
UCD LAWR	UC Davis, Land, Air and Water Resources	*Professor Will Horwath*
UCD Ecotox	UC Davis, Ecotoxicology	Michael Johnson, Ph.D.
CSUS OWP	California State Univ. of Sacramento, Office of Water Programs	Kevin Murphy, Dipen Patel, Ph.D. and John Johnston, Ph.D.
CSUS Chem	California State Univ. of Sacramento, Chemistry	Professor Susan Crawford
HF	Hydrofocus, Inc	*Steve Deverel, Ph.D.*

[1] Italics indicates principal not involved in Tahoe but related California projects.

Unifying Approach

- Applied research bridging theory and real-world applications
- Mechanistic approach focusing on COCs
  - transport and cycling
  - removal and sequestration
- Integrates small-scale laboratory and *in situ* studies with larger-scale field studies
- If possible work within constraints of existing infrastructure (i.e., basins, treatment wetlands, basins and drains, farm fields)
- Consider regulatory framework and goals

COCs at Lake Tahoe

- Primary – Fine particles, Phosphorus
- Secondary – Nitrogen

Enhancing Phosphorus and Fine Particle Removal Through Low Intensity Chemical Dosing and its Potential Application in the Tahoe Basin

P.A.M. Bachand of Bachand & Associates;
J. Trejo, J. Darby, A. Heyvaert and J. Reuter of UC Davis; R. Fujii of USGS and S. Crawford of CSU Sacramento

- Funded by Forest Service through Placer County and Caltrans
- In collaboration with CSUS Office of Water Programs

LICD Project's Goal

- Phase 1 study
  - Determine the feasibility (i.e., performance, environmental, logistical) of LICD for application in the Tahoe Basin.
  - Investigate its application to high nutrient/turbidity loaded sites for which agencies are enthusiastic

- Phase 2 (contingent upon Phase 1 results)
  - Test technology in larger-scale replicated pilot system.

Phase 1 Overview

- Feasibility
  - Laboratory & Settling Column
    - Performance
    - Flocculate stability and fate studies
  - Preliminary Eco-toxicity Assessment and EIR/EIS Issues Investigation
  - Site and Watershed Selection
  - Cost Analysis
- Pre-implementation
  - Site design
  - Experimental design

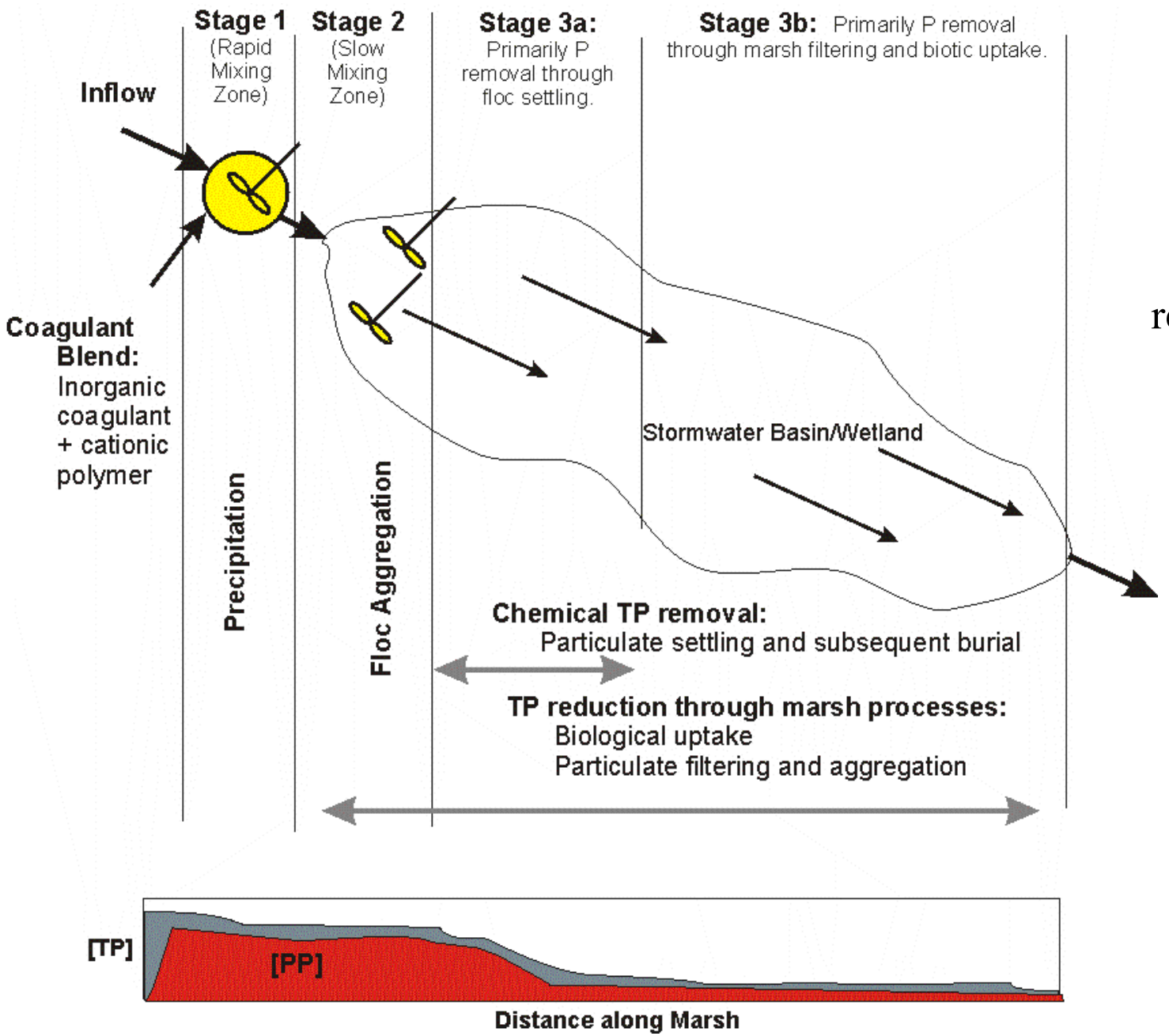

LICD
Phosphorus
removal model

Summary of Water Quality Improvements using Coagulants, Phase 3 Studies, 2003

Dep. Var.	NoTrt		PASSC		PXXL9		SUM50		J1720	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Dose mg-me/L	NA	NA	7.1	1.1	6.0	0.8	2.7	1.7	1.3	0.8
Dose mg-coag/L	NA	NA	137	22	108	14	21	13	22	14
TP ppb	166	150	12	9	18	6	14	8	19	12
FTP ppb	19	9	5	2	6	2	7	3	7	3
Turbidity 5min	139	160	17	22	14	6	27	20	18	8
Turbidity 30 min	89	111	1	1	1	1	6	5	6	6

Turbidity Settling Column Tubidity at 24 hrs

No Treatment

PAX XL9

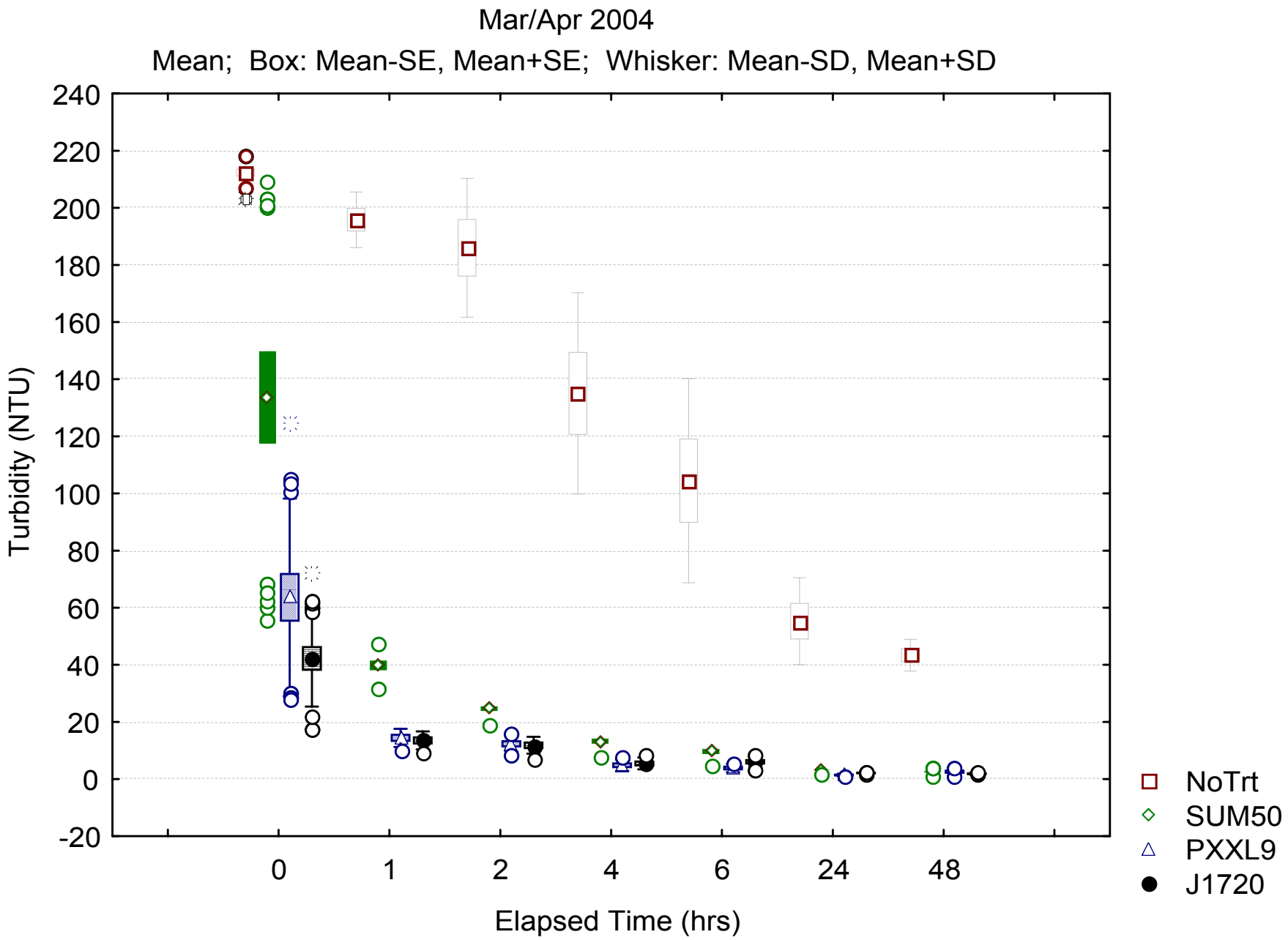
Mar/Apr 2004
Mean; Box: Mean-SE, Mean+SE; Whisker: Mean-SD, Mean+SD
Turbidity (NTU)
240
220
200
180
160
140
120
100
80
60
40
20
0
-20
0
1
2
4
6
24
48
Elapsed Time (hrs)
NoTrt
SUM50
PXXL9
J1720

Stratification in sampling

NoTrt = Distance Weighted Least Squares

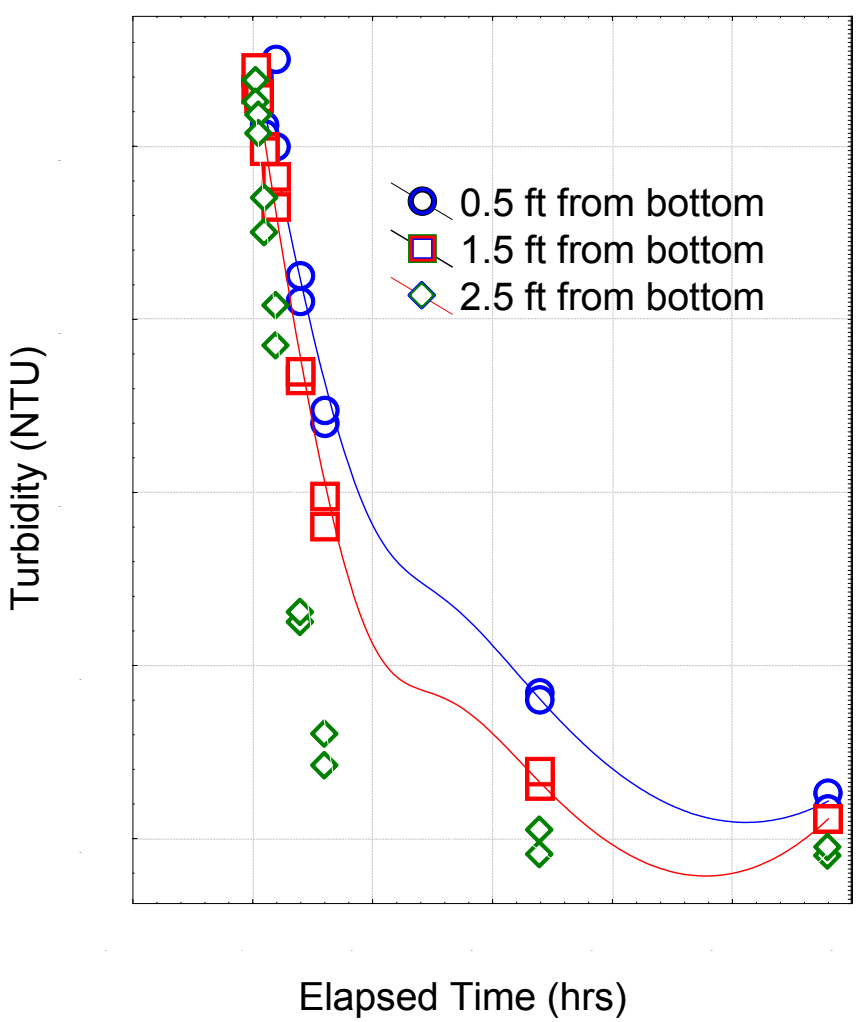

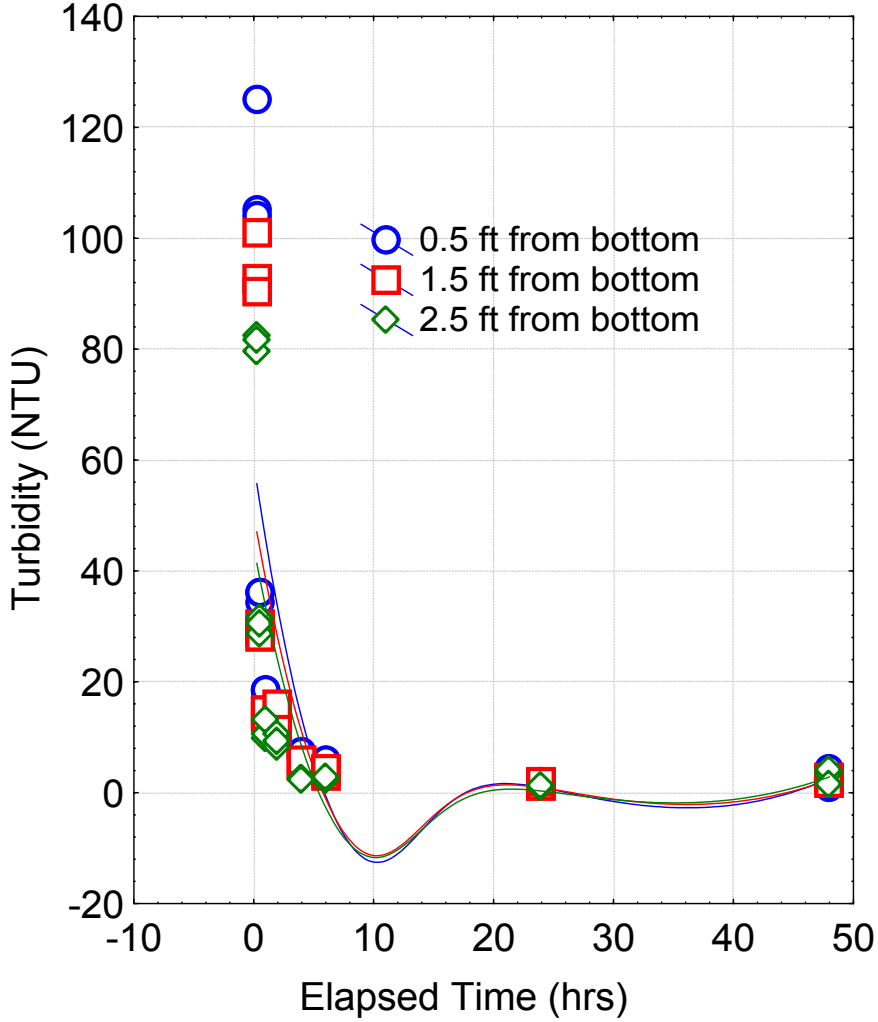

Preliminary Floc Stability/ Ecotoxicity Results

- Preliminary Floc Stability Results
  - Clear crystalline structures
  - More stable structures than found in stormwater
  - Appears true chemical bond formation is creating stable aluminum compounds
- Very, Very Preliminary Ecotoxicity Results
  - Untreated and treated stormwater showing some toxicity

LICD Summary

Performance feasibility suggests ready for Phase 2 study

- Test application issues
- Test performance against temporally variable conditions
- Develop operational and design/retrofit recommendations

- Ecotoxicity & environmental effects studies need more study
- Broadened the dialog in the Tahoe Basin on this technology in a TMDL world
- Provided important data for other Tahoe AT projects
- Provided important data describing stormwater settling characteristics

Investigating Various Locally Available Media for Dissolved Phosphorus Removal through Adsorption

P.A.M. Bachand, Bachand & Associates
and
Alan Heyvaert, UC Davis Tahoe Research Group

- Funded by Forest Service through Placer County
- In collaboration with CSUS Office of Water Programs (Caltrans Research Team)

Adsorption Project's Goal:

- Test and describe adsorptive capacity of locally available soils and adsorptive media
- Predict performance for P removal
- Confirm performance with laboratory column studies and *in situ* experiments
- Develop recommendation for application in demonstration-scale project.

Factors affecting Performance of Different Media

Chemical –

- Rich in Fe, Al or Ca

Physical -

- Specific surface area (m^2/g)
  - Sand: 1.8 – 2.4 (Stevik et al. 1999)
  - LWA: 0.2 – 0.9 (Stevik et al. 1999)
  - DE: 2 – 90 (Eagle Picher)
  - AA: >300 (Alcoa)
- Grain size (Arias et al 2001) –
  - d_{10}: 0.3 – 2. Mm
  - d_{60}: 0.5 – 8.0 mm
  - $d_{60}/d_{10} < 4$

Langmuir Curves for Isotherm Data

Coon Street Basin Soil

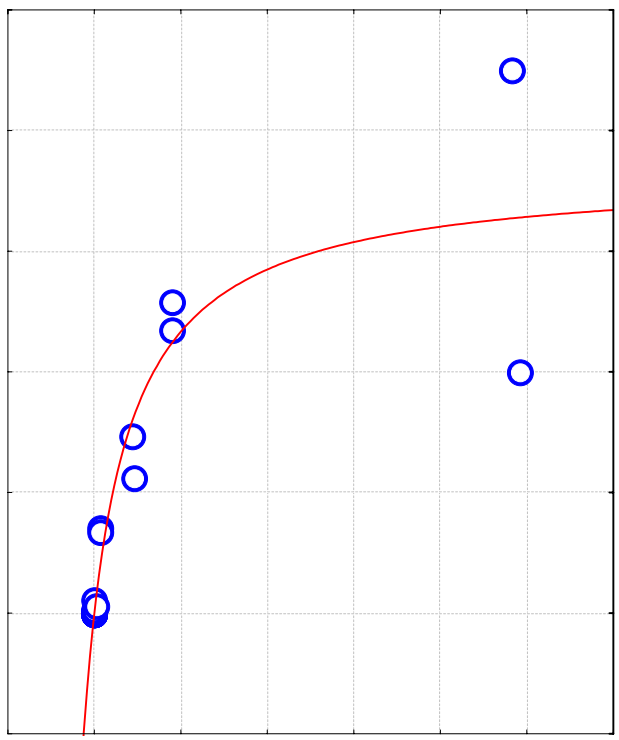

Lanthanum coated MP79

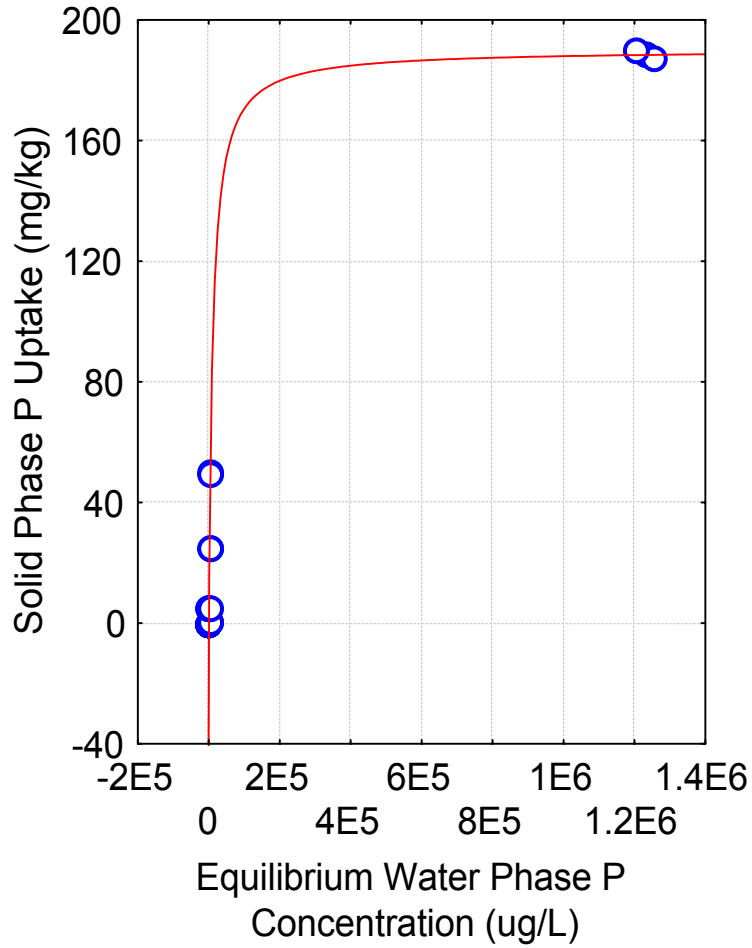

Isotherm constants and retardation factors (R_d) for tested soils and substrates.

Soil/Media	Langmuir Constants			Linear Isotherms[a]		Retardation Factor R_d[c]
	a L/mg	b mg/kg	R^2	K_d ml/g	R^2	
20-mesh Dolomite	3.60E-02	7,976	0.8816	256.3	0.9561	1590
Coon St. Basin	1.76E-03	3,659	0.8820	12.9	0.7034	81
Round Hill Basin	6.62E-03	1,149	0.9452	3.8	0.3786	25
Eloise Basin	9.10E-03	796	0.6870	19.9	0.9371	125
Fine Truckee Sand[b]				3.6	0.9959	23
Course Truckee Sand[b]				0.8	0.5765	6

Notes

a. Based upon equilibrium phosphorus concentrations in the water of < 10 ppm.

b. From Martis Valley, Truckee, CA.

c. Assumed porosity of 30% and a dry bulk density of 1.86 g/cm^3 based upon dense mixed-grain sand (Terzaghi and Peck, 1967) or fine gravel and sand (Garde and Rau, 1987)

$$R \equiv 1 + \frac{\rho_b K_d}{n}$$

Adsorptive Project Summary to Date

- Local soils do not adsorb phosphorus as well as other locally available media
- Important to assess media in the context of P concentrations in the Tahoe Basin
- Realistic retardation coefficients can be developed from the isotherms an a physical assessment of the media.
- Data from project has been useful for larger-scale studies (i.e., Meyers, Caltrans Demonstration Projects)
- Results not only useful for assessing advanced treatment but also groundwater effects.

Related Projects in California

Project	Goal[1]	Organizations[2]	Funders[3]
Low Intensity Chemical Dosing (LICD) for DOC removal	Integrating wetlands/basin with chemical treatment to remove DOC and COCs from Ag Drains	B&A, UCD CE, USGS/CSUS, CCWD	CALFED, USGS
Hydrologic BMPs for Rice in the Delta	Developing hydrologic BMPs to minimize DOC and N export from Rice Fields	UCD LAWR, USGS, HF, B&A, DU	Board/CALFED
Watershed Effects on COCs and Recommended BMPs	Develop BMPs for different land uses to minimize watershed discharges of turbidity, DOC and other COCs	UCD CE & LAWR, HF, B&A, USGS, RCD	Board/CALFED, USGS
And Others …			

1. DOC = Dissolved Organic Carbon; COC = Constituent of Concern
2. DU = Ducks Unlimited, CCWD = Contra Costa Water District, RCD = Yolo County Resource Conservation District
3. CALFED = California Bay Delta Authority; Board = State Water Quality Control Board

CLEAR CREEK SYSTEMS, INC.

OVERVIEW OF

ADVANCED TREATMENT FOR

CONSTRUCTION STORMWATER

IN CALIFORNIA

October 21, 2004

Presentation Overview

I. Brief History
II. Where We Were Last Season
III. Where We Are This Season
IV. Where Are We Going?

Definitions

- Polymer
  - "Any of numerous natural and synthetic compounds of usually high molecular weight consisting of up to millions of repeated linked units, each a relatively light and simple molecule."
- Coagulate
  - "To cause transformation of (a liquid or sol, for example) into or as if into a soft, semisolid, or solid mass."
- Flocculate
  - "To cause (soil) to form lumps or masses.
  - To cause (clouds) to form fluffy masses."

As defined in Webster's Dictionary

Brief Background

- Technology adapted from industrial sector
- Polymer treatment & EC started in WA
  - Very tightly regulated
  - Case by case basis until confident in reliability
- CA much more incremental route to AT
  - Not as much political commitment
  - Reasonable cost more of an issue
  - Different regulatory structure
- Lack of regulation led to spills

CCS & UC Berkeley Polymer Evaluation for Fish & Game

The Results: Highly Effective

Where We Were Last Season

- Major increase in regulatory enforcement
- Brought about major change in operations
  - Just implementing SWPPP no longer enough
- Paradigm shift—End result matters
  - Effluent water quality in line with background
  - Need to handle entire storm volume
- About 15-20 projects in Sac. area
- Adaptations to construction operating env.

What This Meant

- Improvements developed in
  - Operations
  - Costs
  - Reliability
- Still two sites with unauthorized discharges
- Not good odds

Where We Are This Season

- Value of AT to provide clear water is proven
- Incorporation as BMP and BAT
- Use is greatly expanding
- Concerns about reliability & env. safety

What This Means

- Maybe 30-50 sites using AT
- New technologies and service providers
- Continued improvements in
  - Operations
  - Costs
  - Reliability
- New testing and monitoring requirements

Operational Issues

- Educating Contractors on site needs for AT
- Contractors planning ahead
- Equipment availability
- Improving existing system designs
- Trained personnel—only needed when it rains

Cost Issues

- Higher cost than in the past—doing nothing
- Cost continuing to decline
  - Better equipment designs
  - Contractors planning ahead
  - Economies of scale
- Temptations to cut corners

Reliability Issues

- High volume flow through systems are new
- Better conceptual designs for SW operations
  - Equipment from other sectors needs adaptations
  - Contractors originally used materials they knew
- Temptations to cut corners
- Very dynamic operations
- Practice of 100% compliance is relatively new

New Testing & Monitoring

- Must be able to test for any materials used and all known by-products
- Test must be quantitative & “scientifically defensible”!
- Detectable limit must be below chronic toxicity level
- Field tests not required, but at risk if results are delayed due to lab turnaround time
- “Qualified personnel” must monitor “frequently”
- Results of monitoring must be kept with the SWPPP

Testing & Monitoring (Continued)

- Limits the products due to available data
- Chronic toxicity data not common (understatement)
- Residual testing capability not common
- When forced, manufacturers are more helpful
- Main issue here is when used improperly
- Various level of security for different polymers
- By-products testing rule opens doors
  - “no exposure/no test”
- For what species is chronic toxicity data required?

Where Are We Going

- Much more widespread use
- Revision of regulatory language
- Tighter regulations of other contaminants?

What This Means

- Much greater number of sites
- Greater regulatory scrutiny?
- Continued improvements in
  - Operations
  - Costs
  - Reliability

Operational Issues

- Adaptations for a wide range of conditions
- New technologies and materials
- Organized training for operators?

Cost Issues

- Price will continue to go down
  - Volume
  - More cost effective technologies and designs

Reliability Issues

- Bugs worked out
- More environmentally safe designs
- Real time testing

A HIGHLY EFFECTIVE TOOL

TO ENSURE STORMWATER QUALITY

CLEAR CREEK SYSTEMS, INC.

OVERVIEW OF

ADVANCED TREATMENT FOR

CONSTRUCTION STORMWATER

IN CALIFORNIA

October 21, 2004

ADVANCED TREATMENT SYSTEMS OVERVIEW
State of Washington

CONFERENCE ON ADVANCED TREATMENT
FOR
CONSTRUCTION SITES

CalEPA – October 21, 2004

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Clear Water Compliance Services, Inc.

- Regulatory Permitting (NPDES Applications)
- Stormwater Pollution Prevention Planning
- Stormwater Treatment System Design
- On-site Stormwater Management
- Regulatory Compliance Monitoring

Full Service Stormwater and Process Water Management for Construction and Industrial Sites

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Clear Water Compliance Services, Inc.

- Established September 1998.
- Certified in 1998 under the auspices of the City of Redmond and the Northwest Regional Office of the Department of Ecology to employ batch-operated chemical treatment systems on construction sites using the flocculant, *Calgon CatFloc 2953*.
- The first independent company in Washington State authorized to perform water treatment at construction sites for others.
- Developed its first proprietary auto-control filtration system in 2001; now manufacturing and employing third-generation systems with remote data logging and remote alarm capabilities.

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LISTING OF SELECT PROJECTS AND CLIENTS

- Weyerhaeuser / Quadrant Homes
- Cam West Development
- Burnstead Construction
- GLY Construction
- Ferguson Construction
- KLB Construction
- North Forty Development
- Murray Franklyn Homes
- Costco
- Microsoft
- Home Depot
- Specified by name in bid documents issued by Wal-Mart for its retail centers.

Please Note: Most of these are repeat clients.

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GOALS OF THIS PRESENTATION

- Discuss Why Advanced Treatment is Needed
- Present an Overview of Various Treatment Technologies
- Discuss the Process Used for Selecting a Treatment Approach
- Managing and Treating Non-visible Pollutants
- Offer a Summary of the Presentation
- Issue a Request for Consistency in Enforcement of the Regulations

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Why Advanced Treatment is Needed – 1

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Why Advanced Treatment is Needed – 2

DESCRIPTION	SETTLING TIME
GRAVEL	1 SEC.
	9.8 SEC.
COARSE SAND	
	48 SEC.
FINE SAND	67 SEC.
	125 SEC.
	47.6 MIN.
SILT	107 MIN.
	7.2 HRS.
	20.1 HRS.
CLAY	
	180 HRS.
	754 DAYS
COLLOIDAL PARTICLES	207 YEARS

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Why Advanced Treatment is Needed – 3

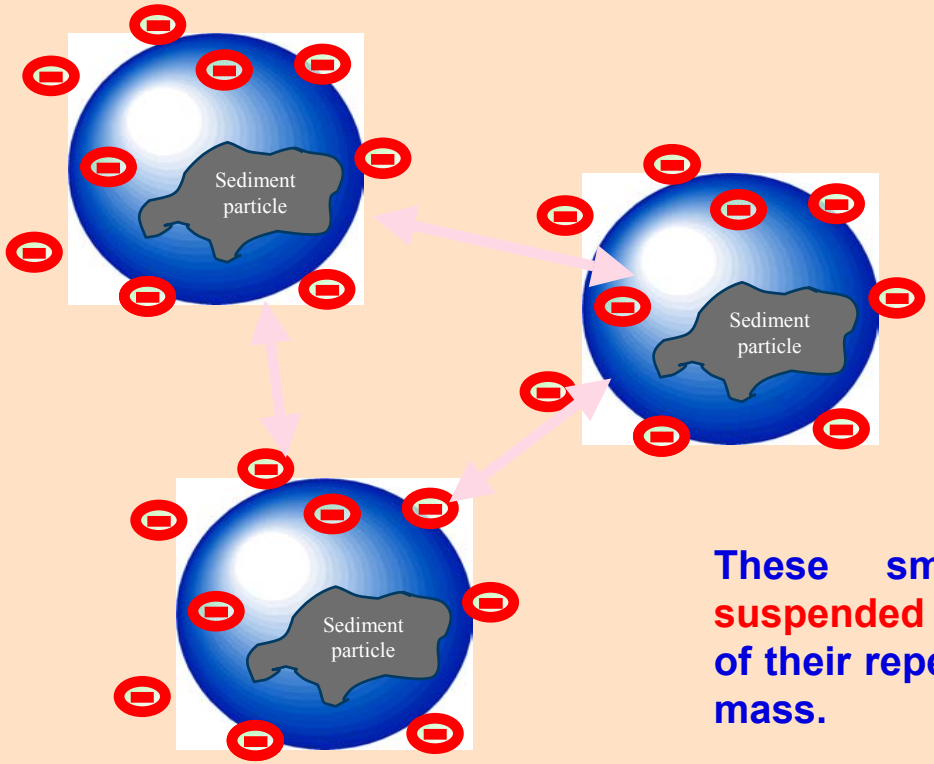

Note: The diagram shows negative electrostatic charge; many soil particles exhibit a positive electrostatic charge.

These small particles remain suspended in stormwater because of their repellent charges and small mass.

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Overview of Various Treatment Technologies – 1

- Gravity Settling
- Natural Filtration (Infiltration and/or Bio-filtration)
- Mechanical Filtration (no chemicals employed)
- Active Stormwater Treatment - Chemical Coagulation & Flocculation
- Coagulation Using Sacrificial Electrodes (EC)
- Chemically Enhanced Filtration

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Natural Settling

DESCRIPTION	SETTLING TIME
GRAVEL	1 SEC.
	9.8 SEC.
COARSE SAND	
	48 SEC.
FINE SAND	67 SEC.
	125 SEC.
	47.6 MIN.
SILT	107 MIN.
	7.2 HRS.
	20.1 HRS.
CLAY	
	180 HRS.
	754 DAYS
COLLOIDAL PARTICLES	207 YEARS

Sometimes soil particles will settle out quickly enough to achieve satisfactory discharge quality.

Frequently, however, they won't.

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Gravity Settling

Most often, however, they won't.

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Natural Filtration (Infiltration and/or Bio-filtration)

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Mechanical Filtration (no filter-aid chemicals) - 1

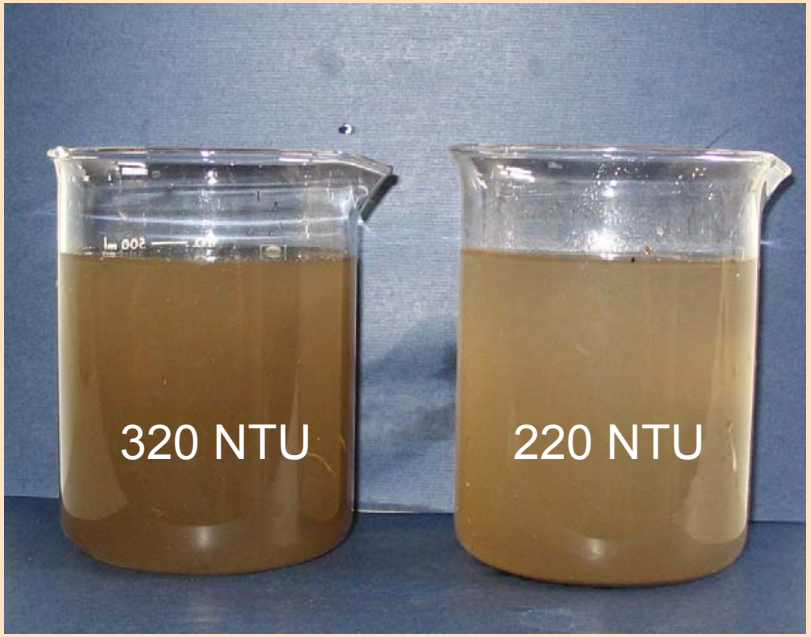

Problems:

1. **(Most) often it doesn't work.**
2. **Usually occludes filter in < 1 hour**

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Mechanical Filtration (no filter-aid chemicals) - 2

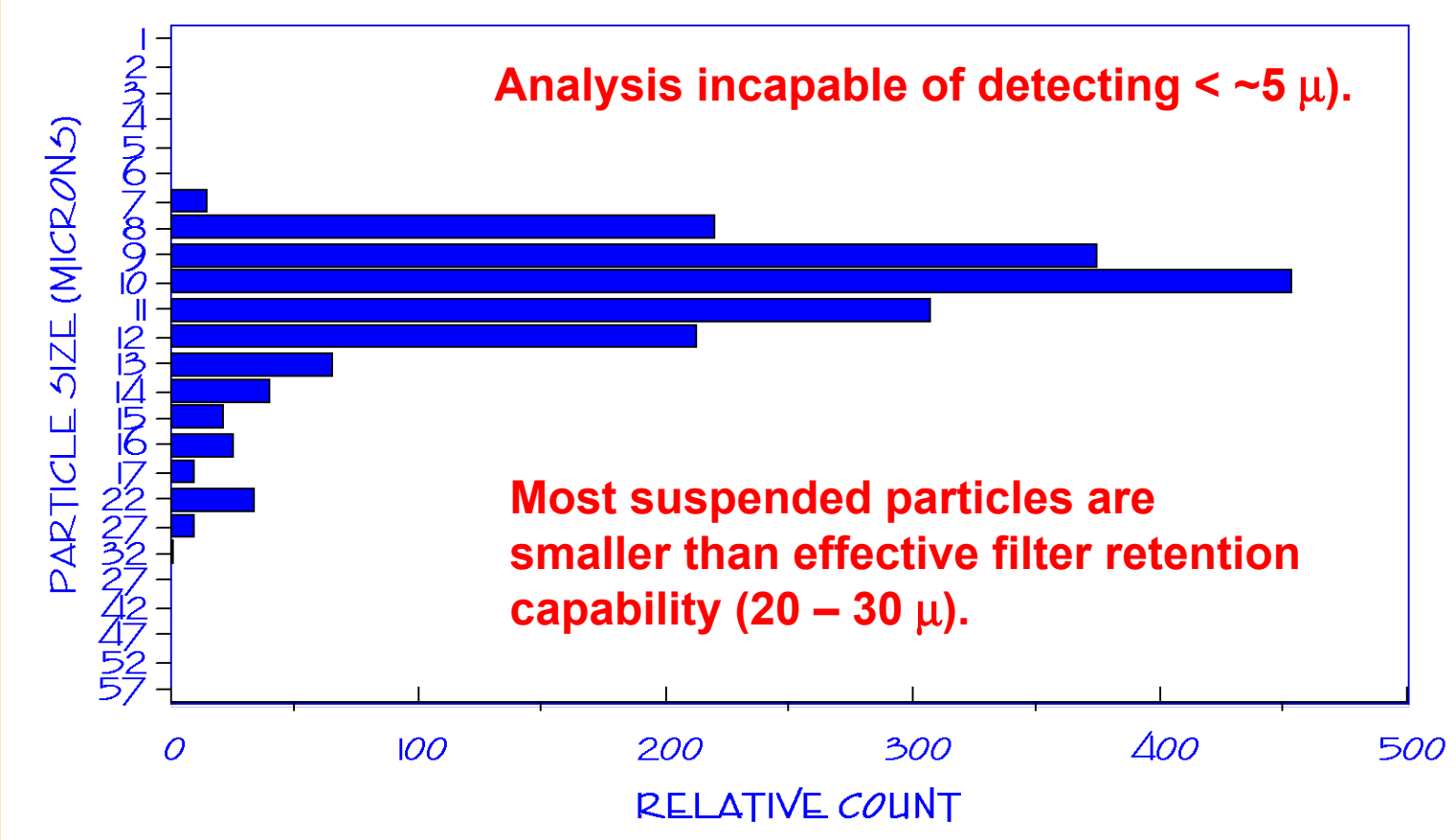

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Advanced Treatment - Active Stormwater Treatment (Chemically-enhanced Treatment)

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Remember:

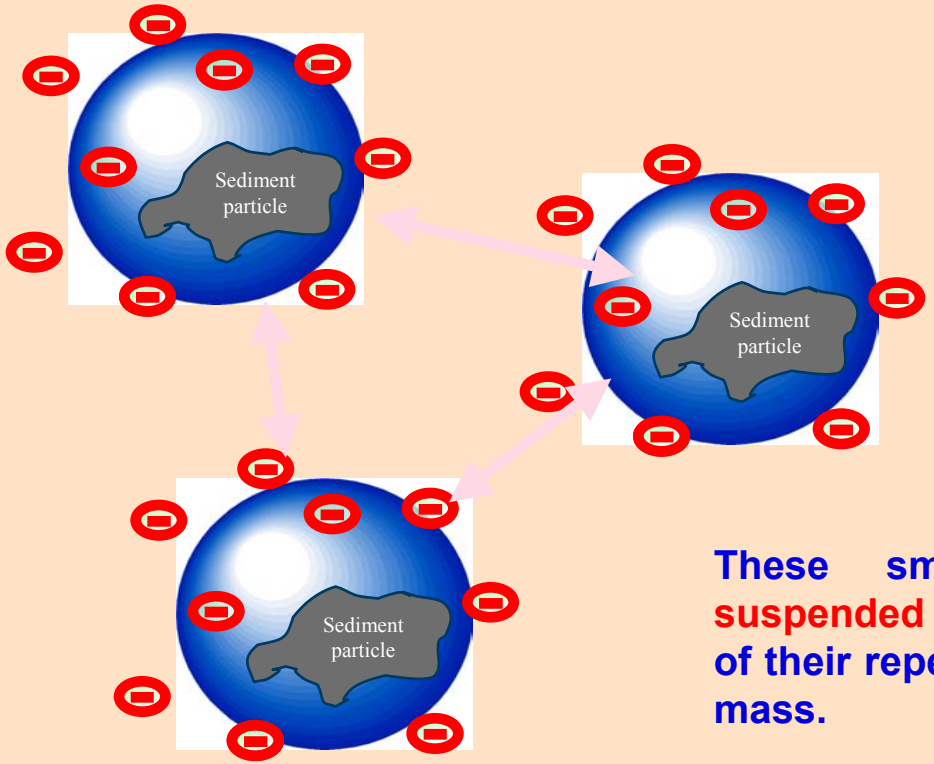

Note: The diagram shows negative electrostatic charge; many soil particles exhibit a positive electrostatic charge.

These small particles remain suspended in stormwater because of their repellent charges and small mass.

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Coagulation and Flocculation

- Often used interchangeably, but are, in fact, two distinct processes.
- Coagulation is the destabilization of colloids by neutralizing the charges that keep them apart. As a result, the particles can collide to form larger particles (flocs).
- Flocculation is the action by which polymers facilitate the binding of floc particles into large clumps by providing adsorption sites onto which the particles can attach.

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The Process of Coagulation and Flocculation – a Good Thing

Add Coagulant

Neutralizes electrostatic charge

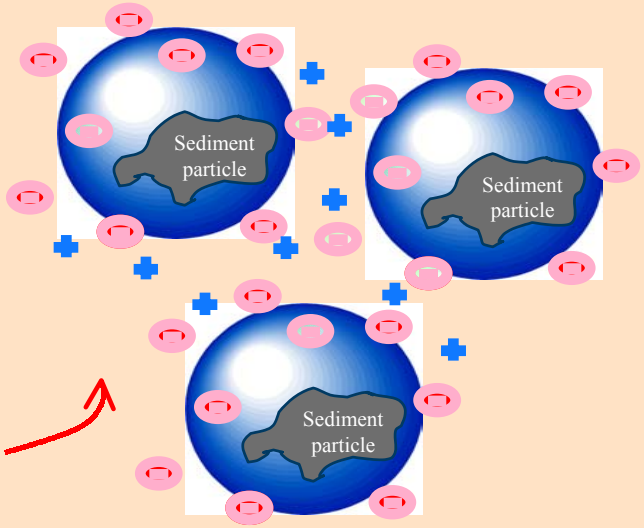

Flocculation

Once suspended particles are flocculated into larger particles, they can usually be removed from the liquid by settling, floating, filtering, or centrifuging.

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Coagulation and Flocculation Demonstrated

(Chitosan Acetate added to form flocculate)

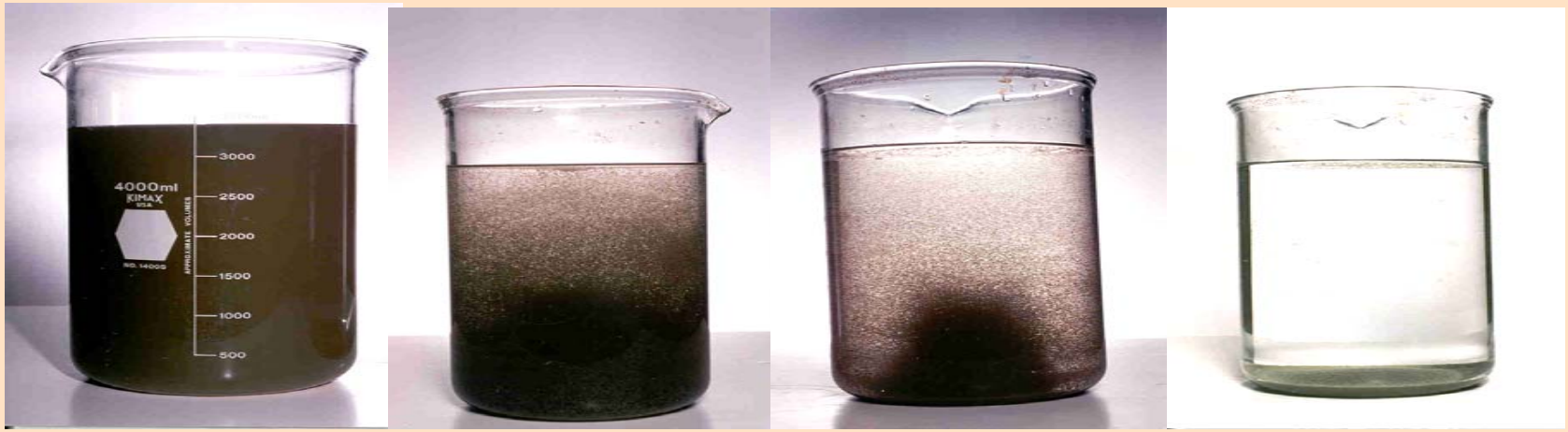

No Treatment	At 30 Seconds	At 60 Seconds	At 30 Minutes

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Over Dosing – Too Much of a Good Thing

Add More Coagulant

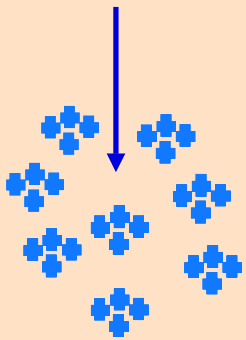

Reverses electrostatic charge

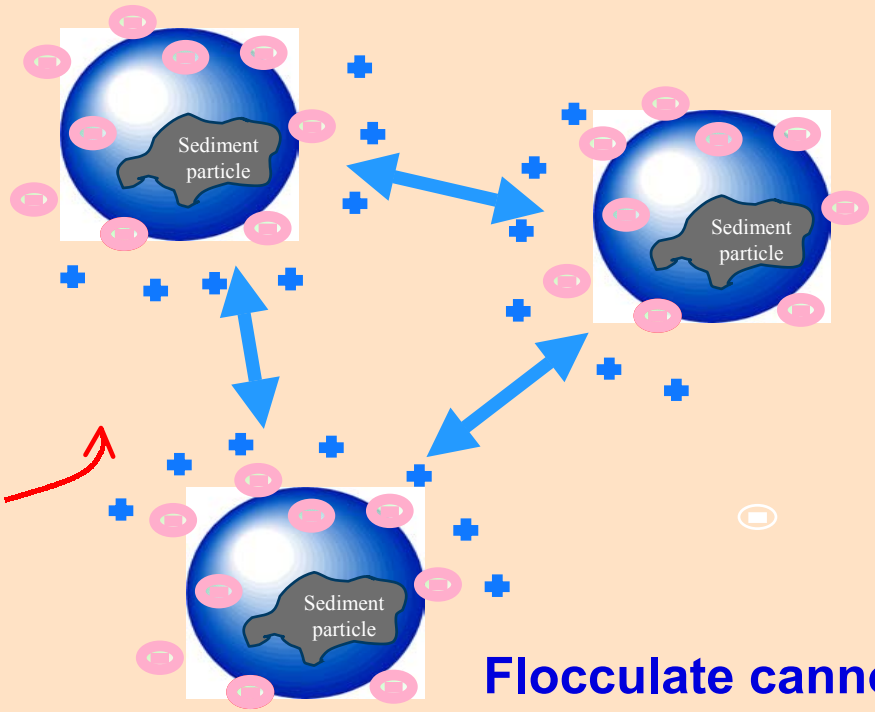

Flocculate cannot form

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Active (Chemically-enhanced) Stormwater Treatment

- Types of Coagulants and Flocculants (anionic, cationic, or non-ionic) –
  - Organic Polymers – e.g. chitosan, guars, modified starches
  - Inorganic Polymers – e.g. Polyaluminumhydroxychloride, alum, ferric chloride
  - Polyacrylamides (PAM)

- Separation of Suspended Sediment from Treated Water –
  - Gravity Settling, or
  - Filtering
  - Centrifuging

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Active Stormwater Treatment Methods

- **Batch Treatment**
  - Ponds
  - Tanks
- **Flow-through Treatment**
  - Upstream Chemical Injection (Ponds or Tanks)
  - Downstream Chemical Injection (Ponds or Tanks)

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Stormwater Treatment in Washington

- City of Redmond – mid-1990s – pioneered the first methodical approach to temporary large-scale water treatment in the State.
- Resulted from the nexus of environmentally-conscious corporate developers (Microsoft), stringent environmental regulations, and two forward-looking (and independent thinking) regulators Guy Oliver (City of Redmond) and Ron Devitt (Ecology).
- *NPDES and State Waste Discharge General Permit for Stormwater Discharges Associated with Construction Activities* reissued in Nov. 1995.
- August 1999 – WA State Dept. of Ecology issues draft Best Management Practice for the implementation of construction chemical stormater treatment.

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WA Turbidity Standards

- Turbidity Standards for Discharges to Surface Waters Vary with the Turbidity of Receiving Waters.
- Turbidity Shall not Exceed:
  - 5 NTU over background turbidity when the background turbidity is 50 NTU or less.

  OR
  - 10 percent higher than background when background turbidity is more than 50 NTU.
- Other, more stringent standards may be required.

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Active Batch Treatment

1. Effective.
2. May require extended settling time.
3. Requires large footprint.
4. May require polishing filter at discharge.

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Active Flow-through Treatment – Dosing at Inlet

1. Effective and inexpensive.
2. Measure inlet flow and turbidity.
3. Liquid coagulant delivered in proportion to flow and turbidity.
4. Floc settles in pond.
5. Clean water decanted to discharge area.

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Active Flow-through Treatment – Dosing at Outlet

1. Effective and inexpensive.
2. Passive chemical delivery (e.g. Gel-Floc).
3. Coagulant delivered in proportional to flow.
4. Floc removed by bio-filtration.

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Coagulation using Sacrificial Electrodes (EC)

1. Technology described this morning by Jim Mothersbaugh of *Water Techtonics*.

2. Effective, safe, flow-through treatment process.

3. Currently under review by WA Dept. of Ecology.

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CHEMICAL ENHANCED SAND FILTRATION

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CHEMICAL ENHANCED SAND FILTRATION

THE MOST COST EFFECTIVE PROCESS AVAILABLE FOR LARGE-VOLUME, FLOW-THROUGH STORMWATER TREATMENT

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CHEMICAL ENHANCED SAND FILTRATION PROCESS FLOW DIAGRAM

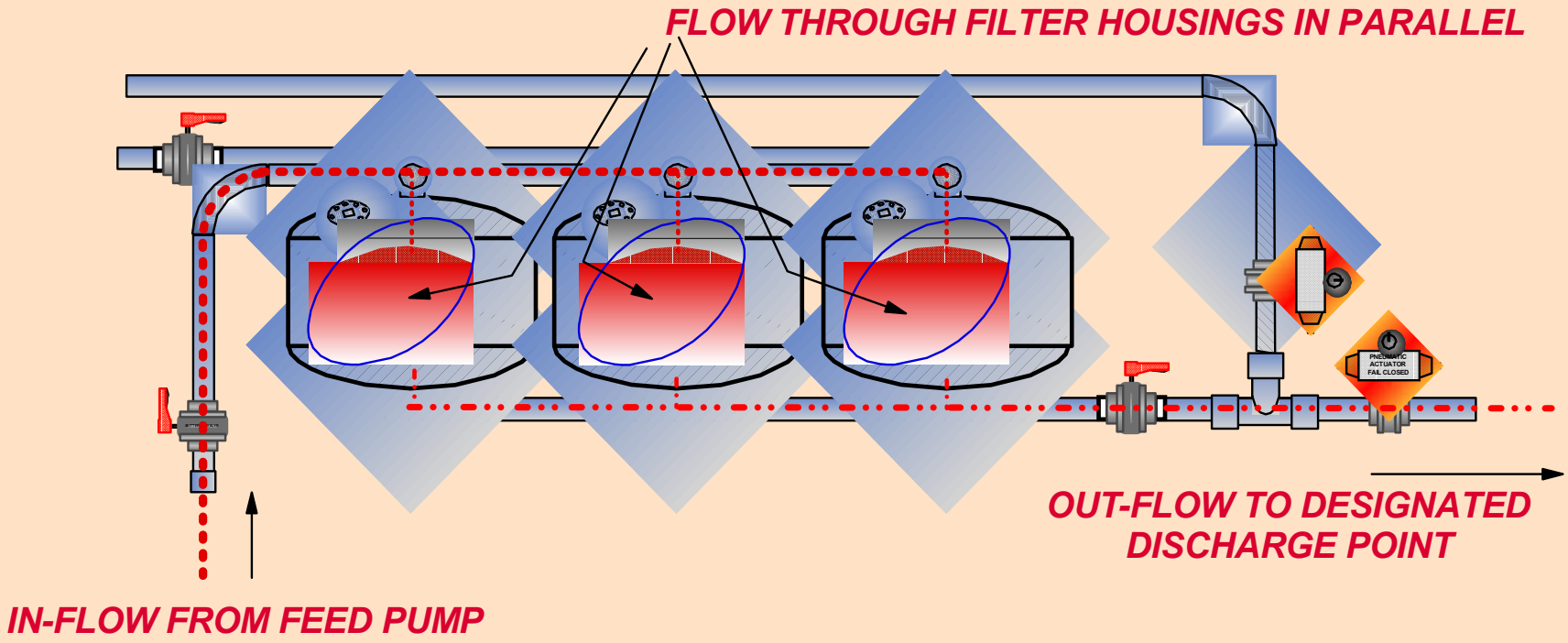

NORMAL FLOW

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CHEMICAL ENHANCED SAND FILTRATION PROCESS FLOW DIAGRAM

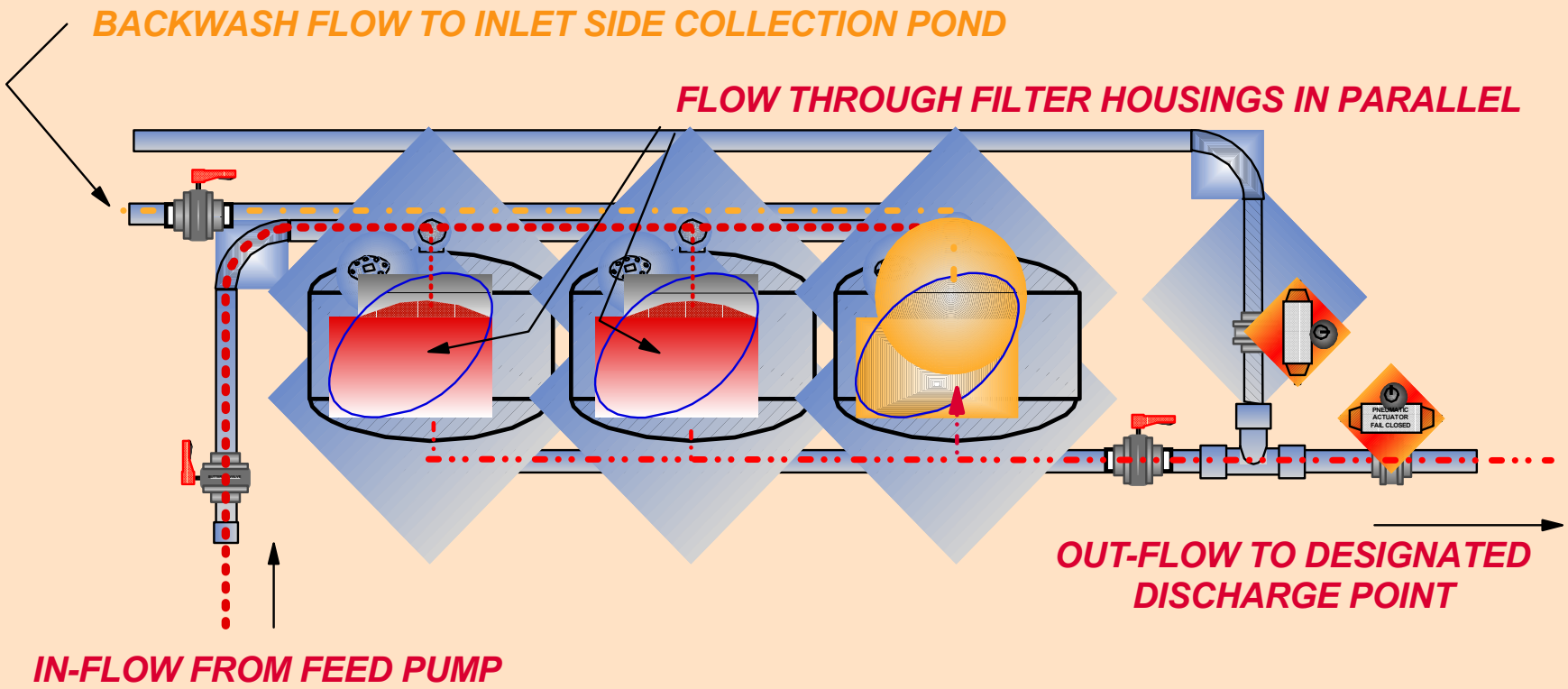

BACKWASH FLOW – CYCLE 1

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OPERATIONAL CAPABILITIES OF ENHANCED FILTRATION

WHEN PROPERLY OPERATED AND MAINTAINED:

- OPERATES OVER THE pH RANGE OF 6.5 TO 8.5 (ENTIRE RANGE FOR ALLOWABLE DISCHARGES)
- < 10 NTU 100% OF TIME WHEN INLET TURBIDITY < 400 – 500 NTU
- < 10 NTU 100% OF TIME WITH PRE-TREATMENT OF INLET WATER WHEN INLET TURBIDITY > 400 – 500 NTU

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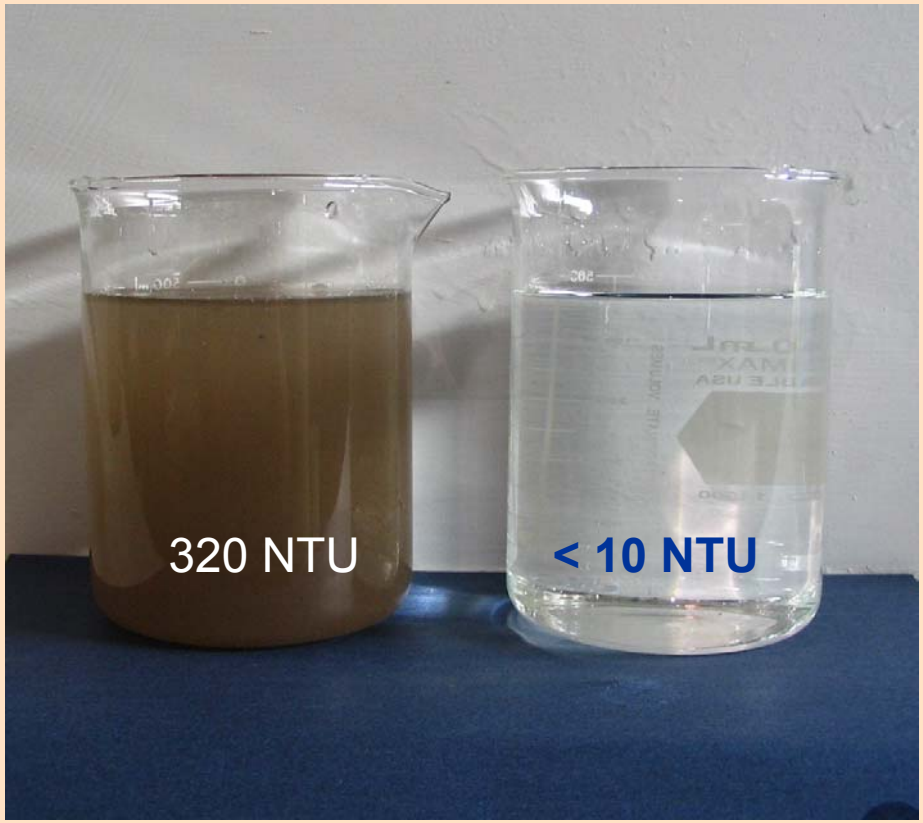

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A SIMILAR SYSTEM CAN BE ADAPTED FOR RECYCLING OF WHEEL-WASH WATER

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Selecting a Treatment Approach

- Evaluate physical site conditions
- Evaluate capacity of site to handle rainfall and runoff
- Determine required system capacity
- Conduct bench-scale testing

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Evaluate Site Conditions

- Area
- Topography
- Soil Characteristics
- Water Characteristics
- Surface Conditions & Vegetation
- Downstream Conditions
- Other Off-Site Conditions
- Chemical Use on Site

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Evaluate Capacity of Site to Handle Rainfall and Runoff

- Historical rainfall volumes, durations, intensities
- Anticipated runoff generated from rainfall
- Maximum allowable rate(s) for discharging treated water
- Actual / potential temporary storage volume for runoff

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Determine Required System Capacity

$$\frac{\text{(Runoff Volume – Storage Volume)}}{\text{Design Storm Duration}} = \text{Required System Capacity}$$

Required System Capacity < Allowable Discharge Rate

IF

Required System Capacity > Allowable Discharge Rate

MUST INCREASE STORAGE VOLUME

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Conduct Bench-scale Testing

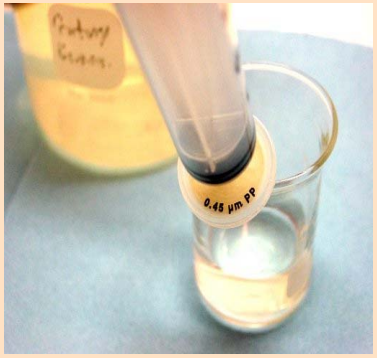

- Evaluate filterability of water both before and after treatment.

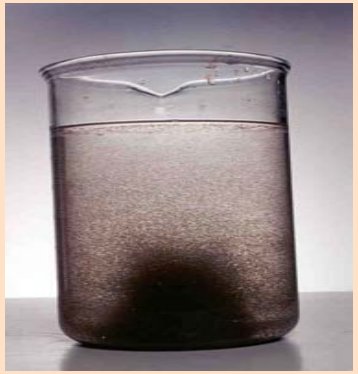

- Try different coagulants and flocculants
- Try different dose rates
- Determine optimum product and dose

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Managing and Treating Non-visible Pollutants

- Phosphorus
- Dissolved Metals
- Solvents
- Emulsified Hydrocarbons
- Any Material Stored on Site
- Other non-visible pollutants

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pH

pH 14	Concentrated caustic soda
pH 13	Drain cleaner
pH 12	Concrete wash-out water
pH 11	Runoff from fresh concrete
pH 10	Runoff from fresh concrete
pH 9	Baking soda in water
pH 8.5	Highest pH for discharge
pH 8.0	Nearly neutral
pH 7.5	Nearly neutral
pH 7	NEUTRAL
pH 6.5	Lowest pH for discharge
pH 6	Nearly neutral
pH 5	(Some) Rainwater
pH 4	Cola
pH 3	Lemon juice
pH 2	Strong acid
pH 1	Strong acid
pH 0	Concentrated sulfuric acid

This pH range will not harm fish.

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Manage pH

- CO_2 (solid, liquid, or gas)
  - H_2SO_4
  - $NaHCO_3$
  - NaOH

California Environmental Protection Agency

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Hydrocarbon Filtration

Carbon-Clay Polishing Media

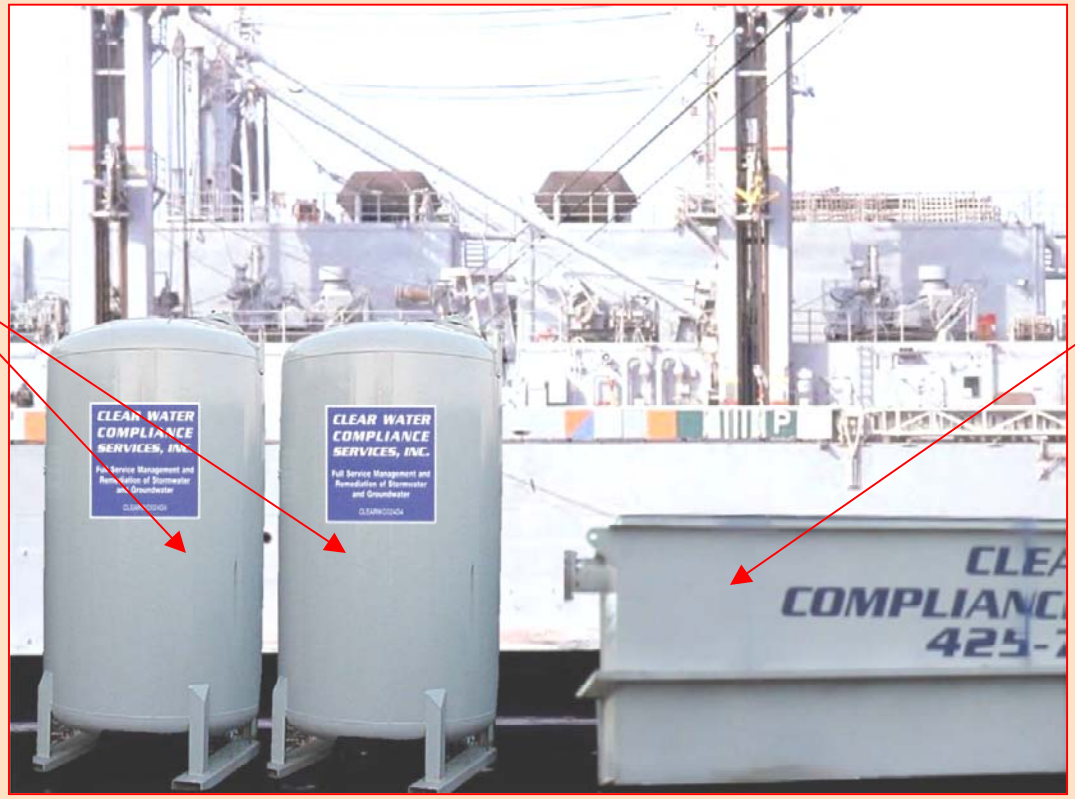

Oil/Water Separator

TPH out 5 to 50 ppm (typical); Discharge to sanitary sewer.

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Summary

- Why Advanced Treatment?
- Overview of Various Treatment Technologies
- Process Used for Selecting a Treatment Approach
- Managing and Treating Non-visible Pollutants

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- AT needed because suspended sediment particles will not settle naturally in a timely manner.
- AT use coagulants to cause suspended sediment to agglomerate and settle or be filtered out.
- No one treatment methodology is appropriate for all conditions.
- Selection should account for site characteristics, soil and water characteristics, physical constraints, and applicable discharge water-quality criteria.

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Stormwater Treatment Technician's Dream

- Clearly defined requirements
- Uniformly enforced from jurisdiction to jurisdiction

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Clear Water Compliance Services, Inc.

- Regulatory Permitting (NPDES Applications)
- Stormwater Pollution Prevention Planning
- Stormwater Treatment System Design
- On-site Stormwater Management
- Regulatory Compliance Monitoring

Full Service Stormwater and Process Water Management for Construction and Industrial Sites

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October 21st, 2004

Sacramento, CA

Storm-Klear™ (Chitosan) Toxicity and Applications

Construction Stormwater Treatment

Natural Site Solutions, LLC

John Macpherson

Presentation Overview:

- Chitosan is a powerful cationic biopolymer.
- Chitosan is removed in the treatment process.
- Residual chitosan is less than 1/10th the toxic threshold.
- Residual chitosan can be detected down to 100 µg/L in treated water using a simple field test.
- Chitosan treatment systems are extremely effective in removing turbidity and other pollutants.

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Polyglucosamine (Chitosan) Structure

A cationic polysaccharide biopolymer

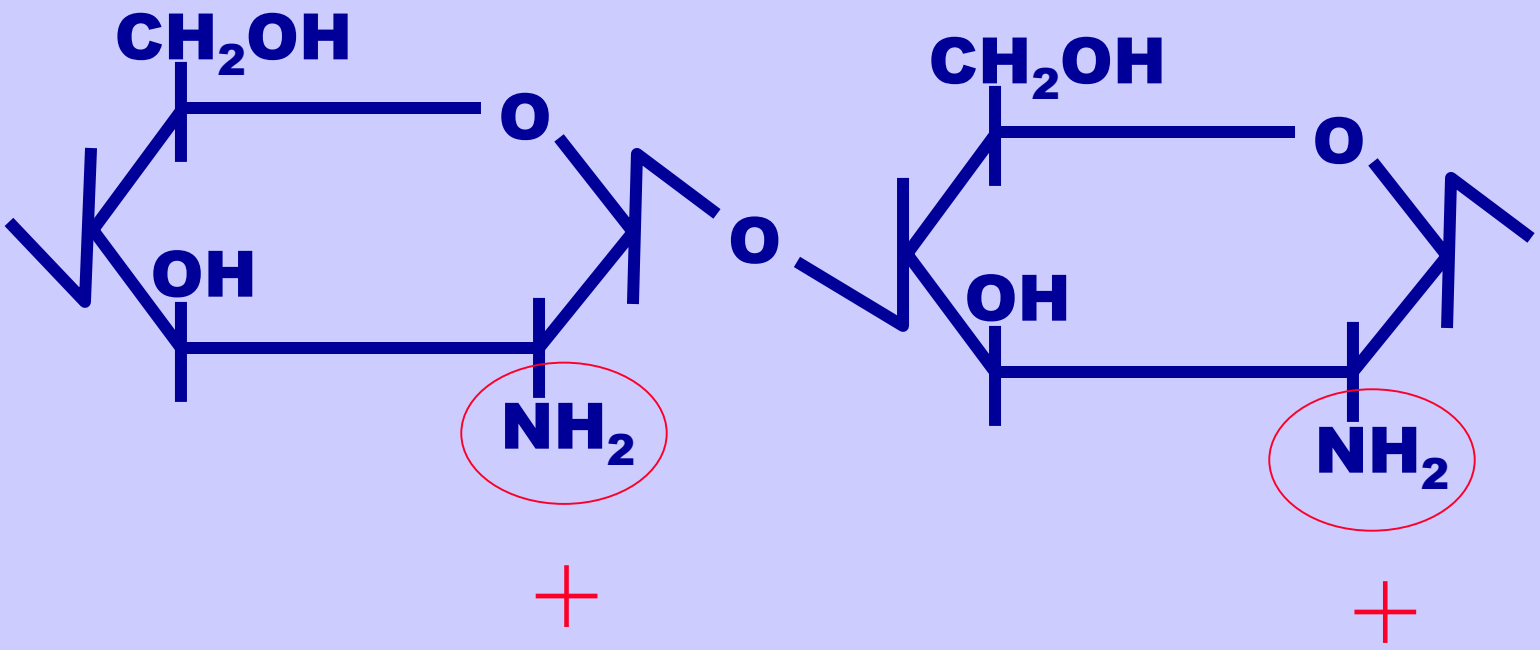

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Extraction Process

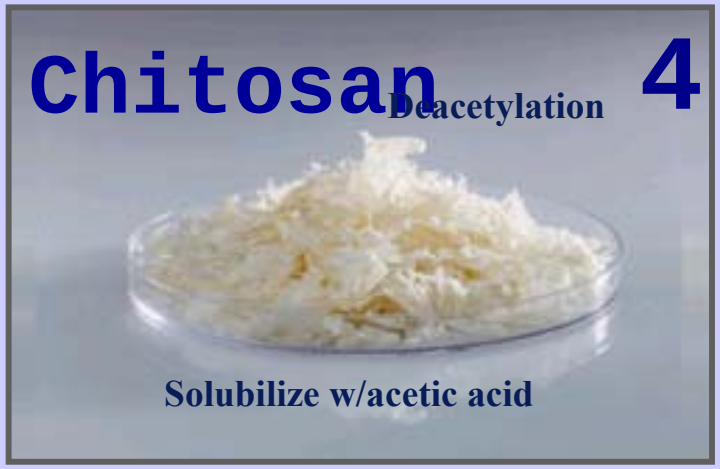

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Commercial Forms of Chitosan

(Chitosan Acetate/Lactate)

- **Storm-Klear Liqui-Floc™ (1% liquid form)**
- **Liqui-Floc™ Concentrate (2% liquid form)**
- **Storm-Klear Gel-Floc™ (100% solid form)**

- **Manufactured by Vanson, Inc. of Redmond, Washington**

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Chitosan Can Remove:

- Suspended Sediment (turbidity)
- Total Phosphorus
- Total & Dissolved Metals
- PAHs/PCBs/other Organics
- Chitosan is effective on 95% of soils tested

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Coagulation - Flocculation

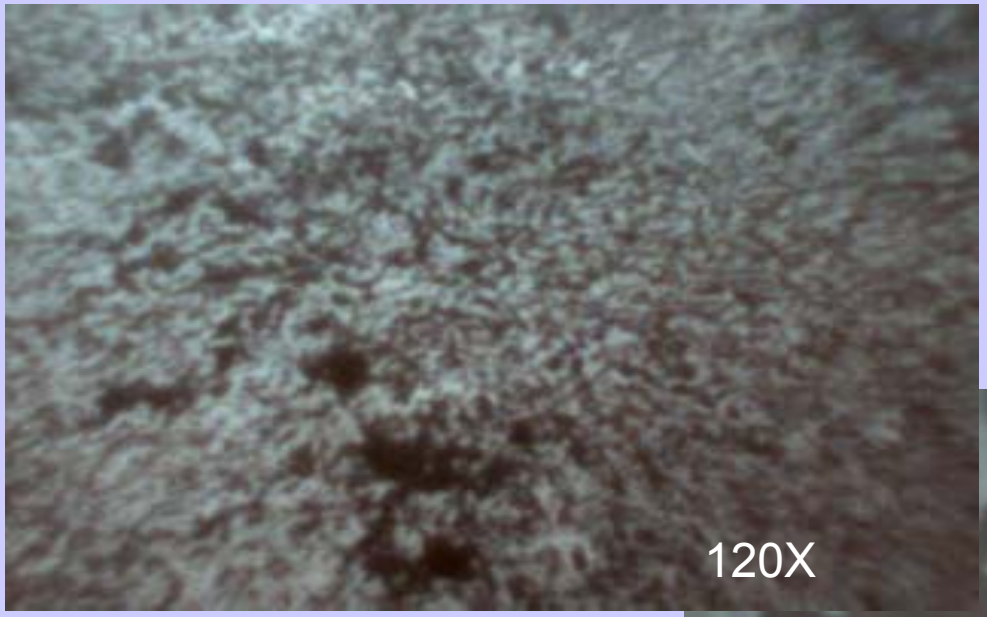

Stormwater contaminated with sediment before and after coagulation with chitosan

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014692

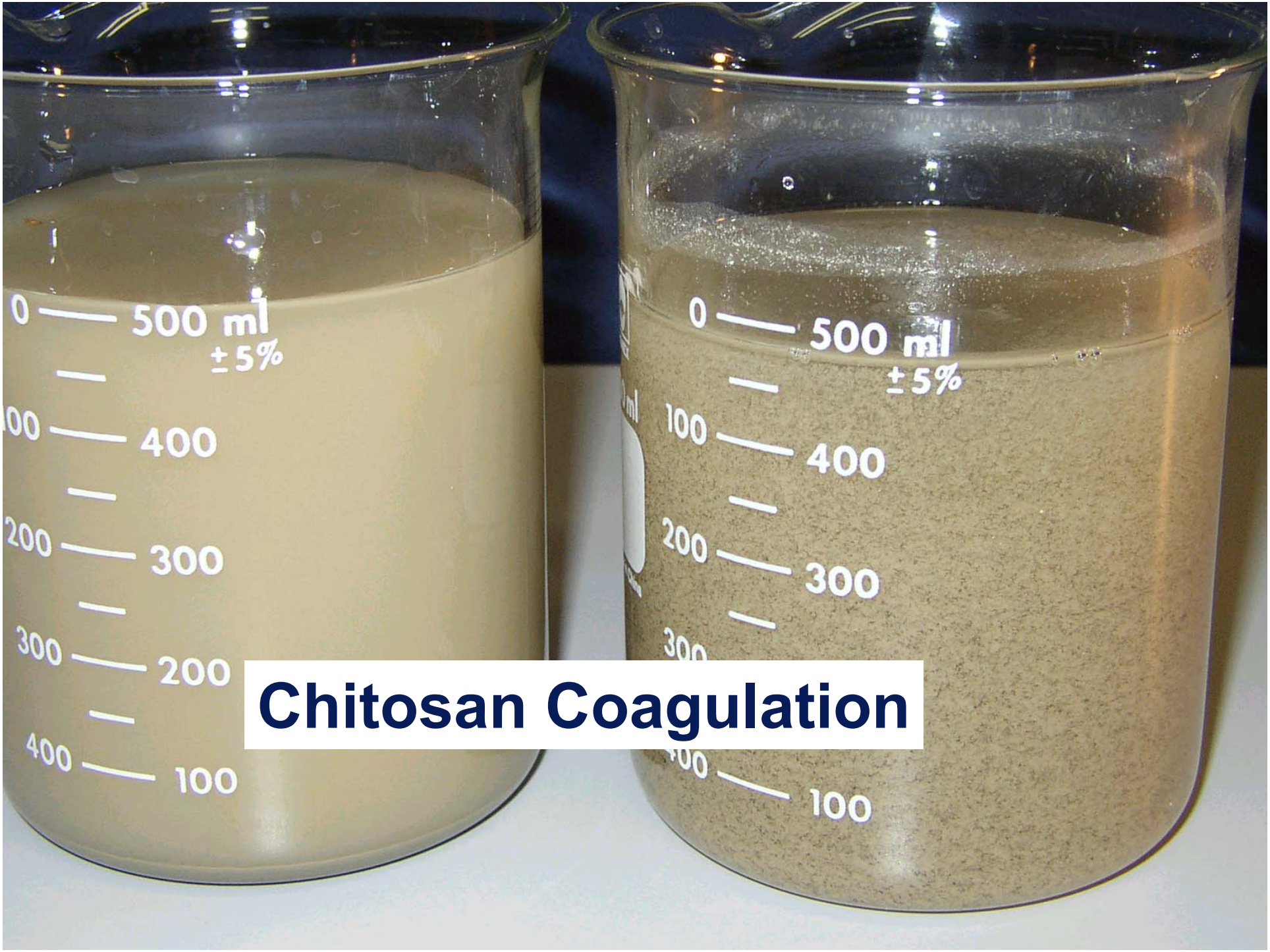

Chitosan Coagulation

Chitosan is Insoluble at pH > 6.5

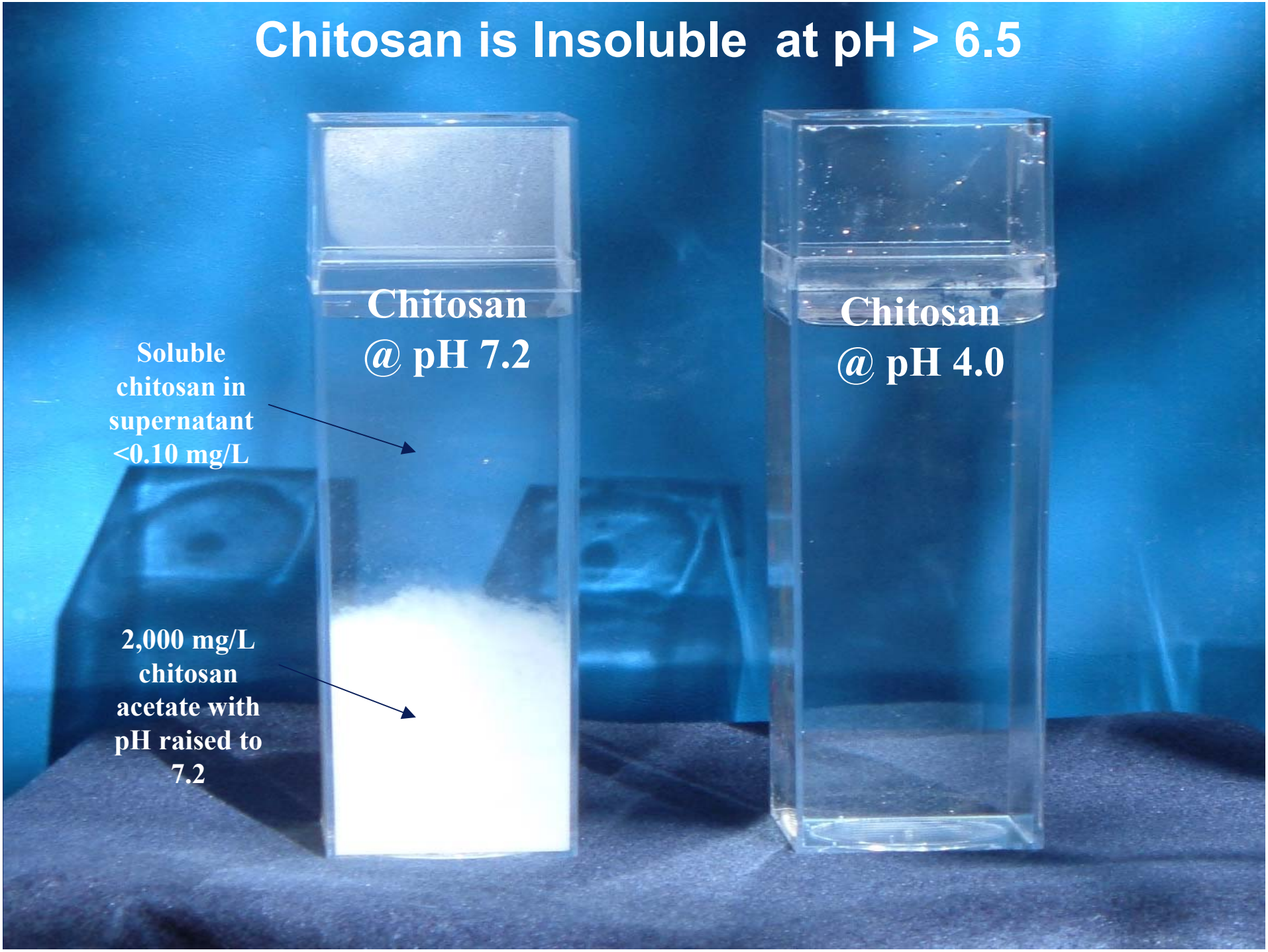

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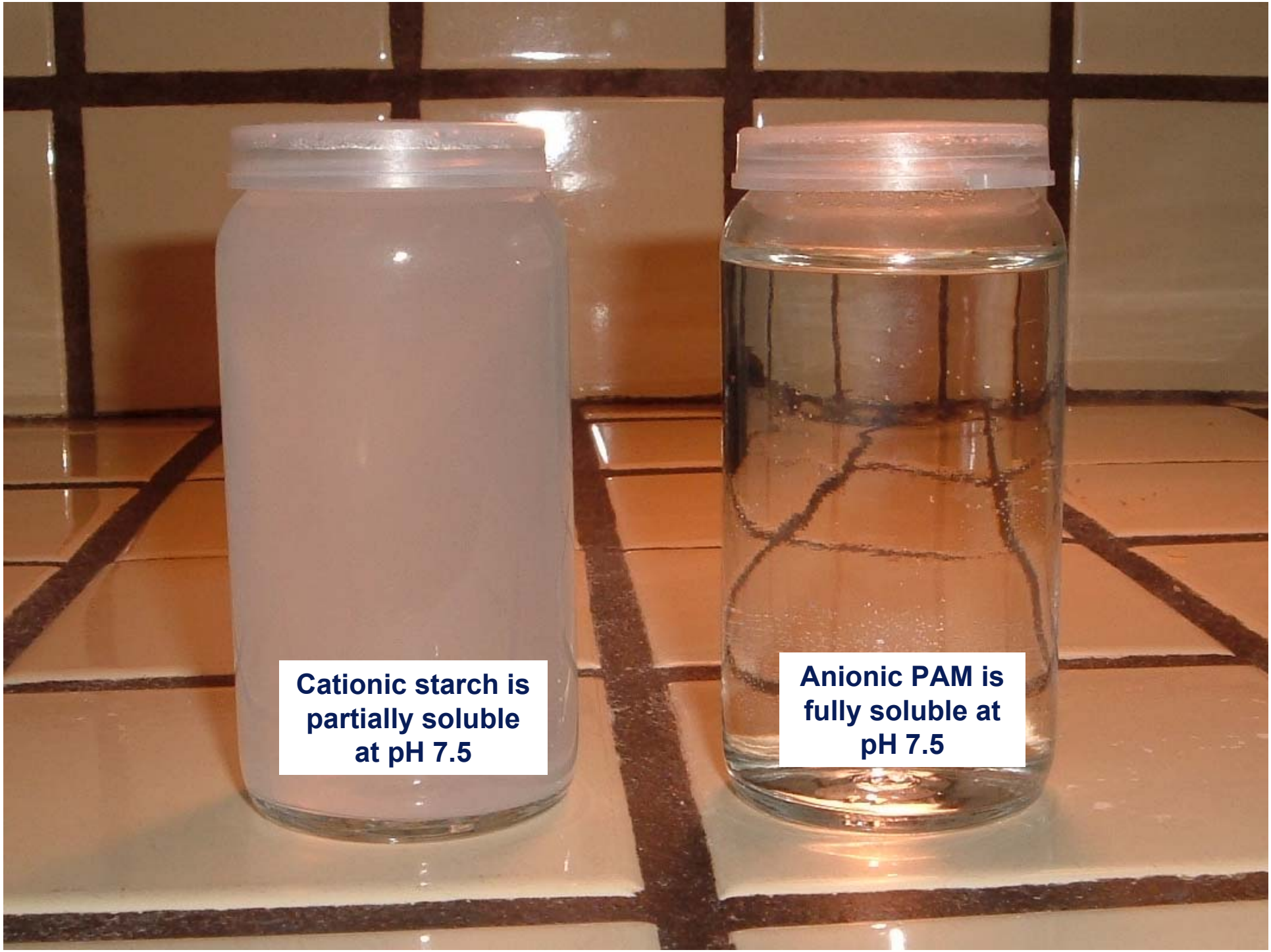
Cationic starch is partially soluble at pH 7.5
Anionic PAM is fully soluble at pH 7.5

General Environmental Safety

U.S. EPA Says:

"Given its low potential for toxicity and its abundance in the natural environment, chitosan is not expected to harm people, pets, wildlife, or the environment when used according to label directions."

…and

"Risks to the environment are not expected because chitosan has not shown toxicity in mammals, it is abundant in nature, and it is used in tiny amounts."

Source:

http://www.epa.gov/pesticides/biopesticides/ingredientsfactsheets/factsheet_128930.htm Posted June 2003

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Chitosan Aquatic Toxicity

Chitosan Acetate

Typical dose rate 0.3 to 3.0 mg/L

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Liqui-Floc (chitosan acetate) Definitive Aquatic Toxicity Results (in clean water)

TEST ORGANISM	TEST ENDPOINT	EC50 OR IC50	EC25[1] OR IC25[1]
Fathead minnow	96-hr survival	6.42 mg/L	NC[2]
	7-day survival	>10.0 mg/L	NC
	7-day growth	>10.0 mg/L	NC
	7-day teratogenicity	10 – 100 mg/L	NC
Daphnia pulex	48-hr survival	13.69 mg/L	NC
Rainbow trout	96-hr survival	1.73 mg/L	1.28 mg/L
	* 7-day survival	1.54 mg/L	1.21 mg/L
	7-day growth	1.52 mg/L	1.16 mg/L
	7-day embryo	>10.0 mg/L	NC

[1] Toxic Threshold.

[2] NC = not calculated because they do not represent the most sensitive species.

Liqui-Floc (mg/L)	Control	50 NTU	200 NTU	500 NTU
0	100.0 ± 0.0	97.5 ± 5.0	100.0 ± 0.0	100.0 ± 0.0
0.25	100.0 ± 0.0	--	--	--
0.50	100.0 ± 0.0	100.0 ± 0.0	--	--
1.0	100.0 ± 0.0	100.0 ± 0.0	100.0 ± 0.0	100.0 ± 0.0
2.0	25.0 ± 10.0	57.5 ± 15.0	100.0 ± 0.0	100.0 ± 0.0
4.0	0.0 ± 0.0	0.0 ± 0.0	0.0 ± 0.0	67.5 ± 22.2
8.0	--	0.0 ± 0.0	0.0 ± 0.0	0.0 ± 0.0
16.0	--	--	0.0 ± 0.0	0.0 ± 0.0
Chronic (7-day) Rainbow trout survival test in turbid water.				
LC50	**1.68**	**2.11**	**2.83**	**4.52**
Toxic threshold*	**1.21**	**1.52**	**2.03**	**3.25**

* Defined as lowest 25% point estimate – in these tests it is equivalent to the LC25

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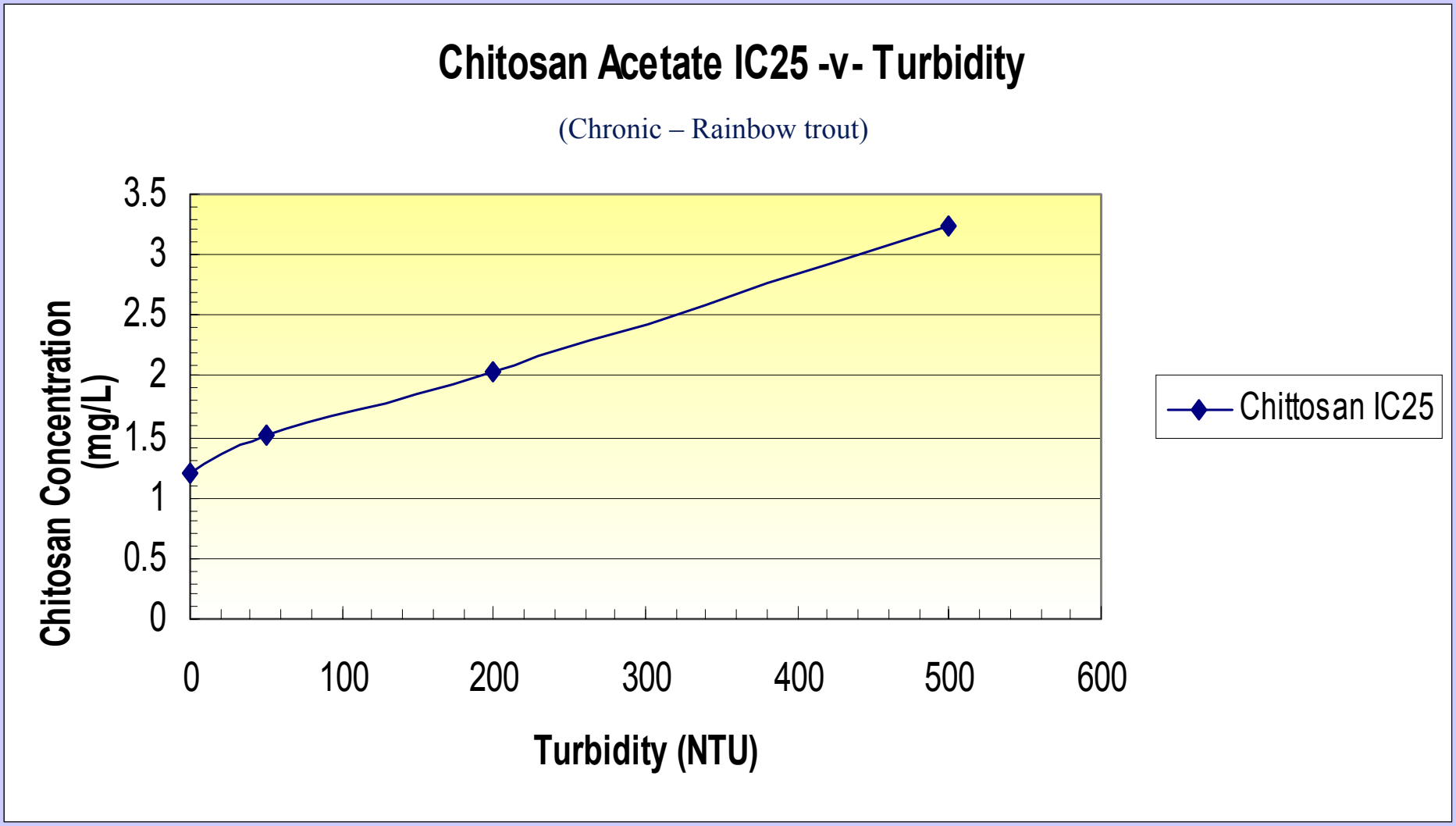

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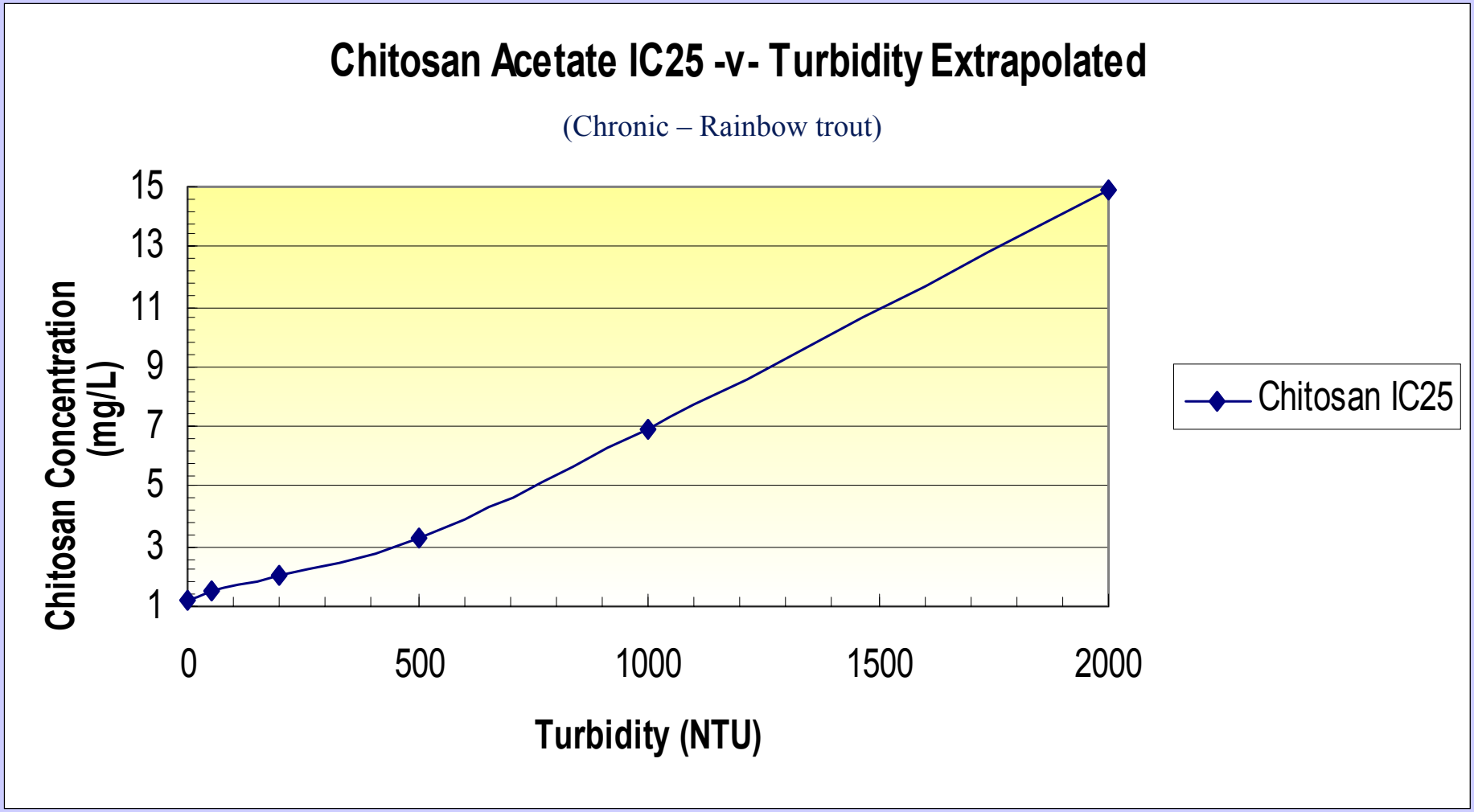

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Exaggerated Chitosan Dose Toxicity Test

TEST # 03-19-99 (20.4 mg/L dose rate)							
Time	Dose Rate (µg/L)	Before Filtration			After Filtration		
		Turbidity (NTU)	pH	Conductivity (µS/cm)	Turbidity (NTU)	pH	Conductivity (µS/cm)
1440	20,400	**643**	7.1	143	3.1	7.1	111
Whole effluent exhibited no acute mortality to Rainbow trout or Daphnia magna.							

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What does all this Mean?

For the most sensitive species:

The residual chitosan concen. <0.10 mg/L

The toxic threshold is 1.21 mg/L

The chtosan safety factor is > 12.1

EPA considers a safety factor > 3 adequate

Liqui-Floc (chitosan acetate)

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Chitosan Aquatic Toxicity

Chitosan Lactate (Gel-Floc)

Typical dose rate 0.3 to 3.0 mg/L

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Gel-Floc (chitosan lactate) Definitive Aquatic Toxicity Results (in clean water)

TEST ORGANISM	TEST ENDPOINT	EC50 OR IC50	EC25[1] OR IC25[1]
Fathead minnow	96-hr survival	23 mg/L	NC[2]
	7-day survival	25 mg/L	NC
	7-day growth	23 mg/L	NC
	7-day teratogenicity	10 – 100 mg/L	NC
Daphnia pulex	48-hr survival	93 mg/L	NC
Rainbow trout	96-hr survival	6.4 mg/L	4.4 mg/L
	* 7-day survival	5.3 mg/L	4.8 mg/L
	7-day growth	4.0 mg/L	3.5 mg/L
	7-day embryo	>1,000 mg/L	NC

[1] Toxic Threshold.

[2] NC = not calculated because they do not represent the most sensitive species.

Gel-Floc (chitosan lactate) Dose, Toxicity, Turbidity

IC25 @ 0 NTU = 3.5 mg/L

NOEC @ 900 NTU = 37.5 mg/L

(Chronic – Rainbow trout)

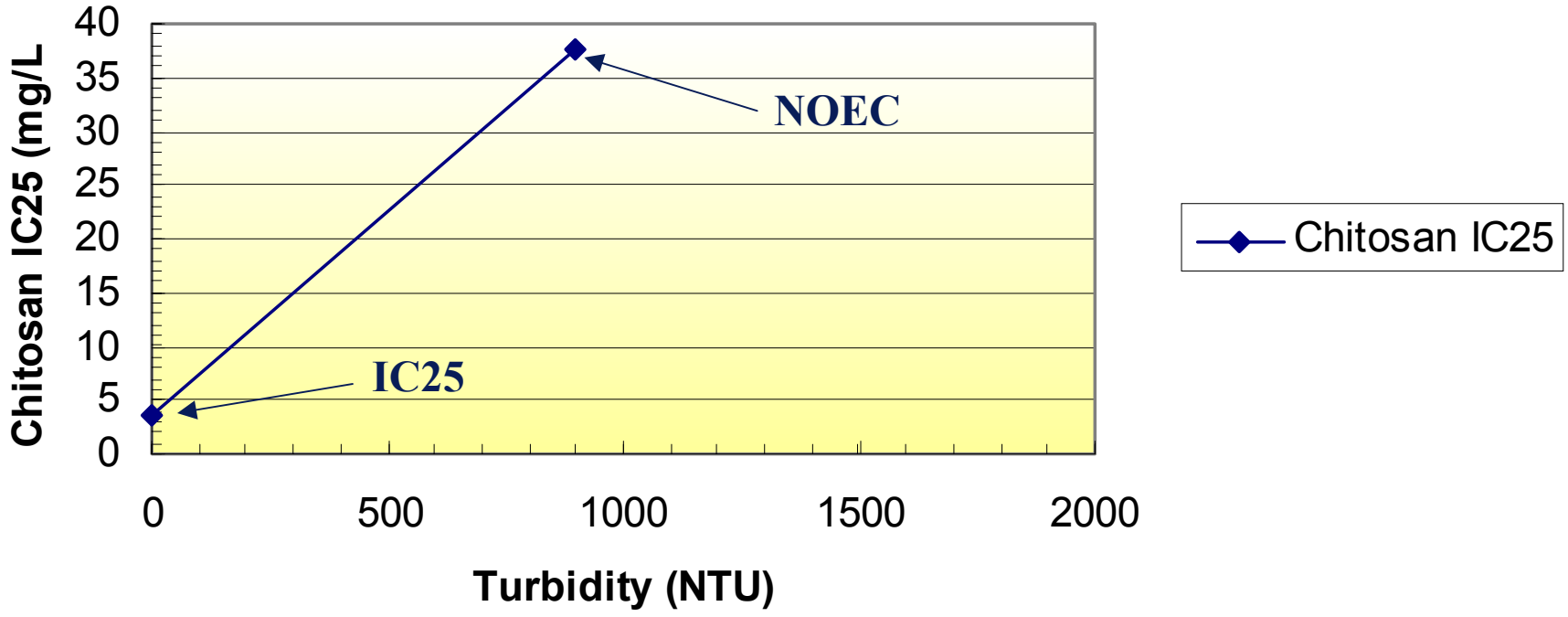

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And Again,

What does all this Mean?

For the most sensitive species:

The residual chitosan concen. <0.10 mg/L

The toxic threshold is 4.8 mg/L

The chitosan safety factor is 48

EPA considers a safety factor > 3 adequate

Gel-Floc (chitosan lactate)

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BIOLOGICAL DEGREDATION OF CHITOSAN

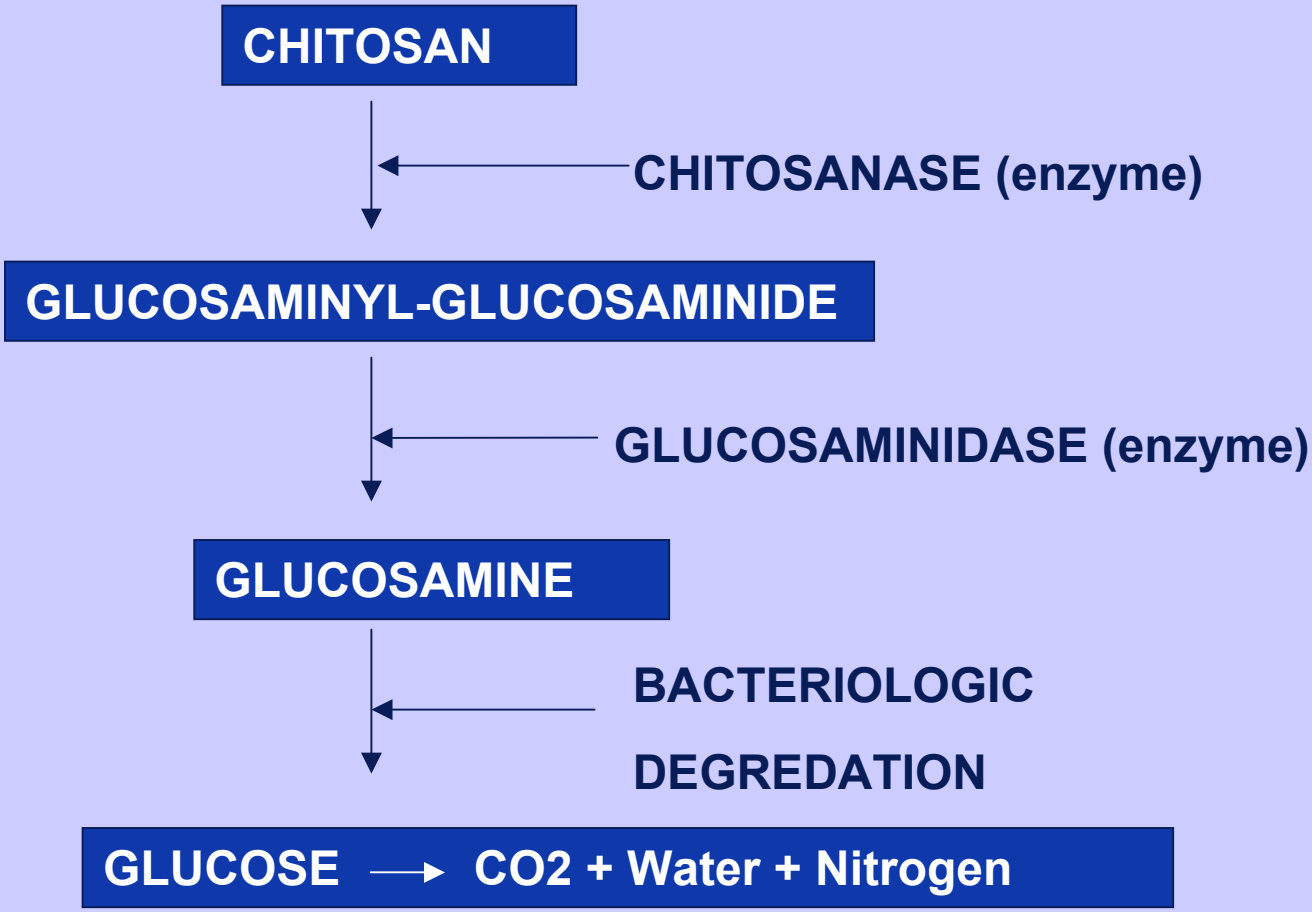

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Chitosan Biodegradation
(1% to 10% per Day)

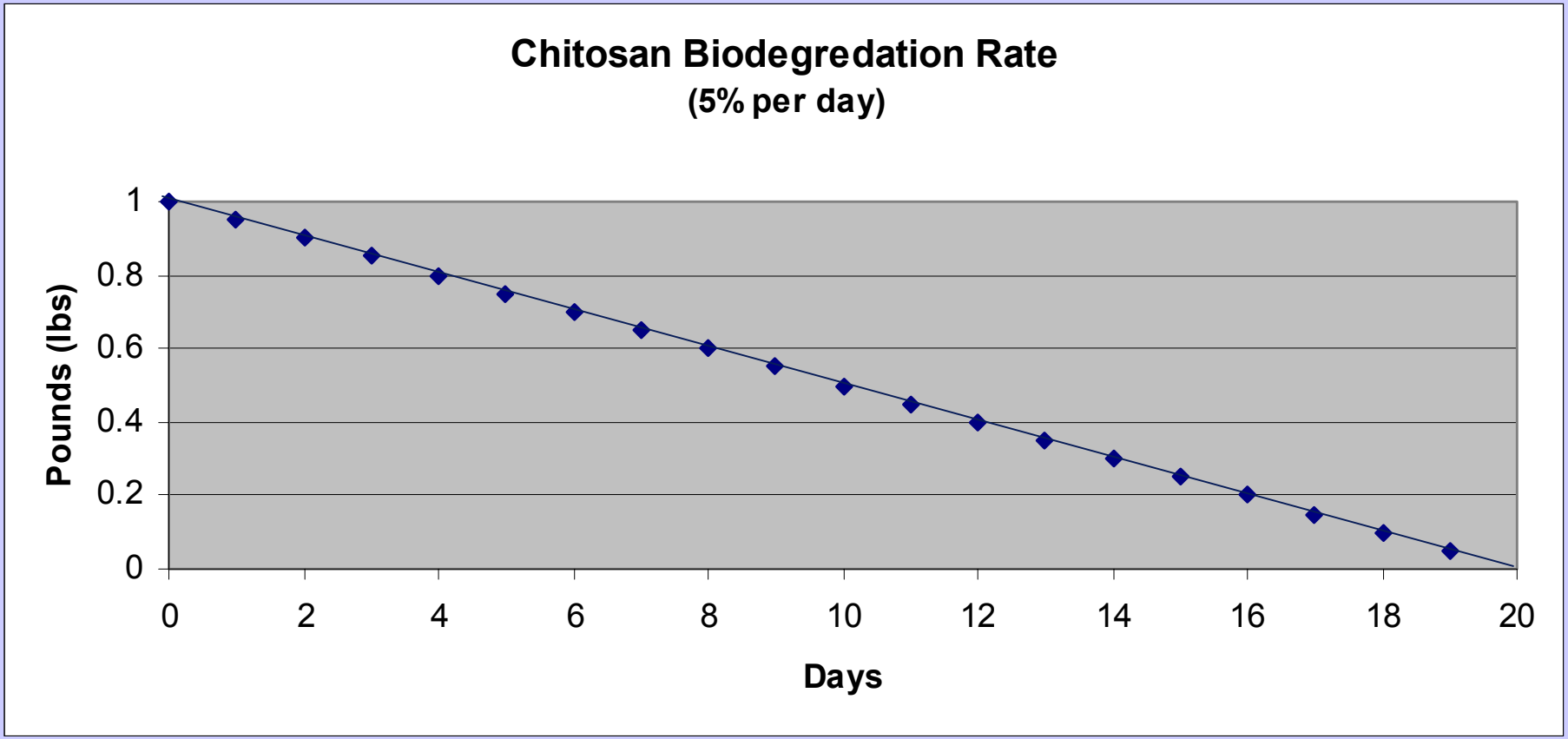

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Residual Chitosan Test

Based on the reaction between iodine and polysaccharides

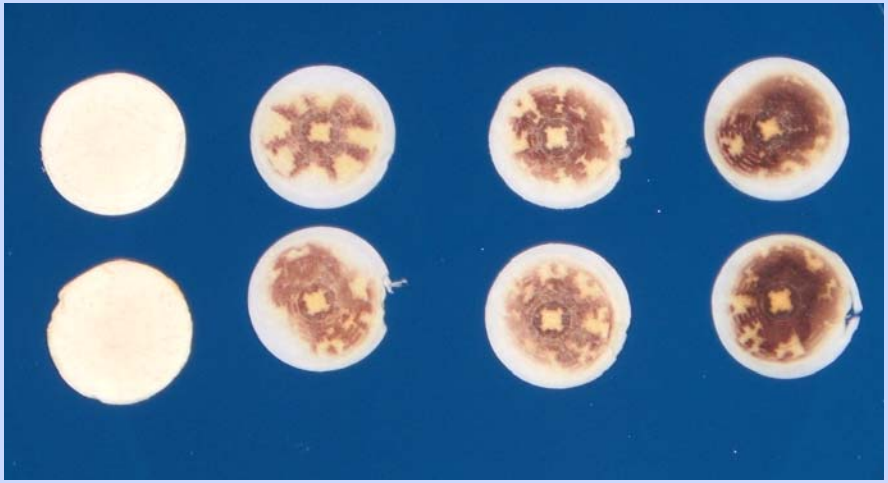

Duplicates

Blank
0 µg/L

125 µg/L

250 µg/L

500 µg/L

Over 1,000 analyses performed with no positive reactions

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Engineered Applications

© Copyright Natural Site Solutions 2004

Two Forms of Chitosan Available

Gel-Floc

Passive
Dissolving
Chitosan Gel

Liqui-Floc

Liquid Chitosan
for Injection

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014712

Chitosan-Enhanced Sand Filtration

© Copyright Natural Site Solutions 2004

Modular Sand Filter System

Clearwater Compliance
Services, Inc.

CUD Test Project

Lakeside Divisions 1, 2 & 3

Redmond, Washington

Lakeside Test Project Stats

Average turbidity reduction:	98.4% (SD=1.29%, CV=0.013)
Average influent turbidity:	248 NTU (42.3 NTU to 917 NTU)
Average effluent turbidity:	2.98 NTU (0.58 NTU to 5.18 NTU)
Residual chitosan concn.:	<0.10 mg/L
Chitosan dose rate variation:	0.3 mg/L to 0.8 mg/L relative to influent turbidity

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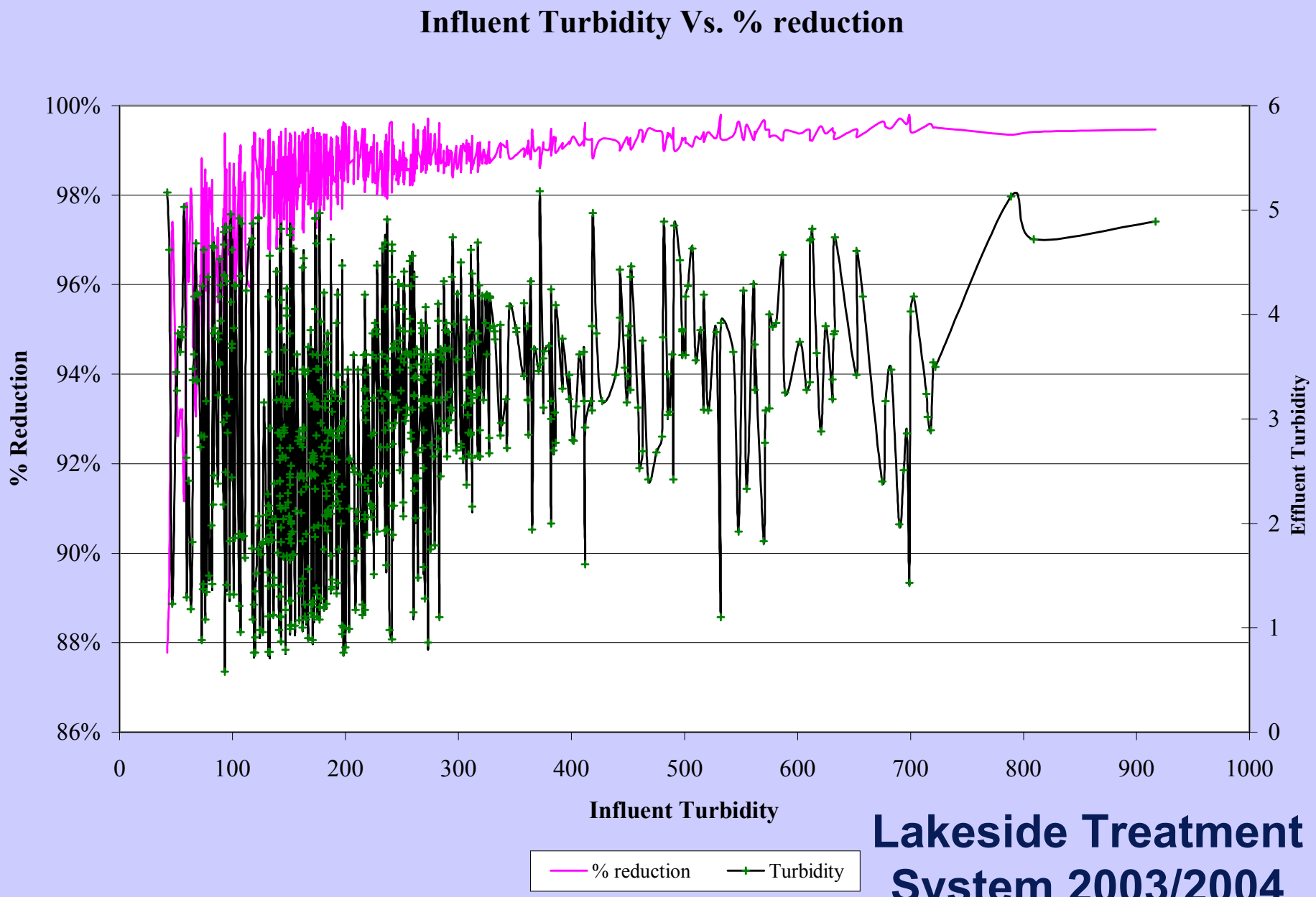

Lakeside Treatment System 2003/2004

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Lakeside Treatment System Acute Trout Results

Rainbow Trout 96-Hour Acute Toxicity

Sample Date	Sample ID	pH	Cond	Turb	Temp	DO	% Survival
2/5/03	LSB-2/5/03-5-E	7.78	145.1	1.93	4.2	9.95	**100**
2/18/03	LSB-2/18/03-11-E	7.75	173.1	1.1	9	12.59	**100**
2/21/03	LSB-2/21/03-17-E	7.76	181.1	1.79	9.2	10.63	**100**
2/21/03	LSB-2/21/03-23-E	7.75	180.4	0.84	9.1	10.98	**100**
2/28/03	LSB-2/28/03-21-E	7.64	176.6	0.6	8	12.27	**100**
3/5/03	LSB-3/5/03-52-E	7.73	175.7	2.31	8.7	10.98	**100**
3/11/03	LSB-3/11/03-85-E	7.71	172.2	4.08	10.3	10.63	**100**
3/12/03	LSB-3/12/03-115-E	7.63	161.7	1.79	12.6	12.21	**100**
3/13/03	LSB-3/13/03-145-E	7.61	104.8	1.52	11.9	11.81	**100**

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Lakeside Treatment System Acute Daphnia Results

Daphnia Magna 48-Hour Acute Toxicity

Sample Date	Sample ID	pH	Cond	Turb	Temp	DO	**% Survival**
2/5/03	LSB-2/5/03-5-E	7.78	145.1	1.93	4.2	9.95	**97.5**
2/18/03	LSB-2/18/03-11-E	7.75	173.1	1.1	9	12.59	**100**
2/21/03	LSB-2/21/03-17-E	7.76	181.1	1.79	9.2	10.63	**95**
2/21/03	LSB-2/21/03-23-E	7.75	180.4	0.84	9.1	10.98	**100**
2/28/03	LSB-2/28/03-21-E	7.64	176.6	0.6	8	12.27	**97.5**
3/5/03	LSB-3/5/03-52-E	7.73	175.7	2.31	8.7	10.98	**97.5**
3/11/03	LSB-3/11/03-85-E	7.71	172.2	4.08	10.3	10.63	**95**
3/12/03	LSB-3/12/03-115-E	7.63	161.7	1.79	12.6	12.21	**100**
3/13/03	LSB-3/13/03-145-E	7.61	104.8	1.52	11.9	11.81	**100**
3/24/03	LSB-3/24/03-205-E	7.56	152.6	2.04	9.8	10.91	**90**

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Phosphorus Results

14 Phosphorus tests:

Average % P reduction = 70.4%

Min. = 23.8% reduction

Max. = 93.3 reduction

Median = 78.6% reduction

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Seatac Int'l Airport Seattle

3,500 gpm Storm-Klear™ Sand Filtration System

One Of Seven (600 gpm) Chitosan Treatment Systems Installed at Seatac Int'l Airport

Conclusions

- Chitosan is an effective coagulation/flocculation agent.
- Chitosan dose rates are 0.3 to 3 mg/L.
- Chitosan is removed with sediment in the treatment process.
- Chitosan has a conservative safety factor > 10.
- Water treated with chitosan has never exhibited toxicity.
- Chitosan treatment systems are extremely effective in the purification of construction stormwater.

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Advanced Treatment Equipment

Michael R. Chase, CPESC

Colloids

- Sub-micron particles that remain suspended in water for long periods of time due to a process known as Zeta Potential
- Create turbidity in water
- Problems to receiving water include
  - Increased temperature
  - Decreased visibility

Zeta Potential

- The potential for particles to remain in suspension due to the relative size of the particle compared to the charge associated with the particle
- Particles with like charges repel each other
- The colloidal particles in storm water have a negative charge

Detention Basin

Batch Treatment

- Basin alone will not remove colloidal particles without flocculation
- Basin or tank required for treatment containment
- Requires liner to keep flocculent from reacting with sediment from basin walls and floor
- Requires circulation for mixing, usually centrifugal pumps, which could cause shearing, requiring additional flocculent
- Requires time for coagulated particles to settle
- Requires filtration after treatment

Chitosan Enhanced Sand Filtration

Chitosan Enhanced Sand Filtration

Chitosan Enhanced Sand Filtration

- System Requirements
  - Pumps to move the water through the treatment process
  - Hoses and Piping to contain the water through the process and to aid in reaction time
  - Tanks either weir or tube settlers to reduce turbidity if levels exceed 800 Nephelometric Turbidity Units (NTU)
  - Injection pump to deliver chitosan at proper dosage
  - Sand media filters to capture coagulated particles

Pumps

Pumps

- Centrifugal
- Normally electric or diesel
- Self Priming
- Needs to meet system requirements for flow rate and pressure
- Run dry capability a plus
- Auto start/shut down a plus

Pipe and Hose

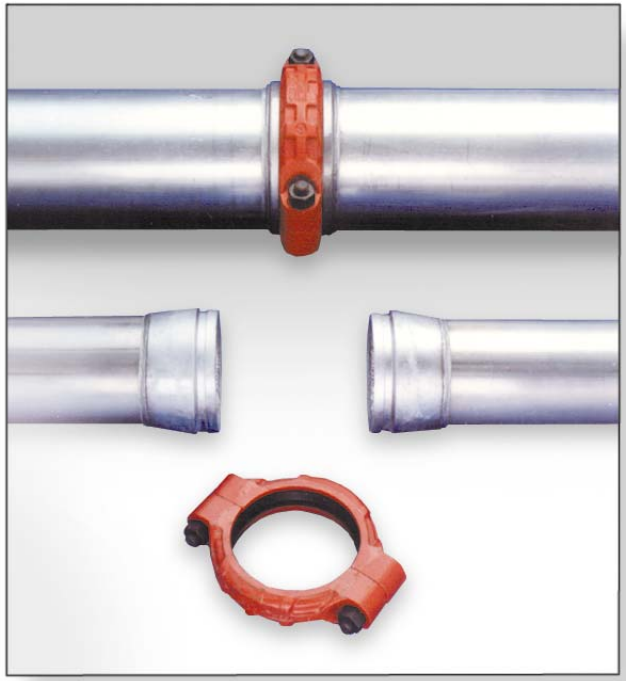

Pipe and Hose

- Quick connect
- Non-leak
- Pressure rated
- Sized to reduce velocity after treatment injection
- Length of 80 to 100 feet between mixing point or injection point to sand media filter

Weir Tank

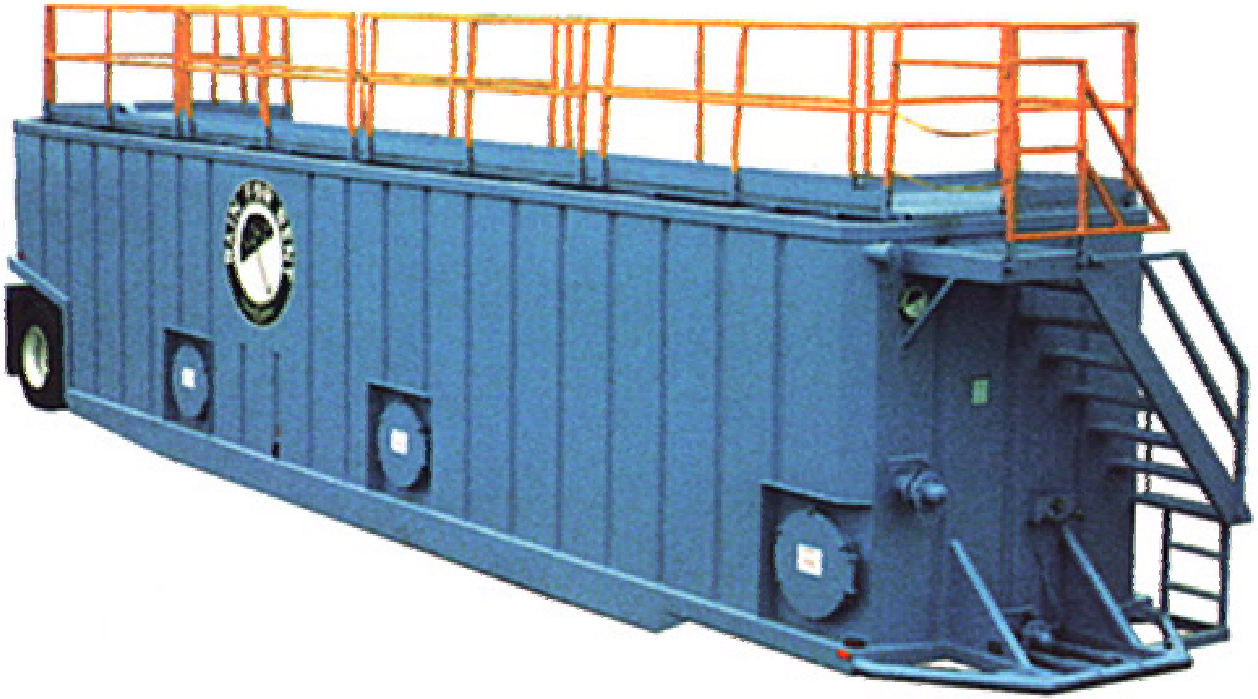

Weir Tank

- Two weir over/under configuration best for treatment application
- Removal of large particles or pre-treatment reaction chamber using chitosan to reduce NTU levels
- 18,000 gallon capacity
- Flow rates up to 250 gpm
- Continuous flow

Weir Tank

Tube Settler Technology

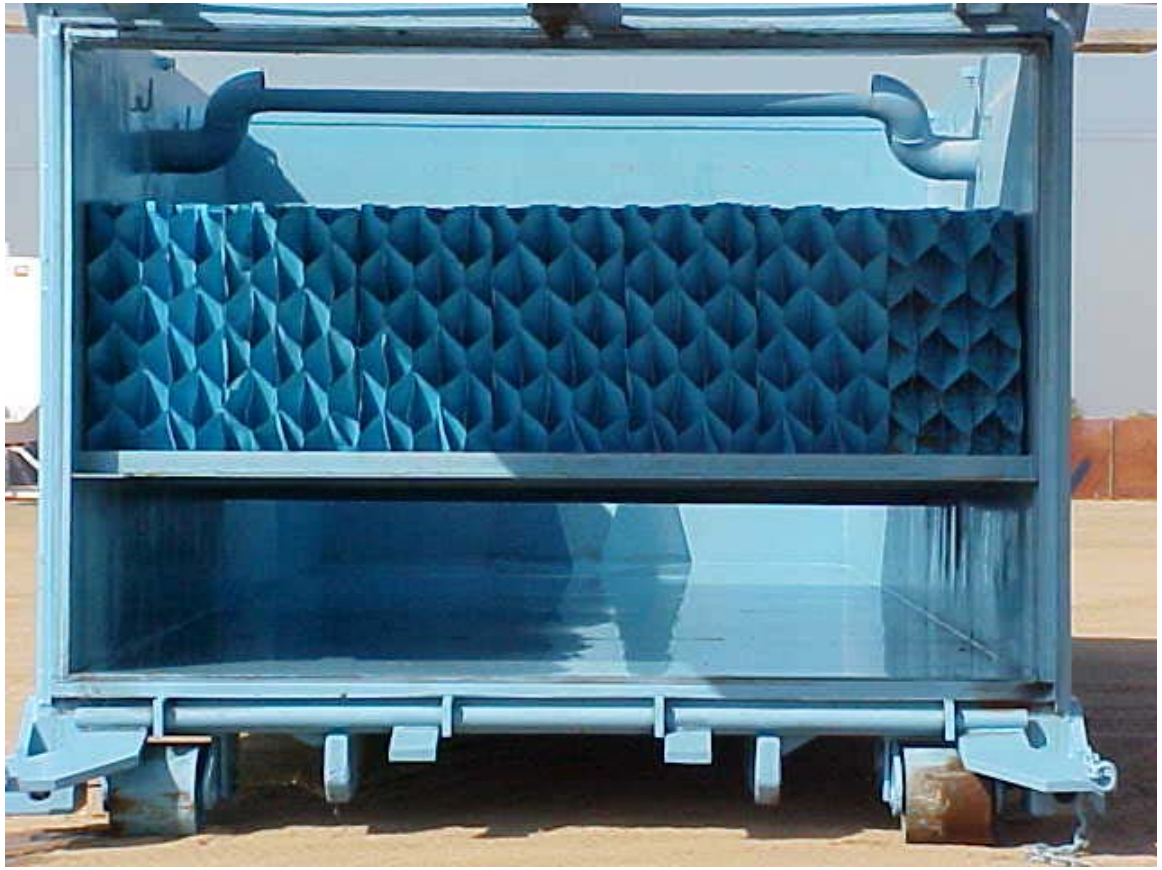

Tube Settler Technology

- Similar to slant plate clarifier
- 60^{0} incline to aid in reducing the flow energy allowing sediment to drop out of suspension
- Flow rates up to 2.5 gpm per square foot of surface area
- Effective for NTU reduction with or without polymer treatment

Tube Settler Technology

Injection Pump

Injection Pump

- Various models available
- Unit requires a high viscosity head
- Should be variable speed to adjust for dosage rates
- Positive displacement to insure accurate dosage
- High pressure to pump against line pressure
- Weather resistant
- Typical flow rate 0-10 gph

Sand Media Filtration

Sand Media Filtration

- Requires at least 3 vessels per unit to provide adequate backwash
- Flow rate at or below 15 gpm per square foot of surface area
- Requires #30 crushed silica for the media
  - Larger sand will allow migration of colloidal particles
- Automatic backwash capability for timed, or pressure differential backwash

Sand Media Filter

New Technology

- Injection Pump
  - Reads the charge associated with the water and adjusts the polymer dosage to match the charge
  - Prevents overdosing of polymer

Injection Pump

New Technology

- Monitoring system
  - Reads the NTU and pH
  - Determines if treated water meets discharge requirements
  - If not, unit re-circulates discharge in until it meets discharge requirements and then allows discharge to receiving water

NTU and pH Probes

NTU and pH Meters

Discharge and Re-circulation Valves

Results

Results

Need for Advanced Stormwater Treatment at Lake Tahoe

John E. Reuter & Dave Roberts
Tahoe TMDL Research Program

Lake Tahoe: A Changing Ecosystem

- Significant portions are urbanized
- Increased resident population
- Millions of tourists
- Peak VMT >1,000,000 miles/day
- Loss of wetland and runoff infiltration
- Extensive road network
- Land disturbance - soil erosion
- Air pollution

Unraveling Cause(s) for Declining Water Clarity

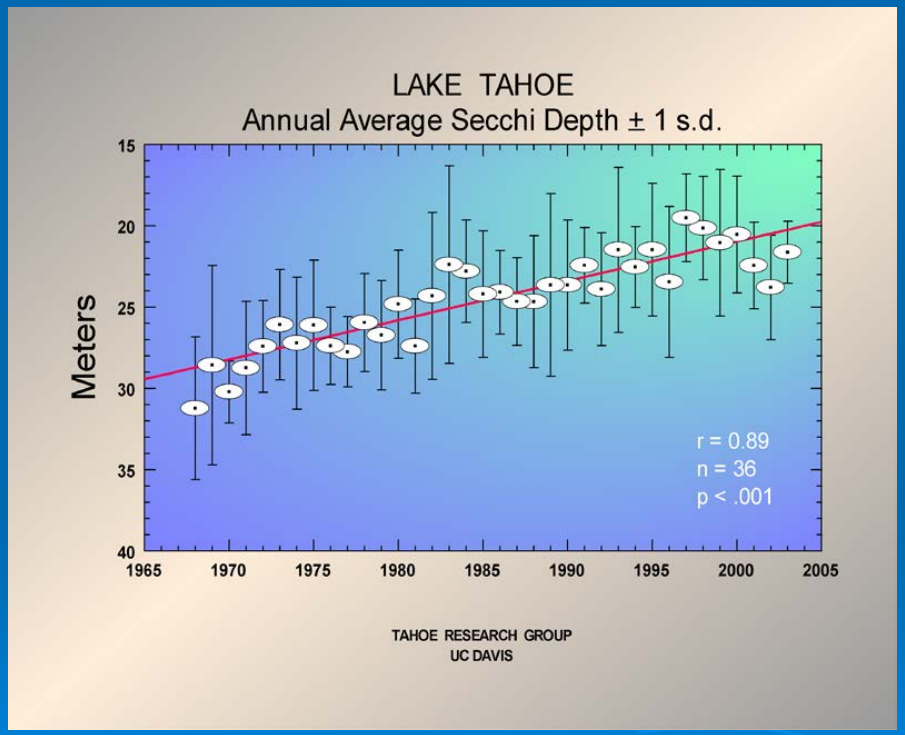

- Nutrients stimulate algae
- Fine-sediments directly reduces clarity (1-20 µm)
- Progressive accumulation leads to long-term decline
- Management strategy - P, N, sediment control
- TMDL, EIP & other plans are addressing load reduction

TMDL Development Phases

Phase I

- Determines Current Loading
- Determines Basin-wide Load Reduction Needs

Phase II

- Identify Load Reduction Possibilities
- Allocates Pollutant Load Reductions
- Implementation Plan

Phase III

- Implementation and Monitoring
- Adaptive Management framework
- Predetermined Review Periods

Tahoe TMDL Phase 2

- Preliminary finding suggest that in many urban areas at Tahoe, traditional BMPs may not be capable of meeting the needed levels of pollutant reduction.
- New approaches/technologies may be required.
- Implementers must be given a full range of load reduction options.
- In 2004 Tahoe Basin one of 14 projects selected nation-wide to receive A USEPA Targeted Watershed grant.

Tahoe TMDL Phase 2

- New approaches under consideration at Tahoe:
  - Mitigation of air-borne pollutants
  - Hydrologic controls to reduce runoff
  - Stream channel erosion
  - BMP maintenance
  - Advanced localized or centralized stormwater treatment
- Collaborative research by Phil Bachand & Assoc., UC Davis, Caltrans and CSUS-OWP has been examining use of flocculants and coagulants as a possible means of enhancing treatment either in separate treatment systems or associated with an existing BMP.

014762

PARSONS ...Water Tectonics

The Next Wave

Conference on
Advanced Treatment
For
Construction Sites

October 21st, 2004

Sacramento, California

Presented by:
James Mothersbaugh

Company Information

1999 WT's first commercial project

2000 1st direct discharge to a public lake- <5ntu

2001 Conditional approval for continuous treatment
Continuous toxicity testing- acute & chronic
Automated controls & online testing

2002 Wireless monitoring and performance controls

2003 Started *Operations in California*

2004 Expanded operations in Nevada, Texas, Florida

Company Information

Scope of Services

Certified Toxicity Laboratory

Monitoring – Manual and inline automatic

Stormwater Treatment – multiple designs

Permitting – SWPPP & NPDES

Equipment Supplier of Control Systems

Fabrication of Specialty Systems

Stormwater Phase II

Clients

Microsoft

New Redmond City Hall

Port of San Francisco-Pier 48

New Washington Mutual Headquarters

Home Depot

Whole Foods

Sound Transit

Brightwater Design Team

I-5 Everett Design Team

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Stormwater Phase II

We use various types of technologies

to process stormwater

Trucking

Infiltration

Filtration

Passive Filtration

Polymer-chitosan

Electro-coagulation

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Trucking

Infiltration

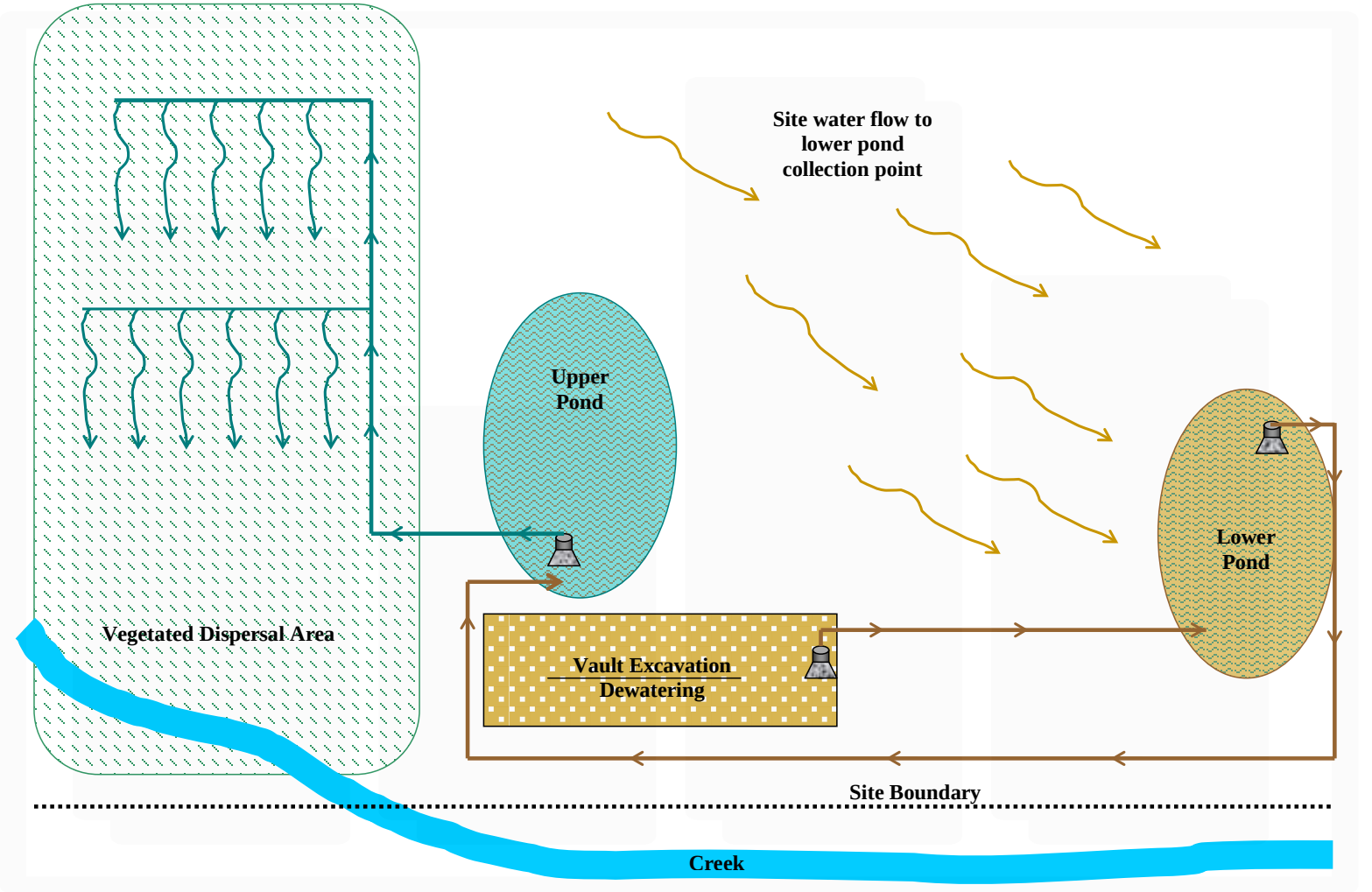

Polymer - Chitosan

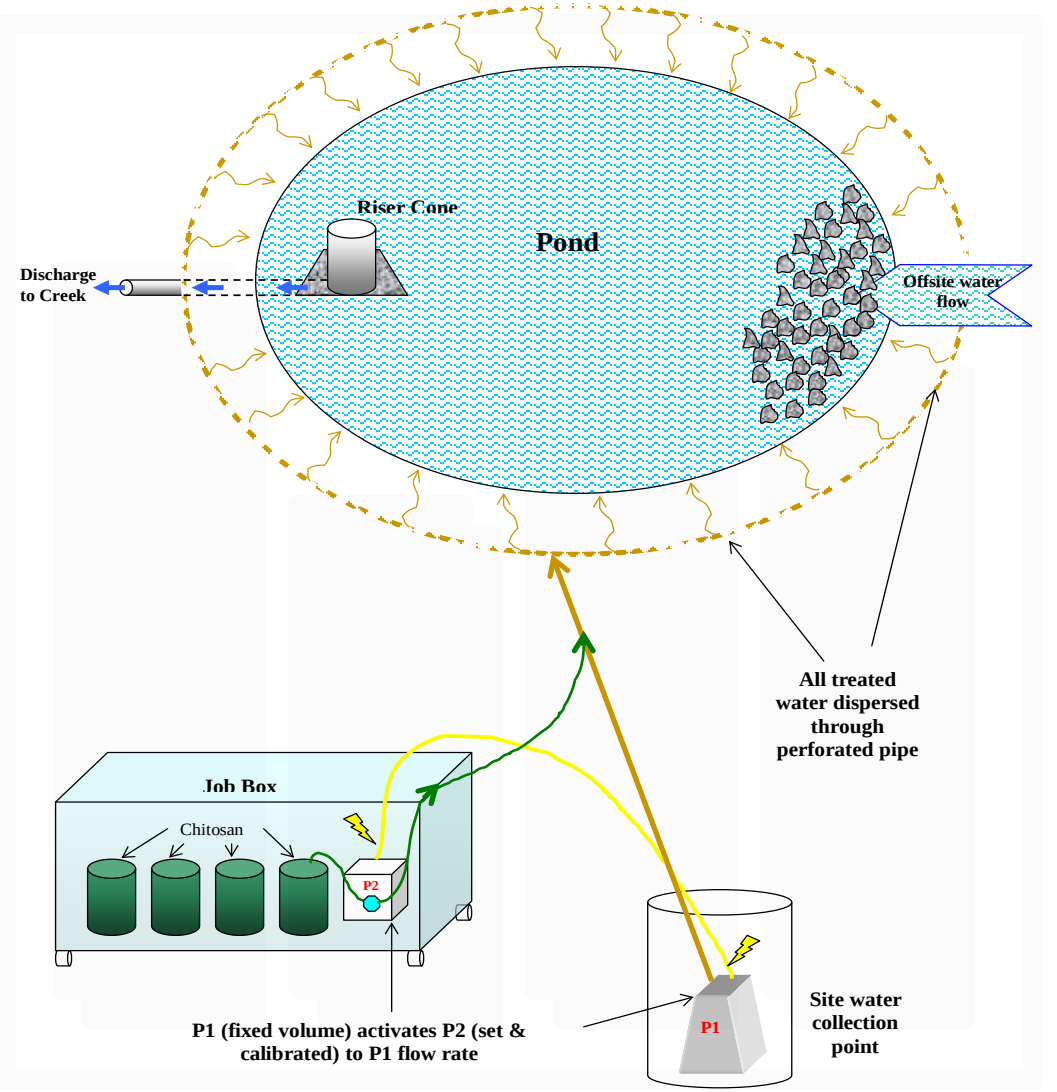

Filtration - Cartridge, Sand & Bag

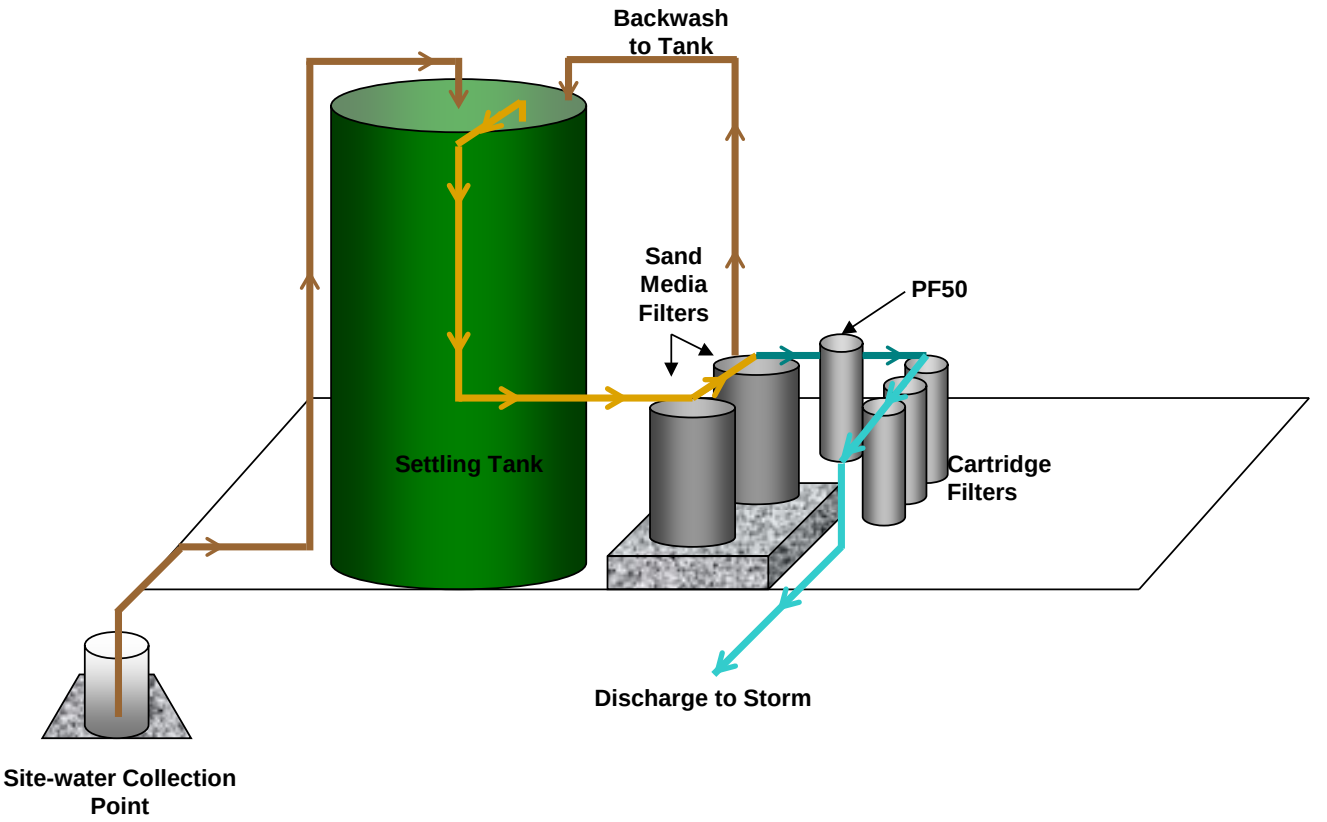

Passive Filtration

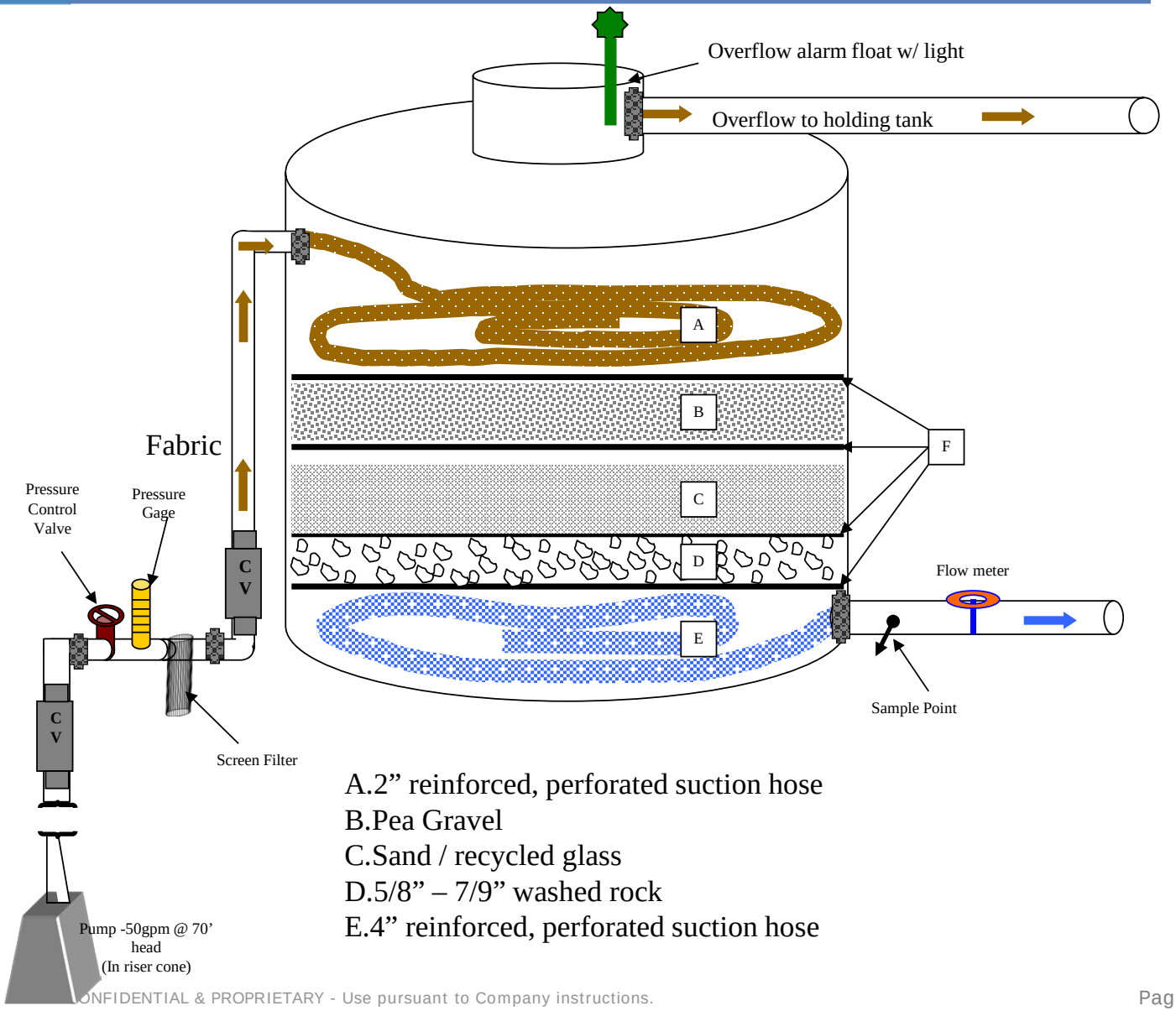

A.2" reinforced, perforated suction hose
B.Pea Gravel
C.Sand / recycled glass
D.5/8" – 7/9" washed rock
E.4" reinforced, perforated suction hose

Electro-coagulation

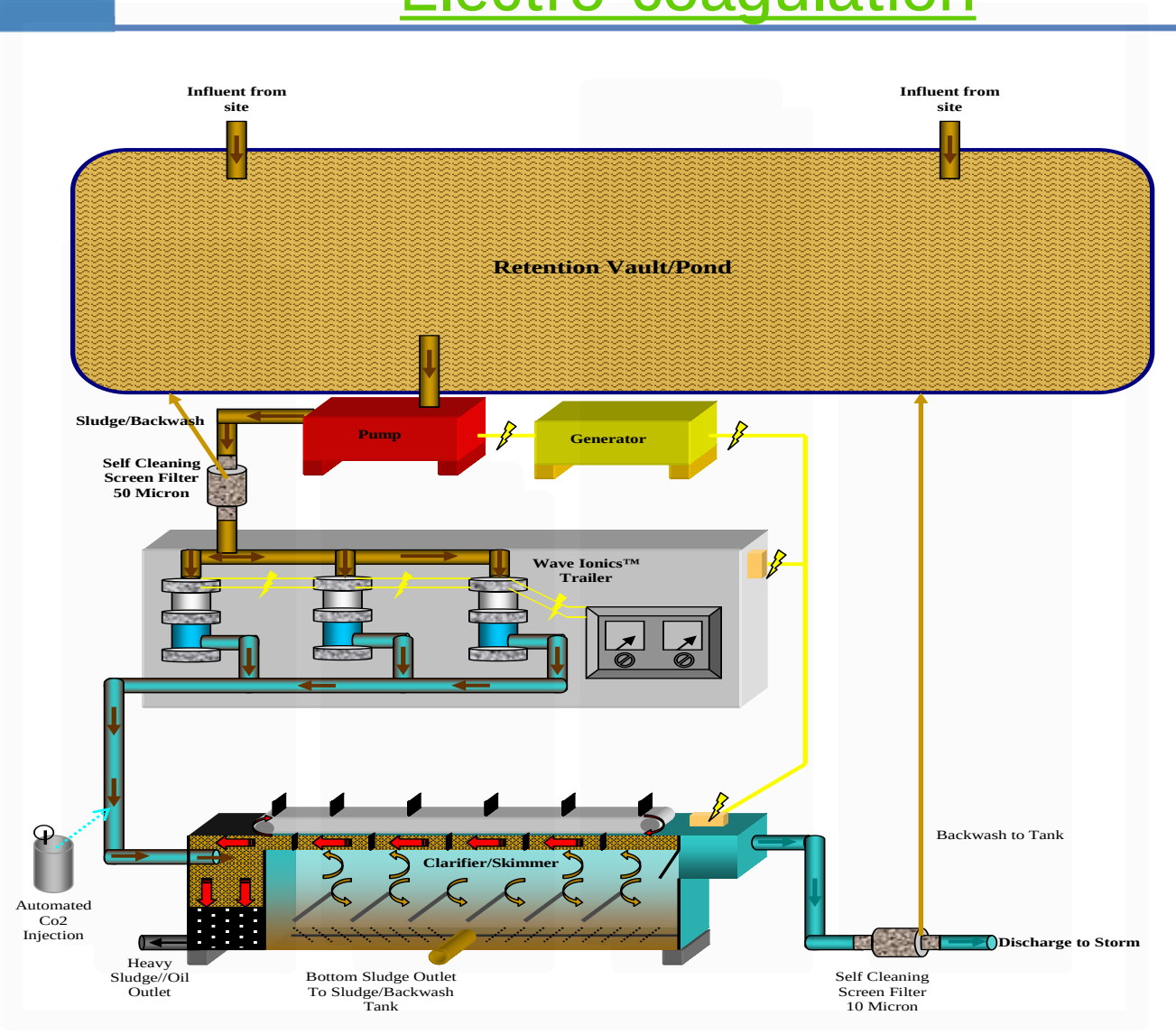

MAKE SURE WHEN COMPARISONS ARE MADE

EVERYTHING IS EQUAL

WT's Technologies

Electro-Coagulation

&

Carbon Dioxide Control of Alkalinity

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Reactions Comparison

Chemical Coagulation

Ferric chloride positive charge

Cationic polymers positive charge

- Colloids normally carry a negative charge
- Dosage rate is related to contaminant load

Electrical-Coagulation

Metal plates are charged & sacrifice a (+) metal ion

The metal ion is normally Ferric or Aluminum

- The metal ion cause the destabilization of suspended particles
- The destabilization results in several forms of coagulation (compression, adsorption, sweep & bridging)
- The consumption of electrical energy is inversely proportional to the conductivity

Advanced Treatment Technologies

Particle *destabilization* is essential

Particle *sweeping* is essential

Particle agglomeration is essential

EC Technology is based on Faraday's Laws of Electrolysis

Four Main Reaction Principles

- ***Electro-flotation*** *!!!!!!!!*
  - *Production of micro bubbles supporting sweep aggregation of particles*
- ***Electro-flocculation***
  - *Production of flocculating agents that promote bridging and coalescence to remove colloids*
- **Electro-coagulation**
  - Production of sacrificial ions to promote destabilization and charge neutralization and the promotion of oxidation
- **Electro-oxidation**
  - Via the production of hydroxyl radicals

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Wave-Ionics: Equipment Profile

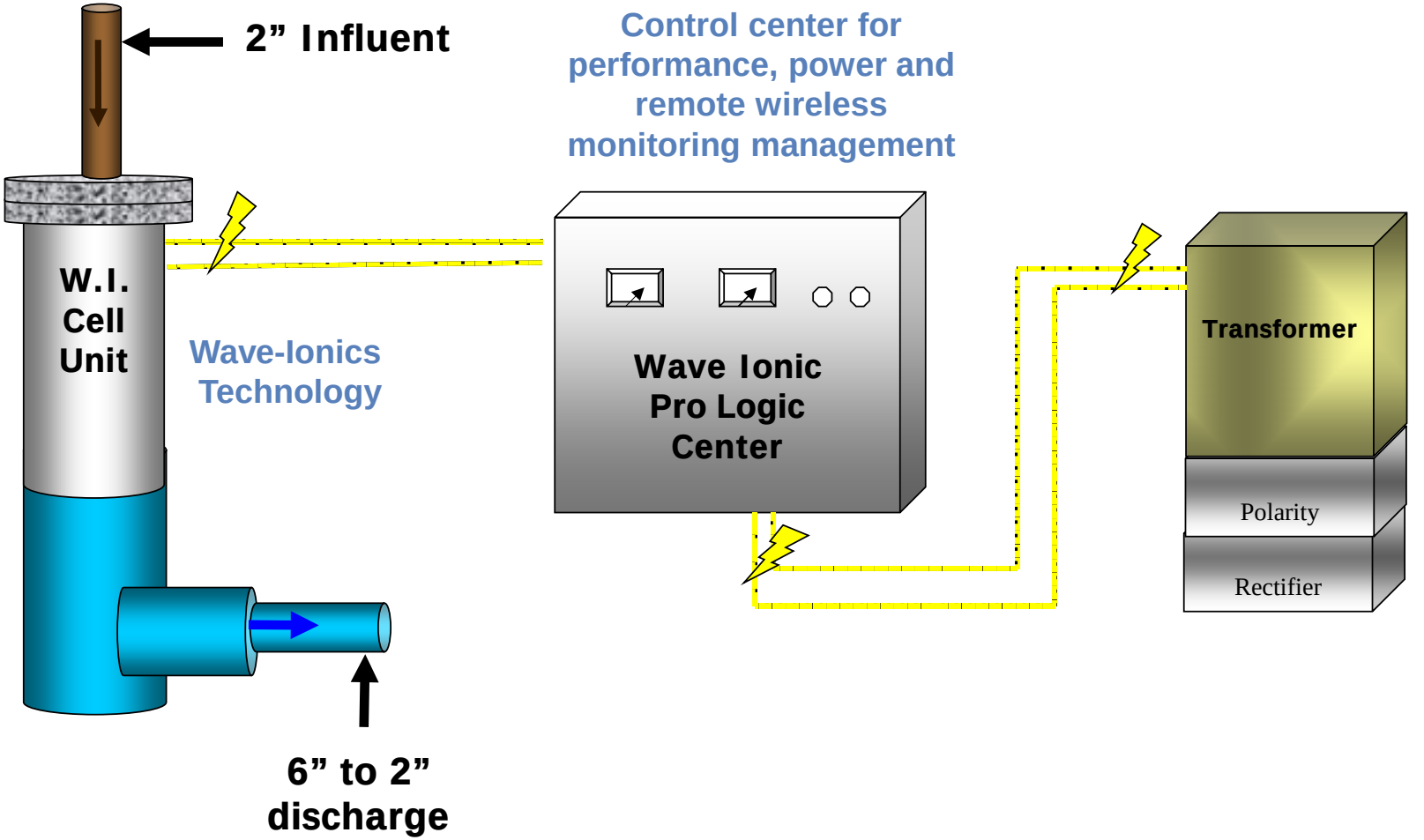

Wave-Ionics: *In Action*

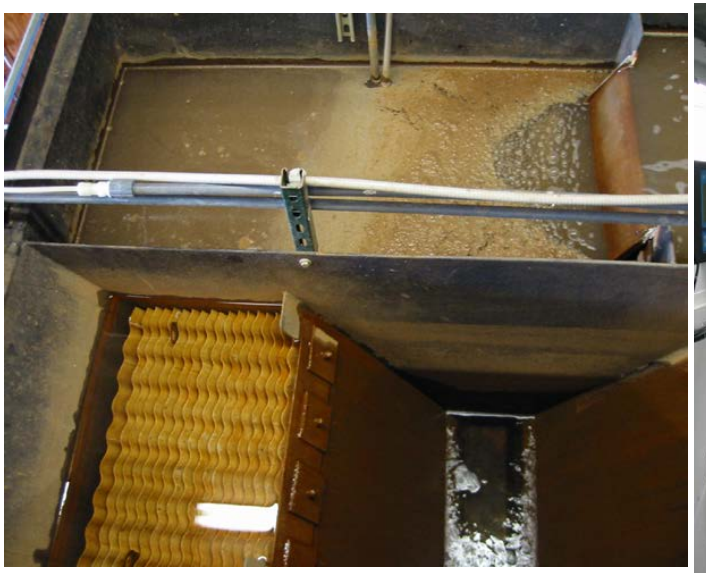

Equipment Special Features

Primary System

Wireless alarms - notify operator

loss of flow

loss of electrical power

pressure due to blockage

NTU performance

pH problem

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Performance Range

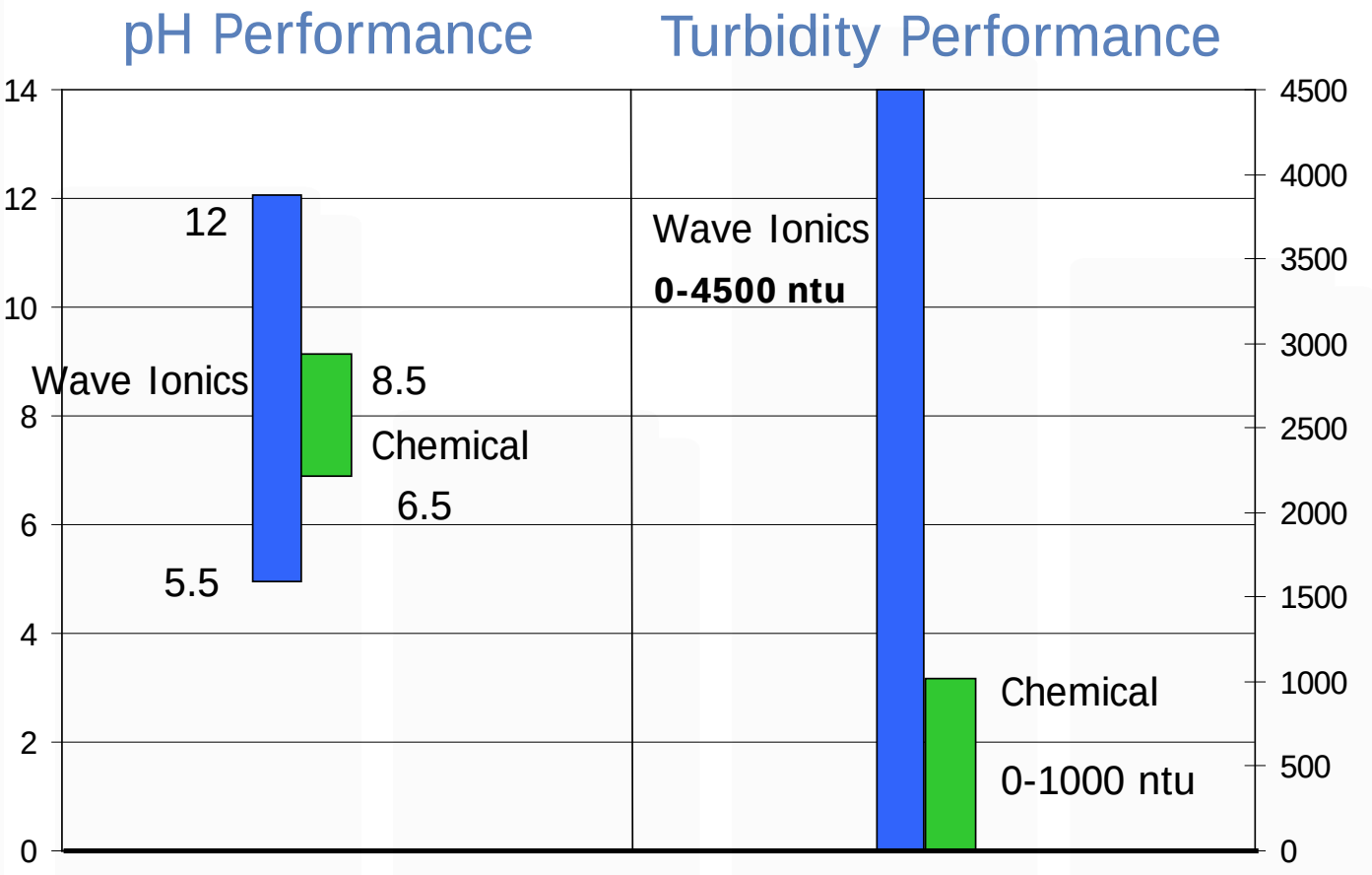

Performance Results - ZINC

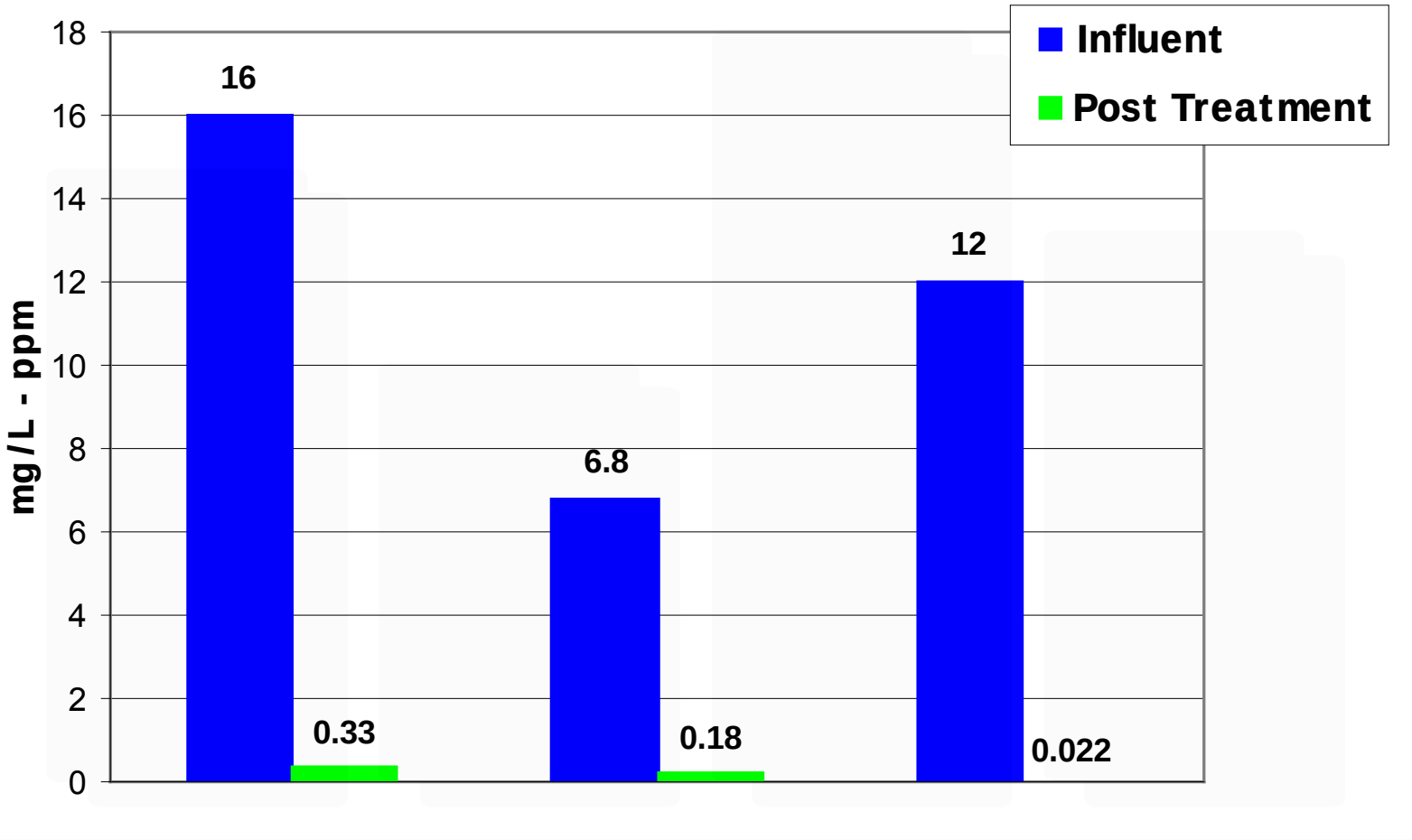

1 mg/l for sanitary ----- > 99 % + reduction

Performance Results - COPPER

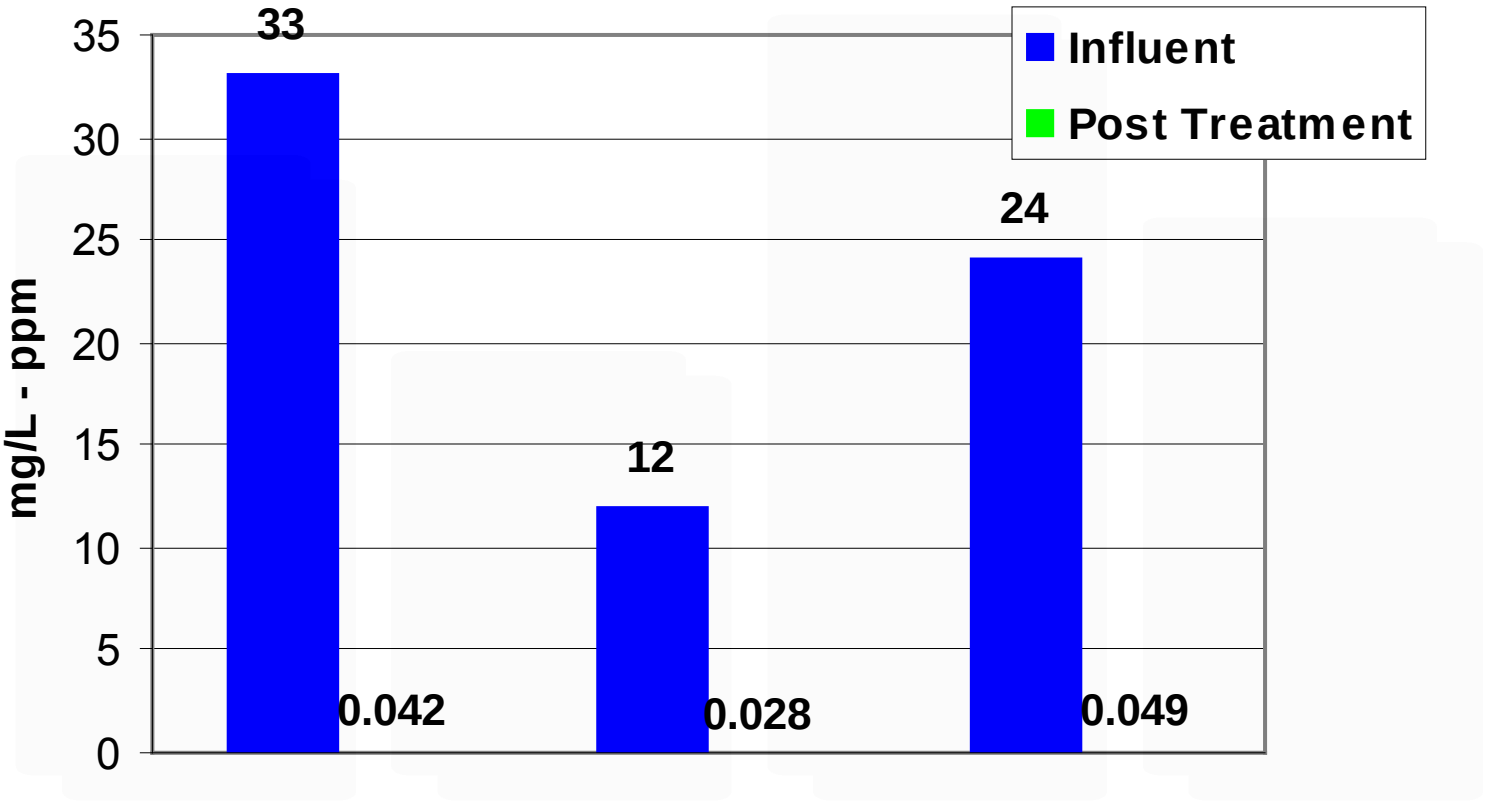

1 mg/l for sanitary ……. 99 % + reduction

Performance Results - LEAD

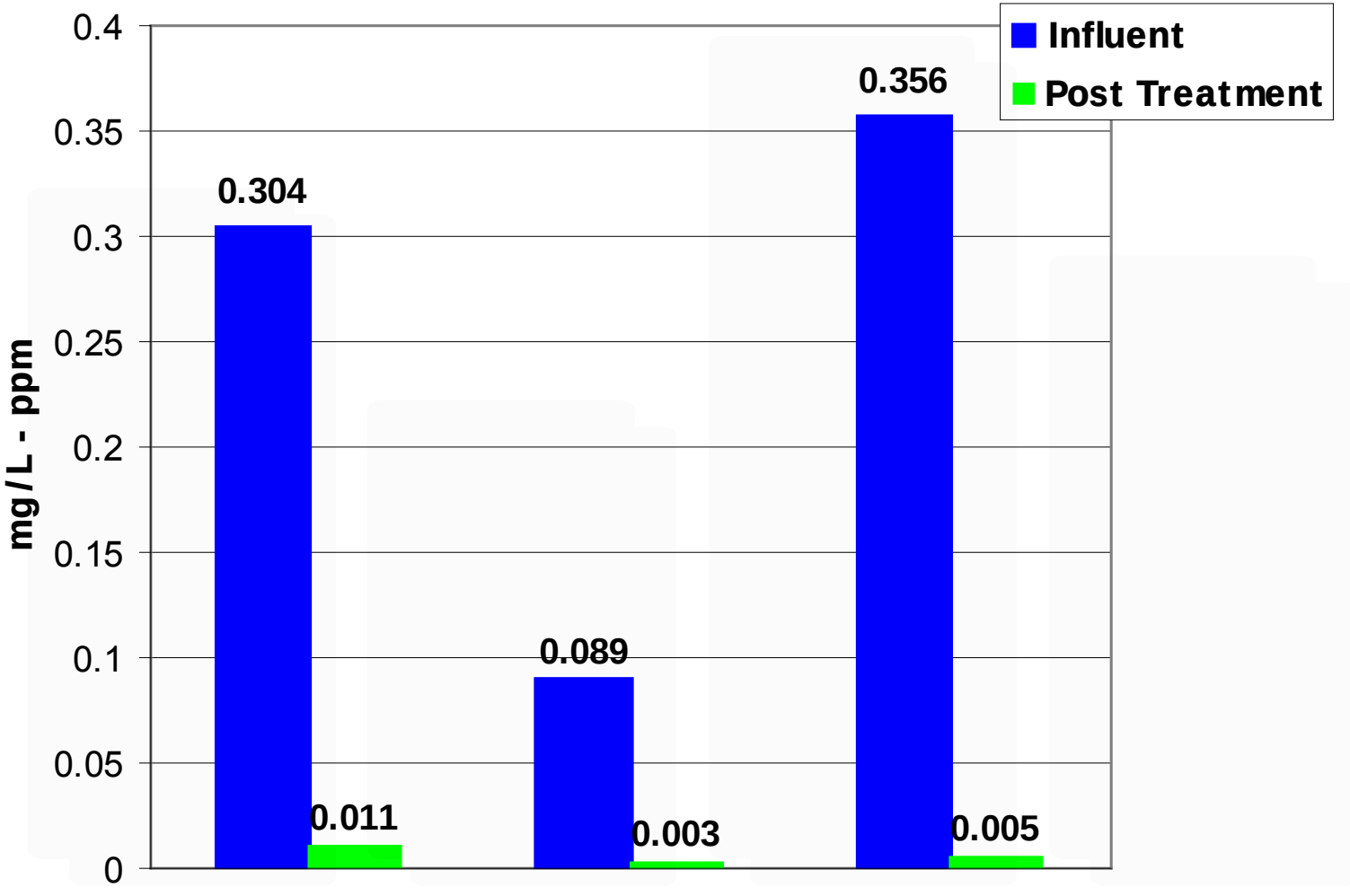

.4 mg/l for sanitary …… 96 % + Reduction

Wave-Ionics; *Performance Control*

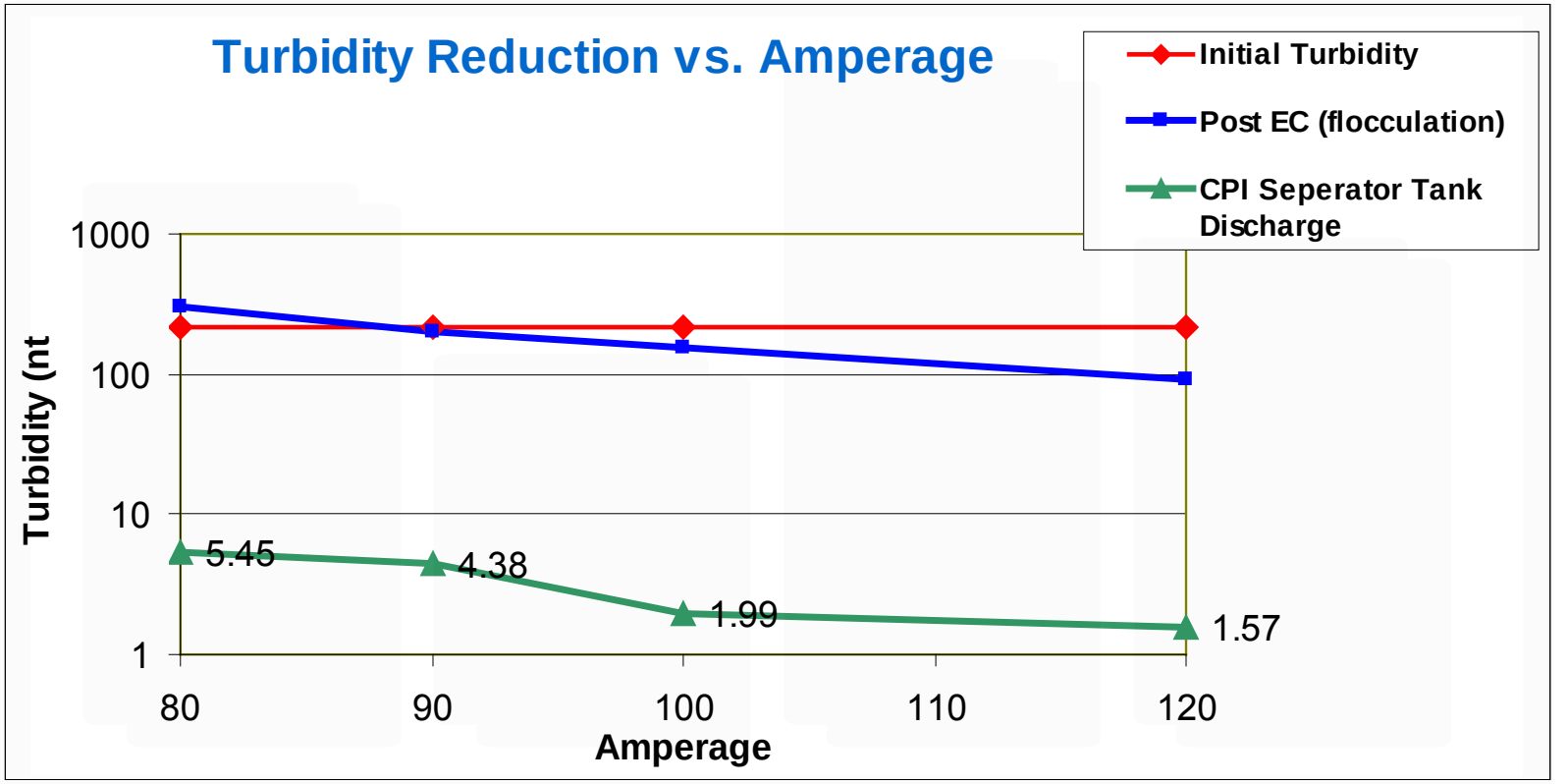

Specialize Amperage Design Allows for NTU Control

AT Stormwater Phase II

Applications for Electro-coagulation

Construction Site Stormwater

Groundwater Cleanup

Emulsified Oils-Produced Waters

Metals-Pesticides

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Liquid CO2

Carbonic Acid

Liquid Carbon Dioxide stored Pressure and released as a gas

$CO_2 + H_2O \rightarrow H_2CO_3$

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CO2 GAS

$CO_2 + H_2O \rightarrow H_2CO_3$

Carbonic Acid

Recycled Water

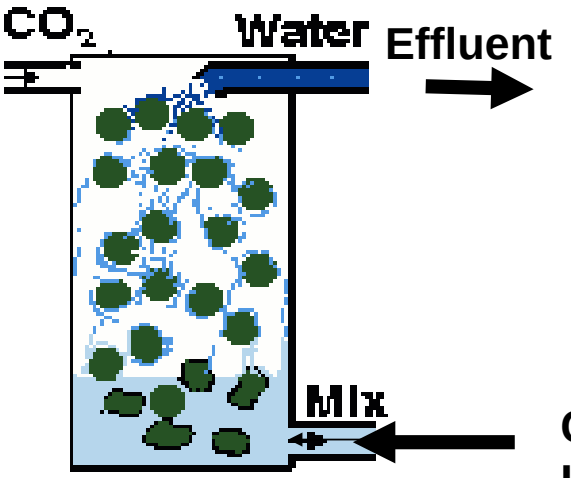

Carbon Dioxide
Liquid Injection

Weak Acid

Simple Inorganic

Safe

Used for 3 yrs in

Washington State

Network Topography

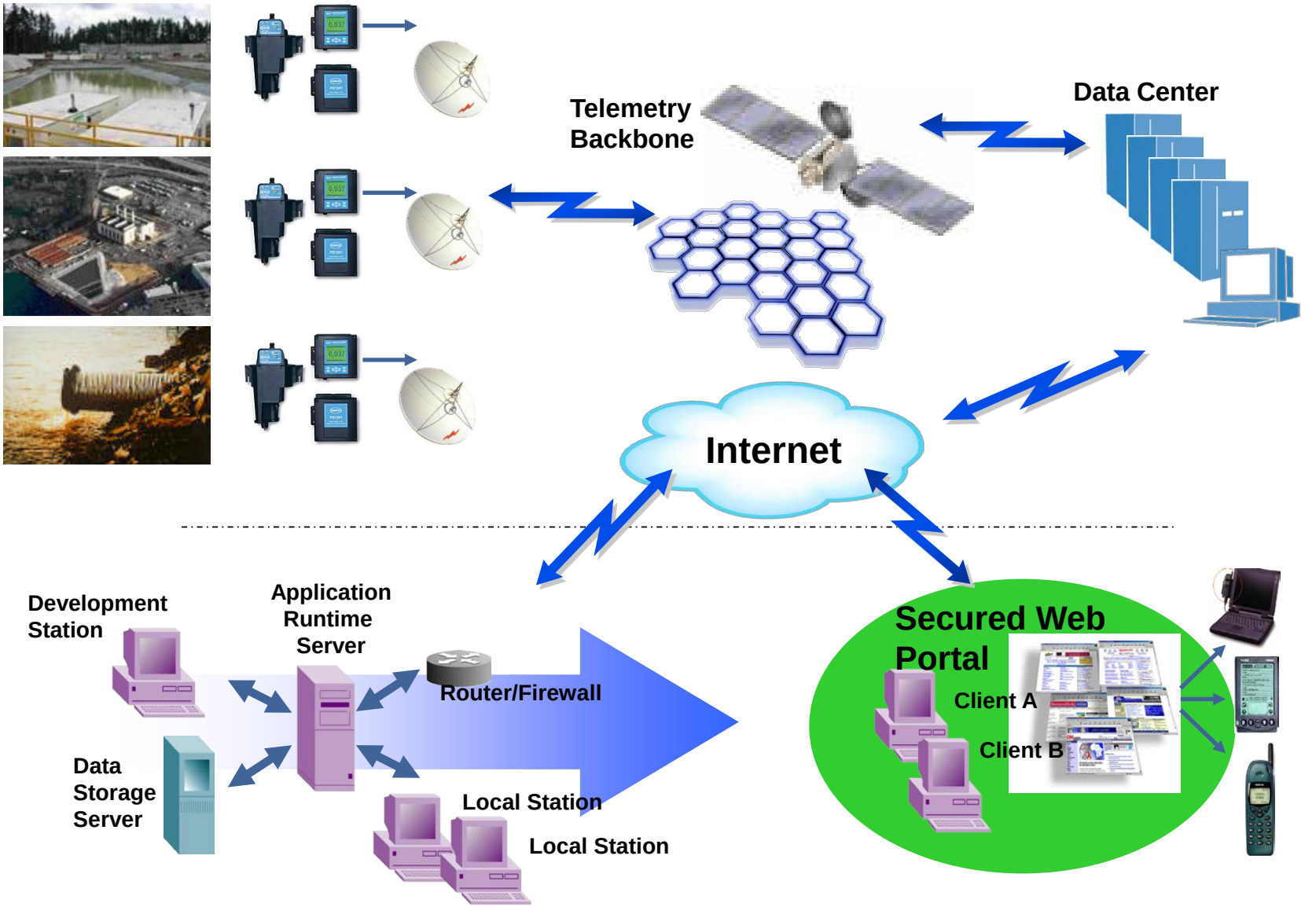

"Water Tectonics"

Technology Evolution

Turbidity → pH → Metals Reduction

in

Stormwater

Enforcement of
Regulations is changing

&

Technology is getting better

"The 1st Key"

Regulators

Need

To

Be

Involved

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"The 2nd Key"

Clear

Permit

Language

"The new rules"

- **Temporary Erosion Control Plans**

- **That detail the size, frequency and volume of rainfall events as a baseline to design and size**

stormwater treatment systems

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"The new rules"

Expectations-

numeric requirements!!!!!!!!!

new digital control systems allow protection for the contractor, the State and the environment

Subjective rules put all of us at risk!!

"The new rules"

Water Characteristics –

- Require the treatment system designers to address the site water characteristics;
  - high pH due to lime treatment,
  - low conductivity,
  - high colloidal clays
  - Backup emergency plans
  - Toxicity management

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"The new rules"

Setup reciprocal agreements

with other States

Treatment systems need safeguards to protect the environment & the user

calibration, toxicity controls

operation logs

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The new message

Where Sediment ends – BMP's

Turbidity begins - AT

Sediment is > 0.45 microns

Turbidity is < 0.45 microns

Ask yourself the questions

Mobilization & Treatment Costs ?

The market place will sort out cost of treatment

What Performance is required ?

The State needs to define the requirements

What are the risks?

Toxicity and Litigation

Safe ?

Summary

Stormwater Phase II

Compliance

Water Tectonics, Inc
22833 Bothell Everett Hwy
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PUBLICATION 8125

Managing Mosquitoes in Stormwater Treatment Devices

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The federal Clean Water Act, as amended in 1987, requires states to develop and implement nonpoint source pollution management programs (see Copeland 1999, 2003). These mandated programs require that certain measures be taken to abate pollutants carried by rainwater and urban (i.e., dry weather) runoff, herein collectively referred to as stormwater runoff. A principal component of stormwater programs is the implementation of Best Management Practices (BMPs), a term first adopted in the 1970s to represent actions and practices used to reduce the flow rates and the constituent concentrations in runoff (WEF and ASCE 1998).

The regulatory pressure to achieve increasingly higher levels of pollution abatement gave birth to a burgeoning industry that specializes in developing stormwater treatment devices based on the latest available technologies. These "treatment" BMPs are engineered to maximize the capture and removal of target pollutants from stormwater, often with the added benefit of reducing excessive downstream flows. Hundreds of designs have been developed across the United States, including many proprietary devices, and in some cases existing structures such as flood-control basins and constructed wetlands may be modified to function as treatment BMPs to satisfy local needs. Unfortunately, although "best" for managing runoff, these devices often provide aquatic habitats suitable for mosquitoes and other vector species as an unintended consequence of their implementation (see CH2M Hill 1999; Chanda and Shisler 1980; Dorothy and Staker 1990; Florida Coordinating Council on Mosquito Control 1998; Kluh et al. 2002; McLean 2000; Metzger et al. 2002, 2003; O'Carroll 1978; Santana et al. 1994; Schimmenti 1979; Schmidt 1980; Smith and Shisler 1981). In this publication, "treatment BMP" and "treatment device" are used interchangeably.

Public health and safety is a major component of all stormwater management programs. Flood control and the reduction of waterborne pathogens are high priorities, yet mosquito management is often overlooked. Mosquito management is essential to prevent disease transmission and maintain quality of life and must be integrated into every stormwater program. This publication provides basic guidelines for mosquito management that are relevant to the location, design, and operation of proprietary and nonproprietary stormwater treatment devices. Unfortunately, the rapid growth and evolution of stormwater programs and BMP designs combined with the tremendous number of local factors that may influence mosquito production at any given site preclude any "cure-all" recommendations or solutions. Careful implementation of these guidelines will help suppress mosquito breeding while reducing health risks and discomfort, lowering costs associated with mosquito abatement, and lessening legal liability.

MOSQUITOES AND MOSQUITO CONTROL

Mosquitoes are regarded as undesirable in both rural and urban areas throughout most of the United States. Not only is their biting activity a nuisance, mosquitoes also vector (transmit) pathogens that cause human and animal diseases. The recent threat of West Nile virus compounds concerns and reinforces the need for effective mosquito control.

There are approximately 3,000 species of mosquitoes worldwide (about 200 in the United States) and all require water to complete their life cycle (fig. 1). Mosquito control is most effective when directed at immature stages in standing water rather than at adults and is best conducted using a combination of techniques including biological, physical, chemical, and in states such as California, legal control (California Health & Safety Code [H&S Code], §§2060-2067, 100170, 100175). Biological control uses or enhances natural enemies of mosquitoes such as fish; physical control makes habitats less suitable for mosquito production; chemical control uses insecticides that target immatures or adults; and legal control can force uncooperative parties to eliminate breeding habitats on their property or face financial penalties.

Despite advances in mosquito management, the importance and need for careful preventative design and maintenance plans is paramount. This becomes apparent especially when faced with the limitations imposed by certain treatment BMPs as a result of their design, location, or accessibility. For example, underground treatment devices that hold permanent sources of water and produce mosquitoes are unlikely to support commonly used biological control agents, and physical controls such as exclusion

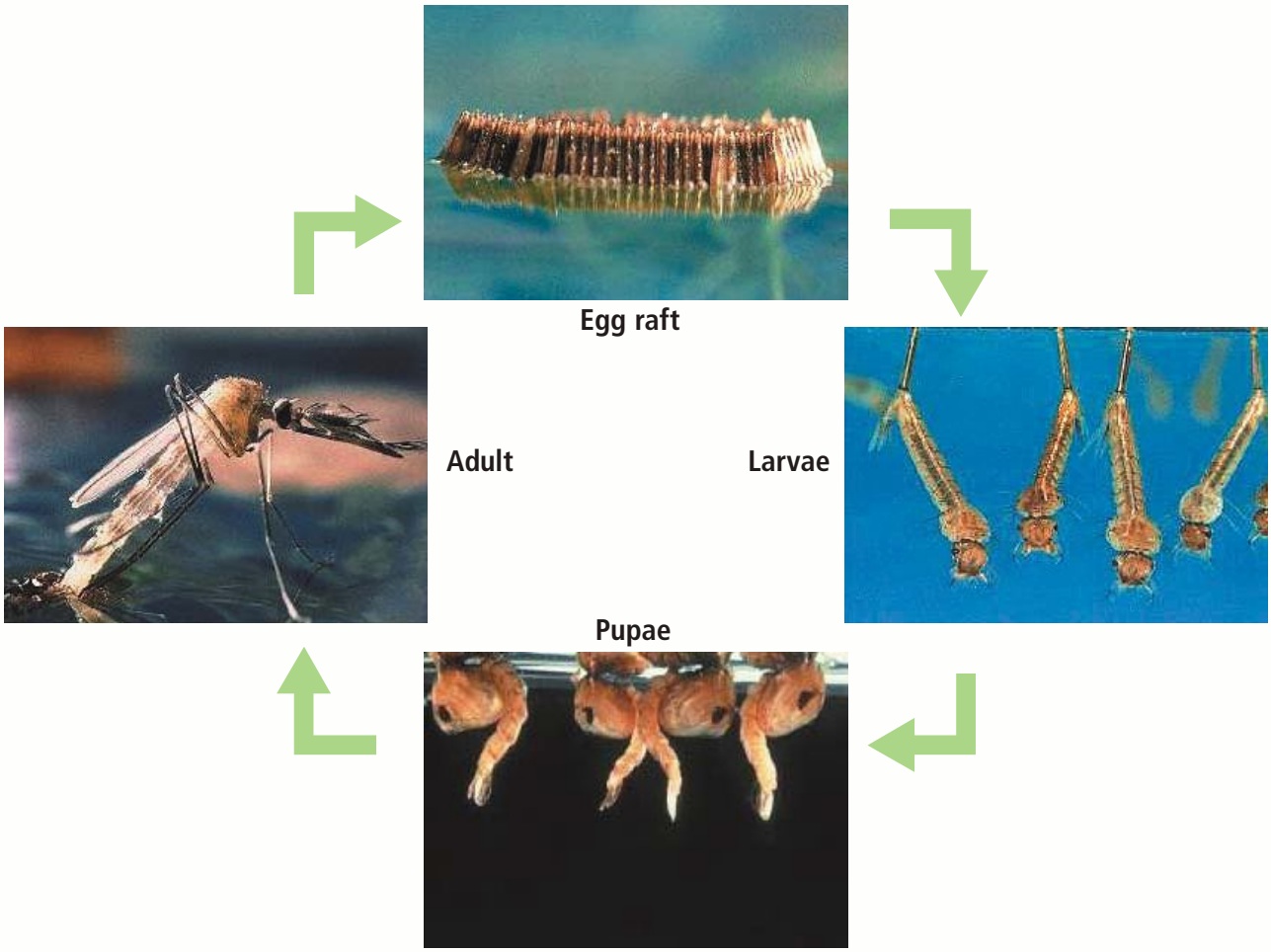

Figure 1. The mosquito life cycle consists of four stages: egg, larva, pupa, and adult. Female mosquitoes lay eggs on or near water. Eggs hatch into aquatic larvae that feed on organic material and grow through four stages before becoming pupae. Winged adults emerge from pupae, mate, and begin the cycle again. Only female mosquitoes feed on blood, which provides the nutrients needed for the development of eggs. Males are more short-lived and feed on plant juices. *Photos courtesy of Marin/Sonoma Mosquito and Vector Control District.*

(e.g., valves and covers) can be difficult to implement without affecting the devices' intended function. In these situations, chemical treatment, and legal abatement in some states, are the only remaining options. Note that in this publication, "chemical treatment" refers to the use of registered pesticides to control the aquatic stages of mosquitoes (larvicides), including bacteria, hormone mimics, and oils.

LARVICIDING VERSUS PREVENTATIVE ENGINEERING

As more and more stormwater programs recognize the importance of integrating mosquito control into their lists of public health priorities, the dilemma of how to effectively manage mosquitoes in designs that favor mosquito breeding becomes obvious. Larvicide treatments are increasingly considered as long-term solutions for mosquito control in lieu of costly retrofits, replacements, or redesigns. However, sole reliance on larvicides is *not* a long-term solution for preventing mosquito production. Every possible effort should be made to "design the bugs out" during preconstruction planning or via postconstruction retrofits to avoid creating a possible public health hazard. When all else fails, registered pesticides should be applied only by certified professionals due to the risk of establishing pesticide resistance in target organisms, as well as potential liability issues from misuse.

TYPE AND LOCATION OF TREATMENT BMPS

When selecting and installing stormwater treatment devices, agencies consider factors such as the projected runoff for a given area, the available or allocated space, cost, and local pollutants of concern. Structural designs can range from simple to elaborate and appear to be limited only by funding and the imagination of engineers. The most common processes used for pollution management in treatment BMPs that may be used singly or in combination include trash capture, settling and sedimentation, media filtration, and infiltration. Typical urban and suburban treatment devices include vegetated channels (swales), dry detention basins, wet retention ponds or constructed wetlands, media filtration devices, and belowground sumps, vaults, and basins. Of concern to public health officials is that an alarming number of these devices hold nutrient-rich stagnant water that provides breeding places for mosquitoes (fig. 2).

Figure 2. Waters rich in accumulations of organic materials created by some treatment BMPs provide ideal larval habitats for many species of mosquitoes, including those that can transmit human diseases. The standing water in this small roadside stormwater basin harbored hundreds of mosquito larvae and illustrates the reproductive potential of mosquitoes when provided with suitable habitat. *Photo: Marco Metzger.*

Location can greatly affect whether a treatment BMP becomes a significant source of mosquitoes. For example, identical structures in different locations may vary widely in potential mosquito production due to the number of mosquitoes present in the area, the species composition, and the duration of breeding activity. Elements that may influence the mosquito breeding potential in any given location may include a variety of environmental, construction, and local factors operating singly or in combination (table 1). Because of their propensity to breed mosquitoes, *all* treatment BMPs, regardless of their design, should be monitored periodically by vector control professionals with knowledge of the biology and ecology of local mosquito species. A more proactive approach would be to include vector

Table 1. Factors that may influence mosquito production potential in treatment BMPs.

Elevation
Installation above or below ground
Local climate
Local fauna (i.e., potential predators)
Nonstormwater runoff quantity, quality, and event frequency (e.g., residential and commercial)
Proximity to existing mosquito sources
Stormwater runoff quantity, quality, and event frequency
Surrounding host animals (wild and domestic) potentially available for female mosquitoes to feed upon
Surrounding land use, both present and future
Surrounding structural refuges for adult mosquitoes (e.g., trees, shrubs, storm sewers)
Surrounding vegetation, both native and exotic

Note: This list is incomplete. Other local factors may also be conducive to mosquito production.

control professionals in preconstruction planning. This type of collaborative effort could help prevent costly future retrofits or replacements necessary to meet mosquito management goals.

MOSQUITO SUPPRESSION THROUGH DESIGN AND MAINTENANCE

The majority of treatment BMPs operate as "passive" systems, meaning that they do not require active operational control or adjustment beyond routine maintenance. As a result, most installations remain unsupervised for extended periods, and if conditions are favorable, mosquito breeding could occur unobserved and uncontrolled. Conscientious planning that emphasizes mosquito habitat reduction or elimination in both design and maintenance plans can prevent these problems (Metzger et al. 2002; O'Carroll 1978; Schimmenti 1979). Minimizing the mosquito production potential of treatment BMPs requires that standing water not be available for sufficient time to permit emergence of adult mosquitoes. This can be achieved in one of three ways:

- Rapid discharge of all captured water.
- Denying mosquitoes access to standing water (e.g., tight-fitting covers).
- Making the habitat less suitable for breeding (e.g., vegetation management, mosquitofish).

Mosquito development from egg to adult varies by species and is influenced primarily by temperature and food availability. Certain species can complete the aquatic stages of development and emerge as adults in less than 1 week under ideal conditions. Because of this, a 72-hour maximum residence time for captured water in treatment BMPs is recommended in California and elsewhere as a conservative safeguard to prevent emergence of adult mosquitoes (Florida Coordinating Council on Mosquito Control 1998; Metzger et al. 2003; Santana et al. 1994). In reality, many treatment BMPs hold water for over 72 hours, sometimes due to their outdated designs, and more recently in order to meet stringent effluent water quality requirements. To ensure that public health and safety is maintained, the following suggestions should be considered for any structure that holds water for over 72 hours.

- Select or design an alternative (or modified) device that provides adequate constituent removal and complete drainage in 72 hours. *This is the most reliable and cost-effective choice.*
- Contact state or local public health or vector control agencies to determine whether local mosquito species and local factors (e.g., high elevation) may preclude rapid mosquito emergence, thus safely allowing water residence times to exceed 72 hours. In some areas this may require a detailed study that should be funded by the soliciting party.
- Provide adequate funds necessary to support routine mosquito monitoring and control.

Possibly the most overlooked aspect of treatment BMP implementation is the long-term commitment of funds necessary for proper maintenance of structures. Routine and timely maintenance is critical for suppressing mosquito breeding as well as for meeting local water quality goals. If maintenance is neglected or inappropriate for a given site, even structures designed to be the least "mosquito friendly" may

become significant breeding sites. Table 2 lists conditions that may increase the probability of breeding mosquitoes over time in various treatment BMPs. Maintenance guidelines for individual BMPs are often site-specific and are beyond the scope of this publication.

Table 2. Postconstruction conditions that may increase the probability of mosquito production in treatment BMPs.

Clogging (e.g., effluent pipes, media filters, infiltration basins)
Establishment of invasive or exotic vegetation
Groundwater fluctuations
Nonstormwater runoff (i.e., increases in runoff frequency, residence time, and/or volume)
Scouring and erosion
Structural damage (e.g., shifting or settling, roots)
Trash and sediment accumulation (e.g., formation of pools, clogging, redirected water flows)
Vandalism
Vegetation overgrowth

Note: This list may be incomplete. Other conditions favorable to mosquito production may become apparent as structures age.

BASIC GUIDELINES FOR MOSQUITO MANAGEMENT

Dry Systems

This category includes all stormwater treatment devices that are designed to drain completely following a storm event and remain dry. Examples include extended detention (dry detention) basins, vegetated swales, infiltration devices, and media filters.

- Design structures so they do not hold standing water for more than 72 hours. Special attention to groundwater depth is essential.
- Incorporate features that prevent or reduce the possibility of clogged discharge orifices (e.g., debris screens). The use of weep holes is not recommended due to rapid clogging.
- Use the hydraulic grade line of the site to select a treatment BMP that allows water to flow by gravity through the structure. Pumps are not recommended because they are subject to failure and often require sumps that hold water.
- Design distribution piping and containment basins with adequate slopes to drain fully and prevent standing water. The design slope should take into consideration buildup of sediment between maintenance periods. Compaction during grading may also be needed to avoid slumping and settling.
- Avoid the use of loose riprap or concrete depressions that may hold standing water (fig. 3).
- Avoid barriers, diversions, or flow spreaders that may retain standing water.

Figure 3. The use of loose rocks (riprap) to dissipate the energy of incoming runoff encourages mosquito production. Inevitably, standing water collects between the rocks, providing habitat for mosquitoes and making monitoring and control very difficult. A low-maintenance sloped concrete slab with imbedded rocks or concrete blocks is recommended as an alternative. *Photo: Marco Metzger.*

Systems with Sumps, Vaults, or Basins

This category includes all stormwater treatment devices, except ponds and wetlands, that incorporate features that hold permanent or semipermanent standing water. Sumps, vaults, and basins may be located both above and below ground, but they are particularly common features of belowground proprietary and nonproprietary treatment devices that tie into existing storm sewers. Examples include above- and belowground media filters, oil-water separators, vortex separators, and vault-type devices (fig. 4).

- Completely seal structures that retain water permanently or longer than 72 hours to prevent entry of adult mosquitoes. Adult female mosquitoes may

Figure 4. Stormwater treatment BMPs that hold permanent sources of standing water, especially belowground devices, pose a difficult challenge to mosquito exclusion efforts. A cooperative effort between stormwater professionals, municipal planners, public health officials, vector control agencies, and others is crucial to developing novel techniques that eliminate or deny mosquitoes access to standing water. Contact the state or local public health or vector control agency to discuss local vector issues and provide input and consultation on siting, design, and maintenance of proposed treatment BMPs. *Photo: Marco Metzger.*

Figure 5. Mosquitoes can access underground sources of water in treatment BMPs from many places, including inlet and outlet pipes, loose-fitting covers, and vent holes. As a general rule, any gap 1/16 inch (2 mm) or greater is large enough to allow egg-laying females to enter. The hole in this manhole cover is more than large enough to allow mosquito entry. *Photo: Marco Metzger.*

penetrate openings as small as 1/16 inch (2 mm) to gain access to water for egg laying (fig. 5). Screening can exclude mosquitoes, but it is subject to damage and is not a method of choice.

- If using covers, they should be tight fitting with maximum allowable gaps or holes of 1/16 inch (2 mm) to exclude entry of adult mosquitoes. The use of gaskets can provide a much more effective barrier when used properly.
- If the sump, vault, or basin is sealed against mosquitoes, with the exception of the inlet and outlet, submerge the inlet and outlet completely to reduce the available surface area of water for mosquito egg-laying (female mosquitoes can fly through pipes). Alternatively, creative use of flapper or pinch valves, collapsible tubes (Mulligan and Schaefer 1982), and "brush curtains" might be effective for mosquito exclusion in certain designs.
- Design structures with the appropriate pumping, piping, valves, or other necessary equipment to allow for easy dewatering of the unit if necessary.

Stormwater Ponds and Wetlands

Stormwater ponds and constructed, modified, or restored wetlands that receive runoff and provide stormwater treatment pose a difficult challenge for mosquito control because nearly all produce mosquitoes to some degree (fig. 6). Over time, emergent and shoreline vegetation create habitats conducive to mosquito breeding that may be difficult or even hazardous for mosquito control professionals to access. Hazards increase significantly if proper access (see below) is not provided. If these kinds of structures must be built, it is crucial that appropriate and adequate funds be allocated to support long-term site maintenance as well as routine monitoring and management of mosquitoes by a qualified agency. The long-term costs, jurisdictional and maintenance conflicts associated with establishment of protected species (United States Fish and Wildlife Service 1999), and legal liability (e.g., H&S Code) associated with

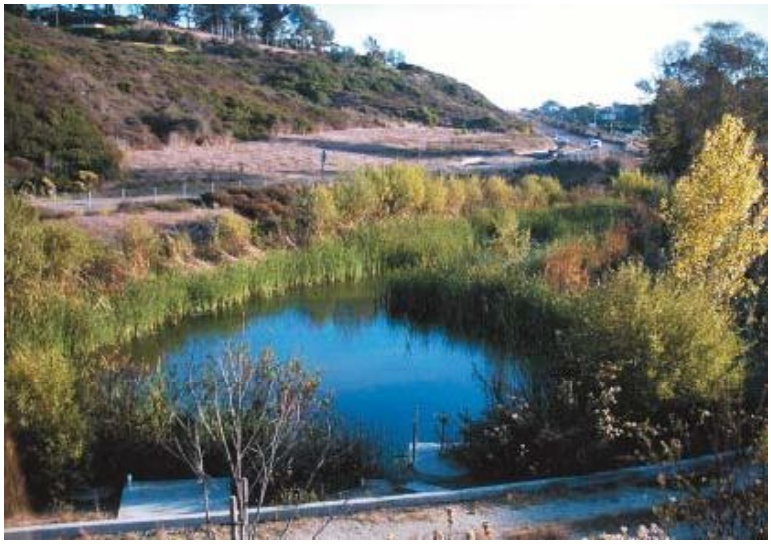

Figure 6. Stormwater treatment ponds and constructed wetlands form complex biological systems in which mosquitoes can be difficult to control. Effective mosquito management in these habitats requires careful planning before, during, and after construction. Mosquito suppression in this stormwater pond was achieved by following guidelines provided in this publication, i.e., weekly larval monitoring, annual removal of emergent vegetation, and maintenance of a healthy mosquitofish population. Additional guidelines for managing mosquitoes in surface-flow constructed wetlands are available and should be consulted (see Walton 2003). *Photo: Marco Metzger.*

these kinds of projects must be evaluated; if any doubt exists, consider alternate treatment devices. For example, feasibility studies of subsurface flow treatment wetlands are currently under investigation and may provide excellent mosquito-free alternatives (see Anonymous 2002).

Long-term management of mosquitoes in stormwater ponds and wetlands should integrate biological control, vegetation management and other physical practices, and chemical control as appropriate. Also, a provision for regular inspection of sites for detection of developing mosquito populations should be included. Some general guidelines are listed below. Local factors may influence the overall effectiveness of certain approaches for mosquito reduction. Additional information and guidelines are available for surface-flow constructed treatment wetlands and should be consulted (Walton 2003) to ensure that mosquito populations are minimized.

Mosquito Predators and Biological Control

- Stormwater ponds and wetlands should maintain water quality sufficient to support surface-feeding fish such as mosquitofish *(Gambusia affinis)*, which feed on immature mosquitoes and can aid significantly in mosquito control.
- If large predatory fish are present (e.g., perch and bass), mosquitofish populations may be negatively impacted or eradicated. In this case, careful vegetation management remains the only nonchemical mosquito control measure.
- Where mosquitofish are not allowed, careful vegetation management remains the only nonchemical mosquito control measure.
- Other opportunistic predators such as dragonflies, diving beetles, birds, and bats feed on mosquitoes when available, but their effects are generally not sufficient to preclude chemical treatment. Despite popular beliefs, control of adult mosquitoes by birds (e.g., purple martins) and bats cannot be relied on in lieu of habitat maintenance and chemical control (Kale 1968; Tuttle 2000).

Vegetation

- Emergent vegetation provides mosquito larvae with refuge from predators, protection from surface disturbances, and increased nutrient availability while interfering with monitoring and control efforts.
- Perform routine maintenance to reduce emergent plant densities to facilitate the ability of mosquito predators (i.e., fish) to move throughout vegetated areas.
- Whenever possible, maintain stormwater ponds and wetlands at depths in excess of 4 feet (1.2 m) to limit the spread of invasive emergent vegetation such as cattails (*Typha* spp.). Deep, open areas of exposed water are typically unsuitable for mosquito immatures due to surface disturbances and predation. Deep zones also provide refuge areas for fish and beneficial macroinvertebrates should the densely vegetated emergent zones be drained.

- Build shoreline perimeters as steep and uniform as practicable to discourage dense plant growth.
- Use concrete or liners in shallow areas to discourage unwanted plant growth where vegetation is not necessary.
- Eliminate floating vegetation conducive to mosquito production (i.e., water hyacinth [*Eichhornia* spp.], duckweed [*Lemna* and *Spirodela* spp.], and filamentous algal mats).

Miscellaneous

- Make shorelines accessible to maintenance and vector control crews for periodic maintenance, control, and removal of emergent vegetation, as well as for routine mosquito monitoring and abatement procedures, if necessary.
- Design and obtain necessary approvals for all stormwater ponds and wetlands to allow for complete draining when needed.

General Access Requirements

Providing adequate and safe access for maintenance activities and for mosquito monitoring and management in stormwater treatment devices cannot be over emphasized (fig. 7). An alarmingly high number of treatment BMPs already exist that were constructed with little or no regard to reasonable access and safety. Examples include basins with 1:1 perimeter slopes, devices with deep sumps or vaults, and covered devices with heavy lids or grates.

- All stormwater treatment devices should be easily and safely accessible without the need for special requirements (e.g., OSHA requirements for "confined space"). This allows vector control personnel to effectively monitor and, if necessary, abate vectors.
- If utilizing covers, the design should include spring-loaded or lightweight access hatches that can be opened easily for inspection.
- Mosquito larvicides are applied with hand-held equipment at small sites and with backpack or truck-mounted high-pressure sprayers at large sites. The effective swath width of most backpack or truck-mounted larvicide sprayers is approximately 20 feet (6 m) on a windless day. Because of these equipment limitations, all-weather road access (with provisions for turning a full-size work vehicle) should be provided along at least one side of large above-ground structures that are less than 25 feet (7.5 m) wide. Structures that have shoreline-to-shoreline distances in excess of 25 feet should have a perimeter road for access to all sides.

Figure 7. An example of a well-designed perimeter road and access ramp to the basin floor. Adequate access in and around BMP devices such as this large extended detention basin are critical for maintenance activities and vector control. *Photo: Marco Metzger.*

- Access roads should be built as close to the shoreline as possible. Vegetation or other obstacles should not be permitted between the access road and the stormwater treatment device that might obstruct the path of larvicides to the water.
- Vegetation should be controlled (by removal, thinning, or mowing) periodically to prevent barriers to access.

CONCLUSION

Stormwater treatment devices, especially those that hold permanent sources of standing water by design, create a difficult challenge for public health officials and vector control agencies and may pose a legal liability in states such as California (H&S Code). The best solution to managing mosquito populations in stormwater structures lies in fostering interdisciplinary cooperation among stormwater professionals, municipal planners, public health officials, vector control agencies, and others. Existing and future treatment BMPs must incorporate features and follow guidelines to minimize or eliminate mosquitoes. Contact state or local public health or vector control agencies to discuss local vector issues and provide input and consultation into siting, design, and maintenance of proposed treatment BMPs. Ultimately, a proactive rather than reactive approach saves money, time, effort, and most importantly, ensures the public's health.

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FOR MORE INFORMATION

You'll find more information on mosquito control in the following ANR Communication Services publications

Aquatic Pest Control, Publication 3337, 2001.

Managing Mosquitoes in Surface-Flow Constructed Treatment Wetlands, Publication 8117, 2003, available for free downloading at http://anrcatalog.ucdavis.edu/pdf/8117.pdf

Mosquitoes: Pest Notes for Home and Landscape, Publication 7451, 1998.

Mosquitoes of California, 3rd edition, Publication 4084, 1978.

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CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN DIEGO REGION
ORDER NO. R9-2004-001
NPDES NO. CAS0108766
WASTE DISCHARGE REQUIREMENTS FOR DISCHARGES OF URBAN RUNOFF FROM THE MUNICIPAL SEPARATE STORM SEWER SYSTEMS (MS4s) DRAINING THE COUNTY OF RIVERSIDE, THE CITY OF MURRIETA, THE CITY OF TEMECULA AND THE RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT WITHIN THE SAN DIEGO REGION

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MONITORING AND REPORTING PROGRAM No. R9-2004-001

FINDINGS

The California Regional Water Quality Control Board, San Diego Region (hereinafter SDRWQCB), finds that:

1. The Riverside County Flood Control and Water Conservation District (District), the County of Riverside and the Cities of Murrieta and Temecula (hereinafter called Permittees), own or operate municipal separate storm sewer systems (MS4s), through which urban runoff is discharged into waters of the United States (U.S.) within the Santa Margarita Watershed area of Riverside County in the San Diego Region (hereinafter referred to as the Upper Santa Margarita Watershed).

2. The SDRWQCB has previously issued two MS4 permits for the Upper Santa Margarita Watershed. The first-round MS4 permit was issued on July 16, 1990, and the second-round MS4 permit was issued on May 13, 1998 (Order No. R9-98-02). On May 26, 1998, the United States Environmental Protection Agency (EPA), Region IX, objected to Order No. 98-02 due to concerns regarding the Receiving Water Limitations (RWL) language. The EPA concluded that the RWL language in the permit did not comply with the federal Clean Water Act (CWA) and its implementing regulations. On April 27, 1999, the EPA reissued the MS4 permit, which the SDRWQCB adopted as Addendum No. 1 to Order No. R9-98-02 on November 8, 2000. On May 30, 2003 and in accordance with Order No. R9-98-02, the District, as the Principal Permittee, submitted a Report of Waste Discharge (ROWD) for renewal of their MS4 Permit.

3. The Water Quality Control Plan for the San Diego Basin (Basin Plan), identifies the following beneficial uses for water bodies in the Santa Margarita Watershed: Municipal and Domestic Supply (MUN), Agricultural Supply (AGR), Industrial Process Supply (PROC), Industrial Service Supply (IND), Ground Water Recharge (GWR), Contact Water Recreation (REC1) (potential use), Non-contact Water Recreation (REC2), Warm Freshwater Habitat WARM, Cold Freshwater Habitat (COLD), Wildlife Habitat (WILD), and Rare, Threatened, or Endangered Species (RARE).

4. Urban runoff contains waste, as defined in the California Water Code (CWC), and pollutants that adversely affect the quality of the waters of the State. The discharge of urban runoff from an MS4 is a "discharge of pollutants from a point source" into waters of the U.S. as defined in the CWA.

5. The most common categories of pollutants in urban runoff include total suspended solids, sediment (due to anthropogenic activities); pathogens (e.g., bacteria, viruses, protozoa); heavy metals (e.g., copper, lead, zinc and cadmium); petroleum products and polynuclear aromatic hydrocarbons; synthetic organics (e.g., pesticides, herbicides, and PCBs); nutrients (e.g., nitrogen and phosphorus fertilizers), oxygen-demanding substances (decaying vegetation, animal waste), and trash.

6. The discharge of pollutants and/or increased flows from MS4s may cause or threaten to cause the concentration of pollutants to exceed applicable receiving water quality objectives and impair or threaten to impair designated beneficial uses resulting in a condition of pollution (i.e., unreasonable impairment of water quality for designated beneficial uses), contamination, or nuisance.

7. Pollutants in urban runoff can threaten human health. Human illnesses have been clearly linked to recreating near storm drains flowing to coastal waters. Also, urban runoff pollutants in receiving waters can bioaccumulate in the tissues of invertebrates and fish, which may be eventually consumed by humans.

8. Development and urbanization especially threaten environmentally sensitive areas (ESAs), such as water bodies designated as supporting a RARE beneficial use (supporting rare, threatened or endangered species) and CWA 303(d) impaired water bodies. Such areas have a much lower capacity to withstand pollutant shocks than might be acceptable in the general circumstance. In essence, development that is ordinarily insignificant in its impact on the environment may become significant in a particular sensitive environment. Therefore, additional control to reduce pollutants from new and existing development may be necessary for areas adjacent to or discharging directly to an ESA.

9. Urban runoff often contains pollutants that cause toxicity to aquatic organisms (i.e., adverse responses of organisms to chemicals or physical agents ranging from mortality to physiological responses such as impaired reproduction or growth anomalies). Toxic pollutants impact the overall quality of aquatic systems and beneficial uses of receiving waters.

10. The Final 2002 CWA Section 303(d) List of Water Quality Limited Segments identifies the entire length of Murrieta Creek (12 miles) and the upper portion of the Santa Margarita River (18 miles) as impaired for phosphorus. Potential sources of the phosphorus impairment include urban runoff and unknown point and nonpoint sources. The Santa Margarita Lagoon is listed as impaired for eutrophication.

11. The Permittees' water quality monitoring data submitted to date documents persistent exceedances of Basin Plan water quality objectives for various urban runoff-related pollutants (chlorpyrifos, chromium, diazinon, dissolved oxygen, fecal coliform, MBAS, phosphorus, etc.) at eight different monitoring stations in the Upper Santa Margarita Watershed. The data indicate that urban runoff from activities such as over-application of pesticides and potential illicit discharges from industrial and commercial activities may be contributing to potential water quality impairments. Also, bioassessment monitoring, conducted by the California Department of Fish and Game, and physical assessments, conducted as part of the development of the Draft Operational Guidebook For Referenced Based Assessment of the Functions of Riverine Waters/Wetlands in the Santa Margarita Watershed, indicate that impacts to the biological and physical integrity of receiving waters have occurred as a result of urbanization in the upper watershed.

12. Peak storm water discharges rates, velocities and durations must be controlled to prevent downstream erosion and protect stream habitat. When natural vegetated pervious ground cover is converted to impervious surfaces such as paved highways, streets, rooftops, and parking lots, the natural absorption and infiltration abilities of the land are lost. Therefore, runoff leaving a developed urban area is significantly greater in volume, velocity, peak flow rate, and pollutant load than pre-development runoff from the same area. The increased volume, velocity, rate, and duration of runoff greatly accelerate the erosion of downstream natural channels.

13. As part of the ROWD, the Permittees proposed to update and modify their existing Drainage Area Management Plan (DAMP), dated March 1993, to incorporate new programs, requirements, and commitments. Direction to the Permittees in revising the DAMP, hereinafter referred to as a Storm Water Management Plan (SWMP), is necessary to ensure that the document provides a written description of the specific urban runoff management measures and programs that each Permittee will implement to fulfill its individual responsibilities and the area-wide and watershed-based activities necessary to meet the maximum extent practicable (MEP) standard. It is practicable for the Permittees to update the SWMP within one year. The SWMP is an integral and enforceable component of this Order.

14. The MEP standard is an ever-evolving, flexible, and advancing concept, which considers technical and economic feasibility. As knowledge about controlling urban runoff continues to evolve, so does that which constitutes MEP. Reducing the discharge of pollutants in urban runoff to the MEP requires Permittees to conduct and document evaluation and assessment of each program component and revise activities, control measures, best management practices (BMPs), and measurable goals, as necessary to meet MEP. Because MEP is a dynamic performance standard, it is necessary to describe in greater detail, measures that are essential for compliance.

15. Pollutants can be effectively reduced in urban runoff by the application of a combination of pollution prevention, source control, and treatment control BMPs. Pollution prevention is the reduction or elimination of pollutant generation at its source and is the best "first line of defense". Source control BMPs (both structural and non-structural) minimize the contact between pollutants and flows (e.g., rerouting run-on around pollutant sources or keeping pollutants on-site and out of receiving waters). Treatment control BMPs remove pollutants from urban runoff.

16. Developing minimum BMPs and implementing or requiring their implementation at industrial and commercial facilities, construction sites, and residential areas is necessary for the Permittees to ensure that, ultimately, discharges of pollutants into and from its MS4 are reduced to the MEP.

17. Controlling urban runoff pollution by using a combination of onsite source control BMPs augmented with treatment control BMPs before the runoff enters the MS4 is important for the following reasons: (1) Many end-of-pipe BMPs (such as diversion to the sanitary sewer) are typically ineffective during significant storm events. Whereas, onsite source control BMPs can be applied during all runoff conditions; (2) End-of-pipe BMPs are often incapable of capturing and treating the wide range of pollutants which can be generated on a sub-watershed scale; (3) End-of-pipe BMPs are more effective when used as polishing BMPs, rather than the sole BMP to be implemented; (4) End-of-pipe BMPs do not protect the quality or beneficial uses of receiving waters between the source and the BMP; and (5) Offsite end-of-pipe BMPs do not aid in the effort to educate the public regarding sources of pollution and their prevention.

18. Urban runoff treatment and/or mitigation must occur prior to the discharge of urban runoff into a receiving water. Federal regulations at 40 CFR 131.10(a) state that in no case shall a state adopt waste transport or waste assimilation as a designated use for any waters of the U.S. Authorizing the construction of an urban runoff treatment facility within a water of the U.S., or using the water body itself as a treatment system or for conveyance to a treatment system, would be tantamount to accepting waste assimilation as an appropriate use for that water body. Furthermore, the construction, operation, and maintenance of a pollution control facility in a water body can negatively impact the physical, chemical, and biological integrity, as well as the beneficial uses, of the water body. This is consistent with EPA guidance to avoid locating structural controls in natural wetlands.

19. Historic and current developments make use of natural drainage patterns and features as conveyances for urban runoff. Urban streams used in this manner are both MS4s and receiving waters.

20. As operators of the MS4s, the Permittees cannot passively receive and discharge pollutants from third parties. By providing free and open access to an MS4 that conveys discharges to waters of the U.S., the operator essentially accepts responsibility for discharges into the MS4 that it does not prohibit or control. These discharges may cause or contribute to a condition of contamination or exceedances of water quality objectives.

21. In accordance with federal NPDES regulations and to ensure the most effective oversight of industrial and construction site discharges, discharges of runoff from industrial and construction sites are subject to dual (state and local) storm water regulation. Under this dual system, the SDRWQCB is responsible for enforcing the General Construction Activities Storm Water Permit, SWRCB Order 97-03 DWQ, NPDES No. CAS000001 (General Construction Permit) and the General Industrial Activities Storm Water Permit, SWRCB Order 99-08 DWQ, NPDES No. CAS000002 (General Industrial Permit), and each municipal Permittee is responsible for enforcing its local permits, plans, and ordinances, which may require the implementation of additional BMPs than required under the statewide general permits.

22. This Order implements the federal CWA, the Porter-Cologne Water Quality Control Act (Division 7 of the CWC, commencing with section 13000), applicable state and federal regulations, all applicable provisions of statewide Water Quality Control Plans and Policies adopted by the State Water Resources Control Board (SWRCB), and the Basin Plan.

23. The RWL language specified in this Order is consistent with language recommended by the EPA and established in SWRCB Water Quality Order 99-05, adopted by the SWRCB on June 17, 1999. The RWL in this Order require compliance with water quality standards through an iterative approach requiring the implementation of improved and better-tailored BMPs over time.

24. The Standard Urban Storm Water Management Plan (SUSMP) requirements contained in this Order are consistent with Order WQ-2000-11 adopted by the SWRCB on October 5, 2000. In the precedential order, the SWRCB found that the design standards, which essentially require that urban runoff generated by 85 percent of storm events from specific development categories be infiltrated or treated, reflects the MEP standard. The order also found that the design standards are appropriately applied to the majority of the Priority Development Project categories contained in Section F of this Order. It gave Regional Water Quality Control Boards (RWQCBs) the discretion to include additional categories and locations, such as retail gasoline outlets (RGOs) and ESAs, in future SUSMPs.

25. RGOs are significant sources of pollutants in urban runoff. RGOs are points of convergence for motor vehicles for automotive related services such as repair, refueling, tire inflation, and radiator fill-up and consequently produce significantly higher loadings of hydrocarbons and trace metals (including copper and zinc) than other urban areas. To meet MEP, source control and treatment control BMPs are needed at RGOs that meet the following criteria: (a) 5,000 square feet or more, or (b) a projected Average Daily Traffic (ADT) of 100 or more vehicles per day. These are appropriate thresholds since vehicular development size and volume of traffic are good indicators of potential impacts of urban runoff from RGOs on receiving waters.

26. This Order is in conformance with SWRCB Resolution No. 68-16 and the federal Antidegradation Policy described in 40 CFR 131.12.

27. Section 6217(g) of the Coastal Zone Act Reauthorization Amendments of 1990 (CZARA) requires coastal states with approved coastal zone management programs to address non-point pollution impacting or threatening coastal water quality. CZARA addresses five sources of non-point pollution: agriculture, silviculture, urban, marinas, and hydromodification. This NPDES permit addresses the management measures required for the urban category, with the exception of septic systems. The adoption and implementation of this NPDES permit relieves the Permittee from developing a non-point source plan, for the urban category, under CZARA. The SDRWQCB addresses septic systems through the administration of other programs.

28. Each Permittee is individually responsible for adoption and enforcement of ordinances and/or policies, implementation of identified control measures/BMPs needed to prevent or reduce pollutants in storm water runoff, and for the allocation of funds for the capital, operation and maintenance, and enforcement expenditures necessary to implement and enforce such control measures/BMPs under its jurisdiction.

29. Although dependent on several factors, the risks typically associated with properly managed infiltration of runoff (especially from residential land use areas) are not significant. The risks associated with infiltration can be managed by many techniques, including (1) designing landscape drainage features that promote infiltration of runoff, but do not "inject" runoff (injection bypasses the natural processes of filtering and transformation that occur in the soil); (2) taking reasonable steps to prevent the illegal disposal of wastes; and (3) ensuring that each drainage feature is adequately maintained in perpetuity.

30. If not properly designed or maintained, certain BMPs implemented or required by municipalities for urban runoff management may create a habitat for vectors (e.g. mosquitoes and rodents). However, proper BMP design to avoid standing water can prevent the creation of vector habitat. Nuisances and public health impacts resulting from vector breeding can be prevented with close collaboration and cooperative effort between municipalities and local vector control agencies and the State Department of Health Services during the development and implementation of the SWMP.

31. The issuance of waste discharge requirements and an NPDES permit for the discharge of urban runoff from MS4s to waters of the U.S. is exempt from the requirement for preparation of environmental documents under the California Environmental Quality Act (CEQA) (Public Resources Code, Division 13, Chapter 3, section 21000 et seq.) in accordance with the CWC section 13389.

32. The SDRWQCB has notified the Permittees, all known interested parties, and the public of its intent to consider adoption of an Order prescribing waste discharge requirements that would serve to renew an NPDES permit for the existing discharge of urban runoff.

33. The SDRWQCB has, at public meetings on February 11, 2004 and July 14, 2004, held public hearings and heard and considered all comments pertaining to the terms and conditions of this Order.

PERMIT PROVISIONS

IT IS HEREBY ORDERED: That the Permittees, in order to meet the provisions contained in Division 7 of the CWC and regulations adopted thereunder, and the provisions of the CWA and regulations adopted thereunder, shall each comply with the following:

A. PROHIBITIONS

1. Discharges into and from MS4s in a manner causing, or threatening to cause, a condition of pollution, contamination, or nuisance (as defined in CWC section 13050), in waters of the State are prohibited.

2. Discharges from MS4s that cause or contribute to exceedances of water quality objectives for surface water or groundwater are prohibited.

3. Discharges from MS4s containing pollutants which have not been reduced to the MEP are prohibited.

4. In addition to the above prohibitions, discharges from MS4s are subject to all Basin Plan prohibitions cited in **Attachment A** to this Order.

B. NON-STORM WATER DISCHARGES

1. Each Permittee shall effectively prohibit all types of non-storm water discharges into its MS4 unless such discharges are either authorized by a separate NPDES permit; or authorized in accordance with Requirements B.2 and B.3 below.

2. The following categories of non-storm water discharges are not prohibited unless a Permittee or the SDRWQCB identifies the discharge category as a source of pollutants to waters of the U.S. For such a discharge category, the Permittee shall either prohibit the discharge category or develop and implement appropriate control measures under the SWMP to reduce pollutants to the MEP and submit the report to the SDRWQCB pursuant to section III.A.1.d of Monitoring and Reporting Program No. R9-2004-001 (hereafter referred to as the MRP).

   a) Diverted stream flows;
   b) Rising ground waters;
   c) Uncontaminated ground water infiltration [as defined at 40 CFR 35.2005(20)] to MS4s;
   d) Uncontaminated pumped ground water;
   e) Foundation drains;
   f) Springs;
   g) Water from crawl space pumps;
   h) Footing drains;
   i) Air conditioning condensation;
   j) Flows from riparian habitats and wetlands;
   k) Water line flushing;
   l) Landscape irrigation;
   m) Discharges from potable water sources not subject to NPDES Permit No. CAG679001, other than water main breaks;
   n) Irrigation water;
   o) Lawn watering;

p) Individual residential car washing;
q) Non-emergency fire fighting flows; and
r) Dechlorinated swimming pool discharges.

3. Discharges from emergency fire fighting activities are not prohibited. If discharges are determined to be a significant source of pollutants to waters of the U.S., the Permittees shall require the implementation of appropriate BMPs to reduce the discharge of pollutants to the MEP, when not interfering with the protection of health and property.

4. Each Permittee shall examine its Illicit Discharge Monitoring results collected in accordance with Requirement J.3 of this Order and section II.B of the MRP to identify water quality problems which may be the result of any non-prohibited discharge category(ies) listed above in Requirement B.2. Follow-up investigations shall be conducted as necessary to identify and control any non-prohibited discharge category(ies) listed above.

C. RECEIVING WATER LIMITATIONS

1. Discharges from MS4s that cause or contribute to the violation of water quality standards (designated beneficial uses and water quality objectives developed to protect beneficial uses of receiving waters) are prohibited.

2. Each Permittee shall comply with Requirement C.1, Prohibition A.2, and Prohibition A.4 as it applies to Prohibition No. 5 in **Attachment A** of this Order through timely implementation of control measures and other actions to reduce pollutants in urban runoff discharges in accordance with the SWMP and other requirements of this Order including any modifications. The SWMP shall be designed to achieve compliance with Requirement C.1, Prohibition A.2, and Prohibition A.4 as it applies to Prohibition 5 in **Attachment A** of this Order. If exceedance(s) of water quality standards persist notwithstanding implementation of the SWMP and other requirements of this Order, the Permittee shall assure compliance with Requirement C.1, Prohibition A.2, and Prohibition A.4 as it applies to Prohibition 5 in **Attachment A** of this Order by complying with the following procedure:

   a) Upon a determination by either a Permittee or the SDRWQCB that MS4 discharges are causing or contributing to an exceedance of an applicable water quality standard, the Permittee shall promptly notify and thereafter submit a report to the SDRWQCB that describes BMPs that are currently being implemented and additional BMPs that will be implemented to prevent or reduce any pollutants that are causing or contributing to the exceedance of water quality standards. The report may be incorporated in the SWMP Annual Report unless the SDRWQCB directs an earlier submittal. The report shall include an implementation schedule. The SDRWQCB may require modifications to the report;

   b) Submit any modifications to the report required by the SDRWQCB within 30 days of notification;

   c) Within 30 days following SDRWQCB approval of the report described above, the Permittee shall revise its SWMP and monitoring program to incorporate the approved modified BMPs that have been and will be implemented, the implementation schedule, and any additional monitoring required;

   d) Implement the revised SWMP and monitoring program in accordance with the approved schedule.

   So long as the Permittee has complied with the procedures set forth above and are implementing

the revised SWMP, the Permittee does not have to repeat the same procedure for continuing or recurring exceedances of the same receiving water limitations unless directed by the SDRWQCB to develop additional BMPs.

D. LEGAL AUTHORITY

1. Each Permittee shall establish, maintain, and enforce adequate legal authority to control pollutant discharges into and from its MS4 through ordinance, statute, permit, contract or similar means. This legal authority must, at a minimum, authorize the Permittee to:

   a) Control the contribution of pollutants in discharges of runoff associated with industrial and construction activity to its MS4 and control the quality of runoff from industrial and construction sites. This requirement applies both to industrial and construction sites that have coverage under the General Industrial Permit and General Construction Permit, as well as to those sites that do not. Grading ordinances shall be upgraded and enforced as necessary to comply with this Order.

   b) Prohibit all identified illicit discharges not otherwise allowed pursuant to Requirement B.2 including but not limited to:

      (1) Sewage;

      (2) Discharges of wash water resulting from the hosing or cleaning of gas stations, auto repair garages, or other types of automotive services facilities;

      (3) Discharges resulting from the cleaning, repair, or maintenance of any type of equipment, machinery, or facility including motor vehicles, cement-related equipment, and port-a-potty servicing, etc.;

      (4) Discharges of wash water from mobile operations such as mobile automobile washing, steam cleaning, power washing, and carpet cleaning, etc.;

      (5) Discharges of wash water from the cleaning or hosing of impervious surfaces in municipal, industrial, commercial, and residential areas including parking lots, streets, sidewalks, driveways, patios, plazas, work yards and outdoor eating or drinking areas, etc.;

      (6) Discharges of runoff from material storage areas containing chemicals, fuels, grease, oil, or other hazardous materials;

      (7) Discharges of pool or fountain water containing chlorine, biocides, or other chemicals; discharges of pool or fountain filter backwash water;

      (8) Discharges of sediment, pet waste, vegetation clippings, or other landscape or construction-related wastes; and

      (9) Discharges of food-related wastes (e.g., grease, fish processing, and restaurant kitchen mat and trash bin wash water, etc.).

   c) Prohibit and eliminate illicit connections to the MS4;

   d) Control the discharge of spills, dumping, or disposal of materials other than storm water to its MS4;

   e) Require compliance with conditions in Permittee ordinances, permits, contracts or orders (i.e., hold dischargers to its MS4 accountable for their contributions of pollutants and flows);

f) Require the use of BMPs to prevent or reduce the discharge of pollutants into MS4s to the MEP.

g) Carry out all inspections, surveillance, and monitoring necessary to determine compliance and noncompliance with local ordinances and permits and with this Order, including the prohibition on illicit discharges to the MS4. This means the Permittee must have authority to enter, sample, inspect, review and copy records, and require regular reports from industrial facilities discharging into its MS4, including construction sites;

h) Utilize enforcement mechanisms to require compliance with Permittee storm water ordinances, permits, contracts, or orders; and

i) Control the contribution of pollutants from one portion of the shared MS4 to another portion of the MS4 through interagency agreements among Permittees;

2. Each Permittee shall include as part of its Individual SWMP, which must be submitted within 365 days of adoption of this Order, a statement certified by its chief legal counsel that the Permittee has adequate legal authority to implement and enforce each of the requirements contained in 40 CFR 122.26(d)(2)(i)(A-F) and this Order.

E. STORM WATER MANAGEMENT PLAN (SWMP)

1. Within 365 days from the date of this Order, the Principal Permittee shall submit a SWMP to the SDRWQCB. The SWMP shall describe the various urban runoff management programs that will be implemented to comply with this Order and to reduce pollutants in urban runoff to the MEP for the duration of this Order. The SWMP is an integral and enforceable component of this Order and shall consist of the following:

   a) Individual SWMP - The written description of each Permittee's individual programs that address Sections B through J of this Order. **Attachment D** contains direction for the preparation of the Individual SWMP. Each Permittee shall submit their Individual SWMP to the Principal Permittee by a date determined by the Principal Permittee for inclusion in the SWMP.

   b) Watershed SWMP - The written account of all area-wide and watershed-based programs and activities conducted by the Permittees. The Watershed SWMP shall contain the programs and items required above in Requirements K.1 – K.4 of this Order.

2. Unless otherwise specified, within 365 days of the adoption of this Order, each Permittee shall have completed full implementation of the SWMP and all requirements in this Order. Prior to the implementation of new or revised programs, each Permittee shall, at a minimum, continue implementation of existing programs developed pursuant to Order No. R9-98-02 and described in the 2002-2003 Annual Progress Report.

3. Each Permittee shall incorporate a mechanism for public participation during the development and implementation of its SWMP.

F. DEVELOPMENT PLANNING

Permittees shall implement a program, including but not limited to, the requirements in this section, to reduce pollutants in urban runoff from developments to the MEP.

1. Assess General Plan

Each Permittee's General Plan or equivalent plan (e.g., Comprehensive, Master, or Community Plan) shall include water quality and watershed protection principles and policies to direct land-use decisions and require implementation of consistent water quality protection measures for development projects. As part of its Individual SWMP, each Permittee shall provide a workplan with a time schedule detailing any changes to its General Plan regarding water quality and watershed protection. Examples of water quality and watershed protection principles and policies to be considered include the following:

a) Minimize the amount of impervious surfaces and directly connected impervious surfaces in areas of development and, where feasible, slow runoff and maximize on-site infiltration of runoff.

b) Implement pollution prevention methods supplemented by source control and treatment control BMPs. Use small collection strategies located at, or as close as possible to, the source (i.e., the point where water initially meets the ground) to minimize the transport of urban runoff and pollutants offsite and into an MS4.

c) Preserve, and where possible, create or restore areas that provide important water quality benefits, such as riparian corridors, wetlands, and buffer zones. Encourage land acquisition of such areas.

d) Limit disturbances of natural water bodies and natural drainage systems caused by development including roads, highways, and bridges.

e) Prior to making land use decisions, utilize methods available to estimate increases in pollutant loads and flows resulting from projected future development. Require incorporation of appropriate BMPs to mitigate the projected increases in pollutant loads and flows.

f) Avoid development of areas that are particularly susceptible to erosion and sediment loss; or establish development guidance that identifies these areas and protects them from erosion and sediment loss.

g) Reduce pollutants associated with vehicles and increasing traffic resulting from development.

h) Post-development runoff from a site shall not contain pollutant loads that cause or contribute to an exceedance of receiving water quality objectives and which have not been reduced to the MEP.

2. <u>Modify Development Project Approval Processes</u>

a) Requirements for all Development Projects (New Development and Redevelopment)

During the planning process, prior to the issuance of permits, Permittees shall require all proposed development projects to implement BMPs to ensure that the discharge of pollutants from the development will be reduced to the MEP and will comply with this Order and all local ordinances, plans, and permits. Development project requirements shall ensure that water quality objectives are not violated throughout the life of the development. At a minimum, requirements shall:

(1) Require project proponent to implement applicable pollution prevention and source control BMPs for applicable development projects.

(2) Require project proponent to implement site design/landscape characteristics where feasible which maximize infiltration, provide retention, slow runoff, and minimize impervious land coverage for all development projects.

(3) Require project proponent to incorporate buffer zones for natural water bodies, where feasible. Where buffer zones are infeasible, require project proponent to implement other buffers such as trees, access restrictions, etc.

(4) When known, require industrial facility operators subject to the General Industrial Permit to provide evidence of permit coverage prior to occupancy.

(5) Require project proponent to ensure its grading or other construction activities meet the provisions specified in Section G of this Order.

(6) Require project proponent to provide proof of a mechanism which will ensure ongoing long-term maintenance of all structural post-construction BMPs.

b) Standard Urban Storm Water Mitigation Plans (SUSMPs) – Requirements for Priority Development Projects

Within 365 days of adoption of this Order, each Permittee shall develop, adopt, and implement a SUSMP to reduce pollutants to the MEP and to maintain or reduce downstream erosion and protect stream habitat from all Priority Development Projects. Priority Development Projects are: a) all new development projects, and b) those redevelopment projects that create, add or replace at least 5,000 square feet of impervious surfaces on an already developed site, that are listed under the project categories or locations in Requirement F.2.b.(1) below. Redevelopment includes, but is not limited to: the expansion of a building footprint or addition or replacement of a structure; structural development including an increase in gross floor area and/or exterior construction or remodeling; replacement of impervious surface that is not part of a routine maintenance activity; and land disturbing activities related with structural or impervious surfaces. Where redevelopment results in an increase of less than fifty percent of the impervious surfaces of a previously existing development, and the existing development was not subject to SUSMP requirements, the numeric sizing criteria discussed in Requirement F.2.b.(3) applies only to the addition, and not to the entire development. Each Permittee shall submit both the adopted SUSMP and amended ordinances to the SDRWQCB no later than 365 days after the adoption of this Order.

Immediately following adoption of its SUSMP, each Permittee shall review and ensure that all Priority Development Projects meet SUSMP requirements. The SUSMP requirements shall apply to all Priority Development Projects or phases of Priority Development Projects that have not yet begun grading or construction activities. If a Permittee determines that lawful prior approval of a project exists, whereby application of SUSMP requirements to the project is infeasible, SUSMP requirements need not apply to the project. Where feasible, the Permittees shall utilize the 12-month SUSMP development and implementation period to ensure that projects undergoing approval processes include application of SUSMP requirements in their plans.

(1) Priority Development Project Categories

(a) *Housing subdivisions of 10 or more dwelling units.* This category includes single-family homes, multi-family homes, condominiums, and apartments.

(b) *Commercial developments greater than 100,000 square feet.* This category is defined as any development on private land that is not for heavy industrial or residential uses where the land area for development is greater than 100,000 square feet. The category includes, but is not limited to: hospitals; laboratories and other medical facilities; educational institutions; recreational facilities; municipal facilities; commercial nurseries; multi-apartment buildings; car wash facilities; mini-

malls and other business complexes; shopping malls; hotels; office buildings; public warehouses; automotive dealerships; airfields; and other light industrial facilities.

(c) *Automotive repair shops.* This category is defined as a facility that is categorized in any one of the following Standard Industrial Classification (SIC) codes: 5013, 5014, 5541, 7532-7534, or 7536-7539.

(d) *Restaurants.* This category is defined as a facility that sells prepared foods and drinks for consumption, including stationary lunch counters and refreshment stands selling prepared foods and drinks for immediate consumption (SIC code 5812), where the land area for development is greater than 5,000 square feet. Restaurants where land development is less than 5,000 square feet shall meet all SUSMP requirements except for structural treatment BMP and numeric sizing criteria requirement F.2.b.(3) and peak flow rate requirement F.2.b.(2)(a).

(e) *All hillside development greater than 5,000 square feet.* This category is defined as any development which creates 5,000 square feet of impervious surface which is located in an area with known erosive soil conditions, where the development will grade on any natural slope that is twenty-five percent or greater.

(f) *Environmentally Sensitive Areas (ESAs).* All development located within or directly adjacent to or discharging directly to an ESA (where discharges from the development or redevelopment will enter receiving waters within the ESA), which either creates 2,500 square feet of impervious surface on a proposed project site or increases the area of imperviousness of a proposed project site to 10% or more of its naturally occurring condition. "Directly adjacent" means situated within 200 feet of the ESA. "Discharging directly to" means outflow from a drainage conveyance system that is composed entirely of flows from the subject development or redevelopment site, and not commingled with flows from adjacent lands.

(g) *Parking lots 5,000 square feet or more.* Parking lot is defined as a land area or facility for the temporary parking or storage of motor vehicles used personally, for business, or for commerce.

(h) *Street, roads, highways, and freeways.* This category includes any paved surface that is 5,000 square feet or greater used for the transportation of automobiles, trucks, motorcycles, and other vehicles.

(i) *Retail Gasoline Outlets.* This category includes RGOs that meet the following criteria: (a) 5,000 square feet or more or (b) a projected Average Daily Traffic (ADT) of 100 or more vehicles per day

(2) BMP Requirements – The SUSMP shall include a list of recommended source control and treatment control BMPs. The SUSMP shall require all Priority Development Projects to implement a combination of on-site source control and on-site/shared treatment control BMPs (to treat the runoff specifically generated from each project) selected from the recommended BMP list. The BMPs shall, at a minimum:

(a) Control the post-development urban runoff discharge velocities, volumes, durations, and peak rates to maintain or reduce pre-development downstream erosion, and to protect stream habitat;

(b) Conserve natural areas where feasible;

(c) Minimize storm water pollutants of concern in urban runoff from the Priority Development Projects (through implementation of source control BMPs). Identification of pollutants of concern shall include, at a minimum, all pollutants for which water bodies receiving the development's runoff are listed as impaired under CWA section 303(d), all pollutants associated with the land use type of the development, and all pollutants commonly associated with urban runoff;

(d) Be effective at removing or treating the pollutants of concern associated with the project;

(e) Minimize directly connected impervious areas where feasible;

(f) Protect slopes and channels from eroding;

(g) Include storm drain stenciling and signage;

(h) Include properly designed outdoor material storage areas;

(i) Include properly designed trash storage areas;

(j) Include proof of a mechanism, to be provided by the project proponent or Permittee, which will ensure ongoing long-term BMP maintenance;

(k) Include additional water quality provisions applicable to individual Priority Development Project categories;

(l) Be correctly designed so as to remove pollutants to the MEP;

(m) Be implemented close to pollutant sources, when feasible, and prior to discharging into receiving waters; and

(n) Ensure that post-development runoff does not contain pollutant loads which cause or contribute to an exceedance of water quality objectives and which have not been reduced to the MEP.

Under no circumstances can a BMP be constructed in a receiving water.

(3) Numeric Sizing Criteria – The SUSMP shall require treatment control BMPs to be implemented for all Priority Development Projects. All treatment control BMPs shall be located so as to infiltrate, filter, or treat the required runoff volume or flow prior to its discharge to any receiving water. Treatment control BMPs may be shared by multiple Priority Development Projects as long as construction of any shared treatment control BMPs is completed prior to the use of any development project from which the treatment control BMP will receive runoff, and prior to discharge to a receiving water.

In addition to meeting the BMP requirements listed in Requirement F.2.b.(2) above, all treatment control BMPs for a single Priority Development Project shall collectively be sized to comply with the following numeric sizing criteria:

(a) *Volume* - Volume-based BMPs shall be designed to mitigate (infiltrate, filter, or treat) either:

(i) The volume of runoff produced from a 24-hour 85th percentile rainfall depth, as determined from the local historical rainfall record (0.6 inch approximate average for the Riverside County area)[1]; or

(ii) The volume of runoff produced by the 85th percentile 24-hour runoff event, determined as the maximized capture storm water volume for the area, from the formula recommended in Urban Runoff Quality Management, WEF Manual of Practice No. 23/ASCE Manual of Practice No. 87, (1998); or

(iii) The volume of annual runoff based on unit basin storage volume, to achieve 90% or more volume treatment by the method recommended in *California Stormwater Best Management Practices Handbook New Development and Redevelopment* (2003)); or

(iv) The volume of runoff, as determined from the local historical rainfall record, that achieves approximately the same reduction in pollutant loads and flows as achieved by mitigation of the 85th percentile 24-hour runoff event;[2]

OR

(b) *Flow* - Flow-based BMPs shall be designed to mitigate (infiltrate, filter, or treat) either:

(i) The maximum flow rate of runoff produced from a rainfall intensity of 0.2 inch of rainfall per hour, for each hour of a storm event; or

(ii) The maximum flow rate of runoff produced by the 85th percentile hourly rainfall intensity (for each hour of a storm event), as determined from the local historical rainfall record, multiplied by a factor of two; or

(iii) The maximum flow rate of runoff for each hour of a storm event, as determined from the local historical rainfall record, that achieves approximately the same reduction in pollutant loads and flows as achieved by mitigation of the 85th percentile hourly rainfall intensity multiplied by a factor of two.

(4) Equivalent Numeric Sizing Criteria - The Permittees may develop, as part of the SUSMP, any equivalent method for calculating the volume or flow which must be mitigated (i.e., any equivalent method for calculating numeric sizing criteria) by post-construction treatment control BMPs. Such equivalent sizing criteria may be authorized by the SDRWQCB for use in place of the above criteria. In the absence of development and subsequent authorization of such equivalent numeric sizing criteria, the above numeric sizing criteria requirement shall be implemented.

[1] This volume is not a single volume to be applied to all of Riverside County. The size of the 85th percentile storm event is different for various parts of the County. The Permittees are encouraged to calculate the 85th percentile storm event for each of their jurisdictions using local rain data pertinent to their particular jurisdiction (inch standard is a rough average for the County and should only be used where appropriate rain data is not available). In addition, isopluvial maps may be used to extrapolate rainfall data to areas where insufficient data exists in order to determine the volume of the local 85th percentile storm event in such areas. Where the Permittees will use isopluvial maps to determine the 85th percentile storm event in areas lacking rain data, the Permittees shall describe their method for using isopluvial maps in their SUSMPs.

[2] Under this volume criteria, hourly rainfall data may be used to calculate the 85th percentile storm event, where each storm event is identified by its separation from other storm events by at least six hours of no rain. Where the Permittees may use hourly rainfall data to calculate the 85th percentile storm event, the Permittees shall describe their method for using hourly rainfall data to calculate the 85th percentile storm event in their SUSMPs.

(5) Pollutants or Conditions of Concern – As part of the SUSMP, the Permittees shall develop a procedure for pollutants or conditions of concern to be identified for each Priority Development Project. The procedure shall address, at a minimum: (1) Receiving water quality (including pollutants for which receiving waters are listed as impaired under CWA section 303(d)); (2) Land use type of the development project and pollutants associated with that land use type; (3) Pollutants expected to be present on site; (4) Changes in storm water discharge flow rates, velocities, durations, and volumes resulting from the development project; and (5) Sensitivity of receiving waters to changes in storm water discharge flow rates, velocities, durations, and volumes.

(6) Implementation Process – As part of the SUSMP, the Permittees shall develop a process by which SUSMP requirements will be implemented. The process shall identify at what point in the planning process development projects will be required to meet SUSMP requirements. The process shall also include identification of the roles and responsibilities of various municipal departments in implementing the SUSMP requirements, as well as any other measures necessary for the implementation of SUSMP requirements.

(7) Waiver Provision – A Permittee may provide for a project to be waived from the requirement of implementing all treatment control BMPs (Requirements F.2.b.(2) & F.2.b.(3)) if infeasibility can be established. A waiver of infeasibility shall only be granted by a Permittee when all available treatment control BMPs have been considered and rejected as infeasible. Permittees shall notify the SDRWQCB within 5 days of each waiver issued and shall include the following information in the notification:

(a) Name of the person granting each waiver;

(b) Name of developer receiving the waiver;

(c) Site location;

(d) Reason for waiver; and

(e) Description of BMPs required.

As part of the SUSMP, the Permittees may develop a program to require project proponents who have received waivers to transfer the savings in cost, as determined by the Permittee(s), to a storm water mitigation fund. This program may be implemented by all Permittees that choose to provide waivers. Funds may be used on projects to improve urban runoff quality within the watershed of the waived project. The waiver mitigation program should, at a minimum, identify:

(a) The entity or entities that will manage the storm water mitigation fund (i.e., assume full responsibility for);

(b) The range and types of acceptable projects for which mitigation funds may be expended;

(c) The entity or entities that will assume full responsibility for each mitigation project including its successful completion; and

(d) How the dollar amount of fund contributions will be determined.

(8) Infiltration and Groundwater Protection – To protect groundwater quality, each Permittee shall apply restrictions to the use of treatment control BMPs that are designed to primarily function as infiltration devices (such as infiltration trenches and infiltration

basins). Such restrictions shall ensure that the use of such infiltration treatment control BMPs shall not cause or contribute to an exceedance of groundwater quality objectives. At a minimum, use of treatment control BMPs that are designed to primarily function as infiltration devices shall meet the following conditions.[3] As part of the SUSMP, the Permittees may develop alternative restrictions on the use of treatment control BMPs which are designed to primarily function as infiltration devices.

(a) Urban runoff shall undergo pretreatment such as sedimentation or filtration prior to infiltration;

(b) All dry weather flows shall be diverted from infiltration devices;

(c) Pollution prevention and source control BMPs shall be implemented at a level appropriate to protect groundwater quality at sites where infiltration treatment control BMPs are to be used;

(d) Infiltration treatment control BMPs shall be adequately maintained so that they remove pollutants to the MEP;

(e) The vertical distance from the base of any infiltration treatment control BMP to the seasonal high groundwater mark shall be at least 10 feet. Where groundwater basins do not support beneficial uses, this vertical distance criteria may be reduced, provided groundwater quality is maintained;

(f) The soil through which infiltration is to occur shall have physical and chemical characteristics (such as appropriate cation exchange capacity, organic content, clay content, and infiltration rate) which are adequate for proper infiltration durations and treatment of urban runoff for the protection of groundwater beneficial uses;

(g) Infiltration treatment control BMPs shall not be used for areas of industrial or light industrial activity; areas subject to high vehicular traffic (25,000 or greater average daily traffic on main roadway or 15,000 or more average daily traffic on any intersecting roadway); automotive repair shops; car washes; fleet storage areas (bus, truck, etc.); nurseries; and other high threat to water quality land uses and activities as designated by each Permittee; and

(h) Infiltration treatment control BMPs shall be located a minimum of 100 feet horizontally from any water supply wells. As part of the SUSMPs, the Permittees may develop alternative restrictions on the use of treatment control BMPs that are designed to primarily function as infiltration devices.

(9) Downstream Erosion – The Permittees shall develop numeric criteria to ensure that discharges from Priority Development Projects maintain or reduce pre-development downstream erosion and protect stream habitat. At a minimum, numeric criteria shall be developed to control urban runoff discharge velocities, volumes, durations, and peak rates in order to maintain or reduce pre-development downstream erosion and protect stream habitat. The Permittees shall propose numeric criteria and a time-schedule for implementation of the criteria on new development projects within 365 days of the identification of the criteria and no later than the fourth-year Annual Report, or the application for permit renewal, to be submitted no later than October 31, 2008.

[3] These conditions do not apply to treatment control BMPs that allow incidental infiltration and are not designed to primarily function as infiltration devices (such as grassy swales, detention basins, vegetated buffer strips, constructed wetlands, etc.).

The Permittees shall be prepared to implement the numeric criteria upon renewal of this Order.

3. Revise Environmental Review Processes

Permittees shall revise their current environmental review processes as necessary to include requirements for evaluation of water quality effects and identification of appropriate mitigation measures for all development projects. The following questions are examples to be considered in addressing increased pollutants and flows from proposed projects:

a) Could the proposed project result in an increase in pollutant discharges to receiving waters? Consider water quality parameters such as temperature, dissolved oxygen, turbidity and other typical storm water pollutants (e.g., heavy metals, pathogens, petroleum derivatives, synthetic organics, sediment, nutrients, oxygen-demanding substances, and trash).

b) Could the proposed project result in significant alteration of receiving water quality during or following construction?

c) Could the proposed project result in increased impervious surfaces and associated increased runoff?

d) Could the proposed project create a significant adverse environmental impact to drainage patterns due to changes in runoff flow rates or volumes?

e) Could the proposed project result in increased erosion downstream?

f) Is the project tributary to an already impaired water body, as listed on the CWA section 303(d) list? If so, can it result in an increase in any pollutant for which the water body is already impaired?

g) Is the project tributary to other environmentally sensitive areas? If so, can it exacerbate already existing sensitive conditions?

h) Could the proposed project have a potentially significant environmental impact on surface water quality of marine, fresh, or wetland waters?

i) Could the proposed project have a potentially significant adverse impact on groundwater quality?

j) Could the proposed project cause or contribute to an exceedance of applicable surface or groundwater receiving water quality objectives or degradation of beneficial uses?

k) Can the project impact aquatic, wetland, or riparian habitat?

4. Conduct Education Efforts Focused on Development

a) Internal: Municipal Staff

Each Permittee shall implement an education program that includes annual training to ensure that planning and development review staffs (and Planning Boards and Elected Officials, if applicable) have an understanding of:

(1) Federal, state, and local water quality laws and regulations applicable to development projects;

(2) The connection between land use decisions and short and long-term water quality impacts (i.e., impacts from land development and urbanization); and

(3) How impacts to receiving water quality resulting from development can be minimized (i.e., through implementation of various source control and treatment control BMPs).

b) External: Project Applicants, Developers, Contractors, Property Owners, Community Planning Groups

As early in the planning and development process as possible, each Permittee shall implement a program to educate project applicants, developers, contractors, property owners, and community planning groups on the following topics:

(1) Federal, state, and local water quality laws and regulations applicable to development projects;

(2) Required federal, state, and local permits pertaining to water quality;

(3) Water quality impacts of urbanization; and

(4) Methods for minimizing the impacts of development on water quality.

G. CONSTRUCTION

Each Permittee shall implement a program to address construction sites to reduce pollutants in runoff to the MEP during all construction phases. At a minimum the construction component shall address:

1. Pollution Prevention

Each Permittee shall implement pollution prevention methods in its Construction Component and shall require its use by construction site owners, developers, contractors, and other responsible parties, where appropriate.

2. Grading Ordinance Update

Within 365 days of adoption of this Order, each Permittee shall review and update its grading ordinances as necessary for compliance with its storm water ordinances and this Order. The updated grading ordinance shall require implementation of BMPs designated by the Permittees pursuant to Requirements G.5 of this Order and other measures during all construction activities.

3. Modify Construction and Grading Approval Process

Each Permittee shall develop and implement a process to ensure that BMPs to reduce the discharge of pollutants to the MEP are applicable to construction and grading permits and plans prior to their approval and issuance. Such BMPs shall include the following requirements or their equivalent:

a) Require project proponent to develop and implement a plan to manage storm water and non-storm water discharges from the site at all times;

b) Require project proponent to minimize grading during the wet season and coincide grading with seasonal dry weather periods to the extent feasible. If grading does occur during the wet season, require project proponent to implement additional BMPs for any rain events which may occur, as necessary for compliance with this Order;

c) Require project proponent to emphasize erosion prevention as the most important measure for keeping sediment on site during construction;

d) Require project proponent to utilize sediment controls as a supplement to erosion prevention for keeping sediment on-site during construction, and never as the single or primary method;

e) Require project proponent to minimize areas that are cleared and graded to only the portion of the site that is necessary for construction;

f) Require project proponent to minimize exposure time of disturbed soil areas;

g) Require project proponent to temporarily stabilize and reseed disturbed soil areas as rapidly as possible;

h) Require project proponent to permanently revegetate or landscape as early as feasible;

i) Require project proponent to stabilize all slopes; and

j) Require project proponents subject to the General Construction Permit to provide evidence of existing permit coverage.

4. Source Identification

Each Permittee shall annually develop and update, prior to the rainy season, an inventory of all construction sites within its jurisdiction regardless of site size or ownership. This requirement is applicable to all construction sites regardless of whether the construction site is subject to the General Construction Permit, or other individual NPDES permit. The use of an automated database system, such as Geographical Information System (GIS) is highly recommended, but not required.

5. BMP Implementation

a) Each Permittee shall designate a set of minimum BMPs that ensure the following at all construction sites:

(1) Erosion prevention;

(2) Slope stabilization;

(3) Phased grading;

(4) Revegetation as early as feasible;

(5) Preservation of natural hydrologic features where feasible;

(6) Preservation of riparian buffers and corridors where feasible;

(7) Maintenance of all source control and treatment control BMPs; and

(8) Retention and proper management of sediment and other construction pollutants on site.

b) Each Permittee shall implement, or require the implementation of, the designated minimum BMPs at each construction site within its jurisdiction year round. If a particular minimum BMP is infeasible at any specific site, each Permittee shall implement, or require the implementation of, other equivalent BMPs. Each Permittee shall also implement or require any additional site specific BMPs as necessary to comply with this Order, including BMPs which are more stringent than those required under the General Construction Permit.

c) Each Permittee shall implement, or require the implementation of, BMPs year round; however, BMP implementation requirements can vary based on wet and dry seasons.

d) Each Permittee shall implement, or require implementation of, additional controls for construction sites tributary to CWA section 303(d) water bodies impaired for sediment as necessary to comply with this Order. Each Permittee shall implement, or require implementation of, additional controls for construction sites within or adjacent to or discharging directly to receiving waters within ESAs as necessary to comply with this Order.

6. Inspection of Construction Sites

   a) Each Permittee shall conduct construction site inspections for compliance with its local ordinances (grading, storm water, etc.), permits (construction, grading, etc.), and this Order.

   b) During the wet season Permittees shall, at a minimum, inspect the following sites every two weeks[4]:

      (1) All sites 50 acres or more in size and grading will occur during the wet season;

      (2) All sites 5 acres or more, and tributary to a CWA section 303(d) water body impaired for sediment or within or directly adjacent to or discharging directly to a receiving water within ESA; and

      (3) Other sites determined by the Permittees or the SDRWQCB as a significant threat to water quality. In evaluating threat to water quality, the following factors shall be considered: (1) soil erosion potential; (2) site slope; (3) project size and type; (4) sensitivity of receiving water bodies; (5) proximity to receiving water bodies; (6) non-storm water discharges; and (7) any other relevant factors.

   c) The Permittees, at a minimum, shall inspect all construction sites that do not meet the criteria specified in Requirement G.6.b above, but encompass 1 acre or more of soil disturbance at least three times during the wet season.

   d) The Permittees shall inspect construction sites less than 1 acre in size on as needed basis.

   e) Permittees shall inspect all construction sites as needed during the dry season.

   f) Based upon site inspection findings, each Permittee shall implement all follow-up actions necessary to comply with this Order.

7. Enforcement of Construction Sites

   Each Permittee shall enforce its ordinances (grading, storm water, etc.) and permits (building, grading, etc.) at all construction sites as necessary to maintain compliance with this Order. Permittee ordinances or other regulatory mechanisms shall include sanctions to ensure compliance. Sanctions shall include the following or their equivalent: stop work authority, non-monetary penalties, fines, financial security, and/or permit denials for non-compliance.

8. Education Focused on Construction Activities

   a) Internal: Municipal Staff

      Each Permittee shall implement an education program that includes annual training to ensure that its construction, building, and grading review staff and inspectors have, at a minimum, an understanding of:

      (1) Federal, state, and local water quality laws and regulations applicable to construction and grading activities;

[4] Any site may be inspected on a monthly basis if the responsible Permittee certifies in a written statement to the SDRWQCB ALL of the following (certified statements may be submitted to the SDRWQCB at any time for one or more sites):

- Permittee has record of construction site's WDID number documenting the site's coverage under the General Construction Permit;
- Permittee has reviewed the construction site's SWPPP and finds the SWPPP to be in compliance with all local ordinances, permits, and plans; and
- Permittee finds that the SWPPP is being properly implemented on site.

(2) The connection between construction activities and water quality impacts (i.e., impacts from land development and urbanization);

(3) How erosion can be prevented;

(4) How impacts to receiving water quality resulting from construction activities can be minimized (i.e., through implementation of various source control and treatment control BMPs); and

(5) How to assess construction sites for adequate BMP implementation and compliance with local codes, ordinances, and permits, and this Order.

b) External: Project Applicants, Contractors, Developers, Property Owners, and other Responsible Parties

Each Permittee shall implement an education program to ensure that project applicants, contractors, developers, property owners, and other responsible parties have an understanding of the topics outlined above.

H. EXISTING DEVELOPMENT

Each Permittee shall develop and implement programs to prevent or reduce pollutants in runoff to the MEP from all existing development under its jurisdiction. The Existing Development programs shall address Sections H.1 through H.3 for municipal facilities and activities, industrial and commercial facilities, and residential activities.

1. Municipal Program

a) Pollution Prevention

Each Permittee shall require the use of pollution prevention methods by municipal departments, contractors, and personnel, where appropriate.

b) Source Identification

Each Permittee shall develop, and update annually, an inventory of the name, address (if applicable), and description of all of the Permittee's municipal facilities and activities that generate pollutants. Municipal facilities and activities to be inventoried shall include, but are not limited to, the following:

- Roads, streets, highways, and parking facilities;
- Flood management projects and flood control devices;
- Drainage facilities;
- Active or closed municipal landfills;
- Publicly owned treatment works (including water and wastewater treatment plants) and sanitary sewage collection systems;
- Incinerators;
- Solid waste transfer facilities;
- Land application sites;
- Uncontrolled sanitary landfills;
- Corporate yards including maintenance and storage yards for materials, waste, equipment and vehicles;
- Sites for disposing and treating sewage sludge;
- Hazardous waste treatment, disposal, and recovery facilities;
- Household hazardous waste collection facilities;

- Municipal airfields;
- Parks and recreational facilities;
- Golf courses;
- Cemeteries;
- Other landscaped areas;
- Channel maintenance activities involving mowing and pesticide/herbicide application;
- Municipal facilities and activities tributary to a CWA section 303(d) impaired water body, where an area or activity generates pollutants for which the water body is impaired. Facilities and activities within or adjacent to or discharging directly to receiving waters within ESAs; and
- Other municipal facilities and activities that the Permittee determines may contribute a significant pollutant load to the MS4.

c) BMP Implementation

(1) Within 365 days from the date of this Order, each Permittee shall implement or require the implementation of BMPs to reduce pollutants in urban runoff to the MEP from all of the Permittee's municipal facilities and activities. The required BMPs shall be facility or activity specific as appropriate.

(2) For facilities and/or activities tributary to CWA section 303(d) impaired water bodies that generate pollutants for which the water body is impaired, each Permittee shall implement or require the implementation of additional BMPs to target that pollutant. Each Permittee shall implement, or require implementation of, additional controls for municipal facilities and activities within or directly adjacent to or discharging directly to receiving waters within ESAs as necessary to comply with this Order.

d) MS4 Maintenance

(1) Each Permittee shall implement a schedule of maintenance activities for its structural source and treatment control BMPs designed to reduce pollutant discharges to or from its MS4s and related drainage structures.

(2) Each Permittee shall implement a schedule of maintenance activities for its MS4. The maintenance activities must, at a minimum, include:

(a) Inspection of all of the Permittee's catch basins and storm drain inlets at least once a year between May 1 and September 30. If accumulated waste is visible, the catch basin, or storm drain inlet, shall be cleaned out. Additional cleaning shall be conducted as necessary;

(b) Removal of anthropogenic litter from the Permittee's open channels at least once a year between May 1 and September 30, with additional removal as necessary;

(c) Record keeping of the Permittee's MS4 cleaning activities;

(d) Proper disposal of waste removed from the Permittee's MS4 pursuant to applicable laws; and

(e) Measures to eliminate waste discharges during MS4 maintenance and cleaning activities.

e) Management of Pesticides, Herbicides, and Fertilizers

The Permittees shall implement BMPs to reduce the contribution of pollutants to the MEP

associated with the application, storage, and disposal of pesticides, herbicides and fertilizers from municipal facilities and activities to MS4s. Such BMPs shall include, at a minimum: (1) educational activities, permits, certifications and other measures for municipal applicators and distributors; (2) integrated pest management measures that rely on non-chemical solutions; (3) the use of native vegetation; (4) schedules for irrigation and chemical application; and (5) the collection and proper disposal of unused pesticides, herbicides, and fertilizers.

f) Inspection of Municipal Facilities and Activities

At a minimum, each Permittee shall inspect all municipal facilities and activities annually. Inspections shall include an assessment of BMP implementation and effectiveness. Based upon site inspection findings, each Permittee shall implement all follow-up actions necessary to comply with this Order.

g) Enforcement of Municipal Facilities and Activities

Each Permittee shall enforce its storm water ordinance at all of its municipal facilities and activities as necessary to maintain compliance with this Order.

2. Industrial/Commercial Facilities Program

a) Pollution Prevention

Each Permittee shall require the use of pollution prevention methods by industrial/commercial facilities, where appropriate.

b) Source Identification

Each Permittee shall develop an inventory or database of all industrial and commercial facilities under its jurisdiction (regardless of site ownership) that could contribute a significant pollutant load to the MS4. At a minimum, the following facilities shall be included:

(1) Commercial Facilities:

- Automobile mechanical repair, maintenance, fueling, or cleaning;
- Airplane mechanical repair, maintenance, fueling, or cleaning;
- Boat mechanical repair, maintenance, fueling, or cleaning;
- Equipment repair, maintenance, fueling, or cleaning;
- Automobile and other vehicle body repair or painting;
- Mobile automobile or other vehicle washing (base of operations);
- Automobile (or other vehicle) parking lots and storage facilities;
- Retail or wholesale fueling;
- Pest control services (base of operations);
- Eating or drinking establishments;
- Mobile carpet, drape or furniture cleaning (base of operations);
- Concrete mixing or cutting (base of operations);
- Masonry (base of operations);
- Painting and coating (base of operations);
- Landscaping (base of operations);
- Nurseries and greenhouses;
- Golf courses, parks and other recreational areas/facilities;

- Cemeteries;
- Pool and fountain cleaning (base of operations);
- Port-a-Potty servicing (base of operations);

(2) Industrial Facilities:

- Industrial facilities, as defined at 40 CFR 122.26(b)(14), including those subject to the General Industrial Permit;
- Operating and closed municipal landfills;
- Facilities subject to SARA Title III;
- Hazardous waste treatment, disposal, storage and recovery facilities;

(3) All other facilities tributary to a CWA section 303(d) impaired water body, where a facility generates pollutants for which the water body is impaired; and

(4) All other facilities that the Permittee determines may contribute a significant pollutant load to the MS4.

The inventory shall include the following minimum information for each facility: name; address; a narrative description that best reflects the principal products or services provided by each facility, and the SIC code for industrial facilities.

Each Permittee shall maintain an up-to-date inventory. New information obtained during inspections or through other intra-agency informational sources (e.g. business licenses, pretreatment permits, sanitary sewer hook-up permits, yellow pages, etc.) shall be used to update the inventory on a regular basis.

c) <u>BMP Implementation</u>

(1) Within 365 days from the date of this Order, each Permittee shall designate a set of minimum BMP requirements for all inventoried industrial/commercial facilities to reduce the discharge of pollutants in runoff to the MEP. Designated BMPs may be specific to facility types or to pollutant-generating activities conducted at the facilities.

(2) For facilities and/or activities tributary to CWA section 303(d) impaired water bodies that generate pollutants for which the water body is impaired, each Permittee shall designate additional BMPs to target that pollutant. Each Permittee shall implement, or require implementation of, additional controls for industrial/commercial facilities and activities within or directly adjacent to or discharging directly to receiving waters within ESAs as necessary to comply with this Order.

(3) Within 365 days from the date of this Order, each Permittee shall notify all inventoried facilities of their applicable minimum BMP requirements, and a description of the local codes or ordinances requiring compliance with reducing the discharge of pollutants in runoff to the MEP.

(4) Each Permittee shall implement, or require the implementation of, the designated minimum BMPs at each inventoried facility within its jurisdiction. If a particular minimum BMP is infeasible at any specific site, each Permittee shall implement, or require implementation of, other equivalent BMPs. Each Permittee shall also implement or require any additional site specific BMPs as necessary to comply with this Order including BMPs which are more stringent than those required under the General Industrial Permit.

d) <u>Inspection of Industrial/Commercial Facilities</u>

(1) To establish priorities for inspections and oversight of industrial/commercial facilities, the Permittees shall prioritize each inventory described in Requirement H.2.b. above by threat to water quality (high, medium, or low). In evaluating threat to water quality, each Permittee shall consider, at a minimum, the following:

- Type of facility (SIC Code);
- Materials used at the facility;
- Wastes generated;
- Exposure of activities and pollutant discharge potential;
- History of non-storm water discharges;
- Size of facility;
- Proximity to receiving water bodies and sensitivity of receiving water bodies;
- Whether the industrial site is subject to the General Industrial Permit;
- Any available source monitoring data; and
- Any other relevant factors.

(2) Each Permittee shall inspect and ensure minimum BMP implementation at all inventoried industrial/commercial facilities in accordance with the following schedule:

(a) High priority facilities shall be inspected annually;

(b) Medium priority facilities shall be inspected biannually (twice during the 5-year term of the permit);

(c) Low priority facilities shall be inspected once during the 5-year term of the permit; and

(d) Mobile operations shall be inspected as needed.

(3) Inspections of industrial facilities shall include, but not be limited to:

(a) Check for coverage under the General Industrial Permit (Notice of Intent (NOI) and/or Waste Discharge Identification No.);

(b) Assessment of compliance with Permittee ordinances and permits related to urban runoff, including the implementation and maintenance of designated minimum BMPs;

(c) Assessment of BMP effectiveness;

(d) Visual observations for non-storm water discharges, potential illicit connections, and potential discharge of pollutants in storm water runoff; and

(e) Education and outreach on storm water pollution prevention.

(4) Inspections of commercial facilities shall include, but not be limited to:

(a) Assessment of compliance with Permittee ordinances and permits related to urban runoff, including the implementation and maintenance of designated minimum BMPs;

(b) Assessment of BMP effectiveness;

(c) Visual observations for non-storm water discharges, potential illicit connections, and potential discharge of pollutants in storm water runoff; and

(d) Education and outreach on storm water pollution prevention.

(5) To the extent that the SDRWQCB has conducted an inspection of an industrial facility during a particular year, the requirement for the responsible Permittee to inspect this site during the same year will be satisfied.

(6) Based upon facility inspection findings, each Permittee shall implement all follow-up actions necessary to comply with this Order.

e) Enforcement of Industrial/Commercial Facilities

Each Permittee shall enforce its storm water ordinance at all industrial/commercial facilities as necessary to maintain compliance with this Order. Permittee ordinances or other regulatory mechanisms shall include sanctions to ensure compliance. Sanctions shall include the following or their equivalent: Non-monetary penalties, fines, bonding requirements, and/or permit denials for non-compliance.

f) Reporting of Industrial Non-Filers

As part of each Annual Report, each Permittee shall report a list of industrial facilities, including the name, address, and SIC code, that may require coverage under the General Industrial Permit for which a NOI has not been filed.

g) Industrial/Commercial Inspection Training

Each Permittee shall train staff responsible for conducting inspections of industrial/commercial facilities at least once a year. Permittees are encouraged to conduct training programs and provide compliance assistance to industrial/commercial facility owners, operators, and employers.

3. Residential Program

a) Pollution Prevention

Each Permittee shall encourage the use of pollution prevention methods by residents, where appropriate.

b) Source Identification

Each Permittee shall identify high priority residential activities that may contribute a significant pollutant load to the MS4. These activities may include:

- Automobile repair and maintenance;
- Automobile washing;
- Automobile parking;
- Home and garden care activities and product use (pesticides, herbicides, and fertilizers);
- Disposal of household hazardous waste;
- Disposal of pet waste;
- Disposal of green waste; and
- Any other residential source that the Permittee determines may contribute a significant pollutant load to the MS4.

c) BMP Implementation

(1) Within 365 days from the date of this Order, each Permittee shall designate a set of minimum BMP requirements for all high priority residential activities to reduce the discharge of pollutants in urban runoff to the MEP.

(2) For residential activities tributary to CWA section 303(d) impaired water bodies that generate pollutants for which the waterbody is impaired, each Permittee shall designate additional BMPs to target that pollutant. Each Permittee shall implement, or require implementation of, additional controls for high priority residential activities within or directly adjacent to or discharging directly to receiving waters within ESAs as necessary to comply with this Order.

(3) Each Permittee shall implement, or require implementation of, the designated minimum BMPs for the high priority residential activities identified pursuant to Requirement H.3.b. above. If a particular minimum BMP is infeasible for any specific site/source, each Permittee shall require implementation of other equivalent BMPs. Each Permittee shall also implement, or require implementation of, any additional BMPs necessary to comply with this Order.

(4) Within 365 days from the date of this Order, each Permittee shall notify residents of the applicable minimum BMP requirements, and a description of the local codes or ordinances requiring compliance with reducing the discharge of pollutants in runoff to the MEP.

d) Enforcement of Residential Areas and Activities

Each Permittee shall enforce its storm water ordinance for residential activities as necessary to maintain compliance with this Order.

I. EDUCATION

Each Permittee shall implement an Education Component using all media as appropriate to (1) measurably increase the knowledge of the target communities regarding MS4s, impacts of urban runoff on receiving waters, and potential BMP solutions for the target audience; and (2) to measurably change the behavior of target communities and thereby reduce pollutant releases to MS4s and the environment. At a minimum the education component shall address the following target communities:

1. Municipal Departments and Personnel
2. Construction Site Owners and Developers
3. Industrial Owners and Operators
4. Commercial Owners and Operators
5. Residential Community, General Public, and School Children
6. Quasi-Governmental Agencies/Districts (i.e., educational institutions, water districts, sanitation districts, etc.)

J. ILLICIT DISCHARGE DETECTION AND ELIMINATION PROGRAM

Each Permittee shall implement an Illicit Discharge Detection and Elimination program containing measures to actively seek and eliminate illicit discharges and connections. At a minimum the Illicit Discharge Detection and Elimination program shall address:

1. Illicit Discharges and Connections

Each Permittee shall implement a program to actively seek and eliminate illicit discharges and connections into its MS4. The program shall address all types of illicit discharges and connections excluding those non-storm water discharges not prohibited by the Permittee in accordance with Section B of this Order.

2. Develop/Maintain MS4 Map

Each Permittee shall develop or obtain an up-to-date labeled map of its entire MS4 and the corresponding drainage areas within its jurisdiction. The use of a GIS is highly recommended. The accuracy of the MS4 map shall be confirmed and updated at least annually.

3. Illicit Discharge Monitoring

Each Permittee shall implement the Illicit Discharge Monitoring Program in accordance with Section II.B of the MRP to detect illicit discharges and connections.

4. Investigation/Inspection and Follow-Up

Each Permittee shall investigate and inspect any portion of its MS4 that, based on visual observations, monitoring results or other appropriate information, indicates a reasonable potential for illicit discharges, illicit connections, or other sources of non-storm water (including non-prohibited discharge(s) identified in Section B of this Order). Each Permittee shall develop numeric criteria in accordance with section II.B.3. of the MRP to determine when follow-up actions will be necessary. Numeric criteria and follow-up procedures shall be described in each Permittees' Individual SWMP.

5. Elimination of Illicit Discharges and Connections

Each Permittee shall eliminate all illicit discharges, illicit discharge sources, and illicit connections as soon as possible after detection. Elimination measures may include an escalating series of enforcement actions for those illicit discharges that are not a serious threat to public health or the environment. Illicit discharges that are a serious threat to public health or the environment must be eliminated immediately.

6. Enforce Ordinances

Each Permittee shall implement and enforce its ordinances, orders, or other legal authority to prevent illicit discharges and connections to its MS4. Each Permittee shall also implement and enforce its ordinance, orders, or other legal authority to eliminate detected illicit discharges and connections to it MS4.

7. Sewage Spill Prevention and Response

Each Permittee shall take appropriate actions to prevent, respond to, contain and cleanup sewage spills (including private laterals and failing septic systems) into the MS4 and to prevent the contamination of surface water, ground water and soil to the MEP. Appropriate actions may include the following:

- Develop and implement a mechanism to be notified of all sewage spills from private laterals and failing septic systems into the MS4;
- Coordinate sewage spill prevention, containment and response activities throughout all appropriate departments, programs and agencies to ensure maximum water quality protection at all times;
- Require adequately sized and properly maintained private property sewerage systems, such as at residential and commercial complexes;
- Require proper connections of private laterals to the public sewer main;
- Require adequately-sized, and properly maintained grease control devices at food establishments which otherwise could result in sewer line grease blockages;

- Conduct municipal activities such as street repair or tree plantings in a manner that minimizes sewer line damages or root blockages;
- Identify priority areas, produce maps and other information on systems obtained during development review;
- Educate the public on measures to prevent sewage spills; and
- Ensure that private sewer lines are inspected.

8. Facilitate Public Reporting of Illicit Discharges and Connections - Public Hotline

   Each Permittee shall promote, publicize and facilitate public reporting of illicit discharges or water quality impacts associated with discharges into or from MS4s. Each Permittee shall facilitate public reporting through development and operation of a public hotline. Public hotlines can be Permittee-specific or shared by Permittees. All storm water hotlines shall be capable of receiving reports in both English and Spanish 24 hours per day / seven days per week. Permittees shall respond to and resolve each reported incident. All reported incidents, and how each was resolved, shall be summarized in each Permittee's Individual Annual Report.

9. Facilitate Disposal of Used Oil and Toxic Materials

   Each Permittee shall facilitate the proper management and disposal of used oil, toxic materials, and other household hazardous wastes. Such facilitation shall include educational activities, public information activities, and establishment of collection sites operated by the Permittee or a private entity. Neighborhood collection of household hazardous wastes is encouraged.

K. WATERSHED-BASED ACTIVITIES

1. Each Permittee shall collaborate with other Permittees to identify, address, and mitigate the highest priority water quality issues/pollutants in the Upper Santa Margarita Watershed.

2. Each Permittee shall collaborate with all other Permittees to develop and implement a Watershed SWMP for the Upper Santa Margarita Watershed. The Watershed SWMP shall, at a minimum, contain the following:

   a) An accurate map of the Upper Santa Margarita Watershed (preferably in GIS format) that identifies all receiving waters, all CWA section 303(d) impaired receiving waters, existing and planned land uses, MS4s, major highways, jurisdictional boundaries, and industrial and commercial facilities, municipal sites, and residential areas.

   b) A description of any interagency agreement, or other efforts, with non-Permittee owners of the MS4 (such as Caltrans, Native American Tribes, and school districts) to control the contribution of pollutants from one portion of the shared MS4 to another portion of the shared MS4;

   c) An assessment of the water quality of all receiving waters in the watershed based upon (1) existing water quality data; and (2) results from the Receiving Waters and Illicit Discharge Monitoring Programs described in the MRP;

   d) An identification and prioritization of major water quality problems in the watershed caused or contributed to by MS4 discharges and the likely source(s) of the problem(s);

   e) An implementation time schedule of short and long-term recommended activities (individual and collective) needed to address the highest priority water quality problem(s) identified in Requirement K.2.d. above. For this section, "short-term activities" shall mean those activities

that are to be completed during the life of this Order and "long-term activities" shall mean those activities that are to be completed beyond the life of this Order;

f) A watershed-based education program, which focuses on water quality issues specific to the Santa Margarita watershed;

g) A mechanism to facilitate collaborative "watershed-based" (i.e., natural resource-based) land use planning with neighboring local governments in the watershed.

h) A description of any other urban runoff management programs or activities being conducted collectively by the Permittees to address water quality issues;

i) A description of Permittee responsibilities for implementing the programs described in the Watershed SWMP;

j) The expenditures and funding sources for the area-wide and watershed-based activities and programs;

k) Standardized reporting formats developed collectively by the Permittees, as specified in Requirement M.1;

l) Short-term strategy for assessing the effectiveness of the activities and programs implemented as part of the Watershed SWMP. The short-term assessment strategy shall identify methods to assess program effectiveness and include specific direct and indirect performance measurements that will track the immediate progress and accomplishments of the Watershed SWMP towards improving receiving water quality impacted by urban runoff discharges. The short-term strategy shall also discuss the role of monitoring data collected by the Permittees in substantiating or refining the assessment; and

m) Long-term strategy for assessing the effectiveness of the Watershed SWMP. The long-term assessment strategy shall identify specific direct and indirect performance measurements that will track the long-term progress of the Watershed SWMP towards achieving improvements in receiving water quality impacted by urban runoff discharges. Methods used for assessing effectiveness shall include the following or their equivalent: surveys, pollutant loading estimations, receiving water quality monitoring, and achievement of measurable goals. The long-term strategy shall also discuss the role of monitoring data in substantiating or refining the assessment.

3. Permittees shall, as appropriate, participate in watershed management efforts to address storm water quality issues within the entire Santa Margarita Watershed, including efforts conducted by other entities in the watershed, such as San Diego County, U.S. Marine Corps Base Camp Pendleton, Native American tribes, and other state, federal, and local agencies.

4. At least once a year, all Permittees shall meet to review and assess available water quality data (from the MRP and other reliable sources), assess program effectiveness, and to review and update the Watershed SWMP.

L. MONITORING AND REPORTING PROGRAM

Pursuant to CWC section 13267, the Permittees shall comply with all requirements contained in the **MRP**.

M. PRINCIPAL PERMITTEE RESPONSIBILITIES

The Principal Permittee shall, at a minimum:

1. Coordinate the joint development by all of the Permittees of standardized format(s) for all reports required under this Order (e.g., annual reports, monitoring reports, fiscal analysis reports, and program effectiveness reports, etc.). The standardized reporting format(s) shall be submitted to the SDRWQCB for review as part of the SWMP. The standardized format(s) shall be used by all Permittees and shall include protocols for electronic reporting.

2. Integrate individual Permittee documents and reports required under this Order into single unified documents and reports for submittal to the SDRWQCB as described below. If a reporting date falls on a non-working day or State holiday, then the report is to be submitted on the following working day.

   a) SWMP – The Principal Permittee shall submit the SWMP in its entirety to the SDRWQCB within 365 days of the adoption of this Order. The Principal Permittee shall be responsible for preparing the Watershed SWMP and its Individual SWMP. The Principal Permittee shall also be responsible for collecting and assembling the Individual SWMPs describing the activities and programs to be implemented by each individual Permittee.

   b) MRP - The Principal Permittee shall submit the SWMP Annual Reports and the Monitoring Program Annual Reports in accordance with MRP No. R9-2004-001. The Principal Permittee shall be responsible for producing the Watershed SWMP Annual Report as well as its Individual Annual Report, and for collecting and assembling the Individual SWMP Annual Reports covering the activities conducted by each Permittee. The Principal Permittee shall also be responsible for coordinating the implementation of and reporting on the Receiving Waters Monitoring Program, described in sections II.A and III.B of the MRP.

   c) Interagency Agreement - The Principal Permittee shall submit a copy of the Interagency Agreement to the SDRWQCB, if and when the agreement is updated.

N. STANDARD PROVISIONS

1. Each Permittee shall comply with the standard provisions contained in **Attachment B** of this Order. This includes 24 hour/5day reporting requirements for any instance of non-compliance with this Order as described in Section 1.1.6 of **Attachment B**.

2. All documents submitted to the SDRWQCB pursuant to this Order, including but not limited to SWMP documents, annual reports, monitoring reports, and SUSMPs, shall include an executive summary, introduction, conclusion, recommendations, and signed certified statement.

3. All plans, reports and subsequent amendments submitted in compliance with this Order shall be implemented immediately (or as otherwise specified) and shall be an enforceable part of this Order upon submission to the SDRWQCB. All submittals by Permittees must be adequate to implement the requirements of this Order.

*I, John H.Robertus, Executive Officer, do hereby certify the foregoing is a full, true, and correct copy of an Order adopted by the California Regional Water Quality Control Board, San Diego Region, on **July 14, 2004.***

John H. Robertus
Executive Officer

ATTACHMENT A

BASIN PLAN PROHIBITIONS

California Water Code (CWC) section 13243 provides that a California Regional Water Quality Control Board (RWQCB), in a water quality control plan, may specify certain conditions or areas where the discharge of waste, or certain types of waste is not permitted. The following discharge prohibitions are applicable to any person, as defined by section 13050(c) of the CWC, who is a citizen, domiciliary, or political agency or entity of California whose activities in California could affect the quality of waters of the state within the boundaries of the SDRWQCB.

1. The discharge of waste to waters of the state in a manner causing, or threatening to cause a condition of pollution, contamination or nuisance as defined in CWC section 13050, is prohibited.

2. The discharge of waste to land, except as authorized by waste discharge requirements or the terms described in CWC section 13264 is prohibited.

3. The discharge of pollutants or dredged or fill material to waters of the United States except as authorized by an NPDES permit or a dredged or fill material permit (subject to the exemption described in CWC section13376) is prohibited.

4. Discharges of recycled water to lakes or reservoirs used for municipal water supply or to inland surface water tributaries thereto are prohibited, unless the SDRWQCB issues a NPDES permit authorizing such a discharge; the proposed discharge has been approved by the State Department of Health Services and the operating agency of the impacted reservoir; and the discharger has an approved fail-safe long-term disposal alternative.

5. The discharge of waste to inland surface waters, except in cases where the quality of the discharge complies with applicable receiving water quality objectives, is prohibited. Allowances for dilution may be made at the discretion of the SDRWQCB. Consideration would include streamflow data, the degree of treatment provided and safety measures to ensure reliability of facility performance. As an example, discharge of secondary effluent would probably be permitted if streamflow provided 100:1 dilution capability.

6. The discharge of waste in a manner causing flow, ponding, or surfacing on lands not owned or under the control of the discharger is prohibited, unless the discharge is authorized by the RWQCB.

7. The dumping, deposition, or discharge of waste directly into waters of the state, or adjacent to such waters in any manner which may permit its being transported into the waters, is prohibited unless authorized by the SDRWQCB.

8. Any discharge to a MS4 that is not composed entirely of "*storm water*" is prohibited unless authorized by the SDRWQCB. [The federal regulations, 40 CFR 122.26 (b) (13), define storm water as storm water runoff, snow melt runoff, and surface runoff and drainage. 40 CFR 122.26 (b) (2) defines an illicit discharge as any discharge to a MS4 that is not composed entirely of storm water except discharges pursuant to a NPDES permit and discharges resulting from fire fighting activities. [40 CFR 122.26 amended at 56 FR 56553, November 5, 1991; 57 FR 11412, April 2, 1992].

9. The unauthorized discharge of treated or untreated sewage to waters of the state or to a MS4 is prohibited.

10. The discharge of industrial wastes to conventional septic tank/subsurface disposal systems, except as authorized by the terms described in CWC section 13264, is prohibited.

11. The discharge of radioactive wastes amenable to alternative methods of disposal into the waters of the state is prohibited.

12. The discharge of any radiological, chemical, or biological warfare agent into waters of the state is prohibited.

13. The discharge of waste into a natural or excavated site below historic water levels is prohibited unless the discharge is authorized by the SDRWQCB.

14. The discharge of sand, silt, clay, or other earthen materials from any activity, including land grading and construction, in quantities which cause deleterious bottom deposits, turbidity or discoloration in waters of the state or which unreasonably affect, or threaten to affect, beneficial uses of such waters is prohibited.

ATTACHMENT B
STANDARD PROVISIONS

1. FEDERAL NPDES STANDARD PROVISIONS [40 CFR 122.41]

(a) *Duty to comply* [40 CFR 122.41(a)]. The permittee must comply with effluent standards or prohibitions established under section 307(a) of the CWA for toxic pollutants and with standards for sewage sludge use or disposal established under section 405(d) of the CWA within the time provided in the regulations that establish these standards or prohibitions or standards for sewage sludge use or disposal, even if the Order has not yet been modified to incorporate the requirement.

(1) The permittee shall comply with effluent standards or prohibitions established under section 307(a) of the CWA toxic pollutants and with standards for sewage sludge use or disposal established under section 405(d) of the CWA within the time provided in the regulations that establish these standards or prohibitions or standards for sewage sludge use or disposal, even if the Order has not yet been modified to incorporate the requirement.

(2) The CWA provides that any person who violates section 301, 302, 306, 307, 308, 318 or 405 of the Act, or any permit condition or limitation implementing any such sections in a permit issued under section 402, or any requirement imposed in a pretreatment program approved under sections 402(a)(3) or 402(b)(8) of the Act, is subject to a civil penalty not to exceed $25,000 per day for each violation. The CWA provides that any person who negligently violates section 301, 302, 306, 307, 308, 318 or 405 of the Act, or any condition or limitation implementing any of such sections in a permit issued under section 402 of the Act, or any requirement imposed in a pretreatment program approved under section 402(a)(3) or 402(b)(8) of the Act, is subject to criminal penalties of $2,500 to $25,000 per day of violation, or imprisonment of not more than 1 year, or both. In the case of a second or subsequent conviction for a negligent violation, a person shall be subject to criminal penalties of not more than $50,000 per day of violation, or by imprisonment of not more than 2 years, or both. Any person who knowingly violates such sections, or such conditions or limitations is subject to criminal penalties of $5,000 to $50,000 per day of violation, or imprisonment for not more than 3 years, or both. In the case of a second or subsequent conviction for a knowing violation, a person shall be subject to criminal penalties of not more than $100,000 per day of violation, or imprisonment of not more than 6 years, or both. Any person who knowingly violates section 301, 302, 306, 307, 308, 318 or 405 of the Act, or any permit condition or limitation implementing any of such sections in a permit issued under section 402 of the Act, and who knows at that time that he thereby places another person in imminent danger of death or serious bodily injury, shall, upon conviction, be subject to a fine of not more than $250,000 or imprisonment of not more than 15 years, or both. In the case of a second or subsequent conviction for a knowing endangerment violation, a person shall be subject to a fine of not more than $500,000 or by imprisonment of not more than 30 years, or both. An organization, as defined in section 309(c)(3)(B)(iii) of the CWA, shall, upon conviction of violating the imminent danger provision, be subject to a fine of not more than $1,000,000 and can be fined up to $2,000,000 for second or subsequent convictions.

(3) Any person may be assessed an administrative penalty by the Administrator for violating section 301, 302, 306, 307, 308, 318 or 405 of the CWA, or any permit condition or limitation implementing any of such sections in a permit issued under Section 402 of the CWA. Administrative penalties for Class I violations are not to exceed $10,000 per violation, with the maximum amount of any Class I penalty assessed not to exceed $25,000. Penalties for Class II violations are not to exceed $10,000 per day for each day during which the violation continues, with the maximum amount of any Class II penalty not to exceed $125,000.

(b) *Duty to reapply* [40 CFR 122.41(b)]. If the permittee wishes to continue an activity regulated by this Order after the expiration date of this Order, the permittee must apply for and obtain a new order.

(c) *Need to halt or reduce activity not a defense* [40 CFR 122.41(c)]. It shall not be a defense for the permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this Order.

(d) *Duty to mitigate* [40 CFR 122.41(d)]. The permittee shall take all reasonable steps to minimize or prevent any discharge or prevent any discharge or sludge use or disposal in violation of this Order which has a reasonable likelihood of adversely affecting human health or the environment.

(e) *Proper operation and maintenance* [40 CFR 122.41(e)]. The permittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the discharger to achieve compliance with the conditions of this Order. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures. This provision requires the operation of back-up or auxiliary facilities or similar systems which are installed by the discharger only when the operation is necessary to achieve compliance with the conditions of this Order.

(f) *Permit actions* [40 CFR 122.41(f)]. This Order may be modified, revoked and reissued, or terminated for cause. The filing of a request by the permittee for a permit modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance does not stay any permit condition.

(g) *Property rights* [40 CFR 122.41(g)]. This Order does not convey any property rights of any sort or any exclusive privilege.

(h) *Duty to provide information* [40 CFR 122.41(h)]. The permittee shall furnish to the Director, within a reasonable time, any information which the SDRWQCB may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this Order or to determine compliance with this Order. The permittee shall also furnish to the SDRWQCB upon request, copies of records required to be kept by this Order.

(i) *Inspection and entry* [40 CFR 122.41(i)]. The permittee shall allow the SDRWQCB, or an authorized representative (including an authorized contractor acting as a representative of the SDRWQCB or EPA), upon presentation of credentials and other documents as may be required by law, to:

(1) Enter upon the permittee's premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of this Order;
(2) Have access to and copy, at reasonable times, any records that must be kept under the conditions of this Order;
(3) Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this Order; and
(4) Sample or monitor at reasonable times, for the purposes of assuring compliance with this Order or as otherwise authorized by the CWA , any substances or parameters at any location.

(k) *Signatory requirement* [40 CFR 122.41(k)]

(1) All applications, reports, or information submitted to the SDRWQCB shall be signed and certified (see 40 CFR 122.22)

(2) The CWA provides that any person who knowingly makes any false statement, representation, or certification in any record or other document submitted or required to be maintained under this Order, including monitoring reports or reports of compliance or non-compliance shall, upon conviction, be punished by a fine of not more than $10,000 per violation, or by imprisonment for not more than 6 months per violation, or by both.

(l) *Reporting requirements* [40 CFR 122.41(l)]

(1) *Planned changes.* The permittee shall give notice to the SDRWQCB as soon as possible of any planned physical alterations or additions to the permitted facility. Notice is required only when:

i) The alteration or addition to a permitted facility may meet one of the criteria for determining whether a facility is a new source in 40 CFR 122.29(b); or
ii) The alteration or addition could significantly change the nature or increase the quantity of pollutants discharged. This notification applies to pollutants, which are subject neither to effluent limitations in the permit, nor to notification requirements under 40 CFR 122.42(a)(1).
iii) The alteration or addition results in a significant change in the permittee's sludge use or disposal practices, and such alteration, addition, or change may justify the application of permit conditions that are different from or absent in the existing Order, including notification of additional use or disposal sites not reported during the permit application process or not reported pursuant to an approved land application plan;

(2) *Anticipated noncompliance.* The permittee shall give advance notice to the SDRWQCB of any planned changes in the permitted facility or activity, which may result in noncompliance with permit requirements.

(3) *Transfers.* This permit is not transferable to any person except after notice to the SDRWQCB. The SDRWQCB may require modification or revocation and reissuance of the permit to change the name of the permittee and incorporate such other requirements as may be necessary under the CWA. (See 40 CFR 122.61; in some cases, modification or revocation and reissuance is mandatory.)

(4) *Monitoring reports.* The applicable provisions from 40 CFR 122.41(l)(4) are contained in the Monitoring and Reporting Program for this Order.

(5) *Compliance schedules.* Reports of compliance or noncompliance with, or any progress reports on, interim and final requirements contained in any compliance schedule of this permit shall be submitted no later than 14 days following each schedule date.

(6) *Twenty-four hour reporting.*

i) The permittee shall report any noncompliance, which may endanger health or the environment. Any information shall be provided orally within 24 hours from the time the permittee becomes aware of the circumstances. A written submission shall also be provided within 5 days of the time the permittee becomes aware of the circumstances. The written submission shall contain a description of the noncompliance and its cause; the period of noncompliance, including exact dates and times, and if the noncompliance has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance.
ii) The following shall be included as information, which must be reported within 24 hours under this paragraph.

(A) Any unanticipated bypass which exceeds any effluent limitation in the Order (See 40 CFR 122.41(g)).
(B) Any upset which exceeds any effluent limitation in the Order.
(C) Violation of a maximum daily discharge limitation for any of the pollutants listed by the SDRWQCB in the permit to be reported within 24 hours. (See 40 CFR 122.44(g)).

iii) The SDRWQCB may waive the written report on a case-by-case basis for reports under paragraph (l)(6)(ii) of this section if the oral report has been received within 24 hours.

(7) *Other noncompliance.* The permittee shall report all instances of noncompliance not reported under paragraphs (l)(4), (5), and (6) of this section, at the time monitoring reports are submitted. The reports shall contain the information listed in paragraph (l)(6) of this section.

(8) *Other information.* Where the permittee becomes aware that it failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application or in any report to the SDRWQCB, it shall promptly submit such facts or information.

(m) *Bypass* [40 CFR 122.41(m)]

(1) Definitions

i) "Bypass" means the intentional diversion of waste streams from any portion of a treatment facility.
ii) "Severe property damage" means substantial physical damage to property, damage to the treatment facilities which causes them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production.

(2) Bypass not exceeding limitations. The permittee may allow any bypass to occur which does not cause effluent limitations of this Order or the concentrations of pollutants set forth in Ocean Plan Table A or Table B to be exceeded, but only if it also is for essential maintenance to assure efficient operation. These bypasses are not subject to the provisions of paragraphs (m)(3) and (m)(4) of this provision.

(3) Notice

i) Anticipated bypass. If the permittee knows in advance of the need for a bypass, it shall submit prior notice, if possible, at least ten days before the date of the bypass.

ii) Unanticipated bypass. The permittee shall submit notice of an unanticipated bypass as required in paragraph (1)(6) of this section (24-hour notice).

(4) Prohibition of Bypass

i) Bypass is prohibited, and the SDRWQCB may take enforcement action against the permittee for bypass, unless:

(A) Bypass was unavoidable to prevent loss of life, personal injury, or severe property damage;

(B) There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate back-up equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass which occurred during normal periods of equipment downtime or preventive maintenance; and

(C) The permittee submitted notices as required under paragraph (m)(3) of this section.

ii) The SDRWQCB may approve an anticipated bypass, after considering its adverse effects, if the SDRWQCB determines that it will meet the three conditions listed above in paragraph (m)(4)(i) of this section.

(n) *Upset* [40 CFR 122.41(n)]

(1) Definition. "Upset" means an exceptional incident in which there is unintentional and temporary noncompliance with technology based effluent limitations because of factors beyond the reasonable control of the discharger. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation.

(2) Effect of an upset. An upset constitutes an affirmative defense to an action brought for noncompliance with such technology based permit effluent limitations if the requirements of paragraph (n)(3) of this section are met. No determination made during administrative review of claims that noncompliance was caused by upset, and before an action for noncompliance, is final administrative action subject to judicial review.

(3) Conditions necessary for a demonstration of upset. A permittee who wishes to establish the affirmative defense of upset shall demonstrate, through properly signed, contemporaneous operating logs, or other relevant evidence that:

i) An upset occurred and that the permittee can identify the cause(s) of the upset;

ii) The permitted facility was at the time being properly operated;

iii) The permittee submitted notice of the upset as required in section (1)(6)(ii)(B) of this section (24-hour notice); and

iv) The permittee complied with any remedial measures required under paragraph (d) of this section.

(4) Burden of Proof. In any enforcement proceeding the discharger seeking to establish the occurrence of an upset has the burden of proof.

2. SIGNATORY REQUIREMENTS [40 CFR 122.22]

(a) *Applications* [40 CFR 122.22(a)(3)]. All applications shall be signed by either a principal executive officer or ranking elected official.

(b) *Reports* [40 CFR 122.22(b)]. All reports required by this Order, and other information requested by the SDRWQCB shall be signed by a person described in paragraph a. of this reporting requirement, or by a duly authorized representative of that person. A person is a duly authorized representative only if:

(1) The authorization is made in writing by a person described in section (a) above;

(2) The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity, such as the position of plant manager, operator of a well or a well field, superintendent, position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters for the company. (A duly authorized representative may thus be either a named individual or any individual occupying a named position.); and,

(3) The written authorization is submitted to the SDRWQCB.

(c) *Changes to authorization.* If an authorization under paragraph (b) of this reporting requirement is no longer accurate because a different individual or position has responsibility for the overall operation of the facility, a new authorization satisfying the requirements of paragraph b. of this reporting requirement must be submitted to the SDRWQCB prior to or together with any reports, information, or applications to be signed by an authorized representative.

(d) *Certification.* Any person signing a document under paragraph (a) or (b) of this section shall make the following certification:

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

3. ADDITIONAL STANDARD PROVISIONS

(a) *Municipal separate storm sewer systems* [40 CFR 122.42(c)]. The operator of a large or medium municipal separate storm sewer system or a municipal separate storm sewer that has been designated by the Director under 40 CFR 122.26(a)(1)(v) must submit an annual report by the anniversary of the date of the issuance of the permit for such system. The report shall include:

(1) The status of implementing the components of the storm water management program that are established as permit conditions;

(2) Proposed changes to the storm water management programs that are established as permit conditions. Such proposed changes shall be consistent with 40 CFR 122.26(d)(2)(iii); and

(3) Revisions, if necessary, to the assessment of controls and the fiscal analysis reported in the permit application under 40 CFR 122.26(d)(2)(iv) and 40 CFR 122.26(d)(2)(v);

(4) A summary of data, including monitoring data, that is accumulated throughout the reporting year;

(5) Annual expenditures and budget for year following each annual report;

(6) A summary describing the number and nature of enforcement actions, inspections, and public education programs; and

(7) Identification of water quality improvements or degradation.

(b) *Storm water discharges* [40 CFR 122.42(d)]. The initial permits for discharges composed entirely of storm water issued pursuant to 40 CFR 122.26(e)(7) shall require compliance with the conditions of

the permit as expeditiously as practicable, but in no event later than three years after the date of issuance of the permit.

(c) *Discharge is a privilege* [CWC section 13263(g)]. No discharge of waste into the waters of the State, whether or not such discharge is made pursuant to waste discharge requirements, shall create a vested right to continue such discharge. All discharges of waste into waters of the State are privileges, not rights.

(d) *Review and revision of Order* [CWC section 13263(e)]. Upon application by any affected person, or on its own motion, the SDRWQCB may review and revise this permit.

(e) *Termination or modification of Order* [CWC section13381]. This permit may be terminated or modified for causes, including, but not limited to, all of the following:

(8) Violation of any condition contained in this Order;
(9) Obtaining this Order by misrepresentation, or failure to disclose fully all relevant facts.
(10) A change in any condition that requires either a temporary or permanent reduction or elimination of the permitted discharge.

(f) *Transfers.* When this Order is transferred to a new owner or operator, such requirements as may be necessary under the CWC may be incorporated into this Order.

(g) *Conditions not stayed.* The filing of a request by the permittee for modification, revocation and reissuance, or termination of this Order, or a notification of planned change in or anticipated noncompliance with this Order does not stay any condition of this Order.

(h) *Availability.* A copy of this Order shall be kept at a readily accessible location and shall be available to on-site personnel at all times.

(i) *Duty to minimize or correct adverse impacts.* The permittees shall take all reasonable steps to minimize or correct any adverse impact on the environment resulting from noncompliance with this Order, including such accelerated or additional monitoring as may be necessary to determine the nature and impact of the noncompliance.

(j) *Responsibilities, liabilities, legal action, penalties* [CWC sections 13385 and 13387]. The Porter-Cologne Water Quality Control Act provides for civil and criminal penalties comparable to, and in some cases greater than, those provided for under the CWA.

Nothing in this Order shall be construed to protect the discharger from its liabilities under federal, state, or local laws.

Except as provided for in 40CFR 122.41(m) and (n), nothing in this Order shall be construed to relieve the permittee from civil or criminal penalties for noncompliance.

Nothing in this Order shall be construed to preclude the institution of any legal action or relieve the permittee from any responsibilities, liabilities, or penalties to which the discharger is or may be subject to under Section 311 of the CWA.

Nothing in this Order shall be construed to preclude institution of any legal action or relieve the permittee from any responsibilities, liabilities, or penalties established pursuant to any applicable state law or regulation under authoring preserved by Section 510 of the CWA.

(k) *Noncompliance.* Any noncompliance with this Order constitutes violation of the CWC and is grounds for denial of an application for modification of the Order (also see 40 CFR 122.41(a).

(l) *Director.* For purposes of this Order, the term "Director" used in parts of 40 CFR incorporated into this Order by reference and/or applicable to this Order shall have the same meaning as the term "SDRWQCB" used elsewhere in this Order, except that in 40 CFR 122.41(h) and (I), "Director" shall mean "SDRWQCB. SWRCB, and EPA."

(m) The SDRWQCB has, in prior years, issued a limited number of individual NPDES permits for non-storm water discharges to MS4s. The SDRWQCB or SWRCB may in the future, upon prior notice to the Permittee(s), issue an NPDES permit for any non-storm water discharge (or class of non-storm water discharges) to a MS4. Permittees may prohibit any non-storm water discharge (or class of non-storm water discharges) to a MS4 that is authorized under such separate NPDES permits.

(n) *Effective date.* This Order shall become effective on the date of its adoption provided the EPA has no objection. If the EPA objects to its issuance, this Order shall not become effective until such objection is withdrawn. This Order supersedes Order No. R9-98-02 upon the effective date of this Order.

(o) *Expiration.* This Order expires on **July 14, 2009**.

(p) *Continuation of expired order* [23 CCR 2235.4]. After this Order expires, the terms and conditions of this Order are automatically continued pending issuance of a new permit if all requirements of the federal NPDES regulations on the continuation of expired permits (40 CFR 122.6) are complied with.

(q) *Applications.* Any application submitted by a permittee for reissuance or modification of this Order shall satisfy all applicable requirements specified in federal regulations as well as any additional requirements for submittal of a Report of Waste Discharge specified in the CWC and the CCR.

(r) *Confidentiality.* Except as provided for in 40 CFR 122.7, no information or documents submitted in accordance with or in application for this Order will be considered confidential, and all such information and documents shall be available for review by the public at the SDRWQCB office.

(s) *Severability.* The provisions of this Order are severable, and if any provision of this Order, or the application of any provisions of this Order to any circumstance, is held invalid, the application of such provision to other circumstances and the remainder of this Order shall not be affected thereby.

(t) *Report submittal.* The discharger shall submit reports and provide notifications as required by this Order to the following:

NORTHERN WATERSHED PROTECTION UNIT
CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN DIEGO REGION
9174 SKY PARK COURT, SUITE 100
SAN DIEGO CA 92123-4340
Telephone: (858) 467-2952 Fax: (858) 571-6972

EUGENE BROMLEY
US ENVIRONMENTAL PROTECTION AGENCY
REGION IX
PERMITS ISSUANCE SECTION (W-5-1)

75 HAWTHORNE STREET
SAN FRANCISCO CA 94105

Unless otherwise directed, the discharger shall submit one hard copy for the official record and one electronic copy of each report required under this Order to the SDRWQCB and one hard copy to the EPA.

ATTACHMENT C
DEFINITIONS

Anthropogenic Litter – Trash generated from human activities, not including sediment.

Basin Plan – Water Quality Control Plan, San Diego Basin, Region 9, and amendments, developed by the SDRWQCB.

BAT (Best Available Technology) – The technology-based standard established by congress in CWA section 402(p)(3)(A) for industrial dischargers of storm water. Technology-based standards establish the level of pollutant reductions that dischargers must achieve, typically by treatment or by a combination of treatment and best management practices, or BMPs. For example, secondary treatment (or the removal of 85% suspended solids and BOD) is the BAT for suspended solid and BOD removal from a sewage treatment plant. BAT generally emphasizes treatment methods first and pollution prevention and source control BMPs secondarily.

The best economically achievable technology that will result in reasonable further progress toward the national goal of eliminating the discharge of all pollutants, as determined in accordance with regulations issued by the EPA Administrator. Factors relating to the assessment of best available technology shall take into account the age of equipment and facilities involved, the process employed, the engineering aspects of the application of various types of control techniques, process changes, the cost of achieving such effluent reduction, non-water quality environmental impact (including energy requirements), and such other factors as the permitting authority deems appropriate.

Beneficial Uses - The uses of water necessary for the survival or well being of man, plants, and wildlife. These uses of water serve to promote the tangible and intangible economic, social, and environmental goals "Beneficial Uses" of the waters of the State that may be protected against include, but are not limited to, domestic, municipal, agricultural and industrial supply; power generation; recreation; aesthetic enjoyment; navigation; and preservation and enhancement of fish, wildlife, and other aquatic resources or preserves. Existing beneficial uses are uses that were attained in the waters of the State on or after November 28, 1975; and potential beneficial uses are uses that would probably develop in future years through the implementation of various control measures. "Beneficial Uses" are equivalent to "Designated Uses" under federal law. [CWC section 13050(f)].

Bioaccumulate - The progressive accumulation of contaminants in the tissues of organisms through any route including respiration, ingestion, or direct contact with contaminated water, sediment, pore water, or dredged material to a higher concentration than in the surrounding environment. Bioaccumulation occurs with exposure and is independent of the tropic level.

Bioassessment - The use of biological community information to evaluate the biological integrity of a water body and its watershed. With respect to aquatic ecosystems, bioassessment is the collection and analysis of samples of the benthic macroinvertebrate community together with physical/habitat quality measurements associated with the sampling site and the watershed to evaluate the biological integrity of a water body.

Biological Integrity - Defined in Karr J.R. and D.R. Dudley. 1981. Ecological perspective on water quality goals. Environmental Management 5:55-68 as: "A balanced, integrated, adaptive community of organisms having a species composition, diversity, and functional organization comparable to that of natural habitat of the region." Also referred to as ecosystem health.

(BMP) Best Management Practices - Defined in 40 CFR 122.2 as schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the pollution of waters of the U.S. BMPs also include treatment requirements, operating procedures and practices to control plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage.

Clean Water Act Section 303(d) Impaired Water Body - An impaired water body in which water quality does not meet applicable water quality standards and/or is not expected to meet water quality standards, even after the application of technology based pollution controls required by the CWA.

Construction Site – Any project requiring a local grading or building permit, including projects requiring coverage under the General Construction Permit, that involves soil disturbing activities. Soil disturbing activities include clearing, grading, disturbances to ground such as stockpiling, and excavation.

Contamination - As defined in the Porter-Cologne Water Quality Control Act, contamination is "an impairment of the quality of waters of the State by waste to a degree which creates a hazard to the public health through poisoning or through the spread of disease. 'Contamination' includes any equivalent effect resulting from the disposal of waste whether or not waters of the State are affected."

CWA – Federal Clean Water Act

CWC – California Water Code

Designated Waste - A "nonhazardous waste which consists of pollutants which, under ambient environmental conditions at the waste management unit, could be released at concentrations in excess of applicable water quality objectives, or which could cause degradation of waters of the State" [CCR Title 27, chapter 3, subchapter 2, article 2, section 20210; CWC section 13173].

Development Projects - New development or redevelopment with land disturbing activities; structural development, including construction or installation of a building or structure, the creation of impervious surfaces; and land subdivision.

Dry Season – May 1 through September 30 of each year.

Effluent Limitations – any restriction imposed on quantities, discharge rates, and concentrations of pollutants, which are discharged from point sources into waters of the State.

Erosion – When land is diminished or worn away due to wind, water, or glacial ice. Often the eroded debris (silt or sediment) becomes a pollutant via storm water runoff. Erosion occurs naturally but can be intensified by land clearing activities such as farming, development, road building, and timber harvesting.

ESA (Environmentally Sensitive Area) – Areas "in which plant or animal life or their habitats are either rare or especially valuable because of their special nature or role in an ecosystem and which would easily be disturbed or degraded by human activities and developments" (California Public Resources Code section 30107.5). ESAs subject to urban runoff requirements include but are not limited to all CWA section 303(d) impaired water bodies, areas designated as Areas of Special Biological Significance by the SWRCB (Basin Plan); water bodies designated with the RARE beneficial use by the SWRCB (Basin Plan); areas within the Western Riverside County Multi-Species Habitat Conservation Plan (MSHCP) plan area that contain rare or especially valuable plant or animal life or their habitat; and any other equivalent environmentally sensitive areas which the Permittees have identified.

GIS – Geographic Information System

Grading - The cutting and/or filling of the land surface to a desired slope or elevation.

Hazardous Material – Any substance that poses a threat to human health or the environment due to its toxicity, corrosiveness, ignitability, explosive nature or chemical reactivity. These also include materials named by the EPA in 40 CFR 116 to be reported if a designated quantity of the material is spilled into the waters of the U.S. or emitted into the environment.

Hazardous Waste - Hazardous waste is defined as "any waste which, under Section 600 of Title 22 of this code, is required to be managed according to Chapter 30 of Division 4.5 of Title 22 of this code" [CCR Title 22, Division 4.5, Chapter 11, Article 1].

Household Hazardous Waste – Paints, cleaning products, and other wastes generated during home improvement or maintenance activities.

Illicit Connection – Any connection to the MS4 that conveys an illicit discharge.

Illicit Discharge - Any discharge to the MS4 that is not composed entirely of storm water except discharges pursuant to a NPDES permit and discharges resulting from fire fighting activities [40 CFR 122.26(b)(2)].

Inert Waste - Material that "does not contain hazardous waste or soluble pollutants at concentrations in excess of applicable water quality objectives, and does not contain significant quantities of decomposable waste" [CCR Title 27, Chapter 3, Subchapter 2, Article 2, Section 20230].

MEP (Maximum Extent Practicable) – The technology-based standard established by Congress in CWA section 402(p)(3)(B)(iii) that operators of MS4s must meet. Technology-based standards establish the level of pollutant reductions that dischargers must achieve, typically by treatment or by a combination of source control and treatment control BMPs. MEP generally emphasizes pollution prevention and source control BMPs primarily (as the first line of defense) <u>in combination</u> with treatment methods serving as a backup (additional line of defense). MEP considers economics and is generally, but not necessarily, less stringent than BAT. A definition for MEP is not provided either in the statute or in the regulations. Instead the definition of MEP is dynamic and will be defined by the following process over time: municipalities propose their definition of MEP by way of their SWMP. Their total collective and individual activities conducted pursuant to the SWMP becomes their proposal for MEP as it applies both to their overall effort, as well as to specific activities (e.g., MEP for street sweeping, or MEP for MS4 maintenance). In the absence of a proposal acceptable to the SDRWQCB, the SDRWQCB defines MEP.

In a memo dated February 11, 1993, entitled "Definition of Maximum Extent Practicable," Elizabeth Jennings, Senior Staff Counsel, SWRCB addressed the achievement of the MEP standard as follows:

> *"To achieve the MEP standard, municipalities must employ whatever Best Management Practices (BMPs) are technically feasible (i.e., are likely to be effective) and are not cost prohibitive. The major emphasis is on technical feasibility. Reducing pollutants to the MEP means choosing effective BMPs, and rejecting applicable BMPs only where other effective BMPs will serve the same purpose, or the BMPs would not be technically feasible, or the cost would be prohibitive. In selecting BMPs to achieve the MEP standard, the following factors may be useful to consider:*
>
> *a. Effectiveness: Will the BMPs address a pollutant (or pollutant source) of concern?*

b. *Regulatory Compliance: Is the BMP in compliance with storm water regulations as well as other environmental regulations?*
c. *Public Acceptance: Does the BMP have public support?*
d. *Cost: Will the cost of implementing the BMP have a reasonable relationship to the pollution control benefits to be achieved?*
e. *Technical Feasibility: Is the BMP technically feasible considering soils, geography, water resources, etc?*

The final determination regarding whether a municipality has reduced pollutants to the maximum extent practicable can only be made by the Regional or State Water Boards, and not by the municipal discharger. If a municipality reviews a lengthy menu of BMPs and chooses to select only a few of the least expensive, it is likely that MEP has not been met. On the other hand, if a municipal discharger employs all applicable BMPs except those where it can show that they are not technically feasible in the locality, or whose cost would exceed any benefit derived, it would have met the standard. Where a choice may be made between two BMPs that should provide generally comparable effectiveness, the discharger may choose the least expensive alternative and exclude the more expensive BMP. However, it would not be acceptable either to reject all BMPs that would address a pollutant source, or to pick a BMP base solely on cost, which would be clearly less effective. In selecting BMPs the municipality must make a serious attempt to comply and practical solutions may not be lightly rejected. In any case, the burden would be on the municipal discharger to show compliance with its permit. After selecting a menu of BMPs, it is the responsibility of the discharger to ensure that all BMPs are implemented."

MS4 (Municipal Separate Storm Sewer System) – A conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, or storm drains): (i) Owned or operated by a State, city town, borough, county, parish, district, association, or other public body (created by or pursuant to State law) having jurisdiction over disposal of sewage, industrial wastes, storm water, or other wastes, including special districts under State law such as a sewer district, flood control district or drainage district, or similar entity, or an Indian tribe or an authorized Indian tribal organization, or designated and approved management agency under section 208 of the CWA that discharges to waters of the United States; (ii) Designated or used for collecting or conveying storm water; (iii) Which is not a combined sewer; (iv) Which is not part of the Publicly Owned Treatment Works (POTW) as defined at 40 CFR 122.26.

NOI – Notice of Intent

Non-hazardous Solid Waste - All putrescible and nonputrescible solid, semi-sold, and liquid wastes, including garbage, trash, refuse, paper, rubbish, ashes, industrial wastes, demolition and construction wastes, abandoned vehicles and parts thereof, discarded home and industrial appliances, manure, vegetable or animal solid and semi-sold wastes and other discarded solid or semi-solid waste; provided that such wastes do not contain wastes which must be managed as hazardous wastes, or wastes which contain soluble pollutants in concentration which exceed applicable water quality objectives or could cause degradation of wasters of the state." [CCR Title 27, Chapter 3, Subchapter 2, Article 2, Section 20220]

Non-Storm Water - All discharges to and from a MS4 that do not originate from precipitation events (i.e., all discharges from a MS4 other than storm water). Non-storm water includes illicit discharges, non-prohibited discharges, and NPDES permitted discharges.

NPDES (National Pollution Discharge Elimination System) - The national program for issuing, modifying, revoking and reissuing, terminating, monitoring and enforcing permits, and imposing and enforcing pretreatment requirements, under Sections 307, 318, 402, and 405 of the CWA.

NPS (Nonpoint Source) – Diffuse, widespread sources of pollution. These sources may be large or small, but are generally numerous throughout a watershed. Non Point Sources include but are not limited to urban, agricultural, or industrial areas, roads, highways, construction sites, communities served by septic systems, recreational boating activities, timber harvesting, mining, livestock grazing, as well as physical changes to stream channels, and habitat degradation. NPS pollution can occur year round any time rainfall, snowmelt, irrigation, or any other source of water runs over land or through the ground, picks up pollutants from these numerous, diffuse sources and deposits them into rivers, lakes, and coastal waters or introduces them into ground water.

Nuisance - As defined in the Porter-Cologne Water Quality Control Act a nuisance is "anything which meets all of the following requirements: 1) Is injurious to health, or is indecent, or offensive to the senses, or an obstruction to the free use of property, so as to interfere with the comfortable enjoyment of life or property. 2) Affects at the same time an entire community or neighborhood, or any considerable number of persons, although the extent of the annoyance or damage inflicted upon individuals may be unequal. 3) Occurs during, or as a result of, the treatment or disposal of wastes."

Order – Order No. R9-2004-001 (NPDES No. CAS0108766)

Person - A person is defined as an individual, association, partnership, corporation, municipality, State or Federal agency, or an agent or employee thereof [40 CFR 122.2].

Point Source - Any discernible, confined, and discrete conveyance, including, but not limited to, any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operations, landfill leachate collection systems, vessel, or other floating craft from which pollutants are or may be discharged. This term does not include return flows from irrigated agriculture or agricultural storm water runoff.

Pollutant - Any agent that may cause or contribute to the degradation of water quality such that a condition of pollution or contamination is created or aggravated.

Pollution - As defined in the Porter-Cologne Water Quality Control Act: "the alteration of the quality of the waters of the State by waste, to a degree that unreasonably affects the either of the following: 1) The waters for beneficial uses; or 2) Facilities that serve these beneficial uses." Pollution may include contamination.

Pollutants of Concern – All pollutants for which water bodies are listed as impaired under CWA section 303(d), all pollutants associated with the land use type of a development, and all pollutants commonly associated with urban runoff. Pollutants commonly associated with urban runoff include total suspended solids; sediment; pathogens (e.g., bacteria, viruses, protozoa); heavy metals (e.g., copper, lead, zinc, and cadmium); petroleum products and polynuclear aromatic hydrocarbons; synthetic organics (e.g., pesticides, herbicides, and PCBs); nutrients (e.g., nitrogen and phosphorus fertilizers); oxygen-demanding substances (decaying vegetation, animal waste, and anthropogenic litter).

Pollution Prevention - Pollution prevention is defined as practices and processes that reduce or eliminate the generation of pollutants, in contrast to source control BMPs, treatment control BMPs, or disposal.

Post-Construction BMPs - A subset of BMPs including structural and non-structural controls which detain, retain, filter, or educate to prevent the release of pollutants to surface waters during the final functional life of developments.

Principal Permittee – Riverside County Flood Control and Water Conservation District

Priority Development Projects – New development and redevelopment projects listed in Requirement F.2.b.(1) of tentative Order No. R9-2004-001.

Receiving Waters – Waters of the U.S.

RWLs (Receiving Water Limitations) - Waste discharge requirements issued by the SDRWQCB typically include both: (1) "Effluent Limitations" (or "Discharge Limitations") that specify the technology-based or water-quality-based effluent limitations; and (2) "Receiving Water Limitations" that specify the water quality objectives in the Basin Plan as well as any other limitations necessary to attain those objectives. In summary, the "Receiving Water Limitations" provision is the provision used to implement the requirement of CWA section 301(b)(1)(C) that NPDES permits must include any more stringent limitations necessary to meet water quality standards.

Sediment - Soil, sand, and minerals washed from land into water. Sediment resulting from anthropogenic sources (i.e. human induced land disturbance activities) is considered a pollutant. This Order regulates only the discharges of sediment from anthropogenic sources and does not regulate naturally occurring sources of sediment. Sediment can destroy fish-nesting areas, clog animal habitats, and cloud waters so that sunlight does not reach aquatic plants.

Shared Treatment BMP - BMPs used by multiple developments to infiltrate, filter, or treat the required volume or flow prior to discharge to a receiving water. This could include, for example, a treatment BMP at the end of an enclosed storm drain that collects runoff from several commercial developments.

Source Control BMP – Land use or site planning practices, or structural or nonstructural measures that aim to prevent urban runoff pollution by reducing the potential for contamination at the source of pollution. Source control BMPs minimize the contact between pollutants and urban runoff.

Storm Water – Per 40 CFR 122.26(b)(13), means storm water runoff, snowmelt runoff and surface runoff and drainage.

SUSMP (Standard Urban Storm Water Mitigation Plan) – A plan developed to mitigate the impacts of urban runoff from Priority Development Projects in accordance with Requirement F.2.b. of tentative Order No. R9-2004-001.

SWMP (Storm Water Management Plan) – A written description of the specific urban runoff management measures and programs that each Permittee will implement to reduce the discharge of pollutants in urban runoff to the MEP and to comply with Order No. R9-2004-001.

TMDL (Total Maximum Daily Load) - The maximum amount of a pollutant that can be discharged into a water body from all sources (point and non-point) and still maintain water quality standards. Under CWA section 303(d), TMDLs must be developed for all water bodies that do not meet water quality standards after application of technology-based controls.

Toxicity - Adverse responses of organisms to chemicals or physical agents ranging from mortality to physiological responses such as impaired reproduction or growth anomalies). The water quality objectives

for toxicity provided in the Basin Plan state in part... *"All waters shall be free of toxic substances in concentrations that are toxic to, or that produce detrimental physiological responses in human, plant, animal, or aquatic life... The survival of aquatic life in surface waters subjected to a waste discharge or other controllable water quality factors, shall not be less than that for the same water body in areas unaffected by the waste discharge."*

Treatment Control BMP – Any engineered system designed to remove pollutants by simple gravity settling of particulate pollutants, filtration, biological uptake, media absorption or any other physical, biological, or chemical process.

Urban Runoff - All flows in a storm water conveyance system and consists of the following components: (1) storm water (wet weather flows) and (2) non-storm water illicit discharges (dry weather flows).

Waste - As defined in CWC Section 13050(d), "waste includes sewage and any and all other waste substances, liquid, solid, gaseous, or radioactive, associated with human habitation, or of human or animal origin, or from any producing, manufacturing, or processing operation, including waste placed within containers of whatever nature prior to, and for purposes of, disposal."

Article 2 of CCR Title 23, Chapter 15 (Chapter 15) contains a waste classification system that applies to solid and semi-solid waste, which cannot be discharged directly or indirectly to water of the state and which therefore must be discharged to land for treatment, storage, or disposal in accordance with Chapter 15. There are four classifications of waste (listed in order of highest to lowest threat to water quality): hazardous waste, designated waste, non-hazardous solid waste, and inert waste.

Water Quality Objective - Numerical or narrative limits on constituents or characteristics of water designated to protect designated beneficial uses of the water. [CWC section 13050 (h)]. California's water quality objectives are established by the SWRCB and RWQCBs in the Water Quality Control Plans.

Water Quality Standards - The beneficial uses (e.g., swimming, fishing, municipal drinking water supply, etc.,) of water and the water quality objectives necessary to protect those uses.

Waters of the State - Any water, surface or underground, including saline waters within the boundaries of the State [CWC section 13050 (e)]. The definition of the Waters of the State is broader than that for the Waters of the United States in that all water in the State is considered to be a Waters of the State regardless of circumstances or condition. Under this definition, a MS4 is always considered to be a Waters of the State.

Waters of the United States - As defined in 40 CFR 122.2, the Waters of the U.S. are defined as: **"(a) All waters, which are currently used, were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide;** (b) All interstate waters, including interstate "wetlands;" (c) All other waters such as intrastate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, "wetlands," sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds the use, degradation or destruction of which would affect or could affect interstate or foreign commerce including any such waters: (1) Which are or could be used by interstate or foreign travelers for recreational or other purposes; (2) From which fish or shellfish are or could be taken and sold in interstate or foreign commerce; or (3) Which are used or could be used for industrial purposes by industries in interstate commerce; (d) All impoundments of waters otherwise defined as waters of the United States under this definition**: (e) Tributaries of waters identified in paragraphs (a) through (d) of this definition;** (f) The territorial seas; and (g) "Wetlands" adjacent to waters (other than waters that are themselves wetlands) identified in paragraphs (a) through (f) of this

definition. Waters of the United States do not include prior converted cropland. Notwithstanding the determination of an area's status as prior converted cropland by any other federal agency, for the purposes of the CWA, the final authority regarding CWA jurisdiction remains with the EPA."

Watershed - That geographical area which drains to a specified point on a water course, usually a confluence of streams or rivers (also known as drainage area, catchment, or river basin).

WDRs – Waste Discharge Requirements

Wet Season – October 1 through April 30 of each year.

ATTACHMENT D

INDIVIDUAL SWMP CONTENTS

Pursuant to Requirement E.1.a. of tentative Order No. R9-2004-001, each Permittee shall develop an Individual SWMP that describes their specific urban runoff management programs and activities that will be implemented to comply with the Order. An individual SWMP that addresses the items listed below would provide a complete description of the programs and activities the Permittee plans to implement to comply with the Order and to reduce pollutants in urban runoff to the MEP. In the event that a specific component is not applicable to a Permittee, the Permittee shall provide an explanation of non-applicable programs with the SWMP submittal and does not need to provide the information requested below in that particular section of their Individual SWMP.

1. Administrative and Legal Procedures

a) Identification of all departments within the jurisdiction that conduct urban runoff related activities, and their roles and responsibilities under the Order. Include an up-to-date organizational chart specifying these departments and key personnel;

b) Citation of urban runoff related ordinances and the reasons they are enforceable;

c) Identification of the local administrative and legal procedures available to mandate compliance with urban runoff related ordinances and therefore with the conditions of the Order;

d) Description of how these ordinances are implemented and appealed; and

e) Description of whether the Permittee can issue administrative orders and injunctions or if it must go through the court system for enforcement actions.

2. Development Planning (Section F)

a) A description of the water quality and watershed protection principles that have been or will be included in the Permittee's General plan, and a time schedule where modifications are planned, if applicable;

b) A description of the development project approval process and how it ensures that urban runoff from new development and redevelopment will be reduced to the MEP, that post-development runoff volumes and velocities will be controlled, and that water quality objectives will not be violated throughout the life of the project;

c) A final SUSMP document that meets the requirements specified in Section F.2.b. of the Order, and a copy of the ordinance (amended or new) that gives the Permittee the authority to implement and enforce the SUSMP. The SUSMP may be submitted under separate cover as an attachment to the SWMP;

d) A description of the Permittee's current environmental review process and how it addresses impacts to water quality and appropriate mitigation measures. If the Permittee plans to modify the process during the permit term, a time schedule for modifications shall be included;

e) A description of education efforts related to development and how they will be implemented; and

f) A description of the measurable goals that will be used to assess the effectiveness of this program component.

3. Construction Component (Section G)

a) A description of which pollution prevention methods will be required for implementation, and the steps that will be taken to ensure implementation;

b) Updated grading ordinances, including adequate enforcement mechanisms;

c) A description of the modified construction and grading approval process;

d) Updated construction and grading project requirements in local grading and construction permits;

e) A completed inventory of all construction sites;

f) A list and description of minimum BMPs that will be implemented, or required to be implemented;

g) A description of the steps that will be taken to ensure the implementation of prescribed BMPs at all construction sites;

h) A description of planned inspection frequencies;

i) A description of inspection procedures;

j) A description of enforcement mechanisms and steps that will be used;

k) A description of the construction education program and how it will be implemented; and

l) A description of the measurable goals that will be used to assess the effectiveness of this program component.

4. Municipal Component (Section H.1)

a) A description of which pollution prevention methods will be required for implementation, and the steps taken to ensure implementation;

b) A completed inventory of all municipal facilities and activities;

c) A description of which BMPs will be implemented, or required to be implemented, for municipal facilities and activities;

d) A description of steps that will be taken to ensure the implementation of prescribed BMPs at municipal facilities and activities;

e) A description of municipal maintenance activities and schedules;

f) A description of the management strategy for pesticides, herbicides, and fertilizer use;

g) A description of inspection procedures;

h) A description of enforcement mechanisms and how they will be used; and

i) A description of the measurable goals that will be used to assess the effectiveness of this program component.

5. Industrial/Commercial Facilities Component (Section H.2)

a) A description of which pollution prevention methods will be required for implementation, and the steps that will be taken to ensure implementation;

b) A completed and prioritized inventory of all industrial/commercial facilities that could contribute a significant pollutant load to the MS4;

c) A list of minimum BMPs that will be implemented, or required to be implemented, for each facility type or pollutant-generating activity;

d) A description of the steps that will be taken to ensure the implementation of prescribed BMPs at industrial/commercial facilities, including notification procedures;

e) A description of inspection procedures;

f) A description of enforcement mechanisms and how they will be used;

g) A description of training efforts; and

h) A description of the measurable goals that will be used to assess the effectiveness of this program component.

6. Residential Component (Section H.3)

a) A description of which pollution prevention methods will be encouraged for implementation, and the steps that will be taken to encourage implementation;

b) A list of residential activities that have been identified as high priority;

c) A list of minimum BMPs that will be implemented, or required to be implemented, for high priority residential activities;

d) A description of the steps that will be taken to ensure the implementation of prescribed BMPs for high priority residential activities;

e) A description of enforcement mechanisms and how they will be used; and

f) A description of the measurable goals that will be used to assess the effectiveness of this program component.

7. Education Component (Section I)

a) A description of the content, form, and frequency of education efforts for each target community; and

b) A description of the measurable goals that will be used to assess the effectiveness of the public education program.

8. Illicit Discharge Detection and Elimination Component (Section J)

a) A description of the program to actively seek and eliminate illicit discharges and illicit connections;

b) An Illicit Discharge Monitoring Program, in accordance with the Monitoring and Reporting Program, to be conducted to detect illicit discharges and illicit connections;

c) A description of investigation and inspection procedures to follow up on dry weather monitoring results or other information which indicate potential for illicit discharges and illicit connections;

d) A description of procedures to promptly eliminate detected illicit discharges and illicit connections;

e) A description of enforcement mechanisms and how they will be used;

f) A description of the mechanism to receive notification of spills;

g) A description of efforts to facilitate public reporting of illicit discharges and connections, including a public hotline;

h) A description of efforts to facilitate proper disposal of used oil and other toxic materials; and

i) A description of measurable goals that will be used to assess the effectiveness of this program component.

9. Public Participation Component (Section E.3)

A description of how public participation will be included in the development and implementation of each Permittee's Individual SWMP.

10. Assessment of Individual SWMP Effectiveness Component

As part of its Individual SWMP, each Permittee shall develop a long-term strategy for assessing the effectiveness of its Individual SWMP. The long-term assessment strategy shall, at a minimum, include the following:

a) An assessment of the progress towards meeting the measurable goals identified in each program component;

b) An assessment of Illicit Discharge and Receiving Water monitoring data; and

c) An assessment of overall program effectiveness.

11. Fiscal Analysis Component

Each Permittee shall secure the resources necessary to meet the requirements of the Order. As part of its Individual SWMP, each Permittee shall describe and analyze the capital and operation and maintenance expenditures necessary to accomplish the activities required in the Order, and a description of the source of funds the Permittee proposes to use to meet those expenditures.

12. Fire Fighting

A description of a program to reduce pollutants from non-emergency fire fighting flows identified by the Permittee to be significant sources of pollutants.

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN DIEGO REGION
MONITORING AND REPORTING PROGRAM No. R9-2004-001
NPDES PERMIT No. CAS0108766
FOR THE DISCHARGES OF URBAN RUNOFF FROM THE MUNICIPAL SEPARATE STORM SEWER SYSTEMS (MS4s) DRAINING THE COUNTY OF RIVERSIDE, THE CITY OF MURRIETA, THE CITY OF TEMECULA AND THE RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT WITHIN THE SANTA MARGARITA WATERSHED IN THE SAN DIEGO REGION

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I. PURPOSE

This Monitoring and Reporting Program (MRP) is intended to meet the following goals:

1. Assess compliance with Order No. R9-2004-001;
2. Measure and improve the effectiveness of the SWMPs;
3. Assess the chemical, physical, and biological impacts of receiving waters resulting from urban runoff;
4. Characterize urban runoff discharges;
5. Identify sources of specific pollutants;
6. Prioritize drainage and sub-drainage areas that need management actions;
7. Detect and eliminate illicit discharges and illicit connections to the MS4; and
8. Assess the overall health of receiving waters.

II. MONITORING PROGRAM

The Monitoring Program consists of the Receiving Waters Monitoring, Illicit Discharge Monitoring, Monitoring Provisions, and the program assessments required under Section III.B of this MRP. All monitoring program components shall be implemented no later than October 2004, unless otherwise specified herein.

A. Receiving Waters Monitoring

The Receiving Waters Monitoring consists of: 1) **Core Monitoring** requirements to address on-going, site-specific needs, such as estimating pollutant loads and assessing trends; 2) **Regional Monitoring** to address watershed-wide issues; and 3) **Special Studies** to address specific research or management issues.

A.I Core Monitoring

In order to achieve the above goals, the triad[1] and tributary Core Monitoring requirements are intended to generate water quality data that will build upon existing data to begin answering the following management questions:

- Are conditions in receiving waters protective, or likely to be protective, of beneficial uses?
- What is the extent and magnitude of the current or potential receiving water problems?
- What is the relative urban runoff contribution to the receiving water problem(s)?
- What are the sources of urban runoff that contribute to receiving water problem(s)?
- Are conditions in receiving waters getting better or worse?

1. Mass Loadings

   a) The Permittees shall monitor mass loadings from the following three triad stations. Alternative locations representative of urban/urbanizing drainage areas may be selected.

      (1) Lower Temecula Creek;

      (2) Lower Murrieta Creek @ USGS Weir; and

      (3) A reference station representative of natural, undeveloped conditions. Permittees shall evaluate the reference station annually for suitability and select new reference stations as needed.

[1] Triad means a station where chemical, toxicity, and bioassessment monitoring occur.

b) At each triad station, the Permittees shall monitor the first storm event of each monitoring year[2] that produces sufficient flow to collect a composite sample, and a minimum of two additional storm events during each monitoring year.

c) In the event that the required number of storm events are not sampled during one monitoring year at any given station, the Permitees shall submit, with the subsequent Annual Report, a written explanation for a lack of sampling data, including streamflow data from the nearest USGS gauging station.

d) In addition to the storm events, the Permittees shall analyze a minimum of two dry weather samples from each triad station per monitoring year. If flow is insufficient to collect a sample, this shall be documented in the subsequent annual report.

e) Sampling at triad stations shall begin no later than the first storm after October 2004 that produces sufficient flow to collect a composite sample.

f) Mass loading sampling and analysis protocols shall be consistent with 40 CFR 122.21(g)(7)(ii) and with the EPA Storm Water Sampling Guidance Document (EPA 833-B-92-001). Storm water samples shall be flow-weighted composites[3], collected during the first 3 hours of flow, or for the duration of the storm if it is less than 3 hours. A minimum of 3 sample aliquots, separated by a minimum of 15 minutes, shall be taken within each hour of discharge, unless the SDRWQCB Executive Officer approves an alternate protocol. Automatic samplers are recommended, but manual samples may be collected from mass loading stations where it is not feasible to install an automatic sampler. Grab samples[4] shall be taken for pathogen indicators and oil and grease. Grab samples are acceptable for dry weather sample collection.

g) Permittees shall measure or estimate flow rates and volumes for each triad sampling event in order to determine mass loadings of pollutants. Data from nearby USGS gauging stations may be utilized, or flow rates may be estimated in accordance with the EPA Storm Water Sampling Guidance Document (EPA-833-B-92-001), Section 3.2.1.

h) At triad stations, the first storm of every sampling year shall be analyzed for the full EPA priority pollutant list (40 CFR 122, Appendix D). For the remaining sampling events, analysis may be reduced to the constituents listed in Table below, unless data from the first storm indicate the need for additional constituents.

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[2] A monitoring year is from July 1 through June 30.
[3] A flow-weighted composite sample is a mixed or combined sample that is formed by combining a series of individual and discrete samples of specific volume in proportion to flow.
[4] A grab sample is a discrete, individual sample taken within a short period of time (usually less than 15 minutes).

Table 1. Short List of Constituents	
Trace Metals	**Pesticides**
Total Cadmium	Diazinon
Total Chromium	chlorpyrifos
Total Copper	Other OP pesticides
Total Nickel	
Total Lead	**Conventionals**
Total Zinc	Temperature
Nutrients	pH
Ammonia (NH_3)	Hardness
Total Kjeldahl Nitrogen (TKN)	Specific conductance
Nitrate (NO_3)	Dissolved oxygen
Total phosphorus	MBAS
Bacteria	**PAHs**
Total coliform	
Fecal coliform	**Volatiles** (dry weather only)
E. coli	
	Total suspended solids

2. Water Column Toxicity Testing

The Permittees shall conduct toxicity testing at triad stations to evaluate the extent and causes of toxicity in receiving waters.

a) The Permittees shall analyze all storm samples (at least three annually) collected at the three triad stations for toxicity. The Permittees shall conduct toxicity testing using the following three species and EPA protocol for each sample:

- *Ceriodaphnia dubia* (water flea) – EPA-821-R-02-012 or EPA-821-R-02-013;
- *Hyalella azteca* (freshwater amphipod) – EPA-821-R-02-012; and
- *Pseudokirchneriella subcapitata*, formally known as *Selenastrum capricornutum*, (unicellular algae) – EPA-821-R-02-013.

b) The presence of acute toxicity shall be determined in accordance with EPA protocol (EPA-821-R-02-012). The presence of chronic toxicity shall be determined in accordance with EPA protocol (EPA-821-R-02-013).

3. Bioassessment

The Permittees shall conduct bioassessment monitoring at the three triad stations to evaluate the biological integrity of receiving waters, to detect biological responses to pollutants in urban runoff, and to identify probable causes of impairment not detected by chemical and toxicity monitoring. The program required in this section replaces the program currently being conducted by the Permittees under CWC section 13225 Directive for Assessing Water Quality Impacts of Urban Runoff in the Santa Margarita Watershed, issued by the SDRWQCB on March 6, 2003. Bioassessment monitoring shall include the following:

a) Each bioassessment station shall be monitored twice annually, in May and October of each year. A minimum of three replicate samples shall be collected at each station during each sampling event.

b) Sampling, laboratory, quality assurance, and analysis procedures shall follow the standardized procedures set forth in the California Department of Fish and Game's California Stream Bioassessment Procedure (CSBP)[5]. Analysis procedures shall include comparison between station mean values for various biological metrics and the Preliminary San Diego Index of Biotic Integrity (IBI)[6], or any subsequently developed applicable IBI. Sampling, laboratory, quality assurance, and analytical procedures shall follow the standardized "Non-Point Source Bioassessment Sampling Procedures" for professional bioassessment set forth in the CSBP. In the event that the CSBP "Point-Source Professional Bioassessment Procedure" is performed in place of the "Non Point Source Bioassessment Sampling Procedure," justification and documentation of the procedure shall be submitted with the annual monitoring report.

c) A professional environmental laboratory shall perform all sampling, laboratory, quality assurance, and analytical procedures. Permittee staff trained in CSBP methods may collect samples, but data collected by volunteer monitoring organizations shall not be submitted in place of professional assessments.

4. Follow-up Analysis and Actions Based on Triad Approach

When results from the chemistry, toxicity, and bioassessment monitoring described above indicate urban runoff-induced degradation, Permittees shall evaluate the extent and causes of urban runoff pollution in receiving waters and prioritize management actions to eliminate or reduce sources. Toxicity Identification Evaluations (TIEs) shall be used to determine the cause of toxicity, and Toxicity Reduction Evaluations (TRE) shall be used to identify sources and implement management actions to reduce pollutants in urban runoff causing toxicity. Permittees shall conduct TIE(s) and TRE(s) based on Table 2 below.

[5] California Stream Bioassessment Procedure (Protocol Brief for Biological and Physical/Habitat Assessment in Wadeable Streams), California Department of Fish and Game – Aquatic Bioassessment Laboratory, May 1999.
[6] This document can be downloaded from http://www.swrcb.ca.gov/rwqcb9/programs/bioassessment.html

Table 2. Triad Approach to Determining Follow-Up Actions

	Chemistry	Toxicity	Bioassessment	Action
1.	Persistent[7] exceedance of water quality objectives	Evidence of toxicity[8]	Indications of benthic alteration[9]	Conduct TIE to identify contaminants of concern, based on TIE metric, initiate TRE
2.	No persistent exceedances of water quality objectives	No evidence of toxicity	No indications of benthic alteration	No action necessary
3.	Persistent exceedance of water quality objectives	No evidence of toxicity	No indications of benthic alteration	Assess possible upstream sources causing exceedances
4.	No persistent exceedances of water quality objectives	Evidence of toxicity	No indications of benthic alteration	Conduct TIE to identify contaminants of concern, based on TIE metric, initiate TRE
5.	No persistent exceedances of water quality objectives	No evidence of toxicity	Indications of benthic alteration	No action necessary due to toxic chemicals Initiate TRE for physical sources of benthic alteration
6.	Persistent exceedance of water quality objective	Evidence of toxicity	No indications of benthic alteration	If chemical and toxicity tests indicate persistent degradation, conduct TIE to identify contaminants of concern, based on TIE metric, initiate TRE
7.	No persistent exceedances of water quality objectives	Evidence of toxicity	Indications of benthic alteration	Conduct TIE to identify contaminants of concern, based on TIE metric, initiate TRE
8.	Persistent exceedance of water quality objectives	No evidence of toxicity	Indications of benthic alteration	Initiate upstream source identification

[7] Persistent exceedance shall mean the exceedance of relevant Basin Plan or California Toxics Rule objectives by 20% for 3 sampling events.
[8] Evidence of toxicity shall mean a high score, in relation to other stations, on metric that combines magnitude and persistence of toxicity over an entire year.
[9] Indications of benthic alteration shall mean an IBI score of Fair, Poor, or Very Poor.

a) Toxicity Identification Evaluations (TIE)

The goal of a TIE is to identify the pollutant(s) causing toxicity in the receiving waters.

(1) Permittees shall conduct Phase I TIEs in accordance with Table 2 above. Permittees shall use EPA protocol described in *Methods for Aquatic Toxicity Identification Evaluations: Phase I Toxicity Characterization Procedures* (EPA/600/6-91/003) or subsequent editions.

(2) If the Phase I TIE is not sufficient to identify the toxicant(s), a Phase II TIE may be required in order to identify or confirm the identity of the pollutants causing toxicity. Phase II TIEs shall be conducted in accordance with Methods for Aquatic Toxicity Identification Evaluations: Phase II Toxicity Identification Procedures for Samples Exhibiting Acute and Chronic Toxicity (EPA/600/R-92/080), or subsequent editions.

(3) In the event that the pollutant causing toxicity has been sufficiently identified through previous TIEs or corresponding chemical monitoring data, a TIE may not need to be conducted.

b) Toxicity Reduction Evaluations (TRE)

The purpose of a TRE is to investigate the cause of and to identify corrective actions to eliminate toxicity from urban runoff in receiving waters.

When a TIE identifies a pollutant(s) associated with urban runoff as a cause of toxicity, Permittees shall initiate a TRE immediately. The TRE shall include all reasonable steps to identify the source(s) of toxicity and propose appropriate BMPs to eliminate the causes of toxicity. Once the source of toxicity and appropriate BMPs are identified, the Permittees shall submit the TRE to the SDRWQCB for review. Within 30 days following the approval by the SDRWQCB, Permittees shall revise their SWMPs to incorporate the modified BMPs that will be implemented. At a minimum, a TRE shall include a discussion of the following items:

(1) The potential sources of pollutant(s) causing toxicity;

(2) A list of municipalities and other entities that may have jurisdiction over sources of pollutant(s) causing toxicity; and

(3) Proposed actions that will be taken to reduce the pollutants causing toxicity and methods to measure the effectives of those actions.

5. Tributary Monitoring

a) The Permittees shall collect a grab sample from the first storm event of each monitoring year, a minimum of one additional storm event, and two dry weather events during each monitoring year at the following four tributary stations to help identify sources of pollutants. Alternative locations representative of urban/urbanizing drainage areas may be selected.

(1) Warm Springs Creek, near the confluence with Murrieta Creek;

(2) Santa Gertudis Creek, near the confluence with Murrieta Creek;

(3) Long Canyon Creek near the confluence with Murrieta Creek; and

(4) Redhawk Channel, near the confluence with Temecula Creek

b) If flow is insufficient to collect a sample, this shall be documented in the subsequent annual report.

c) Tributary samples shall be analyzed for constituents of concern. Constituents of concern shall be determined based on exceedances of water quality objectives at respective triad and dry weather monitoring stations, as well as land uses in the area.

d) Sampling at tributary stations shall begin no later than the first storm after October 2004.

A.II Regional Monitoring

The Permittees shall participate and coordinate with federal, state, and local agencies and other dischargers in the Santa Margarita Watershed in development and implementation of a regional watershed monitoring program as directed by the Executive Officer. The intent of a regional monitoring program is to maximize the efforts of all monitoring partners using a more cost-effective monitoring design and to best utilize the pooled resources of the watershed. During a coordinated watershed sampling effort, the Permittees' sampling and analytical effort may be reallocated to provide a regional assessment of the impact of discharges to the watershed.

A.III Special Studies

Special studies are intended to address specific research or management issues that are not addressed by the routine core monitoring program. The Permittees' shall conduct special studies as directed by the Executive Officer, including the study described below.

Numeric Criteria to Control Runoff from New Developments

The Permittees shall develop and implement a study to determine numeric criteria for controlling the volume, velocity, duration, and peak discharge rate of runoff from new developments (required in section F.2.b(9) of Order No. 2004-001) to minimize erosion of natural stream channels and impacts to instream habitat. The Permittees shall propose numeric criteria and a time-schedule for implementation of the criteria on Priority Development Projects within 365 days of the identification of the criteria and no later than the fourth-year Annual Report, or the application for permit renewal. In each Annual Report, the Permittees shall describe the status of this special study, details of implementation, and progress towards the development of numeric criteria. Permittees may satisfy this requirement if they can demonstrate to the SDRWQCB that criteria developed in other areas of Southern California are applicable to and protective of the conditions in the Upper Santa Margarita Watershed. This should be accomplished through demonstrating similarities in areas monitored as part of studies outside of the Santa Margarita Watershed.

B. Illicit Discharge Monitoring

Each Permittee shall develop and implement an Illicit Discharge Monitoring program that meets or exceeds the requirements of this section within 365 days of the adoption of Order No. R9-2004-001. Each Permittees' program shall be designed to emphasize frequent, geographically widespread inspections, monitoring, and follow-up investigations to detect illicit discharges and connections. Each Permittees' Illicit Discharge Monitoring Program shall be described in the Individual SWMP.

1. Station Location

   a) Each Permittee shall select Illicit Discharge Monitoring stations within its jurisdiction. The number of stations shall be sufficient to represent the MS4 and detect illicit discharges that may occur throughout the system. Stations shall be accessible points in the MS4 (i.e., outfalls, manholes or open channels) located downstream of potential sources of illicit discharges (i.e., commercial, industrial, and residential areas). Permittees shall use the MS4 map, developed pursuant to section J.2 of Order No. R9-2004-001, to help locate dry weather monitoring stations and to determine the number necessary to adequately represent the entire MS4. Each identified station shall be inspected at least twice between May 1st and September 30th of each year, and more frequently if the Permittee determines necessary to comply with section J of Order No. R9-2004-001.

   b) In addition to the stations required in section B.1.a. above, each Permittee shall inspect all other dry weather flows that are observed or reported.

2. Illicit Discharge Monitoring Methods

   a) At each inspected site, Permittees shall record the following general information:
      - Time since last rain;
      - Quantity of last rain;
      - Site descriptions (i.e., conveyance type, dominant land uses in drainage area);
      - Flow estimation (i.e., width of surface, approximate depth of water, approximate flow velocity, flow rate); and
      - Visual observations (e.g., odor, color, clarity, floatables, deposits/stains, oil sheen, surface scum, vegetation condition, structural condition, and biology).

   b) If flow or ponded water is observed at a station and there has been at least seventy-two hours of dry weather, a field screening analysis using suitable methods to estimate the following constituents shall be conducted:

      (1) Specific conductance (or calculate estimated Total Dissolved Solids);
      (2) Turbidity;
      (3) PH;
      (4) Temperature; and
      (5) Dissolved Oxygen.

   c) If field screening analysis or visual observations at a site indicate a potential illicit discharge, a sample shall be collected for laboratory analysis. At a minimum, samples shall be analyzed at a laboratory for the following constituents:

      (1) Total hardness;

(2) Oil and grease;
(3) Ammonia Nitrogen;
(4) Total phosphorus;
(5) Copper (total and dissolved);
(6) Surfactants (MBAS);
(7) Diazinon and Chlorpyrifos;
(8) Lead (dissolved);
(9) Nitrate Nitrogen;
(10) E. coli;
(11) Total coliform; and
(12) Fecal coliform.

3. As part of the Illicit Discharge Monitoring Program, the Permittees shall develop numeric criteria for field screening and analytical monitoring results that will trigger follow-up investigations to identify the source causing the exceedance of the criteria. In the event of an exceedance of the criteria, Permittees shall implement the follow-up investigation procedures developed pursuant to section J.4 of Order No. R9-2004-001.

C. Monitoring Provisions

All monitoring activities shall meet the following requirements:

a) Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity [40 CFR 122.41(j)(1)].

b) The Permittees shall retain records of all monitoring information, including all calibration and maintenance of monitoring instrumentation, copies of all reports required by this Order, and records of all data used to complete the Report of Waste Discharge and application for this Order, for a period of at least five (5) years from the date of the sample, measurement, report, or application. This period may be extended by request of the SDRWQCB or EPA at any time and shall be extended during the course of any unresolved litigation regarding this discharge. [40 CFR 122.41(j)(2), CWC section 13383(a)]

c) Records of monitoring information shall include [40 CFR 122.41(j)(3)]:

(1) The date, exact place, and time of sampling or measurements;
(2) The individual(s) who performed the sampling or measurements;
(3) The date(s) analyses were performed;
(4) The individual(s) who performed the analyses;
(5) The analytical techniques or methods used; and,
(6) The results of such analyses.

d) All sampling, sample preservation, and analyses must be conducted according to test procedures approved under 40 CFR part 136, unless other test procedures have been specified in this MRP or approved by the Executive Officer [40 CFR 122.41(j)(4)].

e) Where procedures are not otherwise specified in this MRP, sampling, analysis and quality assurance/quality control must be conducted in accordance with the Quality Assurance Program Plan (QAPP) for the State of California's Surface Water Ambient Monitoring Program, adopted

by the State Water Resources Control Board (SWRCB). The QAPP can be downloaded from the SWRCB web page at: http://www.swrcb.ca.gov/swamp/docs/swamp_qapp.pdf.

f) The CWA provides that any person who falsifies, tampers with, or knowingly renders inaccurate any monitoring device or method required to be maintained under this Order shall, upon conviction, be punished by a fine of not more than $10,000, or by imprisonment for not more than two years, or both. If a conviction of a person is for a violation committed after a first conviction of such person under this paragraph, punishment is a fine of not more than $20,000 per day of violation, or by imprisonment of not more than four years, or both. [40 CFR 122.41(j)(5)]

g) Calculations for all limitations which require averaging of measurements shall utilize an arithmetic mean unless otherwise specified in this MRP [40 CFR 122.41(l)(4)(iii)].

h) All chemical, bacteriological, and toxicity analyses shall be conducted at a laboratory certified for such analyses by the California Department of Health Services or a laboratory approved by the Executive Officer.

i) For priority toxic pollutants that are identified in the California Toxics Rule (CTR) (65 *Fed. Reg.* 31682), the Permittees shall instruct its laboratories to establish calibration standards that are equivalent to or lower than the Minimum Levels (MLs) published in Appendix 4 of the Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California (SIP). If a Permittee can demonstrate that a particular ML is not attainable, in accordance with procedures set forth in 40 CFR 136, the lowest quantifiable concentration of the lowest calibration standard analyzed by a specific analytical procedure (assuming that all the method specified sample weights, volumes, and processing steps have been followed) may be used instead of the ML listed in Appendix 4 of the SIP. The Permittee must submit documentation from the laboratory to the SDRWQCB for approval prior to raising the ML for any priority toxic pollutant.

j) The SDRWQCB Executive Officer or the SDRWQCB may make revisions to this MRP at any time during the term of Order No R9-2004-001, and may include a reduction or increase in the number of parameters to be monitored, locations monitored, the frequency of monitoring, or the number and size of samples collected.

III. REPORTING PROGRAM

A. SWMP Reporting Requirements

The Principal Permittee shall submit a SWMP Annual Report to the SDRWQCB on or before October 31 annually. The reporting period for these annual reports shall be the previous fiscal year. For example, the report submitted on or before October 31, 2005 shall cover the reporting period July 1, 2004 to June 30, 2005. The SWMP Annual Report shall contain the Watershed Annual Report, and the four Individual Annual Reports.

1. **Individual Annual Report** - Each Individual Annual Report shall be a documentation of the activities conducted by each Permittee during the previous annual reporting period. Each Permittee shall submit their Individual Annual Report to the Principal Permittee by a date determined by the Principal Permittee for inclusion in the SWMP Annual Report. Each Individual Annual Report shall, at a minimum, contain the following:

   a) Comprehensive description of all activities conducted by the Permittee to meet all requirements of Order No. R9-2004-001, including, but not limited to, the following information:

      (1) Development Planning (Section F):
         - (i) Description of any amendments to the General Plan or the development project approval process;
         - (ii) Number of grading permits issued;
         - (iii) Number of developments conditioned to meet SUSMP requirements*;
         - (iv) Attach one example of a development project that was conditioned to meet SUSMP requirements and a description of the required BMPs;
         - (v) Description of any updates to the environmental review process;
         - (vi) Description and number of training efforts conducted during the reporting period (for staff, developers, contractors, etc.), including the number of staff trained; and
         - (vii) An assessment of program effectiveness based on the measurable goals established in the Permittee's Individual SWMP.*

      (2) Construction (Section G):
         - (i) Number of inspections conducted;
         - (ii) Number and type of enforcement actions related to construction sites;
         - (iii) Description of modifications made to the construction and grading approval process;
         - (iv) Description and number of training efforts conducted during the reporting period (for staff inspectors, contractors, and construction site operators); and
         - (v) An assessment of program effectiveness based on the measurable goals established in the Permittee's Individual SWMP.*

      (3) Municipal (Section H.1):
         - (i) Number of municipal inspections conducted;
         - (ii) Number and types of enforcement actions taken;
         - (iii) Number of catch basins and inlets that were inspected and the number that were cleaned;

* Items with an asterisk are not applicable to the first annual report.

(iv) Assessment of the amount and type of debris removed from catch basins, streets, and open channels, including an identification of problem areas that generate the most pollutants;

(v) Assessment of effectiveness of BMPs that have been implemented for municipal facilities and activities;

(vi) Description and number of training efforts conducted over the last year (for municipal facility operators and/or inspectors); and

(vii) An assessment of program effectiveness based on the measurable goals established in each Permittee's Individual SWMP.*

(4) Industrial/Commercial (Section H.2):

(i) Number of inspections conducted;

(ii) Number and type of enforcement actions taken; and

(iii) An assessment of overall program effectiveness based on the measurable goals established in the Permittee's Individual SWMP.*

(5) Residential (Section H.3):

(i) A description of residential areas that were focused on during the past year;

(ii) Number and types of enforcement actions taken; and

(iii) Assessment of overall program effectiveness based on the measurable goals established in the Permittee's Individual SWMP.*

(6) Education (Section I):

(i) Description of education efforts conducted by the Permittee (not collectively with other Permittees) during the previous year;

(ii) Assessment of overall program effectiveness based on the measurable goals established in the Permitee's Individual SWMP.*

(7) Illicit Discharge Detection and Elimination (Section J):

(i) Number of illicit discharges, connections and spills reported and/or identified during the reporting period;

(ii) Number of illicit discharges or connections investigated during the reporting period and the outcome of the investigations;

(iii) Number and types of enforcement actions taken for illicit discharges or connections during the reporting period;

(iv) Number of times your agency's hotline was called during the reporting period, as compared to previous reporting periods;

(v) Number and location of dry weather monitoring sites that were monitored during the reporting period;

(vi) Summary of Illicit Discharge Monitoring Program results, including: 1) All inspection, field screening, and analytical monitoring results; 2) All follow-up and elimination activities; and 3) Any proposed changes to station locations and/or sampling frequencies; and

(vii) An assessment of overall program effectiveness based on the measurable goals established in the Permittee's Individual SWMP.*

(8) Public Participation – a description of efforts to include the public in urban runoff management programs during the reporting period (i.e., river clean-ups, volunteer monitoring, Permittee council meetings related to the SWMP, etc.).

b) Assessment of Program Effectiveness - each Permittee shall include an assessment of the effectiveness of its Individual SWMP using the measurable goals and direct and indirect assessment measurements developed in the SWMP, in accordance with **Attachment D** of Order No. R9-2004-001.

c) Fiscal Analysis Component - each Permittee shall include an annual fiscal analysis, for each fiscal year covered by Order No. R9-2004-001, in its Individual Annual Report. This analysis shall evaluate the expenditures (such as capital, operation and maintenance, education, and administrative expenditures) necessary to accomplish the activities of the Pemittee's Individual SWMP. The analysis shall include the following:

(1) A report of the previous reporting period's budget, and a budget for the upcoming reporting period. To the extent possible, the budgets should be broken down by the following programs:

(i) Program management;
(ii) Construction Inspections;
(iii) Development plan review/SUSMP implementation;
(iv) Industrial/Commercial inspections;
(v) Illicit discharge and connection response and elimination;
(vi) Municipal activities (catch basin cleaning, BMP maintenance, etc.);
(vii) Education;
(viii) Monitoring; and
(ix) Other

(2) A description of the source(s) of funds that were utilized during the previous fiscal year and the source(s) of funds proposed to meet the necessary expenditures for the subsequent year, including legal restrictions on the use of such funds.

d) Non-Storm Water Discharges – Permittees shall report on any discharge category listed in Requirement B.2 of Order No. R9-2004-001 that was identified as a source of pollutants during the reporting period. For each identified category, the Permittee shall report whether it elected to prohibit the discharge or to require BMPs to reduce pollutants in the discharge to the MEP. If the discharge is not prohibited, the BMPs that will be implemented, or required to be implemented, shall be described in each Permittee's Individual SWMP Annual Report.

e) Receiving Water Limitations – the report required pursuant to Requirement C.2.a. of Order No. R9-2004-001, if applicable.

f) A summary of all urban runoff related data not included in the annual monitoring report (e.g., special investigations); and

g) Proposed revisions to the Individual SWMP, including areas in need of improvement based on the assessment of effectiveness of each program component.

2. **Watershed Annual Report** – The Watershed Annual Report, to be produced by the Principal Permittee shall describe the area-wide and watershed-based programs and activities (as described in

the Watershed SWMP) conducted during the previous reporting period. At a minimum, the Watershed Annual Report shall contain the following information:

a) A description of all area-wide and watershed-based activities conducted during the reporting period;

b) A description of efforts to coordinate with other stakeholders in the Santa Margarita Watershed, such as San Diego County and the U.S. Marine Corps Base Camp Pendleton;

c) An assessment of water quality in the Santa Margarita watershed area of Riverside County, this assessment shall include data from the previous monitoring report;

d) Identification of water quality improvement or degradation;

e) A prioritization of water quality problems and potential sources;

f) A description of watershed-specific educational activities conducted during the reporting period;

g) Recommended activities to be conducted jointly by the Permittees to address the identified water quality problems;

h) An assessment of overall program effectiveness based on the measurable goals established in the Watershed SWMP; and

i) Proposed revisions to the Watershed SWMP.

B. Receiving Waters Monitoring Reporting Requirements

1. Monitoring Program Annual Report

The Principal Permittee shall submit the Monitoring Program Annual Report (Monitoring Report) to the SDRWQCB on or before October 31 of each year. The Monitoring Report shall contain tabular and graphical summaries as well as discussions and interpretations of the receiving water monitoring data obtained during the previous monitoring year. At a minimum, each Monitoring Report shall include the following:

a) Description of each receiving water monitoring station, including but not limited to:

(1) Station location (latitude and longitude, and a narrative description).
(2) Photographs of triad stations.
(3) Approximate size and land uses of the drainage area.
(4) Any other relevant information.

b) A description of monitoring methods for each type of monitoring, including but not limited to:

(1) Monitoring equipment.
(2) Sampling procedures.
(3) Quality assurance/quality control (QA/QC) procedures (laboratory QA/QC documentation shall be submitted with the report).
(4) Laboratory analytical methods including the method detection limits (MDLs). Analytical data shall be reported with one of the following methods, as appropriate:

- An actual numerical value for sample results greater than or equal to the MDL;
- "Not-detected (ND)" for sample results less than the laboratory's MDL; or

- "Detected, but Not Quantified (DNQ)" if results are greater than or equal to the laboratory's MDL but less than the ML. The estimated chemical concentration of the sample shall also be reported. This is the concentration that results from the confirmed detection of the substance by the analytical method below the ML value.

c) A description of monitoring results, including but not limited to:

(1) Data and data products, including but not limited to:

- Actual data.
- Identification of exceedances of Basin Plan and CTR objectives.
- Estimated annual mass loadings at each station.
- Toxicity testing results in Toxic Units (TUs).
- Bioassessment data (including electronic data formatted to California Department of Fish and Game Aquatic Bioassessment Laboratory specifications) and analysis using metrics in the CSBP and the San Diego IBI.
- Graphical summaries of data.

(2) Methods used to evaluate data. Methods shall be appropriate to answer the management questions listed in Section II.A of this MRP and to assess the progress towards achieving the goals listed in Section I of this MRP. Examples of methods include, but are not limited to:

- Site-by-site summaries and comparisons of results at triad and tributary stations for wet and dry weather, including graphs of concentrations and toxicity.
- Rough estimates of the relative contribution of urban runoff to total pollutant loads.
- Maps of potential sources of pollutants.
- Any other appropriate analysis.

(3) Discussion of results and analyses of each Monitoring Program Component, including but not limited to:

- Discussion of pollutants of concern and their potential sources.
- Interpretation of bioassessment metric values.
- Discussion of any TIEs that were conducted and the potential sources of toxic pollutants.
- If applicable, a discussion of the development, implementation, and results of any TREs.
- Discussion of any relevant information or conclusions from the Illicit Discharge Monitoring Program.
- Discussion of the progress towards answering the management questions listed in Section II.A of this MRP and achieving the goals listed in Section I of this MRP.
- Discussion of any other data analyses performed.

d) In addition to the information required above, the fourth-year Monitoring Report due no later than October 31, 2008, shall include:

- A discussion of any long-term trends that can be detected from existing data (from all previous permit terms).
- Recommendations for future monitoring based on the results of previous efforts and the progress towards answering the management questions listed in Section II.A of this MRP and achieving the goals listed in Section I of this MRP.
- Recommended modifications to Individual or Watershed SWMPs to address identified source of pollutants in urban runoff.

e) If the Permittees monitor any pollutant more frequently than required by this MRP using test procedures approved under 40 CFR part 136, unless otherwise specified in the Order, the results

of this monitoring shall be included in the calculation and reporting of the data submitted in the Monitoring Reports [40 CFR 122.41(l)(4)(ii)].

f) All Monitoring Reports shall be submitted in both electronic and paper formats.

C. Certified Perjury Statement

All reports submitted to the SDRWQCB shall include the following signed, certified perjury statement:

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

I, John H. Robertus, Executive Officer, do hereby certify the foregoing is a full, true, and correct copy of a Monitoring and Reporting Program adopted by the California Regional Water Quality Control Board, San Diego Region, on July 14, 2004.

John H. Robertus
Executive Officer

FACT SHEET/TECHNICAL REPORT

FOR

SDRWQCB ORDER NO. R9-2004-001
MUNICIPAL STORM WATER PERMIT

FOR

THE COUNTY OF RIVERSIDE, THE CITY OF MURRIETA, THE CITY OF TEMECULA, AND THE RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
WITHIN THE SANTA MARGARTIA WATERSHED
IN THE SAN DIEGO REGION
(UPPER SANTA MARGARITA WATERSHED)

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I. LIST OF ACRONYMS

ADT – Average Daily Traffic

BAT – Best Available Technology

BMP – Best Management Practice

CEQA – California Environmental Quality Act

CWA – Clean Water Act

CWC – California Water Code

DAMP – Santa Margarita Regional Drainage Area Management Plan

EPA – United States Environmental Protection Agency

GIS – Geographic Information System

MEP – Maximum Extent Practicable

MS4 – Municipal Separate Storm Sewer System

NOI – Notice of Intent

NPDES – National Pollutant Discharge Elimination System

NURP – Nationwide Urban Runoff Program

RWQCB – Regional Water Quality Control Board

SDRWQCB – San Diego Regional Water Quality Control Board

SIC – Standard Industrial Classification Code

SUSMP – Standard Urban Storm Water Mitigation Plan

SWMP – Storm Water Management Plan

SWRCB – State Water Resources Control Board

SWPPP – Storm Water Pollution Prevention Plan

TAC - State Water Resources Control Board Urban Runoff Technical Advisory Committee

TMDL – Total Maximum Daily Load

II. FACT SHEET FORMAT

This Fact Sheet briefly sets forth the principle facts and the significant factual, legal, methodological, and policy questions that the San Diego Regional Water Quality Control Board (SDRWQCB) considered in preparing Order No. R9-2004-001. In accordance with the Code of Federal Regulations (CFR) title 40 parts 124.8 and 124.56, this Fact Sheet includes, but is not limited to, the following information:

- **Contact information (Section III);**
- **Public process and notification procedures (Section IV);**
- **A brief description of the type of facility or activity that is being regulated by the Order (Section V);**
- **The type and quantity of pollutants discharged (Section VI);**
- **A brief summary of the basis for the requirements in the Order, including references to the applicable statutory or regulatory provisions (Section VII); and**
- **A discussion of the requirements in the Order (Sections VIII and IX).**

Findings contained in the Order are discussed throughout this Fact Sheet. The findings that broadly apply to the entire Order are discussed in Sections V, VI and VII. Findings that justify specific requirements in the Order are discussed in the applicable subsections of Section VIII.

III. CONTACT INFORMATION

SDRWQCB

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The Order and other related documents can be downloaded from the SDRWQCB website at: http://www.swrcb.ca.gov/rwqcb9/programs/rsd_stormwater.html

All documents referenced in this Fact Sheet and in Order No. R9-2004-001 are available for public review at the SDRWQCB office, located at the address listed above. Public records are available for inspection during regular business hours, from 8:00 am to 5:00 pm Monday through Friday. To schedule an appointment to inspect public records, contact Megan Quigley at 858-268-5363, or DiAnne Broussard at 858-492-1763.

Permittees

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IV. PUBLIC PROCESS AND NOTIFICATION PROCEDURES

The SDRWQCB followed the schedule listed below for the preparation of Order No. R9-2004-001:

- The SDRWQCB received the Report of Waste Discharge (ROWD) on May 30, 2003
- On December 15, 2003, the SDRWQCB released the Order and supporting Fact Sheet, beginning the public comment period. The documents were available on the SDRWQCB web page at http://www.swrcb.ca.gov/rwqcb9/programs/rsd_stormwater.html and mailed to the Permittees and all other parties who requested a copy.
- A public notice was published in the Riverside Press-Enterprise on December 20, 2003 notifying the public of the opportunity to submit written comments and to present verbal comments to the San Diego Regional Board at the February 11, 2004 meeting.
- The SDRWQCB held a public workshop on January 23, 2004 at the Temecula City Hall. The purpose of the workshop was to answer questions regarding the Order and to discuss the affect of potential new requirements on the business community.
- A public hearing to receive testimony at the San Diego Regional Board meeting was conducted on February 11, 2004.
- The public comment period closed at 5:00 pm on March 10, 2004.
- A response to written comments received during the public comment period and the revised Order were issued on May 7, 2004.
- After deliberation, the San Diego Regional Board adopted the Order at the July 14, 2004 meeting.

In addition to the public process described above, various informal meetings have been conducted with SDRWQCB staff and the Permittees. The meetings served as workshops for the Permittees to express their concerns and questions regarding the permit.

V. DESCRIPTION OF THE TYPE OF FACILITY OR ACTIVITY THAT IS BEING REGULATED BY THE NPDES PERMIT

A. Permit History (Finding Nos. 1 and 2)

The Riverside County Flood Control and Water Conservation District (District), the County of Riverside, and the Cities of Murrieta and Temecula (hereinafter called Permittees), own or operate municipal separate storm sewer systems (MS4s) through which urban runoff is discharged into waters of the United States (U.S.) within the portion of the Santa Margarita watershed located in Riverside County in the San Diego Region (hereinafter referred to as the Upper Santa Margarita Watershed) (**Finding No. 1**). Pursuant to the 1987 Water Quality Act (WQA) and the U. S. Environmental Protection Agency's (EPA) final storm water regulations (the "Phase I rule" at 55 Fed. Reg. 47990), the Permittees obtained a National Pollutant Discharge Elimination System (NPDES) permit for discharges from their MS4(s) to waters of the U.S. in the Upper Santa Margarita Watershed.

In July of 1990, the District, the County, and the City of Temecula obtained a first-round NPDES permit (Order No. R9-90-46). Following its incorporation, the City of Murrieta was added to that permit on May 18, 1992. Then, on May 13, 1998, the SDRWQCB adopted Order No. R9-98-02 as a second-round MS4 permit for the Upper Santa Margarita Watershed. The EPA objected to the order due to the Receiving Water Limitations (RWL) language, which EPA determined did not comply with the federal Clean Water Act (CWA) and its implementing regulations. EPA assumed responsibility and reissued the permit on April 27, 1999. Subsequently on November 8, 2000, the SDRWQCB issued Addendum No. 1 to Order R9-98-02, which incorporated EPA's permit by reference. On May 30, 2003, the District, as the Principal Permittee, submitted a Report of Waste Discharge (ROWD) for renewal of their NPDES MS4 permit (**Finding No. 2**). Order No. R9-2004-001 is the third-round Phase I NPDES MS4 permit for the Upper Santa Margarita Watershed.

B. Permit Coverage (Finding Nos. 19 and 20)

The Order regulates discharges of urban runoff from MS4s owned or operated by the Permittees, and discharges into MS4s from areas within the Permittees' jurisdiction. In the Order, urban runoff is defined as "all flows in a storm water conveyance system and consists of the following components: (1) storm water (wet weather flows) and (2) non-storm water illicit discharges (dry weather flows)."

A MS4 is defined in the federal regulations as a conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, or storm drains), owned or operated by a Permittee, and designed or used for collecting or conveying urban runoff (EPA, 2000a). In addition, natural drainage patterns and urban streams are frequently used by municipalities to convey urban runoff away from development within their jurisdiction. Therefore, as stated in **Finding No.19**, the SDRWQCB considers natural drainages that are used for conveyances of urban runoff, regardless of whether or not they've been altered by the municipality, as both part of the MS4s **and** as receiving waters. To clarify, an unaltered natural drainage, which receives runoff from a point source (channeled by a Permittee to drain an area within their

jurisdiction), which then conveys the runoff to an altered natural drainage or a man-made MS4 is both an MS4 and a receiving water (SDRWQCB, 2001c). Whereas, a natural channel which receives sheet flow from a property in a rural area is not part of the MS4.

Federal, state, regional, or local entities within the Permittees' boundaries, and which are not named in the Order, may operate storm drain facilities and/or discharge urban runoff to storm drains and water courses covered by the Order. In addition, discharges into the Permittees' MS4s from agricultural and other activities identified in 40 CFR 122.3 are excluded from federal NPDES regulations. However, the Permittees are responsible for all discharges from their MS4s to receiving waters, and discharges from entities and activities not specifically regulated by the Order may cause or contribute to a condition of contamination or exceedances of water quality objectives. Therefore, Permittees cannot passively receive and discharge pollutants from third parties. By providing free and open access to a MS4 that conveys discharges to waters of the U.S., the operator of the MS4 that does not prohibit or control discharges into its own system essentially accepts responsibility for those discharges (**Finding No. 20**).

In their comments on the Order, the Permittees proposed a procedure to address discharges from third parties outside of their jurisdictions (Permittees, 2004a). The proposed procedure includes documenting and sampling discharges, utilizing the Hazardous Materials Emergency Response Team in emergency situations, verbally notifying the discharger, notifying the appropriate enforcement agency and/or the SDRWQCB, and notifying the discharger of available assistance to address the discharge. The proposed procedure meets the SDRWQCB's expectations for addressing discharges from third parties.

C. Description of Permitted Area (Finding No. 3)

The Upper Santa Margarita Watershed is approximately 548 square miles and includes unincorporated portions of Riverside County, the Cities of Murrieta and Temecula, as well as portions of the Cleveland and San Bernardino National Forests, and the Cahuilla, Ramona, Pauma, and Pechanga Indian Reservations. Approximately 168,400 people reside within the permitted area (Permittees, 2003). Approximately 36,400 people reside in the unincorporated area while approximately 132,000 people reside within the Cities of Murrieta and Temecula (Permittees, 2003).

Temecula Creek, which drains the Palomar Mountains, and Murrieta Creek, which drains the Santa Ana Mountains, are the main drainages in the permitted area. They join to form the Santa Margarita River near the City of Temecula. Main tributaries to Murrieta Creek include Warm Springs Creek and Santa Gertrudis Creek. Main tributaries to Temecula Creek include Pechanga Creek and Arroyo Seco Creek. Vail Lake, Skinner Reservoir, and Diamond Valley Reservoir are major impoundments in the permitted area. For more information about watershed characteristics, see the ROWD (Permittees, 2003).

The Water Quality Control Plan for the San Diego Basin (SDRWQCB, 1994) identifies the following beneficial uses for water bodies in the Santa Margarita Watershed: Municipal and Domestic Supply (MUN), Agricultural Supply (AGR), Industrial Process Supply (PROC), Industrial Service Supply (IND), Ground Water Recharge (GWR), Contact Water Recreation (REC1) (potential use), Non-contact Water Recreation (REC2), Warm Freshwater Habitat

WARM, Cold Freshwater Habitat (COLD), Wildlife Habitat (WILD), and Rare, Threatened, or Endangered Species (RARE) (**Finding No. 3**).[1]

In addition to providing habitat and recreation opportunities, residents and businesses in the permitted area rely heavily on local water for drinking, agriculture, and industrial supply. Over 40% of water used in the watershed is locally produced (Jenks, 2002). In 2001, local water production in the watershed was 41,765 acre-feet. Imported supplies totaled 66,369 acre-feet. Of the total water supply, 49,212 acre-feet were used for agriculture, 5,390 acre-feet were used for commercial purposes, and 41,802 acre feet were used for domestic purposes (Jenks, 2002). In addition, portions of Fallbrook in San Diego County and the U.S. Marine Corps Base Camp Pendleton, depend on surface and ground water that originates form the Upper Santa Margarita Watershed.

The Santa Margarita River is one of the few remaining natural gorge rivers in Southern California, with approximately 70 species of special concern (rare, threatened, or endangered, regularly inhabiting the watershed, including 30 that are currently protected under the Federal Endangered Species Act (Stein, 1998). Although the majority of the river is not within the jurisdiction of the Permittees, the riparian systems in the upper watershed play an integral role in the maintenance of sensitive downstream ecological functions (Stein, 1998). The upper watershed riparian habitats are in direct hydrologic contact with downstream systems and are associated with freshwater recharge to a series of downstream aquifers (Shapiro, 1991). In addition, these riparian systems in the Upper Santa Margarita Watershed often provide breeding, migratory, or escape habitat for many animal species that reside in the lower watershed (Stein, 1998).

VI. TYPE AND QUANTITY OF POLLUTANTS DISCHARGED

A. Background

Pollutants in Urban Runoff (Finding Nos. 4, 5 and 6)

Urban runoff contains waste, as defined in the California Water Code (CWC), and pollutants that adversely affect the quality of waters of the State. The discharge of urban runoff from an

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[1] **MUN** – Municipal and Domestic Supply – Uses of water for community, military, or individual water supply systems (i.e., drinking water).
AGR – Agricultural Supply – Uses of water for farming, horticulture, or ranching.
IND – Industrial Service Supply – Uses of water for industrial activities that do not depend primarily on water quality (i.e., mining, cooling water supply, gravel washing, fire protection).
PROC – Industrial Process Supply – Uses of water for industrial activities that depend primarily on water quality.
GWR – Ground Water Recharge – Uses of water for natural or artificial recharge of ground water for purposes of future extraction, maintenance of water quality, or halting of saltwater intrusion into freshwater aquifers.
REC1 – Contact Water Recreation – Uses of water for recreational activities involving body contact with water, where ingestion of water is reasonably possible (i.e., swimming, wading, fishing, and white water activities). * Means this is a potential use.
REC2 – Non-contact Water Recreation – Uses of water for recreational activities involving proximity to water, but not normally involving body contact with water (i.e., picnicking, hiking, camping, boating, and sightseeing).
WARM – Warm Freshwater Habitat – Uses of water that support warm water ecosystems.
COLD – Cold Freshwater Habitat – Uses of water that support cold water ecosystems including.
WILD – Wildlife Habitat – Uses of water that support terrestrial ecosystems.
RARE – Rare, Threatened, or Endangered Species – Uses of water that support habitats necessary, at least in part, for the survival and successful maintenance of plant and animal species established under state or federal law as rare, threatened, or endangered.

MS4 is a "discharge of pollutants from a point source" into waters of the United States as defined in the CWA (**Finding No. 4**). Section 13050(d) of the CWC defines "waste" as "sewage and any and all other waste substances, liquid, solid, gaseous, or radioactive, associated with human habitation, or of human or animal origin, or from any producing, manufacturing, or processing operation, including waste placed within containers of whatever nature prior to, and for purposes of, disposal." 40 CFR 122.2 defines "point source" as "any discernable, confined, and discrete conveyance, including but not limited to, any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, landfill leachate collection system, vessel or other floating craft from which pollutants are or may be discharged. This term does not include return flows from irrigated agriculture or agricultural storm water runoff." 40 CFR 122.2 defines "discharge of a pollutant" as "Any addition of any pollutant or combination of pollutants to waters of the U.S. from any point source." Also, the justification for control of pollution into Californian waters can be found at CWC section 13260(a)(1), and State Water Resource Control Board (SWRCB) Order WQ 2001-15 verifies that urban runoff contains waste (SWRCB, 2001).

The quality of urban runoff is fundamentally important to the health of the environment and the quality of life in Southern California. The discharge of pollutants and/or increased flows from MS4s may cause or threaten to cause the concentration of pollutants to exceed applicable receiving water quality objectives and impair or threaten to impair designated beneficial uses resulting in a condition of pollution (i.e., unreasonable impairment of water quality for designated beneficial uses), contamination, or nuisance (**Finding No. 6**). The 1992, 1994, and 1996 National Water Quality Inventory Reports to Congress prepared by the EPA showed a trend of impairment in the Nation's waters from contaminated storm water and urban runoff (EPA, 2000b). The 1998 National Water Quality Inventory Report showed that urban runoff discharges affect 11% of rivers, 12% of lakes, and 28% of estuaries (EPA, 2000b). The report states that ocean shoreline impairment due to urban runoff increased from 55% in 1996 to 63% in 1998. The report notes that urban runoff discharges are the leading source of pollution and the main factor in the degradation of surface water quality in California's coastal waters, rivers, and streams (EPA, 2000b).

Furthermore, the National Urban Runoff Program (NURP) Study found that pollutant levels from illicit discharges were high enough to significantly degrade receiving water quality, and threaten aquatic life, wildlife, and human health (EPA, 1993b).

The most common categories of pollutants in urban runoff include total suspended solids, sediment (due to anthropogenic activities); pathogens (e.g., bacteria, viruses, protozoa); heavy metals (e.g., copper, lead, zinc, and cadmium); petroleum products and polynuclear aromatic hydrocarbons; synthetic organics (e.g., pesticides, herbicides, and PCBs); nutrients (e.g., nitrogen and phosphorus fertilizers), oxygen-demanding substances (decaying vegetation, animal waste), and trash (**Finding No. 5**). The NURP study showed that heavy metals, organics, coliform bacteria, nutrients, oxygen demanding substances (e.g., decaying vegetation), and total suspended solids are found at relatively high levels in urban runoff (EPA, 1993b). It also found that MS4 discharges draining residential, commercial, and light industrial areas contain significant loadings of total suspended solids and other pollutants. The Basin Plan goes on to identify urban runoff pollutants to include lawn and garden chemicals, household and automotive care products dumped or drained on streets, and sediment that

erodes from construction sites (SDRWQCB, 1994). In addition, the SWRCB Urban Runoff Technical Advisory Committee (TAC) finds that urban runoff pollutants include sediments, nutrients, oxygen-demanding substances, heavy metals, petroleum hydrocarbons, pathogenic bacteria, viruses, and pesticides (SWRCB, 1994). Water that flows over streets, parking lots, construction sites, and industrial, commercial, residential, and municipal areas carries these untreated pollutants through storm drain networks directly to the receiving waters of the Upper Santa Margarita Watershed.

According to the Center for Watershed Protection, the quality of both surface and ground water in urbanizing areas of arid and semi-arid regions of the southwest is strongly shaped by urbanization. Since rain events are so rare, pollutants have more time to build up on impervious surfaces compared to humid regions. Therefore, the pollutant concentrations of storm water runoff from arid watersheds tends to be higher than that of humid watersheds (Center for Watershed Protection, Article 66).

Impacts From Urbanization (Finding No. 12)

The Natural Resources Defense Council (NRDC) 1999 Report, "Stormwater Strategies, Community Responses to Runoff Pollution" identifies two main causes of the storm water pollution problem in urban areas (NRDC, 1999). Both causes are directly related to development in urban and urbanizing areas:

1. Increased volume and velocity of surface runoff. There are three types of human-made impervious covers that increase the volume and velocity of runoff: (i) rooftop, (ii) transportation imperviousness, and (iii) non-porous (impervious) surfaces. As these impervious surfaces increase, infiltration will decrease, forcing more water to run off the surface, picking up speed and pollutants.
2. The concentration of pollutants in the runoff. As discussed above, certain industrial, commercial, residential and construction activities are large contributors of pollutant concentrations in urban runoff. As human population density increases, it brings with it proportionately higher levels of car emissions, car maintenance wastes, municipal sewage, pesticides, household hazardous wastes, pet wastes, trash, etc.

As a result of these two causes, runoff leaving developed urban areas is significantly greater in volume, velocity, and pollutant load than pre-development runoff from the same area (**Finding No. 12**). The Permittees have demonstrated their support for this finding in the DAMP (Permittees, 1993), which states:

> "Many storm water runoff problems are primarily a consequence of urbanization. Water that previously soaked into the ground, removing pollutants by filtering through soil, and eventually replenishing groundwater supplies, now must flow overland and therefore enters local streams more rapidly. The rapid transport of water increases the erosion of stream banks and hillsides and does not permit filtering of pollutants. Sediment carried by storm water runoff can build up in streambeds, harming fish and aquatic habitat. The sediment acts as a transport mechanism for pollutants which adhere to soil particles. Typical urban runoff pollutants found in surface waters include heavy metals, nutrients, petroleum products, sediment, bacteria, chemicals, and litter."

Studies have shown that the level of imperviousness in an area strongly correlates with the quality of nearby receiving waters (EPA, 1999b). One comprehensive study, which looked at numerous areas, variables, and methods, revealed that stream degradation occurs at levels of imperviousness as low as 10 – 20% (EPA, 1999b). Stream degradation is a decline in the biological integrity and physical habitat conditions that are necessary to support natural biological diversity. For instance, few urban streams can support diverse benthic communities with imperviousness greater than or equal to 25% (EPA, 1999b). To provide some perspective, a medium density, single-family home area can be from 25% to 60% impervious (variation due to street and parking design) (Schueler, 1994).

To demonstrate the principle of increased volume and velocity of runoff from urbanization, the following figure shows the flow rate of an urban vs. a natural stream. What the figure demonstrates is that urban stream flows have greater peaks and volumes, as well as shorter retention times than natural stream flows. The greater peak flows and volumes result in stream degradation through increased erosion of stream banks and damage to aquatic habitat. The shorter retention times result in less time for sediments and other pollutants to settle before being carried out to the ocean. This sediment, and the associated pollutants it carries, can be a significant cause of water quality degradation.

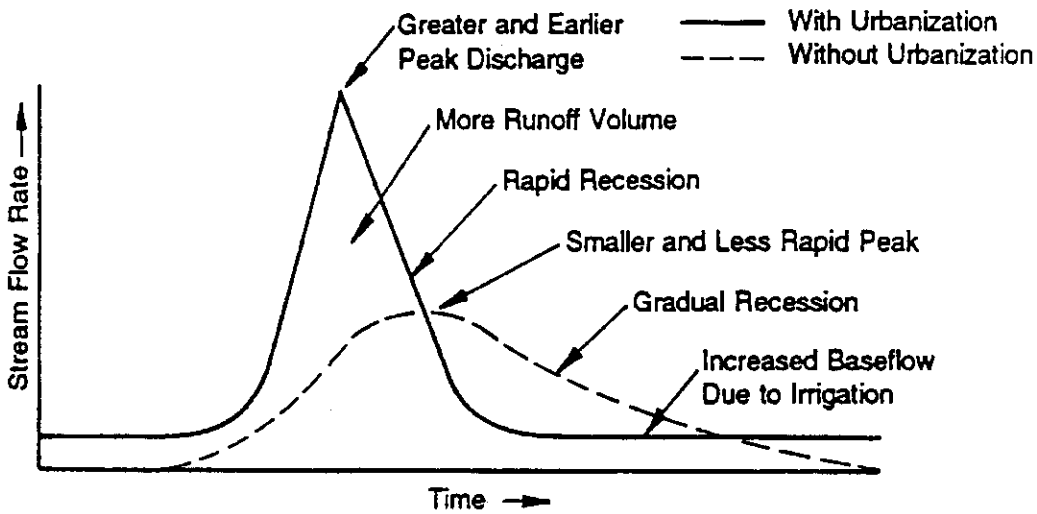

Source: Adapted from Schueler, 1997

Increased volume and velocity of runoff adversely impacts receiving waters and their beneficial uses in many ways. According to the TAC report (SWRCB, 1994), increases in population density and imperviousness result in changes to stream hydrology including:

1. Increased peak discharges compared to pre-development levels;
2. Increased volume of storm water runoff with each storm compared to pre-development levels;
3. Decreased travel time to reach receiving water; increased frequency and severity of floods;
4. Reduced stream flow during prolonged periods of dry weather due to reduced levels of infiltration;

5. Increased runoff velocity during storms due to a combination of effects of higher discharge peaks, rapid time of concentration, and smoother hydraulic surfaces from channelization, and
6. Decreased infiltration and diminished ground water recharge.

Even though the rainfall depths in arid watersheds are lower, watershed development can greatly increase peak discharge rates during rare flood events (Center for Watershed Protection, Article 66). A study conducted in arid watersheds around Riverside, CA showed that, over two decades, impervious cover increased from 9% to 22%, which resulted in an increase of more than 100% in the peak flow rate for the two-year storm event. The study also showed that the average annual storm water runoff volume had increased by 115% to 130% over the same time span (Center for Watershed Protection, Article 66).

Flooding caused by the increased volume and velocity of runoff from urbanization in the Upper Santa Margarita Watershed are clear examples of the effects described above. Disastrous flooding has occurred more frequently in recent years. In the last century, major flood events occurred in 1938, 1969, 1980, 1993, 1995, and 1998 (U.S. Army Corps of Engineers, 2000). In the 1993 flood event, the Cities of Murrieta and Temecula sustained $12 million dollars in damage, and Camp Pendleton sustained $88 million in damage (U.S. Army Corps of Engineers, 2000). Future flooding is expected to occur more frequently because of continued urban development within the watershed, and flood damages are expected to continue accruing at an estimated annual rate of $1,780,300 (U.S. Army Corps of Engineers, 2000).

Impacts to Aquatic Life (Finding No. 9)

In addition to chemical and physical impacts, urban runoff often contains pollutants that cause toxicity to aquatic organisms (i.e., adverse responses of organisms to chemicals or physical agents ranging from mortality to physiological responses such as impaired reproduction or growth anomalies). Toxic pollutants impact the overall quality of aquatic systems and beneficial uses of receiving waters (**Finding No. 9**). A study of urban runoff samples from Chollas Creek in San Diego County, revealed toxic concentrations of organophospate pesticides and metals (Bay, 2001). In Los Angeles County, storm water samples were found to be toxic to various aquatic organisms in the Los Angeles River, the San Gabriel River, Ballona Creek, and the Santa Monica Bay (LARWQCB, 2001). Also, a water quality data assessment conducted in Aliso Creek in Orange County showed that storm events caused varying degrees of mortality to test organisms (SDRWQCB, 2002a). To date, there has not been sufficient monitoring to determine if toxicity from urban runoff exists in the Upper Santa Margarita Watershed, however, the land uses causing toxicity in other urbanized areas of Southern California are little different than urbanized areas in Murrieta and Temecula.

Impacts to Human Health (Finding No. 7)

In addition to impairing receiving water quality and aquatic life, pollutants in urban runoff can also threaten human health. According to the EPA, spilled fuel, solvents, waste oil, paints, and other maintenance fluids pose a risk to the environment but may be especially harmful if they enter someone's drinking water supply (EPA, 2004b). "The percolation of

contaminated runoff can cause unacceptable consequences to ground water resources." Urban runoff discharges were identified in a California Department of Health Services assessment as one of the most prevalent possible contaminating activities for drinking water sources (EPA, 2004b). This issue of potential source water contamination is of fundamental importance, because of the dependence on local water for domestic use in the Santa Margarita Watershed. Rancho California Water District and Eastern Municipal Water District, which serve the Upper Santa Margarita Watershed, the Fallbrook Public Utilities District, which serves the community of Fallbrook, and Camp Pendleton are among those agencies in the watershed who are directly dependent on surface and ground water for domestic use.

Human health is also a concern related to body contact recreation. Human illnesses have been clearly linked to recreating near storm drains flowing to coastal waters (**Finding No. 7**). A landmark study, conducted by the Santa Monica Bay Restoration Project, found that there was an increased occurrence of illness in people that swam in proximity to a flowing storm drain (Haile, 1996). Although the Upper Santa Margarita Watershed is inland, the watershed drains to the Pacific Ocean, and pollutants generated in the permitted area may impact coastal waters. For example, the Santa Margarita River system provides the main source of beach sand for the beaches of northern San Diego County (Shapiro, 1991). Also, residents in the permitted area who recreate at Southern California beaches benefit from clean water.

Furthermore, urban runoff pollutants in receiving waters can bioaccumulate in the tissues of invertebrates and fish, which may eventually be consumed by humans (**Finding No. 7**). Pollutants such as heavy metals and pesticides, which are commonly found in urban runoff, have been found to bioaccumulate and biomagnify in long-lived organisms at the higher trophic levels (Abel, 1996). Since many aquatic species are utilized for human consumption, toxic substances accumulated in species' tissues can pose a significant threat to public health. The EPA supports this finding when it states, "As runoff flows over areas altered by development, it picks up harmful sediment and chemicals such as oil and grease, pesticides, heavy metals, and nutrients (e.g., nitrogen and phosphorus). These pollutants often become suspended in runoff and are carried to receiving waters, such and lakes, ponds, and streams. Once deposited, these pollutants can enter the food chain through small aquatic life, eventually entering the tissues of fish and humans" (EPA, 2000c).

Environmentally Sensitive Areas (Finding No. 8)

Development and urbanization especially threaten environmentally sensitive areas (ESAs), such as water bodies designated as supporting a RARE beneficial use and CWA section 303(d) impaired water bodies. Such areas have a much lower capacity to withstand pollutant shocks than might be acceptable in the general circumstance. In essence, development that is ordinarily insignificant in its impact on the environment may become significant in a particularly sensitive environment. Therefore, additional control to reduce pollutants from new and existing development may be necessary for areas adjacent to or discharging directly to an environmentally sensitive area (**Finding No. 8**). ESAs are defined in the Order as "areas in which plant or animal life or their habitats are either rare or especially valuable because of their special nature or role in an ecosystem and which would easily be disturbed or degraded by human activities and developments (California Public Resources Code section 30107.5). ESAs subject to urban runoff requirements include but are not limited to

all CWA section 303(d) impaired water bodies; areas designated as Areas of Special Biological Significance by the SWRCB (Basin Plan); water bodies designated with the RARE beneficial use by the SWRCB (Basin Plan); areas within the Western Riverside County Multi-Species Habitat Conservation Plan (MSHCP) plan area that contain rare or especially valuable plant or animal life or their habitat; and any other equivalent environmentally sensitive areas which the Permittees have identified." Areas that meet this definition are inherently sensitive habitats containing unique, rare, threatened, or endangered species, or are not achieving their designated beneficial uses. As discussed above, urban runoff is known to contain a wide range of pollutants and have demonstrated toxicity to plants and animals. Therefore, it is necessary to apply additional controls for developments within, adjacent to, or directly discharging to ESAs. This need for additional controls is addressed within each component of the Order.

The EPA supports the requirement for additional controls, stating "For construction sites that discharge to receiving waters that do not support their designated use or other waters of special concern, additional construction site controls are probably warranted and should be strongly considered" (EPA, 1992a). Further support for requiring additional controls to reduce pollutants in discharges to ESAs can be found in *Mitigation of Storm Water Impacts From New Developments in Environmentally Sensitive Areas*, a technical report written by the LARWQCB (LARWQCB, 2001b).

B. Water Quality Concerns in the Upper Santa Margarita Watershed

In addition to the general information about typical urban runoff-related pollutants discussed above in Section VI.A, various sources document water quality concerns in the Upper Santa Margarita Watershed. **Tables 1 and 2** below summarize existing and potential problems. **Table 3** summarizes exceedances of urban runoff-related pollutants reported in the Permittees water quality monitoring reports, and **Table 4** lists potential sources of the reported exceedances.

Table 1. Water Quality Concerns in the Santa Margarita Watershed

Source	Existing or Potential Problem
SWRCB 303(d) List[2]	**Listings:** Phosphorus (entire 12 miles of Murrieta Creek and upper 18 miles of Santa Margarita River) Eutrophication (estuary) **Constituents of concern:** sedimentation/siltation, iron, manganese, TDS
Riverside County General Plan[3]	Sediment from construction-related erosion; Pollution due to urban storm water runoff
San Diego County WURMP[4]	Eutrophication, nitrogen, phosphorus, diazinon, TDS, other toxic substances, trash
SDRWQCB	Degraded biological and physical integrity

[2] SDRWQCB. 2003. Final 2002 Clean Water Act Section 303(d) List of Water Quality Limited Segments.

[3] County of Riverside. October 2003. County of Riverside General Plan: Multipurpose Open Space Element. Chapter 5, OS-10.

[4] County of San Diego. January 2003. Watershed Urban Runoff Management Program for the Santa Margarita Watershed. Table 4-5.

Bioassessment Data[5]	
SDRWQCB, EPA Draft Operational Guidebook for reference based assessment[6]	Severe physical impacts (Excessive erosion, down cutting, sedimentation, etc.) from rapid and high volumes of urban runoff and a lack of effective runoff management practices
Santa Margarita Regional DAMP[7]	Oxygen demanding substances, heavy metals, pesticides, herbicides, oil and grease, nutrients, settleable solids, TDS, TSS Volatile organic carbon, pathogens, and debris

Impairments and Pollutants of Concern (Finding Nos. 10 and 11)

According to the *Final 2002 CWA Section 303(d) List of Water Quality Limited Segments* (SDRWQCB, 2003a), the entire length of Murrieta Creek (12 miles) and the upper 18 miles of the Santa Margarita River are impaired for phosphorus. Potential sources of the phosphorus impairment include urban runoff and unknown point and nonpoint sources. The Santa Margarita Lagoon is listed as impaired for eutrophication. (**Finding No. 10**). In addition to the impairments, the SDRWQCB has identified various constituents of potential concern (SWRCB, 2003b). These constituents, listed above in Table 1, were not included on the 2002 303(d) list as impairments because available data was not adequate and more information is needed to determine whether water quality objectives and beneficial uses are being met. The impairments and constituents of concern were based on quarterly data collected and analyzed by Camp Pendleton from 1997-2000, data collected and analyzed by the Department of Water Resources from May 1998-November 2000, Rancho California Water District's receiving water monitoring, and grab sampling conducted by the SDRWQCB in June 1998.

The San Diego County's *Watershed Urban Runoff Management Program (WURMP) for the Santa Margarita Watershed* (San Diego County, 2003) states that eutrophication (associated with low dissolved oxygen, and the presence of solids and excessive nutrients), toxic substances (trace elements and synthetic organics), diazinon contamination, and high levels of TDS are potential water quality issues in the watershed, and that these constituents of concern may have detrimental impacts to the beneficial uses. The WURMP prioritizes the problems based on potential beneficial use impairment (Table 2 below). The WURMP states that data is limited and further data collection and assessment should be made to substantiate concerns.

Table 2. WURMP Prioritization of Water Quality Problems[8]

[5] California Department of Fish and Game. 2002. SDRWQCB 2002 Biological Assessment Report: Results of May 2001 Reference Site Study and Preliminary Index of Biotic Integrity.

[6] EPA. November 2003. Draft Operational Guidebook for reference based assessment of the functions of riverine waters/wetlands in the Santa Margarita Watershed, Riverside County. Chapter 4.

[7] Permittees, 1993

[8] Table 2 was modified from Table 4-5 of the WURMP (San Diego County, 2003)

Constituents of Concern	Potential Beneficial Use Impairment	Priority
Eutrophication, nitrogen, phosphorus	MUN, REC1, REC2, WARM, COLD, WILD, and RARE	High
Toxic substances – diazinon	WARM, COLD, WILD and RARE	Medium
TDS	MUN and AGR	Medium
Toxic substances – other	WARM, COLD, WILD and RARE	Low
Trash	REC1, REC2, WARM, COLD, WILD and RARE	Low

In addition to the sources discussed above, the Permittees have been conducting water quality monitoring pursuant to the MS4 permit since 1993. Although the program has many deficiencies (SDRWQCB, 2002b), the data shows various persistent exceedances of water quality objectives for urban runoff-related pollutants. Table 3 below lists the monitoring stations and the constituents for which multiple or persistent exceedances of water quality objectives have been reported (Permittees, 2002a, 2002b, and 2003b). Due to inadequate monitoring and reporting, it was not possible to conduct a detailed analysis.

Table 3. MS4 Monitoring Results[9]

Stn #	Station Name	Multiple or Persistent Exceedances of Water Quality Objectives[10] (from 1993 – 2003)
188	Cole Creek	Color, Total Nitrogen, Total Phosphorus, Iron, Manganese
404	Wildomar outlet	MBAS, Color, Total Nitrogen, Total Phosphorus, Fecal Coliform, Chromium, Iron, Manganese, Nitrogen-Nitrate, Ammonia, Odor, Thallium, Turbidity, pH, Antimony, Beryllium, Chlorpyrifos, Diazinon
768	Redhawk Channel	Boron, MBAS, Color, Total Nitrogen, Total Phosphorus, Fecal Coliform, Fluoride, Iron, Manganese, Nitrogen-Nitrate, Ammonia, Odor, DO, TDS, Sulfate, Turbidity, pH, Antimony, Beryllium, Chlorpyrifos, Diazinon
769	Empire Creek	Boron, MBAS, Color, Total Nitrogen, Total Phosphorus, Fecal Coliform, Chromium, Iron, Manganese, Nitrogen-Nitrate, Odor, DO (increasing trend), TDS, Thallium, Turbidity, pH, Antimony, Beryllium, Chlorpyrifos, Diazinon
776	Cal Oaks Channel (Line F)	MBAS, Color, Total Nitrogen, Total Phosphorus, Fecal Coliform, Chromium, Iron, Manganese, Nitrogen-Nitrate, Ammonia, Odor, TDS, Turbidity, pH, Antimony, Chlorpyrifos, Diazinon
777	Temecula Creek	Color, Total Nitrogen, Total Phosphorus, Fecal Coliform, Iron, Manganese, Nitrogen-Nitrate, DO, TDS, Sulfate, Turbidity, Antimony
778	Lower Murrieta	Color, Total Nitrogen, Total Phosphorus, Fecal Coliform,

[9] Information obtained from Permittee Annual Program Reports (Permittees, 2002a, 2002b, and 2003b).

[10] Does not include California Toxics Rule

	Creek	Iron, Manganese, Nitrogen-Nitrate, Odor, DO, TDS, Sulfate, Turbidity, Antimony, Chlorpyrifos, Diazinon
779	Upper Murrieta Creek	Color, Total Nitrogen, Total Phosphorus, Fecal Coliform, Iron, Manganese, Nitrogen-Nitrate, Ammonia, TDS, Turbidity, pH, Antimony
828	Santa Margarita River near Temecula	Color, Total Nitrogen, Total Phosphorus, Fecal Coliform, Chromium, Iron, Manganese, Nitrogen-Nitrate, Odor, DO, TDS, Turbidity, Antimony, Chlorpyrifos, Diazinon

Table 4 below identifies potential sources of the pollutants that exceeded water quality objectives at the majority of the MS4 monitoring stations. This information indicates that urban runoff from construction, residential, industrial, commercial and municipal activities is contributing to the degradation of water quality. Specifically, the data indicate potential illicit discharges from industrial and commercial activities, over-application of pesticides and fertilizers by residents and/or businesses, and sediment discharges from construction sites and/or eroding channels.

Table 4. Potential Sources of Pollutants[11]

Pollutant	Potential Sources
Antimony	Industrial activity
Chlorpyrifos	Organophosphate pesticide commonly used in residential areas
Chromium	Industrial activity (plating operations, manufacture of paints, dyes, explosives, ceramics, and paper)
Diazinon	Organophosphate pesticide commonly used in residential areas
Dissolved oxygen	Biodegradable organics, increased temperatures and salinity decrease dissolved oxygen
Fecal coliform	Bacteria originating from humans, animals, amphibians and birds
Iron	Industrial activity, acid mine drainage, corrosion from iron pipes and other material
Manganese	Industrial sources (manufacture of steel alloys, dry-cell batteries, glass and ceramics, paints and varnishes, inks and dyes, matches and fireworks and agriculture
MBAS	Detergents typically associated with dry cleaners
Nitrogen	Excessive application of fertilizer in agriculture and urban areas, septic tank leachate
Phosphorus	Excessive application of fertilizer in agriculture and urban areas
PH	Industrial wastes can be strongly acidic, and laundry waste, and soda and sulfate-pump rinse water are alkaline wastes
Sulfate	Agricultural runoff, mining, tanneries, sulfate-pump mills, and other plants that use sulfates or sulfuric acid

[11] Potential source information from Permittees, 2003b and San Diego County, 2003.

Turbidity	Microorganisms, detritus, mineral substances, manganese compounds, industrial wastes, and eroded soil and silt.
TDS	Urban runoff, imported water, irrigation practices

Biological and Physical Concerns

In addition to the chemical water quality data described above, biological and physical monitoring in the Upper Santa Margarita Watershed also indicates impacts to receiving waters from urbanization.

According to the *San Diego Regional Water Quality Control Board: 2002 Biological Assessment Report*, based on data collected from 1998 – 2001, the bioassessment stations located in lower Murrieta Creek, lower Temecula Creek, and upper Santa Margarita River exhibited degraded biological and physical integrity (Index of Biotic Integrity (IBI) ranged from "Very Poor" to "Good"). As a comparison, the reference stations in the watershed, located in Sandia Creek and DeLuz Creek, were characterized by a high degree of biological and physical integrity (IBI was consistently "Very Good"). This data indicates that urbanization, not agriculture, is contributing to the impairment of the biological and physical integrity of the receiving waters.

The *Draft Operational Guidebook for reference based assessment of the functions of riverine waters/wetlands in the Santa Margarita Watershed, Riverside and San Diego Counties, California* (EPA, 2003) documents the physical impacts that have resulted from urbanization, including but not limited to:

- Temecula and Murrieta Creeks have been moderately to severely impacted by development and degradation of their watersheds. No hydrogeomorphic reference standard conditions were observed. Local effects are caused by **(a) massive earthwork associated with flood control projects, (b) channelization, (c) hardening of the channel bed and banks with concrete, rip-rap, etc., (d) rapid and high volume inputs of storm water runoff from impervious surfaces associated with urbanizing areas, (e) rapid and concentrated inputs of urban pollutants associated with untreated storm water, and (f) large accumulations of trash/debris**. "Currently, development pressures along the Temecula, Murrieta and Wilson Creeks are severe and apparently irreversible in the context of current land use practices and rates of urbanization."
- **Storm water inputs from roads, yards, and parking areas tend to be direct, without benefit of oil-water separators, grit removal, or retention/detention of storm flows**. "The consequences of poor watershed, riparian, and channel management practices in agricultural and developing areas are clear."
- **It is clear that Murrieta and Temecula Creeks are not performing hydrologic functions to their potential.** Specifically, given the urban setting of these creeks, the degree of development taking place within and near their floodplains, and **the current lack of effective stormwater management practices**, improvements in ecosystem functioning within these systems are likely to occur very slowly, if at all. **"Functional improvements in Murrieta and Temecula Creeks depend not only on changes in stream management techniques, but also upon BMPs throughout the upper watershed."**

- "As a result of urban/suburban development, infiltration rates have decreased, peak flows have increased, and base flows have been diminished in both durations and volume"
- "Significant impacts from erosion resulted from poor sediment and erosion control practices and/or development of impervious and smoothed surfaces in the contributing area."
- **"Landscape-scale development in the Santa Margarita watershed appears to be causing main stem hydrologic and biogeochemical functions to degrade at unprecedented rates."**

A recent environmental assessment of Murrieta Creek (USFWS, 2000) further describes some of the physical impacts that have occurred as a result of urbanization in the Upper Santa Margarita Watershed:

> "Since the 1980's, rapid development and urbanization in Murrieta Creek's watershed, including its floodplain and riparian corridor, has severely altered the watershed's drainage. The urbanization has simultaneously introduced artificial flows from activities such as landscape irrigation, washing down of parking lots, and washing of personal vehicles, and has increased impervious surface, which reduces groundwater recharge. Consequently, the volumes and velocities of the discharges from the surface flows and flows through the storm water conveyance systems into Murrieta Creek have increased dramatically. The changes in the hydrology and the hydraulics of Murrieta Creek and its watershed caused by development, flood control activities, ground water dewatering, and a reduction in groundwater recharge, have upset the natural fluvial processes and greatly diminished the ecological value of Murrieta Creek and its riparian corridor. The increased volumes and velocities have intensified the erosion along the stream bed and banks of Murrieta Creek, its tributaries, and downstream of Murrieta Creek. This erosion has exacerbated the sediment loading into Murrieta Creek and the Santa Margarita River."

The assessment goes on to say that, without appropriate controls, water quality is expected to continue to decline. "Advancing erosion and downcutting of stream channels will continue to feed larger amounts of sediment into the system. [...] Increasing development of the watershed is expected to continue to impact available habitat. In addition, an elimination of infiltration zones, increase in peak discharges with associated impacts on downstream riparian area, and the replacement of native plants with non-native species would likely occur." (USFWS, 2000)

Overall, the chemical, biological, and physical data and information described above indicate that urban runoff is causing degradation of the quality and the biological and physical integrity of the receiving waters in the Santa Margarita Watershed.

VII. BASIS FOR PERMIT REQUIREMENTS

This section discusses the broad legal authority that supports the requirements contained in Order No. R9-2004-001. It also discusses the intent of the federal NPDES storm water regulations and several findings that broadly support all requirements in the Order.

A. Broad Legal Authority (Finding No. 22)

Order No. R9-2004-001 implements the CWA, the Porter-Cologne Water Quality Control Act (Division 7 of the CWC, commencing with Section 13000), applicable state and federal regulations, all applicable provisions of statewide Water Quality Control Plans and Policies adopted by the SWRCB, and the Basin Plan adopted by the SDRWQCB (**Finding No. 22**).

In 1987, Congress established CWA Amendments to create requirements for storm water discharges under the NPDES program, which provides for permit systems to regulate the discharge of pollutants. Under the Porter-Cologne Water Quality Control Act, the SWRCB and each Regional Water Quality Control Board (RWQCB) have primary responsibility for the coordination and control of water quality, including the authority to implement the CWA. Porter Cologne (section 13240) directs the RWQCBs to set water quality objectives via adoption of Basin Plans that conform to all state policies for water quality control. As a means for achieving those water quality objectives, Porter Cologne (section 13243) further authorizes the RWQCBs to establish waste discharge requirements (WDRs) to prohibit waste discharges in certain conditions or areas. Since 1990 the SDRWQCB has issued area-wide MS4 NPDES permits. The Order will renew Order No. R9-98-02 as a means to attain water quality objectives in the Basin Plan by limiting the contributions of pollutants conveyed by urban runoff and to comply with CWA. Further discussions of the broad and specific legal authority associated with the prohibitions and directives of the Order are provided throughout this document.

Specific federal regulations include 40 CFR parts 122, 123, 124 (NPDES Permit Application Regulations for Storm Water Discharges, Final Rule), Part II of 40 CFR Parts 9, 122, 123, and 124 (NPDES – Regulations for Revision of the Water Pollution Control Program Addressing Storm Water Discharges; Final Rule), and 40 CFR 131 Water Quality Standards; Establishment of Numeric Criteria for Priority Toxic Pollutants for the State of California; Rule (California Toxics Rule).

The following broad legal authority citations generally apply to all requirements in Order No. R9-2004-001, and provide the SDRWQCB with ample underlying authority to require each of the directives.

CWA 402(p)(3)(B)(ii) – The CWA requires in section 402(p)(3)(B)(ii) that permits for discharges from MS4s "shall include a requirement to effectively prohibit non-stormwater discharges into the storm sewers."

CWA 402(p)(3)(B)(iii) – The CWA requires in section 402(p)(3)(B)(iii) that permits for discharges from MS4s "shall require controls to reduce the discharge of pollutants to the maximum extent practicable, including management practices, control techniques and system, design and engineering methods, and such other provisions as the Administrator or the State determines appropriate for the control of such pollutants."

40 CFR 122.26(d)(2)(i)(B,C,E, and F) – Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B,C,E, and F) provide that each Permittee's permit application "shall consist of: (i) Adequate legal authority. A demonstration that the applicant can operate pursuant to legal authority established by statute, ordinance or series of contracts which authorizes or enables the applicant at a minimum to: [...] (B) Prohibit through ordinance, order or similar means, illicit discharges to the municipal separate storm sewer; (C) Control through

ordinance, order or similar means the discharge to a municipal separate storm sewer of spills, dumping or disposal of materials other than storm water; [...] (E) Require compliance with condition in ordinances, permits, contracts or orders; and (F) Carry out all inspection, surveillance and monitoring procedures necessary to determine compliance and noncompliance with permit conditions including the prohibition on illicit discharges to the municipal separate storm sewer."

40 CFR 122.26(d)(2)(iv) – Federal NPDES regulation 40 CFR 122.26(d)(2)(iv) provides that the Permittee shall develop and implement a proposed management program which "shall include a comprehensive planning process which involves public participation and where necessary intergovernmental coordination, to reduce the discharge of pollutants to the maximum extent practicable using management practices, control techniques and system, design and engineering methods, and such other provisions which are appropriate. The program shall also include a description of staff and equipment available to implement the program. [...] Proposed programs may impose controls on a systemwide basis, a watershed basis, a jurisdiction basis, or on individual outfalls. [...] Proposed management programs shall describe priorities for implementing controls."

CWC section 13377 – CWC section 13377 provides that "Notwithstanding any other provision of this division, the state board or the regional boards shall, as required or authorized by the Federal Water Pollution Control Act (CWA), as amended, issue waste discharge requirements and dredged or fill material permits which apply and ensure compliance with all applicable provisions of the act and acts amendatory thereof or supplementary, thereto, together with anymore stringent effluent standards or limitation necessary to implement water quality control plans, or for the protection of beneficial uses, or to prevent nuisance."

In addition to the broad legal authority items cited above, which underlie all of the directives in Order No. R9-2004-001, additional specific legal authority citations applicable to particular directives of the Order are provided in this Fact Sheet as necessary.

Order No. R9-2004-001 is an essential mechanism for achieving the water quality objectives that have been established for protecting the beneficial uses of the water resources in the Santa Margarita Watershed. Federal NPDES regulation 40 CFR 122.44(d)(1) requires MS4 permits to include any requirements necessary to "achieve water quality standards established under CWA section 303, including State narrative criteria for water quality." The term "water quality standards" in this context refers to a water body's beneficial uses and the water quality objectives necessary to protect those beneficial uses, as established in the Basin Plan.

B. Maximum Extent Practicable (Finding No. 14)

Under CWA section 402(p), municipalities are required to reduce the discharge of pollutants from their MS4s to the maximum extent practicable (MEP). MEP is the critical technology-based performance standard that municipalities must attain in order to comply with their MS4 permits. The MEP standard establishes the level of pollutant reductions the municipality must achieve. The MEP standard can be achieved by means of implementing pollution prevention and source control BMPs (as the first line of defense) in combination with treatment control BMPs serving as a backup (additional line of defense).

The MEP standard is an ever-evolving, flexible, and advancing concept, which considers technical and economic feasibility. As knowledge about controlling urban runoff continues to evolve, so does that which constitutes MEP. Reducing the discharge of storm water pollutants to the MEP requires Permittees to conduct and document evaluation and assessment of each program component and revise activities, control measures, best management practices (BMPs), and measurable goals, as necessary to meet MEP. Because MEP is a dynamic performance standard, it is necessary to describe in greater detail, necessary and effective measures that are essential for compliance. **(Finding No. 14)**

To achieve the MEP standard, municipalities must employ whatever BMPs are technically feasible (i.e., are likely to be effective) and are not cost prohibitive. The major emphasis is on technical feasibility. Reducing pollutants to the MEP means choosing effective BMPs, and rejecting applicable BMPs only where other effective BMPs will serve the same purpose, or the BMPs would not be technically feasible, or the cost would be prohibitive. In selecting BMPs to achieve the MEP standard, the following factors may be useful to consider:

1. Effectiveness: Will the BMPs address a pollutant (or pollutant source) of concern?
2. Regulatory Compliance: Is the BMP in compliance with storm water regulations as well as other environmental regulations?
3. Public Acceptance: Does the BMP have public support?
4. Cost: Will the cost of implementing the BMP have a reasonable relationship to the pollution control benefits to be achieved?
5. Technical Feasibility: Is the BMP technically feasible considering soils, geography, water resources, etc?

If a municipality reviews a lengthy menu of BMPs and chooses to select only a few of the least expensive BMPs, it is likely that MEP has not been met. On the other hand, if a municipal discharger employs all applicable BMPs except those where it can show that they are not technically feasible in the locality, or whose cost is prohibitive, it would have met the standard. Where a choice may be made between two BMPs that should provide generally comparable effectiveness, the discharger may choose the least expensive alternative and exclude the more expensive BMP. However, it would not be acceptable either to reject all BMPs that would address a pollutant source, or to pick a BMP base solely on cost, which would be clearly less effective. In selecting BMPs the municipality must make a serious attempt to comply and practical solutions may not be lightly rejected. In any case, the burden would be on the municipal discharger to show compliance with its permit. After selecting a menu of BMPs, it is the responsibility of the discharger to ensure that all BMPs are implemented. (SWRCB, 1993)

A definition of MEP is not provided in either the federal statute or in the federal regulations. The final determination regarding whether a municipality has reduced pollutants to the MEP can only be made by the SDRWQCB or the SWRCB, and not by the municipal discharger. While the SDRWQCB or the SWRCB ultimately define MEP, it is the responsibility of the Permittees to initially propose actions that implement BMPs to reduce pollution to the MEP. In other words, the Permittees' Individual and Watershed SWMPs to be developed under the Order are the Permittees' proposals of MEP. Their total collective and individual activities

conducted pursuant to their SWMPs become their proposal for MEP as it applies both to their overall effort, as well as to specific activities.

It is the SDRWQCB's responsibility to evaluate the proposed programs and specific BMPs to determine what constitutes MEP, using the above guidance and the court's 1994 decision in NRDC v. California Department of Transportation, Federal District Court, Central District of California. The federal court stated that a permittee must evaluate and implement BMPs except where (1) other effective BMPs will achieve greater or substantially similar pollution control benefits; (2) the BMP is not technically feasible; or (3) the cost of BMP implementation greatly outweighs the pollution control benefits. In the absence of a proposal acceptable to the SDRWQCB, the SDRWQCB will define MEP by requiring implementation of additional measures by the Permittees.

The Order represents the SDRWQCB's definition of MEP. The Order provides a minimum framework that allows Permittees the flexibility to develop and implement their own unique programs and BMP requirements and to improve and modify them as necessary to achieve and maintain compliance with the Order, and therefore, the MEP standard. The EPA supports the SDRWQCB's finding that the Order is consistent with the MEP standard when it states, "Overall, we believe that the permit [Order No. R9-2004-001] is fully consistent with the Clean Water Act (CWA), EPA regulations, and is appropriate for the Santa Margarita Watershed..." (EPA, 2004).

C. BMP Implementation (Finding Nos. 15, 16 and 17)

Pollutants can be effectively reduced in urban runoff by the application of a combination of pollution prevention, source control, and treatment control BMPs. Pollution prevention is the reduction or elimination of pollutant generation at its source and is the best "first line of defense". Source control BMPs (both structural and non-structural) minimize the contact between pollutants and flows (e.g., rerouting run-on around pollutant sources or keeping pollutants on-site and out of receiving waters). Treatment control BMPs remove pollutants from urban runoff. (**Finding No. 15**)

The SWRCB finds in its Order WQ 98-01 that BMPs are effective in reducing pollutants in urban runoff, stating that "implementation of BMPs [is] generally the most appropriate form of effluent limitations when designed to satisfy technology requirements, including reduction of pollutants to the maximum extent practicable." The TAC further supports this finding by recommending "that nonpoint source pollution control can be accomplished most effectively by giving priority to [BMPs] in the following order:

1. Pollution Prevention – implementation of practices that use or promote pollution free alternatives;
2. Source Control – implementation of control measures that focus on preventing or minimizing urban runoff from contacting pollution sources;
3. Treatment Control – implementation of practices that require treatment of polluted runoff either onsite or offsite."

Pollution prevention, the reduction or elimination of pollutant generation at its source, is an essential aspect of BMP implementation. By limiting the generation of pollutants by urban activities, less pollutants are available to be washed from urban areas, resulting in reduced

pollutant loads in storm water discharges from these areas. In addition, there is no need to control or treat pollutants that are not initially generated. Furthermore, pollution prevention BMPs are generally more cost effective than removal of pollutants by treatment facilities or cleanup of contaminated media (Schueler, 2000).

In the Pollution Prevention Act of 1990, Congress established a national policy that emphasizes pollution prevention over control and treatment. CWC section 13263.3(a) also supports pollution prevention, stating "The Legislature finds and declares that pollution prevention should be the first step in a hierarchy for reducing pollution and managing wastes, and to achieve environmental stewardship for society. The Legislature also finds and declares that pollution prevention is necessary to support the federal goal of zero discharge of pollutants into navigable waters." Finally, the Basin Plan also supports this finding by stating "To eliminate pollutants in storm water, one can either clean it up by removing pollutants or prevent it from becoming polluted in the first place. Because of the overwhelming volume of storm water and the enormous costs associated with pollutant removal, pollution prevention is the only approach that makes sense" (SDRWQCB, 1994).

Controlling urban runoff pollution by using a combination of onsite source control BMPs augmented with treatment control BMPs before the runoff enters the MS4 is important for the following reasons: (1) Many end-of-pipe BMPs (such as diversion to the sanitary sewer) are typically ineffective during significant storm events. Whereas, onsite source control BMPs can be applied during all runoff conditions; (2) End-of-pipe BMPs are often incapable of capturing and treating the wide range of pollutants which can be generated on a sub-watershed scale; (3) End-of-pipe BMPs are more effective when used as polishing BMPs, rather than the sole BMP to be implemented; (4) End-of-pipe BMPs do not protect the quality or beneficial uses of receiving waters between the source and the BMP; and (5) Offsite end-of-pipe BMPs do not aid in the effort to educate the public regarding sources of pollution and their prevention (**Finding No. 17**).

The EPA also supports the utilization of a combination of BMPs to address pollutants in urban runoff. For example, the EPA has found there has been success in addressing illicit discharge related problems through BMP initiatives like storm drain stenciling and recycling programs, including household hazardous waste special collection days (EPA, 1999b). Structural BMP performance data has also been compiled and summarized by the EPA (EPA, 1999e). This data indicates that structural BMPs can be effective in reducing pollutants in urban runoff discharges. The summary provides the performance ranges of various types of structural BMPs for removing suspended solids, nutrients, pathogens, and metals from storm water flows. These pollutants are in general the pollutants of most concern in storm water in the San Diego Region. For suspended solids, the least effective structural BMP type was found to remove 30-65% of the pollutant load, while the most effective was found to remove 65-100% of the pollutant load. For nutrients, the least effective structural BMP type was found to remove 15-45% of the pollutant load, while the most effective was found to remove 65-100% of the pollutant load. For pathogens, the least effective structural BMP type was found to remove <30% of the pollutant load, while the most effective was found to remove 65-100% of the pollutant load. For metals, the least effective structural BMP type was found to remove 15-45% of the pollutant load, while the most effective was found to remove 65-100% of the pollutant load.

As discussed above, developing minimum BMPs and implementing or requiring their implementation at industrial and commercial facilities, construction sites, and residential areas is necessary for the Permittees to ensure that, ultimately, discharges of pollutants into and from its MS4 are reduced to the MEP (**Finding No. 16**). Therefore, **Sections F through H of the Order** require Permittees to develop and require the implementation of minimum BMPs, including pollution prevention as a first line of defense, to reduce the discharge of pollutants in urban runoff to the MEP from all areas and activities with their jurisdictions.

D. Permittee Responsibility for Requiring BMPs (Finding No. 28)

Through its permitting processes, each Permittee authorizes the three major phases of urban development within its jurisdiction. Therefore, each Permittee must assume responsibility for its urban development decisions. The federal regulations clearly require municipalities to address urban runoff during each stage of development. Regarding BMP implementation during each stage of urban development, the EPA recommends that Permittees ensure the appropriate implementation of the structural BMPs by considering some or all of the following: pre-construction review of BMP designs; inspections during construction to verify BMPs are built as designed; post-construction inspection and maintenance of BMPs; and penalty provisions for noncompliance with design, construction or operation and maintenance (EPA, 1999b).

Since municipalities approve and permit construction and land use within their jurisdiction, they must assume responsibility for urban runoff discharges from these activities and land uses. The Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(A – D) are clear in placing responsibility on municipalities for control of urban runoff from third party activities and land uses to their MS4 (EPA, 2000a). In order for municipalities to assume this responsibility, they must implement ordinances, permits, and plans addressing urban runoff from third parties. Assessments for compliance with their ordinances, permits, and plans are essential for a municipality to ensure that third parties are not causing the municipality to be in violation of its municipal storm water permit. When conditions of non-compliance are determined, enforcement is necessary to ensure that violations of municipality ordinances and permits are corrected. As stated in **Finding No. 28**, each Permittee is responsible for adoption and enforcement of ordinances and/or policies, implementation of identified BMPs, and for the allocation of funds for the capital, operation, and maintenance, and enforcement expenditures necessary to implement and enforce such BMPs within its jurisdiction. Therefore, when a Permittee determines a violation of its storm water ordinance, it must pursue correction of the violation. Without enforcement, third parties do not have incentive to correct violations. The EPA supports inspections and enforcement by municipalities when it states "Effective inspection and enforcement requires [...] penalties to deter infractions and intervention by the municipal authority to correct violations. Enforcement mechanisms [...] also must be described" (EPA, 1992a).

MS4 permits are issued to municipalities because of their land use authority. The ultimate responsibility for the pollutant discharges, increased runoff, and inevitable long-term water quality degradation that results from urbanization lies with local governments. This responsibility is based on the fact that it is the local governments that have authorized the urbanization (i.e., conversion of natural pervious ground cover to impervious urban surfaces) and the land uses that generate the pollutants and runoff. Furthermore, the MS4 through which

the pollutants and increased flows are conveyed, and ultimately discharged into natural receiving waters, are owned and operated by the same local governments. In summary, the Permittees under the Order are responsible for discharges into and out of their MS4s because (1) they own and operate the MS4; and (2) they have the legal authority that authorizes the very development and land uses with generate the pollutants and increased flows in the first place.

For example, since grading cannot commence prior to the issuance of a local grading permit, the Permittees have a built-in mechanism to ensure that all grading activities are protective of receiving water quality. The Permittee has the authority to withhold issuance of the grading permit until the project proponent has demonstrated to the satisfaction of the Permittee that the project will not violate the Permittee's ordinances or cause the Permittee to be in violation of its MS4 permit. Since the Permittee will ultimately be held responsible for any discharges from the grading project by the SDRWQCB, the Permittee will want to use its own permitting authority to ensure that whatever measures the Permittee deems necessary to protect discharges into its MS4 are in fact taken by the project proponent.

Order No. R9-2004-001 holds the local government accountable for this direct link between its land use decisions and water quality degradation. The Order recognizes that each of the three major stages in the urbanization process (development planning, construction, and the use or operational stage) are controlled by and must be authorized by the local government. Developing minimum BMPs and implementing or requiring their implementation at industrial and commercial facilities, construction sites, and residential areas is necessary for the Permittees to ensure that, ultimately, discharges of pollutants into and from its MS4 are reduced to the MEP (**Finding No. 16**). As discussed in **Finding No. 20**, Permittees cannot passively receive and discharge pollutants from third parties (within or outside of their jurisdiction). In the absence of BMPs, these discharges may cause or contribute to a condition of contamination or exceedances of receiving water quality objectives. Accordingly, the Order requires the local government to implement, or require others to implement, appropriate BMPs to reduce pollutant discharges and increased flow during each of the three stages of urbanization.

E. Dual Regulation of Industrial and Construction Sites (Finding No. 21)

In accordance with federal NPDES regulations and to ensure the most effective oversight of industrial and construction site discharges, discharges of runoff from industrial and construction sites are subject to dual (state and local) storm water regulation. Under this dual system, the SDRWQCB is responsible for enforcing the statewide General Construction Activities Storm Water Permit, SWRCB Order 97-03 DWQ, NPDES No. CAS000001 (General Construction Permit) and the statewide General Industrial Activities Storm Water Permit, SWRCB Order 99-08 DWQ, NPDES No. CAS000002 (General Industrial Permit), and each municipal Permittee is responsible for enforcing its local permits, plans, and ordinances, which may require the implementation of additional BMPs than required under the statewide general permits. (**Finding No. 21**)

According to the EPA, the storm water regulations envision that NPDES permitting authorities [SDRWQCB] and municipal operators [the Permittees] will cooperate to develop programs to monitor and control pollutants in storm water discharges from industrial facilities (EPA, 1992a).

The EPA discusses the "dual regulation" of construction sites in its Storm Water Phase II Compliance Assistance Guide (EPA, 2000c), which states "Even though all construction sites that disturb more than one acre are covered nationally by an NPDES storm water permit, the construction site runoff control minimum measure [...] is needed to induce more localized site regulation and enforcement efforts, and to enable operators [...] to more effectively control construction site discharges into their MS4s." While the Storm Water Phase II Compliance Assistance Guide applies to small municipalities, it is applicable to the Permittees, because they are similar in size and have the potential to discharge similar pollutant types as Phase II municipalities.

Municipalities assume initial responsibility for enforcement against illegal discharges from land uses and activities within their jurisdiction because of their land use authority. Since the municipality approves and permits development and land use, it must ensure that its development or land use decisions do not result in receiving water quality degradation. The SDRWQCB will assist municipalities in enforcement against non-compliant sites after the municipality has exhibited a good faith effort to bring the site into compliance.

VIII. DISCUSSION OF PERMIT REQUIREMENTS

This section discusses each component of Order No. R9-2004-001. Each discussion includes the specific legal authority in addition to the broad legal authority discussed in section VII.A of this Fact Sheet, a discussion of the requirements, and comments on the Permittees' existing and proposed programs related to each component.

A. PROHIBITIONS (Order Section A)

1. Specific Legal Authority for Prohibitions

- CWA section 402(p)(3)(B)(ii) states that municipalities shall "effectively prohibit non-stormwater discharges **into** the storm sewers."
- CWA section 402(p)(3)(B)(iii) requires that permits for discharges from MS4s "shall require controls to reduce the discharge of pollutants to the maximum extent practicable, including management practices, control techniques and system, design and engineering methods, and such other provisions as the Administrator or the State determines appropriate for the control of such pollutants."
- Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(A - D) require municipalities to have legal authority to control various discharges **to** their MS4.
- Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(A - D) require municipalities to implement controls to reduce pollutants in urban runoff **from** commercial, residential, industrial, and construction land uses or activities.
- Federal NPDES regulation 40 CFR 122.44(d)(1)(i) requires NPDES permits to include limitations to "control all pollutants or pollutant parameters (either conventional, nonconventional, or toxic pollutants) which the Director determines are or may be discharged at a level which will cause, have reasonable potential to cause, or contribute to an excursion above any State water quality standard, including State narrative criteria for water quality."

- The Basin Plan contains the following waste discharge prohibition: "The discharge of waste to waters of the state in a manner causing, or threatening to cause a condition of pollution, contamination, or nuisance as defined in California Water Code section 13050, is prohibited."
- CWC section 13050(l) states "(1) 'Pollution' means an alteration of the quality of waters of the state by waste to a degree which unreasonably affects either of the following: (A) The water for beneficial uses. (B) Facilities which serve beneficial uses. (2) 'Pollution' may include 'contamination'."
- CWC section 13050(k) states "'Contamination' means an impairment of the quality of waters of the state by waste to a degree which creates a hazard to public health through poisoning or through the spread of disease. 'Contamination' includes any equivalent effect resulting from the disposal of waste, whether or not waters of the state are affected."
- CWC section 13050(m) states "'Nuisance' means anything which meets all of the following requirements: (1) Is injurious to health, or is indecent or offensive to the senses, or an obstruction to the free use of property, so as to interfere with the comfortable enjoyment of life or property. (2) Affects at the same time an entire community or neighborhood, or any considerable number of persons, although the extent of the annoyance or damage inflicted upon individuals may be unequal. (3) Occurs during, or as a result of, the treatment or disposal of wastes."
- CWC section 13241 requires each RWQCB to "establish such water quality objectives in water quality control plans as in its judgment will ensure the reasonable protection of beneficial uses and the prevention of nuisance [...]."
- CWC section 13243 provides that "A regional board, in a water quality control plan or in waste discharge requirements, may specify certain conditions or areas where the discharge of waste, or certain types of waste, will not be permitted."
- CWC section 13263(a) provides that waste discharge requirements prescribed by the SDRWQCB implement the Basin Plan.

2. Discussion of Prohibitions

The entire thrust of Order No. R9-2004-001 is to prevent discharges from MS4s from causing, or threatening to cause, a condition of pollution, contamination, or nuisance. In fact, **Prohibition A.1** exhibits a major component of the SDRWQCB's mission, and is included in its Basin Plan. The SDRWQCB seeks to preserve and enhance the quality of the region's waters, and one primary method to achieve this is by preventing conditions of pollution, contamination, or nuisance in the region's waters.

Because discharges that enter the MS4 are generally discharged unimpeded directly into receiving waters, **Prohibition A.1** applies to both discharges into and from MS4s. Federal NPDES regulations clearly provide the SDRWQCB with the legal authority to require municipalities to control discharges from third parties into their MS4. 40 CFR 122.26(d)(2)(iv)(A - D) require municipalities to implement controls to reduce pollutants in urban runoff from commercial, residential, industrial, and construction land uses or activities. Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(A - D) require municipalities to have legal

authority to control various discharges to their MS4. This concept is further supported in the Preamble to the Phase II Final Rule NPDES storm water regulations, which states "The operators of regulated small MS4s cannot passively receive and discharge pollutants from third parties" (EPA, 1999b). As discussed in section VII.E of this Fact Sheet, Phase II Final Rule findings are applicable to the Permittees. Finally, underlying the Federal NPDES storm water regulations is the CWA, which states in Section 402(p)(3)(B)(ii) that municipalities shall "effectively prohibit non-stormwater discharges into the storm sewers."

As with Prohibition A.1, **Prohibition A.2** also characterizes a primary goal of Order No. R9-2004-001 and the SDRWQCB. This goal is to protect the beneficial uses of the region's waters and achieve the water quality objectives necessary to protect those uses. The overarching intent of the CWA embodies **Prohibition A.2** as well; the CWA's objective is to "restore and maintain all chemical, physical and biological integrity of the Nation's waters [to make all surface waters] fishable [and] swimmable."

Prohibition A.3 is consistent with the direction provided in SWRCB Order WQ 2001-15 (SWRCB, 2001). The CWA and Federal NPDES regulations clearly require operators of MS4s to reduce pollutants in discharges from MS4s to the MEP. Therefore, the SDRWQCB has prohibited discharges that do not meet this requirement.

Prohibition A.4 pertains to the Basin Plan Prohibitions, which were established by the SDRWQCB pursuant to CWC section 13243. The SDRWQCB is required to implement Basin Plan Prohibitions in Order No. R9-2004-001 pursuant to CWC section 13263(a).

3. Comments on Existing and Proposed Programs Related to Prohibitions

The Permittees report in Section 2.5 of the ROWD states "The Permittees shall continue to maintain adequate legal authority to control the contribution of pollutants to the MS4s by urban runoff and enforce those authorities." The Permittees further report that they are taking "the necessary steps… to ensure that non-storm water discharges to their MS4s do not cause or contribute to violations of water quality objectives or discharge pollutants to waters of the U.S." In addition, Section 3.1 of the ROWD states "The Permittees shall prohibit illicit discharges from entering into the MS4 and require controls to reduce the discharge of pollutants to the [MEP]." The Permittees should determine if they need to revise their existing ordinances to provide the authority to specifically prohibit discharges from their MS4s that have not been reduced to the MEP.

Discharge Prohibition A.4 is not specifically addressed in the ROWD. Again the Permittees should determine if they need to revise their existing ordinances to provide the authority to specifically prohibit discharges in violation of Basin Plan prohibitions cited in Attachment A to Order No. R9-2004-001.

B. NON-STORM WATER DISCHARGES (Order Section B)

1. Specific Legal Authority for Non-Storm Water Discharge Requirements

- Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B) requires MS4 operators "to detect and remove (or require the discharger to the municipal separate storm sewer to obtain a separate NPDES permit for) illicit discharges and improper disposal into the storm sewer."

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- Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B)(1) provides that the Permittees shall prevent all types of illicit discharges into the MS4 except for the non-storm water discharges listed in Prohibition B.2, provided that these discharges are not found to be a significant source of pollutants to waters of the U.S.
- CWA section 402(p)(3)(B)(ii) requires each Permittee to prohibit non-storm water discharges into its MS4.
- Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B)(2) requires that Permittees shall provide "A description of procedures to conduct on-going field screening activities during the life of the permit, including areas or locations that will be evaluated by such field screens."
- Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B)(3) provides that Permittees shall "investigate portions of the separate storm sewer system that, based on the results of a field screen, or other appropriate information, indicate a reasonable potential of containing illicit discharges or other sources on non-storm water."
- CWC section 13267 provides that "the regional board may require that any person who has discharged [...] shall furnish, under penalty of perjury, technical or monitoring reports which the regional board requires."

2. Discussion of Non-Storm Water Discharge Requirements

The discharges listed in Non-Storm Water Discharges **Requirement B.2** are referred to as "de minimis" discharges in the Federal NPDES regulations. However, if a municipality identifies any of these discharges as a source of pollutants to waters of the U.S., they must be addressed in the municipalities storm water management plan (40 CFR 122.26(d)(2)(iv)(B)(1)).

The list of "de minimis" discharges in **Requirement B.2** is essentially the same as the current list prescribed by EPA in NPDES Permit No. CAS0108766 and identical to the list in State Board Order No. 2003-0005-DWQ, the General Storm Water Permit for small MS4s (SWRCB, 2003).

3. Comments on Existing and Proposed Programs Related to Non-Storm Water Discharge Requirements

The Permittees currently have the legal authority to prohibit non-storm water discharges to the MS4, and their existing ordinance contains a list of non-prohibited non-storm water discharges that is consistent with the Order.

In Section 3.1 of the ROWD, the Permittees proposed to add street wash water, fire hydrant testing and flushing, and other types of discharges identified and recommended by the Permittees to their list of allowable non-storm water discharges. Fire hydrant testing and flushing is a category of discharge that is considered by the SDRWQCB as a Non-emergency fire fighting flow (**Requirement B.2.q.**). Order No. R9-2004-001 requires that Permittees address discharges from non-emergency fire fighting activities when those discharges are identified as a significant source of pollutants. However, the EPA determined street wash water to be contaminated and deleted it as a non-prohibited discharge when it issued NPDES Permit CAS0108766 in April 1999 (EPA, 1999d). The Permittees have not provided

monitoring data to document that street wash water does not contain pollutants that pose a threat to water quality. In addition, SWRCB Order No. 99-06-DWQ, the Statewide Storm Water permit for Caltrans and State Board Order No. 2003-0005-DWQ, the General Storm Water Permit for small MS4s do not include street wash water as a non-prohibited discharge. Therefore, the SDRWQCB did not include street wash water on the list in **Requirement B.2** of the Order.

The discharge categories in 40 CFR 122.26(d)(2)(iv)(B)(1) comprise an inclusive and not exemplary list. Consequently, the SDRWQCB does not have the authority to add other discharge categories to the list. Pursuant to **Requirement B.1**, discharges other than those listed in Requirement B.2. are allowed if authorized by a separate NPDES permit.

Although Section 3.1 of the ROWD states that Permittees will prohibit any of the listed discharges if they are identified by the Permittees or the SDRWQCB as a source of pollutants, **Requirement B.2** of the Order allows the Permittees the option to implement BMPs to reduce pollutants to the MEP.

Pursuant to Order No. R9-98-02, the Permittees developed BMPs to address fire fighting activities (Permittees, 2000). These BMPs should be incorporated into the Permittees' SWMPs.

C. RECEIVING WATER LIMITATIONS (Order Section C)

1. Specific Legal Authority for Receiving Water Limitations (RWL) Requirements

- CWC section 13241 provides that the "SDRWQCB shall establish such water quality objectives in water quality control plans as in its judgment will ensure the reasonable protection of beneficial uses and the prevention of nuisance."
- CWC section 13263(a) provides that waste discharge requirements prescribed by the SDRWQCB implement the Basin Plan.

2. Discussion of RWL Requirements

As stated in **Finding No. 23**, the RWL language specified in the Order is consistent with language recommended by the EPA and established in SWRCB Order WQ-99-05 (SWRCB, 1999a). The RWL in the Order require compliance with water quality standards through an iterative approach for implementing improved and better-tailored BMPs over time.

The iterative BMP process requires the implementation of increasingly stringent BMPs until receiving water standards are achieved. This is necessary because implementation of BMPs alone cannot ensure attainment of receiving water quality objectives. For example, a BMP that is effective in one situation may not be applicable in another. An iterative process of BMP development, implementation, and assessment is needed to promote consistent compliance with receiving water quality objectives. If assessment of a given BMP confirms that the BMP is ineffective, the iterative process should be restarted, with redevelopment of a new BMP that is anticipated to result in compliance with receiving water quality objectives.

On October 14, 1999, the SWRCB issued a legal opinion on the federal appellate decision and provided advice to the RWQCBs on how to proceed in the future (SWRCB, 1999b). In the memorandum, the SWRCB concludes that the recent Ninth Circuit opinion upholds the

discretion of the EPA and the State to (continue to) issue permits to MS4s that require compliance with water quality standards through iterative BMPs. Moreover, the memorandum states, "[...] because most MS4 discharges enter impaired water bodies, there is a real need for permits to include stringent requirements to protect those water bodies. As total maximum daily loads (TMDLs) are developed, it is likely that MS4s will have to participate in pollutant load reductions, and the MS4 permits are the most effective vehicles for those reductions." In summary, the SWRCB concludes that the RWQCBs should continue to include the RWL language established in SWRCB Order WQ 99-05 in all future permits.

It should be noted that while implementation of the iterative BMP process is a means to achieve compliance with water quality objectives, it does not shield the discharger from enforcement actions for continued non-compliance with water quality objectives. Consistent with EPA guidance (EPA, 1998a and 1998b) regardless of whether or not an iterative process is being implemented, discharges that cause or contribute to an exceedance of water quality objectives are in violation of Order No. R9-2004-001.

3. Comments on Existing and Proposed Programs Related to RWL Requirements

The RWL requirements were not discussed in the ROWD.

D. LEGAL AUTHORITY (Order Section D)

1. Specific Legal Authority for Legal Authority Requirements

- Federal NPDES regulation 40 CFR 122.26(d)(2)(i)(A) provides that the Permittees shall develop and implement legal authority to "Control through ordinance, order or similar means, the contribution of pollutants to the municipal storm sewer by storm water discharges associated with industrial activity and the quality of storm water discharged from sites of industrial activity."
- Federal NPDES regulation 40 CFR 122.26(d)(2)(i)(D) provides that the Permittees shall develop and implement legal authority to "Control through interagency agreements among coapplicants the contribution of pollutants from one portion of the municipal system to another portion of the municipal system."
- Illicit discharge is defined under Federal NPDES regulation 40 CFR 122.26(b)(2) as "any discharge to a municipal separate storm sewer system that is not composed entirely of storm water except discharges pursuant to a NPDES permit (other than the NPDES permit for discharges from the municipal separate storm sewer) and discharges resulting from fire fighting activities."
- Federal NPDES regulation 40 CFR 122.26(b)(14) provides that "The following categories of facilities are considered to be engaging in 'industrial activity' for purposes of this subsection: [...] Construction activity including clearing, grading and excavation activities [...]."
- Federal NPDES regulation 40 CFR 122.26(d)(1)(ii) requires from the Permittee "A description of existing legal authority to control discharges to the municipal separate storm sewer system."

- Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(A - D) require municipalities to implement controls to reduce pollutants in urban runoff from commercial, residential, industrial, and construction land uses or activities.
- CWC section 13243 also provides that a "regional board, in a water quality control plan or in waste discharge requirements, may specify certain conditions or areas where the discharge of waste, or certain types of waste, will not be permitted."

2. Discussion of Legal Authority Requirements

An important means for a municipality to control the discharge of pollutants in urban runoff is through development of municipal legal authority. The EPA states "A crucial requirement of the NPDES storm water regulation is that a municipality must demonstrate that it has adequate legal authority to control the contribution of pollutants in storm water discharged **to** its MS4. [...] In order to have an effective municipal storm water management program, a municipality must have adequate legal authority to control the contribution of pollutants to the MS4. [...] 'Control,' in this context, means not only to require disclosure of information, but also to limit, discourage, or terminate a storm water discharge to the MS4" (EPA, 1992a).

Since discharges that enter the MS4 are generally discharged unimpeded directly into receiving waters, the Permittees' legal authority is to apply to both discharges **into** and **from** MS4s. Federal NPDES regulations clearly provide the SDRWQCB with the legal authority to require municipalities to control discharges from third parties into their MS4. 40 CFR 122.26(d)(2)(iv)(A - D) require municipalities to implement controls to reduce pollutants in urban runoff from commercial, residential, industrial, and construction land uses or activities. Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(A - D) require municipalities to have legal authority to control various discharges **to** their MS4. This concept is further supported in the Preamble to the Phase II NPDES storm water regulations, which states "The operators of regulated small MS4s cannot passively receive and discharge pollutants **from** third parties" (EPA, 1999b). As discussed in section VII.E of this Fact Sheet, Phase II findings for small municipalities are applicable to the Permittees. Finally, underlying the Federal NPDES storm water regulations is the CWA, which states in section 402(p)(3)(B)(ii) that municipalities shall "effectively prohibit non-stormwater discharges **into** the storm sewers."

In order to effectively prohibit illicit or non-storm water discharges, legal authority addressing the discharges must be developed and implemented by each Permittee (see discussion of **Finding No. 28** in Section VII.D of this Fact Sheet). An illicit connection is a connection to the MS4 that carries an illicit discharge. Because illicit discharges to the MS4 are prohibited, illicit connections are also prohibited and must be eliminated. In order to effectively prohibit and eliminate illicit connections, legal authority addressing the discharges must be developed and implemented by each Permittee.

In order for the ordinances to be effective, each Permittee must be able to require compliance with the ordinances. Lack of ordinance enforcement by a Permittee allows third parties to violate a municipality's ordinances with little fear of retribution, leading to receiving water quality degradation. The EPA recommends that a municipality in its urban runoff management program "identify the administrative and legal procedures available to mandate compliance with appropriate ordinances, and therefore, with permit conditions. [Programs] should contain descriptions of how ordinances are implemented and appealed. In particular,

a municipality should indicate if it can issue administrative orders and injunctions or if it must go through the court system for enforcement actions" (EPA, 1992a).

Discharges from Permittees that share an MS4 eventually reach the same receiving water body. Each Permittee that discharges to the shared MS4 is therefore responsible for discharges from the shared MS4, and the impacts of those discharges on receiving waters. The Permittees of a shared MS4 must demonstrate that together they can control the contribution of pollutants over the whole shared MS4. To this effect, the EPA states "When two or more municipalities submit a joint application, each coapplicant must demonstrate that it individually possesses adequate legal authority over the entire municipal system it operates and owns. A coapplicant need not fulfill every component of legal authority specified in the regulations, as long as the combined legal authority of all coapplicants satisfies the regulatory criteria for every segment of the MS4 (including authority over all sources that discharge to the MS4). [...] Coapplicants also may use interjurisdictional agreements to show legal authority and to ensure planning, coordination, and the sharing of the resource burden of permit compliance" (EPA, 1992a).

The Permittees' ability to determine compliance and noncompliance with permit conditions is critical to control pollutant discharges to and from MS4s. Determination of compliance and noncompliance allows for significant sources of pollutants to be identified and addressed, thereby minimizing the discharge of pollutants from the MS4 and the resulting receiving water quality degradation. For this reason each Permittee must have legal authority to carry out the inspections, surveillance, and monitoring necessary to assess compliance. Regarding compliance determination, the EPA states "municipalities should provide documentation of their authority to enter, sample, inspect, review, and copy records, etc., as well as demonstrate their authority to require regular reports" (EPA, 1992a).

Permittees must demonstrate that they can operate pursuant to legal authority to meet the requirements of Federal NPDES regulations 40 CFR 122.26(d)(2)(A-F). For the Permittee to demonstrate this legal authority, the EPA suggests that "One acceptable way to support a declaration of adequate legal authority, including the ability to enforce appropriate ordinances, is for the municipality to provide a certification from the Municipal General Counsel or equivalent. The certification should state that the applicant has the legal authority to apply and enforce the requirements of 40 CFR 122.26(d)(2)(i)(A-F) in State or local courts. The certification would, therefore, cite specific ordinances and the reasons why they are enforceable. The statement should discuss what the municipality can do to ensure full compliance with 40 CFR 122.26(d)(2)(i)" (EPA, 1992a).

3. Comments on Existing and Proposed Programs Related to Legal Authority

Section 2.4.1 of the ROWD states that the Permittees have adopted a comprehensive storm water ordinance and have previously provided a certification of adequate legal authority to the SDRWQCB. The Permittees may have had adequate legal authority to implement Order No. R9-98-02, but the existing ordinances may need to be updated to reflect requirements contained in Order No. R9-2004-001 (i.e. the required implementation of designated minimum BMPs that each Permittee develops for industrial and commercial sites, residential areas and activities, and construction sites), and a new certification will need to be submitted. The Permittees report in Section 2.4 of the ROWD that the Permittees have the legal authority

to prohibit the disposal of pollutants onto public or private land, to prohibit illicit connections and discharges and to prohibit non-storm water discharges (except for those specifically listed).

Section 2.4.1 of the ROWD states that Permittees have the authority to require construction activity to comply with local erosion and sediment control ordinances. Industrial sites are not specifically addressed in the ROWD. However, the ordinances that are currently in place in Riverside County and the City of Temecula state that any industrial discharger, discharger associated with construction activity, or other discharger subject to an NPDES permit shall comply with all requirements of such permit. Compliance with the General Industrial Permit and the General Construction Permit is specifically required.

Section 2.4.1 of the ROWD states that the Permittees have the authority to prohibit illicit connections and discharges to the MS4 and to prohibit the disposal of pollutants on public or private land.

Section 2.4.2.2 of the ROWD lists various enforcement/compliance mechanisms, but is vague about how they will be used. The ROWD states that the SDRWQCB will take the lead in initiating enforcement actions related to high priority incidents. This is incorrect and must be revised in the SWMP. Permittees are responsible for enforcing compliance with all aspects of Order No. R9-2004-001.

Although specific **Requirements D.1.g., D.1.h. and D.1.i**. are not addressed in the ROWD, the model urban runoff ordinance adopted by the Permittees (Riverside County, 1995), requires compliance with existing and future MS4 permits. This general statement may provide adequate legal authority to comply with these requirements of Order No. R9-2004-001.

It should be noted that the ROWD states that the SDRWQCB will take the lead in initiating enforcement actions related to high priority incidents. This is incorrect and must be revised in the SWMP. Permittees are responsible for enforcing compliance with all aspects of Order No. R9-2004-001.

It should also be noted that the District does not have an ordinance to prohibit illicit discharges to its MS4(s) or to require implementation of MS4 permits. The District relies on the legal authority of the municipalities that have jurisdiction over the land uses within the District.

E. STORM WATER MANAGEMENT PLAN (SWMP) (Order Section E)

1. Specific Legal Authority for SWMP Requirements

Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(A) – (D) require that permittees develop a management program that covers the duration of the permit. The regulations require that permittee plans include descriptions of each required program component to demonstrate how they will reduce pollutants to the MEP using management practices, control techniques and systems, design and engineering methods.

2. Discussion of SWMP Requirements

To meet the above-referenced federal requirements, Section E of the Order requires the development of **Individual and Watershed SWMPs**, and Attachment D provides specific

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information that, where applicable, must be included in each Permittee's SWMP. The framework provided in Attachment D allows the Permittees to develop the programs, activities, and measures that will satisfy or exceed the requirements of the federal regulations, and therefore, the Order. It provides the Permittees with the flexibility and discretion to build upon existing programs and develop BMP requirements most appropriate for their jurisdiction.

The Order requires each Permittee to develop its own **Individual SWMP**. This is necessary for each Permittee to describe their own specific programs and activities that will be implemented to reduce pollutants in discharges of urban runoff within their jurisdiction to the MEP. For example, Permittees may have different enforcement protocol or development project review procedures, while another Permittee may lack a program component altogether (i.e., the District has no jurisdiction over residential, commercial, or industrial areas). Therefore, individual plans specific to each Permittee are necessary.

Section E of the Order also requires the development of a **Watershed SWMP**. This is necessary because watershed-wide issues should be addressed collectively (see Section VIII.K of this Fact Sheet for a discussion of the watershed management approach). Also, some programs are conducted collectively by the Permittees, or solely by the Principal Permittee on behalf of the Permittees. For example, the Permittees collaborate to develop materials and implement the public education program. These area-wide programs and activities should be described in an area-wide plan.

The Order requires the Permittees to develop, submit, and implement the SWMP within one year from the date of adoption (**Finding No. 13**). The one-year time schedule is both necessary and feasible for the following reasons:

- In accordance with 40 CFR 122.26(d)(2)(iv)(A) – (D), the Permittees should have developed a comprehensive SWMP as part of their application for permit renewal. In various correspondence, beginning in July of 2002, the SDRWQCB provided the Permittees with specific information that should have been addressed in the management plan to be submitted as an application. The Permittees have disregarded these requests for a detailed SWMP and submitted an application that stated that the DAMP would be revised within 18 months of permit adoption. Providing the Permittees 365 days from the date of permit adoption, is essentially providing them with an additional year. Further additional time is not justified.
- The requirements are based on federal NPDES regulations that have been in place for 13 years. Therefore, the Permittees should have an existing plan that can feasibly be improved to meet the current expectation of the MEP standard within one year.
- 34 other permittees in the San Diego Region were given 365 days to develop and implement similar requirements. All of these permittees met the requirements in a timely fashion. The City of Escondido said the one-year schedule was reasonable, including the inter-departmental planning and review, public meetings, Planning Commission review and approval, and City Counsel approval. The Permittees have not proven that they are significantly different procedurally from the 34 other permittees to warrant additional time.

- The SDRWQB has provided the Permittees with several acceptable models that can be used as examples.
- In order to reduce pollutants in runoff to the MEP, the Permittees, in the rapidly-developing Upper Santa Margarita Watershed, must implement improved urban runoff management programs as soon as possible.

3. Comments on Existing and Proposed Programs Related to SWMP Requirements

As part of the ROWD, the Permittees proposed to update and modify their existing DAMP, dated March 1993, to incorporate new programs and commitments. Section E and Attachment D of the Order provide direction to the Permittees in revising the DAMP, which serves the purpose of, and should be referred to as, a SWMP. It is not required or necessary for the Permittees to abandon existing programs and management measures. The SWMP is just a framework for each Permittee to describe existing and improved programs that will be implemented during the permit term.

The Permittees proposed to improve the DAMP within 18 months from the adoption of the Order. For the reasons described above, and considering that Permittees will be building on existing programs, one year is ample time to develop a SWMP (consisting of the Individual and Watershed SWMPs).

F. DEVELOPMENT PLANNING (Order Section F)

1. Specific Legal Authority for Development Planning Requirements

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A)(2) provides that Permittees' proposed SWMPs must include "A description of planning procedures including a comprehensive master plan to develop, implement and enforce controls to reduce the discharge of pollutants from municipal storm sewers which receive discharges from areas of new development and significant redevelopment. Such plan shall address controls to reduce pollutants in discharges from municipal separate storm sewers after construction is completed." This regulation generally applies to all directives contained in Requirements F.1-F.4 of Order No. R9-2004-001.

2. Discussion of Development Planning Requirements

As discussed in section VI of this Fact Sheet, urban development can negatively impact water quality by increasing the pollutant load, volume, and velocity of urban runoff. An effective means for minimizing these impacts is to address water quality concerns during the planning phase of urban development. The EPA supports this, stating "Post-construction storm water management in areas undergoing new development or redevelopment is necessary because runoff from these areas has been shown to significantly effect receiving water bodies. Many studies indicate that prior planning and design for the minimization of pollutants in post-construction storm water discharges is the most cost-effective approach to storm water quality management" (EPA, 2000c). The Preamble to the Phase I Final Rule emphasizes that municipalities with large areas of new development have a greater opportunity to focus controls to reduce pollutants in storm water generated by new developments during the planning phase (55 Fed. Reg. 48053). For these reasons, section F

of the Order No. R9-2004-001 includes requirements for the development and implementation of BMPs to reduce the discharge of pollutants in urban runoff from development projects to the MEP.

The EPA finds that the Permittee "must thoroughly describe how the municipality's comprehensive plan is compatible with the storm water regulations" (EPA, 1992a). To achieve this, in accordance with **Requirement F.1**, the Permittee shall incorporate water quality and watershed protection principles and policies into its general plan (or equivalent plan). The EPA supports addressing urban runoff problems in general plans (or equivalent plans) when it states "Runoff problems can be addressed efficiently with sound planning procedures. Master plans, comprehensive plans, and zoning ordinances can promote improved water quality by guiding the growth of a community away from sensitive areas and by restricting certain types of growth (industrial, for example) to areas that can support it without compromising water quality" (EPA, 2000c).

In the Santa Margarita Watershed, there is concern among resource managers that the cumulative impacts associated with rapid development of the upper watershed will degrade the ecological integrity of the entire watershed (Stein and Ambrose, 1998). Controls on new development are critical for the protection of the sensitive ecological functions and downstream aquifers in the Santa Margarita Watershed.

The principles and policies included in **Requirement F.1** are based on TAC findings (SWRCB, 1994). They incorporate basic measures that have been found to minimize pollutants in urban runoff from new development and redevelopment.

Requirement F.2 directs Permittees to incorporate post-construction BMPs into all new development and redevelopment projects during the planning and approval. The EPA finds that review of development plans during the project approval process is necessary, stating:

> "Proposed storm water management programs should include planning procedures for both during and after construction to implement control measures to ensure that pollution is reduced to the maximum extent practicable in areas of new development and redevelopment. Design criteria and performance standards may be used to assist in meeting this objective. Further, storm water management program goals should be reviewed during planning processes that guide development to appropriate locations and steer intensive land uses away from sensitive environmental areas. [...] A municipality should describe how it plans to implement the proposed standards (e.g., through an ordinance requiring approval of storm water management programs, a review and approval process, and adequate enforcement)" (EPA, 1992a).

Regarding conditions of approval in storm water permits, the EPA finds that "Proposed storm water management programs should include planning procedures for both during and after construction to implement control measures to ensure that pollution is reduced to the maximum extent practicable in areas of new development and redevelopment. Design criteria and performance standards may be used to assist in meeting this objective" (EPA, 1992a). The EPA further finds that "The municipality should consider storm water controls and structural controls in planning, zoning, and site or subdivision plan approval" (EPA, 1992a). In addition, the EPA states each Permittee should "have an ordinance or other

regulatory mechanism requiring the implementation of post-construction runoff controls [...]" (EPA 2000c).

Furthermore, in its Phase II Final Rule, EPA requires small municipalities to "Use an ordinance or other regulatory mechanism to address post-construction runoff from new development and redevelopment projects [...]" (EPA, 1999b). As discussed in section VII.E of this Fact Sheet, Phase II findings and guidance are applicable to the Permittees.

Standard Urban Storm Water Mitigation Plan (SUSMP) - (Requirement F.2.b):

As part of the SWMP, Permittees must also develop SUSMPs for Priority Development Projects. The SUSMPs include requirements for implementation of minimum source control and treatment control BMPs. The treatment control BMPs also have numeric sizing criteria that must be met based on volume or flow (of runoff). By developing and implementing the SUSMPs, the Permittees are reducing the potential negative impacts of urban runoff on receiving waters.

SUSMP requirements are necessary due to the potential for new development to increase the volume, flow velocity, and pollutant load of urban runoff. As the TAC states, "Urban development often results in impacts to the land and consequently the water bodies adjacent to the land. The two major changes that result from urbanization are changes in stream hydrology and an increase in pollutant loading" (SWRCB, 1994). To alleviate these potential negative impacts on receiving waters, each Permittee must develop and implement a SUSMP for various categories of development. This is consistent with EPA guidance, which states "Through ordinances, permits, or contracts, municipalities may mandate storm water controls for new residential, commercial, or industrial developments in order to improve or assure maintenance of the quality of receiving water at or near pre-development levels (EPA, 1992a)". Also, EPA recommends design criteria (such as numeric sizing criteria) and performance standards for post construction BMPs at development sites (EPA, 1992a).

The post-construction requirements and design standards contained in **Section F** of Order No. R9-2004-001 are consistent SWRCB guidance, Superior Court decision, and RWQCB requirements. The SWRCB and RWQCBs have made several recent decisions in regards to inclusion of SUSMP in MS4 permits. In a precendential decision, SWRCB WQ Order No. 2000-11 (SWRCB, 2000b), SWRCB found that the SUSMP provisions constitute MEP for addressing pollutant discharges resulting from Priority Development Projects (**Finding No. 24**). The provisions of Section F of the Order are consistent with those previously issued by the SDRWQCB for Orange County (Order No. R9-2002-0001) and San Diego County (Order No. R9-2001-001), as well as requirements in the Los Angeles County MS4 permit (Order No. R4-2001-182). In SWRCB Order WQ 2001-15, the SWRCB reaffirmed the inclusion of SUSMP requirements as meeting MEP (SWRCB, 2001). On February 13, 2003, the State Superior Court dismissed an appeal of the San Diego County MS4 permit (Order No. R9-2001-001) that includes the SUSMP requirements (Superior Court of CA, 2003).

Requirement F.2.b. gives the Permittees 365 days to develop, adopt, and implement local SUSMPs. This requirement is reasonable because the SUSMPs have been implemented by various neighboring municipalities and several examples of documents and programs exist for the Permittees to use in the development of their own local SUSMPs. For example, on June 12, 2002, the SDRWQCB approved a Final Model SUSMP as meeting the new development and redevelopment controls and SUSMP requirements of the San Diego County

Permit (San Diego Co-Permittees, 2002). The Orange County permittees developed a Model Water Quality Management Plan that can also be used for guidance (County of Orange, 2003). The 640 days for SUSMP implementation requested by the Permittees has not been incorporated into the Order. In addition to the multiple SUSMP examples already available for the Permittees, the City of Murrieta and Riverside County will have developed SUSMP-type requirements pursuant to the Santa Ana RWQCB MS4 permit (Order No. R8-2002-0011) by January 2005, well before the 365-day schedule contained in the Order. Furthermore, the Permittees already have the authority to require BMPs for new development through their existing storm water ordinances. Overall, the 365-day time schedule is practicable for the Permittees.

Priority Development Project Categories

Priority Development Projects include: a) all new development projects; and b) those redevelopment projects that create, add or replace at least 5,000 square feet of impervious surfaces on an already developed site[12], that are listed under the project categories or locations in **Requirement F.2.b.(1)**. The project categories generally result in the large increases in impervious surfaces, are potential significant sources of pollutants, or have a history of storm water mismanagement. SWRCB Order WQ Order 2000-11 addressed the majority of the categories included in **Requirement F.2.b.(1)** and gave RWQCBs discretion to include additional categories or locations in SUSMP requirements in future MS4 permits (SWRCB, 2000b). Those categories that were not included in the precedential outcome of the SWRCB Order are discussed below.

Requirement F.2.b.1.(h) includes streets, roads, highways, and freeways as a SUSMP Priority Development Project category. This is due to their potential to be a significant contributor of pollutants in urban runoff. A Federal Highway Administration (FHA) report finds that concentrations of total suspended solids, nitrate + nitrite nitrogen, and zinc exceed EPA benchmark values for concentrations of these pollutants in urban runoff (FHA, 1990). Another study found that, "Water quality impacts due to highway runoff could be significant particularly in environmentally sensitive areas, such as wetlands, ground-water recharge zones, and drinking water supply watershed" (CTE, 1998). Streets, roads, highways, and freeways also consist of extensive impervious surfaces, which alter flow regimes and increase potential for downstream erosion.

Requirement F.2.b.1.(i) includes retail gasoline outlets (RGOs) as a Priority Development Project category because RGOs are points of confluence for motor vehicles for automotive related surfaces such as repair, refueling, tire inflation, and radiator fill-up and consequently produce significantly greater loadings of hydrocarbons and trace metals (including copper and zinc) than other urban areas. To meet MEP, source control and structural treatment BMPs are needed at RGOs that meet the following criteria: (a) 5,000 square feet or more or (b) a projected Average Daily Traffic (ADT) of 100 or more vehicles per day. These are

[12] Redevelopment includes, but is not limited to: the expansion of a building footprint or addition or replacement of a structure; structural development including an increase in gross floor area and/or exterior construction or remodeling; replacement of impervious surface that is not part of a routine maintenance activity; and land disturbing activities related with structural or impervious surfaces. Where redevelopment results in an increase of less then fifty percent of the impervious surfaces of a previously existing development, and the existing development was not subject to SUSMP requirements, the numeric sizing criteria discussed in Requirement F.2.b.(3) applies only to the addition, and not to the entire development.

appropriate thresholds since vehicular development size and volume of traffic are good indicators of potential impacts of urban runoff from RGOs on receiving waters. (**Finding No. 25**)

In SWRCB WQ Order No. 2000-11, the SWRCB removed RGOs as a SUSMP category because they were already heavily regulated, and limited on their ability to construct infiltration devices or perform treatment. Order No. 2000-11 also acknowledged that a threshold (size, average daily traffic, etc.) appropriate to trigger SUSMP requirements should be developed and that specific findings regarding RGOs should be included in MS4 permits to justify the requirement (SWRCB, 2000b). The SWRCB removed the RGO category from the San Diego County MS4 permit (Order No. R9-2001-01) because the SDRWCB did not specifically address the issues raised in WQ Order No. 2000-11. As discussed below, the LARWQCB and the SDRWQCB have adequately addressed the issues, and RGOs have been included as a SUSMP category in the Los Angeles County MS4 permit (Order No. R4-01-182), and the statewide general Phase II MS4 permit (WQ Order No. 2003-0005-DWQ). Additional detailed supporting information can found in the technical Report, *Retail Gasoline Outlets: New Development Design Standards for Mitigation of Storm Water Impacts* (LA and SDRWQCB, 2001b).

- Heavily Regulated - The heavily regulated distinction does not remove RGOs as significant source of pollutants in urban runoff and therefore should not be a basis for exempting them. Other regulation of RGOs is separate from regulation under the CWA and does not necessarily relate to water quality from urban runoff. Other municipalities already require that RGOs implement structural BMPs even though they are regulated under other programs.

- Treatment Limitations - Structural treatment BMPs are available for RGOs to reduce pollutants and control peak flow rates and velocities that that are both inexpensive and effective. Studies have shown that catch basin inserts can remove hydrocarbons and heavy metals that are the pollutants of concern. Sand or media filters have also been found to be effective and available for use at RGOs. Cisterns are examples of established BMPs to control flow, but RGOs could also use site design measures such as small weirs, baffles, and redirecting roof runoff to pervious areas.

- Safety - No evidence has been provided to indicate that use of these structural BMPs will pose a safety risk. In fact, filter BMP have been installed at RGOs in other municipalities without apparent adverse safety effects. In addition, similar BMPs such as oil/water separators have been used for years by RGOs without apparent adverse safety risks.

- Threshold - Studies indicate that runoff from RGOs contains similar pollutants to runoff from commercial parking lots. In precedential WQ Order 2000-11, the SWRCB determined that parking lots with a size threshold of 5,000 square feet or more is an appropriate SUSMP category (SWRCB, 2000b). Based in part on the similarity of pollutants, the 5,000 square feet size threshold was also included for RGOs in the Order. In addition, other municipalities currently use similar size thresholds for RGOs to require design standards to mitigate storm water runoff. To provide additional flexibility for the Permitees, another threshold of 100 or more motor vehicles ADT has been added to the Order. This threshold is based on requirements from Washington and Oregon for what is

considered a "high use" site. This is an appropriate threshold since vehicular traffic is a good indicator of the amount of pollutants generated at a site.

The SDRWQCB followed the SWRCB's direction for the inclusion of RGOs as a Priority Development Project category by including the above discussion in this Fact Sheet, as well as a specific finding (Finding No. 25) that justifies the regulation of urban runoff from RGOs that meet certain criteria. The SWRCB also addressed the inclusion of RGOs through the appeals of MS4 permits issued by the Los Angeles and San Francisco RWQCBs that included RGOs as a priority development category. The SWRCB held a workshop that identified RGOs as significant sources of pollutants and dismissed the petitions for removal of RGOs from the SUSMP requirements in the permits. The Western States Petroleum Association, who filed the petitions to the inclusion of RGOs, did not appeal the SWRCB's dismissal of the petitions and did not comment on the Order. Finally, the SWRCB adopted a General Permit for the Discharge of Storm Water from Small MS4s (WQ Order No. 2003-0005-DWQ), which includes RGOs as a priority development category.

Considering all of the supporting documentation discussed above, it is appropriate to include RGOs as a Priority Development Project category.

ESAs are also included as a Priority Development Project location for the reasons discussed in section VI of this Fact Sheet. For further information regarding the inclusion of ESAs is contained in the technical report, *Mitigation of Storm Water Impacts from New Development in Environmentally Sensitive Areas* (LARWQCB, 2000c).

Requirement F.2.b.2 specifies that SUSMPs include a list of recommended source control and treatment control BMPs for all projects falling under the Priority Development Project categories. This requirement also establishes criteria that these BMPs must meet. The intent of the requirement is to allow the Permittees and developers flexibility in choosing which combination of source control and treatment control BMPs are to be implemented at a site and to define what minimum performance standards must be met by these selected BMPs.

As described in **Finding No. 18**, urban runoff treatment and/or mitigation in accordance with any of the requirements in Order No. R9-2004-001 must occur prior to the discharge of storm water or urban runoff into receiving waters. Allowing polluted runoff to enter a receiving water prior to treatment to the MEP will result in degradation of the water body and potential exceedances of water quality standards, from the discharge point to the point of dissipation, infiltration, or treatment. Furthermore, the construction, operation, and maintenance of a pollution control facility in a water body can negatively impact the physical, chemical, and biological integrity, as well as the beneficial uses, of the water body. This requirement is supported by federal regulation 40 CFR 131.10(a) and EPA guidance. According to the EPA, "To the extent possible, municipalities should avoid locating structural controls in natural wetlands. Before considering siting of controls in a natural wetland, the municipality should demonstrate that it is not possible or practicable to construct them in sites that do not contain natural wetlands... Practices should be used that settle solids, regulate flow, and remove contaminants prior to discharging storm water into a wetland" (EPA, 1992a).

The numeric sizing criteria is included to ensure that structural BMPs are sized effectively to remove the pollutants of concern. The sizing criteria are based on capture of runoff from a

24-hour 85th percentile rainfall depth. The 24-hour 85th percentile storm represents the "knee" of a precipitation probability curve from which it is no longer cost effective to treat runoff. The precipitation curve is calculated by using local historical rainfall data on the number and intensity of storm events. SDRWQCB staff has calculated the average 24-hour 85th percentile rainfall depth for area covered by the permit to be 0.6 inch (See Table 2 below). The San Diego SUSMP Staff Report developed for the San Diego MS4 Permit is available for example calculations on how staff determined the average 85th percentile rainfall depth t (SDRWQCB, 2001b). However, the requirements allow needed flexibility for the Permittees and developers to mitigate runoff based on either volume or flow. In addition, the requirements allow for several different options to calculate the amount of runoff to ensure that projects are not required to capture runoff from storm events beyond the point of diminishing returns. For example, a project proponent may demonstrate that the 24-hour 85th rainfall depth may be less than the average 0.6 inch by using local precipitation data.

Table 5. Calculation of 85th Percentile Rainfall Depth for the Upper Santa Margarita Watershed

Wildomar

Total Range (Inches)	Number of Storms	Cumulative	Cumulative Percent
0.01 - 0.09	917	917	29.80
0.10 - 0.49	1344	2261	73.46
0.50 - 0.99	467	2728	88.63
1.00 - 1.99	246	2974	96.62
2.00 - 2.99	78	3052	99.16
3.00 - 3.99	14	3066	99.61
4.00 - 4.99	8	3074	99.87
5.00 - 5.99	2	3076	99.93
6.00 – 6.99	2	3078	100.00

Temecula

Total Range (Inches)	Number of Storms	Cumulative	Cumulative Percent
0.01 - 0.09	652	652	33.94
0.10 - 0.49	758	1410	73.40
0.50 - 0.99	281	1691	88.03
1.00 - 1.99	171	1862	96.93
2.00 - 2.99	44	1906	99.22
3.00 - 3.99	10	1916	99.74
4.00 – 4.99	5	1921	100.00

Winchester

Total Range (Inches)	Number of Storms	Cumulative	Cumulative Percent
0.01 - 0.09	725	725	36.47
0.10 - 0.49	826	1551	78.02
0.50 - 0.99	281	1832	92.15
1.00 - 1.99	126	1958	98.49
2.00 - 2.99	26	1984	99.80
3.00 - 3.99	3	1987	99.95
5.00 – 5.99	1	1988	100.00

Average 85th Percentile Rainfall Depth For Area=(Wildomar + Temecula + Winchester)/3 (0.4 + 0.8 + 0.6)/3= 0.6 inch 85th Percentile Rainfall Depth for Southern Riverside County

Requirement F.2.b.4 allows Permittees the opportunity to develop an equivalent method for calculating the volume or flow to be mitigated. The intent of the requirement is to provide necessary flexibility to Permittees to develop equivalent methods in calculating the volume or flow that must be mitigated from the 24-hour 85th percentile rainfall depth.

As part of the SUSMP (**Requirement F.2.b.5**), the Permittees are required to develop a procedure to identify pollutants or conditions or concern for each Priority Development Project. Identifying the pollutants or conditions or concern for a project is crucial to selecting the appropriate BMPs.

Requirement F.2.b.7 allows Permittees to waive treatment control BMPs when all available BMPs have been considered and rejected as infeasible. The requirement also allows the Permittees to develop a program to require projects that receive waivers, to transfer the cost savings to a fund. The intent of the requirements is to allow Permittees necessary flexibility to waive treatment control BMPs when it can be established that the implementation of treatment control BMPs that meet numeric sizing criteria is not feasible at a given site. This provision also allows Permittees discretion to transfer the costs saving from such a waiver to a fund for water quality projects within the watershed.

Requirement F.2.b.8 defines what restrictions to protect groundwater quality are placed on treatment control BMPs that are designed to primarily function as infiltration devices, but allows Permittees to develop alternative restrictions. Applying large amounts of runoff water in a small area has the potential to adversely impact groundwater quality. The intent of these requirements is to provide necessary restrictions for use of these structural BMPs to protect the beneficial uses (municipal, agricultural, industrial) of groundwater in the Santa Margarita watershed. The intent of the requirements is also to provide the Permittees needed flexibility to develop alternative restrictions for projects or locations.

Requirement F.2.b.9 directs Permittees to develop numeric criteria to ensure discharges from Priority Development Projects maintain or reduce pre-development downstream erosion and protect stream habitat. Development can cause increases in runoff amount and velocity causing down erosion problems. Simply maintaining the peak flow rate may not be adequate to prevent increased downstream erosion because of the increase in duration of erosive flows. According to several studies, this approach is an oversimplification of geomorphological processes (Brown, 2001). Simply controlling the post-development peak discharge rate

causes the duration of erosive flows to increase, which may actually exacerbate channel erosion since bank are exposed to a longer duration of erosive events (Brown, 2001). Development of numeric criteria over the permit cycle is needed to establish a design storm type and level of discharge that is appropriate to protect downstream habitat from increased erosion. Due to urbanization, there is a substantial increase in volume and rates of runoff during smaller storm events. The intent of the requirements in the Order to control peak rates, velocities, volumes, and durations from these smaller storms (typically 1 or 2 year storm events) to maintain downstream erosion and not the larger storm events (Brown, 2001). Section II.A of Monitoring and Reporting Program No. R9-2004-001 requires the Permittees to conduct a study to help develop the numeric criteria.

The Ventura County Flood Control District and the Southern California Coastal Water Research Project are currently conducting studies to evaluate the erosive effects on urbanization in part, to quantitatively predict downstream impacts due to development. The development of numeric criteria by the Permittees should build upon these efforts and not duplicate them. The intent of these requirements is to mitigate these potential increases and prevent downstream erosion problems like the severe bank erosion and channel degradation that has occurred in Murrieta Creek (USFWS, 2000 and EPA, 2003).

The Permittees are encouraged to use any existing programs to meet these requirements and should provide detail on how these programs are implemented in the SUSMPs. It is expected that the Permittees will utilize information from any studies that are conducted on numeric criteria to protect downstream erosion and incorporate them into their development of their own numeric criteria by 2009.

Requirement F.3 requires the Permittees to consider the effects of development projects on water quality during project approval processes. This measure will help ensure that potential water quality problems resulting from the development are identified and addressed. The EPA finds that "Proposed storm water management programs should include planning procedures for both during and after construction to implement control measures to ensure that pollution is reduced to the maximum extent practicable in areas of new development and redevelopment. Design criteria and performance standards may be used to assist in meeting this objective" (EPA, 1992a). The EPA further finds that "The municipality should consider storm water controls and structural controls in planning, zoning, and site or subdivision plan approval" (EPA, 1992a). The TAC advises that the Permittees' CEQA initial study checklists be revised to include consideration of water quality effects from new development or redevelopment. The questions included in Requirement F.3. are based on questions recommended by the TAC (SWRCB, 1994).

Requirement F.4 requires Permittees to educate staff (on an annual basis) and the development community on the impacts from development and the requirements of the Order. Training of municipal planning and development review staff is a critical aspect of an urban runoff management program. With adequate training, municipal planning and development review staff can require implementation of BMPs early in the project planning process, thereby minimizing the urban runoff impacts of development in a cost effective manner. The EPA supports training of municipal staff when it identifies "training for

appropriate employees" as a measurable goal of an urban runoff management program (EPA, 2000c).

Education on urban runoff planning issues for the public sector involved with development is equally critical. When the public sector has knowledge of urban runoff issues and regulations, it is more likely to incorporate storm water planning in the development and redevelopment process. In this manner, implementation of measures to address these issues will be included in development plans, saving time and money for the developer and the municipality. The TAC finds that Permittees should "Establish an education/information dissemination program that includes such things as: brochures to distribute to developers and contractors at permit counters and by mail; reference and training manuals for planners, engineers, inspectors, developers, contractors; and training and information exchange workshops" (SWRCB, 1994).

Furthermore, in its Phase II Final Rule, EPA requires small municipalities to "...implement a public education program to distribute educational materials to the community or conduct equivalent outreach activities [...]" (EPA, 1999b). As discussed in section VII.E oft his Fact Sheet, Phase II findings are applicable to the Permittees.

3. Comments on Existing and Proposed Programs Related to Development Planning

Section 6.3 of the ROWD states that, "Within 10 months of permit adoption, each Co-Permittee will review its general plan and land use ordinances to assess whether the following principles and policies are properly considered:

1. Limit disturbance of natural water bodies and drainage systems; conserve natural areas; protect slopes and channels; minimize impacts from urban runoff on the biological integrity of natural drainage systems and water bodies;
2. Minimize changes in hydrology and pollutant loading; require incorporation of source control and structural BMPs to mitigate the projected increases in pollutant loads and flows; ensure that post-construction runoff rates and velocities from a site do not result in significant adverse impact on downstream erosion and stream habitat; limit the quantity of Urban Runoff directed to impermeable surfaces and the MS4s; and maximize the percentage of permeable surfaces to allow more percolation of Urban Runoff in to the ground;
3. Preserve wetlands, riparian corridors, and buffer zones, establish reasonable limits on the clearing of vegetation from the project site;
4. Encourage the use of BMPs to manage Urban Runoff quality and quantity;
5. Provide for appropriate permanent measures to reduce pollutant loads in Urban Runoff from the development site; and
6. Establish development guidelines for areas particularly susceptible to erosion and sediment loss.

In addition each Co-Permittee shall provide a summary of the review and assessment in that year's Annual Progress Report and within 24 months the Co-Permittees shall revise their general plans and land use ordinances as determined necessary during review and assessment."

This proposal is basically consistent with **Requirement F.1**.

Section 6.3 of the ROWD proposes that Permittees will reduce pollutants and runoff flows form new developments and significant redevelopment to the MEP by:

1. Reviewing and revising their respective land use approval and CEQA review processes to ensure that they address urban runoff issues.
2. Developing and implementing a public/business education program.

To be consistent with the **Requirement F.2.a**. the Permittees' proposal must also provide that BMPs will be required and that new developments will not cause or contribute to an exceedance of water quality standards.

Section 6.3 of the ROWD states that Permittees will continue to implement the New Development Guidelines and will continue to address the maintenance, operation and funding of structural BMPs that ensure management of Urban Runoff quality from new development. The Permittees' current processes, including the New Development Guidelines, do not contain specific requirements consistent with those in **Requirement F.2.b.(1)**.

Section 6.3 of the ROWD proposes that, within 9 months of permit adoption, the Permittees will develop a Model Water Quality Management Plan (WQMP) identifying BMPs, including design standards for source control and structural BMPs to be applied when discretionary approval is sought. The WQMP is intended to address regional and sub-regional BMPs and to provide guidelines for site-specific, post-construction BMPs to address management of urban runoff quantity and quality in new development and significant redevelopment projects. The ROWD does not specify priority development categories, numeric criteria, or any other specific provisions required in **Requirement F.b**, which must be included in the WQMP. It should also be noted that the SDRWQCB requires the use of site-specific source and treatment control BMPs and does not encourage the use of regional or sub-regional BMPs. Regional and sub-regional BMPs are sometimes necessary in an area that has already been developed without urban runoff management measures, but it is not justified for a developing area that has the opportunity to incorporate low-impact designs and management measures into new developments during the planning process.

Also, if the Permittees choose to develop a model document, this should be completed within 6 months of the permit adoption date, so that Permittees have sufficient time to begin implementation of SUSMP requirements within 1 year. Permittees are encouraged to use existing model SUSMP documents (County of Orange, 2003; San Diego Co-Permittees, 2002), which the SDRWQCB has previously approved, so that resources can be focused on program implementation instead of developing another similar model.

Section 6.3 of the ROWD proposes that, within 10 months of permit adoption, Permittees shall review their land use approval and CEQA processes to ensure that urban runoff issues are properly considered, and revise if necessary to mitigate impacts to water quality. The ROWD states that the following six factors will be considered in each Permittee's environmental assessment:

- Potential impact that construction of the project may have on urban runoff;
- Potential impact that operation of the project may have on urban runoff;

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- Potential for discharge of pollutant in urban runoff from areas identified within the project site to be used for material storage, vehicle or equipment fueling, vehicle or equipment maintenance (including washing), waste handling, hazardous materials handling or storage, delivery areas or loading docks, or other outdoor work areas;
- Potential for pollutants in urban runoff discharged from a project site to affect the beneficial uses of receiving waters;
- Potential for significant changes in the flow velocity or volume of urban runoff from a project site to result in environmental harm; and
- Potential for significant increases in erosion of a project site or surrounding areas.

These factors are similar to the examples listed in **Requirement F.3**, therefore, this proposal is sufficient to comply with the **Requirement F.3**.

No specific internal or external training regarding development planning is proposed in the ROWD. It states that the New Development Guidelines, which contains the information needed to acquaint developers and contractors with the requirements for post-construction BMPs, will be made available during the review process for project planning and permitting. This proposal does not meet the MEP standard and, therefore, is insufficient to meet the requirements in **Requirement F.4**.

G. CONSTRUCTION (Order Section G)

1. Specific Legal Authority for Construction Requirements

- Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(D) provides that the proposed management program include "A description of a program to implement and maintain structural and non-structural best management practices to reduce pollutants in storm water runoff from construction sites to the municipal storm sewer system."
- Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(D)(1) provides that the proposed management program include "A description of procedures for site planning which incorporate consideration of potential water quality impacts."
- Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(D)(2) provides that the proposed management program include "A description of requirements for nonstructural and structural best management practices."
- Federal NPDES regulation 40 CFR 122.26(d)(2)(i)(A) provides that each Permittee must demonstrate that it can control "through ordinance, permit, contract, order or similar means, the contribution of pollutants to the municipal storm sewer by storm water discharges associated with industrial activity and the quality of storm water discharged from site of industrial activity."
- Federal NPDES regulation 40 CFR 122.26(b)(14) provides that "The following categories of facilities are considered to be engaging in 'industrial activity' for the purposes of this subsection: [...] Construction activity including clearing, grading and excavation activities [...]."
- Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(D)(3) provides that the proposed management program include "A description of procedures for identifying priorities for

inspecting sites and enforcing control measures which consider the nature of the construction activity, topography, and the characteristics of soils and receiving water quality."

- Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(D)(4) provides that the proposed management program include "A description of appropriate educational and training measures for construction site operators."

2. Discussion of Construction Requirements

CWA sections 402(p)(3)(B)(ii-iii) requires each Permittee to prohibit non-storm water discharges into its MS4 and to reduce the discharge of pollutants to the MEP for all urban land uses. The purpose of these two broad requirements is to minimize the short and long-term impacts of urban runoff on receiving water quality. Land used for construction activities is clearly identified in the federal regulations as one of several high priority land uses from which pollutants in urban runoff discharges must be reduced to the MEP by each Permittee.

Requirements G.2 and G.3 are consistent with the EPA statement that "A description of the local erosion and sediment control law or ordinance is needed to satisfy this requirement [i.e., Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(D)(2)]" (EPA, 1992a). Regarding Permittee approval of construction activities, the EPA further states, "applicants must propose site review and approval procedures that address sediment and erosion controls, storm water management, and other appropriate measures. Approvals should be clearly tied to commitments to implement structural and nonstructural BMPs during the construction process" (EPA, 1992a).

Furthermore, the EPA requires small municipalities to develop and implement for construction sites "An ordinance or other regulatory mechanism to require erosion and sediment controls, as well as sanctions to ensure compliance [...]" (EPA, 2000c).

Requirement G.2 provides the Permittees with 365 days to update their grading ordinances and not the 640 days requested the Permittees. The Permittees will have adequate authority to require and enforce minimum BMPs at construction sites prior to the next rainy season and 365 days is adequate to allow for the only minor changes needed in the grading ordinances.

An effective means for reducing pollutants discharges from construction and grading activities is specified under **Requirement G.3** for the Permittees to develop conditions of approval for grading and construction permits that require measures to minimize pollutant discharges. The EPA recommends approval processes which consider water quality impacts, stating that approval process requirements should "include phasing development to coincide with seasonal dry periods, minimizing areas that are cleared and graded to only the portion of the site that is necessary for construction, exposing areas for the briefest period possible, and stabilizing and reseeding disturbed areas rapidly after construction activity is completed (EPA, 1992a)". Other suggested construction and grading conditions of approval listed in this item are based on TAC recommendations (SWRCB, 1994).

During approval and issuance of grading and construction permits, each Permittee must review construction and grading plans to ensure that the conditions of approval are met. The EPA states that to determine if a construction site is in compliance with construction and

grading ordinances and permits, the "MS4 operator should review the site plans submitted by the construction site operator before ground is broken" (EPA, 2000c). Furthermore, the EPA requires small municipalities to develop and implement for construction sites "Procedures for site plan review which incorporate consideration of potential water quality impacts" (EPA, 1999b).

Development of an inventory of construction sites as specified by **Requirement G.4**. will help identify potential sources of pollutants in storm water. By assessing information provided in the inventory (such as site topography and site proximity to receiving waters), sites can be prioritized by threat to water quality. Those sites that pose the greatest threat can then be targeted for inspection and monitoring. This will allow for limited inspection and monitoring time to be most effective. The EPA requires that all construction sites be addressed (and therefore inventoried), stating: "All construction sites, regardless of size, must be addressed by the municipality. To begin to identify these sites, the applicant should obtain lists of construction site operators that are covered by general or individual storm water NPDES permits from the NPDES permitting authority. However, construction sites not covered by a storm water discharge permit also need to be addressed by the municipality. The best way to identify these construction sites and implement an effective BMP program to reduce pollutants in their runoff is through the site planning process" (EPA, 1992a).

Designation of a set of minimum BMPs for construction sites as specified by **Requirement G.5** will help ensure that appropriate, consistent controls are implemented and that discharges of pollutants from construction sites are reduced to the MEP. **Requirement G.5.c.** provides the Permittees with the flexibility to allow different BMPs for the wet and dry seasons. See the discussions regarding BMP Implementation and Permittee Responsibility for Requiring BMPs in Sections VII.C. and VII.D of this Fact Sheet.

Regarding designation of BMPs to be implemented, the EPA states, "the proposed management program should describe requirements for nonstructural and structural BMPs that operators of construction activities that discharge to MS4s must meet" (EPA, 1992a). While minimum BMPs will be required at all construction sites, implementation of particular BMPs will be site specific in order to address various conditions at different sites. Regarding site specific BMPs, the EPA states, "Appropriate structural and nonstructural control requirements will vary by project. Project type, size, and duration, as well as soil composition, site slope, and proximity to sensitive receiving waters will determine the appropriate structural and nonstructural BMPs" (EPA, 1992a).

In order to comply with Order No. R9-2004-001 requirements, implemented BMPs may need to be more stringent than those required under the General Construction Permit. The EPA implies that local sediment and erosion control requirements may be more stringent than General Construction Permit requirements when it states that "construction sites covered under NPDES permit regulations must indicate whether they are in compliance with State and local sediment and erosion control plans" (EPA, 1992a).

Requirement G.6. specifies requirements for inspecting construction sites. Inspections provide a necessary means by which Permittees can evaluate compliance with their municipal ordinances. Inspections are especially important at high-risk areas for pollutant discharges, such as industrial and construction sites. The Order (Attachment C - Definitions) defines the wet season as Oct 1 through April 30, which is consistent with Order No. R9-

2001-001, Order No. R9-2001-0001, Order No. R8-2002-0011, and the SDRWQCB implementation of the General Construction Permit. To ensure that BMPs are properly installed and maintained, the EPA states MS4 operators should "develop procedures for site inspection and enforcement of control measures to deter infractions" (EPA, 1992a).

The EPA further states that "Site inspections are expected to be the primary enforcement mechanism by which erosion and sediment controls are maintained" (EPA, 1992a). When inspections result in findings of noncompliance, follow-up by the Permittee to ensure compliance is necessary. The EPA states "Effective inspection and enforcement requires [...] intervention by the municipal authority to correct violations" (EPA, 1992a). This is supported by the North Carolina Study that provided empirical support for the importance of inspections in increasing construction site compliance with local and state ordinances. Both the frequency and duration of project inspections were positively associated with the level of installation and maintenance compliance at the construction sites (Malcom, 1990). The EPA further finds "inspections give the MS4 operator an opportunity to provide additional guidance and education, issue warnings or assess penalties" (EPA, 2000c). Frequent inspections by Permittees of high priority construction sites will keep compliance a priority, and allow opportunities for inspectors to enhance problem-solving skills among site personnel.

Construction site inspection frequencies are to be based on threat to water quality. The EPA supports this, stating that site inspection procedures should "identify priority sites for inspection and enforcement based on the nature and extent of the construction activity, topography, and the characteristics of soils and receiving water quality" (EPA, 2000c). For example, construction sites that are considered a high threat to water quality are to be given a high priority for inspection. This will allow for limited inspection and monitoring time to be most effective. Bi-weekly to monthly inspection of high threat sites is necessary due to the dynamic nature of construction activities. Medium and low threat construction sites can be inspected less frequently, due to their reduced risk of negatively impacting receiving waters. The minimum inspection schedule in the Permit is reasonable for the Permittees to ensure that construction sites are implementing adequate BMPs. More frequent inspections may be necessary due to site conditions. Review of storm water pollution prevention plans (SWPPPs) can be one effective tool for determining frequency of site inspections. Construction sites that effectively implement the measures of a comprehensive SWPPP may not need to be inspected as frequently as less diligent sites.

Each Permittee must develop grading and storm water ordinances under its Individual SWMP. When a Permittee determines a violation of its grading or storm water ordinance, it must pursue correction of the violation. A critical aspect of the correction of violations is enforcement of ordinances. Enforcement increases the probability of correction of a violation. The EPA supports development of enforceable ordinances and permits when it states "applicants must describe proposed regulatory programs to reduce pollutants in storm water runoff from construction sites to the MS4" (EPA, 1992a). The EPA supports enforcement of these ordinances and permits at construction sites when it states "Effective inspection and enforcement requires [...] penalties to deter infractions and intervention by the municipal authority to correct violations. Enforcement mechanisms [...] also must be described" (EPA, 1992a).

Furthermore, the EPA requires small municipalities to develop and implement "An ordinance or other regulatory mechanism to require erosion and sediment controls, as well as sanctions to ensure compliance [...]" (EPA, 1999b).

Implementation of an education program is an important best management practice for construction sites and activities. The TAC "recognizes that education with an emphasis on pollution prevention is the fundamental basis for solving nonpoint source pollution problems." The TAC points out several target communities for education efforts, including "Government: Educate agencies and officials to achieve better communication, consistency, collaboration, and coordination at the federal, state and local levels" and "Development Community: Educate the development community, including developers, contractors, architects, and local government planners, engineers, and inspectors, on nonpoint source pollution problems associated with development and redevelopment and construction activities and involve them in problem definitions and solutions" (SWRCB, 1994).

The EPA also supports education efforts for parties involved in construction, stating "technical information on how to incorporate storm water management with erosion and sediment control and other BMP training courses are recommended for municipal employees and construction site operators" (EPA, 1992a).

3. Comments on Existing and Proposed Programs Related to Construction

Pollution Prevention as required in **Requirement G.1** is not specifically mentioned in the ROWD.

Section 2.5 of the ROWD proposes that Permittees will, within 18 months of permit adoption, review and revise grading/erosion control ordinances in order to reduce erosion caused by new development and significant redevelopment. The ROWD proposal does not include the specific provisions required in **Requirement G.2**, and ordinances must be revised and adopted no later than 6 months following permit adoption (SWMPs must be implemented in full within 1 year).

The ROWD does not indicate that the Permittees' construction approval processes will be modified to include the requirements in **Requirement G.3**, except that the requirement for evidence of coverage under the General Construction Permit prior to issuance of grading permits.

Section 5.2 of the ROWD states that, within 10 months of permit adoption, "each Permittee will develop an inventory (database) of active construction sites within its jurisdiction for projects for which a building or grading permit has been issued for a site that is 1 acre or larger." This proposal is not consistent with **Requirement G.4** of the Order, since all construction sites, regardless of size, must be included in the inventory.

Section 5.2 of the ROWD proposed that, within 6 months of permit adoption, Permittees shall develop a list of erosion control BMPs appropriate for use during construction. The proposed time frame is adequate, but the list must also include minimum erosion prevention and sediment control BMPs that address **Requirement G.5**. Also, the ROWD does not state that the BMPs will be required, which is necessary to comply with Order No. R9-2004-001. The ROWD does not require additional controls for construction sites that are tributary to

CWA section 303(d) water bodies or within/adjacent to or discharging directly to receiving waters within environmentally sensitive areas, which is necessary to comply with the Order.

The ROWD proposes to initiate inspections of all inventoried sites within 11 months of permit adoption. The ROWD proposal is not sufficient to meet the requirements in Order No. R9-2004-001 because it does not include inspection frequencies. Also, construction inspections should be ongoing, as they were required in Order No. R9-98-02, until new programs begin. Stating that inspections will be "initiated" 11 months after permit adoption would cause Permittees to be in violation of the requirement to continue implementation of Order No. R9-98-02 until the SWMP is fully implemented.

Section 2.4.2.2. of the ROWD, which describes enforcement and compliance responses, states that Permittees will emphasize and encourage voluntary compliance and will initiate enforcement/compliance actions within 60 days form the date a violation was identified. It also says that the SDRWQCB will take all enforcement actions related to compliance with the General Construction Permit and that the SDRWQCB will take the lead in initiating enforcement actions related to high-priority incidents. The Permittees are responsible for enforcing their ordinances and permits related to all violations, especially those of high priority. The SDRWQCB is responsible for enforcement of the General Construction Permit, however, if Permittee ordinances are also violated, Permittees must address these violations. Furthermore, 60 days is an inappropriately long amount of time to allow a violation to occur. The ROWD does not include adequate sanctions to ensure that BMPs are implemented at construction sites. The authority to issue sanctions (including the authority to stop work) at construction sites for lack of adequate BMPs is necessary to proactively prevent discharges. The Enforcement/Compliance Strategy, as described in the ROWD, is insufficient to maintain compliance with Order No. R9-2004-001.

Section 5.2 of the ROWD proposes that, within 10 months of permit adoption, each Permittee will have arranged for training of its current inspection staff and on an annual basis thereafter, and new hires and transfers will be trained within 6 months of starting inspection duties. This proposal to train municipal staff on an annual basis is adequate to meet permit requirements. However, the ROWD does not address external training.

H. EXISTING DEVELOPMENT (Order Section H)

The Existing Development section contains the following three sections:

H.1 Municipal Program

H.2 Industrial/Commercial Facilities Program

H.3 Residential Program

H.1 MUNICIPAL PROGRAM (Order Section H.1)

1. Specific Legal Authority for Municipal Program Requirements

- Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A)(1) provides that the proposed management program include "A description of maintenance activities and a

maintenance schedule for structural controls to reduce pollutants (including floatables) in discharges from municipal separate storm sewers."

- Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A)(3) provides that the proposed management program include "A description for operating and maintaining public streets, roads and highways and procedures for reducing the impact on receiving waters of discharges from municipal storm sewer systems, including pollutants discharged as a result of deicing activities."
- Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A)(4) provides that the proposed management program include "A description of procedures to assure that flood management projects assess the impacts on the water quality of receiving water bodies and that existing structural flood control devices have been evaluated to determine if retrofitting the device to provide additional pollutant removal from storm water is feasible."
- Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A)(5) provides that the proposed management program include "A description of a program to monitor pollutants in runoff from operating or closed municipal landfills or other treatment, storage or disposal facilities for municipal waste, which shall identify priorities and procedures for inspections and establishing and implementing control measures for such discharges."
- Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A)(6) provides that the proposed management program include "A description of a program to reduce to the maximum extent practicable, pollutants in discharges from municipal separate storm sewers associated with the application of pesticides, herbicides, and fertilizer which will include, as appropriate, controls such as educational activities, permits, certifications, and other measures for commercial applicators and distributors, and controls for application in public right-of-ways and at municipal facilities."
- Federal NPDES regulation 40 CFR 122.26(d)(1)(iii) requires source identification, including the location of MS4 outfalls, the location and description of the activities of each currently operating or closed municipal land fill or other treatment, storage or disposal facility for municipal waste, the location of major structural controls for storm water discharge, and the identification of publicly owned parks, recreational areas, and other open lands.

2. Discussion of Municipal Program Requirements

Municipal facilities and activities are clearly identified in the federal regulations as one of several high priority land uses from which pollutants in urban runoff discharges must be reduced to the MEP. The EPA targets municipal areas and activities "to help ensure a reduction in the amount and type of pollution that (1) collects on streets, parking lots, open spaces, and storage and vehicle maintenance areas and is discharged into local waterways; and (2) results from actions such as environmentally damaging land development and flood management practices or poor maintenance of storm sewer systems" (EPA, 2000c).

As specified by **Requirement H.1.b**, Permittees must first identify all of the municipal areas and activities that generate pollutants within their jurisdiction. The areas and activities listed in **Requirement H.1.b** are either specifically addressed in the federal NPDES regulations

referenced above, or have been determined by the Permittees (Permittees, 2003), the SDRWQCB (SDRWQCB, 2002a), or the EPA (EPA, 1992a) to contribute pollutants to the MS4. Source identification is necessary to characterize the nature and extent of pollutants in discharges and to develop appropriate control measures. It is the first step in developing a targeted approach to urban runoff management.

Regarding **Requirement H.1.d**, MS4 Maintenance is critical to the successful implementation of every SWMP. The requirement to conduct a maintenance program is specifically directed in both the Phase I and Phase II storm water regulations. The EPA finds that "Lack of maintenance often limits the effectiveness of storm water structural controls such as detention/retention basins and infiltration devices. [...] The proposed program should provide for maintenance logs and identify specific maintenance activities for each class of control, such as removing sediment from retention ponds every five years, cleaning catch basins annually, and removing litter from channels twice a year" (EPA, 1992a). Regarding catch basin cleaning, the EPA states, "The removal of sediment, decaying debris, and highly polluted water from catch basins has aesthetic and water quality benefits, including reducing foul odors, reducing suspended solids, and reducing the load of oxygen-demanding substances that reach receiving waters" (EPA, 1999c). It goes on to say, "Catch basin cleaning is an efficient and cost-effective method for preventing the transport of sediment and pollutants to receiving water bodies. The requirement (Requirement H.1.d.(d)) is necessary to identify problem areas and sources of debris in catch basins.

Requirement H.1.e, Management of Pesticides, Herbicides and Fertilizers, is supported by the EPA finding that "The proposed program should include educational measures for the public and commercial applicators, and should include integrated pest management measures that rely on non-chemical solutions to pest control. The program should also describe how educational materials will be developed and distributed. Applicants are encouraged to consider providing information for the collection and proper disposal of unused pesticides, herbicides, and fertilizers, or to establish their own program. [...] In addition, applicants must include a discussion of controls for the application of pesticides, herbicides, and fertilizers in public rights-of-way and at municipal facilities. Planting low-maintenance vegetation, such as perennial ground covers, reduces pesticide and herbicide use. Native vegetation is often preferable because there is less need to apply fertilizers and herbicides, and to perform other forms of maintenance, such as mowing" (EPA, 1992a).

Requirement No. H.1.f, Inspections of Municipal Facilities and Activities, is specified to insure that proper measures are being undertaken to reduce pollutant discharges to the MEP. The EPA supports inspections of municipal areas and activities, stating "Applicants must describe programs that identify measures to monitor and reduce pollutants in storm water discharges from facilities that handle municipal waste, including sewage sludge. [...] The types of facilities that should be included are: active or closed municipal waste landfills; publicly owned treatment works, including water and wastewater treatment plants; incinerators; municipal solid waste transfer facilities; land application sites; uncontrolled sanitary landfills; maintenance and storage yards for waste transportation fleets and equipment; sites for disposing or treating sludge from municipal treatment works; and other treatment, storage, or disposal facilities for municipal waste" (EPA, 1992a). The EPA further states, "Procedures to evaluate, inspect, monitor, and establish control measures for

municipal waste sites over the term of the NPDES permit should be described" (EPA, 1992a)."

3. Comments on Existing and Proposed Municipal Programs

Section 4.1 of the ROWD describes the Municipal Facilities Strategy, which the Permittees developed pursuant to Order No. R9-98-02 to identify BMPs for activities conducted at municipal facilities. This section of the ROWD identifies the types of municipal facilities and the activities conducted at those facilities that have the potential to contribute pollutants to urban runoff (ROWD Table 4-1). The Permittees identified maintenance yards, vehicle and equipment maintenance areas, waste transfer stations, corporation and storage yards, and parks and recreational facilities as "facilities of concern". The number of each type of facility operated by each Permittee is listed in Table 4-2 of the ROWD. All other facilities that may be sources of pollutants, including parking areas, hazardous material collection facilities, and other facilities covered under the General Industrial Permit were not identified as "facilities of concern", and were not included in Table 4-2. As discussed above, all facilities and activities listed in **Requirement H.1.b** of the Order must be identified in the inventory. Also, Table 4-2 only lists the number of each type of facility in each Permittee's jurisdiction. The inventory must include, at a minimum, the name, address, and description of activities conducted at each facility.

The ROWD also identifies potential pollutants of concern from municipal facilities and activities (Table 4-3) and "potential" source control BMPs to address the pollutant-generating activities (Table 4-4). The Permittees propose to "maintain up-to-date site-specific Urban Runoff pollution prevention plans for public agency facilities and activities." If the "potential" BMPs listed in Table 4-4 include pollution prevention methods, and are required to be implemented (as applicable) these programs are adequate to comply with **Requirements H.1.a and c** of the Order.

It is important to note that the ROWD claims that brake pad wear, the operation of internal combustion engines, and tire wear, among other thing, are beyond the ability of the Permittees to control. The EPA and the SDRWQCB do not concur with this claim. The EPA states, "proposed management programs must include a description of practices for operation and maintenance of public streets, roads, and highways, and procedures for reducing the impact of runoff from these areas on receiving waters. [...] Pollutants from traffic can be minimized by using nonstructural controls (e.g., traffic reduction and improved traffic management), structural controls (e.g., traditional and innovative BMPs), and changing maintenance activities" (EPA, 1992a).

Regarding MS4 maintenance, Section 4.2 of the ROWD proposes that, within 12 months of permit adoption, Permittees will develop "Model Maintenance Procedures" for public agency activities and drainage facilities. However, in December 1999, the Permittees submitted proposed "Storm Drain System Inspection and Maintenance" programs, pursuant to Order No. R9-98-02 (Permittees, 1999). Each Permittee's proposed program would satisfy the requirements in **Requirement H.1.d** of the Order. Because such plans have already been submitted, the Permittees do not need 12 months to develop another program, and they do not need additional time to implement maintenance activities. Considering that this is a third-round permit, the Permittees should already be conducting the proposed MS4

maintenance activities and continued implementation would be adequate for compliance with Order No. R9-2004-001 without requiring additional resources.

Regarding the management of pesticides, herbicides, and fertilizers, Section 4.2 of the ROWD proposes that "Permittees shall continue to provide training to municipal staff and to contract field operations staff on fertilizer and pesticide management, maintenance procedures, and other pollution control measures. Permittee staff shall attend at least 3 out of 5 annual training sessions." This proposal satisfies **Requirement H.1.e** of the Order, but it does not address the requirements to include integrated pest management measures that rely on non-chemical solutions.

Section 4.2 of the ROWD proposes to "review municipal activities and facilities annually to identify needed revisions of the Municipal Facilities Strategy". In order to identify needed revisions to BMP requirements and municipal programs, inspections are necessary. Therefore, it is assumed that the Permittees proposal includes inspections of municipal facilities and activities. Considering the small number of municipal facilities that each Permittee operates, with the exception of parks (ROWD Table 4-2), inspecting each facility annually is feasible.

Regarding parks and recreation facilities, the Permittees identified these areas as facilities of concern in the ROWD due to their potential to generate pollutants. Therefore, parks and recreation facilities, or the municipal activity conducted at the facilities must be inspected annually. If the same municipal maintenance staff perform similar landscaping or other activities at all parks, the inspection process could be streamlined to focus on the activities. For example, the Permittees could possibly develop one pollution prevention plan for all parks that includes all activities conducted at municipal parks, and conduct annual inspections of the activities performed to ensure that effective BMPs are being implemented (not necessarily inspecting all parks annually).

Enforcement of municipal areas and activities is not specifically addressed in the ROWD. This program will need to be developed as part of each Permittee's Individual SWMP.

Overall, with minor refinement, the existing and proposed municipal programs are adequate to meet the requirements of **Requirement H.1** of the Order.

H.2 INDUSTRIAL/COMMERCIAL FACILITIES PROGRAM (Order Section H.2)

1. Specific Legal Authority for Industrial/Commercial Facilities Requirements

- Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(C) provides that the proposed management program include "A description of a program to monitor and control pollutants in storm water discharges to municipal systems from municipal landfills, hazardous waste treatment, disposal and recovery facilities, industrial facilities that are subject to Section 313 of title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA), and industrial facilities that the municipal permit applicant determines are contributing a substantial pollutant loading to the municipal storm sewer system."
- Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(C)(1) provides that the permittee must "identify priorities and procedures for inspections and establishing and implementing control measures for such discharges."

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- Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A) provides that the permittee develop a proposed management program which includes "A description of structural and source control measures to reduce pollutants from runoff from commercial and residential areas that are discharged from the municipal storm sewer system that are to be implemented during the life of the permit, accompanied with an estimate of the expected reduction of pollutant loads and a proposed schedule for implementing such controls."
- Federal NPDES regulation 40 CFR 122.26(d)(2)(ii) provides that the permittee "Provide an inventory, organized by watershed of the name and address, and a description (such as SIC codes) which best reflects the principal products or services provided by each facility which may discharge, to the municipal separate storm sewer, storm water associated with industrial activity."
- Federal NPDES regulation 40 CFR 122.44(d)(1)(i) requires NPDES permits to include limitations to "control all pollutants or pollutant parameters (either conventional, nonconventional, or toxic pollutants) which the Director determines are or may be discharged at a level which will cause, have reasonable potential to cause, or contribute to an excursion above any State water quality standard, including State narrative criteria for water quality."

2. Discussion of Industrial/Commercial Facilities Requirements

The requirements contained in Section H.2 provide a framework for developing management programs to reduce pollutants in urban runoff discharges from industrial and commercial facilities to the MEP.

The EPA supports the industrial/commercial facility requirements when it states, "NPDES permits for MS4s will establish responsibilities for municipal system operators to control pollutants from industrial storm water discharged through their system" (EPA, 1992a). The guidance further states that Permittees are ultimately responsible for discharges to their MS4. Therefore, storm water management programs should do the following:

- Identify priority industries discharging to their systems;
- Review and evaluate SWPPPs and other procedures that industrial facilities must develop under general or individual permits;
- Establish and implement BMPs to reduce pollutants from these industrial facilities (or require industry to implement them); and
- Inspect and monitor industrial facilities to verify that the industries discharging storm water to the MS4 are in compliance with their NPDES storm water permit, if required.

Source identification is necessary to characterize the nature and extent of pollutants in discharges and to develop appropriate BMPs. The industrial and commercial facilities listed in **Requirement H.2.b** are either specifically addressed in the federal NPDES regulations referenced above, or have been determined by the Permittees, or the SDRWQCB (SDRWQCB, 2002a) to contribute pollutants to the MS4. The Permittees have not provided data, or other information, documenting that any of the facilities should be removed from the list because they are not a source of pollutants in the Upper Santa Margarita Watershed.

The EPA supports the list of facilities in the Order when it states the following (EPA, 2004):

> "EPA regulations at 40 CFR 122.26(d)(2)(iv)(A) provide for a broad program of 'source control and structural control measures to reduce pollutants from runoff from commercial and residential areas…' We believe that this regulation provides a firm basis for the permit's [Order] requirements related to commercial facilities. The requirements for outreach to commercial facilities, inspections, and the follow-up enforcement would all be consistent with a program of 'source control' measures to be included in a storm water management program…"

Regarding the list of industrial facilities, EPA goes on to say:

> "The issue of industrial inspections also arose for the Los Angeles County MS4 permit. The State Board, in a memo dated November 9, 2001, from Michael Lauffer of the State Board to Dennis Dickerson, Executive Officer of the Los Angeles Regional Board, noted that under Section 402 (p)(3)(B)(iii) of the CWA, the Board has broad authority to require 'such other provisions…as the State determines appropriate…' and that this would provide a basis for requirements that go beyond specific provisions of the EPA regulations. We would agree with the State Board on this matter, and that the Regional Board would have the authority to require inspections of all the industrial facilities listed in the permit [Order], notwithstanding the specific provisions of the EPA regulations."

Regarding **Requirement H.2.c**, BMP Implementation, guidance from the EPA makes it clear that Permittees are required to designate BMPs for industrial and commercial facilities when it states that permittees should, "Establish and implement BMPs to reduce pollutants from these facilities (or require industry to implement them)" (EPA, 1992a). The EPA goes on to say that BMPs more stringent than those required under the General Industrial Permit may be necessary. The EPA finds that "nothing in the Federal regulations would prohibit the municipality from requiring additional controls beyond the permit requirements for industrial activities. For this reason, the EPA recommends that municipal applicants incorporate a provision in the proposed storm water management program that allows the municipality to require priority industrial facilities to implement the controls necessary for the municipality to meet its permit responsibilities" (EPA, 1992a). These statements from the EPA support the requirement for dual regulation of facilities covered by the General Industrial Permit (see discussion in support of **Finding No. 21** in Section VII.E of this Fact Sheet).

In support of **Requirement H.2.c.(3)**, the EPA recommends that Permittees provide BMP guidance to industrial facilities, stating, "The applicant should suggest procedures for requiring pollutant control measures in runoff from priority industrial facilities. Applicants should provide information to the industrial facilities that discharge to the MS4s and industry-specific guidance on appropriate control measures that industries discharging to the systems should follow" (EPA, 1992a). The EPA goes on to say, "Applicants should provide information to the industrial facilities that discharge to the MS4s and industry-specific guidance on appropriate control measures that industries discharging to their systems should follow" (EPA, 1992a).

Furthermore, inspections are necessary to verify that industries are in compliance with the MS4 permit and local ordinances (EPA, 1992a). According to the EPA, "The proposed management program should describe the inspection procedures that will be followed. […]

Proposed management programs should address minimum frequency for routine inspections. For example, how often, how much of the site, and how long an inspection may take are appropriate to explain in this proposed management program component. Applicants should also describe procedures for conducting inspections and provide an inspector's checklist" (EPA, 1992a). In further support of inspections and dual regulation of industrial facilities, the EPA states "Municipalities are urged to evaluate pollution prevention plans and discharge monitoring data collected by the industrial facility to ensure that the facility is in compliance with its NPDES storm water permit. Site inspections should include (1) an evaluation of the pollution prevention plan and any other pertinent documents, and (2) an onsite visual inspection of the facility to evaluate the potential for discharges of contaminated storm water from the site and to assess the effectiveness of the pollution prevention plan" (EPA, 1992a).

The EPA also finds that follow-up actions are to be implemented based upon site inspection findings: "The results of inspection may be used as a basis for requiring storm water management controls and enhanced pollution prevention measures" (EPA, 1992a).

Industrial site inspection frequencies specific in **Requirement H.2.d** are based on threat to water quality prioritization in order to allow for limited inspection resources to be most effective. Annual or bi-annual inspection of high threat sites is necessary to ensure that changes to the site that may be detrimental to water quality are identified and addressed.

Requirement H.2.f, Reporting of Non-Filers, is necessary to ensure effective oversight of industrial facilities.

3. Comments on Existing and Proposed Industrial/Commercial Programs

Pursuant to Order No. R9-98-02, the Permittees have developed and implemented an industrial/commercial facilities program that meets or exceeds several of the requirements in Section H.2 of the Order. Each Permittee has already developed a prioritized list of facilities, including industrial facilities as defined at 40 CFR 122.26(b)(14), food facilities, and all other facilities that store, generate, or handle hazardous waste. The method of prioritization used in developing the current lists is consistent with what the SDRWQCB considers to be "high", "medium", and "low". Section 7.3 of the ROWD proposes that, within 9 months of permit adoption, each Permittee will update its existing inventories of industrial and commercial facilities within its jurisdiction that have the potential to discharge pollutants to the MS4. The ROWD says that the industrial and commercial facilities databases will include the name, address, location reference, facility contact and phone number, SIC code, WDID number, assessor's parcel number, and site size.

Also pursuant to Order No. R9-98-02, the Permittees developed the Commercial/Industrial Compliance Assistance Program (CAP) as a mechanism to conduct the required inspections of inventoried facilities. The CAP was formed as an agreement between the District and the County's Department of Environmental Health and involves the completion of a "storm water compliance survey" in addition to the routine inspections that the Department Environmental Health conducts pursuant to other regulations. Through the CAP, the County currently inspects sites with underground storage tanks once per year, sites that handle and generate hazardous waste every two years (began in May 2002), and retail food facilities 1-3 times annually (began in January 2002). Section 7.3 of the ROWD proposes that, within 12

months of permit adoption, each Permittee will implement an inspection frequency for industrial and commercial facilities of no less than:

- Once a year for industrial facilities designated as high priority;
- Once biannually for commercial facilities designated as medium priority; and
- Once during the permit term for facilities designated as low priority.

Except for the facilities that are not captured under the CAP, which must be addressed by each Permittee, the Permittees existing and proposed programs are adequate to comply with the requirements in **Requirement H.2.b and H.2.d.**

Section 7.2 of the ROWD states that, "In conducting a commercial/industrial facility inspection, if it appears that the facility may be required to have coverage under the General Permit for Stormwater Discharges Associated with Industrial Activities and the facility operator has indicated that an NOI has not been filed, the inspector will provide the operator with an informational sheet on the requirements of the General Permit for Stormwater Discharges Associated with Industrial Activities. The inspector also documents the name, address, and SIC code of the facility. Subsequently, a listing of such facilities is compiled and forwarded to the San Diego Regional Board staff on a frequency to be determined by the Permittees." This proposal meets **Requirement H.2.f.**

It is important to note that there are approximately 25 industrial facilities currently covered by the General Industrial Permit within the Upper Santa Margarita Watershed. Most of these facilities are already included in the Permittees' inventories and covered under the CAP. The remaining few that will require inspections and oversight will not constitute a significant burden on the Permittees. Therefore, dual regulation of these sites should not be an issue. In the Permittees comments on the Order, they proposed BMP requirements to comply with Requirement H.2.c.1. The proposed BMPs may be adequate minimum requirements for food facilities and for facilities that store hazardous waste. However, broadly applying these few BMPs to all types of inventoried industrial and commercial facilities may not be adequate or appropriate. Adequate minimum BMPs should address all facility types and activities that could potentially contribute pollutants to the MS4.

Regarding enforcement, Section 2.4.2.2. of the ROWD states that Permittees will emphasize and encourage voluntary compliance and will initiate enforcement/compliance actions within 60 days form the date a violation was identified. It also says that the SDRWQCB will take all enforcement actions related to compliance with the General Industrial Permit and that the SDRWQCB will take the lead in initiating enforcement actions related to high-priority incidents. These statements are incorrect and do not meet the requirements of **Requirement H.2.e**. As discussed in Sections VII.D and VII.E of this Fact Sheet, the Permittees are responsible for enforcing their ordinances and permits related to ALL violations, especially those of high priority. The SDRWQCB is responsible for enforcement of the General Industrial Permit, however, if Permittee ordinances are also violated, Permittees must address these violations. Furthermore, 60 days is an inappropriately long amount of time to allow a violation to occur. The Permittees' Enforcement/Compliance Strategy, as described in the ROWD, is insufficient to meet the enforcement requirements contained in Order No. R9-2004-001.

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Section 7.3 of the ROWD proposes that, within 1 year of permit adoption, each Permittee will have arranged for adequate training of all staff inspectors and on an annual basis thereafter. New hires that will be performing inspections will be trained within 6 months of starting field duties. This proposed training schedule meets **Requirement H.2.g** of the Order.

H.3 RESIDENTIAL PROGRAM (Order Section H.3)

1. Specific Legal Authority for Residential Requirements

- Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A) provides that the Permittee develop a proposed management program which includes "A description of structural and source control measures to reduce pollutants from runoff from commercial and residential areas that are discharged from the municipal storm sewer system that are to be implemented during the life of the permit, accompanied with an estimate of the expected reduction of pollutant loads and a proposed schedule for implementing such controls."
- Federal NPDES regulation 40 CFR 122.44(d)(1)(i) requires NPDES permits to include limitations to "control all pollutants or pollutant parameters (either conventional, nonconventional, or toxic pollutants) which the Director determines are or may be discharged at a level which will cause, have reasonable potential to cause, or contribute to an excursion above any State water quality standard, including State narrative criteria for water quality."

2. Discussion of Residential Requirements

Land used for residential activities is clearly identified in the federal regulations as one of several high priority land uses from which pollutants in urban runoff discharges must be reduced to the MEP by each Permittee (40 CFR 122.26(d)(2)(iv)). Residential activities have the potential to be significant sources of pollutants in urban runoff. In residential areas, pollution sources conveyed by the MS4 include activities related to automobile maintenance, landscaping/gardening, home-improvement, pets, and others, including those listed in **Requirement H.3.b.** The requirements contained in Section H.3 will provide a program for the development and implementation of BMPs to reduce pollutants in urban runoff discharges from residential activities to the MEP (see discussion of **BMP Implementation** in Section VII.C of this Fact Sheet).

Pursuant to Order No. R9-98-02 and pre-existing programs, the Permittees have instituted or promoted residential pollution prevention BMPs, including street sweeping, household hazardous waste collections, and education. Nationally, education is increasingly being used as a tool for pollution prevention in residential areas, where the use of regulatory enforcement actions has traditionally been less than in other land use areas. Pollution prevention can encourage responsible residential nutrient management, such as proper fertilization rates and proper pet waste disposal, when a connection is established between such practices and local or regional water quality needs (Nonpoint Source News Notes, 2000). Similarly, source control is vital to protect urban watersheds from pesticides that are applied in residential areas and are transported to streams via the MS4. For example in a

review, "Diazinon Sources in Runoff from the San Francisco Region," the Center for Watershed Protection concluded that, "the only real tool to control diazinon in urban watersheds is source control to either reduce the use of diazinon or to apply it in a safer manner." In addition, where structural BMPs or MS4 facilities are owned or operated by the residential community, pollution prevention activities taken by local governments can include maintenance guidance.

3. Comments on Existing And Proposed Residential Programs

Section 8.0 of the ROWD states that pollution prevention is a major focus of the Permittees' existing StormWater/CleanWater Protection Program, and the following pollution prevention themes are emphasized in public outreach activities and materials:

- Proper disposal of household hazardous waste;
- Proper disposal of used motor oil;
- Pesticide and fertilizer use guidelines;
- Good housekeeping BMPs; and
- Proper disposal of pet waste.

Section 8.2 of the ROWD proposes to educate the public regarding pollutants in urban runoff. Education and outreach may be sufficient to reduce the discharge of pollutants to the MEP from residential areas, however, additional BMPs may be necessary in some cases. These minimum BMP requirements should be identified in each Permittee's Individual SWMP.

I. EDUCATION (Order Section I)

1. Specific Legal Authority for Education Requirements

- Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A)(6) provides that the proposed management program include "A description of a program to reduce to the maximum extent practicable, pollutants in discharges from municipal separate storm sewers associated with the application of pesticides, herbicides, and fertilizer which will include, as appropriate, controls such as educational activities, permits, certifications, and other measures for commercial applicators and distributors, and controls for application in public right-of-ways and at municipal facilities."
- Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B)(6) provides that the proposed management program include "A description of educational activities, public information activities, and other appropriate activities to facilitate the proper management and disposal of used oil and toxic materials."
- Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(D)(4) provides that the proposed management program include "A description of appropriate educational and training measures for construction site operators."

2. Discussion of Education Requirements

Education is a critical BMP and an important aspect of the SWMP. The EPA finds that "An informed and knowledgeable community is critical to the success of a storm water management program since it helps ensure the following:

> "Greater support for the program as the public gains a greater understanding of the reasons why it is necessary and important. [...]
>
> Greater compliance with the program as the public becomes aware of the personal responsibilities expected of them and others in the community, including the individual actions they can take to protect or improve the quality of area waters". (EPA, 2000c)

Regarding target audiences, EPA states "The public education program should use a mix of appropriate local strategies to address the viewpoints and concerns of a variety of audiences and communities, including minority and disadvantaged communities, as well as children" (EPA, 2000c). The target communities included in Requirement I. are based on recommendations of the TAC (SWRCB, 1994).

3. Comments on Existing and Proposed Education Programs

Public education was strongly emphasized in the Permittees' 1993 DAMP implemented under the first and second term permits. Consequently, the Permittees already have well-developed education programs that may be readily reviewed and revised, as necessary, to satisfy the requirements of Order No. R9-2004-001.

Section 8.2 of the ROWD includes several good program commitments, such as conducting a survey to measure changes in awareness, which should be incorporated into the SWMP.

J. ILLICIT DISCHARGE DETECTION AND ELIMINATION (Order Section J)

1. Specific Legal Authority for Illicit Discharge Detection and Elimination Requirements

- Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(B) and 40 CFR 122.26(d)(2)(iv)(B)(1) generally apply to all directives under Section J. Illicit Discharge Detection and Elimination of Order No. R9-2004-0001.
- Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B)(2) provides that the permittee include in its proposed management program "a description of procedures to conduct on-going field screening activities during the life of the permit, including areas or locations that will be evaluated by such field screens."
- Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B)(3) provides that the permittee include in its proposed management program "procedures to be followed to investigate portions of the separate storm sewer system that, based on the results of the field screen, or other appropriate information, indicate a reasonable potential of containing illicit discharges or other sources of non-storm water."
- Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(B)(5) provides that the permittee include in its proposed management program "a description of a program to promote, publicize, and facilitate public reporting of the presence of illicit discharges

or water quality impacts associated with discharges from municipal separate storm sewers."

- Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(B)(6) provides that the permittee include in its proposed management program "a description of educational activities, public information activities, and other appropriate activities to facilitate the proper management and disposal of used oil and toxic materials."

2. Discussion of Illicit Discharge Detection and Elimination Requirements

In accordance with 40 CFR 122.26(d)(2)(iv)(B) and 122.26(d)(2)(iv)(B)(1), **Requirement J.1** requires each Permittee to actively seek and eliminate illicit discharges and illicit connections. As guidance for detecting and eliminating illicit discharges and connections, the EPA suggests "The proposed management program must include a description of inspection procedures, orders, ordinances, and other legal authorities necessary to prevent illicit discharges to the MS4" (EPA, 1992a).

In order to detect illicit discharges and connections, **Requirement J.2** requires each Permittee to develop and maintain an accurate, up-to-date map of its MS4. An accurate map of the MS4 will enable the Permittees to monitor the system for illicit discharges and connections and to be aware of the entire MS4 within its jurisdiction.

Requirement J.3 requires Permittees to develop and implement an Illicit Discharge Monitoring Program as specified in **section II.B of Monitoring and Reporting Program No. R9-2004-001 (hereafter referred to as the MRP)**. If results indicate that an illicit discharge or connection may be present, **Requirement J.4** specifies that the Permittees shall conduct follow-up procedures to pinpoint the source of the illicit discharge or connection. Once the illicit discharge or connection source is identified, steps may be taken to eliminate the discharge or connection. In this manner, monitoring of dry weather urban runoff can lead to the elimination of illicit discharges and connections and the reduction of pollutants in urban runoff.

Requirement J.5 requires the elimination of illicit discharges and illicit connections as soon as possible. The time needed to eliminate the discharge/connection will depend on the nature and circumstance of the problem including conditions that are not under the control of the Permittees. However, discharges that the Permittees have the ability to eliminate immediately must be eliminated immediately. The EPA supports elimination as soon as possible when it states, "Once the source is identified, the offending discharger should be notified and directed to correct the problem. Education efforts and working with the discharger can be effective in resolving the problem before taking legal action" (EPA, 1992a).

The EPA states that the "proposed management program component should describe how the prohibition on illicit discharges will be implemented and enforced. The description could include a schedule and allocation of staff and resources. A direct linkage should exist between this program component and the adequate legal authority requirements for the ordinances and orders to effectively implement the prohibition of illicit discharges" (EPA, 1992a). Consistent with this statement, **Requirement J.6** requires Permittees to implement and enforce its ordinance, orders, or other legal authority over illicit discharges and connections.

Requirement J.7 pertains to sewage spill prevention and response. Such spills into and from the MS4 can severely impair receiving water quality and pose a significant threat to public health. To avoid these negative impacts, the Order requires Permittees to implement appropriate procedures to prevent, contain, and respond to spills that may discharge into the MS4. The Order contains suggestions of possible appropriate actions. The EPA states, "The goal of a spill prevention program is to reduce the frequency and extent of spills of hazardous materials which can cause water quality impairment" (EPA, 1992a).

Requirement J.8 pertains to public reporting of illicit discharges or water quality impacts associated with discharges from MS4s. Regarding this issue, the EPA states "Timely reporting by the public of improper disposal and illicit discharges are critical components of programs to control such sources. To enhance public awareness, programs may include setting up a public information hotline number, educating school students, community and volunteer watchdog groups, using inserts into utility bills, and newspaper, radio, and television announcements to inform the public about what to look for and how to report incidents" (EPA, 1992a).

The EPA states "If private individuals find the proper disposal of used oil or toxic materials difficult, incidents of improper disposal (such as into the MS4) increase" (EPA, 1992a). Therefore **Requirement J.9** directs the Permittees to propose a program component that will facilitate the proper disposal of used oil and toxics from households by establishing municipally operated collection sites, or ensuring that privately operated collections sites are available. The EPA suggests this program component "should describe outreach plans to handlers of used oil and to the public, and operating plans for oil and household waste collection programs" (EPA, 1992a).

3. Comments on Existing and Proposed Illicit Discharge Detection and Elimination Programs

The ROWD references a reconnaissance survey that the Permittees conducted pursuant to their first-round MS4 permit (Order No. R9-90-46), which identified and removed any illicit connections. According to the 2001-2002 Annual Progress Report, the Reconnaissance survey showed that illicit connections were almost non-existent within the Upper Santa Margarita Watershed, whereas illegal discharges were more commonplace (Permittees, 2001). Based on these results, the Permittees concluded that focusing on inspections of open channels and the curtailment of illicit discharges is a more effective use of resources than inspections of underground storm drains. The EPA concurs with this conclusion when it says, "Permits for older municipalities may emphasize control of cross-connections, while permits for municipalities with large areas of new development may emphasize the installation of permanent structural controls during construction" (EPA, 1992a). **Requirement J.1** of the Order gives the Permittees the flexibility to focus their programs on priority areas, so long as they are actively seeking and eliminating illegal discharges. It should be noted that the reconnaissance survey was conducted 10 years ago and the length of the MS4 has increased significantly. The survey, dated September 30, 1993, covered approximately 25.2 miles of underground storm drains and over 8.9 miles of open channels. According to the ROWD, the District's MS4 currently consists of about 71 miles of open and closed storm drains, and the City of Murrieta's MS4 currently consists of about 18 miles of open and closed storm drains. The total length of Temecula's MS4 is unknown. Therefore, the survey covered less than half

of the current MS4 and cannot serve as evidence that illicit connections are currently non-existent.

Section 3.2 of the ROWD states that the Permittees have programs in place to identify and eliminate illicit connections. According to the 2001-2002 Annual Progress Report, the City of Murrieta conducts annual video inspections of portions of its MS4 and investigates any illicit connections identified, and District and County staff perform visual inspections of open storm drains to check for discharges. The City of Temecula seems to have a reactive program that relies on reports of illegal discharges.

Regarding **Requirement J.2**, the District and the City of Murrieta submitted a map of their MS4s with the ROWD. The City of Temecula has not yet submitted a map.

Section 3.5 of the ROWD proposes that Permittees shall continue to implement and improve routine inspection and monitoring and reporting programs for their MS4s. In order to satisfy **Requirement J.3** of the Order, each Permittee shall describe their inspection and monitoring programs to meet the requirements of Section II.B of the MRP in their Individual SWMPs.

Section 3.5 of the ROWD proposes that, "If routine inspections or dry weather monitoring indicate illicit connections or illegal discharges, they shall be investigated and eliminated or permitted within sixty (60) calendar days of receipt of notice." Sixty days is an unreasonably long time frame for the investigation and elimination of illicit discharges and connections. As stated above, these discharges can cause or contribute to receiving water degradation and are prohibited. Also, illicit discharges are often a discrete event that must be investigated immediately to identify the source. Therefore, the proposed timeframe for investigation and elimination must be decreased to represent the most immediate response time as is possible for the Permittees. In accordance with **Requirement J.5**, illicit discharges that pose a serious threat to public health or the environment must be eliminated immediately, and all others must be eliminated as soon as possible.

Section 3.2 of the ROWD states that the Permittees have programs in place to identify, eliminate, and respond to illicit connections and discharges. However, these programs are not described. According to the 2001-2002 Annual Progress Report, the District manages a toll-free reporting hotline, which satisfies **Requirement J.8** of the Order (Permittees, 2002a). The reports do not mention hotlines for the Cities of Murrieta and Temecula and it is not clear if the countywide hotline is coordinate with the other Permittees. In order for the Cities to satisfy this requirement, Individual SWMPs must either discuss individual public reporting hotlines or describe how the countywide hotline is coordinated.

As indicated in Section 3.3 of the ROWD, the Permittees already have mechanisms in place to facilitate the proper management and disposal of used oil and toxic materials that meet or exceed **Requirement J.8**.

K. WATERSHED-BASED ACTIVITIES (Order Section K)

1. Discussion of Watershed Requirements

Management of urban runoff on a watershed basis is recommended by the SWRCB and the SDRWQCB. The TAC defines watershed-based water quality protection as "the prevention/control of pollution and management of human activities in a geographically or other defined drainage area to protect, restore, and/or enhance the natural resources and

beneficial uses within the watershed" (SWRCB, 1994). The TAC recommends that "All NPDES permits and Waste Discharge Requirements should be considered for reissuance on a watershed basis" (SWRCB, 1994). The SDRWQCB also recommends watershed-based water quality protection, stating in the Basin Plan that "Public agencies and private organizations concerned with water resources have come to recognize that a comprehensive evaluation of pollutant contributions on a watershed scale is the only way to realistically assess cumulative impacts and formulate workable strategies to truly protect our water resources" (SDRWQCB, 1994).

The requirements in Section K of the Order are necessary for the Permittees to identify and mitigate sources of pollutants in urban runoff from the entire watershed that impact common downstream receiving waters. This is the key to addressing the impacts from areas and activities within the Permittees' jurisdiction on downstream receiving waters and their beneficial uses (i.e. Camp Pendleton's drinking water supply) as well as addressing pollutant sources in the watershed which are outside the Permittees' jurisdiction. **Finding No. 20** emphasizes the need for watershed-based activities and collaboration among dischargers in a common watershed. It states, "As operators of the MS4s, the Permittees cannot passively receive and discharge pollutants from third parties. By providing free and open access to an MS4 that conveys discharges to waters of the U.S., the operator essentially accepts responsibility for discharges into the MS4 that it does not prohibit or control. These discharges may cause or contribute to a condition of contamination or exceedances of receiving water quality objectives." Permittees could be held responsible for discharges of pollutants from sources outside of their jurisdiction if they cause or contribute to exceedances of water quality objectives, therefore, it is necessary for Permittees to make efforts to address all sources of pollutants in the watershed.

2. Comments on Existing and Proposed Watershed Programs

The Permittees already collaborate with each other through monthly meetings. However, these meetings, as well as many aspects of the existing DAMP, are countywide. In order to address watershed-specific issues, the Permittees should meet separately to focus on the Upper Santa Margarita Watershed. The Permittees also already participate in San Diego County's current effort to develop a Santa Margarita Watershed Management Plan, the Southern California Stormwater Monitoring Coalition, and the Santa Margarita River Executive Management Team. At this time, this level of participation is appropriate to meet the objectives of Requirement K.3. of the Order.

L. MONITORING AND REPORTING PROGRAM (Order Section L)

See discussion in Section IX of this Fact Sheet.

M. PRINCIPAL PERMITTEE RESPONSIBILITIES (Order Section M)

1. Specific Legal Authority for Principal Permittee Responsibility Requirements

- Federal NPDES regulation 40 CFR 122.26(d)(2)(i)(D) provides that "[The Permittee must demonstrate that it can control] through interagency agreements among coapplicants the contribution of pollutants from one portion of the municipal system to another portion of the municipal system."

- Federal NPDES regulation 40 CFR 122.26(a)(3)(iii)(C) provides that "A regional authority may be responsible for submitting a permit application."

2. Discussion of Principal Permittee Responsibility Requirements

The Principal Permittee responsibilities required in Section M are necessary to facilitate intergovernmental coordination and for the standardization and compilation of required reports. Standardized documents provide for easier assessment and application of report data, making reports more useful for the SDRWQCB and the Permittees, which can result in more effective urban runoff management. The EPA recommends intergovernmental coordination, such as a memorandum of understanding, to define specific municipal roles, responsibilities and points of coordination (EPA, 1992a).

3. Comments on Existing and Proposed Principal Permittee Responsibilities

The Permittees currently operate under an Implementation Agreement, which was executed in November 1998. The Implementation Agreement sets forth the responsibilities of the Principal Permittee and the Permittees and provides for funding of "umbrella" activities. In Section 2.1 of the ROWD, the Permittees propose to amend the implementation agreement to set forth the responsibilities of the Permittees in accordance with the Order.

N. STANDARD PROVISIONS (Order Section O and Attachment B)

The standard provisions included in **Attachment B** of Order No. R9-2004-001 are consistent to all NPDES permits and are generally found in federal NPDES regulation 40 CFR sections 122.22, 122.41, 122.42 and the CWC (specific citations are provided in **Attachment B** of Order No. R9-2004-001).

IX. MONITORING AND REPORTING PROGRAM

The MRP consists of requirements for receiving waters monitoring, monitoring of dry weather flows/illicit discharges, and annual reporting.

A. RECEVING WATERS MONITORING

1. Specific Legal Authority for Receiving Waters Monitoring Requirements

Federal NPDES regulations at 40 CFR 122.26(d)(2)(iii)(D) require municipal permittees to propose a monitoring program for representative data collection for the term of the permit that describes the location of outfalls, field screening points, instream stations, why the location is representative, the frequency of sampling, parameters to be sampled, and a description of sampling equipment.

2. Discussion of Monitoring Requirements

According to the EPA, the benefits of sampling data include, but are not limited to (EPA, 1992b):

- Providing a means for evaluating the environmental risk of storm water discharges by identifying types and amounts of pollutants present;

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- Determining the relative potential for storm water discharges to contribute to water quality impacts or water quality standard violations;
- Identifying potential sources of pollutants; and
- Eliminating or controlling identified sources more specifically through permit conditions.

Most importantly, monitoring programs are an essential link in urban runoff management efforts. Data collected from monitoring programs can be assessed to determine the effectiveness of management programs and practices, which is vital for the success of the iterative approach used to meet the MEP standard. Specifically, when data indicates that a particular BMP is not effective, an improved BMP can be selected. Also, when water quality data indicate that water quality standards or objectives are being exceeded, particular pollutants, sources, and drainage areas can be identified and targeted for urban runoff management and specific education efforts.

Considering the benefits described above, the MRP has been designed to determine impacts to receiving water quality and beneficial uses from urban runoff and to use the results to refine the SWMP for the reduction of pollutant loadings to the MEP. The primary goals of the MRP include:

1. Assess compliance with Order No. R9-2004-001;
2. Measure and improve the effectiveness of the SWMPs;
3. Assess the chemical, physical, and biological impacts of receiving waters from urban runoff;
4. Characterize urban runoff discharges;
5. Identify sources of specific pollutants;
6. Prioritize drainage and sub-drainage areas that need management actions;
7. Detect and eliminate illicit discharges and illicit connections to the MS4; and
8. Assess the overall health of receiving waters.

Each of the components of the Receiving Waters and Illicit Discharge Monitoring Programs is necessary to meet the objectives listed above. The justifications for each component are discussed below.

Framework

The SDRWQCB typically uses the following framework in NPDES MRPs:

1. Core monitoring to address ongoing, site-specific needs, such as estimating pollutant loads and assessing trends;
2. Regional monitoring to address large spatial scales at infrequent (i.e. every five years) intervals. Regional monitoring is useful to put localized site-specific results into context of the larger ecosystem; and
3. Special studies to address directed needs or to answer specific questions. This monitoring is useful to address unique issues, oftentimes triggered by routine monitoring

to help understand results or identify efficient management measures. Special studies are short-term studies with a predefined beginning, middle and end.

Core Monitoring

Section II.A.1 of the MRP requires mass loading monitoring at three triad[13] and four tributary stations. The mass loading monitoring will provide data representing the total pollutant loadings from specific drainage and sub-drainage areas. This data can be used to help achieve the MRP goals listed above and answer the following management questions:

- Are conditions in receiving waters protective, or likely to be protective, of beneficial uses?
- What is the extent and magnitude of the current or potential receiving water problems?
- What is the relative urban runoff contribution to the receiving water problem(s)?
- What are the sources of urban runoff that contribute t receiving water problem(s)?
- Are conditions in receiving waters getting better or worse?

The number and locations of triad and tributary stations are consistent with the Permitees' proposal (Permittees, 2004b). In addition to one reference station, the triad stations are existing Permittee monitoring stations located in lower Murrieta Creek and lower Temecula Creek. These stations are located at the downstream end of the Upper Santa Margarita Watershed and should be representative of discharges from the entire permitted area. The tributary station locations were proposed by the Permittees and are representative of urbanized sub-drainage areas. Data from these locations will allow the Permittees to better identify sources of pollutants, prioritize drainage areas for management actions, and determine the conditions of the tributary streams (MRP Goals 4,5,6 and 8).

Federal NPDES regulations at 40 CFR 122.21(g)(7)(ii) require the sampling protocols specified in **section II.A.1 of the MRP.** These protocols are necessary to ensure consistent sampling, adequate representation of storm events, and accurate, comparable data.

Section II.A.2 of the MRP requires the Permittees to conduct toxicity monitoring to evaluate the extent and causes of toxicity in receiving waters. Toxicity testing is used to assess the impact of urban runoff on the overall quality of aquatic systems (Center for Watershed Protection, 1996). Evidence of toxicity indicates that pollutants are bioavailable and have the potential to cause degradation to aquatic systems. When combined with chemical data, which by itself does not necessarily reveal the impacts of urban runoff to aquatic life or the beneficial uses of receiving waters, toxicity monitoring data can be used to better determine the extent and causes of impacts to aquatic systems (MRP Goals 3 and 8).

Toxicity testing can also be used to evaluate the effectiveness of urban runoff BMPs and other management measures (MRP Goal No. 2). The Center for Watershed Protection rated it as a "very useful" indicator for assessing municipal storm water programs. Permittees can use the results of toxicity testing to identify areas of high concern and to establish priority locations for BMPs (MRP Goal No. 6).

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[13] Triad means a station where chemical, toxicity, and bioassessment monitoring occur.

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Section II.A.2.a specifies three freshwater test species for use, because multiple species are needed to provide a more complete assessment of the causes of toxicity in urban runoff (Bay, 2001). Different species vary in their sensitivity to contaminants and, therefore, multiple species can reveal when varying contaminants are present at toxic levels (Bay, 2001). Reliance on single species tests may not provide an accurate assessment of toxicity (Center for Watershed Protection, 1996). The rationale for the specified test species is as follows:

- *Ceriodaphnia dubia* (water flea): represents the invertebrates that live in the water column and serve as a food source for larger invertebrates and small fish. This species is known to be sensitive to metals and pesticides in water, as well as other contaminants. (San Diego County, 2004)
- *Hyalella azteca* (freshwater amphipod): an invertebrate associated with the sediment at the bottom of streams and lakes. It serves as a food source for larger invertebrates as well as fish. This species is generally sensitive to metals and pesticides, as well as nitrogen compounds such as ammonia. (San Diego County, 2004)
- *Pseudokirchneriella subcapitata*, formally known as *Selenastrum capricornutum*: unicellular algae present in the water column of streams and lakes. It is the base of the food chain in freshwater systems. It is sensitive to herbicides and metals and its growth is greatly affected by nutrient loads. (San Diego County, 2004)

An additional reason to use the species listed above, is for consistency with other monitoring in the Santa Margarita Watershed. Pursuant to the County of San Diego's MS4 permit (Order No. R9-2001-01), toxicity testing using these three species occurs at the mass loading station near the mouth of the Santa Margarita River. Using the same species throughout the watershed will allow the results to be comparable and potential sources of toxicity to be better identified.

For cost purposes, toxicity testing is only required on wet weather samples.

Section II.A.3 of the MRP requires the Permittees to conduct bioassessment monitoring. Bioassessment data is a cost-effective tool that measures the effects of water quality over time (CDFG, 2002). It is an important indicator of stream health and impacts from urban runoff. It can detect impacts that chemical and toxicity monitoring cannot. The EPA encourages permitting authorities to consider requiring biological monitoring methods to fully characterize the nature and extent of impacts from urban runoff (EPA, 1996c). Therefore, the SDRWQCB and other RWQCBs commonly require bioassessment monitoring in MS4 and other types of discharge permits.

Bioassessment is the direct measurement of the biological and physical condition, and the attainment of beneficial uses (COLD, WARM, WILD, and RARE) of receiving water, using benthic macroinvertebrates. Bioassessment monitoring integrates the effects of both water chemistry and physical habitat impacts (e.g., sedimentation or erosion) of various discharges on the biological community native to the receiving waters. Moreover, bioassessment is a direct measurement of the impact of cumulative, sub-lethal doses of pollutants that may be below reasonable water chemistry detection limits, but that still have biological affects.

Because bioassessment focuses on communities of living organisms as integrators of cumulative impacts resulting from water quality or habitat degradation, it defines the ecological risks resulting from urban runoff. Bioassessment not only identifies that an

impact has occurred, but also measures the effect of the impact and tracks recovery when control or restoration measures have been taken. These features make bioassessment a powerful tool to assess compliance, evaluate the effectiveness of BMPs, and to track both short and long-term trends (MRP Goals 1,2,3, and 8).

From 1998 through 2001, the SDRWQCB implemented the Ambient Bioassessment Monitoring Program, which monitored rivers and streams in the San Diego region. The monitoring concluded that waters in the Upper Santa Margarita Watershed, including Murrieta Creek, Temecula Creek, and the upper Santa Margarita River, exhibited degraded biological and physical integrity (Index of Biotic Integrity (IBI) ranged from "Very Poor" to "Good"). As a comparison, the reference stations in the watershed, located in Sandia Creek and De Luz Creek, were characterized by a high degree of biological and physical integrity (IBI was consistently "Very Good") (CDFG, 2002). These conclusions support the need for continued bioassessment monitoring to determine the long-term health of the receiving waters and impacts from MS4 discharges.

Through a CWC section 13225 directive, issued in March 2003, the Permittees were required to begin implementing a bioassessment monitoring program. The bioassessment required in the MRP replaces that required under the directive. The program consists of sampling, monitoring, and analysis of data at the three triad stations. The Permittees began bioassessment monitoring four stations in November 2003, pursuant to the directive. For cost purposes, the number of stations was reduced to three.

Section II.A.4 of the MRP requires the Permittees to use the results of the chemistry, toxicity, and bioassessment monitoring, to determine if impacts from urban runoff are occurring and when follow-up actions are necessary. The triad approach allows a wide range of measurements to be combined to more efficiently identify pollutants, their sources, and appropriate follow-up actions. Results from the three types of monitoring shall be assessed to evaluate the extent and causes of pollution in receiving waters and to prioritize management actions to eliminate or reduce the sources. The framework provided in Table 6 below shall be used to determine conclusions from the data and appropriate follow-up actions. The framework in Table 6 was derived from the *Model Monitoring Program for Municipal Separate Storm Sewer Systems in Southern California* (SMC, 2004).

When, based on the framework in Table 6, data indicates the presence of toxic pollutants in runoff, Permittees are required to conduct a Toxicity Identification Evaluation (TIE). A TIE is a set of procedures used to identify the specific chemical(s) responsible for toxicity to aquatic organisms. When discharges are toxic to a test organism, a TIE must be conducted to confirm potential constituents of concern and rule out others, therefore allowing Permittees to determine and prioritize appropriate management actions. If a sample is toxic to more than one species, it is necessary to determine the toxicant(s) affecting each species. If the type and source of pollutants can be identified based on the data alone and an analysis of potential sources in the drainage area, a TIE is not necessary.

When a TIE identifies a pollutant associated with urban runoff as a cause of toxicity, it is then necessary to conduct a toxicity reduction evaluation (TRE). A TRE is a study conducted in a step-wise process to identify the causative agents of toxicity, isolate the sources of toxicity, evaluate the effectiveness of toxicity control options, and then confirm the reduction in toxicity. A TRE should include an analysis and discussion of all potential

source(s) causing toxicity, proposed BMPs to eliminate or reduce the pollutants causing toxicity, and suggested follow-up monitoring to demonstrate that toxicity has been removed.

Table 6. Triad Approach to Determining Follow-Up Actions

	Chemistry	Toxicity	Bioassessment	Possible Conclusion Determining Action	Action
1.	Persistent[14] exceedance of water quality objectives	Evidence of toxicity[15]	Indications of benthic alteration[16]	Strong evidence of pollution-induced degradation	Conduct TIE to identify contaminants of concern, based on TIE metric, initiate TRE
2.	No persistent exceedances of water quality objectives	No evidence of toxicity	No indications of benthic alteration	No evidence of pollutant-induced degradation	No action necessary
3.	Persistent exceedance of water quality objectives	No evidence of toxicity	No indications of benthic alteration	Contaminants are present but not bioavailable	Assess possible upstream sources of pollutants causing exceedances
4.	No persistent exceedances of water quality objectives	Evidence of toxicity	No indications of benthic alteration	Unmeasured contaminants exist with the potential to cause degradation to aquatic life	Conduct TIE to identify contaminants of concern, based on TIE metric, initiate TRE
5.	No persistent exceedances of water quality objectives	No evidence of toxicity	Indications of benthic alteration	Alteration probably not due to toxic pollutants	No action necessary due to toxic chemicals Initiate TRE for physical sources of benthic alteration
6.	Persistent exceedance of water quality objective	Evidence of toxicity	No indications of benthic alteration	Toxic contaminants are bioavailable, but in situ effects are not demonstrable	If chemical and toxicity tests indicate persistent degradation, conduct TIE to identify

[14] Persistent exceedance shall mean the exceedance of relevant Basin Plan or CTR objectives by 20% for three sampling events.

[15] Evidence of toxicity shall mean a high score, in relation to other stations, on metric that combines magnitude and persistence of toxicity over an entire year.

[16] Indications of benthic alteration shall mean an IBI score of Fair, Poor, or Very Poor.

					contaminants of concern, based on TIE metric, initiate TRE
7.	No persistent exceedances of water quality objectives	Evidence of toxicity	Indications of benthic alteration	Unmeasured toxic contaminants are causing degradation	Conduct TIE to identify contaminants of concern, based on TIE metric, initiate TRE
8.	Persistent exceedance of water quality objectives	No evidence of toxicity	Indications of benthic alteration	Inconclusive	Initiate upstream source identification (TIE cannot be conducted when toxicity is not present)

Regional Monitoring

Section II.A.II of the MRP requires that the Permittees participate and coordinate with federal, state, and local agencies and other dischargers in the Santa Margarita Watershed in development and implementation of a regional monitoring program as directed by the Executive Officer. The purpose of regional monitoring is to maximize the efforts of all monitoring partners using a more cost-effective monitoring design and to best utilize the pooled resources of the watershed. If a coordinated watershed sampling effort is approved or directed by the Executive Officer, the Permittees' sampling and analytical efforts may be reallocated.

Special Studies

Special studies are intended to address specific research or management issues that are not addressed by the routine core monitoring program. The MRP requires the Permittees to develop and implement a study to determine appropriate numeric criteria for controlling the volume, velocity, duration, and peak discharge rate of runoff to minimize erosion of natural channels and impacts to in-stream habitat. The study is necessary to comply with section F.2.b.9 of the Order.

Various similar studies and other efforts have occurred in southern California to address the issue of downstream erosion caused by increased runoff rates, volumes, velocities and durations. MS4 permits in San Diego, Orange, Los Angeles, and Ventura Counties have similar requirements, and the Southern California Stormwater Monitoring Coalition (SMC) is in the process of conducting a study (funded by Los Angeles County) to assess the connection between stream erosion and urbanization in natural drainage systems in southern California (SCCWRP, 2004). Ventura County has also conducted a similar study. It is expected that the Permittees will build on existing work and utilize the results and

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conclusions of previous studies. The Permittees are encouraged to continue the SMC study in an area in the Santa Margarita Watershed.

3. Comments on Existing and Proposed Monitoring Program

The current monitoring program, the *Consolidated Program for Water Quality Monitoring* (District, 1994), was submitted as an element of the NPDES Municipal Storm Water Application for Permit Renewal, Santa Margarita Watershed, dated January 17, 1995. The objectives and components of the program are listed below (the program does not contain sampling frequencies):

1. Program Objectives:
   - Assessment of mass loadings from storm drains
   - Assess influence of land use on water quality
   - Verification and control of illicit discharges
   - Compliance monitoring of water quality
   - Assess effectiveness of various urban practices designed to control pollution
   - Identify problem areas and/or trends
   - Establish database for future reference
   - Identify baseline conditions
   - Identify pollutants of concern

2. Dry weather sampling stations:
   - Wildomar Channel
   - Cal Oaks Drain (permanent station)
   - Empire Creek Channel
   - Redhawk Parkway Drain

3. Wet weather stations:
   - Wildomar Channel
   - Cal Oaks Drain
   - Empire Creek Channel

4. Sediment sampling at the above stations plus the I-15 basin

5. Receiving water stations
   - Upper Murrieta
   - Lower Murrieta
   - Temecula Creek

6. Toxicity testing

The *Consolidated Program for Water Quality Monitoring* contains many of the same program objectives and components as the Monitoring Program. However, as determined and discussed in several documents (SDRWQCB, 2002b, 2002d, 2003b; Permittees, 2002b), the current program has been inadequate to meet its objectives and needs to be improved.

For details regarding previous monitoring, see the documents referenced herein. The Permittees did not propose a monitoring program as part of the ROWD.

B. ILLICIT DISCHARGE MONITORING PROGRAM

1. Specific Legal Authority for Illicit Discharge Monitoring Requirements

- Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B)(2) provides that the permittee include in its proposed management program "a description of procedures to conduct on-going field screening activities during the life of the permit, including areas or locations that will be evaluated by such field screens."

2. Discussion of Illicit Discharge Monitoring Requirements

Section II.B of the MRP describes the Illicit Discharge Monitoring Program. The requirements are consistent with the specifications for developing a field screening program contained at 40 CFR 122.26 (d)(1)(iv)(D). Although the minimum number of inspections is set at twice during the period of May 1st to September 30th of each year, it is expected that more frequent inspections may be necessary. An emphasis is placed on designing a program with clear criteria and rationale. The programs designed should be flexible and implemented in a manner that will enable the Permittees to identify illicit discharges and illegal connections, respond to citizen complaints, and follow-up on ongoing investigations to identify and eliminate sources.

3. Discussion of Existing and Proposed Dry Weather Monitoring

The Permittees' current water quality monitoring program identifies four dry weather monitoring stations, but no sampling frequencies, sampling protocol, or specific screening program are specified. In order to comply with **Requirement J.3** of the Order, Permittees will need to develop an Illicit Discharge Monitoring Program that meets the requirements in **section II.B of the MRP**.

C. MONITORING COSTS

The cost of the Receiving Waters and Illicit Discharge Monitoring Programs is reasonable, considering the need for the data in the Upper Santa Margarita Watershed. All of the monitoring requirements are necessary to meet the goals of the MRP, stated in Section IX.A above, and are consistent with other MS4 monitoring programs in southern California.

As part of their written comments on the Order (Permittees, 2004b), the Permittees provided cost estimates for the MRP, dated December 15, 2003, and for their proposed revised MRP. The Permittees estimated that the annual cost of the original Receiving Waters and Dry Weather Monitoring Programs would be $468,353. They estimated the annual cost of their proposed revised program to be $255,873. Due to variability of necessary overtime, parameters to be analyzed, necessary TIEs, etc., it is difficult to estimate a total cost of the monitoring program. Therefore, the SDRWQCB is assuming that the Permittees' estimate is representative.

In response to the cost information the Permittees submitted, the SDRWQCB revised and reduced the Receiving Waters and Illicit Discharge Monitoring Program requirements to the essential equivalent of the Permittees' proposal. Therefore, the cost should be equivalent to the Permittees' estimate and is reasonable for an MS4 monitoring program in southern California.

D. REPORTING REQUIREMENTS

1. Specific Legal Authority for Reporting Requirements

- Standard provisions and reporting requirements are consistent to all NPDES permits and are generally found in federal NPDES regulation 40 CFR 122.41.
- Federal NPDES regulation 40 CFR 122.42(c) requires that "The operator of a large or medium municipal separate storm sewer system of a municipal separate storm sewer system that has been designated by the Director under section 122.26(a)(1)(v) of this part must submit an annual report by the anniversary of the date of the issuance of the permit for such system. The report shall include: (1) The status of implementing the components of the storm water management program that are established as permit conditions; (2) Proposed changes to the storm water management program that are established as permit condition. Such proposed changes shall be consistent with § 122.26(d)(2)(iii) of this part; (3) Revisions, if necessary, to the assessment of controls and the fiscal analysis reported in the permit application under § 122.26(d)(2)(iv) and (d)(2)(v) of this part; (4) A summary of data, including monitoring data, that is accumulated throughout the reporting year; (5) Annual expenditures and budget for year following each annual report; (6) A summary describing the number and nature of enforcement actions, inspections, and public education programs; and (7) Identification of water quality improvements or degradation."

2. Discussion of Annual Reporting Requirements

SWMP Reporting Requirements (Section III.A of the MRP)

All of the SWMP reporting requirements are necessary to meet the above-referenced federal requirements and to measure the effectiveness of programs and BMPs. According to the EPA, measurable goals are necessary to evaluate the effectiveness of individual BMPs and the storm water management program as a whole (EPA, 2000d). The EPA strongly recommends that measurable goals include: (1) The activity, or BMP, to be implemented; (2) A schedule or date of implementation; and (3) A quantifiable target to measure progress toward achieving the activity or BMP (EPA, 2002d). The Order is structured so that the descriptions of programs and BMPs are included in the SWMP, and the quantifiable measurements are reported in each annual report.

The current permit, Order No. R9-98-02 requires the annual report to be submitted on September 15 of each year. However, the District submitted a request, dated November 3, 2003, to change the annual report date to October 31. The District's request was based on the difficulty of obtaining necessary materials with sufficient time to prepare a report. The SDRWQCB concurs with the request.

Monitoring Provisions and Reporting Requirements (Sections II.C and III.B of the MRP)

The majority of the monitoring provisions and reporting requirements contained in sections II.C and III.B of the MRP are specified in 40 CFR 122.41. Those that are not are standard provisions in SDRWQCB NPDES permits, or are necessary to meet the objectives of the MRP.

Section II.C.h of the MRP specifies that the Minimum Levels (MLs) listed in Appendix 4 of the State Board Policy for Implementation of Toxics Standards for Inland Surface Water, Enclosed

Bays, and Estuaries of California, 2000 (SIP) shall be used for analyses of priority toxic pollutants identified in the CTR (65 Fed. Reg. 31682). The MLs from the SIP represent the lowest quantifiable concentration in a sample based on the proper application of all method-based analytical procedures and the absence of any matrix interferences (SWRCB, 2000a). The SIP's MLs therefore represent the best available science for determining the presence of toxic pollutants at concentrations of concern. If MLs are not used, concentrations of concern of priority toxic pollutants may not be detected. Detection and control of toxic pollutants in surface waters is necessary to achieve the CWA's goals and objectives (65 Fed. Reg. 31683). Using MLs will also provide quantifiable data that is necessary to better assess water quality and BMP effectiveness. Non-detects cannot be used to accurately determine mass loadings. Therefore, the method detection limits (MDLs) used for analysis of priority toxic pollutants must be equivalent to or lower than the MLs in Appendix 4 of the SIP.

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Model Monitoring Program for Municipal Separate Storm Sewer Systems in Southern California

A report from the Stormwater Monitoring Coalition's
Model Monitoring Technical Committee

August 2004

Technical Report #419

EXECUTIVE SUMMARY

This report describes a model monitoring program for receiving waters affected by urban runoff in both wet and dry weather. It provides a common design framework for municipal urban runoff programs and Regional Board staff to use in developing and/or revising program requirements for monitoring receiving waters for impacts, status and trends, toxicity, mass emissions, and source identification. This effort was funded in part by the State Water Resources Control Board (SWRCB), prompted by Senate Bill 72 (Kuehl), which addressed the standardization of sampling and analysis protocols in municipal stormwater monitoring programs. The development of the model monitoring program itself was organized through the Southern California Stormwater Monitoring Coalition (SMC), which impaneled a technical committee including representatives from:

- Regional Water Quality Control Boards (Los Angeles, Santa Ana, San Diego)
- Municipal permittees (Counties of Ventura, Los Angeles, San Bernardino, Riverside, Orange, and San Diego)
- Heal the Bay
- Southern California Coastal Water Research Project (SCCWRP).

As a result of the SMC's role and the makeup of the technical committee, the model stormwater monitoring program reflects issues and contexts of paramount importance in southern California and addresses some, but not all, of the requirements of SB72. Additional technical guidance related to performance standards for laboratory analysis and data reporting formats is detailed in companion documents.

The model program is structured around five fundamental management questions, with the goal of achieving a basic degree of comparability across southern California monitoring programs, while maintaining individual programs' ability to adapt to site-specific and local concerns.

The five core management questions are:

- Question 1: Are conditions in receiving waters protective, or likely to be protective, of beneficial uses?
- Question 2: What is the extent and magnitude of the current or potential receiving water problems?
- Question 3: What is the relative urban runoff contribution to the receiving water problem(s)?
- Question 4: What are the sources to urban runoff that contribute to receiving water problem(s)?
- Question 5: Are conditions in receiving waters getting better or worse?

As illustrated in Figure Ex-1, the questions are linked in a logical progression that defines an efficient sequence of study design steps.

While there is a wide range of beneficial uses defined in the Basin Plans for southern California, the model monitoring program focuses on a subset of these beneficial uses that are common to most urban runoff management programs in the region and relate to human health and habitat protection:

- Contact Water Recreation (REC1)
- Non-contact Water Recreation (REC2)
- Warm Freshwater Habitat (WARM)
- Estuarine Habitat (EST)
- Marine Habitat (MAR)
- Wildlife Habitat (WILD).

For each category of beneficial use (i.e., human health, habitat protection) the model program defines monitoring objectives and study designs. Where adequate historical data were available, statistical analyses were used to develop detailed guidance on appropriate levels of sampling effort. Rather than define a static program, the technical committee develop several tools to serve as adaptive triggers for initiating more monitoring effort if an impact was observed, or a reduction in monitoring effort if no impact (or potential for impact) was found. These tools include triggers for toxicity identification evaluations, upstream source tracking, a prioritization scheme for special studies, and a computer program for estimating sample size based on statistical power to detect trends.

The following types of stations could be integral parts of a stormwater monitoring program that address each of the five key management questions:

- Long-term, fixed, bottom-of-watershed (but above tidal influence) stations to assess cumulative water quality and aggregate loads, with monitoring based primarily on a mass emissions model including wet weather chemistry and toxicity
- Spatially extensive, perhaps randomly sited or rotating, stations to support statistically valid comparisons across multiple watersheds, and with monitoring based primarily on the Triad approach for dry weather sampling and on chemistry and toxicity for wet weather
- Site-specific stations focused on the status of high-priority inland habitats of concern, with monitoring based primarily on the Triad approach for dry weather sampling and on chemistry and toxicity for wet weather
- High-priority inland body contact recreation areas
- Site-specific stations designed to generate information to support key program goals, such as source prioritization or BMP implementation and evaluation
- Coastal estuarine stations to assess status in these key habitats, with monitoring based primarily on the Triad approach
- Coastal ocean stations to assess stormwater plume impacts, conducted primarily as part of the periodic Bight surveys.

While the idealized monitoring design in Figure 5-2 shows each type of monitoring station separately, in practice there may be overlap among two or more types of stations.

The technical committee gave significant consideration to how the model program would be used in practice. It was well aware that stormwater monitoring has been ongoing for some time in southern California and that important basic steps, such as characterization studies, have been completed by many programs. In addition, the degree to which programs have addressed the five management questions in Figure 2-1 varies substantially, in part due to each program's history and in part due to the nature of the surface waters in different parts of the region.

Thus, the model stormwater monitoring program does not assume that each program is starting with a blank sheet of paper. Nor does the model program assume that each permittee will proceed through Figure 2-1 in a linear, stepwise fashion. Instead, the model program is intended to

improve each program's ability to build appropriate linkages among the five core management questions. This is best accomplished through the following steps:

1. Evaluate a program's ability to answer each of the five management questions
2. Identify critical gaps in knowledge (e.g., inability to document impacts, lack of knowledge about potential sources, absence of trend monitoring component) relevant to each program's circumstances
3. Use the monitoring designs in the model monitoring program as a framework for developing monitoring components suited to each program's circumstances.

The SMC's technical committee intended that the model program be used to direct an incremental process of adaptation using the three steps above, rather than one of wholesale change. This incremental change should be based on a prioritization of needs (i.e. using the triad approach in perennial streams before ephemeral streams). Through this process, the ultimate goal of developing regionally consistent programs that directly address key management questions in a scientifically rigorous and cost effective manner can be accomplished.

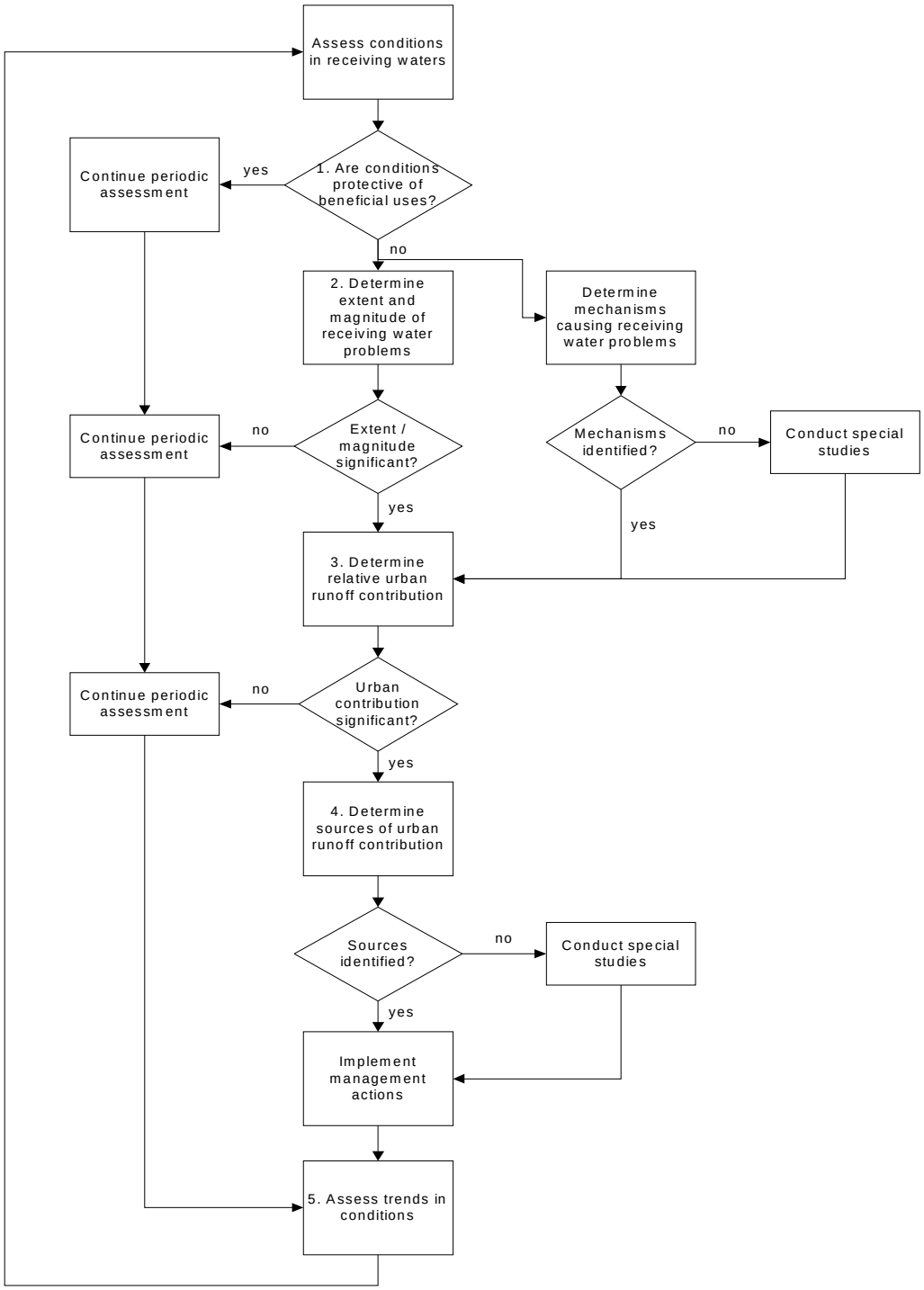

Figure Ex-1. Graphical illustration of the idealized logical flow through the five core management questions (reworded as statements to fit flowchart conventions). The answer to each question provides the basis for developing the monitoring design to answer the next. In actuality, monitoring programs may have addressed questions in parallel or out of sequence, depending on available knowledge and specific information needs.

ACKNOWLEDGEMENTS

This project was partially funded by the State Water Resources Control Board and the Southern California Stormwater Monitoring Coalition. The content of the report was developed over the course of one year a technical committee consisting of regulated, regulatory, environmental and research organizations including:

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1.0 INTRODUCTION

1.1 Rationale and approach

Large municipalities in southern California are required, under the Clean Water Act (CWA) and National Pollutant Discharge Elimination System (NPDES) permits from their respective Regional Water Quality Control Boards (RWQCBs), to monitor discharges of urban runoff[1] from municipal separate storm sewer systems (MS4s) and their impacts on receiving waters. However, urban runoff monitoring programs throughout southern California often focus on different monitoring questions, approach the same question in different ways, sample different sets of parameters, and use a range of field and laboratory methods to collect and analyze samples. This inconsistency makes it difficult, if not impossible, to address questions on a broader spatial scale, to compare urban runoff monitoring results across programs, and to improve efficiency by taking advantage of opportunities for exchanging data and coordinating monitoring responsibilities at regional scales.

In response to this set of circumstances, the Southern California Stormwater Monitoring Coalition (SMC) has undertaken a project to develop regionally consistent monitoring approaches and designs. The goal of the study is to produce a "model" monitoring program that will provide a foundation for each of the urban runoff monitoring programs in southern California to build on for their respective agency's needs. The development of the model monitoring program will therefore focus on developing regionally consistent management questions, efficient monitoring designs to answer those questions, creating standardized laboratory analysis protocols, and coordinating necessary quality assurance activities to ensure comparability among programs. This document focuses specifically on management questions and monitoring designs. Standardization of laboratory analysis protocols and data transfer and reporting methods are dealt with in companion documents.

This report reflects the collaborative work of a technical committee impaneled by the SMC. The technical committee included representatives from three southern California RWQCBs (the Colorado Region was not represented), the lead municipal MS4 management programs (commonly referred to as stormwater programs), SCCWRP, Heal the Bay and the State Water Resources Control Board (SWRCB). This report makes recommendations about a model urban runoff monitoring program, assesses current monitoring practice, and recommends adjustments to bring current programs more in line with the model program.

1.2 Relationship to SB72 and State Board efforts

Senate Bill 72 (Kuehl), adopted in October 2001, required the State Water Resources Control Board (SWRCB) to develop "minimum monitoring requirements for regulated municipalities that were subject to a stormwater permit on or before December 31, 2001." The SWRCB therefore has initiated efforts to develop standardized protocols for collection and analysis of stormwater samples, as well as a standardized reporting format. Working in coordination with local stormwater agencies and RWQCBs through the SMC presents an opportunity to gain consensus towards a common shared goal.

[1] Urban runoff includes those discharges from residential, commercial, industrial and construction areas within the Permit Area and excludes discharges from feedlots, dairies, farms and open space.

There are, however, some important differences among the SMC and SWRCB goals. On one hand, the SWRCB goals are much larger than the SMC's goals. The SWRCB is mandated to develop statewide consistency while the goal of this project is development of consistency only for the southern California region. On the other hand, the SWRCB goals are more limited than the SMC's goals. The SWRCB is mandated to develop the "how to's" of stormwater monitoring (i.e. sampling, analysis, reporting), whereas this project starts with understanding the "why, where, and what" (i.e. monitoring questions and study designs) of developing an integrated stormwater monitoring program. Finally, the SWRCB and the SMC have different focal points of their monitoring programs. The SWRCB is mandated to develop standardized monitoring protocols for stormwater from all of their regulated discharges (i.e. municipal agencies and industrial facilities). This project, however, only addresses monitoring programs developed for municipal agencies, but examines monitoring designs for both wet and dry weather runoff.

1.3 A note on terminology

It is important to emphasize that the monitoring designs described in subsequent sections of this report focus explicitly on supporting the management of urban runoff to protect receiving water quality, with "receiving water" defined as surface Waters of the State, with the exception of ground water and lakes/reservoirs. While the SMC's technical committee recognized that there are other point and nonpoint sources of receiving water impact, the core focus of municipal stormwater programs is urban runoff, in both wet and dry weather. Thus, references to "stormwater" throughout the body of the report should be understood to refer to urban runoff.

It is also important to recognize that this document focuses on potential water quality problems and impacts, as opposed to water quality impairments. The technical committee opted to avoid the terminology of impairments because it has a distinct regulatory connotation that eventually leads to a Total Maximum Daily Load (see box on TMDLs). Water quality problems and impacts are more broad than impairments, which seemed more appropriate since some monitoring elements are meant to be early warning indicators and hopefully will avoid TMDLs in the future.

Total Maximum Daily Loads (TMDLs)

TMDLs are a regulatory framework for trying to restore beneficial uses in impaired waterbodies. Waterbodies sometimes have impaired water quality, even when all discharges to that waterbody are regulated under national pollutant discharge elimination system (NPDES) permits. The State will often use NPDES monitoring data to create the list of impaired waterbodies, also called the §303(d) list, which refers to the specific section in the Clean Water Act for TMDLs. Once promulgated, TMDLs typically call for additional monitoring either to refine source assessment or to determine if management actions implemented as a result of the TMDL are improving water quality. The model program described in this document is for urban runoff monitoring and, while there is some potential overlap with TMDL monitoring, the intent is to deliberately keep them separate. The reason is twofold. First, TMDLs are inherently site-specific and the goal of this document is to ensure regional applicability. Secondly, urban runoff may, or may not, be the cause of the water quality impairment that leads to a TMDL. If TMDL monitoring is called for, it is prudent to link monitoring from all NPDES dischargers to the impaired waterbody. Regardless of a §303(d) listing, urban runoff monitoring will be a necessity in order to characterize impacts, or lack of impacts, in receiving waters. Additional information on TMDLs in southern California can be found at www.swrcb.ca.gov

2.0 GOALS, OBJECTIVES AND IMPLEMENTATION

This model urban runoff monitoring program is intended as a framework to assist permittees and Regional Board staff in modifying existing monitoring programs, both wet and dry weather, with the goal of improving their ability to answer key management questions common to all programs in a cost effective and scientifically rigorous way. This is described in the following sections:

- The principals and philosophy for developing the model program are given in Section 3.0.
- A description of the key management questions, including rationale and expected data products, are given in section 4.0.
- The specific design elements, such as identifying the number of sampling sites and frequency of sampling, are given in Section 5.0.

This section, however, first addresses the basic program goals, how these goals address universal NPDES permit objectives as defined by the State and the Federal government, and describes an approach for applying the model monitoring program to an existing stormwater permit. Such modifications can occur when permits are periodically renewed and/or when permittees propose monitoring program revisions to their respective Regional Boards.

2.1 Monitoring program goals

Figure 2-1 summarizes the model monitoring program's ultimate goal, which is to ensure that each stormwater program has the ability to assess and manage its overall performance by answering five basic questions:

- Question 1: Are conditions in receiving waters protective, or likely to be protective, of beneficial uses?
- Question 2: What is the extent and magnitude of the current or potential receiving water problems?
- Question 3: What is the relative urban runoff contribution to the receiving water problem(s)?
- Question 4: What are the sources to urban runoff that contribute to receiving water problem(s)?
- Question 5: Are conditions in receiving waters getting better or worse?

These basic questions are universal to all MS4 programs in southern California and were prioritized by their program managers during the technical committees' early meetings.

2.2 Meeting permit objectives

Stormwater monitoring programs in southern California focus on meeting a set of NPDES permit objectives that, with some minor differences, are common to all programs in the region. These include the following (edited slightly for conciseness):

- Define water quality status, trends, and pollutants of concern associated with urban stormwater and non-stormwater discharges
- Evaluate impact of stormwater/urban runoff on biological species in receiving waters

- Identify those waters which cannot reasonably be expected to attain or maintain applicable water quality standards required to sustain beneficial uses
- Identify significant water quality problems related to urban stormwater and non-stormwater discharges
- Estimate annual mass emissions of pollutants discharged to surface waters through the MS4
- Evaluate water column and sediment toxicity in receiving waters
- Determine and prioritize pollutants of concern in stormwater
- Identify sources of urban runoff pollutants
- Identify other sources of pollutants in stormwater and non-stormwater runoff
- Evaluate the effectiveness of existing municipal stormwater quality management programs, including that of BMPs
- Identify and prohibit illicit connections
- Identify and prohibit illicit discharges.

The basic questions outlined in section 2.1 above, and described in detail in sections 4.0 and 5.0, will produce improved information that will help address many of these objectives (Table 2-1). The model program's structure, which moves from assessment monitoring, through source identification, and to tracking of longer-term trends, reflects the range of concerns represented in the set of common permit objectives.

2.3 Applying the model program

The technical committee's intent was to create the model program as guidance, providing sufficient detail to assure consistency in approach, but allowing for site-specific modifications and adaptations as necessary. This document serves as the starting point for negotiating a monitoring and reporting program. It is not a "copy and paste" list of static monitoring requirements, but an attempt to provide useful guidance. Therefore, this section outlines a procedure for implementing this guidance. We strongly recommend the user reread this section after reading sections 3.0, 4.0 and 5.0 in order to more fully understand this important implementation guidebook and place it in context.

The technical committee that developed the model program was well aware that stormwater monitoring has been ongoing for some time in many parts of southern California. Thus, important basic steps, such as stormwater characterization studies, have been completed by many programs (See Box on Discharge Characterization). In addition, the degree to which programs have addressed the five management questions in Figure 2-1 varies substantially, in part due to each program's history and in part due to the nature of the surface waters in different parts of the region. For example, inland programs in general have focused relatively more on identifying sources while coastal programs have allocated much more effort to assessing receiving

Stormwater Discharge Monitoring

The US EPA has published a manual (US EPA 1992) that provides detailed guidance for the basic elements of stormwater monitoring program design and implementation. This guidance is an extremely useful starting point for management programs faced with the necessity of performing initial characterization studies.

The manual describes when and where to sample, including defining storm event criteria, obtaining rainfall data, and dealing with the logistics of locating sampling sites. Alternative sampling methods (e.g., grab vs. composite, manual vs. automatic) are described and evaluated and special attention is given to the issue of measuring or estimating flow rates. In addition, the manual follows the analysis and reporting pathway once sampling is complete, providing detailed instructions on sample documentation, labeling, shipping, and chain of custody procedures.

water impacts, especially in high-use areas such as Newport or Santa Monica Bays.

The model stormwater monitoring program does not assume that each program is starting with a blank sheet of paper, nor that each program will implement the monitoring guidance in a linear, stepwise fashion. Instead, the model program is intended to improve each program's ability to build appropriate linkages among a key set of management questions (see Figure 2-1; Section 4.0). This is best accomplished through the following steps (see also Figure 2-3):

1. Evaluate a program's ability to answer each of the five management questions
2. Identify critical gaps in knowledge (e.g., inability to document impacts, lack of knowledge about potential sources, absence of trend monitoring component) relevant to each program's circumstances
3. Use the model program's monitoring guidance as a framework for developing monitoring components suited to each program's circumstances.

For Step 1, Appendix 1 summarizes current (as of June 2003) stormwater monitoring efforts in southern California, providing a first cut at assessing each program's ability to answer the five management questions. A full assessment under Step 1 would also involve a cumulative analysis of available historical monitoring data for each program. However, the variation among programs demonstrated in Appendix 1 suggests that implementing the model monitoring program would most likely involve focusing on different questions, and thus emphasizing different designs, for different programs. For example, source identification designs (Questions 3 and 4) might be needed for one program, but trend monitoring designs (Question 5) for another.

For Step 2, determining where to focus additional monitoring effort will depend on specific information on source characterization, patterns of development, hydrography and watershed structure, resources at risk, and levels and patterns of contamination. In addition, management initiatives in each program's area can influence decisions about what represents a critical knowledge gap. For example, TMDL development may require additional effort toward source identification. As another example, planned or ongoing BMP implementation may involve allocating additional effort to problem definition and/or to long-term trend monitoring to track BMP effectiveness.

For Step 3, the monitoring designs in the model monitoring program provide a starting point for developing detailed monitoring designs appropriate to the specifics of each program. The model framework is merely the foundation on which to build a permit-specific monitoring and reporting program. For example, the application of habitat monitoring designs based on bioassessment must take into account patterns of stream flow, the nature of biological communities, and the relative importance of urban runoff. The committee also considered the advisability of preparing explicit recommendations on the numbers and locations of sampling sites, and the degree of replication, but concluded that this was inappropriate given the amount of variation from program to program, as well as from place to place within each program. For example, numbers of stations will depend, among other things, on watershed size and complexity, amount and intensity of human use, severity and significance of potential impacts, known patterns of contamination, and hydrography of the study area. The degree of replication will depend on the kinds and amounts of variability in each area, as well as on the relative degree of certainty required by management agencies and the timeframe for decision making. Thus, the committee determined that each program should address the same five management questions and apply the same general monitoring design approaches, but then adapt the specifics of sampling to each individual situation. In this way, the model program will optimize comparability yet provide sufficient flexibility to address permit or site-specific needs

Table 2-1. Relationship between typical stormwater program monitoring objectives, as stated in NPDES permits, and the monitoring elements for which the model stormwater monitoring program prov**ides design guidance. "Q" refers to the management questions** described in Section 4.0 (e.g., Q1 refers to Question 1).

	Management question and type of monitoring				
Permit objective	**Q1: Assessment**	**Q2: Extent and magnitude**	**Q3: Urban runoff contribution**	**Q4: Source identification**	**Q5: Trends**
Define status, trends, pollutants	X				X
Evaluate impacts	X				X
Identify waters that do not attain uses	X	X			
Estimate mass emissions	X				X
Evaluate toxicity	X	X		X	
Identify polllutants of concern	X	X		X	
Identify sources of urban runoff pollutants			X	X	
Identify other sources			X	X	
Evaluate program effectiveness	X				X
Identify illicit connections				X	
Identify illicit discharges				X	

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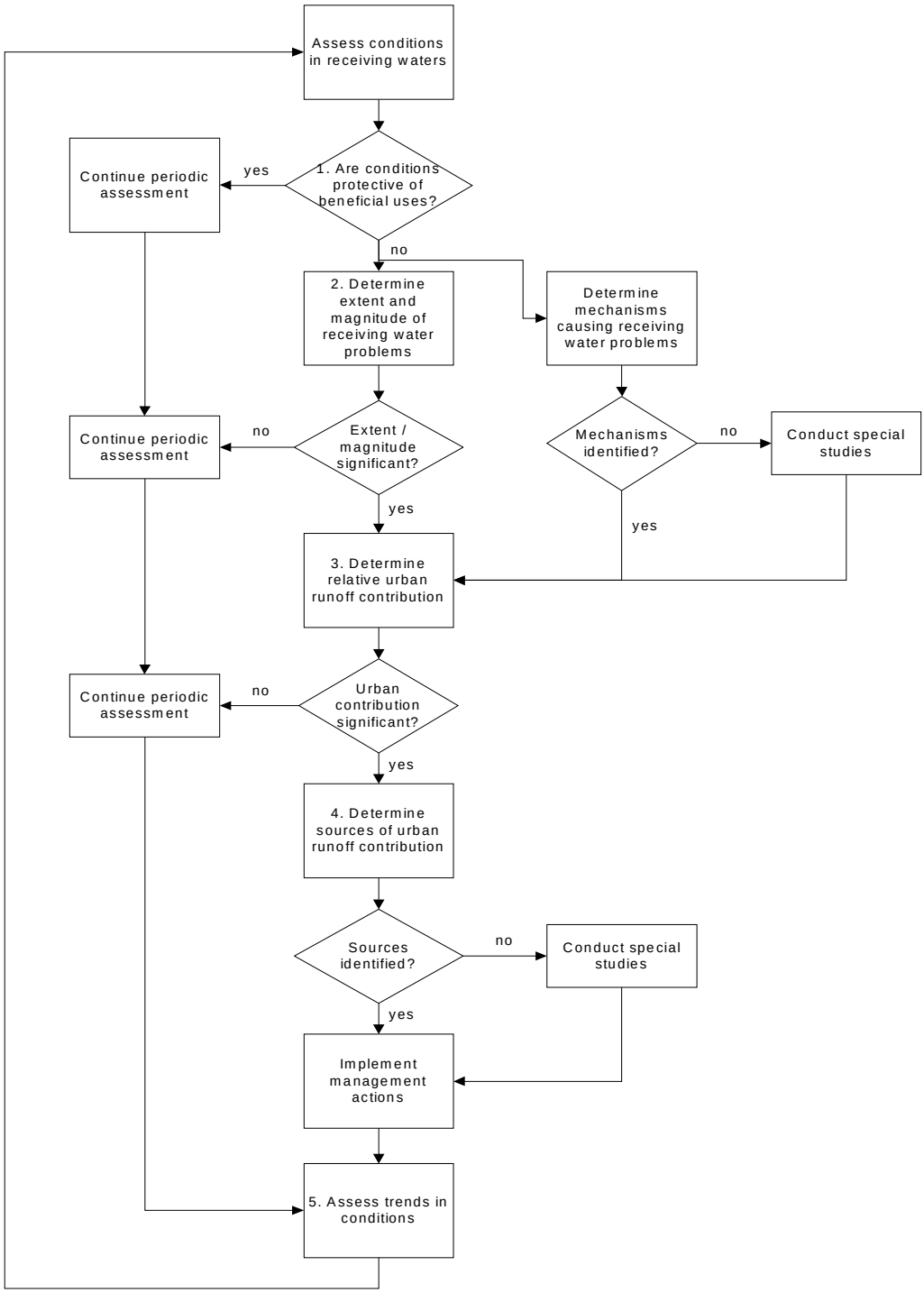

Figure 2-1. Graphical illustration of the idealized logical flow through the five core management questions (reworded as statements to fit flowchart conventions). The answer to each question provides the basis for developing the monitoring design to answer the next. In actuality, monitoring programs may have addressed questions in parallel or out of sequence, depending on available knowledge and specific information needs.

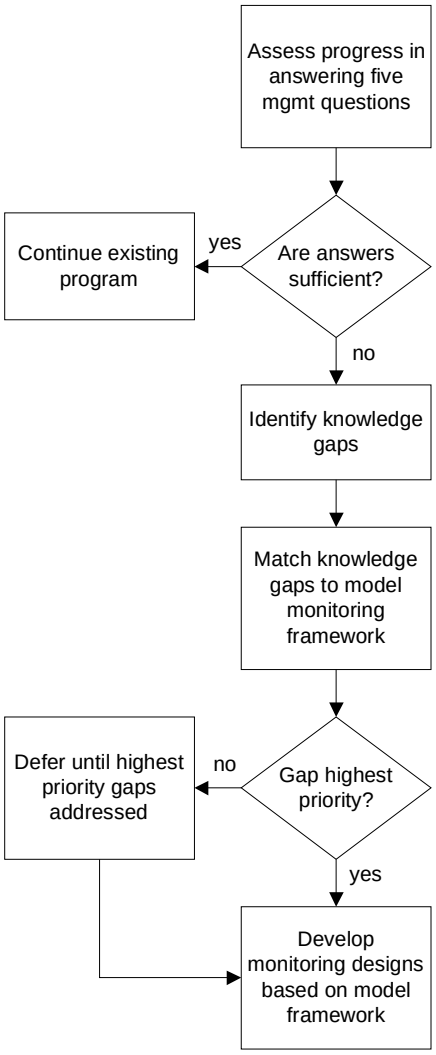

Figure 2-2. Sequence of steps involved in applying the model monitoring program framework to an existing stormwater monitoring program.

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3.0 PRINCIPLES AND FRAMEWORK FOR A MODEL MONITORING PROGRAM

3.1 Principles for allocating monitoring effort

In developing the details of monitoring guidance to address the management questions and their related objectives, the committee was guided by three basic principles that provided an overall set of boundary conditions for monitoring design:

- Monitoring should be focused on decision making; data not helpful in making a decision about clearly defined regulatory, management, or technical issues should not be collected.
- The level of monitoring effort should reflect the potential for impact, with more monitoring allocated to situations where the potential impact (in terms both of the probability of an impact's occurrence and its extent and magnitude) is higher and less monitoring to situations where such potential is lower or where monitoring is not likely to provide useful information.
- Monitoring should be adaptive, in terms of its ability to both trigger follow-on studies as needed and make necessary mid-course corrections based on monitoring findings.

In addition, the committee identified three categories of monitoring activities that fulfill different types of information needs and defined them in the monitoring guidance in Section 5.0.

Core monitoring includes long-term monitoring, intended to track compliance with specific regulatory requirements or limits, to conduct ongoing assessments, or to track trends in certain important conditions over time. Thus, core monitoring generally occurs at fixed stations that are sampled routinely over time.

Regional monitoring includes cooperative studies that provide a larger-scale view of conditions in the southern California region. Regional monitoring can be used to assess the cumulative results of anthropogenic and natural effects on the environment. Regional monitoring also helps to place individual stormwater agencies' monitoring in perspective by comparing local results (i.e. core monitoring) to the breadth and depth of human impacts and natural variability found throughout southern California's watersheds. Regional monitoring requires the participation of all dischargers to the environment, not just MS4 permittees, thus potentially making this type of monitoring more cost-effective (see Box on Regional Watershed Monitoring). Finally, regional monitoring is best conducted periodically (i.e.

Regional Watershed Monitoring

There are many agencies in and around southern California in addition to municipal stormwater agencies that are interested in watershed to regional scale monitoring. For instance, the Statewide Ambient Monitoring Program (SWAMP) coordinated by the State Water Resources Control Board conducts monitoring throughout the southern California region in order to assess, among other things, the health of California's watersheds and estuaries. Another is the State's Wetlands Recovery Project, which has a similar goal as SWAMP, but is focused on wetland habitats. In a similar vein, the US Environmental Protection Agency coordinates the Environmental Monitoring and Assessment Program (EMAP), which monitors watersheds in the southern California region, but attempts to integrate these assessments nationally. Several other agencies are also monitoring in southern California's watersheds including the US Geological Survey's National Water Quality Assessment Program (NAWQA), the US Fish and Wildlife Service, numerous water reclamation plants, water districts, citizen monitoring organizations, and universities. Although each agency has a slightly different motive for monitoring, they all have at least one goal in common; to assess the health of the environment. Therefore, each one of these agencies represent an opportunity for a productive partnership in regional monitoring since they bring a different set of skills and perceptions to a meaningful collaboration.

every five years) because of its large spatial scale and integration among program types.

Special projects include specific targeted studies included as adaptive elements within core or regional monitoring designs. These are shorter-term efforts intended to extend or provide more insight into core monitoring results, for example, by investigating the specific sources of a receiving water problem. Special projects also include developmental research, designed to move monitoring science and policy forward. These can be used to demonstrate the value of particular analyses, to illustrate ways in which data can be used, or to develop new skills. These projects have a specified beginning, middle, and end. Stormwater programs may wish to conduct special studies individually or in coordination with the SMC.

3.2 Framework for developing monitoring questions and designs

The first major philosophical approach of the model urban runoff monitoring program is to help ensure that monitoring activities are:

- Linked directly to key management questions
- Integrated into a logically consistent whole
- Designed and structured for both cost effectiveness and scientific rigor.

To accomplish this set of ideals, the committee followed the philosophical framework of Bernstein et al. (1993), which outlines a series of successively more detailed levels of monitoring objectives. This philosophy includes series of logical steps that led from defining the key monitoring questions to specifying the technical detail of monitoring designs. This framework was defined as:

- Level I: broadly stated public and management core concerns (management questions)
- Level II: management and scientific objectives that include specific statements about time and space scales, reference conditions, and the monitoring approach to be used
- Level III: measurement goals that identify the types and amounts of change to be monitored for
- Level IV: specific technical plans and methods for implementing monitoring.

The second philosophical approach of the model program was to develop a framework that would provide broad consistency of approach, but can also be adapted or customized to meet local needs and conditions. One major concern of the technical committee was that, in its attempt to standardize monitoring programs regionwide, the model urban runoff monitoring program would become too inflexible to adapt to local site specific needs. Therefore, this document fully specifies Level I and Level II objectives (See Section 5.0), partially spells out Level III objectives, and provides examples, through technical guidance and brief case studies, of possible Level IV objectives (See Section 5.0). In addition, the companion documents that describe the laboratory intercalibration study and the data transfer and reporting formats do provide detailed Level IV objectives for two aspects of monitoring design that are important for ensuring comparability of data among programs. In this way, the model urban runoff monitoring program is not too restrictive, but provides sufficient guidance to make certain that managers throughout southern California have similar aims and approaches among programs.

4.0 MANAGEMENT QUESTIONS

There are five questions (or Level I objectives) that create a common foundation for monitoring design and urban runoff management in the region. These questions are not strictly independent, but are logically linked (Figure 2-1) where the answer to one question establishes the context for addressing the next. Thus, the management questions provide a means of organizing information about impacts, sources, and long-term trends in receiving water conditions into a logically consistent whole. The five management questions are:

- Question 1: Are conditions in receiving waters protective, or likely to be protective, of beneficial uses?
- Question 2: What is the extent and magnitude of the current or potential receiving water problems?
- Question 3: What is the relative urban runoff contribution to the receiving water problem(s)?
- Question 4: What are the sources to urban runoff that contribute to receiving water problem(s)?
- Question 5: Are conditions in receiving waters getting better or worse?

Each question can be addressed by one or more categories of monitoring effort, as summarized in Table 3-2. That is, some questions are best addressed using core monitoring, others questions are best addressed in a cooperative regional monitoring program, and others by directed special studies. The category(ies) of monitoring effort is identified within each question description.

The committee recognized that there are many beneficial uses enumerated in the region's Basin Plans and agreed that the five core management questions are equally applicable to the entire range of beneficial uses. However, for purposes of developing specific monitoring guidance, it chose to focus on a subset that is common to most municipal stormwater programs in the region and for which monitoring and regulatory approaches are relatively well established. These include:

- Contact Water Recreation (REC1)
- Non-contact Water Recreation (REC2)
- Warm Freshwater Habitat (WARM)
- Estuarine Habitat (EST)
- Marine Habitat (MAR)
- Wildlife Habitat (WILD).

The following subsections describe each question in more detail including background and rationale, explain how they are functionally interrelated (see also Figure 2-1), and describe the specific management and scientific objectives appropriate to each question including expected data products. For each question, the technical committee defined:

- What is the management goal?
- What monitoring strategy is suitable?
- What degree of certainty and precision is possible or required?
- What reference conditions are appropriate?
- What spatial scale is appropriate?

- What temporal scale is appropriate?

These questions and objectives then form the basis for the more detailed monitoring designs described in Section 5.0.

4.1 Question 1: Are conditions in receiving water protective, or likely to be protective, of beneficial uses?

4.1.1 Background to Question 1

Question 1 is a fundamental linch-pin for many, if not most, aspects of stormwater management. The presence of receiving water problems, or at least the potential for such problems, is the justification for a broad range of activities to better identify and reduce sources of contamination from urban runoff that may cause or contribute to such problems. In addition, detailed information about the nature of receiving water problems can greatly improve the effectiveness of a wide range of management actions. In principle, the design of any receiving water monitoring program should be based on reconnaissance and/or characterizations studies that target the likely sources and locations of receiving water problems. However, the southern California stormwater programs have already generated substantial information about where receiving water problems should be monitored for. Thus, the model monitoring program does not include a reconnaissance or characterization step for Question 1. However, where information on conditions in receiving waters is sparse or nonexistent, it may be necessary to initially conduct broad reconnaissance studies and/or evaluations of available historical data to determine the likely sources and locations of current or potential problems in receiving waters. In those cases, USEPA guidance (US EPA 1992) is available to direct the design of such studies.

In general, there are two often competing approaches to assessing whether conditions in receiving waters constitute a "problem", the compliance approach and the assessment approach. The committee described a compliance approach as one in which monitoring is used to determine if the value of an indicator is above or below a quantitative regulatory threshold. In this approach, the indicator measure would be considered as evidence of recreational water quality or habitat problem, acting as a surrogate for more detailed studies involving a larger range of measures. Exceedance of compliance standards would then provide the basis for management actions such as source identification studies, source control efforts, and further iterative monitoring and management actions. In contrast, an assessment approach would not be based primarily on comparison to specific quantitative thresholds or limitations. Rather, it would focus on better understanding actual conditions in the receiving water (i.e., the actual nature of problems) and is based on a weight of evidence approach in which chemical, biological, and ecological data are used to assess impacts. This approach emphasizes developing evidence of actual impacts in receiving waters in addition to, or instead of, evidence derived only from indicator measures.

The model monitoring committee believes that these two approaches should be complementary, rather than competitive or mutually exclusive. Thus, evidence provided by indicators could help initiate further studies to determine actual problem(s) and identify sources. Quantitative thresholds or limitations could be used to trigger or justify needed management actions, and the overall timeframe would be long enough to encompass iterations of monitoring and management efforts. The program design guidance in Section 5.0 illustrate how both approaches can be used in tandem, as in, for example, the use of mortality levels of indicator organisms in toxicity tests as a trigger for follow-up TIEs to identify the source(s) of toxicity.

4.1.2 Recreational water quality objectives

The Level II objective suggested for recreational water quality for Question 1 is described in Table 4-3 that focuses primarily on identifying conditions that may present elevated risk to humans from body contact recreation. The Level II management/monitoring objective can be stated as:

> Monitor a suite of bacterial indicators at high-priority sites selected by qualitative risk characterization and affected by urban runoff, including along beaches; in enclosed bays and estuaries; and along creeks, streams, and rivers at frequencies needed to ensure that relevant freshwater and marine standards are being met, to a moderate degree of certainty and precision.

The types of data products appropriate for answering Question 1 for recreational water quality may include:

- Frequent (daily, weekly, monthly depending on the circumstance) measures of fecal coliform or E. coli, total coliform, and Enterococcus at high-priority (defined in Section 5.1.1 as having both high use and elevated levels of indicator bacteria) beaches, coastal storm drains, lagoons, bays, estuaries, and inland creeks, streams, and rivers (Tables of individual measurements and relevant averages)
- Comparisons of bacterial indicator values with relevant standards (i.e., REC1, REC2, AB411) on spatial and temporal scales that match sampling scales as closely as possible (tables that highlight exceedances, figures that show exceedances over time)
- Summaries that identify the relative degree of contamination at monitored locations (i.e., maps, Heal the Bay's Report Card for beaches in Santa Monica Bay).

4.1.3 Habitat objectives

The Level II objective suggested for habitat health for Question 1 is described in Table 4-4. The Level II management/monitoring objective can be stated as:

> Use the Triad approach as a basis for monitoring both specific sites of high concern, as well as a set of random watershed sites, at least yearly and assess overall habitat health by comparing a suite of measurements to relevant reference conditions, to a moderate degree of certainty and precision. Use the Triad results to trigger an appropriate set of adaptive follow-up studies intended to better characterize conditions.

As might be expected, given both the inherent complexity of ecosystem monitoring and the variety of measurements included in the Triad approach, there is a range of reference conditions potentially applicable to monitoring of this question. The committee therefore recommended a structured framework for using reference conditions in the interpretation of Triad monitoring results (see Section 5.0).

The types of data products appropriate for answering Question 1 for habitat include:

- Site-by-site summaries of each sampled leg of the Triad (tables of individual measurements and relevant averages)
- Site-by-site interpretations and conclusions based on synthesized Triad results (narrative conclusions, decision trees)

- Comparisons across sites for each leg of the Triad (tables highlighting differences, maps)
- Comparisons across sites for synthesized Triad results (narrative conclusions, decision trees, maps)

4.2 Question 2: What is the extent and magnitude of the current or potential receiving water problems?

4.2.1 Background to Question 2

Question 2 is framed as the logical next step once receiving water problems related to urban runoff are found or predicted. Question 2 thus expands on the information provided by Question 1as a basis for describing the spatial and temporal extent of existing or likely impacts, as well as their relative intensity. This information is necessary for assessing the relative severity or importance of different problems, targeting source identification efforts, and planning management actions such as source reduction efforts.

In most cases, monitoring designs to answer Question 1 will include only representative sites within key recreational areas or habitats. Thus, once a receiving water problem is found, data from these sites will most often be insufficient to characterize the full extent and magnitude of the problem and additional studies will normally be called for. This is because most managers need to know the severity of a problem before proceeding with some remedial action. Impacts that cover large areas or extend over long periods of time typically require more immediate attention. The information collected to answer Question 2 is important for scoping the source identification studies that are the focus of Questions 3 and 4 (see Figure 2-1).

In some cases, the extent, magnitude, and/or severity of a receiving water problem will be immediately apparent from the core monitoring data obtained under Question 1. In such cases, for example, very high bacteria counts along a popular beach or severe toxicity in an enclosed lagoon, source identification work as described in Questions 3 and 4 should begin promptly. In addition, un-permitted dry weather discharges are specifically forbidden and such discharges should therefore also be a high priority for prompt source identification studies. In other cases, broader sampling to assess spatial and temporal extent will be required, usually as shorter-term studies that are conducted once or perhaps periodically when there is reason to believe the scale of the problem has changed. In some situations, where the problem is complex and/or covers a large area, addressing Question 2 will involve regional studies that require the cooperative efforts of several agencies. Monitoring under Question 2 would be conducted in either wet or dry weather, depending on the specific issue and in accord with the findings of Question 1.

4.2.2 Recreational water quality objectives

The Level II objective suggested for recreational water quality for Question 2 is described in Table 4-6. The Level II management/monitoring objective can be stated as:

> Monitor a suite of bacterial indicators at a spatially and temporally more intensive set of stations around sites, prioritized by risk, in order to define the extent of problems to a moderate degree of certainty and precision, and compare indicator levels to relevant marine and freshwater standards in order to define the relative severity of the problem, also to a moderate degree of certainty and precision.

The types of data products appropriate for answering Question 2 for recreational water quality include:

- Measures of the spatial extent of bacterial contamination (maps)
- Measures of the temporal patterns of bacterial contamination (figures that show temporal patterns, measures of variance)
- Measures of the relative magnitude of indicator values over space and time (graphs of concentration over time or by site).

4.2.3 Habitat objectives

The Level II objective suggested for habitat for Question 2 is described in Table 4-7. The Level II management objective can be stated as:

> Monitor specific aspects of the Triad, including adaptive elements such as additional chemistry measurements or TIEs, at a spatially and temporally more intensive set of stations where impacts have been observed in order to define the extent of problems to a moderate degree of certainty and precision, and compare measurements to relevant marine and freshwater standards in order to define the relative severity of the problem, also to a moderate degree of certainty and precision.

The types of data products appropriate for answering Question 2 for habitat include:

- Measures of the spatial extent of modified communities, chemical contamination, and/or elevated toxicity (maps)
- Measures of the temporal patterns of modified communities, chemical contamination, and/or elevated toxicity (figures that show temporal patterns, measures of variance)
- Measures of the relative magnitude of indicator values over space and time (graphs of concentration or toxicity over time or by site).

4.3 Question 3: What is the relative urban runoff contribution to the receiving water problem(s)?

4.3.1 Background to Question 3

Once monitoring or other studies demonstrate that there is a current or potential impact to receiving waters (Question 1) and describe the problem's extent and magnitude (Question 2), decisions about any management responses depend on information about the source(s) of the problem. The model monitoring framework breaks this source identification into two parts (Figure 2-1), represented by Questions 3 and 4. The purpose of this two-step process is to prioritize more detailed source identification efforts in Question 4 at only those problems for which urban runoff is a significant contributor. Question 3 begins this process by taking the information from Questions 1 and 2 and beginning to work upstream, both literally and figuratively, to better define the overall contribution of urban runoff to receiving water problems. It is important to clarify that this two-step process involving Questions 3 and 4 is not intended in any way to diminish or replace municipalities' permit requirements to reduce contaminant inputs to the maximum extent practicable. It is rather intended to help determine when additional, more detailed and extensive, upstream source identification efforts should be conducted by a municipality, with the goal of ensuring that the full burden of source identification work not be shifted to the MS4 permittees where action by them would not solve the larger problem.

The model monitoring framework assumes that, if urban runoff contributes only a very small percentage to the receiving water problem, then there would be no need for a municipal permittee to independently carry out substantial source identification efforts in addition to those activities usually carried out under the municipal stormwater permit. For a first-cut estimation, therefore, Question 3 requires only minimal resolution, including at least a rough estimate of the identity and magnitude of the non-urban runoff contributions. In many situations, aggregate estimates of the non-urban runoff contribution, rather than source-by-source estimates, may be adequate and may already be available from previous characterization and/or monitoring studies. Only if urban runoff is found to contribute significantly to receiving water problems would a municipality be required to take the lead on conducting further source identification studies at greater resolution (as described in Question 4).

The committee engaged in substantial discussion of criteria for prioritizing source identification work and agreed that several factors should be taken into account in each instance, including:

- The severity of the problem
- The type of pollutant(s) involved
- The potential for human health risk
- The relative certainty of the estimates of relative contribution from different sources. If the estimate of urban contribution is very low, then even high uncertainty might not be important. However, if the estimate is higher, e.g., 10%, and the uncertainty is high (e.g., could be as high as 30%) then that would be a different situation
- Whether the problem occurs during dry and/or wet weather, since dry weather problems may be more easily dealt with
- The biological resources at issue
- Regulations and other legal mechanisms that require source identification and/or control
- Stakeholder involvement such as watershed group planning priorities.

The committee agreed that source identification work should be prioritized based on the factors above, and that the threshold level for further independent source identification efforts by the permittees should be somewhere between 5 – 10%. It is important to emphasize that this threshold is intended as a guideline only in situations where the source of a receiving water problem is not known. Where the source(s) of such problems are known, then relevant permit conditions related to source reduction and cleanup would come into play. As emphasized above, this threshold is not intended to diminish or replace permit requirements to reduce contaminant inputs to the maximum extent practicable (MEP) or other regulations or legal requirements.

4.3.2 Recreational water quality and habitat objectives

The Level II objective suggested for both recreational water quality and habitat for Question 3 is described in Table 4-8. The Level II management objective can be stated as:

> Using parameters relevant to the nature of the receiving water problem, estimate the proportional contribution of urban runoff at the most downstream point of input to the receiving water, based on a loads study performed at minimal to moderate resolution, and repeated every several years as needed.

The types of data products appropriate for answering Question 3 for both recreational water quality and habitat include:

- Description of all potential sources of inputs to the receiving water (maps of potential sources)
- Rough estimates of the relative magnitude of loads from all sources (table of concentrations or loads by source)
- Rough estimate of the proportional contribution of urban runoff to total loads (pie charts or stacked bar charts).

4.4 Question 4: What are the sources of the urban runoff contribution to receiving water problems?

4.4.1 Background to Question 4

Once it has been determined, either through specific studies carried out under Question 3 or through other available data, that urban runoff is, or is likely to be, a significant source of one or more receiving water problems, then more intensive source identification efforts are called for. Question 4 thus involves more thorough source identification studies intended to provide more detailed information about the nature, location, and quantity of inputs to the receiving waters identified in Question 1. This information can help refine receiving water monitoring, improve fundamental understanding of stormwater contamination processes, and help guide management actions intended to reduce sources and their attendant impacts. It can also help focus trend monitoring on those parameters that are potentially most responsive to urban runoff source reduction efforts.

In the context of Question 4, "sources" can refer to multiple layers of sources, such as a golf course that is the source of pesticides, which are in turn the source of toxicity in the receiving water. Thus, questions about sources should be framed carefully in order to clarify both the spatial definition of "upstream source" as well as the level of causality that is the central focus of the investigation.

4.4.2 Recreational water quality and habitat objectives

The Level II objective suggested for both recreational water quality and habitat for Question 4 is described in Table 4-9. The Level II management objective can be stated as:

> Using parameters relevant to the nature of the receiving water problem, prioritize receiving water sites for upstream source identification studies and perform source identification studies at the watershed scale and to a moderate degree of resolution until the appropriate stopping rules are reached.

The types of data products appropriate for answering Question 4 for both recreational water quality and habitat include:

- Prioritization of receiving water sites in terms of severity of impact (ranked list of sites)
- Description of all potential urban runoff sources of inputs to the higher priority receiving waters (map of potential sources)
- Determination of actual sources of urban runoff and their relative magnitude (table of concentrations and flows by source with estimated levels of confidence)
- Quantitative estimates of the loads from urban runoff sources(table of loads by source with estimated levels of confidence).

4.5 Question 5: Are conditions in receiving waters getting better or worse?

4.5.1 Background to Question 5

Assuming that monitoring related to Questions 1 – 4 has resulted in improved information about the nature and source(s) of current and/or potential receiving water problems, and that this in turn has led to management actions to address such sources, Question 5 provides the logical feedback to determine if such actions are improving conditions in receiving waters. Given that changes in receiving water conditions are likely to occur over several years (at the least), Question 5 is a trends monitoring question. The trends of interest are in both discharges and receiving waters and the time frame for this question is the longer-term period needed to determine if management actions are having their intended effects.

In its simplest form, a trend monitoring design involves repeated sampling over time at the same monitoring site(s). The ability of a trend design to detect change depends on:

- The amount of change it is important or necessary to detect
- The timeframe within which decision makers need information about trends
- The variability of the indicator on different time scales, typically shorter term (weekly, monthly) and longer term (yearly)
- The resources available for sampling and analysis.

Developing the specifics of the monitoring design thus involves making a series of tradeoffs among these factors.

The statistical power of a monitoring design is its ability to detect a change of a certain size, if it in fact has occurred. Power analysis, used to estimate the power of a given design, can provide insight into the sampling effort (both in terms of the number of samples per year and the number of years) required to observe trends of different size. In addition, power analyses can reveal important inherent constraints on the ability to detect trends imposed by underlying variability in the system being monitored. This can provide a realistic basis for establishing both management and monitoring goals, as well as a basis for making tradeoffs in the monitoring design (e.g., between the number of samples collected per year and the number of years over which the trend monitoring will extend).

Figure 4-1 provides an example of how site-specific power analysis results might be used. In one instance (Figure 4-1a), trend monitoring would be futile and monitoring resources should be shifted to another site and/or issue. In a second instance (Figure 4-1b), the only way to improve the design's ability to detect a trend is to increase the number of years to be monitored. In such an instance, the length of time needed to detect a trend must be compared against both the management time horizon (i.e., how quickly is information needed?) and the timeframe over which changes are expected to occur (e.g., how rapidly are BMPs expected to reduce loads?). In a third instance (Figure 4-1c), the main way to improve the design's power is to increase the number of samples per year. However, for some questions, there is a natural constraint imposed by the relatively small number of storms per year in southern California. In such cases, the monitoring design will have an inherent limit on its ability to detect trends within a given time period. In a final example (Figure 4-1d), sampling additional times per year and monitoring for more years must be traded off against each other, since increasing both kinds of sampling intensity improves power. Such tradeoffs should be based on both the management time horizon and the timeframe over which changes are expected to occur. Thus, if an answer to Question 5 is

not immediately urgent, then the number of samples per year can be reduced and the timeframe extended into the future.

Appendix 2 uses historical data from the southern California region to provide example power analysis results for trend monitoring of bacteria and mass emissions. Sufficient data for power analyses of other data types (e.g., bioassessment, toxicity) are not yet available. Because power analysis results can vary widely from site to site and across constituents, these results should be considered only as a "starter kit" for trend monitoring designs. The committee strongly recommends that each trend monitoring program conduct its own site-specific power analyses after obtaining three years of trend data, and revise its monitoring design accordingly based on these results. To support such program-specific design efforts, the committee has developed a simple software package that automates the needed power analysis (Go to http://www.sccwrp.org to download a copy of this program). Because trend monitoring programs will typically continue for many years, this approach will enable trend monitoring to begin and then to adjust its design appropriately with little or no loss of information.

The central importance of estimates of variability in trend monitoring highlights the importance of improving our basic understanding of sources of variability in MS4s. Thus, in addition to tracking trends over time, the analysis of monitoring data under Question 5 should include efforts to examine and quantify sources and patterns of variability in monitoring data, with the overall goal of reducing any controllable variability (i.e., variability introduced through sampling techniques and laboratory analysis, or due to spatial and temporal sources that can be accounted for in the structure of the monitoring design itself).

Finally, a full answer to Question 5 should also include an assessment of changes in the extent and magnitude of impacts over time. Such an assessment can be accomplished by repeating the studies described in Question 2.

4.5.2 Recreational water quality objectives

The Level II objective suggested for recreational water quality for Question 5 is described in Table 4-10. The Level II management objective can be stated as:

> Monitor bacterial indicators at fixed stations over a number of years to determine, to a moderate degree of resolution, whether levels have increased or decreased compared to historical data and to relevant standards.

The types of data products appropriate for answering Question 5 for recreational water quality include:

- Graphs of the levels of bacterial indicators over time at each station of concern
- Periodic statistical power analysis results to confirm the power of the trend monitoring design.

4.5.3 Habitat objectives

The Level II objective suggested for habitat for Question 5 is described in Table 4-11. The Level II management objective can be stated as:

Monitor relevant habitat indicators at fixed stations over a number of years to determine, to a moderate degree of resolution, whether levels have increased or decreased compared to historical data and to relevant standards.

The types of data products appropriate for answering Question 2 for habitat include:

- Graphs of the levels of habitat indicators over time at each station of concern
- Periodic statistical power analysis results to confirm the power of the trend monitoring design.

Table 4-1. Relationship between the five key management questions and the three basic categories of monitoring activity. Core monitoring for Questions 1 and 5 typically occurs at fixed stations over a period of time. The design of regional monitoring and special projects under Questions 2, 3, and 4 is contingent on monitoring results from other core management questions. Numbers in italics (e.g., *5.1.1*) refer to report sections that detail specific design guidance for each element of the model monitoring program.

Management Questions	Core Monitoring	Regional Monitoring	Special Projects
1. Are conditions protective?	Recreational water quality assessment (wet & dry) *5.1.1* Ecosystem assessment (dry) *5.1.2*		
2. What is extent / magnitude?		One-time or periodic larger-scale assessment (depends on Question 1) *5.2*	One-time or periodic larger-scale assessment (depends on Question 1) *5.2*
3. What is urban runoff contribution?		One-time characterization, assessment (depends on Questions 1 & 2) *5.3*	One-time characterization, assessment (depends on Questions 1 & 2) *5.3*
4. What are sources of urban contribution?			Site-specific, one-time or periodic source ID studies (wet & dry) (depends on Question 3) *5.4*
5. Are conditions getting better or worse?	Long-term trends monitoring (wet & dry) of: • Bacterial indicators *5.5.1* • Habitat indicators (incl. loads) *5.5.2*		

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Table 4-2. Level II objectives for recreational water quality monitoring for Question 1: Are conditions in receiving waters protective of beneficial uses? Aspects of the objective are organized around the six categories of information that make up each Level II objective.

Level II category – Q1 recreational water quality	**Level II objective – Q1 recreational water quality**
Management goal	Protect human health by meeting existing standards
Monitoring strategy	Allocate sampling effort with respect to overall risk (combination of use and contamination) Monitor bacteria indicators (fecal coliform (or E. coli), total coliform, Enterococcus) Use improved indicators when available and approved by health department Adaptive link to magnitude, extent, and upstream urban runoff source identification studies
Degree of certainty and precision	Moderate
Reference conditions	Freshwater standards (REC1, REC2) Marine standards (AB411)
Spatial scale	Open-coast beaches Specific coastal storm drains Bay, lagoons, estuaries Rivers and creeks
Temporal scale	Daily (for health risk) Weekly (for health risk) Seasonal (for health risk, trends)

Table 4-3. Level II objectives for habitat monitoring for Question 1: Are conditions in receiving waters protective of beneficial uses? Aspects of the objective are organized around the six categories of information that make up each Level II objective.

Level II category – Q1 habitat	**Level II objective – Q1 habitat**
Management goal	Protect ecosystem health by tracking the relationship of indicators to relevant reference conditions
Monitoring strategy	Triad approach Coordinated watershed and subwatershed scales Adaptive monitoring triggers depending on triad results Sites targeted at specific management issues
Degree of certainty and precision	Moderate
Reference conditions	Basin Plan Ocean Plan Regional IBI (for stream bioassessment) CTR (for chemistry) Toxicity test reference Historical reference conditions (site-specific) Local reference conditions (site-specific) Other watersheds (regional)
Spatial scale	Site-specific (e.g., Talbert Marsh) Watershed / subwatershed Jurisdictional
Temporal scale	Yearly Several years

Table 4-4. Level II objectives for recreational water quality monitoring for Question 2: What is the extent and magnitude of receiving water problems? Aspects of the objective are organized around the six categories of information that make up each Level II objective.

Level II category – Q1 recreational water quality	**Level II objectives – Q1 recreational water quality**
Management goal	Define the scale of impact
Monitoring strategy	Short-term sampling at broader spatial extent Sampling appropriate to define temporal patterns at weekly to seasonal scales Measure bacteria loads at MS4 discharge locations
Degree of certainty and precision	Moderate
Reference conditions	Freshwater standards (REC1, REC2) Marine standards (AB411) Comparisons across parts of the region
Spatial scale	Watershed / subwatershed Jurisdictional Regional
Temporal scale	For REC1 objective, geomean over a season Process-based (e.g., seasonal) 3 years for impairment (303d)

Table 4-5. Level II objectives for habitat monitoring for Question 2: What is the extent and magnitude of receiving water problems? Aspects of the objective are organized around the six categories of information that make up each Level II objective.

Level II category – Q2 ecosystem	Level II objectives – Q2 ecosystem
Management goal	Receiving water conditions improve (if impaired) Receiving water conditions remain the same (if not impaired)
Monitoring strategy	Triad monitoring in key receiving waters Long-term trend monitoring Adaptive toxicity testing Adaptive upstream toxicity testing
Degree of certainty and precision	Moderate
Reference conditions	Basin Plan Ocean Plan Regional IBI (for stream bioassessment) CTR (for toxicity) Toxicity test reference Comparisons across parts of the region
Spatial scale	Watershed / subwatershed Jurisdictional Regional
Temporal scale	Periodic snapshots (yearly)

Table 4-6. Level II objectives for both recreational water quality and habitat monitoring for Question 3: What is the relative urban runoff contribution to the receiving water problem(s)? Aspects of the objective are organized around the six categories of information that make up each Level II objective.

Level II category – Q3 recreational water quality & habitat	**Level II objective – Q3 recreational water quality & habitat**
Management goal	Estimate the proportional contribution of urban runoff to problem(s) in specific receiving water
Monitoring strategy	Loads estimation
Degree of certainty and precision	Minimal to moderate
Reference conditions	Relative severity of local receiving water problem(s) Relative contribution of urban runoff to other receiving waters in the region
Spatial scale	Point of input to receiving water (scales depending on definition of receiving water)
Temporal scale	Periodic assessment (every 5 years)

Table 4-7. Level II objectives for both recreational water quality and habitat monitoring for Question 4: What are the sources to urban runoff that contribute to receiving water problems? Aspects of the objective are organized around the six categories of information that make up each Level II objective.

Level II category – Q4 recreational water quality & ecosystem	**Level II objectives – Q 4 recreational water quality & ecosystem**
Management goal	Urban sources identified and resolved
Monitoring strategy	Prioritize downstream sites Upstream source ID studies
Degree of certainty and precision	Moderate to great
Reference conditions	Internal tests of “signal” strength
Spatial scale	Watershed / subwatershed Jurisdictional Regional
Temporal scale	Until stopping rules reached

Table 4-8. Level II objectives for recreational water quality monitoring for Question 5: Are conditions in receiving waters getting better or worse? Aspects of the objective are organized around the six categories of information that make up each Level II objective.

Level II category – Q5 recreational water quality	**Level II objectives – Q5 recreational water quality**
Management goal	Reduction in indicator levels Identification and removal of key sources
Monitoring strategy	Repeated monitoring at specific sites over a season Long-term trend monitoring
Degree of certainty and precision	Moderate
Reference conditions	Standards Historical data as a basis of trends
Spatial scale	Specific receiving waters Where use is concentrated Watershed / subwatershed Jurisdictional
Temporal scale	For REC1 objective, geomean over a season Process-based (e.g., seasonal) 3 years for impairment (303d) Permit term (~ 5 years) for trends TMDL implementation phase (~ 10 years)

Table 4-9. Level II objectives for habitat monitoring for Question 5: Are conditions in receiving waters getting better or worse? Aspects of the objective are organized around the six categories of information that make up each Level II objective.

Level II category – Q5 habitat	**Level II objective – Q5 habitat**
Management goal	Conditions improve (if degraded) Conditions remain the same (if not degraded)
Monitoring strategy	Triad approach
Degree of certainty and precision	Moderate
Reference conditions	Basin Plan Ocean Plan Regional IBI (for stream bioassessment) CTR (for chemistry) Toxicity test reference
Spatial scale	Watershed / subwatershed Jurisdictional
Temporal scale	Permit cycle for overall assessment Process-based for specific components Bioassessment (greater than 5 years) Bioaccumulation (e.g., short-term for Se, long-term for DDT) BMP (based on site-specific geomorphology, BMP mechanism) Hydrology (annual) Toxicity (sporadic, seasonal)

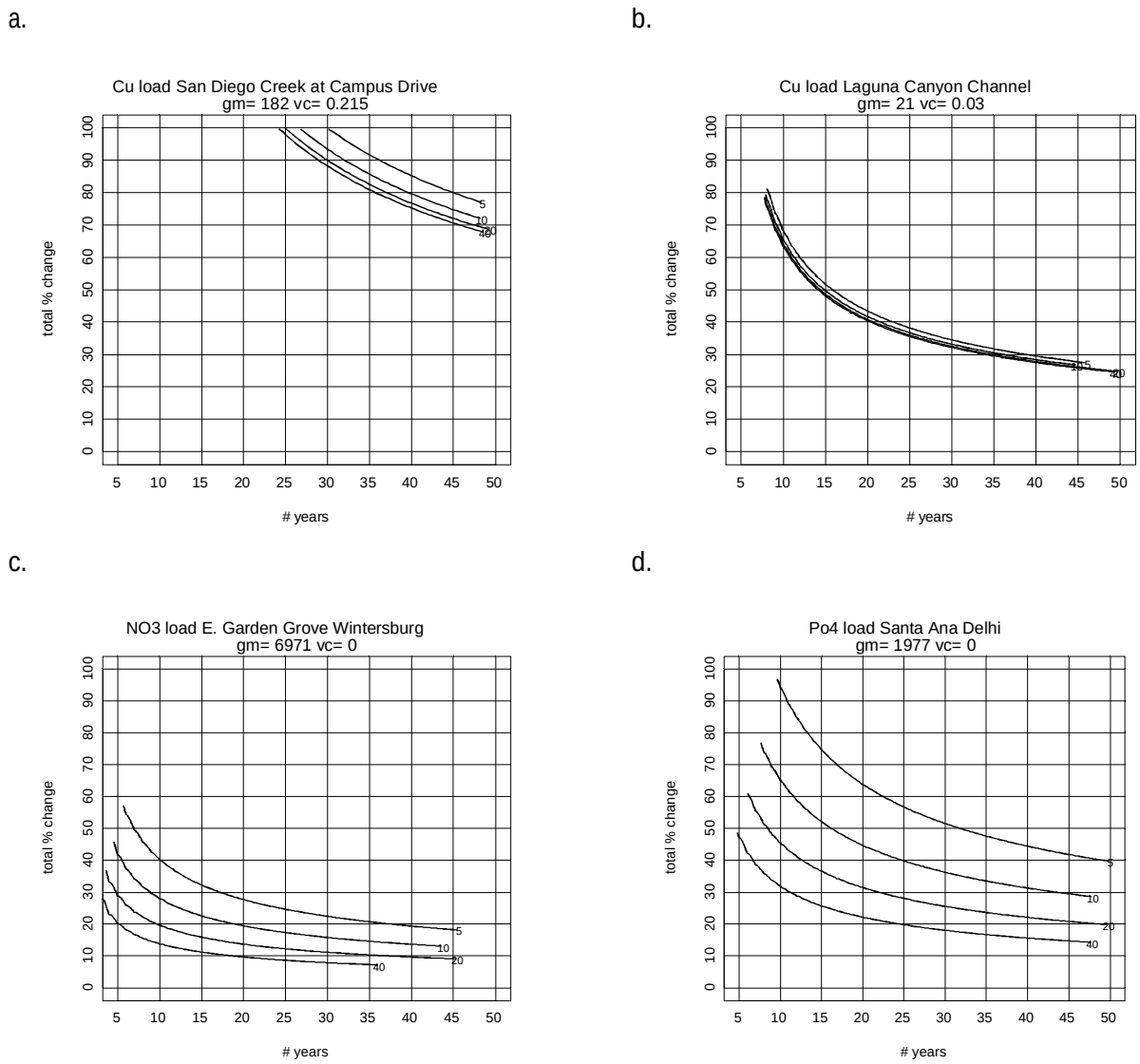

Figure 4-1. An example of the range of site-specific statistical power analysis results that can provide useful guidance for both trend monitoring design and setting management and monitoring goals. In the example figures below, the x-axis shows the number of years over which trend monitoring could continue and the y-axis the amount of change monitoring could detect. The four curves represent different amounts of sampling intensity per year. a. Even large amounts of sampling will not detect trends. b. Increasing the number of sampling events per year will not increase power because virtually all the variability is year-to-year variability. c. Increasing the number of years sampled beyond a certain point will not increase power because virtually all the variability is within-year variability. d. Both within- and between-year variability are important and increasing both kinds of sampling intensity will increase power.

5.0 MONITORING GUIDANCE

The following sections provide specific guidance for the design of core monitoring, regional monitoring, and special projects needed to address each of the core management questions (Table 4-1). The description of each monitoring design follows the same format:

- An overview that quickly summarizes the major features of the design, including a table of key design elements
- A lengthier description of specific design elements, such as station selection, monitoring frequency, indicators, triggers or thresholds for regional monitoring and/or special projects
- A discussion of design issues that describes the underlying rationale for the design and any important constraints that may affect monitoring success.

As the description of the key management questions and objectives (Section 4.0) makes clear, monitoring guidance focuses on recreational water quality and habitat issues. In some cases, distinct monitoring designs are required for each set of issues, while in other cases the same design approach is suitable for both. Where distinct monitoring designs are required, recreational water quality and habitat beneficial uses are presented separately.

5.1 Assessment monitoring

Assessment of recreational water quality and habitat conditions addresses Question 1: Are conditions in receiving waters protective, or likely to be protective, of beneficial uses? Data from such monitoring provides the basis for other aspects of the model program (Figure 3-1) intended to better characterize the extent and magnitude of any problems (Question 2), identify sources (Questions 3 and 4), and track trends in condition over time (Question 5).

Assessment monitoring effort falls exclusively into the core and regional monitoring categories (Table 4-1). Core monitoring is that conducted by individual agencies to evaluate issues related to specific sites or watershed. Regional monitoring is that conducted cooperatively by multiple agencies (see box on regional monitoring) to address issues across broader scales and time periods. In many cases, the same monitoring sites and/or approaches can meet both core and regional monitoring needs.

5.1.1 Recreational water quality assessment

5.1.1.1 Overview and philosophy

Design overview. Table 5-1 presents an overview of the technical design elements for assessment of recreational water quality conditions at beaches; bays and estuaries; and creeks, streams, and rivers. The following discussion does not include inland lakes and reservoirs, which, because they represent a special case, the committee agreed to defer until a later time.

The model monitoring framework allocates core monitoring of bacterial indicators to high-priority locations based on risk of adverse health effects. This risk is defined in terms of a combination of level of contamination and degree of human body contact use. In general, local public health departments have completed risk characterization for many waterbodies with recreational beneficial uses, particularly for marine beaches. Additionally, local health agencies have already established routine monitoring locations at many marine beaches that are sampled at

least weekly. To address the assessment of recreational water quality conditions, the model program recommends that stormwater agencies build upon the monitoring data, local knowledge, and experience of the local public health departments. Thus, the model monitoring committee explicitly assumed that local public health agencies would take the lead in specifying high priority areas based on their knowledge and experience.

Somewhat different monitoring designs are recommended for linear open-coast beaches, enclosed bays and estuaries, and creeks/streams/rivers, based on differences in their basic hydrology. The number of sampling locations is dependent on the size of an area and its level of relative risk, as is the sampling frequency. However, at all monitoring sites, monitoring should measure indicator levels in the discharge itself, as well as upcoast and downcoast (or upstream and downstream) of the discharge. In addition, where the monitoring objective is to determine whether overall conditions constitute a problem as opposed to monitoring for body contact, monitoring may be focused on that portion of the year that represents the worst-case scenario.

At the moment, there are no ongoing regional monitoring efforts focused on recreational water quality, with the exception of the Bight Program's periodic snapshots of shoreline water quality and the new regional harbors monitoring program being developed by the San Diego Regional Water Quality Control Board. Both programs rely on a probability-based design intended to support general conclusions about the relative degree of contamination in different parts of the region.

Design philosophy. The model design framework specifies somewhat different approaches for core monitoring at linear open-coast beaches; enclosed bays and estuaries; and creeks, streams, and rivers. However, all three approaches reflect the basic assumption that monitoring resources should be allocated based on risk. Where the county health departments and the State Board's Beach Water Quality Work Group (BWQWG) have established monitoring approaches and/or designs, the model stormwater program will remain consistent with these. The committee felt that, ultimately, the county health departments are one end-user for much of this data since they have the responsibility for assessing if a beach should be closed or posted for swimming.

Widely accepted risk management principles recommend allocating monitoring and management effort in proportion to the relative degree of risk. The basic design feature of the model urban runoff monitoring program for Question 1 for recreational water quality therefore is to focus effort at those places and times (whether wet or dry weather) where human health risk associated with urban runoff is the highest. The model design assumes that risk, at the population level, is directly related to exposure, and estimates exposure, in turn, as the qualitative combination of estimates of bacterial contamination and the intensity of human use. While these qualitative risk estimates may be improved by future risk assessments, this improved information should not alter the basic principle of allocating monitoring in terms of relative risk.

There are three types of situations that are relevant to stormwater monitoring programs and that require somewhat different monitoring approaches:

- Linear, open-coast beaches
- Enclosed bays and estuaries
- Inland creeks, streams, and rivers.

Both linear, open-coast beaches and enclosed bays and estuaries can have many kinds of bacteria inputs, although they differ somewhat. Open-coast beaches can receive bacteria from storm drains, river discharge, wildlife, intense beach usage, pet waste, terrestrial vegetation

decomposition, improperly maintained toilet facilities, and perhaps kelp decomposition. In addition to these potential sources, enclosed bays and estuaries can also be affected by bacteria from maintenance activities, homeless populations, groundwater, moored boats, failing septic systems, and concentrated populations of birds. The primary urban inputs of bacteria to inland creeks, streams, and rivers are through storm drain discharges, homeless encampments, unauthorized public use, and passage of domestic and wild animals. These and other differences stemming from their basic hydrology lead to a different approach for each situation. For each type of area, risk characterization should be completed in conjunction with the local health department.

The model design framework for regional monitoring adopts the probability-based design approach used by the Bight Program and assumes that, for purposes of assessment, the Bight Program does an adequate job of shoreline assessment. The Bight Program design is being used as a basis for developing a somewhat more spatially intensive regional monitoring program for enclosed bays and estuaries in the San Diego Region. Once this is completed, it can act as a design template for regional monitoring in other enclosed bays and estuaries throughout southern California. The model monitoring committee determined that, at present, concerns about recreational water quality in inland creeks, streams, and rivers were site specific enough to be dealt with by the core monitoring design. If there is a need for a regional assessment in the future, the basic stratified random sampling design used in the Bight Program would also apply here (see Section 5.1.2 Habitat assessment for more detail on regional watershed designs).

5.1.1.2 Design elements

Somewhat different monitoring designs are recommended for core monitoring at the three types of monitoring locations.

Linear open-coast beaches. Monitoring of storm drains (i.e., MS4s) discharging to beaches should conform to the prioritization framework (Table 5-2) established by the State Board's Beach Water Quality Work Group (BWQWG).

In this framework, the highest monitoring frequency of daily to five times per week is targeted at beaches with lifeguards and many potential sources of bacteria and a lower monitoring frequency (e.g., weekly to monthly) is applied to less heavily used beaches and/or beaches with only a few probable sources. Monitoring should measure indicator levels in the discharge itself, as well as upcoast and downcoast of the discharge. The basic monitoring approach includes stations situated both upcoast and downcoast of monitored storm drains because the ocean current direction in a portion of beach can frequently change, and because the dispersion of storm drain discharges in the surfzone can vary widely from place to place (due to discharge volume, bacteria concentration, beach configuration, current patterns, tidal height, and water temperature). The specific location of these stations should be determined after a characterization study of plume behavior to estimate the average seasonal range of influence of the storm drain discharge. This zone of influence will often extend further along the beach in one direction than the other, and will typically be much larger during wet weather. The upcoast and downcoast stations should then be located within the outer bounds of this influence, with a wet weather zone of influence applied to those stations that are routinely sampled during wet weather.

The model monitoring program does not include monitoring of beach coastal stations directly in front of storm drains, or "Point 0", the point in the surfzone where the storm drain discharge meets ocean water. Instead, most of the coastal beach monitoring completed by the local health departments and others is conducted at varying distances from the drain, depending on the sampling agency. Currently, county health departments do not monitor directly in front of storm

drains and freshwater outlets because all flowing outlets are posted with permanent warning signs of poor water quality. The model program follows this approach in accord with its primary intent to maximize coastal monitoring efforts by remaining consistent with the health departments' sampling protocols. However, since the ultimate management goal is to ensure that all locations at the beach are safe for swimming, stormwater monitoring agencies should be aware that the impacts to beaches directly in front of most storm drains and freshwater outlets is unknown, but are conservatively considered impacted by the health departments and the SWRCB. As stormwater monitoring and management programs progress, monitoring near drains and freshwater outlets at the beach may need to be adapted to include Point 0 monitoring. The issue of Point 0 sampling is being reevaluated by the State's Beach Water Quality Workgroup and, if the BWQWG revises the recommended health department sampling protocols, the model stormwater program should adjust to reflect this structure.

Enclosed bays and estuaries. In general, beaches in enclosed bays and estuaries (e.g., Newport Bay, Mission Bay) should be an important concern for allocating monitoring resources. This is because there is more potential for retention of bacteria, such waterbodies often have more numerous inputs, populations of birds are often denser, and children are more likely to engage in body contact recreation at these beaches. As at the open-coast beaches, monitoring effort should be allocated in proportion to relative risk, with high-use areas that have numerous inputs receiving the highest priority (Table 5-2). If all portions of an enclosed beach have equal risk, and it is not possible to monitor all urban runoff inputs, then a random subset of such inputs should be monitored, with the number of samples set based on analyses of the statistical power of alternative subsampling schemes. Monitoring should measure indicator levels in the targeted discharges themselves, as well as upcoast and downcoast of the discharge.

Creeks, streams, and rivers. As for the other two types of areas, monitoring of creeks, streams, and rivers should measure indicator levels in targeted discharges themselves, as well as upstream and downstream of the discharge. Because many inland waters in southern California are seasonal or intermittent, rather than perennial, monitoring should be prioritized with the risk-based approach described in Section 5.1.1. This approach prioritizes potential monitoring locations based on both their amount of body contact recreation and levels of bacteria contamination.

The Aliso Creek watershed in southern Orange County (which has been monitored intensively for the past two years) provides one example of how this approach can be applied. In this watershed, a recreational use survey indicated that human use "where the ingestion of water is reasonably possible" (Basin Plan definition of REC1 beneficial use) is concentrated in the lower portion of the Creek in the summer and early fall, when temperatures are warmest. An examination of two years' of monitoring data showed (Figure 5-2) that the late summer and early fall are also the period when bacterial levels are the highest. (The selection of monitoring sites was based on a field reconnaissance to identify those drains above a threshold size that typically had dry weather flow.) Given that bacterial levels are consistently elevated during this time period, if compliance with the Basin Plan REC1 objective could be demonstrated with one or two 30-day, 5-sample monitoring efforts in the late summer and early fall, which would represent the worst-case scenario, compliance is more likely during the rest of the year. This design is the most efficient approach to assessing the condition of the beneficial use; however, because large portions of the year are not monitored, it does not fulfill public health monitoring requirements.

This example from Aliso Creek illustrates the application of the criterion of allocating monitoring effort based on a qualitative risk assessment. It also demonstrates the difference between monitoring to address Question 1 and monitoring to fulfill public health requirements. Thus, even though exceedances occur during other periods of the year, the purpose of the monitoring design

in the example was to assess receiving water quality during the high-priority period. When bacteria levels in the high-priority period consistently drop to near the Basin Plan objectives in the future, it might be worthwhile at that point to expand monitoring to other parts of the year, on the assumption that indicator levels will have dropped below the objectives by that point (assuming the historical pattern stays the same, with the highest levels typically found in the late summer and early fall).

Indicators. Monitoring should use existing indicators (Table 5-1) and use comparable methods across the region. Laboratory intercalibration exercises for bacterial indicators were conducted as part of the Bight '98 and Bight '03 regional studies. Another intercalibration study, sponsored by the City of Los Angeles, will begin in early 2004 and includes most of the laboratories analyzing monitoring samples for SMC member agencies. With all indicators, the emphasis for assessment of recreational water quality conditions should be on comparison to existing standards, the Basin Plan REC1and REC2 for inland areas and AB411 for beaches.

5.1.1.3 Design issues

In general, there is currently a spatial distribution of responsibility for assessing recreational water quality conditions in the region, with county health departments having primary responsibility for beaches and for major inland water bodies (e.g., rivers, bays, lakes and reservoirs) where substantial body contact recreation occurs. In contrast, stormwater programs (i.e., MS4 permittees) tend to monitor inland storm drains and channels and, in some cases, storm drains that discharge directly to the beach. Thus, while there is some overlap between the two sets of agencies, health departments have a responsibility to protect public health while stormwater agencies focus on receiving water conditions and identifying urban runoff contributions to impaired receiving waters. As a result of their respective responsibilities, health departments typically monitor more frequently than do stormwater agencies.

To address Question 1, stormwater agencies should build upon the existing recreational water monitoring programs already implemented by local county health agencies. As a starting point, the stormwater agency should become thoroughly familiar with the existing health agencies' monitoring programs including risk characterization of beaches, monitoring locations, and sampling frequencies for both wet and dry weather. Next, with consultation from the health agency, the following types of questions should be answered to determine if additional monitoring should be conducted by the stormwater agency to answer Question 1:

- Are there urban runoff discharge points at marine beaches that are currently not monitored by the health agency?
- Are there marine beaches impacted by wet or dry urban runoff that are not monitored by the health agency?
- At marine beaches, what is the distance from the point the discharge enters the surfzone and the local health agency's monitoring location?
- What freshwater locations are frequently used for recreation? Are any of these currently monitored by the health agency or another entity? Which of these are potentially impacted by dry and wet weather urban runoff?
- Does the health agency monitor their routine sites during wet weather?

In general, data gaps in the existing health agency monitoring programs that may require new monitoring locations sampled by the stormwater agencies will likely include marine beaches where the health agencies' monitoring location is located away from the storm drain discharge point (thus, existing data may not indicate if the stormwater discharge is causing a problem on the

beach) and at freshwater locations that are currently not monitored by the health agencies. The stormwater agency should work with the health agencies to identify any new monitoring locations and to develop risk characterizations of these locations.

Stormwater agencies may be already working with local health agencies in southern California in many instances. For example:

- For the Pathogen TMDL in Newport Bay, the Orange County Health Care Agency conducts sampling while the Orange County Stormwater Program reports on the results
- In southern Orange County, the Stormwater Program samples and prioritizes coastal storm drains and reports the data to the Health Care Agency
- The Orange County Stormwater Program contracts with the Health Care Agency to conduct sampling and laboratory analyses
- The Riverside County Flood Control and Water Conservation District and San Bernardino County Flood Control District are conducting a bacterial source identification study on the Santa Ana River
- Orange County and San Diego Counties carry out routine IC/ID programs on their respective MS4s during dry weather, with a major focus on bacteria
- The City of Los Angeles conducts daily monitoring of more than two dozen beaches in Santa Monica Bay.

Such collaborative efforts formed the basis for the model monitoring committee's recommendation that such functional coordination be encouraged and expanded throughout the region, in two primary ways:

- Stormwater monitoring programs should strive to fill gaps in spatial coverage of high-priority areas not monitored by County Health Departments and characterized by the combination of elevated indicator levels and human use
- The application of adaptive triggers that would initiate upstream source identification studies by stormwater management agencies when receiving water monitoring has identified a receiving water problem.

Such a division of labor improves overall efficiency by emphasizing the respective strengths of each type of agency.

5.1.2 Habitat assessment

5.1.2.1 Overview and philosophy

Design overview. Table 5-3 presents an overview of the technical design elements for assessment of habitat status, using six distinct station types that fall into both core and regional monitoring categories (see detailed design elements in Section 5.1.2.2).

The model monitoring framework for habitat assessment is based primarily on the Triad approach, in which bioassessment, chemical, and toxicity data provide a variety of perspectives on conditions at a site. It is especially suited to situations where the primary concern is habitat or ecosystem condition and no single or simple suite of indicators afford an unambiguous measure of status (see Box on Bioassessment and Index of Biological Integrity). The framework identifies six different types of stations designed to capture the range of issues related to habitat condition, and capturing both core and regional monitoring issues. In addition to describing a decision framework for interpreting Triad results, the framework includes adaptive features intended to furnish the flexibility needed to adjust to specific local conditions and to accommodate the needs of both wet weather and dry weather sampling. However, the bioassessment leg of the Triad is best suited to perennial streams. Ephemeral stream systems may not be appropriate for routine bioassessment monitoring because they lack established biological communities except perhaps during periods in the spring.

Bioassessment and the Index of Biological Integrity

Rapid bioassessments of macrobenthic invertebrates are quickly becoming a valuable monitoring tool because biological communities are integrators of anthropogenic impacts. These organisms respond to both physical and chemical disturbances and can integrate these impacts over several storms or an entire wet season. The California department of Fish and Game (CDFG) has developed protocols for rapid bioassessments in wadeable rivers and streams and has conducted numerous surveys throughout the State. The CDFG has also developed an Index of Biological Integrity (IBI) for quantitatively assessing the status of biological communities in the San Diego Region. The Stormwater Monitoring Coalition has formed a partnership with the CDFG and the State Water Resources Control Board to build a monitoring infrastructure and standardize bioassessments throughout southern California, then refine an assessment tool, such as the IBI, for the entire region. The CDFG rapid bioassessment manual can be found at www.dfg.ca.gov/cabw/cabw/professionals.PDF

Design philosophy. The inherent complexity of watershed structure, and the variability in structure across watersheds, leads to a range of concerns about the effects of urban runoff on habitat conditions. Each concern is somewhat distinct, requiring a somewhat different monitoring approach, sampling frequency, and set of indicators. For example, some sites may be intended to measure conditions in specific, high-priority habitats (core monitoring), others to provide information about the watershed as a whole (core and/or regional monitoring), and yet others to improve knowledge about certain management issues related to urban runoff (special projects). This complexity is reflected in the several different types of habitat monitoring stations that can be established. In addition, the model monitoring design framework uses the Triad approach to organize this range of possible monitoring needs. The strength of the Triad approach (which is essentially a weight of evidence approach) is that it relies on multiple types of measures to reduce the chance of mistakenly concluding there is no impact when one in fact does exist.

5.1.2.2 Design elements

Types of monitoring sites. The committee identified several kinds of core and regional monitoring stations that could be required in assessing habitat conditions at the watershed scale:

- Long-term, fixed, bottom-of-watershed (but above tidal influence) mass emissions stations to assess cumulative water quality and aggregate loads, with monitoring based primarily on a mass emissions model and including wet weather chemistry and toxicity (core station)
- Spatially extensive, perhaps randomly sited or rotating, stations to support statistically valid comparisons across multiple watersheds, and with monitoring based primarily on the Triad

approach for dry weather sampling and on chemistry and toxicity for wet weather (regional station)

- Site-specific stations focused on the status of high-priority inland habitats of concern, with monitoring based primarily on the Triad approach for dry weather sampling and on chemistry and toxicity for wet weather (core station)
- Site-specific stations designed to generate information to support key program goals, such as source prioritization or BMP implementation and evaluation (core station, special project)
- Coastal estuarine stations to assess status in these key habitats, with monitoring based primarily on the Triad approach (core and/or regional station)
- Coastal ocean stations to assess stormwater plume impacts, conducted primarily as part of the periodic Bight surveys (regional station).

Given this potential variety of station types, monitoring within any particular watershed must be carefully integrated to achieve design efficiencies as well as an overall picture of the watershed. For example, Figure 5-1 presents an example watershed monitoring design, with a range of types of watershed monitoring stations, that illustrates how individual stations can serve more than one function within the watershed design (also see the US EPA strategy for randomized watershed sampling in US EPA 2002).

While there is an extensive body of experience in the region to support the development of core monitoring designs, this is less so for regional monitoring, or watershed-based, designs. The committee therefore outlined the following types of regional assessment designs that could be developed and implemented:

- Probability based designs, similar to the Bight Program design, in which stations are located randomly in order to provide the ability to draw statistically valid inferences about an area as a whole, rather than just the site itself. For example, the probability design used in the Bight Program permits statements about the percentage of the area that is above/below particular levels of different indicators. Such designs can allocate monitoring sites randomly throughout the entire region, or can subdivide the region into a number of strata that are relatively homogeneous. Strata can be defined on any number of grounds, depending on the questions or concerns that have motivated the program. For example, watershed strata could be based on relative amount of urbanization, general habitat type, or channel morphology, among others. Whatever the stratification scheme, the basic design principle is that samples are allocated randomly among strata, with the number of samples per stratum based on a consistent weighting factor (e.g., area of the respective strata). The level of sampling effort required in probability based designs depends, as in all designs, on the specific questions being asked, the underlying levels of variability in the data, and on the level of precision needed for decision making. The intent of the Bight Program's design, for example, is to be purely descriptive, rather than to test for conformity to a predetermined threshold or to detect a particular amount of change over time. Thus, the Program's requirement of 30 samples per stratum is based on a subjective decision by the Program's designers about the size of the confidence limit they are willing to accept in the descriptive statistics.
- Systematic designs, in which stations are located at set intervals along one or more underlying spatial or conceptual frameworks. For example, regional stations could be located on a 1-mile grid, every 1-mile along each river, creek, or stream, at every major discharge into rivers, and so on. One value of systematic designs is that they allow for more detailed mapping of indicator levels across a region. In addition, if resources permit, systematic designs can provide more thorough coverage than do probability based designs. The sampling

requirements in systematic designs are typically based on the degree of spatial resolution desired.

- Early warning designs, in which stations that are considered to be particularly vulnerable a particular impact are monitored as "canaries in the coal mine." Such monitoring can take place on a regular schedule or after the occurrence of an event thought to increase the probability of an impact past an acceptable level. The number of stations in an early warning design will depend on the number of suitable locations available and whether the potential for impact is homogeneous across the region. If the impact potential is homogeneous, then a subset of locations could adequately represent the entire region. If the impact potential is heterogeneous, then the region should be stratified in terms of impact potential and sampling within each stratum scheduled accordingly.
- Rotating designs, in which a different subset of stations in sampled during each sampling event, with the goal of sampling the entire set of stations over a certain period of time. Such designs have the virtue of maximizing the impact of limited monitoring resources because the entire suite of monitoring stations need not be sampled each time. However, because conditions change over time, rotating designs have a diminished ability to support valid comparisons between sets of stations sampled at different times in the rotation schedule. This can be compensated for to some extent by defining comparisons of interest during the design process and then ensuring that such stations are sampled during similar index periods or seasons. The location of stations in rotating designs can be random, systematic, or early warning depending on the kinds of questions being asked.

Evaluating Triad results. Once monitoring data are available, determining whether conditions are protective of beneficial uses depends on a combination of explicit definitions of reference conditions (see Table 4-4) and the ability to interpret results in the context of individual watershed conditions. Given the potential complexity of ecosystem impacts, the committee agreed that no single benchmark should be automatically used as evidence of impact. Thus, there are no hard and fast rules for determining that a receiving water impact has occurred. However, Table 5-4 provides an organized set of rules of thumb for interpreting Triad results and determining if further studies are warranted. Where the full Triad has not been sampled, Basin Plan, Ocean Plan, and other reference benchmarks listed in Table 4-4 could be applicable.

Adaptations of the basic design. Because of the range of specific situations that may occur in different watersheds, the basic design shown in Figure 5-1 may be adapted with a variety of alternative approaches. For example:

- Chemistry and toxicity could be used in wet weather when the bioassessment leg of the Triad is not feasible (e.g., in high flow conditions when biological communities. Any finding of impact could be investigated further with the complete Triad during dry weather (except in ephemeral streams, which rarely have dry-weather flow)
- Toxicity tests could be used in lieu of broader chemistry scans where historical data demonstrates no evidence of impacts at the site and there is no *a priori* reason to believe there are significant sources of chemical contamination
- Bioassessment could be used in lieu of toxicity tests and chemistry scans where the primary concern is the status of a particular habitat and historical data demonstrates no evidence of impacts from urban runoff at the site
- The spatial and temporal intensity of sampling could be adapted to match the spatial scale of the site and the temporal scale of the processes that influence habitat condition
- The suite of chemical analyses can be adjusted (see Tables 5 and 6, and following subsection) based on prior knowledge about sources of contamination.

Thus, the model framework provides an overall context for assessing and tracking habitat status, while allowing for the flexibility needed to make the best use of available information to adapt to specific management information needs.

Constituent list. While the committee emphasizes that the Triad approach (bioassessment, toxicity testing, chemistry monitoring) works best when all three legs are consistently sampled, it also recognized that certain situations may call for sampling only one or two, rather than all three, legs. Thus, the particular combination of Triad measurements to be collected at any individual site or time could be based on the season of the year (wet vs. dry), the location and purpose(s) of the station, the specific problem or question being addressed, the past history of monitoring results at that location. In general, however, sampling effort might be distributed as in Table 5-3 and Table 5-5 (core monitoring column).

The model monitoring committee gave particular attention to the suite of chemical constituents that should be measured at the watershed stations, attempting to balance a desire for regional comparability with the ability to adapt to the specifics of each situation. The committee developed a short list of common constituents (Table 5-6) to be sampled routinely by all programs and an expanded list, some of which would be sampled if needed. In addition, the full EPA priority pollutant list would be sampled once every several years in concert with the regional Bight Program.

A decision about when to add constituents from the expanded list would be dependent on both available information and the management question(s) being asked. For example, past monitoring data or data on historical land uses indicating the presence of legacy pesticide contamination could cause these constituents to be added to the program. As another example, where the focus is on total loads or trends, as at the mass emissions stations, then total metals would be the appropriate monitoring target. In contrast, where receiving water impacts are the primary concern, as at specific habitat stations, then dissolved metals should be measured. It will thus be important to consider the potential use(s) of the monitoring data when deciding which constituents to monitor. Dissolved metals might also be measured when toxicity has been found, the site is on the 303(d) list, or total metals exceeds the relevant CTR value, which is often used as a benchmark in receiving waters for stormwater effects.

Flow measurement and compositing approaches. Many field sampling methods relevant to stormwater monitoring programs are described and reviewed in BASMAA (1995), as well as in various USEPA guidance documents (e.g., USEPA 1992). Of particular interest are methods for estimating flow and compositing approaches for deriving mass emissions estimates.

In general, there are two basic methods for estimating flow. The first is based on engineering equations that use gravity, the height of water in an idealized pipe, the slope of the pipe, and a friction coefficient to derive the flow. The second is based more on direct measurement of the speed of the flow, combined with an estimate of the cross sectional area of the water (computed from the shape of the channel and the height of the water) to derive the flow. There are variations within each of these basic methods. For example, the engineering equations can use unimpeded flow in a pipe or channel or, alternatively, the height of flow over a weir. Similarly, direct flow measurements can be based on the rate of spin of a paddlewheel or on ultrasonic signals from sensors in the water. In addition, there is a range of methods for measuring the height of the water in a channel, the other key input to flow estimates. These methods range from simple staff gauges to various types of pressure transducers or ultrasonic sensors suspended over the water. As a rule of thumb, the more engineered a hydrologic system is, the easier it is to rate for flow. For

example, a concrete channel will typically have a constant cross section and the slope will be constant.

Different approaches have different strengths and weaknesses depending on the particular situation. For example, flow sensors that are mounted in the water are vulnerable to damage from debris carried in storm flows. Downward looking flow sensors can be more suited to smaller channels with space constraints, however, foam on the surface of the water can degrade the accuracy of the reading. Various pressure transducer models differ in their sensitivity and the maximum height of water they can accurately measure. Where the channel configuration permits, flow can be routed through a flume for more accurate measurements; however, flumes cannot handle large volumes of flow.

The United States Geological Survey (USGS), which is generally recognized as producing the most accurate and precise flow estimates, measures flow velocity at several points along a channel cross section at several times with different water heights. These data are then used to develop a flow rating curve specific to that channel. The rating curve can then be used to estimate flow based simply on the height of water at any given time, on the premise that water at a particular height will be moving at a specific speed. This is an empirically derived relationship as opposed to one based on modeled engineering principles. While this method can be the most accurate, it is also the most difficult to implement in terms of up-front effort and costs. In addition, changes to the channel morphology due, for example, to siltation or erosion can undermine the accuracy of a flow rating curve.

The various approaches to flow measurement also differ in terms of their relative accuracy and precision. The USGS attempts to achieve accuracy to within 5%, but that level can be difficult to achieve in channels with scouring, filling, and other sources of bias. Despite the potential drawbacks of empirical methods, they are considered to have better accuracy than the model-based engineering methods, although it can be very expensive to improve the precision of the empirical estimates. In contrast, the engineering methods can produce relatively precise estimates, but the accuracy may be less than that achievable with empirical methods, depending on the degree to which model assumptions are violated. The model monitoring committee was reluctant to propose specific performance standards for flow monitoring. The preferred approach in any particular situation will depend on site characteristics and the use(s) intended for the data.

In contrast, the committee considered that performance standards for the measurement of mass emissions, especially as part of a long-term trends monitoring program, were more relevant. There are two primary methods for estimating the concentrations of constituents of interest in urban runoff. The first, flow compositing, collects water samples for analysis at specific increments of flow. The second, time compositing, collects water samples at specific increments of time. These two approaches were described in more detail and compared in an intensive year-long sampling program (Leecaster et al., 2002) that found that flow compositing was the most efficient sampling approach to achieve a given degree of accuracy and precision. A minimum of 10 to 12 samples per composite using a flow-weighted scheme efficiently reduced bias and improved precision. Time-weighted composites can achieve similar levels of precision and bias, but required a far greater number of samples; more than 42 samples per composite were necessary.

5.1.2.3 Design issues

Ecosystem perspective. There are four major habitat types in the region:

- Ocean
- Estuaries / wetlands
- Streams, creeks, and channels
- Lakes and reservoirs.

Because they are somewhat of a special case, the committee agreed to set lakes and reservoirs aside for possible consideration at a later time. Based on the Bight '98 study in the coastal ocean, which showed that riverine effects on the benthic ecosystem are small, the committee agreed that further study of stormwater impacts in the coastal zone should be the focus of regional efforts (as in Bight '03). Such regional studies could then provide more concrete guidance to individual programs where urban runoff plume effects (perhaps on the water column) are found to be substantial. Thus, the model monitoring program framework focuses explicitly on streams, creeks, channels, and rivers, and on estuaries and wetlands.

Habitat monitoring for these habitat types can involve a wide range of methods, including:

- Water chemistry
- Sediment chemistry
- Aqueous toxicity
- Sediment toxicity
- Bioaccumulation
- Bioassessment
- Hydrology

Given this variety of potential measurements, the committee determined that monitoring should be based on an ecosystem perspective, rather than consisting of collections of functionally disconnected measurements on the one hand, or focusing on individual species or chemical parameters on the other. The Triad approach, which combines chemistry, toxicity, and bioassessment (including physical habitat measures) provides a practical means of integrating a wide range of measurements, as well as a structure on which to base adaptive follow-up monitoring. It should be noted that the bioassessment leg of the Triad may not be applicable in some situations, such as ephemeral streams, where minimum requirements are not consistently met. However, the overall watershed monitoring framework (see Figure 5-1) also provides a structure for including sites targeted at specific management issues such as problem characterization or BMP evaluation.

5.2 Extent and magnitude monitoring

Evaluation of the extent and magnitude of receiving water problems addresses Question 2: What is the extent and magnitude of the current or potential receiving water problems? Monitoring related to Question 2 provides useful information for prioritization of both source identification studies (Questions 3 and 4) and specific management actions intended to remediate the problem. Monitoring of the extent and magnitude of problems falls primarily into the special projects category (Table 4-1) because these are typically efforts targeted at specific problems and with clear beginning and ending points. However, to the extent that such studies require collaboration among multiple responsible parties and/or extend over large areas, they would also have some of the characteristics of regional monitoring.

5.2.1Extent and magnitude assessment – recreational water quality

5.2.1.1 Overview and philosophy

Table 5-7 presents an overview of the technical design elements for regional monitoring of recreational water quality monitoring focused on estimating the extent and magnitude of receiving water problems.

The model monitoring framework for assessing the extent and magnitude of recreational water quality problems assumes that the stormwater agency will work with local health departments to determine those high-priority (i.e., combination of human use and contamination) locations where extent and magnitude of a bacteria problem should be defined. Currently, coastal beach monitoring by local health agencies near urban runoff discharge points is comprised of one or two fixed stations located at various distances from the point of discharge. Thus, often the length of beach impacted by urban runoff has not been fully characterized. In most cases, even less data is likely available for inland freshwater sites. The monitoring design to determine the extent and magnitude of bacterial contamination should include estimates of bacterial loads, in addition to upcoast/downcoast (at beaches) or upstream/downstream (along creeks, streams, and rivers) arrays of samples. An estimate of temporal persistence would depend on monitoring through at least one complete year.

The extent and magnitude monitoring design is essentially the same for both regional monitoring and special projects aspects of the program, with regional monitoring encompassing a larger area and/or greater numbers and kinds of potential sources (see 5.2.1.2 Design elements).

5.2.1.2 Design elements

Regional monitoring to establish extent and magnitude is distinguished from special projects in its larger geographic scale and/or greater number and kinds of potential sources. The committee did not establish an explicit dividing line between these two categories of monitoring (i.e., regional and special projects), since real-world situations will exist on a continuum of scale and complexity. Regional monitoring will therefore most likely involve a wider range of parties and require more collaborative implementation. However, this is not a substantive design issue because the basic design approach is the same for both regional monitoring and special projects.

A monitoring design to establish the extent and magnitude of bacterial contamination must have the ability to determine:

- The degree of temporal persistence of a particular receiving water problem
- The spatial extent of a particular receiving water problem
- The relative severity of a particular receiving water problem, compared to other parts of the region.

Therefore, the monitoring design for this question should include:

- The core or regional monitoring assessment site(s) in the location of interest
- Measures of bacteria loads, which requires flow estimates
- Measures of the spatial extent of actual impact in receiving waters, which requires an array of upstream/downstream samples in creeks, and upcoast/downcoast samples, regularly spaced grids, or random arrays on the beach and in bays/estuaries
- Measures of temporal persistence or pattern, such as between wet and dry weather, which requires at a minimum samples through one calendar year.

Depending on the extent of existing knowledge, these design elements may be scaled as needed to fill data gaps. For example, where the spatial extent of contamination is well understood, additional sampling at only a few representative stations might be required to define the temporal extent of contamination. Conversely, where the spatial extent is not well understood, a survey of shorter-term but more intensive monitoring at an array of stations (either regularly spaced or random, depending on the site) might be necessary to define the boundary of contamination during periods when human use and contamination combine to create a high-priority period. Finally, if the spatial and temporal extent are well defined, a focused sampling effort during one or more representative subsets of the high-priority period might be used to determine peak loads and/or receiving water levels. A rule of thumb in such studies is to use the highest sampling frequency possible in order to better characterize the nature of variability in extent and magnitude. The key adaptive element of the bacteria monitoring design for assessing extent and magnitude thus includes the ability to modify the spatial and temporal intensity of sampling as needed, both in the discharge and the receiving waters.

Indicators in studies of the magnitude and extent of recreational water quality problems should include the levels and loads of the three main bacterial indicators (Table 5-7), along with other measures that may add useful information (e.g., stream or channel flow, patterns of human use).

5.2.13 Design issues

Existing sampling effort may be adequate in many cases to characterize the spatial and temporal extent of bacterial contamination, along with its severity. For example there already exist substantial monitoring data on levels of bacterial indicators at many coastal monitoring sites. Additional monitoring effort is being initiated along the San Diego and southern Orange County coasts, targeted at coastal storm drains, and at specific inland sites as part of these counties' dry weather reconnaissance and IC/ID programs.

In many cases, however, existing monitoring designs may not be optimal for measuring the extent, magnitude, and severity of bacterial contamination associated with urban runoff. At coastal locations near urban runoff discharges, sampling data that provides length of beach impacted by bacteria densities above the health standards may not available. Many factors can affect the length of beach impacted including the bacteria densities and flow rate of the urban runoff discharge, surfzone conditions including swell, wind and tide, and the configuration of the storm drain and beach relative to the incoming swell. Routine coastal monitoring completed by local health agencies may not capture extent. At freshwater inland sites, less routine monitoring data are collected by local health agencies and data on the extent of the problem will typically be limited to special studies. The extent and magnitude of bacteria problems along inland creeks, streams, and rivers resulting from urban runoff discharges may be particularly difficult to assess because there are often many, diffuse sources of bacteria, including natural sources. For both coastal and freshwater sites, defining extent of impact from individual discharges during wet weather may be difficult because plumes from separate discharges will often overlap and because of increased loading of bacteria from natural sources (particularly at freshwater locations). A further complication stems from the fact that extent and magnitude are likely to be very different in wet and dry weather.

In addition to these issues, data from the various bacterial monitoring programs are not aggregated, making it difficult to identify broad spatial patterns and temporal trends, and only recently has a laboratory intercalibration study for bacteria been undertaken. Further, there are growing concerns that the bacterial indicators, alone, may not provide an accurate picture of the extent and magnitude of actual human pathogen contamination. Not only do the indicators not measure pathogens directly, there is some evidence that the indicators themselves may propagate

in the MS4 system and may derive partly or entirely from animals and birds. Thus, even a data aggregation and mapping exercise that described indicator patterns in detail might not necessarily describe the extent and magnitude of actual pathogen problems associated with urban runoff.

While the model monitoring committee developed quantitative metrics to assist in prioritizing studies under other aspects of the overall program (e.g., TIEs, upstream bacterial source identification, it determined that the expert judgment of health department staff is the best source of information for triggering efforts to determine the extent and magnitude of bacterial contamination in each of the three kinds of areas (linear open-coast beaches; enclosed bays and estuaries; creeks, streams, and rivers). Thus, stormwater program staff would review monitoring data with health department staff and representatives of other potential sources to determine if they have completed additional sampling or have knowledge of data that establish the extent and magnitude of contamination, and to receive recommendations from health agency staff about which monitoring locations should be the first priority for additional efforts.

5.2.2 Extent and magnitude assessment – habitat

5.2.2.1 Overview and philosophy

The model monitoring framework for assessing the extent and magnitude of habitat problems builds on the core monitoring Triad approach, by adding repeated measurements to characterize temporal persistence, upstream sampling of the Triad components to describe spatial extent, and/or adaptive features such as TIEs or targeted upstream source identification studies to better define the magnitude of the problem (see Table 5-4). These latter two types of studies begin to merge into the kinds of special project source identification efforts described in Sections 5.3 and 5.4, illustrating the fact that real-world distinctions between monitoring categories are not always clear cut.

The extent and magnitude monitoring design is essentially the same for both regional monitoring and special projects aspects of the program, with regional monitoring encompassing a larger area and/or greater numbers and kinds of potential sources.

5.2.2.2 Design elements

Regional monitoring to establish extent and magnitude is distinguished from special projects in its larger geographic scale and/or greater number and kinds of potential sources. The committee did not establish an explicit dividing line between these two categories of monitoring (i.e., regional and special projects), since real-world situations will exist on a continuum of scale and complexity. Regional monitoring will therefore most likely involve a wider range of parties and require more collaborative implementation. However, this is not a substantive design issue because the design approach is the same for both regional monitoring and special projects.

Table 5-4 provides an overall framework for a set of adaptive monitoring and special study responses to a finding that there is or could be a receiving water problem, many of which focus on determining the magnitude, extent, and/or severity of any such problem. The type and design of any such adaptive monitoring in a particular instance will depend on the results of the Triad measurements, site-specific factors, and other types of relevant knowledge such as land use data or information on upstream sources. For example, additional toxicity tests at higher dilutions, accompanied in some instances by TIEs, can provide more information about the nature of toxicity (as described above, this is one example where assessment of the extent and magnitude of a problem would overlap somewhat with source identification special projects). Or, repeating toxicity tests with different toxicity test organisms could also improve the understanding of toxicity. In addition, repeating routine measurements over time at a specific station or group of related stations will determine the temporal extent of the problem. Similarly, extending an array

of stations upstream and downstream of the original monitoring station will help assess the spatial extent of the problem.

While Table 5-4 presents a conceptual overview of possible studies, the specific efforts required in any particular situation will depend on which leg(s) of the Triad have been sampled, on the nature of the monitoring findings, and on the characteristics of the environment. Issues that should be considered in designing adaptive studies of extent and magnitude include:

- The nature of the "signal," e.g., which leg(s) of the Triad are involved
- The strength of the "signal"
- Available information about possible causes of actual or potential problems
- The spatial and temporal extent of the habitat of concern
- Local geography and hydrology.

The preferred monitoring design, whether it be regional or a special study, is described in detail within the section on habitat assessment (Section 5.1.2). There are a variety of approaches for allocating sites including stratified random, systematic, or rotating designs depending on the specific area to be evaluated and indicators to be measured. For sure, managers will want to integrate the extent and magnitude designs into design(s) for assessment, which will maximize continuity and cost-efficiency.

5.2.2.2 Design issues

Assessing the extent and magnitude of impacts on ecosystem health will begin with an assessment of results from the suite of core watershed stations. As described in more detail in Section 5.1.2, stations should be located in receiving waters with key beneficial uses, where significant contamination problems related to urban runoff are known to exist, where the likelihood of such problems is high, in high-value habitats whose continued protection is a high priority, at core mass emissions stations, and at distributed locations that will provide a basis for comparisons among watersheds.

5.3 Urban runoff contribution assessment

Assessment of the relative contribution of urban runoff to a receiving water problem addresses Question 3: What is the relative urban runoff contribution to the receiving water problem(s)? Data from this monitoring element are useful primarily in prioritizing more extensive source identification efforts under Question 4. Assessments of the urban runoff contribution fall into the special projects category (Table 4-1) because such studies are targeted, one-time efforts. However, they may also take on the collaborative aspects of regional monitoring if they involve multiple parties and/or cover large areas (Table 4-1).

5.3.1 Overview and philosophy

The model monitoring framework for assessing the relative urban runoff contribution to both recreational water quality and habitat problems is primarily a matter of loads estimation at a fixed downstream reference point. Similar loads estimation approaches apply to both recreational water quality and habitat indicators, as described in the following sections, including expert judgment, visual reconnaissance, land use modeling, empirical tributary monitoring, the use of conservative tracers, and the evaluation of existing data (see Box on Modeling). The actual combination of methods in any particular instance will depend on the quantity and quality of historical data, the

nature of the receiving water problem, the number and types of potential sources, and the physical structure and hydrography of the watershed. In addition, many of the methods applicable to this issue are also directly applicable to the more detailed source identification special projects described in Section 5.3 and 5.4.

The extent and magnitude monitoring design is essentially the same for both regional monitoring and special projects aspects of the program, with regional monitoring encompassing a larger area and/or greater numbers and kinds of potential sources. The source identification case studies in Appendix 3 include examples of both. For example, the Contaminated Sediment Task Force study in Los Angeles Harbor was a regional study involving many participants, while the investigation of elevated total dissolved solids in Orange County was a special project conducted by the County Stormwater Program alone.

> **Modeling**
>
> Watershed modeling is a useful tool for estimating flow, concentrations or loads from unmonitored watersheds or unmonitored storm events. There are a variety of models available to watershed managers, from very simplistic spreadsheet-based techniques to very complex time-variable algorithms. The decision on which model to use is a function of the management questions and types of assumptions watershed managers are willing to make, as well as the availability of data for running the model. Simplistic models (i.e. rational method) answer questions at large temporal and spatial scales, make the most assumptions, and require the least data. Complex models (i.e. HSPF, SWMM, etc.) answer questions at finer temporal and spatial scales, make fewer assumptions, but require the most data. See Singh and Woolheiser (2002) for a recent review of watershed hydrology models.

5.3.2 Design elements

This section describes a general set of approaches to source identification, accompanied by a set of illustrative case studies presented in Appendix 3. The committee chose this approach because the wide variety of specific situations in which source identification studies might be required makes it impossible to define a standard approach.

Assessing the relative urban runoff contribution to a particular receiving water problem involves loads estimation at a fixed downstream point, which is in or near the affected receiving water. Depending on how the receiving water is defined in a particular instance, "downstream" may be at the point where a tributary enters a larger creek, where a creek enters a wetland or estuary, or where a river empties into the ocean. Similar loads estimation approaches apply to both recreational water quality and habitat indicators, including:

- Expert judgment
- Visual reconnaissance and observation
- Land use modeling
- Empirical tributary monitoring
- The use of unique and/or conservative tracers
- Evaluation of existing data.

These approaches can be extended with more detailed information provided in US EPA (1993), Pitt (2001), and SWRCB (2001), which describe a range of methods for identifying sources of stormwater pollution. A decision about which approach(es) to use in any particular instance will depend on the quantity and quality of historical data, the nature of the receiving water problem, the number and types of potential sources, and the physical structure and hydrography of the watershed. Thus, even a preliminary loads estimation for a high-priority bathing beach, such as in Mission Bay in San Diego, might proceed through several steps from expert judgment which provides the basis for targeting visual observation which in turn forms the basis for modeling

and/or empirical measurement. Where information from the Triad approach is available, Table 5-4 provides an example of a decision framework for interpreting monitoring results to better focus preliminary source identification efforts.

One key element of the committee's thinking is that such preliminary loads assessments should ideally be a collaborative effort, undertaken by all the parties responsible for potential inputs to the receiving water. Such regional, collaborative efforts will be more efficient and more productive because they will streamline data acquisition, integration, and evaluation. They can also provide a basis for future, more intensive, collaborative source identification efforts, should they be required.

While in general the needed accuracy and precision is only low to moderate, the degree of accuracy and precision needed will depend in part on the relative size of the urban contribution to the overall loads. For example, if the urban contribution is small (i.e., less than 5% of the cumulative load), there would probably be no need to refine the estimate any further because large variability does not change the answer to the question; urban runoff is still a small contribution. In contrast, if the urban contribution is 15% +/- 15%, there would be a need to refine the estimate to determine whether and to what extent to proceed to the more detailed source identification work described in Section 5.4. Thus, monitoring designs for this issue might proceed through multiple iterations.

When identifying and characterizing potential sources, it is important to use terminology that is consistent with standard USEPA usage. Thus:

- Urban runoff: both wet (stormwater) and dry weather (non-stormwater) runoff from urban land uses
- Dry weather runoff: runoff from urban land uses in dry weather
- Stormwater runoff: runoff from urban land uses during storms

In addition, there are other land uses and sources that discharge to MS4s but that are typically not under the jurisdiction of municipalities, including:

- Industry and POTW discharges (which are regulated by state permit)
- Other discharges permitted by the RWQCB
- State and federal facilities
- Agriculture
- Augmented water
- Open lands
- Native American lands
- Special districts, school districts, parks
- Utilities
- Aerial deposition.

5.3.3 Design issues

There are two primary design issues associated with determining the relative urban runoff contribution to a receiving water problem. The first is the fact that the wide variety of specific situations likely to be encountered makes it infeasible to recommend a standard design. The committee resolved this issue by providing general guidance on study design, referencing two reports that describe detailed monitoring methods, and including a set of representative case

studies in Appendix 3. The second is that there may be cases in which the relative urban runoff contribution is small. In such cases, the committee agreed that a municipal permittee should not be obligated to independently conduct detailed source identification studies beyond the activities already required in their respective NPDES permits. The committee therefore recommended a threshold level of urban runoff contribution above which permittees would be required to independently perform detailed source identification studies, and set this level at 5 – 10%. A lengthier discussion of the threshold issue is provided in Section 4.3.

5.4 Source identification studies

More detailed source identification studies address Question 4: What are the sources to urban runoff that contribute to receiving water problems? These are almost always special studies and are conducted when preliminary source identification work under Question 3 (Table 4-1) shows that urban runoff constitutes a significant portion of the source(s) of a receiving water problem. Information from these more detailed special projects can help refine receiving water monitoring, improve fundamental understanding of stormwater contamination processes, and help guide management actions intended to reduce sources and their attendant impacts.

5.4.1 Overview and philosophy

Table 5-8 presents an overview of the technical design elements for special projects monitoring of recreational water quality and habitat focused on source identification. Since the primary philosophy of the model program is not to design site-specific studies, this section provides guidance on adaptive triggers for special studies. Therefore, this section creates a series of starting and stopping rules for when to initiate detailed source identification studies and tools for prioritizing locations on where to conduct them.

The model monitoring framework for detailed source identification for both recreational water quality and habitat involves two kinds of studies. The first are studies at downstream stations to gain additional insight into the sources of the problem. For bacteria, this may include more traditional sanitary survey methods and/or more sophisticated biological testing. For habitat, this may include toxicity tests with a broader suite of test organisms, TIEs, or more detailed analyses of the pattern of impact in communities or on key organisms. The second kind of study will be upstream source tracking and source identification studies that may use a variety of methods. In general, however, they will share the same design, which will involve using a basic indicator of impact (e.g., bacterial indicator, toxicity) to trace the strength of the impact signal upstream, in either wet or dry weather, combined with more powerful and/or targeted methods (e.g., genetic source identification, TIEs, chemical reconnaissance, physical reconnaissance) to locate the specific source(s) of pollution.

5.4.2 Design elements – recreational water quality

There are two primary design elements for source identification related to recreational water quality. The first is to identify and then prioritize the upstream sites at which source identification efforts will be conducted. The second is to identify a core set of methods for bacterial source tracking at these sites. The approaches for these issues are somewhat different for beaches and for inland waters because inland waters (i.e., creeks, streams, and rivers) have a clear upstream – downstream morphology while beaches may not. Instead, contamination from a discharge can often spread out in both directions along a beach.

Open-coast and enclosed beaches. In contrast to creeks, there is no consistent and obvious upstream – downstream relationship between urban runoff inputs (typically storm drains) and the receiving water. Thus, it is not possible to estimate impact in terms of the difference between an upstream and a downstream station. The committee therefore proposed a prioritization approach based on the relationship between bacterial levels in individual storm drains and levels in the nearby receiving water.

Figure 5-3 demonstrates this approach with bacterial monitoring data from San Diego County. The figure is divided into five sections that reflect different relationships between indicator levels in the receiving water and those in the outflow of the coastal storm drain itself. In general, higher priority is given to storm drain discharges that are consistently high and receiving water densities that exceed health standards. While Figure 5-3 illustrates a prioritization approach specifically for fecal coliform, parallel methods could readily be developed for total coliforms and Enterococcus, since standards for these indicators in marine waters have been developed.

Once a subset of inputs has been identified for further source identification efforts, the well-accepted approaches described in US EPA (1993), Pitt (2001), and SWRCB (2001) are excellent sources of guidance. When implementing such approaches, it will be important to be systematic and thorough yet also have clear stopping points (Figure 5-4). In particular, the stopping rules are prioritized to focus on determining, first, whether there identifiable sources of human sewage and, second, whether there are other controllable anthropogenic sources. First and foremost, stormwater agencies need to identify and remove all sources of human inputs (See Box on Microbial Source Tracking). The committee agreed that further source identification efforts for nonhuman inputs should await the development of more powerful microbial source identification tools with the ability to more accurately distinguish among a range of specific sources (e.g., livestock, pets, birds, other wildlife). This testing is currently being conducted by the SMC and others (Griffith *et al* 2003).

Microbial Source Tracking

Microbial Source Tracking (MST) is a class of potentially powerful tools for identifying sources of bacteria in receiving waters. The traditional fecal indicator bacteria typically measured by county health departments are not human specific and can arise from any warm-blooded organism including birds, dogs, cats, livestock, horses or other mammals. Thus, the goal of most MST techniques is to determine if the measured indicator bacteria are of human origin and, if not, what was their host of origin. There are numerous MST techniques available, but all are still experimental. The Stormwater Monitoring Coalition co-sponsored a study in 2002 to test 11 MST techniques by 22 of the nations' leading researchers for their accuracy and precision in southern California. The results, which are summarized in the *Journal of Water and Health* (Volume 1, No. 4, November 2003), show that none of techniques worked perfectly and many were susceptible to false positives. As a result of the intercalibration study, research continues on refining and improving the more promising methods, but a single definitive technique(s) is still unavailable.

Creeks, streams, and rivers. Source identification studies in creeks, streams, and rivers are particularly problematic because bacteria are not conservative in the MS4, may originate from a wide range of small, diffuse sources, and can be highly variable in both space and time. However, because bacteria die off due to ultraviolet (UV) exposure as they flow downstream, there may be an upper limit on the distance bacteria can travel in longer natural creeks and streams and still impact high-priority areas of concern. (Bacteria can also be removed through sedimentation; however, during the low flow conditions characteristic of dry weather in southern California, UV exposure is the dominant factor.) Therefore, the committee developed a conceptual model (Figure 5-5; Appendix 4) to identify and prioritize inputs for upstream source identification work. This conceptual model also assumes that core monitoring has shown there is an exceedance of a bacteria water quality objective in a high-priority recreational use area, and

that either regional monitoring or special projects that it is persistent and large enough to warrant further action, and that urban runoff constitutes a substantial proportion of the source(s).

The following steps describe how to apply this conceptual model in a particular situation:

1. Locate high-priority use area
2. Define upstream boundary of high-priority use area
3. Calculate the number of days required for 95% of bacteria to die off, using the equation in Appendix 4 and an inactivation rate selected from the range presented in Appendix 4
4. Calculate average net downstream flow rate of the creek or stream in meters/day
5. Calculate the linear distance required for 95% of bacteria to die off, using the following equation:

   Days required for 95% die off x flow rate in meters/day = X meters
6. Define an upstream segment with its bottom edge at the upstream boundary of the high-priority use area and its upstream edge X meters upstream above that.

There are two constraints that would affect the application of this conceptual model. First, it may be most appropriate in dry weather in longer natural creeks and streams with relatively slow flow rates, because bacteria die off rates in creeks that are partially or fully concrete-lined may be less than transport times. For example, it would be less applicable to systems with discontinuous flow. Second, spatial and temporal variability in bacteria densities mean that deriving more than rough estimates of the upstream segment may require substantial sampling effort. However, even a somewhat rough estimate could prove valuable in focusing upstream source identification studies. Thus, this conceptual model is not directly applicable to all situations and should be applied carefully. For example, in the Santa Ana River above Prado Dam, flow during dry weather is discontinuous and consists of disinfected POTW effluent and rising groundwater. Though bacteria levels in this case exceed REC1 standards, there are no dry weather urban runoff discharges and the conceptual model would not be directly applicable.

Within this upstream portion of the drainage system, termed a "potential source segment," there may be a number of discharges or other inputs that must be prioritized for source identification study. The committee developed a unique tool for prioritizing such inputs, based on a combination of their loads and local impact on the receiving water, as explained in the following paragraph.

The influence of inputs within the potential source segment on the downstream high-priority recreational use area will result from a combination of the size of the input (bacterial load) and the effect of each input on the receiving water (impact). This is because loads alone do not reflect a discharge's potential impact on the receiving water. A large load discharged into a creek section with high flow may have little downstream effect, while a small load discharged into a creek section with low flow may have a disproportionately large downstream effect. Thus, prioritization of inputs for upstream source identification efforts, as well as monitoring of the inputs in the potential source area, should be based on both loads and impact, with impact measured as the difference between bacterial indicator levels at upstream and downstream stations. Table 5-9 demonstrates the committee's approach for combining measurements of both load and impact into a single metric for prioritizing a series of inputs. Generating this metric involves the following steps:

1. Calculate the bacterial load of each direct input to the creek within the potential source segment

2. Calculate the receiving water impact of each direct input, measured as the simple difference in bacterial concentration between stations 25 feet upstream and downstream of the input
3. Scale loads values from 0 – 1, with the lowest load assigned the value of 0 and the highest the value of 1
4. Scale impact values from 0 – 1
5. For each input, calculate the average of the scaled loads and impact values as:

$$\frac{\text{Scaled load + scaled impact}}{2}$$

6. Rank inputs within the potential source segment in terms of their average scaled value
7. Select highest ranked inputs for further source identification efforts upstream of each input.

If desired, loads and/or impact estimates could be weighted to emphasize one or the other to a greater degree. The highest ranked inputs would be selected for further source identification efforts, with the threshold established based on the pattern of average scaled values and cost and logistical constraints. It will be important to ensure that the data used for calculating this metric be gathered during that portion of the year when human health risk is the highest. It is also important to recognize that the relationship of each individual input in potential source segment to health-based water quality objectives in their immediate vicinity is not directly relevant to the prioritization exercise. There are two reasons for this. First, the prerequisite for the upstream prioritization exercise is that the downstream high-priority recreational use area has been determined to exceed water quality objectives on a regular basis. Second, a series of inputs could all contribute to a cumulative problem at the downstream use area, even if none of them individually exceeds water quality objectives.

Similar to the approach for beaches, once a set of inputs have been identified as potential sources of receiving water problems, upstream source identification studies on creeks, streams, and rivers should be conducted. The stopping rules described above for beaches and in Figure 5-4, are also directly applicable to creeks, streams, and rivers.

5.4.3 Design elements – habitat

The design elements for source identification for habitat are somewhat more complex than for recreational water quality. There are two main reasons for this. First, it is more difficult to quantitatively prioritize sites because the Triad approach involves three distinct types of data and there are no established standards or benchmarks for two of these, toxicity and bioassessment. Second, because these three data types sometimes produce inconsistent results (see Table 5-4 for examples), it can be difficult to establish clear benchmarks for when the weight of evidence calls for upstream source identification efforts. In addition, the availability of complete Triad data, as well as the interpretation of monitoring results, may be more complex in certain situations, such as ephemeral streams.

Rather than a quantitative metric, such as that shown for bacterial indicators in Table 5-9, the committee developed an overall framework for implementing a weight of evidence approach to triggering additional, targeted source identification studies (Tables 5-10 and 11). Table 5-10 provides expanded definitions of the thresholds in Table 5-4 that would trigger additional adaptive studies in response to combinations of Triad results. Table 5-11 then assigns a priority for source identification studies to each possible combination of Triad results from Table 5-4. Thus, in Table 5-11, the combination of results represented by Row 3 of Table 5-4 (persistent chemical exceedances, no toxicity, no benthic impact) would have a low priority for source identification studies. In contrast, the combination of results represented in Table 5-11 by Row 7 (no chemical exceedances, high toxicity, benthic impact) would have a high priority.

Monitoring results should be evaluated, using Table 5-4 as guidance, to determine whether the probable source(s) of impact is physical, chemical, or unknown. Upstream source identification efforts should then be initiated according to the set of priorities suggested in Table 5-21. Upstream source identification efforts should build on those performed to preliminarily assess the urban runoff contribution to receiving water problems, and should include detailed visual inspection of MS4s, water courses, and drainage areas as a first step. Visual inspections can then be followed with the water quality based source identification methods described in U.S. EPA (1993) and Pitt (2001).

As part of this overall framework, the committee did develop a quantitative method for combining toxicity testing results into a single metric (see Appendix 5) that would assist in ranking stations in terms of their aggregate toxicity. This ranking can then be used to assign priorities to stations for follow-up TIEs, as part of a source identification effort. The metric combines information about the degree of toxicity, the persistence of toxicity at a station throughout the year, and the percentage of test species found to exhibit toxicity.

Table 5-11 sets forth a set of starting rules for source identification efforts targeted at habitat impacts. Stopping rules are similar to those described for recreational water quality (Figure 5-6), with the same emphasis on identifying controllable sources.

5.4.4 Design issues

The same basic methods for detailed source identification apply to both recreational water quality and habitat. While the specific methods used in any instance will, of course, differ somewhat depending on the watershed structure and the constituents involved, they will include one or more of the following set of approaches, which are listed in order of increasing effort involved:

1. Evaluation of existing data
2. Visual reconnaissance and observation
3. Empirical tributary monitoring, which involves sampling tributary mouths upstream of the receiving water impact in order to identify the most likely point(s) of input
4. Sampling, or chemical "fingerprinting" of individual sources, including further upstream along tributaries, which can include the use of unique and/or conservative tracers.

These are similar to the methods described for the preliminary source identification in Question 3. However, Question 4 involves a more detailed focus on identifying specific sources of urban runoff and a greater degree of quantification than needed for Question 3. These methods are described more fully in US EPA (1993), Pitt (2001), and SWRCB (2001), which provide detailed descriptions of study designs, field sampling, and data analysis and interpretation appropriate for tracking sources of both bacteria and chemical pollutants.

The committee also recognized the need to supplement these methods descriptions with more explicit starting and stopping rules for detailed source identification studies. Starting rules are necessary for ensuring that source identification studies, which can be costly and time consuming, are triggered where and when monitoring data strongly suggest the presence of a persistent problem. Such rules are also needed to focus available resources on the highest priority problems. Stopping rules are essential for ensuring that source identification studies do not continue indefinitely, but end when reasonable and realistic expectations have been met. Such rules are proposed for receiving water problems associates with both recreational water quality and habitat.

5.5 Trend monitoring

Assessment of trends, for both recreational water quality and habitat, addresses Question 5: Are conditions in receiving waters getting better or worse? Question 5 provides the logical feedback to determine if management actions are having their intended effects. While this is a core monitoring element, the locations of stations and the relative emphasis on specific indicators may depend on information developed in answer to other questions (Table 4-1) related to the where problems exist (Question 1), the extent and magnitude of such problems (Question 2), and the nature and number of sources (Questions 3 and 4). Trends monitoring is a core monitoring program element (Table 4-1).

5.5.1 Recreational water quality trends

5.5.1.1 Overview

Table 5-12 presents an overview of the technical design elements for trend monitoring of recreational water quality at beaches; bays and estuaries; and creeks, streams, and rivers.

The model monitoring framework for trend monitoring of recreational water quality is based on statistical power analysis of a monitoring design that involves repeated sampling over time at fixed stations. For recreational water quality, sampling data from one inland watershed (Aliso Creek) suggests that trend monitoring might productively focus on one period of the year when both bacteria levels and human use are highest. Power analysis results from this watershed also suggest that the statistical power of the trend monitoring design can vary widely from station to station, as well as across indicators. However, comparable data were not available to support analogous conclusions for beaches and bays and estuaries. Thus, the committee recommends that programs begin trend monitoring with ten to fifteen weekly samples per year for three years, and then conduct site-specific power analyses with the software package developed by the committee and made available on the SCCWRP website. Power analyses on available data from southern California show clearly that differences across sites mean that a "one size fits all" approach to trend monitoring design will not work. The recommended approach will therefore ensure appropriate levels of both within-year replication and number of years of trend monitoring. Given that trend monitoring will most likely need to continue for a minimum or ten or fifteen years, devoting the first three years to obtaining site-specific data will not result in any substantial reduction in the longer-term power of the trend monitoring design. Any such reduction will be outweighed by gains in site-specific efficiency and statistical power.

See Section 4.5, for an expanded discussion of the use of statistical power analysis in the core trend monitoring aspects of the model monitoring design.

5.5.1.2 Design elements

The following subsections address, in turn, trend monitoring design in high-priority recreational areas where use is concentrated and then in the upstream areas that are the sources of contamination. Where such upstream source areas have been identified and are the targets of active source reduction efforts, it may be useful to monitor trends in the levels of these sources.

Conditions in high-priority recreational areas. Figure 5-2 shows that fecal coliform levels (the basis of the REC1 Basin Plan standard in this case) vary considerably among months in the high-priority area in lower Aliso Creek. While there are not equally intensive data records from other creeks throughout the region, it is reasonable to assume that similar variability would be present elsewhere. Thus, it would statistically be most efficient to stratify trend analyses by month, with separate trend analyses for each month. Lumping months that normally have highly divergent

fecal coliform counts would increase the within-year variability and make it more difficult to detect trends over time.

Power tests (see Section 4.5.1 and Figure 4-1 for a discussion of the importance of statistical power analyses as part of a trend monitoring design) on the monthly Aliso Creek data were thus conducted to estimate the number of years and number of samples within a 30-day period that might be required to detect different percentages of decrease in fecal coliform counts. Power tests were performed only at stations and for months for which more than one year was sampled because the power tests require an estimate of between-year variability. Figure A2.1 (Appendix 2), with plots for each station organized in order of increasing geomean, shows that the ideal months to sample differ from station to station. For example, the highest power for a given sampling effort occurs in August for the SOCWA treatment plant site (Figure A2.1d) but in June for the Aliso Wood Canyon Park Site (Figure A2.1c).

These results provide guidance that illustrates how the details of a trend monitoring design could be developed. Figure 5-5 shows that in the study of Aliso Creek the peak bacteria levels coincide with the period of highest recreational use in the late summer and early fall. Thus, it would be most efficient to target a trend monitoring program at one or more of the months in that portion of the year. Once a monitoring period is chosen, power analyses such as those in Figure A2.1 can be used to determine a preferred combination of reduction in indicator values, short-term sampling intensity, and length in years of the monitoring program. As mentioned above, the software package available on the SCCWRP website provides a straightforward means for each program to conduct power analysis with site-specific data.

High-priority inputs. Trend monitoring may also be useful where specific upstream inputs have been identified that contribute to contamination at a high-priority recreational use area. The key trend monitoring question for such inputs is whether the loads of bacteria, and their local impacts on the receiving water, are decreasing over time. Loads are a clear measure of the size of the input itself, and directly reflect the relative success of BMPs in the local drainage area. However, loads alone are insufficient to measure a discharge's potential impact on the receiving water. Thus, trend monitoring of high-priority inputs should include both loads and impact (measured as the difference between stations upstream and downstream of the discharge). A quantitative method for prioritizing upstream inputs for management actions and for trend monitoring is described above in Section 5.4.2, which discusses source identification approaches.

The monitoring data from Aliso Creek provide a useful illustration of how power analysis can be used to design a site-specific trend monitoring program. Figure A2.2 (Appendix 2) shows that bacterial levels in the high-priority drains in Aliso Creek, as well as at the upstream and downstream stations associated with each, are typically highest in the June – September period and lower throughout the rest of the year. The illustrative power analyses therefore focused on this period in order to reduce the within-year variability. Power analyses were performed for two measures, the load from each drain (Figure A2.3) and the impact of each drain (Figure A2.4) measured as the difference between the downstream and upstream stations. These results suggest that it will not be feasible to track loads at station J06 (Figure A2.3) nor to track impacts at station J01P08 (Figure A2.4). With the exception of these parameters at these stations, however, the power analysis also suggests that a sampling frequency of 20 samples, collected in the June – September period, would be adequate to detect an average 50% reduction in loads and an average 30% reduction in impact over a ten year period.

5.5.1.3 Design issues

Trends monitoring of existing bacterial indicators is complicated by their extreme variability in space and time. Thus, there may be limitations on our ability to detect change with current monitoring technology.

There are two aspects of trend monitoring with regards to recreational water quality. The first is related to conditions in the high-priority recreational use area(s) that are the major focus of concern. The question here is therefore whether indicator levels are trending downward toward applicable water quality objectives. The second aspect of such trend monitoring is related to whether the high-priority inputs upstream of the high-priority recreational area are improving. The question here is somewhat different, instead being whether loads and localized impacts (a measure of the direct effect on the receiving water) are declining. This is why the recommended indicators include both a measure of concentration and a measure of loads.

5.5.2 Habitat trends

5.5.2.1 Overview

Assessment of habitat trends addresses Question 5: Are conditions in receiving waters getting better or worse? Question 5 provides the logical feedback to determine if management actions are having their intended effects. While this is a core monitoring element, the locations of stations and the relative emphasis on specific indicators may depend on information developed in answer to other questions (Table 4-1) related to the where problems exist (Question 1), the extent and magnitude of such problems (Question 2), and the nature and number of sources (Questions 3 and 4).

Table 5-13 presents an overview of the technical design elements for trend monitoring of habitat conditions.

The model monitoring framework for trend monitoring of habitat conditions is based on statistical power analysis of a trend monitoring design that involves repeated sampling over time at fixed stations. For habitat, the timing of trend monitoring will differ depending on the parameters being tracked, with mass emissions monitored during wet weather and bioassessment during dry weather. Available data indicate that power analysis results can vary widely from station to station, as well as across parameters. Thus, the committee recommends that programs begin trend monitoring with two or three samples per year for three years, and then conduct site-specific power analyses with the software package developed by the committee and made available on the SCCWRP website.

5.5.2.2 Design elements

Trend monitoring is relevant to all aspects of habitat monitoring in the watershed design. Trend monitoring can occur at one or more of the core monitoring assessment stations depending on criteria such as the level of management concern or whether a receiving water problem has previously been documented.

Appendix 2 provides example statistical power analysis results for two aspects of a trend monitoring design (event mean concentration (EMC) and mass emissions) for which sufficient data currently exist for such an analysis. These results Figures A2.5 - and A2.14, which use data from several representative long-term stations in Orange County, reflect, as do the bacteria results described above, large differences in power from station to station and across parameters. (Data from other monitoring programs were not suitable for power analysis.) As a result, it is not possible to recommend levels of sampling effort that would be generally applicable across the

region. Therefore, the committee recommends that trend monitoring programs for habitat begin by collecting two or three samples per year for three years and then use these data to conduct site-specific power analyses to refine the following aspects of the design:

- The amount of change expected or desired
- The number of samples to be collected per year
- The number of years before the expected change is detected.

These analyses can be carried out with the software package available on the SCCWRP website. While results will undoubtedly vary from site to site, the committee's analyses of available historical monitoring data (Appendix 2) suggests that it is unlikely that substantial amounts of change (e.g., reductions of 50% or more) will be observable in less than ten years and that management targets and monitoring designs should be developed accordingly.

5.5.2.3 Design issues

Trends monitoring of habitat indicators is complicated by the variety of station types, the long list of monitored constituents, and the complexity of ecosystem processes that influence observed trends. Therefore, general guidance is presented for two main categories of monitoring data – mass emissions and toxicity. As for the recreational water quality aspect of Question 5, the power analysis software available on the SCCWRP website will enable each program to perform relevant site-specific power analyses as required

Table 5-1. Design overview for assessment monitoring of recreational water quality.

Type of area	Site location	Frequency	Indicator(s)
Open-coast beach	Gaps in Health Department coverage ● High-priority areas ● Flowing stormdrains Drain itself Upcoast and downcoast of drain Characterize dispersion of drain plume prior to siting upcoast and downcoast stations	Based on BWQWG prioritization Daily – monthly (see Table 5-2)	Total coliform Fecal coliform Enterococcus
Enclosed bays and estuaries	Gaps in Health Department coverage High priority areas Subsample of flowing stormdrains Drain itself Upcoast and downcoast of drain	Based on BWQWG prioritization Daily – monthly (see Table 5-2)	Total coliform Fecal coliform Enterococcus
Creeks, streams, and rivers	High-priority areas Drain or other input Upstream and downstream of input	Weekly in high-use season	Total coliform or E. coli Fecal coliform Enterococcus

015042

Table 5-**2. The Beach Water Quality Workgroup's risk-based approach fo**r determining sampling frequency. The presence of lifeguards is an indicator of high-use beaches that are most likely above the 50,000 users threshold in Assembly Bill 411.

	Likelihood of Contamination			
Usage	**High**: e.g., stormdrains that flow continuously, frequently exceeding bacterial standards; pier areas	**Medium**: e.g., stormdrains that flow intermittently or continuously with infrequent exceedances of standards	**Low**: source nearby, do not expect a problem, stormdrain not flowing but if had a sewage spill it would flow to beach, if a problem it would be long term	**No known source**
High use beach: lifeguarded, high use surf/dive area	Daily or 5X per week	5X per week	Weekly or 5X per month	Weekly or 5X per month
Accessible sandy beach: low use surf/dive area or other water contact recreation area (wind surfing, kayaking)	2 – 3X per week	Weekly or 5X per month	Weekly or 5X per month	None
Other accessible shoreline: rocky coastline, small coves accessible by trails, private homes limit access	Weekly or 5X per month	Weekly or 5X per month	Monthly or other identification system	None
Inaccessible: beach area > 1 mile from access area	None	None	None	None

015043

Table 5-3. Design overview for assessment monitoring of habitat.

Type of area	Site location	Frequency	Indicator(s)
Mass emissions	Bottoms of watersheds	3 storms / yr for 3 yrs, then modify per results of power analyses	Chemistry (see Table 5-16) Toxicity
Watershed	Random or rotating, perhaps per Bight design	Every few years, perhaps per Bight Program schedule	Triad in dry weather Chemistry, toxicity in wet weather
High-priority inland habitat	High-value habitat either impacted or threatened	1 or 2 / yr in dry weather	Triad
Program goals	As needed based on nature of specific goal(s)	Dependent upon problem, question	Dependent upon problem, question
Estuaries	Random per Bight design Key habitats and/or downstream of major inputs	Every few years per Bight design 1 or 2 / yr, in wet and/or dry, depending on problem, question	Chemistry (see Table 5-16) Toxicity
Nearshore ocean	Random and/or clustered in plumes, per Bight design	Every few years per Bight design	Chemistry (see Table 5-16) Toxicity

015044

Table 5-4. Decision framework for interpreting triad results. Possible conclusions and actions/decisions are intended as general guidance, dependent on the specific monitoring results found and the actual relationships among chemistry, toxicity, and benthic data.

	Chemistry	Toxicity	Benthic Alteration	Example Conclusions	Example Actions or Decisions
1.	Persistent exceedance of water quality objectives	Evidence of toxicity	Indications of alteration	Strong evidence of pollution-induced degradation	Toxicity tests at higher dilutions to better quantify toxicity Use TIE to identify contaminants of concern, based on TIE metric Initiate upstream source identification as a high priority
2.	No persistent exceedances of water quality objectives	No evidence of toxicity	No indications of alteration	No evidence of current pollution-induced degradation Potentially harmful pollutants not yet concentrated enough to cause visible impact	No immediate action necessary Conduct periodic broad scans for new and/or potentially harmful pollutants
3.	Persistent exceedance of water quality objectives	No evidence of toxicity	No indications of alteration	Contaminants are not bioavailable Test organisms not sensitive to problem pollutants	TIE would not provide useful information with no evidence of toxicity Continue monitoring for toxic and benthic impacts Consider whether different or additional test organisms should be evaluated Initiate upstream source identification as a low priority
4.	No persistent exceedances of water quality objectives	Evidence of toxicity	No indications of alteration	Unmeasured contaminant(s) or conditions have the potential to cause degradation Pollutant causing toxicity at very low levels Synergistic effects of multiple chemicals at low levels causing toxicity	Recheck chemical analyses and evaluate detection limits relative to reported toxic levels Verify toxicity test results Consider additional advanced chemical analyses Toxicity tests at higher dilutions to better quantify toxicity Use TIE to identify contaminants of concern, based on TIE metric Initiate upstream source identification as a medium priority

015045

	Chemistry	Toxicity	Benthic Alteration	Example Conclusions	Example Actions or Decisions
5.	No persistent exceedances of water quality objectives	No evidence of toxicity	Indications of alteration	Alteration may be due to physical impacts, not toxic contamination Test organisms not sensitive to problem pollutants Synergistic effects of multiple chemicals at low levels causing toxicity	No action necessary due to toxic chemicals Initiate upstream source identification (for physical sources) as a high priority Consider whether different or additional test organisms should be evaluated
6.	Persistent exceedance of water quality objectives	Evidence of toxicity	No indications of alteration	Toxic contaminants are bioavailable, but in situ effects are not demonstrable Benthic analysis not sensitive enough to detect impact Potentially harmful pollutants not yet concentrated enough to change community	Determine if chemical and toxicity tests indicate persistent degradation Recheck benthic analyses; consider additional data analyses Toxicity tests at higher dilutions to better quantify toxicity If recheck indicates benthic alteration, perform TIE to identify contaminants of concern, based on TIE metric Initiate upstream source identification as a high priority If recheck shows no effect, use TIE to identify contaminants of concern, based on TIE metric Initiate upstream source identification as a medium priority
7.	No persistent exceedances of water quality objectives	Evidence of toxicity	Indications of alteration	Unmeasured toxic contaminants are causing degradation Pollutant causing toxicity at very low levels Synergistic effects of multiple chemicals at low levels causing toxicity Benthic impact due to habitat disturbance, not toxicity	Recheck chemical analyses and consider additional advanced analyses Toxicity tests at higher dilutions to better quantify toxicity Use TIE to identify contaminants of concern, based on TIE metric Initiate upstream source identification as a high priority Consider potential role of physical habitat disturbance
8.	Exceedance of water quality objectives	No evidence of toxicity	Indications of alteration	Test organisms not sensitive to problem pollutants Benthic impact due to habitat disturbance, not toxicity	TIE would not provide useful information with no evidence of toxicity Initiate upstream source identification as a high priority Consider whether different or additional test organisms should be evaluated Consider potential role of physical habitat disturbance

015046

Table 5-5. Example distribution of monitoring effort among the various kinds of stations in the watershed design. Special studies would be implemented when results of core or regional monitoring indicated a need for them. Specific triggers initiate adaptive monitoring and special studies designed to answer questions about the magnitude, extent, and source(s) of problems.

Station type	**Core monitoring**	**Regional monitoring**	**Further monitoring / special studies**
Mass emissions	Triad, including broader suite of chemistry		TIEs (Q4) Upstream source ID (Q4)
Watershed		Bioassessment Basic chemistry Some toxicity	Expanded toxicity, chemistry (Q2) TIEs (Q4) Upstream source ID (Q4)
High-priority habitat	Bioassessment Chemistry (if prior reason) *		Toxicity, chemistry (Q1, 2) TIEs (Q4) Upstream source ID (Q4)
Program goals	Dependent on question(s)		
Estuaries	Toxicity Chemistry (if prior reason) *		TIEs (Q4) Upstream source ID (Q4) Process studies (Q1 – 4) Biology (e.g., benthos, bioaccumulation) (Q1, 2)
Nearshore ocean +		Plume tracking Plume toxicity Plume chemistry	

* Chemical monitoring could be deferred until bioassessment or toxicity results suggest a potential problem.
+ Conducted as part of the periodic regional Bight program.

Table 5-6. The short list of chemical constituents that should be sampled routinely by all programs and an expanded list to be sampled where routine monitoring data or other information suggest the need for additional information and/or where appropriate to the management question being asked.

Category	Short list	Expanded list
Trace metals	total Cd, Cr, Cu, Ni, Pb, Zn	dissolved (with hardness)
Nutrients	NH_3, total Kjeldahl Nitrogen (TKN), NO_3, total P	
Bacteria	total coliform, fecal coliform or E. coli, Enterococcus	
Pesticides	diazinon, chlorpyrifos, other OP pesticides	others as necessary, e.g., legacy pesticides (DDT, chlordane, lindane), emergent pesticides (e.g., pyrethroids)
Conventionals	temperature, pH, hardness, specific conductance, dissolved oxygen	chemical oxygen demand (COD), sulfides
PAHs	if methods are available that are suitable for measuring on particles, at low detection limits	
Volatiles		dry weather only
Suspended solids	total suspended solids (TSS)	
Priority pollutants	every 5 years, with Bight Program	

Table 5-7. Design overview for extent and magnitude monitoring of recreational water quality problems. Regional monitoring is distinguished from special projects in its larger geographic scale and/or greater number and kinds of potential sources

Type of area	Site location	Frequency	Indicator(s)
Open-coast beach	Input(s) of concern Spaced array upcoast and downcoast of input of concern	One calendar year to establish basic pattern, then: Daily within representative periods (e.g., storms, dry weather, dominant current regimes)	Concentration and loads: • Total coliform • Fecal coliform • Enterococcus Dye
Enclosed bays and estuaries	Input(s) of concern Based on nature of problem, either: • Spaced array around input of concern • Regular grid throughout area of concern • Random array throughout area of concern • Gradient array downcurrent of input of concern	One calendar year to establish basic pattern, then: Daily within representative periods (e.g., storms, dry weather, dominant current regimes)	Concentration and loads: • Total coliform • Fecal coliform • Enterococcus Dye
Creeks and streams	Regular grid throughout high-priority use area	One calendar year to establish basic pattern, then: Daily within subsample of high-use period	Total coliform or E. coli Fecal coliform Enterococcus Dye

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Table 5-8. Design overview for both recreational water quality and habitat source identification under Question 4: What are the sources to urban runoff that contribute to receiving water problems?

Type of area	Site location	Frequency	Indicator(s)
Recreational water quality			
Open-coast beach	Inputs that fall in upper right section of Figure 5-3	Ongoing until reach stopping rules in Figure 5-7	Total coliform Fecal coliform Enterococcus
Enclosed bays and estuaries	Inputs that fall in upper right section of Figure 5-3	Ongoing until reach stopping rules in Figure 5-7	Total coliform Fecal coliform Enterococcus
Creeks and streams	High-priority inputs as identified with conceptual model in Figure 5-3	Ongoing until reach stopping rules in Figure 5-7	Total coliform or E. coli Fecal coliform Enterococcus
Habitat			
All areas except coastal ocean	At core monitoring site Upstream of core monitoring site	Ongoing until reach stopping rules in Figure 5-8	Constituents identified in Questions 1 - 3

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Table 5-9. Aliso Creek stations in order of scaled load and impact. Impact = downstream **concentration – upstream concentration on each date. Load = factor x flow (csf) x concentration in pipe on each date. Scaled values are rescaled to 0 – 1. Average scaled** values = average of scaled impact and load values. Stations are ranked in order of average scaled values.

Station	Avg scaled	Impact scaled	Load scaled	Impact	Load
J01P08	0.45442	0.30327	0.60558	1.09240	5.12476
J01P28	0.42830	0.16437	0.69223	0.59208	5.80725
J02P05	0.41653	0.21205	0.62102	0.76381	5.24640
J04	0.41279	0.12574	0.69984	0.45291	5.86718
J01P01	0.40517	0.22449	0.58585	0.80864	4.96939
J02TBN1	0.40237	0.23424	0.57049	0.84376	4.84841
J03P01	0.39515	0.17026	0.62004	0.61328	5.23868
J01TBN8	0.39016	0.27729	0.50303	0.99881	4.31707
J01P03	0.35542	0.10754	0.60331	0.38738	5.10688
J03P02	0.34631	0.04993	0.64270	0.17984	5.41714
J01P27	0.34413	0.05564	0.63262	0.20040	5.33780
J01P30	0.34067	0.10229	0.57906	0.36847	4.91588
J03P05	0.33684	0.04794	0.62573	0.17270	5.28352
J03TBN2	0.33178	0.19535	0.46821	0.70366	4.04286
J01P23	0.32485	0.09907	0.55062	0.35686	4.69191
J03P13	0.32480	0.09263	0.55698	0.33365	4.74199
J06	0.32433	0.09277	0.55589	0.33415	4.73343
J01P06	0.30957	0.12342	0.49573	0.44455	4.25962
J01P26	0.30500	0.05205	0.55794	0.18750	4.74956
J05	0.28978	0.05328	0.52628	0.19192	4.50018
J01P05	0.28974	0.08773	0.49175	0.31600	4.22829
J01TBN2	0.28929	0.12163	0.45695	0.43812	3.95419
J03TBN1	0.28574	0.09032	0.48116	0.32534	4.14483
J01P22	0.28419	0.06092	0.50745	0.21944	4.35194
J07P01	0.26681	0.09332	0.44031	0.33613	3.82309
J01TBN4	0.26512	0.05184	0.47840	0.18674	4.12309
J01P04	0.25812	0.06553	0.45072	0.23603	3.90509
J01P25	0.25406	0.05010	0.45801	0.18047	3.96254
J01TBN3	0.24684	0.04788	0.44580	0.17248	3.86634
J01P33	0.24246	0.05250	0.43242	0.18909	3.76094
J01P24	0.20587	0.03620	0.37553	0.13040	3.31286
J01P21	0.14696	0.04556	0.24836	0.16411	2.31128

Table 5-10. Definitions of the triggers in Table 5-4, the Triad interpretation framework, designed to initiate further adaptive studies to **identify potential sources of impact. "BRI"** refers to the regional Benthic Response Index for estuaries developed by the Bight **Program. "IBI" refers to the Index of Biotic** Integrity, a regional bioassessment index under development by the Stormwater Monitoring Coalition.

Possible trigger in Table 5-4	Definition of trigger
Persistent exceedance of water quality objectives	Exceedance of relevant Basin Plan or CTR objectives by 20% for 3 sampling periods
Evidence of toxicity	High score, in relation to other stations, on metric that combines magnitude and persistence of toxicity observed over an entire year (see Appendix 5: TIE Metric)
Evidence of benthic alteration	BRI score that indicates substantially degraded community (in estuaries) IBI score that indicates substantially degraded community (in freshwater creeks, streams, and rivers)

Table 5-11. Summary of the upstream source identification priorities from Table 4-7, based on combinations of the chemical, toxicity, and benthic components of the triad approach. **"Yes" and "No" refer to whether or not data from each component exceeded the triggers** described in Table 5-20.

Table 4-7 Row	Triad Component	Yes	N o	Source ID Priority
1	chemistry	X		
	toxicity	X		
	benthos	X		High
2	chemistry		X	
	toxicity		X	
	benthos		X	None
3	chemistry	X		
	toxicity		X	
	benthos		X	Low[1]
4	chemistry		X	
	toxicity	X		
	benthos		X	Medium
5	chemistry		X	
	toxicity		X	
	benthos	X		High (for physical components)
6	chemistry	X		
	toxicity	X		
	benthos		X	Medium
7	chemistry		X	
	toxicity	X		
	benthos	X		High
8	chemistry	X		
	toxicity		X	
	benthos	X		High

[1] If further testing indicates appropriate and sensitive enough toxicity tests were used and analytical results suggest pollutant is not bioavailable.

Table 5-12. Design overview for trends monitoring of recreational water quality.

Type of area	Site location	Frequency	Duration	Indicator(s)
Open-coast beach	Input(s) of concern at high-priority beaches Upcoast and downcoast stations	Weekly within representative periods (e.g., storms, dry weather, dominant current regimes) Repeated yearly	10 – 15 per year for 3 years, then based on power analysis	Concentration and loads: ● Total coliform ● Fecal coliform ● Enterococcus Dye
Enclosed bays and estuaries	Input(s) of concern at high-priority sites Stations bracketing input(s)	Weekly within representative periods (e.g., storms, dry weather, dominant current regimes) Repeated yearly	10 – 15 per year for 3 years, then based on power analysis	Concentration and loads: ● Total coliform ● Fecal coliform ● Enterococcus Dye
Creeks and streams	High-priority use area High-priority upstream inputs	Weekly with representative periods (e.g., storms, dry weather, dominant current regimes) Repeated yearly	10 – 15 per year for 3 years, then based on power analysis	Concentration and loads: ● Total coliform or E. coli ● Fecal coliform ● Enterococcus Dye

Table 5-13. Design overview for trends monitoring of habitat.

Type of area	Site location	Frequency	Duration	Indicator(s)
Mass emissions	Bottoms of watersheds	3 storms / yr for 3 yrs, then modify per results of power analyses	Based on power analysis	Chemistry (see Table 4-8) Toxicity
Watershed	Random or rotating, perhaps per Bight design	Every few years, perhaps per Bight Program schedule	Ongoing	Triad in dry weather Chemistry, toxicity in wet weather
High-priority habitat	High-value habitat either impacted or threatened	1 or 2 / yr in dry weather	Based on power analysis Revisit when habitat status changes	Triad
Program goals	As needed	Dependent upon problem, question	Based on power analysis Until goals met / change	Dependent upon problem, question
Estuaries	Random per Bight design Key habitats and/or downstream of major inputs	Every few years per Bight design 1 or 2 / yr, in wet and/or dry, depending on problem, question	Ongoing for Bight Based on power analysis for key habitats and downstream stations	Chemistry (see Table 4-8) Toxicity
Nearshore ocean	Random and/or clustered in plumes, per Bight design	Every few years per Bight design	Ongoing	Chemistry (see Table 4-8) Toxicity

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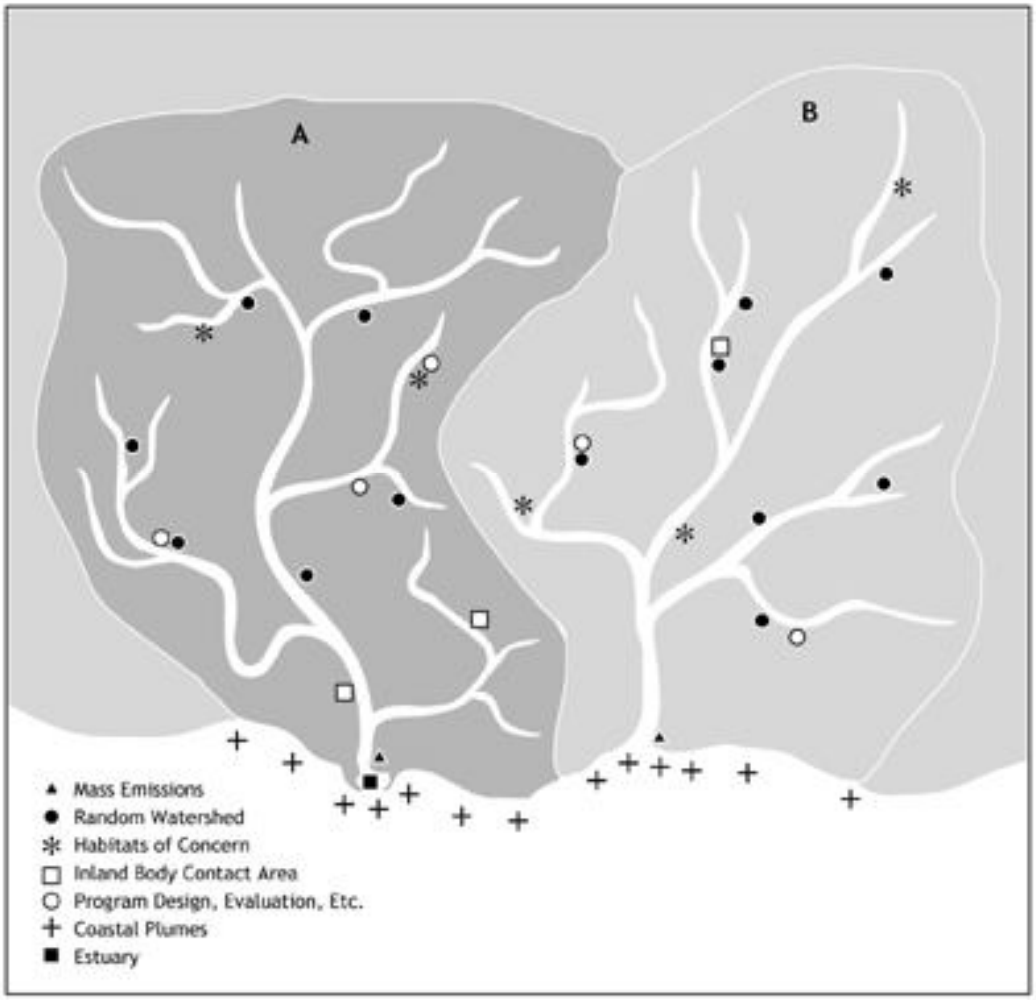

Figure 5-1. Example model monitoring program design in an idealized watershed.

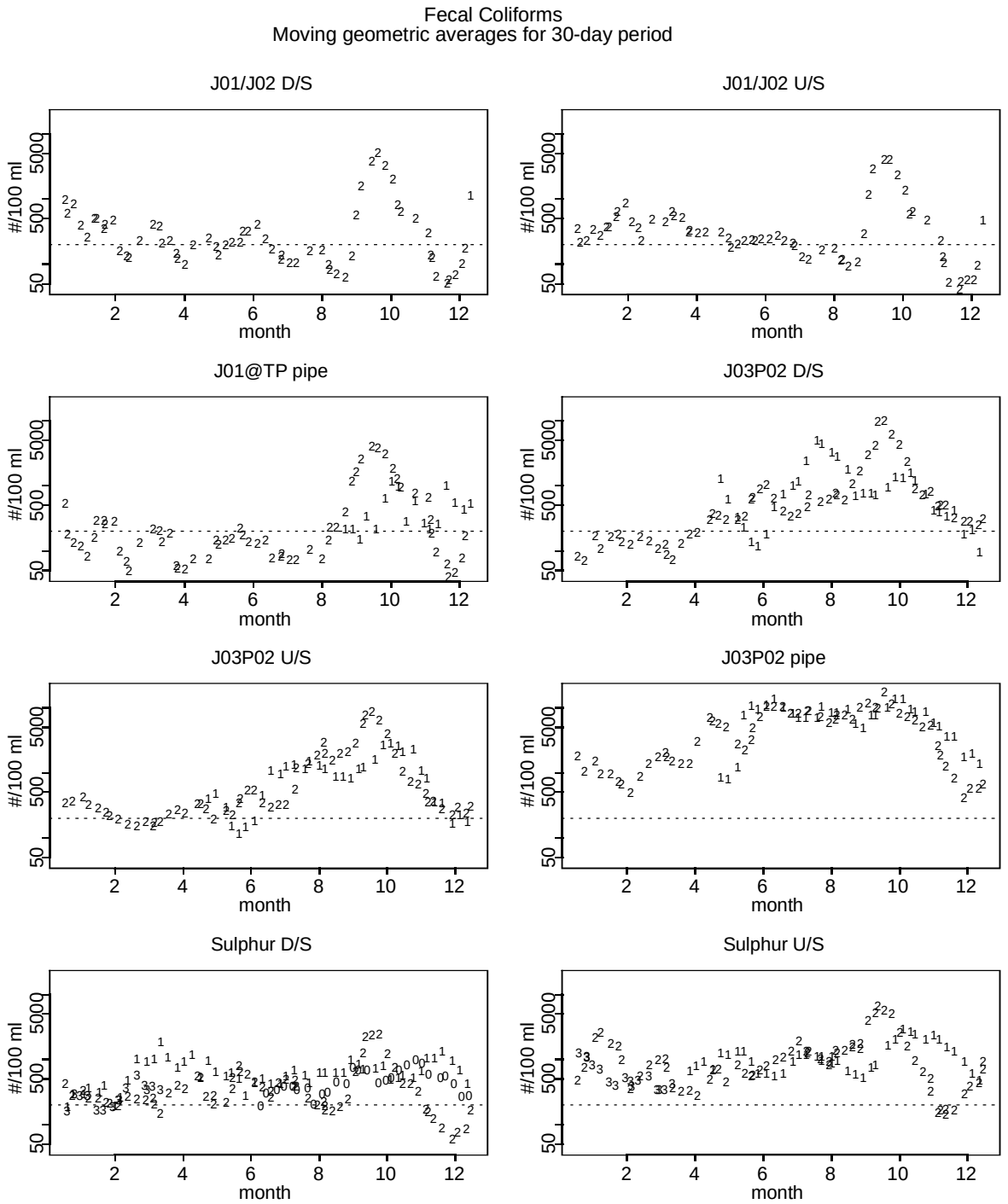

Figure 5-2a. Fecal coliform measurements at and upstream/downstream of discharge points in lower Aliso Creek. Data points are 5-sample moving geometric averages. The horizontal dashed line represents the Basin Plan REC1 objective for fecal coliforms (geomean not higher than 200/100 ml). The point symbols indicate the year of sampling (i.e., 1 for 2001, 2 for 2002).

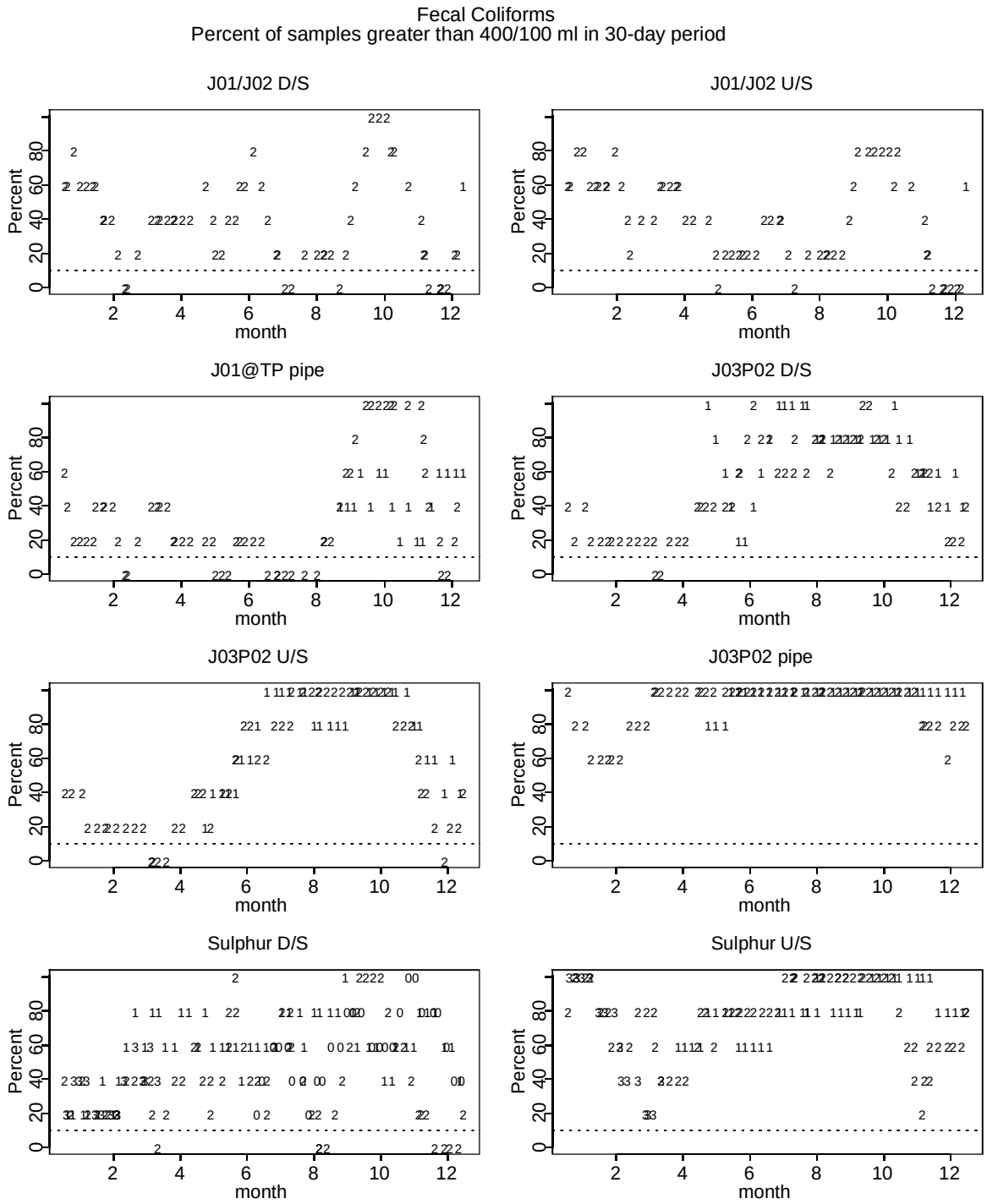

Figure 5-2b. Fecal coliform measurements at and upstream/downstream of discharge points in lower Aliso Creek. The data points are the percent of fecal coliform samples above 400/100 ml in the five most recent samples. The horizontal dashed line represents the Basin Plan REC1 objective for fecal coliforms (no more than 10% above 400/100 ml). The point symbols indicate the year of sampling (i.e., 1 for 2001, 2 for 2002).

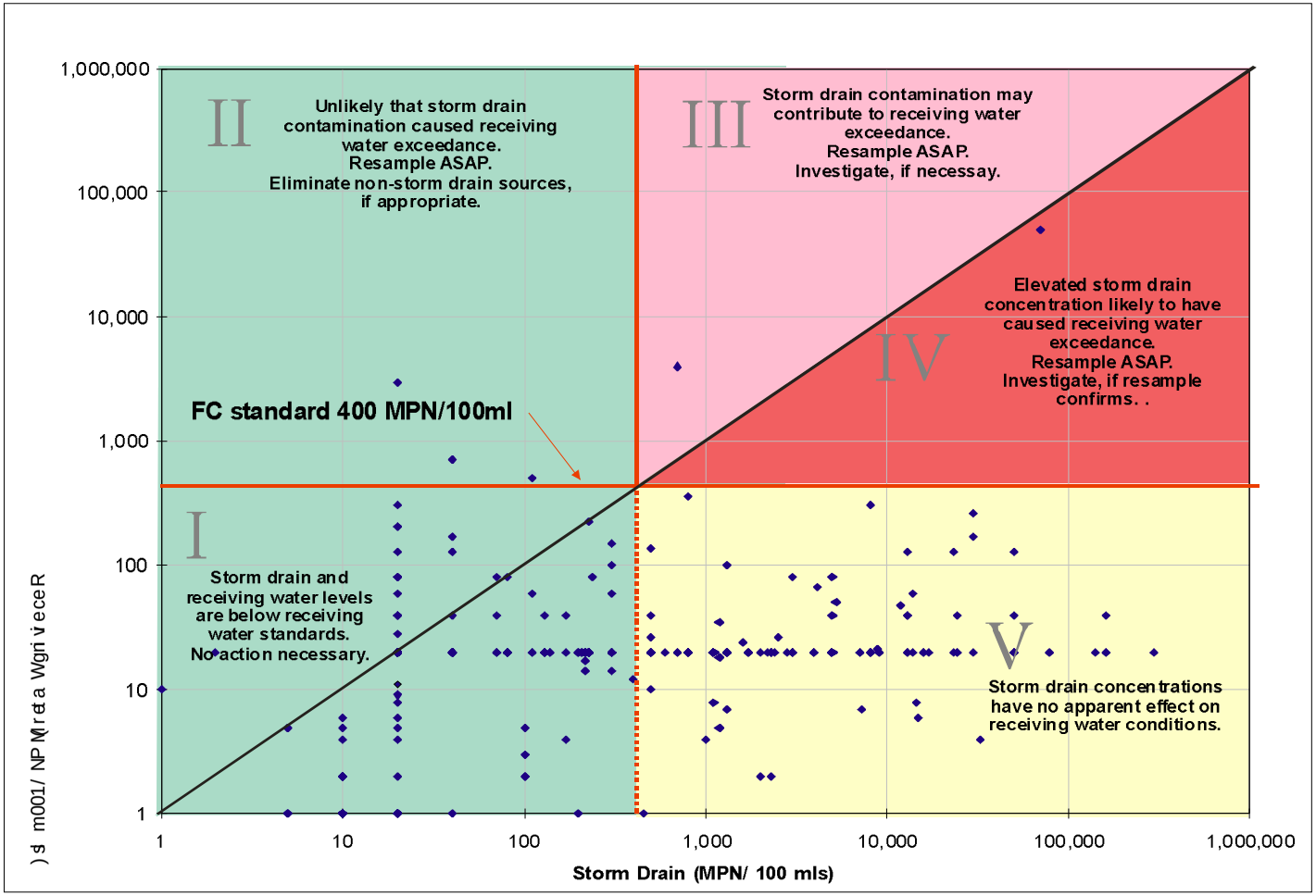

Figure 5-3. Approach for prioritizing coastal and estuarine bacterial inputs for further upstream source identification efforts. The highest priority is given to situations in which elevated bacterial indicator levels in the discharge are matched with elevated levels in the receiving water. This figure shows an example using fecal coliform, and analagous figures could be prepared with other indicator data.

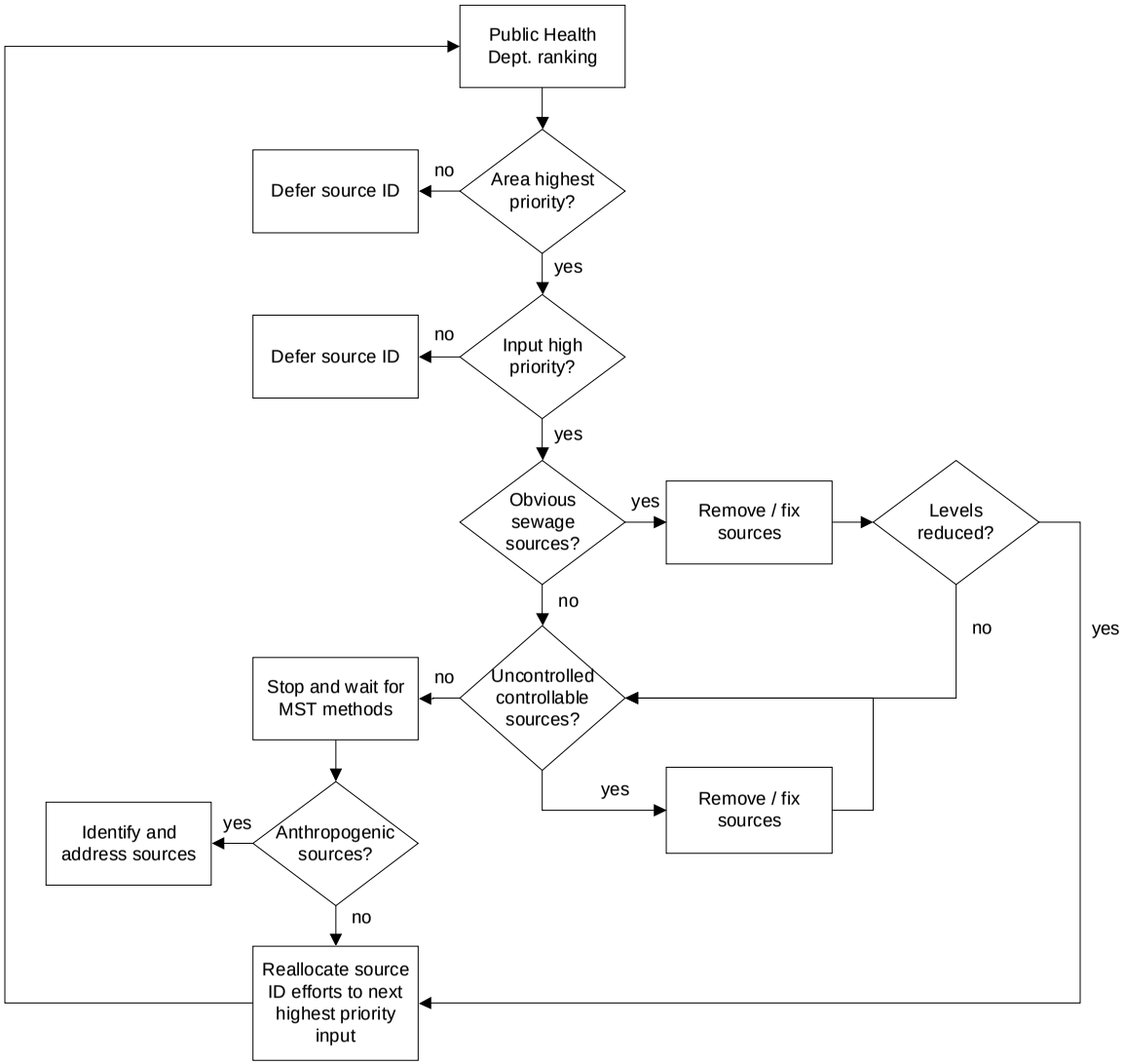

Figure 5-4. Decision tree that organizes starting and stopping rules for upstream bacterial source identification efforts. MST refers to microbial source tracking methods.

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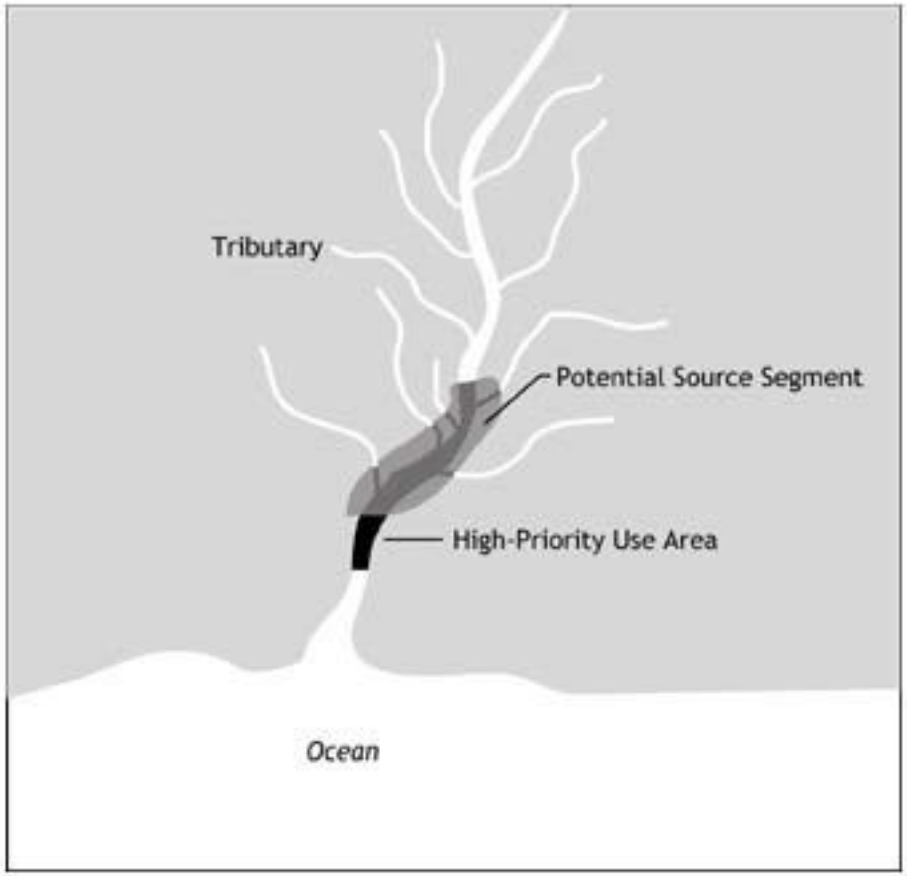

Figure 5-5. Conceptual model for determining the upstream segment of a creek or stream that should be the focus of source identification efforts for bacterial contamination. The model assumes that bacterial dieoff as water flows downstream places an upper limit on the distance bacteria can travel and still impact the high-priority use area.

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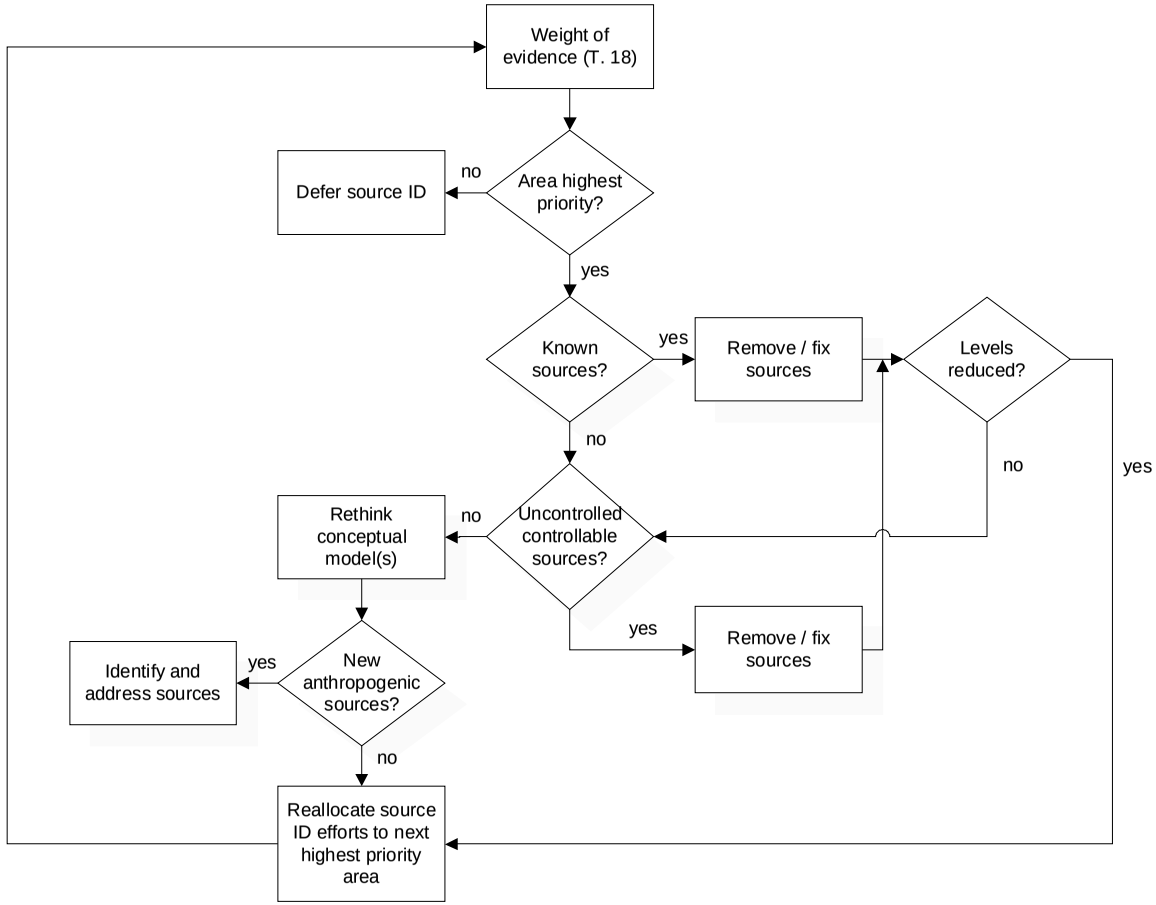

Figure 5-6. Decision tree that organizes starting and stopping rules for upstream source identification efforts targeted at habitat.

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6.0 REFERENCES

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7.0 APPENDICES

Appendix 1: Summary of Existing Municipal Stormwater Monitoring Programs in Southern California

June 2003

As part of the effort to develop a model stormwater monitoring program, we have reviewed and summarized the existing monitoring designs being implemented by each of the major stormwater programs in southern California. This information will be used, in a later step of the project, as a starting point for assessing what sorts of changes might be advisable to bring existing monitoring efforts more into line with the recommendations of the model program.

Program-specific details

There are six basic types of monitoring approaches currently used in NPDES stormwater monitoring programs throughout southern California, including:

- End of watershed designs that typically measure the cumulative mass emissions from all discharges
- Dispersed watershed designs that assess overall conditions and impacts in freshwater habitats
- Site-specific watershed designs that assess conditions and trends in freshwater or estuarine habitats of particular concern
- Beach stormdrain designs that assess stormwater impacts on the surfzone
- Near-coastal designs that assess the impact of stormwater plumes on near-coastal habitats
- Dry-weather reconnaissance designs focused on identifying sources of pollution to the MS4 system.

While all of these approaches can be found in the region, not every stormwater program includes all six, as illustrated in Table A1-1.

Table A1-1. Distribution of monitoring approaches across the separate stormwater programs in southern California.

Program	End of watershed	Dispersed watershed	Site-specific watershed	Beach	Near-coastal	Recon-naissance
Ventura		X				
Los Angeles	X		X			
Long Beach	X		X			
Orange	X	X	X	X	X	X
San Bernardino	X					
Riverside	X	X				
San Diego	X	X	X	X		X

In addition, the relative attention paid to each type of monitoring varies across programs. This reflects differences in habitat types, regulatory emphasis, stage of program development, and patterns of urbanization across the region. For example, monitoring in the northern part of Orange County focuses more heavily on problems intrinsic to more urbanized areas than does monitoring in Ventura County, which has a larger proportion of agricultural and open space land uses.

The following set of tables summarizes the existing distribution of effort in each of the programs. Information was drawn from the most recent set of program documents available for each program.

Table A1-2 shows the distribution of end of watershed monitoring efforts across the region's programs. All the programs except for San Bernardino County and Riverside County have ongoing end of watershed designs focused primarily on estimating mass loads from larger watersheds. The lack of such stations from San Bernardino and Riverside Counties partly reflects the fact that these inland areas are at the upper ends of large watersheds (such as for the Santa Ana River), which is a quite different situation than in the coastal counties. However, the lack of mass emissions stations in the inland counties also hampers their ability to estimate the proportional contribution of these inland areas to cumulative loads downstream.

Table A1-2. End of watershed monitoring efforts in each stormwater program.

Program	No. Sites	No. Events/Yr	Indicators	Notes
Ventura	3	2 wet, 5 dry		
Los Angeles	7 6/trib	3 storms, 2 dry 4 storms, 1 dry	Water qual, tox, trash Water qual	Adaptive TIE Rotate among tributaries each year
Long Beach	4	4 storms, 2 dry	Water qual, tox	Adaptive TIE Additional sites in LA and San Gabriel river watersheds as decided by Reg. Board
Orange	12 * 6	3 storms, 3 dry 3 storms	Water qual, tox Water qual, tox	Adaptive tox, TIE, source ID Adaptive TIE
San Bernardino	-			
Riverside	-			
San Diego	11	3 storms	Water qual, tox	Link to bioassessment at other sites

* For Orange County, the upper set of information refers to the Santa Ana Region of the County and the lower to the San Diego Region of the County, which have somewhat different monitoring programs.

Table A1-3 shows the distribution of dispersed watershed monitoring efforts across the monitoring programs in the region. Dispersed watershed monitoring efforts are typically used to assess the extent and magnitude of impact on watersheds and their beneficial uses. All the programs except for Long Beach (which is a relatively small, heavily urbanized area) include this approach, and four of these six programs contain bioassessment sampling. This reflects a growing awareness that chemical measurements alone, or even chemical measurements combined with toxicity testing, will not necessarily capture impacts to aquatic habitats. The inclusion of bioassessment monitoring is an effort to directly measure habitat quality in areas where this is of concern. The model program will identify the types of locations where dispersed watershed monitoring should occur and define the measurement indicators, including bioassessment, that should be monitored at these sites.

Table A1-3. Dispersed watershed monitoring efforts in each stormwater program.

Program	No. Sites	No. Events/Yr	Indicators	*Notes*
Ventura	3 landuse 2 rec. water 14 bioass	1 dry 1 dry 1 dry	Water qual Water qual Bioassessment	Characterize landuse discharges Characterize receiving water quality in smaller tributaries
Los Angeles	20	1 dry	Bioassessment	CDFG methods
Long Beach	-			
Orange	11 15	2 dry 2 dry	Water qual, tox, bioassessment Water qual, tox, bioassessment	Includes reference sites Adaptive chem, tox, TIEs, source ID
San Bernardino	5	4 storms	Water quality	
Riverside	25 25	1 – 5 wet 3 dry	Water qual Water qual	
San Diego	23	2 dry	Bioassessment	Link to mass emissions, tox at other sites

Table A1-4 shows the distribution of site-specific watershed monitoring across the region. These efforts are targeted at locations that are considered of concern because of their high ecological and societal value. The uneven distribution of such effort across the region reflects the uneven distribution of high-value habitats such as lagoons and estuaries (e.g., Newport Bay), as well as the varying degree to which management agencies have addressed this issue. The effect of sample size has not been fully evaluated in southern California. Too few samples will lead to conclusions with low confidence or even erroneous conclusions while oversampling leads to wasted resources. The model program will address this issue through power analysis of historical data to assess the optimal number of samples.

Table A1-4. Site-specific watershed monitoring efforts in each stormwater program.

Program	No. Sites	No. Events/Yr	Indicators	Notes
Ventura	-			
Los Angeles	-			
Long Beach	1	4 storms, 2 dry	Water qual, tox, bacteria	Alamitos Bay receiving water
Orange	12 estuary 6 channel	2 storms, 2 dry 2 storms, 2 dry	Water qual, tox, seds, benthos	Adaptive tox, TIE, source ID, link to Bight '03
San Bernardino	-			
Riverside	11	4	Water qual	
San Diego	13 lagoon	1 dry	Sed chem, tox, benthos	Adaptive prioritization using triad

Table A1-5 shows the distribution across the region of monitoring efforts targeted at storm drains discharging directly to the beach or coastal zone. The absence of such sites in San Bernardino and Riverside Counties is due to their inland location. In other coastal counties, beach monitoring may be conducted by county health departments rather than by stormwater programs. The stormwater model monitoring technical workgroup has teamed up with the SWRCB's Beach Water Quality Workgroup to evaluate potential collaborative monitoring designs that would coordinate with the county health department and other shoreline monitoring efforts.

Table A1-5. Beach drain monitoring efforts in each stormwater program.

Program	No. Sites	No. Events	Indicators	Notes
Ventura	-			Co DHS
Los Angeles	26	Daily	Bacteria	City of LA conducts
Long Beach	-			City DHS
Orange	TBD	Weekly	Bacteria	In addition to HCA; monitor surfzone up- and downcoast, adaptive source ID, risk assessment
	36	Weekly	Bacteria	
San Bernardino	-			
Riverside	-			
San Diego	60	Weekly	Bacteria	Cities conduct program, monitor drain and receiving water, adaptive source ID

Table A1-6 shows the distribution of near-coastal monitoring effort across the programs in the region. This is a relatively new priority for stormwater programs, as reflected in the fact that only the Los Angeles County and Orange County programs include this component. The model monitoring program is looking to integrate this monitoring with existing near coastal monitoring through southern California Regional Monitoring.

Table A1-7 shows the distribution of dry-weather reconnaissance monitoring efforts across the region's stormwater monitoring programs. This type of monitoring is targeted specifically at source identification, and is contained only in the Orange and San Diego County programs. Source characterization monitoring is important and the model monitoring program is looking to integrate this design as an adaptive element, triggered by the extent and magnitude of impacts described in Table A1-3.

Table A1-6. Near-coastal monitoring efforts in each program.

Program	No. Sites	No. Events/Yr	Indicators	Notes
Ventura	-			
Los Angeles	50	1 / permit period	Sed chem, tox, benthic infauna	Paired sites at and beyond mouths of rivers Adaptive TIE
Long Beach	-			
Orange	0 8	 2 storm, 2 dry	 Water qual, tox	 Adaptive drain characterization and nearshore plume tracking
San Bernardino	-			
Riverside	-			
San Diego	-			

Table A1-7. Dry-weather reconnaissance monitoring efforts in each program.

Program	No. Sites	No. Events/Yr	Indicators	Notes
Ventura	-			
Los Angeles	-			
Long Beach	-			
Orange	40 58	5 / dry 5 / dry	Water qual	Adaptive source ID
San Bernardino	-			
Riverside	-			
San Diego	90 County > 500 cities	3 / per permit period 1 / per permit period	Water qual	Adaptive source ID

Summary and Discussion

The monitoring programs described above were designed and implemented to address issues specific to each county or city. Thus, many of the differences between the programs reflect a logical amount of variety, given the variability across the entire region in factors such as degree

of urbanization, type and amount of critical habitat, design of the MS4 system, and kinds of beneficial uses. However, there are other differences that are more arbitrary in nature, for example the frequency of sampling events, the analyte list, and whether to include a dry weather reconnaissance program. In addition, some programs have moved aggressively to include adaptive elements, while others have chosen designs that remain relatively constant across sampling events throughout the permit term.

In addition, the monitoring programs currently in place in the region have to some extent accreted over time, with new elements being added as permits are renewed. Thus, programs have not all been designed with the goal of addressing, in a logical and integrated way, the core management questions the technical committee has identified:

1. Are conditions in receiving water protective of beneficial uses?

1a. What are the mechanism(s) causing receiving water problems?

2. What is the extent and magnitude of the receiving water problems?
3. What is the relative urban runoff (both storm and non-storm, wet and dry) contribution to the receiving water problem(s)?
4. What are the sources of the urban runoff contribution to receiving water problems?
5. Are conditions in receiving waters getting better or worse?

As a result, information about the extent and magnitude of impacts on receiving waters is not always available, nor are loadings estimates (Question 3) that separate out the urban runoff component always an integral part of monitoring designs. In addition, upstream source identification efforts occur in some programs but not others, and are designed to different standards of rigor.

This overview of current monitoring practice provides a concrete starting point for two distinct but complementary considerations. First, the variety across programs provides insight into the breadth and flexibility the model program needs to encompass to be applicable to programs throughout the region. Second, the overview presents information needed for assessing what adjustments could be made to individual programs to bring them more into accord with the model monitoring program, once it is fully fleshed out. The model monitoring program must balance the desire for consistency, standardization, and regional efficiency with reasonable requirements for program-specific differences in design needed to address site-specific issues.

Appendix 2: Power Analysis Results

This appendix contains results of statistical power analyses for long-term trend with several types of historical monitoring data from southern California, including:

- Bacteria indicators at a high-priority recreational use area on Aliso Creek
- Bacteria indicators at stations upstream of the high-priority use area
- Bacteria loads from discharges upstream of the high-priority use area
- Bacteria impacts from discharges upstream of the high-priority use area
- Event mean concentrations (EMC) at a series of mass emissions stations
- Loads at a series of mass emissions stations.

Bacteria loads were calculated as the difference between indicator levels 25 feet upstream and 25 feet downstream of the discharge. The specific figures included in this appendix are listed in the following table:

Figure	Content
Fig A3.1	Aliso Creek, downstream use area power analysis results
Fig A3.2	Levels of bacterial indicators at upstream Aliso Creek stations
Fig A3.3	Power analysis results for bacteria loads at upstream Aliso Creek stations
Fig A3.4	Power analysis results for bacteria impact at upstream Aliso Creek stations
Fig A3.5	Power analysis results for EMC, Anaheim Barber Channel
Fig A3.6	Power analysis results for EMC, Westminster Channel
Fig A3.7	Power analysis results for EMC, Santa Ana Delhi Channel
Fig A3.8	Power analysis results for EMC, San Diego Creek at Campus
Fig A3.9	Power analysis results for EMC, Oso Creek
Fig A3.10	Power analysis results for loads, Anaheim Barber Channel
Fig A3.11	Power analysis results for loads, Westminster Channel
Fig A3.12	Power analysis results for loads, Santa Ana Delhi Channel
Fig A3.13	Power analysis results for loads, San Diego Creek at Campus
Fig A3.14	Power analysis results for loads, Oso Creek

In each figure, the X-axis shows the number of years over which monitoring may continue, the Y-axis the cumulative percent change to be detected, and the four curves options for the number of samples per year that could be taken. Thus, each figure shows the amount of change that could be detected (at a statistical power of 80%) at each combination of within- and between-year sampling intensity.

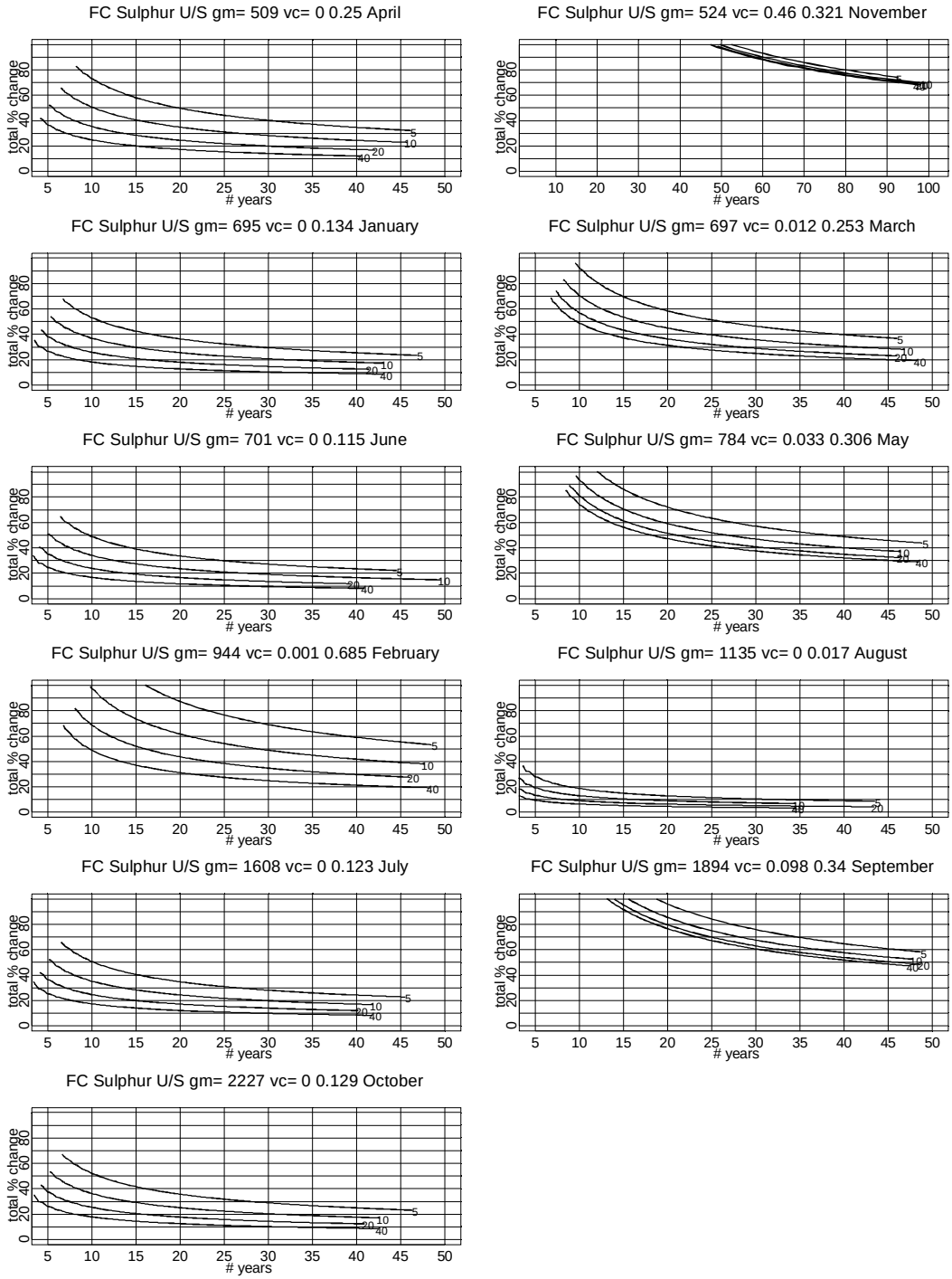

Figure A2.1a. Power analysis of a trend monitoring design at the AWMA ROAD Bridge, station Sulphur Creek upstream. The y-axis shows the amount of change detectable, the x-axis the years of sampling, and the different curves the number of samples in a given 30-day period (5, 10, 20, 40) needed for 80% power.

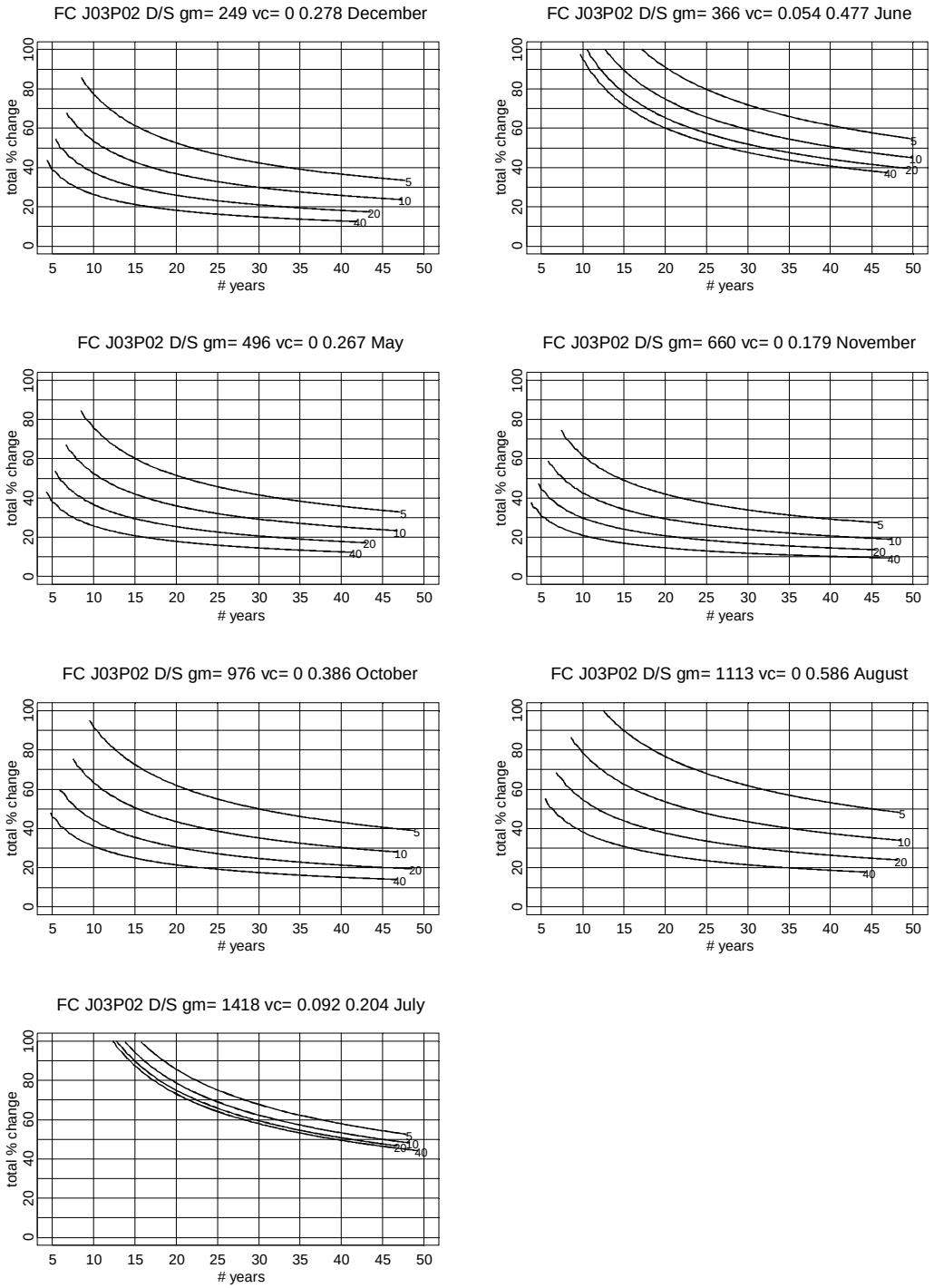

Figure A2.1b. Power analysis of a trend monitoring design at the confluence of Aliso and Sulphur Creeks, station J03P02 downstream. The y-axis shows the amount of change detectable, the x-axis the years of sampling, and the different curves the number of samples in a given 30-day period (5, 10, 20, 40) needed for 80% power.

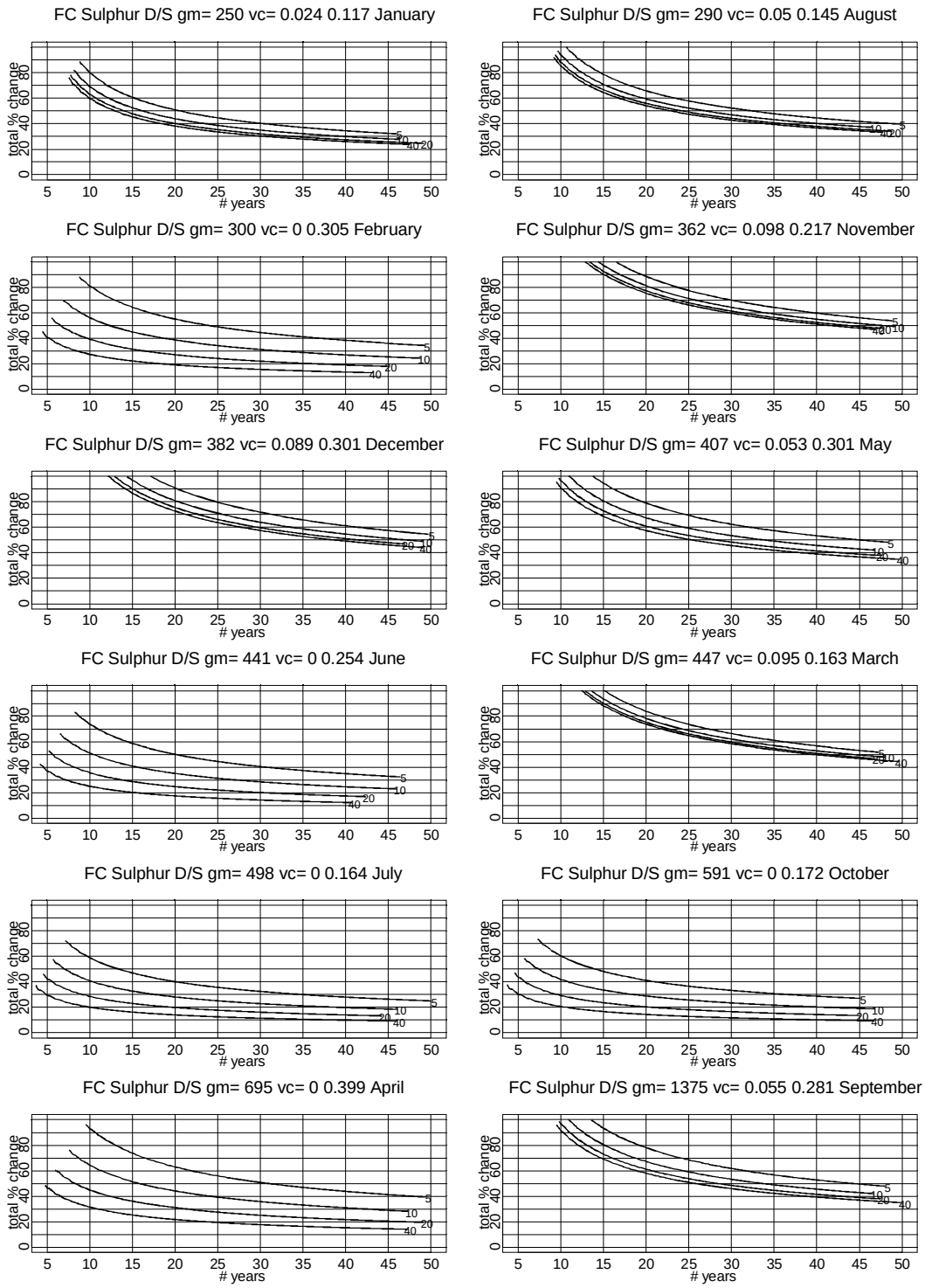

Figure A2.1c. Power analysis of a trend monitoring design at Aliso Wood Canyon Park, station Sulphur Creek downstream. The y-axis shows the amount of change detectable, the x-axis the years of sampling, and the different curves the number of samples in a given 30-day period (5, 10, 20, 40) needed for 80% power.

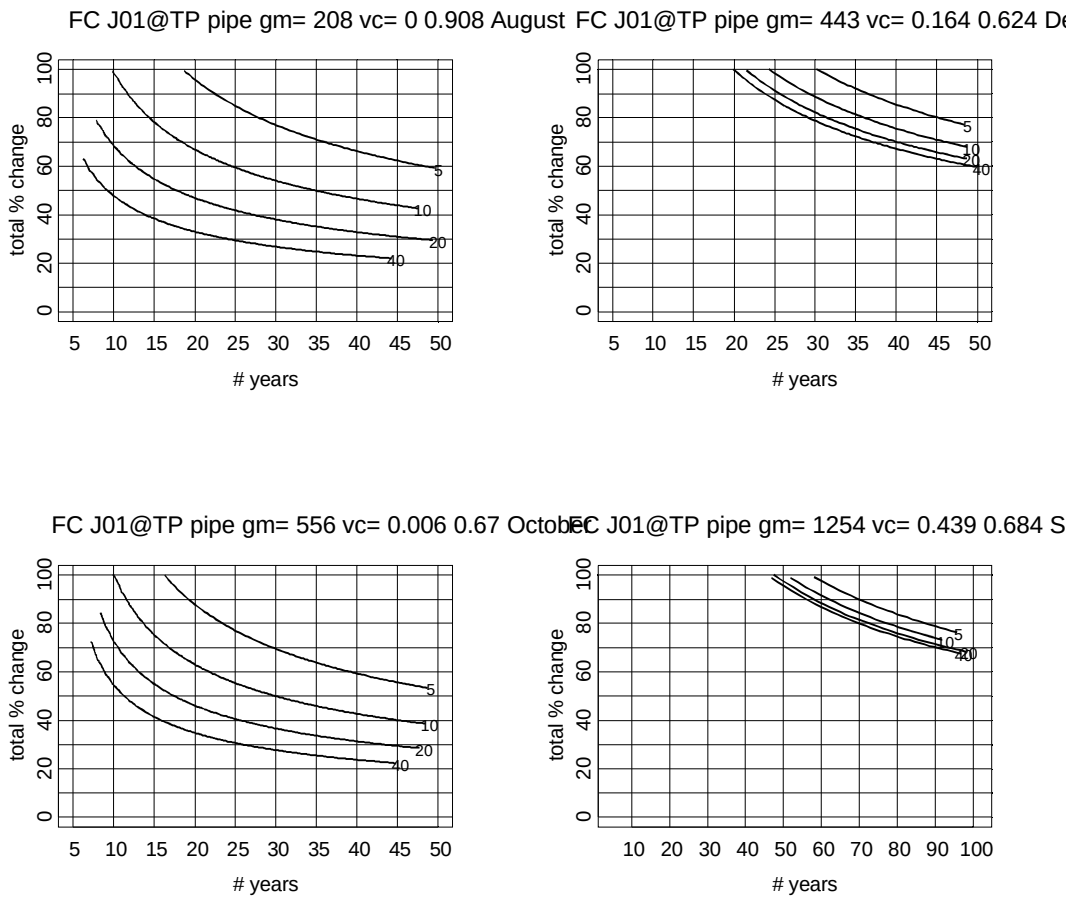

Figure A2.1d Power analysis of a trend monitoring design at the SOCWA treatment plant, station J01@TP. The y-axis shows the amount of change detectable, the x-axis the years of sampling, and the different curves the number of samples in a given 30-day period (5, 10, 20, 40) needed for 80% power.

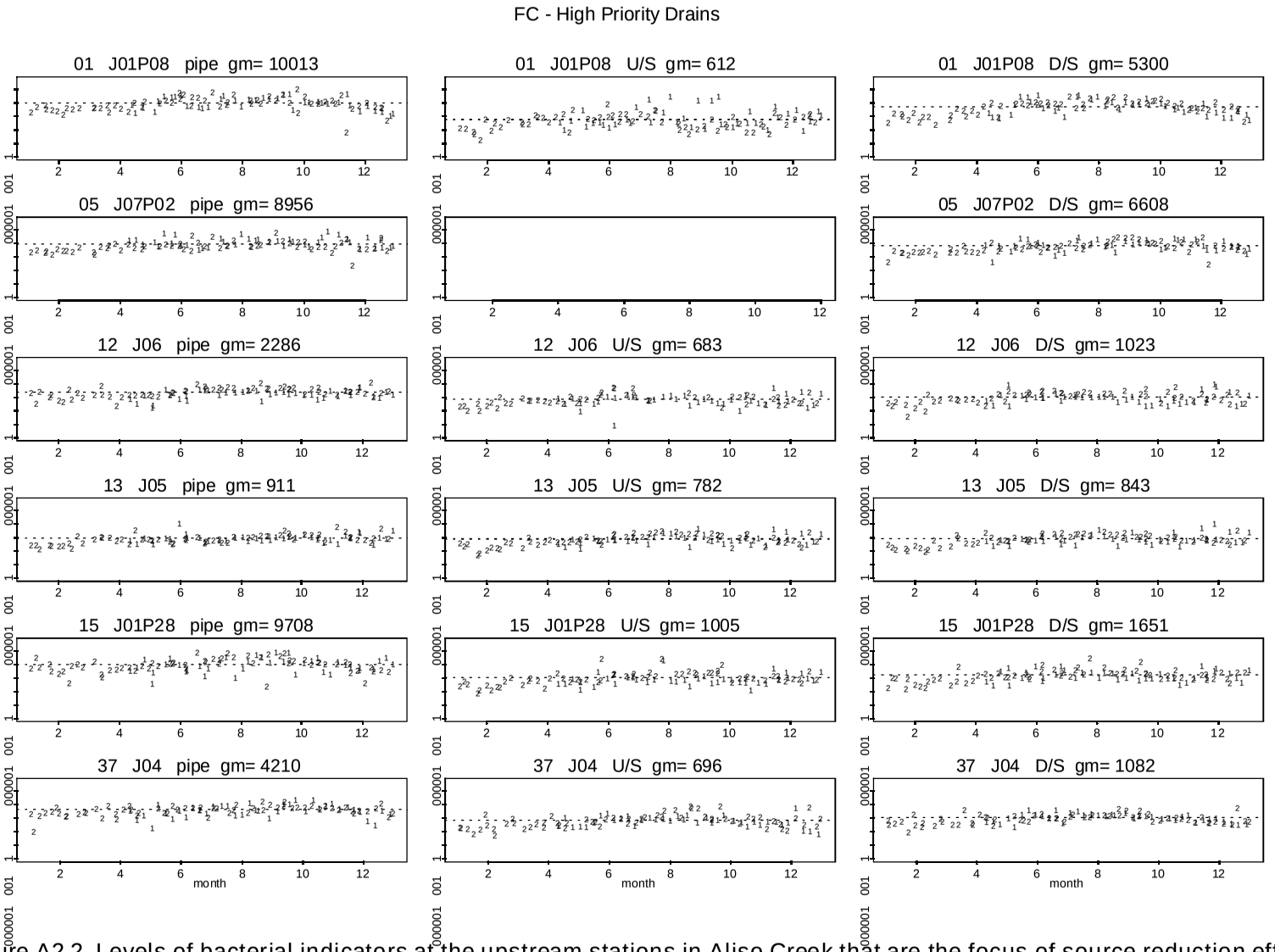

Figure A2.2. Levels of bacterial indicators at the upstream stations in Aliso Creek that are the focus of source reduction efforts.

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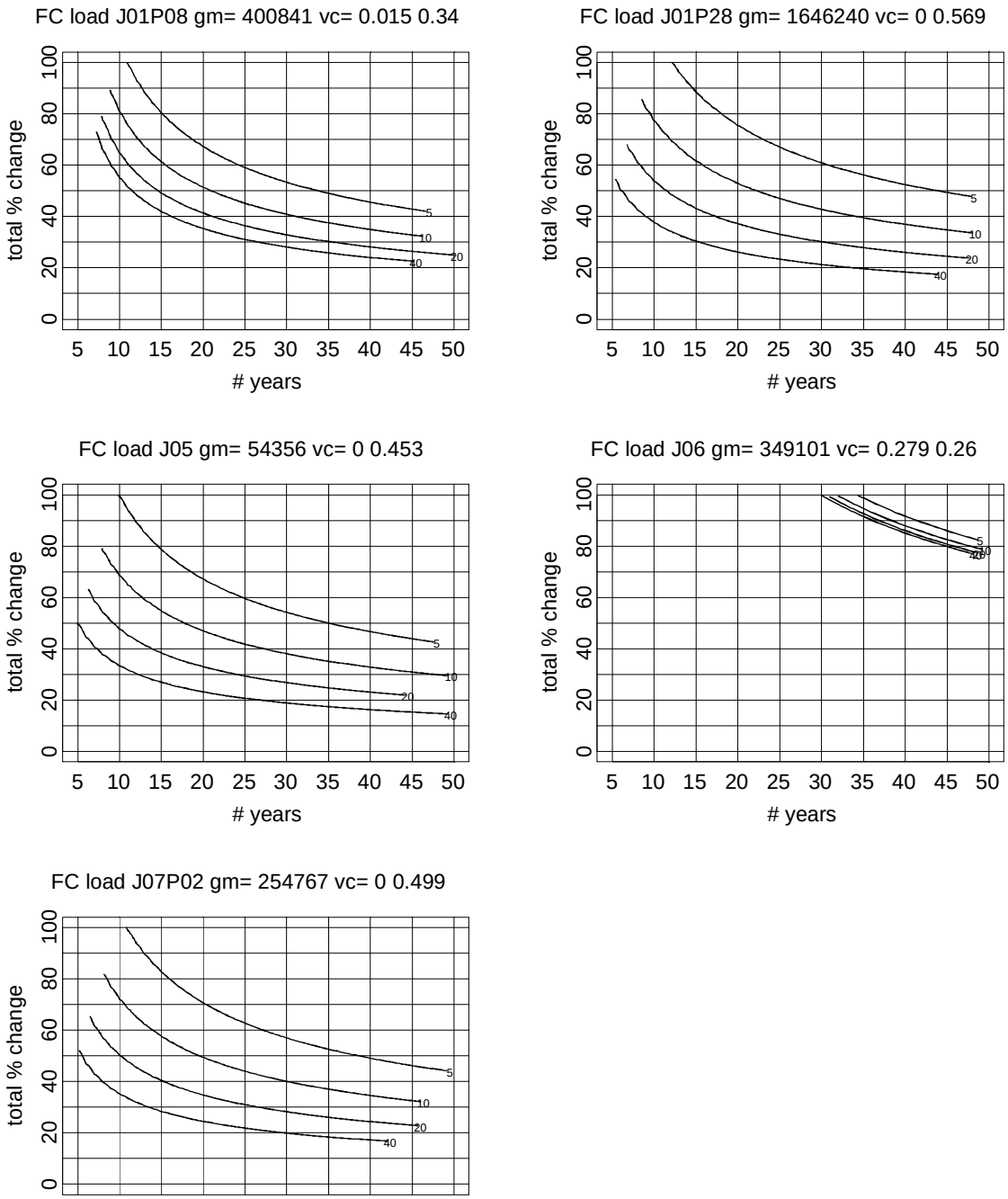

Figure A2.3. Statistical power analysis results of a trend monitoring design for bacterial loads at the upstream stations in Aliso Creek.

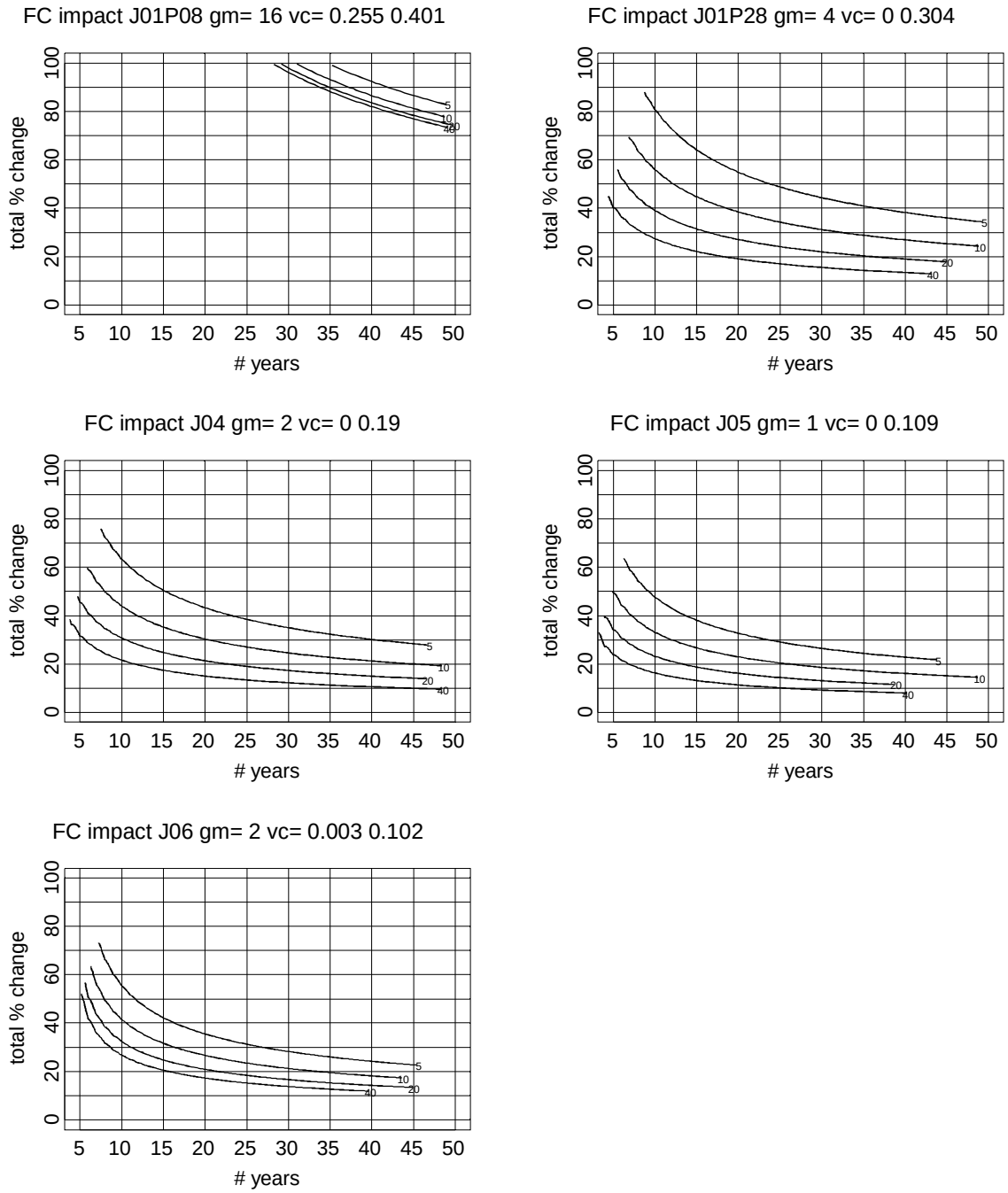

Figure A2.4. Statistical power analysis results of a trend monitoring design for receiving water impact (measured as the difference in bacterial levels between stations 25 feet upstream and downstream of the discharge point) at upstream stations in Aliso Creek.

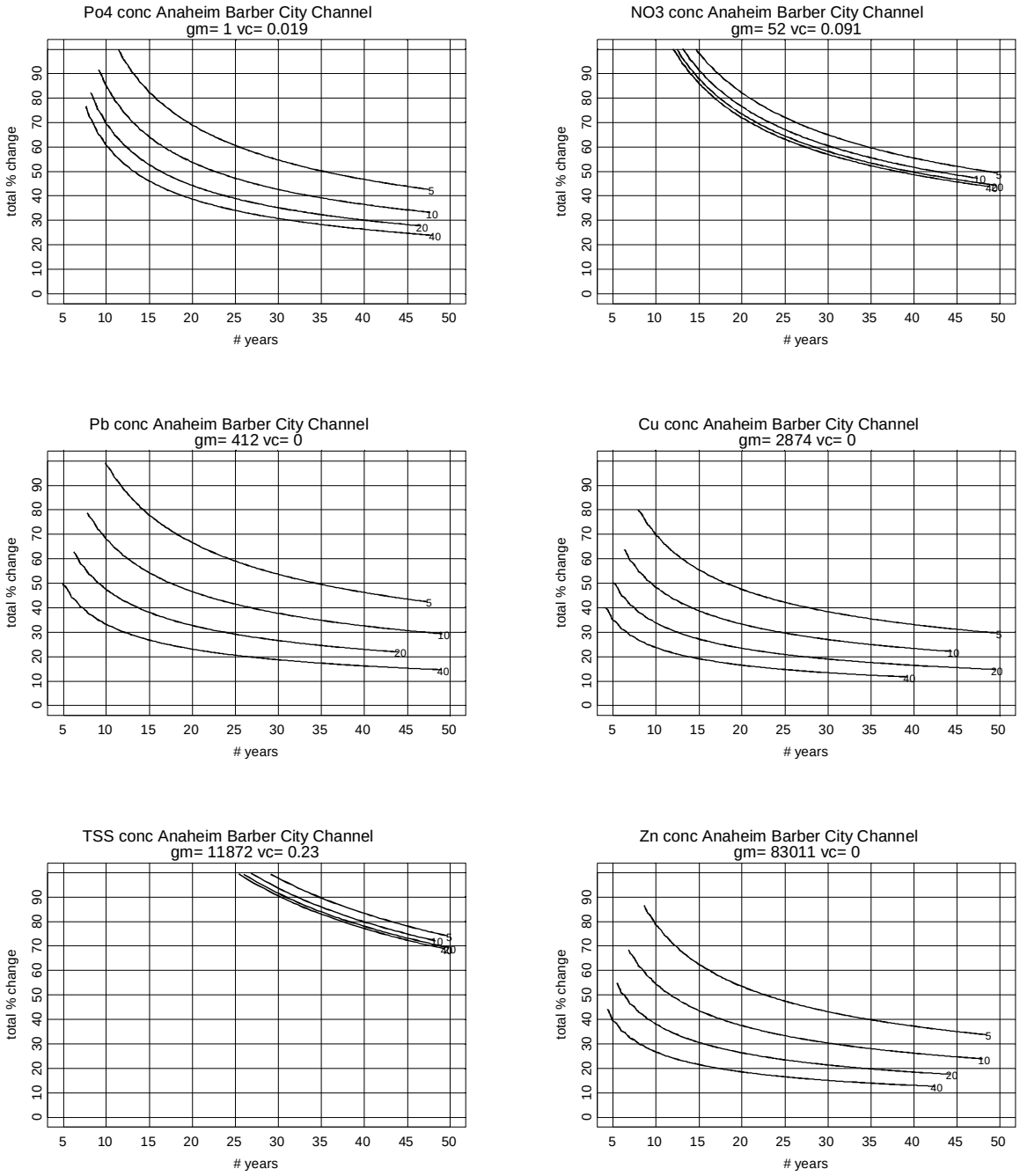

Figure A2.5. Statistical power analysis results for a trend monitoring design for event mean concentrations (EMC) of several parameters at Anaheim Barber City Channel, a long-term mass emissions station in Orange County.

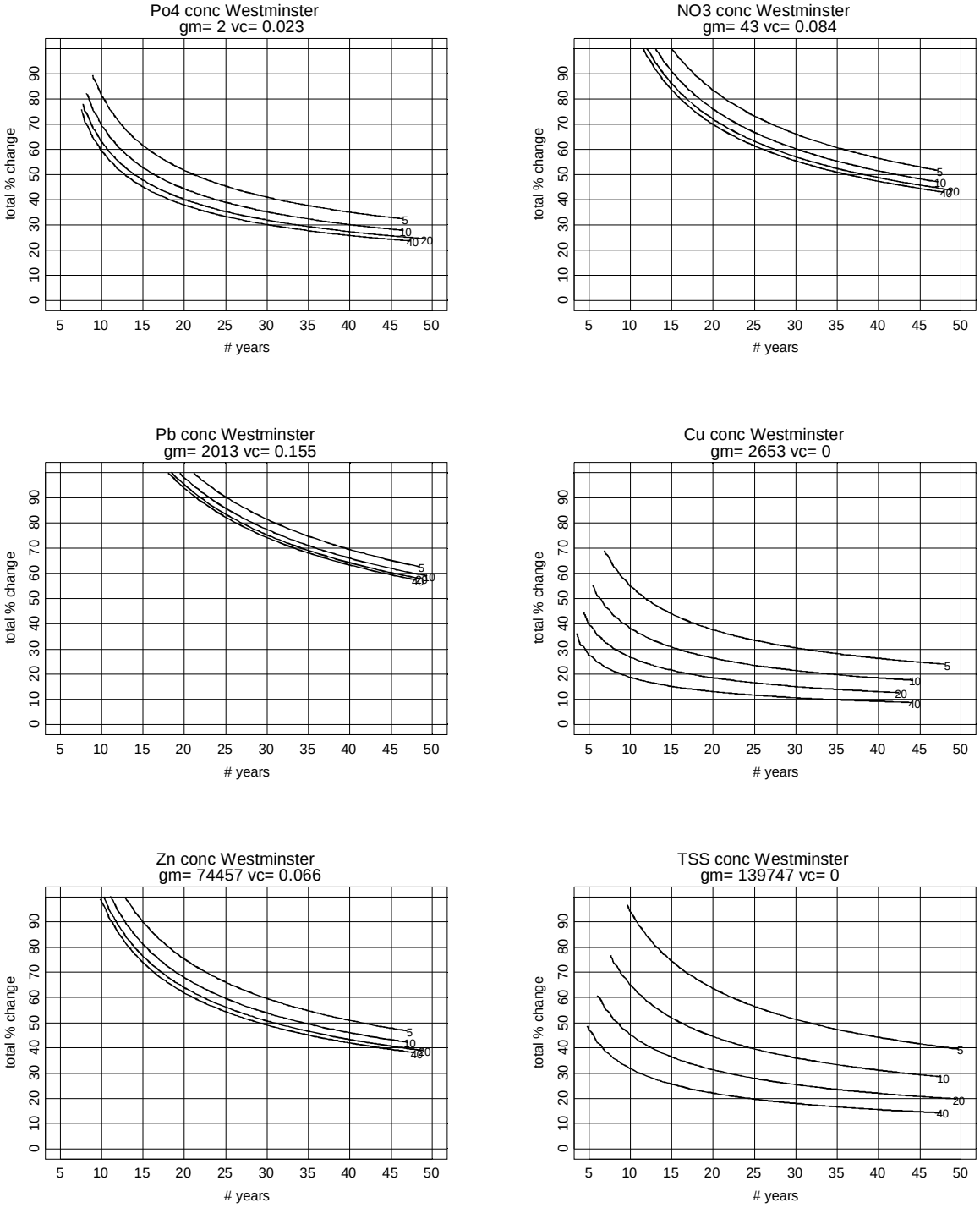

Figure A2.6. Statistical power analysis results for a trend monitoring design for event mean concentrations (EMC) of several parameters at Westminster Channel, a long-term mass emissions station in Orange County.

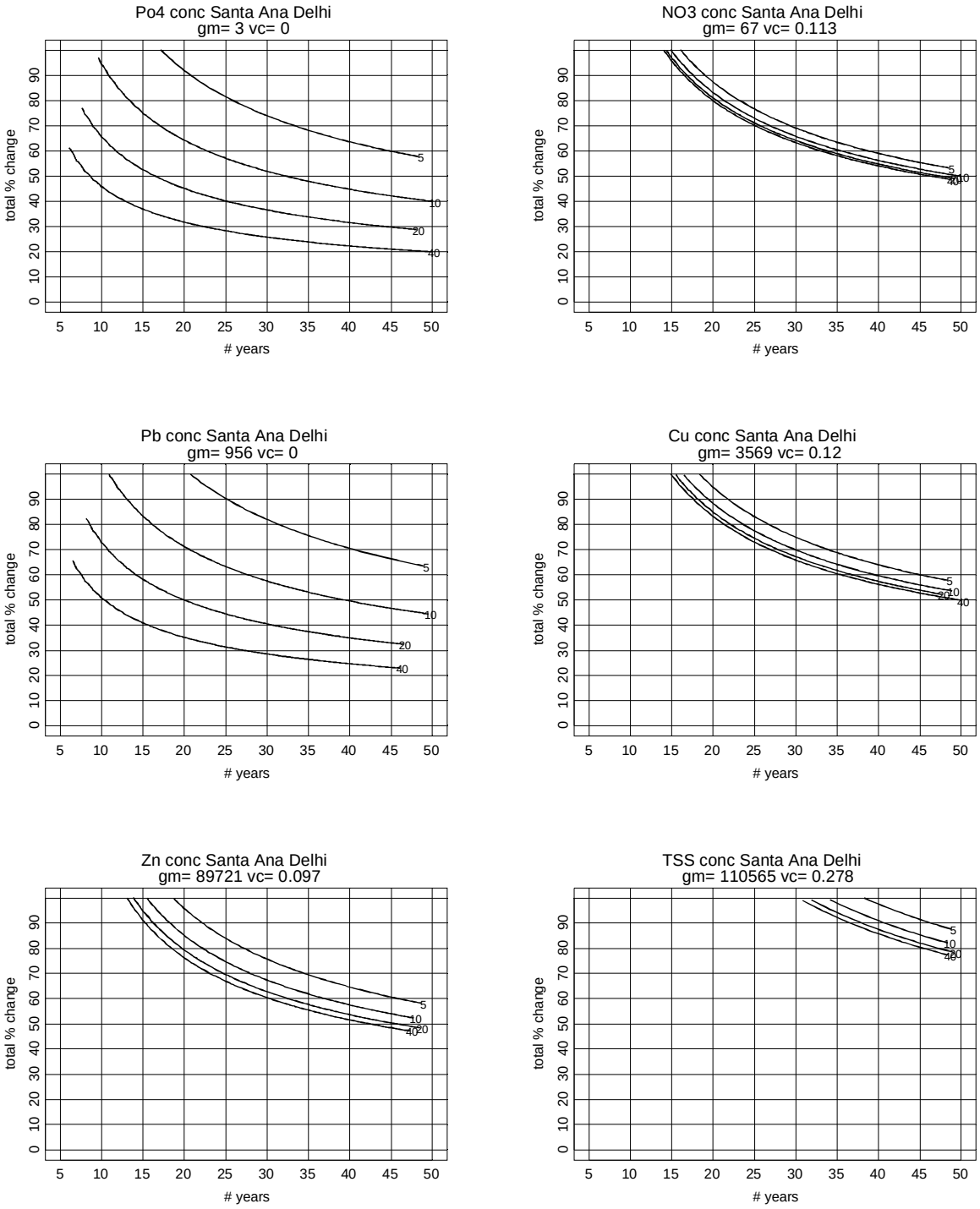

Figure A2.7. Statistical power analysis results for a trend monitoring design for event mean concentrations (EMC) of several parameters at Santa Ana Delhi Channel, a long-term mass emissions station in Orange Couinty.

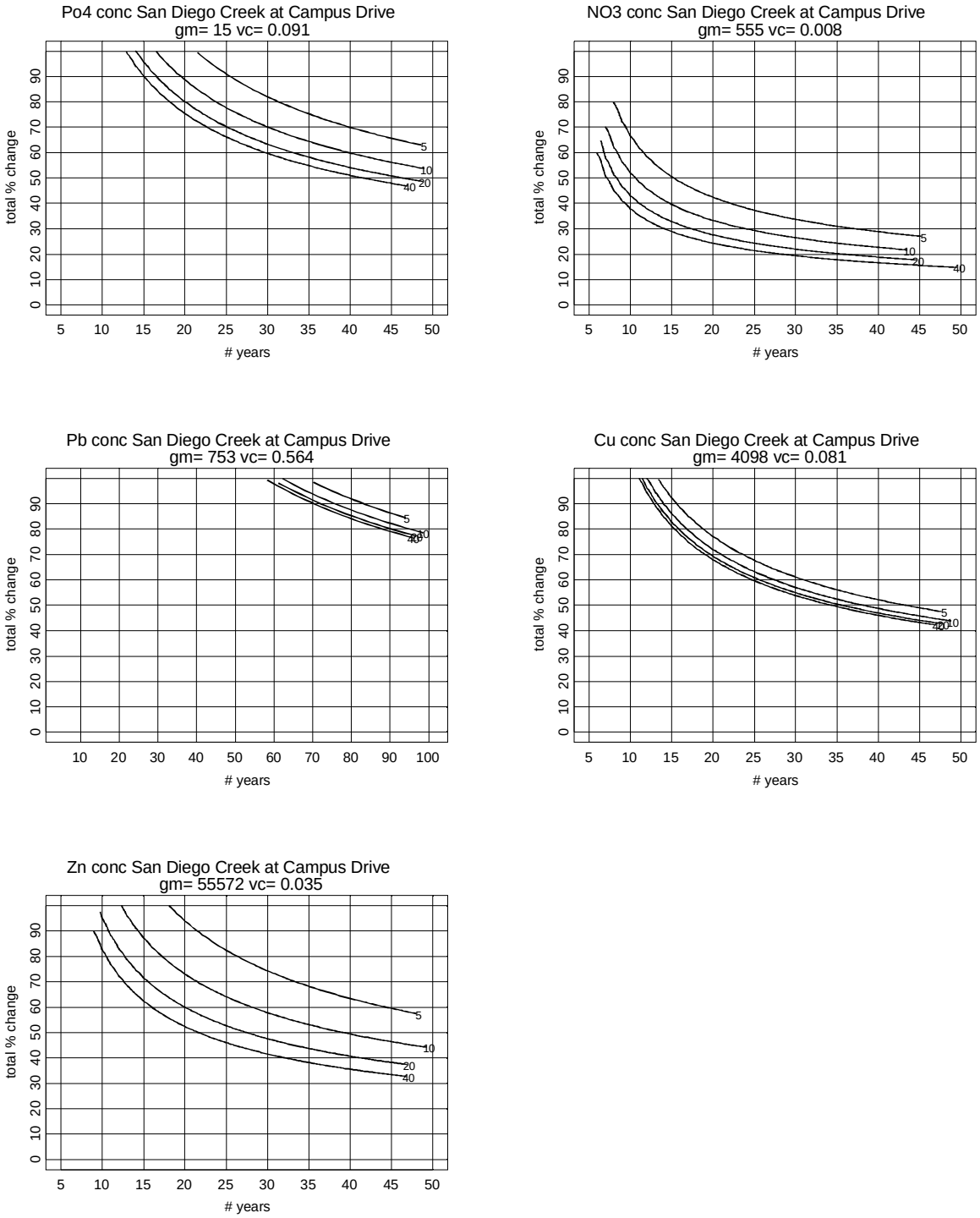

Figure A2.8. Statistical power analysis results for a trend monitoring design for event mean concentrations (EMC) of several parameters at San Diego Creek at Campus Drive, a long-term mass emissions station in Orange County.

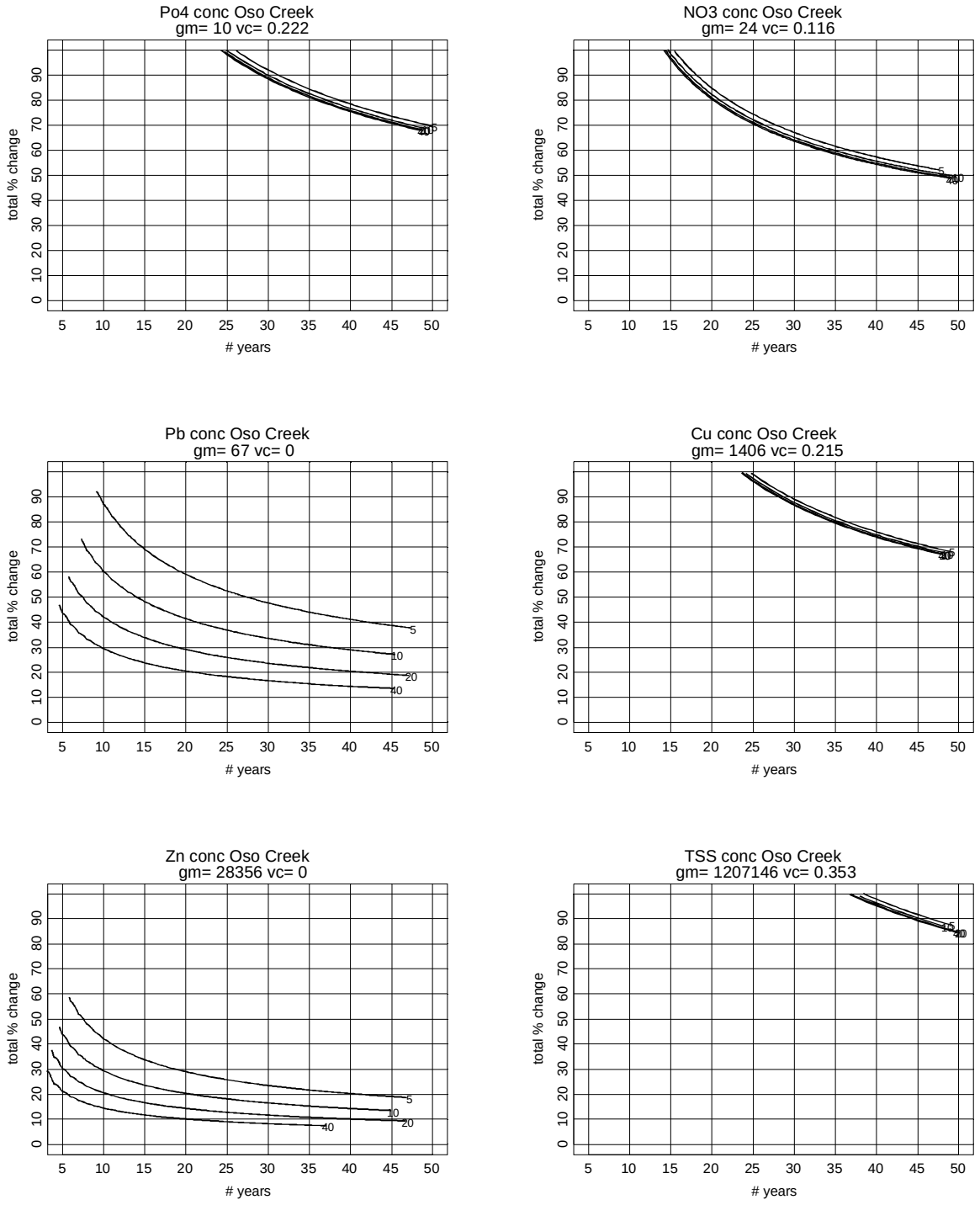

Figure A2.9. Statistical power analysis results for a trend monitoring design for event mean concentrations (EMC) of several parameters at Oso Creek, a long-term mass emissions station in Orange County.

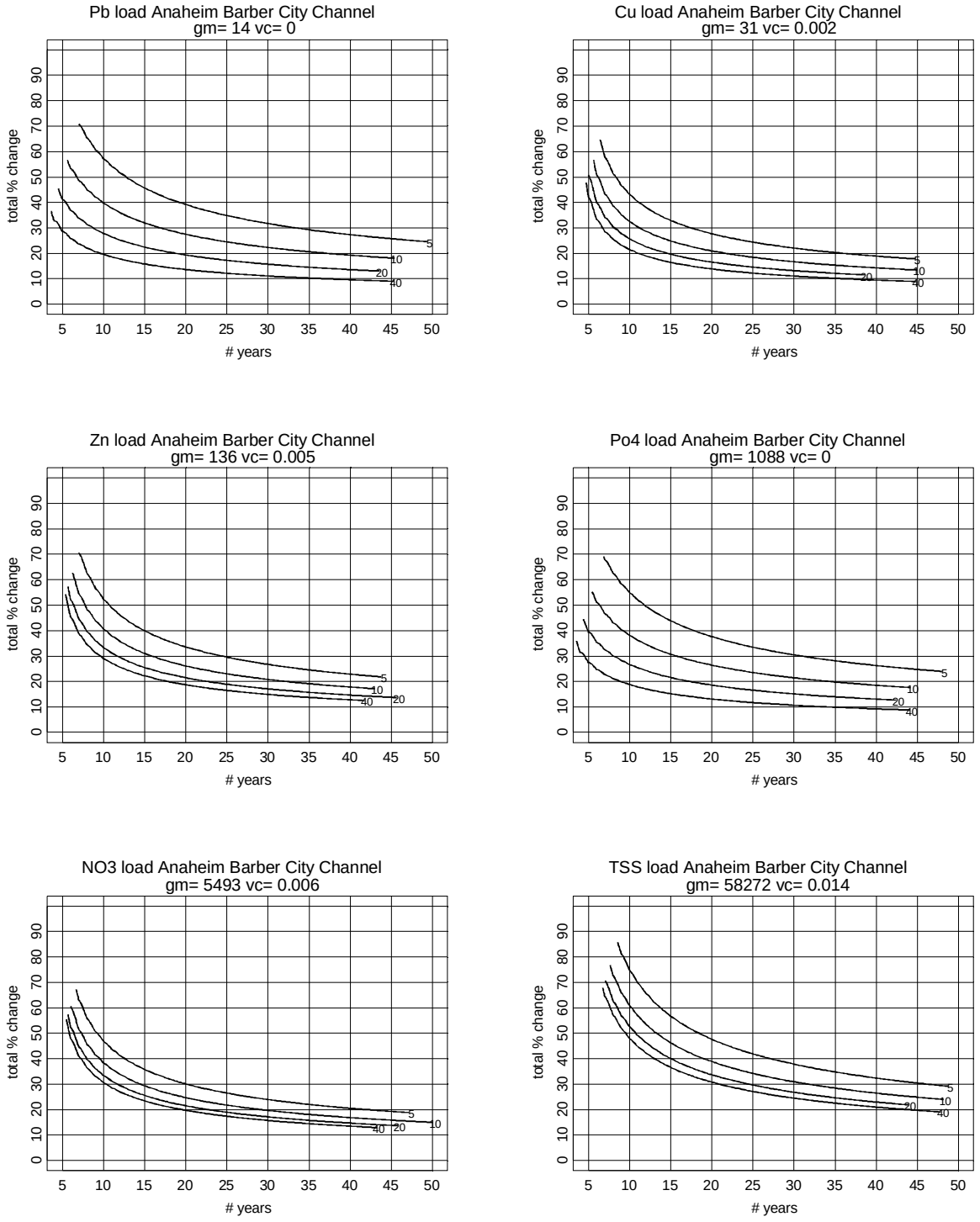

Figure A2.10. Statistical power analysis results for a trend monitoring design for loads of several parameters at Anaheim Barber Channel, a long-term mass emissions station in Orange County.

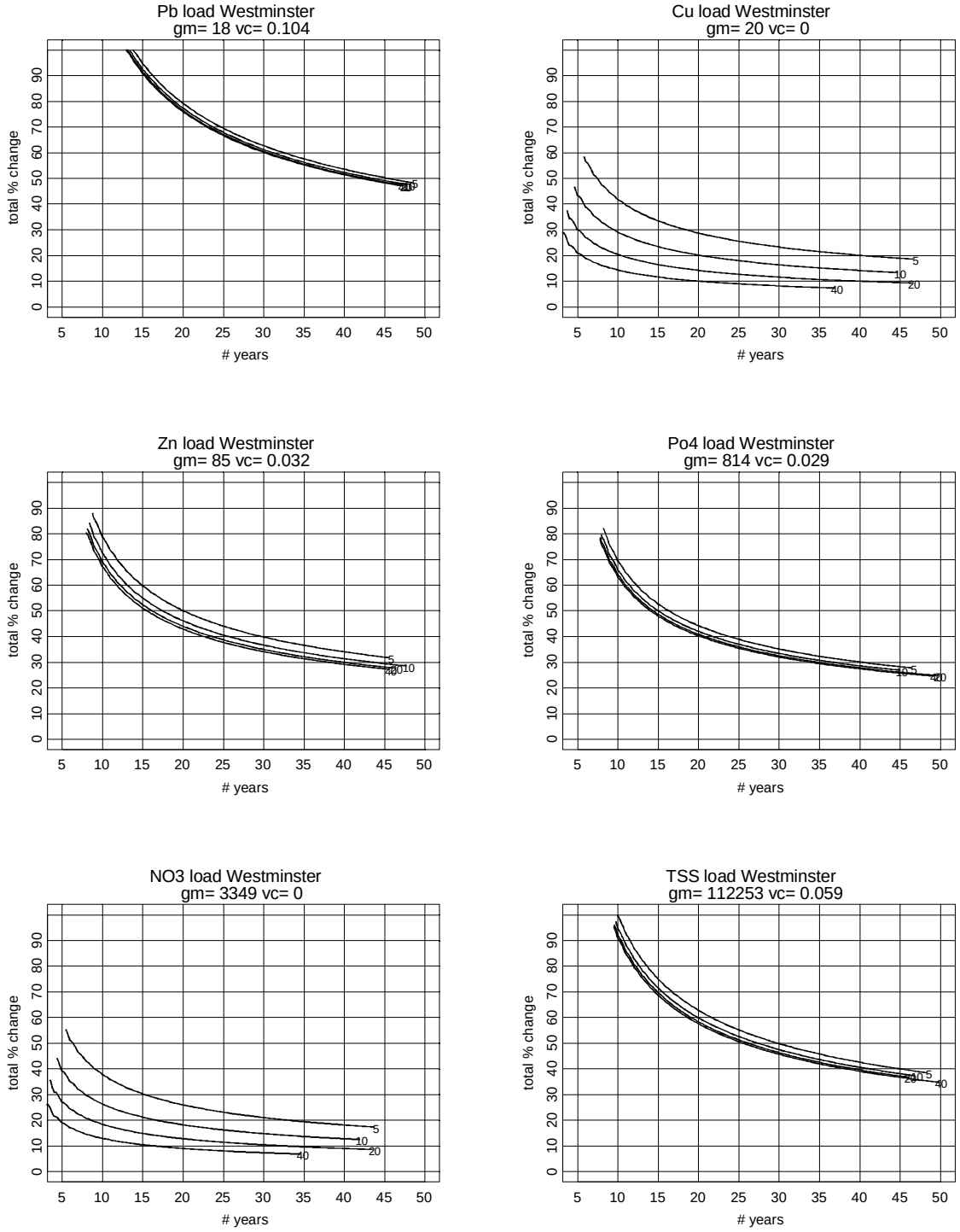

Figure A2.11. Statistical power analysis results for a trend monitoring design for loads of several parameters at Westminster Channel, a long-term mass emissions station in Orange County.

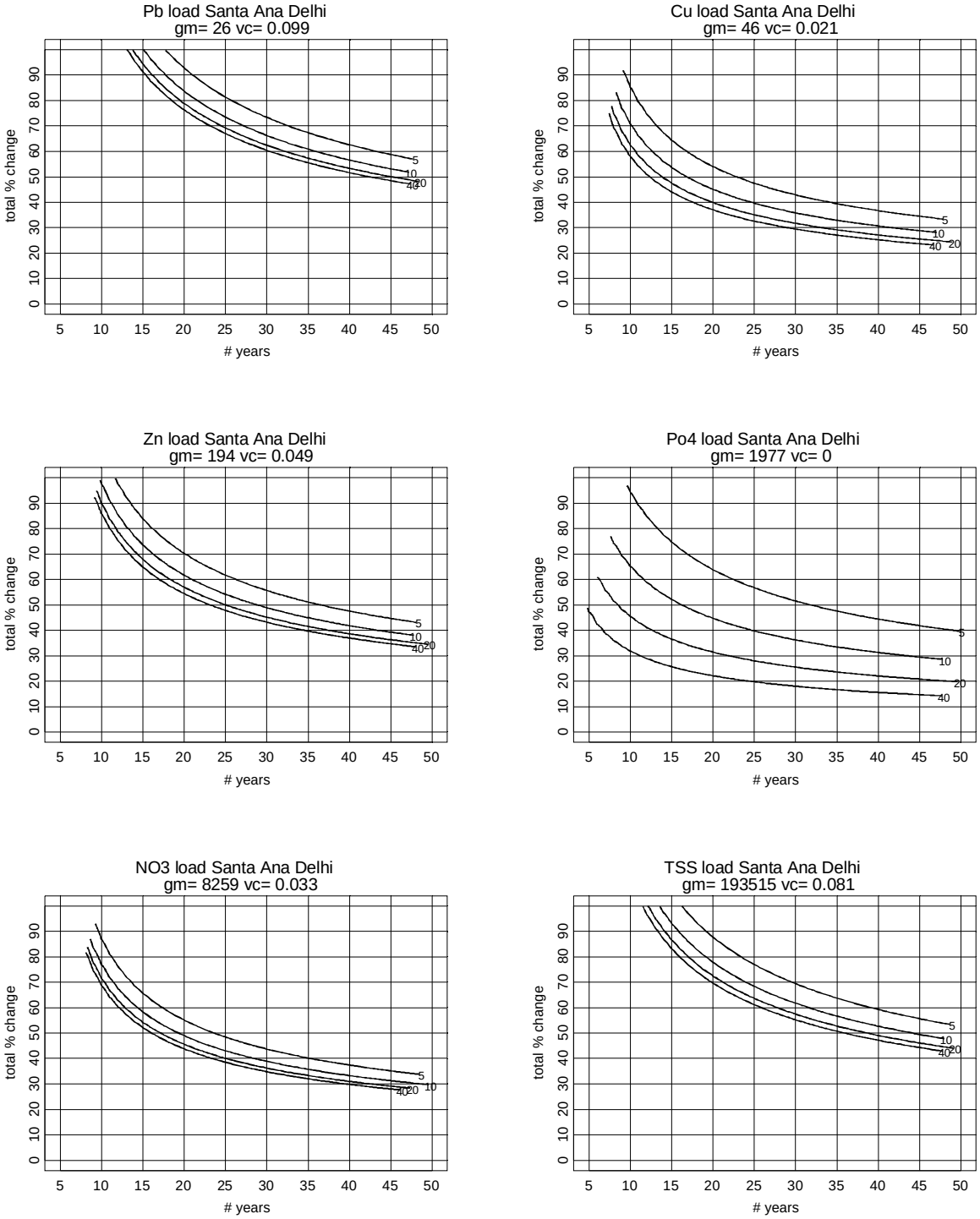

Figure A2.12. Statistical power analysis results for a trend monitoring design for loads of several parameters at Santa Ana Delhi Channel, a long-term mass emissions station in Orange County.

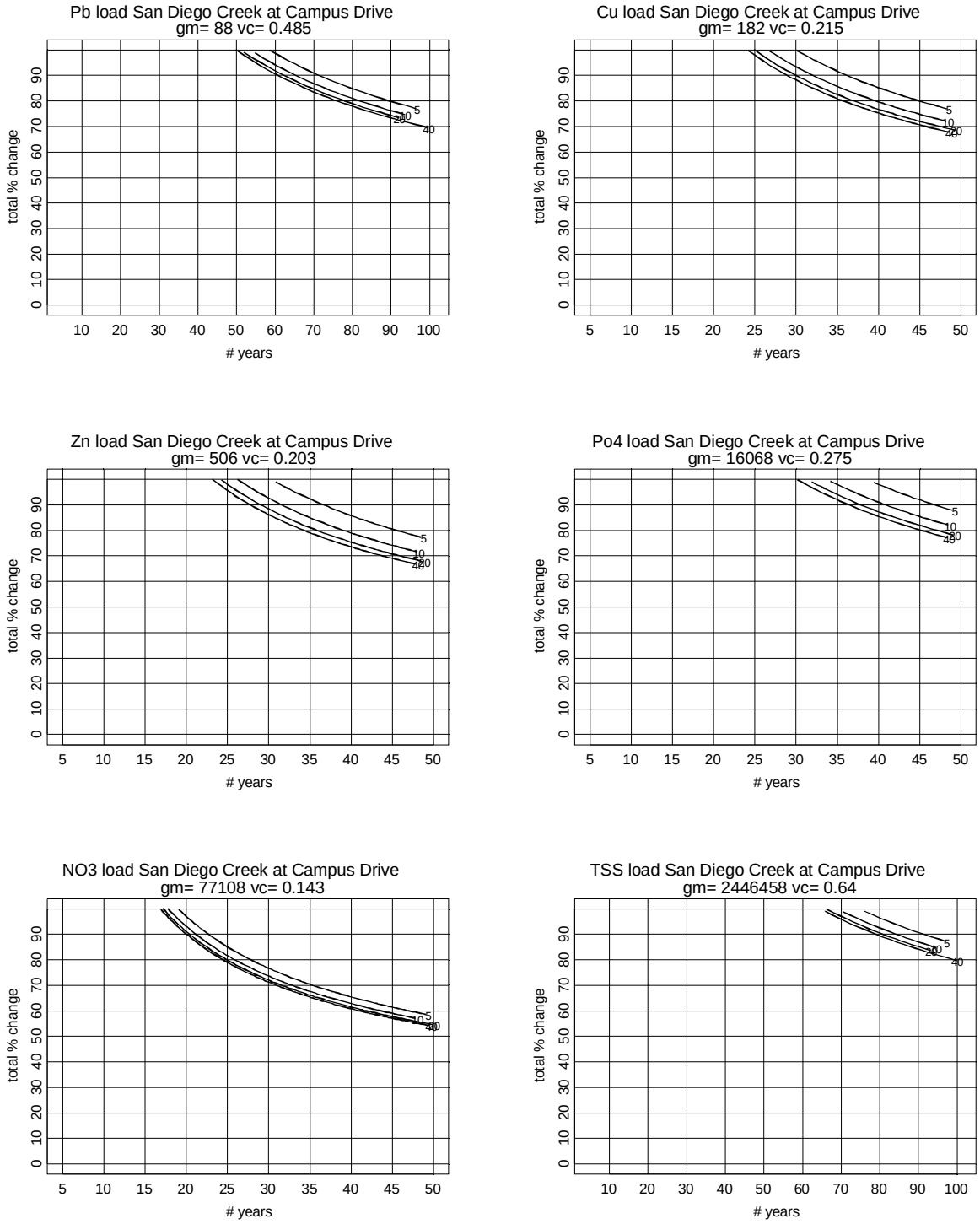

Figure A2.13. Statistical power analysis results for a trend monitoring design for loads of several parameters at San Diego Creek at Campus Drive, a long-term mass emissions station in Orange County.

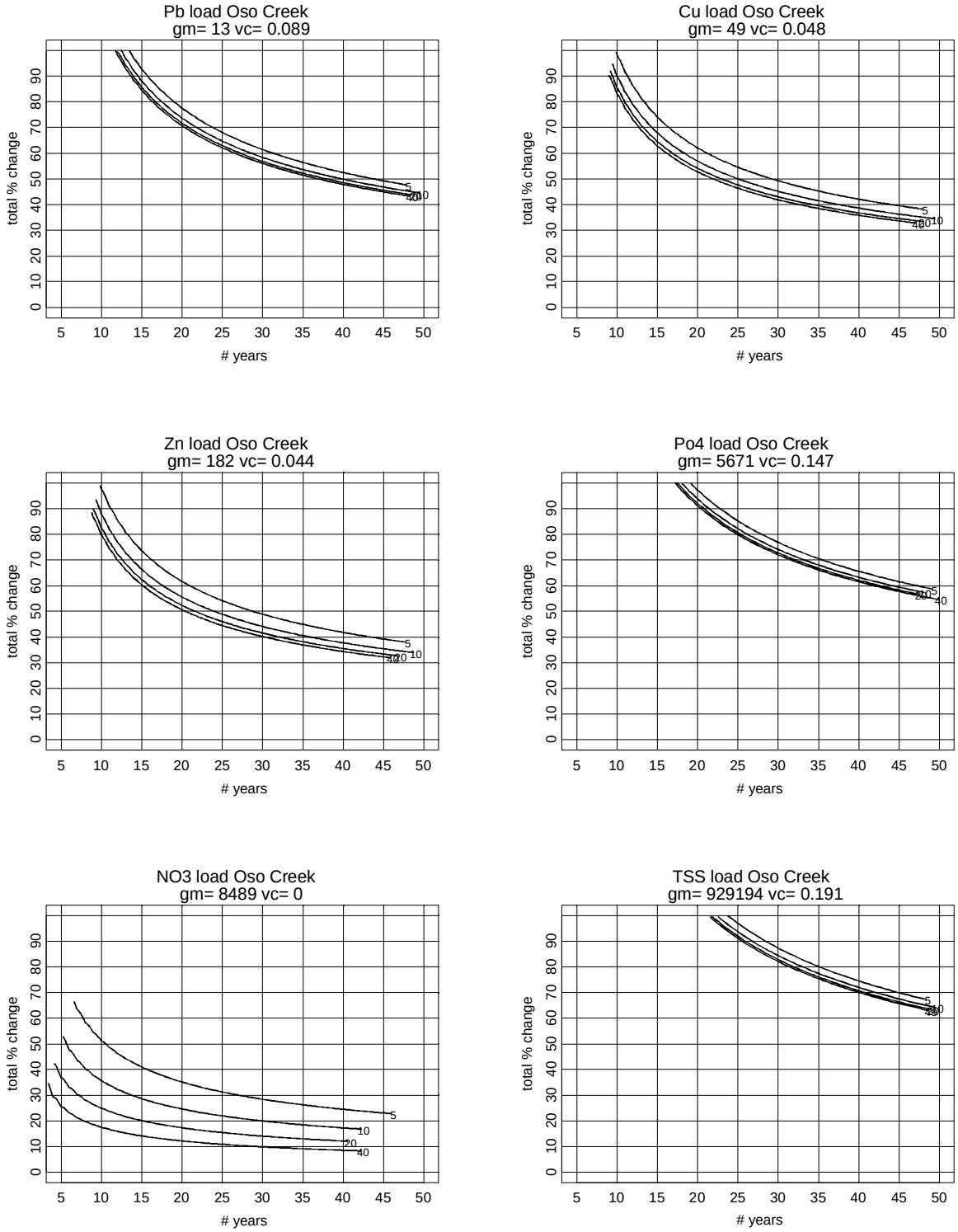

Figure A2.14. Statistical power analysis results for a trend monitoring design for loads of several parameters at Oso Creek, a long-term mass emissions station in Orange County.

Appendix 3: Source Identification Case Studies

The following case studies present examples of source identification efforts conducted to determine the rough proportion of input from urban runoff sources. They include several different kinds of problems and study approaches and exemplify the variety of methods that might be employed to address Question 3. The majority of the case studies were conducted in dry weather. This reflects difficulties of performing source identification studies in wet weather, given the large flow volumes and the typically increased number of possible sources. The cases also exhibit a range of level of effort, from evaluation of routine monitoring data and interviews to a series of iterative special field studies.

A3.1 Contaminated sediment taskforce (LA Harbor)

Sediments in ports, harbors, and marinas are subject to numerous pollutant inputs including sediments, trace metals, and organic contaminants. These sediments eventually need to be dredged to maintain navigable waterways, but the level of sediment contamination has a tremendous effect on the eventual disposal of these dredged materials. Clean sediments can be used for beach replenishment or even disposed at sea, but contaminated sediments need to be sent to a landfill or some other confined disposal area so they will not harm the environment. As the Port Districts, RWQCB and Coastal Commission (collectively known as the Contaminated Sediment Task Force) design a long-term dredged material management program, they are carefully considering ways to reduce the inputs of pollutants to the areas that need periodic maintenance dredging. One way to accomplish this is to identify and reduce or eliminate the sources of pollutants to these locations.

In order to begin reducing pollutant loads, the Contaminated Sediments Task Force asked SCCWRP to estimate the relative magnitude of pollutant loading from several potential sources to Los Angeles and Long Beach Harbors and Marina del Rey. A particular emphasis of the study was estimating loads from the Los Angeles River and Dominguez Channel to San Pedro Bay and from Ballona Creek to Marina del Rey. Primary questions addressed included:

- What are the predominant sources of contaminants?
- What are the long-term (i.e. decadal) trends in annual loading?
- What is the typical range of annual loading that should be expected?
- Which watersheds typically contribute the greatest annual loading?
- What land use types are the largest contributors to annual loading?

These questions were evaluated with an assessment study that involved existing data and limited modeling to estimate watershed loading patterns. Because historic data were somewhat limited, SCCWRP estimated loads with a ratio estimation technique. This involves establishing a relationship between flow and loads using available data and then applying this relationship to an entire storm season. Flow was estimated by applying rainfall data and standard runoff coefficients to different land use types. This combination of methods allowed loads to be approximated for a variety of land uses for entire years in the periods 1971-72, 1979-80, 1986-87, and 1987-88.

The analysis confirmed that the largest source of contamination to San Pedro Bay is watershed-derived loading from the Los Angeles River and Dominguez Channel watersheds. The Los Angeles River watershed contributed the greatest overall mass loading, but the Dominguez Channel watershed contributed the largest proportional loading (i.e. loading normalized for

watershed size). In general, industrial and residential land uses are the largest contributors of contaminants. Data from the 1990s also revealed that dry season (i.e. non-storm) loading may make up a significant portion of total annual loading, and in dry years, can be the predominant source of contaminants to the harbor. Analysis of temporal trends in the data showed that metals loading has not substantially changed since the 1970s, but loading of DDT and PCBs has declined.

Annual loadings of metals varied between 10^3 and 10^5 kg/year, with zinc and copper loading typically exceeding loads of other metals. Variations in annual loading appear to correspond with changes in rainfall and runoff; however, direct analysis of the relationship between rainfall intensity and duration and loading produced only weak correlation coefficients. This correlation would likely be improved by analyzing a larger data set on more homogenous land use types.

Because the study depended on available data, not all possible sources of loading could be evaluated and key data gaps remained. These included the lack of data on loading of PAH and pesticides, lack of long-term data on dry season loading, lack of information on inputs from the Dominguez Channel Watershed, and the need for more temporally resolved loading data from specific land use types. Information on the transport and fate of runoff-derived contaminants within the study area would also be needed to improve estimates of the impact of loadings on sediment contamination.

Summary based on SCCWRP Technical Report #143. Watershed-based sources of contaminants to San Pedro Bay and Marina del Rey: Patterns and trends. October 13, 2003. ftp://ftp.sccwrp.org/pub/download/PDFs/413_cstf_watershed.pdf

A3.2 Elevated total dissolved solids in Prima and Segunda Deshecha channels (Orange County)

Routine monitoring during the 2001-2002 monitoring year documented elevated levels of total dissolved solids (TDS) at monitoring stations in Prima and Segunda Deshecha channels in Orange County. Special studies involving hourly measurements of conductivity and flow rate, conducted in both channels, showed that the peak TDS concentration was not a function of tide (i.e., did not reflect a higher concentration of saltwater) and that the TDS concentration was inversely proportional to flow rate in the channel (see the figure below).

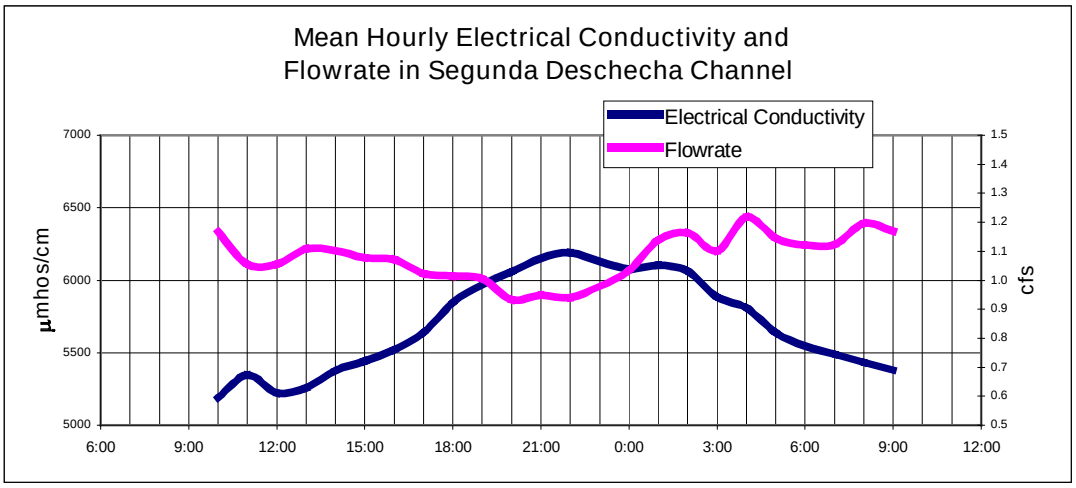

This strongly suggested that urban runoff diluted a naturally high level of dissolved solids in the channels. Subsequent to this finding, an upstream reconnaissance survey identified the presence of hundreds of weepholes in the concrete sidewalls of the channel. These weepholes appeared to be allowing subsurface drainage to leach salts from soils and carry them into the channel. Preliminary sampling of three weepholes during the reconnaissance survey showed them to have extremely high levels of electrical conductivity, an indicator of TDS. In addition, the crystalline residue on the channel walls near the routine monitoring location was found to have high concentrations of sodium and soluble sulfate.

These findings provided the basis for a more substantial upstream source identification study in the Prima Deshecha channel in March 2002 that included monitoring at several weepholes, as well as upstream and downstream of the weepholes. The resulting data (see following table) indicate that the seepage from the channel seams and weepholes increases the concentrations of dissolved solids in the channel downstream of the seepage.

Reach of Channel	Time	Monitoring Point	EC (µmhos)	TDS (mg/L)
At Diamante	13:00	Prima Deshecha Channel (M01)	Dry	
At Calle Nuevo	13:40	M01	5,150	
u/s Avenida Vacquero	14:48	M01 50' u/s weeping seam	5,510	4,880
	14:45	weeping seam	19,870	18,900
	14:42	M01 50' d/s weeping seam	7,510	7,330
	14:50	36" pipe discharging to M01	3,800	
d/s I-5	15:20	M01 in Shorecliff Golf Course	7,550	
u/s Calle Grande Vista	15:37	M01 50' u/s bubbling weepholes	7,750	7,490
	15:34	Bubbling weepholes	14,480	12,800
	15:40	48"pipe discharging to M01, 20' d/s weepholes	5,850	
At Calle Grande Vista	15:30	M01	8,480	

The conclusion was corroborated by soil samples collected from the levee of the Prima Deshecha channel above a weeping seam and from the levee of San Juan Creek, a channel with no history of elevated TDS levels (see following table).

Location	Chloride	Soluble Sulfate	Calcium	Magnesium	Potassium	Sodium
	mg/kg	%	mg/kg	mg/kg	mg/kg	mg/kg
Prima Deshecha Ch. Levee	61.3	0.447	861	275	37.2	582
San Juan Creek levee	13/7	0.048	34.1	11.1	15.4	202

Information obtained from the 2001-2002 annual report of the Orange County Stormwater Program

A3.3 SCCWRP's study of sources of loads to the LA River

The Los Angeles River drains most of Los Angeles County and extends 56 miles, starting from its headwaters in the San Fernando Valley, flowing past downtown Los Angeles, and eventually draining to San Pedro Bay near Long Beach. The highly developed watershed is 834 mi^2 and is comprised of residential (35%), commercial (5%), industrial (8%), and open land (51%) uses. The river's mainstem and tributaries are listed as impaired waterbodies for many constituents including nutrients (N), bacteria (fecal coliform), and trace metals (copper, lead, and zinc). The three primary sources of these pollutants included water reclamation plants (WRPs), major

tributaries, and storm drain outfalls. As part of efforts to establish TMDLs for the river, SCCWRP conducted a short-term study to characterize the water quality in the Los Angeles River and the various loads to the system.

This study was comprised of two parts. The first identified and sampled the inputs to the Los Angeles River and major tributaries. The second sampled the mainstem of the river to assess spatial distributions of water quality. The input monitoring was conducted using citizen volunteers while the spatial distribution monitoring was conducting using professionals. Visual observations were made of the outfall size and location, flow, and general characteristics (such as water discoloration; the presence of foam or oily sheens, trash or algae; and water quality). Flow was measured using either timed-volumetric or depth-velocity methods.

Water quality parameters included flow, total suspended solids (TSS), total organic carbon (TOC), biological oxygen demand (BOD5), nutrients (nitrate, nitrite, ammonia, TKN, and total phosphorous), and trace metals (cadmium, chromium, copper, iron, lead, nickel, mercury, and zinc). Sampling was accomplished on September 11, 2000 and included eight locations along the mainstem of the Los Angeles River and at the head of all seven tributaries Existing flow gages maintained by the Los Angeles County Department of Public Works provided flow information.

Table A3-3 shows the relative magnitude of the various inputs to the LA River. The majority of the dry weather flow in the river arose from the three inland POTW discharges in this watershed. In accordance, POTWs were the largest source of nutrients and some trace metals. In contrast, storm drains were the major source of bacteria and the remaining trace metals during dry weather. This preliminary sampling effort provided data sufficient to characterize the relative contributions of the major sources of pollutant loads to the system and a basis for more detailed source identification and loadings studies in the future.

Table A3-3. Total pollutant loads and the relative contributions among major sources to theLos Angeles River on September 10-11, 2000.

Constituent		Total Mass Emissions	Units	% Contribution POTWs	Tributaries	Storm Drains
Bacteria						
	E. coli	12,022	(10^9)/day	0	11	89
	Enterococcus	2,948	(10^9)/day	0	33	67
	Total Coliforms	113,854	(10^9)/day	1	65	35
Metals						
	Copper	3.7	kg/day	73	22	6
	Iron	39	kg/day	4	23	73
	Lead	0.53	kg/day	0	54	46
	Nickel	0.19	kg/day	0	0	100
	Zinc	11	kg/day	79	17	4
Nutrients						
	Ammonia-N3, 357		85	14	0	34
	Nitrate-N		kg/day	32	35	2
	TKN		kg/day	82	17	2
	Total Phosphate-P		kg/day	82	15	3

Ackerman, D., K. Schiff, H. Trim, and M. Mullin. 2003. Characterization of water quality in the Los Angeles River. *Bulletin of the Southern California Academy of Sciences* 102:17-25 or at ftp://ftp.sccwrp.org/pub/download/PDFs/2001_02ANNUALREPORT/08_ar08-drew.pdf.

A3.4 Elevated levels of diazinon in Bouquet Canyon Creek (Los Angeles County)

Toxicity tests conducted in late 2001 on water from Bouquet Canyon Creek documented elevated toxicity (4 – 5 toxic units). Subsequent TIEs showed the toxicity to be due primarily to diazinon, and water samples collected through late 2002 from inputs to the Creek (tributaries and storm drains) showed extremely high levels of diazinon (as high as 4000 ng/l). Following these findings, the Regional Board instructed Los Angeles County and the City of Santa Clarita to investigate the potential sources of diazinon and to eliminate any illicit discharges found.

By late November 2002, preliminary reconnaissance efforts, which included qualitative land use characterization) had identified several potential sources, including homeowner associations, exterminator companies, landscaping companies, and discharge outfalls. These efforts, including review of sales reports from hardware stores, suggested that there was no dominant single source of diazinon but, rather, that the diazinon contamination stemmed from widespread use by residents in the area. This conclusion led to the implementation of an aggressive pollution prevention approach in the area.

Monitoring continued at several key sites in parallel with the ongoing pollution prevention efforts. Monitoring data showed that, through March 2003, diazinon levels had dropped substantially (see following table), although some levels remained above the California Department of Fish and Game acute (0.08 ug/l) and chronic (0.05 ug/l) water quality criteria for diazinon.

Sample date	NR1	NR5	S2	S3	S7
08/28/02	5.698[1]	No data	4.214	No data	No data
10/16/02	0.95	3.76	1.19	0.46	0.53
11/20/02	0.20	0.02	0.17	No sample	No sample
01/14/03	0.34	No sample	0.16	0.41	0.31
02/03/03	0.05	No sample	0.04	0.08	0.08
03/05/03	0.15	No sample	0.10	0.22	0.08

[1] All data values reported as ug/l

The City of Santa Clarita is continuing with their educational outreach program, as part of ongoing pollution prevention efforts, to reduce diazinon levels to below State standards.

Information obtained from correspondence between the Los Angeles Regional Water Quality Control Board and the City of Santa Clarita.

A3.5 Elevated ammonia in Calleguas Creek stormwater flow (Ventura County)

Routine monitoring during the November 2001 detected an extremely high value of ammonia (52 mg/l) in Calleguas Creek. After the value was confirmed by reanalysis at the chemistry laboratory, Program staff conducted reconnaissance in the Calleguas watershed to attempt to identify the source of the ammonia. The reconnaissance was carried through in-person and telephone interviews to assess uses of ammonia in the watershed, which has a large percentage of agricultural land use. These interviews revealed that celery farmers typically inject ammonia into celery during wet weather to prevent the celery from becoming pithy.

Based on this information, the Program established five additional sites at the confluence of tributaries and at the inputs of major drains entering the creek from agricultural lands. This

sampling, conducted in dry weather, found no additional "hits" of ammonia. Nor did routine wet weather monitoring detect any further instances of elevated ammonia. Based on the information obtained about the use of ammonia by celery farmers, the presence of several celery farms upstream of the monitoring point, and the absence of any additional findings of elevated levels in either wet or dry weather samples, Program staff concluded that the elevated ammonia was most likely due to an unreported spill that occurred during the injection process. Because agriculture is exempt from the municipal NPDES permit, this was not pursued further.

Information obtained from personal communication with Ventura County Public Works Agency staff.

Appendix 4: Bacterial Die-off Rates in Freshwater Streams

This appendix reviews data on the inactivation of indicator microorganisms in freshwater as a basis for prioritizing sources of fecal contamination in southern California for further source identification work.

Fecal indicator bacteria, and the pathogenic organisms that they are meant to be the proxies for, have a limited ability to survive in most aquatic environments. Factors such as pH, temperature, solar (both UV and visible) irradiation, predation, osmotic stress, nutrient deficiencies, particulate levels, turbidity, oxygen concentrations, and microbial community composition affect bacteria inactivation once they reach receiving waters (Berry and Noton 1976, Mancini 1978, Kapuscinski and Mitchell 1980, Fujioka *et al.* 1981, Gerba and Bitton 1984, Auer and Niehaus 1992, Davies-Colley *et al.* 1994 , and Johnson *et al.* 1997). Indicator bacteria inactivation, that is, the rate at which the indicator bacteria die, is considered to be adequately represented by a first-order equation (see Thomann and Mueller, 1987). The first order decay rate (or inactivation) is usually referred to as k_D, and is usually reported as a per hour, or per day rate (e.g. 0.1 h^{-1}). In practice, people often use the term T_{90} , which describes the decline of bacteria in the time that it takes to obtain 90% mortality of the original number of bacteria, assuming a first-order loss. Throughout the rest of this document, the process will be referred to as inactivation, rather than decay, due to the fact that inactivation refers more specifically to the loss of the metabolic capabilities of the cell.

It is possible, with an adequate knowledge of environmental conditions, to create simple models of indicator bacteria inactivation using first order decay constants. In addition, several die-off equations can potentially be used in sequence with each other in order to estimate inputs from several stream inputs. There are existing models, like QUAL2E, that will permit the input of a particular coliform bacteria concentration, with temperature information, to estimate indicator bacteria levels downstream.

This document will outline a range of inactivation rates that could potentially be utilized to model bacterial inactivation in freshwater streams of southern California. However, it is particularly important to remember key points regarding bacterial inactivation rates, and the attempt to model such. First, even though most studies of rates of inactivation of indicator bacteria have been focused on single factors, we know that the process of inactivation is complex, and dependent upon multiple factors. For this reason, most of the studies that have been conducted in the laboratory to date should be reviewed suspiciously. Most of the studies have focused on analyzing the effects of one, two, or three factors independently (like temperature, pH, and TSS), and in doing so have ignored the biological complexities of the inactivation process. Second, solar irradiation/UV light is known to be one of the most important factors governing bacterial inactivation, and many studies have simply been conducted in the laboratory using UV lamps, ignoring the range of damage caused by visible, UV A, UV B, and UV C. Third, most studies have been conducted using laboratory strains of either *E. coli* or *enterococcus spp*. bacteria. These bacteria may not reflect the naturally found phylogenetic diversity of indicator bacteria inoculated into aquatic environments. Therefore the laboratory strains may be more susceptible to degradation than their outdoor counterparts. Finally, many different methods have been used to assess inactivation/decay/degradation. This is an issue that deserves much attention but in the interest of brevity, an example might be more useful. If two methods, membrane filtration, and chromogenic substrate kits (like Colilert-18®), were used to study rates of inactivation of *E. coli* in freshwater, the rate of inactivation determined with the use of the membrane filtration method would be much more rapid than that observed using the chromogenic substrate kits. The reason

for this discrepancy is that bacterial cells find it much more difficult, energetically speaking, to form a colony on a plate (the criteria for growth by membrane filtration), than to breakdown a growth substrate enzymatically (the criteria for growth by chromogenic substrate kits).

Given the cautions outlined above in interpreting data on bacterial inactivation, there are many useful studies that have been conducted that can be used to provide some general estimates of bacterial inactivation rates. Most studies have been conducted at a variety of temperatures, but presented here are the studies that have been conducted at temperate water temperatures that are applicable to southern California waters (ranging from 8-22° C).

One of the first things to do to understand the inactivation process is to determine whether or not sunlight will be considered in your estimates of bacterial inactivation rates. The detrimental effect of sunlight on survival of enteric bacteria in aquatic systems has been recognized for decades (Fujioka *et al.* 1981). Sunlight is capable of increasing inactivation rates by at least a factor of five compared to dark inactivation rates. Barcina *et al.* (1990) reported that EC was more resistant to damage by sunlight than *E. coli,* but Noble et al. (2003) demonstrated greater inactivation rates for EC than for *E. coli* even under low solar irradiation levels. The effect of sunlight is important to note, especially in sub-temperate latitudes such as southern California, where fluctuations in solar irradiation need to be considered. Published kD values for *E. coli* in freshwater can range from 0.03 to 0.06 h^{-1} (e.g., Barcina *et al.* 1986, Auer and Niehaus 1992, Menon 1993, and Mezrioui *et al.* 1995). However, other reports with kD as low as 0.001 h^{-1} and as high as 0.29 h^{-1} have been reported by Davies and Evison (1991), and Sinton *et al*. (2002), respectively. Obviously, different studies have revealed different rates of inactivation.

Given the concentration of the indicator bacteria of interest (C, in cfu or MPN/100 ml), an average decay coefficient (k_D, h^{-1}), a distance (D, meters or kilometers), and a stream or river velocity (U, translate into meters or kilometers per hour). An expected concentration of indicator bacteria can be calculated by:

$$C= C_0 * \exp(-k_D*D/U)$$

A general recommendation might be to assess the given conditions (high sunlight, low sunlight, etc.) and use a low rate of inactivation (conservative estimate), and a high rate of inactivation (liberal estimate) to provide a range of values of indicator bacteria that you will achieve downstream. The following table provides estimates of rates of inactivation, from several well-conducted and rigorously designed studies. Most rates of inactivation fall within the ranges observed here. In addition, the studies conducted by Noble et al. (2003) were specifically conducted in southern California waters, and so are a system specific representation of inactivation.

Table A4-1: Rates of inactivation for a range of studies.

Indicator	k_D (hr^{-1})	Notes	Reference
Total coliform	0.041-0.23	Ranges, freshwater, measured for 20° C	Thomann and Mueller, 1987
Total coliform	0.02	Riverine freshwater	Baudisova, 1997
Fecal coliforms	0.0162 0.007	Waste stabilization pond Raw sewage (conducted in the dark)	Sinton et al. 2002

Fecal coliforms	0.086 0.275	Waste stabilization pond Raw sewage (conducted in sunlight)	Sinton et al. 2002
E. coli	0.008	Natural surface water	Medema et al. 1997
E. coli	0.134	High solar radiation	Noble et al. 2003
E. coli	0.054	Low solar radiation	Noble et al. 2003
E. coli	0.001	Freshwater, dark	Davies and Evison 1991
E. coli	0.0171 0.023	Waste stabilization pond Raw sewage (conducted in the dark)	Sinton et al. 2002
E. coli	0.078 0.287	Waste stabilization pond Raw sewage in freshwater (conducted in sunlight)	Sinton et al. 2002
E. coli	0.03-0.06	Freshwater	Barcina et al. 1986,
Enterococci	0.27	High solar radiation	Noble et al. 2003
Enterococci	0.24	Low solar radiation	Noble et al. 2003
Enterococci	0.0168 0.012	Waste stabilization pond Raw sewage (conducted in the dark)	Sinton et al. 2002
Enterococci	0.276 0.137	Waste stabilization pond Raw sewage (conducted in sunlight)	Sinton et al. 2002
Enterococcus faecalis	0.016-0.038	Freshwater at 20° C	Thomann and Mueller, 1987

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Appendix 5: TIE Prioritization Metric

This appendix describes the calculation of a metric for prioritizing TIEs (Toxicity Identification Evaluations) to better identify the potential source(s) of toxicity in receiving waters. As discussed in the main body of the report, the model monitoring design recommends that a full year of toxicity testing be conducted and then TIEs be performed in the subsequent year, based on the relative magnitude and persistence of toxicity at the monitoring stations. The metric described below results in a single number for each site for each year and is an approach for combining the magnitude of toxicity (measured as mortality relative to a control), the breadth of toxicity across multiple test species, and the persistence of toxicity over multiple monitoring events in a given year. The metric provides users the ability to weight each of these three components differently, depending on the nature of toxicity and the specific management concern(s). However, all sites being considered for TIEs must be evaluated with the same metric weighting in order to ensure a consistent comparison among sites.

The experimental design is illustrated below:

	Time 1	Time 2	Time 3
Species 1			
Species 2			
Species 3			

At a specific site, three different species toxicity tests are performed at three different times over the course of the monitoring year. Each cell of the design contains a measure of the strength of water toxicity. A test with no measured toxic effects is represented by a value of zero.

The index is computed as the cell average toxicity value adjusted for consistency of toxic hits within species (rows) and/or time (columns). A toxic hit is defined as a toxicity value greater than zero. The consistency of toxicity within columns (across species) is measured by a cumulative score that depends on the numbers of toxic hits in the columns. For each column with three toxic hits, 1 is added to the total score (see the tables below), and for each column with two toxic hits, ½ is added to the total score. Nothing is added to the total score for 0 or 1 toxic hits in a column. A similar total score based in toxic hits in the rows is computed for consistency within rows.

Variables used to compute the index value are:

C_{col} = the column consistency score,

C_{row} = the row consistency score,

A_{col}=percent adjustment for column consistency,

A_{row}=percent adjustment for row consistency, and

M=the mean of all cells.

The index is computed as

$$I = M\left(1 + \frac{A_{col}}{100}\frac{C_{col}}{3} + \frac{A_{row}}{100}\frac{C_{row}}{3}\right). \qquad (1)$$

The value 3 in equation (1) is the maximum consistency score for rows (C_{row}) or columns (C_{col}). Thus, when the consistency score is maximal, the full percent adjustment (A) is added to the value in the parentheses, and lesser amounts are added for less than maximal scores. The values of 100 in equation (1) convert the adjustment percents to proportions.

It can be seen that equation (1) is the cell mean with upward adjustments for consistency within rows or columns. The user must decide what percent adjustment of the cell mean will be associated with the maximum score for both rows and columns. For example, if the user wants to emphasize consistency of toxicity across species at the same time, the user could set A_{col}=30 and A_{row}=0, which will adjust the cell mean upward by 30% for maximal within-column consistency, and ignore within-row consistency. Some example calculations with these A values are provided for below.

Example data with minimum within-column consistency might be as follows:

	Time 1	Time 2	Time 3	# hits
Species 1	30	40	20	3
Species 2	0	0	0	0
Species 3	0	0	0	0
# hits	1	1	1	

The calculations for these data with A_{col}=30 and A_{row}=0 are shown in equation (2).

$$I = M\left(1 + \frac{A_{col}}{100}\frac{C_{col}}{3} + \frac{A_{row}}{100}\frac{C_{row}}{3}\right) = 10\left(1 + \frac{30}{100}\frac{0}{3} + \frac{0}{100}\frac{1}{3}\right) = 10 \qquad (2)$$

Example data with some within-column consistency might be as follows:

	Time 1	Time 2	Time 3	# hits
Species 1	30	0	0	1
Species 2	40	0	0	1
Species 3	20	0	0	1
# hits	3+1	0	0	

The calculations for these data with A_{col}=30 and A_{row}=0 are shown in equation (3).

$$I = M\left(1 + \frac{A_{col}}{100}\frac{C_{col}}{3} + \frac{A_{row}}{100}\frac{C_{row}}{3}\right) = 10\left(1 + \frac{30}{100}\frac{1}{3} + \frac{0}{100}\frac{0}{3}\right) = 11 \qquad (3)$$

Note that the index value for the data used in equation (3) is higher than the index value for the data used in equation (2). This is because the equation (3) data have more within-column consistency and the A values were set to emphasize the within-column consistency. A more dramatic difference between the two index values would have resulted if a higher value for A_{col} was used.

It is important to stress that the intended use of the index (I) values is to help prioritize stations for follow-up TIEs. Thus, stations with higher index values would be a higher priority when allocating a fixed amount of resources for TIEs.

015104

CEQA The California Environmental Quality Act

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BUILDING INDUSTRY ASSOCIATION OF SAN DIEGO COUNTY et al., Plaintiffs and Appellants, v. STATE WATER RESOURCES CONTROL BOARD et al., Defendants and Respondents; SAN DIEGO BAYKEEPER et al., Interveners and Respondents.

D042385

COURT OF APPEAL OF CALIFORNIA, FOURTH APPELLATE DISTRICT, DIVISION ONE

124 Cal. App. 4th 866; 22 Cal. Rptr. 3d 128; 2004 Cal. App. LEXIS 2073; 2004 Cal. Daily Op. Service 10694; 2004 Daily Journal DAR 14492; 34 ELR 20149

December 7, 2004, Filed

NOTICE: As modified Jan. 4, 2005. CERTIFIED FOR PARTIAL PUBLICATION n1

n1 Pursuant to California Rules of Court, rule 976.1, this opinion is certified for publication with the exception of Discussion parts III, IV, V, VI and VII.

SUBSEQUENT HISTORY: Modified by, Rehearing denied by Building Industry Assn. v. State Water Resources Control Bd., 2005 Cal. App. LEXIS 7 (Cal. App. 4th Dist., Jan. 4, 2005)
Time for Granting or Denying Review Extended Building Industry Assn. of San Diego v. Calif Regional Water Qlty Bd., 2005 Cal. LEXIS 2502 (Cal., Feb. 24, 2005)
Review denied by, Request denied by Building Industry Association of San Diego County v. California Regional Water Quality Control Board, 2005 Cal. LEXIS 3489 (Cal., Mar. 30, 2005)

PRIOR HISTORY: Superior Court of San Diego County, No. GIC 780263, Wayne L. Peterson, Judge.

COUNSEL: Latham & Watkins, David L. Mulliken, Eric M. Katz, Paul N. Singarella, Kelly E. Richardson and Daniel P. Brunton for Plaintiffs and Appellants.

Bill Lockyer, Attorney General, Mary Hackenbracht, Assistant Attorney General, Carol A. Squire, David Robinson and Deborah Fletcher, Deputy Attorneys General, for Defendants and Respondents.

David S. Beckman, Heather L. Hoecherl, Anjali I. Jaiswal and Dan L. Gildor for Interveners and Respondents.

Marco Gonzalez for Intervener and Respondent San Diego BayKeeper.

Law Offices of Rory Wicks and Rory R. Wicks for Surfrider Foundation, Waterkeeper Alliance, The Ocean Conservancy, Heal the Bay, Environmental Defense Center, Santa Monica BayKeeper, Orange County CoastKeeper, Ventura CoastKeeper, Environmental

Health Coalition, CalBeach Advocates, San Diego Audubon Society, Endangered Habitats League and Sierra Club as Amici Curiae on behalf of Defendants and Respondents and Interveners and Respondents.

JUDGES: Haller, J., with Benke, Acting P. J., and Aaron, J., concurring.

OPINIONBY: HALLER

OPINION: HALLER, J.--This case concerns the environmental regulation of municipal storm sewers that carry excess water runoff to lakes, lagoons, rivers, bays, and the ocean. The waters flowing through these sewer systems have accumulated numerous harmful pollutants that are then discharged into the water body without receiving any treatment. To protect against the resulting water quality impairment, federal and state laws impose regulatory controls on storm sewer discharges. In particular, municipalities and other public entities are required to obtain, and comply with, a regulatory permit limiting the quantity and quality of water runoff that can be discharged from these storm sewer systems.

In this case, the California Regional Water Control Board, San Diego Region, (Regional Water Board) conducted numerous public hearings and then issued a comprehensive municipal storm sewer permit governing 19 local public entities. Although these entities did not bring an administrative challenge to the permit, one business organization, the Building Industry Association of San Diego County (Building Industry), filed an administrative appeal with the State Water Resources Control Board (State Water Board). After making some modifications to the permit, the State Water Board denied the appeal. Building Industry then petitioned for a writ of mandate in the superior court, asserting numerous claims, including that the permit violates state and federal law because the permit provisions are too stringent and impossible to satisfy. Three environmental groups intervened as defendants in the action. After a hearing, the trial court found Building Industry failed to prove its claims and entered judgment in favor of the administrative agencies (the Water Boards) and the intervener environmental groups.

(1) On appeal, Building Industry's main contention is that the regulatory permit violates federal law because it allows the Water Boards to impose municipal storm sewer control measures more stringent than a federal standard known as "maximum extent practicable." (See 33 U.S.C. § 1342(p)(3)(B)(iii).) n2 In the published portion of this opinion, we reject this contention, and conclude the Water Boards had the authority to include a permit provision requiring compliance with state water quality standards. In the unpublished portion of the opinion, we find Building Industry's additional contentions to be without merit. We affirm the judgment.

n2 Further statutory references are to title 33 of the United States Code, unless otherwise specified.

RELEVANT BACKGROUND INFORMATION

I. *Summary of Relevant Clean Water Act Provisions*

Before setting forth the factual background of this particular case, it is helpful to summarize the federal and state statutory schemes for regulating municipal storm sewer discharges. n3

n3 The systems that carry untreated urban water runoff to receiving water bodies are known as "[m]unicipal separate storm sewer" systems (40 C.F.R. § 122.26(b)(8)), and are often referred to as "MS4s" (see 40 C.F.R. § 122.30). For readability, we will identify these systems as municipal storm sewers. To avoid confusion in this case, we

will generally use descriptive names, rather than initials or acronyms, when referring to parties and concepts.

A. *Federal Statutory Scheme*

When the United States Congress first enacted the Federal Water Pollution Control Act in 1948, the Congress relied primarily on state and local enforcement efforts to remedy water pollution problems. (*Middlesex Cty. Sewerage Auth. v. Sea Clammers* (1981) 453 U.S. 1, 11 [69 L. Ed. 2d 435, 101 S. Ct. 2615]; *Tahoe-Sierra Preservation Council v. State Water Resources Control Bd.* (1989) 210 Cal. App. 3d 1421, 1433 [259 Cal. Rptr. 132].) However, by the early 1970's, it became apparent that this reliance on local enforcement was ineffective and had resulted in the "accelerating environmental degradation of rivers, lakes, and streams ... ." (*Natural Resources Defense Council, Inc. v. Costle* (D. C. Cir. 1977) 568 F.2d 1369, 1371 (*Costle*); see *EPA v. State Water Resources Control Board* (1976) 426 U.S. 200, 203 [48 L. Ed. 2d 578, 96 S. Ct. 2022].) In response, in 1972 Congress substantially amended this law by mandating compliance with various minimum technological effluent standards established by the federal government and creating a comprehensive regulatory scheme to implement these laws. (See *EPA v. State Water Resources Control Board*, *supra*, 426 U.S. at pp. 204-205.) The objective of this law, now commonly known as the Clean Water Act, was to "restore and maintain the chemical, physical, and biological integrity of the Nation's waters." (§ 1251(a).)

(2) The Clean Water Act employs the basic strategy of prohibiting pollutant emissions from "point sources" n4 unless the party discharging the pollutants obtains a permit, known as an NPDES n5 permit. (See *EPA v. State Water Resources Control Board*, *supra*, 426 U.S. at p. 205.) It is "unlawful for any person to discharge a pollutant without obtaining a permit and complying with its terms." (*Ibid.*; see § 1311(a); *Costle, supra,* 568 F.2d at p. 1375.) An NPDES permit is issued by the United States Environmental Protection Agency (EPA) or by a state that has a federally-approved water quality program. (§ 1342(a), (b); *EPA v. State Water Resources Control Board*, *supra*, 426 U.S. at p. 209.) Before an NPDES is issued, the federal or state regulatory agency must follow an extensive administrative hearing procedure. (See 40 C.F.R. § § 124.3, 124.6, 124.8, 124.10; see generally, Wardzinski, et al., *National Pollutant Discharge Elimination System Permit Application and Issuance Procedures* in The Clean Water Act Handbook (Evans, edit., 1994) pp. 72-74 (Clean Water Act Handbook).) NPDES permits are valid for five years. (§ 1342(b)(1)(B).)

n4 The Clean Water Act defines a "point source" to be "any discernible, confined and discrete conveyance, including but not limited to any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, or vessel or other floating craft, from which pollutants are or may be discharged." (§ 1362(14).)

n5 NPDES stands for National Pollution Discharge Elimination System.

(3) Under the Clean Water Act, the proper scope of the controls in an NPDES permit depends on the applicable state water quality standards for the affected water bodies. (See *Communities for a Better Environment v. State Water Resources Control Bd.* (2003) 109 Cal.App.4th 1089, 1092 [1 Cal. Rptr. 3d 76].) Each state is required to develop water quality standards that establish " 'the desired condition of a waterway.' " (*Ibid.*) A water quality standard for any given water segment has two components: (1) the designated beneficial uses of the water body; and (2) the water quality criteria sufficient to protect those uses. (*Ibid.*) As enacted in 1972, the Clean Water Act mandated that an NPDES permit require compliance with state water quality standards and that this goal be met by setting forth a specific "effluent limitation," which is a restriction on the amount of pollutants that may be discharged at the point source. (§ § 1311, 1362(11).)

Shortly after the 1972 legislation, the EPA promulgated regulations exempting most municipal storm sewers from the NPDES permit requirements. (*Costle, supra,* 568 F.2d at p. 1372; see *Defenders of Wildlife v. Browner* (9th Cir. 1999) 191 F.3d 1159, 1163 (*Defenders of Wildlife*).) When environmental groups challenged this exemption in federal court, the Ninth Circuit held a storm sewer is a point source and the EPA did not have the authority to exempt categories of point sources from the Clean Water Act's NPDES permit requirements. (*Costle, supra*, 568 F.2d at pp. 1374-1383.) The *Costle* court rejected the EPA's argument that effluent-based storm sewer regulation was administratively infeasible because of the variable nature of storm water pollution and the number of affected storm sewers throughout the country. (*Id.* at pp. 1377-1382.) Although the court acknowledged the practical problems relating to storm sewer regulation, the court found the EPA had the flexibility under the Clean Water Act to design regulations that would overcome these problems. (*Id.* at pp. 1379-1383.)

During the next 15 years, the EPA made numerous attempts to reconcile the statutory requirement of point source regulation with the practical problem of regulating possibly millions of diverse point source discharges of storm water. (*Defenders of Wildlife*, *supra*, 191 F.3d at p. 1163; see Gallagher, *Clean Water Act* in Environmental Law Handbook (Sullivan, edit., 2003) p. 300 (Environmental Law Handbook); Eisen, *Toward a Sustainable Urbanism: Lessons from Federal Regulation of Urban Stormwater Runoff* (1995) 48 Wash. U. J. Urb. & Contemp. L. 1, 40-41 (Regulation of Urban Stormwater Runoff).)

(4) Eventually, in 1987, Congress amended the Clean Water Act to add provisions that specifically concerned NPDES permit requirements for storm sewer discharges. (§ 1342(p); see *Defenders of Wildlife, supra,* 191 F.3d at p. 1163; *Natural Resources Defense Counsel v. U.S. E.P.A.* (1992) 966 F.2d 1292, 1296.) In these amendments, enacted as part of the Water Quality Act of 1987, Congress distinguished between industrial and municipal storm water discharges. With respect to *industrial* storm water discharges, Congress provided that NPDES permits "shall meet all applicable provisions of this section and section 1311 [requiring the EPA to establish effluent limitations under specific timetables] ... ." (§ 1342(p)(3)(A).) With respect to *municipal* storm water discharges, Congress clarified that the EPA had the authority to fashion NPDES permit requirements to meet water quality standards without specific numerical effluent limits and instead to impose "controls to reduce the discharge of pollutants to the maximum extent practicable ... ." (§ 1342(p)(3)(B)(iii); see *Defenders of Wildlife, supra,* 191 F.3d at p. 1163.) Because the statutory language pertaining to municipal storm sewers is at the center of this appeal, we quote the relevant portion of the statute in full:

"(B) ... Permits for discharges from municipal storm sewers--

"(i) may be issued on a system-or jurisdiction-wide basis;

"(ii) shall include a requirement to effectively prohibit non-stormwater discharges into the storm sewers; and

"(iii) shall require controls to reduce the discharge of pollutants to the maximum extent practicable, including management practices, control techniques and system, design and engineering methods, and such other provisions as the Administrator or the State determines appropriate for the control of such pollutants." (§ 1342(p)(3)(B).)

To ensure this scheme would be administratively workable, Congress placed a moratorium on many new types of required stormwater permits until 1994 (§ 1342(p)(1)), and created a phased approach to necessary municipal stormwater permitting depending on the size of the municipality (§ 1342(p)(2)(D)). (See *Environmental Defense Center, Inc. v. U.S. E.P.A.* (9th Cir. 2003) 344 F.3d 832, 841-842.)

B. *State Statutory Scheme*

Three years before the 1972 Clean Water Act, the California Legislature enacted its own water quality protection legislation, the Porter-Cologne Water Quality Control Act (Porter-Cologne Act), seeking to "attain the highest water quality which is reasonable ... ." (Wat. Code, § 13000.) The Porter-Cologne Act created the State Water Board to formulate statewide water quality policy and established nine regional boards to prepare water quality

plans (known as basin plans) and issue permits governing the discharge of waste. (Wat. Code, § § 13100, 13140, 13200, 13201, 13240, 13241, 13243.) The Porter-Cologne Act identified these permits as "waste discharge requirements," and provided that the waste discharge requirements must mandate compliance with the applicable regional water quality control plan. (Wat. Code, § § 13263, subd. (a), 13377, 13374.)

Shortly after Congress enacted the Clean Water Act in 1972, the California Legislature added Chapter 5.5 to the Porter-Cologne Act, for the purpose of adopting the necessary federal requirements to ensure it would obtain EPA approval to issue NPDES permits. (Wat. Code, § 13370, subd. (c).) As part of these amendments, the Legislature provided that the state and regional water boards "shall, as required or authorized by the [Clean Water Act], issue waste discharge requirements ... which apply and ensure compliance with all applicable provisions [of the Clean Water Act], together with any more stringent effluent standards or limitations necessary to implement water quality control plans, or for the protection of beneficial uses, or to prevent nuisance." (Wat. Code, § 13377.) Water Code section 13374 provides that "[t]he term 'waste discharge requirements' as referred to in this division is the equivalent of the term 'permits' as used in the [Clean Water Act]."

(5) California subsequently obtained the required approval to issue NPDES permits. (*WaterKeepers Northern California v. State Water Resources Control Bd.* (2002) 102 Cal.App.4th 1448, 1453 [126 Cal. Rptr. 2d 389].) Thus, the waste discharge requirements issued by the regional water boards ordinarily also serve as NPDES permits under federal law. (Wat. Code, § 13374.)

II. *The NPDES Permit at Issue in this Case*

Under its delegated authority and after numerous public hearings, in February 2001 the Regional Water Board issued a 52-page NPDES permit and Waste Discharge Requirements (the Permit) governing municipal storm sewers owned by San Diego County, the San Diego Unified Port District, and 18 San Diego-area cities (collectively Municipalities). n6 The first 10 pages of the Permit contain the Regional Water Board's detailed factual findings. These findings describe the manner in which San Diego-area water runoff absorbs numerous harmful pollutants and then is conveyed by municipal storm sewers into local waters without any treatment. The findings state that these storm sewer discharges are a leading cause of water quality impairment in the San Diego region, endangering aquatic life and human health. The findings further state that to achieve applicable state water quality objectives, it is necessary not only to require municipalities to comply with existing pollution-control technologies, but also to require compliance with applicable "receiving water limits" (state water quality standards) and to employ an "iterative process" of "development, implementation, monitoring, and assessment" to improve existing technologies.

n6 Under the Clean Water Act, entities responsible for NPDES permit conditions pertaining to their own discharges are referred to as "copermittees." (40 C.F.R. § 122.26(b)(1).) For clarity and readability, we shall refer to these entities as Municipalities.

Based on these factual findings, the Regional Water Board included in the Permit several overall prohibitions applicable to municipal storm sewer discharges. Of critical importance to this appeal, these prohibitions concern two categories of restrictions. First, the Municipalities are prohibited from discharging those pollutants "which have not been reduced to the *maximum extent practicable ... .*" n7 (Italics added). Second, the Municipalities are prohibited from discharging pollutants "which cause or contribute to exceedances of receiving water quality objectives ... " and/or that "cause or contribute to the violation of water quality standards ... ." This second category of restrictions (referred to in this opinion as the Water Quality Standards provisions) essentially provide that a Municipality may not discharge pollutants if those pollutants would cause the receiving water body to exceed the applicable water quality standard. It is these latter restrictions that are challenged by Building Industry in this appeal.

n7 The Permit does not precisely define this phrase, and instead, in its definition section, contains a lengthy discussion of the variable nature of the maximum extent practicable concept, referred to as "MEP." A portion of this discussion is as follows: "[T]he definition of MEP is dynamic and will be defined by the following process over time: municipalities propose their definition of MEP by way of their [local storm sewer plan]. Their total collective and individual activities conducted pursuant to the [plan] becomes their proposal for MEP as it applies both to their overall effort, as well as to specific activities (e.g., MEP for street sweeping, or MEP for municipal separate storm sewer maintenance). In the absence of a proposal acceptable to the [Regional Water Board], the [Regional Water Board] defines MEP." The definition also identifies several factors that are "useful" in determining whether an entity has achieved the maximum extent practicable standard, including "Effectiveness," "Regulatory Compliance," "Public Acceptance," "Cost," and "Technical Feasibility."

Part C of the Permit (as amended) qualifies the Water Quality Standards provisions by detailing a procedure for enforcing violations of those standards through a step-by-step process of "timely implementation of control measures ...," known as an "iterative" process. Under this procedure, when a Municipality "caus[es] or contribute[s] to an exceedance of an applicable water quality standard," the Municipality must prepare a report documenting the violation and describing a process for improvement and prevention of further violations. The Municipality and the Regional Water Board must then work together at improving methods and monitoring progress to achieve compliance. But the final provision of Part C states that "Nothing in this section shall prevent the [Regional Water Board] from enforcing any provision of this Order while the [Municipality] prepares and implements the above report."

In addition to these broad prohibitions and enforcement provisions, the Permit requires the Municipalities to implement, or to require businesses and residents to implement, various pollution control measures referred to as "best management practices," which reflect techniques for preventing, slowing, retaining or absorbing pollutants produced by stormwater runoff. These best management practices include structural controls that minimize contact between pollutants and flows, and non-structural controls such as educational and public outreach programs. The Permit also requires the Municipalities to regulate discharges associated with new development and redevelopment and to ensure a completed project will not result in significantly increased discharges of pollution from storm water runoff.

III. *Administrative and Trial Court Challenges*

After the Regional Water Board issued the Permit, the Building Industry, an organization representing the interests of numerous construction-related businesses, filed an administrative challenge with the State Water Board. Although none of the Municipalities joined in the administrative appeal, Building Industry claimed its own independent standing based on its assertion that the Permit would impose indirect obligations on the regional building community. (See Wat. Code, § 13320 [permitting any "aggrieved person" to challenge Regional Water Board action].) Among its numerous contentions, Building Industry argued that the Water Quality Standards provisions in the Permit require strict compliance with state water quality standards beyond what is "practicable" and therefore violate federal law.

In November 2001, the State Water Board issued a written decision rejecting Building Industry's appeal after making certain modifications to the Permit. (State of California Water Resources Control Board Order WQ2001-15 (Nov. 15, 2001).) Of particular relevance here, the State Water Board modified the Permit to make clear that the iterative enforcement process applied to the Water Quality Standards provisions in the Permit. But the State Water Board did not delete the Permit's provision stating that the Regional Water Board retains the authority to enforce the Water Quality Standards provisions even if a Municipality is engaged in this iterative process.

Building Industry then brought a superior court action against the Water Boards, challenging the Regional Board's issuance of the Permit and the State Water Board's denial of Building Industry's administrative challenge. n8 Building Industry asserted numerous legal claims, including that the Water Boards: (1) violated the Clean Water Act by imposing a standard greater than the "maximum extent practicable" standard; (2) violated state law by failing to consider various statutory factors before issuing the Permit; (3) violated the California Environmental Quality Act (CEQA) by failing to prepare an environmental impact report (EIR); and (4) made findings that were factually unsupported.

n8 Several other parties were also named as petitioners: Building Industry Legal Defense Foundation, California Business Properties Association, Construction Industry Coalition for Water Quality, San Diego County Fire Districts Association, and the City of San Marcos. However, because these entities were not parties in the administrative challenge, the superior court properly found they were precluded by the administrative exhaustion doctrine from challenging the administrative agencies' compliance with the federal and state water quality laws. Although these entities were named as appellants in the notice of appeal, they are barred by the exhaustion doctrine from asserting appellate contentions concerning compliance with federal and state water quality laws. However, as to any other claims (such as CEQA), these entities are proper appellants. For ease of reference and where appropriate, we refer to the appellants collectively as Building Industry.

Three environmental organizations, San Diego BayKeeper, National Resources Defense Council, and California CoastKeeper (collectively Environmental Organizations), requested permission to file a complaint in intervention, seeking to uphold the Permit and asserting a direct and substantial independent interest in the subject of the action. Over Building Industry's objections, the trial court permitted these organizations to file the complaint and enter the action as parties-interveners.

After reviewing the lengthy administrative record and the parties' briefs, and conducting an oral hearing, the superior court ruled in favor of the Water Boards and Environmental Organizations (collectively respondents). Applying the independent judgment test, the court found Building Industry failed to meet its burden to establish the State Water Board abused its discretion in approving the Permit or that the administrative findings are contrary to the weight of the evidence. In particular, the court found Building Industry failed to establish the Permit requirements were "impracticable under federal law or unreasonable under state law," and noted that there was evidence showing the Regional Water Board considered many practical aspects of the regulatory controls before issuing the Permit. Rejecting Building Industry's legal arguments, the court also stated that under federal law the Water Boards had the discretion "to require strict compliance with water quality standards" or "to require less than strict compliance with water quality standards." The court also sustained several of respondents' evidentiary objections, including to documents relating to the legislative history of the Clean Water Act.

Building Industry appeals, challenging the superior court's determination that the Permit did not violate the federal Clean Water Act. In its appeal, Building Industry does not reassert its claim that the Permit violates state law, except for its contentions pertaining to CEQA.

DISCUSSION

I. *Standard of Review*

(6) A party aggrieved by a final decision of the State Water Board may obtain review of the decision by filing [a superior court] petition for writ of mandate in the superior court. (Wat. Code, § 13330, subd. (a).) Code of Civil Procedure section 1094.5 governs the proceedings, and the superior court must exercise its independent judgment in examining the evidence and resolving factual disputes. (Wat. Code, § 13330, subd. (d).) "In exercising its independent judgment, a trial court must afford a strong presumption of correctness concerning the administrative findings, and the party challenging the administrative decision

bears the burden of convincing the court that the administrative findings are contrary to the weight of the evidence." (*Fukuda v. City of Angels* (1999) 20 Cal.4th 805, 817 [85 Cal. Rptr. 2d 696, 977 P.2d 693].)

(7) In reviewing the trial court's factual determinations on the administrative record, a Court of Appeal applies a substantial evidence standard. (*Fukuda v. City of Angels, supra,* 20 Cal.4th at p. 824.) However, in reviewing the trial court's legal determinations, an appellate court conducts a de novo review. (See *Alliance for a Better Downtown Millbrae v. Wade* (2003) 108 Cal.App.4th 123, 129 [133 Cal. Rptr. 2d 249].) Thus, we are not bound by the legal determinations made by the state or regional agencies or by the trial court. (See *Yamaha Corp. of America v. State Bd. of Equalization* (1998) 19 Cal.4th 1, 7-8 [78 Cal. Rptr. 2d 1, 960 P.2d 1031].) But we must give appropriate consideration to an administrative agency's expertise underlying its interpretation of an applicable statute. n9 (*Ibid*.)

n9 We note that in determining the meaning of the Clean Water Act and its amendments, federal courts generally defer to the EPA's statutory construction if the disputed portion of the statute is ambiguous. (See *Chevron U.S.A. v. Natural Res. Def. Council, Inc.* (1984) 467 U.S. 837, 842-844 [81 L. Ed. 2d 694, 104 S. Ct. 2778] (*Chevron*).) However, the parties do not argue this same principle applies to a *state agency's* interpretation of the Clean Water Act. Nonetheless, under governing state law principles, we do consider and give due deference to the Water Boards' statutory interpretations in this case. (See *Yamaha Corp. of America v. State Bd. of Equalization, supra,* 19 Cal.4th at pp. 7-8.)

II. *Water Boards' Authority to Enforce Water Quality Standards in NPDES Permit*

Building Industry's main appellate contention is very narrow. Building Industry argues that two provisions in the Permit (the Water Quality Standards provisions) violate federal law because they prohibit the Municipalities from discharging runoff from storm sewers if the discharge would cause a water body to exceed the applicable water quality standard established under state law. n10 Building Industry contends that under federal law the "maximum extent practicable" standard is the "exclusive" measure that may be applied to municipal storm sewer discharges and a regulatory agency may not require a Municipality to comply with a state water quality standard if the required controls exceed a "maximum extent practicable" standard.

n10 These challenged Permit provisions state "Discharges from [storm sewers] which cause or contribute to exceedances of receiving water quality objectives for surface water or groundwater are prohibited" (Permit, § A.2), and "Discharges from [storm sewers] that cause or contribute to the violation of water quality standards ... are prohibited" (Permit, § C.1).

In the following discussion, we first reject respondents' contentions that Building Industry waived these arguments by failing to raise a substantial evidence challenge to the court's factual findings and/or to reassert its state law challenges on appeal. We then focus on the portion of the Clean Water Act (§ 1342(p)(3)(B)(iii)) that Building Industry contends is violated by the challenged Permit provisions. On our de novo review of this legal issue, we conclude the Permit's Water Quality Standards provisions are proper under federal law, and Building Industry's legal challenges are unsupported by the applicable statutory language, legislative purpose, and legislative history.

A. *Building Industry Did Not Waive the Legal Argument*

Respondents (the Water Boards and Environmental Organizations) initially argue that Building Industry waived its right to challenge the Permit's consistency with the maximum extent practicable standard because Building Industry did not challenge the trial court's

factual findings that Building Industry failed to prove any of the Permit requirements were "impracticable" or "unreasonable."

In taking this position, respondents misconstrue the nature of Building Industry's appellate contention challenging the Water Quality Standards provisions. Building Industry's contention concerns the scope of the authority given to the Regional Water Board under the Permit terms. Specifically, Building Industry argues that the Regional Water Board does not have the authority to require the Municipalities to adhere to the applicable water quality standards because federal law provides that the "maximum extent practicable" standard is the exclusive standard that may be applied to storm sewer regulation. This argument--concerning the proper scope of a regulatory agency's authority--presents a purely legal issue, and is not dependent on the court's factual findings regarding the practicality of the specific regulatory controls identified in the Permit.

Respondents alternatively contend that Building Industry waived its right to challenge the propriety of the Water Quality Standards provisions under federal law because the trial court found the provisions were valid under state law and Building Industry failed to reassert its state law challenges on appeal. Under the particular circumstances of this case, we conclude Building Industry did not waive its rights to challenge the Permit under federal law.

(8) Although it is well settled that the Clean Water Act authorizes states to impose water quality controls that are more stringent than are required under federal law (§ 1370; see *PUD No. 1 of Jefferson Cty. v. Washington Dept. of Ecology* (1994) 511 U.S. 700, 705 [128 L. Ed. 2d 716, 114 S. Ct. 1900]; *Northwest Environmental Advocates v. Portland* (9th Cir. 1995) 56 F.3d 979, 989), and California law specifically allows the imposition of controls more stringent than federal law (Wat. Code, § 13377), the Water Boards made a tactical decision in the superior court to assert the Permit's validity based solely on federal law, and repeatedly made clear they were not seeking to justify the Permit requirements based on the Boards' independent authority to act under state law. On appeal, the Water Boards continue to rely primarily on federal law to uphold the Permit requirements, and their assertions that we may decide the matter based solely on state law are in the nature of asides rather than direct arguments. On this record, it would be improper to rely solely on state law to uphold the challenged Permit provisions.

B. *The Water Quality Standards Requirement Does Not Violate Federal Law*

We now turn to Building Industry's main substantive contention on appeal-- that the Permit's Water Quality Standards provisions (fn. 10, *ante*) violate federal law. Building Industry's contention rests on its interpretation of the 1987 Water Quality Act amendments containing NPDES requirements for municipal storm sewers. The portion of the relevant statute reads: "(B) ... Permits for discharges from municipal storm sewers ... [P] ... [P] (iii) shall require controls to reduce the discharge of pollutants to the *maximum extent practicable*, *including* management practices, control techniques and system, design and engineering methods, and such other provisions as the [EPA] Administrator or the State determines appropriate for the control of such pollutants." (§ 1342(p)(3)(B)(iii), italics added.)

1. *Statutory Language*

Focusing on the first 14 words of subdivision (iii), Building Industry contends the statute means that the maximum extent practicable standard sets the upper limit on the type of control that can be used in an NPDES permit, and that each of the phrases following the word "*including*" identify examples of "maximum extent practicable" controls. (§ 1342(p)(3)(B)(iii), italics added.) Building Industry thus reads the final "and such other provisions" clause as providing the EPA with the authority only to include *other* types of "maximum extent practicable" controls in an NPDES storm sewer permit.

Respondents counter that the term "including" refers only to the three identified types of pollution control procedures--(1) "management practices"; (2) "control techniques"; and (3) "system, design and engineering methods"--and that the last phrase, "*and such other provisions as the Administrator or the State determines appropriate for the control of such pollutants*," provides the EPA (or the approved state regulatory agency) the specific authority to go beyond the maximum extent practicable standard to impose effluent limitations or

water-quality based standards in an NPDES permit. In support, respondents argue that because the word "system" in section 1342(p)(3)(B)(iii) is singular, it necessarily follows from parallel-construction grammar principles that the word "system" is part of the phrase "system, design and engineering methods" rather than the phrase "control techniques and system." Under this view and given the absence of a comma after the word "techniques," respondents argue that the "and such other provisions" clause cannot be fairly read as restricted by the "maximum extent practicable" phrase, and instead the "and such other provisions" clause is a separate and distinct clause that acts as a second direct object to the verb "require" in the sentence. (§ 1342(p)(3)(B)(iii).)

Building Industry responds that respondents' proposed statutory interpretation is "not logical" because if the "and such other provisions" phrase is the direct object of the verb "require," the sentence would not make sense. Building Industry states that "permits" do not generally "require" provisions; they "include" or "contain" them.

(9) As a matter of grammar and word choice, respondents have the stronger position. The second part of Building Industry's proposed interpretation--"control techniques and system, design and engineering methods"--without a comma after the word "techniques" does not logically serve as a parallel construct with the "and such other provisions" clause. Moreover, we disagree that the "and such other provisions" clause cannot be a direct object to the word "require." (§ 1342(p)(3)(B)(iii).) Although it is not the clearest way of articulating the concept, the language of section 1342(p)(3)(B)(iii) does communicate the basic principle that the EPA (and/or a state approved to issue the NPDES permit) retains the discretion to impose "appropriate" water pollution controls in addition to those that come within the definition of " 'maximum extent practicable.' " (See *Defenders of Wildlife, supra,* 191 F.3d at pp. 1165-1167.) We find unpersuasive Building Industry's reliance on several statutory interpretation concepts, *ejusdem generis, noscitur a sociis*, and *expressio unius est exclusion alterius*, to support its narrower statutory construction.

2. *Purpose and History of Section 1342(p)(3)(B)(iii)*

(10) Further, "[w]hile punctuation and grammar should be considered in interpreting a statute, neither is controlling unless the result is in harmony with the clearly expressed intent of the Legislature." (*In re John S.* (2001) 88 Cal.App.4th 1140, 1144, fn. 1 [106 Cal. Rptr. 2d 476]; see *Estate of Coffee* (1941) 19 Cal.2d 248, 251 [120 P.2d 661].) If the statutory language is susceptible to more than one reasonable interpretation, a court must also "look to a variety of extrinsic aids, including the ostensible objects to be achieved, the evils to be remedied, the legislative history, public policy, contemporaneous administrative construction, and the statutory scheme of which the statute is a part." (*Nolan v. City of Anaheim* (2004) 33 Cal.4th 335, 340 [14 Cal. Rptr. 3d 857, 92 P.3d 350].)

(11) The legislative purpose underlying the Water Quality Act of 1987, and section 1342 (p) in particular, supports that Congress intended to provide the EPA (or the regulatory agency of an approved state) the discretion to require compliance with water quality standards in a municipal storm sewer NPDES permit, particularly where, as here, that compliance will be achieved primarily through an iterative process.

Before section 1342(p) was enacted, the courts had long recognized that the EPA had the authority to require a party to comply with a state water quality standard even if that standard had not been translated into an effluent limitation. (See *EPA v. State Water Resources Control Board*, *supra*, 426 U.S. at p. 205, fn. 12; *PUD No. 1 of Jefferson Cty. v. Washington Dept. of Ecology, supra,* 511 U.S. at p. 715; *Northwest Environmental Advocates v. Portland* (9th Cir. 1995) 56 F.3d 979, 987; *Natural Resources Defense Counsel v. U.S.E.P.A.* (9th Cir. 1990) 915 F.2d 1314, 1316.) Specifically, section 1311(b)(1)(C) gave the regulatory agency the authority to impose "any more stringent limitation, including those necessary to meet water quality standards," and section 1342(a)(2) provided that "[t]he [EPA] Administrator shall prescribe conditions for [NPDES] permits to assure compliance" with requirements identified in section 1342(a)(1), which encompass state water quality standards. The United States Supreme Court explained that when Congress enacted the 1972 Clean Water Act, it retained "[w]ater quality standards ... as a supplementary basis for effluent limitations, ... so that numerous point sources despite individual compliance with

effluent limitations, may be further regulated to prevent water quality from falling below acceptable levels. ... " (*EPA v. State Water Resources Control Board*, *supra,* 426 U.S. at p. 205, fn. 12; see also *Arkansas v. Oklahoma* (1992) 503 U.S. 91, 101 [117 L. Ed. 2d 239, 112 S. Ct. 1046].)

There is nothing in section 1342(p)(3)(B)(iii)'s statutory language or legislative history showing that Congress intended to eliminate this discretion when it amended the Clean Water Act in 1987. To the contrary, Congress added the NPDES storm sewer requirements to strengthen the Clean Water Act by making its mandate correspond to the practical realities of municipal storm sewer regulation. As numerous commentators have pointed out, although Congress was reacting to the physical differences between municipal storm water runoff and other pollutant discharges that made the 1972 legislation's blanket effluent limitations approach impractical and administratively burdensome, the primary point of the legislation was to address these administrative problems while giving the administrative bodies the tools to meet the fundamental goals of the Clean Water Act in the context of stormwater pollution. (See Regulation of Urban Stormwater Runoff, *supra*, at pp. 44-46; Environmental Law Handbook, *supra*, at p. 300; Clean Water Act Handbook, *supra*, at pp. 62-63.) In the 1987 congressional debates, the Senators and Representatives emphasized the need to prevent the widespread and escalating problems resulting from untreated storm water toxic discharges that were threatening aquatic life and creating conditions dangerous to human health. (See Remarks of Sen. Durenberger, 133 Cong. Rec. 1279 (Jan. 14, 1987); Remarks of Sen. Chaffee, 133 Cong. Rec. S738 (daily ed. Jan 14, 1987); Remarks of Rep. Hammerschmidt, 133 Cong. Rec. 986 (Jan. 8, 1987); Remarks of Rep. Roe, 133 Cong. Rec. 1006, 1007 (Jan. 8, 1987); Remarks of Sen. Stafford, 132 Cong. Rec. 32381, 32400 (Oct. 16, 1986).) This legislative history supports that in identifying a maximum extent practicable standard Congress did not intend to substantively bar the EPA/state agency from imposing a more stringent water quality standard if the agency, based on its expertise and technical factual information and after the required administrative hearing procedure, found this standard to be a necessary and workable enforcement mechanism to achieving the goals of the Clean Water Act.

To support a contrary view, Building Industry relies on comments by Minnesota Senator David Durenberger during the lengthy congressional debates on the 1987 Water Quality Act amendments. n11 (132 Cong. Rec. 32400 (Oct. 16, 1986); 133 Cong. Rec. S752 (daily ed. Jan. 14, 1987.) In the cited portions of the Congressional Record, Senator Durenberger states that NPDES permits "shall require controls to reduce the discharge of pollutants to the maximum extent practicable. Such controls include management practices, control techniques and systems, design and engineering methods, and such other provisions, as the Administrator determines appropriate for the control of pollutants in the stormwater discharge." (*Ibid.*) When viewing these statements in context, it is apparent that the Senator was merely paraphrasing the words of the proposed statute and was not intending to address the issue of whether the maximum extent practicable standard was a regulatory ceiling or whether he believed the proposed amendments limited the EPA's existing discretion. n12

n11 We agree with Building Industry that the trial court's refusal to consider this legislative history on the basis that it was not presented to the administrative agencies was improper. However, this error was not prejudicial because we apply a de novo review standard in interpreting the relevant statutes.

n12 In the cited remarks, Senator Durenberger in fact expressed his dissatisfaction with the EPA's prior attempts to regulate municipal storm sewers. He pointed out, for example, that "[r]unoff from municipal separate storm sewers and industrial sites contain significant values of both toxic and conventional pollutants," and that despite the Clean Water Act's "clear directive," the EPA "has failed to require most stormwater point sources to apply for permits which would control the pollutants in their discharge." (133 Cong. Rec. 1274, 1279-1280 (daily ed. Jan. 14, 1987).)

Building Industry's reliance on comments made by Georgia Representative James Rowland, who participated in drafting the 1987 Water Quality Act amendments, is similarly unhelpful. During a floor debate on the proposed amendments, Representative Rowland noted that cities have "millions of" stormwater discharge points and emphasized the devastating financial burden on cities if they were required to obtain a permit for each of these points. (133 Cong. Rec. 522 (daily ed. Feb. 3, 1987).) Representative Rowland then explained that the amendments would address this problem by "allow[ing] communities to obtain far less costly single jurisdictionwide permits." (*Ibid.*) Viewed in context, these comments were directed at the need for statutory provisions permitting the EPA to issue jurisdiction-wide permits thereby preventing unnecessary administrative costs to the cities, and do not reflect a desire to protect cities from the cost of complying with strict water quality standards when deemed necessary by the regulatory agency.

3. *Interpretations by the EPA and Other Courts*

(12) Our conclusion that Congress intended section 1342(p)(3)(B)(iii) to provide the regulatory agency with authority to impose standards stricter than a "maximum extent practicable" standard is consistent with interpretations by the EPA and the Ninth Circuit. In its final rule promulgated in the Federal Register, the EPA construed section 1342(p)(3)(B)(iii) as providing the administrative agency with the authority to impose water-quality standard controls in an NPDES permit if appropriate under the circumstances. Specifically, the EPA stated this statutory provision requires "controls to reduce the discharge of pollutants to the maximum extent practicable, *and where necessary water quality-based controls* ... ." (55 Fed.Reg. 47990, 47994 (Nov. 16, 1990), italics added.) We are required to give substantial deference to this administrative interpretation, which occurred after an extensive notice and comment period. (See *ibid*.; *Chevron, supra,* 467 U.S. at pp. 842-844.)

The only other court that has interpreted the "such other provisions" language of section 1342(p)(3)(B)(iii) has reached a similar conclusion. (*Defenders of Wildlife*, *supra*, 191 F.3d at pp. 1166-1167.) In *Defenders of Wildlife*, environmental organizations brought an action against the EPA, challenging provisions in an NPDES permit requiring several Arizona localities to adhere to various best management practice controls without requiring numeric effluent limitations. (*Id.* at p. 1161.) The environmental organizations argued that section 1342(p) did not allow the EPA to issue NPDES permits without requiring strict compliance with effluent limitations. (*Ibid*.) Rejecting this argument, the Ninth Circuit found section 1342 (p)(3)(B)(iii)'s statutory language "unambiguously demonstrates that Congress did not require municipal storm-sewer discharges to comply strictly" with effluent limitations. (*Defenders of Wildlife*, *supra*, at p. 1164.)

But in a separate section of the opinion, the *Defenders of Wildlife* court additionally rejected the reverse argument made by the affected municipalities (who were the interveners in the action) that "the EPA may not, under the [Clean Water Act], require strict compliance with state water-quality standards, through numerical limits or otherwise." (*Defenders of Wildlife*, *supra*, 191 F.3d at p. 1166.) The court stated: "Although Congress did not require municipal storm-sewer discharges to comply strictly with [numerical effluent limitations], § 1342(p)(3)(B)(iii) states that '[p]ermits for discharges from municipal storm sewers ... shall require ... *such other provisions as the Administrator ... determines appropriate for the control of such pollutants.*' (Emphasis added.) That provision gives the EPA discretion to determine what pollution controls are appropriate. ... [P] *Under that discretionary provision, the EPA has the authority to determine that ensuring strict compliance with state water-quality standards is necessary to control pollutants.* The EPA also has the authority to require less than strict compliance with state water-quality standards ... . Under 33 U.S.C. § 1342(p)(3)(B)(iii), the EPA's choice to include either management practices or numeric limitations in the permits was within its discretion. [Citations.]" (*Defenders of Wildlife, supra,* 191 F.3d at pp. 1166-1167, second italics added.) Although dicta, this conclusion reached by a federal court interpreting federal law is persuasive and is consistent with our independent analysis of the statutory language. n13

n13 Building Industry's reliance on two other Ninth Circuit decisions to support a contrary statutory interpretation is misplaced. (See *Natural Res. Def. Council, Inc. v. U.S.E.P.A., supra*, 966 F.2d at p. 1308; *Environmental Defense Center, Inc. v. U.S. E.P.A.* (9th cir. 2003) 344 F.3d 832.) Neither of these decisions addressed the issue of the scope of a regulatory agency's authority to exceed the maximum extent practicable standard in issuing NPDES permits for municipal storm sewers.

To support its interpretation of section 1342(p)(3)(B)(iii), Building Industry additionally relies on the statutory provisions addressing nonpoint source runoff (a diffuse runoff not channeled through a particular source), which were also part of the 1987 amendments to the Clean Water Act. (§ 1329.) In particular, Building Industry cites to section 1329(a)(1)(C), which states, "The Governor of each State shall ... prepare and submit to the [EPA] Administrator for approval, a report which ... [P] ... [P] describes the process ... for identifying best management practices and measures to control each [identified] category ... of nonpoint sources and ... to reduce, to the *maximum extent practicable*, the level of pollution resulting from such category ... ." (Italics added.) Building Industry argues that because this "nonpoint source" statutory language expressly identifies only the maximum extent practicable standard, we must necessarily conclude that Congress meant to similarly limit the storm sewer point source pollution regulations to the maximum extent practicable standard.

The logic underlying this analogy is flawed because the critical language in the two statutory provisions is different. In the nonpoint source statute, Congress chose to include only the maximum extent practicable standard (§ 1329(a)(1)(C)); whereas in the municipal storm sewer provisions, Congress elected to include the "and such other provisions" clause (§ 1342(p)(3)(B)(iii)). This difference leads to the reasonable inference that Congress had a different intent when it enacted the two statutory provisions. Moreover, because of a fundamental difference between point and nonpoint source pollution, Congress has historically treated the two types of pollution differently and has subjected each type to entirely different requirements. (See *Pronsolino v. Nastri* (9th Cir. 2002) 291 F.3d 1123, 1126-1127.) Given this different treatment, it would be improper to presume Congress intended to apply the same standard in both statutes. Building Industry's citation to comments during the 1987 congressional debates regarding nonpoint source regulation does not support Building Industry's contentions.

4. *Contention that it is "Impossible" for Municipalities to Meet Water Quality Standards*

We also reject Building Industry's arguments woven throughout its appellate briefs, and emphasized during oral arguments, that the Water Quality Standards provisions violate federal law because compliance with those standards is "impossible." The argument is not factually or legally supported.

(13) First, there is no showing on the record before us that the applicable water quality standards are unattainable. The trial court specifically concluded that Building Industry failed to make a factual showing to support this contention, and Building Industry does not present a proper appellate challenge to this finding sufficient to warrant our reexamining the evidence. All judgments and orders are presumed correct, and persons challenging them must affirmatively show reversible error. **(14)** (*Walling v. Kimball* (1941) 17 Cal.2d 364, 373 [110 P.2d 58].) A party challenging the sufficiency of evidence to support a judgment must summarize (and cite to) *all* of the material evidence, not just the evidence favorable to his or her appellate positions. (*In re Marriage of Fink* (1979) 25 Cal.3d 877, 887-888 [160 Cal. Rptr. 516, 603 P.2d 881]; *People v. Dougherty* (1982) 138 Cal. App. 3d 278, 282 [188 Cal. Rptr. 123].) Building Industry has made no attempt to comply with this well-established appellate rule in its briefs.

In a supplemental brief, Building Industry attempted to overcome this deficiency by asserting that "[t]he record clearly establishes that [the Water Quality Standards provisions] are unattainable during the period the permit is in effect." This statement, however, is not supported by the proffered citation or by the evidence viewed in the light most favorable to the respondents. Further, the fact that many of the Municipalities' storm sewer discharges currently violate water quality standards does not mean that the Municipalities cannot comply

with the standards during the five-year term of the Permit. Additionally, Building Industry's assertions at oral argument that the trial court never reached the "impossibility" issue and/or that respondents' counsel conceded the issue below are belied by the record, including the trial court's rejection of Building Industry's specific challenge to the proposed statement of decision on this very point. n14

n14 Because we are not presented with a proper appellate challenge, we do not address the trial court's factual determinations in this case concerning whether it is possible or practical for a Municipality to achieve any specific Permit requirement.

(15) We reject Building Industry's related argument that it was respondents' burden to affirmatively show it is feasible to satisfy each of the applicable Water Quality Standards provisions. The party challenging the scope of an administrative permit, such as an NPDES, has the burden of showing the agency abused its discretion or its findings were unsupported by the facts. (See *Fukuda v. City of Angels, supra,* 20 Cal.4th at p. 817; *Huntington Park Redevelopment Agency v. Duncan* (1983) 142 Cal. App. 3d 17, 25 [190 Cal. Rptr. 744].) Thus, it was not respondents' burden to affirmatively demonstrate it was possible for the Municipalities to meet the Permit's requirements.

Building Industry alternatively contends it was not required to challenge the facts underlying the trial court's determination that the Permit requirements were feasible because the court's determination was wrong as a matter of law. Specifically, Building Industry asserts that a Permit requirement that is more stringent than a "maximum extent practicable" standard is, by definition, "not practicable" and therefore "technologically impossible" to achieve under any circumstances. Building Industry relies on a dictionary definition of "practicable," which provides that the word means " 'something that can be done; feasible,' " citing the 1996 version of "Webster's Encyclopedic Unabridged Dictionary."

(16) This argument is unpersuasive. The federal maximum extent practicable standard it is not defined in the Clean Water Act or applicable regulations, and thus the Regional Water Board properly included a detailed description of the term in the Permit's definitions section. (See *ante*, fn. 7.) As broadly defined in the Permit, the maximum extent practicable standard is a highly flexible concept that depends on balancing numerous factors, including the particular control's technical feasibility, cost, public acceptance, regulatory compliance, and effectiveness. This definition conveys that the Permit's maximum extent practicable standard is a term of art, and is not a phrase that can be interpreted solely by reference to its everyday or dictionary meaning. Further, the Permit's definitional section states that the maximum extent practicable standard "considers economics and is generally, but not necessarily, *less* stringent than BAT." (Italics added.) BAT is an acronym for "best available technology economically achievable," which is a technology-based standard for industrial storm water dischargers that focuses on reducing pollutants by treatment or by a combination of treatment and best management practices. (See *Texas Oil & Gas Ass'n v. U.S. E.P.A.* (5th Cir. 1998) 161 F.3d 923, 928.) If the maximum extent practicable standard is generally "less stringent" than another Clean Water Act standard that relies on available technologies, it would be unreasonable to conclude that anything more stringent than the maximum extent practicable standard is necessarily impossible. In other contexts, courts have similarly recognized that the word "practicable" does not necessarily mean the most that can possibly be done. (See *Nat. Wildlife Federation v. Norton* (E.D. Cal. 2004) 306 F. Supp. 2d 920, 928, fn. 12 ["[w]hile the meaning of the term 'practicable' in the [Endangered Species Act] is not entirely clear, the term does not simply equate to 'possible' "]; *Primavera Familienstiftung v. Askin* (S.D.N.Y. 1998) 178 F.R.D. 405, 409 [noting that "impracticability does not mean impossibility, but rather difficulty or inconvenience"].)

We additionally question whether many of Building Industry's "impossibility" arguments are premature on the record before us. As we have explained, the record does not support that any required control is, or will be, impossible to implement. Further, the Permit allows the Regional Water Board to enforce water quality standards during the iterative process, but does not impose any obligation that the board do so. Thus, we cannot determine with any

degree of certainty whether this obligation would ever be imposed, particularly if it later turns out that it is not possible for a Municipality to achieve that standard.

Finally, we comment on Building Industry's repeated warnings that if we affirm the judgment, all affected Municipalities will be in immediate violation of the Permit because they are not now complying with applicable water quality standards, subjecting them to immediate and substantial civil penalties, and leading to a potential "shut down" of public operations. These doomsday arguments are unsupported. The Permit makes clear that Municipalities are required to adhere to numerous specific controls (none of which are challenged in this case) and to comply with water quality standards through "timely implementation of control measures" by engaging in a cooperative iterative process where the Regional Water Board and Municipality work together to identify violations of water quality standards in a written report and then incorporate approved modified best management practices. Although the Permit allows the regulatory agencies to enforce the water quality standards during this process, the Water Boards have made clear in this litigation that they envision the ongoing iterative process as the centerpiece to achieving water quality standards. Moreover, the regulations provide an affected party reasonable time to comply with new permit requirements under certain circumstances. (See 40 C.F.R. § 122.47.) There is nothing in this record to show the Municipalities will be subject to immediate penalties for violation of water quality standards.

We likewise find speculative Building Industry's predictions that immediately after we affirm the judgment, citizens groups will race to the courthouse to file lawsuits against the Municipalities and seek penalties for violation of the Water Quality Standards provisions. n15 As noted, the applicable laws provide time for an affected entity to comply with new standards. Moreover, although we do not reach the enforcement issue in this case, we note the Permit makes clear that the iterative process is to be used for violations of water quality standards, and gives the Regional Water Board the discretionary authority to enforce water quality standards during that process. Thus, it is not at all clear that a citizen would have standing to compel a municipality to comply with a water quality standard despite an ongoing iterative process. (See § 1365(a)(1)(2).)

n15 The Clean Water Act allows a citizen to sue a discharger to enforce limits contained in NPDES permits, but requires the citizen to notify the alleged violator, the state, and the EPA of its intention to sue at least 60 days before filing suit, and limits the enforcement to nondiscretionary agency acts. (See § 1365(a)(1)(2).)

III.-VII. *[NOT CERTIFIED FOR PUBLICATION]

*See footnote, *ante*, page 866.

DISPOSITION

Judgment affirmed. Appellants to pay respondents' costs on appeal.

Benke, Acting P. J., and Aaron, J., concurred.

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Hydrologic Changes in Urban Streams and Their Ecological Significance

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Abstract.—Urban development modifies the production and delivery of runoff to streams and the resulting rate, volume, and timing of streamflow. Given that streamflow demonstrably influences the structure and composition of lotic communities, we have identified four hydrologic changes resulting from urban development that are potentially significant to stream ecosystems: increased frequency of high flows, redistribution of water from base flow to storm flow, increased daily variation in streamflow, and reduction in low flow. Previous investigations of streamflow patterns and biological assemblages provide a scale of ecological significance for each type of streamflow pattern. The scales establish the magnitude of changes in streamflow patterns that could be expected to produce biological responses in streams. Long-term streamflow records from eight streams in urbanizing areas of the United States and five additional reference streams, where land use has been relatively stable, were analyzed to assess if streamflow patterns were modified by urban development to an extent that a biological response could be expected and whether climate patterns could account for equivalent hydrologic variation in the reference streams. Changes in each type of streamflow pattern were evident in some but not all of the urban streams and were nearly absent in the reference streams. Given these results, hydrologic changes are likely significant to urban stream ecosystems, but the significance depends on the stream's physiographic context and spatial and temporal patterns of urban development. In urban streams with substantially altered hydrology, short-term goals for urban stream rehabilitation may be limited because of the difficulty and expense of restoring hydrologic processes in an urban landscape. The ecological benefits of improving physical habitat and water quality may be tempered by persistent effects of altered streamflow. In the end, the hydrologic effects of urban development must be addressed for restoration of urban streams.

Introduction

Streamflow is the dominant physical process distinguishing rivers and streams from other ecosystems. The structure and composition of lotic communities in fluvial ecosystems depend on source, timing, and rate of streamflow as they regulate both habitat conditions and disturbance regimes. Because of the important roles of streamflow in fluvial ecosystems, hydrologic changes in urban streams pose plausible and potentially significant ecological risks that warrant evaluation, along with other recognized changes (e.g., water chemistry, physical habitat, riparian conditions). Although previous investigations have associated degradation in the biological condition of streams with urban development (Klein 1979; Wang et al. 2000; Morley and Karr 2002; Booth et al. 2004), streamflow patterns per se are seldom implicated as a primary cause of urban stream degradation. Failure to address the significant hydrologic changes in urban areas may limit the success of restoration efforts in rivers and streams.

"Urbanization" is not a single condition; instead, it is a collection of actions that lead to recognizable landscape forms and, in turn, to changes in stream conditions. No single change defines urbanization,

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but the cumulative effect of human activities in urban basins profoundly influences streams and their biota. Karr and Yoder (2004) provide a conceptual framework for assessing biological degradation in which the human actions that constitute urbanization modify many aspects of stream ecosystems, which elicit biological responses (Figure 1). Among the many aspects of stream ecosystems modified by urbanization, changes in hydrologic regimes (i.e., the timing and rate of streamflow) and potential biological responses are the focus of this paper. The influence of hydrologic modification, however, is likely to depend on a broader ecological context, and so the importance of hydrologic modification is likely to vary from stream to stream and region to region.

We focus on hydrology as a primary link between urban development and biological responses in urban streams because of the well-established influence of streamflow on the structure, composition, and productivity of lotic communities. In this paper, we briefly review the literature on relations between streamflow patterns and lotic communities to identify the types of streamflow patterns that have demonstrable effects on stream biota. We then extend the results of two investigations, Poff and Allan (1995) and Clausen and Biggs (1997), that associated variation of biological assemblages with variation in a variety of streamflow statistics. Our extended analyses identify the magnitude of variation in four streamflow patterns (high flow frequency, flow distribution, daily variation, and low flow magnitude) that was associated with biological differences within their respective groups of streams. The magnitude of hydrologic variation associated with biological differences establishes the scale of ecological significance for assessing changes in each streamflow pattern. We then analyze long-term streamflow records from eight urban streams and five reference streams in the United States, where land use has been relatively stable, to identify streamflow patterns that changed in association with urban development. Finally, we discuss our results in the context of managing urban streams.

Hydrologic Effects of Urban Development

Hydrologic effects of urbanization can be characterized as the redistribution of water once intercepted by

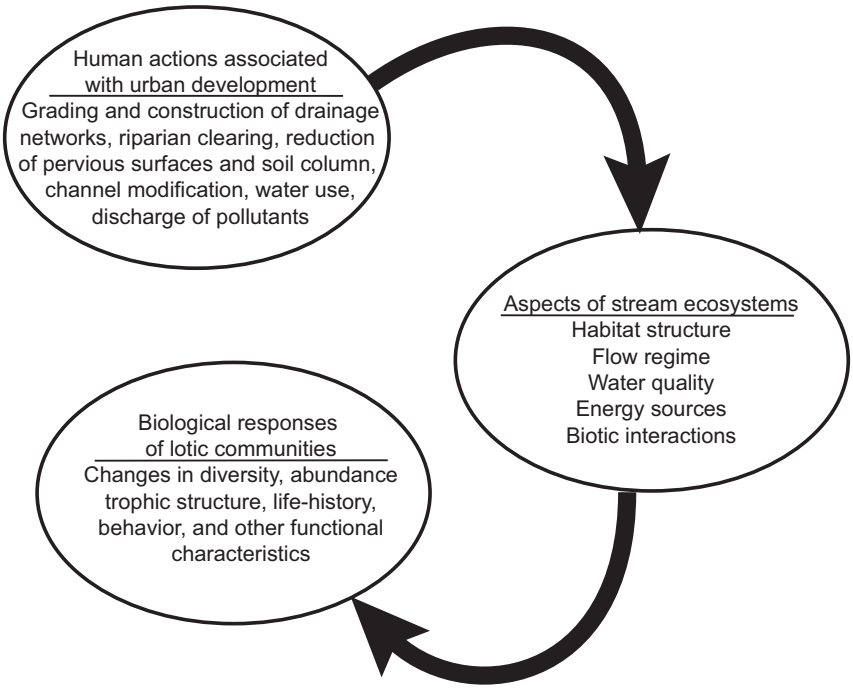

FIGURE 1. Urban development represents many distinct human actions that affect each of five major aspects of stream ecosystems. Changes in the ecosystem, in turn, elicit biological responses (modified from Karr and Yoder 2004).

vegetation or stored in the soil column, from which it drained slowly into streams or aquifers or was taken up by vegetation and transpired. Following development, this water runs off impervious surfaces or saturates thin soils and then runs off as overland flow. Drainage networks collect runoff and allow it to flow quickly as open-channel flow to receiving water bodies, greatly reducing the length of subsurface or overland flow paths. Aquifer recharge and evapotranspiration may be reduced. The hydrologic effects of urban development were evident in a comparison of runoff from two headwater catchments in western Washington (Burges et al. 1998). Novelty is a 37-ha, forested catchment. Klahanie is a 17-ha catchment with residential land use. Although much of the landscape in Klahanie is "pervious" lawn, the thin soils are quickly saturated during storms producing runoff patterns distinct from Novelty, including higher peak unit-area discharge, higher runoff volume, and more frequent peaks (Figure 2).

Changes in runoff patterns resulting from urban development manifest in streams as an increase in storm flow rates and volumes and a corresponding reduction in recessional flow and base flow rates and volumes (Leopold 1968; Konrad 2003a). There are also higher-order hydrologic effects of urban development: streamflow rises more rapidly during storms and recedes more rapidly after storms, which is typically described as "flashy" streamflow. Storm flow is more frequent and the seasonal period for storm flow may lengthen as storms produce higher streamflow in urban areas, even when antecedent conditions are dry. Because runoff is redistributed from base flow periods to storm flow periods, the total water balance and, thus, central measures of streamflow distributions such as annual mean streamflow may not change in response to urban development (Konrad and Booth 2002). The water balance for a stream basin may change when changes in vegetation alter interception of precipitation and evapotranspiration, surface or groundwater is used consumptively, or water is imported into a basin for irrigation.

Base flow changes less consistently in response to urban development. Annual base flow volume for two streams draining sewered areas of Long Island, New York was reduced from more than 60% to approximately 20% during urban development (Simmons and Reynolds 1982). Unit-area base flow during the wet season in western Washington streams clearly decreases with increasing road density, in contrast to unit-area base flow during the dry season (Figure 3). Minimum annual 7-d streamflow, however, did not change consistently in response to urban development in western Washington (Konrad and Booth 2002). Thus, urban development appears to reduce shallow subsurface flow that supports wet-season base flow but has a less evident effect on deeper groundwater recharge that supports summertime discharges.

Low flow in urban streams can increase as a result

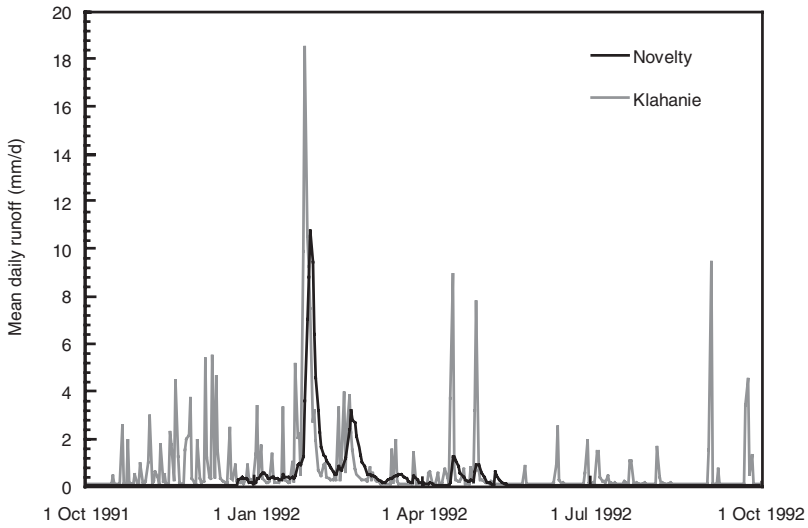

FIGURE 2. Runoff during water year 1992 for two headwater catchments in western Washington. At the time of data collection, Novelty was a fully forested 37-ha catchment; Klahanie was a fully built-out 17-ha residential catchment.

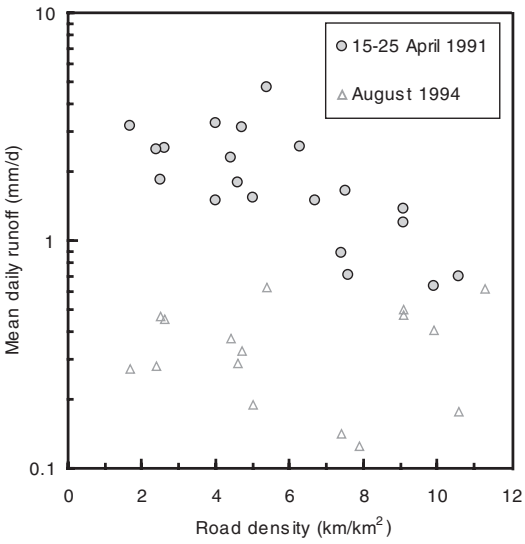

FIGURE 3. A comparison of mean unit-area base flow in the wet season and dry season for 21 streams in western Washington.

of imported water used for landscape irrigation that subsequently drains through shallow soil layers and aquifers (Harris and Rantz 1964) or used in residences with on-site septic systems. In contrast, decreases in low flow occur from increased surface drainage (storm sewers and ditches), surface water diversions, and pumping shallow groundwater. For example, annual minimum streamflow in Big Soos Creek in Washington have declined significantly in response to residential development and water use in the basin over the past few decades, while no such trends are evident in nearby rural streams (Konrad and Booth 2002).

In headwater ephemeral streams, periods of continuous flow are likely to be briefer with frequent intermittency (Figure 2). For example, during the period from water year (WY) 1991–1993, there was an average of 24 periods of flow intermittency per year in the residential Klahanie catchment, including periods of no flow during spring, compared to five times per year for the forested Novelty catchment. This difference is not reflected by the percentage of days with flow in these streams, which was 62% of the 3-year period in Klahanie compared to 54% in Novelty.

Given the magnitude of hydrologic changes resulting from urban development, urban streamflow patterns are likely to affect the biological conditions of streams, although these patterns frequently have been quantified in ways that are not directly relevant to their ecological effects but, instead, represent only their social impacts. Few studies definitively make the link between hydrologic alteration and biological responses in urban streams, in part because urban development affects nearly all aspects of fluvial ecosystems. Orser and Shure (1972) documented lower population densities of dusky salamander *Desmognathus fuscus fuscus* with increasing levels of urban development for five streams near Atlanta, Georgia. They indicated that floods had likely transported individuals downstream, reducing salamander populations and creating unstable age structures. In 27 streams in Maryland, Klein (1979) found an association between biological conditions (macroinvertebrate diversity and fish taxa) and the percent of watershed imperviousness, which in turn was linked to unit-area base flow. Likewise, an index of the diversity and structure of macroinvertebrate assemblages was correlated with streamflow patterns in western Washington streams (Booth et al. in press). As in any study of urban streams, however, many other factors, including channel morphology, streambed material, nutrients, migration barriers, water temperature, and water chemistry, are likely to have influenced the biological conditions of these urban streams.

Biological Variation Associated with Streamflow Patterns

Although the biological effects of streamflow modification are difficult to isolate because of other changes in urban streams, many ecological investigations have documented how the rate, timing, and sources of streamflow affect the structure, composition, and productivity of lotic assemblages by regulating habitat conditions, availability of food sources, or natural disturbance regimes (Shelford and Eddy 1929; Horwitz 1978; Fisher et al. 1982; Schlosser 1985; Newbury 1988; Power et al. 1988; Resh et al. 1988; Townsend 1989; Power et al. 1999). Physical characteristics of water (e.g., velocity, depth, temperature, turbidity, and nutrient availability) and geomorphic features of the channel (e.g., width, bank height, and bed material) depend on streamflow. These characteristics and features define habitat units that compose the physical template for stream ecosystems in which distinct hydraulic conditions and substrates favor specific types of organisms or provide refugia during disturbance (Stehr and Branson 1938; Minshall 1984, 1988; Statzner and Higler 1986; Statzner et al. 1988; Townsend 1989; Townsend et al. 1997). The area,

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volume, and diversity of habitats generally increase with streamflow, which may account for the increasing diversity and productivity of lotic assemblages in larger streams and rivers (Harrel et al. 1967; Platts 1979; Allan 1995; Fairchild et al. 1998; Wiberg-Larsen et al. 2000). Hydrologic variability generally decreases with increasing stream size, which promotes habitat stability and may also promote increased diversity of lotic assemblages with stream size (Horwitz 1978). A relatively uniform distribution of streamflow is generally associated with relatively high groundwater inflow, which produces more stable seasonal temperatures, less ice cover in cold regions, higher dissolved oxygen during summer, and stable habitat volume (Power et al. 1999).

Disturbances in the form of high flows or hydrologic droughts (i.e., streamflow very low or absent) reduce periphyton biomass, macrophyte and fish populations, and the diversity of lotic assemblages (Stehr and Branson 1938; Douglas 1958; Anderson and Lehmkuhl 1968; Fisher et al. 1982; McAuliffe 1984; Schlosser 1985; Erman et al. 1988; McElravy et al. 1989; McCormick and Stevenson 1991; Boulton et al. 1992; Bayley and Osborne 1993; Closs and Lake 1994; Dieterich and Anderson 1995; Wootton et al. 1996). High flows, in particular, have a direct effect on stream biota by scouring streambeds, killing organisms or transporting them downstream. High flows also modify the trophic structure of streams by transporting dissolved nutrients and particulate organic material (Biggs and Close 1989; Anderson and Lehmkuhl 1968) or by selecting for benthic insects with traits (e.g., morphology) that affect their suitability as fish prey (Wootton et al. 1996; Perry et al. 2003). Lotic communities quickly recover after an individual flood or period of no flow (Shelford and Eddy 1929; Stehr and Branson 1938; Fisher et al. 1982; Power and Stewart 1987; Scrimgeour and Winter-bourn 1989; DeBrey and Lockwood 1990; Boulton et al. 1992; Bayley and Osborne 1993; Jones et al. 1995); however, rivers and streams with frequent high flows or no-flow periods have relatively simple trophic structure, low taxonomic diversity, and high dominance by a few taxa (Gorman and Karr 1978; Schlosser 1985; White and Pickett 1985; Robinson and Minshall 1986; Power and Stewart 1987; Death and Winterbourn 1995; Rabeni and Wallace 1998). While periodic disturbance is readily accommodated in river and stream ecosystems without degrading biological productivity, diversity, or structure, frequent disturbances may have persistent biological effects.

The biological influence of disturbance is complex; it depends on the biological attribute or organism of interest and is mediated by the ecological context at a site. For example, the lack of disturbance can allow a few taxa to dominate an assemblage (Connell 1978; McAuliffe 1984; Wootton et al. 1996), as can a high frequency of disturbance. Different attributes of lotic communities do not respond consistently to disturbance. In an investigation of 11 streams in New Zealand, Death and Winterbourn (1995) found the density of invertebrate species and species richness increased with site stability, but species evenness peaked at sites with intermediate stability. The biological effects of high flows also depend on seasonal timing in relation to the life histories of aquatic organisms (Bickerton 1995; Dieterich and Anderson 1995).

The relative magnitude of streamflow is an important component of the ecological context. To account for differences in stream size in ecological investigations, high flows are often assessed with respect to the mean or median flow (Horwitz 1978; Poff and Ward 1989; Clausen and Biggs 1997). Nonhydrologic factors such as habitat diversity (Gorman and Karr 1978; Gurtz and Wallace 1984; Townsend et al. 1997) and biotic interactions (McAuliffe 1984; Feminella and Resh 1990; McCormick and Stevenson 1991; Wootton et al. 1996) also help form the broad ecological context that mediates effects of single extreme streamflow events on stream biota. Thus, the specific biological responses to changes in streamflow patterns are difficult to assess without information about the biological feature of interest and the other components of the ecosystem. Nonetheless, investigations of groups of streams representing a range of biological and physical conditions provide evidence of systematic biological responses to streamflow patterns.

Previous investigations have provided frameworks for ecological analyses of streamflow patterns. Poff and Ward (1989) developed a classification system of regional hydrologic regime. Their conceptual model included a hierarchy of four flow characteristics: duration of intermittency, high flow frequency, high flow predictability, and overall flow variability. Richter et al. (1996) assessed flow alteration of regulated rivers in terms of five characteristics of flow: magnitude, duration, frequency, timing, and rate of change. Clausen and Biggs (2000) used principal component analysis to identify four distinct categories of streamflow statistics for New Zealand streams: central tendency (stream size), flow variability, volume of high flows, and frequency of high-flow events. Clausen and Biggs (2000) did not include any statistics for the timing of flows or

rate of change. Each of these frameworks include streamflow statistics that are likely to be modified by urban development. Unlike the effects of regulation by a dam or other control structure, the hydrologic consequences of urban development are incremental. Streamflow patterns are produced by runoff processes, not by controlled releases through penstocks and spillways. As a result, urban streamflow does not necessarily have clearly artificial patterns such as truncated peaks, stepped ramping of flows, or high frequency (diurnal) fluctuations. Instead, urban development causes broad changes in the rate and timing of runoff that should be evident from a limited set of streamflow statistics representing ecologically significant streamflow patterns.

Ecologically Significant Variation in Streamflow Patterns

Comparative analyses of rivers and streams provide evidence for the strongest associations between streamflow patterns and biological conditions, though not necessarily the causative mechanisms. Two studies—Poff and Allan (1995) and Clausen and Biggs (1997)—are reviewed to define ranges of streamflow variables associated with attributes of lotic assemblages. These studies did not attribute streamflow patterns to differences in land use, though it is likely that land use had an influence in some basins. Instead, they examined rivers and streams from wide geographic regions where various physiographic factors such as drainage area, climate, and geology produced different streamflow patterns.

We assume that natural physiographic factors produce differences in streamflow among the Poff and Allan (1995) and Clausen and Biggs (1997) streams comparable to the hydrologic changes resulting from urban development. Thus, these streams provide a natural correlate of an urban gradient to assess the biological response to differences in streamflow (e.g., streamflow is typically flashier in smaller streams than in large rivers). This approach avoids the covarying and, thus, confounding effects from water quality, channel form, and riparian zones that also vary with streamflow patterns across an urban gradient. Hydrologic changes in urban streams, however, may not be strictly analogous to hydrologic differences between streams. In urban streams, hydrologic changes occur over decadal time scales, so species do not have the time to evolve to modified streamflow regimes that they have had in natural systems. Thus, the biological response to changes in streamflow patterns over decades in a stream may be greater than the biological variation between streams that have long standing natural differences in streamflow pattern.

Poff and Allan (1995) analyzed relations between four streamflow statistics and fish assemblages at 34 sites in rivers in Wisconsin and Minnesota. Streamflow statistics were calculated from records collected over various time periods spanning at least 20 years. Two functional groups of fish were identified based on species presence/absence at the sites. Canonical discriminant analysis was used to identify hydrologic characteristics of the sites associated with the two groups. A canonical variate composed of daily flow predictability, base flow stability, coefficient of variation (CV) of daily flows, and frequency of spates distinguished the two functional groups of fishes based on hydrologically variable or hydrologically stable sites. Daily flow predictability and base flow stability were significantly different ($P < 0.05$, Wilcoxon rank-sum test) between the two groups of sites, but the CV of daily flows and frequency of daily flow with a 1.67-year return interval were not (Table 1). A comparison of species traits for the two functional groups indicated that the hydrologically variable group had more trophic and habitat generalists tolerant of silt than the hydrologically stable group.

Clausen and Biggs (1997) analyzed relations between 34 streamflow statistics and benthic (periphyton and invertebrate) assemblages in 83 rivers in New Zealand. Streamflow statistics were calculated from contemporaneous records spanning 1–7-year periods. They found that periphyton biomass was inversely related to mean flow, median flow, and the frequency of high flows (daily streamflow equal to or greater than three times the median daily streamflow). Periphyton biomass was directly related to 90th-percentile flow. Periphyton species richness was inversely related to flood volume/base flow volume, frequency of high flows, and the product of frequency and duration of high flow. Periphyton species diversity was related to high flow and variation (CV) statistics but not to central-tendency or low-flow statistics. Invertebrate density and richness were inversely related to mean, median, and low flows and directly related to flow variability and the frequency of high flows. The frequency of high flows provided the single most useful measure to account for the variation in measures of benthic assemblages among the rivers.

Clausen and Biggs (1997) proposed that flood disturbance (scour, deposition, abrasion of bed mate-

TABLE 1. Median values of streamflow statistics for 34 sites in Wisconsin and Minnesotta classified by Poff and Allan (1995) as hydrologically stable or hydrologically variable based on fish assemblages.

Streamflow statistics	Sites with hydrologically stable fish assemblage	Sites with hydrologically variable fish assemblages
Frequency of daily flow with 1.67 year return interval	0.69	0.77
Daily coefficient of variation	1.3	1.9
Daily flow predictability[a]	70	46
Baseflow stability[a]	0.36	0.05
Annual frequency of flows > 10th percentile[a]	4.9	6.0
Annual frequency of flows > three times median flow[a]	3.9	6.5
T_{Qmean} (fraction of time that flow exceeds mean flow)	0.26	0.25
CV (LN transformed data)[a, b]	0.7	2.1
Median daily percent change in streamflow[a]	5%	7%
90th percentile flow/median flow[a]	0.52	0.21

[a] Values were significantly different between the two groups ($P < 0.05$, two-tailed Wilcoxon rank sum test).
[b] Coefficient of variation of natural log transformed daily flows.

rial) and relative flow stability were the dominant hydrologic mechanisms affecting the benthic assemblages. They also found that mean and median flows were negatively correlated with periphyton and invertebrate density and invertebrate richness because of decreasing bed stability and heterogeneity of bed material with stream size. Thus, the biological influence of stream size was not solely hydrologic but instead also depended on sediment supply and the size of structural features (wood, cobbles, valley width) relative to the stream channel.

Clausen and Biggs (2000) also suggested additional reasons for lower density and richness of benthic assemblages in larger rivers. These include lower velocity, lower gradient, finer bed material, reduced allochothonous inputs, and increased light availability. Inorganic nitrogen and phosphorous concentrations were also negatively correlated with specific yield (a measure of stream size) and high flow magnitude, and were likely to control autotrophic production between high flows. None of these reasons for a biological response are solely a function of streamflow patterns.

Four types of streamflow patterns examined by Poff and Allan (1995) and Clausen and Biggs (1997) were thus associated with variation of fish and benthic assemblages: high flow frequency, streamflow distribution, daily variation, and low flow magnitude (Table 2). The biological response of lotic assemblages to variation in each of these patterns has a mechanistic basis. Increased high flow frequency could result in shorter periods between disturbances and increased seasonal periods with episodic high flows. Change in high flow frequency is particularly an issue in regions where the reproduction and growth cycles of aquatic and benthic organisms are tied to stable flow periods. The likelihood and spatial extent of bed disturbance increase with storm flow frequency (Konrad et al. 2002). The distribution of streamflow, as characterized by its central tendency (i.e., mean or median) provides a gross indication of the amount (volume and area) of habitat available to aquatic organisms. Measures of variability provide information on habitat heterogeneity over time. Stream ecosystems where storm flow, rather than base flow, constitutes much of the total distribution of streamflow will have short periods when hydraulic conditions, nutrient transport, and amount of habitat are at high levels (though not necessarily optimal) and extended periods of time when these conditions and processes are at low levels. Movement of nutrients and particulate organic material is also likely to be skewed to short periods of rapid transport and limited retention. Increased daily variation in flow may reduce the time that a given location is suitable habitat for an organism and cause the organism to expend energy moving to suitable locations. Reduced low flows can reduce the area of benthic habitat and volume of aquatic habitat, leading to lower population sizes and diversity in lotic communities.

Methods for Assessing Hydrologic Changes in Urban Streams

We examine the effects of urban development on the four types of streamflow patterns (high flow frequency,

TABLE 2. Streamflow patterns with biological responses to variation, statistics, and ranges of values for streams in each source. Statistics in italics were analyzed in this chapter for selected reference and urban streams.

Biological responses to variable:	High-flow frequency statistics	Range of values
Variation in high-flow frequency		
Dominance of trophic and habitat generalists in fish assemblages, lower periphyton density and diversity with increasing high flow frequency.	*Frequency of daily flows that exceeded three times median flow*	0 to 34 events per year[b] 1.1 to 10 events per year[c]
	Frequency of events greater than 10th percentile flow	2.4 to 10 events per year[c]
	Frequency of daily flow corresponding to annual peak flow with 1.67 return interval	0.4 to 1.1 events per year[a]
Variation in streamflow distribution		
Dominance of trophic and habitat specialists in fish assemblages with increasing mean or median flows; lower periphyton density, richness, and diversity with increasing mean and median flows or increasing stormflow relative to baseflow; lower invertebrate density and richness with increasing mean or median flow or increasing stormflow to baseflow.	*Mean streamflow*	0.4 to 520 m^3/s[b] 0.6 to 37 m^3/s[c]
	Median daily streamflow	0.3 to 468 m^3/s[c] 0.1 to 30 m^3/s[c]
	$T_{Q\text{mean}}$	0.17 to 0.37[c]
	Flood flow index	0.03 to 2.8[b]
Variation in daily streamflow		
Dominance of trophic and habitat generalists in fish assemblages, lower periphyton diversity, lower invertebrate density and evenness with increasing daily variation.	*Coefficient of variation of logarithms of daily streamflow*	0.4 to 27[c]
	Median daily percent change	3% to 12%[c]
	Coefficient of variation	0.4 to 3.2[a] 0.09 to 3.7[b]
Variation in low flow		
Dominance of trophic and habitat specialists in fish assemblages, higher periphyton and invertebrate density with increasing low flow	*90th percentile flow*	0 to 20.4 m^3/s[c]
	90th percentile flow/median daily flow	0.17 to 0.98[b] 0 to 0.72[c]
	Baseflow stability	0 to 0.6[a]

Sources: [a] Poff and Allan (1995), [b] Clausen and Biggs (1997), [c] reanalysis of sites examined by Poff and Allan (1995).

streamflow distribution, daily variation, low flow/flow intermittency) in 13 streams in the United States that have streamflow records of at least 30 years (Table 3). Five streams are part of the U.S. Geological Survey (USGS) Hydrologic Benchmark Network (HBN), which represents reference streams relatively unaffected by local land uses, and eight urban streams were in counties with population densities greater than 200 people/km^2 in 2000 (Figure 4).

A host of streamflow statistics can be used to demonstrate the hydrologic effects of urbanization and their relations to stream biota, but many streamflow statistics are correlated with each other because they represent the same underlying streamflow pattern. For our analysis, we selected nine statistics representing four distinct streamflow patterns (Table 2) to assess which statistics consistently change in response to urban development while remaining stationary in reference streams. Annual values of the streamflow statistics were analyzed for changes in urban streams between WY 1957–1968 and WY 1991–2000 using the Wilcoxon rank-sum test, with rejection of the null hypothesis when $P < 0.05$. For the urban streams, the specific direction of change was hypothesized for each parameter except mean, median, and low-flow statistics. The hypotheses are described below and allow a one-tailed test (i.e., reject the null hypotheses for no change or a change in the opposite direction). Two-

TABLE 3. Selected Hydrologic Benchmark Network stations and urban streams with U.S. Geological Survey station number, county and state, and drainage area.

Stream	Station number	County and state	Drainage area
Hydrologic Benchmark Network			
Elder Creek	11475560	Mendicino, CA	17 km^2
Holiday Creek	02038850	Appomattox, VA	22 km^2
Andrews Creek	12447390	Okanogan, WA	57 km^2
Mogollon Creek	09430600	Grant, NM	177 km^2
Popple River	04063700	Florence, WI	356 km^2
Urban			
Valley Stream	01311500	Nassau, NY	12 km^2
Mercer Creek	12120000	King, WA	31 km^2
Poplar Creek	05550500	Cook, IL	90 km^2
San Francisquito Creek	11164500	Santa Clara, CA	96 km^2
Morrison Creek	11336580	Sacramento, CA	137 km^2
Northeast Branch Anacostia River	01649500	Prince George's, MD	186 km^2
Peachtree Creek	02336300	Fulton, GA	222 km^2
Salt Creek	05531500	Cook, IL	294 km^2

tailed tests were used for mean streamflow, median streamflow and the two low-flow statistics because we did not have specific hypotheses regarding the direction of change for these statistics

Streamflow records for most HBN sites began later than the urban streams, so statistics for WY 1969–1978 were compared to statistics for WY 1991–2000 for the HBN sites. For the HBN sites, periods were compared with a two-tailed Wilcoxon rank-sum test. The null hypothesis (no change over time) was rejected when $P < 0.10$ for the HBN streams to increase the power of the test to detect changes in each statistic. By reducing the likelihood of false rejection of the null hypothesis for the HBN sites, there is greater certainty for concluding that a statistic is relatively stationary despite decadal-scale variation in weather patterns.

Streamflow data available for the period of analysis include annual maxima and daily mean streamflows. Daily mean streamflow does not capture the variability of urban streamflow, which can rise and fall rapidly during an hour or two. Thus, hydrologic measures based on daily streamflow underrep-resent the hydrologic changes associated with urban development and their biological consequences. Nonetheless, these data are consistent with those used by Clausen and Biggs (1997) and Poff and Allan (1995).

Frequency of High-Flow Events

Urban development was expected to increase the volume and peak rate of runoff from storms, which results in increased flood magnitude and frequency. Various approaches account for the relative magnitude of a flood in a particular stream, including scaling the flow by drainage area or channel width, converting the discharge to a depth and assessing it relative to bankfull depth, or using a reference discharge as a threshold for identifying a high flow. Clausen and Biggs (1997, 2000) selected a discharge three times the median streamflow as a threshold for defining "high" flows because of its association with variation in benthic assemblages.

In our reanalysis of streamflow data from sites examined by Poff and Allan (1995), the frequency of events greater than three times the median flow was significantly different between the hydrologically variable and hydrologically stable sites (Table 1). Poff and Allan (1995) used the daily discharge on the day when there was a peak discharge with a 1.67-year recurrence interval as the threshold for high flows because it referenced a significant, but not rare, disturbance to the fish assemblage. Although such an event may represent a disturbance, it does not provide much resolution between streams insofar as the annual frequency of a given streamflow is related to its recurrence interval. Indeed, the frequency of high flows was not significantly different between hydrologically stable and hydrologically variable sites using this frequency-based threshold (Table 1).

The cumulative exceedence distribution of streamflow (flow-duration curve) provides a mechanistic basis for selecting a geomorphically effective flow (Wolman and Miller 1960) capable of disturb-

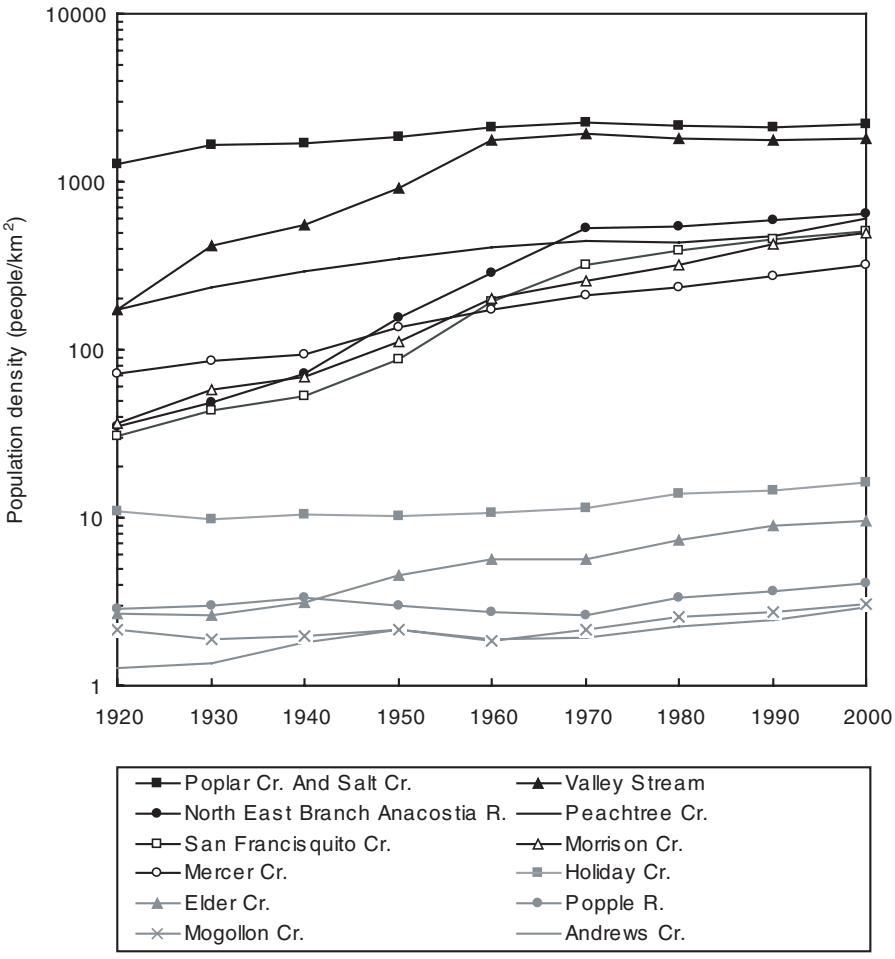

FIGURE 4. Decadal population densities from 1920 to 2000 for the counties where the selected streamflow gauges are located. Refer to Table 3 for stream locations. Data from the U.S. Census Bureau (2004).

ing a streambed. The 5th- to 10th-percentile flows represent an approximate threshold of streambed stability for many river channels (e.g., Helley 1969; Milhous 1973; Pickup and Warner 1976; Andrews 1984; Sidle 1988; Carling 1988; Konrad et al. 2002). The 5th- or 10th-percentile flows are very highly correlated; for simplicity, we use the 10th-percentile flow as the high flow threshold. When high flow frequency was reanalyzed at the sites investigated by Poff and Allan (1995), hydrologically variable sites had more frequent high-flow events than hydrologically stable sites (Table 1). Changes in the frequency of high-flow events in the urban and HBN streams were analyzed using as thresholds both the 10th-percentile streamflow and three times the median streamflow.

Flow Distribution

We did not expect central measures of streamflow distribution to change consistently in response to urban development, but both annual mean and annual median flows were tested for changes between the urban and reference streams because of the associations of these measures with characteristics of fish and benthic assemblages, and with habitat area/volume and streamflow. Streamflow was expected to be redistributed from base flow periods to storm flow periods in response to urban development. Clausen and Biggs (1997) used the ratio of flood-flow volume to base flow volume as a "flood-flow index" (FFI). However, the flood-flow index requires a stream-specific specification of base flow for each

stream and reference changes in streamflow volume. These data were not available for the streams we analyzed.

As an alternative measure of the distribution of streamflow, we analyzed the fraction of time that streamflow exceeds mean streamflow ($T_{Q\text{mean}}$) in the urban and reference streams. $T_{Q\text{mean}}$ provides a relative measure of the distribution of storm flow and base flow comparable to the flood-flow index, but it is based on the duration rather than the volume of streamflow. In response to urban development, $T_{Q\text{mean}}$ is expected to decrease because there is a shorter period of the year when streamflow is greater than mean streamflow (Konrad and Booth 2002).

In the reanalysis of the Poff and Allan (1995) sites, $T_{Q\text{mean}}$ was not significantly different between the hydrologically variable and hydrologically stable sites (Table 1). Four sites with hydrologically variable fish assemblages were associated with hydrologic stability (higher $T_{Q\text{mean}}$) possibly because of either low base flow stability or a short spate-free period. When these sites were excluded from the analysis, $T_{Q\text{mean}}$ was significantly lower (P = 0.02, Wilcoxon rank-sum test) for the hydrologically variable group (median = 0.22), than the hydrologically stable group (median = 0.26). Annual values of $T_{Q\text{mean}}$ were tested to assess whether there was a significant redistribution of streamflow from base flow to storm flow in urban streams and whether the distribution of streamflow between base flow and storm flow was relatively stationary year to year in the reference streams.

Daily Variation of Streamflow

Daily variation of streamflow was analyzed to represent variability, distinct from high-flow disturbances and the gross distribution of storm flow and base flow. Two statistics describing daily variation were examined: the CV of the logarithms of daily streamflow and the percentage daily change in streamflow. The values of both variability statistics were expected to increase in response to urban development. The logarithmic transformation reduced the sensitivity of CV to high flows (Stedinger et al. 1993). Because of zero values, 1 m^3/s was added to each streamflow value before taking the logarithm.

Although the CV of untransformed daily streamflow was not significantly different between the hydrologically variable and hydrologically stable sites analyzed by Poff and Allan (1995), a reanalysis of these sites showed significantly higher values of CV of log-transformed streamflow for hydrologically variable sites (median = 2.1) compared to hydrologically stable sites (median = 0.7) (Table 1). The CV of log transformed daily streamflow was included in the analysis of urban and reference streams to represent routine variation in hydraulic conditions.

The absolute value of the relative change in daily streamflow, $|Q_d - Q_{d-1}|/Q_d$, where Q_d is daily discharge for day d (expressed as the daily percent change in daily flow), was used as an alternative measure of daily flow variability. This statistic weights the relative changes in high flows and low flows equally and, thus, is less sensitive to changes in high flows than is CV. In a reanalysis of the sites in Poff and Allan (1995), the median daily percentage change in streamflow was significantly higher at hydrologically variable sites (median = 7%) compared to hydrologically stable sites (median = 5%) (Table 1).

Low Flow Magnitude

As noted earlier, low flows are not consistently affected by urban development, but we assessed changes in low flows because of their ecological significance. Two low-flow statistics were tested for significant changes over time in the HBN and urban streams: 90th-percentile flow and 90th-percentile flow divided by median streamflow. The 90th-percentile flow provides an absolute measure of streamflow during relatively common low-flow periods but does not account for extremely low flows. The 90th-percentile flow divided by the median flow, from Clausen and Biggs (1997), provides a relative measure that should be less sensitive to annual variation in low flows. In our reanalysis of the Poff and Allan (1995) sites, the values of 90th-percentile flow divided by the median flow were significantly lower at hydrologically variable sites (median = 0.21) compared to hydrologically stable sites (median = 0.52) (Table 1).

Temporal Changes in Streamflow Patterns at Urban and Reference Streams

High Flow Frequency

The frequency of high flows increased from 1958–1967 to 1991–2000 in most of the urban streams, but not in any of the HBN streams (Table 4). The frequency of events greater than the 10th-percentile flow increased in four of the urban streams, while the frequency of events greater than three times the me-

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TABLE 4. Median annual frequency of high-flow events.

Stream	Frequency of events exceeding the 10th-percentile flow (events per year)		Frequency of events exceeding the three times median (events per year)	
	Period 1[a]	Period 2[b]	Period 1[a]	Period 2[b]
Hydrologic Benchmark Network				
Elder Cr.	10	9	7	9
Holiday Cr.	20	22	20	22
Andrews Cr.	3	3	2	4
Mogollon Cr.	6	10	12	15
Popple R.	5	8	7	11
Urban				
Valley Stream	26	30	25	42[c]
Mercer Cr.	18	27[c]	19	32[c]
Poplar Cr.	9	19[c]	14	26[c]
San Francisquito Cr.	7	10	15	10
Morrison Cr.	12	17	12	23[c]
Northeast Branch Anacostia R.	25	34[c]	28	41[c]
Peachtree Cr.	27	33	36	48[c]
Salt Cr.	13	19[c]	20	24

[a] Period 1 is 1969 to 1978 for Hydrologic Benchmark Network streams and 1958 to 1967 for urban streams.
[b] Period 2 is 1991 to 2000.
[c] Probability < 0.05 that frequency is the same for both periods or lower in period 2 based on a one-tailed Wilcoxon rank-sum test.

dian flow increased in six of the urban streams. Only one urban stream, San Francisquito Creek in central California, did not have a significant increase in either high-flow statistic. Streamflow in San Francisquito Creek was intermittent and the high flow regime is likely to reflect storm patterns driven by decadal-scale oscillations in ocean conditions. In this case, it appears that the frequency of events greater than the 10th-percentile flow may be less sensitive to climatic conditions than the frequency of events greater than three times the median flow.

Both of these statistics represent relatively common high-flow events with median annual values for 1991–2000 ranging from 10 to 48 events per year for urban streams and from 3 to 22 events in the HBN streams. The frequency of events greater than the 10th-percentile flow was higher in the urban streams than the streams analyzed by Poff and Allan (1995) (2.4–10.3 events per year) and, thus, all represent hydrologically variable streams by their criterion even during the earlier period from 1958 to 1967. Likewise, the change in the frequency of events exceeding three times the median flow in the urban streams was outside the range for the streams examined by Poff and Allan (1995) (1.1–10 events per year) but spanned part of the range found by Clausen and Biggs (1997) (0–34 events per year) (Table 2).

Streamflow Distribution

The distribution of streamflow changed between 1958–1967 and 1991–2000 in many of the urban streams but not between 1969 and 1978 and 1991–2000 in the HBN streams. Mean streamflow increased significantly between 1958–1967 and 1991–2000 in two urban streams (Table 5). The increases in mean and median streamflow, however, were much less than the three to four order-of-magnitude ranges associated with responses in either fish or benthic assemblages (Table 2).

The redistribution of runoff from base flow to storm flow periods resulted in significant decreases in $T_{Q\text{mean}}$ from 1958–1967 to 1991–2000 in three urban streams. In Valley Stream, Long Island, $T_{Q\text{mean}}$, decreased from 0.24 for 1958–1967 to 0.15 for 1991–2000 (Table 5). The decrease in $T_{Q\text{mean}}$ corresponded to redistribution of annual streamflow volume from more than 60% base flow (FFI = 0.67) prior to 1960 to less than 20% base flow (FFI = 4) after 1966 (Simmons and Reynolds 1982). The urban streams without significant changes in $T_{Q\text{mean}}$ had

TMABLE 5. Median annual values of streamflow distribution statistics.

Stream	Mean daily streamflow (m^3/s)		Median daily streamflow (m^3/s)		Fraction of time mean streamflow is exceeded	
	Period 1[a]	Period 2[b]	Period 1[a]	Period 2[b]	Period 1[a]	Period 2[b]
Hydrologic Benchmark Network						
Elder Cr.	0.85	0.85	0.19	0.20	0.25	0.25
Holiday Cr.	0.28	0.25	0.17	0.19	0.23	0.28
Andrews Cr.	0.91	1.07	0.15	0.18	0.20	0.22
Mogollon Cr.	0.32	0.98	0.10	0.41	0.29	0.30
Popple R.	3.30	3.07	1.95	2.05	0.28	0.31
Urban						
Valley Stream	0.07	0.04	0.04	0.01	0.24	0.15[d]
Mercer Cr.	0.57	0.64	0.37	0.40	0.33	0.26[d]
Poplar Cr.	0.57	0.83[c]	0.21	0.44[c]	0.26	0.28
San Francisquito Cr.	0.18	0.91	0.00	0.06	0.15	0.16
Morrison Cr.	0.40	0.78	0.17	0.15	0.14	0.15
Northeast Branch Anacostia R.	2.03	2.79	1.08	1.33	0.24	0.21[d]
Peachtree Cr.	3.40	4.11	1.67	1.66	0.20	0.20
Salt Cr.	2.75	5.03[c]	1.29	3.04[c]	0.27	0.28

[a] Period 1 is 1969 to 1978 for Hydrologic Benchmark Network streams and 1958 to 1967 for urban streams.
[b] Period 2 is 1991 to 2000.
[c] Probability < 0.05 that value was the same for both periods based on a two-tailed Wilcoxon rank-sum test.
[d] Probability < 0.05 that value was the same for both periods or higher for period 2 based on a one-tailed Wilcoxon rank-sum test.

low values (0.2 or lower) during the initial period of the analysis or had significant increases in base flow (Salt and Poplar Creeks). The changes in T_{Qmean} spanned much of the total range of values (0.17–0.37) from the reanalysis of streams examined by Poff and Allan (1995) (Table 3). Thus, the redistribution of runoff from base flow to storm flow in many, but not all, urban streams is likely to be ecologically significant.

Daily Flow Variability

Daily flow variability increased in many urban streams from 1958–1967 to 1991–2000. Although the CV of the logarithm of daily flows increased in five urban streams (Table 6), the changes were significant in only three of the streams because of interannual variability. No differences between 1969–1978 and 1991–2000 were significant for the HBN streams.

The median daily percentage change in streamflow appeared to be more sensitive to urban development, increasing in five urban streams between 1958–1967 and 1991–2000 and generally having higher values in urban streams than in HBN streams (Table 6). One HBN stream had a significant increase in the median daily percentage change in streamflow, and one HBN stream had a significant decrease from 1969–1978 to 1991–2000. The median daily percentage change for urban streams was more variable (10–40%), than in the HBN streams (3–12%) or the reanalyzed streams of Poff and Allan (1995) (3–12%).

Low Flow

The 90th-percentile streamflow increased significantly in four of the urban streams from 1958–1967 to 1991–2000 and increased significantly one HBN stream from 1969–1978 to 1991–2000 (Table 7). Two of the urban streams had significant increases in 90th-percentile flow normalized by median discharge, but none of the HBN streams had significant changes (Table 7). The increase in low flow may be a result of many factors, including wastewater discharges, or uses of deep groundwater or water imported from other basins that contribute to base flow (e.g., landscape irrigation or septic system effluent). These changes in low flow were small relative to the range of value reported by Clausen and Biggs (1997) and for the reanalysis of the streams examined by Poff and Allan

TABLE 6. Median annual values of streamflow-variability statistics.

Stream	Daily percentage change in streamflow		Coefficient of variation of logarithms of daily streamflow	
	Period 1[a]	Period 2[b]	Period 1[a]	Period 2[b]
Hydrologic Benchmark Network				
Elder Cr.	6%	6%	1.72	1.62
Holiday Cr.	10%	10%	0.77	0.74
Andrews Cr.	4%	3%	1.36	1.25
Mogollon Cr.	10%	12%[c]	1.17	1.43
Popple R.	5%	5%	0.78	0.76
Urban				
Valley Stream	18%	40%[d]	0.71	0.74
Mercer Cr.	11%	15%[d]	0.80	0.80
Poplar Cr.	14%	19%[d]	1.19	1.17
San Francisquito Cr.	0%	10%	1.13	2.08
Morrison Cr.	11%	11%	0.82	1.12[d]
Northeast Branch Anacostia R.	15%	19%[d]	0.91	0.93
Peachtree Cr.	15%	21%[d]	0.90	0.98[d]
Salt Cr.	13%	12%	0.97	0.80[d]

[a] Period 1 is 1969 to 1978 for Hydrologic Benchmark Network streams and 1958 to 1967 for urban streams.
[b] Period 2 is 1991 to 2000.
[c] Probability < 0.10 that value was the same for both periods based on two-tailed Wilcoxon rank-sum test.
[d] Probability < 0.05 that value was the same for both periods or lower for period 2 based on a one-tailed Wilcoxon rank-sum test.

TABLE 7. Median annual values of low-flow statistics.

Stream	90th-percentile streamflow (m^3/s)		90th-percentile streamflow/ median daily streamflow	
	Period 1[a]	Period 2[b]	Period 1[a]	Period 2[b]
Hydrologic Benchmark Network				
Elder Cr.	0.03	0.03	0.20	0.17
Holiday Cr.	0.07	0.08	0.41	0.51
Andrews Cr.	0.07	0.10[c]	0.45	0.55
Mogollon Cr.	0.01	0.02	0.09	0.09
Popple R.	1.06	1.13	0.54	0.58
Urban				
Valley Stream	0.01	0.00	0.16	0.00
Mercer Cr.	0.15	0.20[d]	0.40	0.54[d]
Poplar Cr.	0.03	0.06[d]	0.20	0.14
San Francisquito Cr.	0.00	0.01[d]	0.50	0.23
Morrison Cr.	0.10	0.10	0.65	0.62
Northeast Branch Anacostia R.	0.35	0.48	0.34	0.39
Peachtree Cr.	0.69	0.72	0.41	0.46
Salt Cr.	0.48	1.58[d]	0.40	0.50[d]

[a] Period 1 is 1969 to 1978 for Hydrologic Benchmark Network streams and 1958 to 1967 for urban streams.
[b] Period 2 is 1991 to 2000.
[c] Probability < 0.10 that the value was the same for both periods based on a two-tailed Wilcoxon rank-sum test.
[d] Probability < 0.05 that value was the same for both periods based on a two-tailed Wilcoxon rank-sum test.

(1995) (Table 2). Moreover, increases in low flow would likely promote biological responses opposite from the other hydrologic effects of urban development (Table 2).

Framework for Assessing the Ecological Effects of Urban Streamflow Patterns

Urban development modifies the basic hydrologic processes generating runoff in many river basins. In our analysis of eight urban streams, changes in some streamflow patterns were comparable to hydrologic variation associated with demonstrated differences in the structure and composition of lotic communities in other streams. Hydrologic changes in urban streams are likely to affect three streamflow characteristics with ecological consequences: high-flow frequency, distribution of water between storm flow and base flow, and daily flow variability. These changes may contribute to dominance of fishes representing trophic and habitat generalists and also to lower periphyton biomass, diversity, and richness.

Biological responses to urban streamflow patterns also depend on the larger physiographic setting (climate, sediment supply, and channel/valley geomorphology) and other urban stressors (habitat alteration, changes in water chemistry). For example, even though minimum flows were not lower in the urban streams considered here, water depths during low flow may be less in an urban stream if its channel has widened in response to increased high flows.

Effects of urban development are neither uniform nor invariant—naturally "flashy" systems in arid regions may not become much more flashy after urbanization. It is likely that hydrologic changes are greatest in small to intermediate-sized streams with naturally low seasonal and storm flow variability. Large rivers may be buffered because urban development does not cover the whole basin, precipitation may not fall over the whole basin during small storms, and channel routing and overbank storage may attenuate high flows. Poff and Allan (1995) noted that large streams may function like headwater streams if they are seasonally variable. Likewise, the lotic communities in urban streams may function like those in smaller and more hydrologically variable streams because of hydrologic modification.

In streams and rivers with hydrologic changes from urban development, those changes are not necessarily outside the bounds of "natural" variation in streamflow patterns as defined by all streams spanning the range from arid to humid climates. Likewise, variation in weather patterns produces a wide range of natural variation in streamflow regardless of land use. Both types of natural hydrologic variability make it difficult to attribute specific streamflow patterns to land-use changes and to assign specific ecological consequences to streamflow patterns, because lotic species are adapted to natural hydrologic variation. Only through the systematic assessment of a long-term record is it possible to identify those changes that are persistent in hydrologic effects and ecological consequences.

Management Responses to Hydrologic Modification in Urban Streams

Two management questions arise if hydrologic modification is acknowledged as a significant factor in the biological degradation of urban streams. First, are the hydrologic influences on urban streams limited to a few, identifiable mechanisms that could become objectives (or priorities) for mitigation through stormwater management? Second, given the difficulties in accomplishing hydrologic restoration, what is the best possible condition for urban streams under an urban streamflow regime and what marginal effects might result from managing other aspects of the ecosystem (e.g., water quality treatment, stream habitat, riparian zone)?

The varied nature of urban-induced hydrologic changes and the many ways in which aquatic biota interact with flow regime suggest that there are not one or two aspects of an altered hydrologic regime that cause biological consequences. The belief in "single-issue" hydrologic changes is reminiscent of past approaches to stormwater management, namely to achieve flood control by limiting peak discharges. The single-issue focus failed to protect biological systems, because single-storm peak discharge is not a hydrologic characteristic of particular significance to biota. Ironically, that focus has even failed to provide flood protection, because most analyses have not recognized the full range of urban-induced hydrologic changes, including redistribution of streamflow, increased daily variation of streamflow, sequential peak flow events (Booth et al. 2002), and extended flow durations that result in enhanced sediment transport and deposition (Booth 1990). Inspection of comparative hydrographs (e.g., Figure 2) reveals changes in all seasons, across multiple temporal scales, and at every level of discharge. Even if hydrologic changes are limited to the types identified by the analysis of long-term streamflow patterns, mitigation would require greatly increased storage capacity of stormwater management systems. Moreover, the

predevelopment patterns of many streams could not be replicated by large detention ponds with simple control structures to release the water because they cannot support gradual, sustained recessional flows after storms.

The variety of hydrologic changes is symptomatic of an underlying cause, namely the pervasive loss of water storage capacity of hillslopes that accompanies urban development where it reduces vegetation, topographic depressions, soil depths, and infiltration capacity of the land surface. Ultimately, any true solution must account for each of these hydrologic changes. The classic mitigation approach, detention ponds, fails because (1) it replaces only a scant fraction of the storage capacity of hillslopes that was lost (Booth and Jackson 1997); (2) it converts what was once spatially distributed subsurface runoff into a point discharge at a surface water outfall; and (3) it reduces the rate and changes the location of groundwater recharge and subsequent discharge because even the largest detention ponds cannot delay the production of runoff from large or long storms in the same fashion as large areas of natural landscape with intact vegetation, topography, and soils. For these reasons, objective assessments of detention-pond performance are rarely encouraging (e.g., Maxted and Shaver 1999).

Directly addressing the loss of long-term storage of storm flow is more challenging and much less widely implemented. Two other traditional engineering approaches, infiltration ponds and bypass pipelines, provide plausible opportunities for hydrologic mitigation but are each constrained by site requirements. Infiltration ponds (i.e., centralized facilities to store and reintroduce stormwater into the groundwater system) require deep infiltrative geologic strata at or near the ground surface to accommodate the large volumes of runoff collected. In many areas. such geologic conditions are ubiquitous; in others, they are widely scattered or absent altogether. Bypass systems provide partial hydrologic mitigation at best—they reduce total postdevelopment runoff volume in noninfiltrative soils and can provide nearly fail-safe reductions of peak flows and/or flow durations. However, they can leave the plethora of small and moderate discharges from paved surfaces nearly unaffected. Conversely they may eliminate all base flow once contributed from now-paved upland areas. In either case, bypass systems release all runoff as surface flow at a point discharge without any opportunity for groundwater recharge.

These considerations lead to the conclusion that hydrologic restoration requires the distributed retention of stormwater in reservoirs with a combined volume equivalent to the original soil layer and land surface. Where the land surface was steep, the soil was thin, and its infiltration capacity naturally low, the changes caused by urbanization may not be great, and achieving an equivalent degree of stormwater retention in the built environment may be relatively simple. Where predevelopment soil depths naturally approach a meter or more and porosities approach 50% and where wetlands retained much of the rainfall, simple strategies and normal land-development practices will not be successful at reestablishing streamflow patterns.

Recent efforts to achieve more comprehensive hydrologic mitigation have involved a suite of engineering and site-design approaches collectively known as "low impact development" (LID) (U.S. Environmental Protection Agency 2000). This strategy seeks to store, infiltrate, evaporate, or otherwise slowly release stormwater runoff in a close approximation of the rates and processes of the predevelop-ment hydrologic regime (Konrad and Burges 2001). To date, LID has been pursued primarily in humid, temperate regions where urban development can create the greatest alteration to the predevelopment hydrologic regime. Challenges for more widespread use of this approach include uncertainty in its application on relatively noninfiltrative soils, its effectiveness in mitigating high-intensity and (or) large-volume storms, and its construction in new or previously developed areas. Long-term performance, coupled with the uncertain level of long-term maintenance, require further study before the effectiveness of this stormwater-management approach can be advocated or its biological consequences evaluated. Until such time, we recognize no stormwater management strategy, or suite of approaches, that can achieve anything approaching full hydrologic mitigation. Some significant, measurable degree of biological decline is thus unavoidable in urban watersheds where streamflow has been altered for the foreseeable future.

Ecological Management Goals for Urban Streams

Streams nominally protected under land-use regulations have still experienced significant biological degradation. Widespread adoption of some types of development and stormwater management strategies may prevent further degradation of some streams. Yet, the full range of hydrological and ecological processes cannot be restored in urban streams, and we see no basis to expect that improvements in other aspects of

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stream ecosystems can mitigate the hydrologic consequences of urban development (Booth et al. 2004; Konrad 2003b). As a result, urban stream managers face the difficulty of acknowledging limits on stream ecosystem improvement imposed by the failure to restore streamflow patterns while maintaining prospects for future ecosystem recovery.

Stream restoration in the Pacific Northwest typically focuses on habitat elements in fish-bearing streams include large woody debris, pools, protective cover, gravel deposits, floodplains, and riparian vegetation. Although these elements can be imported to a site or otherwise constructed, neither the biological effectiveness (e.g., Larson et al. 2001) nor longevity (Frissell and Nawa 1992) of artificially placed elements is well documented. Over the long term, habitat elements of streams will be created and maintained only through functioning ecological processes. In recognition of the distinction between direct manipulation of stream habitat elements for an outcome and the self-regulation of habitat conditions in natural stream ecosystems, we discriminate between short-term and long-term actions for improving the biological conditions of streams. Short-term actions are generally feasible under many different management settings but are unlikely to produce long-lasting effects; long-term actions are necessary for true ecosystem enhancement but may be intractable under present-day regulatory, economic, or land-use conditions.

Short-term actions include riparian planting, water quality source control, fish-passage projects, selective instream structures, and social amenities (Bethel and Neal 2003). They address acute problems typical to stream channels in urban and urbanizing settings (e.g., denuded vegetation buffers, point source pollution, fish blockages, simplified channel structure, and dumping of solid wastes). They are not comprehensive, so their efficacy is limited by elements of the ecosystem that are missing or degraded in urban areas. Although some aspects of hydrologic modification in urban areas such as increased frequency of high flows may be addressed in part by short-term actions such as peak flow control, the range of changes in streamflow patterns resulting from urban development are unlikely to be addressed in the short term. As a consequence, hydrologic changes are likely to have persistent effects on the biological conditions of many urban streams.

Short-term actions also acknowledge the presence of people in the urban environment. Streams are affected, often irrevocably, by activities of streamside residents in pursuit of personal esthetics or low maintenance (Schauman 1998). Management actions that enhance interactions between the public and urban streams are likely to be supported, but the financial costs for such actions are commonly greater than the ecosystem benefits. Such actions are often considered desirable because they improve "quality of life" or the stream's value as a public amenity or educational resource.

Long-term, self-sustaining actions must ultimately address all of the five aspects of stream ecosystems (Figure 1). These actions might include various types of land-use planning (e.g., preserves, zoning), minimizing or redesigning road and utility crossings, upland hydrologic rehabilitation (e.g., stormwater infiltration), erosion control, riparian vegetation restoration, and reconnection of streams with floodplains. In some cases, there are fundamental conflicts between the processes that create and maintain aspects of stream ecosystems (e.g., flooding) and extensive infrastructure and human occupation around streams. Streamflow is a key habitat-forming process, and failure to reestablish streamflow patterns almost certainly precludes full restoration of the ecosystem. Over the long term, restoration of an urban stream to a predevelopment state is likely to require the exclusion of people from the immediate environment (channel and riparian areas) and, perhaps, even upland portions of the basin, even as it requires their support to ensure its implementation and success. Support and stewardship by the surrounding community would be essential to such an ambitious goal, but people's involvement would be very different from the short-term efforts that depend on human actions in and along stream channels.

Evidence to date suggests that short-term actions alone, and even some well-intentioned and well-reasoned long-term actions, do not achieve broad ecosystem protection in the urban environment. At best, biological communities in urban streams may be diverse and complex, but they will depart significantly from predevelopment conditions. These streams can be neighborhood amenities and provide nearby residents with a connection to a place not completely managed by human actions, and with a self-sustaining and self-regulating biological community. These outcomes for urban streams should be achievable even in the absence of reestablishing natural hydrologic processes, which is the likely scenario for many streams in urban and urbanizing watersheds.

Conclusions

"Urbanization" is not a single condition; it is a collection of actions that lead to recognizable landscape forms

and, changes in stream conditions. Because of the broad and important roles of streamflow in fluvial ecosystems, hydrologic changes in urban streams pose significant ecological risks that warrant evaluation along with other changes (e.g., water chemistry, physical habitat, riparian conditions) long associated with urban development. Three types of hydrologic changes of ecological significance are likely to result from urban development: increased frequency of high flows; redistribution of water from periods of base flow to periods of storm flow, and increased daily variation in streamflow. These changes do not necessarily occur in all urban streams, but they are common and need to be addressed as part of any comprehensive effort to rehabilitate urban streams. Other hydrologic changes may also occur in urban streams, particularly where surface water or shallow groundwater are used for water supplies, which may also have ecological repercussions. Urban streams can provide habitat for biological communities even if the hydrologic consequences of urban development are not addressed, but the structure and composition of these communities are likely to depart from those of the predevelopment stream. Ultimately, true restoration of urban streams can only occur if hydrologic processes and the spatial distribution of the water-storage capacity is reestablished across the urban landscape.

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First Flush Phenomenon Characterization

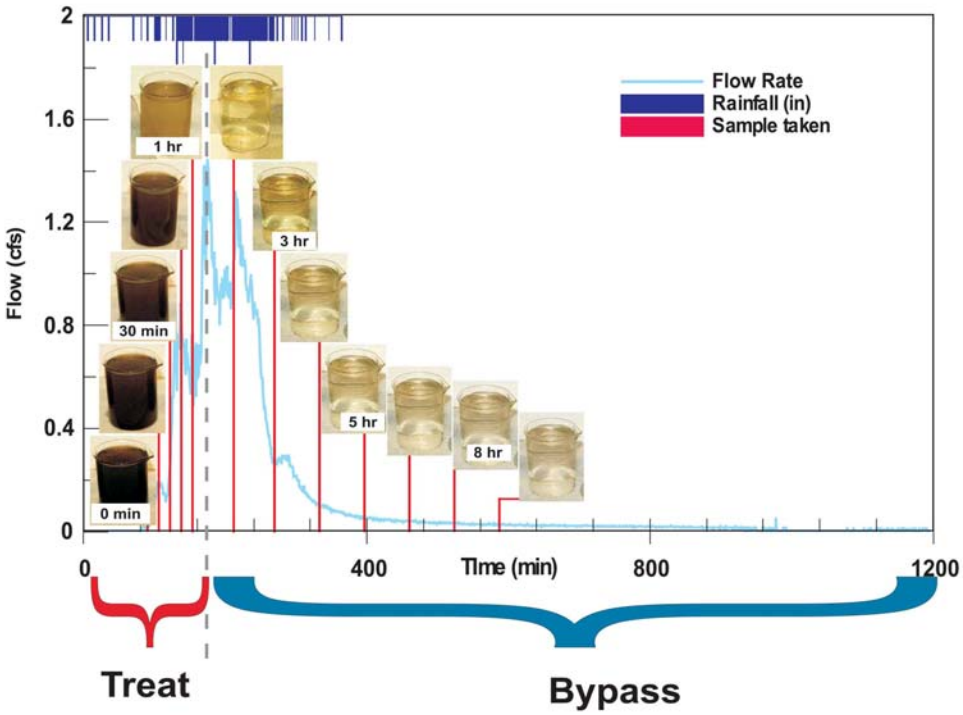

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GLOSSARY

ADD	Antecedent Dry Days
ADT	Average Daily Traffic
AADT	Annual Average Daily Traffic
ASCE	American Society of Civil Engineers
BMP	Best Management Practice
COD	Chemical Oxygen Demand
Department	California Department of Transportation
DOC	Dissolved Organic Carbon (see also Total Organic Carbon)
DOT	Department of Transportation
EMC	Event Mean Concentration
EPA	US Environmental Protection Agency
FF	"First Flush" refers to pollutant concentration or mass that is associated with initial portion of the runoff (usually, less than 50 percent of the total runoff volume) within a storm event. First flush can be applied to a single constituent such as DOC, particle, or litter, and is referred to as "first flush of DOC", "first flush of particles" or "first flush of litter". First flush can also be used for group of constituents such as PAHs that will be referred as "first flush of PAHs". Also see the term seasonal first flush
GC	Gas Chromatography
ICP	Inductively Coupled Plasma
LARWQCB	Los Angeles Regional Water Quality Control Board
LACDPW	Los Angeles County Department of Public Works
MFF	Mass First Flush Ratio
MFF_n	Ratio of the discharged pollutant mass to the runoff volume in the first n% of the runoff. For instance, $MFF_{10} = 3$ means 30 percent of the discharged mass occurs over the first 10 percent of the initial runoff volume.
MPN	Most Probable Number

NPDES	National Pollutant Discharge Elimination System
O & G	Oil and Grease
PAHs	Polynuclear Aromatic Hydrocarbons
PEMC	Partial Event Mean Concentration
PFF	Particle First Flush Ratio
PNFF	Particle Number First Flush Ratio
$PNFF_n$	Ratio of the number of discharged particle to the runoff volume in the first n% of the runoff. For instance, $PNFF_{20} = 2.5$ means 50 percent of the discharged particles is associated with 20 percent of the initial runoff volume.
PSD	Particle Size Distribution
RMS Error	Root Mean Square Error
Seasonal FF	First flush of pollutant concentration of mass that is associated with the first storm of the season compared with the pollutant concentration or mass in the remaining storm events
TEF	Treatment Effectiveness Factor
TKN	Total Kjeldahl Nitrogen
TOC	Total Organic Carbon
TSS	Total Suspended Solids
VSS	Volatile Suspended Solids
US EPA	United States Environmental Protection Agency
USWS	United States Weather Service

ADA STAEMENT

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ACKNOWLEDGEMENTS AND DISCLAIMER STATEMENT

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EXECUTIVE SUMMARY

"First flush" is a phenomenon that is associated with the occurrence or belief that the first portion of stormwater runoff in a storm event is the most contaminated. While most researchers believe that the first portion of runoff does have higher contaminant concentrations, opinions vary as to the importance of the increased concentrations, and whether the actual mass of the first flush is a significant portion of the total runoff mass. Lay people generally believe there is a first flush, and associate hazardous driving conditions with the onset of rainfall. There is also a general believe that the first rainfall of a new rainy season is the most contaminated (seasonal first flush), and washes out several months of contaminant buildup. The concept of seasonal first flush is applicable to climates such as California, which have distinct wet and dry seasons.

This study has identified several types of first flushes, but all, with the exception of "seasonal first flush" indicate the discharge of greater concentrations or mass in the early part of a storm event. The term first flush can be used to describe the discharge of any contaminant. For example, a first flush that is associated with particles or litter will be reported as "particle first flush" or "litter first flush," respectively.

The first flush study was jointly performed by the University of California at Los Angeles (UCLA) and the University of California at Davis (UCD). Most of the data presented in this report were collected by UCLA from three representative highway sites in west Los Angeles, California. Much effort went into developing a quantitative way of defining the mass first flush. Various other aspects of first flush were also investigated such as: water quality during storm events, litter characteristics, correlations among contaminants, first flush of organics, litter and particles, models for the build up and washoff of pollutants, new methods for measuring oil and grease, grab and composite sampling strategies.

The existence of a first flush may present alternative opportunities for stormwater pollutant reduction strategies. First, the cost of treatment, such as a stormwater BMP, is more dependent on the volume of water to be treated than the contaminant concentrations. Second, removal efficiency is greater at higher concentrations and zero at lower concentrations. These phenomena have been demonstrated using catch basin inserts, sorbers and sedimentation devices. The emerging American Society of Civil Engineers database on stormwater treatment BMP trials has also shown this effect.

1. INTRODUCTION

1.1 Overview of the First Flush Phenomenon

The "**first flush**" phenomenon is generally assumed for rainfall events, and can be described as a concentration first flush or a mass first flush. A concentration first flush occurs when the first runoff has high concentration relative to runoff later in the storm event. A mass first (concentration times flow rate) is flow dependent and it will occurs when both concentration and the initial runoff is high relative to mass emission rate in the later runoff. Concentration first flushes have been frequently reported, but mass first flushes have rarely been quantified. For example, most of the parameters monitored for all the events in this study had higher concentrations at the beginning of the runoff than later in the runoff. Mass first flushes were less frequently observed and with lower magnitudes. This is due to the nature of the runoff, which generally has lower flow rate at the beginning of the storm than in the middle of the storm. Therefore, the mass emission rate in the middle of the storm event may be greater than at the beginning of the storm event, in spite of lower concentrations in the middle of the storm. The concept can be applied to any particular constituent or water quality parameter. Therefore, a first flush in total organic carbon (TOC), for example, can be called a TOC first flush.

The concept of first flush can also be applied to a rainfall season. In California and many other areas of the world, rainfall occurs over distinct periods. For example, the bulk of the rainfall in Los Angeles occurs from approximately November to March, with the months of January and February usually having the greatest rainfall. The long dry period from April or May to October allows contaminants to build up. The first large rainfall of the season, occurring any time from October to January, generally mobilizes the built-up contaminants, creating a larger discharge. This phenomenon is called a "**seasonal first flush**."

In this report the term first flush will be used as follows:

First flush	The discharge of a larger mass or higher concentration in the early part of a storm relative to the later part of the storm. The term can be applied to any contaminant. The magnitude of the first flush will depend on site specific conditions, but the term first flush is applicable.
Seasonal first flush	The discharge of a larger mass or higher concentration of the first storm or first few storms of a rainy season, relative to storms later in the season.

Both terms can be applied to any water quality parameter and constituents such as metals, litter, particles, toxicity, turbidity, etc. and both terms can be used to describe a mass first flush or a concentration first flush. The modifiers of the terms indicate if it is a mass or a concentration.

Various ways have been previously proposed to quantify mass first flush, and absolute quantitative definitions have been offered. An early definition offered by Bertrand-Krajewski *et al.* (1998) is typical and suggested the existence of a first flush if 80% of the pollutant mass is emitted in the first 30% of the runoff. Other definitions and observations have been offered, and will be discussed in greater detail later (Thornton and Saul, 1987; Geiger, 1987; Vorreiter and Hickey, 1994; Saget *et al*, 1995; Gupta and Saul, 1996; Sansalone and Buchberger, 1997; Larsen *et al*., 1998; Sansalone *et al*., 1998; Deletic, 1998). They all in some way suggest a higher pollutant mass emission rate in the early part of the storm than in the later part, and the early part is generally considered the first 20 to 40% of the runoff volume. In this report and in earlier papers (see Bibliography at the end of this report, which lists our previously submitted or published reports and papers), we have proposed a mass first flush ratio or MFF, which quantitatively describes the mass first flush and is sufficiently broad to apply to any initial portion of the storm.

It is possible to have a concentration seasonal first flush as well as a mass seasonal first flush. The techniques used to describe a mass first flush can also be used to describe a mass seasonal first flush. Occasionally, when investigators are describing both the first flush of a single storm and an entire season, they may use the term "**storm first flush**" to emphasize that the first flush is for a single storm event. In this study, he term "storm first flush" is not used. The term first flush always refers to a single storm event and seasonal first flush will always be used for an entire season.

Evidence collected in this study, combined with other datasets from Southern California, have provided the first quantitative demonstration of a seasonal first flush. The existence of a seasonal first flush presents opportunities and challenges stormwater management.

The presence of a mass first flush depends on a number of factors, which will be discussed in greater detail throughout the report. Often one sees or reads of an investigator describing a very large watershed, and noting that a first flush was not observed. Such conclusions are naïve, because in a large watershed, stormwater must be transported a great distance to a single discharge point, or mouth of the watershed. Therefore, the time of travel of the runoff from various places in the watershed to the monitoring point is different (time of travel is the elapsed time for a quantity of stormwater to flow from the point of generation to the monitoring point). In this case, the first flush from each small area in the watershed arrives at the mouth of the watershed at different times, which mixes the smaller first flushes of each area into a broad discharge pattern. Therefore, the first flush from one area is mixed with runoff from other areas that occurred much later in the storm.

The definition of large watershed for this context is a function of the time of travel. The first flush of pollutants observed in this study was generally within the first few minutes to the first hour after detecting observable runoff. First flushes are much less likely to occur in large watersheds.

The imperviousness of the watershed or catchment area also affects the first flush. Highly impervious surfaces create high velocities that easily transport solids or scour contaminants from surfaces, and runoff occurs almost immediately at the beginning of rainfall. Previous

work performed in our laboratory (Lau *et al*, 1998), evaluated Ballona Creek and Malibu Creek during rainfall events. Flow appeared in the Ballona Creek watershed (~70% impervious) 10 to 15 minutes after the beginning of measurable rainfall. The same rainfall did not produce additional runoff in Malibu Creek until 10 to 12 hours after the beginning of measurable rainfall. The quickly occurring runoff, or short time of travel provided by highly impervious watersheds, provides more opportunity for first flushes.

The bulk of our efforts have been devoted to estimating the mass first flush of highway emissions, with the objective of proposing methods to improve the effectiveness of best management practices (BMPs) that take advantage of the first flush. Highways catchments are landuses that are likely to have a first flush. They are generally impervious and small. Our three sites, which were picked in 1998 as "typical" of for the Department's sites, are 0.6 to 1.6 hectares and are more than 95% impervious. Runoff appears only a few minutes after measurable rainfall. The nature of the Department's sites, and by implication many sites for other state departments of transportation (DOT), may provide an excellent opportunity for improved stormwater management at reduced cost because of the likelihood of first flushes.

A BMP that takes advantage of the first flush is sometimes called "first flush friendly" and an example of such a BMP is an infiltration/sedimentation basin. An infiltration/sedimentation basin could be operated in one of two ways: it could be operated as a flow through device, which would remove some portion of the contaminants such as suspended solids, throughout a storm event. For large storms, over the design frequency of the basin, some portion of the flow rate would be bypassed, or the basin would operate at high flow rate and reduced efficiency. An alternative way of operating the basin is to fill the basin with the first runoff, and bypass the remaining runoff. The second strategy provides greater opportunity the small particles to settle, and will be a superior strategy if there is a significant mass first flush. The definition of "significant" will depend on site-specific issues, which we will address later in the report.

Our findings suggest that for most pollutants, the second strategy is preferable. Generally, 30 to 50% of the pollutants in highway runoff from a single storm event are contained in the first 10 to 20% of the runoff volume. This can mean that treating the first 20% of the flow can treat 50% of the pollutants. Conversely, uniformly treating 20% of the flow during the entire storm would treat only 20% of the mass. The ratio of mass treated to volume treated in the first case is 2.5 and in the second case is 1.0. Generally, the cost of managing stormwater is more related to the volume than the concentration, which means that the first strategy will be much more cost effective than the second strategy. Also, emerging information collected by others (Strecker et al. 2001) and our laboratory (Lau and Stenstrom, 2002) shows that BMPs are generally more effective in treating higher concentrations than lower concentrations (i.e., the removal efficiency of a catch basin insert or a sedimentation basin may be close to zero at low concentrations, and as high as 70% or more at high concentrations). Therefore, applying BMPs to the first runoff, when the concentrations are higher, will be a more effective strategy for two reasons: 1) the most contaminated runoff is being treated, and if there is bypassing it will be less contaminated runoff that occurs later in the storm, and 2) the BMPs are likely to have higher removal efficiencies treating the more contaminated runoff.

The first flush or seasonal first flush can represent an opportunity to achieve higher pollutant reductions at lower cost or effort. For example, the Department has been required to remove litter from highway catch basins at the end of the summer. The seasonal first flush presents an opportunity to remove six to nine months of litter buildup in a single cleaning. If a seasonal first flush did not exist, the monthly cleanings might be needed to remove the same mass of litter.

1.2 Focus of the Report

This report describes the results of an extensive study to characterize and quantify the first flush of highway pollutants from three sites near UCLA, and to report on data collected by two consultants funded by the Department at other sites in District 7. The study was conducted over four years and includes storms monitored from 1999 to 2003, or four wet seasons.

1.3 Report Organization

This report is organized to be brief yet comprehensive. It is complemented by a CD that includes all data and graphical representations in PDF format.

The report is organized in chapters. The introduction chapter summaries the important concepts to be realized by taking advantage of the first flush in highway stormwater management, focus of the report and the report organization. Chapter 2 describes methodology and summarizes analytical methods and sampling strategies. Chapter 3 summaries the water quality results, providing summaries, such as the event mean concentrations (EMCs), for the various parameters. Chapter 4 presents the first flush results and discussion in the following order: meaningful definition of first flush for practical implication, organic (PAH) first flush, litter first flush, particle first flush and seasonal first flush. Chapter 5 presents additional topics related to first flush that include: preliminary treatment evaluation strategy with respect to first flush pollutant loads, a new method to monitor oil and grease, and sampling issue-composite versus grab sampling. Chapter 6 summarizes the information presented in chapter 4 and 5. Full results are compiled in a CD as summary tables and graphs and presented in Appendices A through K.

A series of technical memorandums are also included in the appendix. The technical memorandums were issued to the Department much earlier than the final report and were designed to provide early availability of the results. A bibliography of the papers presented at conferences and submitted or published in journals is listed at the end of this report. The technical memorandums along with technical papers provide greater detail or more explanation than contained in the final report, which allows a more readable, compact final report. The main report includes only the most important parts of the technical memorandums and technical papers.

2. METHODOLOGIES

2.1 Description of Monitoring Sites

Three monitoring stations were used for the UCLA-sampled first flush studies. They were selected by the Department in 1999, based on five major criteria: clearly defined runoff area, personnel safety, proximity to UCLA, representativeness and access to the flow stream. Table 2.1 summarizes the site characteristics. Initially the sites were labeled by the Department as UCLA 1, 2 and 3. Later the Department assigned numbers to the sites as 7-201, 7-202, and 7-203. Some of the early reports and publications use the "UCLA-n" designation, and later reports and publications use the "7-20n" designation.

Figure 1 shows the location of the sites. The sub-watersheds are delineated by bold blue lines. Red lines show major freeways. The light blue object north of Site 1 is the Sepulveda Dam flood protection area. It is close to Site 1, but is hydraulically separated from the site. The travel time travel by automobile to the sites from ULCA via freeways is usually less than 15 minutes, but can be more during high traffic conditions. Additionally, the sites can be reached in about the same time via surface streets. Easy and quick site access was important in order to reach the sites quickly to catch the first flush

Monitoring site 7-201 was located near the intersection of the US 101 and IS 405 Freeways, on the south side of US 101. The site was accessible from a service road, which was reached from the Haskell exit of the northbound US 101 Freeway. The Department's right-of-way was protected by a chain link fence, and a gate was ideally located for entry. This site has several 20-inch diameter corrugated drainage pipes and they all have lengthy straight sections to facilitate flow measurement. The freeway is elevated at this point with sound walls. No other drainage can enter the site. There is a free waterfall as the stormwater exits the pipe to facilitate sampling.

Monitoring site 7-202 was located near the IS 405 Freeway and the Getty Center exit, on the east side of the freeway. The site was accessible from a public park and the Department's right-of-way was unobstructed. Drainage was through a 24-inch diameter corrugated drainage pipe. The site has a single stormwater inlet with several grates, along the east shoulder. There are no sound walls, and a hill exists on the east side of the shoulder. In heavy rainfall events, it is possible for runoff from the hill to reach the shoulder and the Department's inlet. Analysis of runoff rates suggests that this rarely happened. Sampling was also possible at a free waterfall.

Monitoring site 7-203 was located on the east side of the IS 405 Freeway just south of the point where it passes over Santa Monica Boulevard. This site was constructed as a monitoring site previously by the Department. It has a 24-inch diameter plastic corrugated pipe (smooth on the inside, corrugated on the outside) which collects runoff from the northbound, east side of the freeway. The curb was opened to collect runoff from the shoulder, and no runoff can enter the site in any other way, including the freeway and shoulder south of the site. It has no sound walls. It has AC power and a small house (approximately 2.5 square with a pitched roof approximately 3 ft high in the center) to hold

an automatic sampler. The small house was reused to contain the composite sampler after the first year of our study. As the runoff exits the pipe there is a gap of 20 cm, which creates a free waterfall for sampling.

Table 2.1 Summary description of UCLA monitoring stations

Site characteristics/ parameter	Monitoring Site		
	7-201	7-202	7-203
Freeway/postmile	US 101 PM 17	IS 405 PM 34.8	IS 405 PM 30.8
Location	Eastbound US 101	IS 405 Freeway and Sepulveda	North Bound IS 405 and Santa Monica Blvd.
Drainage area (m^2)	12802	16918	3917
Freeway type	Grade	Fill	Cut
Annual average daily traffic	328,000	260,000	322,000
Longitude	34.16	34.10	34.05
Latitude	-118.48	-118.48	-118.44

All three sites were virtually 100 percent impervious, and the runoff coefficient was usually 0.9 to 0.95. Each site was equipped in the first year with an American Sigma rain gage and flow meter. The flow meter recorded flow and rainfall in one-minute intervals. In the second year a composite sampler was added to each site and it was also an American Sigma device. Data from each site was downloaded into a laptop, Windows-based computer after the end of each storm.

The three sites were also used for litter collection during the second and third years of the study. Litter bags, with 6 mm octagonal openings were attached to the corrugated pipes. An aluminum collar fabricated in the UCLA shops was used for Sites 1 and 2. The collar clamped to the outside of the corrugated pipes, and had an opening at the top that allowed the sampling team access to the free waterfall with a scope. Figures 2.2, 2.3 and 2.4 show several pictures of the sites.

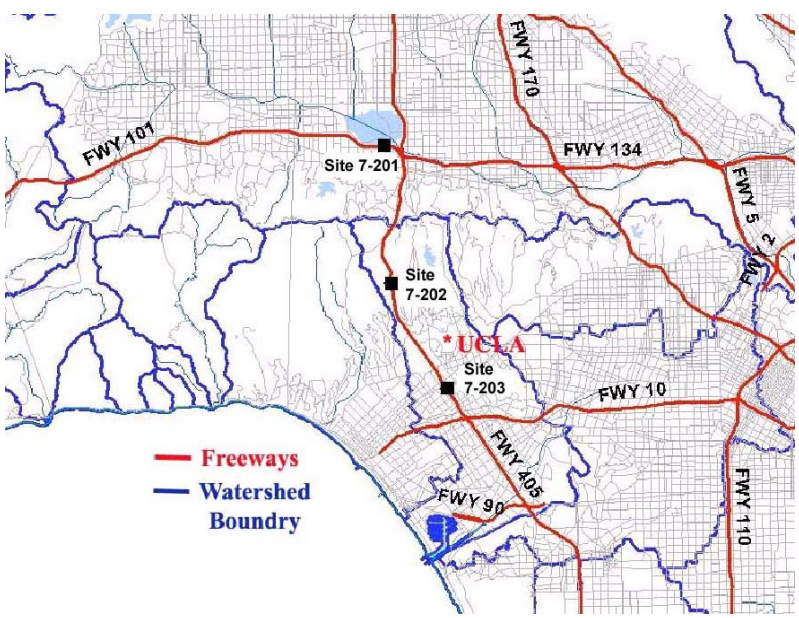

Figure 2.1 Locations of UCLA Sites 1 to 3 (Department's designation 7-201, 7-202, 7-203)

Figure 2.2 Pictures of Site 1, clockwise from the top: **1)** site from a distance of 30 meters; **2)** drainage pipe showing free waterfall and cables for level and velocity sensors, and **3)** rain gage above the sound wall.

Figure 2.3 Pictures of Site 2, clockwise from the top: **1)** site from a distance of 15 meters, showing rain gage, rain protection enclosure, PVC pipe for cables. The discharge is obscured by the brush; **2)** drainage pipe showing free waterfall and PVC pipe for cables for level and velocity sensors, and **3)** freeway looking north showing the four inlet grates.

Figure 2.4 Pictures of Site 3, clockwise from the top: 1) site from a distance of 50 meters, looking north, showing drainage pipe (an early picture, taken before our study) 2) drainage pipe showing rain gage and dry/wet collection containers from an earlier study. The free water fall is at the end of the black pipe, and 3) site entrance from shoulder, looking south.

The sites were maintained by the Department during the study. Maintenance was coordinated with District 7 personnel and occasionally the UCLA team had to perform brush removal. Site 3 shows additional equipment for dry and wet deposition sampling, but was not part of our study. It was especially important at Site 3 to contain the overhead growth, to prevent interference with the rain gage.

2.2 Sampling Strategies

Weather forecasting was an important aspect of the sampling. It was necessary to obtain the most reliable forecast in order to avoid time consuming and frustrating mobilizations for storms that did not occur, as well as making sure that the teams were prepared for the real events. A variety of forecasting methods were used. The long term (3 to 5 day) forecasts by the US Weather Service (USWS) were useful to prepare the teams for upcoming events, in order to check the equipment and replace batteries. UCLA's Department of Atmospheric Sciences also provided useful forecasts. When USWS forecast suggested that a storm probability was greater than 50%, the sampling teams were mobilized to each sampling site, to within 5 to 10 minutes travel time to each site. After some practice, USWS Doppler radar was useful in predicting the beginning of rainfall. Approximately 80% of the storms approached the sampling sites from the north west (i.e., Santa Barbara) and active rainfall could be observed as it traveled to the sites. Storms that came from a southerly direction (i.e., Santa Catalina Island) were less predictable.

Detecting the first flush required grab samples to be collected throughout the storm but especially in the early runoff period. Grab samples can be collected manually or can be collected with automated samplers having multiple bottles. Multi-bottle samplers were not available and manual sampling was used. The manual sampling also provided greater flexibility, allowing larger sample volumes to be collected as well as special samples using different bottles. The sampling strategy was perfected in the first year and a consistent protocol was used in the second and later years. Automatic flow-weighted composite samplers were also added in the second year.

In the first year (1999-2000), five grab samples were collected in the first hour of runoff followed by two or three grab samples collected in the following two to three hours, which were combined to create a composite sample. This strategy adequately characterized the initial runoff but was inadequate to characterize later runoff, and especially for long storms with a lengthy period of light rainfall. The mass contribution of the runoff late in the storm was significant compared to the mass in the early runoff.

In the second year, five grab samples were again collected in the first hour, followed by one grab sample per hour for the next 7 hours, providing a total of 12 grab samples. For storms lasting less than 8 hours, fewer grab samples were collected. For storms lasting longer than 8 hours, an additional one or two grab samples were collected in the period from 8 hours to the end of the storm. In the first year, all samples were analyzed. In later years, storms that were sampled but were too short to produce a sufficient number of samples to create pollutographs were not analyzed.

The highly impervious nature of the sites created runoff soon after the beginning of rainfall. Even though the time of travel from UCLA to the sites was short, it was still necessary to mobilize the sampling teams before the beginning of rainfall in order to collect the first runoff. Three teams of two people each were used in the early part of the storm when more frequent sampling occurred. After the first few hours of the storm event, the sample team was reduced to one or two teams and the other team members worked in the laboratory on analytical methods.

The sampling teams generally arrived at the sampling site prior to the start of the storm event. Sampling began as soon as the flow was observed at the collection point, or if runoff had already begun, as soon the teams arrived.

Runoff samples were collected from the storm drain outfall (or drain pipe) using a polypropylene scoop, and then transferred to 4-L amber glass bottles. In all cases samples were collected from a free waterfall. The bottles were then transported to the laboratory at UCLA immediately after collection and refrigerated at 4°C until analyzed. Generally the first five bottles were transported to the laboratory after the first hour, and one or two more trips were made as the storm progressed. Returning samples to the laboratory at frequent intervals was not particularly burdensome, because of its close proximity and because the team wanted to get out of the rain and warm up in the hour between samples. The time between the sample collection and receipt of samples at UCLA laboratory was less than 4 hours. This became important in the last year of the study, when particle size distribution (PSD) was being measured. Changes in the PSD were observable after 10 to 12 hours of storage. Therefore a holding time of 6 hours was established for particle size distribution analysis.

Samples were collected in 4-L amber glass bottles. The bottles were prewashed and kept in the laboratory cold room prior to the storm. As soon as samples arrived at the laboratory they were mixed and divided into sub samples for different analysis. In the first three years of the study, the most time-critical analysis was filtration for metals analysis, which must be completed within 24-hours of sample collection. Later the particle size distribution became the most time-critical analysis, which needed to be preformed within six hours of sample collection. Additional sample were collected for particle size analysis, depending on the types of analysis being performed, which is described in more detail later in the report.

In the second and third year of the study, litter samples were collected, using a large, reusable bag with 6-mm openings. The draw-string bag was placed over discharge of each pipe to capture the entire flow, but still allowed the grab samples to be collected from a free water fall. Three bags were collected for each site for each storm. The first bag was installed before the beginning of the storm, and removed after 1 hour of runoff. A second bag was then installed and was removed after 8 hours or the cessation of grab sample collection. The third bag was installed and was left in place until the next day, well after the end of the storm. It was retrieved and all bags for all sites were transported to an outside lab under contract with the Department for performing the litter analysis. The bags were cleaned and reused.

Autosamplers (Sigma 900MAX, American Sigma) were installed at all three monitoring locations prior to the second storm season (2000-2001) begins. Flow-weighted composite samples was collected and analyzed for the same suite of contaminants, except oil and grease.

2.3 Constituents and Analytical Methods

The water quality parameters were selected based on the Department's Storm Water Monitoring Protocols (California Department of Transportation, 2000a), in compliance with the NPDES permits. Table 2.2 shows the selected water quality parameters and their corresponding analytical methods. All analyses were performed as soon as the samples were collected, and within the recommended holding time. All analyses were performed in the UCLA Water Quality Laboratory, except for metals analysis. The metal samples were filtered and digested at UCLA, but the final analysis was done using an ICP/AE instrument at the Castaic Water Laboratory (a State certified laboratory).

Polynuclear aromatic hydrocarbons (PAHs) were also monitored, but not as routinely as the other constituents. Both dissolved and particulate bounded PAHs were analyzed according to US EPA Methods (SW-846, 1999): Method 3535 was used for dissolved PAHs and Method 3546 was used for particulate-bound PAHs. Both fractions were analyzed using a Finnigan 4000 Quadrapole mass-spectrometer with a Varian 3400 gas chromatograph. A splitless injector (at 290°C) was used for sample injection onto a 30 m x 0.25 mm i.d. DB-5ms capillary column (J&W Scientific). The GC temperature was programmed at 30°C for 4 min., 30° - 300° at 6°C/min and 300°C for 30 min. Mass spectral data were collected by using a scan range of 35 - 500 amu and a scan rate of 1 scan/s. A total of 41 PAHs were analyzed using this method.

2.4 Rainfall and Monitored Events

The number of monitored events was impacted distribution of rainfall. Figure 2.5 shows the rainfall that occurred during the four years and compares the total for each year. The vertical bars show the monthly rainfall. It is clear that the majority of the rainfall usually occurs in January and February, and almost no rainfall occurs between May and October. This rainfall pattern is associated with Mediterranean climates, and will be important in analyzing the seasonal first flush noted earlier. Based upon the amounts of rainfall that occurred each year, year 1 (1999-2000) was an average year. Years 2 and 4 (2000-2001 and 2002-2003) were wet years. Year 3 (2001-2002) was an extremely dry year. The study years followed the general monthly trends, although 2002-2003 had no rainfall in January and more than average rainfall in March.

Figure 2.6 shows the rainfall arranged as a probability plot. The 50% probability storm for the UCLA sites was 18 mm. The largest single storm was over 100 mm.

Table 2.2 Constituents monitored

Parameters	Units	Reporting Limits	Analytical Method	Holding Time and Preservation
Conventionals				
Total suspended solids	mg/L	2	EPA[1] 160.2	7 days; refrigerated at 4°C
Turbidity	NTU	1	EPA 150.1	48 hours; refrigerated at 4°C
Conductivity	μmho/cm	1	EPA 180.1	28 days; refrigerated at 4°C
pH	pH	0.01	EPA 120.1	Analyze immediately
Hardness	mg/L as $CaCO_3$	2	EPA 130.2	6 months; acidify with HNO_3 to pH < 2
Chemical oxygen demand	mg/L	2	EPA 410.0	Analyze as soon as possible
Dissolved organic carbon	mg C/L	1	EPA 415.1	7 days; acidify to pH <2 with H_3PO_4
Nutrients				
Ammonia[2]	mg /L	0.01	EPA 350.3	Analyze as soon as possible
Nitrite[2]	mg /L	0.01	EPA 354.1	48 hours; refrigerated at 4°C
Nitrate[2]	mg /L	0.1	EPA 300.0	48 hours; refrigerated at 4°C
Total Kjeldahl Nitrogen[2]	mg /L	0.1	EPA 351.4	7 days; refrigerated at 4°C, acidify to pH <2 with H_2SO_4
Ortho-Phosphate[3]	mg /L	0.1	EPA 300.0	48 hours; refrigerated at 4°C
Phosphorus (Dissolved and Total)[3]	mg /L	0.03	EPA 200.7	48 hours; refrigerated at 4°C
Organics				
Particulate PAHs	μg/L	$1–5 \times 10^{-3}$	EPA 3535	7 days; refrigerated at 4°C
Dissolved PAHs	μg/L	$1–5 \times 10^{-3}$	EPA 3546	7 days; refrigerated at 4°C
Oil and grease	mg/L	1	C18 SPE[4]	28 days; acidify to pH < 2 with HCl
Metals (dissolved and total)			EPA 200.7	Filter immediately, acidity to pH < 2 with HNO_3
Cadmium, chromium, nickel, zinc	μg/L	1		
Copper		3		
Lead		5		
Microbiological				
Total coliform	MPN/100 ml	2	SM[5] B9221	24 hours
Fecal coliform	MPN/100 ml	2	SM C9221	24 hours

EPA Methods and Guidance for Analysis of Water (USEPA, 1999)
[2] Reported as mg nitrogen per liter
[3] Reported as mg phosphorus per liter
[4] Lau and Stenstrom (1997)
[5] Standard Methods (1999)

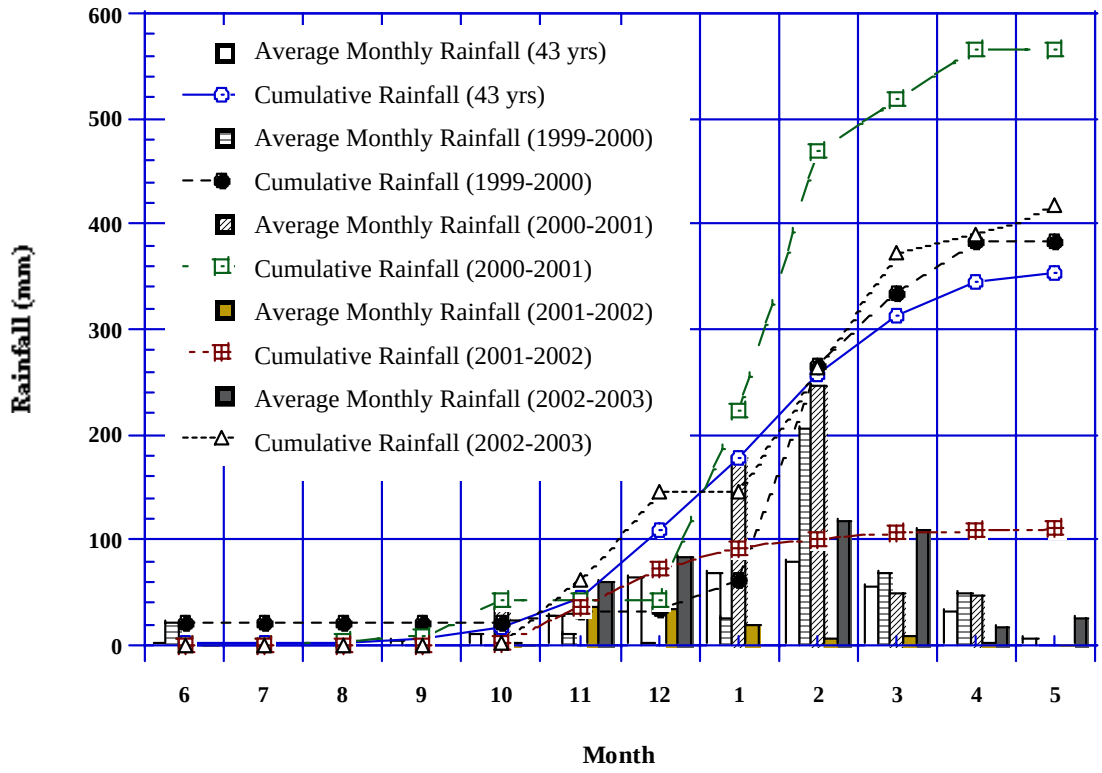

Figure 2.5 Rainfall during the study.

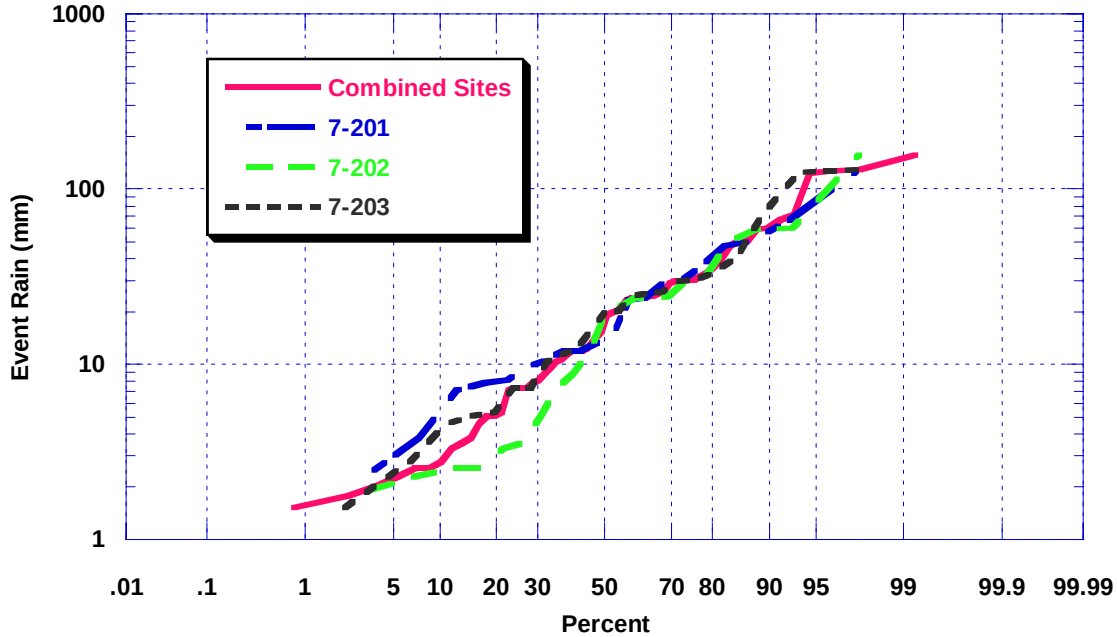

Figure 2.6 Rainfall probabilities for all three sites.

Tables 2.3 to 2.7 show the monitored storm events for each year. Generally, all large storm events were monitored. Storm events that followed an earlier storm within 24 to 36 hours were generally not monitored. A special effort was made to insure that the first storm of each rainy season was monitored. Appendix A shows the sampled event parameters in greater detail and also includes the events sampled by the consultants in years two and three.

Table 2.3 Basic statistics of storm events

Site		Total Rainfall (mm)	Max. Intensity (mm/hr)	Antecedent Dry Day	Storm Duration (hr)	Ave. Rainfall Intensity (mm/hr)
7-201	No. of storm events	30	29	30	30	30
	Min. / Max.	1.3 / 127.0	3.0 / 51.8	1.0 / 69.4	2.0 / 47.5	0.1 / 10.7
	Median / Mean	13.8 / 25.0	12.2 / 18.4	11.7 / 15.6	10.1 /12.1	1.7 / 2.6
	Standard Dev.	28.3	17.0	16.0	11.2	2.6
7-202	No. of storm events	32	32	32	32	32
	Min. / Max.	1.8 / 156.0	3.0 / 61.0	1.0 / 192.2	0.5 / 46.5	0.2 / 11.3
	Median / Mean	20.2 / 26.4	12.2 / 18.9	12.6 / 22.3	8.2 / 10.9	2.1 / 3.0
	Standard Dev.	32.0	18.4	34.8	11.1	2.9
7-203	No. of storm events	35	33	34	35	35
	Min. / Max.	0.5 / 128.5	3.0 / 51.8	0.3 / 192.3	1.4 / 52.2	0.1 / 8.9
	Median / Mean	15.5 / 25.1	21.3 / 21.1	11.7 / 21.9	7.3 / 10.6	2.2 / 2.8
	Standard Dev.	30.3	12.8	34.1	11.1	2.3
Combined sites	No. of storm events	97	94	96	97	97
	Min. / Max.	0.5 / 156.0	3.0 / 82.3	0.3 / 192.3	0.5 / 52.2	0.1 / 11.3
	Median / Mean	15.5 / 25.5	15.2 / 19.5	11.7 / 20.1	8.6 / 11.2	2.0 / 2.8
	Standard Dev.	30.0	16.1	29.8	11.0	2.6

Table 2.4 Events sampled in Year 1 (1999-2000)

Site ID	Date	Event Rain (mm)	Max. Intensity (mm/hr)	Antecedent Dry (days)	Peak Flow (L/s)	Cumulative Precipitation (mm)
7-201	01/17/00	1.27	3.05	17	0.32	1.27
	01/25/00	17.02	6.10	8	16.84	18.29
	01/30/00	2.54	3.05	5	1.14	20.83
	02/10/00	7.37	12.19	10	15.71	28.19
	02/11/00	18.54	15.24	1	46.37	46.74
	02/20/00	90.68	51.82	4	139.49	137.41
	02/27/00	3.30	6.10	4	6.18	140.72
	03/05/00	45.72	-	2	11.89	186.44
	03/08/00	17.78	12.19	2	22.21	204.22
	04/17/00	13.21	12.19	40	16.99	217.42
7-202	11/20/99	1.78	15.24	12	5.86	1.78
	01/17/00	1.78	3.05	17	0.32	3.56
	01/25/00	25.15	6.10	8	16.84	28.70
	01/30/00	12.70	6.10	5	1.14	41.40
	02/10/00	11.68	12.19	10	15.71	53.09
	02/11/00	25.15	24.38	1	46.37	78.23
	02/20/00	92.46	82.30	4	139.49	170.69
	02/27/00	7.37	15.24	4	6.18	178.05
	03/05/00	50.80	36.58	2	15.52	228.85
	03/08/00	23.37	12.19	2	22.21	252.22
	04/17/00	44.45	27.43	40	66.62	296.67
7-203	11/08/99	1.27	-	-	0.28	1.27
	12/31/99	0.51	-	41	0.28	2.54
	01/17/00	1.52	3.05	17	0.85	4.06
	01/25/00	18.29	6.10	8	16.99	22.35
	01/30/00	13.46	6.10	5	14.16	35.81
	02/10/00	14.99	24.38	10	15.57	50.80
	02/12/00	21.08	24.38	2	14.16	71.88
	02/20/00	58.93	45.72	4	24.92	169.67
	02/27/00	10.16	12.19	4	5.66	210.57
	03/04/00	5.84	24.38	6	11.33	216.41
	03/08/00	18.80	12.19	2	2.27	276.10
	04/17/00	56.39	51.82	40	19.82	332.49

Table 2.5 Events sampled in Year 2 (2000-2001)

Site ID	Date	Event Rain (mm)	Max. Intensity (mm/hr)	Antecedent Dry (days)	Peak Flow (L/s)	Cumulative Precipitation (mm)
7-201	10/26/00	23.88	9.14	33.63	27.13	32.51
	01/08/01	3.81	3.05	69.39	12.15	52.83
	01/10/01	127.00	51.82	1.98	63.12	179.83
	02/10/01	13.21	21.34	14.20	22.96	239.27
	02/19/01	7.11	6.10	5.36	8.52	375.16
	02/24/01	14.48	6.10	0.97	5.01	391.67
	03/04/01	11.94	6.10	4.02	10.39	473.20
	04/20/01	8.13	12.19	13.17	9.97	552.45
7-202	10/26/00	23.88	9.14	33.63	11.75	32.51
	01/08/01	5.08	3.05	69.39	4.62	54.10
	01/10/01	155.96	60.96	1.94	36.08	210.06
	02/19/01	23.88	15.24	4.84	17.08	375.41
	02/24/01	19.05	6.10	0.99	9.37	396.49
	03/04/01	8.89	12.19	4.02	18.41	474.98
	04/06/01	30.23	12.19	31.13	38.62	542.80
7-203	10/26/00	25.91	30.48	33.58	7.26	34.54
	01/08/01	5.33	6.10	69.36	5.80	56.39
	01/10/01	128.52	36.58	1.96	21.58	184.91
	02/10/01	15.49	21.34	14.21	11.41	246.63
	02/19/01	30.23	21.34	5.33	20.73	405.64
	02/24/01	11.43	9.14	0.99	3.34	419.10
	03/04/01	5.08	6.10	4.02	3.28	493.78
	04/06/01	25.40	21.34	31.57	9.88	556.77

Table 2.6 Events sampled in Year 3 (2001-2002)

Site ID	Date	Event Rain (mm)	Max. Intensity (mm/hr)	Antecedent Dry (days)	Peak Flow (L/s)	Cumulative Precipitation (mm)
7-201	11/12/01	7.87	3.05	11.90	68.44	9.40
	11/24/01	47.24	51.82	11.64	75.67	56.64
	12/20/01	10.67	21.34	6.26	24.65	68.33
	01/27/02	11.94	6.10	27.13	11.18	80.26
	02/17/02	2.03	3.05	20.38	4.71	82.30
7-202	10/30/01	3.30	6.10	192.20	14.25	3.30
	11/12/01	11.94	33.53	13.10	82.37	15.24
	11/24/01	50.29	51.82	11.69	123.97	65.53
	12/14/01	3.56	12.19	19.77	34.73	69.09
	01/27/02	31.75	15.24	27.13	30.27	123.44
	02/17/02	7.37	6.10	20.27	13.20	130.81
	03/06/02	2.54	3.05	17.61	3.91	133.35
	03/17/02	2.29	6.10	10.66	13.26	135.64
7-203	10/30/01	2.79	6.10	192.30	4.79	2.79
	11/12/01	7.37	27.43	13.10	12.88	10.16
	11/24/01	29.72	39.62	11.69	17.58	39.88
	12/20/01	12.19	33.53	6.31	13.88	54.10
	01/27/02	24.64	24.38	27.14	10.20	78.74
	02/17/02	7.37	9.14	20.31	9.80	86.11
	03/07/02	4.57	12.19	17.39	6.04	90.68
	03/17/02	10.41	24.38	10.60	16.40	101.09

Table 2.7 Events sampled in Year 4 (2002-2003)

Site ID	Date	Event Rain (mm)	Max. Intensity (mm/hr)	Antecedent Dry (days)	Peak Flow (L/s)	Cumulative Precipitation (mm)
7-201	11/07/02	28.96	12.19	40.13	21.10	30.23
	11/29/02	9.65	39.62	20.23	29.36	39.88
	12/16/02	29.72	18.29	16.43	49.41	76.45
	12/19/02	36.07	24.38	3.25	69.69	112.01
	02/11/03	23.37	18.29	44.27	24.95	146.81
	03/15/03	66.55	45.72	11.68	88.09	445.77
	05/02/03	50.29	51.82	18.10	77.84	495.81
7-202	11/07/02	58.67	18.29	41.21	109.44	58.42
	11/29/02	1.78	6.10	19.97	10.79	60.20
	12/15/02	2.54	6.10	16.21	18.86	62.23
	12/16/02	59.94	42.67	1.21	154.61	121.16
	02/11/03	24.38	15.24	44.26	37.99	204.72
	04/14/03	21.34	21.34	27.85	137.79	475.24
7-203	11/07/02	71.37	15.24	40.16	15.80	72.64
	11/29/02	1.52	6.10	19.96	0.93	74.17
	12/16/02	40.64	30.48	0.27	57.57	117.86
	12/19/02	32.51	18.29	3.09	25.06	151.13
	02/10/03	20.07	15.24	44.12	19.44	182.63
	03/15/03	123.19	39.62	11.68	48.32	538.48
	04/12/03	19.81	30.48	27.85	39.79	558.29

3. WATER QUALITY RESULTS

The large body of data collected over the four years to quantify the first flush has utility to describe the various parameters associated with highway runoff. To the best of the authors' knowledge, these three sites may have been more extensively monitored for a larger variety of parameters than any other highway sites. Since many of the site specific parameters for the three sites are similar (e.g., rainfall, average daily traffic, location, etc.) the pooled data represents an even larger data resource.

The parameters were monitored in two ways after the first year of the study: using a series of grab samples, and automatically sampled, flow-weighted composite samples. A flow weighted composite sample can be calculated from a series of grabs if the flow rates were simultaneously measured. The flow weighted composite sample, whether collected by an automated instrument or calculated from a series of grab samples, is called an event mean concentration or EMC. There are several procedures, and in Chapter 4 we describe some of the benefits of the various approaches. Before we present the EMCs of water quality parameters, we will show a proper method to compute the EMC from grab samples.

3.1 Computation of Event Mean Concentrations (EMCs)

Mathematically, EMCs can be defined as total pollutant mass (*M*) discharged during an event divided by total volume (*V*) discharge of the storm event.

$$EMC = \frac{M}{V} = \frac{\int C(t)Q(t)dt}{\int Q(t)dt} \tag{3.1}$$

In equation 3.1, *C(t)* is a smooth real-valued function of time that represents the pollutant concentration curve, and *Q(t)* is also a smooth real-valued function of time that represents the stormwater flow rate curve. However, in practice, the integrals are not by the functions of *Q(t)* and *C(t)* but approximations created by discrete measurements of *Q(t)* and *C(t)*. If we assume we measure the concentration and the flow rate based on equal time-interval in a storm event, the EMC can be estimated as

$$EMC = \frac{\sum_i c_i q_i}{\sum_i q_i} \tag{3.2}$$

where q_i and c_i are the measurements for the discharge rate and pollutant concentration in the ith interval. From the point of view of approximating the continuous functions in equation 3.1, the more measurements we take, the more accurate approximation we can obtain by equation 3.2. When we view the measurements of the flow rate as the weights, equation 3.2 becomes the discharge-weighted average throughout the storm event, as follows:

$$EMC = \sum_i w_i c_i \tag{3.3}$$

$$w_i = \frac{q_i}{\sum_i q_i} \tag{3.4}$$

where w_i is the flow weight, and $\sum_{i=1}^{n} w_i = 1$. In practice, one common situation is the number of concentration measurements does not match the number of flow measurements. Generally there are many fewer concentration measurements, because concentration measurements are much more expensive and time consuming; flow measurements can be easily and automatically obtained by the instrument. For most situations the weights must be adjusted for each concentration measurement in equation 3.3. One of the reasonable ways to adjust the weights is to use the discharge volume. One approach (Charbeneau and Barrett, 1998) splits the discharge volume from the mid-point between two consecutive concentration measurements. Figure 3.1 shows this approach, and the adjusted weight can be written as:

$$w_i = \frac{V_i}{\sum_i V_i} \tag{3.5}$$

where V_i is the corresponding discharge volume for the ith concentration measurement. This mid-discharge splitting method can also be applied for measurements at unequal time-interval bases. Alternatively, if the concentration measurements are based on constant discharge volume, the weighted average of $w_i c_i$ form is reduced to the arithmetic average. Ideally, automated samplers can collect samples in proportion to discharge volume. Additionally there are always slight errors (noise) in sample volume and pace that change the equal weights. Thus, an EMC can be calculated using a series of flow-weighted grab samples.

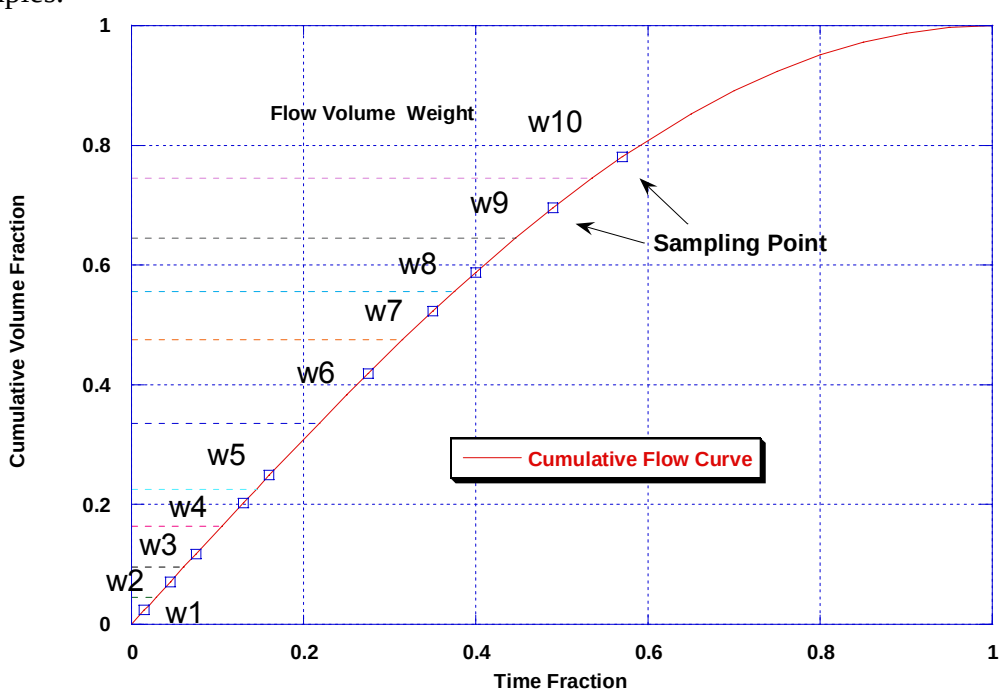

Figure 3.1 Example of flow weighing for EMC calculations.

The EMCs shown in this report were calculated from grab samples, using flow weights as described, unless noted otherwise.

3.2 EMCs of Water Quality Parameters

Table 3.1 shows the mean, median and EMCs for the pollutants measured during the four years of the study. The different estimates of the concentration are provided to show the variability. The maximum values for some values are startlingly high; for example, the maximum value of COD is 2282.8. These high numbers would have been unobserved if only automatic composite samplers had been used.

Table 3.1 Basic statistics of principal EMCs and grab samples for combined sites

Parameters	No. of cases[1]	Mean of EMCs	Median of EMCs	Mean of Grabs	Median of Grabs	Min. of EMCs	Max. of EMCs	Std. Dev. of EMCs
TSS (mg/L)	62 / 569	67.7	57.6	71.3	45.9	8.8	466.4	62.9
Turbidity (NTU)	62 / 569	46.8	33.0	52.0	31.9	10.9	170.5	39.2
Cond. (µmho/cm)	62 / 569	239.0	135.0	315.1	157.0	23.4	1991.7	302.7
Hardness (mg/L)	62 / 569	78.4	50.7	104.9	48.4	6.8	598.0	95.6
COD (mg/L)	62 / 569	252.3	119.8	321.3	138.5	19.3	2282.8	373.0
DOC (mg/L)	62 / 544	67.6	29.4	81.4	29.3	2.9	848.8	126.8
Oil & Grease (mg/L)	62 / 569	14.0	9.3	18.1	10.6	1.5	80.2	14.6
TKN (mg/L)	62 / 569	9.7	4.1	11.6	4.7	0.8	111.3	16.4
NH_3-N (mg/L)	62 / 569	4.6	1.4	5.5	1.3	0.1	65.0	9.7
NO_2-N (mg/L)	62 / 569	0.3	0.2	0.5	0.2	0.0	3.0	0.4
NO_3-N (mg/L)	62 / 552	2.7	1.2	3.2	1.5	0.0	34.7	5.3
Total P (mg/L)	43 / 564	0.9	0.4	895.8	437.1	0.1	8.2	1.6
PO_4-P (mg/L)	45 /138	0.3	0.1	653.2	355.0	0.0	2.7	0.5
Dissolved P (mg/L)	62 / 566	0.7	0.2	740.1	291.0	0.1	7.3	1.3
Total Cd (µg/L)	24 / 361	2.5	1.4	3.0	1.1	0.5	20.2	3.9
Total Cr (µg/L)	58 / 563	10.1	8.8	10.5	8.4	2.4	40.1	6.3
Total Cu (µg/L)	62 / 564	93.1	55.7	113.9	64.7	16.2	920.8	125.2
Total Ni (µg/L)	62 / 563	20.0	11.2	23.3	12.8	2.3	253.7	33.9
Total Pb (µg/L)	47 / 556	33.0	25.0	24.6	19.2	4.6	239.1	38.1
Total Zn (µg/L)	62 / 558	506.4	267.9	564.9	274.0	83.4	8881.3	1137.0
Dissolved Cd (µg/L)	43 / 299	1.3	0.5	2.4	0.8	0.5	17.8	2.7
Dissolved Cr (µg/L)	58 / 495	2.8	2.0	3.5	2.3	0.5	19.3	2.8
Dissolved Cu (µg/L)	62 / 566	65.9	35.4	85.5	39.2	5.3	735.3	103.9
Dissolved Ni (µg/L)	62 / 558	15.7	7.9	18.9	8.7	0.5	229.2	31.3
Dissolved Pb (µg/L)	47 / 392	4.9	3.6	6.0	4.1	0.5	43.5	6.5
Dissolved Zn (µg/L)	62 / 562	415.4	177.7	465.5	184.0	42.4	8150.0	1055.7

[1] Number of events / total number of grab samples

Of particular interest are the particulate forms of the metals, since they have the greatest opportunity for removal through removal of the suspended solids. Soluble metals are much more difficult to remove, requiring ion exchange, precipitation or reverse osmosis.

Table 3.2 shows the percentage of the metals that are sorbed to suspended solids. The percentage sorbed ranges from nearly zero to 100%. In general, Cd, Cr and Pb are particulate-bound and Cu, Ni and Zn are more associated with the dissolved phase.

In future projects the association between metals and particles will be further investigated. There is evidence in our study, mostly anecdotal at present, that the soluble metals are not in equilibrium and that sorption to particles is continuing well after 24 hours. Our protocol required metal samples to be filtered within 24 hours (essentially ending the sorption process), but were generally filtered in less than 12 hours. In a future project, we hope to investigate the rate of sorption and equilibrium of soluble metals during the 24 hours after sample collection. If the metals equilibrium is shifting towards the particulate phase, it is a useful finding for BMP selection, since BMPs can generally remove pollutants sorbed to suspended solids than soluble pollutants.

Table 3.2 Summary statistics for particulate-bound metals (% of total metals sorbed to solids)

		Site 1	Site 2	Site 3	Combined
No. of cases	Cd	130	164	150	444
	Cr	171	192	193	556
	Cu	172	192	200	564
	Ni	172	192	200	564
	Pb	163	192	200	555
	Zn	166	192	200	558
Minimum	Cd	6.9	0.0	5.0	0.0
	Cr	0.2	16.0	30.2	0.2
	Cu	0.2	2.3	2.1	0.2
	Ni	0.3	0.9	1.4	0.3
	Pb	23.2	25.3	7.5	7.5
	Zn	0.8	1.2	0.3	0.3
Median	Cd	57.2	50.0	50.0	50.0
	Cr	71.4	74.8	74.4	73.7
	Cu	26.1	42.4	25.7	31.1
	Ni	22.2	31.9	28.8	27.9
	Pb	90.8	92.5	81.7	87.6
	Zn	21.4	33.6	19.6	24.1

		Site 1	Site 2	Site 3	Combined
Standard Dev	Cd	27.7	33.8	30.9	31.7
	Cr	19.0	15.3	15.4	16.9
	Cu	15.7	20.6	22.8	20.8
	Ni	20.9	22.4	24.6	23.0
	Pb	18.3	15.2	18.7	17.9
	Zn	20.9	26.1	19.1	22.7
Maximum	Cd	100.0	100.0	100.0	100.0
	Cr	100.0	100.0	100.0	100.0
	Cu	91.5	84.0	85.3	91.5
	Ni	100.0	87.5	90.6	100.0
	Pb	100.0	100.0	99.5	100.0
	Zn	92.1	93.4	78.7	93.4
Mean	Cd	69.4	53.7	58.2	59.8
	Cr	66.3	73.8	73.9	71.5
	Cu	29.2	42.0	32.7	34.8
	Ni	28.2	35.4	35.3	33.2
	Pb	84.0	86.5	77.1	82.4
	Zn	27.8	36.5	25.3	29.9

Note: Site 1, 2 and 3 are 7-201, 7-202 and 7-203, respectively.

3.3 Correlation among Water Quality Parameters

The correlation among pollutants and TSS is also interesting and important. Tables 3.3 and 3.4 show the correlations. The numbers above the line are the Pearson correlation coefficient, frequently referred to as “R.” Below the line are the probabilities associated with obtaining a random result with the same value of R (lower numbers indicate less likelihood of a random or artifactual finding). Generally, probabilities less than 0.05 are considered significant results.

The organic or oxygen demanding pollutants shown in Table 3.3 are particularly significant. The COD and DOC are highly correlated, suggesting that the COD is primarily composed of organic compounds, and not reduced inorganic, such as nitrite, sulfur compounds and certain metals. This is also an important correlation for an important finding described later between Oil and Grease and COD. The high correlations suggest one of two things: either the two correlated pollutants are measuring the same material, or that the sources of the pollutants are similar or release the pollutants in similar ways.

For the case of COD and DOC, the two parameters are measuring similar properties. The DOC measures the amount of organic carbon, but not its oxidation state. For COD, the tendency to react with oxygen is measured. The two are related depending on the form of the carbon. For example, methane, the most reduced form of organic carbon, has an oxygen demand weight ratio of 5.6 (e.g., 5.6 grams of oxygen are consumed for each gram of methane oxidized). For a highly oxidized form of carbon, such as carbon monoxide, the ratio is only 1.3. The high correlation between COD and DOC suggests that the oxygen-consuming pollutants are organic and have relatively consistent oxidation state.

The high correlations between different metals probably suggest similar sources. For example, metals used in manufacturing are frequently alloys, such as brass, which is an alloy of Cu, Zn and Pb. Brass particles would show all three metals in the analysis.

The poor correlation of particulate Cd and TSS shows that the sorbed Cd varies with TSS concentration. Even though the percentage sorbed is high, as shown in Table 3.2, a treatment system removing particulates would have a varying Cd removal rate. The high variability associated with Cd may be in part related to its low concentration, which is usually near the detection limits of the analytical procedures.

Table 3.3 Correlation analysis results among non-metals and TSS

Water Quality Parameter	TSS	COD	DOC	O & G	TKN	NH_3-N	T-P
TSS	1	0.40	0.34	0.38	0.40	0.39	0.35
COD	0.00	1	0.95	0.83	0.84	0.79	0.74
DOC	0.00	0.00	1	0.98	0.89	0.88	0.60
O & G	0.00	0.00	0.00	1	0.89	0.85	0.84
TKN	0.00	0.00	0.00	0.00	1	0.84	0.87
NH_3-N	0.00	0.00	0.00	0.00	0.00	1	0.81
Tot. P	0.00	0.00	0.00	0.00	0.00	0.00	1

- above the diagonal : Pearson's Coefficient "r"

- below the diagonal : Probability Values (P-Value)

Table 3.4 Correlation analysis results for particulate phase metals and TSS

Parameter	TSS	Part. Cd	Part. Cr	Part. Cu	Part. Ni	Part. Pb	Part. Zn
TSS	1	0.02	0.59	0.58	0.57	0.60	0.60
Part. Cd	0.67	1	0.02	0.30	0.26	0.62	0.75
Part. Cr	0.00	0.60	1	0.75	0.70	0.65	0.70
Part. Cu	0.00	0.00	0.00	1	0.85	0.70	0.83
Part. Ni	0.00	0.00	0.00	0.00	1	0.70	0.75
Part. Pb	0.00	0.00	0.00	0.00	0.00	1	0.74
Part. Zn	0.00	0.00	0.00	0.00	0.00	0.00	1

- above the diagonal : Pearson's Coefficient "r"

- below the diagonal : Probability Values (P-Value)

4. FIRST FLUSH RESULTS AND DISCUSSION

This chapter discusses the measured first flush of the various monitored parameters. The parameters have been ranked according to the magnitude of the first flush. In order to rank the first flush, a new parameter was developed, called the mass first flush ratio (MFF). Other first flush characteristics discussed in this chapter include PAHs, litter, and particles (based upon particle counting methods and not TSS). The results of seasonal first flush have also been discussed in this chapter..

4.1 Meaningful Definition of First Flush for Practical Application

The first flush of the highway runoff sites were characterized with mass first flush ratios. As noted in the introduction, this ratio is a quantitative method of concepts proposed earlier. It quantifies the mass of emitted pollutants as a function of the storm progress, as indicated by the normalized runoff volume (e.g., 0 to 1, with 1 being the total volume). It is defined as follows:

$$MFF_n = \frac{\dfrac{\int_0^{t_1} C(t)Q(t)dt}{M}}{\dfrac{\int_0^{t_1} Q(t)dt}{V}} \tag{4.1}$$

In equation 4.1, MFF is the mass first flush ratio, and is dimensionless; n is the index or point in the storm, and corresponds to the percentage of the runoff, ranging from 0 to 100%. M is the total mass of emitted pollutant, V is the total runoff volume, C(t) and Q(t) are the pollutant concentration and runoff volume as functions of time. The terms have the same meaning as used earlier in equation 3.1 that defined the EMC.

By definition, the MFF is equal to zero at the storm beginning and always equals 1.0 at the end of the storm. Values greater than 1 indicate that normalized mass is being discharged faster than the normalized volume, or a first flush.

The MFF can be defined or visualized graphically, and Figure 4.1 shows the concept for a hypothetical storm. The normalized pollutant mass emission is plotted as a function of the normalized flow volume. This line is sometimes called a “load graph.” The MFF can be calculated at any point on the curve by dividing the Y axis value by the X axis value.

In Figure 4.1, two points were selected at normalized runoff volumes of 0.1 and 0.3, or 10 and 30% of the storm volume (i.e., n = 10 and n = 30). The intersection of the load graph for 10 and 30 are 0.45 and 0.66. This means that 45% of the pollutant mass was discharged in the first 10% of the runoff, and 66% of the mass was discharged in the 20% of the runoff. The MFF ratio is the quotient of the normalized pollutant mass divided by the normalized pollutant volume. Figure 4.1 shows the MFF_{10} = 4.5 and MFF_{30} = 2.2. To calculate the percentage of pollutant discharged at a point in the storm using the MFF ratio, the index is multiplied by the ratio, or 10 x 4.5 =45% or 30 x 2.2 = 66%.

Calculating the first flush requires a series of grab samples, or at least two flow weighed composite samples. The ratio can be conveniently calculated using the series of grab samples as shown in the previous chapter for EMC calculation. Alternatively, a full storm composite sample, as normally collected, can be used for the denominator of the MFF ratio. The numerator can be a second flow-weighted composite sample, which must be collected from the storm beginning to the point in the storm corresponding to n. The MFF ratio or knowledge of the first flush cannot be determined from routine monitoring data, and the data collected in this study are unique among the Department's stormwater monitoring programs.

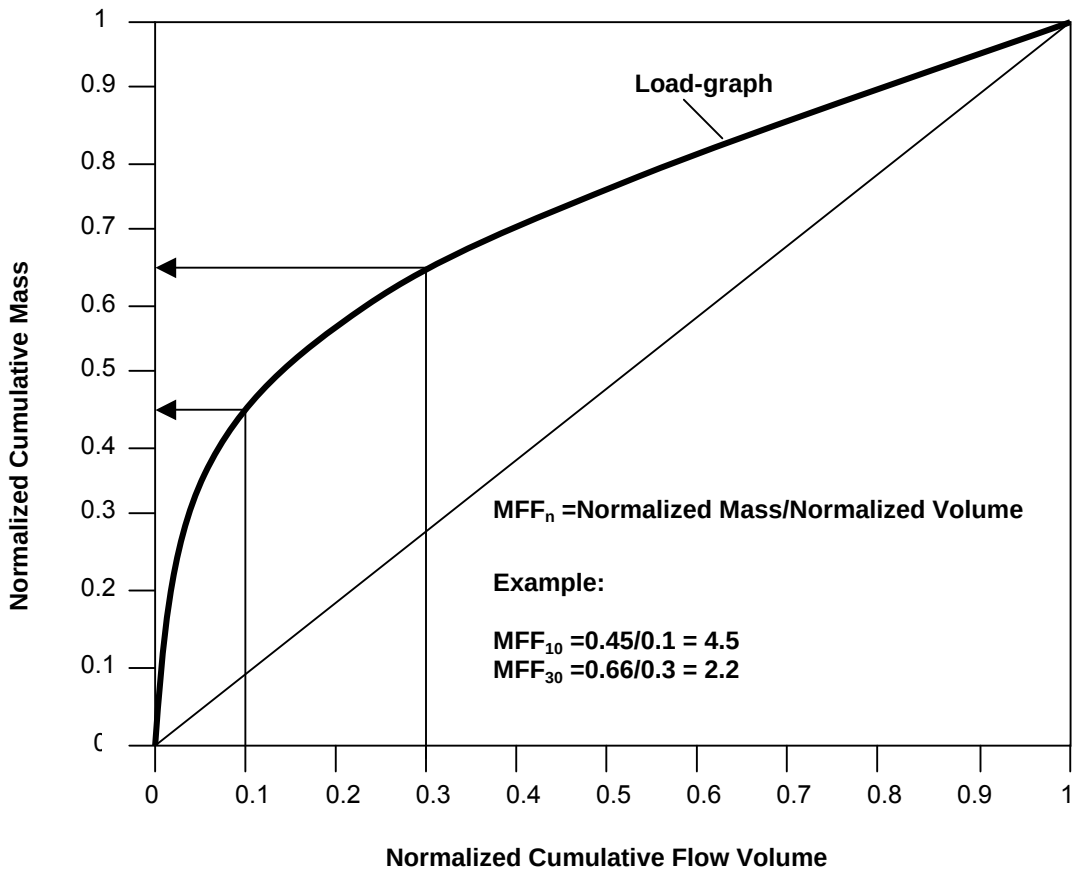

Figure 4.1 Load graph example of MFF calculation.

The MFF ratio can be related to another concept called the partial EMC or PEMC. The PEMC is a flow weighted composite sample, collected from the storm beginning to a point in the storm, as described in the previous paragraph. The MFF ratio can be defined as follows, and is numerically the same as calculated from equation 4.1

$$MFF_n = PEMC_n/EMC \tag{4.2}$$

MFF ratios have been calculated for the last three years of the study (data from the first year was not suitable, since the tail of the storm was monitored with only a composite sample). The appendix contains the MFF ratios, calculated from 10 to 50% of the storm, for all events and for all parameters.

Table 4.1 shows the MFF_{20} ratios for all three UCLA sites and the pooled data for all three sites, for 26 pollutants. They are ranked by magnitude. Generally the chemical oxygen demanding (COD) or organics indicating pollutants (DOC, O&G, TKN) have the highest MFF ratios. It should be expected that they have similar ratios, since they are highly correlated, as shown in the last chapter. The fact that their values are high suggests that they are washed or scoured from the sites early in the storm.

Table 4.1 Ranked mass first flush ratios for MFF_{20}

Rank	7-201		7-202		7-203		Combined Sites	
	Parameters	Median	Parameters	Median	Parameters	Median	Parameters	Median
1	COD	1.740	Dissolved Ni	2.086	DOC	2.511	Dissolved Ni	1.943
2	Total P	1.706	DOC	2.005	Dissolved Ni	2.405	DOC	1.942
3	Dissolved P	1.688	NH_3-N	2.000	COD	2.326	TKN	1.895
4	TKN	1.589	Total Zn	1.999	TKN	2.180	COD	1.883
5	Dissolved Ni	1.577	Dissolved Cu	1.982	Dissolved Cu	2.122	NH_3-N	1.882
6	Oil & Grease	1.567	COD	1.948	NH_3-N	2.099	Dissolved P	1.748
7	TSS	1.559	TKN	1.944	TSS	1.980	TSS	1.718
8	NH_3-N	1.558	Dissolved Zn	1.927	Total Ni	1.864	Total P	1.717
9	DOC	1.522	Dissolved P	1.862	Total Cu	1.792	Oil & Grease	1.699
10	Total Ni	1.489	Total Ni	1.845	Oil & Grease	1.787	Dissolved Cu	1.680
11	Total Zn	1.484	Total Cu	1.714	Dissolved P	1.747	Total Ni	1.680
12	Dissolved Zn	1.428	Oil & Grease	1.709	Total P	1.747	Total Zn	1.666
13	Conductivity	1.416	Total P	1.703	Conductivity	1.741	Dissolved Zn	1.657
14	Dissolved Cu	1.401	NO_3-N	1.486	Dissolved Zn	1.661	Total Cu	1.644
15	Total Cu	1.396	Total Cd	1.459	Total Zn	1.652	Conductivity	1.538
16	NO_2-N	1.392	Turbidity	1.429	Hardness	1.607	Hardness	1.484
17	Total Cr	1.358	TSS	1.416	NO_3-N	1.573	NO_2-N	1.371
18	Turbidity	1.299	Dissolved Pb	1.377	NO_2-N	1.369	NO_3-N	1.345
19	Total Pb	1.225	PO_4-P	1.366	Dissolved Pb	1.339	Turbidity	1.288
20	Hardness	1.200	Dissolved Cr	1.349	Total Cd	1.269	Total Cd	1.264
21	Dissolved Cr	1.152	Total Pb	1.323	Total Cr	1.224	Total Pb	1.230
22	Total Cd	1.074	Dissolved Cd	1.307	Total Pb	1.131	Total Cr	1.223
23	Dissolved Cd	1.001	NO_2-N	1.251	Turbidity	1.093	Dissolved Pb	1.206
24	Dissolved Pb	1.000	Hardness	1.227	Dissolved Cd	1.091	Dissolved Cr	1.172
25	PO_4-P	1.000	Conductivity	1.214	Dissolved Cr	1.040	Dissolved Cd	1.087
26	NO_3-N	0.983	Total Cr	1.200	PO_4-P	1.000	PO_4-P	1.000

The range or statistical variability of the MFF ratios is also important. Table 4.1 shows only the median values. Figures 4.2 and 4.3 show notched box plots of the MFF_{10} to MFF_{50} ratios for combined sites for COD, TSS and the six metals of most interest to the Department (Cd. Cr, Ni, Pb, Cu and Zn). The bar plots show the 25% and 75% percentiles (edges of the bar), the median (notch of the bar), confidence intervals (5%, upper and lower knees), fences and outliers. Different software produces slightly different notch bar plots. Systat 10.2 (Richmond, CA) was used to produce all the notched bar plots in this report. The advantage of notched bar plots over standard bar plots is the ability to observe statistical differences in categories. If the knees of the notches do not overlap, there is a significant difference in the categories.

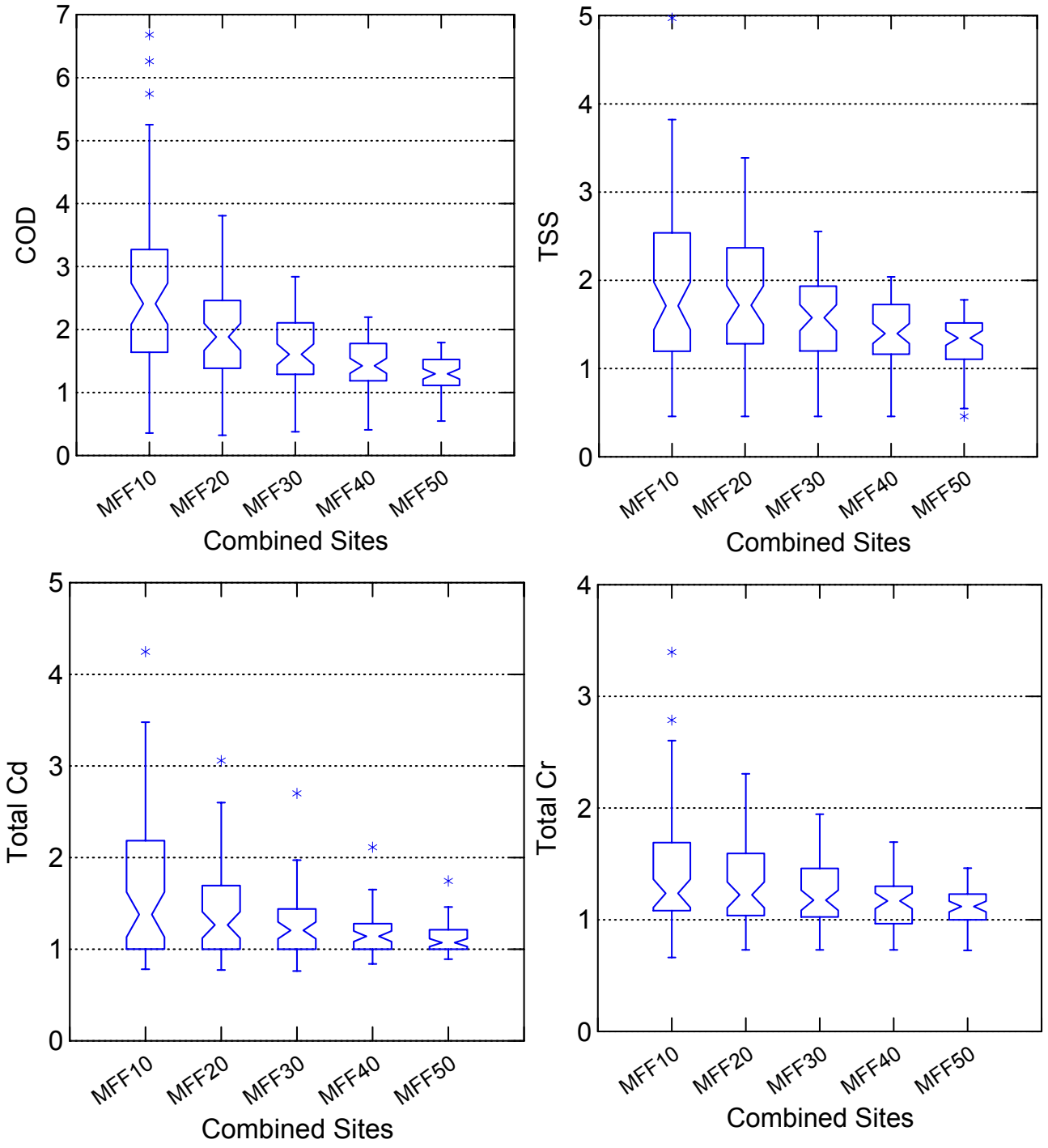

Figure 4.2 Notched bar graphs for MFF ratios (10 to 50%) for COD, TSS, Total Cd and Total Cr for the combined sites (The number of cases is 58 for COD and TSS, and 62 for metals).

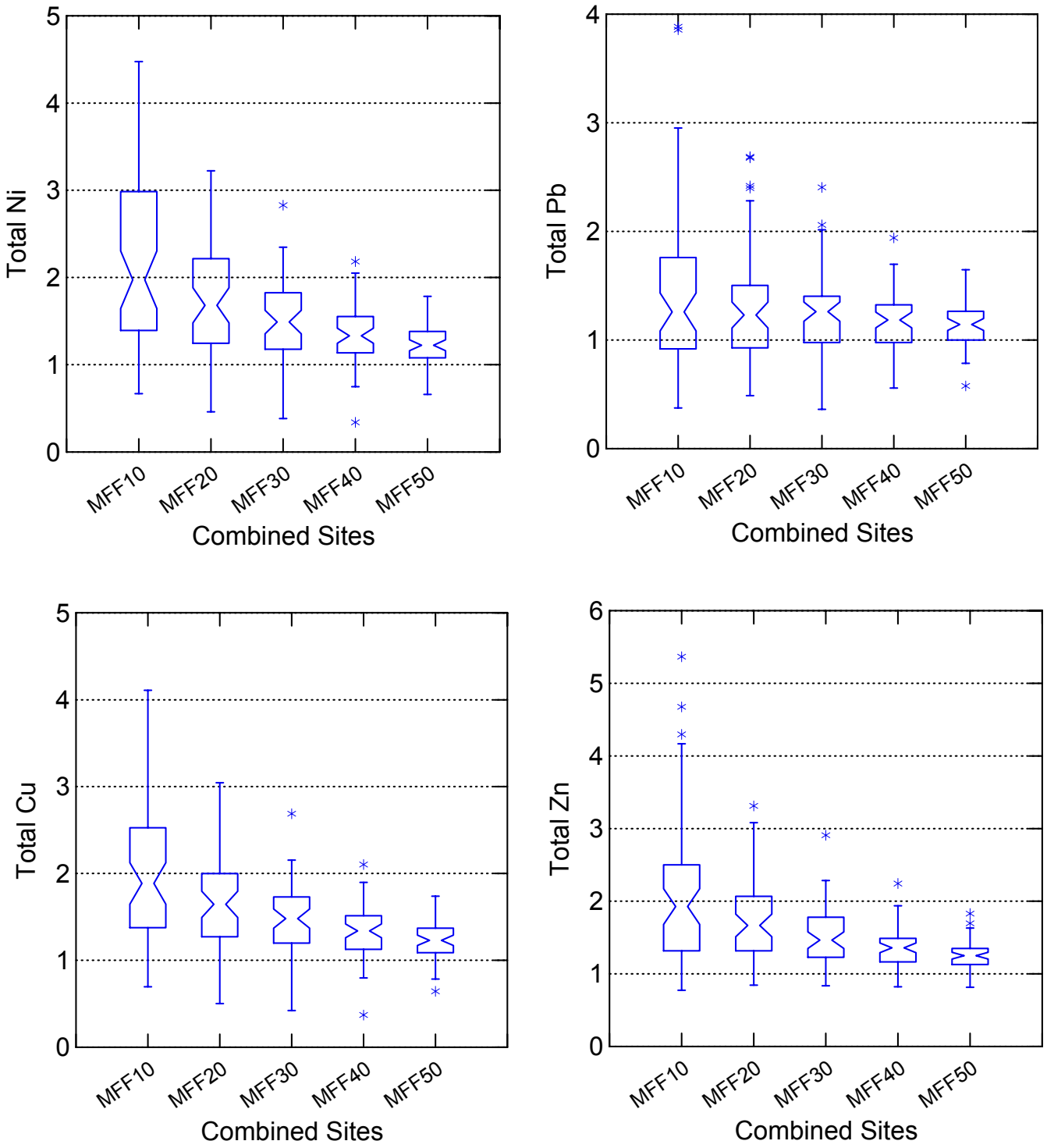

Figure 4.3 Notched bar graphs for MFF ratios (10 to 50%) for Total Ni, Pb, Cu and Zn for the combined sites (The number of cases is 58 for COD and TSS, and 62 for metals).

Ratios for the individual sites, including those monitored by the consultants are shown in the appendix. All the ratios measured in this investigation decline with increasing runoff volume. It is possible that a ratio at a larger flow volume could be larger than a ratio for a smaller volume, but an unusual runoff behavior would have to occur.

As noted earlier the MFF ratios for the different pollutants are in many cases highly correlated, and the correlations are shown in the appendices. Unfortunately, no significant correlations have been found yet between MFF ratios and storm and site parameters, such as ADD, ADT, rainfall intensity, and total rainfall. At present the Pearson-type correlations, which are useful for describing linear relationships, have been investigated. There are other opportunities to detect meaningful relationships. Techniques that will be investigated in our future work will include component analysis, Bayesian analysis and neural networks. These have been successfully applied by our group (Ha, et al, 2003) for determining relationships among water quality parameters and land use. These tools are better in detecting non-linear relationships.

4.2 PAH First Flush

Polynuclear aromatic hydrocarbons (PAHs) are often associated with highway runoff and combustion residuals. PAHs are included in organic measurements such as COD and DOC, but are generally so low in concentration that there first flush behavior cannot be determined from these measurements. In order to measure the first flush of PAHs, 32 different PAHs were measured at three sites over the study. At first, both soluble and particulate phase PAHs were measured. Soluble phase PAHs were rarely above the detection limit of 5 ng/L, and the analysis was abandoned. Particulate phase PAHs were found, and Table 4.2 shows typical results. Figure 4.4 shows the MFF ratios for total PAHs.

Table 4.2 Particulate phase PAHs for Site 1, 2001-2002 season

PAH Compound	EMC (ng/L)							
	10/30	11/12	11/24	12/14	1/27	2/17	3/7	3/17
Napthalene	28	6		17	6	2		11
Acenapthylene								
Acenapthene								
Fluorene								
Phenanthrene	83	24	14	54	21	22	29	42
Anthracene	14			14				
Fluoranthene	226	53	31	277	59	73	98	166
Pyrene	511	128	73	532	134	144	220	356
Benz[a]anthracene	93	24	17	102	24	29	31	50
Chrysene	332	85	51	295	86	108	179	241
Benzo[b]fluoranthene	57	41	22	124	38	38	25	84
Benzo[k]fluoranthene	60	11	9	59	13	20	22	30
Benzo[a]pyrene	147	48	28	124	44	48	71	113
Indeno[1,2,3,cd]pyrene	65	16	9	24	8	7		31
Dibenzo(ah)anthracene				0				
Benz[g,h,i]perylene	296	86	41	229	73	74	100	195
Total PAHs	1882	529	300	1852	511	568	778	1327

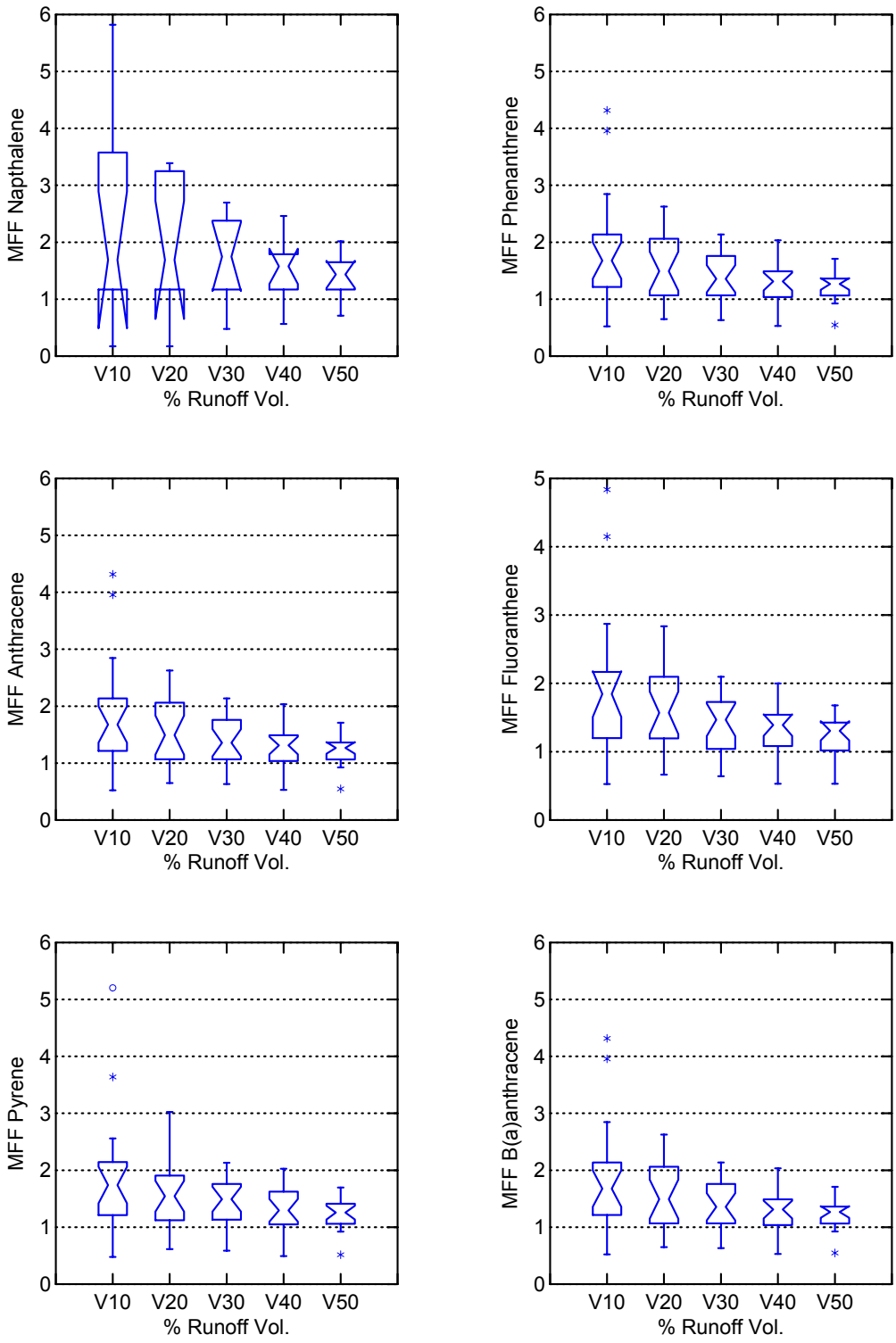

Figure 4.4 Notched bar graphs showing MFF ratios for various PAHs.

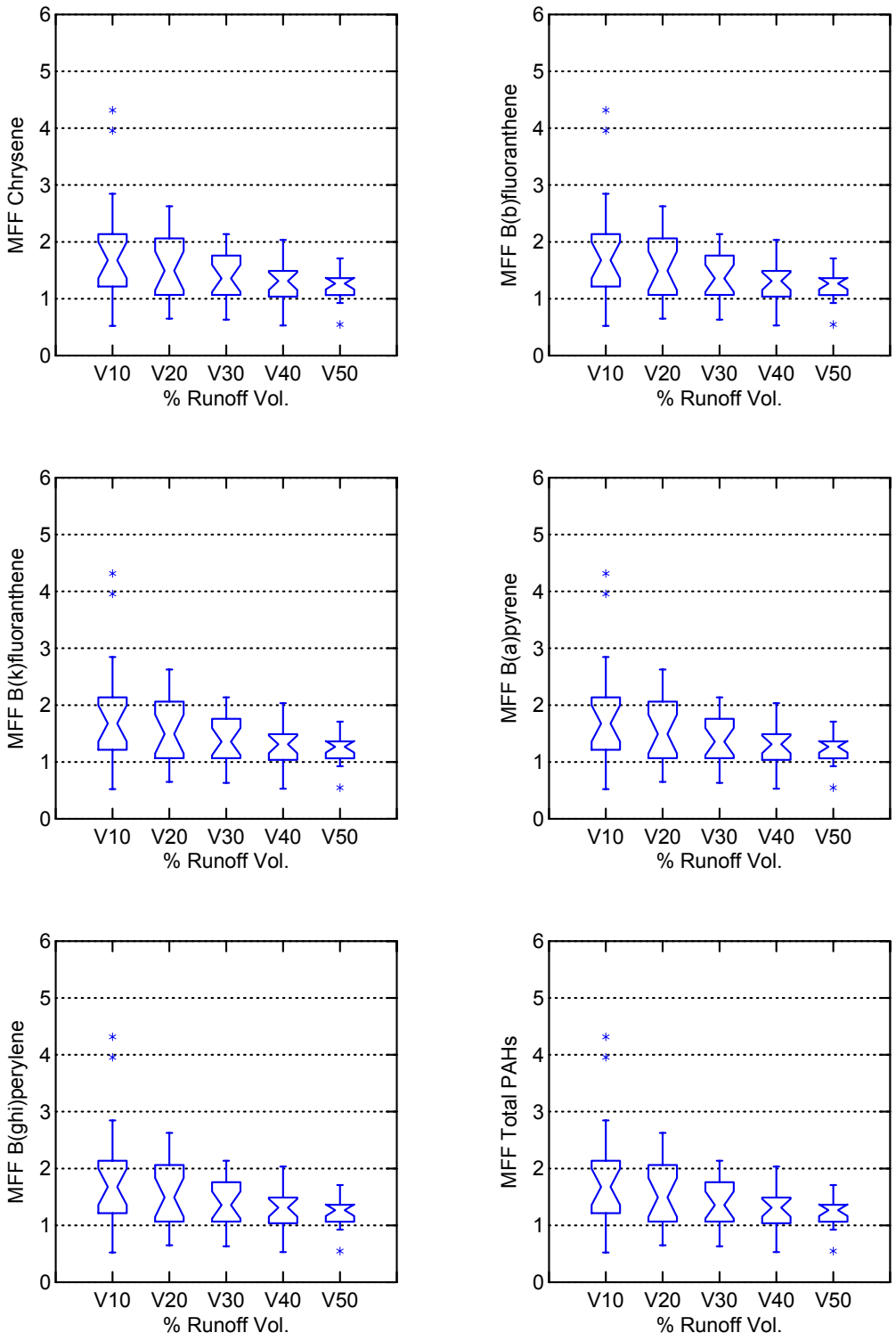

Figure 4.4 (Continued) Notched bar graphs showing MFF ratios for various PAHs.

PAHs generally showed a first flush in the same order as organic pollutants such as COD and DOC, and enhanced removal of PAHs will occur if BMPs that treat the first flush are used.

4.3 Litter First Flush

Litter is generally not considered a water quality parameter, but has been regulated by the Los Angeles Regional Water Quality Control Board under its total maximum daily load (TMDL) program. The Department's first flush criterion for litter is defined as the litter mass fraction within the first two hours of the storm event. If more than 50% of the mass is emitted during the first two hours, it is called a first flush. The litter first flush observation based on the litter ratio is presented in Table 4.3 for selected events. The occurrence of a first flush was not consistently observed at all monitoring sites during the same storm event. Similarly, review of the litter pollutographs and load-graphs indicate that the first flush phenomenon was occasionally observed in all sites during certain storm events. Table 4.3 shows that site 6-20F most consistently exhibited a first flush. During the storm event of January 10, 2001, site 6-20F, 8-23C and 23 showed significant first flush effects, but there was none present for site 7-202 and 7-203. This storm event also had the highest relative rainfall intensity of the season.

Table 4.3 Fraction of litter occurring in the first 2 h of runoff [a]

Parameters		Gross Pollutant Wet Weight	Gross Pollutant Wet Volume	Litter Wet Weight	Litter Wet Volume	Litter Air Dry Weight	Litter Air Dry Volume	Biodegradable Dry Weight	Biodegradable Dry Volume
7-202	10/26/01	0.02	0.03	0.04	0.05	0.03	0.06	0.03	0.04
	1/8/01	0.98	0.95	0.98	0.97	0.96	0.97	0.97	0.98
	1/10/01	0.05	0.11	0.53	0.39	0.48	0.5	0.5	0.63
7-203	10/26/01	0.92	0.73	0.85	0.62	0.81	0.61	0.64	0.4
	1/8/01	0.94	0.9	0.98	0.96	0.98	0.96	0.98	0.95
	1/10/01	0.2	0.27	0.59	0.31	0.38	0.34	0.49	0.37
	2/10/01	0.25	0.26	0.15	0.13	0.12	0.1	0.15	0.1
	2/19/01	0.61	0.57	0.85	0.71	0.92	0.74	0.75	0.57
6-20F	10/26/00	0.23	0.29	0.33	0.35	0.29	0.34	0.24	0.31
	1/10/01	0.98	0.96	0.94	0.96	0.96	0.94	0.97	0.94
	1/26/01	0.87	0.88	0.94	0.96	0.96	0.96	1	0.93
	2/10/01	0.97	0.95	0.99	0.93	0.99	0.94	0.99	0.93
8-23C	10/26/00	0.19	0.2	0.14	0.12	0.12	0.12	0.16	0.14
	1/10/01	0.77	0.68	0.58	0.7	0.53	0.62	0.77	0.7
	2/24/01	0.22	0.32	0.37	0.43	0.37	0.33	0.46	0.33

[a] Due to low rainfall in 2001-2002 monitoring season, limited litter data were collected.

Gross pollutant and litter data were also reviewed and compared on a multi-event basis to evaluate a potential effect of the first storm event of the season. It was hypothesized that the

first storm event of the season would have the highest relative amount of litter mass, volume and mass loading compared to subsequent storm events. Table 4.3 shows that the first monitored storm event of the season did not produce a relatively greater amount of litter when compared to the subsequent storm events. The existence of a first flush and the mass of gross pollutants may be a function of the total or maximum intensity of rainfall. Gross pollutants are retained on the surfaces and in catch basins and pipes, and a minimum flow may be required to mobilize them. If the first rainfall of the season is large but lengthy with low intensity, gross pollutants may not be mobilized. Conversely, a short, intense rainfall may mobilize more pollutants.

The ratio of biodegradable to non-biodegradable litter was calculated for each event and site. The values varied considerably during each storm event. Site 6-20F, the site with the highest normalized litter mass loading, consistently had higher amounts of biodegradable litter. Site 7-202 had more non-biodegradable litter. On average for all sites, a slightly greater percentage (approximately 60%) of biodegradable litter was measured in the first flush of the storm events. This was consistent with individual storm event observations where lighter biodegradable litter appeared to be washed out first, leaving the relatively heavier non-biodegradable litter to wash out with the remainder of the storm event during the peak flow periods.

Gross pollutant and litter data were evaluated as pollutographs (concentration versus time) and load-graphs (mass loading rate versus time) for each event and site. The litter concentrations were calculated as the dry litter mass divided by the total flow volume during the time of the litter sample collection. The litter mass loading rates were calculated as the dry litter mass divided by the elapsed time of litter collection, and normalized by the catchment area. These plots were compared to the respective hydrographs to determine the potential relationships to flow intensity and storm duration. The plots were also used to determine whether a first flush effect (i.e., relatively higher litter concentrations early in the event, followed by a decrease in concentration after a period of time) was present. Figure 4.5 shows an example of combined litter pollutograph and load-graph for the first event of the season. The first event of the season at site 7-201 shows very high dry litter concentration and load in first hour.

Evaluation of the litter load-graphs, however, presented no clear observations of a first flush phenomenon. In many instances, the litter mass loading rates were not highest during the first portion of a storm event; the highest litter mass loading rate was observed later in the storm event, after the peak flow had occurred.

Figure 4.6 shows the normalized wet gross, vegetation and litter rates for each event at site 7-203. The storm event, October 30, 2001, is the first storm at site 7-203. The mass rate is not higher compared to other events. The mass rates vary to event-to-event and influenced by several factors such as antecedent dry days and total rainfall. A regression model was developed to describe litter EMC as a function of antecedent dry days and total rainfall. Detail information on regression model and additional litter characterization is presented elsewhere (Kim, et al., 2004).

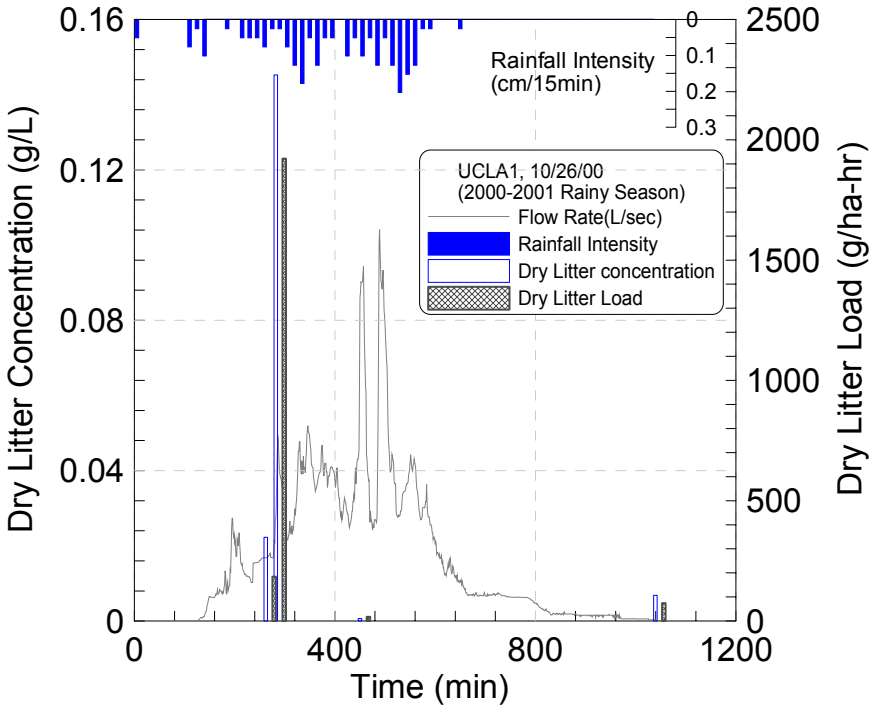

Figure 4.5 Litter polluto- and load-graphs for a storm event (with hydrograph shown in background).

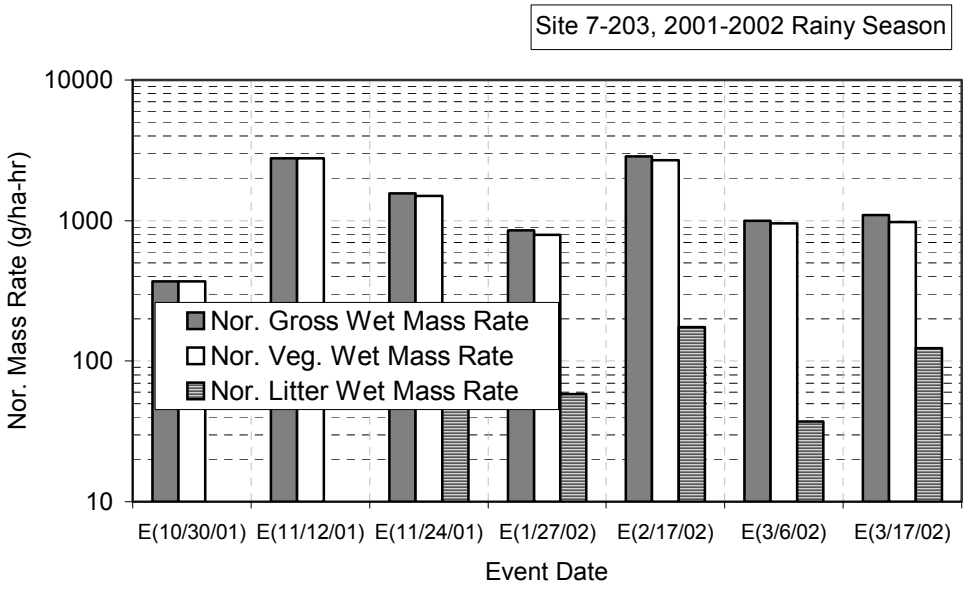

Figure 4.6 Normalized mass rates as function of catchment area and storm duration.

4.4 Particle First Flush

During the third year of the project, a particle size analyzer was acquired which can measure the number of particles from 2 to 1000 μm (Nicomp, Santa Barbara, California, PSS AccuSizer 780 Optical Particle Sizer module equipped with an auto-dilution system and a LE1000-2SE Light Scattering/Extinction sensor). This instrument has never been used in stormwater monitoring and required new protocols to be developed to reliably and accurately quantify the particles in highway runoff. The work on this topic is embryonic, and is the subject of our future work. The appendices include the entire text of a technical memorandum on its use.

The developed protocol included the following components:

1. Storage time. Sample storage is limited to 6 hours. After 6 hours, there is a noticeable aggregation in particle size. Therefore composite samples cannot be used (the time in the sampler is usually longer than 6 hours)
2. Bottle cleaning. Sample bottles must be rigorously clean and a protocol was developed that limited spurious particles to less than 250/ml, which was adequately compared to the range of particles in stormwater, which was 10^4 to 10^7/ml.
3. Mixing. Samples stored in bottles for even a few minutes need to be mixed so that a representative subsample can be collected. A mixing protocol was developed that insured a representative sample. The mixing had to be adequate to resuspend all particles without shearing them into smaller particles.
4. A series of reproducibility measurements were made. Generally the reproducibility of the method is within 5% for particles less than 30 μm, where many particles are usually present. For the larger ranges (200 μm and larger), the reproducibility may only be 20 to 50%, which can be created by one additional particle or one less particle.

Particle analysis was performed on 3 storms. Figure 4.7 shows pollutographs as well as the particle size distributions for the series of grab samples. The upper graphs show the runoff flow, rainfall intensity, TSS, turbidity, conductivity, median particle size and the particle size distribution for each grab sample. The upper graph shows the points in the pollutographs where grab samples were collected. The lower graphs show the number of particles as a function of particle size. Each grab sample corresponds to a line on the lower graphs. Sampling times are shown to locate the particle size function to a point on the pollutographs. It is easily observed that the number of particles declines dramatically as the storm progresses. Samples later in the storm have many fewer particles (note the scale change on the lower PSD axis in Figure 4.7). The median particle diameter decreases as the storm proceeds, which means that the larger particles are washed out faster than the smaller particles.

Figure 4.8 shows the Particle number first flush ratios (PNFF) which are calculated exactly the same as MFF ratios, except that particle numbers are used instead of concentrations. The PNFF can be calculated for the entire size distribution or for smaller intervals. Figure 4.8 shows that the smaller particles had $PFFN_{20}$ as low as 2.0. The larger particles had median ratios higher than 3.0.

The work on particle analysis is just beginning, but we expect to be able to develop quantitative designs for sedimentation-type BMPs based on the particle size and the pollutant concentrations on the particles. Work is being done as part of our follow-on project in 2004-2005 to measure pollutant concentrations as a function of particle size, as well as collecting more particle size information.

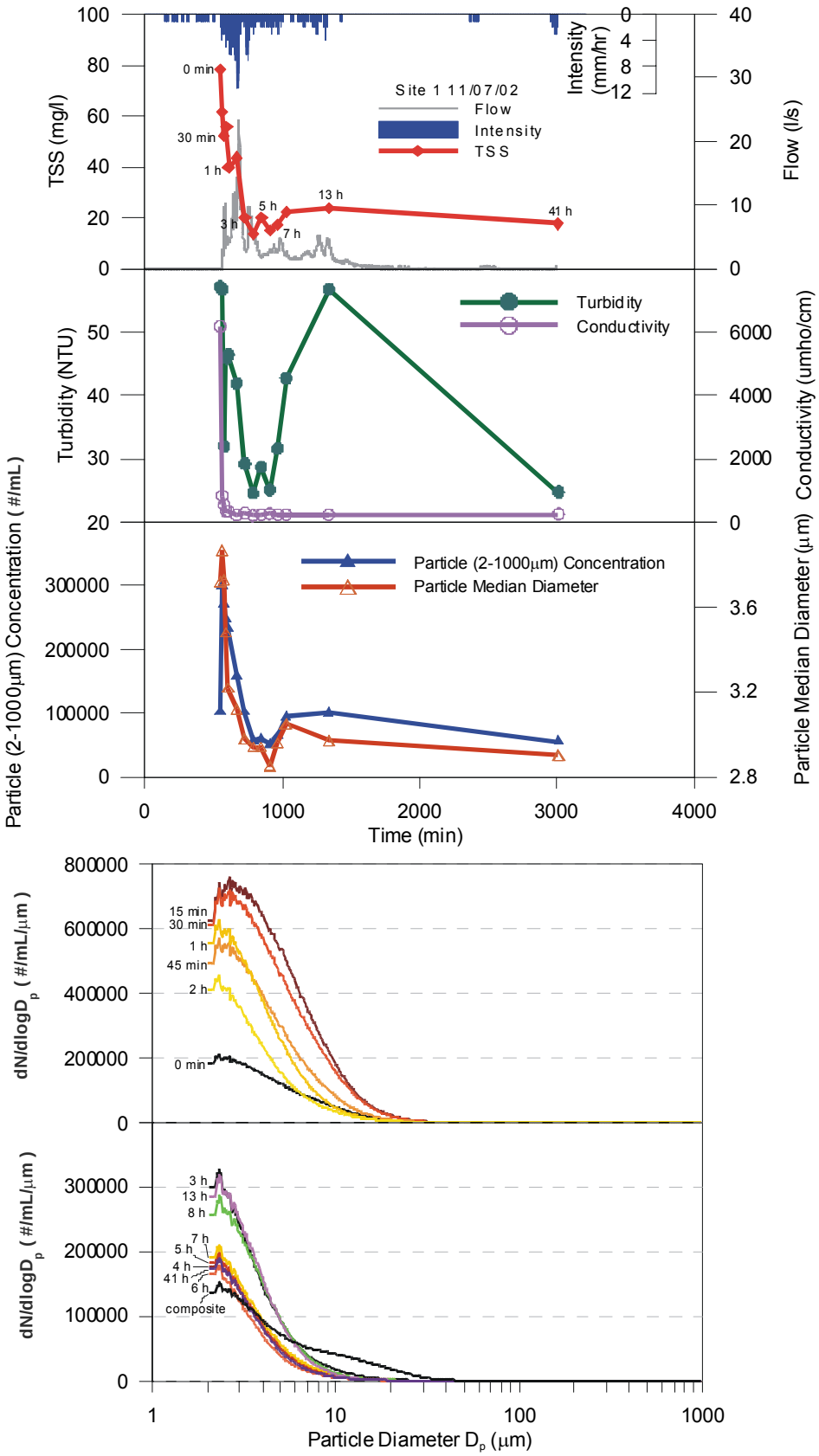

Figure 4.7 Pollutograph and particle size distribution for Site 7-201, even 11/07/02

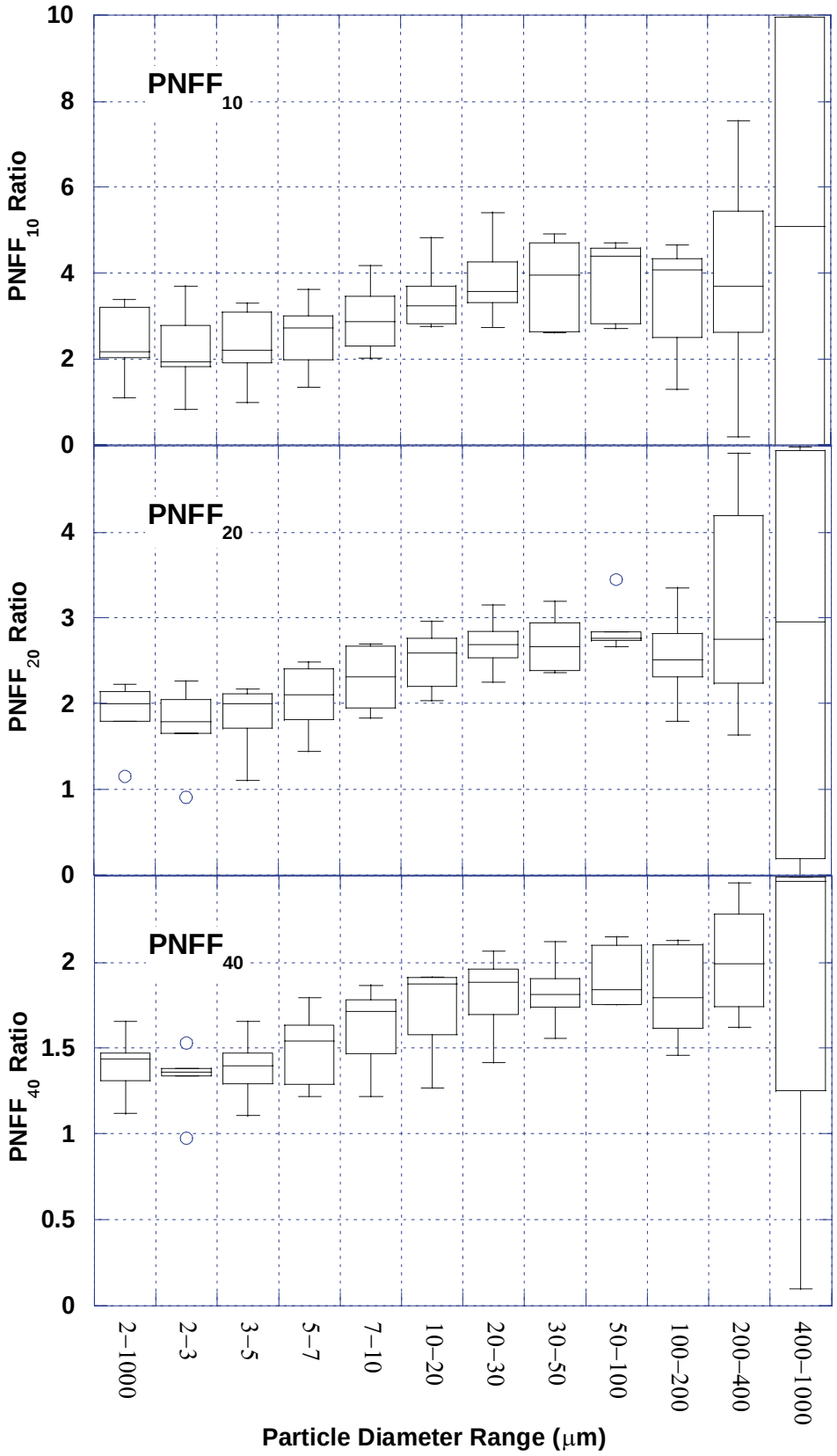

Figure 4.8 Particle number first flush ratio

4.5 Seasonal First Flush

The same method of quantifying an event first flush can be applied to seasonal first flush. Most parts of California have wet and dry seasons, often characterized as a Mediterranean climate. Figure 2.5 showed the rainfall season for Southern California as November to March, with most rain occurring in January and February. Figure 4.9 shows the average California rainfall patterns in Los Angeles and Sacramento and compares them to two locations in New England (Connecticut).

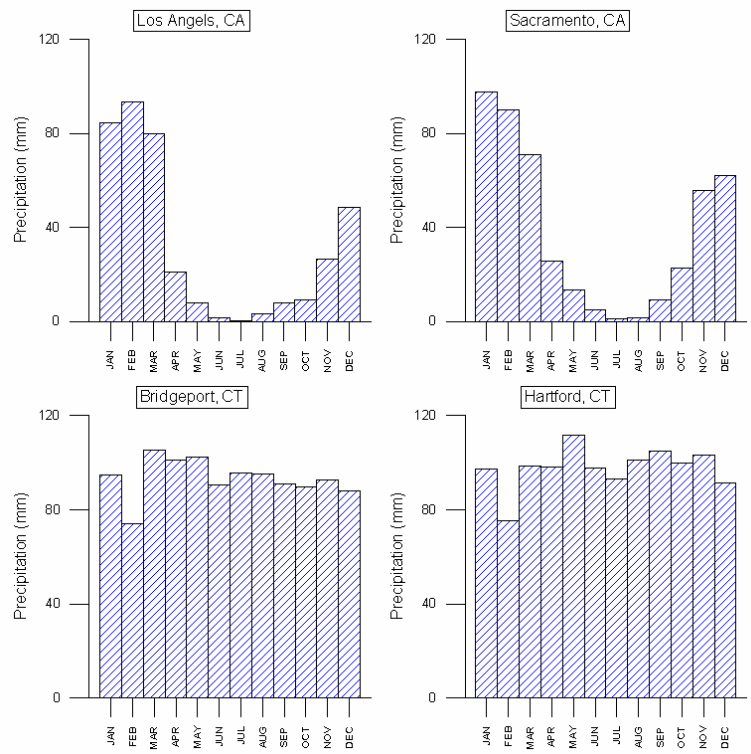

Figure 4.9 Monthly average Rainfall in Los Angeles, Sacramento, Bridgeport, and Hartford during 1971-2000

The long periods of dry weather in California, essentially from April to October, provide a long period for pollutant build up. The existence of the long dry period should be viewed as an opportunity as opposed to a problem. For example, the Department has already taken advantage of the seasonal rainfall by scheduling its insert cleaning in the late summer or early autumn. This should be viewed as an opportunity because the Department, in a single cleaning, can collect approximately 6 months of accumulated debris and litter. In a more common rainfall environment, monthly cleanings would be required to collect 6 months of accumulation, and even then, debris would be discharged with the frequent rains.

To examine the magnitude of the seasonal first flush and its impact on BMP design, several datasets were examined to determine the differences in runoff of the first storm of the season

or early storms of the season and later storms (see Table 4.4). It was necessary to enlarge our study because the required analysis must pool each season's rainfall events into a single observation. Therefore, even though the first flush data collected in this study are, to the authors knowledge, the most extensive highway runoff dataset in existence, still more data were needed. The first flush data were combined with the data from the Department's statewide monitoring program, as well as two other datasets collected in or near Los Angeles County. The other datasets had, in so far as possible, similar landuses to transportation landuse. The Industrial General Permit dataset covered some transportation landuse, but many landuses were similar to the Department's maintenance facilities and parking areas.

Table 4.4 Summary of datasets used for seasonal first flush evaluation

Name of Monitoring Program	Sponsoring or Managing Agency	Monitoring year	Monitoring Area	Primary Land Use	No. observations
Industrial Activities General Permit	Los Angeles Regional Water Quality Control Board, (LARWQCB)	from 1992 to 2003	County of Los Angeles	Industrial	~ 6500 events from many sites over two years
Land Use Monitoring	Los Angeles County Department of Public Works (LACDPW)	from 1996 to 2001	near LAX	Transportation	24 events from 1 site over three years
First Flush Highway Runoff Characterization [a]	California Department of Transportation (Department)	from 1999 to 2003	IS 405 and US 101 freeway near UCLA (3 sites)	Transportation (Highway)	71 events from 3 sites over three years
Statewide Highway Runoff Monitoring [b]	California Department of Transportation (Department)	from 1997 to 2003	California (statewide)	Transportation (Highway)	237 events from 25 sites over three years

[a] Performed by the Civil & Environmental Engineering Department, University of California, Los Angeles.
[b] Part of the Department's state-wide stormwater runoff monitoring program, Department (2003).
[C] Transportation includes surface roads, while highway includes only freeways.

In order to compare different seasons and different sites and monitoring programs, a common parameter to reflect the point in the rainy season was needed. Ideally, the runoff of each site could be used, and added to produce an accumulated runoff for the entire season. Unfortunately, such runoff data was rarely available, and even the Department's statewide monitoring program does not have such data (not all storms were sampled, and in some cases, the actual runoff data is too voluminous to be reported). For other studies such as the Industrial Activities General Permit, runoff is not required and is not usually measured (Stenstrom and Lee, 2005).

To create a common parameter for all datasets, rainfall was used. Rainfall data were collected from the nearest gauge and added to produce an accumulated rainfall. For some datasets it was difficult to locate the correct rain gages. For the Department's datasets, this was much easier since rainfall was usually measured at the monitoring station. The accumulated rainfall

was then normalized, so that all years would produce a scale from 0 to 1.0. Next, the concentrations of the pollutants of interest were plotted as a function of accumulated rainfall.

Figure 4.10 shows four graphs of various pollutants for selected years of data from this study. The rainfall of each storm is plotted along the top, as well as the ADD. Because the rainfall is cumulative, it is not possible to determine the time between rainfall events from the horizontal axis. The horizontal axis is frequently used for time in stormwater studies, and it natural to assume that the horizontal axis is linear in time. The cumulative rainfall is the appropriate parameter to plot for this analysis, since the rainfall washes out the pollutants. The rainfall is not a linear function of time. The opportunity for pollutants to accumulate between rainfall events is quantified by ADD.

It is clear from the graph that the first storms of the season have higher concentrations. In some cases the first storm was small which biased the concentration, but in general, with very few exceptions, and declining trend in concentrations is observed for almost every parameter. The appendices to this report include a copy of the technical memorandum devoted to the topic, and can be consulted for more information on individual events or datasets.

The MFF ratios can be applied to those datasets with runoff volume. Both of the Department's datasets can be analyzed in this way. Figure 4.11 shows the load graph for four metals, TSS and COD for the first flush study. Each point represents a storm in each season. The MFF ratio is equal to the Y coordinated divided by the X coordinate. Values above the diagonal indicated a seasonal first flush. The vast majority of the points are above the diagonal, with points for copper being commonly found in the upper part of the figure. The majority of the points for lead are below the diagonal line.

Figure 4.12 shows a similar analysis for the data from the Department's statewide sampling program. Virtually all the metals show a seasonal first flush.

As stated before, the existence of a seasonal first flush provides an opportunity. The first storms of the season carry a higher mass load of pollutants; therefore developing BMPs that treat all of the first storms will be a better strategy than trying to treat a fraction of all storms throughout the season. An example might be infiltration basins that dry out over the summer, which allows them to capture and retain the first few storms of the wet season.

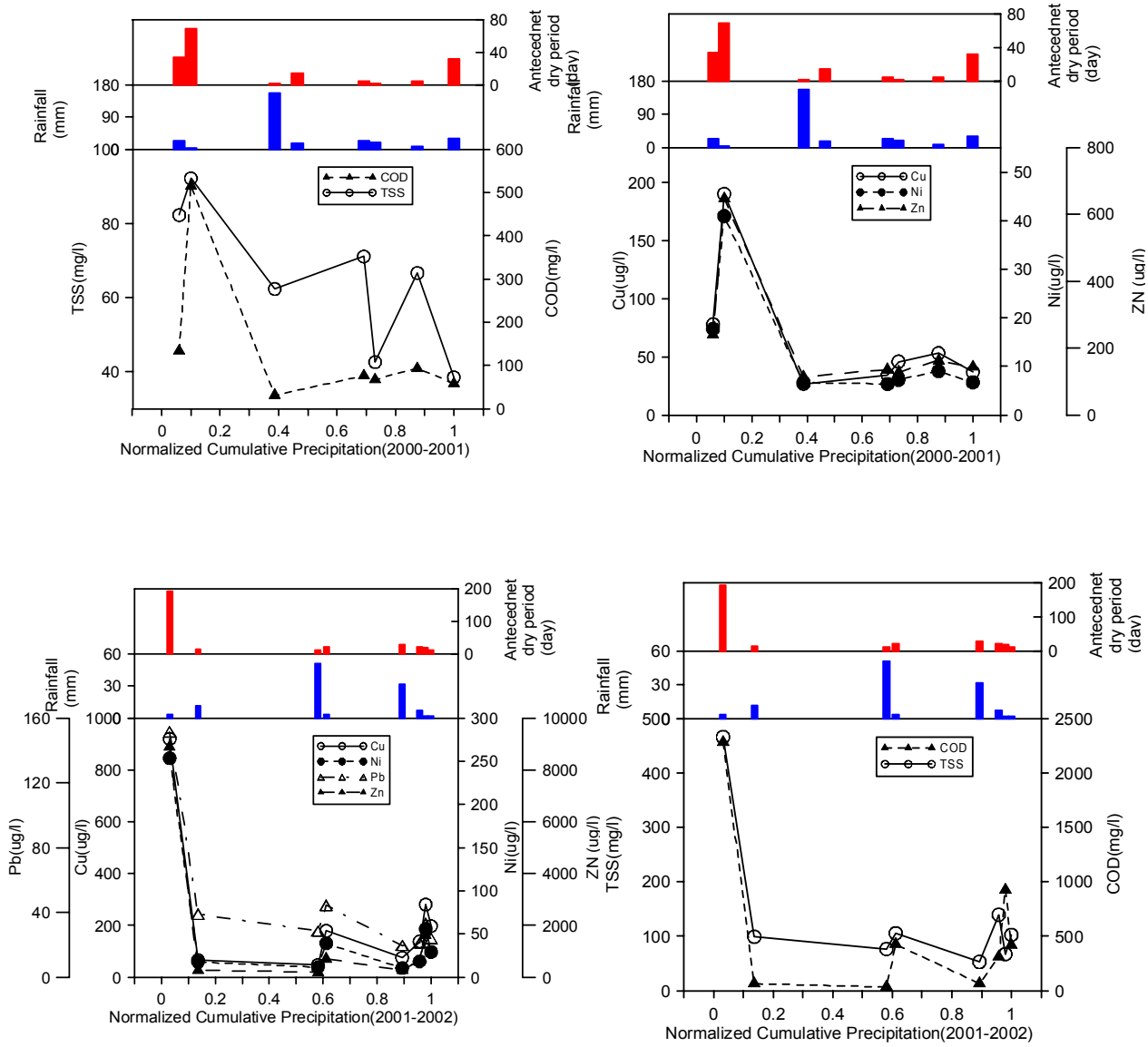

Figure 4.10 Concentrations of various pollutants versus normalized cumulative rainfall for selected monitoring events for the first flush highway runoff dataset

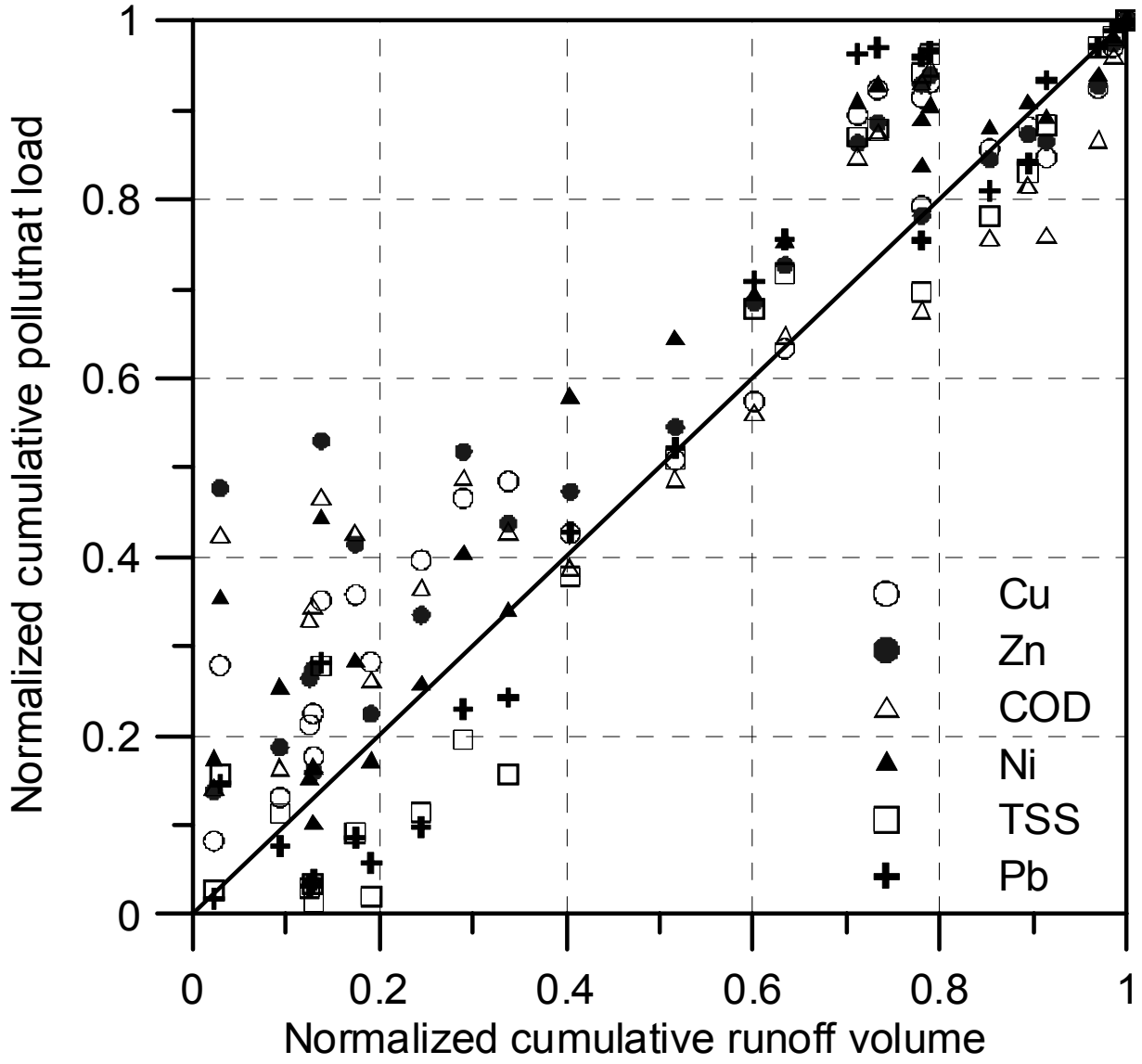

Figure 4.11 Load graphs of four metals, TSS and COD for the first flush study sites

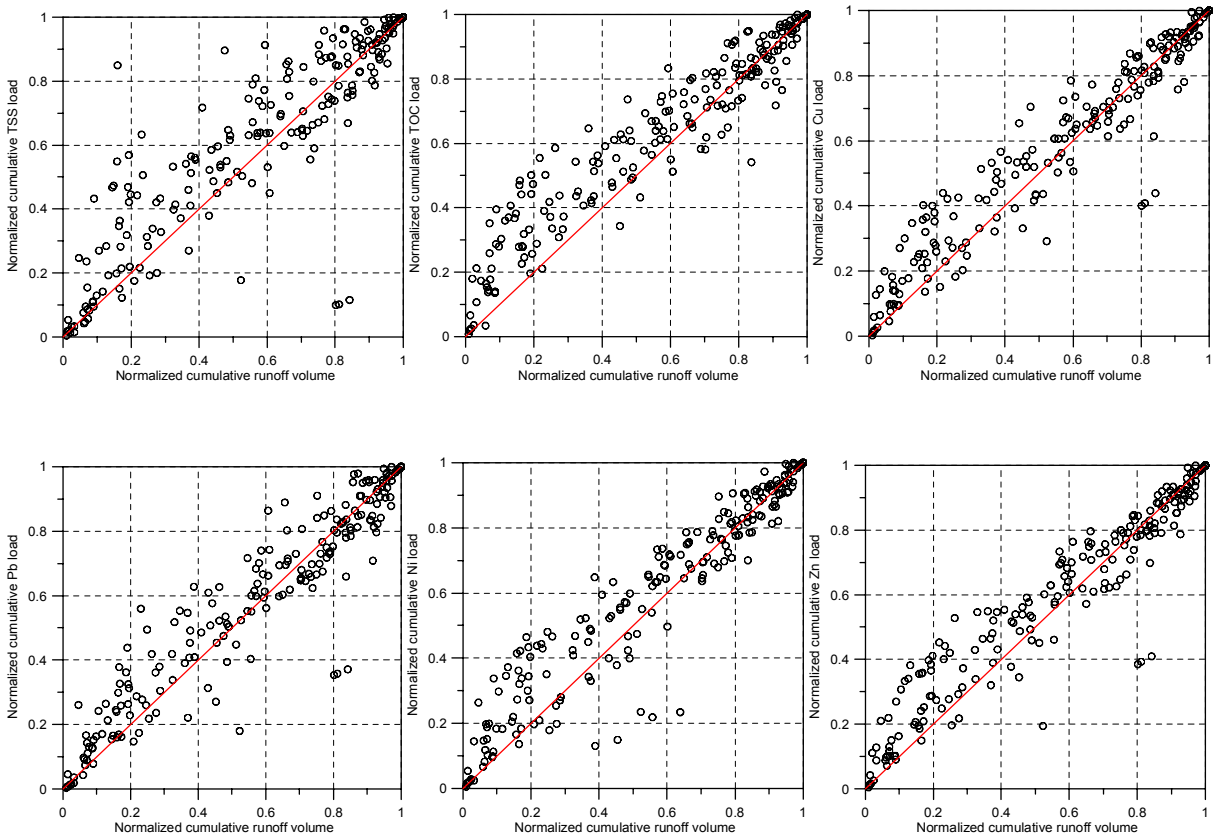

Figure 4.12 Load graphs for metals for the Department's statewide monitoring program sites

5. TOPICS RELATED TO FIRST FLUSH

5.1 Treatment Strategies with Respect to First Flush Pollutant Load

The MFF ratios plotted and tabulated in the figures and appendices can be very useful to the Department in estimating potential removals of BMPs. Since it will not be possible to design and construct BMPs that can treat all of the runoff from all sites for all storms, there must be a probabilistic goal for treatment.

The Los Angeles Regional Water Quality Control Board's example is useful for demonstration. The Board adopted a regulation that requires all new developments to capture or treat the runoff from first 25 mm (1 inch) of rainfall. This rainfall corresponds to a 60% storm for the monitored sites, as shown in Figure 2.6. For storms larger than 60%, some portion of the flow must be bypassed. For very large storms, perhaps only 30 or 40% of the flow can be treated. If only 30% of the flow is treated, the BMP, because of the first flush, has an opportunity to remove not just 30% of the pollutants, but 30% times the MFF_{30} ratio of the pollutants. Using COD as an example, the MFF_{30} is approximately 1.6, and a BMP that treats 30% of the flow would in fact treat 48% of the COD mass.

MFFs can be used to better define the potential removal of BMPs that are "first flush friendly." This term is coined to describe a BMP that treats the first runoff and bypasses later runoff, without washing out the material retained from the earlier part of the storm. Detention basins are one example of a BMP that can be operated in first flush friendly mode. BMPs operated as first-flush friendly may be 2 to 4 times as effective as other BMPs when only a portion of the runoff volume can be treated. Other, more detailed examples of this advantage will be presented later.

Using the MFF ratios provided through this study, the Department can revise upwards its predictions for BMP removal rates, based upon the expected volumes to be treated. For small storms that are completely captured by BMPs, the removals will not change, but for larger storms, which are the most expensive to manage, the mass removals will be greater.

In order to estimate the potential benefits of treating early runoff as compared to runoff later in the season, we defined an effectiveness factor as a function of cumulative runoff volume. In the expected situation of having limited funding for BMP construction, applying BMPs to runoff with higher pollutant concentrations will generally be more beneficial. Also there is growing evidence that suggests that BMPs removal efficiencies are higher in runoff with higher concentrations (Strecker et al., 2001; Lau and Stenstrom, 2002).

The effectiveness factor at a specific cumulative runoff volume is calculated as follows:

$$E(V) = \frac{(Mv / v)}{(1 - Mv)/(1 - v)} \tag{5.1}$$

where *E(V)* is the effectiveness factor at a specific cumulative runoff volume *V*, and *Mv* is the normalized cumulative mass at a specific normalized cumulative runoff volume, *v*.

The effectiveness factor has the same utility as the MFF ratio. Values close to 1 are obtained if there is no first flush. Higher values are observed with greater first flush.

Figure 5.1 shows the effectiveness factor calculated for TSS, TOC and four metals for the Department's state wide monitoring program results. The factor was calculated at 10 runoff volume intervals. The dashed line at 1.0 shows the expected value of the effectiveness factor for constant pollutant concentrations or no first flush. The data are plotted as box plots (no confidence intervals).

It is readily apparent that treating the early runoff in the season is several times more effective than treating the later runoff. The results suggest that the Department's efforts to implement BMPs should address the early storms as effectively and completely as possible. Such a strategy will maximize the benefits of the applied BMPs.

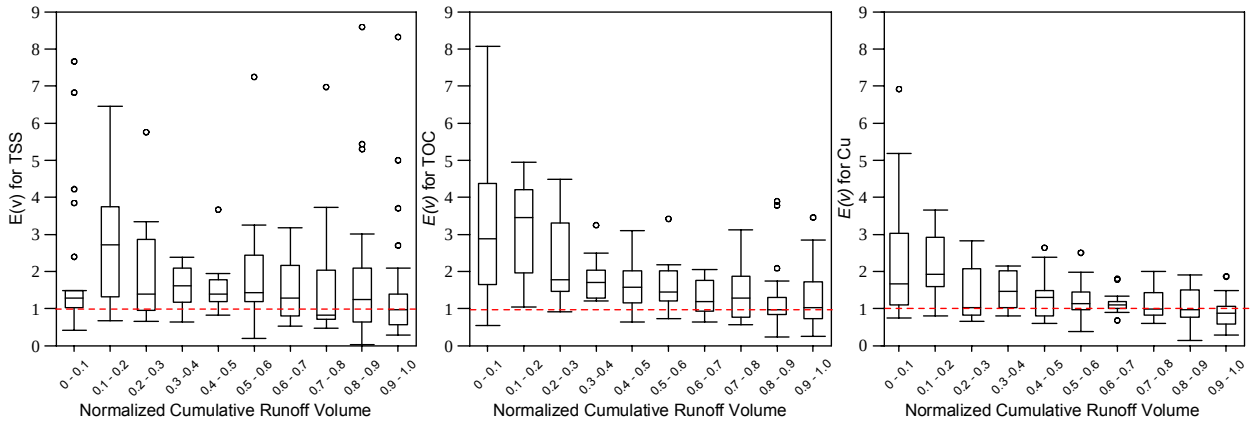

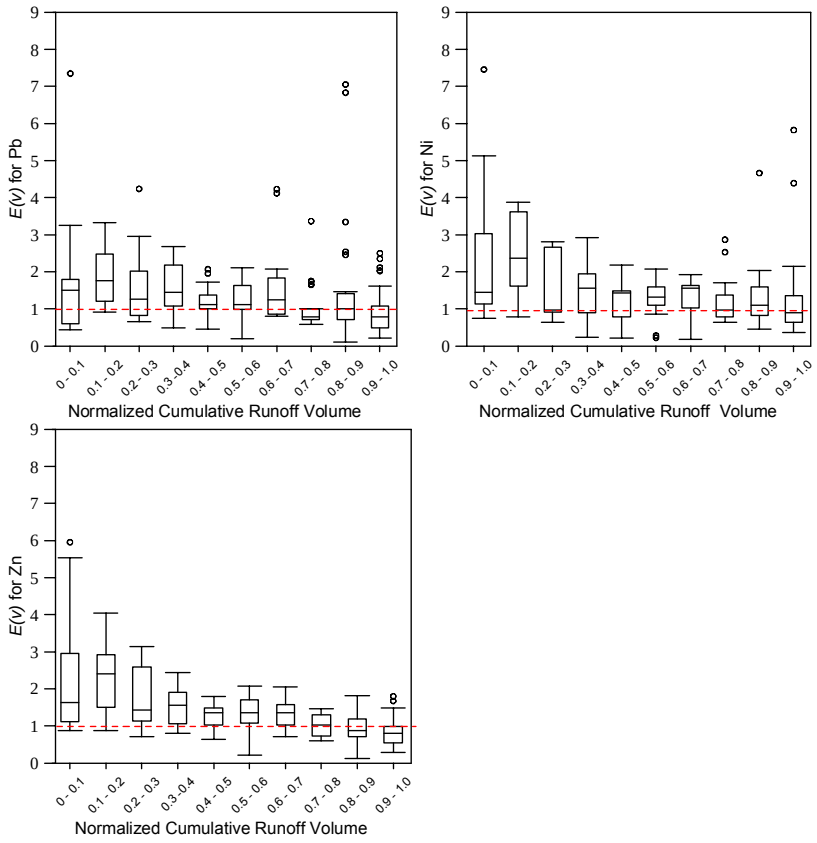

Figure 5.1 Effectiveness factor calculated for ten volume intervals for data from the Department's statewide monitoring program

5.2 A New Methodology to Monitor Oil and Grease

Monitoring for O&G presents special problems because automated samples are not recommended for O&G samples collection (American Public Health Association 1998). Carry over from one sample to the next is caused by oil and grease retention in the sampler tubing. Automated samplers are also avoided when measuring toxicity, due to the introduction of artifactual toxicity from tubing, pumps and containers. Otherwise, automated samplers generally work well, can be left unattended and can be triggered automatically to insure that the very beginning of runoff is sampled. The sampler is programmed to collect many small samples over the entire storm event to insure representativeness.

It is difficult to measure the EMC of O&G in stormwater because a series of grab samples must be collected. If ten samples are collected, the analytical costs are ten times greater and the additional sampling labor maybe even more expensive. Also, the first part of a storm event maybe missed by the sampling team, since the rains will occur at an inconvenient times and the sampling team may have a great distance to cover.

To avoid the complexity and cost of collecting a series of grab samples, a single grab sample is often substituted for the composite sample or the series of grab samples. This strategy reduces the cost, but potentially creates bias due to the timing of the grab sample.

O&G usually exhibits a first flush and Table 4.1 showed that the MFF ratios for O&G were among the highest. Earlier publications document some of the findings on O&G first flush (Lau et al. 2002; Ma et al. 2002). Therefore, a sample collected early in the runoff event will have higher concentration than a sample collected later in the storm event. The critical question is when to collect the grab sample so that it most closely approximates the EMC.

The first flush dataset presented a unique opportunity to develop a methodology for predicting the best time for collecting a grab sample. The existence or more than 60 storm events monitored with 12 grab samples each was used to answer the question of when to sample. Also, correlations were investigated to determine if other parameters might be more useful in estimating the EMC.

Figure 5.2 shows the concept of best time to sample. The O&G concentration declines from a high value at the beginning of the storm to a low value at the end of the storm. This was typically observed in our samples. It is readily apparent from this graph that a sample collected early in the storm overestimates the EMC and a sample collected later in the storm underestimates the EMC. For this event, the idea time to collect a sample is at 133 minutes. Unfortunately there is no way for the sampling team to know this, and if they were to take multiple grabs to determine the best time, it would defeat the purpose of knowing the best time.

To estimate the best time, oil and grease samples from the first three years of the study were analyzed. A Matlab program was written to “read” the pollutographs and calculate the best time. The same program was also written to interpolate between data points on the pollutographs, so sampling times could be simulated. In this way the Matlab program could

tabulate the best time for all pollutographs, as well as indicating the O&G concentration that would have been measured if a specific sampling time had been used.

The Matlab program could then be used to calculate the answer to the question "What if all storms had been sampled at 30 minutes" or similar questions. Using this program, a range of sampling strategies was evaluated. The first strategy simulated was random sampling. A random time was selected for sampling each storm and the results were tabulated. Next, fixed times were used, such as 15 minutes into the storm, 1 hour, etc., or at the end of the storm. Next, averages and regressions were used. For example, regressions were performed between storm characteristics and the best times to sample. In some cases, the storm parameters are not known before the storm, which means that weather predictions would have to be used, further complicating the samplers' job.

Finally, correlations with other parameters were investigated. Both dissolved organic carbon and COD measure the O&G. They also include organic compounds or oxygen demanding compounds that are not O&G. Correlations were made to determine if consistent ratios among the parameters exist.

Table 5.1 shows the results of all strategies. The left most column describes the sampling strategy. The next column shows the number of storms that was included in the analysis. The next three columns show the goodness of fit in different ways. For regression, the R^2 are shown and for other cases the root mean square errors (RMS, equal to the square root of the sum of squares divided by the number of observations) are shown. Finally, the last column shows the bias. The bias is the average difference between the observed EMC and the predicted EMC from the sampling strategy. The observed EMC is the EMC calculated from the series of 8 to 12 grab samples.

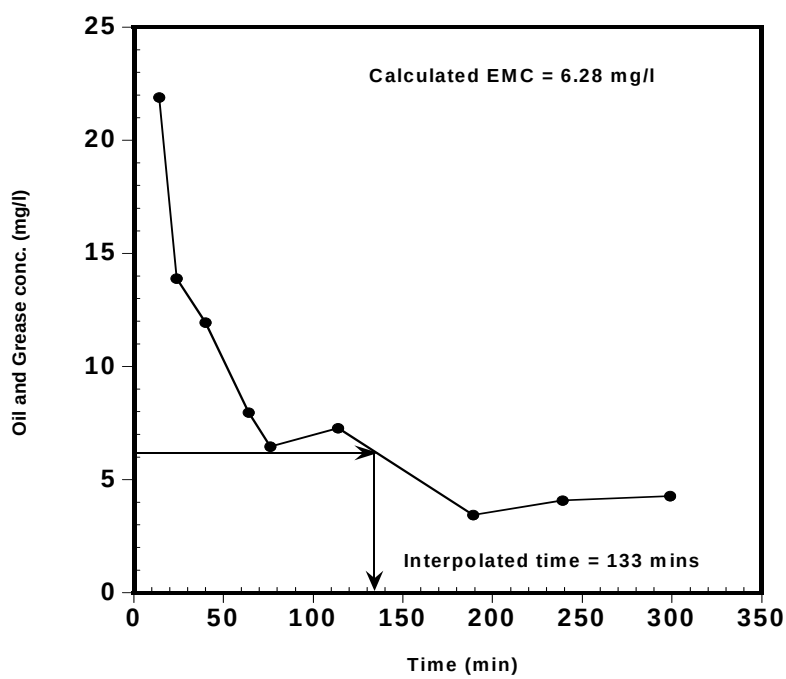

Figure 5.2 Illustration of the best time to collect a grab sample to approximate the EMC

Table 5.1 Results of best sampling time simulations and regressions

Sampling strategy or regression method	No. of Obs.	R^2	RMS Error (mg/L)	Bias (mg/L)
Random grab sampling time	22	0.54	9.40	1.15
Strategy 1: Timed sample strategies after beginning of runoff				
0.25 hr	22		32.4	23.8
1 hr	22		3.47	1.39
2 hr	22		3.91	-2.07
3 hr	18		3.92	-2.54
4 hr	15		3.59	-0.88
5 hr	14		3.13	-1.21
6 hr	9		2.19	-1.38
Storm end	22		3.52	-1.96
Strategy 2: Best sampling time from event and site variables				
Post storm measured parameters				
Total rainfall	22	0.96	1.99	-0.27
Duration of runoff	22	0.92	2.64	-0.22
Total rainfall and duration of runoff	22	0.96	1.96	-0.26
Total rainfall, duration of runoff, and ADD	22	0.97	2.72	0.73
Predicted parameters				
Total rainfall	22	0.89	2.98	0.39
Duration of runoff	22	0.95	2.22	-0.40
Total rainfall and duration of runoff	22	0.88	3.19	0.37
Total rainfall, duration of runoff, and ADD	22	0.92	3.46	1.18
Strategy 3: *EMC* of O&G from site and event variables				
ADD	22	0.82	3.84	-0.01
ADD and total rainfall	22	0.83	3.79	0.00
Logarithm of ADD and total rainfall	22	0.84	3.60	-0.42
Strategy 4: Correlation to composite COD or DOC measurement				
COD Eq. (13)	22	0.90	2.90	0.07
DOC Eq. (14)	22	0.90	2.84	0.01

The first strategy is random timing, which is probably the most common current strategy. The sampling team travels to the site and collects the grab sample when they are able. This strategy had an RMS error of 9.4 mg/L and on average was 1.15 mg/L higher than the EMC. The timed strategies produced the expected results. Samples collected in the first 15 minutes were much higher than the EMC, on average being 23.8 mg/L higher than the EMC. If the storm is sampled after 1 to 4 hours, the grab sample is pretty good and the bias ranges from -1.39 to 2.45 mg/L. Sampling at the end of the storm is also biased on the negative side.

The second set of strategies shows the results of the regression methods. The time to sample in these methods was based upon regressions of the storm parameters. The first group used the post storm parameters, and it is not realistic because they are not known until after the storm. The second group used simulated weather predictions, which provided estimates that

were +/- 50% of the actual values. This group of simulations provided results with RMS errors of 2 to 3.5 mg/L, and the bias was nearly zero, which is expected from a regression.

The third group used ADD and total rainfall for predicting the oil and grease concentration. This strategy used no sample for O&G, just a regression from the ADD and./or the total rainfall. The RMS error for this method was only slightly larger than the error associated with strategies that used a sample.

The final group used a simple correlation with COD or DOC. This is the method of choice and provides an accurate answer with the least sampling effort. If COD and DOC are being measured it is a simple matter to estimate the O&G EMC from the COD or DOC EMC. The value of R^2 is nearly as high as the other methods, and no O&G sample is required.

$$O\&G_{EMC} = 3.705 + 0.037 \times COD_{EMC} \qquad R^2 = 0.90 \qquad (5.2)$$

$$O\&G_{EMC} = 0.15 + 0.28 \times DOC_{EMC} \qquad R^2 = 0.90 \qquad (5.3)$$

These results have important consequences for the Department. It is recommended that the Department end O&G sampling, and correlate O&G to either COD or DOC. This change may require regulatory approval, but the analysis provides powerful support for its approval.

A word of caution is needed. The reason the correlation of O&G to COD or DOC works well is the nature of the stormwater. The organics in highway runoff are mostly compounds that are classified as O&G. For other stormwaters or wastewaters, the correlation may be poor, since the organics in the waters may be carbohydrates or proteins, which do not extract into the organic phase during O&G analysis. A general discussion and review of O&G is helpful in understanding the makeup of O&G (Stenstrom, et al, 1986). The appendices of this report contain the full text of the technical memorandum on this topic.

5.3 Sampling Issue: Composite Samples versus Grab Samples

In order to evaluate different sampling strategies, it is necessary to simulate many events and to add stochastic component (noise) to make the simulation realistic. A COD regression model was used top perform this simulation, as follows:

$$E(\log COD \mid \mathbf{x}) = 6.08 - 0.60 \log CumRs + 0.40 \log AtDry - 0.16 \log AtRs \qquad (5.4)$$

where,

COD = chemical oxygen demand concentration (mg/L),
CumRs = cumulative rainfall, corresponding to grab sample collection time, (0.01 inch increments),
AtDry = antecedent dry period before monitored events, days and
AtRs = previous event's precipitation before the monitored event, (0.01 inch increments)

Figure 5.3 shows the model's fitted values vs. the observations. The COD model can be used to predict any number of concentrations for a given hydrograph. In this way, collecting any

number of grab samples can be simulated. A random component is added (white noise) which has mean zero and a variance equal to the variance in the original data. A special simulation will use equation (4.4) to generate COD concentrations at one-minute intervals. This special simulation will be used as the benchmark in simulation tasks and is the shortest possible sampling frequency, since the rainfall and flow data are collected at one-minute intervals. The EMC is then calculated using equation 3, where the weights are the discharge rates.

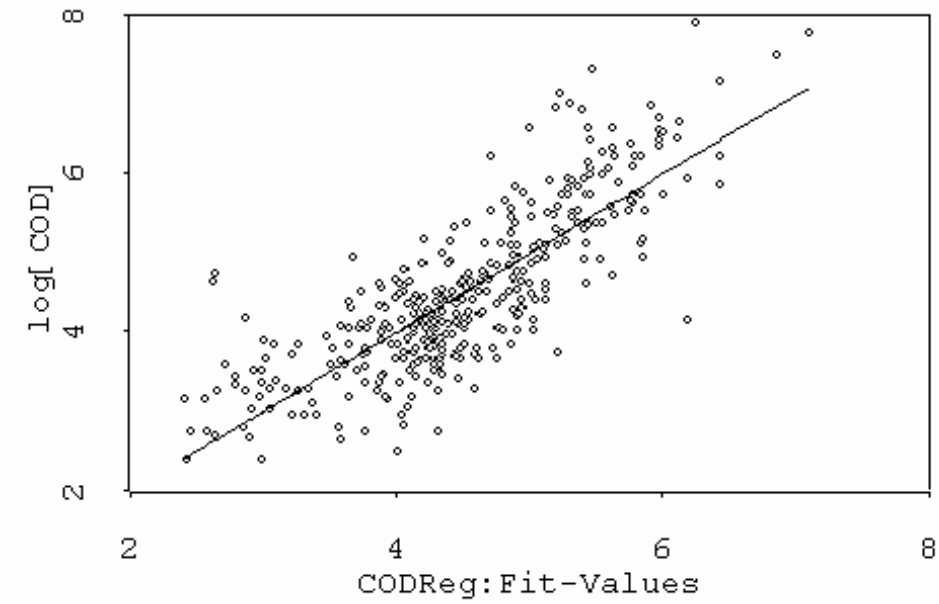

Figure 5.3 Regression's fitted values vs. observation

In order to illustrate this one-minute simulation, one real event is used for demonstration. Figure 5.4 shows the original and the smoothed event hydrographs. The smoothed hydrograph will be used in simulation to correct fluctuations in original data. Figure 5.5 shows the histogram of 1000 simulated EMCs. The original sample mean is 116.36 (mg/L), and the mean of the simulations is 116.25 (mg/L).

To compare other sampling strategies, simulations were performed using different numbers and different strategies for collecting samples during typical storm events (e.g., random, equally spaced in time, equal volume, etc.). A total of 35 different rainfall patterns, corresponding to actual observed patterns in our monitoring program, were used. Table 5.2 summaries the events. Each type of simulation will generate a distribution of EMCs after multiple runs. Simulations that use more samples will produce EMCs that are closer to the original sample EMC. The value of differing numbers of samples as well as the strategy can be compared.

Five types of sampling strategies were evaluated. Type 1 used random timing of the samples. The simulation assumes a sample set with specified size (*n*) that is randomly collected from all possible time elements during each tested event. It is a random permutation of size *n* for a

sequence. Theoretically, this is the most general case for a sample set with fixed size. The influence of sample size on EMC results is evaluated simulating 10, 20, 40, 60, and 100 samples per event. Type 2 used equal-time sampling. To avoid the extreme result of a sample sequence, each selected sample sequence was randomly shifted forward or backward in a range (10 minutes). Type 3 used equal-rainfall interval sampling by simulating the sample collection at equal intervals of rainfall depths. Type 4 used equal discharge-volume sampling. No weighting noise was assumed in this task (i.e., the weightings are perfectly known, without measurement error). Type 5 was similar to Type 4, except that random noise was applied to the weighting factors (i.e., the discharged volumes cannot be perfectly measured).

Table 5.2 Hydrologic characteristics for 35 monitored events

Hydrologic Property	Average	StdDev	Minimum	Median	Maximum
Total Rainfall (in)	1.17	1.54	0.08	0.67	6.14
Max Rain Intensity (in/hr)	0.31	0.33	0.02	0.19	1.28
Discharge Volume (gal)	75022	99293	1799.5	36808	374217
Max Discharge Rate (gpm)	340	304	17	258	1465
Rain Duration (min)	660.5	512.7	93	610	2376

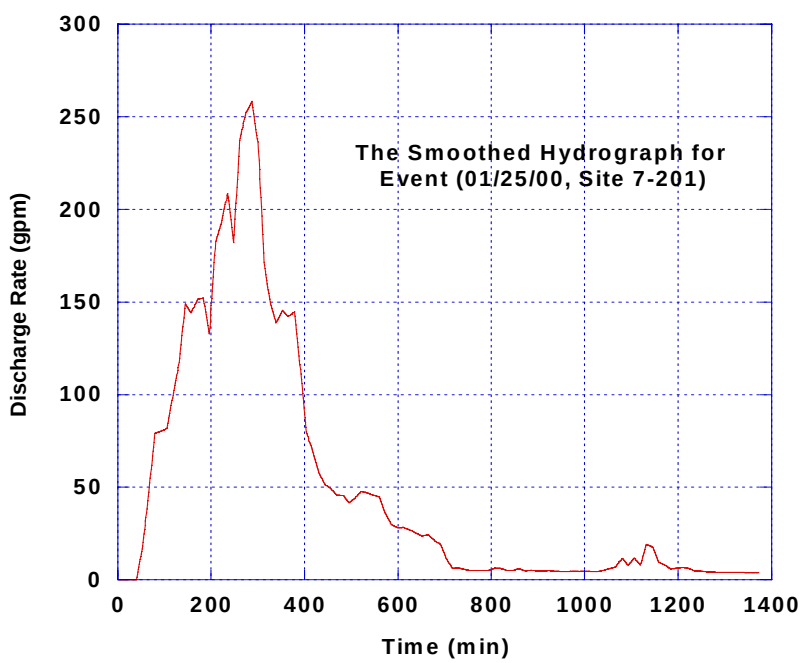

Figure 5.4 Smoothed hydrographs (event recorded on 01/25/00, Site 7-201)

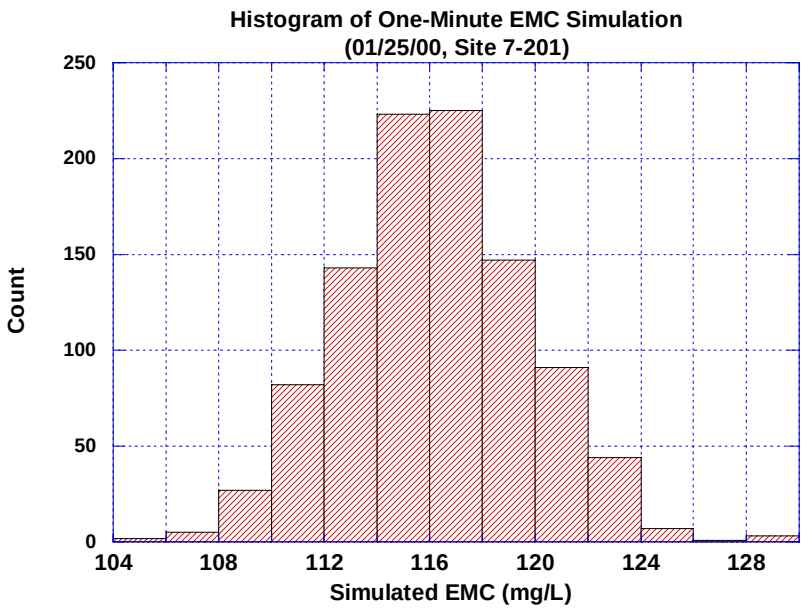

Figure 5.5 Sampling distribution for one-minute EMC simulation
(event recorded on 01/25/00, Site 7-201

The results of the various simulations for different types of sampling strategies are presented in a series of figures. The figures show the distribution of simulated EMCs for each number of samples. Figure 5.6 (top) is a box plot and shows the results for Type 1. The worst error percentage can be up to 80% for n = 10. The average error percentages for n = 10, 20, 40, 60, and 100, are 47.0%, 30.2%, 19.5%, 15.3%, and 11.6% respectively. The medians of errors are slightly lower than the averages. The corresponding standard deviations are 13.9%, 7.2%, 4.1%, 2.9% and 2.2%. Type 1 is a benchmark on the influence of sample size for estimating EMCs, and is the most general sampling strategy.

Figure 5.6 (middle) shows the sample distributions Type 2. Only one outlier was found for each n. The worst case is for n = 10 with error of approximately 66%, which is much improved over Type 1. The average error percentages for n = 10, 20, 40, 60, and 100, are 37.2%, 21.7%, 15.2%, 12.4%, and 9.2% respectively. The medians of errors are generally the same as the averages. The corresponding standard deviations are 11.1%, 4.4%, 2.7%, 2.8% and 1.7%. These statistics show an improvement over random sampling.

Figure 5.6 (bottom) shows the sample distributions from Type 3. Although several outliers were found for n = 10, the worst case is approximately 30%, which is much improved over Type 2. The average error percentages for n = 10, 20, 40, 60, and 100, are 23.9%, 17.5%,

13.5%, 11.9%, and 10.5% respectively. The medians of errors are generally the same as the averages. The corresponding standard deviations are 2.2%, 2.2%, 2.6%, 3.2% and 3.7%, a large improvement over time sampling.

Figure 5.7 (top) shows the sample distributions from Type 4. It is obvious on plot that this is the best result from the aspect of outliers, averages, or variances. The average error percentages for n = 10, 20, 40, 60, and 100, are 23%, 16.6%, 12.0%, 9.7%, and 7.5% respectively. The medians are generally the same as the averages. The corresponding standard deviations are 2.5%, 1.6%, 1.2%, 1.0% and 0.7%. Figure 5.7 (bottom) shows the sample distributions for Type 5. This is the same strategy as Type 4, except that the weights are not perfectly measured. The average error percentages for n = 10, 20, 40, 60, and 100, are 23.5%, 17.1%, 12.3%, 10.1%, and 7.8% respectively. The corresponding standard deviations are 2.1%, 1.6%, 1.3%, 0.9% and 0.8%. The effect of imperfect weights is not very large.

This analysis has shown that a flow weighted composite sample can be viewed as a series of grab samples summed with weights that reflect the flow. To evaluate the error of using a limited number of grab samples and the strategy for collecting the samples, a series of simulations was performed using a COD correlation, random noise and hydrographs from 35 different storm events.

The results show that a series of 10 grab samples provides a relatively poor estimate of the EMC, with median errors of 40% for randomly timed samples to 23% for samples collected at equal flow volumes. If the number of grab samples increases to 20, the error is reduced to 30% for randomly timed samples to 16% for samples collected at equal flow volumes. Even if 100 samples are collected, the error is still nearly twice as large as the minimum possible error, when samples are collected each minute.

The best strategy is to collect the grab samples at equal flow volume intervals. Equal rainfall interval is the second choice, with equal timing and random timing being less desirable strategies.

The results show that automatic flow weighted composite samples, which can be programmed to collect several hundred samples per storm, are far superior to a series of grab samples, even if 100 grab samples are used. If automatic composite samplers can be used without chemical or physical biases (e.g., such as the concerns of sample carry-over when sampling for oil and grease, or the introduction of artifactual toxicity), they are always preferred.

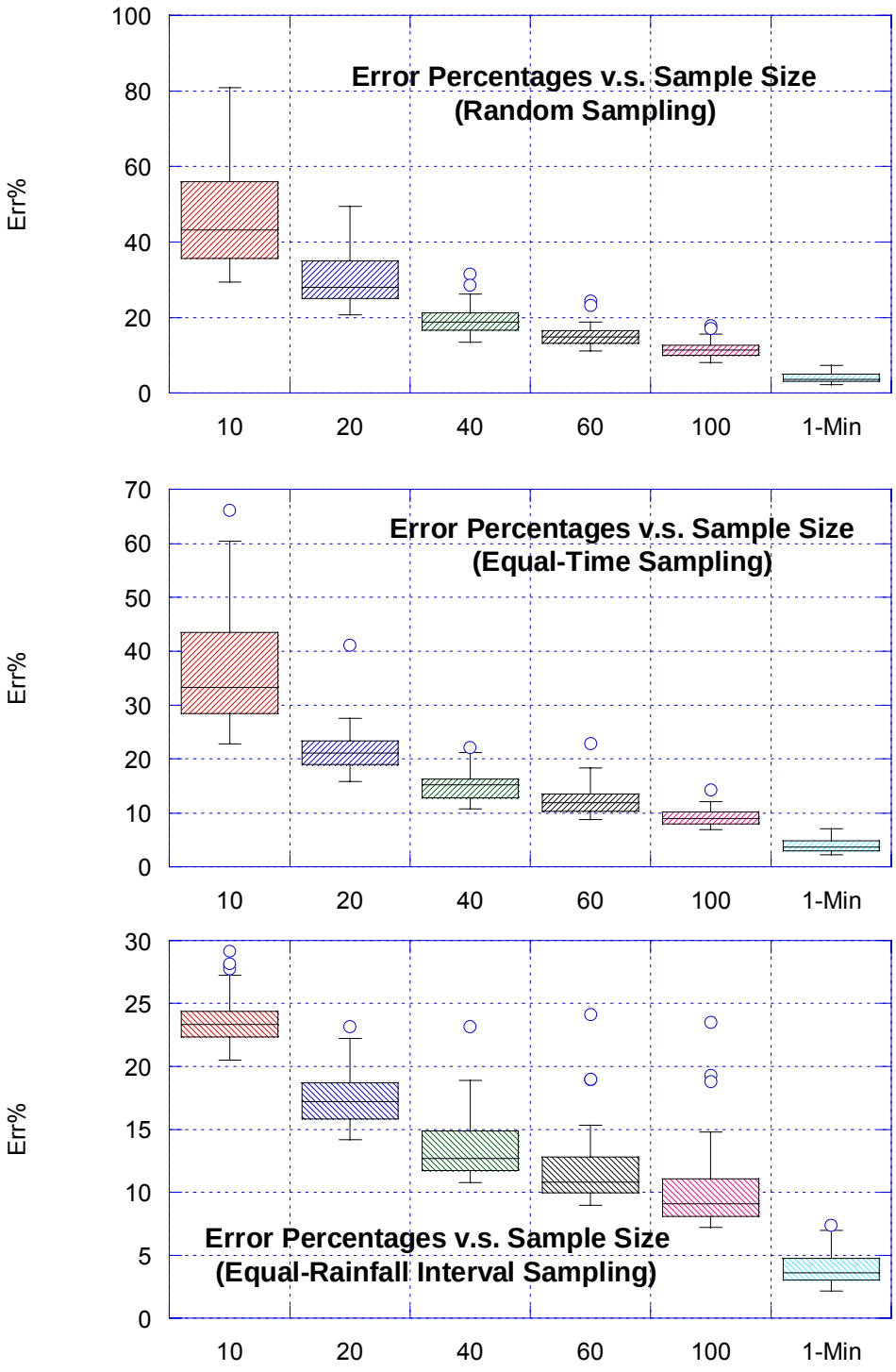

Figure 5.6 Sampling distributions for random time (top), equal time (middle) and equal rainfall interval (bottom) (with n = 10, 20, 40, 60, and 100) plus one-minute simulation

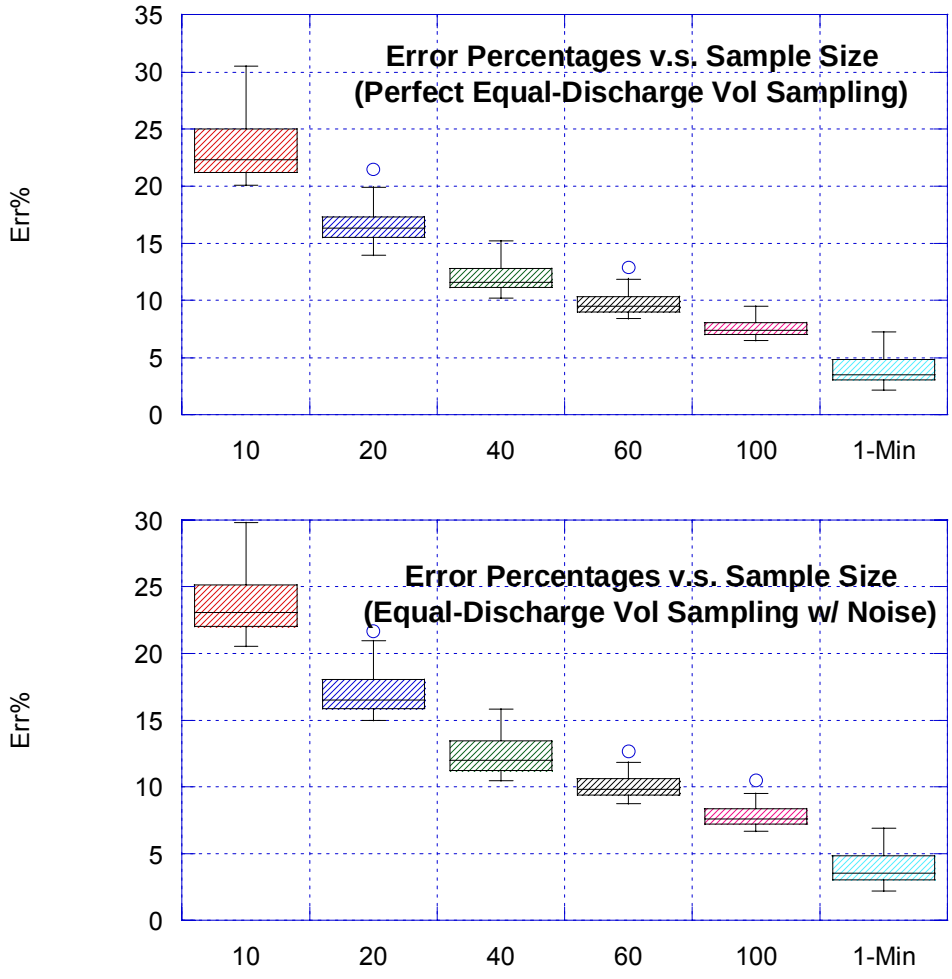

Figure 5.7 Sampling distributions for perfect equal-discharge volume sampling (top) and equal-discharge volume sampling with noise (bottom) (as n = 10, 20, 40, 60, and 100) plus one-minute simulation

6. SUMMARY

The California Department of Transportation sponsored a four-year stormwater monitoring study to investigate first flush phenomenon. The Department of Civil and Environmental Engineering at the University of California, Los Angeles (UCLA) in collaboration with the Center for Environmental and Water Resources Engineering at the University of California, Davis (UCD) conducted the investigation. UCLA collected the bulk of data and performed the analysis of the results. Consultants under contract with the Department sampled several sites in the first two years of the study, and assisted in the initial set up the sites and monitoring equipment.

Three highly urbanized representative highway sites near UCLA were selected for this study. Two sites were located on IS 405 near Santa Monica Boulevard and the Getty Center and the third site was located on the intersection of US 101 and IS 405. The sites were instrumented with rain gauges, flow meters and automatic composite samplers. Consultants monitored two different sites in the 1999-2000 and three different sites in the 2000-2001. Nearly all analysis and discussion presented in this report are based on the results obtained from the UCLA monitoring data, although data from both consults are included with the UCLA monitoring data in the Appendix.

In the first year, five grab samples were collected during the first hour of runoff followed by two or three manually composited samples in the following two to three hours. In the second, third and forth years, five grab samples were again collected in the first hour, followed by one grab sample per hour for the next 7 hours, providing a total of 12 grab samples. For storms lasting less than 8 hours, fewer grab samples were collected. For storms lasting longer than 8 hours, an additional one or two grab samples were collected in the period from 8 hours to the end of the storm.

The grab samples were collected from the storm drain outfall (or drain pipe) using a polypropylene scoop, and then transferred to 4-L amber glass bottles. In all cases samples were collected from a free waterfall. The bottles were transported to the laboratory at UCLA immediately after collection and refrigerated at 4°C until analyzed. Generally the first 5 bottles were transported to the laboratory after the first hour, and one or two more trips were made as the storm progress. The time between the sample collection and receipt of samples at UCLA laboratory was less than 4 hours. This became important in the last year of the study, when particle size distribution (PSD) was being measured. Measurable changes in PSD occurred within 12 hours after sample collection.

Numerous water quality parameters, nutrients, metals (particulate and dissolved), oil and grease were routinely monitored for the duration of the study. Other constituents that were monitored less frequently include indicator organisms and polynuclear aromatic hydrocarbon (PAHs). All analyses were performed within the recommended holding time using US EPA and Standard Method protocols. In addition, during the second and third year of the study, litter samples were collected. A large mesh, draw-string bag (6 mm opening) was placed over the entire flow from each site to collect litter. Three bags were collected for each site for each storm. The first bag was installed before the beginning of the storm, and removed after 1 hour of runoff. A second bag was installed and was removed after 8 hours or the end of grab samples. The third bag was installed and was left in place until the end of the storm.

It was retrieved and all bags for all sites were transported to an outside lab under contract with the Department for performing the litter analysis.

Major results and findings of the study are summarized in the following paragraphs.

6.1 Definition of First Flush Phenomenon

First-flush is a phenomenon that is associated with the belief that the first runoff in a storm event is the most contaminated. Most researchers believe that the first runoff does have higher contaminant concentrations, but opinions vary as to the importance of the increased concentrations, and whether the actual first flush mass is a significant portion of the total runoff mass. Lay people generally believe there is a first flush, and associate hazardous driving conditions with the onset of rainfall. The study has devoted a great deal of effort to developing a quantitative definition of first flush. In areas which have distinct seasonal rainfall patterns, such as California, a similar concept, called seasonal first flush exists. A mathematical concept was developed (described in section 4) that can be applied to different types of first flush phenomena, defined as follows:

> First flush – the concept that pollutants are more concentrated at the beginning of a rainfall event than in the later parts of a rainfall event. The concept can be applied to the mass discharge of contaminants (e.g., mass first flush) or the concentration (e.g. concentration first flush).
>
> Seasonal first flush - the concept that pollutants are more concentrated in the runoff of the first few storms of a rainy season than in the storms that occur later in the season. The concept can be applied to the mass discharge of contaminants (e.g., mass first flush) or the concentration (e.g. concentration first flush). The existence of a seasonal first flush requires an extended dry period before the rainy season.

6.2 Pollutograph and First Flush of Pollutants

The EMC measured through flow-weighted composite samples is perhaps the best, single descriptor of stormwater contaminant concentration and is generally preferred in any monitoring study. Unfortunately, the EMC provides no information on the temporal variability of contaminant concentrations. It cannot be used to characterize first flush. Analysis of a series of grab samples, while more expensive, provides the temporal pollutant variability throughout the storm hydrograph. This temporal variability is usually illustrated through pollutographs by plotting constituent concentration vs. duration of the storm event. A large concentration of pollutant at the beginning of the event with a gradual decrease of the pollutant concentration towards the end of the storm event is an indication of first flush.

The results of this study revealed a large change in concentration of most contaminants as a storm progresses. For example, the first sample may have had more than 500 mg/L chemical oxygen demand (COD) but the EMC may have been only 100 mg/L. The reduction occurs because the pollutant mass may be washed out of the site, or may be diluted by higher runoff flow rate as the storm progresses. By reporting only the EMC concentrations, the high initial concentrations are not recognized. This may be significant for BMP selection, since BMPs generally perform better at higher influent concentrations. Using the EMC for BMP evaluation may underestimate overall BMP removal rates.

6.3 Load-graph and Mass First Flush Ratio

The graph of normalized cumulative mass versus normalized cumulative volume is usually referred to as "load-graph" and can be used to examine the mass first flush phenomenon. The mass first flush ratio is defined as the normalized discharged constituent mass divided by the normalized runoff volume for a specific runoff volume. For example, a MFF_{10} ratio of 4.5 implies that 45 percent of pollutant mass is transported in the first 10 percent of the runoff volume. The greater the MMF_n ratio, the larger the mass first flush. The MFF always approaches 1.0 as the normalized runoff volume approaches 1.0. For a pollutant to have a first flush the mass first flush ratio (MFF_n), must be greater than 1.

6.4 Organic (PAHs) First Flush

Dissolved polyaromatic hydrocarbons (PAHs) were generally at or below detection limits. However, particulate PAHs were dominant and in most cases, first flushes of particulate PAHs were exhibited. The mass first flush ratio generally was above 2 for the first 20% of the runoff volume, and in some cases as high as 2.8. The results suggest that best management practices (BMPs) that address particulate phase contaminants in the initial runoff can have greater effectiveness for particulate PAH removal than other types of BMPs.

6.5 Litter First Flush

Results obtained indicate that a first flush of gross pollutants was generally observed. Gross pollutants were defined as being larger than 6 mm and were classified into three categories: vegetation, biodegradable litter, and non-biodegradable litter. The gross pollutants were 90% vegetation and 10% litter. Approximately 50% of the litter was composed of biodegradable materials. However, a greater percentage of biodegradable litter was normally collected in the first flush. No statistically significant correlations of litter production were noted, although the event mean concentrations show an increasing trend with antecedent dry days and a decreasing trend with total runoff volume or total rainfall. The mass emission rates will be useful to estimate total litter production for developing total maximum daily loads for litter.

6.6 Seasonal First Flush

The seasonal first flush issue was addressed by plotting the concentrations of the various water quality parameters as a function of normalized rainfall for several years. Results revealed that the constituents' concentrations decline as the season progresses. This indicates that treating stormwater early in the season is more effective than treating runoff late in the season. The engineering opportunities to exploit these differences were beyond the scope of this study and have not been explored. Similar trends in other water quality parameters and the data from the Department's statewide monitoring program (Department's report CTSW-RT-03-065.51.42) also show a seasonal first flush.

6.7 Particle First Flush

In the fourth year of the study, particle size distribution was measured during the various stages of the hydrograph. The numbers of particles were measured over the range of 2 to 1000 μm. It was observed that the numbers of particles declined dramatically as the storm progressed. Preliminary analysis of particle size distribution indicated the occurrence of a natural aggregation. This natural aggregation of particles required that analysis be performed as soon as possible, but in no case longer than six hours after sample collection of the sample. Analysis of samples older than six hours could be biased due to particle aggregation. Samples collected using automatic composite samplers had lesser numbers of small particles and greater numbers of large particles than grab samples. The holding time during the composite sample collection allowed particles to aggregate. Therefore, composite samplers are not recommended for collecting samples for PSD analysis.

More than 97% of the particles were less than 30 μm in diameter. Particle concentration and size generally decreased rapidly as the storm progressed. Rapid increases in particle numbers occurred after rapid increases in rainfall or runoff, and were accompanied by increases in turbidity and total suspended solids concentration. Particles showed an obvious first flush, with median of PFF_{20} of approximately 2, indicating that 40 % of total particles were carried in the first 20 % of runoff volume. Larger particles showed a stronger first flush effect than smaller particles.

The availability of particle size distribution measurements will greatly increase our understanding of treatment mechanisms. BMPs can be sized to remove particles larger than a specific size, which will allow more scientific evaluation of BMPs. Work is underway to measure pollutant concentrations as a function of the particle size.

6.8 BMP Evaluation based on First Flush

As part of this study, the MFF ratios have been calculated for all storms and monitored constituents. The mean mass first flush ratios at 10, 20, 30, 40 percent runoff volume were computed and ranked for all constituents. The use of the MFF ratios, as opposed to an arbitrary definition of first flush, allows BMPs to be evaluated for a continuum of conditions. The MFF values can be used in evaluating BMPs, especially those that are “first flush friendly,” meaning that the treatment system can capture or treat the early runoff and associated pollutant mass.

To estimate the potential benefits of treating pollutants in the early runoff, either as the first flush of a storm event or a seasonal first flush, a treatment effectiveness factor (TEF_n) as a function of MFF_n was introduced. Computation of TEF for 10, 20, 30 and 40 percent of the normalized cumulative runoff volume showed a value between 2 to as high as 7. A TEF_{10} of 7 means that treating the first 10 percent of the stormwater runoff volume will be 7 times more effective than treating an equal volume of runoff at a later time in the storm event.

6.9 Correlation among Water Quality Parameters

Results showed that there are strong correlations among many of the water quality parameters and particularly among parameters that measure organic content (e.g., COD, total or dissolved organic carbon, etc). COD shows a particularly high correlation with other

parameters. There are strong correlations among metals, such as zinc and copper, and the dissolved and particulate phase concentrations are highly correlated as expected. TSS is not as well correlated to other water quality contaminants as we have previously thought. The high degree of correlation among parameters raises questions about the need for such extensive monitoring of all parameters. It may not be necessary to measure all parameters for routine monitoring. For example, it may be possible to measure only one organic quality parameter, such as TOC or COD. TOC is easy to measure and generates no laboratory hazardous wastes as COD. It is easier and more reliable than oil and grease measurement. The degree of correlation is very high among soluble and total metals. Therefore it may be possible to measure only total metals. The utility in reducing the number of parameters will depend on the monitoring purpose. For BMP selection, the difference in soluble and total metals is important, since most BMPs generally cannot remove soluble metals. For routine monitoring, it may be possible to substitute total metals and calculate the soluble metal from the correlation.

6.10 New Method to Measure Oil and Grease Concentration

Oil and grease can generally not be sampled with an automatic sampler because the oil adheres to tubing and sample bottle surfaces. The adsorbed oil reduces the sampled value and can carry over to the following sample. Most agencies choose to take one grab sample instead of a composite sample. If the oil and grease sample is collected early in the storm, it will likely be greater than the EMC. If it is collected later in the storm, it can be lower. There is no distinct time in a storm event to collect a single oil and grease sample to be representative of the entire storm event. The most representative time to collect a sample ranges from 2 to 5 hours after the beginning of rainfall, and depends on many factors.

Correlation between O&G and other organic constituents, such as chemical oxygen demand (COD) or dissolved organic carbon (DOC) was shown to be a better method to estimate the oil and grease EMC. Most importantly, COD and DOC can be collected using automatic samplers. Strong correlation (R^2= 0.9) between these aggregate organic constituents and oil and grease were found. A linear mathematical relationship was derived and for highway runoff, and the composite sample analyzed for DOC was the best method to estimate O&G event mean concentration.

6.11 Sampling Issue: Automatic versus Grab Sampling

It is generally known that flow weighted composite samples provide more accurate and precise information than a grab sample. During the course of this research, questions were raised about the accuracy of flow-weighted automated composite samplers, and whether they provide better information than a series of composite samples that are flow-weight averaged to produce a calculated composite sample.

To answer this question, a series of simulations were performed to “mimic” the runoff flow rate and concentrations observed in the first two years of our study. Random noise was added to simulate the stochastic nature of stormwater. The degree of noise was selected to match the variability in the actual observations. Next an automated sampler and flow weighted grab samples were simulated. The automated sampler was simulated by rapidly sampling the runoff at short intervals, simulating the “squirts” that the automated composite

samplers collect in proportion to flow rate. Grab samples were simulated in a similar fashion, but at randomly timed intervals.

More than 1000 simulations were performed and the result showed that and EMC estimated by averaging 10 grab samples will have a mean error of 42 % difference as compared to a flow weighed composite sample, collecting small sample volumes every minute. The error decreases with the number of samples and approaches 12% for 100 grab samples. In general, however, it is shown that a large number of grab samples is needed to approximate the flow weighted composite sample. Thirty grab samples per storm event provided a good estimate of a composite sample. To detect a first flush, it is necessary to take even more samples or to weight the samples towards the beginning of the storm. The superiority of the automatic sampling equipment is demonstrated, and the results show that investigators using only a few grab samples to characterize an event would not be able to observe a first flush.

In Conclusion

The existence of a first flush, either a storm or a seasonal first flush, may present opportunities for managers and regulators to affect better pollutant reduction programs. Treating early runoff that has higher contaminant concentrations may be a better policy than treating a similar fraction of the entire runoff volume. This will be true for two reasons. The first reason is the cost of treatment is generally more dependent more on the volume of water to be treated than the contaminant concentration. The second reason relates to the way that stormwater BMPs function; removal efficiency is greater at higher concentrations. Treatment efficiency at low concentrations is nearly zero, but significant removal can be obtained at higher concentrations. The emerging ASCE database on BMP trials shows this effect.

The Department’s future development programs to reduce pollutants from stormwater may take advantage of first flush for removal of specific contaminate at local watershed basis.

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Program Evaluation Report

Orange County Storm Water Program: Cities of Laguna Beach, Laguna Hills, Lake Forest, and Rancho Santa Margarita (Order No. R9-2002-0001, NPDES Permit No. CAS0108740)

Executive Summary

Tetra Tech, Inc., with assistance from the California Regional Water Quality Control Board, San Diego Region (Regional Board), conducted a program evaluation of four of the 13 permittees implementing the Orange County Storm Water Program (the Program) in May 2005. The purpose of the program evaluation was to determine the permittees' compliance with their National Pollutant Discharge Elimination System (NPDES) permit (CAS0108740 and Board Order No. R9-2002-0001) and to evaluate the current implementation status of the permittees' Local Implementation Plans (LIPs) with respect to EPA's storm water regulations. The program evaluation included an in-field verification of program implementation. The four permittees evaluated were the cities of Laguna Beach, Laguna Hills, Lake Forest, and Rancho Santa Margarita. Although Orange County is subject to NPDES municipal storm water permits issued by both the San Diego and Santa Ana Regional Boards, this program evaluation examined only the permittees and activities within the purview of the San Diego Regional Board.

This program evaluation report identifies potential permit violations, program deficiencies, and positive attributes and is not a formal finding of violation. Program deficiencies are areas of concern for successful program implementation. Positive attributes indicate overall progress in implementing the program.

The following deficiencies and potential permit violations were identified:

- Each city should develop a plan to document the long-term effectiveness of its storm water program.
- Each city should work with the development community to improve the water quality management plan (WQMP) review process and the quality of WQMPs submitted by project applicants.
- The cities of Laguna Beach and Lake Forest do not require developers to submit adequate erosion and sediment control plans.
- The cities of Laguna Hills, Lake Forest and Rancho Santa Margarita should regularly evaluate the services provided by the County of Orange and commercial contractors.
- The City of Lake Forest failed to apply for storm water General Construction Permit coverage for the El Toro Road construction project.

- The City of Rancho Santa Margarita failed to require a project proponent to provide evidence of existing coverage under the State's General Construction Permit.

Several elements of the permittees' programs were particularly notable:

- The City of Laguna Beach has developed a WQMP template for project applicants and uses a detailed WQMP checklist during the review process.

- The City of Laguna Hills has developed a broad public outreach program that reaches a variety of target groups.

- The City of Lake Forest staff walked the City's entire drainage area during the development of the system inventory and map.

- The City of Rancho Santa Margarita has developed an HOA document (DF-1 HOA) enforceable by City ordinance.

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1.0 Introduction

1.1 Program Evaluation Purpose

Tetra Tech, Inc., with assistance from the California Regional Water Quality Control Board, San Diego Region (Regional Board), conducted a program evaluation of four of the 13 permittees implementing the Orange County Storm Water Program (the Program) in May 2005. The purpose of the program evaluation was to determine the permittees' compliance with the National Pollutant Discharge Elimination System (NPDES) permit (CAS0108740 and Board Order No. R9-2002-0001) and to evaluate the current implementation status of the permittees' Local Implementation Plans (LIPs) with respect to U.S. Environmental Protection Agency's (EPA) storm water regulations. Secondary goals included the following:

- Review the overall effectiveness of the Program.
- Identify and document positive elements of the Program that could benefit other Phase I and Phase II municipalities.
- Acquire data to assist in reissuance of the permit.

40 CFR 122.41(i) provides the authority to conduct the program evaluation.

Although Orange County is subject to NPDES municipal storm water permits issued by both the San Diego and Santa Ana Regional Boards, this program evaluation examined only the permittees and activities within the purview of the San Diego Regional Board.

1.2 Permit History

The NPDES storm water permit was issued on February 13, 2002, and is scheduled to expire on February 13, 2007. The current permit, the third issued to the permittees, requires each permittee to develop and implement a Jurisdictional Urban Runoff Management Plan (JURMP), which the permittees have renamed a Local Implementation Plan (LIP).

1.3 Logistics and Program Evaluation Preparation

Before initiating the on-site program evaluation, Tetra Tech, Inc., reviewed the following program materials:

- NPDES Permit No. CAS0108740
- Laguna Beach 2003 LIP and 2003-04 Annual Report
- Laguna Hills 2003 LIP and 2003-04 Annual Report
- Lake Forest 2003 LIP and 2003-04 Annual Report
- Rancho Santa Margarita 2003 LIP and 2003-04 Annual Report
- Regional Board correspondence with each permittee

- Permittees' Web sites

On May 17–19, 2005, Tetra Tech, Inc., with assistance from the Regional Board, conducted the program evaluation. The evaluation schedule was as follows:

Tuesday, May 17	Wednesday, May 18	Thursday, May 19
• Program evaluation kickoff meeting • Program Management; Program Effectiveness • New Development /Significant Redevelopment (office) • Construction (office and field)	• Industrial and Commercial Components (office and field) • Illicit Discharge Component (office and field)	• Municipal Activities (office and field) • Outbrief

Upon completion of the evaluation, the evaluation teams held an exit interview with each permittee to discuss the preliminary findings. During the exit interview, the attendees were informed that the findings were to be considered preliminary pending further review by the Regional Board.

1.4 Program Areas Evaluated

The following program areas were evaluated:

- Program management, including the permittees' effectiveness assessment
- New Development/Redevelopment Component
- Construction Component
- Industrial/Commercial Component
- Illegal Discharges and Illicit Connections Component
- Municipal Activities Component

1.5 Program Areas Not Evaluated

The following areas were not evaluated in detail as part of this program evaluation:

- Public Education and Residential Components
- Wet-weather monitoring program and monitoring program details (e.g., sample locations, types, frequency, parameters)
- Other NPDES permits issued to the permittees (e.g., industrial or construction NPDES storm water permits)
- Fiscal resources required or expended to implement the programs outlined in the LIPs
- Legal authority

- Inspection reports, plan review reports, and other relevant files. The program evaluation team did not conduct a detailed file review to verify that all elements of the Program were being implemented as described. Instead, the team relied on its observations and on statements from the permittees' representatives to assess overall compliance with permit requirements. A detailed file review of specific program areas could be included in a subsequent evaluation.

1.6 Program Areas Recommended for Further Evaluation

The evaluation team recommends the following additional assessments:

- An evaluation of the other permittees not evaluated
- An evaluation of the permittees' implementation of the local WQMPs, after additional plans have been approved
- A review of each permittee's industrial and commercial inspection and enforcement process, once a sufficient number of inspections have been performed
- A review of the commercial inspections to be performed by the Orange County Health Department on behalf of several of the permittees
- A review of the methods the permittees intend to use to measure the long-term effectiveness of the LIPs

2.0 Program Evaluation Results

This program evaluation report identifies potential permit violations, program deficiencies, and positive attributes and is not a formal finding of violation. Program deficiencies are areas of concern for successful program implementation. Positive attributes indicate a permittee's overall progress in implementing the Program. The evaluation team identified only positive attributes that were innovative (beyond minimum requirements). Some areas were found to be simply adequate; that is, not deficient or innovative.

The evaluation team did not evaluate all components of each permittee's Program. Therefore, the permittees should not consider the list of program deficiencies contained in this report as constituting a comprehensive evaluation of individual program elements.

The most significant potential permit violations, program deficiencies, and positive attributes identified during the evaluation are noted in the Executive Summary and are described in *text boxes* in the following subsections.

2.1 Findings Common to All Four Permittees Evaluated

2.1.1 Evaluation of Program Management and Effectiveness

Deficiencies Noted:

- *Each city should develop a plan to document the long-term effectiveness of its storm water program.*

  Provision F.8.a of the permit requires each permittee to develop a long-term strategy for assessing the effectiveness of its program. Each city describes past-year storm water activities in its annual report (also called "program effectiveness assessments"). For example, the City of Laguna Beach's Annual Report contains "effectiveness and assessment summaries" that describe activities completed and provide a basic analysis of the data from the past reporting year. Each of the cities should expand on the information provided in its Annual Reports and develop a plan to document the long-term effectiveness of its storm water program. An overall program effectiveness plan should be developed with input from the County and other cities, but each city should also develop a plan that is specific to its unique challenges and water quality issues. The plan should set long-term goals and specify evaluation techniques that help the city demonstrate that it is making progress toward achieving these goals. Ultimately, this plan will help each city to improve implementation of the Program and help to document water quality improvements.

  For additional information on program effectiveness, the cities should review the presentations from the November 14, 2003, meeting of the California Storm Water Quality Association. That meeting focused on municipal separate storm system (MS4) program effectiveness and how MS4s can document such effectiveness. The presentation materials are available at http://www.casqa.org/meetings/presentations.htm. An additional resource is *A Framework for Assessing the Effectiveness of Jurisdictional Urban Runoff Management Programs,* developed by the San Diego Municipal Storm Water co-permittees. A copy of the framework is available at http://www.projectcleanwater.org/pdf/copermittees/assessment_framework_final.pdf.

- *Each city should develop a city-specific enforcement guide.*

  The County storm water program, as part of the 2003 Drainage Area Management Plan (DAMP), has developed an *Enforcement Consistency Guide for Water Quality Ordinance Implementation*. Although this is a good overall guidance on inspections and enforcement, each of the cities should build on this to develop guidance specific to its own ordinances and legal authority. The guidance should not only list enforcement response options but also provide recommendations for when certain enforcement responses are applied. For example, a construction operator with past notices for the same violation would not receive another verbal warning but would receive a written notice of noncompliance or other enforcement action. For an example of a city-specific enforcement guidance, see the *Watershed Enforcement Response Plan* developed by the City of San Jose.

- *Each city should develop a written training plan.*
  Each of the cities currently provides training to staff or allows staff to attend training courses. The cities, however, have not developed a written training plan that is specific and targeted based on the type of training required for staff by department or by task. Each of the cities indicated that because of the size of the city, a formal training program was not needed; however, during the evaluation the need for specific training for different city staff and departments was noted. Each city should develop a written training plan to identify the training needs within the city and the type of curriculum that should be developed. The training program should include both focused and general training. The cities currently use the County of Orange to provide most of their training. The cities may incorporate use of the County's training program into their city-specific training program strategies.

- *The cities are not designating a set of BMPs for high, medium, and low threat to water quality for construction, municipal, industrial, commercial, and residential sources.*
  For each of the LIP components, the MS4 permit describes a standard process of identifying the sources, prioritizing the sources (as high, medium, or low) on the basis of threat to water quality, and designating minimum BMPs for high, medium, and low threats to water quality. The cities are not consistently designating BMPs based on the prioritized high, medium, or low threat to water quality. These BMP requirements are specified in parts F.2.f (construction), F.3.a.(4) (municipal), F.3.b.(4) (industrial), F.c.3.(3) (commercial), and F.3.d.(3) (residential). Each city should identify minimum BMPs for high-, medium-, and low-priority threats for each source. The cities can also identify minimum BMPs that apply to all priorities for a source.

2.1.2 Evaluation of Land Use Planning for New Development and Redevelopment

Deficiencies Noted:

- *Each city should work with the development community to improve the water quality management plan (WQMP) review process and the quality of WQMPs submitted by project applicants.*
  New developments provide a unique opportunity to design projects to minimize a development's impact on water quality. The cities should develop a review process that considers the effectiveness of BMPs in controlling the pollutants of concern. This should include a hierarchy for the selection of BMPs based the effectiveness of a particular BMP in controlling specific pollutants. Developers would then be required to provide justification for selecting BMPs that are not as effective as other BMPs. For example, the cities generally allow catch basin inlet filters (classified as a proprietary control measure treatment control BMP) as the primary BMP selected for most new development sites. The California *Storm Water Quality Association New Development and Redevelopment BMP Handbook* provides a fact sheet on the use and applicability of drain inserts. According to the fact sheet the performance of drain inserts is likely significantly less than that of treatment systems located at the end of the drainage system, such as ponds and vaults, and drain inserts are usually not suitable for large areas or areas with trash or leaves that can plug the insert. The fact sheet further indicates that drain inserts are recommended for retrofit situations and as

pretreatment where other treatment BMPs are used and should not be stand-alone BMPs. Based on this information, the cities generally should not allow drain inlet filters as stand-alone new development BMPs.

Also, Part F.1.b.(2)(h) of the permit requires each city to develop restrictions that apply to treatment BMPs that are designed to function as infiltration devices to protect groundwater quality. Because infiltration BMPs are city-approved BMPs, the cities must develop restrictions to ensure that the use of such BMPs does not cause or contribute to an exceedance of groundwater quality objectives.

As an example, the City of Sacramento has implemented a technical guidance manual that identifies specific new development BMPs for commercial and industrial development (available at http://www.sacstormwater.org/const/manuals/hc-on_site.html). The manual provides fact sheets containing site, design, construction, operation, and maintenance standards and specifications for these BMPs. The manual allows a developer to propose equivalent, alternative BMPs in lieu of the approved BMPs if adequate justification is provided. As an incentive for a developer to select city-approved BMPs, the manual indicates that plans submitted with the alternative BMPs will require additional time for review and approval, which could result in delays in final approval of the plans. The County of Ventura also provides a technical guidance manual, which is available at http://www.vcstormwater.org/publications.htm.

In addition, the cities should work with project applicants to improve the quality of WQMPs, especially with better site design BMPs and more effective treatment control BMPs. For example, applicants should be encouraged to minimize impervious surfaces and to direct runoff to adjacent landscaping whenever practical. Also, project applicants should select the most effective treatment control BMP for the pollutant of concern. Drain inserts, generally the least effective of the treatment control BMPs, should be used only when other options are documented as not being feasible.

- *Each city should ensure that post-construction BMPs are adequately maintained.*
  The cities are not formally tracking post-construction BMPs (source and treatment controls) installed to fulfill the WQMP requirements. To ensure that these BMPs are maintained over the long term and perform as designed, and to verify that source controls continue to be implemented at new developments (e.g., that covered waste enclosures remain covered), each city should develop a system to track these post-construction BMPs.

2.1.3 Evaluation of Illicit Discharge Detection and Elimination Program

Deficiency Noted:

- *Each city should analyze dry weather screening data.*
  The County conducts dry weather reconnaissance for all four cities. Procedures are in place for the County to notify a city when a collected field sample is significantly above mean conditions; however, most data collected by the County is not delivered to the cities in a timely manner. The cities should also use these dry weather

screening data to provide additional analysis of potential pollutants and sources. For example, the cities could analyze the data to determine which pollutants most commonly exceed the threshold and which outfalls receive the most flow during dry weather. The cities should consider these data when assessing whether changes to their current activities and BMPs are warranted.

2.2 City of Laguna Beach

2.2.1 Evaluation of Program Management and Effectiveness

Positive Attribute:

- *The City created a Water Quality Department to specifically address storm water and sanitary sewer activities.*
  To consolidate staff and emphasis the importance of these activities, the City created a Water Quality Department with two departments – Wastewater and Water Quality – to focus on maintenance of the sewer lines, pump stations, and sewer interceptor and compliance with the City's NPDES storm water permit. With 15 employees, 2 of whom are dedicated full-time to water quality, the City is able to better plan and manage activities to protect water quality.

2.2.2 Evaluation of Land Use Planning for New Development and Redevelopment

Positive Attribute:

- *The City has developed a WQMP template for project applicants and uses a detailed WQMP checklist during the review process.*

  The City modified the County's WQMP template to create a template used in preparing WQMPs for priority development projects. The template is a simplified document that follows the City's comprehensive WQMP preparation document but includes tables that the project applicant must complete. The template provides a standard format for project applicants to follow and a consistent form that facilitates the City's review.

  The City has also developed a WQMP checklist to ensure that all WQMP requirements are satisfied and to document the review process. The City's consultant completes the checklist during each WQMP review and notes any concerns or missing items. A copy of the completed checklist is also provided to the project applicant to help in correcting any problems.

2.2.3 Evaluation of Construction Program

Potential Permit Violation:

- *The City does not require developers to submit adequate erosion and sediment control plans.*

  Part F.2.c of the City's permit lists the minimum requirements that must be addressed by the City in its construction management program. Parts F.2.c(1)(c) through F.2.c(1)(g) specify that (1) erosion prevention is the most important measure, (2) sediment controls are to supplement erosion control and are never to be used as the single or primary method, (3) sites are to minimize areas that are cleared and graded, and (4) sites are to minimize the exposure time of disturbed areas. The City generally approves erosion and sediment control plans with minimal BMPs. Usually, only gravel bags are indicated along the perimeter of the project and copies of standard

erosion control and water quality notes are attached. These plans do not provide enough detail for project applicants to adequately plan for the cost of storm water BMPs, and the lack of detail increases the work of the City's inspector who uses the plans during inspections to review required BMPs.

The City should require more specific BMPs on erosion and sediment control plans, including erosion control for steep slopes, the identification of pollution prevention/materials management BMPs (e.g., concrete washouts, trash management), and a grading schedule (or phased grading requirements). Also, the development of an erosion and sediment control plan review checklist listing common BMPs and requirements would help the City's plan review staff to ensure that critical BMPs are included on plans.

Positive Attribute:

- *The City's construction inspector was knowledgeable and conducted thorough inspections.*
  Despite erosion and sediment control plans that lacked detailed BMPs, the City's construction inspector conducted thorough inspections at the construction sites visited. The inspector was very knowledgeable in erosion and sediment control BMPs and identified missing BMPs at sites.

Deficiency Noted:

- *The City should develop a BMP fact sheet for residential construction projects on steep slopes.*
  For guidance on the selection of construction site BMPs, the City provides project applicants with copies of the County's *Construction Runoff Guidance Manual* or refers applicants to the CASQA *Construction BMP Manual*. The City should develop more specific outreach on the types of BMPs expected at the projects most common in the City – residential construction projects on steep slopes.

  An example of a specific BMP brochure is available from the City of Coronado at http://www.coronado.ca.us/ContentPage.asp?ContentID=94. The City of Coronado's construction industry pollution prevention guide includes contact information for the City and information on right-of-way permitting, BMPs, and the City's inspection and enforcement program. The guide also illustrates the types of BMPs that should be used at all construction sites by providing a graphic representation of a common construction project in the City showing the types of BMPs the City expects to be implemented.

2.2.4 Evaluation of Existing Development: Industrial and Commercial Programs

Positive Attribute:

- *The City has completed inspections at its industrial facilities.*
  The City has 38 industrial facilities (none of which are ranked high-priority). The City completed inspections of these facilities in 2003. In addition, the City's inspector

conducted a thorough inspection of a commercial auto repair facility. The City has also begun conducting inspections at most of its commercial facilities.

Deficiency Noted:

- *The City should consider conducting full industrial/commercial inspections when investigating illicit discharges at businesses.*
  Currently, when the City conducts illicit discharge investigations that involve a business, it works with the business to eliminate the discharge but does not necessarily investigate other potential storm water issues at the site. The City inspector should conduct a full storm water inspection at a business where an illicit discharge has occurred. Although the business owner is focused on water quality, the inspector has a good opportunity to identify any other potential water quality issues at the site. These inspections could also count toward the City's commitment to inspect industrial and commercial facilities over the permit term.

2.2.5 Evaluation of Illicit Discharge Detection and Elimination Program

Positive Attribute:

- *The City is very proactive in addressing illicit discharges.*
  The City inspector was very proactive in identifying and addressing illicit discharges discovered while driving through the City. These discharges included discharges from construction sites, landscaping contractors, and residents. This field presence and the education/enforcement provided helps to remind City residents and contractors of the requirements in the City's Water Quality Control ordinance and the importance of protecting water quality.

Deficiency Noted:

- *The City should include in its tracking database information on how illicit discharge complaints are resolved.*
  The City has developed a database to track illicit discharge complaints, but the database does not include specific information on how and when each compliant is resolved. The City should add this information to the database to demonstrate to the Regional Board and others that each complaint received has been investigated and appropriately resolved.

2.2.6 Evaluation of Existing Development: Municipal Program

Positive Attributes:

- *The City has installed more than a dozen diversion structures to capture urban runoff.*
  The City has installed more than a dozen diversion systems (CDS units) to capture urban runoff and divert the flow to the sewer system for treatment at the wastewater treatment facility. During storm events, diversion to the sewer is stopped. The storm flow passes through the separator unit and is filtered up to the design capacity of the

unit and discharged to the ocean. Storm flow above the design capacity of the separator unit is bypassed directly to the ocean.

- *The City has funded a study to assess the effectiveness of oil/grease removal socks for CDS units.*
  The City recently completed a 6-month study to determine the effectiveness of oil booms in removing oil/grease that enters the City's urban runoff diversion continuous deflection separator units. The oil booms were installed at five locations and removed and replaced bimonthly. The used booms were weighed and tested to determine the amount of oil removed. The results of the study will be included in the City's next Annual Report.

- *The City designed and constructed a custom mobile trailer for concrete wash water.*
  After identifying a need, City staff designed and constructed a custom mobile trailer that contains concrete wash water collected at City projects. The mobile trailer allows the City to clean concrete equipment in the field and dispose of the wash water back at the corporation yard.

Deficiencies Noted:

- *The City should develop documented procedures or BMP fact sheets for common maintenance activities that can impact storm water quality.*
  The City conducts maintenance activities such as pressure washing, saw cutting, and concrete work, which could affect water quality. Although staff employ BMPs when conducting these activities, the BMPs are not documented in writing. The City should develop simple "cut sheets" that describe the BMPs and the procedures staff should follow when conducting common activities that could affect water quality.

2.3 City of Laguna Hills

2.3.1 Evaluation of Program Management and Effectiveness

Positive Attribute:

- *The City has developed a broad public outreach program that reaches a variety of target groups.*

The City, in conjunction with the County of Orange, implements a storm water public education program. The program has developed a broad range of materials, including general storm water brochures in both English and Spanish and educational posters for priority commercial facilities. The City has also assisted with the development of the *Equestrian Related Water Quality Best Management Practices* handbook targeting the equestrian community. Most notably, the City has developed storm water banners that hang from the light poles that line main streets of the City.

Deficiencies Noted:

- *The City should regularly evaluate the services provided by the County of Orange and commercial contractors.*

Sections F.3.a.(5)(b) and F.3.a.(5)(c)i.-v. of the permit require the permittee to implement a schedule of specific maintenance activities for the MS4. The City of Laguna Hills contracts out a majority of its MS4 maintenance services to the County of Orange. The City's agreement with the County requires monthly status reports to summarize work conducted; however, none were available for review.

Sections F.1.b and F.2.g. of the permit require the permittee to modify the development project approval process and conduct construction inspections, respectively. The City uses commercial contractors to assist with construction inspections and plan review. The City acknowledged the lack of training associated with the contracted construction inspectors and contractors that conduct plan review.

The evaluation team saw few signs of oversight and assessment of the contractors conducting work associated with municipal services, new development plan review, and construction inspections. Although contracting storm water services is acceptable, compliance with the permit is ultimately the City's responsibility. The City should implement a thorough contractor training program to address all elements of the permit applicable to the contractor. In addition, the City should regularly monitor and evaluate the performance of its contractors to ensure permit compliance. This regular evaluation would also assist with completion of the effectiveness assessment and guarantee effective use of resources.

2.3.2 Evaluation of Land Use Planning for New Development and Redevelopment

Deficiencies Noted:

- *The City lacks formalized procedures for the internal WQMP review and approval process.*
  Part F.1.b of the permit requires the permittee to modify its development project approval processes to ensure that pollutants and runoff from development will not affect water quality. In addition, part F.1.b(2)(f) requires the development of an implementation process for the local WQMP. The evaluation team found that the City lacked flowcharts, guidance manuals, Environmentally Sensitive Area (ESA) maps, and decision support systems for staff to follow. The City acknowledged the use of its LIP and a checklist for review of WQMPs; however, a completed checklist could not be produced from any file. Laguna Hills is a largely built-out city with few WQMP-applicable projects; however, the City still needs to develop clear, specific guidance for plan review staff explaining the WQMP review process. The City should also conduct regular training for plan review staff which details WQMP requirements. Additional training that addresses ESAs is also recommended for plan review staff.

  To ensure consistent implementation and continued organization, the City should develop formalized procedures, preferably in a stand-alone document, to address the WQMP review and approval process. The document would be oriented toward internal staff and could include flowcharts and BMP selection guides. Formalized procedures would delineate roles and responsibilities for City staff during each phase of the plan review and approval process. Locally, the City could review the process being deployed by the City of Mission Viejo.

- *Plan reviews and field inspections focus on sediment control, not erosion control.*
  Residential construction within the City of Laguna Hills is occurring primarily on hillsides. Upon review of the plan check and construction inspection procedures, the evaluation team identified a lack of erosion control BMPs. The emphasis of the plan review and construction site inspections appears to be sediment control rather than erosion control. Part F.2.c.(1)(c) requires the permittee to ensure that erosion prevention is emphasized and is used as the most important measure for keeping sediment on-site during construction. The City needs to revise its minimum BMP requirements to emphasize the use of erosion controls. In addition, the City needs to improve its plan check procedures and construction inspection activities to ensure that proper erosion controls are installed and maintained on all applicable construction sites.

  It is also recommended that the City create a hillside development BMP fact sheet/guidance for construction contractors. This guidance should be distributed to construction contractors before the grading permit is issued to ensure that erosion prevention is being adequately emphasized. See the finding in section 2.2.3 for additional recommendations and an example BMP fact sheet.

2.3.3 Evaluation of Construction Program

Deficiency Noted:

- *City contractors conducting inspections of construction sites should use a standardized checklist that specifically addresses storm water.*
  Part F.2.g.(1) of the permit requires each permittee to "conduct construction site inspections for compliance with its ordinances (grading, storm water, etc.), permits (construction, grading, etc.) and this Order." The City currently uses contractors to inspect capital improvement projects and, when needed, private construction sites. Contractors conducting the construction site inspections use a standardized form to evaluate the site, but, the form is general and does not prompt the inspector to specifically evaluate the construction sites for compliance with local permits, ordinances, or the MS4 permit. A standardized checklist that reflects these regulatory documents, as well as standard conditions, BMP implementation plans, and site erosion control measures found at construction sites, should be developed and implemented. An associated training component should also be developed for contractors using the checklist.

- *The City should have a mechanism for ensuring applicable project applicants are covered under the Statewide General Construction Permit.*
  Part F.2.c(1)(j) of the MS4 permit requires the City to ensure project proponents subject to the statewide General Construction Permit provide evidence of existing coverage. The City has adopted construction and grading project requirements that require construction and grading project proponents to provide evidence of coverage under the General Construction Permit and Section A-8.5 of the City's LIP mandates that the City require proof of General Construction Permit coverage before issuing a grading or building permit. However, the evaluation team did not identify any formal mechanism for ensuring applicable project applicants were complying with the state and local requirements. The City should incorporate into their WQMP checklist and/or Project Application Form a means of assuring project applicants are adequately addressing City and State requirements.

2.3.4 Evaluation of Existing Development: Industrial and Commercial Programs

Positive Attribute:

- *The City conducts training targeted at commercial sites and sources that are high-priority threats to water quality.*
  The City conducts training workshops for commercial sites/sources listed in part F.3.c.(2) of the permit as high priority threats to water quality. The City attempts to hold the workshops once every 2 months. Posters, flyers, and additional resources specific to the commercial activity are provided for all attendees.

2.3.5 Evaluation of Illicit Discharge Detection and Elimination Program

Deficiency Noted:

- *The City should implement formal tracking procedures upon detection of illicit discharges, connections, and spills.*
  Part F.5., illicit discharge detection and elimination, establishes requirements for the permittee to "actively seek and eliminate illicit discharges and connections into its MS4." Currently, the City's illicit discharge detection and elimination program lacks a well-constructed tracking mechanism to identify how each illicit discharge investigation is recorded. It is recommended that the City supplement its formal tracking procedures to ensure the timely elimination of the illicit discharge, connection, or spill. Examples of fields in a database that would assist with this effort are time and date of the event; identification of illicit discharge, connection, or spill; location of the event; contact information associated with the event; any enforcement action taken; threat to the MS4 and subsequent waterbodies; description of the final action taken; and date of the final action taken.

  Improved tracking procedures not only would assist with the elimination of illicit discharges, connections, and spills, but also would aid in proactively identifying locations subject to frequent events requiring follow-up investigations. Regarding follow-up investigations, criteria should be developed to assist field staff with the procedures of the investigation.

2.3.6 Evaluation of Existing Development: Municipal Program

Positive Attribute:

- *The City's Parks Department has developed an Integrated Pest Management Program.*
  The City has developed an Integrated Pest Management Program (IPMP) in coordination with the contractor performing all municipal landscaping activities. The IPMP is actively seeking alternatives to the use of fertilizers, such as the use of white flies, and it tracks the reduction in fertilizers and pesticides used for landscaping. The City's contractor uses slow-release fertilizer; however, the contractor maintains a schedule to limit the volume used and the City ensures that application never occurs prior to a rain event. Parks Department managers also ensure that applicators of the fertilizer are certified and trained, as well as informed of County educational seminars.

2.4 City of Lake Forest

2.4.1 Evaluation of Program Management and Effectiveness

Positive Attributes:

- *Storm water program management conducts midyear audits of program implementation to ensure that the program is meeting the minimum requirements specified in the permit and LIP.*
  The City storm water program manager collects information on program implementation activities being conducted by various City staff to evaluate the status of program implementation and to ensure that corrective actions are taken to ensure that program tasks are completed within the reporting year for the program. This approach will help the City correct identified deficiencies and ensure that workplan commitments are met.

- *The status and progress of the storm water program are presented to the City Council quarterly.*
  An update on the City's storm water program is a standing quarterly agenda item for City Council meetings. This ensures that the City's leaders and top managers are fully informed and aware of the activities of the storm water program.

Deficiencies Noted:

- *The City's storm water program management lacks adequate resources and authority to conduct adequate oversight of the City's program implementation and progress.*
  In accordance with section A.2.2 of the City's LIP, the City has an assigned LIP manager to coordinate and manage the development, implementation, and administration of the City's LIP and related DAMP programs. The manager's role is important and critical to the overall success of the City's program; however, it was apparent during the evaluation that the manager is overtasked. For example, the manager conducts many implementation tasks that are time intensive, such as industrial inspections and updates of the business inventory. The lack of adequate resources for program implementation results in the manager's being unable to conduct the general oversight of program activities that is needed for the City's program. The City should consider increasing the overall resources allocated to implementing its program to ensure that the LIP manager's time is allocated appropriately to coordinating and managing the implementation and administration of the LIP and related DAMP programs.

- *The City does not have a formal storm water program organization chart that emphasizes the role and authority of the storm water program manager in the implementation of the City's storm water program.*
  The City implements the various components of its storm water program through the various City departments. None of these departments or staff report directly to the City's LIP manager for their daily tasks or activities. This management structure adds complexity to the overall management of the program and might present a

higher risk for noncompliance if the City does not address it adequately. The use of various departments and staff persons to implement the program could be effective provided the role and authority of the person assigned as the overall LIP manager is clearly defined by the City. For example, the City could assign specific persons, such as the designated storm water inspectors, to report directly to the storm water program manager when it is appropriate.

- *The current Annual Report format does not allow the City to report its activities in sufficient detail to demonstrate full compliance with the City's permit and LIP.*
  The City's Annual Report does not accurately report all of the City compliance and enforcement activities, including follow-up activities conducted in response to complaints and incidents of noncompliance. This deficiency has resulted in the City's underreporting of some of its tasks. For example, in the Illegal Discharge/Illicit Connection (ID/IC) Program, City staff investigate all complaints received but do not report a complaint if staff cannot confirm a spill or discharge during their investigation. The City also does not report all of its follow-up actions. For example, in the Existing Development - Industrial Program, the City reports the number of inspections conducted, the number of enforcement actions taken, and the number of facilities with or without BMPs, but the report does not specify what the City inspectors did to bring facilities into compliance or explain how issues or incidents of noncompliance were resolved. The City should revise its annual reporting practices to include this additional information for all program areas that involve staff follow-up and response.

- *The City does not provide adequate oversight and does not audit contractors and County staff that perform work and activities for the City to ensure compliance with its permit and LIP.*
  The City relies on the County, special districts, and contractors to implement various elements of its permits, but the LIP manager does not adequately audit these activities to ensure that the contractors or other parties are implementing the program in accordance with the City's permit or LIP. The City should develop a procedure for conducting periodic audits of its contractors. The City should also develop and implement a reporting procedure to ensure that the contractors and other parties submit periodic reports of activities and certify that they are in compliance with the City's permit and LIP.

- *The City does not have a centralized database or tracking system for the management, monitoring, and reporting of its program.*
  Throughout Order R9-2002-2001, the City is required to collect and report activities conducted to implement the requirements of the permit and the City's LIP in its Annual Report and to evaluate and assess the effectiveness of the City's program. The City currently implements various rudimentary electronic and manual tracking practices to record permit-related activities. Each department is responsible for collecting and tracking data and providing data to the City's LIP manager, who then compiles the data for reporting to the Regional Board. The City's current methods do not provide the City the capabilities to (1) readily evaluate the status of BMP implementation for the entire program, or (2) properly evaluate and measure the

effectiveness of its program through trend analysis and other measurement and evaluation tools that might be available if a more centralized database system were used. The City is implementing a geographic information system (GIS) that will be initially deployed for the City's construction inspection program. The City plans to expand the GIS to include other City programs. The City should develop a more centralized tracking system to track and monitor its program, and it should proceed with expanding its GIS capabilities.

- *The City's enforcement policy could be strengthened to allow inspectors the capability to issue citations.*
  The City currently implements a progressive enforcement policy that assumes a certain level of burden of proof for City inspectors to demonstrate noncompliance before additional enforcement may be imposed. Although the enforcement policy allows the City to move immediately to stronger enforcement methods for egregious or unusual circumstances, in most cases, City inspectors are to provide a written Notice of Noncompliance specifying the items to be corrected and providing a time frame within which the alleged violator is to correct the situation. This process can discourage inspectors from adequately addressing violations that are serious enough to need immediate attention yet are not serious enough to meet the definition of "egregious" or "unusual." The City should consider revising its enforcement policy to include the issuance of citations by the City inspectors. MS4s that have implemented this method of enforcement have found it to be very effective in achieving immediate compliance.

2.4.2 Evaluation of Land Use Planning for New Development and Redevelopment

Positive Attribute:

- *The City is designing an approach to addressing water quality issues in areas within the City planned for future development.*
  The City has approximately 900 acres of open land on which it expects major development to occur during the next few years. The City is evaluating planning methods to ensure that it adequately addresses water quality up-front. The City is considering developing a master tentative map for the large planned development that will address major storm water quality issues for the entire development area. The water quality issues that involve the individual development projects within the master planned development will be addressed through specific plans. Because the development is expected to occur beyond the term of the City's current permit, the City was advised to ensure that requirements and conditions set in any such master document/plan ensure that future changes to the City's permit can be easily incorporated into the future development activities in the master plan.

Deficiencies Noted:

- *The City has not established a plan to ensure that urban runoff in common-interest areas and HOAs meets the objectives of the City's permit.*
  Part F.6.a of the permit requires the permittee to "develop and implement a plan for ensuring that urban runoff from private roads, drainage facilities, and other storm

water conveyance systems in common interest areas and in areas managed by HOAs meets the objectives of the permit." During the evaluation, City representatives indicated that they plan to develop a program to monitor and assess HOAs for improved BMP implementation.

- *The City's Planning Department's CEQA thresholds for water quality do not adequately address the storm water quality program objectives.*
  During the evaluation, City planning staff indicated that the City had developed very detailed thresholds for CEQA that define projects that would "normally have a significant impact" and identify potential mitigation measures. Staff indicated that the water quality thresholds address the requirements of the storm water program, in particular the new development requirements of the City's permit. The City did not consult with the Regional Board or ask the Regional Board to review or provide comment regarding the proposed thresholds prior to adopting and implementing them. Review of the thresholds subsequent to the evaluation has found that the thresholds do not adequately address Parts F.1.a and F.1.c of the City's permit, which describe issues to be addressed through general plans and the environmental review process. For example, Part F.1.a.(3) states that important water quality benefits provided by riparian corridors, wetlands, and buffer zones should be preserved and, where possible, created or preserved; however the significant thresholds do not include projects where the reduction or taking of riparian corridors, wetlands, and/or buffer zones would occur. In addition, the potential mitigation measures do not adequately address Part F.1.b of the City's permit which describes the WQMP requirements.

- *The City has not developed written procedures for implementing the WQMP requirements through its development processes and has not revised existing checklists to include appropriate references to the storm water requirements.*
  Part F.1.b.(2)(f) of the City's permit requires the City to develop an implementation process to ensure that the WQMP requirements are addressed. The purpose is to identify at what point in the planning process development projects will be required to meet the WQMP requirements. The City relies on the Engineering/Public Works Department to ensure that new development and construction requirements are adequately addressed in new development projects. Although use of the Engineering Department is appropriate, the City's current project review process does not address new development requirements early enough in the planning process and has resulted in developers limiting the types of BMPs they are willing to implement due to site design constraints. The City must develop an implementation process to ensure that new development requirements are addressed very early in the planning process.

  In addition to establishing a formalized process for review, additional tools are necessary to ensure that new development and construction programs are implemented effectively. The City has not developed pre-applicant guidance documents or checklists that address new development requirements. City officials indicated that such documentation is not necessary because the engineers and developers that develop and construct projects within the City are well versed in the storm water quality requirements of the City. However, the field visit portion of the

evaluation found poor compliance with the new development and construction requirements. New development BMPs were limited to catch basin inlet filters. New sites were developed with minimal landscaping, and all sites were paved with runoff directly connected to the storm drain system. Early site development planning and design could have addressed implementing additional BMPs and reduced the amount of paved area directly connected to the storm drain. Review of the City's existing application and engineering plan checklists found that the checklists do not adequately address water quality issues. Many lists have identified minimum items that must be shown on plans, but the lists do not include permanent BMPs. Currently, the City requires BMP that descriptions and details be addressed through WQMP plans. However, to ensure that BMPs are adequately addressed during the design and construction of projects, the BMPs should be adequately identified on construction plans along with the appropriate details and notes needed. The City should create or revise current checklists to adequately address new development and construction requirements.

2.4.3 Evaluation of Construction Program

Potential Permit Violations:

- *The City does not require developers to submit adequate erosion and sediment control plans.*

Part F.2.c of the City's permit lists the minimum requirements that must be addressed by the City in its construction management program. Parts F.2.c(1)(c) through F.2.c(1)(g) specify that (1) erosion prevention is the most important measure, (2) sediment controls are to supplement erosion control and are never to be used as the single or primary method, (3) sites are to minimize areas that are cleared and graded, and (4) sites are to minimize the exposure time of disturbed areas. The City does not require an adequate combination of erosion and sediment control BMPs to be implemented on construction sites. The erosion and sediment control plans reviewed during the evaluation did not include sufficient notes or details to ensure that BMPs would be installed, maintained, and monitored properly. The City's current program implements predominantly perimeter control and some other sediment control measures, but it does not require any erosion control measures to be implemented. This was confirmed during the field visit portion of the evaluation. During the office portion of this evaluation, a completed erosion and sediment control plan was reviewed, and the plan was found to include notes that call out many BMPs. Only perimeter control BMPs, however, were shown on the plan. The plans submitted to the City should include more specific details regarding the location, installation, construction, operation, and maintenance requirements of construction site BMPs. The City can refer to the *Erosion and Sediment Control Field Manual* developed for the San Francisco Regional Water Quality Control Board, which is available at http://www.waterboards.ca.gov/stormwtr/training.html. An additional reference is a manual developed by the Minnesota Pollution Control Agency on how to conduct inspections entitled *Storm Water Construction Inspection Guide;* it is available at http://www.pca.state.mn.us/publications/wq-strm2-10.pdf.

- *The City failed to apply for storm water General Construction Permit coverage for the El Toro Road construction project.*

  Part F.2.c requires the City to ensure that project proponents provide evidence of coverage under the State's General Construction Permit. The City failed to submit an NOI to the State for its own construction project on El Toro Road. The City also lacked documentation that the site had been adequately inspected to ensure that minimum BMPs were implemented.

Deficiencies Noted:

- *The City's construction site inspection staff is not adequately trained.*
  During the office and field portions of the evaluation, the evaluation team noted that the construction inspectors had a basic knowledge and awareness of the storm water program and its requirements; however, additional office and on-the-job training for construction inspectors is recommended. The inspectors lacked working knowledge of applicable and appropriate BMPs that should be implemented during the different phases of construction. Parts F.2.j.(1)(a) through F.2.j.(1)(e) of the City's permit establish lists of the minimum items construction site inspectors should understand to adequately inspect construction sites for compliance with the City's permit. Part F.2.j.(1)(c) requires that the inspectors understand how erosion is prevented. Based on field observations, the City inspectors need significant training and education in this area.

2.4.4 Evaluation of Existing Development: Industrial and Commercial Programs

Positive Attribute:

- *The City has dedicated storm water inspectors.*
  The City has two dedicated storm water inspectors that conduct industrial and commercial site visits. The inspectors are trained and knowledgeable in the City's code and permit requirements for the industrial and commercial BMP program.

Deficiencies Noted:

- *The City has difficulty maintaining an updated inventory because it does not issue business licenses.*
  Parts F.3.b.(2) and F.3.c.(2) require the City to create and annually maintain an inventory of all industrial and high-priority commercial sites in the City. The City does not issue business licenses, and the primary tool it uses to maintain its business inventory is for the City LIP Manager to drive through the City to visually identify new businesses. This process is very resource-intensive and makes it difficult for the City to maintain and sustain its industrial and commercial program. It also results in poor utilization of the LIP Manager's time, which could be used more effectively to manage, coordinate, and provide oversight to all storm water program areas and activities for the City. The City should investigate other tools and measures that could be used to better track when businesses start and stop, and to identify the types of business or activities. Such tools might include requiring all businesses to register with the City or working with other agencies or companies that might have access to

business information that could be made available electronically for use by the City, such as the Irvine Water District (IWD), utility companies, fire departments or the State of California.

- *The City does not have a schedule for conducting industrial inspections and has not inspected sites during the wet season.*
  The City has only 11 industrial facilities; and all have been identified as high-priority industries. They are all inspected once a year as required by the City's permit. City representatives indicated that they do not have a set approach for conducting industrial inspections and have not conducted any inspections during the wet season. Visually observing the runoff and conditions at an industrial site during a wet weather event is a useful tool in evaluating the overall effectiveness of an industrial site's BMP program. It is also one tool the City could use to evaluate the effectiveness of its MS4 industrial program. The City should develop an industrial inspection program that ensures that all of its industrial sites will be inspected at least once during the wet season over the term of the City's permit.

- *The City does not have a strategy for conducting commercial site inspections.*
  Part F.3.c.(4) of the City's permit requires the City to conduct inspections of high priority commercial sites and sources as needed. According to the City's 2004 Annual Report, there were 392 high-priority commercial facilities in the City. Section A-9.2.6 of the City's LIP requires the City to inspect high-priority commercial sites at least once during the permit cycle, but the City has not developed a strategy or process to determine how or when it will conduct site inspections of these facilities. Currently, the City determines which facilities to inspect by responding to complaints or to drive-by observations made by City personnel. Instead of implementing a random commercial inspection program, the City should develop a strategy for conducting inspections that will ensure that all sites are inspected during the term of the permit. One such approach is to partition the City into sectors and then schedule drive-by and site inspections of commercial sites within a particular sector.

- *The City's industrial minimum BMP fact sheets do not address BMP operation and maintenance (O&M) requirements.*
  In the City's 2004 Annual Report, the City indicated that some industrial facilities had only "partially implemented BMPs" but did not count these incidents as noncompliance. During the evaluation, City representatives indicated that the City uses the term "partially implemented BMPs" when BMPs have been implemented but not maintained. For BMPs to be fully effective and to ensure compliance with the City's permit, BMPs must be implemented and maintained. The City should consider the lack of adequate O&M for BMPs an incident of noncompliance when reporting such incidents to the Regional Board. In addition, the City should consider revising the fact sheets it developed for the minimum BMPs that must be implemented by industrial and commercial sites to include minimum O&M tasks for each BMP.

2.4.5 Evaluation of Illicit Discharge Detection and Elimination Program

Positive Attributes:

- *City staff walked the City's entire drainage area during the development of the system inventory and map.*

  The City was incorporated in 1991, and previous records of the storm sewer system were not accurate or were not available. To complete an inventory, City representatives walked the entire drainage area to adequately survey the system. This approach provided the City the opportunity to identify potential illicit connections and illegal discharges and to identify potential areas of concern for illegal discharges, dumping, or spills.

Deficiencies Noted:

- *The City does not adequately document its illicit discharge investigation activities.*
  Appendix A-10.2.5.1 of the City's LIP indicates that the City will use standardized forms to document all illicit discharge investigation activities. The City has developed a form that is to be used by city staff investigating discharges; however, during the evaluation City staff indicated that the form is rarely used. The City should implement the use of its source identification form in accordance with the LIP.

- *The City has not entered into a written agreement with the Irvine Water District (IWD) to implement elements of its program and has not provided training to the IWD or adequate oversight of IWD activities.*
  The City relies on the IWD to implement a portion of its IC/ID program in responding to sanitary sewer overflows (SSOs), but the City does not have a written agreement with the IWD. According to a City representative, the IWD may or may not report SSOs to the City. Although the IWD is conducting this activity for the City, the City is ultimately responsible for compliance with its permit and LIP. The City must develop and implement a program to address the activities of the IWD within the city limits. At a minimum, the City should enter into a written agreement with the IWD and provide training as soon as reasonably possible to IWD staff and managers. The City should seek the assistance of the Regional Board if the IWD does not enter into a written agreement with the City.

- *The City has not provided a map of its storm drain system to the County Fire Department or to the IWD.*
  The City relies on the County Fire Department to respond to hazmat spills and relies on the IWD to respond to SSOs, but the City has not supplied these entities with a map of their storm drain system. In accordance with Section A-10.1.3 of the City's LIP, the City has developed an MS4 map and other information necessary to allow staff to quickly and efficiently respond to spills. To ensure full compliance with the City's permit and LIP, this same information should be made available to all other agencies, departments, districts and contractors used by the City to implement elements of its IC/ID program.

2.4.6 Evaluation of Existing Development: Municipal Program

See section 2.4.1 for deficiency in providing oversight to contractors conducting municipal activities for the City.

2.5 City of Rancho Santa Margarita

2.5.1 Evaluation of Program Management and Effectiveness

Positive Attribute:

- *The City focuses much of its program on Home Owners Associations (HOAs).*
  The City of Rancho Santa Margarita is a new city that is comprised mostly of private streets and HOAs. This makes the City somewhat unusual in that there is not a significant number of development/redevelopment projects, high-priority construction sites, or industrial facilities. Because much of the City's storm water originates within the boundaries of an HOA, it is reasonable to assume that grounds maintenance, minor construction, landscaping, and other activities typically conducted by HOAs and private homeowners could be a significant source of storm water pollution. To address the threat to water quality posed by the HOAs, the City has adopted a storm water quality program for HOAs that is enforceable under a City ordinance.

Deficiency Noted:

- *The City should regularly evaluate the services provided by the County of Orange and commercial contractors.*
  The City relies on the County, special districts, and contractors to implement various elements of its permits, but the LIP manager does not adequately audit these activities to ensure that the contractors or other parties are implementing the program in accordance with the City's permit or LIP. The City should develop a procedure for conducting periodic audits of its contractors. The City should also develop and implement a reporting procedure to ensure that the contractors and other parties submit periodic reports of activities and certify that they are in compliance with the City's permit and LIP.

2.5.2 Evaluation of Land Use Planning for New Development and Redevelopment

Positive Attribute:

- *The City requires commercial projects that are not subject to WQMPs to develop plans for staff education and awareness.*
  For new development and redevelopment projects not subject to the WQMP requirements, the City requires that the projects address staff education and awareness of storm water quality issues.

Deficiency Noted:

- *The City should ensure that prioritization forms are completed for all potential WQMP projects.*
  The City has developed a prioritization form that assists plan review staff in determining whether a WQMP is required for a particular project. However, when reviewing the files for new development projects, the evaluation team found that

prioritization forms had not been completed on a regular basis. The City should ensure that these forms are completed for all potential WQMP projects.

2.5.3 Evaluation of Construction Program

Potential Permit Violation:

- *The City failed to require a project proponent to provide evidence of existing coverage under the State's General Construction Permit.*

  Part F.2.c(1)(j) of the MS4 permit requires that the City adopt construction and grading project requirements in local grading and construction permits that require construction and grading project proponents to provide evidence of coverage under the General Construction Permit. Section A-8.5 of the City's LIP mandates that the City require proof of General Construction Permit coverage before issuing a grading or building permit. The City disclosed during the records review portion of the MS4 program evaluation that a construction site subject to the requirements of the General Construction Permit was allowed to operate for a year without submitting an NOI and obtaining coverage under the permit.

Deficiency Noted:

- *City construction inspectors need to use all enforcement tools available to ensure compliance.*

  The field evaluation indicated that inspectors have the flexibility to give verbal warning or pursue more formal enforcement through notice of noncompliance orders, administrative compliance orders, administrative citations or fines, cease and desist orders, and stop work orders. During the field evaluation, the evaluation team observed, at the same construction site that had failed to submit an NOI, a non-storm water discharge of concrete wash water to the storm drain. The inspector issued a verbal warning for this violation. A verbal warning might be an effective means of enforcement for some violations, but an active, illegal discharge to the MS4 requires at least a written warning or even stronger action. As described in section 2.1.1, the City should develop a city-specific enforcement guide that specifies recommended actions when violations such as active discharges to the MS4 occur.

2.5.4 Evaluation of Existing Development: Industrial and Commercial Programs

Positive Attribute:

- *The City's industrial and commercial facility inspector was knowledgeable and conducted thorough inspections.*

  The City's inspector was well trained on storm water, BMPs, and enforcement of the City's storm water requirements. The inspector clearly identified deficiencies at the commercial and industrial facilities inspected and documented his findings by using an inspection checklist.

Deficiency Noted:

- *Code enforcement officers do not have citation authority.*
  Code enforcement officers who work under contract to the City do not have the authority to fine or cite violators of the City's storm water regulations. Code enforcement officers must refer violators to the City Attorney for imposition of fines. This would typically occur in only the most egregious of cases. It might be difficult to enforce requirements when violators know that enforcement officers are not able to levy fines without involving the City Attorney. See section 2.1.1 for a recommendation on developing a city-specific enforcement guide.

2.5.5 Evaluation of Illicit Discharge Detection and Elimination Program

Positive Attribute:

- *The City has a GIS-based catch basin maintenance program.*
  The City has a GIS-based tracking system for its catch basin maintenance program. Maintenance personnel (city contractors) clean the catch basins annually during the dry season. Maintenance personnel carry PDAs programmed to gather essential data for each basin. If any illicit discharges are observed, they are recorded in a PDA, from which the information is uploaded to a centralized database. Illicit discharges are investigated during follow-up inspections and tracked by using the centralized database.

2.5.6 Evaluation of Existing Development: Homeowners' Associations

Positive Attribute:

- *The City has developed an HOA document (DF-1 HOA) enforceable by City ordinance.*

  Much of the City is owned and maintained by private HOAs. To comply with part F.6 of the MS4 permit and to ensure that storm water discharges from HOAs to the City's MS4 do not cause violations of receiving water limitations, the City has negotiated with HOAs and developed an enforceable document (DF-1 HOA) that

  1. Includes a list of required minimum BMPs that HOAs and their contractors must implement.
  2. Requires HOAs to educate residents regarding storm water quality issues.
  3. Requires HOAs to clean and maintain their catch basins.
  4. Requires HOA members and contractors to fill out activity forms when performing work or maintenance that might affect storm water quality.
  5. Requires HOAs to submit an annual report to the City.

  The DF-1 HOA document will help the City to regulate most of the storm water discharged into its MS4.

Deficiency Noted:

- *Assessment of the HOA program is dependent on HOA self-reporting and monitoring requirements.*
  The City relies on HOA self-reporting to determine whether the HOA program is effective. It might be necessary for the City to inspect HOAs periodically for illicit discharges or other violations of City regulations. The inspection would ensure that the HOAs are implementing the program effectively.

Program Evaluation Report

San Diego Standard Urban Storm Water Mitigation Plan (SUSMP) Evaluation

Executive Summary

Tetra Tech, Inc., with assistance from the California Regional Water Quality Control Board, San Diego Region, conducted an evaluation of 10 of the 21 copermittees' Standard Urban Storm Water Mitigation Plan (SUSMP) programs in March 2005. The primary goal of the program evaluation was to determine each permittee's overall success in meeting the SUSMP conditions and requirements contained within the permit, with a focus on how each permittee reviews, approves, and implements the SUSMP requirements for individual projects.

This report describes the program evaluation, provides a summary of findings from the evaluation, and presents the individual evaluation results for each of the 10 copermittees reviewed. The evaluation of each copermittee consisted of an assessment of their SUSMP review procedures, a review of individual SUSMP plans submitted to the copermittee, and an evaluation of how SUSMP BMPs were implemented and maintained in the field.

For each copermittee, the evaluation team assessed the following:

- Requirements, including ordinances and local SUSMPs
- Tracking and screening of SUSMP priority projects
- SUSMP plan review procedures
- Maintenance requirements
- Field evaluation of constructed SUSMP projects

This report also contains a SUSMP evaluation checklist (Attachment 1) used by each team to verify that SUSMP reports complied with the requirements in the model SUSMP and a SUSMP evaluation reference sheet (Attachment 2) that summarizes some of the key tables and design information from the model SUSMP.

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1.0 Introduction

1.1 Program Evaluation Purpose

The primary goal of the program evaluation was to determine each permittee's overall success in meeting the SUSMP conditions and requirements contained within the permit, with a focus on how each permittee reviews, approves, and implements the SUSMP requirements for individual projects.

1.2 Permit History

The NPDES storm water permit was issued February 21, 2001, and is scheduled to expire February 21, 2006. The current permit, the second issued to the copermittees, requires each copermittee to develop and implement a Jurisdictional Urban Runoff Management Plan (JURMP). A component of the JURMPs is a program for land use planning for new development and redevelopment. This new development program includes the SUSMP requirements.

1.3 Logistics and Program Evaluation Preparation

Before initiating the on-site program evaluation, Tetra Tech, Inc., conducted a review of available program materials. The goals for the file review were (1) to gain greater knowledge of the existing program, permit requirements, performance criteria, and past activities and (2) to prepare for on-site activities. The following materials were reviewed:

- NPDES Permit No. CAS0108758
- Model SUSMP for San Diego, approved by SDRWQCB on 6/12/02
- Information, including local SUSMPs, submitted by each copermittee

Four evaluation teams were used in order to review the SUSMP programs of ten copermittees over three days. The evaluation schedule for the copermittees was as follows:

	Team 1	**Team 2**	**Team 3**	**Team 4**
Tuesday, March 1, AM	San Diego County	Carlsbad	Chula Vista	Poway
Tuesday, March 1, PM	San Diego County	Carlsbad	Chula Vista	Poway
Wednesday, March 2, AM	San Diego County	San Diego County	Oceanside	El Cajon
Wednesday, March 2, PM	City of San Diego		Oceanside	El Cajon
Thursday, March 3, AM	City of San Diego	Lemon Grove	National City	Escondido
Thursday, March 3, PM	City of San Diego	Lemon Grove	National City	Escondido

Each copermittee was asked to submit to the Regional Board a copy of their local SUSMP, the number of reviewed and approved SUSMP projects for the past reporting period, and the number of approved SUSMP projects that have been constructed. The evaluation addressed the following topics for each copermittee:

SUSMP review procedures
The evaluation teams discussed the SUSMP review procedures with each Copermittee. The evaluation also addressed tracking and review of SUSMP plans and how new projects are screened to determine SUSMP applicability.

Review of SUSMP plans
The evaluation team reviewed SUSMP plans that were either reviewed and approved by the copermittee or were still in the review process. Plans and files were reviewed to determine project compliance with the final model SUSMP. The total number of SUSMP plans reviewed varied by copermittee.

Field visits to verify SUSMP designs and BMPs
Finally, where approved SUSMP projects have been constructed or are undergoing construction, the evaluation team conducted field visits to verify that approved BMPs have been installed and are being operated and maintained in the field.

1.4 SUSMP Requirements

Terminology
The term Standard Urban Storm Water Mitigation Plan (SUSMP) refers to both the post-construction runoff control requirements placed on a project and the site-specific plan developed to meet those requirements. Some copermittees also use the terms Storm Water Management Plan (SWMP) or Water Quality Technical Report (WQTR) to refer to these site-specific post-construction runoff control plans. In general, the terms SUSMP, SWMP, and WQTR are interchangeable for the purposes of this report.

MS4 Permit Requirements
Part F.1 of the MS4 NPDES permit requires copermittees to "minimize the short- and long-term impacts on receiving water quality from new development and redevelopment to the maximum extent practicable." The SUSMP requirements are within Part F.1.b(2), which requires the copermittees to collectively develop a model SUSMP within one year and adopt a local SUSMP within 180 days of Regional Board approval of the model SUSMP.

Part F.1.b(2) describes the categories of priority development projects subject to SUSMP, the general BMP requirements applicable to SUSMP projects, numeric sizing criteria for treatment control BMPs, the requirement to address pollutants of concern, and the requirement to develop an implementation process for SUSMPs.

Model SUSMP Requirements
The final model SUSMP was approved by the Regional Board on June 12, 2002.

All new development and significant redevelopment projects that fall into one of 9 priority project categories are subject to the SUSMP requirements. The SUSMP requires project proponents to identify pollutants from the project area, identify the pollutants of concern in receiving waters, and identify the hydrologic conditions of concern for the project. This information will help the project proponent to then select appropriate storm water BMPs, including site design BMPs, source control BMPs, and treatment control BMPs. The model SUSMP describes the different types of site design BMPs that projects should consider and the source control BMPs that must be implemented when projects contain certain features. Treatment control BMPs that meet specific numeric sizing criteria are also required, along with proof of ongoing storm water BMP maintenance.

1.5 Program Areas Not Evaluated

This evaluation focused on the SUSMP requirements implemented by each copermittee and did not address other components of the copermittee's JURMPs such as construction or illicit discharges.

The following copermittees were not evaluated during this review:

- City of Coronado
- City of Del Mar
- City of Encinitas
- City of Imperial Beach
- City of La Mesa
- City of San Marcos
- City of Santee
- City of Solana Beach
- City of Vista
- San Diego Unified Port District
- San Diego County Regional Airport Authority

1.6 Program Areas for Additional Review

The evaluation team recommends the following program areas for additional review:

- A follow-up evaluation after additional SUSMP projects have been constructed to assess compliance.

- An evaluation of the site design techniques being approved by copermittees under the SUSMP requirements.

- Because many of the site visits were to projects either still under construction or recently constructed, a follow-up evaluation of the long-term operation and maintenance of treatment control BMPs is recommended after additional projects have been constructed and have been in use for a year or two.

2.0 Summary of Findings from the Program Evaluation

This section summarizes the SUSMP program findings identified during the evaluation in order to assist all copermittees in improving the implementation of their SUSMP program. This summary presents some of the key activities copermittees should consider in implementing their SUSMP program. Findings specific to each copermittee are identified in section 3.0 of this report.

SUSMP Requirements

Each copermittee has adopted a storm water ordinance and has developed a local SUSMP. The SUSMP requirements should be easily available to project proponents via the City's Web site or other means. Also, copermittees must ensure SUSMP requirements apply to both discretionary and ministerial projects that fall under one of the priority development categories.

SUSMP Tracking/Screening

Copermittees need a systematic method of screening incoming projects for SUSMP applicability. The use of a checklist to identify the priority development category and site design, source control, and treatment control best management practices required on-site is essential. If project applicants are required to complete such a checklist with their permit application, then the copermittee can verify the information during plan review. The same checklist should also be required to be completed for public projects.

Two specific issues that can be difficult to screen for are whether the project is discharging to an Environmentally Sensitive Area and whether the project is a significant redevelopment. Copermittees must ensure projects that replace more than 5,000 ft^2 of impervious surface and are not part of a routine maintenance activity comply with SUSMP requirements.

Copermittees also must develop a system to track SUSMP projects. This will help copermittees to report the total number of SUSMP projects to the Regional Board each year and will ensure that the copermittees can identify these priority projects in the future.

SUSMP Plan Review

The review of SUSMP plans is the most critical step in the SUSMP process. Plan review staff should have a formal document review process for SUSMPs. This includes the use of a checklist or similar mechanism to verify that the numerous SUSMP requirements have been appropriately addressed. An example of a SUSMP review checklist is provided in Attachment 1 of this report. Also, public SUSMP projects should undergo the same or an equivalent review process as private SUSMP projects.

Site design

Many of the SUSMP plans reviewed for this program evaluation did not adequately address site design. The Model SUSMP requires priority projects to "consider, incorporate, and implement where determined applicable and feasible" a series of site design BMPs. Copermittees should require project proponents to describe how they met each of the site design options, including where the project proponent deemed an option not feasible. To assist in understanding better site design concepts, several site design references are provided below for copermittees:

- As an educational resource to understand the concepts of better site design, the Bay Area Storm Water Management Agencies Association (BASMAA) published in May 2003 the document *Using Site Design Techniques to Meet Development Standards for Storm Water Quality*. This document is available from http://www.scvurppp-w2k.com/pdfs/0203/c3_related_info/startatthesource/using_sas.pdf.
- The Santa Clara Valley Urban Runoff Program has developed a guidebook of site design examples available from the City of Fremont's web page at http://www.ci.fremont.ca.us/Construction/StormwaterRegulations/SiteDesignTechniques.htm.
- The Low Impact Development Center provides examples of LID techniques at http://www.lid-stormwater.net/intro/sitemap.htm.

Source controls
The appropriate source controls for the project should be listed in the SUSMP and should include the same detailed requirements as described in the model and local SUSMPs (for example, irrigation systems should employ rain shutoff devices, be designed to the landscape area's specific water requirements, use flow reducers or shutoff valves, etc.). These detailed requirements for source controls should also be translated to the engineering plan sheets used by inspectors in the field.

Treatment controls
Many SUSMP reports did not adequately describe the selection of treatment controls to remove pollutants to the maximum extent practicable. Project proponents should begin with the treatment control that is most effective at removing the pollutant(s) of concern (Table 3 from the Model SUSMP) and provide a justification if that treatment control BMP is not selected. Copermittees should not approve SUSMP reports that propose drainage inserts (generally the lowest removal efficiency for most pollutants) without justification that other treatment control BMPs were considered and their implementation was found to be infeasible.

Also, some SUSMP reports did not clearly describe how treatment control BMPs were designed. Either the design criteria were not included in the report or the engineer attached multiple pages of printouts and other charts that did not clearly describe the BMPs' design. Copermittees could require developers to use standard forms to document the design of treatment control BMPs. As an example, Ventura County has developed a BMP manual that includes standard design procedure forms for BMPs. Ventura County's *Technical Guidance Manual for Storm Water Quality Control Measures* is available at http://www.vcstormwater.org/tech-man1-03.pdf. Copies of the design procedure forms are in Appendix G and Section 5.

SUSMP Maintenance Requirements
Project applicants are required to provide proof that structural treatment controls will be maintained. Maintenance can be performed by the landowner or an assessment district, home owner's association, or public entity. The copermittees should ensure that proof of how maintenance will be conducted is identified in the SUSMP report.

Source and treatment control BMPs should be tracked in order to assess the number of BMPs installed, for reporting purposes, and to create an inventory for verifying maintenance in the future.

Copermittees should also develop a process to periodically verify the effectiveness of selected BMPs. This could consist of random inspections of a small subset of BMPs to verify that they are being maintained. Inspectors conducting industrial or commercial inspections should also verify that structural treatment controls are being maintained. In order to assist with the process of verifying maintenance, copermittees should develop a system to track source control and treatment control BMPs. This information will help copermittees to ensure BMPs are not modified or removed (for example, storm drain labels could disappear or catch basin inserts could be removed).

SUSMP Field Evaluation

The thorough review of SUSMP reports is only half the process. The BMPs in an approved SUSMP report must be successfully installed and maintained in the field in order to protect water quality. Copermittees should ensure that the BMP design details in SUSMP reports are translated to the engineering plan sheets used in the field.

Inspection staff must also ensure that the SUSMP BMPs are properly installed in the field. This includes verifying factors such as the location, sizing, and type of BMPs installed. If during construction a change to site design, source control, or treatment control BMPs is necessary, that change should go through the same review process as the original SUSMP plan to ensure consistent application of the SUSMP requirements.

Training and Education

Training of copermittee staff and education of developers/engineers submitting SUSMP plans is critical to the success of the SUSMP program. Training for copermittee staff should focus on specific topics such as employing better site design techniques, identifying source controls, and selecting the most effective treatment controls for the targeted pollutants. Field staff should also receive training on source and treatment control BMP installation and maintenance.

Developers and engineers also must be educated on the SUSMP requirements and BMPs so they submit more effective SUSMP reports. This begins by making sure developers and engineers have the relevant regulations and standards readily available. Copermittees can also encourage better site design by providing developers/engineers with examples of local projects using innovative site design techniques.

3.0 Program Evaluation Results

Sections 3.1 through 3.10 below summarize the program evaluation results for each of the copermittees evaluated. Each copermittee section addresses the following SUSMP topics:

- SUSMP Requirements
- SUSMP Tracking/Screening
- SUSMP Plan Review
- SUSMP Maintenance Requirements
- SUSMP Field Evaluation
- Training and Education

This report briefly summarizes the copermittee's activities for each of the SUSMP topics and highlights key program strengths and weakness, where applicable. A program strength was identified when the activity was not common to all copermittees and could be applied by other copermittees to help implement their program. A program weakness was identified when a copermittee was not fully implementing the SUSMP requirements.

Because the evaluation team reviewed only a limited number of SUSMP reports and conducted a limited number of field evaluations, program weaknesses identified for one copermittee could also apply to other copermittees. Also, some copermittees had not reviewed many SUSMP projects yet, therefore the evaluation team was limited in the information available to review.

3.1 County of San Diego

3.1.1 SUSMP Requirements

The County's Watershed Protection, Storm Water Management, and Discharge Control Ordinance (WPO) requires both discretionary and ministerial permit applicants to demonstrate how the specific requirements in Appendix A of the WPO will be met before the decision maker approves the permit. Appendix A of the WPO contains the Stormwater Standards Manual (SSM), which describes in more detail, by project category, what dischargers must do to comply with the WPO and receive permits for projects and activities subject to the WPO. The WPO, including the SSM, defines the requirements that are legally enforceable by the County in the unincorporated parts of San Diego County. The WPO and SSM are available from: http://www.projectcleanwater.org/html/ordinance.html

Section G of the SSM addresses "Land Development and Redevelopment." The SSM largely codifies the requirements in the Model SUSMP and addresses additional requirements such as a list of site factors that must be considered in selecting BMPs (section G.4.2.1), a preference for natural BMPs (section G.4.4), practices to minimize impervious surface area (section G.4.6), and requirements for buffer zones (section G.4.7).

The County has developed a SUSMP Manual (available at http://www.sdcounty.ca.gov/dpw/watersheds/land_dev/susmp.html) that requires project proponents to develop a storm water management plan (SWMP) to comply with the SUSMP Manual and WPO. The SUSMP Manual describes the permitting procedures and process for SUSMP projects. The SUSMP Manual largely follows the Model SUSMP but does not address

all requirements in the WPO or SSM. For example, the requirement in section G.4.4.1 of the SSM that requires that "BMPs which incorporate natural systems or approaches shall be considered and shall be utilized whenever practical" is not specifically mentioned in the SUSMP Manual.

Program Strength:

- *The County's Watershed Protection Ordinance (WPO) and Stormwater Standards Manual (SSM) provide specific legal authority to help the County implement the SUSMP requirements.*
  The WPO and SSM are very specific in terms of the new development and redevelopment requirements for storm water. For example, Section 67.818 of the WPO requires all projects, whether a County permit or approval is required or not, to implement BMPs, if applicable, such as pollution prevention and source control, site design and site planning, BMPs for trash storage, and structural treatment BMPs.

Program Weaknesses:

- *The SWMP example provided in Appendix C of the County's SUSMP Manual is not detailed enough to serve as a good example for project engineers.*
  Most of the SWMPs reviewed by the evaluation team relied heavily on the example SWMP in Appendix C to dictate the format, content, and level of detail that should be in their SWMP. Unfortunately, this is generally not a good example for most projects to follow, and the example does not even comply with all of the requirements in the SSM. For example, the source control BMPs in the example largely list educational brochures. The source control BMPs do not address the specific requirements to use efficient irrigations systems (G.5.2.2.4), address storm drain tiles and signage (G.4.9), and address residential driveways (G.5.2.2.5(b)).

  The example SWMP is generally lacking in detail and gives project proponents the erroneous assumption that all plans should follow this format and contain this level of detail. Moreover, many project proponent SWMPs simply reiterate the language provided by the example SWMP, regardless of whether the language is applicable to the specific project or not. The County should consider either revising the example SWMP to more closely and specifically meet the WPO requirements, or remove the example SWMP and list the required elements of a SWMP instead. If the County chooses to revise the example SWMP, it should work with other jurisdictions in San Diego to review SUSMP plans that are more detailed and more closely meet the model SUSMP requirements.

- *The WPO Treatment Control BMP Selection Matrix is inconsistent with the Model SUSMP*
  Attachment G-3 of the WPO includes a Treatment Control BMP Selection Matrix, to be used in identifying treatment control BMPs that are effective in removing pollutants of concern from project runoff. However, the effectiveness rankings for "drainage inserts" listed in this matrix are not consistent with the Model SUSMP effectiveness rankings. Attachment G-3 provides "drainage inserts" with higher effectiveness rankings for various pollutants of concern than the effectiveness

rankings found in the Model SUSMP. The County must update Attachment G-3 to ensure that the listed BMP effectiveness rankings are consistent with the Model SUSMP. In addition, the County must closely review future SWMPs to ensure that the proper BMP effectiveness rankings are being used by project proponents.

- *The WPO limits the standards to only new project features*.
  WPO Section 67.818(a) states that "Post-construction BMP requirements imposed by this section and by the Stormwater Standards Manual shall not apply to those physical aspects of the project that have been completed or substantially completed pursuant to and as required by a valid County permit or approval, at the time a complete application for a subsequent permit or approval is submitted." However, section F.1.b.2.a of the permit requires that redevelopment projects which result in an increase of greater than fifty percent of the impervious surfaces of a previously existing development must treat the runoff from the entire development. The County should clarify when the WPO and SSM apply to the entire project site for redevelopment projects, and not just to the new project feature under construction.

3.1.2 SUSMP Tracking/Screening

The County generally requires SWMPs for all projects disturbing greater than 5,000 square feet. The County's permit tracking system, KIVA, does not currently track SUSMP priority development projects or the status of SWMP reviews. Because the County does not specifically flag projects that fall under one of the SUSMP priority project categories, the County was not able to easily identify SUSMP projects for the evaluation team to review.

Program Weaknesses:

- *The County does not adequately screen for and track SUSMP projects*.
  During the evaluation, the County could not easily identify projects that fell into one of the priority development project categories described on pages 7-8 of the WPO. By not tracking SUSMP category projects, the County is unable to effectively report the number of SUSMP projects reviewed annually to the Regional Board. The County should develop a process so that new projects that fall into one of the priority development project categories are appropriately screened and tracked for SUSMP compliance.

- *The County failed to apply SUSMP requirements to a County construction project.*
  The Riverside Drive Improvement project was scheduled to be sent out for bid on March 18, 2004. Although the County identified this as a priority development project, a formal SUSMP report was not prepared because the County believed that the project began before SUSMP requirements became effective. SUSMP requirements apply to all projects that had not yet begun grading or construction activities as of December 2002, therefore this project should have complied with the SUSMP requirements.

3.1.3 SUSMP Plan Review

Both the Planning and Land Use (DPLU) department and Public Works (DPW) Land Development section review WQMPs. DPLU staff are responsible for reviewing basic project

information and water quality information, while DPW staff are responsible for reviewing drainage, BMPs, and maintenance. Other than conditions of approval, neither department completes a detailed review checklist or develops written documentation demonstrating that the project has met the specific requirements in the WPO, SSM, and SUSMP Manual.

Program Weakness:

- *The County is not adequately reviewing SWMPs to ensure they comply with the WPO, SSM, and SUSMP Manual.*
  As described in Section 2.1.1 above, most of the SWMPs submitted to the County essentially mirror the example SWMP provided in Appendix C of the SUSMP Manual. County plan review staff generally approve plans that follow the example, even though these plans may not address all the requirements in the SUSMP Manual. Collectively, the WPO, SSM and SUSMP Manual represent more than 225 pages of requirements that would be difficult for a plan reviewer to memorize when reviewing plans. Plan review staff should document their review of SWMPs using a detailed checklist or similar document. An example of a SUSMP checklist is provided in Attachment 1 of this report.

- *The County is not adequately reviewing SWMPs to ensure treatment control BMPs are treating runoff from all areas of development projects.*
  During the field inspection, it was found that only approximately half of the under-construction Hidden Glen subdivision drained to a storm water detention basin for treatment, while the other half of the project drained to a concrete ditch without treatment. According to the field inspector, this design was in accordance with the approved plans for the project. SWMP plans should be more closely reviewed to ensure that runoff from all areas of development projects is being treated by treatment control BMPs.

- *Site design and source control BMPs are inadequately addressed in most approved SWMP plans.*
  Out of about a dozen SWMP plans reviewed during the evaluation, ten projects copied the language in the example SWMP in addressing site design and source control BMPs. The County's SUSMP Manual requires project applicants to "consider, incorporate, and implement where determined applicable and feasible" a series of site design BMPs. The example SWMP provides only minimal information on these BMPs and does not document how other BMPs not listed were considered. Each SWMP should document how site design BMPs are considered and should provide an explanation or justification if a site design BMP is not considered feasible.

  For source control BMPs, as described in section 3.1.1, the example does not provide details on the required source control BMPs for the project.

- *The County should require more detail before approving SUSMP plans.*
  Some of the SUSMP reports reviewed by the evaluation team lacked the necessary detail to determine whether the plan fully complied with the SUSMP requirements. The following are specific issues identified during the evaluation:

- Proponents of priority projects are not selecting treatment controls based on their efficiency. For a specific pollutant of concern, project proponents should start by considering treatment control BMPs with high removal efficiencies for that pollutant. Where a BMP with a high removal efficiency is not practicable, a justification should be provided in the plan before a lower efficiency BMP is accepted.
- Engineering plan sheets used by inspectors during construction should include the necessary details from the SUSMP plans. These inspectors often do not see the SUSMP plans, therefore the engineering plan sheets should include all necessary design details to ensure compliance.

3.1.4 SUSMP Maintenance Requirements

The County requires maintenance agreements for treatment control BMPs. In the County SUSMP Manual, the County has designated four categories of maintenance mechanisms. The first and second categories apply to maintenance on private property, while the third and fourth categories apply to BMPs the County will maintain.

Program Weakness:

- *The County should develop a system to track installed BMPs to help verify maintenance.*
  In order to verify that source control and treatment control BMPs are being adequately maintained, the County will need to develop a system to track the location of these controls. Then the County could conduct periodic inspections of a selected subset of projects to verify that the BMPs are being adequately maintained. This will also assist the County in annual reporting of the numbers of BMPs installed in the County.

3.1.5 SUSMP Field Evaluation

The audit team conducted field evaluations of four SUSMP projects—two completed projects and two under construction. All four projects generally met the approved design outlined in the SWMPs; however, the approved SWMP designs did not adequately meet the SUSMP requirements. For example, at a subdivision still under construction, only half of the site drained to a storm water detention basin for treatment while the other half of the project drained to a concrete ditch without treatment. Another commercial site visited did not employ site design BMPs such as directing roof runoff to vegetated areas and labeling catch basins. These problems reflect inadequate SWMP review, rather than lack of field verification.

3.1.6 Training and Education

County staff have received internal training on SUSMPs and have attended regional SUSMP workshops. The County also provides information on SUSMPs, including the County's SUSMP Manual, on its Web site.

Program Weakness:

- *The County should train staff annually and educate external stakeholders on SUSMP BMPs and requirements.*

Although the County has held a variety of training sessions on SUSMP topics for staff, additional training on topics such as better site design techniques, source controls, and selecting the most effective treatment controls for the targeted pollutants is needed to ensure the SUSMP requirements are fully met. DPW Engineers should also receive additional training on SUSMP BMPs and requirements. Field staff should receive training on source and treatment control BMP installation and maintenance.

The County should also conduct external training and education on SUSMP requirements, better site design techniques, BMPs, maintenance, and how to develop better SUSMP plans. This training and education should include developers, contractors, property owners, consultants, community planning groups, the construction community, and other interested groups.

3.2 City of Carlsbad

3.2.1 SUSMP Requirements

The City has developed a SUSMP manual both for construction and permanent storm water BMPs (April 2003) (http://www.ci.carlsbad.ca.us/stormwater/susmppdf/susmp.pdf). The SUSMP Manual describes the review and permitting procedures and process for SUSMP projects. The Manual includes two flow charts that outline the review process for "discretionary actions" and projects requiring a construction permit. Discretionary actions are defined by this manual (Figure 1, p. 5) as those that include "land use plan amendments, rezonings, subdivisions, planned development permits, planned industrial permits, redevelopment permits, coastal development permits, conditional use permits, [and] site development plans." The second flow chart (Figure 2, p. 6) states that projects that require construction permits are building permits, grading permits, demolition permits, ministerial permits, and public right-of-way permits.

Program Strength:

- *The City of Carlsbad reviews all businesses applying for conditional use permit renewals for SUSMP applicability.*
  Various businesses in the City are required to have conditional use permits (CUPs) in order to operate in certain areas of the City (i.e. drive-thru restaurants, veterinary hospitals). Each business owner is required to renew his/her CUP every five years. The City reviews each CUP renewal application and considers each site for SUSMP requirements. If the business is considered a priority project, the City requires the submittal of a SWMP.

Program Weakness:

- *The City's SUSMP Manual does not indicate that all ministerial projects must be reviewed to determine whether post-construction SUSMP requirements apply.*
  During the interview process, City staff indicated that all projects, discretionary and ministerial, are reviewed by Engineering Department staff for applicability of SUSMP requirements. A checklist was provided that showed that post-construction SUSMP requirements must be considered when submitting an application for a

grading permit, which covers many ministerial projects. However, the City's SUSMP manual (Figure 2) indicates that high priority projects requiring a construction permit (including ministerial permits) only require the development of SWPPP, not a post-construction SWMP. The City should amend the manual to indicate that all discretionary and ministerial priority projects must comply with post-construction SUSMP requirements.

3.2.2 SUSMP Tracking/Screening

Currently, the City is mapping public stormwater BMPs in a GIS Asset Inventory program. This program catalogs the location of various City assets and links the mapping to work maintenance software to indicate the locations of public infrastructure and track maintenance needs. Currently, the Asset Inventory includes publicly owned catch basins, outfalls, and regional detention facilities. Additional publicly maintained BMPs are being incorporated into the system later this year.

The City is developing a Treatment Control BMP Database to catalog private storm water management BMPs as well. Currently the City tracks the private development review process using Permits Plus software. This software only tracks SUSMP projects that paid the SWMP review fee that has been required since November 2003. The current database does not track the specific BMPs installed at SUSMP projects.

The planned new version of the Permits Plus database will require that applicants complete the Storm Water Requirements Applicability checklist and that information will be entered into the new database for review to determine if the project is a priority project. Any additional information submitted in a subsequent SWMP or SWPPP will also be entered and submittals and corrections will be tracked as well.

The locations of any private post-construction BMPs will be cataloged in the existing GIS Asset Inventory system to assist with scheduling of maintenance and inspection activities. By June 2005, the Treatment Control BMP Database system (including changes to Permits Plus and Asset Inventory) will begin incorporating private, "day forward" BMPs. No plans have been made to catalog existing, historic structures already installed.

The evaluation team reviewed a list of recent projects screened for SUSMP applicability and found that SUSMP projects were properly identified.

<u>Program Strength</u>:

- *The City is updating an existing database structure to improve SUSMP review and BMP installation tracking and reporting.*
  The new database structure will allow the City to track not only the SUSMP review process, but also the types and locations of installed post-construction BMPs so that the City will be able to adequately inspect and enforce maintenance requirements.

<u>Program Weakness</u>:

- *The City does not plan to locate and track existing or approved BMPs prior to the "day forward" date for the Treatment Control BMP Database implementation.*

In the City of Carlsbad, SUSMP requirements have been implemented at least since December 2002, therefore numerous post-construction BMPs undoubtedly have been installed during the last 2+ years. The City will need to know where these BMPs are in order to adequately inspect and maintain the BMPs.

3.2.3 SUSMP Plan Review

According to staff interviewed, all discretionary projects are reviewed by the Development Services Division of the Engineering department to determine whether they qualify as a priority project. In addition, Appendix A of the City's SUSMP Storm Water Standards provides a checklist for developers to use to determine the applicability of storm water requirements. Currently, the City does not require that this checklist be submitted by the developer. In addition, the City has developed a "Grading and Erosion Control Plan Submittal" checklist to assist developers with the submittal process. The checklist indicates that a storm water management plan (SWMP) is listed as a requirement for initial plan check "if the project is defined as a priority project per SUSMP or if conditioned with the project."

All proponents of discretionary projects are encouraged to prepare and submit a preliminary SWMP with a menu of possible BMPs. This SWMP is then reviewed and an "issues letter" is sent outlining problems or suggestions regarding the preliminary SWMP. This preliminary review costs $500 but is strongly recommended for most discretionary projects to ensure a more timely review and approval of final SWMPs. Approximately 40–50 percent of projects go through this process, which can also include a pre-project planning meeting with City staff.

Carlsbad public capital improvement projects (CIP) are designed in-house by City designers. According to staff interviewed, post-construction storm water requirements are determined using the CEQA environmental review process, not the Carlsbad SUSMP review document. The SUSMP is sometimes referenced to determine which "standard practices" should be used on certain public projects, but the review process is not followed during the design of public projects.

<u>Program Weaknesses</u>:

- *The City of Carlsbad is not incorporating SUSMP requirements into CIP projects.* The City's NPDES MS4 permit requires and the Carlsbad SUSMP Manual confirms that public projects are required to comply with all Manual requirements. Interviews with applicable staff, however, indicated that this site design process was not being followed and staff interviewed did not have a basic knowledge of SUSMP requirements. The evaluation team did not review specific SUSMP plans for CIP projects as staff indicated that SUSMP requirements were not currently being incorporated into CIP projects.

- *The City should require more detail before approving SUSMP plans.* Some of the SUSMP reports reviewed by the evaluation team lacked the necessary detail to determine whether the plan fully complied with the SUSMP requirements. The following are specific issues identified during the evaluation:
    - The model SUSMP requires priority project proponents to "consider, incorporate, and implement where determined applicable and feasible" a

series of site design BMPs. The City should ensure that plans address these site design options and provide a justification if an option is not included in the design.

- Proponents of priority projects are not selecting treatment controls based on their efficiency. For a specific pollutant of concern, proponents should start by considering treatment control BMPs with high removal efficiencies for that pollutant. Where a BMP with a high removal efficiency is not practicable, a justification should be provided in the plan before a lower efficiency BMP is accepted.
- Engineering plan sheets used by inspectors during construction should include the necessary details from the SUSMP plans. These inspectors often do not see the SUSMP plans, therefore the engineering plan sheets should include all necessary design details to ensure compliance.

3.2.4 SUSMP Maintenance Requirements

The City has mapped basic storm water public infrastructure and maintains those assets accordingly. In addition, as previously stated, the City of Carlsbad is developing a comprehensive database system to consistently track post-construction BMPs on private and public projects in the City. This database will be used to manage maintenance activities for publicly-owned BMPs as well as to track and inspect private facilities to ensure compliance with maintenance agreements required by the SUSMP.

Program Weakness:

- *The City should develop a system to track installed BMPs to help verify maintenance.* In order to verify that source control and treatment control BMPs are being adequately maintained, the City will need to develop a system to track the location of these controls. Then the City could conduct periodic inspections of a selected subset of projects to verify that the BMPs are being adequately maintained. This will also assist the City in annual reporting of the numbers of BMPs installed in the City.

3.2.5 SUSMP Field Evaluation

The evaluation team visited two different projects in the City of Carlsbad, one CIP and one subdivision.

Program Weakness:

- *The field evaluation confirmed that the City is not consistently incorporating post-construction BMPs into CIP projects.*
  One of the projects visited was a CIP road extension that was necessary for serving a subdivision. For this reason, the Cannon Road extension was partially built by the developer and the remainder is being constructed by the City. The storm water from the portion of the road that was required in the private development SUSMP is being treated with post-construction BMPs (i.e., detention pond). The remaining section of the roadway, which discharged directly into a surface water, was being constructed by the City and did not incorporate any post-construction SUSMP requirements. City staff indicated that this project began prior to SUSMP requirements implemented in

December 2002, however, no retrofit of catch basins has been incorporated into the public roadway design.

3.2.6 Training and Education

Engineering staff indicated that weekly meetings are held to discuss development project requirements and educate staff members about new BMPs and site design techniques. Staff attend periodic seminars presented by consultants and vendors.

Program Weakness:

- *The City should train staff annually and educate stakeholders on SUSMP BMPs and requirements*.
  Although the City has held a variety of training sessions on SUSMP topics for staff, additional training on topics such as better site design techniques, source controls, and selecting the most effective treatment controls for the targeted pollutants is needed to ensure the SUSMP requirements are fully met. Field staff should also receive training on source and treatment control BMP installation and maintenance.

  The City should also conduct external training and education on SUSMP requirements, better site design techniques, BMPs, maintenance, and how to develop better SUSMP plans. This training and education should include developers, contractors, property owners, consultants, community planning groups, the construction community, and other interested groups.

3.3 City of Chula Vista

3.3.1 SUSMP Requirements

The City of Chula Vista SUSMP is based on the model SUSMP and is implemented through the City's *Development and Redevelopment Projects Storm Water Management Standards Requirements Manual* (November 26, 2002) available at http://www.chulavistaca.gov/City_Services/Development_Services/Engineering/stormWaterManual.asp. This Manual provides information to applicants for development, redevelopment, and public projects that are processed through the City on how to comply with permanent storm water requirements. The City uses the Manual to implement section 14.20.120.A of the Chula Vista Municipal Code, which makes it unlawful for any person not to comply with BMPs and pollution control requirements established by the City or other responsible agency to eliminate or reduce pollutants entering the City's storm water conveyance systems. The Manual is currently being updated by the City.

Part II of the Manual, titled Project Review & Permitting Process, specifies that both discretionary and ministerial projects are subject to priority project permanent storm water requirements. Appendix A of the Manual requires that applicants complete the "Storm Water Requirements Applicability Checklist." Applicable SUSMP requirements must be incorporated per Appendix B1 of the Manual, which specifies that project proponents must incorporate all necessary permanent BMPs into the project plans prior to submittal, regardless of project type. Another requirement is the preparation and submission of a Water Quality Technical Report (WQTR) in accordance with Attachment B1 of the Manual. The WQTR must include an

analysis of the project's anticipated pollutants of concern in downstream receiving waters as well as conditions of concern.

Ultimately, the process consists of project screening to determine applicable storm water BMP requirements, project review after applicants prepare and submit an appropriate plan culminating in the City making a determination of the adequacy of the proposed plan, and project tracking and inspection to ensure implementation and maintenance requirements are met.

Program Weakness:

- *The City should ensure that the review process addresses all SUSMP requirements.* The City's recent reorganization that changed its internal review process for SUSMP requires that up to 7 organizations provide some SUSMP review function. Although the new organization appears to be logical as described by the City, because so few SUSMP projects have made it all the way through the process, it is still too early to tell if some of the SUSMP program elements have the potential to fall through the cracks without being addressed.

3.3.2 SUSMP Tracking/Screening

The evaluation team reviewed the 30 most recent projects received for screening by the City. The vast majority of these projects required SUSMPs and the City was accurately screening these projects to ensure the SUSMP requirements were applied.

The City is in the process of developing a computer system by which SUSMP projects identified as such during the grading permit process are linked to the City's Building Inspections database (their Permits Plus computer system) and flagged for SUSMP requirements. The City intends to obtain project CADD files to enter into the system and then edit them once they are verified following project completion. This system has a field for SUSMP priority development projects and a separate GIS layer for future maintenance requirements and agreements that are tied to specific BMP facilities.

3.3.3 SUSMP Plan Review

The City's Planning Division is the first to review private development applications and evaluate them for potential environmental issues. Planning also routes Initial Studies, EIRs, Tentative Maps, and other development-related documents to the Engineering Division and the Public Works Operations Storm Water Management Section for review and comment. These two groups screen for SUSMP and other requirements and provide feedback to the Planning Division. Development applicants are required to comply with the City's *Development and Redevelopment Projects Storm Water Management Standards Requirements Manual*. Preparation and submission of a water quality technical report (WQTR) is required for all SUSMP projects. The WQTRs identify pollutants of concern and propose source control and treatment control BMPs. The City has an independent consultant to essentially serve as City review staff to assess and verify developers' analyses contained in special permit applications, WQTRs, and grading plans prior to permit issuance.

The City's Community Development department routes its projects to the Engineering Permits Section for review and screening for SUSMP requirements. The General Services Design

Section develops CIPs and includes SUSMP requirements in the design of these projects where required. The General Services Parks and Buildings Section develops public parks and other building projects. SUSMP requirements are included where required based on review by the Storm Water Management Section.

Program Weakness:

- *The City should require more detail before approving SUSMP plans.* Attachment B1 of the City's Manual provides direction on the content of WQTRs, however, some of the SUSMP reports reviewed by the evaluation team lacked the necessary detail to determine whether the plan fully complied with the SUSMP requirements. The following are specific issues identified during the evaluation:
    - The model SUSMP requires proponents of priority projects to "consider, incorporate, and implement where determined applicable and feasible" a series of site design BMPs. The City should ensure that plans address these site design options and provide a justification if an option is not included in the design.
    - Proponents of priority projects are not selecting treatment controls based on their efficiency. For a specific pollutant of concern, proponents should start by considering treatment control BMPs with high removal efficiencies for that pollutant. Where a BMP with a high removal efficiency is not practicable, a justification should be provided in the plan before a lower efficiency BMP is accepted.
    - Engineering plan sheets used by inspectors during construction should include the necessary details from the SUSMP plans. These inspectors often do not see the SUSMP plans, therefore the engineering plan sheets should include all necessary design details to ensure compliance.

3.3.4 SUSMP Maintenance Requirements

Public Works inspectors ensure that development projects are constructed according to approved plans, which includes inspection and approval of installed/constructed treatment control BMPs. The Engineering Division develops agreements with private developers for long-term maintenance of structural treatment control BMPs. These take the form of agreements with Home Owners' Associations that in some instances become part of the Codes, Covenants, & Restrictions (CC&Rs) or result in the establishment of Community Facility District (CFD) Agreements, both of which include maintenance and funding mechanisms whereby the responsible parties are required to conduct inspections and maintenance as well as maintain a log for inspections by the City's Storm Water Management staff. The Storm Water Management Section maintains publicly owned SUSMP treatment control BMPs.

Program Weaknesses:

- *Maintenance agreements are not always approved at the same time as the WQTR.* Although the City appears to be working towards implementation of a comprehensive approach to ensuring owner maintenance responsibility through the use of model maintenance agreements, supplementary declarations, and CFD agreements, the evaluation team observed that fully executed and enforceable agreements are not always in place at the time that SUSMP projects are approved.

- *The City should develop a system to track installed BMPs to help verify maintenance*. In order to verify that source control and treatment control BMPs are being adequately maintained, the City will need to develop a system to track the location of these controls. Then the City could conduct periodic inspections of a selected subset of projects to verify that the BMPs are being adequately maintained. This will also assist the City in annual reporting of the numbers of BMPs installed in the City.

3.3.5 SUSMP Field Evaluation

Generally, infiltration BMPs are not being encouraged by the City, so there appears to be a tendency for the approved treatment control BMPs to be proprietary flow-based inserts and filtration devices. The field evaluation consisted of visiting four SUSMP projects and found generally that SUSMP BMPs were being implemented as designed.

3.3.6 Training and Education

Department of Public Works Operations Storm Water Section and Engineering Division staff receive external storm water-related training 3 or 4 times per year. The City also provides internal training that may include storm water topics at biweekly staff meetings. This training is tailored to the responsibilities that each City agency has regarding storm water and SUSMP requirements. The City is also proactive with developers and the general public regarding storm water awareness.

Program Weakness:

- *The City should train staff annually and educate stakeholders on SUSMP BMPs and requirements*.
  Although the City has held a variety of training sessions on SUSMP topics for staff, additional training on topics such as better site design techniques, source controls, and selecting the most effective treatment controls for the targeted pollutants is needed to ensure the SUSMP requirements are fully met. Field staff should also receive training on source and treatment control BMP installation and maintenance.

  The City should also conduct external training and education on SUSMP requirements, better site design techniques, BMPs, maintenance, and how to develop better SUSMP plans. This training and education should include developers, contractors, property owners, consultants, community planning groups, the construction community, and other interested groups.

3.4 City of El Cajon

3.4.1 SUSMP Requirements

The City adopted Ordinance No. 4717, which is an amendment to the Municipal Code Title 16, Subdivisions 16.100 through 16.108, and includes the language for the SUSMP requirements (available at http://municipalcodes.lexisnexis.com/codes/elcajon/). The Ordinance was adopted on December 17, 2002, and follows the format and language of the model SUSMP. Ministerial and discretionary projects undergo an identical initial screening process for SUSMP requirements.

The City adopted a Jurisdictional Urban Runoff Management Program (JURMP) on February 12, 2004, that provides descriptions of specific measures to minimize or eliminate the impacts of human activities to receiving waterbodies. The JURMP is available online at http://www.ci.el-cajon.ca.us/content/forms/JURMP.pdf.

3.4.2 SUSMP Tracking/Screening

The City has developed project tracking and screening tools that have evolved with the program over time. A spreadsheet was developed that tracks all the SUSMP projects, including the priority development project category, project description, BMPs implemented, and project status. A development review process is established that ensures all projects are screened for SUSMP applicability. The City has not had any recent public projects, so only private projects have been screened and tracked at this time.

Program Strength:

- *The City has an excellent tracking and screening system.*
  The City keeps thorough records of current, future, and past projects, what was done, what the trigger was, and the BMP types that were implemented. The development review is set up such that the Storm Water Section is one of the first to review plans for SUSMP applicability.

Program Weakness:

- *The City does not adequately identify projects that fall into multiple SUSMP categories.*
  A project can fall under more than one priority project category, thereby requiring additional source controls for each category. During the evaluation, the City stopped the initial review once a project had been identified as a SUSMP project, ignoring the fact that the project may actually fall into more than one category. For example, the City identified a new car dealership as a SUSMP project because of the added impervious area but missed the fact that this project also contained a garage that would fall under the automotive repair shop priority project category.

3.4.3 SUSMP Plan Review

The City prepared a flow chart to show the proper routing of the review process, which ensures all projects are reviewed in the proper order by the appropriate staff. A SUSMP Implementation Checklist is used to verify that the project meets SUSMP requirements and that the plans reflect what is proposed. The City will soon publish a Storm Water Management Plan template that will provide applicants with a format for drainage reports and submittals to streamline the review process.

Program Weaknesses:

- *The City does not currently have a standard format for plan submittals related to storm water.*
  The City has not established clear standards for the format and content of SUSMP reports, resulting in staff spending a significant amount of time trying to locate

information in the document. The City is currently developing a document that will specify the format for SWMPs, providing consistency for review staff.

- *The City should require more detail before approving SUSMP plans.*
  Some of the SUSMP reports reviewed by the evaluation team lacked the necessary detail to determine whether the plan fully complied with the SUSMP requirements. The following are specific issues identified during the evaluation:
  - The model SUSMP requires proponents of priority projects to "consider, incorporate, and implement where determined applicable and feasible" a series of site design BMPs. The City should ensure that plans address these site design options and provide a justification if an option is not included in the design.
  - Proponents of priority projects are not selecting treatment controls based on their efficiency. For a specific pollutant of concern, proponents should start by considering treatment control BMPs with high removal efficiencies for that pollutant. Where a BMP with a high removal efficiency is not practicable, a justification should be provided in the plan before a lower efficiency BMP is accepted.
  - Engineering plan sheets used by inspectors during construction should include the necessary details from the SUSMP plans. These inspectors often do not see the SUSMP plans, therefore the engineering plan sheets should include all necessary design details to ensure compliance.

3.4.4 SUSMP Maintenance Requirements

A Storm Water Management/BMP Facilities Agreement is executed between the City and the property owner prior to project acceptance. The City allows several options for maintenance, including public equity maintenance, project proponent agreements, conditional use permits, etc. The Agreement stipulates that the City has the right to maintain storm water facilities should the owner not properly maintain them. The Agreement becomes part of the land record for the property and annual inspections are required at a minimum.

Program Weakness:

- *The City should develop a system to track installed BMPs to help verify maintenance.*
  In order to verify that source control and treatment control BMPs are being adequately maintained, the City will need to develop a system to track the location of these controls. Then the City could conduct periodic inspections of a selected subset of projects to verify that the BMPs are being adequately maintained. This will also assist the City in annual reporting of the numbers of BMPs installed in the City.

3.4.5 SUSMP Field Evaluation

The evaluation team visited seven projects in the field, including commercial and residential projects and a parking lot. The principal SUSMP reviewer spends a great deal of time in the field verifying compliance with the permits, especially after rain events.

Program Weakness:

- *Several of the sites visited did not conform to the approved plans.*

Designs, as approved, were not constructed in the field properly and the City did not identify these problems. In situations where the BMPs were not functioning or built properly, City staff had difficulty understanding why the device was not functioning and what should be done to repair or remedy the situation.

3.4.6 Training and Education

City staff have not received any formal training other than a periodic day-long seminar. The City has a good public outreach program and distributes flyers, brochures, and fact sheets in the City offices and on their Web site. The City also has a PowerPoint presentation on storm water training for public employees on the City's Web site.

Program Weakness:

- *The City should train staff annually and educate stakeholders on SUSMP BMPs and requirements.*
  Although the City has held a variety of training sessions on SUSMP topics for staff, additional training on topics such as better site design techniques, source controls, and selecting the most effective treatment controls for the targeted pollutants is needed to ensure the SUSMP requirements are fully met. In particular, staff should also receive training on technical storm water design issues such as peak flow control and water quality control requirements. Field staff should also receive training on source and treatment control BMP installation and maintenance.

  The City should also conduct external training and education on SUSMP requirements, better site design techniques, BMPs, maintenance, and how to develop better SUSMP plans. This training and education should include developers, contractors, property owners, consultants, community planning groups, the construction community, and other interested groups.

3.5 City of Escondido

3.5.1 SUSMP Requirements

Escondido Municipal Code, Chapter 22, Article 2, Storm Water Management and Discharge Control, Sections 22-19 through 22-31, address the NPDES permit requirements, although the phrase SUSMP does not appear in the ordinance. The City of Escondido Zoning Code Article 55, Grading and Erosion Control Ordinance requires that all new development and redevelopment activities comply with the Storm Water Management Requirements. The Ordinance is available at http://www.ci.escondido.ca.us/depts/pw/utilities/stormwater/regulations/stormord.pdf. The Municipal Code can be found at http://ordlink.com/codes/escondid/index.html and the Grading and Erosion Control Ordinance is located at http://www.ci.escondido.ca.us/depts/pw/utilities/stormwater/regulations/gradord.pdf.

In addition, the City has a *Storm Water Management Requirements and Local Standard Urban Storm Water Mitigation Plan* document that was approved on November 13, 2002. The document contains the SUSMP specifics, construction and post-construction BMP information, and implementation and maintenance requirements. The document also provides a SUSMP applicability form, water quality technical report guidelines, and various BMP/pollutant

matrices. This document is available at
http://www.ci.escondido.ca.us/depts/pw/utilities/manual/index.html.

3.5.2 SUSMP Tracking/Screening

As part of the erosion control plan required for all earth-disturbing projects, the City also requires conformance with the storm water requirements. Public projects do not undergo the same screening process as private projects, and many public projects discussed did not address storm water at all.

Projects are tracked by grading permit number in a spreadsheet. The evaluation team found it difficult to follow exactly how the projects were tracked for SUSMP compliance. A hand-written logbook was used to enter projects, and SUSMP-applicable projects were not clearly marked.

Program Weaknesses:

- *The City does not adequately screen for and track public SUSMP projects.*
  During the evaluation, the City admitted that public projects do not undergo the same review process as private projects and that SUSMP requirements are addressed in-house by the design engineer. There is no designated staff lead who verifies SUSMP compliance on public projects.

- *The City failed to apply SUSMP requirements to a City construction project.*
  The Bear Valley Parkway Project, which began after the SUSMP requirements took effect, is in Phases II and IV of construction but a SUSMP report has not been developed. Two additional transportation improvements were included on the City's SUSMP list – El Norte (a City road improvement project) and Oakhill (street widening) – but the SUSMP plans were not available to the evaluation team for review. However, these two projects listed "storm drain facilities" as their SUSMP BMP, which is similar to the BMP listing for the Bear Valley Parkway Project. The City should ensure that all public projects that fall within one of the priority project categories comply with the SUSMP requirements.

3.5.3 SUSMP Plan Review

Projects that are determined to be SUSMP-applicable are reviewed by Planning, Engineering, and Storm water staff. A checklist or format is not available for reviewers to follow for consistency and accuracy. Written documentation of the review and comment stages is not kept.

Program Strength:

- *The City encourages each project submitted for review to use natural techniques to manage storm water.*
  Although not specifically required by the Stormwater Standards Manual, City staff stated that they encourage project proponents to use natural, vegetative techniques to promote infiltration and reduce runoff volume when practical. This encouragement has resulted in most of the SUSMP projects using biofiltration BMPs instead of other structural treatment controls.

Program Weaknesses:

- *The City should improve the coordination between Planning and Engineering departments on SUSMP reviews.*
  Because both Planning and Engineering staff review SWMPs, ownership of the SUSMP process and final approval of SWMPs is sometimes unclear. The City should designate a lead review authority for SWMPs and also document a process that identifies department responsibilities for SUSMP compliance.

- *The City should require more detail before approving SUSMP plans.*
  Some of the SUSMP reports reviewed by the evaluation team lacked the necessary detail to determine whether the plan fully complied with the SUSMP requirements. For example, pollutants of concern were not properly identified and required site design and source controls were not always included. The following are specific issues identified during the evaluation:
  - The model SUSMP requires proponents of priority projects to "consider, incorporate, and implement where determined applicable and feasible" a series of site design BMPs. The City should ensure that plans address these site design options and provide a justification if an option is not included in the design.
  - Proponents of priority projects are not selecting treatment controls based on their efficiency. For a specific pollutant of concern, proponents should start by considering treatment control BMPs with high removal efficiencies for that pollutant. Where a BMP with a high removal efficiency is not practicable, a justification should be provided in the plan before a lower efficiency BMP is accepted.
  - Engineering plan sheets used by inspectors during construction should include the necessary details from the SUSMP plans. These inspectors often do not see the SUSMP plans, therefore the engineering plan sheets should include all necessary design details to ensure compliance.

- *The City does not maintain records of review comments.*
  The City sends mark-up reviews back to the developer and does not maintain a copy in-house. Any revisions made to the plans are listed on the final set of plans that are approved. Inaccuracies or omission of information in the original submittal and drainage report are not required to be revised.

3.5.4 SUSMP Maintenance Requirements

Maintenance of BMPs is required twice monthly and after rainfall events. The City has a landscape maintenance district and contracts with a local landscape firm to maintain BMPs periodically. A maintenance agreement is a condition of plan approval and acceptance.

Program Weakness:

- *The City should develop a system to track installed BMPs to help verify maintenance.*
  In order to verify that source control and treatment control BMPs are being adequately maintained, the City will need to develop a system to track the location of these controls. Then the City could conduct periodic inspections of a selected subset

of projects to verify that the BMPs are being adequately maintained. This will also assist the City in annual reporting of the numbers of BMPs installed in the City.

3.5.5 SUSMP Field Evaluation

Several different types of projects were evaluated in the field. The evaluation team also reviewed the SUSMP report for most of the projects visited.

Program Weaknesses:

- *Many of the facilities visited were not maintained.*
  Several biofilters and basins visited were under-performing with evidence of large amounts of sediment build-up that decreased capacity and reduced hydrologic benefits. At one location, a charter school, the filter inserts to two catch basins were missing. The City should remind property owners of the need to adequately maintain BMPs and should periodically inspect selected SUSMP projects to verify if BMPs are being properly maintained.

- *Two sites did not conform to the approved plans.*
  Two sites that were visited were required to have roof drains connected to landscaped areas and biofilters. Both sites had the roof drains discharging to the parking lot and the biofilters were under-sized and lacked sufficient storage and filtration capacity. City inspectors should ensure that BMPs are installed as designed on approved SUSMP plans.

3.5.6 Training and Education

The City has good information regarding storm water pollution prevention available through the City's Web site, as well as various brochures and pamphlets available in City Hall. City staff have not received any formal training, and understanding of storm water quality fundamentals was poor overall.

Program Weakness:

- *The City should train staff annually and educate stakeholderson SUSMP BMPs and requirements.*
  Although the City has held a variety of training sessions on SUSMP topics for staff, additional training on topics such as better site design techniques, source controls, and selecting the most effective treatment controls for the targeted pollutants is needed to ensure the SUSMP requirements are fully met. Field staff should also receive training on source and treatment control BMP installation and maintenance.

  The City should also conduct external training and education on SUSMP requirements, better site design techniques, BMPs, maintenance, and how to develop better SUSMP plans. This training and education should include developers, contractors, property owners, consultants, community planning groups, the construction community, and other interested groups.

3.6 City of Lemon Grove

3.6.1 SUSMP Requirements

The City of Lemon Grove has developed a SUSMP document that outlines, using both narrative text and flow charts, the SUSMP requirements for the City (http://www.ci.lemon-grove.ca.us/clg_copy(1)/cityhall/departments/SUSMP.pdf). All discretionary and ministerial projects are reviewed by the Water Quality Program Coordinator (Public Works department) for SUSMP applicability. The City is mostly built out with very little new development. Staff stated that approximately 10 to 14 infill projects were proposed each year, with most being single family houses.

3.6.2 SUSMP Tracking/Screening

The City currently tracks SUSMP projects using a paper filing system. Due to the low number of development projects submitted annually, a comprehensive database has not been developed for the program. The Water Quality Program Coordinator plans to develop a simple database to track SUSMP projects and requirements. There are only six approved SUSMP projects in the City and none have been implemented to date.

3.6.3 SUSMP Plan Review

A recently hired Water Quality Program Coordinator in the Public Works department reviews all ministerial and discretionary projects to determine SUSMP applicability. She also participates in pre-project planning meetings with Community Development staff and reviews all submitted SWMPs. No checklists are used to review proposed projects or submitted SWMPs.

Various BMPs are being required and approved by the City. However, file reviews and staff interviews revealed that the City often approves existing "urban storm water conveyance channels" as storm water BMPs on proposed projects. The City was informed that if those channels are actually receiving waters of the State, they may not be used for storm water treatment and storm water is to be treated prior to discharge to any such receiving water. The City's SUSMP definition of "receiving waters" includes streams that are perennial, intermittent, and ephemeral that exhibit bed, bank, and an ordinary high water mark, which is consistent with the definition of State waters. Site inspections on several proposed projects were scheduled to verify whether assumed urban storm water conveyance channels were actually waters of the State.

Program Weaknesses:

- *The City does not utilize a SUSMP checklist during the review of potential projects or to determine if submitted SWMPs meet the requirements of the local SUSMP.*
  The City should develop several checklists for use by the Water Quality Program Coordinator. An applicability checklist should be used to determine if proposed projects should be considered priority projects under the SUSMP requirements. This checklist should then be kept on file for reference when reviewing submitted SWMPs. A second checklist should then be used to review SWMPs for compliance with the local SUSMP requirements, including whether appropriate pollutants of concern are identified and whether all required site design, source control, and

treatment control BMPs are addressed. These checklists could also be provided to applicants to assist in the timely submittal of compliant SWMPs.

- *The City should require more detail before approving SUSMP plans.*
  Some of the SUSMP reports reviewed by the evaluation team lacked the necessary detail to determine whether the plan fully complied with the SUSMP requirements. The following are specific issues identified during the evaluation:
  - The model SUSMP requires proponents of priority projects to "consider, incorporate, and implement where determined applicable and feasible" a series of site design BMPs. The City should ensure that plans address these site design options and provide a justification if an option is not included in the design.
  - Proponents of priority projects are not selecting treatment controls based on their efficiency. For a specific pollutant of concern, proponents should start by considering treatment control BMPs with high removal efficiencies for that pollutant. Where a BMP with a high removal efficiency is not practicable, a justification should be provided in the plan before a lower efficiency BMP is accepted.
  - Engineering plan sheets used by inspectors during construction should include the necessary details from the SUSMP plans. These inspectors often do not see the SUSMP plans, therefore the engineering plan sheets should include all necessary design details to ensure compliance.

3.6.4 SUSMP Maintenance Requirements

Maintenance agreements and plans are required for SUSMP projects, however, during the file review, one project (Winemiller development) did not include the necessary detailed maintenance plan.

Program Weakness:

- *The City should develop a system to track installed BMPs to help verify maintenance.*
  In order to verify that source control and treatment control BMPs are being adequately maintained, the City will need to develop a system to track the location of these controls. Then the City could conduct periodic inspections of a selected subset of projects to verify that the BMPs are being adequately maintained. This will also assist the City in annual reporting of the numbers of BMPs installed in the City.

3.6.5 SUSMP Field Evaluation

Because there were no SUSMP projects constructed, the evaluation team visited two small proposed subdivision projects in the City. Both are in the preliminary planning stages and the City is currently negotiating initial project requirements. The sites were selected to determine whether existing ditches on the sites were "urban drainage channels" that can be used for storm water treatment, or waters of the State, which are considered receiving waters and cannot be used for storm water treatment.

Program Weakness:

- *The field evaluation confirmed that the City is incorrectly characterizing waters of the State as urban storm water conveyance channels.*
  The channels inspected at both proposed projects exhibited bed, bank, and an ordinary high water mark. Staff were informed that the channels could not be used as storm water treatment and should be considered the receiving waters for each proposed development. The City was encouraged to contact the Regional Board with questions about future projects.

3.6.6 Training and Education

The current SUSMP reviewer was hired in the fall of 2004. She has not received any formal SUSMP training to date but is scheduled to attend BMP training in May 2005. She has received on-the-job training and appears adequately knowledgeable about basic SUSMP requirements; however, the inspection team recommends that she receive additional site design and low-impact development training to assist in SWMP review.

Program Weakness:

- *The City should train staff annually and educate stakeholders on SUSMP BMPs and requirements.*
  Additional training for staff on topics such as better site design techniques, source controls, and selecting the most effective treatment controls for the targeted pollutants is needed to ensure the SUSMP requirements are fully met. Field staff should also receive training on source and treatment control BMP installation and maintenance.

  The City should also conduct external training and education on SUSMP requirements, better site design techniques, BMPs, maintenance, and how to develop better SUSMP plans. This training and education should include developers, contractors, property owners, consultants, community planning groups, the construction community, and other interested groups.

3.7 City of National City

3.7.1 SUSMP Requirements

The City Council of the City of National City passed their SUSMP ordinance on November 19, 2002. The ordinance is enforceable pursuant to Section 1.20.010 of the City's Municipal Code. According to the ordinance, the SUSMP provisions take precedence over the City's Municipal Code in case of a conflict. The ordinance requires that all City departments must implement, administer, and enforce the SUSMP.

Page 1 of the City's SUSMP implementation document, dated November 6, 2002, specifies that the City will approve SUSMP project plans as part of the development plan approval process for discretionary projects, and prior to issuing permits for ministerial projects.

The City's SUSMP is based on the San Diego Model SUSMP.

3.7.2 SUSMP Tracking/Screening

The City keeps track of its development projects manually through the use of project case files. An evaluation of the list of the most recent project applications that the City had received indicated that all but one of the SUSMP projects had been adequately screened and identified.

Each of the SUSMP project files reviewed during the audit contained a completed "Priority Project Applicability Checklist" that identified the project name, location, address, receiving water information (hydrologic unit and sub area), and whether any previous storm water action is on file for the site. The form includes a yes/no checklist that review staff complete for each project. This guides the reviewer through the basic SUSMP applicability types to determine priority project permanent storm water BMPs and to determine standard permanent storm water requirements.

Program Weakness:

- *The City should improve their SUSMP tracking mechanism.*
  Information on SUSMP projects is contained within individual project files. The City does not track SUSMP projects using a computerized system and therefore is unable to quickly track or summarize SUSMP projects. The City will need this tracking system as more SUSMP projects are approved in order to assist with both reporting on SUSMP activities and verifying maintenance of SUSMP BMPs.

3.7.3 SUSMP Plan Review

The City has identified the departments responsible for ensuring that SUSMP requirements are implemented and the roles and responsibilities that each department has under the review process. SUSMP requirements must be incorporated into project designs at specific points along the way during the development review process. For both discretionary and ministerial projects, SUSMP requirements must be incorporated into the project design and shown on the plans before the approval of required permits. City departments that implement public projects that are not required to obtain permits are responsible for ensuring that SUSMP requirements are incorporated into project designs and shown on plans before bidding for construction contracts can occur.

The City requires preparation and submission of water quality management plans (WQMPs) along with project applications for SUSMP projects. The City's consultant, D-Max Engineering, reviews and provides a recommendation of approval to the City for WQMPs. D-Max uses the WQMP Checklist to document their review. The checklist includes various SUSMP and other local review elements.

Program Weaknesses:

- *The City should ensure that developers consider various site design, source control, and treatment control BMPs and justify their selection of BMPs.*
  Due to site size constraints, particularly with redevelopment projects, the City often ends up approving the developer's use of storm drain inserts and other proprietary storm water treatment devices rather than requiring them to seriously consider other site design opportunities. The City should require developers to document which BMPs they considered in their design and justify their BMP selection. This is

especially critical when a project proponent selects a BMP such as a catch basin insert, which has a low removal efficiency for most pollutants.

- *The City should require more detail before approving WQMPs.*
  Some of the WQMPs reviewed by the evaluation team lacked the necessary detail to determine whether the plan fully complied with the SUSMP requirements. The following are specific issues identified during the evaluation:
  - The model SUSMP requires proponents of priority projects to "consider, incorporate, and implement where determined applicable and feasible" a series of site design BMPs. The City should ensure that plans address these site design options and provide a justification if an option is not included in the design.
  - Proponents of priority projects are not selecting treatment controls based on their efficiency. For a specific pollutant of concern, proponents should start by considering treatment control BMPs with high removal efficiencies for that pollutant. Where a BMP with a high removal efficiency is not practicable, a justification should be provided in the plan before a lower efficiency BMP is accepted.
  - Engineering plan sheets used by inspectors during construction should include the necessary details from the WQMPs. These inspectors often do not see the WQMPs, therefore the engineering plan sheets should include all necessary design details to ensure compliance.

3.7.4 SUSMP Maintenance Requirements

The City has developed a template for a "Private Storm Water Treatment Maintenance Agreement" between the Director of Public Works/Engineering and private project proponents. This agreement is supposed to be recorded and then kept on file with the City Clerk. The City described that they also require assurance that annual maintenance of treatment control BMPs has occurred before the onset of the wet season. However, the evaluation team was not able to view any documentation that this has actually occurred in the field with any of the SUSMP treatment control practices.

Program Weakness:

- *The City should develop a system to track installed BMPs to help verify maintenance.*
  In order to verify that source control and treatment control BMPs are being adequately maintained, the City will need to develop a system to track the location of these controls. Then the City could conduct periodic inspections of a selected subset of projects to verify that the BMPs are being adequately maintained. This will also assist the City in annual reporting of the numbers of BMPs installed in the City.

3.7.5 SUSMP Field Evaluation

The field evaluation consisted of visiting three sites. The evaluation team was not able to review the WQMPs for the projects but generally found that BMPs were being implemented. One large commercial project showed no evidence of site design BMPs being used. At a new condominium that was nearly completed the plan had called for roofs to drain to landscaped areas as required by site design BMPs. However, during construction, a change was made to allow the roof drains

to discharge to the parking lot instead of the landscaped area. It was not clear in the field whether these plan changes were approved by the City or not.

Program Weakness:

- *The City should improve their management of WQMP files.*
  Due to hard copy file management and storage issues, the City was unable to produce complete sets of the plans, including drainage studies and WQMPs, for the three sites visited in the field. The City should improve their tracking and information management of WQMPs to ensure the information is readily available during both plan review and construction of projects.

- *Changes to WQMP plans during construction should go through the same review process as the original plan.*
  During one of the field visits, the construction operator stated that some BMPs were changed and "approved" by the City. A copy of the WQMP plan was not available, so it was unclear whether, like the original plan, the change was reviewed and approved by the City's consultant. Whenever changes are made to site design, source control, or treatment control BMPs, these changes should go through the same review process as the original plan.

3.7.6 Training and Education

The City's consultant, D-Max, provided training to City staff with SUSMP responsibilities in January 2005. The training consisted of a PowerPoint presentation of SUSMP requirements and how they are being applied in National City. The training materials presented succinct information for both planning and engineering staff and had examples of what developers are required to provide, how plans should be reviewed and evaluated, and examples of engineering calculations for BMP sizing.

Program Weakness:

- *The City should train staff annually and educate stakeholders on SUSMP BMPs and requirements.*
  Although the City has held a variety of training sessions on SUSMP topics for staff, additional training on topics such as better site design techniques, source controls, and selecting the most effective treatment controls for the targeted pollutants is needed to ensure the SUSMP requirements are fully met. Field staff should also receive training on source and treatment control BMP installation and maintenance.

  The City should also conduct external training and education on SUSMP requirements, better site design techniques, BMPs, maintenance, and how to develop better SUSMP plans. This training and education should include developers, contractors, property owners, consultants, community planning groups, the construction community, and other interested groups.

3.8 City of Oceanside

3.8.1 SUSMP Requirements

The City's Clean Water Coordinator leads SUSMP program management and oversight in Oceanside. The Planning and Engineering departments play important project screening and review roles, although the consulting firm PBS&J has been retained by the City to conduct most of the SUSMP program implementation activities. The Engineering department conducts the project completeness determinations and all priority projects are routed to PBS&J staff, who are responsible for the review and evaluation for compliance with SUSMP requirements.

The City's SUSMP was originally prepared in November of 2002 and was most recently revised on February 6, 2003. The City's SUSMP is based on the Model SUSMP developed collectively by the copermittees.

In addition to the SUSMP requirements, the City also requires a Runoff Assessment Report (RAR) for projects that fall just below the SUSMP thresholds. This includes residential developments between 5 and 9 units, commercial and industrial developments creating 2,500 to 4,999 square feet of impervious area, and parking lots from 5 to 14 parking spaces.

Materials used internally by PBS&J staff include a Storm Water Mitigation Plan (SWMP)/Runoff Assessment Report (RAR) Review Checklist, an Operation and Maintenance (O&M) Review Checklist, SUSMP/RAR Tracking Spreadsheet, and a Post-construction BMP Tracking Spreadsheet.

Additional information on the City's storm water program can be found at http://www.oceansidecleanwaterprogram.org/ by selecting "development" and then "local development information."

Program Strengths:

- *The City requires more than just priority project category projects to implement post-construction BMPs.*
  The City requires implementation of BMPs for projects that do not trigger SUSMP projects (i.e., non-priority projects) through its Runoff Assessment Report (RAR) requirements. These projects are smaller than SUSMP priority projects and include projects that are just under the threshold for SUSMPs.

- *The City has developed a clear and detailed Web site to guide developers through the storm water requirements.*
  The City's Clean Water Program Web site (http://www.oceansidecleanwaterprogram.org/) includes information that clearly guides a developer through the various storm water-related requirements. This includes explaining the State construction general permit process and the City's local process for SUSMPs and RARs. Information on construction site prioritization, inspections, BMPs, and other topics is also included.

3.8.2 SUSMP Tracking/Screening

An evaluation of the list of the 30 most recent project applications received indicated that the SUSMP projects are being screened and identified adequately. The projects that were not considered SUSMP (or RAR) included several very small development sites with small impervious footprints and a general plan amendment, which by itself does not represent any actual development.

The City's SUSMP project electronic tracking system is a spreadsheet-based system that contains information on the status of the storm water mitigation plan (SWMP) reviews. The City has developed some internal information tracking mechanisms, such as the Runoff Assessment Report Submittal Requirements Checklist, which is a comprehensive approach to tracking and effectively managing the information submitted. However, this checklist does not appear to have been integrated into an automated system to track SUSMP projects as they are being developed or treatment control BMPs once they have been installed.

Program Weakness:

- *The City's electronic SUSMP project tracking system should be upgraded to enable it to capture all facets of the SUSMP program.*
  The electronic tracking system should include information on the source control and treatment control BMPs selected, as well as information from the requirements checklist. This information will help the City ensure consistent review of projects and assist in verifying maintenance of BMPs.

3.8.3 SUSMP Plan Review

The City provides SUSMP information to project proponents via the *Application Package for Planning Department Processing*, the *Development Processing Guide*, and the City's SUSMP requirements document.

An applicant proposing a development project requiring a discretionary action obtains a copy of the *Application Package for Planning Department Processing*, which informs the applicant of SUSMP and RAR requirements. The applicant may request a pre-submittal development conference to determine SUSMP/RAR applicability. The City requires that a complete and comprehensive SWMP or RAR be prepared and submitted to the Planning department as part of a complete application. The application package is routed to the Engineering department for a completeness determination. If the application is incomplete, the Engineering department provides comments to the Planning department, which are then sent to the applicant.

Complete applications are reviewed by the Engineering department's consultant for a determination that the SWMP or RAR is acceptable. If not, the cycle is repeated via comments to the Planning department, which are in turn sent back to the applicant for reconsideration/revision. Once considered to be acceptable by the Engineering department and the Application Review Committee, conditions of approval are provided to the Planning department, who incorporates the SWMP or RAR into the project's environmental documentation. The Planning Commission then reviews and renders approval or disapproval of discretionary actions.

Program Strength:

- *The City encourages passive BMPs and requires project applicants to provide justification if an alternative is selected.*
  City staff state that they encourage passive, open channel BMPs, and applicants are required to justify the selection of an alternative to these types of BMPs. The City also requires that applicants use the efficiencies identified in Table 3 of their February 6, 2003, SUSMP when demonstrating the appropriateness of certain BMPs for given pollutants of concern.

Program Weakness:

- *The City should require more detail before approving SWMPs.*
  Some of the SWMPs reviewed by the evaluation team lacked the necessary detail to determine whether the plan fully complied with the SUSMP requirements. The following are specific issues identified during the evaluation:
    - The model SUSMP requires proponents of priority projects to "consider, incorporate, and implement where determined applicable and feasible" a series of site design BMPs. The City should ensure that plans address these site design options and provide a justification if an option is not included in the design.
    - Proponents of priority projects are not selecting treatment controls based on their efficiency. For a specific pollutant of concern, proponents should start by considering treatment control BMPs with high removal efficiencies for that pollutant. Where a BMP with a high removal efficiency is not practicable, a justification should be provided in the plan before a lower efficiency BMP is accepted.
    - Engineering plan sheets used by inspectors during construction should include the necessary details from the SWMPs. These inspectors often do not see the SWMPs, therefore the engineering plan sheets should include all necessary design details to ensure compliance.

3.8.4 SUSMP Maintenance Requirements

Maintenance of SUSMP BMPs is ensured through a requirement that recorded agreements are executed between project proponents and the City. A letter of credit (bond) covering 10 years of estimated maintenance costs, easements, and conditions of approval are also specified for each SUSMP structural BMP. The City provides an O&M Submittal Requirements and Procedures package to each project proponent, Storm Water Facilities Maintenance Agreement (SWFMA) Guidelines for their submittal, a template for the Maintenance Agreement, Letter of Credit, and a copy of the Standard Conditions of Approval.

Following project approval by the Planning Commission, the applicant prepares or revises their SWMP O&M Plan, the 10-year O&M cost estimate, and the letter of credit that is equal to the 10-year cost estimate. The project proponent then executes the maintenance agreement with the City, and once the Engineering department determines that theses materials are acceptable, they are routed to the City Attorney for review. If the City Attorney determines that the O&M materials are unacceptable, they are sent back to the applicant for revision and resubmission.

Once the City Attorney finds the agreement to be acceptable, it is recorded with the San Diego County Recorder and also kept on file with the City's Engineering department.

Program Strength:

- *The City has developed detailed standards for O&M plans that include a security for 10 years of maintenance costs.*
  The City recently developed in February 2005 submittal requirements for O&M plans. These submittal requirements describe the required components of an O&M Plan, including an annual and ten-year cost estimate for maintenance. In addition to a storm water facilities maintenance agreement, project applicants are required to include a security that covers 10 years of maintenance costs.

Program Weakness:

- *The City should develop a system to track installed BMPs to help verify maintenance.*
  In order to verify that source control and treatment control BMPs are being adequately maintained, the City will need to develop a system to track the location of these controls. Then the City could conduct periodic inspections of a selected subset of projects to verify that the BMPs are being adequately maintained. This will also assist the City in annual reporting of the numbers of BMPs installed in the City.

3.8.5 SUSMP Field Evaluation

The field evaluation consisted of visiting four sites. In general, site design, source control, and treatment control BMPs were implemented at the sites. At one site, a church, bioswales with a significant standing water problem were observed, indicating the final grade of the bioswale was not implemented according to the approved plan.

Program Weakness:

- *The City needs to ensure that BMPs are installed according to the approved plans.*
  The standing water problem that was observed in the bioswale at the church project indicated that the final grade of this bioswale was not implemented according to the approved plan. City inspectors should ensure that BMPs are installed according to the approved plans.

3.8.6 Training and Education

City staff that have SUSMP implementation responsibilities receive periodic training from PBS&J staff. An internal training titled "Urban Runoff Requirements for Development" was held on November 5, 2003, and was attended by all relevant staff. Staff also attended a SUSMP Workshop held in May 2004.

Program Weakness:

- *The City should train staff annually and educate stakeholders on SUSMP BMPs and requirements.*
  Although the City has held a variety of training sessions on SUSMP topics for staff, additional training on topics such as better site design techniques, source controls, and selecting the most effective treatment controls for the targeted pollutants is needed to

ensure the SUSMP requirements are fully met. Field staff should also receive training on source and treatment control BMP installation and maintenance.

The City should also conduct external training and education on SUSMP requirements, better site design techniques, BMPs, maintenance, and how to develop better SUSMP plans. This training and education should include developers, contractors, property owners, consultants, community planning groups, the construction community, and other interested groups.

3.9 City of Poway

3.9.1 SUSMP Requirements

The City adopted Ordinance No. 569, which amends Title 16, Subdivisions and Other Land Use Regulations, of the Poway Municipal Code for Standard Urban Storm Water Mitigation Plan, on January 22, 2002. Poway's Municipal Code is located at http://search.mrsc.org/nxt/gateway.dll/pwaymc?f=templates&fn=pwaypage.htm$vid=municodes:Poway. The Ordinance is similar to the model SUSMP.

Chapter 16.102 of the Ordinance contains the provisions for SUSMP requirements. The City adheres to the conditions of the Ordinance and encourages all project proponents to incorporate BMPs into their site plans. Both ministerial and discretionary permits are required to comply with the Ordinance requirements. A maintenance agreement is required to be submitted with the project prior to the issuance of permits.

Program Strength:

- *The City has a development review committee that meets weekly to discuss new and ongoing projects.*
  The City meets regularly so that all departments can discuss upcoming and ongoing development projects. This enables each department to be aware of what is going on and allows inspectors from different departments to check on SUSMP projects in the field.

Program Weakness:

- *A standard format has not been established for submission of SUSMP projects.*
  The City had not developed a standard format for the drainage report. The drainage reports reviewed during the audit lacked consistency and not all of the required components of the report were included, such as proper pollutant identification. It has not yet been a problem for the City because the majority of the projects were parking lots; however, this lack of consistency can pose problems in the future if more complex projects are proposed.

3.9.2 SUSMP Tracking/Screening

The City has had 22 projects reviewed and approved since the SUSMP requirements went into effect. The City tracks all projects that require any type of permit, both public and private, and maintains project folders that include the project history and associated communications with

applicants. The Development Services department has an established SUSMP screening process in place.

3.9.3 SUSMP Plan Review

As most of the SUSMP projects were priority projects because of the parking lot requirements, it was difficult to assess how the review process would work for other types of priority projects. A checklist is not used to review projects for SUSMP requirements. There is some confusion as to whether some projects required a SUSMP, such as long driveways creating >5,000 ft^2 of imperviousness. The City has requested clarification on these issues. The City's consultant, D-Max Engineering Inc., performs the more complex SUSMP submittal reviews.

Program Weaknesses:

- *The City should develop a standard protocol for SUSMP plan review.*
  Without a formal process, such as a checklist, to document whether the many requirements involved in a SUSMP project are met, it is difficult to ensure that all aspects have been included. For example, plan review staff must check whether the correct pollutants of concern are listed, whether all site design and source control BMPs have been considered and included, and whether the best treatment control BMPs has been selected. Because the vast majority of the SUSMP projects fall under the parking lot priority development category, the City may wish to include in the protocol more specific information for the review of these types of projects.

- *The City should require more detail before approving SUSMP plans.*
  Some of the SUSMP reports reviewed by the evaluation team lacked the necessary detail to determine whether the plan fully complied with the SUSMP requirements. The following are specific issues identified during the evaluation:
  - The model SUSMP requires proponents of priority projects to "consider, incorporate, and implement where determined applicable and feasible" a series of site design BMPs. The City should ensure that plans address these site design options and provide a justification if an option is not included in the design.
  - Proponents of priority projects are not selecting treatment controls based on the efficiency. For a specific pollutant of concern, proponents should start by considering treatment control BMPs with high removal efficiencies for that pollutant. Where a BMP with a high removal efficiency is not practicable, a justification should be provided in the plan before a lower efficiency BMP is accepted.
  - Engineering plan sheets used by inspectors during construction should include the necessary details from the SUSMP plans. These inspectors often do not see the SUSMP plans, therefore the engineering plan sheets should include all necessary design details to ensure compliance.

3.9.4 SUSMP Maintenance Requirements

The City requires that a maintenance mechanism be in place before the final acceptance of structural BMPs. Each structural BMP presented for the project must have an Operation & Maintenance Plan and access agreement. A maintenance agreement is executed between the City

and the owner as to how the installed BMPs will be maintained. The City has the right to maintain the BMP if the owner fails to comply with the agreement, and all costs incurred by the City are billed to the owner.

Program Strength:

- *The City inspects structural BMPs frequently and departments are cross-trained.* At a minimum, the City inspects constructed structural BMPs on a yearly basis, and the City inspects structures more frequently during construction and significant rainfall events. Various types of inspectors are trained in SUSMP requirements, and these inspectors look for maintenance problems during other types of inspections (e.g., building or erosion and sediment control inspections).

Program Weakness:

- *The City should develop a system to track installed BMPs to help verify maintenance.* In order to verify that source control and treatment control BMPs are being adequately maintained, the City will need to develop a system to track the location of these controls. Then the City could conduct periodic inspections of a selected subset of projects to verify that the BMPs are being adequately maintained. This will also assist the City in annual reporting of the numbers of BMPs installed in the City.

3.9.5 SUSMP Field Evaluation

Seven sites were reviewed in the field, most all of them parking lots with filter inserts, as the majority of the City's SUSMP projects were of this type. One residential community that was not a SUSMP project but had incorporated site and source control BMPs was also visited.

Program Weakness:

- *Sites reviewed in the field lacked sufficient maintenance.* The majority of the sites visited during the field review lacked adequate maintenance and were under-performing. Most of the filter inserts were clogged or not installed properly and not functioning as intended. The City should remind property owners of the need to adequately maintain BMPs and should periodically inspect selected SUSMP projects to verify if BMPs are being properly maintained.

3.9.6 Training and Education

The City staff responsible for implementing the SUSMP requirements have been with the City since the inception of the Ordinance. Staff has received formal training via workshops and seminars. The City provides information to the development community via brochures, handouts, and online resources.

Program Weakness:

- *The City should train staff annually and educate stakeholders on SUSMP BMPs and requirements.* Although the City has held a variety of training sessions on SUSMP topics for staff, additional training on topics such as better site design techniques, source controls, and selecting the most effective treatment controls for the targeted pollutants is needed to

ensure the SUSMP requirements are fully met. Field staff should also receive training on source and treatment control BMP installation and maintenance.

The City should also conduct external training and education on SUSMP requirements, better site design techniques, BMPs, maintenance, and how to develop better SUSMP plans. This training and education should include developers, contractors, property owners, consultants, community planning groups, the construction community, and other interested groups.

3.10 City of San Diego

3.10.1 SUSMP Requirements

The City of San Diego primarily implements the SUSMP requirements through their Stormwater Standards Manual (available at http://www.sandiego.gov/development-services/news/newslist.shtml#storm). The Stormwater Standards Manual describes the project review and permitting process for both permanent BMPs and construction BMPs. Discretionary actions and projects requiring a construction permit (such as building permits, grading permits, demolition permits, or right-of-way permits) are required to comply with the Manual.

All projects are required to complete a "Storm Water Requirements Applicability Checklist" that identifies whether the project falls into one of the priority development categories. Projects subject to the priority project requirements must submit a Water Quality Technical Report (WQTR) and address requirements in the Manual on identifying pollutants and conditions of concern. The Manual describes how project applicants are to identify pollutants and conditions of concern and BMPs for site design, source control, and treatment control.

The City's main storm water Web site is at http://www.sandiego.gov/stormwater/.

Program Strength:

- *The City's Stormwater Standards Manual includes guidelines on the contents of WQTRs.*
  Appendix D of the Manual specifies the contents and minimum requirements in a WQTR. These guidelines list the contents for a site map, issues that need to be addressed for pollutants and conditions of concern, and the major factors to consider in selecting BMPs. This provides developers with guidance on how to write the WQTRs and helps to ensure a consistent format when reviewing the WQTRs.

3.10.2 SUSMP Tracking/Screening

As mentioned above, the City uses an applicability checklist to identify SUSMP priority projects. The City also uses databases, including the Project Tracking System (PTS) database, to track SUSMP projects.

Program Strength:

- *The City requires project applicants to complete a Storm Water Requirements Applicability Checklist with their permit application.*

The Storm Water Requirements Applicability Checklist is a standard form that is required to be completed and submitted with permit applications. The checklist asks project applicants whether they meet one of the SUSMP priority project categories, whether the project will include certain features (such as trash storage areas or new impervious areas), and asks about construction-related requirements. The checklist is then checked by City staff to verify the information is accurate. The applicability checklist allows the City to easily screen projects that may be subject to SUSMP requirements. A copy of the checklist is available at http://www.sandiego.gov/development-services/news/pdf/ds-5601stormwtr.pdf.

3.10.3 SUSMP Plan Review

The Development Services department reviews plans and Water Quality Technical Reports for compliance with the Storm Water Technical Standards. The Engineering and Capital Projects (ECP) department takes the lead for all public projects subject to SUSMP requirements. ECP will route plans to the Storm Water Program staff for review and comment. Storm Water Program staff sometimes receive plans late in the review process and do not always receive information indicating how their comments were resolved.

Program Weaknesses:

- *The City should develop a better process to ensure that SUSMP requirements are included in CIP projects.*
  The City should develop a more formal process to ensure that public projects address all requirements in the Stormwater Standards Manual. The process should specify how and when Storm Water Program staff will be involved in the review process and how issues identified during the Storm Water Program staff's review will be addressed. Project plans and WQTRs for CIP projects should be specific and detailed where appropriate. For example, the plans for a new Central Police Facility included a vehicle maintenance and K9 area, yet the Water Quality Technical Report did not include the required source controls for maintenance bays, fueling areas, and vehicle wash areas.

- *The City should require more detail before approving WQTRs.*
  Some of the WQTRs reviewed by the evaluation team lacked the necessary detail to determine whether the plan fully complied with the SUSMP requirements. The following are specific issues identified during the evaluation:
  - The model SUSMP requires proponents of priority projects to "consider, incorporate, and implement where determined applicable and feasible" a series of site design BMPs. The City should ensure that plans address these site design options and provide a justification if an option is not included in the design.
  - Proponents of priority projects are not selecting treatment controls based on their efficiency. For a specific pollutant of concern, proponents should start by considering treatment control BMPs with high removal efficiencies for that pollutant. Where a BMP with a high removal efficiency is not practicable, a justification should be provided in the plan before a lower efficiency BMP is accepted.

- Engineering plan sheets used by inspectors during construction should include the necessary details from the WQTRs. These inspectors often do not see the WQTRs, therefore the engineering plan sheets should include all necessary design details to ensure compliance.

3.10.4 SUSMP Maintenance Requirements

The City requires signed maintenance agreements that are recorded against the property for all permanent storm water BMPs. The project applicant is required to also develop an operation and maintenance plan that describes the party responsible for maintenance, employee training program and duties, operating schedule, maintenance frequency, and other relevant information.

Program Weakness:

- *The City should develop a system to track installed BMPs to help verify maintenance*. In order to verify that source control and treatment control BMPs are being adequately maintained, the City will need to develop a system to track the location of these controls. Then, the City could conduct periodic inspections of a selected subset of projects to verify that the BMPs are being adequately maintained. This will also assist the City in annual reporting of the numbers of BMPs installed in the City.

3.10.5 SUSMP Field Evaluation

The evaluation team visited two SUSMP projects, a commercial storage yard and a public capital improvement project. One project was still largely under construction. The commercial project's engineering plan sheets lacked detail on the design of the treatment control, resulting in a detention basin that was not installed properly.

Program Weakness:

- *The City should ensure that approved SUSMP design details are also on the engineering plan sheets that field staff use to review projects*.
  Field inspection staff typically use engineering plan sheets to verify that projects meet City-approved plans. These inspectors do not have copies of the WQTRs developed to comply with the SUSMP requirements. Therefore, where critical design details are approved in the WQTRs, these design details should also be included on the engineering plan sheets. For example, where a non-retail fueling area is proposed for a project, the engineering plan sheets should specify Portland cement extending 6.5 feet from the corner of each fuel dispenser, a proper slope to prevent ponding, a grade break to prevent run-on of urban runoff, etc.

3.10.6 Training and Education

For education on SUSMP requirements, the City has information and brochures available on both their storm water Web site (http://www.sandiego.gov/stormwater/) and the Think Blue Web site (http://www.thinkbluesd.org/). Brochures on the SUSMP requirements and BMPs are available, along with a copy of the Stormwater Standards Manual.

Staff training was accomplished through regularly scheduled staff meetings as well as a series of training sessions on the Stormwater Standards Manual. The training sessions were spread over

six weeks and addressed specific SUSMP topics during two-hour training sessions. The City also hosted a CASQA training session on the New Development BMP Handbook.

Program Weakness:

- *The City should train staff annually and educate stakeholders on SUSMP BMPs and requirements.*
  Although the City has held a variety of training sessions on SUSMP topics for staff, additional training on topics such as better site design techniques, source controls, and selecting the most effective treatment controls for the targeted pollutants is needed to ensure the SUSMP requirements are fully met. Field staff should also receive training on source and treatment control BMP installation and maintenance.

  The City should also conduct external training and education on SUSMP requirements, better site design techniques, BMPs, maintenance, and how to develop better SUSMP plans. This training and education should include developers, contractors, property owners, consultants, community planning groups, the construction community, and other interested groups.

Attachment 1 – SUSMP Evaluation Checklist

This checklist was developed by the evaluation team in order to ensure that the SUSMP plans reviewed addressed all of the requirements in the model SUSMP. The checklist is provided as a resource to copermittees as they continue to review SUSMP plans.

Project Information

Project Name:_____ Public or Private Project

Project Address:_____

Project size (acres) _____ Hydrologic Area Number:_____

SUSMP Engineer:_____ SUSMP Report Date: _____

Project Description: _____

Does project discharge to an Environmentally Sensitive Area? Yes / No

SUSMP Category

Check all SUSMP categories that apply to the project:

- ☐ Residential development of 100 units or more
- ☐ Residential development of 10 to 99 units
- ☐ Commercial development greater than 100,000 ft^2
- ☐ Automotive repair shops
- ☐ Restaurants
- ☐ Steep hillside development > 5,000 ft^2
- ☐ Projects discharging to receiving waters within Environmentally Sensitive Areas (ESA) that creates 2,500 ft^2 or more of impervious surfaces or increases area of imperviousness of project site to 10% or more of its naturally occurring condition and:
  - ☐ Project is within 200 ft of an ESA
  - ☐ Project is more than 200 ft from an ESA but discharges urban runoff to receiving water within ESA without mixing with flows from adjacent land
- ☐ Parking Lots > 5,000 ft^2 or with > 15 parking spaces and potentially exposed to urban runoff
- ☐ Streets, roads, highways, and freeways which would create a new paved surface that is >= 5,000 ft^2.
- ☐ Significant Redevelopment - create or add >= 5,000 ft^2 of impervious surfaces on an already developed site

Identify Pollutants from the Project Area

- ☐ Check that all pollutants anticipated to be generated from the project area correspond with the anticipated pollutants in Table 1.

Identify Primary and Secondary Pollutants of Concern

Check that primary and secondary pollutants of concern for the project have been correctly identified and compared with pollutants identified in Table 1.

- ☐ Which receiving water(s) does the project discharge to? _____
- ☐ What are the pollutants for which the receiving water is impaired? _____
- ☐ Did project compare receiving water pollutants with pollutants generated from project area? Y / N
- ☐ What are the primary pollutants of concern_____
- ☐ What are the secondary pollutants of concern_____

Identify Conditions of Concern

- ☐ Was a drainage study report prepared? Y / N
- ☐ Was the report prepared by a registered civil engineer? Y / N Who?_____
- ☐ Was a field reconnaissance conducted? Y / N

 Did drainage study compute:

 Peak flow rate 2-year frequency storm
 Flow velocity 10-year frequency storm
 Runoff volume What duration storm was used?
 Time of concentration 6 hour or 24 hour
 Retention volume

 Were conditions of concern adequately identified? Y / N

If so, has the project implemented site design, source control, and/or treatment control BMPs to maintain pre-project hydrologic conditions affecting downstream conditions of concern? Y / N

Establish Storm Water BMPs

Site Design BMPs

SUSMPs must consider, incorporate and implement where determined applicable and feasible by the MS4 (check all that were considered, incorporated, or implemented):

- Maintain Pre-Development Rainfall Runoff Conditions
  - Minimize project's impervious footprint
  - Conserve natural areas
  - Construct low traffic areas (walkways, trails, patios, parking lots, alleys, etc.) of permeable surfaces
  - Construct streets, sidewalks, and parking lot aisles to minimum widths
  - Maximize canopy interception by preserving existing trees and shrubs
  - Minimize use of impervious surfaces, such as decorative concrete, in landscape design
  - Preserve natural drainage systems
- Minimize directly connected impervious areas
  - Drain rooftops into landscaping
  - Drain sidewalks, walkways, trails, and patios into landscaping
  - Protect slopes and channels

Comments:_____

_____

Source Control BMPs

Does the project:

- Provide storm drain system stenciling and signage
- Design outdoor material storage areas to reduce pollution introduction
- Design trash storage areas to reduce pollution introduction
- Use efficient irrigations systems & landscape design
- Incorporate requirements applicable to priority project categories (see model SUSMP for detailed requirements):
  - Private Roads
  - Residential Driveways & Guest Parking
  - Dock Areas
  - Maintenance Bays
  - Vehicle Wash Areas
  - Outdoor Processing Areas
  - Equipment Wash Areas
  - Parking Areas
  - Roadways
  - Fueling Areas
  - Hillside Landscaping

Treatment Control BMPs

Check the treatment control(s) selected:

- Biofilters
- Detention basin
- Infiltration Basin
- Wet pond
- Constructed Wetland
- Filtration system

- Infiltration basin
- Infiltration trench
- Porous asphalt, concrete, or modular concrete block
- Hydrodynamic Separation System

- Drainage insert
  - Oil/Water Separator
  - Catch basin insert
  - Other _____
- Do treatment controls effectively address primary pollutants of concern ("H" or "M")? Y / N

If No, describe:_____

Verify the design of selected treatment controls:

Was the treatment control BMP designed for:

- Volume
- Flow

- Did the SUSMP present the BMPs design process? (e.g., the specific design criteria used)
- Did the SUSMP use the 85th percentile storm event for design? Y / N
- What design storm was used to calculate numeric sizing criteria? _____
- Was the BMP designed properly? If not, describe:

_____

- Is BMP(s) located near pollutant sources? Y / N
- Are there restrictions on use of infiltration BMPs?

Maintenance Requirements

- Was an O&M plan attached?
  - Does plan require annual inspection and maintenance of all structural BMPs?
- Was an access easement/agreement included?

Waiver of Structural Treatment BMP Requirements

- Was a waiver of infeasibility granted?
- Was RWQCB notified?

Other Information

_____

_____

Field Inspection

During BMP installation:

- Did the MS4 verify that treatment control BMPs were properly constructed in the field? Y / N
- Did the MS4 verify that site design BMPs and source control BMPs were installed? Y / N

After project completion:

- Are all site design BMPs still in place?
- Are all source control BMPs still in place?
- Are treatment control BMPs still in place?
- Are all BMPs being maintained? Y/ N If No, then describe:

_____

Attachment 2 – SUSMP Evaluation Reference Sheet

SUSMP Effective Date
Copermittees were required to develop local SUSMP by December 2002 (180 days after approval of the Model SUSMP on 6/12/02). Immediately following adoption of its local SUSMP, each Copermittee was required to ensure that all new development and significant redevelopment projects meet SUSMP requirements. SUSMP requirements were to apply to all priority projects or phases of priority projects that have not yet begun grading or construction activities.

Pollutants
Each SUSMP priority project category must address the following anticipated and, if applicable, potential pollutants.

Primary pollutant of concern = pollutant generated by project and receiving water impaired by that pollutant.

Secondary pollutant of concern = pollutant generated by project but receiving water is not impaired by that pollutant.

Table 1. General Pollutant Categories

Priority Project Categories	Sediments	Nutrients	Heavy Metals	Organic Compounds	Trash & Debris	Oxygen Demanding Substances	Oil & Grease	Bacteria & Viruses	Pesticides
Detached Residential Development	X	X			X	X	X	X	X
Attached Residential Development	X	X			X	P(1)	P(2)	P	X
Commercial Development >100,000 ft^2	P(1)	P(1)		P(2)	X	P(5)	X	P(3)	P(5)
Automotive Repair Shops			X	X(4)(5)	X		X		
Restaurants					X	X	X	X	
Hillside Development >5,000 ft^2	X	X			X	X	X		X
Parking Lots	P(1)	P(1)	X		X	P(1)	X		P(1)
Streets, Highways & Freeways	X	P(1)	X	X(4)	X	P(5)	X		

X=anticipated
P=potential
(1) A potential pollutant if landscaping exists on-site.
(2) A potential pollutant if the project includes uncovered parking areas.
(3) A potential pollutant if land use involves food or animal waste products.
(4) Including petroleum hydrocarbons.
(5) Including solvents.

Source Controls

All projects are required to implement site design and source control BMPs.

Individual project categories may have additional source control BMPs as indicated on Table 2 (see model SUSMP pages 22-26 for specific source control BMP requirements)

Table 2. Site Design and Source Control Storm Water BMP Selection Matrix

Priority Project Categories	Site Design BMPs	Source Control BMPs	Requirements Applicable to Individual Priority Project Categories										
			a. Private Roads	b. Residential Driveways & Guest Parking	c. Dock Areas	d. Maintenance Bays	e. Vehicle Wash Areas	f. Outdoor Processing	g. Equipment Wash Areas	h. Parking Areas	i. Roadways	j. Fueling Areas	k. Hillside Landscaping
Detached Residential Development	R	R	R	R									R
Attached Residential Development	R	R	R										
Commercial Development >100,000 ft^2	R	R			R	R	R	R					
Automotive Repair Shops	R	R			R	R	R		R			R	
Restaurants	R	R			R				R				
Hillside Development >5,000 ft^2	R	R	R										R
Parking Lots(1)	R	R								R			
Streets, Highways & Freeways	R	R									R		

R=Required
(1) Paved area totals >5,000 ft^2 or with >15 parking spaces and is potentially exposed to urban runoff

Source Controls required for ALL projects:

Provide Storm Drain System Stenciling and Signage

- Stencil all storm drain inlets
- Post signs prohibiting illegal dumping at public access points along channels and creeks in project area
- Maintain legibility of stencils and signs

Outdoor Material Storage Areas for Hazardous Materials

- Hazardous materials in enclosure or secondary containment
- Storage area paved
- Storage area shall have a roof or awning

Trash Storage Areas (except detached residential homes)

- Paved, designed to prevent run-on from adjoining areas, and screened or walled to prevent off-site transport of trash
- Lids on all trash containers

Irrigation Systems and Landscape Design. Following shall be considered and implemented where deemed applicable and feasible by Copermittee:

- Use rain shutoff devices
- Design irrigation systems to each landscape areas specific water requirements
- Use flow reducers or shutoff valves to prevent water loss from broken sprinkler heads

Source Controls for individual priority project categories:

Private Roads. Use at least one of the following:

- Rural swale system
- Urban curb/swale system
- Duel drainage system
- Other comparable methods

Residential driveways and guest parking. Use at least one of the following:

- Design driveways with shared access, flared, wheel strips, or drain into landscaping first
- Guest parking on private residential lots: paved with permeable surface or designed to drain into landscaping first

Loading/unloading dock areas

- Cover dock areas, or design to preclude run-on and runoff
- Direct connections to storm drains from depressed loading docks prohibited

Maintenance Bays

- Maintenance bays shall be indoors or designed to preclude run-on and runoff
- Design bay to capture all wash water; connect drains to a sump; direct connection to storm drain system prohibited

Vehicle Wash Areas

- Self-contained or covered with a roof or overhang
- Equipped with a clarifier or other pretreatment facility
- Properly connected to sanitary sewer

Outdoor Processing Areas (such as rock grinding or crushing, painting or coating, grinding or sanding, degreasing or parts cleaning, landfills, waste piles, and wastewater and solid waste treatment and disposal)

- Control runoff from areas that are most significant sources of pollutants (cover, slope to dead-end sump, or discharge to sanitary)
- Grade or berm to prevent run-on
- Installation of storm drains in areas of equipment repair is prohibited

Equipment Wash Areas

- Self-contained or covered
- Equipped with a clarifier, grease trap or other pretreatment facility, as appropriate
- Properly connected to sanitary sewer

Parking Areas Following shall be considered and implemented where deemed applicable and feasible by Copermittee:

- Where landscaping is proposed, incorporate into drainage design
- Overflow parking <u>may</u> be constructed on permeable paving

Fueling Areas (non-retail fueling areas)

- Overhanging roof structure or canopy, drainage away from fuel dispensing area; fueling area must drain to the treatment control BMP prior to discharge to MS4
- Paved with Portland cement (asphalt concrete prohibited)
- Sloped to prevent ponding; grade break to prevent run-on
- Concrete fuel dispensing area must extend 6.5 feet from the corner of each fuel dispenser

Hillside Landscaping

- Hillside areas that are disturbed must be landscaped with deep-rooted, drought tolerant plant species selected for erosion control

Treatment Control Selection

For **priority** pollutants, project must "select a single or combination of storm water BMPs from Table 3 which maximizes pollutant removal for the particular primary pollutant of concern" (i.e., a single BMP proposed for a project must have a H or M removal efficiency).

For **secondary** pollutants, "L" removal efficiency is OK, but project must show why other BMPs with a higher removal efficiency were rejected.

Pollutant of Concern	**Treatment Control BMP Categories**						
	Biofilters	Detention Basins	Infiltration Basins	Wet Ponds or Wetlands	Drainage Inserts	Filtration	Hydrodynamic Separator Systems
Sediment	M	H	H	H	L	H	M
Nutrients	L	M	M	M	L	M	L
Heavy Metals	M	M	M	H	L	M	L
Organic Compounds	U	U	U	U	L	M	L
Trash & Debris	L	H	U	U	M	H	M
Oxygen Demanding Substances	L	M	M	M	L	M	L
Bacteria	U	U	H	U	L	M	L
Oil & Grease	M	M	U	U	L	H	L
Pesticides	U	U	U	U	L	U	L
L: Low removal efficiency M: Medium removal efficiency H: High removal efficiency U: Unknown removal efficiency							

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Hydrologic exchange and N uptake by riparian vegetation in an arid-land stream

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Abstract. Riparian zones can strongly influence the exchange of nutrients between streams and their watersheds. Most riparian studies have been done in mesic watersheds, which differ significantly from arid-land watersheds hydrologically. The goals of our work were to determine the strength and direction of hydrologic linkages between stream and riparian zone, and to estimate the extent of uptake of streamwater N by riparian trees in Sycamore Creek, a Sonoran Desert stream. Br^- and $^{15}NH_4^+$ were added simultaneously to the surface stream to trace water and N from stream to riparian zone. Br^- concentrations in riparian wells installed downstream of the release point increased during the addition, demonstrating a strong hydrologic linkage from stream to riparian zone. Percentage stream water in wells increased in a downstream direction, suggesting little or no input of water laterally from uplands or vertically from deep groundwater. Leaf and wood samples collected from willow trees downstream of the addition point became significantly labeled with ^{15}N during the addition, indicating uptake of streamwater N. Other tree species did not become labeled, most likely because they were located farther from the stream channel than the willows. Results from our study provide evidence of strong hydrologic linkage between stream and riparian zone and suggest that N demand by riparian vegetation is a potentially significant sink for streamwater N.

Key words: riparian, nitrogen retention, hydrologic exchange, nitrogen uptake, tracer tests.

Riparian zones influence the exchange of materials between streams and their watersheds because of their unique position in the landscape. The strength of that influence depends on the hydrogeologic setting in which riparian–stream interactions take place (Hill 1996, 2000, Cirmo and McDonnell 1997, Lowrance et al. 1997, Hill et al. 1998). Much of the work reviewed in these papers was done in mesic watersheds, where rainwater generally infiltrates upland soils and flows horizontally through riparian soils before entering the stream. Riparian zones in these watersheds often act as efficient nutrient filters, particularly of N, as water flows through riparian soils (Lowrance et al. 1984, Peterjohn and Correll 1984, Groffman et al. 1992, Pinay et al. 1993, Lowrance 1998, Sabater et al. 2003). In many agricultural watersheds, riparian buffer strips have significantly reduced N loads in runoff water from fertilized agricultural fields, thereby maintaining streamwater quality (Lowrance 1998).

In our study, retention is defined as the difference between input and output of N in water moving through riparian soils. Therefore, retention includes dissimilatory mechanisms of N removal, such as denitrification. N retention is particularly effective when riparian soils are underlain by geologic features that force groundwater to move laterally through organic-matter-rich soils in the rooting zone of vegetation, and it is less effective when water mainly flows deeper in mineral soils below the rooting zone (Groffman et al. 1992, Hill 1996, 2000, Cirmo and McDonnell 1997, Lowrance et al. 1997). Furthermore, retention often occurs rapidly in a

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narrow zone adjacent to upland–riparian or riparian–stream boundaries as water carries electron acceptors (i.e., NO_3^- and O_2) from the oxidizing environment of upland soils or the surface stream into the reducing environment of organic-matter-rich riparian soils (McClain et al. 1994, Hedin et al. 1998, Hill et al. 1998).

The mechanisms responsible for retention of N from groundwater in the rooting zone remain unclear; in particular, the influence of vegetation is poorly understood (Hill 1996). Most work to date has focused on 2 main mechanisms: 1) plant uptake with subsequent incorporation of N into biomass, and 2) denitrification. The ultimate fate of N depends strongly on the relative importance of these mechanisms. N in plant biomass eventually is recycled back to the pool of available N in the ecosystem, whereas denitrification removes N permanently by returning it to the atmosphere as N_2, which is unavailable to most organisms. The relative importance of each of these mechanisms in any given riparian ecosystem has been difficult to establish with much confidence because both mechanisms act simultaneously, and riparian ecosystems are not easily manipulated experimentally (Nelson et al. 1995, Hill 1996, Jacinthe et al. 1998; but see Verchot et al. 1997, Schade et al. 2001).

In arid-land watersheds, soils are relatively impermeable and, as a result, runoff flows overland into small rills and ephemeral channels before emptying into large, perennial stream channels (Fetter 1994). Once in these perennial stream channels, water infiltrates the subsurface through coarse channel sediments, and then moves laterally out into the riparian zone (Martí et al. 2000). Therefore, the dominant direction of groundwater movement is from stream to riparian zone, under both baseflow (Fetter 1994) and flood (Martí et al. 2000) conditions. The distribution, extent, and species composition of riparian vegetation in arid lands is dependent on the maintenance of minimum stream flows and shallow groundwater tables (Stromberg and Patten 1991, Stromberg et al. 1996), and this relationship suggests a hydrologic connection between stream and riparian zone in arid-land streams. The stream could be a source of nutrients for riparian vegetation in desert watersheds because stream water carries solutes with it as it moves into the riparian zone. Furthermore, the riparian zone may influence water quality by retaining nutrients from stream water as it moves into and out of the riparian zone during downstream transport. This hydrologic interaction could have important implications for primary production by riparian vegetation and for N dynamics in both the stream and riparian zone. At this point, however, little is known about the influence of riparian zones on streamwater chemistry in arid lands.

Hydrologic differences between mesic and arid-land watersheds generate contrasting linkage characteristics between upland, riparian zone, and stream. Preliminary observations of flowpath direction in Sycamore Creek, a Sonoran Desert stream, suggest that flowpaths from stream to riparian zone dominate at this site, at least during floods (Martí et al. 2000). The objective of our study was to address 2 questions: 1) How strong, and in what direction, is the hydrologic linkage between stream and riparian zone in Sycamore Creek? 2) Does N in stream water enter the riparian zone, and is it used by riparian vegetation? Our working hypothesis was that water generally moves from the stream to the riparian zone and carries with it N, which is then available for use by vegetation. Our approach was to add a conservative tracer (Br^-) and $^{15}NH_4^+$ to Sycamore Creek surface water (see Mulholland et al. 2000). We expected to find elevated Br^- in water from riparian wells and ^{15}N enrichment in riparian vegetation if our hypothesis was correct.

Site Description

The study site was a 400-m run in the middle reaches (~700 m elevation) of Sycamore Creek, a stream northwest of Phoenix, Arizona. Sediments in the channel of the main study reach consist primarily of sand and fine gravel, and the depth of alluvial sediments averages ~1.5 m (Holmes et al. 1994). Surface flow occurs during most of the year; however, at base flow, the surface stream typically occupies <25% of the active channel, with the remainder of the channel consisting of extensive gravel bars. The riparian zone consists of a strip of vegetation dominated by large trees such as Gooding's willow (*Salix goodingii*), ash (*Fraxinus pennsylvanica velutina*), sycamore (*Platanus wrightii*), mesquite (*Prosopis* sp.), and woody shrubs such as seepwillow (*Baccharis salicifolia*) and burro bush (*Hymenoclea monogyra*). These plants are distributed in a narrow strip bounded on one side by upland Son-

oran Desert scrub and restricted on the other side to high-flow stream margins by severe flash floods that prevent the establishment of large trees in the active channel.

Methods

Tracer addition

In summer 1997, Br^- and $^{15}NH_4^+$ were added simultaneously to the surface stream at the top of the study reach. Prior to the addition, one longitudinal transect of 20 piezometers was installed on each bank of the riparian zone in the reach. Piezometers were spaced 20 m apart on the transects, which were 3 to 4 m from the stream channel. Piezometers were constructed of polyvinyl chloride (PVC) tubing that was 16 mm in diameter and 2 m in length, and piezometers were slotted over the bottom 5 to 10 cm. The piezometers reached a depth ~1.5 m below the soil surface (initially 50–100 cm below the water table). Tubes were cut 10 to 15 cm above the soil surface after installation.

Tracer additions began on 1 May 1997. Target concentrations were 2 mg/L for Br^- and 500‰ for $^{15}NH_4^+$, and were achieved by adding the solutes to the stream at a constant rate with 2 solar-powered metering pumps. Br^- was added for 15 d, whereas $^{15}NH_4^+$ was added for 42 d. The stream remained at base flow throughout the addition, i.e., no flash floods occurred during this time, although discharge did decline over the 42 d from 70 L/s to 42 L/s by day 15 and to 15 L/s by day 42.

Initial Br^- samples were collected from each piezometer 24 h after the addition began, with continued sampling at 24 to 72 h intervals throughout the 15-d Br^- addition and for several weeks after the end of the Br^- addition. Br^- concentrations were measured with an Orion Br^--specific electrode. The % of stream water in each piezometer was calculated by comparing the background-corrected, peak Br^- concentration in the piezometer to the background-corrected, plateau, or steady state Br^- concentration in the surface stream. Sampling for Br^- concentration in the surface stream followed procedures outlined in Triska et al. (1989).

Water samples for analysis of NO_3^- and NH_4^+ concentrations were collected from the riparian zone and the surface stream several times during the injection. Samples from the surface stream were collected every 20 to 40 m downstream of the addition point on days 0, 20, and 40 of the addition. Subsets of riparian wells were sampled using a peristaltic pump on days 20 (16 wells) and 40 (10 wells). All samples were collected in 60-mL, acid-washed, polyethylene sample bottles. Samples were placed on ice and returned to the laboratory, where they were filtered and analyzed for NO_3^- and NH_4^+ concentrations. All analyses were completed within 24 h of collection. NO_3^- concentration was analyzed on a Braun and Leubbe TRAACS 800 autoanalyser using Cd reduction, and NH_4^+ concentration was measured using the phenol-hypochlorite method (Solorzano 1969).

Plant tissue ^{15}N

Leaves and wood were sampled to determine if N in stream water entering the riparian zone was retained via uptake by riparian vegetation. Leaves were collected from all individuals of the dominant tree species in the riparian zone of the study reach (willow, ash, sycamore, and mesquite) just prior to and at the end of the addition (April and June 1997, respectively). Leaves were sampled from willow trees only (n = 40) in April, May, and June 1998. Leaves from all species were sampled in September 1998 and April 1999. Leaves from willow trees upstream of the addition point were sampled in June 1997, September 1998, and April 1999. Wood cores were collected from 40 willow trees, 20 upstream and 20 downstream of the addition point, in the summer of 1999. Cores were returned to the laboratory, and wood from individual tree rings corresponding to 1995 (pre-addition year), 1997 (addition year), and 1998 (post-addition year) was collected and analyzed separately by year. All leaf and wood samples were dried, milled, and analyzed for N isotopic composition on a Europa Scientific 20/20 stable isotope analyzer (analytical precision for plant tissues ~0.08/mil). N isotopic composition was reported in terms of $\delta^{15}N$ values, a measure of the ^{15}N content of a sample relative to the atmospheric N standard. An increase in ^{15}N signifies an increase in ^{15}N content.

Data analysis

All statistical analyses were performed using Systat for Windows (version 10, Systat, Point

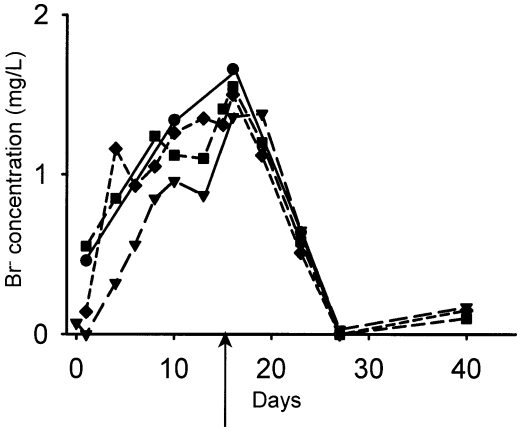

FIG. 1. Temporal pattern of change in groundwater Br^- concentration following start of continuous Br^- addition to Sycamore Creek, Arizona, in the 4 riparian piezometers furthest from the addition point. Streamwater plateau averaged ~1.8 mg/L. Each type of symbol represents a different piezometer. Arrow indicates termination of the Br^- addition.

Richmond, California). NO_3^- and NH_4^+ concentrations were compared between surface water and riparian groundwater with *t*-tests. Leaf $\delta^{15}N$ was compared among sampling dates with separate analyses of variance (ANOVA) for each species. Leaf $\delta^{15}N$ was compared among species with separate ANOVAs for each sampling time. Tukey's tests were used to detect differences among means when ANOVAs were significant.

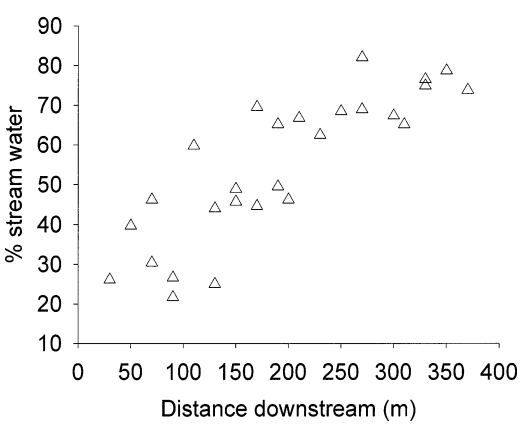

FIG. 2. Longitudinal changes in % stream water in riparian piezometers, calculated from peak Br^- concentration (measured on day 15 of the addition) in piezometers and at plateau in stream water. Distances are measured from the addition point.

Wood $\delta^{15}N$ was compared between years using 2 repeated-measures ANOVAs, one for upstream and one for downstream sites. Paired *t*-tests were used to compare $\delta^{15}N$ values between years when ANOVAs were significant. Enrichment of ^{15}N in wood samples was calculated by subtracting 1995 $\delta^{15}N$ values from 1997 $\delta^{15}N$ values for upstream and downstream sites, and enrichment values were compared using *t*-tests. A *p*-value <0.05 was considered significant for all statistical tests.

Results

Tracer addition and water chemistry

Br^- concentration in the surface stream reached a plateau at 1.8 mg/L within several hours of the beginning of the addition (not shown), whereas Br^- concentration in riparian groundwater began to increase within 24 to 72 h of the beginning of the addition (Fig. 1). All piezometers were labeled, to some extent, with Br^- at the end of the addition but, in many piezometers, Br^- concentrations never reached a plateau. However, peak Br^- concentrations generally were close to the streamwater plateau concentration in most piezometers (including the 4 farthest downstream; Fig. 1) that did not reach a plateau. This result suggested that piezometers were close to plateau conditions all along the reach. Percent stream water ranged from ~20% at the upstream end, near the addition point, to ~80% at the downstream end of the reach and generally increased with distance downstream (Fig. 2). Streamwater $^{15}NH_4^+$ was between 300‰ and 700‰ 10 m below the addition site, declined to values as low as 12‰ at the downstream end of the reach, and averaged 101‰ over the 42-d addition. Streamwater $\delta^{15}NO_3^-$ was not enriched early in the addition, but by day 42, streamwater $\delta^{15}NO_3^-$ showed enrichment ranging from ~8‰ to nearly 40‰ along the reach (EM, unpublished data).

Concentrations of NO_3^- and NH_4^+ in the surface stream showed no consistent longitudinal pattern on any dates, so data were pooled, and a single mean was calculated for the injection period. NO_3^- concentrations were slightly higher than NH_4^+ concentrations, but mean concentrations were similar (Table 1). On 20 May 1997 (day 20), NH_4^+ concentrations were significantly higher in riparian wells than in surface water.

TABLE 1. Mean (SE) concentrations of NO_3^--N and NH_4^+-N in surface water and riparian wells. Mean surface-water concentrations are averages across all locations and times. BDL = below detection limits, with detection limit for the TRAACS 800 ~1 μg/L.

	Surface water				Riparian wells	
	Day 0 (n = 7)	Day 20 (n = 7)	Day 40 (n = 7)	Mean (n = 21)	Day 20 (n = 16)	Day 40 (n = 10)
NO_3^- (μg/L)	6.4 (0.9)	8.5 (0.5)	14.2 (2.9)	9.7 (2.3)	14 (1)	BDL
NH_4^+ (μg/L)	7.6 (0.3)	8.6 (0.2)	6.6 (0.6)	7.6 (0.6)	32 (7)	19 (6)

NO_3^- concentrations were similar in riparian wells and surface water. By the end of the injection (9 June 1997, day 40), NO_3^- concentrations in riparian wells were below detection limits (BDL), and NH_4^+ concentrations in riparian wells had declined, although they were still significantly higher than NH_4^+ concentrations in surface water (Table 1). On both dates, NH_4^+ was the dominant form of inorganic N in riparian wells.

Plant tissue ^{15}N

Willow leaves accumulated ^{15}N label during the addition and had significantly higher $\delta^{15}N$ values on the last day of the addition (June 1997) than prior to addition (April 1997) (Fig. 3A). Sycamore, ash, and mesquite leaves showed no significant change in $\delta^{15}N$ during the addition (Fig. 3A). By April 1998, willow leaves showed further accumulation of ^{15}N and had significantly higher $\delta^{15}N$ values than leaves collected in April and June 1997. Between April and September 1998, willow-leaf $\delta^{15}N$ values declined linearly (r^2 = 0.984, p = 0.008) to pre-addition values (Fig. 3A). By September 1998, 1.5 y after the addition, $\delta^{15}N$ values were similar in willow, sycamore, and mesquite leaves, but $\delta^{15}N$ was higher in willow than in ash leaves.

At the end of the addition (June 1997), $\delta^{15}N$ values were significantly higher in leaves collected from willows downstream of the addition point than in leaves collected from willows upstream of the addition point (Fig. 3B). However, $\delta^{15}N$ values in willow leaves did not differ between upstream and downstream sites in September 1998 or April 1999. Leaf $\delta^{15}N$ values for all species, including upstream willows, increased between September 1998 and April 1999 (Fig. 3A, B).

Wood $\delta^{15}N$ values were significantly lower in 1995 than in 1997 (addition year) and 1998 for willow trees downstream of the addition point (Fig. 4A). Wood $\delta^{15}N$ values did not differ between 1997 and 1998 for trees downstream of the addition point. Wood $\delta^{15}N$ values did not differ among years for willow trees upstream of the addition point (Fig. 4A). Enrichment was significantly higher in wood from trees downstream of the addition point than in wood from trees upstream of the addition point (Fig. 4B).

Discussion

Surface water–groundwater linkages

Our results clearly show a strong hydrologic linkage between stream and riparian zone. The appearance of Br^- in riparian piezometers showed that stream water was moving into the riparian zone. This result was consistent with previously reported results from the same reach under flood conditions (Martí et al. 2000). The downstream increase in % stream water in the riparian zone differed from the results of other studies, typically done in mesic streams, in which % stream water decreased with distance from the addition point (e.g., Triska et al. 1993). These studies generally were done in gaining reaches in which the decrease in % stream water was a consequence of dilution by unlabeled water moving laterally from the uplands or up from deep groundwater sources (Triska et al. 1993, Hedin et al. 1998). Our results suggest that the only major source of unlabeled water to our study site was from bypass flow upstream of the addition point, with the volume of labeled stream water entering the riparian zone increasing downstream. Our observations indicated little dilution from groundwater sources moving laterally from uplands, or up from deep groundwater sources, a result characteristic of losing reaches. Stream water was clearly the pri-

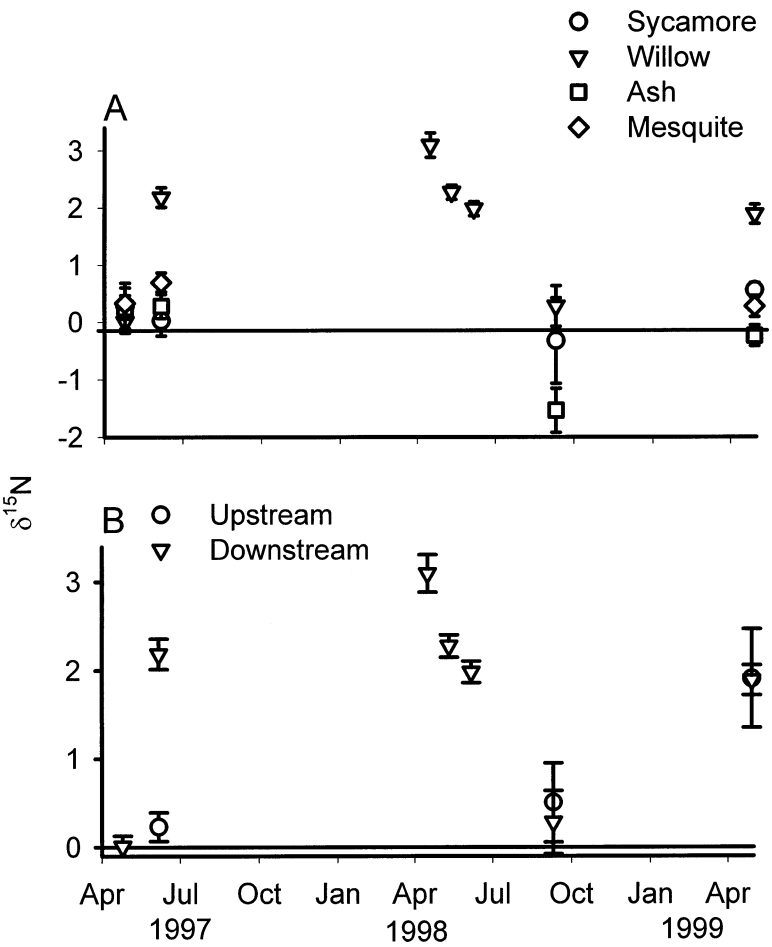

FIG. 3. Changes in $\delta^{15}N$ of riparian tree leaves in Sycamore Creek following $^{15}NH_4^+$ addition. Sampling period includes 6-wk $^{15}NH_4^+$ addition to surface water (April–June 1997) and 2 y post-addition. A.—All riparian tree species. B.—Willow trees upstream and downstream of the addition point. Horizontal lines represent $\delta^{15}N = 0$. Error bars are ±1 SE.

mary source of water to the subsurface during baseflow conditions.

Accumulation of ^{15}N

Accumulation of ^{15}N in willow leaves and wood clearly showed that N in stream water was taken up by willow trees. Lack of enrichment of other tree species suggested that these species did not have access to streamwater N as a resource, perhaps because of their spatial arrangement in the riparian zone. With a few exceptions, sycamore and ash trees grew significantly farther from the stream channel than willows (Fig. 5). We hypothesize that either these species were using a different source of water than willow trees, or N in stream water was removed before water penetrated far enough into the riparian zone to reach more distal trees. We believe an alternative water source for more distal trees is unlikely because the results of the Br^- addition showed that stream water provided most water to the subsurface. The proximity of the willow trees to the stream channel may have given them greater access to streamwater N, partly because willow roots grew into the stream channel. Thus, willows may have been able to withdraw N directly from surface or subsurface water in the channel. In turn, this direct access may have depleted streamwater N

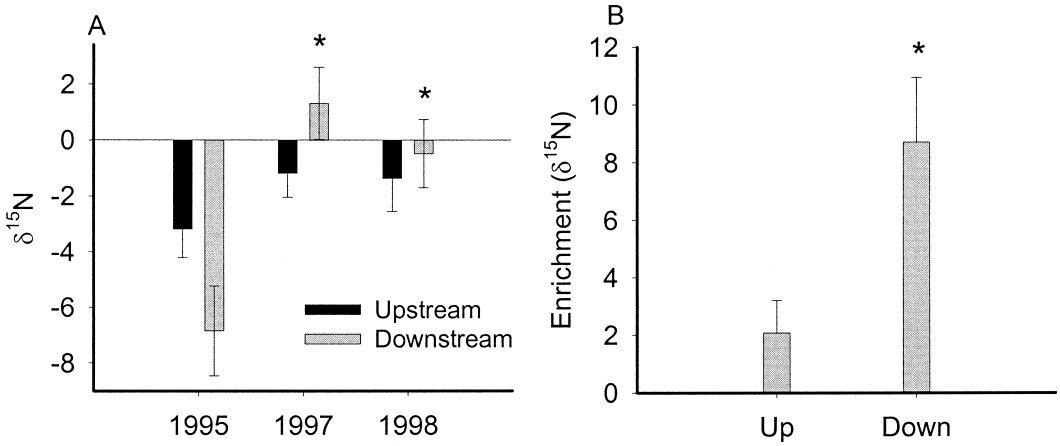

FIG. 4. Changes in $\delta^{15}N$ of riparian willow-tree wood in Sycamore Creek following $^{15}NH_4^+$ addition. A.—$\delta^{15}N$ in willow trees upstream and downstream of the addition point in a pre-addition year (1995), the addition year (1997), and a post-addition year (1998). Stars indicate significant differences ($p < 0.05$) between pre- and post-addition years. B.—Enrichment of ^{15}N in willows upstream and downstream of the addition point, calculated as $\delta^{15}N$ in 1997 minus $\delta^{15}N$ in 1995. Star indicates significant difference ($p < 0.05$) between upstream and downstream wood samples. Error bars are ±1 SE. Up = upstream, Down = downstream.

at the stream–riparian edge, thereby reducing the availability of streamwater N to species that grew further inland.

$\delta^{15}N$ in willow leaves collected in April 1998 was higher than $\delta^{15}N$ in leaves collected in June 1997 at the end of the addition (Fig. 3A). Furthermore, leaf $\delta^{15}N$ was high in spring 1999 for all species downstream of the addition point and for willows upstream of the addition point. The elevated $\delta^{15}N$ in leaves in April 1998 could be explained by storage of streamwater N in the riparian zone, possibly in roots or soil organic matter or through sorption to soil particles. This stored N could have been released to the available pool or translocated from roots to leaves during spring leafout. The surface stream was not labeled during this period, so the additional accumulation of ^{15}N suggests that uptake of N from stream water may be less important than recycling of N in soils and roots for initial allocation to leaves in the spring. This explanation is consistent with previous work showing the importance of soil-N recycling as a source of nutrients for willow trees in Sycamore Creek (Schade et al. 2002). An alternative explanation is that the increases in both spring 1998 and 1999 may have reflected a shift in nutrient-processing rates in riparian soils. Winter precipitation in both 1998 and 1999 was higher than winter precipitation in 1997. Higher precipitation is likely to have increased soil moisture and, possibly, mineralization rates, in 1998 and 1999. N mineralization favors ^{14}N, leading to enrichment of the remaining soil-N pool. Therefore, high N mineralization rates in riparian soils may lead ultimately to isotopic enrichment of soil-N pools, even in the absence of added ^{15}N. Given the importance of N recycling to riparian trees in Sycamore Creek, this enrichment would be reflected in higher $\delta^{15}N$ in tissues of plants using soil-N pools than in plants not using those pools.

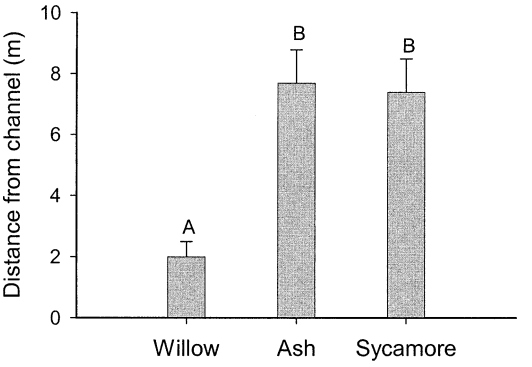

FIG. 5. Mean distance of willow, ash, and sycamore trees from the stream channel in the addition reach. Bars with different letters are significantly different ($p < 0.05$). Error bars are +1 SE.

N mass-balance calculations

The mechanism by which N is removed from groundwater flowing through riparian soils remains unclear and has been difficult to establish unequivocally in any particular ecosystem. The importance of uptake often has been inferred using mass-balance methods, which compare calculations of N retention in incremental biomass of riparian vegetation to measures of total mass of N lost from groundwater (Lowrance et al. 1984, Hill 1996). However, N in plant biomass can come from a variety of sources, including groundwater, surface water, or N recycled from soil organic matter (Schade et al. 2002). The shortcoming of this mass-balance method is its inability to determine from which source plant N is derived, and this inability may lead to overestimates of the use of groundwater N by plants. In our experiment, streamwater N was labeled with ^{15}N without significantly increasing inorganic N concentrations. With a few assumptions, this label can be used to estimate uptake of streamwater N by riparian trees. A modified mass-balance approach was used to estimate N uptake by willow trees in the riparian zone and the proportion of streamwater N input this uptake represented.

The Br^- addition showed that all of the piezometers received water from the stream and, in fact, the stream appeared to be the only source of water to the riparian zone. Assuming that all piezometers were directly connected to the stream by similar flowpaths, the flux of NO_3^- and NH_4^+ from stream to riparian zone can be calculated using streamwater inorganic-N concentrations, cross-sectional area of the stream–riparian edge (saturated zone, corrected for porosity of riparian soils = 0.3; Jones et al. 1995), and velocity of water moving across this edge. Velocity was estimated by dividing the average nominal travel time by the average distance of piezometers from the stream. Cross-sectional area was estimated by multiplying the total length of the reach (800 m, using both banks), by the depth of the riparian zone, assumed to be 1.5 m (based on measurements of the depth of alluvial sediments; Holmes et al. 1994). Flux of inorganic N (NO_3^- and NH_4^+) was calculated to be 0.6 kg during the 6-wk addition, or 5 kg ha^{-1} y^{-1}. This input is comparable to atmospheric deposition to the desert (3 kg ha^{-1} y^{-1}; Peterjohn and Schlesinger 1990), but small when compared to groundwater NO_3^- inputs to the riparian zone in 2 agricultural watersheds, estimated to be 50 (Peterjohn and Correll 1984) and 29 kg ha^{-1} y^{-1} (Lowrance et al. 1984).

Estimates of uptake use ^{15}N labeling of stream water and the increase in $\delta^{15}N$ in willow leaves and wood. It was assumed that ^{15}N in leaves and wood increased solely because of uptake of labeled streamwater N, and that uptake did not cause any fractionation of N isotopes, i.e., did not favor ^{14}N, causing changes in isotopic signature. Both assumptions were reasonable because of the magnitude of the increase in $\delta^{15}N$ in stream water, which was likely to have swamped other potential sources of N or the effects of fractionation. Moles of ^{15}N taken up by willow trees during the injection were calculated using the increase in $\delta^{15}N$ in leaves and wood and the estimates of total N in leaf and wood tissue in the reach. Total mass of N in leaves and wood was estimated as 24 and 4 kg, respectively, based on estimates of production multiplied by % N of leaves and wood (JRW, unpublished data). On average, leaf $\delta^{15}N$ values were enriched by 2.18‰, whereas wood was enriched by 8.7‰. These enrichment levels were the equivalent of 0.05 and 0.04 kg of streamwater N in leaves and wood, respectively, or a total of 0.09 kg N removed from stream water by plant uptake. Based on this calculation, uptake was responsible for retention of 15% of the total N inputs from the stream to the riparian zone, and streamwater N represented a very small proportion of the total N demand by willow trees (0.3%). This level is likely to be an underestimate, however, because the injection began after leaves were fully expanded. A major source of error in this calculation is the omission of N uptake and storage in belowground biomass.

Our first assumption in calculating uptake was that all piezometers were hydrologically connected to the stream along similar flowpaths. If this were the case, then variation in nominal travel time simply would have reflected variation in the velocity of water caused by variation in some factor, such as hydraulic conductivity of the soil. If, however, variation in nominal travel time reflected differences in the flowpaths, or the tightness of the connection between the stream and the piezometers, then stream water may have been entering the riparian zone only at specific locations. Assuming

that water entered the riparian zone only at the piezometers with the shortest nominal travel time (4 d), then the total length of the zone of exchange would have been ~10% of the total length of the reach, or ~80 m. Estimates of velocity would increase to 0.3 m/h. Substituting these values into our calculation, total input of N to the riparian zone would become 0.15 kg. Because our uptake calculation is unaffected by changes in our assumptions about connections, 60% of these inputs would have been stored in plant biomass. Thus, the riparian zone may have been an effective filter of N from stream water in Sycamore Creek. Furthermore, the lack of enrichment of the tree species growing further from the stream suggests that retention occurred rapidly at the interface between stream and riparian zone, a conclusion consistent with results from several other studies (Peterjohn and Correll 1984, McClain et al. 1994, Hedin et al. 1998, Hill et al. 1998, Schade et al. 2001, 2002).

A more detailed understanding of hydrologic exchange between stream and riparian zone is clearly necessary for a deep understanding of spatial and temporal variation in N retention. Combining ^{15}N labeling of sources with detailed hydrologic studies is a potentially powerful approach to improving our understanding of mechanisms of N retention by riparian zones and our understanding of sources of nutrients for the production of riparian vegetation.

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Effect of Increases in Peak Flows and Imperviousness on the Morphology of Southern California Streams

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EFFECT OF INCREASES IN PEAK FLOWS AND IMPERVIOUSNESS ON THE MORPHOLOGY OF SOUTHERN CALIFORNIA STREAMS

A report from the Stormwater Monitoring Coalition

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Technical Report #450

EXECUTIVE SUMMARY

Urbanization in southern California has resulted in direct and indirect effects on natural stream courses that have altered their physical and biological character. Development typically increases impervious surfaces on formerly undeveloped (or less developed) landscapes and reduces the capacity of remaining pervious surfaces to capture and infiltrate rainfall. The result is that as a watershed develops, a larger percentage of rainfall becomes runoff during any given storm. In addition, runoff reaches the stream channel much more efficiently, so that the peak discharge rates for floods are higher for an equivalent rainfall than they were prior to development. This process has been termed *hydromodification*.

Although the effects of increased impervious cover on stream flow have been well documented (Bledsoe, 2001; Booth, 1990; 1991; MacRae, 1992; 1993; 1996), the majority of past studies have focused on perennial streams. Until recently, few comparable studies have evaluated the impacts of urbanization on ephemeral or intermittent streams of arid or semi-arid climates. This had made it difficult to effectively manage stormwater impacts on southern California's natural streams. In response, the Stormwater Monitoring Coalition (SMC) conducted this study to assess the relationship between stream erosion and urbanization. It is anticipated that the results of this study will be useful in developing peak flow criteria for Los Angeles County as well as future stormwater regulations or management strategies.

The goal of this study is to assess relationships between stream channel type and resistance that will allow prediction of channel response under changed conditions associated with increased impervious cover. The specific study objectives are to:

- Establish a stream channel classification system for southern California streams;
- Assess stream channel response to watershed change, and attempt to develop deterministic or predictive relationships between changes in impervious cover and stream channel enlargement; and
- Provide a conceptual model of stream channel behavior that will form the basis for future development of a numeric model.

The intent of this study was to use multiple watersheds (each containing a single site) studied in broad scope rather than a single watershed (with many sites) studied in great detail. Consequently a total of 11 separate sites were selected in 8 distinct watersheds (Table ES-1).

Table ES-1 Study Site List

Site No.	Site Name	CDA (mi^2)	Major Watershed	Type of Site	County
1	Topanga Creek	18.07	Santa Monica Bay	Control Site	Los Angeles
3u	Hasley Canyon	1.55	Santa Clara River	Control Site	Los Angeles
3d	Hasley Canyon	1.66	Santa Clara River	Developed Site	Los Angeles
4u	Plum Canyon	2.23	Santa Clara River	Developed Site	Los Angeles
4d	Plum Canyon	2.40	Santa Clara River	Developed Site	Los Angeles
7u	Borrego Canyon	2.27	San Diego Creek	Developed Site	Orange
7d	Borrego Canyon	3.06	San Diego Creek	Developed Site	Orange
9	Serrano Creek	2.64	San Diego Creek	Developed Site	Orange
10	Santiago Creek	12.36	Santa Ana River	Control Site	Orange
23	Dry Canyon	1.22	Calleguas Creek	Control Site	Ventura
27	Hicks Canyon	1.33	San Diego Creek	Control Site	Orange

CDA = catchment drainage area

The study approach was to evaluate the changes in stream channel configuration over time and compare them to the changes in total basin impervious cover (TIMP) over the same time period. Data collection occurred in two phases. In the first phase background and historic information was gathered on each site and its contributing drainage area. In the second phase detailed field data was collected on the geomorphic condition of each study reach. The combinations of historic and contemporary data were used to develop predictive relationships between changes in impervious cover and channel form.

This study resulted in the following general conclusions regarding the relationship between impervious cover and stream channel form for ephemeral streams in southern California:

1. **Southern California streams exhibit deterministic relationships between bankfull discharge (Q_{bfl}), and measures of channel geometry such as cross section area (A_{bfl}).** Of the field measures calculated, the greatest consistency in relationship to the discharge rate at the bankfull stage, also termed the *Dominant Discharge* (Q_{bfl}), was with the channel cross-sectional area (A_{bfl}). Dominant Discharge exhibited a clear, predictable (or deterministic) relationship with features of channel geometry, such as channel width and cross-section area, i.e. as discharge increases, predictable increases in channel size are observed. An example of this deterministic relationship is shown in Figure ES-1, which indicates that the initial channel response to increases in discharge is to widen; however, with increasing discharge, the rate of channel widening decreases and downcutting is the predominant response.

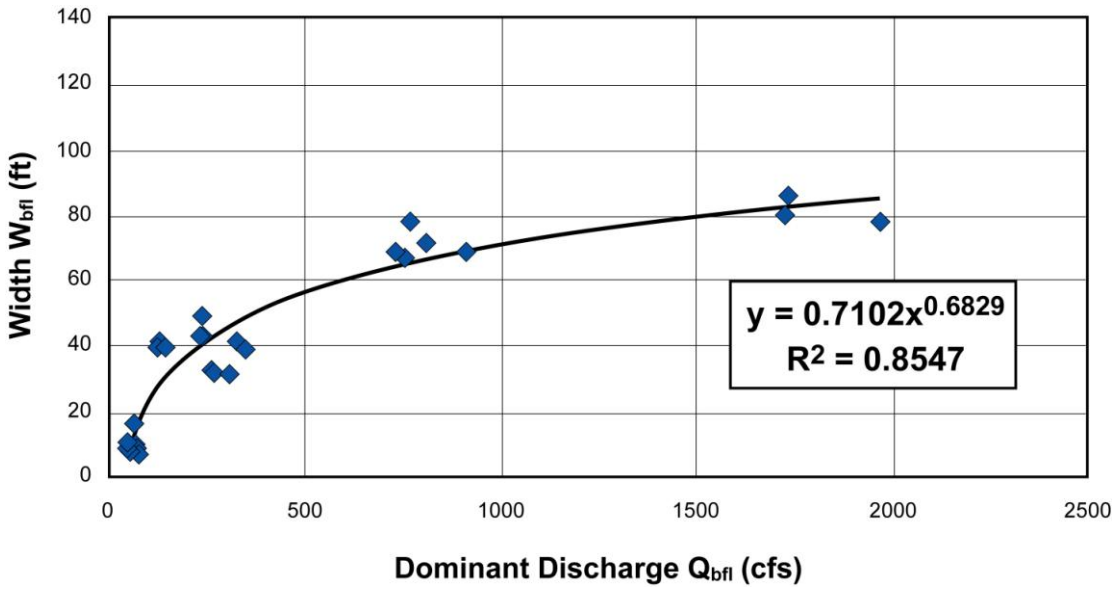

Figure ES-1: Relationship of Dominant Discharge to Channel Width

2. **The ephemeral/intermittent streams in southern California appear to be more sensitive to changes in TIMP than streams in other areas**. Stream channel response can be represented using an *enlargement curve*, which relates the percent of impervious cover (TIMP) to a change in cross-sectional area (Figure ES-2). The data for southern California streams forms a relationship very similar in shape to the enlargement curves developed for other North American streams. However, the curve for southern California streams is above the general curve for streams in other climates. This suggests that a specific enlargement ratio is produced at a lower value of impervious surface area in southern California than in other parts of North America. Specifically, the estimated threshold of response is approximately 2-3% TIMP, as compared to 7-10% for other portions of the U.S. It is important to note that this conclusion applies specifically to streams with a catchment drainage area less than $5mi^2$.

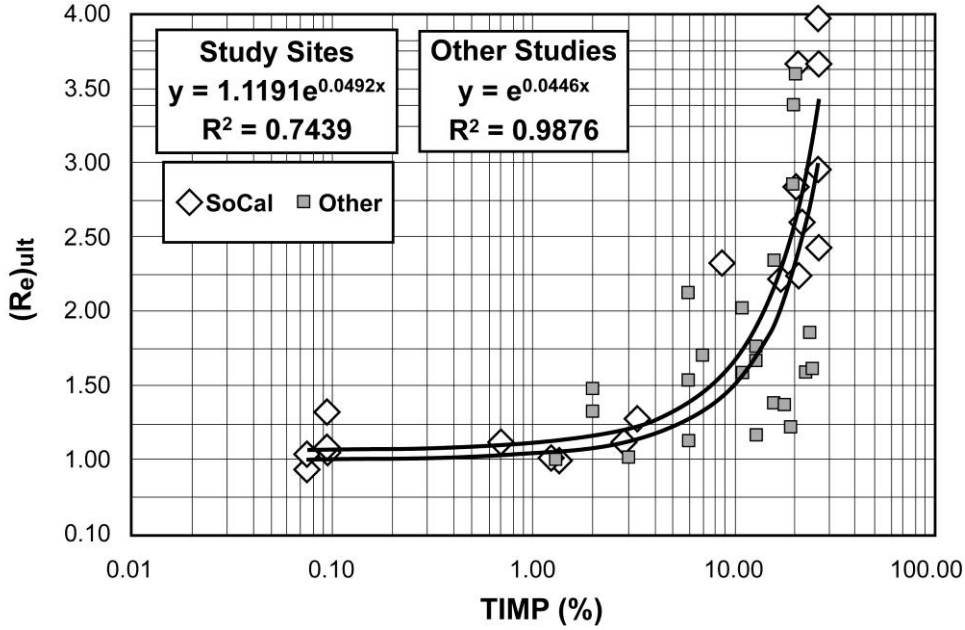

Figure ES-2. Enlargement Curve for Southern California.

Upper curve and data points are for southern California channels in the current study. Lower curve is based on data from other locations in North America.

3. **There is a natural background level of channel degradation that is occurring in all stream channels studied, even in the absence of development within the drainage area.** A minimal rate of change in channel bottom elevation was observed in all sites, regardless of whether the watershed has experienced an increase in impervious cover. Control sites exhibited a state of dynamic equilibrium where downcutting was observed, but channel morphology did not change appreciably over time. In contrast, the developed sites exhibited instability, where one or more measures of channel morphology changed over time. In addition, the rate of change in downcutting was greater in the developed sites than in the control sites. For example, at the Dry Canyon control site downcutting was estimated to be 0.7 ft/yr, while the rate at the developing Plum Canyon site was estimated to be 1.7 ft/yr. These results demonstrate poor channel resistance to increased flow in all stream channels except those subject to bedrock control, such as Topanga Creek.

4. **Streams are sensitive to both peak discharge and duration of discharge.** The ephemeral and intermittent streams investigated in this study appear to be highly sensitive to changes in flow rates associated with increased impervious cover. Additionally, they appear to have a low resistance to erosion, which results in increased susceptibility to channel enlargement in response to increases in the duration of high flows.

The predictive relationships established in this study can be used to evaluate potential effects of proposed development on the stability of natural streams. There are ranges of strategies that can be used to help reduce the potential effects of increased TIMP. However, the selection of a management strategy is dependent upon the extent to which a stream channel has been impacted by development within the watershed, the nature of the stream channel reach under consideration, and the anticipated future watershed conditions (i.e. expected increases in TIMP). Three general strategies should be considered when attempting to manage increases in peak flow:

1. **Limit Impervious Area.** Although the focus of this study was necessarily on TIMP, disconnecting impervious areas from the drainage network and adjacent impervious areas is a key approach to protecting channel stability. Utilizing this strategy can make it practical to keep the effective impervious cover (i.e. the amount hydrologically connected to the stream) equal to or less than the identified threshold of 2-3%.

2. **Control Runoff.** Hydrograph matching is not recommended for a single "design" storm with a specific return period, but rather for a range of return periods from 1 year to 10 years. Accomplishing such hydrograph matching will be challenging, and undoubtedly require a combination of techniques to prevent (retain), as well as to delay or attenuate (detain) runoff and/or stream flow.

3. **Stream Channel Movement.** Allow the greatest freedom possible for "natural stream channel" activity. This includes establishing buffer zones and maintaining setbacks to allow for channel movement and adjustment to changes in energy (associated with runoff). However, where in-stream controls are required consider all potential management options.

It is important to keep in mind that the choice of a management approach or approaches should be dictated by the strategies that are appropriate given the conditions of each stream reach and its contributing watershed. Consequently a suite of management approaches may need to be applied to provide a comprehensive solution to managing potential increases in runoff due to land use change.

Stream channels respond to changes in basin imperviousness in complex ways, and specific responses will vary based on the characteristics of the stream and watershed. An exhaustive analysis of these issues was beyond the scope of this study; nevertheless, the present study represents an important first step in understanding the response of ephemeral streams to increases in impervious cover.

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1.0 INTRODUCTION

The southern California region is expected to experience significant urbanization over the next several decades that has the potential to have significant impact on the many ephemeral or intermittent streams of this arid to semi-arid region. In response to this concern, the 2001 Los Angeles County Municipal Stormwater Permit calls for a study to help develop numeric criteria to prevent or minimize erosion of natural stream channels and banks associated with urbanization.

Working through the Stormwater Monitoring Coalition (SMC), the Southern California Coastal Water Research Project (SCCWRP) has been designated as the facilitator for studies to assess the relationship between stream erosion and urbanization. It is anticipated that the results of this study will be useful in developing peak flow criteria for Los Angeles County as well as future stormwater regulations. Earth Tech, Inc. has been retained to conduct this study to relate measurable urban/suburban development within a watershed to observable changes in stream-channel morphology (including width, depth, cross-sectional area, and plan-form shape) in the southern California region.

1.1 Project Background

The process of urbanization alters many aspects of a landscape and often results in the emplacement of structures and infrastructure. One of the primary changes that has the potential to affect stream courses is alteration of watershed hydrology. Development increases impervious surfaces on formerly undeveloped (or less developed) landscapes and reduces the capacity of remaining pervious surfaces to capture and infiltrate rainfall. The result is that as a watershed develops, a larger percentage of rainfall becomes runoff during any given storm. In addition, runoff reaches the stream channel much more efficiently, so that the peak discharge rates for floods are higher for an equivalent rainfall than they were prior to development. This has been well documented since the early research by Hammer (1972) and Hollis (1975), through the recent efforts of Bledsoe (2001), Booth (1990, 1991), and MacRae (1992, 1993, 1996). Changes in runoff and flow have also been shown to result in impacts on aquatic habitat and species (Benke, et al. 1981, Booth and Jackson 1997, Garie and McIntosh 1986, Jones and Clark 1987, and Pedersen and Perkins 1986).

Although the effects of increased impervious cover on stream flow have been well documented, the majority of past studies have focused on perennial streams. Few comparable studies have evaluated the impacts of urbanization on streams of arid or semi-arid climates where most of the smaller streams are ephemeral or intermittent. Ephemeral streams are defined as those that flow only in direct response to a rainfall event, and (particularly in southern California) are otherwise dry for most of the year. Intermittent streams will have base flow for some of the period between rainfall events, but will also have dry periods throughout the year. Perennial streams will flow throughout the year, having enough base flow to maintain water in the stream channel even during the long months of the dry season.

Two recent projects in California have begun to investigate effects of increased peak flow on arid streams that were either formerly ephemeral (Thompson Creek in Santa Clara County) or presently and historically ephemeral (Arroyo Simi in Ventura County). In each case, reports prepared for these projects summarized the relevant literature and noted the sparseness of work on streams in arid or semi-arid climates. GeoSyntec (2002) provides a substantial review of the literature on this topic, and AQUA TERRA (2004) contributes additional references not covered in the more extensive GeoSyntec (2002) literature review. Of the 123 papers, reports, or books reviewed between these two references, only one citation was noted specifically for considering and evaluating ephemeral streams (Caraco 2000). This emphasizes the lack of reference material available for assessing ephemeral or intermittent streams in dry climates.

There are additional classic (Graf 1987) and recent (Tooth 2000, and Bull and Kirkby 2002) works on stream processes in arid areas not cited by the recent California projects. However, these additional publications do not focus on impacts from increased imperviousness. Therefore, the limited nature of applicable research is particularly problematic for the relatively steep arid and semi-arid streams typically found in southern California, which may have different bed and bank properties than streams in other regions. The lack of research into the impacts of urbanization on ephemeral and intermittent streams also makes it difficult to manage stormwater impacts on natural streams effectively in southern California or other parts of the southwest. Furthermore, the current, rapid pace of urbanization in foothill areas of the study region emphasizes the importance of understanding the relationship between changes in the hydrologic and hydraulic processes of these systems and the resultant change in stability of the streams in arid watersheds. Such an understanding is urgently needed to help managers make informed decisions regarding strategies to protect these streams.

The present study is another step toward understanding the responsiveness of ephemeral stream channels to changes in hydrology (i.e. evaluating their resistance to expected changes in the flow peaks and duration). The approach adopted here differs from the two recent efforts in California to evaluate the impacts of urbanization. AQUA TERRA (2004) used a modeling approach with field verification to evaluate a single watershed using data from six stream channel monitoring points. GeoSyntec (2003), also used multiple stream channel data collection points within a single watershed to evaluate stream channel response to development. The present study evaluated stream channel study sites in multiple, small watersheds from a larger geographic area that includes Los Angeles, Orange and Ventura counties in order to begin developing a regional understanding of the relationship between increased impervious cover and stream channel stability.

1.2 Study Objectives

The primary objective of this study was to find relationships between stream channel type and resistance that would allow prediction of channel response under changed conditions associated with increased impervious cover. Ultimately this effort will contribute to the establishment of stormwater management criteria to help minimize the impacts to stream channels from the conversion of undeveloped (or less developed) areas to residential, commercial, or other intensive land uses.

The study was structured to address specific problems expressed in terms of urbanizing systems (Table 1-1). Although solutions to these problems may not be attainable through this study, they are presented as a desirable outcome of this type of research. More tenable study goals are provided as reasonable expected results of this project. Finally, several viable approaches applied by this project are presented to indicate how the study addressed the stated problems in order to reach the stated study goals.

Table 1-1. Project Structure

Problems	Approaches	Study Goals
1. Understand stream channel response to urbanization in southern California streams. 2. Isolate the effects of urbanization on stream channel response. 3. Identify geomorphic thresholds for southern California streams. 4. Understand the effectiveness of mitigation strategies. 5. Establish a model or procedure to extrapolate relationships based on case studies.	1. Use data obtained from the study sites to establish a stream channel classification system for southern California. 2. Use stream channel type to discriminate among the quantifiable impacts to stream channel morphology. 3. Establish a procedure to assess significance of morphological impacts.	1. Evaluate the impact of urbanization on stream morphology in natural ephemeral stream-channel systems in southern California. 2. Develop cause and effect relations between stream channel morphology change and urbanization. 3. Review potential BMP implementation. 4. Recommend possible applications of this study's findings to other streams and watersheds in southern California.

Since this was an empirical study, it required several stream channel sites that were selected from within a six-county region in southern California. The investigation looked at historical changes in stream channel configuration relative to historical changes in land use. The intent, therefore, was to use multiple watersheds (each containing a single site) studied in broad scope rather than a single watershed (with many sites) studied in great detail. Consequently a total of 11 separate sites were selected in 8 distinct watersheds. The locations of these watersheds are regional, and range from northwestern Los Angeles County through southern Ventura County, and down to central Orange County. The evaluations performed should allow a greater range of site conditions to be evaluated than they would for a single watershed, and ultimately provide results with broader applicability in the southern California region. There is a great need for additional research in this geographic area on the impacts from urbanization, and this need is for both focused (single watershed) and regional (multiple watersheds) investigations. The two recent California studies (AQUA TERRA 2004 and GeoSyntec 2004) were focused studies. The present study is the first regional investigation of ephemeral stream channel response to urbanization.

The objectives of this study, which were needed in establishing the relationship sought by the primary study goal, include the following:

- Create a classification system to generalize responses of different types of stream channels,
- Evaluate stream channel response to watershed change, and
- Attempt to provide a conceptual model of stream channel behavior.

While the results of the current study are only directly applicable to the sites included in this study, the use of a classification system similar to the one proposed here (see Section 3) holds promise for eventually broadening this applicability and allowing extrapolation of results to other similar stream types. Understanding such relationships could be an important part of future watershed and stormwater management by identifying stream channel reaches that are most susceptible to change. Toward this end, Section 4 of this report provides some recommendations for additional research needs to provide a broader scientific basis for the classification of stream channels in all six counties of the study region and their applicability to different development scenarios.

2. DATA COLLECTION METHODS

This study employed a stepwise stream evaluation protocol previously applied at a number of sites throughout North America, and developed partly from research conducted worldwide (Table 2-1). This project evaluated the applicability of this protocol to the semi-arid southern California region. Specifically, the study tested the comparability of relationships derived from southern California streams to data collected in other areas encompassing more diverse hydrologic settings. If the two data sets are comparable, the larger data set can be used to augment the relatively modest data expected from this study; thereby strengthening the reliability of the analysis based on local conditions.

2.1 Evaluation Process

The overall protocol includes eleven steps, but only steps 1 through 5, 7, and 8 have been employed in this study, as this study has been broadly applied to sites in southern California rather than being applied to a single watershed with multiple stream or river channel sites. Each step of the process and a brief summary of its application to this study are provided below. The remaining sections of this report provide background information on the study sites and evaluations performed for the application of this protocol. Detailed field and analytical data are contained in the appendices to this report.

Table 2-1. Eleven-Step Protocol
The Protocol, as applied in this study pertains to the geomorphic component of stream channel investigations.

ID	Name	Question
STEP 1	Study Objectives	What is the nature and degree of the perceived problem?
STEP 2	Past Stream channel	What was the form of the historic stream channel?
STEP 3	Expected Disturbances	What future disturbance is likely to occur?
STEP 4	Present Stream channel	What is the stream channel like today?
STEP 5	Future Stream channel	What will the stream channel look like in the future?
STEP 6	Accept/Reject Future	Is the future stream channel form desirable, acceptable or unacceptable?
STEP 7	Disturbance Control	Can the perturbations be controlled through watershed planning?
STEP 8	Channel Works	Are instream works required, desirable, feasible and practical?
STEP 9	River Management	What is the preferred river corridor management plan?
STEP 10	Engineering Design	What does the detailed design look like?
STEP 11	Implementation	How will the plan be implemented?

Study Objectives. The first step of the protocol is to establish study objectives by defining the problems to be solved, establishing goals for solving these problems, and defining an assessment approach for determining when the goals are reached. For this study, the objectives have been articulated previously in Section 1.2, Study Objectives.

Past Stream Channel. Previously surveyed cross sections were available for each of the study sites, including at least one at every stream channel reach. These cross sections are an important key to evaluating how stream channel morphology differed in the past from its present-day form. The differences in stream channel geometry between past sections and present sections were evaluated for

every site. The results of this evaluation are used as a basis for both the stream channel classification system and the stream channel response evaluation discussed in Section 3 of this Technical Report.

Expected Disturbances. This study is focused entirely on expected disturbances related to land use changes within the watersheds of these sites. Therefore, evaluation of expected disturbances is centered on changes in energy and erosion potential at these stream reaches.

Present Stream Channel. The present stream channel configurations are very clearly understood at all of the sites through the diagnostic surveys performed in May 2004. Each stream channel reach had from three to six cross sections surveyed, with characterizations made of the topography and the composition of bed and bank materials. In addition, a longitudinal profile was also surveyed that tied all of the cross sections together spatially and geometrically.

Future Stream Channel. Evaluation of the historical changes in stream channel morphology, combined with the data on bed and bank material composition, and bank cohesion, allowed an assessment of the potential for additional adjustment in stream channel morphology at each of the study reaches.

Accept/Reject Expected Future. If the purpose of this study had been stormwater management for a specific watershed, then the intent of this step would be applicable to the current discussion. However, because this effort is attempting to characterize a broad range of stream channels and assess their thresholds for stream channel change (most specifically enlargement), accepting or rejecting change is not required.

Disturbance Control. This study attempts to provide a generic assessment of the effectiveness of different classes of stormwater management measures, and when they can be appropriate to use in controlling the expected stream channel change resulting from urbanization.

Channel Works (BMPs). This project also considers the need for, and appropriate use of, in-channel management practices and under what conditions they might be appropriate.

2.2 Site Selection

The general goals in site selection were to find stream channels that would be representative of stream channel types across the region. In addition, candidate sites needed to have available historic information on the stream channel and the watershed. Finally, the selected watersheds must have been subject to some degree of development over the period for which information is available.

A detailed discussion of the logic behind the site selection process, and the guidelines applied while selecting the sites used in the study, can be found in the Work Plan prepared for this effort (Earth Tech, 2004). However, a brief summary of each guideline is presented below. A brief description of the sites selected and key background information on each site is presented in Sections 3.

- **Selection Guideline 1. Small Watershed Size.** The target drainage area for selected study sites/reaches was between 1 and 5 square miles, depending upon the degree of impervious cover.
- **Selection Guideline 2. Shear Stress Dominated.** The selected stream channel sites needed to have well-formed morphological characteristics that could be readily distinguished and surveyed using traditional geomorphic and engineering study techniques. Ideally, the stream channel system would be approaching a metastable position and shear stress processes are the dominant channel-forming mechanism.
- **Selection Guideline 3. Natural Channel.** The stream channels were to be primarily undisturbed by direct human activity (as well as could be determined) during the surveyed period. This included such activity as channel straightening, channel enlargement, bank protection or stabilization, upstream or downstream hydraulic control devices, and sediment trapping or containment structures. The length of the undisturbed stream channel needed to be greater than the minimum survey length of 1 to 2 meander wavelengths or the equivalent of 10 to 20 bankfull stream channel widths.

- **Selection Guideline 4. Development.** The watershed areas of the sites had to contain some level of urban (or suburban) development. Preferably at least 5 to 10 percent of the land area within the watershed should be in urban, suburban, commercial, or industrial land use categories.
- **Selection Guideline 5. Historic Cross Sections.** It was absolutely critical that each of the sites has previous stream channel cross-section surveys available for comparison. Ideally, these cross sections would be for one or more time periods prior to, and during the development period. Preferably the surveys would be from a time when a smaller percentage of the watershed was developed than it is currently.
- **Selection Guideline 6. Streamflow Data.** Sites were sought with stream flow data available in or near the study reach. Acceptable data was from actual flow measurements, modeled flow values, estimated peak discharges for specific recurrence intervals, or regional relationships. In the absence of such data, some idea of the number of days in a year that the stream channel contains flowing water was sought.
- **Selection Guideline 7. Aerial Photos.** Although not required, paired, stereographic aerial photographs at a useable scale (e.g., 1:10,000 or better) were sought for one or more historic periods.
- **Selection Guideline 8. Topographic Maps.** A study reach needed maps with a useable scale and contour interval (ideally 1 inch = 50 feet, to 1 inch = 100 feet, and a contour interval of 1 foot).
- **Selection Guideline 9. Geotechnical Data.** The availability of the results of geotechnical investigations that characterized materials similar to the stream channel bank and bed materials for a reach was considered very helpful in the site selection process.

The site selection process was a two-phase effort of (1) identifying potential (or "candidate") sites and (2) picking a subset of these sites for inclusion in the investigation. The process included contacting federal, state, county, and local government agency personnel, faculty members at local universities, and staff at local non-profit organizations to seek recommendations for candidate sites that generally appeared to meet the selection guidelines. The identified candidate sites are shown in Figure 2-1, as well as the final selected sites for the study. Details on the selected sites are given in Section 3.0, including location, topography, local geology, and other salient information.

2.3 Data Collection

Two phases of data collection were conducted for each of the eleven selected study sites. The first phase consisted of collecting background and historic information on each site and its contributing drainage area. The second phase consisted of collecting intensive field data on the geomorphic condition of each study reach. These two phases are described in detail in sections 2.3.1 and 2.3.2 below.

The historic data gathered for this study included the following types:

- Land use maps and/or digital files marking a specific land use coverage at a specific point in time.
- Surveyed cross sections (of distance and elevation) previously measured at each of the study sites.
- Precipitation records for rain gauges close to the watershed areas of the study sites; primarily annual amounts for the period of record.
- Stream flow measurements at local USGS (or other) stream gages; mostly annual peak flows for the period of record.
- Aerial photographs covering a range of times over the watershed area.

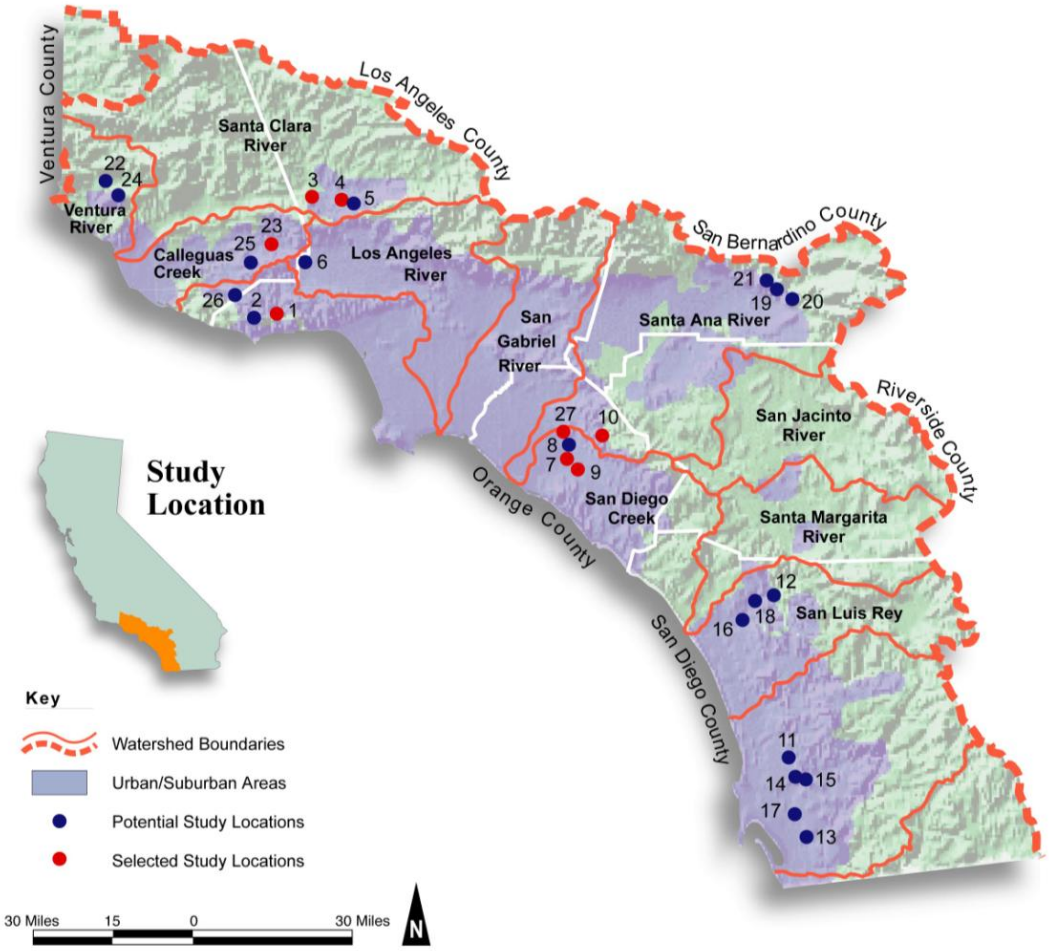

Figure 2-1. Study Sites

Map of study area showing the locations of potential study sites. See Table 1-1 for identification of, and additional information about, the selected study sites.

(Includes all candidates sites.)

- Evaporation (or evapotranspiration) records or approximate amounts for the watershed of the modeled reach.
- Satellite imagery and interpretation for impervious areas in the Hasley Canyon and Plum Canyon watersheds.

The current data was collected during two weeks of field work in May 2004. The specific types of field data collected at each of the stream channel reaches selected for this study include:

- Total-station surveys of the entire study reach that included stream channel cross sections (especially at locations of the previously surveyed cross sections), longitudinal profiles of the stream channel, and other points of interest tied to the geomorphic mapping.
- Geomorphic mapping of the stream channel reach, including up to, and slightly beyond the perceived "bankfull" channel configuration.
- Pebble counts and/or sieve analyses at multiple points across the stream channel to characterize bed materials.
- Sieve analyses and Torvane® shear stress meter readings to characterize bank material sizes and cohesion of both right and left banks.
- Rapid geomorphic assessment of each study reach.

2.3.1 Historic Data

Sources for the historic data are summarized below. These data generally required some amount of processing to make them consistent with the other data sources, and useable with the field-generated data from the current study.

Land Use. Land use data were used as a surrogate for impervious surface area within the watersheds. Land use/impervious cover data came from three primary sources (Table 2-2). The basic land use data came from detailed maps prepared for the Southern California Association of Governments (SCAG) for the years 1990, 1993, and 2001. Older land use data came from aerial photos and interpreted land use maps for the Serrano Creek and Borrego Canyon sites made available by Felicia Federico of UCLA. Data from DigitalGlobe was used to supplement the land use mapping for Hasley and Plum canyons. It consisted of digital orthoimagery collected with the QuickBird® satellite, which was used to supplement the SCAG land use maps. The DigitalGlobe imagery of Hasley Canyon was taken on 23-July-2002, while the imagery for Plum Canyon was taken on 22-March-2003.

Cross Sections. Previously surveyed cross sections came from six primary sources (Table 2-3). Most data were for multiple sections surveyed one or more years apart. The exceptions were Topanga Creek (one section, one survey time), Borrego Canyon (one section for each site, multiple survey times), and Santiago Creek (four sections, one survey time). Monuments used in the original survey, or other recoverable "surrogate" monuments were used to tie the current surveys to their historic cross section counterparts.

Precipitation Records. Rainfall records were sought for each watershed area to provide background information on relative hydrologic conditions for the period of land use change and the related adjustment in stream channel morphology (Table 2-4). Rainfall records were obtained for multiple weather stations near the watershed areas of the sites. The relative locations of the weather stations to the watersheds are shown in Figures 2-2 and 2-3.

Table 2-2. Land Use/Impervious Cover Data

Site		Source	Information
Site 1.	Topanga Creek	SCAG (2004).	Land use mapping with GIS layers for 1990, 1993, and 2001 data.
Site 3.	Hasley Canyon	SCAG (2004), DigitalGlobe (2004).	Land use mapping with GIS layers for 1990, 1993, and 2001 data; satellite imagery for 23-July-2002.
Site 4u.	Plum Canyon (upstream)	SCAG (2004), DigitalGlobe (2004).	Land use mapping with GIS layers for 1990, 1993, and 2001 data; satellite imagery for 22-March-2003.
Site 4d.	Plum Canyon (downstream)	SCAG (2004), DigitalGlobe (2004).	Land use mapping with GIS layers for 1990, 1993, and 2001 data; satellite imagery for 22-March-2003.
Site 7u.	Borrego Canyon (upstream)	SCAG (2004), Aerial Photos.	Land use mapping with GIS layers for 1990, 1993, and 2001 data; aerial photos for 1952, 1967, 1972, 1983
Site 7d.	Borrego Canyon (downstream)	SCAG (2004) Aerial Photos.	Land use mapping with GIS layers for 1990, 1993, and 2001 data; aerial photos for 1952, 1967, 1972, 1983
Site 9.	Serrano Creek	SCAG (2004) Aerial Photos and Interpretation (Federico 2003).	Land use mapping with GIS layers for 1990, 1993, and 2001 data; land use mapping for 1949, 1968, 1978, 1982, and 1997
Site 10.	Santiago Creek	SCAG (2004).	Land use mapping with GIS layers for 1990, 1993, and 2001 data
Site 23.	Dry Canyon	SCAG (2004).	Land use mapping with GIS layers for 1990, 1993, and 2001 data
Site 27.	Hicks Canyon	SCAG (2004).	Land use mapping with GIS layers for 1990, 1993, and 2001 data

Stream Gage Records. Although only two of the sites (Topanga Creek and Santiago Creek) have stream gages near the study reach, we have collected stream flow records from local gages for as many of the reaches as possible (Table 2-5). These gage records have been used to establish flow frequency relationships that are essential for estimating the recurrence interval (RI) of discharge values calculated for the study sites. The process involves prorating the calculated discharge values, by watershed area, to an equivalent discharge at a gage. The gage discharge is then used to estimate a RI with the established flow frequency relationship. Verification of these return period values made with the regional flood frequency relationships developed by the U. S. Geological Survey (Waananen and Crippen 1977).

Table 2-3. Historic Cross Section Data

Site		Source	Information
Site 1.	Topanga Creek	Rosi Dagit, Santa Monica Mountains Resource Conservation District.	Copy of field notes for original survey of cross section TS-1 performed in November 2000 by Orme, et al. (2002).
Site 3.	Hasley Canyon	Matt Yeager, Ph.D. candidate, University of California, Los Angeles.	Electronic file copies of surveys for cross sections HC-1, HC-2, HC-2.5, HC-3, HC-4, and HC-5 taken from October 2001 to April 2003.
Site 4u.	Plum Canyon (upstream)	Matt Yeager, Ph.D. candidate, University of California, Los Angeles.	Electronic file copies of surveys for cross sections PC-2, PC-2.75, PC-3, and PC-4 taken from October 2001 to April 2003.
Site 4d.	Plum Canyon (downstream)	Matt Yeager, Ph.D. candidate, University of California, Los Angeles.	Electronic file copies of surveys for cross sections PC-1, PC-2, and PC-2.5 taken from October 2001 to April 2003.
Site 7u.	Borrego Canyon (upstream)	Professor Stanley Trimble, Department of Geography, University of California, Los Angeles.	Copy of field notes for surveys of cross section (Range) 4A taken in September 1992, April 1993, December 1998, and February 2003.
Site 7d.	Borrego Canyon (downstream)	Professor Stanley Trimble, Department of Geography, University of California, Los Angeles.	Copy of field notes for surveys of cross section (Range) 4D taken in September 1992, April 1993, and February 2003.
Site 9.	Serrano Creek	Felicia Federico, Ph.D. candidate, University of California, Los Angeles.	Copy of field notes for surveys of cross section (Range) C taken in October 1997, and cross sections (Ranges) A2 and A4 taken in September 1991, and May 1993.
Site 10.	Santiago Creek	Jeff Agajanian, U. S. Geological Survey	Copy of field notes for surveys of cross sections XS-1, XS-2, XS-3, and XS-4 taken in April 1995.
Site 23.	Dry Canyon	Darla Wise, Ventura County Watershed Protection District	Electronic file copies of AutoCAD cross sections North, Middle, and South taken in October 2001, January 2002, and March 2003.
Site 27.	Hicks Canyon	Professor Stanley Trimble, Department of Geography, University of California, Los Angeles.	Copy of field notes for surveys of and cross sections (Ranges) A2 and A4 taken in September 1986, April 1992, and April 1993.

Table 2-4. Precipitation Data

Site		Source	Information
Site 1.	Topanga Creek	Los Angeles County Department of Public Works (LA DPW)	LA Co. Stations 6 and 1194
Site 3.	Hasley Canyon	LA DPW	LA Co. Stations 372, 801B, 1012B, 1262, and 1263
Site 4u.	Plum Canyon (upstream)	LA DPW	LA Co. Stations 372, 801B, and 1262
Site 4d.	Plum Canyon (downstream)	LA DPW	LA Co. Stations 372, 801B, and 1262
Site 7u.	Borrego Canyon (upstream)	Orange County Resources and Development Management Department, Watershed and Coastal Resources Division (RDMD); California Irrigation Management Information System (CIMIS)	OC Stations 121, 165, 169, 173, 176 (annual and hourly), and 216; CIMIS Station #75 (hourly)
Site 7d.	Borrego Canyon (downstream)	RDMD and CIMIS.	OC Stations 121, 165, 169, 173, 176 (annual and hourly), and 216; CIMIS Station #75 (annual and hourly)
Site 9.	Serrano Creek	RDMD and CIMIS.	OC Stations 121, 165, 169, 173, 176, and 216
Site 10.	Santiago Creek	RDMD and CIMIS.	OC Stations 121, 165, 169, 173, 176, and 216
Site 23.	Dry Canyon	Ventura County Watershed Protection District (VC WPD)	Ventura Co. Stations 154, 193, and 196
Site 27.	Hicks Canyon	RDMD and CIMIS.	OC Stations 121, 165, 169, 173, 176, and 216

Table 2-5. Stream Gage Records

Agency	Site ID Number	Site Name	Elevation of Gage (ft.)	CDA (mi^2)	Years of Record
LA DPW	F54C-R	Topanga Creek above Mouth of Canyon	265.6	16.0	63
USGS	11104000	Topanga Creek near Topanga Beach, CA	255.0	18.0	49
USGS	11047500	Aliso Creek at El Toro	440.0	7.9	50
USGS	11075800	Santiago Creek at Modjeska	1,210.0	13.0	42
USGS	11096500	Little Tujunga Creek near San Fernando, CA	1,068.4	21.1	46
USGS	11105850	Arroyo Simi near Simi	720.0	70.6	42

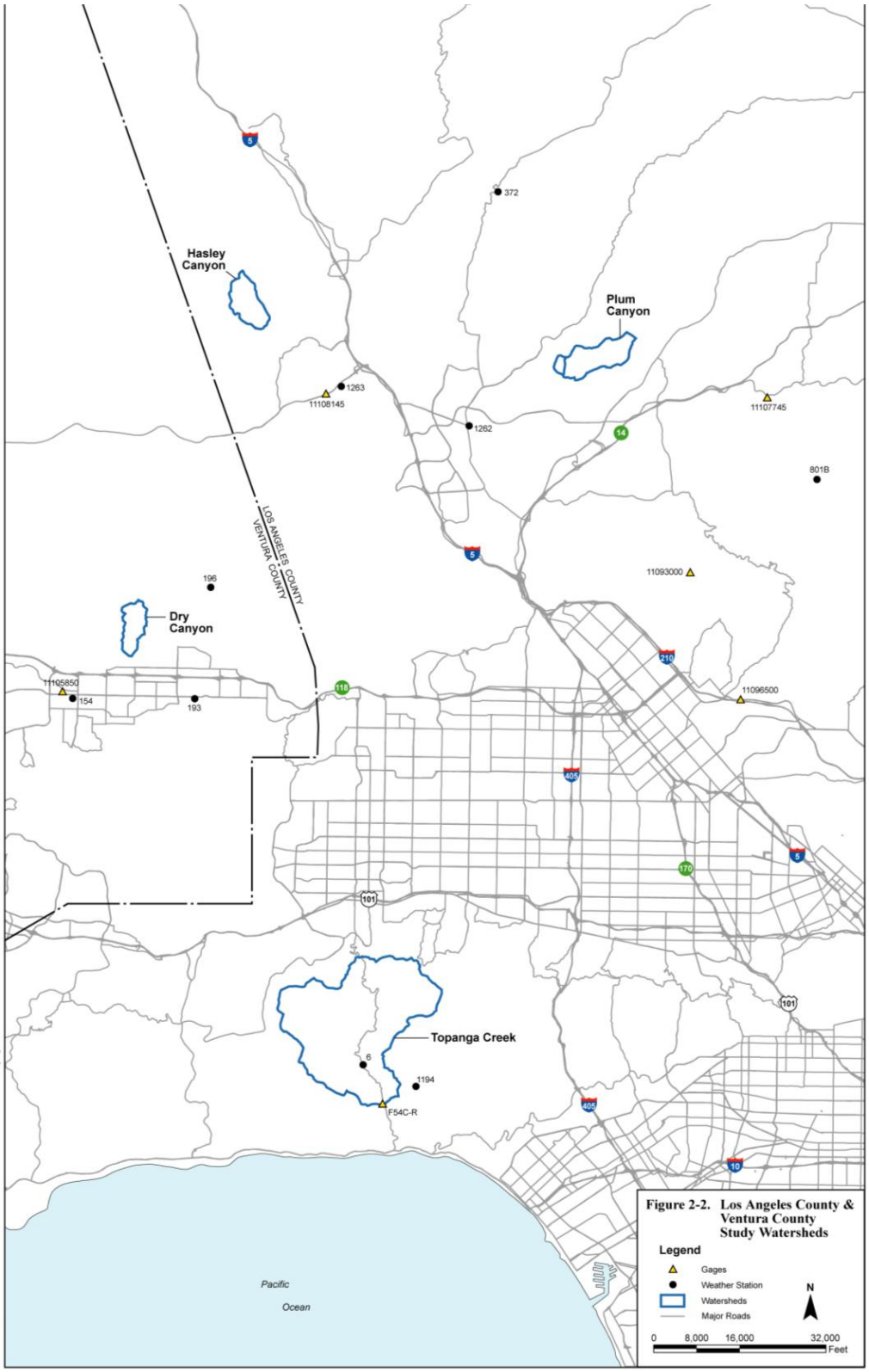

Figure 2-2. Los Angeles County and Ventura County Study Watersheds

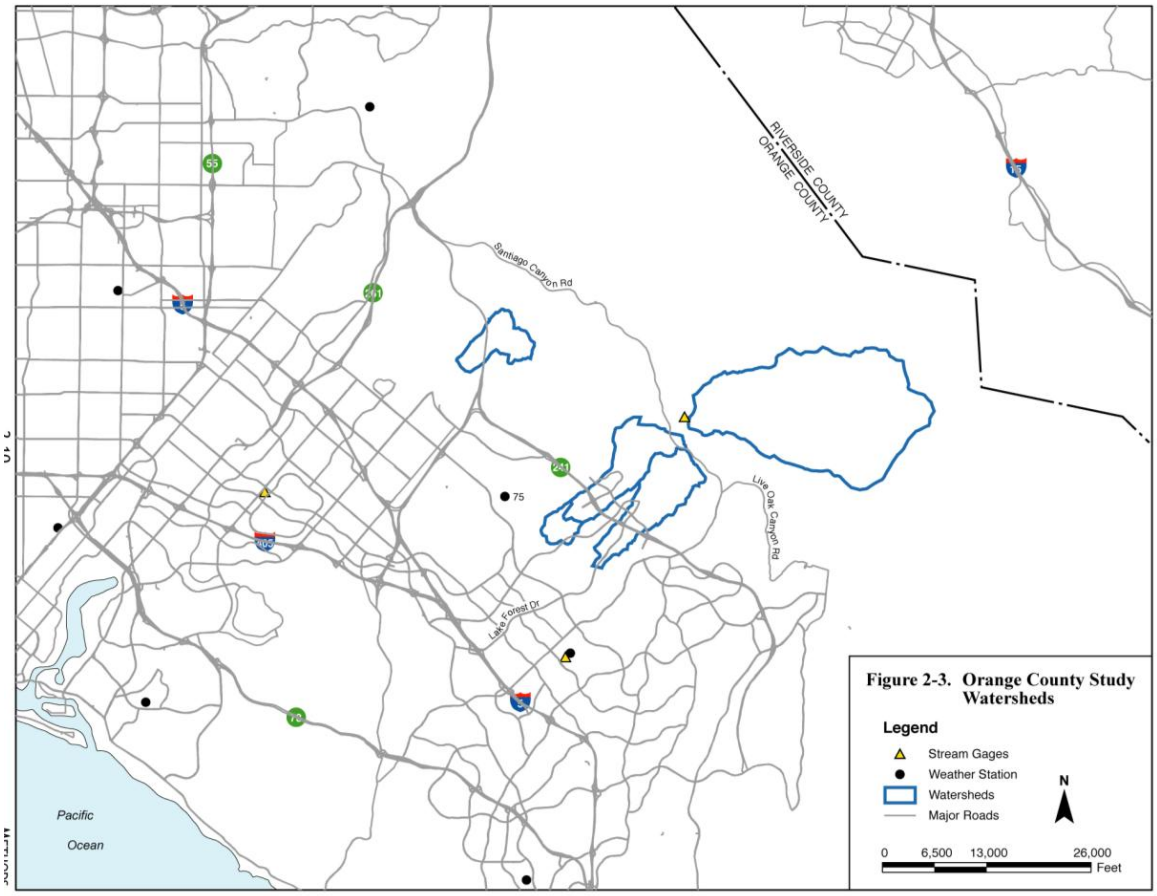

Figure 2-3. Orange County Study Watersheds

2.3.2 Field Data

Current conditions at each study site were evaluated through measurements and observations made during a two-week field program conducted from 3-May-2004 through 13-May-2004. A five- to seven-person field crew collected the data. The field procedures and data collection techniques are briefly described below. Data collected during this field program are provided in Appendix B.

Topographic Surveys. Distance and elevation readings were made using a Leica TPS700 Total Station surveying instrument. This instrument was capable of measuring distance, elevation difference, and declination from the instrument to a survey target, or prism. Readings were taken for specific stream channel features along the reach (thalweg, cut banks, bars chutes, etc.) as well as for the individual cross sections of interest. At least one cross section per site was termed the Master Section, and it coincided with the historic cross section, thus allowing comparison with the historic section(s) for that specific study reach. Generally the Master Section was the middle cross section in a series of three to five sections, and often had more detailed bed sediment data gathered, in addition to being the section used for evaluating historic changes at the site. Spacing of the cross sections were at distances approximately equal to 5 bankfull channel widths apart, for each of the 5 cross sections. Stream channel feature interpretations were also based on the geomorphic mapping prepared for the reach. Cross section surveys provide key data on stream channel morphology and capacity, which can be compared to historic values. Table 2-6 provides the details of which current cross sections match to the historic cross section(s) for each site. Longitudinal profile data, which also were measured during these topographic surveys, are important for deciphering current hydraulic conditions at these reaches, as well as estimating past or future conditions.

Geomorphic Mapping. Detailed mapping of geomorphic features was prepared for the reach at each study site using tape measure readings from a survey centerline that was established for the site during the survey. The centerline tape was turned and extended as needed to complete the full reach. Centerline points were included in the topographic surveys to help align and combine them with the synoptic geomorphic mapping, once both were completed. Specific geomorphic features were mapped that would aid in interpreting the current conditions in the study reach and help define what morphological changes had occurred.

Bed Material. Composition of bed material was characterized through a combination of pebble counts (Wolman 1954) and sieve analyses at a selected number of points across the bed at each surveyed cross section for all study sites.

Bank Material. Composition of the material in the stream channel banks was characterized through a combination of sieve analyses, detailed soil descriptions including standard field assessment of silt and clay fractions.

Rapid Geomorphic Assessment. In addition to the detailed synoptic mapping that was conducted, a quick assessment of the condition of each reach was made with a tool called the rapid geomorphic assessment (RGA; see Section 5.7 for additional details on the RGA).

Table 2-6. Matching Cross Section Surveys

		Historic Cross Section ID[1]					
Site	**Current Section[2]:**	**1**	**2**	**3**	**4**	**5**	**6[3]**
Site 1.	Topanga Creek	--	TS-1	--	ns	ns	ns
Site 3u.	Hasley Canyon (upstream)	--	--	--	HC-2	ns	ns
Site 3d.	Hasley Canyon (downstream)	--	HC-2.5	--	--	ns	ns
Site 4u.	Plum Canyon (upstream)	--	--	--	PC-3	PC-4	ns
Site 4d.	Plum Canyon (downstream)	--	PC-1	--	--	--	ns
Site 7u.	Borrego Canyon (upstream)	--	--	Range 4A	--	--	ns
Site 7d.	Borrego Canyon (downstream)	--	--	Range 4D	--	--	ns
Site 9.	Serrano Creek	--	--	Range D	Range C	Range B2	ns
Site 10.	Santiago Creek	XS-4	XS-3	XS-2	XS-1	--	ns
Site 23.	Dry Canyon	--	South	Middle	North	--	na
Site 27.	Hicks Canyon	--	Range A2	--	Range A4	--	Range A3

(1) Historic sections as identified by the source.

(2) Current section numbering starts at the downstream end of the reach. Unique section identification numbers have been given to each current section for the discussion and data presentation in Appendix C.

(3) Section 6 was surveyed only for Hicks Canyon, and that section was on a tributary, not the main stream channel.

ns Not a surveyed cross section in the current program.

3. STREAM CHANNEL STUDY SITES

The site selection effort covered a six-county region, including Los Angeles, Orange, Riverside, San Bernardino, San Diego, and Ventura counties. There were two general phases in the site selection process. Phase I was a screening process to identify candidate sites that generally appeared to meet the selection guidelines established for the project. Contacts were made either by networking referrals or targeting local agencies in the study region. The final candidate site list included a total of 27 stream channel locations in five of the six counties in the study region. No candidate sites were identified for Riverside County. Locations of all 27 candidate sites are shown in Figure 2-1. Phase II was a closer evaluation of the candidate sites to see how much data was available for each, and how well they met the specific selection guidelines. A total of 8 streams were selected for the study, after it was established that sufficient data was available for each. Two of these streams had multiple sections that proved distinct enough to be treated as separate sites. Therefore, sites 4 and 7 were divided into an upstream (4u and 7u) and a downstream (4d and 7d) site prior to field data collection. The selected sites are identified and key information provided on each in Table 3-1. After field data gathering was completed, it was concluded that Site 3 should also be treated as two separate sites. See the site description for Hasley Canyon in Section 3.1 for a discussion of this adjustment. Therefore, the final list of sites with data used in the evaluation presented in this report, included 11 sites in 8 different watersheds.

Table 3-1. Study Site List

Site No.	Site Name	CDA (mi^2)	Major Watershed	Type of Site	County	Thomas Brother's Map Sheet No.
1	Topanga Creek	18.07	Santa Monica Bay	Control Site	Los Angeles	630
3u	Hasley Canyon	1.55	Santa Clara River	Control Site	Los Angeles	4459
3d	Hasley Canyon	1.66	Santa Clara River	Developed Site	Los Angeles	4459
4u	Plum Canyon	2.23	Santa Clara River	Developed Site	Los Angeles	4461
4d	Plum Canyon	2.40	Santa Clara River	Developed Site	Los Angeles	4461
7u	Borrego Canyon	2.27	San Diego Creek	Developed Site	Orange	861
7d	Borrego Canyon	3.06	San Diego Creek	Developed Site	Orange	861
9	Serrano Creek	2.64	San Diego Creek	Developed Site	Orange	862
10	Santiago Creek	12.36	Santa Ana River	Control Site	Orange	832
23	Dry Canyon	1.22	Calleguas Creek	Control Site	Ventura	478
27	Hicks Canyon	1.33	San Diego Creek	Control Site	Orange	831

CDA = catchment drainage area

3.1 Study Site Streams

The stream channel study sites used in this investigation, with two exceptions, were formed in medium to coarse alluvial materials (sands and gravels). Topanga Creek and Serrano Creek were the exceptions, both being influenced by bedrock. The larger channels formed in alluvial materials have similar wide, shallow shapes (width to depth ratios greater than 20). The smaller watersheds, bedrock channels, and the control sites all have narrower and deeper channels (width to depth ratios smaller than 20).

Topanga Creek. Topanga Creek is located in western Los Angeles County between Highway 101 and the Pacific Ocean. The creek empties directly into Santa Monica Bay between Pacific Palisades and Malibu. The long axis of its watershed is oriented in a north-south direction and much of the watershed is in the Santa Monica Mountains. The watershed has some development in the northernmost part in the Glenview area and also in the central part of the watershed in Fernwood. The study site is located along Highway 27 (Topanga Canyon Boulevard), approximately halfway between Highway 101 and the Pacific Coast Highway. Gage records for this watershed show that it should be considered a perennial stream. Only 6 years in a 68-year record showed a minimum flow of zero.
Topanga Creek has outcrops of resistant volcanic bedrock in or near the channel in the study reach. There are also deposits of very coarse alluvial material, ranging from sand and silt to boulder sizes, in the valley bottom. The alluvium forms a flood plain with an atypical alluvial surface and rugged channel banks.

Hasley Canyon. Hasley Canyon is situated in northwest Los Angeles County west of Interstate 5, north of State Route 126, and between Lake Piru and Castaic Lake. The watershed trends from the northwest to the southeast. Development is occurring in the watershed adjacent to and upstream from the study site. Hasley Canyon is a tributary to Castaic Creek and is situated about 1.4 miles upstream from Castaic Creek's confluence with the Santa Clara River. The stream channel at this site is considered ephemeral, although there is a tributary entering from the west that had a small flow coming from the new large-lot residential development across Hasley Canyon Road. Evaluation of the data for Hasley Canyon demonstrated distinctly different changes at the upstream cross section (#4) compared to the other sections (#1, #2, and #3). It was concluded that a tributary to the main channel joining between section #3 and #4 affected only the lower sections (#1, #2, and #3). Furthermore, the watershed of this tributary includes all of the recently developed land (i.e. all of the increased total impervious surface area (TIMP)). As a result, the Hasley Canyon site has been divided into two sites; an upstream site (section #4) and a downstream site (sections #1, #2, and #3).

The Hasley Canyon channel is formed in a finer grained alluvium in the channel and has a more cohesive channel bank than most of these sites. In addition, there is an obvious enlargement and slight incision of the channel downstream from the tributary channel that drains the adjacent housing development.

Plum Canyon. Plum Canyon is located northeast of Santa Clarita in the Canyon Country of northern Los Angeles County. The watershed is a tributary of Bouquet Canyon, which empties into the Santa Clara River near the town of Saugus. The watershed is a northeast to southwest trending basin that is moderately developed in the lower portion and undergoing development in the upper portions. Two study reaches were used on Plum Canyon as sites, separated by a distance of more than 500 feet. Both sites are considered ephemeral stream channels, and both were dry in May 2004 during field data collection.
Plum Canyon, the stream channels of both the upstream and downstream sites, are formed in coarse materials (sands and gravels) and have wide, shallow channel shapes. These are among the steeper sites, both averaging more than a 2% gradient. Upstream from both sites is a major valley fill that has accounted for most of the new development within the watershed, extending up to the crossing of the Plum Canyon/Whites Canyon Road. In the early to mid 1990s a box culvert (twin 8' x 8' cells approximately 200' long) was installed to carry stream flow from Plum Canyon under the road. An extension of that conveyance (in the form of a single, 10-foot diameter, round concrete pipe) was installed

within the past five years to allow the placement of the valley fill. The outlet of this concrete pipe lies at least 1,500 feet upstream (linear channel distance) from the most upstream channel. This is well beyond the selection guideline of 10-20 bankfull widths (approximately 580 feet to 1,160 feet based on an average bankfull width of 58 feet for the upstream Plum Canyon site).

Borrego Canyon Wash. Borrego Canyon Wash is located in Orange County northeast of Interstate 5 and drains across the new Foothill Transportation Corridor toll road (State Route 241). In its lower reaches (downstream from the study reaches) the wash is confined within a U-shaped concrete channel as it runs adjacent to the former El Toro Marine Corps Air Station. Borrego Canyon Wash empties into Agua Chinon Wash about 1 mile upstream from its confluence with San Diego Creek. The watershed trends from northeast to southwest. A good portion of the watershed from the former Marine Corps base upstream to the toll road is mostly undeveloped. The watershed above the toll road is fairly heavily developed, except in the Whiting Ranch Park, which occupies most of the headwaters area. The two Borrego Canyon Wash study sites are separated by a significant stream channel distance and represent distinct stream channel types. Both sites are considered to be ephemeral stream channels, and both were dry in May 2004 during field data collection.

The Borrego Canyon sites, both upstream and downstream, are formed in alluvial materials consisting of sands and gravels. While both sites have wide, shallow channels, the upstream site has the widest channel of all the study sites, averaging 95 feet.

Serrano Creek. Serrano Creek is located in Orange County. It is similar in size, shape, and alignment to Borrego Canyon Wash and shares a common watershed boundary to along the northwestern side. However, the Serrano Creek watershed is developed to a greater extent than Borrego Canyon wash. Much of the lower portion is occupied by residential development. The middle portion contains primarily commercial type development, although some open space is present. The upper portion has significant areas of residential development, but also contains the Whiting Ranch Wilderness Park. Serrano Creek is a tributary to San Diego Creek with a confluence just east of Interstate 5. The Serrano Creek study site is upstream from Dimension Drive. Although once this site was considered to be an ephemeral stream channel, because of the degree and proximity of development, this site appears to have a small amount of base flow most of the time.

Serrano Creek has a soft sedimentary bedrock that forms the channel bed and most of the channel banks. It is the most deeply entrenched study site, and has the smallest width to depth ratio (averaging less than 4).

Santiago Creek. Santiago Creek is located in Orange County. It is a tributary to the Santa Ana River and drains portions of the southern flank of the Santa Ana Mountains. The watershed is mostly undeveloped except for pockets of houses along Modjeska Canyon Road between Santiago Canyon Road and the Tucker Wildlife Sanctuary. The upper part of the watershed is in the Cleveland National Forest and is undeveloped. This site is considered to be an ephemeral stream channel, and it was dry in May 2004 during field data collection. Santiago Creek serves as a control site.

Santiago Creek is formed in alluvial material that appears to have been modified somewhat by earthmoving equipment to help maintain a flood protection berm adjacent to the channel. This was probably associated with the last major flood event in 1995, and natural hydrologic forces have been at work modifying and maintaining the channel configuration since.

Dry Canyon. Dry Canyon is located in Ventura County on the northern side of Simi Valley, less than a mile north of State Route 118. It is about halfway between the City of Moorpark and the Los Angeles County line. The watershed trends north to south and is a tributary to Arroyo Simi. Flow from Arroyo Simi empties into Arroyo Las Posas, which is a tributary to Calleguas Creek. The watershed is

undeveloped except for the Lost Canyon Golf Club. This site is considered to be an ephemeral stream channel, and it was dry in May 2004 during field data collection. Dry Canyon serves as a control site.
The Dry Canyon channel is formed in alluvium, though the bed material is primarily sand and the banks are fairly cohesive. This has resulted in a width to depth ratio that is among the smallest of the study sites (averaging less than 6).

Hicks Canyon Wash. Hick's Canyon Wash is located in the foothills of the Santa Ana Mountains in Orange County. It is a tributary to Rattlesnake Wash, which empties into Peters Canyon Wash before it discharges into San Diego Creek. The site reach is north of Portola Parkway, south of the Foothill Transportation Corridor Toll Road, and just east of the Hicks Canyon Haul Road. Most of the watershed is undeveloped. This site is considered to be an ephemeral stream channel, and it was dry in May 2004 during field data collection. Hicks Canyon serves as a control site.

Hicks Canyon appears to be entrenched into a thick (greater than 10 to 20 feet) alluvial sequence. The channel bottom consists of sands with minor amounts of gravel. The banks are made of similar materials that are cohesive. Consequently, the channel has the smallest width to depth ratio of any of the alluvial channels (averaging just over 5).

3.2 Suitability of Selected Sites

One of the great difficulties in this project was locating suitable study sites, due to the specific requirements of the site selection guidelines. Thus it is reasonable to inquire about the satisfaction of selection guidelines by the final sites included in the study. A summary of how well these sites meet the selection guidelines is provided below. There is no specific order of importance of the selection guidelines, however, the first five are all equally important and critical for a successful outcome.
Small Watershed Size. The desired CDA size range for a selected study site was between 1 square mile and 5 square miles. As shown in Table 3-1, all of the study sites fell within this size range, except Topanga Creek and Santiago Creek, both of which are control sites. Thus, all of the watersheds that have experienced some level of development (i.e. the altered sites) are within the desired watershed size range.

Shear Stress Dominated. Streams that have movable beds and erodible banks under the normal range of stream flows (from frequent to infrequent) are considered to be "Shear Stress Dominated." In general this includes channels formed in alluvial materials, but not those formed in bedrock materials. The latter are generally considered to be "bedrock dominated" channels. By this definition, all of the channels included in this study would be considered as shear stress dominated, except Serrano Creek. However, the bedrock in the site reach of Serrano Creek is considered to be soft enough that normal stream flows can erode it.

On the other hand, Topanga Creek, although technically an "alluvial" channel is somewhat limited in its erodibility. The alluvial materials present are dominated by extremely large particle sizes, and are also underlain by resistant bedrock. Therefore, it is very difficult to move these alluvial materials with the frequent (smaller size) flows, and even more difficult to move or erode the bedrock even with rare flood events.

Natural Channel. The stream channel sites used by this study needed to be found in a more or less "natural" state, meaning that they are not controlled by engineering works. By this definition, all of the sites included in this study have natural channels with freedom to deposit or erode bed material or bank material, and alter their geometry by the action of their flows. Many of these channels have "unnatural" stretches either upstream or downstream, and sometimes both. The control sites had very limited amounts of unnatural channel reaches, while the developed watershed sites generally at least had downstream engineering works. One of the control sites, Santiago Creek, had evidence of anthropomorphic manipulation in that a berm had been constructed to limit the flooding extent on the valley bottom for very large flows. However, this berm was well away from the active channel and did not impact the

channel configuration of the bankfull (Dominant Discharge) stage. Therefore, the site is considered acceptable as a natural, or self-formed stream channel reach.

Watershed Development. Because this study evaluates the impacts from watershed development on natural stream channels, it was equally necessary to have study sites that included watershed development, except in the control sites. The desired level of development, in terms of impervious area, was a TIMP value of between 5% and 10%. As will be discussed in Section 5, the sites with developed watersheds had TIMP values that ranged from 3.3% to 26.7% (see Table 5-1 in Section 5). In contrast, the control sites had TIMP values that remained very constant throughout the time period that was evaluated, and these ranged from 0.2% to 2.8%. Additional details about the measurement of impervious cover and its change over time in the developed watersheds is provided in Appendix A1.

Historic Cross Sections. Historic cross section surveys provide the means by which channel change can be measured. Therefore, the availability of such surveys for each of the study sites was imperative. The number of historic cross section locations for each site varied, as did the number of times each was surveyed previously, and the total time span covered. Most of the sites had only one previously surveyed cross section (Topanga, Hasley u/s, Hasley d/s, Plum d/s, Borrego u/s, and Borrego d/s). However, all but the Topanga cross section were surveyed more than once. The remaining sites had multiple cross section locations surveyed (Plum u/s: 2, Serrano: 3, Santiago: 4, Dry: 3, and Hick's: 2). Table 2-3 provides background on the match-up between historic sections and sections resurveyed during field data gathering for this project. Appendix Table A4-1 gives details concerning the dates of the previously surveyed cross sections.

Stream Flow Data. Although important, stream flow data was not imperative since engineering practice has provided the means by which flows can be estimated. Certainly actual flow measurements are superior to use than estimated values, but the stream gaging network in southern California is limited. Therefore, a single and distinct stream gage for each of the sites providing accurate and substantive coverage of the stream flow history of each stream was not expected, nor was it realized. Two channels did have stream flow records of significant length at or near the site location, Topanga Creek and Santiago Creek. Other stream gages were located in general proximity to the remaining sites (see Figures 2-2 and 2-3 for the locations). Table 2-4 identifies the stream gage records used in this project, and Appendix A2 provides the annual peak flow record available for each of these gages.

Aerial Photos. Available aerial photos can be used for evaluating land use changes over time, and if they are of a large enough scale, can provide information on channel plan form at specific points in time. Photos obtained for this project were limited in coverage (Table 2-2) and not detailed enough to show channel plan form at any of the study sites.

Topographic Maps. Us of topographic maps for evaluating channel form changes requires that they be at a very detailed scale. The guideline established for this use in the current project was for amps with a scale of least 1 inch equals 100 feet (or better) and a contour interval of 1 foot. No contour maps meeting these guidelines were identified for any of the study sites.

Geotechnical Data. Geotechnical data (descriptions of the soil/sediment materials) were sought to provide historical comparisons with the current data collected at each site of bed and/or bank material. Unfortunately, no geotechnical data was located for any of the study sites.

In summary, the selected study sites meet the critical guidelines established for site selection in this project very well, with one exception. Topanga Creek is limited in that there is only one historic cross section, and it was surveyed relatively coarsely compared to the other historic cross sections surveyed for the other study sites. In addition, the specific location of the historic Topanga Creek section was not reoccupied with a high level of confidence. None-the-less, the data generated for this site is valuable as it provides information for a channel type and watershed size not included in the other sites. This allows

better definition of the results as it provides a broader spectrum of plotting positions in many of the deterministic relationships and channel adjustment relationships discussed in later sections of this report. The final sites selected are considered to provide a reasonably robust data set. The main limitations of these data are the relatively short period of time that is covered by the historic period and the similar channel types of all the sites except Topanga Creek and Serrano Creek. However, this is an unavoidable limitation of the study.

4.0 STREAM CHANNEL CLASSIFICATION SYSTEM

Different stream types respond to changes in peak flow in different ways. Therefore, it was necessary to develop a classification system to organize relationships between impervious cover and channel stability and guide management decisions for each stream type. The classification system proposed here focuses on the relevant physical attributes of the system starting with large-scale features (the watershed) and progressing toward detailed consideration of bed and bank properties for specific stream channel reaches.

The framework for the proposed classification system includes three primary factors, or levels that can be used to systematically separate sites into similar management units based on physical characteristics. Each level has a different focus with a specific set of considerations that are described in the subsections below. The levels can be summarized as follows. Details about selecting features of form and process used in classifying streams are provided in Appendix C1.

- **Level 1. Watershed Characteristics.** The first step in classification is to define the nature of the watershed. Watershed characteristics include the physical attributes of the basin including size, shape and topography that may affect runoff patterns in the stream of interest.
- **Level 2. Stream Channel Characteristics.** The next step in classifying stream reaches is to define the stream channel type. Stream channel characteristics involve the stream channel morphology, channel form (shape and slope), energy potential (flows in the stream channel), and degree of alteration
- **Level 3. Stream Channel Resistance.** The third step in classification is an assessment of the expected, or potential, responsiveness of the stream channel system to perturbations in the watershed system by such things as changing land uses. This level focuses on a characterization of the ability of the stream channel to resist erosion based on the inherent mechanical properties of the bed and banks.

4.1 Watershed Characteristics

The first factor for differentiating sites is the size and nature of the watershed, or catchment drainage area (CDA). Zielinski (2002) provides a useful classification of CDA size in urban streams (Table 4-1). An alternate size discriminator could be stream order, though assigning stream order is dependant on the map scale used and the mapping methodology. Because there currently is no consistent regional map that includes all ephemeral and intermittent streams, stream order is not recommended as an alternative for CDA.

The focus of the present study was on smaller drainage areas that generally are more responsive to changes in impervious surface area. Therefore, the proposed classification system focuses on small watershed management units that fall within the size range of the subwatershed- and catchment-size categories of Table 4-1.

While CDA is the most obvious differentiator among watersheds, it is by no means the only characteristic that can be used. Topographic relief, shape, and location within the study region can all affect rainfall-runoff response. However, CDA is likely to have the greatest effect on runoff, so it is the focus of Level 1 of the proposed classification system.

Watershed management units should be delineated in three size ranges, defined by their degree of sensitivity to land use change (Table 4-2). In general, priority should be given to the management of the smallest units first (2.5 square miles or less) as they provide the greatest sensitivity to change and are the most responsive to management actions. Zielinski (2002) offers several other considerations for delineating watershed management unit boundaries.

Table 4-1. Possible Watershed Management Units

Watershed Management Unit	Typical Area of Feature (mi^2)	Relative Influence of Impervious Cover	Sample Management Measure
Catchment	0.05 – 0.5	Very strong	Stormwater management and site design
Subwatershed	0.5 – 30	Strong	Stream classification and management
Watershed	30 – 100	Moderate	Watershed based zoning
Sub-Basin	100 – 1,000	Weak	Basin planning
Basin	1,000 – 10,000	Very Weak	Basin planning

From: Zielinski, 2002.

Table 4-2. Level 1 CDA Categories

Category	Designation	CDA (mi^2)	Explanation
Very sensitive	i	≤ 2.5	Basins of this size show the greatest rates of change in response to urbanization. It is easier for development to impact a larger portion of the CDA.
Mildly sensitive	ii	≤ 10.0	Between 2.5 and 10.0 square miles the rates of change in stream channel morphology in response to changes in impervious area fall significantly.
Least sensitive	iii	≤ 20.0	Basins larger than 10 square miles but less than 20 square miles show some sensitivity to changes in impervious area, but less than the smaller subwatershed areas.

- *Subwatershed size.* In addition to the guidelines in Table 4-2, start delineations downstream from tributary junctions (rather than upstream),
- *Jurisdictional boundaries.* Keep watershed management units entirely within a single jurisdiction(cities, counties, etc.) where possible,
- *Impoundments or stormwater management facilities.* Delineate from the outlet of ponds, lakes, or detention/retention basins,
- *Monitoring stations.* Include existing monitoring stations (stream gages, water quality sample points, etc.) within watershed management unit boundaries where possible,
- *Access points.* Delineate from existing roads or bridges to provide easier access for sample collection or field surveys.

4.2 Stream Channel Characteristics

Level 2 of the classification system focuses on the stability/state of a particular stream reach (Table 4-3). Stream channels are divided into stable or unstable based on the results of the RGA (see Section 5.7). The RGA is a semi-quantitative method for evaluating the stability of a site based on geomorphic indicators observed and recorded in the field. The RGA produces a stability index (SI) that can be used to categorize the geomorphic condition of the stream reach (SI scores range from 0 –1.0). A stability index (SI) score of 0.25 or less indicates that the stream channel is stable, while anything greater that 0.25 indicates that the stream channel is unstable. Alternatively, a qualitative assessment of geomorphic stability can be performed based on observable field evidence of channel instability, such as excessive deposition of sediment, stream channel widening, and/or stream channel scour that is noticeably divergent from upstream and downstream reaches. Unstable stream channels are already reacting to some hydrologic or sediment regime change within the watershed, and therefore have little to no tolerance for additional change to the hydrologic or sediment regime. Unstable stream channels receive no additional classification at this level and are only considered further at the final classification level (Level 3, Stream Channel Responsiveness). Stable stream channels do not show noticeable signs of either aggradation or degradation throughout the reach under consideration. Altered stream channels, i.e. those that have been modified through direct, engineered changes, such as stream channel lining, bed or bank protection, relocation or realignment, stabilization, are not considered further in this classification system, because they fall outside the scope of the present study.

Following the general assessment of stability, stream channels should be further classified according to their morphology (see Table 4-3). The data needed for this classification are the stream channel slope (as measured in the field over a distance of 10 times the stream channel width), and unit discharge (discharge divided by the width of the stream channel). The elevations used to calculate slopes should be a consistent stream channel feature such as the deepest point in the stream channel (thalweg) or the toe of a common bank for the length of the stream channel used. The distance measured for slope calculation should be the curvilinear distance along the flow-line of the stream channel, again using a common feature such as the thalweg (i.e. deepest portion of the channel) or the toe of a bank.

Because discharge data is often not readily available on any given stream, or at any specific point along a stream channel, we recommend using the USGS regional equations (Waananen and Crippen 1977) to calculate the 2-year recurrence interval storm discharge (Q_2), as indicated below. The 2-year equation is selected as the lowest value in recurrence interval for any of the regional equations and the closest to an assumed recurrence for the dominant discharge (1.5 to 2.0 years).

$$\mathbf{Q_2} = 0.14\ \mathbf{CDA}^{0.72}\mathbf{P}^{1.62} \qquad [4.1]$$

Where: **CDA** is catchment drainage area (mi^2)

P is average annual precipitation (in.)

The precipitation value should be selected for a weather monitoring station near the watershed being classified. Selected values of average annual precipitation for stations located in the vicinity of the sites in this investigation are given in Table 4-4. Stream channel widths should be measured in the field at the same time stream channel slopes are measured. Two to four width measurements should be made and averaged to provide the width used to define stream channel morphology with Figure 4-1. The width feature to measure is the top of the “bankfull” channel, which is defined as the top of the “active” channel, which should be discernable (the active channel) by a lack of permanent vegetation and/or the presence of obvious stream channel deposit features such as bar deposits.

Table 4-3. Level 2 Stream Channel Morphology

Condition	Current State	Category	Designation	Indications
Altered	Altered		X	Altered stream channels already have had permanent instream management actions applied; they are no longer considered to be natural
Natural	Unstable		Un	Unstable stream channels show signs of change to the stream channel morphology such as aggradation (excessive sediment deposition), stream channel widening (one or both channel banks have fresh, cut surfaces or undermined bank materials), or channel scour (loose material on the channel bed is scarce and adjacent bank height is significantly different from stable upstream or downstream reaches.
	Stable	Tranquil	St-t	Slope of the stream channel appears to be very shallow; when water is flowing the velocity is relatively slow. Sediment load is very low.
		Anastamosing	St-a	Anastamosing stream channels also have shallow slopes, but slightly steeper than tranquil stream channels. Sediment load is low. Stream channel pattern can be very sinuous, with multiple, inter-twining stream channel threads.
		Meander, Pool-Riffle	St-m	The meandering stream channel is a single conveyance with a slightly to moderately sinuous form that has periodically spaced shallow, rapid flowing water in “riffles” interspersed with deeper “pools.” Depending on sediment type and load riffles can be more transient (fine sediment) or more permanent (coarse sediment) under higher flows. Point bar deposits and cut banks alternate along opposite sides of the stream channel.
		Braided, Cascade-Pool	St-b	The braided stream channel is wide, shallow, and steep with multiple, inter-twining conveyances and an abundant sediment load. Shifting channel positions are common after, or during, periods of channel flow.
		Step-Pool, Canyon	St-s	Cascade-Pool channels are also steep, but have an abundance of very coarse sediment that is beyond the normal capacity of flood flows (except in very rare, high discharge rates). These materials tend to armor the channel and form very persistent, steep-flowing riffle features.

The flow and channel data described above can be used to calculate a unit stream power (2-year peak flow divided by channel width) (Q_2/w). The unit stream power can be plotted against the stream channel gradient for each site (Figure 4-1), This relationship will define the expected form of the stream channel based on measurements of its energy. Deviations from the expected form indicate that the stream reach is in the process of adjusting to a new form. This is discussed in more detail in the next section.

Table 4-4. Selected Annual Precipitation Averages

Station ID	Station Name	Latitude	Longitude	Elevation (feet)	Years of Record	Ave. Annual Precipitation (inches)
LA DPW # 6	Topanga Patrol	34.084167	118.599167	745	77	23.94
LA DPW # 372	San Fran. Pwr Hs	34.533889	118.524167	1,580	63	16.22
LA DPW # 801B	Magic Mountain	34.38833	118.324167	4,720	37	17.53
LA DPW # 1012B	Castaic Junction	34.738333	118.611944	1,005	35	12.40
LA DPW # 1194	Santa Ynez Res.	34.073056	118.566389	735	31	20.25
LA DPW # 1262	Saugus Reclam.	34.413333	118.539722	1,150	19	13.66
LA DPW # 1263	Valencia Reclam.	34.431944	118.620278	1,000	19	12.18
OC RDMD # 121	Santa Ana	33.751111	117.869722	170	96	12.98
OC RDMD # 165	Costa Mesa	33.668611	117.893056	53	48	12.14
OC RDMD # 169	Corona del Mar	33.609722	117.857500	300	44	12.46
OC RDMD # 173	Villa Park Dam	33.814722	117.766667	566	43	15.01
OC RDMD # 176	El Toro	33.627500	117.68333	445	39	14.96
OC RDMD # 216	Laguna Niguel	33.549722	117.70000	200	29	14.58
CIMIS # 75	Irvine	33.688611	117.720556	410	17	14.24
VC WPD # 154	Simi, Co Fire Sta	34.270000	118.781667	760	56	14.85
VC WPD # 193	Santa Susana	34,270833	118.706667	950	47	14.62
VC WPD # 196	Tapo Canyon	34.328333	118.698333	1,525	46	19.20

4.3 Stream Channel Resistance

Level 3 of the classification assesses the ability of the stream channel to tolerate changes in its hydrologic and/or sediment regimes. The hydrologic regime is defined by the quantity and timing of flow, while the sediment regime is defined by the texture (or size distribution) of the sediment load, the quantity of the load, and the timing of its delivery. The quickest and most direct way to evaluate a stream channel's resistance is by plotting its position on the gradient vs. stream power curve (Figure 4-1). If the plotting position of stream power vs. gradient is within the "stable energy" zone for the determined stream channel type, it can be considered as stable. Conversely, if the plotting position is close to the upper limit of the zone, it is an indication of relative instability, because it is approaching, or is within, a transition zone. For example, ω values for Site 23 (Dry Canyon) fall between the 25 and 87 Watts/ft^2 isoclines; therefore this site appears to be a relatively stable braided, cascade-pool system. In contrast, ω values for Site 9 (Serrano Creek) appear to be deviating from the 87 Watts/ft^2 isocline, indicating that the stream channel is shifting to a new morphological form.

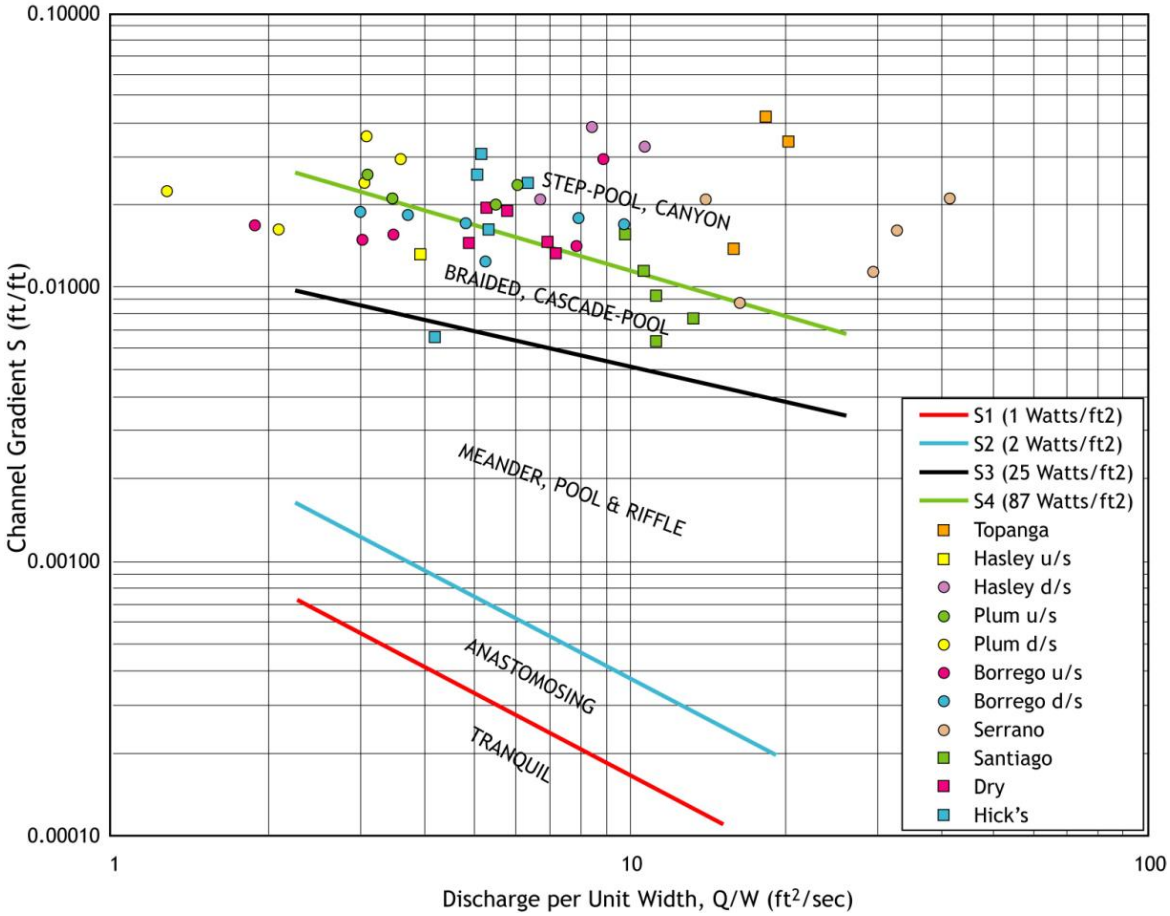

Figure 4-1. Stream Channel Morphology

Stream Power (Discharge/Unit Width) versus Gradient (Longitudinal Slope) for streams within the study area. Energy ranges are defined below:

	Energy Range (Watts/ft²)	
Classification	*Minimum*	*Maximum*
Step-pool, Canyon	*87.0*	--
Braided, Cascade-pool	*25.0*	*87.0*
Meander-pool-riffle	*2.0*	*25.0*
Anastamosing	*1.0*	*2.0*
Non-shear stress dominated	--	*1.0*

Additional qualitative classification of channel resistance can be made based on field observations of the relative erodibility of the bed and bank materials (see Table 4-5). For stable stream channels, this evaluation should confirm the plotting position on the stream channel morphology chart (Figure 4-1). In contrast, if the plotting position of a site is within the "meander, pool-riffle" stream channel morphology zone, but the field observations suggest that this site looks more like a "braided, cascade-pool" site, this is an indication that the site is not stable and is about to change stream channel morphology in response to higher energy levels. See Figure 4-2 for an example of this type of assessment.

A more rigorous assessment of the resistance provided by either the bed or the bank is possible using equations for stream power [4.2] and specific stream power [4.3]. First they must be transformed into units of applied shear stress that can be compared to a critical shear stress value for either the bed material or the bank material.

$$\Omega = \rho g Q S \qquad [4.2]$$

where:

Ω = stream power applied to channel perimeter (watts/foot)
ρ = density of channel bed sediment (kilgrams/cubic foot)
g = gravity (feet/second^2)
Q = discharge (cfs) calculated for the channel configuration at which slope, width, and average depth are measured
S = slope of the channel as measured in the field (feet/foot)

Dividing Ω by the stream channel width (W) produces the specific stream power.

$$\omega = \Omega/W = \rho g Q S/W \qquad [4.3]$$

where:

ω = specific stream power (watts/square foot)
W = stream channel width (feet)

Specific stream power can be translated to an applied shear stress, as follows

$$\tau = \rho g d S \qquad [4.4]$$

where:

τ = average shear stress (newtons/square foot)
d = average depth (feet)

Knowing that discharge is a volume per time:

$$Q = AV = WdV \qquad [4.5]$$

where:

A = stream channel cross-sectional area (square feet)
V = average velocity of flow (feet/second)

We can combine equations [4.2], [4.4] and [4.5] to represent stream power in terms of applied shear stress:

$$\Omega = \rho g Q S = \tau V W \qquad [4.6]$$

Finally we can express this in terms of specific stream power:

$$\omega = \tau V \qquad [4.7]$$

Sample Calculation for Channel Form(Hasley Canyon Data)

Step 1 Estimate the drainage area of the watershed to the site and obtain a value of the average annual rainfall for the area.

CDA = 1.66 square miles (from Table 3-1)
P = 12.18 inches (from Table 4-4)

Step 2 Calculate discharge using equation [4.1]

$Q_2 = 0.14 \times [(1.66)^{0.72} \times (12.18)^{1.62}]$
$= 0.14 \times [(1.44) \times (57.38)]$
$= 11.57$ cfs

Step 3 Measure bankfull channel width and bankfull channel slope in the field. In this case we are using averages for these values measured from several points in the site reach.

W_{bfl} = 8.71 feet
S_{bfl} = 0.0308 feet/feet

Step 4 Plot these values on the channel morphology classification chart (Figure 3-1).

Q_2/W_{bfl} = 1.33 square feet/second
S_{bfl} = 0.0308 feet/feet

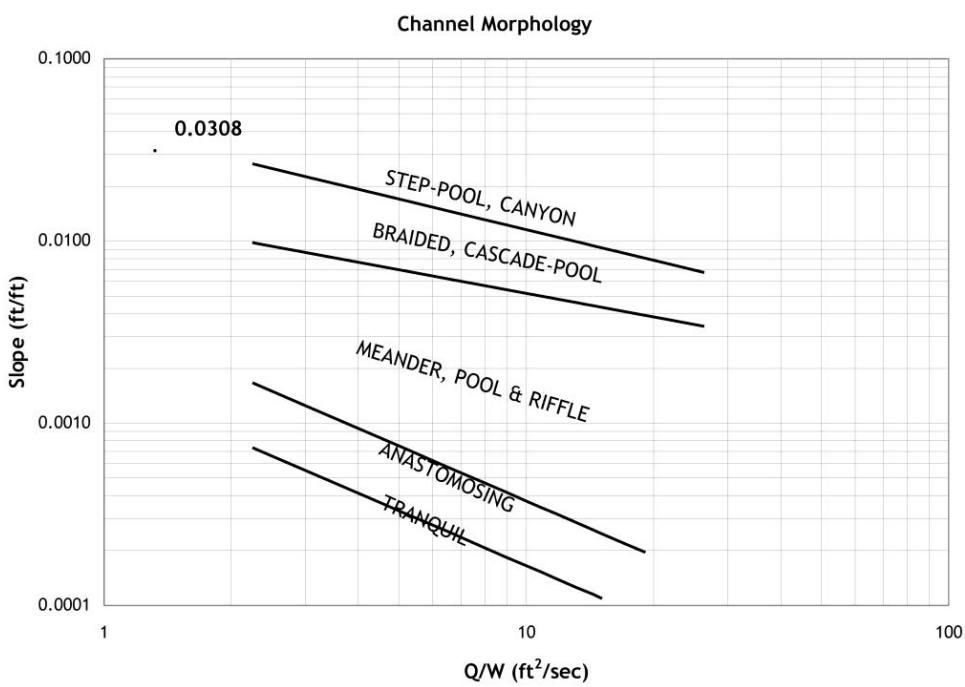

Step 5 Assess channel form as braided based on plotting position. However, field observations suggest the form is actually a step pool form.

Figure 4-2. Example Calculation of Channel Form

Remembering that the length term is a unit value to keep the equation dimensionally correct, it is insignificant in calculations. Therefore, specific stream power can be expressed in terms of calculated shear stress and calculated average velocity. These calculations depend on actual field measurements of the stream channel dimensions and slope, and an estimate of the flow velocity and from there an estimate can be made of the flow rate. In order to apportion the calculated specific stream power to the bed and bank, two "geometric correction" factors are introduced that resolve the specific stream power for these two different parts of the stream channel. They are used in the specific stream power equation [4.7] as follows:

$$\omega = k_b \tau V \qquad [4.8]$$

$$\omega = k_s \tau V \qquad [4.9]$$

where:

k_b = geometric correction factor for the bed (dimensionless)
k_s = geometric correction factor for the bank (dimensionless)

Table 4-5. Level 3 Stream Channel Resistance

Bed Material	**Bank Material**	
	Resistant	Susceptible
Resistant	**Designation**: Bdr / Bkr Generally true for rock channels and rock bed channels with very cohesive to indurated bank materials. These stream channels have the most flexibility for management options as they are best at tolerating changes in hydrologic or sediment regimes	**Designation**: Bdr/ Bks Generally true for rock bed channels with alluvial material in the bank; can also be found in alluvial channels where stream power is not sufficient to carry the current sediment load (braided channel condition).
Susceptible	Designation: Bds / Bkr Unusual for arid streams, though Serrano Creek is an example; there the bed and bank material is a poorly cemented sandstone. Bank material has proven to be more resistant to erosive forces in the stream channel than has the bed material. Channel scour occurs resulting in a deepening of the stream channel. Width to depth ratio of the stream channel should decrease.	**Designation**: Bds / Bks Expect this to occur, if not be common, in ephemeral and intermittent stream channels. Lack of water, or even moisture, in and around the stream channel for much of the year Stream channel scour and widening occurs at the same time. Width to depth ratio should remain relatively constant, but stream channel area (in cross-section) will likely increase.

Using field-measured values to estimate flow (Q), the average velocity can be calculated, the length term is insignificant, and the stream power range has been read from Figure 4-2, so the applied shear stress on the bed can be calculated using equation [4.10] or the bank using equation [4.11].

$$k_b \tau = \omega / V \qquad [4.10]$$

$$k_s \tau = \omega / V \qquad [4.11]$$

In this case it is not necessary to know the value of the correction factors, because the whole term is used to compare to a critical shear stress value (τ_c) determined for either the bed or the banks. Details of the recommended procedure for determining the critical shear stress values are given in Appendix C. A comparison is made between the estimated applied shear stress and the estimated critical shear stress representing the resistance of the bed or bank. Under stable conditions, the following expressions would be true:

$$k_b\tau \leq \tau_{cb} \qquad [4.12]$$

$$k_s\tau \leq \tau_{cs} \qquad [4.13]$$

where:

τ_{cb} = critical shear stress for the bed (newtons/square foot)

τ_{cs} = critical shear stress for the bank (newtons/square foot)

If either expression is untrue, then an unstable condition is present. Depending on which feature is considered stable (or unstable), or if both bed and bank are the same, the classification of stream channel resistance follows from Table 4-6. See Figure 4-3 for an example of this evaluation.

4.4 Classification Summary

This classification is proposed as a starting point for the development of a system that could be applied throughout the southern California region. It does not restrict the classification to ephemeral or intermittent stream channels, but would apply to perennial streams as well. Although the creation of a complete and exhaustive classification system is beyond the scope of this project, a general framework for establishing such a classification system has been presented. This classification system could be used to define characteristics of the watershed-stream channel system that are important in selecting management strategies and approaches, which are discussed in Section 7.2 (Management/Regulatory Approach). A summary of the steps of the proposed stream classification process is provided below. In addition, Table 4-6 provides a summary of the designation of each of the study sites using this classification system.

STEP 1: Locate the CDA within its major watershed.

STEP 2: Identify the CDA category (based on size)

STEP 3: Collect local site information and calculate Q_2 using regional equation [4.1] to estimate stream channel slope and specific stream power

STEP 4: Define stream channel form using calculations from Step 3 and plotting position from Figure 4-1

STEP 5: Estimate stream channel resistance using field evaluations by experienced field personnel, and/or evaluate with measured field data to compare with calculated erosive forces.

Table 4-6. Study Site Classification

Study Site	Watershed Designation[1]	CDA Category[2]	Channel Form[3]	Channel Resistance[4]	Full Designation
1. Topanga Creek	SMB	iii	St-s	Bdr-Bkr	SMB/iii/St-s/Bdr-Bkr
3. Hasley Canyon	SCR	i	Un	Bds-Bks	SCR/i/Un/Bds-Bks
4u. Plum Canyon	SCR	i	Un	Bds-Bks	SCR/i/Un/Bds-Bks
4d. Plum Canyon	SCR	i	Un	Bds-Bks	SCR/i/Un/Bds-Bks
7u. Borrego Cyn.	SDC	ii	Un	Bds-Bks	SDC/ii/Un/Bds-Bks
7d. Borrego Cyn.	SDC	i	Un	Bds-Bks	SDC/i/Un/Bds-Bks
9. Serrano Creek	SDC	ii	Un	Bds-Bks	SDC/ii/Un/Bds-Bks
10. Santiago Ck.	SAR	iii	Un	Bds-Bks	SAR/iii/Un/Bds-Bks
23. Dry Canyon	CGC	i	St-s	Bdr-Bkr	CGC/i/St-s/Bdr-Bkr
27. Hicks Canyon	SDC	i	Un	Bds-Bks	SDC/i/Un/Bds-Bks

EXPLANATIONS

1 Watersheds

CGC Calleguas Creek
SAR Santa Ana River
SCR Santa Clara River
SDC San Diego Creek
SMB Santa Monica Bay

2 CDA Size Ranges (Table 3-3)

i $CDA \leq 2.5\ mi^2$
ii $2.5 < CDA \leq 20\ mi^2$
iii $20\ mi^2 < CDA$

3 Channel Forms (Table 3-4)

St-b Stable, braided
St-s Stable, step-pool
Un Unstable

4 Channel Resistance (Table 3-6)

Bdr Resistant bed
Bds Susceptible bed
Bkr Resistant bank
Bks Susceptible bank

Disregarding the major watershed location, this classification system could result in one of three size categories, one of seven different channel form types, and one of four distinct channel resistance categories. Therefore, there are potentially 84 distinct classifications (3 x 7 x 4 = 84) of stream channels. The 10 stream channel sites selected for this study represent only 5 distinct channel types in this classification system. Whether or not all 84 stream types are represented in the study region remains to be evaluated.

SAMPLE CALCULATION FOR CHANNEL RESISTANCE
(Hasley Canyon Data)

STEP 1 Establish values for variables of channel characteristics (using field measurements) and properties of water at standard conditions.

W_{bfl}	=	10.6 ft	(from Table 5-6)
S_{bfl}	=	0.0264 ft/ft	(from Table 5-6)
d_{bfl}	=	1.7 ft	(from Table 5-6)
ρ	=	62 lb/ft^3	(density at normal temperatures)
g	=	32 ft/sec^2	(acceleration due to gravity)

STEP 2 Calculate the expected shear stress from the measured channel values using equation [4.4]:

$$\tau = \rho g d_{bfl} S_{bfl} = 62 \times 32 \times 1.7 \times 0.0264 = 89 \text{ newtons/ft}^2$$

STEP 3 Resolve the expected shear stress from Step 2 into an applied shear force on the bed material using the geometric correction factor (k_b), and an applied shear force on the bank material using the geometric correction factor (k_s). The geometric correction factor for the bed shear stress (Lane 1955) is based on the width to depth ratio of the measured channel values established in Step 1 (10.6/1.7 = 6.2). The correction factor for the bank shear stress is also based on channel geometry (Lane 1955).

$$k_b\tau = 0.95 \times 89 = 84.6 \text{ newtons/ft}^2 \quad \text{(Bed material)}$$

$$k_s\tau = 0.75 \times 89 = 66.8 \text{ newtons/ft}^2 \quad \text{(Bank material)}$$

STEP 4 Compare the calculated shear forces on both the bed and bank to resistance values derived with the sediment characteristics measured in the field.

$$84.6 \text{ newtons/ft}^2 \geq 57.2 \text{ newtons/ft}^2 \quad \text{(Bed material)}$$

$$66.8 \text{ newtons/ft}^2 \geq 14.8 \text{ newtons/ft}^2 \quad \text{(Bank material)}$$

STEP 5 Assess channel resistance as Bds-Bks, or a susceptible bed and susceptible banks.

Figure 4-3. Example Calculation of Channel Resistance

5. SUMMARY OF FIELD DATA

For each of the 10 study sites, the following data was collected for both historic and current conditions: 1) characteristics of the catchment draining to the site; 2) rainfall and streamflow; and 3) physical condition of the stream channel.

Land use records and aerial photographs were used to estimate the total impervious surface area (TIMP) values in the study watersheds. Precipitation records were evaluated to gain an understanding of when the wet and dry periods occurred in the regions where the study watersheds are located, and whether or not the rainfall amounts were representative of normal conditions during both the period of land use change and the period of stream channel morphology change. The stream flow records provided data for statistical analyses of peak flow frequency for the different drainage areas and serve as a second piece of evidence to determine the representativeness of the climatic conditions during the period of urbanization. Data on bed and bank material were used to evaluate susceptibility to erosion (critical shear stress) and to help define roughness for hydraulic calculations. The results of these analyses are summarized in the sections below.

5.1 Impervious Surface Area (TIMP)

Data on land uses were either available in ArcGIS format (SCAG data) or were delineated on aerial photographs and imported into AcrGIS. The surface area covered by each land use type was calculated for the watershed (drainage area) of each study site. Each land use type was then assigned a specific percent impervious cover value. Total and percent impervious surface area for each watershed was then calculated based on the extent of land use types within the watershed (Table 5-1). A detailed discussion of the process, the percent impervious cover values used for each land use, and the tabulation of land uses and impervious areas by watershed is provided in Appendix A1.

A word of caution is necessary concerning the use of TIMP to represent the degree of development in a watershed and provide a quantitative value against which to relate observed channel changes. Better relationships would likely result from the use of a different representation of impervious area that accounts for the location of impervious surfaces relative to the stream channel and the connection between impervious surfaces and conveyance routes for surface runoff. Such a measurement is often called CIMP (Connected Impervious Cover) or FRIMP (the FRaction of IMPervious surface that is directly connected to another impervious surface and eventually a storm sewer or to the stream channel). However, FRIMP was not used in this study, for two reasons.

1. It is very difficult to calculate FRIMP because it requires field verification of impervious area connections based on air photo or map interpretation. Not only is it difficult and time-consuming to verify for current conditions, it is nearly impossible to verify estimates for historic conditions. Also, the cost for this level of effort is not reasonable for a regional study of this nature.

2. The bulk of the published literature on the effects of urbanization uses TIMP values, so comparisons of values for southern California would be more appropriate using TIMP values. Nevertheless, it would be useful to revisit the FRIMP values for the study watersheds and compare them to the calculated TIMP values; however, this is beyond the scope of the present study.

Table 5-1. Impervious Area Estimates from Land Use Data

SITE NO.	SITE NAME	PERCENT IMPERVIOUS (TIMP)														
		1949(1)	1952(1)	1967(1)	1968(1)	1972(1)	1978(1)	1982(1)	1983(1)	1990(3)	1993(3)	1997(1)	2001(3)	2002(2)	2003(2)	2004(2)
1	Topanga Creek									2.48%	2.62%		2.82%			
3u	Hasley Canyon (upstream)									1.19%	1.26%		1.34%	1.34%	1.34%	
3d	Hasley Canyon (downstream)									1.19%	1.26%		1.34%	1.34%	3.27%	
4u	Plum Canyon (upstream)									0.15%	0.15%		0.16%		1.73%	16.96%
4d	Plum Canyon (downstream)									0.20%	0.20%		1.64%		1.62%	17.52%
7u	Borrego Canyon (upstream)		1.00%	1.05%		1.03%			1.04%	1.46%	5.80%	13.19%	22.00%			
7d	Borrego Canyon (downstream)		1.23%	1.06%		1.06%			1.08%	1.87%	5.08%	11.47%	21.00%			
9	Serrano Creek	1.08%			1.14%		1.11%	3.74%		5.98%	11.18%	21.75%	26.66%			
10	Santiago Creek									0.23%	0.23%		0.24%			
23	Dry Canyon									0.06%	0.06%		0.70%			
27	Hicks Canyon									0.10%	0.10%		1.24%			

(1) Aerial Photo Interpretation
(2) DigitalGlobe® Satellite Imagery
(3) SCAG Land Use Maps

5.2 Precipitation

Rainfall records were obtained from various sources adjacent to each of the study areas (see Table 2-3). Rainfall data for each of the weather stations listed in Table 2-3, and plots of rainfall amounts over time are provided in Appendix A2. Precipitation data were used to help assess the relative importance of climatic factors on the observed changes in stream channel morphology for the period of land use change covered by this study. Comparisons were made between the rainfall during the post-urbanization period (i.e. the period of interest for this study) and the average annual precipitation to assess the representativeness of the time period being evaluated.(see Tables 5-2, 5-3, and 5-4). Because the empirical investigation methods employed in this study related changes in stream channel form to changes in runoff potential, no direct use of rainfall events, amounts, or intensities was made. The empirical methods attempt to look at cumulative effects rather than specific, event-related results.

Development in the Hasley Canyon and Plum Canyon watersheds has only recently begun; therefore, there is only a short period of record available since urbanization. According to the changes in impervious surface area (see Table 5-1) the limited development in Hasley Canyon began in approximately 2002, while the more extensive development in Plum Canyon began initially in 2002 and continued through 2003. Therefore, the average annual rainfall for the period from 2001 through 2003 was calculated and compared to the average for the period of record for four of the stations near these two watersheds (Table 5-2). For these watersheds, it appears that the rainfall was less than normal during the period of urbanization. Thus, climatic factors probably did not contribute to the impacts on these stream channels.More time has passed since the development in the Borrego Canyon and Serrano Creek watersheds occurred. Using the values of TIMP in Table 5-2 as a guide, the start of development for Serrano Creek was estimated to be around 1980, while in Borrego Canyon it was estimated to be around 1991. Therefore, there are enough records available to consider 3-year, 5-year and 10-year averages for annual precipitation after the start of urbanization (Tables 5-3 and 5-4). Results of these comparisons are much different than for the Los Angeles County streams, and suggest that above-average rainfalls could have played a role in the observed stream channel morphology changes in the Orange County sites. Further discussion concerning the implications of above average rainfall amounts on study results is included in Section 6.2 (Evaluating Changes in Stream Channel Condition).

Table 5-2. Hasley and Plum Canyons Rainfall Comparisons

Comparison of the average precipitation for the period of urbanization to the period of record for the station.

	Station 372(1)	Station 801B(1)	Station 1262	Station 1263
Ave. Ann. Precip. (inches)	16.22	17.53	13.66	12.18
Length of Record	63	37	19	19
3-Year Period	2001-2003	2001-2003	2001-2003	2001-2003
3-Year Average (inches)	11.64	14.88	13.66	5.86

(1) Only 2 years of record were available for the 2001-2003 period.

5.3 Stream Flow

Stream gage data for peak flows at recording stations at or near study sites were obtained from the USGS web site [http://waterdata.usgs.gov/ca/nwis/nwis] or from Los Angeles County. The data for each gaging station were prepared for plotting flow frequency curves using the Weibull formula (Haan 1977). Values were taken from these curves to prepare regional peak flow curves (CDA vs. peak discharge) for specific,

low value recurrence interval events (1.2-year, 2-year, 5 year, and 10-year). Data and curves are provided in Appendix A3.

Table 5-3. Borrego Canyon Wash Rainfall Comparisons

Comparison of the average precipitation for the period of urbanization to the period of record for the station.

	Station 121	Station 165	Station 169	Station 173	Station 167	Station 216
Ave. Ann. Precip. (inches)	12.98	12.14	12.46	15.01	14.96	14.58
Length of Record	96	48	44	43	39	29
3-Year Period	1991-1993	1991-1993	1991-1993	1991-1993	1991-1993	1991-1993
3-Year Average (inches)	17.25	15.03	15.27	20.06	18.97	16.00
5-Year Period	1991-1995	1991-1995	1991-1995	1991-1995	1991-1995	1991-1995
5-Year Average (inches)	17.57	15.00	15.78	19.79	18.89	17.31
10-Year Period	1991-2000	1991-2000	1991-2000	1991-2000	1991-2000	1991-2000
10-Year Average (inches)	16.24	14.36	15.03	18.11	17.84	17.13

Peak flow data were also reviewed as a second approach to consider the impact of climatic factors on the change in stream channel morphology for Borrego Canyon and Serrano Creek. The Santiago Creek gage at Modjeska has a continuous record from 1962 through the present. The entire record of annual peak flows for this gage is presented in Table 5-5. The return periods of the annual peaks from 1980 through 1989 (urbanization period for Serrano Creek) show two flows above an 8-year return period. These flows ranked as the third and fifth largest flows of the 42-year record at this gage. The return periods of the annual peaks from 1991 through 2000 (urbanization period for Borrego Canyon) show two flows above a 10-year return period (ranked as the second and fourth largest flows on record). This concentration of higher than normal flows during these two periods is consistent with the conclusion that climate could have contributed to the morphological changes in the Borrego Canyon and Serrano Creek stream channels.

5.4 Stream Channel Characteristics

Field data gathered in May 2004 consisted of a series of cross sections and a single, longitudinal profile for the entire reach at each site. Measurements of stream channel width, cross-sectional area, average depth, and longitudinal gradient (channel slope) were made for each surveyed cross section (Table 5-6). The common feature used to standardize the measurements among the sites was the bankfull stage (i.e., the elevation/depth of flow that fills the active channel), also referred to in this study as the Dominant Discharge (see Appendix C2 for a discussion of the logic for this determination). In addition, sediments in the stream channel bed and banks were characterized. Hydraulic calculations from the data in Table 5-6 provide an estimate of discharge at the bankfull stage (Q_{bfl}).

Table 5-4. Serrano Creek Rainfall Comparisons

Comparison of the average precipitation for the period of urbanization to the period of record for the station.

	Station 121	Station 165	Station 169	Station 173	Station 167	Station 216
Ave. Ann. Precip. (inches)	12.98	12.14	12.46	15.01	14.96	14.58
Length of Record	96	48	44	43	39	29
3-Year Period	1980-1982	1980-1982	1980-1982	1980-1982	1980-1982	1980-1982
3-Year Average (inches)	16.12	16.30	16.56	17.79	15.85	14.45
5-Year Period	1980-1984	1980-1984	1980-1984	1980-1984	1980-1984	1980-1984
5-Year Average (inches)	15.73	15.38	15.93	18.16	17.11	16.15
10-Year Period	1980-1989	1980-1989	1980-1989	1980-1989	1980-1989	1980-1989
10-Year Average (inches)	16.34	15.90	16.00	18.68	17.56	16.17

Nine of the eleven sites are channels formed in relatively erosive alluvial material. The remaining two sites are bedrock controlled (i.e. outcropping bedrock in the channel and banks within, or very near to, the study reach). Although not caused by geomorphic setting, the most obvious difference in these two sites from other sites is that Topanga Creek (the largest watershed) and Serrano Creek (the most developed watershed) are the only two non-ephemeral stream channels in the study. Both channels had flowing water at the time of the survey in May 2004. However, it was not documented whether flow persisted all year (i.e. whether either stream is perennial). Despite that fact that Topanga and Serrano creeks were both bedrock controlled, differences in the composition of the bedrock influenced their relative resistivity. The Topanga Creek site consists of resistant bedrock that provides the source of coarse sediment in the channel (cobble to boulder size). In contrast, the bedrock in Serrano Creek is a poorly-consolidated sandstone that has proven to have little resistance to erosion.

Differences in channel type help explain some of the variability in channel metrics between the sites. Nevertheless it is useful to consider this data set as a whole and make some general statements about the values obtained for the existing conditions at these sites. Judging by the values in Table 5-6, the calculated discharge rates for the bankfull stage show the greatest consistency among the sites. The standard deviation for the Dominant Discharge (Q_{bfl}) calculated for each site show the lowest values and smallest range of values of any parameter in the table. Figure 5-1 shows the relation between CDA and the Dominant Discharge. The developed sites show higher runoff rates for similar watershed areas. On the other hand, the measured widths and slopes have the highest values and largest range of values. This is logical in that discharge should be the most dependent on watershed size, and therefore vary the least in a short channel reach. The fact that this calculated value is consistent for all of the sites demonstrates that the bankfull stage is a reliable feature to identify in the field and use for comparison purposes. It is also important to point out that the downstream sites at Plum Canyon and Borrego Canyon Wash have smaller values for the Dominant Discharge than the upstream sites. Therefore, it is apparent that in each of these reaches there is loss of flow between the upstream and downstream sites. This can be explained as a loss to infiltration into the porous materials in the channel bottom.

Table 5-5. Stream Gage Record for Santiago Creek at Modjeska

Annual peak flows for the period of record (water years 1962 – 2003)

Rank	Peak Q (cfs)	Peak Date	Return Period (years)	Rank	Peak Q (cfs)	Peak Date	Return Period (years)
11	825.00	16-Mar-03	3.91	20	386.00	20-Jan-82	2.15
42	3.40	21-Dec-01	1.02	17	483.00	29-Jan-81	2.53
34	75.00	25-Feb-01	1.26	5	1,810.00	18-Feb-80	8.60
31	97.00	21-Feb-00	1.39	14	555.00	05-Jan-79	3.07
41	5.60	26-Jan-99	1.05	6	1,550.00	09-Feb-78	7.17
2	6,200.00	23-Feb-98	21.50	39	16.00	07-Jan-77	1.10
24	257.00	26-Jan-97	1.79	18	440.00	01-Mar-76	2.39
33	77.00	21-Feb-96	1.30	28	185.00	08-Mar-75	1.54
4	2,400.00	05-Mar-95	10.75	13	575.00	08-Jan-74	3.31
36	36.00	20-Feb-94	1.19	15	516.00	11-Feb-73	2.87
10	1,370.00	17-Jan-93	4.30	25	241.00	25-Dec-71	1.72
12	807.00	12-Feb-92	3.58	35	56.00	21-Dec-70	1.23
23	274.00	01-Mar-91	1.87	32	90.00	02-Mar-70	1.34
22	287.00	17-Feb-90	1.95	1	6,520.00	25-Feb-69	43.00
30	167.00	25-Dec-88	1.43	26	211.00	08-Mar-68	1.65
27	203.00	17-Jan-88	1.59	8	1,420.00	06-Dec-66	5.38
40	13.00	05-Jan-87	1.08	7	1,500.00	22-Nov-65	6.14
19	396.00	29-Nov-85	2.26	29	175.00	09-Apr-65	1.48
9	1,400.00	19-Dec-84	4.78	38	17.00	02-Apr-64	1.13
16	490.00	24-Nov-83	2.69	37	30.00	10-Feb-63	1.16
3	3,400.00	02-Mar-83	14.33	21	302.00	11-Feb-62	2.05

Given that the variability of channel depth and cross-sectional area are also relatively small, the high variability in the width and slope are quite logical. Since the flow in these sites is conservative (as the data in Table 5-6 suggest) flow is not changing much over time, nor is the depth of flow or channel area. Therefore, adjustment to changes in stream power to maintain channel competency (i.e. its ability to transport sediment load) is accomplished primarily through changes in width and slope of the channels. This is easily accomplished in alluvial channels with the abundance of loose sediment material available to move and be reshaped.

5.5 Dominant Discharge

The concept of using a single, discrete flow to represent the actions of a range of flows that a channel experiences, is very useful. This is the basis for the use of the term *Dominant Discharge*. The actual value of the Dominant Discharge has been defined in various ways, (a) related to channel form (as in meander wavelength), (b) the flow that does the most work, statistically, in carrying sediment, or (c) the flow which fills the channel to capacity (i.e. the

"bankfull stage"). Knighton (1984) asserts that there is enough evidence from previous studies to make a compelling case for a convergence of these methods of defining Dominant Discharge.

Table 5-6. Stream Channel Site Data

Average values for measurements and standard deviations taken in May 2004. Actual measurements by cross section are presented in Appendix B1.

Site No.	Name	Value	Q_{bfl} (cfs)	A_{bfl} (ft^2)	W_{bfl} (ft)	d_{bfl} (ft)	S_{bfl} (ft/ft)
1	Topanga	Average	1,427.4	191.1	75.7	6.0	0.0298
		Stnd. Dev.	3.4%	18.0%	9.7%	3.6%	48.3%
3	Hasley	Average	71.0	11.4	10.6	1.7	0.0264
		Stnd. Dev.	7.8%	21.5%	38.1%	12.8%	43.4%
4u	Plum	Average	267.7	49.1	53.7	2.2	0.0216
	Upstream	Stnd. Dev.	11.2%	20.0%	49.2%	23.1%	15.6%
4d	Plum	Average	127.8	32.6	54.8	1.1	0.0257
	Downstream	Stnd. Dev.	7.5%	19.5%	42.7%	22.7%	28.1%
7u	Borrego	Average	343.5	79.0	95.1	1.7	0.0183
	Upstream	Stnd. Dev.	4.2%	32.1%	59.9%	6.5%	34.6%
7d	Borrego	Average	248.1	54.2	54.7	1.9	0.0170
	Downstream	Stnd. Dev.	11.5%	16.7%	34.0%	18.1%	15.5%
9	Serrano	Average	346.1	43.2	17.0	5.2	0.0157
		Stnd. Dev.	3.3%	16.9%	34.7%	22.1%	35.4%
10	Santiago	Average	752.1	136.3	69.9	3.9	0.0101
		Stnd. Dev.	8.9%	16.4%	7.7%	14.6%	35.9%
23	Dry	Average	55.5	11.2	9.6	1.7	0.0163
		Stnd. Dev.	7.6%	9.6%	13.2%	10.6%	17.8%
27	Hicks	Average	48.3	9.1	8.7	1.7	0.0208
		Stnd. Dev.	11.9%	18.0%	13.0%	14.1%	45.9%

The single flow identified as Dominant Discharge is often thought of as a "channel forming" flow that is responsible for the present shape of a natural stream channel. However, the Dominant Discharge is actually just concept, and represents the variability in flows of each watershed. Nevertheless, because of the demonstrated tendency of the Dominant Discharge to be coincident with the current channel form, the bankfull stage can be used to estimate Dominant Discharge. This application is adopted for this study, and the Dominant Discharge is used as a surrogate for the range of geomorphic activities in the channel. Consequently, it provides an effective comparative value among channels.

The obvious concerns with using this feature are how well adjusted it is to the range of flows that are currently representative of watershed activity, and how accurately it can be measured for any given stream channel segment. Both of these sources of error can be significant, but this is an accepted level of uncertainty in geomorphic research when drawing deterministic conclusions about stream channel activity in natural systems. Perhaps the uncertainty is even greater than normal when dealing with bankfull features in semi-arid systems because the channel form can be unduly impacted by the most recent major storm to reach the watershed. Graf (1988) provides a strong argument for the importance of recent flows

in dryland watersheds. However, even with the complexities of the relationship between channel form and the range of flows within a watershed (and their timing), this use of the Dominant Discharge concept provided the best opportunity to draw meaningful conclusions about channel behavior in these semi-arid locations.

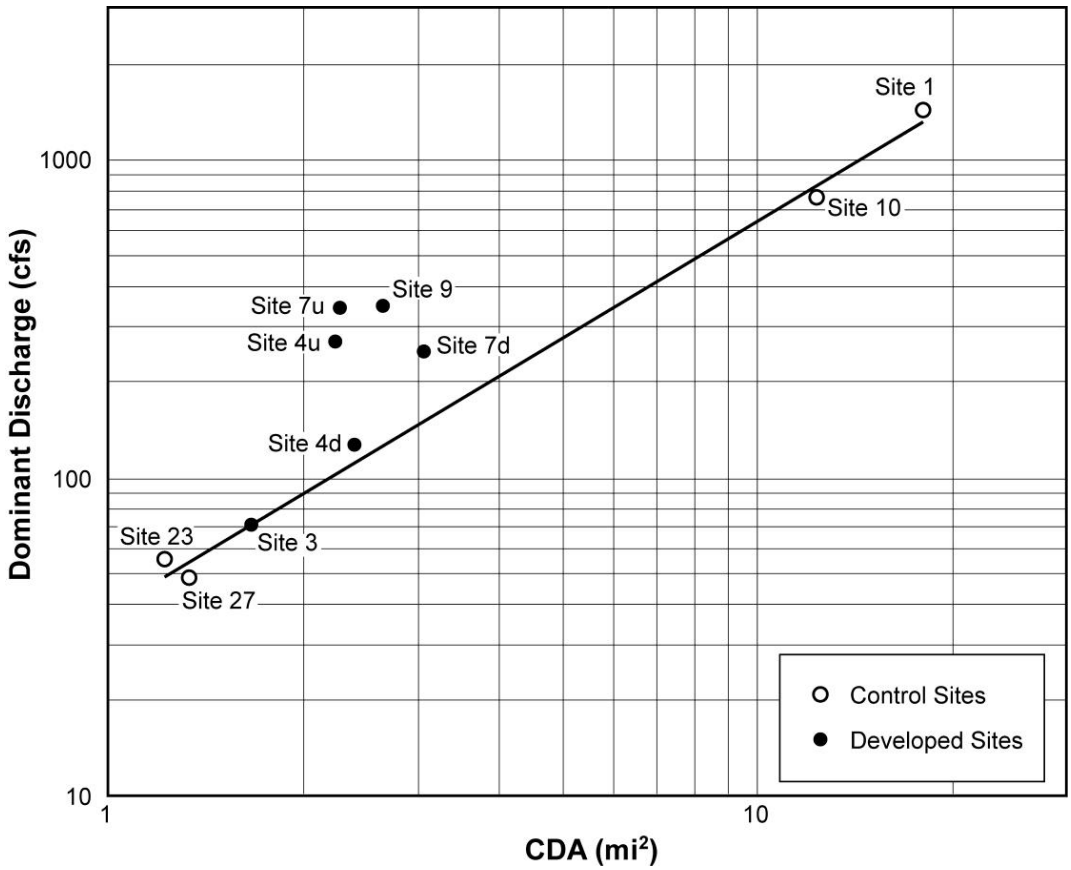

Figure 5-1. Discharge and Drainage Area

The reference line is a best fit for the control sites. Most of the sites with developed watersheds are well above the line, demonstrating greater runoff per unit area than the control sites.

Concerning the specific data for the study sites, the Dominant Discharge calculated for each cross section at every site is based on bio-geomorphic indicators (see Appendix C2). Of interest to this study, as well as urban stormwater managers, is the relative frequency of these discharges. It is well established in the literature that urbanizing watersheds (in the absence of stormwater management measures) have an increase in runoff associated with a storm of a similar frequency. Therefore the return period of the discharge associated with the bankfull stage, the Dominant Discharge, is significant for comparing these sites. Table 5-7 provides two estimates of the value of the return period for the calculated Dominant Discharges for a specific cross section at each of the sites.

Recurrence intervals are estimated with two distinct methods as a means of comparing and validating results. The first method employs the regional equations developed by the U.S. Geological Survey (Waananen and Crippen 1977) to estimate peak discharges for ungaged basins. These equations provide estimates of peak flow for specific recurrence intervals based on watershed size (CDA) and average annual rainfall amounts. Graphs were prepared for each site, plotting recurrence interval vs. discharge, using these equations and specific CDA values and rainfall amounts. The Dominant Discharge calculated

for a cross section can then be plotted on the graph to estimated recurrence interval A more detailed description of this process and the results are provided in Appendix C2.

Table 5-7. Recurrence Interval Estimates
Values estimated for current conditions at specified cross sections

Study Site		Section	Date of Survey	Dominant Discharge Q_{bfl} (cfs)	Recurrence Interval	
					USGS Estimate (yrs)	Prorate to Gage (yrs)
1	Topanga Creek	TOP-02	4-May-04	1,381.4	n/a	2.4
3u	Hasley Canyon	HAS-04	9-May-04	64.8	6.2	2.1
3d	Hasley Canyon	HAS-02	9-May-04	77.5	6.6	2.1
4u	Plum Canyon	PLU(u/s)-05	11-May-04	308.2	3.9	5.7
4d	Plum Canyon	PLU(d/s)-02	10-May-04	127.8	7.3	2.5
7u	Borrego Canyon	BOR(u/s)-03	6-May-04	327.7	10.5	6.7
7d	Borrego Canyon	BOR(d/s)-03	7-May-04	292.2	6.6	3.9
9	Serrano Creek	SER-03	7-May-04	353.6	2.8	5.6
10	Santiago Creek	SAN-01	13-May-04	754.4	1.5	4.1
23	Dry Canyon	All stations	11-May-04	55.6	6.4	2.3
27	Hick's Canyon	HIC-04	8-May-04	54.8	6.0	2.2

The second method uses gage records to develop flow frequency curves from which return periods can be read for a corresponding discharge. However, the flow frequency curve is specific for the CDA to the gage. Therefore, the Dominant Discharge calculated for a specific cross section at a study site must be prorated by CDA size to obtain the corresponding flow rate at the gage before its return period can be read from the flow frequency curve.

5.6 Bed and Bank Material

A summary of the particle-size distributions of the channel bed sediment evaluated during field assessment for the current study is given in Table 5-8. The material characterized represents the coarse fraction of bed sediment that is actually or potentially the sediments that result in natural channel armoring. The ϕ_{16}, ϕ_{50}, ϕ_{75}, and ϕ_{84}, values represent the sediment particle size diameter for which 16%, 50%, 75%, and 84% of the cumulative size distribution is smaller. These material size values have been used in the evaluation of channel bed resistance to erosion. In addition to the coarse sediment fraction, the finer sediments were characterized with sieve analyses in the field. The fact that all of these sites had bed sediment ϕ_{50} sizes ranging from sand size (0.01 in. to 0.08 in.) to boulder gravel (greater than 10 in.) indicates that they are poorly to very poorly sorted sediments. The ϕ_{50} size values in Table 5-8 classify most of the "armor fraction" of these sediments in the cobble gravel size range (2.5 in. to 10 in., Compton 1962). The only real distinction among these sites based on sediment size is the order of magnitude difference of the Topanga sediment from the other sites.

A Torvane® shear meter was used to measure the cohesion of the bank materials. The size distributions of bank materials as a description of cohesion (using units of applied shear force) are ultimately used in evaluating the susceptibility of the bed and bank materials to erosion based on the estimated applied shear forces of the Dominant Discharge. Results of the analysis of sediment data, including the size-fraction distribution, are provided in Appendix B2.

Table 5-8. Summary of Particle Size Data

Values presented in this table are from pebble counts, using the Wolman (1954) method, of the coarsest materials in the channel bed at each cross section.

Watershed	Cross-Section ID	Equivalent Diameter For Selected Particle Size Fractions			
		ϕ_{16} (in)	ϕ_{50} (in)	ϕ_{75} (in)	ϕ_{84} (in)
Topanga Canyon	TOP-01		29.95		44.98
	TOP-02		35.65		44.96
	TOP-03		17.49		22.13
Hasley Canyon Upstream	HAS-04	2.05	3.46	4.72	5.00
Hasley Canyon Downstream	HAS-01	2.95	5.04	5.71	5.94
	HAS-02	2.05	2.83	3.19	3.27
	HAS-03	2.13	2.91	3.15	3.23
Plum Canyon Upstream	PLU-01u/s	2.01	3.11	3.62	3.78
	PLU-02u/s	3.43	5.87	7.60	8.15
	PLU-03u/s	1.97	3.07	3.66	4.02
	PLU-04u/s	2.99	5.39	7.20	7.72
	PLU-05u/s	2.60	3.94	4.76	4.96
Plum Canyon Downstream	PLU-01d/s	4.09	8.15	9.13	9.21
	PLU-02d/s	2.40	3.15	3.35	3.43
	PLU-03d/s	2.17	3.35	3.82	4.06
	PLU-04d/s	1.93	3.62	5.67	5.79
Borrego Canyon Wash Upstream	BOR-01u/s	3.74	6.93	8.43	8.98
	BOR -02u/s	3.15	4.69	5.55	5.83
	BOR -03u/s	3.19	3.82	4.37	4.49
	BOR -04u/s	3.74	5.20	5.79	6.02
	BOR -05u/s	3.19	5.20	6.57	7.52
Borrego Canyon Wash Downstream	BOR-01d/s	2.56	3.43	3.98	4.25
	BOR -02d/s	4.80	8.11	9.53	9.92
	BOR -03d/s	2.60	4.41	5.35	5.63
	BOR -04d/s	2.32	4.13	5.59	5.91
	BOR -05d/s	3.94	7.09	7.48	7.56
Serrano Creek	SER-01	3.19	4.21	5.16	5.35
	SER-02	3.94	6.89	7.52	7.60
	SER-03	2.64	4.17	5.67	5.91
Santiago Canyon	SAN-01	1.81	3.35	4.17	4.41
	SAN-02	2.28	5.83	6.81	7.05
	SAN-03	7.13	8.90	9.37	9.84
	SAN-04	2.68	5.08	5.35	5.43
	SAN-05	2.36	3.74	4.72	5.24
Dry Creek	DRY-01	2.76	4.76	6.38	6.50
	DRY-02	3.39	5.59	6.06	6.22
	DRY-03	1.93	3.11	3.43	3.58
	DRY-04	2.44	3.39	3.98	4.45
Hick's Canyon Wash	HIC-01	4.06	7.64	8.98	9.41
	HIC-02	2.48	3.58	5.12	5.43
	HIC-03	0.87	1.22	1.30	1.46
	HIC-04	0.87	1.10	1.26	1.34
	HIC-05	1.97	3.70	4.13	4.13

5.7 Rapid Geomorphic Assessment

Channel stability at each site was evaluated using a Rapid Geomorphic Assessment (RGA). The RGA is a semi-quantitative method for evaluating the stability of a site based on geomorphic indicators observed and recorded in the field. The RGA produces a stability index (SI) that can be used to categorize the geomorphic condition of the stream reach. The calculated stability index values suggest that all of the study sites are either already unstable or are in transition to being unstable (Table 5-9). The two control sites, Hicks and Dry canyons, had the lowest SI scores while more developed watersheds, such as Plum and Serrano canyons had appreciably higher SI values. Nevertheless, the "undisturbed" watersheds still exhibited moderate channel instability. These results suggest that all channels are continually undergoing adjustment and that there is some level of naturally occurring background hydromodification within southern California watersheds, even in the absence of development.

Table 5-9. Rapid Geomorphic Assessment

Results of evaluation process designed to assess the stability of a stream site

	Site	Stream Type	AI	DI	WI	PI	M	SI	Stability Class
1	Topanga Canyon	AL(Ar)	0.33	0.40	1.00	-	3	0.43	A
3	Hasley Canyon	AL	-	0.89	0.83	0.43	4	0.54	A
4u	Plum Canyon u/s	AL	0.80	0.80	0.71	1.00	4	0.83	A
4d	Plum Canyon d/s	AL	0.83	0.60	0.71	1.00	4	0.79	A
7u	Borrego Creek u/s	AL	0.83	0.40	0.80	0.86	4	0.72	A
7d	Borrego Creek d/s	AL	0.83	0.83	0.71	0.67	4	0.76	A
9	Serrano Creek	RC	-	1.00	0.83	0.43	3	0.75	A
10	Santiago Creek	AL	0.60	0.80	0.60	0.57	4	0.64	A
23	Dry Creek	AL	-	0.57	0.83	0.43	4	0.46	A
27	Hick's Canyon	AL	-	0.71	0.75	0.14	4	0.40	T

Explanation:

AI Evidence of aggradation
DI Evidence of degradation
WI Evidence of widening
PI Evidence of plan form adjustment
SI Stability Index (see interpretation of SI value below)

SI Value	Interpretation	Comment
$0 \leq SI \leq 0.25$	S - Stable	The morphologic features do not show evidence of progressive alteration and type and variance in the dimensions of morphologic features is within acceptable levels.
$0.25 < SI \leq 0.4$	T - Transitional	The type and variance of observed morphologic features indicates that the stream channel is in or about to begin the initial stages of adjustment.
$0.4 < S \leq 1.0$	A - In Adjustment	The type of morphologic features suggests that the channel system has been de-stabilized and is in the middle of adjusting to new conditions.

5.8 Data Summary

The data collected for this study, both historical and field data, have been summarized and described in this section. More detailed presentations of this data are provided in Appendix A (land use, precipitation, stream flow, and historic surveys) and Appendix B (survey comparisons and channel materials). A basic assessment of the data including some general implications about the channel and watershed systems that they describe has also been provided. These serve more to describe the study sites and provide background and general findings based on the data collected.

6. CHANNEL RESPONSE

Results of the analysis of stream channel response to changes in watershed TIMP are presented in this section, followed by a discussion of the implications of these results for management purposes in Section 7. Analysis of channel response was based on an evaluation of the discernable changes in channel form and how they relate to measurable changes in watershed imperviousness (TIMP). Various channel metrics (measurements of channel form) are evaluated to establish these relationships. Summarized below are the results of channel-specific data evaluation and the connections between changes in channel morphology and the changes in watershed development (i.e. imperviousness). More detailed discussion and data on these evaluations are provided in Appendix C.

6.1 Stream Channel Morphology

Stream channel morphology was evaluated based on channel width (W_{bfl}), average channel depth (d_{bfl}), and cross sectional area (A_{bfl}, or the combination of width times average depth), and flow velocity (V_{bfl}). Width and cross sectional area are measured directly from the plotted cross sections derived through current and historic field surveys. Average depth was calculated from the measured data ($d_{bfl} = A_{bfl} / W_{bfl}$). Flow velocity was also calculated using channel slope (S_{bfl}) and estimates of roughness derived from sediment data collected during field surveys. These features were measured at the stage (water surface elevation) of the Dominant Discharge, also referred to as the "bankfull" stage (hence the various subscripts of "bfl"). Details of the selection of Dominant Discharge for use among the channels is given in Appendix C2.

The channel features for a specific stream type were plotted against the estimated Dominant Discharge ($Q_{bfl} = A_{bfl} * V_{bfl}$) to look for a correlation values that would indicate deterministic behavior. The following three relationships were established:

1. There is a logarithmic relationship between dominant discharge (Q_{bfl}) and channel width (W_{bfl}; Figure 6-1). The data used in this plot excluded the braided channel types (Sites 4d and 7d) and the canyon channel type (Site 9).
2. Dominant discharge (Q_{bfl}) is realated to cross sectional area (A_{bfl}) by a power function (Figure 6-2). The data set for this assessment included all of the sections for all of the study sites.
3. There is an inverse logarithmic relationship between the width to depth ratio (W_{bfl} / d_{bfl}) and the ratio of excess shear stress for the bed materials to the excess shear stress for the bank materials (Figure 6-3). The latter ratio expressed on the x-axis is a measure of the inherent ability of the channel bed and bank materials to resist the erosive forces associated with flowing water. The term "excess" in this case is the difference between actual calculated shear stress on the bed or bank and the critical shear stress required to move (or erode) particles. The full expression is provided in Appendix C3, along with an expanded discussion of the evaluation process. The correlation of these values is considerably lower than it is for the channel geometry components ($R^2 = 0.67$), but is surprisingly good considering the range of activities represented by this measure of channel shape.

The relationships between channel features and the Dominant Discharge (Figures 6-1 and 6-2) demonstrate a predictable or deterministic behavior in the channel geometry at these sites. As discharge increases, there is an expected increase in channel size. Comparing Figures 6-1 and 6-2 show that the initial channel response to increases in discharge is to widen; however, with increasing discharge, increased depth (i.e. downcutting) is the predominant response. The relationship of channel shape to excess shear stress (Figure 6-3) also establishes a good basis for the predictable nature channel form. The shear stress relationship also suggests threshold

behavior for the widening or deepening of the stream channel. After a minimal level or bed and bank resistivity has been exceeded, the width-to-depth quickly declines (i.e. channel incision). All of these relationships provide useful techniques to fill data gaps in time series assessments of channel changes.

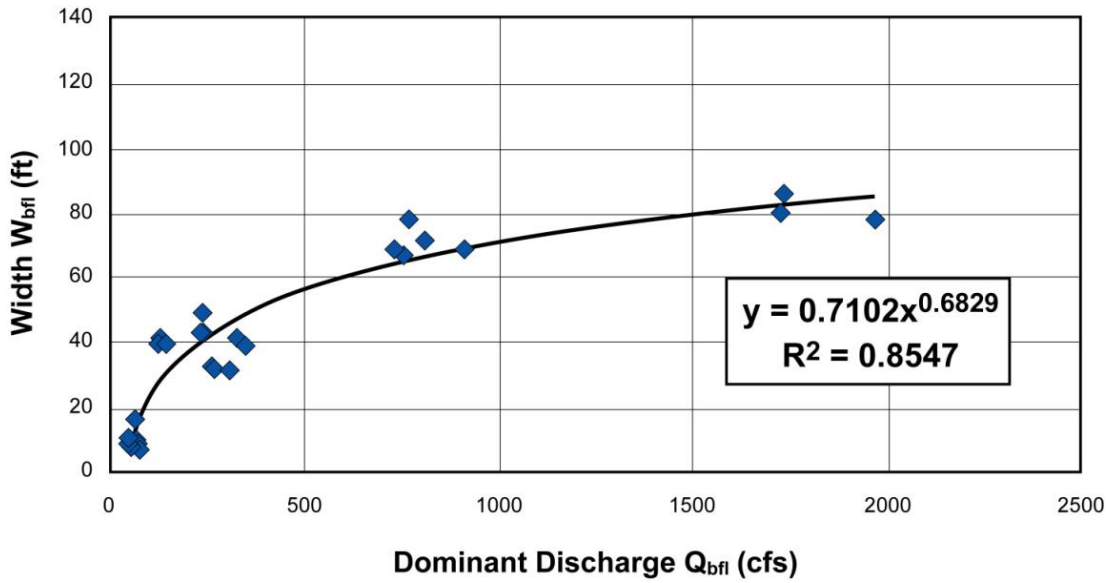

Figure 6-1. Channel Width and Dominant Discharge

6.2 Evaluating Changes in Stream Channel Condition

Natural stream channels exhibit changes over time in their geometry (width, depth, and slope) due to changes in environmental conditions. Various conceptual models exist that can be used to explain the state of a stream channel relative to an equilibrium condition, including steady state, dynamic equilibrium, and metastable equilibrium. The literature on this subject is quite large and the application of terminology has been somewhat inconsistent. Therefore, the terms and concepts discussed here in relation to conceptual models of channel adjustment are defined below.

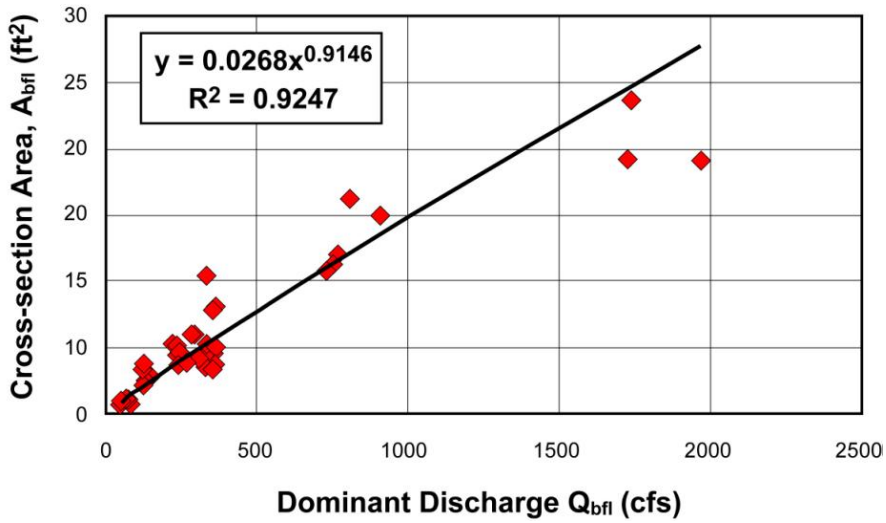

Figure 6-2. Cross Section and Discharge

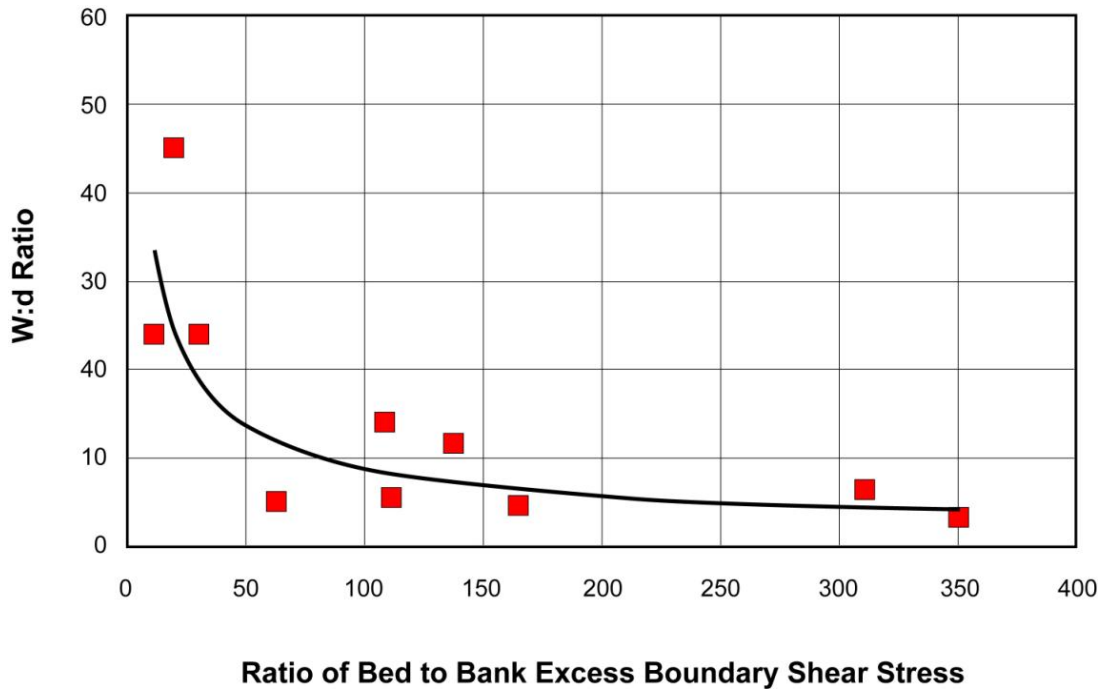

Figure 6-3. Channel Shape and Resistance

Width to depth ratio as a function of the product of specific stream power and the ratio of bed to bank excess boundary shear stress

- **Steady State.** Channel form components, including the width, depth, and slope, vary over time, but always within a definable range about a mean value that does not change over the period of time under consideration. Such a system is usually identified only for short time periods.

- **Dynamic Equilibrium.** Channel form components vary about a mean value that slowly changes over time. This type of condition usually can be identified for longer time periods than the Steady State condition.
- **Metastable Equilibrium.** Channel components also vary about a slowly changing mean value. However, this mean value can suffer rapid and dramatic change if a threshold is passed. Thus, the Metastable Equilibrium state is multiple periods of dynamic equilibrium separated by significant adjustment.
- **Statistical Stationarity.** Demonstration of a steady state condition through the application of statistical evaluation of one or more components of channel form.

In the present study the length of time represented by the data set is relatively short, which makes evaluating the system equilibrium a challenge. In addition, because this investigation is looking at artificially induced change in the equilibrium of these systems, it is important to be able to distinguish between internal (or natural) system change, and external (or artificial) change. The attempt to sort out the equilibrium status of these systems included the use of "control" sites where little to no development has occurred over the period of historic measurement of channel form.

Two of the control sites were Dry Canyon (Ventura County) and Hicks Canyon (Orange County). Each of these sites had multiple measurements at the same channel cross section over time periods of 3 years and 18 years respectively. Although both of these sites demonstrated periodic, or cyclical behavior in the adjustment of some channel geometry components (including W_{bfl} and A_{bfl}), they also exhibited an abrupt change in the thalweg elevation that to-date does not appear to be reversing. Neither change appears to have resulted from excessive storm events or other external causes. Therefore, it appears that the studied channel systems in southern California are not in a steady state condition, and the statistical stationarity of this system (at least in terms of the thalweg elevation) cannot be demonstrated. In other words, even in the absence of external forces, there is a natural rate of change of stream channel depth over time (see also Appendix C3, Section C3.4).

Both the control and the developed sites experienced channel degradation (i.e. negative change in the thalweg elevation) over the period studied. The average degradation rate over the longer period of records was 0.12 ft./yr. for the control sites and 0.31 ft./yr. for the developed sites. It appears that one of the effects of increased TIMP is an increase in the *rate* of channel degradation.

In addition, the precipitation averages during the periods of change for the stream channel sites adjacent to these control sites differed in each area (see Section 5.2). The Ventura County and LA County data suggest that changes occurring at Hasley Canyon and Plum Canyon occurred during a period of lower than average precipitation. The data for Orange County suggests the opposite situation, with higher than average precipitation amounts occurring during the periods of channel change. However, the actual impact of these higher than normal rainfall amounts and stream flows (see Section 5.3) on the Orange County sites, does not appear to alter the conclusion that changes in TIMP were the primary cause of channel change, and not higher than normal rainfall. The most important argument for this assertion is that the channel conditions at nearby Hick's Canyon remained stable during this same period, even though it was experiencing a decrease in thalweg elevation. Thus the same rainfall conditions that were causing significant channel erosion at Borrego Canyon Wash and Serrano Creek, were not significantly altering the channel conditions at Hick's Canyon other than the thalweg elevation.

The fact that deterministic relationships have been demonstrated for a number of channel geometry components and for channel boundary resistance (as described earlier in Section 5), argues for these systems being at least in a dynamic equilibrium. Since statistical stationarity cannot be demonstrated, dynamic equilibrium is still possible and steady state is not likely. Furthermore, because the developed watersheds are undergoing imposed changes, and the stream channels are responding to this perturbation, significant adjustments are occurring in the general

mean values of the system in its state of dynamic equilibrium. This suggests further refinement of the model to one of dynamic metastable equilibrium. More detailed discussion of this topic is provided in Appendix C3.

6.3 Stream Channel Response

Evaluation of channel enlargement requires multiple data points over a time sequence that includes the predevelopment condition (as the baseline or beginning point in time), the current condition (as the end-point), and one or more "historical" data points. The historical data points represent conditions that occurred along the time sequence between the baseline and the end point. In many cases the current conditions do not represent the ultimate end of the adjustment response (the ultimate end point). Therefore, the ultimate condition must be estimated, if possible, using specific and consistent techniques. A full description of the channel enlargement evaluation process is provided in Appendix C4. A brief summary of the procedure follows:

1. Collect available data and decide whether the data coverage is adequate.
2. Establish the baseline time marker (the actual date, or a time of t_0) and channel baseline condition (A_{pre}) for each site.
3. Evaluate all historical points between the baseline time marker (t_0) and the present time (t_{ext}) to understand their condition. Decide whether a single response or multiple responses are occurring at each site.
4. Predict the ultimate condition of the channel at each site upon completion of the adjustment (assuming the existing condition is not the ultimate condition). Appendix C4 provides a discussion of the techniques for completing Steps 3 and 4 if the data set is incomplete.
5. Use the data output from Steps 2, 3, and 4 to construct the *relaxation curve* for each site.
6. Since all of the sites have varying amounts of change in their watershed with regard to TIMP, and this causes varying amounts of channel adjustment, an enlargement curve (defined below) is developed to understand and compare data. To do create the enlargement curve we must assume or predict values of the time it will take to reach the ultimate condition, and the value of that ultimate condition (A_{ult}), for each adjusting site.

Two important aspects of channel change are compared over time, (a) the change in thalweg elevation and (b) the change in channel cross section area for the bankfull stage. The availability of all of this data for historic and/or baseline conditions is not always ideal, so adjustments must be made to complete the evaluation. However, all of the data mentioned above, except the channel slope, can be calculated from surveyed cross sections.

Comparison of the cross-section area of the channel at the bankfull or Dominant Discharge stage (Q_{bfl}) at different points in time produces a ratio of channel cross section area (A_{bfl}) from a later period to the earliest, or baseline period. This comparison is termed the enlargement ratio (R_e), and takes the form of Equation [6.1].

$$(R_e)_{his} = A_{his} / A_{pre} \qquad [6.1]$$

where:

A_{his} = Cross section area of the bankfull channel at an historical point in time (square feet).

A_{pre} = Cross section area of the bankfull channel for the baseline condition (square feet).

Similar comparisons are made for the existing condition (A_{ext}) and the projected, ultimate condition (A_{ult}). The ultimate condition requires an estimation of channel metrics at the end of the adjustment period. None of these sites has reached its ultimate condition in response to the development that has occurred, as this can take several decades (see Appendix C4). Therefore, the ultimate channel condition, and the time it will take to achieve it, must be estimated. The amount of time required for the full adjustment to be completed is called the *relaxation period*. The plot of the adjustment process over time is called the *relaxation curve*. Data from the current study are plotted in Figure 6-4 along with a reference relaxation curve developed using data from urban stream channels on Austin, Texas, which have similar geomorphic and hydraulic conditions, but somewhat different precipitation patterns.

The data plotted on Figure 6-4 are the results of the current investigation with the curve developed for the Austin data. It appears that the changes occurring at the current study sites are still within the initial stages of adjustment, and thus too close to the increase in TIMP to effectively predict the complete adjustment process. Therefore, it is still premature to prepare a relaxation curve developed only with the southern California data from the study sites. In addition, some of the study site data, particularly for the Plum Canyon and Borrego Canyon Wash sites, are not typical of the enlargement data in general.

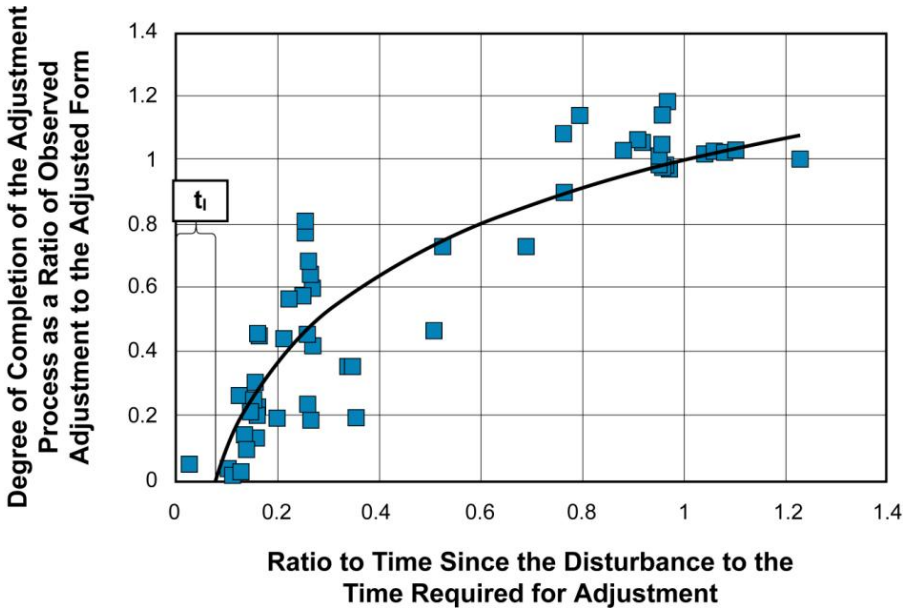

Figure 6-4. Relaxation Curve and Study Data.
Curve developed for urban channels in the Austin, Texas area formed in alluvium. Data points shown are for the study sites in southern California.

The Plum Canyon (LA County) and Borrego Canyon Wash (Orange County) sites are similar to each other and dissimilar to the other sites. Each of these stream channels had two sites, an upstream and a downstream site. On each stream the downstream site has a smaller channel and smaller Dominant Discharge than the upstream site, indicating a loss of flow downstream (i.e. a losing stream). In both cases the upstream sites showed a significant increase in channel size in response to the increase in TIMP, followed by a decrease in channel area. At Site 4u (Plum upstream) the channel cross section area initially increased more than 100% [$(R_e)_{his}$ = 2.22] and then decreased to a size only 43% greater than the baseline condition [$(R_e)_{ext}$ = 1.43] as recorded in the current survey data. At Site 7u (Borrego upstream) the enlargement ratio initially went to 1.37, declined to 1.25, increased to 1.47 and then decreased to 1.06 in the current survey. In neither case did the enlargement ratio continue to increase, albeit at a declining rate of increase, toward an expected ultimate value (as the curve in Figure 6-4 shows). In contrast, the

other sites with developed watersheds (Sites 3u, 3d, 4d, 7d and 9) did show consistent increases in enlargement ratios.

A possible explanation for the changes observed at the upstream Borrego Canyon and Plum Canyon sites is suggested in a conceptual model proposed by Andrews (1979). His model identifies three phases of channel adjustment.

- The **First Phase** of Andrews' Three-Phase response model predicts straightening of the channel thalweg and destruction of the bed forms leading to homogenization of the bed materials and fluvial features in the longitudinal sense. This increases the slope and decreases channel resistance thereby effectively increasing the energy available in the watercourse to perform work.
- In the **Second Phase** of the adjustment process, Andrews' model predicts one of three responses: downcutting, widening or both downcutting and widening. The actual response will depend on the absolute resistance of the boundary materials as well as the relative resistance of the bed and bank materials at the least resistant bank toe stratigraphic unit (MacRae, 1992). The net effect of channel widening would only be temporary, however, as eventually the channel becomes too wide to support continued growth.
- The **Third Phase** would result in a new channel forming (incising) into the newly formed, extra-wide channel. Channel change from this point would then follow the more common response to increased flow and reduced sediment load with the typical enlargement of the channel to a new equilibrium position.

The current observations at the upstream Borrego Canyon and Plum Canyon sites are likely at the transition between the second and third phases of Andrew's 3-Phase model; the channel has constricted after initially enlarging significantly. The bank materials in the upstream Borrego and Plum reaches are highly erodable (mostly unconsolidated sands) while the bed may have been armored with cobbles prior to urbanization. Consequently, the resistance of the bank materials is very low relative to the bed materials as is the absolute resistance of the bank materials to the applied stress. Consequently, while there may have been some downcutting it is likely that the initial response was widening. Furthermore, overbank flows would have easily reworked the loose sands in the overbank area creating chutes and scouring out the wide swath of channel that was observed at the upstream sites.

Although the data from the current study are not adequate by themselves to develop a specific relaxation curve for southern California streams, they were used in conjunction with the established curve (in Figure 6-4) to develop an enlargement curve (Figure 6-5). The data for southern California streams forms a relationship very similar in shape to the enlargement curves developed for the larger database of North American streams. However, the database for southern California streams plots above the general line for the other data, suggesting that a specific enlargement ratio is produced at a lower value of impervious surface area in southern California than in other parts of North America. It is important to emphasize that the data for southern California streams are from systems in the initial stages of adjustment, and therefore are less reliable than they would be if the data were from a more advanced stage of adjustment.

Nevertheless, there are some important conclusions that can be drawn from the data of the current study.

- The channel systems studied here are very sensitive to external changes in the impervious areas within their watersheds. Increases on the order of 2% to 3% in TIMP have initiated increases in channel cross sectional area. The threshold of response for channel enlargement in southern California appears to be substantially lower than in other parts of North America.

- On the short time frame considered in this investigation (10 to 20 years) these systems are considered to be in a state of dynamic equilibrium. The control sites exhibit signs of active downcutting (thalweg elevation decreases) over time while maintaining stable channel morphology. This indicates that all channels are undergoing change; however, the rate of change may be different between streams that are subject to increases in peak flow and those that are not. Longer time series of analysis is necessary to more clearly define these relationships.

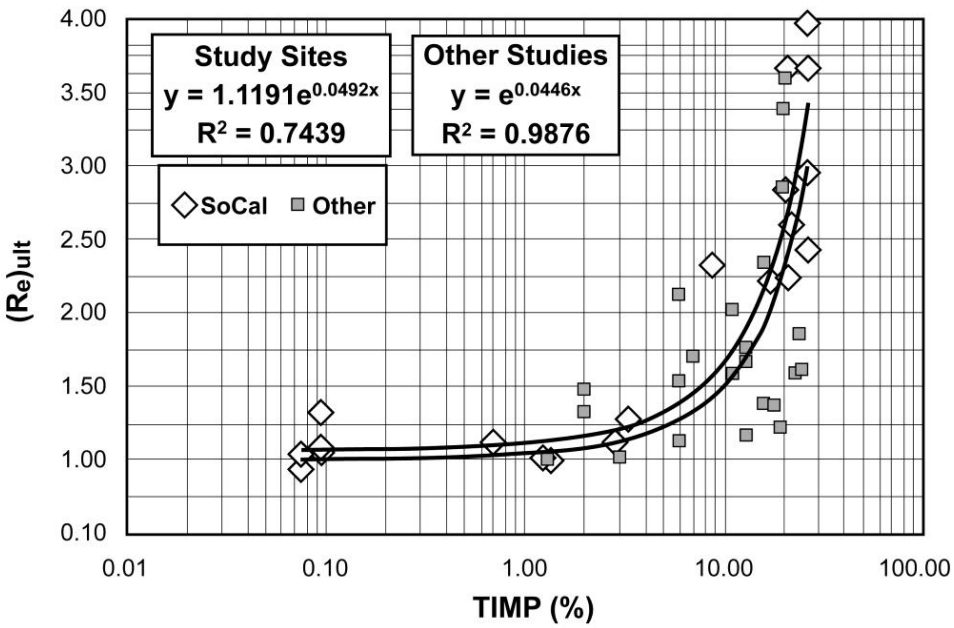

Figure 6-5. Enlargement Curve for Southern California.
Upper curve and data points are for southern California channels in the current study. Lower curve is based on data from other locations in North America.

- Because the measurement error is of the same order of magnitude as the sensitivity values, these systems should be considered to have zero tolerance for increases to TIMP values, and be managed accordingly. This includes adopting one or more of the following management strategies:
  1. Zero tolerance for runoff increases (if not actually reducing runoff to below pre-development levels); or
  2. Employ active management of stream channels to maintain or stabilize the stream channel condition and habitat; or
  3. Establish a “no build” or “no disturb” riparian corridor to accommodate the expected change in watershed imperviousness.

7. CONCLUSIONS AND RECOMMENDATIONS

The affects of urbanization on stream channels have been well studied in perennial systems in the humid regions of the U.S. The results of these studies are widely accepted, and demonstrate that increases of urban (or developed) areas within a watershed lead to increases in stream channel size (depth and/or width) and a decline in the diversity of aquatic species and the quality of aquatic habitat. The present investigation attempted to expand this understanding into ephemeral and intermittent stream channels in semi-arid climates. However, because many of the smaller stream channels in arid to semi-arid areas are ephemeral and intermittent, the present study focused solely on changes in stream channel morphology and did not address impacts to aquatic habitat.

The primary concerns about the affects of urbanization on natural stream channels in southern California, from a regulatory/management perspective, can be summarized as follows

a) How do semi-arid stream channels differ from humid area stream channels in their response to increases in impervious area?
b) How can effective controls be selected for minimizing the impacts from increases in impervious area?
c) Which situations and what conditions are appropriate for use of the identified controls?

The following subsections provide answers to these questions to the extent that the data generated by, and analyzed under, this investigation will allow.

7.1 Conclusions

The focus of this study was to relate changes in watershed development to observed changes in the morphology of the stream channel draining the watershed. The study sites selected were intentionally small (i.e. all less than 20 mi^2 and most less than 5 mi^2) since stream channels draining smaller watershed areas are most sensitive to changes in impervious cover. Ephemeral stream channels can be found in all climates, the main difference between regions is the size at which the contributing watershed area becomes large enough to support perennial stream flow. This size is dependent on a number of variables, but climate is a significant variable. In general, stream channels in arid areas remain ephemeral with larger catchment drainage areas than stream channels in more humid regions. This difference contributes to their increased sensitivity to changes in TIMP.

Based on the results of the present investigation, several principles of urbanizing ephemeral stream channels are suggested. The first principle concerns watershed area.

Principle 1. CDA Size Focus. The drainage area contributing runoff to a stream channel is a key characteristic for determining stream channel size. Ephemeral/intermittent stream channels are no different than perennial streams in this regard.

- Hydromodification from changes in impervious area are most recognizable in watersheds smaller than about 20 square miles.
- Watersheds in the present study with CDA < 15 $mi.^2$ are ephemeral, with one exception (Serrano Creek appears to have a nuisance base flow from surrounding residential areas).
- Management of impervious area and connected impervious area is most critical in the smallest watershed management units (CDA ≤ 2.5 square miles).

The results of this investigation suggest that the threshold for TIMP (total impervious area) at which changes in stream channel morphology would be expected is lower in the semi-arid sites that are typical of southern California than for comparably-sized sites on perennial streams in more humid areas. Based on the current data set the apparent threshold in the value of TIMP for

initiating stream channel morphology change is between 2% and 3%. Similar threshold values for perennial streams generally are closer to 7% for the northeastern U. S. (Schueler 1998) and 10% for the northwestern U. S. (Booth 1997).

The sites in this investigation that experienced changes in their morphology all had relatively low resistance to bed and bank erosion. This leads to the second principle of urbanizing (and arid) ephemeral streams:

Principle 2. TIMP Sensitivity Ephemeral stream channels are also affected by change in total watershed imperviousness (TIMP). The ephemeral/intermittent stream channels of the arid to semi-arid study region in southern California appear to be more sensitive to such changes than are perennial streams in the literature.

- The threshold of ephemeral stream channels for exhibiting changes to stream channel morphology due to change in TIMP value, is between 2% and 3% change in the total impervious area for the watershed.
- The threshold of response will vary based on stream type. For example, ephemeral stream channels that are configured like Topanga Creek with highly resistant bed and bank materials are likely to have a higher TIMP threshold for stream channel change.

The form of a stream channel is a composite response (by its ability to resist erosion) to the cumulative applied forces of stream flow. The forces imposed on the stream channel result from its hydrologic and sediment regimes, the size and timing of flows and the stream channel form, particularly the slope of the stream channel, or energy grade. The resistance of the stream channel to the imposed erosive forces is dependent on the competence and cohesion of the materials forming the stream channel bed and banks. This relates both to characteristics of the stream channel form as well as the resistance of its bed and bank materials.

The stream channels studied in this project included control sites, where little or no watershed development had occurred, and developed (i.e. adjusting) sites, where changes in TIMP had occurred over a period of time. Some minimal rate of change in channel depth and area was observed in all sites (control and adjusting); however, the rate of change was greater in the developed sites than in the control sites. The control sites exhibited a state of dynamic equilibrium because downcutting was observed, but channel morphology did not change appreciably over time. The adjusting sites exhibited instability, as some significant change had occurred in one or more measure of channel morphology. These results demonstrate poor channel resistance to increased flow in all the adjusting channels except Topanga Creek. However, because this is a relatively small data set, generalizations made from the current data will have to be confirmed with a more extensive inventory of stream channel form, stream channel slope, and bed and bank material resistance for both ephemeral streams and perennial streams in the study area.

A key component of stream bank resistance, especially in smaller streams, is the vegetation present and the impact it has in providing resistance to erosion through root binding or energy dissipation. While the study sites had vegetation present to varying degrees, it did not appear to be a significant component of the stream channel stability, particularly at those sites experiencing changes in stream channel morphology. This probably has as much to do with climate, because the dry conditions in ephemeral stream channels in southern California persist for large blocks of time through the year, favoring a limited vegetative cover for banks, and hence less cohesive stream channel banks.

This leads to the third principle of urbanizing ephemeral streams:

Principle 3. Stream Channel Resiliency is Low. The small sample of ephemeral stream channels taken in this investigation whose morphology is changing, had relatively low resistance to erosion. However, further investigation is needed to verify and quantify any differences in stream channel resistance between ephemeral and perennial streams in southern California. The role of vegetation in stream channel resistance also needs to be better defined.

- It is suspected that ephemeral stream channels have a narrower range in resistance and resiliency than perennial streams, and that this is on the lower end of the resistance scale, however there is no conclusive proof of this in the results of the current investigation.
- The low impact of vegetation on stream channel resiliency appears to be a significant difference between ephemeral and perennial streams.

The management of increased stormwater runoff due to development must be concerned not only with the total volume of runoff but also with the flow peaks for individual flood events (both of which increase with increasing TIMP). If the results of the current study are representative of ephemeral stream channels in southern California, then it appears concern for both volume control and peak control should be exercised for control of hydromodification. Because these stream channels appear to be more sensitive to changes in TIMP (Principle 2) it follows that they would be very sensitive to increases in flow rates. Additionally, they appear to have a low resiliency, or resistance to erosion (Principle 3), so it would also follow that these stream channels are more susceptible to channel enlargement. Change in the flow rate would imply not only the peak flow rate but also the duration of time that erosive flows occur. Therefore, it would appear that maintaining the current regime (i.e. hydrograph matching) would be necessary to avoid stream channel enlargement.

This leads to the fourth principal of urbanizing ephemeral streams:

Principle 4. Management Considerations. As an extension of Principles 2 and 3, ephemeral stream channels are expected to be sensitive to both the larger flow peaks resulting from volume control, and the extended duration of erosive flows under peak control.

- In the absence of channel stabilization or other in-stream controls, retention methods are likely to be more effective than detention methods.

Management options and strategies to address these concerns are discussed further in Section 4.2 to explore the alternatives available to watershed managers.

Previous stormwater management investigations were primarily concerned with perennial stream channels. This investigation has looked at a small number of sites on ephemeral/intermittent stream channels in a very large region with significant diversity. In spite of a considerable effort to locate study sites with the broadest representation possible, the sites selected provide only a limited representation of that diversity. Still, these sites have provided some very useful results in characterizing ephemeral stream channels. Differences clearly exist between the ephemeral/intermittent stream channels of this study and the perennial stream channels in the literature in sensitivity to increases in TIMP and stream channel resiliency. Some of these differences have been better clarified by this study, while others have been identified for further investigation.

This investigation and its results should provide both the regulatory community and management personnel with insights into ephemeral/intermittent stream channel behavior and management options that were previously not available or elucidated.

7.2 Management/Regulatory Approach

Management of stormwater ultimately begins with a vision of how the drainage network and stream channel system should look and function. This will determine the opportunities and constraints possible for stormwater management. The vision must be realistic and flexible, and is not likely to be the same for all watersheds. The focus of this investigation has been on physical properties of the “natural” stream channel, its response to changes in watershed development, and management implications.

7.2.1 Management Objective

Once the vision has been established, stormwater management starts with the establishment of global goals and objectives for the watershed. From these goals and objectives will follow the specific objectives for local stream channel reaches and smaller subwatershed areas. If preservation (or re-establishment) of natural stream channel appearance and function is one of these specific, local objectives, the results of this study provide a modest start toward establishing some of the criteria needed to meet this objective. The classification system provided in Section 4 forms the basis for making informed decisions regarding the type and focus of stormwater management and stream channel maintenance applications. By focusing on maintaining a viable, "natural" stream channel (at least in form and function), management approaches include some form of runoff control (to lessen possible increases in the volume of water in the stream channel) and/or stream channel protection (to prevent stream channel erosion due to increased forces on the bed and bank materials). The relative effectiveness of these two types of management is represented in Figure 7-1.

7.2.2 General Approaches

Three general approaches for accomplishing the specified stormwater management objectives are described below. They involve a trade-off between runoff control, and stream channel protection.

Natural Channel Design (NCD). This management approach is concerned primarily with preserving the native (and stable) condition of the stream channel reach under consideration. Because the emphasis is on preserving existing functions, this approach precludes in-channel activities that are not created using materials that are not native to that location and emphasizes surface runoff controls as the primary management tool. Allowable development within the contributing watershed can only be tolerated to the threshold level before surface runoff control must be implemented. The threshold for a watershed will depend on the type of stream channel and the nature of the stream channel slope, soil characteristics and bedrock in the watershed. For example, a stream channel with highly resistant bed and banks (like Site 1, Topanga Creek) will be able to accommodate a significantly higher level of change without a meaningful adjustment in stream channel morphology. Other stream channels (like the remaining study sites) can only tolerate a change in TIMP of between 2% and 3% above the "natural" condition of the pre-disturbed watershed. Therefore, zoning and building density restrictions to encourage low-impact, or "smart" development will be very important with this approach, as well as runoff controls.

Geomorphologically-Referenced River Engineering (GRRE). The goal of this management approach is to preserve the appearance of natural stream channel function to the greatest extent possible while limiting instability in stream channel morphology. Geomorphic principals are used to design a stable stream channel given the expected hydrologic and sediment regimes (which will be different than the pre-disturbed state). The stream channel is re-shaped to this design using a minimum of hard, engineered structural elements within the stream channel so that the natural appearance is preserved while the new stream channel form can remain stable. However, both surface runoff and in-channel controls are required to maintain the hydrologic and sediment regimes for which the new stream channel is designed. Allowable development that can be tolerated under this approach has fewer restrictions than the NCD approach in that the new stream channel is designed to accommodate flows that are larger than the flows that shaped the stream channel under the natural conditions of the watershed prior to development. None-the-less, surface runoff controls eventually become just as critical to the stability of the new stream channel design,

as it maintains semi-autonomous behavior. In-stream controls are employed to the extent they are needed, and are not necessarily created with native materials.

Traditional River Engineering (TRE). The goal of this management approach, also referred to as "hard-lining," is to create the most efficient conveyance system possible for stormwater, and provide the greatest degree of protection for the bed and banks of the stream channel that provides stormwater conveyance. The stream channel system is engineered to accommodate flows up to the design storm level, whatever that may be, and is protected by hard-lining the bed and banks. Surface runoff controls are much less important under this approach than they are under the NCD or GRRE approaches.

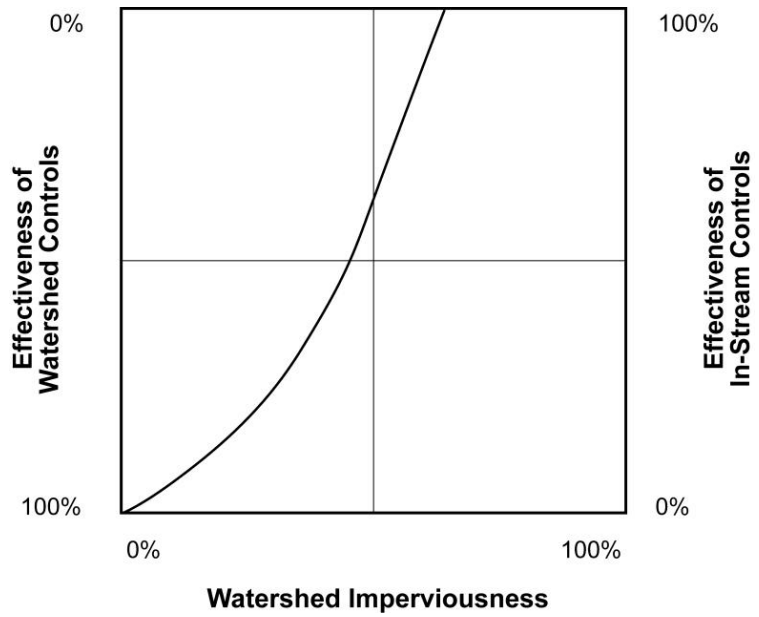

Figure 7-1. Effectiveness of Stormwater Management Control Strategies

Management approaches are selected so that they match the general goals and objectives for the watershed, as well as the specific objectives established for the stream channel reach in question. Because this investigation is concerned primarily with natural stream channel form and function, it focuses only on stormwater quantity and sediment load as it relates to stream channel activity, and is not directly concerned with water quality. There are a variety of best management practices (BMPs) available for controlling stormwater quantity, and a number of sources for obtaining information about these practices (EPA 1999, 2002, Mays 2001, WEF 1992). Controlling runoff can be organized into three general areas of control (source control, conveyance system control, and centralized control). Specific practices that illustrate these areas are listed in Table 7-1a. In-stream management practices also fall into multiple areas (grade control, sediment regime control, and bank stabilization). Some specific practices are listed in Table 7-1b. These tables list representative stormwater management options, but are not intended to be exhaustive lists.

7.2.3 Management Strategies

A general framework for assessing stormwater management strategies is presented in Table 7-2, which describes the applicability of four management strategies. The strategies are based on the

current amount of development (i.e. TIMP) in a watershed and the expected stream channel stability. Functional relationships between these strategies, the management approaches discussed previously in this section, and the stream channel type classification system presented in Section 4 of this Technical Report are explored further in the discussions of these strategies presented below.

Preservation. The strategy for watersheds that have relatively little development and therefore a low percentage of impervious area is to take advantage of the opportunity to maintain or preserve a stable stream channel system. The recommended management for these watersheds is to first to consider NCD, as this is likely to be one of those rare occasions where NCD can be effective. The stream channel in its existing form is considered desirable and worth retaining. The stream channel is also considered to be a metastable system where change in stream channel form under natural conditions is considered acceptable over the planning horizon of 100 years. Management efforts are based almost entirely on surface runoff control with limited in-stream actions.

Table 7-1a. Stormwater Management Practices

Focus	Objective	
	Retention	**Detention**
Source Control	• Dry well • French drain • Cistern • Rain barrel • Bioretention	• Detached downspouts • Vegetated areas
Conveyance System Control	4. Porous pavement 5. Channel diversions	6. Rural drainage profile 7. Grassed swales 8. Stream Corridor Buffer zones 9. In-line detention 10. Reconnecting channel to the floodplain
Centralized Control	• Infiltration basin • Retention basin	• Constructed wetlands • Detention basin

Table 7-1b. In-Stream Management Practices

Focus	Practices	
	Soft Engineering	**Hard Engineering**
Grade Control	• Riffle • Boulder clusters	• Drop structures • Channel lining
Sediment Regime Control	• Pool • Sediment introduction	11. In-line detention 12. In-line sediment trap
Bank Stabilization	• Grading and vegetation of stream banks • Vegetated gabions	• Riprap • Rock gabions • Pavers • Channel lining

Restoration. Watersheds with greater amounts of impervious area require management focused on bringing an unstable stream channel system back into a stable situation. Part of the management effort, ultimately, is to decide on an acceptable level of development for the watershed. Although the stream channel is destabilized, it can be restored to pre-disturbance form through control of the sediment-flow regime and in-stream works strategically located for grade control. Once provided with the right balance of control, the stream channel is able to restore itself through its own means. Erosion control is still primarily managed with surface runoff controls, although the emphasis on in-stream measures has increased to include localized sites and unstable and incised stream channel reaches.

Rehabilitation. Watersheds with significant impervious areas that are still manageable in total amount can have seriously degraded stream channels that are highly unstable and require significant effort to bring the stream channel back into a new, and stable, condition. The stream channel cannot be restored to its pre-disturbance form due to irrevocable changes to its form. However, the stream channel can be modified through a combination of surface runoff and in-stream works in accordance with the vision for the stream channel-valley system. Erosion control is based on matching the morphology of the stream channel with the new sediment-flow regime established for the stream channel based on implementation of a preferred SWM Alternative. SWM measures a required for new development and retrofit of existing developments. The emphasis on in-stream measures has increased to include localized sites and all unstable stream channel reaches.

Table 7-2. Stormwater Management Strategies

Strategy Name	Applicability	Description
Preservation	Stable Channel TIMP ≤ 6%	Stream channel is expected to be stable; Effort will be to keep it stable.
Restoration	Unstable Channel 6% < TIMP ≤ 10%	Stream channel is likely to be experiencing some instability (increase in capacity, change in hydraulic geometry values, etc.); effort will be correct changing inputs and nudge stream channel back to normal conditions
Rehabilitation	10% < TIMP ≤ 20%	Stream channel probably has experienced irreparable changes (not able to restore "normal" conditions); effort will be to create a new (and maintainable) "natural" stream channel configuration.
Stabilization	20% < TIMP	Stream channel has become extremely unstable and is on the verge (or in the middle) of significant morphological changes; effort will be to stabilize conditions with any means necessary and prevent excessive change.

Stabilization. The worst case is in a watershed with levels of impervious area that are so high the focus of stream channel management must be on stabilizing a situation that will only get worse if nothing is done to address the stream channel erosion. The stream channel has become entrenched and the valley is confined by development, floodplain fill, and/or infrastructure

encroachment. Instability is systemic to the majority of the main stream channel and erosion threatens property and infrastructure. Further adjustment of the stream channel is anticipated and will exacerbate the problem. Surface runoff controls for new developments and retrofit options for existing developments can achieve significant reductions in erosion potential. However, surface runoff management is not sufficient to stabilize the stream channel that is undergoing valley formation and susceptible to catastrophic failure during rare flood flow events. In-stream works are required to reconnect the stream channel to its floodplain, arrest the down-cutting process and stabilize the stream channel. Due to encroachment of development into the floodplain and infrastructure located within the valley, lateral migration of the stream channel may not be desirable. In this case GRRE at TRE approaches may be required, and these approaches may have no alternative except to hard-line the stream channel. In this situation surface runoff controls become redundant from an erosion control perspective. However, surface runoff control measures may be necessary for water quality or flood hazard issues. Surface runoff controls may also be required to meet the long-term vision for the watershed as the urban landscape reshapes itself through in filling and redevelopment.

7.2.4 Implementation of Management Strategies

Selection of a management strategy is dependent upon the extent to which a stream channel has been impacted by development within the watershed. The first step in implementing a management plan requires local communities to inventory and characterize each channel segment. This may result in a single stream having one or more stream segments with each of the four management goals. Therefore, land use controls and in-stream practices would vary based upon the established strategy for that particular stream segment. Table 7-3 summarizes the criteria and methods that could be used by communities to manage their stream networks.

Table 7-4 summarizes the various management approaches discussed earlier and shows linkages with implementation strategies that are appropriate for a given channel type and degree of TIMP. This table is based on practical, nationwide experience in stormwater management implementation that has been tailored for consideration in the southern California setting. In addition to this table, there are a three general strategies which should be considered when attempting to manage increases in peak flow:

1. **Limit Impervious Area.** Although the focus of this study was necessarily on TIMP, disconnecting impervious areas from the drainage network and adjacent impervious areas is a key approach to protecting channel stability. Utilizing this strategy can make it practical to keep the effective impervious cover (i.e. the amount hydrologically connected to the stream) equal to or less than the identified threshold of 2-3%.
2. **Control Runoff.** Hydrograph matching is not recommended for a single “design” storm with a specific return period, but rather for a range of return periods from 1 year to 10 years. Accomplishing such hydrograph matching will be challenging, and undoubtedly require a combination of techniques to prevent (retain), as well as to delay or attenuate (detain) runoff and/or stream flow.
3. **Stream Channel Movement.** Allow the greatest freedom possible for “natural stream channel” activity. This includes establishing buffer zones and maintaining setbacks to allow for channel movement and adjustment to changes in energy (associated with runoff). However, where in-stream controls are required consider all potential management options.

It is important to keep in mind that the choice of a management approach or approaches should be dictated by the strategies that are appropriate given the conditions of each stream reach and its contributing watershed. Consequently a suite of management approaches may need to be applied to provide a comprehensive solution to managing increases in peak runoff.

7.3 Applicability

Impacts to stream channels resulting from changes within the contributing watershed area, such as development and increased impervious area, are generally viewed as negative. Although no positive impacts were identified at any of the study sites, positive results are possible. The best example of this would be a stream reach that has an excess sediment load prior to development (i.e. an aggrading reach). Increased runoff and stream flow resulting from development could increase the carrying capacity of the stream enough to accommodate the excessive sediment load, thus producing a stable reach.

In order to relate the measurable changes in stream channels to changes in development, a measurable variable for development must be identified. The most commonly used value to represent development changes has been the areal extent of impervious area. This can be measured, laboriously, from maps and aerial photographs, or it can be estimated from existing land use maps with accepted conversion values. The latter method provides an estimate of the total impervious area (TIMP) in a watershed. A more accurate assessment of the actual impacts from development would come from the use of “connected impervious” area, or “CIMP” (also termed FRIMP). However, CIMP cannot be estimated as easily or effectively from land use data as can TIMP. CIMP must be carefully measured or delineated using detailed aerial photographs and (if available) detailed maps such as development plot plans or municipal parcel maps combined with extensive ground-truth checks. This is possible, though difficult, for current conditions, but it becomes much more difficult (if not virtually impossible) for historical conditions where ground-truthing is not possible. The degree of difficulty in calculating CIMP values and the scarcity of CIMP values in previous studies led to the decision to use TIMP values in the current investigation rather than CIMP values.

Table 7-3. Implementation of Recommendations

Management Goal	Management Strategy	Role of Local Government	Funding	Implementation Approach
NCD – Preservation Stable Channel 0% ≤ TIMP ≤ 6%	Minimize Impervious Area Maximize Infiltration Preserve Environmentally Sensitive Areas	Land use planning Zoning restrictions Develop design standards for "smart growth"	Private developers	Inventory stream characteristics Complete assessments of individual watersheds Complete land use planning Preserve environmentally sensitive areas Establish stream channel/valley buffer zone Develop "smart growth" design standards that • Maintain "natural" shear stresses and hydroperiod of watershed. • Post-development runoff volumes to closely equal pre-development runoff volumes • Post-development peak rate of runoff < pre-development peak rate of runoff Implement riparian vegetation planting/ management program Monitor field conditions
NCD – Restoration Unstable channel 6% ≤ TIMP ≤ 10%	Minimize addition of new Impervious Area Maximize infiltration Preserve strategic environmentally sensitive Areas Restore "natural" hydroperiod Restore natural characteristics of stream channels	Land use planning Zoning restrictions Develop design standards for "smart growth" Restore natural characteristics of stream channels	Private developers Public capital improvements	Inventory stream characteristics Complete watershed assessments Complete land use planning Preserve environmentally sensitive areas Establish stream channel/valley buffer zones Develop "smart growth" design standards • Maintain "natural" shear stresses and hydroperiod of watershed. • Post-development runoff volumes to closely equal pre-development runoff volumes • Require post-development peak rate of runoff to be less than pre-development peak rate of runoff Implement riparian vegetation planting/ management program Develop design criteria to retrofit existing development to mitigate increases in runoff volume and peak discharge rates Plan, design and implement projects to retrofit existing development. Limit in-stream works (localized erosion problems) Monitor field conditions

Table 7-3 (continued)

Management Goal	Management Strategy	Role of Local Government	Funding	Implementation Approach
GRRE – Rehabilitation Unstable channel 10% ≤ TIMP ≤ 20%	Preserve existing hydroperiod Stablize stream channels	Development of design standards for runoff peak and volume controls Stablize stream channels	Private developers Public capital improvements	Inventory stream characteristics Develop design criteria for a new development to maintain existing runoff volume and peak discharge rates • Post-development peak rate of runoff = or < pre-development peak rate of runoff Plan, design and implement BMPs to retrofit existing development. Preserve vegetative cover of stream channel and buffer strips along stream channel Substantial In-stream works to stabilize stream channel • Establish grade controls • Use bioengineering techniques to stabilize stream channels
TRE – Stablization Unstable channel 20% ≤ TIMP	Stablize stream channels	Stablize stream channels	Public Capital Improvements	Inventory stream characteristics Maximize storage of stormwater runoff to reduce in-stream peak discharges Channel hardening & grade controls • Maximize use bioengineering techniques to stabilize stream channels • Maximize use of "natural" materials to harden Stream channels • Preserve vegetative buffer strips along stream channel Flow Diversions

In addition to concern over physical changes to stream channels (hydromodification) that result from increased impervious areas, impacts to habitat can also be significant. Natural stream channels offer some of the best opportunities in the southern California region for threatened and endangered bird species to avoid the pressures of development. Stable riparian zones can also support native plant species effectively. Such habitat is predicated on conditions remaining stable within the stream channel. Adjustment of plant and animal species to unstable conditions within the stream channel would require a separate, study. A study of this type should focus on the expected adjustments to various types of stream channel changes (widening, deepening, loss of soil, etc.) by a variety of biotic communities. The current study had to necessarily focus on understanding the physical system while attempting to understand the relationships of change within it.

Although stream flow records were available for only 2 of the 10 study sites, all of the stream gage records obtained were used primarily for establishing generic flow frequency relationships and return periods. This can be effectively accomplished (and was in this study) using nearby gage data. Therefore, the lack of specific gage data for each site is more a concern for

convenience rather than reliability of results. Also, measuring stream flows for specific storms before and after development and relating that to changes in impervious area would be very helpful data for this investigation. However, in watershed studies as in much of scientific endeavor, there is always a gap between the ideal data set and the actual data set. The relation that was possible to measure compared stream channel changes (that resulted from changes in discharge) directly to the changes in impervious area. This did not provide the ideal comparison (impervious area to stream flow, stream flow to stream channel change) but it does provide a quantifiable relationship between stream channel change and impervious area change.

7.4 Study Limitations

The charge of this study, the defined objectives, and the adopted approaches were all very ambitious. However, the need for data on these types of systems in this environmental setting is great, and aim was therefore to maximize results for the available resources. Thus, the results should be recognized as preliminary.

This study attempted to define several complex relationships involving stream channel response to watershed change using a modest data set that covers a relatively short period of time. Because there are many variables that affect the complex relationships between TIMP, runoff, and geomorphic response in stream channels, the study design attempted to limit the potential influences of certain variables to better evaluate the response of others. However, in reality it is difficult to achieve the desired control of variables that is required for definitive results in a study of this type. Consequently, it is important to be aware of the following points while assessing the results of this study.

- The data gathering and assessment requirements of this project included three major efforts that each could have been addressed as stand-alone investigations. Stream channel classification, evaluation of Dominant Discharge, and assessment of form and process of streams located in urbanizing watersheds of a semi-arid region could each have been a significant investigative effort on their own. Therefore, the analytical effort was great relative to the data set generated.
- The scale of the study region is very large compared to the actual area included in the study. The size of the study region, excluding the interior drainage areas, is nearly 6,300 square miles. The total watershed area covered by the sites used in this study is less than 33 square miles.
- The nature and response of watersheds in drylands is generally different than watersheds in humid areas. Dryland streams have fewer stream flow events and the importance of the flows from the last storm event is greater (Graf 1988). Knowing the magnitude of the latest flood event is important for interpreting the channel features measured after that event. However, in all cases, the field measurements of channel features did not follow a wet season with significant storm events, and thus are considered representative of the lower range of more normal events in these systems.
- Although a sizeable effort went into gathering data for this study, a relatively small data set was generated and used to evaluate channel response. Therefore, compelling as the results of this study may be, they must be considered preliminary.

7.5 Additional Research Needs

There is a large body of research into the effects of urbanization on increases in peak flow from regions of the county with wetter climates. However, this information is nearly absent for semi-arid regions, like southern California. This investigation is one of the first to assess the response of ephemeral/intermittent stream channels in an arid region with changing hydrology due to urbanization of the watershed. This is a common condition throughout the six counties of the study area that grew at a rate of more than 12% between the last two censuses. Communities are increasingly concerned about the damage to the environment and to property but are uncertain as to how to make sound management decisions to control the situation. This investigation has identified a number of principles that appear to characterize the

relationship between urbanization and the stability, or lack of stability, of ephemeral/intermittent stream channels. However, the investigation included a very limited number of streams. Therefore, it is recommended that future investigations be conducted to confirm and expand the understating of the unique processes involved.

(A) Survey stream channels in the study area with reconnaissance or remote sensing techniques to identify and classify the critical "natural" stream channel reaches that still remain in this region, and help focus management efforts and prioritize future research.

(B) Measure stream channel form, stream channel slope, and bed and bank material resistance for both ephemeral streams and perennial streams in the study area that fall into the category of critical "natural" stream channel reaches. This could include streams and rivers in the study region with watersheds greater than the size limits recommended for the classification system here.

(C) Study USGS and county stream gage data that span the period of urbanization in various locations throughout the study region to establish quantitative values for increased flows. Tie back to percent change in impervious area for this time period. Quantitatively assess whether relationships exist that could predict "effective rainfall" levels (the minimum precipitation needed to produce an "effective" flow in the stream channel) based on watershed size and TIMP

(D) Investigate in greater detail the measurement or estimation of impervious area through various methods and establish a correlation between them. This will create a common set of assessment values that would allow the use of older photographs and newer digital imagery remote sensing techniques to overlap TIMP calculations for longer time periods.

(E) Identify more candidate sites for future studies. Establish a permanent set of sites that will be less likely to be affected by future development or stream channel "improvements." Use the long-term monitoring of these sites to quantify natural rates of change over various climatic cycles.

(F) Develop and test conceptual and/or predictive models for use in evaluating management strategies and specific management options in different watersheds and stream channel types.

(G) Broaden understanding of ephemeral stream channels in the six county region with additional characterization and study; perhaps extending into the truly arid (interior drainage) parts of this region.

(H) Resurvey the study sites within the current water year to capture the impacts on these stream channels from an excessively wet rainfall season.

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Managing Runoff to Protect Natural Streams: The Latest Developments on Investigation and Management of Hydromodification in California

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EXECUTIVE SUMMARY

Stream channel downcutting, widening, and erosion due to increased surface runoff present the most profound and difficult to manage problems resulting from conversion of natural land surfaces to developed areas. Land use changes that reduce the capacity for infiltration and evapotranspiration of rainfall may result in an increase in the magnitude and frequency of erosive flows and changes in the proportion and timing of sediment delivery downstream. These effects, termed *hydromodification*, can adversely impact the physical structure, biologic condition, and water quality of streams.

This document summarizes the presentations and discussions from a workshop convened to provide an overview of key technical and managerial issues associated with hydromodification, with specific focus on California's climatic setting. The goal of this workshop was to identify key conclusions regarding the mechanisms and causes of hydromodfication and to provide managers and decision makers with a list of recommended priorities for future work in terms of both technical and managerial products.

Recent studies indicate that California's intermittent and ephemeral streams are more susceptible to the effects of hydromodification than streams from other parts of the United States (US). Physical degradation of stream channels in the central and eastern US can initially be detected when watershed impervious cover approaches 10%, although biological effects (which may be more difficult to detect) may occur at lower levels. In contrast, initial response of streams in the semi-arid portions of California appears to occur between 3% and 5% impervious cover.

Managing the effects of hydromodification requires attention to changes in runoff volume, magnitude of flows, frequency of erosive events, duration of flows, timing of high flows, magnitude and duration of base flows, and patterns of flow variability. Slope, composition of bed and bank materials, underlying geology, watershed position, and connections between streams and adjacent floodplains are also key considerations in the management of hydromodification effects.

A contemporary toolbox for assessing the effects of hydromodification consists of three technical approaches: continuous simulation modeling, physical process modeling using geomorphic metrics, and risk-based modeling. Independently and in a range of combinations, these approaches are instrumental to understanding and predicting channel responses. In conjunction with these approaches, the following research areas are recommended for enhanced understanding and assessment of hydromodification:

- Establishment of appropriate reference conditions for various stream types
- Establishment of linkage between geomorphic changes and biologic effects
- Development and calibration of linked models that provide long-term simulation of hydrologic, and resultant physical changes in channel morphology

Furthermore, ongoing monitoring programs should be established for reference streams, streams subject to effects of hydromodification, and streams where various hydromodification management strategies have been employed.

Hydromodification is best addressed with a suite of strategies including site design, on-site controls, regional controls, in-stream controls, and restoration of degraded stream systems. To improve the effectiveness of hydromodification management, it is important to identify the most appropriate set of strategies based on the type of channel, setting, stage of channel adjustment, and amount of existing and expected impervious cover in drainage catchments. Management of hydromodification could be improved by integrating it into a multi-objective strategy that addresses hydrology, water quality, flood control, and stream ecology. In addition, streams should be surveyed and classified in order to identify areas with the greatest risk of impact from hydromodification. Output from dynamic modeling can be used to develop easy to use management guides, and standard monitoring protocols and performance criteria need to be developed. These management tools should be geared toward application by land-use planners and regulators at the municipal and state levels. Finally, a hydromodification workgroup should be formed to facilitate communication and exchange of ideas and information on technical and management strategies relevant to hydromodification.

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WORKSHOP OVERVIEW

The process of urbanization has the potential to affect stream courses by altering watershed hydrology. Development and redevelopment can increase impervious surfaces on formerly undeveloped (or less developed) landscapes and reduce the capacity of remaining pervious surfaces to capture and infiltrate rainfall. In addition, in semi-arid regions, development is usually accompanied by significant supplemental landscape irrigation that maintains high soil moisture conditions. Development practices also tend to reduce or eliminate native vegetation, thus reducing evapotranspiration of rainfall. Consequently, as watersheds develop, a larger percentage of rainfall becomes runoff during any given storm; runoff reaches stream channels much more rapidly, resulting in peak discharge rates that are higher than those for an equivalent rainfall prior to development. These changes to the runoff hydrograph have been termed *hydromodification*.

Hydromodification can result in adverse effects to stream habitat and water supply, and stream erosion associated with hydromodification often threatens infrastructure, homes, and businesses. In response to these effects, state and local agencies have developed, or are developing, standards and management approaches to control and/or mitigate the effects of hydromodification on natural and semi-natural stream courses.

On October 2 and 3, 2005, 26 speakers and 175 participants gathered in Ontario, California to discuss the results of recent research inside and outside of California. This technical workshop was convened to provide an overview of the key technical and managerial issues associated with hydromodification, with specific focus on California's climatic setting. The specific objectives of the workshop were:

- Exchange of information on technical and managerial approaches to hydromodification
- Identification of common conclusions regarding a general understanding of hydromodification
- Recommendation of priority needs for future work relevant to technical and managerial products in response to hydromodification issues

The workshop consisted of two evening and one all-day session. The first night, a small group of scientists and managers gathered to discuss key knowledge gaps and technical information needs. The day session was open to all attendees, who interacted with a slate of speakers summarizing technical, regulatory, and management approaches to responding to the effects of hydromodification. The workshop concluded with an evening session in which a small group discussed priority needs for future research and management tool development. The agenda for the workshop is provided in Appendix A.

This document summarizes key conclusions resulting from the presentations and discussions that occurred during the workshop. The document also provides managers and decision makers with a list of recommend priorities for future work in terms of both technical and managerial products related to hydromodification response.

INTRODUCTION TO HYDROMODIFICATION

Hydromodification is defined by the Environmental Protection Agency (EPA) as the "alteration of flow characteristics through a landscape which has the capacity to result in degradation of water resources" (http://www.epa.gov/owm/mtb/cwns/1996rtc/glossary.htm). Most often, hydromodification results from changes in land use practices or direct management of surface runoff. Consequences of hydromodification can include stream channel incision, aggradation, desiccation, and/or inundation.

Land use practices over the past several hundred years have resulted in hydromodification of western landscapes (Haltiner et al. 1996, Leopold 1968). Historically, many small streams were not connected to main river channels, but rather existed as shallow swales and wetland systems connected to larger rivers via subsurface flow. Surface hydrologic connections occurred intermittently following periodic large storm events. Increased surface runoff and channel disturbance, beginning during the cattle-grazing era circa 1700 – 1900, resulted in many of these systems becoming permanently channelized (Cooke and Reeves 1976). Channel modification through either direct alteration, or as a consequence of changes in patterns of surface runoff, e.g. through increases in impervious cover, continues today.

Hydromodification has typically resulted in channel incision and bank erosion in the upper and middle portions of the watershed, and in deposition, aggradation, and increased channel meandering in the downstream, flatter portions of the watershed. Often, as the main channel has incised, the lowered base level results in the formation of "knickpoints" (abrupt drops in the channel floor) that migrate upstream into the headwater areas. Often, these migrating "knickpoints" result in severe gully formation in lower order streams, i.e. first- through third-order streams, based on the Strahler stream ordering system. These smaller headwater streams are important from a watershed perspective because much of the sediment generation, carbon export, and initial nutrient processing occur in the upper watershed (Rheinhardt et al. 1999). The vast majority of stream miles in any given watershed exist as small headwater streams (Beschta and Platts 1986); consequently, impacts to these streams can result in profound cumulative effects to sediment and water movement patterns throughout the watershed. In many areas, the majority of remaining semi-intact streams is in the upper portions of watersheds. Notably, these areas are the most susceptible to land use change and associated effects of hydromodification. When development occurs in headwater areas rather than lower in the watershed, it tends to result in larger increases in peak discharge due to cumulative decreases in the time of concentration of rainfall to runoff (Beighley and Moglen, 2002).

Small, frequent runoff events, i.e. two-year frequency storms and smaller, demonstrate the most dramatic effects due to increased imperviousness, effects of supplemental irrigation, or other changes in land use practices (Beighley et al. 2003, Donigian and Love 2005, Hollis 1975). These small events account for the majority of long-term movement of sediment and consequently are the most deterministic of the geomorphic stability of the stream channels (Wolman and Miller 1960). However, small increases in basin impervious cover can also result in dramatic increases in runoff during 0.5-5 year flow events. For example, an increase of a few percent in impervious cover can increase the magnitude of a 1- or 2-year flood event by 20-fold (Hollis 1975, Urbonas and Roesner 1992).

Studies from parts of the country with climates more humid than California's indicate that physical degradation of stream channels can initially be detected when watershed impervious cover approaches 10%, although biological effects, which may be more difficult to detect, may

occur at lower levels (CWP 2003). Recent studies from both northern and southern California indicate that intermittent and ephemeral streams in California are more susceptible to the effects of hydromodification than streams from other regions of the US, with stream degradation being recognized when catchment's impervious cover is as little as 3-5%[1] (Coleman et al. 2005). Furthermore, supplemental landscape irrigation in semi-arid regions, like California, can substantially increase the frequency of erosive flows (AQUA TERRA Consultants 2004). However, because all streams are constantly undergoing change and adjustment, effects of impervious cover should be investigated in terms of changes in the rate of channel response in addition to the absolute magnitude of response.

Managing the effects of hydromodification requires attention to more than just the peak runoff. The work (or energy) that affects physical and biological channel structure results from movement of water and sediment controlled by runoff volume, flow magnitude and duration, frequency of erosive events, timing of high flows, and magnitude and duration of base flows (Konrad and Booth 2005, Montgomery and MacDonald 2002, Paul and Meyer 2001, Roesner and Bledsoe 2003). Changes in patterns of flow variability and increases in the frequency of high flows have been shown to have measurable effects on the community composition of stream biota (Konrad and Booth 2005). Because streams are coupled hydrologic, geomorphic, biologic systems, it is important to understand the various effects of all changes in surface runoff patterns and to develop appropriate management strategies for each potential effect.

As channels incise, they often go through a series of adjustment stages from initial downcutting, to widening, to establishing new floodplains at lower elevations (Figure 1). This process can occur over years or decades depending on the type of channel and flow regime. Sand-dominated channels may pass through the full sequence of stages in a few decades, whereas channels in more resistant materials, such as clay, may take much longer, in some cases 50–100 years (Roesner and Bledsoe 2003). Therefore, it is important to understand a channel's stage of adjustment, and target management strategies to account for current and expected future evolution of the channel form.

[1] Most studies evaluate the response of stream channels to "total impervious cover". However, a more appropriate assessment would be based on "effective impervious cover", i.e., the amount of impervious cover that is hydrologically connected to the stream channel. Assessment based on effective impervious cover is more likely to result in observed channel response at lower levels of imperviousness.

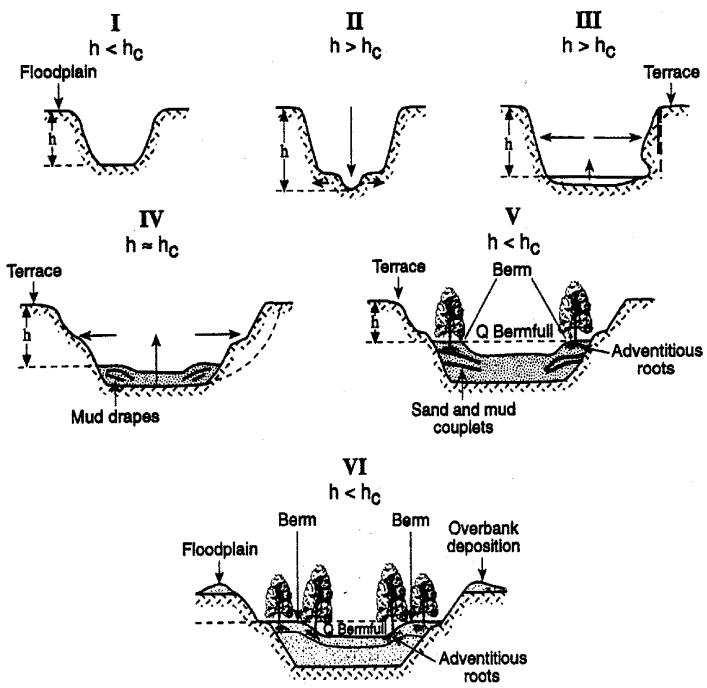

Figure 1: Stages of sand-bed channel adjustment (Schumm et al. 1984).

The pattern and rate of channel response to hydromodification will vary based on channel type and recent disturbance history (Montgomery and MacDonald 2002). Underlying geology, composition of bed and bank materials, slope, watershed position, and floodplain connectivity all affect channel response. Several stream classification systems have been developed over the years, including Shumm (1963), Montgomery and Buffington (1993), Rosgen (1994), and Church (2002). Most of these systems classify streams based on their sensitivity to change and therefore can be used to help assess, prioritize, and customize hydromodification management approaches. For example, Montgomery and Buffington (1993) define the following five channel types, listed from most to least resilient:

- Cascade
- Step pool
- Plane bed
- Pool riffle
- Dune ripple

Classification systems provide a useful starting point for evaluation of channel response to hydromodification; however, the classification systems above were developed in regions more humid and/or mountainous than those typical to California. Given differences in substrate and the extreme range of flows typically observed in arid regions, it is important to develop and regionally calibrate a classification system for dryland channels. Furthermore, the assessment of channel condition and the development of management strategies must be interpreted in terms of both spatial context (i.e. valley slope and position within the watershed) and temporal context (i.e. disturbance history) of the stream (Montgomery and MacDonald 2002). For example,

channel incision may be most dramatic in the middle portions of the watershed; however, these reaches may have stabilized, while the most active erosion and sediment production is occurring in smaller headwater channels. For these reasons, simplistic classification and assessment schemes based on channel appearance must be supported by in-depth geomorphic assessment, historical studies, and thorough understanding of physical and hydrologic processes.

Ultimately, some management strategies may vary based on the channel type, as well as the degree of current and anticipated hydromodification, while others may be more uniformly applied. For example, controlling the magnitude and duration of runoff may be an effective strategy for all stream types, while bioengineered streambank stabilization may only be effective for specific stream types under specific circumstances.

TECHNICAL APPROACHES TO ASSESSING HYDROMODIFICATION

The contemporary toolbox for assessing the effects of hydromodification consists of several technical approaches that may be combined in various ways. Continuous simulation hydrologic models can be used to assess elements in rainfall-runoff cycles and to describe conditions of flow in stream channels. These approaches can be used to assess the way changes in land cover may affect stream flow and to develop management strategies aimed at preventing or reducing such effects. A second, more involved approach, physical process modeling uses hydrologic models to predict changes in stream flow and to predict how these changes may affect the physical structure of the channel itself. This approach may couple hydraulic and sediment transport models, and/or incorporate geomorphic metrics to predict whether or not a channel will remain stable when subjected to the effects of hydromodification. Finally, risk-based assessments are used to account for the uncertainty associated with long-term cumulative effects of altered hydrology on stream channel flow, sediment transport, and stream geomorphology.

Continuous Simulation Modeling

Continuous simulation modeling provides a powerful tool for investigating the way rainfall-runoff patterns change over time with respect to normal climatic cycles and changes in land use practices. Hydrologic models integrate land use, precipitation, soils, topography, and other physical factors to simulate resultant runoff patterns. These models can be used to evaluate the way changes in the extent and distribution of impervious cover may affect flow magnitude, timing, frequency, and duration. In addition, continuous simulation models can be used to assess changes in the shear stress of channel beds and banks over time. Predicted shear stress (τ_{actual}) values can be compared to critical shear stress ($\tau_{critical}$) values associated with the onset of erosion in order to predict conditions that may result in initiation of scour. Recent studies in Ventura County have successfully used $\tau_{actual}/\tau_{critical}$ values between 1.2 - 1.5 as a threshold for initiation of channel scour along with an assessment of the frequency of occurrence of these erosive flow events (AQUA TERRA Consultants 2004). When using hydrologic models it is important to simulate runoff and erosion patterns over periods of at least 20-30 years. Short-term or single-event modeling is not sufficient to capture the continuous erosion and aggradation processes that occur during large and small storm events over extended periods of time.

Physical Process Modeling/Geomorphic Metrics

Physical process modeling aims to establish relationships between impervious cover, runoff patterns, and channel response based on field observations of changes in channel form over time. These field observations are used to derive mathematical relationships that can be used to predict channel response to changes in land use practices. Erosion Potential (E_p) is a geomorphic metric that has been used in several recent studies relevant to the effects of increased runoff associated with increases in impervious cover. The E_p represents the ratio of pre- and post-development erosive forces for a given stream type, expressed as:

$$E_p = \frac{W_{post}}{W_{pre}}$$

Where: W_{post} = Cumulative erosive energy or work after development
W_{pre} = Cumulative erosive energy or work before development

Where: Erosive energy is defined as the energy that is above the threshold of erosion for the stream boundary materials, also referred to as excess specific stream power

Values for E_p are derived for both the channel bed and bank, and the boundary that is more susceptible to erosion is used as the basis of setting response thresholds. The E_p of a stream channel should be evaluated based on long-term simulations (e.g. 50 yrs) or based on empirical data collected over extended periods of time. Geomorphic metrics can be used to project changes in channel cross-section area over time in response to increases in impervious cover, as shown in Figure 2, which describes the expected effect of increases in total impervious cover (TIMP) on channel cross-sectional area. Channel response thresholds can be inferred according to inflection points on the curve. In this plot, the upper curve is derived from southern California data; the lower curve is derived from data observed in other parts of the US. Expected threshold of response for southern California streams is approximately 4% (Coleman et al. 2005).

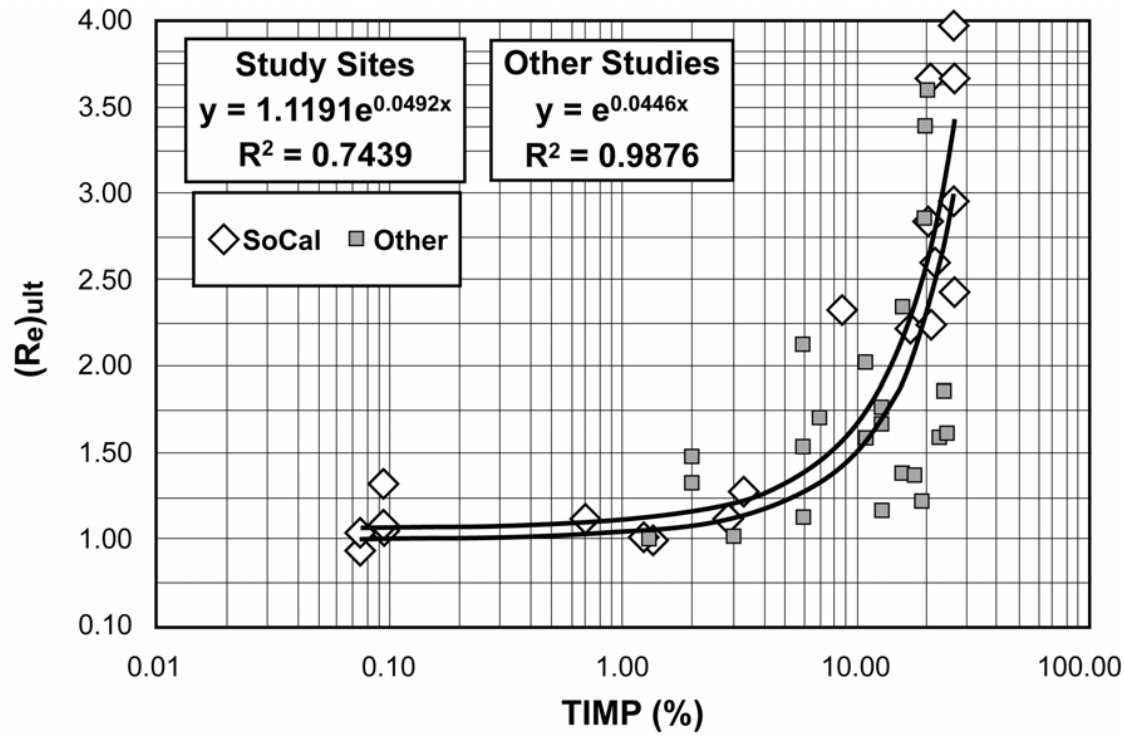

Figure 2: Enlargement curve showing expected effect of increases in total impervious cover (TIMP) on channel cross-sectional area. (Re) is the ratio of ultimate channel cross-sectional area to current cross sectional area. Upper curve is derived from data from southern California, lower curve is derived from data from other parts of the US. Expected threshold of response for southern California streams is approximately 4% (from Coleman et al. 2005 and C. MacRae).

It is important to note that curves such as those shown in Figure 2 assume a consistent hydrologic response to increased impervious cover. Long-term hydrologic simulations should be coupled with physical process models to fully explore these relationships and help validate the curves. Furthermore, different channel types respond differently to changes in runoff. Therefore, an enlargement curve, such as the one shown in Figure 2 for a single channel type, should be developed for each major channel type in a region in order to help focus the timing and location of strategic runoff management measures.

Risk-based Modeling

Unlike physical process modeling, which aims to establish response thresholds, risk-based modeling estimates the probability of channel response to increases in erosion potential associated with anticipated changes in runoff as a result of increases in impervious cover. Managers can then determine acceptable risk levels. Typically, risk-based modeling uses the output of continuous simulation or physical process models to generate time-series data relevant to flow and sediment transport. Often this type of modeling includes linear and logistic regressions, in addition to probability networks. These data are then used to estimate the risk of channel response with respect to anticipated changes in runoff volume and sediment. Figure 3 provides an example of the way logistic regression analysis can be used to estimate the likelihood of channel instability based on progressive degrees of erosion potential.

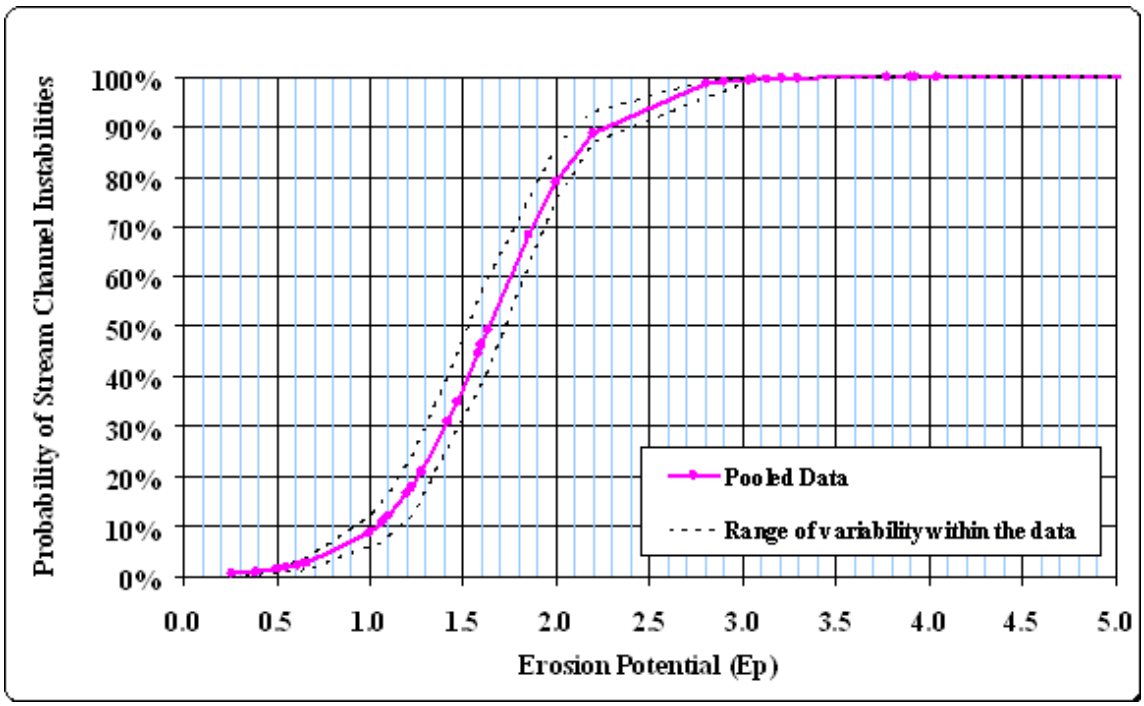

Figure 3: Logistic regression analysis showing the probability of various channel erosion potentials (from B. Bledsoe).

For studies conducted in the San Francisco Bay Area, an E_p value of 1.2 was proposed as an acceptable threshold based on a 15% probability of channel instability[2]. This was typically associated with approximately 3 - 6% impervious cover for channels in sand substrates and 10-12% for channels in clay substrates.

[2] The negotiated Ep value of 1.0 was adopted for the final Hydromodification Management Plan for Santa Clara Valley and included in a permit amendment for agencies in that area.

PRIORITY TECHNICAL NEEDS AND INFORMATION GAPS

Workshop participants identified five priority areas for additional research and data collection:

- Regional reference conditions for various stream channel types
- Links between geomorphic change and biologic effects
- Dynamic simulation models calibrated for local conditions
- Potential consequences of increased storm water infiltration from urbanized areas
- Ongoing monitoring programs to assess hydromodification impacts and to develop effective management strategies

Regional reference conditions for various stream channel types need to be established

Because most areas in the western US have been subjected to historic grazing or logging, many channels in this region have undergone some degree of change over time. Furthermore, the dynamic nature of this region's fluvial systems means that these streams are constantly undergoing some degree of change. Understanding the historic conditions of stream channels can provide valuable insight; however, historic conditions may not be the most appropriate "reference" in light of current constraints. Rather, reference should be considered a condition where stream channels are in a state of dynamic equilibrium under contemporary natural watershed processes. Once a regional reference condition is defined, data on flow, sediment movement, and geomorphology should be collected on an ongoing basis from representative reference stream reaches. These data will facilitate modeling that more effectively differentiates natural cycles from human-induced changes, especially during long wet or dry cycles where changes may be dramatic but infrequent.

Links between geomorphic change and biologic effects need to be more clearly defined

Hydromodification can cause a variety of physical changes to streams. However, hydrologic changes that are most relevant to biologic communities have not been well defined. For example, it is unclear how changes in base flow duration; peak flow magnitude, duration, and timing; or flow variability affect the structure and function of stream communities. Ultimately, there is a need to develop biologic indices to assess the effects of hydromodification and more effectively direct management strategies.

Dynamic simulation models need to be developed and calibrated for local conditions

Although continuous hydrologic simulation and physical process models have been developed for California streams, these models have not been routinely linked to the assessment of stream channel response to various forms of hydromodification. Hydrologic, physical process, and risk-based models are much more effective when used in combination and appropriately calibrated and validated for California streams. The resultant tool(s) can greatly improve assessments that predict the likelihood of stream channel response to anticipated changes in hydrology associated with changes in land use patterns. Model output may also be useful in the development of objective criteria for establishing land use practices that minimize

hydromodification effects, designing tools for best management practices (BMP) design, and evaluating the performance of management measures.

Potential consequences of increased storm water infiltration from urbanized areas need to be investigated

Infiltration of substantial volumes of storm water runoff from developed land surfaces may introduce unacceptable levels of contaminants into groundwater and/or shallow aquifers. The risk of groundwater contamination and the fate of pollutants introduced into subsurface waters need to be investigated by increased monitoring, development of coupled surface water-groundwater models, and implementation of demonstration projects.

Ongoing monitoring programs to assess hydromodification impacts and develop effective management strategies need to be designed and implemented

First, more extensive flow monitoring needs to be instituted to compensate for the difficulty of calibrating hydrologic models for un-gauged headwater streams. Second, regular geomorphic data needs to be collected from reference streams as well as streams subject to the effects of hydromodification. Routine measurement of channel cross-sections and substrate will greatly improve understanding of channel adjustment processes and allow better discrimination between natural and anthropogenic changes. Third, streams subject to various hydromodification management strategies need to be monitored and documented to support adaptive management and education on emerging techniques and strategies.

REGULATORY AND MANAGEMENT STRATEGIES

Regulatory Approaches to Address Potential Effects of Hydromodification

A variety of regulatory programs and tools exist to help in the regulation of hydromodification effects, including:

- Clean Water Act Section 401 certifications
- Total Maximum Daily Loads (TMDLs)
- Municipal storm water (MS4) permits under Section 402 of the Clean Water Act, and the associated Standard Urban Storm Water Mitigation Program (SUSMP) requirements
- Watershed Urban Runoff Management Plans (WURMPs) and the Watershed Management Initiative (WMI) which encourage municipalities to work cooperatively to manage issues such as hydromodification

In addition, California Environmental Quality Act/National Environmental Policy Act (CEQA/NEPA) processes can be used to better address hydromodification issues, especially with regard to cumulative effects.

Looking to the future, Regional Water Boards in California are considering development of numeric criteria and objectives for new development and redevelopment projects to offset and/or mitigate hydromodification effects. These objectives may involve requirements for managing flow and/or reducing effective impervious cover as well as strategies to maximize infiltration and reuse of storm water. Some Regional Boards are also considering ways to better coordinate with other regulatory agencies that have authority over hydromodification and stream alteration. Similarly, some State and Regional Water Boards are evaluating their existing regulatory authority over hydromodification and considering ways to strengthen their authority, particularly under section 401 of the Clean Water Act, or as part of
Basin Plans.

Management Approaches to Address the Effects of Hydromodification

Hydromodification is best addressed by using a suite of strategies, including site-design, restoration of degraded stream systems, as well as in-stream, on-site control, and regional controls. Managers need to identify the most appropriate set of strategies based on channel type and setting, channel adjustment stage, and amount of existing and anticipated impervious cover in the drainage catchment. However, attempting to have the post-development condition match pre-development runoff magnitude and duration should be an initial consideration for all circumstances.

Management strategies should address not only changes in peak flows but also changes in flow duration and sediment yield. Research to support development of several recent Hydromodification Management Plans indicates that post-project BMPs should ensure no change in runoff volume and cumulative duration of all flows greater than the critical flow for bed or bank mobility. Case studies of three Hydromodification Management Plans/Strategies are provided in Appendix B.

Over the long term, land-use planning, runoff management, as well as channel and floodplain restoration, should be the cornerstones of any hydromodification management strategy. The planning cycle for new development or re-development projects should begin with

hydromodification management assessment as part of the preparation of General and Specific Plans, master drainage plans, and zoning designations. Hydromodification effects must be managed with respect to long-term cycles; therefore, strategies should be adaptive. As conditions change and stream channels evolve, the management approaches must be adjusted. However, it is important to recognize that because changes to watershed hydrology are continual; it is unlikely that any management strategy will be able to achieve full hydrologic mitigation. Over the long term, some lasting physical and biological effects should be expected. Management goals should realistically reflect these anticipated changes.

The Center for Watershed Protection, the National Association of Homebuilders, the Water Environment Research Foundation, the Bay Area Stormwater Management Agencies Association, and others have developed resources that land managers can use to guide improved site design. A list of some of these resources is provided in Appendix C.

PRIORITY MANAGEMENT NEEDS

In response to rapidly developing technical tools, regulations, and management goals, workshop participants identified the following management and information priorities:

1. Establish mapping and classification of streams based on their susceptibility to hydromodification effects. Susceptibility should be evaluated with respect to both stream properties, potential for future increases in impervious cover, and concomitant changes in land use practices, such as supplemental irrigation. Such a system would help managers prioritize streams requiring protection and hydromodification management.
2. Model stream systems in ways that are useful for regulators to make decisions. Once models are validated with local data, output should be:
   - Readily understandable and usable by planners and managers
   - Easily interpreted by regulators for development of consistent requirements and evaluation criteria for the specific region
   - Readily used to develop standardized flow control sizing and design tools for BMPs, where applicable
3. Develop a series of management tools that can be easily used to make recommendations or set requirements relative to hydromodification for new development and re-development projects. These tools would utilize the results of monitoring, modeling, and assessment completed under previous projects to develop a series of plots, nomographs, checklists, or similar managerial tools. It is envisioned that ideally, tools should be developed for three different levels of analysis:

   Screening tools – Checklists or similar tools that allow planners and managers to evaluate whether or not a project is likely to involve substantial hydromodification issues.

   Effects tools – For projects that are considered likely to have hydromodification effects based on the results of the screening tool, this tool would serve as a nomograph or series of plots used to evaluate the expected magnitude or intensity of effects associated with a particular project. This tool could also be used to identify projects that should be subjected to subsequent in-depth analysis.

   Mitigation tools – Once the expected magnitude of effects are determined, this tool would be used to guide recommended mitigation and management measures. This tool could be a series of fact sheets, design criteria, and sizing standards to be used to aid in the development of standards or mitigation requirements.
4. Construct metrics and monitoring protocols to measure the effects of hydromodification on biological communities including riparian habitat.
5. Determine standard monitoring protocols for hydromodification effects and facilitate regional information sharing on project performance.
6. Evaluate the relative costs and benefits of hydromodification management at the site level (e.g. low impact development), and at the regional level (e.g. large retention and infiltration facilities). The economic costs of hydromodification have not been well documented, nor have the economic benefits of managing the physical and biological

effects of hydromodification. Information is also needed on the cost to maintain and manage hydromodification BMPs.

7. Establish recommended short-term measures for use while longer-term solutions, such as low-impact development and alternative site design are evolving.

In addition to management and information priorities, several institutional barriers were identified that may hinder effective management of hydromodification effects. Steps to overcome such barriers include:

A. Hydromodification management needs to be part of an integrated multi-objective management strategy. Stream planning and management should integrate hydromodification, water quality, flood control, and habitat management strategies as a whole rather than addressing each issue in isolation. Increased coordination between agencies, departments, and stakeholders should be strongly supported. Specifically, agencies that have authority over hydromodification and stream alteration should work toward coordinating regulatory approaches to achieve greater consistency.

B. Local ordinances need to be revised to facilitate integrating water quality and water quantity management into project design. These ordinances should be flexible enough to allow for variances from standard design requirements, such as curb and gutter and street width parameters, to help reduce impervious cover and increase infiltration.

C. Hydromodification needs to be addressed in both General and Specific Plans in terms of the location and design of new development. Site-by-site or project-specific approaches tend to be less effective and more costly to implement.

D. Better linkage between theory and practice need to be established through case studies, academic research, demonstration projects, and long-term BMPs monitoring.

E. Management of hydromodification needs to be incorporated into regional resource planning efforts, such as the Corps of Engineers Special Area Management Plans (SAMPs) or US Fish and Wildlife Service's Multi-species Habitat Conservation Plans. These regional planning efforts may be effective tools to address cumulative effects of hydromodification at the watershed scale.

F. A more effective public communication and education strategy needs to be developed. Property owners, local businesses, and community groups need to be better educated about the causes and effects of hydromodification in the context of the watersheds where they live and work. Simple definitions of streams and watersheds should be provided as part of the education strategy. Hydromodification effects need to be linked to health, aesthetic, recreational, and economic endpoints. Citizens should be made aware of simple actions, such as redirecting downspouts, using xeriscaping, and installing planter boxes, that help reduce hydromodification effects.

G. An ongoing working group should be established to coordinate research, monitoring, technology transfer, education, and management approach evaluation that includes all stakeholder groups.

CONCLUSIONS AND RECOMMENDATIONS

Presentations and discussions during the two-day hydromodification workshop resulted in the following key conclusions and recommendations:

Conclusions

- Physical degradation of stream channels in semi-arid climates of California may be detectable when basin impervious cover is between 3% and 5%. However, biological effects are probably occurring at lower levels.
- Frequent, 0.5-5 years, small runoff events, are most affected by hydromodification.
- Not all streams will respond in the same manner. Certain management strategies need to account for differences in stream type, stage of channel adjustment, current and expected amount of basin impervious cover, and existing or planned BMPs.
- Management strategies should address effects on flow magnitude, duration, and volume.
- Assessment of potential effects and suitability of possible management approaches must account for decadal scale climatic cycles and associated stream channel response.
- Improved site design is likely to be the most effective hydromodification management strategy and should be incorporated at the planning stage of a project.
- It is unlikely that all the effects of hydromodification can be fully mitigated. Changes in impervious cover will result in some changes to the flow patterns and ecology of the affected stream. Realistic management goals should be established to acknowledge long-term effects of increased impervious cover.

Recommendations

- Integrate management of hydromodification into a multi-objective strategy that addresses hydrology, water quality, flood control, stream ecology, and overall watershed and land use planning.
- Institute interim management measures until runoff management becomes a more standard and accepted element of site design, for example, low impact development principles become commonly accepted and implemented in all site designs.
- Establish and implement a stream channel classification system based on expected vulnerability of different streams to hydromodification-induced change.
- Establish appropriate regional reference conditions should for each stream type based on the established classification system.
- Develop and calibrate dynamic simulation models for local streams. Models that combine continuous hydrologic simulations, physical process models, and risk-based modeling will be the most effective.
- Establish ongoing regional hydromodification monitoring programs. These programs should collect flow and geomorphic data from reference streams, unmitigated streams impacted by hydromodification, and streams subject to hydromodification management measures. Helping to separate natural variability from urban-induced changes in stream condition should be a primary goal of such ongoing monitoring programs.
- Develop indices to assess the biological effects of hydromodification.

- Develop protocols for measuring the economic costs and benefits of hydromodification management. Assemble case studies that document these economic costs and benefits.
- Initiate a hydromodification workgroup to facilitate exchange of ideas and information on technical and managerial approaches.
- Increase public education about what can be done at homes, businesses, and in the community to address hydromodification effects.

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APPENDIX A – WORKSHOP AGENDA

HYDROMODIFICATION WORKSHOP AGENDA – October 2-3, 2005

SUNDAY EVENING, INVITED SESSION

5:00- 5:15 **Welcome and Introductions** – Eric Stein (Chair), *Southern California Coastal Water Research Project*

5:15 – 5:30 **Regulatory Perspective** – John Robertus, *San Diego Regional Water Quality Control Board*

5:30 – 6:30 ***Status of Science on Evaluating/Studying Hydromodification*** (panel discussion)

- Jeff Haltiner, *Philip Williams and Associates*
- Gary Palhegyi, *Geosytec Consultants*
- Craig MacCrae, *Aquafor Beech*
- Brian Bledsoe, *Colorado State University*
- Derek Booth, *University of Washington*

7:30 – 8:30 **Dinner and Open Discussion of Data Gaps and Areas for Future Research**

MONDAY, OPEN SESSION

8:30 – 8:40 **Welcome and Opening Remarks** – Chris Crompton (Chair), *SMC*

8:40 – 9:15 **Introduction to Hydromodification** – Jeff Haltiner, *Philip Williams and Associates*

9:15 – 10:15 ***Why is Hydromodification Such a Big Deal?*** (mini-panel discussion)

- Policy Perspective – Susan Cloke, *Los Angeles Regional Water Quality Control Board*
- Regulatory Perspective – John Robertus, *San Diego Regional Water Quality Control Board*
- Homebuilders Perspective – Marolyn Parson, *National Association of Home Builders*
- Natural Resource Perspective – Shelley Luce, *Santa Monica Bay Restoration Commission*

10:15 – 10:30 **Break ~**

10:30 – 12:30 **Hydromodification Research and Studies**

- Risk-Based Channel Stability Analysis for Urbanizing Watersheds – Brian Bledsoe, *Colorado State University*
- Changes in Streamflow Patterns from Urbanization: A Humid-Region Perspective – Derek Booth, *University of Washington*
- Modeling Urbanization Impacts and Channel Stability in Ventura County – Tony Donigian, *AQUA TERRA Consultants*
- Southern California Peak Flow study results and conclusions – Craig MacRae, *Aquafor Beech*
- Santa Clara Valley HMP Studies- Gary Palhegyi, *GeoSyntec Consultants*

12:30 – 1:30 **Lunch ~**

1:30 – 2:15 **Regulatory Response to Hydromodification**

- Northern California Perspectives – Larry Kolb, *San Francisco Bay Regional Water Quality Control Board*
- Southern California Perspectives – Xavier Swamikannu, *Los Angeles Regional Water Quality Control Board*

2:15 – 3:30 **Implementation of Hydromodification Management Practices**

- Contra Costa County – Dan Cloak, *Dan Cloak Consulting (for Contra Costa County)*
- Santa Clara Valley – Jill Bicknell, *Santa Clara Valley Urban Runoff Program*
- Newhall Land and Farming– Mark Subbotin, *Newhall Land and Farming Company*
- Control of Hydromodification Through Land Planning – Laura Coley-Eisenberg, *Rancho Mission Viejo*

3:30 – 4:30 **Panel Discussion on Implementation Issues** – Facilitated by Matt Yeager, *San Bernardino County Flood Control District*

- Rene DeShazo, *Los Angeles Regional Water Quality Control Board*
- Mark Abramson, *Heal the Bay*
- Marolyn Parson, *National Association of Home Builders*
- Jeff Haltiner, *Philip Williams and Associates*
- Jill Bicknell, *Santa Clara Valley Urban Runoff Program*

MONDAY EVENING, INVITED SESSION

5:30 – 6:00 **Welcome & Summary of Open Session** – Matt Yeager, *San Bernardino County Flood Control District*

6:00 – 7:00 **Dinner ~**

7:00 – 8:00 **Key Needs of Managers for Addressing Hydromodification** (panel discussion)

- Jeff Pratt, *Ventura County Watershed Protection District*
- Bill DePoto, *Los Angeles County Dept. of Public Works*
- Aaron Allen, *US Army Corps of Engineers - Regulatory Branch*
- Laura Coley-Eisenberg, *Rancho Mission Viejo*
- Jon Bishop, *Los Angeles Regional Water Quality Control Board*
- Rebecca Drayse, *TreePeople*

8:00 – 8:30 **General Conclusions and Outline for Workshop Report**

APPENDIX B – CASE STUDIES

Case Study 1 – Contra Costa County

Contra Costa County's Hydromodification Management Plan was developed in response to the National Pollutant Discharge Elimination System (NPDES) permit requirements from the San Francisco Bay Regional Water Quality Control Board. The goal of this Hydro-modification Management Plan (HMP) is to protect urban watersheds from ongoing hydro-modification by applying these requirements to development projects that are greater than or equal to 1 acre. They assist applicants to comply by providing designs and sizing factors. Permit conditions require municipalities to propose a plan to manage increases in flow and volume where increases could:

- Increase erosion
- Generate silt pollution
- Impact beneficial uses

The goal of these plans is to ensure that post-project runoff does not exceed pre-project rates and durations. Contra Costa's plan encourages Low Impact Development Integrated Management Practices (LID IMPs) and allows proposals for stream restoration in lieu of flow control where benefits clearly outweigh potential impacts. The plan includes four options for compliance:

1. Demonstrate project will not increase directly connected impervious area
2. Implement pre-designed hydrograph modification IMPs
3. Use a continuous simulation model to compare post- to pre-project flows
4. Demonstrate increased flows will not accelerate stream erosion

Management approaches are selected according to risk:

- Low risk = channelized systems
- Medium risk = channels in substrates with high bed and bank resistance
- High risk = all other channels

Project proponents need to develop a comprehensive analysis of management options for all high risk channels.

Case Study 2 – Santa Clara Valley

The Santa Clara Valley Urban Runoff Pollution Prevention Program's (SCVURPPP's) NPDES permit requires that increases in runoff peak flow, volume, and duration shall be managed for all projects involving one or more acres of impervious cover, where increased flow and/or volume can cause increased erosion of creek beds and banks. SCVURPPP's overall approach to creating a HMP was to conduct geomorphic and hydrologic assessments of three representative watersheds in the valley, conduct channel stability analyses to establish thresholds

for hydromodification control, develop design criteria for flow control measures, and provide guidance for best management practice implementation[3].

The performance criteria in the HMP state that post-project runoff shall not exceed estimated pre-project rates and/or durations, where the increased storm water discharge rates and/or durations will result in increased potential for erosion. Projects shall not cause an increase in Ep of the receiving stream over the pre-project (existing) condition. Furthermore, the Ep value should not be increased at any point downstream of the project. These requirements can be met with a combination of on-site and off-site control measures.

On-site controls should be designed to match flow-duration curves of post-development conditions to pre-development conditions for all flows between 10% of the 2-year peak flow and the 10-year peak flow. Example sizing of flow-duration basins are shown in Table B-1. Management measures are considered "practicable" if construction cost of treatment plus flow controls is less than or equal to 2% of project cost, excluding land value.

Table B-1: Basin Sizing Case Studies from the Santa Clara Valley Urban Runoff Program Hydromodification Management Plan (SCVURPPP Final HMP Report, 2005).

	Thompson	San Jose	Alameda
Basin Depth	4 feet	2.25 feet	2 feet
Basin Area	30 acres	0.06 acre	0.8 acre
Basin Size % DCIA	5.7% (4% catchment)	3.7% (1.7% catchment)	10% (7% catchment)
Drain Time	3 days (90% of the time)	< 1 day	1 day
Q_{cp} (low flow)	2.4 cfs	0.1 cfs	0.25 cfs
Infiltration Rate (rainfall)	0.2 inch/hour	0.2 inch/hour	0.5 inch/hour
Infiltration Rate (flow)	5.5 cfs	0.012 cfs	--

*cfs = cubic feet per second

This hydromodification management plan lays out on-site and in-stream options. Projects in highly urbanized areas with more than 90 % build out and a large percentage of impervious cover are exempt. Additional information on this program is available at www.SCVURPPP.org.

Case Study 3 – Newhall Land

Newhall Ranch is a specific plan approved for 26,000 homes in the Santa Clara watershed. Runoff from the proposed new development will be addressed by a Natural River Management Plan and a Newhall Ranch Stormwater Plan developed by the land owner.

[3] The Final HMP Report (April 2005) is available at http://www.eoainc.com/hmp_final_draft

The Natural River Management Plan is a long-term (20-year) master plan that provides for the construction of various infrastructure improvements to the Santa Clara River and tributaries. The plan maintains 15 miles of the Santa Clara River and its tributaries in a natural state with 75- to 200-foot setbacks from the river that sustains habitat quality and meets requirements for flood control. The plan calls for buried bank stabilization, instead of hardened systems, to meet county flood protection requirements and maintain habitat functions in riparian areas. Trenches have been dug far up from the streambed, filled with a compound called "sand cement" – similar to sandstone, then topped with soil, and replanted with native plant species.

The Newhall Ranch Stormwater Plan is a regional approach to storm water management that incorporates both water quality treatment and hydromodification control. The goals of this plan include:

- Reduction in percentage of impervious cover in the upper watershed using cluster design of development and maximizing open space
- Utilization of BMPs for both water quality and hydromodification source control
- Design of in-stream solutions that protect or enhance habitat.
- Incorporation of the "avoidance, minimization, mitigation" hierarchy in plan development

Case Study 4 – Rancho Mission Viejo

Rancho Mission Viejo, a private landowner, has voluntarily developed a set of land planning principles as part of a comprehensive land-use planning and resource management program for 25,000 acres in Orange County California. These planning principles will serve as self-imposed requirements, intended to minimize the effects of future development on natural streams in planning areas. Using these principles, the landowners are proposing to focus development on ridges, which are underlain by less pervious material, thereby preserving valleys which contain pervious areas that support infiltration important to creek functions.

Planning Principles:

Geomorphology/Terrains

- Recognize and account for the hydrologic response of different terrains at the sub-basin and watershed scale

Hydrology

- Emulate, to the extent feasible, the existing runoff and infiltration patterns in consideration of specific terrains, soil types, and ground cover
- Address potential effects of future land use changes on hydrology
- Minimize alterations of the timing of peak flows of each sub-basin relative to the mainstem creeks
- Maintain and/or restore the inherent geomorphic structure of major tributaries and their floodplains

Sediment Sources, Storage, and Transport

- Maintain coarse sediment yields, storage and transport processes

Groundwater Hydrology

- Utilize infiltration properties of sandy terrains for groundwater recharge and to offset potential increases in surface runoff and adverse effects to water quality
- Protect existing groundwater recharge areas supporting slope wetlands and riparian zones and maximize alluvial groundwater recharge to the extent consistent with aquifer capacity and habitat management goals

Water Quality

- Protect water quality using a variety of strategies, with particular emphasis on natural treatment systems, water quality wetlands, swales, and infiltration areas

APPENDIX C – ADDITIONAL RESOURCES

BASMAA's Start at the Source: Design Guidance Manual for Stormwater Quality Protection, 1999. Prepared by Tom Richman & Associates and CDM. Available from www.basmaa.org .

BASMAA's Using Site Design Techniques to Meet Development Standards for Stormwater Quality: A Companion Document to Start at the Source, 2003. Prepared by CDM. Available from www.basmaa.org

Better Site Design: A Handbook for Changing Development Rules in Your Community
Available for $35.00 from the Center for Watershed Protection at www.cwp.org, under the "Publications" tab.

Redevelopment Roundtable, Consensus Agreement, Smart Practices for Redevelopment and Infill Projects.
Available for free download from the Center for Watershed Protection at www.cwp.org, under the "Publications" tab; it is listed with the "Better Site Design" publications.

Builders for the Bay Program
Information about this program, which is joint project of the Alliance for the Chesapeake Bay, the Center for Watershed Protection and the National Association of Home Builders, can be found at http://www.cwp.org/builders_for_bay.htm.

The Practice of Low Impact Development
Available for $5.00 from the U.S. Department of Housing and Urban Development, at http://www.huduser.org/publications/alpha/alpha.html. It is also available for $50.00 from the NAHB Research Center's bookstore at www.nahbrc.org.

National Association of Homebuilders Research Center
"Builder's Guide to Low Impact Development" and "Municipal Guide to Low Impact Development". Available for free download from
http://www.toolbase.org/tertiaryT.asp?TrackID=&CategoryID=36&DocumentID=3834

"Growing Greener: Putting Conservation into Local Codes". Available for free download from http://www.dcnr.state.pa.us/growinggreener/growinggreener.htm.

Low-Impact Development Design Strategies: An Integrated Approach; Low-Impact Development Hydrologic Analysis
Both are available for free download from US Environmental Protection Agency's website at http://www.epa.gov/owow/nps/lid/.

Truckee Meadows Structural Control Design Manual: Guidance on Source and Treatment Controls for Storm Water Quality Management - Kennedy/Jenks Consultants
http://ci.reno.nv.us/gov/pub_works/stormwater/management/controls/pdfs/TOC.pdf

National NEMO (Non Point Education for Municipal Officials) Network - Educational Materials on the link between land use and water quality
http://nemonet.uconn.edu/

Physical Effects of Wet Weather Flows on Aquatic Habitats: Present Knowledge and Research Needs , by L.A. Roesner and B.P. Bledsoe – Water Environment Research Foundation, 2003.
http://www.werf.org

Impacts of Impervious Cover on Aquatic Systems – Center for Watershed Protection, 2003.
http://www.cwp.org/

Santa Clara Valley
Urban Runoff
Pollution Prevention Program

HYDROMODIFICATION MANAGEMENT PLAN REPORT

Revised Public Review Draft

November 2004

Milpitas
Palo Alto
Cupertino
Los Altos
San Jose
Sunnyvale
Santa Clara
Los Altos Hills
Mountain View
Santa Clara County
Santa Clara Valley Water District
West Valley Communities – Campbell, Los Gatos, Monte Sereno, Saratoga

Santa Clara Valley
Urban Runoff
Pollution Prevention Program

Campbell • Cupertino • Los Altos • Los Altos Hills • Los Gatos • Milpitas • Monte Sereno • Mountain View • Palo Alto
San Jose • Santa Clara • Saratoga • Sunnyvale • Santa Clara County • Santa Clara Valley Water District

November 4, 2004

Subject: Release of the SCVURPPP Hydromodification Management Plan (HMP) Report (Revised for Further Public Review – November 2004)

To Interested Parties:

The Santa Clara Valley Urban Runoff Pollution Prevention Program announces the release of its HMP Report (revised as of October 2004) for further public review. The revised Report is available for download on the SCVURPPP website: www.scvurppp.org.

The first public review of the HMP Report was initiated on July 9, 2004. During July and August, four public meetings were held to present the report and solicit comments. The SCVURPPP HMP Report has now been revised to address the comments received during the public comment period, as well as comments from an expert panel providing peer review.

The release of the revised HMP Report for further public review is intended to allow the SCVURPPP agencies to continue to improve the HMP based on additional feedback from interested persons (particularly as to the revisions) and to obtain city council review and approval (as may be necessary in certain jurisdictions) prior to submission for consideration by the Regional Water Quality Control Board. It is also intended to allow SCVURPPP to continue to derive additional lessons and refinements from its implementation program and to coordinate with other Bay Area municipal stormwater programs as they complete their draft HMP reports so as to promote the Regional Water Quality Control Board's unified approval of a consistent approach for Final HMPs throughout the Bay Area.

If you have any questions regarding the report or would like to submit additional comments, please contact Jill Bicknell at jcbicknell@eoainc.com.

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At their July 6, 2004 meeting, the SCVURPPP Management Committee (MC) authorized the Program Manager to release the HMP Draft document for public review. During July and August 2004, a series of public meetings was held to present the document and solicit comments, and a peer review conducted. This revised draft report contains responses to the comments received. The MC approved release of the revised draft HMP report for further public review on October 21, 2004.

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The Program also recognizes the HMP Expert Panel: Professor Brian Bledsoe, Colorado State University; Professor Tom Dunne, UC Santa Barbara; and Professor Matt Kondolf, UC Berkeley who reviewed and provided input on several key documents during the HMP development process through September 2004. The Expert Panel's review included this document, and their input has been incorporated into the Final Report.

EOA, Inc., as the Program management consultant, coordinated and compiled the information and was responsible for the overall preparation of this document.

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The HMP Report and Appendices can be viewed on the SCVURPPP website: www.scvurppp.org

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Appendix I Chapters 3, 4, 5, and 9 from "Draft Hydromodification Report," Prepared for Santa Clara Valley Water District, June 2004

ACRONYMS AND ABBREVIATIONS

ASCE	American Society of Civil Engineers
BASMAA	Bay Area Stormwater Management Agencies Association
BMPs	Best Management Practices
CA	California
CalTrans	California Department of Transportation
CASQA	California of Stormwater Quality Association
cfs	Cubic Feet per Second
CWA	Clean Water Act
Ep	Erosion Potential
EPA	United States Environmental Protection Agency
GIS	Geographic Information System
HEC HMS	Hydrologic Engineering Center Hydrologic Modeling System
HMP	Hydromodification Management Plan
MHHW	Mean Higher High Water
NPDES	National Pollutant Discharge Elimination System
Qc	Critical Flow
RWQCB	Regional Water Quality Control Board
SCVURPPP	Santa Clara Valley Urban Runoff Pollution Prevention Program
SCVWD	Santa Clara Valley Water District
TM	Technical Memorandum
WMI	Santa Clara Basin Watershed Management Initiative

1. INTRODUCTION

1.1 PROBLEM STATEMENT

Urbanization is defined as the transformation of land into residential, commercial, and industrial properties, and associated drainages, roads, sewers and other community planned infrastructure. Urbanization modifies natural watershed and stream processes by altering the terrain, modifying the vegetation and soil characteristics, introducing pavement and buildings, installing drainage and flood control infrastructure, and altering the condition of stream channels through straightening, deepening, and armoring. These changes affect hydrologic characteristics in the watershed (rainfall interception, infiltration, runoff and stream flows), and affect the supply and transport of sediment in the stream system. The change in runoff characteristics from a watershed caused by changes in land use conditions (i.e. urbanization) is defined as hydromodification.

As the total area of impervious surfaces increases in previously undeveloped areas, infiltration of rainfall decreases, causing more water to run off the surface as overland flow at a faster rate. Storms that previously didn't produce runoff under rural conditions can produce erosive flows. The increase in the volume of runoff and the length of time that erosive flows occur ultimately intensify sediment transport, causing changes in sediment transport characteristics and the hydraulic geometry (width, depth, slope) of channels.

The larger runoff durations and volumes and the intensified erosion of streams impair the beneficial uses of the stream channels. These types of changes have been documented in the Bay Area on Wildcat Creek, San Antonio Creek, Novato Creek, San Pedro Creek, and others.[1]

The Regional Water Quality Control Board (RWQCB), San Francisco Bay Region, as part of the Bay Area National Pollutant Discharge Elimination System (NPDES) stormwater permits, is requiring stormwater programs to develop and implement hydromodification management plans

[1] GeoSyntec Consultants, Inc., *Hydromodification Management Plan Literature Review*, 2002. (Appendix B)

(HMPs) and to implement associated management measures. Many factors and processes interact to influence hydromodification; however this document focuses on the changes in the volume, magnitude, and duration of runoff resulting from the increases in impervious surfaces and drainage networks associated with urbanization.

1.2 PERMIT REQUIREMENTS

The first Bay Area permit to include the new requirements was that of the Santa Clara Valley Urban Runoff Pollution Prevention Program (SCVURPPP or Program). SCVURPPP is comprised of the thirteen cities of Santa Clara Valley, Santa Clara County, and the Santa Clara Valley Water District (SCVWD), all of which are Co-permittees, also referred to as Dischargers. The RWQCB's Order 01-119 (October 2001) amended Provision C.3 of SCVURPPP's reissued NPDES permit (Order 01-024, February 2001) to incorporate specific new development and redevelopment requirements, including the HMP requirements. The requirements apply to development projects that exceed certain thresholds of impervious surface area.

Provision C.3.f of the NPDES permit, *Limitation on Increase of Peak Stormwater Runoff Discharge Rates*, (in Attachment 1-1), describes the HMP requirements. Under Provision C.3.f, the Co-permittees are required to develop an HMP to describe how they plan to manage increases in the magnitude, volume, and duration of runoff from "Group 1"[2] new development and significant redevelopment projects in order to protect streams from increased potential for erosion or other adverse impacts.

In implementing the HMP, runoff controls[3] must be designed so that post-project runoff shall not exceed estimated pre-project rates, durations, and volumes from the development site (Provision C.3.f.i). Runoff controls are not required for projects that discharge stormwater runoff where the potential for erosion, or other impacts to beneficial uses, is minimal. Such situations may include: discharges into creeks that are concrete-lined or significantly hardened (e.g., with rip-rap, sack concrete, etc.) downstream to their outfall in San Francisco Bay; underground storm drains discharging to the Bay; and construction of infill projects in highly developed watersheds, where the potential for single-project and/or cumulative impacts is minimal (Provision C.3.f.ii).

Provisions C.3.f.vi.5 and C.3.f.vii of the permit allow hydromodification impacts to be addressed by using strategies other than on-site runoff controls, or in combination with on-site controls. These strategies may allow increases in flow rates, durations, and volumes from a development site, subject to the implementation of specified best management practices (BMPs) and land use planning practices that will accommodate expected stream changes without harming beneficial uses (e.g., increases in the cross-sectional area of a stream channel). BMPs may also be regional projects that mitigate the impacts of more than one new development or redevelopment project.

The translation of these requirements into HMP standards and performance criteria is presented in Chapter 5.

[2] Group 1 projects are public and private projects that create one (1) acre (43,560 square feet) or more of impervious surface over the entire project site, including roof area, streets and sidewalks. See full definition in Attachment 1-1.
[3] This document uses the term runoff controls or flow controls to refer to Best Management Practices (BMPs) that reduce impacts of runoff volume, rate, and duration. Runoff controls that remove pollutants from stormwater will be referred to as treatment controls.

1.3 GOALS AND OBJECTIVES

The goal of the SCVURPPP Hydromodification Management Plan is to protect the physical, chemical, and biological functions of stream systems in urbanizing areas. In order to meet this goal and the NPDES Permit requirements, the following project objectives have been defined:

1. Develop a watershed-based approach to address the impacts of hydromodification on the beneficial uses of streams.
2. Develop, test, and apply an assessment method to evaluate potential hydrograph changes and impacts to stream channels from proposed projects, and identify where such changes can cause increased erosion of creek beds and banks, silt pollutant generation, or other impacts to beneficial uses.
3. Develop design criteria, control measures, and guidance on management strategies to address hydromodification and identified impacts.
4. Develop guidance for Co-permittees to manage the impacts of hydromodification on streams through the implementation of an HMP.
5. Develop an approach for measuring the effectiveness of the runoff controls and management strategies, and continuously improving the HMP as needed.

These objectives form the basis of the SCVURPPP HMP Work Plan, described in Chapter 2.

1.4 ORGANIZATION AND CONTENTS OF THE HMP REPORT

This report is organized into the following six chapters.

Chapter 1: Introduction

This chapter begins with the problem statement for the project including a discussion of the effects of development or urbanization on streams, the definition of hydromodification, the regulatory requirements for the HMP, and the goals and objectives of the HMP.

Chapter 2: Previous Submittals and Activities

This report is developed on a foundation of previously completed tasks. The activities and work products from these tasks are summarized in this chapter. These tasks produced a work plan, goals and objectives, a literature review, a conceptual model, an assessment method, and the application of the assessment method to three test watersheds. The activities included providing opportunities for public involvement and review of work products by a panel of experts in the field.

Chapter 3: Stream Assessment

This chapter provides a discussion of the assessment method and summarizes the application of the assessment method to the Thompson Creek, Ross Creek, and San Tomas Creek subwatersheds. The chapter describes the geomorphic assessments (field measurements and observations), hydrologic/hydraulic modeling, and stability analyses conducted for the subwatersheds and compares the results.

Chapter 4: Technical Analyses of Hydromodification Controls

This chapter presents a summary of the technical analyses performed to evaluate methods of hydromodification control, which provide the basis for the hydromodification control standards and performance criteria in Chapter 5.

Chapter 5: Proposed Hydromodification Control Standard and Performance Criteria

Hydromodification control standards will be used by local agencies to manage hydromodification impacts of development projects. The proposed hydromodification control standard, management objective, and performance criteria for new development and redevelopment projects covered by the HMP requirements of Permit Provision C.3.f are provided in this chapter. Guidelines are provided that Co-permittees can use to identify project types and/or areas within the Santa Clara Basin that may be exempt from hydromodification controls under Permit Provision C.3.f.ii.

Chapter 6: Guidance for Selection and Design of Hydromodification Control Measures

This chapter provides a discussion of the selection and sizing of hydromodification controls. Hydromodification controls are measures designed to meet hydromodification control standards. Hydromodification controls can be classified into the following categories: on-site project controls; regional controls; and in-stream controls. On-site controls can include site design and treatment measures that reduce runoff and flow control facilities such as detention/retention and infiltration facilities that are engineered to meet a specified discharge performance. The chapter ends with descriptions of three example projects for which flow control facilities are sized.

Chapter 7: HMP Implementation Guidance

This chapter provides guidelines to Co-permittees and the development community for implementing the SCVURPPP Hydromodification Management Plan in compliance with Permit Provision C.3.f. The guidelines cover:

- Implementation Options
- Process for Evaluating Hydromodification Impacts and Requirements for Development Projects
- Incorporating HMP Requirements into Local Approval Processes
- Land Use Planning Measures
- Opportunities for Watershed Master Planning for Hydromodification, Water Quality, and Flood Management
- Inspection and Maintenance Requirements
- Monitoring and Reporting Requirements
- Program Evaluation and Continuous Improvement

Appendices

Supporting technical documents are provided in Appendices to this report. The Appendices are contained in a second volume and available on the SCVURPPP website at www.scvurppp.org

Permit Provisions C.3.f.iv and C.3.f.vi state required and optional elements, respectively, of the SCVURPPP HMP. Table 1-1 lists these elements and where they are addressed in this HMP Report.

Table 1-1

HMP ELEMENTS AND REFERENCES

Provision No.	Description of Element	Location in Report
Required Elements		
C.3.f.iv.1	A review of pertinent literature.	Section 2.2 (summary)
C.3.f.iv.2	A protocol to evaluate potential hydrograph change impacts to downstream watercourses from proposed projects.	Section 2.4 (summary), Chapter 3; Chapter 4 Section 7.3
C.3.f.iv.3	An identification of the rainfall event or range of events below which peak flow management standards will apply.	Section 4.3
C.3.f.iv.4	A description of how the Dischargers will incorporate these requirements into their local approval process or the equivalent.	Section 7.4
C.3.f.iv.5	Guidance on management practices and measures to address identified impacts.	Chapter 6
Optional Elements		
C.3.f.vi.1	Evaluation of the cumulative impacts of urbanization of a watershed on stormwater discharge and stream morphology in the watershed.	Chapter 3
C.3.f.vi.2	Evaluation of stream form and condition, including slope, discharge, vegetation, underlying geology, and other information as appropriate.	Section 3.3
C.3.f.vi.3	Implementation of measures to minimize impervious surfaces and directly connected impervious area in new development and redevelopment projects.	Sections 6.1 and 6.2 Sections 7.2 and 7.3
C.3.f.vi.4	Implementation of measures including stormwater detention, retention, and infiltration.	Chapter 6
C.3.f.vi.5	Implementation of land use planning measures (e.g.: stream buffers, restoration in advance of development, revegetation) to allow expected changes in stream channel cross-sections, stream vegetation, and discharge rates, velocities, and/or duration without adverse impacts to stream beneficial uses.	Section 7.5

ATTACHMENT 1-1

- Definition of Group 1 Projects

- Provision C.3.f of the NPDES permit
Limitation on Increase of Peak Stormwater Runoff Discharge Rates

Definition of Group 1 Projects

DETERMINING THE APPLICABILITY OF PROVISION C.3 TO NEW PROJECTS AND REDEVELOPMENT PROJECTS

The amount of impervious surface created or replaced as part of a development project determines whether it falls under the requirements of Provision C.3 and the extent of the Provision C.3 requirements. Project applications submitted and deemed complete prior to October 15, 2003[1] do not have to comply with Provision C.3 requirements. Project applications submitted after October 15, 2003 are evaluated as Provision C.3 Group 1 projects.

Group 1 Projects. Group 1 projects consist of all new public and private projects that create one (1) acre (43,560 square feet) or more of impervious surface collectively over the entire project site, including roof area, streets and sidewalks. Also, significant redevelopment projects that result in the addition or replacement of impervious surface area that combined totals 1 acre (43,560 square feet) or more qualify for Group 1 status. If more than fifty percent (50%) of the existing impervious surface area is replaced or added, the entire project is included in the design of treatment measures. If less than fifty percent (50%), only that affected portion must be included in treatment design. Excluded from this category are interior remodels and routine maintenance or repair, including roof or exterior surface replacement and repaving.

Group 2 Projects. Group 2 projects consist of public and private projects that create 10,000 square feet or more of impervious surface. Comments from and discussions with Regional Board staff have determined that the HMP requirements only apply to Group 1 projects (1 acre or more of impervious surface) and do not apply to Group 2 projects.[2]

Projects Exempt from Provision C.3 Requirements. The table below provides a description of the land uses that are exempt from Provision C.3 requirements.

Projects Exempt from Provision C.3

Land Use Category	Exempted Land Use
Commercial, industrial, or residential developments.	Construction of one single-family home that is not part of a larger common plan of development, with the incorporation of appropriate pollutant source control and design measures, and using landscaping to appropriately treat runoff from roof and house-associated impervious surfaces (e.g., runoff from roofs, patios, driveways, sidewalks, and similar surfaces).
Street, road, highway, and freeway projects that are under the Dischargers' jurisdiction.	Sidewalks, bicycle lanes, trails, bridge accessories, guardrails, and landscape features that are part of a street, road, highway or freeway project. Note, these are not exempt when part of commercial, industrial or residential developments.
Significant Redevelopment projects	Interior remodels and routine maintenance or repair, such as roof or exterior surf-ace replacement, pavement resurfacing, repaving and road pavement structural section rehabilitation within the existing footprint, and any other reconstruction work within a public street or road right-of-way where both sides of that right-of-way are developed.

[1] Including those developments with previous entitlements or development agreements.
[2] 1) Letter to Mr. David Chesterman, SCVURPPP Management Committee Chair, from Shin-Roei Lee, Division Chief of South Bay Watershed Division, San Francisco Bay Regional Water Quality Control Board re Comments on the Hydromodification Management Plan Report, Public Review Draft, August 25, 2004; 2) Jan O'Hara, at San Jose Developers Roundtable Meeting, August 12, 2004.

Provision C.3.f of the NPDES permit

f. **Limitation on Increase of Peak Stormwater Runoff Discharge Rates:**

i. The Dischargers shall manage increases in peak runoff flow and increased runoff volume, for all Group 1 Projects, where such increased flow and/or volume can cause increased erosion of creek beds and banks, silt pollutant generation, or other impacts to beneficial uses. Such management shall be through implementation of a Hydrograph Modification Management Plan (HMP). The HMP, once approved by the Regional Board, will be implemented so that post-project runoff shall not exceed estimated pre-project rates and/or durations, where the increased stormwater discharge rates and/or durations will result in increased potential for erosion or other adverse impacts to beneficial uses, attributable to changes in the amount and timing of runoff. The term duration in this section is defined as the period that flows are above a threshold that causes significant sediment transport and may cause excessive erosion damage to creeks and streams.

ii. This requirement does not apply to new development and redevelopment projects where the project discharges stormwater runoff into creeks or storm drains where the potential for erosion, or other impacts to beneficial uses, is minimal. Such situations may include discharges into creeks that are concrete-lined or significantly hardened (e.g., with rip-rap, sackrete, etc.) downstream to their outfall in San Francisco Bay**,** underground storm drains discharging to the Bay, and construction of infill projects in highly developed watersheds, where the potential for single-project and/or cumulative impacts is minimal. Guidelines for identification of such situations shall be included as a part of the HMP. However, plans to restore a creek reach may re-introduce the applicability of HMP controls, and would need to be addressed in the HMP.

iii. The HMP may identify conditions under which some increases in runoff may not have a potential for increased erosion or other impacts to beneficial uses. Reduced controls or no controls on peak stormwater runoff discharge rates and/or durations may be appropriate in those cases, subject to the conditions in the HMP. In the absence of information demonstrating that changes in post-development runoff discharge rates and durations will not result in increased potential for erosion or other adverse impacts to beneficial uses, the HMP requirements shall apply.

iv. The HMP proposal shall include:

1. A review of the pertinent literature;
2. A protocol to evaluate potential hydrograph change impacts to downstream watercourses from proposed projects;
3. An identification of the rainfall event below which these standards and management requirements apply, or range of rainfall events to which this limitation applies;
4. A description of how the Dischargers will incorporate these requirements into their local approval processes, or the equivalent; and

5. Guidance on management practices and measures to address identified impacts.

v. The identified maximum rainfall event or rainfall event range may be different for specific watersheds, streams, or stream reaches. Individual Dischargers may utilize the protocol to determine a site- or area-specific rainfall event standard.

vi. The HMP's evaluation protocols, management measures, and other information may include the following:

1. Evaluation of the cumulative impacts of urbanization of a watershed on stormwater discharge and stream morphology in the watershed;
2. Evaluation of stream form and condition, including slope, discharge, vegetation, underlying geology, and other information, as appropriate;
3. Implementation of measures to minimize impervious surfaces and directly connected impervious area in new development and redevelopment projects;
4. Implementation of measures including stormwater detention, retention, and infiltration;
5. Implementation of land use planning measures (e.g., stream buffers and stream restoration activities, including restoration-in-advance of floodplains, revegetation, use of less-impacting facilities at the point(s) of discharge, etc.) to allow expected changes in stream channel cross sections, stream vegetation, and discharge rates, velocities, and/or durations without adverse impacts to stream beneficial uses;
6. A mechanism for pre- vs. post-project assessment to determine the effectiveness of the HMP and to allow amendment of the HMP, as appropriate; and,
7. Other measures, as appropriate.

vii. Equivalent limitation of peak flow impacts: The Dischargers may develop an equivalent limitation protocol, as part of the HMP, to address impacts from changes in the volumes, velocities, and/or durations of peak flows through measures other than control of those volumes and/or durations. The protocol may allow increases in peak flow and/or durations, subject to the implementation of specified BMPs and land planning practices that take into account expected stream change (e.g., increases in the cross-sectional area of stream channel) resulting from changes in discharge rates and/or durations, while maintaining or improving beneficial uses of waters.

viii. The Dischargers as a group shall complete the HMP according to the schedule below. All required documents shall be submitted acceptable to the Executive Officer, except the HMP, which shall be submitted for approval by the Regional Board. Development and implementation status shall be reported in the Dischargers' Annual Reports, which shall also provide a summary of projects incorporating measures to address this section and the measures used.

1. March 1, 2002: Submit a detailed workplan and schedule for completion of the literature review, development of a protocol to identify an appropriate

limiting storm, development of guidance materials, and other required information;

2. September 15, 2002: Submit literature review;
3. March 1, 2003: Submit a draft HMP, including the analysis that identifies the appropriate limiting storm and the identified limiting storm event(s) or event range(s);
4. October 15, 2003: Submit the HMP for Regional Board approval; and,
5. Upon adoption by the Regional Board, implement the HMP, which shall include the requirements of this measure. Prior to approval of the HMP by the Regional Board, the early implementation of measures likely to be included in the HMP shall be encouraged by the Dischargers.

Deadline Extensions

By a letter dated May 12, 2003[3], the Regional Board Executive Officer authorized extension of three specified deadlines in Order 01-119 (Provision C.3.f.viii) as shown below, in order to be consistent with other stormwater permits adopted in 2002-2003.

Provision	Activity	Original Deadline	New Deadline
C.3.c.i.	Require stormwater treatment BMPs at Group 1 Projects	July 15, 2003	October 15, 2003
C.3.c.ii.	Require stormwater treatment BMPs at Group 2 Projects in addition to Group 1 Projects	October 15, 2004	April 15, 2005
C.3.f.	Submit final HMP for Regional Board approval	October 15, 2003	January 15, 2004

[3] Letter to Mr. Beau Goldie, SCVURPPP Management Committee Chair, from Loretta Barsamian, Executive Officer, Regional Water Quality Control Board, San Francisco Bay Region, re: Extension of Specified Deadlines in Order 01-119, May 12, 2003.

2. PREVIOUS WORK PRODUCTS AND ACTIVITIES

This report is a synthesis of work conducted by SCVURPPP Co-permittee staffs, Program staff, consultants, and selected experts. The development of the Final HMP Report is based on the completion and knowledge gained from previous tasks. Products of these tasks include: the HMP Work Plan; a literature review; a technical memorandum on the assessment method for the HMP; and application of the assessment method to three test watersheds. Seven additional technical memoranda were prepared by the Program and its consultants that describe analyses of exempt area criteria, potential HMP standards, range of geomorphically significant flows, and on-site runoff management measures and costs. These work products and activities are summarized in the following sections and form the basis of the remaining chapters of this report.

2.1 HMP WORK PLAN

The HMP Work Plan developed by SCVURPPP, provided in Appendix A (GeoSyntec, 2002), consists of the following tasks. Where appropriate, the section in the permit provision addressed by the task is noted in parentheses.

1. Develop a problem statement and goals;
2. Review literature and data source availability (*Provision C.3.f.iv.1*);
3. Characterize stream conditions and future development patterns (*Provision C.3.f.ii*);
4. Develop a conceptual model of processes affecting stream stability;
5. Select HMP assessment method;
6. Compile available data and apply the HMP assessment method;
7. Develop guidance for management measures, including recommended cost effective solutions to address the impact on streams (*Provision C.3.f.iv.5, C.3.f.v, C.3.f.vi, C.3.f.vii*);
8. Develop an implementation strategy and process for continuous improvement
9. Convene an Expert Panel; and
10. Involve the public.

The problem statement and goals are presented in Chapter 1 of this report. The literature review, conceptual model, HMP assessment method, expert panel and public involvement tasks are described in the following sections. The remaining chapters in this report present the synthesis of all of the completed Work Plan tasks.

2.2 LITERATURE REVIEW

A review of the current literature[1] was one of the first steps required by the NPDES permit in addressing the hydromodification problem and identifying solutions because hydromodification is a relatively new subject for most stormwater practitioners and because early attempts by others at finding solutions have failed. In addition to meeting the permit requirements, the literature review has the following purposes:

- Provide the technical basis for the selection and application of methods for assessing hydromodification, for developing control measures and developing an implementation plan.
- Educate those who will be approving the HMP (e.g., Program Co-permittees, RWQCB) and those who will have to implement the plan (Co-permittees and development community).

Over 50 articles were reviewed that addressed the following topics: 1) the natural hydrologic and geomorphic processes important for addressing hydromodification, 2) the effects of urbanization on hydrology and geomorphology, 3) the available assessment tools that can be used to address hydromodification, and 4) management strategies that Co-permittees can use to implement the HMP. Information from these articles pertaining to the SCVURPPP HMP is summarized in the *Hydromodification Management Plan Literature Review* (GeoSyntec Consultants, 2002), which is included in its entirety in Appendix B. A summary of the key findings of the literature review is presented below.

Hydrologic Processes

Urbanization causes increases in drainage infrastructure density (rain gutters, curbs/gutters, drainage pipes), and increases in the percent imperviousness and connectivity of impervious areas. Urbanization also may result in soil compaction, removal of native vegetation, and reductions in the width of riparian corridors. Increases in impervious surface increase peak flows (especially for more frequent events), runoff volume, the duration of smaller flow events, and the frequency and duration of sediment transporting flow events. Seasonal flow regimes may also change with urbanization. Dry season baseflows can decrease where the loss of infiltration is significant, which may limit riparian vegetation. Dry season baseflows can also increase in areas where excess irrigation is significant, compared to normal dry season flows, and alter wetland and riparian hydro-periods.

Geomorphic Processes

Fluvial geomorphology deals with forms and characteristics of stream channels and the processes that create them. Over time and before human disturbances, channel planform, slope, and cross sectional dimensions evolved to balance stream flow energy and the need to transport sediment load. A natural stream channel is “stable” when its cross section, planform, and profile features

[1] *Hydromodification Management Plan Literature Review* (GeoSyntec Consultants) was completed and submitted to the Regional Board on September 13, 2002.

are in dynamic equilibrium such that the stream does not aggrade, degrade, or change in geometry or meander pattern during the present climatic regime.

Increases in impervious surfaces and the associated changes in runoff have the potential to destabilize streams. The degree of change is highly variable and depends on the characteristics of the watershed and the land development. The increased frequency and duration of runoff associated with increases in imperviousness lead to increases in the amount of "work done" (erosive forces applied over time) on the stream bed and banks. This in turn can cause increases in stream depth ("incision"), erosion of stream banks, increased sediment transport, and sediment deposition in downstream segments closer to the Bay.

HMP Assessment Methods

Several assessment tools that can be combined to formulate an HMP assessment method are summarized. These tools include stream classification, empirical methods, mapping and modeling. An HMP assessment method must incorporate factors that describe the characteristics of watersheds, stream types, development style, and existing riparian conditions. Watershed and stream channel characterization is the first step towards any assessment addressing the physical and ecological conditions of a watershed and stream network. The watershed scale characterization helps focus attention on the processes impacted by development and the actual causes of the observed impacts rather than focusing in on the symptoms, such as bank failures. Historical information can be used to help explain the observed physical and ecological processes and existing stream channel conditions and to verify assumptions about the expected channel response.

The current direction of research is to utilize simplified methods, or indices that can be used to distinguish between eroding or non-eroding, or stable and unstable channel conditions. Indices, such as ratios of stream power, are attractive because they are simple to use and inexpensive to apply. Indices of stability, energy, or erodibility must be referenced to the erodibility of the most sensitive boundary condition (e.g., bed vs. bank stability).

Management Strategies

Management strategies described in the literature often integrate a series of progressive control measures including land use planning, distributed on-site control measures, regional facilities, and stream restoration.

Typical elements of such strategies are as follows:

1. Optimize site-design to preserve the natural hydrologic conditions and protect sensitive hydrologic features, sediment source characteristics and sensitive habitats. Avoid, to the extent possible, the need to mitigate for hydromodification.
2. Minimize the effects of development through strategic design (e.g., reduce connected impervious surfaces) and through the implementation of environmentally sensitive on-site distributed Best Management Practices (BMPs) (e.g., wetlands, swales, infiltration gardens, etc.).
3. Manage the stream corridor itself by implementing in-stream controls, such as grade controls, biotechnical bank stabilization controls, and other restoration measures.

Provide allowances for the modified stream flow characteristics and enhance the beneficial uses of streams.

4. In some cases, a regional stormwater management system may be cost effective. These strategies could include regional floodplain management, secondary collection and drainage systems, and large-scale detention and infiltration basins.

Available Local Data

The literature review summarizes the available local data that can be useful in addressing hydromodification, implementing an HMP assessment method, and identifying solutions. Local programs and plans identified and reviewed in the process of developing the HMP include:

- SCVWD Fisheries and Aquatic Habitat Collaborative Effort;
- SCVURPPP Coyote Watershed Pilot Assessment;
- Santa Clara Basin Watershed Management Initiative (SCBWMI) Pilot Watershed Assessment;
- Surface Water Ambient Monitoring Program (SWAMP)/Regional Monitoring and Assessment Strategy (RMAS);
- SCVURPPP Multi-Year Monitoring Plan;
- SCVWD flood protection projects;
- SCVWD Stream Maintenance Program;
- Alum Rock Park Riparian Management Plan; and
- SCVWD GIS data.

2.3 CONCEPTUAL MODEL

The information obtained during the literature review was formulated into a *Conceptual Model*[2] of the hydrologic and geomorphic processes and attributes that are considered most important when addressing hydromodification. The Conceptual Model is presented in Figure 2-1. The process begins with the regional factors of climate, geology, and physiography, which in turn affect the amount of runoff and sediment sources discharged to stream channels. Land use, soil and vegetation characteristics ultimately affect the proportion of rainfall that infiltrates the ground or runs off the surface. The nature of the local climate, geology, and physiography affect the frequency and type of sediment supplied to the stream system. The increased energy imposed on the stream channel as a result of hydromodification affects sediment transport and causes streambed incision and erosion of stream banks, which lead to adjustment in the channel's geometry, planform and slope. The HMP assessment methodology and control measures are developed on the basis of the processes and linkages shown in the conceptual model.

[2] *Hydromodification Management Plan Literature Review,* GeoSyntec Consultants, 2002.

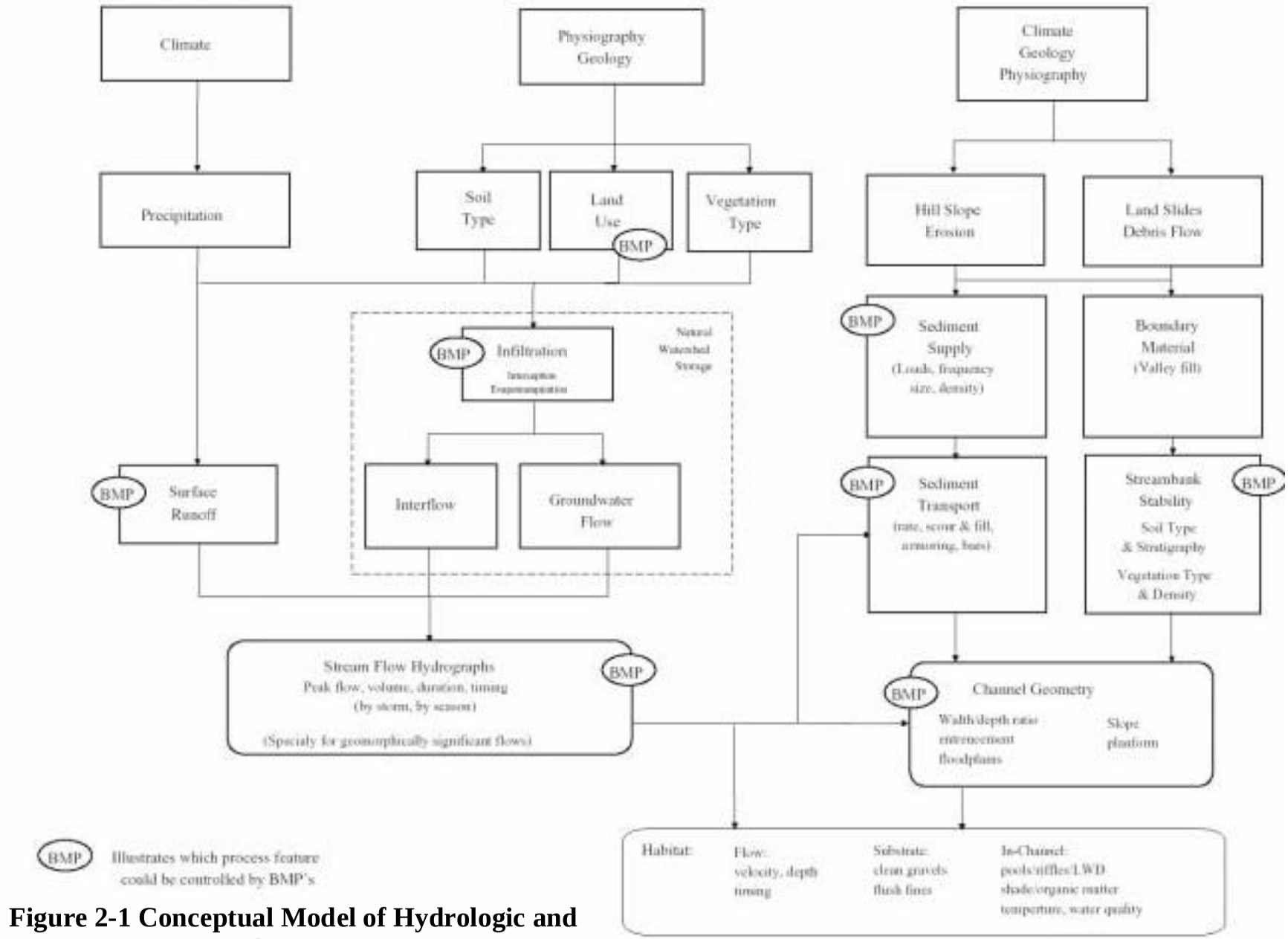

Figure 2-1 Conceptual Model of Hydrologic and Geomorphic Processes

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2.4 SCVURPPP HMP ASSESSMENT METHOD

The literature review and conceptual model described above were used to guide the consultant team in the development of the HMP assessment method[3] that was used in the Santa Clara Basin to evaluate effects of hydromodification from existing and future development. The HMP assessment method was developed to evaluate changes in hydrology and associated stream channel conditions and predict the potential for erosion and deposition or other impacts attributed to hydromodification from urban development. The HMP assessment method consists of four major elements or phases: 1) problem area and reach characterization, 2) geomorphic/historic assessment, 3) hydrologic/hydraulic modeling, and 4) stability assessment. Figure 2-2 illustrates the HMP assessment method graphically and shows the sequence and links between phases.

The assessment focuses primarily on the physical characteristics of stream systems, which are interrelated with water quality and ecology in determining the health of the riparian corridor.

The reader should refer to the literature review for more background information and reference material regarding the development of the HMP assessment method.

Problem Area and Reach Characterization

The purposes of this element are to characterize features of the watersheds and stream channels within the Santa Clara Basin, to understand the nature and extent of problem areas in stream reaches, and to explain existing conditions. During this phase, stream segments within the Santa Clara Basin that are currently subject to erosion and/or deposition, and those segments that could potentially be affected by future development will be identified.

Permit Provision C.3.f requires that the HMP assessment method address changes in watershed hydrology from urbanization. The assessment must distinguish between urbanizing impacts and impacts caused by past land use practices and changes in drainage patterns. This element provides the foundation for evaluating how past hydrology has changed, how modified flow pathways have affected channel form and stability, and what that means in terms of how to address hydromodification. Review of aerial photography of pre-urban versus urban periods provides a cost effective way to evaluate changes in stream channels. This element helps plan the field survey and stability assessment. From this information, geomorphic reaches are defined with similar stream channel conditions and hydrographic segments where substantial changes in stream flows occur (e.g., between major outfalls).

[3] Technical Memorandum #1: *Recommended Assessment Method for Developing the Hydromodification Management Plan, Including Data Requirements* was completed in October 2002 and presented to Regional Board staff on December 5, 2002. Appendix C

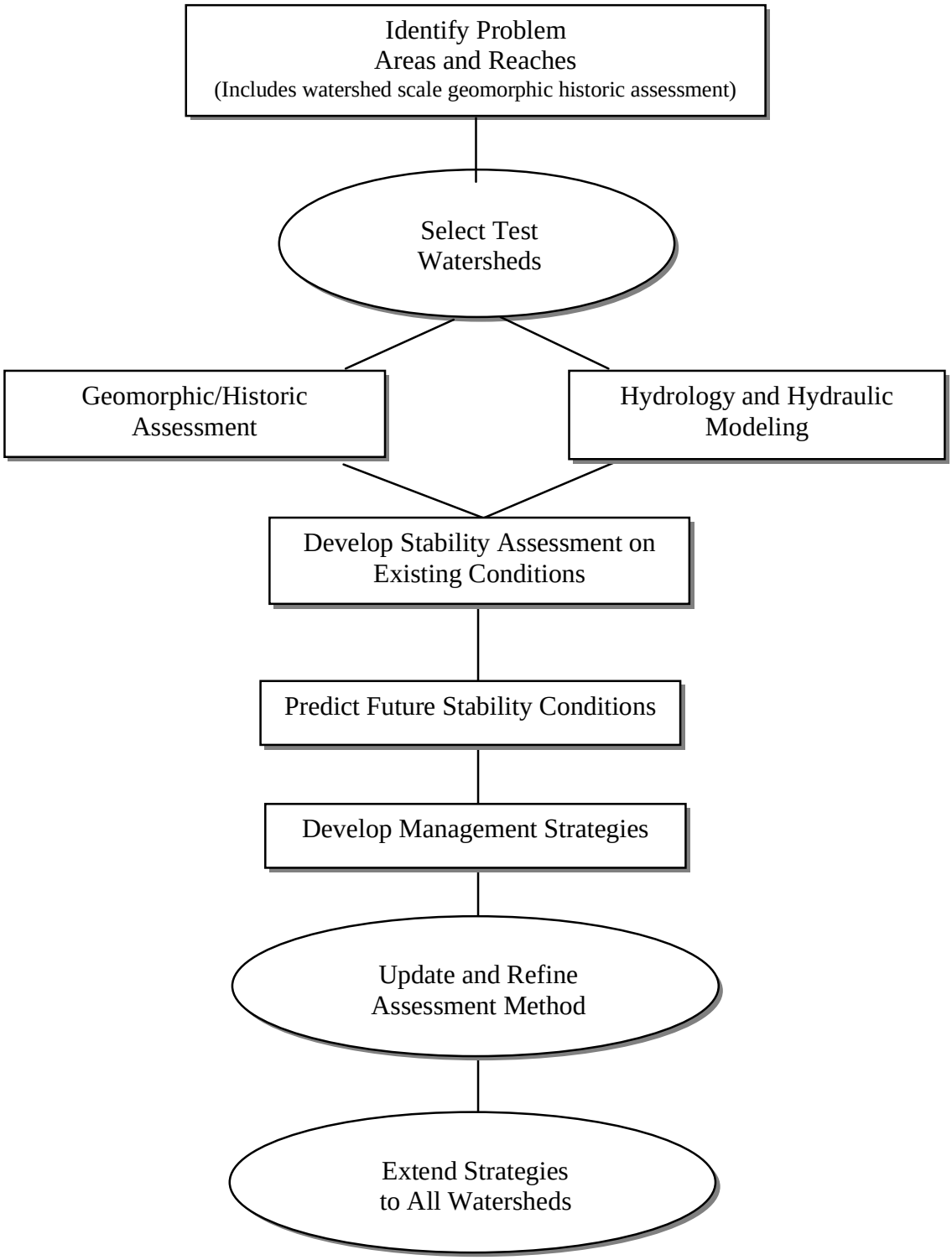

Figure 2-2
Overview of the Recommended HMP Assessment Method

Geomorphic/Historic Assessment

The goal of the geomorphic/historic assessment is to characterize features of the Santa Clara Basin watersheds and stream channels necessary to understand the nature and extent of the problem areas and stream reaches, explain the existing conditions, and to correctly interpret results and formulate solutions. The objectives of the geomorphic/historic assessments are to describe:

1. The geologic and geomorphic characteristics of the watersheds and stream networks;
2. The dominant physical processes that seem to be controlling stream attributes and erosion historically and at present; and
3. The extent and modes of failure for observed eroding channel banks and beds. Geomorphic reaches are defined using broadly similar influences that affect channel form and processes (e.g., vegetation, geology, topography, level of upstream development).

The extent and modes of failure for observed eroding channel banks and beds. Geomorphic reaches are defined using broadly similar influences that affect channel form and processes (e.g., vegetation, geology, topography, level of upstream development). An evaluation of historical conditions can be conducted using a wide range in levels-of-effort and detail. The HMP assessment method calls for the collection of the following data to meet the above objectives:

- Stream planform, longitudinal profile, cross sectional geometry, and bed and bank characteristics, to describe the existing morphology of the stream channel system.
- Data on channel sinuosity, cross-sections, channel slopes, headcuts, nick points, bed material size and field measured bankfull discharge.
- Locations of significant bed and bank erosion, bank height and side slope, estimate of bank material, vegetation type and density, to evaluate bank stability.

Hydrologic/Hydraulic Modeling

In traditional water resources engineering practice, stream flow analysis has been conducted using measured flow records (if a gaging station exists), regional regression equations, or numerical rainfall-runoff models. For analysis and design in flood hazard management, “event-based” models using design storms are commonly used. These provide conservative estimates of floods ranging from the 2- to 100-year event. While these are useful for flood hazard characterization, they do not capture the wider effects of hydromodification. In particular, event based models do not simulate the changes in soil moisture over time resulting from back-to-back storms, or from early to late winter. To quantify these differences, the HMP assessment method incorporates both a traditional event-based model and a continuous simulation model approach. The model results are used as input to the stability assessment.

Stability Assessment

The stability assessment combines information from the above elements to predict stream channel erosion and instability. The methodology is based on the premise that a balance among flow energy, sediment loads, and channel resilience exists naturally and must be maintained in order for the stream network to remain stable. Fundamental principles of stability, dynamic equilibrium and work from the science of fluvial geomorphology are incorporated, including

how these factors are affected under urbanized watershed conditions. By applying this method and establishing management criteria, the intent is to maintain the sediment transport and erosion processes, not eliminate them. The stability assessment measures the potential for erosion using an index that represents the long-term work done by flow energy in excess of the amount required to transport the available sediment load.

2.5 TEST WATERSHEDS

Using the Basin-wide information compiled during the identification of problem areas and reaches described above, the Program and consultant team selected three subwatersheds to develop, test, and verify the HMP assessment method. Within the Santa Clara Basin, one subwatershed was selected from each of the three major regions. The first test subwatershed, the Lower Silver-Thompson Creek Subwatershed, was used to test the applicability and usefulness of the recommended HMP assessment method tools and parameters. It was also used to develop, test and verify the HMP assessment method itself and determine whether existing erosion and deposition could be predicted correctly with the method. The Draft Interim HMP Report (July 2003) summarized the application of the HMP assessment method to the Lower Silver-Thompson Creek subwatershed, which was selected as the first test watershed.[4] The remaining two subwatersheds were used to verify that the method works on watersheds with different characteristics. The reasons for selecting these subwatersheds and the results of the assessments are summarized in Chapter 3 of this report.

2.6 EXPERT PANEL

An Expert Panel was convened to review and provide input on several key documents during the HMP development process. The purpose of the Expert Panel is to help ensure that the HMP is scientifically defensible and embodies a sound approach to hydromodification management. The Expert Panel consists of Professor Brian Bledsoe, Colorado State University; Professor Tom Dunne, UC Santa Barbara; and Professor Matt Kondolf, UC Berkeley. The panel has reviewed the Literature Review (September 2002), Technical Memorandum #1 - *HMP Assessment Method* (October 2002), the *Hydromodification Management Plan, Draft Interim Report, Assessment of the Lower Silver–Thompson Creek Subwatershed.* (July 2003), *Hydromodification Management Plan Report – Public Review Draft* (June 2004), and specific technical aspects of the HMP assessment method approach according to their areas of expertise. In addition, Mr. Craig MacRae, P.E. of Aquifor Beech Limited, and Professor Ted Hromadka, Ph.D., P.E., California State University, Fullerton, also provided valuable input on several elements of the methodology. Table 2-1 summarizes the activities of the Expert Panel and other reviewers. A summary of the Expert Panel comments is provided in Appendix D.

[4] *Hydromodification Management Plan, Draft Interim Report, Assessment of the Lower Silver–Thompson Creek Subwatershed,* submitted by SCVURPPP to the RWQCB in July 2003.

Table 2-1
Work Conducted By Expert Panel and Other Professionals

Topic	EXPERT PANEL			Personal Communication	
	Brian Bledsoe, Ph.D.	**Tom Dunne, Ph.D.**	**Matt Kondolf, Ph.D.**	Craig MacRae	Ted Hromadka, Ph.D.
Literature Review	Yes	Yes	Yes	-	-
Tech Memo #1: HMP assessment method	Yes	-	Yes	-	-
Interim Draft HMP Report (July 2003)	Yes	Yes	Yes	-	-
Public Review Draft HMP Report (June 2004)	Yes	Yes	No	-	-
Use of Index Method	Yes	-	-	Yes	-
Simple Approach, Discrete Events	Yes	-	-	-	Yes
Critical Shear Stress for Bank Material	-	-	-	Yes	-
Layout of Cross Sections for Stability Assessment	-	-	-	Yes	-

2.7 PUBLIC INVOLVEMENT

Regional Board staff, other Bay Area stormwater programs, and members of the Santa Clara Basin Watershed Management Initiative (WMI) have been kept informed of HMP progress through periodic presentations. Regional Board staff attended each of these briefings. In addition, Regional Board staff participated on SCVURPPP's HMP Work Group and had the opportunity to review draft work products and provide input.

Public meetings were held during the summer and fall of 2004 to get input from the development community (developers and engineering consulting firms) on the Public Review Draft HMP Report (June 29.2004). These meetings also served to update and get input from BASMAA and WMI members on the HMP.

A summary of the groups receiving presentations on the HMP development and report is presented below:

Groups Receiving Presentations/Briefings	Date
• WMI's Watershed Assessment Subgroup and Flood Management Subgroup	November 18, 2002 July 31, 2004
• Bay Area Stormwater Management Agencies Association's (BASMAA's) New Development Committee and Regional Board staff.	December 5, 2002. August 5, 2004
• SCVURPPP's C3 Provision Oversight Ad Hoc Task Group and Regional Board staff	April 26, 2004
• SCVURPPP's Management Committee and Regional Board staff	April 29, 2004
• City of San Jose Developer Roundtable Meetings (for Development Community and Municipal Staff)	August 5, 2004 August 12, 2004

Public meetings were held during the summer and fall of 2004 to get input from the development community (developers and engineering consulting firms) on the "public review draft" HMP. These meetings will also serve to update and get input from BASMAA and WMI members on the HMP.

2.8 EVALUATION OF EXEMPTION FOR INFILL PROJECTS IN HIGHLY DEVELOPED WATERSHEDS

Provision C.3.f.ii states that HMP controls do not apply to "*construction of infill projects in highly developed watersheds, where the potential for single-project and/or cumulative impacts is minimal.*" To develop a guideline for identifying "infill projects in highly developed watersheds", the Program formed an Exempt Areas Subgroup of the HMP Work Group, which explored two approaches for defining highly developed watersheds, the percent imperviousness approach and the percent developed or "build-out" approach.

Percent Imperviousness Approach

An initial approach explored by Program staff and the Exempt Areas Subgroup was to propose that catchments with existing percent imperviousness above a certain threshold be exempted from HMP controls.

Program staff analyzed GIS data to map areas with different percentages of impervious cover. The data used to evaluate existing impervious area came from a catchment level analysis calculated by Dave Mattern (Mattern & Associates, contractor to SCVWD) using current (2003) and fine resolution (1-meter satellite imagery) data. The catchment level of analysis was employed because it could take into account the stream segment into which a development project would ultimately discharge (i.e., the location of the outfall for the specific catchment). Program staff also mapped the predicted changes in percent imperviousness (i.e., difference between existing and future imperviousness) by catchment, using estimates of future imperviousness prepared by Mattern & Associates for the SCVWD hydrologic modeling efforts.

Mattern & Associates estimated the future impervious surface area by applying estimated future percentages of imperviousness to various planning land use categories within the watersheds, based on General Plan information. Because the way land use categories and land use areas were defined varied among cities (e.g., some included roads and highways and some did not), separate evaluations of expected impervious area percentages were done for each city. Areas of the same land use type that were considered to be fully developed were aggregated to determine the average existing impervious area for that land use. To be considered fully developed, a threshold criterion was established for each land use type, and only those areas that equaled or exceeded the threshold were used to compute the average imperviousness. For example, the threshold for Industrial Park land use in San Jose was 70%. The average percent impervious for Industrial Park land use blocks currently at or above 70% was 81% (range was 70% to 96%). A value of 85% was selected to represent future imperviousness in all Industrial Park land use blocks. Those land use areas that were considered fully developed and were less than 85% impervious now were assumed to increase to 85% impervious in the future.

While this approach may be valid for the development of the District's hydrologic model, many Subgroup members felt that this was a conservative approach and was probably overestimating future imperviousness and future runoff peaks and volumes. The approach also did not take into account that some land use types may have lower percentages of impervious area in the future, due to incorporation of site design measures.

The Exempt Areas Subgroup decided that the percent imperviousness approach could not be supported for the following three reasons:

1. Due to the high variability of catchment imperviousness and the changes in imperviousness, it was difficult to reach consensus on translating catchment level information to a guideline for identifying a highly developed watershed. References identified by Program staff that relate percent imperviousness in a watershed to expected changes in stream habitat were not appropriate for evaluating effects on stream erosion potential.
2. The Subgroup, with the exception of the District, did not support using the estimates of future imperviousness for the exempt areas analysis, because of some of the assumptions made in developing these data for the District's model (described above).
3. The percent imperviousness approach does not adequately represent the expected level of future development in an area. This approach is misleading in areas containing dedicated open space, parks, school grounds, etc. that are not expected to develop further (i.e., catchments that contain open space and parks have a low percent imperviousness and do not appear to be highly developed).

<u>Percent Developed Approach</u>

A second method that was explored for defining highly developed watershed is the percent developed or percent "build-out" approach. This approach is based on the definition of "highly developed" that Co-permittees already use for a variety of land use decisions. The approach defines a highly developed watershed as one in which the area of developed land equals or exceeds a certain percentage of total watershed area. The developed area is the total watershed

area minus the amount of undeveloped land in the watershed or subwatershed as identified on a Co-permittee's vacant land inventory map or database.

Program staff worked with City of San Jose staff to apply this approach within that city's boundary. The working definition of undeveloped land for this analysis is as follows:

> Undeveloped Land – land without improvements (i.e., curb and gutter, sidewalks, structures, etc.). Parking lots, parks, designated open space, cemeteries, golf courses, etc. that have been developed according to the designated zoning for the parcel are not considered undeveloped land.

City staff used a GIS to calculate the percentage of developed land at three different scales of drainage area: catchment, subwatershed, and watershed. The coverages for the catchment and subwatershed boundaries were obtained from the District. The City of San Jose Vacant Land Inventory was used to identify areas within the City that represent undeveloped land. These areas were intersected with each of the three drainage area data sets to identify the percentage of drainage area that contains undeveloped land (or conversely, percent developed land). City staff presented maps showing the ranges of percent-developed land for all three scales of drainage area. The Subgroup agreed that the subwatershed drainage area provided the most useful scale at which to identify percent-developed land area, as there was too much variability within the catchment level data to develop a consistent guideline for the highly developed area of a city.

The results of the percent-developed analysis at the subwatershed scale for San Jose are presented on Figure 2-3. Additional analyses are being conducted for other Co-permittee jurisdictions. Analyses completed to date are included in Appendix H.

The Subgroup, with the exception of the District, supported the percent developed approach because it best represents the amount of expected additional development in a subwatershed and the likelihood that the additional development will cause a significant impact on streams. It is consistent with the term "highly developed" (not highly impervious) watershed used in the permit and findings[5].

As a result of these analyses, the Program is proposing that a subwatershed that is 90% built-out, using the method described above, be considered a highly developed watershed. Guidelines for identifying the projects that will be exempt using the recommended percent build-out approach are provided in Chapter 5.

[5] Permit Finding #12 states that "transit village type developments within 1/4 mile of transit stations, and within the 80% developed urban core of cities, are unlikely to fall under the requirements of C.3.f. and the HMP. This is due to the fact that significant change in impervious surface or significant change in stormwater runoff volume or timing is unlikely in this circumstance, because the development would be within a largely already paved catchment, and on a site that is largely already paved or otherwise impervious."

Figure 2.3
Percent Developed Land
San Jose by Subwatershed

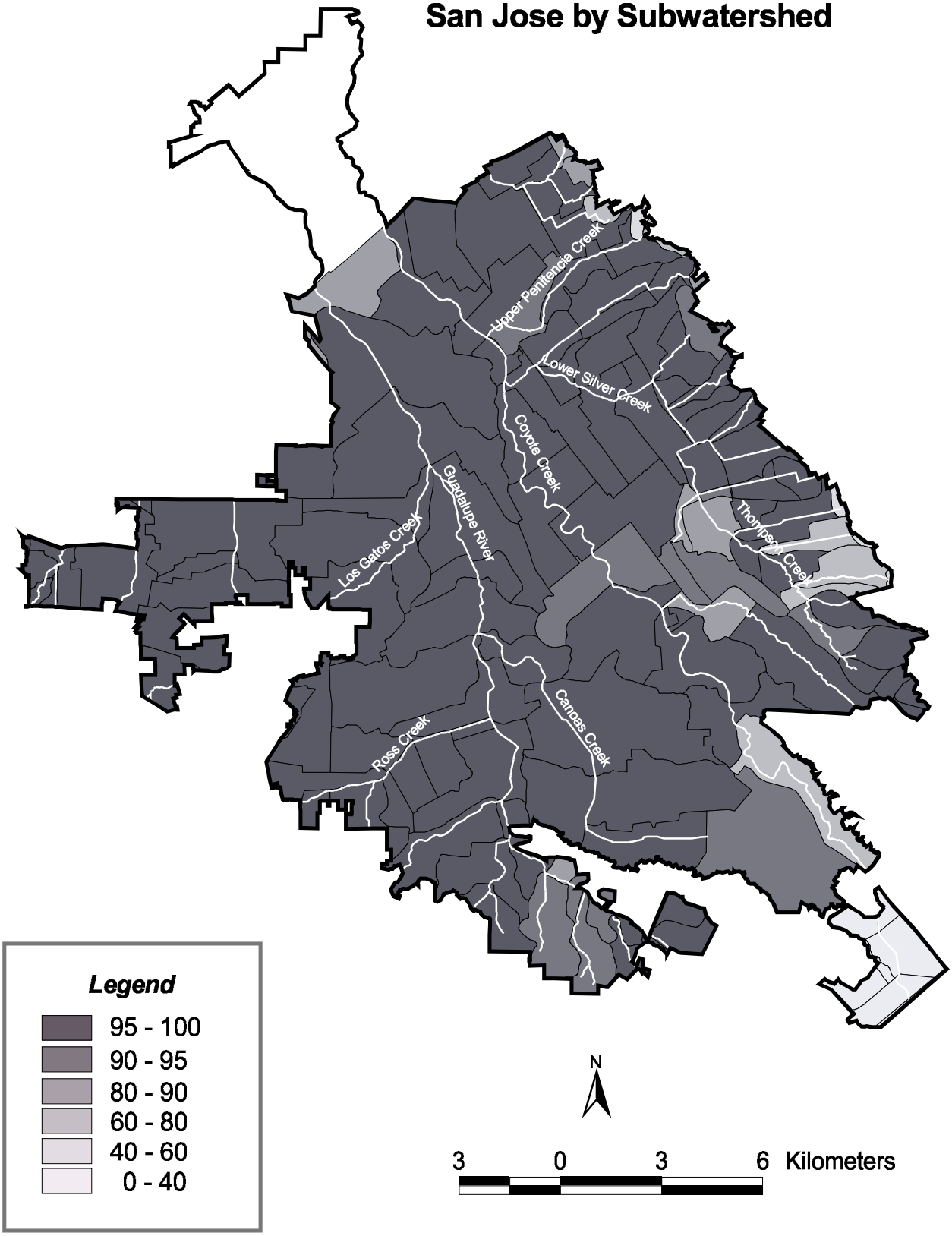

3. STREAM ASSESSMENT METHOD

3.1 DESCRIPTION OF ASSESSMENT METHOD

The assessment methodology was subdivided into five elements: 1) Problem area and reach characterization, 2) geomorphic assessment, 3) hydrologic modeling, 4) stability assessment, and 5) effectiveness evaluation of potential control measures.

Problem area and reach characterization describes features of the watershed and stream channels necessary to understand the nature and extent of the problem and to explain existing conditions. Historical aerial photography, soils and geologic maps, channel maintenance records, infrastructure data and historical surveys were used to distinguish between urbanizing impacts and impacts caused by past land use practices.

The geomorphic assessment describes the geologic and geomorphic characteristics of the stream network, the dominant physical processes that seem to be controlling stream attributes and erosion, and the extent and modes of failure for observed eroding channel banks and beds. Field crews recorded reach-wide observations on streambed and bank erosion, collected location specific data at multiple cross sections, and then assigned each cross section a rank of *stable, low, medium or high* observed condition of erosion, or likelihood of erosion in the near future. Several factors affecting channel bank and bed stability were combined with the extent, age, and magnitude of existing erosion to designate an appropriate erosion ranking.

Hydrologic continuous simulation models of the pre-urban[1], existing, and future (year 2020) land use conditions were developed using the U.S. Army Corps of Engineers' Hydrologic Engineering Center - Hydrologic Modeling System (HEC-HMS). The models were calibrated using two to four years of measured flow data. The calibrated models were run using 50+ years

[1] The pre-urban land use condition was modeled to enable comparison of stable stream segments to unstable segments under existing land use and validate the assessment methodology (see Section 3.3).

of rainfall records, which produced a time series of hourly stream flows to analyze changes in flow duration, runoff volume, and frequency between land use scenarios.

The stability assessment looks at the balance among flow energy and channel resilience that exists in a stable stream. An index representing the total effective work done, W, (i.e., hydraulic force applied) to the channel boundary is derived that predicts the probability of channel adjustment given watershed and stream hydrologic and geomorphic variables. The effective work index under urbanized conditions is compared to the index under pre-urban conditions. The comparison, expressed as a ratio, is defined as the Erosion Potential (Ep) following research by MacRae (1992, 1996).

An empirical relationship between Ep and the observed erosion classification of stream segments was derived and used to make informed management decisions. A "threshold of adjustment" is considered that distinguishes between stable and unstable conditions. The Ep and the threshold of adjustment are used to set management criteria and evaluate the effectiveness of proposed solutions (using the method developed by MacRae, 1993).

3.2 SELECTION OF TEST WATERSHEDS

Provision C.3.f. of the NPDES permit requires Co-permittees to develop an HMP that applies to all of the Santa Clara Basin watersheds under the jurisdiction of the SCVURPPP Co-permittees. A key question raised early in the HMP development was whether a single standard, management criteria and threshold could be used for all watersheds in the Basin for uniformity and ease of implementation or whether the watersheds are different enough to warrant site- or area-specific standards, as allowed by Provision C.3.f.v.

According to geomorphic theory, watersheds and streams with different climate, physiography, soils and vegetation could potentially have different resilience and thresholds of adjustment and thus could require different standards. On the other hand, if the assessment methodology is parameterized effectively, incorporating the relevant physical processes, the method could account for these differences and lead to uniform results.

Based on the watershed and stream assessment work completed for this HMP Report, the consultant team concluded that the Basin can be sub-divided into three regions with similar characteristics: the Coyote Creek watershed, the Guadalupe River watershed, and the western watersheds (San Tomas Aquino Creek to San Francisquito Creek[2]). Subwatersheds were identified to represent these three watersheds. The Lower Silver – Thompson Creek subwatershed was selected to represent the eastern Coyote Creek region and the Ross Creek subwatershed was selected to represent the Guadalupe River region. San Tomas Aquino Creek (also referred to as San Tomas Creek) was chosen to represent the characteristics of the western watersheds. Figure 3-1 presents a map showing the Basin and the location of the three test subwatersheds.

[2] Approximately two-thirds of the San Francisquito Creek watershed is located in San Mateo County. The San Mateo Countywide Stormwater Pollution Prevention Program (STOPPP) has requirements to complete an HMP in its NPDES permit; however, the timeframe for implementation is different. The draft HMP for STOPPP is due to the Regional Board on November 15, 2004. SCVURPPP intends to collaborate with STOPPP such that a coordinated plan for San Francisquito Creek is developed.

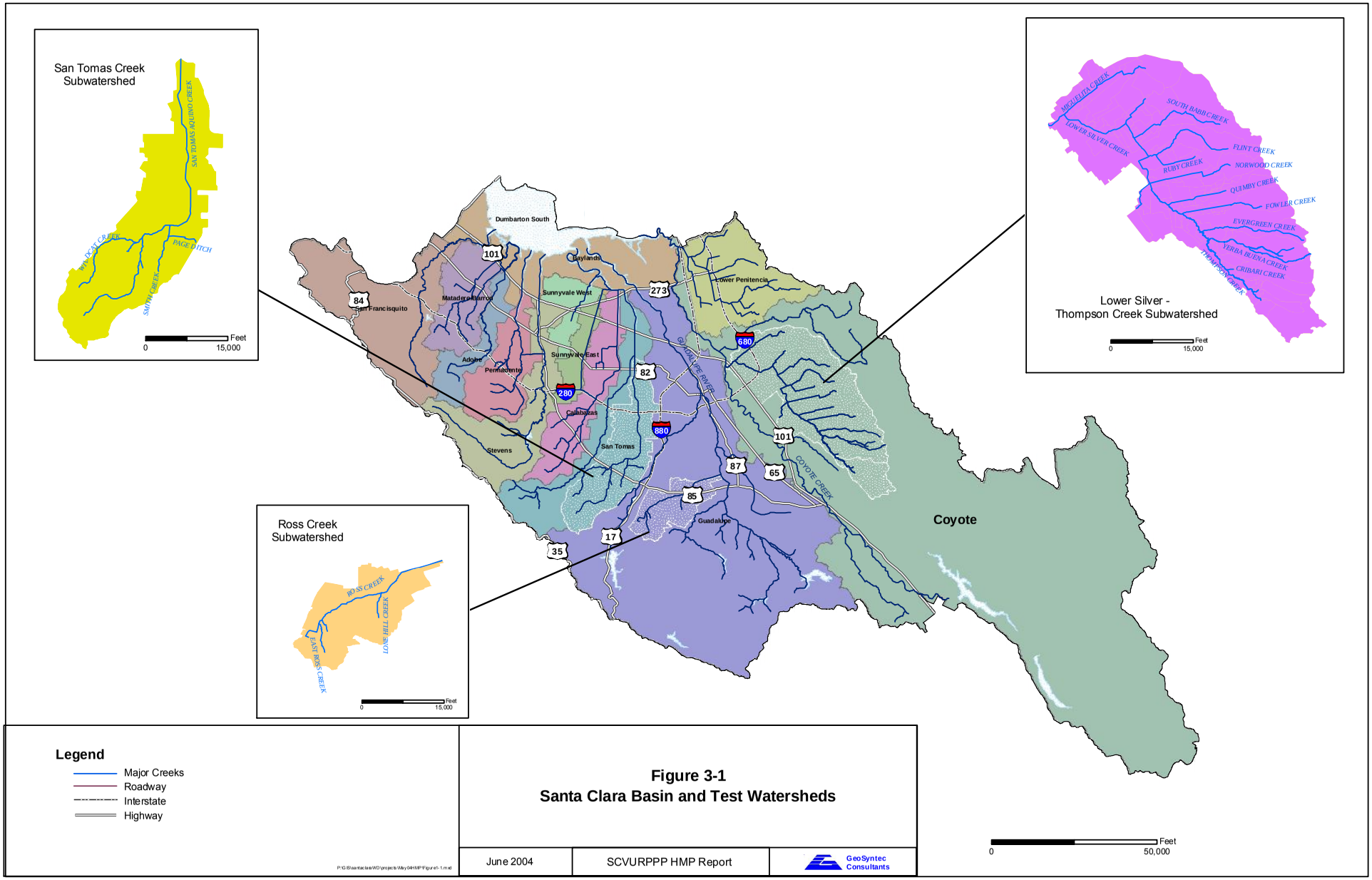
San Tomas Creek Subwatershed
SAN TOMAS AQUINO CREEK
WINDGATE CREEK
PAGE DITCH
SMITH CREEK
Feet
0
15,000
Ross Creek Subwatershed
ROSS CREEK
LOS GATOS HILL CREEK
EAST ROSS CREEK
Feet
0
15,000
Lower Silver - Thompson Creek Subwatershed
MIGUELITA CREEK
SOUTH BABB CREEK
LOWER SILVER CREEK
FLINT CREEK
NORWOOD CREEK
RUBY CREEK
QUIMBY CREEK
FOWLER CREEK
EVERGREEN CREEK
VERBA BUENA CREEK
CRIBARI CREEK
THOMPSON CREEK
Feet
0
15,000
Dumbarton South
Baylands
Lower Penitencia
Sunnyvale West
Sunnyvale East
Matadero/Barron
San Francisquito
Adobe
Permanente
Calabazas
San Tomas
Stevens
Guadalupe
Coyote
GUADALUPE RIVER
COYOTE CREEK
101
84
273
680
82
280
880
87
65
85
17
35
Feet
0
50,000
Legend
Major Creeks
Roadway
Interstate
Highway
Figure 3-1
Santa Clara Basin and Test Watersheds
June 2004
SCVURPPP HMP Report
GeoSyntec Consultants

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The first test subwatershed, Lower Silver/Thompson Creek (GeoSyntec Consultants, July 2003), was used primarily to develop, test, and verify the assessment method itself. For example, "can we correctly predict existing erosion and deposition?" "How successfully can we define erosion thresholds?" The second and third test subwatersheds, Ross Creek and San Tomas Creek, were used to verify that the method works in watersheds with different characteristics and answer the following question:

- Are the results for Thompson Creek, Ross Creek, and San Tomas Creek significantly different enough to warrant separate hydromodification standards, criteria, and threshold?

The three test subwatersheds were selected for the following reasons:

1. Each subwatershed represents a distinct hydro-geomorphic region of the Basin.
2. The subwatersheds are of a size appropriate for the testing methodology (approximately 20 to 40 square miles).
3. Each subwatershed has a stream gage(s) where data have been and are being collected that were used to help calibrate the hydrologic model.
4. The subwatersheds have undergone significant development in the past 20 to 40 years, with some additional growth planned for the future. Thompson Creek underwent significant development from the late 1970's, while development in Ross Creek and San Tomas Creek began around the late 1950's.
5. The streams are earthened channels and show signs of hydromodification type impacts due to urbanization. Other effects, such as dams and reservoirs, gravel mining were not present in these watersheds.

3.3 APPLICATION OF THE ASSESSMENT METHODOLOGY

This chapter summarizes the application of the assessment method to the Thompson Creek, Ross Creek, and San Tomas Creek subwatersheds.

Geomorphic Assessment

A field geomorphic assessment was completed for the subwatersheds of Thompson, Ross, and San Tomas Creeks. Conducting a geomorphic assessment is a critical step toward understanding the hydrologic and geomorphic processes that influence channel stability within an urbanizing watershed. The historic assessment and geomorphic field work conducted for this study provide the foundation for evaluating how past hydrologic conditions have changed, how modified flow pathways have affected channel form and stability, and what this information means in terms of how the system might be managed to create an ultimately stable channel.

The geomorphic assessment complements and supplements information provided by hydrologic models of storm runoff and stability assessment, and helps in the interpretation of what the models mean in different stream systems.

The geomorphic assessment was conducted on two different scales, with the identification of both geomorphic reaches as well as hydrographic segments. Creeks vary longitudinally—that is, from upstream to downstream, both with respect to channel bed and bank properties and with respect to the magnitude and duration of flows that act upon them. The intrinsic properties of bed

and banks plus the flows acting upon them need to be considered when developing a method for predicting how future flows will affect the creek.

The consultant team distinguished geomorphic reaches that characterize each creek based on the longitudinal variation of bed and bank conditions. Within a given reach, broadly similar influences (whether vegetation, geology, topography, level of upstream development, etc. or some combination therein) affect channel form and processes in a similar manner.

Hydrographic segments differ from geomorphic reaches in that they define a creek section based on significant flow additions, whether it is from tributaries, diversion structures, and/or stormwater outfalls rather than physical characteristics of the channel. Cross-sections located within a common hydrographic segment are characterized as having similar discharges. The segmentation reflects important differences in channel-forming flows.

The geomorphic field work consisted of taking a set of qualitative and quantitative measurements at multiple cross-sections along Thompson, Ross, and San Tomas Creeks. Cross-sections were selected to represent typical problem sites found within the subwatersheds. It was also a goal to compare unstable sites with ones appearing to be stable. Therefore, cross-sections were also located at non-problem sites that did not experience incision or excessive erosion for use in the stability assessment model.

The problems observed reflected both site-specific conditions as well as larger-scale watershed factors. The field program provided the data to characterize both small- and larger-scale hydrologic and geomorphic factors causing creek problems.

Based on the results of the geomorphic assessment, hydromodification has clearly impacted streams in the Santa Clara Basin[3]. Field observations have found streambed incision from 2 to 20 feet deep depending on stream location. Bank retreat and channel widening was also observed. In some locations, bank failure and slough off had occurred during larger storms because of over-steepened and over-tall banks. Hydromodification impacts are observed in some earthen-engineered channels in the three test subwatersheds as well as in natural streams.

Hydrologic Modeling

This section describes the hydrologic modeling of the Thompson Creek, Ross Creek, and San Tomas Creek subwatersheds. Modeling was conducted as part of the hydromodification assessment as well as the technical analyses conducted during the planning process (see Chapter 4).

Creek flows were modeled under pre-urban (i.e., before large scale development of the subwatershed)[4], existing, and future land use conditions. The watershed models convert rainfall input sequences to estimated stream flow rates at various selected points throughout the project

[3] The complete set of results for the Thompson Creek cross-sections is presented in *Hydromodification Management Plan, Draft Interim Report, Assessment of the Lower Silver–Thompson Creek Subwatershed.* Prepared by GeoSyntec Consultants, Inc. for SCVURPPP. Submitted to the RWQCB in July 2003.

[4] The pre-urban land use condition was modeled to enable comparison of stable stream segments to unstable segments under existing land use and validate the assessment methodology. Predictions for stream instability and erosion occurring between the pre-urban and existing scenarios were compared to observed locations of erosion.

watersheds. The model rainfall input consisted of simulated "design storms" and continuous rainfall records to conduct single event-based and continuous simulations, respectively. Design storms were developed for various rainfall magnitudes, such as the 2-, 10-, or 100- year rainstorms. The design storm approach was applied to the Thompson Creek subwatershed as a way to compare modeling techniques and their effectiveness at addressing and managing hydromodification impacts on stream channels. Design storm modeling was not necessary for Ross Creek or San Tomas Creek subwatersheds.

Within event-based and continuous simulations, the model incorporates information about the watershed characteristics (topography, soils, vegetation, land use, urbanization, etc.) to estimate how much rainfall is held in the watershed ("losses", including infiltration to the soil and capture on vegetation or in shallow depressions, etc.), and how much precipitation results in surface runoff, eventually reaching stream channels.

The consultant team chose to model the Thompson, Ross, and San Tomas Creek watersheds using the U.S. Army Corps of Engineers' Hydrologic Engineering Center - Hydrologic Modeling System (HEC-HMS) rainfall-runoff model. The U.S. Army Corps of Engineers developed HEC-HMS to supersede the HEC-1 Flood Hydrograph Package. Unlike the single event-based HEC-1, HEC-HMS allows continuous hydrograph simulation over long periods of time in addition to event-based analysis.

Event-based modeling is useful because it provides a simple method for comparing hydrograph results under different land use conditions for statistically relevant design storms. In addition, event-based modeling is a convenient and commonly accepted approach for evaluating flood risk and design alternatives. Continuous modeling, however, allows for continuous accounting of soil moisture and infiltration and other losses for an extended time period. Therefore, continuous modeling is preferable to event-based modeling when trying to identify the hydromodification effects of development on small, frequent erosive flows and to evaluate their impacts on stream stability.

The modeling approach generally followed methods and procedures for HEC-1 modeling outlined in Santa Clara Valley Water District's *Hydrology Procedure*s (SCVWD, 1998). A previous Thompson Creek hydrology study conducted by Nolte Associates (2000) and a Ross Creek study described in SCVWD's *Hydrology Procedures* also provided background information and estimated flow peaks for model comparison.

Existing hydrologic conditions were modeled using detailed soils and land use GIS data from the SCVWD. The land use data were then modified to model hydrologic conditions for future and past (pre-urbanized) conditions. For the pre-urban scenario, the consultant team reviewed County of Santa Clara aerial photographs from the 1950s and 1960s and USGS topographic maps of the region to characterize the pre-urbanized land use conditions in the subwatersheds. These sources provided a representation of the pre-urban distribution of developed, agricultural, and woodland and grassland areas for each subwatershed, which was then converted to model parameters. For future conditions, the percentage of impervious land for each subwatershed under current conditions was increased based on future build-out information from city and county general plans. For details on the method of estimating future imperviousness, see Mattern & Associates, 2003.

HEC-HMS was used to predict stream flows at selected locations within the study areas. The models were calibrated and verified using two to four years of measured stream flow data. Continuous simulations were run for the 50-year period of rainfall record to analyze changes in flow duration, runoff volume, and frequency between pre-urban, existing, and future (year 2020) land use conditions.

Results of the hydrologic modeling are presented below. Due to the large amount of data generated by the model for each land use scenario (50 years of hour data at multiple locations), summary results of select locations are presented to demonstrate representative model results. The reader can refer to Appendix I to find more details regarding model results. The hydrologic model results are described in terms of *frequency* of ALL storm events (not just partial or annual series) and *duration* of flows.

Storm Magnitude: Table 3-1 presents a brief summary of the predicted changes in peak flow magnitude for two locations in Thompson Creek and two locations in Ross Creek. In the upper portion of Thompson Creek upstream from the confluence with Yerba Buena Creek (J-5), the 10-year peak flow increases from 520 cfs under pre-urban conditions to 620 cfs under existing and 730 cfs under future conditions (a 20% and 40% increase between pre-urban and existing and future conditions, respectively). The 2-year peak flow increases from 100 cfs to 190 cfs under existing and 270 cfs under future conditions (a 90% and 170% increase between pre-urban, and existing and future conditions, respectively). Similar results are provided for the lower portion of Thompson Creek, near Quimby Road (J-12). The magnitude of change predicted for Ross Creek is much greater than that predicted for Thompson Creek; examples are provided for locations J-1 (downstream) and J-5 (upstream).

Table 3-1 – Summary of Changes in Peak Flow Magnitude (cfs)

	Pre-Urban		Existing		Future		Percent Change Pre-urban vs. Existing	
Location	2 year	10 year	2 year	10 year	2 year	10 year	2 year	10 year
TC J-5	100	520	190	620	270	730	90	20
TC J-12	520	1500	1300	2250	1500	2500	150	50
RC J-1	240	500	1100	1480	1300	1750	358	196
RC J-5	150	250	390	580	410	610	160	132

Notes: 10-year return periods based on "annual" frequency distributions of the continuous simulation results.

Storm Frequency: Table 3-2 summarizes the change in frequency of occurrence for the 2-year and 10-year peak flows. Consider the upper reach of Thompson Creek (J-5) for example; the 10-year peak flow for the pre-urban condition (~520 cfs) occurs approximately every 6 years under existing conditions and every 5 years under future conditions. The 2-year peak flow under pre-urban conditions (~100 cfs) now occurs about once every 18 and 16 months under existing and future conditions, respectively. Similar results are also provided for the lower portion of Thompson Creek (J-12).

The Ross Creek subwatershed, similar to Thompson Creek, is largely built-out in the lower reaches. The pre-urban 10-year peak flows for both the downstream (J-1) and upstream (J-5) ends are now expected to occur several times a year. The pre-urban 2-year peak flows are also predicted to occur several times a year under existing and future conditions.

Table 3-2 – Summary of Changes in Peak Flow Frequency of Occurrence (years)

Location	Pre-Urban		Existing	Future
	Return Period (Years)	Flow (cfs)	Return Period (Years)	Return Period (Years)
TC J-5	10	520	6	5
	2	100	1.5	1.3
TC J-12	10	1500	2.5	2
	2	520	0.6	0.4
RC J-1	10	500	0.28	0.2
	2	240	0.1	0.1
RC J-5	10	250	0.28	0.25
	2	150	0.5	0.4

Notes: 10-year return period based on "annual" frequency distribution
2-year return period based on "partial duration" frequency distribution

One of the more dramatic changes is the frequency of small storm events less than the 2-year peak flow. For example, under pre-urban conditions, small runoff events occur about two to three times each year on average. Under both existing and future conditions, runoff events now occur almost every time there is a rain event. Furthermore, the magnitude of the events that occur two to three times a year increased by several orders of magnitude from the pre-urban condition.

Cumulative Duration: The results of the hydrologic modeling show that urbanization significantly increases the volume and duration of small to moderate size flows more than those for larger flows. Although the results vary by subwatershed, location within the subwatershed, and within the range of flow bins, increases in the volume and duration of runoff events range from 2 to 30 times between pre-urban and existing, and future land use conditions. Figure 3-2 provides an example flow duration histogram for a model junction in each of the three subwatersheds. Considering Thompson Creek as an example, the incremental increase in the number of hours that flows persist at certain magnitudes (i.e., duration) for the post-urban condition exceeds the pre-urban case by as much as 20 to 30 times for flows less than the 1-year peak flow magnitude. For flows greater than the 1-year peak flow magnitude, increases in duration are on the order of 2 to 3 times. Model results for Ross Creek show about a 2 to 3 times increase in volume and duration throughout the range of flows, whereas, San Tomas results show a similar trend as Thompson Creek with 2 to 20 times increases throughout its range of flows, with the largest increase in the small to moderate sized flows.

Stability Assessment

The stability assessment methodology is based on the premise that a balance among flow energy, sediment supply, and channel resilience must be maintained in order for the stream network to remain stable (MacRae, 1996). The hypothesis is that, over time, the stream channel slope and geometry co-evolved with vegetation, local physiography and climate to establish its pre-development dynamic equilibrium. By applying this method and establishing management criteria, the intent is to maintain stream sediment transport and erosion processes, not to eliminate them.

Using the flow data from the continuous simulation modeling, the stability assessment involves 1) computing the excess shear stress applied to the channel boundary, 2) computing velocity, and 3) integrating the product of excess shear and velocity over the total time (duration). The resulting integration is defined as the Effective Work Index (W). Excess shear stress is defined as the amount of applied shear (hydraulic force) that exceeds the critical shear stress for initial motion of bed material or erosion of bank material. This integration is done over a period of 50 years in this analysis. The assessment method then measures the potential for erosion by computing the ratio of the post-developed Effective Work Index to the pre-developed Effective Work Index. This ratio expresses the change in work done on the channel boundary between pre- and post- watershed conditions.

To gain confidence that the stability assessment method is a reliable predictor of stream channel erosion and instability, the results of the method were compared to observed field conditions classifying the current eroded state of the stream channel (low, medium or high). An empirical relationship is derived that relates model predictions to the probability of having unstable channel conditions. Through this relationship, a threshold is defined that predicts the on-set of channel adjustment and erosion, which is then used to evaluate the effectiveness of management strategies.

Figure 3-2a – Thompson Creek (Junction 5)

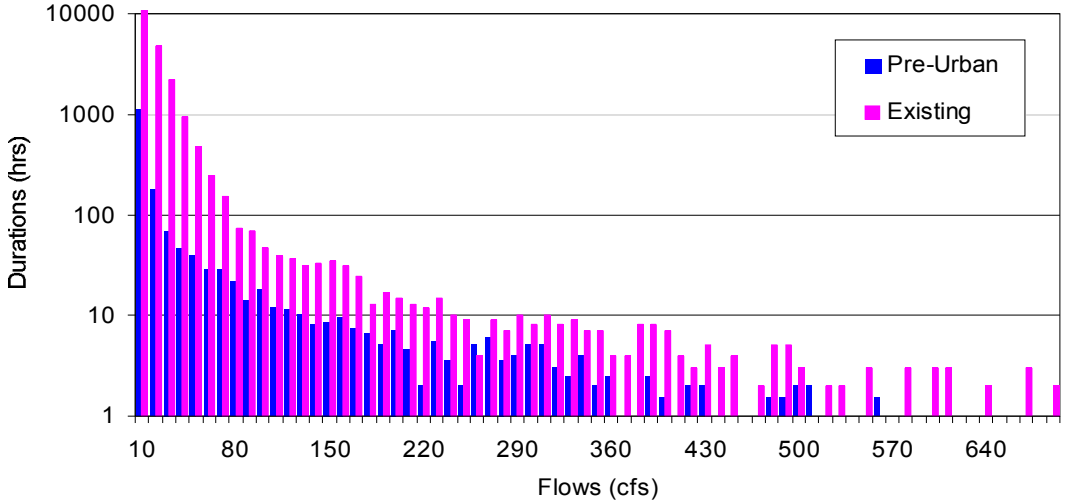

Figure 3-2b – Ross Creek (Junction 4)

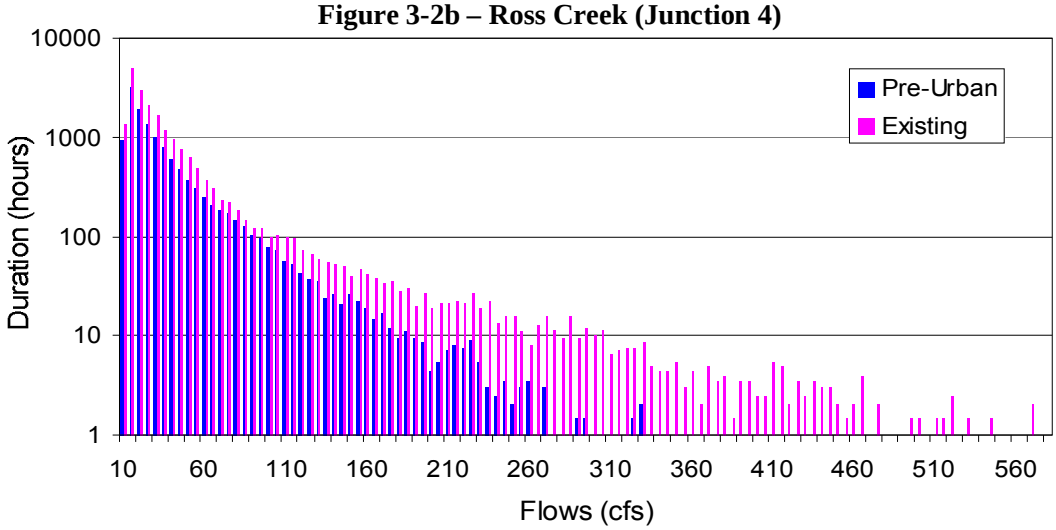

Figure 3-2c – San Tomas Creek (Junction 3)

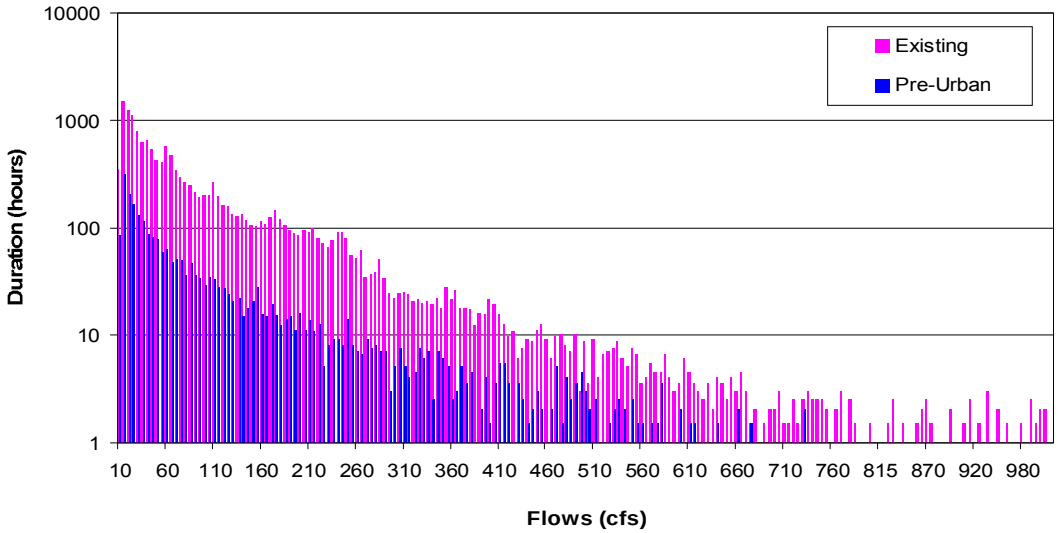

Figure 3-2 – Example Flow Duration Results for each of the Three Test Subwatersheds

Channel Stability and Thresholds. To test and verify the method, the stability assessment requires stable "*baseline*" conditions to compare to the existing conditions. Stable baseline conditions are being represented by pre-urban watershed conditions and modeling. Both the hydrologic modeling and the stream hydraulic modeling were completed using 1940s and early 1950s conditions on Ross and San Tomas Creek watersheds, and 1960s conditions on Thompson and Lower Silver Creek watersheds.

A stable channel is loosely defined as one that neither aggrades nor degrades, but instead maintains its average cross-section, planform, and profile features over time and within a range of variance. A stable channel can tolerate short-term disturbances without significant change. A disturbance of sufficient magnitude and duration that exceeds the stream's ability to self-regulate and causes the channel to begin changes is defined as the "threshold of adjustment." Under such conditions, streams can migrate, widen, or incise into underlying materials. The intent of the assessment method is to identify the threshold of adjustment where channels begin to incise or widen and the forces that cause this adjustment and accelerate the natural erosion and sediment transport processes.

Effective Work Index. The stability assessment is based on measuring the magnitude of the effective work index (***W***) by flows that exceed a specified critical value for the streambed or bank material. ***W*** is an index that represents the total work done on the channel boundary integrated over time. The index includes a velocity term to accurately represent ***W*** in units of work. The Thompson Creek study (GeoSyntec Consultants, July 2003) was updated to include the index as shown below in Equation 1 and illustrated in Figure 3-3. The effective work index is defined as follows:

$$W = C \cdot \sum_{i=1}^{n} (\tau_{bi} - \tau_c)^e \cdot V \cdot \Delta t \qquad (1)$$

Where:

- ***W*** = index of total effective work done over the length of flow record per square foot of bed or bank (ft-lbs/sq-ft).
- C = a constant to convert equation to dimensional or dimensionless units of work, dependent on exponent *e*
- *n* = number of flow records in a histogram of flows
- τ_c = critical shear stress that initiates bed mobility or shear erosion of the toe of streambanks (lbs/sq-ft)
- τ_{bi} = applied hydraulic shear stress, computed as ρgdS (lbs/sq-ft), on the bed or toe of banks and determined using the central channel conditions
  d = depth of water (ft) S = longitudinal slope (ft/ft)
  g = gravity constant (ft/sec^2) ρ = density of water (lb/ft^3)
- *e* = exponent that captures the exponential rise in stream power with flow (ranges between 1 and 2.5, estimated as 1.5 for watersheds in Santa Clara Basin based on field measurements)
- *V* = mid-channel velocity (ft/sec)
- Δ*t* = duration of flow (in seconds) for each flow record

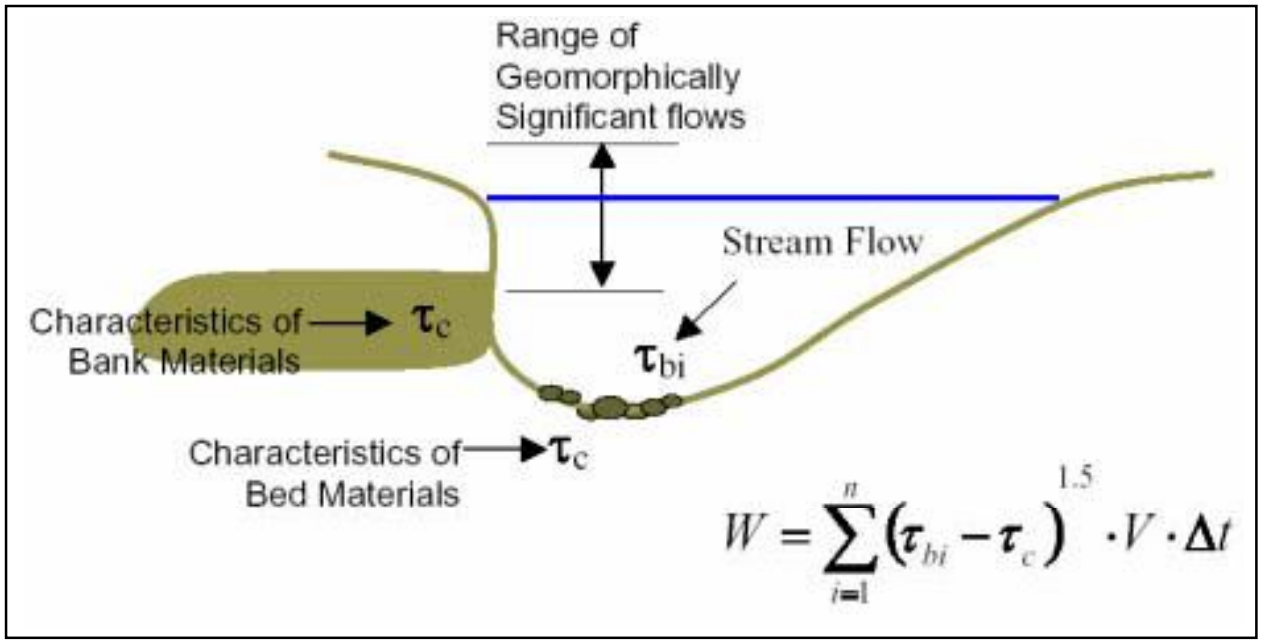

Figure 3-3
Schematic Illustrating Effective Work Index

Critical values for the shear stress of the streambed and stream bank provide a measure of the stream's resistance to erosion. Critical values for bed material reflect the onset of sediment transport. Critical values for bank material reflect the onset of erosion of the bank, especially for weak stratigraphy layers. Selection of the critical value is based on the weakest boundary material, whether bed material or a layer of unconsolidated sands and gravels as suggested in Figure 3-3. Channels can enlarge either by downcutting into the bed or by eroding the banks and widening, or combinations of both. Streams (or boundary material) with larger critical values have more resilience to hydromodification. Observed physical properties of the stream bed and bank materials were used to determine the critical values of shear stress and velocity for those materials, based on published ranges (ASCE, 1997).

The time increment (Δt) is determined by generating a histogram of flows from the continuous hydrologic simulation results, which are hourly data. For each flow range (or "bin"), the histogram provides the count of hours or duration of time that flows are within the designated flow range. For the average flow within a bin, the depth, velocity, and shear stress are computed. Equation 1 is solved for each flow bin, to compute the incremental effective work done by that specific range of flows. When Equation 1 is summed over the 50-year flow record (histogram), the result (***W***) is a measure of the total effective work done on the stream channel boundary.

As an example, Figure 3-4 shows the effective work curves for the pre-urban, existing, and future watershed condition for segments of Ross Creek. The change between the existing curves and the future curves illustrate which additional urban flows will do the greatest amount of work on the stream channel and be most likely responsible for the increase in erosion in the future build-out condition. The work done at cross section RC-8, for example, shows the most dramatic

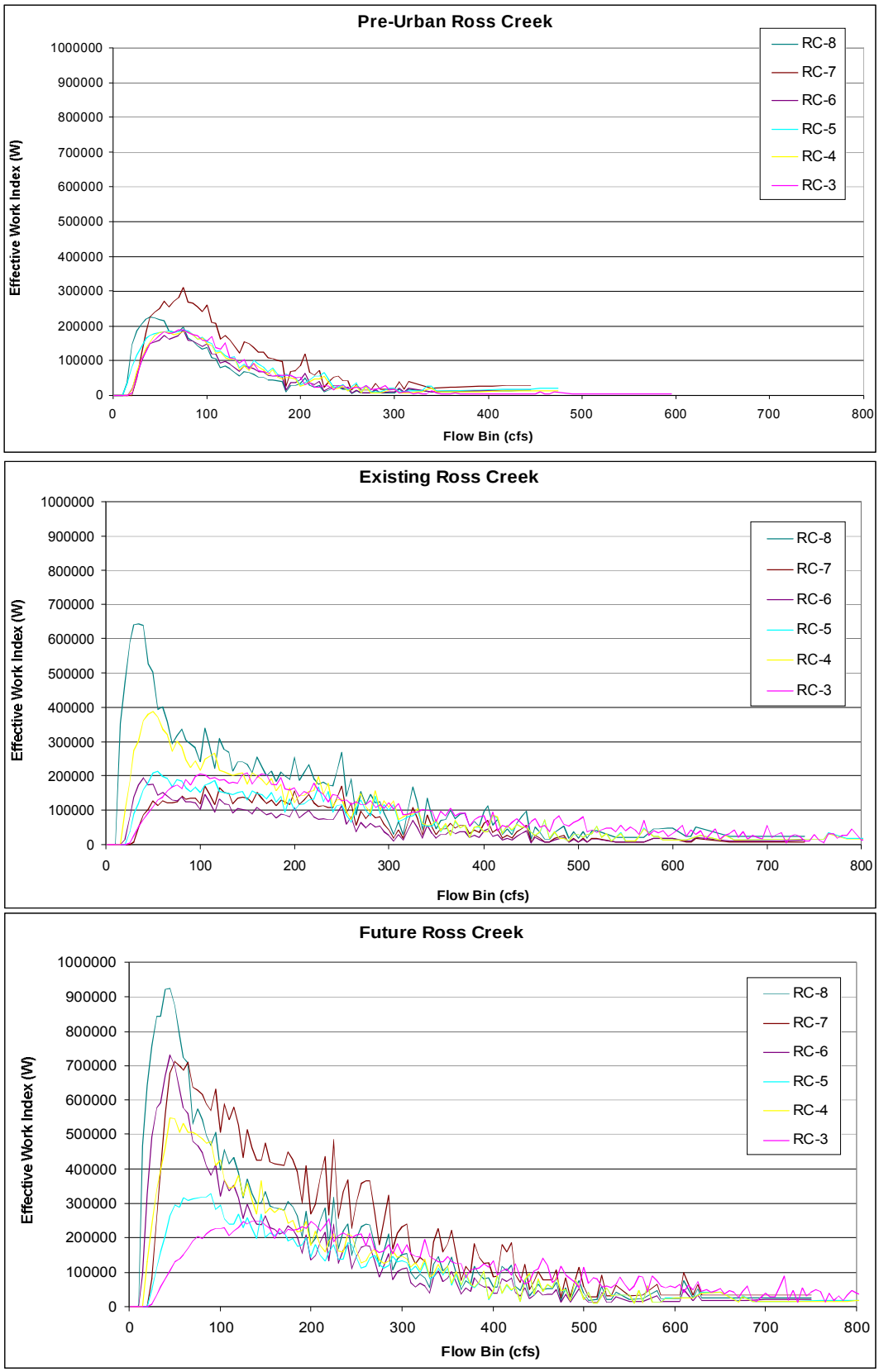

Figure 3-4
Effective Work Curves for Pre-Urban, Existing, and Future Watershed Conditions for Ross Creek

increases from pre-urban to existing to future conditions, when compared to the other cross sections. The maximum work done under future conditions is 920,000 ft-lbs/ sq-ft, a 44% increase from existing conditions.

Erosion Potential. The effective work index for stable stream channels under pre-urban conditions (or drainage areas as close to undeveloped as possible) is compared to both stable and unstable channels under urbanized conditions. The comparison, expressed as a ratio, is defined as the Erosion Potential (Ep) (MacRae, 1992, 1996).

For the stability analyses in this report, the Ep ratio was defined as:

$$Ep = \frac{W_{existing}}{W_{pre-urban}} \qquad (2)$$

$W_{existing}$ = work index for a stream section under existing conditions (could be either stable or unstable)

$W_{pre\text{-}urban}$ = work index for a stream section under pre-urban conditions (baseline assumed to be stable)

Predicting the erosion potential for future development projects and for management purposes, the Ep ratio would be written as:

$$Ep = \frac{W_{post}}{W_{pre}} \qquad (3)$$

W_{post} = work index estimated for the post-project condition

W_{pre} = work index measured for the pre-project condition

A conceptual diagram defining the concept of Ep is provided in Figure 3-5. The effective work done for the pre-project and post-project condition is the area under the shear stress-time curve, above the threshold critical shear stress. Ep is represented by the ratio of the area under the post-project curve to the area under the pre-project curve.

In the stability assessment, the computed work indices for the pre-urban and existing land use conditions and the resulting Ep values at a particular stream cross-section were then compared to the field classified erosion condition (stable/low or medium/high level of erosion). The numeric value of each parameter was plotted by group on a vertical chart referred to as the Erosion Potential Chart.

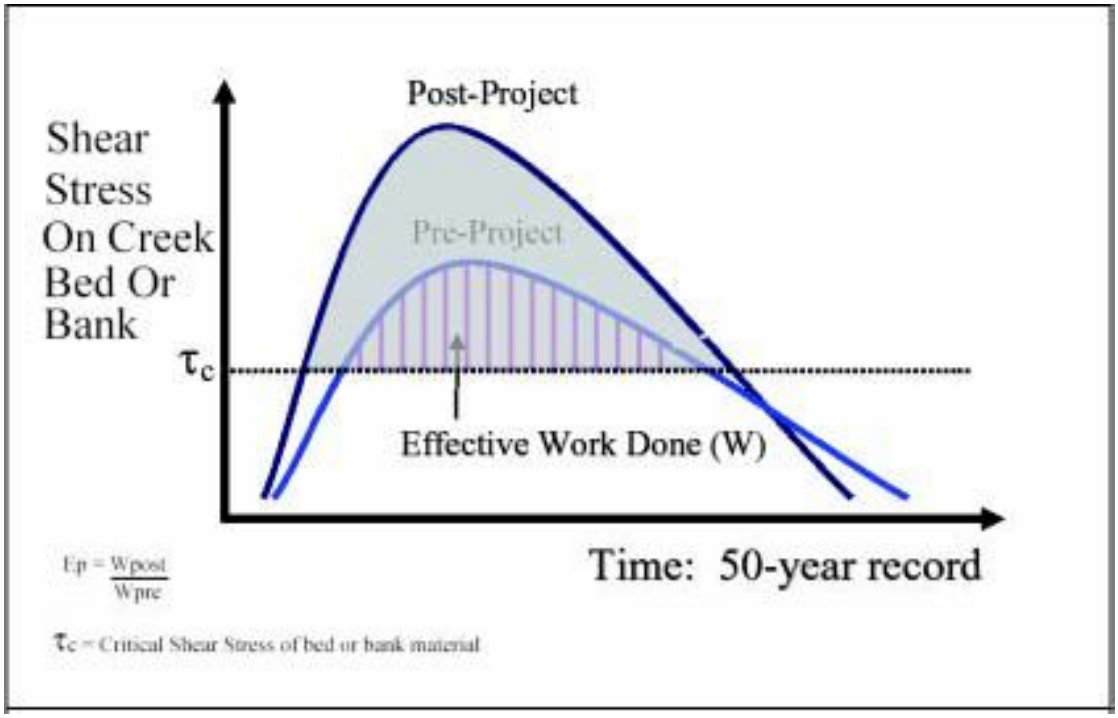

Figure 3-5
Definition of Ep Ratio

Figure 3-6 presents the Erosion Potential Chart for Thompson Creek (TC), Ross Creek (RC), and San Tomas Creek (ST), which shows a strong correlation between computed Ep and the field-designated erosion classification. These three subwatersheds include data and analysis on Yerba Buena Creek (YB) and East Ross Creek (ER) in the Thompson Creek and Ross Creek subwatersheds, respectively. Those sections classified as having medium/high observed erosion characteristics plot on the chart above those classified as stable/low with only two outliers. Not including the two extreme outliers, the lowest Ep computed for sections with medium/high erosion is 1.5, whereas the highest Ep value for sections classified as stable /low is estimated as 1.6. Comparing the results between all three subwatersheds, the Ep values at which cross-sections transition from stable to unstable rates of erosion are similar.

It is unrealistic to believe that stream channels will behave such that a single Ep threshold value can be specified (such as 1.5) that, if exceeded, would always result in unstable channel conditions; or conversely, if less than would always be stable. Because of natural variability in stream attributes and also considering uncertainties in the methodology, the threshold of adjustment was represented as a probability relationship described in the following section.

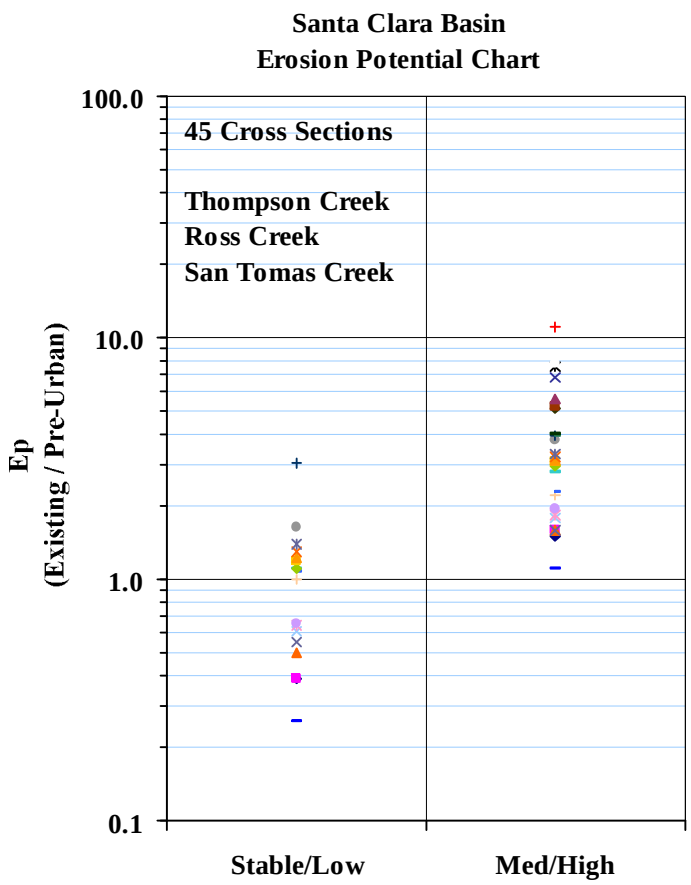

Figure 3-6 Erosion Potential Chart for Santa Clara Basin Streams

Logistic Regression. Logistic regression is a methodology that can be used to predict the probability, or likelihood, of having a stream segment become unstable in a two discrete state model (stable, unstable), based on a measure of Ep. Appendix E briefly describes how logistic regression is applied to stream stability issues.

Figure 3-7 presents the logistic plot of the erosion potential (Ep), based on the pooled data from all three subwatersheds. Forty-five cross sections spread out between the three subwatersheds were ultimately used in the final assessment and plotted in Figure 3-7. This curve represents the probability of having a stream segment become unstable given a value for Ep. If for example the Ep was computed to be 1.63, the chance of having unstable channel conditions is 50:50. Channel sections with Ep values in excess of 2 have a 77 percent chance of becoming unstable.

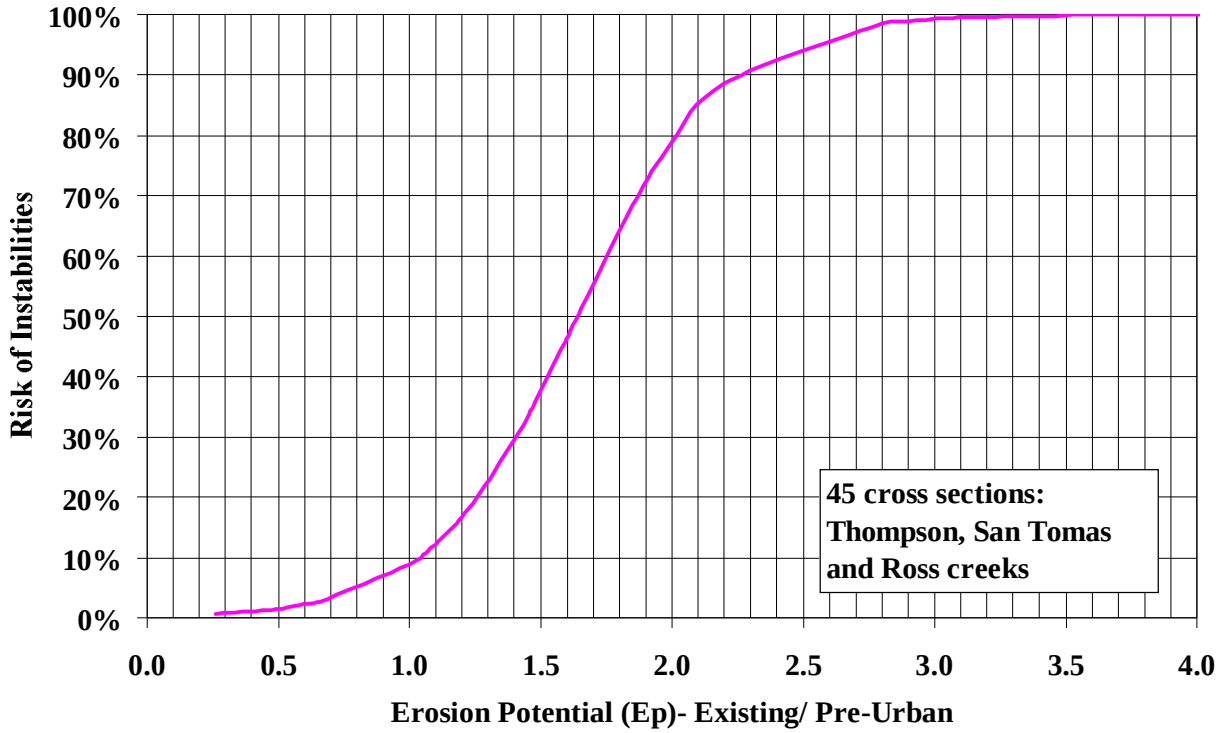

Figure 3-7 Probability of a Stream Segment Becoming Unstable, Based on Logistic Regression of Erosion Potential (Ep) Values

From a risk management perspective, Ep values between 1.0 and 1.2 reflect the portion of the logistic plot where the probability of becoming unstable begins to increase. For example, an Ep of 1.0 to 1.2 indicates that the chance of a segment becoming unstable range from 9 to 17 percent. Above an Ep of 1.4, the chances increase substantially (i.e. >25 percent).

One way to understand the meaning of "risk of instability" is to think about it in terms of the number of streams that could still become unstable even with flow controls in place. For example, a 25% risk implies that 1 in 4 streams could become unstable and lead to erosion problems even with control in place. A 9% risk implies that 1 in 11 streams could still become unstable even with controls, while a 17% risk implies that 1 in 6 stream could become unstable.

Analysis of Critical Flow (Qc). Critical flow is defined as the stream flow that produces the critical shear stress that initiates bed movement or that erodes the toe of stream banks. When measuring Qc for other streams and future studies, Qc should be based on the weakest boundary material – either the bed or bank. Table 3-3 lists the estimated critical flows at selected cross sections in Thompson and Ross Creeks.

Computed critical flows for Thompson Creek ranged from 3 cfs to 40 cfs depending on the location in the stream, using average critical shear of 0.14 lbs/sq-ft for most sections. However, based on the sediment sampling data collected in Thompson Creek, critical flows were estimated

to range from 1 cfs to 18 cfs. Computed critical flows for Ross Creek ranged from 15 cfs to 25 cfs, using critical shear values ranging from 0.23 to 0.38 lbs/sq-ft depending on location. The critical shear stresses for Ross Creek are higher than those used for Thompson because the size of the bed material is larger. The large values observed for cross sections TC1-1 and TC1-2 are a result of the channel having been engineered with grade controls installed so that higher flows could be accepted.

Table 3-3
Summary of 2-Year Peak Flows and Estimated Critical Flow Values

Subwatershed and Location	Cross Section	Critical Flow (Qc) in Stream (cfs)	% of 2-Year Peak Flow in Stream
Thompson Creek			
J-1	TC5-7	10	18
J-5	TC5-1, 5-2 & 5-3	3, 5, 7	2, 3, 4
J-12	TC1-1, 1-2	40, 40	8
Yerba Buena	YB-6, YB-7	5, 4	7, 6
	YB-2, YB-4	3, 10	5, 18
Ross Creek			
J-1	RC-1, RC-2	25, 25	12
J-5	RC-6, RC-8	20, 15	14, 11

a) Thompson Creek 2-year peak flows were generated from synthetic design storm hydrographs under pre-urban land use conditions.
b) Ross Creek 2-year peak flows were generated from the 50-year continuous model runs for the pre-urban condition.

In order for the critical flow to be useful to dischargers in design of hydromodification control structures, the critical flow in the stream must be partitioned or related to an on-site project based variable. For this purpose, the in-stream critical flow was related to the pre-urban 2-year peak flow in the stream. The critical flow was generalized as being 10% of the 2-year peak flow under undeveloped land use conditions.

The 2-year peak flows was estimated using a balanced hyetograph approach for 24-hour storm duration in conjunction with design storm rainfall depths following the SCVWD *Hydrology Procedures* manual (1998) guidance.

Findings

Effective Work

- The predicted effective work index (***W***) is capable of distinguishing between stable stream sections (pre-urban, stable/low existing conditions), and unstable stream sections (medium/high existing conditions).
- In all watersheds studied, the more frequent small to moderate magnitude flows have the greatest influence on channel shape and erosion potential.

- The critical discharge (Qc) at which bed material begins to move in quantity is about 10 to 15 cfs for Thompson Creek and 20 to 25 cfs for Ross Creek. In both instances, it is roughly 10 percent of the pre-urban 2-year peak flow in the stream.

Erosion Potential (Ep)

- The Ep methodology is capable of distinguishing stable/low eroding conditions from medium/high eroding conditions for each of the three subwatersheds (including East Ross Creek and Yerba Buena Creek).
- The Ep ratio between the subwatersheds is similar such that the Ep data for all three subwatersheds can be pooled together to evaluate the threshold of adjustment.

Threshold of Adjustment

- The logistic regression analysis provides a statistical tool to relate the likelihood of a stream channel becoming unstable to the computed Ep ratio.
- An Ep ≤ 1.0 is recommended as the in-stream target value for HMP management. From a risk management perspective, the chance of a stream becoming unstable at an Ep of 1.0 is 9%, meaning 1 in 11 streams could become unstable even with controls. The in-stream erosion potential must be measured considering the effects of the cumulative changes that take place in a watershed.

Implications for a Watershed Wide Standard

- The watersheds studied are not significantly different to warrant separate hydromodification standards, criteria, and thresholds. Differences between watersheds are accounted for in the assessment methodology (see Section 3.4).

3.4 DEVELOPING A BASIN WIDE STANDARD

One relevant question to this discussion is "why do the results for Ross Creek seem to be consistent with the results for Thompson Creek?" These two subwatersheds have different climatic, physiography, soils and vegetation characteristics; and geomorphic theory suggests that these stream systems could have different management strategies. A related question was raised during the preparation of the Literature Review - that is, if Santa Clara Basin conditions are different from other regions, can hydromodification assessment methods developed in other regions be applied to Santa Clara? A member of the Expert Panel[5] commented that this is a reasonable question to ask but one that can be resolved. If models are calibrated to local conditions and the relevant processes are described adequately, methods from other regions in North America can be used. In other words, if the hydromodification assessment methodology incorporates the relevant physical processes, then differences between regions - or differences between subwatersheds - are accounted for and a model can produce consistent results.

Factors Used to Justify a Basin Wide Standard

The factors that were considered to compare the results for the test watersheds include the estimated erosion potential values and the range of flows to be managed for hydromodification.

[5] The Peer Review Team includes Professor Matt Kondolf, UC Berkeley; Professor Tom Dunne, UC Santa Barbara; and Professor Brian Bledsoe, Colorado State University.

Erosion Potential. One important element of estimates of erosion potential is that the range in values does not differ significantly between subwatersheds. Even though the subwatersheds have different climatic, physiography, soils and vegetation characteristics; the erosion potential (Ep) is normalized on each subwatershed's own baseline conditions. That is, the denominator of the Ep value is the work index (or amount of work done by stream flows) for the pre-urban condition of that subwatershed. In this way, the difference in critical shear stress between stream systems is accounted for in the baseline condition. Different stream systems can have different absolute values of work (higher or lower), but have similar tolerances for change.

Range of Flows. Critical flow (Qc) is defined as the stream flow that produces the critical shear stress (τc) and initiates bed movement or erodes the toe of streambanks. The critical flow in the stream must be partitioned or related to an on-site project based variable. The in-stream critical flow was related to the pre-urban 2-year peak flow and was generalized as being 10% of the 2-year pre-urban peak flow. The results for Thompson Creek and Ross Creek are similar so that separate definitions for Qc are not required

The upper limit on the range of storms has been determined by evaluating the percent that different flow magnitudes contribute to the total work done on the channel boundary. The low flows contribute the most work, whereas high flows contribute less. Approximately 90% of the total work on the channel boundary is done by flows between Qc and the pre-urban 10-year peak flow magnitude. Flows greater than the 10-year peak flow contribute only 10% of the total work. The range of storms analysis is discussed further in Chapter 4.

Conclusions. The results indicate that Ross Creek and San Tomas Creek are not significantly different from Thompson Creek and do not warrant a separate hydromodification standard, criteria, or threshold of adjustment. Although the absolute magnitude of the computed work indices is different, the Ep ratio is consistent between subwatersheds. The transition between stable and unstable channels occurs between Ep values of 1 and 1.2.

The estimates for the range of storms to manage (Qc to the 10-year pre-urban peak flow) are consistent between subwatersheds. The value of Qc is dependent on the bed and bank material characteristics of each subwatershed. However, approximating Qc as 10% of the 2-year pre-urban peak flow is generally consistent between subwatersheds for HMP management purposes.

One of the goals of this study was to develop an analytical method that could be used to predict hydromodification impacts from development. These studies were necessarily conducted in subwatersheds with primarily urban development without other potentially overlapping impacts like dams/reservoirs, gravel mining, etc. These test subwatersheds allow for the evaluation of urban impacts and the effectiveness of potential solutions. Implementation of control measures that mitigate hydromodification impacts from urbanization will not address problems generated from other sources of impacts, such as dams and reservoirs.

4. TECHNICAL ANALYSIS OF HYDROMODIFICATION CONTROLS

4.1 INTRODUCTION

Under Provision C.3.f, *Limitation on Increase of Peak Stormwater Runoff Discharge Rates*, Dischargers (Co-permittees) must manage increases in peak runoff flow and increased runoff volume from certain new development and redevelopment projects so that post-project runoff does not exceed estimated pre-project rates and/or durations. This applies to conditions where the increased runoff from the project will result in increased potential for erosion or other adverse impacts to beneficial uses that are attributable to changes in the amount and timing of runoff.

How can increases in runoff peak flow, volume, and duration created by development projects be managed? This chapter describes the technical analyses that provided the basis for development of hydromodification control standards for the Santa Clara Basin.

4.2 DESIGN APPROACHES

Several approaches to the design of on-site measures for hydromodification control were explored:

- **Flow duration control** is a method that maintains the magnitude and duration of post-project flows at the same level as the pre-project flows, for the full distribution of flows between an upper and lower limit. The flow duration approach considers the entire multi-year discharge record, as opposed to a single event. Flow duration control also achieves volume control for the full distribution of flows.
- **Volume control** is an approach in which only the amount of runoff generated from the pre-project site may be discharged from the site after development. The difference between the pre-project and post-project runoff volumes is stored on-site in a basin and either infiltrated, discharged to another stream segment which would not be impacted by increased flows, or discharged at a very slow rate (i.e., less than the critical low flow for the stream). There is no control of the discharge rate or duration of the remaining (pre-

project) runoff volume.

- **Hydrograph matching** is a method that maintains the post-project volume and distribution of flows at the same level as the pre-project flows for a single design storm event. This method is used in combination with a volume control basin to provide control of the discharge rate of the pre-project volume.

4.3 SUMMARY OF SUPPORTING TECHNICAL ANALYSES

In developing a proposed hydromodification control standard, a number of technical issues needed to be addressed:

1. What is the rainfall event, or range of events, below which the standard and management requirements apply (i.e., what is the design rainfall event)?
2. Will HMP controls be effective in protecting streams if they are designed based on discrete rainfall events or do they need to control increases in runoff based on a continuous flow record? For example, are volume control and/or hydrograph matching for discrete events an effective strategy? Are these approaches technically and economically feasible?
3. Is it possible to design an HMP control that matches the magnitude and duration of the pre-project runoff pattern (i.e., provide flow-duration control)? Is this approach technically and economically feasible and protective of the stream?

A series of technical memoranda were prepared to answer these questions. A summary of the findings and conclusions of Technical Memoranda (TMs) #4 through #8 is presented in Table 4-1 and described below[1]. These memoranda provided the technical basis and justification for the proposed hydromodification standard and performance criteria. The memoranda in their entirety are included in Appendix C of this report.

Range of Storms to Manage

Provision C.3.f.iv.3 of the permit requires that the HMP identify the maximum rainfall event below which the standard applies, or range of rainfall events for which the standard applies[2]. TM #4, *Evaluation of the Range of Storms for HMP Performance Criteria*, provides an evaluation of the range of flows that are the most important when considering stream channel erosion and hydromodification impacts. The evaluation is based on the erosion potential (Ep) methodology[3] developed for the Thompson Creek Subwatershed. It considers two land use scenarios, pre-urban (pre-1970) and future development in 2020, as an example of a "before" and "after" watershed condition, and assumes a stable, healthy stream as a baseline condition.

[1] TM #1 covers the HMP Assessment Methodology and TM #2 addresses the Exempt Areas Analysis, which is presented in Sections 2.8 and 5.3. TM #3 on Hydromodification Control Standards was incorporated into Chapter 5.

[2] RWQCB staff has indicated that, although paragraph C.3.f.iv.3 refers to rainfall events, management of hydromodification should be focused on runoff and stream flows (personal communication with Jan O'Hara, RWQCB). Appendix A of TM #4 provides a discussion of the distinction between rainfall event and flow event frequencies or return periods.

[3] The erosion potential (Ep) is a measure of amount work done hydraulically on the stream channel above a baseline condition (pre-project). Ep is expressed as a ratio of the post-project work done to the pre-project work done. Work done is measured using the "effective work index" (W) described in Chapter 3.

Table 4-1
SUMMARY OF HMP TECHNICAL MEMORANDA #4 - #8[4]

Topic	Preliminary Conclusions
Evaluation of Range of Storms	
a) TM #4 – Define the rainfall event below which these standards apply.	• Critical low flow, Qc (approx. 10% of 2-year pre-urban peak discharge) to the 10-year pre-urban peak discharge.
Volume Control / Discrete Events	
a) TM #5 – Volume control effectiveness	• Volume control alone does not protect stream from increased erosive forces.
b) TM #7 – Hydrograph matching	• Sizing flow control basins to match the pre-project runoff hydrographs for discrete events does not closely reproduce the pre-project flow-duration patterns for other storms.
c) TM #6 – Example problem (SCS)	• Basins are technically feasible and may be economically feasible for infiltration rates of 0.2 in/hr and greater. • From 7% to 10% of the contributing impervious area (public streets, in this example) is required for volume control facilities sized for the 2-, 5-, and 10-yr storms.
– Cost analysis	• Costs do not vary much for volume control basins designed to control the 2-, 5-, and 10-yr storms. • About $3-4K per lot for onsite BMP, plus $1-2K per lot for regional basin (excluding land costs); maximum basin depth of 4.0 feet.
Flow Duration Control	
a) TM #7 – Basin sizing for flow-duration matching	• Basin and outlet structure can be sized to match pre-project flow-duration curve
b) TM #7 – Example problem (Thompson Creek)	• About 3-5% of the drainage area (4-6% of impervious area) is required for flow duration control (Infiltration rate = 0.2 in/hr); basin depths range from 10 feet for 3% to 4 feet for 5%.
– Cost analysis	• About $600 per lot for regional basin (excluding land costs).
c) TM #8 – Small project example in San Jose (3.6 acre, 12-lot subdivision)	• Basin sized using HEC-HMS model, SCS, and Rational Method; HMS model result was smallest. • About 1-2% of drainage area (3-5% of impervious area) required for flow duration control basin (infiltration = 0.2 in/hr), moderately steep slopes; basin depth of 1.75 to 3.0 feet; landscape controls on individual lots reduced basin size by about 35%.

[4] TM #1 covers the HMP Assessment Methodology and TM #2 addressed the Exempt Areas Analysis, which is presented in Section 2.8 and 5.3. TM #3 on Hydromodification Control Standards was incorporated into Chapter 5.

The analysis looks at cumulative "work" curves for various stream cross-sections before and after development. "Work" is a measure of the erosive hydraulic forces on the stream, and a cumulative work curve shows the percentage of total amount of work done for various stream flow rates occurring over the period of rainfall record (as simulated by the hydrologic model). The cumulative work curves showing the range of significant flows at selected cross-sections before and after development are presented in Figures 4-1 and 4-2.

These figures show that the flows that appear most important in controlling erosion and sediment transport processes range from near zero to the 10-year peak flow. A significant amount of the total work done (90-95%) on the channel bed and banks is associated with flows up to the 10-year peak flow. Flows higher than the 10-year peak flow perform a very small percentage of the total work (5-10%) because they occur infrequently over the period of record. A comparison of Figure 4-2 to Figure 4-1 indicates that a larger percentage of work is done by the lower flows than what was done before development; however, the range of significant flows appears to be the same as Figure 4-1. Selecting the 10-year predevelopment peak flow as the upper limit is consistent with a "knee of the curve," cost-effectiveness approach for controlling erosive flows.

A range of flows should be selected that is protective of all stream segments downstream of the discharge point. The 10-year peak flow is believed to be an appropriate upper limit for the range of flows to be managed in the Thompson Creek Subwatershed considering results at all cross-sections (and later assessments confirmed this to be true for the Ross Creek Subwatershed as well, as described in Chapter 3). There may be locations in the downstream portion of the watershed that could control a range of flows with an upper limit less than the 10-year peak flow and be protective of downstream segments; however, an Ep analysis would have to be performed consistent with the methodology described in this report to confirm this for a particular project.

The lower limit of the range of geomorphically significant flows is based on the critical flow in the stream, "Qc," i.e., the flow that produces the critical shear stress and initiates bed movement. This concept was discussed in Chapter 3. Estimated critical flows for Thompson Creek ranged from 1 cfs to 18 cfs depending on the conditions of the stream segment. Critical flows for Ross Creek range from 15 cfs to 25 cfs, again depending on the location in the stream. As described in Chapter 3, the in-stream critical flow for each stream segment was related to the pre-urban 2-year peak flow for that segment. For both Thompson and Ross Creeks, the critical flow was roughly equal to 10% of the pre-urban 2-year peak flow.

In conclusion, the range of flows considered important for managing hydromodification is from Qc (10% of the pre-urban 2-year peak flow) to the pre-urban 10-year peak flow.

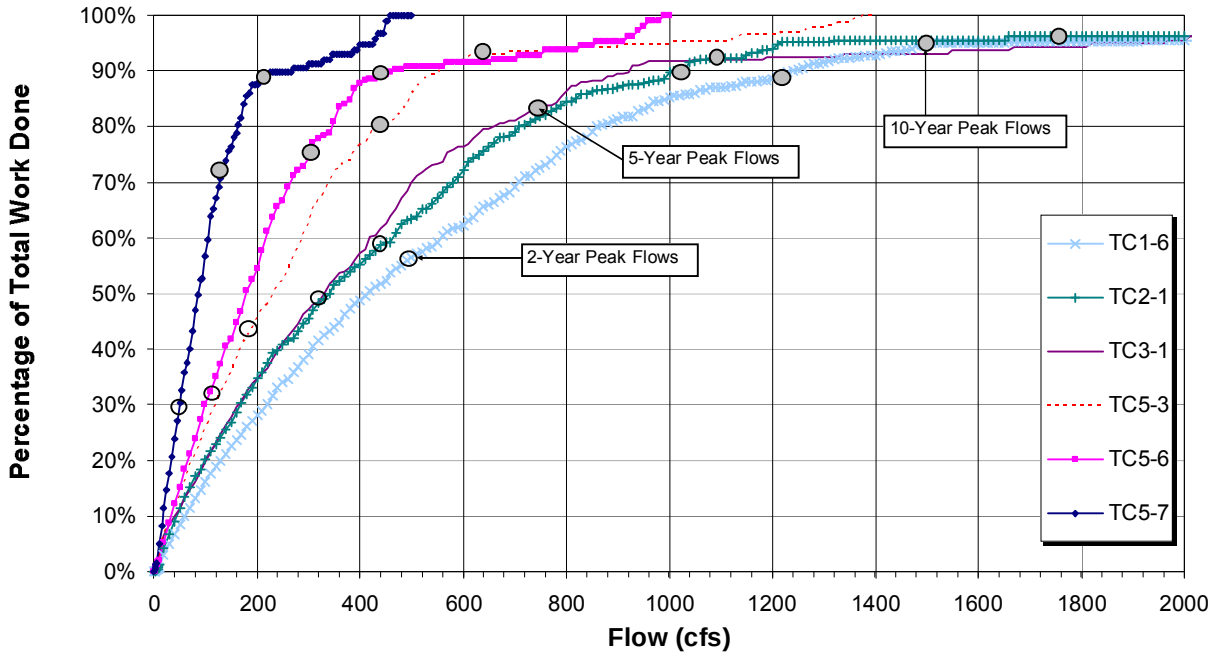

Figure 4-1 - Cumulative Work Curves Showing Range of Significant Flows <u>before</u> Development
(using Thompson Creek stream segments as an example)

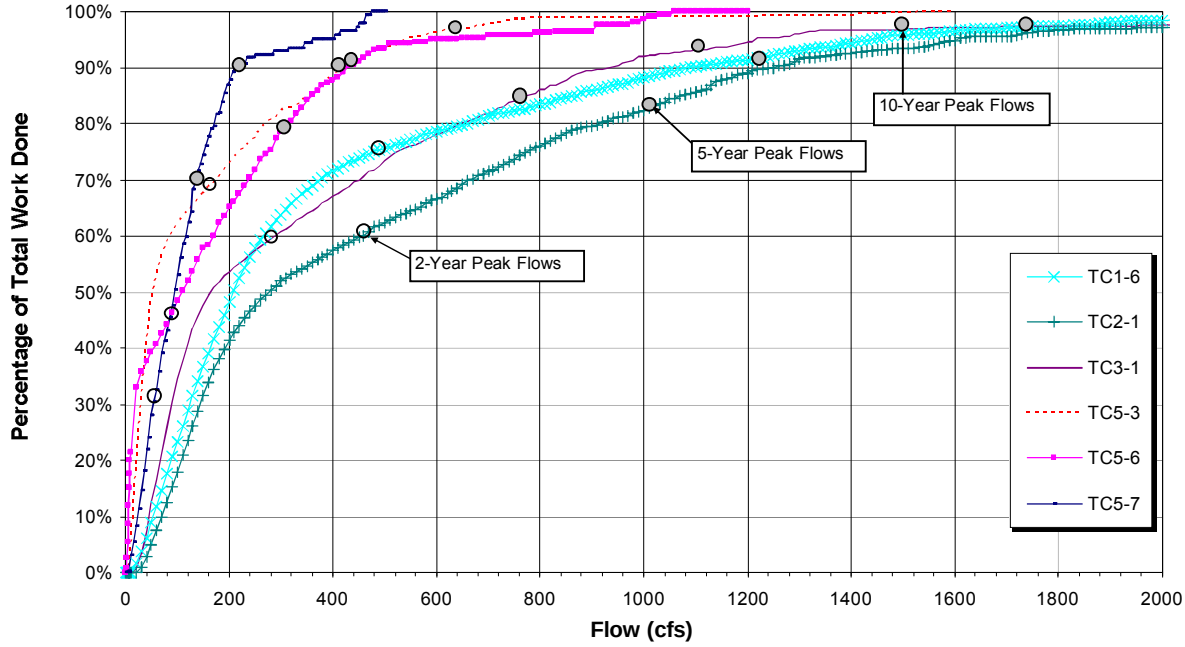

Figure 4-2 - Cumulative Work Curves Showing Range of Significant Flows <u>after</u> Development
Note: 2-, 5-, and 10-year peak flows indicated represent <u>pre-development</u> peak flows for comparison with Figure 4-1.

Flow Duration Control

Historically, stormwater management facilities have been designed to maintain peak flow rates at their pre-development levels to prevent increases in the frequency of flooding due to new development. Facilities that control peak flow rates usually allow the duration of flows to increase, which can cause increased erosion of the downstream system. Therefore, stream systems that require protection from hydromodification require BMPs that control the duration of geomorphically significant flows (flows capable of moving sediment). Peak flow controls alone are not adequate for erosion control. In Ontario, Canada, MacRae (1996) observed that attempts to control the 2-year discharge with no consideration for the duration of flows resulted in equally degraded streams as implementing no BMP at all. This fact has also been recognized in western Washington, where the Department of Ecology has adopted a flow duration control standard in which pre- and post-project flow duration curves must be matched according to specified criteria.

TM #7, *Flow Duration Control Example*, provides two examples of the design of flow duration controls, one for the Thompson Creek Subwatershed and one for a watershed in Southern California. The flow duration approach involves: 1) simulating the runoff from the project site, pre- and post-project, using a continuous rainfall record (50 years of record in this case); 2) generating flow-duration curves from the results; and 3) designing a flow control facility such that when the post-project time series of runoff is routed through the facility, the discharge pattern matches the pre-project flow-duration curve. An example of the flow duration curve for the Thompson Creek example, which illustrates the hours of flows higher than or equal to each flow rate from the continuous simulation, is presented in Figure 4-3. The objective is to size a control measure such that the post-project curve matches the pre-project curve over the range of significant flows.

The continuous runoff time series from the future development is routed through a detention basin that diverts and retains a certain portion of the runoff. This portion to be retained is essentially the increase in surface runoff volume created between a pre-project and post-project condition. This captured runoff is assumed to be infiltrated in the basin for this example but can also be disposed of via evapotranspiration and/or discharge at less than the critical flow of the stream (Qc) The allowable discharge from the basin for this detained volume is 10% of the pre-project 2-year peak flow from the project site (called "Qcp") [5].

The flow duration basin is designed to have two pools: a low flow pool and a high flow pool. The low flow pool is designed to capture the difference in volume of runoff between the pre- and post-project conditions, as describe above. It will also capture small to moderate size storms, the initial portions of larger storms, and dry weather flows. The high flow pool is designed to store and release higher flows to maintain, to the extent possible, the pre-project runoff conditions. A flow duration basin can also serve as a water quality treatment facility and can be designed to treat dry and wet weather flows using a combination of extended detention and natural treatment processes.

[5] In computing Qcp, the allowable low flow discharge from a flow control structure on a project site, the original condition of the site before development must be considered. This does not imply that the developer is being required to provide flow controls to match pre-development conditions; rather, it is a means of apportioning the critical flow in a stream to individual projects that discharge to that stream, such that cumulative discharges do not exceed the critical flow in the stream. A description of the method for computing Qcp is provided in Appendix F.

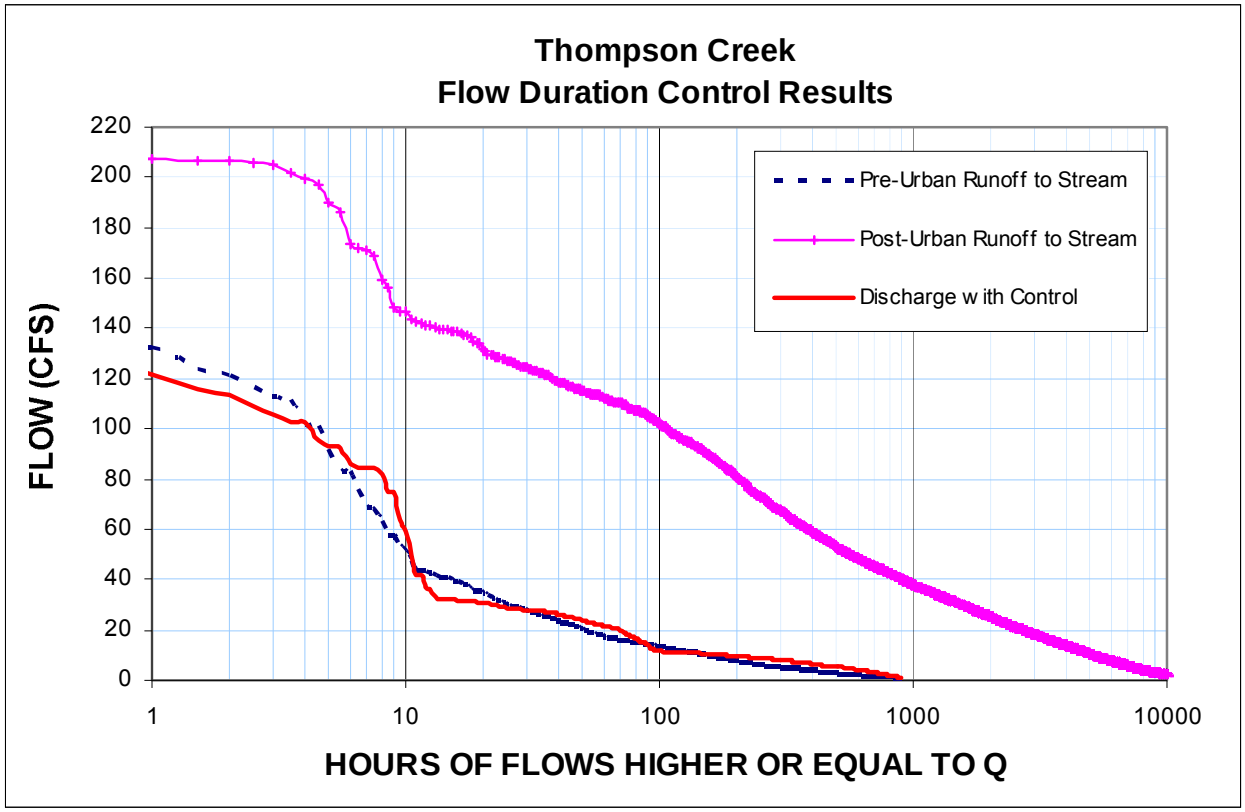

Figure 4-3 Flow Duration Curves for Thompson Creek Example

TM #8, *Sizing Flow Duration Controls for a Small Development Project in San Jose*, describes the application of the flow duration control analysis for a 12-lot, 3.6-acre subdivision in San Jose. In this example, about 1-2% of the drainage area was required for a flow duration control basin (given an infiltration rate of 0.2 in/hr, moderately steep slopes, and basin depths ranging from 1.75 to 3 feet). Hydrologic source controls (landscape features that reduced runoff) on individual lots reduced the basin size by about 35% in this example. (The effectiveness of site design and source control measures in achieving flow control and volume reduction depends on the imperviousness of the developed site.)

More details on these flow duration basin sizing examples, including cost estimates, are provided in Chapter 6. The economic feasibility of these controls is difficult to generalize, as it is highly dependent on site conditions; however, costs are similar to those required for traditional stormwater detention basins. Combining basins with treatment BMPs and using hydrologic source controls to reduce runoff can improve cost-effectiveness.

Basin design, specifically depth and area requirements, also affects feasibility. A shallow (1-3 foot) basin is more easily integrated into parks, playing fields, and other multi-purpose facilities; however, the surface area will be larger than a deeper basin. On the other hand, deeper basins (4 to 6 feet deep) will require less land area but will have less opportunity for alternate uses and

may need fencing or other security measures.

Volume Control and Hydrograph Matching

Technical Memorandum (TM) #5, *Evaluation of Volume Control Effectiveness*, describes an analysis of the effectiveness of volume control methods for managing hydromodification. Volume control means that only the amount of runoff equal to that generated from the pre-project site may be discharged from the site after development. The difference between the pre-project and post-project runoff volumes is stored on-site in a basin and either infiltrated, discharged to another stream segment (within the same subwatershed) which would not be impacted by increased flows, or discharged at a very slow rate (i.e., Qcp). It was originally thought that a volume control structure would be easier to design with standard engineering methods than a flow-duration control structure and thus less costly for small developments to comply with HMP requirements.

However, for control measures designed to maintain the pre-project runoff volume, it is assumed that there is no control of the discharge rate. When development increases the amount of impervious surface on a site, the pre-project volume is discharged at a higher flow rate and has a higher erosive power than the pre-project runoff. The evaluation found that volume control does not account for these differences in erosive power for the same volume at higher flow rates. To evaluate the effect of hydrograph shape[6] while maintaining pre-project volume, the work done by several hydrographs having different shapes but the same volume was compared to the work done by the pre-project hydrograph. The conclusion was that hydrograph shape does matter and unexpected stream erosion is likely if managing volume alone. (Refer to TM #5 in Appendix C for more details.)

From this result, hydrograph matching was then tested. TM #7, *Flow Duration Control Example*, provides a discussion of the effectiveness of hydrograph matching. Hydrograph matching is a method that maintains the post-project volume and distribution of flows at the same level as the pre-project flows for a single design storm event. This method is used in combination with a volume control basin to provide control of the discharge rate of the pre-project volume (i.e., after the difference between pre- and post-project runoff volume is removed, the remaining volume is discharged at a rate that matches the peak and duration of the design flow hydrograph.).

The analysis in TM #7 compares the effectiveness of various basins designed by matching discrete storm hydrographs at reproducing the pre-project flow duration curve. Specifically, three control basins were designed using independent discrete storm sizes (2-year, 10-year, and 50-year), and one sized using the full 50-year hourly record of runoff generated by the HEC-HMS hydrologic model.[7] The analysis shows that basins sized using discrete events do not match the pre-project flow duration curve (i.e., pre-project flow durations were exceeded over the range of expected flows). Use of a hydrograph matching approach for flow control basin design could result in stream channel erosion if widely used throughout a drainage area. Single event

[6] A hydrograph is a plot of stormwater flow versus time. The shape of the hydrograph describes the peak flow, volume, and duration of runoff for a single storm event.
[7] The Hydrologic Engineering Center Hydrologic Modeling System (HEC HMS) model is the model used to simulate the hydrology of the test watersheds to determine the stream flows resulting from a 50-year rainfall record under different land use scenarios (see Chapter 3, Section 3.3).

management strategies do not account for frequent low flows less than the 2-year storm, soil moisture conditions before a storm, partially filled basins when the following storm arrives, or the natural variability in rainfall patterns.

In conclusion, hydromodification controls designed for discrete event volume control or hydrograph matching do not provide adequate protection of the erosion potential of streams. The recommended method for hydromodification control is to maintain the pre-project flow duration curve via a flow duration control structure (supplemented by low impact development strategies that reduce the amount of post-project runoff generated at the site).

5. PROPOSED HYDROMODIFICATION CONTROL STANDARD AND PERFORMANCE CRITERIA

5.1 INTRODUCTION

Hydromodification control standards will be used by local agencies as part of the development plan review process to manage hydromodification impacts of development projects. This chapter describes the proposed hydromodification control standard, management objective, and performance criteria for new development and redevelopment projects covered by the HMP requirements.

5.2 PROPOSED STANDARDS

Hydromodification control standards, such as those used in the State of Washington and Canada, contain the following interrelated elements:

- The actual hydromodification control standard;
- Applicability statements or exclusions;
- Management (performance) criteria and/or thresholds; and
- Implementation strategies

Standards and criteria can be stream specific, watershed specific, or basin wide. Standards that are directed towards controlling runoff from individual development projects may allow alternative hydromodification controls to be identified on a project specific basis in stormwater basin plans, master plans, and EIR/EIS plans. Watershed planning is well suited for controlling hydromodification because stream erosion and adjustment is a function of the cumulative effects within a watershed. Alternative control requirements may be established through master plans that provide equivalent stream protection through a combination of project, drainage area, and in-stream controls.

In the case of the SCVURPPP NPDES permit, sections of Provision C.3.f provide a broad hydromodification control standard and statements of applicability, as described below. In order

to implement this standard, a recommended management objective and performance criteria were developed based on the findings of the watershed assessments and technical analyses described in Chapter 3 and Chapter 4. Findings from these analyses are presented in the discussion following each recommended criterion.

SCVURPPP Hydromodification Control Standard

The following sections of Provision C.3.f provide the hydromodification control standard and applicability statement.

> Hydromodification Control Standard
>
> *The Dischargers shall manage increases in peak runoff flow and increased runoff volume, for all Group 1 Projects, where such increased flow and/or volume can cause increased erosion of creek beds and banks, silt pollutant generation, or other impacts to beneficial uses. Such management shall be through implementation of a Hydromodification Management Plan (HMP). The HMP will be implemented so that post-project runoff shall not exceed estimated pre-project rates and/or durations, where the increased stormwater discharge rates and/or durations will result in increased potential for erosion or other adverse impacts to beneficial uses, attributable to changes in the amount and timing of runoff.* (Provision C.3.f.i)
>
> Applicability -- Exempt Areas
>
> *This requirement does not apply to new development and redevelopment projects where the project discharges stormwater runoff into creeks or storm drains where the potential for erosion, or other impacts to beneficial uses, is minimal. Such situations may include discharges into creeks that are concrete-lined or significantly hardened (e.g., with rip-rap, sackrete, etc.) downstream to their outfall in San Francisco Bay, underground storm drains discharging to the Bay, and construction of infill projects in highly developed watersheds, where the potential for single-project and/or cumulative impacts is minimal. Guidelines for identification of such situations shall be included as a part of the HMP.* (Provision C.3.f.ii)
>
> (Guidelines for identifying exempt areas are provided in Section 5.3 of this chapter.)
>
> Applicability -- Exempt Projects/ Reduced Requirements
>
> *The HMP may identify conditions under which some increases in runoff may not have a potential for increased erosion or other impacts to beneficial uses. Reduced controls or no controls on peak stormwater runoff discharge rates and/or durations may be appropriate in those cases, subject to the conditions in the HMP. In the absence of information demonstrating that changes in post-development runoff discharge rates and durations will not result in increased potential for erosion or other adverse impacts to beneficial uses, the HMP requirements shall apply.* (Provision C.3.f.iii)

Management Objective

The Hydromodification Control Standard above states that "the HMP will be implemented so that post-project runoff shall not exceed estimated pre-project rates and/or durations, where the

increased stormwater discharge rates and/or durations will result in increased potential for erosion…" The erosion potential analysis in Chapter 3 provides an index, Ep, to indicate the impact of increased flows on stream stability. Ep can be expressed as the ratio of post-project to pre-project "work done" on the stream. Using this index as a point of reference, the following proposed management objective was developed:

> *Stormwater discharges from a non-exempt, Group 1 development project shall not cause an increase in the erosion potential of the receiving stream over the pre-project (existing) condition, i.e., an Ep of up to 1.0 will be maintained for stream segments downstream of the project discharge point.*

Performance Criteria

The following section presents five proposed performance criteria for meeting the hydromodification control standard.

1. *Projects shall meet the management objective by providing stormwater controls as needed to maintain the pre-project stream erosion potential. Stormwater controls may include a combination of on-site, off-site (drainage area) and in-stream measures.*

   Discussion: This criterion incorporates the Ep management objective as well as flexibility to meet the objective with different types of controls. It recognizes that there may be limitations to achieving the objective on-site, due to space limitations, soil conditions, depth to groundwater, economic feasibility, and other factors.

2. *On-site controls that are designed to provide flow duration control to the pre-project condition are considered to meet the erosion potential management objective and comply with the HMP.*

   Flow duration controls shall be designed such that post-project stormwater discharge rates and durations match pre-project discharge rates and durations from 10% of the pre-project 2-year peak flow up to the pre-project 10-year peak flow.

   Discussion: Stream channel erosion is caused by the increase in flow duration for the small and moderate magnitude flows above the threshold for sediment transport and stream bank erosion. Flow duration control maintains the flow duration pattern of the pre-project condition. Maintaining the pre-project flow duration effectively also maintains pre-project runoff volume for the full distribution of flows from the critical threshold flow (Qc) up to the selected upper limit. Therefore, applying flow duration control to achieve the pre-project condition is considered to be fully protective of the existing condition of the stream segment to which the project discharges. These concepts are described in more detail in TM #7 (Appendix C).

   Flow duration matching does not require additional watershed and stream analyses to ensure that Ep is being maintained in the stream**.** The allowable low flow discharge from the project site (Qcp) can be estimated as 10% of the pre-project 2-year peak flow.[1]

[1] In computing Qcp, the allowable low flow discharge from a flow control structure on a project site, the original condition of the site before development must be considered. This does not imply that the developer is being required to provide flow controls to match pre-development conditions; rather, it is a means of apportioning the

Design of stormwater controls for flow duration matching does require continuous long-term hydrologic modeling of the project site. The design of flow duration controls is discussed further in Chapter 5 of this report. The procedure for design of a flow duration basin, including guidelines for matching the pre-project flow duration curve, is provided in Appendix F.

3. *Where on-site measures are not practicable for achieving flow duration control criteria, projects shall comply with the HMP requirements through the use of appropriate site design and source control measures, including treatment control measures with flow control benefits. In addition, where available, off-site and/or in-stream controls must be used to meet the management objective (see Performance Criterion #5).*

   Discussion: Meeting the flow duration control criteria generally requires some type of detention and/or infiltration facilities that reduce the volume and control the rate of post-project discharge. These types of facilities may not be suitable for all project sites due to space limitations, soil conditions, depth to groundwater, economic feasibility and other factors. When flow duration controls are not feasible on-site and off-site or in-stream control measures are available (see Performance Criterion #5), these additional measures shall be used to fully meet the management objective. If this option is not available, a project for which flow duration control is impracticable shall use site design measures and/or integrated management practices to achieve performance criteria to the maximum extent practicable. (See discussion under #4 below). Guidance on the use of these criteria is in the implementation of the HMP is presented in Chapter 7.

4. *Projects located on sites less than or equal to 20 acres in size that are not part of a larger phased development ("Small Site Project") and Smart Growth Projects[1] shall comply with the HMP requirements through the use of appropriate site design and source control measures and treatment control measures with flow control benefits. In addition, where available, off-site and/or in-stream controls must be used to meet the management objective (see Performance Criterion #5). If this option is not available, a Small Site or Smart Growth Project shall use site design measures and/or integrated management practices to match pre-project discharge volumes and times of concentration[2] for 10-year storm to the maximum extent practicable[3].*

   Discussion: Projects on small sites can have challenges with meeting HMP requirements due to space limitations and economic feasibility. Regulators and municipalities agree that it is not desirable or practical from a maintenance standpoint to have a large number of small flow duration basins spread throughout the Valley. One approach for developers of small sites is to contribute funds to an off-site (regional or in-stream) project

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critical flow in a stream to individual projects that discharge to that stream, such that cumulative discharges do not exceed the critical flow in the stream. A description of the method for computing Qcp is provided in Appendix F.

[1] "Smart Growth" is defined by each municipality's General Plan and/or policies.

[2] Time of concentration is defined as the length of time required for runoff to travel from the most remote point in the drainage area to the point of interest, say a storm drain inlet or receiving water.

[3] Flow control basins must be designed per Performance Criteria #2.

commensurate with the expected impacts of the project. However, this approach is not feasible until off-site projects have been identified and planned and a mechanism for funding established.

Integrated management practices (IMPs) are small scale, distributed stormwater management techniques such as bioretention facilities, infiltration trenches, filter strips, vegetated swales, and multi-functional landscape areas (a subset of the "site design measures" described in the SCVURPPP permit). The objectives of site design measures and IMPs used to comply with the HMP are to: 1) reduce runoff volume through the reduction of impervious surface area and provide opportunities for infiltration; and 2) increase the time of concentration of runoff to approximate that of the pre-project condition. Time of concentration can be increased by lengthening flow paths and allowing impervious areas to flow onto pervious areas.

Runoff reduction and time of concentrations can be computed using a discrete storm event approach (based on a 10-year design storm) until modeling tools are available for simulating the effectiveness of IMPs (see Chapter 7). If a retention-detention basin or a structure that detains and releases flow is included as part of IMPs to meet the volume and time of concentration requirements, it should use flow duration matching.

The SCVURPPP Co-permittees intend to collect data on the implementation of the HMP at small sites for a period of two years after the start of implementation, and plan to re-evaluate the small site size threshold and approach at that time.

5. *Off-site (drainage area) or in-stream controls may be implemented to address potential project impacts in lieu of or in combination with on-site controls, where an approved plan, including an appropriate funding mechanism, is in place that accounts for the stream changes expected to result from changes in project runoff conditions. The off-site or in-stream controls or combination of controls shall be designed to achieve the hydromodification management objective threshold of Ep $\leq$ 1.0.*

   Discussion: When a combination of on-site and off-site measures is proposed for hydromodification management, the erosion potential index, Ep is used to determine the effectiveness of the combination of controls in protecting the stream. Using an in-stream erosion potential criterion is the most direct method of comparing pre- and post-project potential for erosion. This method incorporates analyses of the actual forces on the channel from stormwater discharges before and after the project. Using this method, a project may be allowed to discharge runoff at higher rates and durations than a flow duration criterion would allow, as long as the stream is protected downstream of the project discharge point using off-site controls within the same drainage area or in-stream protection measures.

   Using the Ep method involves a hydrologic and geomorphic evaluation of the stream system downstream of the project. The method requires computing stream flows at several locations within a stream system and the work done on the stream channels before and after development. A continuous hydrologic model is required as well as geometric and geomorphic data at each location.

The District has an SMP (Stream Maintenance Program) through which in-stream projects are permitted and approved. The SMP may provide the basis for an in-stream program to support hydromodification management (see Chapter 7 for discussion).

5.3 EXEMPT AREAS AND PROJECTS

This section of Chapter 5 provides guidelines that Co-permittees can use to identify project types and/or areas within the Santa Clara Basin that may be exempt from hydromodification controls under Permit Provision C.3.f.ii and explains how the various exemptions will be applied. Program staff worked with the Exempt Areas Subgroup of the HMP Work Group, including representatives of Palo Alto (Chair), San Jose, Sunnyvale, and the Water District, to develop the guidelines. Permit Provision C.3.f.ii states:

> *"This requirement does not apply to new development and redevelopment projects where the project discharges stormwater runoff into creeks or storm drains where the potential for erosion, or other impacts to beneficial uses, is minimal. Such situations may include discharges into creeks that are concrete-lined or significantly hardened (e.g., with rip-rap, sackcrete, etc.) downstream to their outfall in San Francisco Bay, underground storm drains discharging to the Bay, and construction of infill projects in highly developed watersheds, where the potential for single-project and/or cumulative impacts is minimal. Guidelines for identification of such situations shall be included as part of the HMP. However, plans to restore a creek may re-introduce the applicability of HMP controls, and would need to be addressed in the HMP."*

The Permit also recognizes that some projects will be exempt from HMP requirements "*where increased stormwater discharge rates and/or durations will not result in increased potential for erosion or other adverse impacts to beneficial uses*", e.g. where post-project runoff will not exceed estimated pre-project rates and/or durations (Provision C.3.f.i.).

A project may be exempt from HMP requirements under three conditions:

1. Exemption based on project characteristics (e.g., the project will cause no increase in the potential for erosion or other impact to beneficial uses, such as where the post-project flow rate and/or duration will not exceed the estimated pre-project condition);
2. Exemption based on the condition of the stream segment to which the project ultimately discharges (i.e., there is minimal potential for erosion or other impact on beneficial uses in that segment and downstream segments); or
3. Exemption based on project location, i.e., the project is an infill project in a highly developed watershed.

Guidelines for determining whether one of these conditions applies to particular a project are provided below.

Exemption Based on Project Characteristics

The HMP requirements do not apply to projects where there is no potential for erosion or other impact to beneficial uses. These are projects for which estimated post-project flow rates and/or durations will not exceed estimated pre-project conditions. For the purpose of this exemption,

"pre-project condition" is defined as the existing condition of the site prior to construction of the project in question, not the original condition of the site.

A simple indicator of the post-project runoff pattern is the amount of impervious surface on the site upon completion of construction. If a project does not increase the amount of directly connected impervious area (DCIA)[1] on the site (i.e., the DCIA of the post-project condition will be the same as or less than the DCIA of the pre-project condition) and does not significantly change the drainage pattern from the site, then the HMP requirements do not apply to that project because it will not cause an increase in stormwater discharge rates, volumes, or durations. An example of this type of project is a redevelopment project that has the same amount of roof area, parking lot, and hardscape as the previous use of the site.

The amount of impervious surface is not the only indicator of pre-project runoff. For example, a project may be able to show that even though the impervious surface area has increased, actual runoff will be less because permeability of the remaining area will be enhanced by the project and there is less directly connected impervious surface. The effect of the project on runoff rates and durations is also determined by any changes in the topography and/or storm drain infrastructure on the site.

Several Co-permittees have reported that many of the recent redevelopment projects in their jurisdictions actually reduce the amount of impervious area that was present before construction, due to stricter landscaping requirements and better site design practices. The use of swales, pervious paving and landscape features for stormwater treatment also results in reduction of impervious surfaces.

Even where post project rates and/or durations will increase over pre-project levels, a project may still be exempt if the project proponent can demonstrate that there will be no increase in potential for erosion or other adverse impact to beneficial uses. For this purpose, a project proponent may conduct stream-specific field and modeling studies that are consistent with the method used in this report to estimate the impacts of a particular project.

Exemption Based on Stream Segment Condition

Projects located within areas that drain to stream segments that are unlikely to erode or experience other impacts from increased flows are exempt from HMP requirements. Four guidelines identify such stream segments. Figure 5-1 illustrates the application of these guidelines to the streams in the Santa Clara Valley and the catchment areas that are exempt from HMP requirements as a result.

1. **Project area drains to a stream channel within the tidally influenced area.**

   Within tidally influenced areas, the daily fluctuations in flow move sediment within the tidal zone; therefore it is unlikely that increases in flow to these areas would cause further erosion in the stream channel. Figure 5-1 shows the farthest upstream locations of the tidal zone in

[1] Directly connected impervious area is defined as an area covered by an impervious surface that drains directly across other impervious surfaces to a storm drain without first flowing across a pervious surface such as a lawn or vegetated area.

Santa Clara Valley streams. Areas that discharge stormwater into a stream below this point are exempt.

Tidally influenced stream segments were identified using the SCVWD GIS data layer entitled "Mean Higher High Water (MHHW)." The furthest upstream end of the stream segment identified as "below MHHW" in the GIS database represents the furthest limit of area regularly inundated by tidal flows (SCVWD 2000). The elevation of MHHW was digitized for each Santa Clara Valley stream to indicate the farthest upstream location influenced by this criterion, with the exception of Barron, Matadero and Adobe Creeks, which are no longer tidally influenced due to the construction of tidal gates located farther downstream.

2. Project area drains to a non-earthen stream channel that is hardened on three sides and extends continuously upstream from the tidally influenced area.

Stream channels that have already been hardened on all sides are not susceptible to erosion. Permit Provision C.3.f.ii states that channels that are continuously hardened downstream to their outfall to the Bay are exempt from HMP controls. Intermittent hardened segments further upstream that discharge to a non-hardened segment are not exempt. Channel segments and tributary catchment areas considered exempt from HMP requirements are shown on Figure 5-1.

The designation of hardened channel segments on Figure 5-1 is based on the following data sources. The SCVWD's Water Ways Management Model (WWMM) is the primary available information source for channel type and channel material. Specifically, information about channel materials contained in attributes that describe channel bottom and channel sides was used (e.g., concrete, gabion, or rock). For stream segments that did not contain information on channel materials, the channel type attribute was used to identify hardness of channels. Analysis of the data showed that certain channel types were typically hardened on all three sides (i.e., occurred for more than 90% of the records). These channel types included culverts (e.g., box, pipe) and concrete channels (e.g., trapezoidal and rectangular). Where these channel types had no channel material information, they were assumed to be hardened on all three sides. In addition, several non-hardened channel segments were considered exempt because they were less than 1,000 feet in length and had hardened channel segments above and below them, or were within 0.5 miles upstream of a tidal area and had hardened channel segments above them. The data supporting exemption of six specific segments is presented in Appendix G.

Field verification of channel condition is recommended as part of project development. Localized applications of rock riprap do not qualify a reach as "hardened" because bank failure can occur (and has been observed) around riprap due to excess velocities.

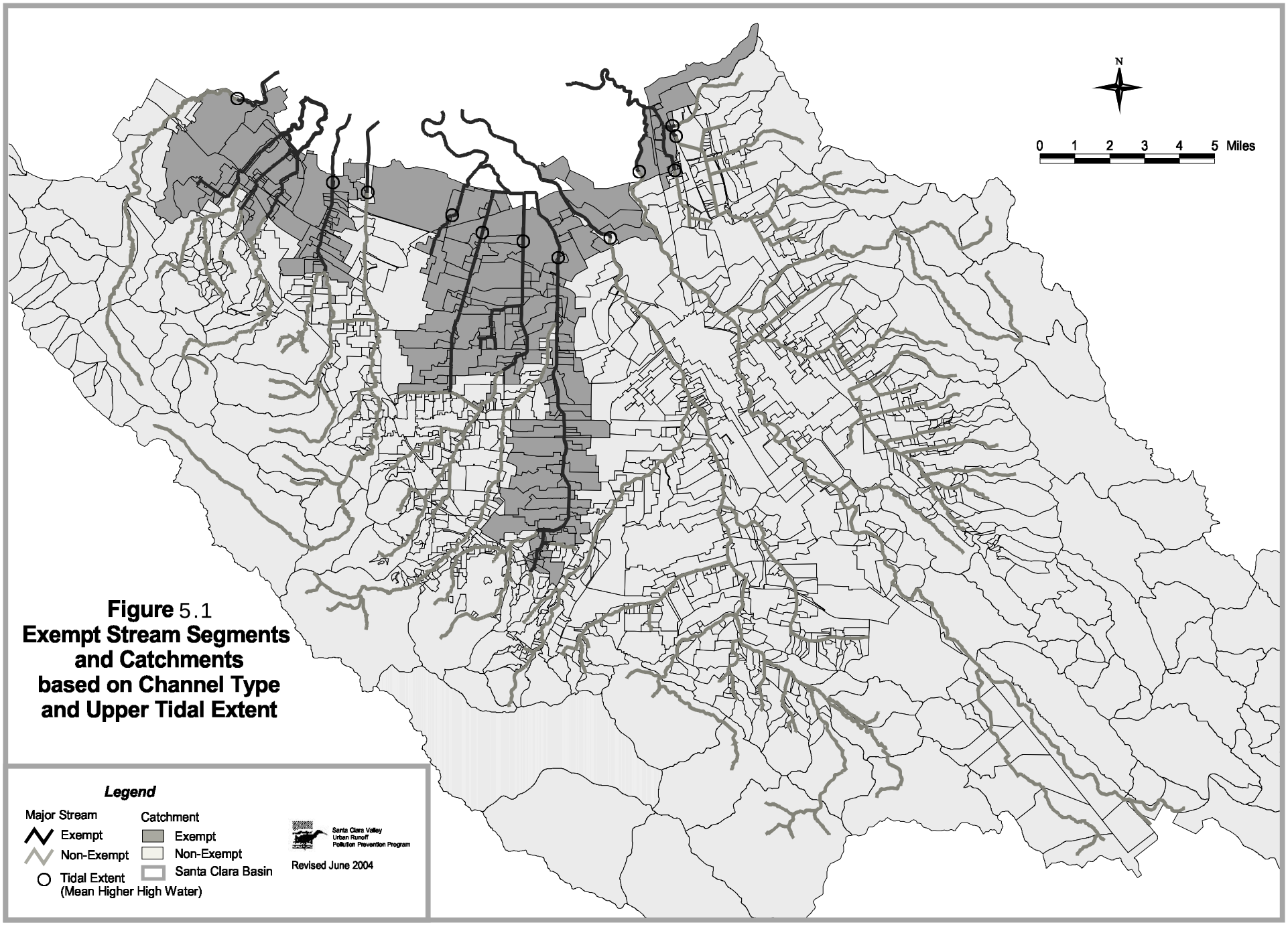

Figure 5.1
Exempt Stream Segments and Catchments based on Channel Type and Upper Tidal Extent

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3. Project drains to Sunnyvale East or West Channels

The Sunnyvale East and West Flood Control Channels and areas draining to them are considered exempt from HMP requirements. These channels were constructed by the Water District in 1964-1967 and 1959, respectively, to provide drainage for a large area of Sunnyvale between Stevens Creek and Calabazas Creek, where natural channels did not historically exist. (This exemption does not apply to the Stevens or Calabazas Creek watersheds.)

The Sunnyvale East and West Channels are constructed of diked earthen materials that have been compacted during construction. They occur in a low-lying area of the Valley and have significant areas of tidal influence in their northern sections. For these reasons, the potential for erosion in these channels from increased flows resulting from upstream hydromodification is minimal. Additional justification for the exemption of these channels is presented in Appendix G.

4. Project drains to an underground storm drain that discharges directly to San Francisco Bay.

The permit specifically exempts projects that drain to "underground storm drains discharging to the Bay", as these will not cause erosion in stream segments. Areas in which such projects would be located are likely contained within the areas exempted due to discharge to tidally influenced stream segments. The final determination should be made from the project storm drain maps.

Exemption for Infill Projects in Highly Developed Watersheds

Analysis

Provision C.3.f.ii states that HMP controls do not apply to "*construction of infill projects in highly developed watersheds, where the potential for single-project and/or cumulative impacts is minimal.*" Two approaches that the Program explored for identifying highly developed watersheds, the percent imperviousness approach and the percent developed or "build-out" approach, are described in Section 2.8. Analysis of these two approaches resulted in development of guidelines for identifying the projects that will be exempt using the recommended "percent build-out approach."

As a result of this analysis, the Program proposes that a subwatershed that is 90% built-out be considered a highly developed watershed. Co-permittees should conduct the subwatershed-scale percent buildout analysis described in Section 2.8 for their local jurisdictions. Analyses that have been completed to date for San Jose, Milpitas, Palo Alto and Santa Clara County are presented in Appendix H. The Program will work with other Co-permittees to complete their build-out analyses.

Exemption Statement

All "infill" projects located within highly developed subwatersheds (i.e., those that are 90% or more developed, based on a build out analysis for the Co-permittee's service area) shall be

exempt from HMP requirements. "Infill" projects are those in an area developed with urban uses and served by urban infrastructure.

Proposed Guideline for Identifying Exempt Projects Using "Percent Build-out" Approach

Provision C.3.f.ii states that HMP requirements do not apply to infill projects in highly developed watersheds. That is, in order to be exempt, a project has to be categorized as "infill" and located in a highly developed watershed. Thus, there are two steps to the application of this guideline.

Step 1. Is the project in a highly developed watershed?

Subwatersheds with developed areas constituting 90% or greater of the total subwatershed area (i.e., 90% built out) are considered highly developed watersheds.

Step 2. Is the project an infill project?

The following definition and guideline should be used when determining whether a project is an infill project:

> Infill Development – development of vacant or underutilized land within areas that are already developed with urban uses and served with urban infrastructure (e.g., sanitary sewers, water mains, etc.).

All projects that meet the definition of infill development and are located within subwatersheds with 90% or greater build out may be considered exempt from HMP requirements, except those located on the edge of the highly developed area (i.e., on the "urban fringe").

Application of HMP upon Proposed Change in Land Use from Low Intensity Development

The percent developed approach for defining a highly developed watershed considers Low Intensity Development land uses (such as parks, designated open space, cemeteries, golf courses, schools, and single family homes built at one dwelling unit per acre or less) as "developed land" if they have been fully developed according to the designated zoning for those parcels. Any Group 1 project on a site greater than 20 acres that is redeveloped from a low intensity development land use to a higher intensity land use (i.e., allowing a greater amount of impervious surface on the site than allowed by the General Plan designation and zoning in place at the time of HMP approval) shall be subject to HMP performance criteria. This requirement only applies to projects in highly developed watersheds and does not apply to projects on sites less than or equal to 20 acres.

Encouragement of Voluntary Measures

These guidelines advise Co-permittees to recommend that all Group 1 project developers, even those exempted from HMP requirements, incorporate flow reduction into the project design, as part of site design and treatment controls, to the extent possible on the project site. This is less important for those areas that discharge to a tidal zone, a hardened channel or directly to the Bay.

Application of Exemption Guidelines

A flow chart for determining whether HMP requirements apply to a particular development project is presented in Figure 5-2.

Future Analyses

The District and its consultants have recently completed field investigations to determine the most downstream limit (MDL) of reach-wide, active erosion on a number of creeks in the Santa Clara Valley. Each MDL reach is characterized by an upstream end where the creek is at the threshold of a medium-to-high level of erosion. Further development which increases the impervious area upstream of the MDL could accelerate the erosion at the upstream end of the reach and increase the length of creek that is unstable.

The SCVURPPP Co-permittees have not had the opportunity to review the MDL concept thoroughly or discuss whether and how it fits within the framework of the HMP. The Program plans to facilitate the review of the MDL analyses, both by the Co-permittees and by the HMP Expert Panel, and then work with the Management Committee to determine the need to integrate some or all of the MDL analyses in the implementation of the HMP. This review and any additional analyses will be completed within the first two years of implementation of the HMP.

Figure 5-2
HMP Applicability and Requirements Flow Chart

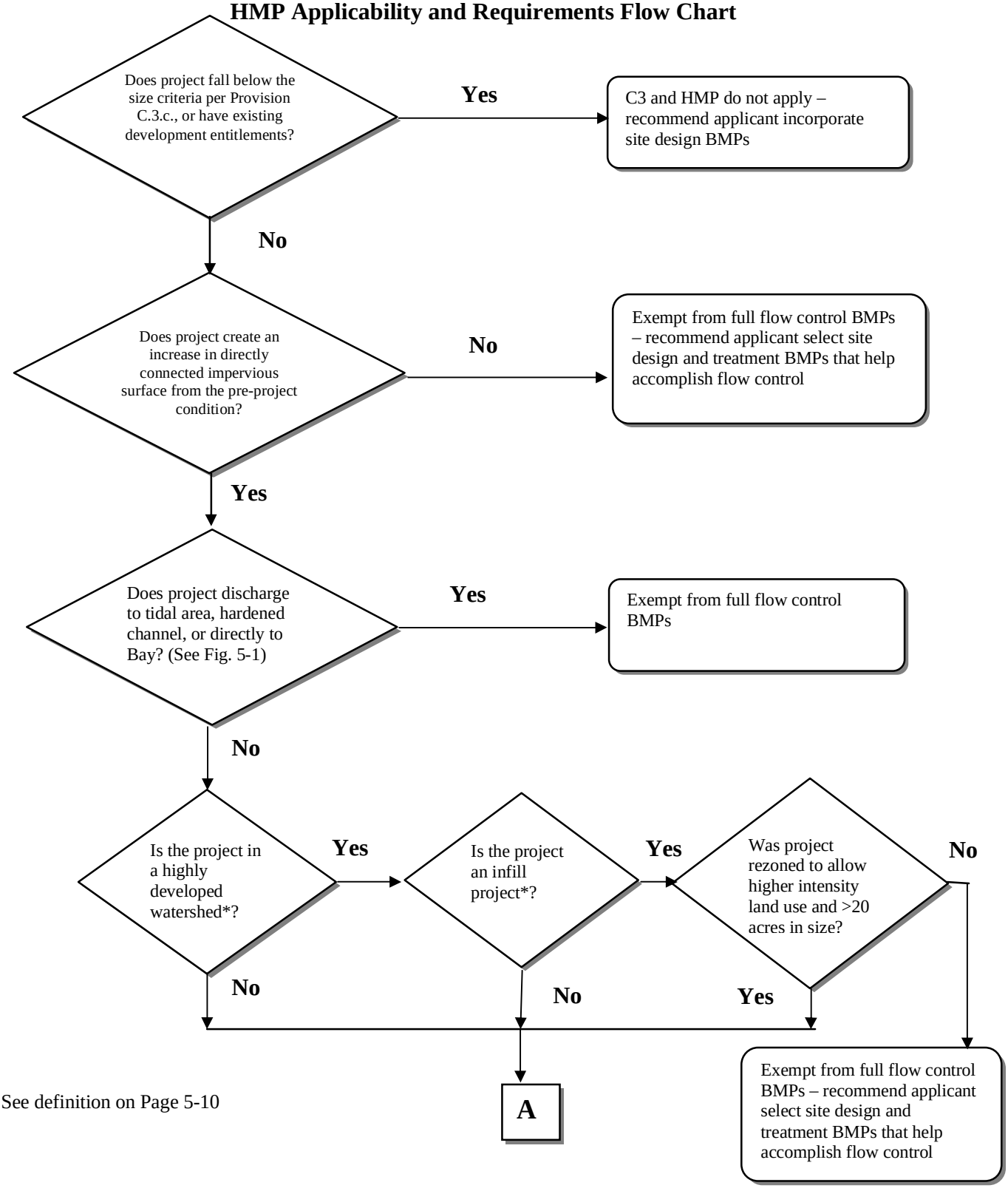

* See definition on Page 5-10

Figure 5-2 **(Cont'd)**
HMP Applicability and Requirements Flow Chart

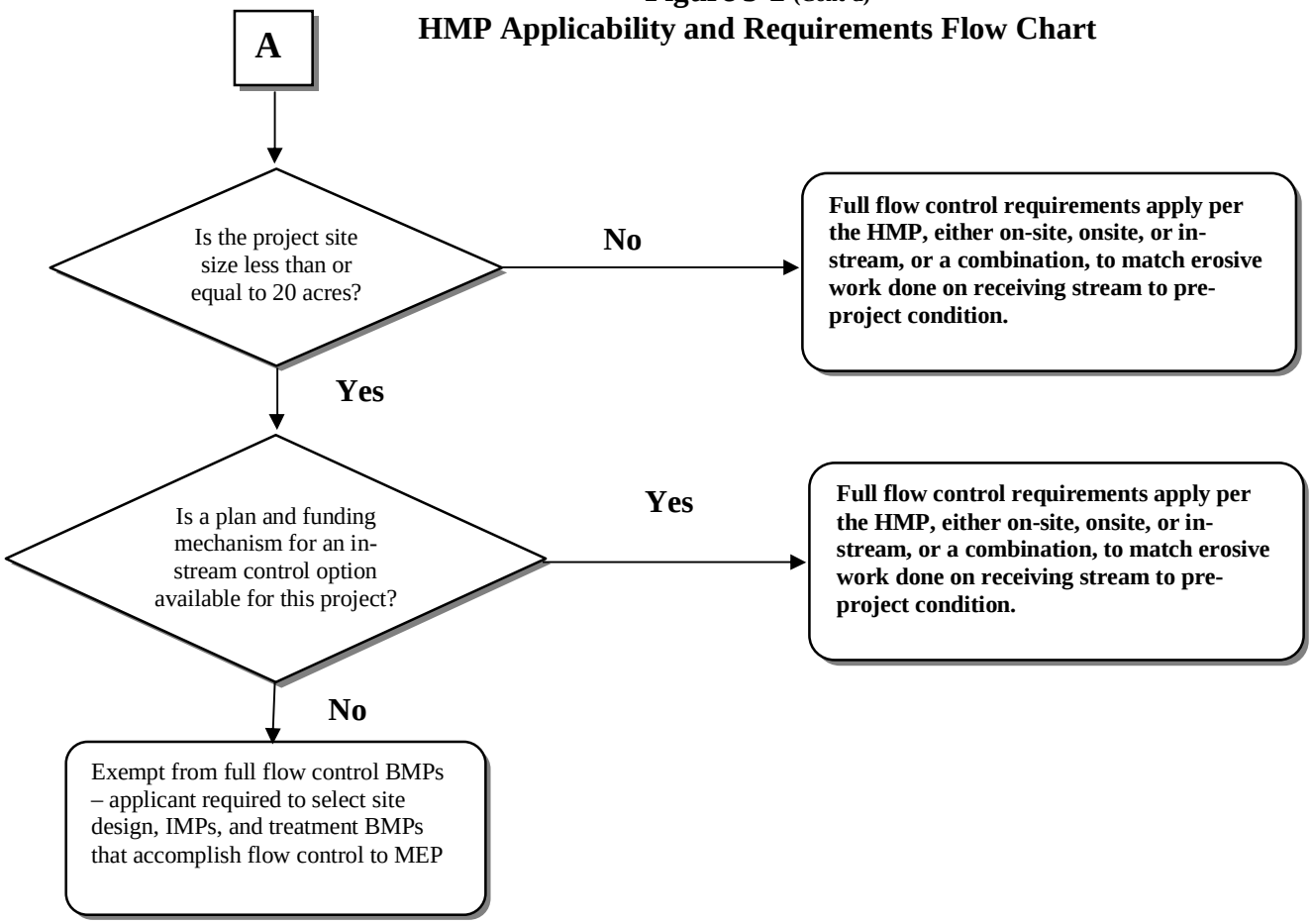

6. GUIDANCE FOR SELECTION AND DESIGN OF HYDROMODIFICATION CONTROL MEASURES

6.1 SELECTION OF CONTROL MEASURES

Types of Control Measures

Hydromodification controls are measures designed to meet the hydromodification control standards in Chapter 5. Hydromodification controls can be classified into the following categories:

- On-site controls (also referred to as project controls)
- Regional controls (including drainage-area controls and larger scale facilities)
- In-stream controls

On-Site (Project) Controls. Project controls are applied to individual projects when the site is developed or redeveloped. Project controls include site design features that are integrated into the development and are intended to reproduce, to the extent feasible, the natural processes of infiltration, evapotranspiration, and delayed runoff response. These are also known as "hydrologic source controls" because they have the effect of reducing runoff volumes resulting from development. Examples of such site design features include minimizing impervious surface areas, preserving natural areas, limiting development especially where native soils have good infiltration characteristics, directing roof runoff to bioretention areas, using vegetated swales in lieu of traditional gutter inlets and underground storm drains, and using soil amendments to improve infiltration and evapotranspiration.

Project controls also include flow control structures such as retention/detention basins and underground detention vaults and tanks. These may be needed to supplement the site design techniques for runoff volume and flow duration control to meet the hydromodification control standards. The two types of on-site controls are discussed in more detail below.

Site Design Techniques. Site design may be incorporated into the standard features of a development with only small to moderate changes in the project design. Appropriately applied, site design control techniques can reduce the runoff volume, duration and flow rate, and can reduce the infrastructure necessary to control and convey stormwater. Site design controls can be very effective at controlling geomorphically significant flows (i.e., erosive flows) and can be used to fulfill both water quality and flow control objectives. However, since site design controls

retain water on site through infiltration, evapotranspiration, and/or detention, their effectiveness depends on soil properties, groundwater levels, topography, and other site conditions.

The first step in this strategy is using design features that minimize the changes in the pre-project hydrograph by reducing impervious surfaces, breaking up impervious areas with pervious areas, disconnecting roof drains from direct connection to storm drains, and other options. Once all the strategies for minimizing the increase in runoff have been considered, then management practices that retain the excess runoff volume are employed (e.g., depressions in landscaping or "rain gardens", infiltration, and vegetated filters). These should be distributed throughout the development site. Where site design and retention in landscaping are not enough to meet hydromodification control standards, detention is then employed, where some of the excess runoff is held in storage and later released at a slower rate.

Following are examples of site design techniques:

Decrease Impervious Surface Area

1. Minimize the impervious footprint by increasing building density (e.g., increasing the number of stories above or below ground, or adding parking below ground).
2. Conserve natural areas, especially riparian corridors, by concentrating or clustering development on the least environmentally sensitive portions of a site while leaving the remaining land in a natural, undisturbed condition.
3. Construct walkways, trails, patios, parking lots, driveways, low-traffic streets and other low-traffic areas with open-jointed paving materials or permeable surfaces, such as pervious concrete, porous asphalt, unit pavers, and granular materials.
4. Construct streets, sidewalks and parking lots to the minimum widths necessary, provided that public safety and a walkable environment for pedestrians are not compromised. Incorporate landscaped buffer areas between sidewalks and streets.
5. Maximize canopy interception and water conservation by preserving existing native trees and shrubs, and planting additional native or drought tolerant trees and large shrubs.
6. Design driveways with shared access, flared layout (single lane at street widening to double lane at garage) or wheel strips (paving only under tires).
7. Use natural drainage systems to the maximum extent practicable.

Promote Infiltration and Evapotranspiration

1. Where native soils have good infiltration characteristics (say, infiltration rates of 0.5 in/hr or greater), consider using shallow infiltration trenches for infiltration of roof runoff, or eliminating downspouts and extending roof eaves over pervious areas. Where less infiltrative soils are present, amend the soils and disperse roof runoff through landscaping or swales sloped away from buildings.
2. Construct on-site ponding areas in landscaping (small depressions or rain gardens) to increase opportunities for infiltration.

3. Incorporate landscaping into parking areas and drain the impervious surfaces to the landscaped area.
4. Drain impervious driveways, sidewalks, walkways, trails, and patios into adjacent landscaping.
5. Drain roads to vegetated drainage swales in lieu of curb and gutter.
6. Pave uncovered temporary or guest parking on private residential lots with a permeable surface.
7. Design bioretention areas[1] into parking lots in landscape islands, around the parking perimeter, or in strips between parking stalls.

Alternative Site Design Concepts

1. Vegetated rooftops, also know as green roofs or eco-roofs, are veneers of living vegetation that are installed on top of conventional roofs. A green roof is an extension of the existing roof, which involves a special root repelling membrane, a drainage system, a lightweight growing medium, and plants.
2. Runoff storage systems on top of roofs ("blue roofs") can be used to detain and evaporate runoff volume. A flat roof with a large surface area can store a large quantity of water at a shallow depth.
3. A cistern is a vessel that provides storage of roof runoff for irrigation of landscaped areas. Cisterns may be either an above ground vessel with a manually operated valve or permanently open outlet, or a below ground vessel with a pump for water distribution.

Flow Control Structures. As described above, project controls also include retention/detention basins and underground detention vaults and tanks that are sized and fitted with outlet structures to control outflow duration. Flood control and water quality treatment facilities can be combined with flow control structures; for example, wet ponds and constructed wetlands can be modified to provide hydromodification control. Such control facilities are often located just before the point where project runoff leaves the development site. Design guidance for flow duration basins is provided in Appendix F.

Regional (Drainage-Area) Controls. Drainage-area controls intercept runoff from a drainage area before runoff is discharged to a creek. Drainage-area controls include larger detention and/or retention basins and bypass pipelines. They are designed to reduce flows, volume and durations and/or divert runoff so it is discharged at a less-sensitive location. In some cases, bypasses are used to intercept flow at outfalls and redirect a portion of that flow to a nearby detention basin. In other cases, bypass pipelines redirect flows away from a more-erosive stream segments to a less-erosive downstream segment or to an existing downstream impoundment (e.g., flood control basin or lake).

[1] Bioretention is a practice to manage and treat stormwater runoff by using a conditioned planting soil bed (3 to 4 feet deep) and planting materials to filter runoff stored within a shallow depression.

The benefits of drainage-area controls are: 1) they can be economical for serving several development projects; 2) they allow for efficient maintenance in one location; and 3) they can serve dual uses as multi-purpose facilities during the dry season. However, the use of drainage-area controls can be significantly constrained in urban areas due to lack of space and land costs.

In-Stream Modifications. In-stream modifications are applied within the riparian corridor to stabilize channels under an altered hydrologic regime. These measures improve channel stability and prevent erosion by increasing the channel's flow capacity and reducing the erosive forces, according to fluvial geomorphic principles. Examples include reducing channel slope (e.g., by increasing channel sinuosity or installing grade control structures), providing terraces and/or bypass channels, stabilizing banks (e.g., by grading slopes back, re-vegetation and providing structural measures where needed), and installing rock drop structures.

In-stream controls can be used to stabilize a stream channel that has already been impacted by hydromodification. For streams that are somewhat impacted or where delayed impacts are anticipated (after an area is developed, the impacts of increased runoff may take years to become evident), in-stream controls can improve the stream condition or minimize impacts that would otherwise continue. Where possible, the least-intrusive, most-environmentally sensitive in-stream controls should be used, such as re-vegetating banks or biotechnical bank stabilization techniques. For stable healthy streams, project controls or drainage area controls are preferable since they do not require disturbing the stream channel.

Selection Process

The selection process should follow a progressive control strategy that integrates: land use planning, distributed on-site control measures, followed by regional solutions and stream rehabilitation. Land use planning involves preserving the natural hydrologic conditions and protecting sensitive hydrologic features, sediment source and sensitive habitats, and helps to avoid the need to mitigate for hydromodification. On-site control measures are focused on minimizing the effects of development through conscientious design and through the implementation of distributed volume reduction BMPs (e.g., infiltration swales, infiltration gardens, etc.). After land use planning and on-site BMPs are maximized, then attention can be turned to managing the stream corridor itself by implementing in-stream controls and providing allowances for the modified stream flow characteristics to enhance the beneficial uses of streams.

In summary, three principles form the framework for implementing hydromodification control:

1. *AVOID* stormwater impacts and preserve existing natural channels, wetlands and riparian vegetation through hydrologic source controls. These measures can include such things as land use planning, regulation and site design practices to limit changes in quantity and quality before it enters the storm drain system.
2. *MINIMIZE* impacts to natural waterways by using structural controls to reduce or delay stormwater runoff, and intercept and/or remove pollutants after entering the storm drain system.
3. *MANAGE* the receiving water body itself by using bed and bank stability techniques, treatment measures, and stream maintenance programs.

In some cases, a regional stormwater management system may be more cost effective than individual project controls in achieving the second principle above. These strategies could include regional floodplain management, secondary collection and drainage systems, and large-scale detention and infiltration basins.

The following three-step process is recommended for selecting hydromodification control measures:

> ***Step 1: Select Appropriate Site Design Measures*:** A list of site design techniques is provided earlier in this section. Additional techniques and design information is provided in the BASMAA "Start at the Source" Manual (1999). The companion document, "Using Site Design Techniques to Meet Development Standards for Stormwater Quality" (BASMAA, 2003) illustrates how various site planning concepts can be used to help minimize quantities of runoff from the site.
>
> ***Step 2: Select Treatment Control Measures to Help Reduce the Volume and/or Rate of Runoff*:** After selecting appropriate site design measures, the second step in the selection process is to utilize treatment controls that also provide hydromodification benefits. All Provision C.3. Group 1 new development and significant redevelopment projects require stormwater quality treatment measures. Chapter III of the C.3 Stormwater Handbook lists treatment controls that may be appropriate for conditions in Santa Clara Valley and the considerations that apply in selection. These considerations include the land uses associated with the proposed development, the pollutants commonly associated with those land uses, the treatment processes that have been found effective for selected constituents, and the type of BMPs that utilize those treatment processes. In many cases, this selection process results in more than one candidate treatment control. In such situations, additional consideration should be made to select those treatment controls that also provide hydromodification benefits. Such benefits can be in the form of runoff volume reduction as achieved for example by treatment measures utilizing retention (e.g., bioretention facility) or measures that can achieve flow control as part of detention (e.g., extended detention basins). In general, retention facilities would be considered superior to detention facilities, but constraints on infiltration devices as described in Section III.4 and Attachment III-3 of the C.3 Stormwater Handbook may in some cases preclude retention facilities.
>
> ***Step 3: Select Additional or Modify Measures to Meet Hydromodification Standard***: The third step in the selection process would be to consider the need for additional controls or modification of controls selected in Step 2 that might still be required to meet the hydromodification control standard. Such controls would likely be similar to the treatment controls considered above, but could include increasing the size or capacity of the facilities, and modifying the outlet structure to manage the discharge to meet the hydromodification standard for flow duration control.

Design Issues

Issues that must be addressed in developing the initial design concepts for hydromodification control facilities include the following:

Capacity and Costs of Hydromodification Facilities. The capacity of the hydromodification basin (or equivalent storage volume associated with alternative controls such as bioretention or green roofs) is dependent on the nature of the development and site conditions, especially the infiltrative capacity of the soils. Where soils are more infiltrative, the pre-project runoff is low and matching such runoff conditions requires a larger basin. On the other hand, infiltrative soils also allow for infiltrating excess runoff. Basin size in terms of capacity and area are concerns for the land developer who may need to dedicate additional land for a hydromodification facility. This additional cost may be reduced or even eliminated if, instead of an end-of-pipe basin, low impact development type alternatives (e.g., utilizing existing landscaped areas) are feasible.

Basin Water Balance. A key design issue is how to best manage water in the basin. Water in a flow duration basin can be released through an outlet and, depending on soils and vegetation, infiltrated and evapo-transpirated. Discharge via an outlet must be such as to match pre-project flow duration and at a rate that will not contribute to additional erosive flows in the stream.

Infiltration Conditions and Constraints. A key design issue in the Santa Clara Valley is whether soil and groundwater conditions are conducive for infiltration and if so, whether infiltration can be accomplished without adversely affecting groundwater quality. The C.3 provisions call for caution with regard to groundwater quality impacts. In some cases where the tributary area is considered a significant source of pollutants (e.g., heavy industrial site), pre-treatment or lining the flow duration basin may be required. Infiltrative soils also may clog over time, requiring removal of fine sediment.

Potential Impacts from Infiltration on Slope and/or Foundation Stability. Infiltration near the foundation of buildings can cause uneven settlement, and infiltration near steep slopes can cause or contribute to slope failures. Infiltration near buildings may be feasible through the utilization of designs that isolate the infiltrating area from the foundation and maintaining a 2% slope away from the building.

Mosquito Concerns. Drain times of 3 days and less are recommended to prevent mosquito production. However, recent communication with the Santa Clara County Vector Control District and the RWQCB indicates that infrequent events that cause drain times of up to 5 days would be acceptable. Most of the time when the basin exceeds the 3-day drain time is in the winter when temperatures are cold and mosquito production is reduced. Also, the exceedence occurs only when the basin is full, which is caused by large infrequent storm events.

Vegetation Choices for BMPs that Incorporate Vegetation. Vegetation type can enhance the performance of a basin by increasing evapotranspiration losses. Deep-rooted vegetation also can enhance infiltration. Where vegetation is desirable, a water balance analysis is necessary to ensure that there is adequate water to support the vegetation during dry periods. Vegetation must also be able to tolerate water inundation for up to 3 days.

Safety Considerations. Basin depths and side slopes can be a concern for public safety. Chain link fencing may be required for basin with large depths and steep side slopes. Moderate side

slopes and safety benches also can be employed to avoid the use of fencing. If the basin is to be part of a multi-purpose facility, consideration must be given to public safety as well as ease of use.

Flow Duration Control. Any facility that can retain and infiltrate runoff from impervious surfaces could be considered hydromodification control. However, the last facility in the train of controls must match the flow duration curve of the pre-project condition in order for the controls to be protective of streams and minimize erosion and channel adjustment. For example, infiltration swales along roadsides or between houses can reduce the runoff volume from the development, but measures must be taken to match the pre-project flow duration curve before final discharge to the drainage system.

Outlet Operation and Clogging. To discharge at flow rates necessary to match flow duration curves, or to discharge at Qc, small orifice diameters may be required. These small openings will be subject to clogging if not properly protected. Basin designs must include features to help prevent clogging, such as screens, filter fabric and gravel barriers. This is particularly true for small developments where flow rates are small and less true for larger basins (such as regional basins). Outlet weir designs may also be considered.

Cost for On-Site Measures

Estimated costs for on-site measures include design, material, construction, maintenance, and land costs. Local conditions such as available head, soils, depth to groundwater, and slope can greatly affect costs. In urban areas, clearances and tie-ins to existing infrastructure also can lead to design changes and increased costs. Estimated construction and maintenance costs for on-site and treatment measures are summarized in Chapter III of the C.3. Stormwater Handbook as part of the selection matrices for choosing site design and treatment control measures (Attachment III-2).

Figures 6-1 and 6-2 show the construction cost curves for a surface basin (such as a flow duration basin) and a sub-surface facility (such as a bioswale/infiltration trench), respectively. These curves were derived from detailed cost spreadsheets, including such elements as site preparation, earthwork, structures, piping, re-vegetation and so forth. Costs do not include soil disposal fees, hauling, or contaminated soil testing, mitigation, or disposal. In addition, land costs have been excluded from this analysis. These are applied to the example problem in Section 6.3.

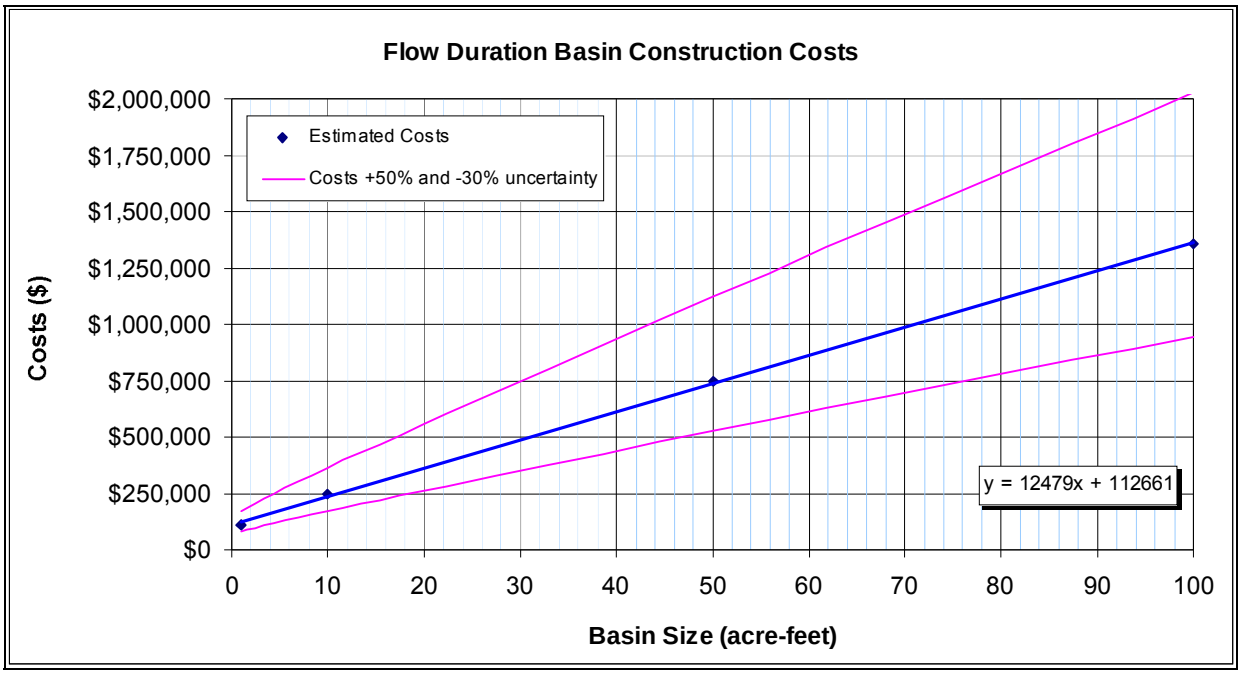

Figure 6-1 Estimated Cost for Surface Basin

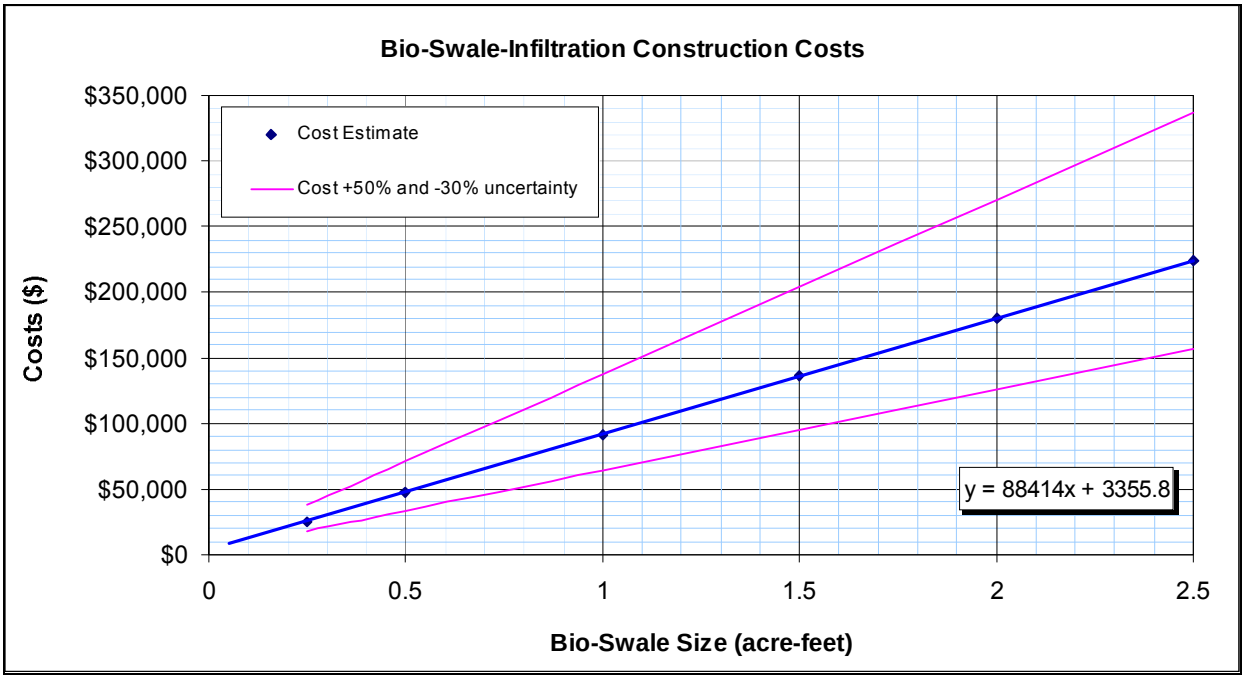

Figure 6-2 Estimated Costs for Sub-Surface Facility

6.2 HYDROMODIFICATION CONTROL DESIGN GUIDANCE

In Section 6.1, several types of hydromodification control measures were discussed, including site design techniques (hydrologic source control), use of treatment controls to achieve reductions in runoff volume, and flow control structures such as flow duration basins. Guidance on the sizing and design of site design and treatment measures is provided in several existing references: the C.3. Stormwater Handbook (SCVURPPP, 2004); "Start at the Source" (BASMAA, 1999); "Using Site Design Techniques to Meet Development Standards for Stormwater Quality" (BASMAA, 2003); and the California Stormwater Best Management Practice Handbooks, New and Redevelopment (CASQA, 2003). As a result, this section of the report focuses on the design of flow control structures. This report does not cover design of regional facilities (other than flow duration basins) or design of in-stream modifications to mitigate hydromodification effects.

Hydromodification control facilities are detention/retention and infiltration facilities engineered to meet a specified discharge performance. These facilities can be described as detention facilities, retention facilities, and infiltration facilities, or retention/detention (R/D) facilities. A detention facility temporarily stores surface water runoff and discharges it at a reduced rate. A retention facility retains stormwater and effectively has no outflow (outflow occurs by evaporation or soaking into the ground). Infiltration facilities are retention facilities that rely on the infiltration to soak water into the ground.

Any facility that can retain and infiltrate runoff from impervious surfaces could be considered hydromodification control. However, if the goal is to achieve hydromodification control on-site, the last facility in the "train" of controls must match the flow duration curve of the pre-project condition in order for the controls to be protective of streams. For example, vegetated swales along roadsides or between houses can reduce the runoff volume from the development, but additional measures must be taken to match the pre-project flow duration curve before final discharge to the stream system.

There are three primary types of detention facilities: basins, tanks, and vaults. Detention basins are built above ground; tanks and vaults are below-ground structures. Outlet control structures are used for controlling outflow from the facility to meet the desired discharge performance (flow duration control). In general, basins are preferred because of the relative ease of maintenance and the water quality treatment that surface soil and vegetation provide. Commonly R/D basins take the form of parks, athletic fields, duck ponds, golf courses, and other multi-purpose areas.

Infiltration facilities may be used where soils have suitable infiltration rates[2] for disposing of the increased runoff from development. Such facilities usually have a detention volume component to allow for temporary storage of runoff while it is being infiltrated. The detention volume is typically dependent on the infiltration capacity of the soils and the required facility performance. Infiltration facilities should be designed to protect ground water quality (see SCVURPPP C.3. Stormwater Handbook, Chapter III, and SCVWD design guidance).

[2] In the flow duration basin sizing examples in Section 6.3 and TMs #6, 7, and 8 (Appendix C), infiltration of stormwater from the basin was determined to be feasible for infiltration rates of 0.1 in/hour and greater.

Flow Duration Basin Design

The flow duration control approach involves: 1) simulating the runoff from the project site, pre- and post-project, using a continuous rainfall record; 2) generating flow-duration curves from the results; and 3) designing a flow control facility such that when the post-project time series of runoff is routed through the facility, the discharge pattern matches the pre-project flow-duration curve. The flow control facility is a detention basin that diverts and retains a certain portion of the runoff. The portion to be retained is essentially the increase in surface runoff volume created between the pre-project and post-project condition. This captured increase in volume must be discharged to the ground via infiltration (and/or evapotranspiration if vegetation present) in the basin, released at a very low rate to the receiving stream (at the critical flow for basin design, Qcp, or 10% of the pre-project 2-year storm), and/or diverted to a safe discharge location or other infiltration site, if feasible.

As shown in Figure 6-3, the flow duration basin is designed to have two pools, a low flow pool (Zone A) and a high flow pool (Zone B). The low flow pool is designed to capture the difference in volume of runoff between the pre- and post-project conditions. It will also capture small to moderate size storms, the initial portions of larger storms, and dry weather flows. The high flow pool is designed to store and release higher flows to maintain, to the extent possible, the pre-project runoff conditions. The flow duration basin can also serve as a water quality treatment facility and can be designed to treat dry and wet weather flows using a combination of extended detention and natural treatment processes. Most dry weather “nuisance flows” will also infiltrate in the basin depending on the infiltration rate.

The flow duration basin is sized using an iterative process of adjusting basin storage as well as selecting and adjusting orifice sizes in the outlet structure. The low flow pool within the basin is initially sized to capture the increase in runoff volume that is generated from the development project. This capture volume is dependent on the development characteristics, the soil types, and the magnitude of increase in impervious surfaces. Previous analyses have shown that area requirements have less to do with the range of storms selected for management and more to do with site and development characteristics.

Once the lower pool is sized to capture the correct volume of runoff, the upper pool of the basin is sized to detain and discharge larger flows through an outlet structure in such a way as to reproduce the flow duration curve. Figure 6-4 illustrates an outlet structure consisting of a series of orifices at set elevations above the basin bottom. The number, diameter, and elevation of these orifices are determined by a trial and error approach (King County, 1998). The number, size and placement will vary from basin to basin depending on project conditions. The combination of sizing the lower portion of the basin and the upper portion to detain and discharge high flows has the affect of capturing the correct volume of runoff and matching the pre-project distribution of hourly flows. A weir and orifice combination could also be designed to accomplish the same level of control.

Separate flow duration and infiltration basins may be needed for water quality reasons, or a by-pass pipeline could carry the excess runoff to a safe discharge location, if feasible. Combining flow duration and treatment into a single facility reduces the overall land requirements for stormwater management.

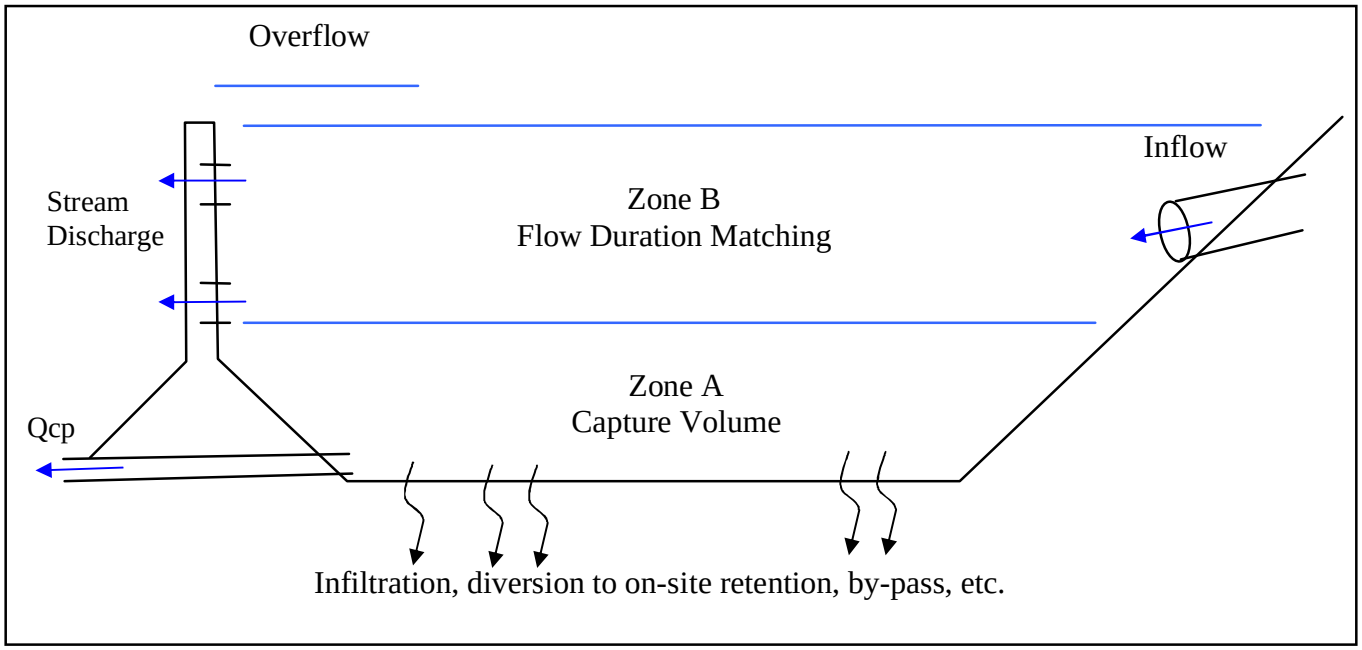

Figure 6-3
Generalized Configuration of Flow Duration Basin

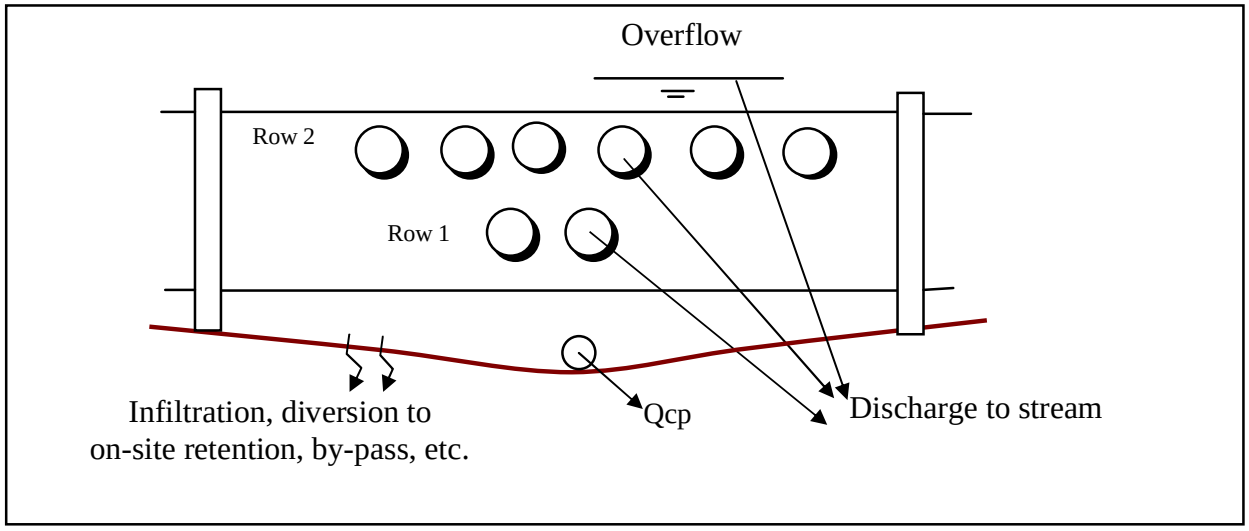

Figure 6-4
Generalized Configuration of Orifice-Type Outlet Structure

6.3 Examples of Application of Hydromodification Control Standard to Several Case Studies

The flow duration control design concept has been applied to several development scenarios in Santa Clara County and in Alameda County. The results are summarized in this section. Flow duration control has been used in western Washington as a hydromodification control measure for several years. Flow duration basin designs have also been used recently in Orange County, California.

Thompson Creek Large Site Example

This section summarizes the flow duration basin sizing results for an example development in the Thompson Creek subwatershed. This example sizes flow duration controls for an existing 716-acre residential development between Yerba Buena Creek and upper Thompson Creek, as if HMP controls were required when the project was constructed. This developed area is 71% impervious. Existing land uses are predominantly single-family residents, streets, parks and golf course properties. The infiltration rate for soils at the basin site is 0.2 inches/hour and the critical flow for the basin (Qcp) is 2.4 cfs (10% of the pre-project 2-year peak flow).

Figure 6-5 presents the pre-project flow duration curve, post-project (future) curve and post-project curve with controls at the site outlet point, using the 50-year continuous simulation results from the Thompson Creek hydrologic model. The post-project curve illustrates that the effect of development is to increase the duration of flows; that is, the flow duration curve moves to the right, indicating that both volume and duration of flows increase. (Note the logarithmic scale on the horizontal axis, so small changes along the axis may indicate large changes in volume and duration.) The effect of the flow control BMP is to reduce the durations to closely replicate the pre-project condition. This means that the magnitude of hourly runoff and the number of hours (duration) that flows occur at those magnitudes are nearly the same between pre- and post-project conditions.

For the 716 acres of development, the resulting basin characteristics are as follows:

- Basin volume is 120 acre-feet.
- Basin surface area is 15 acres (2% of the catchment area), assuming a maximum basin depth of 10-feet and 3:1 side slopes, and Qcp = 0 cfs
- If the basin depth were limited to 6 feet and Qcp = 2.4 cfs, the required surface area would be 20 acres, or 2.8% of the drainage area.
- If the basin depth were limited to 4 feet and Qcp = 2.4 cfs, the required surface area would be 30 acres, or 4% of the drainage area.
- Fifteen orifices having diameters of 9-inches each discharge to the creek.

For simplicity, this example assumes that no individual lot on-site control measures or low impact site design techniques were used. These options would be strongly encouraged if an actual project like this was implementing HMP requirements, and would result in a smaller flow control basin. In addition, in a large development area like this, the required flow control basin

volume would be divided into a number of smaller basins distributed throughout the area, such as in neighborhood parks.

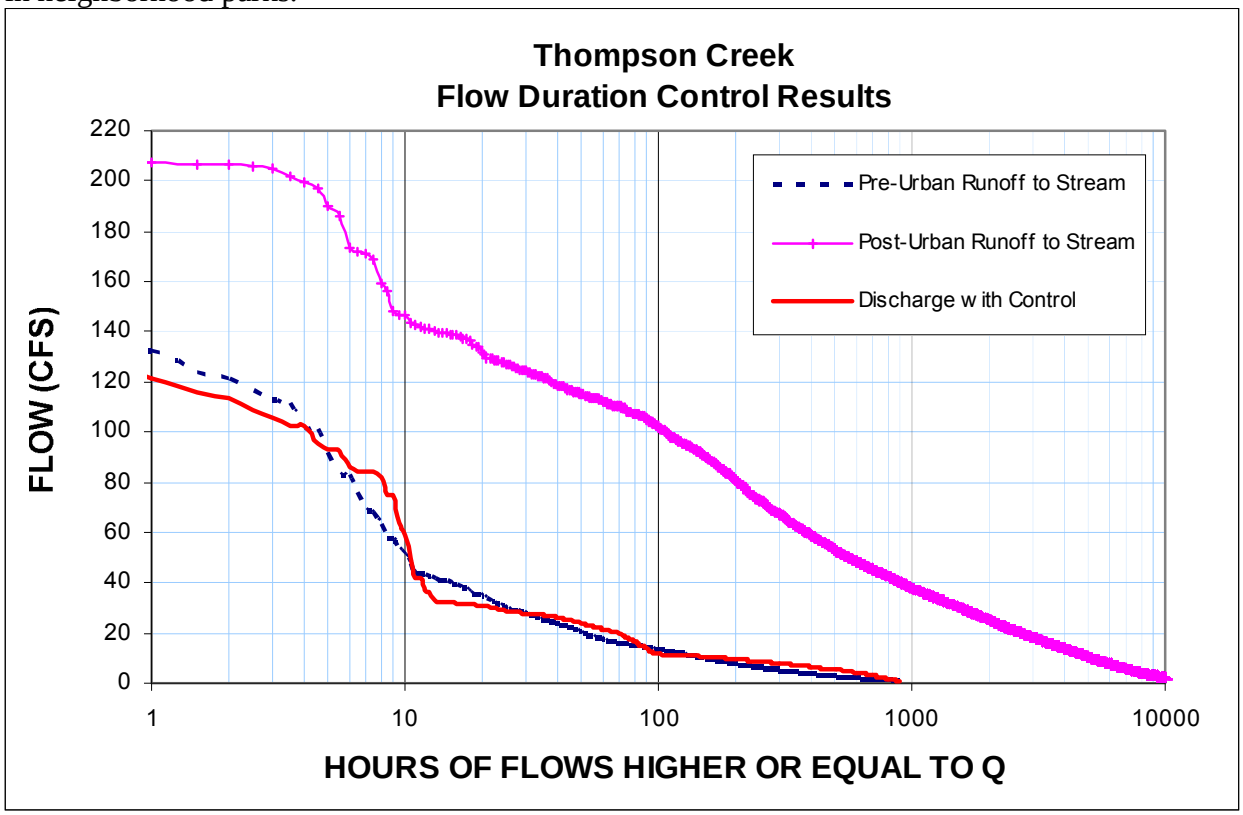

Figure 6-5
Flow Duration Curves for Thompson Creek Example

When comparing the pre-project curve to the post-project with BMP curve, the results shown in Figure 6-5 would be considered a very good match. Design of flow duration basins is somewhat of a trial and error process, and some design configurations match pre-project curves better than others. Western Washington hydromodification control standards allow no more than a 10% deviation between the curves over no more than 10% of the curves' length, or range of flows (WDOE, 2001). Appendix F provides more guidance on flow duration curve matching.

The shape of the post-project with BMP curve is dependent on the type of outlet structure. In this case, orifice holes in a headwall are used, following Western Washington's guidelines. Orifice holes create the convex shaped sections of the curve, where each section represents the change in flows from adding the next row of orifice holes. In the example in Figure 6-5, there are three convex curve sections between zero and 51 cfs. Above 51 cfs, flows are spilling over the overflow structure.

A summary of the results of this analysis for the Thompson Creek development is presented in Table 6-1. The table lists the results for a variety of conditions varying allowable depth, the soil infiltration rate and the rate of Qcp. Basin size is reported as a function of the total catchment

area (project drainage area) and the total directly connected impervious surface area (DCIA). The infiltration rate is also expressed as a loss rate (cfs) to compare to Qcp and to evaluate the importance of Qcp and infiltration in basin sizing.

As would be expected, the basin area requirements are controlled by the depth limitation imposed on the design. Shallower allowable depths require more surface area to contain the right storage volume. The ability to discharge the runoff volume to be controlled (infiltrated and/or discharged at Qcp) also affects the resulting basin size.

Table 6-1
Summary of Basin Sizing Results for Thompson Creek Large Site (716 Acres) Example

	10-foot Maximum Depth	**6-foot Maximum Depth**	**6-foot Maximum Depth**	**4-foot Maximum Depth**
Basin Size in Acres	15 acres	20 acres	25 acres	30 acres
Basin Size as % of Catchment Area	2%	2.8%	3.4%	4%
Basin Size as % of DCIA (1)	2.8%	3.9%	4.8%	5.7%
Drain time (2)	Not available at this time	3 days 80% of the time	3 days 75% of the time	3 days 90% of the time
Qcp	0	2.4 cfs	2.4 cfs	2.4 cfs
Infiltration Rate (Loss rate through wetted bottom)	0.2 in/hr (2.7 cfs)	0.2 in/hr (4.0 cfs)	0.1 in/hr (2.5 cfs)	0.2 in/hr (5.5 cfs)

Notes: 1. DCIA = Directly Connected Impervious Area
2. Goal for drain time is 3 days, to minimize mosquito production. Regional Board staff and Vector Control District staff have indicated that 5 days' drain time is acceptable, given the type of mosquito prevalent in Santa Clara County and that mosquito production rates drop during cold winter weather.

Cost Results for Thompson Example. Table 6-1 above presented the construction cost curves for a surface basin infiltration facility. This curve was derived from detailed cost spreadsheets, including such elements as site preparation, earthwork, structures, piping, re-vegetation and so forth. Costs do not include soil disposal fees, hauling, or contaminated soil testing, mitigation, or disposal. Land costs are not included. The cost estimates presented in this section represent a planning level cost estimate with an accuracy of + 50% to -30%. The Thompson Creek example construction costs are estimated to be approximately $1.6 million for the basin itself not including design, environmental documents, or land costs. The $1.6 million construction cost is equivalent to $2,300 per acre of development area. Assuming 4 houses per acre in this location, the flow duration basin construction would cost approximately $600 per lot, excluding land costs.

San Jose Small Site Example

This section summarizes the application of the flow duration basin sizing technique to a small 12-lot residential subdivision in San Jose. The site is located near Alum Rock, has a moderate slope, and discharges to South Babb Creek through the storm drain system. The objective was to apply the flow duration control strategy to a small project and determine how well this approach would work on a small scale.

Project Description. The catchment area is 3.6 acres, with twelve residential lots of 3,000 square feet each. Run-on from the adjacent hill slopes is assumed to be zero. According to the City of San Jose, a ditch will be constructed along the upper boundary of the property to collect hill slope runoff and route it around the development to the storm drain system.

The pre-project and post-project percent imperviousness are estimated to be 9 and 45 percent, respectively. The post-project impervious surface includes paved roads and the driveways, patios and roofs of the 12 houses.

The soil type in this area is classified as "D" type soils using the SCS classification system. The infiltration rates for this soil type range from 0.06 to 0.20 in/hr. For hydrologic modeling purposes, an average infiltration rate of 0.13 in/hr was used over the project site. An infiltration rate of 0.20 in/hr was assumed for the basin location.

Results. Table 6-2 summarizes the results of the small project example. The resulting basin area requirements range from 1.3% to 2.1% of the total project area (3.6 acres), or 2.8% and 4.6% of the directly connected impervious area (45% imperviousness). For comparison, a water quality basin would be about 2% of the total project area (the facilities could be combined). Basin depths range from 1.75 feet to 2.25 feet. During the sizing procedure, basin depth was limited to a maximum of 3 feet. Because the scale of this project is small, the resulting flows, basin sizes, and orifice sizes are all small. Orifice sizes are 3 inches in diameter.

Table 6-2
Summary of Basin Sizing Results for San Jose Small Site (3.6 Acres) Example

Parameter	Discharge of extra volume at infiltration rate only	Discharge of extra volume at infiltration rate plus Qcp	Basin size with Roofs Disconnected
Basin Size -- % catchment area	2.1%	1.7%	1.3%
Basin Size -- % DCIA (1)	4.6%	3.7%	2.8%
Basin Depth	1.75 ft	2.25 ft	2.5 ft
Drain time (2)	3.7 days	<1 day	3.6 days
Qcp	0	0.1 cfs	0
Infiltration Rate (Loss rate through wetted bottom)	0.2 in/hr (0.015 cfs)	0.2 in/hr (0.012 cfs)	0.2 in/hr (0.009 cfs)

Notes: 1. DCIA = Directly Connected Impervious Area
2. Goal for drain time is 3 days, to minimize mosquito production. Regional Board staff and Vector Control District staff have indicated that 5 days' drain time is acceptable, given the type of mosquito prevalent in Santa Clara County and that mosquito production rates drop during cold winter weather.

Figure 6-6 presents the pre-project flow duration curve and post-project curves under two scenarios: 1) with no individual lot BMPs and 2) with each lot assumed to have runoff controls. Each lot is assumed to have its roof and patios disconnected from the storm drain system and runoff from those areas controlled with a bioswale/infiltration trench or similar BMP designed to maintain pre-project runoff conditions on the lot. The figure shows that, with the individual lot BMPs, there is a much smaller difference between pre- and post- flow duration curves. The resulting flow duration basin area and volume are 62% and 77% smaller, respectively, than when the basin sized to collect both roof runoff and pavement runoff.

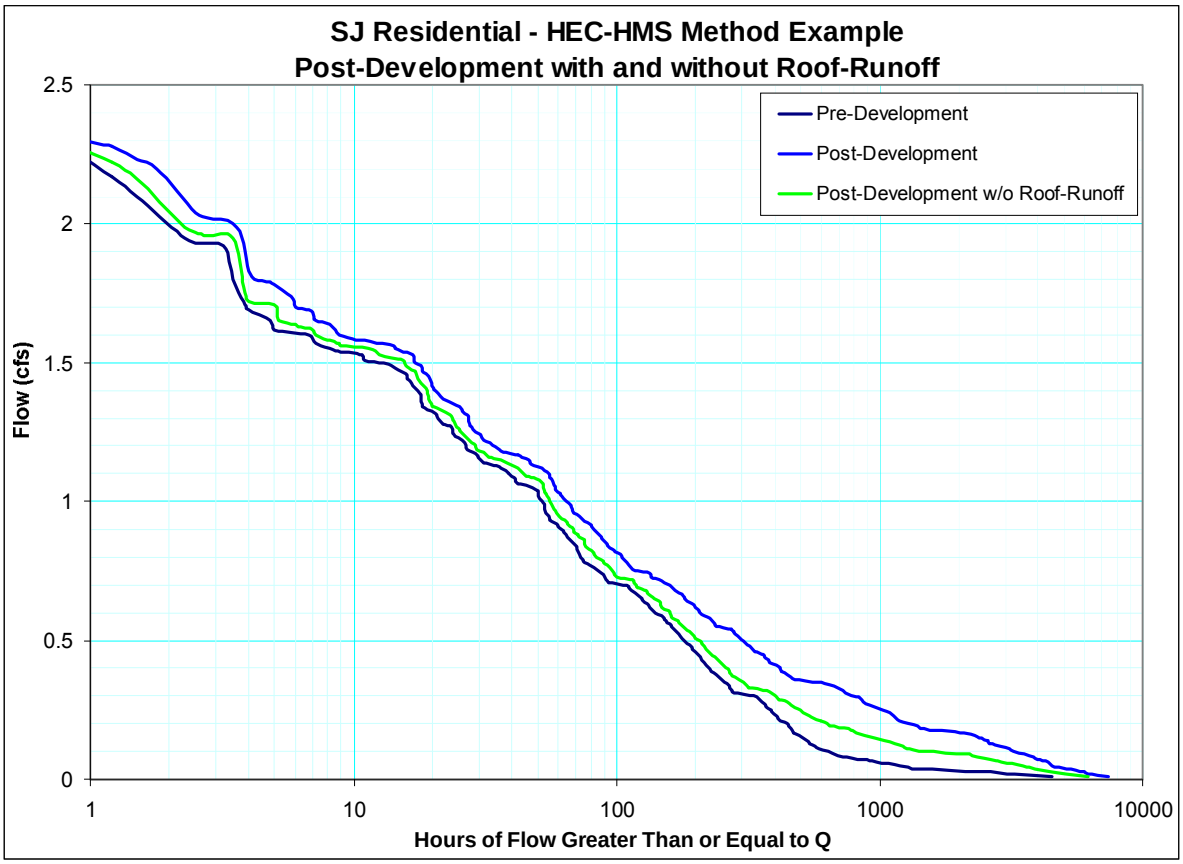

Figure 6-6
Post-Project Flow Duration Curves with and without Roof Runoff for San Jose Residential Example

The flow duration basin sizing was re-computed after adding an allowable discharge equal to a Qcp value of 0.10 cfs. Qcp is computed as 10% of the 2-year pre-project peak flow. The 2-year peak flow was determined by performing a flood frequency analysis of the HMS model results and was estimated to be 1.0 cfs. Figure 6-7 presents the resulting matched flow duration curves under this scenario.

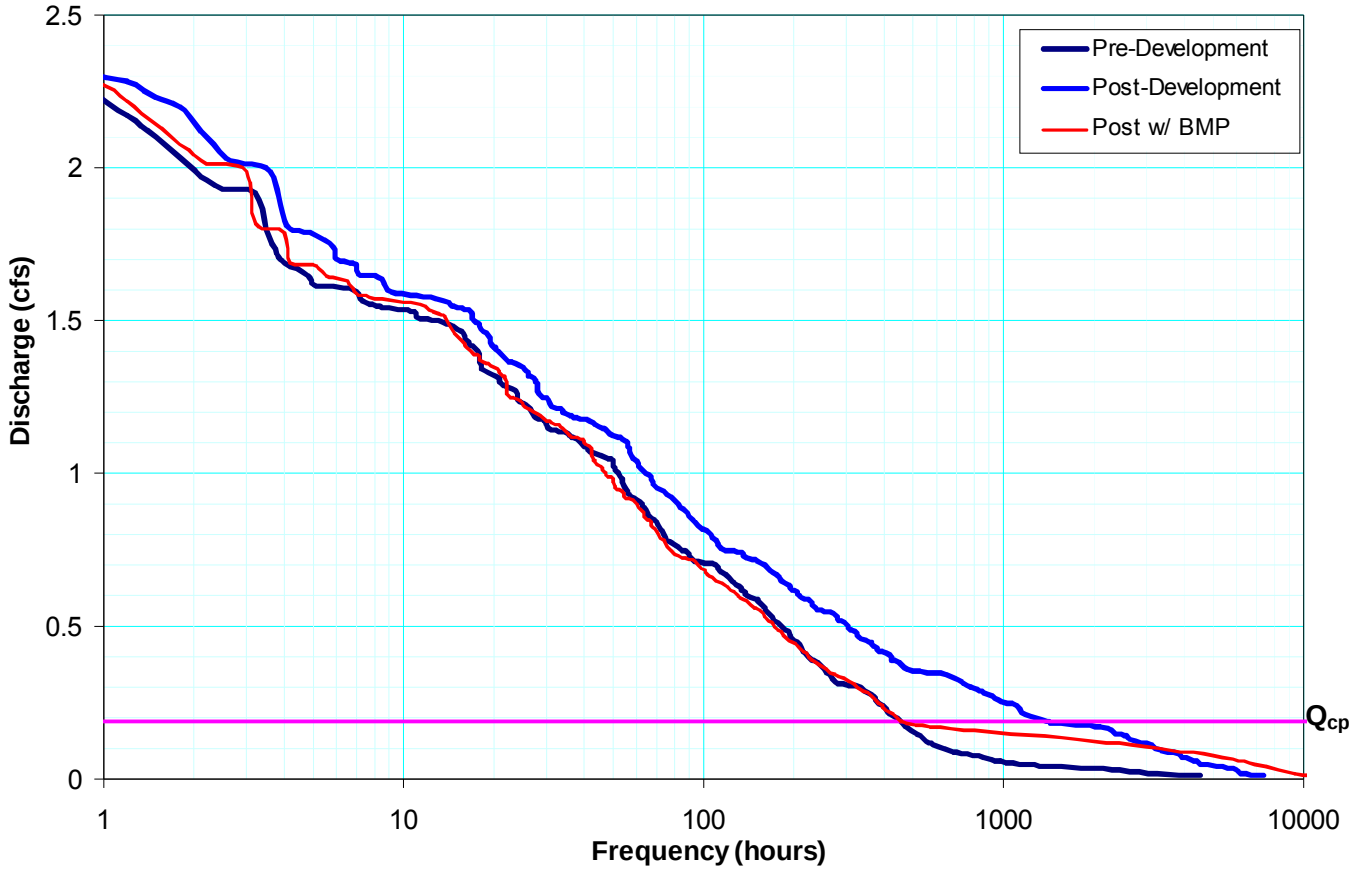

Figure 6-7
Post-Project Curve for San Jose Residential with Allowable Qcp

Cost Results for San Jose Small Site Example. This curve was derived from detailed cost spreadsheets, including such elements as site preparation, earthwork, structures, piping, re-vegetation and so forth. Costs do not include soil disposal fee, hauling, or contaminated soil testing, mitigation, or disposal. Land costs are not included. The cost estimates presented in this section represent a planning level cost estimate with an accuracy of + 50% to -30%. The San Jose small site example construction costs are estimated to be approximately $60,000 for the basin itself not including pipelines to the facility, design, environmental documents, or land costs. The $60,000 construction cost is equivalent to $5,000 per lot, excluding land costs.

Alameda County Commercial Example

This section summarizes the application of the flow duration basin sizing technique to a conceptual plan for a commercial development in Alameda County[3]. The objective was to apply the flow duration methodology to a small size project in Alameda typical of the developments expected in the future.

Project Description. This section summarizes relevant project information required for hydrologic modeling purposes.

- The catchment area is 12.2 acres. The pre-developed project site has zero impervious surface area and is covered with short grass with an average slope of 1.1 percent.
- The post-project percent imperviousness is estimated to be 67 percent. This includes building roofs, parking lots, paved roads, and sidewalks.
- The mean annual precipitation for the site is 22 inches. Precipitation records used in this continuous simulation analysis are from the NCDC gage ID# 040693 in Berkeley, covering the period from July 1, 1948 through January 1, 1991.
- The soil type in this area is classified as "B" type sandy loam soils using the SCS classification system. Infiltration rates for this soil type range from 0.5 to 1.0 in/hr. For hydrologic modeling purposes, an infiltration rate of 0.5 in/hr was used.

Results. Figure 6-8 presents the resulting matched flow duration curves. Under pre-project conditions, the model is only predicting 200 hours of flow due to the relatively high infiltration rate and flat slope. However under post-project conditions, more than 10,000 hours of runoff now occurs. The figure also shows the post-project flow duration curve with the BMP (flow duration basin). The pre-project flow duration curve is matched beginning from Qc up to about 4 cfs and 10 hours. At this point the curve deviates from the pre-project curve, which is acceptable in this case because it is less than the pre-project curve. The reason it deviates is because the basin storage is large relative to runoff affecting peak discharges estimated by the continuous model and basin overflows. The post-project flow duration curve has an increase in the hours of flows below the Qc. This is, of course, the allowable low flow discharge.

Table 6-3 presents the resulting flow duration basin size information, compared to a water quality basin sized using the CA BMP Handbook Method. This comparison is provided to give the reader perspective on the resulting flow duration basin sizes. In this case, with good pre-project soil infiltration capacity (0.5 in/hr) the required flow duration basin storage is 1.6 acre-feet, or 7% of the project area. The water quality basin is about 3% of the total project area. The continuous simulation model results suggest that the increase in surface runoff volume between class "D" soils (typically 0.06-0.2 in/hr infiltration rate) and impervious surfaces is smaller than the same comparison between class "B" soils (0.5-1.0 in/hr infiltration rate) and impervious surfaces. In the current example, the flow duration basin ends up large because of the large increase in runoff volume between the pre- and post-project conditions.

[3] ACCWP Technical Memorandum #1, GeoSyntec Consultants, May 25, 2004. SCVURPPP acknowledges the Alameda Countywide Clean Water Program for the use of this example.

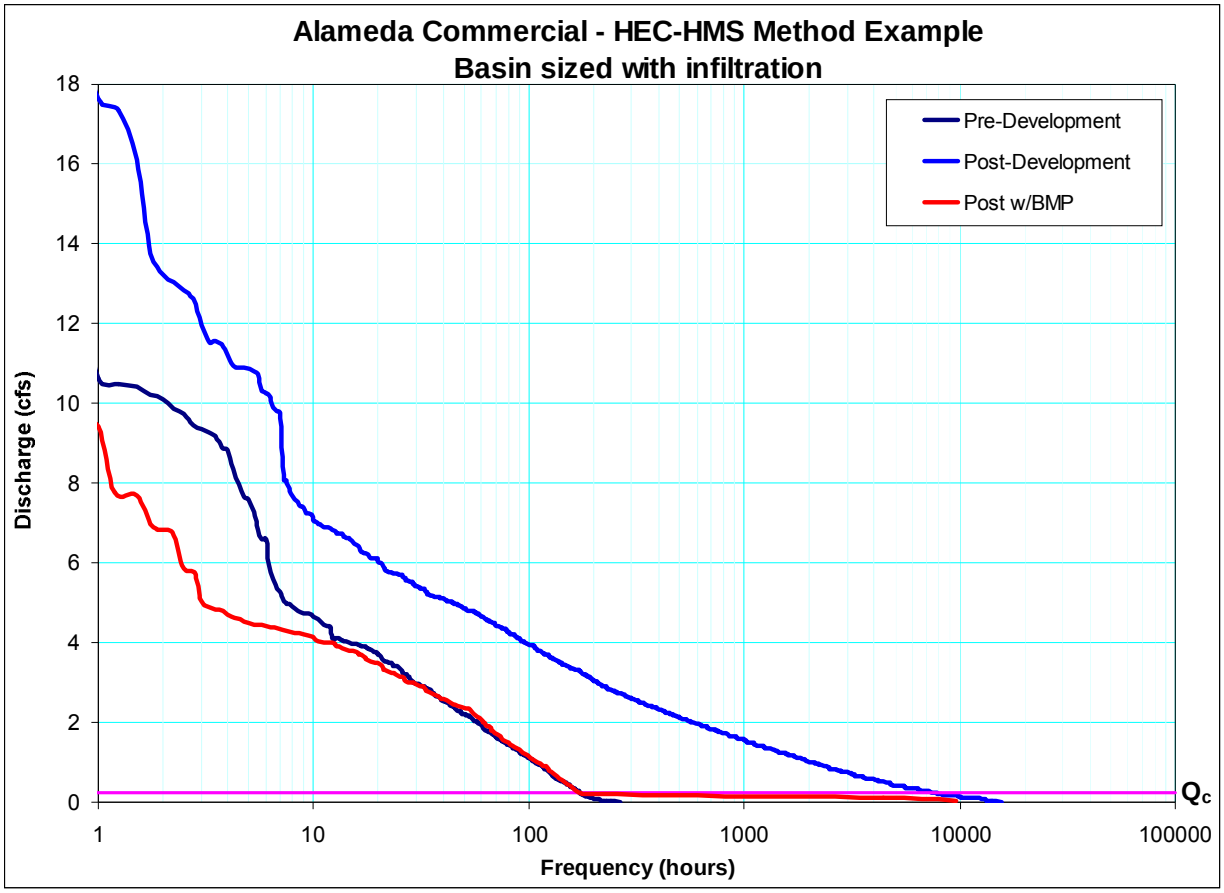

Figure 6-8
Basin Sized with Infiltration for Alameda Commercial Development Example

Table 6-3
Comparison of Basin Sizing for Alameda County Commercial Example

	GeoSyntec Analysis Based On Flow Duration Control (assumes infiltration and low flow release at <Qcp)	**Water Quality Basin using CA BMP Handbook Method**
Basin Volume	1.6 acre-ft	0.7 acre-ft
Basin Depth	2 ft	2 ft
Basin Area	0.8 acres	0.36 acres
Basin Area (% of site)	7%	3%
Drain time	1 day	2 days
Qcp	0.25 cfs	N/A

The outlet structure for the flow duration basin was assumed to consist of a concrete or steel headwall with small diameter holes drilled into the wall. While the basin size is controlled by the runoff volume change between pre- and post-project conditions, the flow duration curve matching is primarily accomplished through design of the headwall structure. Because the scale of this project is relatively small, the resulting flows, basin sizes, and orifice sizes are all small. The orifice size to release the Qcp flow is less than 3 inches in diameter. Adequate protection from clogging using screens and gravel will be required. A multi-stage weir could be used, but would also require small openings subject to clogging.

Cost Results for Alameda Commercial Example. This curve was derived from detailed cost spreadsheets, including such elements as site preparation, earthwork, structures, piping, re-vegetation and so forth. Costs do not include soil disposal fee, hauling, or contaminated soil testing, mitigation, or disposal. Land costs are not included. The cost estimates presented in this section represent a planning level cost estimate with an accuracy of + 50% to -30%. The Alameda commercial example construction costs were estimated to be approximately $115,000 for the basin, not including, design, environmental documents, or land costs.

Discussion of the Application of Qcp

The importance of Qcp appears to vary depending on the area of the basin and the soil infiltration rates. In the flow duration basin examples for Thompson Creek (Table 5-1), increasing Qcp from zero to 2.4 cfs had a limited effect on basin design because the drainage area to the basin and the basin size were so large. Qcp is more important when sizing small flow duration basins like the ones sized for the small development examples. Because Qcp and infiltration are the primary means of discharge from the basin for the extra volume of runoff caused by the impervious surfaces, their relative values are important in determining which is the controlling factor for basin size.

For large basins like the one in Thompson Creek, the surface area is large (29 acres) and thus the infiltration loss rate (I_f * area = 5.5 cfs) is also large. When compared to the Qcp rate of 2.4 cfs (10% of the pre-project 2-year peak flow of 24 cfs), the infiltration loss rate is twice as important and Qcp has little affect on basin size. For small basins, the area is small (0.06 acres) and the infiltration loss rate (I_f * area = 0.01 cfs) is also small. The estimated Qcp for this small basin is 0.10 cfs and much more important for basin sizing.

Conclusions

The flow duration basin sizing approach can be applied to development sites of different sizes and land use types. The area required for flow duration basins seems to be between 2 to 7 percent of the contributing catchment area, depending on the infiltration capacity of the soil and the basin depth. Where projects have good soil infiltration rates and utilize low-impact development strategies, less land area may be required (1.5 to 2 percent).

Basin size can be reduced by applying volume reduction or low impact design strategies. For example, disconnecting impervious area such as roof drains and discharging runoff to landscaping, swales and/or infiltration trenches reduces the difference in volume between pre- and post-project runoff that need to be controlled in the basin.

Qcp should be incorporated in every basin design but its relative impact on basin sizing is dependent on project size and soil infiltration rates. The Qcp rates for small basins may require small orifice diameters as small as 2 inches.

7. HMP IMPLEMENTATION GUIDANCE

7.1 INTRODUCTION

This chapter provides guidelines to Co-permittees and the development community for implementing the SCVURPPP Hydromodification Management Plan. The concept of controlling the increased runoff flow resulting from development projects is not new – agencies have been requiring mitigation for increased flood flows in the form of flood control detention basins and storm drain improvements for years, and many stream channels in the Santa Clara Valley have been modified to accommodate increased flows. Hydromodification management differs from historical approaches in that it focuses on controlling changes in the smaller, more frequent runoff flows that over time can have more impact on stream health than infrequent flood events. Fortunately, most of the hydromodification management measures discussed in this report are consistent with and compatible with the site design and stormwater treatment measures required for development projects by Permit Provision C.3.

7.2 IMPLEMENTATION OPTIONS

The approach to implementation of the hydromodification control standard, management objective and the associated performance criteria is based on the following considerations:

- Due to the cost of land, limited available space on project sites, and the limited infiltration capacity of soils in Santa Clara Valley, a combination of on-site, off-site, and/or in-stream measures may need to be considered to meet HMP requirements.
- Implementation guidance needs to allow for regional planning efforts between the Cities/County and the District, and coordination with planned District in-stream maintenance, erosion repair, and flood control projects.
- The District is the appropriate agency to plan, construct, and maintain in-stream measures for erosion protection.

Three basic options for implementing the hydromodification control standard are proposed, as described in this section. This approach is intended to allow the selection of the most cost effective strategy, considering on-site, off-site, and/or in-stream measures, and combining HMP control with site design and stormwater treatment controls.

Option 1 – On-Site Controls Only

Option 1a – Minimize Hydromodification Effects. Under this option, effects of the project on hydromodification are avoided or greatly reduced through the application of land use planning and hydrologic source controls as part of site design practices to limit changes in stormwater quantity.

Option 1b – Provide On-site Flow Control. Under this option, hydromodification controls are provided on-site. The project can achieve some of the flow control requirements using site design and stormwater treatment measures that reduce runoff volume and flow. Additional flow control BMP(s) may also be needed to fully meet the performance criteria. If retention or detention basins are selected, they are sized to meet the flow-duration control performance criterion. It may be cost effective for the developer to provide flow duration control and stormwater treatment within the same BMP.

Option 2 – On-Site, Off-Site, and/or Instream Controls

Under this option, hydromodification impacts of development are addressed with a combination of on-site, off-site and/or in-stream controls. On-site controls such as those described in Option 1 can be combined with off-site or in-stream controls to achieve the in-stream erosion potential criterion. Off-site controls can include flow control measures in the same subwatershed that mitigate hydromodification impacts of one or more projects but do not involve modifications to the stream channel. If instream controls are proposed, implementation of this option requires coordination with the Water District. The net effect of the combination of controls needs to be protective of the stream according to the management objective (i.e., $Ep \leq 1.0$).

Option 3 – Master Planning

Option 3 is the development of a master plan to address the impacts of development in large, relatively undeveloped watersheds such as Coyote Valley. The master plan can include a combination of on-site, off-site, regional, and/or in-stream control measures for hydromodification control. The combination of controls would be designed to maintain the existing erosion potential downstream of the planning area. The master plan would also consider requirements for water quality and flood control (see discussion in Section 7.6).

Implementing Off-Site Controls

The most likely scenario for off-site controls would be the use of a regional flow control facility that would serve the needs of multiple developments. If several developments are being constructed at about the same time in the same watershed, developers may wish to explore the concept of a regional facility that may be more cost-effective to build and maintain than individual on-site facilities. Municipal agencies and regulators agree that regional facilities can be practical and economical solutions, especially for development projects on small sites.

However, such a project would require the coordination of multiple projects in close proximity and, at the present time, there are no plans for such facilities to be constructed by public agencies.

Implementing In-stream Controls

The likely scenario for in-stream controls is development projects contributing to the funding of an in-stream project implemented by the Water District. In order to implement in-stream controls, a District project needs to be identified which can addresses the impacts of the proposed development, given information about the increase in impervious surface and the discharge point of the project. In addition, several funding components must be in place:

- An adequate funding mechanism must be available to ensure the project's completion;
- An appropriate mechanism must be developed for collecting funds from a development project proponent; and
- A technically-based methodology must be developed for determining a development project's contribution to an in-stream project based on its contribution to stream impacts. The value of such a contribution must be compatible with the concept of impact nexus and rough proportionality.

While the funding components are not currently in place, the Co-permittees acknowledge the value of having such an option available to development projects and will work toward creating these tools in the near future.

The Santa Clara Valley Water District's Stream Maintenance Program (SMP) may be a viable mechanism to facilitate in-stream controls. Through this program, in-stream projects for erosion control are permitted and approved. Permitted projects are currently funded by the District. The designs completed as part of the SMP accommodate permitted discharges to each reach. SMP designs can typically be completed within a 2 to 3 year period after issuance of the permit for additional in-stream discharges. The District also funds capital projects for improvements to streams for erosion and flood control; these are typically larger in physical scope and budget, and take a longer period of time to design and construct.

If future development is permitted to increase the discharge to certain reach(es), in-stream projects under the SMP can be designed to accommodate the additional flow. A proposed approach is that developers would be able to contribute to the SMP project cost in proportion to each development's flow and erosive work done on a reach. The District plans to develop a GIS map showing creek reaches where SMP projects are planned and/or feasible to construct. City/County staff and developers will be able to use this map to make a preliminary determination of the availability of SMP projects, based on the locations of discharge points of planned developments. Once a developer determines the discharge point and amount of impervious surface of the planned project, the SMP project can be designed and the cost allocation calculated using an agreed upon methodology.

Early Consultation with Santa Clara Valley Water District (District)

If a development project would need to consider or provide in-stream control measures to comply with HMP requirements, the developer or permitting agency would notify the District early in the planning process so that an appropriate Stream Maintenance Project (SMP) project, if it exists and a funding mechanism has been determined, can be identified for the stream reach receiving the increased discharges.

ADDITIONAL POLICY LANGUAGE CURRENTLY UNDER DEVELOPMENT

7.3 PROCESS FOR EVALUATING HYDROMODIFICATION IMPACTS AND REQUIREMENTS FOR DEVELOPMENT PROJECTS

The potential hydromodification impact of a proposed project should ideally be identified early in the development plan review process, through the use of applicability checklists and environmental review checklists. As a general rule, increases in directly connected impervious surface area on a project site are going to result in increased runoff peaks, volumes and durations. If the impervious surfaces are disconnected or "broken up" by strategic placement of pervious surfaces to absorb the additional runoff, the potential hydromodification impact is reduced. In some cases, good site design techniques such as clustering buildings and draining runoff to designated open space areas can completely mitigate the increases in flow; however, due to development constraints and land costs, developers in Santa Clara Valley do not often have the luxury of that option.

Evaluation Process

The following is a proposed guideline for evaluating the impacts and requirements of a development project.

1. Determine the potential applicability of the HMP requirements to the proposed project, using the flow chart in Attachment 7-1 as a guide.

a. Determine if the project is subject to the C.3 requirements based on the size criteria and other factors in Provision C.3.c (refer to the SCVURPPP C.3 Stormwater Handbook for guidance).

b. Estimate the increase in impervious surface resulting from the project, compared to the pre-project condition. If there is no net increase in directly connected impervious surface, the project is unlikely to have hydromodification impacts and is exempt from HMP controls. (If the project will have an increase in impervious area that is not directly connected to other impervious surfaces, such as a paved or roof area that discharges runoff to a pervious area, the project proponent will need to demonstrate that the pervious area can absorb the increased volume created by the added impervious area.)

c. Determine the ultimate discharge point of the project site or the storm drain system it discharges to (i.e., the location of the storm drain outfall for the catchment in which the project is located). Refer to Figure 5-1 (or a local agency version of this map) to determine whether the project discharges to a tidal area, hardened channel, or directly to the Bay, and is therefore exempt from HMP controls.

d. Determine if the project is an infill project in a highly developed watershed, per the "Proposed Guideline for Identifying Exempt Projects Using the Percent Build-out Approach" in Chapter 5, Section 5.3. If the project meets the criteria in this guideline, it is exempt from full flow control BMPs, but the local agency should recommend that the project include site design and treatment BMPs that help accomplish flow control to the extent practicable.

   If the project is an infill project in a highly developed watershed, is greater than 20 acres, AND the project site has undergone a change in land use from low intensity development to a higher intensity (allowing a greater amount of impervious surface on the site), the project is <u>not</u> exempt from HMP requirements.

2. If the project is not exempt from HMP requirements, it has the potential to cause hydromodification impacts on the receiving stream and must use the performance criteria to determine how it will meet the management objective. The next step is to identify the performance criteria applicable to the project.

   a. Consider whether the project is a "Small Site Project" (less than or equal to 20 acres in size) or a "Smart Growth Project" (as defined by the municipality's General Plan or policies). If so, then this project must meet Performance Criteria 4 and 5 (see Chapter 5). The project will comply with the HMP through the use of site design and treatment control measures with flow control "benefits", i.e. measures that accomplish some reduction in runoff volume. They will also be required to contribute funding to an off-site or in-stream project to mitigate any additional flows that are not controlled with the on-site measures, <u>if such off-site or in-stream projects are available and a funding mechanism and methodology for determining developer contributions are in place</u>. If this option is not available, a

Small Site or Smart Growth Project will need to show that site design measures and/or integrated management practices are used to match pre-project discharge volumes and times of concentration[1] for 10-year storm to the maximum extent practicable.

Integrated management practices (IMPs) are small scale, distributed stormwater management techniques such as bioretention facilities, infiltration trenches, filter strips, vegetated swales, and multi-functional landscape areas (a subset of the "site design measures" described in the SCVURPPP permit). The objectives of site design measures and IMPs used to comply with the HMP are to: 1) reduce runoff volume through the reduction of impervious surface and providing opportunities for infiltration; and 2) increase the time of concentration of runoff to approximate that of the pre-project condition. Time of concentration can be increased by lengthening flow paths and allowing impervious areas to flow onto pervious areas.

Runoff reduction and time of concentrations can be computed using a discrete storm event approach (based on a 10-year design storm) until modeling tools are available for simulating the effectiveness of IMPs (see section on Hydrologic Models below).[2]

b. Other non exempt projects will be required to meet Performance Criteria 1, 2, 3, and 5. These projects are required to perform a more detailed analysis to compare pre-project and post-project runoff patterns for the project site. As described in Chapter 6, flow duration curves illustrating the distribution of flows resulting from a continuous rainfall record will need to be generated for the pre- and post-project condition. This will be accomplished using a continuous simulation hydrology model or a sizing tool based on a continuous simulation model. These or similar tools will then be used to design flow control BMPs, such as a flow duration basin, that produce a discharge pattern that matches the pre-development flow duration curve. A detailed description of the process for sizing a flow duration basin is provided in Appendix F.

3. After a project has gone through the analysis described in Step 2 above, the next step for the developer is to incorporate the flow control BMPs into the project design.

   Meeting the flow duration control criteria generally requires some type of detention and/or infiltration facilities that reduce the volume and control the rate of post-project discharge. These types of facilities may not be suitable for the project site due to space limitations, soil conditions, depth to groundwater, economic feasibility and other factors.

   In this case, it is recommended that the developer be required to submit an application for impracticability with the plan for stormwater controls on the project site. The application

[1] Time of concentration is defined as the length of time required for runoff to travel from the most remote point in the drainage area to the point of interest, say a storm drain inlet or receiving water.

[2] If a retention-detention basin or a structure that detains and releases flow is included as part of IMPs to meet the volume and time of concentration requirements, it should use a flow duration matching approach for design.

should provide the reasons for impracticability and relevant site data and/or cost estimates. Such projects will be subject to the Early Consultation process described above so that the District and city can work together to identify a project and appropriate funding mechanism to address the in-stream project(s) that may be required to mitigate the additional flows. If an in-stream project and funding mechanism can be identified through the Early Consultation process, the developer is required to contribute funding to these additional measures to fully meet the management objective. If not, a project for which flow duration control is impracticable must use site design measures and/or integrated management practices to achieve performance criteria to the maximum extent practicable.

Hydrologic Models

There are several hydrologic models available as public domain software that can be used for simulating runoff for a continuous rainfall record and sizing flow control facilities. Examples are: 1) the Army Corps of Engineers' Hydrologic Engineering Center Hydrologic Modeling System (HEC-HMS) which was used for the analyses in this report; 2) the Environmental Protection Agency's (EPA's) Hydrologic Simulation Program – Fortran (HSPF) which is specified in the Stormwater Management Manual for Western Washington (WDOE, 2001); and 3) the EPA's Stormwater Management Model (SWMM). Data for running the models for the three test subwatersheds will be available from the Program's website, and a number of engineering firms have experience with the use of these models. The Program will be sponsoring workshops on HMP implementation that will include training on the various models.

The Program is investigating an automated modeling and flow control facility sizing tool called the Western Washington Hydrology Model (WWHM) and is considering funding the adaptation of this tool for use in Santa Clara Valley. The Program is also discussing the potential for collaboration with other Bay Area programs to offset the costs.

The WWHM was developed for the Washington Department of Ecology to assist project proponents with compliance with the western Washington hydromodification control requirements. It is a tool that runs the HSPF model to generate flow duration curves for the pre- and post-project condition and then sizes a flow duration control basin or vault and outlet structure to match the pre-project curve.

Hydrologic modeling of site design or low impact development (LID) techniques on a micro-scale or lot level is a current area of research (Huber, et al, 2004). There are few models available in the public domain that can simulate the effectiveness of these measures in reducing hydromodification impacts using a continuous simulation approach. The WWHM is currently able to simulate simplified representations of several LID techniques (dispersion of roof runoff on lawns, infiltration of roof runoff, and porous paving) An updated version of the tool (WWHM3) is being developed for the Washington Department of Ecology that can model lateral flow between pervious and impervious surfaces on a site. This will facilitate the future addition of more accurate representations of LID BMPs. A Bay Area adaptation of the WWHM will be able to take advantage of these improvements, and provide a comprehensive tool to developers to evaluate a variety of on-site options for flow control.

7.4 INCORPORATING HMP REQUIREMENTS INTO LOCAL APPROVAL PROCESSES

Roles and Responsibilities of Co-permittee Agencies

The contemplated roles and responsibilities of the Co-permittee agencies and the development project proponents are similar to those identified for implementing other C.3 provisions, as described in the SCVURPPP C.3 Stormwater Handbook. The Co-permittees' prospective responsibilities are summarized below, with a reference to the section or document that can provide guidance:

1. Provide outreach and education to developers and training to agency staff, with help from SCVURPPP (HMP workshops, future revisions to SCVURPPP C.3 Stormwater Handbook for HMP)
2. Review a development application to determine whether the project is subject to C.3 requirements, and specifically HMP requirements (Flow charts in Chapter II of C.3 Stormwater Handbook, Attachment 7-2 of this report).
3. Ensure that hydromodification impacts are addressed in environmental (CEQA) reviews, including initial study checklists and environmental impact reports (guidance in SCVURPPP C.3 Stormwater Handbook, Section II.5 and Attachment II-7).
4. Review site stormwater management plans and sizing and design of proposed facilities to ensure they address hydromodification impacts according to the standards and criteria in Chapter 5 (see design guidance in Chapter 6).
5. Require a maintenance agreement and maintenance access agreement or other legal control mechanism from the property owner and provide education about maintenance, or accept responsibility for maintenance. (C.3 Stormwater Handbook, Chapter VI)
6. Log information about the project and flow control BMPs, for future annual reporting and for use in the BMP Operation & Verification Program. (C.3 Stormwater Handbook, Chapter VII)
7. Inspect the construction of the flow control BMPs to ensure specifications are met.
8. Include the flow control BMPs on a list of prioritized BMPs for future post-construction inspections. (C.3 Stormwater Handbook, Chapter VI)

If project proponents are not able to meet the HMP standards or performance criteria with on-site controls, they may need to look at a combination of on-site, off-site and/or instream controls. In this case, Co-permittee staffs may need to coordinate on the planning and design of proposed flow controls with multiple property owners and project applicants, other Co-permittees' staff (if drainage areas for off-site controls cross jurisdictional boundaries), Santa Clara Valley Water District staff, and/or Regional Board staff. It is recommended that the Water District be notified if a project will not meet the HMP requirements on-site and will need to look at the availability of off-site and/or in-stream control options.

Steps in the Review Process

Chapter II of the SCVURPPP *C.3 Stormwater Handbook* describes the changes to Co-permittees' development project review processes that are necessary to address the requirements of Provision C.3. A table and flow chart of typical development review process steps and the stormwater quality requirements that need to be considered in each step are provided in Attachments II-1 and II-2, respectively. In general, hydromodification controls should be considered at the same times in the process that site design and treatment measures are considered. Not only does this ensure that the requirements are met during the review process, but it provides the opportunity to consider the combined flow control benefit of all of the BMPs selected.

Attachments 7-1 and 7-2 in this HMP Report provide two tools to assist with incorporation of HMP requirements into local approval processes: the HMP Applicability and Requirements Flow Chart (from Figure 5-2) and a Development Review Process Flow Chart Incorporating HMP Requirements (an update of *C.3 Handbook*, Attachment II-2).

As with site design and stormwater treatment BMPs, it is desirable to consider hydromodification controls as early in the project planning stages as possible. One of the first steps is to determine whether the project falls under the C.3 requirements at all (i.e., whether the completed project's impervious area exceeds the thresholds for Group 1 projects) and then whether the HMP requirements apply to the project. The flow chart in Attachment II-3 of the *C.3 Handbook* can be used to determine C.3 applicability, and the flow chart in Attachment 7-2 of this HMP Report can be used to determine potential HMP applicability. Even if the project is determined to be exempt from HMP requirements, Co-permittees should recommend that the project applicant select site design and treatment BMPs that accomplish flow control if possible.

Another important reason to start considering HMP requirements early in the project planning process is that extra lead time may be needed to coordinate implementation of hydromodification mitigations that are a combination of on-site, off-site and/or in-stream controls. As discussed in the previous section, Co-permittee staff and project proponents may need to meet with multiple agencies, property owners, and other parties to coordinate the planning, design, approval and construction of proposed flow controls. Notification of the Water District regarding availability of off-site and/or in-stream control options should take place as early in the planning process as possible. The Co-permittee agencies will need to evaluate how District notification is incorporated into their development review processes and schedules.

7.5 LAND USE PLANNING MEASURES

Permit Provision C.3.f.vi.5 states that the HMP's management measures may include implementation of land use planning measures to "allow expected changes in stream channel cross sections, stream vegetation, and discharge rates, volumes and durations without adverse impacts to stream beneficial uses." The examples provided in the provision include stream buffers and stream restoration activities, such as "restoration-in-advance" of flood plains, revegetation, and use of less impacting facilities at the point(s) of discharge.

A key element of hydromodification management strategies described in the literature is land use planning. The approach is to optimize development project site design to preserve the natural

hydrologic conditions and protect sensitive hydrologic features, sediment source characteristics and sensitive habitats. This helps avoid the need to mitigate for hydromodification

A number of the site design techniques described in Chapter 6, such as clustering buildings to provide more open space, can be considered effective land use planning measures to reduce the increases in stormwater runoff from the project. However, there are additional planning measures that may be implemented for land use near streams that can further help the stream tolerate or adjust to increases in flow and associated erosion potential.

Some Co-permittees have established policy for allowable development and uses near riparian corridors, such as minimum buffer widths in which no development or very little development is allowed[3]. For example, the City of San Jose's Riparian Corridor Policy Study (1999) contains a guideline that all structures, impervious surfaces and ornamental landscaping be separated from the edge of the riparian corridor by a minimum of 100 feet. In addition to protection of riparian habitat, large setbacks from streams, where feasible, allow room for the stream channel to widen in response to increased flows and restabilize with a larger cross section.

Riparian corridors provide natural vegetative filters for slowing and infiltrating runoff and removing pollutants from runoff. For developments that are located near riparian corridors, the conveyance of runoff in sheet flow across these buffer areas instead of piped to an outfall to the creek can be considered. In addition, wide riparian corridors can also provide opportunities for siting shallow infiltration facilities that are intentionally constructed to provide flow control. These facilities can be designed to blend in with the surrounding terrain and planted with native vegetation.

The Santa Clara Valley Water District is the agency that conducts flood protection and environmental restoration projects in Santa Clara Basin streams. Flood protection projects are now typically multi-objective projects that provide valuable habitat, protect endangered species, and allow for open space recreation. In the design of future flood protection projects, District staff will also consider providing bank stabilization, grade controls, and other in-stream measures to protect the stream from impacts of hydromodification from future development.

7.6 OPPORTUNITIES FOR WATERSHED MASTER PLANNING FOR HYDROMODIFICATION, WATER QUALITY, AND FLOOD MANAGEMENT

The C.3.f. requirements include: …*An equivalent limitation protocol, as defined in the HMP, may be used to address impacts from changes in the volumes, rates, and/or durations of peak flows through measures other than control of those volumes and/or durations. The protocol may allow increases in peak flow and/or durations, subject to the implementation of specified BMPs and land use planning practices that take into account expected stream change resulting from changes in discharge rates and/or durations, while maintaining or improving beneficial uses of waters.* (Paraphrased from C.3.f.vii) This protocol provides for managing hydromodification through a combination of efforts that are not restricted to the project site.

In the Santa Clara Valley Basin, where many of the watersheds have been developed and where projects will be more of an infill variety, controls may not be required or are likely to be

[3] SCVURPPP Development Policies Comparison Report, 2003.

addressed on-site. However where portions of watersheds are currently not developed but planned for development, there may be an opportunity to conduct Watershed Master Planning that not only incorporates water quality and hydromodification, but also flood control. The incentive for such an effort derives from the fact that multi-purpose facilities designed for flood control are usually sufficient in size to address water quality and hydromodification, and that such facilities would be more economical to build and maintain than if separate facilities were designed for water quality, hydromodification, and flood control. A significant advantage of Master Planning is that cumulative effects of multiple developments and stream reach sensitivity to hydromodification are taken into account in the development of the plan.

Watershed Master Planning has its own set of institutional, regulatory, scheduling and financial challenges. Cooperative arrangements may be required to resolving institutional issues such as roles and responsibilities, and operation and maintenance. Regulatory approval will be needed to ensure that the master planning effort meets the C.3 requirements, and the master plan may require CEQA approval and perhaps other permits. Funding sources and cost sharing also come into play, with the added requirement that an approved plan and funding mechanism need to be in place to ensure that in-stream controls will be constructed within a reasonable time following completion of the development project. Resolution of some of these issues is sometimes achieved by distinguishing a water quality treatment pool (sometimes referred to as "dead storage") from the flood control volume. This distinction ensures that flood control reliability will not be compromised by multipurpose use and also may assist in defining O&M requirements and responsibilities.

Master planning in the Santa Clara Valley Basin also may be appropriate for those situations where stakeholders agree that in-stream controls in stream reaches already impacted by existing development is feasible and desirable. This makes particular sense where proposed large developments would discharge to already impacted streams, in which case the implementation of on-site controls alone would not provide any in-stream benefits. In such situations, developers could participate with the Santa Clara Valley Water District and perhaps other entities to jointly fund in-stream restoration efforts. If a plan and funding mechanism for an in-stream project is in place, contributing developers would receive credit for funding the value of mitigation for their developments' impacts.

7.7 Inspection and Maintenance Requirements

This section addresses the prospective inspection and maintenance requirements for hydromodification control facilities, including flow duration basins and site design and treatment measures that could be used to reduce runoff volumes as part of a hydromodification control strategy.

Chapter VI of the *C.3 Stormwater Handbook* provides a discussion of inspection and maintenance requirements for all stormwater BMPs, including: elements of a BMP operation and maintenance (O&M) verification program; landowner and municipality responsibilities; BMP maintenance fact sheets; maintenance cost estimates; options for disposal of residuals; and vector control issues. Both the Co-permittee agency issuing the building permit and the property owner(s) have inspection and maintenance responsibilities for on-site flow and drainage area control measures. These may include:

Co-permittee:

- Require a maintenance agreement and maintenance access agreement or other legal control mechanism from the property owner and provide education about maintenance, or accept responsibility for maintenance.
- Inspect the construction of the flow control BMPs to ensure specifications are met.
- Include inspection of the BMP in the Co-permittee's BMP O&M Verification Program, according to the inspection priorities and frequencies established in the program.

Property Owner(s):

- Enter into a maintenance agreement and maintenance access agreement or other legal agreement with the permitting agency.
- Conduct regular inspection and maintenance of the facilities, according to the recommendations in the *C.3 Handbook* and *California BMP Handbooks*.
- Keep a log of inspections and records of maintenance performed, and make them available to the permitting agency upon request.

In addition, the Water District may have responsibility for inspecting and maintaining any in-stream hydromodification controls.

Flow duration basins are very similar to detention and infiltration basins in their design and therefore in their maintenance requirements. The main difference is in the design of the outlet structure, but the components of the outlet that need to be maintained are similar (e.g., orifices, weirs, screen and/or rock protection, etc.). Key maintenance issues include sediment and debris removal, vegetation management, and ensuring that the basin dewaters completely within 5 days to minimize vector production. A pretreatment mechanism for sediment removal, such as a sediment forebay, facilitates maintenance and helps keep the facility from clogging.

Attachment VI-3 of the *C.3.Stormwater Handbook* contains 22 BMP Maintenance Fact Sheets[4] developed for use by Co-permittees and property owners. The fact sheets describe inspection and maintenance activities for a number of BMPs that could be used for flow control and to reduce runoff volumes. These include:

- Bioretention
- Exfiltration trench
- Extended detention basin
- Infiltration basin
- Infiltration trench
- Planter boxes (flow-through type)
- Porous pavement
- Retention/irrigation
- Roof gardens
- Vegetated buffer strip
- Vegetated swale
- Wet pond
- Wetland

The fact sheets help property owners understand the maintenance and inspection requirements and recommended frequencies associated with the facilities on their property. They can be

[4] Sixteen (16) of the 22 BMP Maintenance Fact Sheets were taken from the California Stormwater BMP Handbooks (CASQA, 2003) and six (6) were developed by Program staff for the C.3 Handbook.

attached to building permits and/or maintenance agreements. The fact sheets are available on-line at www.scvurppp.org .

7.8 MONITORING AND REPORTING REQUIREMENTS

The Program's monitoring strategy is based on a two-pronged approach: Programmatic Monitoring and Environmental Monitoring/Assessment Measures. Programmatic monitoring is used to gauge how well performance standards are being met and control measures implemented. For the HMP, programmatic monitoring efforts by the Co-permittees will include:

1. Tracking the projects that have HMP requirements and how the requirements were met, including the types of flow control measures that are installed, via the Provision C.3 reporting requirements (Chapter VII of the *C.3 Handbook*);
2. Documenting the design of flow control measures according to the HMP guidelines;
3. Documenting inspections conducted as part of the BMP O&M Verification Program;
4. Self-evaluation of the New Development element of local urban runoff management programs, including the implementation of the HMP requirements, in annual reports.

The Program, if authorized, will assist Co-permittees with these efforts annually and provide a Program-level evaluation of effectiveness of HMP implementation in the Program's Annual Report every two to three years.

The Program is conducting environmental monitoring and assessment according to its Multi-Year Receiving Waters Monitoring Plan (2002). The Multi-Year Plan incorporates specific data needs that have been identified in Program activities relevant to watershed assessment and monitoring requirements. The need for monitoring activities related to the HMP will be discussed with the Water District and other Co-permittees and coordinated with other activities in the Multi-Year Plan.

7.9 PROGRAM EVALUATION AND CONTINUOUS IMPROVEMENT

On January 15, 2004, the Program submitted to the Regional Board a letter documenting the substantial completion of the HMP Work Plan tasks and a list of next steps to be conducted to complete the final HMP. The letter and next steps were approved by the SCVURPPP Management Committee. Since that time, the following tasks have been completed:

- Ross Creek and San Tomas Aquino Creek assessments;
- Various technical studies and implementation guidance;
- Development of and solicitation of public review on a comprehensive standalone HMP Report (this document).

Implementation Program

To effectuate implementation of the HMP as contemplated by Provision C.3.f.viii.5. and to better evaluate and address issues that could arise from full scale implementation of the HMP following its approval, Program staff, City of San Jose staff, and District staff have been involved in discussions concerning implementation in the Evergreen area on the eastern edge of San Jose, based on the draft HMP. The City of San Jose is currently developing a Smart Growth Strategy for Evergreen, which includes the future development of several non-contiguous properties in the

Evergreen area. The development of these properties comprises more than 500 acres and could include approximately 6,000 homes. The Evergreen Smart Growth Strategy provides a unique opportunity to address stormwater and HMP issues early in the planning stages for this community development. San Jose, Water District and Program staffs have met several times with the team of consultants representing the property owners, and are continuing to assist them in evaluating how to meet the HMP requirements for the proposed developments.

Next Steps

This HMP report was initially released as a public review draft to Co-permittees and Regional Board staff at the end of June 2004, as contemplated in the January 15, 2004 letter. The HMP Report will continue to be improved through lessons learned from implementation experiences and the public review and peer review process associated with the release of this revised version of the HMP Report. Additional contemplated steps are as follows:

- Address remaining implementation issues as follows:
    - Develop a funding mechanism such that projects can utilize in-stream control options, and a methodology for determining developer contributions based on the stream changes expected to result from changes in project runoff conditions (high priority).
    - Work with City/County planning and public works departments and the Water District to determine the timing and method of notifying District staff during the development review process about HMP projects that may need in-stream controls, in a manner that does not unreasonably prolong the review process.
    - Investigate potential guidelines for quantifying practicability.
    - Conduct additional studies of implementation of site design, integrated management practices, and/or basins at example development sites in Santa Clara Valley
    - Collect data on the implementation of the HMP at small sites for a period of two years after the start of implementation, and plan to re-evaluate the small site size threshold and approach at that time.
- Coordinate with other Bay Area stormwater programs to work toward a consistent approach for the Bay Area.
- Apply HMP requirements to additional projects and obtain feedback/suggestions for further refinement and implementation guidance
- Make additional refinements per: 1) lessons learned from implementation efforts based on the draft HMP; 2) the need for consistency with HMPs being developed by other Bay Area stormwater programs; and 3) development community, Co-permittee, and Regional Board feedback.
- Coordinate additional Co-permittee, Bay Area stormwater program, and Regional Board staff review process and progress meetings, including the development of a schedule for Bay Area-wide HMP implementation pursuant to requirements to be adopted by the Regional Board in the upcoming regional municipal urban runoff permit.

Attachment 7-1
HMP Applicability and Requirements Flow Chart

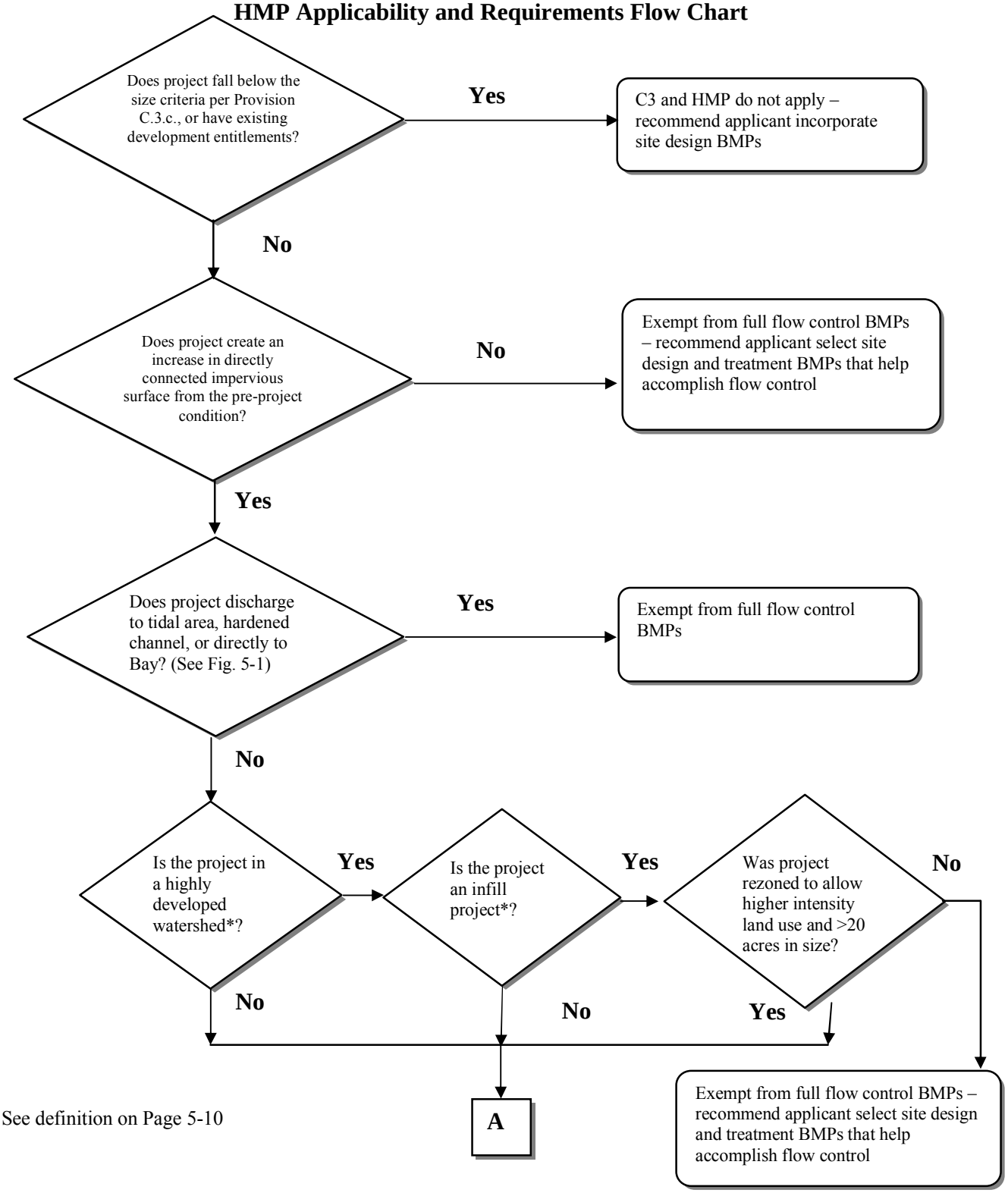

* See definition on Page 5-10

Attachment 7-1 **(Cont'd)**
HMP Applicability and Requirements Flow Chart

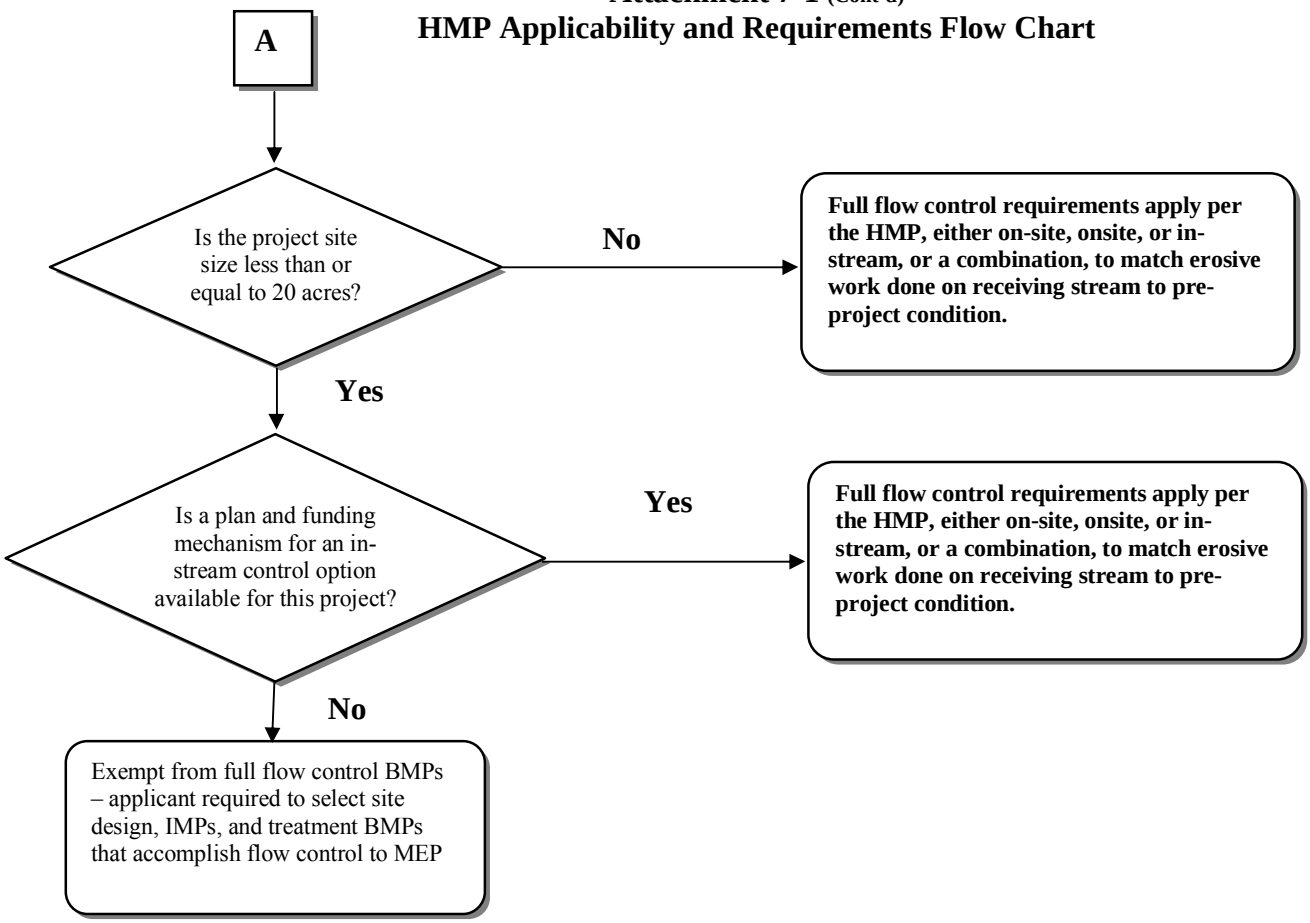

Attachment 7-2

SCVURPPP Typical Development Review Process Incorporating Provision C.3 Stormwater Requirements

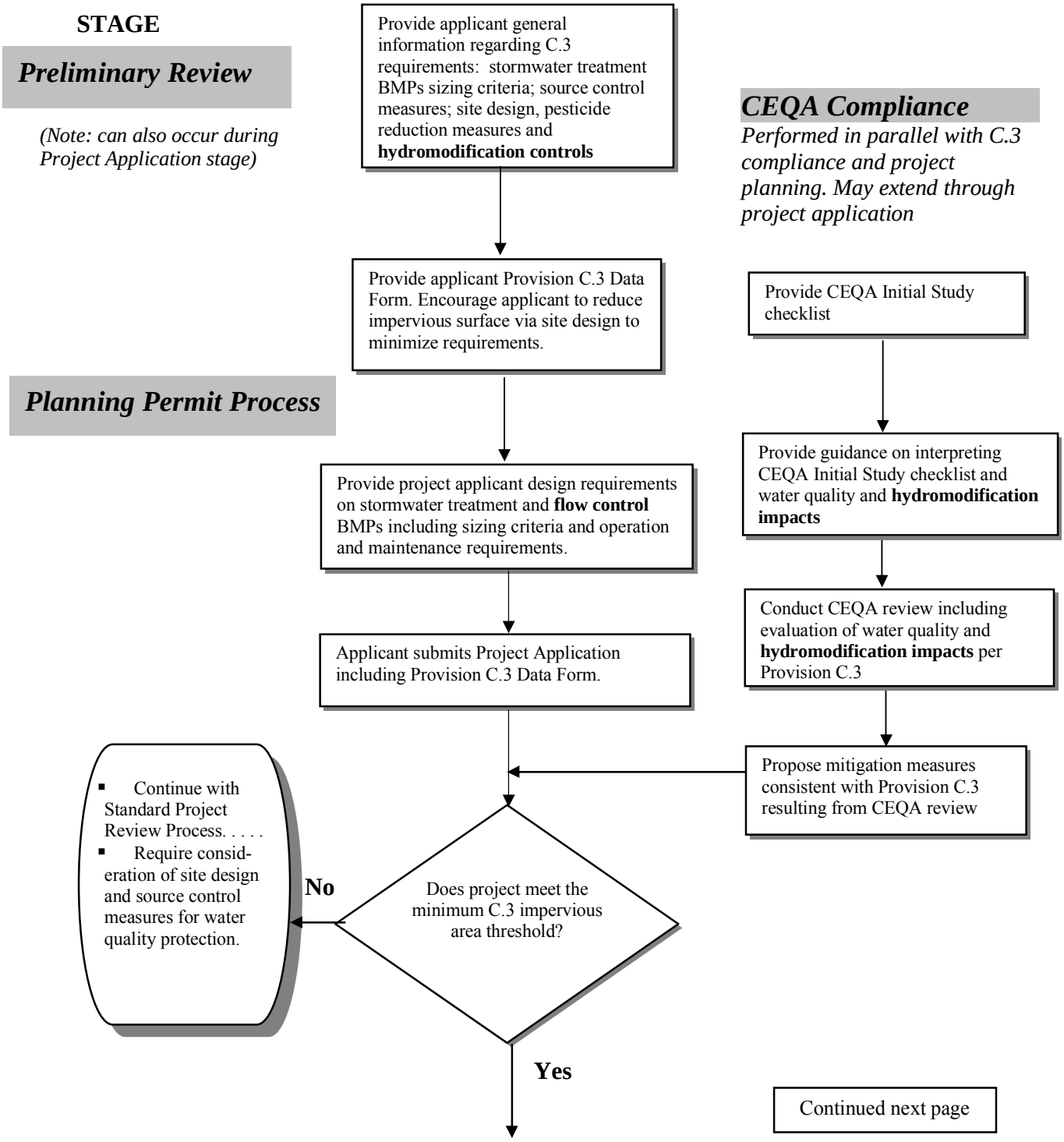

Attachment 7-2 (cont'd)

SCVURPPP Typical Development Review Process Incorporating Provision C.3 Requirements (continued)

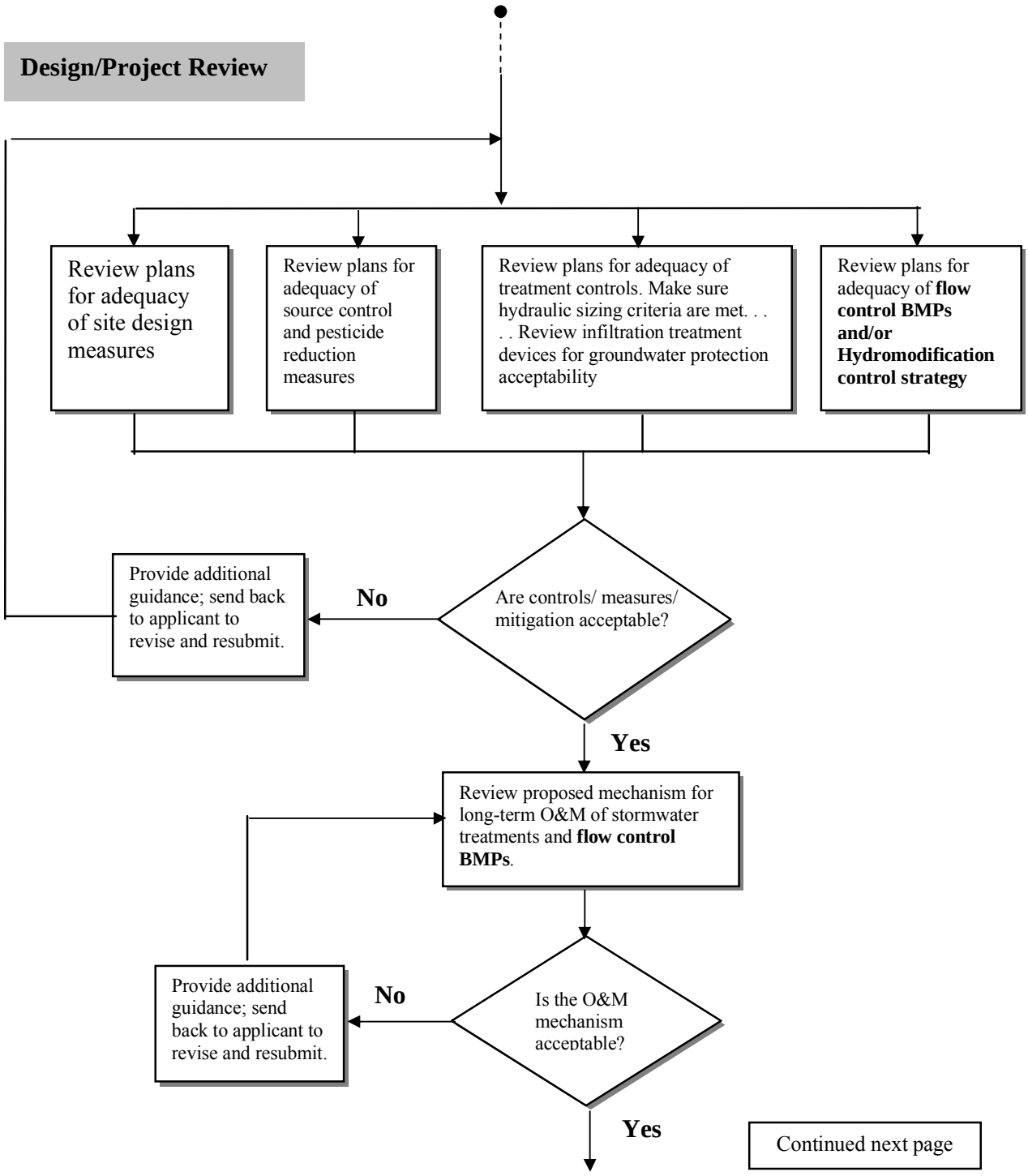

Attachment 7-2 (cont'd)

SCVURPPP Typical Development Review Process Incorporating Provision C.3 Requirements (continued)

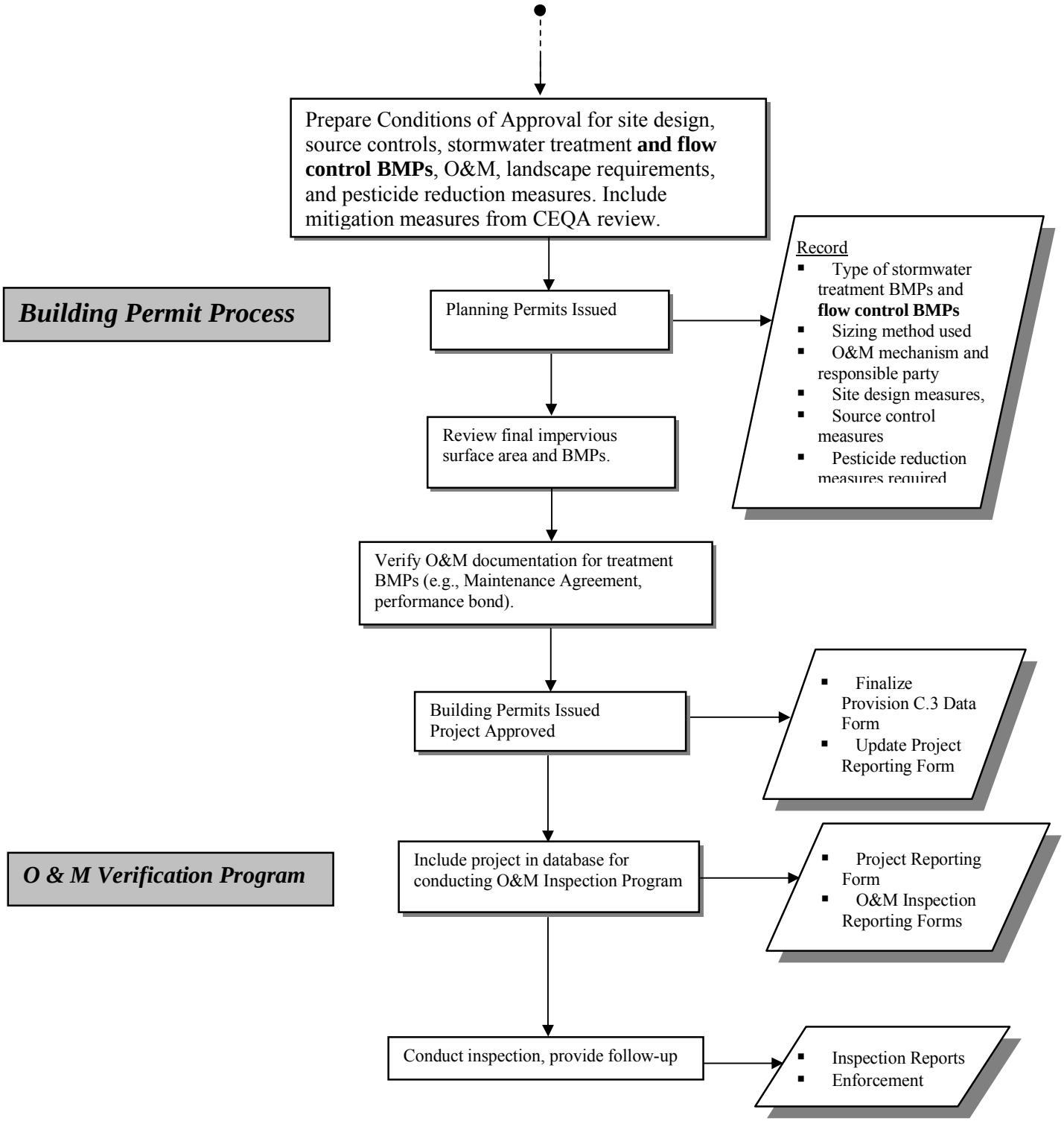

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Technical Memorandum #3: HMP Standard, Performance Criteria, and Implementaion. SCVURPPP, Prepared by: GeoSyntec Consultants, Inc. and EOA, Inc., April 1, 2004, revised final draft. (Appendix C)

Technical Memorandum #4: Evaluation of the Range of Storms for HMP Performance Criteria. SCVURPPP, Prepared by: GeoSyntec Consultants, Inc. and EOA, Inc., April 1, 2004, revised final draft (Appendix)

Technical Memorandum #5: Evaluation of Volume Control Effectiveness. SCVURPPP, Prepared by: GeoSyntec Consultants, Inc. and EOA, Inc., April 1, 2004, revised draft. (Appendix C)

Technical Memorandum #6: Volume Control Sizing Example and Cost Analysis. SCVURPPP, Prepared by: GeoSyntec Consultants, Inc. and EOA, Inc., April 1, 2004, revised draft. (Appendix C)

Technical Memorandum #7: Flow Duration Control Example. SCVURPPP, Prepared by: GeoSyntec Consultants, Inc. and EOA, Inc., April 1, 2004, revised draft. (Appendix C)

Technical Memorandum #8: Sizing Flow-Duration Controls for a Small Development Project in San Jose. SCVURPPP, Prepared by: GeoSyntec Consultants, Inc. and EOA, Inc., April 29, 2004, revised draft. (Appendix C)

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For details on the method of estimating future imperviousness, see Mattern & Associates, 2003.

GLOSSARY OF TERMS

Aggradation	The deposition and accumulation of sediment that was eroded and transported from the upstream watershed, resulting in an elevated streambed.
Alluvium	Silt, sand, and gravel deposited by flowing water.
Armor	A layer of rocks on the surface of a streambed that resists erosion by water flows. The rock can be naturally occurring, caused by the scour of smaller particles from high discharges, or placed by humans to stop channel erosion.
Bankfull	The flow at which a stream with a natural, self-formed floodplain just exceeds the capacity of the banks.
Bar	A sand or gravel deposit found on the bed of a stream that is often exposed during low-water periods.
Basin	An area confined by topographic divides encompassing a number of watersheds that ultimately drain to a common point. In this report, *basin* is the term used to describe the Santa Clara Basin that contains a number of watersheds that drain to the Lower South Bay. The Santa Clara Basin is designated by the USGS as Hydrologic Cataloging Unit No. 18050003.
Bedload	Medium-grained sand and coarser material such as gravel that rolls and saltates along the bottom of the stream by the flow of water.
Beneficial Use	A waterbody's beneficial uses are the resources, services, and qualities of aquatic systems that are the ultimate goals of protecting and achieving high water quality. The beneficial uses of surface waters, groundwaters, marshes, and mudflats serve as a basis for establishing water quality objectives and the discharge prohibitions or conditions necessary to attain them.
Best Management Practice (BMP)	Any program, technology, process, siting criteria, operational method or measure, or engineered system, which when implemented prevents, controls, removes, or reduces pollution. Includes schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the water pollution. BMPs also include treatment requirements, operating procedures, and practices to control site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage.
Buffer Strip or Zone	Strip of erosion-resistant vegetation over which stormwater runoff is directed.
Catch Basin	Box-like underground concrete structure with openings in curbs and gutters designed to collect runoff from streets and pavements.
Catchment	An area that drains to a single storm drain outfall.
Clay	Hydrous aluminum silicate minerals with platy structure, typically less than 1/256-mm in diameter.
Clean Water Act (CWA)	The Federal Water Pollution Prevention and Control Act, or Clean Water Act (33 United States Code 1251 et seq.) is structured to control or eliminate surface water pollution and establish uniform standards for publicly owned treatment works, direct industrial discharges and indirect industrial discharges.
Colluvium	Material deposited by gravity at the foot of a slope.

Constructed Wetland	Constructed detention basins that have a permanent pool of water throughout the year and capacity for temporary additional storage of runoff that is released via an outlet structure. They differ from wet ponds in that they are typically shallower and have greater vegetation coverage.
Continuous Simulation	Model simulation that utilizes actual measured rainfall from a nearby gage over a long period of time, through multiple rain events.
Conveyance System	Any channel or pipe for collecting and directing the stormwater.
Critical Flow (Qc)	Qc is defined as the smallest flow that begins movement of the bed material or erosion of the bank. Qc is determined by matching the applied hydraulic shear stress to the critical shear stress of bed and/or bank materials. Flows less than this value do not substantially move bed material or erode the bank.
Cross-section geometry	The geometry of a channel from which you can estimate the width, depth, area, wetted perimeter, hydraulic radius and channel conveyance.
Design Storm	A synthetic rainstorm defined by rainfall intensities and durations.
Detention	The temporary storage of stormwater runoff in ponds, vaults, within berms, or in depressed areas to allow treatment by sedimentation and metered discharge of runoff at reduced peak flow rates. See Infiltration and retention.
Directly Discharging	Outflow from a drainage conveyance system that is composed entirely or predominantly of flows from the subject, property, development, subdivision, or industrial facility, and not commingled with the flows from adjacent lands.
Directly-Connected Impervious Area (DCIA)	The area covered by a building, impermeable pavement, and/or other impervious surfaces, which drains directly into the storm drain without first flowing across permeable land area (e.g., turf buffers).
Discharge	A release or flow of stormwater or other substance from a conveyance system or storage container.
Dominant discharge	The channel-forming discharge responsible for creating the primary channel that transports the majority of the sediment load.
Drainage Area	Areas smaller than a subwatershed but larger than a catchment. For example, the land drainage to Yerba Buena Creek, which flows into Thompson Creek, is referred to as the Yerba Buena Creek Drainage area.
Erosion Potential	The erosion potential (Ep) is a measure of amount work done hydraulically on the stream channel above a baseline condition (pre-project). Ep is expressed as a ratio of the post-project work done to the pre-project work done. Work done is measured using the "effective work index" (W) described in Chapter 3.
Erosion	The wearing away of land surface by wind or water. Erosion occurs naturally from weather or runoff but can be intensified by land-clearing practices relating to farming, residential or industrial development, road building, or timber cutting.
Event Based Simulation	A single rainstorm event (ranging from perhaps 3 to 24 hours) is simulated.
Flood control levees	An embankment raised to contain the floodwaters of a stream or river.
Flow Duration	Flow duration is the total long-term period of time (hours) that flows occur at a specified magnitude (not a single storm event duration). The simplest way to visualize this is to consider a histogram of pre- and post-project flows using long-term records of hourly data. To maintain pre-project flow duration means that the total number of hours (counts) within each range of flows in a flow-duration histogram cannot increase between the pre- and post-project condition. Flow duration within the range of geomorphically significant flows is important for managing erosion.
Flow-based BMPs	BMPs that treat pollutants from a moving stream of water through filtration, infiltration, and/or biological processes.

Fluvial Geomorphology	The study of forms and characteristics of streams and the physical processes that create them. The processes of hydrology, geology, and sediment supply and transport interact with the watershed and material making up the channel boundary, creating features such as terraces, floodplains, channel planform and geometry, and instream channel features, such as pools, riffles, bars, and secondary channels.
Geomorphic reaches	Stream segments that are fairly homogenous in terms of bed and bank characteristics, as well as channel geometry.
Geomorphically Significant Flows	Geomorphically significant flows is defined as the range of flows that tend to have the most influence over the stream channel cross section geometry, planform, and longitudinal slope. Geomorphically significant flows begin at a threshold that causes sediment transport or erosion of the stream bank (Qc), and extends up to the elevation where flows spill out onto floodplains, or similar features.
Geomorphology	The study of forms and characteristics of the earth's surface and the physical and chemical processes that affect landforms. Weathering, erosion and transport are the fundamental geomorphic processes that break down mountains and supply sediment to stream channels.
Grade control structures	Structures installed in a stream channel intended to reduce the energy of flow by reducing the slope of the streambed. Examples include cross-vane grade control structures, weirs and sackrete terrace structures.
Gravel	Sedimentary matter having a diameter between 4.75 and 75-mm.
Groundwater	Subsurface water that occurs beneath the water table in soils, and geologic formations that are fully saturated.
Hardpan	A layer of hard subsoil or clay.
HMS	The Hydrologic Modeling System is designed to simulate the precipitation-runoff processes of dendritic watershed systems. It is designed to be applicable in a wide range of geographic areas for solving the widest possible range of problems. This includes large river basin water supply and flood hydrology, and small urban or natural watershed runoff. Hydrographs produced by the program are used directly or in conjunction with other software for studies of water availability, urban drainage, flow forecasting, future urbanization impact, reservoir spillway design, flood damage reduction, floodplain regulation, and systems operation.
HEC	The Hydrologic Engineering Center, an organization within the Institute for Water Resources, is the designated Center of Expertise for the US Army Corps of Engineers in the technical areas of surface and groundwater hydrology, river hydraulics and sediment transport, hydrologic statistics and risk analysis, reservoir system analysis, planning analysis, real-time water control management and a number of other closely associated technical subjects.
Hydrograph	The way in which stream flow, or discharge, varies with time. A graph describing stream discharge over time. A hydrograph provides a way of seeing seasonal and yearly changes in the flow or discharge of a waterway.
Hydrograph matching	A method that maintains the post-project volume and distribution of flows as the same as the pre-project flows for a single discrete storm event. This method can be used in combination with a volume control basin to provide additional control of the discharge rate of the pre-project post-project volume.
Hydrographic segments	Segments of a stream that have similar water inputs. Segments are identified based on significant flow increases in the downstream direction due to confluences with major tributaries.

Hydrologic processes	The extent to which precipitation is intercepted by vegetation, infiltrates into the ground, or results in overland flow, influencing the rate and magnitude of stream flows.
Hydrology	The scientific study of the properties, distribution, and effects of water on the earth's surface, in the soil and underlying rocks, and in the atmosphere.
Hydromodification Management Plan (HMP)	Required by the C.3 provisions to the stormwater NPDES permit, the HMP will be submitted to the Regional Water Quality Control Board (Regional Board) in June 2004. The HMP, once approved by the Regional Board, will be implemented so that post-project runoff shall not exceed estimated pre-project rates and/or durations, where the exceedance would result in increased potential for erosion or other adverse impacts to beneficial uses.
Hydromodification	The change in the natural watershed hydrologic processes and runoff characteristics (i.e., interception, infiltration, overland flow, interflow and groundwater flow) caused by urbanization or other land use changes that result in increased stream flows and sediment transport.
Imbrication	A shingling effect of deposited sediments, creating a protective barrier on the streambed.
Impervious surfaces	A hard surface area that either prevents or retards the entity of water into the soil mantle. A hard surface area which causes water to run off the surface in greater quantities or at an increased rate of flow from the flow present under natural conditions prior to development. Common impervious surfaces include: roofs, roadways, walkways, driveways, parking lots, patios, concrete or asphalt paving, gravel roads, and packed earthen material.
Imperviousness	Term applied to surfaces – roads, sidewalks, rooftops, and parking lots – that prevent or inhibit rainfall from sinking into groundcover and groundwater.
Impracticable	As applied to on-site treatment BMPs, technically infeasible excessively costly, as demonstrated by set criteria.
Incision	The hydrologic processes of stream flow that exceeds the available sediment load and erodes streambeds, resulting in a deepening channel.
Infeasible	As applied to on-site treatment BMPs, impossible to implement because of technical constraints specific to the site.
Infill Development	Development of vacant or underutilized land within areas that are already developed with urban uses and served with urban infrastructure (e.g., sanitary sewers, water mains, etc.).
Infiltration and Exfiltration Trench	Long narrow trench filled with permeable material (e.g., gravel), which may contain perforated pipe (exfiltration), designed to store runoff and infiltrate through the bottom and sides into the subsurface soil.
Infiltration Basin	Shallow impoundment that is designed to infiltrate stormwater into the subsurface soil.
Infiltration	Seepage of runoff through the soil to mix with groundwater. See retention.
Knickpoint	The point of a stream bed where there is an abrupt change in slope, governed by regimen and by the structure and composition of the bed and bank materials of the river.
Loam	Soil composed of a mixture of sand, clay, silt, and organic matter.
Low Impact Development/Better Site Designs	Low Impact Development is an integrated site design methodology that uses small-scale detention and retention to replicate pre-existing site hydrological conditions.
Maximum Extent Practicable (MEP)	Standard, established by the 1987 amendments to the Clean Water Act, for the implementation of municipal stormwater pollution prevention programs.
Meander Bends	A bend in the course of a stream, developed through lateral shifting of its course toward the convex side of the bend.
New Development	Land disturbing activities; structural development, including construction or installation of a building or structure, creation of impervious surfaces; and land subdivision.

Stormwater NPDES Permit	The permit issued to 13 Santa Clara Basin cities and towns, Santa Clara County, and the Santa Clara Valley Water District by the Regional Water Quality Control Board for the San Francisco Bay Region. Order 01-024. Order 01-119 amended Provision C.3 of the permit.
NPDES Permit	An authorization, license, or equivalent control document issued by EPA or an approved State agency to implement the requirements of the National Pollutant Discharge Elimination System (NPDES) program. As part of the 1972 Clean Water Act, Congress established the NPDES permitting system to regulate the discharge of pollutants from municipal sewers and industries. The NPDES was expanded in 1987 to incorporate permits for stormwater discharges as well.
Outfall	The point where stormwater discharges from a pipe, channel, ditch, or other conveyance to a waterway.
Overland flow	Sheets of surface runoff created by excess precipitation that is not infiltrated or intercepted by vegetation.
Peak Flow	
Permeability	A property of soil that enables water or air to move through it. Usually expressed in inches/hour or inches/day.
Permeable Pavement	Permeable hardscape or paved surface that allows surface runoff to infiltrate into surface soil (e.g., turf block, brick, natural stone, cobbles, gravel).
Physiography	**The study of the physical features of the earth's surface**
Planform	Stream channel patterns (braided, straight or meandering) as viewed from above.
Planned Unit Development (PUD)	Allows land to be developed in a manner that does not conform to existing zoning requirements. Allows greater flexibility and innovation because the PUD is regulated as one unit instead of each lot being regulated separately.
Pool	A location in an active stream channel typically located in the outside bend of a meander, that exhibits relatively deep waters and reduced flow velocities.
Pool-riffle morphology	Alternating regularly shaped deep and shallow areas of a stream.
Pre-project (existing) condition	Pre-project conditions are the on-site conditions at the time of development, before construction begins.
Provision C.3	A reference to the Provisions, added in November 2001, by the Regional Water Quality Control Board to the SCVURPPP stormwater NPDES permit requiring SCVURPPP to change its development review process to control the flow of stormwater and stormwater pollutants from new and redevelopment sites. (Regional Board Order 01-119.)
Redevelopment	A project on a previously developed site that results in the addition or replacement of impervious surface on such an already developed site. Development that includes, but is not limited to the following: the expansion of a building footprint or addition or replacement of a structure; structural development including an increase in gross floor area and/or exterior construction or remodeling; replacement of impervious surface that is not part of a routine maintenance activity; land disturbing activities related with structural or impervious surfaces.
Regional Water Quality Control Board, San Francisco Bay Area	One of nine (9) California Regional Boards, the Regional Board for the San Francisco Bay Region is responsible for implementing pollution control provisions of the Clean Water Act and California Water Code within the area that drains to San Francisco Bay.
Retention	The storage of stormwater to prevent it from leaving the development site; may be temporary or permanent.
Riparian	Of or pertaining to the bank of a river or stream.
Riverine	Of or pertaining to a river

Runoff	Water originating from rainfall and other precipitations (e.g., sprinkler irrigation) that is found in drainage facilities, rivers, streams, springs, seeps, ponds, lakes, wetlands, and shallow groundwater.
Runon	Stormwater surface flow or other surface flow that enters property other than that where it originated.
Santa Clara Basin	The Basin refers to the 840 square mile that drain into San Francisco Bay south of the Dumbarton Bridge
Santa Clara Valley Urban Runoff Pollution Prevention Program (SCVURPPP)	SCVURPPP is established by a memorandum of understanding among 13 Santa Clara Valley cites and towns, Santa Clara County, and the Santa Clara Valley Water District, who are listed as Co-permittees in an NPDES Stormwater discharge permit issued by the Regional Water Quality Control Board. SCVURPPP implements common tasks and assists the member agencies to implement their local stormwater pollution prevention programs.
Sedimentation	The process of depositing soil particles, clays, sands, or other sediments that were picked up by runoff
Sediments	Soil, sand, and minerals washed from land into water usually after rain that accumulate in reservoirs, rivers, and harbors, destroying aquatic animal habitat and clouding the water so that adequate sunlight might not reach aquatic plants.
Shale	A fissile rock composed of layers of claylike, fine-grained sediments.
Silt	Particles with diameters between 0.75 and 0.002-mm.
Siltation	The settling of soil and sedimentary particles in lakes, rivers, and streams.
Sinuosity	The ratio of stream length to valley length.
Source Control BMP or Measure	Any schedules of activities, structural devices, prohibitions of practices, maintenance procedures, managerial practices or operational practices that aim to prevent stormwater pollution by reducing the potential for contamination at the source of pollution.
Spill Guard	A device used to prevent spills of liquid materials from storage containers.
Storm Drain System	Network of above and belowground structures for transporting stormwater to streams or outfalls for flood control purposes.
Storm Event	A rainfall event that produces more than 0.1 inch of precipitation and is separated from the previous storm event by at least 72 hours of dry weather.
Stormwater	Stormwater runoff, snowmelt runoff, surface runoff, and drainage, excluding infiltration and irrigation tailwater.
Stratigraphy	The study of rock strata, including the distribution, deposition, and age of sedimentary rocks.
Structural BMP or Control Measure	Any structural facility designed and constructed to mitigate the adverse impacts of stormwater and urban runoff pollution (e.g. canopy, structural enclosure). The category may include both Treatment Control BMPs and Source Control BMPs.
Subwatershed	Refers to the land that drains to a tributary of one of the major streams (for example, the Lower Silver – Thompson Creak subwatershed within the Coyote Creek Watershed). The catchment area of a stream tributary or series of stream tributaries.
Treatment Control BMP or Measure	Any engineered system designed to remove pollutants by simple gravity settling of particulate pollutants, filtration, biological uptake, media adsorption or any other physical, biological, or chemical process.
Tributary	A stream or river flowing into a larger body of water.
Underground Detention System	System that consists of underground detention tank, vault or pipes that is designed to fill with stormwater during large storm events and slowly release it back into stormwater conveyance systems over a number of hours.

Undeveloped Land	Land without improvements (i.e., curb and gutter, sidewalks, structures, etc.). Parking lots, parks, designated open space, cemeteries, golf courses, etc. that have been developed according to the designated zoning for the parcel are not considered undeveloped land.
Unlined or Open-Bottomed Vault or Box Below Grade	Below grade structure designed to receive runoff from conveyance systems and store stormwater. Storage structure allows infiltration of stormwater into subsurface soil. (Includes bubble ups and permeable pavement with underground storage)
Unlined Retention Basin	A basin without an outlet that is designed for storing runoff and infiltrating stormwater into the subsurface soils. Basin is not designed to drain runoff into any stormwater conveyance system.
Urbanization	The transformation of land into residential, commercial, and industrial properties and associated infrastructure such as drainages, roads, and sewers.
Vegetated Filter Strip	Linear strips of vegetated surfaces that are designed to treat sheet runoff flow from adjacent surfaces.
Vegetated Swale	Open, shallow channels with vegetation covering side slopes and bottom that collect and slowly convey runoff flow to downstream discharge points.
Volume-based BMPs	BMPs that detain stormwater for a certain period and treat primarily through settling and infiltration.
Volume control	A method in which the difference between the pre-project and post-project runoff volumes is stored on-site in a basin and either infiltrated, discharged to another stream segment which would not be impacted by increased flows, or discharged at a very slow rate (i.e., the critical low flow for the stream, Qc). There is no control of the discharge rate of the remaining (pre-project) runoff volume.
Watershed	A region drained by a single major stream system such as Coyote Creek. Watersheds are named for the associated watercourse (for example, the Coyote Creek Watershed).
Wet Pond	Constructed detention basins that have a permanent pool of water throughout the year and capacity for temporary additional storage of runoff that is released via an outlet structure. They differ from constructed wetlands in that they typically have a greater average depth and less vegetation.
Work	"Work" is a measure of the erosive hydraulic forces on the stream, and a cumulative work curve shows the percentage of total amount of work done for various stream flow rates occurring over the period of rainfall record (as simulated by the hydrologic model).

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Assessing Water Source and Channel Type as Factors Affecting Benthic Macroinvertebrate and Periphyton Assemblages in the Highly Urbanized Santa Ana River Basin, California

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Abstract.—The Santa Ana River basin is the largest stream system in Southern California and includes a densely populated coastal area. Extensive urbanization has altered the geomorphology and hydrology of the streams, adversely affecting aquatic communities. We studied macroinvertebrate and periphyton assemblages in relation to two categorical features of the highly engineered hydrologic system—water source and channel type. Four water sources were identified—natural, urban-impacted groundwater, urban runoff, and treated wastewater. Three channel types were identified—natural, channelized with natural bottom, and concrete-lined. Nineteen sites, covering the range of these two categorical features, were sampled in summer 2000. To minimize the effects of different substrate types among sites, artificial substrates were used for assessing macroinvertebrate and periphyton assemblages. Physical and chemical variables and metrics calculated from macroinvertebrate and periphyton assemblage data were compared among water sources and channel types using analysis of variance and multiple comparison tests. Macroinvertebrate metrics exhibiting significant ($P < 0.05$) differences between water sources included taxa and Ephemeroptera-Plecoptera-Trichoptera richness, relative richness and abundance of nonchironomid dipterans, orthoclads, oligochaetes, and some functional-feeding groups such as parasites and shredders. Periphyton metrics showing significant differences between water sources included blue-green algae biovolume and relative abundance of nitrogen heterotrophic, eutrophic, motile, and pollution-sensitive diatoms. The relative abundance of trichopterans, tanytarsini chironomids, noninsects, and filter feeders, as well as the relative richness and abundance of diatoms, were significantly different between channel types. Most physical variables were related to channel type, whereas chemical variables and some physical variables (e.g., discharge, velocity, and channel width) were related to water source. These associations were reflected in correlations between metrics, chemical variables, and physical variables. Significant improvements in the aquatic ecosystem of the Santa Ana River basin are possible with management actions such as conversion of concrete-lined channels to channelized streams with natural bottoms that can still maintain flood control to protect life and property.

Introduction

Human influence on the environment has been extensive for thousands of years. The introduction of agriculture changed human–environmental relations in virtually all parts of the world (Grimm et al. 2000). However, some of the more severe human-induced environmental impacts are those associated with urbanization. Even in ancient cities, dense human populations caused extreme regional degradation, resulting

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in abandoned cities and reductions in agricultural productivity leading to the collapse of entire civilizations (Grimm et al. 2000).

Currently, urbanization is second only to agriculture as the main cause of stream impairment (Paul and Meyer 2001). Urbanization alters the geomorphic and hydrologic characteristics of streams that drain urban catchments. Drainage basin boundaries are made meaningless by imports and exports of water and construction of drainage and flood control structures. Flow regimes are altered by diversions of water to and from natural channels, water storage and release activities, and changes in surrounding land use that alter runoff patterns (Leopold 1968; Klein 1979; Booth 1991). In addition, flow may be augmented by discharges from wastewater treatment plants. These changes in stream geomorphology, hydrology, and landscape affect water quality. Urban catchments typically have elevated concentrations of phosphorus and other nutrients (U.S. Geological Survey 1999; Winter and Duthie 2000); inorganic ions such as chloride, sodium, and potassium (Paul and Meyer 2001); metals (Paul and Meyer 2001); pesticides (U.S. Geological Survey 1999); and other organic contaminants (Moring and Rose 1997; Frick et al. 1998; Burton 2002).

Changes in landscape and water quality also alter aquatic biotic communities. Taxa richness (number of taxa) declines and communities shift to more tolerant species in association with measures of urbanization including increased population density, increased impervious surface area, and changes in streambed substrate and water quality (Garie and McIntosh 1986; Winter and Duthie 1998; Ourso 2001; Kennen and Ayers 2002). Tolerant species increase in abundance and often dominate the biological community (Barbour et al. 1999; Paul and Meyer 2001).

The Santa Ana River basin is the largest stream system in Southern California, encompassing about 6,900 km^2 of the densely populated coastal area (Figure 1). The river begins in the San Bernardino Mountains (which reach altitudes exceeding 3,000 m) and flows more than 160 km to the Pacific Ocean. The watershed is home to almost 5 million people, and the population is expected to reach almost 7 million by the year 2025 (Santa Ana Watershed Project Authority 2003).

The hydrologic system is highly engineered. Flow from most headwater tributaries is diverted to groundwater-recharge facilities (Figure 1), public supply, and, on the Santa Ana River, to hydroelectric plants. Because of diversions and hot, dry summers, the Santa Ana River and almost all its tributaries lose surface flow once they reach the alluvium-filled basin. Groundwater is withdrawn and supplemented with imported water for public use. Some of the water used by the public returns to the ground through infiltration from lawns, some is lost through evapotranspiration from ornamental plants, some becomes urban runoff, and most is sent to wastewater treatment plants. Farther downstream, flow is reestablished in some channels due to inputs from wastewater treatment plants (Figure 1). In a few small streams, urban runoff or groundwater forced upward by faulting or by bedrock outcrops restores surface flow. Imported water is occasionally discharged to a stream and then diverted for groundwater recharge farther downstream. Most water in streams is from sources impacted by human activities. Treated wastewater and urban runoff maintain perennial flow in some streams that historically were ephemeral. Flow in these streams is 70–100% treated wastewater (Mendez and Belitz 2002). Moreover, the volume of treated wastewater is increasing every year (Burton et al. 1998). In addition to changes in source water, the tributary network on the basin floor has been greatly altered. Natural stream courses are typically channelized and, in many cases, concrete-lined.

Ecological conditions in the Santa Ana River basin have also been significantly altered. Watersheds have been converted from natural habitats to urban land uses and riparian vegetation has been removed. Many streams have been channelized and concrete-lined for the protection of life and property. Human activities have introduced many toxic compounds to surface- and groundwater, rerouted the distribution of streamflow, and changed the timing of these flows. Changes to the landscape and streams imposed by urbanization cannot be fully corrected (Booth and Reinelt 1993); however, that does not mean ecosystem conditions cannot be improved. The problem is identifying differences in biological conditions related to anthropogenic factors that may be mitigated.

Many urban studies focus on an urbanization gradient either within one catchment or among several catchments. Other studies compare reference conditions to urban condition. Because of the engineered hydrologic system, the arid climate, and the high percentage of urban land use in the basin, gradient studies are not feasible in the Santa Ana River basin. However, some aspects of the hydrologic system in the Santa Ana River basin are well constrained. It is possible to identify the source of water as well as the channel modification or type for many streams. This provides an opportunity for assessing the effects of these two anthropogenic factors. Objectives of this

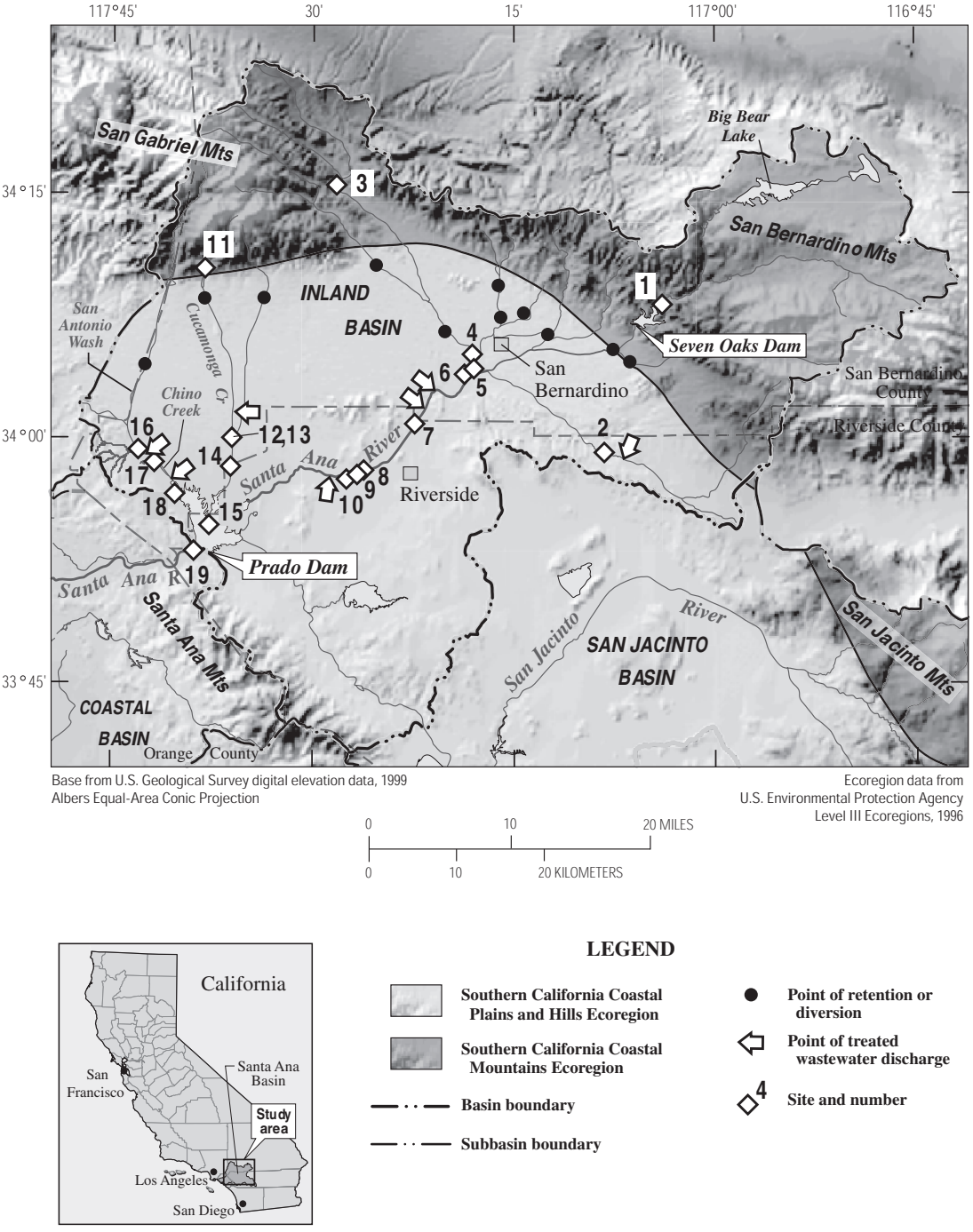

FIGURE 1. Location of stream sites, retention basins, and points of treated-wastewater discharge in the Santa Ana River basin, California.

paper are to relate condition of the benthic macroinvertebrate and periphyton (attached algae) assemblages to water source and channel type. We also address some challenges of studying and understanding highly urbanized streams. In a companion paper (Brown et al. 2005, this volume), we use multivariate ordination

techniques to better understand the ecological processes affecting aquatic communities in the Santa Ana River basin and generating the patterns observed in this study.

Methods

Study Area

Urban and agricultural land uses occur primarily in the alluvium-filled valleys and coastal plain, which are located in the Southern California Plains and Hills ecoregion (Omernik 1987) (Figure 1). The uplands, which include the San Gabriel, San Bernardino, and San Jacinto Mountains, lie within the Southern California Coastal Mountain ecoregion and are generally steep and undeveloped. Land use in the entire basin is about 35% urban; 10% agricultural; and 55% open space, primarily steep, mountain slopes. The alluvium-filled valleys and coastal plain are more than 70% urban. Population density in the entire basin is about 580 people/km^2; population density in the alluvium-filled valleys and coastal plains is about 1,160 people/km^2. The climate is Mediterranean and characterized by hot, dry summers and cool, wet winters. Average annual precipitation ranges from 25 to 60 cm in the coastal plains and inland valleys, and from 60 to 122 cm in the San Gabriel and San Bernardino Mountains (U.S. Army Corps of Engineers 1994).

Site Selection

Preliminary assessments identified four categories of water source (natural, human-impacted groundwater, urban runoff, and treated wastewater) and three categories of channel type (natural, channelized with natural bottom, and concrete-lined). Conceptually, this represents a 4 × 3 categorical design, but perennial stream reaches that represented all combinations were not available (Table 1). At least one study reach was selected to represent all combinations available in the basin for a total of 19 sites (Table 2).

TABLE 1. Number of sites in each combination of water source and channel type, Santa Ana River basin, California.

	Channel type		
Water source	Natural	Channelized	Concrete
Natural	3	0	0
Groundwater	0	1	3
Urban runoff	0	2	1
Treated wastewater	4	2	3

Natural landscape variability was minimized by locating reaches within one ecoregion, the Southern California Plains and Hills (Omernik 1987), with one exception. Sites with little to no urban land use could not be found within the ecoregion. Therefore, three sites (1, 3, and 11) located near the interface with the Southern California Mountain ecoregion were selected to represent least-impacted conditions (Table 2; Figure 1). These mountain-runoff sites are supplied with natural water, have a natural channel type, and represent conditions as streams enter the valley floor.

Four sites are primarily supplied with human-impacted groundwater. Of these, one is channelized (9) and the remaining three are concrete-lined (4, 6, and 8). Three sites are primarily supplied with urban runoff. Two of these sites are channelized (5 and 16), and the third is concrete lined (12). Nine sites are dominated by discharge from wastewater treatment plants. Four of these sites are located in natural channels (2, 10, 15, and 19), two in channelized streams (7 and 18), and three in concrete-lined channels (13, 14, and 17).

Basin area and percentage of urban land use were calculated for all sites for the natural, topographical drainage basin. The actual contributing drainage area also was calculated based on information about retention basins, storm drains, and treated wastewater discharge locations (Table 2). Drainage areas behind retention basins were subtracted from the topographical drainage basin, and basin boundaries were adjusted to account for storm drains and treated wastewater discharge locations. The contributing area was usually a subset of the topographical drainage area that is separated from mountain runoff by retention basins. In the case of the three least-impacted sites, the topographical drainage basin area and contributing basin area are the same. Percentage of urban land use also was calculated using the contributing basin area. In the case of a stream receiving 100% treated wastewater, the contributing basin area has no meaning because the flow emerges from a pipe and all of the water is from urban uses (100%).

Data Collection

Water samples for major ions, nutrients, pesticides, and field parameters (specific conductance, pH, water temperature, dissolved oxygen, and discharge) were collected using standard U.S. Geological Survey (USGS) protocols (Shelton 1994). Water samples were collected in Teflon bottles using either the equal-width-incremental method or the multiple-vertical method,

TABLE 2. Site number, site name, drainage area, land use, population density, major source of water, and channel type for study sites, Santa Ana River basin, California.

Site no.	Station name	Drainage area (topographical, km^2)	Drainage area (contributing, km^2)	Urban land use (topographical, %)	Urban land use (contributing %)	Population density (contributing, people per km^2)	Major contributing water source[a]	Channel type[b]
1	Santa Ana River (SAR) at upper powerhouse	398	398	5	5	20	N	N
2	San Timoteo Creek near Eastside Ranch	141	NA[c]	20	100[d]	NA[c]	W	N
3	Cajon Creek below Lone Pine	145	145	4	4	10	N	N
4	Warm Creek above Orangeshow	4	4	90	90	1,990	G	C
5	Warm Creek above E Street	30	30	93	93	1,890	U	Ch
6	Warm Creek near San Bernardino	32	32	94	94	1,890	G	C
7	SAR above Riverside Road	1,918	743	21	46	690	W	Ch
8	Sunnyslope channel near Rubidoux Nature Center	19	19	52	52	870	G	C
9	Sunnyslope channel in SAR Regional Park	19.4	19.4	53	53	870	G	Ch
10	SAR at MWD Crossing	2,136	960	25	49	730	W	N
11	Cucamonga Creek near Upland	26	26	0	0	2	N	N
12	Cucamonga Creek at Chino Ave, main channel	180	132	58	80	1,460	U	C
13	Cucamonga Creek at Chino Ave, wastewater channel	180	NA[c]	65	100[d]	NA[c]	W	C
14	Cucamonga Creek near Mira Loma	208	160	56	72	1,280	W	C
15	Mill Creek near Slatter S Duck ponds	234	186	52	63	1,120	W	N
16	Little Chino Creek above Pipeline	16	16	46	46	560	U	Ch
17	Chino Creek above Central Ave	234	155	55	78	1,680	W	C
18	Chino Creek below Pine Road	259	191	51	69	1,520	W	Ch
19	SAR below Prado Dam	3,726	2,394	32	45	690	W	N

[a] N, natural; W, treated wastewater; G, urban ground water; U, urban runoff.
[b] C, concrete-lined channel, Ch, channelized; N, natural channel.
[c] Contributing area is not applicable (NA) because all flow in the channel comes from a wastewater treatment plant.
[d] Urban land use is 100% because all flow in the channel comes from wastewater treatment plant.

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depending on site conditions. Water samples for determination of dissolved nutrients and major ions were filtered through a 0.45-μm Gelman capsule filter. Water samples for determination of cations were preserved with nitric acid. Water samples collected for pesticides were filtered through a baked glass-fiber filter. Water samples for major ions, nutrients, and pesticides were chilled to 4°C and shipped to the USGS National Water-Quality Laboratory (NWQL), Denver, Colorado, for analysis. Samples for major ions, nutrients, and pesticides were collected once, when the algae samples were collected. Field parameters were collected during each site visit.

Habitat variables were measured at each of 11 transects within each sampling reach (Fitzpatrick et al. 1998). Reaches ranged from 150 m for small streams and concrete-lined channels to 900 m for larger streams. Basin area, urban land use, and population densities were determined using geographic information system databases. Land-use information was obtained from the Southern California Association of Governments (1997), and population density information is from the 1990 U.S. Census (Hitt 1994).

Periphyton, benthic macroinvertebrate, and water quality samples were collected and the habitat was characterized at the 19 sites from July to September 2000. Artificial substrates were used for periphyton and benthic macroinvertebrates to decrease the effect of radically different substrate types among sites (cobbles, sand, concrete), facilitating comparisons among sites (Aloi 1990; Lowe and Pan 1996).

Unglazed clay tiles (approximately 7.5 × 7.5 cm) attached to concrete paving blocks were used to collect periphyton. Four paving blocks with two tiles each were placed at each site. Water depth and velocity were measured at each paving block when the substrates were deployed and when they were collected. After a 2-week colonization period, the clay tiles were removed from the paving blocks. Periphyton was collected and processed using the top-rock scrape method (Moulton et al. 2002). Samples were preserved in 4% formalin. Periphyton taxa were identified and enumerated at the Philadelphia National Academy of Science following the methods of Charles et al. (2002).

Artificial substrates for benthic macroinvertebrates consisted of a section of bristled plastic doormat (approximately 15 × 15 cm) and an 18-cm length of 3.2-cm polyvinyl chloride (PVC) pipe wrapped three times with plastic fencing (1.9-cm mesh) attached to a concrete paving block (Figure 2). Four substrates were placed at each site. Water depth and velocity were measured at each paving block when the substrates

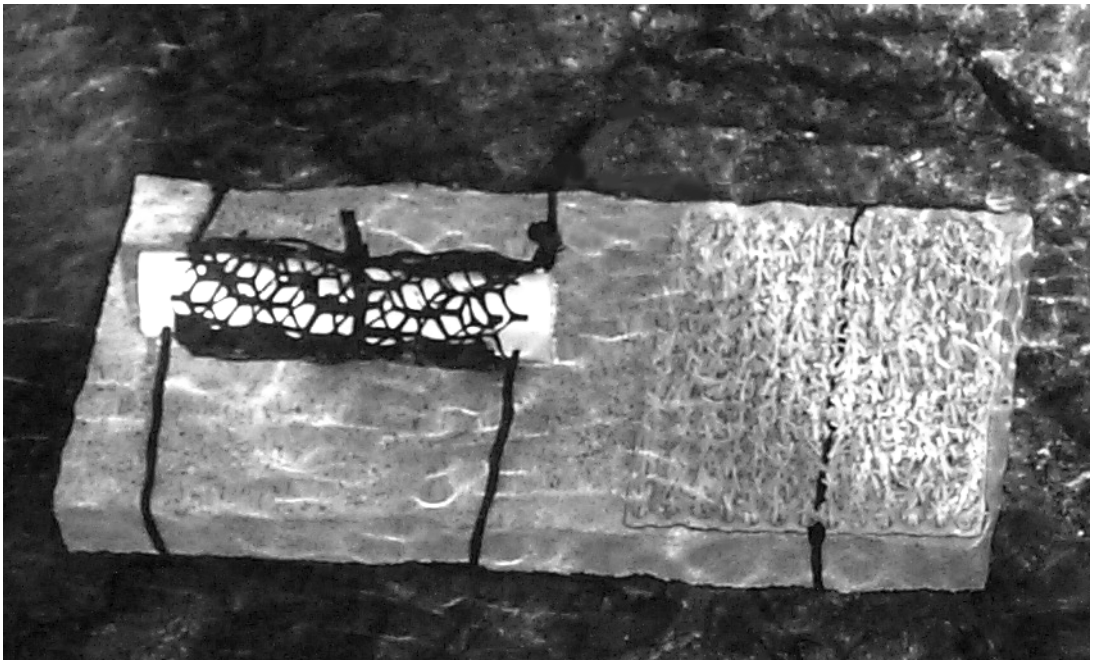

FIGURE 2. Artificial substrate used to collect macroinvertebrate samples from the Santa Ana River basin, California.

were deployed and when they were collected. Up to three substrates were removed after a 6-week colonization period. The doormat and PVC pipe were removed from the paving block, and placed in a bucket. A 500-μm-mesh net was placed downstream from the substrate to collect any macroinvertebrates that were dislodged in the removal process. The doormat, PVC pipe, and fencing were scrubbed and inspected to remove macroinvertebrates. The sample was sieved (500 μm) and preserved in 10% formalin (Moulton et al. 2002). Macroinvertebrates were identified and enumerated at the NWQL following protocols for a 100-organism fixed-count (Moulton et al. 2000).

Data Analysis

More than 80 chemical and 30 physical variables were measured, including concentrations of dissolved nutrients, concentrations of dissolved major ions, concentrations of dissolved pesticides, and habitat characteristics. Analysis of variance (ANOVA) was used on ranked chemical and physical variables to identify those that were significantly different ($P < 0.05$) between water sources or channel types. These selected chemical and physical variables were used in all further analyses. Principal components analysis (PCA) was used to explore overall patterns among the final set of environmental variables.

Benthic macroinvertebrates were generally identified to genus. Ambiguous individuals identified at a higher taxonomic level (usually family) were distributed among the lower taxa (usually genera) in accordance with the relative abundance of each genus when most of the individuals were identified at the lower level. Otherwise, data were aggregated at the higher level of taxonomy. Species lists and counts are not presented in this paper but are available from the corresponding author (Carmen Burton). The taxa data were summarized as biological metrics using the Invertebrate Data Analysis System program (Cuffney 2003).

Periphyton was identified to species in most cases. As with the macroinvertebrates, species lists and counts are not presented in this paper. Metrics were calculated using autecological and tolerance information described by Van Dam et al. (1994), Bahls (1993), and Lange-Bertalot (1979).

More than 120 macroinvertebrate metrics and 40 periphyton metrics were calculated. Macroinvertebrate metrics included taxa richness, relative taxa richness, taxa abundance (density), and relative taxa abundance, functional-feeding group (taxa having similar adaptations for feeding) richness and abundance, and relative richness and abundance. Periphyton metrics include taxa richness, relative richness, abundance, relative abundance, biovolume, and percentage of biovolume of periphyton classes, as well as relative abundance of taxa according to autecological characteristics such as motility and pollution tolerance. Only those metrics that were statistically different among water sources or channel types are discussed further.

Biological metric values were compared among water sources or channel types using ANOVA. The data were transformed by ranking before using the general linear model procedure in SAS. Tukey's multiple comparisons tests (Helsel and Hirsch 1992) were conducted for biological metrics showing significant differences among water sources or channel types. The test was modified using the harmonic mean to account for unequal sample sizes (Helsel and Hirsch 1992). Significant metrics ($P < 0.05$) were correlated (Spearman's correlation) with the selected chemical and physical variables. The significant macroinvertebrate metrics and the significant periphyton metrics also were analyzed by PCA to determine patterns of correlation among metrics within each taxa group and facilitate interpretation of general patterns. The number of important axes was determined by Kaiser's rule, which states that the minimum eigenvalue for an axis should be greater than the average of the eigenvalues for all axes.

Results

Chemical and Physical Variables

Nineteen chemical and physical variables were significantly different between sources of water or channel type (ANOVA, $P < 0.05$). Fifteen chemical and physical variables showed significant differences between sources of water, and nine physical variables showed significant differences between channel types (Tables 3 and 4). Concentrations of dissolved chemicals were highest in streams with treated wastewater and lowest in streams with natural water (Table 3). Inorganic ions such as chloride (Cl), potassium (K), and sodium (Na) were significantly different among water sources, but specific conductance was not. Of the physical variables, discharge, water velocity, and wetted channel width were highest in streams supplied with treated wastewater and usually lowest in natural streams (Table 3). Streams supplied with water from natural sources had the highest values for the remaining physical variables. Streams supplied with urban runoff and groundwater had the highest percentages of urban land use.

TABLE 3. Median values for chemical and physical variables that were significantly different among water-source categories (ANOVA, $P < 0.05$). For each variable, water sources with different letters were significantly different (Tukey tests, $P < 0.05$).

	Water source			
Variable	Natural	Groundwater	Urban runoff	Treated wastewater
Cl (mg/L)	6 A	7 A	61 AB	94 B
K (mg/L)	2 A	3 A	4 A	11 B
Na (mg/L)	19 A	71 AB	64 AB	82 B
Ammonia (mg/L as N)	0.01 A	0.02 AB	0.04 AB	0.09 B
PO_4 (mg/L as P)	0.005 A	0.005 A	0.087 B	1.05 C
Discharge (m^3/s)	0.03 A	0.07 A	0.06 A	0.88 B
cv[a] bank-full width	33 A	5 B	14 AB	14 B
Channel width, wetted (m)	3.8 AB	4.4 A	5.7 AB	14.1 B
cv depth	61 A	52 B	49 AB	36 B
% riffle	53 A	0 B	0 B	0 B
Streambed substrate size[b]	7.0 A	1.7 B	2.5 B	3.1 AB
Velocity (m/s)	0.18 A	0.12 A	0.21 AB	0.47 B
cv velocity	101 AB	98 AB	102 A	44 B
% urban land use (contributing)	4 A	71 B	80 B	69 AB
Water temperature (°C)	20.0 A	29.8 B	30.5 B	28.0 B

[a] cv, coefficient of variation.
[b] The streambed substrate size was characterized as 1, concrete; 2, silt, mud, or detritus; 3, sand (>0.063–2 mm); 4, fine/medium gravel (>2–16 mm); 5, coarse gravel (>16–32 mm); 6, very coarse gravel (>32–64 mm); 7, small cobble (>64–128 mm); 8, large cobble (>128–256 mm); 9, small boulder (>256–512 mm); 10, large boulder, irregular bedrock, irregular hardpan, or irregular artificial surface (Fitzpatrick et al. 1998).

Water temperature, open canopy, and percentage of urban land use were highest in concrete-lined channels and lowest in natural channels (Table 4). Bank shading, coefficient of variation (cv) of bank-full width, cv of open canopy, presence of riffles, and streambed substrate size were lowest in concrete-lined channels and highest in natural channels. Values for channelized streams fell between the values for concrete-lined and

TABLE 4. Median values for chemical and physical variables that were significantly different among channel-type categories (ANOVA, $P < 0.05$). For each variable, channel types with different letters were significantly different (Tukey tests, $P < 0.05$).

	Channel type		
	Natural	Channelized	Concrete
% bank shading	87 A	69 A	9 B
cv[a] of bank-full width	24 A	21 A	0 B
Depth (m)	0.19 A	0.23 A	0.10 B
Open canopy (degrees)	61 A	122 AB	153 B
cv open canopy	47 A	24 AB	9 B
% riffle	17 A	7 AB	0 B
Streambed substrate size[b]	4.9 A	4.1 A	1.0 B
% urban land use (contributing)	45 A	53 B	79 B
Water temperature (°C)	23.5 A	26.0 B	30.3 B

[a] cv, coefficient of variation.
[b] The streambed substrate size was characterized as 1, concrete; 2, silt, mud, or detritus; 3, sand (>0.063–2 mm); 4, fine/medium gravel (>2–16 mm); 5, coarse gravel (>16–32 mm); 6, very coarse gravel (>32–64 mm); 7, small cobble (>64–128 mm); 8, large cobble (>128–256 mm); 9, small boulder (>256–512 mm); 10, large boulder, irregular bedrock, irregular hardpan, or irregular artificial surface (Fitzpatrick et al. 1998).

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natural streams; however, they were usually more similar to values for natural streams.

Principal components analysis of chemical and physical variables resulted in four PCA axes accounting for more than 80% of the variance in the data (Table 5). The first two PCA axes accounted for most of the variance (65%). Principal components analysis axis 1 explains about 39% of the variation among sites and is composed of variables associated with water source (Figure 3). Loadings for the chemical variables of chloride, potassium, sodium, phosphate, and ammonia increase in the positive direction toward the sites supplied

TABLE 5. Loadings of ranked chemical and physical variables and biological metrics derived from principal component analysis.

	Loadings					
Variable	Axis 1	Axis 2	Axis 3	Axis 4	Axis 5	Axis 6
Chemical and physical variables:						
Cl	0.28	—[a]	—	0.42	NA[b]	NA
K	0.31	—	—	—	NA	NA
Na	0.28	—	—	0.30	NA	NA
Ammonia	0.26	—	—	0.32	NA	NA
PO_4	0.31	—	—	—	NA	NA
Discharge	0.26	—	—	—	NA	NA
cv[c] bank-full width	—	—	0.25	—	NA	NA
Bank shading	—	0.31	–0.28	—	NA	NA
Channel width, wetted	—	—	0.43	—	NA	NA
Depth	—	0.36	—	0.29	NA	NA
cv depth	—	—	—	—	NA	NA
Open canopy	—	–0.26	0.39	—	NA	NA
cv open canopy	—	0.32	–0.33	—	NA	NA
% riffle	–0.24	—	—	—	NA	NA
Streambed substrate size	—	0.35	—	—	NA	NA
% urban land use (contributing)	—	—	–0.46	—	NA	NA
Velocity	0.26	—	—	–0.35	NA	NA
cv velocity	–0.25	—	—	0.47	NA	NA
Water temperature	—	–0.31	—	—	NA	NA
Cumulative variance explained:	39	65	75	83	NA	NA
Macroinvertebrate taxa metrics:						
Richness	—	0.22	—	0.22	0.24	—
EPT richness	0.21	—	0.24	—	—	—
Trichoptera richness	—	—	0.23	—	—	—
% nonchironomid dipteran richness	—	0.28	—	–0.24	—	—
% nonchironomid abundance	—	0.28	—	—	—	—
% Orthoclad richness	—	–0.23	–0.21	–0.30	—	—
% Orthoclad abundance	—	—	—	–0.24	0.21	0.31
% Oligochaete richness	—	–0.22	—	—	—	—
% Oligochaete abundance	—	—	—	—	—	—
EPA tolerance, based on richness	–0.22	—	–0.20	—	—	0.21
% parasite richness	—	—	–0.23	—	—	—
% parasite abundance	—	—	–0.23	—	—	—
Scraper richness	—	—	0.38	—	—	—
% shredder richness	—	–0.25	—	—	—	0.46
% shredder abundance	—	—	0.22	—	—	0.28
% predator richness	—	—	—	0.32	—	0.37
% gatherer richness	—	—	–0.25	—	—	0.31
% Trichoptera abundance	0.25	—	—	—	—	—

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TABLE 5. Continued.

Variable	Loadings					
	Axis 1	Axis 2	Axis 3	Axis 4	Axis 5	Axis 6%
%Tanytarsini abundance	0.20	—	—	0.22	0.23	—
% Tanytarsini abundance/Chironomid abundance	—	—	–0.20	—	0.25	—
% noninsect abundance	–0.23	—	—	—	—	—
Nonmidge diptera plus noninsect abundance	–0.23	—	—	—	—	—
% filterer richness	—	—	—	–0.26	—	—
% filterer abundance	0.24	—	—	—	—	—
Cumulative variance explained:	38	65	75	83	88	92
Periphyton taxa metrics:						
% diatom richness	—	0.56	—	NA	NA	NA
% diatom abundance	—	0.52	0.27	NA	NA	NA
Green algae biovolume	–0.29	—	–0.55	NA	NA	NA
Blue-green algae biovolume	–0.44	—	0.33	NA	NA	NA
% blue-green algae biovolume	–0.36	—	0.53	NA	NA	NA
% Nitrogen-heterotrophic diatom abundance	–0.38	0.33	–0.34	NA	NA	NA
% eutrophic diatom abundance	–0.35	0.37	–0.28	NA	NA	NA
% motile diatom abundance	–0.33	0.31	—	NA	NA	NA
% Pollution-sensitive diatom abundance	0.39	—	—	NA	NA	NA
Cumulative variance explained:	43	69	84	NA	NA	NA

[a] —, loading < 0.20 for macroinvertebrate metrics; loading < 0.24 for periphyton metrics and chemical and physical variables.
[b] NA, not applicable.
[c] cv, coefficient of variation.

with treated wastewater. Physical variables of discharge and velocity also increase in the positive direction. Physical variables of percentage of riffles and cv of velocity increase in the negative direction toward the sites supplied with natural water (Table 5; Figure 3).

Principal components analysis axis 2 explains 26% of the variation among sites and includes primarily variables associated with channel type (Table 5; Figure 3). Loadings for the physical variables of bank shading, depth, streambed substrate size, and cv of open canopy increase in the positive direction toward sites that are channelized or have natural channels. Open canopy and water temperature increase in the negative direction toward sites that are concrete-lined.

Biological Metrics and Water Source

Twenty-four benthic macroinvertebrate and six periphyton metrics were significantly different among water sources (ANOVA, $P < 0.05$). Eight benthic macroinvertebrate metrics are measures of taxa richness, 6 are measures of taxa abundance, and 10 are measures of functional-feeding groups. Several macroinvertebrate metrics based on slightly different measures of the same taxa (e.g., oligochaetes) gave similar results, suggesting that they were redundant. In these cases, only results for relative richness and abundance are given (Tables 6 and 7). Macroinvertebrate metrics varying with water source included taxa richness, Ephemeroptera-Plecoptera-Trichoptera (EPT) richness, nonchironomid dipterans, orthoclad chironomids, oligochaetes, richness of tolerant taxa, parasites, shredders, predators, scrapers, and gatherers.

Streams supplied by natural water and streams supplied by treated wastewater were significantly different from other sources for more biological metrics than were streams supplied by either human-impacted groundwater or urban runoff (Table 6). Streams supplied by natural water sources generally had higher values for total richness, EPT richness, trichopteran

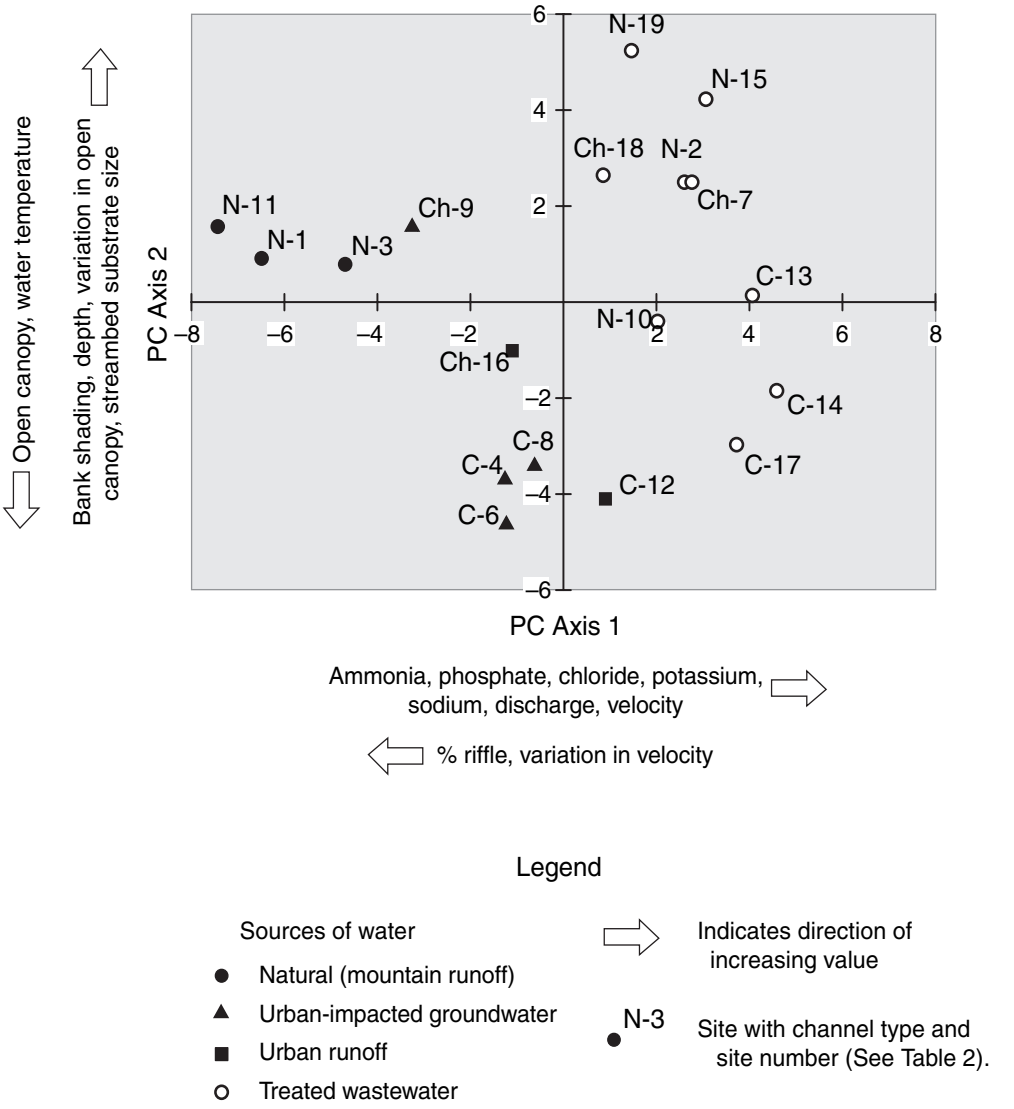

FIGURE 3. Principal component analysis (PCA) site scores based on chemical and physical data from the Santa Ana River basin, California. Principal component analysis axis 1 is controlled by water-source variables. Principal component analysis axis 2 is controlled by channel-type variables.

richness, and measures of nonchironomid dipteran abundance (predominantly Simuliidae and *Caloparyphus* sp.) than did streams dominated by treated wastewater (Table 6). Urban runoff and treated wastewater generally had higher values than those of natural water or groundwater sources for measures of orthoclad chironomids (dominated by *Cricotopus* sp.) and oligochaetes.

The importance of functional-feeding groups varied among water sources (Table 6). Measures of parasites (Nematoda) and predators (Turbellaria) were greatest at urban groundwater sites. Measures of shredders (predominantly *Cricotopus* sp.) were greatest at urban runoff and treated wastewater sites. Scraper richness (dominated by *Physella* sp., *Petrophila* sp., and *Helicopsyche* sp.) was significantly greater in natural waters and urban runoff compared with treated wastewater and urban groundwater. Percentage gatherer richness (predominantly Naididae, *Fallceon* sp., and *Baetis* sp.) was lowest in natural waters compared with urban runoff or groundwater.

Thirteen of the 19 selected chemical and physical

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TABLE 6. Median values for biological metrics that were significantly different among water-source categories (ANOVA, $p < 0.05$). For each variable, medians with different letters were significantly different (Tukey tests, $P < 0.05$).

Metric	Water source			
	Natural	Groundwater	Urban runoff	Treated wastewater
Macroinvertebrate taxa metrics:				
Taxa richness	19 A[b]	17 AB	14 AB	9 B
EPT[a] richness	6 A	5 B	1.5 B	2 B
Trichoptera richness	4 A	3 AB	1.5 AB	1 B
% nonchironomid dipteran richness	11 AB	23 A	11 AB	0 B
% nonchironomid dipteran abundance	9 A	11 A	1 B	0 B
% Orthoclad richness	0 A	10 AB	9 AB	14 B
% Orthoclad abundance	0 A	<1 A	35 B	4 B
% Oligochaete richness	0 A	0 A	14 B	14 B
% Oligochaete abundance	0 A	0 A	28 B	17 B
EPA[b] tolerance, based on richness	4.9 A	6 B	7.2 B	5.5 AB
Macroinvertebrate functional-feeding group metrics:				
% parasite richness	0 A	7 B	0 A	0 A
% parasite abundance	0 A	<1 B	0 A	0 A
% shredder richness	8 A	7 A	19 B	17 AB
% shredder abundance	1 AB	<1 A	36 B	5 B
% predator richness	23 AB	42 A	33 AB	20 B
Scraper richness	4 A	2 B	3 A	1 B
% gatherer richness	30 A	42 B	48 B	33 AB
Periphyton taxa metrics:				
Blue-green algae biovolume	0 A	0.004 B	0 AB	0.1 B
% blue-green algae biovolume	0 AB	<1 AB	<1 A	5 B
% Nitrogen heterotrophic diatom abundance	11 A	16 A	86 B	94 B
% eutrophic diatom abundance	57 AB	22 A	87 BC	97 C
% motile diatom abundance	33 A	53 A	81 AB	76 B
% pollution-sensitive diatom abundance	46 A	2 AB	3 A	<1 B

[a] EPT, Ephemeroptera-Plecoptera-Trichoptera.
[b] EPA, U.S. Environmental Protection Agency.

variables were correlated with more than 2 of the 24 benthic macroinvertebrate metrics associated with water source. Measures of taxa richness, EPT richness, and nonchironomid dipterans were commonly negatively correlated with concentrations of dissolved chemicals (Table 7). These metrics tended to be positively correlated with cv of bank-full width, presence of riffles, and streambed substrate size. That is, these metrics were higher at sites that had lower concentrations of Cl, K, Na, orthophosphate (PO_4), ammonia, and lower percentages of urban land use and more heterogeneous habitat. Measures of orthoclad chironomids, oligochaetes, and U.S. Environmental Protection Agency's (EPA) tolerance tended to show the opposite patterns. Correlations of functional-feeding groups with chemical and physical variables were more limited, and there were no strong general patterns (Table 7).

Two of six periphyton metrics associated with water source are measures of blue-green algal biovolume, and four metrics are autecological measures (Table 6). Streams with natural waters were lower in blue-green algal biovolume and relative abundance of nitrogen heterotrophic, eutrophic, and motile diatoms (predominantly *Nitzschia amphibia, N. palea,* and *Diadesmis confervacea*) than were streams with treated wastewater (Table 6). The relative abundance of pollution-sensitive diatom species (predominantly *Cymbella affinis*) was greater in natural waters than in treated wastewater (Table 6). The relationships of sites with urban runoff and groundwater were mixed.

All fifteen chemical and physical variables differing among sources of water were correlated with at least one of six periphyton metrics. The periphyton metrics associated with water source, except pollution-

TABLE 7. Results of Spearmans' correlations for chemical and physical variables with invertebrate metrics that were associated with water-source categories.

Metric	Cl	K	Na	Ammonia	PO_4	Discharge	cv[a] bankfull width	cv depth	% riffle	Streambed substrate size	Velocity	% urban land use (contributing)	Water temperature
Macroinvertebrate taxa metrics:													
Taxa richness	—[b]	—	—	—	—	–	+	NS	NS	NS	–	–	NS
EPT[c] richness	–	NS	—	–	–	NS	++	NS	+	+	NS	—	NS
Trichoptera richness	—	NS	—	–	—	NS	++	NS	+	+	NS	—	NS
% nonchironomid dipteran richness	–	–	NS	NS	–	NS	NS	NS	NS	NS	NS	NS	++
% nonchironomid dipteran abundance	—	—	—	—	—	–	NS	NS	NS	NS	NS	NS	NS
% Orthoclad richness	++	+	++	+	++	+	NS	NS	NS	NS	+	NS	NS
% Orthoclad abundance	+	NS	+	++	+	NS	NS	NS	NS	NS	NS	+	NS
% Oligochaete richness	NS	++	++	++	++	NS	NS	NS	NS	NS	–	NS	–
% Oligochaete abundance	NS	NS	NS	++	+	NS	NS	NS	NS	NS	NS	NS	NS
EPA tolerance, based on richness	NS	NS	NS	NS	NS	NS	–	–	—	—	NS	+	NS
Macroinvertebrate functional-feeding group metrics:													
% parasite richness	NS	–	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	+
% parasite abundance	NS	–	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	+
Scraper richness	—	NS	—	NS	–	–	NS	NS	+	NS	NS	–	NS
% shredder richness	NS	++	NS	+	+	+	NS	NS	NS	NS	+	NS	NS
% shredder abundance	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
% predator richness	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
% gatherer richness	NS	NS	NS	NS	NS	NS	-	-	—	—	NS	+	NS

[a] cv, coefficient of variation.

[b] +, positive correlation at $P < 0.05$; –, negative correlation at $P < 0.05$; ++, positive correlation at $P < 0.01$; —, negative correlation at $P < 0.01$.

[c] EPT, Ephemeroptera-Plecoptera-Trichoptera.

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TABLE 8. Results of Spearmans' correlations for chemical and physical variables with periphyton metrics that were associated with water-source categories.

Metric	Cl	K	Na	Ammonia	PO_4	Discharge	cv[a] bankfull width	Channel width, wetted	cv depth	% riffle	Stream bed substrate size	Velocity	cv velocity	% urban land use (contributing)	Water temperature
Blue-green algae biovolume	++[b]	NS	++	NS	NS	+	NS	++	NS	NS	NS	NS	NS	NS	NS
% blue-green algae biovolume	NS	NS	+	NS	NS	+	NS	++	NS	NS	NS	NS	NS	NS	NS
% Nitrogen-heterotrophic diatom abundance	+	++	+	+	++	+	NS	++	NS	–	NS	++	—	NS	–
% eutrophic diatom abundance	+	++	+	+	++	++	NS	++	NS	NS	NS	++	—	NS	–
% motile diatom abundance	+	+	++	+	+	NS	NS	+	NS	NS	NS	NS	–	NS	–
% pollution-sensitive diatom abundance	–	–	—	–	–	NS	++	NS	+	++	++	NS	NS	—	NS

[a] cv, coefficient of variation.

[b] +, positive correlation at $P < 0.05$; –, negative correlation at $P < 0.05$; ++, positive correlation at $P < 0.01$, —, negative correlation at $P < 0.01$.

TABLE 9. Median values for biological metrics that were significantly different among channel types (ANOVA, $P < 0.05$). For each variable, medians with different letters were significantly different (Tukey tests, $P < 0.05$).

	Channel type		
Metric	Natural	Channelized	Concrete
Macroinvertebrate taxa metrics:			
% Trichoptera abundance	29 A	57 A	0.3 B
% Tanytarsini abundance	1 A	2.9 AB	0 B
% Tanytarsini/Chironomid abundance	0.2 A	0.4 AB	0 B
% noninsect abundance	9.2 AB	6.7 A	49 B
Nonmidge diptera plus noninsect abundance	5,346 A	9,863 A	44,878 B
Macroinvertebrate functional-feeding group metrics:			
% filterer richness	25 A	22 AB	0 B
% filterer abundance	50 A	57 A	0 B
Periphyton taxa metrics:			
% diatom richness	20 A	21 A	13 B
% diatom abundance	86 A	90 A	45 B
Green algae biovolume	0.003 A	0 A	1.5 B

sensitive diatom abundance, tended to be positively correlated with chemical variables and with most physical variables but had negative correlations with cv of stream velocity, water temperature, and presence of riffles (Table 8). Therefore, these metrics were higher at sites with higher Cl, K, Na, PO_4, and ammonia concentrations but cooler water temperatures. Pollution-sensitive diatom abundance tended to be negatively correlated with these chemical variables and urban land use and positively correlated with most physical variables (Table 8).

Biological Metrics and Channel Type

Thirteen benthic macroinvertebrate and three periphyton metrics were significantly different among channel types (ANOVA, $P < 0.05$). Nine macroinvertebrate metrics are measures of taxa abundance. Four macroinvertebrate metrics are measures of functional-feeding groups. Similar to water source results, several macroinvertebrate metrics based on slightly different measures of the same taxa gave similar results suggesting redundancy. Therefore, only results for relative abundance are given (Tables 9 and 10). Macroinvertebrate metrics differing with channel type included measures of abundance of trichopterans, tanytarsini chironomids, noninsects, and filterers.

Concrete-lined channels had significantly lower abundances of trichoptera, tanytarsini chironomids, and filterers (predominantly *Hydropsyche* sp. and *Rheotanytarsus* sp.) in comparison with natural and channelized channels (Table 9). Concrete-lined channels were highest in noninsect abundance (predominantly Naididae, Turbellaria, *Hyalella* sp., and *Physella* sp.). No significant differences in macroinvertebrate metrics were observed between natural and channelized sites (Table 9).

Nine physical variables showing significant differences between channel types were correlated with at least 1 of the 13 benthic macroinvertebrate metrics associated with channel type (Table 10). Several strong patterns were evident in macroinvertebrate correlations. Metrics for trichopterans and tanytarsini chironomids were positively correlated with percentage of bank shading, depth, and streambed substrate size and negatively correlated with open canopy, water temperature, and urban land use (Table 10). This was generally reflected in results for filterers because the two taxonomic groups were dominated by filtering genera, *Hydropsyche* sp. and *Rheotanytarsus* sp., respectively. Hence, trichopterans and tanytarsini chironomids were found in higher abundance at sites with more shading, larger streambed substrate, cooler water temperatures, and less urban land use. Noninsects showed reverse patterns with negative correlations to percentage of bank shading, depth, streambed substrate size, and urban land use. Noninsect metrics also showed negative correlations with cv of bank-full width and presence of riffles indicating higher abundance of noninsects in concrete-lined channels.

Relative diatom richness and abundance were lowest in concrete-lined channels (Table 9). Biovolume of green algae was greater in concrete-lined channels than in channelized and natural streams (Table

TABLE 10. Results of Spearman's correlations for physical and chemical variables with invertebrate metrics that were associated with channel type.

Metric	% bank shading	cv[a] of bank-full width	Depth	Open canopy	cv open canopy	% riffle	Streambed substrate size	% urban land use (contrib-uting)	Water temper-ature
Macroinvertebrate taxa metrics:									
% Trichoptera abundance	+[b]	+	+	NS	NS	+	++	–	NS
% Tanytarsini abundance	++	NS	+	–	+	NS	+	–	NS
% Tanytarsini/Chironomid abundance	++	+	+	–	+	NS	+	–	–
% noninsect abundance	–	NS	NS	NS	NS	NS	–	NS	NS
Nonmidge diptera plus noninsect abundance	NS	–	–	NS	NS	–	—	++	NS
Macroinvertebrate functional-feeding group metrics:									
% filterer richness	++	NS	++	–	++	NS	+	NS	NS
% filterer abundance	++	NS	++	–	+	NS	++	NS	NS

[a] cv, coefficient of variation.

[b] +, positive correlation at $P < 0.05$; –, negative correlation at $P < 0.05$; ++, positive correlation at $P < 0.01$; —, negative correlation at $P < 0.01$.

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TABLE 11. Results of Spearman's correlations of physical variables with periphyton metrics that were associated with channel type.

Metric	cv[a] bank-full width	Streambed substrate size	Water temperature
% diatom richness	++[b]	+	–
% diatom abundance	++	+	–
Green algae biovolume	–	–	NS

[a] cv, coefficient of variation
[b] +, positive correlation at $P < 0.05$; –, negative correlation at $P < 0.05$; ++, positive correlation at $P < 0.01$.

9).Three variables were correlated with at least one of three periphyton metrics (Table 11). Relative richness and the abundance of diatoms were positively correlated with cv of bank-full width and streambed substrate size but negatively correlated with water temperature (Table 11). Therefore, more diatoms were found in higher abundances in natural and channelized streams than in concrete channels. Biovolume of green algae showed a reverse pattern and was negatively correlated to both cv of bank-full width and streambed substrate size (Table 11).

Principal Components Analysis

Principal components analysis effectively summarized the relations between macroinvertebrate and periphyton metrics. Principle components analysis of the macroinvertebrate metrics resulted in six PCA axes that accounted for more than 90% of the variance in the macroinvertebrate metrics among sites (Table 5). The first axis explained 38% of the variance among sites. Most of the metrics dominating this axis were associated with channel type; however, three metrics associated with water source—EPT richness, EPA tolerance, and shredder abundance—were also important (Table 5; Figure 4). The second axis explained 27% of the variation among sites and was dominated by macroinvertebrate metrics associated with water source. Loadings for orthoclads, oligochaetes and shredders increase in the negative direction toward the sites supplied with treated wastewater. Taxa richness and nonchironomid dipteran metrics increase in the positive direction toward sites supplied by natural water or groundwater.

Principal component analysis of periphyton metrics resulted in three PCA axes that accounted for 84% of the variance among sites (Table 5). The first axis accounted for 42% of the variance among sites and is dominated by metrics associated with water source (Figure 5). The second axis accounts for 26% of the variance and is also dominated by metrics associated with water source; however, metrics associated with channel type also contribute to the second axis. In general, sites with treated wastewater are in the upper left portion of the graph, whereas sites with natural sources of water are more toward the right of the graph; sites with urban runoff and groundwater are between the two (Figure 5).

Discussion

The categorical study design successfully characterized associations of biological assemblages with water source and channel type. Many macroinvertebrate and periphyton metrics showed significant differences among the four sources of water or the three types of channels (Tables 6 and 9). In addition, many chemical and physical variables that correlated to these biological metrics also showed significant differences between sources of water and channel types (Tables 3 and 4). Although water source and channel type were treated largely as independent factors for analysis, organisms are responding to physical and chemical conditions generated jointly by these two factors and others not explicitly considered in the study (such as annual patterns in hydrology). For example, PCA axis 1 from the analysis of chemical and physical variables (Figure 3) clearly separates sites with natural and wastewater sources, but the gradient includes chemical and physical variables related to differences among streams with natural channels and streams in concrete-lined channels. Brown et al. (2005) address these issues more fully.

Artificial substrates were used to mitigate some effects caused by different channel types; however, it is likely that the macroinvertebrate and periphyton assemblages sampled from the artificial substrates were somewhat different from the natural assemblages. Lamberti and Resh (1985) found that clay tiles were similar to natural substrates for algae and macroinvertebrates after colonizing for 28 d. Other studies showed artificial substrates had different compositions and abundances of invertebrates in comparison with natural substrates (Garie and McIntosh 1986; Casey and Kendall 1996). Colonization rates and replacement of colonizing periphyton by more persistent species can be affected by environmental conditions, including current velocity, nutrient concentrations, water temperature, and light (Oemke and Burton 1986). Although assemblages on artificial substrates are likely different from assemblages in the stream,

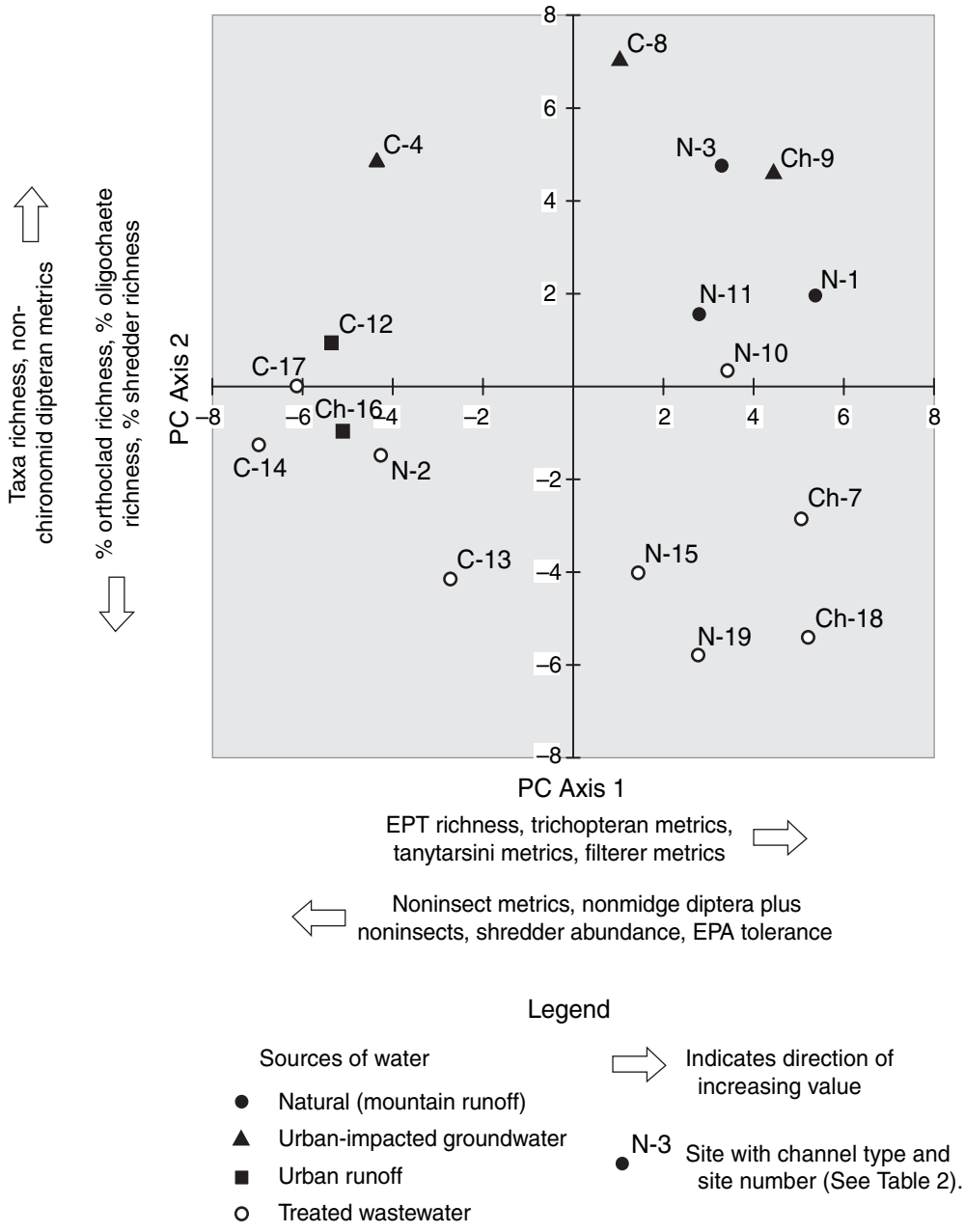

FIGURE 4. Principal component analysis (PCA) site scores based on macroinvertebrate metrics from the Santa Ana River basin, California. Principal component analysis axis 1 is controlled principally by metrics associated with channel type. Principal component analysis axis 2 is controlled principally by metrics associated with water source.

artificial substrates should represent a similar sub-assemblage, including the taxa best at colonizing and exploiting new habitats. Therefore, assemblages on artificial substrates likely reflect differences between sites.

Macroinvertebrate Response

Macroinvertebrate metrics appeared most responsive to habitat alteration. The first PCA axis (Figure 4) emphasizes tanytarsini, trichoptera, noninsect, and filterer metrics that differed among channel types.

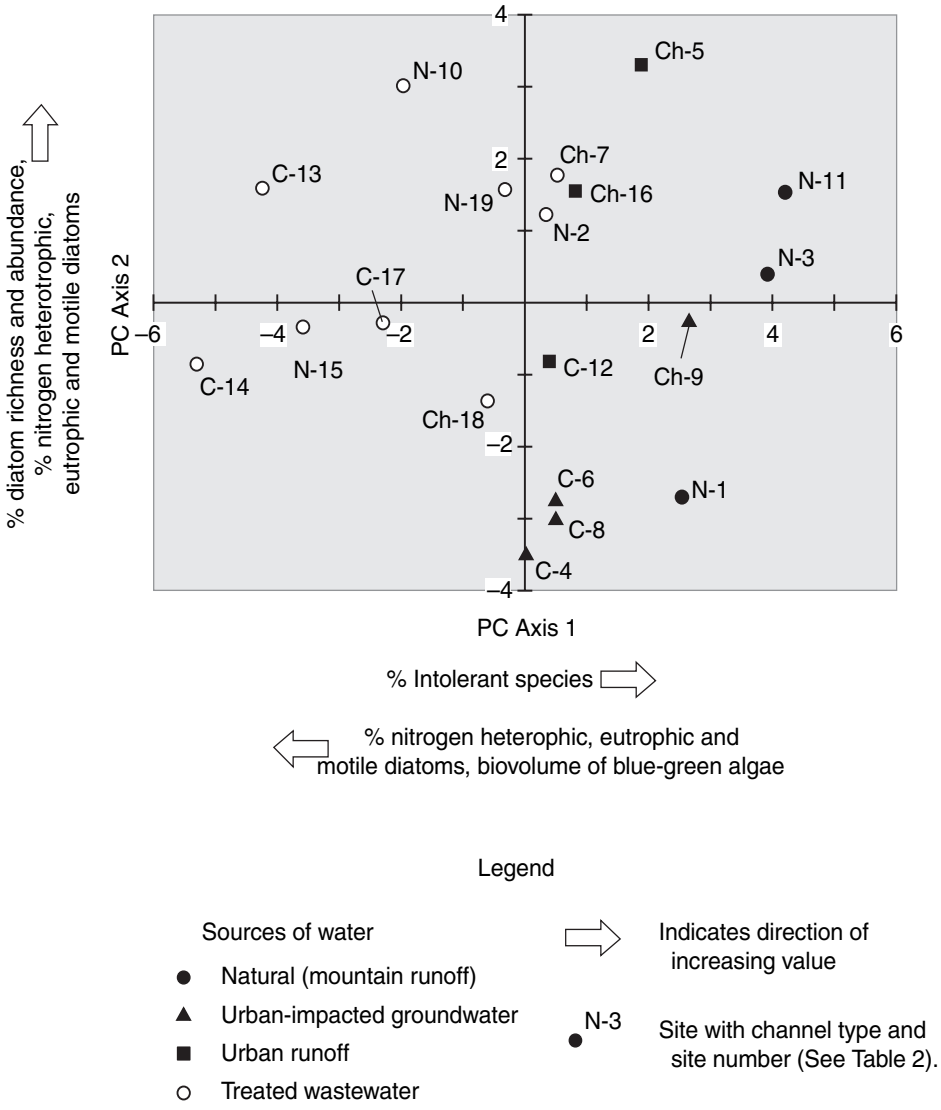

FIGURE 5. Principal component analysis (PCA) site scores based on periphyton metrics from the Santa Ana River basin, California. Principal component analysis axis 1 is controlled principally by metrics associated with water source. Principal component analysis axis 2 is controlled by metrics associated with both water source and channel type.

Concrete-lined channels always differed from one or both of the other channel types (Table 9). Although channelized sites appeared to be intermediate between concrete-lined and natural sites, differences between channelized sites and natural sites were not statistically significant. This suggests that channelized sites are able to support the same assemblages as natural channels. Most habitat measures were similar between these two channel types (Table 4). In particular, some riparian vegetation was present at most channelized sites, ranging from grasses and cattails to trees. There was less riparian vegetation in channelized streams compared with natural channels, but channelized streams were not as bare as concrete channels.

Several metrics related to water source—EPT richness, trichoptera richness, EPA tolerance, and shredder abundance—mainly reflect differences among the natural, least-impacted sites and the other sites with a variety of water sources (Table 6). Natural-water source sites were chemically and physically different from other sites (Figure 3; Table 3). These sites are at the interface of the

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mountains and valley and have little urban land use in their drainage areas (Figure 1; Table 3).

Specific conductance and other surrogates for salinity are commonly related to macroinvertebrate assemblages (Leland and Fend 1998; Brown and May 2000), but they were not correlated in this study. The lack of such correlation, despite correlations of metrics with ionic species, could be due to the relatively narrow range of specific conductance (286–1,250 μS/cm) and one of the least-impacted sites having a fairly high value (804 μS/cm at site 3). In addition, the least-impacted site was high in calcium, magnesium, and sulfate instead of Na, Cl, or K. There were differences in ionic composition among water sources (Table 3); however, it is unknown if differences of this relatively small magnitude can affect macroinvertebrate taxa.

The macroinvertebrate metric responses observed in this study are generally consistent with results of other studies. The least-impacted streams had the highest macroinvertebrate taxa richness, EPT richness, and trichopteran richness in comparison with urban streams. Barbour et al. (1999) observed that increases in tolerance and relative abundance of oligochaetes were expected responses to stream degradation. The proportion of oligochaetes is expected to be higher in urban areas (Winter and Duthie 1998; Ourso 2001; Paul and Meyer 2001; Kennen and Ayers 2002) and to increase with stream degradation (Karr and Kerans 1992; Fore et al. 1996).

A number of other macroinvertebrate metrics suggest differences among the urban water sources (Table 6). For example, macroinvertebrate metrics at urban-impacted groundwater sites appear to be different from those for other water sources as indicated by the dominance of nematodes (parasite metrics), turbellarians (predator metric), and nonchironomid dipterans and relatively low values for oligochaete metrics (Table 6). These metrics were responsive to environmental stresses including urbanization in other studies (Garie and McIntosh 1986; Karr and Kerans 1992; Barbour et al. 1996; Fore et al. 1996). However, those studies were conducted in less altered streams across a relatively wide range of urbanization. It is unclear what such differences mean ecologically in the context of highly altered streams all within a highly urbanized area.

Several functional-feeding group metrics were responsive to water source or channel type and warrant discussion because of implications for ecological functions within highly urbanized areas. With respect to water source, the most interesting relationships involved shredders and scrapers. Shredder metrics tended to be higher at sites affected by urban runoff and treated wastewater (Table 6), mainly because of the abundance of *Crictopus* sp., a pollution tolerant genus of chironomids that has been associated with highly urbanized sites (Jones and Clark 1987; Kennen and Ayers 2002). Cummins et al. (1989) and Kerans and Karr (1994) suggested that the presence of shredders may be more indicative of local riparian habitat rather than more general indicators of urbanization. Although a number of these sites have riparian vegetation present, the highest abundance of this genus occurred at an urban-runoff site (site 12) with no riparian vegetation and high urbanization. Shredders could be feeding on macroalgae present at the site.

Scraper richness was higher at sites supplied with natural water or urban runoff compared to sites supplied with groundwater or treated wastewater. Decreasing scraper richness has been considered an indicator of environmental degradation, although Fore et al. (1996) suggested that the response of scrapers can be variable. Scraper taxa at urban-runoff sites and at groundwater sites consisted of both highly pollution-tolerant genera (i.e., *Physella* sp.) and pollution-sensitive genera (i.e., *Petrophila* sp. and *Helicopsyche* sp.). However, the pollution-tolerant *Physella* sp. was significantly more abundant at sites with urban runoff than at sites with groundwater.

Filterer metrics were strongly affected by channel type (Table 9), with concrete-lined channels having the lowest abundances. Primary filtering taxa in this study were the trichopteran *Hydropsyche* sp. and the chironomid *Rheotanytarsini* sp. These taxa were also most responsible for responses of trichoptera and tanytarsini metrics to channel type. Previously reported responses of filterers to environmental degradation are variable (Karr and Kerans 1992; Barbour et al. 1996; Fore et al. 1996; Winter and Duthie 1998). *Hydropsyche* sp. and *Rheotanytarsini* sp. are generally considered pollution sensitive (DeShon 1995; Barbour et al. 1999); however, in this study, water chemistry of concrete channels was variable (Figure 4). A simple physical explanation might be applicable. Both of these filterer taxa are net builders (*Rheotanytarsini* sp. can also build tubes) (Merritt and Cummins 1984). The relatively two-dimensional nature of the concrete substrate may limit the number of locations appropriate for net and tube construction, therefore limiting the population.

Periphyton Response

Periphyton metrics were most responsive to water source. Principal component analysis axis 1 included

only metrics responsive to water source. Principal component analysis axis 2 included metrics responsive to water source and those responsive to channel type (Figure 3; Table 5). Sites with treated wastewater generally had the highest values for the periphyton metrics, except for percentage pollution-sensitive diatoms, which had the lowest value (Table 6). Other water sources were more variable, with each being at the other extreme from treated wastewater for at least one metric. Clearly, treated wastewater has a strong effect on periphyton assemblages.

Three periphyton metrics highest in treated wastewater—nitrogen-heterotrophic diatom abundance, eutrophic diatom abundance, and motile diatom abundance—were dominated by *Nitzchia palea*, a species most abundant in the most disturbed streams in a New Jersey urban study (Kennen and Ayers 2002). All three metrics show a positive relationship with inorganic salts, ammonia, phosphate, and wetted channel width and a negative relationship with cv of velocity. Treated wastewater has the highest concentrations of these chemical constituents and sites with treated wastewater had the widest channels and the most uniform velocities. Similar relationships between periphyton metrics and physical and chemical variables were found in the mid-Appalachian region (Hill et al. 2000).

Two periphyton metrics—relative diatom richness and abundance—were lowest in concrete-lined channels, whereas green algae biovolume was highest in concrete-lined channels (Table 9). Response of the diatom metrics is indicative of higher environmental stress in concrete channels (Barbour et al. 1999). Diatom metrics have a positive correlation to streambed substrate and cv of bank-full width, indicating that diatoms prefer more complex aquatic habitat than is available in concrete-lined channels. Also, diatom metrics had a negative correlation with water temperature. Previous studies showed that diatom richness decreases when water temperature is greater than 30°C and diatoms are often replaced with green or blue-green algae (DeNicola 1996). In our study, fewer diatoms and a higher biovolume of green algae were present in concrete channels, which were warmer than the other channel types. Median water temperature at sites with concrete channels was 30°C compared to 23°C at sites with natural channels and 26°C in channelized streams.

Challenges of Studying Highly Urbanized Areas

A general approach to urban aquatic studies is to examine hydrologic, geomorphic, chemical, habitat, and biological characteristics of streams over a gradient of urban land use intensities in specific environmental settings (e.g., Tate et al. 2005, this volume). The basic requirements for these studies include (1) consistent definition of the land-use gradient; (2) consistent environmental setting to minimize natural gradients (e.g., temperature, stream size, hydrologic variability, soil type, and precipitation); (3) collection of sufficient physical, chemical, and biological data to characterize stream response to land use; and (4) sufficient distribution and number of sites to accurately represent a response over the range of the land-use gradient. Conditions in the Santa Ana River basin did not support this approach.

The traditional view of precipitation falling on the landscape and flowing toward stream channels through various land uses does not apply in the Santa Ana River basin and in other basins in the arid and semiarid Southwest. Some streams are ephemeral in nature. Other streams are diverted for public supply or into retention basins for groundwater recharge. As a result, many streams lose surface flow shortly after reaching the valley floor. Flow is reestablished in some stream channels from anthropogenic sources (e.g., treated wastewater, urban runoff). Therefore, the traditional view that water quality in a stream channel reflects the proportions of land uses in a basin also does not apply. Alternatively stated, land use is not a surrogate for the source of water in the Santa Ana River basin, and land use and basin area are not surrogates for the volume of water in the streams. These discontinuities in the hydrologic cycle owing to the semiarid climate and human engineering in combination with extreme urbanization made it impossible to find least-impacted sites in the valley. The rapid change from undeveloped mountains to the highly urbanized valley made it impossible to define an urbanization gradient because there were few streams with low to intermediate levels of urbanization (Table 2). This also precludes another common approach to urban studies, comparing reference or least-impacted conditions with conditions in urbanized areas.

An alternative model is to explicitly identify aspects of highly urbanized streams, such as impervious area, and determine the associations of the chosen factor with some of the effects this has on habitat quality, water quality, or aquatic communities. However, it is difficult to study just one or two aspects of urbanization because the observed effect may also be caused by other factors not included in the study. In the Santa Ana River basin, some aspects of the hydrologic system are well constrained despite the complexities of human

involvement. Therefore, it was possible to identify the source of water and channel type for many of the streams. This provided an opportunity for assessing the effects of these two anthropogenic factors; however, even in this highly constrained system, the effects of the two factors could not be separated completely.

Conclusions

Based on analysis of macroinvertebrate and periphyton metrics and their correlations with chemical and physical variables, water source and channel type had significant associations with ecosystem condition. The source of water affected not only chemical variables such as Cl and K, but also some physical variables such as velocity and water temperature, whereas channel type affected only physical variables such as streambed substrate size. Macroinvertebrate assemblages appeared to be most sensitive to physical variables, particularly those associated with differences between concrete-lined channels and streams with natural channels or channelized streams with natural bottoms. In contrast, periphyton metrics mainly reflected associations with aspects of water quality related to water source.

Our results suggest that significant improvements in aquatic ecological condition are possible in streams of the highly urbanized Santa Ana River basin even though conditions will not be returned to full ecological function. These results are likely to be similar for other urban streams in arid or semiarid areas. Given appropriate design criteria, converting concrete-lined channels to channelized streams with stabilized sides and natural bottoms could support aquatic ecosystems more similar to those of less degraded sites and still maintain flood control to protect life and property. Reducing chloride, sodium, potassium, ammonia, and phosphate concentrations in treated wastewater could also contribute to such changes.

Acknowledgments

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A plan for metropolitan Kansas City to improve water quality with rain gardens and other green solutions.

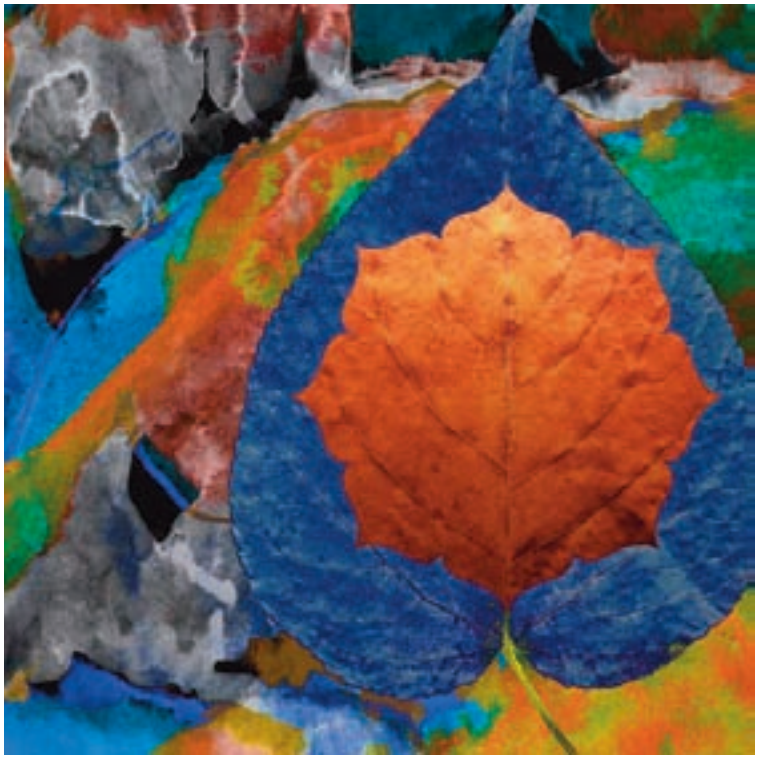

Parvati by Lyn Bishop

10,000 Rain GardenS

Initiative Purpose

- To establish the Kansas City area as a leader in water quality;
- To educate property owners, businesses, developers, and students about water quality, native plants, and green solutions;
- To engage citizens in practical "backyard" solutions for water quality improvement;
- To study the effects of these solutions on water quality;
- To serve as a source of demonstration projects for KC-One Stormwater Management and the Overflow Control Program (OCP);
- To establish green solutions as standard Best Management Practices (BMPs) for city departments and throughout the region;
- To raise the profile and enhance the reputation of Water Services in order to secure voter-approved funding for future infrastructure needs.

Why this initiative, why now?

All U.S. cities struggle with water quality concerns. The infrastructure ages in one part of the city while new infrastructure is developed; new regulations require retrofits and changes in policies. Most cities are inadequately funded to operate and maintain the system perfectly.

10,000 Rain Gardens is an initiative directed at changing the behavior that affects water quality. All property owners can make changes to reduce storwater runoff and pollutants, maximizing our infrastructure investment.

Water quality is everyone's responsibility.

Initiative Overview

Leadership

An advisory panel composed of elected officials, community leaders, and activists would be a crucial addition to 10,000 Rain Gardens.

This board will meet to discuss the initiative, its challenges and objectives, and to leverage successes.

We request Anita Gorman and Ollie Gates to serve as honorary chairpersons.

Board members will be available if rain garden staff and volunteers need advice or guidance.

We envision an ambitious three and a half year initiative in the metropolitan bi-state area. Preliminary activities will start in the fall of 2005, followed by intensive efforts to promote and plant rain gardens in 2006, 2007, and 2008. 10,000 Rain Gardens has several simultaneous paths:

- Community and neighborhood involvement in improving water quality
  - Information about rain gardens and green solutions
  - Training for partners and participants
  - Education of students, Scouts, clubs, and related groups
  - Rain garden registration and monitoring
  - Coordinated partnerships and activities with stakeholders
  - Media releases
  - Booths at farmers' markets, state fairs, and festivals
- Arts projects and special outreach efforts to reach youth, at-risk youth, the elderly, the disabled, and foreign-language communities
- Training and outreach to support minority business development
- Inherit the Earth, a program to encourage religious groups in environmental stewardship
- Study of green solutions on stormwater flow
  - Monitoring
  - Analysis
  - Final report
- Rain garden development
  - Native plant cultivation
  - Native plant estimates (for annual demand)
  - Native plant distribution
  - Garden kits with design concepts, instruction manual, registration form, and garden sign
  - Coordination with Monarch Watch
- Policy amendments to include rain gardens as standard Best Management Practices for city departments, state departments, and transportation authorities
- Fund-raising activities
  - Sweepstakes
  - Contests
  - Donations
  - Plant and kit sales
  - Merchandise sales and distribution
  - Grants: federal, state, local, National Geographic Educational Foundation, etc.

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Iris versicolor • Blue Flag Iris

Aquilegia canadensis • Wild Columbine

Verbena hastata • Blue Vervain

Monarda fistulosa • Wild Bergamot

Eupatorium fistulosum • Joe Pye Weed

Lobelia cardinalis • Cardinal Flower

Rhus typhina • Staghorn Sumac

Assumptions & Risks

Funding for this initiative will be provided under the Overflow Control Program. The consultant is Burns & McDonnell. Further support is available from the KC-One Stormwater Management Program with consultant Black & Veatch. Future funding sources include government and foundation grants, corporate partnerships, and cooperative ventures with other city projects. The City may wish to contract with a nonprofit group such as Bridging the Gap for some implementation activities, such as coordination of volunteers.

One risk to this program is the cost of established native plants (plugs). Fund-raising efforts are designed to offset the cost of these plants to registered rain gardeners. Discounted plants will be offered to these participants whenever possible.

We assume that Critical Site Products will grow most of the native plants and supply them at retail cost to consumers and at wholesale prices distribution points; we also assume that they will assemble rain garden kits. A portion of the proceeds from each kit will go back to the initiative to purchase native plants for public rain gardens. **All other groups mentioned in this document are potential partners; they have not formally agreed to participate, although many expressed interest.**

A related risk is the maintenance and expertise required to keep a rain garden functioning. One of the reasons for requiring registration is to offer tips and ongoing support to rain gardeners. There is a risk that lack of education will lead to rain garden "abandonment," so measures must be taken to support people once they've committed to the initiative. Communication, education, and monitoring will be key efforts.

A core part of this program involves temporary and volunteer labor. Most of the people that are the most likely to volunteer already face significant demands on their time. This initiative will train volunteers as Stewards and Ambassadors; a children's volunteer program will also be available. Children may use rain garden kits to raise money for their school and extra-curricular activities, and they will be asked to help distribute the kits that they sell.

We are assuming that Kansas City desires to be a leader in green solutions for water quality and stormwater management, and that nearby municipalities have a similar interest. This leadership role requires a political and departmental commitment to look for opportunities to apply green solutions in new projects, existing projects, and municipal property. This commitment may also require a formal change to existing policies in order to fully support the effort. We assume that 10,000 Rain Gardens will have activities in the bi-state metropolitan area.

Changes in policies may involve counties and states, as well as cities.

Benefits

In a recent City audit, stormwater was identified as a top concern for area citizens. Flooding continues to be an expensive problem in our community, for a variety of reasons. 10,000 Rain Gardens provides an opportunity to:

- Reduce water pollution
- Reduce stream degradation—and costly rehabilitation—by reducing stormwater flows
- Discuss water quality and stormwater in a positive way, not just as a reaction to flooding
- Engage citizens as a part of the solution
- Increase city and roadside beautification
- Educate citizens about watersheds and the responsibility of responding on a regional basis to watershed concerns
- Demonstrate successful Wet Weather Solutions projects to boost public confidence in these efforts in particular and in Water Services in general
- Give developers tools that offer practical stormwater management techniques, improve water quality, enhance their investment by creating amenities that improve quality of life, and possibly save or reduce development costs with green solutions
- Improve the attractiveness of riverfront and waterway development by connecting interest and recreation to rivers and streams
- Raise the regional and national profile of the Kansas City area as a progressive, environmentally-friendly community: be a national model
- Supply the media with positive releases and images of bi-state cooperation, environmental activities, parks and recreation, and municipal water departments
- Reduce the need for an expensive and controlling consent decree
- Stimulate local and state economies by increasing interest in native gardening, outdoor projects, parks, and waterways
- Support schools and educational programs by providing hand-on curricular tools and opportunities
- Encourage the preservation and propagation of vital native plant species

And, ultimately:

Increase the likelihood that citizens will vote to fund large projects to improve the Combined Sewer Overflow (CSO) infrastructure.

Why Rain Gardens?

City of Fountains—and Flowers?

Midwestern states have planted native flowers along roadways for beautification, inflow and infiltration, and to encourage tourism.

Seattle uses street medians as planters for flowers and grasses. This approach reduces runoff from impervious surfaces while enhancing the beauty of city streets.

Kansas City, known for its fountains, could also be known for its native flowers along boulevards and highways.

Governments and organizations have multiple responsibilities. Each one has a mission and focus for their services. How they perform these functions is vital because they depend on citizen involvement and support. New initiatives require voters to trust their leaders and public servants; if voters perceive that they currently are not getting much for their bucks, they are unlikely to offer more. On the positive side, progressive cities thrive. People are excited about living there; they pay attention to successes, as well as challenges; businesses are more willing to locate in this area and provide jobs. Wellbeing and good energy are hard to quantify, but they have real economic effects.

A community with a high quality of life is by design.

Quality of Life

10,000 Rain Gardens proposes to support Water Services and other departments and groups in their key functions while improving quality of life with clean water; flooding mitigation; beautiful roadways, parks, and property; and positive neighborhood involvement. The Kansas City metropolitan area can be known for more than low-cost living and good suburban school districts.

We should be a city full of life.

Dollars and Sense: Water Services

Water services must ensure water quality in a growing city with aging infrastructure and changing EPA regulations—changes that often increase costs. Rates are approved by voters, who assume that only water services is responsible for water quality and flood control.

According to the manual *Developing Successful Runoff Control Programs for Urbanized Areas* prepared by the staff of the Northern Virginia Soil and Water Conservation District in Fairfax, Virginia:

> The attempts to control point source pollution have reduced pollutant loads and considerable progress has been made in restoring and maintaining water quality. However, the abatement of point source pollution did not solve all water quality problems. Recent studies and surveys by EPA and by state water quality agencies indicate that the majority of the remaining water quality impairments in our nation's rivers, streams, lakes, estuaries, coastal waters, and wetlands result from nonpoint source pollution and other nontraditional sources, such as urban storm water discharges and combined sewer overflows....Urbanized areas

Burnsville, MN
http://www.landandwater.com/features/vol48no5/vol48no5_2.html

and areas in which development has altered the natural hydrology and infiltration characteristics of the land typically experience increased surface runoff. Land development alters the natural balance between runoff and natural absorption areas by replacing them with greater amounts of impervious surface. The result is increased rates and volumes of surface runoff.

Few citizens appreciate that their expectation of services is not matched by their willingness to pay for them. Few understand that green solutions may save money in the long run by reducing runoff and erosion, reducing the need for detention facilities, as well as adding community amenities. Educating citizens and developers about water quality, through the promotion of rain gardens, may both help to solve a problem (inflow and infiltration) and improve quality of life (by creating small lakes, fountains, wild flower gardens, etc.).

10,000 Rain Gardens will also link voters directly to water as a resource and assist them in being more connected to it and responsible for it. This connection will translate into support for future funding and increased neighborhood involvement.

The authors of *Developing Successful Runoff Control Programs for Urbanized Areas* explore many alternatives to improve water quality (and in this case, stormwater management), but their recommendations also touch on the non-technical aspects of achieving water quality goals—strong economic motivation, adequate staffing and training, and teamwork:

Why Rain Gardens, cont.

> Teamwork is essential to accomplish your goals.. Pick the right people and the right organizations. The experience gained from the case studies proves that teamwork is necessary to achieve the desired results. The nature of the urban runoff problem means that any solution will cut across departmental, bureaucratic, and organizational boundaries...So identify the key players early and make good working relationships a high priority. Don't neglect the important role of private organizations and interests.

Dollars and Sense: Lawns and Roadways

Maintaining roadways is an expensive, time-consuming effort. Mowers use costly fuel and contribute to air pollution; herbicides worsen water pollution. Native plants, with long root systems, increase water inflow and infiltration, reduce erosion, and require no fertilizer, which reduces runoff pollutants. Established plants require little weeding. They can also be beautiful, providing flowering corridors along roadways during peak tourism months in spring and fall.

According to Robert Jacobson of MnDOT (Minnesota Department of Transportation) in "The Cost-Effectiveness of Prairie Passage Plantings,"

> Recently MnDOT looked at the cost benefits of managing for natives vs. turf vs. forage species. Costs of seed mixes, establishment, and both short term and long term maintenance costs were looked at. Maintenance activities included mowing, spot spraying, burning, fertilizing and spraying. The costs for native prairie seed mixes can be $150 per acre more than the forage mix and $50 more than the turf mixes. However, the total maintenance costs per acre over a 10 year time costs about half as much to manage for native prairie mixes as it does for forage mixes. Turf mixes are somewhat more costly than native prairie mixes. Cost savings extended beyond ten years were estimated at even greater savings in the native prairie mixes.
>
> The long-term savings in managing natives vs. forage species is significant. Increased benefits of native cover vs. introduced forage species, cover for wildlife, ecosystem health, and water quality, is not easily quantifiable. However, fewer pesticides and less fuel is needed to manage native prairie than other types of cover. These factors alone provide environmental and economic incentives to look at the benefits of growing native.

Mowing contributes to ozone pollution

by Dennis Patton, Horticulture Agent, Johnson County K-State Research & Extension

(Excerpt)

Lawn mowing contributes greatly to the ozone problem. Engines are inefficient at reducing pollution. In fact, using a gasoline-powered lawn mower for one hour generates the same amount of air pollution as driving a car for forty hours.

Yes, forty hours not forty miles!

A gasoline powered weed eater operated for one hour is even worse as it generates pollution equivalent to driving a car for sixty hours.

http://www.oznet.ksu.edu/Johnson/hort/articles/mowing_adds_ozone.htm

If this approach has served Minnesota, these successes could be duplicated in Kansas and Missouri. (Missouri and Kansas are Prairie Passage Plantings Partners; see Appendix for more information.)

MoDOT and KDOT

MoDOT's annual mowing budget for 2004 was $19,266,198.77. Annual herbicide costs were $4,521,208.83. Presumably, KDOT's costs are similar. While both states have some roadway beautification programs in place, the 10,000 Rain Gardens initiative would like to see native roadway plantings become a Best Management Practice (BMP) for departments of transportation.

Installing native plants, over time, would reduce polluting runoff, save mowing and herbicide expenditure, and benefit Missouri farmers and the ag economy.

According to a Grow Native! grant proposal:

> If MoDOT converts 5% of 385,000 right-of-way acres to native vegetation over the next 10-15 years, this conversion will create a demand of up to 577,500 pounds of Missouri-native seed—a ten-fold increase over current Missouri in-state production

Beautiful roadways also attract tourists. Oklahoma, for instance, holds rodeos and outdoor events when native flowers are in bloom.

Parks and Recreation

Parks and Recreation can also benefit from native plants. In Kansas City, Missouri, the park system is extensive and includes boulevards and streetscaping. There is a balance between beauty and budget. Native plants will reduce maintenance costs over time, reduce pollutants such as herbicides and fertilizers, and absorb some of the water that flows onto streets during storms.

Dollars and Sense: Minority Business Development

Few landscape designers and landscaping companies are familiar with rain gardens or using garden-worthy native plants in landscape designs. This lack of experience is a golden opportunity for minority business owners: landscape architects, landscape firms, nurseries, equipment renters and operators, etc. 10,000 Rain Gardens would provide training materials customized for these groups and training workshops in partnership with Critical Site Products (with translation services provided as needed).

The goal is to give these groups a "heads up" about the rain garden and native plant market opportunity while providing more advocates for the 10,000 Rain Gardens initiative.

Conservation—regardless of the weather

Remember the Flood of '93? That year Missouri Department of Conservation and other natural resource management agencies noticed that levees planted with native switchgrass were less likely to yield to flood waters than those planted with non-natives. Deep roots give natives the advantage over short-rooted exotics in stabilizing soil and managing storm water. Waterways planted with native warm-season grasses will catch, clean, store and slowly release storm water, keeping soil at home, fields and pastures greener, and streams cleaner. Similarly, deep roots help native warm season grasses endure drought while cool season exotics die, exposing soil and giving weeds a foothold. Grow Native! website: http://www.grownative.org/index.cfm?fuseaction=unoyf.whynative

Why Rain Gardens, cont.

Dollars and Sense: Agriculture

With increased interest in using local-source native plants in landscapes, the native plant industry is thriving at both a local and national level. Missouri's native plant industry reports a combined $63 million in native plant materials is sold annually in the state. In addition, more than $60 million is sold in native plant services including crop services, design, installation and maintenance. The industry has experienced tremendous growth in the last ten years, and it is expected to grow at least 12% annually over the next ten years. Nationally, the native plant materials industry is expected to top $30 billion in 2005. Public conservation programs, as well as increased consumer and professional awareness of the benefits of native plant materials will fuel this growth.

Missouri has many conditions favorable for the future development of its industry.

- The state and federal governments have many entrepreneurial assistance programs available for plant producers.
- Missouri is centrally located and has diverse ecosystems capable of supporting over 3,000 native plant species.
- Relative to other states in the region, Missouri has a large number of small farms. These small farms are logical areas for expansion of the native plant industry.

Native plant products include:

- Grasses, plants, shrubs and trees
- Seeds
- Forestry products
- Forage
- Food and medicinal products

Native plants can also assist farmers in erosion control, water quality, and pollution reduction on their fields and lots.

Dollars and Sense: Help for Allergies...and Butterflies?

According to the Allergy and Asthma Foundation of America in 2004, Kansas City ranked in the top ten worst cities for asthmatics to live in.

Thomas Ogren is the author of Allergy-Free Gardening, Ten Speed Press. Tom does consulting work on for the USDA, county asthma coalitions, and the American Lung Associations. He has appeared on CBS, HGTV and The Discovery Channel. In 2004 Time Warner Books published his latest: What the Experts May NOT Tell You About: Growing the Perfect Lawn. www.allergyfree-gardening.com

Asthma attacks are commonly triggered by allergens like pollen and mold. Would planting 10,000 Rain Gardens in the metropolitan area benefit public health, or make allergies worse?

In "Avoiding Allergies by Use of the Right Native Plants in the Landscape," author Tom Ogren* says,

> "Biodiversity is the way to go when we are creating landscapes that will limit allergenic exposure. Almost any species of plants can eventually cause allergies if it is over-planted enough. All too often in our urban landscapes of today we see that landscapers have used the same old plants over and over again. This overly simplistic approach to landscaping results in landscapes that lack originality and produce a numbing "sameness" to far too much of our urbanscape.... Allergy rates today are far worse in urban areas than they are out in the country. Pollen allergies are worse in cities than in the country, despite the fact that there is much more total green matter in the countryside than in the city. Plant selection has been the main problem."

Biodiversity is also a boon for wildlife, especially migrating wildlife such as birds and monarch butterflies. Migrating monarchs depend on the food sources that they find along the way. The widespread use of herbicides has caused a steep decline in the plants that monarchs feed on. Planting rain gardens with native plants, such as milkweed and nectar, would provide way stations for monarchs during their life cycle.

With deep root systems, native plants allow water to infiltrate into the ground. Asphalt, impervious surfaces, and lawns force water to run off into the stormwater system.

Government studies have shown that up to 70% of the pollution in streams, rivers and lakes is carried by stormwater. About half of the pollution that stormwater carries comes from things we do in our yards and gardens. Keeping rain where it falls, by putting it into a beautiful rain garden, is a natural solution. You not only get a lovely garden out of it, you have the added benefit of helping protect our rivers, streams and lakes from stormwater pollution. You can be part of a beautiful solution! (Rain Gardens of West Michigan: http://www.raingardens.org/Index.php)

Annual Objectives

2005

Assist Mayor Kay Barnes in coordinating with other mayors to support rain gardens.

Flow meters installed in Brookside.

Have a kick-off meeting with potential partners and clarify roles and responsibilities

Partner with Powell Gardens to create and maintain a rain garden on their site by year three of this initiative.

Partner with the Zoo to create and maintain a rain garden on their site by year two.

Partner with Lakeside Nature Center to have a rain garden on their site by year two.

Ask local meteorologists to be the "faces" and advocates for the 10,000 Rain Gardens initiative.

Recruit public/private partners to provide support, raise funds, provide materials and native plants, etc. Seek local celebrities to promote the initiative.

Communication

Create a Website with a menu approach to stormwater management, educational resources, how-to videos and animations, merchandise, etc. Link to related sites.

Create and maintain a registration process for rain gardens and other green solutions.

Create a branding identity and signage for 10,000 Rain Gardens.
Finalize the 2006 marketing plan.

Nurseries

Partner with Critical Site Products to develop rain garden kits using local-source native plants. 10% of the proceeds will be returned to the initiative to purchase native plants for public rain gardens.

Partner with Monarch Waystation Program to offer rain gardens as butterfly habitats with the appropriate native plants (University of Kansas Entomology Department).

Study

Collect and analyze current bioretention research and look for Best Management Practices (BMPs) established in other states and cities.

Fundraising

Begin efforts to create a sweepstakes, seek local, state, and federal grants, and partner with arts groups.

Encourage area groups to use rain garden kits for their fund-raisers.

2006

Goal: establish 1,000 rain gardens and/or green solutions

Rain Gardens

Establish at least 200 municipal demonstration rain gardens in the bi-state area.

Establish at least 100 rain gardens at non-profit organizations, community centers, worship centers, and colleges. Include golf courses and cemetaries.

Establish rain garden and bioswale demonstrations at Critical Site Products.

Establish at least 20 rain gardens at fire stations with greenspace property.

Begin to establish plans to integrate rain gardens at KCI.

Launch initiative to have a rain garden at every school in the bi-state metropolitan area; identify one or two school districts for this first year and tie into No Child Left Behind requirements.

Establish at least 500 private rain gardens in the bi-state metropolitan area, including new developments.

Establish at least 50 corporate rain gardens in the bi-state metropolitan area.

Policy

Work with municipalities to make bioretention a BMP for stormwater management.

Media

Launch a media campaign with Mayor Kay Barnes, key partners, and meteorologists
Provide video releases to local news stations.
Provide press releases to local newspapers.

Give out 10,000 rain garden brochures.

Give out 500 rain garden kits with how-to DVDs.

Publish a quarterly electronic newsletter for registered rain gardeners and interested parties with bioretention tips, community events, etc.; publish on Website, provide a PDF download, and offer an e-mail text version.

Arts Involvement

Partner with the Kansas City Art Institute to launch the Artistic Rain Barrel program.
Partner with Science City to add a watershed exhibit and activities.

Partner with the City and Crossroads First Fridays to create a public art event with outdoor sculptures and fountains that relate to water or watersheds.

Community Outreach

Provide information to meteorologists for managing stormwater with green solutions.

Create and deliver at least 6 workshops to Master Gardeners; ask Master Gardeners to commit at least 2 presentations on rain gardens.

Recruit local gardens, who plan to place their gardens on garden tours, to incorporate a rain garden on their property.

Give presentations at neighborhood association meetings.

Give presentations to agricultural, industry, and development groups, including Future Farmers of America (FFA).

Recruit area librarians to have a rain garden display and books for children.
Recruit volunteers for booths at farmer's markets to promote and sell native plants, and educate customers about their value and care.

Recruit volunteers to booths at river festivals to educate about rain gardens and watershed concerns.

Partner with Powell Gardens to offer a rain garden and butterfly garden how-to workshop.
Work with the Boy and Girl Scouts to create a merit badge or establish a connection with an existing badge.

Create and deliver "Eco-walks" along streams and rivers.

2006, continued

Participate in river festivals.

Show the how-to rain garden video regularly on Channel 2.

Work with the local public television station to develop a native plant and watershed show.

Strive for placement on national networks and cable channels.

Ask Landscape Architects to donate 2 hours per month to rain garden design and education for property owners.

Educational Outreach

Partner with watershed and environmental groups to deliver presentations to children in schools, camps, Scout troops, etc.

Partner with active high school science clubs to train younger students about green stormwater solutions.

Partner with a group like Envirothon to provide stormwater and watershed training to teachers.

Create and deliver a Communiversity course (fall, spring, and summer) on rain garden and butterfly garden design and cultivation.

Partner with 4-H Extension, UMKC, KU, K-State, and the metropolitan community colleges to establish rain gardens and distribute information.

Study

Establish a baseline for a bioretention study.

Deploy monitoring methods for measuring bioretention effects.

Visit U.S. cities with rain garden programs.

Funding

"Win a Garden Makeover" Sweepstakes: for a donation to 10,000 Rain Gardens, the randomly-chosen winner will receive an installed rain garden. Contest will begin on January 1st and close the week before the Flower, Lawn, and Garden Show. Winner will be announced at the show.

Seek funding for rain garden materials:

- EPA grants
- Corporate underwriting
- Website sales of rain garden merchandise
- Rain barrel kits at major retailers and nurseries
- Sponsorship for artistic rain barrels
- Artistic rain barrel auction

2007

Goal: establish 4,000 rain gardens and/or green solutions

Rain Gardens

Establish at least 1,000 municipal demonstration rain gardens in the bi-state area.

Establish at least 1,000 rain gardens at non-profit organizations, community centers, worship centers, and colleges.

Establish at least 1,000 rain gardens in area schools.

Establish at least 1,000 private rain gardens in the bi-state metropolitan area.

Establish a rain garden at the Zoo.

Establish a showcase rain garden at Sprint Center arena.

Policy

Continue to work with municipalities to make bioretention a BMP for stormwater management.

Work with MoDOT and KDOT to establish bioretention as a BMP adjacent to highways.

Lobby for state laws and regulations to include bioretention and green solutions to stormwater management.

Media

Give out 15,000 rain garden brochures.

Give out 1,000 rain garden kits with how-to DVDs.

Continue to update the Website, newsletter, and rain garden registration.

Coordinate for media coverage at significant events and issue releases.

Arts Involvement

After a major river clean up, sponsor an art contest. Entrants, either teams or individuals, must create sculptures from trash and materials cleaned from the river. Sculptures will be constructed and displayed at an adjacent park. Seek corporate involvement and sponsorship. Partner with Avenue of the Arts to have water-inspired art displays.

Sponsor a poetry contest for students (in age-based categories). Poems must pertain to water, watersheds, fountains, butterflies, prairies, storms, streams, rivers, or oceans. Winners will read at a Watershed Reading at the Writers Place.

Community Outreach

Analyze the previous year's outreach efforts and continue the most successful ones; if other opportunities were discovered, include those in the outreach activities.

Proceeds from contests and other fund-raising activities will be used to supply native plants to homeowners, businesses, and not-for-profit organizations. Plants will be given away at special publicized events at farmers' markets.

Create and promote a watershed display at a Missouri and Kansas state fair.

Hold a community meeting for current rain gardeners to troubleshoot any problems.

Ask Landscape Architects to donate 2 hours per month to rain garden design and education for property owners.

2007, continued

Educational Outreach
Partner with school districts to create and deliver watershed curriculum to science teachers.

Find cross-curricular opportunities, such as incorporating environmental fiction into Language Arts, Math, and English courses. Create and distribute a list of such poems, stories, and novels.

Partner with educational experts (i.e.., Learning Exchange) to provide stormwater and watershed training to teachers.

Partner with Cabela's to produce water quality educational materials for their customers.

Study
Continue studies as needed to establish the effect of green solutions on stormwater flows.

Nurseries
Maintain and expand nursery partnerships.

Funding
"Win a Cabela's Shopping Spree" Sweepstakes: For a donation, the winner of the first drawing receives a shopping spree at Cabela's. Contest in tandem with a Cabela's water quality educational initiative (1st drawing).

"Win a Backyard Bird Shopping Spree" Sweepstakes: For a donation, the randomly-chosen winner will receive a gift certificate from a bird watching store (2nd drawing).

Seek funding for rain gardens in addition to OCP funds:

- EPA grants
- Corporate underwriting
- Website sales of rain garden merchandise
- Rain barrel kits at major retailers and nurseries
- Entry fees for contests and donations

2008

Goal: establish 5,000 rain gardens and/or green solutions

Rain Gardens
Establish at least 2,000 municipal demonstration rain gardens in the bi-state area.

Establish at least 500 rain gardens at non-profit organizations, community centers, worship centers, and colleges.

Establish at least 500 rain gardens in schools.

Establish at least 2,000 private rain gardens in the bi-state metropolitan area.

Establish a rain garden at Lakeside Nature Center.

Policy
Continue to work with municipalities to make bioretention a BMP for stormwater management.

Work with MoDOT and KDOT to establish bioretention as a BMP adjacent to highways.

Lobby for state laws and regulations to include bioretention and green solutions to stormwater management.

Media
Give out 20,000 rain garden brochures.
Give out 2,000 rain garden kits with how-to DVDs.

2008, continued

Continue to update the Website, newsletter, and rain garden registration.

Coordinate for media coverage at significant events and issue releases.

Arts Involvement

After a major river clean up, sponsor an art contest. Entrants, either teams or individuals, must create sculptures from trash and materials cleaned from the river. Sculptures will be constructed and displayed at an adjacent park. Seek corporate involvement and sponsorship (if the previous year was a success).

Sponsor a student art contest (in age-based categories). Art must pertain to water, watersheds, fountains, butterflies, prairies, storms, streams, rivers, or oceans—art must also contain text on these subjects.. Winners' work will be displayed in Kansas City and Johnson County public libraries.

Community Outreach

Analyze the previous years' outreach efforts and continue the most successful ones; if other opportunities were discovered, include those in the outreach activities.

Proceeds from contests and other fund-raising activities will be used to supply native plants to homeowners. Plants will be given away at special publicized events at farmers' markets.

Create and promote a watershed display at a Missouri and Kansas state fair.

Hold a community meeting for current rain gardeners to troubleshoot any problems.

Ask Landscape Architects to donate 2 hours per month to rain garden design and education for property owners.

Educational Outreach

Provide curricular materials that were developed in Year Two to all interested school districts.

Partner with Envirothon to provide stormwater and watershed training to teachers.

Study

Continue studies as needed to establish the effect of green solutions on stormwater flows. Generate a report on the findings.

Nurseries

Maintain and expand nursery partnerships.

Funding

"Win a Holiday at Hermann" Sweepstakes: for a donation to 10,000 Rain Gardens, entrant will receive a chance to win a three-day stay at a Hermann, Missouri, bed and breakfast.

Seek funding for rain gardens in addition to OCP funds:

- EPA grants
- Corporate underwriting
- Website sales of rain garden merchandise
- Rain barrel kits at major retailers and nurseries
- Entry fees for contests and donations

Stakeholders

Stakeholders Defined

Everyone is a stakeholder in water quality, but a several key groups will play important roles in the success of this initiative.

All stakeholders are assumed to be in both Kansas and Missouri.

Municipal & State

City Mayor
City Manager
Council members
City Water Services
State Water Bureaus
Public Works
Parks & Recreation
Dept. of Natural Resources
Dept. of Conservation
Dept. of Agriculture
Clay/Jackson Field Service Office Area
Corps of Engineers
Dept. of Health and Environment
Weed control
Fire departments and stations

Federal

EPA
U.S. Geological Survey
Army Corps of Engineers
Congressional representatives

River & Watershed

Blue River Watershed Association
Little Blue River Watershed Coalition
KS Area Watershed Council
MO River Relief

Residential

Current homeowners
New homeowners
Neighborhood associations
KC Neighborhood Alliance

Business

Outdoor retailers
Real estate developers
Economic development groups
Small businesses
Mid-size and large corporations
Golf courses
Cemetaries
Chambers of Commerce
Organic food markets
Farmers' markets
Environmental scientists
Bio-engineers
Landscape architects and designers (Prairie Gateway Chapter of the American Society of Landscape Architects)

Environmental

All Species Initiative
Bridging the Gap
Earth Share of MO
Environmental Management Commission
Friends of Lakeside Nature Center
Habitat for Humanity's ReStore
Heartland Tree Alliance
Keep Kansas City Beautiful
Lakeside Nature Center
KC Wildlands
MARC
MO Prairie Foundation
Monarch Watch
Nature Conservancy of MO
North American Pollinator Protection Campaign
Sierra Club

Education

Universities & colleges
School districts
High school science clubs
Public libraries
Learning Exchange
Discovery Center
4-H Extension
Nature Centers
MO Environmental Education Assoc.
UMKC Center for the City

Industry & Agriculture

MO Dept. of Agriculture
Small farms
MO native plant materials and services industry

Gardening & Native Plants

Master Gardeners of Kansas City
Powell Gardens
Critical Site Products
Native plant nurseries
Grow Native!
MO Native Plant Society
Water Garden Society
Universal Gardening
Lawn & Garden shows and tours
Community gardens

Religious Groups

Churches, temples. etc.
Interfaith organizations
Green Sanctuaries

Media

Meteorologists
TV news stations
Radio stations
Newspapers
Magazines
Time/Warner cable

Arts

Avenue of the Arts
First Fridays
Mattie Rhodes
Writers Place
Kansas City Art Institute

Transportation

MoDOT
KDOT
KCI
Downtown airport
Johnson County airport
Railroads
Port Authority

Best Mangement Practices

Study in Burnsville, MN

Once cuts were made in the curb to allow stormwater to enter the gardens from the street, the amount of runoff entering Crystal Lake from the neighborhood dropped drastically. Compared to its sister street with no gardens, the study street contributes about 90 percent less stormwater to the lake. The decrease in runoff volume means that less phosphorus and sediment are entering the lake, too, which helps preserve water clarity and fish populations; it also minimizes the sudden rise in water level that usually follows a storm and contributes to shoreline erosion.

(http://www.landandwater.com/features/vol48no5/vol48no5_2.html)

Although many sites around the country have incorporated rain gardens and other bioretention systems uncertainty about the implementation and regulatory processes still exists. (Morzaria-Luna et al., 2004) For this reason, this summary section attempts to collect concepts and results from existing and on-going projects that will be valuable information for officials and practitioners enthusiastic enough to pursue the goal of implementing 10,000 Rain Gardens and Best Management Practices (BMPs) in the Kansas City region.

Seattle Natural Drainage Systems

Seattle, Washington
Natural Systems Application and Effectiveness

Seattle Public Utilities constructed two drainage projects in 2000, to decrease stormwater quantities, with the goal of reducing channel erosion and water pollutant loadings to streams. One initiative, the Viewlands Cascade Drainage System, replaced a narrow, partially-concreted ditch with a wide series of stepped pools. The second installation, at 2nd Avenue NW and known as a Street Edge Alternatives (SEA Streets) initiative, involved the complete reconstruction of the street and its drainage system to reduce impervious area and install stormwater detention ponds. These projects were monitored over three water years beginning for flow in relation to precipitation to determine their actual benefits.

Monitoring demonstrated that the Viewlands Cascade is capable of reducing the mean influent peak flow rate by approximately 60 percent and total runoff volume by more than half, although little or no reduction of either peak flow rate or volume occurs in relatively large storms. Based on estimates for the ditch that preceded the Viewlands Cascade initiative, the new channel discharges 1/3 the runoff in the wet months.

The 2nd Avenue SEA Streets initiative has prevented discharge of all dry season flow and 99 percent of the wet season runoff. This initiative's performance has advanced since its installation, to the point that it has not discharged since December of 2002, even during large rainfalls. Maturing vegetation appears to be assisting both infiltration and evapotranspiration. It was estimated that a street drainage system design according to City of Seattle conventions in the same place would have discharged almost 100 times as much runoff.

The two projects represent two contrasting urban stormwater management

options. The SEA Streets initiative is at the drainage source, where rainfall is converted to surface runoff. It is capable of preventing almost all of the conversion. The large Viewlands Cascade is in an end-of-pipe location and can attenuate large amounts of already flowing runoff, although not at nearly the proportional efficiency of the SEA Streets alternative. Together, using the two strategies where the best opportunities for each exist can significantly advance the ability to manage urban runoff peak flow rates and volumes.

Bibliography:
Horner, R.R., L. Heungkook, and S.J. Burges. 2004. Hydrologic Monitoring of the Seattle Ultra-Urban Stormwater Management Projects: Summary of the 2000-2203 water years. University of Washington, Department of Civil and Environmental Engineering, Water Resources Series, Technical Report No. 181. October 2004.

Jordan Cover Urban Watershed

Waterford, Connecticut
Rain Garden Effectiveness Study

The Jordan Cove Urban Watershed Section 319 National Monitoring Program Initiative is a ten year study designed to determine the water quantity and quality benefits through the development of an urban subdivision using pollution prevention BMPs. Stormwater runoff from three watersheds - control, traditional and best management practice (BMP) - is monitored as part of the study. The traditional watershed has been developed using 'traditional' subdivision requirements. The BMP watershed has been developed using a best management practice approach before, during, and after construction. The runoff from these two watersheds is compared to an existing control watershed. The initiative goal is to show that pre-development hydrologic conditions can be maintained during and after residential development by using a BMP approach.

Initial results show that residential construction has had significant impacts on runoff quality and quantity. Typical hydrologic alterations due to construction activities, such as increased runoff volume, were not found in the BMP watershed. On the contrary, a two-order magnitude reduction of stormwater runoff was observed. This reduction can be attributed to both, excavation of all basements in a relatively short time and proper location of earthen berms, to retain and infiltrate stormwater onsite. Decreases in runoff of 106% were observed in the BMP watershed during the first year following construction period. Alternately, during construction in the traditional watershed, runoff volume doubled. Post-construction results are forthcoming.

Bibliography:
Clausen, J.C. and J.K. Gilbert, 2003. Annual Report: Jordan Cover urban watershed section 319 national monitoring program initiative. University of Connecticut, Storrs, College of Agriculture and Natural Resources, Department of Natural Resources Management and Engineering. September 1, 2003.

Best Management, cont.

St. Francis Subdivision

Cross Plains, Wisconsin
Impediments to Widespread Implementation of Rain Gardens

The process of implementation of bioretention practices was analyzed, including Rain Gardens, in the St. Francis subdivision in Cross Plains, Wisconsin. Through the examination of archival data and interviews with key participants, it was found that although regulatory and political pressures encouraged the inclusion of bioretention, current standards for stormwater management prevailed. Developers have to meet both existing requirements and anticipated rules requiring infiltration. As a result, bioretention systems are encouraged but supplement, rather than replace, traditional stormwater practices. Confusion surrounding dual standards contributes to substantial delays in negotiations among relevant stakeholders. The authors conclude that the St. Francis subdivision serves as both a cautionary tale and a bioretention success story. As a caution, this situation demonstrates the need for careful review and refinement of existing stormwater ordinances to incorporate water quality improvement technologies, such as bioretention. The demonstrated success of the St. Francis development is that it became a positive prototype for best management stormwater practices elsewhere in the region. In addition, the water quality monitoring data from the site has contributed to development of a new county ordinance, the first in Wisconsin to address both quantity and quality of stormwater runoff.

Because deed restrictions made it difficult to enforce maintenance, Rain Gardens, the most innovative part of the stormwater management design, were not included in the final version of the plan. Nonetheless, design engineers, the developer, and Wisconsin Department of Natural Resources staff remained committed to including Rain Gardens in each lot. WDNR prepared a Rain Garden brochure that is distributed to Homeowners. The homeowners are then responsible for hiring a Landscape Architect for design and to facilitate maintenance. Building inspector check for compliance with the deed restriction at following construction, but no further oversight occurs unless there is a complaint.

A 2001 pilot study identified several negative perceptions to the adoption of Rain Gardens; i.e., Rain Gardens encourage mosquitoes, require too much work, are expensive to design and plant, and promote weeds. Liability and possible damage to foundations were also mentioned. This study concluded that a homeowner with average ecological knowledge needed extensive education before he would build and care for a rain garden.

The authors believe that further efforts should be directed to implementing rain gardens as a stormwater management practice because they have several advantages over other bioretention practices. Rain Gardens are an appealing landscape feature that can be designed to certain standards and can be included in new designs or retrofitted inexpensively into existing areas. Suggestions given by the authors to promote public acceptance and participation include outreach programs, demonstration Rain Gardens, hands-on design workshops, and credit plans where

homeowners who infiltrate or detain their stormwater on-site could receive a reduction on the stormwater fee. The report suggests that any policy aimed at modifying the approach to stormwater management must originate within the governance structure. They caution that attention must be concentrated on reviewing and reconfiguring existing stormwater regulations and ordinances. Widespread acceptance of bioretention in stormwater management plans is the goal. The new Dane County Stormwater Management Ordinance is an excellent example of how bioretention can complement the traditional stormwater management approach.

Bibliography:
Morzaria-Luna, H.N., K.S. Schaepe, L.B. Cutforth, and R.L. Veltman, 2004. Implementation of Bioretention Systems: A Wisconsin case study. Journal of the American Water Resources Association, August 2004. pp.1053-1061.

TABLE 1.
Urban Development Projects Where Bioretention Practices Have Been Implemented in the United States.

Location	Implementer	Initiative	Implementation*	Practice**
Frederick County, MD1	Ecosite, Inc.	Pembroke Subdivision	N	3,4,5
Seattle, Washington1	Seattle Public Utilities Seattle Trans. Dept.	Urban Creeks Legacy Program. SEA Streets	R	5,7
Sherwood, Arkansas1	Terry Paff, Developer	Gap Creek Subdivision	N	1, 6
Maplewood, MN1		Maplewood Water Gardens	R	5
St. Paul, Minnesota1	Upper Swede Hollow Neighborhood Association	Maria Bates Rain Garden	R	4
Mount Rainier, MD2	Prince George's County Dept. of Environmental Resources	HIP Artist's House	R	1
Port Towns, Maryland2	Port Towns, Prince George's County, Maryland State Highway Administration	Bladensburg Streetscape Initiative	R	4
Austin, Texas3		Alta Vista Planned Unit Dev.	N, M	5
Somerset, Maryland4	Prince George's County Department of Environmental Resources	Somerset Subdivision	N	4
Carrboro, NC5	Giles Blunden, Architect	Pacifica Cohousing	N	1
Minneapolis, MN6	Friends of Bassett Creek	Bassett Creek	R	4
St. Paul, Minnesota6	Friends of Swede Hollow	Lower Phalen Creek	R	4
Grayslake, Illinois7	Applied Ecological Services, Inc.	Prairie Crossing		5,6
Lake Wisconsin, WI8	Heffron and Associates	The Water's Edge	N	4
Seattle, Washington9	City of Seattle	Green Street Initiative	R	1,2,5

Implementation: R = retrofit; N = new construction; and M = monitoring for pollutant removal.
*****Includes housing and living areas. Does not include parking lots or highways. Practices: 1 = bioretention (unspecified); 2 = window boxes; 3 = sediment detention basins; 4 = rain gardens; 5 = swales; 6 = wetlands and natural area preservation; and 7 = retention grading of lawns.***
1Lehner et al., 1999. 2Prince George's County, 2001. 3ASCE, 2001. 4Coffman, 1995. 5Carrboro Collaborative Development Association, 2002. 6Friends of Basset Creek, 2004. 7Apfelbaum et al., 1994. 8Daniel Heffron, Heffron and Associates, personal communication, February 13, 2002. 9Wulkan, 2001.

BMP Toolbox

Best Management Practice (BMP) methodologies can be used in multiple applications and across a wide scale of service within watersheds, depending upon the desired water quality and stormwater control objectives. Many BMPs are applicable from small individual lots or parcels, but may also become components of stormwater management within wide, district-scale applications where large volumes of runoff must be controlled.

Table 1 lists the most common BMP approaches to stormwater and pollutant runoff control, and their associated scale of service applications (small lot or parcel size, block, and district-scale applications). The basic strategies of nearly all of the BMP areas similar, using natural vegetation and soils, as well as natural or engineered topographic features for stormwater control. **Distinctions between BMPs lie in how and where they are applied. Site-specific considerations in the selection and design of BMPs must always be considered when developing a stormwater management strategy.**

BMP	Parcel	Block	District
Bioretention Area	X	X	X
Bio-Detention Basin	X	X	X
Corridor Park			X
Filter Strip	X	X	X
Green Roof	X		
Infiltration Basin	X	X	X
Infiltration Planter	X		
Infiltration Trench/ Filter Strip	X	X	
Interconnected Rain Gardens		X	
Prairie Restoration	X	X	X
Rain Barrel	X		
Rain Cistern	X		
Rain Garden	X	X	
Stormwater Treatment Train©		X	X
Vegetated Bioswale	X	X	X
Wetland	X	X	X

Table 1 – Suitability of BMP applications at parcel, block, and district levels

Descriptions of Example BMPs

Bioretention Areas

Bioretention areas are small, vegetated depressions into which surface water is diverted. Bioretention areas optimize soil and vegetative resources to filter suspended solids and pollutants in rainwater runoff from developed sites by slowing the velocity of water flow and increasing infiltration of water into the soil media.

The vegetative structure—a scaffold of biological weavings—slows flow while causing suspended solids to drop out of the water. By slowing flow, more water can infiltrate the soil, allowing the soil media, a complex structure of physical, chemical, and biological processes, to remove pollutants while providing a conduit of groundwater recharge, a natural and necessary component of successful water management in all environments. Restored natural hydrologic functions facilitate infiltration and evapotranspiration (Figure 1), thereby reducing water volumes.

A typical application for a bioretention area is to infiltrate and treat surface runoff from parking lots. Stormwater flows into the bioretention area, ponds on the surface, and gradually infiltrates into the soil bed. Pollutants are removed by processes that include adsorption, filtration, volatilization, ion exchange, and decomposition (Prince George's County, MD 1999). Treated water is allowed to infiltrate into the surrounding soil, or is collected by an underdrain system and discharged to the storm sewer system or directly to receiving waters. If a bioretention system allows water to infiltrate into the surrounding soil, it can be an excellent source of groundwater recharge.

Figure 1 – Bioretention area during installation procedure

BMP Toolbox, cont.

Bio-Detention Basins

Bio-detention basins are designed to collect stormwater runoff and control it in a single location. The basins are often engineered to facilitate the collection of water and hold it within a detention cell. These cells can vary in size from a small pool to a large pond. Bio-detention basins are similar to bioretention areas in that they utilize native vegetation and soils to slow the flow of runoff and maximize infiltration and treatment of stormwater.

The basin will, like bioretention areas, utilize native vegetation to slow water, promoting infiltration into the soil. The underlying soil may be engineered to maximize infiltration and permeability, allowing water to move into the ground and either re-charge subsurface groundwater or to drain through a conduit to streams or lakes. The movement of water within these systems is controlled, not allowing the discharge of stormwater to occur quickly, but over a longer time-period, therefore not overwhelming the receiving capacity of connected stormwater management systems.

Figure 2– Bio-Detention basin following a storm event.

Filter Strips

Filter Strips are linear vegetated elements that accept sheet flow runoff from adjacent surfaces such as parking lots or streets (Figure 3). They slow runoff, filter sediment and pollutants, and enhance infiltration. Filter strips are often used to treat shallow sheet flows and to evenly distribute storm flows over very short contributing areas. Filter strips are well suited to areas adjacent to parking lots and other impervious surfaces where runoff can be conveyed and filtered before it is discharged into swales, storm sewers, or surface water bodies. Filter strips are also appropriate for construction sites and developing land to filter sediment from overland sheet flow as effective erosion and sedimentation control.

Figure 3 – Native plant filter strip between parking lots.

Green Roofs

Green roofs employ soil and plant mediums on roof-tops to catch rain water that would otherwise become runoff. Water falling onto green roofs is captured for temporary storage and use by the vegetation. They are applicable to a variety of building sizes and types and are becoming features used on large urban buildings that also provide a space where people can step out and enjoy the aesthetic qualities of the vegetation.

A green roof consists of plants and engineered soil over a traditional roofing system (Figure 4). Green roofs are grouped into two categories: intensive and extensive. Intensive roofs typically use a deep-rooting medium such as topsoil and can incorporate a wide variety of plants but require special considerations due to higher roof loading and greater maintenance.

Extensive roofs are lightweight systems of manufactured root medium that typically have low plant diversity, are more easily incorporated into conventional building construction, and require less maintenance. Green roofs offer added advantages in energy savings from heating and cooling and providing green space within an urban environment.

BMP Toolbox, cont.

Infiltration Basins

Infiltration basins are shallow depressions where water is collected, filtered, and allowed to infiltrate into the soil during and after storm events (Figure 5). Infiltration basins are specifically designed to maximize infiltration of stormwater and are typically located in areas that have a high infiltration capacity that will receive large amounts of stormwater runoff.

While infiltration basins function similar to bioretention basins, they are often located and seen in areas that are also used as playgrounds or parks when they are dry, or open lots that can be used as greenspace or similar uses within urban environments. The primary function of the infiltration basin is to maximize surface water recharge in to the soil where it can be stored and used for vegetative sustainability.

Figure 5 – Infiltration basin.

Infiltration Planters

Infiltration planters are designed to function similar to infiltration basins, but in a more controlled, structured setting. Infiltration planters are simply planter "boxes" with the purpose of collecting and absorbing diverted runoff. Because it is a contained structure, the infiltration planter will often has a sub-surface drain incorporated to discharge excess water at a controlled rate. This practice aids in limiting large, sudden discharges of water during rare-event high-flow storms. While water directed into an infiltration planter diminishes surface runoff, it also removes potential pollutants as water flows through vegetation and soil.

Figure 6 – Infiltration planter adjacent to a sidewalk (Photo from the Portland 2004 Stormwater Management Manual)

Infiltration Trenches/Strips

Infiltration trenches are typically narrow, engineered subsurface drains used to collect, filter, and slowly convey stormwater to a collection site or controlled discharge point. Infiltration strips are surface depressions that slow water flow and maximize infiltration, similar to filter strips.

The infiltration strip is engineered to collect and convey water to a specific location, often with controlled, concentrated flow.

Figure 7 –Constructing an infiltration trench.

BMP Toolbox, cont.

Fast Facts: Natives

By allowing the grasses to reach moisture, nutrients, and minerals far below the topsoil, the deep roots allow native grasses to flourish on marginal and droughty soils (Conservation Commission of Missouri, June 25, 2001).

Deep roots help stabilize the soil, reducing erosion (Shea 1999).

The large root mass of native grasses also contributes to an increase in soil fertility. Approximately one-third of the root system of each plant is replaced each year. As these roots are decomposed, vital nutrients are returned to the soil (Conservation Commission of Missouri, July 29, 2001).

Rain Barrels and Cisterns

Rain Barrels and Cisterns collect stormwater from roofs and other impervious surfaces, allowing it to drain slowly or to be reused for non-potable purposes, such as irrigation. The effectiveness of these BMPs is incremetnal. With wide application, their use can be have a significant cumulative impact at relatively low costs.

Figure 9 – Rain Barrel collecting roof runoff from downspout.

Rain Gardens

A Rain Garden is shallow, depressed area planted with native wetland and prairie vegetation that provides an attractive garden area with the primary function of receiving, holding, and filtering rainwater. Rain Gardens function similar to larger-scale bioretention areas and are typically designed to retain water for less than 72 hours. Opportunities for Rain Gardens exist in a myriad of locations, including residential yards and community common areas (See Figure 10).

Figure 10 – Rain Garden

Figure 11 – Rain Garden

Vegetated Bioswales

Vegetated swales have gently sloping sides and are used to convey the overland flow of stormwater down a subtle gradient (Figure 11). Swales accomplish many of the same functions provided by filter strips while providing directed conveyance. This conveyance function is particularly important when managing concentrated flows and during severe storm events when stormwater needs to be directed to a specific destination, such as a wetland. Swales should be designed with native species for the reasons described above, and can be augmented with check dams and other techniques to maximize their effectiveness at managing stormwater.

Figure 12 – Vegetated Bioswale with native wildflowers

BMP Toolbox, cont.

Stormwater Treatment Train©

A Stormwater Treatment Train© is basically a series of interconnected BMPs, strategically placed to take advantage of existing site conditions and to maximize their effectiveness. The net effect of a series of BMPs is greater than the sum of the individual parts due to the effect of continual treatment on runoff.

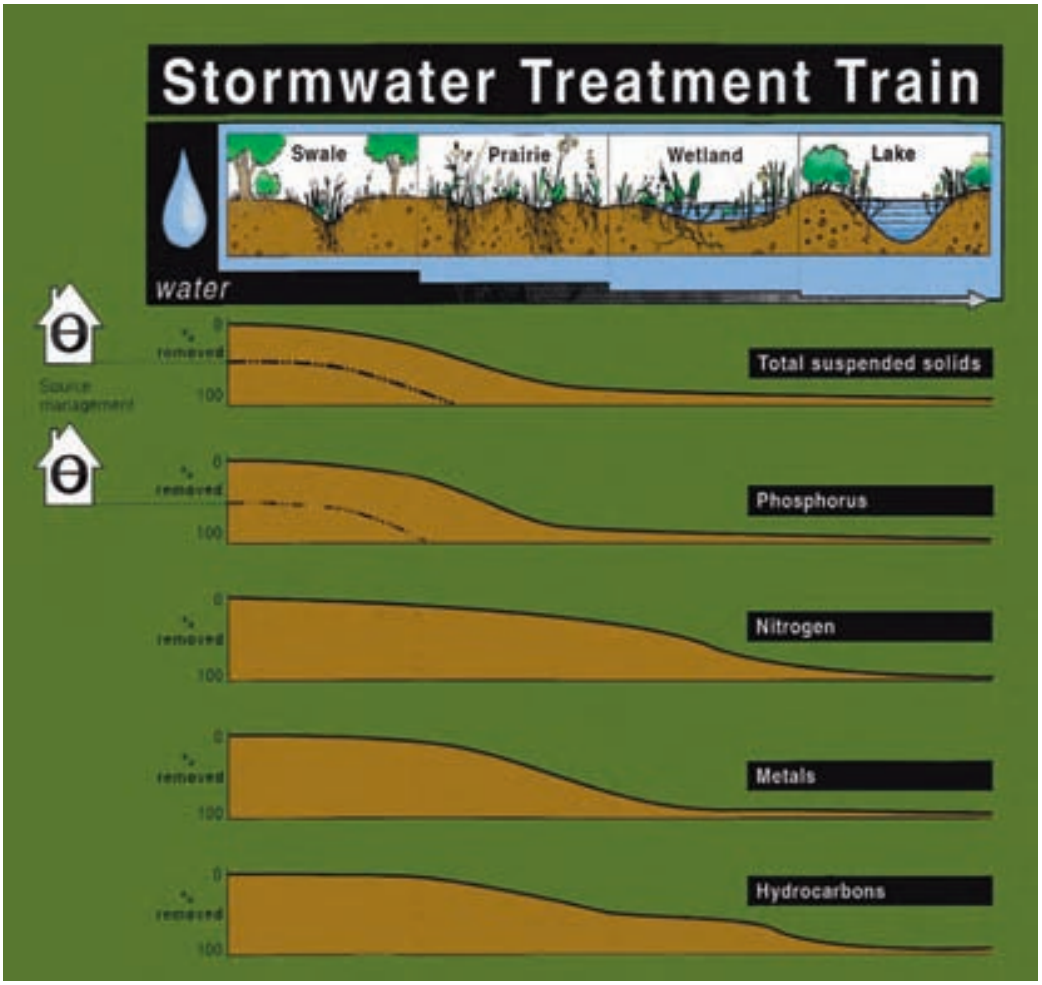

Figure 13 – Stormwater Treatment Train

Seeing Green: Rooftops

Flowers: look up!

Green roofs provide many ecological, aesthetic, and financial benefits, including:

- **Controlling stormwater run-off, erosion, and pollution**
- **Improving water quality**
- **Mitigating urban heat-island effects, cooling and cleaning the air**
- **More than doubling the service life of the roof, reducing both costs and landfill**
- **Conserving energy**
- **Reducing sound reflection and transmission**
- **Creating wildlife habitat, and**
- **Improving the aesthetic environment in both work and home settings.**

Landscaped Roofs Have Chicago Mayor Seeing Green

Brian Handwerk
for National Geographic News, November 15, 2004

When cities run out of valuable real estate, planners look up. The search for green space is no exception. Europe's green roofs have long provided environmental, aesthetic, and economic benefits. Is the idea growing in the United States?

Mayor Richard Daley began a green roof initiative in Chicago, Illinois, after he saw the gardenlike roofs in Europe.

"I thought, with all the flat roofs in Chicago, you could reclaim thousands of acres for the environment and also help buildings with heating and cooling and controlling rainwater going into the sewer system," he said during a recent telephone interview.

"When you look out over the city, instead of steel and concrete, you see something for the environment," he continued. "So I just thought that was the way for us to go."

Green roofs are generally composed of a low-maintenance, drought-resistant plants like sedum. These roofs are less than four inches (ten centimeters) thick and may be planted directly or laid down as pre-vegetated mats. Even sloping roofs are candidates for the green treatment.

More intensive green-roof systems may contain varieties of plants and garden elements such as trees but only on flat roofs. These plantings require deeper planting material, or soil substitute, and are heavier, are more expensive, and require more maintenance.

One of green roofs' biggest benefits is water management. **They can absorb some 50 to 60 percent of the rainwater that falls on them.**

Some of that water is lost when the vegetation transpires, or "exhales" the water back into the atmosphere. Some water is retained in the soil or other growing medium. The rest enters the urban rainwater drainage system in a slow, controlled flow, a process that helps dampen high-volume rainwater surges in urban water systems, which are expensive to expand.

"In a lot of cities even a thunderstorm might overflow [the rainwater

Seeing Green: Rooftops, cont.

system] and mix with sewage," said Brad Rowe, a plant and soil scientist at Michigan State University in East Lansing. "Who knows where that goes?"

Green roof proponents tout other benefits, like energy savings.

How much a green roof lowers energy costs depends on the type of roof and the climate in which it's installed. Warmer climates offer the greatest saving opportunities, since green roofs are more efficient at reducing air conditioning costs than they are at lowering heating bills.

Another benefit: Green roofs last longer than conventional ones. **Where typical roofs might last 20 years, green roofs will survive 40 to 50 years. They protect the roofs waterproof layer from damaging ultraviolet rays and extreme day/night temperature fluctuations, which may cause cracks.**

While the costs of green roofs are one-and-a-half to twice that of conventional roofs, advocates say green roofs make long-term economic sense, even without factoring in energy savings.

The rooftop green space also helps mitigate a phenomenon known as the urban heat island effect. The city microclimates occur when acres of densely-packed human-made building materials absorb heat energy from the sun.

"In Atlanta on a hot summer day, it might be 10 degrees [Fahrenheit/5.6 degrees Celsius] warmer in the city than out in the countryside," Rowe said. Green roofs can help mitigate the unnatural temperature rise, Rowe said.

Green-Roof Zoning

In Germany, where green roof are most common, the city of Stuttgart has promoted green roof and facade planting through subsidies for nearly 20 years.

Martina Laun and Klaus-Juergen Evert serve in the city's park and cemetery department. They noted that the number of green roofs in the city is permanently increasing, thanks to a combination of subsidies and zoning laws, which require green roofs in certain areas.

Under a grant-aid program established by the Stuttgart City Council, private citizens are awarded grants to help cover construction costs.

Between 1986 and 2003, the plan subsidized some 50,018 square meters (540,000 square feet) of private green roofs at a total cost of U.S. $1,076,000. During the same period, the city also invested U.S. $2,523,000 for roof plantings on public buildings. The total area: 102,423 square meters (1.1 million square feet).

Laun and Evert noted that the program has fostered aesthetic benefits as well as environmental ones. "Nature's rhythm is made visible by seasonal changes in the vegetation, even in an urban roof environment," the pair wrote in an e-mail to National Geographic News. "In terms of design, roof planting represents a considerable aesthetic improvement and altogether a significant ecological benefit."

Cultivating Converts

The green roof concept is winning more converts in the United States.

Ford Motor Company created a 10.4-acre (4.2-hectare) living roof, the world's largest, atop its Dearborn, Michigan, truck plant final-assembly building.

In Chicago, Mayor Daley is leading by example. City Hall sports a green roof that was the city's first. Over a hundred building projects, incorporating a million square feet (93,000 square meters) of green roof, are now underway. Officials are even experimenting with green roofs at O'Hare International Airport as a means to reduce noise.

At the Chicago Center for Green Technology, demos showcase green-roof technology to everyone from developers and builders to schoolchildren. The center also serves as a research center, where leading suppliers are invited to install different green-roof plots that are monitored and compared.

And the city government is providing at least a nudge to those involved in new building ventures. Projects that receive tax-increment financing support from the city are required to include some level of green roof.

"I hate to say that we're mandating, but we're really talking to big box [stores], architects, contractors, developers, and others about how important [green roofs] are to the environment and to business," Daley said.

The mayor believes that the city's cleaner, greener roofs are an important part of long-term environmental planning close to home.

"The environmental movement often seems like it's happening somewhere else and people forget about our own community," he said. "We need to be sure that we're planning well."

Precursors to the modern green roof, such as sod roofs, have been used in many cultures for centuries. The contemporary green roof, which supports a natural ecosystem with advanced materials and technology, has been developed in Europe—primarily in Germany—over the last 35 years. As a response to serious regional ecological challenges, European government incentives have encouraged careful research and a flourishing green roof industry.

Water & Stormwater Study

This initiative provides an opportunity to study the effect of rain gardens on water quality and quantity. This data could be used to support and promote demonstration projects for the Overflow Control Program (OCP) and KC-One Stormwater Management.

Monitoring

1. Physical water quantity and quality monitoring

It will be beneficial for the City to collect data periodically to assess the effectiveness of the 10,000 Rain Garden program in its ability to have positive effects on runoff rates, volumes, and quality.

a. Water Quantity

The City is currently installing flow meters in Brookside, an ultra-urban neighborhood with runoff flows contributing to Combined Sewer Overflow (CSO) problems in the Brush Creek Watershed. Brookside could be used as a case study to support further implementation. Baseline data will be needed to validate the effectiveness of Rain Gardens in Kansas City and the flow meters at Brookside will soon provide that data. It will be cost-prohibitive to monitor the effectiveness of 10,000 installations. Gauging existing problems in Brookside and quantifying the usefulness of a neighborhood-wide Rain Garden initiative will be beneficial to the entire city, as well as other communities facing similar infrastructure shortages.

The United States Geological Survey (USGS) conducts water monitoring studies throughout the US and have been a research partner with AES previously. The possibility of using Brookside as a case study should be discussed with USGS and an experiment plan formulated.

b. Water Quality

Aside from complaints concerning flooding in metropolitan Kansas City, citizens have expressed great interest in conserving water quality and wildlife habitat. Rain Gardens will play a significant role in the reduction of Total Suspended Solids (TSS), oil and grease, fertilizers, herbicides, insecticides, and other pollutants.

USGS has a history of partnering on similar projects and should be approached to monitor runoff flow rates and volumes, as well as water quality. Brookside is a great place to conduct these experiments as well.

c. Research partner in Kansas

Johnson County, Kansas is currently conducting a water quality monitoring program at a county owned facility in Olathe, Kansas. Researchers from Kansas State University are partners on the initiative and should be approached as possible partners to this initiative.

2. Reliability of installed Rain Gardens for water quality and stormwater infrastructure:

The effectiveness of Rain Gardens could be a problem concerning their reliability because they are proposed to be constructed on privately held lands. This presents a question of maintenance and reliability. There seem to be three viable models of Rain Garden implementation and maintenance that should be further investigated for their inclusion in this program.

a. Encourage private participation, but only account for Rain Gardens installed in City managed Rights-of-Way, drainage easements, and other City owned or managed lands.

In this case, private landowners are educated and encouraged to install Rain Gardens, but their effectiveness in relation to stormwater infrastructure is disregarded. The City installs, monitors, and maintains Rain Gardens on publicly held or managed lands. Other municipalities have taken this approach successfully. Challenges will relate to available lands and spatial constraints within suitable areas. Considerations might be for the City to explore expanding rights-of-way

Water & Stormwater Study, cont.

on streets and alleys and to aggressively purchase drainage easements in problem areas throughout the city.

b. Tax incentive to private landowners

Land owners in Kansas City pay a stormwater utility fee as part of their water bill each month. This fee is subject to increase as the expense of improving stormwater infrastructure throughout the City is analyzed. Stormwater fees are accessed per unit of imperviousness, equating fees to runoff contributing to the overall system.

Landowners could be granted a reprieve from the stormwater utility fee based on runoff being mitigated through the inclusion of properly situated, sufficiently sized, effectively functioning Rain Gardens or otherwise effective detention or retention of stormwater. This creates an opportunity for home and business owners to reduce or eliminate their contribution to the City's infrastructure, thereby reducing the need for improvements.

This approach has been taken in St. Francis, Wisconsin. There, landowners sign maintenance agreements and deed restriction. Building inspectors check the deed restriction when approving construction plans and subsequently in response to complaints. The landowner is required to hire a Landscape Architect to design the Rain Garden and the subdivision's Architectural Control Committee approves the plan. (Morzaria-Luna et al., 2004).

To ensure continual compliance, drive-by inspections could be conducted on an annual basis and fines for non-compliance could be collected.

c. City encourages participation but only accounts for a certain percentage of effectiveness:

A "level of confidence" method could be employed to account for wide-spread implementation with little or no maintenance or inspection obligation for the City. For example, the City could plan for and encourage installation of Rain Gardens on privately held lands. Infrastructure planners can safely assume that a certain number of these will not function properly or will be removed in subsequent years. This reality is the shortfall of public facilities on private property. The number of remaining, functioning facilities could be presupposed to be as low as 25% of the original Rain Gardens. This then becomes a conservative basis for calculating reductions in infrastructure loading and subsequent sizing. Once a better understanding of functionality and local acceptance is realized, that effectiveness number can be adjusted appropriately.

Work Cited:

Morzaria-Luna, H.N., K.S. Schaepe, L.B. Cutforth, and R.L. Veltman, 2004. Implementation of Bioretention Systems: A Wisconsin case study. Journal of the American Water Resources Association, August 2004. pp.1053-1061.

Holistic Stormwater Management

The historical goal of conventional stormwater engineering has been "efficient conveyance," seeking to quickly export water as a waste product instead of embracing it as a high value natural resource. Conventional strategies do the opposite of what nature has done to manage stormwater. Instead of concentrating flows, nature disperses rainfall, managing precipitation where it falls and throughout the hydrologic cycle. Nature also manages stormwater by reducing water volumes and release rates while simultaneously cleaning water through natural filtration processes.

Alternative Stormwater Management implements practices that are effective at all scales, from entire watersheds to individual backyards. They are widely applicable in both urban and rural environments. These treatments can be designed into new developments or retrofit into existing community open spaces, parks, road rights-of-way, side and rear lots of homes and commercial buildings, rooftops of structurally competent buildings, below paved surfaces, and in many other settings.

By using a series of natural practices to manage stormwater, starting as high in the hydrologic cycle as possible, stormwater treatment can be dispersed throughout the watershed, re-establishing natural hydrologic processes. As an example, a Stormwater Treatment Train© (STT) consists of an interconnected series of natural Best Management Practices (BMPs) that are sized, engineered, and ecologically designed for low maintenance, addressing site-specific stormwater runoff rates, and achieving water quality improvements.

The STT is a landscape design that slowly moves water through natural features maximizing infiltration, evapotranspiration, and filtering of stormwater. Flows are not piped or concentrated, but are dispersed and diffused. STT elements can include a suite of several stormwater BMPs. By allowing runoff to slowly move through vegetated swales and vegetative plantings rather than pipes, the natural processes of soil infiltration, vegetative uptake, evaporation, and stepped storage in gardens, landscapes, wetlands, and ponds can all be maximized and planned to be aesthetically pleasing.

Watershed Planning and Management

Breaking down land uses by political boundaries is familiar to planners of all kinds. Thinking of stormwater management as a function of entire watersheds can provide more effective, successful control of rainfall runoff. Ecological and hydrologic analysis at the watershed scale adds scientific underpinnings, as well as creative solutions, to projects that aspire to not only reduce flooding, but to protect or improve water resources. By mapping natural ecosystems using watershed boundaries rather than political boundaries, governing bodies can develop integrated plans that are more valuable than the sum of their parts.

Native Plants

University of Kansas: Monarch Watch

Monarch Watch is an educational outreach program based at the University of Kansas that involves more than 2,000 schools, nature centers, and other organizations in the United States and Canada.

Monarchs need resource patches—lots of them . Monarch Watch is dedicated to creating garden "waystations" to help monarchs survive their migration.

Without a major effort to restore milkweeds to as many locations as possible, the monarch population is certain to decline to extremely low levels.

Surprisingly, native plants are hard to find at garden centers, even though many species are garden-worthy plants. They do not require fertilizer, reducing polluting run-off, and their long root systems help water to infiltrate into the soil instead of overflowing into rivers and storm drains. These plants also support native wildlife and biodiversity. The lack of local-source native plants, such as milkweed, has serious consequences for monarch butterflies that depend on these plants for nourishment during their life cycle.

Urban sprawl, reduced open land and agricultural land, the use of herbicides on roads and highways, and Genetically Modified Crops reduce native plants and habitats.

10,000 Rain Gardens proposes to benefit water quality, our community, and biodiversity simultaneously. Many gardeners wish to attract butterflies and birds into their gardens. We will incorporate such plants into our rain garden designs. Gardeners may also wish to register with Monarch Watch and participate in tagging and educational activities.

By using local-source native plants from Critical Site Products, we will be supporting a Missouri company. The native seed used for propagation by Critical Site Products comes from local collectors in Missouri and Kansas.

Family farmers are beginning to see native plants as a viable crop that will enable them to compete and thrive in today's agricultural market. Native plants can also assist farmers in reducing erosion and improving inflow and infiltration.

Native plant grower

Critical Site Products

Belton, MO
Judy Allmon: 1-816-752-1328

Critical Site Products (CSP) has been in business for more than 10 years and is the largest grower of containerized natives plants in the Midwest. CSP produces and sells around 2 million native plants each year. 10,000 Rain Gardens proposes a public/private partnership with Critical Site Products to be the main supplier of native plants for distribution to the public and to retail outlets.

Critical Site will put together rain garden kits:

- 6 Green: grasses, rushes, or sedges
- 6 High color
- 6 Butterfly-attracting nectar plants
- Instruction manual or DVD
- List of other supplies
- Registration card (postage-paid)
- 10,000 Rain Gardens sign

A 2" x 2" x 5" deep cell, air-pruned root plant becomes full size in 40 days.

Ideally, rain garden kits will be sold where wood and gravel mulch are sold; gravel mulch will be more stable in heavy rains.

A portion of the kit proceeds will go back to the city/county for public rain garden plants.

Retail distribution

Farmers' markets
Nurseries
Parks during key events
Garden centers
Churches, synagogues, etc.
Festivals
Whole Foods
Wild Oats
Garden tours

Missouri & Kansas Natives

		Clay	Well-drained	Sunny	Shady
Aquilegia canadensis	Columbine		x	x	x
Asclepias incarnata	Swamp milkweed	x		x	
Aster novae-angliae	New England aster	x	x	x	
Campanula americana	Bellflower	x	x	x	
Carex molesta	Field oval sedge (Troublesome sedge)		x	x	x
Carex vulpinoidea	Fox sedge	x			
Cinna arundinacea	Wood reed grass		x	x	
Cinna arundinacea	Stout woodreed	x	x	x	
Corylus americana	American filbert		x	x	x
Dentaria laciniata	Toothwort		x	x	
Elymus canadensis	Canada wild rye	x	x	x	
Elymus virginicus	Virginia wild rye	x	x	x	
Erythronium albidum	White trout lily		x	x	
Eupatorium purpureum	Sweet joe pye weed		x	x	
Glyceria striata	Manna grass	x	x	x	
Helenium autumnale	Sneezeweed		x		
Hypericum punctatum	Dotted St. John's Wort		x		x
Juncus interior	Inland rush	x	x	x	
Juncus Torreyi	Torrey's rush	x	x		
Leersia oryzoides	Rice cut grass	x		x	

Swamp milkweed

White trout lily

Sneezeweed

		Clay	Well-drained	Sunny	Shady
Liatris pycnostachya	Prairie blazing star		x		
Lobelia siphilitica	Great blue lobelia	x	x	x	x
Lycopus americanus	Common water horehound	x		x	x
Mentha arvensis	Wild Mint	x	x	x	
Monarda fistulosa	Wild bergamot		x	x	
Pedicularis canadensis	Wood betony	x	x		x
Penthorum sedoides	Ditch stonecrop	x	x	x	
Polygonatum biflorum	Solomon seal		x	x	x
Pycnanthemum tenuifolium	Slender mountain mint		x		x
Rudbeckia laciniata	Wild goldenglow		x		x
Sagittaria latifolia	Arrowhead (Duck potato)	x			
Salix interior	Sandbar willow	x		x	
Scirpus atrovirens	Common bulrush			x	
Scirpus validus	Great bulrush	x		x	
Silphium perfoliatum	Cup plant		x		x
Solidago gigantea	Giant goldenrod			x	
Symphoricarpos orbiculatus	Indian current coralberry		x		x
Teucrium canadense	Canada germander	x			x
Verbena hastata	Blue vervain	x		x	
Veronicastrum virginiana	Culver's root		x	x	

Wild beramot

Cup plant

Arrowhead (Duck potato)

Registration

Seal of Approval

Anyone can have a rain garden. "Official" gardens for this initiative must be registered to receive our seal of approval.

This registration helps us to study and track rain gardens and their effects, as well as provide information and support to rain gardeners.

This support will mitigate the risk of rain garden "abandonment" due to lack of understanding of native plant care.

Registration of rain gardens will assist initiative staff and the City in studying their effects on water quality. Knowing where gardens are allows us to provide ongoing support and communication.

Registration involves mailing in a form, filling out a form at a 10,000 Rain Gardens booth at a farmers market or event, or signing up on the 10,000 Rain Gardens Website. Registered rain gardeners will receive:

- A 10,000 Rain Gardens sign
- A coupon for a nursery, garden supply store, landscaping company, etc.
- A coupon for entry into garden tours and events
- Entry into current giveaways and sweepstakes for the initiative
- Newsletter (sent by e-mail with an opt-out link)
- A count in the Rain Gardens map, so that each watershed can "compete" to see which one has the most registered rain gardens.

Registration is voluntary. Anyone may sign up the for newsletter online, receive brochures, advice from Master Gardeners, etc. The list of registered rain gardeners may be used for City, county, or state notifications, but will not be sold to any corporation or not-for-profit for solicitation.

The list of registered gardens will be compared to the sales of rain garden kits. This information will give us an approximation of how many kits are sold and what percentage of those gardeners choose to register.

Volunteers

Volunteers are the lifeblood of any large public initiative. 10,000 Rain Gardens will have levels of volunteer service, recognition, and rewards. The following text is a conceptual description of how the 10,000 Rain Gardens volunteer progam could be implemented.

Fireflies

Elementary school children may take part in a special initiative just for kids. Each child is nominated by a teacher. After attending a rain garden workshop, child volunteers are designated as official Rain Garden Firefly. They receive a 10,000 Rain Gardens T-shirt or ball cap and four free passes to Science City. Fireflies are expected to give a short rain garden presentation to their class, raise money for a rain garden at their school, and/or read three books on gardens, water, or wildlife.

Monarchs

Middle-school children, nominated by their teachers, will attend an advanced watershed course and a presentation on monarch tagging and way stations. They will receive a T-shirt or ball cap and four free passes to the Kansas City Zoo. Monarchs are expected to raise funds for a rain garden at their school, give a presentation to their science class, read three books on watersheds, rivers, wildlife, insects, weather systems, etc. They will also be asked to help Stewards and Ambassadors at events.

Stewards

Every adult and youth volunteer who signs up for and attends orientation and training is a 10,000 Rain Gardens Steward. Stewards agree to help with native plant distribution, process mail-in registrations, place rain garden brochures in their neighborhood, and assist in events. Volunteers who are active for six months (including summer months) may elect to receive advanced rain garden training to become a Rain Garden Ambassador.

Volunteers receive a 10,000 Rain Gardens T-shirt or ball cap and a free rain garden kit (18-20 plants).

Ambassadors

Rain Garden Ambassadors receive more advanced training about rain gardens, native plant care, water quality, and watershed health. Ambassadors are qualified to represent 10,000 Rain Gardens at public events and give presentations to the public. Ambassadors must commit to attending a majority 10,000 Rain Garden events and to staffing booths at farmers' markets for eight Saturdays per year.

Approved Rain Garden Ambassadors will receive:

- A 10,000 Rain Gardens button
- Four free passes to garden tours and events
- 10% discount on all purchases from a participating nursery
- Invitations to special workshops or presentations provided by Master Gardeners, Discovery Center, Monarch Watch, etc.
- A special "thank-you" event at the end of the initiative

Volunteer training will be developed in partnership with Judy Allmon of Critical Site Products.

Volunteers, cont.

Beauty by design

Landscape architects design the built environment of neighborhoods, towns and cities while also protecting and managing the natural environment. Members of the profession have a special commitment to improving the quality of life through the best design of places for people and other living things.

Members of the profession are involved in the planning of such sites as office plazas, public squares, and thoroughfares. The attractiveness of parks, highways, housing developments, urban plazas, zoos and campuses reflects the skill of landscape architects in planning and designing the construction of useful and pleasing projects.

from the Prairie Gateway Chapter of the American Society for Landscape Architects: http://www.pgasla.org/information.htm

Landscape architects will play a specialized volunteer role. 10,000 Rain Gardens will request that local landscape architects donate at least 2-4 hours of rain garden design consultation per month. Ideally, neighborhood assocations will promote their services and sign up interested property owners. The landscape architect would visit that area and assist several individuals at one time.

10,000 Rain Gardens will produce hand-outs and training materials for landscape architects if they do not have information on native plant design. Although the rain garden kits will take much of the guesswork out of garden design, the services of a professional are reassuring, especially for large gardens or community gardens.

According to an article about the Burnsville, Minnesota, neighborhood rain garden initiative, Leslie Yetka, a water resources specialist, offered some advice on building a successful rain garden initiative:

> Leslie is often asked how the city obtained such a high level of participation for the study. She says one of the keys was having both an engineer to design the gardens and a landscape architect who met with individual homeowners and worked closely with them to come up with planting designs that fit not only their properties, but also their levels of commitment for long-term maintenance. "As soon as most of the homeowners met Fred," says Leslie, "and found out they essentially had a landscape architect at their disposal, they were like kids in a candy store!"
>
> (http://www.landandwater.com/features/vol48no5/vol48no5_2.html)

According to this same source (above), citizens were primarily interested in attractive designs; their interest in stormwater and water quality was secondary, although it may have heightened with additional watershed education. The participation of landscape architects may happen before, during, or after planting, and will mitigate the risk of garden abandonment. Their volunteer efforts will also increase the visibility of their profession and the

vital role they play in community quality of life.

Bio-engineers and environmental scientists will be included in the outreach efforts to landscape arcihtects because they are often consultants on signifcant landscape projects.

Urbanites continue to treck to orchards to pick their own produce, lose themselves in corn mazes, select the fattest pumpkin, or cut down a Christmas tree. These activities help farmers to diversify, thrive, and maintain their way of life. Wildflowers and native plants can be made into bouquets and wreaths, tea, foodstuffs, and a variety of products. They do well in dry seasons, when other crops may be suffering.

10,000 Rain Gardens hopes to encourge agricultural departments, conservation departments, and the nursery industry to create a firm definition of native plants and to support the future development of the native plant market. We anticipate that demand for such plants will increase, especially for local source plants. This demand should translate into dollars for Kansas and Missouri farmers.

Wildflowers: the next agri-tourist attraction?

Joel Salatin, innovator in small-scale agriculture and proprietor of Polyface Farm in Virginia, has published a handbook for beginning farmers. In it he offers a perspective on an important dimension of the future of American farming—education and entertainment. At least one state—Vermont—has redirected the bulk of its support for agriculture into rural tourism. Salatin and other agricultural writers believe that this is what the public wants and will pay for.

While the popularity of specific enterprises—such as pumpkin patches or U-Pick orchards—may ebb and flow, the public's desire for a "farm experience" remains. Small diversified farms are ideally suited to agri-entertainment. Unlike the mega-hog facility or a corn/soybean operation producing bulk commodities, the small farm can recreate an earlier, simpler, human-scale vision of farming. The chief qualification for the rural landowner who expects to make a living from the land through agri-tourism is the desire and the ability to cater to tourists and meet their expectations of a farm visit.

Tourism is an important industry in many states. For example, it is the second largest industry in New York and the largest in Arkansas. Most writers agree on three main components of rural tourism: small businesses, agricultural events, and regional promotion. Some state agri-tourism promoters lump direct-marketing methods such as CSAs, as well as farm sales of such specialty crops as flowers, garlic, and Asian pears, within the general category of agri-tourism. State-led agri-tourism initiatives work to expand existing businesses, create new festivals and farm markets, and tie this all together regionally to attract visitors.

There are three agri-tourism basics: Have something for visitors to see, something for them to do, and something for them to buy. How well you relate the various components (through a theme or otherwise) will determine how successful your entertainment enterprise will be. Things to see and do are often offered free, but there is still a lot of money to be made selling to visitors. Research shows that tourists buy mainly food, beverages, and souvenirs.

National Sustainable Agriculture Information Service: http://attra.ncat.org/attra-pub/entertainment.html#intro

Inherit the Earth

Stewardship and service

In the Talmud, water is often used as a symbol for Torah. "Ho, everyone that thirsteth come ye for water (Isaiah 60:1)." -Baba Kama 82a

Koran
"By means of water, we give life to everything." Koran 21:30

Bible
"For when they maintain this, it escapes their notice that by the word of God the heavens existed long ago and the earth was formed out of water and by water, through which the world at that time was destroyed, being flooded with water." 2 Peter 3:5-6

In the puja ceremony, Hindus offer flowers and water to the deity. Water and flowers are offered to God along with recitation of God's names.

Inherit the Earth is an initiative within 10,000 Rain Gardens designed to target religious groups for the purpose of teaching and promoting environmental stewardship. No religious group will be directly funded by this initiative, but if the group commits to participating in 10,000 Rain Gardens activities, then native plants will provided at a discount.

Inherit the Earth will have a compatible, separate logo and brand from 10,000 Rain Gardens. The Website will post messages from groups that are looking for Inherit the Earth partners or who wish to report on their success.

Church groups, interfaith agencies, synagogues, mosques, and temples have long been a foundation of service, charity, and community. 10,000 Rain Gardens will support this mission while attaining its primary goals.

Each church or religious group must partner with a non-profit organization or City department, such as Parks and Recreation. Groups may participate in one or more of the following:

- The religious group will install and maintain a rain garden on church property.
- The religious group will commit to installing and maintaining a rain garden on their property and to assist in installing and maintaining a rain garden at the location of the non-initiative organization. The intent is to, for example, encourage church youth to help elderly to have a rain garden or for members to plant a rain garden with children at a homeless shelter.
- The religious group will commit to "adopting" a rain garden at a public park, library, or other community site. They will install and maintain the garden as an ongoing stewardship program.
- The religious group will participate in river cleanup activities as a part of a river festival or organized cleanup effort.

"Everybody needs beauty as well as bread, places to plan in and pray in, where Nature may heal and cheer and give strength to body and soul alike."
- John Muir

Schools & Libraries

Children often bring what they learn at school home to their parents and communities. Young children have a fascination with nature, especially gardening and insects, so 10,000 Rain Gardens is a natural fit for schools.

We propose a partnership with the Blue River Watershed Association, Learning Exchange, Discovery Center, and nature centers to provide curricular tools for teachers and hands-on learning activities for students in primary schools, middle schools, and high schools.

Primary grades

Lesson plans and activities should be cross-curricular, touching more than one subject. Activities off school grounds should tie in directly with the curriculum and allow children to apply what they've learned. Children in 3rd or 4th grade would probably be the ideal age for this teaching.

Middle schools

This age may be the toughest to interest in gardening, but they may be interested in rain gardens as butterfly gardens and the role that flowers play in insect life cycles. Curricular tools for seventh-graders will be more challenging and put the rain garden in a larger ecological context. Special emphasis will be given to monarchs and other insects that depend on the propagation of certain plants.

High schools

Some high schools in the metro area have active science clubs and property set aside for nature experiments. Most high schools would have enough property to plant and maintain a rain garden and use it as a part of their regular science curriculum. We would like to offer advanced watershed lesson plans for science teachers.

Universities

Science, engineering, and ethics professors—and their students—will be invited to submit ideas for river and watershed projects, larger studies that could involve several universities and colleges. The ideas submitted will be peer-reviewed and small grants provided. Students will be expected to present their results and provide a white paper on their activities for publication on the 10,000 Rain Gardens Website.

Libraries

Public librarians will be asked to display books relating to water, watersheds, insects, and gardening. Small grants will be given to the Kansas City and Johnson County public libraries to purchase additional books.

Marketing & Outreach

Citizens have spoken: stormwater is one of the top 5 most important issues facing Kansas City in the next two years, even though floods directly impact only a small percentage of people. It is a neighborhood issue, a quality of life issue, and one which will cost billions of dollars to address in the decade ahead.

The marketing strategy for 10,000 Rain Gardens in Kansas City begins with a large and long-term vision: To create a national model of citizen action by engaging thousands of homeowners, churches, businesses, schools, and neighboring jurisdictions in a pro-active approach to solving wet weather problems that cause flooding, sewer backups, and dangerous pollutants to flow into our streams and rivers during storm events.

Implemented by stormwater engineers in Maryland in 1990 to help mitigate the amount of pollutants entering streams and rivers via runoff, the rain garden concept has now been embraced as a unique landscaping feature to convert a low and soggy spot in a lawn into a colorful and hardy haven for butterflies and birds.

This wet weather solution capitalizes on one of America's favorite pastimes, gardening. By inspiring the creation of thousands of rain gardens throughout the Missouri River Watershed, Kansas City embraces a leadership role as stewards of the natural environment, while at the same time demonstrating to taxpayers a conservative approach to the expenditure of future infrastructure improvement dollars.

Rain Gardens are a cost-effective method of dealing with runoff before it becomes a burden on municipal water treatment systems. By reducing the number of "grey" solutions to the problem—such as building large underground tunnels to carry high volumes of contaminated water to a treatment plan—the "green" solution of 10,000 Rain Gardens engages citizens in a pro-active approach that looks good now and saves money later.

Kansas City is one of the nation's largest cities in terms of land mass, encompassing nearly 300 square miles in the heart of the Midwest. The call for 10,000 Rain Gardens is just as expansive, and is not limited by the state line or other political boundaries.

Mayor Kay Barnes, City Manager Wayne Cauthen, and City Council members will lead the way for the entire watershed, the state, and the nation. While other cities such as Seattle and Chicago are addressing stormwater issues with "green" solutions, the scope and breadth of 10,000 Rain Gardens

in Kansas City goes far beyond any in the nation.

Partnerships are key

A key strategy for the successful implementation of 10,000 Rain Gardens is to build partnerships with an array of interest groups, expanding awareness over time and engaging the maximum number of businesses, churches, schools, and property owners.

Development of a Rain Garden Kit will be underwritten by a private partner in the Kansas City, Missouri, area.

Media partners will provide airtime for PSAs, coverage of newsworthy events, and weekly progress reports, especially during wet weather. Time/Warner digital cable will be asked to provide an on-demand video for installing a rain garden.

Educational partners include primary and secondary schools, area colleges and universities, gardening clubs, extension centers, PTA, FFA, 4-H, Scouts, neighborhood associations and community centers. A fundraising opportunity for many of these groups will be provided by our private partner through discounted Rain Garden Kits that can be sold in place of candy bars, cookie dough, or trash bags.

Corporate partners include the area's engineering, architectural and landscaping firms, as well as other high profile companies and foundations who are good corporate citizens. Sprint has already taken a leadership role in this area at their new campus, and other partners will be recruited.

Clean Streams

According to the EPA, 70% of pollution in our streams and lakes comes from stormwater. When it rains (or melting snow in winter), water courses down gutters, along roads and driveways and across yards before ending in storm drains or culverts and eventually streams. Along the way it gathers fertilizers, pesticides, oil residue and many chemicals from businesses and our own households. The first step in creating a rain garden should be evaluating your property after a rain. Make note of depressions where water pools or where fast-moving rivulets carry water down driveways or sidewalks. By filling these areas with layers of sand, compost and soil, then adding native plants, you've created an absorbent garden of flowers or shrubs. They will not only look pretty and provide a butterfly and wildlife haven, but also filter and absorb 30% more stormwater than the same size patch of lawn. Those flowers that result from our rain showers can also be helping to keep our streams and lakes free of stormwater pollution while recharging our groundwater. This year make a pledge to garden not just in the earth but for the earth.

-- Resources: Yard & Garden News, University of Minnesota Extension Service; Gardening with Water Quality in Mind by Amy Middleton and Sarah Clark

Marketing & Outreach, cont.

Government partners include EPA, Missouri Dept. of Conservation, Missouri Dept. of Natural Resources, Missouri Dept. of Agriculture through the "Grow Native" program.

Elected officials identified as advocates currently include U.S. Senator Kit Bond, Congressman Emanuel Cleaver, Jackson County Executive Katherine Shields, and a number of mayors and leaders in Johnson County.

Challenge and Reward

To make building 10,000 Rain Gardens fun and rewarding, and to track success towards our goal, a number of competitions will be created. Results will be tracked on the website and by our media partners.

At the neighborhood level, full participation challenges between blocks, and even between neighborhood associations, are encouraged. Council members may challenge each other within their district boundaries, and also between the six districts. Mayors may issue challenges to their peers in upstream or downstream municipalities.

Meteorologists, weekly and daily newspapers will be asked to publicize results of various challenges.

Year One – Plant the Seed

The first year is one of education and encouragement as we introduce the concept of rain gardens to the marketplace, planting the seed for exponential growth in future years.

Early Adopters, those who had to be the first on their block with a Blackberry, will be identified and recruited as Rain Garden Ambassadors. These will include people with high profiles in the community who are early supporters (Mayor Barnes, City Manager Cauthen, Councilmembers, Anita Gorman, Ollie Gates, Lamar Hunt).

Partners will be recruited to develop demonstration gardens on corporate and public grounds, so that citizens can see what they look like and where they are located on a site.

Year Two – Watch it Grow

The second year is critical in building momentum. Ongoing support through weekly reports by meteorologists and other media partners is necessary to generate more activity and participation by citizens. The website and Water Logged, the online blog, will be used to update citizens about progress, share new ideas and resources, and encourage an interactive process.

Year Three– Everyone in—help us reach the goal!

The first fully established rain gardens produce scientific evidence of the reduction in runoff in those areas in two Brookside neighborhoods which are measured by flow meters. Results offer a fresh opportunity for media coverage on a regional and national basis. More challenges between neighborhood associations, government entities, media outlets, corporate citizens and non-profit associations are announced. Successful demonstration projects incorporated by CIMO are unveiled throughout the year.

Year Four– Show me the money

As a result of the regional participation in an ambitious Missouri River Watershed initiative, now recognized as the most comprehensive program in the nation, citizens feel a sense of pride, and are more aware of their role in reducing overflows, flooding impacts, and pollution in waterways.

Major grants won from EPA and other sources further demonstrate Kansas City's positive and proactive impact on its environment.

Now the Wet Weather Solutions program can present to the citizens a long-term strategy to address infrastructure improvements and expansion plans benefiting Kansas City for the next two decades. A process of authentic citizen involvement results in the successful funding of projects identified by the Overflow Control Program (OCP), Stormwater Management, and Waterways.

Outreach efforts

Only an informed public can have a positive impact on watershed health and stormwater management. The following activities are designed to reach the public in various and repeated ways.

Meteorologists

Meteorologists are the face of weather and community concerns. We anticipate that area meteorologists will agree to publicize and participate in 10,000 Rain Gardens events and activities.

Farmers' markets

In May and June of all initiative years, 10,000 Rain Gardens will have an informational booth staffed by volunteers at local farmers' markets. The booths will have information on rain gardens and other stormwater management methods, brochures for monarch way stations, rain garden merchandise, a miniature rain barrel for donations, artistic rain barrels, and other materials. Native plants will be for sale.

Scout Badges

Boy Scout and Girl Scout troops will be encouraged to include rain garden activities in their environmental badges.

Marketing & Outreach, cont.

Blue River Watershed Association

The BRWA uses a watershed approach to address improvement in water quality of the Blue River.

T.R.U.E. Blue Initiative: The compilation, implementation, and delivery of stream monitoring curricula aligned with Kansas and Missouri state standards.

Watershed Restoration: streambank stabilization and riparian corridor management.

Community Education: the expansion of volunteer water monitoring opportunities and water quality monitoring training in the watershed.

Partnership Building: facilitating and participation in regional planning among stakeholders in the watershed.

Nature Centers

The Discovery Center, Lakeside Nature Center, Critical Site Products' Prairie Wetland Center, and similar sites offer excellent opportunities for hands-on, outdoor education. This initiative hopes to partner with these organizations to offer rain garden and watershed activities.

Workshops, Presentations, and Hotlines

Master Gardener Workshops

10,000 Rain Garden consultants and partners will develop presentations to area Master Gardeners. These presentations will be at a higher level of complexity in terms of information about plants and gardening methods. The expectation is that Master Gardeners will serve as ambassadors for rain gardens when they assist gardening groups, shows, and answer the Master Gardener Hotline.

Master Gardener Hotline

(816) 833-TREE, (816-833-8733)

The Master Gardeners of Greater Kansas City answer specific home gardening questions on their telephone hotline number 816-833-8733. The hotline is open from 9 a.m. to 3 p.m., Monday thru Friday, March thru October. The hotline is answered from the Blue Springs Extension office (1501 NW Jefferson) Monday, Wednesday, and Friday; and from the Northland office (NE 48th and Vivion Road - Clay County Courthouse annex) on Tuesday and Thursdays. Although this is mainly a telephone service, the Master Gardeners will also identify plant problems from samples brought to the office. The public may bring in unusual plant problems and soil samples, which will be sent to the University of Missouri for analysis at a small fee. Master Gardeners, who have a wealth of personal gardening knowledge and have attended a 50-hour course taught by the University of Missouri Extension Horticulture department, answer the hotline.

Presentations at Gardening Groups and Clubs

10,000 Rain Gardens and partners will give bioretention talks to gardening clubs, such as the active Water Garden Club of Greater Kansas City.

Communiversity

Volunteers will teach courses on growing a rain garden, designing with native plants, constructing a rain barrel, etc.

Contests

Rain Gardens Watershed Contest
10,000 Rain Gardens will publicize a competition between watersheds that will compete for the recognition of having the most rain gardens. The watershed with the most registered rain gardens on March 31st will receive at least $1,000 for donation to river, stream, or lake cleanup efforts.

Promotion: mid-April

Promotion: May 1st

Festivals and events

Envirothon
9th-12th graders in hands-on learning about soils, conservation, forestry, and wildlife. http://www.kcswcd.mo.nacdnet.org/page11.html

River Clean-ups organized by Missouri River Relief. Dates vary.

Master Gardeners of Missouri Conference. http://outreach.missouri.edu/gkcmg/events.html

Week of Water. The Week of Water (WOW) is a week of activities that celebrate clean water efforts throughout the KC metro area. "A Week of Water" will be held in celebration of the Clean Water Act on October 7, 2005 at Kaw Point, Kansas - the confluence of the Kaw & Missouri Rivers.

Earth Day Earth Fest and Soil and Stewardship Week. http://www.kcswcd.mo.nacdnet.org/page6.html

KC Riverfest. http://kcriverfest.com/

Conferences

MEEA Conference, Environmental Education. Nov. 4-6, 2005, University of Missouri-Columbia

Local websites

www.savvygardener.com

Communication

This initiative will communicate to stakeholder through meetings, workshops, arts activities, booths at farmers' markets and festivals, media, brochures, how-to DVD, and the Website. We anticipate communications efforts to increase as the goal for the number of rain gardens increases. This level of communication is needed because 1) few people know what rain gardens are or their benefits, 2) installing and tending a garden takes some training, 3) the number of rain gardens is ambitious and will require significant public involvement, 4) the ultimate goal, securing funding for large water quality projects, necessitates a well-informed community of voters.

The 10,000 Rain Gardens Website will be a primary source of information. The sections described in the box below are the categories of information needed on the site. Others may be identified later in the initiative. The Rain Gardens section will be devoted to information. Tools are interactive. "Water Solutions Simulation,""Design a Garden," and "Identify a Butterfly," are all Flash tools. The simulation, for example, permits the user to control the slope of a backyard, rainfall, and pollutants, then see what the addition of rain gardens, rain barrels, and other methods have on runoff.

Website Sections: English & Spanish

Rain gardens
- Designs
  - ~Native Color
  - ~Songbird Station
  - ~Butterfly Habitat
  - ~Hummingbird Haven
- Installation
- What to expect
- Other solutions
  - ~Rain barrels
  - ~French drains
- Register
- RG Map
- Garden Kits

Learn More
- Waterlogged (blog)
- Newsletter
- Bulletin board
- DVD
- Brochures
  - ~ Build a rain garden
  - ~ Build a rain barrel
  - ~ Native plants

Tools & Games
- Solutions simulation
- Design a garden
- Identify a butterfly

Education
- Lesson plans
- 4-H
- FFA
- Schools
- Activities
- Libraries

RG Ambassadors
- Responsibilities
- Training & Selection
- Benefits
- Sign up for orientation

Developers
- Best practices
- Amenities

Inherit the Earth

Farmers

Businesses
- Landscaping
- Nurseries

Art
- Artistic rain barrels
- Contest
- Avenue of the Arts

Donations & Sweepstakes

Shop

About the initiative
- Demo projects
- Public rain gardens
- Press releases
- Participating cities
- Consultants
- Partners

Links

Good signage and brand identity will be crucial to the success of this initiative. Gardening with natives is unfamiliar to many people. Some plants may look "weedy" until they flower. Signs with the rain garden logo will let people know what rain gardens are and what to expect. Smaller signs can be placed near the rain garden to designate it as a part of 10,000 Rain Gardens, while larger ones will be appropriate for demonstration gardens, park gardens, and similar projects.

10,000 Rain GardenS

Brochures and How-to DVD
Rain garden brochures should be widely distributed and available at partner sites, such as nurseries and commerce associations. Visitors to the Website could download a PDF file of the brochure. How-to DVDs will be given away and the video will be on the Website. Brochures on related topics, such as caring for native plants, will also be designed and distributed.

Waterlogged
Waterlogged will be a water-quality Weblog on the 10,000 Rain Gardens Website. Articles will be updated weekly on water and watershed issues, gardening tips, etc.

Newsletter – quarterly
A quarterly newsletter will be e-mailed to registered rain gardeners (optional), partners, and newsletter subscribers. The newsletter will focus on practical green solutions to improving water quality and watershed health.

Products
To raise funds to help offset the costs of green solutions for stormwater management or for educational activities, the 10,000 Rain Gardens Website will have branded products for sale. Suggestions include:

- Book bags
- T-shirts
- Garden signs
- Garden labels (for flowers and plants)
- Bumper stickers
- Eco-friendly toys and games.

Arts Programs

Spotlight on the arts

For this initiative to be successful, 10,000 Rain Gardens will engage the imagination and participation of more than just gardeners, environmentalists, and people who've experienced flooding. The arts is the best way to benefit other programs while keeping 10,000 rain gardens in the public mind.

Art activities will be tied to raising money for native plants.

In keeping with the City's commitment to the One Percent for the Arts Program, we would also like to commission a sculpture, mural, fountain, or other piece that will exemplify Kansas City's commitment to water and quality of life.

Arts programs are a key way to keep rain gardens in the public mind and to encourage wider public participation. Funds raised from arts activities will go back into 10,000 Rain Gardens to provide native plants.

Artistic Rain Barrels: Save the Rain

The Cow Parade in Kansas City, 2001, added color and entertainment to the outdoor city scene. Auctioned cow sculptures raised money for local charities. 10,000 Rain Gardens proposes a similar program for artistic rain barrels. For more details, see the Funding chapter of this document.

To see Kentucky's artistic rain barrels, follow the link: http://www.kentuckypride.com/weather-matters/barrels/barrels05.htm

Promotion: June

Parameters

A rain barrel is a rainwater harvesting system that is connected to a down spout tube from a house or building. Quality rain water barrels collect, store, and divert rooftop runoff during a rain shower. For the arts program, barrels:

- Must hold water 50-75 gallons and release it slowly
- Can't contain harmful chemicals or materials
- Should withstand the pressure of the water for long period of time
- Use a fine screen over the top of the standing water so the mosquitoes can't reach the water.

The Artistic Rain Barrel or Save the Rain component could target various groups, especially youth.

Youth

- At-risk youth of KC Metro
- YMCA
- Youth Gardeners of KC
- Harris Youth Foundation Park is an inner-city outdoors activities park in Kansas City that provides training and supervision. Each day, more than 100 youths take part in the park's various supervised outdoor league activities as well as its educational and job-skill-development clinics.

- YouthBuild USA, a national nonprofit organization that trains young people with construction skills, is launching a new program site in Kansas City. The local effort is a collaboration of about a dozen agencies in Wyandotte County. The primary partners are United Way of Wyandotte County as lead agency and fiscal agent, City Vision Ministries, KCK Housing Authority, Associated Youth Services, and Unified School District 500.
- Classroom competitions

Beyond youth

- Kansas City Art Institute
- Open call
- KC Artists Coalition
- Design competition to engineers, architects, etc.

Funding Sources

- National Endowment of the Arts
- Kansas Arts Commission
- Art councils
- Auction off rain barrels
- EPA grants
- Corporate and foundation underwriting

Partners

- MARC (in partneship with their current rain barrel project with local government)
- Art councils
- Discovery Center
- Science City
- Union Station
- Zoo

Forums

- First Fridays – public art event
- Avenue of the Arts
- Meteorologists
- Website

Resource

http://rainbarrelguide.com/

Poetry

The 10,000 Rain Gardens Website will solicit poetry submissions on environmental subjects. Published authors will receive $25.00 for their poem.

Develop and deliver a poetry contest for students (in age-based categories). Poems must pertain to water, watersheds, fountains, butterflies, prairies, storms, streams, rivers, or oceans. Winners will read at a Watershed Reading at the Writers Place.

Big Muddy Art

At a major river clean up, registered teams, such as neighborhood associations, will be invited to create an original sculpture from trash salvaged from the river. Only river salvage and a few materials, such as string and wire, will be permitted. The sculpture must be created within 1 hour. The art will remain for one week, then hauled away for disposal or recycling.

Fundraising

Grants

Grants from the EPA and other agencies would offset the costs of native plants for public gardens and for low-income property owners.

We will seek these grants during this initiative, although they are not a guaranteed or primary funding source.

Other resources:

- **State grants**
- **Local foundations, such as the Kauffman Center**
- **Corporate underwriting**

Fundraising activities are designed to offset the cost of native plants for rain gardens and to create promotions and "buzz" around the initiative. These activities also permit us to build partnerships with local and state businesses and groups.

Costs for this initiative, which supports Wet Weather Solutions' goals for public involvement and future voter-approved funding, will come from that City department. As other cities and departments take part, they should contribute to any staffing needs.

Rain Garden Kits

Critical Site Products, the provider of native plants for 10,000 Rain Gardens, has agreed that 10% of the proceeds for rain garden kits will be given back to the initiative. These proceeds will be used to donate native plants for public gardens.

Merchandise Sales

10,000 Rain Gardens will sell branded products through its website, such as book bags, signs, T-shirts, and hats. Proceeds will go to offset the costs of native plant purchases and labor for public gardens.

Win a Garden Makeover Sweepstakes

The 10,000 Rain Gardens Website will have a form for donations to the initiative. Donations pay to offset the cost of native plants for private rain gardens and rain gardens for schools and not-for-profit organizations. Every donation receives an automatic entry for the Win a Garden Makeover Sweepstakes. A winner is randomly selected at the end of each year, December 31st. The winner will be announced at Barney Allis Plaza during the same week as the Flower, Lawn, and Garden Show at Bartle Hall. The winner receives one free, installed rain garden that includes:

- One free gardening workshop with a master gardener on cultivation and care (to last an least an hour and a half)
- A free soil analysis
- Native plants from Critical Site Products, Inc.
- Soil and compost donated by local nurseries
- Stone or landscape materials donated by a local supplier (at least $100 in value)
- Labor for one half day
- A free rain barrel and kit
- One free gardening book donated by a local bookstore
- Any additional materials or plants donated by vendors at the Flower, Lawn, and Garden Show, or local nurseries.

Win Gift Certificate from a Bird Watching Store

Many local stores are dedicated to bird watching and feeding. We will ask these stores to donate gift certificates as giveaways to individuals who donate to 10,000 Rain Gardens.

Win a Cabela's Shopping Spree

Cabela's, a top tourist attraction, would be an ideal public/private partnership. Their customers care about preserving outdoor recreation. With Cabela's, 10,000 Rain Gardens would produce water quality materials. Donations made via the initiative Website will be entered in a Cabela's shopping spree sweepstakes.

Win a Holiday in Hermann Sweepstakes

Hermann, Misssouri, is famous for its wineries, but it also offers outdoor activities like fishing, hiking, and trail riding. Many bed and breakfast establishments are in or near historic homes. The winner will receive a 3-night stay at a Hermann bed and breakfast (with restrictions on the dates). The bed and breakfast and Hermann tourism sites will receive promotion via the 10,000 Rain Gardens website and related publications.

Artistic Rain Barrels

Artistic barrels will be displayed in local areas, such as nurseries, nature centers, garden shows, garden tours, and shopping districts, from March 1st to May 31st. Rain barrel and bioretention information will be available with the rain barrel. Corporations and organizations will be asked for sponsorship.

Photos of all rain barrels will be displayed on the 10,000 Rain Gardens website. Website visitors can place a bid for a "silent" auction; a PayPal account will be required. The auction will close on May 31st. Winners will be notified by e-mail. Rain barrels can be picked up at a central location (to be determined later).

The artist or group whose rain barrel receives the highest donation will receive a $200 gift certificate to a local art supply store.

Auction proceeds will be donated to schools that wish to plant a rain garden on school property and must be used to rent landscape equipment, purchase plants, or buy curricular materials related to rain gardens, rain barrels, watersheds, butterflies, pollination, or conservation. Proceeds may also be donated to Boy Scout or Girl Scout troops that are active in conservation efforts.

Chocolate Bars? Garbage Bags? How About a Garden?

Students sell things for all sorts of reasons: Scouts, band, special trips, you name it. They may also sell and distribute rain garden kits to raise money for their projects. We would anticipate that the sales would be pre-ordered, then distributed by the students door-to-door or at a central location, such as a school, park, or farmers market.

Appendix 1: Roadside Beautification

A Proactive Prairie Passage Partner

By Joanne Orr, ODOT (405) 521-4037

Oklahoma was active early in the creation of the Prairie Passage program, when the working title was "The North Star to Lone Star Wildflower Trail". In 1993, the Oklahoma DOT and Texas initiated correspondence with FHWA in Washington, D. C. which led to two $25,000 grants for each of the six participating states. This was an immense help as the six states met to explore possibilities, goals, and objectives. The grants funded planning surveys of existing native vegetation, nearby attractions, etc.

Oklahoma funded its Prairie Passage efforts in 1997. Each year since then they have planted native wildflowers along their designated route. Many sections of the route have huge vistas of existing wildflowers, notably the Indian paintbrush and tickseed that bloom in the Arbuckles and on I-35 south of Oklahoma City The Prairie Passage plantings have been intended to supplement existing natural wildflowers. A total of 95 sites have been planted during the last four years. Oklahoma DOT spent $96,531 on wildflower seed and planted 273 acres on the roadsides adjacent to the Prairie Passage route. All seed purchased were native wildflowers, such as tickseed, Indian paintbrush, prairie coneflower, plains coreopsis, black-eyed Susan, purple coneflower, showy primrose, and Indian blanket, among others.

Funding for Oklahoma's Prairie Passage program is from the Enhancement portion of the federal ISTEA appropriation. In 1997 $684,000 was approved for Oklahoma's program. The program includes outreach pieces like a wildflower identification brochure, signage, and community involvement.

In Oklahoma, the main route follows I35 for 235 miles from the Texas border to Kansas. A number of side loops are possible, particularly in the Arbuckle Mountains of southern Oklahoma. At Oklahoma City in the center of the state, an alternative route breaks away and heads northeast up the I-44 Turner Turnpike...Osage County and its neighboring five counties support over 2 million acres of native tallgrass prairie rangelands and pasturelands that are used for ranching, wildlife and recreation.The Prairie Passage route winds thru this part of the state and finally connects with Kansas on US 75. From there it is a direct path to the Flint Hills of Kansas.

Important cultural sites include: Guthrie, a National Historic Landmark with 2,169 buildings, the National Cowboy and Western Heritage Museum, and the Woolaroc Museum. Many communities along the way have seasonal festivals, and assorted tribal powwows.

Both Kansas and Missouri are Prairie Passage Partners

A Catalyst for Change

By Fred Markham, KDOT
(785) 296-0853

Kansas boasts that most of the remaining tallgrass prairie is in Kansas. If that is true today, it may not be true in the near future. The idea of preserving portions of the prairie ecosystem as a significant natural and cultural heritage is not a priority to many land owners, particularly in the eastern third of the state. Strong property right concerns and the pride of managing range land responsibly on large tracks of land dominate opinions in the Flint Hills and in many areas in central and western Kansas. One of the most important opportunities presented by the prairie passage is to communicate the value of preserving the character of tallgrass prairie, particularly along the state's highways....

Nearly fifty percent of funds for the prairie passage in Kansas are devoted to educating Kansas and visitors about natural Kansas. Our recent "wildflower" brochure is available at 270 locations and is being requested by teachers, boy scout leaders, Convention and Visitor Bureaus, Chamber of Commerce and Audubon Chapter members...

Prior to the opportunities presented by the prairie passage, the Kansas Department of Transportation did not have goals to implement IRVM programs and did not have anyone who was promoting roadside management. One of our goals was to preserve the native plants we have on our roadside rather than planting large areas to a mix of grasses in wildflowers. **Past attempts to establish diversified seed mixes were "mowed gone", because our crews did not understand or had not "bought into" the concept of correct mowing procedures during plant establishment and beyond. The prairie passage, along with the need to save money on mowing and redirect the efforts of our maintenance crews to other responsibilities, has acted as an agent to change.**

Introducing A Roadside Land Ethic: It's Common Sense

J. Baird Callicot, University of Northern Texas, and Gary K. Lore

Roadsides provide a buffer between the roadway and the commercial, industrial, agricultural, and other economic activities on the adjoining private lands, protecting both the private land owner and the highway user from one another. Maintaining that protection is our responsibility. Understanding the ecology of the roadside plant community leads to providing that protection. For example, we know that non-native invasive plant species - weeds - follow our roadways, taking advantage of our roadside maintenance practices. Very often, such weeds not only clearly threaten the adjacent land owners economic activities, but also fail to protect the highway user's interests.... However, the most profound reasons to protect the beauty, stability and integrity of the roadside plant community are, quite simply, because we can and because it makes sense. In some cases, roadside weeds may do as good a job of preventing soil erosion or other tasks as natives, but we should prefer native plants because they are native. It's the right thing to do, irrespective of the practical or prudent thing to do. We should preserve, protect, and encourage the planting of native plants as a matter of biotic right — and because we love them for what they are in themselves.

Yet, as Leopold also reminded us, "A land ethic of course cannot prevent the alteration, management and use of these 'resources', but it does affirm their right to continued existence, and, at least in spots, their continued existence in a natural state." This means that we must realize that turning our roadsides into highly eroded, barren or weed-infested waste lands, or dump sites for leftover construction materials not only makes very little sense, but also is simply wrong. (http://www.fhwa.dot.gov/environment/rdsduse/rd_use22.htm)

Appendix 2: Development

Engineering Meets Landscaping: The new face of residential storm water management

By: Ryan Reed
http://www.buildernewsmag.com/viewnews.pl?id=46

February, 2004

Most older American cities bear the marks of many different development strategies, from the simple, narrow-lane grid of the 19th century town to the wide arterials, curving streets and cul-de-sacs of the 1960s and 1970s. But these days, so many forces are exerting pressure on community design that it's hard to make out a general trend. City planners are pushing for more grid connections and fewer cul-de-sacs; neo-traditionalists promote mixed-use development and alley-loaded streetscapes; developers are mixing products into single subdivisions to serve more price points; master-planned communities are swapping zoning density to offer open space and other land-based amenities. And everyone, except homebuyers, seems to want higher densities.

But one of the biggest factors in residential development in the West is largely unheralded: storm water management.

"Storm water has increasingly become a key constraint of development and site planning," says Rick Tomkins of Triad Associates, a land development/engineering firm in Kirkland, Wash.

It's not simply a matter of sizing storm pipes anymore. For reasons both political and practical, on-site storm water management has become a critical element of design for both large and small scale developments. Developers are being required to provide facilities within their developments to treat, detain, and if possible, infiltrate runoff before allowing overflows to discharge off-site or into public systems.

In the Pacific Northwest, residential developers have been devoting 5% to 10% or more of their parcels to storm water facilities for more than a decade, and new rules could increase facility sizes. Now Southern California developers are facing similar regulations in the form of standard urban storm water mitigation plans (SUSWMPs) and regional water quality plans, which could increase development costs by 3% to 6%.

Storm water management has always been a factor in subdivision feasibility studies: pipe size, hookup costs, and user fees affect any development's bottom line. With the advent of on-site runoff management, however, more of the small infill developments encouraged by growth policies simply don't pencil out.

"If you have four lots but need a stormwater facility, you're not going to sacrifice one whole lot for a pond," says Jerry Olson of Olson Engineering, Vancouver, Wash.

Storm water concerns also affect the size and shape of residential streets, curb and parking area design, how and when lots can be graded, and where open space is sited. In the near future, runoff control may lead to lot-level requirements such as rain barrels, pervious driveways, prescribed landscaping, and fertilizer restrictions.

For engineering firms involved in land development, what used to be a basic calculation is now a complex design process involving landscape architects, land planners and civil engineers. Storm water management can no longer be treated separately from decisions on street layout, product mix, and open space.

"Eight or ten years ago, an architect could design a site plan and we could work in the infrastructure," says Tomkins. "Now engineering firms really have to be involved early on in the site design."

Storm warnings

How did storm water move to the forefront of residential design? For Southern Californian developers suddenly faced with expensive storm water best management practices (BMPs), the arrival of the strict water quality permits may seem like a case of overzealous environmentalism. But the need to decentralize storm water management has been building for a long time.

For decades, says Mimi Doukas of WRG Design, Portland, storm water engineering was dominated by the notion of conveyance and flood control: getting rainwater into high-speed pipes and out into a large drainage basin, a river, or the ocean. Under this approach, the Los Angeles River became a fenced-off concrete slot, and huge drainage basins were dug to infiltrate what couldn't make it to the ocean fast enough.

But continuing development has increased the acreage of impervious surfaces to the point where older facilities can't handle the flows, and cash-strapped cities are in no position to upgrade them. In some older cities with combined sewer-storm water systems, rainfall regularly causes raw sewage to spill into local rivers and oceans.

Water in conveyance systems moves fast, and the faster water moves, the more sediment and pollutants it can carry. Unless it is all treated, runoff from developed land can exact a high environmental cost. In the Northwest, concern for salmon habitat has driven much of the regu-

Appendix 2: Engineering Meets Landscaping, cont.

lations; in Southern California, storm runoff laden with coliform bacteria and pollutants has led to beach closures, threatening a wellspring of the region's economy.

A decade ago the Clean Water Act (CWA) compelled many jurisdictions to take action on runoff quality. Discharge permits in the Northwest required reductions in phosphorous, among other pollutants, and led to the tighter restrictions on residential developments. Phase II of the CWA is now compelling a new round of rules, including those in Southern California. Many jurisdictions, however, have their own agenda; Portland, for example, is funding runoff reduction measures in part to lessen the stress on its combined sewage-storm water system.

Predictably, politics is also shaping storm water policy. In Los Angeles, new developments of ten or more units, hillside homes, and all redevelopments must be able to capture and treat the first 0.75 inches of rain (0.6 in San Diego), while existing residential areas are largely unaffected.

"It was an easy solution to put it all on developers—the low-hanging fruit," says Tim Piasky of the Southern California Building Industry Association. The BIA complains that new developments generate cleaner runoff than older ones, and that cleaning up only new developments means overall runoff quality won't improve for decades.

"It means 1% to 2% of the water is treated, but it just mixes in with all the untreated runoff. It just doesn't make sense," says Piasky.

Environmentalists argue that cleaning up has to start somewhere, and that the large regional facilities favored by developers just can't be funded anytime soon. They frequently point to the Pacific Northwest as an example of how on-site management can work.

Of course, not all Northwestern BMPs can work in a region with big, sudden storms and so much dry weather, but some engineers say there's a lot of work to be done.
"I'm surprised at how behind they are on storm water in California," says Doukas. "There just hasn't been much discussion of the issue."

Best practices

Most jurisdictions allow developers to choose from a range of BMPs to treat water—remove sediment, nutrients (fertilizers) and pollutants, particularly metals from cars and other sources—and to detain runoff to allow a slow, "natural" release rate into the storm drain system. Since fast-moving water carries sediment, oil, grease, and bacteria, the essential element is to slow water down.

Which BMPs are chosen depends on soil type, slope, proximity to sensitive waters, land value and other factors.

One common treatment BMP is the bioswale, a sloping, vegetated trench typically lined with crushed rock, amended soil, and filter fabric, 3 to 8 feet wide and 20 to 150 feet long. They are low sloped to allow water to be in contact with

the filtering vegetation for at least nine minutes.

Bioswales can be simply grass swales, which must be mowed and even watered in dry months. Wherever possible they are planted with native, drought-resistant plants that look nicer, says Kendra Smith of Clean Water Services (CWS), Washington County, Ore., and maintenance is mostly a matter of vacuuming out sediment.

Wet and dry detention ponds, which allow sediment to settle out, are also common residential BMPs to both treat and slow rainwater's entry into storm systems. Retention ponds hold water long enough for it to infiltrate directly into the ground. Most ponds must be fenced off for safety reasons; wet ponds and swales that hold water for longer than 72 hours can also become mosquito breeding grounds.

In some circumstances, wetlands can be constructed for storm water detention. They are typically part of wetlands mitigation banking, but the result is often indistinguishable from the real thing. They must stay registered as constructed wetlands, however, lest they become protected habitat that cannot be used for storm water.

Other BMPs are more technological. Underground vaults can serve as detention and sedimentation ponds; proprietary catchbasin filters, coagulation tanks, chemical treatments and other methods can be used for inline water quality treatment. These greatly reduce the size of storm water facilities, but are far more expensive and commonly used only in commercial development, particularly from pollution "hot spots" such as auto repair shops.

Amenity or blight?

Depending on site conditions, developers often face a choice: minimize the footprint of the storm water facility and hide it or embrace it as an amenity. More often than not developers take the first approach, building deep and steep-sided detention ponds that are best kept out of view and surrounded with chain-link fences for safety. The approach maximizes buildable land, but creates ugly areas in the midst of neighborhoods.

"The cheapest way to create volume is a square box, but generally it's the ugliest," says Jeff Cox, head of landscape architecture at Triad Associates. Many detention ponds can be made into landscaped water features, he says. Reducing side slopes from 2:1 to 3:1 makes them look more natural, and shallow edges can be planted with wetlands plants.

Appendix 2: Engineering Meets Landscaping, cont.

An increasing number of engineering firms involved in land development are hiring landscape architects like Cox. "There've been a lot of atrocious, rectilinear ponds because engineers tend to think in terms of boxes—it's easier to calculate volumes," concedes Triad's Tomkins. "Landscape architects come up with more pleasing designs, with natural contouring and plantings. We're really trying to make the facilities more of a visual amenity, integrated into the site plan."

Still, an engineer's primary directive is to determine best values and maximize the return on land, not make a nice-looking pond. "The trick is to weigh aesthetics against land use and value," says Cox.

No one's going to be fined for taking the minimal approach, but many public agencies are doing what they can to help educate developers and engineers on the visually appealing options.

CWS demonstrates many of the latest BMPs in and around its new building. "Developers can be in a rush to get the design process done," says Smith. "We try to offer creative solutions."

Smith believes innovative design can eliminate much of the burden developers feel from storm water concerns. "Our goal is to integrate storm water design into the urban landscape. You shouldn't notice that it's a facility; it should become part of a site."

CWS is particularly positive about the use of swales, planted with native vegetation, wherever possible. "Swales can fit into tight spaces, can be curved and landscaped," she says. Unlike ponds, most can remain unfenced, she says, and don't represent a vector risk.

Developers are often unaware of all the possibilities. Many think storm water facilities have to be at a subdivision's low point, which is often inconveniently located near the street entrance. But Smith of notes that this is usually only necessary if storm water has been fed into underground pipes. "It depends on the site, but often you can let the water sheet off an area and flow down to an alternative treatment. You could even have a waterfall."

Low-impact development

Bioswales and detention ponds can satisfy most quantity and quality challenges, but the best solution may be to limit runoff in the first place. Over the past decade the concepts of low-impact development (LID) have taken shape, and those ideas are now moving into application.

LID focuses on minimizing impervious surfaces and promoting infiltration, evaporation, and transpiration of runoff before it must be collected and treated. Basic principles, in technical terms,

include disconnecting runoff pathways (e.g., no downspouts draining into streets) and increasing water flow paths and time.

In practical terms, many LID methods are simply extensions of long-recognized techniques: keeping runoff above ground, minimizing pavement, limiting grading to preserve trees and natural drainage channels, locating open space to absorb overflows, amending soils, using water-permeable pavers, and using a range of low-tech "bioretention" options such as rain gardens.

Proponents of LID say the techniques offer developers huge savings in infrastructure costs, including grading, roadway, hardscaping, and storm drain expenses. Pierce County, Wash., recently completed a case study using LID techniques for a 103-lot development, including porous roadways and lot clustering, that indicated a 75% downsizing of storm water facilities (from two acres to 1/2 acre) and infrastructure construction cost savings of 20%.

But such studies don't always take land value into account, or assume that the additional open space required will be offset by increased lot values. Furthermore, some LID techniques increase maintenance costs, or require individual homeowner cooperation and consent.

A bigger problem is that many LID techniques run counter to existing codes. Fire departments object to narrow streets and reduced-size cul-de-sacs; pervious pavements aren't allowed for many driving and parking surfaces, since the prevailing philosophy is that such runoff must be collected and treated prior to infiltration. And most municipalities have strict rules on sidewalk size, curbs, and medians.

Finally, since LID techniques are relatively new, performance histories are not yet available and both engineering firms and jurisdictions have difficulty quantifying how much a given LID

technique can reduce storm facilities. Increased liability is a concern; if too much credit is taken, downstream neighbors may be affected.

Triad is presently working on two demonstration projects in the Seattle area that will use and monitor various LID techniques, including channeling roof gutters into French drains, soil amendments to increase infiltration, open channel conveyance, and roads with reduced impervious surfaces. The projects required special ordinances to clear the way, because the streets and storm drains don't meet existing codes. Triad hopes initiative data will more precisely document the benefits of various LID techniques, allowing engineers to downsize storm water BMPs accordingly.

Clean Water Services is also testing LID approaches, using runoff meters on green streetscapes, porous pavement, and eco-roofs to document effects and collect data for granting runoff reduction credits. "It's a matter of giving developers a full toolbox, to have more options,"

Appendix 2: Engineering Meets Landscaping, cont.

says CWS's Kendra Smith.

At this point, not many developers are taking the LID bait. Few developers, particularly big builders, are likely to give up on the flat lots that often require extensive grading, or giving up the open space for infiltration landscaping. Most LID has been used in higher end master-planned communities that have already factored open space amenities into the lot prices.

Straight up against conventional development methods, LID doesn't pencil out yet, says Tomkins. "The science isn't there yet, so we're being conservative on taking facility size credits. We've got to implement some of these methods and test them," he says. But that hasn't stopped some forward-thinking developers from proceeding with LID for the market advantage. "It definitely gives you a claim to environmental consciousness, and that can set you apart from other developments," says Tomkins. "You attract a different kind of buyer."

Most developers will be waiting for more information, incentives, or allowances on LID from regulators, not to mention permission to implement the nonconforming techniques. "Codes don't allow much room for experimentation," says Tomkins.

Whether developers choose traditional BMPs or low-impact approaches, many factors are conspiring to make engineering firms even more central to the development process. With growth in the West now concentrated on the urban margins, and challenging topography becoming more the rule than the exception, the complex relationship between landscape, development design, and storm water requirements is getting increasingly complex.

"It all has to be looked at holistically," says Tomkins. "Everything comes into play: density, topography, soils, vegetative cover, sensitivity of the surrounding environment and agency regulations all have to be considered. Every site has a different set of constraints and every development has a different marketing goal, so you don't know what the best solution is until you've done a lot of study."

For their assistance with this article, BUILDERnews thanks Jerry Olson

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Low-impact techniques

- Narrowing local access roads. In addition to collecting less runoff and taking less land away from lots, narrow roads tend to slow traffic and be safer. Many jurisdictions have already narrowed standard local-access streets from 40-foot curb-to-curb asphalt to 28-foot widths; further reductions are possible by limiting on-street parking to one side.
- Clustering and downsizing lots to allow for open space and preserve native trees and vegetation.
- Landscaping roadway features and using depressed medians.
- Designing smaller cul-de-sacs, cul-de-sacs with central planters, or loop roads with green medians.
- Downsizing sidewalks or limiting them to one side of the street.
- Using permeable asphalt or pavers wherever possible—generally walkways, driveways, and some overflow parking use, and roadways where permitted.
- Replace subterranean pipes with open swales and ditches where possible.
- Amending soils where needed. Certain soils may need amendment to boost low infiltration rates and increase plant strength. Landscaped areas should have 8 inches of topsoil, created if necessary by stockpiling, amending and redistributing native soils into soil compacted by construction.
- Minimize grading, use existing topography and drainage patterns. Any native vegetation and trees that can be spared can drastically reduce runoff.
- Sloping roadways and parking lots toward biofiltering medians.
- Using specially designed infiltration landscape features, such as rain gardens—low-lying spongy areas that can absorb and infiltrate runoff—planters, green valleys, and bioretention cells.

Fairfield: From challenges to amenities

A 167-unit development now under construction in Clark County, Wash., Fairfield may not have the polish of the huge master-planned communities built on abundant land, but it's more representative of the type of smaller infill developments going on in Western cities. And this uniquely challenging site illustrates how a developer's vision, an engineer's creativity, and details of a site like soil type and natural drainage can converge to create a unique initiative.

Developers have passed on certain parts of Clark County's Hazel Dell neighborhood for years due to its challenging topography and drainage issues, but in recent years large parcels have been getting very scarce inside the area's Urban Growth Boundary. Pacific Lifestyle Homes, based in Vancouver, Wash., ended up with a parcel with three different residential zones, an uneven topography that made most of the area an enclosed basin, and a collector road bisecting the property.

Pacific Lifestyle and its engineering firm, Vancouver's MGH Associates, got Fairfield approved as a planned unit development to consolidate the three different zones and shift densities to create logical areas for apartments and two sizes of single-family lots. The county allowed the collector to be vacated and rerouted to snake through the area. And they were also able to cluster the units and consolidate open space in the initiative's center.

Appendix 2: Engineering Meets Landscaping, cont.

The central 3.5-acre park sits at the terminus of all three entry roads, fulfilling the developer's trademark goal of a "green focus," says MGH Associates' Mike Miller. The park will also have a rec center and mature trees, which were spared by minimizing grading.

Fairfield sits in an enclosed basin, and the central park, by design, occupies the low point of the development, a natural sump. Miller was able to use the sump area, a grassy depression, as a swale and detention pond, keeping it shallow enough to forego the usual cyclone fence. Overflow pipes were buried in bed of gravel below the pond. Because of the soil's good infiltration rate at that spot, no other storm water facilities were required.

The development's neighbors at first balked at granting an easement for the gravity storm line, says Pacific Lifestyle's Henry Gerhardt. The company went ahead with engineering for an alternate line aided by a pump station. But the county, which has to maintain all residential storm water BMPs and systems, discourages pump stations, and threatened condemnation proceedings to get the gravity line easement.

Vacating the connector added a lot of complexity to the initiative, says Miller. "There was some second guessing about that. Neighbors to the north wanted to be able to buzz right through." Miller agrees with the county's goal of increasing street connectivity, and dislikes neighborhoods isolated by arterials; in this case he was able to keep the connector without splitting the community with a busy street.

With its multiple housing types and community park, Fairfield is unique for an area with little master planning. "They went in with a vision, and what they have will really set them apart," says Clark County engineer Richard Drinkwater. "It's an exceptional initiative on a challenging site."

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Hydrologic Changes in Urban Streams and Their Ecological Significance

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Abstract.—Urban development modifies the production and delivery of runoff to streams and the resulting rate, volume, and timing of streamflow. Given that streamflow demonstrably influences the structure and composition of lotic communities, we have identified four hydrologic changes resulting from urban development that are potentially significant to stream ecosystems: increased frequency of high flows, redistribution of water from base flow to storm flow, increased daily variation in streamflow, and reduction in low flow. Previous investigations of streamflow patterns and biological assemblages provide a scale of ecological significance for each type of streamflow pattern. The scales establish the magnitude of changes in streamflow patterns that could be expected to produce biological responses in streams. Long-term streamflow records from eight streams in urbanizing areas of the United States and five additional reference streams, where land use has been relatively stable, were analyzed to assess if streamflow patterns were modified by urban development to an extent that a biological response could be expected and whether climate patterns could account for equivalent hydrologic variation in the reference streams. Changes in each type of streamflow pattern were evident in some but not all of the urban streams and were nearly absent in the reference streams. Given these results, hydrologic changes are likely significant to urban stream ecosystems, but the significance depends on the stream's physiographic context and spatial and temporal patterns of urban development. In urban streams with substantially altered hydrology, short-term goals for urban stream rehabilitation may be limited because of the difficulty and expense of restoring hydrologic processes in an urban landscape. The ecological benefits of improving physical habitat and water quality may be tempered by persistent effects of altered streamflow. In the end, the hydrologic effects of urban development must be addressed for restoration of urban streams.

Introduction

Streamflow is the dominant physical process distinguishing rivers and streams from other ecosystems. The structure and composition of lotic communities in fluvial ecosystems depend on source, timing, and rate of streamflow as they regulate both habitat conditions and disturbance regimes. Because of the important roles of streamflow in fluvial ecosystems, hydrologic changes in urban streams pose plausible and potentially significant ecological risks that warrant evaluation, along with other recognized changes (e.g., water chemistry, physical habitat, riparian conditions). Although previous investigations have associated degradation in the biological condition of streams with urban development (Klein 1979; Wang et al. 2000; Morley and Karr 2002; Booth et al. 2004), streamflow patterns per se are seldom implicated as a primary cause of urban stream degradation. Failure to address the significant hydrologic changes in urban areas may limit the success of restoration efforts in rivers and streams.

"Urbanization" is not a single condition; instead, it is a collection of actions that lead to recognizable landscape forms and, in turn, to changes in stream conditions. No single change defines urbanization,

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but the cumulative effect of human activities in urban basins profoundly influences streams and their biota. Karr and Yoder (2004) provide a conceptual framework for assessing biological degradation in which the human actions that constitute urbanization modify many aspects of stream ecosystems, which elicit biological responses (Figure 1). Among the many aspects of stream ecosystems modified by urbanization, changes in hydrologic regimes (i.e., the timing and rate of streamflow) and potential biological responses are the focus of this paper. The influence of hydrologic modification, however, is likely to depend on a broader ecological context, and so the importance of hydrologic modification is likely to vary from stream to stream and region to region.

We focus on hydrology as a primary link between urban development and biological responses in urban streams because of the well-established influence of streamflow on the structure, composition, and productivity of lotic communities. In this paper, we briefly review the literature on relations between streamflow patterns and lotic communities to identify the types of streamflow patterns that have demonstrable effects on stream biota. We then extend the results of two investigations, Poff and Allan (1995) and Clausen and Biggs (1997), that associated variation of biological assemblages with variation in a variety of streamflow statistics. Our extended analyses identify the magnitude of variation in four streamflow patterns (high flow frequency, flow distribution, daily variation, and low flow magnitude) that was associated with biological differences within their respective groups of streams. The magnitude of hydrologic variation associated with biological differences establishes the scale of ecological significance for assessing changes in each streamflow pattern. We then analyze long-term streamflow records from eight urban streams and five reference streams in the United States, where land use has been relatively stable, to identify streamflow patterns that changed in association with urban development. Finally, we discuss our results in the context of managing urban streams.

Hydrologic Effects of Urban Development

Hydrologic effects of urbanization can be characterized as the redistribution of water once intercepted by

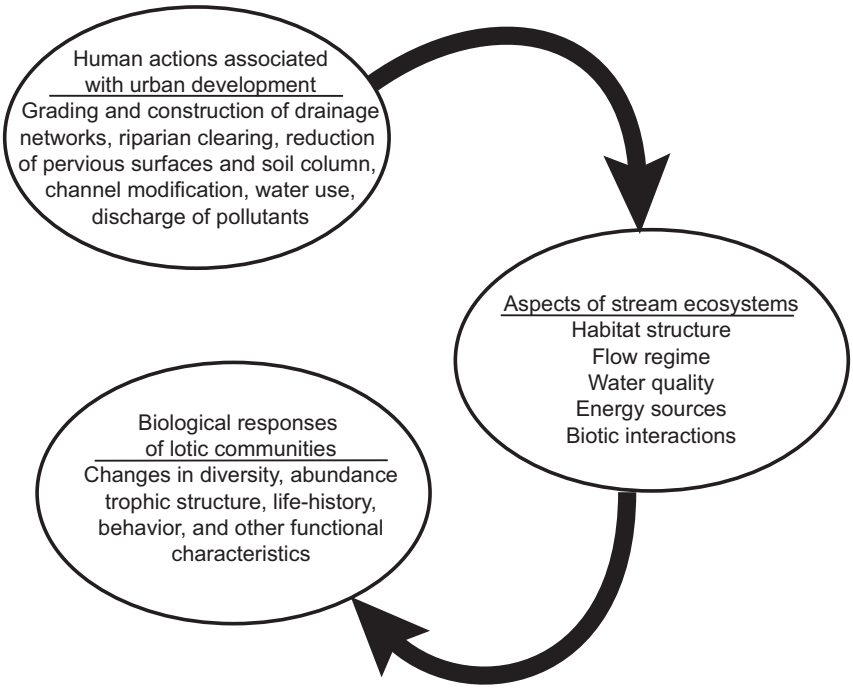

FIGURE 1. Urban development represents many distinct human actions that affect each of five major aspects of stream ecosystems. Changes in the ecosystem, in turn, elicit biological responses (modified from Karr and Yoder 2004).

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vegetation or stored in the soil column, from which it drained slowly into streams or aquifers or was taken up by vegetation and transpired. Following development, this water runs off impervious surfaces or saturates thin soils and then runs off as overland flow. Drainage networks collect runoff and allow it to flow quickly as open-channel flow to receiving water bodies, greatly reducing the length of subsurface or overland flow paths. Aquifer recharge and evapotranspiration may be reduced. The hydrologic effects of urban development were evident in a comparison of runoff from two headwater catchments in western Washington (Burges et al. 1998). Novelty is a 37-ha, forested catchment. Klahanie is a 17-ha catchment with residential land use. Although much of the landscape in Klahanie is "pervious" lawn, the thin soils are quickly saturated during storms producing runoff patterns distinct from Novelty, including higher peak unit-area discharge, higher runoff volume, and more frequent peaks (Figure 2).

Changes in runoff patterns resulting from urban development manifest in streams as an increase in storm flow rates and volumes and a corresponding reduction in recessional flow and base flow rates and volumes (Leopold 1968; Konrad 2003a). There are also higher-order hydrologic effects of urban development: streamflow rises more rapidly during storms and recedes more rapidly after storms, which is typically described as "flashy" streamflow. Storm flow is more frequent and the seasonal period for storm flow may lengthen as storms produce higher streamflow in urban areas, even when antecedent conditions are dry. Because runoff is redistributed from base flow periods to storm flow periods, the total water balance and, thus, central measures of streamflow distributions such as annual mean streamflow may not change in response to urban development (Konrad and Booth 2002). The water balance for a stream basin may change when changes in vegetation alter interception of precipitation and evapotranspiration, surface or groundwater is used consumptively, or water is imported into a basin for irrigation.

Base flow changes less consistently in response to urban development. Annual base flow volume for two streams draining sewered areas of Long Island, New York was reduced from more than 60% to approximately 20% during urban development (Simmons and Reynolds 1982). Unit-area base flow during the wet season in western Washington streams clearly decreases with increasing road density, in contrast to unit-area base flow during the dry season (Figure 3). Minimum annual 7-d streamflow, however, did not change consistently in response to urban development in western Washington (Konrad and Booth 2002). Thus, urban development appears to reduce shallow subsurface flow that supports wet-season base flow but has a less evident effect on deeper groundwater recharge that supports summertime discharges.

Low flow in urban streams can increase as a result

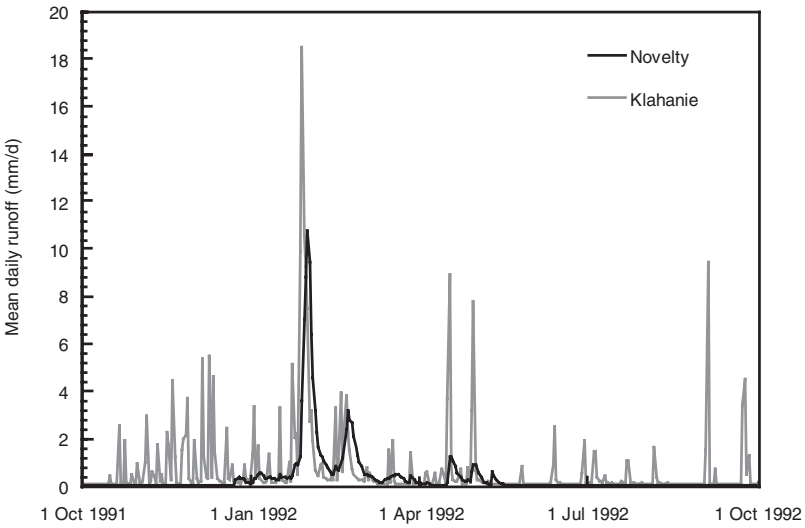

FIGURE 2. Runoff during water year 1992 for two headwater catchments in western Washington. At the time of data collection, Novelty was a fully forested 37-ha catchment; Klahanie was a fully built-out 17-ha residential catchment.

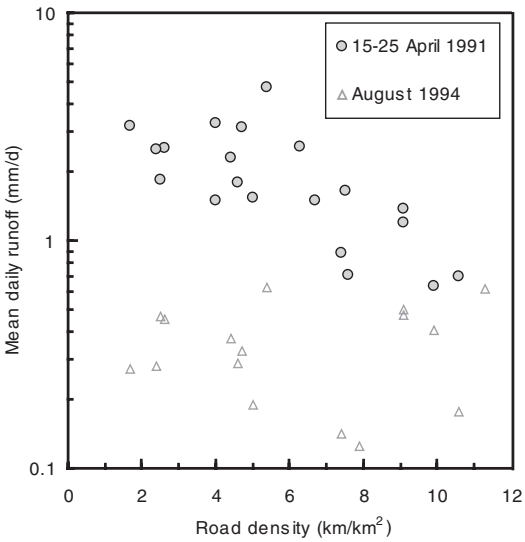

FIGURE 3. A comparison of mean unit-area base flow in the wet season and dry season for 21 streams in western Washington.

of imported water used for landscape irrigation that subsequently drains through shallow soil layers and aquifers (Harris and Rantz 1964) or used in residences with on-site septic systems. In contrast, decreases in low flow occur from increased surface drainage (storm sewers and ditches), surface water diversions, and pumping shallow groundwater. For example, annual minimum streamflow in Big Soos Creek in Washington have declined significantly in response to residential development and water use in the basin over the past few decades, while no such trends are evident in nearby rural streams (Konrad and Booth 2002).

In headwater ephemeral streams, periods of continuous flow are likely to be briefer with frequent intermittency (Figure 2). For example, during the period from water year (WY) 1991–1993, there was an average of 24 periods of flow intermittency per year in the residential Klahanie catchment, including periods of no flow during spring, compared to five times per year for the forested Novelty catchment. This difference is not reflected by the percentage of days with flow in these streams, which was 62% of the 3-year period in Klahanie compared to 54% in Novelty.

Given the magnitude of hydrologic changes resulting from urban development, urban streamflow patterns are likely to affect the biological conditions of streams, although these patterns frequently have been quantified in ways that are not directly relevant to their ecological effects but, instead, represent only their social impacts. Few studies definitively make the link between hydrologic alteration and biological responses in urban streams, in part because urban development affects nearly all aspects of fluvial ecosystems. Orser and Shure (1972) documented lower population densities of dusky salamander *Desmognathus fuscus fuscus* with increasing levels of urban development for five streams near Atlanta, Georgia. They indicated that floods had likely transported individuals downstream, reducing salamander populations and creating unstable age structures. In 27 streams in Maryland, Klein (1979) found an association between biological conditions (macroinvertebrate diversity and fish taxa) and the percent of watershed imperviousness, which in turn was linked to unit-area base flow. Likewise, an index of the diversity and structure of macroinvertebrate assemblages was correlated with streamflow patterns in western Washington streams (Booth et al. in press). As in any study of urban streams, however, many other factors, including channel morphology, streambed material, nutrients, migration barriers, water temperature, and water chemistry, are likely to have influenced the biological conditions of these urban streams.

Biological Variation Associated with Streamflow Patterns

Although the biological effects of streamflow modification are difficult to isolate because of other changes in urban streams, many ecological investigations have documented how the rate, timing, and sources of streamflow affect the structure, composition, and productivity of lotic assemblages by regulating habitat conditions, availability of food sources, or natural disturbance regimes (Shelford and Eddy 1929; Horwitz 1978; Fisher et al. 1982; Schlosser 1985; Newbury 1988; Power et al. 1988; Resh et al. 1988; Townsend 1989; Power et al. 1999). Physical characteristics of water (e.g., velocity, depth, temperature, turbidity, and nutrient availability) and geomorphic features of the channel (e.g., width, bank height, and bed material) depend on streamflow. These characteristics and features define habitat units that compose the physical template for stream ecosystems in which distinct hydraulic conditions and substrates favor specific types of organisms or provide refugia during disturbance (Stehr and Branson 1938; Minshall 1984, 1988; Statzner and Higler 1986; Statzner et al. 1988; Townsend 1989; Townsend et al. 1997). The area,

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volume, and diversity of habitats generally increase with streamflow, which may account for the increasing diversity and productivity of lotic assemblages in larger streams and rivers (Harrel et al. 1967; Platts 1979; Allan 1995; Fairchild et al. 1998; Wiberg-Larsen et al. 2000). Hydrologic variability generally decreases with increasing stream size, which promotes habitat stability and may also promote increased diversity of lotic assemblages with stream size (Horwitz 1978). A relatively uniform distribution of streamflow is generally associated with relatively high groundwater inflow, which produces more stable seasonal temperatures, less ice cover in cold regions, higher dissolved oxygen during summer, and stable habitat volume (Power et al. 1999).

Disturbances in the form of high flows or hydrologic droughts (i.e., streamflow very low or absent) reduce periphyton biomass, macrophyte and fish populations, and the diversity of lotic assemblages (Stehr and Branson 1938; Douglas 1958; Anderson and Lehmkuhl 1968; Fisher et al. 1982; McAuliffe 1984; Schlosser 1985; Erman et al. 1988; McElravy et al. 1989; McCormick and Stevenson 1991; Boulton et al. 1992; Bayley and Osborne 1993; Closs and Lake 1994; Dieterich and Anderson 1995; Wootton et al. 1996). High flows, in particular, have a direct effect on stream biota by scouring streambeds, killing organisms or transporting them downstream. High flows also modify the trophic structure of streams by transporting dissolved nutrients and particulate organic material (Biggs and Close 1989; Anderson and Lehmkuhl 1968) or by selecting for benthic insects with traits (e.g., morphology) that affect their suitability as fish prey (Wootton et al. 1996; Perry et al. 2003). Lotic communities quickly recover after an individual flood or period of no flow (Shelford and Eddy 1929; Stehr and Branson 1938; Fisher et al. 1982; Power and Stewart 1987; Scrimgeour and Winter-bourn 1989; DeBrey and Lockwood 1990; Boulton et al. 1992; Bayley and Osborne 1993; Jones et al. 1995); however, rivers and streams with frequent high flows or no-flow periods have relatively simple trophic structure, low taxonomic diversity, and high dominance by a few taxa (Gorman and Karr 1978; Schlosser 1985; White and Pickett 1985; Robinson and Minshall 1986; Power and Stewart 1987; Death and Winterbourn 1995; Rabeni and Wallace 1998). While periodic disturbance is readily accommodated in river and stream ecosystems without degrading biological productivity, diversity, or structure, frequent disturbances may have persistent biological effects.

The biological influence of disturbance is complex; it depends on the biological attribute or organism of interest and is mediated by the ecological context at a site. For example, the lack of disturbance can allow a few taxa to dominate an assemblage (Connell 1978; McAuliffe 1984; Wootton et al. 1996), as can a high frequency of disturbance. Different attributes of lotic communities do not respond consistently to disturbance. In an investigation of 11 streams in New Zealand, Death and Winterbourn (1995) found the density of invertebrate species and species richness increased with site stability, but species evenness peaked at sites with intermediate stability. The biological effects of high flows also depend on seasonal timing in relation to the life histories of aquatic organisms (Bickerton 1995; Dieterich and Anderson 1995).

The relative magnitude of streamflow is an important component of the ecological context. To account for differences in stream size in ecological investigations, high flows are often assessed with respect to the mean or median flow (Horwitz 1978; Poff and Ward 1989; Clausen and Biggs 1997). Nonhydrologic factors such as habitat diversity (Gorman and Karr 1978; Gurtz and Wallace 1984; Townsend et al. 1997) and biotic interactions (McAuliffe 1984; Feminella and Resh 1990; McCormick and Stevenson 1991; Wootton et al. 1996) also help form the broad ecological context that mediates effects of single extreme streamflow events on stream biota. Thus, the specific biological responses to changes in streamflow patterns are difficult to assess without information about the biological feature of interest and the other components of the ecosystem. Nonetheless, investigations of groups of streams representing a range of biological and physical conditions provide evidence of systematic biological responses to streamflow patterns.

Previous investigations have provided frameworks for ecological analyses of streamflow patterns. Poff and Ward (1989) developed a classification system of regional hydrologic regime. Their conceptual model included a hierarchy of four flow characteristics: duration of intermittency, high flow frequency, high flow predictability, and overall flow variability. Richter et al. (1996) assessed flow alteration of regulated rivers in terms of five characteristics of flow: magnitude, duration, frequency, timing, and rate of change. Clausen and Biggs (2000) used principal component analysis to identify four distinct categories of streamflow statistics for New Zealand streams: central tendency (stream size), flow variability, volume of high flows, and frequency of high-flow events. Clausen and Biggs (2000) did not include any statistics for the timing of flows or

rate of change. Each of these frameworks include streamflow statistics that are likely to be modified by urban development. Unlike the effects of regulation by a dam or other control structure, the hydrologic consequences of urban development are incremental. Streamflow patterns are produced by runoff processes, not by controlled releases through penstocks and spillways. As a result, urban streamflow does not necessarily have clearly artificial patterns such as truncated peaks, stepped ramping of flows, or high frequency (diurnal) fluctuations. Instead, urban development causes broad changes in the rate and timing of runoff that should be evident from a limited set of streamflow statistics representing ecologically significant streamflow patterns.

Ecologically Significant Variation in Streamflow Patterns

Comparative analyses of rivers and streams provide evidence for the strongest associations between streamflow patterns and biological conditions, though not necessarily the causative mechanisms. Two studies—Poff and Allan (1995) and Clausen and Biggs (1997)—are reviewed to define ranges of streamflow variables associated with attributes of lotic assemblages. These studies did not attribute streamflow patterns to differences in land use, though it is likely that land use had an influence in some basins. Instead, they examined rivers and streams from wide geographic regions where various physiographic factors such as drainage area, climate, and geology produced different streamflow patterns.

We assume that natural physiographic factors produce differences in streamflow among the Poff and Allan (1995) and Clausen and Biggs (1997) streams comparable to the hydrologic changes resulting from urban development. Thus, these streams provide a natural correlate of an urban gradient to assess the biological response to differences in streamflow (e.g., streamflow is typically flashier in smaller streams than in large rivers). This approach avoids the covarying and, thus, confounding effects from water quality, channel form, and riparian zones that also vary with streamflow patterns across an urban gradient. Hydrologic changes in urban streams, however, may not be strictly analogous to hydrologic differences between streams. In urban streams, hydrologic changes occur over decadal time scales, so species do not have the time to evolve to modified streamflow regimes that they have had in natural systems. Thus, the biological response to changes in streamflow patterns over decades in a stream may be greater than the biological variation between streams that have long standing natural differences in streamflow pattern.

Poff and Allan (1995) analyzed relations between four streamflow statistics and fish assemblages at 34 sites in rivers in Wisconsin and Minnesota. Streamflow statistics were calculated from records collected over various time periods spanning at least 20 years. Two functional groups of fish were identified based on species presence/absence at the sites. Canonical discriminant analysis was used to identify hydrologic characteristics of the sites associated with the two groups. A canonical variate composed of daily flow predictability, base flow stability, coefficient of variation (CV) of daily flows, and frequency of spates distinguished the two functional groups of fishes based on hydrologically variable or hydrologically stable sites. Daily flow predictability and base flow stability were significantly different ($P < 0.05$, Wilcoxon rank-sum test) between the two groups of sites, but the CV of daily flows and frequency of daily flow with a 1.67-year return interval were not (Table 1). A comparison of species traits for the two functional groups indicated that the hydrologically variable group had more trophic and habitat generalists tolerant of silt than the hydrologically stable group.

Clausen and Biggs (1997) analyzed relations between 34 streamflow statistics and benthic (periphyton and invertebrate) assemblages in 83 rivers in New Zealand. Streamflow statistics were calculated from contemporaneous records spanning 1–7-year periods. They found that periphyton biomass was inversely related to mean flow, median flow, and the frequency of high flows (daily streamflow equal to or greater than three times the median daily streamflow). Periphyton biomass was directly related to 90th-percentile flow. Periphyton species richness was inversely related to flood volume/base flow volume, frequency of high flows, and the product of frequency and duration of high flow. Periphyton species diversity was related to high flow and variation (CV) statistics but not to central-tendency or low-flow statistics. Invertebrate density and richness were inversely related to mean, median, and low flows and directly related to flow variability and the frequency of high flows. The frequency of high flows provided the single most useful measure to account for the variation in measures of benthic assemblages among the rivers.

Clausen and Biggs (1997) proposed that flood disturbance (scour, deposition, abrasion of bed mate-

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TABLE 1. Median values of streamflow statistics for 34 sites in Wisconsin and Minnesotta classified by Poff and Allan (1995) as hydrologically stable or hydrologically variable based on fish assemblages.

Streamflow statistics	Sites with hydrologically stable fish assemblage	Sites with hydrologically variable fish assemblages
Frequency of daily flow with 1.67 year return interval	0.69	0.77
Daily coefficient of variation	1.3	1.9
Daily flow predictability[a]	70	46
Baseflow stability[a]	0.36	0.05
Annual frequency of flows > 10th percentile[a]	4.9	6.0
Annual frequency of flows > three times median flow[a]	3.9	6.5
$T_{Q\text{mean}}$ (fraction of time that flow exceeds mean flow)	0.26	0.25
CV (LN transformed data)[a, b]	0.7	2.1
Median daily percent change in streamflow[a]	5%	7%
90th percentile flow/median flow[a]	0.52	0.21

[a] Values were significantly different between the two groups ($P < 0.05$, two-tailed Wilcoxon rank sum test).
[b] Coefficient of variation of natural log transformed daily flows.

rial) and relative flow stability were the dominant hydrologic mechanisms affecting the benthic assemblages. They also found that mean and median flows were negatively correlated with periphyton and invertebrate density and invertebrate richness because of decreasing bed stability and heterogeneity of bed material with stream size. Thus, the biological influence of stream size was not solely hydrologic but instead also depended on sediment supply and the size of structural features (wood, cobbles, valley width) relative to the stream channel.

Clausen and Biggs (2000) also suggested additional reasons for lower density and richness of benthic assemblages in larger rivers. These include lower velocity, lower gradient, finer bed material, reduced allochothonous inputs, and increased light availability. Inorganic nitrogen and phosphorous concentrations were also negatively correlated with specific yield (a measure of stream size) and high flow magnitude, and were likely to control autotrophic production between high flows. None of these reasons for a biological response are solely a function of streamflow patterns.

Four types of streamflow patterns examined by Poff and Allan (1995) and Clausen and Biggs (1997) were thus associated with variation of fish and benthic assemblages: high flow frequency, streamflow distribution, daily variation, and low flow magnitude (Table 2). The biological response of lotic assemblages to variation in each of these patterns has a mechanistic basis. Increased high flow frequency could result in shorter periods between disturbances and increased seasonal periods with episodic high flows. Change in high flow frequency is particularly an issue in regions where the reproduction and growth cycles of aquatic and benthic organisms are tied to stable flow periods. The likelihood and spatial extent of bed disturbance increase with storm flow frequency (Konrad et al. 2002). The distribution of streamflow, as characterized by its central tendency (i.e., mean or median) provides a gross indication of the amount (volume and area) of habitat available to aquatic organisms. Measures of variability provide information on habitat heterogeneity over time. Stream ecosystems where storm flow, rather than base flow, constitutes much of the total distribution of streamflow will have short periods when hydraulic conditions, nutrient transport, and amount of habitat are at high levels (though not necessarily optimal) and extended periods of time when these conditions and processes are at low levels. Movement of nutrients and particulate organic material is also likely to be skewed to short periods of rapid transport and limited retention. Increased daily variation in flow may reduce the time that a given location is suitable habitat for an organism and cause the organism to expend energy moving to suitable locations. Reduced low flows can reduce the area of benthic habitat and volume of aquatic habitat, leading to lower population sizes and diversity in lotic communities.

Methods for Assessing Hydrologic Changes in Urban Streams

We examine the effects of urban development on the four types of streamflow patterns (high flow frequency,

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TABLE 2. Streamflow patterns with biological responses to variation, statistics, and ranges of values for streams in each source. Statistics in italics were analyzed in this chapter for selected reference and urban streams.

Biological responses to variable:	High-flow frequency statistics	Range of values
Variation in high-flow frequency		
Dominance of trophic and habitat generalists in fish assemblages, lower periphyton density and diversity with increasing high flow frequency.	*Frequency of daily flows that exceeded three times median flow*	0 to 34 events per year[b] 1.1 to 10 events per year[c]
	Frequency of events greater than 10th percentile flow	2.4 to 10 events per year[c]
	Frequency of daily flow corresponding to annual peak flow with 1.67 return interval	0.4 to 1.1 events per year[a]
Variation in streamflow distribution		
Dominance of trophic and habitat specialists in fish assemblages with increasing mean or median flows; lower periphyton density, richness, and diversity with increasing mean and median flows or increasing stormflow relative to baseflow; lower invertebrate density and richness with increasing mean or median flow or increasing stormflow to baseflow.	*Mean streamflow*	0.4 to 520 m^3/s[b] 0.6 to 37 m^3/s[c]
	Median daily streamflow	0.3 to 468 m^3/s[c] 0.1 to 30 m^3/s[c]
	$T_{Q\text{mean}}$	0.17 to 0.37[c]
	Flood flow index	0.03 to 2.8[b]
Variation in daily streamflow		
Dominance of trophic and habitat generalists in fish assemblages, lower periphyton diversity, lower invertebrate density and evenness with increasing daily variation.	*Coefficient of variation of logarithms of daily streamflow*	0.4 to 27[c]
	Median daily percent change	3% to 12%[c]
	Coefficient of variation	0.4 to 3.2[a] 0.09 to 3.7[b]
Variation in low flow		
Dominance of trophic and habitat specialists in fish assemblages, higher periphyton and invertebrate density with increasing low flow	*90th percentile flow*	0 to 20.4 m^3/s[c]
	90th percentile flow/median daily flow	0.17 to 0.98[b] 0 to 0.72[c]
	Baseflow stability	0 to 0.6[a]

Sources: [a] Poff and Allan (1995), [b] Clausen and Biggs (1997), [c] reanalysis of sites examined by Poff and Allan (1995).

streamflow distribution, daily variation, low flow/flow intermittency) in 13 streams in the United States that have streamflow records of at least 30 years (Table 3). Five streams are part of the U.S. Geological Survey (USGS) Hydrologic Benchmark Network (HBN), which represents reference streams relatively unaffected by local land uses, and eight urban streams were in counties with population densities greater than 200 people/km^2 in 2000 (Figure 4).

A host of streamflow statistics can be used to demonstrate the hydrologic effects of urbanization and their relations to stream biota, but many streamflow statistics are correlated with each other because they represent the same underlying streamflow pattern. For our analysis, we selected nine statistics representing four distinct streamflow patterns (Table 2) to assess which statistics consistently change in response to urban development while remaining stationary in reference streams. Annual values of the streamflow statistics were analyzed for changes in urban streams between WY 1957–1968 and WY 1991–2000 using the Wilcoxon rank-sum test, with rejection of the null hypothesis when $P < 0.05$. For the urban streams, the specific direction of change was hypothesized for each parameter except mean, median, and low-flow statistics. The hypotheses are described below and allow a one-tailed test (i.e., reject the null hypotheses for no change or a change in the opposite direction). Two-

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TABLE 3. Selected Hydrologic Benchmark Network stations and urban streams with U.S. Geological Survey station number, county and state, and drainage area.

Stream	Station number	County and state	Drainage area
Hydrologic Benchmark Network			
Elder Creek	11475560	Mendicino, CA	17 km^2
Holiday Creek	02038850	Appomattox, VA	22 km^2
Andrews Creek	12447390	Okanogan, WA	57 km^2
Mogollon Creek	09430600	Grant, NM	177 km^2
Popple River	04063700	Florence, WI	356 km^2
Urban			
Valley Stream	01311500	Nassau, NY	12 km^2
Mercer Creek	12120000	King, WA	31 km^2
Poplar Creek	05550500	Cook, IL	90 km^2
San Francisquito Creek	11164500	Santa Clara, CA	96 km^2
Morrison Creek	11336580	Sacramento, CA	137 km^2
Northeast Branch Anacostia River	01649500	Prince George's, MD	186 km^2
Peachtree Creek	02336300	Fulton, GA	222 km^2
Salt Creek	05531500	Cook, IL	294 km^2

tailed tests were used for mean streamflow, median streamflow and the two low-flow statistics because we did not have specific hypotheses regarding the direction of change for these statistics

Streamflow records for most HBN sites began later than the urban streams, so statistics for WY 1969–1978 were compared to statistics for WY 1991–2000 for the HBN sites. For the HBN sites, periods were compared with a two-tailed Wilcoxon rank-sum test. The null hypothesis (no change over time) was rejected when $P < 0.10$ for the HBN streams to increase the power of the test to detect changes in each statistic. By reducing the likelihood of false rejection of the null hypothesis for the HBN sites, there is greater certainty for concluding that a statistic is relatively stationary despite decadal-scale variation in weather patterns.

Streamflow data available for the period of analysis include annual maxima and daily mean streamflows. Daily mean streamflow does not capture the variability of urban streamflow, which can rise and fall rapidly during an hour or two. Thus, hydrologic measures based on daily streamflow underrep-resent the hydrologic changes associated with urban development and their biological consequences. Nonetheless, these data are consistent with those used by Clausen and Biggs (1997) and Poff and Allan (1995).

Frequency of High-Flow Events

Urban development was expected to increase the volume and peak rate of runoff from storms, which results in increased flood magnitude and frequency. Various approaches account for the relative magnitude of a flood in a particular stream, including scaling the flow by drainage area or channel width, converting the discharge to a depth and assessing it relative to bankfull depth, or using a reference discharge as a threshold for identifying a high flow. Clausen and Biggs (1997, 2000) selected a discharge three times the median streamflow as a threshold for defining "high" flows because of its association with variation in benthic assemblages.

In our reanalysis of streamflow data from sites examined by Poff and Allan (1995), the frequency of events greater than three times the median flow was significantly different between the hydrologically variable and hydrologically stable sites (Table 1). Poff and Allan (1995) used the daily discharge on the day when there was a peak discharge with a 1.67-year recurrence interval as the threshold for high flows because it referenced a significant, but not rare, disturbance to the fish assemblage. Although such an event may represent a disturbance, it does not provide much resolution between streams insofar as the annual frequency of a given streamflow is related to its recurrence interval. Indeed, the frequency of high flows was not significantly different between hydrologically stable and hydrologically variable sites using this frequency-based threshold (Table 1).

The cumulative exceedence distribution of streamflow (flow-duration curve) provides a mechanistic basis for selecting a geomorphically effective flow (Wolman and Miller 1960) capable of disturb-

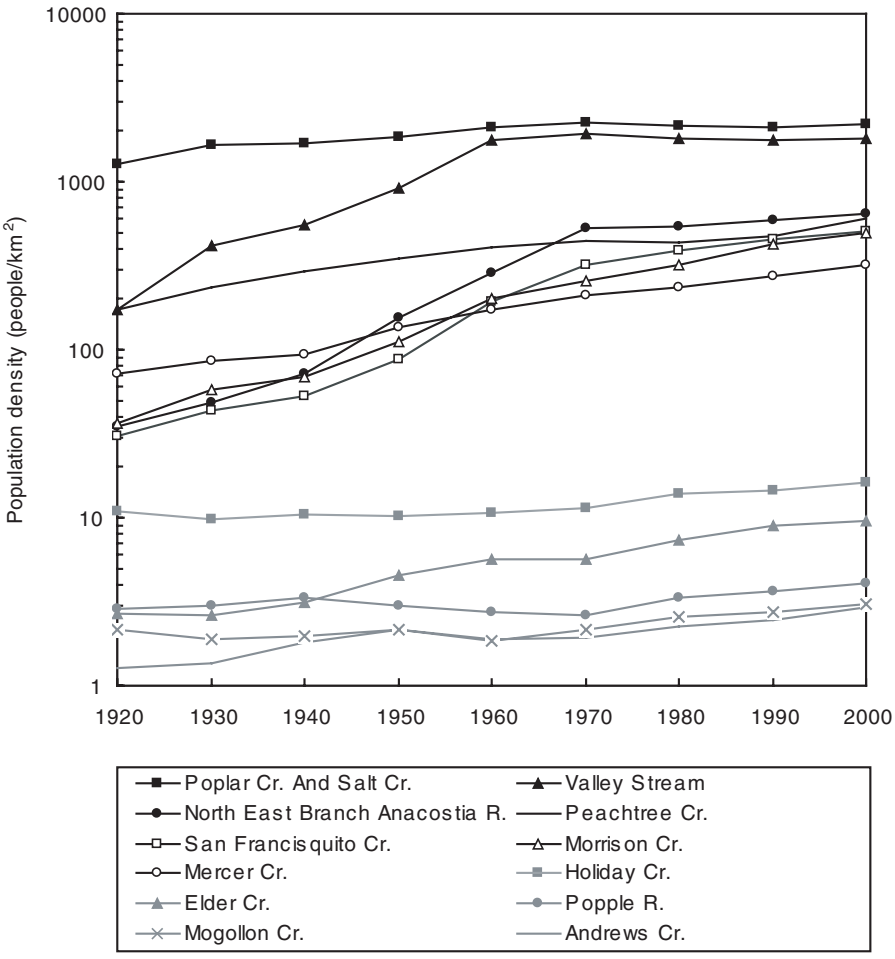

FIGURE 4. Decadal population densities from 1920 to 2000 for the counties where the selected streamflow gauges are located. Refer to Table 3 for stream locations. Data from the U.S. Census Bureau (2004).

ing a streambed. The 5th- to 10th-percentile flows represent an approximate threshold of streambed stability for many river channels (e.g., Helley 1969; Milhous 1973; Pickup and Warner 1976; Andrews 1984; Sidle 1988; Carling 1988; Konrad et al. 2002). The 5th- or 10th-percentile flows are very highly correlated; for simplicity, we use the 10th-percentile flow as the high flow threshold. When high flow frequency was reanalyzed at the sites investigated by Poff and Allan (1995), hydrologically variable sites had more frequent high-flow events than hydrologically stable sites (Table 1). Changes in the frequency of high-flow events in the urban and HBN streams were analyzed using as thresholds both the 10th-percentile streamflow and three times the median streamflow.

Flow Distribution

We did not expect central measures of streamflow distribution to change consistently in response to urban development, but both annual mean and annual median flows were tested for changes between the urban and reference streams because of the associations of these measures with characteristics of fish and benthic assemblages, and with habitat area/volume and streamflow. Streamflow was expected to be redistributed from base flow periods to storm flow periods in response to urban development. Clausen and Biggs (1997) used the ratio of flood-flow volume to base flow volume as a "flood-flow index" (FFI). However, the flood-flow index requires a stream-specific specification of base flow for each

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stream and reference changes in streamflow volume. These data were not available for the streams we analyzed.

As an alternative measure of the distribution of streamflow, we analyzed the fraction of time that streamflow exceeds mean streamflow ($T_{Q\text{mean}}$) in the urban and reference streams. $T_{Q\text{mean}}$ provides a relative measure of the distribution of storm flow and base flow comparable to the flood-flow index, but it is based on the duration rather than the volume of streamflow. In response to urban development, $T_{Q\text{mean}}$ is expected to decrease because there is a shorter period of the year when streamflow is greater than mean streamflow (Konrad and Booth 2002).

In the reanalysis of the Poff and Allan (1995) sites, $T_{Q\text{mean}}$ was not significantly different between the hydrologically variable and hydrologically stable sites (Table 1). Four sites with hydrologically variable fish assemblages were associated with hydrologic stability (higher $T_{Q\text{mean}}$) possibly because of either low base flow stability or a short spate-free period. When these sites were excluded from the analysis, $T_{Q\text{mean}}$ was significantly lower ($P = 0.02$, Wilcoxon rank-sum test) for the hydrologically variable group (median = 0.22), than the hydrologically stable group (median = 0.26). Annual values of $T_{Q\text{mean}}$ were tested to assess whether there was a significant redistribution of streamflow from base flow to storm flow in urban streams and whether the distribution of streamflow between base flow and storm flow was relatively stationary year to year in the reference streams.

Daily Variation of Streamflow

Daily variation of streamflow was analyzed to represent variability, distinct from high-flow disturbances and the gross distribution of storm flow and base flow. Two statistics describing daily variation were examined: the CV of the logarithms of daily streamflow and the percentage daily change in streamflow. The values of both variability statistics were expected to increase in response to urban development. The logarithmic transformation reduced the sensitivity of CV to high flows (Stedinger et al. 1993). Because of zero values, 1 m^3/s was added to each streamflow value before taking the logarithm.

Although the CV of untransformed daily streamflow was not significantly different between the hydrologically variable and hydrologically stable sites analyzed by Poff and Allan (1995), a reanalysis of these sites showed significantly higher values of CV of log-transformed streamflow for hydrologically variable sites (median = 2.1) compared to hydrologically stable sites (median = 0.7) (Table 1). The CV of log transformed daily streamflow was included in the analysis of urban and reference streams to represent routine variation in hydraulic conditions.

The absolute value of the relative change in daily streamflow, $|Q_d - Q_{d-1}|/Q_d$, where Q_d is daily discharge for day d (expressed as the daily percent change in daily flow), was used as an alternative measure of daily flow variability. This statistic weights the relative changes in high flows and low flows equally and, thus, is less sensitive to changes in high flows than is CV. In a reanalysis of the sites in Poff and Allan (1995), the median daily percentage change in streamflow was significantly higher at hydrologically variable sites (median = 7%) compared to hydrologically stable sites (median = 5%) (Table 1).

Low Flow Magnitude

As noted earlier, low flows are not consistently affected by urban development, but we assessed changes in low flows because of their ecological significance. Two low-flow statistics were tested for significant changes over time in the HBN and urban streams: 90th-percentile flow and 90th-percentile flow divided by median streamflow. The 90th-percentile flow provides an absolute measure of streamflow during relatively common low-flow periods but does not account for extremely low flows. The 90th-percentile flow divided by the median flow, from Clausen and Biggs (1997), provides a relative measure that should be less sensitive to annual variation in low flows. In our reanalysis of the Poff and Allan (1995) sites, the values of 90th-percentile flow divided by the median flow were significantly lower at hydrologically variable sites (median = 0.21) compared to hydrologically stable sites (median = 0.52) (Table 1).

Temporal Changes in Streamflow Patterns at Urban and Reference Streams

High Flow Frequency

The frequency of high flows increased from 1958–1967 to 1991–2000 in most of the urban streams, but not in any of the HBN streams (Table 4). The frequency of events greater than the 10th-percentile flow increased in four of the urban streams, while the frequency of events greater than three times the me-

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TABLE 4. Median annual frequency of high-flow events.

Stream	Frequency of events exceeding the 10th-percentile flow (events per year)		Frequency of events exceeding the three times median (events per year)	
	Period 1[a]	Period 2[b]	Period 1[a]	Period 2[b]
Hydrologic Benchmark Network				
Elder Cr.	10	9	7	9
Holiday Cr.	20	22	20	22
Andrews Cr.	3	3	2	4
Mogollon Cr.	6	10	12	15
Popple R.	5	8	7	11
Urban				
Valley Stream	26	30	25	42[c]
Mercer Cr.	18	27[c]	19	32[c]
Poplar Cr.	9	19[c]	14	26[c]
San Francisquito Cr.	7	10	15	10
Morrison Cr.	12	17	12	23[c]
Northeast Branch Anacostia R.	25	34[c]	28	41[c]
Peachtree Cr.	27	33	36	48[c]
Salt Cr.	13	19[c]	20	24

[a] Period 1 is 1969 to 1978 for Hydrologic Benchmark Network streams and 1958 to 1967 for urban streams.
[b] Period 2 is 1991 to 2000.
[c] Probability < 0.05 that frequency is the same for both periods or lower in period 2 based on a one-tailed Wilcoxon rank-sum test.

dian flow increased in six of the urban streams. Only one urban stream, San Francisquito Creek in central California, did not have a significant increase in either high-flow statistic. Streamflow in San Francisquito Creek was intermittent and the high flow regime is likely to reflect storm patterns driven by decadal-scale oscillations in ocean conditions. In this case, it appears that the frequency of events greater than the 10th-percentile flow may be less sensitive to climatic conditions than the frequency of events greater than three times the median flow.

Both of these statistics represent relatively common high-flow events with median annual values for 1991–2000 ranging from 10 to 48 events per year for urban streams and from 3 to 22 events in the HBN streams. The frequency of events greater than the 10th-percentile flow was higher in the urban streams than the streams analyzed by Poff and Allan (1995) (2.4–10.3 events per year) and, thus, all represent hydrologically variable streams by their criterion even during the earlier period from 1958 to 1967. Likewise, the change in the frequency of events exceeding three times the median flow in the urban streams was outside the range for the streams examined by Poff and Allan (1995) (1.1–10 events per year) but spanned part of the range found by Clausen and Biggs (1997) (0–34 events per year) (Table 2).

Streamflow Distribution

The distribution of streamflow changed between 1958–1967 and 1991–2000 in many of the urban streams but not between 1969 and 1978 and 1991–2000 in the HBN streams. Mean streamflow increased significantly between 1958–1967 and 1991–2000 in two urban streams (Table 5). The increases in mean and median streamflow, however, were much less than the three to four order-of-magnitude ranges associated with responses in either fish or benthic assemblages (Table 2).

The redistribution of runoff from base flow to storm flow periods resulted in significant decreases in $T_{Q\text{mean}}$ from 1958–1967 to 1991–2000 in three urban streams. In Valley Stream, Long Island, $T_{Q\text{mean}}$, decreased from 0.24 for 1958–1967 to 0.15 for 1991–2000 (Table 5). The decrease in $T_{Q\text{mean}}$ corresponded to redistribution of annual streamflow volume from more than 60% base flow (FFI = 0.67) prior to 1960 to less than 20% base flow (FFI = 4) after 1966 (Simmons and Reynolds 1982). The urban streams without significant changes in $T_{Q\text{mean}}$ had

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TMABLE 5. Median annual values of streamflow distribution statistics.

Stream	Mean daily streamflow (m^3/s)		Median daily streamflow (m^3/s)		Fraction of time mean streamflow is exceeded	
	Period 1[a]	Period 2[b]	Period 1[a]	Period 2[b]	Period 1[a]	Period 2[b]
Hydrologic Benchmark Network						
Elder Cr.	0.85	0.85	0.19	0.20	0.25	0.25
Holiday Cr.	0.28	0.25	0.17	0.19	0.23	0.28
Andrews Cr.	0.91	1.07	0.15	0.18	0.20	0.22
Mogollon Cr.	0.32	0.98	0.10	0.41	0.29	0.30
Popple R.	3.30	3.07	1.95	2.05	0.28	0.31
Urban						
Valley Stream	0.07	0.04	0.04	0.01	0.24	0.15[d]
Mercer Cr.	0.57	0.64	0.37	0.40	0.33	0.26[d]
Poplar Cr.	0.57	0.83[c]	0.21	0.44[c]	0.26	0.28
San Francisquito Cr.	0.18	0.91	0.00	0.06	0.15	0.16
Morrison Cr.	0.40	0.78	0.17	0.15	0.14	0.15
Northeast Branch Anacostia R.	2.03	2.79	1.08	1.33	0.24	0.21[d]
Peachtree Cr.	3.40	4.11	1.67	1.66	0.20	0.20
Salt Cr.	2.75	5.03[c]	1.29	3.04[c]	0.27	0.28

[a] Period 1 is 1969 to 1978 for Hydrologic Benchmark Network streams and 1958 to 1967 for urban streams.
[b] Period 2 is 1991 to 2000.
[c] Probability < 0.05 that value was the same for both periods based on a two-tailed Wilcoxon rank-sum test.
[d] Probability < 0.05 that value was the same for both periods or higher for period 2 based on a one-tailed Wilcoxon rank-sum test.

low values (0.2 or lower) during the initial period of the analysis or had significant increases in base flow (Salt and Poplar Creeks). The changes in T_{Qmean} spanned much of the total range of values (0.17–0.37) from the reanalysis of streams examined by Poff and Allan (1995) (Table 3). Thus, the redistribution of runoff from base flow to storm flow in many, but not all, urban streams is likely to be ecologically significant.

Daily Flow Variability

Daily flow variability increased in many urban streams from 1958–1967 to 1991–2000. Although the CV of the logarithm of daily flows increased in five urban streams (Table 6), the changes were significant in only three of the streams because of interannual variability. No differences between 1969–1978 and 1991–2000 were significant for the HBN streams.

The median daily percentage change in streamflow appeared to be more sensitive to urban development, increasing in five urban streams between 1958–1967 and 1991–2000 and generally having higher values in urban streams than in HBN streams (Table 6). One HBN stream had a significant increase in the median daily percentage change in streamflow, and one HBN stream had a significant decrease from 1969–1978 to 1991–2000. The median daily percentage change for urban streams was more variable (10–40%), than in the HBN streams (3–12%) or the reanalyzed streams of Poff and Allan (1995) (3–12%).

Low Flow

The 90th-percentile streamflow increased significantly in four of the urban streams from 1958–1967 to 1991–2000 and increased significantly one HBN stream from 1969–1978 to 1991–2000 (Table 7). Two of the urban streams had significant increases in 90th-percentile flow normalized by median discharge, but none of the HBN streams had significant changes (Table 7). The increase in low flow may be a result of many factors, including wastewater discharges, or uses of deep groundwater or water imported from other basins that contribute to base flow (e.g., landscape irrigation or septic system effluent). These changes in low flow were small relative to the range of value reported by Clausen and Biggs (1997) and for the reanalysis of the streams examined by Poff and Allan

TABLE 6. Median annual values of streamflow-variability statistics.

Stream	Daily percentage change in streamflow		Coefficient of variation of logarithms of daily streamflow	
	Period 1[a]	Period 2[b]	Period 1[a]	Period 2[b]
Hydrologic Benchmark Network				
Elder Cr.	6%	6%	1.72	1.62
Holiday Cr.	10%	10%	0.77	0.74
Andrews Cr.	4%	3%	1.36	1.25
Mogollon Cr.	10%	12%[c]	1.17	1.43
Popple R.	5%	5%	0.78	0.76
Urban				
Valley Stream	18%	40%[d]	0.71	0.74
Mercer Cr.	11%	15%[d]	0.80	0.80
Poplar Cr.	14%	19%[d]	1.19	1.17
San Francisquito Cr.	0%	10%	1.13	2.08
Morrison Cr.	11%	11%	0.82	1.12[d]
Northeast Branch Anacostia R.	15%	19%[d]	0.91	0.93
Peachtree Cr.	15%	21%[d]	0.90	0.98[d]
Salt Cr.	13%	12%	0.97	0.80[d]

[a] Period 1 is 1969 to 1978 for Hydrologic Benchmark Network streams and 1958 to 1967 for urban streams.
[b] Period 2 is 1991 to 2000.
[c] Probability < 0.10 that value was the same for both periods based on two-tailed Wilcoxon rank-sum test.
[d] Probability < 0.05 that value was the same for both periods or lower for period 2 based on a one-tailed Wilcoxon rank-sum test.

TABLE 7. Median annual values of low-flow statistics.

Stream	90th-percentile streamflow (m^3/s)		90th-percentile streamflow/ median daily streamflow	
	Period 1[a]	Period 2[b]	Period 1[a]	Period 2[b]
Hydrologic Benchmark Network				
Elder Cr.	0.03	0.03	0.20	0.17
Holiday Cr.	0.07	0.08	0.41	0.51
Andrews Cr.	0.07	0.10[c]	0.45	0.55
Mogollon Cr.	0.01	0.02	0.09	0.09
Popple R.	1.06	1.13	0.54	0.58
Urban				
Valley Stream	0.01	0.00	0.16	0.00
Mercer Cr.	0.15	0.20[d]	0.40	0.54[d]
Poplar Cr.	0.03	0.06[d]	0.20	0.14
San Francisquito Cr.	0.00	0.01[d]	0.50	0.23
Morrison Cr.	0.10	0.10	0.65	0.62
Northeast Branch Anacostia R.	0.35	0.48	0.34	0.39
Peachtree Cr.	0.69	0.72	0.41	0.46
Salt Cr.	0.48	1.58[d]	0.40	0.50[d]

[a] Period 1 is 1969 to 1978 for Hydrologic Benchmark Network streams and 1958 to 1967 for urban streams.
[b] Period 2 is 1991 to 2000.
[c] Probability < 0.10 that the value was the same for both periods based on a two-tailed Wilcoxon rank-sum test.
[d] Probability < 0.05 that value was the same for both periods based on a two-tailed Wilcoxon rank-sum test.

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(1995) (Table 2). Moreover, increases in low flow would likely promote biological responses opposite from the other hydrologic effects of urban development (Table 2).

Framework for Assessing the Ecological Effects of Urban Streamflow Patterns

Urban development modifies the basic hydrologic processes generating runoff in many river basins. In our analysis of eight urban streams, changes in some streamflow patterns were comparable to hydrologic variation associated with demonstrated differences in the structure and composition of lotic communities in other streams. Hydrologic changes in urban streams are likely to affect three streamflow characteristics with ecological consequences: high-flow frequency, distribution of water between storm flow and base flow, and daily flow variability. These changes may contribute to dominance of fishes representing trophic and habitat generalists and also to lower periphyton biomass, diversity, and richness.

Biological responses to urban streamflow patterns also depend on the larger physiographic setting (climate, sediment supply, and channel/valley geomorphology) and other urban stressors (habitat alteration, changes in water chemistry). For example, even though minimum flows were not lower in the urban streams considered here, water depths during low flow may be less in an urban stream if its channel has widened in response to increased high flows.

Effects of urban development are neither uniform nor invariant—naturally "flashy" systems in arid regions may not become much more flashy after urbanization. It is likely that hydrologic changes are greatest in small to intermediate-sized streams with naturally low seasonal and storm flow variability. Large rivers may be buffered because urban development does not cover the whole basin, precipitation may not fall over the whole basin during small storms, and channel routing and overbank storage may attenuate high flows. Poff and Allan (1995) noted that large streams may function like headwater streams if they are seasonally variable. Likewise, the lotic communities in urban streams may function like those in smaller and more hydrologically variable streams because of hydrologic modification.

In streams and rivers with hydrologic changes from urban development, those changes are not necessarily outside the bounds of "natural" variation in streamflow patterns as defined by all streams spanning the range from arid to humid climates. Likewise, variation in weather patterns produces a wide range of natural variation in streamflow regardless of land use. Both types of natural hydrologic variability make it difficult to attribute specific streamflow patterns to land-use changes and to assign specific ecological consequences to streamflow patterns, because lotic species are adapted to natural hydrologic variation. Only through the systematic assessment of a long-term record is it possible to identify those changes that are persistent in hydrologic effects and ecological consequences.

Management Responses to Hydrologic Modification in Urban Streams

Two management questions arise if hydrologic modification is acknowledged as a significant factor in the biological degradation of urban streams. First, are the hydrologic influences on urban streams limited to a few, identifiable mechanisms that could become objectives (or priorities) for mitigation through stormwater management? Second, given the difficulties in accomplishing hydrologic restoration, what is the best possible condition for urban streams under an urban streamflow regime and what marginal effects might result from managing other aspects of the ecosystem (e.g., water quality treatment, stream habitat, riparian zone)?

The varied nature of urban-induced hydrologic changes and the many ways in which aquatic biota interact with flow regime suggest that there are not one or two aspects of an altered hydrologic regime that cause biological consequences. The belief in "single-issue" hydrologic changes is reminiscent of past approaches to stormwater management, namely to achieve flood control by limiting peak discharges. The single-issue focus failed to protect biological systems, because single-storm peak discharge is not a hydrologic characteristic of particular significance to biota. Ironically, that focus has even failed to provide flood protection, because most analyses have not recognized the full range of urban-induced hydrologic changes, including redistribution of streamflow, increased daily variation of streamflow, sequential peak flow events (Booth et al. 2002), and extended flow durations that result in enhanced sediment transport and deposition (Booth 1990). Inspection of comparative hydrographs (e.g., Figure 2) reveals changes in all seasons, across multiple temporal scales, and at every level of discharge. Even if hydrologic changes are limited to the types identified by the analysis of long-term streamflow patterns, mitigation would require greatly increased storage capacity of stormwater management systems. Moreover, the

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predevelopment patterns of many streams could not be replicated by large detention ponds with simple control structures to release the water because they cannot support gradual, sustained recessional flows after storms.

The variety of hydrologic changes is symptomatic of an underlying cause, namely the pervasive loss of water storage capacity of hillslopes that accompanies urban development where it reduces vegetation, topographic depressions, soil depths, and infiltration capacity of the land surface. Ultimately, any true solution must account for each of these hydrologic changes. The classic mitigation approach, detention ponds, fails because (1) it replaces only a scant fraction of the storage capacity of hillslopes that was lost (Booth and Jackson 1997); (2) it converts what was once spatially distributed subsurface runoff into a point discharge at a surface water outfall; and (3) it reduces the rate and changes the location of groundwater recharge and subsequent discharge because even the largest detention ponds cannot delay the production of runoff from large or long storms in the same fashion as large areas of natural landscape with intact vegetation, topography, and soils. For these reasons, objective assessments of detention-pond performance are rarely encouraging (e.g., Maxted and Shaver 1999).

Directly addressing the loss of long-term storage of storm flow is more challenging and much less widely implemented. Two other traditional engineering approaches, infiltration ponds and bypass pipelines, provide plausible opportunities for hydrologic mitigation but are each constrained by site requirements. Infiltration ponds (i.e., centralized facilities to store and reintroduce stormwater into the groundwater system) require deep infiltrative geologic strata at or near the ground surface to accommodate the large volumes of runoff collected. In many areas. such geologic conditions are ubiquitous; in others, they are widely scattered or absent altogether. Bypass systems provide partial hydrologic mitigation at best—they reduce total postdevelopment runoff volume in noninfiltrative soils and can provide nearly fail-safe reductions of peak flows and/or flow durations. However, they can leave the plethora of small and moderate discharges from paved surfaces nearly unaffected. Conversely they may eliminate all base flow once contributed from now-paved upland areas. In either case, bypass systems release all runoff as surface flow at a point discharge without any opportunity for groundwater recharge.

These considerations lead to the conclusion that hydrologic restoration requires the distributed retention of stormwater in reservoirs with a combined volume equivalent to the original soil layer and land surface. Where the land surface was steep, the soil was thin, and its infiltration capacity naturally low, the changes caused by urbanization may not be great, and achieving an equivalent degree of stormwater retention in the built environment may be relatively simple. Where predevelopment soil depths naturally approach a meter or more and porosities approach 50% and where wetlands retained much of the rainfall, simple strategies and normal land-development practices will not be successful at reestablishing streamflow patterns.

Recent efforts to achieve more comprehensive hydrologic mitigation have involved a suite of engineering and site-design approaches collectively known as "low impact development" (LID) (U.S. Environmental Protection Agency 2000). This strategy seeks to store, infiltrate, evaporate, or otherwise slowly release stormwater runoff in a close approximation of the rates and processes of the predevelop-ment hydrologic regime (Konrad and Burges 2001). To date, LID has been pursued primarily in humid, temperate regions where urban development can create the greatest alteration to the predevelopment hydrologic regime. Challenges for more widespread use of this approach include uncertainty in its application on relatively noninfiltrative soils, its effectiveness in mitigating high-intensity and (or) large-volume storms, and its construction in new or previously developed areas. Long-term performance, coupled with the uncertain level of long-term maintenance, require further study before the effectiveness of this stormwater-management approach can be advocated or its biological consequences evaluated. Until such time, we recognize no stormwater management strategy, or suite of approaches, that can achieve anything approaching full hydrologic mitigation. Some significant, measurable degree of biological decline is thus unavoidable in urban watersheds where streamflow has been altered for the foreseeable future.

Ecological Management Goals for Urban Streams

Streams nominally protected under land-use regulations have still experienced significant biological degradation. Widespread adoption of some types of development and stormwater management strategies may prevent further degradation of some streams. Yet, the full range of hydrological and ecological processes cannot be restored in urban streams, and we see no basis to expect that improvements in other aspects of

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stream ecosystems can mitigate the hydrologic consequences of urban development (Booth et al. 2004; Konrad 2003b). As a result, urban stream managers face the difficulty of acknowledging limits on stream ecosystem improvement imposed by the failure to restore streamflow patterns while maintaining prospects for future ecosystem recovery.

Stream restoration in the Pacific Northwest typically focuses on habitat elements in fish-bearing streams include large woody debris, pools, protective cover, gravel deposits, floodplains, and riparian vegetation. Although these elements can be imported to a site or otherwise constructed, neither the biological effectiveness (e.g., Larson et al. 2001) nor longevity (Frissell and Nawa 1992) of artificially placed elements is well documented. Over the long term, habitat elements of streams will be created and maintained only through functioning ecological processes. In recognition of the distinction between direct manipulation of stream habitat elements for an outcome and the self-regulation of habitat conditions in natural stream ecosystems, we discriminate between short-term and long-term actions for improving the biological conditions of streams. Short-term actions are generally feasible under many different management settings but are unlikely to produce long-lasting effects; long-term actions are necessary for true ecosystem enhancement but may be intractable under present-day regulatory, economic, or land-use conditions.

Short-term actions include riparian planting, water quality source control, fish-passage projects, selective instream structures, and social amenities (Bethel and Neal 2003). They address acute problems typical to stream channels in urban and urbanizing settings (e.g., denuded vegetation buffers, point source pollution, fish blockages, simplified channel structure, and dumping of solid wastes). They are not comprehensive, so their efficacy is limited by elements of the ecosystem that are missing or degraded in urban areas. Although some aspects of hydrologic modification in urban areas such as increased frequency of high flows may be addressed in part by short-term actions such as peak flow control, the range of changes in streamflow patterns resulting from urban development are unlikely to be addressed in the short term. As a consequence, hydrologic changes are likely to have persistent effects on the biological conditions of many urban streams.

Short-term actions also acknowledge the presence of people in the urban environment. Streams are affected, often irrevocably, by activities of streamside residents in pursuit of personal esthetics or low maintenance (Schauman 1998). Management actions that enhance interactions between the public and urban streams are likely to be supported, but the financial costs for such actions are commonly greater than the ecosystem benefits. Such actions are often considered desirable because they improve "quality of life" or the stream's value as a public amenity or educational resource.

Long-term, self-sustaining actions must ultimately address all of the five aspects of stream ecosystems (Figure 1). These actions might include various types of land-use planning (e.g., preserves, zoning), minimizing or redesigning road and utility crossings, upland hydrologic rehabilitation (e.g., stormwater infiltration), erosion control, riparian vegetation restoration, and reconnection of streams with floodplains. In some cases, there are fundamental conflicts between the processes that create and maintain aspects of stream ecosystems (e.g., flooding) and extensive infrastructure and human occupation around streams. Streamflow is a key habitat-forming process, and failure to reestablish streamflow patterns almost certainly precludes full restoration of the ecosystem. Over the long term, restoration of an urban stream to a predevelopment state is likely to require the exclusion of people from the immediate environment (channel and riparian areas) and, perhaps, even upland portions of the basin, even as it requires their support to ensure its implementation and success. Support and stewardship by the surrounding community would be essential to such an ambitious goal, but people's involvement would be very different from the short-term efforts that depend on human actions in and along stream channels.

Evidence to date suggests that short-term actions alone, and even some well-intentioned and well-reasoned long-term actions, do not achieve broad ecosystem protection in the urban environment. At best, biological communities in urban streams may be diverse and complex, but they will depart significantly from predevelopment conditions. These streams can be neighborhood amenities and provide nearby residents with a connection to a place not completely managed by human actions, and with a self-sustaining and self-regulating biological community. These outcomes for urban streams should be achievable even in the absence of reestablishing natural hydrologic processes, which is the likely scenario for many streams in urban and urbanizing watersheds.

Conclusions

"Urbanization" is not a single condition; it is a collection of actions that lead to recognizable landscape forms

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and, changes in stream conditions. Because of the broad and important roles of streamflow in fluvial ecosystems, hydrologic changes in urban streams pose significant ecological risks that warrant evaluation along with other changes (e.g., water chemistry, physical habitat, riparian conditions) long associated with urban development. Three types of hydrologic changes of ecological significance are likely to result from urban development: increased frequency of high flows; redistribution of water from periods of base flow to periods of storm flow, and increased daily variation in streamflow. These changes do not necessarily occur in all urban streams, but they are common and need to be addressed as part of any comprehensive effort to rehabilitate urban streams. Other hydrologic changes may also occur in urban streams, particularly where surface water or shallow groundwater are used for water supplies, which may also have ecological repercussions. Urban streams can provide habitat for biological communities even if the hydrologic consequences of urban development are not addressed, but the structure and composition of these communities are likely to depart from those of the predevelopment stream. Ultimately, true restoration of urban streams can only occur if hydrologic processes and the spatial distribution of the water-storage capacity is reestablished across the urban landscape.

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NPDES Stormwater Cost Survey

Prepared For:

California State Water Resources Control Board

Prepared by:

Office of Water Programs
California State University, Sacramento

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Includes Appendix H:

Alternative Approaches to Stormwater Control

Prepared by:

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Contract: 02-189-250-0

NPDES Stormwater Cost Survey
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EXECUTIVE SUMMARY

This report is funded by the California State Water Resources Control Board under contract 02-189-250-0, "Survey of Costs to Develop, Implement, Maintain and Monitor Municipal Separate Storm Sewer System (MS4) Storm Water Management Programs and Description of Alternatives for Control of Stormwater Quality in Los Angeles County."

BACKGROUND

The current costs to implement best management practices (BMPs) have been the basis for lawsuits and petitions challenging the California stormwater regulatory program. Additionally, some permittees contend that current MS4 permits necessitate the use of advanced water treatment to meet water quality standards, which would drastically escalate costs above current levels. This contention is presented in the report titled "An Economic Impact Evaluation of Proposed Storm Water Treatment for Los Angeles County" (Gordon, 2002). This project addresses these issues through two tasks.

Task A – Documenting Stormwater Program Costs

Five California municipalities and one metropolitan area with stormwater programs that are demonstrating meaningful progress toward maximum extent practicable (MEP) compliance as identified by Regional Water Quality Control Board (RWQCB) staff were surveyed for the most recent stormwater compliance costs. Demonstrating meaningful progress is defined in this report as implementing activities specifically presented in the Storm Water Management Plans (SWMPs). Because permits use an iterative approach that increases requirements until water quality objectives are met, current levels of implementation may not be the ultimate MEP standard. This report does not address the benefits of permit compliance activities. Some scenarios addressing ultimate compliance cost are addressed in Task B. Task A was accomplished by the Office of Water Programs (OWP) at California State University, Sacramento (CSUS).

Task B – Alternative Approaches to Stormwater Quality Control

Task B is an assessment of regulatory policy to determine the intent of stormwater regulation regarding advanced treatment. Alternatives for stormwater quality control that are believed to comply with the intent of the regulations are described. Costs were estimated for the Los Angeles Regional Water Quality Control Board (LARWQCB) area. Task B was accomplished by the University of Southern California (USC) and the University of California at Los Angeles (UCLA).

RESULTS

Cost Survey (Task A)

Annual cost per household for the six stormwater programs surveyed ranged from $18 to $46, as seen in Table 1.

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Table 1. Stormwater Costs per Household for the California Cost Survey (Task A)

Municipalities	Municipality Description	Cost/Household ($)
City of Encinitas	Coastal tourism, small city	46
City of Fremont	Bay Area, moderately integrated countywide program	45
City of Santa Clarita	Tourism and industrial	39
City of Corona	Industrial	32
City of Sacramento	Pumped stormwater, large city	29
Fresno-Clovis Metropolitan Area	65-90% infiltration, fully integrated multi-city program	18

The Fresno-Clovis Metropolitan Area (FCMA) had substantially lower cost per household. The following factors are thought to contribute to the FCMA costs limit costs being lower than the other survey results:

- flood control and stormwater quality basins are combined,
- land was set aside for water projects,
- climate helps infiltration due to infrequent storms and low annual rainfall,
- lower land cost compared to other cities,
- FMFCD owned land needed for basins prior to storm water permits requirements,
- topography lends to drainage of urban areas to post-construction BMPs, and
- highly permeable soils allow extensive use of infiltration.

These factors are unique or more prevalent for FCMA than for the other cities surveyed. Excluding the FCMA as an ideal situation, the range of cost is $29 to $46 per household.

The results of the survey are compared to values from the USEPA report "Economic Analysis of the Final Phase II Stormwater Rule." This report contains a summary of costs from two separate efforts to estimate Phase II cost per household. The first is the results of a survey stormwater costs for 56 Phase II municipalities performed by the National Association of Flood and Stormwater Management Agencies (NAFSMA). The NAFSMA survey represents the six minimum measures of the Phase II regulations because two measures seemed to have been combined: 1) Public Education and Outreach and 2) Public Involvement and Participation.

The second effort presented in the USEPA report is the results of a review by USEPA of annual stormwater reports from 26 Phase I municipalities. These municipalities were chosen were smaller Phase I cities, were nearly in the first permit term, and had reported cost in their annual reports. The California survey results for the cost categories corresponding to the six minimum measures were extracted to compare to the NAFSMA survey and the EPA review. The results of this comparison are in Table 2.

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Table 2. Stormwater Costs per Household for Six[1] Minimum Measures from the California Survey, the NAFSMA[2] Phase II Survey, and the USEPA review of Phase I Annual Reports (USEPA, 1999)

Study	Median (50%) ($)	Mean ($)	Max ($)
Adjusted California Survey[3]	24	26	35
NAFSMA Phase II Survey[4]	4.63	10	61
EPA Phase I Survey[5]	3.16	10	67

1. Public Education and Outreach and Public Involvement and Participation were assumed combined for the NAFSMA survey.
2. NAFSMA: National Association of Flood and Stormwater Management Agencies
3. Based only on costs from cost categories that correspond to the six minimum measures
4. NAFSMA survey based on 56 Phase II respondents to a survey on stormwater costs for five minimum measures. Values adjusted to 2003 dollars.
5. EPA results based on a review of 26 annual reports for smaller Phase I cities that were nearly in their first NPDES term so that costs would be more representative of Phase II programs. Values adjusted to 2003 dollars.

In some cases, programs in the California survey appeared to go beyond the minimum requirements of the permit. The cost of this additional effort was not included when it could be identified or estimated, such as street sweeping in Sacramento that was above the permit required frequency. Including the total cost of the street sweeping program the cost per household for Sacramento would increase $1.69. In some cases the additional effort could not be estimated. This was particularly true when stormwater activities were combined with activities that occurred more frequently than the permit requirement for the stormwater activities, such as when stormwater construction inspections for Santa Clarita were performed at every construction permit inspection and these permit inspections occurred more frequently than the permit requirement.

Description of Alternatives for Control of Stormwater Quality (Task B)

The alternatives for control of stormwater quality focus on source control and runoff reduction. The principle strategy for runoff reduction is by infiltration and evapotranspiration, using common BMPs. Based on this approach, costs for two scenarios are estimated for the area under LARWQCB jurisdiction. One scenario assumes source control BMPs are sufficient to comply with regulations. The other scenario assumes treatment using wetlands and infiltration basins. Two costs were estimated for the treatment scenario based on two different sources of unit costs. These scenarios do not include advanced treatment costs. Equivalent annual costs per household were calculated to compare to cost estimates from other studies. Table 3 compares the cost estimates of the two scenarios to the estimated current stormwater cost for the Los Angeles area.

Current level of effort in the Los Angeles area has only made limited progress in implementing the scenarios described in Task B (Devinny, 2004). If there are cases where discharge from these BMPs still requires advanced treatment, the cost of stormwater treatment would be much less than if advanced treatment was solely used because runoff reductions would reduce the size of treatment plant requirements.

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Table 3. Equivalent Cost Per Household For Task B Alternatives

Cost Scenario for the Los Angeles Area	Equivalent Annual Cost, $/household
Current Effort	18
Alternative to Advanced Treatment: Pollution Prevention Scenario (Present worth 2.8 billion)[1]	27
Alternative to Advanced Treatment: Wetlands and Infiltration Basins Scenario, calculated using cost per area (Present worth 5.7 billion)[1]	55
Alternatives to Advanced Treatment: Wetlands and Infiltration Basins Scenario, calculated using cost per capture volume (present worth 7.4 billion)[1]	71

1. Little progress has been made in implementing these scenarios (Devinny, pers. comm., 9/14/04). These costs may be added to the current effort if existing programs continue to be required. Costs based on Devinny et. al. (Appendix H), see Table G-6 for equivalent annual cost calculation.

Table 4 compares several cost estimates in terms of equivalent annual cost per household.

Table 4. Equivalent Annual Cost per Household Comparisons between California Cost Survey Results and Los Angeles Area Future Cost Estimates[1]

Range of Current Cost from the California Survey		Range of Cost Estimates for Alternatives for Control of Stormwater Quality[2]		Maximum TMDL Estimates[3]		Statewide Clean Water Willingness To Pay[4]
				Ballona Creek Metals	L.A. River Trash	
18	46	27	71	75	141	180

1. Calculations are presented in Appendix G and are based on the following sources for each column respectively: survey results in Section 9, Devinny et al (Appendix H), RWQCB, Los Angeles (2004), LARQCB (2001), and Larsen and Lew (2003).
2. Calculated from Task B in Appendix H. Low range is the cost for attaining full compliance using only source control. High range is the cost for attaining full compliance using only treatment BMPs (low tech) estimated on capture volume. It is estimated that this is in addition to the current level of spending in the Los Angeles area.
3. TMDL costs apply to all sources, not just MS4 stormwater sources.
4. Responses were not received from 40% of the mailed surveys. The survey question was for restoring water quality for all waters throughout the state from all impairment, not just within a city or region and not just for impairment from stormwater pollution.

The costs developed by Gordon et al. (2002) were based on capture, collection and advanced treatment of various percentages of the annual runoff volume. An annual runoff capture volume of 70 percent (0.5-inch storm) was selected to compare to the Los Angeles Standard Urban Stormwater Mitigation Plan (SUSMP) capture standards of around 85 percent (0.75-inches). Unfortunately, the next highest capture volume analyzed by Gordon was the 1.25-inch storm. The resulting equivalent annual cost per household using the 0.5-inch storm and assuming a treatment scenario of 65 large regional treatment plants is $459/household. This cost only estimates cost that the cities in Los Angeles County would incur, so they may not directly comparable to the total watershed costs developed in the Total Maximum Daily Load (TMDL) plans because TMDL costs are not restricted to stormwater quality control.

Since some advanced treatment may be required, the future cost will lie between the alternative scenarios estimate and the advanced treatment estimate. Based on the assumption used by the Devinny study, future costs for the Los Angeles area appear to hinge on the ability to reduce stormwater runoff volumes and on the ability to control pollutants through source control.

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This report is funded by the California State Water Resources Control Board (SWRCB) under contract 02-189-250-0, "Survey of Costs to Develop, Implement, Maintain and Monitor Municipal Separate Storm Sewer System (MS4) Storm Water Management Programs and Description of Alternatives for Control of Stormwater Quality in Los Angeles County."

1.1 BACKGROUND

The 1987 amendments to the federal Clean Water Act (CWA) added Section 402(p), which defined stormwater discharges from industrial activities and municipal systems as point sources subject to the National Pollutant Discharge Elimination System (NPDES) Permit Program. The CWA directed the United States Environmental Protection Agency (USEPA) to publish regulations to define the discharges subject to NPDES permits and to establish a framework for regulating these discharges. The stormwater regulations promulgated by USEPA established a two-phase approach for municipal systems. The first phase began in 1990 and addressed discharges from (MS4s) that serve populations greater than 100,000 people. The second phase began in 1999 and addressed discharges from MS4s that serve populations less than 100,000 and are located in urbanized areas. The State Water Resources Control Board and the Regional Water Quality Control Boards (RWQCBs) can apply the Phase I or Phase II rules to areas with smaller populations as needed to protect water quality.

The CWA and federal stormwater regulations require MS4s subject to NPDES permits to reduce the pollutants in stormwater discharges to the maximum extent practicable (MEP). The regulations require the implementation of best management practices (BMPs) to meet the MEP discharge standard. BMPs include both source controls and treatment measures. MS4s are to implement an effective combination of these BMPs to reduce pollutants in stormwater discharges. In California, MS4 permits also require permittees to reduce the discharge of pollutants so that water quality standards are met. However, the permits do not specify strict compliance with numeric water quality standards. Rather, the MS4 permits require the compliance with standards through an iterative approach. Permittees implement BMPs according to storm water management plans. (If the current level of effort does not achieve water quality standards, additional BMPs are implemented until compliance has been achieved).

The current costs to implement BMPs have been the basis for lawsuits and petitions challenging the California stormwater regulatory program. Additionally, some permittees contend that current MS4 permits necessitate the use of advanced water treatment to meet water quality standards, which would drastically escalate costs above current levels (Gordon, 2001). Neither the USEPA nor the SWRCB has estimated costs for the development and implementation of MS4 stormwater programs to achieve MEP. The SWRCB and RWQCBs wish to respond to the contention that the intent of the California stormwater program is to require all stormwater discharges to be treated with advanced treatment devices. This project addresses these issues through two tasks.

Task A – Documenting Stormwater Program Costs

Documenting costs of a subset of California MS4 stormwater programs that were identified by RWQCB staff as demonstrating meaningful progress toward MEP compliance will aid in approximating costs of permit compliance statewide. Making meaningful progress is considered implementing activities specifically presented in the SWMPs. Stormwater program expenditures by those municipalities were compiled. The cost data was analyzed and normalized to identify potential cost factors that can be used to estimate costs for other municipalities to achieve permit compliance. Although compliance with construction and industrial permits is discussed in stormwater permits, the compliance costs for these permits are not included in this report. This report does not address the benefits of permit compliance activities[1].

Only municipal costs are documented; total societal costs are not. There are additional costs borne by developers (passed onto homeowners), businesses, industries and residents that are not addressed in Task A. The Task A was accomplished by personnel from the Office of Water Programs at CSUS.

Task B – Alternative Approaches to Stormwater Quality Control

Task B is an assessment of regulatory policy to determine the intent of stormwater regulation regarding advanced treatment. Alternatives for stormwater quality control that are believed to comply with the intent of the regulations are described and costs are estimated for the Los Angeles Regional Water Quality Control Board (LARWQCB) area. The intent of the regulation was determined by speaking with LARWQCB staff and reviewing past regulatory action. Task B was accomplished by faculty from the University of Southern California and the University of California Los Angeles. This task assumes the MS4 permitting process as it stands presently, using an iterative process of enhancing implementation of BMPs. This scenario may overlap with the Total Maximum Daily Load (TMDL) process, but it is not necessarily the same since the TMDL process address pollution sources other than stormwater.

1.2 REPORT ORGANIZATION

Task A is addressed in Sections 2 through 9. Section 2 presents the methodology for gathering, analyzing, and presenting cost information. Sections 3 through 8 present the NPDES-related stormwater costs and other relevant characteristics for the six municipal areas surveyed. The raw cost data and description of how program costs were developed are shown in Appendices A through F. In Section 9, normalized costs for each major stormwater program element are presented and compared between cities. Explanations for the observed differences are also offered. Appendix G contains the backup calculations for Section 9. Section 10 presents

[1] A subcommittee of the California Stormwater Quality Association (CASQA) is working on developing guidelines for program effectiveness evaluation, which has an ultimate goal of quantifying changes in receiving water quality (the benefit) due to stormwater activities.

recommendations for further cost reporting and analysis. References are in Section 11. Task B is included as Appendix H.

The method for data collection, organization, and quality evaluation is presented in this section. Data sources are also described. Methodology and assumption for Task B are reviewed in the Executive Summary of the report found in Appendix H.

2.1 TECHNICAL ADVISORY GROUP

A technical advisory group (TAG) was formed to assist in the execution of this project. The TAG was comprised of one representative from USEPA, one from RWQCB, three from universities not associated with executing the study, one consultant, and one representative from the California Stormwater Quality Association (CASQA)[2]. TAG members reviewed and commented on each major phase of the study, including the initial city selection, initial scope of the study, initial results from the first city, and the interim draft report. A description of the TAG and their comments are included in Appendix K. The TAG did not review the work done for Task B (Appendix H).

2.2 CITY SELECTION

The following criteria were used in the selection process:

- nominated by RWQCB staff as having a good stormwater program,
- a variety of geographic and hydrologic areas within California,
- have a stormwater fund or equivalent that required the cities to track stormwater costs,
- a variety of populations, with at least one city below 100,000, and
- a variety of income per population or household.

Initial nominations and selection recommendations were presented in a memorandum to the SWRCB (Appendix I). Subsequent discussion with cities and RWQCB staff refined the list. One nominee, Corona, was considered after the memorandum was submitted. All the cities nominated for the inland area of Southern California were not able to participate, so the RWQCB then nominated Corona. Corona was not initially considered because of a lack of familiarity with the progress of their stormwater program. Subsequent review established Corona as a nominee.

The following municipalities were selected and agreed to participate in the cost survey:

- Corona
- Encinitas
- Fremont
- Fresno-Clovis Metropolitan Area
- Sacramento
- Santa Clarita

[2] CASQA is a non-profit organization with mostly municipality membership. CASQA advises the California SWRCB on stormwater issues.

The locations of the participating municipalities are shown in Figure 2-1.

2.3 COST SURVEY CATEGORIES

The Cost Survey Categories were based on the USEPA six minimum measures for Phase II stormwater programs because cities often report cost in annual reports for several of these categories (http://cfpub.epa.gov/npdes/stormwater/menuofbmps/menu.cfm). The six categories initially considered in this study were:

- Public Education and Outreach,
- Public Involvement and Participation,
- Illicit Discharge Detection and Elimination (a.k.a. Illicit Connection and Illicit Discharge),
- Construction Site Stormwater Runoff Control,
- Post Construction Stormwater Management in New Development and Redevelopment, and
- Pollution Prevention and Good Housekeeping for Municipal Operations.

Figure 2-1. Location of Municipal Areas Selected for the Cost Survey

For several cities, Public Education and Outreach and the Public Involvement and Participation costs were not tracked separately. Consequently, differentiating costs between these two categories was often impractical. For these cities, these costs are reported in a "Public Education, Outreach, Involvement, and Participation" category.

Review of the stormwater permits of the selected cities and consultation with SWRCB staff resulted in these additional categories:

- Industrial and Commercial Management Programs,
- Overall Stormwater Program Management,
- Water Quality Monitoring, and
- Watershed Management.

The industrial and commercial management programs were combined because most of the selected cities did not differentiate between the costs associated with industrial sites and commercial sites.

The Watershed Management category includes costs associated with participation in total maximum daily load (TMDL) development processes and watershed management addressing

303(d)[3] pollutants. Most of the cities are not actively implementing TMDLs and costs reported in this category do not include TMDL implementation activities. Furthermore, existing TMDLs suggest stormwater compliance will be through enhancement to current permit compliance activities such as post-construction BMPs.

2.4 IDENTIFYING NEW, EXISTING, AND ENHANCED COSTS

All costs were identified as new, existing, or enhanced according to the extent that the activities existed before the first stormwater permit. New costs are for activities that are exclusively a result of compliance efforts with the stormwater permit. Existing costs are for activities that predated stormwater permits. Enhanced costs are for existing activities that were increased due to permit requirements. Enhanced costs are the total cost for impacted activities. It is not the increase in cost due to permit requirements. This number would have to be developed from 1990 baseline costs, and this is beyond the scope of this project.

2.5 DATA COLLECTION

Because costs for the 2003/2004 fiscal year were not available at the start of this survey, costs for the 2002/2003 fiscal year were collected.

Initially, a questionnaire was developed to facilitate the data collection effort. Questions were developed to capture cost data and descriptions of the stormwater program activities for each city. The questionnaire was organized by cost category and included questions for individual activities or BMPs within each cost category. The questionnaire was given to the city of Sacramento as a test case, but it proved difficult to use as the cost information and description of activities/BMPs available to city staff did not match well with those in the questionnaire. Consequently, the questionnaire was abandoned as the primary data collection tool, though it was shared with other cities as a guide to help staff understand what type of information was being sought.

The data collection methodology is depicted in Figure 2-2. City staff members were contacted by email and with follow-up telephone conversations in which the purpose and scope of the study were described. As mentioned above, a copy of the questionnaire was sent as guidance material. City staff then submitted cost and activity data in whatever format was available. The documents that usually contained the most useful information were the city's annual stormwater report, cost spreadsheets submitted by city staff, the NPDES stormwater permit, and SWMPs, or Stormwater Quality Improvement Plans (SQIPs), or Drainage Area Master Plans (DAMPs).

The next step was to fit the information provided into the cost survey categories. This wasn't always straightforward as there were significant differences among cities in the format and

[3] The term 303(d) pollutants are used here to describe the pollutants in specific waters for which TMDLs are being developed according to Section 303(d) of the CWA.

content of annual stormwater reports. For example, the annual stormwater report for one city was divided into two separate submittals, each covering one half of the year. The study team combined data from each section to represent the whole year. In another example, the annual stormwater reports of two cities did not contain costs. In these cases, cost and activity data was assembled from multiple alternate sources. After working through a variety of reporting formats, costs were allocated among the cost survey categories and entered into tables similar to Table 2-1. These tables were returned to the surveyed cities to give them an opportunity to comment on the allocation of costs. Follow up inquiries were also made when data was incomplete or missing. Data collection, cost allocation, and coordination with the surveyees' continued until all substantial questions were answered. Coordination with city staff members usually resulted in adjustments that more accurately accounted for those stormwater activities related to permit compliance.

Table 2-1. Example of Cost Information Collected for Each Cost Survey Category

Cost Category: Construction Site Stormwater Runoff Control[1]

Activity Names	External Contract	Relation to Permit[2]	Dollar Amount	Activity Statistics	Notes or Units	
Activity 1						
Activity 2						
Activity 3						

1. This example format was repeated within the table for the other cost categories.
2. This column indicates whether required activities were being performed prior to stormwater permits. In some cases activities were enhanced due to permit requirements.

Information was also collected on cost factors that might explain observed differences in costs. These factors were used to "normalize" costs by dividing the cost by the cost factors (activity statistics). Some cost factors were physical characteristics such as population or area. These were collected from census sources, city websites, and through personal communication. Others cost factors, such as number of construction site inspections, reflected stormwater program activities. Cost factors specific to individual activities or cost categories were found in the annual stormwater reports or reported in personal communications from city staff. Identical cost factors were not available for every city because cities often tracked accomplishments differently. For example, one city counted miles of drainage channel cleaned while another measured the weight of trash and debris removed during channel cleaning. As with the costs, the activity statistics were verified by city staff before being entered into tables similar to Table 2-1 under the "Activity Statistics" column.

The TAG suggested that certain fines and penalties from enforcement of ordinances relating to stormwater compliance are available to offset the cost of stormwater programs. Examples include parking tickets to accommodate street sweeping, fines for littering, construction practice violations, commercial facility operations, etc. The net revenue associated with enforcement of city ordinances that support stormwater activities was not available, partly because the cost of enforcement and penalty collection by the municipalities for stormwater violations is not known. Regardless, this does not change the cost of compliance; enforcement only seeks to identify alternative funding sources.

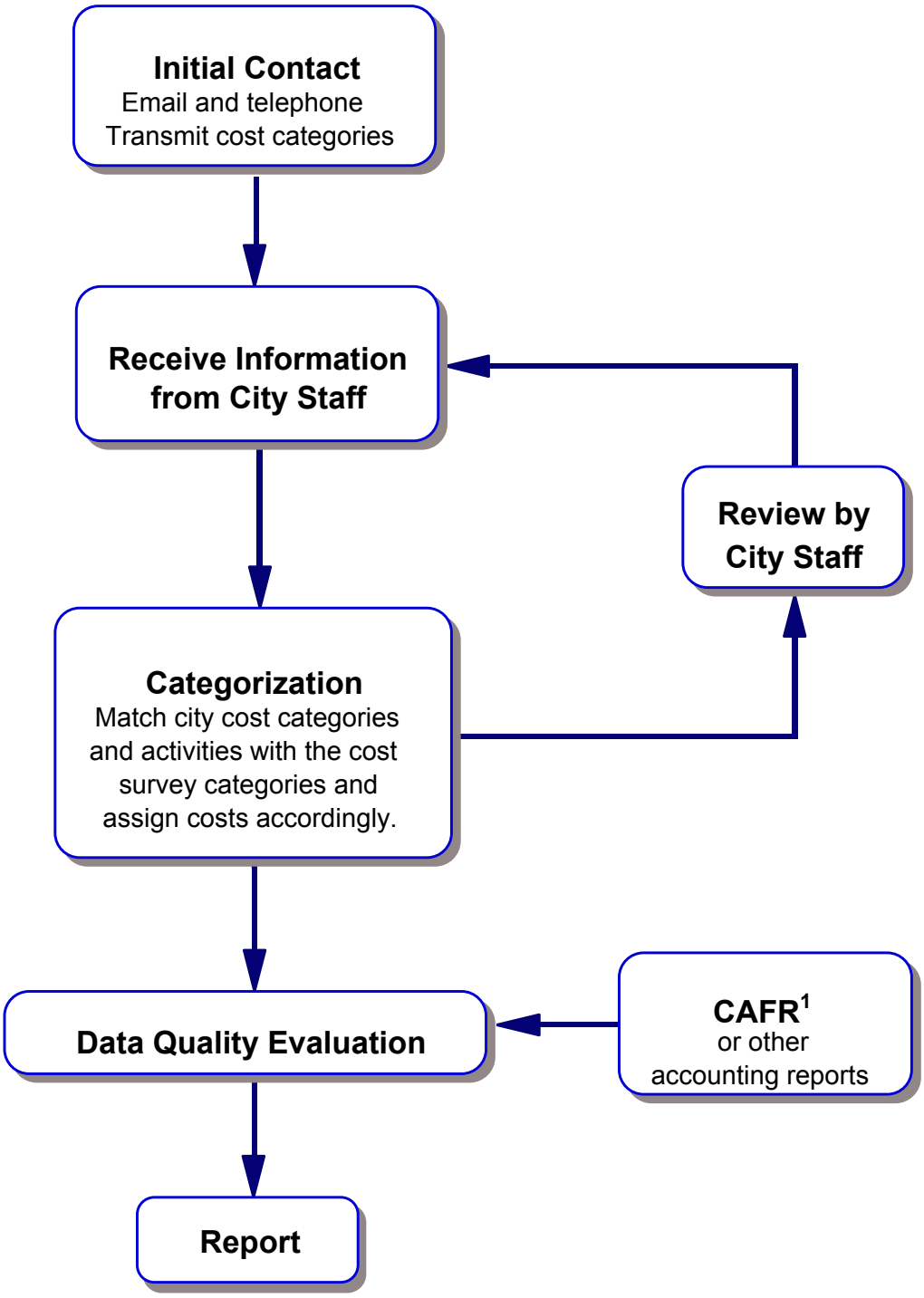

1. CAFR: Comprehensive Annual Financial Report

Figure 2-2. Data Collection Methodology Flow Chart

2.6 DATA QUALITY EVALUATION

After data collection, an assessment was made to assign an appropriate level of confidence in the data. The following confidence levels and criteria were used:

High – Costs were submitted in the form of reports generated by city accounting systems.

Moderately High – Costs were submitted in spreadsheets or other written form and could be checked against stormwater cost entries in the city's Comprehensive Annual Financial Report[4] (CAFR), or other accounting system reports. If a city has established a fund to account for stormwater related financial transactions, confidence was determined by comparing the cost figures found in the CAFR (or accounting system reports) and the data submitted by city stormwater staff. The costs reported in the CAFR should not be less than the staff-reported costs because the CAFR may include costs for stormwater activities not required for permit compliance. If costs submitted by stormwater staff were higher than reported CAFR costs, the inconsistency reduces the level of confidence in the data and casts doubt on the accuracy of the submitted costs.

Moderate – Costs were submitted in spreadsheets or other written form, but comparisons with CAFR stormwater funds or other accounting system reports could not be made.

Low – Costs were submitted verbally through personal communication or major costs for required programs were not available or estimated.

The goal of the data evaluation process was to assign a single confidence level to a city's overall data set. In most cases all of the data submitted by city staff received the same level of confidence because the sources were similar in nature. Where there were differences in data quality because of different data sources, the overall quality was based on the quality of the data representing the majority of the costs. A judgment was also made on the completeness of the data. For example, if major costs are missing, the confidence would be low even though the quality of the data submitted might be high. A commentary on data quality is included in the report sections corresponding to each of the cities surveyed.

2.7 INHERENT LIMITATIONS

As in all cost surveys, this study contains some inherent limitations. The most important of these is the almost complete dependence by the study team on the city staff members to assure the accuracy and completeness of the data provided. While some checks were made against alternate sources (e.g., the CAFRs) and common sense, it was outside the scope of this project for the study team to independently check the quality of each city's stormwater accounting information. Errors can creep into any exercise of this kind. Inherent in the process of recording data are data entry errors such as mistyped numbers. Though unintentional, these errors are

[4] A CAFR is an annual report provides information regarding all funds and account groups under the jurisdiction of a government reporting entity.

sometimes not identified and resolved. Another potential source of error is an incomplete record. Sometimes things are forgotten and overall data quality suffers.

The study team thanks the staff members of the participating cities for their efforts to assure that the data provided are as correct and complete as possible. What errors may have crept into the data are certainly unintentional, and are not believed to be large enough to affect the major findings of the study.

2.8 DATA COMPARISONS TO OTHER STUDIES

A review of literature revealed several sources of cost information throughout the United States. The primary sources reviewed were the Rouge River Watershed project in Michigan, the National Association of Flood and Stormwater Management Agencies (NAFSMA) survey of Phase II municipalities, and the USEPA review of Phase I costs (USEPA, 2004). These costs are discussed in Section 9.6.

The city of Corona is a moderately-sized city located inland in southern California with a population of 124,966 (www.census.gov). It is traditionally an agricultural city. The city is in the Santa Ana River watershed at the junction of State Route 91 and Interstate 15. The stormwater program is coordinated by personnel from the Department of Public Works. Descriptive characteristics for Corona are shown in Table 3-1. Primary personal communication was with Michele Colbert from the city of Corona. The city of Corona costs for 2002/2003 were for complying with their 2002 stormwater permit (RWQCB, Santa Ana, 2002).

Table 3-1. Select Characteristics of the City of Corona

Description	Characteristic	Reference
Mean Income Per Person, $	21,001	www.census.gov
Area, (sq. miles)	35	www.census.gov
Population	124,966	www.census.gov
Curb Miles Swept	20,877	Colbert, pers. comm., 3/12/04
Active Construction Sites	41	Colbert, pers. comm., 3/12/04
Industrial and Commercial Sites	3,050	Colbert, pers. comm., 3/12/04
Households	39,271	www.census.gov
City Actual General Fund Revenue, $	78,413,063	Corona, 2003a.
Annual Rainfall (cm)	29	www.wrcc.dri.edu
Years Since Incorporation	108	www.ci.corona.ca.us

3.1 DATA SOURCES

The following describes the information available from the data sources.

Cost Spreadsheets Submitted by City Staff

A spreadsheet was provided from the city of Corona, which included labor and direct cost information for their stormwater program broken down into different categories by activity (Appendix A, Table A-2). This spreadsheet contained the majority of the city's stormwater program cost. Also, spreadsheets containing cost and other data were submitted for street sweeping and hazardous materials pick-up such as spills from vehicles involved in accidents. (Appendix A, Tables A-10 and A-11).

City of Corona Santa Ana Watershed Annual Reporting Forms 2002/03

This report provided activity statistics (e.g. curb miles swept) for various city stormwater programs. These statistics were used to normalize costs to allow comparison with other cities.

Personal Communication: Interviews, Phone Calls, E-Mail

Personal communication with city of Corona staff provided additional stormwater program costs that augmented the data submitted in their cost spreadsheet. Through personal communication, city staff elaborated on what was accomplished for each cost submitted in their spreadsheet and commented on the allocation of costs among the cost survey categories.

Comprehensive Annual Financial Report (CAFR) 2002/03

The city of Corona has not established a fund to account for overall stormwater transactions, therefore no cost comparisons were made to CAFR figures.

Santa Ana Regional Drainage Area Management Plan (SAR-DAMP) 1993

This document describes the overall stormwater management strategies planned by the municipalities in the Santa Ana drainage area of Riverside County (Corona SAR-DAMP). While no cost figures were obtained from this document, it was used to verify that an activity was required by the permit.

3.2 COST DATA SUMMARY

Table 3-2 summarizes the costs for each survey category. Figure 3-1 shows the relative distribution of costs among the categories. Stormwater staff labor costs were not distributed among survey categories, but were 100 percent allocated to the Overall Stormwater Program Management category. This will make Overall Stormwater Program Management costs appear higher compared to cities that allocate stormwater staff costs to their various programs. According to city staff, the industrial stormwater program is just getting started so costs of that program probably do not represent a mature industrial program (Colbert, personal communication, 3/12/04).

Table 3-2. City of Corona Cost Assigned to Cost Survey Categories

Cost Survey Category	*Costs ($)*
Construction Site Stormwater Runoff Control	53,382
Illicit Discharge Detection and Elimination	20,628
Industrial and Commercial Management Programs	89,916
Overall Stormwater Program Management	317,800
Pollution Prevention and Good Housekeeping for Municipal Operations	720,222
Post Construction Stormwater Management in New Development and Redevelopment	13,509
Public Education, Outreach, Involvement, and Participation	28,409
Water Quality Monitoring	7,000
Watershed Management	0
Total	**1,250,866**

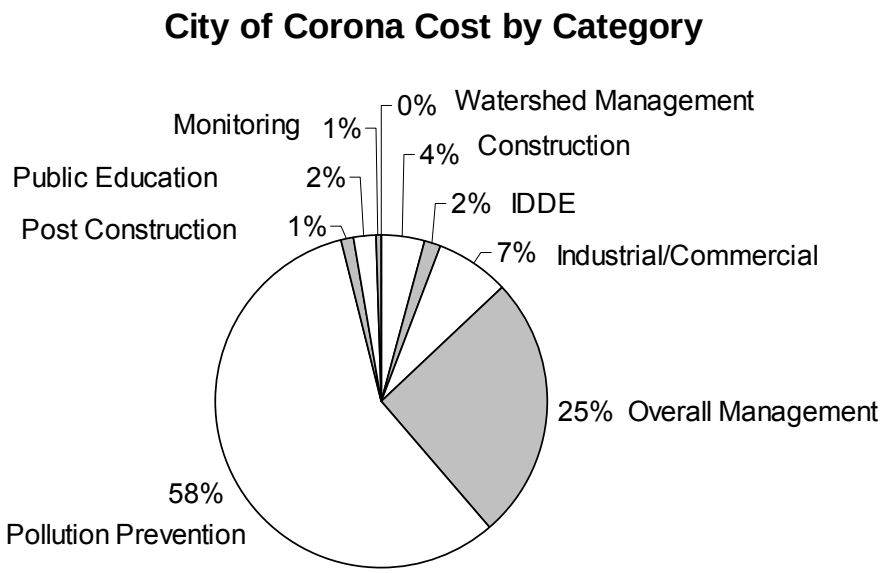

Figure 3-1. Distribution of Corona Stormwater Costs among the Cost Survey Categories.

3.2.1 Discussion of Costs for Each Survey Category

This section presents the major activities for each cost survey category. Further cost breakdown and calculations for each survey category are included in Appendix A. The costs for each survey category are discussed in this section in alphabetical order.

Construction Site Stormwater Runoff Control

The construction program cost was $53,382, which was 4 percent of total stormwater cost. The construction program oversaw 41 active construction sites and performed 564 inspections (Colbert, personal communication, 3/12/04). Including the cost for vehicles, phone usage, training, and stormwater staff labor, the average cost was $95 per inspection and $1,302 per active construction site.

Illicit Discharge Detection and Elimination (IDDE)

The IDDE program cost was $20,628, which was 2 percent of total stormwater cost. The largest cost attributed to this program was for the stormwater share of inspections performed by wastewater staff. The average cost per inspection was $157. Also, new development illicit connection inspections were conducted, which added to the cost of this program (Colbert, personal communication, 3/12/04).

Industrial and Commercial Management Programs

The industrial and commercial program cost was $89,916, which was 7 percent of total stormwater cost. The industrial program had 600 inspections at an average cost of $134 per inspection.

Overall Stormwater Program Management

The overall management program cost was $317,800, which was 25 percent of total stormwater cost. The city was unable to distribute the staff cost among the cost survey categories so all of the stormwater staff cost was assigned to this category. Administrative service charges account for 25 percent of this category's cost. The staff costs represent approximately 62 percent of the costs assigned to this category and 16 percent of total stormwater cost. The remaining 23 percent are for office supplies, reporting, and NPDES fee.

Pollution Prevention and Good Housekeeping for Municipal Operations

The municipal operations program cost was $720,222, which was 58 percent of total stormwater cost. The two primary activities in this category were street sweeping and drain line/channel cleaning. The average cost was $20 per curb mile swept and $8 per linear foot of drain lines and channels cleaned. Street sweeping and drain line and channel cleaning account for 33 percent and 20 percent of total stormwater cost respectively. City staff labor associated with these activities is reported in this category.

Post Construction Stormwater Management in New Development and Redevelopment

The post construction program cost was $13,509, which was 1 percent of total stormwater cost. Post construction cost was primarily for professional consulting services for BMP selection. Also, installation and maintenance of 8 storm drain inlet inserts cost $4,500, averaging $562 per insert per year.

Public Education, Outreach, Involvement, and Participation

The public education program cost was $28,409, which was 2 percent of total stormwater cost. Public education and outreach activities often incorporated public involvement and participation activities. This made differentiating cost between the categories impractical. Because of this, the two programs were combined.

Water Quality Monitoring

The monitoring program cost was $7,000, which was 0.6 percent of total stormwater cost. This cost was associated with the illicit discharge detection and elimination program.

The city of Corona did not allocate any cost to this category. The effort was captured under other programs such as Overall Stormwater Program Management.

3.3 CONFIDENCE IN THE DATA

For the city of Corona, confidence in the data was moderate because most of the cost data submitted was via spreadsheets built, maintained, and updated by the city. However, as with most of the cities selected, the program costs provided could not be verified by city accounting system reports.

Since the city did not have a fund in place to account for overall stormwater related transactions, comparison of stormwater costs submitted by city staff with CAFR cost figures was not possible. This limited the level of confidence in the data to 'moderate.'

The city of Encinitas represents the smallest city selected for the survey with a population of just over 58,000 (www.census.gov). The area of the city is about 20 square miles and is located 25 miles north San Diego. Encinitas is situated along six miles of rugged coastline; characterized by beaches, cliffs, and rolling hills (www.ci.encinitas.ca.us). The stormwater program is coordinated by the Engineering Services Department. Descriptive characteristics for the Encinitas are shown in Table 4-1. Primary personal communication was with Kathy Weldon from the city of Encinitas and Meleah Ashford of Ashford Engineering. The city of Encinitas costs for 2002/2003 were for complying with their 2001 stormwater permit (RWQCB, San Diego, 2001).

Table 4-1. Select Characteristics of the City of Encinitas

Description	Characteristic	Reference
Mean Income Per Person, $	34,336	www.census.gov
Area (sq. miles)	20	www.census.gov
Population	58,014	www.census.gov
Curb Miles Swept	5,832	Encinitas, 2003b
Active Construction Sites	40	Encinitas, 2003b
Industrial and Commercial Sites	417	Encinitas, 2003b, Weldon, pers. comm., 4/2/04
Households	23,843	www.census.gov
City Actual General Fund Revenue, $	42,592,755	Encinitas, 2003a
Annual Rainfall (cm)*	26	www.wrcc.dri.edu
Years Since Incorporation	20	www.ci.encinitas.ca.us
*Rainfall for Oceanside Marina was used.		

4.1 DATA SOURCES

The following describes the information available from the data sources.

Cost Spreadsheets Submitted by City Staff

A spreadsheet was provided by the city of Encinitas that included cost information broken down by activity (Appendix B, Table B-2). The city also submitted another spreadsheet, which allocated the labor, supplies, travel, equipment, and vehicle cost to each stormwater program (Appendix B, Table B-3). The remaining cost data submitted was for public works department costs related to stormwater activities (Appendix B, Table B-4).

Jurisdictional Urban Runoff Management Program (JURMP) Annual Report, FY 2002-2003

This report provided descriptions of the activities and accomplishments of the city's stormwater program (Encinitas, 2003b). Activity statistics (e.g. number of industrial inspections) were provided in this report as well. Stormwater costs were normalized by these statistics. While no

cost figures were obtained from this document, it was used to verify that an activity was required for compliance with the permit.

Personal Communication: Interviews, Phone Calls, E-mail

Personal communication with the city of Encinitas staff provided additional stormwater program costs that augmented the data submitted in their cost spreadsheet. These costs were for stormwater activities performed by the department of public works. They also provided allocations of labor, supplies, travel, equipment, and vehicle to cost survey categories based on estimated percentages. Also, city staff elaborated on what was accomplished for each cost submitted in their spreadsheet and commented on the allocation of costs among the cost survey categories.

Comprehensive Annual Financial Report (CAFR) 2002/03

The city of Encinitas has not established a fund to account for overall stormwater transactions, so no comparisons on cost were made to CAFR figures. During fiscal year 2003/04, the city has since created such a fund (Ashford, personal communication, 4/2/04).

4.2 COST DATA SUMMARY

Table 4-2 summarizes the costs for each survey category. Figure 4-1 shows the relative distribution of costs among the categories. The costs in Table 4-2 include an allocation of stormwater staff time used to develop, oversee, and, in some cases, implement activities within each program.

The backup calculations and source data for these costs are presented and discussed in Appendix B.

Table 4-2. City of Encinitas Cost Assigned to Cost Survey Categories

Cost Survey Category	Costs ($)
Construction Site Stormwater Runoff Control	169,751
Illicit Discharge Detection and Elimination	49,378
Industrial and Commercial Management Programs	65,596
Overall Stormwater Program Management	128,159
Pollution Prevention and Good Housekeeping for Municipal Operations	528,252
Post Construction Water Management in New Development and Redevelopment	15,344
Public Education, Outreach, Involvement, and Participation	41,898
Water Quality Monitoring	76,262
Watershed Management	12,400
Total	**1,087,038**

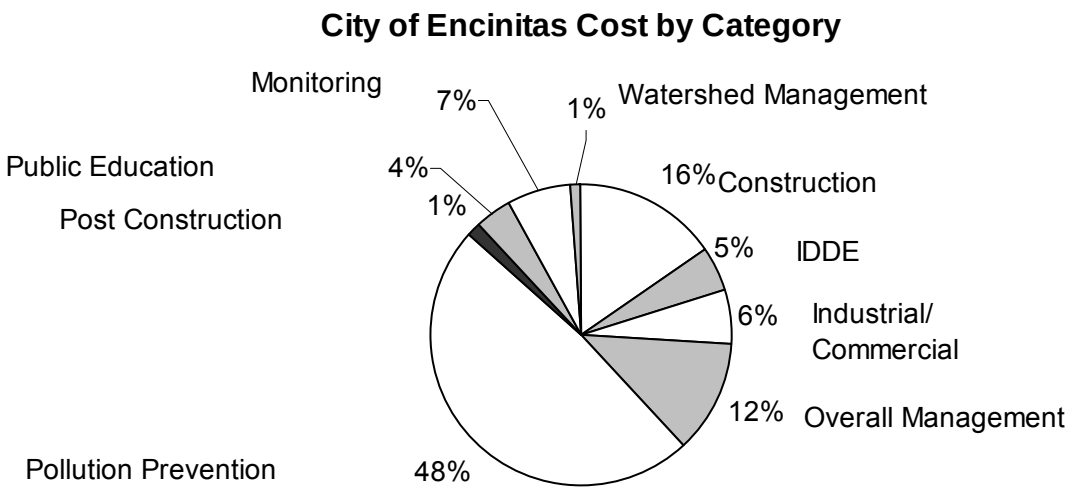

Figure 4-1. Distribution of Encinitas Stormwater Costs Among the Cost Survey Categories.

4.2.1 Discussion of Costs for Each Survey Category

Cost breakdown and calculations for each survey category are found in Appendix B, Table B-1. The costs for each survey category are discussed in this section.

Construction Site Stormwater Runoff Control

The construction program cost was $169,751, which was 16 percent of total stormwater cost. The construction program oversaw 40 active construction sites and performed 401 inspections (Encinitas, 2003b). Including the cost of stormwater staff for oversight and follow-up activities, the average cost was $423 per inspection and $4,244 per active construction site. The normalized cost for Encinitas may be high compared to other cities because the cost includes non-inspection activities such as contractor and inspector training, wet weather monitoring, and BMP manual updating. Stormwater staff also reviewed five SWPPPs, performed general enforcement, issued 13 notices of violation, updated the city BMP manual, educated and trained engineering inspectors with regard to stormwater management and BMP implementation, monitored weather patterns and storms in the Pacific through the National Weather Service, conducted construction education, disseminated brochures and mailings, and held a construction workshop (City of Encinitas, 2003b).

Illicit Discharge Detection and Elimination

The IDDE program cost was $49,378, which was 4 percent of total stormwater cost. The IDDE program conducted 172 education, enforcement, and/or clean-up activities. Using overall IDDE

cost, the average cost per activity was $287. From informal visual inspections, city staff received 76 "complaints," and another 96 complaints were received via the city's stormwater hotline.

Industrial and Commercial Management Programs

The industrial and commercial program cost was $65,596, which was 6 percent of total stormwater cost. This program had 266 inspections at an average cost of $247 per inspection. The normalized cost for Encinitas may be high compared to other cities because the cost includes non-inspection activities such as website updating, facility inventory, education, and enforcement actions (City of Encinitas, 2003b). The city has three industrial sites and 348 commercial sites. Stormwater staff updated the commercial facility inventory, provided BMP manuals and guidance, educated facility staff in regard to stormwater requirements and minimum BMPs, developed a grease program, and issued several enforcement actions (City of Encinitas, 2003b).

Overall Stormwater Program Management

The overall management program cost was $128,159, which was 12 percent of total stormwater cost. Developing a "clean water fee" cost $35,000 (Weldon, personal communication, 4/2/04). This fee pays for stormwater costs and is similar to stormwater fees assessed by other cities. This cost accounts for approximately 27 percent of this category's cost. The other activities in this program were annual reporting and legal support for developing ordinances and plaintiff attorney fees. Costs in this category identified as possibly one-time were for the stormwater fee development, legal fees (ordinances and plaintiff attorneys), and grant writing.

Pollution Prevention and Good Housekeeping for Municipal Operations

The municipal operations program cost was $528,252, which was 49 percent of total stormwater cost. This category had three primary public works activities: cleaning sumps, inlets, and manholes; street sweeping; and cleaning drain lines and channels. Activity statistics were only available for street sweeping which was contracted out with minimal oversight (Weldon, personal communication, 4/2/04). The average cost was $20 per curb mile swept. The street sweeping cost is about 11 percent of total stormwater cost. Street sweeping cost does not include labor of the stormwater staff. This was because stormwater staff time was allocated to all municipal operations for stormwater and not to individual activities (e.g. street sweeping vs. channel cleaning). Other activities included in this program were trash pick-up, sediment disposal, and consulting services for oversight, strategic planning, and management.

Post Construction Stormwater Management in New Development and Redevelopment

The post construction program cost was $15,344, which was 1 percent of total stormwater cost. Post-construction cost was primarily for consulting and oversight of a special project to treat discharge to Moonlight Beach for bacteria. Also, installation and maintenance of 16 storm drain inserts cost $1,908, averaging $119 per insert per year. The cost associated with the "Moonlight Beach" project was possibly a one-time cost.

Public Education, Outreach, Involvement, and Participation

The public education program cost was $41,898, which was 4 percent of total stormwater cost. Public education and outreach activities often incorporated public involvement and participation activities. This made differentiating cost between the categories impractical. Because of this, the two programs were combined. The city of Encinitas had three watershed and beach clean-up activities (City of Encinitas, 2003b). Because the cost of outreach was not available separately and impression statistics were not available, outreach costs were not normalized.

Water Quality Monitoring

The monitoring program cost was $76,262, which was 7 percent of total stormwater cost. The cost was for collection, analysis, and contractor oversight of 48 dry weather bacteria samples (Weldon, personal communication, 4/2/04).

Watershed Management

The cost of this category was $12,400, which was 1 percent of total stormwater cost. These costs were for developing a one time watershed plan and participating in and hosting regional watershed meetings and workshops (Weldon, personal communication, 4/2/04).

4.3 CONFIDENCE IN THE DATA

For the city of Encinitas, confidence in the data was moderately high. This was because only a few cost figures submitted were verbal estimates without backup. Most of the cost data submitted was via spreadsheets built, maintained, and updated by the city. However, as with most of the cities selected, the program costs were provided but could not be verified by city accounting system reports.

For the fiscal year 2002/03, the city did not have a fund in place to account for overall stormwater related transactions. As such, comparison of stormwater costs submitted by city staff with CAFR cost figures was not possible, which did not allow for a higher level of confidence in the data.

Fremont was the third largest city selected and has a population of about 203,000 (www.census.gov). The city is located in Alameda County on the southeast side of the San Francisco Bay between San Jose and Oakland. The stormwater program is coordinated by the Environmental Services Department. Descriptive characteristics for Fremont are shown in Table 5-1. Primary personal communication was with Barbara Silva from the city of Fremont. The FCMA costs for 2002/2003 were for complying with their 2003 stormwater permit (RWQCB, San Francisco Bay, 2003).

Table 5-1. Select Characteristics of the City of Fremont

Description	Characteristic	Reference
Mean Income Per Person, $	31,411	www.census.gov
Area, (sq. miles)	97	Silva, pers. comm., 4/5/04
Population	203,413	www.census.gov
Curb Miles Swept	31,405	Silva, pers. comm., 9/22/04
Active Construction Sites	24	Silva, pers. comm., 4/5/04
Industrial and Commercial Sites	1,028	Silva, pers. comm., 4/5/04
Households	69,452	www.census.gov
City Actual General Fund Revenue, $	98,456,011	Fremont, 2003a
Annual Rainfall (cm)	37	www.wrcc.dri.edu
Years Since Incorporation	48	www.ci.fremont.ca.us

5.1 DATA SOURCES

The following describes the information available from the data sources.

Cost Spreadsheets Submitted by City Staff

The city of Fremont provided a cost spreadsheet that included labor and cost figures for stormwater activities (Appendix C, Table C-2). A further breakdown of one of these cost figures was also provided (Appendix C, Table C-3). A further breakdown of Union Sanitation District[5] (USD) cost is presented in Appendix C, Table C-4. Appendix Table C-5 presents a breakdown of city of Fremont contributions to the Alameda Countywide Clean Water Program (ACCWP).

Alameda Countywide Clean Water Program Fiscal Year 2002/03 Annual Report

The city of Fremont is a member of the ACCWP, so the 2002/03 Annual Report was consulted to obtain activity statistics, descriptions of activities, and accomplishments specifically pertaining

[5] The Union Sanitation District is a special district that provides wastewater collection, treatment and disposal services to the residents and businesses of the city of Fremont, Newark and Union City, in Southern Alameda County in California (www.unionsanitary.com).

to the city of Fremont. As with other cities where relevant activity statistics were available, cost normalization was performed.

Personal Communication: Phone Calls, E-mail

Through personal communication, city staff provided detailed information regarding cost figures. City staff elaborated on what was accomplished for each cost submitted in their spreadsheet and commented on the allocation of costs among the cost survey categories.

Comprehensive Annual Financial Report (CAFR) 2002/03

During the 2002/03 fiscal year, the city of Fremont had a fund in place to account for overall stormwater related transactions. This fund is called the "Urban Runoff/Clean Water" fund (Fremont, 2003a). The cost figures in this fund were used for comparison purposes with costs submitted by city stormwater staff.

Alameda Countywide Clean Water Program, SWMP, July 2001-June 2008

The SWMP provided information regarding the structure, accomplishments, and recent developments of the program. It also gave information regarding objectives and tasks of each program component and specific tasks that the member agencies are required to perform (Fremont, 2003c). While no cost figures were obtained from this document, it was used to verify that an activity was required for compliance with the permit.

5.2 COST DATA SUMMARY

Table 5-2 summarizes the costs for each survey category. Figure 5-1 shows the relative distribution of costs among the categories. Stormwater staff labor costs for the city of Fremont were not distributed among survey categories, but were allocated to Overall Stormwater Program Management. This will make the costs in this category appear higher compared to cities that allocate stormwater staff costs to their various programs. Survey categories (excluding Overall Stormwater Program Management) that include costs or discussion in regard to "stormwater staff labor" only concerns ACCWP labor cost allocated to the city of Fremont. Fremont funded the USD to accomplish portions of the IDDE, industrial/commercial, construction, overall management, and public education programs.

Table 5-2. City of Fremont Cost Assigned to Cost Survey Categories

Cost Survey Category	Costs ($)
Construction Site Stormwater Runoff Control	17,715
Illicit Discharge Detection and Elimination (IDDE)	5,917
Industrial and Commercial Management Programs	210,027
Overall Stormwater Program Management	453,872
Pollution Prevention and Good Housekeeping for Municipal Operations	2,128,175
Post Construction Stormwater Management in New Development and Redevelopment	35,083
Public Education, Outreach, Involvement, and Participation	101,717
Water Quality Monitoring	131,326
Watershed Management	17,610
Total	**3,101,442**

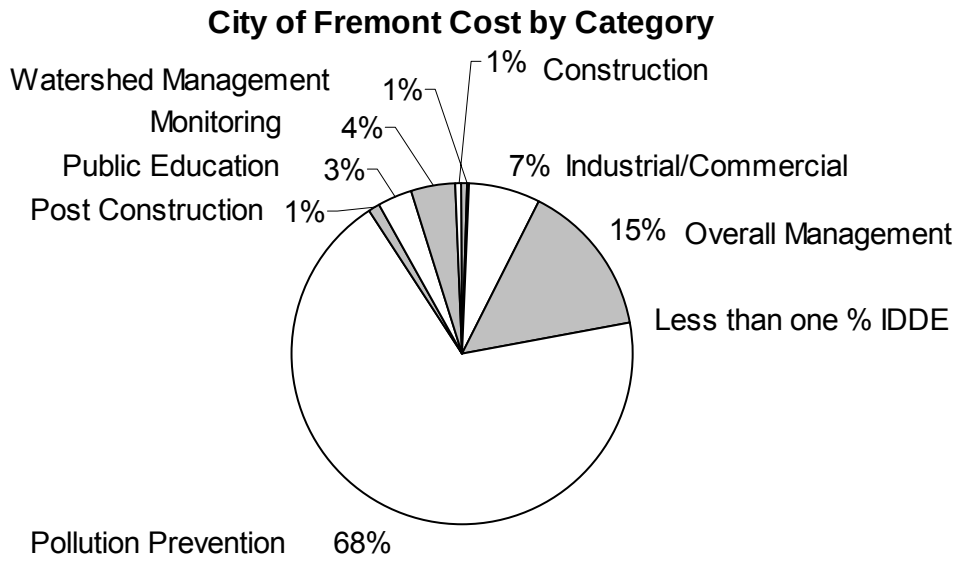

Figure 5-1. Distribution of Fremont Stormwater Costs Among the Cost Survey Categories.

5.2.1 Discussion of Costs for Each Survey Category

Cost breakdown and calculations for each survey category are found in Appendix C, Table C-1. The costs for each survey category are discussed in this section.

Construction Site Stormwater Runoff Control

The construction program (performed by USD), cost was $17,715, which was 1 percent of total stormwater cost. The construction program oversaw 24 active construction sites equal to or greater than five acres (Silva, personal communication, 4/5/04). All of the cost for the program was attributable to inspections (Silva, personal communication, 4/5/04). The program cost,

normalized by construction sites, was $738 per active construction site greater than or equal to five acres.

Illicit Discharge Detection and Elimination

The IDDE program cost was $5,917, which was less than one percent of total stormwater cost. Most of the cost (86 percent) was for assistance to eliminate non-stormwater discharges and reporting. Stormwater staff labor cost represented the remaining 14 percent.

Industrial and Commercial Management Programs

The industrial and commercial program cost was $210,027, which was 7 percent of total stormwater cost. This program was performed by the USD, who performed 482 inspections with 91 follow-up actions of which 81 were enforcement actions. Not including documentation cost, the cost per inspection was $334.

Overall Stormwater Management Program

The overall management program cost was $453,872, which was 15 percent of total stormwater cost. Stormwater staff labor costs are included in this category. The labor costs (including overhead) represent about 69 percent of the cost attributed to this program. The other costs were for administrative services and supplies, permit fees, informational systems, and USD services.

Pollution Prevention and Good Housekeeping for Municipal Operations

The municipal operations program cost was $2,128,175, which was 69 percent of total stormwater cost. The two primary activities of this category were street sweeping, and litter and debris removal. The average cost was $61 per curb mile swept. For this category, street sweeping accounted for approximately 90 percent of the cost and 9 percent was attributable to litter debris and removal. Other activities performed by the city included cleaning drain lines and channels, inlets, cross culverts, and conduits, but costs were not available for these activities.

Post Construction Stormwater Management in New Development and Redevelopment

The post construction program cost was $35,083, which was 1 percent of total stormwater cost. This cost was for engineering, planning, and other city staff to research, track, and report information for the annual stormwater report. It was also for task force meetings to develop strategies for compliance with their permit regarding new development and redevelopment, brochure printing, and stormwater staff labor.

Public Education, Outreach, Involvement, and Participation

The public education program cost was $101,717, which was 3 percent of total stormwater cost. Program activities included production and distribution of citywide newsletters, 28 school outreach presentations, stormwater staff participation in public events, and distribution of

brochures and fliers (Fremont, 2003b). USD was funded $25,897 to provide additional public education outreach services. Outreach materials promote an Integrated Pest Management program that provided businesses and nurseries with shelf displays and fact sheets.

Water Quality Monitoring

The monitoring program cost was $131,326, which was 4 percent of total stormwater cost. This cost was for multiple water quality sampling at two locations. Both chronic and acute toxicity tests were performed (Silva, personal communication, 4/5/04).

Watershed Management

The watershed management program cost was $17,610, which was 1 percent of total stormwater cost. Costs in this category were for developing a watershed study framework, assessment of pilot project activities, and stormwater staff labor (including overhead).

5.3 CONFIDENCE IN THE DATA

For the city of Fremont, confidence in the data was moderately high. Most of the cost data submitted was via spreadsheets built, maintained, and updated by the city. Approximately one-third of the city costs could be corroborated by the 2003/2004 CAFR figures.

The city of Fremont had a fund (Urban Runoff/Clean Water) presented in the CAFR that accounted for stormwater expenditures except street sweeping and litter/debris removal (Cote, 2004). Total expenditures and transfers out for the Urban Runoff/Clean Water fund were $1,234,790. Total stormwater costs submitted by city staff were $3,101,442 but this included $2,115,000 in street sweeping and litter/debris removal costs (Cote, 2004). Subtracting out $2,115,000 leaves $986,442 in stormwater costs compared to the $1,234,790 in the Urban Runoff/Clean Water fund. Because of water conveyance projects, it is expected that compliance costs would be less than this fund reports. The $2,115,000 could not be verified by CAFR figures because it was financed out of larger funds that did not have available breakdown. This cost was about 68 percent of the total stormwater cost.

The Fresno-Clovis Metropolitan Area (FCMA) has a population of 778,000, but a population of nearly 695,000 is used for comparison of normalized costs because this is approximately the population under the jurisdiction of the Fresno Metropolitan Flood Control District (FMFCD), which is the lead agency for compliance efforts. The FCMA is the largest area considered in this cost survey. Fresno is located in the San Joaquin Valley near the Sierra Nevada. Surrounded by agricultural land, the area includes the city of Fresno, the city of Clovis, and other metropolitan areas of Fresno County. The stormwater program is coordinated by the Environmental Services Department. Descriptive characteristics for FCMA and the other agencies, excluding California State University, Fresno (CSUF) are shown in Table 6-1. Primary personal communication was with Daniel Rourke and David Pomaville from the FMFCD. The FCMA costs for 2002/2003 were for complying with their 2002 stormwater permit (RWQCB, Central Valley, 2002a).

Table 6-1. Select Characteristics of the Fresno Metropolitan Area

Description	Fresno-Clovis Area	City of Clovis	County of Fresno	City of Fresno	Reference
Mean Income Per Person, $	*	18,690	15,495	15,010	www.census.gov
Area, (sq. miles)	*	17	6,017	105	www.census.gov
Population	561,120	68,468	65,000***	427,652	www.fresnofloodcontrol.org
Curb Miles Swept	142,411	47,430	21	94,495	FMFCD, 2003b
Active Construction Sites	N/A	N/A	N/A	N/A	N/A
Industrial and Commercial Sites	N/A	N/A	N/A	N/A	N/A
Households**	195,311	25,250	21,036	149,025	www.census.gov
City Actual General Fund Revenue, $	216,089,323	37,707,095	0	178,382,228	Respective CAFRs
Annual Rainfall (cm)	28	28	28	28	www.wrcc.dri.edu
Years Since Incorporation	119	92	N/A	119	www.ci.fresno.ca.us

* Approximately equal to county.
**County of Fresno number of households obtained by dividing the population covered by the stormwater permit by the average number of households in the county according to census 2000. Population provided via personal communication (Pomaville, 6/10/04).
*** County population is only that portion outside the cities but also covered by the FMFCD.

6.1 DATA SOURCES

The following describes the information available from the data sources.

Cost Spreadsheets Submitted by City Staff

The FMFCD provided a spreadsheet generated from an accounting system report. This detailed spreadsheet provided individual expenditures for stormwater except for labor and office supplies (Appendix D, Table D-7).

Fresno-Clovis Storm Water Quality Management Program, Annual Report FY 2002/2003

This report provided descriptions of the activities and accomplishments of the stormwater program. Activity statistics (e.g. number of construction site inspections) were provided in this report, but in most cases numbers were not available for each agency.

Fresno-Clovis Storm Water Quality Management Program (SWQMP), February 1999

The SWQMP presents information regarding objectives and tasks of each program component and specific tasks that the member agencies are required to perform. The report contained budgeted costs incurred by the cities, county, and university in lieu of actual expenditures. These costs were summarized in Appendix D, Table D-3. The cost figures were budgeted amounts and not actual expenditures. The document was also used to verify that an activity was required for compliance with the permit.

Personal Communication: Phone Calls, E-mail

Personal communication with the FMFCD staff provided additional stormwater program costs that augmented the data submitted in their cost spreadsheet. These costs were for labor, office supplies, and street sweeping (Appendix Table D-8). They also provided advice on how to allocate the submitted costs to the cost survey categories. FMFCD staff also advised on where the best available costs were compiled for the other agencies.

Comprehensive Annual Financial Report (CAFR) 2002/03 for the FMFCD, City of Clovis, City of Fresno, and County of Fresno

Except for the FMFCD, the Fresno area agencies had not established a fund to account for overall stormwater transactions, so no comparisons on cost were made to CAFR figures. The CAFR figures were used to determine the general fund revenue, which is considered a potential cost factor.

6.2 COST DATA SUMMARY

Table 6-2 summarizes the stormwater program costs for each cost survey category. Figure 6-1 shows the relative distribution of costs among the categories. Labor cost for the FMFCD staff to develop, oversee, and administer these programs was allocated to the Overall Stormwater Program Management category. The labor costs for the other agencies were allocated to the cost categories.

Table 6-2. Fresno-Clovis Metropolitan Area Cost Assigned to Cost Survey Categories

Cost Survey Category	Costs ($)
Construction Site Stormwater Runoff Control	81,800
Illicit Discharge Detection and Elimination (IDDE)	13,176
Industrial and Commercial Management Programs	47,780
Overall Stormwater Program Management	570,495
Pollution Prevention and Good Housekeeping for Municipal Operations	2,240,605
Post Construction Stormwater Management in New Development and Redevelopment	57,539
Public Education, Outreach, Involvement, and Participation	210,716
Water Quality Monitoring	252,918
Watershed Management	0
Total	**3,475,029**

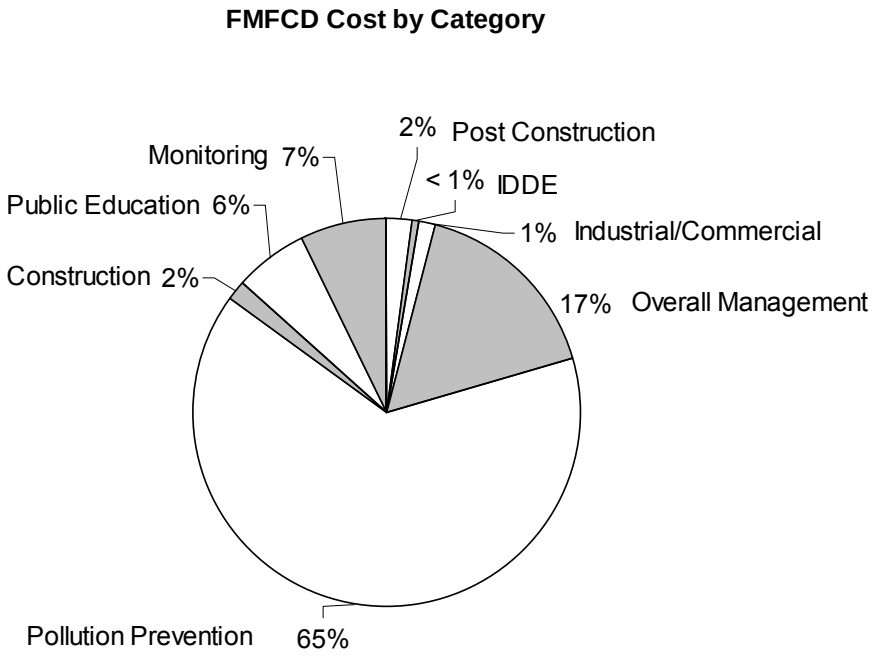

Figure 6-1. Distribution of Fresno-Clovis Metro Area Stormwater Costs Among the Cost Survey Categories

6.2.1 Discussion of Costs for Each Category

Cost breakdown and calculations for each survey category are found in Appendix D, Table D-1. The costs for each survey category are discussed in this section.

Construction Site Stormwater Runoff Control

The construction program cost was $81,800, which was 2 percent of total stormwater cost. The annual stormwater report did not contain the number of inspections for the city of Fresno, so cost could not be normalized by this factor. The number of construction sites was only tracked for the FMFCD so this factor was not used. (FMFCD, 2003b).

Illicit Discharge Detection and Elimination (IDDE)

The IDDE program cost was $13,176, which was less than one percent of total stormwater cost. The number of inspections was not available.

Industrial and Commercial Management Programs

The industrial and commercial program cost was $47,480, which was 1 percent of total stormwater cost. Facilities in the Fresno-Clovis metropolitan area are primarily inspected by Fresno County hazardous waste inspectors, city of Fresno industrial wastewater inspectors, and city of Clovis fire inspectors (FMFCD, 2003b). The number of inspections was only available for the FMFCD so cost could not be normalized on this factor.

Overall Stormwater Program Management

The overall stormwater program management cost was $570,495, which was 16 percent of total stormwater cost. This cost includes the FMFCD staff costs for stormwater (does not include other FMFCD activities such as flood control), which accounted for 98 percent of the cost of this category. The staff costs attributed to stormwater activities were estimated as 11 percent of the total personnel expenses for the FMFCD. The same percentage was applied to obtain office administration costs (Pomaville, 2004). Other costs were for office expenses, office administration, training, and travel.

Pollution Prevention and Good Housekeeping for Municipal Operations

The cost of this program was $2,240,605, which was 64 percent of total stormwater cost. This includes $2,193,296 reported by the city of Clovis and city of Fresno for street sweeping 141,769 of the 142,411 curb miles swept by the agencies (FMFCD, 2003b).

Post Construction Stormwater Management in New Development and Redevelopment

The post construction program cost was $57,539, which was 2 percent of total stormwater cost. This cost was for contracting for maintenance of 8 basins, resulting in an average annual cost of $7,200 per basin.

Public Education, Outreach, Involvement, and Participation

The cost of this program was $210,716, which was 6 percent of total stormwater cost. The Public Education and Outreach category was combined with the Public Involvement and Participation category because the county of Fresno and city of Clovis costs were combined (FMFCD, 1999). There was not a consistently reported activity statistic that could be used for normalization. FCMA agencies were involved in many outreach and participation activities such as public service announcements, brochures, BMP fact sheets, volunteer stenciling, special events, articles, clean-up activities, hotline, school programs, and business outreach (FMFCD, 2003b).

Water Quality Monitoring

The monitoring program cost was $252,918, which was 7 percent of total stormwater cost. The program funded monitoring plan development, sample collection, analysis, reporting, and a Water Environment Research Foundation (WERF) contribution. Only FMFCD reported monitoring costs.

Watershed Management

The Fresno area agencies did not allocate any cost to this category. This effort was captured under other programs such as Overall Stormwater Program Management.

6.3 CONFIDENCE IN THE DATA

For the Fresno-Clovis metropolitan area, confidence in the data was moderate because costs for the other agencies were taken from budgeted numbers out of the SWQMP (FMFCD, 1999). Additionally, baseline labor costs for the cities and county were less than $90,000 (Appendix D, Table D-3), which is approximately the annual cost of one person (salary and overhead). It seems unreasonable that this cost sufficiently covers the pre-existing stormwater labor cost in 1999 for these entities. The street sweeping costs provided for the city of Clovis were corroborated by the city's 2002/03 CAFR within 1 percent.

Surrounded by largely agricultural land, California's capital city is located in the central valley at the conjunction of the Sacramento and American rivers. The city of Sacramento has a population just exceeding 400,000 (www.census.gov). The stormwater program is coordinated by the Department of Utilities. Descriptive characteristics for the city of Sacramento are shown in Table 7-1. Primary personal communication was with Bill Busath from the city of Sacramento. The city of Sacramento costs for 2002/2003 were for complying with their 2002 stormwater permit (RWQCB, Central Valley, 2002b).

Table 7-1. Select Characteristics of the City of Sacramento

Description	Characteristic	Reference
Mean Income Per Person, $	18,721	www.census.gov
Area, (sq. miles)	99	www.census.gov
Population	407,018	www.census.gov
Curb Miles Swept	26,450	Table E-6
Active Construction Sites	417	Sacramento, 2003b
Industrial and Commercial Sites	N/A	N/A
Households	163,957	www.census.gov
City Actual General Fund Revenue, $	267,464,000	Sacramento, 2003a
Annual Rainfall (cm)	46	www.wrcc.dri.edu
Years Since Incorporation	154	www.cityofsacramento.org
*Reporting these numbers started in fiscal year 2004/05 (Sacramento, 2003b)		

7.1 DATA SOURCES

The following describes the information available from the data sources.

Cost Spreadsheets Submitted by City Staff

The staff provided two spreadsheets, which included cost data. One spreadsheet contained direct costs while the other contained labor costs. These spreadsheets represent the entirety of the city's stormwater costs except for the verbal estimates for street sweeping and pump station cleaning activities. The direct and labor cost spreadsheets are presented in Appendix E, Tables E-2 and E-8 respectively. The labor costs as assigned to cost survey categories are presented in Table E-7.

City of Sacramento, Stormwater Management Program, 2002/03 Annual Report

This report provided activity statistics (e.g. curb miles swept) for various city stormwater programs. These statistics were used to normalize costs to allow comparison with other cities.

Personal Communication: Interviews, Phone Calls, E-Mail

Through personal communication, city staff elaborated on what was accomplished for each cost submitted in their spreadsheet and commented on the allocation of costs among the cost survey categories. Also, verbal cost estimates for street sweeping and pump station cleaning activities were provided.

Comprehensive Annual Financial Report (CAFR) 2002/03

During the 2002/03 fiscal year, the city of Sacramento had a fund in place to account for overall stormwater related transactions. This fund is called the "Storm Drainage" fund (Sacramento, 2003a). The cost figures in this fund were used for comparison purposes with costs submitted by city stormwater staff.

City of Sacramento, Stormwater Quality Improvement Plan (SQIP) July 2003

While no cost figures were obtained from this document, it was used to verify that an activity was required for compliance with the permit.

7.2 COST DATA SUMMARY

Table 7-2 summarizes the stormwater program costs for each cost category. Figure 7-1 shows the relative distribution of costs among the categories. These cost figures include labor costs for the stormwater staff.

Table 7-2. City of Sacramento Cost Assigned to Cost Survey Categories

Cost Survey Category	Costs ($)
Construction Site Stormwater Runoff Control	261,716
Illicit Discharge Detection and Elimination (IDDE)	37,507
Industrial and Commercial Management Programs	42,318
Overall Stormwater Program Management	281,502
Pollution Prevention and Good Housekeeping for Municipal Operations	3,510,806
Post Construction Water Management in New Development and Redevelopment	38,517
Public Education, Outreach, Involvement, and Participation	361,440
Water Quality Monitoring	494,577
Watershed Management	31,591
Total	**5,059,973**

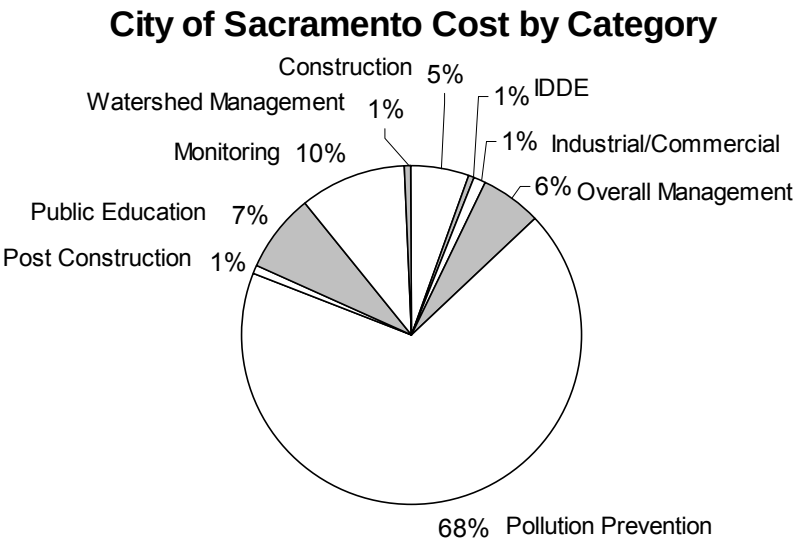

Figure 7-1. Distribution of Sacramento Stormwater Costs Among the Cost Survey Categories

7.2.1 Discussion of Costs for Each Survey Category

Cost breakdown and calculations for each survey category are found in Appendix E, Table E-1. The costs for each survey category are discussed in this section.

Construction Site Stormwater Runoff Control

The construction program cost was $261,716, which was 5 percent of overall stormwater cost. The construction program oversaw 417 active construction sites (Sacramento, 2003b) and performed 6,375 inspections. The average cost was $29 per inspection and $628 per active construction site.

Illicit Discharge Detection and Elimination

The IDDE program cost was $37,507, which was less than 1 percent of total stormwater cost. This cost is the only item attributed to this program and represents stormwater staff labor.

Industrial and Commercial Management Programs

The industrial and commercial management program cost was $42,318, which was less than 1 percent of total stormwater cost. The only cost attributable to this program was for the development of BMP handbooks and labor to do inspections.

Overall Stormwater Program Management

The overall management program cost was $281,501, which was 6 percent of total stormwater cost. Costs in this program were for office products, annual reporting, planning, mailing, CASQA fees, NPDES fee, and legal fees.

Pollution Prevention and Good Housekeeping for Municipal Operations

The municipal operations program cost was $3,510,806, which was 69 percent of total stormwater cost. The two primary activities for this category were street sweeping and pump station cleaning. The average cost was $50 per curb mile swept. Street sweeping and pump station costs are about 38 percent and 12 percent of total stormwater cost respectively. These percentages are based on the estimates provided by city staff and do not include labor cost allocated to oversee this program. Street sweeping costs were discounted because the city performed additional sweeping in their downtown area that was not permit required. This may be an unfair comparison to other permits that are vaguer about the sweeping requirements. In these programs (see Fresno-Clovis Metropolitan Area as an example), all sweeping costs were included because it was assumed that all sweeping was in compliance with the permit. The discounted amount for Sacramento's street sweeping costs was $277,252.

Post Construction Stormwater Management in New Development and Redevelopment

The post construction program cost was $38,517, which was less than 1 percent of total stormwater cost. Post construction cost was primarily for stormwater staff labor and student intern labor associated with working with developers to assure deployment of appropriate post construction BMPs. In addition, $2,500 was spent for the development of BMP handbooks.

Public Education, Outreach, Involvement, and Participation

The public education and outreach program cost was $361,440, which was 7 percent of total stormwater cost. The largest cost for this program was labor, which included both stormwater staff and student internship labor. The total labor cost was approximately 45 percent of the total public education and outreach program cost. The cost of development of integrated pest management (IPM) was about 11 percent and television and newspaper advertisements constituted 19 percent and 5 percent, respectively.

Water Quality Monitoring

The monitoring program cost was $494,577, which was 10 percent of total stormwater cost. Modeling and data analysis accounted for $131,688. Sample collection and lab cost accounted for $303,077. Stormwater staff and student labor accounted for $59,812.

Watershed Management

The cost of this category was $31,591, which was less than 1 percent of total stormwater cost. The primary cost attributed to this category was for stormwater staff labor.

7.3 CONFIDENCE IN THE DATA

For the city of Sacramento, confidence in the data was moderate. Several factors were considered in this assessment. The costs for street sweeping and pump station cleaning were estimated and represent approximately 34 percent of total stormwater program cost for the city. Since 34 percent of total stormwater cost was based on estimates, a higher level of confidence in the data could not be allowed. Secondly, the labor and direct cost data was submitted in spreadsheets built, maintained, and updated by the city staff with the labor costs being based on accounting system generated cost figures. The confidence in the data for Sacramento would be noticeably increased if 2003/04 data were considered (Busath, personal communication, 11/23/04). The city of Sacramento had a fund (Storm Drainage) set up to account for overall stormwater expenditures. Total expenditures for the Storm Drainage fund were $30,926,000[6] (City of Sacramento, 2003a), while total stormwater costs submitted by city staff were $5,046,157. This difference is attributed to the expense for flood control and conveyance work not required by the NPDES permit. Differentiation of stormwater costs in the CAFR was not possible.

[6] This figure represents the sum of operating expenses, interest expense, amortization of deferred charges, loss on disposition of fixed assets, and transfers out.

The city of Santa Clarita is a small to medium-sized city with a population of 151,088 (www.census.gov). The city lies approximately 25 miles from the Pacific coastline in the Santa Clara River watershed. The stormwater program is coordinated by the Field Services Department. Descriptive characteristics for the city of Santa Clarita are shown in Table 8-1. Primary personal communication was with Oliver Cramer and Travis Lange from the city of Santa Clarita. The city of Santa Clarita costs for 2002/2003 were for complying with their 2001 stormwater permit (RWQCB, Los Angeles, 2001).

Table 8-1. Select Characteristics of the City of Santa Clarita

Description	Characteristic	Reference
Mean Income Per Person, $	26,841	www.census.gov
Area, (sq. miles)	48	www.census.gov
Population	151,088	www.census.gov
Curb Miles Swept	46,800	Cramer, pers. comm., 4/22/04
Active Construction Sites	64	Santa Clarita, 2003b
Industrial and Commercial Sites	1,071	Santa Clarita, 2003b
Households	52,442	www.census.gov
City Actual General Fund Revenue, $	61,659,874	Santa Clarita, 2003a
Annual Rainfall (cm)[1]	33	www.wrcc.dri.edu
Years Since Incorporation	17	www.santa-clarita.com

1. Dry Canyon Reservoir rain gage was used.

8.1 DATA SOURCES

The following describes the information available from the data sources.

Los Angeles County Municipal Storm Water Permit (Order 01-182) Individual Annual Report Form, Attachment U-4

This report was the primary source of cost data for the city of Santa Clarita. The report contained labor and direct cost information for the city's stormwater program broken down into categories (Appendix F, Table F-1). The labor cost is described as "Administrative Costs" and were assigned to the Overall Stormwater Management category because the city was unable to distribute these costs among the programs. This report also provided activity statistics (e.g. curb miles swept) for various city stormwater programs. These statistics were used to normalize costs to allow comparison with other cities.

Personal Communication: Interviews, Phone Calls, E-Mail

Through personal communication, city staff elaborated on what was accomplished for each cost submitted in their spreadsheet and commented on the allocation of costs among the cost survey categories.

During the 2002/03 fiscal year, the city of Santa Clarita had a fund in place to account for overall stormwater related transactions. This fund is called the "Stormwater Utility" fund (Santa Clarita, 2003a). The cost figures in this fund were used for comparison purposes with costs submitted by city stormwater staff.

8.2 COST DATA SUMMARY

Table 8-2 summarized the stormwater program costs for each cost category. Figure 8-1 shows the relative distribution of costs among the categories. Since the city staff was unable to distribute stormwater staff labor cost among the programs, it has been captured under Overall Stormwater Program Management.

Table 8-2. City of Santa Clarita Cost Assigned to Cost Survey Categories

Cost Survey Category	Costs ($)
Construction Site Stormwater Runoff Control	74,995
Illicit Discharge Detection and Elimination (IDDE)	114,831
Industrial and Commercial Management Programs	12,600
Overall Stormwater Program Management	515,352
Pollution Prevention and Good Housekeeping for Municipal Operations	859,754
Post Construction Water Management in New Development and Redevelopment	106,925
Public Education, Outreach, Involvement, and Participation	49,130
Water Quality Monitoring	3,300
Watershed Management	332,949
Total	**2,069,836**

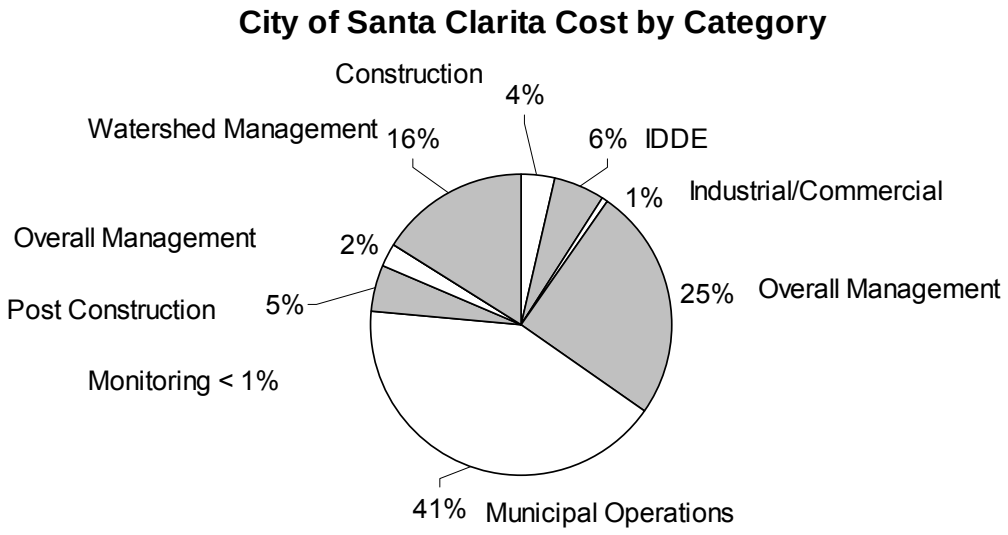

Figure 8-1. Distribution of Santa Clarita Stormwater Costs Among the Cost Survey Categories.

8.2.1 Discussion of Costs for Each Survey Category

Cost breakdown and calculations for each survey category are found in Appendix F, Table F-1. The costs for each survey category are discussed in this section.

Construction Site Stormwater Runoff Control

The construction program cost was $74,995, which was 4 percent of total stormwater cost. The construction program oversaw 64 active construction sites (City of Santa Clarita, 2003b). The average cost was $1,172 per active construction site. The city performed 11,746 inspections, but this reflects all inspections whether or not stormwater inspections were performed. Therefore, it is not appropriate to normalize against number of inspections or compare the number of inspections with other cities. (City of Santa Clarita, 2003b)

The cost of $74,995 was based on the assumption that all construction site inspections averaged a percentage of time for stormwater inspections. This was applied to the cost of all 11,746 inspections whether or not stormwater issues were addressed in all 11,746, but since an average was applied it was not necessary to eliminate non-stormwater inspections for cost estimation. The cost of $74,995 is the best estimate available for the unknown number of stormwater inspections performed in 2002/03.

The city provided an estimate of what the minimum effort might cost should stormwater inspections be performed exclusively and not more often than what is required in the permit (Cramer, personal communication, 6/24/04). Based on 64 sites, $99.21/hr for an inspector and vehicle, and 2 hrs per site including travel, the minimum cost for all inspections was calculated to be $12,699. This cost is not presented in the report, it is only presented to indicate that some cities that perform stormwater inspections concurrently with other inspections are exceeding the minimum requirements of the permit.

Illicit Discharge Detection and Elimination

The IDDE program cost was $114,831, which was 6 percent of total stormwater cost. The cost for this program was attributable to investigations. The average cost per investigation was $311.

Industrial and Commercial Management Programs

The industrial program cost was $12,600, which was less than 1 percent of total stormwater cost. The industrial program had 110 inspections at an average cost of $115 per inspection.

Overall Stormwater Program Management

The overall management program cost was $515,352, which was 25 percent of total stormwater cost. All of the stormwater staff cost was assigned to this category. The staff costs (including overhead allocation) represent approximately 85 percent of the costs assigned to this category and 21 percent of total stormwater cost. The other cost was $76,520 for development planning.

Pollution Prevention and Good Housekeeping for Municipal Operations

The municipal operations program cost was $859,754, which was 42 percent of total stormwater cost. The two primary activities for this category were street sweeping and catch basin cleaning. The average cost was $12 per curb mile swept and $170 per basin cleaning. Street sweeping cost and catch basin cleaning cost are approximately 27 percent and 12 percent of total stormwater cost respectively.

Post Construction Stormwater Management in New Development and Redevelopment

The post construction program cost was $106,925, which was 5 percent of total stormwater cost. Post construction cost was primarily for capital costs, which included purchase of vehicles for catch basin cleaning and ICID equipment (Cramer, personal communication, 6/24/04).

Public Education, Outreach, Involvement, and Participation

The public education program cost was $49,130, which was 2 percent of total stormwater cost. Public education and outreach activities often incorporated public involvement and participation activities. This made differentiating cost between the categories impractical. Because of this, the two programs were combined.

Water Quality Monitoring

The monitoring program cost was $3,300, which was less than 1 percent of total stormwater cost. The total cost of monitoring was $3,300, which was for monitoring for diazinon at a single location (Cramer, personal communication, 6/24/04).

Watershed Management

The watershed management program cost was $332,949, which was 16 percent of total stormwater cost. This cost was for the stormwater share of GIS costs.

8.3 CONFIDENCE IN THE DATA

For the city of Santa Clarita, confidence in the data was high. The cost data was found in the annual reporting forms. Through personal communication (Cramer, personal communication, 4/22/04) with city staff, a couple of adjustments to these numbers were made. These figures were later verified by accounting system reports and comparisons to the CAFR.

Since the city of Santa Clarita had a fund (Stormwater Utility) set up to account for overall stormwater expenditures, the level of confidence in the data was increased. This was because a comparison could be made between CAFR cost figures and those submitted by city staff. Total expenditures for the Stormwater Utility fund were $2,869,025, while total stormwater costs submitted by city staff in the annual reporting forms were $2,219,860. Non-stormwater compliance activities totaled $649,205, which exactly accounts for the difference. Because of this match with CAFR expenditures, the level of confidence in the data was increased.

Analysis of the cost survey results and comparisons to costs published independent of this survey are presented in this section. Backup calculations for the analysis presented in this section are in Appendix G. Costs are analyzed by aggregating costs for all cities and by comparing costs between individual cities.

Aggregate cost is the sum of all costs for all cities in this survey. Aggregating costs results in one cost number for total stormwater costs for all programs surveyed. This number is normalized by the number of households for all cities to calculate an average cost per household. Aggregate costs are broken down into each cost category in Section 9.2. Aggregate costs are presented by cost category and by whether they were enhanced, new, or existed prior to the first stormwater permit.

To take into account the size of the city when making comparisons, costs are normalized by number of households. Number of households was used to normalize costs in other studies. Households were selected because it is the most common cost factor from other studies. Quantitative analysis of cost factors that may affect cost per household are presented in Appendix G.

Section 9.4 presents a breakdown of both aggregate costs and individual city costs into the cost classifications of new, existing, and enhanced.

9.1 COST PER HOUSEHOLD

Table 9-1 presents the number of households for the cities surveyed.

Table 9-1. Number of Households for Surveyed Areas

Area	Households
City of Corona	39,271
City of Encinitas	23,843
City of Fremont	69,452
Fresno-Clovis Metropolitan Area[1]	195,311
City of Sacramento	163,957
City of Santa Clarita	52,442

1. The sum of the number of households for city of Clovis, city of Fresno, and the portion of Fresno County served by the FMFCD, which was calculated using the population of Fresno County served by the district, 65,000 (Pomaville, e-mail communication, 9/13/04), and average persons per household for the county (www.census.gov).

Normalized costs are presented in Table 9-2. Annual total cost per household ranged from $18 to $46 for the six cities. The small data set limits the statistical conclusions which may be drawn. Some anecdotal observations are presented below. These costs, ordered by the size of the city, are displayed in Figure 9-1.

The "true" mean in Table 9-2 is based on the sample of all households in the surveyed municipalities. It is calculated by dividing the total stormwater costs of all cities by the number of households of all cities in this survey. This gives a true average cost per household, while averaging the six cost per household values assigns equal weight to each city regardless of how many households are in each city.

Table 9-2. Summary of Normalized Stormwater Costs for Municipalities

Municipalities	Municipality Description	Cost/Household ($)
City of Encinitas	Coastal tourism, small city	46
City of Fremont	Bay Area, moderately integrated countywide program	45
City of Santa Clarita	Tourism and industrial	39
City of Corona	Industrial	32
City of Sacramento	Pumped stormwater, large city	29
Fresno-Clovis Metropolitan Area	65-90% infiltration, fully integrated multi-city program	18
Summary Statistics		
Mean of the six values for each city		35
Median of the six values for each city		36
Standard Deviation of the six values for each city		11
True Mean[1]		29

1. The "true" mean is the aggregate stormwater cost for all cities surveyed divided by the aggregate number of households

9.1.1 Going Beyond Minimum Requirements

In some cases, programs in the California survey appeared to go beyond the minimum requirements of the permit. The cost of this additional effort was not included when it could be identified or estimated, such as street sweeping in Sacramento that was above the permit required frequency. Including the total cost of the street sweeping program the cost per household for Sacramento would increase $1.69. In some cases the additional effort could not be estimated. This was particularly true when stormwater activities were combined with activities that occurred more frequently than the permit requirement for the stormwater activities, such as when stormwater construction inspections for Santa Clarita were performed at every construction permit inspection and these permit inspections occurred more frequently than the permit requirement.

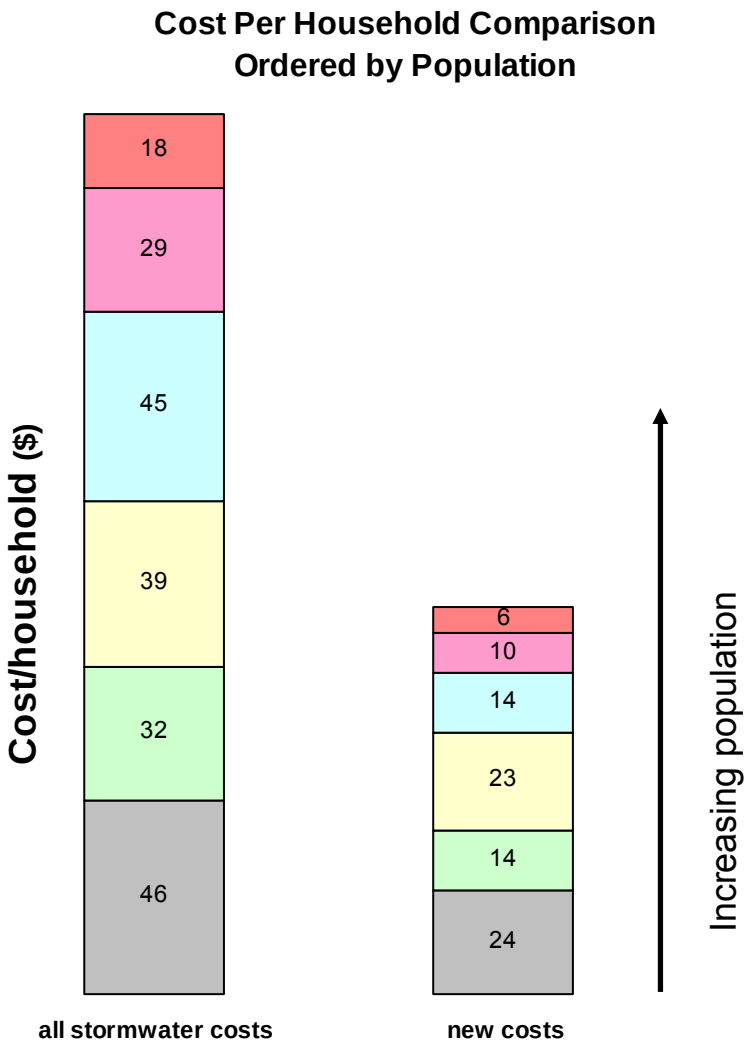

Figure 9-1. Cost per Household Comparison of Each Surveyed City.

9.1.2 Qualitative Discussion of Costs per Households

Qualitative discussion is provided here because quantitatively explaining the variation of costs per households was not successful (see Appendix G for quantitative analyses).

The FCMA had the lowest cost per household. The actual range of costs may be a smaller than what is reported in Table 9-2 because FCMA is at the bottom of this range and FCMA may not have accounted for all cost as well as other survey participants. Recall that the costs for the cities of Fresno and Clovis were based on budgeted numbers. Though the FCMA cost data collected is within the quality expectations of the study team, accounting of actual expenditures may have increased the cost for the FCMA, and decreased the range of costs found in this

survey. However, even if such increases were found, FCMA costs per household would remain substantially lower than the other cities. The following factors are thought to contribute to the FCMA costs limit costs being lower than the other survey results:

- flood control and stormwater quality basins are combined,
- land was set aside for water projects,
- climate helps infiltration due to infrequent storms and low annual rainfall,
- lower land cost compared to other cities,
- FMFCD owned land needed for basins prior to storm water permits requirements,
- topography lends to drainage of urban areas to post-construction BMPs, and
- highly permeable soils allow extensive use of infiltration.

These factors are unique or more prevalent for FCMA than for the other cities surveyed. Excluding the FCMA as an ideal situation, the range of cost is tighter, $29 to $46 per household.

As see in Table 9-2, variation in cost from the other cities is not obviously explainable by the factors of size, location, tourism, and integrated co-permittee programs. These factors are discussed in the following:

Size: Size does not seem to be important as the large cities of Fremont and Sacramento occupy opposite sides of the cost range. Further, Encinitas, population 58,014, and Fremont, population 203,413, had almost identical cost per household. The affect of size on cost per household is shown in Figure 9-1.

Location: Northern versus southern parts of the state do not seem important; however, though it may be coincidental with such a small sample size, the highest cost per household, Encinitas, was adjacent to coastal waters and the next highest, Fremont, is adjacent to South San Francisco Bay.

Tourism: A high dependence on tourism may increase visibility of stormwater problems, such as beach closures and litter. This may not be a very important cost factor because Fremont and Encinitas have very similar cost per household, and yet Encinitas seems to have a far greater reliance on tourism.

Integrated programs: An integrated program is one in which an overseeing agency establishes a common approach in implementing stormwater activities. Certainly in the case of FCMA, an integrated program seems to be an important factor. No other city surveyed had a program in which a single agency implemented a comprehensive plan for post-construction stormwater control for all permittees as did FMFCD for the FCMA. This integration may contribute to relatively low cost per household; however, on the other extreme of the cost range was Fremont, who participates in the Alameda County Clean Water Program.

Not all qualitative factors could be discussed here. Cyre (1983) reports on other qualitative factors that often affect how much a city spends on stormwater activities. Besides the factors discussed above, perceived equity, public acceptance (i.e. willingness-to-pay), and jurisdictional considerations are expected to have an influence on costs.

9.2 AGGREGATE COST BREAKDOWN BY COST CATEGORIES

The distribution of total stormwater costs among the cost categories is shown in Figure 9-2. Note that pollution prevention costs are subdivided into the percent of cost attributed to street sweeping and the percent for all other pollution prevention activities.

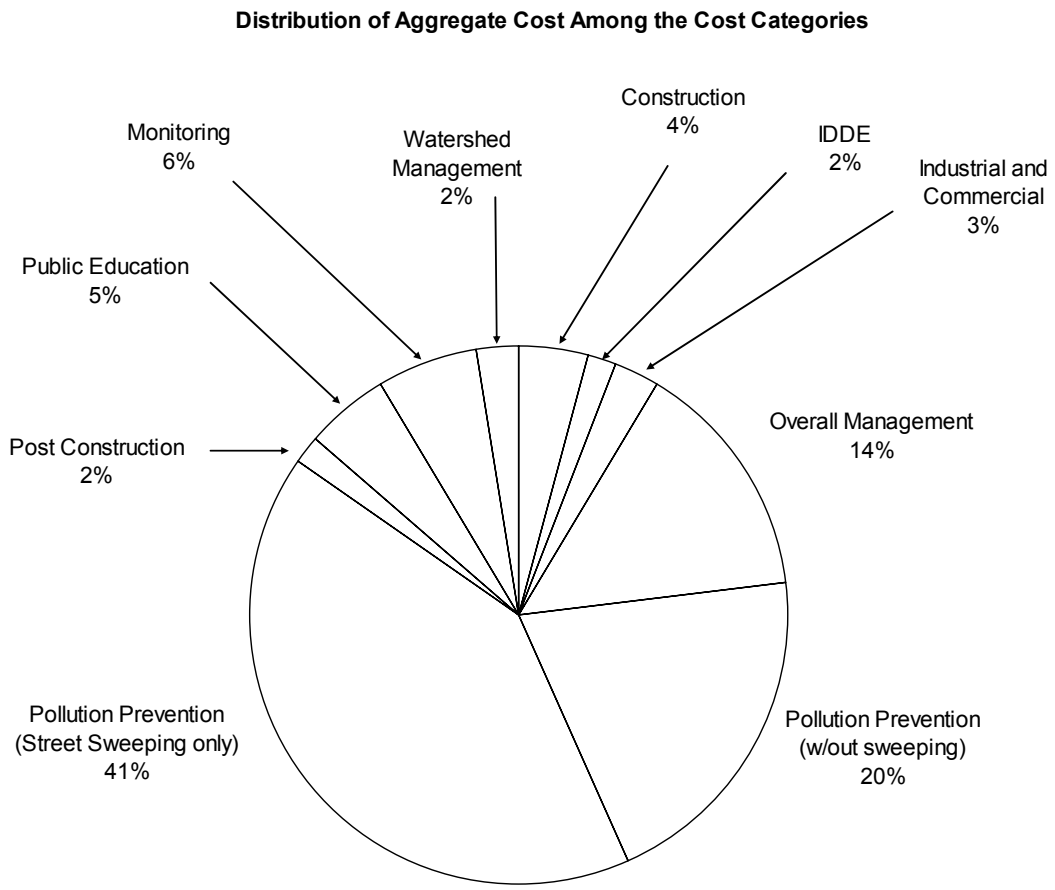

Figure 9-2. Distribution of Aggregate Costs among Cost Categories

9.3 NEW, EXISTING, AND ENHANCED COSTS

Costs for all stormwater activities were identified as new, existing, or enhanced according to the extent that the activity existed before the first stormwater permit. New costs are for activities that are exclusively a result of compliance efforts with the stormwater permit.

Understanding Enhanced Costs

Some stormwater activities preexisted stormwater permits, but permit requirements caused an increase in effort. Enhanced costs include all costs of these impacted activities, and not just the additional amount due to the increase in activities.

Existing costs are for activities that predated stormwater permits. Enhanced costs are for existing activities that were increased due to permit requirements. Street sweeping is a common example of an enhanced activity. Enhanced costs really consist of an unknown fraction of existing and new costs. In the street sweeping case, it seems that the majority, if not all street sweeping costs for some cities, preexisted stormwater permits. Other cases may be similar. Enhanced costs include street sweeping, drain and channel cleaning, and pump station cleaning. Enhanced costs are the total costs for the impacted activities, and not just the increase in cost. Table 9-3 shows the percentage of stormwater costs attributed to new, existing, and enhanced for each city. The distribution of aggregate cost among these classifications is shown in Figure 9-3.

Distribution of Aggregate Cost Between New, Enhanced, and Existing Costs

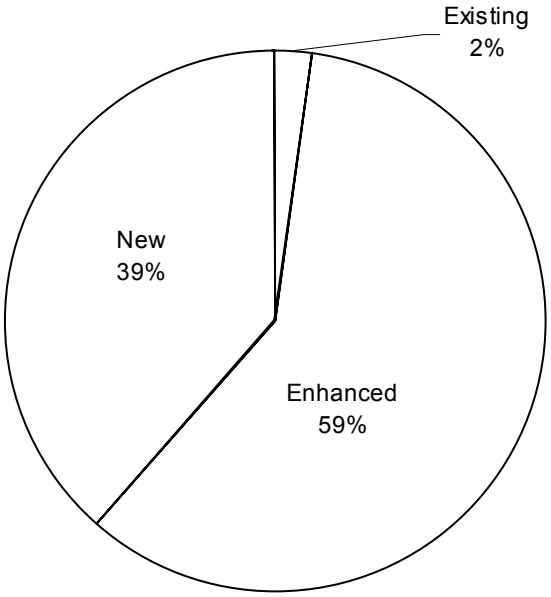

New , Enhanced, and Existing are determined by w hether the cost existed prior to the first stormw ater permit. Enhanced cost existed, but permit requirements caused an increase in cost. Enhanced costs are the total cost for the impacted activities, and not just the increase in cost.

Figure 9-3. Breakdown of Aggregate Costs into New, Existing, and Enhanced Costs

It was proposed in meetings of the TAG that cities with utility fees for stormwater may be less likely to have a high percentage of enhanced costs. This was not observed in the cities surveyed. In fact, cities with a stormwater fee happen to have a larger percentage of ‘enhanced’ costs, but the observation is not conclusive due to limited sample size. This observation is shown in Table 9-3.

Table 9-3. New, Existing, and Enhanced Cost for Each City

Municipality or Area	Existing	% Ex.	Enhanced	% En.	New	% New	Total	Utility Fee
City of Corona	37,651	3%	651,850	52%	561,365	45%	1,250,866	no
City of Encinitas	16,250	1%	490,786	45%	580,002	53%	1,087,038	no
City of Fremont	200,000	6%	1,915,836	62%	985,605	32%	3,101,442	yes
Fresno-Clovis Area	57,539	2%	2,211,196	63%	1,206,295	35%	3,475,029	yes
City of Sacramento	0	0%	3,257,674	68%	1,562,299	32%	4,819,973	yes
City of Santa Clarita	50,403	2%	809,351	39%	1,210,082	59%	2,069,836	yes
Total	**361,842**		**9,336,694**		**6,105,648**		**15,804,184**	

All the enhanced cost activities are under the Pollution Prevention cost category. Of the 59 percent of aggregate cost attributable to enhanced costs, 70 percent was for street sweeping. Figure 9-4 shows the distribution of enhanced cost among the pollution prevention activities.

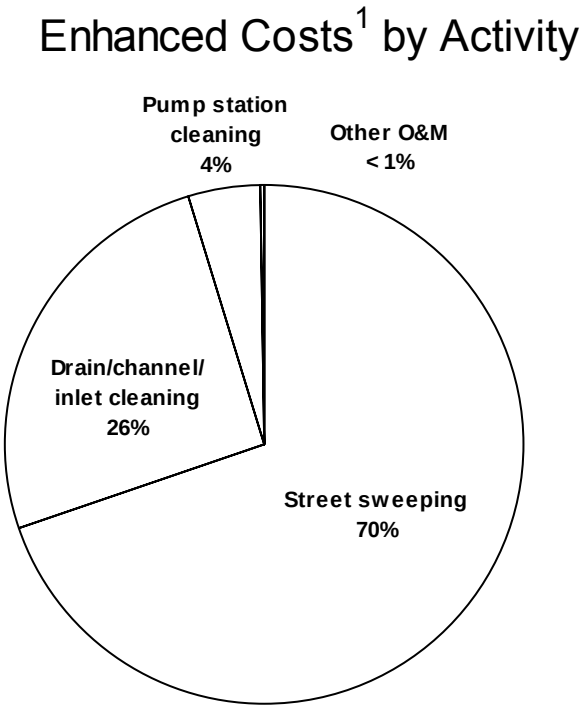

1. Enhanced costs, which is 58% of all costs, has an unknown breakdown between new and exisiting costs

Figure 9-4. Breakdown of Enhanced Costs by Stormwater Activity

Existing costs, while only two percent of all cost, are mostly pollution prevention costs as seen in Figure 9-5. A single activity for one city, litter and debris removal for the city of Encinitas, accounts for 66 percent of the existing pollution prevention cost for all cities.

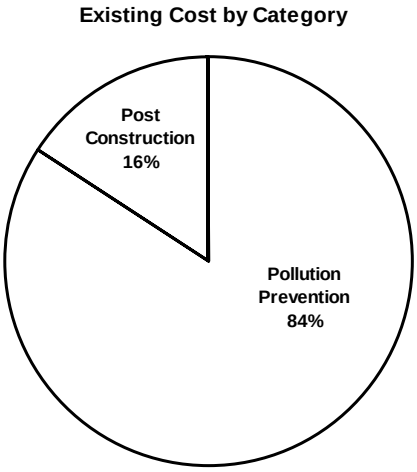

Figure 9-5. Breakdown of Existing Costs by Cost Category

New costs include cost from all categories. One hundred percent of all categories under "new" were identified as new cost, except for post construction and pollution prevention. Figure 9-6 shows the distribution of new costs among the cost categories.

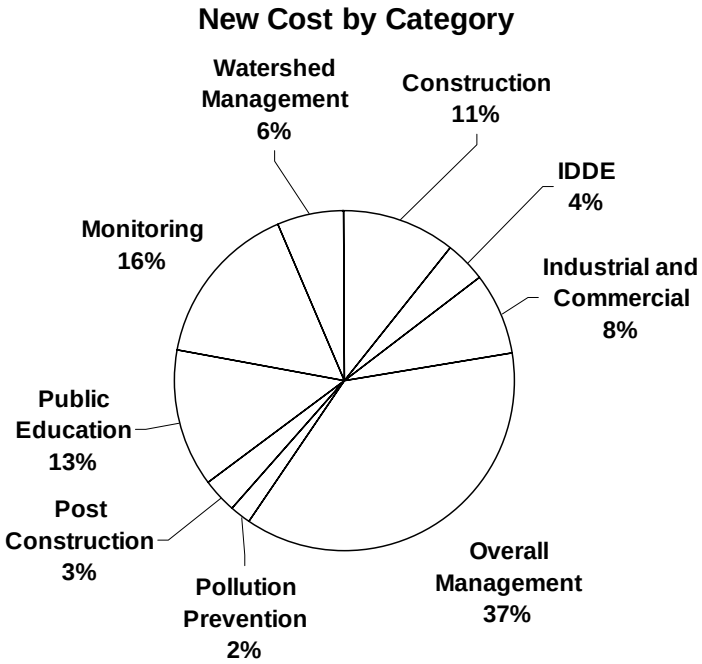

Figure 9-6. Breakdown of New Costs by Cost Category

The distribution, among new, existing, and enhanced, of aggregate cost for all cost categories is shown in Table 9-4. Figure 9-7 shows average cost per household for all stormwater costs and for only new stormwater costs.

Table 9-4. Distribution of Aggregate Cost Category between New, Existing, and Enhanced Classifications[1]

	% New	% Existing	% Enhanced[2]
Construction	100%	0%	0%
IDDE	100%	0%	0%
Industrial and Commercial	100%	0%	0%
Overall Management	100%	0%	0%
Pollution Prevention	1%	3%	96%
Post Construction	78%	22%	0%
Public Education	100%	0%	0%
Monitoring	100%	0%	0%
Watershed Management	100%	0%	0%

1. New, Enhanced, and Existing are determined by whether the cost existed prior to the first stormwater permit. Enhanced cost existed, but permit requirements caused an increase in cost.
2. Enhanced costs are the total cost for the impacted activities, and not just the increase in cost and as such, enhanced costs are made of unknown distribution between new and existing costs.

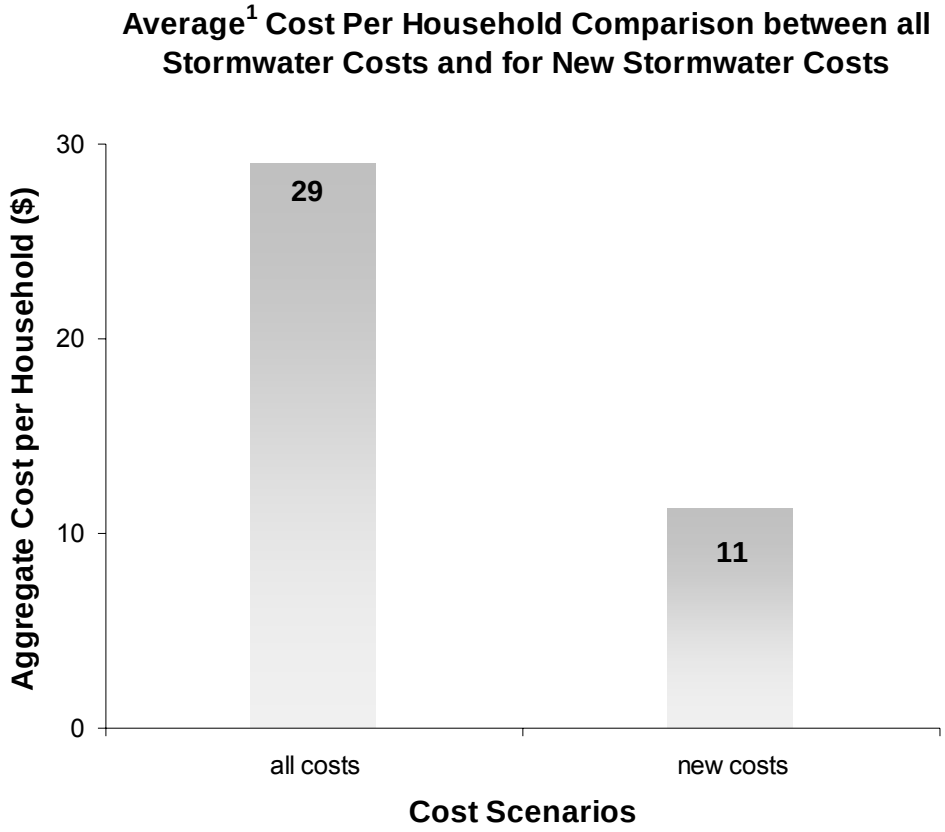

1. Average cost per household is the aggregate cost divided by the aggregate number of households.

Figure 9-7. Comparison of Aggregate Cost per Household for All Costs and for New Costs

9.4 DISCUSSION OF STORMWATER COSTS FOR SELECTED COST CATEGORIES

Noteworthy observations of costs for select categories are presented in this section. Only a qualitative discussion is warranted due to insufficient data.

Overall Stormwater Management: This category included legal fees. Appellant fees are excluded, but legal advice on program implementation and response to citizen suits are included. It is assumed that if legal fees are incurred, it is a cost of running a stormwater program. Legal costs were always less than 18 percent of the total cost of this category.

Pollution Prevention: Street sweeping accounts for 68 percent of the cost of this category as seen in Figure 9-8. The unit cost of street sweeping was a commonly asked question during TAG reviews. A summary of street sweeping statistics is presented in Table 9-5. No explanation was identified for the variation in street sweeping costs, though it does not exceed the estimated cost

from the Rouge River study (see Section 9-6 for comparisons). One suggestion not observed in the data is that frequency has an effect on unit cost because more frequent sweeping increase cost efficiency. Table 9-5 shows unit cost of street sweeping and approximate frequency sorted by unit cost. Clearly, differences in street sweeping practices, such as sweeper speed, will affect costs.

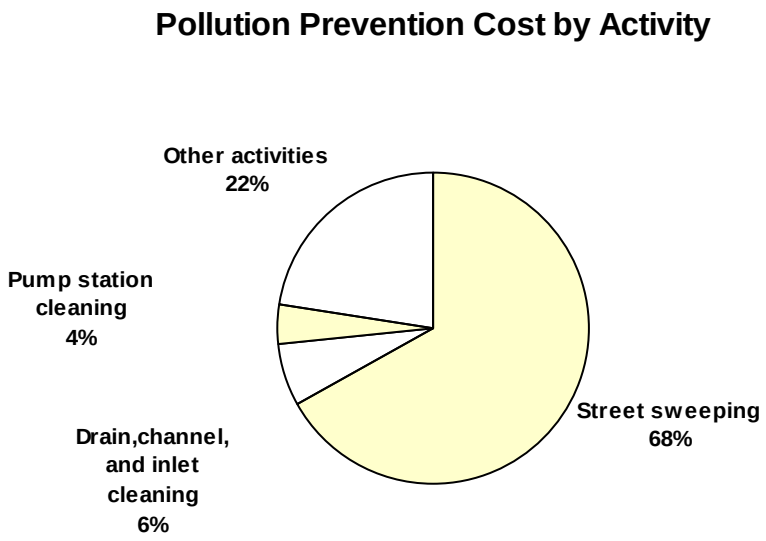

Figure 9-8. Breakdown of Pollution Prevention Costs by Activity.

Table 9-5. Street Sweeping Statistics for Municipalities

Municipality	Street Sweeping Costs ($)	Annual Curb Miles Swept	Cost Per Curb Mile Swept ($/curb mile)	Estimated Annual Frequency[2]
Fremont	1,915,000	31,405	61	12
Sacramento	1,322,748	26,450	50	12
Encinitas	117,962	5,832	20	12
Corona	414,215	20,877	20	26
Fresno-Clovis Area[1]	2,193,296	142,411	15	12
Santa Clarita	557,443	46,800	12	50

1. A breakdown of costs and number of miles swept for the cities of Fresno and Clovis can be found in Appendix Table D-5. Frequency for the city of Fresno was found at http://www.fresno.gov/public_utilities/sanitation/cleanup_street_clean.asp.
2. When an average frequency was not available, frequency was taken as the frequency for residential areas.

Post Construction: Post Construction costs are expected to increase dramatically as cities move into full implementation of SUSMP type requirements for new development and redevelopment.

The reported costs are particularly misleading for cost projection purposes since the research coincides with the start of SUSMP type requirements implementation.

9.5 LIMITATIONS

The information presented is anecdotal. It should not be used to establish a measure of compliance because of the lack of quantitative explanations for the observed variability in cost per household.

9.6 COMPARISONS TO OTHER STUDIES AND SURVEYS

The normalized costs from this cost survey were compared to outside literature (e.g. studies, professional papers, conference proceedings, etc.). Other cost sources include, the NAFSMA survey of Phase II costs, the USEPA review of cost submitted in Phase I permits, the Rouge River National Wet Weather Demonstration Project, street sweeping costs for the city of San Antonio, and projected cost (based on actual expenditures) for the city of Los Angeles. It is important to recognize that the study team did not establish the quality of this other data. However, in some cases literature data could be excluded based on the available information. For example, flow conveyance costs were not included in the California survey; but in some cases they were reported as stormwater costs in other studies, such as the Black and Veach "stormwater utility" survey (2002). This could be because stormwater cost estimates are used to develop a single fee that is used to fund both conveyance and NPDES permit compliance activities.

9.6.1 Current Los Angeles Cost Estimate

Staff of the Los Angeles Regional Water Quality Control Board estimated the cost to comply with the Los Angeles County municipal storm water permit. Using the estimation method believed to be most reliable, Radulescu and Swamikannu (2003) estimated cost per household to be $18. It does not appear that stormwater conveyance costs were included in these costs.

9.6.2 National Association of Flood and Stormwater Management Agencies (NAFSMA) Survey

The USEPA report "Economic Analysis of the Final Phase II Stormwater Rule" contains a summary of costs from two separate efforts to estimate Phase II cost per household. The first is the results of a survey stormwater costs for 56 Phase II municipalities performed by NAFSMA. The NAFSMA survey of five cost measures represents the six minimum measures of the Phase II regulations because two measures seemed to have been combined: 1) Public Education and Outreach and 2) Public Involvement and Participation.

The second effort presented in the USEPA report is that of a review, performed by USEPA, of 26 Phase I municipalities. These 26 municipalities were chosen they were relatively small Phase

I cities, they were nearly in the first permit term, and they had cost published in their annual reports.

The California survey results for the same five minimum measures were extracted to compare to the NAFSMA survey and the EPA review in Table 9-6. The costs were adjusted to 2003 dollars using the Consumer Price Index Urban (U.S. Bureau of Labor Statistics, 2005).

Table 9-6. Stormwater Costs per Household for Six[1] Minimum Measures from the California Survey, the NAFSMA[2] Phase II Survey, and the USEPA review of Phase I Annual Reports (USEPA, 1999)

Study	Median (50%) ($)	Mean ($)	Max ($)
Adjusted California Survey[3]	24	26	35
NAFSMA Phase II Survey[4]	4.63	10	61
EPA Phase I Survey[5]	3.16	10	67

1. Public Education and Outreach and Public Involvement and Participation were assumed combined for the NAFSMA survey.
2. NAFSMA: National Association of Flood and Stormwater Management Agencies
3. Based only on costs from cost categories that correspond to the six minimum measures
4. NAFSMA survey based on 56 Phase II respondents to a survey on stormwater costs for five minimum measures. Values adjusted to 2003 dollars.
5. EPA results based on a review of 26 annual reports for smaller Phase I cities that were nearly in their first NPDES term so that costs would be more representative of Phase II programs. Values adjusted to 2003 dollars.

9.6.3 Rouge River National Wet Weather Demonstration Project (Furguson, 1997)[7]

This study collected cost information for stormwater runoff controls. Total stormwater costs for municipalities in the Rouge River project were not reported. Costs were available for municipal operations and for public education. These costs are not presented here because further information is needed to indicate how the California cities compare to the Rouge River programs. First, municipal operations often include flood conveyance costs and without further information, cost comparisons are not appropriate. Second, without knowing the total stormwater cost of these cities, comparison to individual programs are not presented because cities may focus on different stormwater programs (different cost categories) based on local concerns. This may be especially true of public education costs.

Costs were also available for street sweeping. The Plymouth Township street sweeping costs were reported at $78/curb mile. This number can be compared to the range of cost per curb mile in the California survey, which was $12 to $61 per curb mile. Also, the reported cost range for contracted street sweeping costs for the Rouge River project was from $149 to $172 per curb mile. It was not investigated why contracted street sweeping is so much higher.

[7] All Rouge River costs were presented in 1997 dollars and these were converted to 2003 dollars.

9.6.4 San Antonio Street Sweeping Costs

The city of San Antonio is reported to spend $3.5 million on street sweeping (Brazozowski, 2004). The city of San Antonio estimates that around 45,000 curb miles were swept (Martinez, 2004). This results in a cost per mile swept of $78. The highest cost per mile from the California survey was $61, indicating costs per mile from the survey are reasonable despite a wide range.

This section discusses the significance of cost survey results and suggests standards for reporting cost and activities performed. These suggestions are meant to build the dataset necessary to make management decisions on stormwater program implementation.

10.1 SIGNIFICANCE OF SURVEYED STORMWATER COSTS IN CALIFORNIA

The range of 2002/03 fiscal year stormwater costs for the six municipal areas[8] surveyed was $18 to $46 per household. This only provides a snap shot of costs in 2002/2003 of good California Stormwater programs. Costs will change as requirements change with each new permit.

A specific example of increasing permit requirements is TMDL compliance. TMDL costs are sometimes addressed within the implementation plans or the cost to achieve water quality objectives may already be addressed in 305 (b) reports[9]. Since TMDL requirements will be added to stormwater permits, these cost estimates are an indication of how permit compliance costs will be increasing. However, TMDL allocations may be distributed to a variety of sources besides stormwater, thus stormwater treatment will not bear the entire burden of restoring beneficial use to impaired waters.

Another factor affecting cost in the near term is the increased level of attention given to Standard Urban Stormwater Mitigation Plans (SUSMPs). Post-construction costs in particular are expected to increase significantly, but that cost may be borne by developers and contractors rather than municipalities.

Although compliance with construction and industrial permits is discussed in stormwater permits, the costs for municipalities to comply with these permits are not addressed in this report.

10.2 SUGGESTIONS FOR REPORTING COSTS AND ACCOMPLISHMENTS

Current variability in the organization and content of the data submitted by the cities indicates standards for reporting costs and stormwater activities are needed to allow accurate cost comparisons to be made between stormwater activities. This cost information is crucial in making management decisions regarding which stormwater activities should be implemented.

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[8] The Fresno-Clovis Metropolitan Area includes the stormwater costs of the cities of Fresno and Clovis.

[9] Even if TMDL plans do not address cost, Section 305 (b) states "each State shall prepare and submit….a report which shall include…an estimate of the environmental impact, the economic and social costs necessary to achieve the objective of this chapter in such State, including an estimate of the costs of implementing such programs". First, assuming all 303 (d) listed waters are a subset of 305 (b) waters, it could be assumed that the CWA requires a cost analysis for TMDL implementation plans (which is interpreted as "each State shall prepare…". Otherwise it seems to be required in the State's "305(b) report". Either way, analysis of the cost to restore water quality may be an ongoing requirement.

The following recommendations for cost reporting are only the first step in the process of developing consistent cost reporting. This process includes notifying cities of reporting goals, receiving feedback and data from the cities, reviewing reported costs for quality and consistency, and providing feedback to the cities.

10.2.1 Current Variability

In this survey, there seemed be inconsistent reporting and tracking of stormwater activities and associated costs. This could be from differences in the reporting requirements for each permit. The reasons for these differences were not investigated; however, some possibilities are discussed. One reason may be that interest in cost may vary between RWQCB jurisdictions. Also, cost tracking systems used by the cities may not be designed to accurately track stormwater costs by activity. According to a survey conducted in 2001-2002, only 50 percent of 122 surveyed stormwater utilities said that their accounting system permitted cost tracking by operating activity (e.g. inlet cleaning) (Black and Veatch, 2002). Also, Radulescu and Swamikannu (2003) note that current governmental accounting standards do not require a distinction of stormwater costs. This was confirmed by a review of these standards by the study team.

10.2.2 Proposed Data Tracking and Reporting

A separate fund to account for stormwater related expenditures would provide cities with a starting point for stormwater cost collection. Cities would be able to use this fund for stormwater related expenditures needed for annual stormwater report preparation. It is important that the fund distinguish between stormwater permit compliance costs and stormwater conveyance costs. Having a fund in place also means that the costs reported in the fund would be subject to independent audit on a yearly basis, which would increase the level of confidence in reported cost figures. Stormwater costs should be further broken down into stormwater programs.

Caution for Template Reporting Requirements

Some of the templates used in annual reports reviewed during the survey had yes/no questions for stormwater activities that discouraged quantification of accomplishments.

For all programs, there are several costs that should be tracked for each cost category discussed below. The cost for labor of stormwater staff and benefits should be tracked for each program or allocated to each program on a reasonable basis. Direct costs (e.g. phone, field and office supplies, etc.) and depreciation costs (e.g. vehicles and equipment) should also be tracked for each program. Finally, overhead allocation for the entire stormwater program should be distributed to each cost category. Overhead allocation is often estimated by the cities as a straight percentage of labor cost and includes building fees, payroll, human resources, legal, administration, and other costs that provide ancillary support for stormwater activities.

As with costs, accomplishments should be tracked to support stormwater management decisions. The ultimate goal is to be able to compare cost benefit between stormwater programs and

activities[10]. Reporting accomplishments in terms of receiving water quality benefit is ideal, but currently unrealistic.

Suggested cost categories and what activities they cover are discussed in the following sections.

Construction Site Stormwater Runoff Control

Stormwater permits require cities to implement construction programs that minimize the negative impacts of construction on MS4 stormwater quality. This is commonly accomplished by establishing city ordinances that give the city the legal authority to implement to program. This is a parallel and separate effort from the statewide construction permit issued by the SWRCB. The construction program assists contractors and developers in following appropriate USEPA guidelines for construction sites. Cities accomplish this by instituting ordinances, inspecting sites and providing training to contractors and city inspectors. The USEPA activities that apply to construction sites are divided into four different categories: runoff control, sediment control, erosion control, and good housekeeping. Runoff control activities include minimizing clearing, stabilizing drainage ways, and installing check dams, berms, grass-lined channels, and riprap. The sediment control category includes installing perimeter controls, installing sediment trapping devices, installing drain inlet protection. Erosion control activities include stabilizing exposed soils, permanent seeding, installing sod, soil roughening, protecting steep slopes, geotextiles, gradient terraces, soil retention, temporary slope drain, protecting waterways, temporary stream crossings, vegetated buffers, phase construction, construction sequencing, and dust control (USEPA, 2004).

Cost of stormwater inspections at construction sites, the number of inspections performed, and the number of active construction sites should be tracked. Only inspections should be tracked when stormwater issues are being addressed by a part of the inspection. It is suspected that some building inspectors still count inspections toward stormwater for latter phases of projects, such as interior building work, that has little impact on stormwater. This should be avoided.

Cost of training provided to inspectors and contractors should be tracked, including the cost for the participating inspectors to attend the training. The number of person-hours trained should be tracked for stormwater staff inspectors because the city must pay for each city staff member attending training. For contractor training, the number of training hours provided (regardless of group size) should be reported because the cities do not pay for the contractors to attend as they do for city staff.

Illicit Discharge Detection and Elimination

The IDDE program seeks to identify and eliminate illicit discharges to the storm sewer system. This is done by inspecting connections to the storm sewer system and requiring landowners to remediate illegal discharges. Common IDDE problems include failing septic systems,

[10] A subcommittee of the California Stormwater Quality Association (CASQA) is working on developing guidelines for program effectiveness evaluation.

industrial/business connections, recreational sewage, and sanitary sewer overflows. Costs relating to the activities of identifying illicit connections, wastewater connections to the storm drain system, and illegal dumping should be reported in this category (USEPA, 2004).

For the IDDE program, the cost of inspections for illicit connections and discharges to the stormwater drainage system and the number of inspections should be tracked. Like construction, it is difficult to account for stormwater costs because many activities performed by inspectors serve other purposes, such as inspection of the sanitary sewer system.

Cost of training provided to inspectors should be tracked, including the cost for the participating inspectors to attend the training. The number of person-hours trained should be tracked for stormwater staff inspectors in order to effectively allocate overhead cost.

Industrial and Commercial Management Programs

Similar to the construction program, the industrial and commercial program uses the development and enforcement of city ordinances to minimize pollution of MS4 stormwater. Examples of practices employed by facilities include good housekeeping such as covered material storage, emergency spill equipment, facility sweeping, no “hosing off” into storm drains, and secondary containment of industrial materials.

For the industrial and commercial program, the cost of inspections should be tracked as well as the number of industrial and commercial facilities. Also, the cost of training provided to inspectors should be tracked, including the cost for the participating inspectors to attend the training. The number of person-hours trained should be tracked for stormwater staff inspectors.

Overall Stormwater Program Management

The costs in this category are for stormwater staff costs that could not be allocated to the other cost categories. It includes costs associated with development and oversight of the entire stormwater program. Also, costs for management plans, NPDES fees, reporting, mail, legal support, travel, conferences, printing, producing manuals and handbooks, and other non-labor costs are included that could not be allocated. Normalization for this category is not practical because of the wide variety of activities, and because very few of these activities can be numerically quantified.

Pollution Prevention and Good Housekeeping for Municipal Operations

This program includes costs for source control activities relating to pet waste collection, automobile maintenance, vehicle washing, illegal dumping control, landscaping and lawn care, pest control, parking lot and street cleaning, roadway and bridge maintenance, septic system controls, storm drain system cleaning, and alternative discharge options for chlorinated water. Costs for materials management would be for alternative products, hazardous materials storage, road salt application and storage, spill response and prevention, used oil recycling, and materials management (USEPA, 2004).

For this program, the cost for street sweeping and the number of curb miles swept should be tracked. Also, the cost for drain line and channel cleaning, pump station cleaning, and similar activities along with their associated activity statistics (e.g. lbs. of debris removed) should be tracked.

Post Construction Stormwater Management in New Development and Redevelopment

This program assures that private developers implement post-construction BMPs (treatment BMPs[11] and permanent source control BMPs). This program also includes maintenance of post-construction BMPs on city-owned property. This cost is included, because unlike the construction and industrial programs, post-construction requirements are not regulated by a separate permit.

Treatment BMPs include ponds, dry extended detention ponds, wet ponds, infiltrations practices, basins, trenches, porous pavement, filtration practices, bio-retention, sand and organic filters, vegetative practices, stormwater wetland, grassed swales and filter strips, runoff pretreatment practices, catch basins and inserts, in-line storage, and manufactured products for stormwater inlets. Source control[12] or source reduction BMPs include the following activities: experimental practices, alum injection, on-lot treatment, better site design, buffer zones, open space design, urban forestry, conservation easements, infrastructure planning, narrower residential streets, eliminating curbs and gutters, green parking, alternative turnarounds and pavers, BMP inspection and maintenance, ordinances for post construction runoff, and zoning (USEPA, 2004). If the city performs these activities in-house, the costs should be included in this category.

Public Education, Outreach, Involvement, and Participation

Education and outreach to homeowners would cover topics such as lawn and garden care, water conservation practices, pet waste, trash management, and proper disposal of hazardous waste. General outreach would include outreach relating to commercial activities, tailoring outreach programs to minority and disadvantaged communities and children, classroom education, and educational materials. Outreach relating to new development and existing development would include low impact development, educational displays, pamphlets, booklets, and utility stuffers, media, promotional giveaways, and pollution prevention for businesses. Relating to public involvement and participation, activities would include storm drain marking, stream cleanup and monitoring, volunteer monitoring, reforestation programs, wetland plantings, adopt-a-stream programs, watershed organization, stakeholder meetings, attitude surveys, and community hotlines (USEPA, 2004).

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[11] Treatment BMPs have been called structural BMPs, but the term 'treatment BMP' is preferred since source control BMPs often have structural components.

[12] The USEPA defines these as "nonstructural", but some source controls such as berms and material covers and many erosion controls are structural so the term source control or source reduction is used in this report.

It is unclear at this time of the utility of tracking specific costs of this program and how they may be related to water quality improvements.

Water Quality Monitoring

The program tracks costs related to monitoring or both stormwater and receiving water quality. These costs cover preparation of monitoring plans, sample collection, sampling equipment, laboratory analysis, data analysis, and reporting.

Watershed Management

This program can be used to track cost for watershed meetings, meeting with stakeholders, and development of watershed management plans. It may also be an appropriate category for coordination costs for TMDL planning.

Conclusion on Category Recommendations

It may prove that costs cannot be reported as suggested. Flexibility in compliance is an important aspect to cost effectiveness, however, too much flexibility in reporting requirements generates a useless dataset. At a minimum, it is suggested that annual reports throughout the state follow a standard format for cost reporting, whether the one suggested here is followed or not.

10.3 TAG RECOMMENDATIONS FOR COST TRACKING

The TAG proposes that if the permittees have a correct cost accounting/reporting system, they would be granted an additional quantity of points towards their receipt of a grant under a state/federal program; for example, Section 319(h) grants are evaluated on a point ranking system that is established by a state. If the cost accounting/reporting information were tabulated pursuant to the state's suggested format, that applicant would receive a bonus allotment equal to a boost in total points of approximately 15 percent. This would alert permittees to the benefit in competing for these grants as a prerequisite to establishing the appropriate cost accounting system. The proposed system would benefit from review and acceptance by the California League of Cities.

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ACCWP: Alameda Countywide Clean Water Program

BMP: best management practice[13]

CAFR: Comprehensive Annual Financial Report

CASQA: California Stormwater Quality Association

CFR: Code of Federal Regulations

CPR: Coalition for Practical Regulation

CSUF: California State University, Fresno

CSUS: California State University, Sacramento

CWA: Clean Water Act

DAMP: Drainage Area Master Plan

FCMA: Fresno-Clovis Metropolitan Area

FMFCD: Fresno Metropolitan Flood Control District

GIS: Geographic Information System

IDDE: Illicit Discharge Detection and Elimination

IPM: integrated pest management

JURMP: Jurisdictional Urban Runoff Management Program

LAFCD: Los Angeles Flood Control District

LARWQCB: Los Angeles Regional Water Quality Control Board

MEP: maximum extent practicable

MS4: Municipal Separate Storm Sewer System

NAFSMA: National Association of Flood and Stormwater Management Agencies

NPDES: National Pollutant Discharge Elimination System

[13] BMP, as used in this report, refers to conventional BMPs that operate without power or operators. It does not include advanced treatment.

OWP: Office of Water Programs

RWQCB: Regional Water Quality Control Board

SAR-DAMP: Santa Ana Regional Drainage Area Management Plan

SQIP: Stormwater Quality Improvement Plan

SUSMP: Standard Urban Storm Water Mitigation Plan

SWMP: Storm Water Management Plan

SWPPP: Storm Water Pollution Prevention Plan

SWRCB: State Water Resource Control Board

TAG: technical advisory group

TMDL: total maximum daily load

UCLA: University of California, Los Angeles

USC: University of Southern California

USD: Union Sanitation District

USEPA: United States Environmental Protection Agency

WERF: Water Environment Research Foundation

The backup calculations for the cost for each cost survey category in Section 3 and the sources of the cost data are presented in this appendix. Tables generally are presented by sequentially increasing levels of detail. Figure A-1 illustrates how data is shared throughout the tables.

Table A-1 contains all costs organized into the various standard cost survey categories. The subtotals for each cost category are also presented in Section 3, Table 3-2. The remaining tables (A-2 through A-12) present the detailed back-up information for the numbers in Table A-1. Table A-1 is linked to the back-up tables by the table and item numbers in the 'Source' column. Most of the cost information provided by city staff is listed in Table A-2. Item numbers corresponding to the subtotals in Table A-2 were added to the left hand column to easily show how the numbers are pulled forward to Table A-1. The right hand column in Table A-2 was added to show how costs were allocated to the cost survey categories. Table A-1 entries that were not taken directly from Table A-2 are found in Tables A-3 through A-12.

Table A-1 also provides statistics describing the level of effort for certain activities by numerically representing what or how much was accomplished. References are provided within Table A-1 for the activity statistics. Where relevant statistics are available, normalized costs are calculated in Table A-1. Normalized costs are calculated by dividing the cost of the category or activity by the activity statistic.

For the city of Corona, labor costs of the stormwater staff are not distributed among the cost survey categories. Instead, it is all captured under Overall Stormwater Program Management. Thus, comparing costs with other municipalities where such costs are distributed, Corona's Overall Stormwater Management Program costs will be higher.

Detailed descriptions of how the costs were developed are contained in the following paragraphs.

Construction Site Stormwater Runoff Control

The total cost of this category was $53,382. The costs of the construction runoff control category include labor and vehicle usage expenses for inspections and meetings, vehicle usage expense for stormwater staff for follow-up visits, training stormwater staff for construction, and phone costs by stormwater staff. The labor and vehicle cost for inspections was taken directly from Table A-2. These inspections were performed by the Inspection Division of the Public Works Department (Michele Colbert, personal communication, city of Corona, 3/12/04).

The construction site inspectors also had weekly meetings that covered stormwater issues. City staff estimated that an average of 10 minutes per meeting were spent covering stormwater issues (Michele Colbert, pers. comm., 3/12/04). Table A-8 calculates the cost associated with covering stormwater issues in these meetings, assuming 50 meetings per year.

Follow-up visits for coordination and advisement were performed by the stormwater staff. As mentioned before, these labor costs are not allocated to the construction category because it was

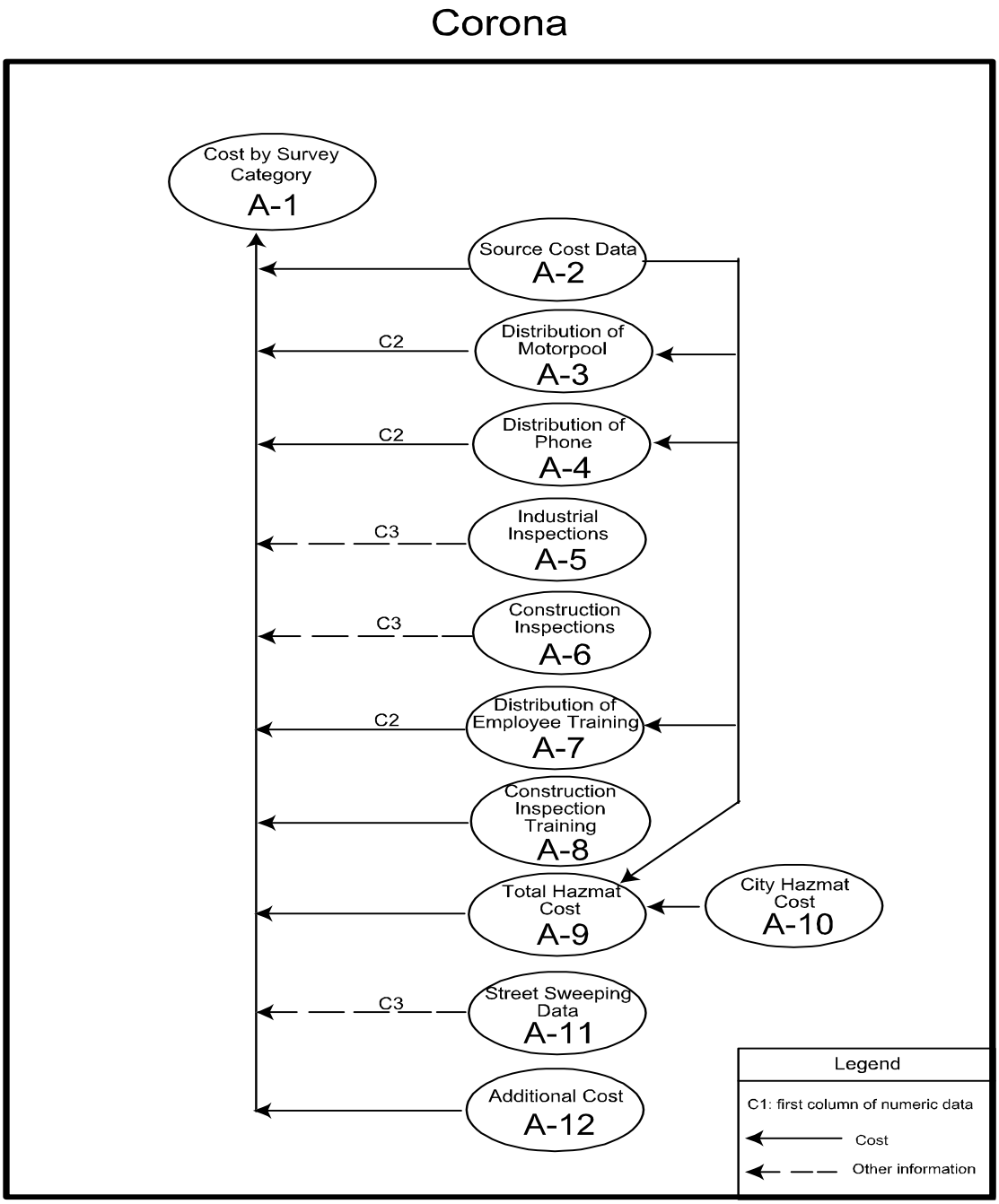

Figure A-1. Corona Flowchart of Cost Tables

difficult for city staff to estimate the distribution of stormwater staff time to the various categories. The allocation of vehicle usage by stormwater staff was estimated by percentages provided by city staff (Michele Colbert, pers. comm., 3/12/04). This information was used in Table A-3 in conjunction with the total cost in Table A-2 to estimate the cost of the vehicle for the construction category. Likewise, the phone charges used on these visits were allocated to construction in Table A-4.

The city of Corona incurred employee training costs (item 26, Table A-2) that had a portion allocated to the construction category in Table A-7 according to percentages provided by city staff (Michele Colbert, pers. comm., 3/12/04).

City staff provided information regarding construction site inspections, which were summarized in Table A-6. Total inspections were calculated in Table A-6 to be 564. The overall normalized cost, calculated by dividing the total cost of the category by the number of inspections is $95/inspection.

Illicit Discharge Detection and Elimination (IDDE)

The total cost of this category was $20,628. The IDDE program was implemented by the source control division and public works inspection division of the city of Corona. The costs attributed to this category were for the stormwater share of inspections performed by source control staff and inspection staff for other illicit connections at industrial, commercial, and new development sites (Table A-2). The source control inspection cost was developed by estimating how much time inspectors took looking for illicit discharges while doing regular inspections of industrial and commercial sites (3,050). Seventy such inspections were made during the 2002/03 fiscal year. The normalized cost calculated by dividing the total cost of the category by the number of inspections, is $295/inspection.

Industrial and Commercial Management Programs

The total cost of this category was $89,916. This program used public works department staff to perform inspections. This cost was taken directly from Table A-2.

As in the construction category, the stormwater staff had vehicle and phone usage expenses to perform follow-up inspections and meetings for industrial facilities. These costs were based on Table A-2, items 14 and 15 and the allocations were calculated in Tables A-3 and A-4.

Training of stormwater staff for this program was allocated according to Table A-7.

Overall Stormwater Program Management

The total cost of this category was $317,800. As discussed previously, stormwater staff costs were not distributed to the other categories. Stormwater staff labor costs are found in Table A-2, items 18 through 21. These costs are loaded costs that include salary, benefits, insurance, etc. Office supplies, telephone, and postage are taken directly from Table A-2, items 24 and 25. The cost of reporting was taken from Table A-2, item 34. Reporting costs paid for updating the Drainage Area Master Plan (DAMP). While not specifically required in the permit the information contained in the report is. For example, the city must address flow velocity and runoff value increases for new development (Permit, R8-2002-0011 section VIII.8-e). The information in the DAMP also allows the city to track spills and identify regional BMPs. The "administration services" charge is taken from Table A-2, item 27. This charge includes the allocation to stormwater for buildings, payroll, accounting, legal, and other overhead charges (Michele Colbert, pers. comm., 3/12/04).

Pollution Prevention and Good Housekeeping for Municipal Operations

The total cost of this category was $720,222. The city of Corona contracted for street sweeping services for 2002/03. These costs are shown in Table A-2, items 1 and 2. The number of curb miles swept was provided by city staff as a stand-alone worksheet. This worksheet is reproduced in Table A-11. The personnel cost of $14,000 (Table A-2, item 2) represents labor cost for the city of Corona to oversee the street sweeping contractor. The cost per curb mile swept ($20) is calculated based on total street sweeping costs.

Drain line and channel cleaning was performed in-house. The equipment rental, labor, and vehicle rental costs are presented in Table A-2 (items 3, 4, and 5 respectively). The normalized cost for this activity is based on the sum of these three costs and the total linear feet of maintained channels and drain lines. The costs for each type of facility could not be separated. Twenty-nine percent of the total linear feet was drain pipe and 71 percent was channels (Corona, 2003a).

Corona also incurred costs for hazardous material spill response. Public works and fire departments incurred costs implementing this program. These costs are calculated in Table A-9 and are based on a stand-alone worksheet provided by city staff reproduced as Table A-10. The normalized costs for hazmat responses ($465/response) are based on the total costs divided by the total number of responses.

Cost for the maintenance of the storm drain geographic information system (GIS) was taken directly from Table A-2.

The allocation of stormwater staff training expenses related to this category are calculated in Table A-7, based on Table A-2, item 26.

The cost incurred by the fire department for implementing SWPPPs for its nine fire stations are taken directly from Table A-2, item 23.

Post Construction Stormwater Management in New Development and Redevelopment

The total cost of this category was $13,509. The city staff identified two costs for this category. Both are taken directly from Table A-2. The professional services costs were for a consultant that advised the city on selection of post-construction BMPs. The drain inlet insert maintenance cost was for 8 drain inlet inserts. The normalized cost calculation gives an approximate cost per drain inlet insert of $563/insert. This normalized value is not expected to be useful in comparing program costs as part of this cost survey.

Public Education and Outreach and Public Involvement and Participation

The total cost of these categories was $28,409. The city did not track these costs separately and dividing the costs would be an artificial exercise (Michele Colbert, pers. comm., 3/12/04). All the costs for these two categories were taken directly from Tables A-2 and A-12. The descriptions for these categories in the annual report did not contain statistics that would be

useful for normalizing the costs of these categories. This was confirmed in the meetings with city staff.

Water Quality Monitoring

The total cost of this category was $7,000. The cost incurred for monitoring was for ad hoc testing in support of the IDDE program. This cost can be found in Table A-2, item 31.

References

City of Corona. 2003a. "Comprehensive Annual Financial Report, 30 June 2003" http://www.ci.corona.ca.us/depts/finance/cafr03/index.cfm (18 March 2004)

City of Corona. 2003b. "Santa Ana Watershed NPDES Municipal Stormwater Permit. Annual Reporting Forms" Corona, CA. July

Table A-1. Corona Cost Organized by Cost Survey Category

Cost Survey Categories

Activity Descriptions

Construction Site Stormwater Runoff Control

Description	External Contract	Relation to Permit[a]	Dollar Amount	Source	% of Category	Activity Statistic	Notes/Units	Reference	Normalized Cost	Notes/Units
Inspections by Public Works department		New	46,184.00	Table A-2, Item 13	86.5%	564	inspections	Table A-6	81.89	$/inspection
Share of stormwater issues in weekly inspector meetings		New	6,013.50	Table A-8	11.3%	9	person days	Calculation	641.44	$/person day
Share of vehicle used by stormwater staff for construction		New	419.40	Table A-3	0.8%					
Share of phone used by stormwater staff for construction		New	28.25	Table A-4	0.1%					
Share of training for stormwater staff for construction	x	New	736.67	Table A-7	1.4%	9	person days	Calculation	78.58	$/person day
Total			53,381.82		4.3%	of total stormwater cost				

Overall Cost Category Normalizations					
total category $ per inspection	564	inspections	Table A-6	94.65	total $/inspection
total category $ per active construction site	41	active construction sites	Colbert, pers. comm., 3/12/04	1,302.00	total $/active construction site

Illicit Discharge Detection and Elimination

Description	External Contract	Relation to Permit	Dollar Amount	Source	% of Category	Activity Statistic	Notes/Units	Reference	Normalized Cost	Notes/Units
Stormwater share of inspections by wastewater staff		New	11,007.00	Table A-2, Item 22	53.4%	70	inspections	Colbert, pers. comm., 4/28/04	157.24	$/inspection
Illicit connection inspections		New	9,621.00	Table A-12	46.6%	20	inspections	Colbert, pers. comm., 4/28/04	481.05	$/inspection
Total			20,628.00		1.6%	of total stormwater cost			294.69	total $/sw inspection

Industrial and Commercial Management Programs

Description	External Contract	Nature	Dollar Amount	Source	% of Category	Activity Statistic	Notes/Units	Reference	Normalized Cost	Notes/Units
Inspections		New	80,674.00	Table A-2, Item 11	89.7%	600	inspections	Table A-5	134.46	$/inspection
Share of vehicle used by stormwater staff for industrial programs		New	7,968.60	Table A-3	8.9%					
Share of phone used by stormwater staff for industrial programs		New	536.75	Table A-4	0.6%					
Share of training for industrial programs		New	736.67	Table A-7	0.8%					
Total			89,916.02		7.2%	of total stormwater cost				

Overall Stormwater Program Management

Description	External Contract	Relation to Permit	Dollar Amount	Source	% of Category	Activity Statistic	Notes/Units	Reference	Normalized Cost	Notes/Units
100% Public Works staff		New	94,476.00	Table A-2, Item 18	29.7%					
50% Public Works staff		New	59,938.00	Table A-2, Item 19	18.9%					
30% Public Works staff		New	34,874.00	Table A-2, Item 20	11.0%					
10% Public Works staff		New	6,196.00	Table A-2, Item 21	1.9%					
Office supplies and publications		New	730.00	Table A-2, Item 24	0.2%					
Telephone and postage		New	1,200.00	Table A-2, Item 25	0.4%					
Administrative service charges		New	79,367.00	Table A-2, Item 27	25.0%					
NPDES fee		New	18,516.00	Table A-2, Item 28	5.8%					
Reporting-Drainage Master Plan		New	22,503.00	Table A-2, Item 34	7.1%					
Total			317,800.00		25.4%	of total stormwater cost				

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Table A-1. Continued.

Pollution Prevention and Good Housekeeping for Municipal Operations

Description	External Contract	Relation to Permit	Dollar Amount	Source	% of Category	Activity Statistic	Notes/Units	Reference	Normalized Cost	Notes/Units
Street Sweeping						20,877	curb miles swept	Table A-11	19.84	$/curb mile swept
Street sweeping contract	x	Enhanced	400,215.00	Table A-2, Item 1	55.6%					
Oversight of street sweeping		New	14,000.00	Table A-2, Item 2	1.9%					
Drain lines/channel cleaning						30,305	linear feet inspected	Corona, 2003b	8.30	$/linear foot
Equipment rental		Enhanced	36,211.00	Table A-2, Item 3	5.0%					
Personnel		Enhanced	188,856.00	Table A-2, Item 4	26.2%					
Vehicle rental		Enhanced	26,568.00	Table A-2, Item 5	3.7%					
Hazmat Response						41	responses	Table A-10	465.15	$/response
Public Works		Existing	9,621.10	Table A-9	1.3%					
Fire		Existing	9,450.00	Colbert, 2004	1.3%	47	responses	Colbert, pers. comm., 6/16/04	201.06	$/response
GIS maintenance for storm drains		New	6,300.00	Table A-2, Item 33	0.9%					
Share of training for municipal operations	x	New	736.67	Table A-7	0.1%					
Fire department cost for SWPPP implementation		New	9,685.00	Table A-2, Item 23	1.3%	9	fire stations	Colbert, pers. comm., 4/28/04	1,076.11	$/station
Disposal costs for hazardous waste	x	Existing	12,101.68	Table A-12	1.7%					
Hazmat waste operator training classes	x	Existing	6,478.00	Table A-12	0.9%					
Total			720,222.45		57.6%	of total stormwater cost				

Post Construction Stormwater Management in New Development and Redevelopment

Description	External Contract	Relation to Permit	Dollar Amount	Source	% of Category	Activity Statistic	Notes/Units	Reference	Normalized Cost	Notes/Units
Professional services (consultant)	x	New	9,009.00	Table A-2, Item 29	66.7%					
Drain inlet insert maintenance		New	4,500.00	Table A-2, Item 35	33.3%	8	inserts	Colbert, pers. comm., 3/12/04	562.50	$/insert
Total			13,509.00		1.1%	of total stormwater cost				

Public Education, Outreach, Involvement, and Participation

Description	External Contract	Relation to Permit	Dollar Amount	Source	% of Category	Activity Statistic	Notes/Units	Reference	Normalized Cost	Notes/Units
Contribution to regional clean air public education program		New	4,000.00	Table A-2, Item 7	14.1%					
Contribution to countywide public education program		New	12,063.00	Table A-2, Item 8	42.5%					
Response to public stormwater complaints		New	8,700.00	Table A-2, Item 12	30.6%					
Share for stormwater education in new business brochures		New	300.00	Table A-2, Item 30	1.1%					
Household Hazardous Waste Collection Event		New	3,346.00	Table A-12	11.8%					
Total			28,409.00		2.3%	of total stormwater cost				

Water Quality Monitoring

Description	External Contract	Relation to Permit	Dollar Amount	Source	% of Category	Activity Statistic	Notes/Units	Reference	Normalized Cost	Notes/Units
Laboratory testing for illicit discharge program	x	New	7,000.00	Table A-2, Item 31	100.0%					
Total			7,000.00		0.6%	of total stormwater cost				

Total Stormwater Costs	1,250,866.28

a. This column indicates whether required activities were being performed prior to stormwater permits. In some cases activities were enhanced due to permit requirements.

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Table A -2. Primary Cost Data for Corona

Item #	City of Corona Category	Total Cost	Cost Survey Category[1]
	Street Cleaning/Sweeping		
1	Annual Street Sweeping Contract Cost	400,215	Pollution Prevention
2	Personnel Cost	14,000	Pollution Prevention
	Storm Drain Cleaning		
3	Equipment Rental	36,211	Pollution Prevention
4	Personnel Cost	188,856	Pollution Prevention
5	Motor Pool Rental	26,568	Pollution Prevention
	Public Education		
6	Personnel Time	0	
7	WRCOG - Clean Cities	4,000	Public Education
8	County Implementation Agreement	12,063	Public Education
	Hazmat Reponse		
9	Cost for Fire Dept.	5,000	Pollution Prevention
	Plan Check Activity		
10	Plan Check Activity	0	
	Ordinance Enforcement Activities		
11	Industrial/Commercial Inspection & Follow-Up	80,674	Industrial
12	Residential	8,700	Public Education
13	Construction (Inspection Costs)	46,184	Construction
14	Motorpool (Explorer)	8,388	See Table A-3
15	Phone	565	See Table A-4
	Code Compliance		
16	Code Compliance	0	
	Permit Administration		
17	Personnel Expenses:	0	
18	Michele (100%)	94,476	Management
19	Nabil (50%)	59,938	Management
20	Ati (30%)	34,874	Management
21	Tracy (10%)	6,196	Management
22	Source Control (10%)	11,007	Illicit Discharge
23	Fire Dept. (10%)	9,685	Pollution Prevention
24	Office Supplies and Publications	730	Management
25	Telephone and Postage	1,200	Management
26	Employee Training and Conference	2,210	See Table A-7
27	Administrative Service Charges	79,367	Management
28	Regional Water Quality Control Board	18,516	Management
29	Professional Services	9,009	Post Construction
30	Public Education and Information	300	Public Education
31	Laboratory Testing	7,000	Monitoring
32	Structural BMP	0	
33	GIS Citywide Storm Drain System	6,300	Pollution Prevention
34	Drainage Master Plan	22,503	Management
	NPDES Facilities Mitigation		
35	Facilities Mitigation	4,500	Post Construction
	Total	1,199,235	

(Source: Colbert, pers. comm., 3/12/04)

1. Cost Categories Abbreviated According to the Following:
   - Construction: Construction Site Stormwater Runoff Control
   - Illicit Discharge: Illicit Discharge Detection and Elimination
   - Industrial: Industrial and Commercial Management Programs
   - Management: Overall Stormwater Program Management

Table A – 2. Continued.

Pollution Prevention: Pollution Prevention and Good Housekeeping for Municipal Operations
Post Construction: Post Construction Water Management in New Development and Redevelopment
Public Education: Public Education, Outreach, Involvement, and Participation
Monitoring: Water Quality Monitoring
Watershed: Watershed Management

Table A-3. Distribution of Motorpool (Explorer) between Construction and Industrial/Commercial Programs

Cost	Source	Percent Allocation	Category	Reference	Allocated Cost
8,388.00	Table 2, Item 14	95%	Industrial/Commercial	Colbert, pers. comm., 4/28/04	7,968.60
8,388.00	Table 2, Item 14	5%	Construction	Colbert, pers. comm., 4/28/04	419.40
Total		100%			8,388.00

Table A-4. Distribution of Phone between Construction and Industrial/Commercial Programs

Cost	Source	Percent Allocation	Category	Reference	Allocated Cost
565.00	Table 2, Item 15	95%	Industrial/Commercial	Colbert, pers. comm., 4/28/04	536.75
565.00	Table 2, Item 15	5%	Construction	Colbert, pers. comm., 4/28/04	28.25
Total		100%			565.00

Table A-5. Calculation of Inspections for Industrial Management Programs

Site Type	Source	Annual Inspections	Reference	Inspections	
High Priority	600	1	Colbert, pers. comm., 3/12/04	600	
Medium Priority	540	0.5	Colbert, pers. comm., 3/12/04	0	*
Low Priority	1,910	0.2	Colbert, pers. comm., 4/28/04	0	*
Totals	3,050			600	

* inspections started in 03/04, not inspected in 02/03

Table A-6. Calculation of Inspections for Construction Site Stormwater Runoff Control Programs

Site Type	Number	Annual Inspections	Reference	Inspections
High Priority	6	24	Colbert, pers. comm., 3/12/04	144
Low Priority	35	12	Colbert, pers. comm., 3/12/04	420
Totals	41			564

Table A-7. Distribution of Employee Training Among

Cost	Source	Percent Allocation	Category	Allocated Cost
2,210.00	Table 2, Item 26	33%	Construction	736.67
2,210.00	Table 2, Item 26	33%	Industrial/Commercial	736.67
2,210.00	Table 2, Item 26	33%	Municipal	736.67
Total		100%		2,210.00

(Source: Colbert, pers. comm., 3/12/04)

Table A-8. Cost of Fraction of Construction Inspectors Weekly Meetings Dedicated to Stormwater Issues

Description	Dollar Amount or Statistic	Reference
Meetings per year	50	Corona, 2003b
Minutes per meeting for stormwater issues	10	Colbert, pers. comm., 3/12/04
Number of person hours	9	Calculation
Overhead Rate	$ 80.18	Colbert, pers. comm., 3/12/04
Labor Cost	$ 6,013.50	Calculation

Table A-9. Calculation of Hazmat Response Cost for Municipal Operations Program

Cost Type	Amount	Source
Fire Department	5,000.00	Table A-2, Item 9
Equipment	1,040.88	Table A-10
Materials	171.42	Table A-10
Labor	3,408.80	Table A-10
Total	9,621.10	

Table A-10. Hazardous Materials Worksheet Submitted by City of Corona Staff

Actvity PHAZM	Haz Mat Cleaned Up
Number of jobs	41
Labor Hours	129.75
Labor Cost	3,408.80
Equipment Hours	69.82
Equipment Cost	1,040.88
Materials Cost	171.42
Total Cost	**4,621.10**
Average Cost/Job	112.71
Average Labor Hours/Job	3.16
Average Equipment Hours/Job	1.70

(Source: Colbert, pers. comm., 3/12/04)

Table A-11. Street Sweeping Analysis Submitted by City of Corona Staff

Service Type	Curb Miles	Services/Year	Annual Miles	Percentage	
Residential	655	26	17,019	82%	84%
Alleys (Residential)	38	12	450	2%	
Commercial	54	52	2,786	13%	16%
Medians/Inter (Commercial)	52	12	622	3%	
Totals	797		20,877	100%	100%

(Source: Colbert, pers. comm., 3/12/04)

Table A-12. Additional Costs Identified and Submitted by the City of Corona Staff

Activity Description	Cost	Stormwater Program
Planning and labor for Household Hazardous Waste Collection Event	3,346.00	Public Education
Disposal costs for hazardous waste	12,101.68	Pollution Prevention
Hazmat waste operator training classes	6,478.00	Pollution Prevention
Illicit connection inspections	9,621.00	Ilicit Discharge
Total	31,546.68	

(Source: Colbert, pers. comm., 5/18/04)

The backup calculations for the cost for each cost survey category in Section 4 and the sources of the cost data are presented in this appendix. Tables are generally presented by sequentially increasing levels of detail. Figure B-1 illustrates how data is shared throughout the tables.

Table B-1 contains all costs organized into the various standard cost survey categories. The subtotals for each cost category are also presented in Section 4, Table 4-2. The remaining tables (B-2 through B-6) present the detailed back-up information for the numbers in Table B-1. Table B-1 is linked to the back-up tables by the table and item numbers in the 'Source' column. Most of the cost information provided by city staff is listed in Table B-2. Item numbers corresponding to the subtotals in Table B-2 were added to the left hand column to easily show how the numbers are pulled forward to Table B-1. The right hand column in Table B-2 was added to show how costs were allocated to the cost survey categories. Table B-1 entries that were not taken directly from Table B-2 are found in Tables B-3 through B-6.

For the city of Encinitas, labor, supplies, travel, equipment, and vehicle costs are distributed among the various survey categories according to estimates provided by city staff (Table B-3). Thus, comparing costs with other municipalities where such costs are not distributed, Encinitas's Overall Stormwater Management Program costs will be lower.

City staff has projected new capital projects and labor that will immediately increase their costs over the next few years. Additional labor costs will relate to engineering inspections, planning, and plan checking. Capital project costs will include installation of filter inserts, fire station wash facilities, and a storm drain. Additional operation and maintenance costs will be incurred relating to these capital projects as well.

Detailed descriptions of how the costs were developed are contained in the following paragraphs.

Construction Site Stormwater Runoff Control

The total cost of this category was $169,751. The city of Encinitas Building Department staff performed all 401 inspections during the wet season spanning from October 1, 2002 to April 30, 2003 (Encinitas, 2003b). The normalized cost, calculated by dividing the total cost of the category by the number of inspections, is $423/inspection. The stormwater staff also conducted the following activities in the construction category (descriptions obtained from annual stormwater report):

- Reviewed 5 SWPPPs
- General enforcement
- Issued 13 Notices of Violation
- Monitored weather patterns and storms in the Pacific through the National Weather Service

The costs presented in Table B-1 for the construction category include all of these activities and does not solely represent the cost for inspections. This should be considered when comparing the normalized cost per inspection for the city of Encinitas to other cities.

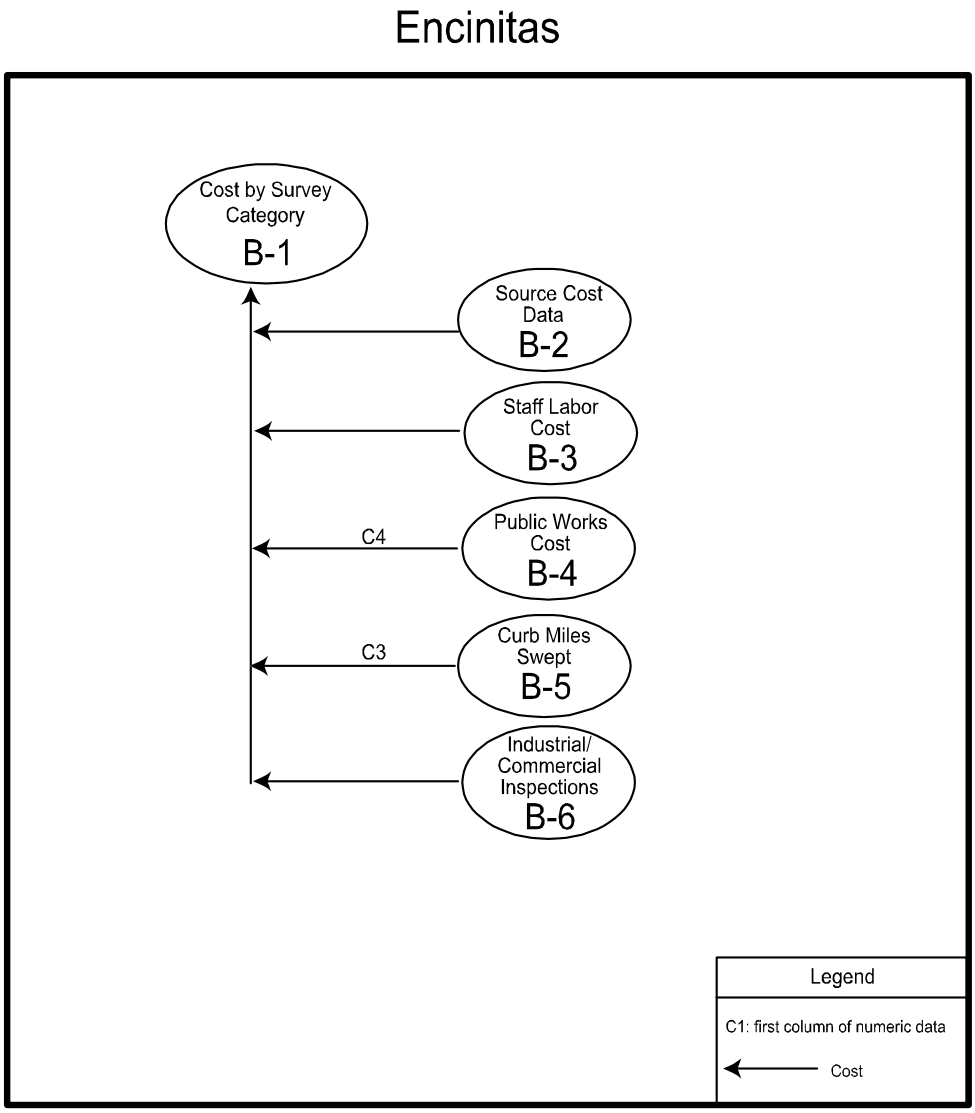

Figure B-1. Encinitas Flowchart of Cost Tables

Illicit Discharge Detection and Elimination (IDDE)

The total cost of this category was $49,378. The IDDE program was implemented by the stormwater staff. The program consists of dry weather monitoring, investigating complaints, and looking for illicit connections during regular inspections and visual inspections of the MS4 (Encinitas, 2003b). The number of inspections for the IDDE program was not available because city staff did not have a formal inspection program. However, 76 "complaints" were filed by city staff from the informal visual inspections. Another 96 complaints were received via the city's stormwater hotline. There were 172 follow up actions to these complaints. (Encinitas, 2003b).

Consequently, cost is normalized by dividing the total cost of the category by the number of follow-up activities resulting in a normalized cost of $287 per follow-up action.

Industrial and Commercial Management Programs

The total cost of this category was $65,596. Costs for this category included consultant administration services and costs for inspections. During 2002/2003, the city performed 266 industrial and commercial inspections (Table B-6). The normalized cost per inspection was $247. The city is planning on increasing inspections to 400 per year (Weldon, pers. comm., 4/2/04), which means this cost will significantly increase. Monitoring is performed at each industrial facility on an on-going basis (Encinitas, 2003b). Activities performed by the stormwater staff relating to the commercial component of this category are as follows (descriptions obtained from the annual stormwater report):

- Updated commercial facility inventory
- Provided BMP manuals and guidance
- Educated facility staff in regard to stormwater requirements and minimum BMPs
- Began development of a grease program
- Issued several enforcement actions

The costs presented in Table B-1 for this category include the cost for all of these activities and do not solely represent the cost for inspections. This should be considered when comparing the normalized cost per inspection for the city of Encinitas to other cities.

Overall Stormwater Program Management

The total cost of this category was $128,159. The city had a cost of $35,000 for developing a stormwater fee. The other activities in this category were for annual reporting and legal support for developing ordinances and plaintiff attorney fees.

Pollution Prevention and Good Housekeeping for Municipal Operations

The total cost of this category was $528,252. The largest cost of this category was street sweeping, which cost $117,962. Drain line and channel cleaning cost was $114,711 while sump, inlet, and manhole cleaning cost was $258,113. Additional activities performed were as follows (descriptions obtained from annual stormwater report):

- Engineering services for oversight, strategic planning, and management
- Trash pick-up
- Disposal of sediment
- Performed capital projects
- Updated municipal inventory

Tables B-1 and B-4 contain a breakdown of costs.

Post Construction Stormwater Management in New Development and Redevelopment

The total cost for this category was $15,344. This cost includes storm drain insert installation and maintenance costs (Weldon, pers. comm., 4/2/04). Also, professional services for UV consulting, administration, report preparation, and presentations were acquired in regard to the Moonlight Beach project.

Public Education and Outreach and Public Involvement and Participation

The total cost of these categories was $41,898. These categories were combined for the city of Encinitas due to major overlap between the two. All direct costs came directly from the data in Tables B-2 and B-4. Statistics were only available for the number of posters distributed. Activities in this category included the following (descriptions obtained from annual stormwater report):

- Dissemination of general stormwater brochures
- Stencils placed at all inlets
- Updated city website with stormwater related information
- Dissemination of door hangers
- Design, purchase, and dissemination of promotional key chains
- Dissemination of pens
- Published 9 local newspaper articles with information regarding the city's Clean Water Program and its accomplishments
- Production and dissemination of a general stormwater poster at public events
- Training of city staff
- Made two presentations to the city council and public attendees; an estimated 20 people were present at each meeting
- Printed materials were provided to contractors and developers via brochures
- Held a 2-hour construction workshop to inform the construction and development community about stormwater regulations and BMP requirements; 50 people attended
- Sent two special mailings relating to stormwater issues were sent to developers and contractors
- Special mailers were sent to restaurants and automotive businesses
- Held a workshop with the local nursery constituency to present nursery BMPs
- Held "garden care" type workshops; approximately 46 people attended
- Performed stormwater sampling with a 5th grade class and made a presentation

- Presented the watershed model to a 3rd grade class; approximately 200 children participated in the presentation
- Initiated a collaborative workgroup of several cities in the North County to develop educational outreach products and approaches on a watershed basis
- Held commercial business workshops
- Participated in a public opinion survey
- Held several community events

Water Quality Monitoring

The total cost for this category was $76,262. Costs were not normalized because they vary according to type of water quality analysis performed.

Watershed Management

The total cost for this category was $12,400. These costs consisted of watershed plan development costs and stormwater staff labor costs.

References

City of Encinitas, 2003. "City of Encinitas Stormwater Annual Report" 2003

Table B-1. Encinitas Cost Organized by Cost Survey Category

Cost Survey Categories

Activity Description

Construction Site Stormwater Runoff Control

Description	External Contract	Relation to Permit[a]	Dollar Amount	Source	% of Category	Activity Statistic	Notes/Units	Reference	Normalized Cost	Notes/Units
Construction inspections		New	150,000.00	Table B-2, Item 28	88.4%	401	inspections	Encinitas 2003b	374.06	$/inspection
Allocated labor		New	19,751.20	Table B-3	11.6%					
Total			169,751.20		15.6%	of total stormwater cost				

Overall Cost Category Normalizations					
total category $ per inspection	401	inspections	Encinitas 2003b	423.32	total $/inspection
total category $ per active construction site	40	active construction sites	Encinitas 2003b	4,243.78	total $/active constructtion site

Illicit Discharge Detection and Elimination

Description	External Contract	Relation to Permit	Dollar Amount	Source	% of Category	Activity Statistic	Notes/Units	Reference	Normalized Cost	Notes/Units
Allocated labor		New	49,378.00	Table B-3	100.0%	172	follow-up activities	Encinitas 2003b	287.08	$/follow-up activitiy
Total			49,378.00		4.5%	of total stormwater cost				

Industrial and Commercial Management Programs

Description	External Contract	Relation to Permit	Dollar Amount	Source	% of Category	Activity Statistic	Notes/Units	Reference	Normalized Cost	Notes/Units
Inspections						266	inspections	Table B-6	246.60	$/inspection
D-Max	x	New	43,600.00	Table B-2, Item 13	66.5%					
Ashford Engineering	x	New	12,120.00	Table B-2, Item 14	18.5%					
Allocated labor		New	9,875.60	Table B-3	15.1%					
Total			65,595.60		6.0%	of total stormwater cost				

Overall Stormwater Program Management

Description	External Contract	Relation to Permit	Dollar Amount	Source	% of Category	Activity Statistic	Notes/Units	Reference	Normalized Cost	Notes/Units
Annual reporting (ashford)	x	New	25,080.00	Table B-2, Item 23	19.6%					
Storm water fee development		New	35,000.00	Table B-2, Item 29	27.3%					
Miscellaneous		New	520.73	Table B-2, Item 27	0.4%					
NPDES fee		New	3,750.00	Table B-2, Item 5	2.9%					
Legal fees-ordinances	x	New	11,915.50	Table B-2, Item 25	9.3%					
Legal fees-plaintiff attorneys	x	New	9,950.00	Table B-2, Item 26	7.8%					
Grant writing		New	2,440.00	Table B-2, Item 24	1.9%					
Allocated labor		New	39,502.40	Table B-3	30.8%					
Total			128,158.63		11.8%	of total stormwater cost				

Pollution Prevention and Good Housekeeping for Municipal Operations

Description	External Contract	Relation to Permit	Dollar Amount	Source	% of Category	Activity Statistic	Notes/Units	Reference	Normalized Cost	Notes/Units
Ashford Engineering	x	New	8,840.00	Table B-2, Item 7	1.7%	4	inspections	Encinitas 2003b	2,210.00	$/inspection
Trash pick-up		Existing	2,850.00	Table B-2, Item 12	0.5%					
Trash pick-up (public works)		Existing	13,400.00	Table B-4	2.5%					
Disposal of sediment		New	2,500.00	Table B-2, Item 8	0.5%					
Allocated labor		New	9,875.60	Table B-3	1.9%					
Sumps, inlets, manholes		Enhanced	258,113.00	Table B-4	48.9%					
Drain lines and channels		Enhanced	114,711.00	Table B-4	21.7%					
Street sweeping		Enhanced	117,962.00	Table B-4	22.3%	5,832	curb miles swept	Table B-5	20.23	$/curb mile swept
Total			528,251.60		48.6%	of total stormwater cost				

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Table B-1. Continued.

Post Construction Water Management in New Development and Redevelopment

Description	External Contract	Relation to Permit	Dollar Amount	Source	% of Category	Activity Statistic	Notes/Units	Reference	Normalized Cost	Notes/Units
Overall Storm Drain Inserts Maintenance						16	inserts installed	Encinitas, 2003b	119.25	$/insert installed
Storm drain inserts		New	1,240.00	Table B-2, Item 9	8.1%					
Storm drain inserts		New	668.01	Table B-2, Item 10	4.4%					
Ashford Engineering (moonlight)	x	New	3,560.00	Table B-2, Item 11	23.2%					
Allocated labor		New	9,875.60	Table B-3	64.4%					
Total			15,343.61		1.4%	of total stormwater cost				

Public Education, Outreach, Involvement, and Participation

Description	External Contract	Relation to Permit	Dollar Amount	Source	% of Category	Activity Statistic	Notes/Units	Reference	Normalized Cost	Notes/Units
Surveys and posters		New	3,292.47	Table B-2, Item 20	7.9%					
Surveys and posters		New	2,000.00	Table B-2, Item 21	4.8%					
UC Extension workshop with nurseries.		New	2,374.00	Table B-2, Item 15	5.7%					
Ashford engineering	x	New	14,480.00	Table B-2, Item 22	34.6%					
Allocated labor		New	19,751.20	Table B-3	47.1%					
Total			41,897.67		3.9%	of total stormwater cost				

Water Quality Monitoring

Description	External Contract	Relation to Permit	Dollar Amount	Source	% of Category	Activity Statistic	Notes/Units	Reference	Normalized Cost	Notes/Units
Wet weather monitoring		New	25,186.00	Table B-2, Item 6	33.0%					
ICID dry weather monitoring		New	14,893.00	Table B-2, Item 16	19.5%					
ICID dry weather monitoring		New	3,161.00	Table B-2, Item 17	4.1%					
ICID dry weather monitoring		New	3,395.00	Table B-2, Item 18	4.5%					
Allocated labor		New	29,626.80	Table B-3	38.8%					
Total			76,261.80		7.0%	of total stormwater cost				

Watershed Management

Description	External Contract	Relation to Permit	Dollar Amount	Source	% of Category	Activity Statistic	Notes/Units	Reference	Normalized Cost	Notes/Units
Watershed plan development		New	2,524.00	Table B-2, Item 19	20.4%					
Allocated labor		New	9,875.60	Table B-3	79.6%					
Total			12,399.60		1.1%	of total stormwater cost				

Total stormwater costs	1,087,037.71

a. This column indicates whether required activities were being performed prior to stormwater permits. In some cases activities were enhanced due to permit requirements.

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Table B-2. Source Data Table Submitted by City of Encinitas (cost survey categories added)

Item #	City of Encinitas Category	Cost	Cost Survey Category[1]
1	Staff Salary	147,760.00	See Table B-3
2	Contract Staff	41,743.00	See Table B-3
3	Supplies/Travel/Equipment	5,409.00	See Table B-3
4	Vehicle	2,600.00	See Table B-3
	Permit Fees:		
5	State Water Resources Control Board	3,750.00	Management
6	Copermittee MOU Fees	25,186.00	Monitoring
	Municipal Programs:		
	Miscellaneous Contracting		
7	Ashford Engineering	8,840.00	Pollution Prevention
8	AMEC	2,500.00	Pollution Prevention
9	BMP Implementation & Maintenance	1,240.00	Post Construction
10	Downstream Services	668.01	Post Construction
11	Ashford Engineering (Moonlight)	3,560.00	Post Construction
12	Clean Up/Abatement Programs	2,850.00	Pollution Prevention
	Industrial/Commercial Programs:		
	Inspections		
13	D-Max	43,600.00	Industrial
14	Ashford Engineering	12,120.00	Industrial
	Nursery Program:		
	Inspections		
15	Education Activities (UC Regents)	2,374.00	Public Education
	Construction Programs:	0.00	
	IC/ID Program:		
	Source Tracking/Spills/Inspections	0.00	
	Water Quality Monitoring:		
16	Encina	14,893.00	Monitoring
17	Del Mar Analytical	3,161.00	Monitoring
18	San Elijo JPA	3,395.00	Monitoring
	Watershed Urban Runoff Management:		
19	Ashford Engineering	2,524.00 [2]	Watershed
20	City of Oceanside (survey& posters)	3,292.47	Public Education
21	City of Carlsbad (survey)	2,000.00	Public Education
	Education:		
22	Ashford Engineering	14,480.00	Public Education
	Reporting (JURMP/WURMP Annual Report):		
23	Ashford Engineering	25,080.00	Management
24	Grant Writing:	2,440.00	Management
	Legal Fees:		
25	Glenn Sabine	11,915.50	Management
26	Marco Gonzalez	9,950.00	Management
27	Misc.: BMP Cottonwood Creek & San Elijo Outlet	520.73	Management
28	Construction	150,000.00	Construction
29	Appropriation for Stormwater Fee Vote	35,000.00 [3]	Management
30	B&D Construction	35,887.00 [4]	Unallocated
	Total Expenditures	618,738.71	

(Source: Weldon, pers. comm., 4/2/04)

1. Cost Categories Abbreviated According to the Following:
   - Construction: Construction Site Stormwater Runoff Control
   - Illicit Discharge: Illicit Discharge Detection and Elimination
   - Industrial: Industrial and Commercial Management Programs
   - Management: Overall Stormwater Program Management

Table B-2. Continued.

Pollution Prevention: Pollution Prevention and Good Housekeeping for Municipal Operations
Post Construction: Post Construction Water Management in New Development and Redevelopment
Public Education: Public Education, Outreach, Involvement, and Participation
Monitoring: Water Quality Monitoring
Watershed: Watershed Management

2. Per personal communication with Kathy Weldon, this number was reduced to $2,524 from $12,880.
3. Per personal communication with Meleah Ashford, this number was reduced to $35,000 from $100,000.
4. Construction of storm drain was not attibuted to permit compliance.

Table B-3. Distribution of Labor ($189,503) and Supplies/Travel/Equipment/Vehicle ($8,009) Costs Submitted by City of Encinitas Staff

Category	Percent All Clean Water Program Staff	Cost Allocated by Percentages
Public Outreach	5%	9,875.60
Public Involvement	5%	9,875.60
ICID	25%	49,378.00
Construction	10%	19,751.20
Post Construction (SUSMP)	5%	9,875.60
Industrial	5%	9,875.60
Pollution Prevention for Municipal	5%	9,875.60
Monitoring	15%	29,626.80
Overall Stormwater Management	20%	39,502.40
Watershed Management	5%	9,875.60
Total	100%	197,512.00

(Source: Ashford, pers. comm., 4/15/04)

Table B-4. Public Works Cost Data Submitted by City of Encinitas Staff

Description	Cost Type Labor	Equipment	Contract	Total
Sumps, inlets, manholes	101,404.00	72,968.00	83,741.00	258,113.00
Drain lines and channels	101,405.00	13,306.00	0.00	114,711.00
Trash pick-up	0.00	0.00	13,400.00	13,400.00
Street sweeping	0.00	0.00	117,962.00	117,962.00
Total	202,809.00	86,274.00	215,103.00	504,186.00

(Source: Ashford, pers. comm., 4/15/04)

Table B-5. Calculation of Number of Curb Miles Swept

Street Miles Swept	Frequency (yearly)	Reference	Annual Street Miles Swept	Annual Curb Miles Swept[1]
243	12	Encinitas, 2003b	2,916	5,832

1. Calculated by multiplying the "annual street miles swept" by 2.

Table B-6. Calculation of Industrial/Commercial Inspections

Type	Number	Reference
Industrial	3	Encinitas, 2003b
Commercial (DMAX)	202	Encinitas, 2003b
Commercial, nurseries	5	Encinitas, 2003b
Complaint driven (Ashford)	56	Encinitas, 2003b
Total	266	

The backup calculations for the cost for each cost survey category in Section 5 and the sources of the cost data are presented in this appendix. Tables generally are presented by sequentially increasing levels of detail. Figure C-1 illustrates how data is shared throughout the tables.

Table C-1 contains all costs organized into the various standard cost survey categories. The subtotals for each cost category are also presented in Section 5, Table 5-2. The remaining tables (C-2 through C-5) present the detailed back-up information for the numbers in Table C-1. Table C-1 is linked to the back-up tables by the table and item numbers in the 'Source' column. Most of the cost information provided by city staff is listed in Table C-2. Item numbers corresponding to the subtotals in Table C-2 were added to the left hand column to easily show how the numbers are pulled forward to Table C-1. The right hand column in Table C-2 was added to show how costs were allocated to the cost survey categories. Table C-1 entries that were not taken directly from Table C-2 are found in Tables C-3 through C-5.

Table C-1 also provides statistics describing the level of effort for certain activities by numerically representing what or how much was accomplished. References are provided within Table C-1 for the activity statistics. Where relevant statistics are available, normalized costs are calculated in Table C-1. Normalized costs are calculated by dividing the cost of the category or activity by the activity statistic.

For the city of Fremont, labor costs of the stormwater staff are not distributed among the various survey categories. Instead, it is all captured under Overall Stormwater Program Management. Thus, comparing costs with other municipalities where such costs are distributed, Fremont's Overall Stormwater Management Program costs will be higher.

The Union Sanitation District (USD) is under contract with the city of Fremont to provide facility and illicit discharge services, construction inspections, public education, countywide clean water program meeting participation, reports, database, and vehicles. The breakdown of the USD cost is presented in Table C-4.

The contribution made to the Alameda County Clean Water Program (ACCWP) was allocated according to Table C-5. Table C-5 has the total cost of the ACCWP broken into stormwater program categories. ACCWP supports subcommittee meetings, legal advice, regulatory advice, agency education and information sharing. On the bottom of the table is the dollar amounts contributed from each of the participating agencies. Fremont contributed $339,990 out of the total ACCWP expenses of $2,342,113. The ratio of Fremont contribution to the total ACCWP program cost was used to determine the contribution Fremont made to the individual programs. This calculation is in the far right column of Table C-5.

Detailed descriptions of how the costs were developed are contained in the following paragraphs.

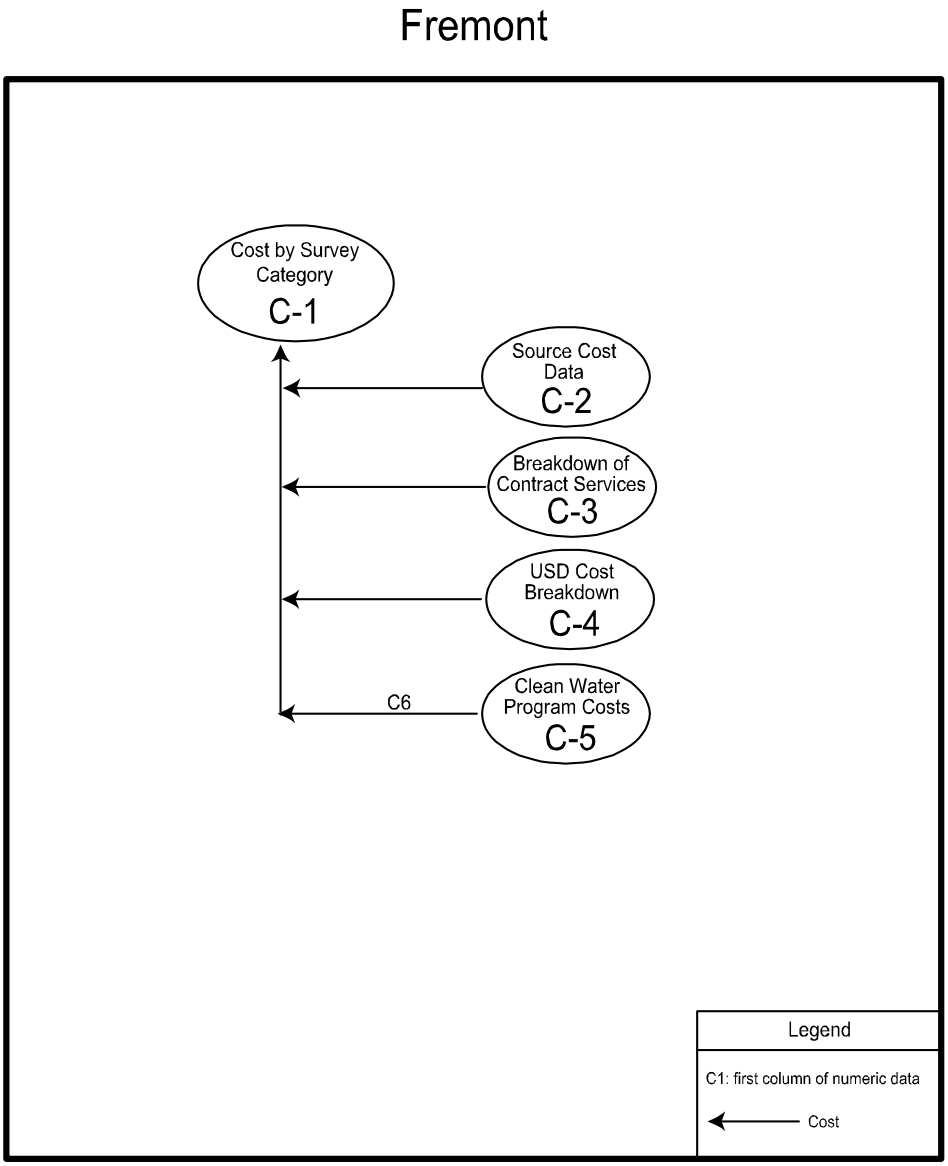

Figure C-1. Fremont Flowchart

Construction Site Stormwater Runoff Control

The total cost of this category was $17,715. The costs of this category were for inspection of active construction sites and for plan checking to verify appropriate post construction BMPs were being used (Fremont, 2003b). Employee training and 58 erosion control inspections were conducted (Fremont, 2003b). USD performed 139 general stormwater inspections.

Illicit Discharge Detection and Elimination (IDDE)

The total cost of this category was $5,917. All of the costs in this category represent contributions to the ACCWP for assistance in eliminating non-stormwater discharges, analyzing

findings, reporting, and staff labor. During the year, 118 follow-up activities were conducted (Fremont, 2003b).

Industrial and Commercial Management Programs

The total cost of this category was $210,027. Most of the activities for this category were performed by USD. A cost breakdown by activity was not provided. The total number of inspections was 482, which includes 91 re-inspections. The city had 81 enforcement actions in 2002/03 and identified and abated 32 "Potential Exposure" and 18 "Non-Stormwater" discharges. (Fremont, 2003b). Inspection documentation costs amounted to $31,697. Though USD also performed some construction inspections, this cost was included here because the majority of inspections were for the industrial/commercial program. Inspection costs were $160,861 resulting in a cost of $436/inspection.

Contributions to the ACCWP totaled $17,469 and were for outreach, refining guidelines, training, and reporting.

Overall Stormwater Program Management

The total cost of this category was $453,872. Sixty-nine percent of the cost allocated to this category was for the stormwater staff labor and allocation of overhead cost. The city staff was unable to distribute the labor costs among the survey categories. Other costs in this category were for USD services, NPDES fees, consultant services, and various administrative costs. USD staff participated in ACCWP subcommittees at a cost of $12,928, $7,659 in reporting costs, $6,107 for meeting attendance, and $135 for mitigation work. The mitigation work was a minor cost and therefore allocated to this cost category rather than investigate for a description of the work.

Contributions to the ACCWP totaled $95,560 and were for regulatory advising, instituting improvements, support committees, legal advice, website, newsletters, dues, permit fees, business water quality incentives, miscellaneous expenses, and staff labor.

Pollution Prevention and Good Housekeeping for Municipal Operations

The total cost of this category was $2,128,175. Of this amount, 85 percent was for street sweeping. The costs for this category were for the activities of street sweeping, litter/debris removal, and GIS. The city performed other activities but was unable to provide the associated costs. These activities were cleaning drain lines and channels, inlets, cross culverts, and conduits (Silva, pers. comm., 9/22/04). Additional activities obtained from the annual stormwater report included employee training, maintenance staff attendance at maintenance subcommittee meetings, mailing information packets to new businesses, workshops, partnered with USD to develop, print, and mail a newsletter (Fremont, 2003b).

Contributions to the ACCWP totaled $13,175 and were for performance standard development and updating, and staff labor.

Post Construction Stormwater Management in New Development and Redevelopment

The total cost of this category was $19,746. This cost was for engineering, planning, and city staff to research, track, and report information for the annual stormwater report. It was also for task force meetings to develop strategies for compliance with their permit regarding new development and redevelopment. The source table (C-2) describes this cost as a "quasi-external expenditure" because it is the amount that was transferred to engineering and other departments to cover stormwater related activities.

Contributions to the ACCWP totaled $15,337 and were for controls guidance, watershed inventory, construction activities, performance standards, coordination, brochures, and staff labor.

Public Education and Outreach and Public Involvement and Participation

The total cost allocated to these categories was $101,717. Advertising costs (including billboards and newsletters) were for public education and outreach. Creek clean-up had both public involvement, participation, and outreach components. Due to this overlap, the programs were combined for the city of Fremont. Approximately 70 percent of the creek clean-up was done by city staff and volunteers accounted for 30 percent of the effort (Silva, pers. comm., 9/22/04). Other activities in these categories included the following (descriptions obtained from the annual stormwater report):

- 24 school outreach presentations to 5th grade classrooms
- 4 school outreach presentations at middle school "special day" classes
- Stormwater staff participated in a Safety Fair at Gomez Elementary by doing a watershed demonstration and distributing pamphlets
- Stormwater staff participated in several public events including the Fremont Festival of the Arts, Good Neighbor Day, Boston Scientific Health and Wellness Fair, and National Night Out
- Rock Steady Juggling performance to 1,490 students who were educated about urban runoff issues
- Educated 680 students about urban runoff issues at the Caterpillar Puppet show
- Participated in and helped fund the "Kids in Creek" workshops
- A city of Fremont staff member served as a panelist at California State University Hayward's "Careers in the Environmental Sciences". The staff member discussed career opportunities in the stormwater field with students.
- Distributed brochures and fliers to Devry University
- The city of Fremont Environmental Services Department funded Math/Science Nucleus (MSN) and city of Fremont Park and Recreation Department to develop and lead field trips to educate 140 students and 26 parents about urban runoff issues. The city also

funded Irvington Academy High School to educate students about urban runoff issues. (Fremont, 2003)

USD provided $25,897 worth of public education services, accounting for 51 percent of the cost in this category. USD provides a website with BMP fact sheets for citizens and business owners and participates in school outreach activities. The materials promote Integrated Pest Management and the Bay Area-wide campaign called Our Water/Our World. USD also provides brochures and facility inspection checklists for businesses such as restaurants and printer shops.

Contributions to the ACCWP totaled $50,796 and were for effectiveness evaluations, staff training, implementation assistance, educational outreach for organized activities and events, community stewardship grants, elementary education, environmental education at a fair, and staff labor.

Water Quality Monitoring

The total cost of this category was $131,326. Of this cost, $7,200 was for water quality sampling at two locations. Both chronic and acute toxicity tests were performed (Silva, pers. comm., 9/22/04).

Contributions to the ACCWP totaled $124,126 and were for regional state board annual fees, mercury testing, watershed inventory, data management, GIS assistance, fishery assessment, contract recreation, litter and leaf control, TMDL compliance tasks, diazinon grant, analytical services, a monitoring project, and staff labor.

Watershed Management

The total cost of this category was $17,610. All of the costs in this category represent contributions to the ACCWP for development of a watershed study framework, assessment of pilot project activities, and staff labor.

References

City of Fremont, 2003. "Alameda Countywide Clean Water Program Fiscal Year 2002/03 Annual Report". Volume III of IV.

Table C- 1. Fremont Cost Organized by Cost Survey Category

Cost Survey Categories

Activity Description

Construction Site Stormwater Runoff Control

Description	External Contract	Relation to Permit[a]	Dollar Amount	Source	% of Category	Activity Statistic	Notes/Units	Reference	Normalized Cost	Notes/Units
Construction inspections by USD		New	17,715	Table C-4	100%	197	inspections[b]	Fremont, 2004b	89.93	$/inspection
Total			17,715		0.6%	of total stormwater cost				

Illicit Discharge Detection and Elimination

Description	External Contract	Relation to Permit	Dollar Amount	Source	% of Category	Activity Statistic	Notes/Units	Reference	Normalized Cost	Notes/Units
Assistance to eliminate non-stormwater discharges, analyze findings, reporting		New	5,081	Table C-5, Item 8.1	85.9%					
Staff labor (including overhead)		New	836	Table C-5, Item 8.2	14.1%					
Total			5,917		0.2%	of total stormwater cost				

Industrial and Commercial Management Programs

Description	External Contract	Relation to Permit	Dollar Amount	Source	% of Category	Activity Statistic	Notes/Units	Reference	Normalized Cost	Notes/Units
Business inspection		New	160,861	Table C-4	76.6%	482	inspections	Silva, pers. comm. 9/22/04	333.74	$/inspection
Inspection documentation		New	31,697	Table C-4	15.1%					
Inspections, outreach activity, track findings, refine guidelines, training, reporting		New	16,694	Table C-5, Item 9.1	7.9%					
Staff labor (including overhead)		New	775	Table C-5, Item 9.2	0.4%					
Total			210,027		6.8%	of total stormwater cost				
Overall Cost Category Normalizations										
total category $ per inspection						482	inspections	Silva, pers. comm. 9/22/04	435.74	total $/inspection

Overall Stormwater Program Management

Description	External Contract	Relation to Permit	Dollar Amount	Source	% of Category	Activity Statistic	Notes/Units	Reference	Normalized Cost	Notes/Units
Labor for city stormwater staff		New	171,047	Table C-2, Items 1,2,3, and 4	37.7%					
Office supplies		New	558	Table C-2, item 7	0.1%					
Periodicals		New	469	Table C-2, item 8	0.1%					
Printing		New	1,688	Table C-2, item 9	0.4%					
Collection fee		New	11,777	Table C-2, Item 11	2.6%					
NPDES fee		New	8,750	Table C-2, Item 16	1.9%					
Telephone		New	13	Table C-2, item 19	0.0%					
Postage		New	75	Table C-2, item 20	0.0%					
Travel expenses		New	403	Table C-2, item 21	0.1%					
Training		New	840	Table C-2, item 22	0.2%					
Technical training		New	1,750	Table C-2, item 23	0.4%					
Office machines<$5k		New	350	Table C-2, item 28	0.1%					
Informational systems		New	19,375	Table C-2, Item 33	4.3%					
Worker's comp		New	590	Table C-2, item 34	0.1%					
General liability		New	3,058	Table C-2, item 35	0.7%					
Overhead allocation		New	110,737	Table C-2, Item 37	24.4%					
ACCWP participation		New	12,928	Table C-4	2.8%					
Reporting		New	7,659	Table C-4	1.7%					
Meeting		New	6,107	Table C-4	1.3%					
Mitigation		New	136	Table C-4	0.0%					
Regulatory advising, institute improvements, support committees, legal advice, website, and newsletter		New	32,372	Table C-5, Item 2.1	7.1%					

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Table C – 1. Continued.

Dues for regional stormwater representation groups and tasks of regional benefit		New	10,887	Table C-5, Item 2.2	2.4%					
NPDES permit fee (ACCWP)		New	2,903	Table C-5, Item 2.3	0.6%					
Program contingency		New	10,670	Table C-5, Item 2.4	2.4%					
Contribution to support business-water quality incentives program		New	2,903	Table C-5, Item 2.5	0.6%					
Miscellaneous		New	5,081	Table C-5, Item 2.6	1.1%					
Staff labor for ACCWP (including overhead)		New	30,745	Table C-5, Item 2.8	6.8%					
Total			453,872		14.6%	of total stormwater cost				

Pollution Prevention and Good Housekeeping for Municipal Operations

Description	External Contract	Relation to Permit	Dollar Amount	Source	% of Category	Activity Statistic	Notes/Units	Reference	Normalized Cost	Notes/Units
Street Sweeping Program						31,405	curb miles swept	Silva, pers. comm., 9/22/04	60.98	$/curb mile swept
Street sweeping		Enhanced	115,000	Table C-2, Item 30	5.4%					
Street sweeping		Enhanced	1,800,000	Table C-2, Item 31	84.6%					
Litter/debris removal		Existing	200,000	Table C-2, Item 32	9.4%					
Performance standard updating and development		New	12,339	Table C-5, Item 6.1	0.6%					
Staff labor (including overhead)		Enhanced	836	Table C-5, Item 6.2	0.0%					
Total			2,128,175		68.6%	of total stormwater cost				

Table C1 continued

Post Construction Stormwater Management in New Development and Redevelopment

Description	External Contract	Relation to Permit	Dollar Amount	Source	% of Category	Activity Statistic	Notes/Units	Reference	Normalized Cost	Notes/Units
Quasi external expenditure		New	19,746	Table C-2, Item 36	56.3%					
Controls guidance, watershed inventory, consruction activities, performance standards, coordination		New	11,613	Table C-5, Item 7.1	33.1%					
Reprographic services (brochures)		New	2,177	Table C-5, Item 7.2	6.2%					
Staff labor (including overhead)		New	1,546	Table C-5, Item 7.3	4.4%					
Total			35,083		1.1%	of total stormwater cost				

Public Education, Outreach, Involvement, and Participation

Description	External Contract	Relation to Permit	Dollar Amount	Source	% of Category	Activity Statistic	Notes/Units	Reference	Normalized Cost	Notes/Units
Creek clean-up		New	5,200	Table C-2, Item 6	5.1%					
Advertising		New	310	Table C-2, Item 24	0.3%					
Storage space rental		New	210	Table C-2, Item 25	0.2%					
Math Science Nucleus (MSN) Environmental Education		New	6,803	Table C-3	6.7%					
Citywide newsletter		New	12,500	Table C-3	12.3%					
Public Education		New	25,897	Table C-4	25.5%					
Effectiveness evaluation, staff training, implemenation assistance		New	6,532	Table C-5, Item 5.2	6.4%					
Educational outreach for organized activities and events		New	4,355	Table C-5, Item 5.3	4.3%					
Community stewardship grants, implementation assistance		New	13,282	Table C-5, Item 5.4	13.1%					
Baysavers elementary education curriculum and implemenation		New	8,129	Table C-5, Item 5.5	8.0%					
Bay area environmental education resource fair		New	363	Table C-5, Item 5.6	0.4%					
General outreach		New	7,258	Table C-5, Item 5.7	7.1%					
Staff labor (including overhead)		New	10,876	Table C-5, Item 5.8	10.7%					
Total			101,717		3.3%	of total stormwater cost				

015792

Table C – 1. Continued.

Water Quality Monitoring

Description	External Contract	Relation to Permit	Dollar Amount	Source	% of Category	Activity Statistic	Notes/Units	Reference	Normalized Cost	Notes/Units
Water quality sampling		New	7,200	Table C-3	5.5%					
Regional state board annual fee		New	20,323	Table C-5, Item 4.1	15.5%					
Murcury testing		New	9,436	Table C-5, Item 4.2	7.2%					
Watershed inventory, data management, and GIS asstistance		New	20,323	Table C-5, Item 4.3	15.5%					
Fishery assessment, contract recreation, litter and leaf control		New	18,871	Table C-5, Item 4.4	14.4%					
Contribution to TMDL compliance tasks		New	23,226	Table C-5, Item 4.5	17.7%					
Diazinon grant		New	1,452	Table C-5, Item 4.6	1.1%					
Analytical services		New	6,678	Table C-5, Item 4.7	5.1%					
Monitoring project		New	5,807	Table C-5, Item 4.8	4.4%					
Staff labor (inlcuding overhead)		New	18,011	Table C-5, Item 4.10	13.7%					
Total			131,326		4.2%	of total stormwater cost				

Watershed Management

Description	External Contract	Relation to Permit	Dollar Amount	Source	% of Category	Activity Statistic	Notes/Units	Reference	Normalized Cost	Notes/Units
Development of watershed study framework, assessment of pilot project activities		New	9,435.65	Table C-5, Item 3.2	53.6%					
Staff labor (including overhead)		New	8,173.96	Table C-5, Item 3.4	46.4%					
Total			17,609.60		0.6%	of total stormwater cost				

Total Stormwater Costs 3,101,442

a. This column indicates whether required activities were being performed prior to stormwater permits. In some cases activities were enhanced due to permit requirements.
b. Inspections for construction includes 58 erosion control inspections and 157 construction site inspections.

015793

Table C-2. Source Data Table Submitted by City of Fremont (cost survey categories added)

Item #	City of Fremont Category	Total Cost	Cost Survey Category[1]
1	Salaries	115,954.72	Management
2	Benefits	37,413.57	Management
3	Overtime	928.78	Management
4	Part time salaries	16,750.10	Management
5	Promotional Materials	0.00	
6	Misc Operating Supplies	5,199.59	Public Education
7	Office Supplies	558.25	Management
8	Periodicals	469.06	Management
9	Printing	1,687.98	Management
10	Legal	0.00	
11	Consultant Services	11,777.40	Management
12	Contractual Services	26,503.39	See Table C-3
13	Photographic Services	0.00	
	Governmental Services[2]		
14	Union Sanitary District	263,000.00	See Table C-4
15	Alameda Countywide Clean Water Program	339,990.00	3 See Table C-5
16	State Water Resource Control Board	8,750.00	Management
	Media Purchase/Advertising		
18	Other Professional Services	0.00	
19	Telephone	12.96	Management
20	Postage	75.00	Management
21	Travel Expenses	403.43	Management
22	Training	840.29	Management
23	Technical Training	1,750.00	Management
24	Advertising development	310.00	Public Education
25	Space Rental	210.00	Public Education
26	Equipment Rental	0.00	
27	Office Machines > $5k	0.00	
28	Office Machines<$5k	350.00	Management
29	Office Furniture	0.00	
30	Interfund Transfers	115,000.00	Pollution Prevention
31	Interfund Transfers	1,800,000.00	Pollution Prevention
32	Interfund Transfers	200,000.00	Pollution Prevention
33	Info Systems	19,375.20	Management
	Transfer to Veh Repl Rund		
34	Worker's Comp	590.42	Management
35	General Liability	3,058.22	Management
36	Quasi-External Expenditure	19,746.31	Post Construction
37	Overhead Allocation	110,737.00	Management
	Total	3,101,441.67	

(Source: Silva, pers. comm., 4/5/04)

1. Cost Categories Abbreviated According to the Following:
   Construction: Construction Site Stormwater Runoff Control

Table C-2. Continued.

Illicit Discharge: Illicit Discharge Detection and Elimination
Industrial: Industrial and Commercial Management Programs
Management: Overall Stormwater Program Management
Pollution Prevention: Pollution Prevention and Good Housekeeping for Municipal Operations
Post Construction: Post Construction Water Management in New Development and Redevelopment
Public Education: Public Education, Outreach, Involvement, and Participation
Monitoring: Water Quality Monitoring
Watershed: Watershed Management

2. The original total submitted for total governmental services was $611,417. This figure was changed per email from Barbara Silva on 6/10/04 to 611,750 as shown by the breakdown between Union Sanitary District, Alameda Countywide Clean Water Program, and State Water Resource Control Board.

3. This number was adjusted down from $340,000 upon reciept of contract breakdown (see Table C-5).

Table C-3. Breakdown of Contractual Services (Table C-2, Item 12)

Description	Cost	Cost Survey Category
Math Science Nucleus (MSN) Environmental Education	6,803	Public Education
Water quality sampling (Pacific Eco Risk)	7,200	Monitoring
Citywide newsletter	12,500	Public Education
Total	26,503	

(Source: Silva, pers. comm., 4/15/04)

Table C-4. Breakdown of Union Sanitation District (USD) Cost (Table C-2, Item 14)

Description	Cost	Cost Survey Category
Public education	25,897	Public Education
ACCWP participation	12,928	Management
Reporting	7,659	Management
Meeting	6,107	Management
Inspection documentation	31,697	Industrial
Mitigation	136	Management
Construction inspection	17,715	Construction
Business inspection	160,861	Industrial
	263,000	

(Source: Silva, pers. comm., 4/15/04)

Table C-5. ACCWP Cost Breakdown

GENERAL CLEAN WATER PROGRAM 2002-2003

Budget Unit 50201 **F15W81** **PROGRAM MANAGER: Jim Scanlin**

2. PLANNING AND REGULATORY COMPLIANCE

MAKE ENTRIES IN YELLOW BOXES

						GENERAL PROGRAM AMOUNT	% of Grand Total	Fremont Contribution
1	EISENBERG OLIVIERI ASSOCIATES	E01				$223,000	10%	32,372
	Regulatory Advising, Institute Improvements, Support Committees, Legal Advice, Website, and Newsletter							
2	PARTICIPATION IN REGIONAL STORMWATER EFFORTS	J11				$75,000	3%	10,887
	Dues for Regional Stormwater Representation Groups and tasks of regional benefit							
3	NPDES PERMIT FEE	J11				$20,000	1%	2,903
	Fee for Countywide Clean Water Program Permit - Required by Regional Water Board							
4	CONTINGENCY					$73,500	3%	10,670
	Program Contingency Amount							
5	GREEN BAY BUSINESS PROGRAM	J11				$20,000	1%	2,903
	Contribution to Support Business - Water Quality Incentives Program							
6	SPECIAL DEPARTMENTAL ACCOUNT					$35,000	1%	5,081
	Dan will tell us what this covers							
7	CONTRACT					$0	0%	0
	To fulfill Total Maximum Daily Load (TMDL) requirements							
8	STAFF --					$211,793	9%	30,745
	R. HALE	J01	300	85.00	$25,500			
	J. SCANLIN	J02	1,332	80.00	$106,560			
	G. SHAWLEY	J02	145	63.00	$9,135			
	LABOR OVERHEAD				$70,598			
				TOTAL PROGRAM ADMINISTRATION		$658,293	28%	95,560
		CLEAN WATER DIV. STAFF HRS.	1,777					

3. FOCUSED WATERSHED STUDIES

1	CONTRACTOR TO BE DETERMINED	E03				$0	0%	0
	Watershed Activities in Watersheds Tributary to Lake Merritt and Laguna Creek							
2	APPLIED MARINE SCIENCES	E03				$65,000	3%	9,436
	Develop Watershed Study Framework, Assess Pilot Project Activities							
3	NAME OF CONTRACTOR							
	Dexcription of service							
4	STAFF					$56,309	2%	8,174
	E. DA COSTA	J03	29	58.00	$1,682			
	A. FENG	J03	399	63.00	$25,137			
	J. SCANLIN	J03	134	80.00	$10,720			
	LABOR OVERHEAD				$18,770			
				TOTAL FOCUSED WATERSHED STUDIES		$121,309	5%	17,610
		HRS.	562					

4. WATER QUALITY MONITORING

							% of Grand Total	Fremont Contribution
1	REGIONAL WATER BOARD FEE FOR REGIONAL MONITORING PROGRAM	E04				$140,000	6%	20,323
	Annual Fee Required by Regional Water Board to Monitor and Report on Health (Water Quality) of San Francisco Bay Estuary							
2	APPLIED MARINE SCIENCES (AMS)	E04				$65,000	3%	9,436
	Mercury Testing							
3	ENVIRONMENTAL IMPACT PLANNING CORP. (EIP)	E04				$140,000	6%	20,323
	Watershed Inventory, Data Management, and Geographical Information Systems Assistance							
4	URS CONSULTANTS	E04				$130,000	6%	18,871
	Assess Fisheries, Contact Recreation, Litter and Leaf Control							
5	REQUIRED CONTRIBUTION TO WATER QUALITY ATTAINMENT STRATEGIES	E04				$160,000	7%	23,226
	Contribution to MOU-based Total Maximum Daily Load compliance tasks.							
6	DIAZINON GRANT	E04				$10,000	0%	1,452
	DiazInon Grant							
7	SYSTECH ENGINEERING					$46,000	2%	6,678
	Analytical Services							
8	CLEAN WATER AGENCIES TMDL COPPER-NICKEL MONITORING PROJECT					$40,000	2%	5,807
	Dexcription of service							
9	NAME OF CONTRACTOR							
	Dexcription of service							
10	STAFF					$124,077	5%	18,011
	E. DA COSTA	J04	20	58.00	$1,160			
	A. FENG	J04	956	63.00	$60,228			
	S. MILLER	J04	300	43.00	$12,900			
	TRAINEE	J04	40	26.00	$1,040			
	J. SCANLIN	J04	53	80.00	$4,240			
	G. SHAWLEY	J04	50	63.00	$3,150			
	LABOR OVERHEAD				$41,359			
				TOTAL WATER QUALITY MONITORING		$855,077	37%	124,126
		HRS.	1,419					

5. PUBLIC INFORMATION/PARTICIPATION

			GENERAL PROGRAM AMOUNT	% of Grand Total	Fremont Contribution
1	TARGETED OUTREACH / REGIONAL ADVERTISING	E05	$0	0%	0
	Targeted Outreach to Meet Public Information Requirements - REGIONAL ADVERTISING				
2	EISENBERG OLIVIERI ASSOCIATES (EOA)	E05	$45,000	2%	6,532
	Evaluate Effectiveness, Clean Water City and County Staff Training, Assist Implementation				

Table C-5. Continued.

3	**ESTUARY ACTION CHALLENGE**	E05				$30,000	1%	4,355
	Educational Outreach for Organized Activities and Events							
4	**AQUATIC OUTREACH INST. (AOI) Kids in Creeks**	E05				$91,500	4%	13,282
	Community Stewardship Grants, Educ.Outreach (Kids in Creeks, Gardens, Marshes & Workshops) Assist Implementation							
5	**RESOURCE CONSERVATION DIST. (RCD) - Baysavers**	E05				$56,000	2%	8,129
	Educational Support - Baysavers Elementary Education Curriculum and Implementation							
6	**BAY AREA ENVIRONMENTAL EDUCATION RESOURCE FAIR (BAEER FAIR)**	E05				$2,500	0%	363
	Educational Support							
7	**CONTRACTOR TO BE DETERM. GEN'L OUTREACH**					$50,000	2%	7,258
	Reinforce Message in Communities							
8	**STAFF**					$74,925	3%	10,876
	L. CERVANTES	J05	850	53.00	$45,050			
	S. GOSSELIN	J05	70	70.00	$4,900			
	LABOR OVERHEAD				$24,975			
					TOTAL PUBLIC INFORMATION / PARTICIPATION	**$349,925**	15%	50,796
		HRS.	920					

6. MUNICIPAL MAINTENANCE PRACTICES

							% of Grand Total	Fremont Contribution
1	**EISENBERG OLIVIERI ASSOCIATES (EOA)**	E06				$85,000	4%	12,339
	Update and Develop Perform. Stds, Coordinate Maint Actvties, ID Struct Controls, Maint. Data Mgmt, Maint. Outreach, Maint Component Mgmt.							
2	**STAFF**					$5,760	0%	836
	J. SCANLIN	J06	48	80.00	$3,840			
	LABOR OVERHEAD				$1,920			
					TOTAL MUNICIPAL MAINTENANCE	**$90,760**	4%	13,175
		HRS.	48					

7. NEW DEVELOPMENT AND CONSTRUCTION SITE CONTROLS

1	**EISENBERG OLIVIERI ASSOCIATES (EOA)**	E07				$80,000	3%	11,613
	Guidance on Stormwtr Controls, Constr. Actvties, Outreach, Perf. Stds. Wshed Inventry, Coord. w/ District, Component Mgmt.							
2	**REPROGRAPHIC SVCS. ALCOLINK (Brochures)**					$15,000	1%	2,177
	Dexcription of service							
3	**STAFF**					$10,650	0%	1,546
	D. BACH	J07	100	47.00	$4,700			
	J. SCANLIN	J07	30	80.00	$2,400			
	LABOR OVERHEAD				$3,550			
					TOTAL NEW DEVELOPMENT AND CONSTRUCTION SITE CONTROLS	**$105,650**	5%	15,337
		HRS.	130					

8. ILLICIT DISCHARGE CONTROLS

1	**EISENBERG OLIVIERI ASSOCIATES (EOA)**	E08				$35,000	1%	5,081
	Assist to Eliminate Non-Stormwater Discharges, Analyze Illicit Discharge Findings, Share Information on Non-Stormwater Discharges, Illicit Discharge Reporting							
2	**STAFF**					$5,760	0%	836
	J. SCANLIN	J08	48	80.00	$3,840			
	LABOR OVERHEAD				$1,920			
					TOTAL ILLICIT DISCHARGE CONTROLS	**$40,760**	2%	5,917
		HRS.	48					

9. INDUSTRIAL INSPECTION PROGRAM

1	**EISENBERG OLIVIERI ASSOCIATES (EOA)**	E09				$115,000	5%	16,694
	Conduct Insp & Outreach Activtes, Track Findings, Share Info on Facilites, Refine Indus BMP Guidelilnes, Insp Training, Insp Reporting							
2	**STAFF**					$5,340	0%	775
	J. SCANLIN	J09	45	80.00	$3,560			
	LABOR OVERHEAD				$1,780			
					TOTAL INDUSTRIAL INSPECTION PROGRAM	**$120,340**	5%	17,469
		CLEAN WATER DIV. STAFF HRS.	45					

TOTAL GENERAL PROGRAM	**$2,342,113**	100%	339,990

MAKE ENTRIES IN YELLOW SHADED CELLS ONLY

To change revision date, go to tab entitled ALTERNATIVES - STAFFING & COSTS

REVISION: 2/3/02

STAFF	HRS	AMOUNT
D. Bach	100	$4,700
L. Cervantes	850	$45,050
E. da Costa	49	$2,842
A. Feng	1,355	$85,365
S. Gosselin	70	$4,900
R. Hale	300	$25,500
S. Miller	300	$12,900
J. Scanlin	1,690	$135,160
G. Shawley	195	$12,285
Trainee	40	$1,040
TOTAL HOURS	4,949	
TOTAL BURDENED LABOR		$329,742
TOTAL STAFF with overhead		**$494,613**

(Source: Hale, pers. comm., 7/15/04)

FUNDING

AVAILABLE FUND BALANCE

$242,113 (for current fiscal year)

CONTRIBUTIONS		**PROPORTION**	
5083	$83,580	0.03980	ALAMEDA
5084	$21,000	0.01000	ALBANY
5085	$107,310	0.05110	BERKELEY
5086	$49,350	0.02350	DUBLIN
5087	$21,000	0.01000	EMERYVILLE
5088	$339,990	0.16190	FREMONT
5089	$235,410	0.11210	HAYWARD
5090	$123,270	0.05870	LIVERMORE
5091	$57,750	0.02750	NEWARK
5092	$462,420	0.22020	OAKLAND
5093	$21,000	0.01000	PIEDMONT
5094	$114,030	0.05430	PLEASANTON
5096	$104,160	0.04960	SAN LEANDRO
5097	$104,790	0.04990	UNION CITY
5082	$254,940	0.12140	UNINCORPORATED AREA (from F15W82 spread)
TOTAL CONTRIBUTIONS	$2,100,000	1.00000	**TOTAL SHARES**
TOTAL FUNDING	**$2,342,113**		

PROGRAM DETAILS:

STAFF WITH OVERHEAD	$494,613
SPECIALIZED SERVICES	$1,752,500
OTHER EXPENSES (fees, etc.)	$95,000
PROGRAM TOTAL:	**$2,342,113**

DETAIL:	MULTI-TASK CONSULTANTS
EOA TOTAL	$583,000
AMS TOTAL	$130,000

Appendix D Fresno-Clovis Metropolitan Area

This appendix contains backup calculations for each cost survey category in Section 6 and the sources of the cost data. The Fresno-Clovis Metropolitan Area (FCMA) covers the area served by the Fresno Metropolitan Flood Control District (FMFCD). Stormwater permittees in this area include the County of Fresno, city of Fresno, city of Clovis, and the California State University at Fresno (CSUF). The FMFCD was the lead agency for communication on this project. Figure D-1 illustrates how data is shared throughout the tables.

Table D-1 contains all costs from all copermittees organized into the cost survey categories and the remaining tables provide backup to the numbers in Table D-1. The relationship of these tables is described below and presented in figure D-1. Table D-2 contains FMFCD cost organized by survey category but with added detail than what is provided in Table D-1. The cost figures in Table D-2 were summarized from the FMFCD accounting system cost summary (Table D-7).

Table D-3 summarizes the costs for the city of Clovis, Fresno County, city of Fresno, and CSUF respectively. These costs include budgeted costs and actual street sweeping costs, which are subtotaled for each cost survey category.

Table D-4 presents the allocation of city staff labor cost to the stormwater program. Table D-5 presents street sweeping data while Table D-6 presents a recreated portion of an FMFCD financial statement which was used for comparison to stormwater costs submitted by city staff.

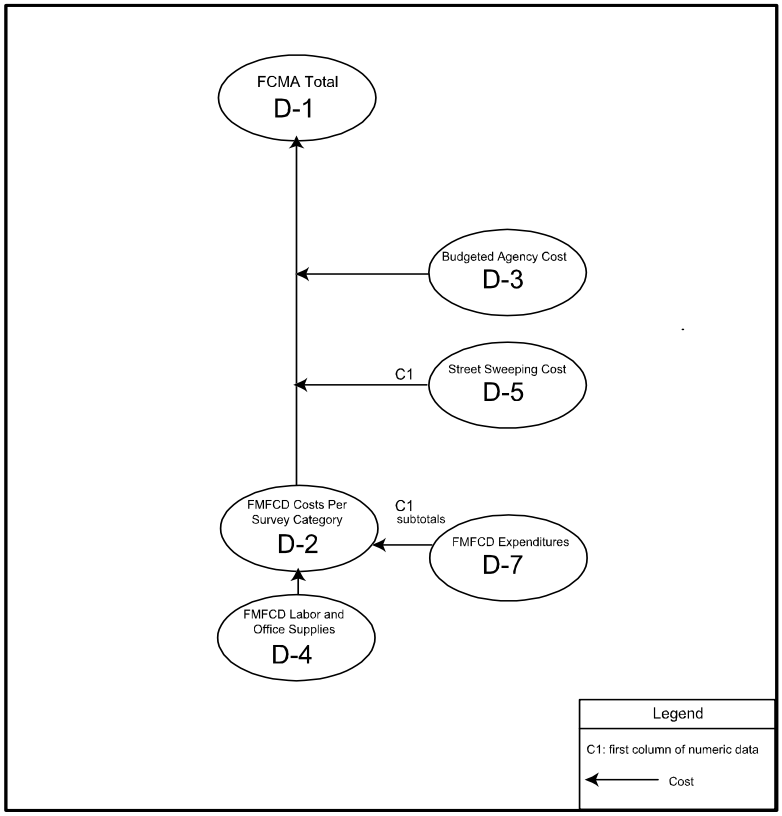

Figure D-1. Fresno-Clovis Metropolitan Area Flowchart

Other Agency Breakdown

Table D-3 contains the budgeted costs contained in the SWQMP report (FMFCD, 1999). These costs are subtotaled for each cost survey category and the subtotals are brought forward to Table D-1. Except for the FMFCD, which submitted actual costs, the costs were taken from the 00/01 budget for the other agencies as presented in the SWMP published in 1999 (FMFCD, 1999). The 00/01 year was used because the implementation of the program under the new permit was delayed for two years. The SWMP assumed the permit would be adopted in 1999 and the first fiscal year of the new program would be 99/00. The permit was not adopted until 2001 and the first fiscal year implementing the new stormwater permit was 00/01. In 02/03, the program only had one year of development. Thus, the second year costs were taken from the SWMP to represent 02/03 costs on the advice of FMFCD staff. Table D-3 includes a 'baseline' cost element. This is for the staff labor of the programs as they already existed at the start of the new permit (Rourke, pers. comm., 6/25/04). Table D-3 also contains an added line item for actual street sweeping costs pulled forward from Table D-5.

Table D-5 contains the street sweeping data collected for the FCMA. Table D-9 also calculates street sweeping cost per mile and estimated sweeping frequency. It should be noted that the estimated frequency for the city of Clovis is nearly four times a week for all streets. This seemed high and it could not be verified with the city. The cost per mile was relatively low ($13), which indicates the costs may be accurate and only the total miles swept is in question.

Notes on Labor Cost

For the FMFCD, the labor costs of the stormwater staff is not distributed among the various programs. Instead, it is all captured under Overall Stormwater Program Management. However, the labor costs from the other agencies within the FMFCD were able to distribute their labor among various programs. This should be considered when comparing costs to other municipalities where such costs are distributed.

Detailed descriptions of how the costs were developed are contained in the following paragraphs.

The reason we allocate FMFCD cost, but not other overall program costs for other cities is because the services provided by outside agencies (e.g. ACCWP to Fremont) are paid for by Fremont. FMFCD gets funds for stormwater directly from households "user fees", "utility bills". If FMFCD did not provide this "free" service, the cities would have to pay for them.

For agencies other than FMFCD, external contracting was not determined for each cost. It is only presented in the text of this appendix on a case-by-case basis. For FMFCD this information is presented in Table D-2.

Construction Site Stormwater Runoff Control

The total cost of this category was $81,800. The costs allocated for this category were only from the city of Clovis (Table D-2), county of Fresno (Table D-3), and the city of Fresno (Table D-4). No statistics were available that described the activity except for the city of Clovis. Clovis conducted 713 inspections at a cost of $29,600, which averages to $42 per inspection. The primary activities performed by each agency were plan reviews, site inspections, enforcement, and employee training. Other activities performed were as follows (source: annual stormwater report, FMFCD, 2003b):

- Identified 163 private detention basins and mailed pond maintenance and vector control fact sheets to pond owners
- Conducted 9 stormwater training workshops and safety tailgate sessions for general contractors, construction site superintendents, field inspectors, plan designers, and municipal regulators
- Increased construction sire inspections and follow-up inspection referrals to the District
- Reviewed construction site guidelines
- Sent out an "Action Alert" notifying area construction sites and companies of new Phase II regulations and schedules
- Included new regulations in training courses and site visits
- Modified the SWPPP to include sampling and analysis guidance
- The District conducted 48 inspections at 15 construction sites

Illicit Discharge Detection and Elimination (IDDE)

The total cost of this category was $13,176. This cost was for investigation, inspection and enforcement. The costs for the FMFCD, county of Fresno, the city of Clovis, and the city of Fresno accounted for two percent, eight percent, eighty-two percent, and eight percent of the IDDE costs, respectively. Activities in this category included the following (source: annual stormwater report, FMFCD, 2003b):

- Field inspectors were trained to identify and report illegal disposals
- Fifty thousand paint sticks were distributed at 17 paint retailers throughout the permit area
- Recharged irrigation waters and nuisance flows
- Participated in Water Awareness Committee and P2 Committee
- Reviewed and revised referral procedures between the District and Copermittees
- Conducted inspector training via workshops and tailgates
- Conducted firefighter training

- The County sponsored the California Conservation Corp to stencil 527 storm drain inlets in Clovis
- Students stenciled 73 storm drain inlets in the city of Clovis
- The District conducted 71 complaint inspections in response to citizen or Copermittee referrals
- The Clovis Fire Department responded to 82 hazardous waste spills
- The District developed and aired water conservation theater advertisement slides at two major movie theaters with over 30 screens and sent out 23,000 utility bill inserts to Clovis households in their monthly water bill
- The city of Clovis sent out notices to 22,360 customers reminding them of the outdoor watering rules and what they can to reduce runoff
- In Fresno County, the emergency response team program documented over 289 units of filed activity involving hazardous waste, which included complaints and follow-up enforcement inspections

Industrial and Commercial Management Programs

The cost for this category was $47,480. FMFCD activities include the purchase of phone complaint forms employee training of the other agencies. Other activities in this category included (source: annual stormwater report, FMFCD, 2003b):

- Held industrial training workshops
- Distributed over 65 model SWPPPs
- Coordinated with County Hazardous Waste and Fresno Industrial Waste inspectors to review inspection and referral procedures
- Conducted audits of 5 Copermittee corporation yards
- The District conducted 14 complaint-driven commercial and industrial inspections and 42 routine industrial inspections at NPDES permitted facilities

Overall Stormwater Program Management

The total cost of this category was $560,495. FMFCD accounted for approximately 98 percent of this category's cost. Most of this was labor cost (see Table D-7 for details). The other costs for this category were attributable to the following activities:

- Travel
- Meetings and conferences
- Dues and fees
- Food
- Printing

- Office supplies
- SWRCB fees
- Handbooks

Pollution Prevention and Good Housekeeping for Municipal Operations

The total cost for this category was $2,240,605. Clovis accounted for 28% and the city of Fresno accounted for 70% due primarily to street sweeping costs (Table D-9).

Other agency costs were for road maintenance, street cleaning, corporation yard guidance, and staff labor.

Other specific activities attributed to this category included (source: annual stormwater report, FMFCD, 2003b):

- Completed digitizing the District's stormwater conveyance system into the District's GIS system
- Developed, organized, and facilitated stormwater pollution prevention training courses for parks and open space maintenance personnel
- The District removed accumulated sediments from their retention basins
- Training of employees

Post Construction Stormwater Management in New Development and Redevelopment

The total cost of this category was $57,539. Most of the cost for this category was for the detention and retention basin operation and maintenance funded by FMFCD. The following detention and retention maintenance activities were performed:

- Cleaned 35 basins
- Rodent control
- Tree care
- Sediment removal and disposal
- Equipment rental
- Vegetation removal and recycling
- Vaccum truck cleaning
- Reviewed monitoring studies
- Completed standards research
- The District incorporated post construction standards in its Code of Requirements
- Soil monitoring

- Fence repair

The other agencies had no cost attributable to this category.

Public Education and Outreach and *Public Involvement and Participation*

The total cost of this category was $210,716. Most of the $208,016 paid by FMFCD was for professional services, newspaper advertisements, utility bill inserts, and other miscellaneous costs. The other agency costs were for school education, staff labor, and coordination with other programs. Other activities performed were (source: annual stormwater report, FMFCD, 2003b):

- Developed and aired three new Public Service Announcements (English and Spanish) targeting pollution prevention and water awareness
- Completed seven Clean Storm Water Grants to community organizations focused on stormwater education
- Continued implementation of a community wide integrated pest management program
- Conducted numerous presentations to community groups and school programs
- Produced a new brochure
- Participated in the local Pollution Prevention Committee
- Provided training for local inspectors
- The District maintained active membership with WERF, participated with the National Association of Flood and Storm Water Managers Association, provided $10,000 to WERF for stormwater research initiatives, and provided comments to EPA though the Storm Water Quality Task Force
- Participated in 18 community and public education events
- Provided a public education display illustrating ways to manage solid waste to incorporated cities throughout the County
- Conducted tours of the American Avenue Landfill for fourth grade to college level students
- Developed training manuals, theater slides, bus signage, pond maintenance fact sheets, mosquito abatement, control, and home owner fact sheets to promote BMPs and the SWQMP program
- Updated public education and technical assistance outreach materials
- Developed and implemented IPM Point of Purchase program
- Awarded 20 grants totaling $20,000
- Provided teacher workshops

Water Quality Monitoring

The total cost of this category was $252,918. The costs were for the FMFCD for the following activities:

- Monitoring
- Consulting
- Phone usage
- Communications
- WERF subscription

The other agencies had no cost attributable to this category.

References

FMFCD. 2003. "Annual Report FY 2002-2003, Fresno-Clovis Storm Water Quality Management Program" Volume 1: Program Evaluations.

Table D-1. Fresno-Clovis Metropolitan Area Costs Organized by Cost Survey Category

Cost Survey Categories

Activity Description

Construction Site Stormwater Runoff Control

Description	Relation to Permit[a]	Dollar Amount	Source	% of Category
FMFCD		0	N/A	0.0%
City of Clovis	New	29,600	Table D-3	36.2%
County of Fresno	New	6,900	Table D-3	8.4%
City of Fresno	New	45,300	Table D-3	55.4%
CSUF		0	N/A	0.0%
Total		81,800		2.4% *

Illicit Discharge Detection and Elimination

Description	Relation to Permit	Dollar Amount	Source	% of Category
FMFCD	New	76	Table D-2	0.6%
City of Clovis	New	10,100	Table D-3	76.7%
County of Fresno	New	1,000	Table D-3	7.6%
City of Fresno	New	1,000	Table D-3	7.6%
CSUF	New	1,000	Table D-3	7.6%
Total		13,176		0.4% *

Industrial and Commercial Management Programs

Description	Relation to Permit	Dollar Amount	Source	% of Category
FMFCD	New	22,180	Table D-2	46.4%
City of Clovis	New	6,100	Table D-3	12.8%
County of Fresno	New	8,200	Table D-3	17.2%
City of Fresno	New	10,400	Table D-3	21.8%
CSUF	New	900	Table D-3	1.9%
Total		47,780		1.4% *

Overall Stormwater Program Management

Description	Relation to Permit	Dollar Amount	Source	% of Category
FMFCD	New	560,895	Table D-2	98.3%
City of Clovis	New	1,600	Table D-3	0.3%
County of Fresno	New	3,200	Table D-3	0.6%
City of Fresno	New	3,200	Table D-3	0.6%
CSUF	New	1,600	Table D-3	0.3%
Total		570,495		16.4% *

Table D-1. Continued.

Pollution Prevention and Good Housekeeping for Municipal Operations

Description	Relation to Permit	Dollar Amount	Source	% of Category
FMFCD	New	29,409	Table D-2	1.3%
City of Clovis	Enhanced	631,696	Table D-3	28.2%
County of Fresno	Enhanced	5,300	Table D-3	0.2%
City of Fresno	Enhanced	1,572,500	Table D-3	70.2%
CSUF	Enhanced	1,700	Table D-3	0.1%
Total		2,240,605		64.5% *

Post Construction Stormwater Management in New Development and Redevelopment

Description	Relation to Permit	Dollar Amount	Source	% of Category
FMFCD	Existing	57,539	Table D-2	100.0%
City of Clovis		0	N/A	0.0%
County of Fresno		0	N/A	0.0%
City of Fresno		0	N/A	0.0%
CSUF		0	N/A	0.0%
Total		57,539		1.7% *

Public Education, Outreach, Involvement, and Participation

Description	Relation to Permit	Dollar Amount	Source	% of Category
FMFCD	New	208,016	Table D-2	98.7%
City of Clovis	New	200	Table D-3	0.1%
County of Fresno	New	2,500	Table D-3	1.2%
City of Fresno		0	N/A	0.0%
CSUF		0	N/A	0.0%
Total		210,716		6.1% *

Water Quality Monitoring

Description	Relation to Permit	Dollar Amount	Source	% of Category
FMFCD	New	252,918	Table D-2	100.0%
City of Clovis		0	N/A	0.0%
County of Fresno		0	N/A	0.0%
City of Fresno		0	N/A	0.0%
CSUF		0	N/A	0.0%
Total		252,918		7.3% *

Total Stormwater Cost	**3,475,029**

a. This column indicates whether required activities were being performed prior to stormwater permits. In some cases activities were enhanced due to permit requirements.

* This percentage is calculated by dividing the total "cost survey category" cost by the "total stormwater cost".

Table D-2. FMFCD Costs Organized by Cost Survey Category

Cost Survey Categories

Activity Description

Construction Site Stormwater Runoff Control

Description	External Contract	Relation to Permit[a]	Dollar Amount	Source	% of Category	Activity Statistic	Notes/Units	Reference	Normalized Cost	Notes/Units
			0							
Total			0			of total FMFCD stormwater program costs				

Illicit Discharge Detection and Elimination

Description	External Contract	Relation to Permit	Dollar Amount	Source	% of Category	Activity Statistic	Notes/Units	Reference	Normalized Cost	Notes/Units
Investigation, Inspection, Enforcement		New	76	Table D-7, Item 39	100%					
Total			76		0.0%	of total FMFCD stormwater program costs				

Industrial and Commercial Management Programs

Description	External Contract	Relation to Permit	Dollar Amount	Source	% of Category	Activity Statistic	Notes/Units	Reference	Normalized Cost	Notes/Units
Phone complaints		New	333	Table D-7, Item 58	1.5%					
Geosyntec services	x	New	21,791	Table D-7, Items 15 & 16	98.2%					
Miscellaneous		New	56	Table D-7, Item 17	0.3%					
Total			22,180		2.0%	of total FMFCD stormwater program costs				

Table D-1 continued

Overall Stormwater Program Management

Description	External Contract	Relation to Permit	Dollar Amount	Source	% of Category	Activity Statistic	Notes/Units	Reference	Normalized Cost	Notes/Units
Travel		New	2,382	Table D-7, Items 10 & 50	0.4%					
Meetings and conferences		New	1,508	Table D-7, Items 11& 51	0.3%					
Dues and fees		New	10,000	Table D-7, Item 12	1.8%					
Training		New	1,261	Table D-7, Items 13 & 53	0.2%					
Miscellaneous expenses		New	7,519	Table D-7, Items 14 & 56	1.3%					
Food		New	341	Table D-7, Item 45	0.1%					
Printing		New	622	Table D-7, Item 47	0.1%					
Office supplies		New	172	Table D-7, Item 48	0.0%					
SWRCB fees		New	17,750	Table D-7, Item 49	3.2%					
Handbooks		New	66	Table D-7, Item 54	0.0%					
Program expenses		New	112	Table D-7, Item 57	0.0%					
Personnel expenses		New	498,300	Table D-4	88.8%					
Office administration		New	20,864	Table D-4	3.7%					
Total			560,895		49.6%	of total FMFCD stormwater program costs				

015807

Table D-2. Continued.

Pollution Prevention and Good Housekeeping for Municipal Operations

Description	External Contract	Relation to Permit	Dollar Amount	Source	% of Category	Activity Statistic	Notes/Units	Reference	Normalized Cost	Notes/Units
BMP Hanbook Update		New	10,000	Table D-7, Item 2	34.0%					
Geosyntec services	x	New	1,996	Table D-7, Item 3	6.8%					
Truck cleaning		New	15,749	Table D-7, Items 33 & 35	53.6%					
Utility expense		New	1,007	Table D-7, Item 36	3.4%					
Fresno Pipeline		New	657	Table D-7, Item 34	2.2%					
Total			29,409		2.6%	of total FMFCD stormwater program costs				

Table D-7 continued

Post Construction Stormwater Management in New Development and Redevelopment

Description	External Contract	Relation to Permit	Dollar Amount	Source	% of Category	Activity Statistic	Notes/Units	Reference	Normalized Cost	Notes/Units
Basin maintenance		Existing	8,174	Table D-7, Item 19	14.2%	8	basins	FMFCD, 2003b	7,192.34	category $/basin
Wild agreement	x	Existing	2,460	Table D-7, Item 20	4.3%					
Rodent control		Existing	1,380	Table D-7, Item 21	2.4%					
Tree care		Existing	290	Table D-7, Item 22	0.5%					
Spruce Ave		Existing	3,439	Table D-7, Item 23	6.0%					
Miscellaneous expenses		Existing	2,237	Table D-7, Item 24	3.9%					
Fuel expense		Existing	1,230	Table D-7, Item 25	2.1%					
Matt and sons agreement	x	Existing	16,989	Table D-7, Item 26	29.5%					
Equipment rental		Existing	433	Table D-7, Item 27	0.8%					
Greenwaste		Existing	2,365	Table D-7, Item 28	4.1%					
Vaccum truck cleaning		Existing	1,015	Table D-7, Item 29	1.8%					
Matt and sons	x	Existing	2,129	Table D-7, Item 30	3.7%					
Cerutti agreement	x	Existing	1,825	Table D-7, Item 31	3.2%					
Emmetts agreement	x	Existing	2,560	Table D-7, Item 32	4.4%					
Fence repair		Existing	584	Table D-7, Item 37	1.0%					
Soil monitoring		Existing	10,428	Table D-7, Item 38	18.1%					
Total			57,539		5.1%	of total FMFCD stormwater program costs				

015808

Table D-2. Continued.

Public Education, Outreach, Involvement, and Participation

Description	External Contract	Relation to Permit	Dollar Amount	Source	% of Category	Activity Statistic	Notes/Units	Reference	Normalized Cost	Notes/Units
Panagraph Inc.	x	New	47,008	Table D-7, Item 7	22.6%					
Panagraph services	x	New	39,177	Table D-7, Item 8	18.8%					
Miscellaneous expenses		New	96,690	Table D-7, Items 9, 18, & 46	46.5%					
Utility bill inserts		New	2,525	Table D-7, Item 55	1.2%					
Newspaper description		New	15,095	Table D-7, Item 59	7.3%					
Grant		New	7,521	Table D-7, Item 52	3.6%					
Total			208,016		18.4%	of total stormwater cost				

Table D-1 continued

Water Quality Monitoring

Description	External Contract	Relation to Permit	Dollar Amount	Source	% of Category	Activity Statistic	Notes/Units	Reference	Normalized Cost	Notes/Units
Geosyntec monitoring	x	New	44,334	Table D-7, Item 1	17.5%					
Sheit, Handon and Hall	x	New	298	Table D-7, Item 4	0.1%					
LWA monitoring	x	New	156,663	Table D-7, Items 5 & 40	61.9%					
LWA services	x	New	40,258	Table D-7, Items 6 & 43	15.9%					
Phone expense		New	282	Table D-7, Item 41	0.1%					
Communication expense		New	1,083	Table D-7, Item 42	0.4%					
WERF		New	10,000	Table D-7, Item 44	4.0%					
Total			252,918		22.4%	of total FMFCD stormwater program costs				

Total FMFCD Stormwater Cost **1,131,033**

a. This column indicates whether required activities were being performed prior to stormwater permits. In some cases activities were enhanced due to permit requirements.

015809

Table D-3. Summary of Budgeted Stormwater Costs for Fresno Agencies

Item #	Program	Description	City of Clovis	County of Fresno	City of Fresno	CSUF
	Public Involvement and Education	Coordinate with other programs	0	400	0	0
	Public Involvement and Education	Maintain and promote school education	200	0	0	0
	Public Involvement and Education	Baseline costs	0	2,100	0	0
1	**Subtotal**		**200**	**2,500**	**0**	**0**
	Illicit Discharge	Implement inspector training	3,200	0	0	0
	Illicit Discharge	Train response personnel	3,200	0	0	0
	Illicit Discharge	Baseline costs	3,700	1,000	1,000	1,000
2	**Subtotal**		**10,100**	**1,000**	**1,000**	**1,000**
	Operations and Maintenance	Implement guidance for road maintenance activities	700	0	0	0
	Operations and Maintenance	Implement street cleaning practices (see 'Actual' costs)	100	0	0	0
	Operations and Maintenance	Implement corporation yard operation guidance	2,500	0	0	0
	Operations and Maintenance	Baseline costs	3,300	5,300	4,300	1,700
	Operations and Maintenance	*Actual street sweeping cost*	625,096	0	1,568,200	0
3	**Subtotal**		**631,696**	**5,300**	**1,572,500**	**1,700**
	Construction and Development	Review plans, inspect sites, enforce control requirement	19,100	2,600	13,700	0
	Construction and Development	Train agency personnel and development community	100	1,100	10,500	0
	Construction and Development	Baseline costs	10,100	3,200	19,000	0
	Construction and Development	Consider standard requirements	300	0	0	0
	Construction and Development	Implement construction site guidelines	0	0	2,100	0
4	**Subtotal**		**29,600**	**6,900**	**45,300**	**0**
	Commercial and Industrial	Implement inspection and enforcement procedures	0	100	0	0
	Commercial and Industrial	Train employees	1,600	100	0	0
	Commercial and Industrial	Baseline costs	4,500	8,000	10,400	900
5	**Subtotal**		**6,100**	**8,200**	**10,400**	**900**
6	***Overall Stormwater Program Man.*** [1]	Administration and management	**1,600**	**3,200**	**3,200**	**1,600**
	Total		**679,296**	**27,100**	**1,632,400**	**5,200**

Source: Fresno-Clovis Storm Water Quality Management Program, 00/01 budget (Fresno, 1999)

1. The program title was assigned and did not come from the reference.

015810

Table D-4. Calculation of Labor and Office Supply Costs for Stormwater

CAFR Description	Amount	Allocation to Stormwater	Reference	Stormwater Cost
Personnel expense[1]	$4,529,998	11%	Palmoville, pers. comm., 6/10/04	$ 498,299.78
Office Administration[1]	$189,671	11%	Palmoville, pers. comm., 6/10/04	$ 20,863.81

1. From page 20 of FMFCD CAFR, Statement of Revenues, Expenditures and Changes in Fund Balance - Government Funds and Reconcilliation to the Statement of Activities

Table D-5. Street Sweeping Data Submitted by City Staff and Normalization

Entity	Cost[1]	Curb Miles Swept[2]	Cost Per Mile Swept	Approximate City Street Miles
City of Fresno	1,568,200	94,495	16.60	
City of Clovis	625,096	47,430	13.18	235
CSUF	N/A	465	N/A	
County of Fresno	N/A	21	N/A	
Total	2,193,296	142,411	15.40	

1. (Source: Rourke, pers. comm., 8/02/04)
2. (Source: FMFCD, 2003b)

Table D-6. Recreated Portion of FMFCD Financial Statement

Fresno Metropolitan Flood Control District
Statement of Activities
for the year ended June 30, 2003

Functions/Programs	Expenses
General government	$6,388,084
Flood control system	4,010,377
Storm water quality	611,870
Interest on long-term debt	1,010,490
Total	12,020,821

(Source: FMFCD, 2003a.)

Table D-7. Source Data Table Submitted by FMFCD (cost survey categories added)

FMFCD Category	Item Number	DESC	APDesc	GL_Amt	Cost Survey Category[1]
Municipal NPDES Program Development 7030-7036					
		Consulting Services			
	1	GeoSyntec Consultants	2001-2002 SWQM	4,575.17	Monitoring
	1	GeoSyntec Consultants	2001-2002 Stormwater Quality M	952.22	Monitoring
	2	San Bernardino County	Updated Best Mgmt Practice Han	10,000.00	Pollution Prevention
	3	GeoSyntec Consultants	Service through 12/03/2002	683.78	Pollution Prevention
	3	GeoSyntec Consultants Inc	Service thru 01/07/2003	230.94	Pollution Prevention
	1	GeoSyntec Consultants Inc	03/2003 SWQ Monitoring	7,029.84	Monitoring
	1	GeoSyntec Consultants Inc	03/2003 SWQ Monitoring	2,343.45	Monitoring
	3	GeoSyntec Consultants Inc	05/2002 Communication Fee	0.30	Pollution Prevention
	1	GeoSyntec Consultants Inc	4/2003 Storm Water Monitoring	8,262.75	Monitoring
	1	GeoSyntec Consultants Inc	02-03 Storm Water Monitoring	7,302.26	Monitoring
	1	GeoSyntec Consultants Inc	02-03 Stormwater Quality Monit	4,867.72	Monitoring
	3	GeoSyntec Consultants Inc	Service thru 06/30/03	1,081.33	Pollution Prevention
	1	GeoSyntec Consultants Inc	02-03 Stormwater Monitoring	9,000.47	Monitoring
	Item Number		**Total Consulting Services**	**56,330.23**	
Subtotals	1		GeoSWQM7031	44,333.88	Monitoring
	2		SanBMPHan7031	10,000.00	Pollution Prevention
	3		GeoService7031	1,996.35	Pollution Prevention
			Total	56,330.23	
			Difference	0.00	
		Monitoring			
	4	Scheidt Haydon & Hall	SWQM BM02-01 6/26/02-7/02/02 W	298.06	Monitoring
	5	Larry Walker Associates Inc	Storm Water Quality Monitoring	3,530.00	Monitoring
	5	Larry Walker Associates Inc	2001-2002 Stormwater Monitorin	1,680.00	Monitoring
	5	Larry Walker Associates Inc	2001-2002 Stormwater Monitorin	1,680.00	Monitoring
	6	Larry Walker Associates Inc	09/01/02-09/18/02 Professional	173.25	Monitoring
	5	Larry Walker Associates Inc	2002-2003 SWQ Monitoring	132.00	Monitoring
	5	Larry Walker Associates Inc	02-03 Stormwater Quality Monit	2,262.50	Monitoring
	5	Larry Walker Associates Inc	02-03 Stormwater Monitoring	3,515.00	Monitoring
	Item Number		**Total Monitoring**	**13,270.81**	
Subtotals	4		SHHSWQM7033	298.06	Monitoring
	5		LWASWQM7033	12,799.50	Monitoring
	6		LWAProf7033	173.25	Monitoring
			Total	13,270.81	
			Difference	0.00	
		Public Information			
	9	Bank of America	Horizon	25.28	Public Education
	7	Panagraph Inc	07/2002 SWQMP Public Informati	3,831.50	Public Education
	9	Reed & Graham Inc	Bags of Gravel	42.83	Public Education
	7	Panagraph Inc	2002-2003 SWQMP Public Info &	1,636.25	Public Education
	7	Panagraph Inc	2001-2002 SWQMP Public Info &	8,227.38	Public Education
	7	Panagraph Inc	2002-2003 SWQMP Education	5,100.00	Public Education
	7	Panagraph Inc	2001-2002 SWQMP Education	1,713.50	Public Education
	7	Panagraph Inc	10/2002 SWQMP Public Info	4,250.00	Public Education
	9	Bank of America	Water Education Foundation	218.43	Public Education
	8	Panagraph Inc	Service through 10/31/2002	2,677.50	Public Education
	8	Panagraph Inc	Service thru 01/2003	3,271.54	Public Education
	8	Panagraph Inc	Services thru 12/2002	4,160.33	Public Education
	7	Panagraph Inc	2002-2003 SWQMP	5,876.97	Public Education
	8	Panagraph Inc	Services thru 03/2003	9,220.35	Public Education
	7	Panagraph Inc	SWQMP Public Info & Education	16,372.78	Public Education
	8	Panagraph Inc	02-03 Public Info & Education	15,036.32	Public Education
	8	Panagraph Inc	06/2003 Services SWQMP Info	4,810.73	Public Education
	Item Number		**Total Public Information**	**86,471.69**	
Subtotals	7		PanSWQMP7034	47,008.38	Public Education
	8		PanServices7034	39,176.77	Public Education
	9		Misc7034	286.54	Public Education
			Total	86,471.69	
			Difference	0.00	

Table D-7. Continued.

		General Expenses			
	10	Bank of America	Hyatt Regency	180.00	Management
	10	Bank of America	Hertz	93.13	Management
	10	Bank of America	City of Fresno Airport	6.00	Management
	10	David J Pomaville	Travel Reimbursement	5.32	Management
	10	Bank of America	Host Airport Hotel	124.75	Management
	10	Bank of America	Hertz	155.50	Management
	10	Bank of America	City of Fresno Parking	12.00	Management
	10	David J Pomaville	Travel Reimbursement	4.00	Management
	10	Doug Harrison	Travel Reimbursement	32.79	Management
	10	Doug Harrison	Travel Reimbursement	40.00	Management
	10	IMPAC Government Services	Radisson Hotel Sacramento	58.96	Management
	14	IMPAC Government Services	Maguire's Chevron	4.75	Management
	10	IMPAC Government Services	Hertz	81.30	Management
	14	IMPAC Government Services	Flag City	9.55	Management
	11	Calif Stormwater Quality Tas	SWQTF September Meeting Fee	40.00	Management
	10	Bank of America	Doubletree Hotel	108.31	Management
	10	Bank of America	City of Fresno Airport Parking	16.00	Management
	10	Bank of America	The Broiler Restaurant	31.37	Management
	10	Bank of America	Hertz Rent A Car	75.60	Management
	10	David J Pomaville	Reimbursement for Parking	7.00	Management
	11	Groundwater Resources Assoc	Nitrate in Groundwater Conf Re	150.00	Management
	12	SWQTF	2002/2003 Annual Dues	10,000.00	Management
	11	Beck & Duke Travel Service	SWQTF Conference-Ontario	526.00	Management
	10	Bank of America	Holiday Inn on the Bay	109.40	Management
	10	Bank of America	Hertz Rent a Car	63.00	Management
	11	California Storm Water Quali	CASQA Annual Board Meeting	40.00	Management
	10	Bank of America	Oakland Intl Airport Parking	12.00	Management
	10	Bank of America	City of Fresno Airport Parking	8.00	Management
	10	Bank of America	Hertz Rental Car	87.02	Management
	11	Beck & Duke Travel Service	Storm Water Quality Conf San D	374.00	Management
	10	David J Pomaville	Reimbursement Circle K Fuel	12.33	Management
	10	Bank of America	Anthony's Fish Grotto-San Dieg	22.88	Management
	10	Bank of America	Holiday Inn on the Bay	244.88	Management
	10	David J Pomaville	Meal Reimb-Cafe Care Ole'	5.00	Management
	10	David J Pomaville	Meal Reimbursement	15.00	Management
	10	David J Pomaville	Orange Cab-San Diego	12.00	Management
	10	Bank of America	Holiday Inn on the Bay	-109.40	Management
	13	Calif Storm Water Quality As	CASQA BMP Training	480.00	Management
	10	Bank of America	Hertz Rent a Car	-63.00	Management
	13	Calif Storm Water Quality As	CASWA CA BMP Training	480.00	Management
	11	Bank of America	CASQA & APWA Mtgs-Oakland Intl	25.00	Management
	11	Bank of America	CASQA & APWA Mtgs-Union 76	10.82	Management
	11	Bank of America	CASQA & APWA Mtgs-Hertz	152.55	Management
	11	Bank of America	CASQA & APWA Mtgs-City of Fres	16.00	Management
	11	David J Pomaville	CASQA Meeting	62.00	Management
	10	Bank of America	CASQA - Hyatt Regency	155.72	Management
	10	Bank of America	CASQA Meeting-Fresno Parking	16.00	Management
	10	Bank of America	CASQA - Hertz	152.19	Management
	10	Bank of America	CASQA - City of Sacto Parking	5.25	Management
	Item Number		**Total General Expenses**	**14,150.97**	
Subtotals	10		Travel7035	1,780.30	Management
	11		Meetings/Conferences7035	1,396.37	Management
	12		Dues/Fees7035	10,000.00	Management
	13		Training7035	960.00	Management
	14		Misc7035	14.30	Management
			Total	14,150.97	
			Difference	0.00	

Table D-7. Continued.

Industrial NPDES Prog Development 7040-7046

	Item Number				
		Consulting Services			
	15	GeoSyntec Consultants	2001-2002 Stormwater Monitorin	518.75	Industrial
	15	GeoSyntec Consultants	2001-2002 SWQM	20.75	Industrial
	15	GeoSyntec Consultants	2001-2002 SWQ Monitoring	2,488.20	Industrial
	16	GeoSyntec Consultants	Service through 12/03/2002	2,842.11	Industrial
	15	GeoSyntec Consultants Inc	03/2003 SWQ Monitoring	1,258.50	Industrial
	17	GeoSyntec Consultants Inc	05/2002 Communication Fee	56.16	Industrial
	15	GeoSyntec Consultants Inc	4/2003 Storm Water Monitoring	8,106.58	Industrial
	15	GeoSyntec Consultants Inc	02-03 Storm Water Monitoring	1,320.00	Industrial
	16	GeoSyntec Consultants Inc	Service thru 06/30/03	3,465.00	Industrial
	15	GeoSyntec Consultants Inc	02-03 Stormwater Monitoring	1,771.00	Industrial
			Total Consulting Services	**21,847.05**	
Subtotal	15		GeoSWQM7041	15,483.78	Industrial
	16		GeoService7041	6,307.11	Industrial
	17		Misc7041	56.16	Industrial
			Total	21,847.05	
			Difference	0.00	
Public Information					
	18	Bank of America	Albertson-PIE Meeting	26.16	Public Education

SWQM Operations & Maintenance 7050-7057

		SWQM Detention Basin Operations and Maintenance			
	20	Wildlife Control Technology	Agreement #2002-04	60.00	Post Construction
	20	Wildlife Control Technology	Agreement #2002-04	60.00	Post Construction
	20	Wildlife Control Technology	Agreement #2002-04	60.00	Post Construction
	20	Wildlife Control Technology	Agreement #2002-04	60.00	Post Construction
	20	Wildlife Control Technology	Agreement #2002-04	60.00	Post Construction
	20	Wildlife Control Technology	Agreement #2002-04	60.00	Post Construction
	20	Wildlife Control Technology	Agreement #2002-04	60.00	Post Construction
	24	R/C Mow-N-Edge Corporation		136.51	Post Construction
	20	Wildlife Control Technology	Agreement #2002-04	60.00	Post Construction
	24	Mow-N-Edge Corporation	Dev Unit II	136.51	Post Construction
	21	Wildlife Control Technology	2003 Rodent Control Srvc	60.00	Post Construction
	24	Pacific Gas & Electric Compa	Line Extension Deficiency	403.86	Post Construction
	19	Mow-N-Edge Corporation	2003 Developed Basin Maint Uni	136.51	Post Construction
	21	Wildlife Control Technology	4/2003 Rodent Control	60.00	Post Construction
	24	Cobb's Tree Care	Agreement 2003-12	320.00	Post Construction
	19	Mow-N-Edge Corporation	2003 Developed Basin Maint Uni	136.51	Post Construction
	21	Wildlife Control Technology	5/2003 Rodent Control	60.00	Post Construction
	19	Mow-N-Edge Corporation	6/03 Dev Basin Maint-Unit 2	136.51	Post Construction
	19	Mow-N-Edge Corporation	6/03 Dev Basin Maint-Unit 2	-150.00	Post Construction
	21	Wildlife Control Technology	6/2003 Rodent Control	60.00	Post Construction
	20	Wildlife Control Technology	Agreement #2002-04	60.00	Post Construction
	20	Wildlife Control Technology	Agreement #2002-04	60.00	Post Construction
	21	Wildlife Control Technology	2003 Rodent Control Srvc	60.00	Post Construction
	21	Wildlife Control Technology	4/2003 Rodent Control	40.00	Post Construction
	21	Wildlife Control Technology	5/2003 Rodent Control	40.00	Post Construction
	21	Wildlife Control Technology	6/2003 Rodent Control	40.00	Post Construction
	19	Lucas Weed Control, LLC	07/2002 Undeveloped Basin Main	106.37	Post Construction
	19	Lucas Weed Control, LLC	08/2002 Undeveloped Basin Main	106.37	Post Construction
	20	Wildlife Control Technology	Agreement #2002-04	60.00	Post Construction
	20	Wildlife Control Technology	Agreement #2002-04	60.00	Post Construction
	19	Lucas Weed Control, LLC	09/2002 Undeveloped Basin Main	106.37	Post Construction
	20	Wildlife Control Technology	Agreement #2002-04	60.00	Post Construction
	19	Lucas Weed Control, LLC	10/2002 Undeveloped Basin Main	106.37	Post Construction
	19	Lucas Weed Control, LLC	11/2002 Undeveloped Basin Main	106.37	Post Construction
	20	Wildlife Control Technology	Agreement #2002-04	60.00	Post Construction
	19	Lucas Weed Control, LLC	12/2002 Undeveloped Basin Main	106.37	Post Construction

Table D-7. Continued.

20	Wildlife Control Technology	Agreement #2002-04	60.00	Post Construction
19	Irly-Bird Landscape Company	01/2003 Undev Basin Maint	82.89	Post Construction
20	Wildlife Control Technology	Agreement #2002-04	60.00	Post Construction
19	Irly-Bird Landscape Company	2003 Undev Basin Maint Unit II	82.89	Post Construction
20	Wildlife Control Technology	Agreement #2002-04	60.00	Post Construction
21	Wildlife Control Technology	2003 Rodent Control Srvc	60.00	Post Construction
19	Irly-Bird Landscape Company	3/03 Undev Basin Maint Unit II	82.89	Post Construction
21	Wildlife Control Technology	4/2003 Rodent Control	60.00	Post Construction
19	Irly-Bird Landscape Company	4/03 Undev Basin Maint Unit II	82.89	Post Construction
21	Wildlife Control Technology	5/2003 Rodent Control	60.00	Post Construction
21	Wildlife Control Technology	6/2003 Rodent Control	60.00	Post Construction
22	Cobb's Tree Care	Agreement #2002-12	290.00	Post Construction
20	Wildlife Control Technology	Agreement #2002-04	60.00	Post Construction
24	Mow-N-Edge Corporation	2002 SWQM Detention Basin O &	562.49	Post Construction
19	Lucas Weed Control, LLC	07/02 Undev Basin Maint-Extra	80.00	Post Construction
20	Wildlife Control Technology	Agreement #2002-04	60.00	Post Construction
23	City of Fresno	6302 W Spruce Ave	1,329.68	Post Construction
19	Mow-N-Edge Corporation	2002 Developed Basin Maint	562.49	Post Construction
19	Mow-N-Edge Corporation	2002 Developed Basin Maint	49.00	Post Construction
20	Wildlife Control Technology	Agreement #2002-04	60.00	Post Construction
19	Mow-N-Edge Corporation	09/2002 Developed Basin Mainte	562.49	Post Construction
20	Wildlife Control Technology	Agreement #2002-04	60.00	Post Construction
23	City of Fresno	6302 W Spruce Ave	1,048.86	Post Construction
19	Mow-N-Edge Corporation	10/2002 Developed Basin Mainte	562.49	Post Construction
19	Mow-N-Edge Corporation	11/2002 Developed Basin Mainte	562.49	Post Construction
20	Wildlife Control Technology	Agreement #2002-04	60.00	Post Construction
23	City of Fresno	6302 W Spruce Ave	223.42	Post Construction
19	Mow-N-Edge Corporation	12/2002 Developed Basin Mainte	562.49	Post Construction
20	Wildlife Control Technology	Agreement #2002-04	60.00	Post Construction
20	Wildlife Control Technology	Agreement #2002-04	60.00	Post Construction
19	Mow-N-Edge Corporation	01/2003 Developed Basin Mainte	573.73	Post Construction
19	Mow-N-Edge Corporation	2003 Developed Basin Maint Uni	573.73	Post Construction
23	City of Fresno	6302 W Spruce Ave	115.62	Post Construction
20	Wildlife Control Technology	Agreement #2002-04	60.00	Post Construction
24	Mow-N-Edge Corporation	Dev Unit II Extra Work	104.13	Post Construction
24	Mow-N-Edge Corporation	Dev Unit II	573.73	Post Construction
21	Wildlife Control Technology	2003 Rodent Control Srvc	60.00	Post Construction
23	City of Fresno	6302 W Spruce Ave	128.46	Post Construction
19	Mow-N-Edge Corporation	2003 Developed Basin Maint Uni	573.73	Post Construction
21	Wildlife Control Technology	4/2003 Rodent Control	60.00	Post Construction
19	Mow-N-Edge Corporation	2003 Developed Basin Maint Uni	573.73	Post Construction
21	Wildlife Control Technology	5/2003 Rodent Control	60.00	Post Construction
23	City of Fresno	6302 W Spruce Ave	592.84	Post Construction
19	Mow-N-Edge Corporation	6/03 Dev Basin Maint-Unit 2	573.73	Post Construction
21	Wildlife Control Technology	6/2003 Rodent Control	60.00	Post Construction
19	Lucas Weed Control, LLC	07/2002 Undeveloped Basin Main	102.50	Post Construction
20	Wildlife Control Technology	Agreement #2002-04	60.00	Post Construction
19	Lucas Weed Control, LLC	08/2002 Undeveloped Basin Main	102.50	Post Construction
20	Wildlife Control Technology	Agreement #2002-04	60.00	Post Construction
20	Wildlife Control Technology	Agreement #2002-04	60.00	Post Construction
19	Lucas Weed Control, LLC	09/2002 Undeveloped Basin Main	102.50	Post Construction
20	Wildlife Control Technology	Agreement #2002-04	60.00	Post Construction
19	Lucas Weed Control, LLC	10/2002 Undeveloped Basin Main	102.50	Post Construction
19	Lucas Weed Control, LLC	11/2002 Undeveloped Basin Main	102.50	Post Construction
20	Wildlife Control Technology	Agreement #2002-04	60.00	Post Construction
19	Lucas Weed Control, LLC	12/2002 Undeveloped Basin Main	102.50	Post Construction
20	Wildlife Control Technology	Agreement #2002-04	60.00	Post Construction
19	Irly-Bird Landscape Company	01/2003 Undev Basin Maint	68.95	Post Construction
20	Wildlife Control Technology	Agreement #2002-04	60.00	Post Construction
19	Irly-Bird Landscape Company	2003 Undev Basin Maint Unit II	68.95	Post Construction
20	Wildlife Control Technology	Agreement #2002-04	60.00	Post Construction
21	Wildlife Control Technology	2003 Rodent Control Srvc	60.00	Post Construction
19	Irly-Bird Landscape Company	3/03 Undev Basin Maint Unit II	68.95	Post Construction
21	Wildlife Control Technology	4/2003 Rodent Control	60.00	Post Construction
19	Irly-Bird Landscape Company	4/03 Undev Basin Maint Unit II	68.95	Post Construction

Table D-7. Continued.

	21	Wildlife Control Technology	5/2003 Rodent Control	60.00	Post Construction
	21	Wildlife Control Technology	6/2003 Rodent Control	60.00	Post Construction
	19	Lucas Weed Control, LLC	07/2002 Undeveloped Basin Main	38.68	Post Construction
	20	Wildlife Control Technology	Agreement #2002-04	60.00	Post Construction
	19	Lucas Weed Control, LLC	08/2002 Undeveloped Basin Main	38.68	Post Construction
	20	Wildlife Control Technology	Agreement #2002-04	60.00	Post Construction
	20	Wildlife Control Technology	Agreement #2002-04	60.00	Post Construction
	19	Lucas Weed Control, LLC	09/2002 Undeveloped Basin Main	38.68	Post Construction
	20	Wildlife Control Technology	Agreement #2002-04	60.00	Post Construction
	19	Lucas Weed Control, LLC	10/2002 Undeveloped Basin Main	38.68	Post Construction
	19	Lucas Weed Control, LLC	11/2002 Undeveloped Basin Main	38.68	Post Construction
	20	Wildlife Control Technology	Agreement #2002-04	60.00	Post Construction
	19	Lucas Weed Control, LLC	12/2002 Undeveloped Basin Main	38.68	Post Construction
	20	Wildlife Control Technology	Agreement #2002-04	60.00	Post Construction
	19	Irly-Bird Landscape Company	01/2003 Undev Basin Maint	2.94	Post Construction
	20	Wildlife Control Technology	Agreement #2002-04	60.00	Post Construction
	19	Irly-Bird Landscape Company	2003 Undev Basin Maint Unit II	2.94	Post Construction
	20	Wildlife Control Technology	Agreement #2002-04	60.00	Post Construction
	21	Wildlife Control Technology	2003 Rodent Control Srvc	60.00	Post Construction
	19	Irly-Bird Landscape Company	3/03 Undev Basin Maint Unit II	2.94	Post Construction
	21	Wildlife Control Technology	4/2003 Rodent Control	60.00	Post Construction
	19	Irly-Bird Landscape Company	4/03 Undev Basin Maint Unit II	2.94	Post Construction
	21	Wildlife Control Technology	5/2003 Rodent Control	60.00	Post Construction
	21	Wildlife Control Technology	6/2003 Rodent Control	60.00	Post Construction
Item Number			**Total SWQM Detention Basins Operations & Maintenance**	**17,980.16**	
Subtotal	19		Undev/DevBasinMaint7051	8,174.05	Post Construction
	20		WildAgree2002-047051	2,460.00	Post Construction
	21		RodentControl7051	1,380.00	Post Construction
	22		CobbAgree2002-127051	290.00	Post Construction
	23		CitySpruceAve7051	3,438.88	Post Construction
	24		Misc7051	2,237.23	Post Construction
			Total	17,980.16	
			Difference	0.00	

	SWQM Retention Basin Operations and Maintenance			
	Seibert's Oil Company Inc	07/2002 Diesel Fuel	114.50	Post Construction
	Seibert's Oil Company Inc	07/2002 Diesel Fuel	117.90	Post Construction
	Seibert's Oil Company Inc	07/2002 Diesel Fuel	115.33	Post Construction
	Seibert's Oil Company Inc	08/2002 Diesel Fuel	80.27	Post Construction
	Matthews & Son	Agreement #2002-01	1,630.50	Post Construction
	Matthews and Sons	Agreement #2002-01	35.00	Post Construction
	Safety Network	Equipment Rental	180.00	Post Construction
	Safety Network	7/21/02-8/02/02 Equip Rental	253.00	Post Construction
	Chevron	Fuel	9.86	Post Construction
	Cardlock Fuels System Inc	Fuel through 5/31/03	33.41	Post Construction
	Matthews and Sons	Agreement #2002-01	280.00	Post Construction
	R/C Matthews & Son		455.00	Post Construction
	Cardlock Fuels System Inc	07/31/2002 Fuel	9.53	Post Construction
	Matthews and Sons	Agreement #2002-01	4,345.13	Post Construction
	Video Inspection Specialists	Cleaning w/ Vacuum Truck	435.00	Post Construction
	R/C Matthews and Sons		273.75	Post Construction
	R/C Matthews and Sons		542.50	Post Construction
	Cerutti & Sons Transportatio	Agreement #2002-09	290.55	Post Construction
	Matthews and Sons	Agreement #2002-01	180.84	Post Construction
	Emmetts Excavation Grading &	Agreement #2002-18	770.00	Post Construction
	Cardlock Fuels System Inc	08/2002 Pump Fuel	68.49	Post Construction
	Cardlock Fuels System Inc	09/2002 Diesel	59.49	Post Construction
	Cardlock Fuels System Inc	10/15/2002 Pump Fuel/Truck Fue	28.27	Post Construction
	Cardlock Fuels System Inc	10/31/2002 Diesel Fuel	15.02	Post Construction
	Cerutti & Sons Transportatio	Agreement #2002-09	961.05	Post Construction
	Matthews and Sons	Agreement #2002-01	180.83	Post Construction
	Emmetts Excavation Grading &	Agreement #2002-18	770.00	Post Construction
	Cardlock Fuels System Inc	08/2002 Pump Fuel	62.98	Post Construction
	Cardlock Fuels System Inc	08/2002 Truck Fuel	7.14	Post Construction

Table D-7. Continued.

		Cardlock Fuels System Inc	09/2002 Diesel Fuel	40.49	Post Construction
		Cardlock Fuels System Inc	09/2002 Diesel	389.47	Post Construction
		Cardlock Fuels System Inc	10/15/2002 Pump Fuel/Truck Fue	28.26	Post Construction
		Cardlock Fuels System Inc	10/31/2002 Diesel Fuel	20.16	Post Construction
		Cardlock Fuels System Inc	09/2002 Diesel Fuel	29.62	Post Construction
		R/C Matthews & Son		350.00	Post Construction
		R/C Matthews and Sons		245.00	Post Construction
		Matthews and Sons	Agreement #2002-01	1,487.50	Post Construction
		Video Inspection Specialists	Cleaning w/ Vacuum Truck	580.00	Post Construction
		R/C Matthews and Sons		262.50	Post Construction
		E & J Gallo Winery	Greenwaste Deliveries	1,155.00	Post Construction
		Matthews and Sons	Agreement #2002-01	7,731.25	Post Construction
		Matthews and Sons	Agreement #2002-01	326.26	Post Construction
		E & J Gallo Winery	09/2002 Greenwaste Deliveries	1,195.00	Post Construction
		Matthews and Sons	Agreement #2002-01	611.25	Post Construction
		E & J Gallo Winery	11/2002 Greenwaste	15.00	Post Construction
		Cerutti & Sons Transportatio	Agreement #2002-09	573.65	Post Construction
		Matthews and Sons	Agreement #2002-01	180.83	Post Construction
		Emmetts Excavation Grading &	Agreement #2002-18	1,020.00	Post Construction
	Item Number		**Total SWQM Retention Basin O&M**	**28,546.58**	
Subtotal	25		Fuel7052	1,230.19	Post Construction
	26		M&SAgree2002-017052	16,989.39	Post Construction
	27		EquipRental7052	433.00	Post Construction
	28		Greenwaste7052	2,365.00	Post Construction
	29		CleaningVacuumTruck7052	1,015.00	Post Construction
	30		M&SBlank7052	2,128.75	Post Construction
	31		CeruttiAgree2002-097052	1,825.25	Post Construction
	32		EmmettsAgree2002-187052	2,560.00	Post Construction
			Total	28,546.58	
			Difference	0.00	
		SWQM Structures Operations and Maintenance			
	33	Video Inspection Specialists	12/2002 Vacuum Truck Cleaning	24.17	Pollution Prevention
	33	Video Inspection Specialists	12/2002 Vacuum Truck Cleaning	290.00	Pollution Prevention
	33	Video Inspection Specialists	11/2002 Vacuum Cleaning	435.00	Pollution Prevention
	33	Video Inspection Specialists	11/2002 Vacuum Cleaning	330.00	Pollution Prevention
	33	Video Inspection Specialists	11/2002 Cleaning & Root Cuttin	330.00	Pollution Prevention
	33	Video Inspection Specialists	10/2002 Vacuum Cleaning	217.50	Pollution Prevention
	33	Video Inspection Specialists	Cleaning w/ Vacuum Truck	362.50	Pollution Prevention
	33	Video Inspection Specialists	Clean w/Vacuum Truck	1,550.00	Pollution Prevention
	33	Video Inspection Specialists	12/2002 Vacuum Truck Cleaning	217.50	Pollution Prevention
	33	Video Inspection Specialists	12/2002 Vacuum Truck Cleaning	145.00	Pollution Prevention
	33	Video Inspection Specialists	12/2002 Vacuum Truck Cleaning	24.17	Pollution Prevention
	33	Video Inspection Specialists	11/2002 Vacuum Cleaning	290.00	Pollution Prevention
	33	Video Inspection Specialists	Clean w/Vacuum Truck & TV Insp	2,195.00	Pollution Prevention
	34	City of Fresno	7/02-3/03 Pipeline Maint	288.10	Pollution Prevention
	34	City of Fresno	7/02-3/03 Pipeline Maint	296.10	Pollution Prevention
	33	Video Inspection Specialists	10/2002 Vacuum Cleaning	217.50	Pollution Prevention
	33	Video Inspection Specialists	12/2002 Vacuum Truck Cleaning	145.00	Pollution Prevention
	33	Video Inspection Specialists	12/2002 Vacuum Truck Cleaning	24.16	Pollution Prevention
	34	City of Fresno	7/02-3/03 Pipeline Maint	72.36	Pollution Prevention
	33	Video Inspection Specialists	12/2002 Vacuum Cleaning	362.50	Pollution Prevention
	33	Video Inspection Specialists	10/2002 Vacuum Cleaning	217.50	Pollution Prevention
	33	Video Inspection Specialists	03/2003 Vacuum Truck Cleaning	310.00	Pollution Prevention
	33	Video Inspection Specialists	11/2002 Vacuum Cleaning	145.00	Pollution Prevention
	33	Video Inspection Specialists	11/2002 Vacuum Cleaning	580.00	Pollution Prevention
	33	Video Inspection Specialists	11/2002 Cleaning & Root Cuttin	290.00	Pollution Prevention
	33	Video Inspection Specialists	12/2002 Vacuum Cleaning	507.50	Pollution Prevention
	33	Video Inspection Specialists	Clean w/Vacuum Truck	310.00	Pollution Prevention
	Item Number		**Total SWQM Structures O&M**	**10,176.56**	
Subtotal	33		VISTruckCleaning7054	9,520.00	Pollution Prevention
	34		FresnoPipeline7054	656.56	Pollution Prevention
			Total	10,176.56	
			Difference	0.00	

Table D-7. Continued.

		SWQM Pump Operations and Maintenance			
	35	Video Inspection Specialists	Clean w/Vacuum Truck	155.00	Pollution Prevention
	35	Video Inspection Specialists	7/2002 Pump Station Vacuum Cle	580.00	Pollution Prevention
	35	Video Inspection Specialists	7/2002 Pump Station Vacuum Cle	507.50	Pollution Prevention
	35	Video Inspection Specialists	11/2002 Cleaning & Root Cuttin	742.50	Pollution Prevention
	35	Video Inspection Specialists	Clean w/Vacuum Truck	787.50	Pollution Prevention
	35	Video Inspection Specialists	11/2002 Vacuum Cleaning	253.75	Pollution Prevention
	35	Video Inspection Specialists	Clean w/Vacuum Truck	310.00	Pollution Prevention
	35	Video Inspection Specialists	11/2002 Cleaning & Root Cuttin	330.00	Pollution Prevention
	35	Video Inspection Specialists	Clean w/Vacuum Truck	232.50	Pollution Prevention
	35	Video Inspection Specialists	03/2003 Vacuum Truck Cleaning	290.00	Pollution Prevention
	35	Video Inspection Specialists	11/2002 Vacuum Cleaning	217.50	Pollution Prevention
	35	Video Inspection Specialists	10/2002 Vacuum Cleaning	217.50	Pollution Prevention
	35	Video Inspection Specialists	10/2002 Vacuum Cleaning	290.00	Pollution Prevention
	35	Video Inspection Specialists	10/2002 Vacuum Cleaning	72.50	Pollution Prevention
	35	Video Inspection Specialists	10/2002 Vacuum Cleaning	580.00	Pollution Prevention
	35	Video Inspection Specialists	10/2002 Vacuum Cleaning	72.50	Pollution Prevention
	36	Pacific Gas & Electric Compa	10/03/02-11/18/02 Service	49.49	Pollution Prevention
	36	Pacific Gas & Electric Compa	Service through 12/17/2002	32.56	Pollution Prevention
	36	Pacific Gas & Electric Compa	Service thru 10/12/02-01/03/03	51.17	Pollution Prevention
	36	Pacific Gas & Electric Compa	Service thru 04/17/03	7.67	Pollution Prevention
	36	Pacific Gas & Electric Compa	Service thru 05/12/03 Pump Sit	28.67	Pollution Prevention
	36	Pacific Gas & Electric Compa	Service through 7/18/03	86.03	Pollution Prevention
	36	Pacific Gas & Electric Compa	Service through 6/18/03	86.03	Pollution Prevention
	36	Pacific Gas & Electric Compa	07/03/02-08/02/02 Service	10.80	Pollution Prevention
	36	Pacific Gas & Electric Compa	08/02/02-09/03/02 Service	10.80	Pollution Prevention
	36	Pacific Gas & Electric Compa	09/03/02-10/02/02 Service	10.80	Pollution Prevention
	36	Pacific Gas & Electric Compa	10/02/02-10/31/02 Service	10.80	Pollution Prevention
	36	Pacific Gas & Electric Compa	10/31/02-11/27/02 Service	11.50	Pollution Prevention
	36	Pacific Gas & Electric Compa	Service thru 10/12/02-01/03/03	12.98	Pollution Prevention
	36	Pacific Gas & Electric Compa	10/12/02-01/03/03 Service	14.22	Pollution Prevention
	36	Pacific Gas & Electric Compa	03/2003 Site Pump Utilities	12.47	Pollution Prevention
	36	Pacific Gas & Electric Compa	Service thru 04/10/03 Pump Sit	11.94	Pollution Prevention
	36	Pacific Gas & Electric Compa	Service thru 05/12/03 Pump Sit	11.91	Pollution Prevention
	36	Pacific Gas & Electric Compa	Service thru 06/11/03 Pump Sit	22.37	Pollution Prevention
	36	Pacific Gas & Electric Compa	Service thru 7/11/03	10.29	Pollution Prevention
	36	Pacific Gas & Electric Compa	07/03/02-08/02/02 Service	126.05	Pollution Prevention
	36	Pacific Gas & Electric Compa	08/02/02-09/03/02 Service	79.22	Pollution Prevention
	36	Pacific Gas & Electric Compa	09/03/02-10/02/02 Service	76.74	Pollution Prevention
	36	Pacific Gas & Electric Compa	10/02/02-10/31/02 Service	57.03	Pollution Prevention
	36	Pacific Gas & Electric Compa	10/31/02-11/27/02 Service	24.12	Pollution Prevention
	36	Pacific Gas & Electric Compa	Service thru 10/12/02-01/03/03	10.29	Pollution Prevention
	36	Pacific Gas & Electric Compa	10/12/02-01/03/03 Service	11.36	Pollution Prevention
	36	Pacific Gas & Electric Compa	03/2003 Site Pump Utilities	10.65	Pollution Prevention
	36	Pacific Gas & Electric Compa	Service thru 04/10/03 Pump Sit	10.65	Pollution Prevention
	36	Pacific Gas & Electric Compa	Service thru 05/12/03 Pump Sit	11.39	Pollution Prevention
	36	Pacific Gas & Electric Compa	Service thru 06/11/03 Pump Sit	13.46	Pollution Prevention
	36	Pacific Gas & Electric Compa	Service thru 7/11/03	83.81	Pollution Prevention
	35	Video Inspection Specialists	10/2002 Vacuum Cleaning	145.00	Pollution Prevention
	35	Video Inspection Specialists	11/2002 Vacuum Cleaning	108.75	Pollution Prevention
	35	Video Inspection Specialists	11/2002 Vacuum Cleaning	181.25	Pollution Prevention
	35	Video Inspection Specialists	Clean w/Vacuum Truck	155.00	Pollution Prevention
	Item Number		**Total SWQM Pump O&M**	**7,236.02**	
Subtotal	35		VISTruckCleaning7055	6,228.75	Pollution Prevention
	36		PGEService7055	1,007.27	Pollution Prevention
			Total	7,236.02	
			Difference	0.00	
SWQM Other Operations and Maintenance					
	37	Melco Fence	02/2003 Fence Repair	584.00	Post Construction
		SWQM Soil Monitoring			
	38	BSK Analytical Laboratories	Low Level Lead Profile	297.00	Post Construction
	38	BSK Analytical Laboratories	07/10/2002 Low Level Lead Prof	99.00	Post Construction
	38	BSK Analytical Laboratories	Low Level Lead Profile	396.00	Post Construction
	38	BSK Analytical Laboratories	07/2002 Low Level Lead Profile	363.00	Post Construction
	38	BSK Analytical Laboratories	07/2002 Low Level Lead Profile	264.00	Post Construction
	38	BSK Analytical Laboratories	07/03/2002 Low Level Lead Prof	198.00	Post Construction
	38	BSK Analytical Laboratories	Low Level Lead Profile	363.00	Post Construction
	38	BSK Analytical Laboratories	08/2002 Low Level Lead Profile	99.00	Post Construction
	38	BSK Analytical Laboratories	Low Level Lead Profile	198.00	Post Construction
	38	BSK Analytical Laboratories	07/03/2002 Low Level Lead Prof	66.00	Post Construction
	38	BSK Analytical Laboratories	Low Level Lead Profile	132.00	Post Construction
	38	BSK Analytical Laboratories	07/10/2002 Low Level Lead Prof	99.00	Post Construction
	38	BSK Analytical Laboratories	07/11/2002 Low Level Lead Prof	396.00	Post Construction
	38	BSK Analytical Laboratories	07/15/2002 Low Level Lead Prof	396.00	Post Construction
	38	BSK Analytical Laboratories	Low Level Lead Profile	396.00	Post Construction
	38	BSK Analytical Laboratories	Low Level Lead Profile	198.00	Post Construction
	38	BSK Analytical Laboratories	07/10/2002 Low Level Lead Prof	99.00	Post Construction
	38	BSK Analytical Laboratories	07/10/2002 Low Level Lead Prof	99.00	Post Construction
	38	BSK Analytical Laboratories	07/2002 Low Level Lead Profile	132.00	Post Construction
	38	BSK Analytical Laboratories	07/2002 Low Level Lead Profile	99.00	Post Construction
	38	BSK Analytical Laboratories	Low Level Lead Profile-II3	165.00	Post Construction
	38	BSK Analytical Laboratories	07/2002 Low Level Lead Profile	396.00	Post Construction
	38	BSK Analytical Laboratories	08/2002 Low Level Lead Profile	264.00	Post Construction
	38	BSK Analytical Laboratories	Low Level Lead Profile	198.00	Post Construction

Table D-7. Continued.

38	BSK Analytical Laboratories	Low Level Lead Profile	198.00	Post Construction
38	BSK Analytical Laboratories	10/2002 Low Level Lead Profile	396.00	Post Construction
38	BSK Analytical Laboratories	11/2002 Low Level Lead Profile	99.00	Post Construction
38	BSK Analytical Laboratories	10/2002 Low Level Lead Profile	99.00	Post Construction
38	BSK Analytical Laboratories	11/2002 Low Level Lead Profile	99.00	Post Construction
38	BSK Analytical Laboratories	07/2002 Low Level Lead Profile	99.00	Post Construction
38	BSK Analytical Laboratories	09/2002 Low Level Lead Profile	297.00	Post Construction
38	BSK Analytical Laboratories	09/2002 Low Level Lead Profile	231.00	Post Construction
38	BSK Analytical Laboratories	08/2002 Low Level Lead Profile	396.00	Post Construction
38	BSK Analytical Laboratories	08/2002 Low Level Lead Profile	198.00	Post Construction
38	BSK Analytical Laboratories	09/2002 Low Level Lead Profile	198.00	Post Construction
38	BSK Analytical Laboratories	07/2002 Low Level Lead Profile	396.00	Post Construction
38	BSK Analytical Laboratories	07/2002 Low Level Lead Profile	297.00	Post Construction
38	BSK Analytical Laboratories	08/2002 Low Level Lead Profile	279.00	Post Construction
38	BSK Analytical Laboratories	Low Level Lead Profile-Bal Due	18.00	Post Construction
38	BSK Analytical Laboratories	07/10/2002 Low Level Lead Prof	231.00	Post Construction
38	BSK Analytical Laboratories	07/2002 Low Level Lead Profile	231.00	Post Construction
38	BSK Analytical Laboratories	08/2002 Low Level Lead Profile	66.00	Post Construction
38	BSK Analytical Laboratories	09/2002 Low Level Lead Profile	198.00	Post Construction
38	BSK Analytical Laboratories	05/2002 Low Level Lead Profile	165.00	Post Construction
38	BSK Analytical Laboratories	08/2002 Low Level Lead Profile	297.00	Post Construction
38	BSK Analytical Laboratories	10/2002 Low Level Lead Profile	99.00	Post Construction
38	BSK Analytical Laboratories	11/2002 Low Level Lead Profile	99.00	Post Construction
38	BSK Analytical Laboratories	05/2002 Low Level Lead Profile	165.00	Post Construction
38	BSK Analytical Laboratories	05/2002 Low Level Lead Profile	165.00	Post Construction
Item Number				
38		**Total SWQM Soil Monitoring**	10,428.00	Post Construction
Municipal NPDES Program Implementation 7060-7066				
	Investigation, Inspection, Enforcement			
39	Fotech Color Labs	08/2002 Photos	6.00	Illicit Discharge
39	Fotech Color Labs	07/2002 Photos	16.66	Illicit Discharge
39	Fotech Color Labs	Photo Developing	53.83	Illicit Discharge
Item Number				
39		**Total Investigation, Inspection, Enforcement**	76.49	Illicit Discharge
	Monitoring			
42	AirLink Communications	08/2002 IP Activation Fee	45.00	Monitoring
41	AT&T Wireless Services	07/14/2002-08/13/2002 Services	26.18	Monitoring
40	Larry Walker Associates Inc	Storm Water Quality Monitoring	10,552.33	Monitoring
41	AT&T Wireless Services	08/14/02-09/13/02 Service Peri	23.76	Monitoring
42	AirLink Communications	07/24/02-08/23/02 Telemetry Fe	58.06	Monitoring
40	Larry Walker Associates Inc	2002-2003 Stormwater Monitorin	1,823.85	Monitoring
40	Larry Walker Associates Inc	2001-2002 Stormwater Monitorin	8,756.96	Monitoring
40	Larry Walker Associates Inc	2001-2002 Stormwater Monitorin	3,192.74	Monitoring
42	AirLink Communications	10/2002 Telemetry Monthly Fee	98.00	Monitoring
41	AT&T Wireless Services	09/14/02-10/13/02 Service	23.35	Monitoring
42	Airlink Communications Inc	09/24/02-10/23/02 Monthly Fee	98.00	Monitoring
41	AT&T Wireless Services	10/14/02-11/13/02 Service	23.98	Monitoring
43	Larry Walker Associates Inc	10/01/02-10/31/02 Professional	7,816.19	Monitoring
43	Larry Walker Associates Inc	09/01/02-09/18/02 Professional	4,692.12	Monitoring
40	Larry Walker Associates Inc	2002-2003 SWQ Monitoring	18,662.34	Monitoring
42	Airlink Communications Inc	Service through 11/23/2002	98.00	Monitoring
41	AT&T Wireless Services	Service through 12/13/2002	23.56	Monitoring
41	AT&T Wireless Services	Service thru 01/15/2003	23.46	Monitoring
43	Larry Walker Associates Inc	Service thru 12/31/2002	27,576.10	Monitoring
42	Airlink Communications Inc	Services thru 12/23/2002	98.00	Monitoring
41	AT&T Wireless Services	Service thru 02/13/03	25.75	Monitoring
40	Larry Walker Associates Inc	2002-2003 SWQ Monitoring	17,728.24	Monitoring
42	Airlink Communications Inc	Service thru 01/23/03	98.00	Monitoring
42	Airlink Communications Inc	02/23/03 Monthly Fee	98.00	Monitoring
41	AT&T Wireless Services	03/15/03 Billing	23.61	Monitoring
40	Larry Walker Associates Inc	02/2003 SWQ Monitoring	14,544.32	Monitoring

Table D-7. Continued.

	41	AT&T Wireless Services	Service thru 04/13/03	21.18	Monitoring
	40	Larry Walker Associates Inc	02-03 Storm Water Monitoring	14,464.70	Monitoring
	42	Airlink Communications Inc	IP Local - Unlimited	98.00	Monitoring
	42	Airlink Communications Inc	IP Local Unlimited	98.00	Monitoring
	41	AT&T Wireless Services	Service Through 5/13/2003	23.24	Monitoring
	40	Larry Walker Associates Inc	02-03 Storm Water Monitoring	17,532.15	Monitoring
	44	Water Env Research Foundatio	03/04 Subscription to WERF	10,000.00	Monitoring
	40	Larry Walker Associates Inc	02-03 Stormwater Quality Monit	12,274.56	Monitoring
	42	Airlink Communications Inc	IP Usage through 6/23/03	98.00	Monitoring
	42	Airlink Communications Inc	IP Local Service through 5/23/	98.00	Monitoring
	41	AT&T Wireless Services	Service through 6/15/2003	22.42	Monitoring
	41	AT&T Wireless Services	Service through 7/13/03	21.50	Monitoring
	40	Larry Walker Associates Inc	02-03 Stormwater Monitoring	24,331.20	Monitoring
	Item Number		**Total Monitoring**	**195,312.85**	
Subtotal	40		LWASWQM7063	143,863.39	Monitoring
	41		ATTService7063	281.99	Monitoring
	42		AirlinkIP7063	1,083.06	Monitoring
	43		LWAProf7063	40,084.41	Monitoring
	44		WERF7063	10,000.00	Monitoring
			Total	195,312.85	
			Difference	0.00	
		Public Information			
	45	Cash	Vons	10.70	Management
	46	David J Pomaville	Clean Water Award Reimbursemen	22.62	Public Education
	46	Pro Image Video LLC	Transfer PSA from VHS to Digit	276.97	Public Education
	48	Bank of America	Office Depot	55.16	Management
	46	Pro Image Video LLC	08/2002 Duplicate PSA VHS Tape	21.58	Public Education
	46	Fotech Color Labs	Dev & Prints	18.72	Public Education
	52	River Parkway Trust	Reimbursement Storm Water Gran	1,920.00	Public Education
	45	Cash	Casa Valadez Mexican Restauran	12.40	Management
	46	Panagraph Inc	2002-2003 SWQMP Public Info &	255.00	Public Education
	47	Fotech Color Labs	09/2002 Dev & Print	7.51	Management
	48	Fresno Ag Hardware	09/2002 Supplies	4.80	Management
	46	San Joaquin River Parkway	Clean Storm Water Grant Reimb	1,899.45	Public Education
	45	Bank of America	Vons Grocery Store	11.49	Management
	45	Bank of America	Vons Grocery Store	24.33	Management
	48	Cash	Orchard Supply	5.18	Management
	45	Cash	Riverfest 2002 Food	15.50	Management
	47	Prestige Printing	10/2002 Letterheads-Storm Wate	606.26	Management
	48	Bank of America	Office Max	28.80	Management
	56	San Joaquin River Parkway Tr	Fresno City Parks & Rec CSW Gr	1,000.00	Management
	46	City Press	10/2002 Action Alert Flyers	625.00	Public Education
	46	City Press	10/2002 Action Alert Flyers	49.22	Public Education
	45	Bank of America	Vons	44.98	Management
	49	SWRCB	Waste Discharge Req Annual Fee	1,500.00	Management
	49	SWRCB	Waste Discharge Req Annual Fee	10,000.00	Management
	49	SWRCB	Waste Discharge Req Annual Fee	2,500.00	Management
	49	SWRCB	Waste Discharge Req Annual Fee	3,750.00	Management
	46	Bank of America	Kinko's	224.10	Public Education
	48	Bank of America	OfficeMax	37.65	Management
	45	Bank of America	Bobby Salazar's	29.35	Management
	56	Bank of America	Env-Sol-Com	203.00	Management
	52	River Parkway Trust	Clean Storm Water Grant Reimb	50.00	Public Education
	50	Daniel P Rourke	Mileage Reimbursement	85.05	Management
	46	Pro Image Video LLC	12/2002 Public Information	149.08	Public Education
	45	Bank of America	Bobby Salazars	37.87	Management
	56	Bank of America	Amazon.Com	232.20	Management
	50	Bank of America	Hyatt Regency Monterey	297.68	Management
	45	Cash	SaveMart Supermarkets	9.14	Management
	50	Daniel P Rourke	Ineligible Portion-Hyatt	-4.28	Management
	51	Daniel P Rourke	CWEA Conference-Peninsula Rest	22.50	Management
	50	Daniel P Rourke	CWEA Conference Mileage Reimb	115.20	Management
	51	Daniel P Rourke	CWEA Conference-Goomba's Kitch	19.00	Management
	51	Daniel P Rourke	CWEA Conference-Jugem Japanese	13.89	Management

Table D-7. Continued.

46	Panagraph Inc	Service thru 01/2003	2,015.13	Public Education
46	City Press	02/2003 Storm Water Pollution	1,048.39	Public Education
51	Daniel P Rourke	03/2003 WRPPN Meetings-040-LJX	11.50	Management
51	Daniel P Rourke	WRPPN Committee Meeting-Zocalo	12.50	Management
51	Daniel P Rourke	03/2003 WRPPN Meetings-Hamburg	13.04	Management
51	Daniel P Rourke	WRPPN Committee Meeting-Hungry	7.50	Management
46	Panagraph Inc	2002-2003 SWQMP	382.50	Public Education
45	Bank of America	Fresno Audio Visual - Vons	24.70	Management
56	Bank of America	Fresno Audio Visual - Cinnamon	141.25	Management
56	Bank of America	Fresno Audio Visual - Mariscos	24.92	Management
45	Bank of America	Fresno Audio Visual - Food 4 L	2.85	Management
56	Bank of America	OSH-Brass Grommet	25.94	Management
56	Bank of America	Fresno Audio Visual - DiCiccos	65.59	Management
56	Bank of America	Fresno Audio Visual - Cinnamon	47.00	Management
45	Bank of America	Fresno Audio Visual - Vons	17.85	Management
56	Bank of America	Fresno Audio Visual - Draper S	18.32	Management
56	Cash	Fresno Pollution Prevention Gr	16.53	Management
52	Central Unified School Distr	2003 Clean Storm Water Grant	1,527.49	Public Education
48	Fresno Ag Hardware	Devoe Traffic Gal/Pail/Bucket	40.27	Management
52	Liberty Elementary	2003 Clean Storm Water Grant	52.00	Public Education
54	Daniel P Rourke	CASQA-BMP Handbook Workshop	27.40	Management
52	Liberty Elementary	Clean Storm Water Grant	68.00	Public Education
56	Bank of America	Vons-Me n Eds-Intergrated Pest	50.65	Management
46	Panagraph Inc	Services thru 03/2003	616.25	Public Education
56	Asian Pacific American Herit	Booth Space/Sponsorship	250.00	Management
47	Cash	Aerial Photocopies	2.00	Management
46	Zoo Lynx	2003 Earth Day Ad & Clean Up	965.00	Public Education
47	Airport Blueprint Inc	Aerial Photos	5.83	Management
55	Consolidated Printworks	Utility Bill Inserts	316.00	Public Education
46	Panagraph Inc	SWQMP Public Info & Education	38,102.22	Public Education
52	UC Regents	Clean Storm Water Grant	2,000.00	Public Education
54	Bank of America	El Pollo-CASQA BMP Handbook Mt	6.80	Management
54	Bank of America	CASQA BMP Handbook Workshop	25.00	Management
53	Bank of America	Hertz-SWQ BMP Training	152.95	Management
53	Bank of America	Hyatt-SWQ BMP Training	95.58	Management
56	Bank of America	The Upper Crust-SWQ BMP Traini	13.21	Management
56	Bank of America	The Thai House-GeoSyntec Meeti	49.00	Management
56	Bank of America	NTIS-EPA-Document	56.00	Management
54	Bank of America	Mariscos-CASQA BMP Handbook Mt	7.01	Management
53	Bank of America	Hyatt-SWQ BMP Training-Parking	12.00	Management
53	Bank of America	Hyatt-SWQ BMP Training-Meals	40.09	Management
55	City Press	Utility Bill Inserts	1,097.74	Public Education
56	Cash	Fresno Audio Visual	21.04	Management
56	Cash	Costco-Open Space Const	67.39	Management
51	Cash	Vons-Phase II Meeting	11.83	Management
56	Solon Manufacturing Co Inc	Paint Paddles	6,829.59	Management
52	Central High School-Env Scie	2003 Clean Storm Water Grant	1,823.87	Public Education
55	City Press	Utility Bill Inserts	1,111.18	Public Education
56	City Press	Stormwater Pollution Packets	878.60	Management
56	City Press	Gardening Tips Bill Insert Cre	-296.05	Management
50	Daniel P Rourke	Mileage Reimbursement	108.36	Management
56	State of CA-WRCB		-2,500.00	Management
56	Consolidated Printworks	Watering Schedule Insert	222.93	Management
46	Panagraph Inc	02-03 Public Info & Education	44,846.40	Public Education
56	Bank of America	City of Fresno-Zoning Ordinanc	25.00	Management
45	Bank of America	Bobby Salazars-Lunch Meeting	64.52	Management
56	Bank of America	OSH-Garden Sprayer	21.62	Management
45	Bank of America	Javiers-Business Lunch	35.00	Management
46	Bank of America	Sir Speedy Printing-Clovis Zon	20.55	Public Education
56	Bank of America	Paper Plus-Environmental Fact	40.93	Management
46	City of Fresno Parks & Recre	2002 Clean Storm Water Grant	1,000.00	Management
46	Jack Nadel, Inc	#2 Pencils/Screen Set Up Charg	1,350.41	Management
46	Linda Jacobsen	Clean Storm Water Grant Reimb	43.11	Management
46	Panagraph Inc	06/2003 Services SWQMP Info	2,445.61	Management
52	San Joaquin River Parkway &	2003 Clean Storm Water Grant	80.00	Management

Table D-7. Continued.

	Item Number				
			Total Public Information	**133,892.99**	
Subtotal	45		Food7064	340.68	Management
	46		PublicEducation7064	96,377.31	Public Education
	47		Printing7064	621.60	Management
	48		OfficeSupplies7064	171.86	Management
	49		SWRCBFees7064	17,750.00	Management
	50		Travel7064 (Mileage, Hotels)	602.01	Management
	51		ConferenceMeetings7064	111.76	Management
	52		Grant7064	7,521.36	Public Education
	53		Training7064	300.62	Management
	54		Handbooks7064	66.21	Management
	55		UtilityBill7064	2,524.92	Public Education
	56		Misc7064	7,504.66	Management
			Total	133,892.99	
			Difference	0.00	
		General Expenses		0.00	
		Program Expenses			
	57	Quercus Publications	Streams of the SJV Book	55.50	Management
	57	Bank of America	NTIS-Groundwater Contamination	56.00	Management
	Item Number				
	57		**Total Program Expenses**	**111.50**	Management
Industrial NPDES Program Implementation 7070-7076					
		Investigation, Inspection, Enforcement			
	58	City Press	Phone Complaints - Forms	332.96	Industrial
		Monitoring		0.00	
		Public Information			
	59	The Business Journal	Newspaper Subscription	88.00	Public Education
	59	EXCAL Visual Communications	08/2002 Storm Water Training K	1,013.50	Public Education
	59	Panagraph Inc	Services thru 12/2002	13,993.30	Public Education
	Item Number				
	59		**Total Public Information**	**15,094.80**	Public Education
(Source: Rourke, pc, 3/23/04			**Total of Subtotals**	**$ 611,843.66**	

1. Cost Categories Abbreviated According to the Following:
   - Construction: Construction Site Stormwater Runoff Control
   - Illicit Discharge: Illicit Discharge Detection and Elimination
   - Industrial: Industrial and Commercial Management Programs
   - Management: Overall Stormwater Program Management
   - Pollution Prevention: Pollution Prevention and Good Housekeeping for Municipal Operations
   - Post Construction: Post Construction Water Management in New Development and Redevelopment
   - Public Education: Public Education, Outreach, Involvement, and Participation
   - Monitoring: Water Quality Monitoring
   - Watershed: Watershed Management

The backup calculations for the cost for each cost survey category in Section 7 and the sources of the cost data are presented in this appendix. Tables are generally presented by sequentially increasing levels of detail. Figure E-1 illustrates how data is shared throughout the tables.

Table E-1 contains all costs organized into the various standard cost survey categories. The subtotals for each cost category are also presented in Section 7, Table 7-2. The remaining tables (E-2 through E-9) present the detailed back-up information for the numbers in Table E-1. Table E-1 is linked to the back-up tables by the table and item numbers in the 'Source' column. Most of the cost information provided by city staff is listed in Table E-2. Item numbers corresponding to the subtotals in Table E-2 were added to the left hand column to easily show how the numbers are pulled forward to Table E-1. The right hand column in Table E-2 was added to show how costs were allocated to the cost survey categories. Table E-1 entries that were not taken directly from Table E-2 are found in Tables E-3 through E-9.

For the city of Sacramento, labor costs are distributed among the various cost survey categories according to labor cost spreadsheets provided by city staff (Table E-7). Thus, comparing costs with other municipalities where such costs are not distributed, Sacramento's Overall Stormwater Management Program costs will be lower.

Detailed descriptions of how the costs were developed are contained in the following paragraphs.

Construction Site Stormwater Runoff Control

The total cost for this category was $261,716. The costs for this category include labor, which was broken down into three categories: inspections, student interns, and all other activities. There was also cost identified for developing BMP handbooks (one time annual cost, but may occur at a time later than one year). Other activities performed included (descriptions obtained from annual stormwater report):

- Issued 144 grading permits
- Reviewed 68 SWPPPs
- Issued 384 enforcement actions
- Sent winterization letters to property owners with active construction sites to remind contractors to prepare their construction sites for the rainy season and to submit winterization certifications
- Developed a Microsoft Access database to track all stormwater inspections and enforcement actions for private development construction sites

Sacramento

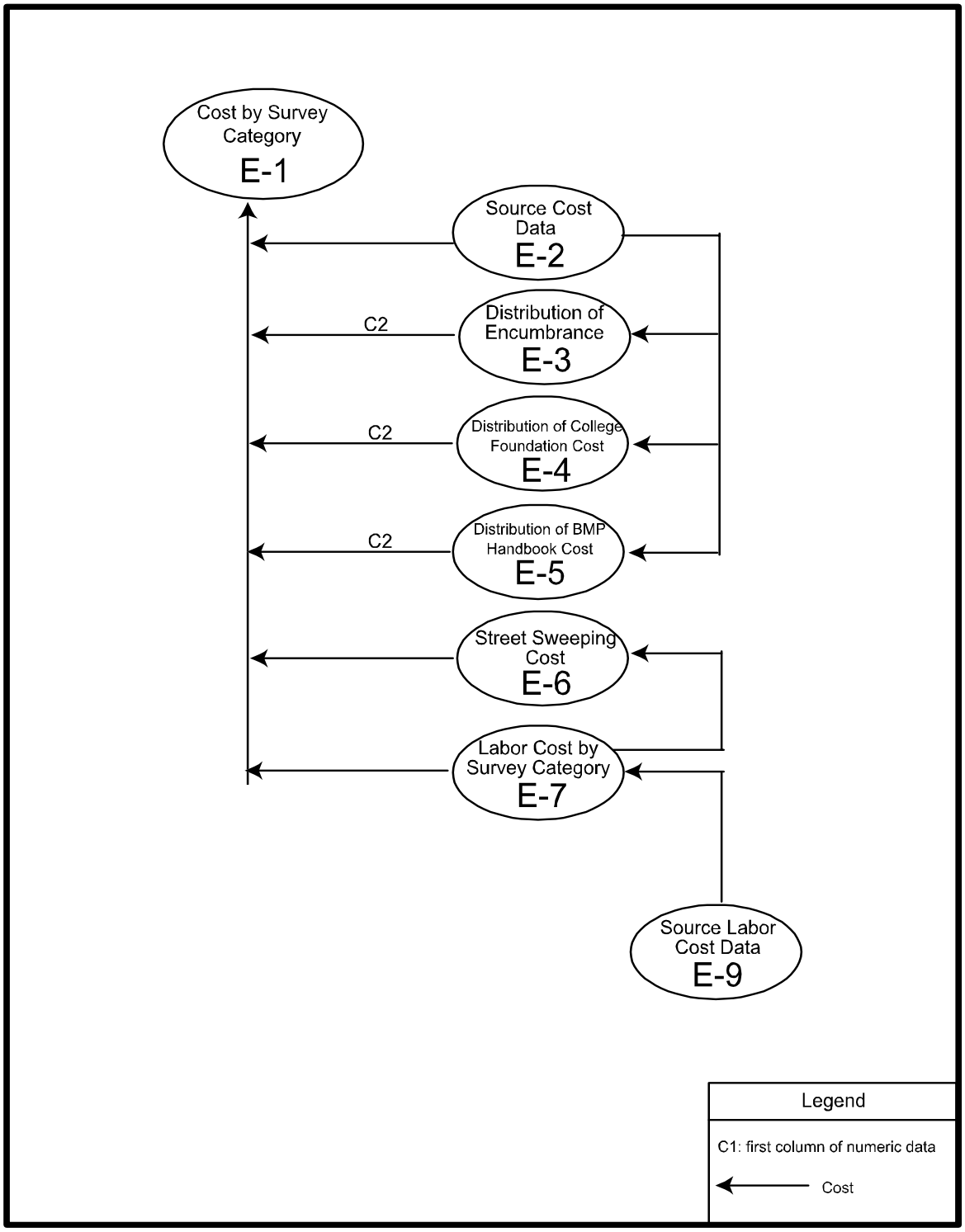

Figure E-1. Sacramento Flowchart

Illicit Discharge Detection and Elimination (IDDE)

The total cost for this category was $37,507. Labor cost is the only cost allocated to this category. Activities performed included issuance of 55 enforcement actions and investigation of all 83 calls received involving suspected illicit discharge (Sacramento, 2003b).

Industrial and Commercial Management Programs

The total cost for this category was $42,318. Approximately 94 percent of the cost was for stormwater staff labor. The other identified cost was for developing BMP handbooks (one time annual cost, but may occur at a time later than one year). Other activities included issuance of 41 enforcement actions, development of BMP brochures for the auto body, auto washing, and auto repair industry, and creation of a Clean Water Business Partner program for the mobile pressure washing industry (Sacramento, 2003b).

Overall Stormwater Program Management

The total cost for this category was $281,501. Activities in this program were as follows:

- Office products
- Planning
- Annual reporting
- CASQA membership fees
- Mailing
- NPDES fees
- Legal fees
- Miscellaneous
- Stormwater staff labor

Pollution Prevention and Good Housekeeping for Municipal Operations

The total cost for this category was $3,270,806. Most of the cost for this category was for the activities of street sweeping (40 percent), drainage system maintenance (46 percent), and pump station cleaning (13 percent).

Street sweeping costs were also estimated by city staff. Street sweeping cost was estimated at $1.6 million. Street sweeping costs included the cost of sweeping 3 percent of the core downtown area 7 extra times a month which is beyond the city's permit requirement (Busath, pers. comm., 11/21/04). Due to this an annual required compliance cost was calculated for the city based on the $1.6 million estimate and permit required street sweeping frequencies (Table E-7). The calculated annual required compliance cost was $1,322,748.

Sump, drain inlet, manhole, and drain line and channel cleaning performed by city staff was reported under the Field Services labor category in Table E-8. Equipment costs for this effort was not available, but was roughly estimated as 75 percent of the labor costs as a result of consultation with city staff. This brings the total cost for drainage system maintenance to $1,514,926.

Lastly, $2,500 was attributable to this category for development of BMP handbooks (one time cost, but may occur less frequent than annually due to updates). The city also performed inspection and maintenance of parking lots (Sacramento, 2003b).

Due to inaccurate use of labor codes by city personnel for pump station cleaning, these costs were estimated by the city of Sacramento staff rather than relying on accounting record reports (Busath, pers. comm., 11/21/03). The reported labor cost of $22,552 from Table E-8 was not used in this report. Pump station cleaning, including equipment costs, was estimated at $420,000 (Busath, pers. comm., 1/11/05).

Post Construction Stormwater Management in New Development and Redevelopment

The total cost of this category was $38,517. The labor costs for this category were broken down in the same way as the Construction Site Stormwater Runoff Control category. There was also cost identified for development of BMP handbooks (one time annual cost, but may occur at a time later than one year)

Public Education, Outreach, Involvement, and Participation

The total cost of this category was $361,440. The costs associated with this category were for the following activities:

- Developing Integrated Pest Management (IPM)
- Television
- Radio
- Billboard
- Newspaper
- Mailings
- Participation in public events
- Water Education Foundation grant
- Project development
- Agriculture outreach
- Pet outreach
- Elementary education

- Student intern labor
- Stormwater staff labor
- University grant

Where activity statistics were available, normalized costs were calculated. Activity statistics were not available for each activity. Therefore, normalization based on total cost was not possible.

Water Quality Monitoring

The total cost of this category was $494,577. Modeling and data analysis accounted for $131,688. Sample collection and lab cost was $303,077 and stormwater staff and student labor cost was $59,812.

Watershed Management

The total cost of this category was $31,591, which was primarily for stormwater staff labor.

References

City of Sacramento. 2003. "Stormwater Management Program 2002/2003 Annual Report"

Table E - 1. Sacramento Costs Organized by Cost Survey Category

Cost Survey Categories

Activity Description

Construction Site Stormwater Runoff Control

Description	External Contract	Relation to Permit[a]	Dollar Amount	Source	% of Category	Activity Statistic	Notes/Units	Reference	Normalized Cost	Notes/Units
Overall Program										
College Foundation costs		New	12,475.20	Table E-4	4.8%					
BMP handbooks (CASQA)		New	2,500.00	Table E-5	1.0%					
Other constuction element		New	64,778.39	Table E-7, Item 1	24.8%					
Construction inpections		New	181,962.17	Table E-7, Item 2	69.5%	6,375	inspections	Sacramento, 2003b	28.54	$/inspection
Total			261,715.76		5.4%	of total stormwater cost				
Overall Cost Category Normalizations										
total category $ per inspection						6,375	inspections	Sacramento, 2003b	41.05	$/inspection
total category $ per active construction site						417	active construction sites	Sacramento, 2003b	627.62	$/active construction site

Illicit Discharge Detection and Elimination

Description	External Contract	Relation to Permit	Dollar Amount	Source	% of Category	Activity Statistic	Notes/Units	Reference	Normalized Cost	Notes/Units
Illegal discharge inspection		New	13,816.15	Table E-7, Item 8	36.8%					
Other iillegal discharge		New	23,690.64	Table E-7, Item 7	63.2%					
Total			37,506.79		0.8%	of total stormwater cost				

Industrial and Commercial Management Programs

Description	External Contract	Relation to Permit	Dollar Amount	Source	% of Category	Activity Statistic	Notes/Units	Reference	Normalized Cost	Notes/Units
BMP Handbooks (CASQA)		New	2,500.00	Table E-5	5.9%					
Industrial inspections		New	1,823.89	Table E-7, Item 6	4.3%	39	inspections	Sacramento, 2003b	46.77	$/inspection
Other industrial		New	37,993.92	Table E-7, Item 5	89.8%					
Total			42,317.81		0.9%	of total stormwater cost				

Overall Stormwater Program Management

Description	External Contract	Relation to Permit	Dollar Amount	Source	% of Category	Activity Statistic	Notes/Units	Reference	Normalized Cost	Notes/Units
Planning-Bill Crooks	x	New	13,550.00	Table E-2, Item 38	4.8%					
NPDES fee		New	10,000.00	Table E-2, Item 40	3.6%					
Legal Fees	x	New	29,585.00	Table E-2, Item 43	10.5%					
Federal Express		New	110.00	Table E-2, Item 44	0.0%					
Legal Fees	x	New	915.00	Table E-2, Item 45	0.3%					
Petty cash		New	1,527.00	Table E-2, Item 48	0.5%					
Viking office products		New	324.00	Table E-2, Item 51	0.1%					
Annual Reporting-Wendy Alexander	x	New	2,480.00	Table E-2, Item 54	0.9%					
CASQA		New	5,000.00	Table E-2, Item 55	1.8%					
Miscellaneous expenses		New	1,108.00	Table E-2, Item 56	0.4%					
General stormwater activiites		New	52,696.90	Table E-7, Item 3	18.7%					
Program management		New	160,161.19	Table E-7, Item 28	56.9%					
Program management		New	4,044.41	Table E-7, Item 29	1.4%					
Total			281,501.50		5.8%	of total stormwater cost				

Table E-1 continued

Pollution Prevention and Good Housekeeping for Municipal Operations

Description	External Contract	Relation to Permit	Dollar Amount	Source	% of Category	Activity Statistic	Notes/Units	Reference	Normalized Cost	Notes/Units
Pump stations		Enhanced	420,000.00	Busath, 2004	12.8%		includes equipment and labor	Busath, pers. comm., 1/12/05		
Street sweeping		Enhanced	1,322,748.02	Table E-6	40.4%	26,450	adjusted curb miles swept	Table E-6	50.01	$/curb mile swept
BMP handbooks (CASQA)		New	2,500.00	Table E-5	0.1%					

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Table E – 1. Continued

Field services (drainage system maintenance)		Enhanced	865,672.17	Table E-7	26.5%		equipment estimated below	Busath, pers. comm., 1/12/05		
Water waste activities		New	896.73	Table E-7, Item 27	0.0%					
Other municipal operations		New	9,735.09	Table E-7, Item 15	0.3%					
Equipment (drainage system maintenance)		Enhanced	649,254.13	Busath, 2004	19.8%		calculated as 75% of field services	Busath, pers. comm., 1/12/05		(no backup available)
Total			3,270,806.13		67.9%	of total stormwater cost				

Post Construction Stormwater Management in New Development and Redevelopment

Description	External Contract	Relation to Permit	Dollar Amount	Source	% of Category	Activity Statistic	Notes/Units	Reference	Normalized Cost	Notes/Units
New development		New	29,779.10	Table E-7, Item 4	77.3%					
College Foundation costs		New	6,237.60	Table E-4	16.2%					
BMP handbooks (CASQA)		New	2,500.00	Table E-5	6.5%					
Total			38,516.70		0.8%	of total stormwater cost				

Public Education, Outreach, Involvement, and Participation

Description	External Contract	Relation to Permit	Dollar Amount	Source	% of Category	Activity Statistic	Notes/Units	Reference	Normalized Cost	Notes/Units
Develop IPM	x	New	4,710.00	Table E-2, Item 9	1.3%					
Develop IPM	x	New	34,812.00	Table E-2, Item 11	9.6%					
Develop IPM	x	New	577.00	Table E-2, Item 12	0.2%					
Television						201	days	Sacramento, 2003b	331.79	subtotal $/day
Univsion 19	x	New	13,010.00	Table E-2, Item 19	3.6%					
Comcast	x	New	26,284.00	Table E-2, Item 4	7.3%					
KCRA	x	New	24,000.00	Table E-2, Item 6	6.6%					
KXTV	x	New	3,396.00	Table E-2, Item 8	0.9%					
Radio						64	days	Sacramento, 2003b	92.25	subtotal $/day
Clear Channel	x	New	4,374.00	Table E-2, Item 3	1.2%					
KSSJ	x	New	1,530.00	Table E-2, Item 7	0.4%					
Billboards						1	days	Sacramento, 2003b	5,208.00	subtotal $/day
Sign Effects	x	New	2,578.00	Table E-2, Item 16	0.7%					
Brownies	x	New	2,630.00	Table E-2, Item 39	0.7%					
Newspaper						34	days	Sacramento, 2003b	601.32	subtotal $/day
Sac Bee	x	New	736.00	Table E-2, Item 13	0.2%					
Z.C. Optimal Solutions	x	New	18,781.00	Table E-2, Item 22	5.2%					
Sacramento Business Journal	x	New	928.00	Table E-2, Item 23	0.3%					
Mailing						34,488	impressions	Sacramento, 2003b	0.06	subtotal $/impression
Vitali-gage Communic	x	New	1,522.00	Table E-2, Item 21	0.4%					
Auto Mailing		New	653.00	Table E-2, Item 37	0.2%					
Public Event Participation										
Pacific Rim		New	100.00	Table E-2, Item 1	0.0%					
Sac Zoo		New	7,000.00	Table E-2, Item 15	1.9%					
Other Activities										
Wayne Neilsen	x	New	1,717.00	Table E-2, Item 52	0.5%					
Jack Nadel	x	New	10,406.00	Table E-2, Item 5	2.9%					
Safe Designs	x	New	764.00	Table E-2, Item 49	0.2%					
Water ED Found Grant										
Water Edu Found		New	2,500.00	Table E-2, Item 18	0.7%					
Grant		New	2,500.00	Table E-2, Item 10	0.7%					
Project Development										
David John Darold	x	New	1,756.00	Table E-2, Item 42	0.5%					
Lee Pitt	x	New	419.00	Table E-2, Item 46	0.1%					
Linda Taylor	x	New	43.00	Table E-2, Item 47	0.0%					
ATV video Center	x	New	387.00	Table E-2, Item 2	0.1%					
UC Regents	x	New	3,589.00	Table E-2, Item 17	1.0%					
Misc encumbrance		New	15,500.00	Table E-3	4.3%					

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Table E – 1. Continued.

Urban creeks		New	750.00	Table E-2, Item 20	0.2%					
Agriculture outreach (cures)		New	2,639.00	Table E-2, Item 34	0.7%					
Pet outreach (doggie bags)		New	4,149.00	Table E-2, Item 35	1.1%					
Elementary Education (sac theatre co)		New	5,100.00	Table E-2, Item 14	1.4%					
Public education		New	93,986.89	Table E-7, Item 9	26.0%					
School outreach		New	23,465.49	Table E-7, Item 10	6.5%					
Landscape grant		New	6,676.64	Table E-7, Item 12	1.8%					
Clean Water Business Partnership		New	2,279.54	Table E-7, Item 13	0.6%					
Grants to agencies within city jurisdiction		New	2,500.00	Table E-2, Item 41	0.7%					
Storm drain stenciling program		New	1,503.76	Table E-7, Item 11	0.4%					
College Foundation costs		New	31,188.00	Table E-4	8.6%					
Total			361,440.32		7.5%	of total stormwater cost				

Table E-1 continued

Water Quality Monitoring

Description	External Contract	Relation to Permit	Dollar Amount	Source	% of Category	Activity Statistic	Notes/Units	Reference	Normalized Cost	Notes/Units
Modeling and Data Analysis										
Kathy Russick	x	New	76,017.00	Table E-2, Item 27	15.4%					
LWA	x	New	43,748.00	Table E-2, Item 29	8.8%					
Geosyntec	x	New	4,690.00	Table E-2, Item 32	0.9%					
CSUS foundation		New	7,233.00	Table E-2, Item 31	1.5%					
Implementation: Sample Collection and Lab Analysis										
Aerospeed	x	New	167.70	Table E-2, Item 24	0.0%					
Caltest	x	New	37,197.00	Table E-2, Item 25	7.5%					
County	x	New	247,274.00	Table E-2, Item 26	50.0%					
Kinetic Labs	x	New	2,938.00	Table E-2, Item 28	0.6%					
Project Development		New	15,500.00	Table E-3	3.1%					
General monitoring		New	27,291.38	Table E-7, Item 19	5.5%					
NPDES compliance monitoring		New	9,525.69	Table E-7, Item 20	1.9%					
BMP effectiveness monitoring		New	341.74	Table E-7, Item 21	0.1%					
Special monitoring studies		New	409.30	Table E-7, Item 22	0.1%					
Coordinated monitoring program		New	390.75	Table E-7, Item 23	0.1%					
Coordinated monitoring program		New	368.56	Table E-7, Item 24	0.1%					
Coordinated monitoring program		New	617.52	Table E-7, Item 25	0.1%					
Coordinated monitoring program		New	8,392.24	Table E-7, Item 26	1.7%					
College Foundation costs		New	12,475.20	Table E-4	2.5%					
Total			494,577.08		10.3%	of total stormwater cost				

Watershed Management

Description	External Contract	Relation to Permit	Dollar Amount	Source	% of Category	Activity Statistic	Notes/Units	Reference	Normalized Cost	Notes/Units
Acchibald and Wallberg	x	New	9,595.00	Table E-2, Item 33	30.4%					
Brake Pad Patnership		New	2,500.00	Table E-2, Item 36	7.9%					
Watershed stewardship		New	5,565.92	Table E-7, Item 14	17.6%					
Target pollutant		New	13,930.08	Table E-7, Item 18	44.1%					
Total			31,591.00		0.7%	of total stormwater cost				

Total Stormwater Costs	4,819,973.09

a. This column indicates whether required activities were being performed prior to stormwater permits. In some cases activities were enhanced due to permit requirements.

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Table E-2. Source Data Table Submitted by City of Sacramento (cost survey categories added)

Item #	City of Sacramento Category	Cost	Cost Survey Category[1]
	Public Outreach		
1	Pacific Rim	100	Public Education
2	ATV video Center	387	Public Education
3	Clear Channel	4,374	Public Education
4	Comcast	26,284	Public Education
5	Jack Nadel	10,406	Public Education
6	KCRA	24,000	Public Education
7	KSSJ	1,530	Public Education
8	KXTV	3,396	Public Education
9	Mark McCarthy	4,710	Public Education
10	Grant	2,500	Public Education
11	Ogilvy	34,812	Public Education
12	Rooney Design	577	Public Education
13	Sac Bee	736	Public Education
14	Sac Theater Co	5,100	Public Education
15	Sac Zoo	7,000	Public Education
16	Sign Effects	2,578	Public Education
17	UC Regents	3,589	Public Education
18	Water Edu Found	2,500	Public Education
19	Univision 19	13,010	Public Education
20	Urban Creeks	750	Public Education
21	Vitali-gage Communic	1,522	Public Education
22	Z.C. Optimal Solutions	18,781	Public Education
23	Sac Business Jour	928	Public Education
	Monitoring		
24	Aerospeed	168	Monitoring
25	Caltest	37,197	Monitoring
26	County	247,274	Monitoring
27	Kathy Russick	76,017	Monitoring
28	Kinetic Labs	2,938	Monitoring
29	LWA	43,748	Monitoring
30	Sequoia Analytical	0	
31	CSUS foundation	7,233	Monitoring
32	Geosyntec	4,690	Monitoring

Table E-2. Continued.

	Target Pollutant		
33	Acchibald and Wallberg	9,595	Watershed
34	Cures	2,639	Public Education
35	Doggie Bags	4,149	Public Education
36	Brake Pad Patnership	2,500	Watershed
	Misc		
37	Auto Mailing	653	Public Education
38	Bill Crooks	13,550	Management
39	Brownies	2,630	Public Education
40	NPDES fee	10,000	Management
41	CSUS	2,500	Public Education
42	David John Darold	1,756	Public Education
43	Downey Brand	29,585	Management
44	Fedex	110	Management
45	George & Shapiro	915	Management
46	Lee Pitt	419	Public Education
47	Linda Taylor	43	Public Education
48	Petty cash	1,527	Management
49	Safe Designs	764	Public Education
50	BMP handbooks	10,000	See Table E-5
51	Viking Office Prods	324	Management
52	Wayne Neilsen	1,717	Public Education
53	Misc encumbrance	31,000	See Table E-3
54	Wendy Alexander	2,480	Management
55	CASQA	5,000	Management
56	Misc Expenses	1,108	Management
	Students		
57	College Foundation	62,376	See Table E-4
	Total	786,175	

(Source: Busath, pers. comm., 11/21/03)

1. Cost Categories Abbreviated According to the Following:
   - Construction: Construction Site Stormwater Runoff Control
   - Illicit Discharge: Illicit Discharge Detection and Elimination
   - Industrial: Industrial and Commercial Management Programs
   - Management: Overall Stormwater Program Management
   - Pollution Prevention: Pollution Prevention and Good Housekeeping for Municipal Operations
   - Post Construction: Post Construction Water Management in New Development and Redevelopment
   - Public Education: Public Education, Outreach, Involvement, and Participation
   - Monitoring: Water Quality Monitoring
   - Watershed: Watershed Management

Table E-3. Distribution of Miscellaneous Encumbrance Between Public Education and Monitoring

Cost	Source	Percent Allocation	Category	Reference	Allocated Cost
31,000.00	Table 2, Item 53	50%	Public Education	Busath, pers. comm., 1/22/04	15,500.00
31,000.00	Table 2, Item 53	50%	Monitoring	Busath, pers. comm., 1/22/04	15,500.00
Total		100%			31,000.00

Table E-4. Distribution of College Foundation Costs for Student Internship Program

Cost	Source	Percent Allocation	Category	Reference	Allocated Cost
62,376.00	Table E-2, Item 57	50%	Public Education	Busath, pers. comm., 1/22/04	31,188.00
62,376.00	Table E-2, Item 57	20%	Construction	Busath, pers. comm., 1/22/04	12,475.20
62,376.00	Table E-2, Item 57	20%	Monitoring	Busath, pers. comm., 1/22/04	12,475.20
62,376.00	Table E-2, Item 57	10%	Post Construction	Busath, pers. comm., 1/22/04	6,237.60
Total		100%			62,376.00

Table E-5. Distribution of BMP Handbooks (CASQA) between Industrial, Municipal, New Development, and Construction

Cost	Source	Percent Allocation	Category	Reference	Allocated Cost
10,000.00	Table E-2, Item 50	25%	Industrial/Commercial	Busath, pers. comm., 1/22/04	2,500.00
10,000.00	Table E-2, Item 50	25%	Municipal	Busath, pers. comm, 1/22/04	2,500.00
10,000.00	Table E-2, Item 50	25%	Post Construction	Busath, pers. comm, 1/22/04	2,500.00
10,000.00	Table E-2, Item 50	25%	Construction	Busath, pers. comm, 1/22/04	2,500.00
Total		100%			10,000.00

Table E-6. Calculation of Street Sweeping Cost

Description	Dollar Amount of Statistic	Reference
Actual Cost	1,600,000.00	Busath, pers. comm., 1/22/04
monthly req. miles	2,200	Sacramento, 2003b
6/year req. miles	0	Sacramento, 2003b
1/year req. miles	50	Sacramento, 2003b
annual required	26,450	Calculation
monthly actual est. mi.	2,662	Busath, pers. comm., 1/22/04
6/year actual est. mi.	0	Sacramento, 2003b
1/year actual est. mi.	50	Sacramento, 2003b
annual actual est. mi.	31,994	Calculation
annual req. cost est.	1,322,748.02	Calculation

Table E-7. Labor Allocations for Sacramento Categories with Corresponding Cost Survey Categories

Item #	Sacramento Category	City Labor Code	Labor Cost	Cost Survey Category
1	Construction Element	HA	64,778.39	Construction
2	Construction Inspections	HA1	181,962.17	Construction
3	General Stormwater Actvities	HAA	52,696.90	Management
4	New Development Element	HB	29,779.10	Post Construction
5	Industrial Element	HC	37,993.92	Industrial
6	Industrial Inspection	HC1	1,823.89	Industrial
7	Illegal Discharge Program	HD	23,690.64	Illicit Discharge
8	Illegal Discharge Inspection	HD1	13,816.15	Illicit Discharge
9	Public Education Program	HE	93,986.89	Public Education
10	School Outreach Program	HE1	23,465.49	Public Education
11	Stormdrain Stenciling Program	HE2	1,503.76	Public Education
12	NN Landscape Grant	HE3	6,676.64	Public Education
13	CWBP	HE4	2,279.54	Public Education
14	Watershed Stewardship	HF	5,565.92	Watershed
15	Municipal Operations	HG	9,735.09	Pollution Prevention
16	Plant Services Stormwater Activities	HH	22,552.19	See Table E-1, pump stations
17	Field Services Stormwater Activities	HI	865,672.17	Pollution Prevention
18	Target Pollutant	HJ	13,930.08	Watershed
19	Monitoring	HK	27,291.38	Monitoring
20	NPDES Compliance Monitoring	HK1	9,525.69	Monitoring
21	BMP Effectiveness Monitoring	HK2	341.74	Monitoring
22	Special Monitoring Studies	HK3	409.30	Monitoring
23	Coordinated Monitoring Program	HK4	390.75	Monitoring
24	Coordinated Monitoring Program	HK5	368.56	Monitoring
25	Coordinated Monitoring Program	HK6	617.52	Monitoring
26	Coordinated Monitoring Program	HK7	8,392.24	Monitoring
27	Water Waste Activities	HL	896.73	Pollution Prevention
28	Program Management	HM	160,161.19	Management
29	Program Management	PM	4,044.41	Management
	Total		1,664,348.44	

(Source: Table E-8)

Table E-8. Labor Cost Data as Submitted by City of Sacramento Staff

City of Sacramento
Department of Utilities
Project Accounting Management System (PAMS)

Job #	Description	Org	Rept Catg	Total Employee Expense	Indiv Hourly Expense
21233	NPDES PROGRAM	3322	HH	665.49	95.1
		3323	HH	4,122.06	64.4
			HH	1,410.18	58.8
			HH	3,508.67	48.7
			HH	1,944.98	44.2
			HH	1,766.04	31.5
			HH	1,124.38	70.3
			HA1	108,293.85	63.9
			HH	868.3	64.3
			HH	1,023.82	64
			HH	930.52	58.2
			HH	198.42	49.6
			HH	448.59	64.1
			HH	384.49	64.1
			HH	656.76	41
			HH	283.2	35.4
			HH	1,122.86	70.2
		3331	HH	2,009.09	24.8
			HH	84.34	42.2
			HA	2,371.26	25.9
			HA1	6,658.08	26.4
			HAA	2,949.16	26.4
			HAA	1,463.31	41.8
			HD	49.61	24.8
			HE	655.9	25.7
			HE1	1,916.75	26.1
			HE2	417.95	26.1
			HF	99.23	24.8
			HK	244.3	27.1
			HK3	198.43	24.8
		3332	HAA	6,475.21	89.9
			HE	2,116.34	90.1
			HE1	1,461.61	89.5
			HG	8,302.14	90.2
			HJ	11,187.93	89.6

Table E-8. Continued.

			HK	17,265.87	89.4
			HK1	4,597.83	89
			HK2	162.9	89
			HK4	266.5	88.8
		3333	HK5	368.56	0
			HK6	617.52	65
			HK7	8,392.24	88.8
21233	NPDES PROGRAM	3333	HA	7,712.62	61.2
			HA	52,918.39	89
			HA	1,776.12	44.4
			HA1	5,602.74	62.3
			HA1	61,407.50	43.6
			HAA	12,504.88	61.9
			HAA	13,331.24	66.7
			HAA	12,627.60	89.2
			HAA	3,345.50	65
			HB	4,303.02	62.4
			HB	25,476.08	88.5
			HC	1,745.21	62.3
			HC	35,847.63	66.5
			HC	401.08	89.1
			HC1	248.44	62.1
			HC1	1,575.45	65.6
			HD	23,193.44	66.6
			HD	447.59	89.5
			HD1	13,816.15	68.2
			HE	11,310.88	62.3
			HE	156.04	62.4
			HE	928.86	88.5
			HE	78,818.87	69.4
			HE1	4,083.84	67.5
			HE1	4,279.00	89.1
			HE1	11,724.29	67.6
			HE2	1,085.81	67.9
			HE3	6,676.64	65.5
			HE4	2,279.54	67.4
			HF	62.43	62.4
			HF	987.49	89.8
			HF	4,416.77	63.1
			HG	1,164.59	68.5
			HG	268.36	89.5
			HJ	1,133.19	100.7
			HJ	1,608.96	67
			HK	804.75	100.6
			HK	1,499.54	68.2
			HK	7,266.64	89.2

Table E-8. Continued.

			HK	210.28	70.1
			HK1	4,927.86	55.7
			HK2	178.84	89.4
21233	NPDES PROGRAM	3333	HK3	210.87	38.3
			HK4	124.25	62.1
			HL	800.31	66.7
			HL	96.42	48.2
			HM	160,070.30	100.4
			HM	90.89	29.5
			PM	4,044.41	101.1
		3342	HI	1,440.10	53.3
		3343	HI	2,252.63	56.3
			HI	205.78	51.4
			HI	16,387.75	46.6
			HI	29,009.49	45.6
			HI	53,108.99	54.6
			HI	945.65	43
			HI	2,059.16	51.5
			HI	1,486.70	41.3
			HI	46,709.55	50
			HI	60,251.76	55.9
			HI	421.01	52.6
			HI	23,368.00	44.3
			HI	11,685.67	46.6
			HI	24,722.55	44
			HI	1,420.81	52.6
			HI	1,197.95	33.3
			HI	33,694.50	48.8
			HI	25,045.38	42.7
			HI	12,318.28	50.3
			HI	15,905.71	44.8
			HI	28,123.15	56
			HI	43,011.80	55.8
			HI	77,791.72	49.9
			HI	6,085.05	56.9
			HI	89,605.65	62.8
			HI	84,737.98	55.3
			HI	2,041.63	51
			HI	4,134.41	51.7
			HI	61,389.23	40.7
			HI	510.55	63.8
			HI	22,888.86	48.5
			HI	1,291.63	47.8
			HI	80,423.09	54.1
			Total	1664348.44	59.92

(Source: Busath, pers. comm., 11/21/03)

The backup calculations for the cost for each cost survey category in Section 8 and the sources of the cost data are presented in this appendix. Tables are generally presented by sequentially increasing levels of detail. Figure F-1 illustrates how data is shared throughout the tables.

Table F-1 contains all costs organized into the various standard cost survey categories. The subtotals for each cost category are also presented in Section 8, Table 8-2. The remaining tables (F-2 through F-7) present the detailed back-up information for the numbers in Table F-1. Table F-1 is linked to the back-up tables by the table and item numbers in the 'Source' column. Most of the cost information provided by city staff is listed in Table F-2. Item numbers corresponding to the subtotals in Table F-2 were added to the left hand column to easily show how the numbers are pulled forward to Table F-1. The right hand column in Table F-2 was added to show how costs were allocated to the cost survey categories. Table F-1 entries that were not taken directly from Table F-2 are found in Tables F-3 through F-7.

For the city of Santa Clarita, labor costs of the stormwater staff are not distributed among the various survey categories. Instead, it is all captured under Overall Stormwater Program Management. Thus, comparing costs with other municipalities where such costs are distributed, Santa Clarita's Overall Stormwater Management Program costs will be higher.

Detailed descriptions of how the costs were developed are contained in the following paragraphs.

Construction Site Stormwater Runoff Control

The total cost of this category was $74,995. The only cost attributed to this category was for inspections. The city conducted 11,746 inspections, but this number reflects multiple inspections for various construction activities at the same site (Santa Clarita, 2003b). Since this number does not solely represent stormwater inspections, this should be considered when comparing these inspection statistics with that of the other cities. Therefore, cost was normalized per active construction site (64) (Santa Clarita, 2003b). Other activities in this category included:

- Development of pollution prevention handouts directly related to specific construction functions
- The city's Environmental, Building and Safety, and Public Works inspectors completed site visits on a daily basis
- Cited contractors in the event of illicit connection detection

Santa Clarita

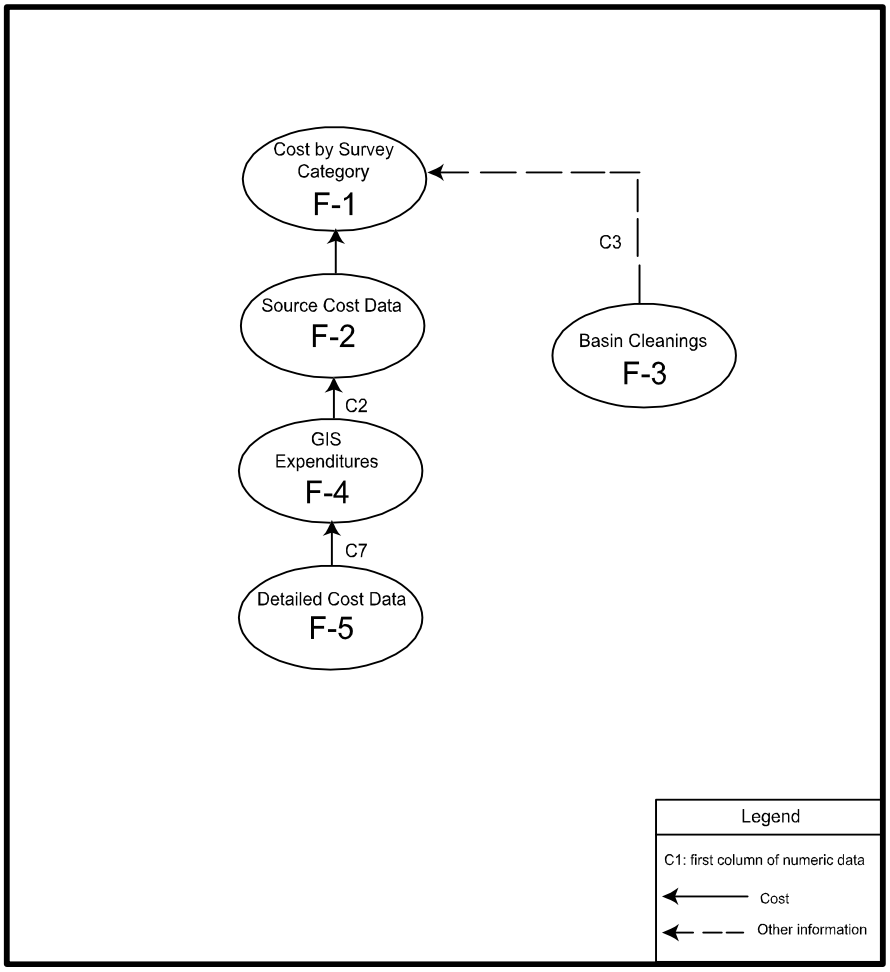

Figure F-1. Santa Clarita Flowchart

Illicit Discharge Detection and Elimination (IDDE)

The total cost of this category was $114,831. Though the city labeled this cost as operation and maintenance activities, activities were specific to identification and elimination of illicit connections and discharges.

The Los Angeles Flood Control District (LAFCD) owns and maintains 122,354 feet of open channel all of which was screened for illicit connections during the 2002/03 fiscal year. Out of the 20 illicit connections that were identified by screening, all were investigated, terminated, removed, and resulted in enforcement action (Santa Clarita, 2003b).

Also, 349 illicit discharges were reported. Of these, 291 were discontinued/cleaned up voluntarily through enforcement and the source identified, 2 were cleaned up with no source identified, 50 resulted in no evidence of discharge, 27 were determined to be conditionally

exempt, and 305 resulted in enforcement action. (Santa Clarita, 2003b). Normalized cost is $311 per investigation of both illicit connections and illicit discharges (20+349). This includes all associated follow up activities performed by the city as described above.

Industrial and Commercial Management Programs

The total cost of this category was $12,600. The only cost for this category was for inspection of industrial and commercial facilities. The city inspection staff performed 110 inspections during 2002/03. The city of Santa Clarita contracts with Los Angeles County of perform these inspections but are done by city staff (Cramer, pers. comm., 4/22/04). Enforcement actions were issued which included 17 verbal warnings and 4 notices to comply. (Santa Clarita, 2003b).

Overall Stormwater Program Management

The total cost for this category was $515,352. These costs are for administrative activities and development planning. Stormwater staff time (including overhead allocation) used to oversee or implement the activities in the other cost categories accounted for $438,832. Overhead allocation (other supporting city functions, building, etc.) was $253,073. This number is described in the footnote to Table F-2. Development planning cost was $76,520. These costs were for activities the city does to insure developers are following SUSMP[1] standards. Maintenance of the stormwater section of city's website was also performed.

Pollution Prevention and Good Housekeeping for Municipal Operations

The total cost for this category was $859,754. Activities performed in this category were for catch basin cleaning, trash pick-up, and street sweeping. The cost attributed to catch basin cleaning was $251,908. During 2002/03, 1,482 catch basins were cleaned (Table F-3). The cost attributed to street sweeping was $557,443. The city sweeps all streets once a week (Santa Clarita, 2003b). A total of 900 curb miles were swept per week in 2002/03 (Cramer, pers. comm., 4/22/04). Trash pick-up costs were $50,403 for the household hazardous waste program.

Post Construction Stormwater Management in New Development and Redevelopment

The adjusted cost of this category was $106,925. The total cost for this category submitted by the city of Santa Clarita was $256,950. Of the cost, $97,813 was for vehicles for catch basin cleaning (Cramer, pers. comm., 4/22/04). These capital costs were recurring for other projects at an unknown interval and were assumed to be annual for the purposes of this survey. The remaining $9,112 was for maintenance and conveyance of one detention basin (Cramer, pers. comm., 4/22/04).

---

[1] SUSMP: Standard Urban Storm Water Mitigation Plans (SUSMPs) are often referenced by permits. They set treatment requirements for new construction and redevelopment. (www.swrcb.ca.gov)

Public Education and Outreach and *Public Involvement and Participation*

The total cost for these categories was $49,130. These categories were combined for the city of Santa Clarita. This cost includes employee training to administer these categories. Activities in this category included:

- Storm drain stenciling: Out of the city owned 440 drain inlets, 45 were marked with a no dumping message
- Maintained stormwater hotline: The city received approximately 30 calls per day relating to trash, household hazardous waste, and stormwater (Cramer, pers. comm., 4/22/04)
- Print, television, radio, and other media: Approximately 5 million impressions were made (for the entire permitted area). A breakdown for Santa Clarita was not available
- School outreach: An environmental mascot visited schools and public events to educate attendees on stormwater issues. Children's activity books were distributed at appearances. Flyers were distributed to promote the River Rally event
- Cooperated with the principal permittee to develop specific outreach programs to target pollutants in their area
- Distributed pollutant-specific materials
- Developed and distributed brochures and door hangers to specific residents
- Attended 4 workshop/community events to discuss stormwater pollution

Programs supported by the principal permittee were funded in part by a contribution from the city of Santa Clarita in the amount of $45,822. The remaining activities were performed by stormwater staff and that cost breakdown was not available.

Water Quality Monitoring

The total cost of this category was $3,300 (Table F-2). This included monitoring for diazinon multiple times at one site (Cramer, pers. comm., 4/22/04).

Watershed Management

The total cost of this category was $332,949. This cost was allocated to this category based on estimates from city staff. The staff estimated that 50 percent of GIS cost was attributable to stormwater activities (Table F-4).

References

City of Santa Clarita. 2003. "Los Angeles County Municipal Storm Water Permit (Order 01-182) Individual Annual Reporting Form, Attachment U-4"

Table F - 1. Santa Clarita Cost Organized by Cost Category

Cost Survey Categories

Activity Description

Construction Site Stormwater Runoff Control

Description	External Contract	Relation to Permit[a]	Dollar Amount	Source	% of Category	Activity Statistic	Notes/Units	Reference	Normalized Cost	Notes/Units
Construction inspections		New	74,995.00	Table F-2, Item 9	100%	64	active construction sites	Santa Clarita, 2003b	1,171.80	$/active construction site
Total			74,995.00		3.6%	of total stormwater cost				

Illicit Discharge Detection and Elimination

Description	External Contract	Relation to Permit	Dollar Amount	Source	% of Category	Activity Statistic	Notes/Units	Reference	Normalized Cost	Notes/Units
Operations and maintenance		New	114,831.05	Table F-2, Item 16	100%	369	investigations	Santa Clarita, 2003b	311.20	$/investigation
Total			114,831.05		5.5%	of total stormwater cost				

Industrial and Commercial Management Programs

Description	External Contract	Relation to Permit	Dollar Amount	Source	% of Category	Activity Statistic	Notes/Units	Reference	Normalized Cost	Notes/Units
Industrial/Commercial site visit activities		New	12,600.00	Table F-2, Item 7	100%	110	inspections	Santa Clarita, 2003b	114.55	$/inspection
Total			12,600.00		0.6%	of total stormwater cost				

Overall Stormwater Program Management

Description	External Contract	Relation to Permit	Dollar Amount	Source	% of Category	Activity Statistic	Notes/Units	Reference	Normalized Cost	Notes/Units
Administrative costs		New	438,832.00	Table F-2, Item 1	85.2%					
Development planning		New	76,519.55	Table F-2, Item 8	14.8%					
Total			515,351.55		24.9%	of total stormwater cost				

Pollution Prevention and Good Housekeeping for Municipal Operations

Description	External Contract	Relation to Permit	Dollar Amount	Source	% of Category	Activity Statistic	Notes/Units	Reference	Normalized Cost	Notes/Units
Catch basin cleaning		Enhanced	251,907.99	Table F-2, Item 12	29.3%	1,482	basin cleanings	Table F-3	169.98	$/basin cleaning
Trash pick-up		Existing	50,402.55	Table F-2, Item 13	5.9%					
Street sweeping		Enhanced	557,443.16	Table F-2, Item 11	64.8%	46,800	curb miles swept	Cramer, pers. comm., 4/22/04	11.91	$/curb mile swept
Total			859,753.70		41.5%	of total stormwater cost				

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Table F – 1. Continued.

Post Construction Stormwater Management in New Development and Redevelopment

Description	External Contract	Relation to Permit	Dollar Amount	Source	% of Category	Activity Statistic	Notes/Units	Reference	Normalized Cost	Notes/Units
BMP maintenance		New	9,111.93	Table F-2, Item 10	8.5%					
Capital costs		New	97,813.00	Table F-2, Item 14	91.5%					
Total			106,924.93		5.2%	of total stormwater cost				

Public Education, Outreach, Involvement, and Participation

Description	External Contract	Relation to Permit	Dollar Amount	Source	% of Category	Activity Statistic	Notes/Units	Reference	Normalized Cost	Notes/Units
Public education and outreach		New	45,821.98	Table F-2, Item 3	93.3%					
Employee training		New	3,308.39	Table F-2, Item 4	6.7%					
Total			49,130.37		2.4%	of total stormwater cost				

Water Quality Monitoring

Description	External Contract	Relation to Permit	Dollar Amount	Source	% of Category	Activity Statistic	Notes/Units	Reference	Normalized Cost	Notes/Units
Monitoring		New	3,300.00	Table F-2, Item 18	100%					
Total			3,300.00		0.2%	of total stormwater cost				

Watershed Management

Description	External Contract	Relation to Permit	Dollar Amount	Source	% of Category	Activity Statistic	Notes/Units	Reference	Normalized Cost	Notes/Units
Watershed management		New	332,949.00	Table F-2, Item 19	100%					
Total			332,949.00		16.1%	of total stormwater cost				

Total Stormwater Costs	2,069,835.60

a. This column indicates whether required activities were being performed prior to stormwater permits. In some cases activities were enhanced due to permit requirements.

015845

Table F-2. Source Data Table Submitted by City of Santa Clarita in their Annual Report Form for Los Angeles County Municipal Stormwater Permit (cost survey categories added)

Item #	City of Santa Clarita Category	Cost	Cost Survey Category[1]
	Program Mangement		
1	Administrative Costs	438,832.00	2 Management
2	Capital Costs	0.00	
	Public Information and Participation		
3	Public Outreach/Education	45,821.98	Public Education
4	Employee Training	3,308.39	Public Education
5	Corporate Outreach	0.00	
6	Business Assistance	0.00	
7	Industrial/Commercial Inspection/Site Visit Actvities	12,600.00	Industrial
8	Development Planning	76,519.55	Management
	Development Construction		
9	Construction Inspections	74,995.00	Construction
	Public Agency Activities		
10	Maintenance of structural and treatment control BMPs	9,111.93	Post Construction
11	Municipal Street Sweeping	557,443.16	Pollution Prevention
12	Catch Basin Cleaning	251,907.99	Pollution Prevention
13	Trash Collection/Recycling	50,402.55	Pollution Prevention
14	Capital Costs	97,813.00	3 Post Construction
15	Other	0.00	
	IC/ID Program		
16	Operations and Maintenance	114,831.05	Illicit Discharge
17	Capital Costs	0.00	
18	Monitoring	3,300.00	Monitoring
19	Other (Watershed Management)	332,949.00	4 Watershed
	Total	2,069,835.60	

(Source: Santa Clarita 2003b)

1. Cost Categories Abbreviated According to the Following:
   - Construction: Construction Site Stormwater Runoff Control
   - Illicit Discharge: Illicit Discharge Detection and Elimination
   - Industrial: Industrial and Commercial Management Programs
   - Management: Overall Stormwater Program Management
   - Pollution Prevention: Pollution Prevention and Good Housekeeping for Municipal Operations
   - Post Construction: Post Construction Water Management in New Development and Redevelopment
   - Public Education: Public Education, Outreach, Involvement, and Participation
   - Monitoring: Water Quality Monitoring
   - Watershed: Watershed Management

2. Cost reported in the annual report form was $184,710. Per personal communication with Dan Smith, this number was adjusted up to $185,759 because of $1,049 in previously unallocated labor for stormwater staff. Another $253,073 was also added as the cost of overhead allocation. Overhead allocation was not included in the annual report and it pays for support by other departments such a payroll, human resources, etc. as well as a fraction of building costs.

3. $137,784 was adjusted down to $97,813 after a more thorough review by city finance staff. The city suggested we add $150,025 for the curb line and gutter maintenance program, but this cost could not be established as a stormwater compliance cost.

4. From Table 7-3.

Table F-3. Calculation of Number of Basin Cleanings

Type	Number	Reference	Frequency (yearly)	Reference	Total Cleanings
Priority A	65	Santa Clarita, 2003b	3	Santa Clarita, 2003b	195
Priority B	180	Santa Clarita, 2003b	3	Santa Clarita, 2003b	540
Priority C	249	Santa Clarita, 2003b	3	Santa Clarita, 2003b	747
Total	494				1,482

Table F-4. Calculation of GIS Expenditures Relating to Stormwater

Amount	Source	Percent Allocation	Category	Reference	Allocated Cost
665,897.12	Table F-5	50%	Watershed Management	Cramer, pers. comm., 6/9/04	332,948.56
665,897.12	Table F-5	50%	Not Related to Stormwater	Cramer, pers. comm., 6/9/04	332,948.56
Total		100%			665,897.12

Table F-5. Financial Cost Data Submitted by City of Santa Clarita

STORMWATER UTILITY FINANCIAL PROJECTIONS
Financial History

		1996-97 Actuals	1997-98 Actuals	1998-99 Actuals	1999-00 Actuals	2000-01 Actuals	2001-02 Actuals	2002-03 Actuals
REVENUES:								
	User Fee	1,847,538	2,149,920	2,527,683	1,925,118	2,101,130	1,954,966	2,251,307
	(Supplemental Refund)							
	Interest Income	42,104	58,193	79,913	86,125	143,197	96,382	81,505
	Misc. Revenues		103	1,811			103,285	147,464
	Sale of Maps & Publications			140	1,792	1,696	2,597	1,929
	Operating Transfers In			53,633	125,028	277,836	323,142	289,765
Total Revenues		**1,889,642**	**2,208,216**	**2,663,179**	**2,138,063**	**2,523,859**	**2,480,373**	**2,771,971**
OPERATING EXPENDITURES:								
2314	GIS	965,352	327,471	213,712	232,334	486,642	504,794	665,897
4311	Stormwater Engineering				56,652	17,924		
5720	Stormwater Utility Admin		312,673	323,391	691,677	539,508	1,561,987	554,823
5740	Stormwater Field Activities	572,534	601,604	627,845	688,919	740,401	994,760	928,992
8140	Stormwater Attorney Services							
	Transfers Out							
	Overhead Allocation - 11% of Rev	197,820	197,820	197,820	197,820	197,820	203,895	253,073
	Audit Adj - AR Allowance							
TOTAL OPERATING EXPENDITURES		**1,735,706**	**1,439,567**	**1,362,768**	**1,867,401**	**1,982,295**	**3,265,435**	**2,402,785**
CAPITAL PROJECTS:								
	1996-97 Access Ramp	0	18,636	6,364				
	1997-98 Curb Gutter & Flowline			115,000				
	1999-00 Stormdrain Repairs					0		
	1999-00 Curb Gutter Flowline				157,415			
	Storm Drain Repairs			(97,660)	110,170	17,500		
M0031	Annual Curb Gutter Flowline						151,766	
M0032	Storm Drain Transfer Program						73,428	316,215
M0037	Annual Curb Gutter Flowline			190,668				150,025
	Water Discharge Retrofit			16,683				
	Galeton Street Improvements			18,850				
	2000-01 Curb Gutter Flowline					177,000		
	Annual Stormdrain Repairs					0		
TOTAL CAPITAL PROJECTS		**0**	**18,636**	**249,905**	**267,585**	**194,500**	**225,194**	**466,240**
Total Expenditures		**1,735,706**	**1,458,203**	**1,612,673**	**2,134,987**	**2,176,795**	**3,490,629**	**2,869,025**
EXCESS (DEFICIENCY) REVENUES OVER		**153,936**	**750,013**	**1,050,506**	**3,077**	**347,065**	**(1,010,256)**	**(97,054)**
FUND BALANCE - BEGINNING OF YEAR		**$ 898,435**	**$ 1,052,371**	**$ 1,802,383**	**$ 2,852,890**	**$ 2,855,966**	**$ 3,203,031**	**$ 2,192,775**
FUND BALANCE - END OF YEAR		**$ 1,052,371**	**$ 1,802,383**	**$ 2,852,890**	**$ 2,855,966**	**$ 3,203,031**	**$ 2,192,775**	**2,095,721**
Reserve For Vehicle Replacement				**47,998**	**65,183**	**83,039**	**115,776**	**175,000**
C.	**RECEIVABLE - NON PAYING CUSTOMERS**						**$ 84,658**	
D.	**REMAINING SCHOOL RECEIVABLES**						**$ 535,611**	
Unreserved Fund Balance		**$ 1,052,371**	**$ 1,802,383**	**$ 2,804,892**	**$ 2,790,783**	**$ 3,119,992**	**$ 1,456,730**	**$ 1,920,721**

Appendix G Calculations and Comparisons

Section G-1 of this appendix contains backup calculations for certain results in Section 9 and additional cost analysis that did not prove useful, but is presented here to demonstrate their lack of utility (Section G-1). This is particularly true of regressions of normalized cost versus cost factors. Section G-2 of this appendix contains analysis of future cost to compare various cost scenarios using equivalent annual cost.

To compare costs from years greater than a year different from the year of this study (2003 dollars), the Consumer Price Index Urban (CPIU) was used (U.S. Bureau of Labor Statistics, 2005). CPIU was used because it is a common measure of inflation, it was similar to the Engineering News Review Construction Cost Index (CCI) from the Engineering News Record (ENR), yet CPIU reflects more broadly on how inflation than the CCI. As an example of similarity between the two indices, the CPIU adjustment factor from 1998 to 2003 agreed with the CCI to three significant figures. Because CPIU was similar to the ENR CCI and for consistency, CPIU was used to adjust both construction costs (e.g. treatment plant) and city stormwater costs that fund mostly non-construction activities such as inspection programs and maintenance of city infrastructure.

G.1 COST SURVEY ANALYSIS

This section contains costs normalized by both number of households and population. Since cost per households is the most common in the literature, several regressions against this parameter are also presented in this section.

Survey Category Costs per Household

Table G-1 presents survey category costs normalized by households.

Table G-1. Survey Category Costs Per Household

	Const.	IDDE	Ind/Com	Overall Man.	Pollution Prevention	Post. Con.	Pub. Ed.	Mon.	W. Man.
Entity	$/HH	$/HH	$/HH	$/HH	$/HH	$/HH	$/HH	$/HH	$/HH
City of Corona	1.36	0.53	2.29	8.09	18.34	0.34	0.72	0.18	0.00
City of Encinitas	7.12	2.07	2.75	5.38	22.16	0.64	1.76	3.20	0.52
City of Fremont	0.26	0.09	3.02	6.54	30.64	0.51	1.46	1.89	0.25
Fresno-Clovis Area	0.42	0.07	0.24	2.92	11.47	0.29	1.08	1.29	0.00
City of Sacramento	1.60	0.23	0.26	1.72	21.41	0.23	2.20	3.02	0.19
City of Santa Clarita	1.43	2.19	0.24	9.83	16.39	2.04	0.94	0.06	6.35
Average	2.03	0.86	1.47	5.74	20.07	0.68	1.36	1.61	1.22
Median	1.39	0.38	1.27	5.96	19.88	0.42	1.27	1.59	0.22
Minimum	0.26	0.07	0.24	1.72	11.47	0.23	0.72	0.06	0.00
Maximum	7.12	2.19	3.02	9.83	30.64	2.04	2.20	3.20	6.35

Survey Category Costs Per Capita

Table G-2 presents survey category costs normalized by population.

Table G-2. Survey Category Costs Per Capita

	Const.	IDDE	Indust.	Overall Man.	Pollution Prevent.	Post. Con.	Pub. Ed.	Mon.	W. Man.
	$/capita								
City of Corona	0.43	0.17	0.72	2.54	5.76	0.11	0.23	0.06	0.00
City of Encinitas	2.93	0.85	1.13	2.21	9.11	0.26	0.72	1.31	0.21
City of Fremont	0.09	0.03	1.03	2.23	10.46	0.17	0.50	0.65	0.09
Fresno-Clovis Area	0.15	0.02	0.09	1.02	3.99	0.10	0.38	0.45	0.00
City of Sacramento	0.64	0.09	0.10	0.69	8.04	0.09	0.89	1.22	0.08
City of Santa Clarita	0.50	0.76	0.08	3.41	5.69	0.71	0.33	0.02	2.20
Average	0.79	0.32	0.53	2.02	7.27	0.24	0.51	0.62	0.43
Median	0.46	0.13	0.41	2.22	7.19	0.14	0.44	0.55	0.08
Minimum	0.09	0.02	0.08	0.69	3.99	0.09	0.23	0.02	0.00
Maximum	2.93	0.85	1.13	3.41	10.46	0.71	0.89	1.31	2.20

Construction Program Cost Normalizations

Table G-3 presents construction program costs normalized by several cost factors. In some cases, activity statistics were not available and, as such, normalization was not possible. In such instances, the average and median statistics are only based on the data available. Construction costs were normalized by number of active construction sites and inspections. The large variability in normalized cost may be a result of inconsistent reporting of these cost factors.

Table G-3. Construction Program Unit Costs

Entity	Construction Cost	Active Sites	Construction $/active site	Inspections	Construction $/inspection
City of Corona	53,382	41	1,302	564	95
City of Encinitas	169,751	40	4,244	401	423
City of Fremont	17,715	24	738	197	90
Fresno-Clovis Area	81,800	N/A	N/A	N/A	N/A
City of Sacramento	261,716	417	628	6,375	41
City of Santa Clarita	74,995	64	1,172	N/A	N/A
Average			1,617		162
Median			1,172		92

Industrial and Commercial Program Cost Normalizations

Table G-4 presents industrial and commercial program costs normalized by several cost factors. In some cases, activity statistics were not available and as such, normalization was not possible. In such instances, the average and median statistics are only based on the data available. Industrial and commercial program costs were normalized by population, number of industrial and commercial sites, and number of inspections.

Table G-4. Industrial and Commercial Program Units

Entity	Program Cost	Sites	Industrial $/site	Inspections	Industrial $/inspection
City of Corona	89,916	3,050	29	600	150
City of Encinitas	65,596	417	157	266	247
City of Fremont	210,027	1,028	204	482	436
Fresno-Clovis Metropolitan Area	47,780	N/A	N/A	N/A	N/A
City of Sacramento	42,318	N/A	N/A	39	N/A
City of Santa Clarita	12,600	1,071	12	110	115
Average			101		406
Median			93		247

Additional Regression Analysis

Many of the following regressions have outer and inner confidence limits. Though practically useless, they are displayed to indicate how much inaccuracy results from the regressions. The inner limits are the 90 percent confidence interval for the mean cost from the total population of

"good" stormwater programs in California. The outer limits are the 90 percent confidence interval for cost of any one "good" California stormwater program.

Mean personal income appears to be the best indicator of total cost per household, but as a model not very useful because the predicted value nearly doubles when considering the confidence limits. Cost per household versus mean personal income is displayed in Figure G-1.

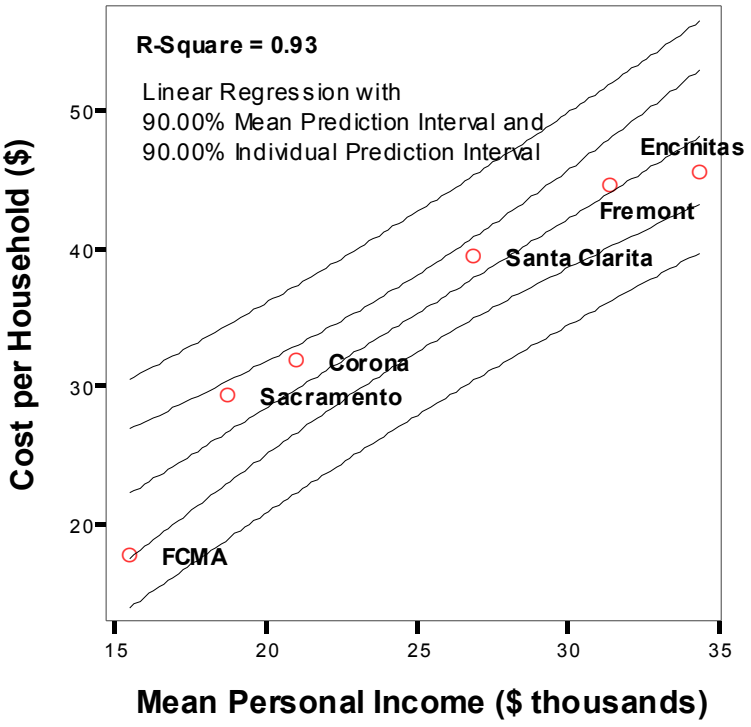

Figure G-1. Cost Per Household versus Mean Personal Income

In the regression of total cost per household verses income per household the theory is that the more money households bring in, the more a city would be able to collect for stormwater activities. However, this may not indicate more is accomplished because of higher cost for areas of higher income may limit how much can be accomplished. Cost per household versus mean household income is displayed in Figure G-2.

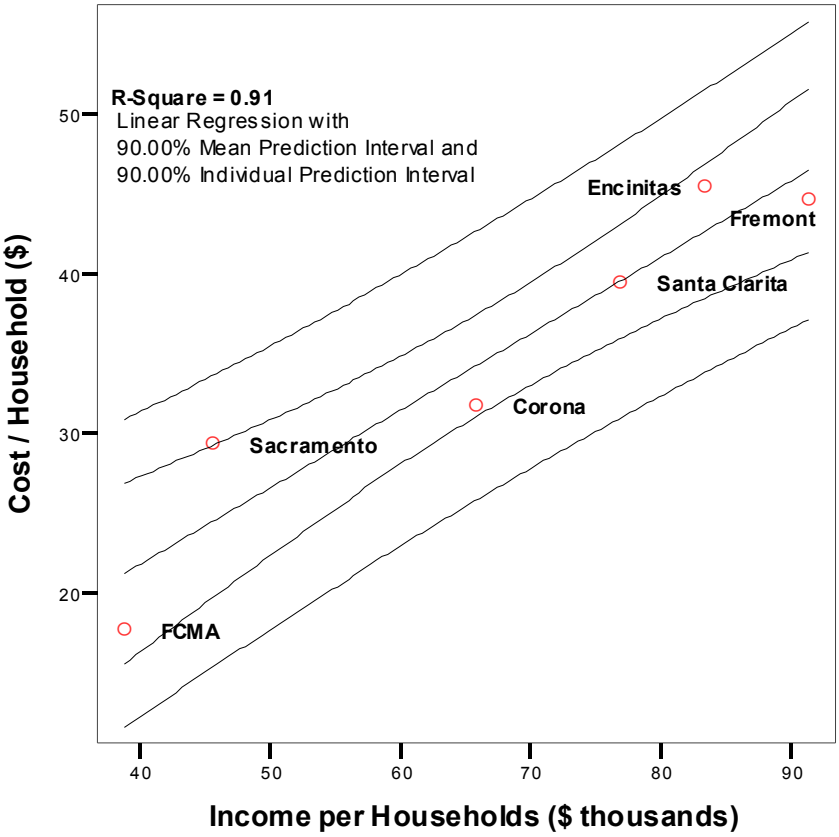

Figure G-2. Cost Per Household verses Income Per Household

As graphically demonstrated in Figure G-3, Fremont and Corona costs are particularly not well behaved in the regression of cost per household verses population. The conclusion is that city size is not a good predictor of stormwater cost per household (this is also discussed in Section 9.1). This is also demonstrated by the regression in Figure G-7.

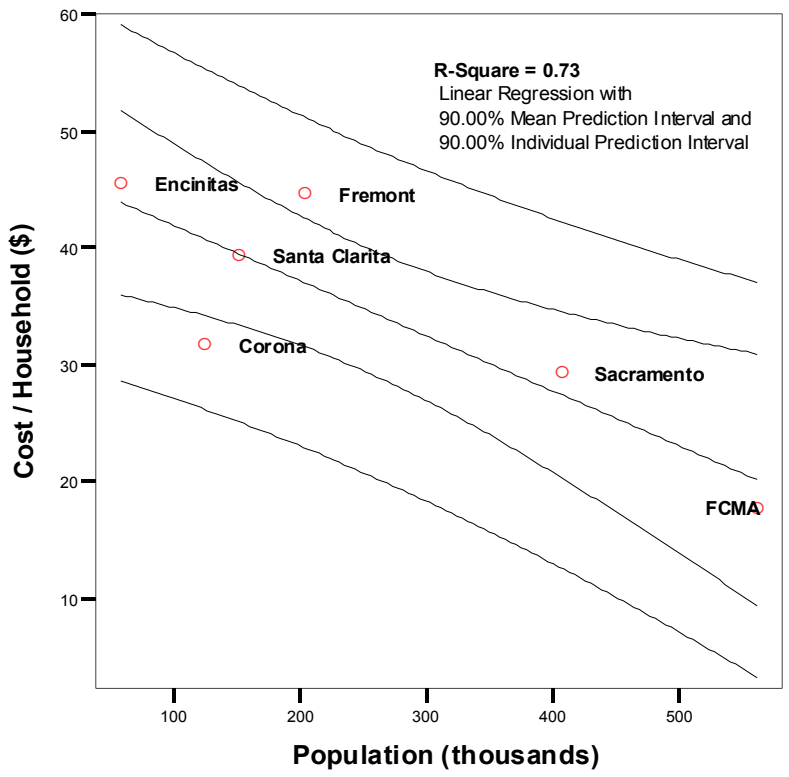

Figure G-3. Cost Per Household verses Population

Figures G-4 through G-7 show regressions using cost factors that are not useful in explaining costs. They are presented because there was some logic that they may be useful, and perhaps with more data they may prove to be helpful in more complicated models. However, they do not seem as important as the factors discussed qualitatively in Section 9.2 of the report. Each factor-years since incorporation, rainfall, income density, and incorporated area were considered for the following reasons:

- Years Since Incorporation was thought to increase cost because older cities would have higher maintenance costs
- Rainfall was thought to increase maintenance costs because of higher pollutant loads and a higher need for inspections
- Income Density was thought to generate a higher tax base for a given area. This would translate into more money available for stormwater.
- Area merely reflects the size of the city much like population. Area was considered because some activities, like street sweeping, may have been more dependent on area than population.

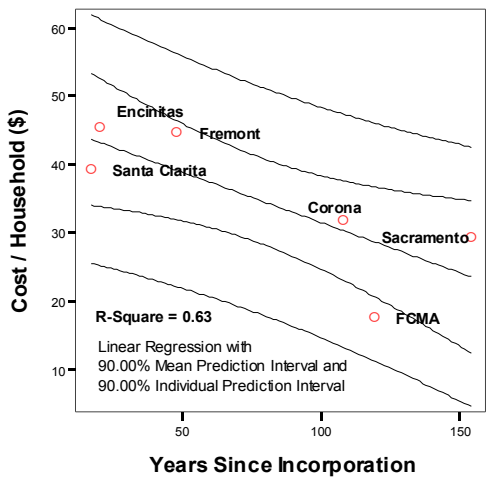

Figure G-4. Cost Per Household versus Years Since Incorporation

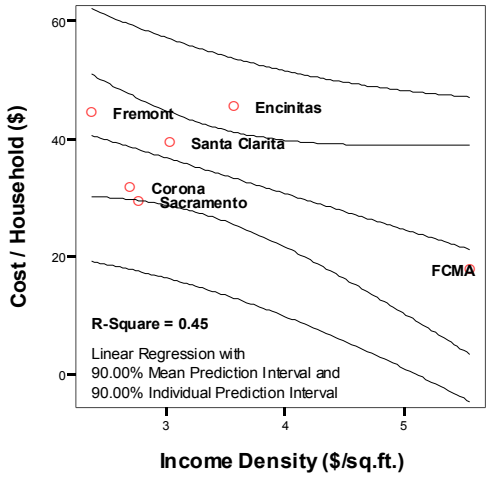

Figure G-5. Cost Per Household versus Annual Rainfall

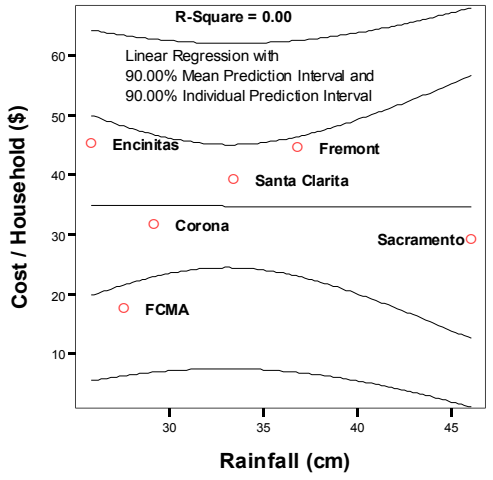

Figure G-6. Cost Per Household versus Income Density

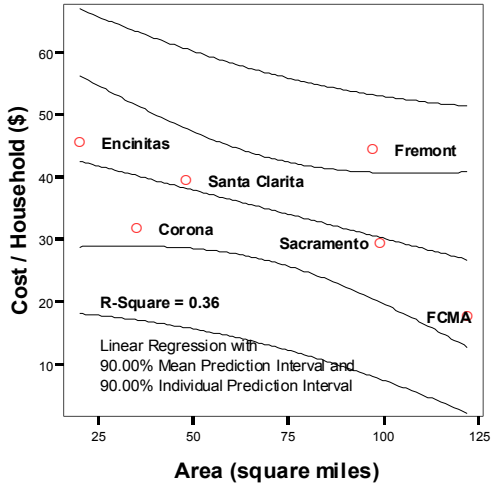

Figure G-7. Cost Per Household versus Area

Figure G-8 demonstrates that even though street sweeping is the highest cost activity, curb miles swept is not a very good predictor of stormwater costs. This is not surprising given the wide variability in street sweeping unit cost.

Another possible cost factor is type of land use but this could not be investigated due to land use data being inconsistent, or in several cases not available.

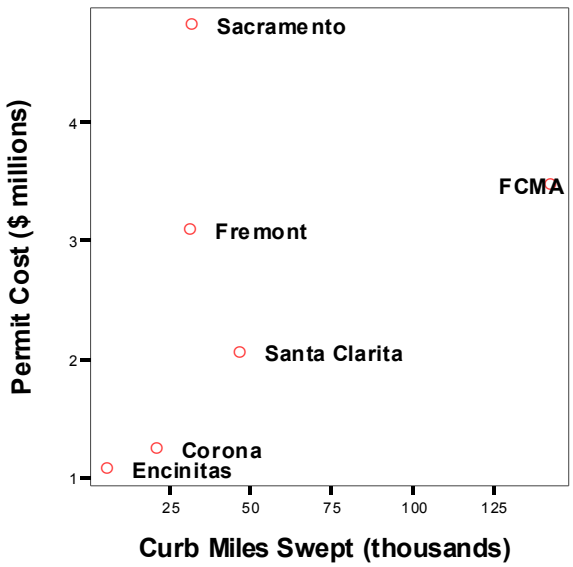

Figure G-8. Permit Cost verses Curb Mile Swept

G.2. FUTURE COST ESTIMATES FOR THE LOS ANGELES AREA

Examples of future costs are restricted to the Los Angeles area where the future compliance cost has been a source of continued controversy. Costs estimates were taken from USC studies, the Los Angeles River Trash TMDL, the Ballona Creek and Estuary Metals TMDL, and the city of Los Angeles. TMDL estimates are for control of all sources of the pollutant, not just stormwater sources. These costs are presented since future permits will reflect TMDL requirements of the TMDL costs will be attributable to stormwater quality management.

To compare these cost estimates with each other, equivalent annual cost was calculated. Equivalent annual cost is calculated by taking the present worth of all capital and annual costs and then multiplying by 3 percent to get an infinite series of annual payments. Observations on these comparisons are discussed in the following sections. Use caution when comparing costs. Each type of cost addresses certain pollutant and source scenarios. TMDLs address sources other than stormwater and also address specific pollutants. Conversely, the USC studies focus solely on stormwater pollution control but address all pollutants causing impairment to water bodies.

Costs from the Description of Alternatives for Control of Stormwater Quality in the Los Angeles County (Devinny et.al., Task B: Appendix H)

Task B is an assessment of regulatory policy to determine the intent to stormwater regulation regarding advanced treatment. Alternatives to advanced treatment that may comply with the intent of the regulations are described and costs are estimated. Task B was accomplished by faculty from the University of Southern California and the University of California Los Angeles and it is included as Appendix H.

The alternatives to advanced treatment focus on runoff reduction. The principle strategy is to reduce runoff by infiltration. The remaining runoff could be treated by conventional post-construction BMPs that are less expensive than advanced treatment. If certain discharges from these conventional BMPs still require advanced treatment, the cost of stormwater would be much less than if advanced treatment exclusively for stormwater pollution control. Based on this approach, costs for several alternatives are estimated for the area under jurisdiction by the LARWQCB. These alternatives do not include cost estimates for cases where advanced treatment is required because this need is assumed to be greatly limited. To compare these cost estimates with cost estimates from other studies, equivalent annual cost was calculated.

If source control[1] BMPs are sufficient to comply with regulations, the present worth cost is estimated at $2.8 billion ($84 million equivalent annual cost). The present worth cost, including low-tech treatment BMPs applied regionally, is between $5.7 billion and $7.4 billion ($171 million to $222 million equivalent annual cost) depending on whether cost per acre or cost per volume, respectively, were used in the estimates. Current level of effort in the Los Angeles area has only made limited progress in implementing the ideas described in Task B (Devinny, 2004). The current annual estimate of this effort is estimated at $18 per household (Radulescu and Swamikannu, 2003).

Table G-5. Equivalent Annual Cost Per Household for Task B Alternatives

Cost Scenario for the Los Angeles Area	Equivalent Annual Cost, $/household
Current Effort	18
Alternative to Advanced Treatment: Pollution Prevention Scenario (Present worth 2.8 billion)[1]	27
Alternative to Advanced Treatment: Wetlands and Infiltration Basins Scenario, calculated using cost per area (Present worth 5.7 billion)[1]	55
Alternatives to Advanced Treatment: Wetlands and Infiltration Basins Scenario, calculated using cost per capture volume (present worth 7.4 billion)[1]	71

1. Little progress has been made in implementing these scenarios (Devinny, pers. comm., 9/14/2004). These costs may be added to the current effort if existing programs continue to be required. Costs based on Devinny et. al. (Appendix H), see Table G-6 for equivalent annual cost calculation.

[1] The term "Non-structural BMP" was used by Devinny et. al. in Appendix H.

Table G-6. Calculation of Equivalent Annual Cost Per Household for Task B Alternatives

	Present Worth, 10^9	Equivalent Annual Cost, 10^6	Los Angeles County Households	Normalized Equivalent Annual Cost, $/Household
Pollution Prevention[1]	2.8	84.00	3,133,774	26.80
Wetlands and Infiltration Basins, based on unit cost per watershed area	5.7	171.00	3,133,774	54.57
Wetlands and Infiltration Basins, based on unit cost per detention volume	7.4	222.00	3,133,774	70.84

1. The pollution prevention scenario may include a small fraction of what cities are currently spending.

City of Los Angeles Bond Initiative and Future Bond Cost Estimates

On July 8, 2004, the Los Angeles Times reported that the council members of the city of Los Angeles agreed to place a $500 million bond on the November ballot to clean up local surface waters in compliance with the federal Clean Water Act. The bond revenue would pay for the first five years of projects to help the city comply with certain Clean Water Act regulations. City officials estimate they will need an additional $435 million and $750 million to fully comply with requirements to reduce pollutants including bacteria. (Garrison, 2004) Using the total compliance costs ($500, $435, and $750 million) results in $40/household[2] in equivalent annual costs.

Los Angeles River Trash TMDL

There are three cost estimates to comply with this TMDL (RWQCB, Los Angeles, 2001). Using catch basin inserts would have annual recurring costs of $66 million ($51/household), small separation units would have annual recurring costs of $183 million ($140/household), and large separation units would have annual recurring costs of $18 million ($14/household). It was not investigated why the cost of larger units is an order of magnitude less than smaller units.

Table G-7 presents the calculation worksheet for converting cost in the TMDL to equivalent annual cost per household.

[2] A discount rate of 3% and 1,275,412 households were used to calculate equivalent annual costs per household.

Table G-7. Cost Calculations for Los Angeles River Trash TMDL[1]

Scenario	2001 dollars		2003 dollars				
	Capital Cost, 10^6	Recurring O&M, 10^6	Capital Cost, 10^6	Recurring O&M, 10^6	Annualized Capital Cost[2], 10^6	Total Annual Cost, 10^6	Cost Per Household[3], $
Catch Basin Inserts Only	120	60	125	62.3	3.7	66.1	51
Small Separation Units	945	148	982	154	29.5	183	140
Large Separation Units	332	7.4	345	7.7	10.3	18.0	14

1. 2001 costs were adjusted for inflation to obtain 2003 cost figures (in millions, except cost per household).
2. A rate of 3 percent was used to calculate these costs.
3. Based on 1,300,000 households in the Los Angeles River watershed.

Ballona Creek and Estuary Metals TMDL

The Ballona Creek watershed covers 128 square miles in Los Angeles County. Open space comprises 17.5 square miles and water comprises 0.75 square miles of the Ballona Creek watershed. Cost estimates are based on the remaining 110 square miles.

Infiltration trenches and sand filters were assumed to cover 40 percent of the urbanized portion. The remaining costs were an estimate of approaches including source control and pollution prevention measures (RWQCB, Los Angeles, 2004). The equivalent annual cost per household in the watershed are estimated to be between $70 and $75.

It is noted in the TMDL that the retrofit cost per area for these devices in the Caltrans BMP Retrofit Pilot Study was nearly 10 times greater for stand alone retrofit projects. It is expected that cost will be reduced if BMPs are installed within larger reconstruction projects (Caltrans, 2004).

Table G-8 provides cost information relating to compliance with this TMDL. Annualized construction costs were calculated by multiplying the construction cost by three percent. Ranges of total annual cost were determined based on the estimates. The low side of the range includes the FHWA annualized construction cost and the USEPA recurring maintenance cost. The high side of the range includes the USEPA annualized construction cost and the recurring maintenance cost. It was assumed that 40 percent of the urbanized portion of the watershed would need to be treated by structural BMPs. Of this 40 percent, infiltration trenches would treat 20 percent of the watershed and sand filters would treat the other 20 percent. The remaining 60 percent would include enhanced pollution prevention activities (e.g. street sweeping).

Table G-8. Cost Calculations for Ballona Creek and Estuary Metals TMDL

Cost Basis	Construction Cost	Recurring Maintenance Cost	Annualized Construction Cost[2]	Total Annual Cost[3]	Cost Per Household
USEPA estimate (1999)	336	36	10.1	46.1	75
FHWA estimate (1994)	245	not reported	7.4	43.4	70

1. Dollars in millions (except cost per household).
2. A rate of 3 percent was used to calculate these costs.
3. Total cost for the FHWA includes their annualized construction cost and the USEPA recurring maintenance cost.

California Willingness to Pay for Statewide Clean Water

According to a survey (Larsen and Lew, 2003), California residents are willing to pay on average $180 per year to remove all impairments from all water bodies in the state (not just urban areas). Potential limitations with this estimate are discussed here.

This assumes cleaning water from all sources of contaminants, not just urban stormwater sources so this may not be directly compared to the cost of stormwater programs. Also, the cost of stormwater programs is only what the cities pay per household. It does not include other cost passed along to the household or individual. These costs are not incurred by the cities but by developers complying with the construction permit and Standard Urban Stormwater Mitigation Plan (SUSMPs) and industries complying with the industrial permit and businesses and individuals complying with the stormwater permit.

The survey also had 40% non-responders. This may overestimate the willingness to pay based on the assumption the people that do not respond to an environmental survey are less likely to care about environmental issues and people that do not care are less willing to pay for water quality improvement. It does not appear that these issues were addressed by the study.

The study did adjust the willingness to pay based on the average education of Californians. The sample population surveyed had a longer education than average Californians and a statistically significant correlation was found between willingness to pay and years of education. However, it is unclear from the report if the correlation was extrapolated to years of education below that of the surveyed population. This would assume that the relationship between education and willingness is the same for lower years of education.

Comparing Task B Alternatives to Advanced Treatment and TMDL Cost Estimates

The 'alternatives' described in Task B are meant to address all pollutants, while the metals or trash TMDLs only address single type pollutants yet the cost estimate is higher. In both cases, advanced treatment is not considered and common BMP costs are used. This comparison indicates the variability in cost estimates for similar stormwater scenarios. Comparing the two TMDL maximum cost estimates also demonstrate the sensitivity of cost estimates to BMP deployment scenarios. Metals are more difficult to remove than litter and thus it is expected the cost would be less, however, the metals TMDL assumed only 40% of the watershed would be retrofitted with treatment BMPs while the trash TMDL assumed 100% deployment of litter removal BMPs. A major cause of variation in these estimates is that the unit cost used in these

estimates vary from study to study. For example, the TMDL estimates use BMP unit cost that are around 10 percent of the unit cost reported by Caltrans, but the Caltrans experience was in a fully developed watershed (Los Angeles and San Diego urban areas) where utility conflicts and space limitations are common. An additional factor is that the Caltrans experience was in a stand-alone retrofit environment which likely caused cost increases over projects integrated into larger projects (Caltrans, 2004). This indicates that costs are extremely site specific and estimating regional cost is very difficult.

Table G-9 compares current costs from the California survey with various estimates to meet certain stormwater management goals. Table G-9 also includes a comparison to the California willingness-to-pay.

Table G-9. Equivalent Annual Cost per Household Comparisons between California Cost Survey Results and various estimates for water quality Los Angeles Area Future Cost Estimates[1]

Range of Current Cost from Six Surveyed California Cities		Range of Alternatives to Advanced Treatment[2]		Maximum TMDL Estimates		City of Los Angeles Bond Estimates	Statewide Clean Water Willingness To Pay Estimate[3]
				Ballona Creek Metals	L.A. River Trash		
18	46	27	71	75	141	40	180

1. Calculations are presented in Tables G-10 through G-12 and are based on the following sources for each column respectively: survey results, Devinny et al (2004), Gordon et al (2002), LARQCB (2004), LARQCB (2001), Garrison (2004), and Larsen (2003).

2. Calculated from Task B in Appendix H. Low range is the cost for attaining full compliance using only source control. High range is the cost for attaining full compliance using only treatment BMPs (low tech) estimated on capture volume.

3. Responses were not received from 40% of the mailed surveys. The survey question was for restoring water quality for all waters throughout the state from all impairment, not just within a city or region and not just for impairment from stormwater pollution (Larsen and Lew, 2003).

Cost of Advanced Treatment (Gordon et.al.)

This study presents a comprehensive analysis of the potential costs required to meet new and emerging stormwater regulations in the Los Angeles area. It assumes that advanced treatment of storm flows will be required to meet current and anticipated federal and state water quality standards. The study presents three scenarios in treatment plant size and distribution among 65 sub-basins. These scenarios are 480 plants per sub-basin, one plant per sub-basin, or one plant per city. Three runoff quantity scenarios (0.5 inch, 1.25 inch, and 2.25 inch storms) were assumed for each treatment plant scenario. The least expensive alternative for the 0.5 inch storm was using 480 plants per sub-basin. This storm depth was chosen because it was closest to the 0.75 inch storm required for treatment in the Los Angeles SUSMP. Table G-10 calculates the equivalent annual cost per household for two treatment plant scenarios for treating the 0.5 inch storm.

Table G-10. Equivalent Annual Cost Calculation for Costs from Gordon et al.

70% Capture of Annual Rainfall (0.5 inch capture volume)	Capital Cost, $\$10^9$	O&M Cost, $\$10^6$	Equivalent Annual Cost (EAC)[1], $\$10^6$	EAC/Household, $
130 small plants	48	91	1,540	491
65 large plants	44	127	1,439	459

1. Cost includes collection system and land cost and maintenance of the collection system (Gordon et al. p. 40-41, 2002).

Comparing Alternatives to Advanced Treatment to Advanced Treatment Estimates

Since some advanced treatment may be required, the future cost will lie between the alternative scenarios estimate and the advanced treatment estimate. Based on the assumption used by the Devinny study, future costs for the Los Angeles area appear to hinge on the ability to reduce stormwater runoff volumes and on the ability to control pollutants through source control.

Significance of Future Compliance Cost Estimates

The range of cost estimates presented for the Los Angeles area should not be used for other areas of California. TMDL compliance, and thus ultimate permit compliance, is only addressed for certain pollutant types in the Los Angeles area. TMDL implementation plans will vary in complexity, pollutant being addressed, other non-stormwater sources, and watershed size. Some watersheds may not have a TMDL. Determining future cost for other California communities is a case-by-case exercise.

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Alternative Approaches to Stormwater Quality Control

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EXECUTIVE SUMMARY

Background

A recent, widely debated study entitled *An Economic Impact Evaluation of Proposed Storm Water Treatment for Los Angeles County* projects extremely high costs for compliance with stormwater quality regulations (Gordon et al., 2002). These estimates followed from the study's fundamental assumption that the only way to comply with water quality regulations is to capture most or all of the flow and subject it to advanced treatment, and to do so at rates equal to peak runoff rates. *In contrast, this report shows that there are far less expensive approaches available that, should they be implemented, will achieve high levels of compliance with current federal water quality standards.*

Alternatives Considered

This report reviews present federal and state regulations and regulatory policy to determine whether advanced ultrafiltration treatment of the entire runoff flow is required to meet water quality standards, or whether compliance can be achieved through the widespread adoption of the various "best management practices" (BMPs) more commonly used for runoff quality control. The work identified and analyzed alternative measures that can be employed to meet present federal and state water quality standards. Particular attention was paid to strategies that concern ground water recharge, pollutant source control, and runoff detention, capture, and BMP treatment.

The report reviews possible approaches for controlling runoff water quality in the Los Angeles Region (the jurisdiction of the Los Angles Regional Water Quality Control Board) and presents a conceptual regional plan, including rough cost estimates. The study pursued a broad approach, providing an evaluation of total costs and benefits for the region, including those for municipalities, businesses, and individuals. The objective of the study was to outline a complete solution to stormwater quality problems, i.e., the plan is intended to meet the requirements of the stormwater permit and Total Maximum Daily Loads and provide acceptable water quality for the area. The alternatives of best management practices (BMPs) for control of individual pollutants (source control), and if necessary, a regional system of wetlands and infiltration facilities to provide final treatment and groundwater replenishment were chosen. These will be much cheaper than advanced treatment plants, and will provide benefits whose value exceeds costs.

Assumptions Made for Determining Costs

Following the review of possible remedial actions for stormwater pollution, a conceptual plan for the Los Angeles Region was developed. It was predicated on the following assumptions:

Because source control is always cheaper than cleaning polluted water, efforts should begin with preventing the release of pollutants to runoff. This includes measures like litter control, improved street cleaning, improved industrial housekeeping and others. Such approaches may constitute sufficient control for runoff coming from residential areas, so that these areas will require no further action.

For new residential development, anecdotal information indicates that landscaping that captures and infiltrates the first-flush storm will be of comparable cost to traditional landscaping, and should therefore be used. For commercial construction, costs may be higher, and adequate regional facilities might be substituted.

Where non-structural BMPs will not be adequate, or where implementation is very expensive, efforts must expand to include regional wetlands and stormwater parks (multiple-use infiltration basins).

Large portions of the Los Angeles Region are already built out to various degrees, constraining available stormwater management solutions. This report assumes that 1000 square miles can be characterized as "low density", and that these regions can be served by a combination of source control, treatment wetlands, and infiltration systems. Another 1000 square miles is "high density" and can be served by source control and infiltration systems. About 50 square miles are "extremely high density" (such as downtown areas) and will require more sophisticated infiltration or treatment devices that occupy smaller areas.

Estimated Costs

Total costs for compliance with runoff water quality regulations were predicted to be between $2.8 billion (if non-structural systems are sufficient for the entire region) to between $5.7 billion and $7.4 billion (if regional treatment or infiltration systems must also be constructed throughout the entire area). It is likely that regional systems will be required for at least some, but not all, of the area, so that the final costs will be somewhere between these extremes.

- Enforcement of littering, pet waste, and chemical use ordinances is expected to cost about $9 million per year.

- Public education will cost about $5 million per year. A program to detect and prevent illicit discharges to the system will cost about $80 million per year at first, but can be reduced to much lower levels as compliance is achieved.

- Increased cleaning of storm drains will be needed if regional solutions are not used, and will cost about $27 million per year.

- Trash discharges to receiving waters can be controlled by installing screening devices on catch basins, enforcing litter laws, and improving street cleaning services. Estimates are that the immediate cost of instituting these measures will be about $600 million over the Los Angeles Region.

- During periods of low flow, runoff water should be diverted to existing wastewater treatment plants. Construction costs for this effort will be about $28 million.

- Trash control and removal of particulates and their associated pollutants can be facilitated by improved street cleaning. It is expected that this will cost $7.5 million per year more than current street cleaning programs, with a present worth of $250 million.

- On-site BMPs required for individual firms might cost about $240 million. Costs associated with compliance with the ¾-inch rule for new construction will be a modest fraction of construction costs.

- With regard to structural BMPs, total costs (regional wetlands and infiltration systems) were first estimated by determining the costs per square mile of drainage area incurred at other sites, and multiplying by the area over which they will be applied. Wetlands for the "low density" areas were estimated to cost $420,000 per square mile of drainage area, for a total cost of $420 million. Infiltration systems for the "high density" areas were estimated to cost $3.7 million per square mile of drainage, for a total cost of $3.7 billion. More sophisticated treatment BMPs (such as sediment traps and oil adsorbers) for the "extremely dense" areas were estimated to cost $33 million per square mile of drainage, for a total of $1.7 billion. Thus total new facilities costs are $5.8 billion.

- A second method for estimating structural BMP costs utilized costs per acre-foot of retention capacity as determined by the Los Angeles County Department of Public Works Sun Valley Project. Presuming that runoff from a ¾-inch storm must be captured in the low-density, high density, and extremely high density areas with runoff coefficients of 0.4, 0.6, and 1.0, costs are $53,000, $98,000, and $470,000 per acre-foot, respectively. The overall facilities cost estimate using this method is $4.0 billion.

Estimated Benefits

There are substantial benefits to the examined approaches that extend beyond the value of stormwater quality control. Reductions in pollutant releases will improve public health and neighborhood livability. Restoration of the hydrologic cycle will replenish groundwater reservoirs, reduce flood risks, and provide greenspace for recreation and wildlife habitat. It was determined that the total value of benefits from the alternatives for runoff quality control described will exceed the costs. Total benefits for the non-structural stormwater quality control programs in the Los Angeles Region are estimated at $5.6 billion. Implementation of the non-structural and regional measures throughout the Los Angeles Region would have benefits worth $18 billion.

- Reduced need for flood control is expected to save about $400 million.

- Property value increases from additional greenspace and bodies of water are expected to amount to $5 billion over the Los Angeles region.

- Additional groundwater supplies created by infiltration will have a current worth of about $7.2 billion.

- "Willingness to pay" surveys in similar circumstances suggest that the public amenity value of avoiding stormwater pollution of local bodies of water is about $2.5 billion.

- Cleaner streets are worth about $950 million.

- Improved beach tourism will bring in about $100 million.

- Preservation of the nature's services in the marine coastal zone, such as nutrient recycling and chemical maintenance of the atmosphere, is worth about $2 billion.

- Reduction of sedimentation in local harbors will save $330 million.

- Improvements in public health associated with reduced exposure to fine particles from streets are likely significant, but could not be quantified.

Recommendations for Immediate Action

Municipalities that have the responsibility for meeting runoff quality regulations should take some immediate steps.

- Outreach programs, explaining to citizens the need for runoff quality control and discouraging illegal discharges such as littering, should begin.

- Data should be collected on the stormwater discharges from subwatersheds to determine what BMPs are workable, and general plans should be updated to include policies that promote stormwater control.

- An administrative structure should be established which includes the relevant stakeholders and funding agencies for each watershed (such as watershed councils).

- Funding plans should be developed.

- Building codes that work against runoff quality control should be changed immediately—in particular, all parking lots built from now on should also be stormwater infiltration systems.

- All new street cleaning equipment should be high-quality vacuuming systems. Appropriate agencies should be encouraged to use the latest microbiological

techniques to investigate sources of pathogenic organisms in runoff, so that mitigation efforts can be optimally designed.

INTRODUCTION

This report identifies and analyzes alternatives for control of stormwater runoff in Los Angeles County. A recent, widely debated study entitled, *An Economic Impact Evaluation of Proposed Storm Water Treatment for Los Angeles County* projects extremely high costs for compliance with stormwater quality regulations (Gordon et al., 2002). These estimates followed from the study's fundamental assumption that the only way to comply with water quality regulations is to capture most or all of the flow and subject it to advanced treatment, and to do so at rates equal to peak runoff rates. As this report shows, however, there are far less expensive approaches that, if implemented, can achieve high levels of compliance with current federal water quality standards.

A broad approach was taken: an evaluation was made of total costs and benefits for the region, including those for municipalities, businesses, and individuals. A complete solution to stormwater quality problems was considered—that is, the plan is intended to meet the requirements of the stormwater permit and Total Maximum Daily Load and provide acceptable water quality for the area. The recommendations for steps to be taken are not limited to the Los Angeles Regional Water Quality Control Board (LA Regional Water Board). Action by other governmental agencies will also be required. The study begins with a brief description of runoff sources and contaminants. A review of present federal and state regulations and regulatory policy to was done to determine whether advanced ultrafiltration treatment of the entire runoff flow will be required, or whether compliance can be achieved through the widespread adoption of the various "best management practices" (BMPs) more commonly used for runoff quality control. The study then identifies and analyzes alternative measures that can be employed to meet present federal and state water quality standards. Particular attention is paid to strategies that facilitate ground water recharge, source control measures, storm water detention and capture, and BMP treatment. While prevailing uncertainties make an overall cost estimate only approximate at this time, costs of specific approaches are illustrated with examples. Financial benefits, such as those regarding groundwater replenishment, more appealing beach environments, improved public health, and the creation of additional urban green space, are also addressed in the report. Clearly, water is a scarce resource in this region of the country, and economic evaluations of different management techniques for stormwater runoff must also consider the benefits of improved water quality and water supply as well as flood control. Prior to reviewing federal and state water quality regulation and policy, this study provides an overview of more general policy and regulation theory.

Runoff

The bulk of urban runoff is generated during rainfall events, and can properly be termed stormwater. This flow is extremely irregular, especially in Southern California, where most days are dry, and measurable rain occurs on average of only 32 days per year. Total rainfall in the area is modest, averaging about 16 inches per year. A large storm in this area might drop as much as three inches of rainfall in 24 hours, but this is

still much less intense than typical rainfall events in other states, such as those on the East Coast.

Even so, high flows and flooding do occur in Southern California because of the topography. Water from large watersheds drains into local rivers, and slopes are steep, so that rainfall is rapidly collected and concentrated.

Water also enters the storm drains from non-rainfall sources. Sprinklers left on overnight, car washing, and hoses used to clean sidewalks and driveways generate smaller streams sometimes called nuisance flows. These flow in the storm drain system all year, and with residual stream flows (and in a some areas, recycled wastewater), constitute dry-weather flow. The terms "stormwater" and "runoff" are often used interchangeably. However, it is important in some cases to recognize the difference—stormwater arrives suddenly in huge amounts, while nuisance flows are much smaller and run all year.

Urbanization of the landscape substantially changes the amount and composition of runoff. Because less water infiltrates (percolates) into soils, the total amount of runoff is increased. Because the water runs off pavement more rapidly, it is concentrated to make peak flows higher. Recharge of groundwater is reduced, and the shallow groundwater that feeds some streams dries up, so surface flows decrease in some areas. Surface flows may increase during dry weather in other areas because of nuisance flows from over-irrigation and car washing. In general, the storage and buffering effects of soils and groundwater reservoirs are reduced. Runoff flowing through vegetation, or entering and leaving shallow groundwater, is subject to the effects of filtration and biodegradation, which has a considerable purifying effect. Water runoff from pavement is not cleaned, and indeed is contaminated by whatever dirt and pollutants are on the pavement.

Pollutants

The cities of Southern California use "separate" systems, meaning stormwater is collected apart from the wastewater generated by toilets and showers. The wastewater enters a closed network of pipes and is carried to treatment plants. Stormwater may initially flow in underground conduits, but eventually passes to open flood control channels, rivers, and the ocean. This storm water drainage system is called a Municipal Separate Storm Sewer System (MS4). Runoff pollutants are different in nature from those in sewage. Pathogens are present, but in far smaller concentrations, as are nutrients such as phosphorus and nitrogen. There may be more petroleum hydrocarbons, dust, sediments, and settled air pollutants in runoff, but total organic content in runoff is usually much lower than in wastewater.

The pollutant load of stormwater varies greatly with location. The water contains pollutants that wash off rooftops, parking lots, industrial facilities, and the streets. Pollutants may also be discharged illegally, when individuals pour motor oil into the storm drains or industries release toxic pollutants.

Water flowing in the streets picks up trash, dust, dirt and other materials that have been deposited on the pavement. The dust includes fine particles of rubber from tire wear, settled air pollutants, trace metals from brake pads and other mechanical sources, and pet feces. Cars drip motor oil onto the pavement and the early flows of fall may carry a petroleum sheen.

Stormwater quality protection measures may be placed in three general categories. Infiltration allows percolation of the water into the ground, relying on the soil to remove pollutants from the replenishing groundwater and eliminating the discharge to runoff. Source control measures prevent the release of pollutants, so that the water is never contaminated. Treatment systems remove the pollutants from the stormwater before it reaches the ocean.

Runoff Sources and Quality

Stormwater and runoff come from a great variety of sources and carry a varied suite of pollutants. There are many approaches to the task of protecting receiving waters, and the best choice depends on stormwater source and quality. Runoff from a residential area of single-family homes, for example, is unlikely to carry industrial pollutants, but may have small amounts of oil and grease from roads, microbiological contamination from pet feces., and dissolved nutrients from fertilizers. These are readily removed by filtration in soil, so groundwater recharge, with its additional benefit of replenishing aquifers, is a good choice. Runoff from construction sites is less likely to carry harmful microorganisms, but may have heavy loads of sediment. The best choice here is to use dikes, detention ponds, and other measures to allow the sediment to settle out of the water before it is percolated to groundwater or released to storm drains. The dispersed and difficult-to-control pollutants of urban commercial areas may best be dealt with by providing regional solutions, such as parkland designed to serve simultaneously as a flood control basin, a groundwater recharge site, and a sedimentation basin for large amounts of water.

Streets

Streets, particularly those in dense commercial areas, are the most difficult source of urban runoff to manage. They receive litter, dust and dirt, air pollutant particulates, pet feces, occasional human waste, trace metals and oil from cars, various illegal discharges, and other pollutants. Because they are the first part of the stormwater collection and transport system, they receive and pass on pollutants that are carried away from parking lots, commercial establishments, and industries.

Exposed Commercial Activity

Manufacturing and other commercial activities, even those dealing with hazardous materials, have no effect on stormwater quality if the work is carried out under cover. However, for some large-scale activities, such as oil refining, this is not practical. Rain falling on machinery, materials, or contaminated surfaces can pick up pollutants. Measures can be taken to cover individual activities, or treatment systems can be installed to clean the water before release.

Construction Sites

Frequently, the first step taken in construction of new facilities is to clear the land of vegetation and pavement. The exposed soil is highly vulnerable to erosion by rainfall, and the movement of trucks and machinery can “track” soil to the adjacent streets.

Residences

Single-family homes are a source of some pollutants. Roof runoff will contain dust, bird feces and settled air pollutants. Runoff from gardens may contain pesticides

and fertilizers. Occasionally, homeowners will (illegally) dispose motor oil or paint waste into storm drains. For the most part, however, runoff from neighborhoods of single-family homes is relatively less polluted (if household toxics such as pesticides are properly used). Multiple-family residences produce many of the same pollutants, but typically have a higher ratio of rooftop and impervious surface to permeable landscaping, so that more water runs off.

Commercial Rooftops

Roof runoff from commercial facilities may be slightly polluted with air pollutant dusts, bird droppings, hydrocarbons from roof tar, and occasionally, some trace metals from rooftop machinery. The contaminants present may be very similar to those found on residential roofs, but handling the runoff may be more difficult because commercial areas have a high ratio of roof area to land area, and often have little landscaping.

Parking Lots and Landscaping

A significant fraction of urban land is devoted to parking lots. Parking lots are commonly polluted by litter, heavy metals from auto-parts and road wear, and by oil leaking from cars. Spilled food is present near establishments that sell food, and pet feces, bird droppings, and settled air pollutants will also be present, and all of these can be washed away in the runoff. Virtually all parking lots are designed for rapid drainage to the street or storm drain. Indeed, where grass or other plantings are present, these are commonly surrounded by curbs that prevent flow of the water from the lot into the soil. Many designs, in fact, promote runoff from the vegetation to the pavement.

ASSESSMENT OF REGULATORY POLICY

Overview of Policy and Regulation Theory

This report, in identifying and assessing BMPs, takes a strategic regulatory planning approach to managing stormwater runoff in Los Angeles County. Strategic regulatory planning involves a close examination of the legislative goals concerning the given policy. The ultimate end of strategic regulatory planning is to control behavior through methods that agree with legislative goals and societal values regarding the issues at hand. Thus, a strategic approach demands careful consideration first of whether enforcement is appropriate; and second, if enforcement is appropriate, to what degree should the parties involved be pressured to comply; and third, how coercive should the regulatory devices be? Compliance with existing laws and regulations, in this case the provisions of the federal Clean Water Act and state law, is a major goal of the strategic regulatory planning process.

How compliance is defined can vary markedly depending upon the actors involved and the policymaking context. In this sense "compliance" means the degree to which members of a target group conform to the directives of an agency, court, legislative body, or some other governmental agency. One way to determine whether members of a target group are in compliance with an environmental law is to monitor levels of pollution on a regular basis. We assume that the greater the number of individuals and firms that are in compliance with rules, the more likely pollution will decrease in a given locality.

When legislators pass laws, they generally expect them to be vigorously enforced and fully obeyed. Only idealists, however, actually believe that this is possible or even necessary in all cases. Political and economic factors usually force policymakers to take a more realistic approach to enforcement by setting a desired and attainable level of compliance prior to program implementation. At this stage, policymakers must consider whether 100 percent compliance is necessary. If not, they must determine what degree of compliance is needed in order to meet environmental quality goals. While the desired degree of compliance is often only a rough estimate, several factors must be kept in mind. Policymakers must take into account, for example, the extent to which members of a target group are making a “reasonable” effort to change their behavior and follow the law.

If it is either unrealistic or undesirable to aim for total compliance on the part of the target population, a clear decision rule must be formulated concerning enforcement priorities. In a policy area where polluters vary a great deal in size and how much they pollute, for example, it is commonly most prudent to concentrate enforcement efforts on the largest polluters. If firms are roughly the same size and pollute about the same amount, however, alternative guidelines for identification and discrimination must be set. For example, will businesses be selected randomly for monitoring and inspection? Is systematic enforcement, perhaps based on location, possible? Or, is self-regulation the preferable approach? The decision rule should relate to the strategic goals, resources, and motivations of all those involved. Further considerations include the legal authority

for enforcement, the resources of the enforcement agency, and the fragmentation of the enforcement agency (or agencies).

In the ex post review/revision stage, policymakers determine the effectiveness of the regulatory program after it has been implemented. Feedback and evaluation are used to assess program performance. Legislative goals are used as a guide in determining whether regulatory approaches are succeeding or failing.

If policymakers determine that the program goals are still desirable, they will continue the same course of action. If they determine that the goals are being met, they will either maintain present enforcement levels or perhaps decrease enforcement efforts. The latter decision should only be made if policymakers believe they can save time and money and feel reasonably certain that compliance rates will not suffer. Appropriate and immediate action is required, of course, if the objectives are no longer desirable or if the objectives are not being achieved. In nearly every case, the aim of policy revision will be improvement in compliance and environmental quality. According to Ingram, the implementation phase of a statutory program "should contribute toward policy improvement or the evolution toward more tractable problems for which there are more doable and agreeable responses." (1990:476) Realization of the statutory goal, therefore, is not the only way to gauge the success of program implementation.

The conceptual perspective for the selection of BMPs analyzed in this report relies on Lowi's (1964) policy classification scheme, with further elaboration by Salisbury (1968). Lowi classifies policies as distributive (non zero-sum policies in which nearly everyone benefits), redistributive (policies that approach zero-sum, in which some benefit and some lose), and regulatory (policies that also tend toward zero-sum, and in which government prescribes rules of behavior for particular groups). Salisbury added a critical dimension to Lowi's typology by identifying self-regulation policies as a fourth policy type. Self-regulation policies are frequently offered as a noncoercive alternative by sectors of society targeted for external regulation, and they are invariably non zero-sum. These policies also impose constraints upon a group, but are perceived only to increase, not decrease, the beneficial options to a particular segment of the population.

Under this classification scheme, policies are *either* self-regulatory *or* regulatory. Thus, the Lowi and Salisbury typologies suggest that regulatory policies are either noncoercive (through self-regulation) or coercive (through direct command-and-control regulation). In the real world, however, regulatory devices tend to fall at different points along a continuum of coerciveness. In other words, devices intended to control behavior tend to vary according to their restrictiveness. Non-coercive approaches (through self-regulation) occupy one end of the continuum while coercive approaches (through direct command-and-control regulation) occupy the other end.

Conceptualizing regulation in these terms provides water quality policymakers a flexible framework in which to assess alternative regulatory mechanisms. Water quality policymakers have a menu of regulatory approaches from which to choose, and careful thought must be given as to which regulatory devices are best suited to control stormwater runoff without being unnecessarily harsh. If members of the target population (e.g., citizens, small businesses, municipalities, etc.) unanimously believe that stormwater regulations and deadlines are too restrictive and unfair, they will likely ignore what they are being told to do. At the same time, if regulatory devices are too weak and not sufficiently coercive to lead to improvement in water quality, then efforts to control

stormwater runoff will fail. Water quality policymakers, therefore, must be familiar with the target population and possess considerable information before they select the most appropriate regulatory mechanisms that embody the level of coercion necessary to achieve an optimum degree of compliance.

Cost is a second dimension that characterizes regulatory mechanisms. Cost here refers to the amount of money government must spend to administer a particular regulatory approach (cost to the regulated community will be considered later). In general, the most coercive activities (e.g., imprisoning polluters) require the greatest government involvement and therefore are more expensive to administer than the least coercive activities (e.g., economic incentives). Limited government revenues obviously make this an important variable. This is especially the case in current government efforts to control stormwater pollution.

The total cost and coerciveness of the selected regulatory program represent the overall government effort necessary to attain compliance and control water pollution. Compliance can be achieved in varying degrees and is best conceptualized along a continuum ranging from avoidance to adherence. Under optimal conditions (e.g., a harmonious political environment), policymakers will be able to use the least coercive enforcement techniques (e.g., reporting by firms and municipalities and formal compliance tracking) at the least cost to achieve full compliance. The expectation is that least coercive mechanisms are always preferable to more coercive mechanisms if only because the former devices are more cost-effective. In contrast, extremely restrictive enforcement arrangements (e.g., court injunctions) will necessitate direct government involvement and thus require substantial cost. Under ideal conditions, therefore, policymakers will select regulatory devices that are the least coercive and least costly and that lead to compliant behavior.

Unfortunately for policymakers, optimal conditions are rare. Many times the conditions that do exist (e.g., a lack of agency funds or a small staff) tend to diminish the effectiveness of the least coercive approaches, often to the point where the outcomes are in danger of moving toward avoidance behavior. In order to prevent outcomes from moving in this direction, policymakers must select techniques, either singularly or in combination, that are affordable and sufficiently coercive to produce compliant behavior.

Naturally, policymaking is a dynamic process and circumstances tend to change over time. Decision makers are continuously gauging the potential impact of given conditions on regulatory mechanisms and making adjustments as they see fit. Eventually, they may be forced to adopt expensive and restrictive approaches that will result in compliant behavior in an attempt to prevent outcomes from moving toward avoidance behavior. When accurate information is available and incorporated into deliberations, policymakers usually will achieve the greatest level of compliance possible with the least effort and expense regardless of the conditions that exist at the time. This underscores the importance of obtaining the most accurate data available as changes occur over time.

In a pluralist, multi-level system like the United States, some communities may favor avoidance behavior in the face of unpopular regulations. While such situations may arise from time to time, in most cases policymakers will want their regulatory devices to achieve the highest level of compliance possible under given conditions.

Stormwater Regulation and Regulatory Intent

The federal Clean Water Act utilizes two approaches to managing water quality: technology-based requirements and national water quality standards. Section 303(d) of the Act integrates these two approaches by stipulating that states make a list of water bodies that are not attaining standards after the technology-based rules are implemented. For water bodies on this list, as well as where the U.S. Environmental Protection Agency (EPA) Administrator believes appropriate, the states are to formulate TMDLs which must account for all sources of the contaminants that forced the listing of the water bodies. Under federal law, TMDLs must account for contributions from point sources (federally permitted discharges) and pollution from nonpoint sources. The U.S. EPA must review and approve the list of contaminated waters and every TMDL. In the event that the U.S. EPA does not approve the list of impaired water bodies or a TMDL, the Agency must establish them for the state. (www.swrcb.ca.gov/tmdl/background.html, July 15, 2003)

The Clean Water Act does not specifically require the adoption of TMDLs. Instead, Section 303(d), Section 303(e), and their provisions stipulate TMDLs be included in water quality plans. The U.S. EPA has adopted rules (40 CFR 122) requiring that the National Pollutant Discharge Elimination System (NPDES) permits be modified to be consistent with all approved TMDLs. An NPDES permit outlines specific limits of pollution for a particular discharger. Nearly all the states, including California, are permitted to administer the NPDES permit program. (U.S. EPA administers the permit system in the remaining states.) Implementation plans are to be formulated along with the TMDLs.

California Law

California effectuates the provisions under the Clean Water Act principally through institutions and procedures set out in certain provisions of the California Water Code, including those of the California Porter-Cologne Water Quality Control Act. These provisions established the State Water Resources Control Board (SWRCB) within the California Environmental Protection Agency to develop and implement state policy for water quality control.

The Porter-Cologne Act also established nine California Regional Water Quality Control Boards that operate under the authority of the SWRCB. Each Regional Board is comprised of nine members and an executive officer appointed by the members of each board. The Regional Boards develop and adopt water quality control plans for all areas within their region. The SWRCB formulates, adopts, and revises general procedures for the development, adoption, and execution of water quality plans by the Regional Boards. It reviews these plans and either approves them or returns them for revision and resubmission. Water quality plans do not become effective until the SWRCB endorses the plans, followed by approval by the California Office of Administrative Law.

The Evolution of Water Pollution Control

During the 1970s, policymakers considered point source pollution to be the biggest threat to the water quality of the nation's inland lakes, rivers, and streams. (www.swrcb.ca.gov/tmdl/background.html, July 15, 2003) The Clean Water Act established a number of programs to address point sources of pollution, and most federal money went to formulate and implement point source controls. California pursued the same approach in its effort to improve the state's water quality. In addition, the State and

Regional Boards implement smaller scale corrective actions for nonpoint source pollution as permitted under the Porter-Cologne Act.

A major goal of the Clean Water Act was to expand treatment of wastewaters. According to Rosenbaum (2002), all treatment plants in operation before July 1, 1977 were required to have "secondary treatment" levels. All treatment facilities, regardless of age, were required to have "the best practicable treatment technology" by July 1, 1983. The Act also appropriated 18 billion dollars between 1973 and 1975 to assist local communities in building necessary wastewater treatment facilities. The federal government paid for 75 percent of the capital cost for building the new facilities. Programs focusing on treatment facilities resulted in significant improvements in water quality by the late 1980s.

Concerns over the nation's water quality arose again due to the growing impacts of nonpoint source pollution, and environmental groups looked to the TMDL requirements to ameliorate continuing water quality problems. A series of lawsuits ensued to force regulators to adopt an aggressive approach to TMDL development. Thus far, over 40 lawsuits have been filed throughout the nation, most of them by environmental groups. (www.swrcb.ca.gov/tmdl/background.html, July 15, 2003) The lawsuits are commonly filed against the U.S. EPA due to its responsibility to approve TMDLs. Several of them have led to negotiated settlements and consent decrees that are overseen by the courts. At present, California is operating under three consent decrees covering most of the North Coast Region, the entire Los Angeles Region, and Newport Bay and its tributaries in the Santa Ana Region.

TMDLs in California are established either by the Regional Boards or by the U.S. EPA. Those established by the Regional Boards are designed as Basin Plan amendments and include implementation rules. Those formulated by the U.S. EPA normally contain the total waste load allocations as required by Section 303(d), but do not include extensive implementation rules, primarily because U.S. EPA implementation of nonpoint source pollution control strategies are generally confined to education and outreach in accordance with CWA Section 319. (www.swrcb.ca.gov/tmdl/background.html, July 15, 2003) Presently, TMDLs are required for all waters and pollutants on the 303(d) list and must consider and include allocations to both point sources and nonpoint sources of contaminants. The limitations in a TMDL may be other than "daily load" limits. There also can be multiple TMDLs on a specific body of water, or there can be one TMDL that focuses on many contaminants. Current examples of TMDLs in the Los Angeles Region include the trash TMDLs for the Ballona Creek and Wetland, Los Angeles River Watershed, and East Fork San Gabriel River, and the wet-weather bacteria TMDL for the Santa Monica Bay Beaches. At this time the Section 303(d) list contains over 1,400 water body/pollutant combinations. Based on this list, the State Board estimates that about 800 TMDLs are needed. The Regional Boards are now developing over 120 TMDLs, with several addressing multiple pollutants. (www.swrcb.ca.gov/tmdl/background.html, July 15, 2003)

Concerns over implementation have become a significant issue in the formulation of TMDLs. (www.swrcb.ca.gov/tmdl/background.html, July 15, 2003) Although these concerns generally fall outside the provisions of Section 303(d), they are nevertheless important to achieving water quality improvements as a result of the establishment of TMDLs. While it is possible to conduct technical assessments of total load without

considering implementation issues, one must address the possible mechanisms by which pollution can be reduced in determining allocations to various sources. Considering different implementation options can help analysts avoid adopting allocation schemes that are far more costly than necessary or, even worse, unachievable. The TMDL strategy in California seeks to engage the public and cultivate an understanding of watershed issues. It relies on an adaptive process that matches management capabilities with scientific knowledge and information.

The Stormwater Permit

The Los Angeles Regional Water Quality Control Board (LA Regional Water Board) has adopted a NPDES permit containing waste discharge requirements for MS4 discharges within the County of Los Angeles (with the City of Long Beach excluded because it is covered under a separate MS4 permit). The main intent of the Permit is to reduce significantly the amount of various pollutants contained in stormwater runoff. The County of Los Angeles has identified seven critical industrial and commercial sources of contamination: 1. wholesale trade (scrap recycling, automobile dismantling), 2. automotive repair/parking, 3. fabricated metal products, 4. motor freight, 5. chemical and allied products, 6. automotive dealers/gasoline stations, and 7. primary metal products. The priority industrial sectors and automobile repair facilities/ gas stations (two of the commercial sectors) on the list contribute substantial concentrations of heavy metals to stormwater. Overall, the Permit is intended to establish and implement a timely, comprehensive, cost-effective stormwater pollution control program to reduce the discharge of pollutants in stormwater to the Maximum Extent Practicable (MEP) from the permitted regions in the County of Los Angeles to the waters of the U.S. subject to the jurisdiction of the Permittees and also meet water quality standards. BMPs must be identified and implemented to reduce the discharge of pollutants in stormwater to the MEP and also meet water quality standards.

The Permit has established an iterative process that allows municipalities in Los Angeles County to measure noncompliance, test alternative BMPs, and consult County and regional water quality authorities. Thus, the Permit provides a mechanism to make adjustments to the required BMPs as necessary to ensure their adequate performance. According to the U.S. EPA, "Water quality-based effluent limits for NPDES-regulated stormwater discharges that implement wasteload allocations in TMDLs *may* be expressed in the form of BMPs under specified circumstances….If BMPs alone adequately implement wasteload allocations, then additional controls are not necessary." (U.S. EPA, Memorandum, November 22, 2002, p.2)

Regulatory Mechanisms

Pollution control regulations can range from programs that prescribe very specifically what the regulated community is to do, to programs that only set goals and leave the community to find the best methods to reach the goals. Programs of the first kind are often criticized by the regulated community for lack of flexibility—the standard complaint is "This approach does not work well for our particular case. We could do this in another way and accomplish the goals for a lower price". Programs of the second kind provide flexibility, but are often criticized for vagueness: "We don't know how to do this. We are not sure what we have to do to come into compliance".

The stormwater management program is clearly of the second type, and it should be so. Stormwater quality control is an extremely complex issue, influencing, if not everything under the sun, then everything under the rain. The best means of compliance will certainly differ from city to city, depending on land uses, land prices, and a host of physical characteristics of the landscape. It is likely that, as the nation engages the problem, new approaches will be developed. Entrepreneurs will develop new devices and methods as others are tried and discarded. Strict specification of methods at this time might well eliminate approaches that are more economical and effective, so a flexible approach is best.

However, an inevitable side effect of maintaining flexibility is that the regulated community faces an unsettling level of uncertainty. Mayors and city councils faced with planning future infrastructure and future budgets are understandably uncomfortable facing mandatory water quality goals without specified means of reaching those goals. This level of uncertainty will decline as plans are developed and experience with water quality control measures accumulates.

There is a historical precedent for this approach in the program for control of air pollution in Southern California. Like stormwater pollution, it is generated by a very large number of sources with varying compositions and emissions rates. Many of the sources are difficult to monitor and regulate. Implementation of pollution controls has been accompanied by intense political controversy. Even so, air pollution control efforts have been relatively successful—pollution levels and their associated health effects have declined. While costs have been high and some high-polluting marginally profitable businesses have closed or left the area, it is also clearly true that the economy of the area has not collapsed, as some predicted. Few people would suggest that we should return to days when taking a deep breath was literally painful.

Policy Implementation

Our research indicates that the LA Regional Water Board is strongly committed to abating pollution from stormwater runoff as effectively and inexpensively as possible. The U.S. EPA supports the LA Regional Water Board's efforts to require individual municipalities in Los Angeles County to adopt necessary BMPs to control stormwater runoff. Federal and state policymakers along with environmental group leaders believe that BMPs, if widely and strategically implemented, can significantly reduce stormwater pollution and improve water quality throughout Los Angeles County. Given the proven effectiveness of BMPs in different areas of the country (and the world), the LA Regional Water Board does not envision the need to build new advanced treatment plants throughout the region, and indeed has expressed the specific intent that such plants should not be required. Advanced treatment is viewed as an absolute last resort given the huge expense it would entail and the confidence policymakers and environmental leaders have in the ability of BMPs to reduce pollution significantly and allow the region to meet federal clean water standards. The authors of this report concur with this position. Some municipal leaders in Los Angeles County have asked why they should be forced to adopt BMPs when there is a possibility that advanced wastewater treatment plants will ultimately be required. Even if advanced treatment plants are necessary in the future, which is highly unlikely, the adoption of BMPs will dramatically reduce the amount of water and the mass of pollutants these plants will treat. This will reduce pollution

treatment costs and improve the effectiveness and ability of plants to handle large volumes of water during heavy rain periods. That is, BMPs will be used as part of any program to build advanced treatment plants because the much cheaper BMPs will reduce the costs of the very expensive advanced treatment plants. Implementing BMPs now will be a good investment even in the unlikely event that an advanced treatment plant is required.

The LA Regional Water Board has focused some efforts on reducing trash in stormwater runoff, and it has adopted a "zero trash" rule to achieve this goal. The Board does not expect all communities to eliminate every single piece of trash from inclusion in stormwater runoff. Instead, the Board policy is that communities in Los Angeles County make reasonable efforts to prevent trash from entering storm drains. "Trash" is defined as materials larger than ½ cm, so municipalities can comply with this regulation by installing ½-cm screening devices on their catch basins, by enforcing litter laws already on the books and by conducting street sweeping in areas where trash tends to accumulate. Public education about littering and the installation and maintenance of catch basin devices can provide substantial progress in preventing garbage from entering storm drains.

In order to avoid a costly court battle with state water pollution policymakers, the County and City of Los Angeles have recently agreed to spend $168 million to reduce by half the amount of trash that collects in the 51-mile-long Los Angeles River (McGreevy and Weiss, 2003). In addition, the City of Los Angeles agreed to drop its lawsuit against state policymakers over the overall plan to abate polluted stormwater runoff. The agreement settles a lawsuit filed by the city and county that opposed the LA Regional Water Board's requirement to reduce trash entering the river 10 percent annually over the next 10 years. The LA Regional Water Board officials negotiated the deal, which requires the city and county to reduce rubbish going into the river and Ballona Creek 50 percent by September 2008, at which point state regulators will consider whether further rules are necessary. The agreement also provides local officials more flexibility in trying less-costly approaches of reducing trash. Environmental groups such as Heal the Bay, Santa Monica BayKeeper, and Friends of the L.A. River applauded the agreement. Rather than spend money on litigation, county and city officials will allocate funds to improve water quality.

Clearly, all communities in Los Angeles County will have to share the financial burden in helping to reduce contamination from stormwater runoff. This may require many communities to modify their budget priorities.

As long as communities make a reasonable, good faith effort to address stormwater pollution issues, it is unlikely that federal and state officials will take legal action. Thus far, this has been the case. Failure to make such an effort, however, will certainly result in legal action against violators. Moreover, environmental groups can choose to file lawsuits against federal and state officials if they do not continue to pursue polluters. Such action will lead to costly delays in meeting federal water quality standards and will likely lead to even more draconian measures given present federal and state law and previous judicial decisions.

Previous Actions by the LA Regional Water Board

The impacts on water quality and the heightened risks to public health from MS4 discharges that affect receiving waters across the U.S. and in Los Angeles County and its coastline have been well studied and documented. Accordingly, the LA Regional Water Board has taken a number of significant actions to control such discharges (LARWQCB, 2001)

In 1990, the LA Regional Water Board adopted Order No. 90-079, the Los Angeles County MS4 Permit. That permit required the Los Angeles County Flood Control District, the County of Los Angeles, and the incorporated municipalities in Los Angeles County to implement stormwater pollution controls including updating ordinances, optimizing existing pollutant controls such as street sweeping, construction site controls, and others. The Regional Board required all Permittees to adopt at least 13 specific BMPs for consistency across the County. The 1990 permit was executed on a system wide basis due to the highly interconnected storm drain system serving a population substantially larger than 100,000 residents. At this point, the region was committed to MEP standards—cleaning up stormwater to the maximum extent practicable.

On July 15, 1996 the LA Regional Water Board issued Order No. 96-054 that updated the 1990 permit. The 1996 Los Angeles County MS4 permit required model programs be formulated and implemented by the Permittees for Public Information and Public Participation, Industrial/Commercial Activities, Development Construction, Illicit Connections and Illicit Discharges, Public Agency Activities, and Development Planning. These model programs will change with time as more data on stormwater impacts are collected and become available.

On January 31, 2001 the Los Angeles County Department of Public Works formerly requested to renew their MS4 permit in the form of an ROWD for the County of Los Angeles and the incorporated cities, except the City of Long Beach. This request began the process of reissuance of the permit, which entered into its third permit term. On the same day the Los Angeles County Flood Control District submitted an ROWD. The Regional Board staff invested considerable time and effort in providing opportunities for public participation and comment. Over 30 meetings, two workshops, and many outreach activities were conducted to allow the public, Permittees, and other interested parties enough opportunity to participate in the development of permit requirements and language prior to consideration by the Regional Board for adoption. The reissued MS4 permit committed the region to meeting water quality standards based on the State Water Resources Control Board's precedential Orders.

Implementation of the MS4 permit requirements should reduce pollutants in stormwater in a cost-effective manner. The adoption of BMPs should also reduce pollutant discharges and enhance the quality of surface water.

The final steps of the regulatory process are now under way—TMDLs for the various impaired water bodies of the region are being promulgated.

Overall, it is clear that the LA Regional Water Board does not intend to require that municipalities build advanced treatment plants: indeed, they have publicly expressed the sentiment that they oppose this solution.

Implementation of Regional Solutions

A regional infiltration and BMP treatment system, in combination with source control of trash, pesticides, and trace metals, can substitute for individual site controls on land parcels within the drainage area. This could take the form of "Local Equivalent Area Drainages", implementing regional solutions that would achieve better results than the application of new source controls, which, in built up areas, will have significant effects only over the long term during which existing structures are rebuilt.

Funding for regional solutions may pose a challenge because of Proposition 13 and other restrictions on tax policy. The challenge however is not insurmountable if property-owners and voters become adequately informed and educated. Nevertheless, regional solutions may significantly shift administrative and cost burdens for water quality protection from businesses and development firms to local government.

Trading Schemes

"Cap and trade" systems, in which regulatory agencies set a cap on the amount of pollution allowable and allow trading of discharge rights within the constraints of the cap, have been successful in several fields. A group of municipalities, for example, might assign discharge rights to landowners within a watershed such that total releases meet the constraints of the TMDLs. They could then allow trading in the discharge rights, so that those who can reduce discharges at least cost are the first to do so, and the overall cost of meeting the TMDL is minimized. Municipalities themselves, as owners of parks and open space, might be able to develop regional solutions and fund them through sales of discharge rights to others.

Stormwater pollution control may be particularly amenable to this approach because the costs of control are highly site-specific. In many cases, there may be considerable economy in applying regional solutions in the best possible sites rather than controlling every site individually.

DESCRIPTION OF ALTERNATIVE APPROACHES

Infiltration

Before the City of Los Angeles was established, most of the rain that fell in the region evaporated or percolated into the soil. The groundwater was continually replenished and runoff flows were small. As population grew, impermeable surfaces such as paved roads, parking lots, and rooftops covered more and more of the land. Residences, commercial facilities, and roads were designed to shed water as rapidly as possible. Historical measurements of discharges to the Los Angeles River at Firestone Boulevard indicate that runoff has increased from 5% to 45% of rainfall. This change adversely affected stormwater quality in two ways. First it increased the amount of stormwater flow, magnifying the cost of any measures to control quality (and also requiring ever more costly flood control measures). Second, water that flowed directly to streams and the ocean no longer benefited from the purifying action of soil and vegetation, which can remove particulates through physical filtering, sequester some chemicals by adsorption, and destroy organic and biological contaminants by biodegradation.

Any program for remediation of stormwater contamination should reverse this trend, reducing the load of both water and pollutants on other parts of the system. At the same time, pollution of groundwater must be avoided. However, infiltration will benefit from the very considerable capacity of soils to filter particles, adsorb contaminants, and biodegrade organic materials. A relative estimate of the magnitude of the problem may be made by comparison with examples of leaking underground storage tanks at gasoline stations. In many cases, spills of tens or hundreds of gallons of gasoline are now being handled by "intrinsic remediation"—allowing natural biodegradation to degrade the hydrocarbons. The acceptability of this approach has been supported by extensive research. Hydrocarbon infiltration with stormwater will involve far lower concentrations of hydrocarbon, and will mostly be the higher-molecular-weight compounds that are much less mobile in soils than gasoline.

We can also compare stormwater infiltration to the effects of septic tanks. These systems infiltrate sewage that has received only a modest degree of treatment. Yet they are still in use in the Los Angeles Region, and indeed are the primary waste disposal method for 15% of households in the U.S. Groundwater contamination from septic tanks has occurred, but most are considered effective and safe waste disposal systems.

This comparison suggests that the relatively low concentrations of pollutants in common stormwater, with appropriate controls on sources of specific contaminants, will not pose a significant threat to groundwater quality.

The permeability of soils in the Los Angeles basin varies from place to place. Beneath the Whittier Narrows spreading basins, for example, sand and gravel deposits allow very high rates of infiltration. In other areas, clay-rich soils reduce rates of infiltration. However, the historically low rates of runoff indicate that infiltration is capable of handling the bulk of the rainfall in the Los Angeles Region. Many areas routinely considered as having poor infiltration rates will never the less be useful as multi-purpose infiltration systems. A soccer field, for example, can be used as an

infiltration basin at little additional cost, and will make a valuable contribution even if infiltration rates are low in comparison to those in spreading basins.

Source Control

Industrial Releases

Industrial discharges can be controlled by a vigorous program of source identification and control. Businesses have a fundamental responsibility to do their work without contaminating their neighborhoods, and in the great majority of cases can do so without significant interference with their activities.

Trash Management

Many businesses and some homeowners contribute a disproportionate amount of trash to the urban burden. Paper waste often accumulates in the parking lots of fast food outlets and strip malls, where it can wash into the street during rainstorms. Inadequate dumpsters and garbage cans are overloaded so that trash spills into the streets. Poorly covered trucks can allow trash to fly out on the streets. In addition, citizens throw trash from their cars onto the streets (it has been estimated that as much as 60% of trash on freeways by weight is cigarette butts). All of these practices are illegal, but enforcement is currently rare and weak. While perfect compliance with anti-litter laws is not expected, there could certainly be major improvements through enforcement. Much of the cost of such efforts could be recovered through fines, with the satisfying result that those causing the problem would be paying for cleaning it up.

Municipalities are responsible for the trash deposited on their streets, and most will respond by installing screens on catch basins. These are sometimes referred to as catch basin "inserts". They will have half-centimeter openings and will be designed to collect trash during periods of low or modest flow, but to bypass the flow during heavy storms or if they are clogged. This will avoid local flooding that would be caused by clogging.

Street Cleaning

Trash that escapes enforcement efforts can be collected by street cleaning before it reaches the storm drains. Enhanced street cleaning is likely to be necessary as cities install half-centimeter screens on their catch basins. Trash that is now washed out of sight (at least until it reaches the beaches) will accumulate on the screens and possibly clog them. More effective and more frequent street cleaning will reduce this problem.

A major fraction of the pollutants in stormwater runoff are adsorbed on particles—this is particularly true of trace metals and pesticides, which are significant contributors to impairment of the receiving waters. Some of this particulate matter can be removed from streets by higher-quality street vacuuming equipment, which collects the dirt much as a vacuum cleaner does. This equipment is more expensive to purchase and operate, but it would make a significant contribution to reducing chemical pollutants in stormwater.

The Port of Seattle has tested high-quality street sweepers as a cleanup method in its container storage area (FHWA, 2003). The approach was successful, removing one-third to one-half of particulates and their associated pollutants. While the equipment is somewhat more expensive than simple sweepers to purchase, operations costs are about

the same. The fine particles carry a significant portion of the pollutants, but they constitute only a small portion of the total mass of material on the streets, so their collection and disposal does not significantly increase costs. Such street cleaning may be more effective in Southern California, where the long dry season allows dust to accumulate for many months.

As explained in detail later, there would be substantial secondary benefits associated with improved street cleaning. Neighborhoods would look better, and residents would be exposed to less resuspended road dust, which dirties buildings and may have significant negative health effects.

Some investigators have also proposed street washing, using recycled water. If this were done during dry weather, and all of the dry-weather flow were being collected for treatment in wastewater treatment plants, street pollutants would be kept out of the rivers.

Pesticide Substitutions

Many of the receiving waters in the Los Angeles Region are impaired by pesticides, particularly Diazinon and Chlorpyrifos. The approach to this pollution should be the same as it has been historically for other pesticides that threatened environmental quality. None has ever been dealt with by treating contaminated waters. Those who use the pesticides should be responsible for ensuring that no water pollution results from that use. Pesticides that cannot be properly managed by appropriate use protocols such as labeling or use rules enforcement and which have an inherent tendency to persist in the environment should be banned. Pesticide controls are instituted by the state and federal governments, so additional political effort will be needed if a bans on specific compounds are required.

We presume that these pesticides are used in many cases because they are currently the most economical approach to insect control, and that substitution of another method would involve some cost. However, there are many possible alternatives, including use of more readily degraded pesticides, insect-resistant strains of plants, biological control with natural insect predators, and others. There are many examples of success with such integrated pest management (IPM), particularly at golf courses (NRDC, 1999). In some cases owners were pleased to find that costs actually declined when they switched from pesticide-dominated approaches to IPM.

Trace Metals

Trace metals enter stormwater as rain drains from industrial operations, transportation land uses, and other sources. Brake pad wear on cars produces a fine dust of copper. Zinc is released when galvanized equipment contacts the water. Trace metals in stormwater can be controlled by covering machinery and materials that release trace metals, by capturing and treating runoff from large industrial operations and transportation land uses, and by developing alternative materials for brake pads (research is currently under way on this objective).

Control of Automotive-Related Sources

Motor vehicles and related facilities are the source of many types of runoff pollutants, including hydrocarbons from oil and fuel leaks, and road wear. Vacuum street cleaning is effective in dealing with particle-bound hydrocarbons left on the street,

and infiltration can effectively deal with hydrocarbons that are transported or deposited off the street surface.

Control of Bacteria

Bacterial contamination in stormwater is typically measured as counts of "coliform" bacteria, a category that contains many species of bacteria. While very few of the coliforms cause disease, some of these species are very abundant in human waste, and so detection of the group has long been used as a marker for sewage pollution. Efforts to interrupt the fecal-oral transmission of disease have commonly taken the elimination of coliforms from water as a surrogate for judging efforts to prevent the spread of the microorganisms that do cause disease. Where coliform counts in drinking water have been reduced (in much of the industrialized world) transmission of water-borne disease has indeed been largely eliminated. Thus the use of coliform counts as a marker for disease control has been remarkably successful. In some cases, a more specific test for "fecal coliforms" is used, because the test is an indicator of contamination by warm-blooded animals, including humans. While we have always counted coliforms, the real concern is pathogens—microorganisms that can cause disease. For sewage pollution, the association between the two has been strong, and controlling coliforms has been equivalent to controlling disease. The situation for stormwater, however, may be far more complex. Because there are many non-human sources of coliforms, it is possible that the test for their presence may be positive even when no human pathogens are present.

The sources of the coliforms found in stormwater remain uncertain. Pet wastes certainly include bacteria that test positive as coliforms, but the degree to which pet wastes constitute a disease threat is uncertain. Wild mammals, such as raccoons, possums, skunks and coyotes, may contribute when their wastes are left on paved surfaces. It has been proposed that fecal matter from homeless people denied access to restrooms may be a source, but there has been no study confirming this. In less developed areas with poor soil infiltration conditions, it is likely that poorly operated septic tanks and illegal disposal of gray water are contributing to the coliform counts detected in runoff. If septic tanks are the source, strict enforcement of waste control ordinances is appropriate. If homeless people are the source, provision of restroom facilities would be far cheaper than any imaginable stormwater treatment system (as well as being more humane). If pet feces are the source, the only approach is, through public outreach and enforcement, to press people to clean up after their pets. It must be expected, however, that such an approach will not be 100% effective. The contribution of wild animals seems uncontrollable.

Because the sources and significance of the coliform counts remain uncertain, it is important that research on the topic be pursued immediately. The recent development of genetic techniques for precise and rapid identification of bacterial species now provides the tool needed to provide the information needed to develop effective policies.

Coliforms, and presumably the associated human pathogens, are substantially reduced in treatment wetlands. Infiltration of course removes them from runoff flows, and adsorption on soils and biodegradation are effective at protecting groundwater. Water storage, because it holds coliforms in an environment for which they are not adapted, and because it allows settling of particles to which they may be attached, has

some beneficial effect. Disinfection, using chlorine, chloramines, or ultraviolet light is possible, but relatively expensive.

Water Quality Control Board Rules allow for 17 exceedences of the coliform limit per year. There are about 32 days per year of significant rainfall in the region, so it has been anticipated that exceedences during the heavy winter storms will be difficult to control, and will be allowed.

Improved Enforcement

It is important that source control efforts include genuine and credible enforcement. Rules that are widely ignored, of course, will not help clean up runoff water, and a considerable fraction of runoff contaminants come from illicit discharges or disposal. Trash is an obvious example—littering is already illegal, so 100% of the trash in stormwater represents illegal release.

The Environmental Protection agency describes an example in which improved enforcement of existing law was effective (USEPA, 1999):

"…during a 12-month period, the Houston, Texas, Public Utilities Department identified 132 sources of discharges leading to Buffalo Bayou, the local drinking water source, with estimated flow rates ranging from 0.3 to 31.5 liters per second. Houston's program involved monthly sampling from bridge crossings; analysis of samples for carbonaceous biochemical oxygen demand, ammonia and nitrate nitrogen, pH, TSS, DO, temperature, fecal coliform, and chlorine residual; comparison of samples to baseline flow concentrations; weekly sampling of temperature, dissolved oxygen (DO), and fecal coliform in stream reaches suspected of contamination; boat sampling to identify the contaminating outfalls along the reach; and, finally, a land-based search to pinpoint the source. Of the flows identified during the program, 85% were due to broken or clogged wastewater lines and 10% were due to illicit connections (Glanton et al., 1992). Eight months after an illicit discharge detection and elimination program began, fecal bacteria log mean concentration was reduced from 20,000 colonies/100mL to 2,000 colonies/100ml."

Thus, in this example, a 90% reduction in bacterial contamination resulted from a careful enforcement program alone.

Detention and BMP Treatment

Stormwater Detention Basins

Many of the problems of stormwater management are associated with its very irregular rate of flow. During dry periods runoff flow rates are so low that the water can be handled by existing sanitary wastewater treatment systems. During rainstorms, the water comes so fast that municipalities have had difficulty doing anything beyond avoiding floods.

The first step toward dealing with this problem is to increase infiltration—substantial reductions in the peak flow rates are possible. The second approach is to provide storage systems that will hold water back during the peak flow periods. Detention basins will reduce peak flows, collect trash, provide quiet water for settlement of particles and their associated pollutants, and promote infiltration. Analysis of the

National BMP Database (Strecker et al., 2003) shows that detention basins infiltrate an average of 30% of the water they receive.

The primary difficulty with this approach is the shortage of available sites to construct large reservoirs. The topography of the Los Angeles area does not include any deep canyons in lower reaches of the rivers that could easily be made into reservoirs. Moreover, virtually all of the land is already occupied by other uses and would accordingly be very expensive to acquire.

This means that detention basins must be conceived as a distributed network of smaller systems, with each serving multiple uses. A useful model is the Sepulveda Dam Recreational Area, which retains water during storms to prevent downstream flooding. For the great majority of the days in the year, the basin is mostly empty, and serves as a park and a wildlife refuge.

A rough estimate of the general feasibility of a regional-park-based approach can be calculated. The City of Los Angeles currently has about 5% of its area in parks (Wolch et al., 2002) and it is reasonable to presume that at least a similar fraction is park throughout the LA Region. Thus, moving the rainfall from adjacent developed areas to the parks would constitute concentration of the flow by a factor of 20 (20 acres of land would drain to 1 acre of park). If the runoff coefficient for the developed areas is 0.5, a rainfall of ¾ inch would thus put 8 inches of water in the parks. This is less than the 24-inch depth of flooding assumed for the stormwater parks planned in the Sun Valley project, suggesting that this approach is feasible on the large scale in terms of the amount of land required.

This calculation is quite approximate: the runoff coefficient is uncertain, and several other factors are poorly known. Never the less, the calculation suggests that a joint program could simultaneously provide the region with needed parks and needed stormwater infiltration capacity.

Sanitary Treatment of Dry Weather Flows

During dry weather, small flows are present in the stormwater system as a result of overwatering of lawns, car washing, and other discharges. This modest amount of water can be collected and passed through existing wastewater treatment plants, which commonly have more than enough excess capacity for this purpose. Because the dry season in Southern California is very long, this would prevent runoff pollution of the oceans for much of the year.

Where this is done, street washing with recycled water would be possible. Collecting and treating the contaminants during dry periods would leave the streets clean for the rainstorms, when the water cannot be collected.

Treatment Wetlands

Wetlands remove many pollutants from the water that passes through them. The low flow velocities allow sediments to settle, removing particulates and any pollutants that are adsorbed on them. Algae and rooted plants absorb nitrate and phosphate as they grow. Vigorous microbiological activity degrades organic chemicals, as microbial predators consume disease organisms. These observations suggest that wetlands can be constructed to serve as treatment systems for stormwater and dry weather runoff. While this approach requires dedication of land, it has the considerable secondary benefit of providing riparian wildlife habitat and esthetic values.

A system of treatment wetlands has been designed for the San Diego Creek Watershed that drains to Newport Bay, in Orange County, California. The system will serve an area of 120 square miles, and is expected to cost in the low tens of millions of dollars. It is expected to meet the low-flow nitrogen TMDL, the phosphorus TMDL during most years, and the fecal coliform TMDL during low flows.

A similar system has been constructed to provide stormwater quality protection for the Ballona Wetlands Watershed in the City of Los Angeles.

BMP Treatment of Flows from Problem Watersheds such as Industrial Areas

If source control is not successful for some industrial areas, it may be necessary to collect the runoff water and use more sophisticated BMP treatment. These might best be constructed as private facilities serving a consortium of local industries, and funded by them for the purpose. A public/private partnership could be created, perhaps with public loan guarantees. Past experience with business improvement districts could serve as a model.

Partial Treatment in Curbside Units

Many proprietary devices have been developed for treatment of runoff as it enters curbside catch basins. These generally remove trash from the flow, and may also collect sediments. Some include adsorbants to remove hydrocarbons and trace metals. They have the disadvantage that they are designed to bypass during higher volume wet-weather flows. All require some degree of maintenance, and some are expensive to install. Trash and sediment must be removed on a regular basis, and adsorbants must be replaced when they are exhausted. Never the less, they may be useful for treatment of problem dry weather flows in specific areas, such as industrial or commercial zones.

Public Outreach and Education

Much of the pollution in runoff water arises from actions of individuals—litter is discarded in the street, for example, or pesticides are used carelessly in a residential garden. This pollutant load can be reduced by educating citizens and urging them to behave in a way that protects water quality.

An effort in Oregon, conducted by the Tillamook Bay Rural Clean Water Project, was made to educate local farmers about the steps they could take to protect local streams. This involved personal visits, tours of successful BMPs, newsletters, and presentations (USEPA, 1999). Four years after the program began, bacterial concentrations dropped 40% to 60% in Tillamook Bay and 50% to 80% in local rivers. Thus in some cases significant progress can be made at very low cost through public education.

Good Housekeeping for Municipal Operations

While the behavior of individual citizens may be difficult to control, municipalities have far more control over their own operations. Efforts can be made to avoid careless use of pesticides and fertilizers on municipal facilities. Such steps have modest, but measurable impacts. An EPA report notes (USEPA, 1999):

> "…the City of Bellevue, Washington, found that street cleaning three times a week removed about only 10% of urban runoff pollutants; catch basin cleaning

twice a year was estimated to be about 25% effective" (Pitt and Bissonnette, 1984).

Combined Approaches for Stormwater Quality Management

A general classification of rainfall receivers and appropriate methods for dealing with runoff they produce is shown in Figure 1. While the approach it describes is quite general, and other mixes of alternatives are possible, it shows one set of measures that can be used to control stormwater pollution.

Streets

The first step in reducing pollutants on streets is to restrict pollutant discharges from adjacent properties. Source control measures should prevent the release of industrial pollutants and construction sites should be managed to contain sediments. Litter laws and pet dropping collection laws should be enforced, although it must be acknowledged that it is not possible to prevent these inputs entirely. To stop litter from entering the storm drains, cities should install half-centimeter screens on their catch basins. The use of such screens will require diligent street cleaning, to ensure that the drains are not blocked during storms. In Southern California, rains mostly occur during a well-defined season, and frequently weather reports give two or three days warning of major storms. Cities should develop contingency plans for rapid-response street cleaning when storms are coming, to minimize stormwater contamination and the chances of flooding caused by clogged screens.

In some areas, where runoff water quality is relatively good, the streets themselves might be used as groundwater recharge facilities, by converting unused alleys to park/detention basins or by using permeable pavements.

It remains likely, however, that much street runoff will be of marginal quality. For the immediate future, it is also likely that a major portion of runoff from other sources will be initially discharged to streets, so that efforts to make use of stormwater as a water resource will require collection, and a degree of treatment before infiltration.

In most cases, this can be done with regional solutions. Water from storm drains can be collected in detention basins and wetlands, where sedimentation and biological activity will reduce pollutant load, and groundwater recharge can occur. The detention basins will serve as parks during the greater part of the year when water is not present, and the wetlands will double as much-needed wildlife habitat.

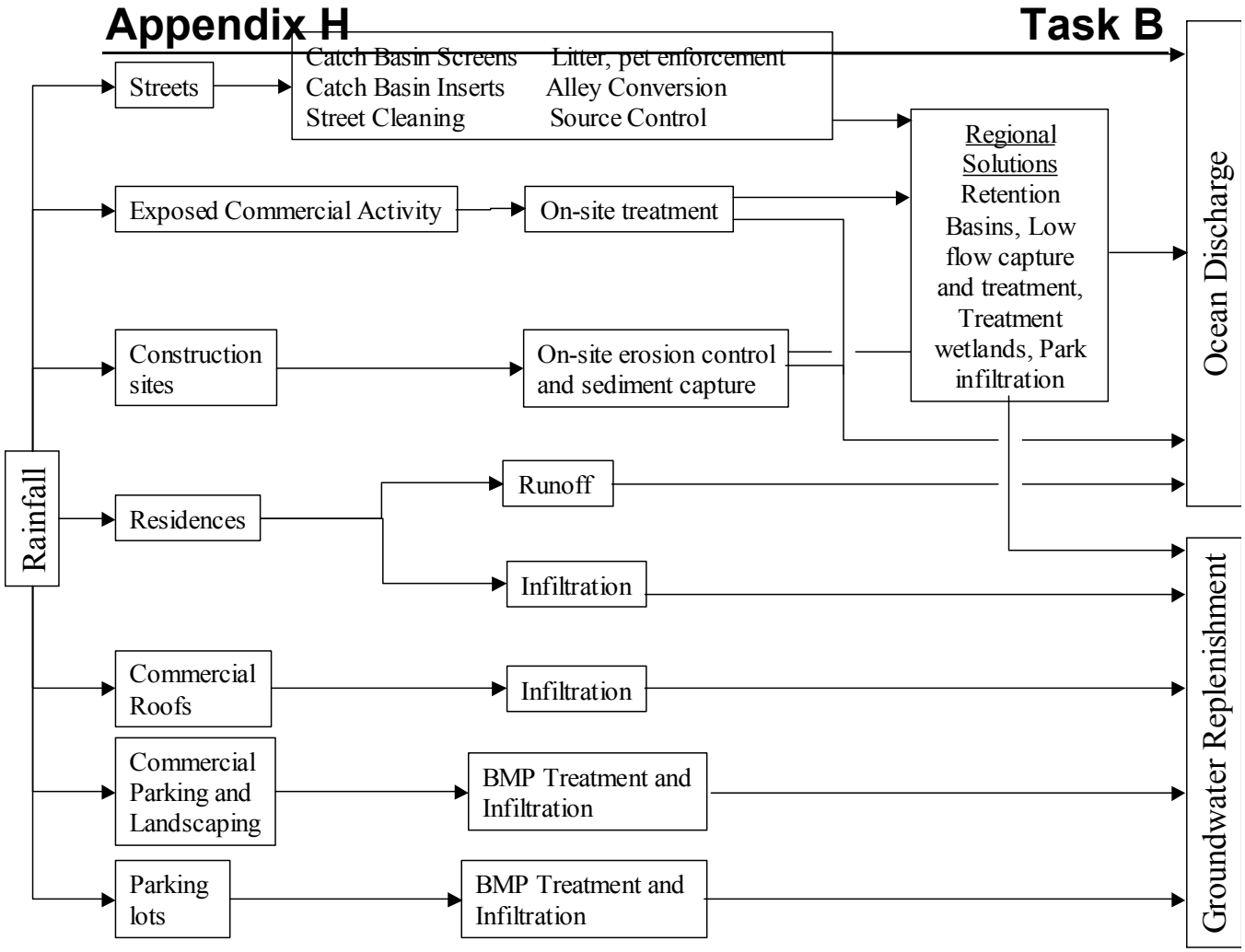

Figure 1. Stormwater quality control solutions for Southern California

Alleys for Public Use and Infiltration

Some alleys in urban areas are no longer necessary for access purposes. Indeed, many have become nuisance areas because of illicit trash disposal and criminal activity. Many of these could be gated and converted to small parks, with keys provided for local residents. They could simultaneously serve as infiltration facilities or as bioswales. There are currently 2.3 square miles of alleys in Los Angeles, for example. While many must be retained for access purposes, the fraction that could be converted could constitute a significant stormwater retention and infiltration resource. Alleys maintained for access might be candidates for partial or permeable pavements.

Similar approaches could be used for power line rights-of-way.

Exposed Commercial Activity

Very often the cheapest approach to stormwater quality control for exposed commercial activities is simply to cover them. Stormwater will thereafter come in contact only with the rooftop, and runoff will be much less polluted and more easily dealt with. However, for some large-scale activities, such as oil refining, it is not physically possible to provide a roof. For others, such as auto dismantling, the large area needed and the relatively low value of the activity may mean that a roof is not financially possible. Such facilities must be required to collect and treat runoff from their facilities, and indeed this is already being done in many cases. While there certainly are costs involved, it has generally proven possible, through a combination of better housekeeping, substitution of non-polluting materials, and simple on-site treatment processes, to solve these problems. Requirements for on-site treatment are advantageous because the cost of such treatment is borne by the business that produces the pollutant, providing incentives for conversion to less-polluting products and methods. Consequently, green manufacturing will become increasingly common.

Construction Sites

Release of sediments from construction sites can be ameliorated if the construction crew provides erosion control measures, such as maintaining vegetation or spraying exposed soil with polymer stabilizers, and an adequate on-site retention pond for rainfall, along with dikes, silt fences, and appropriate vehicle entrance construction to prevent runoff. Detention allows the sediments to settle out and the exposed soils can function effectively for groundwater recharge. It is anticipated that the costs of these measures will be small in comparison to construction costs. A more detailed list of best management practices for construction sites appears in Appendix I.

Residences

In most cases, homes and the surrounding landscaping have been designed to facilitate rapid runoff. It is necessary that water not pool in depths sufficient to flood houses, and ponding is viewed with irritation, even if it is harmless and temporary. However, single-family homes typically are surrounded with a significant area of land that could serve well for infiltration. Commonly, the land is planted or covered with

grass. The runoff from landscaping and residential rooftops typically contains only small amounts of pollutants that are readily removed by percolation through the root zone.

Landscaping for the typical single-family home could be arranged to infiltrate all of the rainfall that it receives (except, perhaps, in the most severe storms). Lawns a few inches below surrounding sidewalks could serve as infiltration ponds, gardens could receive roof runoff, and downspouts could conduct runoff to dry wells. Because the water would have had very little contact with pollutants, such infiltration would be an excellent addition to groundwater resources.

However, very few residences are arranged in this manner and, indeed, building codes often specify features that promote rapid runoff to the street. Building codes should be changed to utilize single-family homes as recharge sites. It is anticipated, however, that the effect on runoff will be seen only slowly in built-up areas as old homes are gradually replaced. Retrofit of existing homes will be expensive and politically difficult, but for new construction, single-family homes could be made to produce essentially zero discharge at little or no additional cost.

Xeriscaping—planting with native and other drought-tolerant plants—can also help to provide space for water infiltration, and it reduces watering and therefore the chance of irrigation runoff. Such landscaping also requires less fertilizer and pesticide, and so reduces incidental contamination.

In many cases, cities may be able to take interim steps to reduce runoff from homes. They have control over the "city strip" land that lies between the sidewalk and the gutter. It would be possible to institute a program of replacing the lawns after minor excavation, so that these areas would lie below the sidewalk and curb and serve as runoff detention and percolation basins.

Where infiltration is not possible, much residential runoff may be acceptable for direct discharge to the ocean, as long as it is not contaminated first by passing through polluted streets. More contaminated water can be conveyed to regional water cleanup and recharge facilities.

Low-flow Treatment in Wastewater Treatment Plants

Wastewater treatment plants are built with excess capacity in order to handle increased flow during rainy weather. While sanitary systems are designed to exclude stormwater, holes in manhole covers, leaks in piping, and illegal connections all allow the entry of some water during rainstorms. The flow is a very small portion of the rainwater, but can produce a significant increase in the much smaller sanitary flows—sometimes up to 50%. Treatment plants are designed with excess capacity to handle these peak loads.

This excess capacity can be used to treat dry weather runoff during periods when there is no rain. While these flows are not, by definition, stormwater, and indeed are governed by a separate set of regulations, dry weather runoff is often a significant contributor to impairment of receiving waters and its treatment would contribute to the objectives of stormwater control. It is also possible to use this capacity in concert with "street washing". In this approach, tank trucks filled with recycled water could be used to wash the streets, particularly in the months before the first rain of the fall. Contaminants removed from the streets and drains by the washing would be treated in the

wastewater plants, leaving the streets far cleaner when the rains came. At present, municipal street cleaning is a prohibited activity where it results in flows to the storm drain system.

This treatment approach for dry weather runoff could also treat runoff from small rainstorms.

It is likely that all of dry weather runoff could be treated for much of the Los Angeles Region. Such a step would eliminate essentially all runoff pollutants in the areas where this is possible. Because this approach uses capacity that is already in place, the cost for this alternative is low.

This approach would be particularly significant for control of coliforms. Sanitary treatment of dry weather flows would eliminate coliforms through much of the year. Rain occurs during only 32 days of the year, on average (Some of these storms are so small that the runoff could still be treated. On the other hand, untreatably high levels of runoff typically continue for a few days after a major storm). The LA Regional Water Board allows variances for 17 days of wet weather flow during the year. Thus it seems likely that dry weather runoff treatment at wastewater treatment plants, plus some degree of source control, plus the variances, will be sufficient to bring most areas into compliance with the bacteria rules. Further study, including some basic research on the sources of coliforms, is necessary to confirm this.

In considering the acceptability of this approach, it is important to note that beach use declines during wet weather, so that closures during the variance days would have a small effect on overall beach use and public health.

Capture and Use of Rooftop Runoff

In many cases, the pollutants from commercial rooftops, like those from residential roofs, could be readily removed by soil infiltration. With appropriate controls to avoid specific pollutants from commercial activities, roof runoff could be used for groundwater recharge. Designs exist for infiltration planters, in which the planter has high sides that allow it to function as a reservoir, and an open bottom that allows infiltrating water to pass into the soil. Risks of groundwater pollution could be mitigated through the use of biologically active and adsorbant soils. Commercial rooftops are commonly associated with large parking areas, which could be adapted for infiltration. Such efforts will be more difficult than those for homes, because most commercial facilities have a higher ratio of roof area to land area. In some cases it may be possible to store runoff for future irrigation use.

The Washington State Department of Ecology (2001) has developed a decision tree for dealing with downspout discharges. For lots larger than 22,000 square feet, it specifies either dispersion or infiltration systems for runoff. For smaller lots on suitable soil, infiltration systems are required. Where soils do not readily accept infiltration, surface dispersion may be appropriate. If water quality is good and infiltration and dispersal are not possible, disposal to the storm drains is accepted.

Parking Lots and Landscaping

Parking areas occupy a very large amount of land in Southern California, and accordingly represent a significant opportunity for improvement in stormwater

management. Construction costs for parking lots are far smaller per square foot than those for buildings, so that alterations are cheaper. They are reconstructed more frequently, so that requirements applying to new construction or reconstruction will propagate through the parking lot inventory much more rapidly than those for buildings.

In most cases, parking lots could serve as sites for rainwater infiltration. Trash can be collected on grates and be disposed of properly by the lot owners. The curbs around plantings (which are often necessary to avoid damage to the plants from cars) can be slotted so that water passes through them to infiltrate in the planter soils. Planted areas must be below grade, so that they collect and temporarily store water, and could be expanded, utilizing more space where cars don't actually park, such as the areas between and behind the parking bumpers. In some areas, permeable pavements could be used. Collected water could be passed to leach fields built under the parking lot.

An example of this sort of development is provided by the 6-acre parking lot of the Oregon Museum of Science and Industry (NRDC, 1999). It had originally been proposed as a traditional design, with water draining to catch basins, storm drains, and eventually the Willamette River. At the request of the Portland Bureau of Environmental Services, it was redesigned to use vegetated medians and landscaping as swales and linear wetlands. The parking lot is now able to infiltrate the water from a storm of 0.83 inches in 24 hours. Overall construction costs for the revised design were actually lower, because of the reduced costs for catch basins and drains.

Pervious pavements have also been developed so that even the space where cars are parked can be used for infiltration.

There is some concern over whether infiltration from parking lots will pollute underlying aquifers. Sediments, hydrocarbons, and trace metals are likely to be present in parking lot runoff from ordinary commercial establishments. But all of these are generally well retained on soils, particularly if the soils are selected to serve this purpose. Adsorbent materials might be added as a surface layer, to further retain hydrocarbons and trace metals.

It will be necessary to develop new guidelines for parking lots. The public and lot owners will not tolerate flooding that requires them to wade to their cars, so detention and infiltration systems will have to be carefully designed. Overflow will occur in extreme storms, and the lot and remediation areas should be designed so that the excess water flows to the street without impeding access to parked vehicles. Redesigned lots can be required for any new construction or for major renovations, but complete retrofit of all lots is likely to be too expensive for political acceptance.

This will require some additional maintenance. If adsorbants are included in the recharge areas to help control hydrocarbon infiltration, for example, these will have to be renewed from time to time. Regular trash collection will be required.

It is anticipated that most parking lots could become zero runoff areas, contributing substantially to water conservation and pollutant remediation. Further, very large parking lots, such as those at "big box" stores and shopping malls, could be reconstructed as stormwater infiltration facilities serving surrounding neighborhoods. In a cap and trade system, the lots would become financial opportunities for the retailers.

River Greening

The Los Angeles Region has become infamous for its historical conversion of rivers to concrete-lined flood control channels. While these have served the purpose of moving water rapidly to the ocean and avoiding flooding, they have also prevented infiltration in the riverbed. For this and many other reasons, advocates have proposed "greening" the river. This would involve widening the river at some points and replacing the steep concrete walls with gently sloping vegetated shores. Parks and wildlife habitat could be developed alongside the river, designed such that they would flood when the river is high. This would allow infiltration to occur, and by providing temporary storage, would decrease peak flood flows. In many areas it may be possible to replace the concrete bottoms of rivers with permeable surfaces.

The Sepulveda Dam Recreation Area is an excellent example of such a facility. It stores water during heavy rains, but serves as a park and wildlife refuge during the greater part of the year when it is not flooded. It promotes infiltration of water during rain events.

Certainly, any such modifications of the rivers must be designed carefully so that flood risk is not increased. But this is clearly possible. Indeed, increased infiltration and storage capacity along the river will reduce peak flows and therefore the frequency of floods, and reduce the associated costs.

Infiltration in Residential Streets

Many areas in Southern California are primarily residential, and runoff from these areas is only moderately polluted—it could be used for direct infiltration without treatment. In newly developed areas, homes could be designed so the runoff is near zero. However, many areas are currently already built out. In these, preventing runoff to the street would be expensive. In many cases, it may be possible to install infiltration devices in the public streets.

Infiltration in Parks

Public parks, in most cases consisting predominantly of grassy areas, are already contributing to groundwater infiltration. However, some portions still contribute to runoff, and could be regraded to collect water rather than shedding it. Indeed, many could be rebuilt to serve as groundwater infiltration systems serving surrounding areas. Playgrounds could be sunk below surrounding areas in order to collect water during rainfall events. Designs would have to include provision for infiltration at acceptable rates—water left standing for days could become a nuisance. In some areas, soil conditions might preclude this approach.

During the few days after water is collected and before it percolates, that area of the park will be unavailable for other uses. However, parks are little used during rainy weather in any case, and detention will only occur on a few days each year, so the interference will be minimal.

Public Facilities

Runoff from public facilities could be reduced by many of the measures previously discussed. Parking lots could be used for infiltration and rooftop runoff could

go to planters serving as infiltration systems. Retrofit of government facilities could begin more quickly than for individual homes, as part of the effort required to meet regulations.

PRIMARY BENEFITS OF RUNOFF QUALITY CONTROL

The immediate purpose of runoff quality control is protection of the receiving waters. In the Los Angeles Region, this refers primarily to rivers, coastal wetlands, bays, and the ocean. Many benefits are definable.

Fishing

Pollutants in stormwater can adversely affect fishing. Commercial fishing is a small and declining industry in the waters local to Southern California, but sportfishing remains a significant activity, bringing income to coastal businesses and providing recreational opportunity for many people. Cleanup of stormwater will preserve and enhance this activity by ensuring that fish are safe for consumption and by preserving fish breeding grounds in estuaries.

Swimming

Ocean swimming, as part of a visit to the beach, is a recreational activity enjoyed by millions of people each year in Southern California. It attracts tourists who contribute substantially to coastal economies. It is discouraged if trash litters the beach or if fear of disease discourages water contact. It is prevented entirely in the event of beach closures, which are a common result of polluted stormwater runoff.

Boating

Powerboats and sailboats are widely used in Southern California and represent a substantial industry in manufacture, maintenance, provision of slips, and various associated shoreside activities. Polluted waters, particularly in the form of trash, can significantly degrade the quality of the boating experience.

Noncontact Recreation and Nonconsumptive Wildlife Uses

Some recreational activities involve bodies of water without contact: sitting or bicycle riding along rivers or lake shores are examples. These activities are seriously degraded if the water produces bad odors or is littered with trash. A stormwater quality program will protect and enhance these uses.

Observation of wildlife is often a valuable part of the outdoor experience. Continuation of this activity requires water quality sufficient to support birds and animals and the plants and insects that they eat. Many migratory birds are dependent on local bodies of water for their sustenance during their yearly movements.

Reduced Illness from Contaminated Seafood

Some illnesses are transmitted through consumption of contaminated seafood. Control of the microbiological quality of runoff waters will reduce the extent of such illnesses.

Reduced Illness from Swimming in Contaminated Waters

Recent studies have indicated that people swimming near storm drains are more likely to contract waterborne diseases than those swimming far from storm drains. Microbiological control of runoff quality, particularly through sanitary treatment of dry weather flows, could reduce the incidence of these diseases.

Enhanced Esthetic Values

The trash cleanup associated with stormwater quality control will improve the appearance of our harbors, rivers, streets, and commercial establishments. Esthetic enjoyment of wildlife habitats such as wetlands, in particular, is hindered if trash is present.

Preservation of Natural Ecosystems

Polluted urban runoff damages natural ecosystems in many ways: toxic material can sicken or kill organisms, trash can choke marine mammals or birds, additional turbidity can prevent the penetration of light necessary for seaweed growth, sediment can bury habitats and prevent attachment of organisms to rocky surfaces, and nutrients can fertilize overgrowth of mosses and plankton. This damage can be prevented by stormwater quality control, and is one of the prime reasons for the program.

SECONDARY BENEFITS OF STORMWATER QUALITY CONTROL

Urban runoff comes from a huge variety of sources and contacts much of the environment around us. The efforts made to clean up runoff, which have the primary purpose of preventing water pollution in receiving waters, will have many secondary benefits and these should be included in any cost-benefit analysis. Indeed, some of these benefits are so substantial that they suggest the agencies responsible for the resources in question should also be providing financial support for runoff quality control efforts.

Groundwater Restoration

Total rainfall in the Los Angeles basin in an average year is equal to about half of the amount used for drinking water supply. It is strange indeed that we pollute this water and discharge it to the ocean even as we import ecologically, politically, and financially expensive water from the Colorado River, Northern California, and the Owens Valley. The primary difficulty in making productive use of this water is the lack of storage capacity. Rainfalls are infrequent but intense: most of the time there is no rainfall available for use, but occasionally it is so abundant that it causes flooding. Surface water reservoirs are the traditional solution to this problem—water is stored during the rainy season to prevent floods and becomes available for valuable uses the weather is dry. But there are few workable sites for large, year-round surface water reservoirs in the Los Angeles area. Groundwater aquifers, however, can also serve as water reservoirs, being drawn down in the dry season and replenished during the wet season. Infiltration will constitute a use of this storage capacity, reducing future dependence on outside sources of water and avoiding expensive alternatives like desalination of seawater. Because environmental and political factors may make increasing water imports impossible at any price, better utilization of local rainfall through the use of the groundwater reservoirs may be necessary for future growth.

Improvement of groundwater supplies within Southern California would save money now spent on imported water, and would save the concomitant external costs of the environmental impact on source areas. It would also reduce political friction with source areas. Ultimately, it may be the only economically and politically feasible method by which the water supply in Southern California can be increased, and as such, it may be the key to continued development in the area.

Flood Control

As the fraction of the Los Angeles Region occupied by impermeable surface has increased, the amount of water runoff has also increased, putting an ever-growing load on the flood control system. A recent project improved flood control for the lower Los Angeles River by increasing the height of the dikes on the channels, at a cost of about $200 million. Future increases in channel capacity would be even more expensive—not only will the walls have to be made higher, several bridges will have to be raised. Increased infiltration will reduce runoff, reducing the maintenance costs on the system and eliminating the need for further capacity increases.

The possible magnitude of the impact can be judged by considering the case of the San Gabriel Valley. Runoff from the valley is mostly captured in spreading basins in

the Whittier Narrows area and used for groundwater recharge. This makes the runoff coefficient for the valley overall 5%. In the urbanized areas of Los Angeles, the value is about 40%. Thus if the urbanized area were as well controlled as the San Gabriel Valley, runoff could decrease by a factor of eight. Flood risks would essentially disappear.

Increased Parkland and Wildlife Habitat

The regional alternatives for stormwater quality control include the development of parks and wetlands. The parks would serve as detention basins and infiltration facilities, but would be used for that purpose only during rainy periods, which comprise about 32 days per year in Southern California. During the rest of the year, these areas could serve the typical purposes for which parks are built, acting as recreational sites, playgrounds, soccer and baseball fields, and wildlife habitat. Because people are less likely to engage in these activities during rainstorms in any case, the conflict between the uses will be small. The Los Angeles area is notably short of public parks in comparison to other major cities, particularly in its poorer neighborhoods (Wolch et al., 2002). Because it is likely that residents will demand more park space in the future, the development of areas for dual use is particularly valuable. Ideally, the cost of development could be borne by both agencies intent on improving stormwater quality and by those responsible for parks and recreation. The planned redevelopment of the Corn Fields site in Los Angeles, for example, might provide a detention basin as well as the new park that is being planned.

Wetlands must be kept wet all year, but can withstand flooding during the rainy season. Thus reestablishment of these habitats, which have been largely lost in the Los Angeles Region, could simultaneously serve the purposes of wildlife restoration, flood control, and stormwater quality control. In many cases, it will be possible to develop wetlands within existing channels, reducing the need for additional land purchases.

Some of the parks and wetlands could be created as a part of river greening projects, and so would also serve the purposes of reestablishing esthetically appealing naturalistic rivers.

Improved Property Values from Trash Control

Often one of the most powerful visual cues that gives a visitor the perception of a "bad" neighborhood is the presence of trash on the streets. One approach to reducing pollutant discharge to storm drains will be improved enforcement of litter laws and additional street cleaning. These will have the secondary benefit of improving the appearance and livability of streets throughout the area. The "broken windows" campaigns of many police departments—indicating that improving the appearance of neighborhoods reduces crime—suggests that apparently cosmetic changes can have substantial benefits for neighborhoods. Certainly property values in a neighborhood with clean streets will be higher than they would if the streets are routinely littered with trash.

Reduction in Harbor Sedimentation

Sediments carried by runoff are moved because the water moves rapidly, and because small particles remain suspended in the low-salt-content chemical environment of fresh water. When runoff enters bays and harbors, however, the velocity of the water

is slowed, allowing the particles to settle to the bottom. The higher salt content of marine waters promotes flocculation of the small particles, so that most of them will also settle to the bottom. The deposited sediment fills channels, blocking the passage of ships and recreational boats, and filling areas set aside for preservation of aquatic ecosystems. Ultimately, harbor dredging is required, and frequently the collected sediment has been contaminated, so that it requires special handling. Dredging associated with storm drains in Los Angeles Harbor, for example, costs between $1 million and $3 million per year. Sedimentation in Upper Newport Bay is considered a significant threat to its function as a wildlife refuge. Stormwater quality control measures would avoid sediments discharges or remove it from the runoff, ameliorating these problems for downstream communities.

Improved Public Health

A significant portion of exposure to particulate air pollutants arises when small particles are resuspended from roadways by traffic and wind. Tire dust, settled air pollutant particles, pet feces, particles with adsorbed trace metals and trash are pounded into fine powder and lifted into the air. Such resuspension includes an ultrafine particle fraction, which is most dangerous to human health. More frequent street cleaning, particularly using vacuum bag type cleaners, would reduce public exposure to fine materials carrying trace metals, hydrocarbons, and microorganisms. Some public health improvement is likely, but its magnitude cannot be estimated.

REGIONAL PROGRAMS DESIGNED FOR STORMWATER QUALITY CONTROL

While there has been a substantial amount of work on individual facilities for runoff quality control, such as detention ponds and grassy swales, there have been only a few studies that have tried to determine the regional cost and effectiveness for a system of these "green solutions". It is important to ask whether it is possible to create an overall program within realistic constraints of land availability and costs that will bring the watershed into compliance with regulations.

We have sought descriptions of example projects that include overall costs and the area of land that drains to the facility, so that cost per square mile of area served can be calculated. In a few cases, these are area-wide systems that are the best evidence that an overall solution is possible. In others, they are single installations, for which we make the assumption that duplication is possible—ten facilities like the one described could be built to serve ten times the area. Because economies of scale are important in determining facility design and even regulatory policy, we have taken special interest in some sources that describe how the size of the drainage area (and the necessary BMP treatment facility) affects cost per square mile. Finally, we have included examples that have actually been built and tested, and others that have only been designed. While data for the latter may be less reliable, most systems perform as designed, and these designed-but-not-built systems provide some of the most useful results.

The chosen examples are described briefly below, and listed in Table 2. Results useful for determining the relationship between facility size and cost per square mile are plotted in Figures 2 and 3.

Area-Wide Systems

Sun Valley

The Sun Valley project was funded by Los Angeles County to develop an alternative approach for flood control and runoff quality management for the Sun Valley district. This is an urbanized area with considerable industrial development that currently does not have storm drains. It is consequently frequently plagued with flooding. The project was undertaken to determine whether there was an approach to flood control other than simply building storm drains.

Four alternative plans were produced, designed to maximize infiltration, to maximize water conservation and wildlife habitat, to maximize stormwater reuse by industry, and emphasizing conveyence to traditional storm drains. Notably, an alternative that maximized the use of onsite BMPs was rejected as too expensive. The components of the plans included industrial reuse, infiltration basins in parks, tree planting and mulching, infiltration in parking lots, and infiltration in vaults beneath the streets.

Because the emphasis of this project was flood control rather than water quality control, the hydraulic control objectives were quite stringent: the system was designed to collect and infiltrate all of the water produced by a 50-year, 96 hour storm. This means that the runoff from the area, if the project is built, will be reduced to near zero. Thus, this project, which includes flood control and water quality control, constitutes an "upper

bound" estimate on the costs for water quality control. Achieving such complete collection and infiltration would certainly substantially exceed water quality goals, and costs for a stormwater quality control system in an area with storm drains already in place would certainly be lower.

San Diego Creek

A project supported by the Irvine Ranch Water District and Orange County and performed by Geosyntec Consultants has developed a plan for natural treatment systems—wetlands and stormwater detention ponds—for the San Diego Creek watershed. This watershed occupies 120 square miles of developed land that drains into Newport Bay. Newport Bay has been designated as impaired, requiring that stormwater discharges be cleaned up.

Geosyntec proposed a plan consisting of 44 facilities, including ponds and wetlands constructed within existing drainage channels or built outside. These are typically facilities with both deeper open water and shallow water supporting emergent vegetation (such as cattails).

Water quality improvements expected from the system are described in the report (Strecker et al., 2002): "The NTS Plan is estimated to achieve total nitrogen (TN) TMDL for base flows and reduce in-stream TN concentration below current standards at most locations. Total phosphorous TMDL targets would be met in all but the wettest years. The fecal coliform TMDL would be met during the dry season, but not all wet season base flow conditions, and not under storm conditions. The NTS Plan is not designed to meet the sediment TMDL, but would capture, on average, about 1,9000 tons/yr (1,724,000 kg/yr) of sediment from urban areas. The wetlands are estimated to remove 11% of the total copper and lead, and 18% of the total zinc in storm runoff. The NTS provides a cost-effective alternative to routing dry-weather flows to the sanitary treatment system."

While final budget numbers were not provided, it was anticipated that the first 13 treatment sites would be constructed for $12 million, and that the overall cost would be substantially less that the $60 million anticipated for low-flow sanitary treatment. This value is listed as the upper bound of cost in Table 2. For comparison of cost vs. unit drainage area size, it was presumed that the average area served by each of the 44 facilities was 120 $mi^2/44 = 2.7\ mi^2$.

Constructed wetlands will collect any trash that enters the storm drain, and should be effective at reducing concentrations of coliform organisms, hydrocarbons, particles, and the suite of pollutants associated with particles. They may constitute a complete control system if they are combined with vigorous source control for metals and pesticides and storm drain screens to minimize the trash loading.

Murray City, Utah, Golf Course and Wetlands

Officials in Murray City recognized an opportunity when the interstate highway I-215 was being built. They agreed to take soil from the excavation and runoff water from the freeway to make a golf course. The links, with an associated string of settling ponds, accept and treat all of the drain water from the eastbound lanes of 4.5 miles of the freeway (NRDC, 1999; Hill, 2003). The golf course has been a commercial success, and now produces $900,000 in revenue against $450,000 in operating and maintenance costs each year. The city has created other treatment wetlands for essentially all of the runoff

from the City and from the westbound lanes of the freeway. The total cost of these wetlands has been less than $1,000,000. Overall, if the golf course infiltration system and the other wetlands are considered as a single stormwater control system, it pays for itself. Because this is an unusual circumstance, for calculation we ignored the income from the golf course, and presume the wetlands cost $1,000,000 and serve the area of Murray City, which is 9.5 mi^2.

Fresno Metropolitan Flood Control District

The Fresno Metropolitan Flood Control District serves the area including and surrounding the city of Fresno. It operates 130 infiltration basins that drain a region of about 120 square miles devoted to agriculture, residential areas, and urban landscape (NRDC, 1999; Pomaville, 2003). Some of the basins are turfed and serve as parks, while others are bare and serve seasonal infiltration needs. The basins succeed in infiltrating 80% to 90% of the stormwater in their drainage areas, and only 2% enters a receiving water without receiving some degree of treatment. To protect groundwater, the District also instituted a program of industrial inspections. While monitoring is still done to check for pollution of the San Joaquin River, the District anticipates no additional infrastructure will be necessary to meet water quality control regulations. For calculations, the unit area for each basin was assumed to be 1 mi^2.

Individual Systems

Long Lake Retrofit, Littleton, Massachusetts

Geosyntec Consultants also designed a low-impact-development program for Littleton, Massachusetts (Roy et al., 2003). The 1.5-square-mile watershed that contains the town drains into Long Lake, which has been subject to eutrophication and other water quality problems associated with urban runoff. The storm drain system collects water at 200 catch basins and releases it to the lake through 18 outfalls. The plan for mitigation of the problem includes a treatment wetland, grass and vegetated swales, bioretention cells (swales with underdrains), rain gardens, rain barrels, and an outreach program to promote source control for fertilizers.

The total budget for the project is estimated at $630,000, or $420,000 per square mile.

Tule Pond, Alameda, California

The Tule Ponds project is a group of three treatment wetlands that was constructed using information developed in the Demonstration Urban Storm Water Treatment Marsh in the early 1980s. It receives urban runoff, passing it through the three ponds in series and discharging it to an existing natural pond. It serves a drainage area of 0.8 square miles and cost $360,000, for a cost of $450,000 per square mile.

Treasure lsland, San Francisco Bay

Treasure Island is an artificial island of 403 acres in San Francisco Bay that was used for many years as a Navy base. It has recently been converted to residential use. A treatment wetland is planned as the means for stormwater quality control. It is anticipated that wetland construction will cost $800,000 to $ 1,100,000 (Bachand, 2003), or $1.2 million to $1.7 million per square mile. However, the island is a tourist destination, and it has been estimated that the increase in visitor spending associated with

the wetland could be $4 million to $11 million (Fine, 2003). It was also estimated that the overall value of the project could be twice these values.

Herrerra Study of Stormwater Regulations Costs

As a part of the effort to determine the costs of complying with stormwater regulations in Western Washington, Herrerra Environmental Consultants (2001) prepared designs for typical projects needed to contain and treat stormwater on site in small projects of new construction. In both cases, the systems were planned for a 1.7-inch rainfall. The first hypothetical project was a ten-acre residential development with 40 individual home sites. It was presumed that runoff from the homes would be collected in a detention pond. Construction of the permanent facilities was determined to cost $240,000 to $230,000, depending on the quality of soils. This is about $15 million per square mile.

The second hypothetical site was a restaurant built on a one-acre site, with the area not occupied by the building used as a parking lot. Runoff was to be collected in subsurface infiltration vaults. Costs were determined to be $280,000 or $570,000, depending on the permeability of the soil, or $175 million to $356 million.

Dover Mall, Delaware

The Dover Mall has 30 acres of parking lot or otherwise impermeable surface. Runoff drains to a wetland that is sized to retain a 1-inch rainfall (NRDC, 1999). It includes a forebay that allows containment of exceptional spills. The total project cost was $171,000 (although much of this was defrayed by in-kind donations). The wetland is considered a considerable esthetic resource. The cost was $3.5 million per square mile.

Oakland Park Industrial Area, Florida

A BMP treatment system was developed for five acres of Oakland Park that included auto repair shops, paint shops and plating facilities. A short treatment train was developed, including a trash removal basin and absorbent media. The system cost $261,000, and was successful in removing 71% to 95% of oil and grease, along with all trash and most sediment. Costs were $33 million per square mile of drainage.

Clear Lake Packed Bed Wetland Filter System

Clear Lake, in Orlando, Florida, receives runoff water from 121 acres of nearby urban land and water quality in the lake has deteriorated significantly as a result of pollution. Packed beds, consisting of 10 filter beds composed of crushed concrete or granite media with growing aquatic plants, allow removal of sediments and nutrients. An initial wet detention pond is used to contain the first flush. The system cost $917,646. In calculations, the system was considered a single installation treating 121 acres of drainage. Costs were $4.6 million per square mile.

Sand Filters in Alexandria, Virginia

Two sand filters were built to treat runoff from an airport parking lot near National Airport in Alexandria, Virginia. The area drained was 1.95 acres, and the filters cost $40,000. While some initial problems with anaerobic conditions were encountered, the filters eventually achieved good treatment. The cost, calculated from the data reported by FHWA (2003), was $12.9 million per square mile.

Compost Filter Facility, Hillsboro, Oregon

A compost filter was constructed to decontaminate water upstream of a grassy swale. The treatment train received water from a five-lane highway, draining a total area of 74 acres. The 1200-square-foot filter contained 120 cubic yards of compost and was constructed and filled for $13,700. The cost, not including the swale, was thus $110,000 per square mile of drainage area.

Infiltration Trenches

The Federal Highway Administration (FHWA 2003) has estimated the costs for constructing infiltration trenches as $C_A = 1317 \times V^{(0.63)}$ where C is the cost in dollars and V is the volume in cubic meters. Calculations for this report are made assuming the need to provide detention for a ¾-inch storm. For one square mile (2.6×10^6 m^2), a ¾-in rainstorm will produce 5×10^4 m^3 of water. The cost per square mile is equal to the cost for each trench divided by the drainage area it serves, or $C_{mi2} = C_A/A = (1/A) \times 1317 \times V^{(0.63)} = 1.2 \times 10^6 \times A^{(-0.37)}$. The total cost for these systems thus declines as each system becomes larger—there are economies of scale. Costs for land are not included, but it is likely that trenches could be installed in land also used for other purposes. In some cases it might be necessary to collect more than ¾ inch of rain. On the other hand, the calculation assumes that no infiltration occurs in the trench during the storm. Also, this presumes that the runoff coefficient for the area served is 1.0—thus the typical systems described could treat a ¾-inch storm on totally impervious area or a 1.5-inch storm on an area with a runoff coefficient of 0.5, which is a commonly observed value. Thus the total seems a reasonable approximation.

Infiltration Basins

The Federal Highway Administration (FHWA 2003) has estimated costs for construction of open infiltration basins (dry basins) as $C = (V/0.02832)^{(0.69)}$, where C is the cost in dollars and V is the volume in cubic meters. As for the infiltration trenches, it is assumed the basins will be designed to treat a ¾-inch storm in an impervious drainage. Thus the cost per square mile is $C_{mi2} = C_A/A = (1/A) \times (V/0.02832)^{(0.69)} = 204{,}000 \times A^{(-0.31)}$. Costs for land are not included, and would be substantial. However, the basins could be used for other purposes for much of the year. Again, the systems assumed could treat a 1.5-inch storm in a drainage area with a runoff coefficient of 0.5.

Bioretention Areas

Stormwater can be collected in areas filled with highly permeable soils and planted with trees and other vegetation. Water that infiltrates is filtered by contact with the soils and may continue to move downward to replenish the groundwater. Much of it will also be taken up by the vegetation and returned to the atmosphere through evapotranspiration. The FHWA (2003) cost estimate for these bioretention areas is $10,000 per impervious acre, or $6.2 million per square mile of impervious watershed. Bioretention areas can readily serve multiple purposes as wildlife habitat and parks.

Detention and Retention Wetlands

The Federal Highway Commission Report (FHWA, 2003) has provided a general formula describing the cost of detention ponds as a function of size. Costs were estimated as $C_A = 168\times V^{(0.699)}$, where C_A is the cost in dollars and V is the volume of the pond in cubic meters. The cost per square mile is $C_{mi2} = C_A/A = (1/A) \times 168 \times V^{(0.699)} =$

$324{,}000 \times A^{(-0.301)}$. Land costs are not included, but these areas can serve other purposes during the larger part of the year when the weather is dry—they can be parks, wildlife areas, and playing fields.

Detention Vaults

In highly urbanized areas, water can be detained in underground vaults, which may be made of concrete or of corrugated steel pipe. Such systems primarily store water to avoid flooding or excessive hydraulic load on downstream systems, but some sedimentation may occur. This provides marginal treatment, but also requires that the vaults be cleaned out on a regular basis. The FHWA estimate for costs of such systems is $C = 38.1\times(V/0.02832)^{(0.6816)}$. Cost per square mile of drainage area is $C_{mi2} = (1/A) \times 38.1 \times (V/0.02832)^{(0.6816)} = 690{,}000 \times A^{(-0.3184)}$.

Underground Sand Filters

Sand filters are quite effective at removing particulates from urban stormwater, and are commonly employed upstream of other systems in order to protect them from excessive sedimentation. They can be installed underground in densely urban areas, but are correspondingly expensive. The FHWA estimate for such systems is $10,000 to $14,000 per impervious acre served, or $8.7 million per square mile. Here we have chosen the upper estimate because costs are likely to be high in the Los Angeles area.

Surface Sand Filters

Sand filters may also be constructed at the surface, which reduces their cost. However, they occupy a relative large amount of land area, and cannot contribute to a secondary use. There are strong economies of scale. For facilities serving more than 5 impervious acres, the FHWA estimate of cost is $3,400 per acre or $2.1 million per square mile.

Dry Swales and Filter Strips

A vegetated dry swale is an area of land shaped so that stormwater flows through it in a broad, relative flat stream. Flow through the grass removes sediments from the water. At the same time, significant amounts of infiltration may occur. It may be necessary to prepare the soils to maximize infiltration before the grass is planted. Swales can be used for other purposes during the periods when it is not raining. The FHWA estimate of construction costs for swales is $1500 per impervious acre, or $930,000 per square mile.

Filter strips are similar installations, in which the water flows as a flat sheet. The FHWA estimate of constructions costs for filter strips is $2000 per acre or $1,240,000 per square mile.

Results from the ASCE-EPA BMP Database

A cooperative effort of the American Society of Civil Engineers and the U.S. Environmental Protection Agency has compiled data on the success of best management practices. Data were carefully vetted, put as much as possible in common format, and arranged so that they could be searched according to several parameters. Several searches of the database were done to gather data for this study.

A search for dry detention basins, serving watersheds of 0-100,000 acres, with 0-30 in annual rainfall, produced 17 responses, of which only four included cost data. All

of the four were associated with freeways and served small watersheds of 1-14 acres. This may be the reason why costs were exceptionally high.

A search for wetlands, serving watersheds of 0-100,000 acres, with 0-30 in annual rainfall, produced 10 responses, only one of which included cost data. Costs for this facility were exceptionally low. It was described as a "natural" wetland, perhaps implying that much of the system was already in place before construction was done.

A search for wetlands, draining 0-100,000 acres, with 0-30 in annual rainfall, produced 9 responses, including 6 with cost data. These also served very small watersheds, and costs per square mile were very high.

A search for hydrodynamic devices serving 0-100,000 acres, in areas of 0-30 in annual rainfall, produced 12 responses, including 8 with cost data. Costs ranged from $344,000 per square mile to $86 million per square mile, showing very strong economies of scale.

A search for grassy swales serving 0-100,000 acres, in areas of 0-30 in rainfall, produced 26 responses, including 7 with cost data. The cost per square mile ranged from $12 million to $341 million, and showed strong economies of scale. This was a surprising result—grassy swales are very simple and cheaply constructed systems—but it reflects the fact that each installation serves only very small areas.

ESTIMATES OF COSTS AND RECOMMENDED APPROACH

Ultimately, stormwater pollution is a symptom of two anthropogenic changes: we are releasing pollutants into our local environment, and we have disrupted the hydrologic cycle of the Los Angeles Region by covering the soil with impervious surfaces. These changes have other symptoms as well. Local pollution impairs health, damages the esthetic quality of life, and reduces property values. Reducing infiltration increases runoff rates and the risk of flooding, and at the same time, reduces recharge of groundwater resources. Finally, impervious surfaces cannot support vegetation, and we suffer the loss of natural habitat, recreational areas, and aesthetic value of green space.

Cost Estimates

The solution proposed in the report by Gordon et al. (2002)—advanced treatment plants to clean up stormwater after it has entered the storm drains—constitutes treatment of a single symptom without correction of the fundamental problem. It is expensive, and has little benefit beyond the single objective of protecting receiving waters. A more fundamental approach—eliminating pollutant releases and restoring the hydrologic cycle—is cheaper. Further, because it will mitigate all of the effects of pollution and hydrologic disruption, it will have benefits whose value exceeds the costs.

While a rudimentary cost-benefit analysis is attempted here, the limitations of such an approach should be kept in mind. Many costs and benefits are difficult to evaluate—the psychological benefit to citizens who live on a clean street rather than a trashy one, for example, or the long term effects on local business of a general perception of regulatory burdens. In past cost-benefit analyses, it has been common that costs and benefits that are difficult to measure have been assumed to be zero, certainly producing misleading results. It remains true that two good-faith investigators can produce quite different cost-benefit results, especially for a complex problem like stormwater quality control. Assumptions may depend greatly on the value system of the investigators. A recent cost-benefit study was criticized, for example, because it put a lower value on the lives of elderly persons. This is reasonable in the sense that the death of and older person represents fewer years of life lost, and less loss of earnings, and it is a common presumption in cost-benefit studies. However, there was outrage among those who felt that this approach was offensive to the elderly and the general principle that we all have equal rights.

In this particular study, because the costs and expenditures are of many different kinds, it was necessary to use a variety of estimation methods. The results are necessarily approximate, and comparisons among them must be viewed with caution. To use technical terms, contingent valuation studies are included with benefits transfer estimates, and results from various investigators are combined. We anticipate that these steps may be criticized, but we hope that we can provide a framework approach that can be improved and refined as further research is done.

Finally, cost-benefit analysis frequently ignores the issues that arise because the costs and benefits are not borne by the same parties. One might suggest that pollution should not be cleaned up if the cost of doing so exceeds the benefits of relief from the pollution. But it is commonly the case that the polluter who is saving money is not the

same person who is suffering from the effects of the pollution. Does your neighbor have the right to throw his trash in your yard if he can show that it saves him more money than it costs you? The principle of "polluter pays" has a satisfying moral aspect and it also puts the incentives right—the parties with the ability to reduce pollution are given the motivation to find a way to do so.

For these reasons, and because in this short study the numbers are particularly only estimates, we present our cost benefit analysis with the caution that more precise and detailed assessments are desperately needed.

Cost estimates have been prepared by examining case studies. Reports were chosen where information was available for both the total cost of the system described and the land area served, or the initial stormwater retention volume, in order to calculate the cost of stormwater management per square mile of watershed. Several assumptions and caveats must be observed:

1. In the cost-per-square-mile calculations, no attempt was made to adjust costs on the basis of the amount of rainfall in the watershed. Sufficient data were generally not available for this purpose. In most cases, data came from areas where annual rainfalls are greater than in Los Angeles, and this may cause the cost estimates to be high.
2. In the cost-per-square mile calculation, the cost data were not available in a uniform format. It was not possible to calculate an accurate "present worth" including operations and maintenance costs for each case. In some cases operations and maintenance data were included, while in others they were not. In most cases operations and maintenance costs are low in comparison to installation costs, and they would be further reduced by discounting to present worth. Never the less, this may cause the cost estimates to be low.
3. Installation costs may vary depending on the slope of the land, the nature of the soils, depth to water table, local labor costs, and a wide variety of other factors that change with locality. No attempt was made to adjust the costs for these factors, and this may make the estimates high or low.
4. It is presumed that the systems described will be sufficient, in conjunction with source control efforts, to comply with water quality regulations. There was no case reported in which the quality control efforts were described as failing, or for which regulators asked for additional measures after the systems were complete. However, few data were shown for after-construction water quality, and most of the systems have not been in place for enough time to allow long-term assessment. The degree of success for source control efforts, while likely to be substantial, cannot be guaranteed.
5. Several of the projects described have been designed, but not implemented. It is assumed that they will perform as designed. In the case of the Federal Highway Administration formulas, these are regression results rather than individual case results.
6. It is likely that implementation in the Los Angeles area would involve projects that are larger than most of those listed. There likely will be economies of scale. This may cause the cost estimates to be high.

Summary of Case Study Project Costs
"I or D" refer to Implemented or Designed

Project	I or D	Description	Unit Size, square miles	Cost, $M	Cost, $M per square mile
Infiltration Systems					
Fresno Metropolitan Flood Control District Regional Infiltration Basins (NRDC, 1999; Dave Pomaville, 2003)	I	130 turfed or unturfed infiltration basins serving residential areas. Treats or infiltrates 98% of runoff over area of 120 square miles	1		2.5 to 3.7
Study of Stormwater Regulations Cost (Herrerra Environmental Consultants, 2001)	D	Hypothetical calculation of costs for new residential development	0.016	.24	15
Study of Stormwater Regulations Cost (Herrerra Environmental Consultants, 2001)	D	Hypothetical calculation of costs for new commercial development	0.0016	0.28 to 0.57	175 to 356
Wetlands					
Tule Pond, Alameda (Wetzig, 1999)	I	Stormwater treatment pond for urban runoff	0.8	0.36	0.45
Treasure Island, San Francisco Bay (NRDC, 1999: Galvanis, 2003)	D	Wetland treatment system for local runoff	0.65	0.8 to 1.1	1.2 to 1.7
Long Lake Retrofit, Littleton, Mass. (Roy et al., 2003)	I	Swales, constructed wetlands, bioretention cells, outreach	1.5	0.63	0.42
San Diego Creek Natural Treatment System Master Plan (Strecker et al., 2003)	D	Network of open-water ponds and wetlands in Newport Bay drainage, 120 square mile area	2.7	<60	<0.5
Murray City, Utah (NRDC 1999: Hill,	I	Golf course and wetlands treat runoff from 4.5 miles of I-215	9.5	1.0	0.11

2003)		and the city			
Dover Mall, Delaware, (NRDC 1999)	I	Wetland installed on mall grounds drains 30 acres of 100% impervious cover	0.048	0.17	3.5
Sun Valley Project, Los Angeles County	D	Combination of various measures for flood and quality control in L.A. Basin	4.4	172 to 297	39 to 68
BMP Treatment Processes					
Oakland Park, Fla, industrial area (NRDC 1999)	I	Oil, grease, sediment, and trash removal by sedimentation and absorbance	0.008	0.261	33
Clear Lake Packed Bed Wetland Filter System (NRDC 1999: FHWA, 2003)	I	Oil, grease, nutrients, trace metal removal for water entering Clear lake	0.2	0.92	4.6
Compost Filter Facility, Hillsboro, Or. (FHWA, 2003)	I	Oil, grease, removal and filtration for highway runoff	0.12	0.12	0.11
Alexandria, Va, airport parking lot	I	Sand filters installed along the borders of a 1.95-acre parking lot	0.003	0.04	12.9
Bioretention Areas, FHWA cost estimate	D	Areas of highly permeable soil planted with trees and other vegetation			6.2
Underground Sand Filters	D	Porous medium filters placed in underground vaults, appropriate for highly urban areas			8.7
Dry Swales	D	Broad, shallow vegetated drainways covered with vegetation, usually grass			0.93
Surface Sand Filters	D	Porous medium filters installed at the surface			2.1
Filter Strips	D	Flat vegetated drainways covered with vegetation, usually grass			1.2
Port of Seattle container area cleanup	I	High quality street sweeping with sediment trap catch basins			3.1
Cost:Area Formulas from FHWA					
Infiltration trenches, FHWA cost estimate	D	Gravel-filled trenches. Infiltration eliminates runoff discharge.	$C_{mi2} = C_A/A$ $= (1/A)\times 1317\times V^{(0.63)}$ $= 1.2\times 10^6\times A^{(-0.37)}$		

Infiltration basins, FHWA cost estimate	D	Open basins, dry at most times, store and infiltrate runoff. Infiltration eliminates runoff discharge.	$C_{mi2} = C_A/A$ $= (1/A)\times(V/0.02832)^{(0.69)}$ $= 204{,}000\times A^{(-0.31)}$		
Detention and retention wetlands, FHWA cost estimate	D	Wetlands used for treating stormwater, with storage capacity available	$C_{mi2} = C_A/A$ $= (1/A)\times 168\times V^{(0.699)}$ $= 324{,}000\times A^{(-0.301)}$		
Detention vaults, FHWA cost estimate	D	Underground reservoirs for storage of runoff to reduce peak flows	$C_{mi2} =$ $(1/A)$ $\times 38.1\times(V/0.02832)^{(0.6816)}$ $= 690{,}000\times A^{(-0.3184)}$		
Results from ASCE-EPA BMP Database					
Dry Detention Basins					
I-605/SR-91 EDB	I		0.0013	0.077	60
I-5/Manchester (East)	I		0.0077	0.33	43
I-5 SR 6	I		0.0085	0.14	17
I-75/SR-78 EDB	I		0.022	0.82	38
Wetlands					
Swift Run Wetland	I		1.95	0.049	0.025
Sand Filters					
I-5/SR-78 P&R	I		0.0013	0.22	170
Escondido MS	I		0.0013	0.45	348
Eastern Eastern Regional MS	I		0.0024	0.34	141
Foothill MS (Sand Filter)	I		0.0029	0.48	164
Termination P&R	I		0.0045	0.46	102
LaCosta P&R	I		0.0045	0.23	49
Hydrodynamic Devices					
Jensen Precast (UVA)-Phase II	I		0.00045	0.039	86
I-210/Orcas Avenue	I		0.0018	0.04	22
Jensen Precast, (Sacramento)	I		0.0032	0.062	19
I-210/Filmore Street	I		0.0040	0.05	12
Charlottesville Stormceptor	I		0.0040	0.017	4.2
Sunset Park Baffle Box	I		0.040	0.023	0.57
Indian River Lagoon CDS Unit	I		0.098	0.055	0.56

Austin Rec Center	I		0.15	0.05	0.34

OSTC					
Grassy Swales					
I-650/SR-91 Swale	I		0.00032	0.11	341
Cerrito MS	I		0.00065	0.06	93
1-605/DelAmo	I		0.0011	0.13	115
I5/I-605 Swale	I		0.0011	0.073	64
Monticello High School	I		0.0013	0.015	11
SR-78 Melrose Dr	I		0.0039	0.13	34
I-5 North of Palomar Airport Road	I		0.0074	0.14	18
I-650/SR-91 Swale	I		0.00032	0.11	341

Economies of Scale

The costs listed in Table 2 reflect the cost for an individual facility ("Cost, $M" and "Cost, $M/mi^2") and associate it with the drainage area served, referred to as the "Unit Size". The costs per square mile for the individual units can be plotted to determine the effects of unit size (Figures 1 and 2). While there is a great deal of scatter in the data, it is clear that there is considerable economy of scale. Units serving drainages of a half square mile are typically 30% more expensive that those serving 1 square mile. Those serving drainages of one-tenth square mile are twice as expensive and small installations are extremely expensive in dollars per square mile. The most notable example of this is grassy swales: while each unit is relatively inexpensive, their small service areas make them very expensive per square mile served.

For some of the BMPs there are not sufficient data to judge the economies of scale, and as described, all of the data must be taken as approximate. Never the less, it seems that there is a good case to suggest that regional systems for handling runoff water will be most economical. This is clearly true of wetlands and infiltration basins, which are likely to be the most widely used approaches in the Los Angeles Region as a whole. This supports the position that the best solution will be a wetland or an infiltration basin also serving as a park, playing filed, or wildlife habitat as the stormwater management unit for a neighborhood of a square mile or greater.

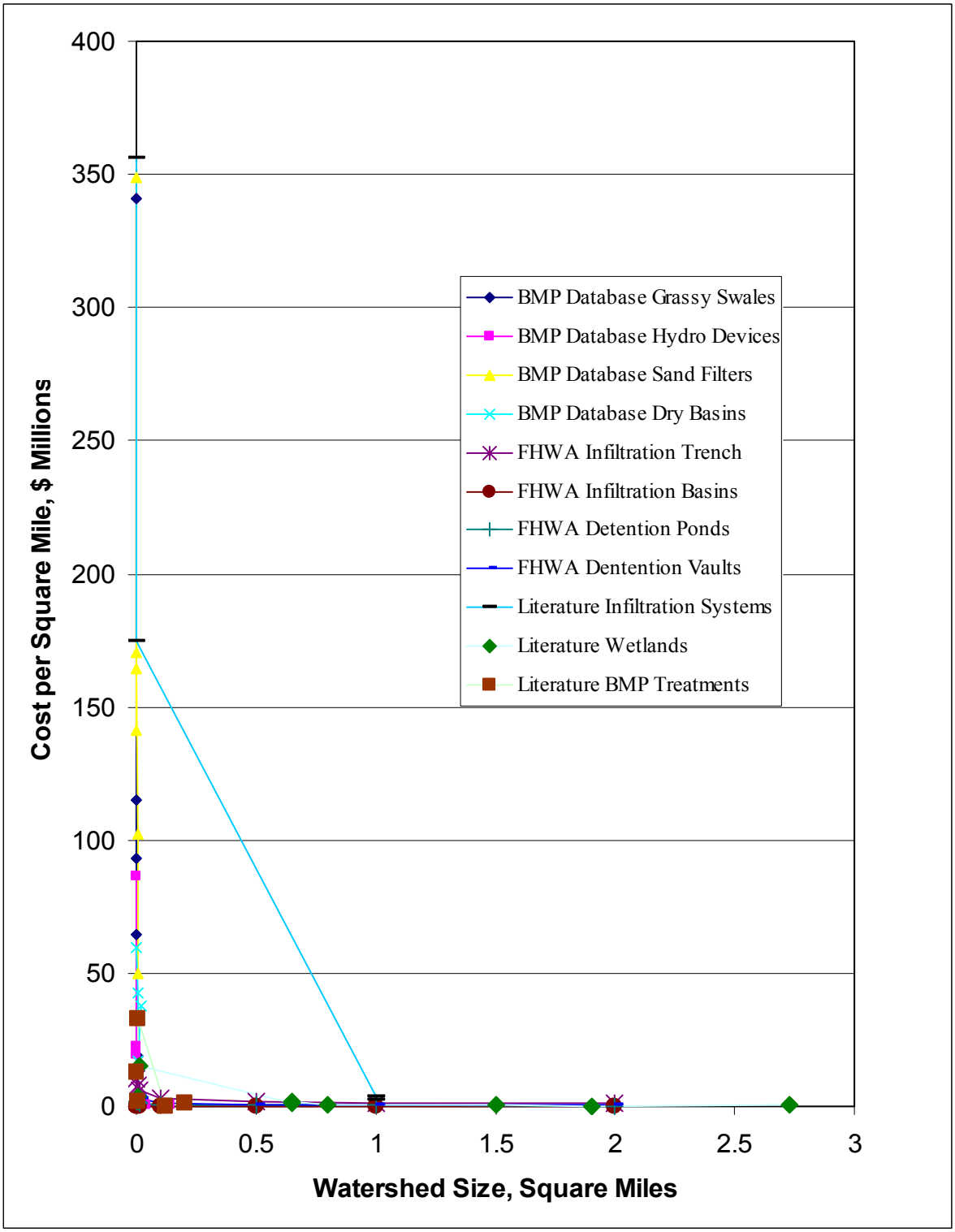

Figure 1. Plot of data for which costs per square mile and unit areas are known.

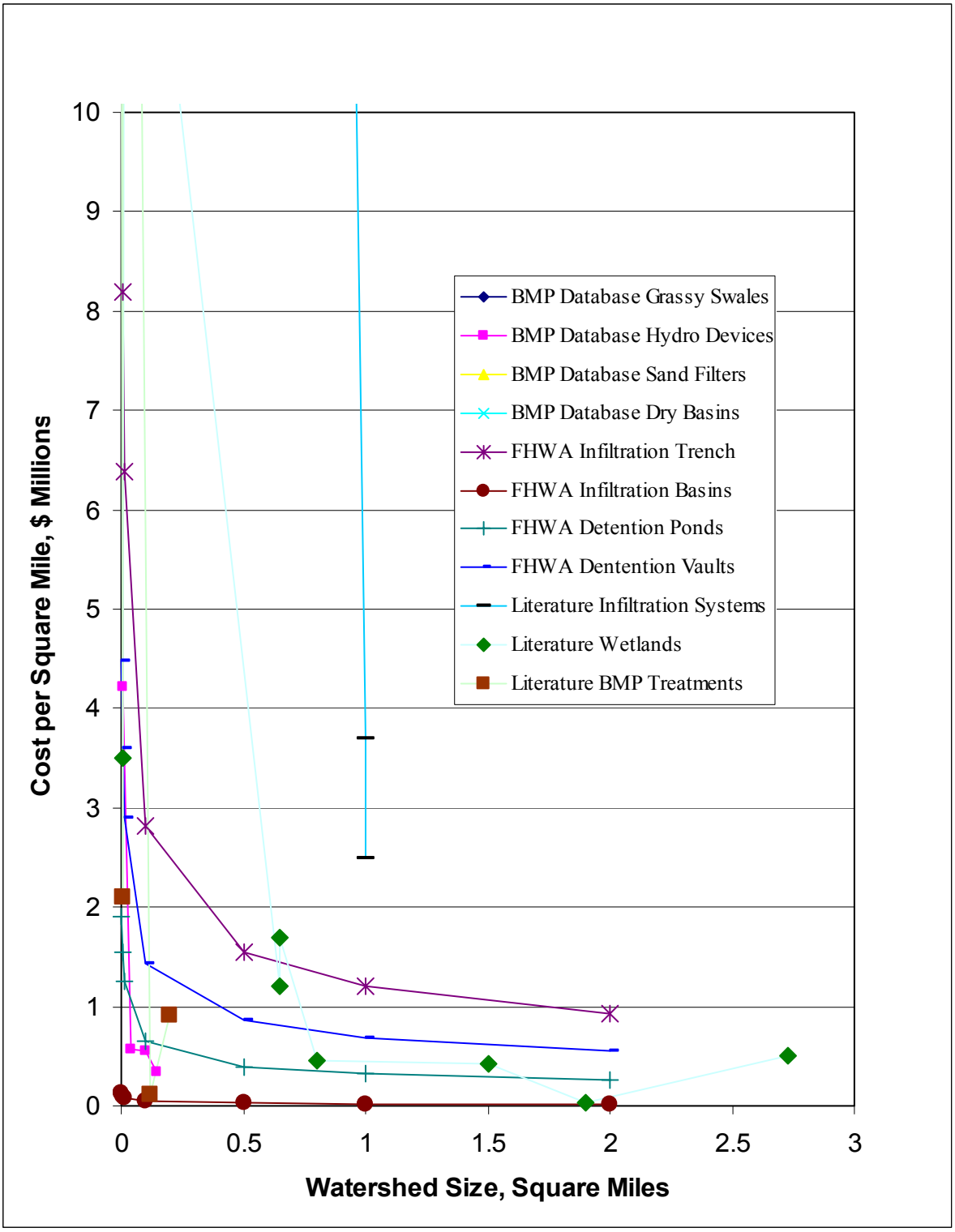

Figure 2. Cost per square mile versus unit size. Data are the same as those shown in Figure 1, but the axes have been magnified to show detail near the origin. Many data points fall outside of the plot.

Overall Costs of Stormwater Quality Control

It remains very difficult to produce an estimate of the total costs for complying with regulations in the Los Angeles Region. While there is substantial information on individual units that have been designed or implemented elsewhere, local factors are likely to make costs different in the Region. In most cases, it seems likely that costs in the Los Angeles Region will be higher than those reported elsewhere because land and labor costs are higher. Therefore, where a range of values is given, we have chosen the higher numbers.

This difficulty is compounded by the great variability in the data reported. To give just one example, the Federal Highway Administration formula estimates the cost of an infiltration basin needed to serve one square mile as $200,000. At the other extreme, the Herrerra Consultants report said that a detention/infiltration system for a residential area would cost $15 million per square mile. In preparing our total estimate, we have avoided using data that seem like outliers in comparison to the general run of the data.

The results compiled suggest two possible scenarios for stormwater quality control. The first approach is to rely on non-structural BMPs, such as programs to reduce littering, control pet waste, collect trash, prevent release of pollutants, and clean existing drains. This approach is less expensive because it involves no construction. However, there remains considerable doubt whether it will be sufficient to meet stormwater quality goals expressed as TMDLs (Total Maximum Daily Loads). Control of pollutant release will be only partial—we cannot expect that everyone will comply with the rules—and the amount of runoff will be reduced only slightly.

The second scenario presumes implementation of non-structural BMPs (except storm drain cleaning) and construction of a network of wetlands and infiltration basins sufficient to capture the first three-quarters of an inch of rainfall, which typically carries the bulk of the pollutants. These relatively simple installations are not likely to be sufficient without complementary measures to reduce releases of coliforms, trace metals, fertilizers and toxic organics. Wetlands help to remove these, but will not be effective if inputs are too high. Infiltration avoids all pollutant discharge, because it prevents release of the water, but it is necessary to protect groundwater quality, so once again, inputs must be restricted. The wetlands and infiltration basins would be designed to have sufficient retention capacity to hold the first ¾ inch of rainfall—this "first flush" carries most of the pollutants, but pollutant discharges must be sufficiently reduced so that subsequent flows can be discharged directly to storm drains.

In combination with the non-structural BMPs, wetlands and infiltration basins (designed as "stormwater parks") are likely to bring stormwater quality into compliance. This system will be more expensive, but it also carries greater secondary benefits: the region will gain much-needed greenspace, property values will be improved, and most important, it will substantially increase the availability of groundwater.

It is our recommendation that the responsible municipalities and agencies in the region begin at once on assessing stormwater quality on a neighborhood basis and implementing the non-structural controls. As the success of these measures is measured, it will become apparent whether the structural BMPs are needed. It seems certain that they will be needed in some areas, but they may not be needed throughout the region. Thus our estimate of costs ranges from a minimum budget needed for the non-structural

BMPs to a maximum representing the cost of an area-wide system of wetlands and infiltration basins. The following section provides the details of how the cost estimates were prepared.

Non-structural BMPs

An estimate of costs for non-structural BMPs has been prepared by the American Public Works Association (APWA, 1992). They defined five levels of BMPs that might be workable, with the appropriate level depending on the stringency of discharge requirements and the success of the individual measures. Their analysis included ten source control measures with cost data, and has been used as the starting point for the analysis here. Our treatment of each measure is described in the following paragraphs.

No littering ordinance. Litter laws are in place in the region, but there is a need for far more vigorous public education and enforcement. The APWA study determined that each municipality would spend $20,000 to put an enforcement program in place, and hire a half time person to manage the program ($30,000 per year). There are about a hundred municipalities in the Los Angeles Region, so this implies a startup cost of $200,000 and yearly costs of $3 million. Some officers will be necessary, but it is assumed that their pay will be covered by revenue from fines. Total costs are estimated to be $3 million plus the present worth of $3 million per year at 3%, or $103 million.

Pet waste ordinance. APWA predicted that the effort to control pet waste would be similar to that for litter, and estimated the same costs.

Chemical use and storage ordinance. APWA determined that a program to control the use and storage of chemicals would be similar is scope and cost to that for litter or pet waste. The same costs are estimated here. This would include the cost of programs to bring auto dismantlers and other local businesses into compliance.

Recycling programs. APWA predicted less trash would be discarded if convenient recycling programs were in place. Because these currently exist in most Los Angeles Region cities, and are justified by other concerns, no additional costs are estimated for this purpose.

Public education programs. Developing public support for stormwater quality control and explaining the need for citizen action will be vital to its success. The APWA determined a program costing $275,000 in each municipality would be necessary. However, it would be confusing and unnecessarily duplicative to have each of the one hundred municipalities in the Los Angeles Region conduct its own program. We instead assume a single program will be funded at the level of $5 million per year, which is approximately the current rate of expenditure. It also seems likely that education will not be needed indefinitely—to the degree that the message is successful, it will certainly become ingrained after perhaps ten years of advertising. We therefore estimate a total of $50 million for public education.

Vacant lot cleanup programs. This function will be part of the improved trash collection program, so funds are not separately allocated.

Spill prevention ordinance. APWA determined a separate program would be necessary to reduce the frequency of chemical spills and facilitate their rapid cleanup. This function has largely been overtaken by hazardous waste management regulations, and so is estimated to require no additional costs here.

Program to prevent illicit discharges. APWA determined that vigorous efforts would be needed to find and eliminate illicit discharges to the storm drain system. We agree that this will be necessary to avoid loads of non-biodegradable pollutants, such as trace metals, on treatment wetlands and infiltration basins, and to prevent excessive loading of organic contaminants and coliforms. APWA predicted a cost of $4 per acre of watershed to start, and $50 per acre per year thereafter in order to deploy and monitor sampling devices and to trace down points of discharge. For the 2,050 square miles in which stormwater protection is needed, this amounts to $6.5 million in capital expenses and $80 million per year in ongoing costs. We expect however, that many illicit connections will be found at first, and that after these are eliminated, only a small program will be needed to detect new illicit connections. We therefore estimate that the ongoing costs will continue for only five years, totaling $407 million.

Improved cleaning of storm drains. During dry periods, storm drains collect trash from illicit dumping and wind blown litter (we expect no trash will enter through the catch basins because screens will be installed). Sediments also accumulate in the channels. Releases to the rivers and ocean could be reduced by a summer program of storm drain cleaning. The APWA estimates such a program can be put in place for $21 per acre per year, or about $27 million per year over the area of concern. The present worth of $27 million per year is $900 million (assuming an interest rate of 3%). No storm drain cleaning is expected for the wetlands and infiltration scenarios, on the presumption that trash and sediments will be removed from the water before it enters the drains.

Trash control. Trash must be removed from the runoff. A settlement agreement on Trash TMDL between the LA Regional Water Board and the City of Los Angeles includes spending of $168 million to reduce trash releases by 50% in five years. Cleaning up the region required removing all of the trash from an urban area more than twice the size of the city. Thus the estimate of $600 million seems reasonable.

Low flow treatment. One of the best steps, in terms of water quality benefits per dollar, is to use excess capacity in the wastewater treatment plants for treatment of low flows. This will keep the rivers and oceans clean for most of the year at little additional cost. The City of Los Angeles estimates the cost of building the necessary diversion structures at $14 million (Kharaghani, 2003). The urban region is about twice the size of the city, so we have estimated a total cost of $28 million. This does not include operation costs. While there will be modest cost increases associated with the greater flows, the biggest costs are associated with the installed treatment capacity, which is already in place.

Improved street sweeping. The APWA report determined that sweeping should be improved by increasing its frequency. Research results developed since the APWA report suggest that more frequent sweeping with traditional brush machines produces only a modest improvement. However, changing to vacuum sweepers is effective, and can remove up to 50% of particulate pollutants.

The upgrade of street sweeping in the region will require purchasing new vacuum-type sweepers to replace those currently in use. There are about 400 street sweeping machines in use, which must be replaced once every four years, so 100 machines will be purchased each year. Vacuum machines cost about $150,000 rather than the $75,000 for standard machines. Thus the additional costs of higher quality

sweeping are $75,000 per machine or about $7.5 million per year. Assuming an interest rate of 3%, this has a present worth of about $250 million.

Costs for on-site BMPs for private firms. It is anticipated that application of non-structural BMPS will include requirements that businesses make efforts to reduce pollution and runoff from their facilities. Efforts are likely to be highly variable: an accounting firm whose work is all done in offices might need to do no more that redirect its roof runoff to landscaping areas. A manufacturing facility might install sand filters and oil-water separators. Parking lots may be remodeled. It is difficult to provide an estimate for these efforts, but a general approximation for the total can be approached if firms are considered by size (Table 3). Data on the number of firms within chosen size ranges, measured by the number of employees, have been compiled for Los Angeles County by the California Employment Development Department (2001). Again, this area is not the same as the Los Angeles Region governed by LA Regional Water Board, but there is substantial overlap and the demographics are similar.

Table 3. Estimate of On-site BMP Costs for Los Angeles County Firms by Size Class

Number of Employees	Number of Firms	Average Cost per Firm	Total Costs
0-4	219,974	10	$2,199,740
5-9	37,125	500	18,562,500
10-19	25,366	1,000	25,366,000
20-49	19,682	2,000	39,364,000
50-99	7,745	5,000	38,725,000
100-249	4,239	10,000	42,390,000
250-499	1,138	25,000	28,450,000
500-999	408	50,000	20,400,000
1000+	260	100,000	26,000,000
Totals	315,937		241,457,240
		Average cost per firm	$764

Most small firms will not spend any money, so the average cost per firm is expected to be very low. A few might be required to improve trash disposal methods or reroute their rooftop drainage. At the other extreme, the largest companies might improve trash disposal and materials handling methods, build infiltration system planters, install oil-water separators, institute parking lot and work area sweeping. Companies that install new parking lots or reconstruct old ones may incur significant costs.

Costs for compliance with the "3/4-inch rule". The SUSMP regulations promulgated by the LA Regional Water Board require that new developments larger than one acre and redevelopment must provide for infiltration or minimal treatment of runoff from the first ¾-inch of rainfall from a storm event. It is difficult to determine how much this will cost. Proponents have suggested the costs will be minimal, while opponents

have predicted high costs. Experts contacted during this study were of the general opinion that landscaping designed to infiltrate the runoff from a ¾-inch storm would be different, but not significantly more expensive, than traditional landscaping. On the other hand, engineers in the discipline believe that most builders are choosing treatment systems rather than infiltration. The stormwater control costs will likely be a small fraction of building costs. Ultimately, we have concluded that there are not sufficient data to make a numerical cost estimate. The costs are therefore described here only as "modest", and further study is recommended.

Wetlands and Infiltration Basins: Estimate Based on Cost per Square Mile of Watershed

The land within the Los Angeles Region varies from lightly settled areas, like the upper reaches of the Santa Clara River Watershed or the Santa Monica Mountains, through neighborhoods of single family homes with yards, to the extremely dense development of downtown Los Angeles or the Wilshire District. There are about 1,375 square miles of incorporated cities in Los Angeles County. The region of the LA Regional Water Board includes parts of Ventura County, and parts of both counties that are not incorporated are never the less populated. To evaluate the possible alternatives for runoff control, we have conceptually divided the 3,100-square-mile region that is under the jurisdiction of the Los Angeles Regional Water Quality Control Board into four parts 1000 square miles is estimated to be of "low density", requiring some runoff BMP treatment, but having sufficient land for development of treatment wetlands or infiltration systems. 1,000 square miles is estimated to be "high density" requiring infiltration systems but excluding wetlands. 50 square miles is estimated to be extremely dense downtown development, requiring some more sophisticated BMP treatment systems. The remainder of the region is considered rural, and we presume the only cost is for source control outreach and enforcement. These definitions and numbers are approximate, but there is also flexibility in the applicability of the various technologies.

For the low density urban areas, we assume some combination of infiltration systems and treatment wetlands will be constructed. The range of reported costs for treatment wetlands runs from $110,000 per square mile for Murray City, Utah, to $1.7 million per square mile for the Treasure Island wetland in San Francisco. The San Diego Creek wetland system seems an excellent example—it is designed for a populated region of Orange County that is quite similar to many areas in Los Angeles County. However, it is specifically designed to treat low flows only, and the total cost of the system has not been provided (except that it is less than $500,000 per square mile). The Long Lake retrofit also seems like an appropriate example. It uses a mix of wetland, infiltration and biological BMPs in an urban residential area, and has a well-established cost of $420,000 per square mile. We have therefore used this value in our total estimate of $420 million for the low density areas.

In areas of high density housing, where yards are small, or in industrial areas with large roof and parking areas, runoff coefficients are higher and there is less land available. Here it seems likely that infiltration systems will be necessary. The best example for comparison is the Fresno Metropolitan Flood Control District, which installed 130 basins over an area of 120 square miles, with many of the facilities dedicated to multiple uses as parks and playing fields. Cost estimates for the system range from $2.5 million to $3.7 million per square mile. While a similar system built in

the Los Angeles Region could take advantage of existing parks, power line rights-of-way, parking lots, and other available land, it seems appropriate to use the higher number because land here will be more expensive. Thus we estimate cost in these areas to be $3.7 million per square mile for a total of $3.7 billion.

In extremely dense areas, neither wetlands nor infiltration systems will be possible. Pollutant loads, despite source control efforts, will be considerable in the near future. Underground sand filters, sediment traps, oil and grease adsorbants and other more elaborate treatment BMPs will be needed. The lowest-cost processes are filter strips, dry swales and bioretention areas, but these require space that is unlikely to be available (the Hillsboro, Oregon compost filter, at $110,000 per square mile is considered an outlier). Even the Alexandria, Virginia airport parking lot solution is unlikely to be workable because so much of the parking area is in multi-level structures in downtown areas. This combination of more pollutants and less space suggests that the Oakland Park, Florida system for treating industrial runoff is the best case example. Its cost was equivalent to $33 million per square mile, for a total of $1.65 billion over the extremely dense urban area.

Together, this approach estimates that the total BMP facilities cost will be about $5.7 billion.

Wetlands and Infiltration Basins: Estimate Based on Needed Retention Capacity

Investigators working on the Sun Valley Project (Los Angeles County Department of Public Works, 2003, Figure 4-3 of page 4-8) have designed several BMPs and provided carefully calculated cost estimates. These are recent figures, reduced to present worth, and reflecting the local conditions in the urban Los Angeles Region. They provide costs in terms of dollars per acre-foot of stormwater storage capacity for several BMPs. Three examples have been chosen for consideration here: Stonehurst Park and Wentworth Park (which simply lower the park level to two feet below the surrounding area so that they serve as infiltration basins, or "stormwater parks"), and storage in below-street infiltration vaults. A system that stores the runoff from a ¾-inch storm will comply with SUSMP requirements. In the low density areas, it is estimated that the runoff coefficient is 0.4. In the high density areas, it is estimated to be 0.6, and in the extremely dense areas it is estimated to be 1.0.

We estimate that the low-density areas can be served at the Stonehurst Park price, the high density areas can be served at the Wentworth Park price, and the extremely dense areas can be served by street infiltration vaults. This approach to estimating the total cost is completely independent of the first approach, but the final estimate of $4.0 billion for BMP facilities is reasonably similar.

Wetlands and Infiltration Basins: Estimation of Total Costs from the APWA Study

The APWA study produced total estimates for costs for the nation for five scenarios for stormwater quality control. One estimate was for a system of detention basins and wetlands, as is being proposed for the structural BMPs described here. They estimated that a national system would cost $91 billion. For 260 million people in the United States, this is about $350 per capita. For the 10 million people in the Los Angeles Region, this produces an estimate of $3.5 billion. The APWA anticipated maintenance costs for detention and retention basins at about 1% of the construction cost per year. Discounted to present worth, this increases the total cost by 33%, or $1.2 billion. APWA

numbers thus indicate a total cost of $4.7 billion. This estimate is similar to those shown for the entries in Table 3 for facilities costs for alternatives B and C.

Wetlands and Infiltration Basins: An "Upper Bound" Provided by the Sun Valley Study

The Sun Valley study developed a detailed design for a 4.4 square mile watershed that currently has no storm drains. It was designed to contain the water from a 50-year, 3-day storm—14.8 inches of rain—using stormwater parks and below-street infiltration vaults. Because this approach will infiltrate essentially all of the rain that runs off from the area, and because the design criterion of 14.8 inches greatly exceeds the ¾ inch assumed here, it unquestionably constitutes a plan that would overcomply with the strictest imaginable stormwater quality control regulations. Further, because it is a complete and detailed design, it is essentially certain that it can be built for the cost estimated. Figures are recent, and reflect the costs of construction in the Southern California area.

The costs determined can therefore serve as an "upper bound" multiple benefit expenditure that a municipality could imaginable be required to incur—while there is every reason to suppose that the easier goal of stormwater quality control can be done for a much lower cost. The low cost alternative described was $171 million for 4.4 square miles, or $39 million per square mile. For the 1050 square miles of the high density and extremely dense urban Los Angeles Region, this would result in a cost of $41 billion. Wetlands for the low-density areas and trash control for the entire region would add about $1 billion more. Thus we can say with great certainty that no alternative more expensive than $42 billion will be needed.

Overall Benefits of Stormwater Quality Control

The Esthetic Value of a Clean Ocean

Much of the value of living near clean streams and a pollution-free ocean is difficult to quantify. People enjoy the view, they like watching wildlife, and they prefer vegetation and sand and water to pavement. Some efforts to place a dollar value on these benefits have been made by the EPA (1999) and others (Kramer, 2003; Soderqvist, 2000; Whitehead, et al., 2000).

Soderqvist asked residents in the area of the Stockholm archipelago how much they were willing to pay in order to reduce eutrophication of the nearby ocean. The effects of oceanic eutrophication are relatively subtle—less obvious than floating trash or debris washed up on the beach. He determined the willingness to pay to be between $54 and $90 per person.

Whitehead investigated resident willingness to pay for reduction of eutrophication of the Neuse River Basin in North Carolina. He found 44,000 landowners were willing to pay about $76 each for the water quality improvement.

Kramer surveyed people in the area of the Catawba River in North and South Carolina, asking about willingness to pay for improved water. The average result was $139 per taxpayer.

The EPA surveyed people across the U.S., asking about their willingness to pay for the various services associated with improvements in fresh water quality. They found people willing to pay $210 per household for improvement of water quality sufficient to support boating, $158 for the further improvement sufficient to support fishing, $177 for

further improvement sufficient to allow swimming, and $158 for improvement sufficient to support natural aquatic life. Of the total of $703, however, only 67% was ascribed to local water quality improvement, while the rest was associated with improvement nationwide. Assuming 2.5 persons per household, this results in an estimate of $188 per person for willingness to pay for local freshwater improvements, similar to the estimate by Kramer for the Catawba River.

We have chosen the EPA estimate for freshwater improvements: the higher estimate seems reasonable because freshwater resources in the LA basin are generally in very poor condition, and because we have ignored the national effect (their results indicated that people throughout the nation were willing to pay for improvements throughout the nation—we are not counting the willingness of people outside the LA Region to pay for improvements here, and that number is not zero). Adding this to a mid-range value of the Soderqvist estimate for improvements in ocean water quality produces a result of $260 per person. This seems a quite reasonable value. 9.5 million people live in the Los Angeles Region, so this value indicates a total willingness to pay, based solely on the value of living in a region of clean waters, of about $2.5 billion.

Larsen and Kew (2003) have surveyed residents of California to determine their total willingness to pay for removing all impairments from bodies of water in the state. They determined that the average willingness to pay was $15.46 per month. Assuming 2.5 persons per household, this is $6.18 per person per month. For 9.5 million residents in the Los Angeles Region, this is $58.7 million per month, with a present worth of $23 billion. This represents the value of removing all impairments—including those caused by wastewater pollution, shoreside development, pollution from boats, and others. Our estimate for stormwater pollution alone is about one-tenth of this. Thus the Larsen and Kew results suggest our estimate is reasonable and conservative.

General support for these numbers was found in a survey done for the Packard Foundation performed by Mark Baldassare (Weisse, 2003). He determined that seven of ten Californians are concerned about the decline in coastal resources. Sixty-nine percent said the condition of the coastline is very important to their quality of life, and 75% visit the coast at least several times each year. Seventy-two percent favor reducing stormwater pollution, even if the cost leads to higher utility bills.

Ecosystem Services

A primary purpose of stormwater quality control is protection of nearshore marine ecosystems. These ecosystems provide humanity with a wide variety of services, ranging from educational opportunity to fish resources to chemical maintenance of the atmosphere. While the effort to value such ecosystem services is necessarily difficult and approximate, some studies have been made. Costanza, et al. (1997) in an article published in the respected journal *Nature*, assessed the value of coastal ecosystems at $12 trillion per year worldwide. The World Resources Institute estimates that there are 1.6 million kilometers of coastline (measured at a resolution of 1 kilometer). If we assume that stormwater discharges from the Los Angeles Region affect about 100 miles, or 160 kilometers of coastline, this is 0.01% of the world's total, suggesting that the value of local coastal resources is $1.2 billion per year. Assuming an interest rate of 3%, this income stream has a present worth of $40 billion. Finally, we can make the general

approximation that stormwater pollution reduces the services provided by the local coastal ecosystem by 5%. This suggests that the value of lost services is $2 billion.

This number is quite approximate. It must secondly be interpreted thoughtfully because it includes services such as nutrient cycling and maintenance of the atmosphere, which are of undoubted value to the world, but which do not show up in the daily budgets of local citizens or local municipalities. The services are nevertheless quite real and quite valuable, and should be included in the accounting.

Additional Water Supply

Infiltration of stormwater will add to area groundwater reserves. These are a valuable resource that currently provides a substantial fraction of the Los Angeles Region water supply. Water that is infiltrated from the stormwater quality control system will add to local resources, reducing the need for imported water. We assumed that water will be collected from 2050 square miles. Rainfall ranges from 12 to 16 inches per year in the region, and infiltration is from 2 to 8 inches per year. It is conservative to assume that installation of a distributed system of infiltration basins will increase infiltration in this area by an average of 3 inches per year, corresponding to collection of four storms of ¾ inches (or a larger number of smaller storms). Thus total infiltration will be 300,000 acre-feet per year. Some of this may be unrecoverable, having entered contaminated or otherwise unusable aquifers. However, even this will contribute to reducing the problems of seawater intrusion. We estimate that about 90% or 270,000 acre-feet of the infiltrated water will be available.

Current importation costs are about $450 per acre-foot. However, current supply shortages are forcing serious consideration of desalination as an alternative source because political and environmental factors preclude significant increases in importation. We predict that continued growth in the Los Angeles Region will require that water be obtained from such high-cost sources, so we have used $800 per acre-foot as the value of the infiltrated ground water. Further, even if water is available for $450 per-acre foot, this is only the marginal financial cost of import—the true life cycle cost, including environmental impacts in source areas, is surely much higher. 270,000 acre-feet of water per year at $800 per acre-foot amounts to $216 million per year. The present worth of this income stream is $7.2 billion.

The appropriate number is highly dependent on assumptions: if conservation measures are effective and growth is slow, desalination might not be necessary. However if we include the costs of political friction with source areas, and the environmental impact of water transfers on those areas—that is, the full life-cycle cost of imported water, even the cost estimate of $800 per acre-foot may be low.

Flood Control

The flood control system in Los Angeles County is currently designed to cope with runoff from areas with a runoff coefficient on the order of 0.5. Stormwater quality control measures could substantially reduce this number—currently the coefficient for the San Gabriel Valley, measured below the spreading grounds at Whittier Narrows, is 0.05. Calculations suggest that the recent Army Corps of Engineers project that raised the embankments along the lower Los Angeles River have eliminated the 100-year flood plain for now, and property owners have correspondingly been relieved of flood insurance costs of $20 million or $30 million per year. However, if development

continues to increase the runoff coefficient of the region, progressively more expensive projects will be required—it is likely that further protection would require rebuilding many bridges. Alternatively, flood insurance will once again be necessary, and uninsured properties will be at risk. It is perhaps reasonable to presume that infiltration systems will avoid the cost of the next embankment project, which could easily costs twice as much as the one just completed, or $400 million.

A second estimate can be developed this way: The National Flood Insurance Program says there are 25,620 policies held in Los Angeles County with an average premium of $550, for a total yearly cost of $14 million. The present worth at 3% is $466 million. Presumably, most but not all of this could be avoided with a complete stowmwater quality control system. Thus the estimate of $400 million seems reasonable.

Property Value Improvements from Greenspace and Water

Certainly additional parks and other greenspace would add to property values. Developers frequently add central lakes or greenspace to large developments, demonstrating their belief that the value of the land for additional housing is less than its value as an amenity. In a study compiled in 1995, the U.S. EPA said (U.S. EPA, 1995):

> "People have a strong emotional attachment to water, arising from its aesthetic qualities--tranquility, coolness, and beauty. As a result, most waterbodies within developments can be used as marketing tools to set the tone for entire projects (Tourbier and Westmacott, 1992). A recent study conducted by the National Association of Home Builders indicates that "whether a beach, pond, or stream, the proximity to water raises the value of a home by up to 28 percent." A 1991 American Housing Survey conducted by the Department of Housing and Urban Development and the Department of Commerce also concurs that "when all else is equal, the price of a home located within 300 feet from a body of water increases by up to 27.8 percent" (NAHB, 1993). Dick Dillingham, President of the National Association of Realtors' Residential Sales Council, declares, "Water makes a difference . . . there is such a very small supply of properties that can claim a water location and it is something you cannot add" (Lehman, 1994)."

Homes overlooking the new wetlands and greenspace will see the greatest increase in property values. Those farther away will appreciate less. A study reported by Fairfax County, Virginia, (Environmental Coordinating Committee, 2003) interpreted the EPA results and concluded that an aesthetically valuable pond raises the value of nearby houses by $10,000 each. In Los Angeles County, the median home is valued at about $400,000, so a $10,000 increase is about 2.5%, which seems a reasonable number. Demographic data for Los Angeles County (This is not the same as the Los Angeles Region governed by the Water Quality Control Board, but there is considerable overlap, and the demographics are quite similar) indicate there are 3.27 million homes, of which 47.9%, or 1.55 million, are owner-occupied. We expect that about one-third of these, or 500,000 homes, would benefit from additional greenspace in a complete stormwater control system (the others could be too remote, or might already have sufficient greenspace). Increasing the value of each home by $10,000 provides a total benefit of $5 billion.

Improved Property Values from Trash Control

Enforcement of litter laws and improved street cleaning would improve the appearance of our neighborhoods. It is believed that the esthetic improvement would have a value to individuals at least equal to the esthetic benefits of a cleaner ocean, so we have valued this at $100 per person, for a total of $950 million.

Cost Savings from Reduced Dredging

Costs for sediment dredging and disposal in area harbors range from about $10 per ton, when the sediment is clean and a nearby disposal site is available, to $30 per ton when the sediment is contaminated or the disposal site is distant. Disposal of sediments classified as toxic may cost $100 per ton. Personnel at Los Angeles Harbor estimate that about 40% of currently dredged sediment is contaminated, and occasional loads are toxic. In general, acceptable disposal sites are becoming harder to find, so distant sites are likely to be the rule. Thus, an estimate for future sediment removal of $30 per ton is reasonable. The Environmental Protection Agency has estimated overall costs and effectiveness for sediment control at construction sites, and the results indicate that preventing the runoff of a ton of sediment costs from $69 to $86 (Appendix II). Therefore, the savings associated with alleviation of harbor sedimentation alone offset about a third of the costs of construction site measures. Savings for Los Angeles Harbor will be about $3 million per year. Regional savings will be about $10 million, with a present worth of $330 million.

To cite another example, it is estimated that the San Joaquin Marsh wetland preserve collects 50,000 tons of sediment per year. Assuming a removal cost of $30 per ton, the benefit for Newport Bay, which is just downstream, is $1.5 million per year.

Cost Savings from Improved Public Health

Sufficient data do not exist for estimating the value of benefits from reduced exposure to air pollutants. Certainly fine particles are an important part of the causes of health impairment, and experts agree that resuspension of road dust is an important contributor to fine particle exposure at street level where we live. They also contribute substantially to settlement of dust and dirt on buildings, requiring cleaning expenses. However, estimates of the magnitude of this effect are not currently possible.

Summary of predicted costs and benefits

Table 3 presents a summary of the estimated costs and benefits. Three estimates are included. In the first (A), non-structural BMPs are presumed to be the only measures employed. In the second (B), wetlands and infiltration basins are assumed, and the costs are estimated on a cost-per-square-mile basis. The third set of columns (C) again describes the wetlands and infiltration basins scenario, but makes cost estimates on a per-acre-foot-detention basis. The second and third estimates also presume implementation of the non-structural BMPs, except for storm drain cleaning.

Benefits differ because implementation on non-structural BMPs does not produce property increases associated with greenspace, does not significantly increase groundwater supply, and does not reduce harbor sedimentation.

The costs of stormwater quality control are significant. Non-structural BMPs alone will cost $2.6 billion. Structural systems, including wetlands and infiltration basins, will cost between $5.7 billion and $7.4 billion. However, it should be noted that these costs will be borne over a period of many years—probably ten years at least. More

importantly, the benefits of these expenditures considerably exceed their costs. For the non-structural BMPs alone, the benefit-to-cost ratio is 1.9. For the structural approach the estimates are 2.5 and 3.3. Control of pollution and reestablishment of the hydrologic cycle will produce a greener city with higher property values, better esthetics, cleaner rivers and a cleaner ocean, and a larger and more stable water supply.

Table 2. Overall Cost Estimate for Stormwater Quality Control in the Los Angeles Region

Sums are rounded to two significant figures

		A. Non-Structural BMPs, modified from APWA			B. Wetlands and Infiltration Basins, watershed area basis		C. Wetlands and Infiltration Basins, detention volume basis		
Regions and BMPs	**Area, sq. miles**	**Capi-tal Cost $M**	**O&M Costs $M**	**Total $M**	**Cost / square mile, $M**	**Cost or Bene-fit $M**	**Acre-feet initial flow**	**Cost per acre-foot**	**Cost or Bene-fit, $M**
Costs for Non-Structural BMPs									
No Littering Ordinance		2.5	3	103		103			103
Pet Waste Ordinance		2.5	3	103		103			103
Chemical Use and Storage		2.5	3	103		103			103
Public Education			5	50		50			50
Illicit Discharge Program		6.5	80	407		407			407
Increased Cleaning of Drains			27	900					
Trash Control				608		608			608
Low Flow Sanitary Treatment				28		28			28
Improved Street Cleaning	2050			250		250			250
Private On-site BMPs		241		241		241			241
New construction rules				Mod-est		Mod-est			Mod-est
Total N-S BMPs				2791		1891			1891
Costs for Structural BMPs									
Rural	1050					0			0
Low Density, Industrial (C=0.4)	1000				0.42	420	15,500	0.053	822
High Density (C=0.6)	1000				3.70	3,700	23,250	0.098	2,279
Extremely Dense (C=1.0)	50				33.00	1,650	1,938	0.470	911
Total Facilities Costs						5,770			4,011
Total Cost, LA Region				**2550**		**7420**			**5661**
Benefits									
Flood Control						400			400
Greenspace, Water Property Values						5,000			5,000
Clean Ocean Esthetics				2500		2,500			2,500
Clean Streets Esthetics				950		950			950
Groundwater Replenishment						7,200			7,200
Improved Beach Tourism				100		100			100
Preservation of Ocean Ecosystems				2000		2,000			2,000
Reduced Harbor Sedimentation						330			330
Improved Health, Cleaner Buildings, Reduced Exposure to Particulates						Sig-nificant			Sig-nificant
Total Benefits, LA Region				**5600**		**18,000**			**18,000**

Recommendations for Action

The results developed here indicate that a distributed approach to stormwater quality control, employing non-structural BMPS with a system of wetlands and infiltration basins will achieve stormwater quality compliance and will be far cheaper than advanced treatment plants. It is recommended that the responsible organizations begin immediately with the non-structural measures, analyze their effectiveness, and add wetlands and infiltration systems as necessary to achieve the goal of protecting the rivers and coastal zones of the Los Angeles Region. Our results indicate that the benefit-to-cost ratio for the non-structural BMPs is about two, and for the larger effort is about 3. Thus both the beginning effort and the full response represent good investments for the people of the region.

Outreach

Municipalities that are finding themselves responsible for stormwater cleanup should act immediately to lay the groundwork for comprehensive programs. Outreach programs should be developed to inform the public of the problems and of what they can do to help with the solution. Vigorous efforts to reduce littering, for example, will reduce costs in subsequent steps as programs develop. Current regulations controlling release of sediments from construction sites should be enforced and supplemented with contractor education efforts.

Data Collection and Planning

Municipalities should immediately begin the process of determining the extent and nature of their individual stormwater quality problems. Many may find, for example, that stormwater from neighborhoods of single-family homes can be discharged to rivers or infiltrated with little or no treatment. Early identification and elimination of problem sources might greatly reduce later expenditures on treatment systems—the programs of thorough data collection and vigorous enforcement described earlier were notably effective at reducing pollutant concentrations in discharges and cost very little. It will certainly be a tragedy if we build expensive treatment systems to solve a problem that can be eliminated with a citation.

Municipalities should also immediately assess their property holdings. Cities frequently own substantial amounts of land, and some of this will be appropriate for stormwater control facilities. Purchasing programs should be developed immediately, so that cities can take advantage of opportunities for economical land acquisition as they arise.

Administrative Structure

Adding to the daunting technical and financial problems, the distributed approach for stormwater control requires that problems be solved by a holistic effort for each sub-watershed. The boundaries of sub-watersheds do not correspond to political boundaries, and cities will be forced to cooperate in ways that have never been required before. Further, controlling local pollution releases and restoring the hydrologic cycle involve issues that have traditionally be dealt with by an astonishing variety of agencies. If we imagine controlling the runoff quality of a sub-watershed by installing a park/infiltration system with associated wetlands, for example, efforts should include the sanitation

districts for the cities overlapping the sub-watershed (because of stormwater quality control), the Water Replenishment District (because of groundwater infiltration), the County Flood Control District (because the park will contribute to flood control and reduce the cost of downstream facilities), parks departments (because a recreational area will result), and wildlife agencies (governing the habitat created). It is reasonable to expect, moreover, that each of these agencies will contribute to the funding necessary for construction and maintenance. It is likely that, with appropriate apportionment, such a facility will have a favorable cost/benefit ratio for each of the agencies involved. It is certain that gaining the cooperation and contributions of all of these agencies will be extremely difficult. It may be appropriate that legislation be passed at the state level to provide a means for bringing these agencies together.

Funding

While runoff quality can be controlled by methods significantly cheaper than the massive construction of advanced treatment plants, the cost remains significant, and comes at a time when state and local governments are desperately short of funds. It is reasonable to suggest that funding should come from those who contribute to the problem, so that the taxation system mimics a market—assigning costs to the activity that generates them. Hundreds of municipal stormwater utilities, for example, have instituted a tax that is proportional to the number of square feet of impermeable surface on the land. An extension to this approach is to give property-owners fee rebates for installing BMPs that lower runoff quantity or increase water quality. This approach, or others that encourage owners to reduce their runoff, could fund the solution even as they reduce the magnitude of the problem. Certainly fines for littering should be used to fund litter law enforcement in the way that parking fines fund parking enforcement. Efforts to control illegal discharges could be at least partially supported by fines of those making the discharges. All of these approaches would be consistent with the principle that the polluter should pay, and would provide incentives that would contribute to stormwater cleanup.

A “cap and trade” system would be one means of approaching the funding dilemma. If all landowners were given the choice of either purchasing tradable discharge allowances or cleaning up runoff, a free-market trading system would allow owners to trade these allowances and in the process assign stormwater runoff reduction to owners who are able to cheaply install BMPs. This system, or a combined stormwater utility fee with BMP credits, would tend to produce the lowest cost solution overall. A study under way in Cincinnati, Ohio, suggests that such systems could be successful (Thurston et al., 2003).

Changes in Building Codes

This study indicates that parking lots constitute a significant resource for promoting stormwater infiltration. Building codes should be amended immediately to require that all new or reconstructed parking lots be designed to infiltrate the water that they collect. While there will be costs associated with the infiltration systems, the work described above indicates that much—and often all—of these costs can be offset by reduced costs for curbs and drainage systems.

Very large facilities, such as those for malls, should be considered sites for installation of subsurface infiltration vaults that could receive water from surrounding areas as well. These could be installed in sections, to minimize disruption to the commercial establishments. A mechanism could be established by which the site owners are compensated for the costs of handling the runoff.

Other building codes should be changed to encourage on-site infiltration of water rather than rapid drainage to the street. It may also be appropriate to consider limitations on the use of architectural copper sheeting, which can release copper ions to stormwater, and on the use of galvanized materials, which can release zinc.

Purchase of High-Efficiency Street Sweeping Equipment

Improved street sweeping seems very likely to be an important part of future stormwater programs. It can remove 30 to 50 percent of the particulate-associated pollutants, substantially reducing the load on downstream systems. It will have the secondary benefits of improving neighborhood appearance and reducing the exposure to air pollutants at street level. Municipalities should make the decision now to purchase only high-efficiency vacuum sweepers as they make routine replacements of their street cleaning machinery.

Investigation of Coliform Sources

Additional studies, particularly employing newly available methods for rapid identification of microorganisms, should be done to determine the sources of pathogenic organisms in stormwater.

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APPENDIX I.
BEST MANAGEMENT PRACTICES FOR CONSTRUCTION SITES

(Adapted from the Washington State Department of Ecology Water Quality Program, 2001).

The **12 Elements** of Storm Water Pollution Prevention Plan (SWPPP):

Mark Clearing Limits

Prior to beginning land disturbing activities all clearing limits, sensitive areas and their buffers, and trees that are to be preserved shall be clearly marked, both in the field and on the plans, to prevent damage and offsite impacts.

Preserving Natural Vegetation

The purpose of preserving natural vegetation is to reduce erosion wherever practicable. Limiting site disturbance is the single most effective method for reducing erosion.

Buffer Zones

An undisturbed area or strip of natural vegetation or an established suitable planting will provide a living filter to reduce soil erosion and runoff velocities.

High Visibility Plastic or Metal Fence, Stake and Wire Fence

Fencing is intended to: (1) restrict clearing to approved limits; (2) prevent disturbance of sensitive areas, their buffers; (3) limit construction traffic to designated construction entrances or roads; and, (4) protect areas where marking with survey tape may not provide adequate protection.

Establish Construction Access

To minimize the tracking of sediment onto public roads and into surface waters:

Stabilized Construction Entrance

Construction entrances are stabilized to reduce the amount of sediment transported onto paved roads by vehicles or equipment by constructing a stabilized pad of quarry spalls at entrances to construction sites.

Wheel Wash

Wheel washes reduce the amount of sediment transported onto paved roads by motor vehicles.

Construction Road/Parking Area Stabilization

Stabilizing subdivision roads, parking areas, and other onsite vehicle transportation routes immediately after grading reduces erosion caused by construction traffic or runoff.

Control Flow Rates

Properties and waterways downstream from development sites shall be protected from erosion due to increases in the volume, velocity, and peak flow rate of stormwater runoff from the project site.

Sediment Trap

A sediment trap is a small temporary ponding area with a gravel outlet used to collect and store sediment from sites cleared and/or graded during construction.

Temporary Sediment Pond

Sediment ponds remove sediment from runoff originating from disturbed areas of the site. Sediment ponds are typically designed to remove sediment no smaller than medium silt (0.02 mm).

Install Sediment Controls

Straw Bale Barrier

To decrease the velocity of sheet flows and intercept and detain small amounts of sediment from disturbed areas of limited extent, preventing sediment from leaving the site.

Brush Barrier

The purpose of brush barriers is to reduce the transport of coarse sediment from a construction site by providing a temporary physical barrier to sediment and reducing the runoff velocities of overland flow.

Gravel Filter Berm

A gravel filter berm is constructed on rights-of-way or traffic areas within a construction site to retain sediment by using a filter berm of gravel or crushed rock.

Silt Fence

Use of a silt fence reduces the transport of coarse sediment from a construction site by providing a temporary physical barrier to sediment and reducing the runoff velocities of overland flow.

Vegetated Strip

Vegetated strips reduce the transport of coarse sediment from a construction site by providing a temporary physical barrier to sediment and reducing the runoff velocities of overland flow.

Straw Wattles

Straw wattles are temporary erosion and sediment control barriers consisting of straw that is wrapped in biodegradable tubular plastic or similar encasing material. They reduce the velocity and can spread the flow of rill and sheet runoff, and can capture and retain sediment.

Sediment Trap

A sediment trap is a small temporary ponding area with a gravel outlet used to collect and store sediment from sites cleared and/or graded during construction.

Temporary Sediment Pond

Sediment ponds remove sediment from runoff originating from disturbed areas of the site. Sediment ponds are typically designed to remove sediment no smaller than medium silt (0.02 mm).

Construction Stormwater Chemical Treatment

Turbidity is difficult to control once fine particles are suspended in stormwater runoff from a construction site. Sedimentation ponds are effective at removing larger particulate matter by gravity settling, but are ineffective at removing smaller particulates such as clay and fine silt. Sediment ponds are typically designed to remove sediment no smaller than medium silt (0.02 mm). Chemical treatment may be used to reduce the turbidity of stormwater runoff.

Construction Stormwater Filtration

Filtration removes sediment from runoff originating from disturbed areas of the site.

Stabilize Soils

Exposed and unworked soils shall be stabilized by application of effective BMPs that protect the soil from the erosive forces of raindrops, flowing water, and wind.

Temporary and Permanent Seeding

Seeding is intended to reduce erosion by stabilizing exposed soils. A well-established vegetative cover is one of the most effective methods of reducing erosion.

Mulching

The purpose of mulching soils is to provide immediate temporary protection from erosion. Mulch also enhances plant establishment by conserving moisture, holding fertilizer, seed, and topsoil in place, and moderating soil temperatures.

Nets and Blankets

Erosion control nets and blankets are intended to prevent erosion and hold seed and mulch in place on steep slopes and in channels so that vegetation can become well established. In addition, some nets and blankets can be used to permanently reinforce turf to protect drainage ways during high flows.

Plastic Covering

Plastic covering provides immediate, short-term erosion protection to slopes and disturbed areas.

Sodding

The purpose of sodding is to establish permanent turf for immediate erosion protection and to stabilize drainage ways where concentrated overland flow will occur.

Topsoiling

Addition of topsoil will provide a suitable growth medium for final site stabilization with vegetation. While not a permanent cover practice in itself, topsoiling is an integral component of providing permanent cover in those areas where there is an unsuitable soil surface for plant growth. Native soils and disturbed soils that have been organically amended not only retain much more stormwater, but they also serve as effective biofilters for urban pollutants and, by supporting more vigorous plant growth, reduce the water, fertilizer and pesticides needed to support installed landscapes. Topsoil does not include any subsoils but only the material from the top several inches, including organic debris.

Polyacrylamide for Soil Erosion Protection

Polyacrylamide (PAM) is used on construction sites to prevent soil erosion. Applying PAM to bare soil in advance of a rain event significantly reduces erosion and controls sediment in two ways. First, PAM increases the soil's available pore volume, thus increasing infiltration through flocculation and reducing the quantity of stormwater runoff. Second, it increases flocculation of suspended particles and aids in their deposition, thus reducing stormwater runoff turbidity and improving water quality.

Surface Roughening

Surface roughening aids in the establishment of vegetative cover, reduces runoff velocity, increases infiltration, and provides for sediment trapping through the provision of a rough soil surface.

Gradient Terraces

Gradient terraces reduce erosion damage by intercepting surface runoff and conducting it to a stable outlet at a non-erosive velocity.

Dust Control

Dust control prevents wind transport of dust from disturbed soil surfaces onto roadways, drainage ways, and surface waters.

Small Project Construction Stormwater Pollution Prevention

To prevent the discharge of sediment and other pollutants to the maximum extent practicable from small construction projects.

Protect Slopes

Design, construct, and phase cut and fill slopes in a manner that will minimize erosion, considering soil type and its potential for erosion.

Temporary and Permanent Seeding

Seeding is intended to reduce erosion by stabilizing exposed soils. A well-established vegetative cover is one of the most effective methods of reducing erosion.

Surface Roughening

Surface roughening aids in the establishment of vegetative cover, reduces runoff velocity, increases infiltration, and provides for sediment trapping through the provision of a rough soil surface.

Gradient Terraces

Gradient terraces reduce erosion damage by intercepting surface runoff and conducting it to a stable outlet at a non-erosive velocity.

Interceptor Dike and Swale

Provide a ridge of compacted soil, or a ridge with an upslope swale, at the top or base of a disturbed slope or along the perimeter of a disturbed construction area to convey stormwater. Using the dike and/or swale to intercept the runoff from unprotected areas and direct it to areas where erosion can be controlled. This can prevent storm runoff from entering the work area or sediment-laden runoff from leaving the construction site.

Grass-Lined Channels

Channels lined with grass can convey runoff without erosion, and will provide some degree of treatment and infiltration.

Pipe Slope Drains

Piping can be used to convey stormwater anytime water needs to be diverted away from or over bare soil to prevent gullies, channel erosion, and saturation of slide-prone soils.

Subsurface Drains

Drains below the surface can intercept, collect, and convey ground water to a satisfactory outlet. These can be a perforated pipe or conduit below the ground surface. The perforated pipe provides a dewatering mechanism to drain excessively wet soils, provide a stable base for construction, improve stability of structures with shallow foundations, or to reduce hydrostatic pressure to improve slope stability.

Level Spreader

To provide a temporary outlet for dikes and diversions consisting of an excavated depression constructed at zero grade across a slope. To convert concentrated runoff to sheet flow and release it onto areas stabilized by existing vegetation or an engineered filter strip.

Check Dams

Construction of small dams across a swale or ditch reduces the velocity of concentrated flow and dissipates energy at the check dam.

Triangular Silt Dike (Geotextile-Encased Check Dam)

Triangular silt dikes may be used as check dams, for perimeter protection, for temporary soil stockpile protection, for drop inlet protection, or as a temporary interceptor dike.

Protect Drain Inlets

Storm drain inlets operable during construction shall be protected so that stormwater runoff does not enter the conveyance system without first being filtered or treated to remove sediment.

Storm Drain Inlet Protection

To prevent coarse sediment from entering drainage systems prior to permanent stabilization of the disturbed area:

Stabilize Channels And Outlets

Temporary on-site conveyance channels shall be designed, constructed, and stabilized to prevent erosion from the expected flow velocity of a 2-year, 24-hour frequency storm for the developed condition.

Channel Lining

Lining will protect erodible channels by providing a channel liner using either blankets or riprap.

Outlet Protection

Outlet protection prevents scour at conveyance outlets and minimizes the potential for downstream erosion by reducing the velocity of concentrated stormwater flows.

Control Pollutants

All pollutants, including waste materials and demolition debris, that occur on site during construction shall be handled and disposed of in a manner that does not cause contamination of stormwater.

Concrete Handling

Concrete work can generate process water and slurry that contain fine particles and high pH, both of which can violate water quality standards in the receiving water. Concrete handling is intended to minimize and eliminate concrete process water and slurry from entering waters of the state.

Sawcutting and Surfacing Pollution Prevention

Sawcutting and surfacing operations generate slurry and process water that contain fine particles and high pH (concrete cutting), both of which can violate the water quality standards in the receiving water. Collection of this water is intended to minimize and eliminate process water and slurry from entering waters of the State.

Control De-Watering

Foundation, vault, and trench de-watering water shall be discharged into a controlled conveyance system prior to discharge to a sediment pond.

Maintain BMPs

Temporary and permanent erosion and sediment control BMPs shall be maintained and repaired as needed to assure continued performance of their intended function. Maintenance and repair shall be conducted in accordance with BMPs.

Manage the Project

Development projects shall be phased where feasible in order to prevent, to the maximum extent practicable, the transport of sediment from the development site during construction. Revegetation of exposed areas and maintenance of that vegetation shall be an integral part of the clearing activities for any phase.

APPENDIX II. ESTIMATION OF COSTS FOR CONTROLLING SEDIMENT RELEASES AT CONSTRUCTION SITES

EPA described the costs of the Phase II program in Chapter 4 of the economic analysis (U.S. EPA, 1995). This appendix is a summary of that description, and the figures presented come from that document. The costs were divided into 4 categories: municipal costs, construction costs, federal costs and state costs. Each of these was considered separately.

Construction costs:

Construction costs were described in parts 4-8 to 4-25. All the cost calculations are based on 1998 dollar value.

Because the Phase II program targets construction areas of 1 to 5 acres of land, the cost analysis are done for these land sizes. EPA divided the construction costs into two parts. The first part requires the owners and operators of construction sites disturbing one to five acres of land to plan and implement erosion and sediment control BMPs. The second part requires the implementation of post-construction stormwater runoff controls on construction sites located in Phase II municipalities.

Erosion and sediment control costs

EPA developed a national level cost estimate for implementing erosion and sediment controls on sites that disturb between one and 5 acres. EPA estimated a per site compliance cost for sites of one, three, and five acres and multiplied the cost by the total number of Phase II construction starts expected to incur incremental cost in these size categories to obtain a national cost estimate. EPA used construction start data from fourteen municipalities and 1994 Census Bureau construction permit data to estimate the number of construction starts disturbing between one and five acres of land. Of the estimated 129,675 construction starts likely to incur incremental costs, EPA expects that 110,223 (85%) will require erosion and sediment controls to comply with the regulation.

Exhibit 4–4. Summary Characteristics of Municipalities Where Construction Start Data was Collected

Municipality	Population 1996 (Estimates)[1]	Population Growth 1990 to 1996	Median Household Income (1989)	Area (Sq. Mi.)
Austin, TX	541,278	+14.7%	$25,414	217.8
Baltimore County, MD	720,662	+4.1%	$38,837	599.0
Cary, NC	75,676	+70.5%	$46,259	31.2
Fort Collins, CO	104,196	+19.1%	$28,826	41.2
Lacey, WA	27,381	+42.0%	$29,726	10.1
Loudoun County, VA	133,493	+54.9%	$52,064	520.0
New Britain, CT	71,512	–5.3%	$30,121	13.3
Olympia, WA	39,006	+15.6%	$27,785	16.1
Prince George's County, MD	770,633	+5.6%	$43,127	486.0
Raleigh, NC	243,835	+15.0%	$32,451	88.1
South Bend, IN	102,100	–3.2%	$24,131	36.4
Tallahassee, FL	136,751	+9.6%	$34,764	63.3
Tucson, AZ	449,002	+9.1%	$21,748	156.3
Waukesha, WI	60,197	+5.8%	$36,192	17.3
United States	265 million	+6.6%	$35,225	

Source: US Department of Commerce, Bureau of the Census. [http://www.census.gov].
[1] US Census Bureau Data (1996).

Per-Site Compliance Costs: Installation and O&M.

EPA used standard cost estimates from R.S. Means (R.S. Means, 1997a and 1997b) and the WEF database to estimate construction BMP costs for 27 model sites of typical site conditions in the United States. The model sites included three different site sizes (one, three, and five acres), three slope variations (3%, 7%, and 12%), and three soil erosivity conditions (low, medium, and high). EPA used the WEF database to determine BMP combinations appropriate to the model site conditions. For example, sites with shallow slopes and a low erosivity require few BMPs, while larger, steeper, and more erosive sites required more BMPs. Detailed site plans, assumptions, and BMPs that could be used are presented in Appendices B–2 and B–3. Based on the assumption that any combination of site factors is equally likely to occur on a given site, EPA averaged the matrix of estimated costs to develop an average cost for one-, three-, and five-acre starts for all soil erodibilities and slopes.

Exhibit 4–6. BMPs Used for the Model Sites

Site Size (acres)	Soil Erodibility	Slope 3%	Slope 7%	Slope 12%
1	low	a	a,b	a,c,e
	med	a,b	a,c,e	a,c,e
	high	a,c,e	a,c,e	c,e,f,g1
3	low	a,b	a,c,e	c,d,e,f,g2
	med	a,c,e	a,c,e	c,d,e,f,g2
	high	a,c,e	c,d,e,f,g2	c,d,e,f,g2
5	low	a,c,d,e	c,d,e,f,g3	c,d,e,f,g3
	med	a,c,d,e	c,d,e,f,g3	c,d,e,f,g3
	high	c,d,e,f,g3	c,d,e,f,g3	c,d,e,f,g3

a = silt fence
b = mulch
c = seed and mulch
d = stabilized construction entrance
e = stone check dam
f = earthen dike directing runoff to sediment trap
g = sediment trap (1=1,800 cf, 2=5,400 cf, 3=9,000 cf)

Costs related to each BMP and the description of the BMP were shown in Exhibit 4-7 of the original document.

Exhibit 4–8. Estimated Cost of BMPs for the Model Sites (1998 dollars)

Site Size (acres)	Soil Erodibility	Cost by Slope 3%	Cost by Slope 7%	Cost by Slope 12%	Average Cost
1	low	$317	$814	$1,422	$1,206
	med	$814	$1,422	$1,422	
	high	$1,422	$1,422	$1,799	
3	low	$1,978	$3,804	$6,047	$4,598
	med	$3,804	$3,804	$6,047	
	high	$3,804	$6,047	$6,047	
5	low	$6,245	$9,334	$9,519	$8,709
	med	$6,245	$9,334	$9,519	
	high	$9,334	$9,334	$9,519	

Per-Site Compliance Costs: Administrative.

EPA then estimated administrative costs per construction site for the following elements required under the Phase II rule: submittal of a notice of intent (application) for permit coverage; notification to municipalities; development of a stormwater pollution prevention plan (SWPPP); record retention; and submittal of a notice of termination. The average total administrative cost per site was estimated to be $937.

Exhibit 4–10. Estimated Other Administrative Phase II Construction Costs Per Site (1998 Dollars)

Administrative Requirement	Cost
NOI	$126.50
Municipal Notification	$17.10
SWPPP	$772.25
Record Retention	$4.51
NOT	$17.10
Estimated Total Cost (per site)	$937.46

Summing the average BMP costs and the administrative costs yields a total compliance cost of $2,143 for sites disturbing between one and two acres of land, $5,535 for sites disturbing between two and four acres of land, and $9,646 for sites disturbing between four and five acres of land. To estimate national level incremental annual costs for Phase II construction starts, EPA multiplied the total costs of compliance for one to two acre, two to four acre, and four to five acre sites by the total number of Phase II construction starts within each of those size categories. This yielded an estimated annual compliance cost of approximately $499.8 million (based on 110,223 construction starts in 1998).

EPA anticipates that 19,452 (15%) of the estimated Phase II incremental construction universe will qualify for a waiver from program requirements by meeting one of two conditions. Construction sites can be waived if they are either located in areas with low rainfall potential or if water quality analyses show that there is no need for regulation. EPA estimates the incremental administrative cost associated with preparing and submitting a waiver to be approximately $665,000 (1998). Total costs (national compliance and waiver costs) resulting from implementation of the Phase II erosion and sediment control provision are estimated to be **$500.4 million**.

Exhibit 4–11. Estimated National Phase II Construction Compliance Costs by Climatic Zones for Year 1998 (1998 Dollars)

Climatic Zone	Representative City	Number of Starts 1–2 Acres	Number of Starts 2–4 Acres	Number of Starts 4–5 Acres	Total Starts	Costs for Starts 1–2 Acres	Costs for Starts 2–4 Acres	Costs for Starts 4–5 Acres	Total Costs
A	Portland, OR	1,683	1,471	659	3,813	$3,608,528	$8,141,052	$6,360,054	$18,356,897
B	Boise, ID	1,508	1,345	576	3,429	$3,232,932	$7,443,548	$5,556,280	$16,455,088
C	Fresno, CA	2,388	2,018	974	5,380	$5,118,068	$11,171,812	$9,400,679	$26,039,422
D	Las Vegas, NV	7,154	6,256	3,035	16,445	$15,335,047	$34,628,344	$29,276,500	$80,306,157
E	Denver, CO	1,787	1,613	636	4,036	$3,829,714	$8,928,128	$6,135,764	$18,893,606
F	Bismarck, ND	560	469	156	1,185	$1,199,916	$2,595,370	$1,508,877	$5,304,163
G	Helena, MT	1,067	921	348	2,336	$2,287,796	$5,098,377	$3,354,650	$10,740,823
H	Amarillo, TX	3,295	2,838	1,152	7,285	$7,063,767	$15,708,383	$11,110,516	$33,882,666
I	San Antonio, TX	1,105	960	414	2,479	$2,368,045	$5,314,569	$3,997,033	$11,679,647
K	Duluth, MN	2,957	1,796	326	5,078	$6,339,106	$9,939,565	$3,141,089	$19,419,760
M	Des Moines, IA	9,335	7,599	2,695	19,629	$20,009,581	$42,063,182	$26,002,165	$88,074,928
N	Nashville, TN	5,801	4,707	1,705	12,212	$12,434,357	$26,052,990	$16,445,128	$54,932,475
P	Atlanta, GA	5,157	2,956	1,127	9,241	$11,054,430	$16,364,835	$10,875,252	$38,294,517
R	Hartford, CT	6,909	5,324	2,116	14,348	$14,808,848	$29,468,120	$20,412,901	$64,689,869
T	Charleston, SC	1,194	675	263	2,132	$2,560,342	$3,736,824	$2,535,496	$8,832,662
V	Hawaii	504	423	218	1,145	$1,080,648	$2,340,928	$2,099,447	$5,521,023
W,X,Y	Alaska	22	20	8	50	$47,885	$112,127	$72,563	$232,575
Total		52,426	41,389	16,408	110,223	$112,379,010	$229,108,154	$158,284,394	$499,771,558

Note: Number of sites include only those where storm water BMPs are not currently required by Federal or State programs. Totals may not add because of rounding.

Exhibit 4–12. Phase II Erosion and Sediment Control Annual Costs

Construction Costs	Universe	Estimated Total National Annual Costs (1998 dollars)
Compliance Costs	110,223	$499,771,558
Waiver Costs*	19,452	$665,064
Total	129,675	$500,436,622

*Based on an engineering assistant's wage of $34.19 per hour. U.S. Department of Labor, 1996.

EPA also estimated incremental costs attributable to the post-construction runoff control measures. The Phase II municipal program requires municipalities to develop, implement, and enforce a program that addresses stormwater runoff from new development and redevelopment sites on which land disturbance is greater than one acre and that discharge into a regulated MS4. To develop a cost estimate associated with this measure, EPA estimated a per site BMP cost, including operation and maintenance, for 12 model sites of varying size (1, 3, 5, and 7 acres) and imperviousness (35%, 65%, and 85%). The per site BMP cost was then multiplied by the total number of multi-family, institutional, and commercial construction starts that are located in Phase II urbanized areas to obtain a national cost estimate. Using this total of 13,364 postconstruction starts, EPA estimated a range of national costs associated with this measure from $44.6 to $178.3 million (see Appendix B–4). EPA estimates total annual costs to construction operators, including implementation of erosion and sediment controls and post-construction controls, to be between **$545.0 – $678.7 million.**

Exhibit 4–15. Estimated Post-Construction Runoff Control Costs

Area	35% Impervious (Multi-Family Residential)	65% Impervious (Multi-Family/ Commercial/ Institutional)	85% Impervious (Commercial)	Total Cost (1998 dollars)
1 Acre	$503,163	$14,318,035	$25,530,478	$40,351,676
3 Acres	$1,486,961	$29,571,535	$29,588,931	$60,647,426
5 Acres	$2,001,641	$11,835,630	$9,151,038	$22,988,309
7 Acres	$3,863,272	$23,910,571	$26,494,414	$54,268,258
Total Cost	$7,855,037	$79,635,771	$90,764,861	$178,255,669

Summary of results of the total costs of the phase II program are shown below:

Exhibit 4–21. Potential Annual Costs for Phase II Storm Water Regulation

Phase II Element	Universe	Estimated Total National Annual Costs (1998 dollars)
Municipal	32,458,000 Households	$297,318,623
Construction	129,675 Erosion & Sediment Control Starts and 13,364 Post-Construction Starts	$545,000,539 – $678,692,291
Federal and State	53 States and Territories	$5,318,668
Total		$847,637,830 – $981,329,582

Reduced Sediment Delivery From Construction Starts:

To estimate reduced sediment delivery from Phase II construction starts, the US ACE developed a model based on EPA's 27 model sites to estimate sediment loads from construction starts with and without Phase II controls (US ACE, 1998). The US ACE model uses the construction site version of the Revised Universal Soil Loss Equation (RUSLE) to generate sediment delivery estimates for 15 climatic regions with each of the following variations: three site sizes (one, three, and five acres), three soil erodibility levels (low, medium, and high), three slopes (3%, 7%, and 12%), and the BMP combinations from EPA's 27 model sites. The 15 climatic regions represent the various rainfall and temperature conditions throughout the United States. Sediment delivery represents the quantity of sediment that BMPs placed at the base of the hill slope are unable to capture. EPA estimated that the average reduction in soil loss from the model sites implementing BMPs would be 89.6 tons per site. (Calculations in Exhibit 4-24)

To determine the reduction in soil loss using the estimated 80% effectiveness rate, EPA multiplied the weighted average soil loss per start (89.6 tons) by 80%. This resulted in an estimated reduction in soil loss of 71.7 tons per site. Multiplying this reduction by the 110,223 construction starts expected to implement erosion and sediment controls for the year 1998, results in an estimated 7.9 million ton reduction in soil loss annually.

Exhibit 4–25. National Reduction Estimates for Municipalities and Construction Starts (tons/year)

Phase II Element	20% Reduction	80% Reduction
Municipal TSS Loading	639,115	4,062,815
Soil loss from Construction Sites	1,975,196	7,900,785

Summary

EPA has not presented the total cost of prevention of sediments leaving the site per ton of the sediment. ES.11 (in executive summary) describes only the costs effectiveness related to the Municipal TSS loading reduction. It seems that by a simple

calculation from the two former exhibits (4-24 and 4-25) that the total cost assuming 80% reduction in the sediments would be between $69 - $86 per ton of sediment.

Appendix I Scoping Memo

MEMORANDUM

OFFICE OF WATER PROGRAMS
CSU SACRAMENTO
7801 Folsom Boulevard, Suite 102
Sacramento, CA 95826

Date: **August 15, 2003**
To: **Pamela Barksdale, State Water Resource Control Board**
From: **Brian Currier**
Subject: **Scope for the storm water cost survey**

This memorandum presents additional information and recommendations in order to proceed with Task A of the "Survey of Costs to Develop, Implement, Maintain and Monitor Municipal Separate Storm Sewer System (MS4) Stormwater Management Programs (SWMP) and Description of Alternatives for Control of Stormwater Quality in Los Angeles County" (See Attachment A). A presentation of candidate municipalities, corresponding demographics, and recommendations for the six municipalities to be surveyed are presented herein.

Nomination of Municipalities

The identification of candidate municipalities began with a conference call on June 23, 2003 with the State Water Resources Control Board and representatives from interested Regional Water Quality Control Boards. The scope and intent of the study was shared with the conference call participants. The Regional Boards then nominated municipalities within their jurisdiction that appear are complying with their permits and are taking appropriate steps toward meeting water quality objectives. Some nominees were subsequently eliminated upon further discussion with either the municipality or the regional board. The remaining municipalities are presented in Table 1 along with a limited set of city characteristics.

Table 1. Nominated Municipalities for the Stormwater Cost Survey

CITY	TOTAL POPULATION	AREA (Sq. Miles)	MEDIAN INCOME/ HOUSEHOLD ($)	MEAN INCOME ($)	INCOME DENSITY ($/ft^2)	STORM WATER DRAINAGE SYSTEM FUND
CALIFORNIA	33,871,648	163,696	47,493	22,711	0.2	
Los Angeles	3,694,820	498	36,687	20,671	5.5	Yes
Fresno	427,652	105	32,236	15,010	2.2	Yes
Sacramento	407,018	99	37,049	18,721	2.8	Yes
Oakland	399,484	78	40,055	21,936	4.0	Yes
Anaheim	328,014	50	47,122	18,266	4.3	Yes
Fremont	203,413	87	76,579	31,411	2.6	No[1]
Huntington Beach	189,594	32	64,824	31,964	6.9	Yes
Ontario	158,007	50	42,452	14,244	1.6	Yes
Santa Clarita	151,088	48	66,717	26,841	3.0	Yes
Salinas	150,724	19	43,720	14,495	4.1	Yes
Santa Monica	84,084	16	50,714	42,874	8.1	Yes
Encinitas	58,014	20	63,954	34,336	3.5	No
Poway	48,044	39	71,708	29,788	1.3	Yes
San Clemete	49,861	18	63,507	34,169	3.3	Yes

Selection Criteria

In order to present compliance costs that are representative of the widest range of California environments, a diverse selection of municipalities from the nominees is recommended. The primary factors considered are location, population, income, rainfall, and whether a stormwater drainage system (SDS) fund exists. Location is given the highest priority to ensure that the results of this survey have the widest statewide applicability. A comment from the conference call participants was to place a high priority on whether a city had a separate storm water fund. This is an indication that the city currently accounts for stormwater related expenses, allowing for further analysis of those costs. Population and income are both considered important factors, but their relative importance is unknown at this time. To make the study results more useful to other communities, it is generally sought to include both large and small cities and include cities with a variety of income parameters. Including at least one municipality with a population smaller than 100,000 will help in understanding cost for smaller cities (including NPDES Phase II municipalities). Income is a consideration as higher income communities generate a higher tax base. This may not directly relate to stormwater expenditures, but at this point it should not be ignored if it proves to be a factor. Rainfall was not a major consideration. Selecting cities by location (different geographical areas) adequately represent the range of rainfall. The range of rainfall of the candidate cities is 10 to 23 inches per year.

[1] Footnote added 1/20/05: Fremont does have a drainage fund; the original memorandum was incorrect.

Selection Recommendations

In considering location, the state can be divided into three sections: north, central, and south. For this exercise, the dividing lines are roughly south of San Jose and north of Santa Clarita. Each section is further distinguished between coastal and inland areas. Thus, one coastal and one inland municipality can be recommended from each section.

For Northern California, Fremont, Oakland, and Sacramento are nominated. Sacramento is the only inland city and it has a storm water fund. For coastal areas, Oakland has the advantage over Fremont because of its storm water fund. Oakland also offers a higher population density compared to Sacramento and Fremont. Based on these observations Sacramento and Oakland are recommended for the cost survey, if Oakland can overcome some timing issues regarding availability of staff time to support this project. If not Fremont could be substituted.

For Central California, Salinas and Fresno are nominated. They are ideal for location (coastal vs. inland), size (151,000 vs. 428,000), and income density (4\$/ft^2 vs. 2\$/ft^2). Therefore, Salinas and Fresno are recommended for the cost survey.

For Southern California, the selection is a bit more complex. San Clemente, Anaheim, Huntington Beach, Ontario, Santa Clarita, Santa Monica, Encinitas and Poway are nominated. Because smaller size communities have not been selected anywhere in California it is recommended that one of the two municipalities in Southern California be smaller (i.e. San Clemente, Santa Monica, Encinitas, or Poway). Encinitas (pop 58,000), is recommended based on their small size and upon the strong recommendation by the San Diego Regional Board. Ontario is the furthest inland, followed by Santa Clarita. The Regional Board highly recommends Ontario, and it also has a stormwater fund. Ontario's willingness to participate has not been confirmed, but their staff that was initially contacted suggested participation may not be a problem. Encinitas and Ontario are recommended for the cost survey.

Although it was not used as a criterion in the above process, income characteristics vary adequately among the recommended municipalities.

Final selection of municipalities will be made after further consultation with you and the Technical Advisory Group.

Please call me with any comments or questions at (916) 278-8109.

Appendix J TAG Comments

This appendix contains a description of the Technical Advisory Group (TAG), written TAG comments, and action items from the final meeting with the TAG. In the action items, the study team condensed all applicable TAG comments each affected section of the report. Additional notes that did not result in changes to the report are listed after the action items.

TECHNICAL ADVISORY GROUP MEMBERS

Dr. Steven Frates is a Senior Fellow at the Rose Institute of State and Local Government at Claremont McKenna College. Dr. Frates has extensive experience in public policy analysis, with particular emphasis on local government finance. He has served as an assistant in municipal government, as the executive director of a major metropolitan taxpayer association, and on the California Constitutional Revision Commission. Dr. Frates has been a faculty member at the University of Colorado and the University of Southern California, and has lectured at other universities and colleges.

Dr. Jay Lund, is Professor of Civil and Environmental Engineering at the University of California in Davis. Dr. Lund's research involves application of systems analysis, economic, and management methods to infrastructure and public works problems. His recent work is primarily in water resources and environmental system engineering. While most of this work involves the application of economics, optimization, and simulation modeling, his interests also include more qualitative policy, planning, and management studies. His work has applied contemporary methods in cost-effectiveness and benefit-cost analysis to evaluate stormwater quality control measures, including both their costs and their likely water quality benefits. Dr. Lund is a past editor of the ASCE Journal of Water Resources Planning and Management and is a member of the International Water Academy.

Dr. Bowman Cutter is a professor of water resources management at U.C. Riverside in the Department of Environmental Sciences. His research examines cost-effective water pollution regulation, environmental federalism, and state and local environmental enforcement efforts. Current projects examine the effect of water pricing on water pollution and analyzing the cost-effectiveness of using stormwater to recharge Los Angeles area aquifers. He currently serves on the Southern California Association of Government's Water Policy Task Force.

Eugene Bromley is an environmental engineer with the Environmental Protection Agency. Mr. Bromley has 25 years experience in water quality protection. As stormwater coordinator in EPA Region 9, Mr. Bromley provides expertise to the stormwater programs in California, Arizona, Nevada, and Hawaii. In California, he participates with the California Stormwater Quality Association, giving updates on EPA policy and projects that could affect the members of CASQA.

Dan Radulescu is a senior engineer with the L.A. Regional Water Quality Control Board, MS4 stormwater permit coordinator. Mr. Radulescu has a P.E. registration in civil engineering with the state of California. Mr. Radulescu has extensive experience with stormwater implementation costs and levels of compliance. He was the primary author of a report that reviewed and analyzed stormwater budget data submitted to the Regional Board by L.A. Region permittees.

Robert Hale is a Supervising Scientist for the Alameda County Public Works, Clean Water Division. Mr. Hale is on the Board of Directors for the California Stormwater Quality Association, where he also serves as an Executive Program Committee member. He has many years of experience with stormwater programs, from his work with Alameda County and from his participation and consultation with other stormwater programs throughout the state.

Steven Sedgwick is an environmental engineer with Camp Dresser & McKee Inc. Mr. Sedgwick has more than 35 years of experience in comprehensive drainage and stormwater planning, stormwater utility evaluations, feasibility studies, pilot plant investigations, regional water resources planning, river basin planning, water and wastewater facilities design, land application and site-specific studies, value engineering and engineering assistance during construction.

TECHNICAL ADVISORY GROUP COMMENTS

- GENERAL COMMENTS: For the 2002-3 data, I think that you did an excellent job of collecting and analyzing fragmented and somewhat non-commensurate data in order to look at the costs from two years ago. I also appreciate the depth of thought that went into your discussion of possible future costs (regardless of the shortcomings mentioned above). The nature of the available information has, I think, necessarily limited your ability to predict accurately the magnitude of costs associated with the recently added permit requirements. As a result, the report would seem to be most useful as a baseline or starting point for future cost documentation efforts. (Hale)
- GENERAL COMMENTS: First, we want to commend the research team for their outstanding job to find, if not some definitive answers, at least the right questions regarding this difficult subject of the relationship between costs and the MS4 permits implementation. It is difficult because MEP is not a clearly defined standard, MS4 permits language depend strongly on the local conditions and the willingness of the local communities to implement those requirements to protect water quality in the existing fiscal conditions. There is little guidance, if any, on this subject, and the estimates on the stormwater program implementation varies wildly depending on the initial premises for the study. Another difficult component is to determine a direct relationship between costs and water quality improvements. If we have any comments, they are triggered by the complex nature of the subject and not necessarily because of any shortcomings of the research itself. As we said, very few nationwide studies are focusing on this subject and even U.S. EPA has provided very little guidance on the subject. We also want to point out that this study focuses on the costs, and not necessarily on the benefits in water quality from the measures implemented due to MS4 permits. Therefore the reader of the study must keep in mind that there is an additional dimension of the economic equation when assessing the implications of MS4 permits costs to give a balanced view of the whole issue. (Dan)
- GENERAL COMMENTS: Due to inherent limitations, the research did not evaluate the impact in funding options, Stormwater Utility Fee vs. General Fund. Cities that rely on the General Fund to cover costs of compliance face different challenges than those with a separate, stable and dedicated funding mechanism. It is also true that municipalities funding their storm water MS4 permit costs through General Fund have a higher tendency to apply pre-existing programs, such as street sweeping, trash collection, storm

drain maintenance, etc., and their costs to the mandatory costs of compliance. In their case, it is even more difficult to discern the origin of costs in pre-existing, new, enhanced, in the absence of clear guidelines. In extreme instances, in some cases of municipalities depending on General Fund and pre-existing programs, contingent on how the requirements of the permit and costs are interpreted, the cost of compliance can vary from low hundreds of thousand dollars to a high dozen million dollars (!) per year for the same small municipality. A number of municipalities even pointed out this discrepancy, based on different interpretations, in their annual reports. This lack of guidance also fuels the debate of the correct impact of MS4 permit compliance costs that can vary from single to hundreds of dollars(!) per household per year. Obviously there is a significant difference from manageable to exorbitant costs. Unless there are clear guidelines and transparency on how to determine the correct compliance costs with MS4 permit requirements we will face this debate from reasonable to exorbitant for years to come.

- WATER QUALITY (Sect. 3) Review major water quality problems that SW Program addresses for each city (Lund)
- IDENTIFYING TRUE COSTS: Establish a 1990 costs baseline and then determine what are the true additional costs due to the stormwater regulations by comparing the 1990 baseline with the data investigated (2002-03). One example is to use per capita costs: if in 1990, the city was spending $10/y/capita for street sweeping, in 2002 the cost (in dollars adjusted for inflation) would be (e.g.)$14/y/capita. Then determine the portion attributable to the SWMP implementation and MS4 permit compliance. Only this type of transparent analysis will reveal the true additional costs, new financial burden, mandated by the existing MS4 permits. This type of analysis may add new findings to the one identified presently in the study. This approach should be used for street sweeping, catch basins and storm drain system, trash collection, hazardous waste recycling programs, flood control component of the city's overall stormwater management, etc…

  How these facts impact the conclusion of the research?

  These types of observations are very important since they reveal the significant importance of such expenditures, such as street sweeping, in the make up of the attributed costs for compliance with the MS4 permits.

  This is even more necessary for cities that depend solely on General Fund money to comply with the MS4 permit requirements. Many pre-existing, well-established programs, in some cities, count now as "exorbitant" MS4 permit costs compliance, when the only change was to move the expense from one column into another in the cities financial reports. (Dan)
- COST/DATA REPORTING: We suggest that a better option for reporting is to use GASB or similar standardized approaches to costs and infrastructure inventory may be a better way to assure transparency. The ways suggested by the research to report cost data seem reasonable, but if this effort can be tied to an existing standardized approach, such as GASB, that may be very valuable since it will provide for consistency statewide and even nationwide. It may be that GASB does not cover all reporting categories. The reporting may use a hybrid between the existing GASB itemization and the approach suggested by the research. An additional approach maybe to lobby the GAS Board to make changes in the accounting rules to allow for water quality itemization. (Dan)

- COST ALLOCATION BY CATEGORY: I would replace the regressions with the interesting analyses contained in appendix G as a starting point. First look at how much the variation in the cost of each program component contributes to the overall cost variation. It appears that the variation in the Municipal category is the biggest driver. However, what I am not sure is whether that is because categories are not consistent across cities and different cities place different costs in the municipal category. Please comment on that possibility. It looks like the variation in overall management is the second biggest driver of the overall cost variation. Again, please comment on whether this is due to "true" cost differences or category-confusion. A very rough statistical methodology to tease this out is to find out the correlation coefficients between each of these two categories and each of the other categories. If you find some strong negative correlations, this is an indicator that really the cost differences are just due to category confusion. In the end this may be a topic that calls for a more qualitative answer. I would like to see a discussion of, taking into account what you know about data quality, whether you think the high cost/household cities tend to have higher costs across the board, or whether their higher costs are generally due to having higher costs in one category or another. From the data, the latter appears to be true, but I don't have a sense of the data quality and how the categories are affected by cost-shifting. (Cutter)
- BUDGET/COST ALLOCATION: (table 6.2) Can percentages of cost assignment add up to 100% to show how the total budget is allocated? (Lund)
- INDUSTRIAL PROGRAM COST PER INSPECTION AND SITE, AND THE EQUIVALENT NUMBERS FOR THE CONSTRUCTION PROGRAM COSTS. Both these programs have almost order of magnitude differences in costs. Please write up the reasons for these differences more thoroughly. I suspect that some of the reason for these large cost differences is cost-category confusion. You should indicate whether you think that is the case, and then indicate which citie(s)' normalized inspection costs you judge to be most satisfactory and why. I know this is going out on a limb, but few observations call for a more qualitative analysis. The large cost ranges diminishes the amount of information in the report and an indication of where the cost numbers likely lie for your best data cases would add quite a bit. (Cutter)
- STREET SWEEPING COSTS: Another possible angle to examine the overall cost range is to break out street-sweeping vs. non-street-sweeping expenditures, since street sweeping seems to be the largest element of the biggest category, and see what the cost/household ranges are in this breakdown. Then you could comment on whether street-sweeping costs are the big driver behind cost differences. Further, you could remark on whether it appears that some communities are doing more street-sweeping than necessary to comply with their permit (do we have a curb miles swept and total curb miles for each city?).(Cutter)
- STREET SWEEPING COSTS: (Table 9.3) Explain street sweeping unit and $cost/curb mile swept variability, in particular the low/high values. (Lund)
- STREET SWEEPING COSTS: On page 52, the paragraph just above the Table 9-5, states: "cost savings can be realized if cities are allowed to focus on the most cost effective programs rather the following overly prescriptive permit requirements." For example, since street sweeping is the most significant share of the stormwater costs maybe it

should be determined if this program is also cost effective the way it is performed presently. This is one avenue to improve the cost-effectiveness relationship. Why spend a significant amount of money if the impact may be insignificant? Some studies in the literature suggest that fact. Secondly, the permits are "overly prescriptive" in many instances due to Permittees specific request to the Regional Board for clarification and guidance in the permits on what they are required to accomplish, when and how. (Dan)

- WATERSHED MANAGEMENT COSTS (Sect. 8 ,Pg. 44) Elaborate on watershed management cost (Lund)
- TMDL COSTS: We strongly recommend the inclusion of TMDL portion of the report in a separate attachment or appendix. The TMDLs cost review were not part of this proposal. The costs vary in a wide range, based on various assumptions and scenarios, none of the cities are currently implementing TMDLs via a MS4 permit. We believe that the inclusion of TMDL discussion in the body of the main report will confuse things. The job of accurately estimating TMDLs implementation costs is complex and open to many interpretations. It is opportune to present various ranges and costs under the research done up to date but we are a long way to agreeing on one set of values. Therefore we believe that the TMDL research on future costs should be included in an Appendix to the report. (Dan)
- TMDL COSTS: p.55 section headed Adding future costs…This is pretty unclear, either expand it or drop it. I think you mean to say something like if current cost estimates are X, and TMDL estimated costs are Y, total costs should be something less than X+Y since current and TMDL expenditures overlap. But I am not quite sure that is what you mean. (Cutter)
- LAND ACQUISITION COSTS: The Advanced Treatment (Gordon, et al.) discussion mentions that land costs were included in that $37 billion cost estimate. However, Section 9 draws in part from Appendix H. Most of the discussions of treatment system examples in the Appendix do not make it clear whether land acquisition costs were included in the cost figures given. In my view, this omission tends to weaken the credibility of the figures used. In the case of the Tule Ponds (the one with which I am most familiar) the $360,000 cost figure does not include any consideration of land costs. The site was, and is owned by the Flood Control District so no purchase price is included. The Authors do touch on the subject when they mention in some examples how land necessary for other purposes (e.g., parking lots) can be put to dual use for stormwater treatment (which makes land acquisition unnecessary). However, the dollar figures given for the various systems need to include mention of whether land costs were included and what they might be if the were not. This is especially true (as you point out) in densely populated urban areas. In the Tule Ponds case, if land were to be purchased on the open market in the center of Fremont, the total cost of the project would be an order of magnitude higher. On the issue of land costs being lower in less densely populated areas (a point that the report makes). In the San Francisco Bay Area, the need for treatment is greatest in densely urbanized areas and almost non-existent in rural areas. In our area, population density tends to increase as one moves toward the Bay. Since stormwater can't really be pumped uphill to treatment facilities, our need for such facilities tends to

be greatest exactly where land prices are highest. This limits our flexibility in locating treatment facilities based on land costs. (Hale)

- DUAL BENEFITS: It is not clear how to account for dual benefit activities. In the case of city of Sacramento, pump station cleaning may be attributable also to maintaining the hydraulic integrity of the system, a water quantity, flood control issue, not necessarily due to water quality concerns. (Dan)
- DATA ANALYSIS: More can be done on the attempts to define what factors lead to higher or lower costs for total costs as well as element by element. The first step is to relegate the various regression analyses to appendices or to drop them altogether. Seven observations are not sufficient for a statistical analysis. This is evidenced by the confidence intervals in Figure 1, which appear to be below zero for three cities. However, there is even less information in this regression than it first appears. Comparing aggregate stormwater spending to aggregate household income is somewhat misleading because they are both driven simply by the overall size of the city. A better regression would be per-household stormwater spending on household mean or median income. I suspect the R2 would be quite a bit less and the confidence intervals correspondingly greater. My recommendation is to simply drop the regressions from the body of the report. (Cutter)
- DATA ANALYSIS: (Section 9.1) Analysis seems simplistic. Should cost be related to the problem, which might be proportional to population or level of economic activity? Cost/ HH values need to be further explained. (Lund)
- DATA ANALYSIS: p.52 2nd par. Sentence beginning with: The present worth cost… please explain this sentence further, why is there such a large cost range? Explain to the reader why the cost-per-acre and cost-per-volume estimated difference and the range in the land prices. You can do this in a footnote. (Cutter)
- DATA ANALYSIS: Explain rainfall as the best indicator for cost (Lund)
- VARIABILITY IN COSTS AMONG CITIES: I would like a final summing up in the report of why the overall cost/household range is large. Again, this will probably have to be more qualitative, but I think that is fine. I would like the reader to come away with a sense of why one city has costs almost three times larger on a per-household basis. That qualitative analysis should think through the following questions: 1) even within the category of cities with good stormwater programs are some cities doing a lot more activities than others?; 2) If so, is the extra activity necessitated by say, greater amounts of construction or other factors? Are some cities in the midst of infrastructure activities so that you would expect say a three year average of stormwater costs to be in a much closer range? Perhaps you will conclude that the cost differences are really inexplicable given what you know. If so, that in itself is interesting and you should suggest further avenues for research into hypotheses suggested by your experience in this project and explain why this research does not give insight into the reasons behind the large cost range. (Cutter)

TAG MEETING NOTES FROM DECEMBER 14, 2004:

Action Items

1. Clarify that, beyond the objectives identified in the report and contract, this report also serves as a step toward establishing cost numbers to be used in budgeting and cost/benefit evaluations. Note that this report does not address the benefits of those permit required stormwater activities that are assumed to improve water quality. Note that the reports use as a budgeting tool may only be timely for Phase II permittees. **Location of Change: pg ES-1, Section "Task A"; Section 1, section "Task A"**

2. Double check consistency of classifying costs (e.g. existing, enhanced, new). Add discussion defining these terms and discuss the likelihood that enhanced cost is, for the most part, pre-existing. Display graphically. Note any differences between the accounting practices of cities with a SW utility fee and those without, especially regarding the amount of the costs that are 'existing' or 'enhanced'. If apparent from the study, discuss the relative importance of having a fee versus having a designated fund, without a fee to fund it. **Location of Change: Figure 9.4 and Section 2.5 and additions to Section 9.1, p49.**

3. Replace the regressions in report with qualitative discussion on cost differences between cities. List major water quality control strategies and affected water bodies for each city. This may help explain some cost variation. Explain differences in cost between cities qualitatively. (e.g. Fresno low because joint use facilities, permeable soils, available land). Note any large infrastructure campaigns of the cities. Move regressions to appendix with the note that we tried various correlations but a model was not successfully developed, partly due to the small sample size. Only do regressions on normalized cost, not aggregate costs, which are only a surrogate for city size. Include a note in the body of the report that the failure of the regressions was expected due to small sample size and that the regressions are presented in an appendix as anecdotal information.
   Location of Change: Discussion additions and modifications to Section 9.1, Deleted regression figures in ES and section 9.

4. Move TMDL and future cost discussion from Section 9 to an appendix. Add a note to the appendix and executive summary that Task B research was done assuming the MS4 permitting process as it stands presently, using an iterative process of enhancing implementation of BMPs. This scenario may overlap with TMDL process, but it is not necessarily the same. TMDLs may be folded in MS4 permit as allocations, as appropriate, depending on the impairments to receiving waters. Note that the costs for LA may be specific for LA only and are difficult to extend to other areas with

different characteristics. **Location of Change: Note added to Introduction and modified discussion moved to appendix G**

5. Downplay comparisons between TMDL costs, which are future costs that are variously estimated, and MS4 permit compliance costs incurred by the cities surveyed costs. TMDL cost estimates are total costs and not the cost to the cities exclusively. Similarly, note that Gordon costs are city-only costs. Take Gordon costs out of table in Executive Summary and discuss in the text.
   Location of Change: Section 9 future cost discussion, including TMDLs, modified and moved to Appendix G. Gordon costs taken from ES table and moved to text

6. Add TAG comment section in Section 10 on cost tracking benefits. Propose that if the permittees have a correct cost accounting/reporting system, they would be granted an additional quantity of points towards their receipt of a grant under a state/federal program; for example, Section 319(h) grants are evaluated on a point ranking system that is established by a state. If the cost accounting/reporting information were tabulated pursuant to the state's suggested format, that applicant would receive a bonus allotment equal to a boost in total points of approximately 15 percent. This would alert that permittee to the benefit in competing for these grants as a pre-requisite to establishing the appropriate cost accounting system. The proposed system would benefit from review and acceptance by the California League of Cities. Note the process in developing consistent cost reporting in the region and the associated benefit to the city with developing and justifying stormwater utility fees. Note that our recommendations for cost reporting are only the first step in this process of developing consistent cost reporting. This process includes notifying cities of reporting goals, identifying whether costs are minor and local and applicable to other cities, review reported costs for quality and consistency, and provide feedback to the cities. Identify appropriate categories with definitions to allow clarification between differences; with appropriate definitions, the individual entities could probably better assist the permittees to understand the benefit of reporting costs in a correct fashion. For example, a reported cost item may be illegal discharge elimination and would have clarified definitions to differentiate between end-of-pipe actions, in-pipe actions, source identification, and source detection. **Location of Change: Discussion added to Section 10.2 and 10.3, pages 51 and 56. Regressions moved to Appendix G.**

7. Make sure legal fees are properly discussed. Appellant fees are excluded, but legal advice on program implementation and response to citizen suits are included. We assume that if legal fees are incurred, it is part of the cost of doing business. This is not an assumption that all lawsuits are frivolous and therefore attorney fees are justified expenses. Neither is it an assumption that all legal advice is to challenge the lawsuit rather than to acquiesce to the demands of the lawsuit. **Location of Change: See discussion in section 9.5**

8. Append all written TAG comments to the report. **Location of Change: See Appendix J.**

9. Report cost without existing and enhanced 'big-ticket' items such as street sweeping trash collection, storm drain maintenance, drain line cleaning, channel cleaning, and pump station cleaning, recycling, hazardous waste roundups, etc. Note that an unknown portion of an "enhanced" cost is appropriate to count toward the additional financial burden of permit compliance. Also, include a suggestion that a three years average, 1987-1990, may be used as a baseline cost to figure out "enhancement" portion costs based on the post 1990 MS4 permit requirements and caveat that unit cost for sweeping varies. Note that sweeping is an enhanced cost and the majority of effort pre-existed the first stormwater permits. Also caveat that all programs may still have hidden costs that could not be identified by the cities. An example is backup equipment for street sweeping, but note that these costs are also preexisting. **Location of Change: See section 9.4 for added discussion of existing and enhanced costs and see Section 2.5 for discussion of using baseline costs.**

10. Consider using pie charts for each city to show distribution of costs among categories. **Location of Change: See individual city sections (sections 3-8)**

11. Note that Post Construction costs are expected to increase as cities move into full implementation of SUSMP type requirements for new development and redevelopment. Note that the reported costs are particularly misleading for cost projection purposes since the research coincides with the start of SUSMP type requirements implementation. **Location of Change: Section 9.5, Qualitative Discussion of Stormwater Costs for Selected Cost Categories**

Additional meeting notes

1. Cities may try to push as much general fund expenses as possible to stormwater a fee, but public response to fees helps balance cost. [I believed we discussed that cities successful in passing a SW fee were very transparent in the process, limited in scope, and going to great lengths to tie the SW fee to activities and capital investments related directly to water quality enhancements and benefits. Probably is not a bad idea to put some positive "lessons learned" from those successful cases in passing a SW fee.] (Dan)
2. GASB 34 may not be a realistic method to encourage cost reporting, especially on the short term. [is there a way to move this idea at a national level? That GASB can develop some standards for such a purpose, or add to an existing one?] (Dan).
3. Hamilton County, Ohio costs were not captured till 2001, for Phase II non-Cincinnati areas. Took two years to establish more consistent cost reporting. The cost had been

accounted for from 2001 through 2003 for Phase II cities, but that even these costs were "too vague" to allow appropriate interpretation by all 44 permittees. When CDM conducted the next evaluation required to establish a charge for these functional activities, CDM had to more precisely define the activities and quantify the level of effort for each action (Steve).

4. Wisconsin and Florida: cities are given points for having a fee, points awarded if utility charges are above $3.50 (80), below (40), and none (0). Points are a criterion for grant applications. Expand the last sentence to read “This approach would assure that permittees competing for grants would receive between 15 and 20 percent bonus points in the priority ranking system utilized by these states to award grants” (Steve).
5. Average cost per billing unit is $2.92/month for all stormwater including flood. Only for cities with stormwater fund/fee. Insert “Based upon evaluations conducted for stormwater utilities charging a stormwater user fee as of December 31, 2003, the total monthly charge per residential dwelling unit was $2.92/month. The services provided for this fee included all components that a given jurisdiction was incorporating into the stormwater management program, but could have been augmented/supplemented with additional monies from other sources that weren't clear in the writer's review. However, greater than 75 percent of those systems reviewed included some costs for quantity management in this fee.” (Steve). [See my comment at first point, it seems that a focused SW quality fee will be on average much less that $3/month/billing unit. city of LA with its current $18/yr/household seems to be right there, at the average.] (Dan)

BUILDING INDUSTRY ASSOCIATION OF SAN DIEGO COUNTY et al., Plaintiffs and Appellants, v. STATE WATER RESOURCES CONTROL BOARD et al., Defendants and Respondents; SAN DIEGO BAYKEEPER et al., Interveners and Respondents.

D042385

COURT OF APPEAL OF CALIFORNIA, FOURTH APPELLATE DISTRICT, DIVISION ONE

124 Cal. App. 4th 866; 22 Cal. Rptr. 3d 128; 2004 Cal. App. LEXIS 2073; 2004 Cal. Daily Op. Service 10694; 2004 Daily Journal DAR 14492; 34 ELR 20149

December 7, 2004, Filed

NOTICE: As modified Jan. 4, 2005. CERTIFIED FOR PARTIAL PUBLICATION n1

n1 Pursuant to California Rules of Court, rule 976.1, this opinion is certified for publication with the exception of Discussion parts III, IV, V, VI and VII.

SUBSEQUENT HISTORY: Modified by, Rehearing denied by Building Industry Assn. v. State Water Resources Control Bd., 2005 Cal. App. LEXIS 7 (Cal. App. 4th Dist., Jan. 4, 2005)

Time for Granting or Denying Review Extended Building Industry Assn. of San Diego v. Calif Regional Water Qlty Bd., 2005 Cal. LEXIS 2502 (Cal., Feb. 24, 2005)

Review denied by, Request denied by Building Industry Association of San Diego County v. California Regional Water Quality Control Board, 2005 Cal. LEXIS 3489 (Cal., Mar. 30, 2005)

PRIOR HISTORY: Superior Court of San Diego County, No. GIC 780263, Wayne L. Peterson, Judge.

COUNSEL: Latham & Watkins, David L. Mulliken, Eric M. Katz, Paul N. Singarella, Kelly E. Richardson and Daniel P. Brunton for Plaintiffs and Appellants.

Bill Lockyer, Attorney General, Mary Hackenbracht, Assistant Attorney General, Carol A. Squire, David Robinson and Deborah Fletcher, Deputy Attorneys General, for Defendants and Respondents.

David S. Beckman, Heather L. Hoecherl, Anjali I. Jaiswal and Dan L. Gildor for Interveners and Respondents.

Marco Gonzalez for Intervener and Respondent San Diego BayKeeper.

Law Offices of Rory Wicks and Rory R. Wicks for Surfrider Foundation, Waterkeeper Alliance, The Ocean Conservancy, Heal the Bay, Environmental Defense Center, Santa Monica BayKeeper, Orange County CoastKeeper, Ventura CoastKeeper, Environmental Health Coalition, CalBeach Advocates, San Diego Audubon Society, Endangered Habitats League and Sierra Club as Amici Curiae on behalf of Defendants and Respondents and Interveners and Respondents.

JUDGES: Haller, J., with Benke, Acting P. J., and Aaron, J., concurring.

OPINIONBY: HALLER

OPINION: HALLER, J.--This case concerns the environmental regulation of municipal storm sewers that carry excess water runoff to lakes, lagoons, rivers, bays, and the ocean. The waters flowing through these sewer systems have accumulated numerous harmful pollutants that are then discharged into the water body without receiving any treatment. To protect against the resulting water quality impairment, federal and state laws impose regulatory controls on storm sewer discharges. In particular, municipalities and other public entities are required to obtain, and comply with, a regulatory permit limiting the quantity and quality of water runoff that can be discharged from these storm sewer systems.

In this case, the California Regional Water Control Board, San Diego Region, (Regional Water Board) conducted numerous public hearings and then issued a comprehensive municipal storm sewer permit governing 19 local public entities. Although these entities did not bring an administrative challenge to the permit, one business organization, the Building Industry Association of San Diego County (Building Industry), filed an administrative appeal with the State Water Resources Control Board (State Water Board). After making some modifications to the permit, the State Water Board denied the appeal. Building Industry then petitioned for a writ of mandate in the superior court, asserting numerous claims, including that the permit violates state and federal law because the permit provisions are too stringent

and impossible to satisfy. Three environmental groups intervened as defendants in the action. After a hearing, the trial court found Building Industry failed to prove its claims and entered judgment in favor of the administrative agencies (the Water Boards) and the intervener environmental groups.

(1) On appeal, Building Industry's main contention is that the regulatory permit violates federal law because it allows the Water Boards to impose municipal storm sewer control measures more stringent than a federal standard known as "maximum extent practicable." (See 33 U.S.C. § 1342(p)(3)(B)(iii).) n2 In the published portion of this opinion, we reject this contention, and conclude the Water Boards had the authority to include a permit provision requiring compliance with state water quality standards. In the unpublished portion of the opinion, we find Building Industry's additional contentions to be without merit. We affirm the judgment.

n2 Further statutory references are to title 33 of the United States Code, unless otherwise specified.

RELEVANT BACKGROUND INFORMATION

I. Summary of Relevant Clean Water Act Provisions

Before setting forth the factual background of this particular case, it is helpful to summarize the federal and state statutory schemes for regulating municipal storm sewer discharges. n3

n3 The systems that carry untreated urban water runoff to receiving water bodies are known as "[m]unicipal separate storm sewer" systems (40 C.F.R. § 122.26(b)(8)), and are often referred to as "MS4s" (see 40 C.F.R. § 122.30). For readability, we will identify these systems as municipal storm sewers. To avoid confusion in this case, we will generally use descriptive names, rather than initials or acronyms, when referring to parties and concepts.

A. Federal Statutory Scheme

When the United States Congress first enacted the Federal Water Pollution Control Act in 1948, the Congress relied primarily on state and local enforcement efforts to remedy water pollution problems. (Middlesex Cty. Sewerage Auth. v. Sea Clammers (1981) 453 U.S. 1, 11 [69 L. Ed. 2d 435, 101 S. Ct. 2615]; Tahoe-Sierra Preservation Council v. State Water Resources Control Bd. (1989) 210 Cal. App. 3d 1421, 1433 [259 Cal. Rptr. 132].) However, by the early 1970's, it became apparent that this reliance on local enforcement was ineffective and had resulted in the "accelerating environmental degradation of rivers, lakes, and streams ... ." (Natural Resources Defense Council, Inc. v. Costle (D. C. Cir. 1977) 568 F.2d 1369, 1371 (Costle); see EPA v. State Water Resources Control Board (1976) 426 U.S. 200, 203 [48 L. Ed. 2d 578, 96 S. Ct. 2022].) In response, in 1972 Congress substantially amended this law by mandating compliance with various minimum technological effluent standards established by the federal government and creating a comprehensive regulatory scheme to implement these laws. (See EPA v. State Water Resources Control Board, supra, 426 U.S. at pp. 204-205.) The objective of this law, now commonly known as the Clean Water Act, was to "restore and maintain the chemical, physical, and biological integrity of the Nation's waters." (§ 1251(a).)

(2) The Clean Water Act employs the basic strategy of prohibiting pollutant emissions from "point sources" n4 unless the party discharging the pollutants obtains a permit, known as an NPDES n5 permit. (See EPA v. State Water Resources Control Board, supra, 426 U.S. at p. 205.) It is "unlawful for any person to discharge a pollutant without obtaining a permit and complying with its terms." (Ibid.; see § 1311(a); Costle, supra, 568 F.2d at p. 1375.) An NPDES permit is issued by the United States Environmental Protection Agency (EPA) or by a state that has a federally-approved water quality program. (§ 1342(a), (b); EPA v. State Water Resources Control Board, supra, 426 U.S. at p. 209.) Before an NPDES is issued, the federal or state regulatory agency must follow an extensive administrative hearing procedure. (See 40 C.F.R. § § 124.3, 124.6, 124.8, 124.10; see generally, Wardzinski, et al., National Pollutant Discharge Elimination System Permit Application and Issuance Procedures in The Clean Water Act Handbook (Evans, edit., 1994) pp. 72-74 (Clean Water Act Handbook).) NPDES permits are valid for five years. (§ 1342(b)(1)(B).)

n4 The Clean Water Act defines a "point source" to be "any discernible, confined and discrete conveyance, including but not limited to any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, or vessel or other floating craft, from which pollutants are or may be discharged." (§ 1362(14).)

n5 NPDES stands for National Pollution Discharge Elimination System.

(3) Under the Clean Water Act, the proper scope of the controls in an NPDES permit depends on the applicable state water quality standards for the affected water bodies. (See Communities for a Better Environment v. State Water Resources Control Bd. (2003) 109 Cal.App.4th 1089, 1092 [1 Cal. Rptr. 3d 76].) Each state is required to develop water quality standards that establish " 'the desired condition of a waterway.' " (Ibid.) A water quality standard for any given water segment has two components: (1) the designated beneficial uses of the water body; and (2) the water quality criteria sufficient to protect those uses. (Ibid.) As enacted in 1972, the Clean Water Act mandated that an NPDES permit require compliance with state water quality standards and that this goal be met by setting forth a specific "effluent limitation," which is a restriction on the amount of pollutants that may be discharged at the point source. (§ § 1311, 1362(11).)

Shortly after the 1972 legislation, the EPA promulgated regulations exempting most municipal storm sewers from the NPDES permit requirements. (Costle, supra, 568 F.2d at p. 1372; see Defenders of Wildlife v. Browner (9th Cir. 1999) 191 F.3d 1159, 1163 (Defenders of Wildlife).) When environmental groups challenged this exemption in federal court, the Ninth Circuit held a storm sewer is a point source and the EPA did not have the authority to exempt categories of point sources from the Clean Water Act's NPDES permit requirements. (Costle, supra, 568 F.2d at pp. 1374-1383.) The Costle court rejected the EPA's argument that effluent-based storm sewer regulation was administratively infeasible because of the variable nature of storm water pollution and the number of affected storm sewers throughout the country. (Id. at pp. 1377-1382.) Although the court acknowledged the practical problems relating to storm sewer regulation, the court found the EPA had the flexibility under the Clean Water Act to design regulations that would overcome these problems. (Id. at pp. 1379-1383.)

During the next 15 years, the EPA made numerous attempts to reconcile the statutory requirement of point source regulation with the practical problem of regulating possibly millions of diverse point source discharges of storm water. (Defenders of Wildlife, supra, 191 F.3d at p. 1163; see Gallagher, Clean Water Act in Environmental Law Handbook (Sullivan, edit., 2003) p. 300 (Environmental Law Handbook); Eisen, Toward a Sustainable Urbanism: Lessons from Federal Regulation of Urban Stormwater Runoff (1995) 48 Wash. U. J. Urb. & Contemp. L. 1, 40-41 (Regulation of Urban Stormwater Runoff).)

(4) Eventually, in 1987, Congress amended the Clean Water Act to add provisions that specifically concerned NPDES permit requirements for storm sewer discharges. (§ 1342(p); see Defenders of Wildlife, supra, 191 F.3d at p. 1163; Natural Resources Defense Counsel v. U.S. E.P.A. (1992) 966 F.2d 1292, 1296.) In these amendments, enacted as part of the Water Quality Act of 1987, Congress distinguished between industrial and municipal storm water discharges. With respect to industrial storm water discharges, Congress provided that NPDES permits "shall meet all applicable provisions of this

section and section 1311 [requiring the EPA to establish effluent limitations under specific timetables] ... ." (§ 1342(p)(3)(A).) With respect to municipal storm water discharges, Congress clarified that the EPA had the authority to fashion NPDES permit requirements to meet water quality standards without specific numerical effluent limits and instead to impose "controls to reduce the discharge of pollutants to the maximum extent practicable ... ." (§ 1342(p)(3)(B)(iii); see Defenders of Wildlife, supra, 191 F.3d at p. 1163.) Because the statutory language pertaining to municipal storm sewers is at the center of this appeal, we quote the relevant portion of the statute in full:

"(B) ... Permits for discharges from municipal storm sewers--

"(i) may be issued on a system-or jurisdiction-wide basis;

"(ii) shall include a requirement to effectively prohibit non-stormwater discharges into the storm sewers; and

"(iii) shall require controls to reduce the discharge of pollutants to the maximum extent practicable, including management practices, control techniques and system, design and engineering methods, and such other provisions as the Administrator or the State determines appropriate for the control of such pollutants." (§ 1342(p)(3)(B).)

To ensure this scheme would be administratively workable, Congress placed a moratorium on many new types of required stormwater permits until 1994 (§ 1342(p)(1)), and created a phased approach to necessary municipal stormwater permitting depending on the size of the municipality (§ 1342(p)(2)(D)). (See Environmental Defense Center, Inc. v. U.S. E.P.A. (9th Cir. 2003) 344 F.3d 832, 841-842.)

B. State Statutory Scheme

Three years before the 1972 Clean Water Act, the California Legislature enacted its own water quality protection legislation, the Porter-Cologne Water Quality Control Act (Porter-Cologne Act), seeking to "attain the highest water quality which is reasonable ... ." (Wat. Code, § 13000.) The Porter-Cologne Act created the State Water Board to formulate statewide water quality policy and established nine regional boards to prepare water quality plans (known as basin plans) and issue permits governing the discharge of waste. (Wat. Code, § § 13100, 13140, 13200, 13201, 13240, 13241, 13243.) The Porter-Cologne Act

identified these permits as "waste discharge requirements," and provided that the waste discharge requirements must mandate compliance with the applicable regional water quality control plan. (Wat. Code, § § 13263, subd. (a), 13377, 13374.)

Shortly after Congress enacted the Clean Water Act in 1972, the California Legislature added Chapter 5.5 to the Porter-Cologne Act, for the purpose of adopting the necessary federal requirements to ensure it would obtain EPA approval to issue NPDES permits. (Wat. Code, § 13370, subd. (c).) As part of these amendments, the Legislature provided that the state and regional water boards "shall, as required or authorized by the [Clean Water Act], issue waste discharge requirements ... which apply and ensure compliance with all applicable provisions [of the Clean Water Act], together with any more stringent effluent standards or limitations necessary to implement water quality control plans, or for the protection of beneficial uses, or to prevent nuisance." (Wat. Code, § 13377.) Water Code section 13374 provides that "[t]he term 'waste discharge requirements' as referred to in this division is the equivalent of the term 'permits' as used in the [Clean Water Act]."

(5) California subsequently obtained the required approval to issue NPDES permits. (WaterKeepers Northern California v. State Water Resources Control Bd. (2002) 102 Cal.App.4th 1448, 1453 [126 Cal. Rptr. 2d 389].) Thus, the waste discharge requirements issued by the regional water boards ordinarily also serve as NPDES permits under federal law. (Wat. Code, § 13374.)

II. The NPDES Permit at Issue in this Case

Under its delegated authority and after numerous public hearings, in February 2001 the Regional Water Board issued a 52-page NPDES permit and Waste Discharge Requirements (the Permit) governing municipal storm sewers owned by San Diego County, the San Diego Unified Port District, and 18 San Diego-area cities (collectively Municipalities). n6 The first 10 pages of the Permit contain the Regional Water Board's detailed factual findings. These findings describe the manner in which San Diego-area water runoff absorbs numerous harmful pollutants and then is conveyed by municipal storm sewers into local waters without any treatment. The findings state that these storm sewer discharges are a leading cause of water quality impairment in the San Diego region, endangering aquatic life and human health. The findings further state that to achieve applicable state water quality objectives, it is necessary not only to require municipalities to comply with existing pollution-control technologies, but also to require compliance with applicable "receiving water limits" (state water quality standards) and to employ an "iterative process" of "development, implementation, monitoring, and assessment" to improve existing technologies.

n6 Under the Clean Water Act, entities responsible for NPDES permit conditions pertaining to their own discharges are referred to as "copermittees." (40 C.F.R. § 122.26(b)(1).) For clarity and readability, we shall refer to these entities as Municipalities.

Based on these factual findings, the Regional Water Board included in the Permit several overall prohibitions applicable to municipal storm sewer discharges. Of critical importance to this appeal, these prohibitions concern two categories of restrictions. First, the Municipalities are prohibited from discharging those pollutants "which have not been reduced to the maximum extent practicable ... ." n7 (Italics added). Second, the Municipalities are prohibited from discharging pollutants "which cause or contribute to exceedances of receiving water quality objectives ... " and/or that "cause or contribute to the violation of water quality standards ... ." This second category of restrictions (referred to in this opinion as the Water Quality Standards provisions) essentially provide that a Municipality may not discharge pollutants if those pollutants would cause the receiving water body to exceed the applicable water quality standard. It is these latter restrictions that are challenged by Building Industry in this appeal.

n7 The Permit does not precisely define this phrase, and instead, in its definition section, contains a lengthy discussion of the variable nature of the maximum extent practicable concept, referred to as "MEP." A portion of this discussion is as follows: "[T]he definition of MEP is dynamic and will be defined by the following process over time: municipalities propose their definition of MEP by way of their [local storm sewer plan]. Their total collective and individual activities conducted pursuant to the [plan] becomes their proposal for MEP as it applies both to their overall effort, as well as to specific activities (e.g., MEP for street sweeping, or MEP for municipal separate storm sewer maintenance). In the absence of a proposal acceptable to the [Regional Water Board], the [Regional Water Board] defines MEP." The definition also identifies several factors that are "useful" in determining whether an entity has achieved the maximum extent practicable standard, including "Effectiveness," "Regulatory Compliance," "Public Acceptance," "Cost," and "Technical Feasibility."

Part C of the Permit (as amended) qualifies the Water Quality Standards provisions by detailing a procedure for enforcing violations of those standards through a step-by-step process of "timely implementation of control measures ...," known as an "iterative" process. Under this procedure, when a Municipality "caus[es] or contribute[s] to an exceedance of an applicable water quality standard," the Municipality must prepare a report documenting the violation and describing a process for improvement and prevention of further violations. The Municipality and the Regional Water Board must then work together at improving methods and monitoring progress to achieve compliance. But the final provision of Part C states that "Nothing in this section shall prevent the [Regional Water Board] from enforcing any provision of this Order while the [Municipality] prepares and implements the above report."

In addition to these broad prohibitions and enforcement provisions, the Permit requires the Municipalities to implement, or to require businesses and residents to implement, various pollution control measures referred to as "best management practices," which reflect techniques for preventing, slowing, retaining or absorbing pollutants produced by stormwater runoff. These best management practices include structural controls that minimize contact between pollutants and flows, and non-structural controls such as educational and public outreach programs. The Permit also requires the Municipalities to regulate discharges associated with new development and redevelopment and to ensure a completed project will not result in significantly increased discharges of pollution from storm water runoff.

III. Administrative and Trial Court Challenges

After the Regional Water Board issued the Permit, the Building Industry, an organization representing the interests of numerous construction-related businesses, filed an administrative challenge with the State Water Board. Although none of the Municipalities joined in the administrative appeal, Building Industry claimed its own independent standing based on its assertion that the Permit would impose indirect obligations on the regional building community. (See Wat. Code, § 13320 [permitting any "aggrieved person" to challenge Regional Water Board action].) Among its numerous contentions, Building Industry argued that the Water Quality Standards provisions in the Permit require strict compliance with state water quality standards beyond what is "practicable" and therefore violate federal law.

In November 2001, the State Water Board issued a written decision rejecting Building Industry's appeal after making certain modifications to the Permit. (State of California Water Resources Control Board Order WQ2001-15 (Nov. 15, 2001).) Of particular relevance here, the State Water Board modified the Permit to make clear that the iterative enforcement process applied to the Water Quality Standards provisions in the Permit. But the State Water Board did not delete the Permit's provision stating that the Regional Water Board retains the authority to enforce the Water Quality Standards provisions even if a Municipality is engaged in this iterative process.

Building Industry then brought a superior court action against the Water Boards, challenging the Regional Board's issuance of the Permit and the State Water Board's denial of Building Industry's administrative challenge. n8 Building Industry asserted numerous legal claims, including that the Water Boards: (1) violated the Clean Water Act by imposing a standard greater than the "maximum extent practicable" standard; (2) violated state law by failing to consider various statutory factors before issuing

the Permit; (3) violated the California Environmental Quality Act (CEQA) by failing to prepare an environmental impact report (EIR); and (4) made findings that were factually unsupported.

n8 Several other parties were also named as petitioners: Building Industry Legal Defense Foundation, California Business Properties Association, Construction Industry Coalition for Water Quality, San Diego County Fire Districts Association, and the City of San Marcos. However, because these entities were not parties in the administrative challenge, the superior court properly found they were precluded by the administrative exhaustion doctrine from challenging the administrative agencies' compliance with the federal and state water quality laws. Although these entities were named as appellants in the notice of appeal, they are barred by the exhaustion doctrine from asserting appellate contentions concerning compliance with federal and state water quality laws. However, as to any other claims (such as CEQA), these entities are proper appellants. For ease of reference and where appropriate, we refer to the appellants collectively as Building Industry.

Three environmental organizations, San Diego BayKeeper, National Resources Defense Council, and California CoastKeeper (collectively Environmental Organizations), requested permission to file a complaint in intervention, seeking to uphold the Permit and asserting a direct and substantial independent interest in the subject of the action. Over Building Industry's objections, the trial court permitted these organizations to file the complaint and enter the action as parties-interveners.

After reviewing the lengthy administrative record and the parties' briefs, and conducting an oral hearing, the superior court ruled in favor of the Water Boards and Environmental Organizations (collectively respondents). Applying the independent judgment test, the court found Building Industry failed to meet its burden to establish the State Water Board abused its discretion in approving the Permit or that the administrative findings are contrary to the weight of the evidence. In particular, the court found Building Industry failed to establish the Permit requirements were "impracticable under federal law or unreasonable under state law," and noted that there was evidence showing the Regional Water Board considered many practical aspects of the regulatory controls before issuing the Permit. Rejecting Building Industry's legal arguments, the court also stated that under federal law the Water Boards had the discretion "to require strict compliance with water quality standards" or "to require less than strict compliance with water quality standards." The court also sustained several of respondents' evidentiary objections, including to documents relating to the legislative history of the Clean Water Act.

Building Industry appeals, challenging the superior court's determination that the Permit did not violate the federal Clean Water Act. In its appeal, Building Industry does not reassert its claim that the Permit violates state law, except for its contentions pertaining to CEQA.

DISCUSSION

I. Standard of Review

(6) A party aggrieved by a final decision of the State Water Board may obtain review of the decision by filing [a superior court] petition for writ of mandate in the superior court. (Wat. Code, § 13330, subd. (a).) Code of Civil Procedure section 1094.5 governs the proceedings, and the superior court must exercise its independent judgment in examining the evidence and resolving factual disputes. (Wat. Code, § 13330, subd. (d).) "In exercising its independent judgment, a trial court must afford a strong presumption of correctness concerning the administrative findings, and the party challenging the administrative decision bears the burden of convincing the court that the administrative findings are contrary to the weight of the evidence." (Fukuda v. City of Angels (1999) 20 Cal.4th 805, 817 [85 Cal. Rptr. 2d 696, 977 P.2d 693].)

(7) In reviewing the trial court's factual determinations on the administrative record, a Court of Appeal applies a substantial evidence standard. (Fukuda v. City of Angels, supra, 20 Cal.4th at p. 824.) However, in reviewing the trial court's legal determinations, an appellate court conducts a de novo review. (See Alliance for a Better Downtown Millbrae v. Wade (2003) 108 Cal.App.4th 123, 129 [133 Cal. Rptr. 2d 249].) Thus, we are not bound by the legal determinations made by the state or regional agencies or by the trial court. (See Yamaha Corp. of America v. State Bd. of Equalization (1998) 19 Cal.4th 1, 7-8 [78 Cal. Rptr. 2d 1, 960 P.2d 1031].) But we must give appropriate consideration to an administrative agency's expertise underlying its interpretation of an applicable statute. n9 (Ibid.)

n9 We note that in determining the meaning of the Clean Water Act and its amendments, federal courts generally defer to the EPA's statutory construction if the disputed portion of the statute is ambiguous. (See Chevron U.S.A. v. Natural Res. Def. Council, Inc. (1984) 467 U.S. 837, 842-844 [81 L. Ed. 2d 694, 104 S. Ct. 2778] (Chevron).) However, the parties do not argue this same principle applies to a state agency's interpretation of the Clean Water Act. Nonetheless, under governing state law principles, we do consider and give due deference to the Water Boards' statutory interpretations in this case. (See Yamaha Corp. of America v. State Bd. of Equalization, supra, 19 Cal.4th at pp. 7-8.)

II. Water Boards' Authority to Enforce Water Quality Standards in NPDES Permit

Building Industry's main appellate contention is very narrow. Building Industry argues that two provisions in the Permit (the Water Quality Standards provisions) violate federal law because they prohibit the Municipalities from discharging runoff from storm sewers if the discharge would cause a water body to exceed the applicable water quality standard established under state law. n10 Building Industry contends that under federal law the "maximum extent practicable" standard is the "exclusive" measure that may be applied to municipal storm sewer discharges and a regulatory agency may not require a Municipality to comply with a state water quality standard if the required controls exceed a "maximum extent practicable" standard.

n10 These challenged Permit provisions state "Discharges from [storm sewers] which cause or contribute to exceedances of receiving water quality objectives for surface water or groundwater are prohibited" (Permit, § A.2), and "Discharges from [storm sewers] that cause or contribute to the violation of water quality standards ... are prohibited" (Permit, § C.1).

In the following discussion, we first reject respondents' contentions that Building Industry waived these arguments by failing to raise a substantial evidence challenge to the court's factual findings and/or to reassert its state law challenges on appeal. We then focus on the portion of the Clean Water Act (§ 1342(p)(3)(B)(iii)) that Building Industry contends is violated by the challenged Permit provisions. On our de novo review of this legal issue, we conclude the Permit's Water Quality Standards provisions are proper under federal law, and Building Industry's legal challenges are unsupported by the applicable statutory language, legislative purpose, and legislative history.

A. Building Industry Did Not Waive the Legal Argument

Respondents (the Water Boards and Environmental Organizations) initially argue that Building Industry waived its right to challenge the Permit's consistency with the maximum extent practicable standard because Building Industry did not challenge the trial court's factual findings that Building Industry failed to prove any of the Permit requirements were "impracticable" or "unreasonable."

In taking this position, respondents misconstrue the nature of Building Industry's appellate contention challenging the Water Quality Standards provisions. Building Industry's contention concerns the scope of the authority given to the Regional Water Board under the Permit terms. Specifically, Building Industry argues that the Regional Water Board does not have the authority to require the Municipalities to adhere to the applicable water quality standards because federal law provides that the "maximum extent practicable" standard is the exclusive standard that may be applied to storm sewer regulation.

This argument--concerning the proper scope of a regulatory agency's authority--presents a purely legal issue, and is not dependent on the court's factual findings regarding the practicality of the specific regulatory controls identified in the Permit.

Respondents alternatively contend that Building Industry waived its right to challenge the propriety of the Water Quality Standards provisions under federal law because the trial court found the provisions were valid under state law and Building Industry failed to reassert its state law challenges on appeal. Under the particular circumstances of this case, we conclude Building Industry did not waive its rights to challenge the Permit under federal law.

(8) Although it is well settled that the Clean Water Act authorizes states to impose water quality controls that are more stringent than are required under federal law (§ 1370; see PUD No. 1 of Jefferson Cty. v. Washington Dept. of Ecology (1994) 511 U.S. 700, 705 [128 L. Ed. 2d 716, 114 S. Ct. 1900]; Northwest Environmental Advocates v. Portland (9th Cir. 1995) 56 F.3d 979, 989), and California law specifically allows the imposition of controls more stringent than federal law (Wat. Code, § 13377), the Water Boards made a tactical decision in the superior court to assert the Permit's validity based solely on federal law, and repeatedly made clear they were not seeking to justify the Permit requirements based on the Boards' independent authority to act under state law. On appeal, the Water Boards continue to rely primarily on federal law to uphold the Permit requirements, and their assertions that we may decide the matter based solely on state law are in the nature of asides rather than direct arguments. On this record, it would be improper to rely solely on state law to uphold the challenged Permit provisions.

B. The Water Quality Standards Requirement Does Not Violate Federal Law

We now turn to Building Industry's main substantive contention on appeal-- that the Permit's Water Quality Standards provisions (fn. 10, ante) violate federal law. Building Industry's contention rests on its interpretation of the 1987 Water Quality Act amendments containing NPDES requirements for municipal storm sewers. The portion of the relevant statute reads: "(B) ... Permits for discharges from municipal storm sewers ... [P] ... [P] (iii) shall require controls to reduce the discharge of pollutants to the maximum extent practicable, including management practices, control techniques and system, design and engineering methods, and such other provisions as the [EPA] Administrator or the State determines appropriate for the control of such pollutants." (§ 1342(p)(3)(B)(iii), italics added.)

1. Statutory Language

Focusing on the first 14 words of subdivision (iii), Building Industry contends the statute means that the maximum extent practicable standard sets the upper limit on the type of control that can be used in an NPDES permit, and that each of the phrases following the word "including" identify examples of "maximum extent practicable" controls. (§ 1342(p)(3)(B)(iii), italics added.) Building Industry thus reads the final "and such other provisions" clause as providing the EPA with the authority only to include other types of "maximum extent practicable" controls in an NPDES storm sewer permit.

Respondents counter that the term "including" refers only to the three identified types of pollution control procedures--(1) "management practices"; (2) "control techniques"; and (3) "system, design and engineering methods"--and that the last phrase, "and such other provisions as the Administrator or the State determines appropriate for the control of such pollutants," provides the EPA (or the approved state regulatory agency) the specific authority to go beyond the maximum extent practicable standard to impose effluent limitations or water-quality based standards in an NPDES permit. In support, respondents argue that because the word "system" in section 1342(p)(3)(B)(iii) is singular, it necessarily follows from parallel-construction grammar principles that the word "system" is part of the phrase "system, design and engineering methods" rather than the phrase "control techniques and system." Under this view and given the absence of a comma after the word "techniques," respondents argue that the "and such other provisions" clause cannot be fairly read as restricted by the "maximum extent practicable" phrase, and instead the "and such other provisions" clause is a separate and distinct clause that acts as a second direct object to the verb "require" in the sentence. (§ 1342(p)(3)(B)(iii).)

Building Industry responds that respondents' proposed statutory interpretation is "not logical" because if the "and such other provisions" phrase is the direct object of the verb "require," the sentence would not make sense. Building Industry states that "permits" do not generally "require" provisions; they "include" or "contain" them.

(9) As a matter of grammar and word choice, respondents have the stronger position. The second part of Building Industry's proposed interpretation--"control techniques and system, design and engineering methods"--without a comma after the word "techniques" does not logically serve as a parallel construct with the "and such other provisions" clause. Moreover, we disagree that the "and such other provisions" clause cannot be a direct object to the word "require." (§ 1342(p)(3)(B)(iii).) Although it is not the clearest way of articulating the concept, the language of section 1342(p)(3)(B)(iii) does communicate the basic principle that the EPA (and/or a state approved to issue the NPDES permit) retains the discretion

to impose "appropriate" water pollution controls in addition to those that come within the definition of " 'maximum extent practicable.' " (See Defenders of Wildlife, supra, 191 F.3d at pp. 1165-1167.) We find unpersuasive Building Industry's reliance on several statutory interpretation concepts, ejusdem generis, noscitur a sociis, and expressio unius est exclusion alterius, to support its narrower statutory construction.

2. Purpose and History of Section 1342(p)(3)(B)(iii)

(10) Further, "[w]hile punctuation and grammar should be considered in interpreting a statute, neither is controlling unless the result is in harmony with the clearly expressed intent of the Legislature." (In re John S. (2001) 88 Cal.App.4th 1140, 1144, fn. 1 [106 Cal. Rptr. 2d 476]; see Estate of Coffee (1941) 19 Cal.2d 248, 251 [120 P.2d 661].) If the statutory language is susceptible to more than one reasonable interpretation, a court must also "look to a variety of extrinsic aids, including the ostensible objects to be achieved, the evils to be remedied, the legislative history, public policy, contemporaneous administrative construction, and the statutory scheme of which the statute is a part." (Nolan v. City of Anaheim (2004) 33 Cal.4th 335, 340 [14 Cal. Rptr. 3d 857, 92 P.3d 350].)

(11) The legislative purpose underlying the Water Quality Act of 1987, and section 1342(p) in particular, supports that Congress intended to provide the EPA (or the regulatory agency of an approved state) the discretion to require compliance with water quality standards in a municipal storm sewer NPDES permit, particularly where, as here, that compliance will be achieved primarily through an iterative process.

Before section 1342(p) was enacted, the courts had long recognized that the EPA had the authority to require a party to comply with a state water quality standard even if that standard had not been translated into an effluent limitation. (See EPA v. State Water Resources Control Board, supra, 426 U.S. at p. 205, fn. 12; PUD No. 1 of Jefferson Cty. v. Washington Dept. of Ecology, supra, 511 U.S. at p. 715; Northwest Environmental Advocates v. Portland (9th Cir. 1995) 56 F.3d 979, 987; Natural Resources Defense Counsel v. U.S.E.P.A. (9th Cir. 1990) 915 F.2d 1314, 1316.) Specifically, section 1311(b)(1)(C) gave the regulatory agency the authority to impose "any more stringent limitation, including those necessary to meet water quality standards," and section 1342(a)(2) provided that "[t]he [EPA] Administrator shall prescribe conditions for [NPDES] permits to assure compliance" with requirements identified in section 1342(a)(1), which encompass state water quality standards. The United States Supreme Court explained that when Congress enacted the 1972 Clean Water Act, it retained "[w]ater quality standards ... as a supplementary basis for effluent limitations, ... so that numerous point sources despite individual compliance with effluent limitations, may be further regulated to prevent water quality from falling below acceptable levels. ... " (EPA v. State Water Resources Control Board, supra,

426 U.S. at p. 205, fn. 12; see also Arkansas v. Oklahoma (1992) 503 U.S. 91, 101 [117 L. Ed. 2d 239, 112 S. Ct. 1046].)

There is nothing in section 1342(p)(3)(B)(iii)'s statutory language or legislative history showing that Congress intended to eliminate this discretion when it amended the Clean Water Act in 1987. To the contrary, Congress added the NPDES storm sewer requirements to strengthen the Clean Water Act by making its mandate correspond to the practical realities of municipal storm sewer regulation. As numerous commentators have pointed out, although Congress was reacting to the physical differences between municipal storm water runoff and other pollutant discharges that made the 1972 legislation's blanket effluent limitations approach impractical and administratively burdensome, the primary point of the legislation was to address these administrative problems while giving the administrative bodies the tools to meet the fundamental goals of the Clean Water Act in the context of stormwater pollution. (See Regulation of Urban Stormwater Runoff, supra, at pp. 44-46; Environmental Law Handbook, supra, at p. 300; Clean Water Act Handbook, supra, at pp. 62-63.) In the 1987 congressional debates, the Senators and Representatives emphasized the need to prevent the widespread and escalating problems resulting from untreated storm water toxic discharges that were threatening aquatic life and creating conditions dangerous to human health. (See Remarks of Sen. Durenberger, 133 Cong. Rec. 1279 (Jan. 14, 1987); Remarks of Sen. Chaffee, 133 Cong. Rec. S738 (daily ed. Jan 14, 1987); Remarks of Rep. Hammerschmidt, 133 Cong. Rec. 986 (Jan. 8, 1987); Remarks of Rep. Roe, 133 Cong. Rec. 1006, 1007 (Jan. 8, 1987); Remarks of Sen. Stafford, 132 Cong. Rec. 32381, 32400 (Oct. 16, 1986).) This legislative history supports that in identifying a maximum extent practicable standard Congress did not intend to substantively bar the EPA/state agency from imposing a more stringent water quality standard if the agency, based on its expertise and technical factual information and after the required administrative hearing procedure, found this standard to be a necessary and workable enforcement mechanism to achieving the goals of the Clean Water Act.

To support a contrary view, Building Industry relies on comments by Minnesota Senator David Durenberger during the lengthy congressional debates on the 1987 Water Quality Act amendments. n11 (132 Cong. Rec. 32400 (Oct. 16, 1986); 133 Cong. Rec. S752 (daily ed. Jan. 14, 1987.) In the cited portions of the Congressional Record, Senator Durenberger states that NPDES permits "shall require controls to reduce the discharge of pollutants to the maximum extent practicable. Such controls include management practices, control techniques and systems, design and engineering methods, and such other provisions, as the Administrator determines appropriate for the control of pollutants in the stormwater discharge." (Ibid.) When viewing these statements in context, it is apparent that the Senator was merely paraphrasing the words of the proposed statute and was not intending to address the issue of whether the maximum extent practicable standard was a regulatory ceiling or whether he believed the proposed amendments limited the EPA's existing discretion. n12

n11 We agree with Building Industry that the trial court's refusal to consider this legislative history on the basis that it was not presented to the administrative agencies was improper. However, this error was not prejudicial because we apply a de novo review standard in interpreting the relevant statutes.

n12 In the cited remarks, Senator Durenberger in fact expressed his dissatisfaction with the EPA's prior attempts to regulate municipal storm sewers. He pointed out, for example, that "[r]unoff from municipal separate storm sewers and industrial sites contain significant values of both toxic and conventional pollutants," and that despite the Clean Water Act's "clear directive," the EPA "has failed to require most stormwater point sources to apply for permits which would control the pollutants in their discharge." (133 Cong. Rec. 1274, 1279-1280 (daily ed. Jan. 14, 1987).)

Building Industry's reliance on comments made by Georgia Representative James Rowland, who participated in drafting the 1987 Water Quality Act amendments, is similarly unhelpful. During a floor debate on the proposed amendments, Representative Rowland noted that cities have "millions of" stormwater discharge points and emphasized the devastating financial burden on cities if they were required to obtain a permit for each of these points. (133 Cong. Rec. 522 (daily ed. Feb. 3, 1987).) Representative Rowland then explained that the amendments would address this problem by "allow[ing] communities to obtain far less costly single jurisdictionwide permits." (Ibid.) Viewed in context, these comments were directed at the need for statutory provisions permitting the EPA to issue jurisdiction-wide permits thereby preventing unnecessary administrative costs to the cities, and do not reflect a desire to protect cities from the cost of complying with strict water quality standards when deemed necessary by the regulatory agency.

3. Interpretations by the EPA and Other Courts

(12) Our conclusion that Congress intended section 1342(p)(3)(B)(iii) to provide the regulatory agency with authority to impose standards stricter than a "maximum extent practicable" standard is consistent with interpretations by the EPA and the Ninth Circuit. In its final rule promulgated in the Federal Register, the EPA construed section 1342(p)(3)(B)(iii) as providing the administrative agency with the authority to impose water-quality standard controls in an NPDES permit if appropriate under the circumstances. Specifically, the EPA stated this statutory provision requires "controls to reduce the discharge of pollutants to the maximum extent practicable, and where necessary water quality-based controls ... ." (55 Fed.Reg. 47990, 47994 (Nov. 16, 1990), italics added.) We are required to give substantial deference to this administrative interpretation, which occurred after an extensive notice and comment period. (See ibid.; Chevron, supra, 467 U.S. at pp. 842-844.)

The only other court that has interpreted the "such other provisions" language of section 1342(p)(3)(B)(iii) has reached a similar conclusion. (Defenders of Wildlife, supra, 191 F.3d at pp. 1166-1167.) In Defenders of Wildlife, environmental organizations brought an action against the EPA, challenging provisions in an NPDES permit requiring several Arizona localities to adhere to various best management practice controls without requiring numeric effluent limitations. (Id. at p. 1161.) The environmental organizations argued that section 1342(p) did not allow the EPA to issue NPDES permits without requiring strict compliance with effluent limitations. (Ibid.) Rejecting this argument, the Ninth Circuit found section 1342(p)(3)(B)(iii)'s statutory language "unambiguously demonstrates that Congress did not require municipal storm-sewer discharges to comply strictly" with effluent limitations. (Defenders of Wildlife, supra, at p. 1164.)

But in a separate section of the opinion, the Defenders of Wildlife court additionally rejected the reverse argument made by the affected municipalities (who were the interveners in the action) that "the EPA may not, under the [Clean Water Act], require strict compliance with state water-quality standards, through numerical limits or otherwise." (Defenders of Wildlife, supra, 191 F.3d at p. 1166.) The court stated: "Although Congress did not require municipal storm-sewer discharges to comply strictly with [numerical effluent limitations], § 1342(p)(3)(B)(iii) states that '[p]ermits for discharges from municipal storm sewers ... shall require ... such other provisions as the Administrator ... determines appropriate for the control of such pollutants.' (Emphasis added.) That provision gives the EPA discretion to determine what pollution controls are appropriate. ... [P] Under that discretionary provision, the EPA has the authority to determine that ensuring strict compliance with state water-quality standards is necessary to control pollutants. The EPA also has the authority to require less than strict compliance with state water-quality standards ... . Under 33 U.S.C. § 1342(p)(3)(B)(iii), the EPA's choice to include either management practices or numeric limitations in the permits was within its discretion. [Citations.]" (Defenders of Wildlife, supra, 191 F.3d at pp. 1166-1167, second italics added.) Although dicta, this conclusion reached by a federal court interpreting federal law is persuasive and is consistent with our independent analysis of the statutory language. n13

n13 Building Industry's reliance on two other Ninth Circuit decisions to support a contrary statutory interpretation is misplaced. (See Natural Res. Def. Council, Inc. v. U.S.E.P.A., supra, 966 F.2d at p. 1308; Environmental Defense Center, Inc. v. U.S. E.P.A. (9th cir. 2003) 344 F.3d 832.) Neither of these decisions addressed the issue of the scope of a regulatory agency's authority to exceed the maximum extent practicable standard in issuing NPDES permits for municipal storm sewers.

To support its interpretation of section 1342(p)(3)(B)(iii), Building Industry additionally relies on the statutory provisions addressing nonpoint source runoff (a diffuse runoff not channeled through a particular source), which were also part of the 1987 amendments to the Clean Water Act. (§ 1329.) In particular, Building Industry cites to section 1329(a)(1)(C), which states, "The Governor of each State shall ... prepare and submit to the [EPA] Administrator for approval, a report which ... [P] ... [P] describes

the process ... for identifying best management practices and measures to control each [identified] category ... of nonpoint sources and ... to reduce, to the maximum extent practicable, the level of pollution resulting from such category ... ." (Italics added.) Building Industry argues that because this "nonpoint source" statutory language expressly identifies only the maximum extent practicable standard, we must necessarily conclude that Congress meant to similarly limit the storm sewer point source pollution regulations to the maximum extent practicable standard.

The logic underlying this analogy is flawed because the critical language in the two statutory provisions is different. In the nonpoint source statute, Congress chose to include only the maximum extent practicable standard (§ 1329(a)(1)(C)); whereas in the municipal storm sewer provisions, Congress elected to include the "and such other provisions" clause (§ 1342(p)(3)(B)(iii)). This difference leads to the reasonable inference that Congress had a different intent when it enacted the two statutory provisions. Moreover, because of a fundamental difference between point and nonpoint source pollution, Congress has historically treated the two types of pollution differently and has subjected each type to entirely different requirements. (See Pronsolino v. Nastri (9th Cir. 2002) 291 F.3d 1123, 1126-1127.) Given this different treatment, it would be improper to presume Congress intended to apply the same standard in both statutes. Building Industry's citation to comments during the 1987 congressional debates regarding nonpoint source regulation does not support Building Industry's contentions.

4. Contention that it is "Impossible" for Municipalities to Meet Water Quality Standards

We also reject Building Industry's arguments woven throughout its appellate briefs, and emphasized during oral arguments, that the Water Quality Standards provisions violate federal law because compliance with those standards is "impossible." The argument is not factually or legally supported.

(13) First, there is no showing on the record before us that the applicable water quality standards are unattainable. The trial court specifically concluded that Building Industry failed to make a factual showing to support this contention, and Building Industry does not present a proper appellate challenge to this finding sufficient to warrant our reexamining the evidence. All judgments and orders are presumed correct, and persons challenging them must affirmatively show reversible error. (14) (Walling v. Kimball (1941) 17 Cal.2d 364, 373 [110 P.2d 58].) A party challenging the sufficiency of evidence to support a judgment must summarize (and cite to) all of the material evidence, not just the evidence favorable to his or her appellate positions. (In re Marriage of Fink (1979) 25 Cal.3d 877, 887-888 [160 Cal. Rptr. 516, 603 P.2d 881]; People v. Dougherty (1982) 138 Cal. App. 3d 278, 282 [188 Cal. Rptr. 123].) Building Industry has made no attempt to comply with this well-established appellate rule in its briefs.

In a supplemental brief, Building Industry attempted to overcome this deficiency by asserting that "[t]he record clearly establishes that [the Water Quality Standards provisions] are unattainable during the period the permit is in effect." This statement, however, is not supported by the proffered citation or by the evidence viewed in the light most favorable to the respondents. Further, the fact that many of the Municipalities' storm sewer discharges currently violate water quality standards does not mean that the Municipalities cannot comply with the standards during the five-year term of the Permit. Additionally, Building Industry's assertions at oral argument that the trial court never reached the "impossibility" issue and/or that respondents' counsel conceded the issue below are belied by the record, including the trial court's rejection of Building Industry's specific challenge to the proposed statement of decision on this very point. n14

n14 Because we are not presented with a proper appellate challenge, we do not address the trial court's factual determinations in this case concerning whether it is possible or practical for a Municipality to achieve any specific Permit requirement.

(15) We reject Building Industry's related argument that it was respondents' burden to affirmatively show it is feasible to satisfy each of the applicable Water Quality Standards provisions. The party challenging the scope of an administrative permit, such as an NPDES, has the burden of showing the agency abused its discretion or its findings were unsupported by the facts. (See Fukuda v. City of Angels, supra, 20 Cal.4th at p. 817; Huntington Park Redevelopment Agency v. Duncan (1983) 142 Cal. App. 3d 17, 25 [190 Cal. Rptr. 744].) Thus, it was not respondents' burden to affirmatively demonstrate it was possible for the Municipalities to meet the Permit's requirements.

Building Industry alternatively contends it was not required to challenge the facts underlying the trial court's determination that the Permit requirements were feasible because the court's determination was wrong as a matter of law. Specifically, Building Industry asserts that a Permit requirement that is more stringent than a "maximum extent practicable" standard is, by definition, "not practicable" and therefore "technologically impossible" to achieve under any circumstances. Building Industry relies on a dictionary definition of "practicable," which provides that the word means " 'something that can be done; feasible,' " citing the 1996 version of "Webster's Encyclopedic Unabridged Dictionary."

(16) This argument is unpersuasive. The federal maximum extent practicable standard it is not defined in the Clean Water Act or applicable regulations, and thus the Regional Water Board properly included a detailed description of the term in the Permit's definitions section. (See ante, fn. 7.) As broadly defined in the Permit, the maximum extent practicable standard is a highly flexible concept that depends on balancing numerous factors, including the particular control's technical feasibility, cost, public

acceptance, regulatory compliance, and effectiveness. This definition conveys that the Permit's maximum extent practicable standard is a term of art, and is not a phrase that can be interpreted solely by reference to its everyday or dictionary meaning. Further, the Permit's definitional section states that the maximum extent practicable standard "considers economics and is generally, but not necessarily, less stringent than BAT." (Italics added.) BAT is an acronym for "best available technology economically achievable," which is a technology-based standard for industrial storm water dischargers that focuses on reducing pollutants by treatment or by a combination of treatment and best management practices. (See Texas Oil & Gas Ass'n v. U.S. E.P.A. (5th Cir. 1998) 161 F.3d 923, 928.) If the maximum extent practicable standard is generally "less stringent" than another Clean Water Act standard that relies on available technologies, it would be unreasonable to conclude that anything more stringent than the maximum extent practicable standard is necessarily impossible. In other contexts, courts have similarly recognized that the word "practicable" does not necessarily mean the most that can possibly be done. (See Nat. Wildlife Federation v. Norton (E.D. Cal. 2004) 306 F. Supp. 2d 920, 928, fn. 12 ["[w]hile the meaning of the term 'practicable' in the [Endangered Species Act] is not entirely clear, the term does not simply equate to 'possible' "]; Primavera Familienstiftung v. Askin (S.D.N.Y. 1998) 178 F.R.D. 405, 409 [noting that "impracticability does not mean impossibility, but rather difficulty or inconvenience"].)

We additionally question whether many of Building Industry's "impossibility" arguments are premature on the record before us. As we have explained, the record does not support that any required control is, or will be, impossible to implement. Further, the Permit allows the Regional Water Board to enforce water quality standards during the iterative process, but does not impose any obligation that the board do so. Thus, we cannot determine with any degree of certainty whether this obligation would ever be imposed, particularly if it later turns out that it is not possible for a Municipality to achieve that standard.

Finally, we comment on Building Industry's repeated warnings that if we affirm the judgment, all affected Municipalities will be in immediate violation of the Permit because they are not now complying with applicable water quality standards, subjecting them to immediate and substantial civil penalties, and leading to a potential "shut down" of public operations. These doomsday arguments are unsupported. The Permit makes clear that Municipalities are required to adhere to numerous specific controls (none of which are challenged in this case) and to comply with water quality standards through "timely implementation of control measures" by engaging in a cooperative iterative process where the Regional Water Board and Municipality work together to identify violations of water quality standards in a written report and then incorporate approved modified best management practices. Although the Permit allows the regulatory agencies to enforce the water quality standards during this process, the Water Boards have made clear in this litigation that they envision the ongoing iterative process as the centerpiece to achieving water quality standards. Moreover, the regulations provide an affected party reasonable time to comply with new permit requirements under certain circumstances. (See 40 C.F.R. §

122.47.) There is nothing in this record to show the Municipalities will be subject to immediate penalties for violation of water quality standards.

We likewise find speculative Building Industry's predictions that immediately after we affirm the judgment, citizens groups will race to the courthouse to file lawsuits against the Municipalities and seek penalties for violation of the Water Quality Standards provisions. n15 As noted, the applicable laws provide time for an affected entity to comply with new standards. Moreover, although we do not reach the enforcement issue in this case, we note the Permit makes clear that the iterative process is to be used for violations of water quality standards, and gives the Regional Water Board the discretionary authority to enforce water quality standards during that process. Thus, it is not at all clear that a citizen would have standing to compel a municipality to comply with a water quality standard despite an ongoing iterative process. (See § 1365(a)(1)(2).)

n15 The Clean Water Act allows a citizen to sue a discharger to enforce limits contained in NPDES permits, but requires the citizen to notify the alleged violator, the state, and the EPA of its intention to sue at least 60 days before filing suit, and limits the enforcement to nondiscretionary agency acts. (See § 1365(a)(1)(2).)

III.-VII. *[NOT CERTIFIED FOR PUBLICATION]

*See footnote, ante, page 866.

DISPOSITION

Judgment affirmed. Appellants to pay respondents' costs on appeal.

Benke, Acting P. J., and Aaron, J., concurred.

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A UC Irvine study tallies the costs of treatment and lost wages for beachgoers who get sick. Stomach ailment? That'll be $36.58.

May 03, 2005 | Sara Lin | Times Staff Writer

Beachgoers who get sick after swimming off two popular Orange County beach areas rack up about $3 million annually in health-related expenses, according to a study announced Monday.

The report, by UC Irvine researchers, is believed to be the first to put a dollar figure on the cost of medical care and lost wages to people who become sick after swimming in ocean waters when bacterial levels are within state health standards.

Although the study looked at the stretch of shoreline along south Huntington Beach and north Newport Beach, its authors said the economic toll would be similar at beaches nationwide. The dollar amount would vary by the number of people using the beach.

"There's no reason to think that Orange County people get sick more than Los Angeles people," said Ryan Dwight, lead author of the report, which was part of his doctorate in environmental health. "People are people. Say you have a standard dose of an organism and you give it to someone from the East Coast or West Coast. They would both contract the same illness."

The report, which has been published online and will appear in the Journal of Environmental Management, combined published data from two earlier studies.

The authors hope it will give policymakers a way to compare the cost of cleaning up coastal waters with the personal cost to beachgoers.

The researchers noted that most people who swim at the beach do not get sick. Though it's a small percentage -- about 0.8% -- at beaches like Huntington State Beach, a small percentage getting sick can produce a large total, Dwight said.

What makes surfers, swimmers and divers sick are pathogens from urban runoff, mostly human and animal waste.

Researchers said that among the more than 5 million people who swam in the waters surveyed, from 1998 to 2000, an estimated 36,000 cases of gastrointestinal illnesses were contracted, along with about 38,000 other ailments, including respiratory, eye and ear infections. Stomach ailments cost each infected person an estimated $36.58, and acute respiratory disease cost $76.76. Eye infections cost $27.31, and ear ailments cost $37.86.

The study did not include the price of self-treatment, such as buying over-the-counter medicine. Losses to the local tourism industry were not considered. Dwight said the group's findings should be considered conservative because it could not be known what was spent on self-treatment.

Data was not used from days when the beaches were closed for poor water quality.

"This study's critical because it provides long-overdue information on what the costs are of swimming in poor water quality," said Mark Gold, executive director of Santa Monica-based Heal the Bay, a nonprofit group that publishes beach report cards on water quality.

The coastal water quality debate is often one-sided, he said, with regulators and polluters focusing on the costs of cleaning urban runoff. "This helps tremendously to balance the ledger in the economics of clean water," Gold said.

To calculate the expense of treating sick beachgoers, researchers first looked at data from a 1996 British epidemiology study -- used by the World Health Organization to set its water quality standards -- tracking how many days people were sick and took off work, and how many needed to see a doctor.

Meshing that information with a 2003 study of Newport Beach and Huntington Beach showing beach attendance and water quality records kept by the Orange County Health Care Agency, academics could calculate how many people were likely to develop infections. Adjusting for the average wage in Orange County and using a third study to determine the average cost of a visit to a doctor to be about $102, the group could estimate how much ocean-borne ailments cost beachgoers. (Some who get sick don't go to the doctor, or don't even miss work.)

Reusing data from previously published reports is common among university academics. The report assumes that beachgoers in Britain and Southern California are in the same general health and that they act similarly when they get sick -- for example, missing the same number of days of work to recover.

"It's sound science, but it's not the best science," said Linwood Pendleton, an associate professor at UCLA specializing in the economics of coastal issues at the School of Public Health. "The best science would be doing an original study ... but it's very expensive to do that. The important part of this paper is that it does a good job of figuring out what it might cost a person who gets sick from swimming."

Pendleton noted that the total health expense figures in the new study are not far from the costs of cleaning up coastal waters. Newport Beach spends $5.5 million a year trying to reduce runoff and sewage spills that cause beach closures.

But although Newport Beach officials agreed that improving water quality was important, they were wary of the new report.

"The message they're reinforcing is a good message, but I'm still skeptical of the science that went into this," said Dave Kiff, assistant city manager of Newport Beach. He said, for example, that the link between ocean-borne bacteria and illness wasn't so simple, and noted that the study relied on studies of other environments.

"To me, the way we convince the public to spend more money on water quality is through very good science, and I don't know this is good science."

City of Burbank v. State Water Resources Control Board et al.
City of Los Angeles v. State Water Resources Control Board et al.
Supreme Court of California
26 Cal. Rptr. 3d 304 (April 4, 2005)

Rehearing Denied June 29, 2005

* * *

II. FACTUAL BACKGROUND

This case involves three publicly owned treatment plants that discharge wastewater under NPDES permits issued by the Los Angeles Regional Board.

* * *

***622** All three plants, which together process hundreds of millions of gallons of sewage ****867** each day, are tertiary treatment facilities; that is, the treated wastewater they release is processed sufficiently to be safe not only for use in watering food crops, parks, and playgrounds, but also for human body contact during recreational water activities such as swimming.

In 1998, the Los Angeles Regional Board issued renewed NPDES permits to the three wastewater treatment facilities under a basin plan it had adopted four years earlier for the Los Angeles River and its estuary. That 1994 basin plan contained general narrative criteria pertaining to the existing and potential future beneficial uses and water quality objectives for the river and estuary. The narrative criteria included municipal and domestic water supply, swimming and other recreational water uses, and fresh water habitat. The plan further provided: "All waters shall be maintained free of toxic substances in concentrations that are toxic to, or that produce detrimental physiological responses in human, plant, animal, or aquatic life." The 1998 permits sought to reduce these narrative criteria to specific numeric requirements setting daily maximum limitations for more than 30 pollutants present in the treated wastewater, measured in milligrams or micrograms per liter of effluent.

The Cities of Los Angeles and Burbank (Cities) filed appeals with the State Board, contending that achievement of the numeric requirements would be too costly when considered in light of the potential benefit to water quality, and that the pollutant restrictions in the NPDES permits were unnecessary to meet the narrative criteria described in the basin plan. The State Board summarily denied the Cities' appeals.

Thereafter, the Cities filed petitions for writs of administrative mandate in the superior court. They alleged, among other things, that the Los Angeles Regional Board failed to comply with sections 13241 and 13263, part of California's Porter-Cologne Act, because it did not consider the economic burden on the Cities in having to reduce substantially the pollutant content of their discharged wastewater. They also alleged that compliance with the pollutant restrictions set out in the NPDES permits issued by the regional ***623** board would greatly increase their costs of treating the wastewater to be discharged into the Los Angeles River. According to the City of Los Angeles, its compliance costs would exceed $50 million annually, representing more than 40 percent of its entire budget for operating its four wastewater treatment plants and its sewer system; the City of Burbank estimated its added costs at over $9 million annually, a nearly 100 percent increase above its $9.7 million annual budget for wastewater treatment.

*****310** The State Board and the Los Angeles Regional Board responded that sections 13241 and 13263 do not require consideration of costs of compliance when a regional board issues a NPDES permit that restricts the pollutant content of discharged wastewater.

The trial court stayed the contested pollutant restrictions for each of the three wastewater treatment plants. It then ruled that sections 13241 and 13263 of California's Porter-Cologne Act required a regional board to consider costs

of compliance not only when it adopts a basin or water quality plan but also when, as here, it issues an NPDES permit setting the allowable pollutant content of a treatment plant's discharged wastewater.* * *

The Court of Appeal, after consolidating the cases, reversed the trial court. It concluded that sections 13241 and 13263 require a regional board to take into account "economic considerations" when it adopts water quality standards in a basin plan but not when, as here, the regional board sets specific pollutant restrictions in wastewater discharge permits intended to satisfy those standards. We granted the Cities' petition for review.

****624** III. DISCUSSION*

A. Relevant State Statutes

The California statute governing the issuance of *wastewater permits* by a regional board is section 13263, which was enacted in 1969 as part of the Porter-Cologne Act. (See 26 Cal.Rptr.3d pp. 306-307, 108 P.3d p. 865, *ante.*) Section 13263 provides in relevant part: "*The regional board*, after any necessary hearing, *shall prescribe requirements as to the nature of any proposed discharge* [of wastewater]. *The requirements* shall implement any relevant water quality control plans that have been adopted, and *shall take into consideration* the beneficial uses to be protected, the water quality objectives reasonably required for that purpose, other waste discharges, the need to prevent nuisance, and *the provisions of Section 13241*." (§ 13263, subd. (a), italics added.)

Section 13241 states: "Each regional board shall establish such water quality objectives in water quality control plans as in its judgment will ensure the reasonable protection of beneficial uses and the prevention of nuisance; however, it is recognized that it may be possible for the quality of water to be changed to some degree without unreasonably affecting beneficial uses. Factors to be considered by a regional board in establishing water quality objectives shall include, but not necessarily be limited to, all of the following:

*****311** "(a) Past, present, and probable future beneficial uses of water.

"(b) Environmental characteristics of the hydrographic unit under consideration, including the quality of water available thereto.

"(c) Water quality conditions that could reasonably be achieved through the coordinated control of all factors which affect water quality in the area.

"(d) *Economic considerations.*

"(e) The need for developing housing within the region.

"(f) The need to develop and use recycled water." (Italics added.)

The Cities here argue that section 13263's express reference to section 13241 requires the Los Angeles Regional Board to consider section 13241's listed factors, notably "[e]conomic considerations," before issuing NPDES permits requiring specific pollutant reductions in discharged effluent or treated wastewater.

[2] ***625** Thus, at issue is language in section 13263 stating that when a regional board "prescribe[s] requirements as to the nature of any proposed discharge" of treated wastewater it must "take into consideration" certain factors including "the provisions of Section 13241." According to the Cities, this statutory language requires that a regional board make an independent evaluation of the section 13241 factors, including "economic considerations," before restricting the pollutant content in an NPDES permit. This was the view expressed in the trial court's ruling. The Court of Appeal rejected that view. It held that a regional board need consider the section 13241 factors only when it adopts a basin or water quality plan, but not when, as in this case, it issues a wastewater discharge ****869** permit that sets specific numeric limitations on the various chemical pollutants in the wastewater to be discharged. As explained below, the Court of Appeal was partly correct.

B. Statutory Construction

[3] When construing any statute, our task is to determine the Legislature's intent when it enacted the statute "so that we may adopt the construction that best effectuates the purpose of the law." (*Hassan v. Mercy American River Hospital* (2003) 31 Cal.4th 709, 715, 3 Cal.Rptr.3d 623, 74 P.3d 726; *Esberg v. Union Oil Co.* (2002) 28 Cal.4th 262, 268, 121 Cal.Rptr.2d 203, 47 P.3d 1069.) In doing this, we look to the statutory language, which ordinarily is "the most reliable indicator of legislative intent." (*Hassan, supra,* at p. 715, 3 Cal.Rptr.3d 623, 74 P.3d 726.)

As mentioned earlier, our Legislature's 1969 enactment of the Porter-Cologne Act, which sought to ensure the high quality of water in this state, predated the 1972 enactment by Congress of the precursor to the federal Clean Water Act. Included in California's original Porter-Cologne Act were sections 13263 and 13241. Section 13263 directs regional boards, when issuing wastewater discharge permits, to take into account various factors including those set out in section 13241. Listed among the section 13241 factors is "[e]conomic considerations." (§ 13241, subd. (d).) The plain language of sections 13263 and 13241 indicates the Legislature's intent in 1969, when these statutes were enacted, that a regional board consider the cost of compliance when setting effluent limitations in a wastewater discharge permit.

Our construction of sections 13263 and 13241 does not end with their plain statutory language, however. We must also analyze them in the context of the statutory scheme of which they are a part. *****312**(*State Farm Mutual Automobile Ins. Co. v. Garamendi* (2004) 32 Cal.4th 1029, 1043, 12 Cal.Rptr.3d 343, 88 P.3d 71.) Like sections 13263 and 13241, section 13377 is part of the Porter-Cologne Act. But unlike the former two statutes, section 13377 was ***626** not enacted until 1972, shortly after Congress, through adoption of the Federal Water Pollution Control Act Amendments, established a comprehensive water quality policy for the nation.

[4] Section 13377 specifies that wastewater discharge permits issued by California's regional boards must meet the federal standards set by federal law. In effect, section 13377 forbids a regional board's consideration of any economic hardship on the part of the permit holder if doing so would result in the dilution of the requirements set by Congress in the Clean Water Act. That act prohibits the discharge of pollutants into the navigable waters of the United States unless there is compliance with federal law (33 U.S.C. § 1311(a)), and publicly operated wastewater treatment plants such as those before us here must comply with the act's clean water standards, regardless of cost (see *id.* §§ 1311(a), (b)(1)(B) & (C), 1342(a)(1) & (3)). Because section 13263 cannot authorize what federal law forbids, it cannot authorize a regional board, when issuing a wastewater discharge permit, to use compliance costs to justify pollutant restrictions that do not comply with federal clean water standards. Such a construction of section 13263 would not only be inconsistent with federal law, it would also be inconsistent with the Legislature's ****870** declaration in section 13377 that all discharged wastewater must satisfy federal standards. This was also the conclusion of the Court of Appeal. Moreover, under the federal Constitution's supremacy clause (art. VI), a state law that conflicts with federal law is " 'without effect.' " (*Cipollone v. Liggett Group, Inc*. (1992) 505 U.S. 504, 516, 112 S.Ct. 2608, 120 L.Ed.2d 407; *Dowhal v. SmithKline Beecham Consumer Healthcare* (2004) 32 Cal.4th 910, 923, 12 Cal.Rptr.3d 262, 88 P.3d 1.) To comport with the principles of federal supremacy, California law cannot authorize this ***627** state's regional boards to allow the discharge of pollutants into the navigable waters of the United States in concentrations that would exceed the mandates of federal law.

*****313** Thus, in this case, whether the Los Angeles Regional Board should have complied with sections 13263 and 13241 of California's Porter-Cologne Act by taking into account "economic considerations," such as the costs the permit holder will incur to comply with the numeric pollutant restrictions set out in the permits depends on whether those restrictions meet or exceed the requirements of the federal Clean Water Act. We therefore remand this matter for the trial court to resolve that issue.

* * *

[5] At oral argument, counsel for amicus curiae National Resources Defense Council, which argued on behalf of California's State Board and regional water boards, asserted that the federal Clean Water Act incorporates state water policy into federal law, and that therefore a regional board's consideration of economic factors to justify greater pollutant concentration in discharged wastewater would conflict with the federal act even if the specified pollutant restrictions were not less stringent than those required under federal law. We are not persuaded. The federal Clean Water Act reserves to the states significant aspects of water quality policy (33 U.S.C. § 1251(b)), and

it specifically grants the states authority to "enforce any effluent limitation" that is not "*less stringent* " than the federal standard (*id.* § 1370, italics added). It does not prescribe or restrict the factors that a state may consider when exercising this reserved authority, and thus it does not prohibit ***628** a state--when imposing effluent limitations that are *more stringent* than required by federal law--from taking into account the economic effects of doing so.

* * *

CONCLUSION

Through the federal Clean Water Act, Congress has regulated the release of pollutants into our national waterways. The states are free to manage their own water quality programs so long as they do not compromise the federal clean water standards. When enacted in 1972, the goal of the Federal Water Pollution Control Act Amendments was to *eliminate* by the year 1985 the discharge of pollutants into the nation's navigable waters. In furtherance of that goal, the Los Angeles Regional Board indicated in its 1994 basin plan on water quality the intent, insofar as possible, to remove from the water in the Los Angeles River toxic substances in amounts harmful to humans, plants, and aquatic life. What is not clear from the record before us is whether, in limiting the chemical pollutant content of wastewater to be discharged by the Tillman, Los Angeles-Glendale, and Burbank wastewater treatment facilities, the Los Angeles Regional Board acted only to implement requirements of the federal Clean Water Act or instead imposed pollutant limitations that exceeded the federal requirements. This is an issue of fact to be resolved by the trial court.

DISPOSITIONMS

We affirm the judgment of the Court of Appeal reinstating the wastewater discharge permits to the extent that the specified numeric limitations on chemical pollutants are necessary to satisfy federal Clean Water Act requirements for treated wastewater. The Court of Appeal is directed to remand this ***629** matter to the trial court to decide whether any numeric limitations, as described in the permits, are "more stringent" than required under federal law and thus should have been subject to "economic considerations" by the Los Angeles Regional Board before inclusion in the permits.

We Concur: George, C.J., Baxter, Werdegar, Chin, and Moreno, JJ.

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Court of Appeal of California, Fourth District, Division Two.

135 Cal.App.4th 1377 (Cal. Ct. App. 2006)

CITY V. REGIONAL WATER QUALITY CONTROL BD

KEY PASSAGES FROM THIS CASE (5)

"But the foregoing allegations did not articulate any improper State Board conduct." Quoted 2 times

"The National Pollutant Discharge Elimination System California cases have repeatedly explained the complicated web of federal and state laws and

MORE PASSAGES

*1379

OPINION

GAUT, J.

1. Introduction

This case involves environmental regulation of municipal storm sewers that carry excess water runoff to the Santa Ana River as it passes through San Bernardino County on its way to the Pacific Ocean. Federal and state laws impose regulatory

required to obtain and comply with a federal regulatory permit limiting the quantity and quality of water runoff that can be discharged from these storm sewer systems.

In this instance, the Regional Water Quality Control Board for the Santa Ana Region (the Regional Board) conducted public hearings and then issued a comprehensive 66-page municipal storm sewer permit governing 18 local *1380 public entities. Two permittees, the City of Rancho Cucamonga and the City of Upland, among others, filed an administrative appeal with the State Water Resources Control Board (the State Board.) The State Board summarily dismissed the appeal. The Cities of Rancho Cucamonga and Upland [1] then filed a petition for writ of mandate and complaint against the State Board and the Regional Board.

1. Upland is not a party to this appeal.

The trial court sustained without leave to amend the demurrer of the State Board to the entire action. It sustained the demurrer as to four causes of action and granted the motion to strike of the Regional Board. After a hearing, the trial court denied the petition for writ of mandate.

Both procedurally and substantively, the City of Rancho Cucamonga challenges the conditions imposed by the NPDES[2] permit and waste discharge requirements (the 2002 permit). It contends the procedure by which the 2002 permit was adopted was not legal, that the 2002 permit's conditions are not appropriate for the area, and that the permit's requirements are too expensive. Because we conclude the permit was properly adopted and its conditions and requirements are appropriate, we reject these contentions.

2. The National Pollutant Discharge Elimination System.

Discharge Elimination System

California cases have repeatedly explained the complicated web of federal and state laws and regulations concerning water pollution, especially storm sewer discharge into the public waterways. (*City of Burbank v. State Water Resources Control Bd.* (2005) 35 Cal.4th 613, 619-621 [26 Cal.Rptr.3d 304, 108 P.3d 862] (*Burbank*); *Building Industry Assn. of San Diego County v. State Water Resources Control Board* (2004) 124 Cal.App.4th 866, 872-875 [22 Cal.Rptr.3d 128] (*Building Industry); Communities for a Better Environment v. State Water Resources Control Bd.* (2003) 109 Cal.App.4th 1089, 1092-1094 [1 Cal.Rptr.3d 76] (*Communities*); *WaterKeepers Northern California v. State Water Resources Control Bd.* (2002) 102 Cal.App.4th 1448, 1451-1453 [126 Cal.Rptr.2d 389]).

For purposes of this case, the important point is described by the California Supreme Court in *Burbank:* "Part of the Federal Clean Water Act [33 U.S.C. § 1251 et seq.] is the National Pollutant Discharge Elimination System (NPDES), `[t]he primary means' for enforcing effluent limitations and standards under the Clean Water Act. (*Arkansas v. Oklahoma* [(1992) *1381 503 U.S. 91, 101 [117 L.Ed.2d 239, 112 S.Ct. 1046]].) The NPDES sets out the conditions under which the federal [Environmental Protection Agency] or a state with an approved water quality control program can issue permits for the discharge of pollutants in wastewater. (33 U.S.C. § 1342(a) (b).) In California, wastewater discharge requirements established by the regional boards are the equivalent of the NPDES permits required by federal law. (§

California's Porter-Cologne Act (Wat. Code, § 13000 et seq.) establishes a statewide program for water quality control. Nine regional boards, overseen by the State Board, administer the program in their respective regions. (Wat. Code, §§ 13140, 13200 et seq., 13240, and 13301.) Water Code sections 13374 and 13377 authorize the Regional Board to issue federal NPDES permits for five-year periods. (33 U.S.C. § 1342, subd.(b)(1)(B).)

As discussed more fully in part 6 *post*, the state-issued NPDES permits are subject to the informal hearing procedures set forth for administrative adjudications. (Gov. Code, § 11445.10 et seq.; Cal. Code Regs., tit. 23, § 647 et seq.) The issuance of permits is specifically excluded from the procedures for administrative regulations and rulemaking. (Gov. Code, §§ 11340 et seq., 11352.)

3. Factual and Procedural Background

The Regional Board issued the first NPDES permit for San Bernardino County in 1990. The principal permittee was the San Bernardino Flood Control District (the District).

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The 1990 permit required the permittees to develop and implement pollution control measures, using "best management practices" and monitoring programs, to eliminate illegal discharges and connections, and to obtain any necessary legal authority to do so. The management programs could be existing or new.

In 1993, the District developed the NPDES drain area management program (DAMP).

on the report of waste discharge (ROWD) prepared by the principal permittee and copermittees, including Rancho Cucamonga. The 1996 permit proposed extending the existing program, which included inspections of industrial and commercial sources; policies for development and redevelopment; better public education; and implementation of a monitoring program. It offered a commitment to reduce pollutants to the "maximum extent practicable."

In 2000, the permittees submitted another ROWD to renew their NPDES permit. The 2000 ROWD proposed continuing to implement and develop water quality management and monitoring programs. *1382

Based on the 2000 ROWD, the Regional Board staff created five successive drafts of the 2002 permit, incorporating written comments by Rancho Cucamonga and others and comments made during two public workshops. Some of the comments addressed the economic considerations of anticipated prohibitive compliance costs.

The notice of the public hearing to consider adoption of the 2002 permit hearing announced: "relevant Regional Board files are incorporated into the record;" the governing procedures were those for an informal hearing procedure as set forth in "Title 23, California Code of Regulations, Section 647 et seq.;" and "Hearings before the Regional Water Board are not conducted pursuant to Government Code section 11500 et seq.," the alternative formal hearing procedure for administrative adjudication. The notice was mailed to all permittees. The accompanying "fact sheet," which was publicly circulated, offered further information about the conduct and nature of the hearing and the legal and factual

The informal public hearing was conducted on April 26, 2002. Neither Rancho Cucamonga nor any of the permittees objected to the form or substance of the hearing. Ultimately, after a staff presentation and testimony, including a statement from Rancho Cucamonga's counsel, the Regional Board adopted the 2002 permit. After the State Board dismissed their administrative appeal, Rancho Cucamonga and Upland filed the instant action.

The operative pleading is the second amended petition for writ of mandate and complaint. The petition alleges that the State Board and the Regional Board acted illegally and in excess of their jurisdiction in developing, adopting and implementing the 2002 permit. Based on 26 pages of general allegations, the petition asserts eight causes of action, alleging the State Board and the Regional Board violated sections 13241, 13263, and 13360 of the Water Code (the Porter-Cologne Act); the California Environmental Quality Act (Pub. Resources Code, § 21000 et seq.); the California Administrative Procedure Act (Gov. Code, §§ 11340- 11529); the California Constitution; and the federal Clean Water Act; and seeking declaratory and injunctive relief.

The State Board successfully opposed the action on demurrer. The Regional Board eliminated four causes of action, the fourth, fifth, seventh, and eighth by demurrer and motion to strike. On the remaining four causes of action, the trial court found in favor of the Regional Board. *1383

4. State Board's Demurrer

Rancho Cucamonga maintains the trial court should not have sustained the demurrer of the State Board without leave to

state-issued NPDES permits, and, therefore, was properly joined as a party: "Because the State Board has for all intents and purposes adopted the rules and policies of general application upon which the Permit is based, it is clearly a proper party to this action."

The difficulty with Rancho Cucamonga's theory of liability against the State Board is, to quote Gertrude Stein about the City of Oakland, "There is no there there." (Stein, Everybody's Autobiography (1937).) In other words, Rancho Cucamonga's allegations against the State Board lack any substance. Instead, Rancho Cucamonga launches an unspecific attack on the State Board without identifying any particular problems. The petition makes the unexceptional allegation that the State Board formulates general water control policy which it implements and enforces through regional boards. It also alleges the State Board has not complied with the Administrative Procedure Act but it does not identify any objectionable policies or how there is no compliance. Instead the petition complains about a State Board letter directing that all NPDES permits follow consistent principles regarding standard urban storm water mitigation plans. Additionally, the petition maintains the 2002 permit included new reporting requirements and increased costs of compliance.

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But the foregoing allegations did not articulate any improper State Board conduct. The 2002 permit, issued by the Regional Board and not by the State Board, is not subject to formal rulemaking procedures. (Gov. Code, § 11352, subd. (b).) The State Board's letter, explaining a precedential

dismissing Rancho Cucamonga's administrative appeal concerning the 2002 permit, the State Board declined to become involved and the Regional Board's decision to issue the permit became final and subject to judicial review. (*People ex rel Cal. Regional Wat. Quality Control Bd. v. Barry* (1987) 194 Cal.App.3d 158, 177 [239 Cal.Rptr. 349].) But the State Board was not made a proper party by reason of its dismissal of the administrative appeal.

Furthermore, even if Rancho Cucamonga had identified any cognizable claim against the State Board, it would have been barred by the 30-day statute of limitations for challenging an improperly adopted State Board regulation or order. (Wat. Code, § 13330; Gov. Code, § 11350.) *1384

We hold the trial court properly sustained without leave to amend the State Board's demurrer to the second amended petition for writ of mandate and complaint.

5. Standard of Review for Petition for Writ of Mandate

In deciding a petition for writ of mandate, the trial court exercises its independent judgment. (Code Civ. Proc, § 1094.5, subd. (c); Wat. Code, § 13330, subd. (d); *Building Industry, supra* , 124 Cal.App.4th at p. 879 .) But, "[i]n exercising its independent judgment, a trial court must afford a strong presumption of correctness concerning the administrative findings. . . . [¶] . . . [¶] . . . Because the trial court ultimately must exercise its own independent judgment, that court is free to substitute its own findings after first giving due respect to the agency's findings." (*Fukuda v. City of Angels* (1999) 20 Cal.4th 805, 817-818 [85 Cal.Rptr.2d

On appeal, the reviewing court determines whether substantial evidence supports the trial court's factual determinations. (*Fukuda, supra* , 20 Cal.4th at p. 824 ; *Building Industry, supra*, 124 Cal.App.4th at p. 879.)

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The trial court's legal determinations receive a de novo review with consideration being given to the agency's interpretations of its own statutes and regulations. (*Building Industry, supra* , at p. 879; *Nasha v. City of Los Angeles* (2004) 125 Cal.App.4th 470, 482 [22 Cal.Rptr.3d 772].)

6. Rancho Cucamonga's Objections to the Administrative Record and Lack of Notice

The notice of the administrative hearing for adoption of the 2002 permit included the statement that the Regional Board's files would be incorporated as part of the record. Before trial on the writ petition, Rancho Cucamonga attempted to raise an omnibus objection to the entire administrative record and a specific objection to four documents, three studies about marine pollution and one economic study. The trial court ruled the objections had been waived by not making them before or at the time of the hearing. Applying the presumption of administrative regularity, we affirm the trial court's evidentiary ruling. (*Mason v. Office of Admin. Hearings* (2001) 89 Cal.App.4th 1119, 1131 [108 Cal.Rptr.2d 102].)

The reasons given by Rancho Cucamonga as to why the trial court should have sustained its objections to all or part of the administrative record are that it did not waive its objections to the record because Rancho Cucamonga did not know the hearing was adjudicative; the Regional Board did not provide

and Rancho Cucamonga never had an opportunity to object to the administrative record.

As noted previously, Government Code section 11352, subdivision (b), makes the issuance of an NPDES permit exempt from the rulemaking procedures of the Administrative Procedure Act. Permit issuance is a quasi-judicial, not a quasi-legislative, rulemaking proceeding: "The exercise of discretion to grant or deny a license, permit or other type of application is a quasi-judicial function." (*Sommerfield v. Helmick* (1997) 57 Cal.App.4th 315, 320 [67 Cal.Rptr.2d 51]; see *City of Santee v. Superior Court* (1991) 228 Cal.App.3d 713, 718 [279 Cal.Rptr. 22].)

Instead, the Regional Board correctly followed the administrative adjudication procedures (Gov. Code, § 11445.10 et seq.) and the companion regulations at California Code of Regulations, title 23, sections 647-648.8 for informal adjudicative public hearings. These procedures were announced in the notice of hearing which also stated that Government Code section 11500 et seq., governing formal administrative adjudication hearings, would not apply, thus satisfying Government Code section 11445.30 requiring notice of an informal hearing procedure. At the time of the hearing, Rancho Cucamonga did not object to the informal procedure. Rancho Cucamonga's effort to argue that federal notice requirements (40 C.F.R. § 124.8 , subd. (b)(6)(h) (2005)) should also have been followed fails because this involved a state-issued NPDES permit adopted according to California procedures.

Because Rancho Cucamonga was given notice that the hearing on the permit would proceed as an informal

was relieved of the obligation to object to the administrative record at the time of the hearing. An informal administrative adjudication contemplates liberality in the introduction of evidence. (Cal. Code Regs., tit. 23, §§ 648, subd. (d), 648.5.1.) If Rancho Cucamonga wished to object to the informal hearing procedures, including the liberal introduction of evidence, it should have raised its objections as provided by statute and regulation before or at the time of the hearing (Gov. Code, §§ 11445.30, 11445.40, 11445.50; Cal. Code Regs., tit. 23, § 648.7), not a year later in the subsequent civil proceeding.

7. Economic Considerations for Issuance of NPDES Permit

Rancho Cucamonga's next assignment of error is that the Regional Board failed to consider the economic impact of the requirements of the 2002 permit by not conducting a cost-benefit analysis. Rancho Cucamonga relies on the California Supreme Court's *Burbank* opinion, in which the court held: "When . . . a regional board is considering whether to make the pollutant restrictions in a wastewater discharge permit *more stringent* than federal law *1386 requires, California law allows the board to take into account economic factors, including the wastewater discharger's cost of compliance." (*Burbank, supra* , 35 Cal.4th at p. 618 .) Rancho Cucamonga contends that the 2002 permit exceeds federal requirements and that, therefore, this case should be remanded for a consideration of economic factors. (See *ibid.;* Wat. Code, § 13241, subd. (d).)

The two problems with this argument are the trial court found there was no evidence that the 2002 permit exceeded federal

how it does so. There was also evidence that the 2002 permit was based on a fiscal analysis and a cost-benefit analysis. In the absence of the foundational predicate and in view of evidence that cost was considered, Rancho Cucamonga's contention on this point fails.

We also reject Rancho Cucamonga's related procedural argument that the Regional Board's motion to strike was impermissible as piecemeal adjudication. (*Regan Roofing v. Superior Court* (1994) 24 Cal.App.4th 425, 432-436 ; *Lilienthal Fowler v. Superior Court* (1993) 12 Cal.App.4th 1848, 1851-1855 [16 Cal.Rptr.2d 458].) It is well recognized a court may strike all or part of a pleading as it did in this instance. (Code Civ. Proc, §§ 431.10, 436; *PH II, Inc. v. Superior Court* (1995) 33 Cal.App.4th 1680, 1682-1683 [40 Cal.Rptr.2d 169].)

8. Substantial Evidence

Rancho Cucamonga also challenges the trial court's independent factual determination that sufficient evidence supports the findings of the Regional Board. Rancho Cucamonga's main contention is that the 2002 permit was not distinctively crafted for San Bernardino County but, instead, copied a similar permit for other counties without identifying any particular water quality impairment in San Bernardino County caused by the permittees. In other words, no evidence in the record supports issuance of the 2002 permit and the trial court did not identify any such evidence in its statement of decision.

One problem with Rancho Cucamonga's foregoing argument is that the Clean Water Act requires an NPDES permit to be issued for *any* storm sewer discharge, whether there is any

Communities, supra , 109 Cal.App.4th at pp. 1092-1093 .) Therefore, Rancho Cucamonga's contention that the permit fails to identify impaired water bodies in the region is beside the point.

In its statement of decision, the trial court discussed the inadequacy of the arguments and evidence cited by Rancho Cucamonga and concluded: "The San Bernardino Permit is based in part on the Basin Plan for this region. It is *1387 also based on the permittees' own reports and monitoring within this region. . . . It incorporates the permittees' management program, which is unique to these cities and county." The trial court included a citation to the 1993 DAMP report's "Geographic Description of the Drainage Area," which discusses the specific conditions present in San Bernardino County.

On appeal, Rancho Cucamonga faults the trial court for not presenting a more detailed description of the evidence supporting the issuance of the permit. We do not think the trial court, or this court, must bear that burden.

First, "[a]n agency may . . . rely upon the opinion of its staff in reaching decisions, and the opinion of staff has been recognized as constituting substantial evidence. (*Coastal Southwest Dev. Corp. v. California Coastal Zone Conservation Com.* (1976) 55 Cal.App.3d 525, 535-536 [127 Cal.Rptr. 775].)" (*Browning-Ferris Industries v. City Council* (1986) 181 Cal.App.3d 852, 866 [226 Cal.Rptr. 575].) Here the Regional Board adopted the recommendation of its staff in issuing the permit. And, as the record shows, the staff's recommendation was based on the previous 1990 and 1996 permits, the 1993 DAMP report and the 2000 ROWD, the

contradicts Rancho Cucamonga's assertion, that "the Regional Board simply copied verbatim the NPDES Permit for North Orange County, a coastal region with markedly different water quality conditions and problems."

As part of the trial court's consideration of the petition for writ of mandate, Rancho Cucamonga and the Regional Board directed the court to review specific items of evidence contained in the administrative record. In its opposing brief, the Regional Board offered a detailed account of the evidence supporting the issuance of the permit. The trial court indicated it had reviewed the parties' submissions before ruling. It discussed the evidence at the hearing on the petition and referred to it in its statement of decision. (*Lala v. Maiorana* (1959) 166 Cal.App.2d 724, 731 [333 P.2d 862].) Rancho Cucamonga had the burden of showing the Board abused its discretion or its findings were not supported by the facts. (*Building Industry, supra*, 124 Cal.App.4th at pp. 887-888.) To the extent it attempted to do so at the trial court level, it was not successful.

This court has independently reviewed the record with particular attention to the evidence as emphasized by the parties. We do not, however, find it incumbent upon us or the trial court to review the many thousands of pages submitted on appeal and identify the particular evidence that constitutes substantial evidence. Instead, we deem the trial court's findings sufficient and not affording any grounds for reversal. (*Building Industry, supra* , 124 Cal.App.4th at p. 888 ; see *Weisz Trucking Co., Inc. v. Emil R. Wohl* *1388 *Construction* (1970) 13 Cal.App.3d 256, 264 [91 Cal.Rptr. 489], citing *Perry v. Jacobsen* (1960) 184 Cal.App.2d 43, 50 [7 Cal.Rptr.

9. Safe Harbor Provision

As it did repeatedly below, Rancho Cucamonga maintains the 2002 permit violates section 402(k) of the Clean Water Act (33 U.S.C. § 1342(k)), because the permit does not include "safe harbor" language, providing that, if a permittee is in full compliance with the terms and conditions of its permit, it cannot be found in violation of the Clean Water Act. (*U.S. Public Interest v. Atlantic Salmon* (1st Cir. 2003) 339 F.3d 23, 26; *EPA v. State Water Resources Control Board* (1976) 426 U.S. 200, 205 [48 L.Ed.2d 578, 96 S.Ct. 2022].) The trial court found there was no statutory right to a "safe harbor" provision to be included as the term of the permit. We agree.

This seems like much ado about nothing because 33 United States Code section 1342(k), already affords Rancho Cucamonga the protection it seeks: "Compliance with a permit issued pursuant to this section shall be deemed compliance, for purposes of sections 1319 and 1365 of this title, with sections 1311, 1312, 1316, 1317, and 1343 of this title, except any standard imposed under section 1317 of this title for a toxic pollutant injurious to human health." Rancho Cucamonga does not cite any persuasive authority as to why this statutory protection had to be duplicated as a provision in the 2002 permit.

Furthermore, the 2002 permit complied with the State Board's water quality order No. 99-05, a precedential decision requiring NPDES permits to omit "safe harbor" language used in earlier permits. A permit without "safe harbor" language was upheld in *Building Industry, supra* , 124 Cal.App.4th at page 877. The trial court did not err.

Practicable

Rancho Cucamonga protests that the 2002 permit's discharge limitations/prohibitions exceed the federal requirement that storm water dischargers should "reduce the discharge of pollutants to the maximum extent practicable." (33 U.S.C. § 1342(p)(3)(B)(iii).) The trial court, however, found there was no evidence presented that the 2002 permit exceeded federal requirements. Because there is no evidence, the issue presented is hypothetical and, therefore, premature. (*Building Industry, supra*, 124 Cal.App.4th at p. 890.)

Additionally, as Rancho Cucamonga recognizes, *Building Industry* rejected the contention that a "regulatory permit violates federal law because it allows the Water Boards to impose municipal storm sewer control measures more *1389 stringent than a federal standard known as `maximum extent practicable.' [Citation.] [Fn. omitted.] . . . [W]e . . . conclude the Water Boards had the authority to include a permit provision requiring compliance with state water quality standards." (*Building Industry, supra* , 124 Cal.App.4th at p. 871.) The *Burbank* case, allowing for consideration of economic factors when federal standards are exceeded, does not alter the analysis in this case where there was no showing that federal standards were exceeded and where there was evidence that economic factors were considered. Furthermore, like the permit in *Building Industries* , the 2002 permit contemplates controlling discharge of pollutants to the maximum extent practicable through a "cooperative iterative process where the Regional Water Board and Municipality work together to identify violations of water quality standards." (*Building Industry, supra* , at p. 890.) The 2002 permit does not exceed the maximum extent practicable

11. The Requirements of the 2002 Permit

Rancho Cucamonga lastly complains the requirements of the 2002 permit are "overly prescriptive," illegally dictating the manner of compliance and improperly delegating to the permittees the inspection duties of the State Board and the Regional Board. Rancho Cucamonga's arguments contradict the meaning and spirit of the Clean Water Act.

In creating a permit system for dischargers from municipal storm sewers, Congress intended to implement actual programs. (*National Resources Defense Council, Inc. v. Costle* (D.C. Cir. 1977) 186 U.S. App.D.C. 147 [568 F.2d 1369, 1375].) The Clean Water Act authorizes the imposition of permit conditions, including: "management practices, control techniques and system, design and engineering methods, and such other provisions as the Administrator or the State determines appropriate for the control of such pollutants." (33 U.S.C. § 1342(p)(3)(B)(iii) .) The act authorizes states to issue permits with conditions necessary to carry out its provisions. (33 U.S.C. § 1342(a)(1) .) The permitting agency has discretion to decide what practices, techniques, methods and other provisions are appropriate and necessary to control the discharge of pollutants. (*National Resources Defense Council v. U.S. EPA* (1992) 966 F.2d 1292, 1308.) That is what the Regional Board has created in the 2002 permit.

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Rancho Cucamonga's reliance on Water Code section 13360 is misplaced because that code section involves enforcement and implementation of state water quality law. (Wat. Code, §

(Wat. Code, § 13370 et seq.) The federal law preempts the state law. (*Burbank, supra* , 35 Cal.4th at p. 618 .) The Regional Board must comply with federal law requiring detailed conditions for NPDES permits. *1390

Furthermore, the 2002 permit does afford the permittees discretion in the manner of compliance. It is the permittees who design programs for compliance, implementing best management practices selected by the permittees in the DAMP report and approved by the Regional Board. Throughout the permit, the permittees are granted considerable autonomy and responsibility in maintaining and enforcing the appropriate legal authority; inspecting and maintaining their storm drain systems according to criteria they develop; establishing the priorities for their own inspection requirements; and establishing programs for new development. The development and implementation of programs to control the discharge of pollutants is left largely to the permittees.

More particularly, we agree with the Regional Board that the permit properly allocated some inspection duties to the permittees. As part of their ROWD application for a permit, the permittees proposed to "Conduct Inspection, Surveillance, and Monitoring. Carry out all inspections, surveillance, and monitoring procedures necessary to determine compliance and noncompliance with permit conditions including the prohibition on illicit discharges to the municipal storm drain system." The ROWD also discussed continuing existing inspection programs.

Water Code section 13383 provides that as part of compliance with the Clean Water Act, the Regional Board may establish

law, either expressly or by implication, requires NPDES permittees to perform inspections for illicit discharge prevention and detection; landfills and other waste facilities; industrial facilities; construction sites; certifications of no discharge; nonstormwater discharges; permit compliance; and local ordinance compliance. (40 C.F.R. § 122.26(d) , (g) (2005); 33 U.S.C. § 1342(p)(3)(B)(ii).) Permittees must report annually on their inspection activities. (40 C.F.R. § 122.42(c)(6) (2005).)

Rancho Cucamonga claims it is being required to conduct inspections for facilities covered by other state-issued general permits. Rancho Cucamonga and the other permittees are responsible for inspecting construction and industrial sites and commercial facilities within their jurisdiction for compliance with and enforcement of local municipal ordinances and permits. But the Regional Board continues to be responsible under the 2002 NPDES permit for inspections under the general permits. The Regional Board may conduct its own inspections but permittees must still enforce their own laws at these sites. (40 C.F.R. § 122.26(d)(2) (2005).) *1391

12. Disposition

Rancho Cucamonga is the only of the original 18 permittees still objecting to the 2002 NPDES permit. It has not successfully demonstrated that substantial evidence does not support the trial court's factual determinations or the trial court erred in its interpretation and application of state and federal law.

We affirm the judgment and order the prevailing parties to recover their costs on appeal.

016021

On February 27, 2006, the opinion was modified to read as printed above.

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016022

Environmentally Sensitive Maintenance for Dirt and Gravel Roads

- Better Roads
- Better Environment
- Better Community
- Less Maintenance

October 2007
Reissue
Ver: 1.1

PENNSTATE 1855

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Pennsylvania SCC

PENNSTATE Center for Dirt and Gravel Road Studies

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NOTICE

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16. Abstract

This is a nonpoint source pollution project that identifies, documents, and encourages the use of environmentally sensitive maintenance of dirt and gravel roads. Specifically, this project involved the development of a reference manual and related technical information sheets on *Environmentally Sensitive Maintenance of Dirt and Gravel Roads* for national use.

The manual will provide insight into using natural systems and innovative technologies to reduce erosion, sediment and dust pollution while more effectively and efficiently maintaining dirt and gravel roads. The manual will address the environment of forests, mountainous terrain, and rolling hills. Various states already employ some of the more common practices, particularly forestry departments. These states and their local governments are prime targets for deploying the additional practices to be addressed in the manual. The manual will give the users a 'tool box' full of environmentally sensitive maintenance 'tools' or practices, recognizing that not one tool can fit every situation or site or solve all their problems in maintaining their dirt and gravel roads and protecting the environment.

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Environmentally Sensitive Maintenance For Dirt and Gravel Roads

A Manual to provide guidance using natural systems and innovative technologies to reduce erosion, sediment and dust pollution while more effectively and efficiently maintaining dirt and gravel roads.

Compiled by
John A. Anderson, Ph.D.
Alan L. Gesford, P.E.

Sponsored by the
Pennsylvania Department of Transportation

with Funding Assistance from the
U.S. Environmental Protection Agency

This manual is based on information and training products developed by

Pennsylvania State Conservation Commission

& the Penn State Center for Study of Dirt & Gravel Roads

December, 2007

The contents of this report reflect the views of the authors, who are responsible for the facts and the accuracy of the data presented herein. The contents do not necessarily reflect the official views of either the Pennsylvania Department of Transportation or the U. S. Environmental Protection Agency. This report does not constitute a standard, specification, or regulation.

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Major Manual Contributors:

This manual has resulted from the initial two-year effort at the Pennsylvania Transportation Institute at Penn State and the Dirt and Gravel Roads Task Force, funded through the State Conservation Commission, which assemble materials for a 2-day ESM training program. Under the direction of the Center for Dirt and Gravel Road Studies, the training program has subsequently followed a path of continued quality improvements over the next seven years which has resulted in two comprehensive revisions to the original document. This manual owes its success to the contributions provided by:

John Anderson, IUP
Steve Bloser, CD&GS/PSU
Woodrow Cobert, SCC [retired]
Dave Creamer, CD&GS/PSU
Alan, Gesford, PSU
Dave Shearer, CD&GS/PSU

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Barry E. Scheetz, Center Director
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Karl Brown, Executive Director
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John A. Anderson, Ph.D.
Alan L. Gesford, P.E.
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Foreword

This manual was written for Road Maintenance Personnel.

To use this manual, do the following two things:

1. Review the underlying basis, mission and major objectives for this manual:

Basis of the Manual: The following facts are the driving force behind development of this manual:
1. Over 1.6 million miles of dirt and gravel roads exist within the United States, and they provide a vital service as part of the nation's transportation system.
2. Dirt and gravel roads will remain important and significant in mileage and use into the future.
3. The depositing of unwanted sediments into our streams and waterways represents one of the largest pollution problems in North America, and improperly maintained dirt and gravel roads are major contributors to this problem.

The Manual's Mission:
The mission of this manual is to address this pollution problem affecting our streams and stemming from our dirt and gravel roads in the form of erosion, sediment and dust.

Major Objectives to Accomplish the Mission:

1. Provide users with an understanding that *our road system is part of our overall environment, that a vital connection exists between the two, and that this connection needs to be considered in whatever actions we take in regards to constructing and maintaining our road system.* In doing so, we will be able to preserve our environment and more effectively and efficiently prolong the life of our transportation system.
2. Give users a 'tool box' full of environmentally sensitive maintenance 'tools' or practices that support both good roads and a good environment by offering a variety of simple, practical environmentally sensitive maintenance practices and by providing a means for using these practices in routine road maintenance.

The practices presented in this manual are inclined toward use for dirt and gravel roads in forested areas. The user may find, however, that many of the concepts and practices could prove applicable in various types of environments, and possibly require only minor research and development efforts.

2. Look at the Chapter Titles to determine how to effectively use the information presented:

Chapter:
1. Introduction
2. Geology, Rocks and Soils
3. Water, Erosion, Drainage and Road Basics
4. Basics of Natural Systems
5. Environmentally Sensitive Maintenance Practices: Roads and Road Drainage
6. Environmentally Sensitive Maintenance Practices: Roadsides and Streams
7. Environmentally Sensitive Maintenance Practices: Additional Techniques

By looking at the Chapter titles, we see that the maintenance "guts" of this manual are contained in Chapters 5, 6, and 7 on "Environmentally Sensitive Maintenance Practices". These are the chapters that you may want to read all the way through and then use this information with the accompanying "Technical Information Sheets" in implementing these practices for better roads and a better environment.

If this is all you do, however, you will not have a full understanding of why you are doing a particular practice a particular way or how these practices really work to better the road and the environment. This path is the traditional philosophy of telling someone what to do without any explanation of why it works or the reasons or factors upon which the practice is based. Without a full understanding of "why and how it works," the wrong reasoning for doing any work may prevail - "this is the way we always did it." On the other hand, if we fully understand the "why and how it works," we become confident in doing it right and can use this knowledge to actually improve upon the practice and its use in maintaining our roads.

This is where Chapters 1, 2, 3, and 4 become most important. These chapters give background information that enables an understanding of "how and why it works." We feel that it is important for road personnel to have "the whole story" or all the information behind the practices. This will enable them to implement the proper practice when needed or desired. Road personnel should know why and what they are doing, and why and how it benefits both the roads and the environment.

Environmentally Sensitive Maintenance For Dirt and Gravel Roads

Chapter 1: Introduction

1.1 Manual Mission & Scope

1.1.1 The Mission. The development of our national road system and the need to sustain it dictated governmental ownership from the start. Today, our state and local governments maintain the vast majority of roads. But our roads are part of our total environment, and just as we are the governmental trustees of our road system, we are also the trustees of our environment and all its resources.

1 - 01 Our roads are part of our total environment.

Beyond this trusteeship lies a greater calling: to be responsible stewards of our environment. The environment is under assault on many fronts, and many of those battles must be fought at the national and international level. But roads and their relationship to the environment are perhaps the one area where state and local governments can make a difference.

Unwanted sediments choke many streams and waterways, representing one of the largest pollution problems in North America. The culprits in many cases are dirt and gravel roads. Our mission, then, is to present proven methods of maintaining our dirt and gravel roads that reduce the erosion, sediment and dust that pollute our streams.

1.1.2 Scope. This manual's mission and philosophy are rooted in the Pennsylvania Program on "*Environmentally Sensitive Maintenance for Dirt and Gravel Roads*." (This Commonwealth program provides funding, training, and technical assistance and is highlighted as a case study for "Essential Programs" in Appendix 1 at the end of this chapter.)

Based on the Pennsylvania model, the practices presented in this manual focus on dirt and gravel roads in forested areas, recognizing that, with only minor research and development, many of the concepts and practices can be applied in various types of environments.

1 - 02 Roads exist as unnatural structures in the natural environment.

This manual will show that our *road system is part of our overall environment, that there is a vital connection between the two,* and that this connection needs to be considered when we construct and maintain our dirt and gravel roads. By doing so, we will be able to preserve our environment and prolong the life of our transportation system.

Roads exist as unnatural structures in the natural environment. Natural forces continually take their toll on our roads, often resulting in degraded roads and environmental damage. The challenge rests in simultaneously preserving our roads and streams in a safe and cost-effective manner. Using a combination of natural systems and road maintenance principles, environmentally sensitive maintenance practices can be integrated into an effective and efficient approach benefiting both the environment and our road transportation system.

Although this manual addresses environmentally sensitive maintenance for dirt and gravel roads, many of the practices, particularly in terms of drainage and vegetation, can be transferred to paved roads and result in benefits to both the paved road and the environment.

1.2 The Importance of Dirt and Gravel Roads

Over 1.6 million miles of dirt and gravel roads criss-cross rural areas of the United States, providing a vital service as part of the nation's transportation system. In many cases, our unpaved roads are the main access for major industries. Unpaved roads provide essential market access for farms, foresters depend on dirt and gravel roads to remove timber from the

1 - 03

forest, and the mining industry could not get minerals out of the mines without these valuable pathways.

In many areas, dirt and gravel roads play a major part in tourism, adding to the economic wealth of the region. Dirt and gravel roads also directly serve millions of rural residents living along them.

Many of our dirt and gravel roads remain unpaved for economic reasons, but, in many areas, residents do not want paved roads, desiring to preserve the rural nature of their area. Dirt and gravel roads are considered the lowest service level in any functional road classification system, usually serving the lowest volumes of traffic. But even as their numbers decline, giving way to more and more paved roads, dirt and gravel roads continue to be a significant part of our road system.

In fact, traffic on dirt and gravel roads is increasing. Further, the vehicles and equipment using these roads are getting larger, meaning the most safe, effective and efficient maintenance practices must be employed to keep pace with the stress these larger vehicles place on the roads.

1.3 The Problem: Roads and the Environment

1.3.1 A Historical Perspective. Read our country's history books and the accounts of our discoverers, trailblazers, pioneers, and early settlements and it becomes clear that roads and streams are connected by their imminent proximity.

1 – 04 Historical development dictated the close proximity of roads and streams.

Early settlements were built next to streams that became the essential water source for drinking, washing, domestic animals, crops, and power generation for sawmills or gristmills. Streams were also used as transportation corridors to haul goods between homesteads. Footpaths developed along these streams to connect the settlements by land. Streamside terrain offered relatively easy slopes for construction and subsequent use by horses and wagons. These footpaths became the roads, many of which survive today as our dirt and gravel roads. *This close proximity of roads and streams, dictated by historical development, began the conflict of erosion and sediment degradation affecting both roads and streams.*

1.3.2 The Connection. Erosion is a natural occurrence in the environment. When roads are constructed, however, they create an interference with the natural systems and collect water, increasing its volume and velocity, resulting in accelerated erosion.

1.3.2.1 Factors Affecting Roads. When we look at all the factors affecting the life of our roads (Figure 1-1), water has to top the list. Alone or combined with other factors, water can be disastrous. The subgrade of the road is what it is built on, the soils. If this foundation is poor, the road's life will be significantly reduced. If the subgrade is water saturated, the condition will be worse.

Most maintained dirt and gravel roads are quite old. Current maintenance crews were not involved in the construction. If poor quality materials were used or the workmanship was substandard, maintenance crews inherit numerous headaches with the road. And even when materials and workmanship are up to standards, the road may not have been built to handle today's heavier traffic loads. Traffic volumes and weights have both increased substantially in the last 20 years. The combination of water and increased traffic loads is potentially disastrous for our roads. That is why maintenance practices are so important. Poor maintenance equals poor roads. If there are drainage problems, however, even the best maintenance is doomed unless drainage problems are taken care of first.

The environment and climate also affect road conditions. The environment, as defined here, refers to vegetation, soil, sand, rocks, drainage conditions, and the overall stability of the area. Climate dictates the local weather conditions. Weather includes rain, freeze-thaw cycles, and hot sun that can dry out soils and road materials.

Looking at all these factors affecting roads, we should ask ourselves "What can we control?"

1.3.2.2 Factors Affecting the Environment. The same factors that affect the road affect the environment. Water feeds vegetation and streams and creates habitats, but also causes erosion, flooding, and sedimentation.

Our roads certainly affect the environment along with our maintenance practices. Poor road structure and material quality, increased traffic levels, and proximity to waterways lead to erosion, sediment and dust pollution problems.

Again, we should ask, "What can we control?"

1.3.2.3 The Road-Environment Relationship. Road conditions are deeply intertwined with the surrounding environment. Concentrated water flows accelerate erosion, overloading natural systems. Excess sediment clogs our streams. Dust becomes sediment in our streams, generates complaints from residents and harms plants, animals, people and equipment. Chemical contamination complicates the picture even more because oils, nutrients, pesticides, herbicides, and other toxic substances bind to dust and sediment and go along for the ride to pollute our streams and waterways.

1 – 05 Dirt and gravel roads are a major source of erosion and sediment.

Dirt and gravel roads are a major potential source of these pollutants. Many roads have unstable surfaces and bases. Roads act like dams, concentrating flows that accelerate erosion of road materials and roadsides. Both unstable surfaces and accelerated erosion then lead to sediment and dust.

The close proximity of roads and streams thus establishes the connection. Because road systems are situated close to streams within the natural environment, they affect the natural systems as they are in turn affected by the natural processes that take place there. The two systems – roads and the environment – are interrelated. Thus, in order to fix road problems, we must understand some things regarding each system to find a solution beneficial to both our roads and the environment.

In addition, not only is there a relationship between the roads and the environment, but both the roads and the environment also have an effect on the overall quality of life within your region. John Muir, who has been called the father of our National Park system, summed it up in this statement: **"When we try to pick out anything by itself, we find it hitched to everything else in the universe."**

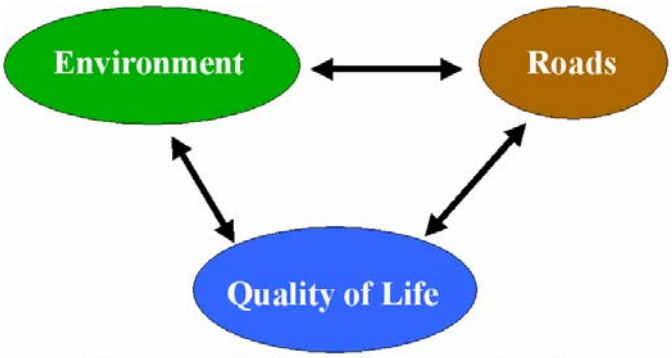

Figure 1-3: Relationship & Effect

1.3.3 Traditional Maintenance Practices. Even though the goal of road maintenance personnel is to maintain good roads, accepted maintenance practices do not always adequately address the road's relationship to the environment.

Why do we do what we do? Because we've always done it that way? There are many things that we do that may not be the best way for the environment or the road. In fact, many existing practices cause damaging sediment pollution, impacting both the road and the environment.

Vegetation management is a major example where many existing practices become counterproductive. Traditional "daylighting" exposes bare soil, disrupts ecological succession and eliminates soil-stabilizing roots, all of which increase erosion and sedimentation, damaging both the road and the environment. In addition, excessive sunlight can dry the roadbed, leading to excessive dust generation. Maybe we should consider leaving existing root structures undisturbed, thinning canopy cover to allow moderate sunlight, and avoid clearing banks just because they are there. Using nature's patterns and forces can result in better roads, less erosion and sediment pollution and lower maintenance costs.

Bank cutting and undercutting results in extensive sediment runoff, blocked ditches, and increased cyclical maintenance. On the other hand, refraining from cutting the toe of slopes, using headwalls to reduce pipe inlet and bank erosion, and using diversion or intercepting swales preserve both road quality and the environment.

Conveying road and ditch runoff to the nearest stream using the most direct route possible has long been an established practice. Any type or amount of sediment being carried by that runoff is also dumped directly into the stream. But directing culvert and ditch outlets (turnouts, bleeders) into a vegetative filtering area will help filter out the sediment, allow water infiltration and groundwater recharge, and protect the stream ecology.

Road aggregate quality directly impacts both the survival of the road and the environment. *Covering the road with poor 'low-bid' material that may wash away is*

another way of paying for sediment pollution, not to mention increased road aggregate replacement costs. Using a good road material that remains in place and prolongs road life will also benefit the total environment.

Undersizing and oversizing water channels, bank armoring, and flow redirection can disrupt stream energy, increasing maintenance costs and causing environmental harm. Understanding stream flows and the natural forces can help to establish better practices to again protect both the road and the environment.

Clearly, many traditional practices are counterproductive. They should be replaced with more productive measures that incorporate our knowledge of roads and natural systems. The result will be better roads, less sediment pollution, and lower maintenance costs.

1.3.4 Combining Goals. The goal of road maintenance personnel has always been good roads through proper maintenance at the lowest cost. We want to keep this goal, but expand our vision. We need to take a different look at our roads and see the total environment in which our roads are contained. This environment affects the life of our roads just as the road affects the environment.

If our goal within this project is to protect the environment through reduction of erosion, sediment and dust pollution, then let's combine our goals. Let's use additional and improved maintenance techniques and practices that benefit both the roads and the environment.

1.3.5 Road Safety. Any effective road maintenance program needs to consider and address safety. A safe transportation system is essential and remains part of our overall goal. Maintaining our roads and environment, however, need not come at the expense of safety. In fact, roads maintained in an environmentally friendly way have more structural strength, suffer less deterioration, and have fewer defects, and, thereby, are also safer. The goals of low-cost, environmentally sensitive maintenance and improved road safety can be combined seamlessly.

1.4 The Manual: Philosophy, Objectives and Contents

1.4.1 The Manual Philosophy. This manual is titled ***Environmentally Sensitive Maintenance for Dirt and Gravel Roads***. The mission, as stated, is to address the pollution problem of erosion, sediment and dust stemming from our dirt and gravel roads and affecting our streams. To meet this mission, the manual centers on an important philosophy or rationale.

To municipal road maintenance personnel, the road has been "sacred." Everything they have been taught about road maintenance has centered on what is good for the road, which has proven at times not to be correct. We need to initiate a change in this thinking. We can no longer afford to think only about the road. We need to understand the relationship between the road and the environment, that everything is interconnected, and

that there are practices that can be implemented that are not only good for the road, but also good for the environment. In addition, we need to make the connection that both good roads and a good environment are important to the welfare of local governments and their residents.

Only when this thinking changes can it be converted into action. In presenting "environmentally sensitive practices," this manual will illustrate to the users how easy these practices are to use and how useful and beneficial they become in prolonging the life of the road and protecting the environment. To accomplish this, however, the practices need to be simple, practical, and easy to incorporate into a routine road maintenance program.

The manual will give the users a "tool box" full of environmentally sensitive maintenance 'tools' or practices, recognizing that no one tool or practice can fit every situation or site or solve all their problems. Because every road and every site along that road is different, we need a toolbox from which we can select the appropriate tool or tools to help solve whatever situation we encounter.

1.4.2 The Manual Objectives. To meet the mission and put "punch" into our philosophy, we set our objectives as follows:

1. Enable the user to recognize the connection between road maintenance and the environment and the importance of good roads and a good environment for good government.
2. Enable the user to recognize sources of erosion, sediment, and dust pollution associated with roads and the importance of preventing these pollution sources.
3. Enable the user to recognize that standards cannot fit every situation and that sound decisions require proper knowledge of basic principles and practices. (Most standards, although often dictated as requirements, should be presented as only guidelines that need to be adjusted or revised to fit each particular site or problem area in the field. To know, however, what "tool" to use or what adjustment is needed, one needs to recognize basic principles and practices not only related to road maintenance but also to the natural systems that influence these roads, leading to our 4th objective.)
4. Arm the user with knowledge on basic principles of nature and natural systems as applied to road maintenance and a healthy environment and on basic road maintenance materials and techniques. (The user needs to know the basics of nature and the natural forces, and how they can be applied to help establish good roads and protect the environment. In addition, to make sure we are "on the same road"; we want to cover the road basics of good materials and techniques.)
5. Arm the user with knowledge on environmentally sensitive maintenance practices and the effective use of these practices in road maintenance. (This is where we provide the "tools" for their toolbox – a variety of simple, practical environmentally sensitive maintenance practices and the means of using these

practices in routine road maintenance to keep both good roads and a good environment.)

1.4.3 The Manual Contents. To accomplish this comprehensive list of objectives, the manual contains 7 chapters.

Chapter 1 – Introduction: Chapter 1 is simply an introduction to the manual. The mission and scope of the manual is introduced, followed by a discussion on the importance of dirt and gravel roads. We then start to make the connection between roads and the environment and discuss the shortcomings of traditional road maintenance practices. The chapter then shows the value of combining the goals of good roads and a good environment. The manual philosophy is then discussed, followed by the objectives and this description of contents. To close, the need for essential programs is covered, with an appendix to describe the Pennsylvania program as a case study.

Chapter 2 – Geology and Soils: This chapter discusses geologic time and relentless natural forces, looking at geological regions, topography, weather, rocks and soils. The chapter demonstrates how geology and natural forces give us what we have to work with and the conditions under which we have to work. Geology dictates the aggregates available for road materials and the soils available to support the natural vegetation.

Chapter 3 – Water, Erosion, Drainage and Road Basics: This chapter starts with basic principles of erosion and how roads cause accelerated erosion and increased sediment and the importance of preventing this pollution, showing the connection between roads and the environment. This module hits hard on the importance of good drainage, discussing the characteristics and effects of water on roads. Discussion then turns to road materials, what's being used and what we need to be concerned with. We then review basic road maintenance techniques for dirt and gravel roads – basic grading operations, road crown, etc. – and end with a discussion on winter maintenance operations.

Chapter 4 – Basics of Natural Systems: This chapter sets the basics on the natural side, presenting guiding principles by defining ecology and discussing three distinct ecosystems: the streams, wetlands, and forests or uplands. We stress the important benefits of these areas and set the stage to discuss, in a later module, how we can use these systems to help in road maintenance. This is unfamiliar area to most road maintenance personnel. The user should read this chapter with an eye to relating roads and road maintenance to natural systems.

Chapter 5 – Environmentally Sensitive Maintenance Practices: Having set the basics for both roads and the natural systems, this chapter presents the environmentally sensitive maintenance practices, with emphasis on road profiles, ditches, culverts, and bridges. Simple, straightforward, easy to implement practices are presented – some of which may already be familiar, or some that may be just tweaking something already in use. Others may be new, but still simple and easy to implement.

We start to fill the user's toolbox with the tools, emphasizing that not one tool or practice or technique will solve all their problems, but a toolbox full of tools will help greatly.

Chapter 6 – Roadsides and Streams: This chapter discusses the value of roadside vegetation management and the important factors affecting bank stability. The chapter then builds on this discussion to show how we can use the forests and natural systems to help reduce road maintenance, introducing more environmentally sensitive maintenance practices. We review common practices and the associated problems that can be detrimental in the long term for both roads and the environment, followed by alternative methods to improve or enhance the existing conditions (e.g., traditional clearcutting practices, stream channel clearing practices). This leads to more environmentally sensitive maintenance practices for vegetation management and bank stabilization, ending with an introduction to a variety of bioengineering techniques for stream banks.

Chapter 7 – Additional Maintenance Techniques: Chapter 7 continues to add tools to the toolbox, discussing three specific areas: dust control, road stabilization (full-depth reclamation), and the world of geosynthetics. The geosynthetics section emphasizes geotextile separation fabrics along with other geosynthetics used in actual road projects including a drainage pipe project case study, demonstrating the variety of functions and uses that geosynthetics play in road maintenance.

1.5 Essential Programs

To successfully fulfill our mission of addressing the national problem of erosion and sediment pollution from our dirt and gravel road system affecting our streams, there is a need not only for a manual but also for comprehensive state programs providing funds, education and training, and technical assistance to the nation's road maintenance personnel.

No change in our environment will occur without a change in thinking. Roads do not exist in isolation. They are an integral part of the environment. A change to the road changes the environment. An environmental shift has consequences for the road. Until those performing maintenance on our roads understand this relationship, both the roads and the environment will continue to suffer.

The way to change thinking is through training and technical assistance, coupled with funding. The message must be clear, simple, and easy to administer. It must be targeted at local and regional road maintenance managers.

As a case study, Appendix 1 presents Pennsylvania's Program as a successful model and resource for other states in meeting this mission. Appendix 1 is a description of the program development and implementation, with a discussion of the essential criteria for a successful program.

APPENDIX 1
Case Study: The Pennsylvania Dirt and Gravel Roads Program

In 1997, Pennsylvania introduced a program that provides an annual $5 million appropriation for "Environmentally Sensitive Maintenance" for our nearly 20,000 miles (38,180 km) of dirt and gravel roads. The program addresses three critical components: Thought and Attitude, Cost Effective Best Management Practices, and Technology Transfer. In developing an understanding of the problem, the program team, spearheaded by the State Conservation Commission, developed a philosophy that simplifies administration, holds the stream sacred, and strives for better roads and reduced maintenance. This exemplifies a major change in "thinking and doing" for road maintenance personnel, where traditionally the road had priority. The program leads them to consider both the road and the environment as important and how natural systems can help with overall road maintenance.

A1.1 Pennsylvania's Dirt and Gravel Roads. Pennsylvania has over 117,000 total miles (188,253 km) of public roads, including both paved and unpaved. Local municipal governments own and maintain two thirds of that total mileage. Of that total mileage, nearly 20,000 miles (32,180 km) are unpaved dirt and gravel roads.

Local municipal governments own and maintain the majority of dirt and gravel roads with over 17,000 miles (27,353 km).The PA Department of Conservation and Natural Resources (DCNR), Bureau of Forestry owns and maintains over 2500 miles (4023 km). The PA Department of Transportation (PENNDOT) has less than 500 miles (805 km). This number continues to decline due to PENNDOT's Turnback Program (PENNDOT pays $2500 per mile as an annual sum added to a municipality's liquid fuels funds for any state roads "turned back" to the municipality to own and maintain). Other agencies having nominal mileage are the DCNR Bureau of State Parks, the PA Fish and Boat Commission, and the PA State Game Commission. Dirt and gravel road mileage continues to decline as development and traffic volumes increase and more and more roads become paved, but dirt and gravel roads will remain a significant part of Pennsylvania road mileage into the future.

Pennsylvania's dirt and gravel roads play an important role for the commonwealth. They provide vital direct access for over 3.6 million PA residents, although probably used by almost all of PA's 12 million people. They also provide vital access to Pennsylvania's industry, namely our top industries of agriculture, forestry, mining and tourism. In fact, tourism is projected to become our state's number one industry, a position that has been held by agriculture. To emphasize, Pennsylvania's dirt and gravel roads have always played an important role, are still playing that role, and will remain playing that role into the future.

A1.2 Program Origin: A Problem Recognized. In January 1991, a man by the name of James "Bud" Byron, active in Trout Unlimited, instigated a Northcentral Pennsylvania Conference of parties interested in protecting streams from sediment

pollution associated with dirt and gravel roads. The results and publicity of that meeting held in Pleasant Gap, PA, sowed the seeds of the program.

A1.3 Program Origin: A Problem Substantiated. Lead by Trout Unlimited, various individuals, organizations and agencies became active in addressing this problem on a statewide basis. In 1993, they formed the Dirt and Gravel Road Task Force, (Figure A1-1). The Task Force set out to substantiate the extent of the problem. They began by conducting field surveys of roads and streams to identify actual conditions in the affected watersheds. Using volunteers (no funding was available), they zeroed in on protected watersheds identified as Exceptional Value and High Quality. Just surveying these areas was a huge undertaking (Figure A1-2). A great number of volunteers were needed, and Trout Unlimited, with its 55 PA chapters, provided most of the manpower. A simplified manual card system was developed to record actual field conditions. The volunteers received onsite training to help ensure consistent results. These surveys identified actual "trouble spots" of sediment pollution into streams throughout the commonwealth. These pollution trouble spots became the initial worksites and, when viewed plotted on a map (Figure A1-2), substantiated the problem.

Figure A1-1
PA Task Force on Dirt and Gravel Roads

Figure A1-2: Result – A Problem Substantiated

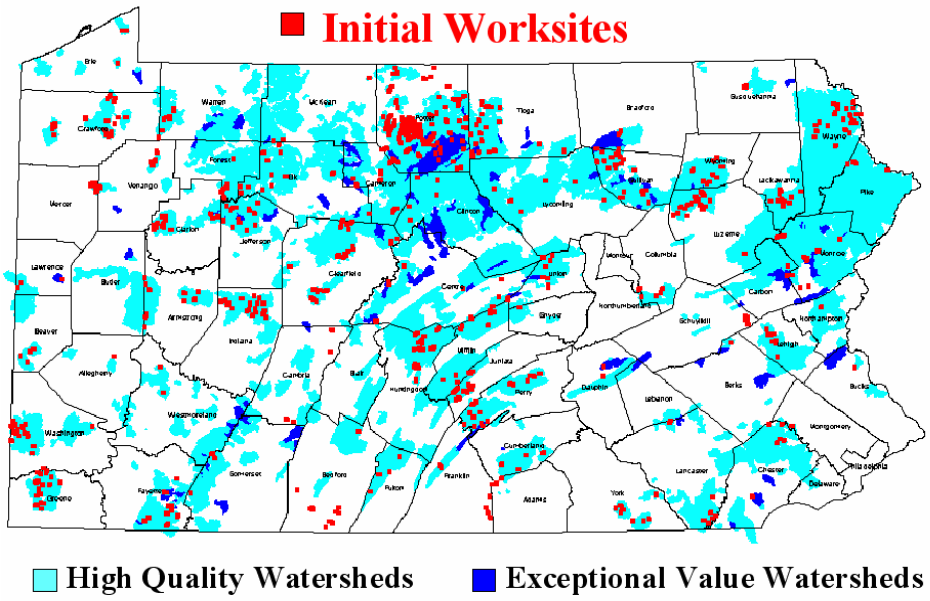

A1.4 A Solution. With the problem substantiated, the Task Force needed to look at a solution. Who was maintaining these dirt and gravel roads? Why were the problems of erosion and sediment occurring? What did they need to do to correct the problems? Municipal governments owned the roads, so the Task Force looked to existing road maintenance. They found that even though the goal was to maintain good roads, existing accepted maintenance practices did not always adequately address environmental concerns. To solve the existing and continually occurring pollution problems required maintenance managers to change their thinking to see the road as part of the environment. This change in thinking had to lead to changes in procedures. Improved maintenance techniques that were good for both the roads and the environment had to be used. To initiate this change, the task force recognized two major needs – training and money.

Legislation was necessary to meet these needs. Pennsylvania Senator Doyle Corman became the program champion and drafted legislation, which became part of the PA Transportation Revenue Bill, signed into law as PA Act 3 of 1997. Section 9106 was added to the PA Motor Vehicle Code, initiating the Dirt and Gravel Road Program.

A1.5 The Legislation. Section 9106 created an annual, non-lapsing $5 million appropriation for Dirt and Gravel Road Maintenance to address the pollution problems of erosion, sediment, and dust. Section 9106 took effect July 1, 1997. The legislation provides that $1 million go directly to the Bureau of Forestry for their roads and that the other $4 million go to the State Conservation Commission, the lead agency for the program. This annual $4 million was to be used as grants for environmentally sensitive maintenance projects on dirt and gravel roads.

The legislation stated that the identified "trouble spots" would be the top priority, recognizing the significance of the volunteer work that substantiated the problem and led to the legislation.

The legislation also **required grant recipients to receive training** as a prerequisite to applying for grant funds.

A1.6 Program Organization. The PA State Conservation Commission serves as the lead agency for the program (Figure A1-3). They allocate the money to the County Conservation Districts who are responsible for administering the program at the local level. Each County Conservation District is required to implement a Quality Assurance Board (QAB) who reviews and

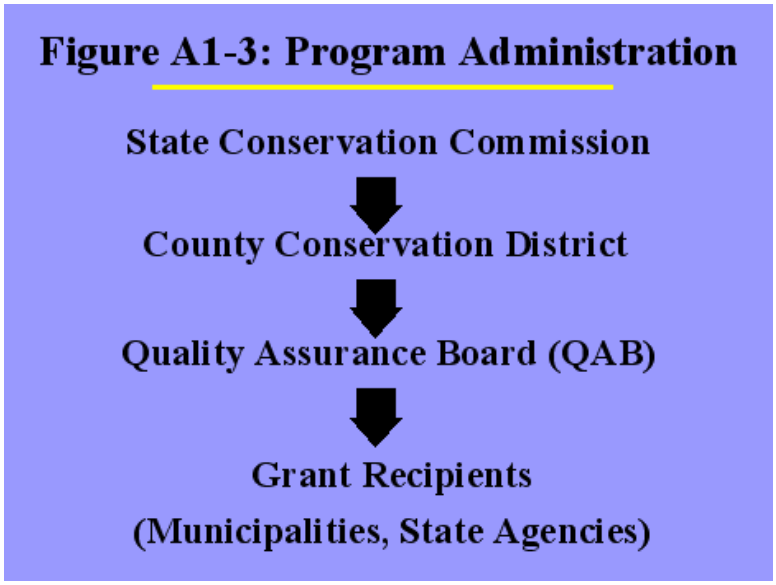

prioritizes grant applications and provides assurance of project completion in accordance with the applications. This board provides recommendations back to the County Conservation District for formal approval. To benefit from a variety of background and experiences, the QAB is comprised of four members: a chairman from the County Conservation District (non-voting) and three voting members, one appointed by the County Conservation District, one appointed by the PA Fish and Boat Commission, and one appointed by the National Resource Conservation Service (NRCS).

Grant recipients are the local municipalities or state agencies that own and maintain dirt and gravel roads.

Two major points emphasized through the program legislation are simplicity and local control. The program organization meets these points with a requirement of a one-page grant application form and with the charge given to the County Conservation Districts to implement the program. What better way to keep it simple and have the program handled at the local level?

A1.7 Program Goal. The program's major goal is to reduce the pollution due to erosion, sedimentation, and dust associated with dirt and gravel roads in the commonwealth. To meet this goal, a strong program basis to protect the dirt and gravel roads was formulated. Several decisions were made by the program initiators and agreed upon through the legislation.

First, the program supports maintaining dirt and gravel roads as dirt and gravel. The program will not fund paving these roads. Second, to minimize road maintenance and stretch limited resources, cost effective maintenance practices that are not only good for prolonging road life but also for protecting the environment are essential.

This program goal and basis led to the required training with its own rationale and objectives.

A1.8 Program Training. The Pennsylvania State University, through the Pennsylvania Transportation Institute and the Environmental Resources Research Institute, were originally charged with development and delivery of the training associated with the Dirt and Gravel Road Maintenance Program. Since then, a Center for Dirt and Gravel Road Studies, in conjunction with Penn State University, was funded through contract with the PA State Conservation Commission. This Center now administers the education, training and technical assistance aspects of the program.

The major purpose of the training was simple – to meet the requirements of the legislation which required anyone who applies for program funding to attend a training course as a prerequisite.

The course was simply titled, following the legislation, "Environmentally Sensitive Maintenance for Dirt and Gravel Roads." The program goal, as stated, is to reduce erosion, sediment, and dust pollution relating to dirt and gravel roads. To meet

this major goal, the training centers on the philosophy and rationale as discussed above in Section 1.4.1 for this manual.

To meet the main program goal, objectives similar to the ones outlined above in Section 1.4.2 for this manual were adopted along with an additional objective to provide the trainee with information on associated laws and regulations and with the information on grant funding procedures.

The training gives them a "tool box" full of environmentally sensitive maintenance "tools" or practices, recognizing that not one tool or practice can fit every situation or site or solve all their problems. These practices are mostly simple, practical, cost effective techniques that can be easily implemented. Municipal road crews with available equipment resources can perform most of the practices, incorporating them into their normal routine road maintenance program. Not all practices will apply to any one municipality's roads, but having a full toolbox from which to choose the best tool or tools to address the problem or concern encountered tends toward a more successful solution. Many of these practices can be used in combination and will apply to most dirt and gravel roads in general

The training is a two-day course and consists of classroom training only. The possibilities of field trips to nearby roads were discussed, but weather and the logistics of coordinating transportation to the site does not lend to the feasibility. The time factor also comes to play an important deterrent.

The training uses PowerPoint® presentations with an LCD projector and projection screen. The PowerPoint® presentations contain all the digitized photos and several video clips to enhance, clarify, or show examples. Trainers also use various samples of products, particularly geosynthetic products.

Training evaluation sheets are distributed at each session. Results have been overwhelmingly favorable on all aspects of the training. Acceptance by municipal road personnel of the many practices presented has been greater than expected. This is a testament to the dedication and concern of local municipal government road personnel.

A1.9 Further Program Development. A new inventory and assessment of PA's dirt and gravel roads were completed with the establishment of the new Center for Dirt and Gravel Roads. County Conservation Districts worked with the local governments to verify unpaved roads via municipal and county maps. All identified roads then received field assessments by the County Conservation Districts for pollution problems affecting streams. This new assessment identified over 11, 000 new sites across the commonwealth which then became eligible for program funding (Figure A1-4).

Figure A1-4: Assessment Phase II Results

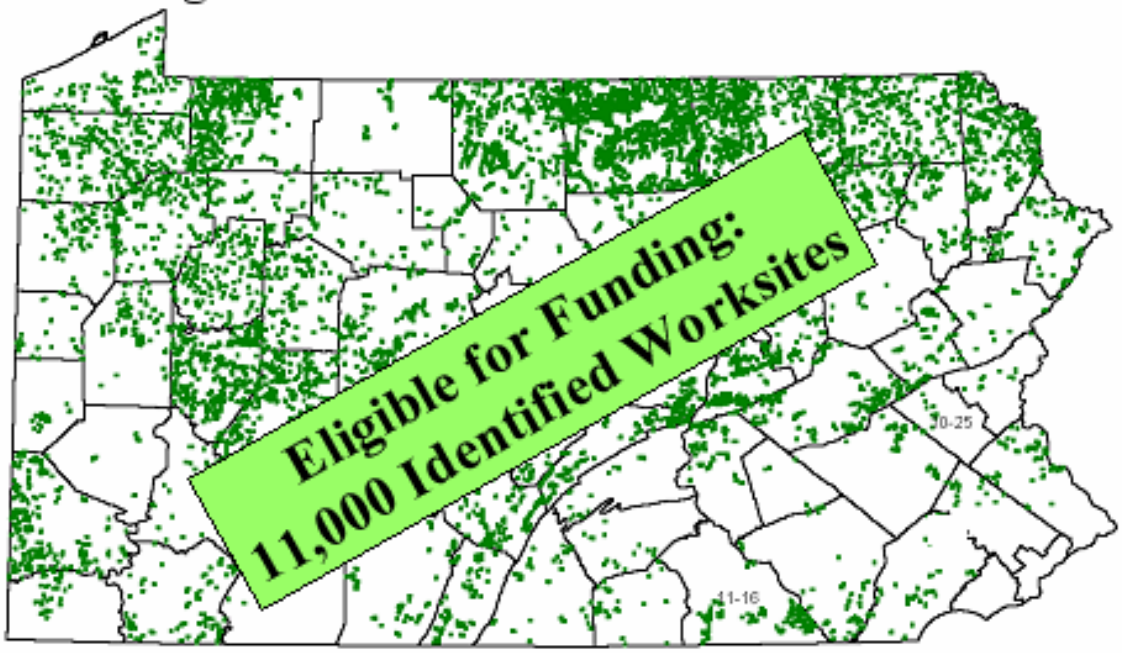

County Conservation Districts inspected the roads and identified worksites

A1.10 Program Results. The program has been and continues to be a success. Projects undertaken and completed with program funds have been evaluated. A computerized GIS system is used for project tracking and central reporting with minimal paperwork. An implemented quality assurance/quality control (QA/QC) process continually monitors and evaluates completed projects, verifying that all but one project has met or exceeded expectations.

The following page is the 2006 Program Report reflecting a summary of the program data showing 1608 projects completed by the close of 2006. The summary gives a breakdown of program funding, completed project costs and major work items, and a training summary of sessions and attendees. It should be interesting to note the amount of in-kind contributions, which are the materials and services donated to the projects by the local government grantees. Although contributions are not required and the projects are 100% fundable with program grant monies within the prescribed parameters, the in-kind contributions have averaged 36%. Comparing this to the many federal and state grant programs that require 10 to 25% matching funds, we can see the substantial **voluntary** commitment made by the Pennsylvania local governments. This factor again speaks to the acceptance and success of the program.

2006 - DIRT AND GRAVEL ROAD PROGRAM SUMMARY DATA

-------All Data is CUMULATIVE Based on District Reports as of January 15, 2007-------

FINANCIAL SUMMARY TO DATE

WORKSITE: a section of unpaved road that is a verified source of pollution to an adjacent stream.

Total Allocated to Districts -	**$35,187,000**	*includes 10 years of funding*
Spent on administration -	$2,203,000	*(6.3% of total allocated) limit of 10%*
Spent on education -	$594,000	*(1.7% of total allocated) limit of 5%*
Spent on completed contracts (1,608)-	$25,381,000	*(72% of total allocated) (In-kind not included)*
Current contract commitments (196)-	$3,796,000	*(11% of total allocated) (Partially completed project included here)*
TOTAL SPENT/COMMITTED -	**$31,974,000**	***(91% of total allocated)***

*******In-Kind Contributions - $9,147,000** ***(donated goods/services from participants) (Avg 36¢ per $1 spent)*** ********

COMPLETED PROJECT COST SUMMARY

note that some worksites have multiple contracts complete

Contracts complete - 1,608 **Length of contracts complete - 826 miles**

BREAKDOWN of $25,381,000 Program funds spent on completed contracts:

$20,340,000 for materials *(80%),* $3,725,000 for equipment *(15%),* $1,316,000 for labor *(5%)*

BREAKDOWN of $9,147,000 In-kind contributions for completed contracts:

$1,451,000 materials *(16%),* $4,045,000 equipment *(44%),* $3,262,000 labor *(36%),* $389,000 other *(4%)*

COMPLETED PROJECT WORK SUMMARY

5.7	Acres Eroded Stream Bank Stabilized	*= a steam bank 5 feet high and 9.4 miles long*
6.7	Acres Drainage Outlets Stabilized	*= 2,918 outlets, each 10' x 10'*
68	Acres Vegetative Management	*= an area 10 feet wide 56 miles long*
67	Acres Eroded Road Bank Stabilized	*= a road bank 5 feet high and 110 miles long*
71	Acres Eroded Road Ditch Stabilized	*= a ditch 5 feet wide and 117 miles long*
117	Acres Separation Fabric Used	*= 54 miles of fabric placed 18 feet wide*
773	Acres Road Surface Stabilized	*= 354 miles of road 18 feet wide*
4,610	Crosspipes Installed	*= 5.6 pipes per mile of project*
178,400	Feet of Crosspipes Installed	*= 34 miles of pipe; average crosspipe length is 39'*
581,700	Cubic Yards of Road Base Added	*= 1 acre of ground covered to a depth of 360 feet*

COMPLETED PROJECTS

YEAR	# Contracts Complete	Money Spent on Completed Projects*	Average Spent per Contract*
1998-2003	1,156	$ 16,198,000	$ 14,012
2004	173	$ 3,253,000	$ 18,803
2005	136	$ 3,255,000	$23,934
2006	143	$ 2,675,000	$ 18,706
TOTAL	1,608	$25,381,000	$ 15,784

**in-kind not included*

2-DAY TOWNSHIP TRAINING SUMMARY:

YEAR	# of Trainings	Municipal-ities Trained	Counties Represented	Total Attendees
1998-2002	115	na	all	3208
2004	8	142	53	294
2005	13	220	56	574
2006	12	254	57	465
TOTAL	148	na	all	4541

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866-668-6683 www.dirtandgravelroads.org

PENNSTATE
Center for Dirt and Gravel Road Studies

The PA Dirt and Gravel Road Program is well established and continues to meet its goal of pollution reduction. The training is constantly under review and changes as more program work projects are completed. The program uses new experiences to develop new practices and test new materials. Environmentally Sensitive Maintenance Practices have been accepted and are being put to use, many of which apply to paved roads as well as unpaved gravel roads. This acceptance, as mentioned before, attests to the dedication and desire to do things better on the part of municipal road personnel. It is best put by one long-time Township Roadmaster who stated: "I wish I would have known these things 30 years ago!"

Resource: The Center for Dirt and Gravel Road Studies
The Pennsylvania State University
207 Research Unit D
University Park, PA 16802
Tel: 814-865-5355
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Website: www.dirtandgravelroads.org

Environmentally Sensitive Maintenance For Dirt and Gravel Roads

Chapter 2: Geology, Rocks and Soils

2.1 Introduction

2 – 01 Geology sets the stage

The term "geology" is used to describe the study of the planet earth, specifically the materials that make up the earth, the processes that affect these materials, the products formed, and the history of the planet. Geology, therefore, with its history, processes, and materials, becomes important in the operation and maintenance of our roads. Geology helps explain the physical setting in which roads are situated as well as the local road materials that are available for use in road building, for example, why limestone may be a prime road aggregate in one area and granite the prime material in another area.

As solid rock breaks down into smaller particles from geological processes, natural forces, and weather, often mixing with decomposing plant and animal matter, it forms soil. Soils are also important in the operation and maintenance of our roads. As the type of soils varies from area to area due to the varying geology of the area, the influence on our road system will vary in different aspects. Roads are typically built directly on top of soils covering the underlying bedrock. The type of soil over which roads are built will influence the design, construction, and maintenance of the overlying portion of the road. In addition, the stability of roadside banks, both upslope and downslope, and the road drainage network are dependent upon the inherent behavior of the soils and vegetation that covers them. The vegetation is also directly dependent on the soil's characteristics as to its type and growth.

In this module, our goal is to focus on geology, soils, and the natural forces that shape the surface of our land and give us the rocks, soils, and vegetation that make up the environment in which our roads exists and, therefore, influence many aspects of design, operation, and maintenance of our total road system.

2.2 Geology and Natural Forces

As mentioned above, geology is important to the construction and maintenance of roads because it defines the physical setting in which roads are situated and the road materials that are locally available. *In other words, geology gives us what we have to work with.*

The geologic history of the earth is complex and spans a period of approximately 4.5 billion years. This complex history has included processes that have drastically changed the characteristics of our planet. Different regions of the United States have very different geologic histories and consequently vary greatly in road conditions, materials, and construction and maintenance methods.

Geologists have divided the United States into different physiographic provinces. These provinces are areas of different geologic history based on the way the different types of rocks and landscapes were formed. The significance of physiographic provinces will be discussed in Section 2.3.2.

2 – 02 Pennsylvania Ridge and Valley Province

2.2.1 Geologic Time. It is important to note that many of the geological processes that shape the earth occur at an extremely slow rate. Because our frame of reference only covers an average of a 70-to 80-year life span, it is often extremely difficult to notice or even comprehend the changes that take place over thousands, millions, or even billions of years. *This is geologic time.* The gradual erosion of the Alleghanian Mountains, a grand mountain range that once stood 2 ½ miles high over the ridge and valley province of Pennsylvania (Photo 2-02), is a good example of an erosion process that occurs over geologic time. The erosion of this mountain range, which continues today, is not likely to be noticed without careful observation and measurement over several decades. On the other hand, some geologic events happen relatively quickly. Volcanoes in Hawaii, the explosion of Mount St. Helens (Photo 2-03), or major landslides are geologic events that drastically change the landscape over a sufficiently short period of time, and humans are able to perceive the changes.

2 - 03 Mount St. Helens

2.2.2 Types of Binding Forces. To provide background information that will assist in understanding some of the geological processes discussed later in this

chapter, we will introduce three types of binding forces that act to hold rock and soil particles together: chemical, physical, and electrical.

Elements are the basic building blocks with which everything is formed. There are approximately 110 different known elements, including things such as oxygen, carbon, hydrogen, sulfur, iron, potassium, nitrogen, gold, silver, and uranium. While we can see many of these elements with the naked eye, they are made up of tiny, individual particles called atoms. For example, a gold ring is an element. It is, however, made up of many minute gold atoms. The atom, in turn, is made up of smaller particles. Although the names of these sub-atomic particles are not important for this discussion, it is important to note that these particles influence the way atoms interact with each other.

When different elements are joined together through a chemical reaction, they form a separate and distinctly different compound composed of two or more elements. This type of bonding is referred to as chemical bonding. The joining of different elements in various proportions and combinations has produced an almost infinite number of compounds. For instance, compounds like our deicing rock salt, which is chemically referred to as sodium chloride, is formed via chemical bonds between sodium and chlorine atoms. The term "molecule" may be familiar to many, and it simply refers to the smallest unit of a compound that can exist. For example, a water molecule is made up of two parts of hydrogen and one part oxygen, H_2O. A bucket of water contains millions of water molecules.

In a geological setting, particles of different compounds may be physically bound together. When this physical bonding occurs, the identities of the original compounds are retained in the new bound material. Sandstone is an example of physical bonding, and you can see the individual grains of sand that are cemented together to form the rock.

The third type of bond, electrical bonding, occurs when particles of one kind "stick" to the surface of another kind of particle. The static electricity that causes pet hair to stick to clothes is an example of electrical bonds. With electrical bonds, the sub-atomic particles act like magnets and cause different elements and compounds to be stuck together. Many of the interesting properties associated with clay are a result of the electrical bonds that hold clay particles together. Because of the electrical bonds, clay particles are strongly attracted to each other, making clay "sticky." These bonds are somewhat flexible or elastic, which also allows for some stretching between the clay particles, causing some clays to be highly plastic and flexible, as well as able to absorb water and expand when wetted.

Electrical bonding also comes into play when other substances attach themselves to sediment particles. These other substances can be toxic substances from chemicals or other materials that can substantially increase pollution when sediment washes into our streams.

2.2.3 Natural Physical Forces. At the same time binding forces are acting to hold things together as elements or compounds, other forces are acting to move or even tear

these bonds apart. Naturally occurring forces, such as wind, water, frost action, heat, gravity, etc. are constantly working to change the surface of the earth. Frequently these forces work very slowly to change the landscape. They are **relentless**, however, and the cumulative effect of billions of years of activity has worn down mountains, carved rivers and filled inland seas. Although these processes may act too slowly for us to see their effects, they are ongoing and continue to affect the earth's surface.

These processes not only shape the surface of the earth, but the habitat that humans need to survive. For example, many productive agricultural areas are dependent upon nutrients that are deposited when sediment-laden floodwaters spill onto adjacent floodplains. Many of these floodplains are used for farming and the deposited sediments act as natural fertilizers for the farmers. Roads are also a necessary part of our human habitat and the effect of the natural forces on our roads creates the need for road maintenance activities on a routine basis. As discussed in greater detail later, these gradual processes and forces are so intricately related to other natural systems that they act to sustain all life on earth.

2 - 04 The relentless force of gravity causes bank failures, downed trees, loss of road gravel and water erosion.

2 - 05 Gravity along with water, acting as a lubricant, causes slip planes.

On the other hand, acts of mankind frequently disrupt these natural processes and forces and thereby accelerate rates of erosion. This increased rate of erosion is faster than naturally occurring rates and is referred to as accelerated erosion. This manual, with its proposed practices, is intended to eliminate or at best alleviate accelerated erosion. Understanding these processes and forces is the key to learning how to use them to reduce pollution and improve the stability of our roads.

Gravity, water lubrication, erosion, water currents and frost action are among the wide range of naturally occurring forces most frequently impacting our road systems. Gravity is the force that causes objects to fall or water to flow downhill. It is one of the most important natural forces because it influences many of the other forces. It is also an important maintenance factor

because it causes road bank failure, downed trees, loss of gravel from road surfaces and water erosion.

When water gets between rocks or soil particles, it acts as a lubricant to help particles slide and roll about. When gravity enters into the picture, the slope of the material may be steep enough that the material may begin sliding along a slip plane. A slip plane is the movement of material in different directions along a plane of weakness, and is similar to the sliding that takes place between individual playing cards when stacked and slanted, (Photo 2-05). It is also common for hillside roads to contribute to their own failure by creating a dam to natural water flow, trapping and absorbing downhill flowing water, adding greatly to the weight of soil and causing the bank to slip or slump along a plane of weakness. Banks can fail slowly by creeping downhill (sloughing) or catastrophically, such as a landslide.

Erosion is defined as a wearing away and most often occurs with wind or water. The effects of winds can be seen in the phenomenon of shifting sands. At Cape Cod, for instance, the sands thrown ashore by the sea are driven inland by the winds, advancing upon the cultivated lands, burying them and destroying their fertility. The sands from the beach on the Pacific coast near San Francisco are driven inland in a similar manner again encroaching upon the more fertile soils. In the fairly dry regions of the interior of our country, high winds, laden with sand and gravel, are a powerful agent in sculpting the rocks into the fantastic forms so often found there.

Erosion due to water ranges from the impact of raindrops to water currents picking up particles and carrying them away from their original location. Erosion due to the movement of surface water is one of the major physical forces that have shaped our country's landscape. Water, in the form of rain or other precipitation, falls to the earth's surface and either soaks into or runs across that surface. Water, percolating through the earth, slowly disintegrates the hardest rocks initiating the work of soil-making, which we will address later in this chapter. A large portion of rainwater, however, never soaks into the earth, but runs off the surface.

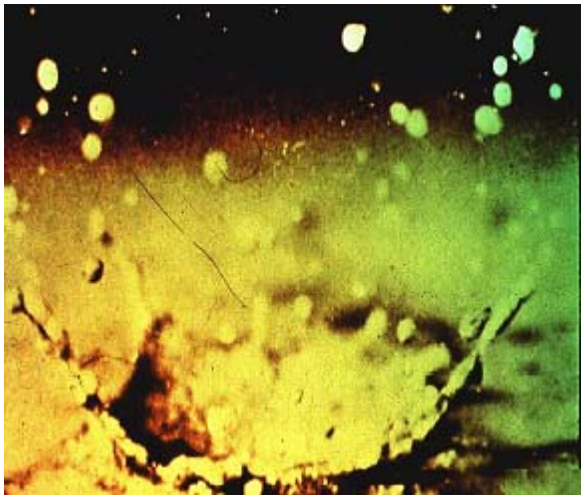

2 - 06 Impact of each raindrop on bare soil initiates the erosion process.

Erosion is all about energy – soil and rock particles do not move unless a force or process has enough energy to pick up and carry the particle away. The ability of water to erode soil and rock materials depends on four factors:

1. Force of the raindrop impact;
2. Soil resistance;
3. Volume of accumulated water; and
4. Velocity (speed) of flow.

Vegetation plays a key role in erosion prevention. This will be discussed in detail in Chapter 4. Briefly, vegetation facilitates soil resistance by breaking the impact force of raindrops, disrupting and slowing the flow of water across the soil surface, and reinforcing the soil with root structures to hold the soil in place.

While soil resistance helps prevent erosion, the remaining three factors lead to erosion. A single raindrop falling from the sky on bare soil creates a mini-explosion to dislodge and scatter soil particles, initiating the erosion process. Once on the ground, water from these raindrops collects and starts to flow downhill, growing in volume and velocity, forming rills and rivulets and producing furrows and gullies. The accumulated water has lots of energy to erode particles. The rivulets join to form torrents, creating ravines and gorges, and further uniting to form rivers that in turn deposit their load partly in their course and partly into the sea. As the accumulated water flows downhill, steeper slopes cause greater speed, increasing the energy and erosive capacity of the flowing water.

2 - 07 Flowing water picks up volume and velocity causing further erosion.

While each of these factors can cause erosion, the impact from a combination of these factors can be great, causing everything from washouts and bank failures to flooding and complete roadbed failure. The width and depth of the Grand Canyon, which has been carved over millions of years by the Colorado River, is testament to the tremendous erosive power of water.

2 - 08 Deposition of sediment alters the landscape.

Our landscape is continuously being altered by water and erosion with material eroded from one location being transported and eventually deposited somewhere else. In this fashion, the landscape is altered in two locations, the point of original soil erosion and the location where the material is deposited as sediment.

Frost action, or the freeze-thaw process, has also helped to change the face of the earth. When water freezes, it expands and exerts pressure on anything that contains it – like the soda can that was stuck in the freezer and “exploded” when it froze. When water gets into the small cracks in rocks, the expanding ice can split the rock. Bear in mind that a large part of our climate

has drastically changed, swinging from temperate to near-arctic conditions during the advance and retreat of glaciers over several periods of time. As will be discussed in Chapter 3, this freeze-thaw process also causes rocks to move upward through the road base and surface; causes potholes to form; and causes posts, poles and structural foundations to shift or tilt.

2.3 Rocks

2.3.1 Rock Families. In their study of the earth's history, geologists have identified three basic rock families: igneous, sedimentary, and metamorphic. What family a rock belongs to is determined by the way in which the rock was formed.

Igneous rocks form when molten rock (magma) cools and hardens. Lava is a form of magma that erupts from volcanoes, and when it hardens, forms volcanic rock. Hawaii and Iceland, both volcanic islands, are primarily made of volcanic igneous rocks. Other types of igneous rocks also form beneath the surface of the earth when magma oozes and intrudes between layers of existing rock. Igneous rocks are usually our older rocks underlying the stratified sedimentary rocks forming the great mass of the earth's interior and forming the axes and peaks of our great mountain ranges, such as the Sierras and the various Colorado ranges. Examples of igneous rocks include granite and diabase.

2 - 09 Sedimentary limestone layers.

Sedimentary rocks form when the elements (sun, wind, water temperature, etc.) wear away rock and soil and the eroded particles wash into low-lying depressions where they are deposited. Over time, these sediments may become fused together by natural cementing, compression, or other methods, forming sedimentary rocks. Common examples of sedimentary rocks include shale, sandstone, conglomerate, and limestone.

Metamorphic rocks make up the third family. These rocks have been changed from their original form by heat, pressure, or chemically active fluids to produce new rocks with different minerals and texture. These heat, pressure, or chemical processes may act on any of the three families of rock to produce a new metamorphic rock. Examples of metamorphic rocks include slate, schist, gneiss, quartzite, and marble. Shale often serves as a parent material that is metamorphosed into slate, while sandstone may become quartzite and limestone may become marble.

2.3.2 Geological Provinces. As mentioned in Section 2.2, geologists have divided the United States into physiographic provinces. Each province has a vastly different

geological history that has influenced the local geology and the shape of the landscape. Geological processes and natural forces take place on a number of different scales that range from individual hillsides to entire regions. Consequently, geologic conditions are not uniform across a province or their immediate subdivisions, geologic sections. Site conditions may even vary between locations within the same local government limits.

Surface water erosion has played an important role in shaping the landscape in all the physiographic provinces. Surface water draining from the landscape has eroded and carved many, if not all, of the river and stream valleys that we see today. In many locations, this erosion was tremendous and considerably increased the difference in elevation between the highest and lowest points. The stream erosion process will be discussed further in Chapter 4.

Several periods of glaciation occurred across the northern part of our continent in which large masses of ice in the form of glaciers altered the landscape with their passage. These glaciers were part of a continental ice sheet that covered most of Canada and the northern part of the United States. These glaciers shaped the landscape by grinding away and lowering the tops of hills, producing rounded uplands and broad, flat-floored valleys. The first glaciers advanced approximately 800,000 years ago with the most recent glaciers advancing only 24,000 years ago.

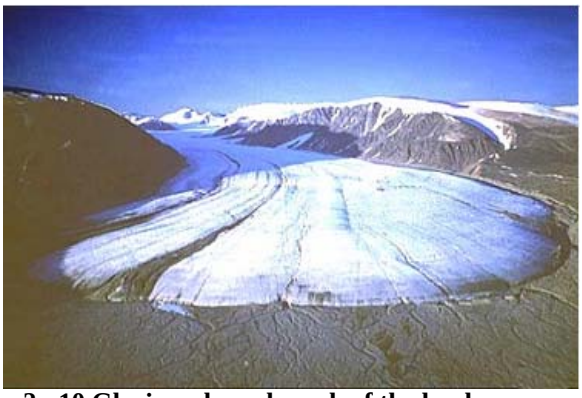

2 - 10 Glaciers shaped much of the landscape across the northern United States.

Glaciers form when snow accumulates to a depth of many feet, compressing the snow at the bottom of the pile into ice. When snow accumulates on top of the glacial ice, the additional weight causes the glacier to slowly move downhill. Glaciers act like huge belt sanders and conveyor belts. Large quantities of rock and smaller fragments become frozen and trapped in the ice. These rocks frozen in the ice of the advancing glacier scrape, grind, and gouge across the landscape, carrying soil and eroding the underlying bedrock as the ice mass slowly slips downhill. This erosion is particularly effective when the underlying rock is as soft as many of the shales and limestones. When glacial ice melts, it leaves behind deposits made of till and outwash that can sometimes be greater than 100 feet in depth.

Till is an unsorted mixture of clay, silt, sand, gravel, and larger particles that was left in piles at the edges or beneath glaciers. Outwash, as the name implies, is composed of well-sorted gravel and sand sediments deposited by streams running away from the ice. Outwash often filled the bottoms of valleys leading away from the glaciers, leaving behind relatively shallow, broad, and level valley bottoms. These outwash deposits frequently serve as a source of low-cost bank run gravel for use on roads. This material,

however, is usually not good road material and can be a major source of sediment and dust pollution.

Local government road managers should become familiar with their state and local geology in order to gain a better understanding of their site conditions and the driving forces shaping those conditions. Additionally, they should have a good working knowledge of the types of rocks and materials available for road maintenance. As we shall see in future chapters, the geological provinces not only define the local topography and the existing rocks and soils, but also relate to other natural systems such as ecoregions, vegetation, and forest types that impact the way we maintain our local road system. Many states have Web sites showing the physiographic provinces contained within their state with a description of the provinces and rock formations that are predominant for the region. Appendix 2 maps Pennsylvania's physiographic provinces, showing the rock types and topography of each province. Other sources of information on local geology include local libraries, universities, agricultural extension offices, county farm service centers, and the U.S. Department of Agriculture (USDA), Natural Resources Conservation Service (formerly the Soil Conservation Service).

2.3.3 Rock as a Road Material. As previously discussed, the geological history of an area determines the characteristics of an area's underlying rock structure. Consequently, the characteristics of the locally available materials determine the suitability for road materials as well as the potential for creating environmental problems. Three important major material characteristics that often help determine the structural and environmental suitability for road use are hardness, durability, and the pH.

A gravel road surface material is directly subjected to vehicles traveling on the road, unlike a base or subbase material under a paved asphalt or cement concrete pavement. In this respect, the hardness of the surface material becomes important to withstand the constant grinding by vehicle tires. A material's hardness can be measured in comparison to a diamond. In roadwork, the Los Angeles Abrasion Test method can be used to measure the aggregate's hardness or abrasion resistance. This test measures the percent weight of material loss or abraded away by tumbling a specific sample of sized material in a drum with steel ball bearings at a fixed speed and for a fixed time (Photo 2-11). Results are abbreviated as LA-xx where xx is the relative hardness. For example, a type of rock with a LA-22 is abrasion resistant since it has only lost 22% of its weight, while another rock with a LA-70 is softer and less resistant to abrasion because 70% was worn away from the sample.

2 - 11 Los Angeles Abrasion Test Drum.

The hardness of a material is an important factor when selecting road material because it determines how easily the material will be physically broken down and worn away. Road materials are broken down by both vehicle traffic and environmental conditions, resulting in successively finer particles. These fine particles are then removed from the road as sediment or dust, which can negatively impact the surrounding natural systems. The removal of fine particles as dust and sediment also means that road material is being lost.

Another measure of a rock's performance as road material is durability, a term used to express a rock's resistance to frost action. Durability can be measured by repeated saturation in a salt (sulfate) solution. Crystallization of the salt in cracks in the rock causes the rock to split. When the test results of a sulfate test are received, remember it is really expressing the reaction to frost. Because this characteristic is critical when aggregates are bound in cement or asphalt, the levels for these applications are more stringent (e.g., durability factor of 10) than those used where the aggregates are not bound (e.g., durability of 20).

The third characteristic is the pH of the rock used as a road material. Chemical tests for pH measures the acidity or alkalinity of a material, with the pH scale ranging from 0 to 14.0. values of less than 7.0 are acidic, while values greater than 7.0 are basic or alkaline, with a value of 7.0 being neutral. For the purposes of this manual, the pH measures the ability of a material to increase or decrease the acidity of soil and water. Fine particles worn from the road have chemical characteristics, and when this dust or sediment settle, the particles can change the pH of the surrounding soil or water. For instance, dust from crushed aggregate having a low pH can be washed into an adjacent trout stream. The acidic particles then mix with the water and increase the acidity of the stream. Because plants and animals can only tolerate a certain range of pH conditions, this increased acidity may decrease or eliminate the productivity of the trout stream. The health and productivity of terrestrial plants and animals can also be negatively impacted by changes in pH. Particles with a different pH may affect soils, thereby impacting plants, crops, and organisms utilizing these soils.

The harmful effects of acid rain is one of the major reasons why we must be careful not to further alter the natural pH of our rivers, streams, wetlands, and soils with road materials. Acid rain is caused when moisture (raindrops, snow, fog, clouds) in the atmosphere is exposed to gaseous and particulate air pollutants that come from our vehicles, factories, and power plants. Normal rainwater is, by nature, slightly acidic, and exposure to these pollutants alters the chemistry of the moisture, causing it to become even more acidic. When the acidified moisture falls as precipitation, it brings the acid with it, where it can impact the natural pH of the soil and water. In many cases, acid rain is so harsh that numerous streams and lakes have become so acidic that they are devoid of almost all life. This form of environmental pollution is everywhere, but some areas are stressed more than others. Since many natural systems are already stressed by acid rain, the environmental impacts of even slight changes in pH caused by eroded road materials may be great.

Our ability to be environmentally conscious is based on attention to local conditions. The variety of both land and water communities necessitates choosing the right road material for each situation. There are roads in areas where rare, acid-loving plant species grow. Placing limestone on those roads could raise the pH of those areas, destroying the habitat that those species require for survival. Conversely, placing acidic shale on a road that is upslope from a clover field could drive the pH of the field's soil down below tolerable levels. It is critical for us to be aware of the potential impacts that our road maintenance activities have on our natural environment.

Local government road personnel should also be aware of threatened and endangered species living within their jurisdiction. These plant and animal species are not only protected by federal and state laws, but they also deserve every official's and citizen's protection so that they survive for their own benefit and for that of future generations. Just one thing such as changing the pH of their required habitat by not paying attention to discharges from road operations and maintenance activities, cannot be justified because both the liability and ethical concerns of such actions are tremendous.

The value of a good road aggregate along with other important road aggregate characteristics and specifications will be further discussed in Chapter 3 with an appendix of example state specifications.

2.4 Soils

Soils play an important role in the construction, maintenance and operation of dirt and gravel roads because most of these roads are built directly on soil. Characteristics of these soils, such as particle size, type, and combinations, influence the properties of the soil. These soil properties, which can include things like drainage, erodability, suitability as a road subgrade material, and use as a growth medium, influence many of our necessary road maintenance activities discussed in this manual as well as those activities currently being performed.

2.4.1 Soil Formation. Soil formation is a component of the larger geologic cycle, and the rocks making up the local geology commonly serve as parent material for a region's soils. Parent material is the raw, intact rock that eventually breaks down into finer and finer pieces which, when combined, are called soil. This process of soil formation can take from 10 to 10,000 years. Soil formation also includes the addition of decomposing plant and animal matter brought by organisms living within the soil, which adds fertility to the newly formed soil.

Chemical and physical weathering are two types of mechanisms that transform parent material into soil. Chemical weathering is the decomposition, or chemical breakdown, of geological materials. Rainwater acts as the most important agent of the chemical weathering process because it is, by nature, mildly acidic. Rainwater, however, also contains other acids obtained from gases in the atmosphere (i.e., acid rain), vegetation, and from microorganisms, which boost the rainwater's ability to dissolve the chemical bonds that hold rocks and minerals together. As these bonds dissolve, fractures

form along zones of weakness. Limestone is dramatically impacted by chemical weathering, forming sinkholes and solution channels for underground streams.

Physical weathering can be thought of as the disintegration, or crumbling, of larger particles into smaller particles. Water also plays a large role in the disintegration process and the frost action discussed before is a common example of physical weathering.

These weathering processes often work hand in hand with one type of weathering occurring along zones of weakness created by the other type. Weathering typically occurs at or near the surface of the earth, with fractures in the rock allowing these weathering processes to penetrate to limited depths. The degree of weathering usually decreases with depth below the ground surface. The depth of weathering, however, may vary from area to area, and geological studies in the Piedmont physiographic province discovered weathered granite approximately 100 feet below the ground surface. Historical and recent climatic conditions also influence the degree of each type of weathering. During periods of glaciation, intense frost action near the glacial margins physically fractured many subsurface sedimentary rock formations. Currently, moderate chemical weathering with frost action is common.

Because of local geology's history and characteristics, parent material varies from one location to the next. This variation in parent materials, in conjunction with local weathering conditions, has resulted in the development of many different types of soils within a small area. The USDA Natural Resources Conservation Service has compiled county soil survey maps that contain information on the location and types of each county's soils.

2.4.2 Soil Particles. As rocks weather, they break down into smaller particles, forming sand, silt, and clay-sized particles. When physical weathering occurs, these particles are simply smaller-sized pieces of the parent material, while chemical weathering alters the nature of the parent material in the decomposition process. The following Table 2-1 contains information on the actual size of the different particles.

Table 2-1: Soil Particle Sizes

Particle Size	Diameter (mm)	Field Test
Clay	Less than 0.002	Feels sticky
Silt	0.002 to 0.05	Feels like flour
Sand	0.05 to 2.0	Feels gritty

The size difference between these particles is also significant for a number of reasons that will be discussed later. To put the particle sizes into perspective, if a clay particle were considered to be the size of the head of a pin, then a silt particle would be the size of a kernel of corn, and a sand particle the size of a basketball.

Clay has unique properties that frequently cause it to impact road construction and maintenance activities. Clay particles have a flat, plate-like structure that is unlike the irregular and more rounded structure of silt and sand, respectively. This flat shape gives

clay particles greater surface area for electrical bonding to take place between individual clay minerals. These electrical bonds give clay its tenacious, sticky properties. The shape and electrical bonds of clay are also responsible for many of clay's other interesting properties, including its ability to absorb water and swell, sometimes to great extents; be flexible; be slippery; and hold more nutrients than other particles types.

The different particle sizes and the type of material that make up those particles influence a number of important properties. The likelihood that a material will erode is affected by shape of the particles as well as the degree of bonding, or cohesion, between particles. For example, Table 2-2 below indicates that rounded sand particles are likely to erode, while sticky clay particles are not. Particle properties also influence how well it serves as a growth medium for vegetation. While clay holds nutrients, many of these nutrients are bound to the clay and not available for plants. Silt has the most nutrients available, and sand is relatively nutrient poor. Road managers are probably more familiar with the suitability of these types of materials for road stability and drainage purposes as shown in Table 2-2.

Table 2-2: Soil Type Properties

	Erodability	Growth Medium	Road Stability	Drainage
Clay	Stable	Holds nutrients	Soft, slippery	Holds water
Silt	Moderately stable	Rich	Soft	Moderately drained
Sand	Unstable	Poor	Poor compaction	Well drained

It is important to note that none of the individual particle sizes or types makes a good, stable road material. *Particle combinations are key!* Soils are formed from combinations of these different particles, and the relative proportions of sand, silt, and clay-sized particles determines soil types. The combination of different particle sizes and types, and their properties, influence the overall characteristics of the soils they form. Knowledge of these combinations and properties can aid decisions regarding management of dirt and gravel roads, and especially the stability of banks and ditches.

Appendix 6A, Soil Identification in the Field, gives a guide that allows road personnel to determine soil particle types in the field.

2.4.3 Soil Layers. Because soils are formed from parent material via weathering processes, they typically develop from the surface downward. Soil development forms layers in the soil, which are called soil horizons, and may be observed when a trench cuts through soils that have not been disturbed by agriculture or construction. Figure 2-1, Soil Horizons, shows an example of these horizons, though not all of these horizons may be represented in every given soil profile.

Figure 2-1: Generalized Soil Horizons in Undisturbed Soil Profile

Note: a. Not all horizons may be represented in a given soil profile
b. The degree of weathering decreases with depth

The horizons develop hand in hand with the soils, frequently taking several hundred to several thousand years to become well developed. Changes in environmental conditions can lead to changes in the development of both the soils and the horizons within those soils. For example, soils that develop under the saturated conditions found in wetlands produce unique soil conditions, as will be discussed in Chapter 4.

2 - 12 Earthworms live in the A Horizon, the first layer of "dirt."

The upper layers of the soil are commonly referred to as topsoil. Topsoil is made up of the O and A horizons (refer to Figure 2-1). The O horizon consists of a collection of organic materials resting on the surface, including seeds, leaves, branches, vegetation, bacteria, insects, animal wastes, and deteriorating plant and animal remains. This organic matter serves as a valuable source of nutrients for the underlying soils.

The A horizon is the first layer of "dirt" and is made up of varying proportions of sand, silt, and clay mineral materials, along with a substantial amount of organic matter. Much of this matter has been washed down through the soil from the overlying O horizon. Plants utilize this layer for the germination of their seeds and the development of root networks for support and gathering food and water. Creatures such as insects, earthworms, fungi, and other microorganisms live within the A horizon and provide several vital functions. These insects, molds, fungi and bacteria help encourage the rotting of wood and leaves, thereby breaking down the organic matter into more usable forms. The insects and earthworms burrow through the ground, aerating the soil so that plant roots can breathe. The burrows of these creatures also help water to infiltrate the

soil. Infiltrating water can help plants grow, but it also helps recharge groundwater supplies.

The layer of soil beneath the topsoil is commonly referred to as subsoil. This layer of soil can be broken into the B and C horizons, as shown in Figure 2-1. In the B horizon, the parent material has been completely weathered, so few rocks are present. The B horizon lacks the organic matter that the A horizon has, but does contain extra silt and clay particles that have washed out of the overlying horizons by water percolating down through the soil profile. The C horizon is typically very rocky and consists of partially weathered parent material. The R horizon is the bottommost horizon and consists of hard bedrock that underlies the soil. Because these subsoil layers do not have organic matter and biological organisms that the A horizon does, they are not as suitable a growth medium for plants. Some plants, however, do send roots down into the subsoil layers to gather water and nutrients that have accumulated in these deeper soils. It is critical to understand that bank and ditch stability is aided by the plants and their root structures. Plants are dependent on the soil and thrive best when a natural soil profile is maintained. Mechanical removal of even leaf litter decreases a plant's chances of holding the bank or ditch together. The common practice of removing all topsoil materials and exposing subsoils is difficult to justify in light of the following valuable insights.

2 - 13 Topsoil provides the nutrients needed for plant growth.

2.4.4 Topsoil Versus Subsoil. Plants normally grow in topsoil, and because of this, topsoil can be used to help road maintenance projects in several ways. Topsoil contains many of the nutrients that plants require for healthy and quick growth. The organic content of the topsoil also helps to retain soil moisture as well as the vital nutrients, which is then available for plant uptake. Many kinds of seeds lay dormant in the topsoil, where they wait for an opportunity to sprout and grow. These dormant seeds often are the first to sprout when topsoil is disturbed by equipment. All of these things help new vegetation to become established quickly. As will be discussed in several other portions of this manual, established vegetation not only looks better, but also prevents erosion of both the road banks and ditches.

In addition, subsoil cannot develop overnight into a suitable growth medium for bankside vegetation. It requires a geological time scale to develop into topsoil. For these reasons, it is important to retain topsoil when performing ditch and other road maintenance activities so that it can be reused to revegetate the site at the completion of the work. Chapter 6 will cover this concept in more detail.

When we consider road construction and maintenance, however, subsoil for road subgrades becomes the material of choice. We do not need all the vital nutrients to support vegetation, but we do need a structurally sound material containing the proper combination of particles to properly drain water away from the road.

It all boils down to the fact that *what makes a good garden makes a poor road and what makes a good road makes a poor garden.*

2.5 Summary of Geology, Rocks, and Soils

The construction and maintenance of roads is closely tied into the local geology. Each region's geologic history has influenced the rocks and soils underlying and surrounding its roads. These underlying materials determine the road's design and maintenance requirements, and the surrounding materials determine the roadside's design and maintenance, affecting vegetation type and growth, bank and slope stability, and drainage. Geology also explains why some road materials are locally available and others are not.

Environmental and road problems stem primarily from several relentless, natural physical forces acting to change the landscape. These forces include gravity, water lubrication, water currents, erosion, and frost action. Many human activities have greatly influenced the effects of these natural forces, often resulting in accelerated rates of erosion and sediment. By understanding and limiting our influence on these natural forces and processes, we can slow this accelerated erosion and minimize our impact on the natural environment.

Igneous, metamorphic, and sedimentary rocks are formed over long periods of time by a number of different geological processes. These processes produce varying conditions that geologists identify as physiographic provinces. Each province has its own unique combination of geologic materials, topography, drainage, and overall character. We have identified hardness, durability and pH as three important characteristics used to determine the suitability of rocks for use as road materials and their potential for environmental problems.

Rocks are subjected to physical and chemical weathering processes that break them down into finer sand, silt, and clay-sized particles. These three particle sizes combine to form soil. The various combinations of particles size and type influence the physical characteristics of soil, which then affects the soil's erosion and drainage characteristics, as well as its suitability as a growth medium and road subgrade material. Topsoil contains decomposing vegetation and animal materials and other vitals for plant establishment and growth, while the "dead" subsoil is better suited to road subgrades.

Rocks and soils form over geological time scales of many thousands of years. Because our roads are situated within the context of the natural environment, they are not only subjected to the same physical and weathering forces, but also often act to accelerate and increase the effects of these forces. As such, it is important to be knowledgeable

about, respect, and consider the interactions between roads and natural systems in order to minimize disturbances to both systems.

When road managers understand their local geology, rocks and soils, they can develop appropriate maintenance techniques. The best maintenance techniques minimize disturbances while striving to retain the functions of the natural systems and facilitate the long-term stability of the road and its surrounding environment.

2 – 14 Understanding geology helps to develop good road maintenance practices.

APPENDIX 2. Case Study: Pennsylvania's Geology

Geologists have divided Pennsylvania into seven physiographic provinces (see Figure A2-1). Each province has a vastly different geological history that has influenced the local geology and shaped the landscape. In general, older rocks (more than 570 million years old) are found in southeastern Pennsylvania while younger rocks (less than 290 million years old) are found in the northwest parts of the state.

Thus, most of the igneous rocks in Pennsylvania are found in the southeastern corner of the state and are of the intrusive type igneous rock. Sedimentary rocks are the

Figure A2-1 Physiographic Provinces of PA

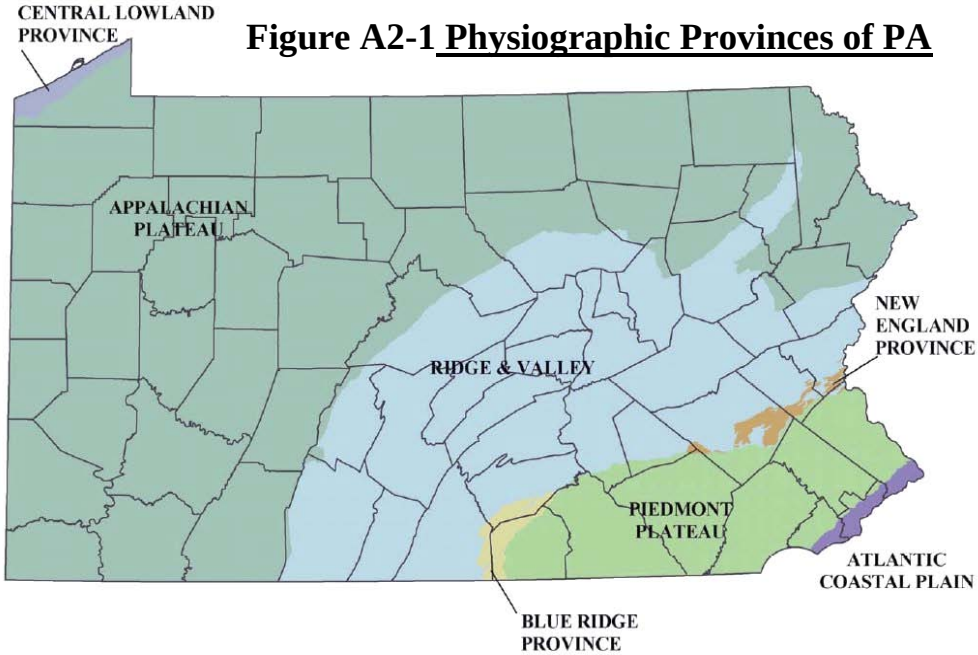

most common type of rock in Pennsylvania and cover approximately 85 to 90% of the state. Metamorphic rocks are again present predominantly in the southeastern portion of the state.

Surface water was a major factor in shaping the landscape in all seven provinces, eroding and carving most of the river and stream valleys that can be seen today. The periods of glaciation occurring in northern Pennsylvania also altered the landscape. The following province descriptions provide a basic overview of Pennsylvania's landscape and its geologic history.

A2.1 Central Lowland Province. This is the northern most province in Pennsylvania, and is found along the Lake Erie shoreline in Erie County. This is only a small portion of the Central Lowland Province as it extends from northwestern Pennsylvania and western New York, northwestward to Minnesota and southwestward to Texas. The portion of the province located in Pennsylvania consists of a series of sand and gravel beach ridges that run parallel to Lake Erie. These ridges were formed by the lake during the last period of glaciation in the area, from approximately 24,000 to 18,000 years ago. As the glaciers retreated and melted, water levels in Lake Erie were higher than they are today. Waves piled up sands and gravels, forming these beach ridges at the then current water levels. As the lake's water levels declined, these beach ridges became inactive, with vegetation becoming established and stabilizing the mobile sand ridges. The ridges can now be viewed as the gently rolling land that is characteristic of the area. Additional wave erosion and relatively steady water levels have caused the more recent formation of a bluff along the Lake Erie shoreline. Surface water drains towards the lake in this area, forming steep-sided, narrow valleys that cut across the ridges and into the underlying shales and siltstones. Rocks in this province include gray and black shale, red sandstone, limestone, and chert.

A2.2 Appalachian Plateaus Province. This province covers the greatest part of Pennsylvania, approximately 60% of the state, including 42 counties and extends from Greene, Somerset, and Fayette counties in the southwest to Erie in the northwest and northeastward across the northern part of the state to Wayne and Pike counties. The province was covered by a series of salt and fresh water seas in which sedimentation occurred. Sediments laid down by these seas became cemented together, forming the 250- to 405-million-year-old sedimentary rocks that underlie this area. During periods when the land was not submerged, vast swamps and bogs developed. Dead vegetation from these swamps and bogs accumulated and formed thick beds of peat. Some of these peat beds were later covered by new layers of sediment, which compressed the peat and caused it to metamorphose into coal, forming the vast coal deposits that have played an essential part in Pennsylvania's history. Surface water erosion has deeply carved an extensive drainage network across this province. Glaciers covered a large portion of the northern corners of the sate, where they dramatically reshaped the landscape. Rocks in this province include red, gray and black shale, red and gray sandstone, limestone, conglomerate, coal, and chert.

A2.3 Ridge and Valley Province. The Ridge and Valley Province of central Pennsylvania is characterized by long, narrow mountain ridges separated by valleys of varying widths. This province encompasses approximately a quarter of the state and extends northeastward into New Jersey and southwestward through Maryland. The province is underlain by the many of same sedimentary rocks that underlie the Appalachian Plateaus Province and are approximately 290 to 570 million years old. The subsequent geological events, however, warrant separation of this area into a new physiographic province.

The earth's continental plates drift around the surface of the earth at a rate of about an inch per year, and about 290 million years ago, North America collided with Africa. This collision resulted in a period of mountain building as the two continents pushed together. The massive forces involved with this collision caused the relatively flat rocks within the province to wrinkle and become folded much like a carpet does when the ends are pushed together. This geologic upheaval resulted in the formation of a mountain range that was 150 miles wide and at least 2.5 miles high that is referred to as the Alleghanian Mountains. Approximately 250 million years ago, the Alleghenian Mountains began to erode away. Because some rocks are more susceptible to erosion than others, erosion rates differ. Extensive erosion of these mountains has since formed valleys in areas of soft rock (shales and siltstones) and left erosion-resistant ridges comprised of very tough sandstone. The ridges and valleys presently cutting across the state are all that remain of this former mountain range. Rocks in this province include gray and black shale, siltstone, red and gray sandstone, limestone, chert conglomerate, quartzite, and dolomite.

As with the Appalachian Plateaus Province, surface water erosion has played a major role in shaping the current topography of the province. The Susquehanna River, which cuts through many of the ridges of the province, is evidence of the impact of surface water erosion on shaping the landscape. The Susquehanna River was able to erode sufficient material to maintain its course while the underlying land was being uplifted by the collision of the continental plates. Glaciers have also acted on small portions of the province, primarily in Northampton, Carbon, Monroe, Luzerne, Columbia, Sullivan and Lycoming counties.

A2.4 Blue Ridge Province. The Blue Ridge Province is represented in south-central Pennsylvania in portions of Cumberland, York, Adams, and Franklin counties. Known locally as South Mountain, this mountain ridge extends southwestward into Maryland and Virginia, where it is known as the Blue Ridge Mountains. The quartzite and metamorphic volcanic rocks that make up this highland province are erosion resistant and more than 500 million years old. Rocks in this province include shale, sandstone, limestone, quartzite, dolomite, gneiss, granite, marble, and other metamorphic rocks.

A2.5 New England Province. The portion of this province extends southwestward into portions of Northampton, Bucks, Lehigh, Berks, Lancaster, and Lebanon counties in southeastern Pennsylvania. This portion of the province is known as the Reading Prong section, which consists of highly distorted metamorphic rocks that are

significantly more resistant to erosion than the surrounding sedimentary rocks. Rocks in this province include gneiss, marble, other metamorphic rocks, and granite.

A2.6 Piedmont Province. The Piedmont Province is located in Southeastern Pennsylvania and covers approximately 15% of the state. This area was influenced tremendously by the same collision of continental plates previously discussed and again formed the Alleghanian Mountains in this area. This mountain building process created metamorphic rocks that are least 430 million years old. Younger sedimentary rocks containing intrusions of igneous rock formed in the northern portions of the province approximately 140 to 250 million years ago during the separation of the two continental plates. As with the Ridge and Valley Province, millions of years of surface water erosion has worn down the grand Alleghanian mountains to form the current topography characterized by broad valleys and gently rolling hills. Rocks in this province include quartzite, schist, slate, marble, serpentine, gneiss, other metamorphic rocks, red sandstone, shale conglomerate, limestone, dolomite, diabase, and granite.

A2.7 Atlantic Coastal Plain Province. This province is located in the extreme southeastern part of Pennsylvania, including almost all of Philadelphia County and southeastern portions of Bucks and Delaware counties. This province extends from Massachusetts to Florida, and includes most of Delaware and all of southern New Jersey. In higher elevations within this province (maximum elevation is about 200 feet above sea level), sand and gravels approximately 2 to 67 million years old overlie older metamorphic rocks. In lower elevations along the Delaware River, floodplain deposits of sand, gravel, silt, and clay are less than 2 million years old. In general, the geologic history of the province has produced rather flat lands with sandy soils. Many of the sand, gravel, silt, and clay deposits remain unconsolidated, as they have not had sufficient time to become cemented together.

A2.8 What Pennsylvania Has to Work With. These previous descriptions of Pennsylvania's geologic history with its physiographic provinces show what the local governments have to work with as far as rocks, soils and road materials. Comparing the province map with the geology map and a soils map shows the similar patterns (Figure A2-2 and Figure A2-3). And, of course, the soils will dictate types and growth of vegetation and the environment in which the roads exist. It explains why many unpaved roads through most of Pennsylvania use limestone as the aggregate road material available from local quarries. It also explains the lack of limestone across the north central part of the state where only softer shales are available, creating more problems of erosion and dust along with increased road maintenance. Geologic history shows how the steep hills and deep valleys in some sections were formed. Roads and banks in these sections are difficult to stabilize because they must fight gravity's relentless force. Pennsylvania still has approximately 20,000 miles of unpaved roads. Sediment and erosion from these roads represent major environmental problems. Part of Pennsylvania's rich geological legacy is its vast resources of coal. But this bounty has come at a price. Acid mine drainage into the streams costs taxpayers millions of dollars each year in cleanup expenses.

Figure A2-2: What do you have to work with?

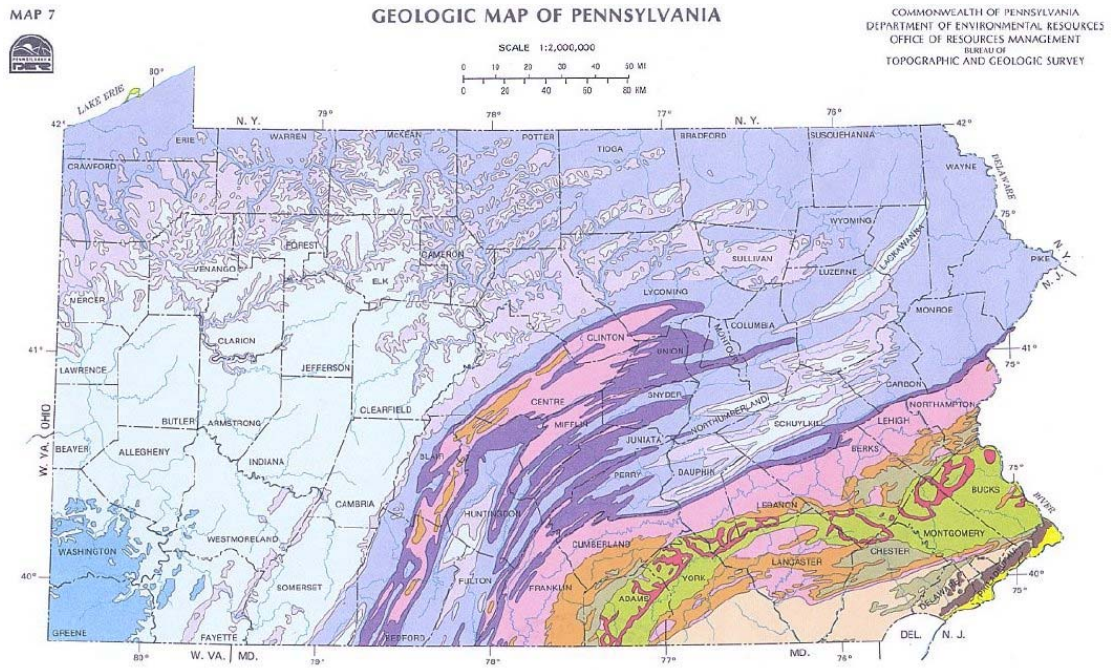

Figure A2-3: What do you have to work with?

SOIL MAP OF PENNSYLVANIA

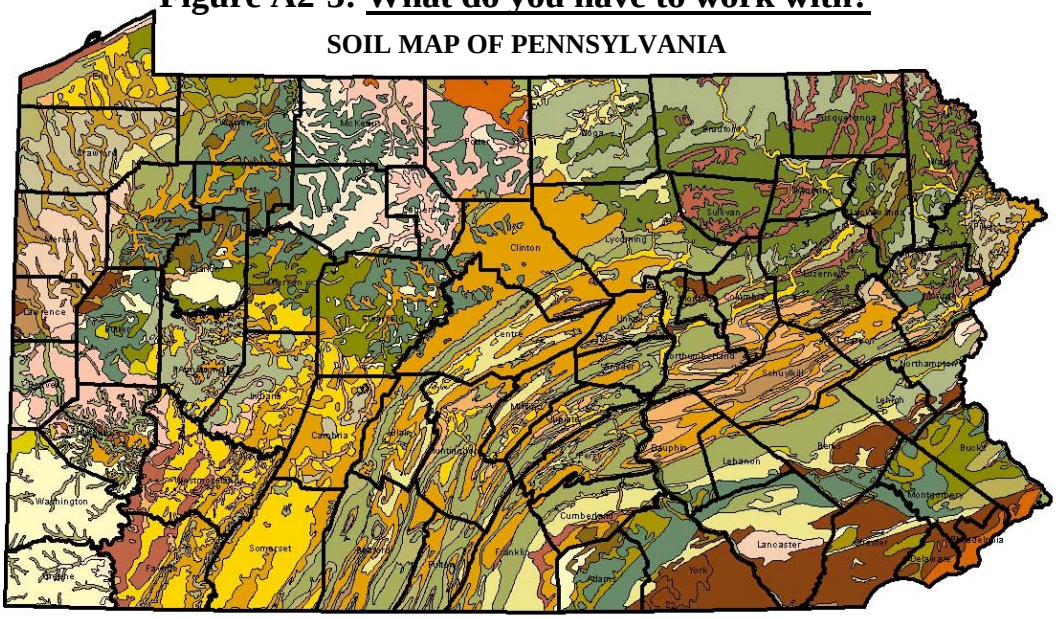

Environmentally Sensitive Maintenance for Dirt and Gravel Roads

Chapter 3: Water, Erosion, Drainage and Road Basics

3.1 Introduction

Water is essential for all life on earth. Water, however, can also cause devastation through erosion and flooding. In the first chapter, we detailed the historical relationship between roads and streams, the interrelationship of our roads and the environment, and the importance of good roads and a good environment for a good municipality. In Chapter 2, we discussed the relentless forces shaping the earth, specifically gravity and water. Now we need to discuss water, accelerated erosion and the importance of proper drainage in maintaining our roads and the environment.

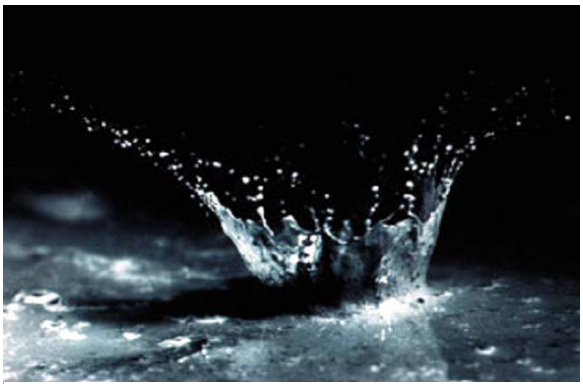

3-01 Never underestimate the force of water.

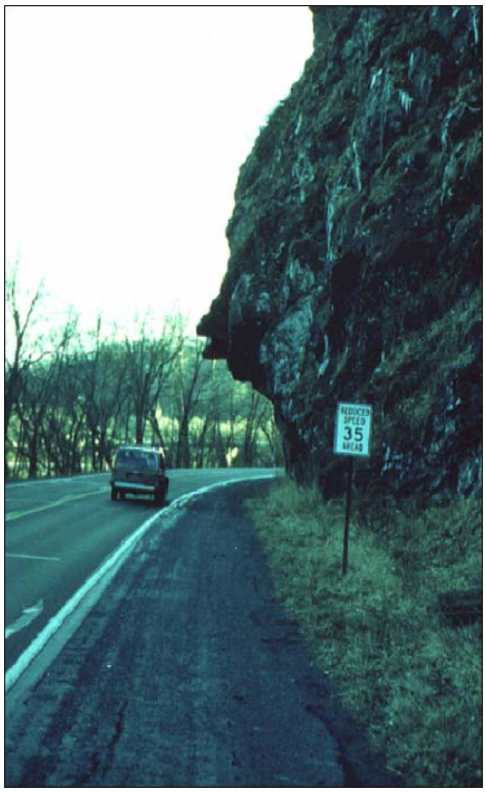

3-02 Stability depends on percentages of rock, sand, silt, and clay.

We will cover basic road maintenance materials and techniques to ensure an understanding of accepted and proven practices in maintaining dirt and gravel roads and establish a basis for our environmentally sensitive maintenance practices.

3.2 Water and Erosion

3.2.1 Principles of Erosion. Never underestimate the force of a drop of rainwater. To recap what was discussed in Chapter 2, it is that water drop exploding when it impacts bare soil that starts the erosion process. Water's eroding force increases with its volume and flow velocity (how fast it is flowing).

How resistant soil is to erosion depends on several factors. First, soil type and particle size are important. Soil stability will depend on the

percentages of rock, sand, silt, and clay in the soil. A rock bank such as seen in the photo is stable with little erosion taking place.

A second factor is soil cover, specifically vegetation. Vegetation breaks the raindrop's fall, dissipating its destructive energy before it hits the soil. Vegetation also slows down surface water flow, keeping velocities low and minimizing erosion.

3-03 Vegetation provides many advantages in erosion control.

Plant roots constitute the third factor. Never underestimate the value of root systems as soil reinforcement. Plant roots provide additional stability by removing water from the soil. The importance of plant roots and root systems will be discussed more thoroughly in Chapter 4.

3-04 Roads interfere with natural systems, causing accelerated erosion

3.2.2 Accelerated Erosion. Remember, the greater the velocity, the greater the erosive force. Erosion is a natural occurrence in nature. When roads are constructed, however, they interfere with natural systems and concentrate water, increasing its volume and velocity, causing **accelerated erosion**. It is this accelerated erosion that causes severe problems for both our roads and the environment.

3.3 Water and the Importance of Road Drainage

3.3.1 The Importance of Drainage. Although water may be the life-giving liquid of our planet, it has long been recognized as the archenemy of our roads. Road literature provides a rich history of the disastrous effect water has on roads.

In 1820, the great Scottish road builder of the 19th Century, John Loudon McAdam, stated "…experience having shown that if water passes through a road and fills the native soil, the road, whatever may be its thickness, loses its support and goes to pieces." In 1909, Connecticut State Highway Commissioner, James H. MacDonald, remarked, "If there is no drainage, there will be no road, no matter what the material may be." In 1912, John Nathaniel Mackall in his Drainage, the Fundamental Principle of Road Construction discussed his conclusion after a seven-year study by stating, "Lay out your road with the object of draining it and never lose sight of this point. It is the ABC of road

building and maintenance." A New Hampshire Highway Department Handbook in 1916 stated it this way: "Always remember and apply this most important rule: Keep water OFF your road, OUT of your road, and AWAY from your road."

These statements are just as true today! Good road drainage and proper maintenance is the best way to combat water's damaging influence – keeping water off, out of, and away from the road. Proper drainage cannot be over-emphasized in road maintenance and construction. Water affects all aspects of road serviceability.

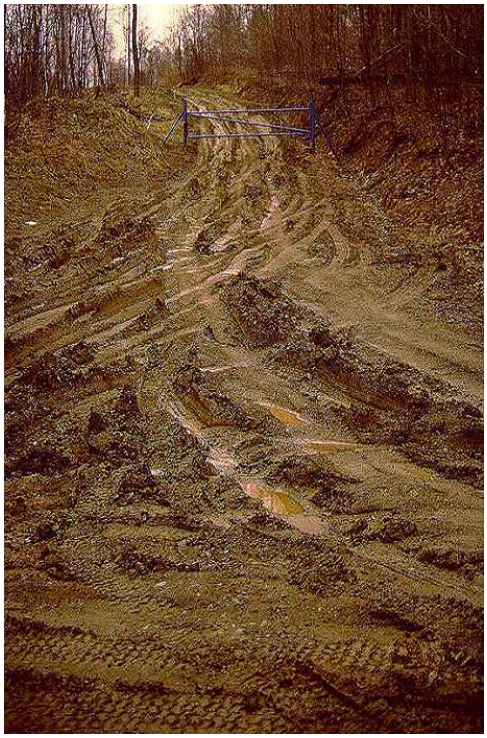

3-05 Water acts as a lubricant, allowing material to move more freely.

3.3.2 Characteristics of Water. To understand water and its effects, we must understand water's three key characteristics that concern us in road maintenance:

1. Water acts as a lubricant
2. Water expands upon freezing
3. Water runs downhill

Remember these factors as related to those relentless physical forces back in Chapter 2. A more detailed discussion of these characteristics is required to determine the concern for roads.

Water acts as a lubricant. Water's presence allows materials to move more freely by decreasing the friction between particles. Photo 3-05 shows a well-lubricated road. When a road gets wet, aggregates are more likely to move or become displaced under traffic loads. This in turn causes surface depressions that collect more water and result in even more weakened areas and soft spots.

If water is within the road structure and freezes, it expands and forms ice lenses as shown in Figure 3-1. This freezing process starts at the road surface and moves downward into the road structure. As the freezing takes place, more water is drawn up from the soils below. Thus, the road structure becomes supersaturated. The ice lenses formed from the expanded frozen water causes pressure in limited spaces – a pressure that is usually transmitted

Figure 3-1: Ice Lens Formation and Capillary Rise

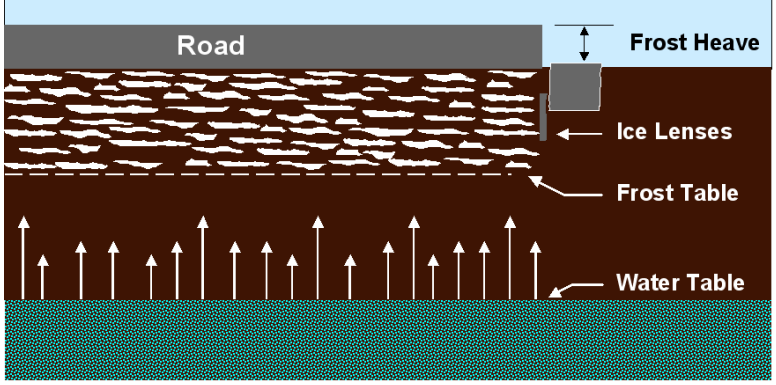

upwards, deflecting the road surface, causing frost heaves or frost boils. As the first step in controlling this frost damage, we must recognize the three conditions required for frost damage to occur: freezing temperatures, frost-susceptible soils, and water. The elimination of any one of these three conditions will prevent frost damage.

Since the power to control temperature is beyond us, we can concentrate on the remaining two. Some soils are more susceptible to frost heave, such as fine-grained clay soils, as was described in Chapter 2, Geology and Soils. It may not be feasible to remove frost-susceptible soils depending on the extent of the problem. Small localized areas can be considered for removal while larger areas may use alternate treatments with geosynthetics. Geosynthetics, their properties and uses will be discussed in Chapter 7. A combined strategy of proper drainage and the use of geosynthetics is usually the most feasible and cost effective method.

Springtime and thawing brings additional problems. During the spring thaw, ice lenses melt, releasing excess water to the base and subgrade. The problem is compounded since melting will occur from the top down, trapping water from draining downward. This excess water, if it cannot drain off laterally, acts as a lubricant, softening our roads and killing their load-bearing capacity. Springtime, often referred to as "mud season," can be a very trying for road maintenance crews.

3-06 Spring, "Mud Season," can be a trying time for road maintenance crews.

The simplest and most obvious characteristic of water is that it runs down-hill, subject to the relentless force of gravity. But we do not maintain our roads with this in mind. How many roads have ponding problems on the surface? We ignore this obvious characteristic at our roads' peril. Like gravity, water's devastating effects are relentless.

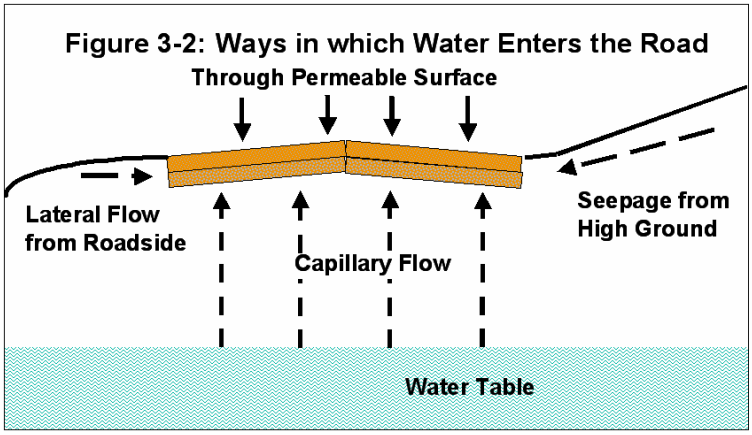

Figure 3-2: Ways in which Water Enters the Road

3.3.3 How Water Enters Our Roads. Figure 3-2 shows the many ways water can seep into our road structure. Road surfaces are not impervious to water, so water can seep through the surface. The longer water lays on the

surface, the more seepage takes place. Water may enter as lateral flow from the roadside or high ground. The water table may rise and enter the road base. If the water table is at a level higher than the road base, then we have to look at ways to lower the water table in the vicinity of the roadway structure using underdrain systems (discussed in a later section). Even if the water table is low, you may still get water into your road by "capillary flow" through the soil. The soil acts like a wick in a kerosene heater, drawing the water upward and into the road. This capillary flow also aids the freezing process as additional water is drawn up from below. Capillary rise can be quite substantial depending on soil type, as the following table illustrates.

Height of Capillary Rise through Soils	
Soil Type	**Height of Rise (feet)**
Small Gravel	0.1 - 0.4
Coarse Sand	0.5
Fine Sand	1 – 3
Silt	3 - 30
Clay	30 - 90

Given water's destructive effect on our roads, good drainage must be our highest priority. Further, unless drainage issues are addressed first, all other maintenance work will not last as long as it should, resulting in a waste of time and money.

3.4 Road Drainage

3.4.1 Drainage Systems. There are two major road drainage systems: surface drainage and subsurface drainage. The surface drainage system controls surface water caused by direct rainfall, melted snow, or surface runoff. The subsurface drainage system drains subsurface water from in our roads or from the subsurface areas surrounding our roads.

3.4.2 Surface Drainage. Surface drainage involves collecting the water from the road surface, road shoulders or berms, side slopes and adjacent areas and carrying it away via downhill slopes, roadside ditches and pipes. More complex surface drainage practices will be presented in later chapters; here we concentrate on road basics emphasizing the road and shoulder profile and the road cross-section or actual structure of the road.

3-07A good road crown is our first line of defense against water.

3.4.2.1 Road Crown and Cross Slope. The road surface acts as our first line of defense against water, and the first component of a good surface drainage system is the road crown. The road crown means the center of the road is higher than the outer edges of the road, as shown in

Figure 3-3. The crown should be a flat "A" shape with a cross slope or drop from the center to the edge of ½" to ¾" per foot or a 4-inch to 6-inch drop for an 8-foot lane.

The crown must be maintained to allow water to flow off the road. Problems develop quickly when a gravel road has no crown, as evident in photo 3-08. Water will quickly collect on the road surface during a rain, softening the surface crust. This will lead to rutting, which can become severe if the subgrade also begins to soften. Even if the subgrade remains firm, traffic will quickly pound out smaller depressions in the road where water collects, and the road will develop potholes. A dirt and gravel road must have crown.

Figure 3-3 Road Crown

(flat A shape)

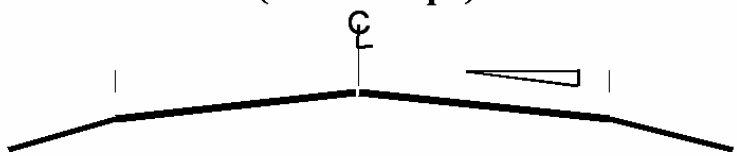

Dirt & Gravel: 1/2" - 3/4" per foot (5 - 7.5 inches in 10 feet)

3-08 Water quickly collects when the road crown is lost.

A crown's ideal shape is a straight line from the centerline down to each road edge, the flat "A" shape already mentioned. This shape can sometimes become rounded. The term for this is "parabolic crown," and it is virtually always a problem. The middle portion of the road will have considerably less crown than the outer portions. This center area is somewhat flat, and water will collect and not drain from the middle adequately. Traffic will form potholes and ruts. A parabolic crown is often caused by a worn grader blade. Grader blades, which are worn down through the center portion of the blade, should be replaced or cut straight with a torch.

With curves, we need to slope the road from one side to the other to "bank" the curve. This banking of the curve, called superelevation, provides for vehicle safety in traveling around the curve, as shown in Figure 3-4.

Figure 3-4 Superelevated Roadway (Curves)

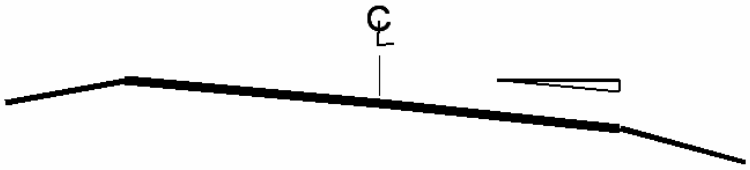

Dirt & Gravel: 1/2" - 3/4" min. per foot

The sloped surface still provides for proper drainage, getting the water off the road. The cross slope of the superelevated section should be a minimum of ¼" to ¾" per foot. Sharper curves may demand steeper cross slopes for safety. Of course, the steeper we bank the curve, the faster the vehicles will go.

3-09 Banked (superelevated) curve.

3.4.2.2 Road Shoulders. Most of our dirt and gravel roads do not have defined shoulders. But shoulders provide some key advantages.

If you have shoulders or a berm area, keep it flush with the road edge with a slightly steeper cross slope, avoiding "shoulder drop-off," which becomes a safety hazard for the motorist. A vertical drop-off can cause a serious accident. The errant driver leaves the road's travel way and drops to the shoulder area. When he attempts to return the wheel will catch on this "lip," and the driver will end up over-steering, allowing the vehicle to jump the lip, taking the vehicle into the adjacent lane of oncoming traffic.

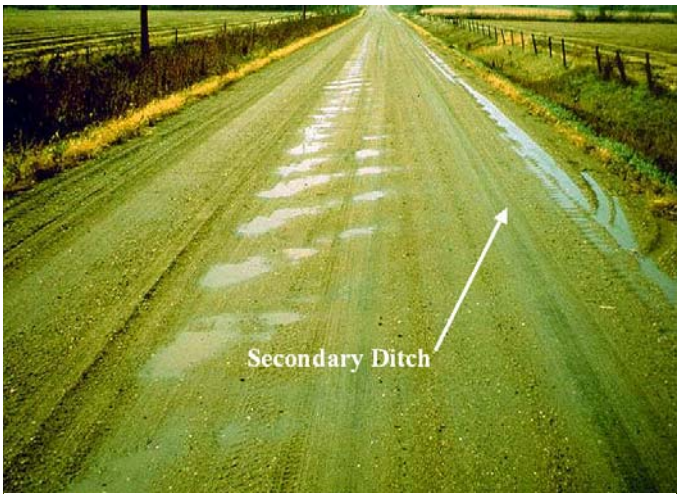

3-10 When water cannot drain off the road, the result is a "secondary ditch."

Roads without a properly sloped shoulder or berm area often develop a "secondary ditch" that will not allow the water to drain off and away from the road. This secondary ditch develops when road material moves toward the edge of the road and catches in the vegetation, forming a barrier to road drainage, as shown in Photo 3-10. Improper grading techniques can also leave a windrow of road material along the edge that acts as a dam, keeping water on the roadway.

A shoulder or berm area also supports the road structure, preventing road edge breakdown. Look at a road where the roadside slope drops immediately from the road edge into the adjacent road ditch, and you will probably find road edge deterioration. Shoulders also allow the water to flow further away from the road, maintaining better drainage, getting the water off and away more effectively.

And finally, shoulders make the road safer by providing a more defined visible roadway for the motorist and more room for erratic vehicle maneuvers or pull-offs. With

all these advantages, developing and maintaining shoulders along our dirt and gravel roads, where feasible, should become a high priority in our road maintenance program.

3.4.2.3 Road Structure (Cross Section). The crown and cross slope are not only important for the road surface and shoulders, but also are important for the road base and subgrade, or the soil on which the road is built. The configuration in Figure 3-5a supports good drainage.

The old "trench construction" method for building a road consisted of digging a trench with a flat bottom and then building your road, depicted in Figure 3-5b. Depending on geology and soil types, this procedure could actually trap water within the road structure.

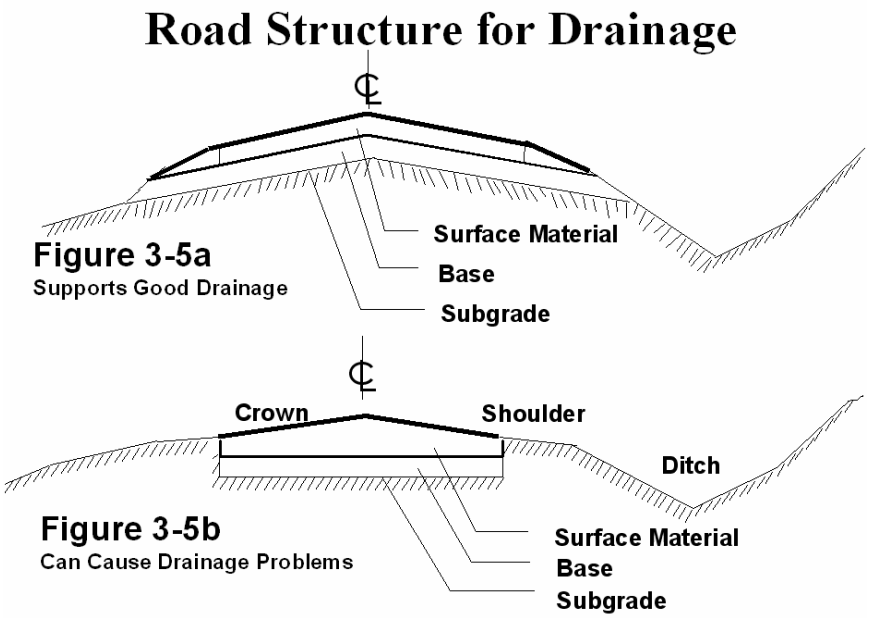

Proper construction maintains a cross slope for each layer including the subgrade and also carries the base materials through to the ditch slope to provide proper drainage of the road structure.

Notice in the figure that the bottom, or flow line, of the ditch is below the subgrade of the road. If a roadside ditch is required, this configuration with a 4:1 foreslope from the road into the ditch is the ideal ditch to drain the road surface and base properly and provide a safety factor for errant vehicles leaving the road. This construction, however, is not always feasible because of roadside terrain and right-of-way limitations often found on our dirt and gravel roads. Ditches will be discussed more thoroughly in Chapter 5 where we address ditch shapes and slopes and look at a variety of practices that can help us in maintaining our roads and ditches.

3.4.3 Subsurface Drainage. Surface drainage is only part of the overall drainage picture. We must drain the road subsurface as well. The free draining base of the road with a proper cross slope is a major component of the subsurface drainage system to drain the road structure, either into the roadside ditch or subdrain system. The ideal road structure would have a free draining base material topped with a good wearing course material, particularly in those areas where subsurface water is a concern.

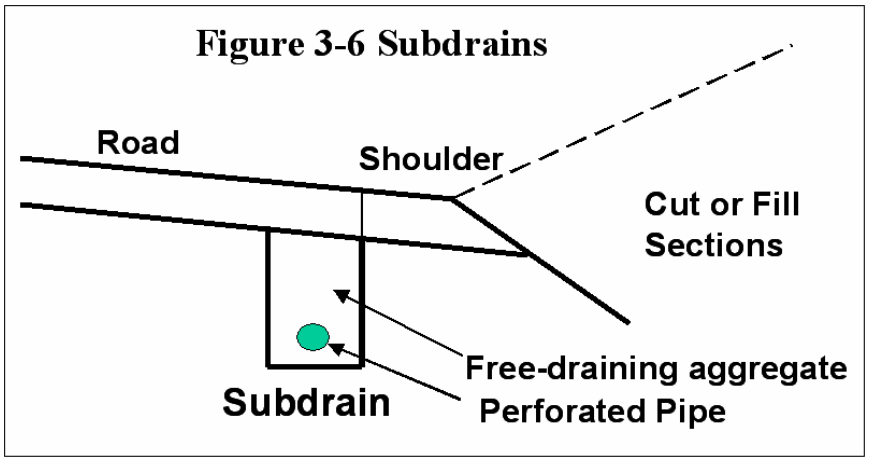

Figure 3-6 Subdrains

The second major component of a subsurface drainage system is an underground collector system, usually referred to as a subdrain. A typical subdrain, as shown in the Figure 3-6, consists of a trench parallel to the road with a free draining aggregate and a perforated pipe to carry the water to an outlet and away from the road. All subdrains should have an outlet. Whether or not adequate ditching exists, subdrains may be necessary to remove the water from the road structure and the surrounding area and/or to lower the water table.

But subdrains are subject to clogging over time. Soil fines, carried into the perforated pipe, can build up sediment, eventually blocking water flow and causing the system to malfunction. Some perforated pipes have perforations halfway around the pipe. These pipes should be installed with the perforations on the down side to prevent fine particles from falling through the holes and clogging the system. Water will find its way into the pipe (the path of least resistance) and keep the bottom flushed more effectively, prolonging the life of the system. Traditionally, roofing paper has been placed over the free draining aggregate in the trench to reduce the amount of fine particles migrating into the pipe.

Chapter 7 will discuss the use of geotextiles and geosynthetic pre-fabricated subdrains as cost effective alternatives that prolong system life.

3.5 Road Materials

Road materials play an important part in a road's structural stability. Additionally, good quality road materials reduce erosion, sediment, and dust pollution. Road material is normally sorted by type, size, shape, and gradation. In addition, as discussed in Chapter 2, we need to be concerned about other factors such as hardness, soundness, pH, and plasticity (cohesiveness/stickiness) to adequately protect both the road and the environment.

3.5.1 Quality Aggregates. What do we mean by quality road aggregates? The answer to this question will vary depending on location (remember geology and the physiographic provinces), aggregate availability, intended aggregate use, and other factors. Some regions do not have good aggregate sources. Common available materials may include:

- granite
- quartzite

- limestone
- sandstone
- shale
- glacial deposits of stone, sand, silt and clay or
- river run gravels. One thing to remember – using the best material available will prolong the road's life, decrease required maintenance work, and further protect the area's natural environment.

3.5.1.1 Surface Aggregate versus Other Uses. Many times surface aggregate used for our dirt and gravel roads comes from stockpiles processed for other uses. For example, the aggregate may have been produced for use as a base or subbase material beneath a paved road surface. But there are major differences between surface aggregates and base course aggregates. Base course aggregate is not designed to withstand traffic and the constant, direct grinding of wheels. A base aggregate may have larger sized stone and less fines than what is required for a good surface aggregate. Base aggregate may not be suited to developing a hard crust surface and remaining bound and stable under traffic. A free-draining fill aggregate may be great as fill material for building sites, but the high sand content that allows for good drainage will remain loose and unstable as a surface aggregate on an unpaved road. A good surface road aggregate needs a fine binding material having more plasticity or stickiness than subbase aggregate.

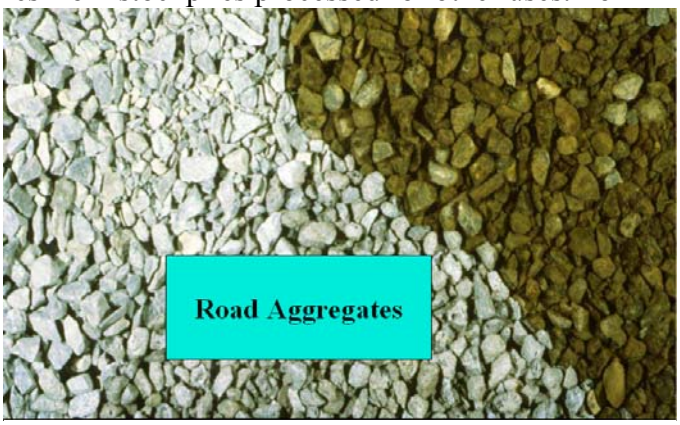

3-11 Road Aggregates

There are still many local governments that use their State Department of Transportation (DOT) specifications for their road aggregates. But many states only have base/subbase course aggregate specifications and do not have an actual unpaved road surface aggregate specification. Aggregate meeting base material specifications will probably not meet unpaved road surface requirements.

3-12 A good road surface aggregate will be well graded from fine to coarse.

3.5.1.2 Road Aggregate Specifications. Dirt and gravel road aggregate must be a granular, well-graded, crushed (irregular) material. Well-graded means the aggregate has a variety of sizes from a maximum coarse material down to a fine material and everything in between. The fine material (passing a #200 sieve) fills all the voids between the larger particles and locks everything together in place. The fines hold the road together, obtaining good density and a hard crust surface to shed water. Most specifications will have a required content of 8% to 15% fines.

Another characteristic of good road fines is their plasticity, or binding quality. Although fines are needed to fill the voids between the large aggregate, a percentage of good plastic fines, such as natural clay, is needed to bind the material together and maintain a tight surface to shed water and prevent dust. A plasticity index (PI) of 4 to 12 is a common specification requirement.

Please note that we are describing a gravel road "surface" material. The amount and plasticity of this fine material determines how effectively it locks in place to form a tight surface that will shed water and provide a smooth driving surface.

Road "base" material plays a different role in effective drainage. This role dictates that base material contain less fines and have a plasticity index of down to 0% to allow water to drain from the road structure. Large quantities of plastic fines in the road base will clog drainage channels in the base material and prevent proper drainage. A poorly drained road will lose strength and stability and ultimately fail.

We have discussed several times how common maintenance techniques can spell disaster for dirt and gravel roads. This is another example. Maintenance crews will commonly use only one type of material for both the road surface and the road base. But that results in either a weak road surface or a poorly drained road base. The best approach, particularly in those areas of poor drainage, would be to specify two types of road aggregates, one for the road surface and one for the road base.

The aggregate should also be angular or irregular in shape. In some regions, it is common to use material directly dredged from streams or by simply loading material from a site onto trucks without processing – hence the terms "river run" gravel or "bank run" gravel. These natural deposits will most likely not meet gradation requirements and will contain rounded natural shape material that will not lock up for stability. Have you ever tried to stabilize a hand full of marbles?

The benefits of processing the material by crushing cannot be overstated. Crushing insures that a good percentage of the stone will be fractured. This crushed, fractured material will lock together for better strength and stability under traffic loads. Quarried aggregates will be composed of virtually all fractured particles, resulting in the best specified road material.

The aggregate must be free of any other debris or contaminants such as soil, vegetation, or trash. Any contaminant material will only interfere in obtaining good consolidation and long-term stability.

The importance of additional material considerations of hardness, durability, and pH were discussed in Chapter 2, Section 2.3.3 in relation to not only the road's structural stability, but also to the surrounding environment.

Quality road aggregate with good gradation, shape, plasticity, hardness, durability, and proper pH will compact well, developing a tightly bound surface to withstand traffic loads, and reduce washboarding, rutting, erosion, sediment, and dust for less maintenance and a better environment.

Appendix A for this chapter contains several state specifications for unpaved road surface aggregate material. Notice the great similarities and the relatively minor differences in the various parameters. Some titles such as Pennsylvania's "Driving Surface Aggregate" say it all. In addition, the Pennsylvania specification reflects the environmental/structural combination qualities of hardness and pH.

3.5.1.3 Recycled Asphalt. As our paved roads wear out, the asphalt pavement materials can be recycled. Although there are various recycling methods to restore the asphalt paved road, this recycled material is many times used for gravel roads. Milling the old asphalt pavement is a common method used in the recycling process. The asphalt pavement can also be removed and then processed through crushing. This milled or crushed recycled asphalt material can create a good gravel road surface. The asphalt in this material, however, is still the binder, and depending on the age and oxidation (brittleness) of the material, can still form the characteristic asphalt pavement. This means that the road will be hard to maintain as a gravel road as far as blading or grading operations and may develop cracking, potholes and other typical asphalt pavement distresses. If the asphalt is still somewhat viscous and not hard and brittle, virgin aggregate can be mixed with the asphalt to overcome some of the asphalt binding quality and to provide a material that will still remain workable for blading and grading operations. A commonly used mix would have 50% virgin aggregate.

3.5.2 Sampling and Testing Aggregates. Aggregates can differ substantially from one area to another or from one quarry to another. Aggregates can also differ substantially within the same quarry and may depend on geology, or quarry operations and procedures in the handling and processing of the material.

Road maintenance managers need to understand the necessity of sampling and testing aggregates to insure that they are getting a road material that meets the specifications and makes for a well-structured road. A visual inspection can tell very little about the quality of the aggregate.

3-13 Mechanical Sieves

National standards for aggregate sampling require a representative sample of the aggregate you intend to use. Using a representative sample helps to ensure reliable test results. A sieve analysis for the proper gradation blend along with other tests for the specified parameters (plasticity, hardness, pH) is essential to insure the quality of the aggregate.

Testing costs, when compared to the benefits of a structurally strong road, are nominal. Using quality aggregates greatly reduces overall maintenance costs and protects the environment.

3-14 Quarry Visit

Check parent material

3.5.3 Pit / Quarry Operations. As mentioned, handling and processing at the quarry has a significant influence on the aggregate quality. Road maintenance managers would be wise to visit the quarry and talk to the operator. Take a look at the parent material and check the pile. Observe the equipment operators as they remove the gravel

3-15 Check Moisture Content And Fines

from the face of the quarry pit, process the piles and mix and load the aggregate. As they remove material, are they getting a good blend? Is segregation of the aggregate visible on the belt loaders or on the surface of the piles?

Check the moisture content of the material. Grab a handful and compress into a ball. If the material sticks together when you open your hand, you've got a good moisture level. If it falls apart, it's too dry. If water runs out between your fingers, it's too wet.

Some separation of aggregate in a pile is normal. Coarse material will tend to end up on the surface. A good loader operator will view the pile and then work it appropriately to obtain a good blend of aggregate.

3-16 Aggregate Separation In A Pile Is Normal

Mix The Pile!

Contamination of the aggregate can also become a problem. Has all the topsoil and vegetation been cleared from the top of the removal site? Are the stockpile sites well maintained, with an uncontaminated level working area? Does the loader operator start with a lowered bucket too far in advance of the pile, picking up soil or other contaminate material?

Loading and hauling of the material, even a good gravel road material, can affect the quality of the road. If the loader operator does not work the pile and obtain a good mix of material from the pile, normal aggregate separation will produce undesirable results on the road. This is depicted in Figure 3-7.

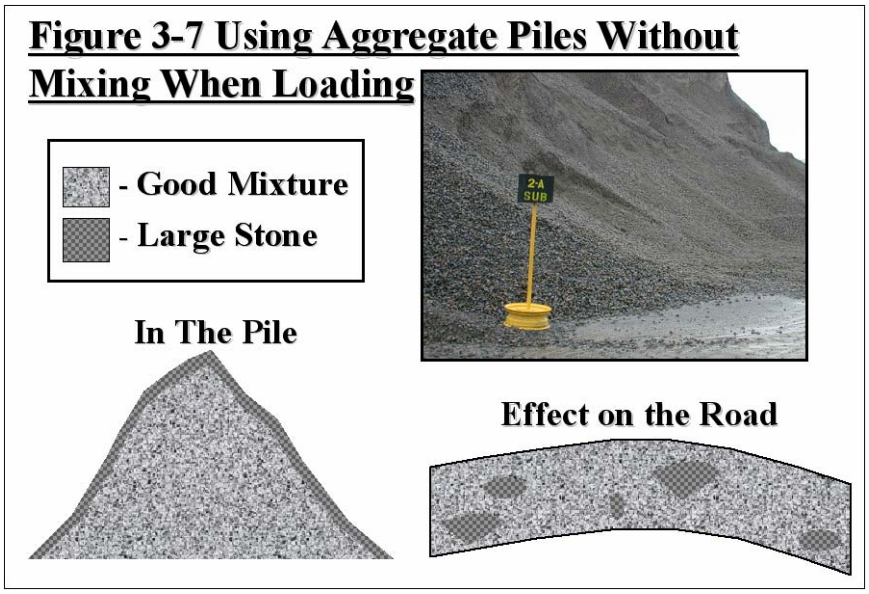

Long distance hauls can also cause problems. The continual vibrations created by hauling, especially over longer haul times, can cause aggregate settling in the truck bed producing a surface of larger stones, as depicted in Figure 3-8.

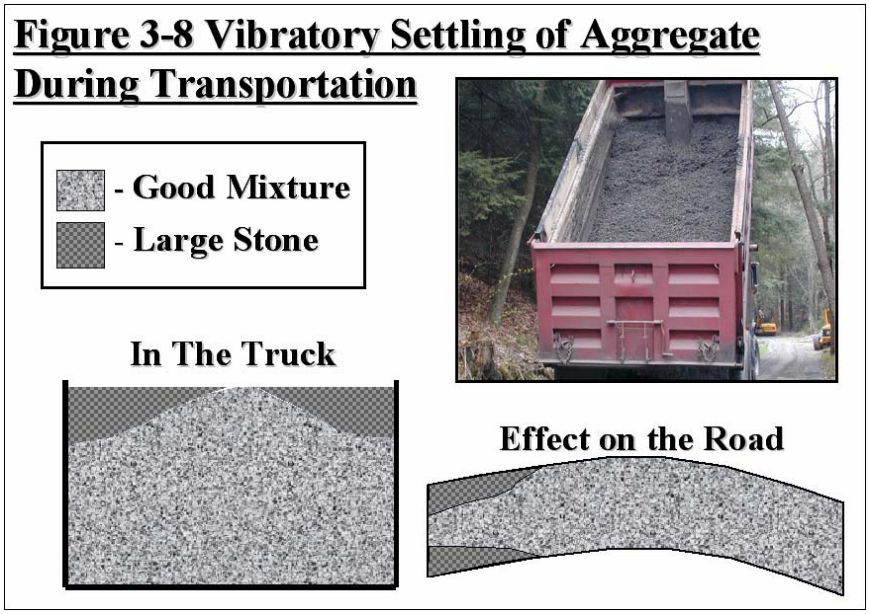

3-17 Talk To The Quarry Operator

Establish The Spirit Of Cooperation

Quarry visits, including observations and discussions with the operators, can establish good working relationships with the proper spirit of cooperation and can result in quality aggregate, good handling practices, and a stronger, longer-lasting road.

3.6 Basic Road Maintenance Practices

We will primarily discuss the use of the motorgrader for dirt and gravel road maintenance. We recognize, however, that other equipment can work just as well. Front-or rear-mounted grading attachments for tractors, road rakes, and road drags of various designs are often used effectively. No matter what equipment is used, the principles of basic road maintenance remain the same.

3-18 Good road surfaces differ in appearance depending on aggregate type and gradation.

Basic road maintenance practices are designed to produce a structurally sound road capable of supporting traffic with a good hard crust surface and proper crown for good drainage. Good road surfaces vary in appearance depending on the type and gradation of the aggregate material being used, as can be seen in the photos. This manual is not a basic gravel road surface maintenance manual. However, it does discuss effective maintenance techniques that ensure road stability. Further, the manual emphasizes the importance of proper basic road surface maintenance in protecting the environment. One of the best resources for gravel road maintenance is the Gravel Roads Maintenance and Design Manual, developed by the South Dakota Local Transportation Assistance Program (SD LTAP) in conjunction with the Federal Highway Administration (FHWA), November 2000. This manual provides valuable information for road maintenance personnel on gravel road materials and routine maintenance operations. The following section, Section 3.6, will provide brief coverage of the basics with several references from the South Dakota manual.

3.6.1 Basic Techniques. First, no matter what work is being done on the road, it should be planned when there is adequate moisture. This usually means that all work should be done after a rainfall unless there is an available water truck and water source. Adequate moisture is needed not only to achieve proper compaction for structural integrity and strength, but also to avoid dust.

Dirt and gravel roads are usually maintained through three basic practices: blading or smoothing, reshaping or regrading, and adding new material. Gravel road deterioration, like any paved road, will develop in stages. Low severity surface distresses such as roughness, loose gravel, and minor ripples appear first. ***Blading or smoothing the road surface frequently to correct these distresses will result in less intense efforts of reshaping or adding new material***. When the road loses crown and more severe distresses appear, a reshaping or regrading to re-establish proper crown is required. The more frequently we reshape using existing road material, the less often we will need to add new material. Sooner or later, however, the road loses crown and enough material has been lost off the roadside or by way of erosion and dust that there is not enough remaining material to simply regrade the road. Then we must add new material in order to re-establish the crown and have an effective road profile.

3.6.1.1 Blading or Smoothing. As described above, blading a road is needed when surface distresses appear but the road still has a good crown. We need to blade the road to smooth the rough surface to restore good rideability and prevent further more extensive distress.

3-19 Blading or smoothing a rough surface restores rideability and prevents further more extensive deterioration.

When using the motorgrader, the moldboard angle and pitch is critical to doing good maintenance. The moldboard should be angled somewhere between 30 and 45 degrees, tilted forward, with light down pressure. A 10 to 15 degree tilt on the front wheels will help oppose the resisting forces and stabilize the operations. A speed of 3 to 5 miles per hour is considered average, but there are many conditions or variables that may require slower speeds for effective operations. With the blading or reshaping operations, compaction of the material is often left to traffic.

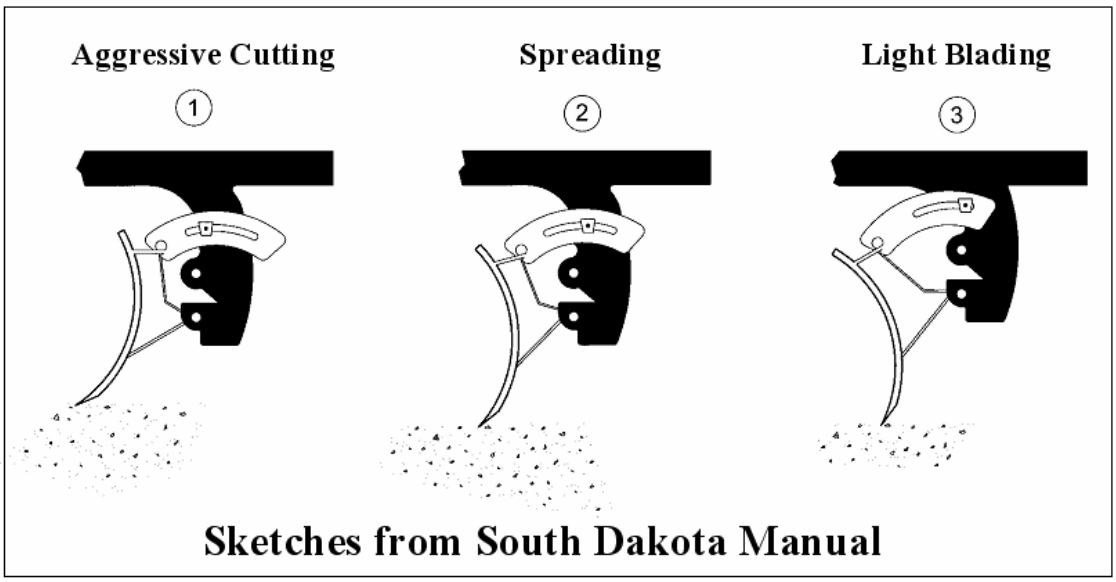

Operating with proper pitch or tilt of the moldboard is important. Moldboard pitch or tilt refers to how much the moldboard is tipped forward or backward. The following excerpts and sketch are taken from the South Dakota LTAP Gravel Roads Maintenance and Design Manual:

3.6.1.2 Regrading or Reshaping. As stated above, when the road loses crown and more severe distresses appear, a reshaping or regrading to re-establish proper crown is required. With the moldboard tilted slightly backward and sufficient down pressure to produce a cutting action, the road is reshaped to restore proper crown and cross-slope for good drainage. A minimum of four passes may be required, with a first pass in each direction to cut and windrow the material to the road center and then a second pass in each direction to spread the material back across each lane. The cutting action should be deep enough to cut to the bottom of all existing distresses such as corrugations, ruts, and potholes or soft spots.

Since this operation is being performed to restore proper crown and cross slope, check the resulting cross slope to insure it meets the half inch to three quarters inch drop from the center of the road with the flat "A" shape.

This operation should include a compaction effort. Using rollers for proper compaction of the disturbed material will result in a stronger road for a longer period of time.

3-20 Checking Cross Slope to insure proper drainage.

3.6.1.3 Adding New Material. If there is not sufficient material remaining to regrade and restore proper crown and cross slope at the proper elevation, additional road material will have to be added. Prior to adding new material, the road should be in good shape with all other maintenance work performed. All distresses, such as corrugations and rutting, should be repaired and the road brought into the proper condition and shape to receive the new material. If the existing road surface is smooth or has a hard crust, the surface should be lightly scarified to loosen surface material to provide a good bond between the road surface and layer of new material. Compaction is again required to provide the proper density for structural strength and durability.

3-21 Adding new material.

3.6.2 Transitions. There are always those areas where we have to transition from our normal road crown to meet other profiles. Transitions are required at road intersections, driveways, road curves, railroad crossings, and bridges.

3.6.2.1 Road Intersections. When two unpaved roads intersect, we need to gradually eliminate the crown as we approach the intersection. This transition from normal crown to a flat profile at the intersection should be made within approximately one hundred (100) feet, resulting in a smooth gradual transition. The shoulder or berm area of the road should still maintain a slope for proper drainage of the road.

3-22 Working parallel to a paved road has advantages.

When a gravel road meets a paved road, we need to transition the crown into the existing edge elevation of the paved road. As we grade out toward the paved road, backdragging may be required in order to avoid leaving aggregate on the paved road. Depending on traffic conditions and safety or operations, working parallel to the paved road can be an advantage in tying into the edge of the paved road.

3.6.2.2 Driveways. Driveways will also cause a need for transitioning. We will be discussing driveways in more detail in later chapters as we look at environmentally sensitive maintenance practices. For now, the basic rules are that we need to grade the driveway, keeping the low point at the ditchline and not leaving a windrow of material

across the driveway. The low point at the ditch line insures drainage off of and away from the road.

3.6.2.3 Curves. Back in Section 3.4.2.1, we discussed superelevation or banking the curve, sloping the entire road surface from one side to the other for vehicle safety in transversing the curve. Here again, we need to transition from the normal crown to the banked slope of the curve and then transition from the banked slope of the curve back to the normal crown. This should be accomplished within about 100 feet on each end of the curve, as shown in Figure 3-9.

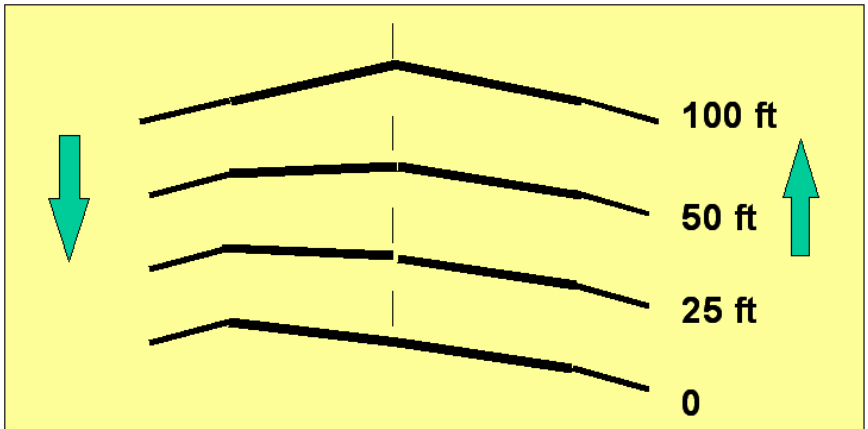

Figure 3-9 Transitioning into and out of a curve.

3-23 Keeping rails clean of road material is essential for safety.

3.6.2.4 Railroad Crossings. Railroad crossings also require gradual elimination of the road crown as we approach the rails. It is important that our operations leave the rails clean, keeping aggregate off of the tracks and being careful not to damage the rails or the moldboard. Handwork could be required using a shovel and broom in order to insure a safe railroad crossing for both vehicles and trains.

3.6.2.5 Bridges. At bridges, we need to transition into the existing bridge deck profile. Many bridges on unpaved roads have flat decks that will require the gradual elimination of the road crown. If the bridge deck is crowned, the task will be to transition the road crown gradually into the bridge crown.

3-24 Road crowns must transition into the existing bridge deck.

Although we will be discussing practices for better bridges in Chapter 5, good bridge maintenance dictates keeping

all road material off the bridge and keeping the bridge drainage facilities clear and open. Road material buildup on the bridge deck will only retain water or moisture that is detrimental to the bridge deck and structure no matter whether the bridge is constructed of metal, concrete or wood.

3-25 Drainage openings (scuppers) in bridge decks must be kept cleaned.

Bridges need to have good drainage. Usually drainage openings are provided in the deck, called scuppers, which drain directly to the stream below. Keeping the deck clean is imperative not only for good drainage and longer bridge life, but also for prevention of sediment into the stream.

One of the more troublesome areas at bridges is the approach area where the road aggregate meets the deck. This approach area demands special attention and probably more maintenance. When traffic moves from a rigid bridge deck to a more flexible dirt and gravel road surface, the impact forces of those vehicles can cause problems, resulting in significantly more maintenance for the approach areas.

3-26 Bridge approach areas demand special attention and usually more maintenance.

3.6.3. Frequency of Maintenance Operations. No matter when operations are being performed, remember that the presence of moisture will avoid dust and aid in proper compaction. If a water truck or water source is not available, work should be planned after a rainfall if at all possible.

That brings us to the question of "how frequently do we blade or smooth the road?" We have already discussed the fact that the more we blade or smooth, the less often we will regrade or reshape, and the less often we will add new material. In other words, keeping the road in good condition by blading and smoothing prolongs the road's life while cutting maintenance costs.

So maintenance operations are performed "as needed" depending on a number of variables such as road type and condition, drainage conditions, the weather, and traffic volumes. How many storms have occurred since the last maintenance was performed? How severe was the storm? What's the traffic volume? Do we have a lot of truck traffic?

Special events may dictate needs, requiring maintenance work in preparation before the event to put the roads in good shape, or after the event to repair damage.

If we accept the "as needed" scenario, we must inspect the roads frequently. Routine inspections, supplemented by special inspections after major storm events, are essential to determining road needs and performing the required maintenance at the right time.

Equipment operators play key roles in road inspection. The operator can also take note of other existing problems on the road or roadside, such as damaged drainage pipes or broken delineators, while he is working on the roads. Operators should keep a notepad and jot down problems with location details so they can be taken care of later, but in a timely fashion to prevent any major problems or costs.

3-27 Operators should note existing problems.

Look at the photos in 3-27. These are samples of what an operator could notice and jot down a note so that maintenance repairs can be planned and the problems taken care of.

On a last note, Photo 3-28 depicts the "sign" of a professional equipment operator. He carries a shovel and is not afraid to use it.

3-28 Using a shovel is the sign of a "professional operator."

3.7 Summary

We have seen how the dirt and gravel roads and their surrounding environment are deeply entangled with one another. We have also seen how poorly maintained roads contribute to erosion, pollution, and dust. By using appropriate materials and techniques, local governments can reduce pollution and maintenance costs at the same time.

APPENDIX 3. Sample Aggregates Specifications

Following are sample specifications for gravel road aggregate surface courses from several different states. Road personnel should check with their State Department of Transportation or their Local Technical Assistance Program / Technology Transfer (T2) Center for specifications being used in their own state. Many state DOTs have their specifications readily available via their Web sites.

A3.1 Pennsylvania's Driving Surface Aggregate

Material Specifications: All Driving Surface Aggregate (DSA) is to be derived from natural stone formations. Stone is defined as rock that has been crushed; rock is defined as consolidated mineral matter. For use in this program, both are restricted to that which has been mined or quarried from existing geologic bedrock formations.

All components of the aggregate mix are to be derived from crushed parent rock material that meets program specifications for abrasion resistance, pH and freedom from contaminants. Ninety-eight percent (98%) of fines passing the #200 sieve must be parent rock material. No clay or silt soil may be added. The amount of particles passing the #200 sieve shall be determined using the washing procedures specified in PTM No. 100.

Size: The required amounts and allowed ranges, determined by percent weight, for various size particles are shown in Table 1.
LA Abrasion: The acceptable limit as measured by weight loss is "less than 40% loss." Los Angeles Abrasion test, AASHTO T-96 [ASTM C 131] shall be used to determine this property. Existing data obtained from tests made for and approved by PENNDOT will be accepted.

Passing sieve	*Lower %*	*High%*
1 ½ inches	**100**	
¾ inches	**65**	**90**
#4	**30**	**65**
#16	**15**	**30**
#200	**10**	**20**

Table 1. DSA Gradation

Sulfate Test: Soundness or resistance to freeze/thaw [*i.e., sulfate test*] is not specified for this application because a gravel road driving surface aggregate is not bound within a concrete or asphalt mix.
pH: Aggregate must be in the range of pH 6 to pH 12.45 as measured by EPA 9045C.
Optimum Moisture: Material is to be delivered and placed at optimum moisture content as determined for that particular source. The optimum percentage moisture is to be identified by the supplier in the bid/purchasing documents.
Transport: Tarps are to be used to cover 100% of the load's exposed surface from the time of loading until immediately before dumping. This requirement includes standing time waiting to dump.

Aggregate producers are required by the program to certify that the aggregate they deliver conforms to the program specifications.

Road Surface Preparation: Driving Surface Aggregate will reflect the shape of the surface to which it is applied; therefore, all road surface preparation work is to be completed before delivery and placement of the aggregate.
1. Prepare underdrainage, including drain tile, French drains (porous fill) and crosspipes.
2. Address surface drainage features such as broad-based dips, grade breaks, crown, and side-slope.
3. Establish proper cross-slope in existing base (Fig. 1). Recommended crown or slope is ½ to ¾ inch rise per horizontal foot. Proper shape may be a flat "A" crown profile, an in-slope or out-slope. If exposed bedrock or insufficient material prevents proper shaping of the road base, additional base material may be needed.
4. To bind aggregate with the road base, scarify impermeable smooth surfaces such as oil and chip, exposed bedrock or smooth tight aggregate. Do not loosen coarse aggregate or chinked stone roadbeds rough enough to permit binding with Driving Surface Aggregate.
5. If required, separation fabric should be placed according to manufacturer's recommendations.

Placement: An un-compacted uniform depth of 8 inches of DSA is to be used to establish the driving surface. Placement is to be in a single 8-inch lift. The preferred method of application is through a paver. Set the paver adjustments on application thickness and width so it is unnecessary to use a grader. The required crown or side slope is to range from ½ to ¾ inch rise per horizontal foot. This slope is to be achieved by properly preparing base and placing aggregate in a uniform lift. When the paver is applying aggregate, care should be taken to keep the paver at or near capacity at all times.

To fill driving surface areas outside the specified width (e.g., driveway entrances, pull-offs, and passing lanes), additional DSA is to be added and tapered to grade or butted against a precut channel of the same depth. If berm or bank edges don't exist to hold the new DSA surface, then sufficient material is to be placed, tapered and compacted to form protective edge berms. Material shall be compacted to a final thickness of approximately 6 inches.

DSA CALCULATION FORMULA

DSA Needed (tons)	=	Road Width (ft)	X	Road Length (ft)	X	0.042

Applies to standard 8" lift, compacted to 6"

Compaction Sequence: Verify that moisture is optimum for compaction. If the material has dried out, re-wet the DSA surface with a water truck. If clumps of aggregate adhere to the roller drum, the aggregate may be too moist. Allow drying time before rolling. Do not use the vibratory rolling mode if that action brings water to the surface of the aggregate.

Only self-powered machines designed specifically for compaction shall be used. Compaction with truck tires is not acceptable.

1A. Supported Edge: *If edge of placed aggregate is supported by an existing bank*

or berm: First pass: Roll slowly in static mode on the outside edge of placed aggregate.
1B. Unsupported Edge: *If the edge of the placed aggregate is not supported*: First Pass: Roll slowly in static mode near but not over unsupported outside edges. Once that path is firm, move progressively closer to the outside edge with static passes until unsupported edge is firm.
2. Sequence: As in all rolling operations, compaction is achieved making overlapping lengthwise passes beginning at the ditch or berm-side and working toward the crown or the top edge (if it is a side-sloped or super-elevated section of road). In no case should the roller be run lengthwise on the top of the road crown.
3A. Static Roller: The minimum acceptable weight of a static roller is 10 tons. Repeat the sequence of overlapping passes until desired compaction is achieved.
3B. Vibratory Roller: The minimum striking force of vibratory rollers is 20,000 lbs. When using a vibratory roller, the initial pass over un-compacted aggregate should be completed in static mode. All successive passes should be made using the vibratory mode until the desired level of compaction is achieved. The final pass over each area should be made in static mode to remove all roller edge marks. The vibratory roller should be set to deliver between 6 and 17 impacts per linear foot with the roller moving at the speed at which a person walks on each pass upgrade. **Vibration must be turned off during downgrade passes**. Vibrating the drum when rolling downgrade will cause aggregate to flow in "waves" in front of the roller, resulting in an uneven surface.
4. Desired Compaction: Unless more refined testing equipment is available, adequate compaction is indicated when no further depressions are created with a roller or loaded dump tuck. Cracking of larger stones or rocks in the road surface is another reliable indication of adequate compaction.

A3.2 Illinois DOT Specifications. (excerpts)(www.dot.il.gov)
Section 402. Aggregate Surface Course
402.01 Description. This work shall consist of furnishing and placing one or more course of aggregate upon a prepared subgrade.
402.02 Materials. Materials shall meet the requirements of Section 1000, Article 1004.04

1004.04 Coarse Aggregate for Aggregate Surface Course.
a. Description. The coarse aggregate shall be pit run gravel, gravel, crushed gravel, novaculite, crushed stone, crushed concrete, crushed slag or crushed sandstone.
a. Quality. The coarse aggregate shall be Class D Quality or better.

Quality Test	Class D
Sodium Sulfate Soundness[2] 5 cycle, AASHTO T104[1,2], Max % loss	25[3]
Los Angeles Abrasion AASHTO T96, Max % loss	45

[1]As modified by the Department
[2]Does not apply to crushed concrete.
[3]For aggregate surface course, the maximum percent loss shall be 30.

b. Gradation.
   1. For aggregate surface course Type B, Gradation CA6, CA9, or CA10 may be used. If approved by the Engineer, Gradation CA4 or CA12 may be used.
   2. For aggregate subbase Type B, Gradation CA6, CA10, CA12, , or CA19 shall be used. If approved by the Engineer, Gradation CA2 or CA4 may be used.
   3. For aggregate Subbase Type C, Gradation CA7 or combined size CA5 and CA7 shall be used.
   4. For granular aggregate courses (base, subbase, and shoulder except subbase Types B and C), Gradation CA6, or CA10 shall be used. If specified, Gradation CA2 or CA4 For aggregate surface course Type B, Gradation CA6, CA9, or CA10 may be used. If approved by the Engineer, Gradation CA4 or CA12 may be used.
   5. Stabilized aggregate courses (base, subbase, and shoulder), Gradation CA6 or CA10 shall be used. If approved by the Engineer, Gradation CA2, CA4, or CA12 may be used.
   6. For aggregate surface course Type A, Gradation CA6, or CA10 shall be used. If approved by the Engineer, Gradation CA2, CA4, CA9, or CA12 may be used.

c. Plasticity. All material shall comply with the plasticity index requirements listed below.

Type of construction	Plasticity Index – Percent[1]	
	Gravel	Crushed Gravel, Stone, Slag
Aggregate Subbase Type A or B	0 to 9	-
Aggregate Base Course Type A or B	0 to 6	0 to 4
Aggregate Surface Course Type A or B[2]	2 to 9	-
Stabilized Aggregate Material	0 to 9	0 to 9

[1]Plasticity index shall be determined by the method given in AASHTO T90. Where shale in any form exists in the producing ledges, crushed stone samples shall be soaked a minimum of 18 hours before processing for plasticity index or minus #40 material. When clay material is added to adjust plasticity index, the clay material shall be a minus #4 sieve size.
[2]When Gradation CA9 is used, the plasticity index requirement will not apply.

402.03 Equipment shall meet the requirements of the following Articles of Section 1100:

a. Tamping Roller……..1101.01
d. Pneumatic-Tired Roller…….1101.01
e. Three-Wheel Roller (Note 1)….1101.01
f. Tandem Roller (Note 1)…….1101.01
g. Spreader…….1101.01
h. Vibratory Machine (Note 2)…..1101.04

Note 1. Three-wheel or tandem rollers shall weigh 6 to 10 tons and shall weigh not less than 200lb/in nor more than325 lb/in of width of the roller.

Note 2. The vibratory machine shall meet the approval of the Engineer.
Construction Requirements
402.04 Subgrade. The subgrade shall be prepared according to Section 301 except that Article 301.06 will not apply.
402.05 Type A Requirements. Aggregate surface course, Type A shall be constructed according to Article 351.05(a) and (b) except the bearing ratio requirements shall not apply.
402.07 Type B Requirements. Any one or two gradations of the material specified in Article 1004.04 shall be used except where two gradations of material are used, the change shall not be made at more than one location on the section.
The surfacing material shall be deposited on the subgrade by means of a spreader.
The equipment used shall be such that the required amount of material will be deposited uniformly along the central portion of the roadbed.
The material which has been deposited shall be spread immediately to the plan cross section. Hauling shall be routed over the spread material so it will cover the entire width of surface. If the equipment used in hauling operations causes ruts extending through the spread material and into the subgrade, and the subgrade material is being mixed with the surface material, the equipment shall be removed from the work or the rutting otherwise prevented as directed by the Engineer.
The Contractor shall keep the surface smooth by dragging or blading as many times each day as the engineer may direct.
Holes, waves, and undulations which develop and which are not filled by blading shall be filled by adding more material.

A3.3 Michigan DOT Specifications (excerpts) (www.mdot.state.mi.us)
Section 306. Aggregate Surface Course
306.01 Description. Construct an aggregate surface course on a prepared subgrade or an existing aggregate surface.
306.02 Materials. Use materials meeting the following:

Dense-graded Aggregate 21AA, 21A, 23A……..902
Use aggregate 21AA or 21A if the aggregate surface course will later receive a hot mix asphalt (HMA) surface. Use aggregate 23A if the aggregate surface course is to be constructed without an HMA surface. Use dense-graded aggregate 22A, 23A for temporary maintenance gravel.
902.06 Dense-Graded Aggregates for Base Course, Surface Course, Shoulders, Approaches and Patching. Michigan Class 21AA, 21A, 22A and 23A dense-graded aggregates will consist of natural aggregate, iron blast furnace slag, reverberatory furnace slag, or crushed concrete, in combination with fine aggregate as necessary to meet the gradation requirements in Table 902-1, the physical requirements in Table 902-2, and the following:

A. Dense-graded aggregates produced by crushing Portland cement concrete will not contain building rubble as evidenced by the presence of more than 5.0%, by particle count, building brick, wood, plaster, or similar materials. Sporadic pieces of steel reinforcement may be present provided they pass the maximum grading sieve size without hand manipulation.

B. Class 21AA, 21A, and 22A dense-graded aggregates produced from Portland cement concrete will not be used to construct either an aggregate base or aggregate separation layer when either of the following conditions apply:
   1. When there is a geotextile liner or membrane present with permeability requirements.
   2. In a pavement structure with an underdrain, unless there is a filter material between crushed concrete and the underdrain. The filter material will be either a minimum of 12 inches of granular material or a geotextile liner or blocking membrane that will be a barrier to leachate.

C. Class 23A dense-graded aggregate may be produced from steel furnace slag, but only for use as an unbound aggregate surface course or as an unbound aggregate shoulder.

Table 902-1 Grading Requirements for Dense-Graded Aggregates

Class	Sieve Analysis (MTM 109) Total Percent Passing (b)						Loss by Washing (MTM 108) % Passing #200
	1.5 in.	1 in.	¾ in	½ in	3/8 in	# 8	
21AA, 21A	100	85-100		50-75		20-45	4-8 (e)(f)
22A		100	90-100		65-85	30-50	4-8(e)(f)
23A		100			60-85	25-60	9-16(f)

(b) Based on dry weights
(e) When used for aggregate base courses, surface courses, shoulders and approaches and the material is produced entirely by crushing rock, boulders, cobbles, slag, or concrete, the maximum limit for Loss by Washing will not exceed 10%.
(f) The limits for Loss by Washing of dense-graded aggregates are significant to the nearest whole percent.

Table 902-2 Physical Requirements for Dense-Graded Aggregates

Class (j)	Crushed Material, % min. (MTM 110,117)	Loss, % max, Los Angeles Abrasion (MTM 102)
21AA	95	50
21A	25	50
22A	25	50
23A	25	50

(j) Quarried carbonate (limestone or dolomite) aggregate will not contain over 10% insoluble residue finer than Number 200 sieve when tested in accordance with MTM 103.

306.03 Construction.

A. Preparation of Base. When required, blade, or scarify and blade, the existing aggregate surface to remove irregularities in the grade.

B. Placing and Compacting. Provide a uniform aggregate mixture compacted in place with uniform density full depth. Provide a completed surface course conforming to the line, grade or plan cross section.
   Place maintenance gravel to provide a flush transition between shoulders, driveways and other areas where traffic is maintained. Maintenance gravel may remain permanently as part of the work, if approved by the Engineer.
   Do not place aggregate when the base is unstable. Maintain the aggregate in a smooth, stable condition and provide dust control until removed or surfaced.

C. Use of additives. Use of additives to facilitate compaction and for dust control of the aggregate is acceptable.

A3.4 New York DOT Specifications (excerpts) (www.dot.state.ny.us)
Section 667 – Local Road Gravel Surface, Base, and Subbase Courses
667-1.02 Material Types. Provide materials as specified by the following options.

Type A. Surface quality material with a maximum particle size of 25mm.

Type B. Base quality material with a maximum particle size of 50 mm.

Type C. Subbase quality material with a maximum particle size of 75mm.
667-2.02 Material Requirements. Provide materials for road gravel surface, base and subbase courses that consist of Sand and Gravel, approved Blast Furnace Slag or Stone that meet the requirements contained herein. Provide materials well graded from coarse to fine, and free from organic or other deleterious materials. Any gravel material will be rejected if it is determined to contain any unsound or deleterious materials.

B. Gradation, Perform sieve analysis in accordance with AASHTO procedures T27, T88 or T311. Provide materials meeting the gradation limits from Table 667-1.
C. Soundness. Material will be accepted on the basis of Magnesium sulfate. Soundness Loss after four cycles performed according to NYSDOT procedures and Table 667-2.
D. Plasticity. Determine plasticity using either of the following methods:
    1. Plasticity Index. The Plasticity Index of the material passing the #40 mesh sieve shall meet the values in Table 667-2. Determine plasticity using AASHTO tests T89 and T90.
    2. Sand Equivalent. The sand equivalence of the granular material shall meet the values in Table 667-2. Determine sand equivalence using AASHTO test T176.

Table 667-1: Percent passing by Weight of Gravel Materials

Sieve (US Sieve)	A (Surface)	B (Base)	C (subbase)
3”			100
2”		100	-
1.5”		85-100	70-100
1”	100	-	-
¾”	85-100	-	-
¼”	50-75	30-50	30-55
#40	15-35	5-20	5-25
#200	8-15	0-5	0-8

Table 667-2: Test and control Limits of Gravel Materials

Material Properties	A (Surface)	B (Base)	C (subbase)
Maximum Soundness loss (%)	20	20	25
Plasticity Index	2-9	0-5	0-8
Sand Equivalent	>25	>40	>35

E. Elongated Particles Not more than 30%, by weight, of the particles retained on a ½” sieve shall consist of flat or elongated particles. A flat or elongated particle is defined herein as one which has its greatest dimension more than 3 times its least dimension. Acceptance for this requirement will normally be

APPENDIX 3. Sample Aggregates Specifications

Following are sample specifications for gravel road aggregate surface courses from several different states. Road personnel should check with their State Department of Transportation or their Local Technical Assistance Program / Technology Transfer (T2) Center for specifications being used in their own state. Many state DOTs have their specifications readily available via their Web sites.

A3.1 Pennsylvania's Driving Surface Aggregate

Material Specifications: All Driving Surface Aggregate (DSA) is to be derived from natural stone formations. Stone is defined as rock that has been crushed; rock is defined as consolidated mineral matter. For use in this program, both are restricted to that which has been mined or quarried from existing geologic bedrock formations.

All components of the aggregate mix are to be derived from crushed parent rock material that meets program specifications for abrasion resistance, pH and freedom from contaminants. Ninety-eight percent (98%) of fines passing the #200 sieve must be parent rock material. No clay or silt soil may be added. The amount of particles passing the #200 sieve shall be determined using the washing procedures specified in PTM No. 100.

Size: The required amounts and allowed ranges, determined by percent weight, for various size particles are shown in Table 1.
LA Abrasion: The acceptable limit as measured by weight loss is "less than 40% loss." Los Angeles Abrasion test, AASHTO T-96 [ASTM C 131] shall be used to determine this property. Existing data obtained from tests made for and approved by PENNDOT will be accepted.

Passing sieve	*Lower %*	*High%*
1 ½ inches	**100**	
¾ inches	**65**	**90**
#4	**30**	**65**
#16	**15**	**30**
#200	**10**	**20**

Table 1. DSA Gradation

Sulfate Test: Soundness or resistance to freeze/thaw [*i.e., sulfate test*] is not specified for this application because a gravel road driving surface aggregate is not bound within a concrete or asphalt mix.
pH: Aggregate must be in the range of pH 6 to pH 12.45 as measured by EPA 9045C.
Optimum Moisture: Material is to be delivered and placed at optimum moisture content as determined for that particular source. The optimum percentage moisture is to be identified by the supplier in the bid/purchasing documents.
Transport: Tarps are to be used to cover 100% of the load's exposed surface from the time of loading until immediately before dumping. This requirement includes standing time waiting to dump.

Aggregate producers are required by the program to certify that the aggregate they deliver conforms to the program specifications.

Road Surface Preparation: Driving Surface Aggregate will reflect the shape of the surface to which it is applied; therefore, all road surface preparation work is to be completed before delivery and placement of the aggregate.
1. Prepare underdrainage, including drain tile, French drains (porous fill) and crosspipes.
2. Address surface drainage features such as broad-based dips, grade breaks, crown, and side-slope.
3. Establish proper cross-slope in existing base (Fig. 1). Recommended crown or slope is ½ to ¾ inch rise per horizontal foot. Proper shape may be a flat "A" crown profile, an in-slope or out-slope. If exposed bedrock or insufficient material prevents proper shaping of the road base, additional base material may be needed.
4. To bind aggregate with the road base, scarify impermeable smooth surfaces such as oil and chip, exposed bedrock or smooth tight aggregate. Do not loosen coarse aggregate or chinked stone roadbeds rough enough to permit binding with Driving Surface Aggregate.
5. If required, separation fabric should be placed according to manufacturer's recommendations.

Placement: An un-compacted uniform depth of 8 inches of DSA is to be used to establish the driving surface. Placement is to be in a single 8-inch lift. The preferred method of application is through a paver. Set the paver adjustments on application thickness and width so it is unnecessary to use a grader. The required crown or side slope is to range from ½ to ¾ inch rise per horizontal foot. This slope is to be achieved by properly preparing base and placing aggregate in a uniform lift. When the paver is applying aggregate, care should be taken to keep the paver at or near capacity at all times.

To fill driving surface areas outside the specified width (e.g., driveway entrances, pull-offs, and passing lanes), additional DSA is to be added and tapered to grade or butted against a precut channel of the same depth. If berm or bank edges don't exist to hold the new DSA surface, then sufficient material is to be placed, tapered and compacted to form protective edge berms. Material shall be compacted to a final thickness of approximately 6 inches.

DSA CALCULATION FORMULA

DSA Needed (tons)	=	Road Width (ft)	X	Road Length (ft)	X	0.042

Applies to standard 8" lift, compacted to 6"

Compaction Sequence: Verify that moisture is optimum for compaction. If the material has dried out, re-wet the DSA surface with a water truck. If clumps of aggregate adhere to the roller drum, the aggregate may be too moist. Allow drying time before rolling. Do not use the vibratory rolling mode if that action brings water to the surface of the aggregate.

Only self-powered machines designed specifically for compaction shall be used. Compaction with truck tires is not acceptable.

1A. Supported Edge: *If edge of placed aggregate is supported by an existing bank*

or berm: First pass: Roll slowly in static mode on the outside edge of placed aggregate.
1B. Unsupported Edge: *If the edge of the placed aggregate is not supported*: First Pass: Roll slowly in static mode near but not over unsupported outside edges. Once that path is firm, move progressively closer to the outside edge with static passes until unsupported edge is firm.
2. Sequence: As in all rolling operations, compaction is achieved making overlapping lengthwise passes beginning at the ditch or berm-side and working toward the crown or the top edge (if it is a side-sloped or super-elevated section of road). In no case should the roller be run lengthwise on the top of the road crown.
3A. Static Roller: The minimum acceptable weight of a static roller is 10 tons. Repeat the sequence of overlapping passes until desired compaction is achieved.
3B. Vibratory Roller: The minimum striking force of vibratory rollers is 20,000 lbs. When using a vibratory roller, the initial pass over un-compacted aggregate should be completed in static mode. All successive passes should be made using the vibratory mode until the desired level of compaction is achieved. The final pass over each area should be made in static mode to remove all roller edge marks. The vibratory roller should be set to deliver between 6 and 17 impacts per linear foot with the roller moving at the speed at which a person walks on each pass upgrade. **Vibration must be turned off during downgrade passes**. Vibrating the drum when rolling downgrade will cause aggregate to flow in "waves" in front of the roller, resulting in an uneven surface.
4. Desired Compaction: Unless more refined testing equipment is available, adequate compaction is indicated when no further depressions are created with a roller or loaded dump tuck. Cracking of larger stones or rocks in the road surface is another reliable indication of adequate compaction.

A3.2 Illinois DOT Specifications. (excerpts)(www.dot.il.gov)
Section 402. Aggregate Surface Course
402.01 Description. This work shall consist of furnishing and placing one or more course of aggregate upon a prepared subgrade.
402.02 Materials. Materials shall meet the requirements of Section 1000, Article 1004.04

1004.04 Coarse Aggregate for Aggregate Surface Course.
a. Description. The coarse aggregate shall be pit run gravel, gravel, crushed gravel, novaculite, crushed stone, crushed concrete, crushed slag or crushed sandstone.
a. Quality. The coarse aggregate shall be Class D Quality or better.

Quality Test	Class D
Sodium Sulfate Soundness[2] 5 cycle, AASHTO T104[1,2], Max % loss	25[3]
Los Angeles Abrasion AASHTO T96, Max % loss	45

[1]As modified by the Department
[2]Does not apply to crushed concrete.
[3]For aggregate surface course, the maximum percent loss shall be 30.

b. Gradation.
   1. For aggregate surface course Type B, Gradation CA6, CA9, or CA10 may be used. If approved by the Engineer, Gradation CA4 or CA12 may be used.
   2. For aggregate subbase Type B, Gradation CA6, CA10, CA12, , or CA19 shall be used. If approved by the Engineer, Gradation CA2 or CA4 may be used.
   3. For aggregate Subbase Type C, Gradation CA7 or combined size CA5 and CA7 shall be used.
   4. For granular aggregate courses (base, subbase, and shoulder except subbase Types B and C), Gradation CA6, or CA10 shall be used. If specified, Gradation CA2 or CA4 For aggregate surface course Type B, Gradation CA6, CA9, or CA10 may be used. If approved by the Engineer, Gradation CA4 or CA12 may be used.
   5. Stabilized aggregate courses (base, subbase, and shoulder), Gradation CA6 or CA10 shall be used. If approved by the Engineer, Gradation CA2, CA4, or CA12 may be used.
   6. For aggregate surface course Type A, Gradation CA6, or CA10 shall be used. If approved by the Engineer, Gradation CA2, CA4, CA9, or CA12 may be used.

c. Plasticity. All material shall comply with the plasticity index requirements listed below.

Type of construction	Plasticity Index – Percent[1]	
	Gravel	Crushed Gravel, Stone, Slag
Aggregate Subbase Type A or B	0 to 9	-
Aggregate Base Course Type A or B	0 to 6	0 to 4
Aggregate Surface Course Type A or B[2]	2 to 9	-
Stabilized Aggregate Material	0 to 9	0 to 9

[1]Plasticity index shall be determined by the method given in AASHTO T90. Where shale in any form exists in the producing ledges, crushed stone samples shall be soaked a minimum of 18 hours before processing for plasticity index or minus #40 material. When clay material is added to adjust plasticity index, the clay material shall be a minus #4 sieve size.
[2]When Gradation CA9 is used, the plasticity index requirement will not apply.

402.03 Equipment shall meet the requirements of the following Articles of Section 1100:

a. Tamping Roller……..1101.01
d. Pneumatic-Tired Roller…….1101.01
e. Three-Wheel Roller (Note 1)….1101.01
f. Tandem Roller (Note 1)…….1101.01
g. Spreader…….1101.01
h. Vibratory Machine (Note 2)…..1101.04

Note 1. Three-wheel or tandem rollers shall weigh 6 to 10 tons and shall weigh not less than 200lb/in nor more than325 lb/in of width of the roller.

Note 2. The vibratory machine shall meet the approval of the Engineer.
Construction Requirements
402.04 Subgrade. The subgrade shall be prepared according to Section 301 except that Article 301.06 will not apply.
402.05 Type A Requirements. Aggregate surface course, Type A shall be constructed according to Article 351.05(a) and (b) except the bearing ratio requirements shall not apply.
402.07 Type B Requirements. Any one or two gradations of the material specified in Article 1004.04 shall be used except where two gradations of material are used, the change shall not be made at more than one location on the section.
The surfacing material shall be deposited on the subgrade by means of a spreader.
The equipment used shall be such that the required amount of material will be deposited uniformly along the central portion of the roadbed.
The material which has been deposited shall be spread immediately to the plan cross section. Hauling shall be routed over the spread material so it will cover the entire width of surface. If the equipment used in hauling operations causes ruts extending through the spread material and into the subgrade, and the subgrade material is being mixed with the surface material, the equipment shall be removed from the work or the rutting otherwise prevented as directed by the Engineer.
The Contractor shall keep the surface smooth by dragging or blading as many times each day as the engineer may direct.
Holes, waves, and undulations which develop and which are not filled by blading shall be filled by adding more material.

A3.3 Michigan DOT Specifications (excerpts) (www.mdot.state.mi.us)
Section 306. Aggregate Surface Course
306.01 Description. Construct an aggregate surface course on a prepared subgrade or an existing aggregate surface.
306.02 Materials. Use materials meeting the following:

Dense-graded Aggregate 21AA, 21A, 23A……..902
Use aggregate 21AA or 21A if the aggregate surface course will later receive a hot mix asphalt (HMA) surface. Use aggregate 23A if the aggregate surface course is to be constructed without an HMA surface. Use dense-graded aggregate 22A, 23A for temporary maintenance gravel.
902.06 Dense-Graded Aggregates for Base Course, Surface Course, Shoulders, Approaches and Patching. Michigan Class 21AA, 21A, 22A and 23A dense-graded aggregates will consist of natural aggregate, iron blast furnace slag, reverberatory furnace slag, or crushed concrete, in combination with fine aggregate as necessary to meet the gradation requirements in Table 902-1, the physical requirements in Table 902-2, and the following:

A. Dense-graded aggregates produced by crushing Portland cement concrete will not contain building rubble as evidenced by the presence of more than 5.0%, by particle count, building brick, wood, plaster, or similar materials. Sporadic pieces of steel reinforcement may be present provided they pass the maximum grading sieve size without hand manipulation.

B. Class 21AA, 21A, and 22A dense-graded aggregates produced from Portland cement concrete will not be used to construct either an aggregate base or aggregate separation layer when either of the following conditions apply:
   1. When there is a geotextile liner or membrane present with permeability requirements.
   2. In a pavement structure with an underdrain, unless there is a filter material between crushed concrete and the underdrain. The filter material will be either a minimum of 12 inches of granular material or a geotextile liner or blocking membrane that will be a barrier to leachate.

C. Class 23A dense-graded aggregate may be produced from steel furnace slag, but only for use as an unbound aggregate surface course or as an unbound aggregate shoulder.

Table 902-1 Grading Requirements for Dense-Graded Aggregates

Class	Sieve Analysis (MTM 109) Total Percent Passing (b)						Loss by Washing (MTM 108) % Passing #200
	1.5 in.	1 in.	¾ in	½ in	3/8 in	# 8	
21AA, 21A	100	85-100		50-75		20-45	4-8 (e)(f)
22A		100	90-100		65-85	30-50	4-8(e)(f)
23A		100			60-85	25-60	9-16(f)

(b) Based on dry weights
(e) When used for aggregate base courses, surface courses, shoulders and approaches and the material is produced entirely by crushing rock, boulders, cobbles, slag, or concrete, the maximum limit for Loss by Washing will not exceed 10%.
(f) The limits for Loss by Washing of dense-graded aggregates are significant to the nearest whole percent.

Table 902-2 Physical Requirements for Dense-Graded Aggregates

Class (j)	Crushed Material, % min. (MTM 110,117)	Loss, % max, Los Angeles Abrasion (MTM 102)
21AA	95	50
21A	25	50
22A	25	50
23A	25	50

(j) Quarried carbonate (limestone or dolomite) aggregate will not contain over 10% insoluble residue finer than Number 200 sieve when tested in accordance with MTM 103.

306.03 Construction.

A. Preparation of Base. When required, blade, or scarify and blade, the existing aggregate surface to remove irregularities in the grade.

B. Placing and Compacting. Provide a uniform aggregate mixture compacted in place with uniform density full depth. Provide a completed surface course conforming to the line, grade or plan cross section.
   Place maintenance gravel to provide a flush transition between shoulders, driveways and other areas where traffic is maintained. Maintenance gravel may remain permanently as part of the work, if approved by the Engineer.
   Do not place aggregate when the base is unstable. Maintain the aggregate in a smooth, stable condition and provide dust control until removed or surfaced.

C. Use of additives. Use of additives to facilitate compaction and for dust control of the aggregate is acceptable.

A3.4 New York DOT Specifications (excerpts) (www.dot.state.ny.us)
Section 667 – Local Road Gravel Surface, Base, and Subbase Courses
667-1.02 Material Types. Provide materials as specified by the following options.

Type A. Surface quality material with a maximum particle size of 25mm.

Type B. Base quality material with a maximum particle size of 50 mm.

Type C. Subbase quality material with a maximum particle size of 75mm.
667-2.02 Material Requirements. Provide materials for road gravel surface, base and subbase courses that consist of Sand and Gravel, approved Blast Furnace Slag or Stone that meet the requirements contained herein. Provide materials well graded from coarse to fine, and free from organic or other deleterious materials. Any gravel material will be rejected if it is determined to contain any unsound or deleterious materials.

B. Gradation, Perform sieve analysis in accordance with AASHTO procedures T27, T88 or T311. Provide materials meeting the gradation limits from Table 667-1.
C. Soundness. Material will be accepted on the basis of Magnesium sulfate. Soundness Loss after four cycles performed according to NYSDOT procedures and Table 667-2.
D. Plasticity. Determine plasticity using either of the following methods:
    1. Plasticity Index. The Plasticity Index of the material passing the #40 mesh sieve shall meet the values in Table 667-2. Determine plasticity using AASHTO tests T89 and T90.
    2. Sand Equivalent. The sand equivalence of the granular material shall meet the values in Table 667-2. Determine sand equivalence using AASHTO test T176.

Table 667-1: Percent passing by Weight of Gravel Materials

Sieve (US Sieve)	A (Surface)	B (Base)	C (subbase)
3”			100
2”		100	-
1.5”		85-100	70-100
1”	100	-	-
¾”	85-100	-	-
¼”	50-75	30-50	30-55
#40	15-35	5-20	5-25
#200	8-15	0-5	0-8

Table 667-2: Test and control Limits of Gravel Materials

Material Properties	A (Surface)	B (Base)	C (subbase)
Maximum Soundness loss (%)	20	20	25
Plasticity Index	2-9	0-5	0-8
Sand Equivalent	>25	>40	>35

E. Elongated Particles Not more than 30%, by weight, of the particles retained on a ½” sieve shall consist of flat or elongated particles. A flat or elongated particle is defined herein as one which has its greatest dimension more than 3 times its least dimension. Acceptance for this requirement will normally be

APPENDIX 3. Sample Aggregates Specifications

Following are sample specifications for gravel road aggregate surface courses from several different states. Road personnel should check with their State Department of Transportation or their Local Technical Assistance Program / Technology Transfer (T2) Center for specifications being used in their own state. Many state DOTs have their specifications readily available via their Web sites.

A3.1 Pennsylvania's Driving Surface Aggregate

Material Specifications: All Driving Surface Aggregate (DSA) is to be derived from natural stone formations. Stone is defined as rock that has been crushed; rock is defined as consolidated mineral matter. For use in this program, both are restricted to that which has been mined or quarried from existing geologic bedrock formations.

All components of the aggregate mix are to be derived from crushed parent rock material that meets program specifications for abrasion resistance, pH and freedom from contaminants. Ninety-eight percent (98%) of fines passing the #200 sieve must be parent rock material. No clay or silt soil may be added. The amount of particles passing the #200 sieve shall be determined using the washing procedures specified in PTM No. 100.

Size: The required amounts and allowed ranges, determined by percent weight, for various size particles are shown in Table 1.
LA Abrasion: The acceptable limit as measured by weight loss is "less than 40% loss." Los Angeles Abrasion test, AASHTO T-96 [ASTM C 131] shall be used to determine this property. Existing data obtained from tests made for and approved by PENNDOT will be accepted.

Passing sieve	*Lower %*	*High%*
1 ½ inches	**100**	
¾ inches	**65**	**90**
#4	**30**	**65**
#16	**15**	**30**
#200	**10**	**20**

Table 1. DSA Gradation

Sulfate Test: Soundness or resistance to freeze/thaw [*i.e., sulfate test*] is not specified for this application because a gravel road driving surface aggregate is not bound within a concrete or asphalt mix.
pH: Aggregate must be in the range of pH 6 to pH 12.45 as measured by EPA 9045C.
Optimum Moisture: Material is to be delivered and placed at optimum moisture content as determined for that particular source. The optimum percentage moisture is to be identified by the supplier in the bid/purchasing documents.
Transport: Tarps are to be used to cover 100% of the load's exposed surface from the time of loading until immediately before dumping. This requirement includes standing time waiting to dump.

Aggregate producers are required by the program to certify that the aggregate they deliver conforms to the program specifications.

Road Surface Preparation: Driving Surface Aggregate will reflect the shape of the surface to which it is applied; therefore, all road surface preparation work is to be completed before delivery and placement of the aggregate.
1. Prepare underdrainage, including drain tile, French drains (porous fill) and crosspipes.
2. Address surface drainage features such as broad-based dips, grade breaks, crown, and side-slope.
3. Establish proper cross-slope in existing base (Fig. 1). Recommended crown or slope is ½ to ¾ inch rise per horizontal foot. Proper shape may be a flat "A" crown profile, an in-slope or out-slope. If exposed bedrock or insufficient material prevents proper shaping of the road base, additional base material may be needed.
4. To bind aggregate with the road base, scarify impermeable smooth surfaces such as oil and chip, exposed bedrock or smooth tight aggregate. Do not loosen coarse aggregate or chinked stone roadbeds rough enough to permit binding with Driving Surface Aggregate.
5. If required, separation fabric should be placed according to manufacturer's recommendations.

Placement: An un-compacted uniform depth of 8 inches of DSA is to be used to establish the driving surface. Placement is to be in a single 8-inch lift. The preferred method of application is through a paver. Set the paver adjustments on application thickness and width so it is unnecessary to use a grader. The required crown or side slope is to range from ½ to ¾ inch rise per horizontal foot. This slope is to be achieved by properly preparing base and placing aggregate in a uniform lift. When the paver is applying aggregate, care should be taken to keep the paver at or near capacity at all times.

To fill driving surface areas outside the specified width (e.g., driveway entrances, pull-offs, and passing lanes), additional DSA is to be added and tapered to grade or butted against a precut channel of the same depth. If berm or bank edges don't exist to hold the new DSA surface, then sufficient material is to be placed, tapered and compacted to form protective edge berms. Material shall be compacted to a final thickness of approximately 6 inches.

DSA CALCULATION FORMULA

DSA Needed (tons)	=	Road Width (ft)	X	Road Length (ft)	X	0.042

Applies to standard 8" lift, compacted to 6"

Compaction Sequence: Verify that moisture is optimum for compaction. If the material has dried out, re-wet the DSA surface with a water truck. If clumps of aggregate adhere to the roller drum, the aggregate may be too moist. Allow drying time before rolling. Do not use the vibratory rolling mode if that action brings water to the surface of the aggregate.

Only self-powered machines designed specifically for compaction shall be used. Compaction with truck tires is not acceptable.

1A. Supported Edge: *If edge of placed aggregate is supported by an existing bank*

or berm: First pass: Roll slowly in static mode on the outside edge of placed aggregate.
1B. Unsupported Edge: *If the edge of the placed aggregate is not supported*: First Pass: Roll slowly in static mode near but not over unsupported outside edges. Once that path is firm, move progressively closer to the outside edge with static passes until unsupported edge is firm.
2. Sequence: As in all rolling operations, compaction is achieved making overlapping lengthwise passes beginning at the ditch or berm-side and working toward the crown or the top edge (if it is a side-sloped or super-elevated section of road). In no case should the roller be run lengthwise on the top of the road crown.
3A. Static Roller: The minimum acceptable weight of a static roller is 10 tons. Repeat the sequence of overlapping passes until desired compaction is achieved.
3B. Vibratory Roller: The minimum striking force of vibratory rollers is 20,000 lbs. When using a vibratory roller, the initial pass over un-compacted aggregate should be completed in static mode. All successive passes should be made using the vibratory mode until the desired level of compaction is achieved. The final pass over each area should be made in static mode to remove all roller edge marks. The vibratory roller should be set to deliver between 6 and 17 impacts per linear foot with the roller moving at the speed at which a person walks on each pass upgrade. **Vibration must be turned off during downgrade passes**. Vibrating the drum when rolling downgrade will cause aggregate to flow in "waves" in front of the roller, resulting in an uneven surface.
4. Desired Compaction: Unless more refined testing equipment is available, adequate compaction is indicated when no further depressions are created with a roller or loaded dump tuck. Cracking of larger stones or rocks in the road surface is another reliable indication of adequate compaction.

A3.2 Illinois DOT Specifications. (excerpts)(www.dot.il.gov)
Section 402. Aggregate Surface Course
402.01 Description. This work shall consist of furnishing and placing one or more course of aggregate upon a prepared subgrade.
402.02 Materials. Materials shall meet the requirements of Section 1000, Article 1004.04

1004.04 Coarse Aggregate for Aggregate Surface Course.
a. Description. The coarse aggregate shall be pit run gravel, gravel, crushed gravel, novaculite, crushed stone, crushed concrete, crushed slag or crushed sandstone.
a. Quality. The coarse aggregate shall be Class D Quality or better.

Quality Test	Class D
Sodium Sulfate Soundness[2] 5 cycle, AASHTO T104[1,2], Max % loss	25[3]
Los Angeles Abrasion AASHTO T96, Max % loss	45

[1]As modified by the Department
[2]Does not apply to crushed concrete.
[3]For aggregate surface course, the maximum percent loss shall be 30.

b. Gradation.
   1. For aggregate surface course Type B, Gradation CA6, CA9, or CA10 may be used. If approved by the Engineer, Gradation CA4 or CA12 may be used.
   2. For aggregate subbase Type B, Gradation CA6, CA10, CA12, , or CA19 shall be used. If approved by the Engineer, Gradation CA2 or CA4 may be used.
   3. For aggregate Subbase Type C, Gradation CA7 or combined size CA5 and CA7 shall be used.
   4. For granular aggregate courses (base, subbase, and shoulder except subbase Types B and C), Gradation CA6, or CA10 shall be used. If specified, Gradation CA2 or CA4 For aggregate surface course Type B, Gradation CA6, CA9, or CA10 may be used. If approved by the Engineer, Gradation CA4 or CA12 may be used.
   5. Stabilized aggregate courses (base, subbase, and shoulder), Gradation CA6 or CA10 shall be used. If approved by the Engineer, Gradation CA2, CA4, or CA12 may be used.
   6. For aggregate surface course Type A, Gradation CA6, or CA10 shall be used. If approved by the Engineer, Gradation CA2, CA4, CA9, or CA12 may be used.

c. Plasticity. All material shall comply with the plasticity index requirements listed below.

Type of construction	Plasticity Index – Percent[1]	
	Gravel	Crushed Gravel, Stone, Slag
Aggregate Subbase Type A or B	0 to 9	-
Aggregate Base Course Type A or B	0 to 6	0 to 4
Aggregate Surface Course Type A or B[2]	2 to 9	-
Stabilized Aggregate Material	0 to 9	0 to 9

[1]Plasticity index shall be determined by the method given in AASHTO T90. Where shale in any form exists in the producing ledges, crushed stone samples shall be soaked a minimum of 18 hours before processing for plasticity index or minus #40 material. When clay material is added to adjust plasticity index, the clay material shall be a minus #4 sieve size.
[2]When Gradation CA9 is used, the plasticity index requirement will not apply.

402.03 Equipment shall meet the requirements of the following Articles of Section 1100:

a. Tamping Roller……..1101.01
d. Pneumatic-Tired Roller…….1101.01
e. Three-Wheel Roller (Note 1)….1101.01
f. Tandem Roller (Note 1)…….1101.01
g. Spreader…….1101.01
h. Vibratory Machine (Note 2)…..1101.04

Note 1. Three-wheel or tandem rollers shall weigh 6 to 10 tons and shall weigh not less than 200lb/in nor more than325 lb/in of width of the roller.

Note 2. The vibratory machine shall meet the approval of the Engineer.
Construction Requirements
402.04 Subgrade. The subgrade shall be prepared according to Section 301 except that Article 301.06 will not apply.
402.05 Type A Requirements. Aggregate surface course, Type A shall be constructed according to Article 351.05(a) and (b) except the bearing ratio requirements shall not apply.
402.07 Type B Requirements. Any one or two gradations of the material specified in Article 1004.04 shall be used except where two gradations of material are used, the change shall not be made at more than one location on the section.
The surfacing material shall be deposited on the subgrade by means of a spreader.
The equipment used shall be such that the required amount of material will be deposited uniformly along the central portion of the roadbed.
The material which has been deposited shall be spread immediately to the plan cross section. Hauling shall be routed over the spread material so it will cover the entire width of surface. If the equipment used in hauling operations causes ruts extending through the spread material and into the subgrade, and the subgrade material is being mixed with the surface material, the equipment shall be removed from the work or the rutting otherwise prevented as directed by the Engineer.
The Contractor shall keep the surface smooth by dragging or blading as many times each day as the engineer may direct.
Holes, waves, and undulations which develop and which are not filled by blading shall be filled by adding more material.

A3.3 Michigan DOT Specifications (excerpts) (www.mdot.state.mi.us)
Section 306. Aggregate Surface Course
306.01 Description. Construct an aggregate surface course on a prepared subgrade or an existing aggregate surface.
306.02 Materials. Use materials meeting the following:

Dense-graded Aggregate 21AA, 21A, 23A……..902
Use aggregate 21AA or 21A if the aggregate surface course will later receive a hot mix asphalt (HMA) surface. Use aggregate 23A if the aggregate surface course is to be constructed without an HMA surface. Use dense-graded aggregate 22A, 23A for temporary maintenance gravel.
902.06 Dense-Graded Aggregates for Base Course, Surface Course, Shoulders, Approaches and Patching. Michigan Class 21AA, 21A, 22A and 23A dense-graded aggregates will consist of natural aggregate, iron blast furnace slag, reverberatory furnace slag, or crushed concrete, in combination with fine aggregate as necessary to meet the gradation requirements in Table 902-1, the physical requirements in Table 902-2, and the following:

A. Dense-graded aggregates produced by crushing Portland cement concrete will not contain building rubble as evidenced by the presence of more than 5.0%, by particle count, building brick, wood, plaster, or similar materials. Sporadic pieces of steel reinforcement may be present provided they pass the maximum grading sieve size without hand manipulation.

B. Class 21AA, 21A, and 22A dense-graded aggregates produced from Portland cement concrete will not be used to construct either an aggregate base or aggregate separation layer when either of the following conditions apply:
   1. When there is a geotextile liner or membrane present with permeability requirements.
   2. In a pavement structure with an underdrain, unless there is a filter material between crushed concrete and the underdrain. The filter material will be either a minimum of 12 inches of granular material or a geotextile liner or blocking membrane that will be a barrier to leachate.

C. Class 23A dense-graded aggregate may be produced from steel furnace slag, but only for use as an unbound aggregate surface course or as an unbound aggregate shoulder.

Table 902-1 Grading Requirements for Dense-Graded Aggregates

Class	Sieve Analysis (MTM 109) Total Percent Passing (b)						Loss by Washing (MTM 108) % Passing #200
	1.5 in.	1 in.	¾ in	½ in	3/8 in	# 8	
21AA, 21A	100	85-100		50-75		20-45	4-8 (e)(f)
22A		100	90-100		65-85	30-50	4-8(e)(f)
23A		100			60-85	25-60	9-16(f)

(b) Based on dry weights
(e) When used for aggregate base courses, surface courses, shoulders and approaches and the material is produced entirely by crushing rock, boulders, cobbles, slag, or concrete, the maximum limit for Loss by Washing will not exceed 10%.
(f) The limits for Loss by Washing of dense-graded aggregates are significant to the nearest whole percent.

Table 902-2 Physical Requirements for Dense-Graded Aggregates

Class (j)	Crushed Material, % min. (MTM 110,117)	Loss, % max, Los Angeles Abrasion (MTM 102)
21AA	95	50
21A	25	50
22A	25	50
23A	25	50

(j) Quarried carbonate (limestone or dolomite) aggregate will not contain over 10% insoluble residue finer than Number 200 sieve when tested in accordance with MTM 103.

306.03 Construction.

A. Preparation of Base. When required, blade, or scarify and blade, the existing aggregate surface to remove irregularities in the grade.

B. Placing and Compacting. Provide a uniform aggregate mixture compacted in place with uniform density full depth. Provide a completed surface course conforming to the line, grade or plan cross section.
   Place maintenance gravel to provide a flush transition between shoulders, driveways and other areas where traffic is maintained. Maintenance gravel may remain permanently as part of the work, if approved by the Engineer.
   Do not place aggregate when the base is unstable. Maintain the aggregate in a smooth, stable condition and provide dust control until removed or surfaced.

C. Use of additives. Use of additives to facilitate compaction and for dust control of the aggregate is acceptable.

A3.4 New York DOT Specifications (excerpts) (www.dot.state.ny.us)
Section 667 – Local Road Gravel Surface, Base, and Subbase Courses
667-1.02 Material Types. Provide materials as specified by the following options.

Type A. Surface quality material with a maximum particle size of 25mm.

Type B. Base quality material with a maximum particle size of 50 mm.

Type C. Subbase quality material with a maximum particle size of 75mm.
667-2.02 Material Requirements. Provide materials for road gravel surface, base and subbase courses that consist of Sand and Gravel, approved Blast Furnace Slag or Stone that meet the requirements contained herein. Provide materials well graded from coarse to fine, and free from organic or other deleterious materials. Any gravel material will be rejected if it is determined to contain any unsound or deleterious materials.

B. Gradation, Perform sieve analysis in accordance with AASHTO procedures T27, T88 or T311. Provide materials meeting the gradation limits from Table 667-1.
C. Soundness. Material will be accepted on the basis of Magnesium sulfate. Soundness Loss after four cycles performed according to NYSDOT procedures and Table 667-2.
D. Plasticity. Determine plasticity using either of the following methods:
    1. Plasticity Index. The Plasticity Index of the material passing the #40 mesh sieve shall meet the values in Table 667-2. Determine plasticity using AASHTO tests T89 and T90.
    2. Sand Equivalent. The sand equivalence of the granular material shall meet the values in Table 667-2. Determine sand equivalence using AASHTO test T176.

Table 667-1: Percent passing by Weight of Gravel Materials

Sieve (US Sieve)	A (Surface)	B (Base)	C (subbase)
3”			100
2”		100	-
1.5”		85-100	70-100
1”	100	-	-
¾”	85-100	-	-
¼”	50-75	30-50	30-55
#40	15-35	5-20	5-25
#200	8-15	0-5	0-8

Table 667-2: Test and control Limits of Gravel Materials

Material Properties	A (Surface)	B (Base)	C (subbase)
Maximum Soundness loss (%)	20	20	25
Plasticity Index	2-9	0-5	0-8
Sand Equivalent	>25	>40	>35

E. Elongated Particles Not more than 30%, by weight, of the particles retained on a ½” sieve shall consist of flat or elongated particles. A flat or elongated particle is defined herein as one which has its greatest dimension more than 3 times its least dimension. Acceptance for this requirement will normally be

APPENDIX 3. Sample Aggregates Specifications

Following are sample specifications for gravel road aggregate surface courses from several different states. Road personnel should check with their State Department of Transportation or their Local Technical Assistance Program / Technology Transfer (T2) Center for specifications being used in their own state. Many state DOTs have their specifications readily available via their Web sites.

A3.1 Pennsylvania's Driving Surface Aggregate

Material Specifications: All Driving Surface Aggregate (DSA) is to be derived from natural stone formations. Stone is defined as rock that has been crushed; rock is defined as consolidated mineral matter. For use in this program, both are restricted to that which has been mined or quarried from existing geologic bedrock formations.

All components of the aggregate mix are to be derived from crushed parent rock material that meets program specifications for abrasion resistance, pH and freedom from contaminants. Ninety-eight percent (98%) of fines passing the #200 sieve must be parent rock material. No clay or silt soil may be added. The amount of particles passing the #200 sieve shall be determined using the washing procedures specified in PTM No. 100.

Size: The required amounts and allowed ranges, determined by percent weight, for various size particles are shown in Table 1.
LA Abrasion: The acceptable limit as measured by weight loss is "less than 40% loss." Los Angeles Abrasion test, AASHTO T-96 [ASTM C 131] shall be used to determine this property. Existing data obtained from tests made for and approved by PENNDOT will be accepted.

Passing sieve	*Lower %*	*High%*
1 ½ inches	**100**	
¾ inches	**65**	**90**
#4	**30**	**65**
#16	**15**	**30**
#200	**10**	**20**

Table 1. DSA Gradation

Sulfate Test: Soundness or resistance to freeze/thaw [*i.e., sulfate test*] is not specified for this application because a gravel road driving surface aggregate is not bound within a concrete or asphalt mix.
pH: Aggregate must be in the range of pH 6 to pH 12.45 as measured by EPA 9045C.
Optimum Moisture: Material is to be delivered and placed at optimum moisture content as determined for that particular source. The optimum percentage moisture is to be identified by the supplier in the bid/purchasing documents.
Transport: Tarps are to be used to cover 100% of the load's exposed surface from the time of loading until immediately before dumping. This requirement includes standing time waiting to dump.

Aggregate producers are required by the program to certify that the aggregate they deliver conforms to the program specifications.

Road Surface Preparation: Driving Surface Aggregate will reflect the shape of the surface to which it is applied; therefore, all road surface preparation work is to be completed before delivery and placement of the aggregate.
1. Prepare underdrainage, including drain tile, French drains (porous fill) and crosspipes.
2. Address surface drainage features such as broad-based dips, grade breaks, crown, and side-slope.
3. Establish proper cross-slope in existing base (Fig. 1). Recommended crown or slope is ½ to ¾ inch rise per horizontal foot. Proper shape may be a flat "A" crown profile, an in-slope or out-slope. If exposed bedrock or insufficient material prevents proper shaping of the road base, additional base material may be needed.
4. To bind aggregate with the road base, scarify impermeable smooth surfaces such as oil and chip, exposed bedrock or smooth tight aggregate. Do not loosen coarse aggregate or chinked stone roadbeds rough enough to permit binding with Driving Surface Aggregate.
5. If required, separation fabric should be placed according to manufacturer's recommendations.

Placement: An un-compacted uniform depth of 8 inches of DSA is to be used to establish the driving surface. Placement is to be in a single 8-inch lift. The preferred method of application is through a paver. Set the paver adjustments on application thickness and width so it is unnecessary to use a grader. The required crown or side slope is to range from ½ to ¾ inch rise per horizontal foot. This slope is to be achieved by properly preparing base and placing aggregate in a uniform lift. When the paver is applying aggregate, care should be taken to keep the paver at or near capacity at all times.

To fill driving surface areas outside the specified width (e.g., driveway entrances, pull-offs, and passing lanes), additional DSA is to be added and tapered to grade or butted against a precut channel of the same depth. If berm or bank edges don't exist to hold the new DSA surface, then sufficient material is to be placed, tapered and compacted to form protective edge berms. Material shall be compacted to a final thickness of approximately 6 inches.

DSA CALCULATION FORMULA

DSA Needed (tons)	=	Road Width (ft)	X	Road Length (ft)	X	0.042

Applies to standard 8" lift, compacted to 6"

Compaction Sequence: Verify that moisture is optimum for compaction. If the material has dried out, re-wet the DSA surface with a water truck. If clumps of aggregate adhere to the roller drum, the aggregate may be too moist. Allow drying time before rolling. Do not use the vibratory rolling mode if that action brings water to the surface of the aggregate.

Only self-powered machines designed specifically for compaction shall be used. Compaction with truck tires is not acceptable.

1A. Supported Edge: *If edge of placed aggregate is supported by an existing bank*

or berm: First pass: Roll slowly in static mode on the outside edge of placed aggregate.
1B. Unsupported Edge: *If the edge of the placed aggregate is not supported*: First Pass: Roll slowly in static mode near but not over unsupported outside edges. Once that path is firm, move progressively closer to the outside edge with static passes until unsupported edge is firm.
2. Sequence: As in all rolling operations, compaction is achieved making overlapping lengthwise passes beginning at the ditch or berm-side and working toward the crown or the top edge (if it is a side-sloped or super-elevated section of road). In no case should the roller be run lengthwise on the top of the road crown.
3A. Static Roller: The minimum acceptable weight of a static roller is 10 tons. Repeat the sequence of overlapping passes until desired compaction is achieved.
3B. Vibratory Roller: The minimum striking force of vibratory rollers is 20,000 lbs. When using a vibratory roller, the initial pass over un-compacted aggregate should be completed in static mode. All successive passes should be made using the vibratory mode until the desired level of compaction is achieved. The final pass over each area should be made in static mode to remove all roller edge marks. The vibratory roller should be set to deliver between 6 and 17 impacts per linear foot with the roller moving at the speed at which a person walks on each pass upgrade. **Vibration must be turned off during downgrade passes**. Vibrating the drum when rolling downgrade will cause aggregate to flow in "waves" in front of the roller, resulting in an uneven surface.
4. Desired Compaction: Unless more refined testing equipment is available, adequate compaction is indicated when no further depressions are created with a roller or loaded dump tuck. Cracking of larger stones or rocks in the road surface is another reliable indication of adequate compaction.

A3.2 Illinois DOT Specifications. (excerpts)(www.dot.il.gov)
Section 402. Aggregate Surface Course
402.01 Description. This work shall consist of furnishing and placing one or more course of aggregate upon a prepared subgrade.
402.02 Materials. Materials shall meet the requirements of Section 1000, Article 1004.04

1004.04 Coarse Aggregate for Aggregate Surface Course.
a. Description. The coarse aggregate shall be pit run gravel, gravel, crushed gravel, novaculite, crushed stone, crushed concrete, crushed slag or crushed sandstone.
a. Quality. The coarse aggregate shall be Class D Quality or better.

Quality Test	Class D
Sodium Sulfate Soundness[2] 5 cycle, AASHTO T104[1,2], Max % loss	25[3]
Los Angeles Abrasion AASHTO T96, Max % loss	45

[1]As modified by the Department
[2]Does not apply to crushed concrete.
[3]For aggregate surface course, the maximum percent loss shall be 30.

b. Gradation.
   1. For aggregate surface course Type B, Gradation CA6, CA9, or CA10 may be used. If approved by the Engineer, Gradation CA4 or CA12 may be used.
   2. For aggregate subbase Type B, Gradation CA6, CA10, CA12, , or CA19 shall be used. If approved by the Engineer, Gradation CA2 or CA4 may be used.
   3. For aggregate Subbase Type C, Gradation CA7 or combined size CA5 and CA7 shall be used.
   4. For granular aggregate courses (base, subbase, and shoulder except subbase Types B and C), Gradation CA6, or CA10 shall be used. If specified, Gradation CA2 or CA4 For aggregate surface course Type B, Gradation CA6, CA9, or CA10 may be used. If approved by the Engineer, Gradation CA4 or CA12 may be used.
   5. Stabilized aggregate courses (base, subbase, and shoulder), Gradation CA6 or CA10 shall be used. If approved by the Engineer, Gradation CA2, CA4, or CA12 may be used.
   6. For aggregate surface course Type A, Gradation CA6, or CA10 shall be used. If approved by the Engineer, Gradation CA2, CA4, CA9, or CA12 may be used.

c. Plasticity. All material shall comply with the plasticity index requirements listed below.

Type of construction	Plasticity Index – Percent[1]	
	Gravel	Crushed Gravel, Stone, Slag
Aggregate Subbase Type A or B	0 to 9	-
Aggregate Base Course Type A or B	0 to 6	0 to 4
Aggregate Surface Course Type A or B[2]	2 to 9	-
Stabilized Aggregate Material	0 to 9	0 to 9

[1]Plasticity index shall be determined by the method given in AASHTO T90. Where shale in any form exists in the producing ledges, crushed stone samples shall be soaked a minimum of 18 hours before processing for plasticity index or minus #40 material. When clay material is added to adjust plasticity index, the clay material shall be a minus #4 sieve size.
[2]When Gradation CA9 is used, the plasticity index requirement will not apply.

402.03 Equipment shall meet the requirements of the following Articles of Section 1100:

a. Tamping Roller……..1101.01
d. Pneumatic-Tired Roller…….1101.01
e. Three-Wheel Roller (Note 1)….1101.01
f. Tandem Roller (Note 1)…….1101.01
g. Spreader…….1101.01
h. Vibratory Machine (Note 2)…..1101.04

Note 1. Three-wheel or tandem rollers shall weigh 6 to 10 tons and shall weigh not less than 200lb/in nor more than325 lb/in of width of the roller.

Note 2. The vibratory machine shall meet the approval of the Engineer.
Construction Requirements
402.04 Subgrade. The subgrade shall be prepared according to Section 301 except that Article 301.06 will not apply.
402.05 Type A Requirements. Aggregate surface course, Type A shall be constructed according to Article 351.05(a) and (b) except the bearing ratio requirements shall not apply.
402.07 Type B Requirements. Any one or two gradations of the material specified in Article 1004.04 shall be used except where two gradations of material are used, the change shall not be made at more than one location on the section.
The surfacing material shall be deposited on the subgrade by means of a spreader.
The equipment used shall be such that the required amount of material will be deposited uniformly along the central portion of the roadbed.
The material which has been deposited shall be spread immediately to the plan cross section. Hauling shall be routed over the spread material so it will cover the entire width of surface. If the equipment used in hauling operations causes ruts extending through the spread material and into the subgrade, and the subgrade material is being mixed with the surface material, the equipment shall be removed from the work or the rutting otherwise prevented as directed by the Engineer.
The Contractor shall keep the surface smooth by dragging or blading as many times each day as the engineer may direct.
Holes, waves, and undulations which develop and which are not filled by blading shall be filled by adding more material.

A3.3 Michigan DOT Specifications (excerpts) (www.mdot.state.mi.us)
Section 306. Aggregate Surface Course
306.01 Description. Construct an aggregate surface course on a prepared subgrade or an existing aggregate surface.
306.02 Materials. Use materials meeting the following:

Dense-graded Aggregate 21AA, 21A, 23A……..902
Use aggregate 21AA or 21A if the aggregate surface course will later receive a hot mix asphalt (HMA) surface. Use aggregate 23A if the aggregate surface course is to be constructed without an HMA surface. Use dense-graded aggregate 22A, 23A for temporary maintenance gravel.
902.06 Dense-Graded Aggregates for Base Course, Surface Course, Shoulders, Approaches and Patching. Michigan Class 21AA, 21A, 22A and 23A dense-graded aggregates will consist of natural aggregate, iron blast furnace slag, reverberatory furnace slag, or crushed concrete, in combination with fine aggregate as necessary to meet the gradation requirements in Table 902-1, the physical requirements in Table 902-2, and the following:

A. Dense-graded aggregates produced by crushing Portland cement concrete will not contain building rubble as evidenced by the presence of more than 5.0%, by particle count, building brick, wood, plaster, or similar materials. Sporadic pieces of steel reinforcement may be present provided they pass the maximum grading sieve size without hand manipulation.

B. Class 21AA, 21A, and 22A dense-graded aggregates produced from Portland cement concrete will not be used to construct either an aggregate base or aggregate separation layer when either of the following conditions apply:
   1. When there is a geotextile liner or membrane present with permeability requirements.
   2. In a pavement structure with an underdrain, unless there is a filter material between crushed concrete and the underdrain. The filter material will be either a minimum of 12 inches of granular material or a geotextile liner or blocking membrane that will be a barrier to leachate.

C. Class 23A dense-graded aggregate may be produced from steel furnace slag, but only for use as an unbound aggregate surface course or as an unbound aggregate shoulder.

Table 902-1 Grading Requirements for Dense-Graded Aggregates

Class	Sieve Analysis (MTM 109) Total Percent Passing (b)						Loss by Washing (MTM 108) % Passing #200
	1.5 in.	1 in.	¾ in	½ in	3/8 in	# 8	
21AA, 21A	100	85-100		50-75		20-45	4-8 (e)(f)
22A		100	90-100		65-85	30-50	4-8(e)(f)
23A		100			60-85	25-60	9-16(f)

(b) Based on dry weights
(e) When used for aggregate base courses, surface courses, shoulders and approaches and the material is produced entirely by crushing rock, boulders, cobbles, slag, or concrete, the maximum limit for Loss by Washing will not exceed 10%.
(f) The limits for Loss by Washing of dense-graded aggregates are significant to the nearest whole percent.

Table 902-2 Physical Requirements for Dense-Graded Aggregates

Class (j)	Crushed Material, % min. (MTM 110,117)	Loss, % max, Los Angeles Abrasion (MTM 102)
21AA	95	50
21A	25	50
22A	25	50
23A	25	50

(j) Quarried carbonate (limestone or dolomite) aggregate will not contain over 10% insoluble residue finer than Number 200 sieve when tested in accordance with MTM 103.

306.03 Construction.

A. Preparation of Base. When required, blade, or scarify and blade, the existing aggregate surface to remove irregularities in the grade.

B. Placing and Compacting. Provide a uniform aggregate mixture compacted in place with uniform density full depth. Provide a completed surface course conforming to the line, grade or plan cross section.
   Place maintenance gravel to provide a flush transition between shoulders, driveways and other areas where traffic is maintained. Maintenance gravel may remain permanently as part of the work, if approved by the Engineer.
   Do not place aggregate when the base is unstable. Maintain the aggregate in a smooth, stable condition and provide dust control until removed or surfaced.

C. Use of additives. Use of additives to facilitate compaction and for dust control of the aggregate is acceptable.

A3.4 New York DOT Specifications (excerpts) (www.dot.state.ny.us)
Section 667 – Local Road Gravel Surface, Base, and Subbase Courses
667-1.02 Material Types. Provide materials as specified by the following options.

Type A. Surface quality material with a maximum particle size of 25mm.

Type B. Base quality material with a maximum particle size of 50 mm.

Type C. Subbase quality material with a maximum particle size of 75mm.
667-2.02 Material Requirements. Provide materials for road gravel surface, base and subbase courses that consist of Sand and Gravel, approved Blast Furnace Slag or Stone that meet the requirements contained herein. Provide materials well graded from coarse to fine, and free from organic or other deleterious materials. Any gravel material will be rejected if it is determined to contain any unsound or deleterious materials.

B. Gradation, Perform sieve analysis in accordance with AASHTO procedures T27, T88 or T311. Provide materials meeting the gradation limits from Table 667-1.
C. Soundness. Material will be accepted on the basis of Magnesium sulfate. Soundness Loss after four cycles performed according to NYSDOT procedures and Table 667-2.
D. Plasticity. Determine plasticity using either of the following methods:
    1. Plasticity Index. The Plasticity Index of the material passing the #40 mesh sieve shall meet the values in Table 667-2. Determine plasticity using AASHTO tests T89 and T90.
    2. Sand Equivalent. The sand equivalence of the granular material shall meet the values in Table 667-2. Determine sand equivalence using AASHTO test T176.

Table 667-1: Percent passing by Weight of Gravel Materials

Sieve (US Sieve)	A (Surface)	B (Base)	C (subbase)
3”			100
2”		100	-
1.5”		85-100	70-100
1”	100	-	-
¾”	85-100	-	-
¼”	50-75	30-50	30-55
#40	15-35	5-20	5-25
#200	8-15	0-5	0-8

Table 667-2: Test and control Limits of Gravel Materials

Material Properties	A (Surface)	B (Base)	C (subbase)
Maximum Soundness loss (%)	20	20	25
Plasticity Index	2-9	0-5	0-8
Sand Equivalent	>25	>40	>35

E. Elongated Particles Not more than 30%, by weight, of the particles retained on a ½” sieve shall consist of flat or elongated particles. A flat or elongated particle is defined herein as one which has its greatest dimension more than 3 times its least dimension. Acceptance for this requirement will normally be

APPENDIX 3. Sample Aggregates Specifications

Following are sample specifications for gravel road aggregate surface courses from several different states. Road personnel should check with their State Department of Transportation or their Local Technical Assistance Program / Technology Transfer (T2) Center for specifications being used in their own state. Many state DOTs have their specifications readily available via their Web sites.

A3.1 Pennsylvania's Driving Surface Aggregate

Material Specifications: All Driving Surface Aggregate (DSA) is to be derived from natural stone formations. Stone is defined as rock that has been crushed; rock is defined as consolidated mineral matter. For use in this program, both are restricted to that which has been mined or quarried from existing geologic bedrock formations.

All components of the aggregate mix are to be derived from crushed parent rock material that meets program specifications for abrasion resistance, pH and freedom from contaminants. Ninety-eight percent (98%) of fines passing the #200 sieve must be parent rock material. No clay or silt soil may be added. The amount of particles passing the #200 sieve shall be determined using the washing procedures specified in PTM No. 100.

Size: The required amounts and allowed ranges, determined by percent weight, for various size particles are shown in Table 1.
LA Abrasion: The acceptable limit as measured by weight loss is "less than 40% loss." Los Angeles Abrasion test, AASHTO T-96 [ASTM C 131] shall be used to determine this property. Existing data obtained from tests made for and approved by PENNDOT will be accepted.

Passing sieve	*Lower %*	*High%*
1 ½ inches	**100**	
¾ inches	**65**	**90**
#4	**30**	**65**
#16	**15**	**30**
#200	**10**	**20**

Table 1. DSA Gradation

Sulfate Test: Soundness or resistance to freeze/thaw [*i.e., sulfate test*] is not specified for this application because a gravel road driving surface aggregate is not bound within a concrete or asphalt mix.
pH: Aggregate must be in the range of pH 6 to pH 12.45 as measured by EPA 9045C.
Optimum Moisture: Material is to be delivered and placed at optimum moisture content as determined for that particular source. The optimum percentage moisture is to be identified by the supplier in the bid/purchasing documents.
Transport: Tarps are to be used to cover 100% of the load's exposed surface from the time of loading until immediately before dumping. This requirement includes standing time waiting to dump.

Aggregate producers are required by the program to certify that the aggregate they deliver conforms to the program specifications.

Road Surface Preparation: Driving Surface Aggregate will reflect the shape of the surface to which it is applied; therefore, all road surface preparation work is to be completed before delivery and placement of the aggregate.
1. Prepare underdrainage, including drain tile, French drains (porous fill) and crosspipes.
2. Address surface drainage features such as broad-based dips, grade breaks, crown, and side-slope.
3. Establish proper cross-slope in existing base (Fig. 1). Recommended crown or slope is ½ to ¾ inch rise per horizontal foot. Proper shape may be a flat "A" crown profile, an in-slope or out-slope. If exposed bedrock or insufficient material prevents proper shaping of the road base, additional base material may be needed.
4. To bind aggregate with the road base, scarify impermeable smooth surfaces such as oil and chip, exposed bedrock or smooth tight aggregate. Do not loosen coarse aggregate or chinked stone roadbeds rough enough to permit binding with Driving Surface Aggregate.
5. If required, separation fabric should be placed according to manufacturer's recommendations.

Placement: An un-compacted uniform depth of 8 inches of DSA is to be used to establish the driving surface. Placement is to be in a single 8-inch lift. The preferred method of application is through a paver. Set the paver adjustments on application thickness and width so it is unnecessary to use a grader. The required crown or side slope is to range from ½ to ¾ inch rise per horizontal foot. This slope is to be achieved by properly preparing base and placing aggregate in a uniform lift. When the paver is applying aggregate, care should be taken to keep the paver at or near capacity at all times.

To fill driving surface areas outside the specified width (e.g., driveway entrances, pull-offs, and passing lanes), additional DSA is to be added and tapered to grade or butted against a precut channel of the same depth. If berm or bank edges don't exist to hold the new DSA surface, then sufficient material is to be placed, tapered and compacted to form protective edge berms. Material shall be compacted to a final thickness of approximately 6 inches.

DSA CALCULATION FORMULA

DSA Needed (tons)	=	Road Width (ft)	X	Road Length (ft)	X	0.042

Applies to standard 8" lift, compacted to 6"

Compaction Sequence: Verify that moisture is optimum for compaction. If the material has dried out, re-wet the DSA surface with a water truck. If clumps of aggregate adhere to the roller drum, the aggregate may be too moist. Allow drying time before rolling. Do not use the vibratory rolling mode if that action brings water to the surface of the aggregate.

Only self-powered machines designed specifically for compaction shall be used. Compaction with truck tires is not acceptable.

1A. Supported Edge: *If edge of placed aggregate is supported by an existing bank*

or berm: First pass: Roll slowly in static mode on the outside edge of placed aggregate.
1B. Unsupported Edge: *If the edge of the placed aggregate is not supported*: First Pass: Roll slowly in static mode near but not over unsupported outside edges. Once that path is firm, move progressively closer to the outside edge with static passes until unsupported edge is firm.
2. Sequence: As in all rolling operations, compaction is achieved making overlapping lengthwise passes beginning at the ditch or berm-side and working toward the crown or the top edge (if it is a side-sloped or super-elevated section of road). In no case should the roller be run lengthwise on the top of the road crown.
3A. Static Roller: The minimum acceptable weight of a static roller is 10 tons. Repeat the sequence of overlapping passes until desired compaction is achieved.
3B. Vibratory Roller: The minimum striking force of vibratory rollers is 20,000 lbs. When using a vibratory roller, the initial pass over un-compacted aggregate should be completed in static mode. All successive passes should be made using the vibratory mode until the desired level of compaction is achieved. The final pass over each area should be made in static mode to remove all roller edge marks. The vibratory roller should be set to deliver between 6 and 17 impacts per linear foot with the roller moving at the speed at which a person walks on each pass upgrade. **Vibration must be turned off during downgrade passes**. Vibrating the drum when rolling downgrade will cause aggregate to flow in "waves" in front of the roller, resulting in an uneven surface.
4. Desired Compaction: Unless more refined testing equipment is available, adequate compaction is indicated when no further depressions are created with a roller or loaded dump tuck. Cracking of larger stones or rocks in the road surface is another reliable indication of adequate compaction.

A3.2 Illinois DOT Specifications. (excerpts)(www.dot.il.gov)
Section 402. Aggregate Surface Course
402.01 Description. This work shall consist of furnishing and placing one or more course of aggregate upon a prepared subgrade.
402.02 Materials. Materials shall meet the requirements of Section 1000, Article 1004.04

1004.04 Coarse Aggregate for Aggregate Surface Course.
a. Description. The coarse aggregate shall be pit run gravel, gravel, crushed gravel, novaculite, crushed stone, crushed concrete, crushed slag or crushed sandstone.
a. Quality. The coarse aggregate shall be Class D Quality or better.

Quality Test	Class D
Sodium Sulfate Soundness[2] 5 cycle, AASHTO T104[1,2], Max % loss	25[3]
Los Angeles Abrasion AASHTO T96, Max % loss	45

[1]As modified by the Department
[2]Does not apply to crushed concrete.
[3]For aggregate surface course, the maximum percent loss shall be 30.

b. Gradation.
   1. For aggregate surface course Type B, Gradation CA6, CA9, or CA10 may be used. If approved by the Engineer, Gradation CA4 or CA12 may be used.
   2. For aggregate subbase Type B, Gradation CA6, CA10, CA12, , or CA19 shall be used. If approved by the Engineer, Gradation CA2 or CA4 may be used.
   3. For aggregate Subbase Type C, Gradation CA7 or combined size CA5 and CA7 shall be used.
   4. For granular aggregate courses (base, subbase, and shoulder except subbase Types B and C), Gradation CA6, or CA10 shall be used. If specified, Gradation CA2 or CA4 For aggregate surface course Type B, Gradation CA6, CA9, or CA10 may be used. If approved by the Engineer, Gradation CA4 or CA12 may be used.
   5. Stabilized aggregate courses (base, subbase, and shoulder), Gradation CA6 or CA10 shall be used. If approved by the Engineer, Gradation CA2, CA4, or CA12 may be used.
   6. For aggregate surface course Type A, Gradation CA6, or CA10 shall be used. If approved by the Engineer, Gradation CA2, CA4, CA9, or CA12 may be used.

c. Plasticity. All material shall comply with the plasticity index requirements listed below.

Type of construction	Plasticity Index – Percent[1]	
	Gravel	Crushed Gravel, Stone, Slag
Aggregate Subbase Type A or B	0 to 9	-
Aggregate Base Course Type A or B	0 to 6	0 to 4
Aggregate Surface Course Type A or B[2]	2 to 9	-
Stabilized Aggregate Material	0 to 9	0 to 9

[1]Plasticity index shall be determined by the method given in AASHTO T90. Where shale in any form exists in the producing ledges, crushed stone samples shall be soaked a minimum of 18 hours before processing for plasticity index or minus #40 material. When clay material is added to adjust plasticity index, the clay material shall be a minus #4 sieve size.
[2]When Gradation CA9 is used, the plasticity index requirement will not apply.

402.03 Equipment shall meet the requirements of the following Articles of Section 1100:

a. Tamping Roller……..1101.01
d. Pneumatic-Tired Roller…….1101.01
e. Three-Wheel Roller (Note 1)….1101.01
f. Tandem Roller (Note 1)…….1101.01
g. Spreader…….1101.01
h. Vibratory Machine (Note 2)…..1101.04

Note 1. Three-wheel or tandem rollers shall weigh 6 to 10 tons and shall weigh not less than 200lb/in nor more than325 lb/in of width of the roller.

Note 2. The vibratory machine shall meet the approval of the Engineer.
Construction Requirements
402.04 Subgrade. The subgrade shall be prepared according to Section 301 except that Article 301.06 will not apply.
402.05 Type A Requirements. Aggregate surface course, Type A shall be constructed according to Article 351.05(a) and (b) except the bearing ratio requirements shall not apply.
402.07 Type B Requirements. Any one or two gradations of the material specified in Article 1004.04 shall be used except where two gradations of material are used, the change shall not be made at more than one location on the section.
The surfacing material shall be deposited on the subgrade by means of a spreader.
The equipment used shall be such that the required amount of material will be deposited uniformly along the central portion of the roadbed.
The material which has been deposited shall be spread immediately to the plan cross section. Hauling shall be routed over the spread material so it will cover the entire width of surface. If the equipment used in hauling operations causes ruts extending through the spread material and into the subgrade, and the subgrade material is being mixed with the surface material, the equipment shall be removed from the work or the rutting otherwise prevented as directed by the Engineer.
The Contractor shall keep the surface smooth by dragging or blading as many times each day as the engineer may direct.
Holes, waves, and undulations which develop and which are not filled by blading shall be filled by adding more material.

A3.3 Michigan DOT Specifications (excerpts) (www.mdot.state.mi.us)
Section 306. Aggregate Surface Course
306.01 Description. Construct an aggregate surface course on a prepared subgrade or an existing aggregate surface.
306.02 Materials. Use materials meeting the following:

Dense-graded Aggregate 21AA, 21A, 23A……..902
Use aggregate 21AA or 21A if the aggregate surface course will later receive a hot mix asphalt (HMA) surface. Use aggregate 23A if the aggregate surface course is to be constructed without an HMA surface. Use dense-graded aggregate 22A, 23A for temporary maintenance gravel.
902.06 Dense-Graded Aggregates for Base Course, Surface Course, Shoulders, Approaches and Patching. Michigan Class 21AA, 21A, 22A and 23A dense-graded aggregates will consist of natural aggregate, iron blast furnace slag, reverberatory furnace slag, or crushed concrete, in combination with fine aggregate as necessary to meet the gradation requirements in Table 902-1, the physical requirements in Table 902-2, and the following:

A. Dense-graded aggregates produced by crushing Portland cement concrete will not contain building rubble as evidenced by the presence of more than 5.0%, by particle count, building brick, wood, plaster, or similar materials. Sporadic pieces of steel reinforcement may be present provided they pass the maximum grading sieve size without hand manipulation.

B. Class 21AA, 21A, and 22A dense-graded aggregates produced from Portland cement concrete will not be used to construct either an aggregate base or aggregate separation layer when either of the following conditions apply:
   1. When there is a geotextile liner or membrane present with permeability requirements.
   2. In a pavement structure with an underdrain, unless there is a filter material between crushed concrete and the underdrain. The filter material will be either a minimum of 12 inches of granular material or a geotextile liner or blocking membrane that will be a barrier to leachate.

C. Class 23A dense-graded aggregate may be produced from steel furnace slag, but only for use as an unbound aggregate surface course or as an unbound aggregate shoulder.

Table 902-1 Grading Requirements for Dense-Graded Aggregates

Class	Sieve Analysis (MTM 109) Total Percent Passing (b)						Loss by Washing (MTM 108) % Passing #200
	1.5 in.	1 in.	¾ in	½ in	3/8 in	# 8	
21AA, 21A	100	85-100		50-75		20-45	4-8 (e)(f)
22A		100	90-100		65-85	30-50	4-8(e)(f)
23A		100			60-85	25-60	9-16(f)

(b) Based on dry weights
(e) When used for aggregate base courses, surface courses, shoulders and approaches and the material is produced entirely by crushing rock, boulders, cobbles, slag, or concrete, the maximum limit for Loss by Washing will not exceed 10%.
(f) The limits for Loss by Washing of dense-graded aggregates are significant to the nearest whole percent.

Table 902-2 Physical Requirements for Dense-Graded Aggregates

Class (j)	Crushed Material, % min. (MTM 110,117)	Loss, % max, Los Angeles Abrasion (MTM 102)
21AA	95	50
21A	25	50
22A	25	50
23A	25	50

(j) Quarried carbonate (limestone or dolomite) aggregate will not contain over 10% insoluble residue finer than Number 200 sieve when tested in accordance with MTM 103.

306.03 Construction.

A. Preparation of Base. When required, blade, or scarify and blade, the existing aggregate surface to remove irregularities in the grade.

B. Placing and Compacting. Provide a uniform aggregate mixture compacted in place with uniform density full depth. Provide a completed surface course conforming to the line, grade or plan cross section.
   Place maintenance gravel to provide a flush transition between shoulders, driveways and other areas where traffic is maintained. Maintenance gravel may remain permanently as part of the work, if approved by the Engineer.
   Do not place aggregate when the base is unstable. Maintain the aggregate in a smooth, stable condition and provide dust control until removed or surfaced.

C. Use of additives. Use of additives to facilitate compaction and for dust control of the aggregate is acceptable.

A3.4 New York DOT Specifications (excerpts) (www.dot.state.ny.us)
Section 667 – Local Road Gravel Surface, Base, and Subbase Courses
667-1.02 Material Types. Provide materials as specified by the following options.

Type A. Surface quality material with a maximum particle size of 25mm.

Type B. Base quality material with a maximum particle size of 50 mm.

Type C. Subbase quality material with a maximum particle size of 75mm.
667-2.02 Material Requirements. Provide materials for road gravel surface, base and subbase courses that consist of Sand and Gravel, approved Blast Furnace Slag or Stone that meet the requirements contained herein. Provide materials well graded from coarse to fine, and free from organic or other deleterious materials. Any gravel material will be rejected if it is determined to contain any unsound or deleterious materials.

B. Gradation, Perform sieve analysis in accordance with AASHTO procedures T27, T88 or T311. Provide materials meeting the gradation limits from Table 667-1.
C. Soundness. Material will be accepted on the basis of Magnesium sulfate. Soundness Loss after four cycles performed according to NYSDOT procedures and Table 667-2.
D. Plasticity. Determine plasticity using either of the following methods:
    1. Plasticity Index. The Plasticity Index of the material passing the #40 mesh sieve shall meet the values in Table 667-2. Determine plasticity using AASHTO tests T89 and T90.
    2. Sand Equivalent. The sand equivalence of the granular material shall meet the values in Table 667-2. Determine sand equivalence using AASHTO test T176.

Table 667-1: Percent passing by Weight of Gravel Materials

Sieve (US Sieve)	A (Surface)	B (Base)	C (subbase)
3”			100
2”		100	-
1.5”		85-100	70-100
1”	100	-	-
¾”	85-100	-	-
¼”	50-75	30-50	30-55
#40	15-35	5-20	5-25
#200	8-15	0-5	0-8

Table 667-2: Test and control Limits of Gravel Materials

Material Properties	A (Surface)	B (Base)	C (subbase)
Maximum Soundness loss (%)	20	20	25
Plasticity Index	2-9	0-5	0-8
Sand Equivalent	>25	>40	>35

E. Elongated Particles Not more than 30%, by weight, of the particles retained on a ½” sieve shall consist of flat or elongated particles. A flat or elongated particle is defined herein as one which has its greatest dimension more than 3 times its least dimension. Acceptance for this requirement will normally be

Environmentally Sensitive Maintenance for Dirt and Gravel Roads

Chapter 4: Basics of Natural Systems

4.1 Introduction

Today, road managers must operate and maintain public roads in a broad context that considers multiple social, political, and environmental objectives. This tough task is made more difficult by the fact that most roads were built within a much narrower context that focused only on short-term purposes such as engineering, cost, and convenience.

4-01 Many roads were built without regard to natural systems.

Through construction, our transportation systems were traditionally laid down across the entire fabric of the landscape. Nearly all roads were built without regard for the function of the natural systems that evolved in these locations. Roads built adjacent to and across streams, through wetlands, farms, and forests inevitably disrupted both surface and subsurface drainage, vegetation patterns, and native animal communities.

4-02 Environmental problems bear witness to our disturbance and disruption of natural systems.

Potholes, ruts, road washouts, bank failures, ditch blockages, and fallen trees bear witness to our disturbance and disruption of natural systems. In addition, typical environmental problems also appeared, such as muddy streams, deteriorated habitat, and changes in the number and type of both plant and animal communities. But efforts to address these problems without understanding their causes have often been a waste of money.

As previously stated, road management is an increasingly complex task where managers must balance human expectations against intricate natural systems. This chapter will introduce some basic guiding principals of natural systems

so road managers can better understand the relationship between the roads and the environment. These basic guiding principles will focus on the three pertinent natural systems: streams, wetlands, and forest/upland areas.

Chapter 4 starts with an introduction to ecology and ecosystems. It will then provide more specific information on the three common ecosystems or communities: streams, wetlands, and forests/uplands, respectively. This information supports our objective to "arm the user with knowledge on basic principles of nature and natural systems…" so that we can apply that knowledge to our road maintenance programs through environmentally sensitive practices, resulting in better roads and a better environment.

4.2 Ecology, Ecoregions and Ecosystems

4-03 Physical factors such as geology, soil, hydrology, and climate shape the 'habitat'.

The term ecology stems from the Greek word "oikos," which means "house." Ecology can be defined as the study of interactions of organisms between one another and the physical and chemical environment. As indicated by the definition, all living organisms (plants, animals, fungi, and micro-organisms, such as bacteria and viruses) are dependent upon conditions present where they live (in their "house"). This range of ecological conditions, which describes where an organism lives, is termed "habitat." Habitat is defined by a wide variety of physical and biological factors. Physical factors, such as local geology (elevation, slope, drainage, rock type, etc.), soil (nutrients, stability, etc.), hydrology (precipitation, runoff, soil, moisture, evaporation, etc.), and climate (temperature, sunlight, day length, etc.), shape the setting in which biological organisms live. Biological factors, such as competition for food sources and mates, predation, disease, and social interaction, determines how well organisms survive and reproduce within the physical setting.

Ecologists have studied many of the interactions that take place between biological and physical systems, and based upon their findings, divided the landscape into ecoregions or areas with similar characteristics. These ecoregions reflect the physical factors (geology, soil, hydrology, climate) that help define their respective habitats, and in turn determine the type of animals and plants that live in that habitat. Geological provinces and ecoregions are closely linked. The comparison of geological and ecoregions maps demonstrates the boundary similarities. (Appendix 4. Case Study: Pennsylvania's Ecology illustrates this comparison in Figure A4-1 using the geology province map and an ecoregion map of Pennsylvania.)

Vegetation is heavily dependent upon the area's elevation, slope, drainage, stability, and nutrient availability conditions, in essence, the geology and soils. If plants

from one ecoregion are planted within another ecoregion, they will most likely not do as well as they would have in their own ecoregion. This is because plants (and animals) have developed and evolved under a certain set of physical conditions characteristic of their ecoregion, and if these conditions are not met, then they will have a difficult time surviving. In some instance, road locations and maintenance practices create conditions unnatural to that ecoregion, causing survival failures in otherwise viable animals or plants.

4-04 Plants develop and evolve under the physical conditions of their ecoregion.

This ecoregion concept is critically important for "environmentally sensitive maintenance for dirt and gravel roads." Road managers must understand natural systems to adopt effective road maintenance practices that provide sustainable roads without hurting the environment.

One key is to use nearby natural systems as an example of what our project sites should look like and how they should function. Projects, whether construction or maintenance, will be more successful if they are modeled after nearby natural systems because nature has already done the research for us. These natural systems can be used to determine what slopes are sustainable for road and stream banks, as well as what plants grow well in a specific location. The relative size of local drainage features serve as a guide for sizing drainage structures for the roadway system. Projects modeled after natural systems will also look more natural and aesthetic compared to more sterile engineering designs. And, as we shall see, we can learn how to use these natural systems to actually aid us in more effective and efficient road maintenance

Streams

Wetlands

Uplands

4-05 Ecosystems (Communities)

Ecoregions are broad areas that cover many different types of habitat, and because of this, ecoregions are often broken down into smaller units. Within each ecoregion, there are typically three types of ecosystems, or communities: streams,

wetlands, and forests/uplands. The term upland commonly refers to areas of higher elevation that are well drained, covered with forests or cleared for farming or have reverted to meadows.

Each one of these ecosystems relate differently to maintaining dirt and gravel roads. In the stream ecosystem, sediments and their effect on stream life are a major concern. Sensitive plants and animals are a major concern with wetlands, in addition to other major benefits, such as flood storage. Strict laws and regulations govern roads built through and near wetlands so we can continue to receive these benefits. Finally, in forested or upland areas, improper trimming and clearing of vegetation associated with road maintenance causes a major concern and unwarranted expense.

4.3 The Stream Ecosystem (Community)

4-06 There are 3,692,830 miles of rivers and streams within the United States.

4.3.1 Introduction: According to EPA's National Water Quality inventory, there are 3,692,830 miles of rivers and streams within the United States. This vast network of streams is a tremendous natural resource. There are a number of important interactions between our dirt and gravel roads and our stream networks. Precisely because our roads and streams are so closely linked, road managers must be extremely sensitive to the well-being of the stream.

4.3.2 Basics of Stream Ecology: Stream ecosystems, or communities, are dependent upon a wide range of both physical and biological factors, as reviewed previously. These factors, how they are connected, and their importance to the stream will be discussed in the following sections.

4.3.2.1 Watersheds: Streams are situated in the bottom of their valleys, draining water from the surrounding higher landscape. This area drained by the stream is referred to by several interchangeable terms: watershed, drainage basin, or catchment area. Although we typically perceive streams starting where sufficient water has accumulated to form a channel, streams actually begin at the highest points within their

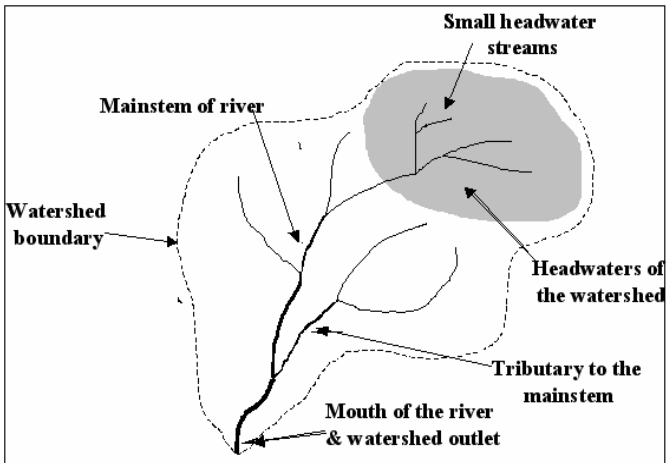

Figure 4-1 Watershed Features

watersheds, the point where precipitation first contacts the ground. Once precipitation hits the ground, gravity causes the water to flow downhill, first as a very thin sheet of water similar to a sheet of water flowing over a paved road. Irregularities in the ground surface break up this smooth flow, causing the water to accumulate in increasingly greater quantities. This water accumulation begins to cut a channel, first forming small rills, then gullies, and then becoming small streams. Small streams are formed in the headwaters portion of the watershed, as shown in Figure 4-1. Small streams join each other, accumulating more water until the flow eventually becomes a river.

Because streams obtain water from their watershed, activities that take place in the watershed can negatively affect the quality of the water entering the stream. If the stream receives polluted water, then the life in the stream will also be impacted. The pollution of our nation's waterways and water quality issues over the past 100 years has created much public resentment. In response to this pollution, laws were passed to protect our water resources as early as the Federal Rivers and Harbors Acts of 1890 and 1899. Pollution, and our knowledge of its impacts, has increased since these early laws, and additional regulations govern activities along streams in an effort to protect and preserve stream systems and the benefits that they provide. It is important to know about and work within these necessary legal restrictions when conducting road maintenance work.

Traditional management of our water resources has been based on political divisions (e.g., township, county, state boundary lines). Water, however, flows across these jurisdictional boundaries, making management and protection of this valuable resource difficult. Effective management must involve the challenging task of coordinating efforts between multiple political jurisdictions. One of the best ways to make the management of our water resources easier and more effective is to manage it on a watershed or catchment area basis. Because planning at the local level is often at too small a scale to address watershed size resource problems, local governments are strongly encouraged to communicate and coordinate control efforts with neighboring municipalities and county agencies.

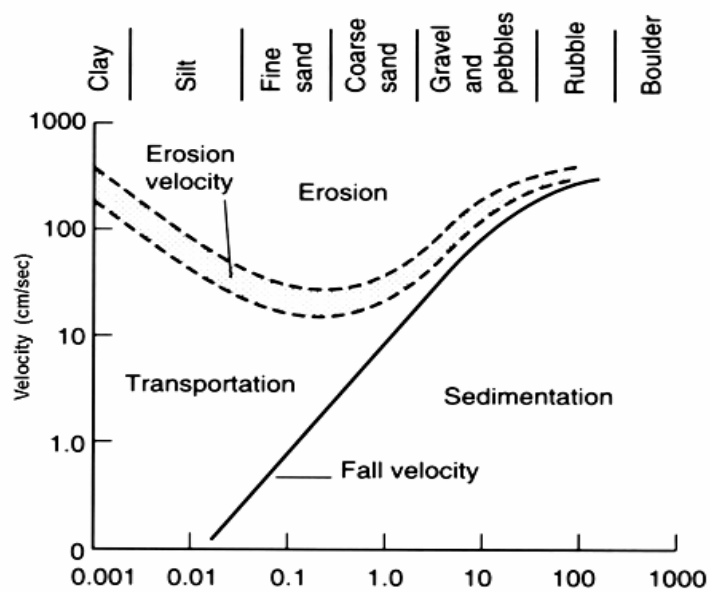

Figure 4-2 Average water velocities to erode, transport and deposit uniformly sorted particle sizes. Velocities between the dotted lines and higher will erode the indicated particle sizes. When velocities drop below the fall velocity line, there is insufficient energy to keep particles suspended in the water, so sedimentation occurs. Erosion velocities differ depending on the shape and bonding characteristics of the particles.

4.3.2.2 Stream Systems. As mentioned in our discussion of watersheds, streams are formed when water flowing downhill concentrates and forms a channel. The volume of water, the velocity, or speed, of water flow, and the characteristics of the underlying material influence the size, shape, and path of the channel. Although the information in this section refers specifically to streams and stream channels, these processes also explain and describe the interactions between water and sediment in drainage ditches.

Flowing water picks up (erodes) material from the bottom (bed) and sides (banks) of the stream channel. This eroded material is called sediment. The water's velocity determines how much material will be picked up, as larger sized particles, in general, require greater amounts of energy to erode or move them. Figure 4-2 shows the velocities necessary to erode, transport, and deposit uniformly sorted particle sizes. This figure also shows that clay sized particles require more velocity to erode than do larger, sand-sized particles. This is because electrical bonds associated with the clay particles help to hold them together, thus requiring more energy to pull this sticky material apart than to pick up the loose grains of the larger-sized sand.

The material that is eroded and carried by the water current is called suspended sediment. If the material is too large to be fully suspended in the water, it may either bounce (saltation load) or roll along the bottom (bed load), as depicted in Figure 4-3. When water velocities slow (e.g., when a mountain stream leaves a hilly area and starts across a valley floor), larger, heavier particles are the first to drop out of suspension and are deposited on the bottom of the stream. As water velocities continue to slow, there is less energy to suspend particles, and finer and finer particles continue settling to the bottom. This process is called sedimentation. Because clay is the smallest and lightest particle, once the stickiness is overcome and the particles are suspended, they remain in suspension longer and travel further than any of the other particle sizes. It can even take several days or weeks for clay particles to settle from perfectly still water.

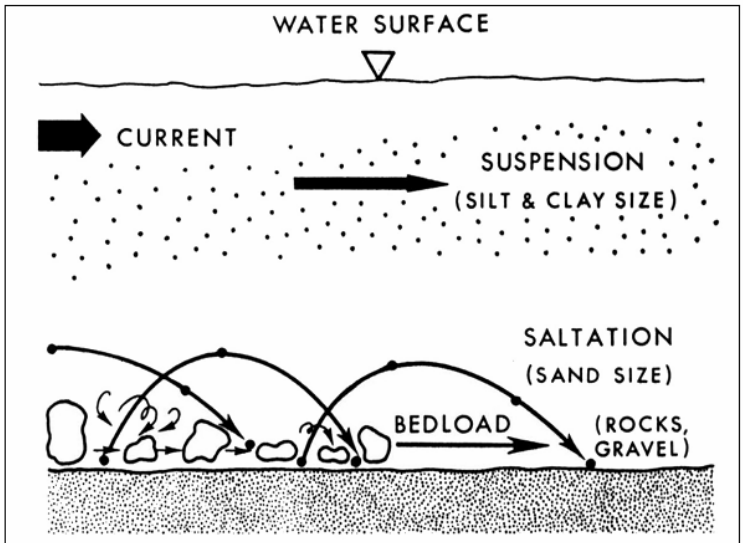

Figure 4-3: Water transport various sized particles in various ways.

Stream channels are dynamic because erosion and deposition processes change their form and shape (morphology) over time. They change both their cross-sectional profile (width, depth, and slope) as well as their 'plan-view' path. It is important to note that stream paths are not fixed in place; stream channels often migrate sideways, either incrementally by eroding their banks or by carving whole new channels through low-

lying areas. These changes in the shape of the stream channel occur both site specifically as well as throughout the whole stream system.

4-07 Streams are constantly eroding, transporting, and depositing materials.

Natural channels are constantly eroding, transporting, and depositing materials. Normal daily flows tend to redistribute small amounts of materials within streams. Storm events, however, introduce large volumes of water in to the stream system, which can significantly alter the morphology of a river or stream by cutting new channels, eroding whole banks, and gouging out shallow river beds. Sediment generated during flooding from major storm events is often carried out of the channel by flooding waters, where it is deposited and stored on the floodplain. These sediments enrich floodplain soils with nutrients, which enable plants to grow well in a floodplain environment. The plants and their roots also help to trap and hold the fine sediments in place. Over time, however, rainwater washing over the floodplain may erode and return some of this sediment to the stream.

As streams continue to erode, transport, and deposit materials, human activities anywhere within the watershed can interfere with these natural processes, creating conditions that alter habitat and disrupt the aquatic life that lives in the stream. For example, poor maintenance of a dirt or gravel road may cause excess sediment to wash into an adjacent stream. Excess sediments will be carried downstream until the water velocity slows and sedimentation occurs.

Individual streams are part of a network of channels that extend the whole length of a watershed. Because networks extend from the top (highest elevation) of a watershed to its outlet (lowest elevation), changes in the headwaters of a stream can affect the entire network. For example, logging a hillside in the headwaters of a watershed can cause more storm water runoff to reach the stream at a faster rate than it ever has before (trees block water flow across the ground and help the water sink into the ground). This extra flow is added to the existing water and can lead to problems downstream. Suddenly the 24-inch culvert that you installed last year is no longer large enough to handle the extra volume of water, resulting in water backing up and flooding out the road. This extra volume of water can also cause additional bank erosion and the redistribution of sediments that destroy habitat and clog drainage facilities and bridges.

4.3.2.3 Hydrology. A major factor influencing stream systems is their source of water and its movements within the watershed. Hydrology is simply the study of water distribution or movement within the watershed. Precipitation landing within a watershed can enter the streams by two different pathways. The most obvious pathway is when surface runoff flows across the landscape directly into the stream system. The less

obvious route is when it seeps (infiltrates) into the ground, where it becomes groundwater. Groundwater flows through the pore spaces between soil and rock particles, and shallow groundwater near the surface may eventually drain into a stream channel. Water may also follow a combination of these pathways. For example, precipitation may flow as surface runoff down a hillside where it settles into a depression. In the depression, it may infiltrate into the ground and flow as groundwater into a stream.

The speed at which water flows through a watershed and enters a stream system helps shape the channel and the habitat found within the stream. Surface runoff, especially after large storm events or when the ground is frozen, flows quickly over the land surface and enters the stream. This causes large amounts of water to enter the stream system within a short time period, exceeding the channel's capacity and resulting in flooding. Streams that receive a large portion of their water supply from surface runoff are susceptible to widely fluctuating water flows and levels. These fluctuating flows create a highly variable, stressful environment in which only specially adapted plants and animals may live.

4-08 Concentrated water flows cause many familiar maintenance problems.

Groundwater-fed streams have more stable flows and environments than surface fed streams. They fill slowly, accumulating groundwater as it makes it way through the tiny pore spaces in soil and rock. When large amounts of precipitation infiltrate into the ground and become groundwater, the surface runoff from the storm is drastically reduced. This water still may enter the stream system, but because it flows slowly through the ground, possible taking days, weeks, or months to reach the stream, stream flows become more stable. More stable stream flows tend to result in more stable channel conditions and in turn, offers habitat for plant and animals that are adapted to these stable conditions.

Several landscape factors influence water flow across and through the landscape. As will be discussed further in our sections on wetlands and upland communities, a watershed's vegetation usually slows the rate and decreases the volume of surface runoff by aiding infiltration of water into the ground. Plants are also able to diminish groundwater supplies by up taking water through their roots. Roads also influence water flow and can have a major impact on watershed hydrology. By cutting across the landscape, roads block, constrict, and divert both surface and subsurface drainage patterns, artificially acting to collect and concentrate flows. These artificially concentrated flows cause many of our familiar road maintenance problems, including washouts, rutting, and flooding. Alterations in subsurface hydrology can also lead to soft spots in roads where additional concentrated water raises groundwater levels and

groundwater flow is blocked. These problems and others are discussed further and addressed elsewhere in this manual.

4-09 As turbidity increases, light penetration decreases.

4.3.2.4 Water Quality. Water in natural environments is not just pure water. As mentioned in the previous discussion on watersheds, precipitation falls to earth where it moves over and beneath the ground's surface, down through the watershed and into the stream system. As the water moves through the watershed, it picks up materials and transports these materials into the stream environment. Materials may be transported as suspended sediment or may become dissolved in the water and carried as dissolved load. The type and quantity of materials entering the stream system from the watershed influence the overall quality of the water. This water quality is often evaluated by testing the water for specific chemical and physical characteristics, such as nitrogen, phosphorus, pH, dissolved oxygen, temperature, color, and turbidity. Turbidity is the degree to which the passage of light through water is blocked by suspended sediment, the cloudiness of the water.

Both the geology and the land use influence water quality. The rocks and soil in the underlying geology of a watershed have always influenced a basin's water. Rocks and soils add nutrients and minerals as well as filter excess materials from groundwater and surface runoff. The type of natural vegetated cover and human uses of the land also influence a watershed's water quality. Land uses such as roads, farming, construction, homes, industrial facilities, and urban areas have caused excessive materials to enter and harm stream systems. In particular, massive amounts of sediment have been eroded due to changes in land use over the past 200 years. These materials may either wash directly into the stream system or become bound to sediment particles and carried into the stream while attached to the sediment. Both natural and artificial materials that wash into streams may include sediment, fertilizers (nitrogen, phosphorus), animal wastes, human sewage, road salts, pesticides, herbicides, other chemicals, oil, and gasoline. The large number of roads crossing streams, unfortunately, has also provided opportunities to dump garbage, tires, appliances, and all sorts of other solid waste into our streams.

Water temperature is an especially important component of water quality for headwater streams. The temperature of the water in these headwater streams is largely influenced by the source of water. Groundwater-fed streams are fed by a relatively constant supply of cold water. Surface runoff-fed streams are fed by intermittent flows of water following storm events where the water flows across hot land in the summer and the cold (frozen) earth in the winter. These surface runoff streams have an irregular supply of water whose temperatures varies widely with ambient temperatures. Vegetation

along streams is also an important temperature influence because it helps to moderate water temperatures. In the summer, shading of streams by adjacent vegetation prevents warming, and in the winter months, forests can trap warmer air in valleys to delay cooling.

4-10 Life in a Stream

4.3.2.5 Stream Life. There are a wide variety (diversity) of organisms that utilize stream habitats, and each stream contains a mix of different species. This mix of species makes up the stream community. Types of organisms include plants, insects, crayfish, mollusks, fish, reptiles, amphibians, spiders, birds, and mammals. Some aquatic plants are microscopic and include things such as plankton and algae. Larger aquatic plants are very diverse, with some spending their life floating in the water, while others live by attaching to soil, rocks, or plants. Many different insects spend at least part of their life cycle underwater (the larvae stage), including dragonflies, mayflies, stoneflies, caddisflies, beetles, and true flies (e.g., gnats, midges, black flies, horse flies, and crane flies). For example, mayflies live in the bottom of streams for a year before emerging as adults to reproduce and die within 2 to 3 days. Although numbers are swiftly declining, freshwater clams and mussels are important stream organisms. Streams can contain a wide diversity of fish, including minnows, sculpins, perch, trout, bass, and sunfish. Turtles (reptiles) and frogs (amphibians) are also found living in and near streams. Birds, such as herons, ducks, and hawks, frequently live along streams. Streams also provide habitat for mammals such as river otters, raccoons, deer, and beaver.

4.3.2.6 Stream Food Webs. All living organisms need a source of energy (food) to survive. In general, plants get their energy from the sun and produce their own food. Animals, on the other hand, get their energy from three different sources. One group of animals, the herbivores, gets their energy or food from the plants they eat. The second group of animals, the predators, eats other animals for their food energy. The third group are the decomposers, who get their energy from plant and animal remains. In stream systems, aquatic plants utilize sunlight and nutrients absorbed from the surrounding water and soil to help them grow. The energy found in aquatic plants, and sometimes more importantly energy from bank-side and upland vegetation (**outside inputs**), provides food for aquatic insects and some fish. While some fish and insects use plant material for food, many others are predators and gain their energy by eating other animals. This concept of who eats what and whom was originally known as a food chain, but biologists have realized that it is more complex than a simple chain of events. The interactions between who eats what is extremely interconnected and is more like a food web than a chain.

4-11 "Outside Inputs" are essential to a stream.

Outside inputs in the form of plant and plant material falling into the stream form the base of the stream food web in headwater streams. The stream's inhabitants break down this plant material and process it in a number of ways. Bacteria and fungi attack this plant material initiating the decomposition process by beginning to break down the plant material, and freeing nutrients for other organisms within the stream system.

Algae and plankton within the stream utilize nutrients, fungi and sunlight to grow. In turn, these plants provide food for other organisms, such as aquatic insects. Aquatic insects play a very large and important role in the aquatic food web. These insects are generally in their larvae stage of development. One group of insect larvae are grazers and wander around grazing and scraping algae and bacteria growing on the rocks and decomposing plant materials. Another group are shredders, tearing up and eating leaves and other plant material that has fallen into the stream. The filtering group strain small particles of suspended debris from the moving water. And finally, there are the predators (both larvae and adults) who eat other insects and small fish.

4-12 Fish are an important part of the aquatic food web.

Fish are also important in the aquatic food web. Like the insects, fish have also become adapted to certain diets. Most stream fishes, like the trout, eat a variety of aquatic insects, while others, such as the northern pike, prey upon smaller fish for their survival. Other types of fish obtain their food from plants, decomposing material from the stream bottom, or are parasitic to other fish. All of this interaction of the various organisms illustrates the complexity of a stream food web.

Stream systems also play an essential role in many terrestrial food webs. They provide vital habitat for creatures to catch food and obtain water. Many important, game and non-game species are directly dependent on the use of streams and the organisms within for survival. And we cannot forget that streams play a role in the human food web, as attested to by many anglers.

4.3.2.7 Outside Inputs. We need to further emphasize the importance of outside inputs. Upper elevation streams are usually small, steep-sloped, fast moving streams.

These smaller headwater streams are less dependent upon materials generated within the stream and more dependent upon the outside source of nutrients and food to support aquatic life. Overhanging branches and bank-side vegetation serve as their primary source of nutrients. Leaves, branches, twigs, roots, and fruit fall into and are washed into the water and, as mentioned previously, become the basis for a food web in the stream. Thus, these outside inputs become vital to the health of the stream. The overhanging vegetation along the stream edges also shades the water so algae dependent on sunlight does not grow and is therefore not readily available as a food source for aquatic life. Shading also helps to moderate swings in temperature, which is an important benefit during hot summer days.

4-13 Clearing streambanks has many negative effects on streams.

Human activities can interfere with this critical component of the food web by clearing vegetation from along the stream banks. Unfortunately, clearing stream banks has been a traditional form of stream bank maintenance. This practice was thought to be beneficial for a number of reasons, including that it cleared the floodway, improved drainage, was easy to maintain, and looked cleaner.

We now realize, however, that there are a number of problems associated with this traditional practice. These clean stream banks in fact shortchange the start of the food web, starving the entire system. In addition, without the vegetation to shade the stream, water temperature increases, and native organisms may not be able to tolerate this increased temperature. Clearing stream banks reduces the number of places for aquatic organisms to live because there are fewer roots and branches that extend over and into the stream. The bank side vegetation also helps slow the velocity of surface water and prevent erosion of the banks into the stream. Finally, without the vegetation along the stream to dissipate energy, trap sediment and floating branches and debris, this material can end up collecting and blocking openings of culverts and bridges or other drainage facilities. We will discuss alternative practices to the traditional stream bank cleaning in Chapter 6.

This manual focuses predominantly on these headwater types of streams as they are the most likely streams to interact with dirt and gravel roads. Impacts to these streams, however, which serve as a source of water, sediments, nutrients and biological organisms for the stream system, can and will impact the larger downhill streams into which they run.

4.3.2.8 Stream Habitat. Each plant and animal species needs a certain set of physical and biological conditions to survive. The area within the stream where these conditions are present is the organism's habitat. Stream organisms have adapted to these conditions and subsequently have become dependent upon these habitat conditions for

survival. If one or more of these factors are missing, then the organisms dependent on those factors will have a harder time surviving. If the change is too great, the organism will die.

The suitability of the habitat also influences the abundance of a species. Abundance is critical because organisms need to be able to find mates to reproduce. If members of the same species are not abundant, fewer offspring will be produced, starting a downward population spiral. A decline of a species is significant for two reasons. First, as a living organism each individual and species has an inherent value. Second, declining populations of a species may upset delicate food webs by creating shortages for other species dependent on them for food, creating an imbalance in those populations, further disrupting the entire stream ecosystem.

4.3.3 Stream Management and Protection Goals. Streams are viewed as a public natural resource and, as such, are protected under various federal, state, and local laws and regulations in addition to many state constitutions. This protection covers the purity (quality) of the water as well as the organisms living in the stream. To this end, one of the primary goals of managing and protecting streams is to maintain a healthy and naturally producing fish community. Natural reproduction of fish is an important goal, and fish are dependent upon a clean, healthy stream environment in which to live. The lack of a naturally reproducing fish community is often an indication that conditions within the stream have degraded.

4.3.3.1 Indicator Species and Community Composition. Effective stream systems management requires some kind of indicator to help managers measure conditions within the stream. Although stream biologists have a wide range of tools and tests that can be performed to help measure stream health, stream ecology is a complex science. Stream ecologists have a strong understanding of the processes and interactions that take place in streams, but there is still much to be learned about these systems. Biologists have learned that instead of trying to monitor all the conditions that organisms require to survive, they can monitor the population of certain existing species and the community composition within the stream environment. These indicator species are sensitive to changes within the stream system, and if one of their habitat and resource needs is impacted, then changes in species abundance will indicate to biologists that something is wrong within the stream. Thus, indicator species are analyzed in the context of the overall abundance of organisms in assessing the condition of the aquatic system.

4-14 Trout is a water quality indicator species.
(Photo courtesy of Trout Unlimited)

Trout are frequently used as an indicator species within headwater streams because, as a top predator, their survival is dependent upon a broad range of stream components. Some of the habitat needs of

trout include cool, clean, well-oxygenated water, suitable invertebrate food sources, cover to hide from other predators and to rest, and spawning sites with gravel beds.

The life cycle of trout is important for their selection as an indicator species. If we look at the brook trout as a common primary species, these trout use their tails to dig nests in gravel streambeds in October and November of each year. The eggs are deposited and then fertilized before they are covered over with loose gravel. These nests need large amounts of cool, clear water flowing through the gravel as it supplies the eggs with oxygen dissolved in the water and carries away waste products produced by the developing eggs, as illustrated in Figure 4-4. This is a critical period for the new trout population because sediment deposition at this point can smother and kill the entire year-class of fish. If all goes well, these eggs will then hatch in March and April.

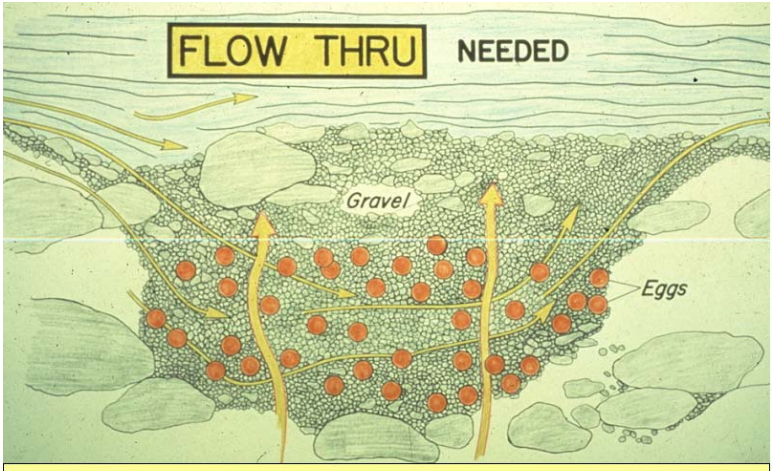

Figure 4-4: Trout eggs need clean flowing water for oxygen

Once the eggs hatch, the trout are initially called sac-fry because they carry their first month's supply of food in an attached yolk sac. At first, this yolk sac is quite large in relation to the size of the fish, which limits the ability of the sac-fry to move about and escape predation. The yolk sac is gradually absorbed during the first month of the fish's life. After the yolk sac has been absorbed, the trout are then called fingerlings. These fingerlings are increasingly mobile and look for minute particles of food. Fingerlings will grow as juvenile trout until they reach sexual maturity at about one to three years of age. Maturity typically corresponds to about 8 inches in length, but depends on environmental factors such as food supply and stress.

Hatching trout fry are typically abundant, but because of the harsh competitive stream environment, less than one percent of the hatched fry will live longer than one year. As will be further discussed, sediment is one of the major environmental factors that decimate the newly hatched young of the year's trout population. Once past this one-year milestone, the death rate of young trout declines sharply because the older and larger trout are better equipped to survive.

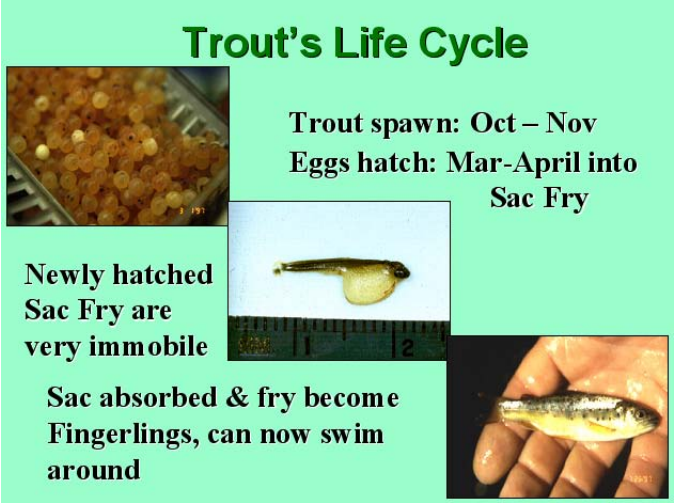

4-15 A Trout's Life Cycle

If done improperly, the initial grading of dirt and gravel roads in the spring time with the possible resulting sediment can totally wipe out an entire one year's population of newly hatched sac-fry trout for a nearby stream.

4-16 The stonefly larva is another indicator species.

Other useful indicator species of stream health are the "macroinvertebrates" such as stoneflies, mayflies, and caddisflies. Some of the stonefly species are particularly sensitive to changes in water quality and methods have been developed to use these insects to evaluate stream health. In general, the public is less aware of the importance of stoneflies and other macroinvertebrates as indicator species for a healthy stream because they are harder to identify and are definitely less charismatic and less tasty than trout.

4.3.3.2 Stream Evaluation. State environmental agencies routinely monitor streams to ensure water quality and overall stream health. These agencies conduct biological and chemical surveys in an attempt to measure habitat conditions and see what pieces of the food web are present. This generally involves various techniques such as the use of electro-fishing gear to shock and temporarily stun fish, which are then collected, identified, measured, weighed, counted, and released. Various methods are used to collect, count, and identify invertebrates living in the streambed, floating in the water, and hiding in the vegetation. Data collected from these surveys are then analyzed and used to make management decisions.

4-17

4.3.4 Impact of Erosion and Sediment on Streams. Excessive erosion impacts streams in a number of ways. Many of the physical effects, such as bank erosion and channel migration, have been discussed in Section 4.3.2. Sediment generated from this excess erosion, however, critically harms the stream system as will be discussed here.

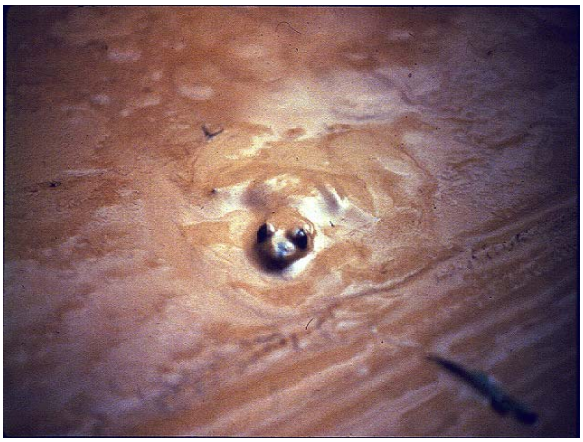

4-18 Excessive sediment causes distress for the stream's inhabitants.

As we stated earlier, sediment in stream systems occurs naturally. Although these natural occurrences can be devastating, stream channels and stream life are more adapted to these natural influxes of sediment and can usually recover appropriately. It is the excessive amounts of sediment and selective particle types and sizes (commonly fine silt and clay) that end up in stream systems as a result of human activities that disrupt the stream ecosystem beyond their ability to recover. These disruptions can cause the original habitat to become unsustainable for the native organisms. These organisms will either die off or move to more suitable habitat. As the former occupants vacate this new habitat, new organisms that prefer the altered habitat will take over. The original nature and character of the stream will have been altered, perhaps changing the stream from a high-quality trout stream to a less valuable and productive stream polluted with what sportsmen call "trash" fish.

Timing of sediment and erosion events is not spread evenly over the course of a year. These events are highly seasonal, with heavy rains and stream flows coinciding with spring construction and road maintenance activities. This combination of events leads to a large percentage of the year's total sediment ending up in stream systems within a short time period during these spring months. During other times of the year, generally drier weather conditions and better established vegetation that is able to hold soils in place or filter sediment from runoff, result in less erosion and sediment into the streams. Although not always practical, shifting human activities (ditch and bank repair) from the spring to the summer or fall months can significantly reduce the sediment pollution entering streams.

However, even modest amounts of sediment entering streams during periods of drought or low-flows may cause problems. During drier periods, many streams are subject to low-flow conditions, with water only present in the deepest part of the stream channel. Summer storms can cause flash flooding and sudden influxes of sediment from disturbed earth into the stream. These floodwaters can quickly recede, leaving water levels low, with much of the sediment recently being left behind in the deeper parts of the channel. These sediments remain for longer periods and reduce living space for aquatic organisms. This can be a real problem because it occurs at a time when water temperatures and other conditions are also very stressful.

4.3.4.1 Suspended Sediment (Turbidity). Earlier in this chapter we talked about suspended sediment and the fact that fine particles stay suspended for much longer periods of time than larger particles, and clay can stay suspended for days and weeks in still water. Once sediment is suspended in the water, it interferes with the habitat needs of both plants and animals. For plants, the sediment particles suspended in the water increase the turbidity of the water, blocking light as well as decreasing the depth to which light penetrates. Decreasing light, the source of energy for plants, results in less food production for plants and less plant growth. With less plant growth, there is less food available at the bottom levels of the food web. This food shortage can cascade through the food web, resulting in less food for top predators like the trout.

4-19 Suspended sediment interferes with both plants and animals within the stream.

Suspended sediment also impacts the aquatic insects and fish directly. Many fish and insects rely on their vision to detect prey and help avoid predators. As the suspended sediment decreases the visibility through the water, organisms will find less food and have a decreased ability to avoid being eaten. Fish and many types of insects breathe underwater by using gills to gather dissolved oxygen from the water. Gills are sensitive organs and suspended sediment can clog them, making it harder for the fish to breathe. Gills are also subject to abrasion from sediment particles. Sediments are particularly harmful to the relatively immobile sac-fry. These physical impacts to aquatic organisms are likely to make it harder for the individuals to find food, eat, and grow normally. With abnormal growth, organisms do not have the energy to fight off disease or to reproduce.

4-20 Embeddedness refers to the sediment filling in all the nooks and crannies in the streambed.

4.3.4.2 Sedimentation (Embeddedness). As water velocities slow within the stream environment, sedimentation occurs. The primary impact of excess sediment in the channel is the altering of habitat. The sediment settles down into the nooks and crannies between the gravel and rock substrate. Insects and small fish need these spaces to graze algae, hide from predators, hunt prey, and as shelter from the faster flowing currents above. Filling in these spaces with

4-21 Contaminants attached to sediment particles further degrades water quality.

sediment reduces the amount of living space available. Some plants and animals may also be buried and suffocate. Sedimentation is particularly harmful to trout reproduction because it kills the eggs while they are incubating in the gravel nests over the winter months.

This filling in of the nooks and crannies in a gravel streambed by sediment is referred to as embeddedness. A typical trout stream is usually about 30% embedded, while one that is completely buried by sediment would be described as being 100% embedded.

4.3.4.3 Attached Contaminants: Another impact of sediment on streams stems from the materials such as road salt, fertilizers, pesticides, oils, greases, and other toxic compounds that are often attached to the sediment particles. Once in the water, these attached compounds may degrade water quality.

4.3.5 Fish Constituency: Fish, unlike many other organisms in the stream environment, are unique in that they have advocates who represent them – the sport fishermen. Angler groups have organized at the local, state, and national levels, where they effectively lobby for government action. These groups, such as Trout Unlimited and B.A.S.S. (Bass Angler Sportsmen's Society), act as watchdogs to protect their fishing interests and aquatic resources. These groups can be a source of positive support for local governments or can make life difficult if inappropriate actions threaten our aquatic resources.

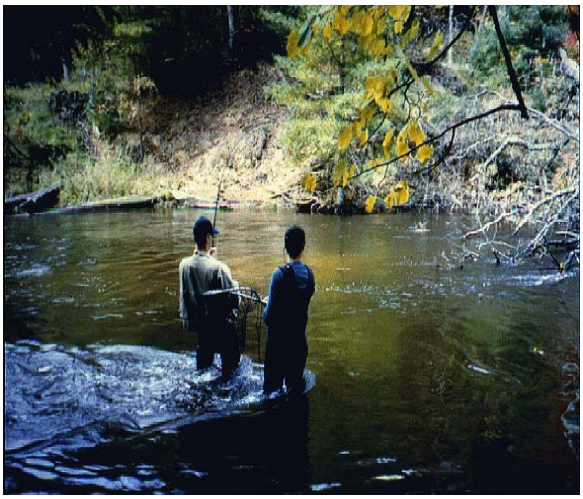

4-22 Anglers are avid fish advocates and can be a positive resource.

Anglers, however, do not always have a positive impact on the stream ecosystem. In their efforts to pursue their interests, they frequently create and use stream access points, footpaths, and car pull-offs. These places can often become a source of erosion and sediment or even interfere with erosion control measures that local governments have already put in place.

Just as when dealing with any group of stakeholders, whether they are landowners, businesses, environmental groups, or angler organizations, the most effective approach is to collaborate, or work together. Collaboration between local governments and angler groups offers tremendous potential. If these stakeholders are included in the decision-making processes, they may be able to add constructive and helpful suggestions, provide resources to aid projects in the form of funds, materials or people, and positively influence other groups, agencies or elected officials as needed. Many of these groups have vast volunteer resources that can be tapped for construction and maintenance projects. It is also an additional opportunity for the community to become more knowledgeable about road maintenance concerns, activities and budgetary limitations.

4-23 Anglers can also have negative effects on stream ecology as stream access points, car pull-offs, and footpaths become erosion sources.

4.3.6 Stream Ecosystem Summary. Streams are an important natural resource. Stream communities are dependent upon the types of physical and biological habitat present within the stream system. Stream flows and water quality conditions shape this habitat and are strongly influenced by both the watershed's underlying geology and land use. Trout and macroinvertebrates, such as stoneflies, are considered good indicators of the health and quality of our headwater streams, as they are sensitive species dependent upon a number of factors that are likely to be impacted by adverse conditions within the stream system. Human activities, such as road maintenance, construction, logging, agriculture, development, and industry, can threaten the health of our streams and the organisms that live there. Excessive erosion and sediment from dirt and gravel roads is one of the primary threats to our streams, altering the entire stream ecosystem. Collaboration with stakeholders, such as anglers, farmers, and landowners, can help alleviate some of the problems and benefit local government in a variety of ways, especially in helping in the planning, construction, and maintenance of environmentally sensitive practices and projects.

4-24 Wetlands are important ecosystems.

4.4 The Wetland Ecosystem (Community)

4.4.1 Introduction: The wetland ecosystem or community is an important one, with wetlands currently covering over one hundred million acres of land in the lower 48 states. Although the word "wetland" seems to conjure up visions of wasteland swamps inhabited by undesirable

creatures or fears of stifling regulations, wetlands provide valuable services and functions that are beneficial to both humans and the environment. This section will define and describe wetlands, discuss the history of management, regulations and wetland loss, introduce the valuable benefits derived from wetlands, and help road managers recognize wetland areas in order to avoid conflicts with existing regulations.

4.4.2 Definition of a Wetland: Under the Federal Clean Water Act, a wetland is defined as "those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions."

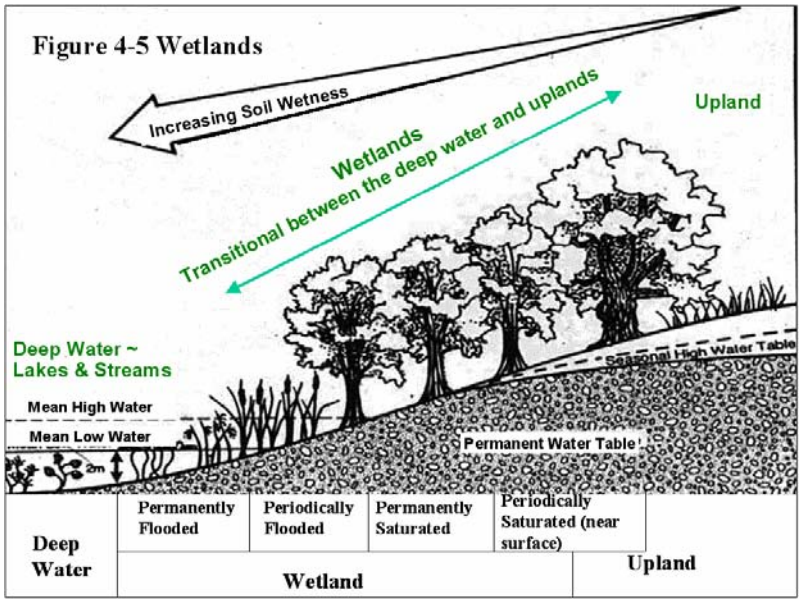

Simply put, a wetland is an area that meets a certain set of soil, plant, and moisture requirements. So there are three basic characteristics common to all wetlands:

a) For at least part of the year, water must be present at or near the ground's surface.
b) Plants must be adapted for wet soil conditions.
c) Soil types must have developed under saturated conditions.

Wetlands are often the transitional area between the deep water and the uplands and can include permanently flooded areas to periodically flooded areas to permanently saturated areas to periodically saturated areas, as depicted in Figure 4-5.

4.4.3 Wetland Basics. A number of environmental factors affect these three wetland characteristics. For example, the amount of water found within a wetland can be influenced by either surface water or groundwater. The source of water plays an important role in providing outside nutrients to wetland systems. The underlying geology and topography of the landscape can influence the location and formation of wetlands. Geology also dictates the rock types that serve as parent material for the initial wetland soils. These mineral soils, however, are often buried under thick layers of organic peat and muck common to many types of wetlands. These moisture and soil factors, in addition to climate characteristics, directly influence the types of vegetation that are present within the wetland. The water in a wetland is directly responsible for forming the hydric soils.

A hydric soil forms when soil is saturated with water for extended time periods. There are a number of biological and chemical processes that take place in soil that influence its formation and the types of plants that it is able to support. In drier soils, oxygen is typically abundant and leads to the formation of upland soils. When soils are saturated, however, natural processes deplete oxygen from the soil and produce very different wetland soils. Many wetland soils also have a much higher percentage of organic matter (decaying plant and animal life, etc.) than do upland soils, a factor that greatly increases the availability of nutrients and food for many wetland plants and animals. These hydric soils also have visible characteristics making them readily identifiable. Hydric soils mark wetlands; recognize the soil and you identify a wetland. The details of wetland recognition will be discussed later.

Wetland plants are those plants that have adapted to life under wet conditions. These plants have taken on a wide range of forms, from pond lilies to trees, in order to take advantage of the many different types of wet habitat. The major difference between these wet habitats is the variation in the amount or depth of water, which changes along an elevation and moisture gradient. For example, pond lilies can only grow in three to four feet of water, while red maples only tolerate periodic saturation. The moisture conditions within each of these habitats fluctuate according to seasons and weather patterns from year to year, with some locations wetter during the winter and spring months than during the warmer months. This variation in moisture or water levels is important because many of the wetland plants, especially grasses and herbs, require drier periods to produce seeds and germinate. Additionally, just as with stream systems, the variability of conditions within each habitat helps maintain a broader mix (diversity) of plant and animal species.

The presence of wetlands is dependent upon a delicate balance between the right soil, water, and vegetation characteristics. While natural variation within a wetland is normal and desirable, human induced disturbances can disrupt wetlands beyond their ability to recover. Human activities near wetlands may alter the flow of water into and out of wetlands, and/or lead to excessive inputs of sediment, nutrients, and chemicals. Care should be taken while conducting road construction and maintenance activities to prevent both short- and long-term impacts to these delicate ecosystems. It is important to note that wetland ecosystems are protected by stringent state and federal laws that restrict activities in and around these areas, as will be discussed in Subsection 4.4.4.2.

4.4.4 Wetland Management. Historically, as mentioned, wetland areas have received a bad reputation as dismal, disease-ridden, unproductive wastelands. As early as the Swamp Land Act of 1849, Congress encouraged draining and filling wetlands for development. Since then, in the name of progress, amazing efforts were put forth to drain and fill vast marshes and swamps to give these lands a purpose. These former wetlands were converted for residential, agricultural, and industrial uses.

These negative attitudes towards wetlands, however, have begun to change over the last several decades. We now realize that wetlands provide many physical, mechanical, and biological benefits that are useful not only to the natural environment,

but to humans as well. Consequently, we have begun to protect wetlands and even replace some of the ones that have been lost to development. So the management of wetlands has come full circle over the last century. Undisturbed wetlands are now viewed as very productive, valuable natural resources for many reasons as will be reviewed in Subsection 4.4.5.

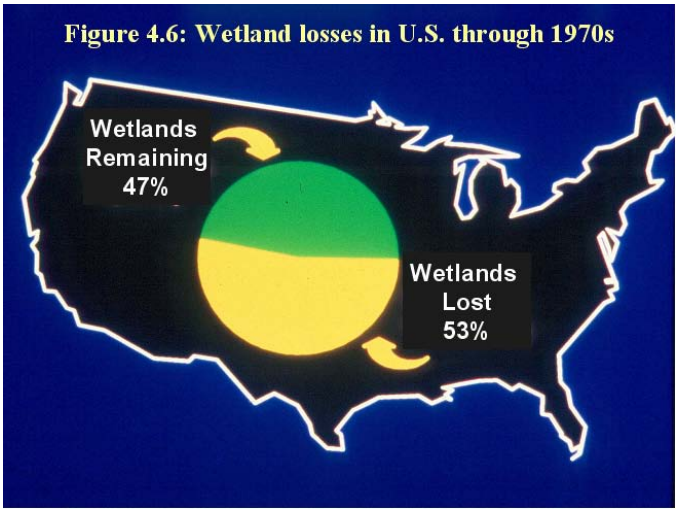

Figure 4.6: Wetland losses in U.S. through 1970s

4.4.4.1 Wetland Loss. Over half of our original wetlands in the United States have been drained and converted to other uses. Major wetland losses occurred from the mid 1950s to the mid 1970s, with the rate of loss decreasing since then. Various factors have contributed toward this decline in wetland loss including the adoption of wetland protection laws and regulations. "Public education and outreach about the value and functions of wetlands, private land initiatives, coastal monitoring and protection programs, and wetland restoration and creation actions have also helped reduce overall wetland losses," according to the U.S. Environmental Protection Agency.

We now understand that wetlands provide many beneficial services and host the most productive habitats on earth. Wetlands, however, can be harmed by many different human activities including draining, dredging, stream channelization, filling, diking and damming, logging, mining, tilling for crops, and miscellaneous pollution discharges. The conversion of wetlands for development and agricultural purposes has probably resulted in the largest loss of wetlands. The loss of wetlands results in a loss of all the benefits derived from them. And all wetlands are important, no matter what size, location, or quality.

4.4.4.2 Regulatory Protection. The regulatory protection of wetlands began early in the 1900s when people began to recognize their value as breeding and fishing habitat for waterfowl. One of the early protection measures was the establishment of many National Wildlife Refuges in which wetland habitat was protected and enhanced for waterfowl and other water birds. During the years since this initial recognition of the wildlife value of wetlands, scientists, policy makers, and the public have also realized that wetlands provide society with many other benefits.

In the 1960s and 1970s, both the federal and state governments began to enact laws that protected wetlands. There are a number of federal agencies that work to protect our wetland resources, including the Army Corp of Engineers, the U.S. Environmental Protection Agency, the U.S. Fish and Wildlife Service, the U.S. D.A. Natural Resources Conservation Service, along with the corresponding state and local agencies. This list of agencies represents a broad spectrum of program areas, ranging from navigation to water

quality and from wildlife management to soil conservation. This spectrum thus represents the complex array of issues associated with the protection of wetlands and each agency is responsible for portions of our federal and states wetland regulations.

The regulatory environment at the time these wetland laws were enacted utilized the permitting process as a major tool to protect wetlands. This system of permits remains in place today. The permitting process is not intended to stop work activities; rather, it is designed to help people learn about wetland benefits as well as methods to lessen the impact of their activities on these important natural resources. In essence, permits are agreements between regulatory agencies and applicants governing work activities in and near wetland areas and outline necessary protection measures. Permits limit the loss of wetland area and help protect existing wetlands from excessive erosion and sedimentation, disruption of wetland hydrology, and pollution from sources such as mine acid drainage, toxic substances, and nutrient runoff. When necessary, permits also provide regulatory agencies with a basis for levying fines and forcing remedial action against those who have failed to live up to the permit's terms.

These regulatory agencies also have procedures for dealing with people who either intentionally or unintentionally harm these valuable natural resources. Local governments and road managers cannot afford to be ignorant about the value of these resources, since ignorance is not a defense against the penalties that may be imposed. The replacement, or mitigation, of wetlands is an expensive prospect, with engineering, land purchases, construction, and operational costs reaching into many thousands of dollars per acre.

Wetlands are also protected by many private groups. Conservation groups acquire land and provide education and volunteers at local, state, and national levels. Several major conservation organizations include The Nature Conservancy, Ducks Unlimited, the National Audubon Society, and the National Wildlife Federation. While these groups do not have the authority to develop their own regulations, they are considered "watchdog" groups and actively advise regulatory agencies of possible violations. Many of these groups also purchase property to protect and preserve sensitive habitat and /or species. Litigation is likely to be a possible response in a case where one of these properties is threatened by off-site sources of disturbance.

4.4.5 Wetland Benefits. Many valuable benefits are associated with wetlands. It is important, therefore, to become familiar with these benefits so that we can take a common sense approach when dealing with roads and wetlands. The following subsections describe the major benefits derived from our wetlands.

4.4.5.1 Floodwater Storage. A significant wetland benefit is the role that they play in floodwater storage. Since many wetlands form in low-lying areas, they are often the first areas to receive water when surface water runoff fills the streams to overflow their banks. The vegetation in these wetland areas slows the movement of the floodwaters, which are temporarily adsorbed, or held back, by the wetland. The wetland acts like a sponge, holding the excess storm water. As time passes, water is slowly released from its temporary storage within the wetland and drains either into the ground to become groundwater or back into the stream network. An engineer's "hydrograph" shown in Figure 4-7, which depicts the amount of flow during a storm time period, illustrates the flood storage benefit of wetlands. The wetlands spread out the flow of water into the stream over a longer period, decreasing flood flows and the peak flood flow that would occur without the wetland. Thus, with less water to overwhelm the stream channel, the height of floodwaters and the area flooded will be reduced.

4-25 Wetland flood storage, a definite benefit

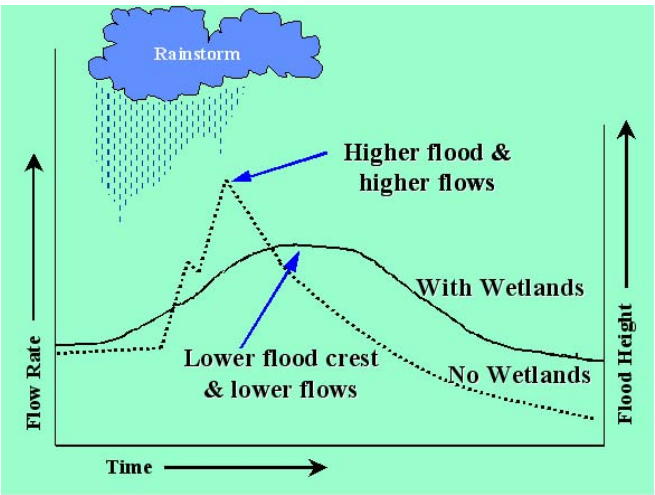

Figure 4-7 Hydrograph

The Charles River in Massachusetts serves as a good example of the beneficial use of wetlands for floodwater storage. The Charles River watershed has approximately 8,400 acres (13 square miles) of wetlands located in the river's floodplain. The lower portion of the river flows right through Boston, posing a serious flood threat to the city. In the early 1970's, the U.S. Army corps of Engineers studied flood control options to protect Boston. The Corps found that the wetlands were so effective at storing floodwater that the best flood protection option was to purchase the floodplain wetlands instead of building structural flood controls, such as levees and detention basins, saving millions of dollars in construction over and above the purchase of the wetlands.

Wetland preservation can thus provide a level of flood control which would otherwise have to be provided by expensive structural facilities and/or dredging

operations. As another example, the bottomland hardwood-riparian wetlands along the Mississippi River once stored at least 60 days of floodwater, but, because of wetland loss due to filling and draining, they now only store 12 days' worth. (U.S. EPA)

4-26 Bank stabilization/ shoreline protection - another wetland benefit.

4.4.5.2 Bank Stabilization (Shoreline Protection). Wetland plants typically help stabilize stream banks and shorelines. Both emergent plants, which grow up out of the water, and woody wetland vegetation have a complex root system that helps hold the plants in place in the soft, wet soils. This extensive root structure also helps to keep the soils in place. In areas where shoreline vegetation has been removed, water currents can swiftly erode the exposed soils. Once eroded, these soils can significantly impact stream systems, as discussed in the previous section on The Stream Ecosystem.

4.4.5.3 Energy Dissipation. Wetland vegetation also helps reduce erosion by providing resistance to moving water currents and waves. The vegetation slows the flow of water as it is spread out over the wetland and dissipates its energy. Although vegetation is not able to stop all of the erosion associated with water currents, it can drastically reduce the impact by reducing the velocity of the water by up to 90%.

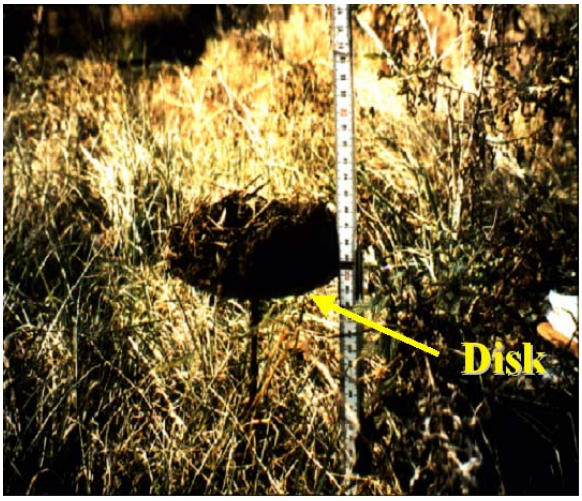

4-27 Sediment study being conducted in a wetland.

4-28 Do NOT use wetlands as sediment traps!

4.4.5.4 Sediment Trapping. Many wetlands, especially those located along the edges of rivers and streams, act as natural sediment traps. As the water slows from spreading out over the wetlands and meeting the flow resistance of vegetation, the flow energy becomes insufficient to carry the suspended sediment, and the larger and heavier particles begin to

settle out. The accumulation of sediment within wetlands is a naturally occurring process, and each wetland has its own sedimentation rate. For, example, one particular wetland may have two inches of sediment deposited each year, while another wetland may typically receive only a quarter of that amount. Studies are conducted to determine the amount of sediment received by wetlands.

This natural sediment trapping wetland function does not mean that wetlands should be used as sediment collection basins. Human activities can seriously increase the natural sedimentation rate and when wetlands fill in, many of the associated benefits are lost.

4.4.5.5 Water Quality Improvement. Wetlands play an important role in improving and maintaining water quality. As mentioned previously, vegetation helps to filter sediments from the water, making the water cleaner and better able to transmit light to underwater plants. These sediments are often nutrient rich, which supports the growth of wetland plants. Materials dissolved in the water also provide a source of nutrients for wetland plants, as well as microorganisms within the soil.

Unfortunately, just as with stream systems, the water quality associated with wetlands is frequently harmed by excess nutrients and chemicals from agricultural and urban runoff and other human activities. These compounds can be dissolved in the runoff or attached to the sediment particles in the runoff. Many of these compounds are filtered from the water by wetlands plants and are even transformed from toxic compounds into harmless compounds. Many wetlands, however, must still process the materials that naturally end up within their boundaries, and excessive materials coming from human sources can easily overwhelm a wetland's ability to improve the water quality.

4-29 Wetlands serve as "riparian buffers"

Wetlands also serve as "riparian buffers" for streams and rivers. The term riparian refers to the portion of the landscape that is located immediately beside the stream or river, while the term buffer refers to a type of filter or barrier. Simply stated, a riparian buffer is any strip of vegetation left intact along a stream or river that can filter out excess sediment, nutrients and chemicals from runoff before the runoff enters the stream.

It is important to note that not all riparian buffers are wetlands because buffers can be constructed in upland areas and contain non-wetland plants. One type of buffer, vegetated filter strips, will be covered in Chapter 5.

4.4.5.6 Ecological Benefits. Wetlands possess a unique combination of physical and chemical conditions that provide ideal habitat for a diverse mix of plants and animals. Many of these wetland organisms have adapted to the unique conditions within wetlands; and if the wetlands are lost, then so are the dependent species that may not be able to survive in any other type of habitat. More than one third of the threatened and endangered species in the United States live only in wetlands. Additionally, many other animals and plants depend on wetlands for survival.

4-30 Wetlands provide vital habitat for a diverse mix of plants, including threatened and endangered species.

Wetlands offer numerous habitat benefits to insects, amphibians, fish, and birds alike. The thick wetland vegetation provides shelter from the elements as well as cover to hide from predators. Wetlands provide habitat for reproduction and developing young for many different terrestrial and aquatic species. The plant material within the wetland also serves as building material for nests and other types of homes. Wetlands provide required habitat for one third of the resident bird population in the United States. Wetlands provide vital habitat for amphibians such as frogs and salamanders, particularly the small forested wetlands, which are only wet during the spring months.

4-31 Wetlands provide Wildlife Habitat: Fish, amphibians, birds, animals. 1/3 U.S. resident bird species dependent on wetlands, especially important for waterfowl.

Wetlands also play an important role in the food web. Wetland vegetation serves as a source of plant material that is eaten by insects, fish, birds, and mammals. These animals, in turn, provide food for the predators. When wetland plants and animals die, their remains break down and decompose, where their nutrients replenish the wetland soils and provide nourishment for additional plant growth.

4.4.5.7 Economic and Social Benefits. Many of the plant and wildlife species that utilize wetlands are economically valuable. Wetlands are home for many commercially important plant species, such as blueberries and cranberries. Bass and other game fish grow and hunt among the wetland vegetation, which also provides critical nesting habitat for most of our waterfowl.

4-32 Wetlands provide many social and economic benefits

- **Education**
- **Recreation**
- **Bird Watching**
- **Hunting**
- **Fishing**
- **Photography**
- **Painting**

Groups such as Ducks Unlimited were among the first to recognize the importance of wetland habitat to ducks and geese. Because of this group's efforts, many thousands of wetlands acres have been protected and restored.

One of the most important benefits of wetland habitat is their use by migratory species. Migratory animals, such as fish, waterfowl and other birds, and insects, use wetlands as places to temporarily rest and replenish food reserves on their long journeys. Many of the wetlands used by migratory animals are relatively small in size, but not in their importance to serve as sanctuaries in our increasingly developed landscape. Because many of these wetland sanctuaries are not large or easily identified, there is a danger that little patches of wetlands will be lost as a result of road maintenance practices and decisions.

Wetlands provide a number of social benefits and opportunities to those who live in and near communities with wetlands. These benefits are largely social in nature, however; just as with stream systems, many of these social benefits also help to support local economies. These economic benefits stem, either directly through creating demand for education or recreation related jobs and services, or indirectly through related spending for gas, lodging, and meals.

Wetlands provide great locations to educate children and adults on a number of different topics. Wetlands provide space that can be used as outdoor classrooms for teaching biology, ecology, natural history, photography, bird watching, painting, arts and crafts, hunting, fishing, trapping, and many other topics and activities.

4.4.6 Types of Wetlands.

There are several systems for classifying wetland types, and each has its own merits. For our purposes, and ease of recognition in the field, we will discuss a system that divides wetlands into three different categories or types. These three types are classified based upon where they are located in the landscape and are more closely associated with the road environments in the forested areas that are the focus of this manual. Some wetlands form in depressions, some form on slopes, while others form along floodplains.

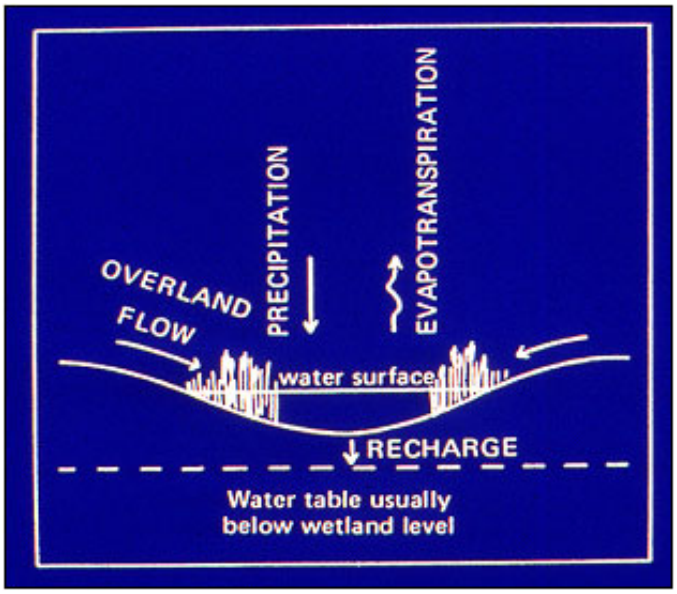

Figure 4-8: Depression Wetland

Depression wetlands form in low lying, bowl-shaped areas. Water enters these wetlands from surface water sources and sometimes ground water sources as well. Figure 4-8 illustrates that these wetlands can have a permanent pool, but in many cases will have various fluctuating water levels depending on precipitation and actually become dry on the surface in times of little or no precipitation. Typically, these wetlands do not have streams or other obvious exits, so water in these wetlands must exit either by evaporation, plant uptake, or by draining into the soil. In forested areas, these "vernal pools" are a prime habitat for a diverse population of amphibians.

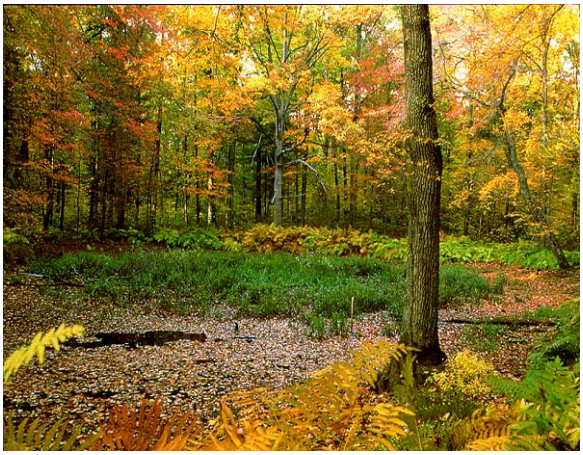

4-33 Depression Wetland (Vernal Pool)

Wetlands that form in these depressions are often the most vulnerable to sedimentation caused by human activities because it is difficult for the sediment to be flushed out of the depression. When excessive sediments

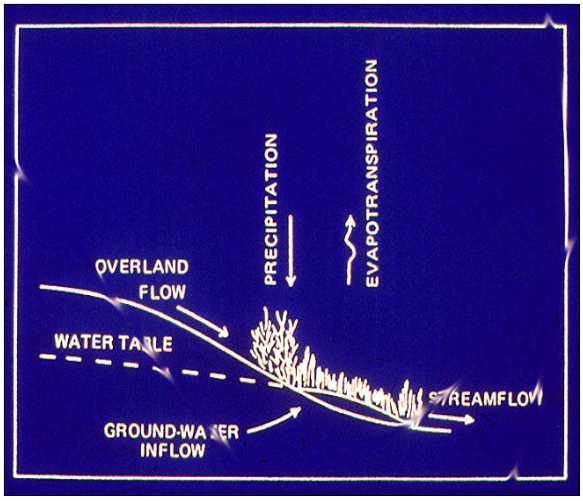

Figure 4-9: Slope Wetland

accumulate in these depressions, it buries plants and animals and can quickly fill in the entire wetland area. This can cause the moisture and soil conditions to change, forcing the plant community to rapidly transition to a more upland mix of species. The wetland plants are then lost along with the wetland and associated benefits.

Sloped wetlands are those wetlands that form on the side of hills and gentle grades. These wetlands typically develop on slopes that have about a 3% grade. This is a common type of wetland found in forested areas where the groundwater emerges at the surface of a slope to supply the wetland, as shown in Figure 4-9. Streams may also enter and leave these wetlands and carry excess sediments during periods of high flows out of the wetland area to locations downhill and downstream. Although still vulnerable to impacts from excess sediment, this ability to remove sediments means that these wetlands are less vulnerable to filling than depression-type wetlands.

4-34 Slope (Seepage) Wetland

Floodplain wetlands are found along the fringes of lakes, rivers, and streams. This wetland type includes vegetation that is commonly submerged by water, as well as vegetation that is temporarily covered with water during periods of high water. This is the most easily recognized and common type of wetland in most areas, as depicted in Figure 4-10. Fluctuating water levels brought about by periodic flooding are critical to the continued survival of these wetlands. Flooding generally occurs during spring months; however, these wetlands can be either dry during much of the year or fairly wet. Sometimes floodplain wetlands also receive water from groundwater sources, and these wetlands tend to be wetter over longer periods. Although all wetlands can be impacted by excessive sediment, sediment and other pollutants in floodplain, wetlands are often only temporarily stored until the next storm event flushes them out.

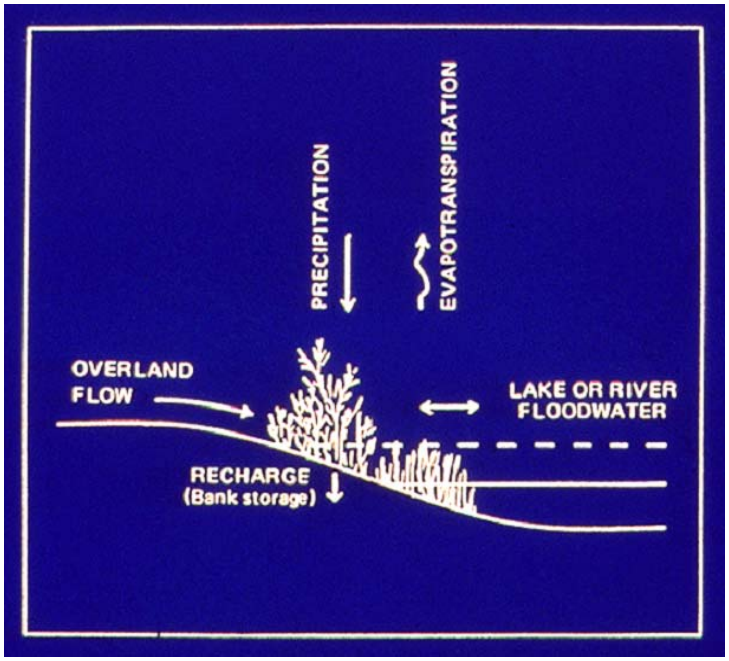

Figure 4-10: Floodplain (Riverine) Wetland

4-35 Floodplain (Riverine) Wetland

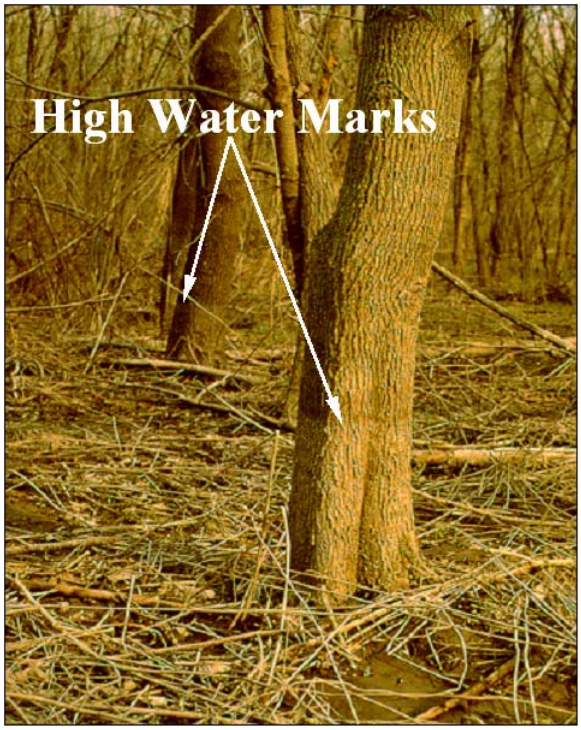

4-36 Wetland Indicators

4.4.7. Wetlands and Road Maintenance. Now that we have discussed the major benefits and regulatory issues regarding wetlands, it is important to provide some tools to help road personnel recognize wetland areas and provide guidance on what to do when these sensitive areas are encountered during road maintenance activities.

4.4.7.1 Recognizing Wetland Areas. When you hear the word wetland, an image of a marsh with cattails might come to mind. Wetlands, however, are not created equally and they vary in size, shape, position in landscape, amount of water present, mix of plants and animals, appearance, and benefits. While cattail marshes are one kind of wetland, there are many other kinds. Many of the wetlands in forested areas are referred to as forested or shrub wetlands. Although there are a variety of wetland types, several relatively easy clues are available to aid in their identification. These clues are based upon the three criteria for wetlands previously discussed: hydrology (drainage), soils, and vegetation. These clues can be used to help road managers know which portions of their jurisdiction might contain wetlands, as well as identify specific areas that regulatory agencies consider wetlands.

4.4.7.2 Wetland Characteristics: Although each of the wetland types discussed previously is different, they share similar characteristics. Based on the regulatory definition of wetlands previously discussed, each wetland must be wet during part of the year, must have soils that are saturated with water, and contain

4-37 Wetland Indicators

plants that are adapted to wet conditions. These factors - hydrology, soils, and vegetation - provide characteristics and clues that we can recognize while we are in the field.

Although the presence of standing or flowing water is an obvious indicator of a wetland, many wetlands are only wet during part of the year. There are, however, telltale signs that water has been there. High water leaves silt lines on tree trunks,

4-38 Wetland Indicators

4-39 Wetland Indicators

similar to a ring around a dirty bathtub. These high water marks are a good indicator that you may have a wetland. Fine sediment particles suspended in water frequently settle and are deposited on vegetation, leaving silt-covered or silt-stained leaves, another wetland indicator. When water flows through wetlands, especially floodplain wetlands, floating debris tends to pile up against trees and rocks, forming wrack lines. These wrack lines indicate water once covered this area and again cold indicate a wetland.

4-40 Wetland Indicators

4-41 Wetland Indicators

The roots of trees and plants living in the area provide another clue. Many wetland plants have shallow roots because the roots need oxygen. Soils that are saturated by a high water table do not supply this much-needed oxygen, so the roots remain closer to or

at the surface to get the oxygen they need. Wet soils are also very soft and do not provide much support for large trees. Some wetland trees thereby adapt by developing large bases or buttressed trunks and root systems that provide better support. These buttressed trunks indicate soft, saturated soils that may be a wetland.

4-42 Wetland Indicators

The second characteristic of wetlands is saturated soils. Interesting things happen to soils when they become saturated with water. Saturation causes oxygen levels to become depleted, resulting in changes to the soil's normal chemical reactions. In submerged or very saturated conditions, the decomposition of dead vegetation is practically halted because there is little oxygen available to support decomposing organisms and reactions. Without decomposition, partially decomposed plant material accumulates into thick layers of organic soils called peat. This peat is similar to the peat that is dried and sold in stores for use in our gardens. Other wetland soils do not have as much organic matter present and consist mainly of mineral soils derived from parent material. These saturated mineral soils are referred to as hydric soils and sometimes produce gleyed soils that are greenish or blue-gray in color. If these mineral soils form in a seasonal wetland, where the area is alternately wet and dry, metals such as iron and manganese react with oxygen to form oxides (rust) and becomes a mottled soil with orange/reddish brown or dark reddish brown/ black spots in the otherwise gray or greenish gleyed soils. The familiar rather unpleasant rotten egg odor that is sometimes given off by wetlands is caused by the release of hydrogen sulfide gas when wetland soils and sediments are disturbed.

4-43 Wetland Indicators: Common Wetland Plants

4-44 Wetland Indicators: Common Wetland Plants

The third wetland characteristic is the vegetation. Most plants cannot tolerate the wet conditions within wetlands. Some species, however, have adapted to wet habitats. These water-loving wetland plants are referred to as hydrophytes and based on their tolerance for standing water can be further lumped into three groups:

1. Those that are dependent upon permanent water for their survival such as cattails, water lilies, skunk cabbage, buttonbush, and arrowhead. This group includes those plants that most of us would associate with wetlands.

2. Those that can live in standing water but prefer moist soils such as black ash, cinnamon fern, joe-pye weed, jewel weed, cardinal flower, pin oak, and pussy willow.

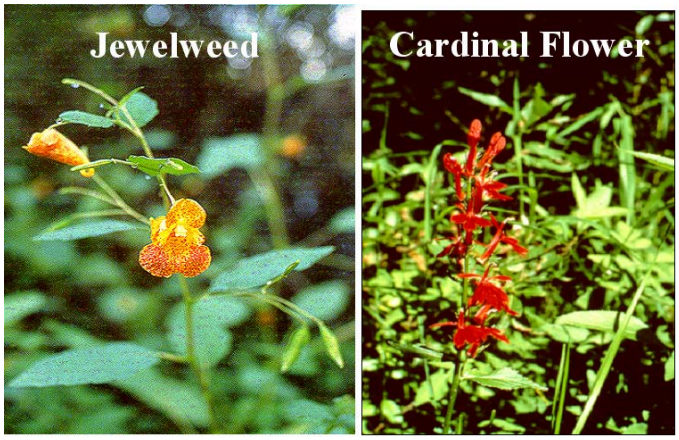

4-45 Common Wetland Indicator Plants

3. Those that do best in moist to somewhat dry soils such as red maple, catalpa, slippery elm, and arrowwood viburnum.

4-46 Less Known Wetland Indicator Plants

Wetland scientists and regulatory personnel use this differentiation of plants to identify and map wetland areas.

It is important to note that not all wetland plants are beneficial. The invasion of purple loosestrife is an example. Just as we are gaining an appreciation for the qualities and benefits provided by wetlands, a terrible foreign invasive plant is destroying our wetlands. Purple loosestrife is a wetland plant with pretty purple flowers that was imported from Europe and Asia. This plant spreads rapidly and, when established, completely out-competes and takes over the wetland within a year. This invasive species became a real problem in New England and quickly spread south and west into many other states.

Purple loosestrife establishes dense, impenetrable stands that are unsuitable as cover, feed, or nesting sites for many wetland animals, including ducks, geese, rails, bitterns, muskrats, frogs, toads and turtles. It also drives out endangered and rare plant species. Purple loosestrife frequently establishes on moist soils that are disturbed by construction activities. Once established, it is very difficult to remove because each plant can dispense 2 million seeds per year. The plant is also able to resprout from roots and broken stems that fall onto the ground or into water. Mowing purple loosestrife often makes the problem worse because it spreads the seeds and scatters bits of plants, which resprout.

4.4.7.3 Encountering Wetlands. Because many of our roads were built along streams and through low-lying areas, it is very likely that wetlands will be a concern for many road managers. It is probably not a question of "if" you encounter wetlands in your work but "when" you encounter wetlands.

4-48 Mandate by Federal Government

As mentioned, there are federal and state laws and regulations governing the protection of wetlands. In many cases, compliance with these laws requires biological and engineering studies and permits with any encroachment onto a wetland. If roadwork interferes with a wetland, the result can be major costs, delays, and potentials for litigation.

A real opportunity exists, however, for local road officials in the realm of wetland regulation. Currently routine maintenance work is usually not a point of enforcement emphasis and, to some degree, permits are waived for such routine items as ditch cleaning. The opportunity is for local road officials to take the information presented here to heart and through their daily maintenance activities prove that no further regulation or increased enforcement is needed in this area. While these opportunities exist, it is critical

to remember the possibility of severe penalties for those that do not follow these wetland protection rules.

4.4.7.4 Wetland Strategy. We hope that a strategy of "avoid, minimize, and mitigate" will help road managers as they attempt to work through encounters with wetlands. This strategy involves, in order, avoiding impacts to wetlands wherever possible, minimizing those impacts that cannot be avoided, and mitigating damages where they occur.

4-49 Adopt a Wetland Strategy

Avoid. The ideal way to deal with wetlands is to identify them in advance and then plan improvements and maintenance activities that will avoid impacting these sensitive areas. Traditionally we probably would have drained a whole hillside into a single culvert that discharges water directly into a wetland or stream, dumping more water, sediment, road fines, and chemicals into a wetland than it is capable of handling. Using a combination of the tools presented in this manual, however, we can avoid discharging these excesses into wetlands. For example, stabilizing banks, maintaining vegetated ditches, and installing turnouts and broad-based dips at frequent intervals could prevent significant amounts of sediment and quantities of water from accumulating and carrying material into the wetland. Many tools or practices will be described in subsequent chapters.

Minimize. We recognize the fact that it is not always feasible to avoid impacting wetlands near our roads. In these instances, it is best to minimize those impacts as much as possible. Continuing with the hillside and single culvert illustration used in our discussion of avoiding impacts, we can use a combination of tools to minimize disruption and damages to wetlands. We can set the culvert discharge back from the lowest point and divert water through a vegetated filter strip of grass or other vegetation, thereby trapping excess sediment before it gets to the wetland. Sediment traps can also be used in place of filter strips, but they need to be inspected and cleaned out on a routine basis.

Although only temporary, practices such as the use of silt fences can also provide significant short-term benefits. Straw bale barriers have also been used, but their effectiveness is questionable and are not recommended by the U.S. Environmental Protection Agency. These materials should only be used for short-term activities and must be maintained and cleaned out regularly until the work site is stabilized. These practices and proper use will also be described in more detail in Chapter 5.

Mitigate. Mitigation involves the creation of artificial wetlands in order to replace the lost function and habitat of a natural wetland. This is often an expensive prospect and should only be used as a last resort when avoidance and minimization techniques are insufficient to prevent the destruction of an existing wetland. The biological and engineering studies and design and required permits, along with site acquisition and actual construction, all lend to the extreme costs and time required for mitigation projects. Given the scale and scope of the projects that are likely to be carried out under maintenance activities, it is unlikely that mitigation will be a necessary and/or a viable option.

4.4.7.5 Working with Regulatory Agencies. This section on wetlands is not intended to turn road experts into wetland experts. Rather, its intent is to provide background information on wetlands and help road managers recognize the importance and value of these sensitive habitats. Using the clues discussed above, road managers should be able to recognize areas that might be considered as wetlands. When these potential wetlands are encountered during road maintenance activities, it is highly recommended that local governments contact their local county or state agencies for further guidance on appropriate actions. Local county conservation agencies are familiar with the local conditions and they are familiar with state and federal environmental regulations and agencies, and will be able to help you directly or help you direct inquiries to the appropriate agency.

4.4.8 Wetland Ecosystem Summary. Wetlands are an important natural resource located between full aquatic and upland environments. For an area to be considered a wetland, it must be saturated with water at least part of the year, have soils that have developed under saturated conditions, and contain plants that are adapted to those wet conditions. Many different types of landscape features meet these conditions, of which three were discussed – depression wetlands, slope wetlands, and floodplain wetlands. Most of these areas are relatively easy to recognize using the hydrology (drainage), soils and vegetation clues as potential indicators for a wetland area.

Wetlands benefit natural systems by providing habitat for fish and wildlife and supporting the food web. They also provide important benefits in terms of floodwater storage, bank and shoreline stabilization, sediment trapping, water quality improvements, and opportunities for education and recreation activities. Linked to many of these values are economic benefits as well. Unfortunately, we have been slow to recognize all these benefits and have lost over 50% of our wetlands. Our federal, state, and local environmental regulatory agencies have reacted to this loss and enacted strict measures to protect the remaining wetlands and the benefits they provide. Road managers are advised to adopt a strategy of avoiding wetlands or minimizing the impact and using mitigation only as a last resort as they encounter wetlands in their road maintenance activities.

4.5 The Upland / Forest Ecosystem (Community)

4-50 Uplands produce different challenges for road managers.

4.5.1 Introduction. As the third ecosystem or community , the uplands present drier conditions and different challenges for road managers. In upland areas, nature's purposes may conflict with road maintenance just as they do in stream and wetland areas. Because significant portions of local government budgets are spent maintaining roadside vegetation, road managers need a more complete understanding of plants. A better understanding of the natural reaction plants have toward outside impacts such as their reaction to injury can help road managers develop a strategy to deal with vegetation that takes advantage of nature and natural systems instead of trying to overpower these forces. Trying to overpower nature is unrealistic, costly, and temporary at best.

4.5.2 Plant Basics. In order to effectively manage roadside plants, it is important to understand some basic information including the way plants grow, their life cycles, root structures, and general plant ecology.

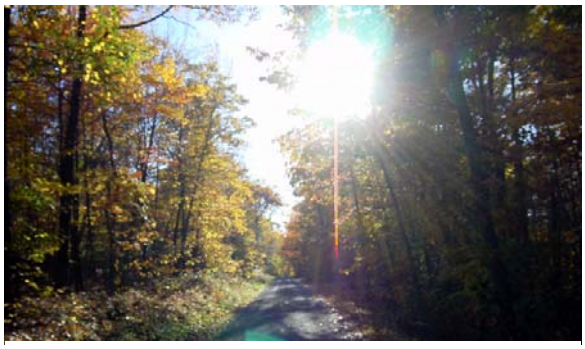

4-51 Plants use the sun's energy (light) with carbon dioxide from the air combined with water and nutrients to produce sugars (food) through the process of "Photosynthesis."

4.5.2.1 Plant Growth and Photosynthesis. Unlike animals, which gather energy by eating other plants and animals, plants are able to produce their own food through a complex process called "photosynthesis." If we can recall from the high school science class where we were introduced to this "big word," photosynthesis is the process by which plants convert sunlight, carbon dioxide from the atmosphere, water, and nutrients into sugars. Plants then use these sugars as food, and extra sugar is stored throughout the plant. A familiar example of this energy storage is the sugar maple. The sugar maple stores excess sugar developed during the summer in its roots. As the plant begins to grow in early spring, the sap containing these dissolved sugars is transported to the buds. "Tapping" holes in the trunk of the sugar maple allows collection of this sap, which can be boiled to evaporate the water and concentrate the sugar into maple syrup. This is how the sugar maple got its name, because of the sap's particularly high concentration of sugar.

4.5.2.2 Vegetation Groupings: There are many different types of vegetation. As road managers, we will look at three groupings: woody plants, herbaceous plants, and seedless plants, with a brief discussion of each.

4-52 Plant Groupings

Woody plants contain hard, ligneous fibers in their trunk, stem, and root tissues, which collectively are called wood. Trees (beech birch, maple, oak, white pine, hemlock, etc), shrubs (mountain laurel, rhododendron, low bush blueberry, etc), and many vines (honeysuckle, grape, etc.) are classified as woody plants.

Herbaceous plants are seed-bearing plants that have fleshy stems instead of woody ones. These plants are typically shorter than woody plants and include broadleaf species and grasses. Common herbaceous plants include goldenrod, milkweed, grasses, daylilies, and skunk cabbage. The life span of herbaceous plants varies by species. A discussion of plant life cycles follows in the next subsection.

Grasses are herbaceous plants that have some unique adaptations that make them of special interest to road managers. Unlike other plants that grow at the tips, the growing point of grasses is located at the base, or ground surface; so as new tissue is added, the plant extends itself upward. Many grasses also reproduce in multiple ways. Grasses do flower and produce seeds for sexual reproduction, but many grasses also reproduce and spread by extending horizontal tillers called rhizomes (underground) and stolons (above ground), which act to fill in the spaces between plants, as new grass shoots extend forth from these tillers, as depicted in Figure 4-11. The ability of grass to reproduce in this fashion makes it very valuable as a roadside plant since the frequent mowing of grassy roadsides removes the flowers/seed structures, but not the growing points. The rhizomes and stolons also

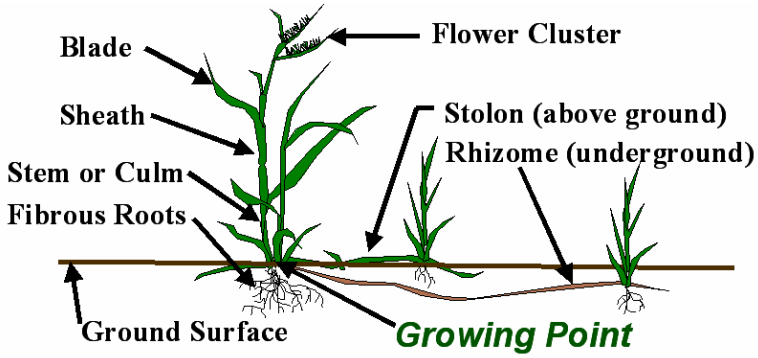

Figure 4-11 Grasses

create a fibrous root system, which holds the soil in place and reduces water runoff velocity.

Seedless plants reproduce by tiny spores that drift on the wind, settle on a surface, and begin to grow. Common seedless plants include mosses, ferns, and puffballs. Mosses are often one of the first plants to become established on barren soil. Ferns are very common roadside plants, and many have deep roots that provide good soil anchorage.

4.5.2.3 Plant Life Cycles. In general, herbaceous plants can be grouped in terms of three basic life cycles. The plant life cycle begins with the germination of a seed and is the time required for the plant to grow, mature, produce seeds, and die. One type of plant has an annual cycle because they complete their seed-to-seed life cycle within a year. Some annuals, called summer annuals, sprout from seeds in the spring, flower, produce seeds by the end of the fall, and then die. Winter annuals sprout in the late summer, lay dormant over the winter, flower, produce seeds in the early summer, and then die.

Biennial plants require two years to produce seeds and complete their life cycle. Typically, they germinate in the spring or early summer, grow until fall, and then go dormant for the winter. The following spring, a second growing season begins and the plant grows to maturity, flowers, produces seeds, and then dies during its second fall. Canada thistle is a common biennial plant. If this thistle is continually mowed to prevent flowering and seed production, the plants will die in two years with no replacements to contend with.

Perennial plants live for an indeterminate number of years. Daylilies and skunk cabbage are common perennial plants. These plants keep coming back year after year, typically going dormant in the winter months.

4.5.2.4 Root Structures. Roots provide anchorage for plants and act as a collection system for water and nutrients from soil. The structure of plant roots varies from species to species. Some plants have a large main taproot that penetrates deep into the ground. Tap rooted trees like hickory also have fine feeder roots near the surface of the soil where oxygen is more abundant. Taproots act like reinforcing bars and can be very effective in stabilizing banks that are seasonally saturated and potentially unstable.

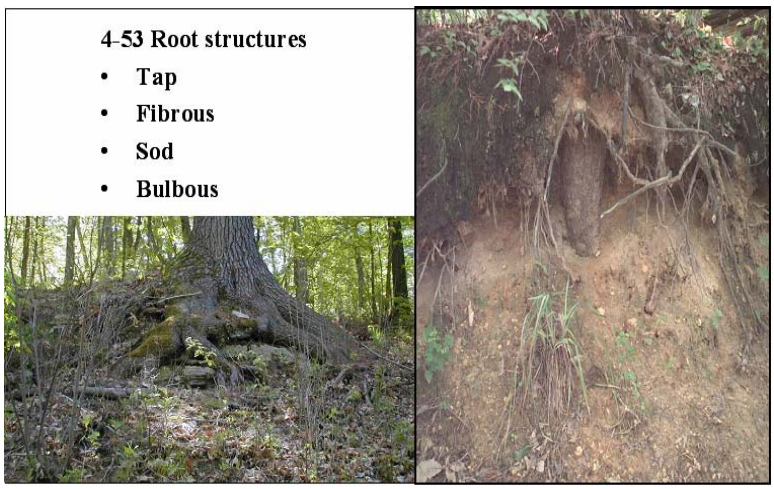

Some plants have a fibrous root system. Maple trees are prime examples of plants with fibrous roots. Fibrous root systems provide excellent soil reinforcement.

Some grasses form thick, matted roots called sod, while other grasses grow from a central point and form clumps. Turf type sod grasses act as a natural erosion control fabric by holding soil in place, trapping soil moisture, slowing runoff, and increasing infiltration. Grasses that grow in clumps, like tall fescue, tend to hold soil closer and more securely to the plants' center. With clump type grasses, surface erosion tends to remove soil from between clumps while plant growth builds the clump higher. Clump grasses are thereby not as effective at retarding soil erosion as turf type grasses unless they are seeded densely and are well maintained.

Other plants have a bulbous root system of bulbs or tubers. Daylilies are a bulbous root plant and can be great roadside bank stabilizers without interfering with the road.

4.5.2.5 Plant Ecology. Plants have characteristics that cause them to act very different from animals. These differences involve the way plants gather resources, develop, and grow. We already discussed photosynthesis, the process with which plants produce their own food. In addition, plants are strongly influenced by their stationary, rooted nature. Plants cannot move. They can only react to the environment that exists where they are growing. Animals, by comparison, can simply seek the environment that they like best.

The growth of plants is affected by soil, light moisture, and climatic/weather conditions. Plants require a certain mixture of these factors to thrive, depending on the plant species. While some plants prefer or even require full sunlight to do well, others prefer partial sunlight or shady conditions. Similarly, some plants require lots of water and others prefer drier conditions. For example, the vegetation found along dry, hot ridge tops is very different than the low-lying, lush vegetation found in wetlands. Topography, or the shape of the landscape, is a major factor in plant growth because of its influence on light and moisture conditions. Flat land receives direct sunlight while slopes receive more or less sunlight according to their orientation to the sun. Sloped areas also dry faster because precipitation runs off quickly, with less infiltration into the ground.

Since light, soil and moisture conditions vary across regions, plant species are not uniformly distributed. In areas where the right combination of conditions exist, species that favor those conditions will dominate the landscape. Forest types are commonly named for the species predominant within them. The significant point is that plants grow and thrive in direct relation to the amount of light, quality of soil, quantity of water and type of weather conditions. Where the conditions are similar across the landscape, similar plants will dominate.

Plants are very dependent upon the underlying soil for a number of their critical needs. Although plants' water requirements vary by species, no plant can survive without water. Moisture stored in the soil serves as a steady supply of this vital requirement. Soils

also provide nutrients that are necessary for plant growth. Water collected by the roots carries these soil nutrients up into the leaves, where together with sunlight and carbon dioxide, they enable the plant to transform these materials through photosynthesis into sugars for food.

Soils also provide anchorage for plants. By providing support, roots and soil work together to allow plants to grow vertically. By increasing in height, which varies by species, plants can collect more sunlight for greater food production.

As stated, the ability of plants to collect resources and grow is limited by their location since they cannot move. Plants aid themselves in this limitation through recycling. Leaves, branches, and bark fall in close proximity to the plant, where insects, worms, bacteria, and fungi digest them. The decay of this fallen organic matter creates an excellent growth medium. By providing habitat for other creatures, plants also attract nutrients and growth enhancers in the form of animal wastes to their location.

Since plants cannot move like animals, they cannot flee from danger. If they could, there would be a lot fewer trees along our roads with cavities that result from road grader injury. Plants have developed numerous adaptations to deter and prevent insect, animal, and physical damage and even intrusion of other plants. These adaptations range from physical factors, such as fire resistant bark, sticky sap, thorns, and very hard seeds, to chemical factors, such as bad tasting leaves, strong and offensive odors, and toxins released to soil. Some plants, such as ferns, black walnut trees, goldenrod and a few grasses, release toxins into the soil, a process called alleopathy. These toxins released into the soil discourage competing plant species from germinating and growing nearby.

4-54 Plants cannot move, cannot flee from danger.

Earlier it was mentioned that plants form the foundation of a stream's food web. This lead role is carried through to the whole earth's food webs. The ability of plants to effectively transform the sun's energy into another form of energy (i.e., sugar) is one of the basic building blocks of life. Sunlight is the key ingredient, supplying an inexhaustible supply of energy, while the other necessary raw materials for photosynthesis are found practically everywhere in the environment. The availability and abundance of these raw materials explains why plants are so widespread across the planet. Consequently, plants serve as a ready and almost limitless source of food for plant-eating insects and animals, forming the foundation of our earth's food webs.

4.5.3 Understanding Trees. Trees are present along many roadsides. Efforts to manage roadside vegetation consume fantastic amounts of money and effort. In order that road managers might better integrate their vegetation management programs with the natural and relentless growth of vegetation, a better understanding of trees is necessary. A discussion of tree growth and their reaction to injury follows.

4.5.3.1 Tree Growth. Trees grow in diameter by adding a new layer of wood each year. This new wood forms in the cambium layer immediately behind the inner bark. These annual layers of new growth form the "rings" that most all of us have seen on tree stumps. These rings of growth, if examined closely, can be counted to determine the age of the tree. In addition, the width of the ring indicates the condition of the growing season, a wider ring meaning more growth from a good growing season with plenty of moisture and positive conditions.

The outermost layer of the tree is the bark. Similar to our skin, bark is a protective layer of tissue on the outside of the tree that stabilizes temperature and forestalls insects and disease from damaging the more delicate, actively growing layers beneath it. Bark is adapted to allow the annual increase in diameter of the tree. Some species of trees have bark that can be described as striped or occurring in vertical rows. On trees with this type of bark (e.g., chestnut, oak) the bark accommodates the annual increase in trunk diameter by expanding between the ridges. Other species of trees have smooth bark that actually stretches as the tree expands in diameter. This bark is then replenished in late summer during a period of less vigorous growth. The point here is that bark is very valuable to the tree. It is a highly adapted tissue that performs numerous functions critical to the tree's survival. We need to be aware of the value of bark so that we can avoid damaging it with our maintenance activities.

When trees grow, they increase their height by extending new tissue at the end of branches. This is why a barbed-wire fence nailed to trees does not become higher off the ground with each year of tree growth. The base of the tree is simply growing outward, not upward. The annual increase in diameter is how objects become embedded in trees.

Although all trees add new tissue in the same manner, they do not all look alike. While each tree species has its own growth patterns, individual plants adapt to their surrounding conditions. The oak trees in Figure 4-12 have all taken on different forms based on their specific site conditions. The field grown oak standing alone in full sunlight grows to a different shape than a forest grown oak The field oak must withstand the wind and elements all by itself and therefore needs a lot more structural root support than the forest oak that is sheltered from the wind by surrounding trees. Forest trees grow upwards in an attempt to gather sunlight, resulting in taller trees with fewer low branches. When trees are cut down, some will resprout new growth from the newly cut stumps. These stump sprouts grow in clusters, which result in yet another growth shape. Trees grown under utility wires continuously have their tops removed, producing an unnatural tree shape that is structurally unsound.

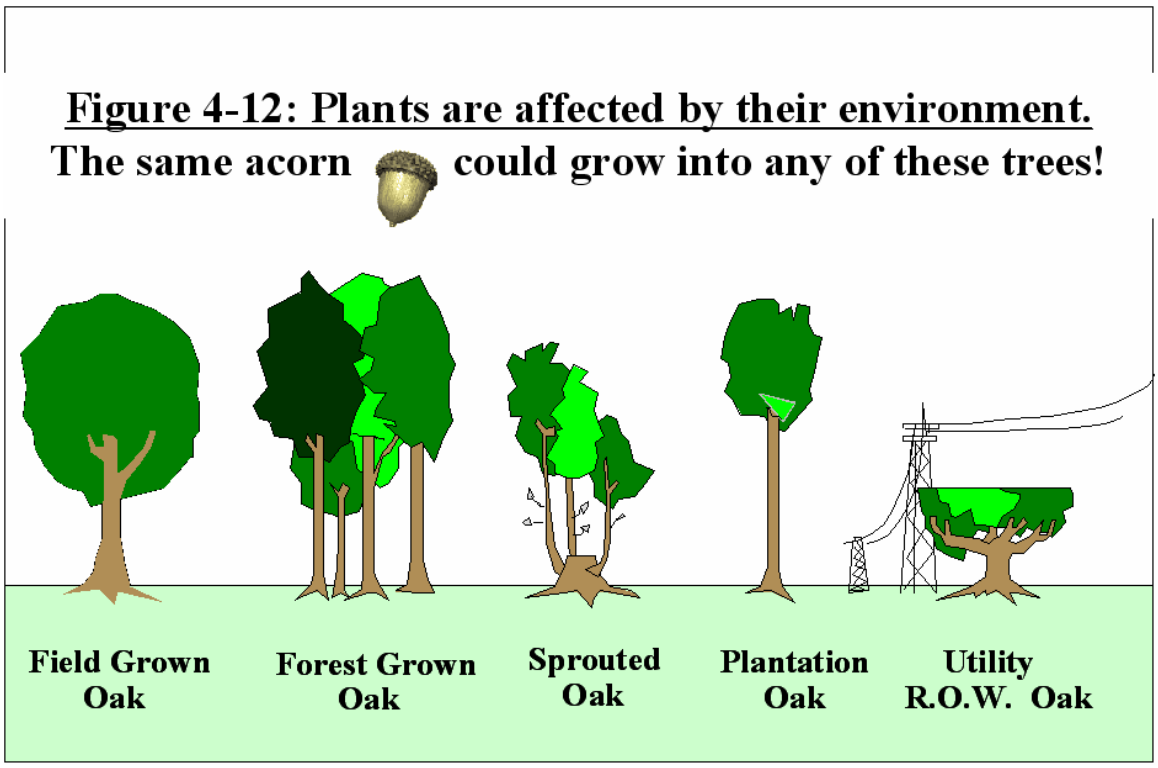

4.5.3.2 Tree Injury. As we discussed earlier, bark is the protective layer of tissue on the outside of the tree. When bark is damaged, the tree is permanently wounded. **Trees do not heal, they seal.** Many things can damage the bark of trees. Fire, animals, and equipment are common causes of tree wounds.

Fire is an enemy of some trees and a friend to others. The heat of fire is an obvious enemy to most trees. Some trees, however, require the heat of a forest fire to open pinecones, expose mineral soil, initiate seed germination, or stimulate new growth. Some species, such as scrub oak, have a high oil content, which cause them to catch fire quickly and generate very high temperatures. The hot fires generated when these species burn kills other species, reducing competition. This suppression of species intolerant of fire is an important component in maintaining the diversity and function of many ecosystems.

4-55 Trees do not heal, they seal!

Animals are a major source of injury to trees. Insects burrow under the bark,

4-56 Fungi attacking wounded tree.

which cuts the trees' lifelines and can allow pathogens into the tree. Insects, like the tent caterpillar, can strip the tree of its leaves, resulting in severe injury or death since the tree cannot process food without green leaves. Birds, such as woodpeckers, peck holes in trees to get bugs and suck sap. Beavers cut trees down for food and building materials, porcupines munch on trees, and deer rub their antlers on trees, damaging the bark.

Road maintenance activities can also cause significant damage to trees. Trees are frequently wounded when heavy equipment bangs into them, ripping sections of bark loose or disturbing the roots. In addition to the physical damage caused by cutting and tearing of the roots, filling and compaction of soils damages roots by cutting off some of their oxygen supply. Any activity that disturbs the tree bark is injurious. Vegetation control measures, which result in indiscriminate injury to roadside trees cause permanent injury. The natural reaction plants have to injury may cause more problems for road managers than the temporary benefit realized by indiscriminant cutting.

4.5.3.3 Tree Reaction to Injury. When trees are wounded, they are not able to heal from the inside as people do. As already mentioned, the growing tissue of the tree is immediately beneath the bark. When a tree is wounded and the growing tissue under the bark is exposed to air, the tissue dries out and dies. Trees attempt to seal these wounds by forming new wood around the edges where bark remains intact. This gradual sealing, or growth of the cambium layer, causes the characteristic callusing around a wound's edges. This sealing process can take years depending on the size of the wound.

As soon as the tree is damaged, natural pathogens attack the exposed tissue. Bacteria and fungi begin to infect and digest the wood. Larger animals like birds and bears dig into the tree to eat the insects that live in the decaying wood. The way trees grow creates ready avenues for rot to spread. When rot invades the tree, it spreads in three directions: radially outwards from the center, vertically up and down, and circularly. The tree rots from the inside out, thus the hollow trees that finally die and always seem to fall onto the road.

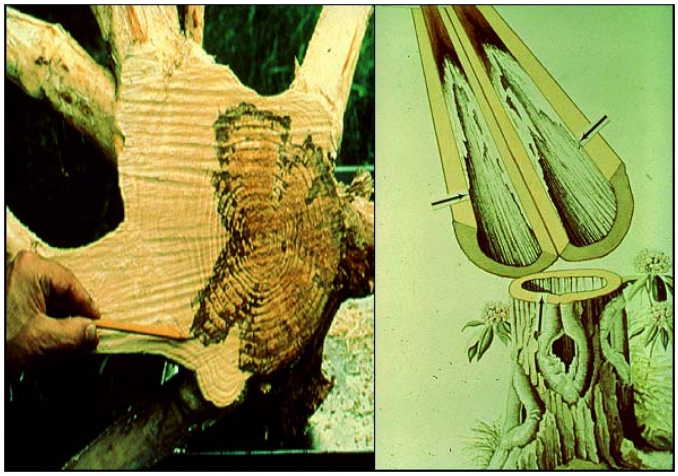

4-57 What's happening inside?

4-58 Once rotted, another natural force causes additional damage: freeze cracks.

Even after a tree has sealed the wound, the internal rot does not stop. Rotting wood attracts water. In freezing weather, this saturated wood freezes, expands, and cracks outward, breaking the seal and re-injuring the tree. These frost cracks can extend deep into the center of the tree and, with repeated freeze-thaw cycles, the tree's seal is continuously broken, exposing the new tissue to additional bacteria and fungi.

4.5.3.4 Proper Pruning. While pruning trees is a necessary maintenance activity, it also wounds a tree by creating openings in the protective bark layer. By understanding the way tress grow and react to injury, we can minimize the unintended damage frequently done by ill-advised and improperly executed pruning. Proper pruning of trees becomes one of our environmentally sensitive maintenance practices that will be discussed in Chapter 6.

4.5.4 Plant Establishment and Succession. In our discussion of geology, we talked about geological time scales because natural processes and forces act to change the surface of the landscape over time. The composition of plant communities (i.e., types of species present) also changes over time and is referred to as ecological succession. Ecological succession takes place in a much shorter time frame than geological processes. Like most things in nature, ecological succession is a complex process. There are some basic principles, however, that are important for road managers to understand. Once understood, these natural principles can be utilized to make roadside vegetation management efforts more successful and less costly.

In ecological succession, the composition of a plant community changes as physical and biological processes act to alter the condition of the habitat. As habitat conditions change, plant communities change. Plant succession can be defined as the gradual and orderly process of ecosystem development brought about by change in the community composition and the production of a climax characteristic of a particular geographic region. In other words, plant succession starts with bare earth and, over time, transitions towards mature forest.

Rates of succession vary depending on site conditions. Succession proceeds most slowly in bare, unshaded, nutrient-poor rock and subsoil conditions. On the other hand, disturbed areas where the topsoil is not removed or is saved and re-used are able to revegetate quickly. This is why old strip mines remain barren for so long, while abandoned pasture is quickly vegetated and often quickly forested.

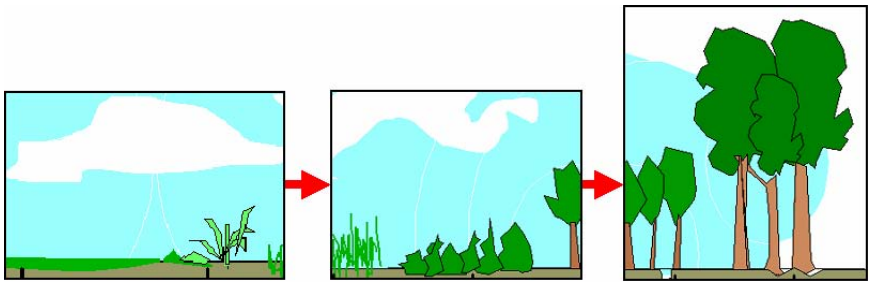

Figure 4-13: Plant Succession

For road managers, roadside trees become a major item within the realm of roadside vegetation management. The following sections describe tree characteristics as they relate to both new and mature successional stages.

4.5.4.1 Colonizer Species. Succession begins with bare soil. The trees that are best adapted to conditions of full sun and nutrient-poor subsoil are called colonizer or pioneer species. Common pioneer species familiar to road managers may include aspen, locust, sumac, grey birch and black locust. These types of trees have certain characteristics for adaptation to the conditions described.

4-59 Colonizer or Pioneer Species

- **Structurally weak & short-lived**
- **Fast growing**
- **Early maturity**
- **Shade intolerant**

EXAMPLES:
Sumac
Multaflora rose
Aspen
Birch
Locust

Generally, colonizer species produce massive quantities of lightweight seeds. Although colonizer seeds are not durable, the massive quantities produced and their ability to be transported by the wind assures that some seeds will find barren ground in full sun and germinate. Since they are shade intolerant, roadside banks laid bare during construction and maintenance activities are classic examples of sites prime for colonization.

Although colonizer species are very valuable plants, serving as nature's pioneers, colonizing the harshest environments, and paving the way for successional changes towards intermediate and climax species, they can be problematic for road managers. These trees are fast growing, reaching an early maturity. Thus, they are structurally weak and short-lived. As roadside trees, these factors tend to make them a recurring maintenance problem. These are the trees that will lean out over the road due to their weak structure and end up falling onto the road as wind and storms take their toll or as the trees reach maturity and start to age and die.

4-60 Intermediate/Climax Species

- **Structurally strong & long-lived**
- **Slow growing**
- **Long term for seed production**
- **Shade tolerant**

EXAMPLES:
Oak
Hickory
Maple
Dogwood
Redbud
Serviceberry

4.5.4.2 Intermediate and Climax Species. Ecological succession is a process that never ends. The modification of the soil by the colonizing species results in an environment that is more attractive to sturdier and longer-lived species, causing better suited plants to gradually take over. This rate of transition between species groups and plant communities varies over time. As slow growing, long-lived species become established, the process of succession slows down. As the rate of change slows and stabilizes, we describe it as an intermediate successional stage. Intermediate plant communities offer greater stability for roadside trees. Intermediate stages are typically followed by climax stages, although in many areas few climax forests are found because they were cut down for lumber and have not had sufficient time to progress from intermediate forests to the climax stage. Examples of intermediate/climax trees include oak, hickory, beech, dogwood, redbud, and serviceberry.

Intermediate and climax species typically produce heavy seeds, like oak and hickory, which remain relatively close to their parents. This is an advantage, since the seeds from these species prefer soils that are shaded and rich in organic material. These ideal conditions are typically found underneath the intermediate/climax trees because they shade the ground, trap moisture, and their fallen leaves, branches, and bark reproduce large quantities of organic material.

The slow-growing, strong structure of these intermediate and climax trees make them better roadside plants. Hemlock, beech, and sugar maple all have these characteristics. Because they are stronger than colonizers, they are less apt to lean out over the road or snap under a heavy snow load. The slow growth of these long-lived species also means that they do not need to be trimmed as frequently as the faster growing colonizers.

4.5.4.3 Significance of Plant Succession for Roadside Maintenance. As succession continues and intermediate species become established, the modifications to the soil and environment continue, thereby promoting and encouraging additional intermediate species. As more and more intermediate species establish, the particular site becomes less and less attractive to the colonizer species. This natural process can be used to reduce roadside vegetation maintenance workload by shading out the fast growing, light-dependent colonizers.

Soil laid bare by grading, daylighting and other common maintenance activities is always going to be subject to the natural process of succession. Road managers need to be aware of this process because the natural reaction to many of their maintenance activities creates colonizer growth. In addition, traditional maintenance activities to control the growth of these colonizers typically encourage its re-growth, effectively resetting the clock on an endless cycle of cutting and re-growing.

Although succession proceeds at varying rates, it is ongoing. Even the modest efforts at encouraging the establishment and growth of properly adapted plants along our roadsides can pay large dividends. Properly selecting the plants you remove, the plants you leave, and the species planted can control and accelerate the revegetation of our disturbed roadsides.

The goal for roadside vegetation management should be stability with as little maintenance as possible. A road built through an intermediate or climax plant community can be less costly to maintain if we learn how to use the forest system to our advantage. The use of the forest system to benefit road maintenance will be further discussed in Chapters 5 and 6.

4.5.5 The Importance of Plants. The fact that plants form the basis of the earth's food webs was already mentioned. In addition to food, plants provide valuable habitat for wildlife. Plants also provide numerous other benefits to human society as part of their role in ecology. These benefits are widespread and occur wherever plants grow, whether in forests, fields, or along our roadways. Many of the benefits have been discussed previously, so the following descriptions will both summarize and add to the benefits that plants provide.

4.5.5.1 Ground Cover and Erosion Prevention. Plants act as groundcover and prevent erosion in several ways. The foliage and physical structure of the plant reduces the direct impact of raindrops on the soil. Plants hold soil in place with their network of roots. Plants also act to slow surface flow, decreasing erosion energy, trapping sediment, and allowing more infiltration into the soils. The shaded or partially shaded soils under plants are cooler and more moist than more exposed soils and therefore more permeable to rainfall. Obviously, the more water that soaks into the ground, the less that runs off and causes erosion problems.

Plants also soak up water out of the soil. This process dries the soil and decreases the lubricating effect of water and again decreases the amount of runoff and erosion.

4.5.5.2 Air Conditioning. The water drawn up from the soil and into and throughout the plant carries the nutrients for plant food production. Excess water is then evaporated from the leaves and released into the atmosphere. This release process, called transpiration, cools the leaves and the surrounding atmosphere. Just as perspiration cools us, transpiration cools the plants, adding humidity and cooling the air. Trees are nature's air conditioners, which is a great advantage to humans. Where would you rather be on a hot summer day: a paved parking lot at the mall or sitting on a park bench under a giant oak tree?

Plants also provide shade that cools the area by reducing sunlight and the drying effect that it has on soil. In this way, plants act to modify the environment to their own benefit, too.

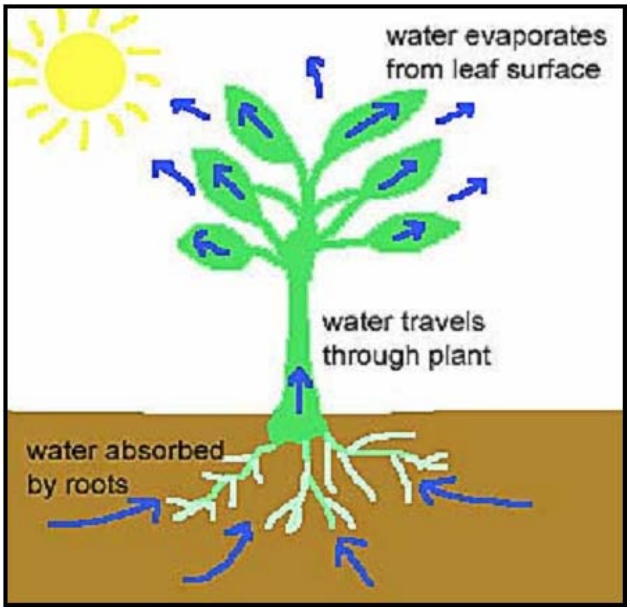

Figure 4-14 Transpiration

4.5.5.3 Air Purification. The air cleaning characteristics of plants improves the quality of air. As part of the process of photosynthesis, plants take carbon dioxide from the air as a raw material and give off oxygen as a natural by-product. Animals, including humans, require oxygen to live. When animals inhale, their lungs extract the oxygen from the air and exhale the carbon dioxide. By using the by-products of each other's life processes, plants and animals are fundamentally tied to one another, with each providing a critical, life-giving element for the other.

Plants can also provide physical cleaning of the air. Airborne particles are filtered out as air drifts through vegetation. The leaves act to slow the air velocity down, which allows dust to settle. This is why leaves on roadside trees are commonly coated with dust (until it rains and the dust is transported as sediment to the nearest stream or wetland).

4.5.5.4 Water Purification. The value of wetland plants in water quality was discussed in the section on the Wetland Community. Plants soak up water along with any chemicals and other contaminants that may be dissolved in the water, thereby having a cleansing effect.

4-61 Value of Plants: Aesthetics and Economics

4.5.5.5 Aesthetics and Economics. The first impression visitors get of a community is what they see along the roads. Nicely vegetated and diverse roadsides give an impression of comfort and relaxation. Management of roadside vegetation in harmony with nature benefits us visually and economically. It looks good (better for tourism), and it is easier on the local government budget than an unending cycle of invasive growth and removal.

4.5.6 Upland Ecosystem Summary. The management of roadside vegetation is traditionally an expensive and time-consuming task. A general understanding of the way plants grow and react to our maintenance efforts can help road managers to utilize natural processes to reduce the frequency and cost of vegetation management efforts.

In this section, we talked about plant basics, their growth factors and the process of photosynthesis that allows plant to produce their own food. We discussed different groupings of plants and their characteristics, along with the different plant life cycles. We looked at plant root systems and their importance in soil stabilization. We then looked at plant ecology and how plants are influenced by light, soil, water, and climate, factors that vary from site to site. Changing any of these primary influencing factors can have a dramatic effect on the plant community. We discussed how plants react to injury, particularly roadside trees. We covered plant succession, differentiating between the colonizer or pioneer plants that are high maintenance items and the intermediate and climax species that can reduce maintenance.

Finally, we discussed the overall importance of plants, noting their value for soil reinforcement and erosion prevention, as air cleaners and conditioners, as water cleaners, and for general roadside aesthetics.

As road managers, the more we know about plants and natural systems, the more we can use this knowledge toward a more efficient and effective roadside vegetation management program.

4.6 Summary of Natural Systems

Because dirt and gravel roads are located amidst natural biological systems, the stream, wetland, and upland/forest communities that these roads pass through are likely to interact with the daily maintenance and operation of these roads. These interactions can affect both the road and the natural systems. Therefore, if road managers are to provide better roads while complying with today's complex environmental regulations, it

is important for them to understand the importance of these natural systems and some of the major processes that take place.

This chapter contains a significant amount of information on natural biological systems. This information should be useful as we move into the remaining chapters and begin to discuss environmentally sensitive maintenance practices that will benefit both the road and the environment and help prevent erosion, sediment, and dust pollution. We will spend less money and do less environmental harm if we understand and work with, not against, nature and the natural systems.

These natural systems have been discussed and summarized individually, but it is critical to note that these systems do not exist individually. Just as they interact with roads, these natural systems interact and depend on each other, with processes and functions blending across the boundaries between each system, making up the total environment in which we live and work. Remember, as John Muir put it, "When we try to pick out anything by itself, we find it hitched to everything else in the universe."

APPENDIX 4. Case Study: Pennsylvania's Ecology

A4.1 Ecoregions and Geological Provinces. The Commonwealth of Pennsylvania encompasses a whole range of ecological conditions or habitats. As discussed, ecoregions reflect the physical factors that help define the type of habitat present and in turn determines the type of animals and plants that live and survive in that habitat. For example, vegetation is heavily dependent upon the area's elevation, slope, drainage, stability, and nutrient availability, in essence, the geology and soils. Comparing geology and ecoregion maps and noting the similarity of boundaries demonstrates this association. Figure A4-1 illustrates this comparison using the geology province map and an ecoregion map of Pennsylvania. The ecoregion map shows that there are eight ecoregions in Pennsylvania. These ecoregions have been delineated primarily according to vegetation types – each ecoregion contains similar types of vegetation. This is because plants (and animals) have developed and evolved under a certain set of physical conditions characteristic of their ecoregion. The three typical community types or ecosystems within each ecoregion – streams, wetlands, and uplands – are all represented in Pennsylvania.

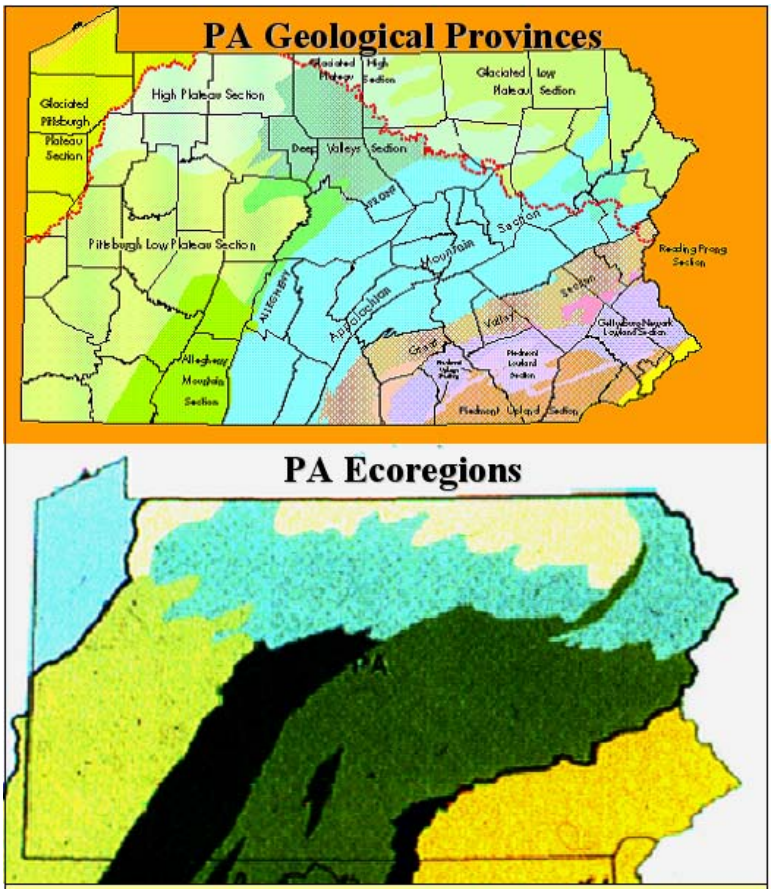

Figure A4-1 Comparing Ecoregions and Geological Provinces

A4.2 Pennsylvania's Stream Ecosystems. The commonwealth has approximately 83,260 miles of streams. Streams systems have played a very large role in shaping the landscape of Pennsylvania, primarily through erosion and deposition of sediments. Much of this activity takes place at a rate that spans thousands to hundreds of thousands of years or geologic time as discussed in Chapter 2, and these processes continue today. For example, approximately 290 million years ago, much of western and northern Pennsylvania was relatively flat and covered with lake-bottom sediments, which later hardened into sedimentary rock. Since that time, erosion has carved numerous stream valleys through these former lake-bottom sediments that are sometimes more than

1000 feet below the level of the surrounding terrain. The process of landscape modification continues today as sediments eroded from a watershed are transported until the water velocities slow and sedimentation occurs as bars in the middle and along the edges of the streams. Sediments are also deposited when floodwaters transport particles outside of the stream channel, depositing them on the floodplain, where they replenish soils along the stream margins.

Pennsylvania derives a number of significant recreation and economic benefits associated with its stream systems. Streams and rivers provide places and opportunities for numerous recreation activities such as fishing, tubing, canoeing, whitewater rafting, bird watching, hunting, and outdoor education. In turn, people who participate in these activities must spend money for gas, lodging, food, sporting equipment, licenses, guides, and many other associated costs. This demand helps provide jobs for local residents. Since many participants live outside the community where the activities take place, there is a significant influx of outside money to the local economies. However, there are costs associated with this tourism, especially their impact on a local government's road system. The timing of tourist activities may be unfortunate – muddy dirt and gravel roads during hunting season can cause tremendous maintenance challenges. The number of tourists viewing the autumn colors may also overwhelm the capacity of less traveled roads. Thus, the condition of a local governments' transportation system can be a great influence – advantage or disadvantage – to the economic growth of the area.

Streams are viewed as a public natural resource in the commonwealth, and, as such, are protected under Pennsylvania's Constitution. To this end, one of the primary goals of managing and protecting streams in Pennsylvania is to maintain a healthy and naturally reproducing fish community. As we have learned, natural reproduction of fish is an important goal because fish are dependent upon a clean, healthy stream environment in which to live. The lack of a naturally reproducing fish community is often an indication that conditions within the stream are degrading.

Pennsylvania has targeted two types of water bodies and their watersheds for "special protection" in order to maintain their existing quality. These two watershed types are described as "Exceptional Value" and "High Quality." They are delineated on a PA map in Figure A4-2. An Exceptional Value (EV) water body is considered to have outstanding water quality, and no degradation of the water is permitted. This is the most stringent protection within the

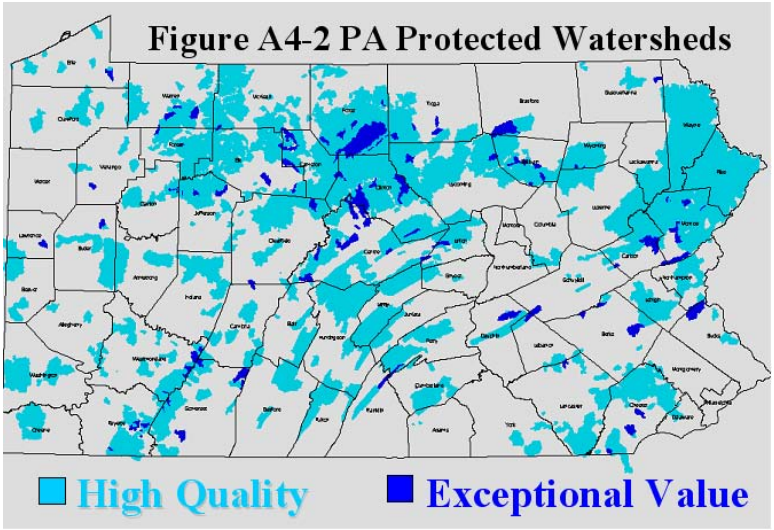

commonwealth. High Quality (HQ) water bodies are considered to be relatively unaffected by humans. No degradation of the water is allowed unless the PA Department of Environmental Protection (PA DEP) agrees that the project's social and economic benefits justify lowering the quality of the water. HQ protection is slightly less stringent then the EV protection status.

Streams designated as EV or HQ are primarily located in the headwater portions of many Pennsylvania streams. Natural reproduction within these streams is a vital function in order to maintain fish populations and trout is the especially good indicator species. As discussed back in Chapter 1 as a historical perspective, many of the state's roads were laid down next to streams in order to take advantage of the gentle gradient and existing routes of travel. The location of these roads often results in erosion and sediment impacts to the adjacent streams, and resulted in the development and implementation Pennsylvania's Dirt and Gravel Road Program.

Pennsylvania's streams are evaluated by the PA DEP's Bureau of Watershed Conservation, whose focus is maintaining water quality and overall health, and the PA Fish and Boat Commission, who manage the state's recreational fishery. These agencies conduct biological and chemical surveys in their evaluation of the streams and rivers. Data collected from these surveys are then analyzed and used to make management decisions.

A4.3 Pennsylvania's Wetland Ecosystems. The wetland community is an important component of Pennsylvania's ecoregions, with wetlands currently covering approximately ½ million acres, or two percent of the commonwealth. These wetlands provide many valuable services and functions that are beneficial to humans and wildlife, as described in Section 4-4 above.

At the time of European settlement in the late 1700's, there were an estimated 1.127 million acres of wetlands within Pennsylvania, or 4.5% of the state. Back then, as mentioned under Section 4.4, these wetlands were looked upon as wasteland and unproductive land. A great deal of wetlands has been lost in Pennsylvania, with conversion of approximately 56% of the pre-settlement wetlands to human land uses. Typically, wetlands have been converted through dredging, draining, and filling, for a number of different human uses. The conversion of wetlands for agricultural purposes has probably resulted in the

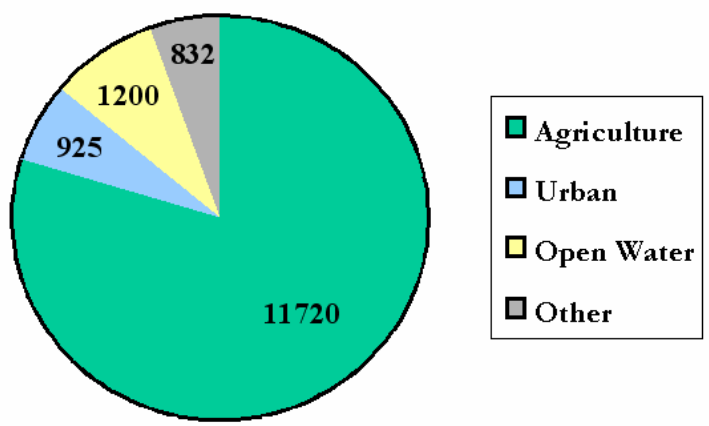

Figure A4-3 PA Freshwater Wetlands Conversion
(mid 1950s to 1970s, thousands of acres)

largest loss. Figure A4-3 shows that wetlands in Pennsylvania have also been converted for urban development, creation of ponds, reservoirs, and lakes, and other forms of development. The loss of wetlands has resulted in a loss of all of the various benefits that they provide.

These valuable natural resources are not evenly distributed across Pennsylvania. The northeastern and northwestern corners contain almost half of the state's wetlands. These relatively small portions of the state contain a large concentration of wetlands primarily because of the impact of glaciers on the underlying geology, topography, and soils. Floodplain wetlands, as previously described, are found along the fringes of lakes, rivers, and streams. This is the most common wetland type in Pennsylvania.

Along with the federal agencies, Pennsylvania has a number of state and local agencies that work to protect the wetland resources, including the PA Department of Environmental Protection, the PA Department of Conservation and Natural Resources, the PA Fish and Boat Commission, and the PA County Conservation Districts.

A4.4 Pennsylvania's Upland Ecosystems. The vast majority of Pennsylvania is uplands. As discussed throughout Chapter 4, plants have physical resource requirements needed to grow and survive. Each species has its own climate, light, moisture, and soil needs. As these conditions vary across the state, plant species are not uniformly distributed. Forest types are commonly named for the species predominant within them. Figure A4-4 shows the forest types of Pennsylvania. Notice the similarity to the previous maps in figure A4-1 showing the geological provinces and ecoregions. Trees are the rule, rather than the exception, along the dirt and gravel roads in Pennsylvania. Management of the forest systems becomes a predominant factor in dirt and gravel road maintenance for Pennsylvania's road managers. Selective tree trimming and limiting shading as described in Chapter 6 are a major component of environmentally sensitive maintenance practices taught through the Pennsylvania Dirt and Gravel Road Program.

Figure A4-4 Forest Types
Map - Location by species groups

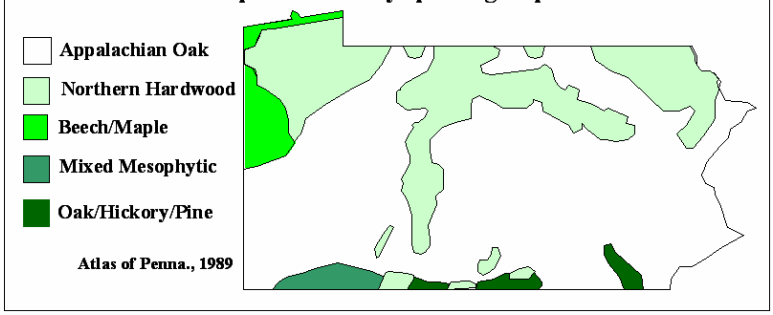

Environmentally Sensitive Maintenance for Dirt and Gravel Roads

Chapter 5: Environmentally Sensitive Maintenance Practices: Roads and Road Drainage

5.1 Introduction

Like when building a good road, we started with a sound foundation. We described the pollution problem from a historical perspective, discussed traditional road maintenance practices, and defined our goals and objectives. We then discussed geology, rocks, and soils as raw materials (giving you what you have to work with) for road maintenance, and continued building on that foundation with road maintenance and natural systems basics. Now, combining and using all that information, we are ready to examine good, sound, specific "Environmentally Sensitive Maintenance Practices" that will benefit both the road and the environment.

Once adopted, these practices will become commonly used tools in your road maintenance toolbox. In some cases, you may already be using the practice we discuss. In others, you may just need to tweak the practice to make it more sensitive to the environment, but still be effective for the road. Some practices may be new, but may fit a need or a particular site.

As with all maintenance and maintenance projects, we need to make that field inspection, evaluate the conditions and decide what needs to be done. The more practices or "tools" available in our toolbox, the better we will be able to perform the required tasks to prevent pollution and prolong the life of the road. Not one tool or practice will solve all your problems, but with a full toolbox, you will be able to select the most appropriate tool or tools for the job.

5.2 Erosion Prevention and Sediment Control

When we talk about erosion and sediment, we should emphasize erosion prevention. If we prevent erosion from happening in the first place, there is no sediment to pollute. Erosion prevention becomes our first line of defense. Look at the badly eroded road in Photo 5-01. Notice the banks on each side of the road. At what elevation do you think the road surface was forty years ago? The road

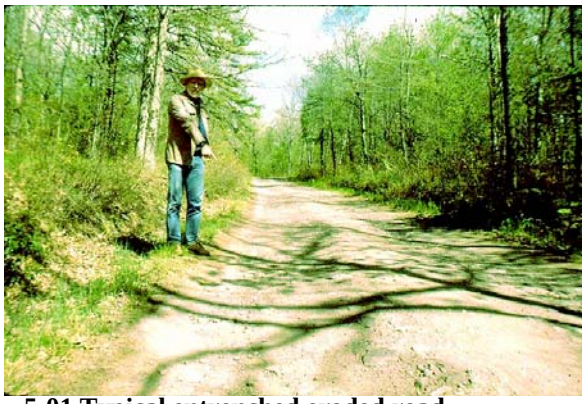

5-01 Typical entrenched eroded road.

would not have been built at the present elevation. If the road surface was originally at the top of the banks, where did all the material go? This is only one small section of road. We have many miles of forested roads with similar profiles. From this photo, we can see why sedimentation, by volume, is the largest pollutant of our streams. Typically, roads with higher banks on each side cause can be improved by filling the road cross section. This technique, although involving major fill work, will be discussed in Section 5.3.7, along with all its advantages.

5-02 Once erosion takes place, the sediment needs to be addressed.

When erosion does take place, for whatever reasons, then we have to control the resulting sediment. Otherwise, we can end up polluting our streams and have serious problems both for our roads and the environment.

5.2.1 Managing Your Erosion Prevention and Sediment Control Systems. Whether temporary or permanent controls, managing your control systems is important. Periodic inspections of your roads, drainage facilities and work sites allow you to keep an eye on potential problem areas and identify problems when they first start. For example, a vulnerable spot around a culvert is a danger sign. If ignored, it could create major road problems, damage the environment, and escalate costs. The following sections include sound practices that can make your control systems more effective and efficient.

5.2.2 Temporary and Permanent Erosion Prevention and Sediment Control Measures. Road managers have a wide variety of control methods or practices at their disposal to combat erosion and sedimentation. They range from the simple to the complex. In some cases, it may be as simple as widening a ditch or flattening a slope to reduce water velocity.

Erosion prevention and sediment control can be broken into two areas or conditions that we have mentioned before:

> ***Temporary Practices***: Practices used before or during construction or maintenance work to prevent and control only for those activities. These include emergency work situations. Some practices serve as either temporary or permanent solutions. Other temporary practices can be used during maintenance and construction activities and become permanent after the work is completed.
>
> ***Permanent Practices***: Practices uses as long-term prevention controls, often requiring little or low maintenance. These practices may be simple or complex in construction and costs.

5.2.3 Basic Temporary Practices. Two of the most common temporary controls are straw bales and filter fabric fence (silt fence). Unfortunately they are also the most improperly used techniques on road construction and maintenance work sites. Although the use of bales has traditionally been a popular method of sediment control from work sites, the fact remains that they are relatively ineffective. **Straw (or hay) bales are not recommended for use.** Bale barriers have more failures than successes and are expensive to install and maintain. The Federal Environmental Protection Agency (EPA) does not recognize bale barriers as an appropriate control method. Since straw bale barriers are still being used in many areas, the most effective installation practices are described below, followed by the recommended commonly used silt fence (fabric filter fence) barrier.

5.2.3.1 Straw Bale Barriers (not recommended by EPA). Straw bales are for temporary use only. Bales should not be used for more than 3 months. They should not be used in concentrated flow conditions. They should only be used for sheet or shallow flows.

5-03 Improper bale installations doomed to fail!

Proper installation is essential as shown in Figure 5-1.

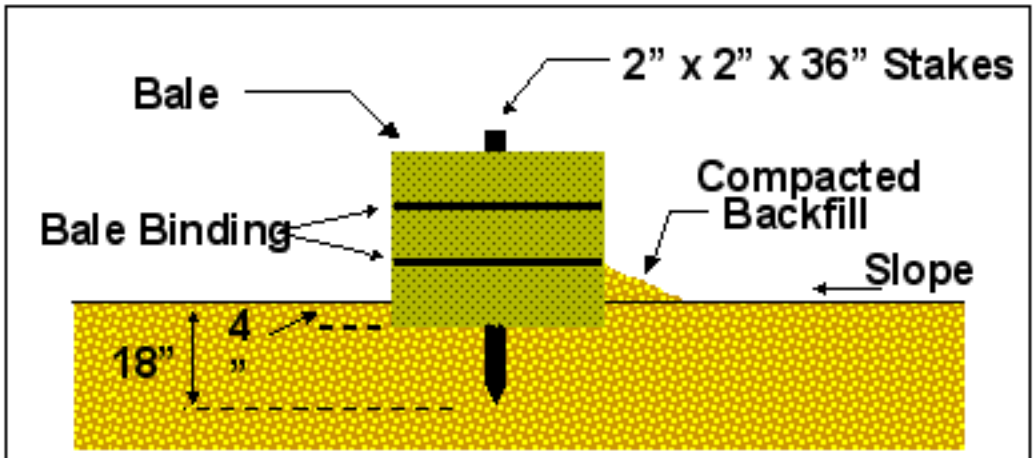

Figure 5-1 Proper Straw Bale Barrier Installation

They should be placed in an excavated area approximately four (4) inches below the ground surface and the excavated soil compacted on the upslope side of the bales. Each bale should be anchored securely by 2 support stakes with straw being wedged between the bales. Notice in the figure that the bale bindings are horizontal, not vertical, where they would be in contact with the ground and susceptible to rot or degradation. Photo 5-04 shows a proper installation immediately prior to a major construction project.

5-04 Proper bale installation prior to start of a major construction project. (Note: Bale barriers not recommended by EPA.)

They need to be inspected at regular intervals and cleaned or replaced as needed. Cleaning should take place when the sediment reaches 1/3 above the ground height of the barrier.

5.2.3.2 Silt Fence Barrier. Silt fence or filter fabric fence is a geosynthetic, or specifically a geotextile fabric, designed for the filtration function needed in sediment control. Again, this fabric is for temporary use only and should not be used for concentrated flow conditions, as can be seen in the photos. Silt fence is normally used at the toe of slopes for sheet sediment flows.

5-05 Improper silt fence installations.

Proper installation is essential, as shown in Figure 5-2. The fence needs to be anchored by digging a small trench and burying the toe of the fabric as shown. Wood or metal stakes need to be place on the downslope side of the fabric to properly support the installation against the load.

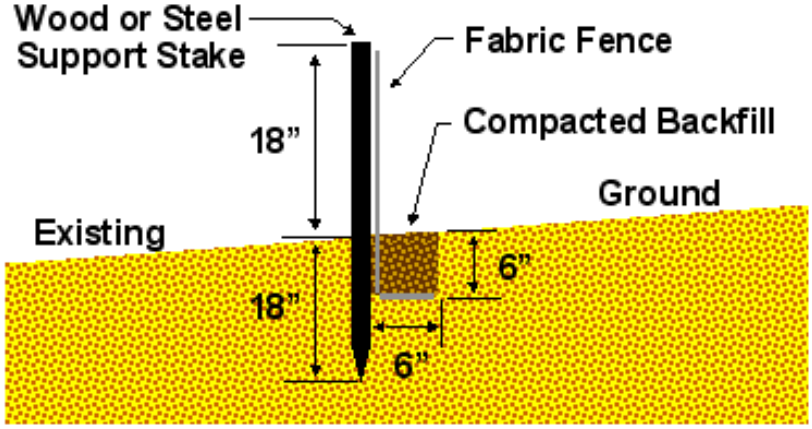

Figure 5-2 Proper Silt Fence Barrier Installation

5-06 This installation will not control much sediment!

Photo 5-06 shows an improper installation with the bottom of the fabric above ground level (this will last a long time but won't control much sediment). Photo 5-07 shows a good installation in a new paved road subdivision that has not been maintained. Although this photo shows the strength of a silt fence barrier, the risk of a system failure is imminent, and the consequences of pollution and cleanup required could be quite substantial. Filter fabric fence should be cleaned when the sediment reaches one-half the height of the barrier.

Like straw bales, frequent inspections followed by proper cleaning or repairs are necessary for proper performance. Filter fabric fence is much more effective and has a much longer life than straw bale barriers but still must be installed properly, inspected regularly and properly maintained.

5-07 Cleaning is required when sediment reaches one-half the height of the fence.

5.3 Environmentally Sensitive Maintenance Practices

Let's turn our attention to more permanent practices that both prolong road life and are good for the environment. Specifically we will look at environmentally sensitive practices involving the road profile, driveways, drainage ditches, culverts, end structures, stream crossings, and bridges. Roadsides and banks will be specifically addressed in Chapter 6.

These practices, as stated before, are mostly simple, practical techniques that can be easily implemented. Local government road crews can perform most of the practices with available equipment resources, incorporating them into their normal routine road maintenance program. Not all practices will apply to any one road or one road system, but having a full toolbox to address any problem encountered lowers overall costs. Many of these practices can be used in combination and will apply to most dirt and gravel roads in general. And many practices are also useful on paved roads.

As we discuss these practices, keep in mind that proper drainage is absolutely essential to prolonging road life and protecting the environment. Drainage means handling flowing water. Greater volume and greater velocity (speed) of that water result in greater erosion and sedimentation. In other words, if we can limit the volume of water and slow it down, we diminish the energy and erosion potential of the flow. Many of the practices to be discussed are based on this "divide and conquer" premise. By limiting the drainage area contributing to the flow, we reduce water volume, thus allowing smaller sized drainage facilities (ditches, pipes, etc.). This reduced area also reduces the flowing water's ability to pick up speed, reducing energy and the likelihood of erosion.

Common practices will be mentioned without elaborate detail but with some explanation of the rationale for inclusion. Other more uncommon practices will include a short description and associated sketches as necessary for clarification. For discussion purposes, the practices are organized into related groups.

5.3.1 Practices Related to Road Profile. In Chapter 3, we discussed the importance of road crown and cross slope, road shoulders, good road materials, and proper road drainage. Following those basic practices will result in a better road and promote a better environment. But beyond those basics, we now introduce several alternate road profile practices.

5.3.1.1 Insloping. "Insloping" of the road can be applied when the road runs along a steep bank. With a steep uphill bank on one side and a steep downhill bank on the other, common practice is to install a normal crown (see Figure 5-3a). This practice concentrates the water volume and flow, causing erosion with the possibility of a severe washout down over the bank and normally into the adjacent stream below. Sometimes a berm dam is installed along the edge of the road at the top of slope. The berm dam can also cause a secondary ditch with poor road drainage and a build-up of water volume and flow that could result again in a severe washout.

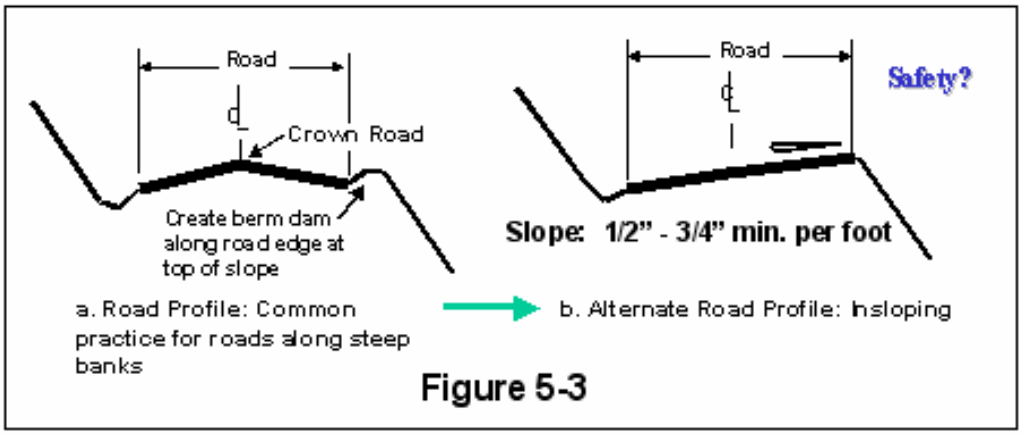

Figure 5-3

Insloping the road using normal cross slopes may take care of this problem (see Figure 5-3b).The entire road is sloped toward the uphill side, eliminating flow over the steep downhill slope and the possible erosion and washout into the stream. The only water reaching this downhill slope will be the rain that falls directly onto the surface. The water draining from the road and the uphill slope still should be collected via a ditch on the uphill side and carried to a cross culvert. The only additional water, however, that is draining into this ditch is from the other half of the roadway surface. This limited additional water volume will not require changes in ditch and culvert sizes. Culverts can be placed strategically with outlet flow protection as needed. The berm on the downhill side can still be built up if desired for safety of vehicles.

5-08 Road candidate for insloping.

Photo 5-08 depicts the typical conditions for insloping. We can prevent water from flowing over the face of the downhill slope by sloping the entire roadway toward the uphill embankment on the left side of the photo. We need to collect this water into a side ditch and to a cross pipe to outlet away from the road. In this photo, we can see how the stream meanders close to and then away from the road. The cross pipes can be strategically located where the vegetative grass strips are the widest to filter out any potential sediment prior to entering the stream. At this particular site, a cross pipe can be installed further down the road where its outlet would be at a flat rock outcrop. This rock configuration will spread the flow, acting as an energy dissipater prior to a grass filtering strip and the stream.

Vehicular safety has to be considered in this approach. Keeping the cross slope at a minimum and considering low traffic volumes, we can still maintain a berm dam on the downhill side for extra safety perception since everything is draining away from that side.

5.3.1.2 Outsloping. "Outsloping" of the road can be applied when the road crosses a **gentle sloping terrain**. Common practice is to install a crown with side ditches. This configuration (see Figure 5-4a) creates a dam and concentrates the overland sheet flow with possible erosion of ditches and ditch outlets. This profile also requires cross pipes to outlet the uphill side ditch with the potential clogging and flooding concerns. The volume of water to be handled can become substantial.

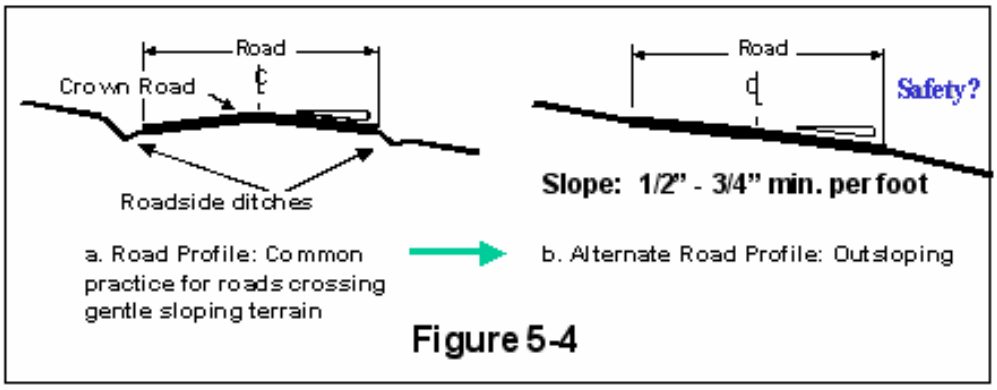

Figure 5-4

With outsloping, we slope the entire road with a normal cross slope from one side to the other, similar to superelevation on a curve, but with no ditching. With this outsloping of the road, as shown in Figure 5-4b, and blending it into the surrounding terrain, concentrated flows are eliminated with no ditches or cross pipes required. The existing general slope sheet flow continues across the road with no interference. This technique should be used with **gentle sloping terrain and low overland sheet flow conditions**. Low traffic flow (low ADT) should also be a prerequisite.

Photo 5-09 shows a typical outsloped road. The terrain is gentle with low sheet flows, which are carried across the outsloped road blending into the natural drainage. This will eliminate concentrating the water flow in ditches and cross pipes and the maintenance of these facilities. Site selection for this practice is critical. A heavy storm may require road maintenance afterward if the flows are substantial enough to cause road surface degradation.

5-09 Outsloping this road proved beneficial, eliminating ditches and cross pipes.

Again, safety should be a concern. Normal cross slopes can be used, alleviating the concern of vehicle safety. Depending on the road surface and amount of flow along with the temperature conditions for the area, however, icing of the road surface may become a problem. This has not happened on the various sites where outsloping has been implemented, but the concern should be recognized and conditions monitored during the winter months.

5.3.2 Practices Related to Roadside Ditches. Ditches drain water away from the road, but often cause various erosion and sediment problems. A typical ditch sketch is shown in Figure 5-5 with common ditch terms of foreslope, backslope, and flowline. In discussing ditches, there are several environmentally sensitive maintenance practices that can be considered.

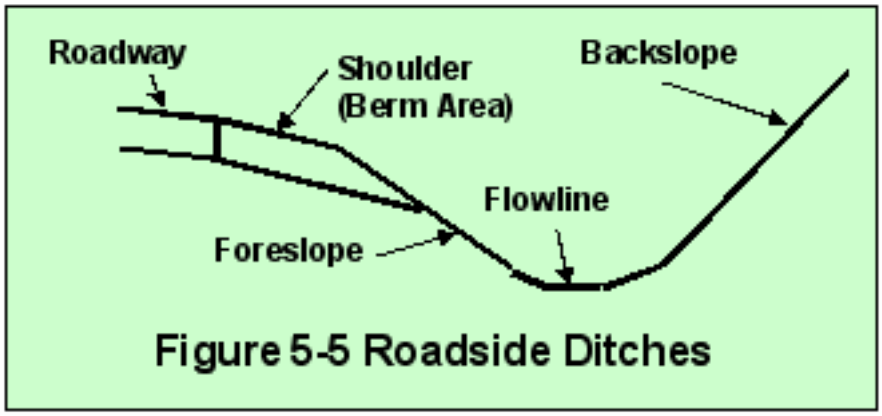

Figure 5-5 Roadside Ditches

5.3.2.1 To Ditch or Not To Ditch? The first question in ditching should always be "Do we need a ditch?" If the road surface drainage can continue to sheet flow away from the road without causing any problems, then a ditch only becomes an impediment, concentrating the sheet flow and compelling further handling through ditches and/or pipes to an outlet along with all the required maintenance. If we can let the road drain naturally by sheet flow into a vegetated area, flows are spread out and thereby slowed down, resulting in the least erosion and sediment potential. At many sites, however, this natural sheet flow drainage conditions is not possible, and ditching is still going to remain the option of choice.

5-10 Trapezoidal shaped ditch.

5.3.2.2 Ditch Shape. Ditches should be shaped and sloped to prevent standing water and must have an outlet. Safety for errant vehicles should also be a consideration. There are many ditch shapes, with common shapes shown in Figure 5-6 with different advantages and disadvantages. For purposes of erosion

prevention and the environment, ditch cross sections with a trapezoidal or parabolic shape are desired. These shapes tend to spread water flow and slow it down, which will reduce the erosion potential and subsequent sediment.

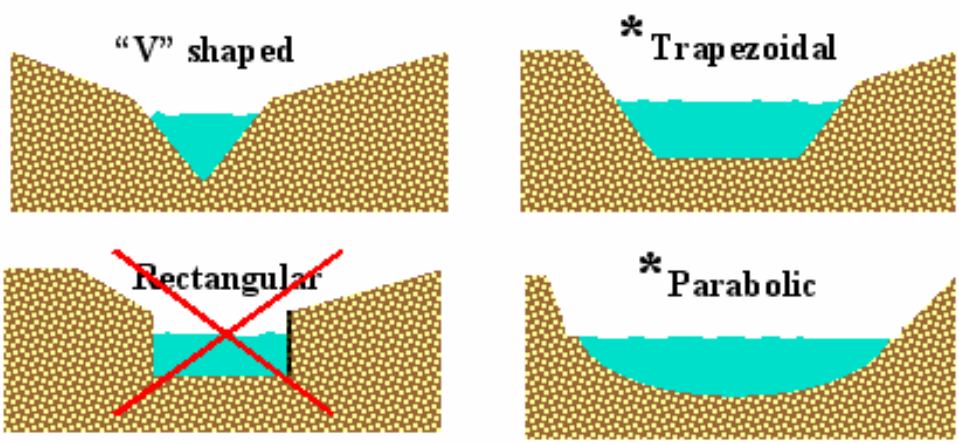

Figure 5-6 Ditch Shapes (*Preferred)

V-shaped ditches are common due to motor grader use in dirt and gravel road maintenance and may not be a problem. A deep V-shape, however, concentrates water flow, increasing its velocity, possibly eroding the ditch's bottom. Deep sharp V-shaped ditches are more prone to this bottom erosion and should be inspected regularly. If water flows and velocity are starting to cause erosion, the ditch can simply be flattened to a wider V-shape. This will again spread the water out and slow it down, diminishing the energy and thereby the erosion potential. Photo 5-11 shows a good grass-lined, v-shape ditch. On close inspection, however, the bottom of the ditch is showing signs of initial erosion. The erosion may not get any worse, but the ditch needs to be watched. If the erosion continues and gets worse, a possible solution may be a simple flattening of the ditch, which would spread the water and slow it down, decreasing energy and erosion potential.

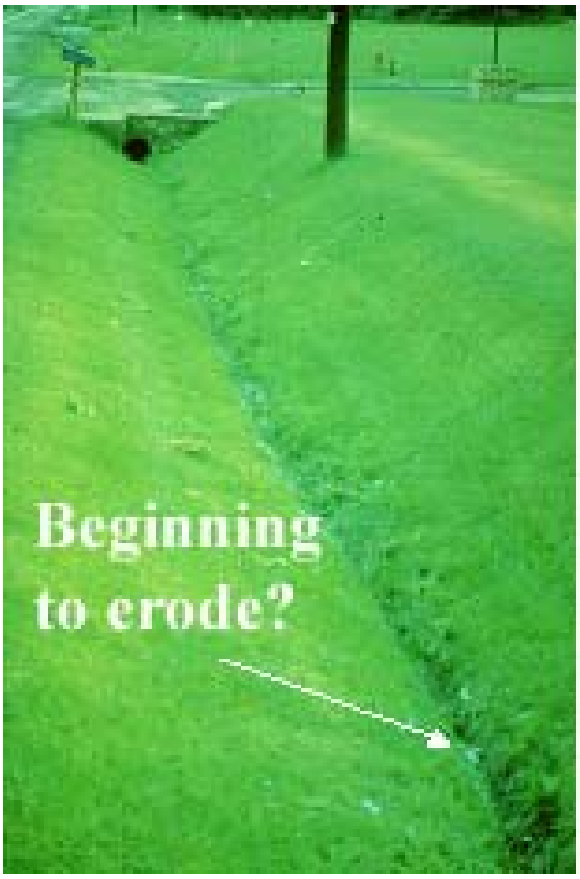

5-11 Grass-lined, V-shaped ditch.

Rectangular shapes give a vertical surface prone to destabilization and

erosion without a more substantial surface protection. Rectangular-shaped ditches may also pose a vehicular safety hazard and are not recommended for use.

5.3.2.3 Ditch Slope. Ditch side slopes often dictate the amount of maintenance due to instability and resulting erosion and sediment. The recommended side slope is 4 to 1 (4 foot horizontal to every 1 foot vertical drop). This slope provides greater stability, better support for the road, and is easier to maintain. In addition, this 4:1 slope is a forgiving shape for safety. A vehicle running off the road onto a 4:1 slope will not turn over and has a better chance to recover control without a serious accident.

On many existing roadsides, the terrain or right-of-way limitations do not allow for a proper slope and ditch. We need to keep in mind, however, that the steeper slopes mean greater instability, less road support, harder maintenance, and lower safety levels (see Figure 5-7).

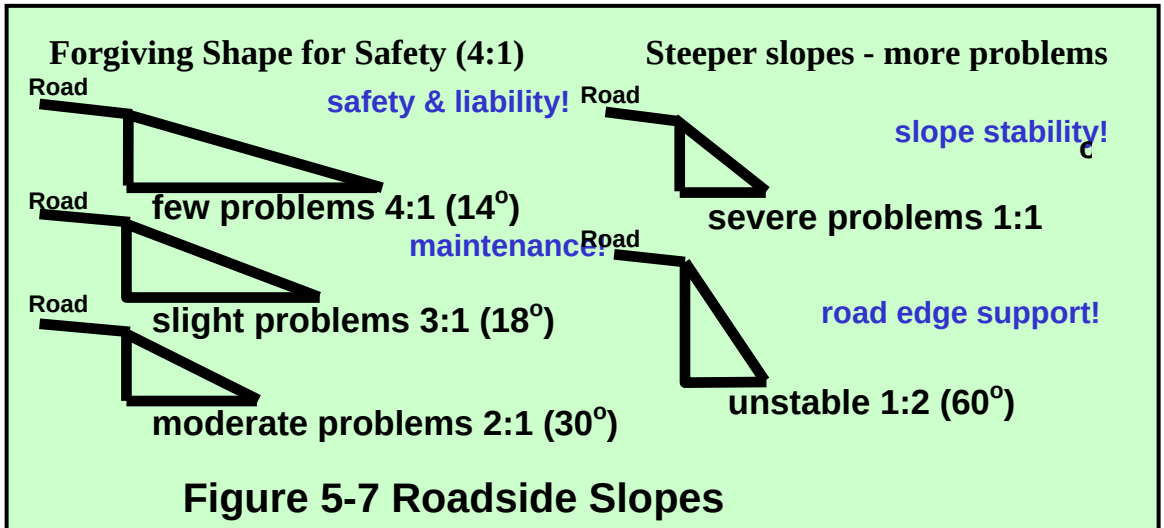

Figure 5-7 Roadside Slopes

Ditches should have minimum longitudinal slopes of 1% or 1-foot drop in 100 feet of ditch. For proper drainage, we need to keep ditch water flowing to an outlet away from the road. Standing ditch water will only result in additional road maintenance. The water will seep back into the road structure, creating the road softening lubricating effect described in Chapter 3 along with freezing and frost heave problems.

5-12 Standing water can only lead to problems.

Flatter slopes slow the water, decreasing ditch erosion while steeper slopes increase velocity, raising ditch erosion potential. On the other hand, flatter slopes will allow sediment accumulation resulting in

increased ditch cleaning, but, remember, if there is no erosion, there is no sediment. Find the source of the erosion, fix the erosion problem, and eliminate the sediment.

5.3.2.4 Alternative Ditch Cleaning Practices. By tweaking traditional practices, ditches can be cleaned in an environmentally sensitive way that benefits the road as well. Again, please note that these practices may not be entirely new, but just a modification of something we are already doing.

Watch Weather Conditions. You can avoid potential devastating erosion and sediment events by only cleaning ditches when no substantial rain or storms are predicted.

Conduct Erosion and Sediment Control During Maintenance. Temporary erosion prevention and sediment control practices (refer to Section 5.2.3 for common basic practices) should be used as necessary during the maintenance operation and until vegetation is completely reestablished. Vegetation reestablishment is critical – including seeding and soil supplements and mulching. Seeding for re-vegetation and other vegetative stabilization practices will be thoroughly covered in Chapter 6.

Sectional Cleaning. Common practice is to clean the entire ditch along the entire section of road right to the outlet and directly to a stream. We will look at that direct outlet to the stream and better alternatives, such as outletting into a vegetative filter strip below. However, we will now look at some alternative cleaning practices that can be used in combination with other practices. For example, cleaning upgrade sections first and leaving the last section before the outlet until later avoids excessive erosion. Similarly, cleaning alternating sections of long ditches accomplishes the same result, and if erosion does take place prior to re-establishment of vegetation, the sediment will be trapped in the uncleaned sections that can be cleaned later.

5.3.2.5 Ditch Widening and Slope Flattening. Preventing ditch erosion may be as simple as widening the ditch to spread water flow and slow velocity or flattening the ditch side slopes to slow water velocity entering the ditch. Remember, the slower the water, the less erosive force it has with less potential for sediment pollution. These practices go right back to the parabolic or trapezoidal shapes discussed before.

5.3.2.6. Reuse of Topsoil and Vegetative Root Mats. In ditch cleaning, ditch widening and slope flattening operations, we usually clean out the established vegetation and end up with subsoil conditions. In Chapter 2 we saw that “dead” subsoil poses a problem for reseeding to establish vegetation. Ditch work can strip existing vegetation and topsoil, which is usually hauled away and discarded. With a little more work and effort, this material could be reused, and re-vegetation will become easier and more timely. Depending on the natural conditions and the equipment used, the existing vegetative root mass can be stripped, laid aside while subsoil is removed to the proper elevations, and then the root mass reused on the newly constructed surface. This root mass, with proper moisture, will re-establish and may need no other seeding or soil supplements added, thus saving additional maintenance work for revegetation and repair

of eroded areas. This practice will be further discussed in Chapter 6 when we look at roadside banks.

5.3.2.7 Ditch / Channel Linings. The water volumes and velocities of ditch and channel flows may necessitate different stabilization methods using different ditch/channel linings. Higher velocities usually dictate a more substantial ditch lining. Each site has to be analyzed to determine what may be required. Charts showing maximum velocities for different linings are available and are good guidelines. A typical chart for natural soil, vegetation and several "paved" linings with the maximum velocities sustained by these linings is shown in Figure 5-8.

Figure 5-8 Maximum Velocities for Various Types of Ditch/Channel Linings

Natural Soil Linings	Max Velocity (fps)
– Clean gravel	6 - 7
– Silty gravel	2 - 5
– Clean sand	1 - 2
– Silty sand, clay	2 - 3
– Clayey sand, silt	3 – 4
Vegetative Linings	**Max Velocity (fps)**
– Avg. turf, erosion resistant soil	4 - 5
– Avg. turf, easily eroded soil	3 - 4
– Dense turf, erosion resistant soil	6 - 8
– Gravel bottom, brushy sides	4 - 5
– Dense weeds	5 – 6
Paved Linings	**Max Velocity (fps)**
– Gravel bottom, concrete sides	8 - 10
– Rip-rap sides & bottom	15 - 18
– Concrete or asphalt	18 - 20

As velocities increase, more substantial linings are required to prevent erosion. Remember, however, to keep in mind that if we can spread the water out by widening the ditch/channel and flatten the ditch/channel grade, we can slow the water (reduce the velocity) and possibly negate the need for a more substantial paved lining. Vegetative linings are less costly over the long run when compared to paved linings. Vegetative linings also provide for infiltration and better aesthetics.

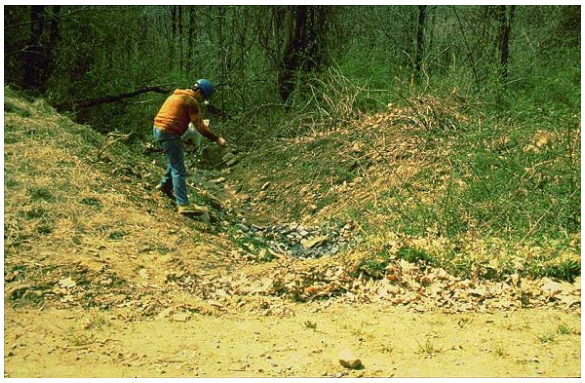

5-13 Seeding and mulching may be sufficient to revegetate the ditch.

5-14 A biodegradable netting will prevent erosion until vegetation is established.

For stabilizing new or disturbed roadside ditches with vegetation, practices can range from seeding and mulching only or in combination with biodegradable mats, netting or blankets, to geosynthetics. These materials provide erosion prevention until the vegetation becomes re-established. They usually come in rolls with directions for pinning or anchoring. Many different products are available with many different designs depending on soil characteristics and water flow conditions. They allow vegetation to grow while providing the necessary erosion protection either temporary as for the biodegradable types to more permanent reinforcement provided by the geosynthetics. Keep in mind that geosynthetics are not biodegradable and will remain for an indefinite period of time.

The type of lining is selected based on the steepest grade of the channel or ditch. Velocity and volume of water in

5-15 Many geosynthetic products are available for erosion prevention.

the ditch and the potential for sediment also need to be considered. If the flow is too slow, sedimentation is the major factor; if the flow is too fast, erosion of the ditch and lining material is the major factor.

Of course, any lining should be installed properly. Photo 5-16 shows a biodegradable netting installation. But look at the erosion behind and around the culvert with sediment on top of the netting. We need to make sure we examine the entire area and stabilize accordingly.

5-16 Good netting installation, but problems at pipe outlet need to be addressed.

Vegetation lined ditches offer several advantages including low-cost maintenance. (Refer back to Figure 5-8 for maximum allowable velocities for different types of vegetation-lined ditches.) Vegetation not only protects the soil from erosion by covering the surface and slowing the water flow with the root structure reinforcing the soil layers, but it also removes silts and fines and attached chemicals from storm water allowing infiltration for ground water replenishment. Keeping suspended solids in side ditches improves water quality.

5-17 Use caution when deciding to line ditches with rock riprap.

We must keep ditches from filling with sediment. Always look to the source of the erosion and sediment to determine what corrective measures can be taken.

Higher water velocities may demand more substantial linings such as riprap, as seen in the chart. Reducing water velocity should always be a priority. For instance, widening the ditch allows you to use a less expensive lining.

Here is one word of caution. Riprap is not a good ditch/channel lining choice if further erosion and sediment is likely. The rock riprap will fill with sediment resulting in major cleanup problems. Most likely, the riprap will have to be removed and replaced at considerable expense. This type of operation can strain limited local government budgets. When considering riprap for ditch linings, factor in future maintenance costs as well. Photo 5-18 shows a typical rock riprap use as ditch lining placed during construction. If this area is not stabilized immediately, the riprap will end up filled with sediment during the first rainstorm. Keep future

5-18 Riprap placed during construction—looking at the sediment potential, was this a good idea?

5-19 Do not outlet ditch directly to stream—use turnouts into vegetative filter strips!

maintenance in mind when considering any materials or practices at any given site.

5.3.2.8 Ditch Turnouts and Vegetative Filter Strips. Do not outlet ditches directly to streams. Photo 5-19 shows a common situation with ditch outlets. They carry water along with any sediment directly to the stream, which is the low point on the road. We need to change our way of thinking and doing in this regard. We need to consider turning the ditch out prior to that low point or that stream into a vegetative filtering area or "filter strip."

Ditch turnouts and vegetative filter strips should automatically go together. Vegetation filter strips spread the water flow, slow velocity, decrease erosive force, and filter out sediment. The slower water allows sediment to settle. Other pollutants that may have attached to the sediment will also be contained and may break down and dissipate, as described in Chapter 4.

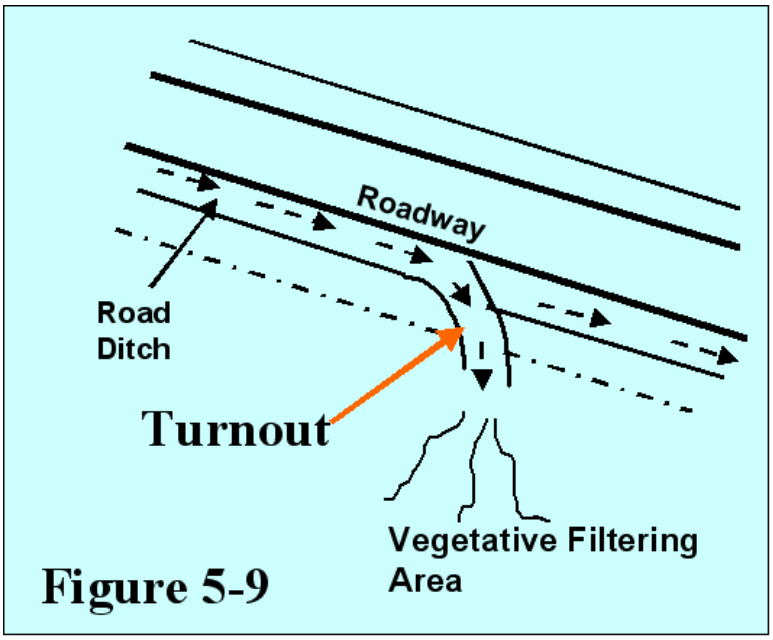

Figure 5-9

In addition, **more turnouts** should always be an option. Limiting the length of the ditch to a turnout will reduce the amount of water and flow in the ditch, keeping ditch size nominal and reducing water velocity and erosion potential (remember "divide and conquer"). Numerous turnouts may be the answer to the private property flooding/wet area problem created by one long ditch with one turnout at that location. Dumping a huge volume of water with possibly a high velocity from a long downhill ditch can cause erosion and flooding problems on private property. Installation of additional turnouts will break the volume of water into smaller quantities, reducing velocity and erosion and flood potential.

As in other techniques, there are no exact spacing or size requirements for turnouts. Charts are available but usually are based on only one condition such as the longitudinal grade of the ditch. They do not take into consideration the many variables that are different from site to site. Other factors to consider are water volume, ditch slope, right-of-way conditions, and ownership. Water volume can vary considerably depending on the terrain – does the ditch just drain the road surface or the road surface plus the entire hillside adjacent to the road?

Photo 5-20 shows a simple turnout of nominal dimensions and a large turnout that apparently takes a lot of water. In the case of this large turnout, the terrain and off right-of-way conditions created no problems or concerns. But every site will be different. We need to remember that more turnouts mean less water, less erosion, and fewer ponding or flooding problems, meaning less future maintenance.

5-20 Multiple small turnouts mean less water, less velocity, less erosion potential.

Working with Residents. Do you have a problem concerning drainage and private property and dealing with residents? Working with property owners is always a requirement for road maintenance personnel. Most people will respond better if they are approached beforehand with a thorough explanation of the work or project to be completed. A resident whose lawn is saturated from a ditch turnout may not be too enthused about putting in additional turnouts. But if approached prior to the work with a positive attitude and explanation of the benefits, the resident may be willing to at least try the solution to see how it works. The additional turnouts may solve the problem by dissipating the water in smaller amounts over a greater area with no adverse effects anywhere. Maintenance workers should promise to reestablished original conditions if the situation does not improve. Establishing good relationships with residents enhances the road department's ability to implement new practices to get the job done.

5.3.3 Practices Related to Ditches and Road Profile

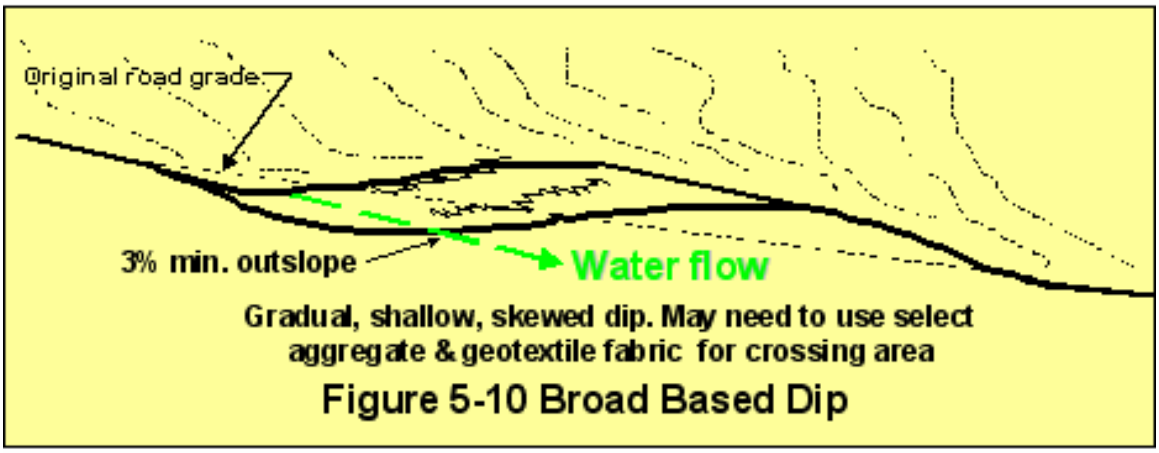

Figure 5-10 Broad Based Dip

5.3.3.1 Broad Based Dips. "Broad based dips" are shallow gradual dips skewed across the road in the direction of water flow, as depicted in Figure 5-10. "Broad based dips" are used when there is a high embankment on one side of the road with a downhill grade. The high embankment does not allow for ditch outlets and would normally require a cross pipe to carry the water to the other side and then to an outlet. These cross pipes are expensive to maintain because of their great potential for blockage and other problems to occur. Without "Broad Based Dips," the water is carried all the way to the bottom of the downhill grade in large volumes at high velocity. The only way to deal with it then is to build large-sized ditches. But this approach creates erosion and sediment-ladened flows that usually outlet directly into a stream. Water also tends to drain down the road surface, building in volume and velocity, producing severe surface erosion.

5-21 Severely eroded road – ideal conditions for broad based dips.

("Water bars" may be a familiar term and are similar to broad based dips, but with a significant difference. Water bars are short, abrupt drainage ways to get water across a road without using a cross pipe. They eliminate water from flowing down the road and can be used to actually block traffic use of the road. They have been most often used on retired logging roads to block traffic and divert water away from the road. Broad based dips can be thought of as water bars stretched out into gradual slopes in order not to interfere with vehicles using the road.)

5-22 Broad based dips can be used in lieu of cross-pipes.

On very low traffic volume roads, broad based dips present an alternative to the costly cross pipes without creating large erosion producing flows. **Used only for ditch flows**, broad based dips should not be used for perennial streams with permanent or intermittent flows. Broad based dips allow the ditch water to flow to the other side joining that ditch flow to a joint outlet or turnout to a vegetative filter strip. The "dip" channel is skewed in the direction of water flow, and the crown of the road is eliminated within this area. The use of multiple broad based dips on a long downhill stretch of road also allows a smaller ditch size to carry the limited volume of water from a shorter section of road, which will not build in volume or velocity within the area between these crossings. This limited water volume and flow should not be substantial enough to do any damage to the reinforced road surface crossing.

Broad based dips can be graded into the road rather easily with existing road materials. Depending on road materials and conditions, an hour of grading and shaping time should be sufficient to complete a broad based dip. For general guidelines, water volume must be contained in the channel with no overtopping the dip, longitudinal road slopes must be gradual to prevent vehicles from dragging. The best way to test the safe traverse of a broad based dip is to drive the road after installation. If the bounce is too great or dragging is experienced, it may be necessary to reshape the skewed dip.

5-23 Broad based dip reinforced with large aggregate.

The dip may have to be reinforced or stabilized with a select aggregate and geotextile separation fabric, since we have water and traffic crossing perpendicular to one another. The need for this reinforcement/stabilization will depend on water volume and flow and the type of existing road material. These fabrics will be discussed in Chapter 7.

Broad based dip spacing and size will vary from site to site depending on road and ditch slopes, volume of water, traffic, terrain, etc. Experienced road personnel know the roads and the water conditions encountered from storms. Their knowledge of the site should be sufficient to establish size and spacing required for broad based dips.

Remember, a greater number of dips decreases the length of road being drained and thereby decreases the volume and the velocity of the water to be handled within each broad based dip.

Road grader operators have to be aware of the broad based dip installations so that they do not think they are washouts or problem areas and reshape the road back to a normal crown. In addition, winter plow operators should be aware of these installations for proper and safe plowing operations.

5.3.3.2 Grade Breaks. "Grade Breaks" are long, gradual breaks in grade on a road with a relatively gradual downhill slope. Grade breaks retain the road crown and require appropriately placed cross pipes. Grade breaks limit water flow by decreasing concentration and velocity from a reduced area of road section, resulting in limited ditch and cross pipe size. This reduction in water volume and flow in turn helps alleviate problems at the pipe outlet. Grade breaks also limit the length of flow and thus velocity down the road surface, eliminating potential surface erosion gullies and rutting.

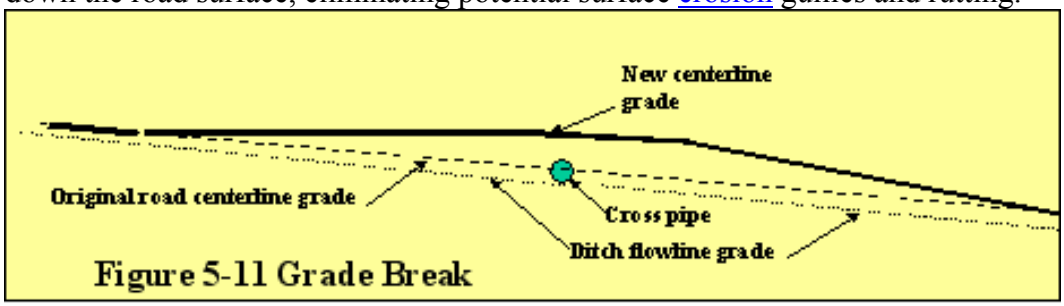

Figure 5-11 Grade Break

5-24 Grade breaks result in short road sections with reduced water volume and flow velocity.

Photo 5-24 depicts typical grade breaks on a road with a long downhill slope. Like broad base dips, there are no exact formulas for spacing or size, again depending on slopes, traffic, volume of water, terrain, etc. Although the photo shows cross pipes at the road low points, cross pipes can be strategically placed and can actually be used to create the grade break. A cross pipe can be installed to effectively meet the ditch gradient, as shown in Figure 5-11, and the road would be built up and over the pipe to create a grade break. Otherwise, cross culverts would have to be installed at a much deeper elevation than the road ditch, resulting in additional potential for pipe blockage, road flooding, or road and ditch erosion. Pipe outlet areas should be continually monitored and erosion protection established as needed. Alternative erosion prevention measures at pipe outlets will be discussed in a later section.

5.3.4 Practices Related to Driveways. Driveways can only be controlled through an ordinance or regulations and a permit system. Each local government should adopt policies and procedures appropriate to their particular situation and resources. Many local governments provide for a cost sharing arrangement with the property owner. The local government may pay for and supply a cross pipe to continue ditch flow, or may do the pipe installation at no cost to the owner. Options as to who does what work and who pays vary considerably from one local government to the next one, but the decision must be set by ordinance or regulation. The main factor is "to have control" so road personnel are free to review the site and determine the best approach to protect both road and environment while providing safe ingress and egress for the property owner and a safe roadway for the motorist.

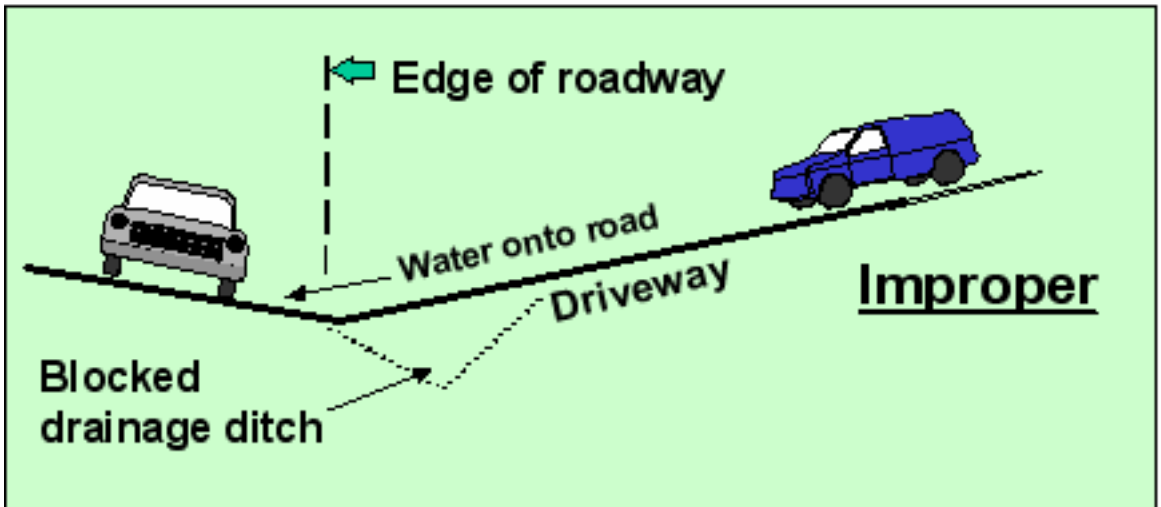

Figure 5-12 Common driveway construction without control

5.3.4.1 Proper Profile. Although driveways should not interfere with normal road and shoulder profile, driveway profiles pose additional problems for proper road drainage. The worst condition results when the driveway slopes downward toward the road and is constructed right to the road edge obliterating the roadside ditch (see Figure 5-12). Even if a pipe is installed to maintain ditch flow, the water draining from the driveway flows onto the road, deteriorating the road surface and causing possible hydroplaning in the summer and icing

5-25 Improperly constructed driveways create recurring road maintenance problems.

in the winter. Continuing ditch flow to drain the road while properly draining the driveway is imperative to ensure vehicle safety, prolong the life of the road and protect the environment. Uncontrolled driveway construction can result in high levels of maintenance, costs, liability, and frustrations, as seen in Photo 5-25. **The low point should be over the ditch line** and the ditch flow maintained.

5.3.4.2 Driveways Over Deep Ditches. There are several options for maintaining good drainage. The most common practice is to install a pipe to carry the ditch flow under the driveway. With the low point remaining over the ditch line, the road and the driveway will both drain to the ditch off either side of the drive (see Figure 5-13).

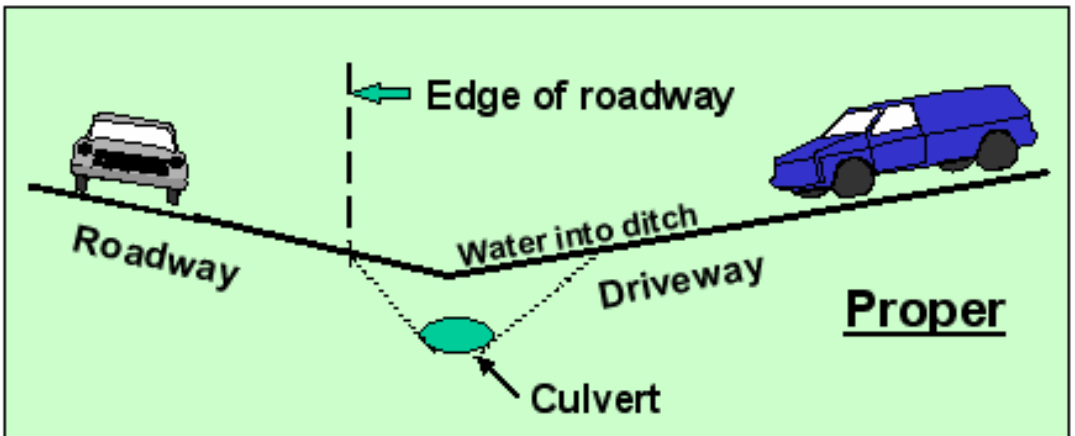

Figure 5-13 Proper driveway construction with deep ditch

An alternate method for medium-depth ditches is to use an open-top culvert or a box with an open grate (see Figure 5-14). These can be pre-fabricated items or homemade. The photo inset in the figure pictures two types of pre-fabricated units, one all-plastic type with a choice of colored grates. Pre-fabricated units are built to withstand truck traffic when installed following the respective manufacturer's requirements.

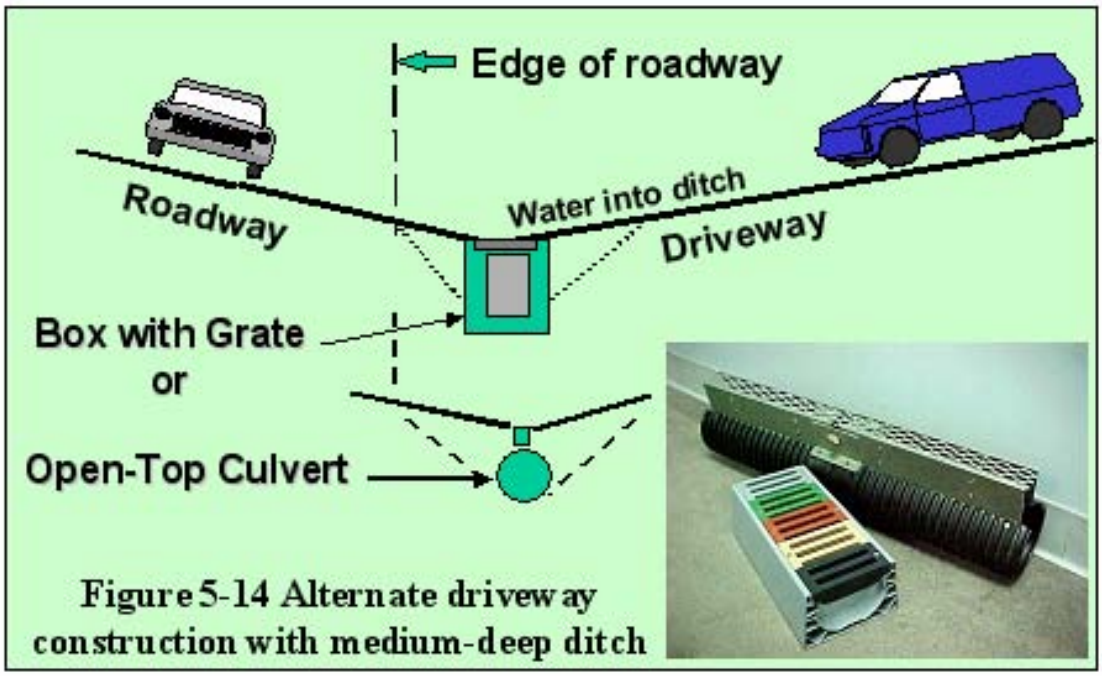

Figure 5-14 Alternate driveway construction with medium-deep ditch

Several cautions should be noted in using these alternatives. First for safety, consider animals and bicycles in determining the appropriate sized openings for drainage in homemade installations. Secondly, although these are definitely beneficial in paved road and driveway conditions, they can be applied for paved driveways to unpaved roads. Water coming off an unpaved driveway may cause problems with clogging the openings or drainage way with eroded driveway material. A paved driveway usually does not present this problem. Photo 5-26 shows an ideal condition for an open-top grate across the drive to collect any water without having to alter the driveway grade.

5-26 Open-top grates may be used on paved driveways.

5.3.4.3 Driveways Over Shallow Ditches. Of course, if ditches are shallow and water flow is not substantial, the ditch may be continued across the drive, as shown in Figure 5-15.

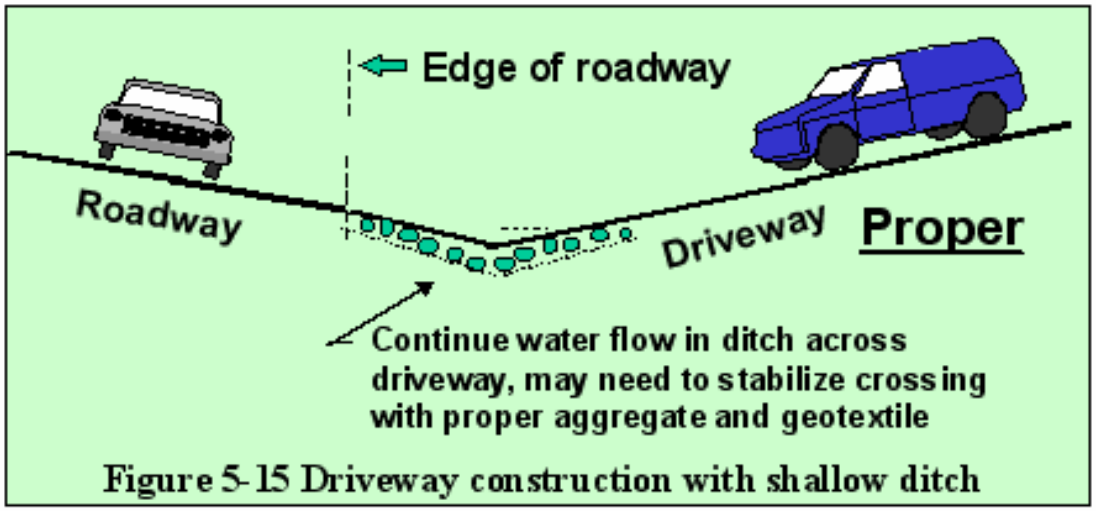

Figure 5-15 Driveway construction with shallow ditch

Carrying only ditch flows during storm events, the shallow ditch should be no problem for vehicles to traverse. This area may need to be stabilized with proper aggregate and a geotextile separation fabric for crossing traffic. Geotextile separation fabrics will be discussed in Chapter 7. Photo 5-27 shows a newly constructed access driveway to a gas facility. The driveway was graded to drain away from the road and

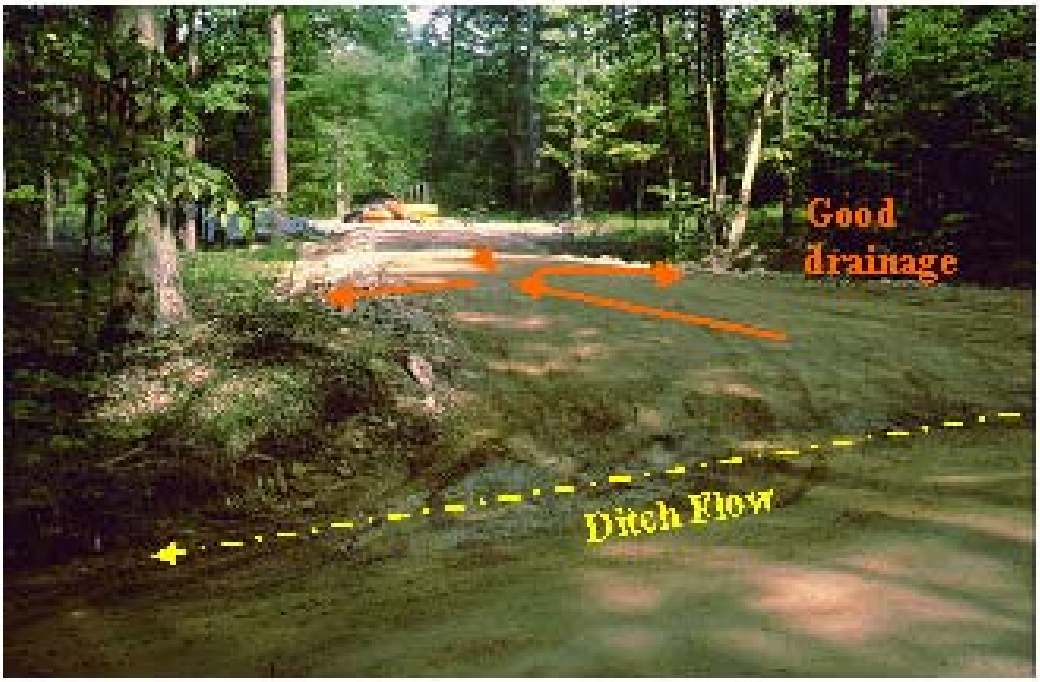

5-27 Gas facility access driveway designed to drain away from road.

away from the gas facility to a low point on the driveway and then off into the wooded area (vegetative filter area) on either side.

Of course, every road and driveway site will have different conditions with different problems. Sometimes good solutions are hard to find, as shown in Photo 5-28. Each site should be evaluated and designed for the best drainage and greatest safety.

5-28 Sometimes good solutions are hard to find!

5.3.5 Practices Related to Culverts. Culverts or pipes are enclosed channels designed to direct stream or ditch water away from the roadway. Culverts come in various materials and shapes. Selection depends on specific applications or particular needs such as durability, strength, cost, corrosion resistance, abrasion resistance, flow characteristics, and installation requirements.

5-29 Common Pipe Materials

The three common materials available are concrete pipe, corrugated metal pipe, and plastic pipe. as shown in the photos. Whatever the shape or material, the culvert has to have adequate strength for support of both fill material and traffic loads. Deep installations have to support the fill material above the pipe. Traffic loads are a minor concern with deep installations. However, with shallow installations traffic is ***the*** major concern.

First, we need to understand how vehicle loads are distributed to the road. All vehicle weight is transferred to the road through the tires. But the area where the tire contacts the road is small. The pounds per square inch over these tire contact areas are at the maximum. However, the load is distributed out over a greater area as it is transmitted down into the road structure, as depicted in Figure 5-16. The greater the road structure

depth, the less pounds per square inch loading occurs because the same amount of load is distributed over a larger area.

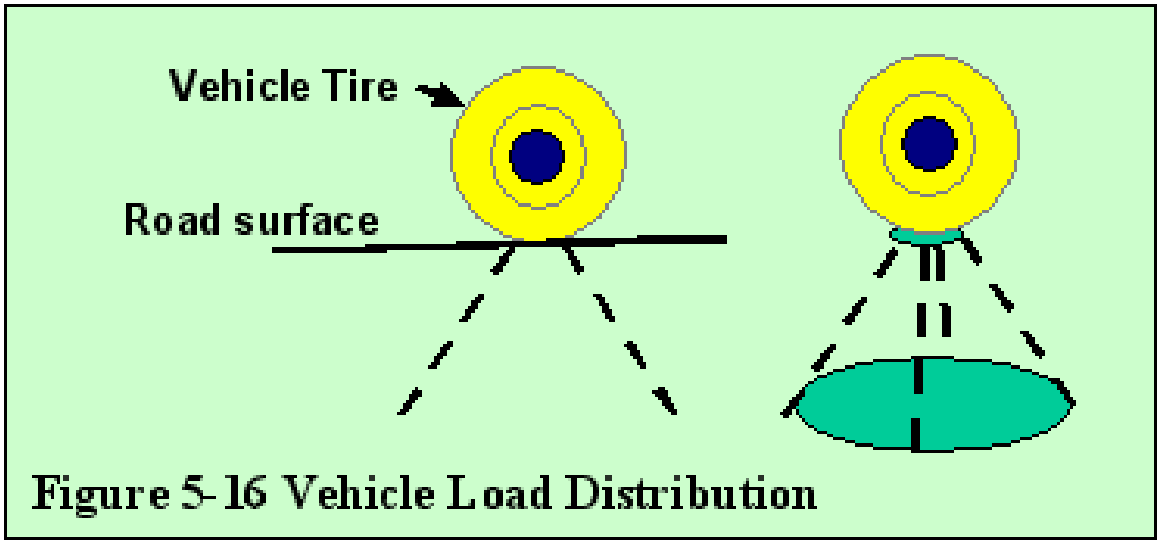

Figure 5-16 Vehicle Load Distribution

In addition to load distribution, it is also important to understand the impact of moving traffic. Traffic exerts a vertical force due to weight and a horizontal force due to motion. These two forces combine to produce an impact force hitting the road surface. The more shallow the pipe, the greater the traffic impact force. It is important to keep a minimum of twelve (12) inches cover over the pipe below the subgrade of the road to minimize the effect of this impact factor. Pipes larger than 24-inch diameter may need additional cover.

Concrete pipe is considered a rigid pipe while corrugated metal and plastic pipes are considered flexible. Rigid concrete pipe cannot flex, and the pipe itself carries most of the load, but it is important that the pipe be given uniform support throughout its entire length to develop its maximum strength. The load-carrying capacity of flexible pipe depends on the support it gets from the surrounding earth. Proper compaction of the backfill material in layers is critical to develop maximum strength. Many pipe failures

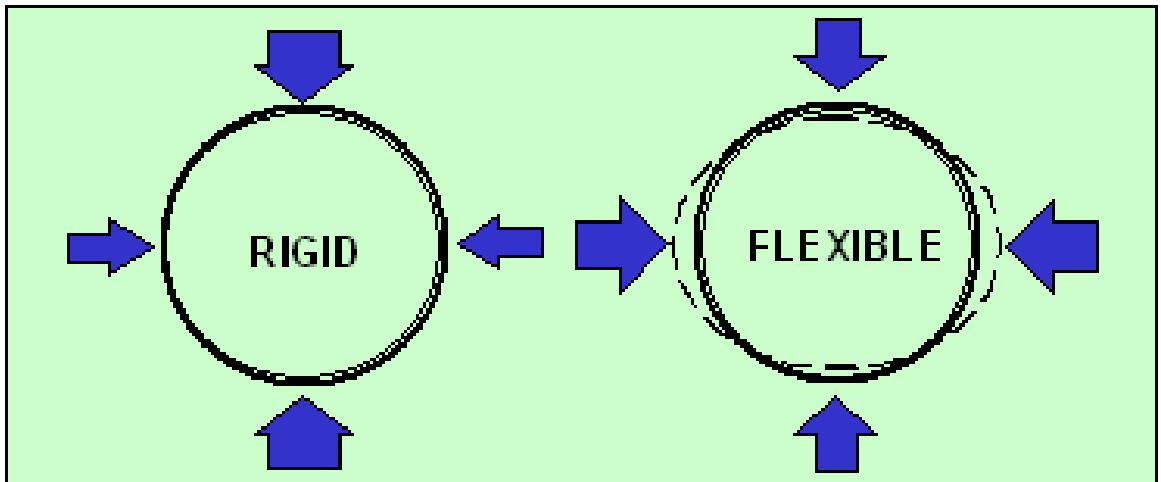

Figure 5-17 Pipe Load Support Characteristics

occur due to improper backfill material compaction. Traffic loads, particularly in shallow installations, will cause the pipe to flex, causing cavities to form around the pipe, eventually undermining the whole installation. Properly compacted backfill provides the necessary support to limit flexing movement and possible resultant failure. Figure 5-17 depicts the pipe load support characteristics of rigid and flexible pipes.

Culverts can be a primary cause of erosion and sediment. Culverts normally restrict water flow as it enters the culvert, increasing velocity, causing turbulence, and increasing energy at the outlets. Shallow installations across the road can also cause continual road maintenance work. With a little understanding and consideration, these problems can be alleviated.

5.3.5.1 Shallow Culvert Installations. Most cross road shallow culvert installations are dictated by the surrounding conditions and terrain. But when the culvert is too shallow, heavy traffic can cause problems. As discussed above, flexible type pipe tends to deflect under traffic, causing road materials to shift and eventual road deterioration to occur. Cross-pipes of 24-inch diameter or less need that minimum of one foot of cover material over the pipe beneath the structure of the road. This will protect the pipe from the impact forces of moving traffic.

5-30 Shallow pipe installations can cause continual road deterioration.

When adequate cover cannot be maintained, there are alternatives. A rigid pipe (concrete, cast iron, steel) will not deflect to the detriment of the road. A “squash pipe” or elliptical pipe will allow for proper flow capacity but will give additional cover for protection. An equivalent 18-inch diameter corrugated metal “squash pipe” is 15 inches in height. This extra three inches of cover can be significant when it comes to traffic loads and resulting road degradation. Rigid concrete pipe does come in an elliptical shape, giving a double advantage of pipe rigidity and extra cover.

5-31 Shallow installations: use rigid pipe, squash pipe, or elliptical concrete (rigid) pipe.

Another consideration is the use of multiple pipes of smaller diameter, allowing more cover but still providing adequate flow capacity. To use multiple pipes, there are a few rules to keep in mind. Flow capacity is directly related to the area of the pipe opening. This means that two 12-inch diameter pipes do not equal the flow capacity of one 24-inch diameter pipe. (Remember back in high school mathematics, the area of a circle is πr^2 or 3.14 times the radius squared.) Another rule is to make sure the pipes are installed far enough apart to enable adequate compacting of the backfill material between the pipes.

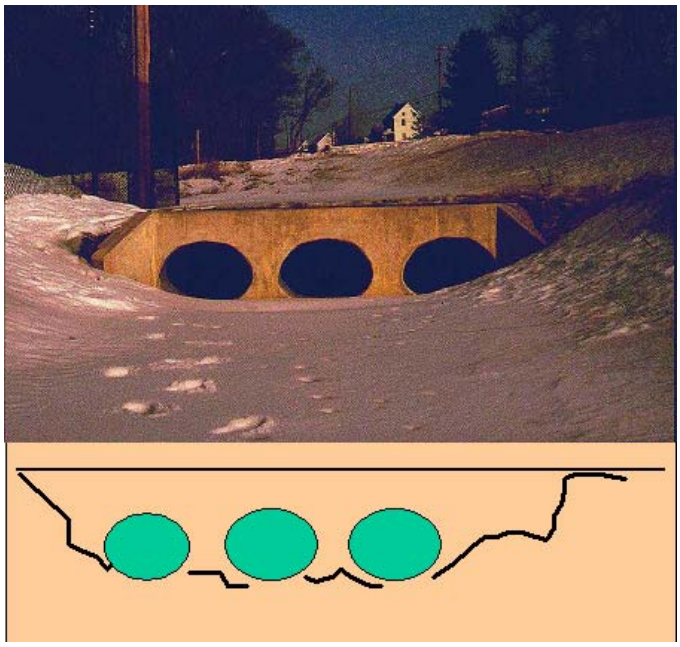

5-32 Shallow installation: Use multiple pipes of smaller diameter, allowing more cover with same capacity.

The use of multiple pipes usually brings comments regarding clogging. Any pipe can clog. One of the simplest solutions, particularly with metal or plastic pipe, is to cut the inlet end of the pipe on a slant or bevel. Any debris flowing toward the pipe will tend to ride up the slant, and water will continue to flow through the pipe. If multiple pipes are used, staggering the inlet ends so that they are not parallel in one line perpendicular to flow will reduce the probability of clogging. Each pipe inlet end is extended a little further (offset) than the pipe beside it. When large debris, such as tree

limbs, comes down stream, it will be forced to an angle that is skewed across the pipes, allowing water to continue flow through the pipes (see Figure 5-18).

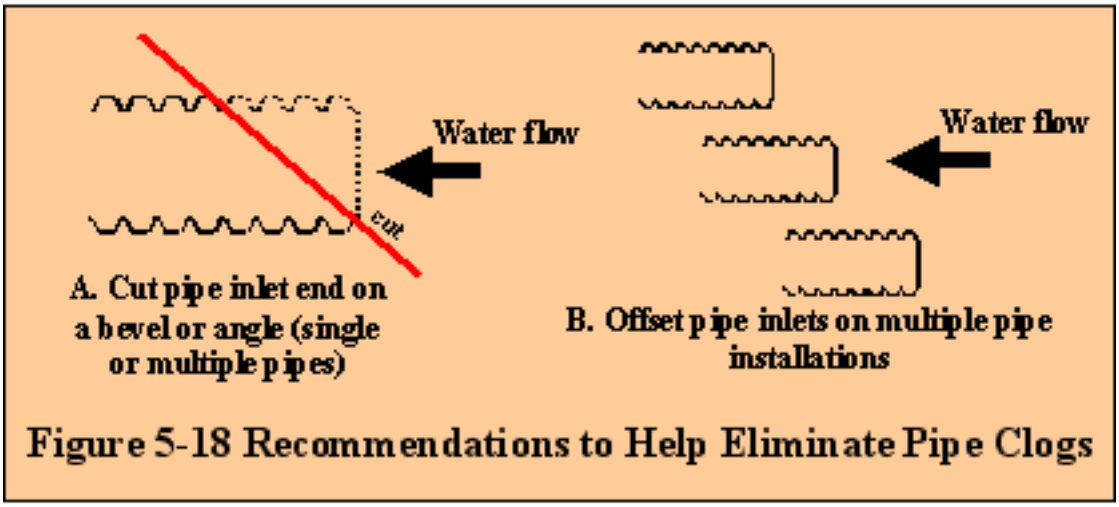

Figure 5-18 Recommendations to Help Eliminate Pipe Clogs

5.3.5.2 Fords on Perennial streams. Ford crossings eliminate the need for a pipe. Several states have numerous existing fords along with related erosion and sedimentation problems. If there is a ford crossing, and it is to remain, the crossing needs to be stabilized and area drainage altered to flow away from the site. Stabilization can be accomplished with select aggregate and geosynthetics with several variations being available (e.g., aggregate and geotextile separation fabric, perforated geoweb filled with aggregate – discussed in Chapter 7).

5-33 Existing fords should be stabilized to prevent erosion and stream degradation.

5.3.5.3 Culvert End Structures. Here are some ideas to reduce future maintenance problems. As mentioned above, when water flows into a pipe, it normally is restricted, as shown in Figure 5-19. This restriction increases the velocity of the water and its erosive force. When water flows out of the pipe, eddy currents develop, swirling water back around at the sides of the pipe, as also shown in Figure 5-19, causing erosion and scour. Straight, smooth transitions into and out of the pipe reduce turbulence and erosion at culvert ends.

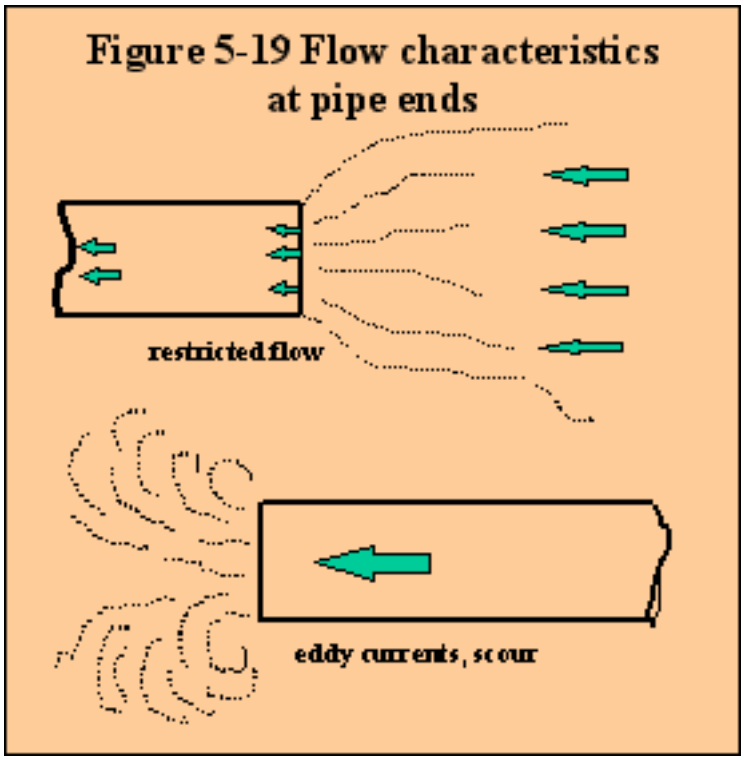

Figure 5-19 Flow characteristics at pipe ends

Straight transitions in and out of the pipe, however, are not always possible. Roadside ditch water flowing parallel to the road must be turned to flow through a cross pipe. Even in straight

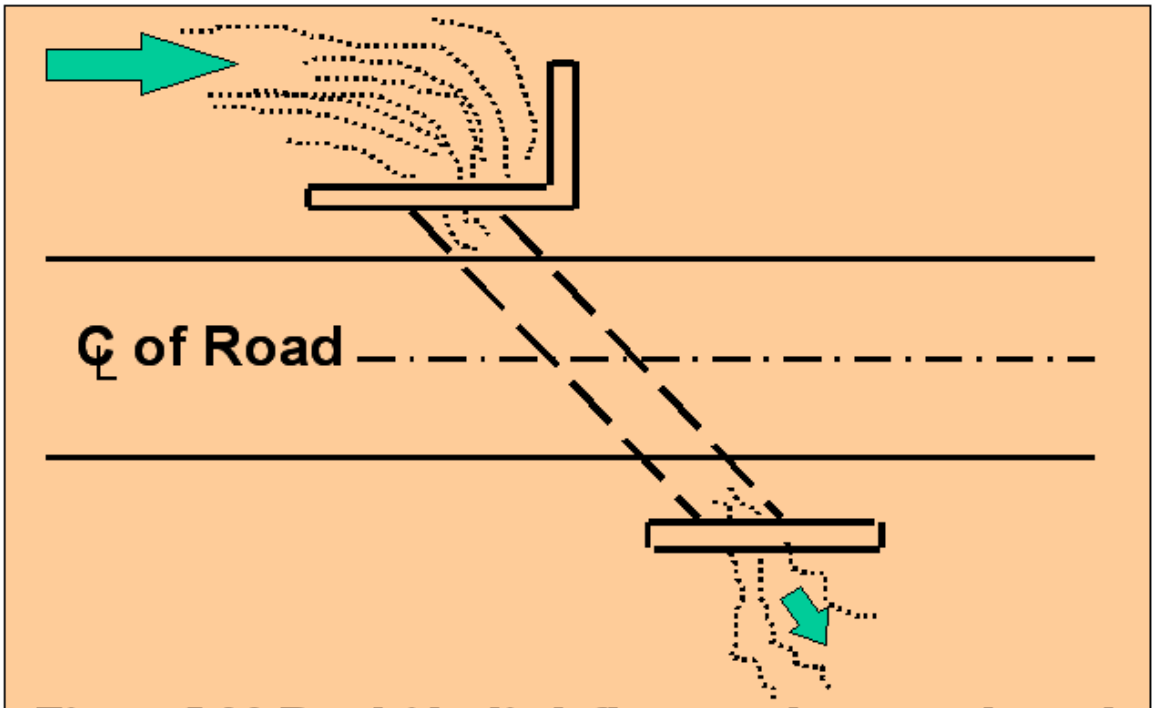

Figure 5-20 Roadside ditch flows need to turn through the cross-pipe – end structures protect against erosion

transitions, circumstances may cause erosion problems on either pipe end. Culvert inlet and outlet protection is important in the prevention of erosion in these areas.

Inlet and outlet structures not only protect the embankment from undercutting water currents and eddies, but also help anchor the culvert and help prevent crushing of the pipe ends from heavy traffic or equipment, A variety of materials can be used for end structures, from prefabricated units and gabions to cement concrete and flagstone to native stone that may be available on site. Native stone not only becomes cost effective but also is environmentally aesthetic, blending in with the natural conditions. The series of photos show different types of end structures.

5-34 Various materials can be used for end structures.

5.3.5.4. Aprons at Culvert Outlets. Culvert outlets, even with an end structure, may still pose a problem with the flow discharge energy. It may be necessary to create a conveyance channel to establish a stable discharge point. For example, a simple pre-

5-35 Typical flared end sections.

fabricated flared end section (concrete, metal, plastic), as shown in Photo 5-35, provides an apron to spread the water flow and dissipate energy. Photo 5-36 shows a metal flared end section on plastic pipe.

Rock riprap can also be used at culvert outlets effectively. The first photo is a new installation with seeding and mulching around the rip-rap. The vegetation, once established will enhance the area aesthetics. The size of rock and the dimensions of an apron will depend on pipe size, discharge volume and velocity, and slope of the outlet channel or terrain. Charts providing guidelines are available. Using riprap for an apron, however, should not be so technically challenging. Experienced road personnel know the water flow amounts and the potential problems at each specific pipe outlet site. They can size the apron based on their past experience. Then, road personnel should follow up with field inspections during and after the next several rainstorms. If erosion is evident past the riprap limits, expand the apron and inspect again. In Photo 5-38, rip-rap was placed from the pipe outlet down the slope as an energy-dissipating channel.

5-36 Metal flared end section on plastic pipe.

5-37 Rock rip-rap at pipe outlets spreads flow and dissipates energy.

5-38 Using rip-rap for erosion prevention at culvert outlet.

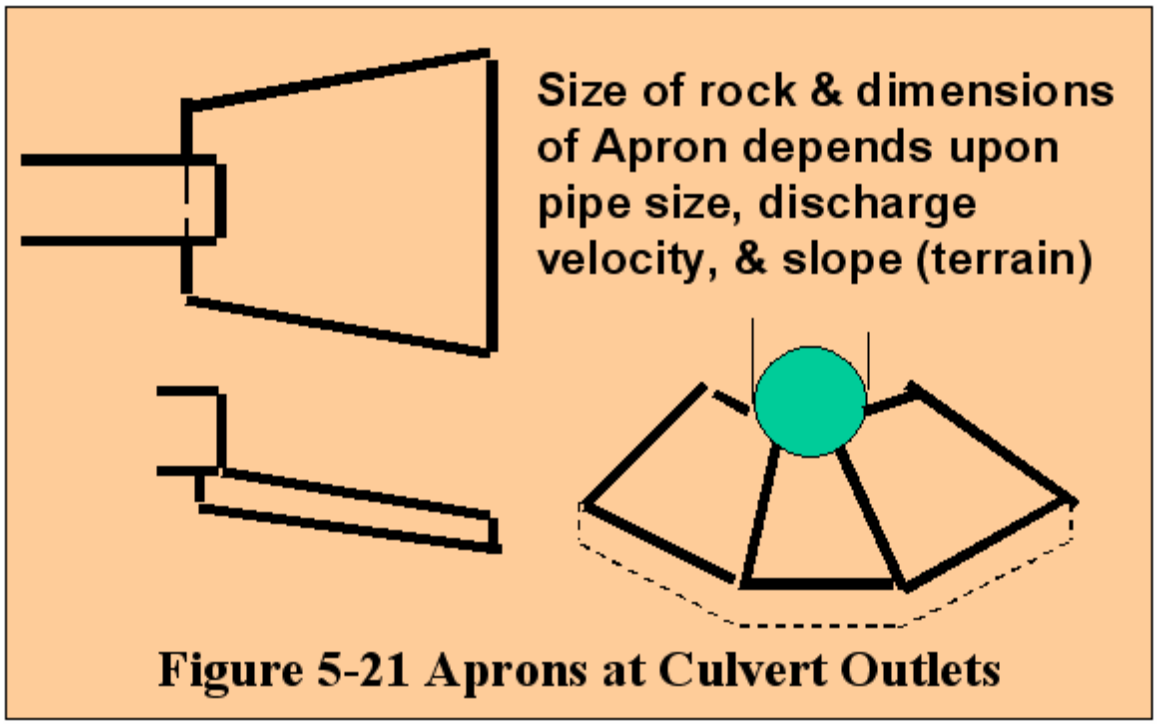

Figure 5-21 Aprons at Culvert Outlets

Although native stone may be the aesthetic choice of material, depending on location, even brush and tree stumps can be effective in dissipating flow energy of water.

5.3.5.5 "Through Drains." Through drains are cross culverts installed strategically to handle springs or spring seeps flowing perpendicular to the road. These drains carry the flow under (through) the road to the other side. Through drains allow water to continue down the path it traveled before the road was built. Because this usually clean water never enters the ditch, it stays clean. The photos depict typical through drain placements. The drains prevent roads from intercepting native ground water flows. If we establish a through drain to allow this natural flow to continue without entering the road ditch, we solve several problems. In addition to keeping the spring water clean, we do not have to handle the water via the road ditch. This reduces ditch flow and potential erosion problems in the ditch and at the ditch outlet. With reduced flow we also may be able to reduce the size of the roadside ditch.

5-39 Brush, tree stumps, etc. can be effective energy dissipaters.

5-40 Through drains keep springs and spring seeps out of road drainage facilities.

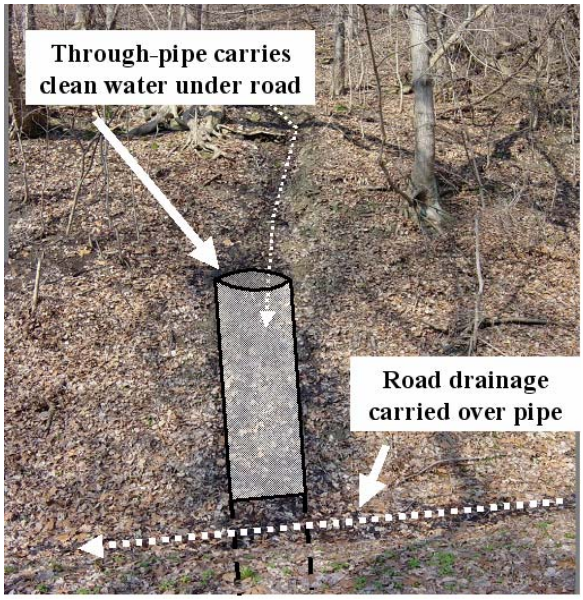

5-41 Through drains keep water clean.

If the spring flowing into the ditch has existed for a number of years, the spring's natural downhill channel may no longer exist. This channel may have to be reestablished, keeping proper erosion prevention in mind.

5.3.5.6 Large Culverts in Perennial Streams. Large culverts in perennial (continual flow) streams provide a prime opportunity to enhance the natural stream environment. With new or replacement installations, a pipe culvert or box culvert can be sized to accommodate both flow and the natural streambed. Observe the existing streambed grade and average surface elevation. Set the bottom of the culvert at the required depth to establish a natural streambed through the culvert. Add stream-like material in type and size to minimize disturbance.

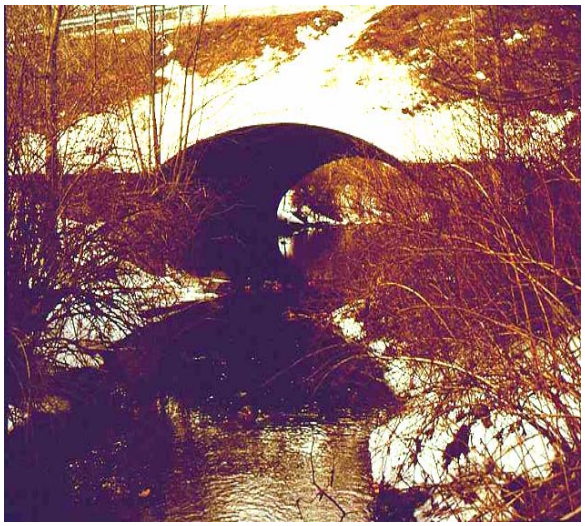

5-42 Over sizing culverts to allow natural streambed conditions through the culvert maintains the stream ecosystem.

Another option is to use a metal plate arch without a bottom. The arch spans the stream, resting on footers at each side. This practice maintains the stream ecosystem and still provides the necessary conveyance for proper drainage. This option also enhances protection against undermining of the culvert due to seepage around the pipe (don't underestimate those little crayfish "critters" from burrowing alongside a culvert in their attempt to move up stream, creating water channels along the outside of the culvert that can initiate an undermining process).

5.3.6 Combination Practices. The next two practices combine new techniques with practices described previously. The use of any of the various practices in combination will depend on analysis of the existing site conditions.

5.3.6.1 The Stream Saver System. Commonly, a road's low point is directly over the stream. For many years, this condition seemed to be the most practical and effective way of draining the road. Roadside ditches could be carried directly to the low point and outletted directly to the stream with a cross culvert carrying the stream under the road.

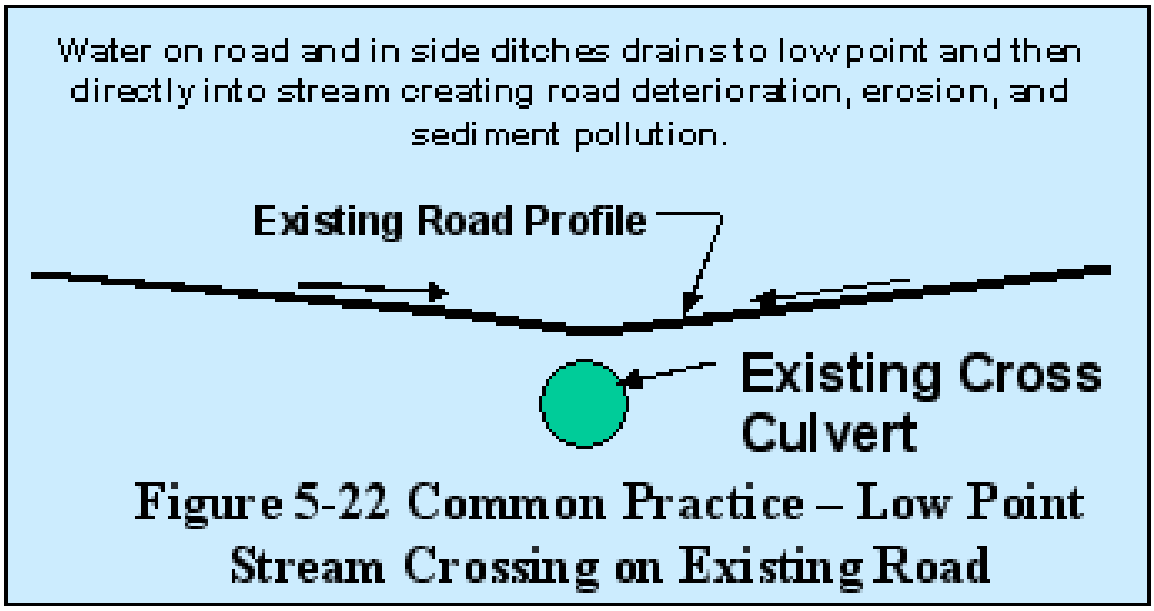

Figure 5-22 Common Practice – Low Point Stream Crossing on Existing Road

But this concept centered on the road only. An analysis of its total impact revealed some problems. First, everything drains directly to the stream, including any and all sediment and other pollutants. A deeper look revealed it wasn't really all that good for the road, either. Under the scenario illustrated in Figure 5-22, if the stream flow exceeds the culvert capacity and overflows the road, we have created a v-shaped channel, although flat, to concentrate the flow and increase the erosive energy. This condition can cause erosion of the road material and continual road maintenance with every major storm.

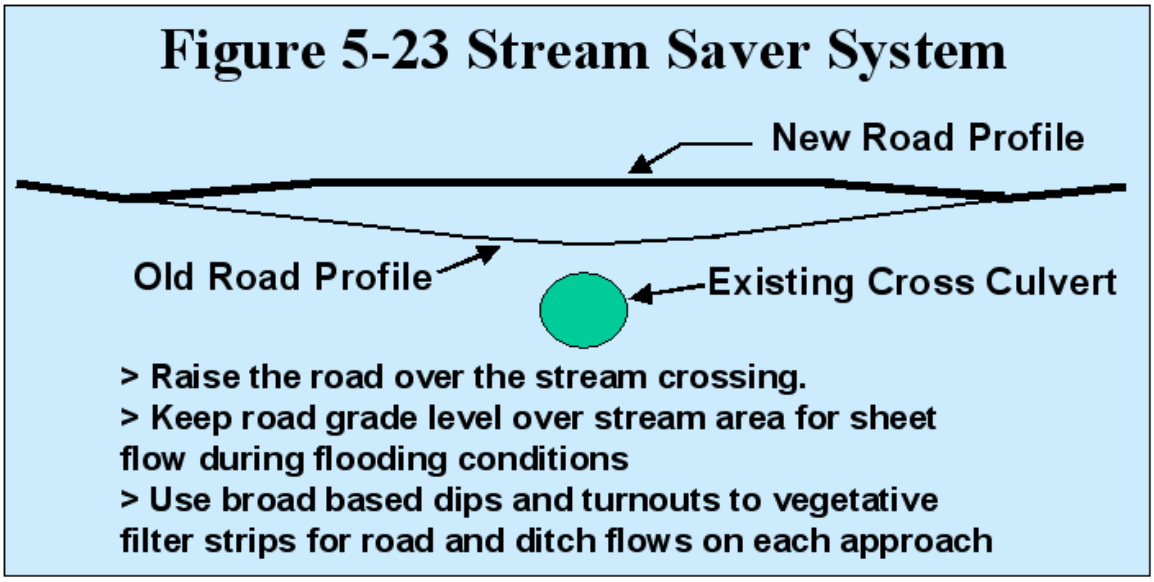

The solution is to implement a "Stream Saver System." Raise the road over the stream crossing, creating a level area extending away from the stream on both sides. This level road grade will allow sheet flow during flooding conditions, if the cross pipe cannot handle the flow. Using broad based dips and turnouts to vegetative filter strips for the road and ditch drainage on each approach as conditions warrant will avoid direct sediment input into the stream and alleviate some flood flow. If pipe capacity is severely limited, a flood flow relief crossing can be established away from the stream depending on the existing terrain and land uses. This crossing can be stabilized as a low water crossing (refer to Chapter 7 for a description of a stabilized low water crossing using geosynthetics).

5-43 Stream Saver System – raised level road with ditch turnouts to vegetative filters.

In raising the road, additional smaller cross pipes could be installed at higher elevations than the flood flow relief cross pipes. Depending on depth of new material to raise the road, these pipes may need only to be laid on the existing road surface or partially excavated into the existing surface. In certain storms, these pipes would handle the additional flow without overtopping the road. Although additional pipes mean more maintenance, these flood relief pipes will only come into use when substantial storms exceed the capacity of the main cross pipe and will keep the road intact.

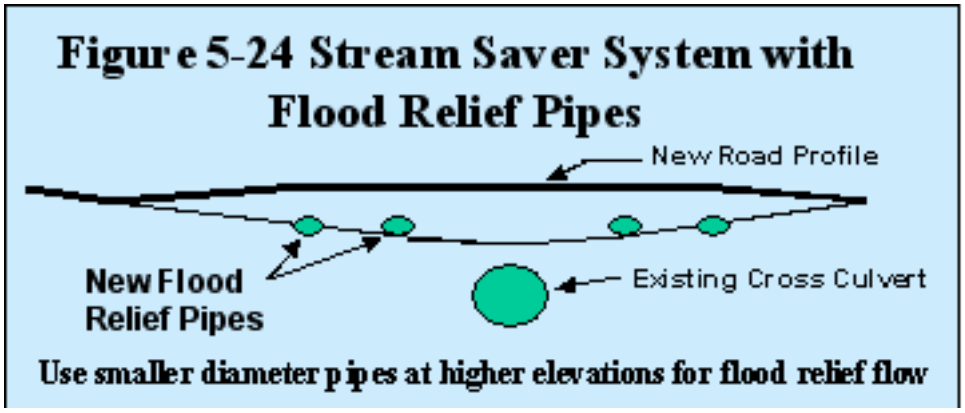

5.3.6.2 Multiple Culverts. Under certain conditions, multiple culverts at various elevations may be the answer. As an example, an existing road traversing a wetland area had existing cross culverts to carry the perennial flow from the naturally formed channels. Both sides of the road, however, had substantial wetland areas abutting the road embankment. Under normal conditions, the pipes handled flow adequately. The watershed, however, being quite extensive, guaranteed that almost any storm would overtop the road, causing some washout of road material into the stream and wetland. A stream saver system was implemented. The installation of smaller pipes at higher elevations and at locations across the extent of the adjacent wetlands gave an additional benefit to the wetlands. As the water level rose during storm conditions, the additional pipes handled flow and kept velocities and currents to a minimum, maintaining a more stabilizing effect on the wetland habitat.

5.3.7 Major Reconstruction: Raising the Road. Raising the road involves major filling of the road cross section between high banks. Before we get into the details for this work, we should understand the reason and basis for the road being in this condition. Referring back to the beginning of this chapter in Section 5.2, we mentioned the typical cross section of many roads depicts a low road surface with high roadside banks on each side. This is particularly the case in forested areas. In almost all cases, this condition is the result of years of traditional road maintenance.

5-44 Remember this photo? Look at the banks on either side of the road.

Routine road maintenance practices (road grading, snow removal, shoulder cutting, ditch cleaning, etc.) combined with the wear and tear of traffic and natural erosive forces have the cumulative effect of lowering the road elevation in relation to the surrounding terrain. As the road profile drops, or becomes entrenched, water draining to the road is trapped and concentrated in parallel ditches, and the road begins to function as

a channel for water flow. This entrenched road profile makes installation of crosspipes, turnouts, and other drainage features to get the water away from the road increasingly challenging. Raising the road can eliminate the persistent maintenance difficulties associated with this entrenched condition.

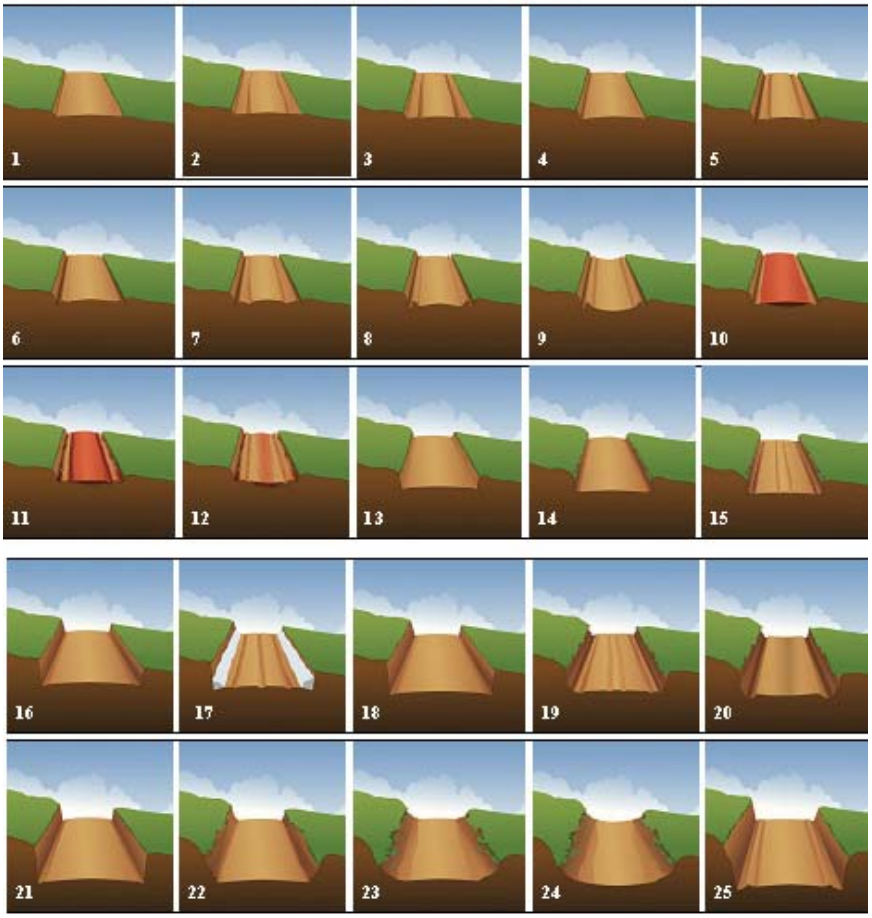

Figure 5-25 The Sequence of Road Entrenchment

Looking at the sequence of photos in Figure 5-25, one can view the lowering of the road surface through the years establishing those high banks on either side. The new road (#1) starts to show surface rutting (#2). The ruts get worse (#3) until grading operations re-establish the profile and attempt to create a better ditch gouging into the bank for drainage (#4). The banks' vertical surfaces start to fall in, and, along with the eroded road materials, create the need for ditch cleaning . Repeated maintenance operations of blading and grading along with ditch cleaning (#5-8) finally results in a need (#9) for additional material as the road crown is lost. Material is added (#10) and the process starts again. This repeated maintenance over the years as more material is lost causes the road to become more and more entrenched (#11-16). Snow removal becomes a problem with the snow being piled along the banks, aggravating the problem (#17). This entrenchment causes the road to act as the drainage conveyance channel, resulting in enhanced erosion of the road and banks and sediment-laden ditches. This, of course, leads to greater road maintenance as the road becomes deeper and wider year after year (#18-25).

5.3.7.1 Raising the Entrenched Road. We can break this cycle. We need to restore the road to its original surface elevation. This could mean substantial fill and a major work effort. Fill material becomes a prime cost in this practice. There are local governments, however, that can obtain free fill and can load and haul the material with their own equipment. Free fill and use of in-house equipment reduces the cost although it will still be a major work effort. Photo 5-45 shows two roads that would be ideal candidates for road raising. Both of these roads have severe drainage, erosion, and sedimentation problems requiring substantial and continual maintenance. But returning

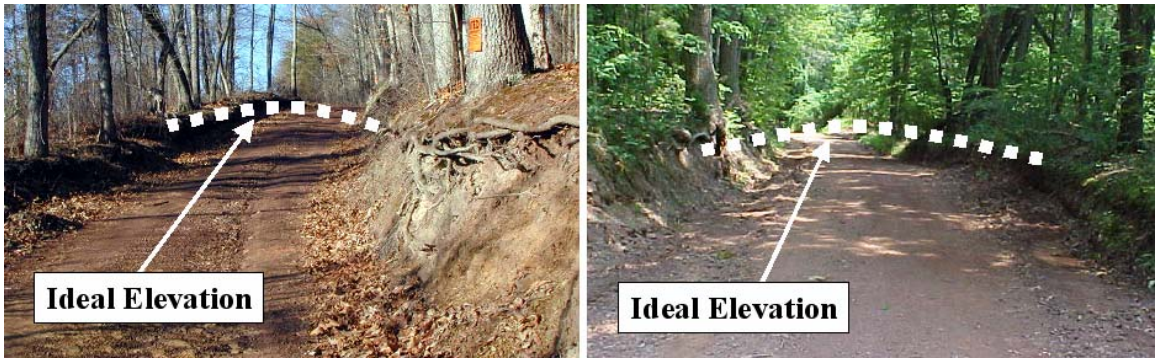

5-45 Good candidates for "raising the road."

these roads to their original elevation could significantly cut maintenance costs. Many roads could be raised to eliminate the banks on both sides, providing excellent road drainage conditions with much less erosion and sediment pollution.

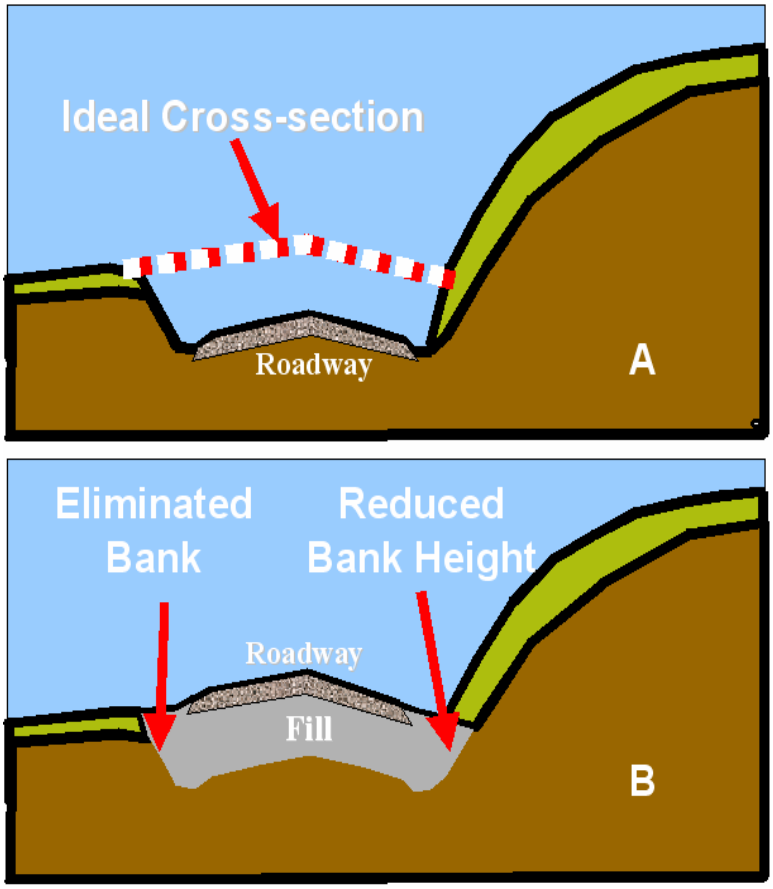

Figure 5-26A shows a typical existing entrenched roadway. Figure 5-26B shows the filled roadway, completely eliminating a bank on one side and reducing the height of the bank on the other side. Depending on terrain, etc, drainage could be sheet-flowed off the road without a ditch on the one side. The road no longer serves as the drainage channel and will experience far less surface erosion, rutting or other degradation. Snow removal no longer becomes a problem since we now have a place to plow it.

Figure 5-26 Raising the Road.

The series of photos shows Red Rose Road in Huntington County, Pennsylvania. The road was raised with free fill shale from a nearby pit. This road then received a final road surface aggregate. (Refer to Appendix 5, Worksites in Focus, to review this Pennsylvania Dirt and Gravel Road Program Project.) Raising the road improves drainage resulting in less erosion and road degradation and thus less road maintenance and a better environment. Winter snows can now be plowed totally off and away from the road, providing better protection from melting snow water seeping back into the road structure.

5-46 Red Rose Road, Huntington County, PA

Before, an entrenched road

During placement of shale fill

After finishing the shale

Final road with driving surface aggregate

Use of Recycled Material. Commonly used fill materials include native rock and mining spoil. Other fill material such as concrete or demolition waste, tire shreds, ground glass, spent sandblasting sand, and coal combustion waste has also been used to aid in recycling programs. Select fill material carefully. Some materials may need special use permits or require special handling. Work closely with your local conservation agencies and state environmental agencies.

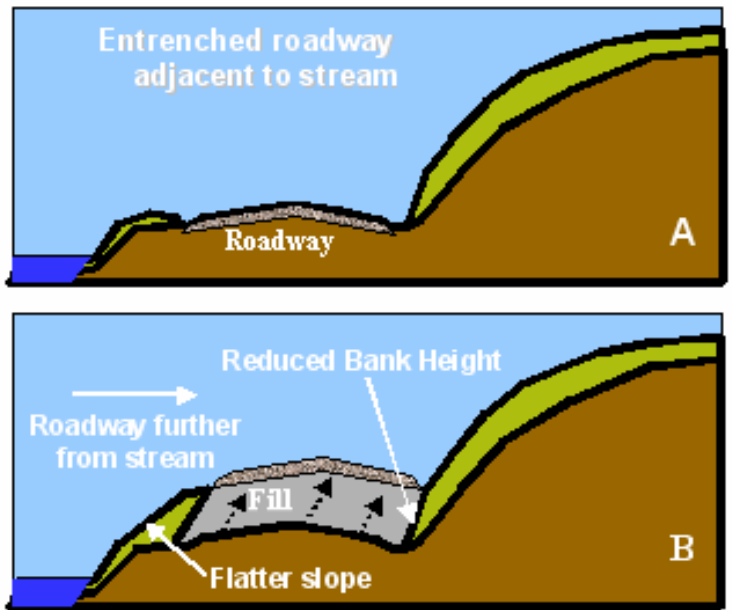

Figure 5-27: Raising the road and moving away from the stream.

5.3.7.2 Raising the Road and Moving Away from a Stream. Figure 5-27 shows a road raising variation where the road has a high embankment on one side and falls steeply off directly to a stream on the other side. The road is entrenched with side ditches. The road is raised upslope away from the stream. We eliminate the entrenchment on the stream side, allowing for sheet flow across additional vegetated area. On the other side, we reduce the embankment height for better stability and drainage control. Depending on the various conditions, insloping could be combined with raising the road, providing additional benefits.

5.3.8 Practices Related to Bridges. Although bridge replacement is neither simple nor inexpensive, sometimes there is simply no alternative. But there are several environmentally sensitive techniques available that will protect the environment and prolong bridge life. Common practice, once more, places the bridge at the low point of the road grade across the stream. The road drains directly onto the bridge, carrying road material and sediment that then drains directly into the stream through the bridge "scuppers" or drainage openings. In addition, abutments built to support the bridge are placed so as to constrict the water flow to the main channel. This scenario poses several maintenance problems. Scour and erosion at bridge abutments shorten bridge life. Further, the constricted water flow frequently results in gravel bars that must be continually removed.

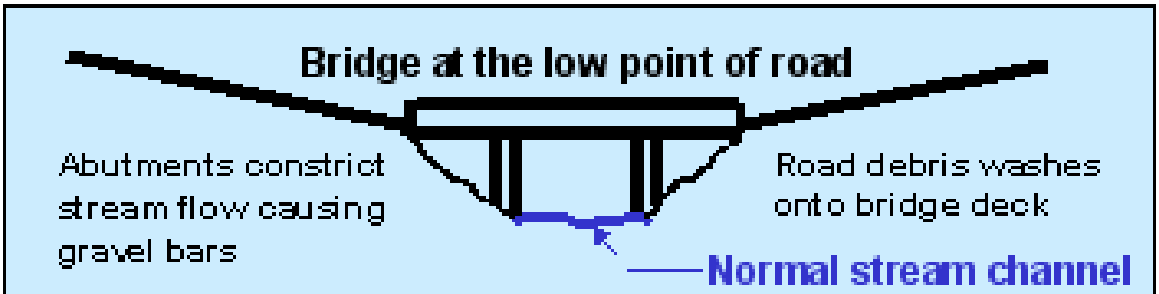

Figure 5-28 Common Practice – Existing Bridges

5.3.8.1 The Stream Saver Bridge System. The Stream Saver Bridge System reduces maintenance by raising the bridge and sloping the road away from it. Roadside ditches are then turned out into vegetative filter strips well away from the bridge approaches.

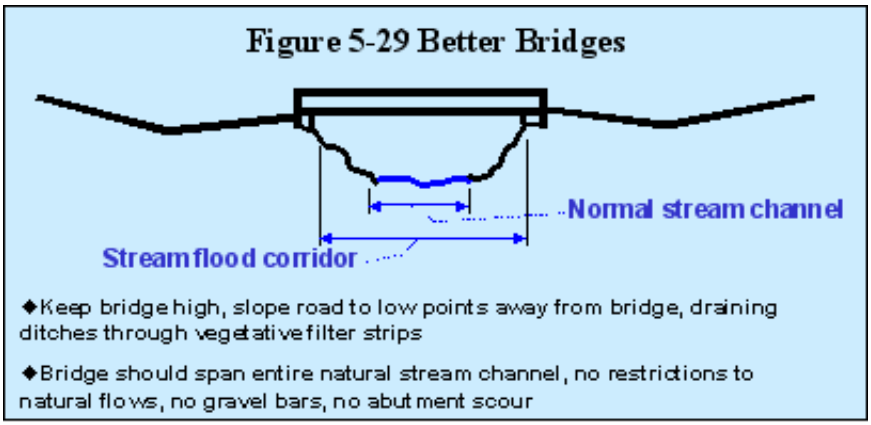

Ideally, the stream saver bridge spans the entire natural stream flood flow channel. Spanning the natural stream corridor reduces interference in stream flows, eliminating abutment scour and gravel bar problems. This system better protects both the environmental stream ecosystem and the bridge structure.

Raising the bridge also allows better drainage off and away from the bridge structure prolonging its life. Bridge drainage can also be carried away from the stream to the same ditch turnout through a vegetative filter strip. Bridge drainage scuppers (openings in the bridge deck – remember the photo from Chapter 3) normally empty the flow directly to the stream along with all the accumulated sediment on the bridge deck. A raised bridge surface that drains off the bridge longitudinally keeps sediment and debris from washing onto the bridge and the bridge surface drainage water clean. This clean water will be much less detrimental to the stream if the bridge has scuppers draining directly into the stream.

5-47 Eliminate this maintenance and environmental problem with Stream Saver Bridges.

5-48 Gravel Bar Removal is a costly maintenance task.

5.3.8.2 Gravel Bar Removal. Gravel bars normally occur because the bridge structure interferes with the natural conditions of stream flow, but can occur naturally anywhere along the stream. At bridge structures, however, gravel bars mean additional maintenance. The bars must be removed to maintain proper flows for flood control and to prevent damage to the bridge.

Sometimes the removed gravel is used for road material. If we refer back to Chapter 3 to the discussion of road material, this "gravel" does not meet the specifications for good road material. It commonly has a rounded shape with little fines and does not lock together to stay in place.

Gravel bar removal also poses several problems other than the cost of removal. Operations cause stream disturbance with resultant turbidity and sediment downstream. This can also result in 100% embeddedness, as described in Chapter 4, to the detriment of stream life. This turbidity and sediment continues for an extended period of time until natural conditions can re-establish the equilibrium.

If gravel bar removal is necessary, there are a few factors to be aware of. Do not use the removed gravel for road material. Keep stream disturbance at a minimum by working in low flow conditions and keeping equipment tires and tracks "dry." Work with your conservation agencies to secure the necessary permits.

5-49 Gravel bar removal causes turbidity and sediment for extended time periods detrimental to the stream ecology. Would you want to fish here?

If gravel bars are extensive and form rapidly after each removal operation, this material has to be coming from somewhere. Look at the stream flow and upstream terrain conditions to determine the source and what may be causing the material deposition, and see if there is a remedy that can prevent future gravel bars from forming.

5.3.8.3 Bridge Decks. Crowning the bridge deck similar to the road will also enhance bridge drainage. Many of our rural bridges have flat decks that aggravate the problem of water and debris on the deck, particularly when the road approaches on either side drain directly to the bridge.

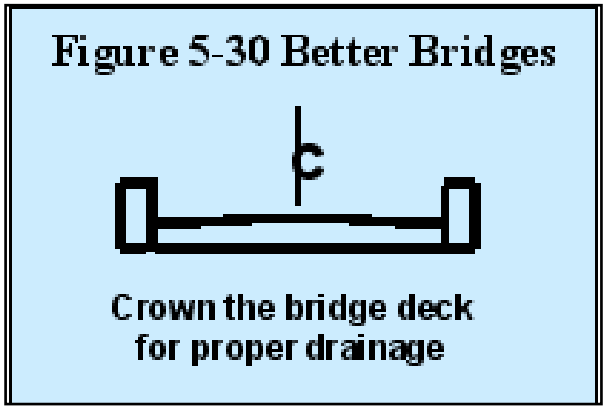

Incorporating these techniques allows for longer bridge life by providing better drainage of the bridge deck and away from the total bridge structure. It also reduces maintenance costs because less material accumulates on the bridge, drainage scuppers are not blocked, less choking sediment flows into the stream, and no gravel bars have to be removed. Just as importantly, the whole stream ecosystem is not affected by these activities, leaving a better environment.

5.4 Summary

This chapter started to fill your toolbox with many various tools or practices that are environmentally sensitive and good for your roads. These practices, for the most part, are simple, practical techniques that can easily be adopted as part of your daily routine maintenance work. Of course, the more major practices of raising the road and replacing bridges can also reap major benefits for your road system and the environment.

Many of these practices, particularly concerning proper drainage, can be adopted for paved roads and will prove to be just as beneficial as they are for unpaved gravel roads.

As you begin to use these practices, you will begin to see the long-range continual benefits for your roads and your environment and thereby for your community.

The following Appendix 5 reviews actual projects in which a combination of practices has been used to solve erosion and sediment pollution problems stemming from dirt and gravel roads.

APPENDIX 5. Worksites in Focus

This appendix reviews several actual projects funded through the Pennsylvania Dirt and Gravel Road Program, as described in Appendix A-1. The first worksite on Red Rose Road was a Demonstration Project for the Pennsylvania Dirt and Gravel Road Program that became the "Drive Thru Classroom Self-Guided Tour" Project to demonstrate various environmentally sensitive maintenance practices being taught to local governments under the program. The next two worksites were actual projects undertaken by Pennsylvania local governments with major funding through the Pennsylvania Dirt and Gravel Road Program. At each local government worksite, the problem(s) is identified, with objectives, considerations, and solutions, followed by a cost summary for the project. The accompanying photos give an insight into the before and after conditions at each site, demonstrating the benefits of using environmentally sensitive maintenance practices to the road and the environment and to the overall aesthetics and to a better community.

raising the road profile before, during & after

Please contact the center with any questions:
toll free: 1-866-668-6683
e-mail: dirtandgravel@psu.edu

For more information visit:
www.dirtandgravelroads.org

Center for Dirt and Gravel Road Studies

environmentally sensitive

maintenance

red rose road

Drive-Thru Classroom Self-Guided Tour

The Problem:

Because the road was lower than the surrounding terrain, rainfall and runoff were captured and concentrated in the roadway, gaining energy and eroding road surface and bank materials. This concentrated flow exited the road with tremendous force, directly into the stream. The stream, consistently inundated with a high-velocity input of sediment-laden water, was eventually incised to the point that it was totally disconnected from its floodplain.

The Solution:

The road profile was raised to elimimate ditches and allow road runoff to flow gently from the road surface into the surrounding porous forest soils. One particularly problematic section of road was shifted uphill, away from the stream, to protect an already damaged and fragile stream reach from further harm. Selective thinning of the tree canopy allows the road to dry out while promoting healthy forest growth patterns.

How to enjoy the outdoor classroom:

- Follow along with this brochure
- Look for matching numbered signs (The icon indicates picture location and direction)
- Stop and have a look around

red rose road

Site Location & Directions

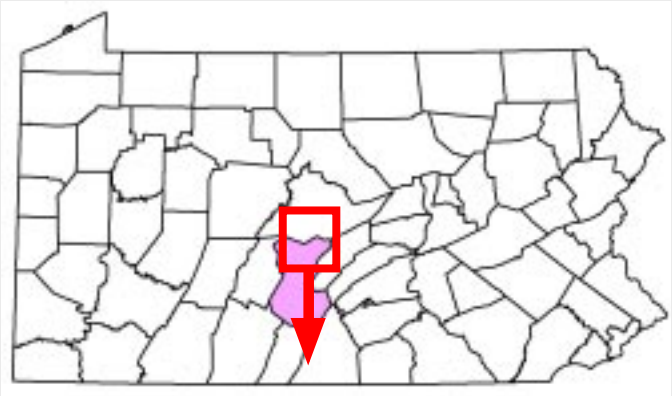

DIRECTIONS

RED ROSE ROAD is located in Huntingdon County 10 miles south of State College. From the north, take Rte. 26 south from State College. Red Rose Road is on the right 3.5 miles past the summit of Tussey Mountain. From the south, take Rte. 26 north from Huntingdon approximately 19 miles. Red Rose Road is the first road on the left after passing the entrance to Whipple Dam State Park.

red rose road

Site Map

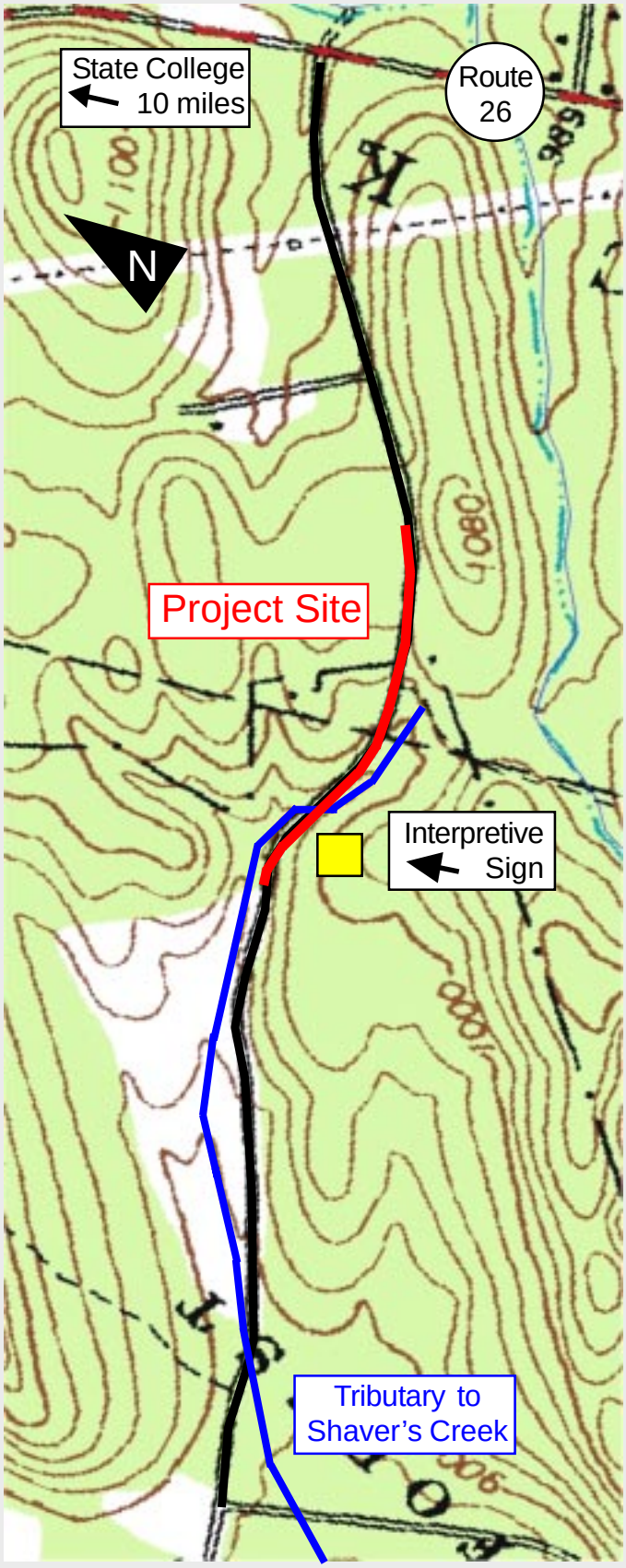

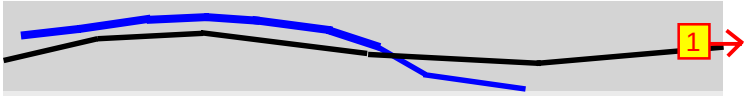

ENTRENCHED ROAD BEHAVES LIKE A DITCH

Years of wear and tear, machine maintenance and erosion caused the road surface to become entrenched below its banks. This captures all water from surface and near-surface drainage. The captured water gains energy as it flows down the road causing it to erode the road surface and side ditches. Road banks collapse into ditches mandating more machine work, which further lowers the road. Observe how the natural surface drainage has been restored by filling the road back to it original elevation and stopping the endless cycle of erosion and repair.

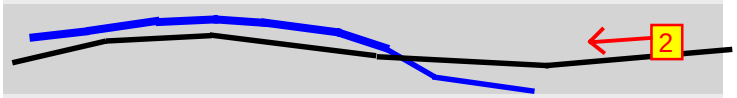

ERODED BANK & SHADE

In addition to the sunken road surface, notice the density of vegetation shown in this photo. The shade is so dense, plants whose roots could have held the bank's soil in place did not have enough light to grow. Also, look at how the treetops lean over the road shading it. Individual trees, which were not structurally sound or vigorous were removed. If not disrupted by deer browsing, vigorous strong young plants will now grow with more full light and provide protection for the soil. Trees growing close to the road will receive light from both sides and develop even crowns.

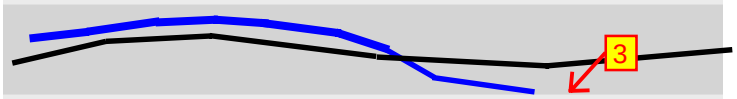

CONTRASTING DRAINAGE TURNOUTS

Road drainage constructed without concern for increasing environmental harm and maintenance costs frequently cuts banks vertically and makes steep drainage patterns. The maintenance practice at this location was to dig excess material out of the turnout and pile it beside the drainage course, constricting the width of flow causing the water to move faster and be more erosive. Now, observe how drainage from the restored road height does not require a ditch, and how flow is dispersed over a wide area at a shallow angle.

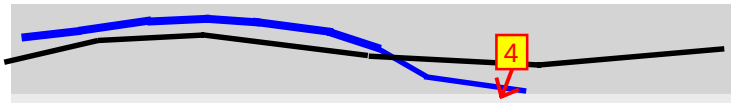

NATURAL ENERGY MANAGEMENT

In a natural landscape it is difficult for water to concentrate. Organic material, including branches and logs, and rocks disrupt and slow the water's flow. Porous forest soils reduce the amount of surface runoff by allowing water to infiltrate.

The natural pattern of organic debris was successfully emulated at the discharge end of this pipe. This simple use of organic materials not only dissipates the energy of the pipeflow but also provides life-supporting food for plant roots and the microbes living in conjunction with them. The roots, in turn, further stabilize the soil and increase infiltration.

MAINTAINABLE ROAD SURFACES

The bank-run shale used on the previous road surface had pieces in it that were too large for available grading machines to work into a drivable surface. Left un-graded, the road deteriorated. Shale has two other disadvantages. It "slacks," or breaks down into silt or clay soil particles when exposed to air, and it does not resist the abrasion of traffic well enough to be rated as a suitable road surface material. Clay and silt are the soil types most prone to make dust and sediment. The Driving Surface Aggregate visible now is a specially formulated mixture of abrasion resistant limestone. Contrast this surface with that of nearby off-site locations.

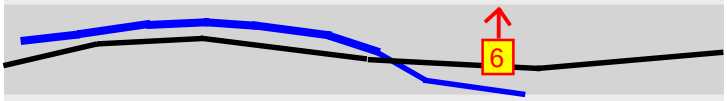

GRADE BREAK

The pipe here was installed at an elevation high enough to allow the pipeflow to discharge at natural ground level. In order to get the required 12" of cover over the plastic pipe, a grade break was constructed. Grade breaks are inexpensive to build, easy to maintain, and serve several purposes. The additional road material used to construct the grade break provides cover for the pipe, slows traffic, and acts to divert water flowing down the road surface into the road ditch. This disruption of water flow prevents road deterioration from water movement on steep road grades and lengthens maintenance cycles.

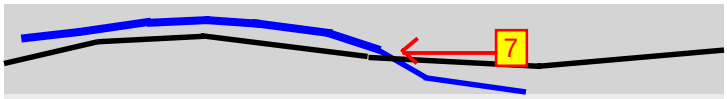

HIGH-CAPACITY DITCH

The picture shows evidence of fast moving water. Tangled brush mattresses and large rocks washed clean indicate a strong erosive force generated by concentrated swift flow. Contrast how wide and deep the pictured ditch is compared to the present ditch.

Large rocks were placed in the ditch before the road was filled in. Known as a “French Drain”, it serves to conduct clear sub-surface water downgrade without forcing it to come to the surface, where soil particles can be carried as unwanted sediment to the stream. To some extent, sub-drains help keep the road base drained, and therefore stronger.

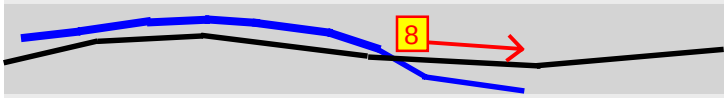

BANK WASHOUT OVERLOADED DITCH

Concentrated flow washed out the road bank at this location sending a plume of sediment to the stream. Over time, that concentrated flow further eroded 400 ft. of ditchline discharging even more sediment directly into the stream.

A non-corroding cross-pipe was added under the road to harmlessly direct this flow to the forest floor on the other side of the road. The pipe entrance was raised to lessen the energy the water gained by falling into the pipe. On the other side, the pipe discharges at natural ground elevation. Dispersed there in a natural pattern, the water can infiltrate into the ground as if the road had never been built.

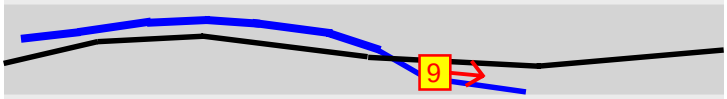

A STREAM AND ITS FLOODPLAIN

A stream will naturally form a channel with the width and depth to contain average flows while allowing naturally-occurring high flows to spill over its bank and onto its floodplain. By spreading high flows out over the floodplain, the excess energy and force of the water is released. Compare the size and shape of the stream channel here to that below the road crossing. The concentrated volumes and velocities of the road drainage have cut a deep gully-shaped channel disconnecting the stream from its floodplain thereby preventing energy dissipation. When all the energy of high flow events is confined within the channel, the cycle of repeated “down cutting” results.

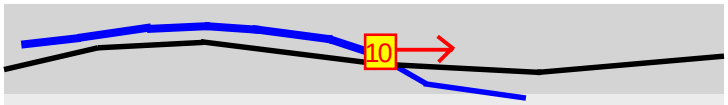

RAISING THE ROAD PROFILE

Excavated shale and limestone from the abandoned pit was trucked and spread on the entrenched road. A D-8 bulldozer crushed, spread and compacted the fill material.

Work sequence was as follows:

- Dump and spread stone of all sizes;
- Track over and crush material to 12” & less;
- Blade resistant larger stone to ditch line to create a subsurface French drain along road;
- Blade forward fines in approximate 8” lifts;
- Track compact and build surface shape into road with each lift, repeat until natural drainage is restored.

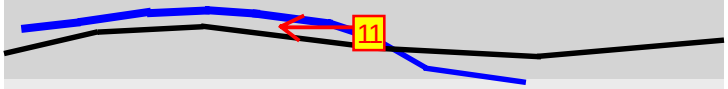

NEW ROAD LOCATION

Sediment from the original road, indicated on the photo at right, flowed directly to the adjacent stream reach. The road base would eventually have failed as storm flows continued to erode the stream banks. This is a very common problem wherever roads are located too close to streams.

The road was relocated to demonstrate the value of respecting and using the forces of nature to correct long-term environmental problems. The pit was reclaimed, surface drainage was restored to its original pattern and a buffer zone was created between the road and the stream.

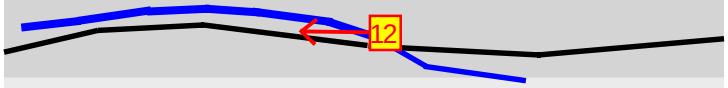

READY FOR NATURE TO ADOPT

Pictured here shortly after project completion is the newly created buffer area immediately after seeding and mulching. Note the naturalized uneven surface with stump, log and rock obstructions to overland water flow. High stumps were placed near the road to provide a visual marker of the road edge.

Contrast during your visit how growth patterns are influenced by water and leaves trapped upslope of the obstructions. As organic matter builds up from leaf litter, more water will be retained over these dry soils. In turn, the numbers of microbes and small creatures like earthworms will increase. As they do, growth capacity of this abandoned shale pit will increase.

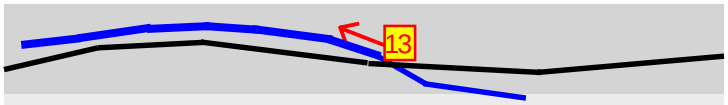

DESTRUCTIVE IMPACT ON STREAM

This section of stream channel should look similar to the stream channel above the road which is generally very stable, producing only small amounts of sediment from the bed and bank materials (# 9). The channel shape, characterized by a series of cascades and irregularly spaced scour pools, is normally 12-15 times wider than it is deep.

In contrast, the stream channel immediately below the road reflects the long-term effects of concentrated road drainage. Notice the severe down cutting that causes the channel to be deeper than it is wide and the complete physical separation of the stream from its floodplain.

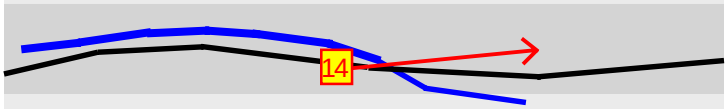

LOOKING EAST AT SHALE PIT

The road at its new alignment and elevation shows several features that prevent pollution. Compare this to previous photos.

In the right foreground see the bank bench (1) and how it intercepts and redirects water toward the camera at a nearly level slope. On the left, the extra space between the road and the stream acts as an effective buffer. In the background, notice the ditch to the left (2) is located farther from the road preventing the bank drainage from mixing with road material.

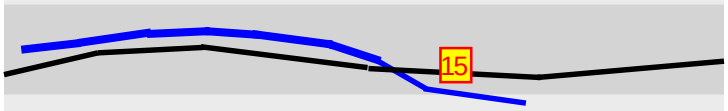

AGGREGATE PLACEMENT

Drainage patterns such as crown and grade breaks, visible in the surface of the road, are reflected in every layer of fill to enhance subsurface water movement under the road base.The top layer is Driving Surface Aggregate (DSA), a specially formulated abrasion resistant mixture of crushed limestone. DSA has a carefully blended size distribution from 1½" stone to fine particles small enough to pass a screen with 200 holes per square inch. The fines act to fill all voids and create strength from increased density. Placement through a paving machine to a uniform 8" depth enables compaction with fines in place. This placement method avoids aggregate separation.

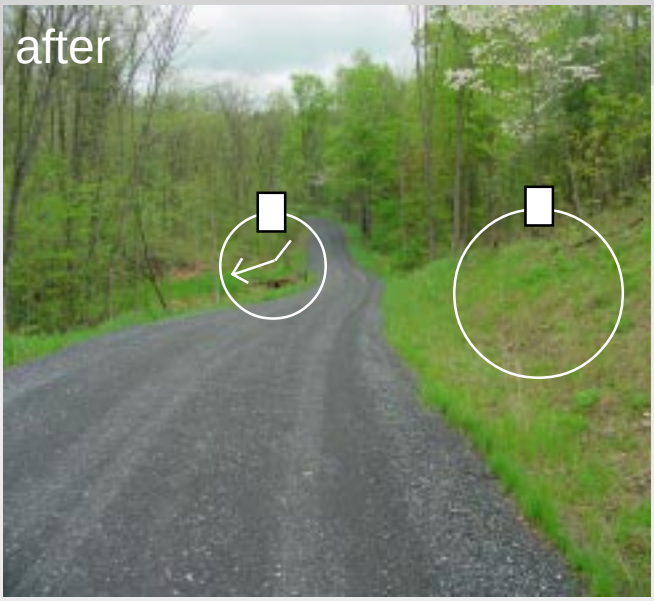

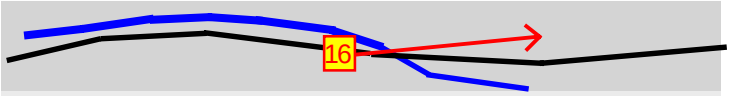

LOOKING EAST AT SHALE PIT

Easily available shale was periodically removed in uneven patterns, extending back over 120' to the right. It was taken from around the underlying hard limestone protrusions, shown here near the road. The road at this spot curved around the end of the abandoned pit, immediately adjacent to the stream (by the people in the photograph).

Contrast this "BEFORE" image with photos #12 and #14 showing the new road at its higher elevation and alignment. The actual point from which this photo (#16) was taken is now under 6' of fill and would be on the bank closest to the stream.

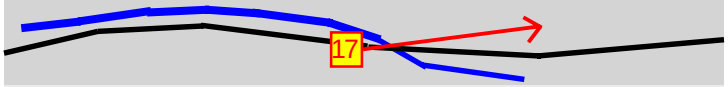

LOOKING EAST AT SHALE PIT

The steep bank on the right, shown being cleared of trees, is now under the left edge of the road. This bank was partially lowered, and the road was built at a steeper angle allowing it to pass over the old bank at a higher elevation.

These actions prevent the creation of a typical 1:1 uphill road bank or "cut" slope and the erosion consistently associated with such steep road banks. When native vegetation is thoroughly established, this more natural land shape will blend in with the beauty of the surrounding forests even better than pictured in photo #12.

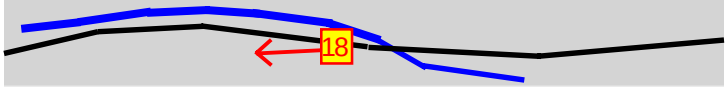

WORK IN PIT

Excavating material from the abandoned pit produced fill to raise the road and correct the entrenched drainage pattern. By removing shale from the pit, a less steep and therefore less erodible profile was created. The more naturally appearing shape was formed with machinery normally used in roadwork.

A D-8 bulldozer with ripping teeth and "U" blade loosened the shale and limestone domes left behind by the smaller machinery used to originally excavate the pit. A track hoe was used to load trucks, shape the final grade and set the stumps.

Worksite in Focus

Potter County

Horseshoe Road

6/10/04

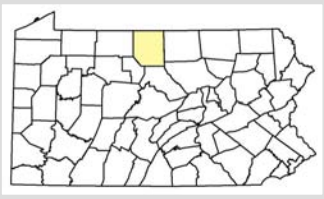

Problem Identification

Routine maintenance operations and the wear and tear of traffic had the cumulative effect of lowering the road elevation in relation to the surrounding terrain (see photo). The resulting entrenched road trapped road drainage. Confined by the road, this water concentrated in parallel ditches and gained velocity. As the volume and velocity increased, more and more valuable road material was washed away, polluting nearby Pine Creek.

Project Objectives

1. Prevent direct discharge of sediment-laden road drainage to Pine Creek.
2. Reduce concentrated drainage from parallel ditches.
3. Filter road runoff using existing roadside vegetation.

Project Considerations

Off right-of-way (ROW) drainage input from an adjacent driveway compounded the problems on Horseshoe Road. Existing drainage structures (ditches and crosspipes) were inadequate to handle flow volumes.

Spring seeps in the road bank drained directly onto the road surface resulting in a soft road base and observable ditchflow year-round.

Adequately addressing drainage on Horseshoe Road required an additional drainage outlet, installation of under-drain, and elevation of the road itself.

Project Statistics

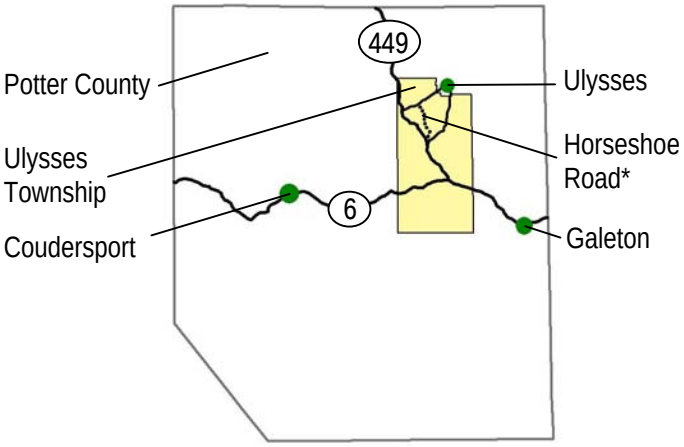

Road:	Horseshoe Road
Road Owner:	Ulysses Township
Affected Watershed:	Pine Creek
Project Length:	1600 ft
Cost:	$53,829
Date Completed:	September 2002

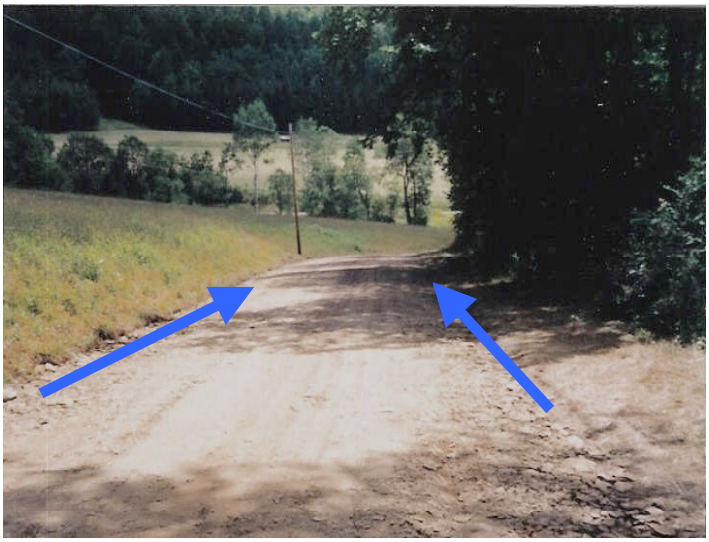

Before: The entrenched road trapped road drainage resulting in fast-moving concentrated ditchflow. This water eroded road material and deposited it directly into Pine Creek.

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Project Solutions

Adding a cross-pipe: Installing a new cross-pipe on the road provided an extra drainage outlet and shortened the flow length of parallel road drainage. By minimzing the distance water has to travel before it is removed from the road corridor, the velocity and erosivity of the water are reduced.

Adding perforated underdrain: Underdrain, or drain tile, was added in the ditch to collect water flowing from spring seeps. This eliminated perennial ditchflow and corrected the soft road base problem.

Filling the road: The elevation of the road was raised by filling the road profile. The added elevation eliminated the need for parallel ditches and allowed drainage to sheet flow into the surrounding terrain through vegetated buffers, removing sediment-laden surface flow to Pine Creek.

Adequate Culvert Size: A hydrologic & hydraulic analysis was used to determine the proper size of the culvert needed for the stream crossing. The existing 30" round concrete pipe was replaced by a 77"x 52" squash pipe. The road was raised to ensure proper cover over the new pipe.

Cost Summary

Total Project Value:	$53,829
District Funding:	$31,769
Materials	$28,428
Contracted Work	$3,341
In-Kind from twp:	$22,060
Materials	$3,837
Labor & Equip.	$18,223

After: The road profile was raised eliminating ditchflow on the downslope side of the road. Drainage that was trapped on the entrenched road can now sheet flow freely off the road into surrounding vegetation. Because the water does not have the opportunity to gain velocity, its erosive potential is greatly reduced.

After: The pipe was re-sized and the road raised for proper cover over the new installation.

For More Information

The Center for Dirt and Gravel Road Studies
(814) 865-5355
www.dirtandgravelroads.org

Potter County Conservation District
Eric Potter
(814) 274-8411

* Directions to Horseshoe Road worksite: From Coudersport: Take U.S. Route 6 east approximately 13 miles to State Highway 449. Follow 449 north to Brookland; just past Brookland veer right at the Y-junction onto SR 1001. Horseshoe Road (T450) is 4/10 of a mile ahead on the left. The project begins at the intersection with SR 1001 and continues for 1600'.

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Worksite in Focus

Fulton County

Dutch Corner Road

4/13/04

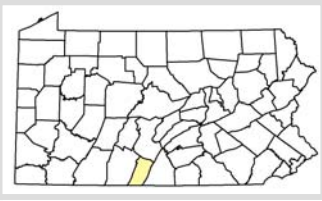

Problem Identification

Dutch Corner Road contributed concentrated, sediment-laden water to Patterson Run, a tributary of Licking Creek. Three primary issues caused this impairment: steep road slopes, deeply entrenched road segments, and significant off right-of-way (ROW) water inputs. Long steep road segments bordered by high banks on either side served to trap stormwater water increasing its volume and velocity thus making it highly erosive. Off ROW inputs from driveways and connecting paved roads contributed more water to already concentrated erosive flows.

Project Objectives

1. Minimize the entrenchment of the road.
2. Separate off ROW drainage and prevent it from flowing onto the road.
3. Divide and minimize concentrated water flow on steep road segments.

Project Considerations

The deep road entrenchment made raising the road elevation to the height of the surrounding landscape impractical and expensive. The topography lent itself on the steep entrenched road segments to pipe installation through the road banks at a slope of 2% and discharging road drainage on the other side of the bank. Drainage routed in this way is directed into adjacent vegetation where it encounters resistance, can release energy and infiltrate slowly.

Project Statistics

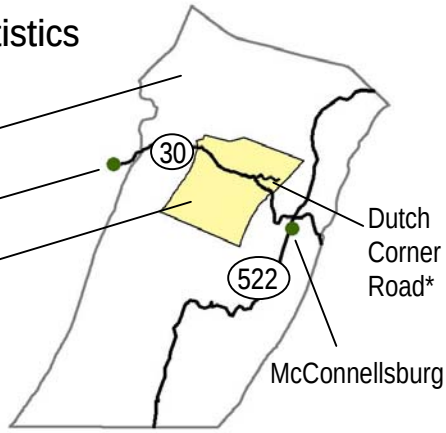

Road:	Dutch Corner Rd
Road Owner:	Licking Creek Township
Length:	4,835 ft
Date Completed:	November 2003

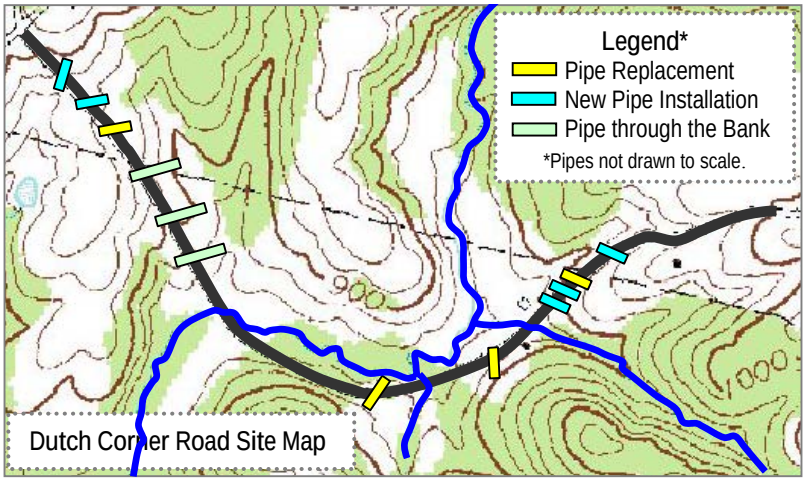

Dutch Corner Road Site Map

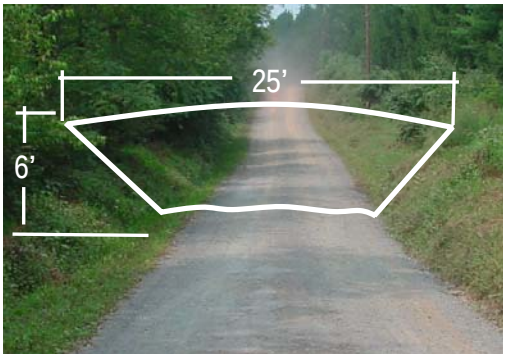

Raising the road elevation to the elevation of the surrounding landscape was impractical because of the amount of material required (above).

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Before and After Shale Placement. Before, severely entrenched road slopes steeply to steam at the bottom of the hill. After, cross-pipes are added to divide drainage and reduce concentrated flow and the road elevation is raised 2' to cover the new pipes.

Project Solutions

Road profile. Shale was placed on steep entrenched areas to a maximum depth of 2 feet to obtain adequate cover on new crosspipes. Road surface was topped with Driving Surface Aggregate (DSA) for improved performance.

Adding crosspipes and installing pipes through the bank. 3 existing crosspipes were replaced and 9 new drainage pipes were added. 3 of the 9 were installed through the bank. Increased road drainage capacity minimizes concentrated flow before sufficient volume and velocity can build to strong erosive force.

Re-profiling driveways. Driveways were re-shaped at the point where they entered the roadway to eliminate any direct discharge to the road.

Grade breaks and broad-based dips. On steep driveways at points of concentrated flow, grade breaks and broad-based dips were installed to direct drainage off the driveway surface into surrounding vegetation for infiltration.

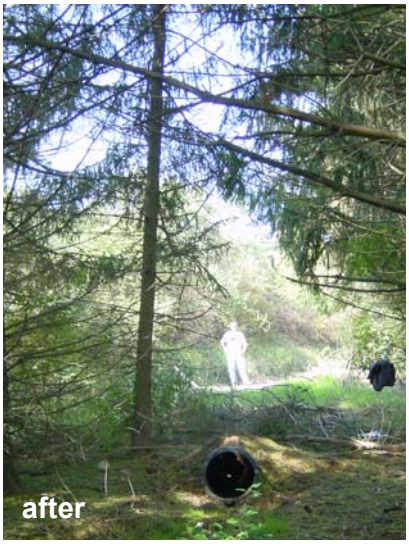

Pipes Through the Bank. Note the depth of the trench during construction. After construction the pipe has been covered and stabilized with vegetation.

Cost Summary

Total Project Value:	$70,962
District Funding:	$63,712
Materials	$46,970
Contracted Work & Equipment	$16,742
In-Kind from twp:	$7,250
Materials	$4000
Labor & Equipment	$3250

For More Information

The Center for Dirt and Gravel Road Studies
(814) 865-5355
www.dirtandgravelroads.org

Fulton County Conservation District
(717) 485-3547

* Directions: From U.S. 30: Take Breezy Point Road north 0.4 miles, turn right on Dutch Corner Road. Dutch Corner Road is located 12 miles east of Breezewood, 6 miles west of the intersection of U.S. 522 and U.S. 30 north of McConnellsburg.

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Environmentally Sensitive Maintenance Practices for Dirt and Gravel Roads

Chapter 6: Environmentally Sensitive Maintenance Practices: Roadsides and Streams

6.1 Introduction

Throughout the previous discussions of natural systems and road maintenance, we have shown how the road and environment are deeply intertwined. That is particularly true of the relationship between roadsides and streams. Traditional road maintenance activities for shoulder, ditch, and roadsides frequently include undercutting stable slopes, removing valuable vegetative cover from roadside banks, and a failure to re-stabilize unprotected soil.

6-01 Typical roadside erosion problems.

The greatest failing of traditional maintenance practices is in the underlying belief of many road managers that roadside vegetation is unwelcome. When road maintenance activities leave bare soil, the resultant erosion and deposition of sediment into critical drainage facilities creates the need for more frequent maintenance cycles. This becomes a self-perpetuating cycle of maintenance and pollution with unacceptable costs to local governments and unacceptable detrimental results to the environment.

As our machinery has become larger and more powerful, in many cases, we have lost touch with basic principles of nature and natural systems; we have fallen into a belief that we can work to set standards, forcing nature to comply to our will. Often the natural consequence of our actions is in direct conflict with our maintenance goal. Environmentally sensitive maintenance practices take into account road maintenance goals and natural principles to provide cost effective longer-term solutions to traditional cyclical maintenance activities.

In this chapter, environmentally sensitive maintenance practices will be presented to deal with the necessary activities of roadside vegetation management and bank stabilization. A short discussion of stream bank maintenance around cross pipes and bridges for stream crossings is also included.

6.2 Expectations of a Finished Product

Even without an understanding of natural systems, road managers usually are well aware of the roads in their network that require less maintenance. Roads requiring less maintenance frequently are working in harmony with natural principles. The road manager would be wise to "read" these roads, comparing them with their problem roads with excessive maintenance.

In this section we want to step out of the box of traditional standards and expectations. Roads that look like they are in harmony with nature, require less money to maintain, pollute less, and offer the additional benefit of being beautiful.

Most of us have been around long enough to witness the incredible advances in machinery over the last forty years. Although some local governments move forward faster than others, most counties and townships are vastly better equipped today than they were twenty-five years ago. As our equipment has gotten better, so too have our projects gotten larger. Generally, local governments have effectively updated their dirt and gravel road networks that so well serve the citizens and industries of their communities.

The development of our state and federal highway systems has in many ways provided guidance and expectations to local governments and citizens for how their roads should look. We as local officials and road managers, however, need to look at and develop guidelines for our roads that fit the use and needs of our own communities. These local roads provide a very different link in our national highway system.

6-02 When a road is working well within the environment, minimal maintenance will be required.

A natural systems approach to road maintenance requires changing expectations and behaviors. When a road is working well within the environment, minimal maintenance should be required. A road that requires continual maintenance attention is probably working against natural principles. Simply asking the question, "Does it look right?" can provide terrific insight. However, the "right" that forms the comparison must be a road that is in harmony with nature. Herein lies a problem if we try to use standards and practices developed for superhighways and interstates.

6.3 Practices Related to Roadsides

6.3.1 Vegetation Management. Tree trimming and removal, brushing, brush cutting, right-of-way clearing are all terms for vegetation management. These activities are common, and road managers may need to perform these activities for a variety of reasons. We need to look at these common practices and reasons and determine what is best for our roads and our municipality.

Roadside vegetation plays an important part in our road maintenance program. Understanding the natural systems allows us to use these systems to help in more effective road maintenance.

6.3.2 Equipment and Methods. First, let's examine typical roadside maintenance equipment and methods and evaluate their effectiveness in all areas of road maintenance, the environment, and community relations.

The normal methods used to trim trees, remove brush and cut vegetation along roadsides include manual methods with manual equipment such as chainsaws, string trimmers, and hand pruners; mechanical methods with mowers and brush cutters; and chemical methods with chemical application equipment and herbicides. All of these methods and equipment have their place in an integrated vegetation management program and can be used effectively. There are some cautions, however, that should be noted.

6-03 Roadside Vegetation Management Options.

In an environmentally sensitive maintenance program, chemical methods using herbicides are certainly the first concern. There are many potential problems associated with the use of herbicides. As a result, numerous federal laws and regulations govern their use. States have also adopted regulations, patterned after the federal laws, regarding the use of chemicals for vegetation control. These regulations require local government applicators to become certified through testing. Environmentally sensitive maintenance does not promote the use of herbicides. If you do use herbicides, you need to become familiar with the laws and follow all the requirements and regulations associated with herbicides use.

Because roadside vegetation management is labor-intensive, boom mowers have become increasingly popular. The boom mower, properly used, is a labor saver and can be safer than other equipment such as chainsaws. However, one only has to travel down a road on which a boom mower was used to totally destroy the roadside vegetation, leaving a hurricane-aftermath look, to realize that the use of this equipment can get out of hand. Damage to large tree limbs can eventually kill the total tree. Refer to the discussion in Chapter 4 on understanding your trees and the effects of wounds.

6-04 Boom mower impalers!

Boom mowers also raise some roadside safety issues. Using a boom mower to cut down young saplings, leaving those "spikes" behind, can result in a very unsafe condition. Motorcyclists or bicyclists who may skid off the road and upset can be impaled on these "spikes," causing severe injury or death, not to mention the resulting tort liability claims.

Boom mowers and their resulting destruction can also be a public relations headache. Many complaints have been lodged against both state and local governments about the "butchering" of roadside vegetation.

6.3.3 Roadside Clearing. Traditional right-of-way clearing, or "daylighting" practice, often creates problems for roadside vegetation for our dirt and gravel roads. These practices may have their place on the interstates and superhighways, but often they cause increased maintenance work on gravel roads in forested areas.

Common accepted reasons for clearing the roadside of trees and bushes are:

1. Eliminate shade
2. Improve roadside visibility
3. Establish a safety "clear zone"
4. Reduce routine trimming.

All of these reasons have some merit and may apply for some roads, but a more thorough understanding of the conditions encountered on dirt and gravel roads, and the consequences of inappropriate roadside clearing, is necessary to make effective decisions.

6.3.3.1 Shading, Good or Bad? Brush cutting, trimming, and tree removal for the purpose of eliminating or reducing shading is probably the most common roadside management practice, other than roadside mowing of grass. A great deal of money is invested in vegetation management for shade reduction each year. The goal of improved public safety is universal and laudable. On low traffic dirt and gravel roads, however, excess tree removal can have the dire consequences of increasing speeds to unsafe limits.

6-05 The disadvantages of shade: retains moisture to promote icing, reduces visibility.

Why should we eliminate shading? Here are the reasons:

1. Shading retains road moisture, promoting unsafe conditions such as icing in the winter.
2. Shading also reduces visibility and limits the "clear zone," again affecting safety.

An abrupt transition from bright sunlight to dense shade or vice versa can be a great safety hazard. Extreme changes in light can have a devastating effect on the motorists' visibility and be a direct cause of accidents. Extreme changes in light conditions should be avoided.

6-06 Bright sunlight to dense shade or vice versa – major visibility safety hazard – should be avoided.

Shading, however, also has advantages. Shading:

1. helps retain road moisture, reducing dust;
2. reduces growth of colonizer plant species and encourages desirable herbaceous plant growth (discussed below);
3. is more aesthetically pleasing, contributing to tourism and the economy.

With this information, we may want to look at shading with a new perspective. A limited amount of shading may be more effective and efficient for our road maintenance and the environment.

6.3.3.2 Problems with Traditional Clearing Techniques. Traditional clearing techniques involve total removal of brush and vegetation along the roadside from right-of-way line to right-of-way line, typically resulting in vastly increased sunlight along the edge of the road. So, if increased sunlight is the goal, what is the problem?

If we could view time-lapse photos of the road and its surrounding environment following a traditional roadside clearing before doing it, we would see it is not the best or most effective practice. If the roadside is wooded or forested and the road well shaded and we automatically go in and cut everything down, as shown in Figure 6-1a to 1b, on each side of the road for whatever distance we consider necessary, let's observe what happens.

6-07 The advantages of shade.

The forest trees, by nature, have grown structurally as a forest, meaning that each tree can depend on surrounding trees for protection against the elements. When a section of trees is cut down, the remaining trees along the cut edge are open to storms and wind and may not be structurally strong enough to withstand these conditions. Wind damage, broken branches, and even uprooting can result, as shown in Figure 6-2a.

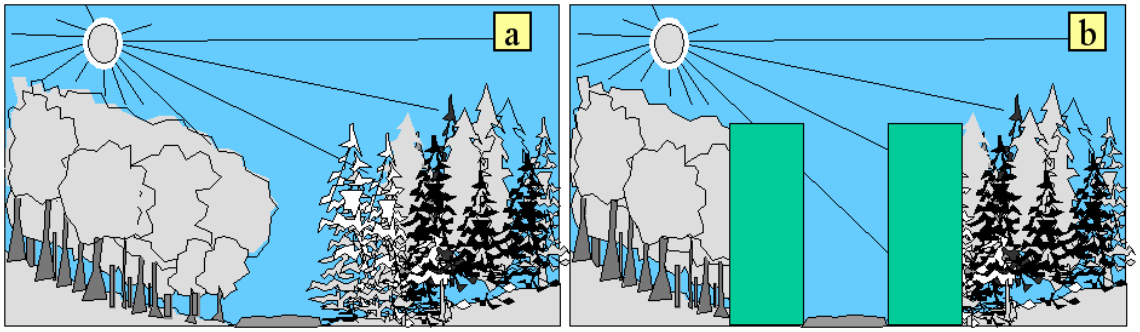

Traditional clearing practice for a shaded road would be from right-of-way line to right-of-way line

Figure 6-1

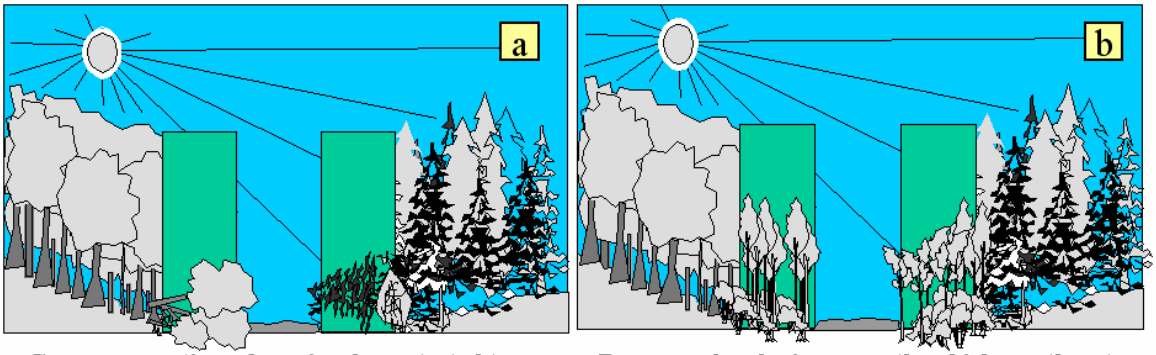

Common reaction of previously protected trees exposed by clear cutting - broken stems, wind damage, uprooting

Dense weak colonizer growth, which can threaten roadway & recreate shade, appears surprisingly fast

Figure 6-2

Additional problems with common clearing practices include the rapid regrowth of the removed trees through stump sprouting. These stump sprouts are weak in structure and can become a continual maintenance problem.

When large quantities of trees and vegetation are removed, previously protected plants, now exposed to full sun, begin to fail. A formerly shaded roadside with low growing, broad-leafed ground cover vegetation becomes a completely different ecosystem when exposed to full sun. Exposing low growing, broad-leafed, shade-tolerant plants to full sunlight typically kills them, with the potential of soil erosion.

Unfortunately, when the roadside, which was previously shaded, receive full sunlight, nature produces vigorous growth, as depicted in Figure 6-2b. This vigorous growth is due to the invasion of colonizer species that are most attracted to this environment, but are the worst possible roadside plants. Colonizer species, which we described in Chapter 4, Section 4.5.4 on succession, are fast-growing, weak growth types. Colonizer trees can threaten the roadway safety and recreate shade. These colonizer trees then become extremely high maintenance roadside plants. In many cases the plants we most want to remove are the plants most encouraged by our efforts. This creates the need to mow and trim in increasingly frequent cycles.

6-08 You do not need fast-growing weak-structured colonizer-type roadside trees!

So in this scenario, the mowing/removal of trees and brush in the interest of safety and visibility, have the opposite effect, starting an endless cycle of cutting and re-cutting of this colonizer growth.

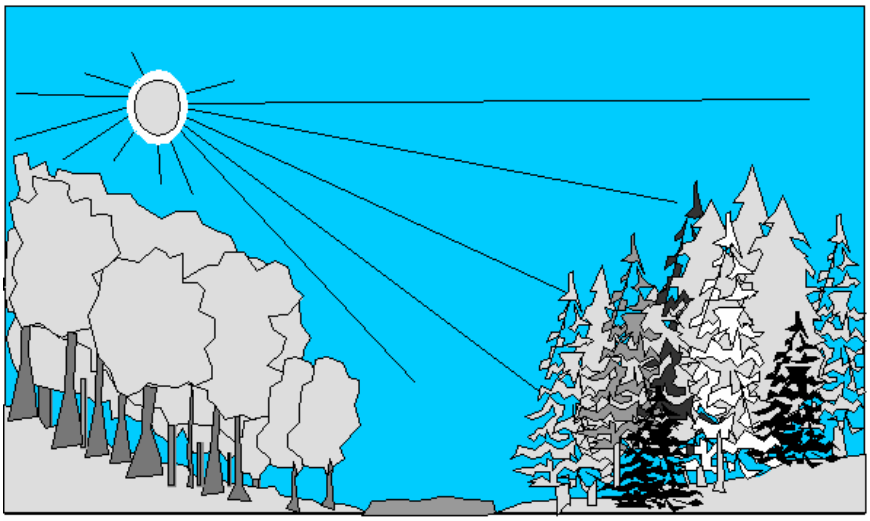

Selective trimming retains some shading to protect roadside soils and forest edge & still allow drying of road bed

Figure 6-3

6.3.3.3 Alternative Techniques. The solution is to **use the forest system to reduce maintenance.** By taking advantage of natural principles, it is possible to create safe clearances, provide enough shade to control dust and invasive species, and eliminate the invasive rapid re-growth of colonizer species and frequent mowing cycles. We need to develop a strategy following some basic guidelines.

6-09 Remove dead, diseased, unstable, or dying trees first.

Be selective! When doing roadside trimming and tree removal, remember to remove the dead, dying, unstable, or damaged trees first. Trees that have been damaged by previous maintenance activities, automobile accidents, etc. will eventually die and become hazards.

The second priority should be to remove the existing colonizer trees. These trees, even if they are healthy, are not good roadside trees. They are very rapid growers and have weak wood and short lives. They commonly fall onto the road or drop limbs, which create maintenance and hazards.

After removing the damaged trees and the colonizers, it is advisable to look the situation over and evaluate the rest of the trees. Maintaining strong, slow-growing, deep-rooted climax species should be an objective (refer to chapter 4, Section 4.5.4). Avoid straight-line cutting, however, favoring instead an irregular edge. Traffic will tend to travel more slowly on a road with an irregular edge. Speed has always been a major safety problem for our dirt and gravel

roads. Clearing the roadside completely or cutting back on a straight line parallel to the road gives the motorist the safe illusion to increase speed.

6-10 Pockets of deep shade can create irregular winter icing conditions.

Maintaining a uniform level of shading is best. One of the greatest dangers from shading comes from winter conditions where pockets of deep shade create irregular icing conditions. The objective should be to thin the canopy to achieve the desired shade density. Sometimes it is necessary to thin back off the edge of the right-of-way, as the desired sunlight may only be available from the side, not from above. Obviously it is necessary to discuss any plans and objectives with property owners to receive permission to work off the right-of-way.

6.3.3.4 Adjacent Residents and Off Right-of-Way Work. Local governments must have a public relations strategy. Road managers should meet with the property owners where brush cutting/trimming is proposed. This local government representative should discuss the plan to do brush cutting with the property owner, offering to walk the roadside and specifically discuss the goal of the project and to take into consideration the property owner's concerns. This one-on-one contact with the property owner prior to the actual cutting of brush or trees is critical. It establishes a level of respect for the property owner, something that is commonly overlooked. It is especially helpful to walk the road with the property owner. When a tree is infringing on the travel-way or an obvious threat of falling into the roadway, it is easier to recognize the problem when both parties are standing right there looking at it. Listening to the property owner's concerns and developing a plan that meets both parties' needs is vital to the success of a roadside management plan.

6-11 Before and after look at selective tree trimming during a road project – letting in more sunlight with less shade – striking a balance.

6.3.3.5 Advantages of Using the Forest System. In a situation where a dirt and gravel road is heavily lined with trees or passes through forested areas, a vegetation management program that uses the forest system to take advantage of natural principles can save time and money in several ways.

1. Moisture is nature's stabilizing agent. Allowing enough shade to hold some moisture on dirt and gravel roads helps to hold the surface together and reduce dust. Although few road managers would readily identify moisture retention as a benefit of shaded roads, they will almost always tell you they use less dust control in shaded areas.

2. Maintaining shade along our roads reduces the establishment of colonizer species (aspen, birch, poplar, sumac, striped maple, etc.). These rapidly growing, weak-wooded trees create the biggest maintenance problems, especially during winter maintenance operations. (They lean out in the roadways with snow load.)

6-12 Would anyone want to plow this road?

3. The trees that are removed are less likely to return as stump sprouts if shade is retained. All of us have witnessed the rapid return of vegetation under new power line cuts. This is usually a combination of stump sprouts and colonizer species. This scenario can be avoided by simply allowing the road to remain partially shaded.

6.3.3.6 A Common Pitfall in Tree Removal. All of these techniques will reduce the frequency and cost of roadside vegetation maintenance. Importantly, at no time in our discussion of vegetation management has a diameter or size been mentioned as a criterion

for what to remove and what to leave. Herein lies one of the biggest problems with boom mowers. Boom mower operators are frequently instructed to cut "everything you can reach and everything small enough that you can cut." This direction and practice will ultimately have, as its consequence, roadsides vegetated only by large trees. If these trees are the right species and are in good health, this might be a defendable practice.

Boom mowers may be effective in maintaining right-of-way, but great care should be exercised when using them to re-establish those long neglected rights-of-way. When decisions are based solely on size, damaged and potentially hazardous trees are left while the potentially stronger, healthier replacement trees are removed. Often this leaves a roadside stimulated into vigorous growth by excessive sunlight. In the case of boom mowers, what is perceived as the "easiest way" may actually be the most expensive.

Additionally, some of the most beautiful, slow-growing, strong, wildlife-friendly trees along the roads are being systematically removed because they have the misfortune of being small. Dogwood trees and serviceberry trees are some of nature's finest work and are frequently chosen as roadside trees by planners. Yet they are often removed by boom mower operations just because of their size. Would it not have been better to remove the big old damaged or dead trees and save those small dogwoods? The dogwood makes an excellent roadside tree with the added value of blossoms to beautify the roadside in the spring.

6-13 Dogwoods are a good roadside tree with the added value of spring blossoms.

6.3.3.7 Tree Leaves. What road maintenance person hasn't uttered unmentionable language concerning leaf problems? Leaves in ditches, leaves on the road - leaves! leaves! leaves! Fall can be a beautiful time of the year with the diverse coloration of the landscape from the changing of the leaves. This seasonal occurrence concludes, however, with the leaves falling to the ground and filling ditches and covering roadways. If we are adding road material, the layer of leaves can become a problem if not removed. If the layer is substantial, the slow composition of the leaves can result in a slip plane for road material to slide. In addition, leaves fill the roadside ditches and interfere with proper drainage, clogging ditches and crosspipes when the rains come.

Leaf removal can be labor intensive and burdensome to the road maintenance crews. Backpack blowers or wheeled walk-behind power blowers are often used to blow leaves off the road prior to aggregate placement. Leaf cleaning in the ditches can be accomplished by the usual grading of ditches, removing the leaves and possibly the existing vegetation lining that may not have time to re-establish prior to winter.

6-14 Leaf Blowers to Clean Ditches and the Roadway

The job can be made easier with a three-point hitch leaf blower. These are the same machines used by many golf courses. By using this type of blower, we can save time and effort. The machine is easy to use and relatively inexpensive considering the amount of leaf blowing needed on many road systems.

Blowing the leaves off the road and out of the ditches and leaving them to decompose in the natural roadside environment is definitely environmentally sensitive. In addition, we reap the benefit of not losing soil and existing vegetation through a ditch grading operation, which would open the potential for additional erosion and sediment.

6.3.4 Using Other Plants for the Roadside. In addition to maintaining limited shading, there are many low maintenance plants that readily grow on roadsides. Deciding what plants to encourage on a given site involves many factors. Often maintenance practice, such as mowing, can be timed to encourage some plants while discouraging others. Plants such as day lilies and ferns are examples of low maintenance plants that do a terrific job of holding soil in place and limiting growth of invasive species. Day lilies and ferns do not benefit from mowing. Wherever possible, care should be taken to leave these plants intact during a mowing cycle. Unless they create a visibility problem, there is no benefit to mowing these plants. If invasion of woody plants into fern or day lilies is a concern, time mowing operations for the dormant seasons of the year. Visibility is better at this time also.

6-15 Day lilies or ferns are good roadside plants – low maintenance, aesthetically pleasing

When doing shoulder cutting or ditch cleaning, if the berm or spoil material is full of sod with day lilies or ferns, we should use this material to our advantage. Pick a bank where there have been problems holding the soil in place and coat it with six inches or more of dirt full of sod and weeds and lilies and whatever else. In no time at all these plants will become established on the new soil. Obviously care should be taken to provide some type of temporary erosion control for the time it takes the plants to become established. It is a lot easier to vegetate soil, which is naturally full of plants, than to get plants to grow from seed on hand-polished subsoil. Remember our discussions in Chapter 2 on topsoil and subsoil.

Grass, of course, is a wonderful roadside plant. Because of how it grows, (refer to Chapter 4, section 4.5.2 Plant Basics) grass is usually not affected by mowing. Grass holds soil in place and helps slow the speed of surface runoff. Grass also traps sediment that is moving with the water. The benefits of grass from an environmental point of view are obvious. The benefit of grass from the perspective of a road manager should also be obvious, but frequently it is unrecognized.

6-16 Grasses make good roadside plants, establishing surface erosion protection

Other vegetation can be used to reduce maintenance in many roadside situations. By encouraging appropriate plants for the location and terrain, maintenance can be minimized and the environment enhanced. Deep-rooted species can be used for soil reinforcement. Ground covers can be used for surface erosion prevention. Species selection for these applications should consider low or no maintenance.

Working with our local and state conservation agencies on appropriate plants for specific sites is always a good idea. We'll be discussing site evaluation in a little more detail below.

6.3.5 Clearing Stream Banks at Cross Pipes. In Chapter 2, we discussed the historical aspects of how so many roads were built close to streams. With so many roads adjacent to streams, we have many stream crossings with associated culvert pipes and bridges. Maintenance around these structures consumes great quantities of time and money for local governments. As science has learned more about water and how it behaves around restrictions in flow, better bridges and culverts have been designed and built. The stream saver system along with the section on better bridges described in Chapter 5 is a great step forward in reducing maintenance and pollution at stream crossings.

6.3.5.1 Common Practice and Associated Problems. We need to zero in on the specific maintenance operation of clearing brush and trees from stream or channel banks adjacent to these crossings. Traditionally, common practice has been to clear stream banks upstream and downstream from a roadway cross culvert or bridge to clear the floodway and improve drainage. Doing so left the crossing with a clearner look and presumably easier maintenance. But are these assumptions really valid?

6-17 Clearing stream banks for a road crosspipe replacement can have devastating effects on the stream and future maintenance.

Although taken during different seasons of the year, look at the before and after, Photo 6-17, of a crosspipe replacement project and consider some of the potential problems. Referring back to Chapter 4, the stream shading is reduced, affecting stream temperature, which in turn affects the stream habitat. Outside inputs of vegetation debris vital to stream life are eliminated, and the streamside habitat is reduced. Look at the stream width upstream of the work area and within the work area. Would fisherman fish this area, or would they go upstream to find the natural shady 'holes'? These are all environmentally related.

Widening the stream causes the water flow to spread out and slow down, resulting in deposition of material immediately prior to the new crosspipe. It should also be apparent that any debris coming down the stream will be deposited at the road culvert or bridge, with possible blockage of drainage openings and subsequent flooding damage at the road or bridge.

Clearing the floodway to improve drainage could also have the unintended consequence of causing flooding downstream. The fact is that improved drainage usually means faster water. Faster drainage of a watershed means more water at one time with potential flooding downstream.

6.3.5.2 Alternative Practices. The alternative technique, or environmentally sensitive maintenance practice for stream bank/stream crossing vegetation is very easy: "DO NOTHING!" The natural stream channel will have less influence on the road crossing and cause less maintenance. The "before" Photo 6-17 emphasizes the fact that any large debris will get hung up long before it gets to the crosspipe.

Sometimes it is impossible to do nothing; some streams produce so much debris that large pieces upstream from the road have to be removed. Common sense dictates that some vegetation maintenance such as selective thinning may be required. The message is to look at what is being done and ask if it is necessary or it has any benefit. The less we disturb streams and stream bank vegetation around our pipes and bridges, the better for the environment and reduced future maintenance. If vegetation has to be removed at the immediate worksite for room to work, trim to the ground. The vegetation will grow back and again create a more natural low-maintenance site. So the solution is to either do nothing (avoid) or do only what is absolutely necessary (minimize).

6.3.5.3 Benefits of a New Approach. Vegetation in the floodway catches a lot of the debris in high water flows, spreads and slows the water flow, allowing gradual escape or release of water without letting the debris clog the drainage pipe or bridge opening

There are other benefits of woody type vegetation around pipes and bridges. Although grass has roots and does act as an erosion preventer by holding soil in place, these roots are shallow surface roots. Woody vegetation commonly has deeper roots and offers greater soil reinforcement around stream and road banks. This extra reinforcement is especially needed at bridges and pipes where water is forced to change direction or speed, causing much more turbulence and the potential for erosion and scour.

Streamside vegetation also shades the stream. The stream ecosystem is very temperature sensitive. Raising the water temperature can have dire consequences for species living in the stream. Additionally, vegetation along streams provides habitat for numerous species critical to the aquatic ecosystem along with those important outside inputs vital as the food link in the aquatic food web.

All of these benefits result in a better environment, less maintenance in keeping the banks cleaned or mowed and the pipes clear and open, and less potential of flooding at the site or downstream.

Although this section dealt with clearing of stream or channel banks at a roadway cross pipe, the next section deals with the stabilization of road and stream banks.

6.4 Practices Related to Road and Stream Banks

In discussing roadsides, roadside banks and stream banks are always a large issue. Our road and streams banks are constant sources of erosion. Road banks, in particular, are constantly being disturbed and stripped of ground cover, waiting for erosion to occur. Erosion from these bare soil road banks creates ongoing maintenance headaches by filling drainage ditches and clogging pipes.

There are a few general factors that should be noted in re-establishing a stabilized bank, be it a road bank or a stream bank. Large, obvious sites with bank erosion can be easily targeted and are commonly the only ones that get taken care of. There are, however, numerous small sites of unstable eroding banks that are left unattended. An effort should be made to do a bank restoration program and include all of these small sites. When we began to add up all the existing small sites across our own local road system and then add those to all of the other sites in other local road systems, we realize that even the small ones can add up to significantly contribute sediment pollution. In addition, these small sites will only continue to get worse with time if left unattended and will eventually become the large site.

6-18 Eroded roadside banks are common sights, but add up to a large erosion and sediment pollution problem affecting both roads and the environment.

The type and physical structure of the soil is the first obstacle of plant establishment. We have already discussed the advantages of topsoil over subsoil. We also need to note that the use of heavy equipment should be limited to avoid **excessive packing** of the soil. Soil compaction can affect the amount of water penetration versus runoff and the ability of roadside vegetation to survive. Remember, when we reseed an area of our lawn, it is always recommended that we till the soil, breaking up the hard surface. Roadsides tend to have very compacted soils due to vehicles and equipment and construction and maintenance activities for the road.

6.4.1 Initial Site Visit. To initiate environmentally sensitive maintenance practices for bank stabilization, a thorough investigation of the site is required. When we think about what makes a bank stable, there are several conditions that we need to determine. First, what type of material and slope do we have? Second, what is the drainage condition? And third, what is the existing vegetation, if any? These important characteristics are all interrelated and should be considered during an initial site visit.

At this initial site visit, we need to ask ourselves the specific questions listed below. Look at each of the following sets of photographs. Do these banks look familiar?

Soils:

1. What soil types are present?
2. What is the degree of slope?
3. Is the bank stable?
4. Are there existing slip planes undercutting the surface?

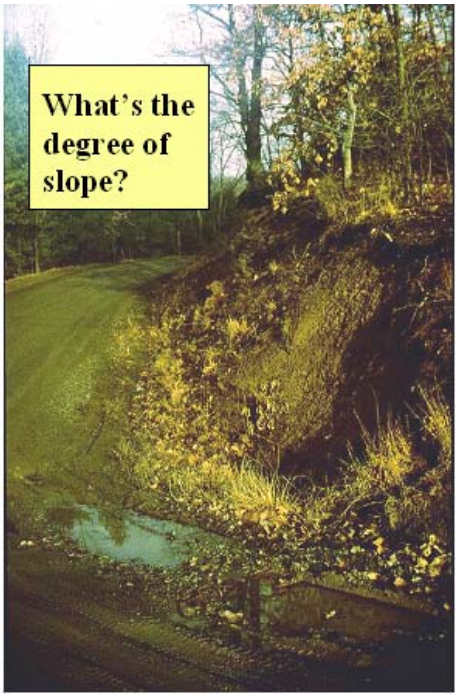

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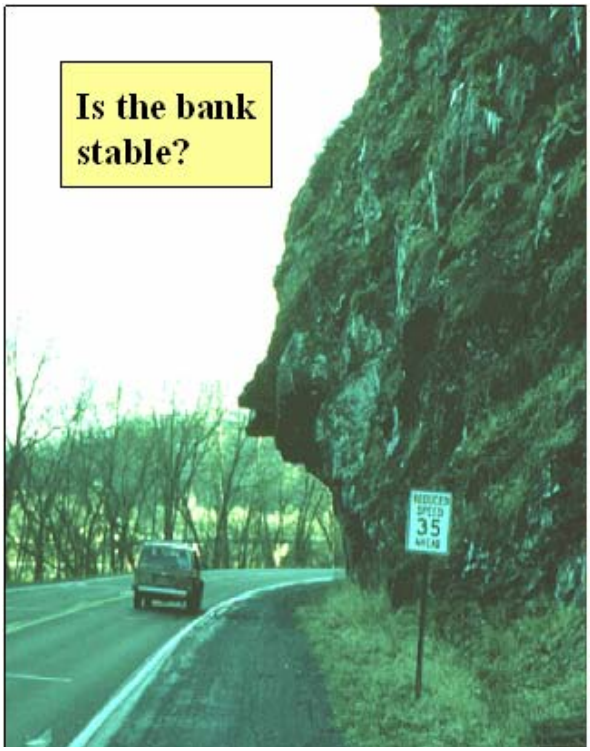

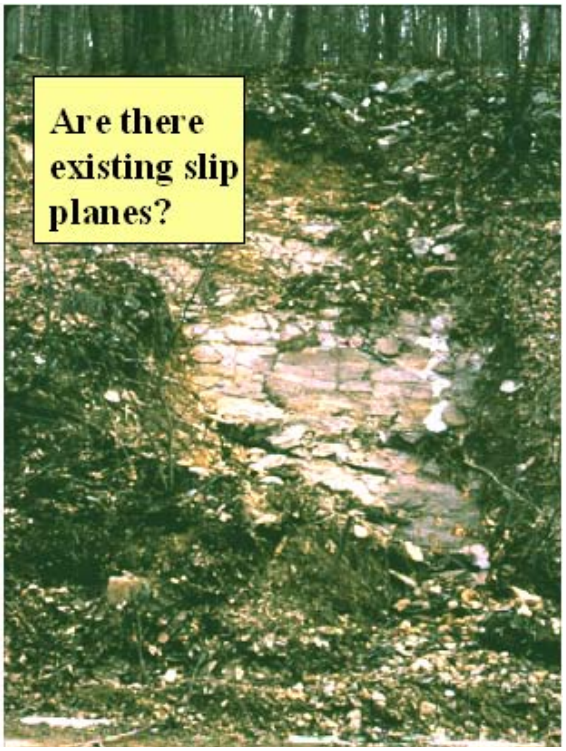

6-20

Hydrology:

1. Is the slope wet or dry?
2. Is there seepage or over the bank flow?
3. What is the condition of nearby banks?
4. What is the surrounding terrain?

6-21

6-22

Vegetation:
1. What is the existing vegetation?
2. What vegetation occurs naturally in the area?
3. Are tree roots reinforcing the bank?
4. Is it shady or sunny?

6-23

6-24

In pursuing this initial site evaluation for road and stream banks, it is wise to observe and follow the natural patterns and not disturb a stable bank. One of the most common problems is "bank gouging" during grading operations or ditch cleaning. The grader operator cuts into a stable bank and creates a vertical surface at the toe of the bank as shown in Figure 6-4. This vertical bank is unstable and will slough off as the bank tries to return to a stable angle. As this occurs, the ditch is filled back in and the whole process starts over again with the next grading operation. Photos 6-25 show to what extremes this operation can lead and clearly indicate that, as these banks collapse, grading operations will again be required – the recurring maintenance in an endless cycle.

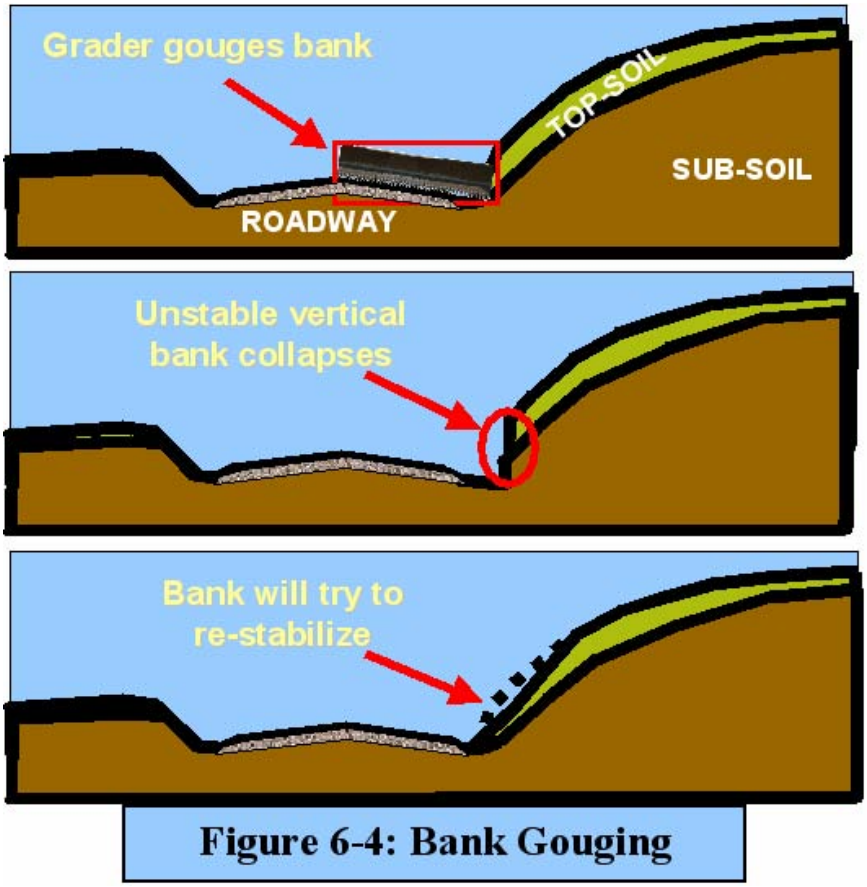

Figure 6-4: Bank Gouging

6-25 Unstable vertical bank will collapse.

6-26 Tree Roots: Mother Nature's Rebar.

Keep in mind that tree removal can result in bank failure. The soil reinforcing roots will no longer be effective. Tree roots are mother nature's reinforcing bars, as discussed in Chapter 4, Section 4.5.2.4

6.4.2 Proven Techniques for Banks. Once the site investigation is complete, then the selected technique or techniques can be effectively implemented. Always keep in mind the possibility of using a combination of practices. Several of these practices are commonly known and used but are still worth mentioning as good "tools" to protect both the road and the environment.

6.4.2.1 Diversion Swales. Diversion or interceptor swales divert upslope surface water before it washes over the top of the road bank and into the road's drainage ditch. Diversion swales reduce the volume of water to be handled by the road ditch, decreasing the size of the road ditch and potential erosion problems. They also stop the erosive forces on the face of the bank.

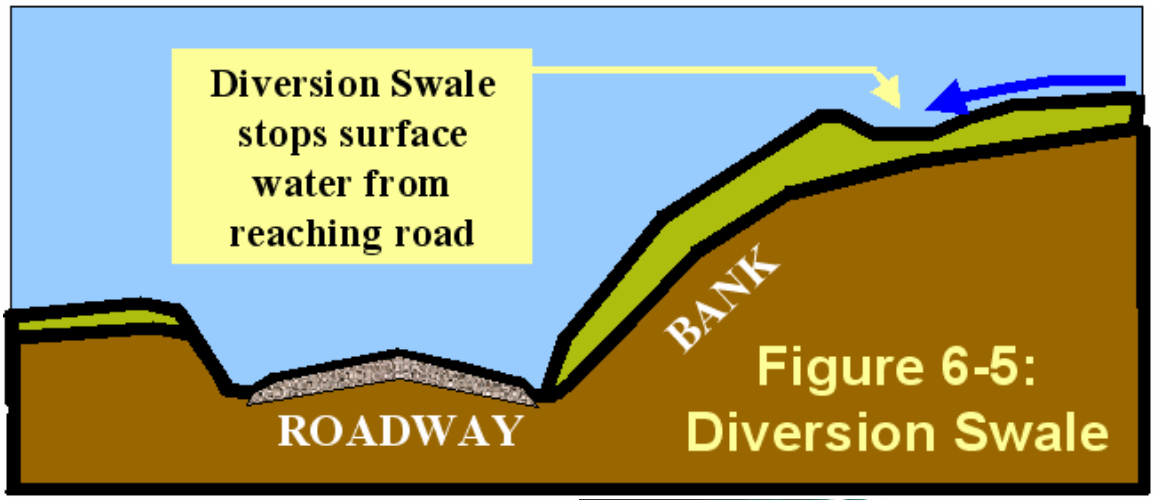

Diversion swales must be stable, with a level longitudinal grade for infiltration back into the soil or sloped to an adequate discharge area. They must contain the overland flow and not be overtopped. Diversion ditches are effective for draining low gradual vegetative slopes. Referring to Photo 6-27, this would be the ideal location to

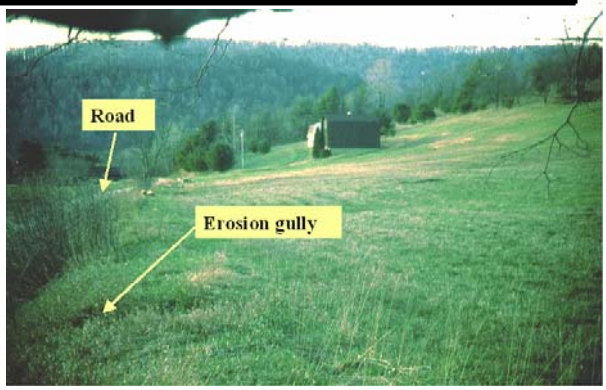

6-27 Ideal Location for a Diversion Swale.

create a diversion swale. The surface runoff from the entire upward slope could be drained into a swale at the top of the road embankment. The road bank would then be protected against the erosion gullies that are now present.

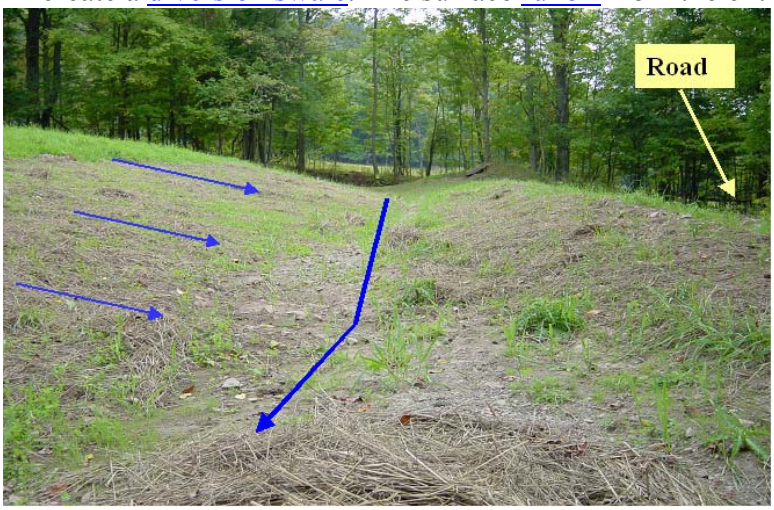

6-28 Diversion Swale: Wider swales and gradual slopes result in more infiltration and less water volume to handle.

Diversion swales are usually outside the right-of-way but need not interfere with agriculture. The wider and more gradual the sideslopes and longitudinal slope, the more infiltration and less accumulation of flows will result. By eliminating washouts and erosion gullies that form down over the road bank and start to "eat" back into the hillside, the swale can actually improve drainage of the landowner's property.

6.4.2.2 Slope Geometry. Slope geometry is an important aspect of bank stabilization. Flattening the slopes gives greater stability and less erosion by spreading water flows out and slowing the flow velocity, in much the same way as flattening roadside ditches reduces flow velocity, as discussed in Chapter 5.

Observing and following existing natural patterns can be beneficial. Do not disturb stable areas if at all possible. And remember the value of tree roots in maintaining a stable slope. Look at the two photos. The first one shows a patchy, vegetated road bank. Vegetation has already started, but is having difficulty establishing on dead subsoil. Notice the flush of growth in the ditch area. Perhaps with a little topsoil, seed, and mulch, this area could flourish. No need for any grader work. If cleaning the ditch, make sure to clean only to the toe of slope and not to cut into that toe of slope. The second photo shows a stable revegetated bank. Here, a "Do not disturb" technique is needed.

A little help is needed!

"Do not disturb!"

6-29

Roughening, grooving, or tracking slopes have distinct advantages. First, however, we need to change our perception of what a "well-dressed" bank should look like. We need to think in terms of existing natural banks. Natural banks are not regular or consistent as to surface and slope, and they are not polished and shiny. A natural appearing slope as shown in Figure 6-6, offers numerous advantages. The shined bank offers none.

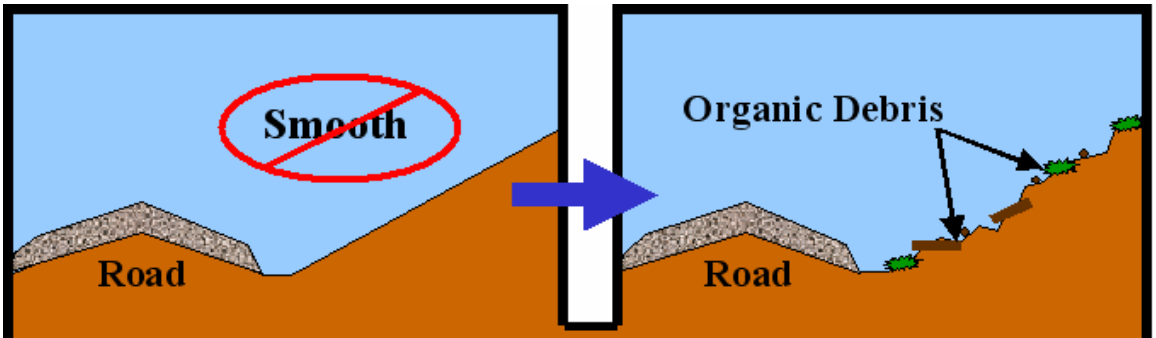

Figure 6-6: Roughening, grooving, or tracking slopes have many advantages

As stated above, roughening, grooving, or tracking of slopes have many advantages:

1. Catching rain water
2. Slowing surface water flow
3. Reducing erosion
4. Increasing filtration
5. Trapping sediment
6. Holding water, seeds, and mulch for enhanced vegetative growth.

These techniques require light equipment in order to prevent packing the soil to the detriment of plant growth. Track equipment should be used up and down the slope, not across, so the grooves catch water and hold seeds and mulch.

6-30 Tracking the newly constructed banks.

6.4.2.3 Benching. Benching, commonly used effectively on long, steep slopes, provides the same benefits as roughening the sloped surface. The top of the bank may have to be moved back and may be off the right-of-way. A good working relationship with property owners is required.

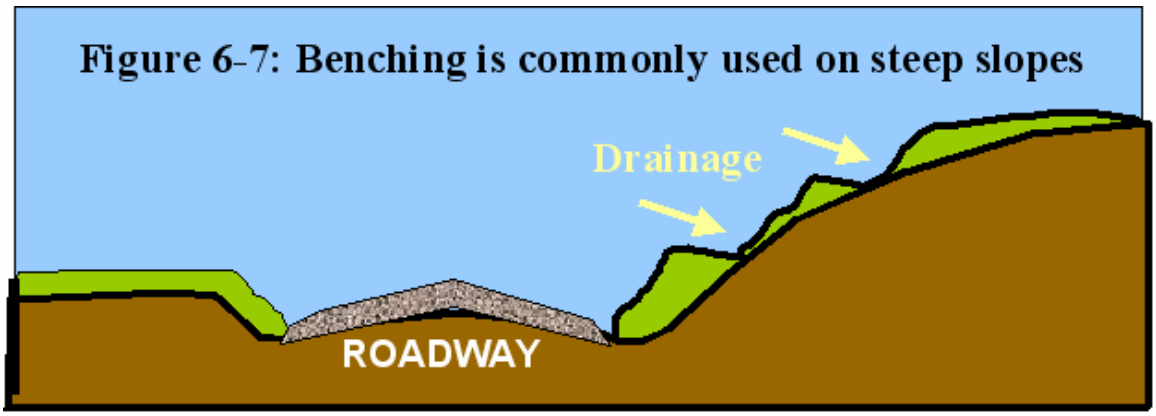

To be effective, the bench must collect water. The outside edge must be higher than the inner edge to prevent over the bank flow, as shown in Figure 6-7. The bench then should have a gradient to drain the bench to a proper outlet. Some benches can be gradually run out to the road ditch grade for drainage. Do not overlook the use of smaller multiple benches or steps and keeping some irregularity for a more natural appearance, if appropriate, for the site. Photo 6-31 shows some newly constructed low-gradient bank benches.

6.4.2.4 Seeding and Mulching. In all these practices, proper seeding is essential. Seeding requires:

1. An initial site evaluation (physical condition, soil tests)
2. Soil preparation (tilling & soil supplements)
3. Selection of species (temporary and permanent cover)
4. Timing of seeding (spring, fall preferred)
5. Establishment procedures (seeding methods, mulching).

The purpose of the initial site evaluation is to determine all site factors, both physical and chemical, which may limit the adaptability of various plant species to the site – moisture, temperature conditions, deficiency of vital soil nutrients, and any materials in the soil which are toxic to plants.

6-31 Newly constructed low-gradient bank benches.

6-32 Soil: Grab a handful, squeeze; does your hand stay "dirty"?

Soil tests determine a majority of this information. You can also get an idea about the soils by getting your hands dirty. Grab a handful, squeeze to check for moisture and clay content. Does it stick together? Does your hand stay "dirty" due to clay? (Refer to Appendix 6A: Soil Identification in the Field.) The optimum condition would be to work lime and fertilizer into the top 12 inches of soil for planting. The soil does need to be loosened by tilling with proper supplements added for good plant growth.

Selection of species is also important. In most applications, a seed mix of fast-growing nurse grass and the desired long-term plants will work well. Nurse grasses, such as rye grass, rye grain, and redtop, grow fast, binding the soil and sheltering slower germinating seeds, and give a good first impression of re-vegetation.

Legumes are a good component of the seed mixture. Legumes fertilize the soil by adding nitrogen to the soil, aiding the other plant types. Examples of legumes would be clover, flat pea, and bird's foot trefoil.

Time of seeding varies on geographical location. Generally, prior to mid-June and from mid-August to mid-September are the best times. This is somewhat a function of soil temperature, so summer can work, but make sure enough water is added with a good layer of mulch.

Establishment procedures refer to seeding methods and mulching. Broadcast spreaders are commonly used for road banks and the scale of most projects. Seeds can be sown by hand or a cyclone spreader as well. Hydroseeding is a spray mix of water, seed and fertilizer onto the bank. Hydromulching takes the above mixture and adds mulch.

Mulching is a requirement to hold and protect the seed. After mulching, the ground should not be visible. More mulch should be used in the summer and fall to protect from heat and frost, respectively. As another rule of thumb, if using hay or straw bales and the job requires more than thirty bales, get (rent) a power mulcher. Anyone who has shaken bales for mulching will gladly accept this rule of thumb.

Straw is cleaner than hay (no seeds) and provides good coverage with a mulcher. Hay is loaded with seeds and is easier spread by hand. Hydromulching, usually green in color, put in the hydroseed mix, may also be used.

The photo shows a vertical slope that has been seeded and mulched. This is a drainage inlet construction site where the bank had to be removed for inlet installation. The terrain and other conditions such as trees and a driveway directly above dictated the vertical slope. But it was not left bare to erode away with the first rainstorm. This is actually a straw mat, straw stitched into a flat mat and manufactured in rolls, and pinned to the bank. Wet down the mat, sprinkle seeds on it and then pin it to the bank. There are mats that are already impregnated with seed that can be used effectively. Leaving bare soil will only result in erosion and sediment and additional maintenance work and cost.

6-33 Rolled seed-impregnated straw blankets can be pinned to steep slopes for re-establishment of vegetation.

Started plants can be used, but are normally limited to small sites where it is hard to get plants to grow from seed. Started plants include pachysandra, day lilies, and periwinkle and are commonly available.

Although this was only a quick overview of seed mixtures and seeding, there are some valuable resources and expertise available. Working closely with the local and state conservation agencies, Departments of Agriculture, College/University Extension Offices is necessary for most local road departments, since road personnel do not generally have expertise in this area. As an additional advantage to consulting the experts, some species are invasive and should not be used.

6.4.3 Bioengineering Techniques. Bioengineering techniques are being used effectively in restoration of many stream and upland banks. Bioengineering combines the biological elements of using live plants with engineering design concepts for slope protection and erosion reduction. Although not the solution to all slope failure and surface erosion problems, many bioengineering techniques can be used in combination with other techniques and practices.

Bioengineering takes a holistic approach, gauging factors such as environmental compatibility, use for difficult sites, cost effectiveness, and the biotechnical strengths of the systems. Many bioengineering practices can be used in wet areas with minor disturbance to the site, enhancing the environmental sensitivity benefit. Hand labor is usually a necessity, but this becomes a benefit for those difficult sites where the use of machinery may not be feasible. That same labor lends again to the cost effectiveness

where labor rates are reasonable. The cost effectiveness of these practices really stems from the resulting low/no maintenance conditions when the work is completed. As the vegetation becomes established, the initial biotechnical strength of these systems only enhances. Growing roots reinforce the soils and extract excess moisture, while the foliage breaks raindrop impact, reduces surface water velocity, and prevents surface erosion.

Bioengineering makes use of local vegetation. Local vegetation is already suited to the climate, soil, and moisture conditions. Installation is accomplished during the dormant season, making the plants easier to handle. A few of the more common plant materials are bank willows and shrub dogwoods, which have been very successful in these installations. Willows would serve well in the practices described below.

6-34 Bank willows are commonly used in bioengineering practices.

Common techniques are live stakes, live fascines, brushlayers, branchpacking, and joint planting. These are the more simple techniques that lend themselves to volunteer labor. These techniques and others are thoroughly described in the **U.S. Department of Agriculture, Natural Resources Conservation Service (NRCS), Engineering Field Handbook, Chapter 16, Streambank and Shoreline Protection, and Chapter 18, Bioengineering for Upland Slope Protection and Erosion Reduction.** This handbook provides the data and details on many bioengineering practices. In addition, NRCS personnel can be quite helpful in providing advice and assistance in these techniques for any site or project being contemplated.

To clarify the use of these techniques and show the advantages and benefits, we will discuss a few of the more common practices accompanied by several photos.

6.4.3.1 Live Stakes. This practice consists of inserting and tamping live, rootable vegetative cuttings into the ground, as shown in Figure 6-8. Once the dormant stakes begin to grow, they create a living root mat and foliage. The primary function of this technique is to reduce soil erosion by slowing water velocities and by reinforcing the soil with root masses. Construction can be inexpensive and accomplished in a short time frame.

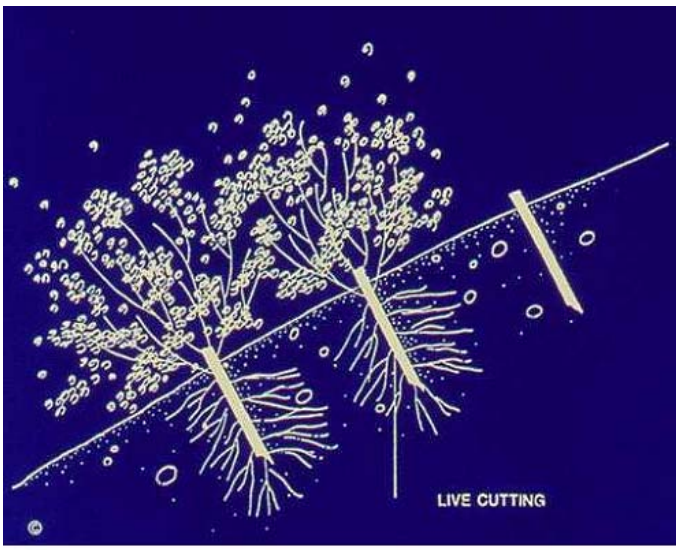

Figure 6-8: Live Stakes

6.35 Cutting the stakes and Preparing the site.

The live stakes are cut to the required length. The site is prepared. The project site depicted in the photo shows some riprap armoring at the water edge and rolled biodegradable erosion protection matting being laid. The tops of the live stakes are then driven into the ground.

6-36 Driving the Stakes.

6.37 Completed site and after one season's growth.

The top of the stake is usually the slightly smaller diameter end and will make driving it into the ground a little easier. The plant will produce roots and foliage appropriate to its orientation. A pilot hole can be made and a dead blow hammer can be used to reduce damage to the cutting. If the end of the stake is damaged (flattened

and splayed), simply cut off the damaged part. The final photos show a completed site and one after a season's growth.

6.4.3.2 Live Fascines. Live fascines are long bundles of branch cuttings bound together and placed in shallow contour trenches on the slope. The function is to protect the slope from shallow slides and reduce surface erosion. This technique is suited to steep, rocky slopes where digging is difficult.

6.38 Tying the bundles and digging the trench.

The branches are cut and the cuttings tied together to form long fascine bundles. Beginning at the base of the slope, a trench is dug on the contour of the slope. The fascine bundle is placed in the trench and staked. Live stakes can be used in combination with this technique.

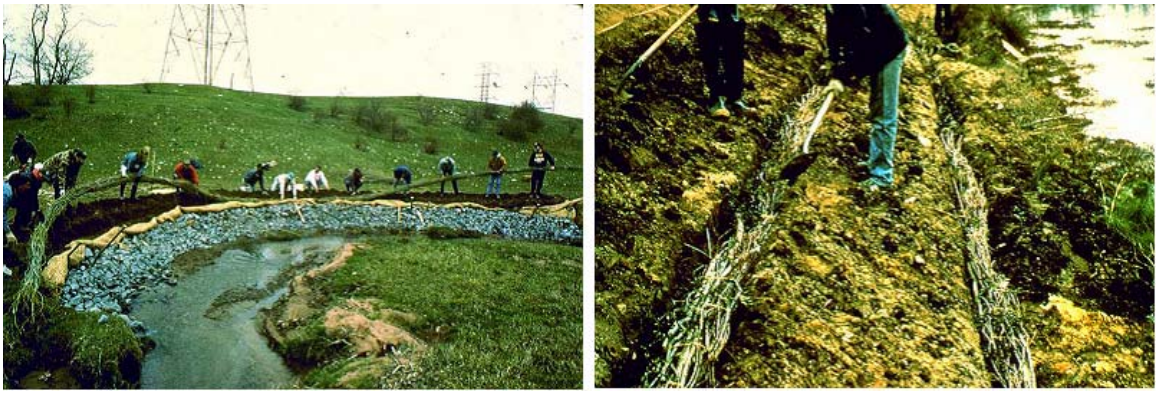

6.39 Placing the fascine and backfilling.

The live stakes are placed on the downslope side of the bundle as shown in Figure 6-9. Backfill soil is then used to fill around the bundles keeping the top of the fascine slightly exposed. The last photo shows a completed spring site after a summer's growth.

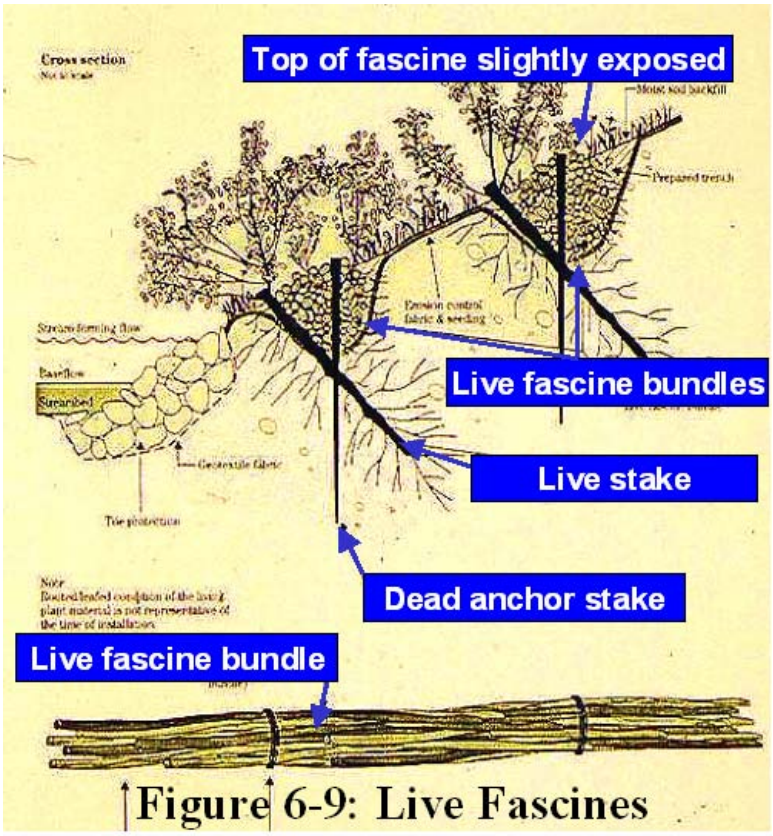

Figure 6-9: Live Fascines

As with many of the bioengineering practices, this technique lends itself to volunteer labor, as one can see in the above photos. These projects seem particularly desirable to many different groups with the volunteers receiving substantial satisfaction from a job well done and the continued satisfaction of the continual site enhancement.

6-40 Fascines after one season's growth.

Media publicity can also be a positive factor in promoting the volunteer group and the project. From Boy Scouts and Girl Scouts to 4H Clubs, from service organizations (Rotary International, Kiwanis, etc) to watershed and conservation groups, volunteers are a great resource for accomplishing these projects.

6.5 Summary

Throughout this chapter, the importance of roadside vegetation was emphasized. Roadside vegetation prevents erosion and sedimentation pollution and results in lower road maintenance costs. Additionally, a well-vegetated roadside is naturally beautiful and can be a draw for tourists.

We not only discussed the importance of roadside vegetation, but we demonstrated how we can effectively use vegetation to our advantage in reducing maintenance and costs and prolonging road life. We can actually use the forest system and other plants to create benefits for the environment, the roadway, and local governments.

We covered various proven techniques that can be utilized, particularly for bank stabilization. We pointed out that if all the eroded banks along our roads would be revegetated, both the large and small sites, a substantial reduction in pollution and associated road maintenance would result. We mentioned easy to use bioengineering techniques that can be accomplished with in-house crews or volunteer work from the many available groups and organizations.

We talked about seeding and the important steps in the revegetation process. And particularly in this area, we emphasized using the available valuable resources in your respective geographical location.

To again see these practices used in actual projects, we refer back to Appendix 5, Section 5A-1 for Worksite #1, Red Rose Road, Huntington County, PA. Adding to that site, Appendix 6B provides an additional project site utilizing vegetation practices. As in Appendix 5, this "Worksite in Focus" reviews an actual Pennsylvania worksite in which a combination of practices has been used to solve the erosion and sediment pollution problems.

We also need to re-emphasize that all of these practices can be adopted for paved roads and will prove to be just as beneficial as they are for unpaved gravel roads. And by using these practices, you will again see the long-range continual benefits for your roads and your environment and thereby for your community.

APPENDIX 6.

Appendix 6A: Soil Identification in the Field

Distinguishing Soil Types in the Field

When laboratory facilities are not available, some simple field tests can help you distinguish soil types and determine gradation, plasticity and dispersion:

Gradation

To judge gradation of dry soil, spread a sample on a flat surface. Separate the larger and smaller particles with a piece of stiff paper or cardboard. Estimate the percentage of particles larger than 1/4 in. (6mm) and the percentage of fines - individual grains too small for you to see with the unaided eye. Finally, gauge whether the larger particles are uniform in size (poorly graded) or have an assortment of sizes (well graded).

Figure 1 - Gradation Test

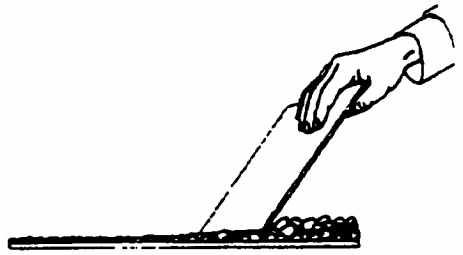

If the soil is wet, break a lump apart. Estimate the percentage of large particles as in the dry soil method. To find the percentage of fines, put just enough water in a clear glass to cover the bottom and fill the glass 1/4 full with soil. Then add enough water to just cover the soil and mark this level with a rubber band.

Figure 2 - Percent of Fines

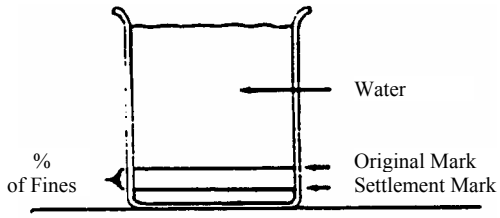

Now add water to the 3/4 mark and stir the mixture vigorously. After it settles for a minute and a half, mark the height of soil that has settled out. The difference between the two marks as a portion of the height of the upper mark approximates the percentage of fines.

Plasticity

Here are four field tests for estimating a soil's plasticity.

The Shaking Test: Knead a sample of the soil to work out as many large grained particles as possible. Add water gradually and knead the soil until it begins to get sticky.

Figure 3 - Shaking Test

Then hold the ball in one hand and tap the back of the hand with the other. If the ball becomes wet and shiny, it is mostly fine sand or silt. No reaction suggests clay.

The Toughness Test: Use the ball from the shaking test. Knead about half of it until it's dry. Then roll the soil sample into a 1/8 in. (3mm) thread or "worm". If you can't form a worm, the soil is sand or silt or fine sand (low plasticity).

Highly plastic soils take a long time to dry and become hard and waxy. You have to exert a lot of pressure to form a worm that breaks at about 1/8 in. diameter.

Figure 4 - Toughness Test

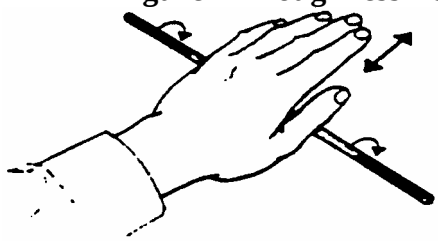

The Dry Strength Test: Knead the other half of the sample into a ball and let it air dry. Then break it apart and select a jagged, pointy fragment. Try to crush this fragment between your thumb and forefinger. A silt will turn to powder with little effort. A clay will be hard and almost impossible to crush.

Hand Washing: After handling silts and sands, your fingers will feel dusty. Rubbing them together will almost clean them. Gently flowing water will rinse them.

If you've been handling clay, you'll find a crust on your fingers you cannot rub off. Water will not rinse it off. You have to rub your hands together under water to cleanse them.

Figure 5 - Dispersion Test

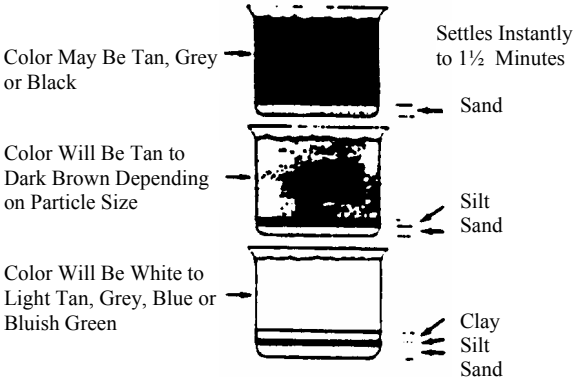

Dispersion

Use a dispersion test to support your gradation estimates. It will also give you an idea of how difficult the soil will be to compact. First fill a glass 1/4 to 1/3 full with soil and then add water to within 1/2 in. (13mm) of the top. Stir the mixture well and set it aside.

The mixture will settle in three layers: sand at the bottom, silt in the middle and clay at the top. Besides showing the relative amounts of the three soils, the results will indicate whether the soil is well or poorly graded.

Although silt and clay particles are smaller than the eye can see, gradation difference will show up as color differences. Also, the longer it takes a layer to settle, the smaller the particles. Usually, a single particle size (poor gradation) and a small particle size mean more difficult compaction than a mix with good gradation.

Summary of Identifying Clues

To summarize how various soil types react to the field tests:

- Clay - No reaction to the shaking test; a tough worm that dries out slowly; a crusty dry residue that is hard to remove from the hands.
- Silts - Rapid reaction to the shaking test; a weak or crumbly worm; powdery residue that is easily wiped or washed off the hands.
- Silt and Clay Mixtures - Intermediate or conflicting reactions to hand tests.
- Sand or Gravel with a few Fine Clays - Enough clay to soil the hand when you knead a wet sample, but not enough to form a lump.
- Sand or Gravel with Silt Fines - Dusty or gritty fines.
- Clean Sands and Gravels - Added water sinks in immediately without making mud.

Soil Test Checklist

Watch for these possible reactions when you are using in-field do-it-yourself soil tests.

1. No reaction to the shaking test, a tough worm that dries slowly, and a crusty residue that is hard to remove from your hands indicates the soil is clay.
2. Rapid reaction to the shaking test, a weak or crumbly worm, and powdery residue that washes easily from your hands indicates silt.
3. Intermediate or conflicting reaction to hand tests indicate silt as well as clay mixtures.
4. Enough clay to soil your hands when you knead a sample, but not enough to form a lump indicates sand or gravel with a few fine clays.
5. Dusty or gritty fines indicates sand or gravel with silt fines.
6. When added water sinks in immediately without making mud, you will have clean sands and gravels.

The above article and graphics were reprinted from Caterpillar Inc. and are available from Caterpillar Dealers. Ask for their "Compaction Manual," Form No. TECB8081© Caterpillar or see Better Roads, May 1991. The "Soil Test Check-list" was reprinted from Michigan Technological University's publication, "The Bridge," Vol. 6, No. 2, Winter 1992.

Appendix 6B: Additional Worksite in Focus

The following worksite is an additional project undertaken by a Pennsylvania local township with major funding through the Pennsylvania Dirt and Gravel Road Program. This worksite reused berm and ditch dirt to provide the needed topsoil cover for coalmine spoil to form a new wide vegetated buffer roadside area. The area was then fertilized and seeded. Although additional road and drainage work were part of the combination of practices used, the new, well-vegetated roadside buffer area reduces dust generation and keeps sediment out of nearby Fall Brook stream.

In addition, please refer back to Appendix 5 to the first Worksite on Red Rose Road in Huntington County, PA, to view the selected tree removal and bank stabilization practices utilized on that project.

Worksite in Focus

Tioga County
Fall Brook Road

4/13/05

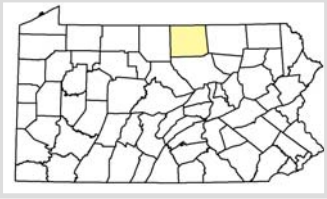

Project Background
Fall Brook Road was used as a coalmining operations haul road until the early 1980's. Constructed of coalmine spoil, the road width, in some places, exceeded 60' wide. When coal trucks quit using the road, Ward Township was left with a problem road that could not maintain crown and had constant potholes. The road surface of coalmine spoil was very acidic, very soft and fine, holding and pumping water. Additionally, the coalmine spoil would not support vegetation, so the berms, ditches and banks were barren and a constant source of erosion. The road had inadequate cross pipes, groundwater in the road, and direct sediment discharges into Fall Brook.

Project Considerations
This segment of road has 2 stream crossings. One of these crossings, inadequate for flood flows, saw high water bypass the existing stream crossing and spill across the road about 300' away.

Project Facts

Project:	Fall Brook Road
Project Owner:	Ward Township
Affected Watershed:	Fall Brook, Tioga River
Project Length:	1100 ft
Date Completed:	September 2001

Cost Summary

Total Project Value:	$24,960
District Funding:	$21,185
Materials	$17,070
Equipment	$3,965
Labor	$150
In-Kind Contributions:	$3,775
Labor	$3,775

For More Information
The Center for Dirt and Gravel Road Studies
(814) 865-5355
www.dirtandgravelroads.org

Tioga County Conservation District
Ralph Brugger
(570) 724-1801

Before: Fall Brook Road was so wide, the township could not keep the road crowned. The road surface of coalmine spoil held water and was full of potholes during wet periods and was a constant source of dust in the summer. High flows sent water flooding across the road eroding the surface material directly into Fall Brook. Although already impacted by acid mine drainage, Fall Brook did not need an additional source of impairment.

The publishers of this publication gratefully acknowledge the financial support of the Pennsylvania State Conservation Commission. For additional information or assistance, contact: Center for Dirt & Gravel Roads Studies, Penn State University, 207 Research Unit D, University Park, PA 16802 (Toll-Free Phone: 1-866-668-6683, Fax: 814-863-6787, Email: dirtandgravel@psu.edu). Additional copies available on our website at: www.dirtandgravelroads.org

Center for Dirt and Gravel Road Studies

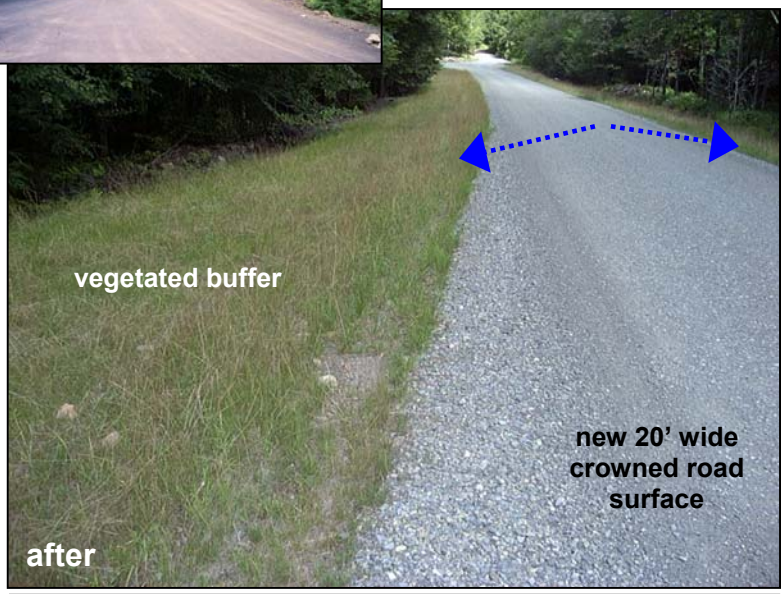

Project Solutions

Construct new road base: To solve the problem of the wide flat road, the township used the existing road surface of coalmine spoil to construct a new crowned road base.

Re-surface the road: The centerline of the new roadway was laid out and a 20-foot wide layer of limestone Driving Surface Aggregate (DSA) was placed and compacted. The newly crowned road surface sheds water to either side as sheet flow.

Vegetate road berms: With the extra width to work with, the township hauled berm and ditch dirt from other roads in the township and covered the coalmine spoil with 6" of topsoil, forming wide buffer areas (see photo at right). Buffer areas, banks and ditches were limed fertilized and seeded.

Stabilize stream crossings: One of the two stream crossings on this project needed to be replaced. A new pipe and head- and endwalls were installed. The township poured its own 2'x2'x4' concrete blocks to construct the headwalls (see photo at right). Additional cross pipes were added to direct ditch water to the vegetated buffer, removing a direct discharge to the stream. At the other crossing, high flows flooded the road 300' away. Where high water crossed the road, the road and road base were armored with R5 rip-rap to allow water to flow over the road without major damage.

Project Results

Previously, Fall Brook Road required frequent regular maintenance and emergency maintenance following high water flooding. Since project completion in 2001, the township has only had to grade twice. The road itself has a new durable driving surface. Well-vegetated buffer areas reduce dust generation and keep sediment out of Fall Brook.

Site Map & Directions

From U.S. Route 6, turn left on to State Route 2029 in Mainesburg. State Route 2029 turns into State Route 2022, then into Fall Brook Road. The project begins approximately 3 miles down Fall Brook Road at the intersection of the road with Fall Brook.

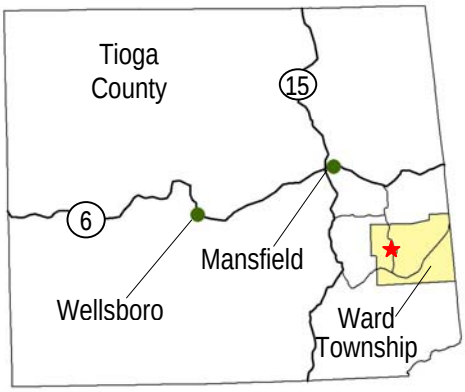

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PENNSTATE

Environmentally Sensitive Maintenance for Dirt and Gravel Roads

Chapter 7: Environmentally Sensitive Maintenance Practices: Additional Maintenance Techniques

7.1 Introduction

In the two previous chapters we introduced numerous maintenance practices as tools for the toolbox. In this chapter, we provide additional tools relating to three major topics:

Dust Control: We will define road dust and learn about its effects on roads and the environment. Armed with this information, we will then discuss dust control materials and methods.

Road Stabilization: We will define road stabilization and introduce the materials and techniques most commonly used. Many dust control materials can also be used as additives in road stabilization.

Geosynthetics: We will then introduce the world of geosynthetics and their many various functions and uses in environmentally sensitive road maintenance.

7.2 Dust Control

Unpaved roads are considered the largest source of particulate air pollution in the country. According to the Environmental Protection Agency, unpaved roads produce almost five times as much particulate matter as construction activities and wind erosion, which are the next two largest sources, combined.

7-01 Unpaved roads are the largest source of dust pollution in the country.

Many local governments do some sort of dust control. This maintenance task is usually performed as a result of public complaints, and the resultant work consists of doing some sort of dust control in front of residences. This action typifies the common thoughts of dust as a nuisance. Dust, however, is much more than a nuisance. We need to understand exactly what dust is and how it originates.

7.2.1 What is Dust and Where Does It Come From? First, look at a commonly accepted statement about dust:

"One car making one pass on one mile of dirt or gravel road one time each day for one year creates one ton of dust."

What is this dust? Where does this dust come from? This dust is part of the road, it's the fines being ground down by traffic and blowing off in the wind. Recalling earlier discussions about road materials, we wanted a well-graded aggregate with fines to lock everything together and keep it in place. If we lose the fines, we lose the road. The above statement translates to losing 50 tons of fine road material a year for each mile of road with an average of 50 vehicles per day.

7-02 Just what is dust? Where does it come from?

When these fines are lost as dust, it deteriorates the gravel surface. Larger aggregate pieces become exposed and are then scattered by vehicles or washed away. The unstable road surface becomes rough, developing potholes and washboarding. These distresses hold water that infiltrates and damages the base. In addition, the eroded material damages ditches and drainage systems. Repairs and maintenance can be frequent and costly.

Dust indicates the road is deteriorating, and the dust, as it settles out and becomes additional sediment in the streams or blankets the vegetation, causes deterioration to the environment. Thus, dust causes excess road maintenance and environmental pollution.

7.2.2 The Necessity of Dust Control. Successful treatment can significantly reduce dust conditions and help preserve road surfaces. Various studies show that control measures can reduce dust by 30% to 80% and cut aggregate loss by 25% to 75%. Such treatments, however, will not last forever, and repeated applications may be necessary.

We must view dust control as a necessary routine maintenance item for all unpaved roads – not only to prolong road life, but also to protect the environment. Dust control means that the roads will stay intact; the fines will remain interlocked with the larger aggregates and keep everything in place. Similar to the cut in aggregate loss, studies report that one can expect a 25% to 75% cost reduction in blading, regarding, and re-graveling by implementing a dust control program.

How often we do dust control and to what extent will depend on many variables. What are the road surface materials? What is the road condition? What is the drainage

condition? What are the environmental conditions – severe storms, rain, droughts, etc.? What is the volume and speed of traffic? What are the objectives or goals for dust control?

Without traffic, dust is not a problem. According to commonly accepted "guidelines," roads with an average daily traffic (ADT) between 15 and 500 vehicles per day are good candidates for dust control. With fewer than 15 vehicles per day, there is probably not a substantial dust problem. Conditions on these roads, however, must be evaluated on an individual basis to determine the potential for dust-related problems. Generally speaking, roads carrying more than 500 vehicles per day will require multiple treatments. In these cases, options range from a more substantial surface treatment to an actual asphalt pavement. Again, each road must be evaluated individually based on specific road and roadside conditions.

7.2.3 Benefits of a Dust Control Program. Let's look at the benefits of a dust control program. The first two major benefits are what we have already discussed above – prolonged road life with less maintenance and less particulate matter polluting our streams.

But there are many other benefits to a dust control program, such as reduced respiratory and associated health problems, not only from the dust itself, but also possibly from other organisms attached to the dust particles through electrostatic forces.

Dust on plants can hamper their growth and development. When the farmer calls and wants something done about the dust because it is affecting his crops, that is a valid complaint. Dust shades necessary light from plants, hindering photosynthesis (plants producing their own food), resulting in stunted plant growth.

7-03 Dust can affect crops.

In general, a good dust control program reduces cleaning costs associated with homes, clothes, and vehicles. Dust control can mean a better quality of life and higher property values for those living and working adjacent to your roads.

Dust poses road safety hazards as well because it reduces visibility for motorists. Dust control can mean reduced vehicle accidents and improved road safety. If the driver cannot see properly, it is unsafe to drive.

7-04 Dust creates visibility problems for the motorists.

A good dust control program can also reduce vehicle maintenance costs. Dust plays total havoc on moving parts. Maintaining a vehicle that drives an average of 40 mph exclusively on gravel roads costs 40% more than maintaining the same vehicle traveling the same speed on paved roads.

If the road fines are lost, the coarse aggregate ravels and loosens and can be kicked up by vehicles, causing windshield breakage and vehicle damage. Good dust control means less vehicle damage.

And, of course, there is the public and public relations. What municipal official has not received the phone call from the irate resident demanding, "You have to do something about this dust!"

A good dust control program means a better road, a better environment, and thus a better community.

7.2.4 Dust Control Options. Road managers have several dust control options available to them depending on specific road conditions. Traffic creates dust. Limiting traffic volumes, however, is really not feasible. After all, that is what the road is there for. Limiting traffic speed could have an effect. But erecting speed limit signs does not always slow traffic down, and no matter what the speed is, traffic will still create dust. Heavy truck traffic creates more dust, but limiting traffic weight is not an efficient dust control alternative. Usually weight restrictions are imposed on roads that are incapable of supporting heavy traffic without significant road deterioration especially in the spring "mud season."

7-05 Traffic weight and speed increase dust.

Although paving the road is the only permanent solution to dust problems, using effective controls can significantly reduce dust and cut required maintenance. That leaves

us with dust suppressants and a few other more substantial methods using road stabilization and geosynthetics, both of which can help in alleviating the dust problem.

Dust suppressants are classified as routine dust control maintenance items. Of course, different materials will provide different service intervals depending on many variables. We also need to be concerned with the environmental effects of the materials used.

7.2.5 Evaluation of Dust Suppressant Materials. Before we discuss dust suppressant materials, we need to talk about evaluation of the materials to be used. What should you know? What do you need to consider?

The following list provides the basic considerations:
Environmentally compatible
Effective at controlling dust
Easily applied with common road maintenance equipment
Workable and responsive to maintenance
Not degrading to ride quality
Relatively harmless to vehicles using the road
Posing little hazard or inconvenience to adjacent residents
Cost competitive

There are several information sources available to help in evaluation of dust suppressants.

Every chemical has to have a Material Safety Data Sheet (MSDS). Right-to-Know Laws, originating at the federal level and adopted at the state level, require all manufacturers to provide an MSDS for every chemical and require all employers to have MSDS sheets for each chemical used in the workplace available to employees.

The MSDS deals with safety in handling the material, listing the manufacturer's name, address, and phone number; the major components of the chemical; its characteristics such as flammability, volatility, reactivity; safety equipment needed to handle the chemical; and emergency procedures in case of spills or exposure.

The Federal Clean Water Act along with respective state acts set the requirements as to toxicity for fish and other aquatic stream life. The material or chemical must meet all of these requirements. But we also should be concerned with effects on vegetation. We now realize how important roadside vegetation is and the important part it plays in erosion and sediment pollution prevention and helping reduce road maintenance. We certainly do not need chemicals that would harm or destroy our roadside vegetation.

It is imperative that road managers evaluate dust control products in light of all of these factors. Road managers need to seek out all information on the product, check referenced users as to their experiences, concerns, and problems, and possibly do trial

applications to develop an effective, efficient and safe dust control program that will protect their roads and the environment.

7.2.6 Common Dust Suppressants. The following list of commonly used dust suppressants along with their attributes and limitations as to effective dust control and environmental compatibility will be discussed.

Water
Sodium Chloride (salt)
Calcium Chloride
Magnesium chloride
Brines (natural, semi-processed)
Lignin Derivatives
Asphalt Emulsions & Cutbacks (oils)
Resins

7.2.6.1 Water. Water is a dust suppressant. Water will do the job but it is short-lived. Road personnel would have to be out there continually each day applying water during the dry summer weather. Water, however, is readily available and safe for the environment.

A notice of "caution" is required here concerning the "safe for the environment" statement. A caution comes with using potable "tap" water from a public water system. A public water system treats water with chlorine for disinfecting to kill all organisms. There is always a chlorine residual in the water. If a tankload of this water would be dumped directly into a stream, you may end up with a detrimental effect on the fish and other aquatic life depending on the volume dumped, the amount of stream flow, the amount of chlorine residual, and other conditions.

7-06 Although environmentally sensitive, water affords only short-term dust control.

Water's real limitations relate to evaporating readily and thereby its short-term control. This means it becomes very labor intensive and costly due to the need for repeated applications for effective control. Contractors use water trucks on large construction sites continually to cut dust during work. Not only do they do this to ward off complaints from adjacent residents, but they also know the savings in equipment maintenance. Water as a temporary control during construction or maintenance work does have merit.

7.2.6.2 Sodium Chloride. Sodium chloride is our deicing salt or rock salt used all over the snow-belt states for paved roads in winter. Salt, however, is not an effective dust control. It begins to absorb water at 76% relative humidity, reduces the rate of water evaporation by a factor of 1.3 times, and it does lower the freezing point of water. However, all of these positive dust control characteristics are not substantial, especially when compared to other available materials.

There are significant environmental concerns with the use of chlorides. Whether the chlorides come from sodium chloride or from magnesium or calcium chloride, they still pose environmental challenges. When these materials are used, the sodium, calcium or magnesium attach themselves to other materials, but the chlorides become free agents and are able to leach out of the road and into nearby streams or ground water sources.

Chlorides can cause serious problems. They can be detrimental to animals and plants, and they are corrosive. With these limitations and the fact that sodium chloride is not effective as a dust control, we do not recommend using sodium chloride for this purpose.

7.2.6.3 Calcium and Magnesium Chlorides. Calcium and magnesium chlorides, on the other hand, can be effective dust suppressants. Calcium chloride begins to absorb moisture at 29% relative humidity, which is very dry and when we need dust control the most. It also reduces water evaporation by a factor of 3.4 times and lowers the freezing temperature of water to –60° F.

Magnesium chloride is very similar and begins to absorb water at a dry 32% relative humidity, reduces water evaporation by 3.1 times, and lowers the freezing point of water to –27° F.

Even with these attributes, calcium and magnesium chlorides are still chlorides, which again can be detrimental to plants and animals and corrosive to metals. Site conditions, particularly where roads are immediate adjacent to streams, must be evaluated carefully if chlorides are being considered for use.

7.2.6.4 Brines. Brines are usually a by-product of gas production wells and consist of a combination of chlorides. Brines, as a by-product, can be less costly than many other materials. Natural or semi-processed brines should be tested and approved for use as a dust control agent. The manufacturer should be responsible for testing and assuring a non-contaminated product.

Brines, being mostly chlorides, give us the same positive attributes and the same concerns as the other chlorides. Brines can be detrimental to animals and plants, but may be worse in that they could be contaminated with other materials – oils, heavy metals, etc. For this reason, brines need to be tested and approved before use.

7.2.6.5 Lignin Derivatives. Lignin derivatives are a by-product of the paper manufacturing industry. They are highly acidic, usually foul-smelling when spread, and

very sticky, clinging to vehicles. Complaints are common because of these problems, so be sure to give advance notice to residents and businesses before treatment. There is dried processed lignin sulfonate available commercially, which does not have these problems. In addition, certain manufacturing processes may make them more or less effective in controlling dust. For example, ammonium lignin sulfonate refers to the process and is one of the more effective agents.

7-07 Lignin derivatives are a by-product of the paper manufacturing industry.

With lignin derivatives, the road should have a silt/clay content of 4% to 8% for them to take the proper effect in controlling dust. Lignins are slippery when wet and brittle when dry, which is not really conducive to good dust control. Rain tends to re-emulsify the material, increasing the potential for run-off. And, although lignins could be called a natural substance, if they leach into the stream, they will deplete the oxygen and destroy stream life. Lignins, because of their acidity, are corrosive. Repeated applications will be needed as lignins decompose over time.

7.2.6.6 Asphalt Emulsions and Cutbacks. An asphalt emulsion is asphalt and water with an emulsifying agent (soap) added to allow them to mix. When used, the water evaporates, leaving asphalt. An asphalt cutback is asphalt thinned with a solvent such as naphtha or kerosene. When used, the solvent evaporates, leaving asphalt. These materials act as adhesives and binders that physically glue soil particles together.

They form a hard crust, and repeated applications can develop into a "paved" road. Depending on the number of applications per year, the road conditions and maintenance operations between applications, and the number of years used, the road can start to look and act like a paved asphalt road.

7-08 Asphalt emulsions and cutbacks are still being used for dust control, but…

Using emulsions and cutbacks gives us the asphalt to combine with the gravel road aggregate, forming a paving-like condition, which begins to build an asphalt pavement. Considering that a hot asphalt mix used to pave roads is just asphalt and aggregate mixed and heated in an asphalt plant, one can realize that under continual use of "asphalt oils," a dirt and gravel road can become that "pancake" paved road. Periodic regrading of the road tends to be more expensive and more

difficult when it has been treated with these products.

These "oils" provide some dust control. Medium cure cutbacks such as MC30 and MC70 are commonly used. A significant problem related to health and air pollution is the volatile organic compounds (VOCs) released by the asphalt cutbacks. Because of this problem, the use of cutbacks has been limited in many states and will probably continually decrease in the future.

Although they can be applied to a broad range of soil types and are good at waterproofing an aggregate surface, tracking can be a problem, particularly if the road surface has a lot of fines. Tracking can be a real nuisance for vehicle owners and nearby residents. Another concern during application is the potential for run-off from excessive application or related to a quick rainstorm.

7-09 With the use of asphalt "oils," tracking and/or run-off can become problems.

7.2.6.7 Resins and Other Materials. Numerous other dust control materials are available, including various resins and enzymes, some of which are by-products of a manufacturing process. Vegetable oils including soybean soapstocks and sugar beet extract are also being used. New products are continually being researched and marketed. Once again, all products need to be evaluated in terms of effectiveness and safety in light of site-specific road conditions.

7.2.7 Use and Application of Dust Suppressants. The two main objectives in dust control, however, remain (1) to develop and implement a program and (2) to use a dust suppressant that will not only be effective, but also environmentally safe.

7.2.7.1 Environmentally Sensitive Materials. When evaluating dust suppressant materials, road managers must pay particular attention to each material's environmental impact. Road managers must seek out all information on the product, checking referenced users as to their experiences, concerns, and problems, and then do trial applications to develop an effective, efficient and safe dust control program that will protect their roads and the environment.

The Pennsylvania State Conservation Commission has addressed the issue of dust suppressants by making it clear to manufacturers and vendors that they are responsible for determining the acceptability of their materials. Appendix 7A discusses the Commission's testing protocols and lists the products that have been approved for use in the Pennsylvania Dirt and Gravel Road Program

7.2.7.2 Application Process. No matter what we are using to control dust, the product must match the existing road materials. We should not be doing dust control with any threat or prediction of rainfall. And remember this important statement:

Dust control will not make a bad road good, but will keep a good road good.

This leads right into the three major tasks in application of a dust suppressant.

1. Determine the product to be used and application rate. The product may depend on the road and type of wearing surface. Application rate depends on the product; the condition of the road; type, volume and speed of traffic; degree of dust control required; climatic conditions; frequency of maintenance; and cost.

2. Perform all required maintenance and repairs to the road. Bring the road to a good condition with a good crown and cross slope. Repair unstable areas, remove unsuitable material and replace with select material, make necessary drainage improvements, clean ditches, grade the road, and restore proper crown.

3. Apply the dust suppressant. An application in spring followed by another application in late summer or early fall may give good dust control for the year. Again, this is dependent on all the variable conditions. Remember, application should be made when there is no threat or prediction of rain for at least 36 hours. Most dust control agents can be applied when the road surface is damp (not wet), except for the asphalt cutbacks, which require a dry surface.

The following are general application guidelines. Use the recommended application rates from the manufacturer for the first spring application. You may want to reduce this rate by half for roads that have been previously treated. With most products, (asphalt cutbacks are an exception) we can pre-wet the surface with water at rates ranging from 0.03 to 0.3 gallons per square yard to reduce surface tension, to develop capillary

action that allows maximum penetration of the suppressant, and to ensure uniform application. If a dust coat has already developed on the road, regrade and moisten.

Avoid runoff or puddling when applying liquids. Use several light sprays if the surface is tight. Follow dry applications with enough water to ensure the pellets or flakes are completely dissolved. Allow the treated road to cure. Curing may take longer for roads with finer grained materials.

A second treatment may be required in late summer or early fall. Treat the road a second time before the first treatment becomes totally ineffective. You may need only half the application rate as used in the spring application.

7.3 Road Stabilization

7.3.1 What is Road Stabilization? We can define road stabilization as the uniformly crushing, pulverizing and blending of the road materials, adding a stabilizing agent, mixing the agent with the blended material, spreading and regrading the road with proper crown, and compacting. Compaction is a requirement in this process. Stabilization can also be performed without a stabilizing agent but is more commonly done with an agent for better strength and stability.

7-10 Road stabilization or full-depth reclamation works well with a stabilizing agent

The newer terminology for road stabilization is “full-depth reclamation.”

7.3.2 Advantages of Stabilization. There are numerous advantages to road stabilization. First, stabilization unifies and strengthens the roadbed, prolonging road life. Through stabilization, we are actually recycling existing road materials to reconstruct a new road. The stabilizing materials obtain the desired moisture, increase cohesion by producing a cementing action, and act as a waterproofing, providing greater road strength and stability. The road also becomes more resistant to dust. Depending on the agent added (calcium chloride for example), we can aid in reducing frost action or frost heaves.

Stabilization is nothing new but went by the wayside when asphalt paving and cement concrete paving were introduced for road surfaces. Now we are again discovering

the advantages of stabilization not only for improving our dirt and gravel roads, but also for stronger bases for paved roads.

7.3.3 Stabilization Additives: The common stabilization additives include many of the dust suppressants with some additional materials added to the list:

Calcium Chloride
Magnesium Chloride
Resins
Lime
Cement
Asphalt
Fly Ash

Many times these materials are used in combination for stabilization.

> ***Caution: Certain materials may require permits or approval from state environmental agencies for use as a road stabilizer. For example, the use of fly ash in Pennsylvania requires the PA Department of Environmental Protection approval – source, quality, quantity, and how it will be used, stemming from the origin of the fly ash and a potential of unwanted contaminants such as heavy metals.***

The same concerns exist for these materials as for dust control materials, particularly since we are talking about some of the same materials. We do need to be concerned with environmental sensitivity and the effectiveness as a road stabilizer. The same information, testing and evaluation should be a priority, with the manufacturer being responsible for verification of their product being environmentally sensitive. See Appendix 7A for Pennsylvania's testing requirements and approved products.

7.3.4 The Stabilization Process. Selecting a stabilizing agent is the first step in the process. Selection of the proper stabilizing agent requires knowledge of the road soils or aggregates and of the agent being used. The stabilizing agent must be of the correct type and used in the correct quantity for satisfactory results.

The stabilization process consists of:

- scarifying and pulverizing the existing road materials;
- adding new material if you need to beef up the road structure;
- mixing in the stabilizing agent; and
- then regrading and shaping the road with the proper crown followed by good compaction.

The process can be accomplished with just a road grader and roller. A good grader operator can scarify and mix the materials and reprofile the road, which can then be rolled for compaction.

7-11 Stabilization can be accomplished with a road grader – scarifying the road, mixing in a stabilizing agent, regrading and shaping.

Another viable option is a “reclaimer.” A “reclaimer” has a drum with carbide teeth and a down-cutting action for pulverizing and proper sizing of the material. Stabilizing agents come in liquid or solid form, and are either sprayed using a tank truck or spread using various methods and equipment. The same equipment, such as the reclaimer, can then be used for mixing the stabilizer uniformly with the road material.

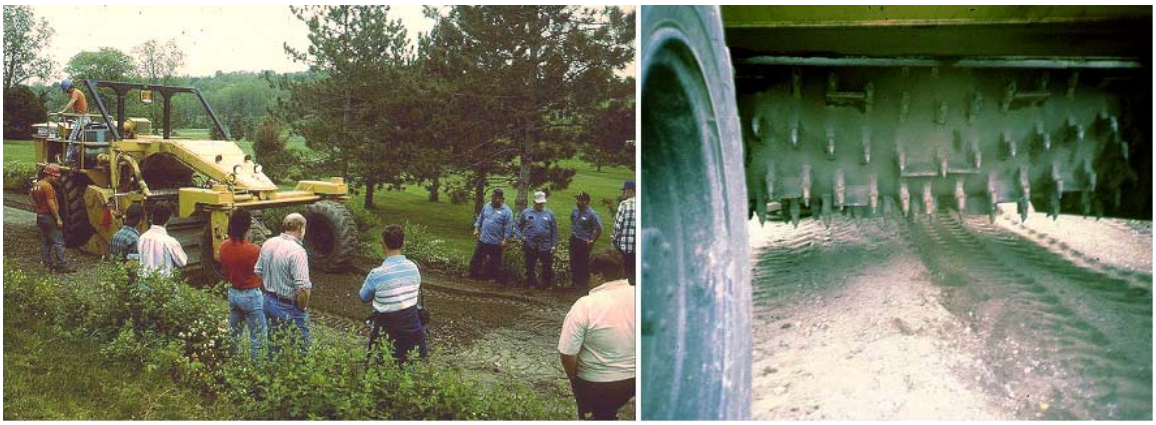

7-12 The “reclaimer” has a down-cutting drum with carbide teeth.

With newer systems, a tanker truck connected by a hose to the reclaimer, introduces the liquid stabilizer agent directly into the roadbed material as it is being pulverized. The reclaimer has a computer-controlled liquid injection system, which is capable of accurately regulating additive application rates.

A road grader can then be used to regrade and restore a proper crown and a roller for compaction. Compaction is a requirement in this process.

Stabilization or full-depth reclamation can be an effective tool to reconstruct a poorly maintained road. The end result is a uniform road material strengthened by the added stabilizer agent and properly shaped and crowned for good drainage. Reusing existing road materials is very cost effective.

7-13 A mish-mash of road surface materials lends itself to a full-depth reclamation project.

Full-depth reclamation is recommended for roads like the one in Photo 7-13. The road has a varied look due to a variety of materials that have been used over the years. Different aggregates, different materials for patching, different treatments for dust, or sectional surface treatments all on the same road can be a continuous maintenance headache for the road manager. This type of road is an excellent candidate for full-depth reclamation.

7-14 A sheep's foot roller is used for soil compaction.

As a side note on compaction, different types of compaction equipment are better suited for different types of materials. If you are compacting soils, a sheep's foot compactor, shown in Photo 7-14, is ideal. This machine compacts the soil from the bottom up. As the soil becomes compacted, the roller will "walk" right out.

7-15a A steel grid-type roller fractures large coarse shale material.

7-15b A rubber tired roller with environmentally friendly ballast.

Large coarse shale materials can be compacted using a grid-type roller, Photo 7-15a, that will tend to fracture and break the larger pieces, helping to consolidate and compact the material into a tight mass. Compaction rollers do not have to be fancy. Photo 7-15b shows a trailer-hitch type with natural ballast materials.

7.4 Geosynthetics

The world of geosynthetics continues to expand with new products and uses in all types of applications. Geosynthetics takes in the whole realm of materials such as geotextiles, geogrids, geowebs, geocells, and other geocomposites. Many local governments are using plastic drainage pipe, so they are already into geosynthetics. There are, however, many other products that could prove useful in a variety of areas associated with dirt and gravel road maintenance. This section will zero in on geosynthetics for pipes and subdrains, for soil erosion protection and embankment reinforcement, and for road separation fabrics.

7-16 The world of geosynthetics and road maintenance.

First, let's examine just what geosynthetics are. The prefix "geo" means relating to the earth. The word "synthetic" means man-made. So a geosynthetic is a man-made material used on or under the earth. The concept of earth stabilization using various materials is not new and can be traced back in history to reed mats in ancient Egypt, bamboo baskets for rice paddies in Asia, and "corduroy" log roads in England. In the United States, woven cotton was used for slope stabilization in South Carolina in the 1930s. All of these materials, however, were from natural products and were biodegradable. Modern geosynthetics began in the 1950s with trials and experiments, but

really came into existence in the 1970s with the introduction of certain polymers. Today the realm of geosynthetics is greatly expanded, using many polymers such as polypropylene (PP), polyester (PET), polyethylene (PE), polyvinyl chloride (PVC), nylon, polystyrene, and ethylene interpolymer alloy (EIA), all of which are non-biodegradable.

7.4.1 Why Use Geosynthetics? Geosynthetics are easy to place because virtually all installations can be accomplished with in-house crews. Additionally, geosynthetic materials cost very little. Low installation costs and low material costs means more bang for the local government buck. Further, geosynthetics may be used in a wide variety of applications and are durable and long-lasting.

7.4.2 Functions and Applications. Geosynthetics serve a variety of functions in many useful applications as follows:

Functions	Applications
Drainage / Infiltration	Subsurface Drainage
Stabilization	Subgrade Stabilization
Reinforcement	Soil Reinforcement
Separation	-Embankments
Erosion Control	-Steep Slopes
Sediment Reduction	-Vertical Walls
Waterproofing	Erosion / Sediment Control
Stress Relief	Base Reinforcement
	Bridge Deck Waterproofing

Selection of a particular product depends on the function and application. This becomes extremely important in geotextile fabrics.

7.4.3 Geotextile Fabrics. There are numerous fabrics on the market; each one designed to perform a specific function. You cannot tell one fabric from another by visual inspection only. Therefore, it becomes imperative that the manufacturer or vendor know how you are going to use the fabric or what function it is supposed to perform.

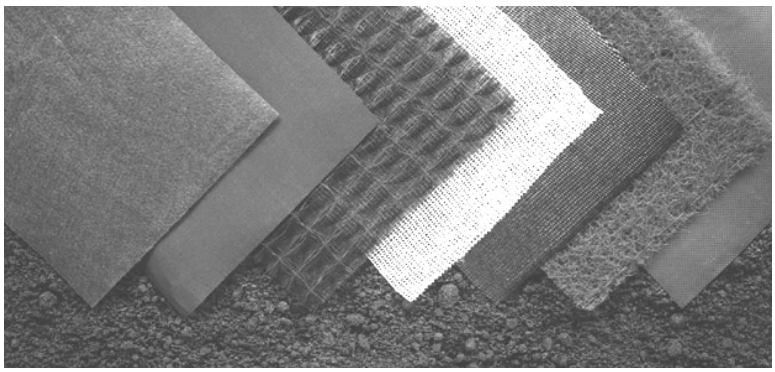

7-17 Different fabrics are designed to perform various functions and for various applications.

There are two major fabric types: woven and non-woven. The manufacturing process of these two types is similar. Plastic polymer beads are melted down and extruded through dies. For non-woven fabrics, the extruded threads are sprayed in random patterns, and then thermally bonded in layers and needle punched. They commonly have high permeability and conformability with high elongation. For woven

fabrics, the extruded threads are woven on machine looms and have a woven appearance. They have high tensile strength and low elongation.

There are woven slit-film fabrics that are melted plastic beads sprayed in sheet films and then slit into long narrow strips of varying width. These strips are then woven together. They also have high tensile strength and low elongation.

7-18 Fabrics come in rolls of various widths

Fabrics normally come in rolls of various widths. Widths of twelve, fifteen, and eighteen feet are common for use as separation fabrics.

7.4.4 Geosynthetic Applications in Road Maintenance. We have already discussed various geosynthetics - plastic pipe for drainage applications in directing collected surface flows, perforated plastic pipe for subsurface drainage, erosion control fabrics for lining ditches or channels, and fabric silt fence for sediment control. We will expand on those applications as we discuss further drainage applications, erosion and sediment control, separation fabrics, and some other geosynthetics as used in special applications.

7.4.4.1 Drainage / Infiltration Fabrics. Fabrics can be specifically used in conjunction with subdrains.

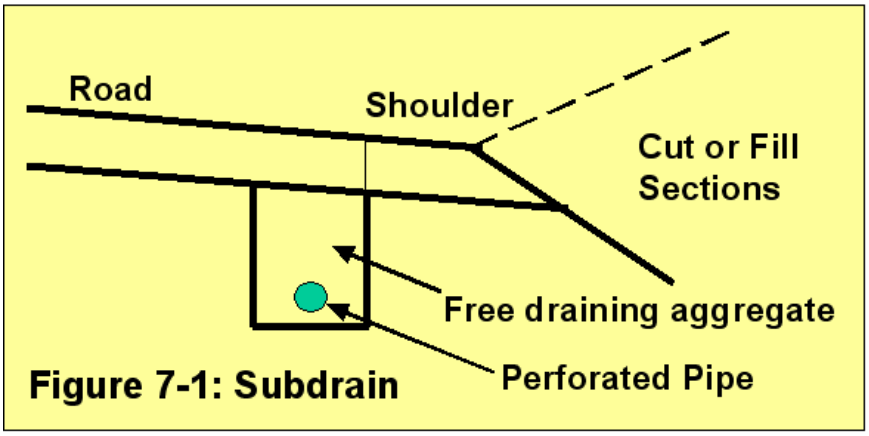

Figure 7-1: Subdrain

Recalling the cross-section sketch of a subdrain as again shown in Figure 7-1, the typical construction was a trench with well-graded aggregate and a perforated pipe. Clogging of the system over time has been the major problem with these subdrains, as shown in Photo 7-19. Looking at the photo, one can imagine how much sediment passed through this pipe prior to reaching this totally clogged condition? And where did all that material go? The subdrain probably outletted to a stream, and we ended up with stream pollution.

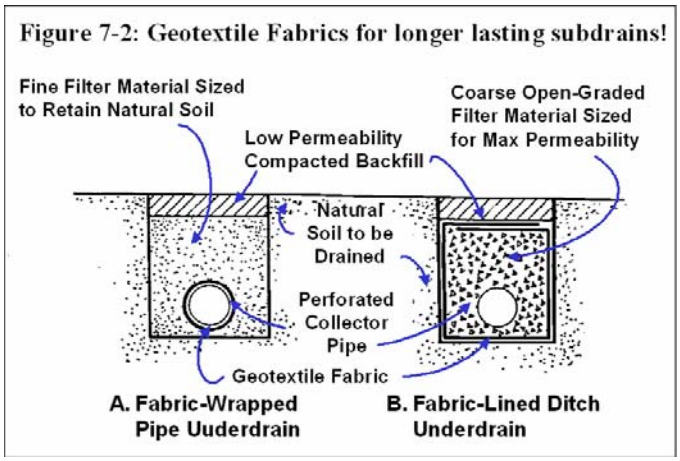

Figure 7-2: Geotextile Fabrics for longer lasting subdrains!

7-19 Clogged subdrain!

Geotextiles can play a valuable part in preventing this sediment and the eventual clogging of the system. You can use a roll of geotextile drainage/infiltration fabric to line the trench. We could also wrap the perforated pipe or purchased pipe already wrapped in a geotextile sock, as shown in Figure 7-2. Lining the trench, however, is just as easy and more effective.

The fabric is designed to let the water through and into the trench and pipe and then to the outlet, but it will not let the fine soils through to clog the system.

Caution: There have been some problems in heavy clay soils – the clay, when wet, becomes very plastic and sticky and has caused some problems when fabric is placed in direct contact with the clay soil.

Lining the trench with fabric is a simple procedure, as shown in Figure 7-3 and the accompanying photos. Dig the trench, roll out the fabric, place bedding, place the perforated pipe, backfill with a one-size aggregate, overlap the fabric on top, and backfill the trench. The result is a better subdrain system that will last a long time.

Figure 7-3: Subdrain construction with geotextiles

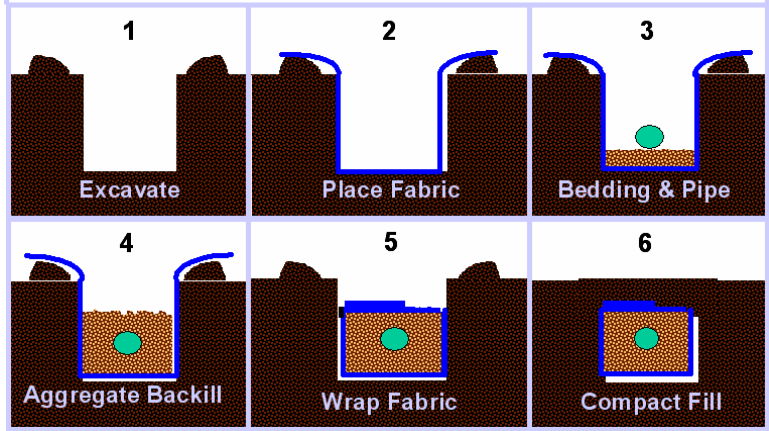

7-20 Subdrain construction - dig trench, roll out fabric, add pipe and aggregate, overlap fabric, backfill.

7.4.4.2 Prefabricated Subdrains. Prefabricated subdrain systems consist of a hard plastic perforated core covered in a geotextile fabric. The perforated plastic core becomes the pipe. It is installed vertically, giving you a greater area for draining the road structure. It commonly comes in 12-, 18-, and 24-inch heights. All sorts of connectors are made to accommodate connections and installation. In addition, there are rigid and flexible systems, the flexible system being manufactured in rolls.

7-21 Pre-fab Underdrains: Rigid Type

7-22 Pre-fab Underdrains: Flexible Type

7-23 All subdrains need an outlet.

7.4.4.3 Subdrain Outlets. Like any subdrain system, whether lined with a fabric or a pre-fabricated, all subdrains must have an outlet. The pre-fab systems, as mentioned, have various connectors to allow the outlet to run in whatever direction is needed.

7.4.4.4 Erosion and Sediment Control. Geotextiles and other geosynthetics are used for channel linings and erosion protection on embankments. Geosynthetics for these applications are usually manufactured in rolls and are easily installed with in-house crews, following manufacturer's recommendations.

We already mentioned the use of geosynthetics in this area in Chapter 5 for ditch and channel linings, where we discussed water flow velocities and the possible need for stabilizing the ditch or channel for faster flows. Many various products are produced for this type of application.

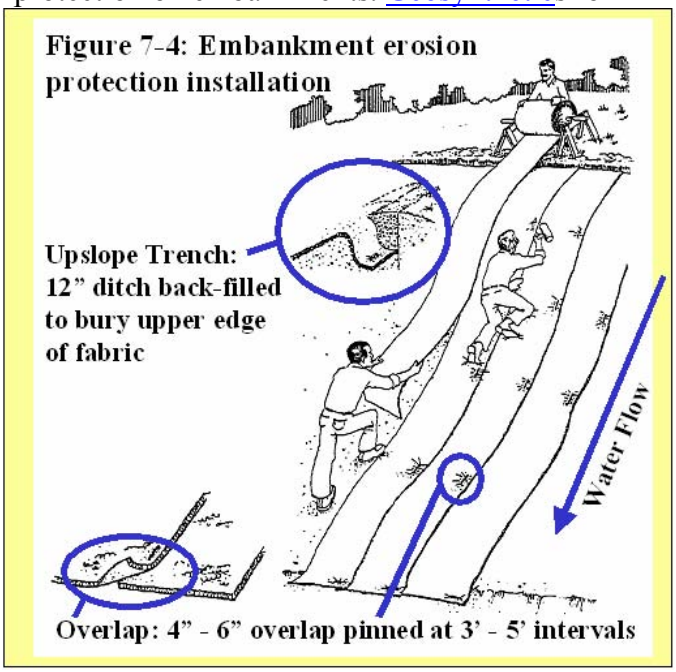

7-24 Installation of an erosion control fabric.

Remember, any type of geosynthetic is non-biodegradable. If we use these materials for temporary erosion prevention until vegetation is re-established, we must make sure that they are compatible with that vegetation since they will remain in place.

7-25 Geotextile silt fence barrier.

This factor applies to embankment protection, too. Again, there are many products on the market for embankment slope protection against erosion.

Normal installation is depicted in Figure 7-4 and consists of rolling out the material, overlapping at seams, pinning, and anchoring the top of the material in a small trench. Again, follow the manufacturer's recommendations for each specific product. Photo 7-24 shows an extensive erosion control fabric installation, which will be covered with a large-size aggregate.

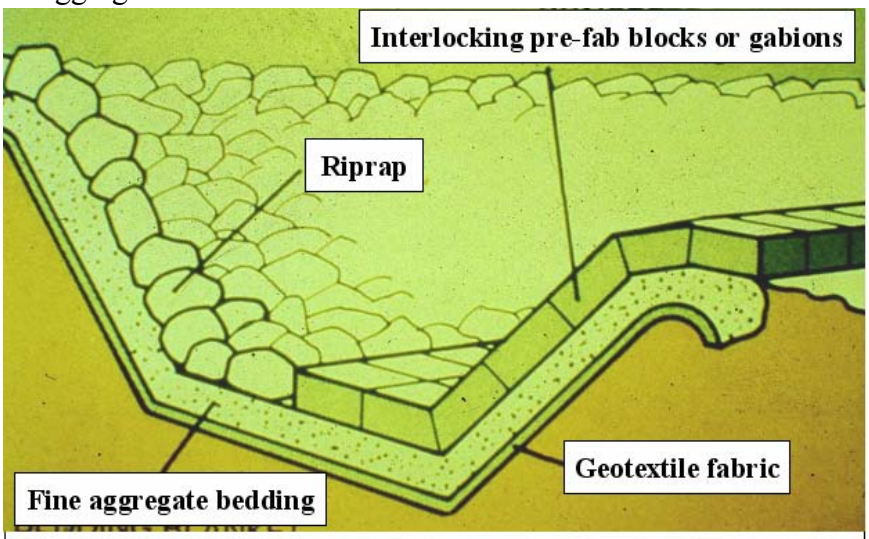

Figure 7-5: Geosynthetic linings serve as reinforcement and separation as well as erosion control

Silt fence is another geosynthetic used for temporary erosion control. Silt fence is discussed in Section 5.2.3.2 of Chapter 5, describing the proper installation practices and required maintenance.

Geotextile fabrics are also used underneath other types of channel linings such as riprap (as in the above Photo 7-24),

gabions, or interlocking pre-fabricated blocks, as shown in Figure 7-5. In this installation, however, they are also serving as reinforcement and separation fabrics that will be discussed below.

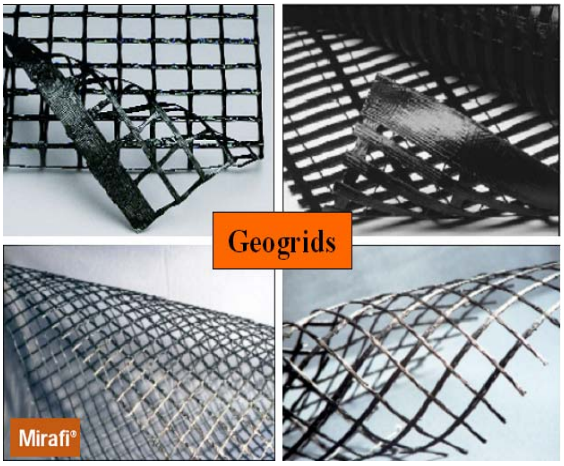

7-26 Geogrids come in various patterns designed for specific applications.

7.4.4.5 Embankment Soil Reinforcement. Both geotextiles and geogrids are used for embankment soil reinforcement. Geogrids come in many patterns and have proven their ability to perform in this type of application. Reinforcement applications usually entail embankments in which fabric or geogrids are place horizontally at designed intervals during construction, as shown in Figure 7.6. Alternate layers of fill and rolled-out geogrid are placed as the embankment is constructed.

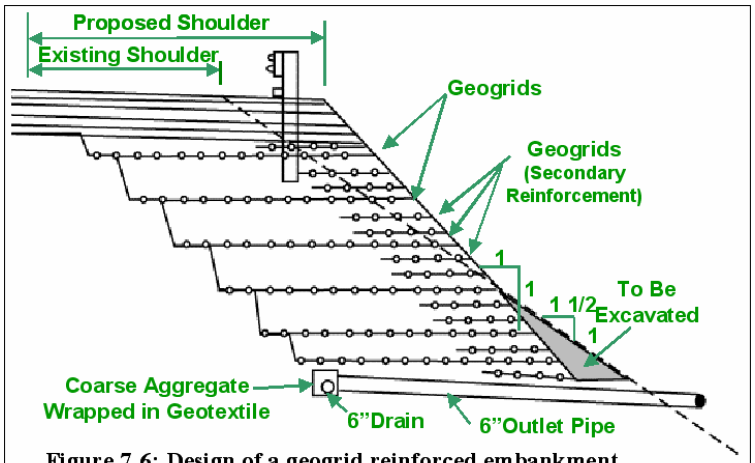

Figure 7-6: Design of a geogrid reinforced embankment

The material can be extended over the face of the embankment for additional protection, a method commonly intrinsic to any design. Photo 7-27 shows an actual road construction site using geogrid for reinforcement - an extensive project, but the applicability is there for any size project.

7.4.4.6 Separation Fabrics. Separation fabrics are among the most commonly used and cost-effective type of geotextile fabrics on dirt and gravel roads. These fabrics separate the subsoil from the road, provide reinforcement, improve drainage, and reduce dust.

7-27 Construction of a geogrid reinforced embankment.

When roads are built, the subsoil or subgrade is prepared with a crown, then a specified thickness of aggregate is laid down and compacted, (Figure 7-7a).

Over time, however, depending on conditions (water and traffic), the aggregate gets pushed down into the soils, and the soils pump up through the aggregate. We end up

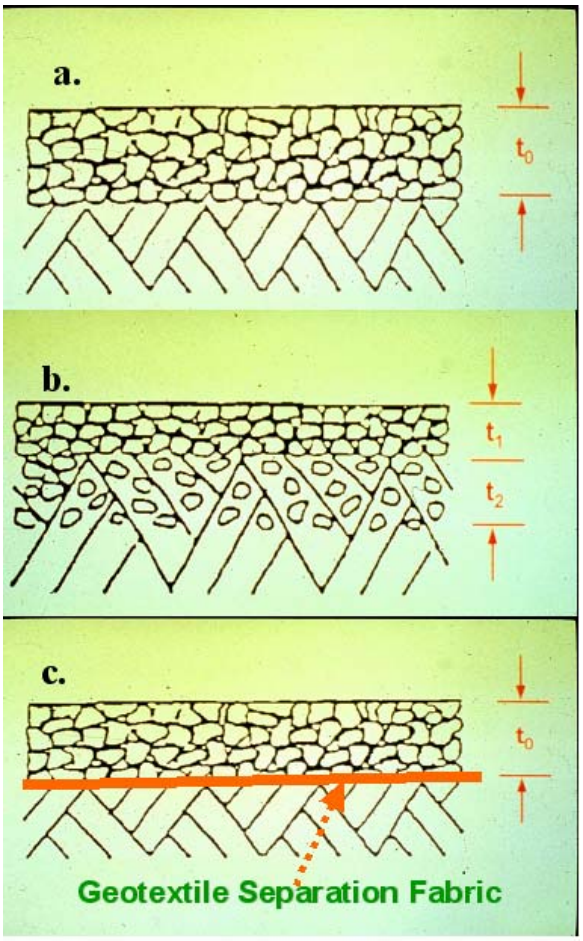

Figure 7-7: Separation Fabrics

with a transition zone not as strong as the aggregate, and the road can no longer support the traffic loads with deterioration as the result (Figure 7-7b).

With the separation fabrics, we prepare the subgrade, roll out the fabric, and build the road on top of the fabric. The aggregate cannot be pushed into the soil and the soil cannot pump up into the aggregate. Everything stays in place, and the road remains as strong as designed for the traffic loads (Figure 7-7c).

7-28 Separation fabrics keep the soil and road aggregate in place.

Water can travel either way, but if it gets into the road, it can drain downward or out laterally due to the crown into side ditches or subdrains. The prevention of soil fines from pumping up through the aggregate to the road surface eliminates the mud in wet weather and the dust in dry weather associated with these fines.

Rolls of fabric waiting for installation

Rolling out the fabric

Backdumping the aggregate

Spreading the aggregate

Compacting the aggregate

Final grading

7-29 Installation of a Separation Fabric.

Fabrics come in woven or nonwoven types for this application. The existing road conditions, particularly the aggregate, rock outcrops, water and saturated subsoils, must be evaluated when selecting fabric type. Transverse joints should be overlapped a minimum of 18 inches in the direction of traffic. Fabrics come in standard 12-, 15-, and 18-foot widths (or customized to any width), eliminating the need for longitudinal joints. Aggregate should be backdumped from the truck to a minimum depth of 6 inches, preferably 8 inches. Compacting the aggregate along with grading and re-establishing the crown completes the project. The photos depict fabric installation on a typical dirt and gravel road. This was a demonstration project where both woven and non-woven separation fabrics were used along with different road aggregates. In some areas, filling of the road with shale material to raise the road elevation took place. The different road materials can be seen in the photos.

If the fabric gets damaged during placement, simply patch with another piece of fabric making sure that an 18" overlap on all sides is maintained. Tears can happen, as shown in Photo 7-30, where the blade of the dozer caught the fabric by accident.

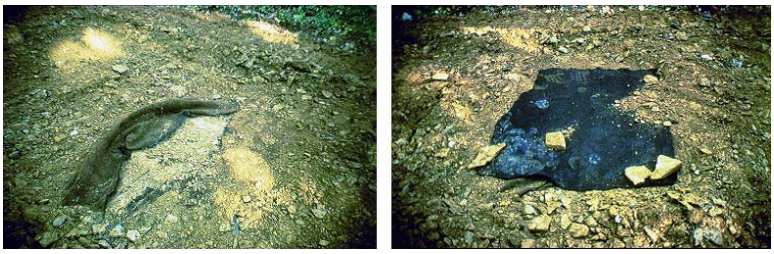

7-30 If damaged, use a fabric patch with 18" overlap.

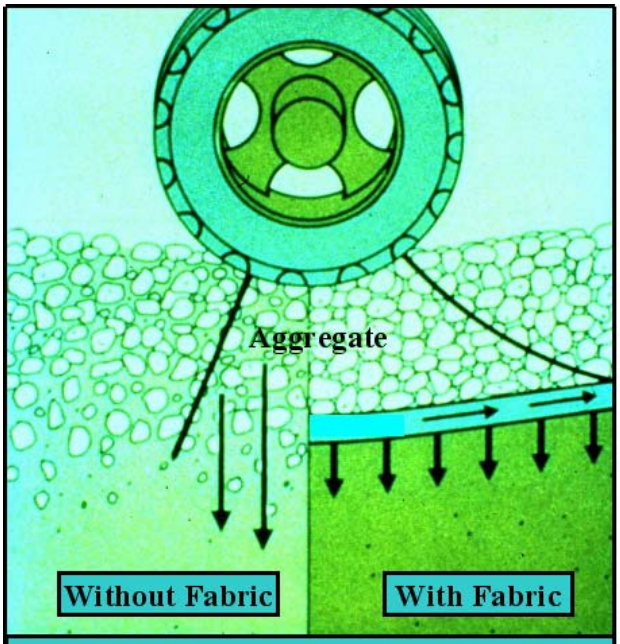

Figure 7-8
Fabrics Separate & Distribute the Load

Fabrics also help to distribute traffic loads over a greater area, making them advantageous to use over soft, saturated soil conditions. Figure7-8 shows this load distribution effect of the fabric. Traffic load distribution was discussed in Chapter 5, Section 5.3.5, Practices Related to Culverts in regards to culvert installations.

Many separation fabric applications are in place throughout the states and proving effective in substantial reduction of road deterioration and the required maintenance. The use of fabrics for stabilizing water crossing areas in conjunction with broad based dips and driveways was mentioned in Chapter 5. In these applications, they perform a reinforcement function and a separation

function to strengthen and keep these areas intact.

The use of separation fabrics, in general, provides us with a number of advantages. Stabilization

1. Subgrade pumping prevention
2. Drainage improvement
3. Excavation reduction
4. Rutting and pothole reduction
5. Dust reduction
6. Reduced maintenance and costs
7. Longer road life.

The excavation reduction refers to those areas where we find unsuitable saturated soils for subgrade material. The common practice is to remove the unsuitable material. This can lead to excavating several feet depending on conditions. With a separation fabric, we can prepare the subgrade surface and roll out the fabric over these soft soil areas and let the fabric handle the problem. Would you rather have a road looking like "a" or "b" in Photo 7-31? With separation fabrics, we can eliminate the sign as seen in the photo inset.

7-31 Before & after fabric installation – let's eliminate the sign!

7.4.4.7 French Mattress. The French mattress refers to the old "French drains" used in many locations to drain storm water. The French mattress is a mattress-shaped structure of coarse aggregate wrapped in a geotextile fabric. This structure is placed under the road and allows water to pass freely through the roadbed without moving soil particles.

The primary purpose of the mattress is to equalize the subsurface water on both sides the road while providing the needed load support for the road and traffic. Support strength is provided by the large aggregate in the lower portions of the mattress spreading the load.

7.4.4.8 Geocells and Geowebs. Geocells or geowebs, as they are also called, are an innovative geosynthetic product used in ground stabilization, road subgrade stabilization, slope erosion control, embankment reinforcement and retaining walls, stream crossings, and channel erosion control. The geocell is a lightweight, flexible mat with a honeycombed structure that is spread and pinned and then filled. A variety of fill materials can be placed within the cellular system, such as soil, sand, aggregate, concrete, etc. The geocell confines the native or select fill materials, adding to the structural strength of the system. Geocells with the appropriate fill material creates various opportunities for economical solutions in the applications listed above.

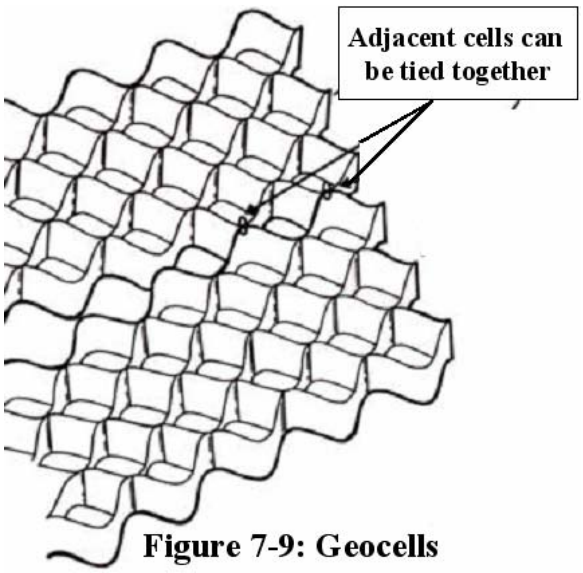

Figure 7-9: Geocells

7-32 Geocells can be filled with a native or select fill material. (Photo: WebTec, Inc. - TerraCell®)

The cells come in various heights with different cell sizes. They can be solid wall or perforated to allow flow between cells. Most manufacturers will also customize sizes for specific requirements. Anchoring systems vary according to the manufacturer.

We will look at a few different applications that could benefit the maintenance of dirt and gravel roads and roadsides.

7-33 Geocells for road base stabilization. (Photos: WebTec, Inc. - TerraCell®)

7.4.4.8.1 Road Stabilization. Geocells have been used to stabilize road base aggregates and give additional structural support to the road. The geocell is spread, pinned, and filled with aggregate, as can be seen in the photo. Common practice uses a geotextile fabric placed on the subgrade prior to spreading and pinning the geocell. The geotextile separation fabric

prevents fines from pumping up through the geocell and aggregate and to prevent the aggregate from sinking into the subsoil underneath and to keep a uniform geocell surface across the road. A final surface aggregate would then be spread over the base aggregate and geocell system.

7.4.4.8.2 Retaining Walls. Geocells can be stacked to form almost vertical walls for embankments. As with geogrids, the structural strength of the geocell wall allows for steeper slopes than most soils would sustain without the geocell confinement system. Typical wall installations are shown in Photo 7-34. Each layer of geocell is stepped back from the underlying one.

7-34 Geoweb retaining wall installations (Photos: WebTec, Inc. - TerraCell®)

7-35 Geoweb embankment retaining wall during construction and after vegetation established (Photos: WebTec, Inc. - TerraCell®)

The cells can be filled with soil and vegetation established to actually conceal the wall cellular structure. A vegetated geocell wall is shown in Photo 7-35

7.4.4.8.3 Low Water Road Crossing. A low water crossing can be used in lieu of a cross culvert being installed. This practice should be used on a very low volume road and will depend on the conditions of the surrounding terrain and the expected flows.

7-36 Installation of a low water crossing.

The series of Photos 7-36 depicts the installation of a typical low water crossing using a geocell. This site was on a road having less than 10 vehicles a day (<10 ADT). The road was in the watershed of a potable water reservoir. The storm water accumulated and crossed the road at this point during most storms, causing a great amount of erosion and road deterioration. The project was designed to raise the elevation of the road but still allow the water to cross naturally at this point through a stabilized low water crossing. A cross pipe installation would create major problems due to elevations of the surrounding terrain. On the downhill side the pipe would have to be extended several hundred feet to outlet at ground level. A low water crossing allowed the water to cross the road in lieu of a cross pipe and sheet flow through the wooded vegetated area without the resulting erosion and road washouts.

A shallow trench excavation is made to install the crossing. As in the road base reinforcement, a geotextile separation fabric is placed prior to the geocell. The geocell is then spread and pinned. Large aggregate is dumped into the cell to an elevation slightly higher then the cell in order that the vehicle wheels do not strike the cell.

7.4.4.8.4 Road Stream Ford Crossing. A geosynthetic reinforced ford crossing enhances the environmentally sensitivity of an existing crossing in lieu of a costly bridge construction project. The reinforced crossing provides a stabilized hard aggregate surface

for vehicles that will not wash out and will not create the continual sediment and disturbance of the stream that the existing unstabilized crossing causes with each vehicle crossing.

7-37 Stream fords cause erosion and sediment, degrading stream habitats. A perforated geoweb offers a stabilizing solution with proper hydraulic and stream ecology protection.

The existing ford crossing shown in Photo 7-37, depicts the erosion potential with each vehicle crossing, with the resultant sediment degradation of the stream ecology (the stream community or ecosystems was discussed in Chapter 4, Section 4.3, and particularly the effect of erosion and sediment on streams in Section 4.3.4). Using a perforated geoweb with one-inch holes allows hydraulic equalization and migration of stream life. The surface of the crossing should match the streambed surface in order not to cause any disturbance in flow by creating a dam effect across the stream.

7.4.4.9 Prefabricated Geosynthetic Pipe Endwalls. Prefabricated geosynthetic endwalls consist of polyethylene sections that can be easily installed by road maintenance crews. The endwalls come in three preformed sections with a pipe adapter for 12”, 18”, and 24” diameter pipe. One person can position and assemble the sections using a power drill or screwdriver and galvanized screws. The sections are filled with

• Low Density Polyethylene
Easy to install

• Consists of 3 preformed sections
+ a pipe adapter

7-38 Pre-Fab Geosynthetic Endwall Systems.

soil, sand, aggregate, or cement and a cap is placed on top. Additional sections can add height as required. A poured concrete footer is recommended. The geosynthetic end wall comes in three natural stone colors, and, from the motorists' point of view, look like laid stone endwalls.

The photos (HartmanEW™ System) show an installation sequence for the endwall.

7-39 Pre-Fab Geosynthetic Endwall Installation.

7.5 Summary

This chapter has discussed the importance of implementing a dust control program. Since dust is actually the fines in your road that lock everything together should be reason enough to have a dust control program. A dust control program prolongs road life, protects the environment, and provides many additional benefits to your community.

We also discussed the importance of evaluation of dust control products as to their effect on the environment and their effectiveness as a dust control, followed by a review of common dust suppressants with their advantages and limitations. We concluded with general application procedures for dust control products.

In the second section, we delved into road stabilization (or full depth reclamation) and the benefits derived from this technique. Road stabilization can add strength to the

road, prolonging its life and reducing maintenance. At the same time, keeping the road intact reduces erosion and dust, thereby helping the environment.

The third section introduced the world of geosynthetics, describing the functions and applications applicable to dirt and gravel roads. This world is constantly expanding with new products and applications. But products like the separation fabrics have had wide use and success in road maintenance.

Appendix 7B continues, as in Appendices 5 and 6, to review actual Pennsylvania worksites in which a combination of practices has been used, including geosynthetics, to solve the erosion and sediment pollution problems stemming from dirt and gravel roads. The first site used pre-fabricated subdrains to collect subsurface water stemming from spring seeps. The second site was a nature reserve where separation fabrics were used for driveway re-construction and geogrids provided the structural strength for a bus parking lane and a French mattress system provided the required subsurface drainage flows. The third site was a demonstration project where geotextile fabric was used to reinforce and stabilize a stream crossing having an inadequate crosspipe.

All of these topics and the products and practices discussed are good “tools” for your toolbox and need to be considered as integral parts of an overall environmentally sensitive dirt and gravel road maintenance program.

Appendix 7

Appendix 7A. Pennsylvania's Testing and Approval Program for Dust Suppressants and Road Stabilizers.

The Pennsylvania State Conservation Commission has addressed the issue of dust suppressants and road stabilizers by making it clear to manufacturers and vendors that they are responsible for determining the acceptability of their materials in conjunction with accepted toxicity testing protocols. Before a product can be approved for use in the PA Dirt and Gravel Road Program, it must undergo toxicity testing according to federal EPA protocol at a laboratory certified by the EPA. The test results are then interpreted with the requirements of the PA Clean Streams Law, specifically Title 25, Chapters 16 and 93. That interpretation is the basis of whether or not the product is acceptable to the Pennsylvania State Conservation Commission.

Tests are required on all commercial products. The tests are to determine toxicity based on identification, quantity, and behavior of elements and compounds found. The tests will include the 7-day rainbow trout (Oncorhynchus mykiss) survival and growth test. Tests with fat head minnows (Pimephales promelas) are not acceptable. The 7-day cladoceran (Ceriodaphnia dubia) survival and reproduction test is also required. Guidelines for the tests must use the federal EPA protocols. Each test must produce two "No Observed Effect Concentrations" (NOEC), one for survival and growth of rainbow trout and one for survival and reproduction of cladocerans.

In addition, Biochemical Oxygen Demand (BOD) and Chemical Oxygen Demand (COD) values must be obtained for the product. These values are not intended for use in determination of the environmentally acceptability of the product but are reference values for use in any potential emergency. (Source: Administrative Manual, Dirt and Gravel Road Maintenance Program, PA State Conservation Commission, March 3, 2005.)

Under the above criteria, the Pennsylvania State Conservation Commission has approved nine different products from six different companies for use at approved application rates in the PA Dirt and Gravel Road Program – four products classified as petroleum emulsion dust suppressants, two products classified as synthetic fluid dust suppressants, and three products classified as acrylic polymer dust suppressants. The products, companies, and approved application rate are as follows:

Petroleum Emulsion Dust Suppressants

PennSuppress "D", American Refining Group, Inc., Bradford, PA
1:4 emulsion to water or more dilute

Ultrabond 2000, JMG Enterprises, Inc., Seward, PA
1:4 emulsion to water or more dilute

Coherex, D&D Emulsions, Inc., Mansfield, OH
1:10 emulsion to water or more dilute

Dust Bond, D&D Emulsions, Inc., Mansfield, OH
1:10 emulsion to water or more dilute

Synthetic Fluid Dust Suppressants

EK35, Midwest Industrial Supply, Inc., Canton, OH
100% active, no water for application
EnviroKleen, Midwest Industrial Supply, Inc., Canton, OH
100% active, no water for application

Acrylic Polymer Dust Suppressants
Pave-Cyrl Suppress, Rohm & Haas Company, North Andover, MA
As-received (51% solids)
Pave-Cryl Suppress Plus, Rohm & Haas Company, North Andover, MA
As-received (51% solids)
DirtGlue, DirtGlue Enterprises, Wakefield, MA
As-received (>50% solids)

APPENDIX 7B. Worksites in Focus

The following worksites are actual projects funded through the Pennsylvania Dirt and Gravel Road Program. The first site was an entrenched township road with saturated ditches, surface erosion, and spring seeps. The project raised the road profile and added pre-fabricated subdrains to collect subsurface water from under the road and both ditches.

The second site was a Nature Reserve experiencing increased traffic loads from the increase in visitors. This project added a new driveway and parking areas, including bus parking reinforced with a geogrid and French mattress construction for two small drainage ways. The third site was an early demonstration site for the Dirt and Gravel Roads Program. The spotlight is on one aspect of this site, entailing the resetting of an existing 3-foot diameter cement concrete drainage pipe.

Worksite in Focus

Adams County
Miltenberger Road

7/16/05

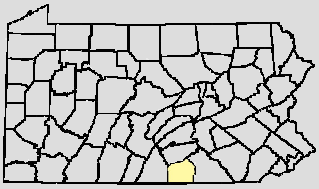

Problem Identification

Miltenberger Road was an entrenched road with few outlets for drainage and spring flow to leave the road area. Water was concentrated in parallel ditches and directed 1,200' downhill and under State Route 233 into Conocheague Creek. Water entering the road area had nowhere to go but down the ditches, gaining velocity and erosive force. Adding additional drainage outlets was impossible with the road at an elevation much lower than that of the surrounding landscape. The entrenched road profile also left little room to plow snow *(Photo1).*

Project Facts

Project: Miltenberger Road
Project Owner: Franklin Township
Watershed: Conococheague Creek, Potomac River
Project Length: 800 ft
Date Completed: June 2005

Cost Summary

Total Project Value:	**$15,689**
District Funding:	**$15,689**
Materials	$670
Equipment	$4,292
Shale	$10,727

Project Objectives

1. Restore natural drainage by raising the road to achieve sheet flow.
2. Reduce stream impact by providing additional outlets for water currently trapped in road ditches.
3. Address maintenance problems such as saturated ditches and lack of space for snow storage.

Project Considerations

Although over 3,000 feet of Miltenberger Road was entrenched, cost limitations only allowed for enough shale to raise about 800 feet of the roadbed. Spring water entered the road profile as subsurface flow. This excess water saturated the road and ditches, softening the road base *(Photo 1).* The land surrounding the road is owned by the Bureau of Forestry.

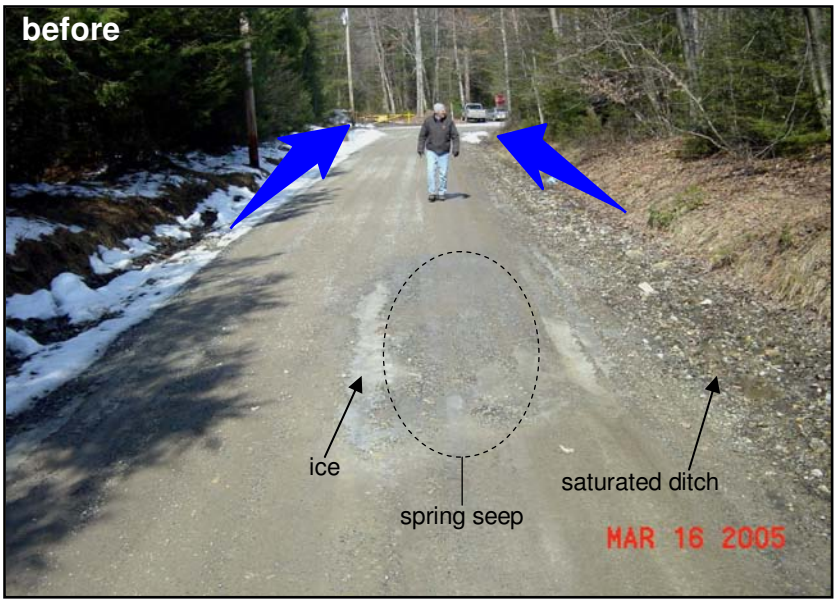

Photo 1. Notice the ice in the middle of the road from a spring seep. The entrenched road profile made it impossible to get water or snow off of the road.

Photo 2. Pre-fabricated underdrain was used to collect subsurface water from under the road and both ditches.

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Center for Dirt and Gravel Road Studies

Miltenberger road was raised an average of 3' using shale fill.

Photo 3. The entrenched road traps water in the road area and conveys it down to the stream. Note the elevation of the road relative to the utility pole on the right compared to *Photo 4*.

Photo 4. The road was elevated to eliminate the ditch on the left and achieve sheet flow. The added material also provided the necessary cover to install new crosspipes.

Project Solutions

Install underdrain: Pre-fabricated underdrain (4" perforate pipe wrapped in geotextile fabric) was placed under the road and ditches to collect subsurface water *(Photo 2)*. The underdrain will keep clean subsurface water from mixing with road drainage. It will also reduce maintenance by allowing the road and ditches to dry.

Raise the road elevation: Shale was purchased for use as road fill *(Photos 3 & 4)*. The shale was spread with a bulldozer and compacted using a vibratory roller in approximately 8" lifts. The road was filled an average of 3' over an 800' length and tapered into the existing road grade on both ends. Filling the road completely eliminates one ditch, and provides the cover necessary to install crosspipes to outlet water from the remaining ditch *(Photo 5)*.

Install crosspipes: Because Miltenberger road was so severely entrenched, no crosspipes existed on the road before this project. Crosspipes were needed to divert drainage into vegetated areas and keep runoff from entering the stream. The new road elevation provided the extra cover needed for two shallow crosspipe installations. These crosspipes were outletted at the existing ground elevation to avoid creating an "outlet trench" into the woods. Gradebreaks were constructed over each crosspipe to obtain adequate pipe cover and divert water from running down the roadway *(photo 5)*.

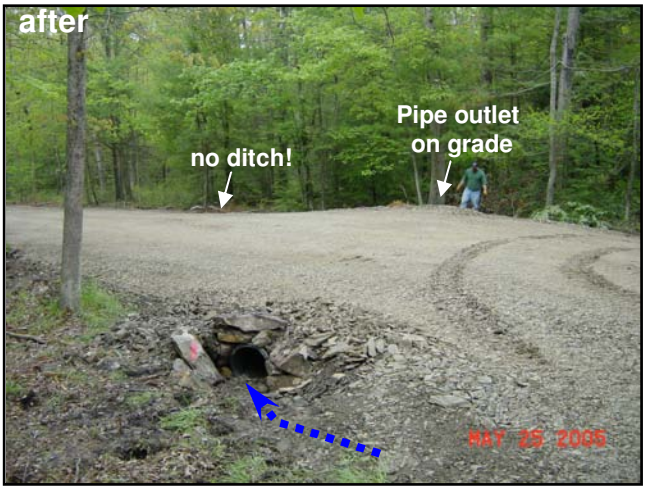

Photo 5. One of two new crosspipes installed. Notice the grade-break in the road over the pipe to get water off the road.

Site Map & Directions: From U.S. Route 30 at Caledonia State Park, follow State Route 233 north approximately 5.5 miles to Miltenberger Road. The worksite begins at the intersection with State Route 233 and continues for 800 feet.

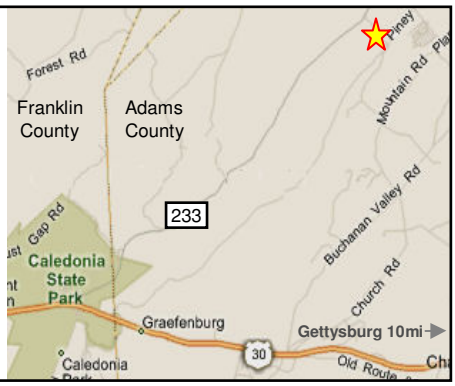

For More Information

The Center for Dirt and Gravel Road Studies
1-866-668-6683 (toll free): www.dirtandgravelroads.org

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Worksite in Focus

Westmoreland County

Powdermill Nature Reserve

11/2/04

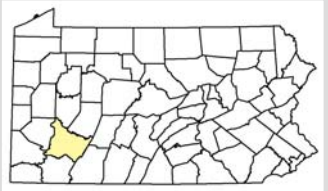

Project Background

In need of additional parking, Powdermill Nature Reserve sought an environmentally sensitive solution that handles increased visitors and related traffic loads without an ugly scarring of the surrounding landscape. To accomplish this, the Reserve added:

- A new driveway with Driving Surface Aggregate* (DSA-as modified) to improve circulation and provide second access to Rte. 381;
- 2 new parking areas: a bus parking lane underlain with Geogrid® (see photo below) and a pervious grassed automobile lot (60' x 100').

Project Considerations

Where the new driveway crossed two small drainage ways (see Site Plan below), French mattresses*, constructed of clean stone wrapped in non-woven geotextile fabric, were installed. This low-cost, low-maintenance technique connects the hydrology on either side of the road allowing water to percolate through the stone while the fabric prevents sediment movement.

Above: Construction of the bus parking lane. Geogrid® was used to add support and tensile strength.

* For more information on DSA and French Mattress construction please see the DSA Informational Bulletin and the French Mattress Technical Bulletin available at www.dirtandgravelroads.org.

Project Facts

Project:	Nimick Nature Center Driveway & Parking Lot
Project Owner:	Powdermill Nature Reserve
Affected Watershed:	Powdermill Run, Youghiogheny River
Project Length:	550 ft
Date Completed:	October 2003

Cost Summary

Project Cost:	$35,049
Geoblock® Parking Lot	$26,833
Contract	$1,980
Materials (geosynthetics)	$1,580
Stone	$4,056
Tree Removal	$600
In-Kind Contributions:	$8,300

This project was completed with monies raised by the Powdermill Nature Reserve.

For More Information

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Powdermill Nature Reserve
1847 Route 381
Rector, PA 15677

Theresa Gay Rohall
(724) 593-6105

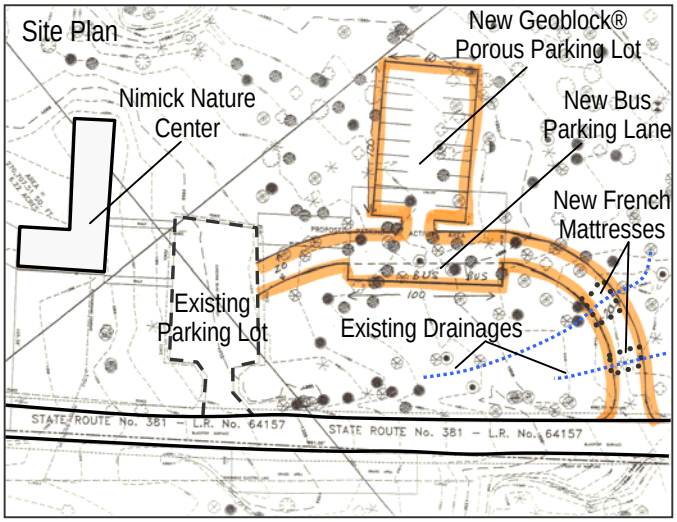

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Driveway Construction Sequence

1. Trees were cleared along the proposed right-of-way and non-woven geotextile fabric was rolled out. Additional lengths of fabric were laid perpendicular to the driveway at two locations to allow construction of the French mattresses (see photo 1).
2. #3 stone was tailgated on top of fabric along the entire length of the right-of-way.
3. The perpendicular fabric sections were wrapped over the #3 stone to create the French mattresses (see photos 2 & 3).
4. #2b stone was tailgated over the entire length of the driveway, including the French mattresses. A modified version of DSA was placed over the #2b stone and rolled to create the driving surface (see photo 4).

Project Results

Environmentally sensitive maintenance practices were employed to minimize cost, reduce future maintenance demands and expand visitor infrastructure while staying in tune with natural surroundings. This collaborative project brought together several diverse partner organizations to reinforce Powdermill's environmental ethic that teaches respect for nature by showcasing how human handiwork can "lay lightly on the land."

Project Partners

Powdermill Nature Reserve
Center for Dirt & Gravel Road Studies
Westmoreland Conservation District
Sustainable Forestry Initiative of PA
Kennametal Inc

Site Map & Directions

From the PA Turnpike (Interstate 76), exit at Donegal/Ligonier/PA 711 (#91). Turn left onto Route 31 after the toll booth. Follow Route 31 to Route 381 north. The Nimick Nature Center is 6 miles ahead on the left.

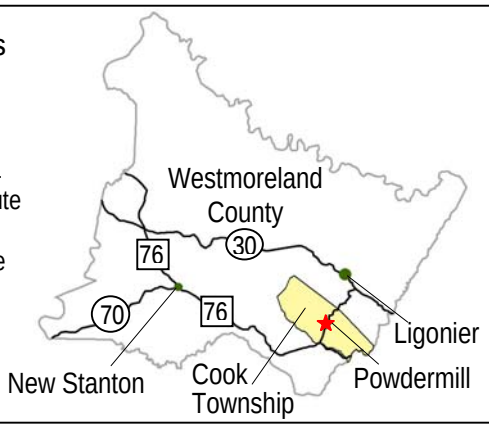

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A7B-3. Worksite #3: Hell Hollow Road, Monroe County, PA: This site was a demonstration project for the Pennsylvania Dirt and Gravel Roads Program on which various practices were demonstrated. One of the sub-sites involved a 36”-diameter cement concrete pipe installed for a stream crossing Hell Hollow Road. Viewing the original site, one can see the voluminous erosion that had taken place, uncovering the outlet side of the pipe, which had actually lifted, causing water to run uphill through the pipe to the outlet side. The inlet side of the pipe was at an elevation that caused water to drop approximately 15” into the pipe entrance, which was causing changes in the stream’s profile on the upstream side and thereby affecting the stream ecology. The pipe was also out of alignment with the stream flow, causing tremendous erosion on the downstream bank, which was in direct line of the pipe outlet flow.

A7-01Hell Hollow Road Demo Site: Existing site conditions prior to project.

A7-02 Excavation of existing pipe during dry conditions.

The pipe could not handle the flows, particularly during the spring rains, causing overflow and damage to the road and continual erosion of the entire site. This township road with daily traffic of less than 10 cars (<10ADT) was in the watershed of a potable water reservoir. Building an adequately sized bridge was not economically feasible. The solution was to reset the existing pipe and stabilize the entire area to protect against further erosion.

A7-03 Geotextile separation fabric laid in new trench.

A7-04 Bedding material added

A7-05 New line and grade checked

The pipe was excavated and sections set aside. A new line and grade was established to better meet the stream flow conditions. Notice from the photos that all work was done during a dry period with no flow. The new pipe trench was prepared, and a geotextile separation fabric was then laid in the trench and extended both upstream and downstream. Bedding material was added, and the pipe sections were reset. Since the old pipe joints were not sealed and no sealing was available, the pipe was wrapped in a geotextile fabric to prevent losing fines through the joints with possible undermining of the material surrounding the pipe. Duct tape held the fabric in place for backfilling.

A7-06 Fabric wrap covers pipe joints, prevents fine material from entering.

After backfilling, the extended fabric was brought up and over the pipe ends, cutting out for the pipe inlet and outlet, and overlapped on top with a road separation fabric. Thus the whole pipe and backfill area was encased in fabric. Water could move through the pipe and through the

A7-07 After backfilling, fabric brought up and over pipe ends to encase entire installation.

surrounding backfill, but the fabric prevented material removal, eliminating the erosion potential. The pipe end areas received large riprap to face off the embankment and further protect against erosion.

A7-08 Placing large size riprap at ends of pipe.

The road was leveled for a short distance on each side of the pipe crossing using the Stream Saver System discussed in Chapter 5, Section 5.3.6.1. The project was completed in the fall of the year.

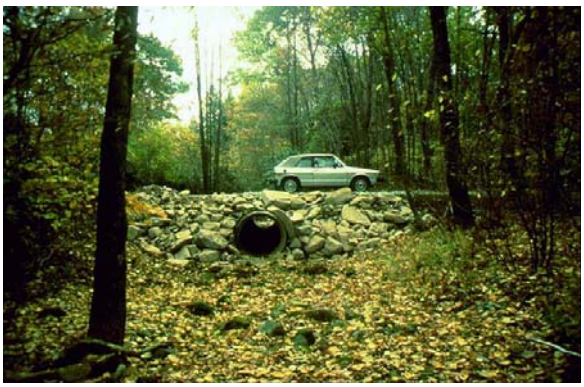

A7-09 Completed project with a leveled road stream saver system.

The following spring brought the rains, which once more proved too much for the pipe to handle. The road has sustained overflows on several occasions each spring with minimal road damage. The site remains essentially erosion free. Road overflows are spread out over the

A7-10 Inlet conditions before and after project.

level road, reducing the velocity and energy of the water. The pipe is better aligned with the stream flow protecting the downstream banks against erosion. The last photos, A7-10 and A7-11, show before and after conditions at each end of the pipe. The project demonstrates one innovative use of geotextile fabrics in solving the erosion and sedimentation pollution at this site.

A7-11 Outlet conditions before and after the project.

Glossary

Note: These terms are defined in relation to their use in this manual for environmentally sensitive maintenance for dirt and gravel roads

ADT: Average Daily Traffic.

Bank Gouging: A problematic practice during grading operations or ditch cleaning where the grader operator cuts into the toe of a stable bank and creates a vertical surface, destabilizing the bank and creating erosion and sediment.

Bed Load: Larger particles on the stream bottom that move by sliding, bouncing, or rolling along the bottom in response to stream flow.

Bench: A step or series of steps cut into and across a steep embankment to catch water and prevent it from running over the face of the bank, creating erosion and sediment pollution. The bench should be sloped to prevent over the bank flow and drain to an appropriate outlet.

Bioengineering: Techniques combining the biological elements of using live plants with engineering design concepts for slope protection and erosion reduction, used effectively in restoration of many stream and upland banks.

Broad Based Dip: Shallow gradual dips skewed across the road in the direction of water flow, used to outlet ditch flows to the other side of the road where outletting is prevented by a high embankment on one side of the road with a downhill grade.

Capillary flow: the percolation or vertical seepage of water through soil. (Fine soils tend to increase capillary flow, with the soil acting like the wick of a kerosene heater sucking water upward.)

Colonizer Trees: Those species that are shade intolerant and thereby first to grow in cleared areas, having the characteristics of being fast-growing, short-lived, and weak-structured, making them undesirable roadside trees, as compared to the intermediate or climax species.

Culvert (pipe, drainage pipe): Enclosed channels of various materials and shapes designed to convey stream or ditch water away from the roadway.

Daylighting: A traditional practice of removing all trees from the roadside to allow sunlight to penetrate through to the road surface in order to dry the road to prevent road deterioration from water and to prevent snow and ice buildup. This practice is also used to improve motorists' sight distance for greater safety. (Caution: This may not be the best practice for dirt and gravel roads in forested areas – refer to Manual Chapter 6.)

Ditch Turnout (ditch outlets, tail ditch, bleeders): A formed channel that diverts ditch water away from the road, usually angled in the direction of water flow and placed at locations to empty into a vegetative filtering area.

Diversion Swale (diversion channel, interceptor ditch): A water conveyance channel constructed across the bottom of a slope for the purpose of intercepting surface runoff to minimize erosion and prevent excess flows into lower lying areas. Most often diversion swales intercept water from an uphill slope and divert it away from the road and roadside ditch to a stabilized outlet area or infiltration back into the ground.

Dust: Fine road material ground down by traffic and blowing off in the wind, indicating that the road is deteriorating.

Dust Suppressant: Any of the variety of materials used as a successful treatment to significantly reduce dust conditions on unpaved roads and helps preserve road surfaces.

Ecology: The study of interactions of organisms between one another and the physical and chemical environment in which the organisms dwell.

Ecoregions: Areas with similar characteristics reflecting the physical factors (geology, soil, hydrology, climate) that help define respective habitats, and in turn determine the type of animals and plants that live in that habitat.

Ecosystems: A smaller unit within an ecoregion. Within each ecoregion, there are typically three types of ecosystems: streams, wetlands, and forests/uplands.

Embeddedness: the degree to which pebbles, cobbles, etc. (the larger pieces of the stream bottom) are surrounded by fine sediments. Normal embeddedness is about one third; higher degrees of embeddedness relate to problems such as lack of living space for invertebrates and lack of free-flowing water for fish eggs in gravel beds.

Endwall, End Structure: A structure placed at a pipe inlet or outlet to prevent erosion and scour around the pipe, protect the embankment, and help anchor the pipe. Endwall may be constructed from a variety of materials.

Energy Dissipater: Any device or installation of material used to reduce the energy of flowing water.

Environmentally Sensitive Maintenance: Effective practices that will not only be beneficial in protecting the natural environment, but also result in less road maintenance and associated costs.

Erosion: the eating away of a surface by water, wind, abrasion, etc.

Flared End Section (pipe end section): A manufactured flared drainage piece that fits on the end of a pipe to enhance hydraulics (water flow); can be metal, concrete, or plastic.

Flowline: The bottom of the ditch or pipe, the invert of the pipe.

Gabions: Manufactured woven wire baskets filled with stone and tied together to form a structure. Gabions are used for bank stabilization and armoring, retaining walls, culvert end structures, channel linings (gabion mattresses), etc.

Geosynthetic: Stemming from "geo" meaning "of the earth" and "synthetic" meaning "man-made"; geosynthetics are man-made materials used on or under the ground, non-biodegradable, for various purposes ranging from reinforcement and separation to drainage filtration and sediment control.

Geotextile: A geosynthetic fabric or textile manufactured from synthetic plastic polymers, non-biodegradable, in woven or non-woven types, and used for various purposes ranging from reinforcement and separation to drainage filtration and sediment control.

Grade Break: A long, gradual break in grade on a road with a relatively gradual downhill slope that improves drainage. Grade breaks limit water flow by decreasing concentration and velocity from a reduced area of road section, resulting in limited ditch and cross pipe size.

Gravel Bar: An accumulation of gravel and rock material normally occurring at a bridge structure, which interferes with the natural conditions of stream flow but can occur naturally anywhere along the stream.

Hydraulics: The mechanics of fluids, primarily water. (Engineers use hydrology to determine the amount of water that will accumulate at a particular point and then use hydraulics to determine the size of pipe channel or pipe needed to carry that amount of water.)

Hydrology: the science of water and its distribution in the air, on the surface, and underground.

Indicator Species: Certain species that are sensitive to changes within the stream system and can be analyzed in the context of the overall abundance of organisms in assessing the condition of the aquatic system.

Insloping: Sloping the entire surface of the road toward the steep uphill bank on one side of the road to eliminate drainage and erosion over the steep downhill embankment into any adjacent stream.

Intermediate or Climax Trees: Shade tolerant species having characteristics of being slow-growing, long-lived, and structurally strong, making them more desirable roadside trees for greater roadside stability and less maintenance.

Macroinvertebrates: Organisms within a stream ecosystem lacking a spinal column (invertebrate) but large enough to be seen by the naked eye (macro) – usually referring to species such as insect larvae (stoneflies, caddisflies, mayflies) that are used in evaluation of a stream's health.

Mitigation: The act of reducing or eliminating an adverse environmental impact, such as wetland mitigation where the destroyed wetland area is replaced with a new wetland of similar size and function.

Morphology: The form and structure or shape, as of a stream or rocks, in relation to the development of erosional forms or topographic features.

MSDS (Material Safety Data Sheet): A form required for all chemicals, dealing with safety in handling the material. The MSDS lists the manufacturer's name, address, and phone number; the major components of the chemical; its characteristics such as flammability and volatility, its reactivity, safety equipment needed to handle the chemical, and emergency procedures in case of spills or exposure.

Outside Inputs: Streamside vegetation such as leaves, branches, twigs, roots, and fruit that falls into or is washed into the water and becomes the basis for a food web in the stream.

Outsloping: Sloping the entire surface of the road toward the downhill side with a normal cross slope, applied when the road crosses a gentle sloping terrain. Outsloping is similar to superelevation or banking of a curve, but on a straight section of road and with no ditching. The outsloped road blends into the gentle slope of the terrain with no ditching or cross pipes, allowing the natural sheet flow conditions to prevail.

Photosynthesis: The process by which plants are able to produce their own food, using sunlight and carbon dioxide from the air with the green chlorophyll of the plant to produce sugars (food) and give off oxygen back into the air.

Pipe Apron: The area immediately adjacent to a pipe outlet, which may need to be stabilized to prevent erosion and scour.

Plant Succession: The gradual and orderly process of ecosystem development brought about by change in the plant community composition and the production of a climax characteristic of a particular geographic region. In other words, plant succession starts with bare earth and over time transitions towards mature forest.

Riparian Buffer: A strip of undisturbed vegetation between sensitive areas, such as rivers, streams, wetlands, ponds, etc., and areas of land disturbance and /or bare ground such as unpaved roads, work sites, etc.; protecting these sensitive areas from sediments and other pollutants carried by surface runoff. Wetlands often serve as riparian buffers along streams, protecting the streams from direct sediment input.

Riprap: Stones or rock placed in locations such as ditches, channels, embankments, and pipe outlets, sized to resist movement and to prevent water erosion and scour of the underlying soils.

Road Cross Slope: The slope of the road surface from the road center to the outer edges, the normal unpaved road cross slope being ½"to ¾" vertical drop for every horizontal foot of road width.

Road Crown: The center of the road being higher than the outer edges, creating a flat A-shape with a normal cross slope of ½" to ¾" per foot for unpaved gravel roads. Road crown serves the major purpose of drainage the road surface, getting the water off of the road.

Road Stabilization: The process of uniformly crushing, pulverizing, and blending of the road materials, adding a stabilizing agent, mixing the agent with the blended material, spreading and regrading the road with proper crown, and compacting.

Runoff: surface drainage due to precipitation or snow melt.

Scuppers: Bridge deck drainage systems, usually openings that allow deck surface runoff to drop directly into the stream below.

Secondary Ditch: A problematic ditch formed along the edge of the road due to a build-up of material and vegetation immediately adjacent to the road edge, preventing water from effectively running off the road surface and into the roadside ditch or swale.

Sediment: Fine particles of inorganic and /or organic matter carried by water.

Sediment Load: The amount of sediment a stream carries under the existing flow conditions.

Sedimentation: The process of deposition of sediment in areas where water velocity is not high enough to carry the sediment along.

Silt Fence (silt fence barrier, filter fabric fence): A temporary sediment control measure used to intercept sediment-laden runoff from disturbed earth areas, typically made of a porous geotextile fabric and supported by wood or metal posts.

Subdrain (subsurface drain, underdrain): A subsurface drainage facility whose prime purpose is to drain the subsurface water out of and away from the road structure to an outlet. Effective subdrains consist of a geotextile lined trench with a perforated pipe and well-draining aggregate backfill, or other prefabricated systems.

Subgrade: The surface or soils upon which the road is constructed, usually shaped with a normal crown and cross slope.

Superelevation: Sloping or "banking" the curve in the road with a uniform cross slope from one edge of the travelway to the other to offset centrifugal forces on vehicles for safer travel.

Through Drain: Cross culverts installed strategically to handle springs or spring seeps flowing perpendicular to the road, carrying the flow under (through) the road to the other side.

Topography: The configuration of a surface (land area) and the position of its physical and natural features and respective elevations.

Tracking (grooving, roughening): The practice of creating an irregular surface on a smooth bank by tracking up and down the bank with a track vehicle or any method of roughening or grooving the surface to catch rain water, reduce erosion, increase water infiltration, trap sediment, and enhance vegetative growth.

Turbidity: The degree to which suspended sediment interferes with light passage through water, the cloudiness exhibited by water carrying sediment.

Upland: Areas of higher elevation that are well drained, covered with forests or cleared for farming or that have reverted to meadows. One of the three typical ecosystems – uplands, streams, wetlands - within an ecoregion.

Vegetative Filter Strip: Any vegetated area receiving water flows in order to spread the flow, reduce flow velocity, and filter out sediment from the flow prior to the water reaching a stream.

Wetland: "Those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions," as defined by the Federal Clean Water Act.

Water Table: The top surface of the free water in the ground and below is completely saturated.

Watershed (drainage basin, drainage area, catchment area): The area of land that drains all collected precipitation to a common low point or outlet.

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Technical Information Sheets

Technical Information Sheet Environmentally Sensitive Maintenance Practices (ESMPs)

Practice: *ESMP #01 Insloping*

Category: Practices Relating to Road Profile

Refer to: Manual Chapter 5, Section 5.3.1.1

Description: Insloping is applied when the road has been constructed along a steep bank, with a steep uphill bank on one side and a steep downhill bank on the other side, ending at the edge of a stream. Insloping means the entire surface of the road slopes toward the uphill embankment side to eliminate drainage over the steep downhill embankment into the adjacent stream, as shown in Figure 1.

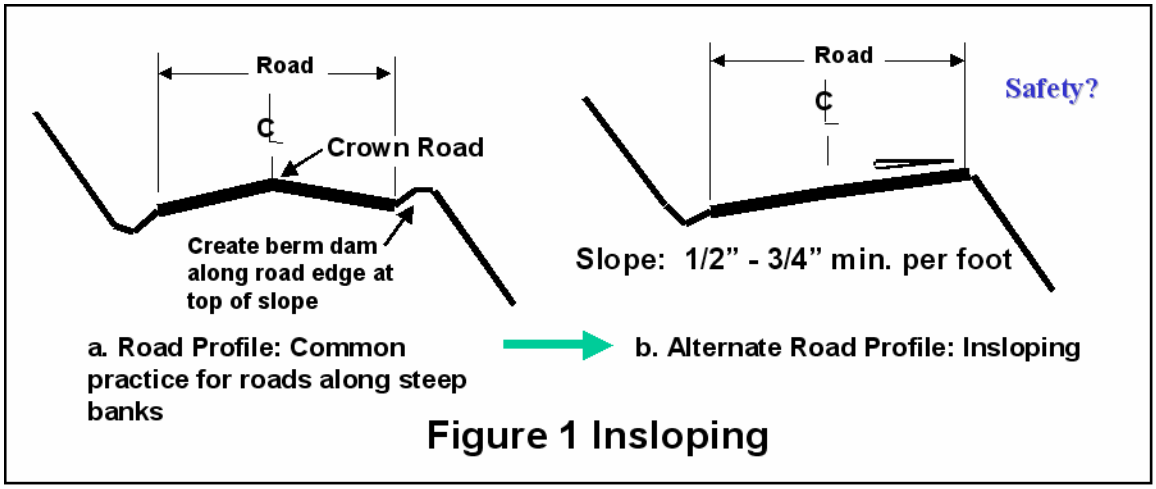

Figure 1 Insloping

Common Practice and Associated Problems: With a steep uphill bank on one side and a steep downhill bank on the other, common practice is to install a normal road crown. This practice concentrates drainage from half of the road toward the downhill side, causing erosion or severe washouts down over the bank, resulting in sediment into the stream. Sometimes a berm dam is installed along this edge of the road at the top of the slope. The berm dam creates a secondary ditch, building up water volume and flow that will result in a washout over the embankment and again into the stream. The photo shows a prime candidate for insloping.

Installation: The road is sloped entirely toward the uphill side using a normal cross slope (1/2" per foot). A roadside ditch collects the water and carries it to a strategically located cross culvert with proper outlet protection. Pipe flows should be directed to a vegetative filter strip. A berm barrier can be constructed along the road at the top of the downhill embankment, if desired, for vehicle safety. Multiple crosspipes will lessen the amount of water to be handled by each pipe, keeping ditch and pipe sizes to a minimum along with minimizing the erosion potential at the pipe outfall.

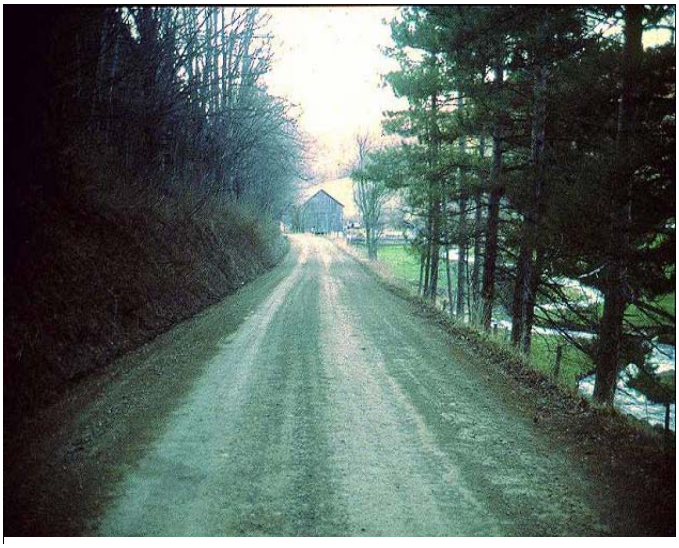

ESMP#01-01 Road candidate for insloping. Crosspipes can be strategically placed to outlet into the vegetative areas between the stream meanders.

Advantages:

- Eliminates flow over the downhill embankment
- Eliminates erosion on bank and sediment flow into stream
- Adds only one half of road surface runoff to ditch along uphill bank, eliminating need to increase size of ditch or cross pipes
- Allows all road drainage to strategically place cross pipes outletting to vegetative filter strips, filtering out sediment and attached pollutants
- Additional crosspipes minimize volume and velocity of water, minimizing ditch and pipe size, adding to roadside safety

Safety Considerations: Vehicle safety has to be considered. This practice should be used on a low volume road with a minimum cross slope. A higher berm along the downhill side creates an additional safety factor. Attempting to keep shallow ditches on the uphill side with flattened foreslopes and additional crosspipes will add to safety regarding vehicles sliding on winter ice.

Related Practices:

ESMP #02 Outsloping
ESMP #11 Stream Saver System

Technical Information Sheet Environmentally Sensitive Maintenance Practices (ESMPs)

Practice: *ESMP#02 Outsloping*

Category: Practices Relating to Road Profile

Refer to: Manual Chapter 5, Section 5.3.1.2

Description: Outsloping is applied when the road crosses a gentle sloping terrain. Outsloping means the entire surface of the road slopes toward the downhill side with a normal cross slope. Outsloping is similar to superelevation or banking of a curve, but on a straight section of road and with no ditching. The outsloped road blends into the gentle slope of the terrain with no ditching or cross pipes, allowing the natural sheet flow conditions to prevail, as shown in Figure 1. This technique should be used with *gentle sloping terrain and low overland flow conditions.*

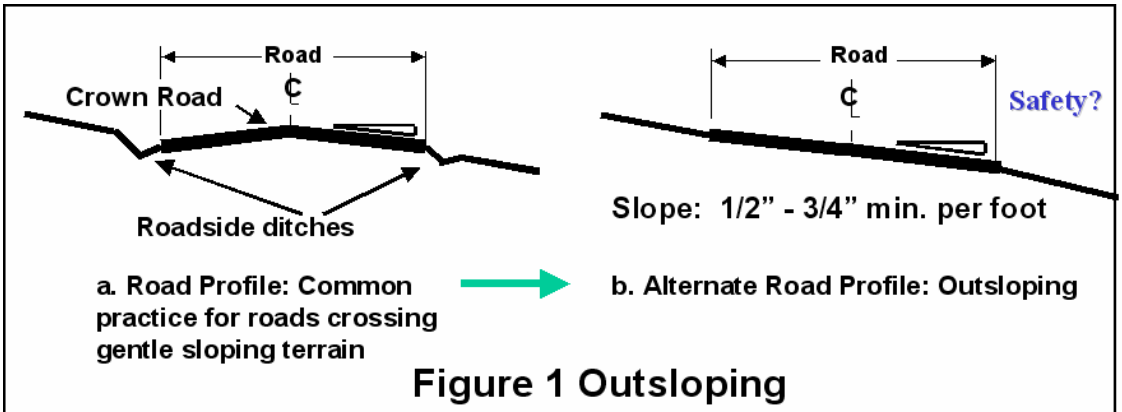

Figure 1 Outsloping

Common Practice and Associated Problems: Common practice dictates a road with a normal crown and side ditches. This configuration creates a dam and concentrates the overland sheet flow, causing potential erosion of ditches and ditch outlets. This profile also requires cross pipes to outlet the uphill side ditch with the potential clogging and flooding concerns. The volume of water to be handled can become substantial.

Installation: The road is sloped entirely toward the downhill side using a normal cross slope (1/2" per foot). The outsloped road profile blends into the sloping terrain and there are no ditches or cross pipes. The uphill natural sheet flow continues down across the road and through lower vegetative filtering areas (vegetative filter strip).
The photo depicts outsloping of a road. The wooded area on the uphill side results in low surface runoff . This runoff continues to sheet flow across the road and into the vegetative area on the other side. No ditches and no ditch maintenance required.

ESMP#2-01 Outsloped road showing no ditches and vegetative filtering areas for overland sheet flows.

Advantages:

- Eliminates concentrating the natural overland sheet flow. Eliminates erosion on bank and sediment flow into stream
- Eliminates ditches and cross pipes, eliminating erosion potential and maintenance
- Allows all road drainage to blend into the natural drainage system
- Has been successfully used for driveways crossing gentle sloping terrain, eliminating driveway ditch flows onto the main gravel road and ditches

Safety Considerations: Vehicle safety should be considered. Although the use of a normal cross slope helps in safety, the road surface condition, amount of flows and temperatures may cause icing of the road surface. Although this has not been the case on actual sites where outsloping has been constructed, conditions should be monitored closely during the winter months. In addition, a heavy storm may require road maintenance afterward if flows are substantial enough to cause road surface degradation. Again, this practice should be used on a low volume road crossing gentle sloping terrain with low overland flow conditions.

Related Practices:

ESMP #01 Insloping
ESMP #11 Stream saver system

Technical Information Sheet Environmentally Sensitive Maintenance Practices (ESMPs)

Practice: *ESMP #03 Ditch Turnouts and Vegetative Filter Strips*

Category: Practices Relating to Roadside Ditches

Refer to: Manual Chapter 5, Section 5.3.2.8

ESMP#3-01 Standing water can only lead to problems!

Description: All roadside ditches should be outletted to carry the water away from the road. Otherwise, the water will pond in the ditch, seeping back into the road structure, reducing its structural capacity and leading to road degradation. Terminology varies from region to region with various descriptive terms used for outletting ditches. Ditch outlets, ditch turnouts, tail ditches, and bleeders are all commonly used terms. Whatever you call it, the ditch turnout carries the ditch flow from the ditch, away from the road, and into a vegetative filter strip. The vegetative filter strip is an area of vegetation that filters out the sediment laden ditch water, increases water infiltration into the ground, and permits only clean runoff into a nearby stream. Ditch turnouts and vegetative filter strips should automatically go together.

Common Practice and Associated Problems: Do not outlet ditches directly to streams! Ditches carry surface runoff from the road and from the surrounding terrain along with any sediment and any contaminants attached to the sediment. Outletting directly to the stream is common since the stream is usually at the low point of the road. But this allows sediment and pollution to go directly into the stream, adversely affecting the stream ecology. Road personnel should turn ditches out prior to that low point into a vegetative filtering area to prevent stream pollution.

Installation: Turnouts can be installed during ditch cleaning operations. Turnouts should be skewed in the direction of water flow into a vegetative area. There are no exact spacing or size requirements for turnouts. Available charts do not take into consideration the many variables of specific sites, but may be used as guidelines. Road personnel need to consider the volume of water and ditch slope and the off right-of-way conditions and ownership. The volume of water can vary considerably depending on the terrain. The ditch may just drain the road surface or it may drain the road surface plus a major hillside area adjacent to the road. Road personnel should use their knowledge and experience when locating and constructing turnouts.

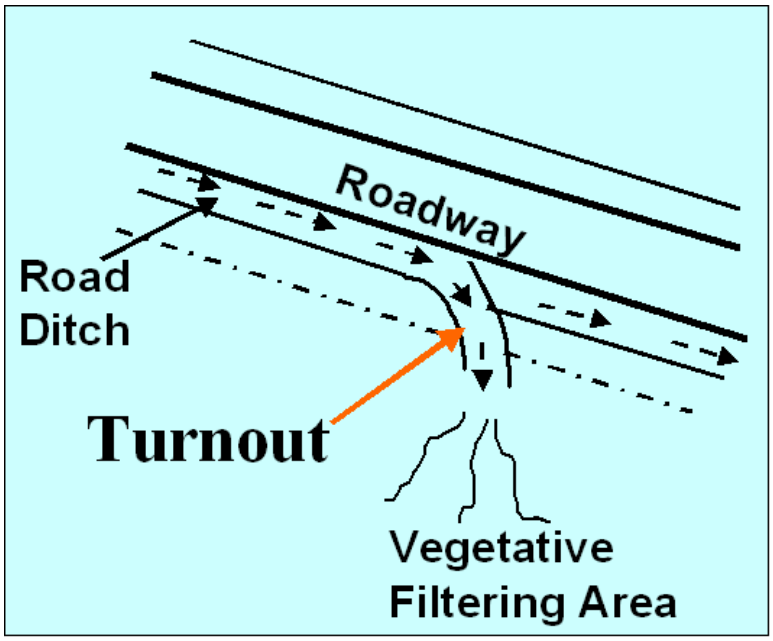

Figure 1: Ditch turnout into vegetative filter strip.

It is important to note that installing more turnouts limits the length of the ditch to each individual turnout. This in turn reduces the amount of water and flow within the ditch reducing water velocity and erosion potential and keeping the size of both the ditch and the turnout nominal. Limiting the amount of water that has to be handled should always be a consideration in any drainage situation. Refer to *ESMP#10 Through Drains*, for reducing water volume in ditches stemming from natural roadside springs.

Ditch turnouts should be strategically located to direct flows to vegetative areas. Vegetative filters strips will spread the water flow, slow velocity, decrease energy, and

ESMP#3-02 Multiple small turnouts mean nominal size ditches with less water, less velocity, less erosion potential, although large sized turnouts may be the only option on certain sites.

filter out the sediment. Other pollutants that may have attached to the sediment will also be contained and may be broken down physically or chemically by the soil or plants (refer to Manual, Chapter 4).

Advantages: The combination of ditch turnouts and vegetative filter strips:

- Carries the water away from the road and keeps streams clean
- Multiple turnouts decrease the volume and velocity of the water that the turnout handles, thereby decreasing the energy and erosion potential and keeping a nominal size on ditch and turnout
- Vegetative filter strips slow the water, dissipate energy, and filter out sediment and other attached pollutants

Safety Considerations: Ditch turnouts and vegetative filter strips carry the water away from the road providing effective road drainage to prevent flooding and road structural deterioration.

Related Practices:

ESMP #04 Broad Based Dips
ESMP #05 Grade Breaks
ESMP #10 Through Drains
Manual Chapter 5, Section 5.3.2, Practices Relating to Roadside Ditches

Technical Information Sheet Environmentally Sensitive Maintenance Practices (ESMPs)

Practice: *ESMP #04 Broad Based Dips*

Category: Practices Relating to Ditches and Road Profile

Refer to: Manual Chapter 5, Section 5.3.3.1

Description: Broad based dips are shallow, gradual dips skewed across the road in the direction of water flow, as depicted in Figure 1. This practice is used where there is a high embankment on one side of the road with a downhill grade. The high embankment does not allow for ditch turnouts and requires a cross pipe to carry the water to the other side and then to an outlet. Broad based dips allow the ditch water to flow to the other side joining that ditch flow to a joint outlet or turnout to a vegetative filter strip. The "dip" channel is skewed in the direction of water flow, and the crown of the road is eliminated within this area.

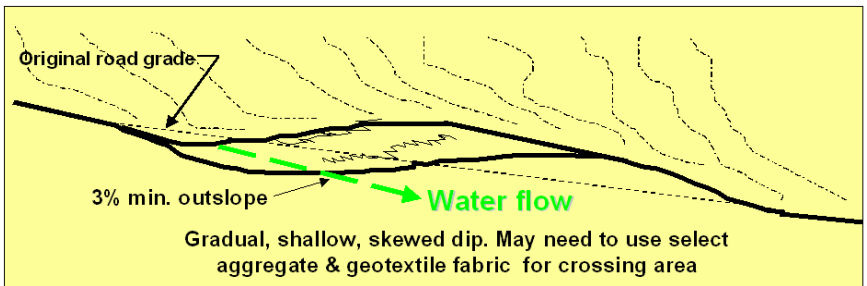

Figure 1: Broad Based Dip

Broad based dips present an alternative to installing and maintaining cross pipes on very low traffic volume roads. Broad based dips should be used only for ditch flows and not for perennial streams with permanent or intermittent flows.

ESMP#3-01 Broad based dips can be used in lieu of cross-pipes.

Common Practice and Associated Problems: Many roads have long downhill sections with a steep embankment on the uphill side, requiring ditches to be outletted through cross pipes or run from the top of the grade all the way to the bottom before they are outletted. Water volume and velocity continually increase as the flows run downhill, necessitating larger ditches and cross pipes to outlet the flow. Increased volume and velocity results in increased

erosion potential and flooding. In addition, water runs down the road surface, again picking up volume and velocity, and causes erosion gullies and rutting to occur. All of these factors lead to ever-increasing road maintenance and the associated increased costs.

Installation: Broad based dips can be graded into the road rather easily with the existing road materials. The bottom of the dip has to pick up the ditch flow, carry it across the road, and outlet to a vegetative filter strip. Broad based dips eliminate the road crown within the dip area. Water volume must be contained in the channel with no overtopping, and longitudinal slopes must be gradual to prevent vehicles from dragging. Proper transitions must be constructed to blend to and from the road crown. Test the dip by driving the road after installation.

ESMP#3-02 Broad based dip reinforced with large aggregate.

There are no exact formulas for spacing or size for broad based dips. These factors will depend upon many variables, such as road grade, traffic, volume of water, terrain, etc. The use of multiple broad based dips on a long downhill stretch of road also allows a smaller ditch size to carry the limited water volume from a shorter section or road. This limited volume of water should not have substantial flow or velocity to do any damage to the road surface crossing. Steeper road grades require placing more broad based dips closer together to limit water volume and velocity. Broad based dips can be easily constructed with a grader or small dozer within a short time period using the existing road materials.

Select larger sized aggregate to fill the dip. Geotextile separation fabric may be required to reinforced and stabilize the dip, since we have traffic and water crossing perpendicular to one another. The need to reinforce the dip depends on water volume and velocity and the type of road material. (See Manual Chapter 7 and ESMP #15for using geotextile separation fabrics.)

Road grader operators have to be aware of the broad based dip installations so that they do not think they are washouts or problem areas and reshape the road back to a normal crown. In addition, winter plow operators should be aware of these installations for proper and safe plowing operations.

Advantages:

- Breaks road into smaller sections for better drainage, handling less water with less velocity
- Allows the ditch to outlet across the road without a cross pipe
- Multiple broad based dips allow use of smaller sized ditches
- Reduces road surface water flows, eliminating damaging erosion gullies and ruts

- Outlets smaller volumes of water into vegetative filtering areas, providing for less erosion and greater sediment control

Safety Considerations: Broad based dips have a calming effect on traffic speed. Broad based dips also break the downhill momentum of vehicles, reducing the operator's chance of losing control.

Related Practices:

ESMP #05 Grade Breaks
ESMP #03 Ditch Turnouts and Vegetative Filter Strips
ESMP #15 Road Separation Fabrics

Technical Information Sheet Environmentally Sensitive Maintenance Practices (ESMPs)

Practice: *ESMP #05 Grade Breaks*

Category: Practices Relating to Ditches and Road Profile

Refer to: Manual Chapter 5, Section 5.3.3.2
(Adapted from the Pennsylvania Dirt and Gravel Roads Program, Technical Bulletin, 2/21/04)

Description: Grade breaks are long gradual breaks in the longitudinal grade of a road on a downhill slope, as depicted in Figure 1, breaking the road into shorter lengths for more efficient drainage. Grade breaks retain the road crown and require appropriately placed cross pipes.

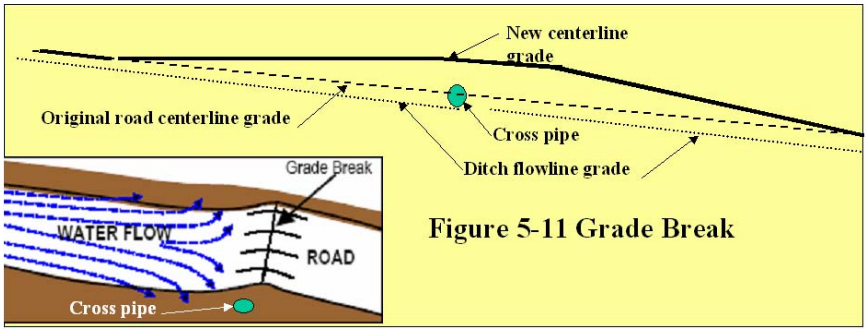

Figure 5-11 Grade Break

Grade breaks limit water flow by limiting the road section area to be drained. A shorter section of road decreases concentration and velocity, resulting in a smaller ditch cross pipe size. This reduction in water volume and flow in turn helps alleviate problems at the pipe outlet. Grade breaks also limit the length of flow and thus velocity down the road surface, eliminating potential surface erosion gullies and rutting.

Common Practice and Associated Problems: Many roads have long downhill sections where the ditches run from the top of the grade all the way to the bottom before they are outletted. Water volume and velocity continually increase as the flows run downhill, necessitating larger ditches and cross pipes to outlet the flow. Increased volume and velocity results in increased erosion potential and flooding. Erosion can be combated with additional ditch armoring, but that is very costly. Large flows through large pipes cause potential problems at the pipe outlet to dissipate the flow energy. In addition, water runs down the road surface, again picking up volume and velocity, and causes erosion gullies and rutting to occur. All of these factors lead to ever-increasing road maintenance and the associated increased costs.

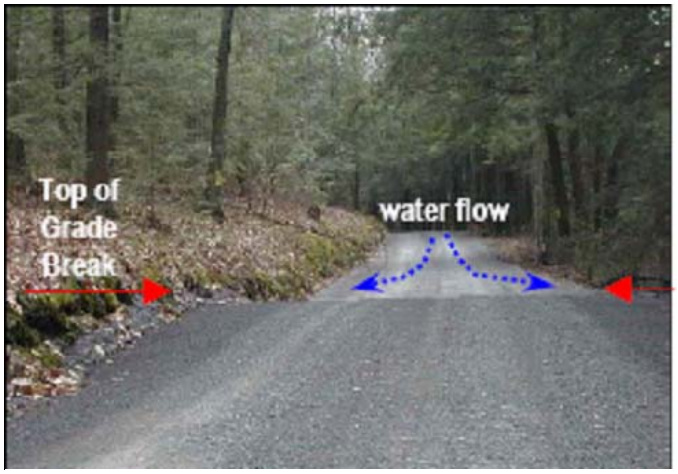

ESMP#5-01

Installation: There are no exact formulas for spacing or size for grade breaks. These factors will depend upon many variables, such as road grade, traffic, volume of water, terrain, etc. Multiple grade breaks keep the road sections shorter for effective drainage and less erosion potential. Steeper road grades require placing more grade breaks closer together to limit water volume and velocity. Grade breaks can be constructed with a grader or dozer. It is important to gradually taper the grade break back into the road grade. Testing the longitudinal slopes by driving through the break at a reasonable speed will indicate whether additional work is needed. The grade break also needs to accommodate snow plowing without road surface damage.

As shown in the above figure, a grade break can be installed at the location of the cross pipe. This allows the cross pipe to effectively meet the ditch gradient with the road being built up and over the pipe to create the grade break. This eliminates the need to install the cross pipe at a much deeper elevation than the road ditch, resulting in additional potential for pipe blockage and road flooding. Pipe outlet areas need continual monitoring and erosion protection established as needed.

Road maintenance personnel, specifically the grader operator, must be aware of grade breaks and their purpose. An uninformed operator may see the grade break as a road surface deviation or consider the grade break as a source of extra road material to use elsewhere.

Advantages:

- Breaks road into smaller sections for better drainage, handling less water with less velocity
- Allows use of smaller sized ditches and cross pipes
- Smaller cross pipes decreases pipe outlet problems
- Eliminates damaging road surface water flows, eliminating gullies and ruts
- Outlets smaller volumes of water into vegetative filtering areas, providing for less erosion and greater sediment control

Safety Considerations: Grade breaks can actually have a calming effect on traffic speed. Grade breaks also break the downhill momentum of vehicles, reducing the operator's chance of losing control.

Related Practices:

ESMP #04 Broad Based Dips
ESMP #03 Ditch Turnouts and Vegetative Filter Strips

Technical Information Sheet Environmentally Sensitive Maintenance Practices (ESMPs)

Practice: *ESMP#06 Driveways*

Category: Practices Relating to Driveways

Refer to: Manual Chapter 5, Section 5.3.4

Description: Driveways pose several problems or concerns not only for the road user, but also for road maintenance personnel. Safety for the road user and the property owner served by the driveway should be a priority. Safe ingress and egress with minimal interference with other traffic should be a goal in driveway construction. Many states have regulations regarding driveways entering the state road system. These regulations are good resources for local governments, since the only way to insure effective driveway construction and rehabilitation is through the adoption and enforcement of policies and regulations, necessitating a driveway permit system. This provides the needed control allowing the road manager to review the site and determine what needs to be done for proper drainage to protect the road and the environment and provide safe access for the property owner and a safe road for other drivers. With that said, this technical information sheet will deal with the one specific problem for road maintenance personnel that also affects road safety and the environment – ***Drainage***.

ESMP#6-01 Improperly constructed driveways not only cause road drainage and road safety hazards, but also cause degradation of the environment through erosion and sediment.

Common Practice and Associated Problems: If property owners are under no regulations and do not need to obtain a permit or notify the governing entity, the end result of driveway construction will most likely cause continual drainage problems and road safety hazards. Roadside ditches will be filled in, and driveways sloping down to the road will continue on a down slope right to the road edge. This condition will drain the driveway onto the road, creating hydroplaning in the summer and icing in the winter. Blocked drainage ditches, likewise, will flood the road and again cause these unsafe situations. Water ponding on the roadway and in the roadside ditch will seep into the road structure and began the degradation that will plague the road crew and shorten the life of the road.

Installation: Driveway installation must follow a few rules – the first of which is maintaining proper road and shoulder and ditch profile. Ditch flow has to be maintained. For driveways sloping down toward the road, the low point should be over the ditch line, allowing both the road and driveway to drain into the ditch off either side of the driveway, as shown in Figure 1. For driveways with deep ditches, a pipe under the driveway continues to carry the ditch flow. These driveway drainage pipes may have nominal cover and have to be strong enough to support the vehicle loads. Refer to ESMP#09 for alternatives in shallow culvert installations.

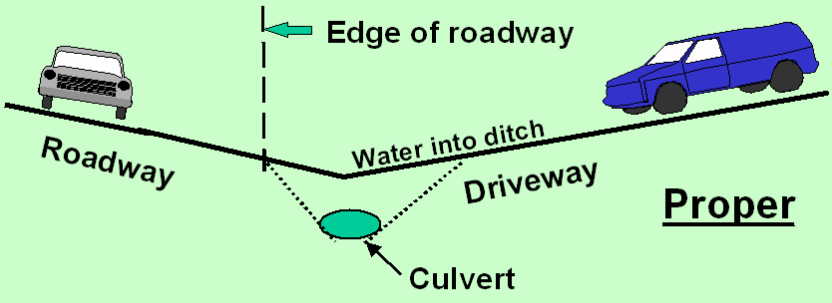

Figure 1 Proper driveway construction with deep ditch

For driveways with medium depth ditches, an open-top culvert or a box with an open grate may suffice, as shown in Figure 2. These units can be prefabricated or homemade. The photo insert in the figure pictures two types of prefabricated units, one all-plastic and one of a combination of plastic and metal. This system should only be employed for paved driveways, which will only drain clean surface runoff into the channel without clogging the grate.

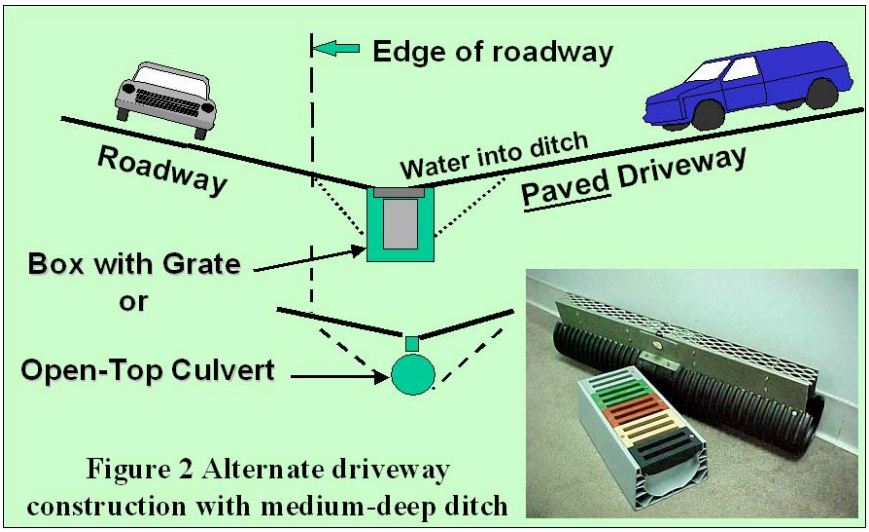

Figure 2 Alternate driveway construction with medium-deep ditch

In many instances, the roadside ditch will be shallow with nominal flows. In this case the ditch may continue across the driveway, as shown in Figure 3. Vehicles should not have any problem traversing a shallow ditch carrying only ditch flows during storm events. This area may require stabilization and reinforcement through the use of larger aggregate and/or a geotextile separation fabric. The need to reinforce the crossing depends on water volume and velocity and the type of driveway material. Geotextile separation fabrics are discussed in the Manual, Chapter 7 and ESMP #15.

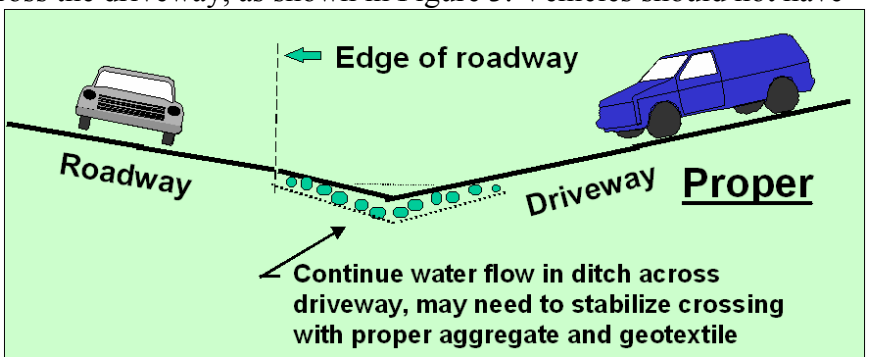

Figure 3 Driveway construction with shallow ditch

Advantages:

- Regulations and driveway permits give the road manager the authority to enforce proper conditions at the driveway site to meet drainage and safety requirements
- Properly constructed driveways:
  - Maintain roadside ditch flows, preventing blockage and flooding
  - Maintain proper road surface drainage off of the road
  - Eliminate water on the road surface which could cause hydroplaning or icing
  - Maintain road structural adequacy by keeping water out of the road structure.
  - Eliminate erosion and sediment from block ditches or road surface ponding, thereby protecting the environment.

Safety Considerations: These practices maintain proper drainage off, out of and away from the road, keeping the road safe, eliminating the potential hydroplaning and icy conditions. The driveway will also be safer due to proper drainage and less degradation.

One safety factor to keep in mind: if a box with grate facility is homemade, use appropriately sized openings in the grate that will not be a safety hazard to animals or bicycles.

Related Practices:

ESMP #07 Culvert End Structures
ESMP #08 Aprons at Culvert Outlets
ESMP #09 Shallow Culvert Installations
ESMP #15 Road Separation Fabrics

Technical Information Sheet Environmentally Sensitive Maintenance Practices (ESMPs)

Practice: *ESMP #07 Culvert End Structures*

Category: Practices Relating to Culverts

Refer to: Manual Chapter 5, Section 5.3.5.3

Description: A culvert end structure is simply a structure built at a pipe opening, either at the pipe's entrance or outlet end. The terms headwall and endwall are also used interchangeably, again referring to end structures for the drainage pipes or culverts.

Common Practice and Associated Problems: Many pipes are installed without any consideration for end structures. The end areas of roadway cross pipes transporting ditch water from side of the road to the other are prime targets for erosion and sediment. The pipe redirects the water flow, turning it through the pipe and across the road. This redirection of flow causes turbulence resulting in erosion around the pipe opening. Where there are close roadside embankments, gouging out the bank to install the crosspipe enhances the erosion potential if bare soil remains, as shown in the photo.

ESMP#7-01 Typical process of gouging out the roadside bank to install a cross pipe for ditch flow with no end structure leads to continual erosion and maintenance.

Even when water flows directly into and out of a pipe, these straight transitions are prone to erosion. Water flow into the pipe is usually restricted by the pipe opening, causing turbulence and possible erosion around the pipe entrance. Since the pipe restricts flow, the water travels faster through the pipe and out the other end. As the flow emerges from the pipe, eddy currents cause swirling flows on each side, leading to erosion around the pipe, as depicted in Figure 1. End structures can solve the erosion problem and provide other benefits as well, as described below.

Installation: Materials vary from concrete, flagstone or native stone to gabions or prefabricated units. Consequently, the cost of installation can vary as much as the material being used. Native stone not only becomes cost effective since it may be available on site, but it is also environmentally aesthetic, blending into the natural conditions. Several factors may influence the choice of materials, including local availability, skill and time required for construction, durability, cost, and volume and velocity of water to be handled. The photos show different types of end structures, including a geosynthetic, prefabricated unit.

ESMP#7-02

The shape of the end structure is important to direct water flow, protect the road and embankments, and improve drainage. The end structure should funnel the water into the pipe while protecting the surrounding area from erosion. On the inlet side, end structures direct the flow into the pipe, reducing turbulence and maximizing the flow capacity of the pipe. Outlet structures prevent erosive back eddy currents from undermining the pipe and road structure.

Figure 1 Flow characteristics at pipe ends

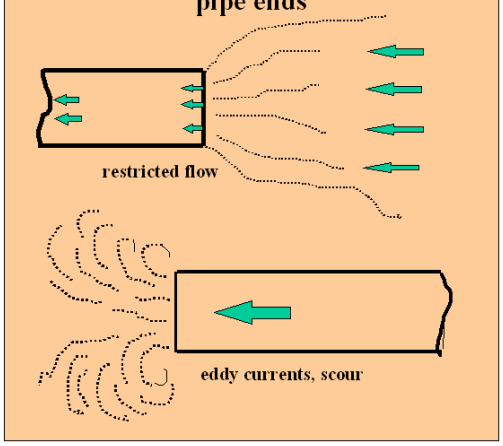

Cross pipes should be installed on an angle (skewed – not perpendicular) across the road in the direction of water flow for smoother flow transitions into and out of the pipe to further reduce erosion potential.

Culvert end structures may not be enough to protect against erosion at the pipe outlet. Further erosion protection may be needed in this "apron" area past the structure. Culvert aprons including the use of flared end sections are covered in Technical Information Sheet ESMP#08 referenced below.

Advantages:

- Prevents erosion from occurring around the pipe opening
- Provides a low-cost, long lasting solution to erosion problems at pipe openings
- Reduces continual maintenance needed to address the erosion and sediment and clogging of the pipe
- Provides structural support for the road

- Anchors the culvert providing structural support and preventing crushing of the pipe end by heavy vehicles

Safety Considerations: Culvert end structures increase safety by providing structural support to the roadway and to the culvert. There are also many designs to enhance roadside safety as to errant vehicles, as well as providing the other benefits described above. One such design is depicted in Figure 2.

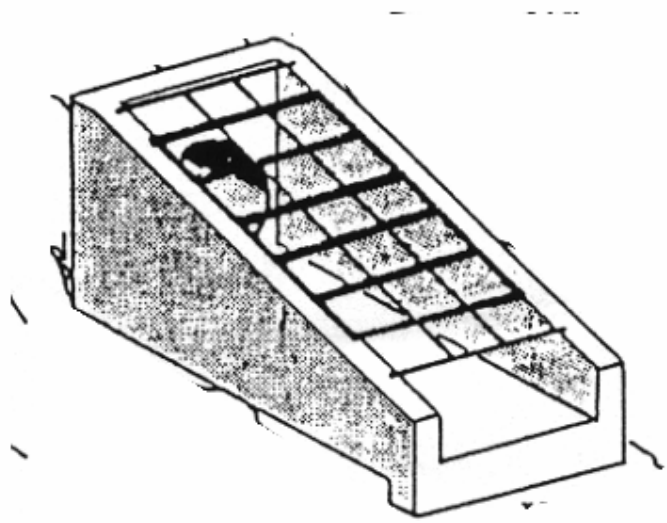

Figure 2: Vehicle safe end structure for roadside embankment

Related Practices:

ESMP #08 Aprons at Culvert Outlets
ESMP #09 Shallow Culvert Installations

Technical Information Sheet Environmentally Sensitive Maintenance Practices (ESMPs)

Practice: *ESMP #08 Aprons at Culvert Outlets*

Category: Practices Relating to Culverts

Refer to: Manual Chapter 5, Section 5.3.5.4

Description: Aprons at culvert outlets refer to the immediate area at a pipe outlet. Culvert outlets, even with an end structure, may still pose a problem with the flow discharge energy. A conveyance channel may need to be created to a stable discharge point. A simple flared end section may suffice as an apron to spread the water flow and dissipate the erosive energy. Other materials, however, can be used as culvert aprons, or used in conjunction with flared end sections to extend the stabilizing apron area.

Common Practice and Associated Problems: Many pipes are installed without any consideration for erosive energy potential of the exiting water. Since flow is usually restricted by a pipe, the water travels faster through the pipe and out the other end. As the flow emerges from the pipe, dissipation of the flow energy is often needed to prevent erosion. This apron area is often neglected and can lead to severe erosion and maintenance headaches, as shown in the photo.

ESMP#8-01 Severe erosion at a pipe outlet.

Installation: This is one area where rock riprap can be very effective. The rip-rap will spread the water flow, slowing it down and dissipating energy. Native stone becomes the cost effective aesthetic material choice, but, depending on location, even brush and tree stumps can be effective. The size of rock and the dimensions of the apron depend on many variables such as pipe size, soil type, the discharge volume and velocity,

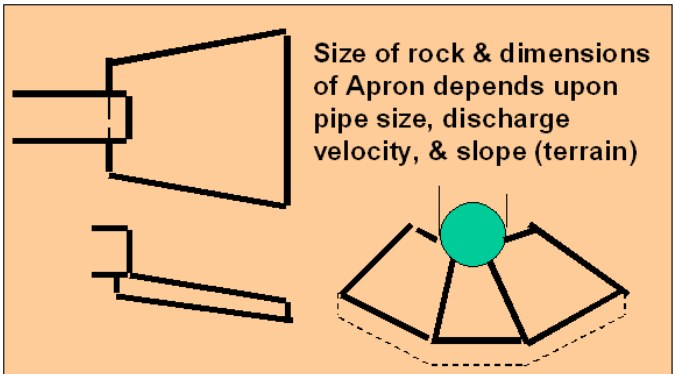

Figure 1 Aprons at Culvert Outlets

and the slope of the outlet channel or terrain. Although there are charts available that can be used as guidelines, apron installation should not be technically challenging. Experienced road personnel know the amount of water flow and the potential problems at a specific site. They can size the apron based on their past experience. Then, they need to follow up with field inspections during and after the next several rainstorms. If erosion is evident past the riprap limits, expand the apron and inspect again.

ESMP#8-02 Rock riprap makes an effective apron to dissipate energy and prevent erosion at the pipe outlet.

Flared end sections can be metal, concrete or plastic. As mentioned, these pre-fabricated sections may be enough to transition the flow to a stable discharge, or may be used in conjunction with other materials, such as riprap. The flared end section initiates spreading the flow and protects against those swirling eddy currents on each side of the pipe opening, while the riprap further spreads the flow and dissipates the flow energy eliminating the erosion potential. Typical flared end sections are shown in the photo.

Advantages:

- Prevents erosion from occurring around the pipe opening, reducing maintenance
- Provides a low-cost, long lasting solution to erosion problems at pipe openings
- Helps anchors the culvert, providing structural support

Safety Considerations: Culvert aprons prevent erosion of outlet ditches, eliminating the vehicle drop-off potential in roadside ditches.

Related Practices:

ESMP #07 Culvert End Structures

ESMP #09 Shallow Culvert Installations

ESMP#8-03 Typical Flared End Sections.

Technical Information Sheet Environmentally Sensitive Maintenance Practices (ESMPs)

Practice: *ESMP #09 Shallow Culvert Installations*

Category: Practices Relating to Culverts

Refer to: Manual Chapter 5, Section 5.3.5.1

Description: Roadway cross pipes are subjected to a variety of forces and loads. The weight of the backfill material above the pipe is a concern in deep installations. Many drainage cross pipes, however, are placed at a shallow depth to better accommodate the flow of water from roadside ditches. Vehicle loading due to the weight and movement of the vehicle is significant in these shallow installations. (See Manual Chapter 5, Section 5.3.5 for a discussion on traffic load distribution.) Road managers should consider various alternatives in those installations where proper cover cannot be maintained. This technical information sheet addresses several alternatives for shallow pipe culvert installations.

Common Practice and Associated Problems: Because of site conditions, depth of drainage ditches, water flow, etc., many cross pipes are installed without sufficient cover and with no consideration of the traffic loading. These shallow installations are subject to failure under traffic loads. In particular, flexible type pipe tends to deflect under traffic

ESMP#9-01 Shallow pipe installations can cause continual road deterioration.

loads, causing road materials to shift resulting in road surface degradation and possible pipe failure. The more shallow the pipe, the greater the direct force from vehicles, and the greater the deflection and resulting damage. A minimum of 12 inches of cover material over the pipe and below the road material minimizes or dissipates the traffic loads. Pipes larger than 24-inch diameter may need additional cover. The required cover, however, cannot always be met in many situations, and the pipe becomes a shallow installation. In

addition, the road surface area directly above the pipe becomes a maintenance headache with continual surface degradation.

Installation: There are several alternatives to improve shallow installations:

Rigid Pipe: A rigid pipe (concrete, cast iron, steel) has the strength to resist deflection under the traffic loads to the detriment of the road.

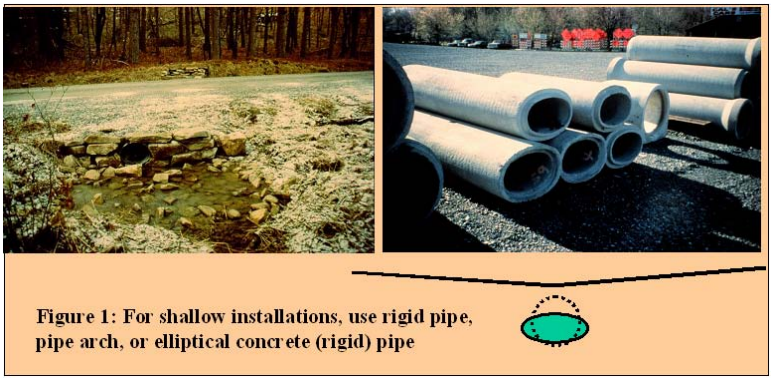

Figure 1: For shallow installations, use rigid pipe, pipe arch, or elliptical concrete (rigid) pipe

Elliptical Pipe or Pipe Arch ("Squash Pipe"): Pipe arch not only allows proper flow capacity but also allows additional cover. An equivalent 18-inch diameter corrugated metal pipe arch is only 15 inches in height. That extra three inches of additional cover is significant in further distribution (reduction) of traffic loads. Rigid pipe also comes in an elliptical shape allowing extra cover in addition to the extra strength factor of the pipe itself. See Figure 1 with accompanying photos.

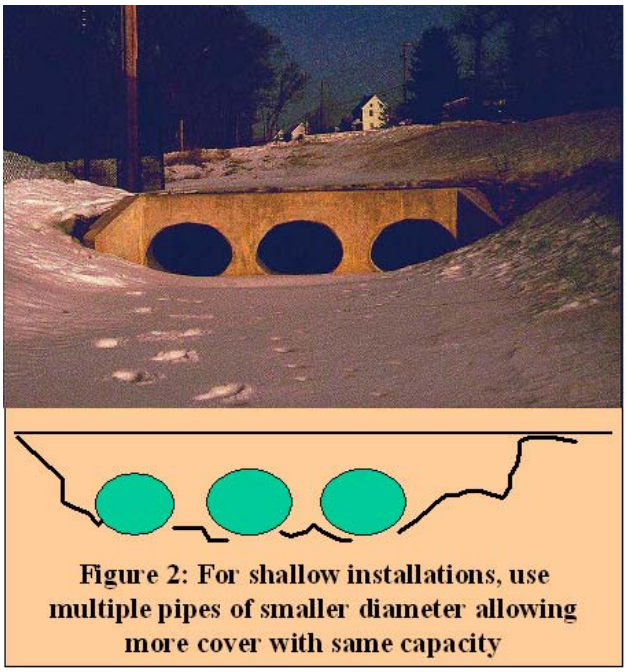

Figure 2: For shallow installations, use multiple pipes of smaller diameter allowing more cover with same capacity

Multiple Pipes: Multiples pipes are another alternative. Multiple pipes of smaller diameter allow more cover but still provides adequate flow capacity (see Figure 2). To use multiple pipes, however, road mangers must keep a few rules in mind. Flow capacity is directed related to the area of the pipe opening. This means that two 12-inch diameter pipes do not equal the flow capacity of one 24-inch diameter pipe. The area of a circle (the opening of the pipe) is πr^2 or 3.14 times the radius squared. A 24-inch diameter pipe has 452 square inches of opening (3.14 x 12 x12). A 12-inch pipe has 113 square inches, or two 12-inch pipes have a total of 226 square inches of opening. It would take four 12-inch pipes to equal the flow of one 24-inch pipe (4 x 113 = 452 square inches). Using three 15-inch pipes or two 18-inch pipes would give additional flow capacity and still maintain greater cover over the pipes.

Another rule for multiple pipes is to make sure they are installed far enough apart to allow adequate backfill compaction between the pipes for the compaction equipment being used.

One of the concerns voiced in multiple pipe use is clogging. Any pipe can clog. One of the simpler solutions for metal or plastic pipes is cutting the inlet end of the pipe on a slant or bevel. Any debris flowing toward the pipe will tend to ride up the slant, which will allow water to continue through the pipe. For multiple pipes, staggering the inlet ends so that they are not parallel in one line perpendicular to flow will lessen the probability of clogging. Each pipe inlet end is extended a little further (offset) from the pipe beside it. When large debris, such as tree limbs or logs, come downstream, they will either block only one pipe or be forced to an angle, skewing across the pipe entrances, but allowing water to continue to flow through the pipes (see Figure 3).

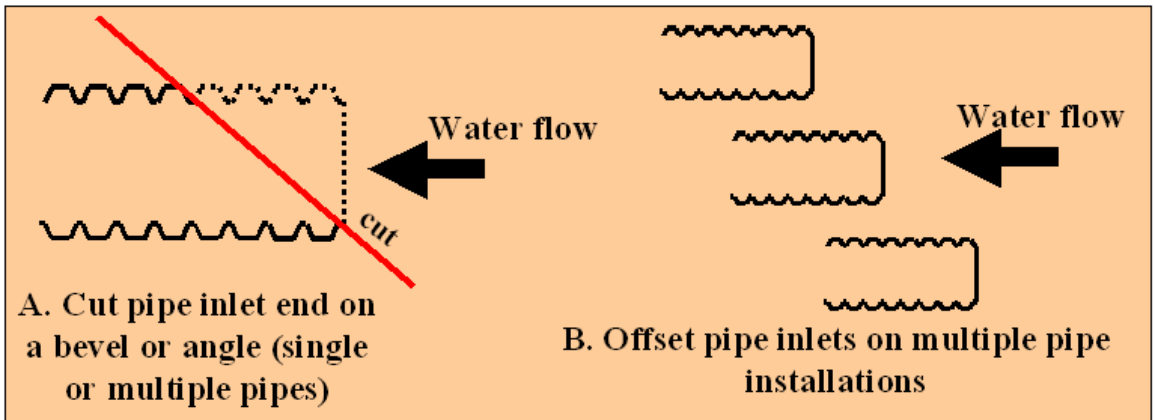

Figure 3 Recommendations to Help Eliminate Pipe Clogs

Advantages:

- The use of rigid pipe diminishes the potential of pipe failure and road surface degradation.
- Elliptical or pipe arches allow adequate cover over cross pipes to protect the pipe and the road.
- Multiple pipes allow adequate cover over cross pipes to protect the pipe and the road.
- Cutting pipe inlet ends on a slant and offsetting multiple pipes reduces potential clogging and the resulting flooding of the road and environment.

Safety Considerations: Shallow culvert alternatives will keep the road and cross pipe(s) in good condition, eliminating the safety factors surrounding road degradation or pipe failures.

Related Practices:

ESMP #07 Culvert End Structures
ESMP #08 Aprons at Culvert Outlets

Technical Information Sheet Environmentally Sensitive Maintenance Practices (ESMPs)

Practice: *ESMP #10 Through Drains*

Category: Practices Relating to Culverts (and Roadside Ditches)

Refer to: Manual Chapter 5, Section 5.3.5.5

Description: Through drains are cross culverts that are strategically placed to handle natural springs or spring seeps flowing perpendicular to the road and carry them under (through) the road to the other side to continue in the original channel prior to the road's existence. Many roads intercept native ground water flows in this manner. The through drain allows this natural flow to continue without entering the road ditch or interfering with road drainage, as shown in Figure 1.

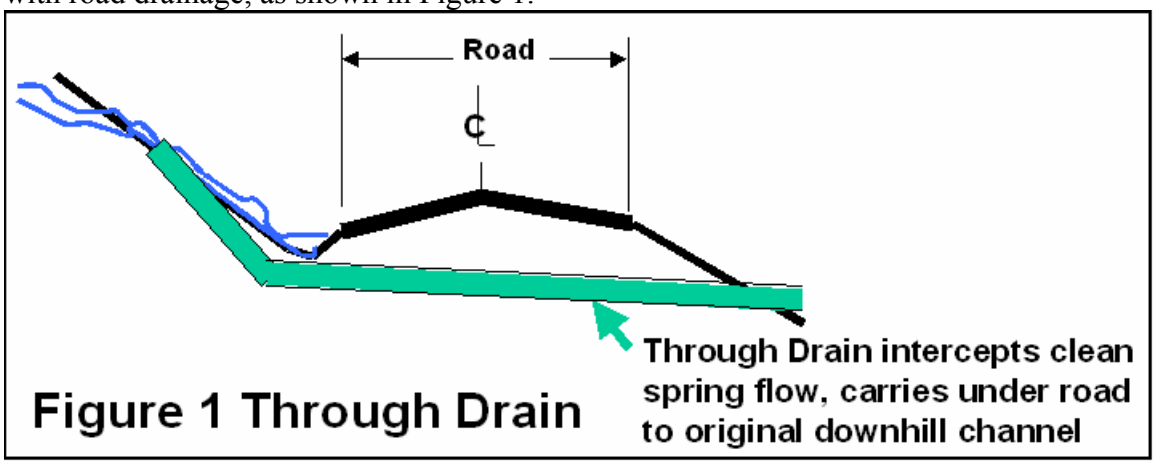

Figure 1 Through Drain

Common Practice and Associated Problems: Common practice allows natural springs of clean water to flow into the road ditch, mix with often sediment-laden ditch flows, and then flow directly to a stream. The additional flows can be substantial during certain periods of the year, such as during the spring rains, causing flooding of the road ditch and road degradation. Even if flooding does not occur, this added volume has to be handled by oversized ditches, increasing the erosion and sediment potential of the combined ditch and spring flows. In addition, substantial flows diverted into streams could adversely affect the stream ecology.

Installation: Through drains should be installed wherever natural spring flows are intercepted by the road and are carried by the roadside ditch and the surrounding terrain and off right-of-way conditions allow installation. The through drain pipes are placed to pick up the natural spring waters and carry them under the road, outletting on the other side into the original downhill flow channel. This eliminates the usually clean water from entering the road ditch, thus keeping the water clean as it continues in its original path prior to the road's existence. The photo depicts typical placement of a through drain.

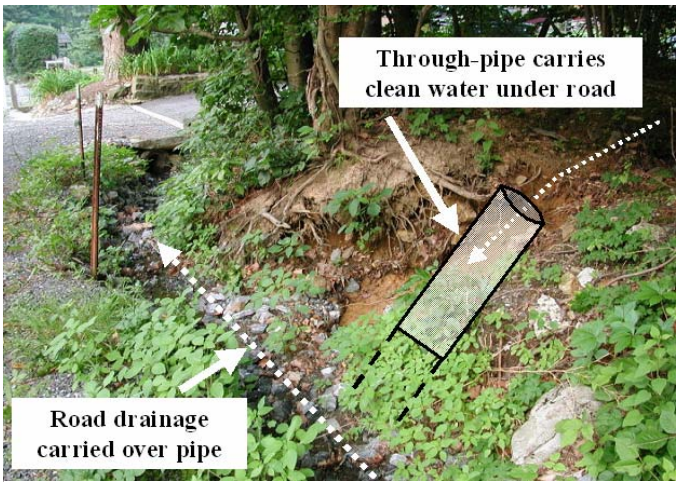

ESMP#10-01 Through Drains keep springs and spring seeps out of road drainage facilities.

The through drain outlet has to be stabilized as to flow volume and energy. If the natural spring waters have been flowing into the ditch for a number of years, the natural channel on the downhill side may be nonexistent. This channel may have to be reestablished, providing proper erosion prevention until the channel is stabilized.

Advantages:

- Maintains clean natural spring waters as clean water
- Eliminates handling of this water volume via the road ditch, reducing ditch size
- Reduces ditch flow reduces erosion potential and resulting sediment

Safety Considerations: Through drains will decrease ditch size and reduce the flooding and road degradation potential, keeping the road and roadside safer for vehicles.

Related Practices:

ESMP #07 Culvert End Structures
ESMP #08 Culvert Aprons

Technical Information Sheet Environmentally Sensitive Maintenance Practices (ESMPs)

Practice: *ESMP #11 Stream Saver System*

Category: Combination Practices

Refer to: Manual Chapter 5, Section 5.3.6.1

Description: The Stream Saver System raises the road profile over the low-point stream crossing; the road surface remains level for an extended area away from the stream on both sides, as shown in Figure 1. If the cross pipe cannot handle the flow, this level road allows sheet flow across the road during flooding conditions with less erosion potential. Using broad based dips and turnouts into vegetative filtering areas for the road and ditch drainage on each approach as conditions warrant avoids direct discharge into the stream and alleviates some flood flow. If pipe capacity is severely limited, a flood relief crossing can be established away from the stream depending on the existing terrain and land use. This crossing should be a stabilized low water crossing (refer to Chapter 7, Section 7.4.3.8.3 for a description of a stabilized low water road crossing using geosynthetics).

Figure 1 Stream Saver System

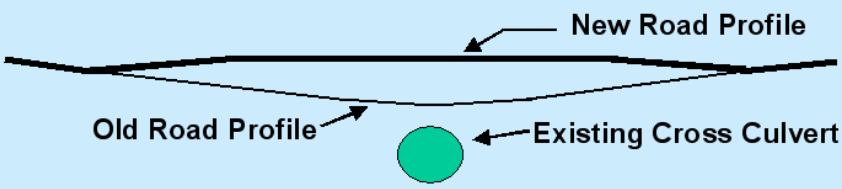

> Raise the road over the stream crossing.
> Keep road grade level over stream area for sheet flow during flooding conditions
> Use broad based dips and turnouts to vegetative filter strips for road and ditch flows on each approach

Figure 2 Stream Saver System with Flood Relief Pipes

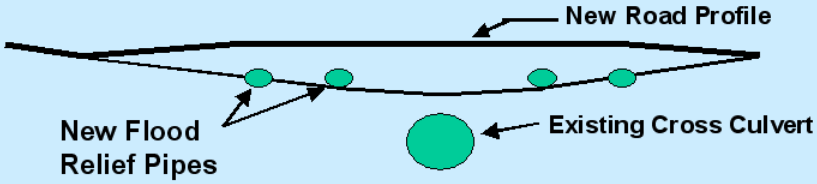

Use smaller diameter pipes at higher elevations for flood relief flow

In raising the road, additional pipes installed at higher elevations allow for flood flow relief, as shown in Figure 2. Depending on the depth of material used to create the new road profile, the additional flood

relief pipes can be laid with minimal or no excavation. During major storms, these flood relief pipes handle the extra flow, minimizing overtopping the road thus preventing road deterioration.

Common Practice and Associated Problems: Common practices followed the traditional topographical site conditions where the road's low point was directly over the stream. This condition seemed to be the most practical way of draining the road. Roadside ditches could be carried to the low point and outletted directly to the stream with a cross culvert carrying the steam under the road. In analyzing the existing problems at these sites, however, this procedure was not the best for the road and definitely not the best for the environment. When all surface and ditch flows drain directly into the stream, they carry all of the road's sediment and pollutants with them. When major storms hit, creating flows beyond the culvert's capacity, the low point of the road became the v-shaped channel, narrowing the overflow across the road, increasing the flow energy and causing erosion of the road surface, again directly into the stream.

Installation: Every site will have different requirements. The installation basics, however, are the same. Add enough road material to raise the road over the stream with a level grade extended in each direction for 50 to 100 feet. Use ditch turnouts into vegetative filter strips for roadside ditches on each approach. Use broad based dips, grade breaks, or additional cross culverts as needed on each approach to break up the surface runoff from the road and surrounding terrain and handle effectively prior to the stream. Refer to the individual technical information sheets on these additional techniques for more detailed information.

ESMP#11-01 Stream Saver System – raised level road with ditch turnouts to vegetative filters.

Advantages:

- Eliminates surface drainage and any sediment from the road and roadside ditches directly into the stream, protecting the stream and the environment
- Raises the road to reduce flooding and surface erosion, establishing a level surface for lower energy sheet flow, with much less road deterioration
- Provides additional flow capacity for flood flows as needed (by installation of additional flood relief pipes)

Safety Considerations: Stream Saver Systems protects the structural stability of the road, keeping the road safer. Road deterioration from flooding and surface erosion will be minimal.

Related Practices:

ESMP #03 Ditch Turnouts and Vegetative Filter Strips
ESMP #04 Broad Based Dips
ESMP #05 Grade Breaks
ESMP #07 Culvert End Structures
ESMP #08 Culvert Aprons
ESMP #12 Raising the Entrenched Road

Many other practices can be used in conjunction with the Stream Saver System as the site conditions may warrant.

Technical Information Sheet
Environmentally Sensitive Maintenance Practices (ESMPs)

Practice: *ESMP #12 Raising the Entrenched Road*
Category: Major Reconstruction
Refer to: Manual Chapter 5, Section 5.3.7

Description: Raising an entrenched road involves major filling of the road cross section between high banks, bringing the road surface back up to the original road surface elevation. When you look at the photo, you see a typical entrenched road in a forested area. Usually entrenchment results from years of traditional road maintenance involving road grading, shoulder cutting, ditch cleaning and widening. As the road profile drops, or becomes entrenched, water draining to the road is trapped and the road begins to function as a channel. Restoring the road to its original surface elevation eliminates a multitude of problems and maintenance headaches.

ESMP12-01 A typical entrenched road.

Common Practice and Associated Problems: Although common road maintenance practices naturally lead to an entrenched condition, we continue year after year making the situation worse. (Refer to chapter 5, Section 5.3.7, for a detailed description and photo sequence of road entrenchment over the road's life.) An entrenched road becomes the stream channel, even as ditch size continues to increase in an attempt to handle the entrenched flows. Flooding and surface deterioration along with a saturated road structure create ongoing maintenance to keep the road usable. Snow removal becomes an increasing problem with the plowed snow piling up against the high banks, adding to the water problem. As the above photo depicts, these roads have severe drainage, erosion and sedimentation problems requiring continual maintenance. All these problems can be eliminated by bringing the road surface back up to the original elevation.

Installation: Installation involves substantial fill and a major work effort. Fill material is expensive, but obtaining free fill material and using in-house equipment and operators can offset costs. Various types of fill material can be used. A new road with good road material can then be built on top of the fill material. The road surface is built back up to its original elevation, eliminating the banks on both sides and providing for excellent road drainage conditions with much less erosion and sediment pollution. Figure 1 shows the typical entrenched roadway before and after filling, completely eliminating the bank on one side and reducing the bank height on the other side. Drainage can then sheet flow off the road without a ditch on the one side. The road will no longer be a drainage channel, experiencing far less road surface deterioration. Snow removal becomes easier, and the removed snow will not be a future source of water back into the road.

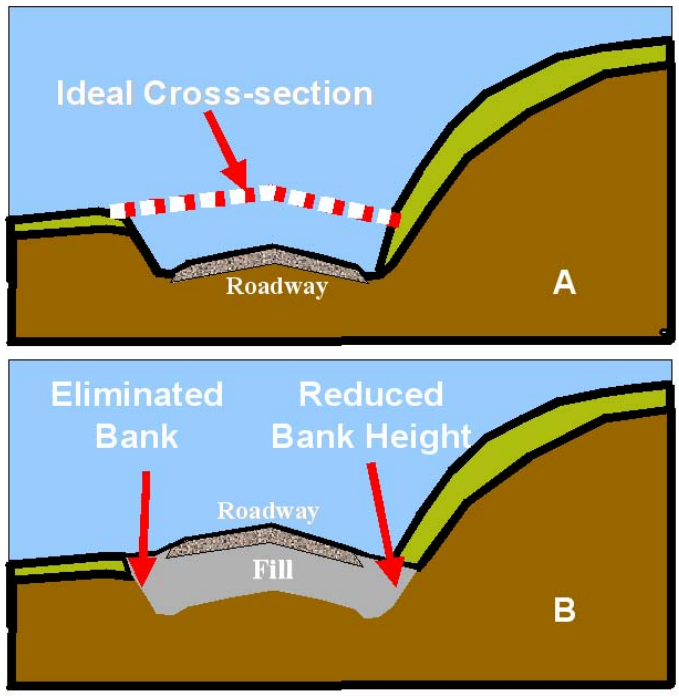

Figure 1: Raising the Road

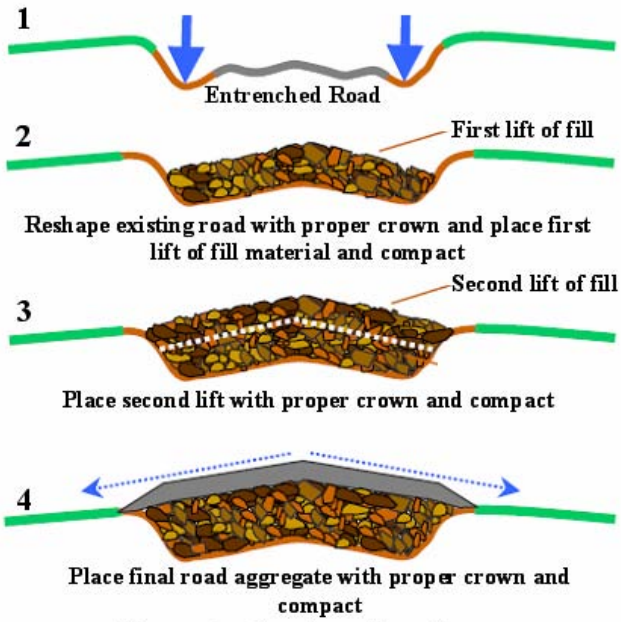

Figure 2: Construction Sequence

Figure 2 shows the construction sequence, beginning at the top with an entrenched road cross section. The entrenched road traps road drainage on the road and in the parallel ditches. To prepare for raising the road, proper crown is needed on the existing road. Then each lift of material is placed in uniform 8- to 12-inch lifts with proper crown of ½-inch to ¾-inch per foot and compacted. Compaction is critical. A large static roller, vibratory roller or sheep's foot roller should be used to thoroughly compact each lift of fill material. Geotextile separation fabrics or geogrids between lifts will add strength to the road base. (See Chapter 7, Section 7.4.4.6 and ESMP #15 for using separation fabrics and Section 7.4.4.8 for geogrids.) The road is then reconstructed on top of the fill using good road aggregates.

The road material is placed with the proper crown and compacted the same as the fill material.

The photos show an entrenched road project from the start of the filling operation to the final road surface being compacted.

ESMP12-02 Raising the entrenched road—step-by-step.

When the road is immediately next to a stream, the procedure is slightly different. In this example, the road has a high embankment on one side and falls steeply off directly into the stream on the other side. The road is entrenched with side ditches, as shown in Figure 3. As also depicted in the figure, the road is raised upslope away from the stream, eliminating the entrenchment on the stream side. This allows for sheet flow across additional vegetated area. The high embankment on the other side is reduced with better stability and drainage control. Depending on site conditions, the implementation of insloping would provide additional benefits.

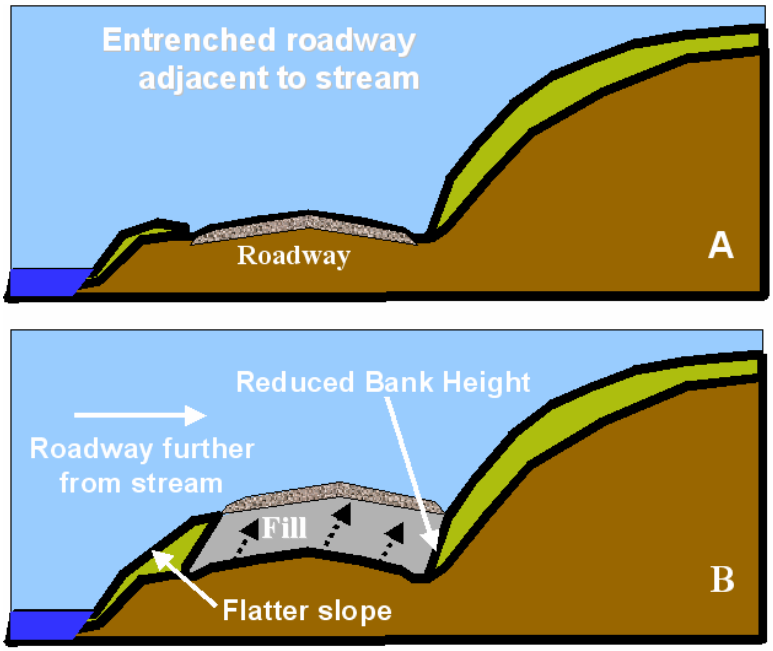

Figure 3: Raising the Road & moving away from the stream

Advantages:

- Allows road surface drainage to sheet flow off the road through vegetated areas reducing erosion and the resultant sediment pollution
- Eliminates ditches and ditch maintenance in terrain where sheet flow can be established
- Eliminates concentration of water trapped in an entrenchment, prolonging the life of the road with less maintenance
- Allows for more efficient snow plowing, removing the snow away from the road and eliminating snow melt back into the road structure

Safety Considerations: Raising the entrenched road helps maintain the road in a safe condition with no flooding and far less surface erosion and rutting.

Related Practices:

ESMP #11 Stream Saver System
ESMP #15 Road Separation Fabrics
Manual Chapter 7, Section 7.4.4 Geosynthetic Applications in Road Maintenance

Many other practices can be used in conjunction with raising the Entrenched Road as the site conditions may warrant.

Technical Information Sheet Environmentally Sensitive Maintenance Practices (ESMPs)

Practice: *ESMP #13 Slope Geometry, Benching, and Diversion Swales*

Category: Practices Related to Road and Stream Banks

Refer to: Manual Chapter 6, Sections 6.4.2.1, 6.4.2.2, 6.4.2.3

Description: Slope geometry, benching, and diversion swales are all related to bank stability. Whether the bank requires stabilization and what practice or practices will be the most appropriate remedy can only be ascertained from a initial site visit that includes a thorough review and analysis of conditions. To determine the stability of a bank, we

ESMP#13-01 Eroded roadside banks are common sights, but add up to a large erosion and sediment pollution problem effecting both roads and the environment. Site investigation and corrective actions are essential.

must consider the site's topography along with the soils, drainage conditions, and vegetation (Chapter 6, Section 6.4.1). Based on this site investigation, the selected practices can be effectively implemented. Diversion swales are used where a vast area drains down toward the road, adding significant surface drainage flows down over the road embankment to the roadside ditch. The diversion swale will divert the upslope surface flow away from the road and roadside ditch. Slope geometry has to do with the degree or steepness of the bank itself and the bank's surface condition. Flattening slopes and roughening or grooving the bank surface are practices that alter the slope geometry for greater stability. Benching is the establishment of a bench or step or multiples steps across a steep bank to aid in stability. Each practice is described in detail below.

Common Practice and Associated Problems: Common road maintenance practices tend toward cutting the toe of slopes (bank gouging), cutting or cleaning banks for better sight distance, and smoothing the surface until it "shines,", all of which can lead to bank instability, resulting in erosion and sediment pollution, and eventually to road deterioration as ditches fill and flood. Cutting the toe of slope leaves a certain-to-erode vertical surface, unable to withstand gravity's relentless force as the bank attempts to re-stabilize itself. In most maintenance work involving bank cleaning or cutting for whatever reasons, the work ends with bare soil remaining, subject to erosion from the impact of raindrops and surface flows, carrying the sediment into the roadside ditches or downhill into the adjacent stream. Reestablishing vegetation is a necessary part of this work and should not be overlooked. Bank cutting often results in a smooth bank surface. The equipment operator's expertise used to be defined by how well the operator could "shine" the bank surface. Then, if we did try to seed and mulch this extra smooth sloped surface, the results were much less than desired.

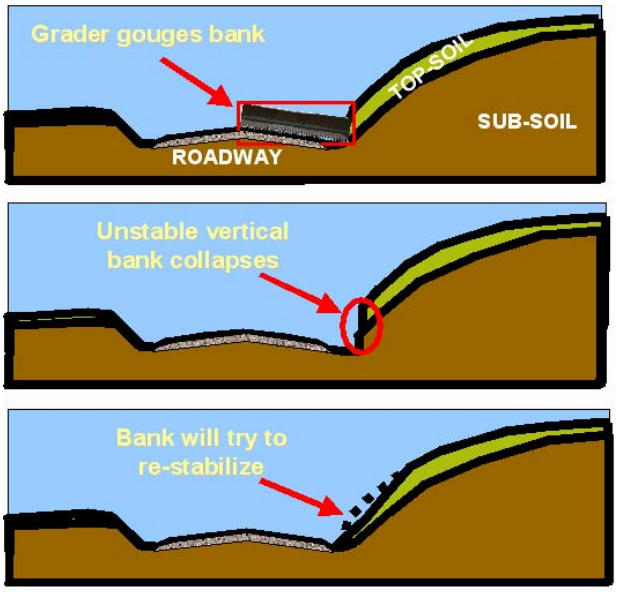

Figure 1: Bank Gouging

Installation: Diversion swales divert upslope surface water before it washes over the top of the road bank and into the road's drainage ditch. Diversion swale profiles can vary, but are normally wide with gradual side slopes. Swales must contain the overland flow and not be overtopped. Diversion swales must be stable, with a level longitudinal grade for infiltration back into the soil or sloped to an adequate discharge area. Diversion swales effectively drain, low, gradual vegetative slopes. The surface runoff from the entire upward slope drains into a swale at the top of the road embankment. The road bank would then be protected against erosion gullies. The volume of water to be handled by the road ditch decreases along with the size of the road ditch and potential flooding and erosion problems. Diversion swales are usually outside the right-of-way but need not interfere with agriculture. Wider and more gradual, the sideslopes and longitudinal slope will result in more infiltration and less flow accumulation. By eliminating washouts and

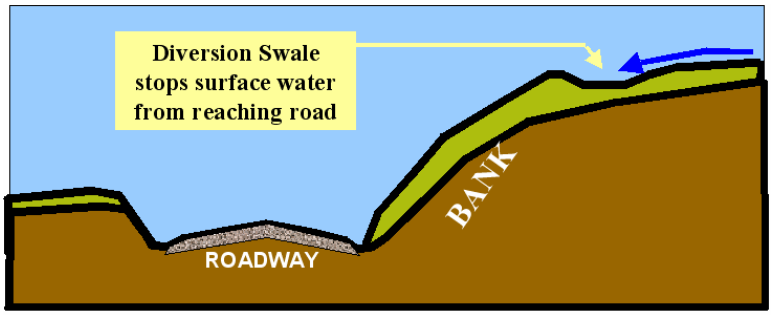

Figure 2: Diversion Swale

erosion gullies that form down over the road bank and start to "eat" back into the hillside, the swale can actually improve drainage of the landowner's property.

ESMP#13-02 Diversion Swale: Wider swales and gradual slopes result in more infiltration and less water volume to handle.

Begin by examining the slope. Flattening a steep slope and roughening or grooving the surface slows the water flow down the surface and with properly re-established vegetation can eliminate the erosion potential. On the uphill side, flattening the slope will move the top of the bank further away from the road and possibly beyond the right-of-way limits. The same may hold for flattening the slope on the downhill side as we add material and extend the toe of the embankment further away from the road. Right-of-way limits, land use, and property owner expectations all need to be considered.

Roughening, grooving, or tracking slopes are simply methods to simulate natural conditions. We need to think in terms of existing natural banks. Natural banks are not regular or consistent as to surface and slope and they are not polished and shiny. These techniques require light equipment in order to prevent packing the soil to the detriment of plant growth. Track equipment should be used up and down the slope, not across, so the grooves catch water and hold seeds and mulch. Roughening, grooving, or tracking of slopes catch rainwater, slow surface water flow, reduce erosion, increase infiltration, and trap sediment. In addition, by holding water, seeds, and nutrients, the rough surface enhances vegetative growth.

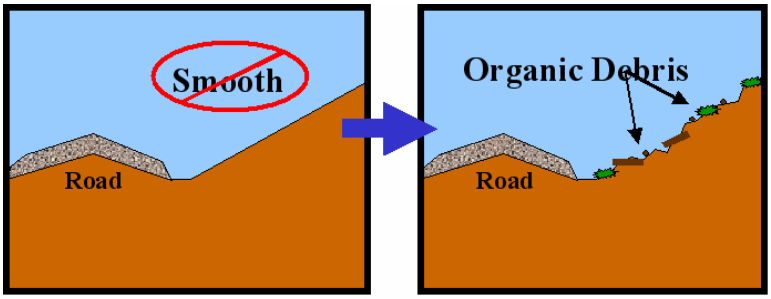

Figure 3: Roughening, grooving, or tracking slopes have many advantages in stabilizing banks

ESMP#13-03 Tracking newly constructed banks.

Benching is commonly used effectively on long, steep slopes with the same benefits of holding soil, water, seed, and mulch for enhanced vegetation growth, as listed above for roughening the sloped surface. The top of the bank may have to be moved back and may be off the right-of-way. A

good working relationship with property owners is again required.

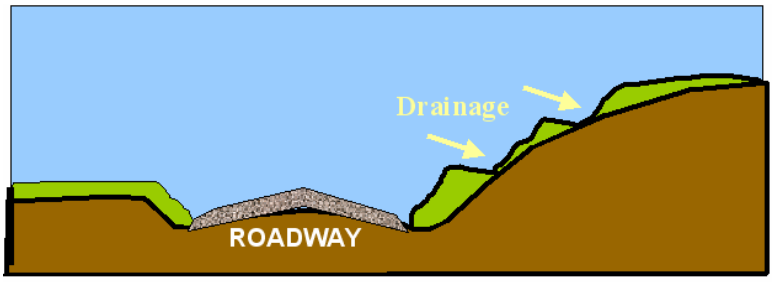

Figure 4: Benching is commonly used on steep slopes

The bench needs to collect water. The outside edge needs to be higher than the inner edge to prevent over the bank flow, as shown in Figure 4. The bench then should have a gradient to drain the bench to a proper outlet. Some benches can be gradually run out to the road ditch grade, for drainage. Do not overlook the use of smaller multiple benches or steps, and keeping some irregularity for a more natural appearance, if appropriate for the site.

ESMP#13-04 Newly constructed low-gradient bank bench.

Advantages: All of these practices result in improved bank stability, tending to do all of the following:

- Catching rain water
- Slowing surface water flow
- Reducing erosion
- Increasing filtration
- Trapping sediment
- Holding water, seeds and mulch for enhanced vegetative growth.

Whether diversion swales, flattened slopes, rough surfaces, or benches, there will be less erosion, less sediment, and less maintenance.

Safety Considerations: Bank stability results in better roadside conditions and less road deterioration, resulting in safer roads.

Related Practices:

Manual Chapter 6, Section 6.4.1 Initial Site Visit
Manual Chapter 6, Section 6.4.2.4 Seeding and Mulching
Manual Chapter 6, Section 6.4.3 Bioengineering Techniques

Technical Information Sheet Environmentally Sensitive Maintenance Practices (ESMPs)

Practice: *ESMP #14 Roadside Trees – Using the Forest System to Reduce Maintenance*

Category: Practices Related to Roadsides

Refer to: Manual Chapter 6, Sections 6.3

Description: By taking advantage of natural principles when managing roadside trees, it is possible to provide safe clearances, enough shade to control dust and invasive species and eliminate the rapid re-growth of colonizer species and frequent mowing cycles. Roads that look like they are in harmony with nature, require less money to maintain, pollute less, and offer the additional benefit of being beautiful. We need to develop a strategy following some basic guidelines to **use the forest system to reduce maintenance.**

ESMP#14-01 Following some guiding natural principles, we can use the forest system to reduce maintenance.

Tree trimming and removal, brushing, brush cutting, and right-of-way clearing are all terms for roadside vegetation management. These activities are common, and road managers may need to perform these activities for a variety of reasons. We need to look at these common practices and reasons, however, and determine what is best for our roads and the environment.

Common Practice and Associated Problems: The normal methods used to trim trees and remove brush along roadsides include manual methods ranging from chainsaws to hand pruners; mechanical methods using mowers and brush cutters; and chemical methods with chemical application equipment and herbicides. All of these methods and equipment have their place in an integrated vegetation management program and can be used effectively. There are some cautions, however, that should be noted.

In an environmentally sensitive maintenance program, chemical methods using herbicides are certainly a concern. Due to the many hazards associated with herbicides, federal and state governments have adopted various laws and regulations governing their use. These regulations require local government applicators to become certified through

testing. Environmentally sensitive maintenance does not promote the use of herbicides. If you do use herbicides, you must become familiar with the laws and follow all the requirements and regulations associated with herbicides use.

Boom mowers bring up an additional caution. Boom mowers, when properly used, can be labor saving. One only has to travel, however, down a road on which a boom mower was used, destroying the roadside vegetation and leaving a hurricane-aftermath look, to realize that the use of this equipment can get out of hand. Damage to large tree limbs can eventually kill the total tree. Refer back to the discussion in Chapter 4 on understanding your trees and the effects of wounds. In addition, boom mower operators are frequently instructed to cut "everything you can reach and everything small enough that you can cut." This direction and practice will ultimately have, as its consequence, roadsides vegetated only by large trees. Some of the most beautiful, slow-growing, strong, wildlife-friendly trees along the roads are being systematically removed because they have the misfortune of being small. Planners frequently choose trees such as dogwood and serviceberry as roadside trees. Yet they are often removed by boom mower operations just because of their size. Would it not have been better to remove the big old damaged or dead trees and save those small dogwoods? The dogwood makes an excellent roadside tree with the added value of blossoms to beautify the roadside in the spring.

ESMP#14-02 Dogwoods are a good roadside tree with the added value of aesthetics.

A third caution is the common practice of traditional right-of-way clearing and its use for dirt and gravel roads. Traditional clearing practices may have their place on the interstate and superhighways, but they can cause continually more maintenance work when used on our gravel roads in forested areas. Common accepted reasons for clearing the roadside of trees and bushes are to eliminate shade, improve visibility, establish a safety clear zone and reduce routine tree trimming. Although all of these reasons have some merit and may apply for some roads, we need to look closely at the conditions created and the need for future maintenance.

Although shading is viewed as negative, it also has advantages. Shading retains road moisture, cutting dust. Shading reduces the growth of unwanted colonizer trees and encourages desirable plant growth. A limited amount of shading may be more effective and efficient for our unpaved road maintenance and the environment.

Regarding visibility, one of the greatest safety hazards results from an abrupt transition from bright sunlight to dense shade or vice versa. This extreme change in light can have a devastating effect on the motorists' visibility and be a direct cause of accidents. This type of extreme change in light conditions should be avoided.

Traditional clearing techniques involve total removal of brush and vegetation along the roadside from right-of-way line to right-of-way line, typically resulting in vastly increased sunlight along the edge of the road. Looking at the sequence of events in a traditional cleared roadside, however, this may not be what is desired. If the roadside is wooded or forested and the road well shaded and we automatically go in and cut everything down, as shown in Figure 1a to 1b, on each side of the road for whatever distance we consider necessary, the results may lead to increased maintenance.

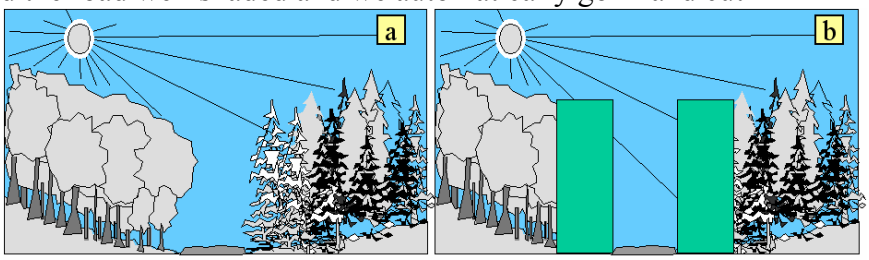

Traditional clearing practice for a shaded road would be from right-of-way line to right-of-way line.

Figure 1

When a section of trees is cut down, the remaining trees along the cut edge are open to storms and wind and may not be structurally strong enough to withstand these conditions. Wind damage, broken branches, and even uprooting can result, as shown in Figure 2a. Other problems include the rapid regrowth of the removed trees through stump sprouts, which are structurally weak and can become a continual maintenance problem. In addition, exposing low growing, broad-leafed, shade-tolerant plants to full sunlight typically kills them, with the potential of soil erosion.

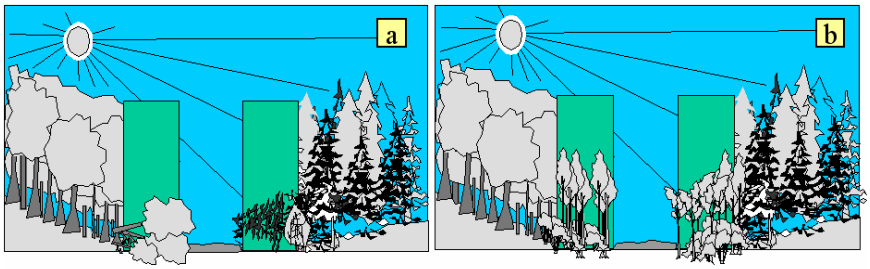

Common reaction of previously protected trees exposed by clear cutting - broken stems, wind damage, uprooting.

Dense weak colonizer growth, which can threaten roadway & recreate shade, appears surprisingly fast.

Figure 2

When the roadsides, previously shaded, receive full sunlight, nature produces vigorous growth, as depicted in Figure 2b. This vigorous growth is due to the invasion of colonizer species that are most attracted to this environment, but are the worst possible roadside plants. Colonizer species, which we described in Chapter 4, Section 4.5.4 on succession, are fast-growing, weak growth types. Colonizer trees can threaten the roadway safety and recreate shade. These colonizer trees then become extremely high maintenance roadside plants. In many cases the plants we most want to remove are the plants most encouraged by our efforts. This creates the need to mow and trim in increasingly frequent cycles.

ESMP#14-03 You do not need fast-growing, weak-structured colonizer-type roadside trees!

So in this scenario, the mowing/removal of trees and brush in the interest of safety and visibility, have the opposite effect, starting an endless cycle of cutting and re-cutting of this colonizer growth.

ESMP#14-04 Remove dead, diseased, unstable, or dying trees first.

Alternative Practices: The solution is to **use the forest system to reduce maintenance.** Be selective! When doing roadside trimming and tree removal, remember to remove the dead, dying, unstable or damaged trees first. Trees that have been damaged by previous maintenance activities, automobile accidents, etc. will eventually die and become hazards.

The second priority is to remove the existing colonizer trees. These trees, even if they are healthy, are not good roadside trees. They are very rapid growers, have weak structures and short lives. They commonly fall onto the road or drop limbs, which create maintenance and hazards.

After removing the damaged trees and the colonizers, it is advisable to look the situation over and evaluate the rest of the trees. Maintaining strong, slow-growing, deep-rooted climax species should be an objective (refer to chapter 4, Section 4.5.4). Avoid straight-line cutting, however, favoring instead an irregular edge. Traffic will tend to travel more slowly on a road with an irregular edge. Speed has always been a major safety problem for our dirt and gravel roads. Clearing the roadside completely or cutting back on a straight line parallel to the road gives the motorist the safe illusion to increase speed.

Maintaining a uniform level of shading is best. One of the greatest dangers from shading comes from winter conditions where pockets of deep shade create irregular icing conditions. Thinning of the canopy to achieve the desired shade density should be the objective. Remember, deciduous trees will lose all their leaves in the winter, letting more sunlight penetrate to the road. Sometimes it is necessary to thin back off the edge of the right-of-way, as the desired sunlight may only be available from the side, not from above. Obviously it is necessary to discuss your plans and objectives with property owners to receive permission to work off the right-of-way.

Advantages: In a situation where a dirt and gravel road is heavily lined with trees or passes through forested areas, a program of vegetation management that seeks to use the forest system and take advantage of natural principles can save time and money in several ways.

ESMP#14-05 A before and after look at selective tree trimming during a road project – using the forest system to reduce maintenance.

1. Allowing a level of shading helps to retain moisture. Moisture is nature's stabilizing agent. Allowing enough shade to remain to hold some moisture on dirt and gravel roads helps to hold the surface together and reduce dust. Although few road managers would readily identify moisture retainage as a benefit of shaded roads, they will almost always tell you they use less dust control in shaded areas.

2. Maintaining shade along our roads reduces the establishment of colonizer species (aspen, birch, poplar, sumac, striped maple, etc.). These rapid growing, weak-wooded trees are the ones which create the biggest maintenance problems, especially during winter maintenance operations when they lean out into the road laden with heavy wet snow.

3. The trees that are removed are less likely to return as stump sprouts. All of us have witnessed the rapid return of vegetation under new power line cuts. This is usually a combination of stump sprouts and colonizer species, resulting in increased mowing cycles. This scenario can be avoided by simply allowing the road to remain partially shaded.

A well-maintained roadside forest system also adds to the aesthetics, which in turn enhances tourism.

Safety Considerations: Safety factors were discussed throughout the above. Well-managed roadsides with structurally strong, deep-rooted, long-lived trees will be safe roads. These roads will also be easier to keep clear and safe through the winter snows. And irregular edges have a tendency to reduce traffic speeds for additional safety.

Related Practices:

Manual Chapter 6, Section 6.3.3.7 Tree Leaves
Manual Chapter 6, Section 6.3.4 Using Other Plants for the Roadside

Technical Information Sheet Environmentally Sensitive Maintenance Practices (ESMPs)

Practice: *ESMP #15 Road Separation Fabrics*

Category: Practices Using Geosynthetics

Refer to: Manual Chapter 7, Sections 7.4.4.6

Description: Road separation fabrics are geosynthetic fabrics that separate the subsoil from the road aggregate, providing improved road stability and reinforcement, improved drainage, prevention of subgrade pumping of fines, and thereby dust reduction.

How They Work: When roads are built, the subsoil or subgrade is prepared with a crown, then a specified thickness of aggregate is laid down and compacted ***(Figure 1a).*** Over time, however, depending on conditions (water and traffic), the aggregate gets pushed down into the soils and the soils pump up through the aggregate ***(Figure 1b).*** We end up with a transition zone not as strong as the aggregate, and the road can no longer support the traffic loads with deterioration as the result.

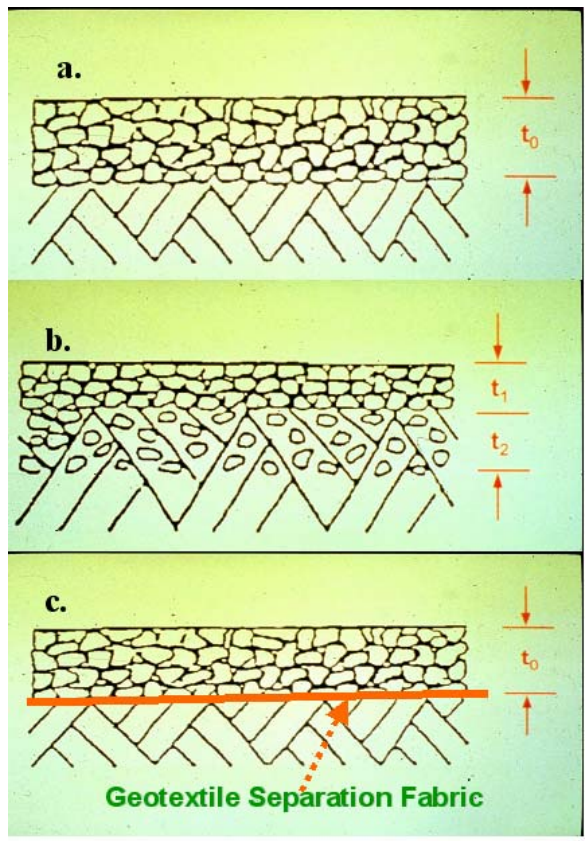

Figure 1: The value of Separation Fabrics

With the separation fabrics, we prepare the subgrade, roll out the fabric, and build the road on top of the fabric ***(Figure 1c).*** The aggregate cannot be pushed into the soil, and the soil cannot pump up into the aggregate. Everything stays in place, and the road remains strong enough as designed for the traffic loads. Water can travel either way, but if it gets into the road, it can drain downward or out laterally due to the crown into side ditches or subdrains. The prevention of soil fines from pumping up through the aggregate to the road surface eliminates the mud in wet weather and the dust in dry weather.

Installation: Fabrics come in woven or non-woven types for this application. The existing road conditions, particularly the aggregate, rock outcrops, water and saturated subsoils, are considered in selection of the fabric type. Transverse joints should be overlapped a minimum of 18 inches in the direction of traffic. Fabric rolls come in standard 12-, 15-, and 18-foot widths (or customized to any width), eliminating the need for longitudinal joints.

ESMP#15-01 Separation fabrics keep the soil and road aggregate in place.

Installation steps include surface preparation with an established crown, rolling out the fabric, placing the road aggregate, and compacting. Aggregate should be backdumped from the truck to a minimum depth of 6 inches, preferably 8 inches. Grading and re-establishing the crown followed by compaction of the aggregate completes the project, as depicted in the series of photos. On this project, sections of the road received additional

Rolls of fabric waiting for installation

Rolling out the fabric

Backdumping the aggregate

Spreading the aggregate

Compacting the aggregate

Final grading

ESMP#15-02 Installation of a separation fabric.

shale material to raise the road elevation (refer to Tech Sheet #ESMP 12, Raising the Entrenched Road).

If the fabric gets damaged during placement, simply patch with another piece of fabric making sure that an 18” overlap on all sides is maintained. Tears can happen, as shown in the photo, where the blade of the dozer caught the fabric by accident.

ESMP#15-03 If damaged, use a fabric patch with 18" overlap on all sides.

Advantages: The use of separation fabrics provides us with a number of advantages:

- Stabilization
- Prevention subgrade pumping
- Drainage improvement
- Rutting and pothole reduction
- Dust reduction
- Reduced maintenance and costs
- Longer road life

Fabrics also help to distribute traffic loads over a greater area, making them advantageous to use over soft, saturated soil conditions. Figure 2 shows this load distribution effect of the fabric. (Traffic load distribution was discussed in Chapter 5, Section 5.3.5, Practices Related to Culverts in regards to culvert installations.)

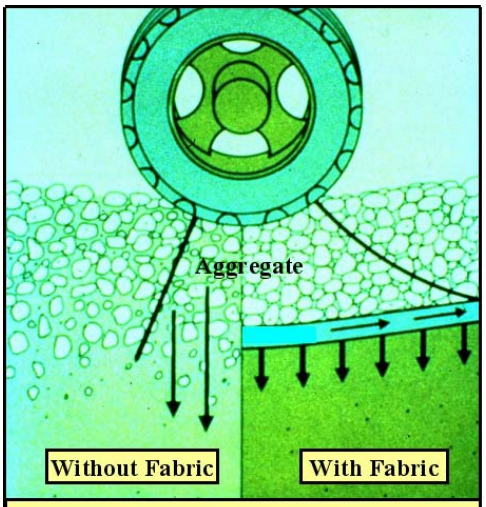

Figure 2
Fabrics Separate & Distribute the Load

ESMP#15-04 Separation fabrics have proven to be effective.

Separation fabric applications prove effective to substantially reduce road deterioration, resulting in reduction of road maintenance.

The use of fabrics for stabilizing water-crossing areas in conjunction with broad based dips and driveways was mentioned in Chapter 5. In these applications, they perform a reinforcement function and a separation function to strengthen and keep these areas intact.

Safety Considerations: Structurally strong roads that remain in place with minor maintenance will be safer roads.

Related Practices:

ESMP #04 Broad Based Dips
ESMP #06 Driveways
ESMP #12 Raising the Entrenched Road
ESMP #11 Stream Saver System
Manual Chapter 7, Section 7.4.4 Geosynthetic Applications in Road Maintenance

PROPOSED 2006 CWA SECTION 303(d) LIST OF WATER QUALITY LIMITED SEGMENTS

SWRCB APPROVAL DATE: OCTOBER 25, 2006

REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
1	B	Bodega HU, Bodega Harbor HA	11522000				
				Exotic Species		810 Acres	2019
					Source Unknown		
1	R	Bodega HU, Estero Americano HA, Americano Creek	11530000				
				Nutrients		38 Miles	2019
				The Bodega HU, Estero Americano HA, Americano Creek includes the following Calwater Super Planning Watersheds (SPWs): 115.30010 and 115.30011. Water Quality Attainment strategy is attempting to increase voluntary measures for attainment of standards & objectives, as was done in the Estero de San Antonio/Stemple Creek TMDL Water Quality Attainment Strategy, adopted by NCRWQCB in Dec, 97.			
					Pasture Grazing-Riparian and/or Upland		
					Range Grazing-Riparian		
					Range Grazing-Upland		
					Intensive Animal Feeding Operations		
					Manure Lagoons		
					Dairies		
1	E	Bodega HU, Estero Americano HA, estuary	11530012				
				Nutrients		199 Acres	2019
				Water Quality Attainment strategy is attempting to increase voluntary measures for attainment of standards & objectives, as was done in the Estero de San Antonio/Stemple Creek TMDL Water Quality Attainment Strategy, adopted by North Coast Regional Water Quality Control Board (NCRWQCB) in Dec, 97.			
					Pasture Grazing-Riparian and/or Upland		
					Manure Lagoons		
				Sedimentation/Siltation		199 Acres	2019
				Water Quality Attainment strategy is attempting to increase voluntary measures for attainment of standards & objectives, as was done in the Estero de San Antonio/Stemple Creek TMDL Water Quality Attainment Strategy, adopted by NCRWQCB in Dec, 97.			
					Range Grazing-Riparian		
					Hydromodification		
					Removal of Riparian Vegetation		
					Streambank Modification/Destabilization		
					Erosion/Siltation		
					Nonpoint Source		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
1	R	Cape Mendocino HU, Mattole River HA, Mattole River	11230000				
				Temperature, water		503 Miles	2019
					Range Grazing-Riparian and/or Upland		
					Silviculture		
					Road Construction		
					Habitat Modification		
					Removal of Riparian Vegetation		
					Natural Sources		
					Nonpoint Source		
1	R	Eel River HU, Lower Eel River HA, Eel River Delta	11110000				
				Sedimentation/Siltation		426 Miles	2019
					Range Grazing-Riparian and/or Upland		
					Silviculture		
					Nonpoint Source		
				Temperature, water		426 Miles	2019
					Removal of Riparian Vegetation		
					Nonpoint Source		
1	R	Eel River HU, Middle Fork HA	11170000				
				Temperature, water		1071 Miles	2019
				USEPA will develop a TMDL for Eel River, Middle Fork.			
					Removal of Riparian Vegetation		
					Nonpoint Source		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
1	R	Eel River HU, Middle Main HA	11140000				
				Sedimentation/Siltation		674 Miles	2004
					Range Grazing-Riparian		
					Range Grazing-Upland		
					Silviculture		
					Harvesting, Restoration, Residue Management		
					Logging Road Construction/Maintenance		
					Construction/Land Development		
					Land Development		
					Hydromodification		
					Habitat Modification		
					Removal of Riparian Vegetation		
					Streambank Modification/Destabilization		
					Erosion/Siltation		
				Temperature, water		674 Miles	2019
				USEPA has committed to developing TMDLs for sediment and temperature for the Middle Main Eel River.			
					Upstream Impoundment		
					Habitat Modification		
					Removal of Riparian Vegetation		
					Streambank Modification/Destabilization		
					Drainage/Filling Of Wetlands		
					Channel Erosion		
					Erosion/Siltation		
1	R	Eel River HU, North Fork HA	11150000				
				Temperature, water		382 Miles	2019
				USEPA Will develop a Temperature TMDL for Eel River, North Fork.			
					Habitat Modification		
					Removal of Riparian Vegetation		
					Streambank Modification/Destabilization		
					Nonpoint Source		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
1	R	Eel River HU, South Fork HA	11130000				
				Temperature, water		943 Miles	2019
				USEPA will develop a temperature TMDL for the Eel River, South Fork.			
					Hydromodification		
					Flow Regulation/Modification		
					Removal of Riparian Vegetation		
					Erosion/Siltation		
					Nonpoint Source		
1	R	Eel River HU, Upper Main HA (Includes Tomki Creek)	11160000				
				Sedimentation/Siltation		1141 Miles	2019
				USEPA will develop a TMDL for Eel River, Upper Main Fork.			
					Agriculture-grazing		
					Silviculture		
					Harvesting, Restoration, Residue Management		
					Logging Road Construction/Maintenance		
					Silvicultural Point Sources		
					Construction/Land Development		
					Highway/Road/Bridge Construction		
					Removal of Riparian Vegetation		
					Streambank Modification/Destabilization		
					Erosion/Siltation		
				Temperature, water		1141 Miles	2019
				USEPA will develop a TMDL for Eel River, Upper Main Fork.			
					Channelization		
					Habitat Modification		
					Removal of Riparian Vegetation		
					Streambank Modification/Destabilization		
					Drainage/Filling Of Wetlands		
					Nonpoint Source		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
1	L	Eel River HU, Upper Main HA, Lake Pillsbury HSA, Lake Pillsbury	11163000				
				Mercury		1973 Acres	2019
					Inactive Mining		
					Natural Sources		
					Nonpoint Source		
1	R	Eureka Plain HU, Elk River	11000000				
				Sedimentation/Siltation		88 Miles	2019
				The Eureka Plain HU, Elk River, includes the following Calwater Planning Watersheds (PWS): 110.00021, 110.00030, 110.00032, and 110.00042. Sedimentation, threat of sedimentation, impaired irrigation water quality, impaired domestic supply water quality, impaired spawning habitat, increased rate and depth of flooding due to sediment, property damage. NCRWQCB and California Department of forestry staff are involved in ongoing efforts to attain adherance to Forest Practice Rules.			
					Silviculture		
					Harvesting, Restoration, Residue Management		
					Logging Road Construction/Maintenance		
					Removal of Riparian Vegetation		
					Streambank Modification/Destabilization		
					Erosion/Siltation		
					Natural Sources		
					Nonpoint Source		
1	R	Eureka Plain HU, Freshwater Creek	11000000				
				Sedimentation/Siltation		84 Miles	2019
				The Eureka Plain HU, Freshwater Creek, includes the following Calwater Planning Watersheds (PWS): 110.00011, 110.00012, 110.00014, 110.00040, and 110.00050. Sedimentation, threat of sedimentation, impaired irrigation water quality, impaired domestic supply water quality, impaired spawning habitat, increased rate and depth of flooding due to sediment, property damage. NCRWQCB and California Department of forestry staff are involved in ongoing efforts to attain adherance to Forest Practice Rules.			
					Silviculture		
					Harvesting, Restoration, Residue Management		
					Logging Road Construction/Maintenance		
					Removal of Riparian Vegetation		
					Streambank Modification/Destabilization		
					Erosion/Siltation		
					Natural Sources		
					Nonpoint Source		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
1	B	Eureka Plain HU, Humboldt Bay	11000000				
				Dioxin Toxic Equivalents		16075 Acres	2019
					Source Unknown		
				PCBs (Polychlorinated biphenyls)		16075 Acres	2019
				This listing was made by USEPA.			
					Source Unknown		
1	R	Eureka Plain HU, Jacoby Creek watershed	11000000				
				Sediment		19 Miles	2019
				The Eureka Plain HU, Jacoby Creek watershed includes the following Calwater Planning Watersheds (PWS): 110.00010 and 110.00013. The beneficial uses of Jacoby Creek appear to be threatened. Specifically, records show a decline in the salmonid fishery in Jacoby Creek, and this decline appears to be correlated with sedimentation.			
					Silviculture		
					Road Construction		
					Land Development		
					Disturbed Sites (Land Develop.)		
					Urban Runoff/Storm Sewers		
					Hydromodification		
					Channelization		
					Removal of Riparian Vegetation		
					Streambank Modification/Destabilization		
					Drainage/Filling Of Wetlands		
					Channel Erosion		
					Erosion/Siltation		
					Sediment Resuspension		
					Natural Sources		
					Nonpoint Source		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
1	R	Klamath River HU, Butte Valley HA	10580000				
				Nutrients		253 Miles	2019
				The Klamath River, from source to mouth, is listed as water quality impaired (by both Oregon and California) under Section 303(d) of the Federal Clean Water Act. In 1992 the California State Water Quality Control Board (SWQCB) proposed that the Klamath River be listed for both temperature and nutrients, requiring the development of Total Maximum Daily Load (TMDL) limits and implementation plans. The United States Environmental Protection Agency (USEPA) and the NCRWQCB accepted this action in 1993. The basis for listing the Klamath River as impaired was aquatic habitat degradation due to excessively warm water temperatures and algae blooms associated with high nutrient loads, water impoundments, and agricultural water diversions.			
					Nonpoint Source		
				Temperature, water		253 Miles	2019
				The Klamath River, from source to mouth, is listed as water quality impaired (by both Oregon and California) under Section 303(d) of the Federal Clean Water Act. In 1992 the SWQCB proposed that the Klamath River be listed for both temperature and nutrients, requiring the development of Total Maximum Daily Load (TMDL) limits and implementation plans. The United States Environmental Protection Agency (USEPA) and the NCRWQCB accepted this action in 1993. The basis for listing the Klamath River as impaired was aquatic habitat degradation due to excessively warm water temperatures and algae blooms associated with high nutrient loads, water impoundments, and agricultural water diversions.			
					Nonpoint Source		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
1	R	Klamath River HU, Lost River HA, Tule Lake and Mt Dome HSAs	10590000				
				Nutrients		612 Miles	2006
				The Klamath River HU, Lost River HA, Tule Lake and Mt Dome includes the following Hydrologic Sub Areas (HSAs): Mt. Dome HSA 105.91 and Tule Lake HSA 105.92. The Klamath River, from source to mouth, is listed as water quality impaired (by both Oregon and California) under Section 303(d) of the Federal Clean Water Act. In 1992 the California State Water Quality Control Board (SWQCB) proposed that the Klamath River be listed for both temperature and nutrients, requiring the development of Total Maximum Daily Load (TMDL) limits and implementation plans. The United States Environmental Protection Agency (USEPA) and the NCRWQCB accepted this action in 1993. The basis for listing the Klamath River as impaired was aquatic habitat degradation due to excessively warm water temperatures and algae blooms associated with high nutrient loads, water impoundments, and agricultural water diversions.		
					Agriculture		
					Specialty Crop Production		
					Agriculture-subsurface drainage		
					Agriculture-irrigation tailwater		
					Agricultural Return Flows		
					Water Diversions		
					Agricultural Water Diversion		
					Habitat Modification		
					Removal of Riparian Vegetation		
					Drainage/Filling Of Wetlands		
					Natural Sources		
					Nonpoint Source		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
1	R	Klamath River HU, Lower HA, Klamath Glen HSA	10511000				
				Nutrients		609 Miles	2006
				Klamath Falls (Oregon) municipal wastewater discharge, industrial facilities, and US Bureau of Reclamation pumped discharge of agricultural waste are significant sources of nutrient loads to the Klamath River as it enters California.			
					Industrial Point Sources		
					Major Industrial Point Source		
					Minor Industrial Point Source		
					Municipal Point Sources		
					Major Municipal Point Source-dry and/or wet weather discharge		
					Minor Municipal Point Source-dry and/or wet weather discharge		
					Agriculture		
					Irrigated Crop Production		
					Specialty Crop Production		
					Pasture Grazing-Riparian and/or Upland		
					Range Grazing-Riparian		
					Intensive Animal Feeding Operations		
					Agriculture-storm runoff		
					Agriculture-subsurface drainage		
					Agriculture-irrigation tailwater		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
				Organic Enrichment/Low Dissolved Oxygen		609 Miles	2006
				Klamath Falls (Oregon) municipal wastewater discharge, industrial facilities, and US Bureau of Reclamation pumped discharge of agricultural waste are significant sources of organic enrichment of Klamath River waters flowing to California.			
					Industrial Point Sources		
					Municipal Point Sources		
					Agriculture		
					Irrigated Crop Production		
					Specialty Crop Production		
					Range Grazing-Riparian		
					Agriculture-storm runoff		
					Agriculture-subsurface drainage		
					Agriculture-irrigation tailwater		
					Agriculture-animal		
					Upstream Impoundment		
					Flow Regulation/Modification		
					Out-of-state source		
				Sedimentation/Siltation		609 Miles	2019
				If this listing is determined to be on tribal lands, USEPA should place this water body and pollutant on the section 303d list for the tribal lands. It is not the State Water Board's intent that this listing affect other actions related to decommissioning and removal of dams on the Klamath River			
					Source Unknown		
				Temperature, water		609 Miles	2006
				Flow regulation and diversion, coupled with reduced riparian vegetative cover and darker material on the channel bottom, all contribute to elevated water temperatures.			
					Hydromodification		
					Dam Construction		
					Upstream Impoundment		
					Flow Regulation/Modification		
					Water Diversions		
					Habitat Modification		
					Removal of Riparian Vegetation		
					Channel Erosion		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
1	R	Klamath River HU, Middle HA, Iron Gate Dam to Scott River	10530000				
				Nutrients		548 Miles	2006
				The Klamath River HU, Middle HA, Iron Gate Dam to Scott River includes the following Hydrologic Sub Areas (HSAs) : Beaver Creek HSA 105.35 and Hornbrook HSA 105.36. The Klamath River, from source to mouth, is listed as water quality impaired by both Oregon and California.			
					Out-of-state source		
					Nonpoint/Point Source		
				Organic Enrichment/Low Dissolved Oxygen		548 Miles	2006
				The Klamath River HU, Middle HA, Iron Gate Dam to Scott River includes the following Hydrologic Sub Areas (HSAs) : Beaver Creek HSA 105.35 and Hornbrook HSA 105.36. The impairment listing regarding dissolved oxygen was prompted by a 1997 United States Fish and Wildlife Service Report.			
					Out-of-state source		
					Nonpoint/Point Source		
				Temperature, water		548 Miles	2006
				The Klamath River HU, Middle HA, Iron Gate Dam to Scott River includes the following Hydrologic Sub Areas (HSAs) : Beaver Creek HSA 105.35 and Hornbrook HSA 105.36.			
					Hydromodification		
					Upstream Impoundment		
					Flow Regulation/Modification		
					Habitat Modification		
					Removal of Riparian Vegetation		
					Nonpoint Source		
1	R	Klamath River HU, Middle HA, Oregon to Iron Gate	10530000				
				Nutrients		129 Miles	2006
				The Klamath River HU, Middle HA, Oregon to Iron Gate Dam includes the following Hydrologic Sub Areas (HSAs): Iron Gate HSA 115.37 and Copco HSA 105.38.			
					Industrial Point Sources		
					Municipal Point Sources		
					Agriculture		
					Specialty Crop Production		
					Agricultural Return Flows		
					Internal Nutrient Cycling (primarily lakes)		
					Natural Sources		
					Nonpoint Source		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
				Organic Enrichment/Low Dissolved Oxygen		129 Miles	2006
				The Klamath River HU, Middle HA, Oregon to Iron Gate Dam includes the following Hydrologic Sub Areas (HSAs): Iron Gate HSA 115.37 and Copco HSA 105.38.			
					Industrial Point Sources		
					Municipal Point Sources		
					Agriculture		
					Irrigated Crop Production		
					Specialty Crop Production		
					Range Grazing-Riparian and/or Upland		
					Agriculture-storm runoff		
					Agriculture-subsurface drainage		
					Agriculture-irrigation tailwater		
					Agriculture-animal		
					Upstream Impoundment		
					Flow Regulation/Modification		
					Out-of-state source		
				Temperature, water		129 Miles	2006
				The Klamath River HU, Middle HA, Oregon to Iron Gate Dam includes the following Hydrologic Sub Areas (HSAs): Iron Gate HSA 115.37 and Copco HSA 105.38.			
					Hydromodification		
					Upstream Impoundment		
					Flow Regulation/Modification		
					Nonpoint Source		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
1	R	Klamath River HU, Middle HA, Scott River to Trinity River	10500000				
				Nutrients		1389 Miles	2006
				The Klamath River HU, Middle HA, Scott River to Trinity River includes the following Hydrologic Sub Areas (HSAs) : Orleans HSA 105.12, Ukonom HSA 105.31, Happy Camp HSA 105.32, and Seiad Valley HSA 105.33			
					Industrial Point Sources		
					Municipal Point Sources		
					Agriculture		
					Agriculture-storm runoff		
					Agriculture-irrigation tailwater		
					Wastewater - land disposal		
					Upstream Impoundment		
					Natural Sources		
					Nonpoint Source		
					Out-of-state source		
				Organic Enrichment/Low Dissolved Oxygen		1389 Miles	2006
				The Klamath River HU, Middle HA, Scott River to Trinity River includes the following Hydrologic Sub Areas (HSAs) : Orleans HSA 105.12, Ukonom HSA 105.31, Happy Camp HSA 105.32, and Seiad Valley HSA 105.33			
					Industrial Point Sources		
					Municipal Point Sources		
					Combined Sewer Overflow		
					Agriculture		
					Agriculture-storm runoff		
					Agriculture-irrigation tailwater		
					Upstream Impoundment		
					Flow Regulation/Modification		
					Out-of-state source		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
				Temperature, water		1389 Miles	2006
				The Klamath River HU, Middle HA, Scott River to Trinity River includes the following Hydrologic Sub Areas (HSAs) : Orleans HSA 105.12, Ukonom HSA 105.31, Happy Camp HSA 105.32, and Seiad Valley HSA 105.33			
					Hydromodification		
					Channelization		
					Dam Construction		
					Upstream Impoundment		
					Flow Regulation/Modification		
					Water Diversions		
					Habitat Modification		
					Removal of Riparian Vegetation		
					Streambank Modification/Destabilization		
					Drainage/Filling Of Wetlands		
					Natural Sources		
					Nonpoint Source		
1	R	Klamath River HU, Shasta River HA	10550000				
				Organic Enrichment/Low Dissolved Oxygen		630 Miles	2007
					Minor Municipal Point Source-dry and/or wet weather discharge		
					Agriculture-storm runoff		
					Agriculture-irrigation tailwater		
					Dairies		
					Hydromodification		
					Dam Construction		
					Flow Regulation/Modification		
					Habitat Modification		
				Temperature, water		630 Miles	2007
					Agriculture-irrigation tailwater		
					Flow Regulation/Modification		
					Habitat Modification		
					Removal of Riparian Vegetation		
					Drainage/Filling Of Wetlands		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
1	L	Klamath River HU, Tule Lake and Lower Klamath Lake National Wildlife Refuge	10590000				
				pH (high)		26998 Acres	2006
				The Klamath River HU, Tule Lake and Lower Klamath Lake National Wildlife Refuge includes the following Calwater Planning Watersheds (PWS): Lower Klamath Lake National Wildlife Refuge PWS 105.91020 and Tule Lake PWS 105.92020. The pH of surface water can influence the toxicity of dissolved materials resulting in synergistic and direct effects on biological systems. High pH levels influence ammonia concentrations which can be toxic to fish. In addition, high pH levels can increase the solubility of minerals and metals, which can effect fish and other aquatic organisms. Photosynthetic activity of algae effects carbonate cycling, which influences pH. Elevated pH levels in Tule Lake and Lower Klamath Lake National Wildlife Refuge are likely due to photosynthetic activity of algae.			
					Internal Nutrient Cycling (primarily lakes)		
					Nonpoint Source		
1	R	Mad River HU, Mad River	10900000				
				Sedimentation/Siltation		654 Miles	2019
				USEPA will develop TMDL for the Mad River. Sediment TMDLS will be developed for the area tributary to and including: (1) the Mad River (North Fork), (2) the mad River (Upper), and (3) the Mad River (Middle).			
					Silviculture		
					Resource Extraction		
					Nonpoint Source		
				Temperature, water		654 Miles	2019
				Recent (1997-2000) temperature data collected on the mainstem of the Mad River indicate that high temperature levels may be a source of impairment of cold water fisheries in the river. Data were available from 11 locations, with at least two years of record at most locations. MWAT values at all of the 11 locations exceeded 20°C, and are higher than any available temperature criteria for sub-lethal effects (reduced growth) on juvenile salmonids. Records also indicate that maximum temperatures at most of the 11 locations in most years are higher than 24°C.			
					Upstream Impoundment		
					Flow Regulation/Modification		
					Habitat Modification		
					Removal of Riparian Vegetation		
					Nonpoint Source		
					Unknown Nonpoint Source		
				Turbidity		654 Miles	2019
				Turbidity TMDLs will be developed for the area tributary to and including: (1) the Mad River (North Fork), (2) the Mad River (Upper), and (3) the Mad River (Middle).			
					Silviculture		
					Resource Extraction		
					Nonpoint Source		

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1	R	Mendocino Coast HU, Albion River HA, Albion River	11340000				
				Temperature, water		91 Miles	2019
					Source Unknown		
1	R	Mendocino Coast HU, Big River HA, Big River	11330000				
				Temperature, water		225 Miles	2019
				The most sensitive beneficial uses supported by the Big River include uses associated with the cold water fishery and municipal and domestic supply. The Big River provides habitat for coho salmon and steelhead trout, which are listed as a threatened species under the federal Endangered Species Act. Populations of coho salmon and steelhead trout in the Big River are extremely low compared to historical levels.Recent (1996-2000) temperature data gathered in the Big River watershed indicate that high temperature levels may be a source of impairment of cold water fisheries in the river. This listing is specific to the area of the watershed from the confluence with the North Fork Big River, including the watersheds of the mainstem Big and the North Fork Big.			
					Habitat Modification		
					Removal of Riparian Vegetation		
					Streambank Modification/Destabilization		
					Drainage/Filling Of Wetlands		
					Erosion/Siltation		
					Nonpoint Source		
1	R	Mendocino Coast HU, Garcia River HA, Garcia River	11370000				
				Temperature, water		154 Miles	2019
				Elevated temperatures impacting coldwater fisheries in these reaches and sub_areas: Planning Units 113.70010 (Pardaloe Creek), 113.70011, 12, 13, 14, 20, 21 and the entire mainstem Garcia River from Pardaloe Creek to the estuary, which includes that portion of 113.70022, 23, 24, 25, and 26. February 2002- The Garcia River TMDL for sediment has been adopted by NCRWQCB and approved by SWRCB and Office of Administrative Law. It is possible that voluntary compliance with measures in this TMDL will improve conditions related to temperature prior to development of a TMDL for temperature.			
					Habitat Modification		
					Removal of Riparian Vegetation		
					Streambank Modification/Destabilization		
					Nonpoint Source		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
1	R	Mendocino Coast HU, Gualala River HA, Gualala River	11380000				
				Temperature, water		455 Miles	2019
				Recent (1994-2000) temperature data collected in the Gualala River watershed indicate that high temperature levels may be a source of impairment of cold water fisheries in the watershed. Temperatures in the Little North Fork are generally below threshold levels and appear to exhibit properly functioning conditions with respect to stream temperature. The Gualala River is listed for temperature, with the exception of the Little North Fork.			
					Removal of Riparian Vegetation		
					Streambank Modification/Destabilization		
					Channel Erosion		
					Erosion/Siltation		
					Nonpoint Source		
1	R	Mendocino Coast HU, Navarro River HA	11350000				
				Temperature, water		415 Miles	2019
				Temperature TMDLs have been developed for: (1) the area tributary to and including the Navarro River above Philo and (2) the area tributary to and including the Navarro River below Philo.			
					Agriculture		
					Agricultural Return Flows		
					Resource Extraction		
					Flow Regulation/Modification		
					Water Diversions		
					Habitat Modification		
					Removal of Riparian Vegetation		
					Streambank Modification/Destabilization		
					Drainage/Filling Of Wetlands		
					Nonpoint Source		
1	R	Mendocino Coast HU, Noyo River HA, Noyo River	11320000				
				Temperature, water		144 Miles	2019
				This listing only applies to the following areas of the Noyo River watershed:----The Noyo River mainstem from the confluence of Duffy Gulch downtstream to the confluence with Hayshed Gulch;----The South Fork Noyo River mainstem from the confluence of Kass Creek downstream to the confluence with Noyo River mainstem; and ----The Little North Fork Noyo River, Duffy Gulch, and Kass Creek tributaries.			
					Source Unknown		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
1	R	Mendocino Coast HU, Noyo River HA, Pudding Creek	11320050				
				Temperature, water		24 Miles	2019
					Source Unknown		
1	R	Mendocino Coast HU, Rockport HA, Ten Mile River HSA	11310000				
				Temperature, water		162 Miles	2019
					Habitat Modification		
					Removal of Riparian Vegetation		
					Streambank Modification/Destabilization		
					Nonpoint Source		
1	R	Redwood Creek HU, Redwood Creek	10700000				
				Temperature, water		332 Miles	2019
				Recent (1994-2001) temperature data collected in the Redwood Creek watershed indicate that high temperature levels may be a source of impairment of cold water fisheries in the river.			
					Logging Road Construction/Maintenance		
					Removal of Riparian Vegetation		
					Streambank Modification/Destabilization		
					Erosion/Siltation		
					Natural Sources		
					Nonpoint Source		
1	R	Russian River HU, Lower Russian River HA, Austin Creek HSA	11412000				
				Sedimentation/Siltation		81 Miles	2019
				Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment.			
					Silviculture		
					Construction/Land Development		
					Disturbed Sites (Land Develop.)		
					Dam Construction		
					Flow Regulation/Modification		
					Erosion/Siltation		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
				Temperature, water		81 Miles	2019
				The most sensitive beneficial uses supported by the Russian River include uses associated with the cold water fishery and municipal and domestic supply. The Russian River provides habitat for coho salmon and steelhead trout, which are listed as a threatened species under the federal Endangered Species Act.Recent (1997-2000) temperature data collected in the Russian River watershed indicate that high temperature levels may be a source of impairment of cold water fisheries in the watershed.			
					Hydromodification		
					Flow Regulation/Modification		
					Habitat Modification		
					Removal of Riparian Vegetation		
					Nonpoint Source		
1	R	Russian River HU, Lower Russian River HA, Guerneville HSA	11411000				
				Pathogens		195 Miles	2008
				Listing covers only the Monte Rio area of this watershed from the confluence of Dutch Bill Creek to the confluence of Fife Creek and Healdsburg Memorial Beach from the Hwy 101 crossing to the railroad crossing upstream of the Beach.			
					Nonpoint/Point Source		
				pH		195 Miles	2019
				Listing only applies to Pocket Canyon Creek , a tributary to the lower Russian River within the greater Guerneville HSA.			
					Source Unknown		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
				Sedimentation/Siltation		195 Miles	2019
				Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment .			
					Agriculture		
					Irrigated Crop Production		
					Specialty Crop Production		
					Agriculture-storm runoff		
					Agriculture-grazing		
					Silviculture		
					Construction/Land Development		
					Highway/Road/Bridge Construction		
					Land Development		
					Hydromodification		
					Channelization		
					Dam Construction		
					Upstream Impoundment		
					Flow Regulation/Modification		
					Habitat Modification		
					Removal of Riparian Vegetation		
					Streambank Modification/Destabilization		
					Drainage/Filling Of Wetlands		
					Channel Erosion		
					Erosion/Siltation		
				Temperature, water		195 Miles	2019
				The most sensitive beneficial uses supported by the Russian River include uses associated with the cold water fishery and municipal and domestic supply. The Russian River provides habitat for coho salmon and steelhead trout, which are listed as a threatened species under the federal Endangered Species Act.Recent (1997-2000) temperature data collected in the Russian River watershed indicate that high temperature levels may be a source of impairment of cold water fisheries in the watershed.			
					Hydromodification		
					Upstream Impoundment		
					Flow Regulation/Modification		
					Habitat Modification		
					Removal of Riparian Vegetation		
					Streambank Modification/Destabilization		
					Nonpoint Source		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
1	R	Russian River HU, Middle Russian River HA, Big Sulphur Creek HSA	11426000				
				Sedimentation/Siltation		85 Miles	2019
				Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment .			
					Geothermal Development		
					Erosion/Siltation		
					Nonpoint Source		
				Specific Conductivity		85 Miles	2019
					Source Unknown		
				Temperature, water		85 Miles	2019
				The most sensitive beneficial uses supported by the Russian River include uses associated with the cold water fishery and municipal and domestic supply. The Russian River provides habitat for coho salmon and steelhead trout, which are listed as a threatened species under the federal Endangered Species Act.Recent (1997-2000) temperature data collected in the Russian River watershed indicate that high temperature levels may be a source of impairment of cold water fisheries in the watershed.			
					Flow Regulation/Modification		
					Habitat Modification		
					Removal of Riparian Vegetation		
					Nonpoint Source		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
1	R	Russian River HU, Middle Russian River HA, Geyserville HSA	11425000				
				Sedimentation/Siltation		242 Miles	2019
				Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment TMDL.			
					Agriculture		
					Nonirrigated Crop Production		
					Irrigated Crop Production		
					Specialty Crop Production		
					Range Grazing-Riparian		
					Range Grazing-Upland		
					Agriculture-storm runoff		
					Agriculture-grazing		
					Silviculture		
					Construction/Land Development		
					Geothermal Development		
					Disturbed Sites (Land Develop.)		
					Surface Runoff		
					Resource Extraction		
					Channelization		
					Bridge Construction		
					Removal of Riparian Vegetation		
					Streambank Modification/Destabilization		
					Drainage/Filling Of Wetlands		
					Channel Erosion		
					Erosion/Siltation		
					Natural Sources		
					Nonpoint Source		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
				Temperature, water		242 Miles	2019
				The most sensitive beneficial uses supported by the Russian River include uses associated with the cold water fishery and municipal and domestic supply. The Russian River provides habitat for coho salmon and steelhead trout, which are listed as a threatened species under the federal Endangered Species Act.Recent (1997-2000) temperature data collected in the Russian River watershed indicate that high temperature levels may be a source of impairment of cold water fisheries in the watershed.			
					Flow Regulation/Modification		
					Habitat Modification		
					Removal of Riparian Vegetation		
					Nonpoint Source		
1	R	Russian River HU, Middle Russian River HA, Laguna de Santa Rosa	11421000				
				Low Dissolved Oxygen		96 Miles	2008
				The Laguna de Santa Rosa was added to the 303(d) List in 1990 for high levels of ammonia and low dissolved oxygen (DO) concentrations. A TMDL was completed for the Laguna for ammonia and dissolved oxygen in 1995. The TMDL concluded that high ammonia levels in the Laguna were the result of point and non-point source nitrogen inputs of various forms. Low dissolved oxygen concentrations were a result of inputs of organic matter and nutrients which stimulate algal growth and subsequently cause depressed dissolved oxygen levels when the algae dies and decays. The TMDL took the form of a Waste Reduction Strategy (WRS) which addressed the reduction of nitrogen loading from point and non-point sources. With the implementation of the WRS and operational improvements at the City of Santa Rosa Waste Water Treatment Plant as well as improvements in waste storage and disposal activities at local dairies, nitrogen inputs to the Laguna were significantly reduced. Following implementation of the WRS and the subsequent attainment of nitrogen-ammonia interim concentration goals, as stated in the WRS, the Laguna was removed from the 303(d) List for ammonia and dissolved oxygen in 1998, pursuant to a recommendation by US EPA. However, dissolved oxygen levels in the Laguna continue to fall below the Regional Water Board Basin Plan minimum DO objective of 7.0 mg/L and in many cases fluctuate significantly on a daily and seasonal basis. Based on available information, it appears that phosphorus may contribute to the dissolved oxygen fluctuations. However, the cause of the low dissolved oxygen levels is not certain. While elevated phosphorus levels may contribute to low DO, nitrogen to phosphorus ratios, based on recent Laguna measurements, indicate that nitrogen may be the macronutrient controlling plant growth in the Laguna. A TMDL addressing nutrients (both nitrogen and phosphorus) and dissolved oxygen is necessary for water quality objective attainment.			
					Internal Nutrient Cycling (primarily lakes)		
					Nonpoint Source		
					Point Source		
				Mercury		96 Miles	2019
					Source Unknown		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
				Nitrogen		96 Miles	2019
				This listing was made by USEPA.			
					Internal Nutrient Cycling (primarily lakes)		
					Nonpoint Source		
					Point Source		
				Phosphorus		96 Miles	2019
				This listing was made by USEPA.			
					Internal Nutrient Cycling (primarily lakes)		
					Nonpoint Source		
					Point Source		
				Sedimentation/Siltation		96 Miles	2019
				Entire Russian River watershed (including Laguna de Santa Rosa) is listed for sedimentation.			
					Road Construction		
					Land Development		
					Disturbed Sites (Land Develop.)		
					Urban Runoff/Storm Sewers		
					Other Urban Runoff		
					Highway/Road/Bridge Runoff		
					Hydromodification		
					Channelization		
					Removal of Riparian Vegetation		
					Streambank Modification/Destabilization		
					Drainage/Filling Of Wetlands		
					Channel Erosion		
					Erosion/Siltation		
					Erosion From Derelict Land		
					Highway Maintenance and Runoff		
					Nonpoint Source		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
				Temperature, water		96 Miles	2008
				Entire Russian River watershed (including Laguna de Santa Rosa) is listed for temperature. The most sensitive beneficial uses supported by the Russian River include uses associated with the cold water fishery and municipal and domestic supply. The Russian River provides habitat for coho salmon and steelhead trout, which are listed as a threatened species under the federal Endangered Species Act.Recent (1997-2000) temperature data collected in the Russian River watershed indicate that high temperature levels may be a source of impairment of cold water fisheries in the watershed.			
					Hydromodification		
					Upstream Impoundment		
					Removal of Riparian Vegetation		
					Streambank Modification/Destabilization		
					Nonpoint Source		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
1	R	Russian River HU, Middle Russian River HA, Mark West Creek HSA	11423000				
				Sedimentation/Siltation		99 Miles	2019
				Russian River Watershed tributary sediment impairments led to listing of entire watershed for sediment .			
					Agriculture		
					Irrigated Crop Production		
					Specialty Crop Production		
					Range Grazing-Riparian and/or Upland		
					Range Grazing-Riparian		
					Intensive Animal Feeding Operations		
					Agriculture-storm runoff		
					Agriculture-grazing		
					Silviculture		
					Harvesting, Restoration, Residue Management		
					Construction/Land Development		
					Highway/Road/Bridge Construction		
					Land Development		
					Disturbed Sites (Land Develop.)		
					Other Urban Runoff		
					Surface Runoff		
					Removal of Riparian Vegetation		
					Streambank Modification/Destabilization		
					Drainage/Filling Of Wetlands		
					Channel Erosion		
					Erosion/Siltation		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
				Temperature, water		99 Miles	2019
				The most sensitive beneficial uses supported by the Russian River include uses associated with the cold water fishery and municipal and domestic supply. The Russian River provides habitat for coho salmon and steelhead trout, which are listed as a threatened species under the federal Endangered Species Act.Recent (1997-2000) temperature data collected in the Russian River watershed indicate that high temperature levels may be a source of impairment of cold water fisheries in the watershed.			
					Hydromodification		
					Upstream Impoundment		
					Flow Regulation/Modification		
					Habitat Modification		
					Removal of Riparian Vegetation		
					Streambank Modification/Destabilization		
					Nonpoint Source		
1	R	Russian River HU, Middle Russian River HA, Santa Rosa Creek	11422000				
				Pathogens		87 Miles	2008
					Nonpoint Source		
					Point Source		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
				Sedimentation/Siltation		87 Miles	2019
				Entire Russian River watershed (including Santa Rosa Creek) is listed for sedimentation.			
					Agriculture		
					Nonirrigated Crop Production		
					Irrigated Crop Production		
					Specialty Crop Production		
					Pasture Grazing-Riparian and/or Upland		
					Range Grazing-Riparian		
					Range Grazing-Upland		
					Dairies		
					Construction/Land Development		
					Highway/Road/Bridge Construction		
					Land Development		
					Urban Runoff/Storm Sewers		
					Urban Runoff--Non-industrial Permitted		
					Other Urban Runoff		
					Surface Runoff		
					Hydromodification		
					Channelization		
					Bridge Construction		
					Habitat Modification		
					Removal of Riparian Vegetation		
					Streambank Modification/Destabilization		
					Drainage/Filling Of Wetlands		
					Channel Erosion		
					Erosion/Siltation		
					Natural Sources		
					Nonpoint Source		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
				Temperature, water		87 Miles	2019
				Entire Russian River watershed (including Santa Rosa Creek) is listed for temperature.			
					Hydromodification		
					Upstream Impoundment		
					Removal of Riparian Vegetation		
					Streambank Modification/Destabilization		
					Nonpoint Source		
1	R	Russian River HU, Middle Russian River HA, Warm Springs HSA	11424000				
				Sedimentation/Siltation		255 Miles	2019
				Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment .			
					Agriculture		
					Agriculture-storm runoff		
					Silviculture		
					Logging Road Construction/Maintenance		
					Construction/Land Development		
					Highway/Road/Bridge Construction		
					Disturbed Sites (Land Develop.)		
					Hydromodification		
					Channelization		
					Dam Construction		
					Upstream Impoundment		
					Flow Regulation/Modification		
					Habitat Modification		
					Removal of Riparian Vegetation		
					Streambank Modification/Destabilization		
					Drainage/Filling Of Wetlands		
					Channel Erosion		
					Erosion/Siltation		
					Nonpoint Source		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
				Temperature, water		255 Miles	2019
				The most sensitive beneficial uses supported by the Russian River include uses associated with the cold water fishery and municipal and domestic supply. The Russian River provides habitat for coho salmon and steelhead trout, which are listed as a threatened species under the federal Endangered Species Act.Recent (1997-2000) temperature data collected in the Russian River watershed indicate that high temperature levels may be a source of impairment of cold water fisheries in the watershed.			
					Hydromodification		
					Upstream Impoundment		
					Flow Regulation/Modification		
					Habitat Modification		
					Removal of Riparian Vegetation		
					Streambank Modification/Destabilization		
					Nonpoint Source		
1	L	Russian River HU, Middle Russian River HA, Warm Springs HSA, Lake Sonoma [Reservoir]	11424000				
				Mercury		2377 Acres	2019
				The Russian River HU, Middle Russian River HA, Warm Springs HSA, Lake Sonoma [Reservoir] includes the following Calwater Planning Watersheds (PWS): 114.24022, 114.24030 and 114.24032.			
					Resource Extraction		
					Nonpoint Source		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
1	R	Russian River HU, Upper Russian River HA, Coyote Valley HSA	11432000				
				Sedimentation/Siltation		171 Miles	2019
				Russian River Watershed tributary sediment impairments led to listing of entire watershed for sediment .			
					Agriculture		
					Silviculture		
					Construction/Land Development		
					Hydromodification		
					Channelization		
					Dam Construction		
					Flow Regulation/Modification		
					Bridge Construction		
					Habitat Modification		
					Removal of Riparian Vegetation		
					Streambank Modification/Destabilization		
					Drainage/Filling Of Wetlands		
					Channel Erosion		
					Erosion/Siltation		
				Temperature, water		171 Miles	2019
				The most sensitive beneficial uses supported by the Russian River include uses associated with the cold water fishery and municipal and domestic supply. The Russian River provides habitat for coho salmon and steelhead trout, which are listed as a threatened species under the federal Endangered Species Act.Recent (1997-2000) temperature data collected in the Russian River watershed indicate that high temperature levels may be a source of impairment of cold water fisheries in the watershed.			
					Hydromodification		
					Upstream Impoundment		
					Flow Regulation/Modification		
					Habitat Modification		
					Removal of Riparian Vegetation		
					Streambank Modification/Destabilization		
					Nonpoint Source		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
1	L	Russian River HU, Upper Russian River HA, Coyote Valley HSA, Lake Mendocino [Reservoir]	11432060				
				Mercury		1704 Acres	2019
					Resource Extraction		
					Nonpoint Source		
1	R	Russian River HU, Upper Russian River HA, Forsythe Creek HSA	11433000				
				Sedimentation/Siltation		122 Miles	2019
				Russian River Watershed tributary sediment impairments led to listing of entire watershed for sediment .			
					Erosion/Siltation		
					Nonpoint Source		
				Temperature, water		122 Miles	2019
				The most sensitive beneficial uses supported by the Russian River include uses associated with the cold water fishery and municipal and domestic supply. The Russian River provides habitat for coho salmon and steelhead trout, which are listed as a threatened species under the federal Endangered Species Act.Recent (1997-2000) temperature data collected in the Russian River watershed indicate that high temperature levels may be a source of impairment of cold water fisheries in the watershed.			
					Hydromodification		
					Upstream Impoundment		
					Flow Regulation/Modification		
					Habitat Modification		
					Removal of Riparian Vegetation		
					Streambank Modification/Destabilization		
					Nonpoint Source		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
1	R	Russian River HU, Upper Russian River HA, Ukiah HSA	11431000				
				Sedimentation/Siltation		460 Miles	2019
				Russian River Watershed tributary sediment impairments led to listing of entire watershed for sediment .			
					Agriculture		
					Silviculture		
					Construction/Land Development		
					Resource Extraction		
					Habitat Modification		
					Removal of Riparian Vegetation		
					Streambank Modification/Destabilization		
					Drainage/Filling Of Wetlands		
					Channel Erosion		
					Erosion/Siltation		
					Highway Maintenance and Runoff		
					Natural Sources		
				Temperature, water		460 Miles	2019
				The most sensitive beneficial uses supported by the Russian River include uses associated with the cold water fishery and municipal and domestic supply. The Russian River provides habitat for coho salmon and steelhead trout, which are listed as a threatened species under the federal Endangered Species Act.Recent (1997-2000) temperature data collected in the Russian River watershed indicate that high temperature levels may be a source of impairment of cold water fisheries in the watershed.			
					Hydromodification		
					Upstream Impoundment		
					Flow Regulation/Modification		
					Habitat Modification		
					Removal of Riparian Vegetation		
					Streambank Modification/Destabilization		
					Nonpoint Source		
1	L	Trinity Lake (was Claire Engle Lake)	10640000				
				Mercury		15985 Acres	2019
					Source Unknown		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
1	R	Trinity River HU, South Fork HA	10620000				
				Temperature, water		1161 Miles	2019
				Elevated temperatures impact coldwater fisheries. USEPA will be developing temperature TMDL for South Fork Trinity River.			
					Range Grazing-Riparian		
					Water Diversions		
					Habitat Modification		
					Removal of Riparian Vegetation		
					Streambank Modification/Destabilization		
1	R	Trinity River HU, Upper HA, Trinity River, East Fork	10640000				
				Mercury		92 Miles	2019
				The Trinity River HU, Upper HA, Trinity River, East Fork includes the following Calwater Super Planning Watersheds (SPWs): Mumbo Creek SPW 106.40030 and Blue Ridge SPW 106.40040.			
					Source Unknown		
2	R	Alameda Creek	20430051				
				Diazinon		51 Miles	2005
				This listing was made by USEPA.			
					Urban Runoff/Storm Sewers		
2	R	Alamitos Creek	20540041				
				Mercury		7.1 Miles	2006
				TMDL will be developed as part of the Santa Clara Basin Watershed Management Initiative. Additional monitoring and assessment is needed.			
					Mine Tailings		
2	L	Anderson Reservoir	20530050				
				Mercury		1013 Acres	2019
					Source Unknown		
				PCBs (Polychlorinated biphenyls)		1013 Acres	2019
					Source Unknown		
2	R	Arroyo Corte Madera Del Presidio	20320020				
				Diazinon		4 Miles	2005
				This listing was made by USEPA.			
					Urban Runoff/Storm Sewers		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
2	R	Arroyo De La Laguna	20430084				
				Diazinon		7.4 Miles	2005
				This listing was made by USEPA.			
					Urban Runoff/Storm Sewers		
2	R	Arroyo Del Valle	20430023				
				Diazinon		31 Miles	2005
				This listing was made by USEPA.			
					Urban Runoff/Storm Sewers		
2	R	Arroyo Las Positas	20430080				
				Diazinon		14 Miles	2005
					Urban Runoff/Storm Sewers		
2	R	Arroyo Mocho	20430080				
				Diazinon		34 Miles	2005
					Urban Runoff/Storm Sewers		
2	L	Bon Tempe Reservoir	20113020				
				Mercury		120 Acres	2019
					Source Unknown		
2	R	Butano Creek	20240031				
				Sedimentation/Siltation		3.6 Miles	2019
				Impairment to steelhead habitat.			
					Nonpoint Source		
2	R	Calabazas Creek	20640012				
				Diazinon		4.7 Miles	2005
				This listing was made by USEPA.			
					Urban Runoff/Storm Sewers		
2	L	Calero Reservoir	20540031				
				Mercury		334 Acres	2006
				TMDL will be developed as part of the Santa Clara Basin Watershed Management Initiative. Additional monitoring and assessment is needed.			
					Surface Mining		
					Mine Tailings		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
2	E	Carquinez Strait	20710020				
				Chlordane		5657 Acres	2008
				This listing was made by USEPA.			
					Nonpoint Source		
				DDT		5657 Acres	2008
					Nonpoint Source		
				Dieldrin		5657 Acres	2008
				This listing was made by USEPA.			
					Nonpoint Source		
				Dioxin Compounds (including 2,3,7,8-TCDD)		5657 Acres	2019
				The specific compounds are 2,3,7,8-TCDD, 1,2,3,7,8-PeCDD, 1,2,3,4,7,8-HxCDD, 1,2,3,6,7,8-HxCDD, 1,2,3,7,8,9-HxCDD, 1,2,3,4,6,7,8-HpCDD, and OCDD. This listing was made by USEPA.			
					Atmospheric Deposition		
				Exotic Species		5657 Acres	2019
				Disrupt natural benthos; change pollutant availability in food chain; disrupt food availability to native species.			
					Ballast Water		
				Furan Compounds		5657 Acres	2019
				The specific compounds are 2,3,7,8-TCDF, 1,2,3,7,8-PeCDF, 2,3,4,7,8-PeCDF, 1,2,3,4,7,8-HxCDF, 1,2,3,6, 7,8,-HxCDF, 1,2,3,7,8,9-HxCDF, 2,3,4,6,7,8-HxCDF, 1,2,3,4,6,7,8-HpCDF, 1,2,3,4,7,8,9-HpCDF, and OCDF. This listing was made by USEPA.			
					Atmospheric Deposition		
				Mercury		5657 Acres	2006
				Current data indicate fish consumption and wildlife consumption impacted uses. Major source is historic: gold mining sediments and local mercury mining; most significant ongoing source is erosion and drainage from abandoned mines; moderate to low level inputs from point sources.			
					Industrial Point Sources		
					Municipal Point Sources		
					Resource Extraction		
					Atmospheric Deposition		
					Natural Sources		
					Nonpoint Source		
				PCBs (Polychlorinated biphenyls)		5657 Acres	2006
				This listing covers non dioxin-like PCBs.Interim health advisory for fish; uncertainty regarding water column concentration data.			
					Unknown Nonpoint Source		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
				PCBs (Polychlorinated biphenyls) (dioxin-like)		5657 Acres	2019
				The specific dioxin like compounds are 3,4,4,5-TCB (81), 3,3,3,3-TCB (77), 3,3,4,4,5-PeCB (126), 3,3,4,4,4,4-HxCB (169), 2,3,3,4,4-PeCB (105), 2,3,4,4,5-PeCB (114), 2,3,4,4,5-PeCB (118), 2,3,4,4,5-PeCB (123), 2,3,3,4,4,5-HxCB (156), 2,3,3,4,4,5-HxCB (157), 2,3,4,4,5,5,-HxCB (167), 2,3,3,4,4,5,5-HpCB (189). This listing was made by USEPA.			
					Unknown Nonpoint Source		
				Selenium		5657 Acres	2019
				Affected use is one branch of the food chain; most sensitive indicator is hatchability in nesting diving birds, significant contributions from oil refineries (control program in place) and agriculture (carried downstream by rivers); exotic species may have made food chain more susceptible to accumulation of selenium; health consumption advisory in effect for scaup and scoter (diving ducks); low TMDL priority because Individual Control Strategy in place.			
					Industrial Point Sources		
					Agriculture		
2	E	Castro Cove, Richmond (San Pablo Basin)	20660014				
				Dieldrin (sediment)		71 Acres	2008
					Urban Runoff/Storm Sewers		
					Point Source		
				Mercury (sediment)		71 Acres	2006
					Urban Runoff/Storm Sewers		
					Point Source		
				PAHs (Polycyclic Aromatic Hydrocarbons) (sediment)		71 Acres	2019
					Urban Runoff/Storm Sewers		
					Point Source		
				Selenium (sediment)		71 Acres	2019
					Urban Runoff/Storm Sewers		
					Point Source		
2	B	Central Basin, San Francisco (part of SF Bay, Central)	20440010				
				Chlordane		40 Acres	2008
				This listing was made by USEPA.			
					Nonpoint Source		
				DDT		40 Acres	2008
				This listing was made by USEPA.			
					Nonpoint Source		
				Dieldrin		40 Acres	2019
				This listing was made by USEPA.			
					Nonpoint Source		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
				Dioxin Compounds (including 2,3,7,8-TCDD)		40 Acres	2019
				The specific compounds are 2,3,7,8-TCDD, 1,2,3,7,8-PeCDD, 1,2,3,4,7,8-HxCDD, 1,2,3,6,7,8-HxCDD, 1,2,3,7,8,9-HxCDD, 1,2,3,4,6,7,8-HpCDD, and OCDD. This listing was made by USEPA.			
					Atmospheric Deposition		
				Exotic Species		40 Acres	2019
				Disrupt natural benthos; change pollutant availability in food chain; disrupt food availability to native species.			
					Ballast Water		
				Furan Compounds		40 Acres	2019
				The specific compounds are 2,3,7,8-TCDF, 1,2,3,7,8-PeCDF, 2,3,4,7,8-PeCDF, 1,2,3,4,7,8-HxCDF, 1,2,3,6,7,8-HxCDF, 1,2,3,7,8,9-HxCDF, 2,3,4,6,7,8-HxCDF, 1,2,3,4,6,7,8-HpCDF, 1,2,3,4,7,8,9-HpCDF, and OCDF. This listing was made by USEPA.			
					Atmospheric Deposition		
				Mercury		40 Acres	2006
				Current data indicate fish consumption and wildlife consumption impacted uses: health consumption advisory in effect for multiple fish species including striped bass and shark. Major source is historic: gold mining sediments and local mercury mining; most significant ongoing source is erosion and drainage from abandoned mines; moderate to low level inputs from point sources.			
					Industrial Point Sources		
					Minor Industrial Point Source		
					Municipal Point Sources		
					Resource Extraction		
					Atmospheric Deposition		
					Natural Sources		
					Nonpoint Source		
				Mercury (sediment)		40 Acres	2006
					Urban Runoff/Storm Sewers		
					Point Source		
				PAHs (Polycyclic Aromatic Hydrocarbons) (sediment)		40 Acres	2019
					Urban Runoff/Storm Sewers		
					Point Source		
				PCBs (Polychlorinated biphenyls)		40 Acres	2006
				This listing covers non dioxin-like PCBs.Interim health advisory for fish; uncertainty regarding water column concentration data.			
					Unknown Nonpoint Source		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
				PCBs (Polychlorinated biphenyls) (dioxin-like)		40 Acres	2019
				The specific dioxin like compounds are 3,4,4,5-TCB (81), 3,3,3,3-TCB (77), 3,3,4,4,5-PeCB (126), 3,3,4,4,4,4-HxCB (169), 2,3,3,4,4-PeCB (105), 2,3,4,4,5-PeCB (114), 2,3,4,4,5-PeCB (118), 2,3,4,4,5-PeCB (123), 2,3,3,4,4,5-HxCB (156), 2,3,3,4,4,5-HxCB (157), 2,3,4,4,5,5,-HxCB (167), 2,3,3,4,4,5,5-HpCB (189). This listing was made by USEPA.			
					Unknown Nonpoint Source		
				Selenium		40 Acres	2019
				Affected use is one branch of the food chain; most sensitive indicator is hatchability in nesting diving birds, significant contributions from oil refineries (control program in place) and agriculture (carried downstream by rivers); exotic species may have made food chain more susceptible to accumulation of selenium; health consumption advisory in effect for scaup and scoter (diving ducks); low TMDL priority because Individual Control Strategy in place.			
					Industrial Point Sources		
					Agriculture		
					Natural Sources		
					Exotic Species		
2	R	Corte Madera Creek	20320011				
				Diazinon		4.1 Miles	2005
				This listing was made by USEPA.			
					Urban Runoff/Storm Sewers		
2	R	Coyote Creek (Marin County)	20320020				
				Diazinon		2.6 Miles	2005
				This listing was made by USEPA.			
					Urban Runoff/Storm Sewers		
2	R	Coyote Creek (Santa Clara Co.)	20530021				
				Diazinon		55 Miles	2005
				This listing was made by USEPA.			
					Urban Runoff/Storm Sewers		
2	L	Del Valle Reservoir	20430024				
				Mercury		1022 Acres	2019
					Source Unknown		
				PCBs (Polychlorinated biphenyls)		1022 Acres	2019
					Source Unknown		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED		PROPOSED TMDL COMPLETION
2	R	Gallinas Creek	20620013					
				Diazinon		2.1	Miles	2005
				This listing was made by USEPA.				
					Urban Runoff/Storm Sewers			
2	R	Guadalupe Creek	20540050					
				Mercury		8.1	Miles	2006
				TMDL will be developed as part of the Santa Clara Basin Watershed Management Initiative. Additional monitoring and assessment is needed.				
					Mine Tailings			
2	L	Guadalupe Reservoir	20540040					
				Mercury		63	Acres	2006
				TMDL will be developed as part of the Santa Clara Basin Watershed Management Initiative. Additional monitoring and assessment is needed.				
					Surface Mining			
					Mine Tailings			
2	R	Guadalupe River	20540050					
				Diazinon		18	Miles	2005
				This listing was made by USEPA.				
					Urban Runoff/Storm Sewers			
				Mercury		18	Miles	2006
				TMDL will be developed as part of the Santa Clara Basin Watershed Management Initiative. Additional monitoring and assessment is needed.				
					Mine Tailings			
2	E	Islais Creek	20440010					
				Ammonia		46	Acres	2019
					Industrial Point Sources			
					Combined Sewer Overflow			
				Chlordane (sediment)		46	Acres	2008
					Industrial Point Sources			
					Combined Sewer Overflow			
				Dieldrin (sediment)		46	Acres	2008
					Industrial Point Sources			
					Combined Sewer Overflow			

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
				Hydrogen Sulfide		46 Acres	2019
					Industrial Point Sources		
					Combined Sewer Overflow		
				PAHs (Polycyclic Aromatic Hydrocarbons) (sediment)		46 Acres	2019
					Industrial Point Sources		
					Combined Sewer Overflow		
				Sediment Toxicity		46 Acres	2019
					Source Unknown		
2	L	Lafayette Reservoir	20732010				
				Mercury		114 Acres	2019
					Source Unknown		
				PCBs (Polychlorinated biphenyls)		114 Acres	2019
					Source Unknown		
2	R	Lagunitas Creek	20113020				
				Nutrients		17 Miles	2019
				Tributary to Tomales Bay. TMDLs will be developed as part of evolving watershed management effort. Additional monitoring and assessment needed.			
					Agriculture		
					Urban Runoff/Storm Sewers		
				Sedimentation/Siltation		17 Miles	2009
				Tributary to Tomales Bay. TMDLs will be developed as part of evolving watershed management effort. Additional monitoring and assessment needed.			
					Agriculture		
					Urban Runoff/Storm Sewers		
2	L	Lake Chabot (Alameda Co)	20420030				
				Chlordane		312 Acres	2019
					Source Unknown		
				DDT		312 Acres	2019
					Source Unknown		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
				Dieldrin	Source Unknown	312 Acres	2019
				Mercury	Source Unknown	312 Acres	2019
				PCBs (Polychlorinated biphenyls)	Source Unknown	312 Acres	2019
2	L	Lake Herman	20721030				
				Mercury *Additional monitoring and assessment needed. Problem due to historical mining.*	Surface Mining	108 Acres	2019
2	L	Lake Merced	20210010				
				Low Dissolved Oxygen *This listing was made by USEPA.*	Source Unknown	299 Acres	2019
				pH *This listing was made by USEPA.*	Source Unknown	299 Acres	2019
2	L	Lake Merritt	20420040				
				Organic Enrichment/Low Dissolved Oxygen *This listing was made by USEPA.*	Source Unknown	142 Acres	2019
				Trash	Urban Runoff/Storm Sewers	142 Acres	2019
2	R	Laurel Creek (Solano Co)	20440040				
				Diazinon *This listing was made by USEPA.*	Urban Runoff/Storm Sewers	3 Miles	2005
2	R	Ledgewood Creek	20723010				
				Diazinon *This listing was made by USEPA.*	Urban Runoff/Storm Sewers	12 Miles	2005

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
2	R	Los Gatos Creek (R2)	20540011				
				Diazinon		19 Miles	2005
				This listing was made by USEPA.			
					Urban Runoff/Storm Sewers		
2	E	Marina Lagoon (San Mateo County)	20440040				
				Coliform Bacteria		169 Acres	2019
					Urban Runoff/Storm Sewers		
					Nonpoint Source		
2	R	Matadero Creek	20550040				
				Diazinon		7.3 Miles	2005
				This listing was made by USEPA.			
					Urban Runoff/Storm Sewers		
2	R	Miller Creek	20620012				
				Diazinon		9 Miles	2005
				This listing was made by USEPA.			
					Urban Runoff/Storm Sewers		
2	E	Mission Creek	20440010				
				Ammonia		8.5 Acres	2019
					Industrial Point Sources		
					Combined Sewer Overflow		
				Chlordane (sediment)		8.5 Acres	2008
					Industrial Point Sources		
					Combined Sewer Overflow		
				Dieldrin (sediment)		8.5 Acres	2008
					Industrial Point Sources		
					Combined Sewer Overflow		
				Hydrogen Sulfide		8.5 Acres	2019
					Industrial Point Sources		
					Combined Sewer Overflow		
				Lead (sediment)		8.5 Acres	2019
					Industrial Point Sources		
					Combined Sewer Overflow		

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				Mercury (sediment)		8.5 Acres	2019
					Industrial Point Sources		
					Combined Sewer Overflow		
				PAHs (Polycyclic Aromatic Hydrocarbons)		8.5 Acres	2019
					Industrial Point Sources		
					Combined Sewer Overflow		
				PCBs (Polychlorinated biphenyls) (sediment)		8.5 Acres	2006
					Industrial Point Sources		
					Combined Sewer Overflow		
				Silver (sediment)		8.5 Acres	2019
					Industrial Point Sources		
					Combined Sewer Overflow		
				Zinc (sediment)		8.5 Acres	2019
					Industrial Point Sources		
					Combined Sewer Overflow		
2	R	Mt. Diablo Creek	20731040				
				Diazinon		13 Miles	2005
				This listing was made by USEPA.			
					Urban Runoff/Storm Sewers		
2	R	Napa River	20650010				
				Nutrients		65 Miles	2008
				TMDL will be developed as part of ongoing watershed management effort. Additional monitoring and assessment needed.			
					Agriculture		
				Pathogens		65 Miles	2006
				TMDL will be developed as part of ongoing watershed management effort. Additional monitoring and assessment needed.			
					Agriculture		
					Urban Runoff/Storm Sewers		

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				Sedimentation/Siltation		65 Miles	2006
				TMDL will be developed as part of ongoing watershed management effort. Additional monitoring and assessment needed.			
					Agriculture		
					Construction/Land Development		
					Land Development		
					Urban Runoff/Storm Sewers		
2	L	Nicasio Reservoir	20113012				
				Mercury		829 Acres	2019
					Source Unknown		
2	R	Novato Creek	20620010				
				Diazinon		17 Miles	2005
				This listing was made by USEPA.			
					Urban Runoff/Storm Sewers		
2	B	Oakland Inner Harbor (Fruitvale Site, part of SF Bay, Central)	20420040				
				Chlordane		0.93 Acres	2008
				This listing was made by USEPA.			
					Nonpoint Source		
				Chlordane (sediment)		0.93 Acres	2008
					Source Unknown		
				DDT		0.93 Acres	2008
				This listing was made by USEPA.			
					Nonpoint Source		
				Dieldrin		0.93 Acres	2008
				This listing was made by USEPA.			
					Nonpoint Source		
				Dioxin Compounds (including 2,3,7,8-TCDD)		0.93 Acres	2019
				The specific compounds are 2,3,7,8-TCDD, 1,2,3,7,8-PeCDD, 1,2,3,4,7,8-HxCDD, 1,2,3,6,7,8-HxCDD, 1,2,3,7,8,9-HxCDD, 1,2,3,4,6,7,8-HpCDD, and OCDD. This listing was made by USEPA.			
					Atmospheric Deposition		
				Exotic Species		0.93 Acres	2019
				Disrupt natural benthos; change pollutant availability in food chain; disrupt food availability to native species.			
					Ballast Water		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
				Furan Compounds		0.93 Acres	2019
				The specific compounds are 2,3,7,8-TCDF, 1,2,3,7,8-PeCDF, 2,3,4,7,8-PeCDF, 1,2,3,4,7,8-HxCDF, 1,2,3,6,7,8-HxCDF, 1,2,3,7,8,9-HxCDF, 2,3,4,6,7,8-HxCDF, 1,2,3,4,6,7,8-HpCDF, 1,2,3,4,7,8,9-HpCDF, and OCDF. This listing was made by USEPA.			
					Atmospheric Deposition		
				Mercury		0.93 Acres	2006
				Current data indicate fish consumption and wildlife consumption impacted uses: health consumption advisory in effect for multiple fish species including striped bass and shark. Major source is historic: gold mining sediments and local mercury mining; most significant ongoing source is erosion and drainage from abandoned mines; moderate to low level inputs from point sources.			
					Industrial Point Sources		
					Municipal Point Sources		
					Resource Extraction		
					Atmospheric Deposition		
					Natural Sources		
					Nonpoint Source		
				PCBs (Polychlorinated biphenyls)		0.93 Acres	2006
				This listing covers non dioxin-like PCBs.Interim health advisory for fish; uncertainty regarding water column concentration data.			
					Unknown Nonpoint Source		
				PCBs (Polychlorinated biphenyls) (dioxin-like)		0.93 Acres	2019
				The specific dioxin like compounds are 3,4,4,5-TCB (81), 3,3,3,3-TCB (77), 3,3,4,4,5-PeCB (126), 3,3,4,4,4,4-HxCB (169), 2,3,3,4,4-PeCB (105), 2,3,4,4,5-PeCB (114), 2,3,4,4,5-PeCB (118), 2,3,4,4,5-PeCB (123), 2,3,3,4,4,5-HxCB (156), 2,3,3,4,4,5-HxCB (157), 2,3,4,4,5,5,-HxCB (167), 2,3,3,4,4,5,5-HpCB (189). This listing was made by USEPA.			
					Unknown Nonpoint Source		
				PCBs (Polychlorinated biphenyls) (sediment)		0.93 Acres	2006
				This listing covers non dioxin-like PCBs. Interim health advisory for fish; uncertainty regarding water columnconcentration data.			
					Source Unknown		
				Sediment Toxicity		0.93 Acres	2019
					Source Unknown		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
				Selenium		0.93 Acres	2019
				Affected use is one branch of the food chain; most sensitive indicator is hatchability in nesting diving birds, significantcontributions from oil refineries (control program in place) and agriculture (carried downstream by rivers); exotic speciesmay have made food chain more susceptible to accumulation of selenium; health consumption advisory in effect for scaupand scoter (diving ducks); low TMDL priority because Individual Control Strategy in place.			
					Industrial Point Sources		
					Agriculture		
					Natural Sources		
					Exotic Species		
2	B	Oakland Inner Harbor (Pacific Dry-dock Yard 1 Site, part of SF Bay, Central)	20420040				
				Chlordane		1.8 Acres	2008
				This listing was made by USEPA.			
					Nonpoint Source		
				Chlordane (sediment)		1.8 Acres	2008
					Source Unknown		
				Copper (sediment)		1.8 Acres	2019
					Source Unknown		
				DDT		1.8 Acres	2008
				This listing was made by USEPA.			
					Nonpoint Source		
				Dieldrin		1.8 Acres	2008
				This listing was made by USEPA.			
					Nonpoint Source		
				Dieldrin (sediment)		1.8 Acres	2008
					Source Unknown		
				Dioxin Compounds (including 2,3,7,8-TCDD)		1.8 Acres	2019
				The specific compounds are 2,3,7,8-TCDD, 1,2,3,7,8-PeCDD, 1,2,3,4,7,8-HxCDD, 1,2,3,6,7,8-HxCDD, 1,2,3,7,8,9-HxCDD, 1,2,3,4,6,7,8-HpCDD, and OCDD. This listing was made by USEPA.			
					Atmospheric Deposition		
				Exotic Species		1.8 Acres	2019
				Disrupt natural benthos; change pollutant availability in food chain; disrupt food availability to native species.			
					Ballast Water		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
				Furan Compounds		1.8 Acres	2019
				The specific compounds are 2,3,7,8-TCDF, 1,2,3,7,8-PeCDF, 2,3,4,7,8-PeCDF, 1,2,3,4,7,8-HxCDF, 1,2,3,6,7,8-HxCDF, 1,2,3,7,8,9-HxCDF, 2,3,4,6,7,8-HxCDF, 1,2,3,4,6,7,8-HpCDF, 1,2,3,4,7,8,9-HpCDF, and OCDF. This listing was made by USEPA.			
					Atmospheric Deposition		
				Lead (sediment)		1.8 Acres	2019
					Source Unknown		
				Mercury		1.8 Acres	2006
				Current data indicate fish consumption and wildlife consumption impacted uses: health consumption advisory in effect for multiple fish species including striped bass and shark. Major source is historic: gold mining sediments and local mercury mining; most significant ongoing source is erosion and drainage from abandoned mines; moderate to low level inputs from point sources.			
					Industrial Point Sources		
					Municipal Point Sources		
					Resource Extraction		
					Atmospheric Deposition		
					Natural Sources		
					Nonpoint Source		
				Mercury (sediment)		1.8 Acres	2006
					Source Unknown		
				PAHs (Polycyclic Aromatic Hydrocarbons) (sediment)		1.8 Acres	2019
					Source Unknown		
				PCBs (Polychlorinated biphenyls)		1.8 Acres	2006
				This listing covers non dioxin-like PCBs.Interim health advisory for fish; uncertainty regarding water column concentration data.			
					Unknown Nonpoint Source		
				PCBs (Polychlorinated biphenyls) (dioxin-like)		1.8 Acres	2019
				The specific dioxin like compounds are 3,4,4,5-TCB (81), 3,3,3,3-TCB (77), 3,3,4,4,5-PeCB (126), 3,3,4,4,4,4-HxCB (169), 2,3,3,4,4-PeCB (105), 2,3,4,4,5-PeCB (114), 2,3,4,4,5-PeCB (118), 2,3,4,4,5-PeCB (123), 2,3,3,4,4,5-HxCB (156), 2,3,3,4,4,5-HxCB (157), 2,3,4,4,5,5,-HxCB (167), 2,3,3,4,4,5,5-HpCB (189). This listing was made by USEPA.			
					Unknown Nonpoint Source		
				PCBs (Polychlorinated biphenyls) (sediment)		1.8 Acres	2006
					Source Unknown		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
				Selenium		1.8 Acres	2019
				Affected use is one branch of the food chain; most sensitive indicator is hatchability in nesting diving birds, significant contributions from oil refineries (control program in place) and agriculture (carried downstream by rivers); exotic species may have made food chain more susceptible to accumulation of selenium; health consumption advisory in effect for scaup and scoter (diving ducks); low TMDL priority because Individual Control Strategy in place.			
					Industrial Point Sources		
					Agriculture		
					Natural Sources		
					Exotic Species		
				Zinc (sediment)		1.8 Acres	2019
					Source Unknown		
2	C	Pacific Ocean at Fitzgerald Marine Reserve	20221012				
				Coliform Bacteria		0.46 Miles	2019
					Nonpoint Source		
2	C	Pacific Ocean at Pacifica State Beach	20221011				
				Coliform Bacteria		0.87 Miles	2019
				Linda Mar and San Pedro beaches are the areas affected.			
					Urban Runoff/Storm Sewers		
					Nonpoint Source		
2	C	Pacific Ocean at Pillar Point	20221012				
				Mercury		0.62 Miles	2019
					Source Unknown		
2	C	Pacific Ocean at Pillar Point Beach	20221012				
				Coliform Bacteria		1.1 Miles	2019
					Nonpoint Source		
2	C	Pacific Ocean at Rockaway Beach	20221011				
				Coliform Bacteria		0.29 Miles	2019
					Urban Runoff/Storm Sewers		
					Nonpoint Source		
2	C	Pacific Ocean at Venice Beach	20222011				
				Coliform Bacteria		0.38 Miles	2019
					Nonpoint Source		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
2	R	Permanente Creek	20550021				
				Diazinon		13 Miles	2005
				This listing was made by USEPA.			
					Urban Runoff/Storm Sewers		
2	R	Pescadero Creek	20240013				
				Sedimentation/Siltation		26 Miles	2019
				If California Department of Fish and Game and the National Marine Fisheries Service find that for this water body fish populations are not impacted, the State Water Board supports removing this water body and pollutant from the list.			
					Nonpoint Source		
2	R	Petaluma River	20630020				
				Diazinon		22 Miles	2005
				Data source: Abelli-Amen, Petaluma Tree Planters, 1999.			
					Urban Runoff/Storm Sewers		
				Nutrients		22 Miles	2019
				TMDL will be developed as part of ongoing watershed management effort. Additional monitoring and assessment needed.			
					Agriculture		
					Construction/Land Development		
					Urban Runoff/Storm Sewers		
				Pathogens		22 Miles	2019
				TMDL will be developed as part of ongoing watershed management effort. Additional monitoring and assessment needed.			
					Agriculture		
					Construction/Land Development		
					Urban Runoff/Storm Sewers		
				Sedimentation/Siltation		22 Miles	2019
					Agriculture		
					Construction/Land Development		
					Urban Runoff/Storm Sewers		
2	R	Petaluma River (tidal portion)	20630040				
				Diazinon		1.1 Miles	2005
				Data source: Abelli-Amen, Petaluma Tree Planters, 1999.			
					Urban Runoff/Storm Sewers		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
				Nickel		1.1 Miles	2019
				Exceedance of California Toxic Rule dissolved criteria and National Toxic Rule total criteria; elevated water and sediment tissue levels.			
					Municipal Point Sources		
					Urban Runoff/Storm Sewers		
					Atmospheric Deposition		
				Nutrients		1.1 Miles	2019
				TMDL will be developed as part of ongoing watershed management effort. Additional monitoring and assessment needed.			
					Agriculture		
					Construction/Land Development		
					Urban Runoff/Storm Sewers		
				Pathogens		1.1 Miles	2019
				TMDL will be developed as part of ongoing watershed management effort. Additional monitoring and assessment needed.			
					Agriculture		
					Construction/Land Development		
					Urban Runoff/Storm Sewers		
2	R	Pine Creek (Contra Costa Co)	20731011				
				Diazinon		13 Miles	2005
				This listing was made by USEPA.			
					Urban Runoff/Storm Sewers		
2	R	Pinole Creek	20660020				
				Diazinon		9.2 Miles	2005
				This listing was made by USEPA.			
					Urban Runoff/Storm Sewers		
2	R	Pomponio Creek	20240020				
				Coliform Bacteria		7.1 Miles	2019
					Nonpoint Source		
2	B	Richardson Bay	20312010				
				Chlordane		2439 Acres	2008
				This listing was made by USEPA.			
					Nonpoint Source		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
				Coliform Bacteria		2439 Acres	2019
				Affected area, Waldo Point Harbor, is less than 10% of embayment; source has been positively identified as substandard sewage systems in some houseboat areas; extensive local control program in place with significant water quality improvements.			
					Urban Runoff/Storm Sewers		
					Septage Disposal		
					Boat Discharges/Vessel Wastes		
				DDT		2439 Acres	2008
				This listing was made by USEPA.			
					Nonpoint Source		
				Dieldrin		2439 Acres	2008
				This listing was made by USEPA.			
					Unknown Nonpoint Source		
				Dioxin Compounds (including 2,3,7,8-TCDD)		2439 Acres	2019
				The specific compounds are 2,3,7,8-TCDD, 1,2,3,7,8-PeCDD, 1,2,3,4,7,8-HxCDD, 1,2,3,6,7,8-HxCDD, 1,2,3,7,8,9-HxCDD, 1,2,3,4,6,7,8-HpCDD, and OCDD. This listing was made by USEPA.			
					Atmospheric Deposition		
				Exotic Species		2439 Acres	2019
				Disrupt natural benthos; change pollutant availability in food chain; disrupt food availability to native species.			
					Ballast Water		
				Furan Compounds		2439 Acres	2019
				The specific compounds are 2,3,7,8-TCDF, 1,2,3,7,8-PeCDF, 2,3,4,7,8-PeCDF, 1,2,3,4,7,8-HxCDF, 1,2,3,6, 7,8,-HxCDF, 1,2,3,7,8,9-HxCDF, 2,3,4,6,7,8-HxCDF, 1,2,3,4,6,7,8-HpCDF, 1,2,3,4,7,8,9-HpCDF, and OCDF. This listing was made by USEPA.			
					Atmospheric Deposition		
				Mercury		2439 Acres	2006
				Current data indicate fish consumption and wildlife consumption impacted uses: health consumption advisory in effect for multiple fish species including striped bass and shark. Major source is historic: gold mining sediments and local mercury mining; most significant ongoing source is erosion and drainage from abandoned mines; moderate to low level inputs from point sources.			
					Municipal Point Sources		
					Resource Extraction		
					Atmospheric Deposition		
					Natural Sources		
					Nonpoint Source		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED		PROPOSED TMDL COMPLETION
				PCBs (Polychlorinated biphenyls)		2439	Acres	2006
				This listing covers non dioxin-like PCBs. Interim health advisory for fish; uncertainty regarding water column concentration data.				
					Unknown Nonpoint Source			
				PCBs (Polychlorinated biphenyls) (dioxin-like)		2439	Acres	2019
				The specific dioxin like compounds are 3,4,4,5-TCB (81), 3,3,3,3-TCB (77), 3,3,4,4,5-PeCB (126), 3,3,4,4,4,4-HxCB (169), 2,3,3,4,4-PeCB (105), 2,3,4,4,5-PeCB (114), 2,3,4,4,5-PeCB (118), 2,3,4,4,5-PeCB (123), 2,3,3,4,4,5-HxCB (156), 2,3,3,4,4,5-HxCB (157), 2,3,4,4,5,5,-HxCB (167), 2,3,3,4,4,5,5-HpCB (189). This listing was made by USEPA.				
					Unknown Nonpoint Source			
2	R	Rodeo Creek	20660022					
				Diazinon		8	Miles	2005
				This listing was made by USEPA.				
					Urban Runoff/Storm Sewers			
2	E	Sacramento San Joaquin Delta	20710010					
				Chlordane		41736	Acres	2008
				This listing was made by USEPA.				
					Nonpoint Source			
				DDT		41736	Acres	2008
				This listing was made by USEPA.				
					Nonpoint Source			
				Dieldrin		41736	Acres	2008
				This listing was made by USEPA.				
					Nonpoint Source			
				Dioxin Compounds (including 2,3,7,8-TCDD)		41736	Acres	2019
				The specific compounds are 2,3,7,8-TCDD, 1,2,3,7,8-PeCDD, 1,2,3,4,7,8-HxCDD, 1,2,3,6,7,8-HxCDD, 1,2,3,7,8,9-HxCDD, 1,2,3,4,6,7,8-HpCDD, and OCDD. This listing was made by USEPA.				
					Atmospheric Deposition			
				Exotic Species		41736	Acres	2019
				Disrupt natural benthos; change pollutant availability in food chain; disrupt food availability to native species.				
					Ballast Water			
				Furan Compounds		41736	Acres	2019
				The specific compounds are 2,3,7,8-TCDF, 1,2,3,7,8-PeCDF, 2,3,4,7,8-PeCDF, 1,2,3,4,7,8-HxCDF, 1,2,3,6, 7,8,-HxCDF, 1,2,3,7,8,9-HxCDF, 2,3,4,6,7,8-HxCDF, 1,2,3,4,6,7,8-HpCDF, 1,2,3,4,7,8,9-HpCDF, and OCDF. This listing was made by USEPA.				
					Atmospheric Deposition			

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
				Mercury		41736 Acres	2006
				Current data indicate fish consumption and wildlife consumption impacted uses. Major source is historic: gold mining sediments and local mercury mining; most significant ongoing source is erosion and drainage from abandoned mines; moderate to low level inputs from point sources.			
					Industrial Point Sources		
					Municipal Point Sources		
					Resource Extraction		
					Atmospheric Deposition		
					Nonpoint Source		
				Nickel		41736 Acres	2019
				This listing was made by USEPA.			
					Source Unknown		
				PCBs (Polychlorinated biphenyls)		41736 Acres	2006
				This listing covers non dioxin-like PCBs.Interim health advisory for fish; uncertainty regarding water column concentration data.			
					Unknown Nonpoint Source		
				PCBs (Polychlorinated biphenyls) (dioxin-like)		41736 Acres	2019
				The specific dioxin like compounds are 3,4,4,5-TCB (81), 3,3,3,3-TCB (77), 3,3,4,4,5-PeCB (126), 3,3,4,4,4,4-HxCB (169), 2,3,3,4,4-PeCB (105), 2,3,4,4,5-PeCB (114), 2,3,4,4,5-PeCB (118), 2,3,4,4,5-PeCB (123), 2,3,3,4,4,5-HxCB (156), 2,3,3,4,4,5-HxCB (157), 2,3,4,4,5,5,-HxCB (167), 2,3,3,4,4,5,5-HpCB (189). This listing was made by USEPA.			
					Unknown Nonpoint Source		
				Selenium		41736 Acres	2019
				Affected use is one branch of the food chain; most sensitive indicator is hatchability in nesting diving birds, significant contributions from oil refineries (control program in place) and agriculture (carried downstream by rivers); exotic species may have made food chain more susceptible to accumulation of selenium; health consumption advisory in effect for scaup and scoter (diving ducks); low TMDL priority because Individual Control Strategy in place. Another source is exotic species.			
					Industrial Point Sources		
					Agriculture		
					Natural Sources		
					Exotic Species		
2	R	San Antonio Creek (Marin/Sonoma Co)	20630031				
				Diazinon		18 Miles	2005
				This listing was made by USEPA.			
					Urban Runoff/Storm Sewers		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
2	R	San Felipe Creek	20530041				
				Diazinon		15 Miles	2005
				This listing was made by USEPA.			
					Urban Runoff/Storm Sewers		
2	B	San Francisco Bay, Central	20312010				
				Chlordane		70992 Acres	2008
				This listing was made by USEPA.			
					Nonpoint Source		
				DDT		70992 Acres	2008
				This listing was made by USEPA.			
					Nonpoint Source		
				Dieldrin		70992 Acres	2008
				This listing was made by USEPA.			
					Nonpoint Source		
				Dioxin Compounds (including 2,3,7,8-TCDD)		70992 Acres	2019
				The specific compounds are 2,3,7,8-TCDD, 1,2,3,7,8-PeCDD, 1,2,3,4,7,8-HxCDD, 1,2,3,6,7,8-HxCDD, 1,2,3,7,8,9-HxCDD, 1,2,3,4,6,7,8-HpCDD, and OCDD. This listing was made by USEPA.			
					Atmospheric Deposition		
				Exotic Species		70992 Acres	2019
				Disrupt natural benthos; change pollutant availability in food chain; disrupt food availability to native species.			
					Ballast Water		
				Furan Compounds		70992 Acres	2019
				The specific compounds are 2,3,7,8-TCDF, 1,2,3,7,8-PeCDF, 2,3,4,7,8-PeCDF, 1,2,3,4,7,8-HxCDF, 1,2,3,6,7,8-HxCDF, 1,2,3,7,8,9-HxCDF, 2,3,4,6,7,8-HxCDF, 1,2,3,4,6,7,8-HpCDF, 1,2,3,4,7,8,9-HpCDF, and OCDF. This listing was made by USEPA.			
					Atmospheric Deposition		
				Mercury		70992 Acres	2006
				Current data indicate fish consumption and wildlife consumption impacted uses: health consumption advisory in effect for multiple fish species including striped bass and shark. Major source is historic: gold mining sediments and local mercury mining; most significant ongoing source is erosion and drainage from abandoned mines; moderate to low level inputs from point sources.			
					Industrial Point Sources		
					Municipal Point Sources		
					Resource Extraction		
					Atmospheric Deposition		
					Natural Sources		
					Nonpoint Source		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
				PCBs (Polychlorinated biphenyls)		70992 Acres	2006
				This listing covers non dioxin-like PCBs.Interim health advisory for fish; uncertainty regarding water column concentration data.			
					Unknown Nonpoint Source		
				PCBs (Polychlorinated biphenyls) (dioxin-like)		70992 Acres	2019
				The specific dioxin like compounds are 3,4,4,5-TCB (81), 3,3,3,3-TCB (77), 3,3,4,4,5-PeCB (126), 3,3,4,4,4,4-HxCB (169), 2,3,3,4,4-PeCB (105), 2,3,4,4,5-PeCB (114), 2,3,4,4,5-PeCB (118), 2,3,4,4,5-PeCB (123), 2,3,3,4,4,5-HxCB (156), 2,3,3,4,4,5-HxCB (157), 2,3,4,4,5,5,-HxCB (167), 2,3,3,4,4,5,5-HpCB (189). This listing was made by USEPA.			
					Unknown Nonpoint Source		
				Selenium		70992 Acres	2019
				Affected use is one branch of the food chain; most sensitive indicator is hatchability in nesting diving birds, significant contributions from oil refineries (control program in place) and agriculture (carried downstream by rivers); exotic species may have made food chain more susceptible to accumulation of selenium; health consumption advisory in effect for scaup and scoter (diving ducks); low TMDL priority because Individual Control Strategy in place.			
					Industrial Point Sources		
					Agriculture		
					Natural Sources		
					Exotic Species		
2	B	San Francisco Bay, Lower	20410010				
				Chlordane		92274 Acres	2008
				This listing was made by USEPA.			
					Nonpoint Source		
				DDT		92274 Acres	2008
				This listing was made by USEPA.			
					Nonpoint Source		
				Dieldrin		92274 Acres	2008
				This listing was made by USEPA.			
					Nonpoint Source		
				Dioxin Compounds (including 2,3,7,8-TCDD)		92274 Acres	2019
				The specific compounds are 2,3,7,8-TCDD, 1,2,3,7,8-PeCDD, 1,2,3,4,7,8-HxCDD, 1,2,3,6,7,8-HxCDD, 1,2,3,7,8,9-HxCDD, 1,2,3,4,6,7,8-HpCDD, and OCDD. This listing was made by USEPA.			
					Atmospheric Deposition		
				Exotic Species		92274 Acres	2019
				Disrupt natural benthos; change pollutant availability in food chain; disrupt food availability to native species.			
					Ballast Water		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
				Furan Compounds		92274 Acres	2019
				The specific compounds are 2,3,7,8-TCDF, 1,2,3,7,8-PeCDF, 2,3,4,7,8-PeCDF, 1,2,3,4,7,8-HxCDF, 1,2,3,6, 7,8,-HxCDF, 1,2,3,7,8,9-HxCDF, 2,3,4,6,7,8-HxCDF, 1,2,3,4,6,7,8-HpCDF, 1,2,3,4,7,8,9-HpCDF, and OCDF. This listing was made by USEPA.			
					Atmospheric Deposition		
				Mercury		92274 Acres	2006
				Current data indicate fish consumption and wildlife consumption impacted uses: health consumption advisory in effect for multiple fish species including striped bass and shark. Major source is historic: gold mining sediments and local mercury mining; most significant ongoing source is erosion and drainage from abandoned mines; moderate to low level inputs from point sources: water quality objective exceedances. Elevated sediment levels and elevated tissue levels.			
					Industrial Point Sources		
					Municipal Point Sources		
					Resource Extraction		
					Atmospheric Deposition		
					Natural Sources		
					Nonpoint Source		
				PCBs (Polychlorinated biphenyls)		92274 Acres	2006
				This listing covers non dioxin-like PCBs.Interim health advisory for fish; uncertainty regarding water column concentration data.			
					Unknown Nonpoint Source		
				PCBs (Polychlorinated biphenyls) (dioxin-like)		92274 Acres	2019
				The specific dioxin like compounds are 3,4,4,5-TCB (81), 3,3,3,3-TCB (77), 3,3,4,4,5-PeCB (126), 3,3,4,4,4,4-HxCB (169), 2,3,3,4,4-PeCB (105), 2,3,4,4,5-PeCB (114), 2,3,4,4,5-PeCB (118), 2,3,4,4,5-PeCB (123), 2,3,3,4,4,5-HxCB (156), 2,3,3,4,4,5-HxCB (157), 2,3,4,4,5,5,-HxCB (167), 2,3,3,4,4,5,5-HpCB (189). This listing was made by USEPA.			
					Unknown Nonpoint Source		
2	B	San Francisco Bay, South	20510000				
				Chlordane		9204 Acres	2008
				This listing was made by USEPA.			
					Nonpoint Source		
				DDT		9204 Acres	2008
				This listing was made by USEPA.			
					Nonpoint Source		
				Dieldrin		9204 Acres	2008
				This listing was made by USEPA.			
					Nonpoint Source		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
				Dioxin Compounds (including 2,3,7,8-TCDD)		9204 Acres	2019
				The specific compounds are 2,3,7,8-TCDD, 1,2,3,7,8-PeCDD, 1,2,3,4,7,8-HxCDD, 1,2,3,6,7,8-HxCDD, 1,2,3,7,8,9-HxCDD, 1,2,3,4,6,7,8-HpCDD, and OCDD. This listing was made by USEPA.			
					Atmospheric Deposition		
				Exotic Species		9204 Acres	2019
				Disrupt natural benthos; change pollutant availability in food chain; disrupt food availability to native species.			
					Ballast Water		
				Furan Compounds		9204 Acres	2019
				The specific compounds are 2,3,7,8-TCDF, 1,2,3,7,8-PeCDF, 2,3,4,7,8-PeCDF, 1,2,3,4,7,8-HxCDF, 1,2,3,6,7,8-HxCDF, 1,2,3,7,8,9-HxCDF, 2,3,4,6,7,8-HxCDF, 1,2,3,4,6,7,8-HpCDF, 1,2,3,4,7,8,9-HpCDF, and OCDF. This listing was made by USEPA.			
					Atmospheric Deposition		
				Mercury		9204 Acres	2006
				Current data indicate fish consumption and wildlife consumption impacted uses: health consumption advisory in effect for multiple fish species including striped bass and shark. Major source is historic: gold mining sediments and local mercury mining; most significant ongoing source is erosion and drainage from abandoned mines; moderate to low level inputs frompoint sources: water quality objective exceedances. Elevated sediment level and elevated tissue levels.			
					Industrial Point Sources		
					Municipal Point Sources		
					Resource Extraction		
					Atmospheric Deposition		
					Natural Sources		
					Nonpoint Source		
				PCBs (Polychlorinated biphenyls)		9204 Acres	2006
				This listing covers non dioxin-like PCBs.Interim health advisory for fish; uncertainty regarding water column concentration data.			
					Unknown Nonpoint Source		
				PCBs (Polychlorinated biphenyls) (dioxin-like)		9204 Acres	2019
				The specific dioxin like compounds are 3,4,4,5-TCB (81), 3,3,3,3-TCB (77), 3,3,4,4,5-PeCB (126), 3,3,4,4,4,4-HxCB (169), 2,3,3,4,4-PeCB (105), 2,3,4,4,5-PeCB (114), 2,3,4,4,5-PeCB (118), 2,3,4,4,5-PeCB (123), 2,3,3,4,4,5-HxCB (156), 2,3,3,4,4,5-HxCB (157), 2,3,4,4,5,5,-HxCB (167), 2,3,3,4,4,5,5-HpCB (189). This listing was made by USEPA.			
					Unknown Nonpoint Source		
				Selenium		9204 Acres	2019
				A formal health advisory has been issued by OEHHA for benthic-feeding ducks in South San Francisco Bay. This health advisory clearly establishes that water contact recreation beneficial use (REC-1) is not fully supported and standards are not fully met.			
					Agriculture		
					Domestic Use of Ground Water		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
2	R	San Francisquito Creek	20550040				
				Diazinon		12 Miles	2005
				This listing was made by USEPA.			
					Urban Runoff/Storm Sewers		
				Sedimentation/Siltation		12 Miles	2008
				Impairment to steelhead habitat.			
					Nonpoint Source		
2	R	San Gregorio Creek	20230014				
				Coliform Bacteria		11 Miles	2019
					Nonpoint Source		
				Sedimentation/Siltation		11 Miles	2019
				Impairment to steelhead habitat.			
					Nonpoint Source		
2	B	San Leandro Bay (part of SF Bay, Central)	20420040				
				Chlordane		588 Acres	2008
				This listing was made by USEPA.			
					Nonpoint Source		
				Dieldrin		588 Acres	2008
				This listing was made by USEPA.			
					Nonpoint Source		
				Dioxin Compounds (including 2,3,7,8-TCDD)		588 Acres	2019
					Atmospheric Deposition		
				Exotic Species		588 Acres	2019
				Disrupt natural benthos; change pollutant availability in food chain; disrupt food availability to native species.			
					Ballast Water		
				Furan Compounds		588 Acres	2019
				The specific compounds are 2,3,7,8-TCDF, 1,2,3,7,8-PeCDF, 2,3,4,7,8-PeCDF, 1,2,3,4,7,8-HxCDF, 1,2,3,6,7,8-HxCDF, 1,2,3,7,8,9-HxCDF, 2,3,4,6,7,8-HxCDF, 1,2,3,4,6,7,8-HpCDF, 1,2,3,4,7,8,9-HpCDF, and OCDF. This listing was made by USEPA.			
					Atmospheric Deposition		
				Lead (sediment)		588 Acres	2019
					Source Unknown		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
				Mercury		588 Acres	2006
				Current data indicate fish consumption and wildlife consumption impacted uses: health consumption advisory in effect for multiple fish species including striped bass and shark. Major source is historic: gold mining sediments and local mercury mining; most significant ongoing source is erosion and drainage from abandoned mines; moderate to low level inputs from point sources.			
					Industrial Point Sources		
					Municipal Point Sources		
					Resource Extraction		
					Atmospheric Deposition		
					Natural Sources		
					Nonpoint Source		
				Mercury (sediment)		588 Acres	2006
					Source Unknown		
				PAHs (Polycyclic Aromatic Hydrocarbons) (sediment)		588 Acres	2019
					Source Unknown		
				Pesticides (sediment)		588 Acres	2019
					Source Unknown		
				Zinc (sediment)		588 Acres	2019
					Source Unknown		
2	R	San Leandro Creek, Lower	20420012				
				Diazinon		9.3 Miles	2005
				This listing was made by USEPA.			
					Urban Runoff/Storm Sewers		
2	R	San Lorenzo Creek	20420023				
				Diazinon		11 Miles	2005
				This listing was made by USEPA.			
					Urban Runoff/Storm Sewers		
2	R	San Mateo Creek	20440032				
				Diazinon		11 Miles	2005
				This listing was made by USEPA.			
					Urban Runoff/Storm Sewers		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
2	B	San Pablo Bay	20610010				
				Chlordane		68349 Acres	2008
				This listing was made by USEPA.			
					Nonpoint Source		
				DDT		68349 Acres	2008
				This listing was made by USEPA.			
					Nonpoint Source		
				Dieldrin		68349 Acres	2008
				This listing was made by USEPA.			
					Nonpoint Source		
				Dioxin Compounds (including 2,3,7,8-TCDD)		68349 Acres	2019
				The specific compounds are 2,3,7,8-TCDD, 1,2,3,7,8-PeCDD, 1,2,3,4,7,8-HxCDD, 1,2,3,6,7,8-HxCDD, 1,2,3,7,8,9-HxCDD, 1,2,3,4,6,7,8-HpCDD, and OCDD. This listing was made by USEPA.			
					Atmospheric Deposition		
				Exotic Species		68349 Acres	2019
				Disrupt natural benthos; change pollutant availability in food chain; disrupt food availability to native species.			
					Ballast Water		
				Furan Compounds		68349 Acres	2019
				The specific compounds are 2,3,7,8-TCDF, 1,2,3,7,8-PeCDF, 2,3,4,7,8-PeCDF, 1,2,3,4,7,8-HxCDF, 1,2,3,6, 7,8,-HxCDF, 1,2,3,7,8,9-HxCDF, 2,3,4,6,7,8-HxCDF, 1,2,3,4,6,7,8-HpCDF, 1,2,3,4,7,8,9-HpCDF, and OCDF. This listing was made by USEPA.			
					Atmospheric Deposition		
				Mercury		68349 Acres	2006
				Current data indicate fish consumption and wildlife consumption impacted uses: health consumption advisory in effect for multiple fish species including striped bass and shark. Major source is historic: gold mining sediments and local mercury mining; most significant ongoing source is erosion and drainage from abandoned mines; moderate to low level inputs from point sources.			
					Municipal Point Sources		
					Resource Extraction		
					Atmospheric Deposition		
					Natural Sources		
					Nonpoint Source		
				Nickel		68349 Acres	2019
				This listing was made by USEPA.			
					Source Unknown		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
				PCBs (Polychlorinated biphenyls)		68349 Acres	2006
				This listing covers non dioxin-like PCBs.Interim health advisory for fish; uncertainty regarding water column concentration data.			
					Unknown Nonpoint Source		
				PCBs (Polychlorinated biphenyls) (dioxin-like)		68349 Acres	2019
				The specific dioxin like compounds are 3,4,4,5-TCB (81), 3,3,3,3-TCB (77), 3,3,4,4,5-PeCB (126), 3,3,4,4,4,4-HxCB (169), 2,3,3,4,4-PeCB (105), 2,3,4,4,5-PeCB (114), 2,3,4,4,5-PeCB (118), 2,3,4,4,5-PeCB (123), 2,3,3,4,4,5-HxCB (156), 2,3,3,4,4,5-HxCB (157), 2,3,4,4,5,5,-HxCB (167), 2,3,3,4,4,5,5-HpCB (189). This listing was made by USEPA.			
					Unknown Nonpoint Source		
				Selenium		68349 Acres	2019
				Affected use is one branch of the food chain; most sensitive indicator is hatchability in nesting diving birds, significant contributions from oil refineries (control program in place) and agriculture (carried downstream by rivers); exotic species may have made food chain more susceptible to accumulation of selenium; health consumption advisory in effect for scaup and scoter (diving ducks); low TMDL priority because Individual Control Strategy in place.			
					Industrial Point Sources		
					Agriculture		
					Natural Sources		
					Exotic Species		
2	R	San Pablo Creek	20660014				
				Diazinon		9.9 Miles	2005
				This listing was made by USEPA.			
					Urban Runoff/Storm Sewers		
2	L	San Pablo Reservoir	20660012				
				Chlordane		784 Acres	2019
					Source Unknown		
				Dieldrin		784 Acres	2019
					Source Unknown		
				Heptachlor epoxide		784 Acres	2019
					Source Unknown		
				Mercury		784 Acres	2019
					Atmospheric Deposition		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
				PCBs (Polychlorinated biphenyls)		784 Acres	2019
					Source Unknown		
				Toxaphene		784 Acres	2019
					Source Unknown		
2	R	San Pedro Creek	20221011				
				Coliform Bacteria		2.4 Miles	2019
					Urban Runoff/Storm Sewers		
					Nonpoint Source		
2	R	San Rafael Creek	20320012				
				Diazinon		3.6 Miles	2005
				This listing was made by USEPA.			
					Urban Runoff/Storm Sewers		
2	R	San Vicente Creek	20221012				
				Coliform Bacteria		3.8 Miles	2019
					Nonpoint Source		
2	R	Saratoga Creek	20550040				
				Diazinon		18 Miles	2005
				This listing was made by USEPA.			
					Urban Runoff/Storm Sewers		
2	L	Shadow Cliffs Reservoir	20430080				
				Mercury		90 Acres	2019
					Source Unknown		
				PCBs (Polychlorinated biphenyls)		90 Acres	2019
					Source Unknown		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
2	R	Sonoma Creek	20640050				
				Nutrients		30 Miles	2008
				TMDL will be developed as part of ongoing watershed management effort. Additional monitoring and assessment needed.			
					Agriculture		
					Construction/Land Development		
					Land Development		
					Urban Runoff/Storm Sewers		
				Pathogens		30 Miles	2006
				TMDL will be developed as part of ongoing watershed management effort. Additional monitoring and assessment needed.			
					Agriculture		
					Construction/Land Development		
					Land Development		
					Urban Runoff/Storm Sewers		
				Sedimentation/Siltation		30 Miles	2008
				TMDL will be developed as part of ongoing watershed management effort. Additional monitoring and assessment needed.			
					Agriculture		
					Construction/Land Development		
					Land Development		
					Urban Runoff/Storm Sewers		
2	L	Soulajule Reservoir	20112012				
				Mercury		49 Acres	2019
					Source Unknown		
				PCBs (Polychlorinated biphenyls)		49 Acres	2019
					Source Unknown		
2	R	Stevens Creek	20550020				
				Diazinon		20 Miles	2005
				This listing was made by USEPA.			
					Urban Runoff/Storm Sewers		
				Toxicity		20 Miles	2019
					Source Unknown		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
2	L	Stevens Creek Reservoir	20550031				
				Chlordane		85 Acres	2019
					Source Unknown		
				Dieldrin		85 Acres	2019
					Source Unknown		
				Mercury		85 Acres	2019
					Source Unknown		
				PCBs (Polychlorinated biphenyls)		85 Acres	2019
					Source Unknown		
2	B	Suisun Bay	20710020				
				Chlordane		25335 Acres	2008
				This listing was made by USEPA.			
					Nonpoint Source		
				DDT		25335 Acres	2008
				This listing was made by USEPA.			
					Nonpoint Source		
				Dieldrin		25335 Acres	2008
				This listing was made by USEPA.			
					Nonpoint Source		
				Dioxin Compounds (including 2,3,7,8-TCDD)		25335 Acres	2019
				The specific compounds are 2,3,7,8-TCDD, 1,2,3,7,8-PeCDD, 1,2,3,4,7,8-HxCDD, 1,2,3,6,7,8-HxCDD, 1,2,3,7,8,9-HxCDD, 1,2,3,4,6,7,8-HpCDD, and OCDD. This listing was made by USEPA.			
					Atmospheric Deposition		
				Exotic Species		25335 Acres	2019
				Disrupt natural benthos; change pollutant availability in food chain; disrupt food availability to native species.			
					Ballast Water		
				Furan Compounds		25335 Acres	2019
				The specific compounds are 2,3,7,8-TCDF, 1,2,3,7,8-PeCDF, 2,3,4,7,8-PeCDF, 1,2,3,4,7,8-HxCDF, 1,2,3,6,7,8-HxCDF, 1,2,3,7,8,9-HxCDF, 2,3,4,6,7,8-HxCDF, 1,2,3,4,6,7,8-HpCDF, 1,2,3,4,7,8,9-HpCDF, and OCDF. This listing was made by USEPA.			
					Atmospheric Deposition		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
				Mercury		25335 Acres	2006
				Current data indicate fish consumption and wildlife consumption impacted uses. Major source is historic: gold mining sediments and local mercury mining; most significant ongoing source is erosion and drainage from abandoned mines; moderate to low level inputs from point sources.			
					Industrial Point Sources		
					Resource Extraction		
					Atmospheric Deposition		
					Natural Sources		
					Nonpoint Source		
				Nickel		25335 Acres	2019
				This listing was made by USEPA.			
					Source Unknown		
				PCBs (Polychlorinated biphenyls)		25335 Acres	2006
				This listing covers non-dioxin-like PCBs. Interim health advisory for fish; uncertainty regarding water column concentration data.			
					Unknown point source		
				PCBs (Polychlorinated biphenyls) (dioxin-like)		25335 Acres	2019
				The specific dioxin-like compounds are 3,4,4,5-TCB (81), 3,3,3,3-TCB (77), 3,3,4,4,5-PeCB (126), 3,3,4,4,4,4-HxCB (169), 2,3,3,4,4-PeCB (105), 2,3,4,4,5-PeCB (114), 2,3,4,4,5-PeCB (118), 2,3,4,4,5-PeCB (123), 2,3,3,4,4,5-HxCB (156), 2,3,3,4,4,5-HxCB (157), 2,3,4,4,5,5-HxCB (167), 2,3,3,4,4,5,5-HpCB (189). This listing was made by USEPA.			
					Unknown Nonpoint Source		
				Selenium		25335 Acres	2019
				Affected use is one branch of the food chain; most sensitive indicator is hatchability in nesting diving birds, significant contributions from oil refineries (control program in place) and agriculture (carried downstream by rivers); exotic species may have made food chain more susceptible to accumulation of selenium; health consumption advisory in effect for scaup and scoter (diving ducks); low TMDL priority because Individual Control Strategy in place.			
					Industrial Point Sources		
					Natural Sources		
					Exotic Species		
2	**T**	**Suisun Marsh Wetlands**	**20723000**				
				Metals		66339 Acres	2019
				Additional monitoring and assessment needed.			
					Agriculture		
					Urban Runoff/Storm Sewers		
					Flow Regulation/Modification		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
				Nutrients		66339 Acres	2019
				Additional monitoring and assessment needed.			
					Agriculture		
					Urban Runoff/Storm Sewers		
					Flow Regulation/Modification		
				Organic Enrichment/Low Dissolved Oxygen		66339 Acres	2019
				Additional monitoring and assessment needed.			
					Agriculture		
					Urban Runoff/Storm Sewers		
					Flow Regulation/Modification		
				Salinity/TDS/Chlorides		66339 Acres	2019
				Additional monitoring and assessment needed.			
					Agriculture		
					Urban Runoff/Storm Sewers		
					Flow Regulation/Modification		
2	E	Suisun Slough	20723000				
				Diazinon		1124 Acres	2005
				This listing was made by USEPA.			
					Urban Runoff/Storm Sewers		
2	B	Tomales Bay	20114033				
				Mercury		8545 Acres	2010
				Current data indicate fish consumption and wildlife consumption impacted uses: health consumption advisory in effect for multiple fish species including striped bass and shark. Major source is historic: gold mining sediments and local mercury mining; most significant ongoing source is erosion and drainage from abandoned mines; moderate to low level inputs from point sources.			
					Mine Tailings		
				Nutrients		8545 Acres	2019
				TMDL will be developed as part of ongoing watershed management effort. Tributary streams, Lagunitas Creek and Walker Creek, must be managed first. Additional monitoring and assessment needed.			
					Agriculture		
				Sedimentation/Siltation		8545 Acres	2008
				TMDL will be developed as part of ongoing watershed management effort. Tributary streams, Lagunitas Creek and Walker Creek, must be managed first. Additional monitoring and assessment needed.			
					Agriculture		
					Upstream Impoundment		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
2	R	Walker Creek	20112013				
				Mercury		16 Miles	2006
				Tributary to Tomales Bay. TMDLs will be developed as part of evolving watershed management effort. Additional monitoring and assessment needed.			
					Surface Mining		
					Mine Tailings		
				Nutrients		16 Miles	2019
				Tributary to Tomales Bay. TMDLs will be developed as part of evolving watershed management effort. Additional monitoring and assessment needed.			
					Agriculture		
				Sedimentation/Siltation		16 Miles	2009
				Tributary to Tomales Bay. TMDLs will be developed as part of evolving watershed management effort. Additional monitoring and assessment needed.			
					Agriculture		
2	R	Walnut Creek	20731040				
				Diazinon		9 Miles	2005
				This listing was made by USEPA.			
					Urban Runoff/Storm Sewers		
2	R	Wildcat Creek	20660013				
				Diazinon		12 Miles	2005
				This listing was made by USEPA.			
					Urban Runoff/Storm Sewers		
3	R	Alamo Creek	31230071				
				Fecal Coliform		7.8 Miles	2008
					Agriculture		
					Range Grazing-Riparian and/or Upland		
					Natural Sources		
3	R	Alisal Creek (Salinas)	30970093				
				Fecal Coliform		7.4 Miles	2007
					Agriculture		
					Urban Runoff/Storm Sewers		
					Natural Sources		
					Nonpoint Source		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
				Nitrate		7.4 Miles	2007
					Source Unknown		
3	R	Aptos Creek	30413023				
				Pathogens		8.4 Miles	2019
				Impaired length for pathogens is below Bridge Creek to the mouth (approximately 5 miles).			
					Urban Runoff/Storm Sewers		
				Sedimentation/Siltation		8.4 Miles	2008
					Disturbed Sites (Land Develop.)		
					Channel Erosion		
3	R	Arroyo Burro Creek	31532010				
				Pathogens		6.1 Miles	2015
					Urban Runoff/Storm Sewers		
					Nonpoint Source		
3	R	Arroyo Paredon	31534010				
				Boron		5.2 Miles	2019
					Source Unknown		
				Nitrate as Nitrate (NO3)		5.2 Miles	2019
					Source Unknown		
				Toxicity		5.2 Miles	2019
					Source Unknown		
3	R	Atascadero Creek (San Luis Obispo County)	30981124				
				Fecal Coliform		5.4 Miles	2019
					Source Unknown		
				Low Dissolved Oxygen		5.4 Miles	2019
					Source Unknown		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
3	R	Bean Creek	30412041				
				Sedimentation/Siltation		8.9 Miles	2019
					Road Construction		
					Disturbed Sites (Land Develop.)		
					Resource Extraction		
					Erosion/Siltation		
					Nonpoint Source		
3	R	Bear Creek(Santa Cruz County)	30412030				
				Sedimentation/Siltation		6.3 Miles	2019
					Silviculture		
					Road Construction		
					Disturbed Sites (Land Develop.)		
					Erosion/Siltation		
					Nonpoint Source		
3	R	Bell Creek (Santa Barbara Co)	31510013				
				Nitrate as Nitrate (NO3)		1.1 Miles	2019
					Source Unknown		
3	R	Blanco Drain	30911010				
				Pesticides		15 Miles	2008
					Agriculture		
					Irrigated Crop Production		
					Agriculture-storm runoff		
					Agriculture-irrigation tailwater		
					Agricultural Return Flows		
					Nonpoint Source		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
3	R	Boulder Creek	30412020				
				Sedimentation/Siltation		7.6 Miles	2019
					Specialty Crop Production		
					Silviculture		
					Road Construction		
					Disturbed Sites (Land Develop.)		
					Erosion/Siltation		
					Nonpoint Source		
3	R	Bradley Canyon Creek	31210030				
				Ammonia (Unionized)		17 Miles	2019
					Source Unknown		
				Fecal Coliform		17 Miles	2008
					Agriculture		
					Pasture Grazing-Riparian and/or Upland		
					Urban Runoff/Storm Sewers		
					Natural Sources		
				Nitrate as Nitrate (NO3)		17 Miles	2019
					Source Unknown		
3	R	Bradley Channel	31210030				
				Fecal Coliform		3.1 Miles	2008
					Source Unknown		
				Nitrate as Nitrate (NO3)		3.1 Miles	2019
					Source Unknown		
3	R	Branciforte Creek	30412051				
				Sedimentation/Siltation		5.8 Miles	2019
					Silviculture		
					Road Construction		
					Nonpoint Source		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
3	R	Canada De La Gaviota	31510031				
				Boron		7 Miles	2019
					Source Unknown		
3	R	Carbonera Creek	30412050				
				Pathogens		10 Miles	2019
					Urban Runoff/Storm Sewers		
					Nonpoint Source		
3	R	Carneros Creek	31531020				
				Ammonia (Unionized)		3.4 Miles	2019
					Source Unknown		
3	R	Carpinteria Creek	31534020				
				Pathogens		5.8 Miles	2015
					Agriculture		
					Land Disposal		
					Septage Disposal		
3	E	Carpinteria Marsh (El Estero Marsh)	31534020				
				Nutrients		188 Acres	2019
					Agriculture		
				Organic Enrichment/Low Dissolved Oxygen		188 Acres	2019
					Agriculture		
				Priority Organics		188 Acres	2019
					Urban Runoff/Storm Sewers		
3	R	Casmalia Canyon Creek	31300040				
				Sedimentation/Siltation		5 Miles	2019
					Source Unknown		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
3	R	Cholame Creek	31700053				
				Boron		8.7 Miles	2019
					Source Unknown		
				Fecal Coliform		8.7 Miles	2019
					Agriculture		
					Pasture Grazing-Riparian and/or Upland		
					Natural Sources		
					Nonpoint Source		
3	R	Chorro Creek	31022012				
				Nutrients		14 Miles	2005
					Municipal Point Sources		
					Agriculture		
					Irrigated Crop Production		
					Agriculture-storm runoff		
				Oxygen, Dissolved		14 Miles	2019
					Source Unknown		
3	R	Clear Creek (San Benito County)	30550013				
				Mercury		9.6 Miles	2004
					Resource Extraction		
3	R	Corralitos Creek	30510010				
				Fecal Coliform		13 Miles	2006
					Source Unknown		
3	R	Cuyama River	31210030				
				Boron		134 Miles	2019
					Source Unknown		
3	E	Elkhorn Slough	30600014				
				Pathogens		2034 Acres	2015
					Natural Sources		
					Nonpoint Source		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
				Pesticides		2034 Acres	2008
					Agriculture		
					Irrigated Crop Production		
					Agriculture-storm runoff		
					Agricultural Return Flows		
					Erosion/Siltation		
					Contaminated Sediments		
					Nonpoint Source		
				Sedimentation/Siltation		2034 Acres	2015
					Agriculture		
					Irrigated Crop Production		
					Agriculture-storm runoff		
					Channel Erosion		
					Nonpoint Source		
3	R	Espinosa Slough	30911010				
				Pesticides		1.5 Miles	2008
					Agriculture		
					Urban Runoff/Storm Sewers		
				Priority Organics		1.5 Miles	2008
					Nonpoint Source		
3	R	Fall Creek	30412022				
				Sedimentation/Siltation		5.1 Miles	2019
					Road Construction		
					Habitat Modification		
					Erosion/Siltation		
					Nonpoint Source		
3	R	Franklin Creek	31534020				
				Nitrate as Nitrate (NO3)		2.8 Miles	2019
					Source Unknown		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
3	R	Gabilan Creek	30919000				
				Fecal Coliform		6.4 Miles	2007
					Urban Runoff/Storm Sewers		
					Natural Sources		
					Nonpoint Source		
				Nitrate as Nitrate (NO3)		6.4 Miles	2019
					Source Unknown		
3	R	Glen Annie Canyon	31531020				
				Nitrate as Nitrate (NO3)		5.7 Miles	2019
					Source Unknown		
3	E	Goleta Slough/Estuary	31531020				
				Pathogens		196 Acres	2015
					Urban Runoff/Storm Sewers		
				Priority Organics		196 Acres	2019
					Nonpoint Source		
3	L	Hernandez Reservoir	30550016				
				Mercury		626 Acres	2005
					Surface Mining		
3	R	Kings Creek	30412011				
				Sedimentation/Siltation		4.4 Miles	2019
					Silviculture		
					Road Construction		
					Disturbed Sites (Land Develop.)		
					Erosion/Siltation		
					Nonpoint Source		
3	R	Las Tablas Creek	30981293				
				Metals		5.7 Miles	2019
					Surface Mining		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
3	R	Las Tablas Creek, North Fork	30981290				
				Metals		6.5 Miles	2019
					Surface Mining		
3	R	Las Tablas Creek, South Fork	30981290				
				Metals		4.7 Miles	2019
					Surface Mining		
3	R	Llagas Creek	30530020				
				Chloride		16 Miles	2019
				Impaired section for Chlorides is located downstream of confluence with Miller Slough (approximately 1 mile of stream near Southside Drive).			
					Nonpoint Source		
					Point Source		
				Fecal Coliform		16 Miles	2011
				Impaired section for Fecal Coliform is located between the confluence with Church Creek and the confluence with Pajaro River (approximately 9.5 miles of stream length).			
					Pasture Grazing-Riparian and/or Upland		
					Natural Sources		
					Nonpoint Source		
				Low Dissolved Oxygen		16 Miles	2019
				This listing was made by USEPA.			
					Municipal Point Sources		
					Irrigated Crop Production		
					Agricultural Return Flows		
					Habitat Modification		
				Nitrate as Nitrate (NO3)		16 Miles	2019
					Source Unknown		
				pH		16 Miles	2019
					Source Unknown		
				Sodium		16 Miles	2019
				Impaired section for Sodium is located downstream of confluence with Miller Slough (approximately 1 mile of stream near Southside Drive).			
					Source Unknown		
					Nonpoint Source		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
				Total Dissolved Solids		16 Miles	2019
				Impaired section for Total Dissolved Solids is located between the confluence with Church Creek and the confluence with Pajaro River (approximately 9.5 miles of stream length).			
					Nonpoint Source		
					Point Source		
3	R	Lompico Creek	30412040				
				Pathogens		4.5 Miles	2019
					Septage Disposal		
					Natural Sources		
					Nonpoint Source		
3	R	Los Osos Creek	31023012				
				Low Dissolved Oxygen		4.1 Miles	2015
				This listing was made by USEPA.			
					Agriculture		
					Pasture Grazing-Riparian and/or Upland		
					Urban Runoff/Storm Sewers		
					Natural Sources		
3	R	Love Creek	30412021				
				Sedimentation/Siltation		3.8 Miles	2019
					Agriculture		
					Silviculture		
					Road Construction		
					Disturbed Sites (Land Develop.)		
					Erosion/Siltation		
					Nonpoint Source		
3	R	Main Street Canal	31210030				
				Ammonia (Unionized)		5.1 Miles	2019
					Source Unknown		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
				Nitrate		5.1 Miles	2015
					Agriculture		
					Urban Runoff/Storm Sewers		
					Nonpoint Source		
3	R	Mission Creek	31532011				
				Pathogens		8.6 Miles	2015
					Urban Runoff/Storm Sewers		
					Transient encampments		
				Unknown Toxicity		8.6 Miles	2019
					Urban Runoff/Storm Sewers		
3	B	Monterey Harbor	30950042				
				Metals		76 Acres	2007
					Railroad Slag Pile		
				Unknown Toxicity		76 Acres	2019
					Source Unknown		
3	E	Moro Cojo Slough	30913011				
				Ammonia (Unionized)		62 Acres	2019
					Source Unknown		
				Low Dissolved Oxygen		62 Acres	2019
					Source Unknown		
				Pesticides		62 Acres	2006
					Agriculture		
					Irrigated Crop Production		
					Agriculture-storm runoff		
					Agricultural Return Flows		
					Nonpoint Source		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
				Sedimentation/Siltation		62 Acres	2019
					Agriculture		
					Irrigated Crop Production		
					Agriculture-storm runoff		
					Construction/Land Development		
					Nonpoint Source		
3	B	Morro Bay	31022012				
				Oxygen, Dissolved		1922 Acres	2019
					Source Unknown		
3	B	Moss Landing Harbor	30600014				
				Pathogens		79 Acres	2019
					Agriculture		
					Nonpoint Source		
					Boat Discharges/Vessel Wastes		
				Pesticides		79 Acres	2006
					Agriculture		
					Irrigated Crop Production		
					Specialty Crop Production		
				Sedimentation/Siltation		79 Acres	2019
					Agriculture		
					Irrigated Crop Production		
					Agriculture-storm runoff		
					Hydromodification		
					Dredging		
					Channel Erosion		
					Erosion/Siltation		
					Nonpoint Source		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
3	R	Mountain Charlie Gulch	30412040				
				Sedimentation/Siltation		3.9 Miles	2019
					Silviculture		
					Road Construction		
					Erosion/Siltation		
					Nonpoint Source		
3	L	Nacimiento Reservoir	30982000				
				Metals		5736 Acres	2019
					Surface Mining		
					Natural Sources		
3	R	Natividad Creek	30911010				
				Nitrate as Nitrate (NO3)		7 Miles	2019
					Source Unknown		
3	R	Newell Creek (Upper)	30412031				
				Sedimentation/Siltation		3.5 Miles	2019
					Agriculture		
					Silviculture		
					Road Construction		
					Disturbed Sites (Land Develop.)		
					Channel Erosion		
					Erosion/Siltation		
					Nonpoint Source		
3	R	Nipomo Creek	31210011				
				Fecal Coliform		9.3 Miles	2008
					Agriculture		
					Urban Runoff/Storm Sewers		
					Natural Sources		
3	E	Old Salinas River Estuary	30911010				
				Ammonia (Unionized)		74 Acres	2019
					Source Unknown		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
				Fecal Coliform		74 Acres	2007
					Source Unknown		
				Low Dissolved Oxygen		74 Acres	2019
					Source Unknown		
				Nutrients		74 Acres	2007
					Agriculture		
					Irrigated Crop Production		
					Agriculture-irrigation tailwater		
					Nonpoint Source		
				Pesticides		74 Acres	2008
					Agriculture		
					Irrigated Crop Production		
					Agriculture-storm runoff		
					Agriculture-irrigation tailwater		
					Agricultural Return Flows		
					Nonpoint Source		
3	R	Orcutt Creek	31210030				
				Ammonia (Unionized)		10 Miles	2019
					Source Unknown		
				Boron		10 Miles	2019
				This listing was made by USEPA.			
					Natural Sources		
				Chlorpyrifos		10 Miles	2019
					Source Unknown		
				DDT		10 Miles	2019
					Source Unknown		
				Dieldrin		10 Miles	2019
					Source Unknown		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
				Fecal Coliform		10 Miles	2008
					Agriculture		
					Pasture Grazing-Riparian and/or Upland		
					Natural Sources		
					Nonpoint Source		
				Nitrate		10 Miles	2015
					Source Unknown		
3	R	Oso Flaco Creek	31210030				
				Ammonia (Unionized)		6.3 Miles	2019
					Source Unknown		
				Fecal Coliform		6.3 Miles	2008
					Source Unknown		
				Nitrate		6.3 Miles	2015
					Source Unknown		
3	L	Oso Flaco Lake	31210030				
				Dieldrin		56 Acres	2019
					Source Unknown		
				Nitrate		56 Acres	2015
					Agriculture		
					Nonpoint Source		
3	C	Pacific Ocean at Arroyo Burro Beach (Santa Barbara County)	31532010				
				Total Coliform		0.06 Miles	2015
					Source Unknown		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
3	C	Pacific Ocean at Carpinteria State Beach (Carpinteria Creek mouth, Santa Barbara County)	31534020				
				Fecal Coliform		0.06 Miles	2015
					Source Unknown		
				Total Coliform		0.06 Miles	2015
					Source Unknown		
3	C	Pacific Ocean at East Beach (mouth of Mission Creek, Santa Barbara County)	31532011				
				Fecal Coliform		0.06 Miles	2015
					Agriculture		
					Urban Runoff/Storm Sewers		
					Natural Sources		
					Nonpoint Source		
					Unknown Nonpoint Source		
				Total Coliform		0.06 Miles	2015
					Agriculture		
					Urban Runoff/Storm Sewers		
					Nonpoint Source		
					Unknown Nonpoint Source		
3	C	Pacific Ocean at East Beach (mouth of Sycamore Creek, Santa Barbara County)	31532012				
				Total Coliform		0.06 Miles	2015
					Source Unknown		
3	C	Pacific Ocean at Gaviota Beach (mouth of Canada de la Gaviota Creek, Santa Barbara County)	31510031				
				Total Coliform		0.06 Miles	2015
					Source Unknown		
3	C	Pacific Ocean at Hammonds Beach (Santa Barbara County)	31533010				
				Fecal Coliform		0.06 Miles	2015
					Source Unknown		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
3	C	Pacific Ocean at Hope Ranch Beach (Santa Barbara County)	31532010				
				Fecal Coliform		0.06 Miles	2015
					Source Unknown		
3	C	Pacific Ocean at Jalama Beach (Santa Barbara County)	31510051				
				Fecal Coliform		0.06 Miles	2015
					Agriculture		
					Pasture Grazing-Riparian and/or Upland		
					Natural Sources		
					Nonpoint Source		
				Total Coliform		0.06 Miles	2015
					Agriculture		
					Pasture Grazing-Riparian and/or Upland		
					Natural Sources		
					Nonpoint Source		
3	C	Pacific Ocean at Ocean Beach (Santa Barbara County)	31410050				
				Fecal Coliform		0.06 Miles	2015
					Source Unknown		
				Total Coliform		0.06 Miles	2015
					Source Unknown		
3	C	Pacific Ocean at Point Rincon (mouth of Rincon Cr, Santa Barbara County)	31534012				
				Fecal Coliform		0.06 Miles	2015
					Source Unknown		
				Total Coliform		0.06 Miles	2015
					Source Unknown		
3	C	Pacific Ocean at Refugio Beach (Santa Barbara County)	31510022				
				Total Coliform		0.06 Miles	2015
					Source Unknown		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
3	R	Pajaro River	30510030				
				Boron		32 Miles	2019
					Source Unknown		
				Fecal Coliform		32 Miles	2011
				Impaired length is above Llagas Creek (approximately 4.5 miles).			
					Pasture Grazing-Riparian and/or Upland		
					Natural Sources		
					Nonpoint Source		
3	R	Prefumo Creek	31024012				
				Nitrate as Nitrate (NO3)		7.7 Miles	2019
					Source Unknown		
3	R	Quail Creek	30919000				
				Nitrate as Nitrate (NO3)		4.2 Miles	2019
					Source Unknown		
3	R	Rincon Creek	31534012				
				Boron		10 Miles	2019
					Source Unknown		
				Toxicity		10 Miles	2019
					Source Unknown		
3	R	Salinas Reclamation Canal	30911010				
				Ammonia (Unionized)		14 Miles	2019
					Source Unknown		
				Fecal Coliform		14 Miles	2007
					Agriculture		
					Pasture Grazing-Riparian and/or Upland		
					Urban Runoff/Storm Sewers		
					Natural Sources		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
				Low Dissolved Oxygen		14 Miles	2019
					Source Unknown		
				Pesticides		14 Miles	2008
					Minor Industrial Point Source		
					Agriculture		
					Irrigated Crop Production		
					Agriculture-storm runoff		
					Agriculture-irrigation tailwater		
					Agricultural Return Flows		
					Nonpoint Source		
				Priority Organics		14 Miles	2008
					Minor Industrial Point Source		
					Agriculture		
					Irrigated Crop Production		
					Agriculture-storm runoff		
					Agriculture-irrigation tailwater		
					Agricultural Return Flows		
					Urban Runoff/Storm Sewers		
					Source Unknown		
					Nonpoint Source		
3	R	Salinas River (lower, estuary to near Gonzales Rd crossing, watersheds 30910 and 30920)	30917000				
				Fecal Coliform		31 Miles	2007
					Source Unknown		
				Nitrate as Nitrate (NO3)		31 Miles	2019
					Source Unknown		
				Nutrients		31 Miles	2007
					Agriculture		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
				Pesticides		31 Miles	2008
					Agriculture		
					Irrigated Crop Production		
					Agriculture-storm runoff		
					Agriculture-irrigation tailwater		
					Agricultural Return Flows		
					Nonpoint Source		
				Salinity/TDS/Chlorides		31 Miles	2019
					Agriculture		
					Natural Sources		
					Nonpoint Source		
				Toxaphene		31 Miles	2019
					Source Unknown		
3	R	Salinas River (middle, near Gonzales Rd crossing to confluence with Nacimiento River)	30917000				
				Pesticides		72 Miles	2008
				Area affected is the lower 20 miles of the middle Salinas River.			
					Agriculture		
					Irrigated Crop Production		
					Agriculture-storm runoff		
					Agriculture-irrigation tailwater		
					Agricultural Return Flows		
					Nonpoint Source		
				Salinity/TDS/Chlorides		72 Miles	2019
				Area affected is the lower 20 miles of the middle Salinas River.			
					Agriculture		
					Natural Sources		
					Nonpoint Source		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
3	R	Salinas River (upper, confluence of Nacimiento River to Santa Margarita Reservoir)	30981112				
				Chloride		49 Miles	2019
					Agriculture		
					Pasture Grazing-Riparian and/or Upland		
					Urban Runoff/Storm Sewers		
				Sodium		49 Miles	2019
					Agriculture		
					Pasture Grazing-Riparian and/or Upland		
					Urban Runoff/Storm Sewers		
3	E	Salinas River Lagoon (North)	30911010				
				Nutrients		197 Acres	2007
					Nonpoint Source		
				Pesticides		197 Acres	2008
					Agriculture		
3	R	San Antonio Creek (San Antonio Watershed, Rancho del las Flores Bridge at Hwy 135 to downstream at Railroad Bridge)	31300050				
				Ammonia as Nitrogen		14 Miles	2019
					Source Unknown		
				Boron		14 Miles	2019
				This listing was made by USEPA.			
					Natural Sources		
				Nitrogen, Nitrite		14 Miles	2019
					Source Unknown		
3	R	San Benito River	30530020				
				Fecal Coliform		86 Miles	2011
					Source Unknown		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
3	R	San Diego Creek	31100050				
				Toxaphene		4.6 Miles	2019
					Source Unknown		
3	R	San Lorenzo Creek	30970023				
				Boron		49 Miles	2019
					Source Unknown		
				Fecal Coliform		49 Miles	2019
					Agriculture		
					Pasture Grazing-Riparian and/or Upland		
					Urban Runoff/Storm Sewers		
					Natural Sources		
3	R	San Lorenzo River	30412022				
				Pathogens		27 Miles	2019
					Urban Runoff/Storm Sewers		
					Septage Disposal		
3	E	San Lorenzo River Lagoon	30412053				
				Pathogens		66 Acres	2019
					Urban Runoff/Storm Sewers		
					Natural Sources		
3	R	San Luis Obispo Creek	31024011				
				Nitrate as Nitrate (NO3)		1.6 Miles	2019
					Source Unknown		
3	R	San Luis Obispo Creek (Below W Marsh Street)	31024012				
				Nitrate as Nitrate (NO3)		9.6 Miles	2019
					Source Unknown		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
				Nutrients		9.6 Miles	2005
					Municipal Point Sources		
					Agriculture		
					Irrigated Crop Production		
					Agriculture-storm runoff		
3	R	San Vicente Creek	30411023				
				Sedimentation/Siltation		9.1 Miles	2019
					Silviculture		
3	R	Santa Maria River	31210030				
				Ammonia (Unionized)		51 Miles	2019
					Source Unknown		
				Chlorpyrifos		51 Miles	2015
					Source Unknown		
				DDT		51 Miles	2015
					Source Unknown		
				Dieldrin		51 Miles	2015
					Source Unknown		
				Endrin		51 Miles	2015
					Source Unknown		
				Fecal Coliform		51 Miles	2008
					Agriculture		
					Pasture Grazing-Riparian and/or Upland		
					Urban Runoff/Storm Sewers		
					Natural Sources		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
				Nitrate		51 Miles	2015
					Agriculture		
					Pasture Grazing-Riparian and/or Upland		
					Urban Runoff/Storm Sewers		
3	R	Santa Rita Creek (Monterey County)	30919000				
				Nitrate as Nitrate (NO3)		11 Miles	2019
				.			
					Source Unknown		
3	R	Santa Ynez River (below city of Lompoc to Ocean)	31410040				
				Nitrate as Nitrate (NO3)		3.8 Miles	2015
					Source Unknown		
				Salinity/TDS/Chlorides		3.8 Miles	2019
					Agriculture		
				Sedimentation/Siltation		3.8 Miles	2019
					Agriculture		
					Urban Runoff/Storm Sewers		
					Resource Extraction		
3	R	Santa Ynez River (Cachuma Lake to below city of Lompoc)	31440050				
				Salinity/TDS/Chlorides		43 Miles	2019
					Agriculture		
				Sedimentation/Siltation		43 Miles	2019
					Agriculture		
					Urban Runoff/Storm Sewers		
					Resource Extraction		
3	L	Schwan Lake	30412053				
				Nutrients		23 Acres	2019
					Nonpoint Source		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
				Pathogens		23 Acres	2019
					Urban Runoff/Storm Sewers		
					Natural Sources		
3	R	Shuman Canyon Creek	31300041				
				Sedimentation/Siltation		8.5 Miles	2019
					Source Unknown		
3	S	Soda Lake	31100050				
				Ammonia (Unionized)		2627 Acres	2019
					Source Unknown		
3	E	Soquel Lagoon	30413014				
				Nutrients		1.2 Acres	2019
					Septage Disposal		
					Nonpoint Source		
				Pathogens		1.2 Acres	2019
					Urban Runoff/Storm Sewers		
					Natural Sources		
					Nonpoint Source		
				Sedimentation/Siltation		1.2 Acres	2011
					Construction/Land Development		
3	R	Tembladero Slough	30911010				
				Ammonia (Unionized)		5 Miles	2019
					Source Unknown		
				Fecal Coliform		5 Miles	2007
					Agriculture		
					Pasture Grazing-Riparian and/or Upland		
					Urban Runoff/Storm Sewers		
					Natural Sources		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
				Nutrients		5 Miles	2006
					Agriculture		
					Irrigated Crop Production		
					Agriculture-storm runoff		
					Agriculture-irrigation tailwater		
					Agricultural Return Flows		
					Nonpoint Source		
				Pesticides		5 Miles	2008
					Agriculture		
					Irrigated Crop Production		
					Agriculture-storm runoff		
					Agricultural Return Flows		
					Nonpoint Source		
3	R	Tequisquita Slough	30530020				
				Fecal Coliform		7.2 Miles	2019
					Agriculture		
					Natural Sources		
					Nonpoint Source		
3	R	Valencia Creek	30413023				
				Pathogens		6.2 Miles	2019
					Agriculture		
					Septage Disposal		
				Sedimentation/Siltation		6.2 Miles	2008
					Agriculture		
					Construction/Land Development		
3	R	Warden Creek	31023010				
				Low Dissolved Oxygen		6 Miles	2019
					Source Unknown		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
3	R	Watsonville Slough	30510030				
				Pesticides		6.2 Miles	2007
					Agriculture		
					Irrigated Crop Production		
					Agriculture-storm runoff		
					Agriculture-irrigation tailwater		
					Nonpoint Source		
3	R	Zayante Creek	30412040				
				Sedimentation/Siltation		9.2 Miles	2019
					Agriculture		
					Silviculture		
					Road Construction		
					Disturbed Sites (Land Develop.)		
					Erosion/Siltation		
					Nonpoint Source		
4	C	Abalone Cove Beach	40511000				
				DDT (sediment)		1.1 Miles	2019
					Nonpoint Source		
				PCBs (Polychlorinated biphenyls)		1.1 Miles	2019
				Fish Consumption Advisory for PCBs.			
					Nonpoint Source		
4	R	Aliso Canyon Wash	40521000				
				Copper		10 Miles	2019
					Source Unknown		
				Fecal Coliform		10 Miles	2019
					Source Unknown		
4	C	Amarillo Beach	40431000				
				DDT		0.64 Miles	2019
				Fish Consumption Advisory for DDT.			
					Nonpoint Source		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
				PCBs (Polychlorinated biphenyls)		0.64 Miles	2019
				Fish Consumption Advisory for PCBs.			
					Nonpoint Source		
4	R	Arroyo Seco Reach 1 (LA River to West Holly Ave.)	40515010				
				Coliform Bacteria		5.2 Miles	2009
					Nonpoint Source		
				Trash		5.2 Miles	2002
					Nonpoint Source		
4	R	Arroyo Seco Reach 2 (Figueroa St. to Riverside Dr.)	40515010				
				Coliform Bacteria		4.4 Miles	2009
					Nonpoint Source		
				Trash		4.4 Miles	2002
					Nonpoint Source		
4	C	Avalon Beach	40511000				
				Indicator bacteria		0.67 Miles	2019
				Area affected is between Pier and BB restaurant (2/3), between Pier and BB restaurant (1/3), between storm drain and Pier (1/3). and between BB restaurant and the Tuna Club.			
					Nonpoint/Point Source		
4	R	Ballona Creek	40513000				
				Cadmium (sediment)		6.5 Miles	2005
					Nonpoint/Point Source		
				Coliform Bacteria		6.5 Miles	2006
					Nonpoint/Point Source		
				Cyanide		6.5 Miles	2019
					Source Unknown		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
				Silver (sediment)	Nonpoint Source	6.5 Miles	2005
				Viruses (enteric)	Nonpoint/Point Source	6.5 Miles	2006
4	R	Ballona Creek Estuary	40513000				
				Coliform Bacteria	Nonpoint/Point Source	2.3 Miles	2006
				Shellfish Harvesting Advisory	Nonpoint/Point Source	2.3 Miles	2006
4	T	Ballona Creek Wetlands	40517000				
				Exotic Vegetation	Nonpoint Source	289 Acres	2019
				Habitat alterations	Nonpoint Source	289 Acres	2019
				Hydromodification	Nonpoint Source	289 Acres	2019
				Reduced Tidal Flushing	Nonpoint Source	289 Acres	2019
4	R	Bell Creek	40521000				
				Coliform Bacteria	Nonpoint/Point Source	8.9 Miles	2009
4	C	Big Rock Beach	40431000				
				DDT *Fish consumption advisory for DDT.*	Nonpoint Source	0.74 Miles	2019

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
				PCBs (Polychlorinated biphenyls)		0.74 Miles	2019
				Fish Consumption Advisory for PCBs.			
					Nonpoint Source		
4	C	Bluff Cove Beach	40511000				
				DDT		0.55 Miles	2019
				Fish Consumption Advisory for DDT.			
					Nonpoint Source		
				PCBs (Polychlorinated biphenyls)		0.55 Miles	2019
				Fish Consumption Advisory for PCBs.			
					Nonpoint Source		
4	R	Brown Barranca/Long Canyon	40321000				
				Nitrate and Nitrite		2.6 Miles	2003
					Nonpoint Source		
4	R	Burbank Western Channel	40521000				
				Cyanide		13 Miles	2019
					Source Unknown		
				Trash		13 Miles	2002
					Nonpoint/Point Source		
4	C	Cabrillo Beach (Outer)	40512000				
				DDT		0.58 Miles	2019
				Fish consumption advisory for DDT.			
					Nonpoint Source		
				PCBs (Polychlorinated biphenyls)		0.58 Miles	2019
				Fish consumption advisory for PCBs.			
					Nonpoint Source		
4	E	Calleguas Creek Reach 1 (was Mugu Lagoon on 1998 303(d) list)	40311000				
				Copper		344 Acres	2006
					Nonpoint/Point Source		
				Mercury		344 Acres	2006
					Nonpoint/Point Source		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
				Nickel		344 Acres	2006
					Nonpoint/Point Source		
				Sedimentation/Siltation		344 Acres	2019
					Agriculture		
					Natural Sources		
4	R	Calleguas Creek Reach 2 (estuary to Potrero Rd- was Calleguas Creek Reaches 1 and 2 on 1998 303d list)	40312000				
				Copper, Dissolved		4.3 Miles	2006
					Nonpoint Source		
				Fecal Coliform		4.3 Miles	2006
				Area affected is at the mouth of the creek.			
					Nonpoint/Point Source		
4	R	Calleguas Creek Reach 3 (Potrero Road upstream to confluence with Conejo Creek on 1998 303d list)	40312000				
				Chlordane		3.5 Miles	2019
					Source Unknown		
				Chloride		3.5 Miles	2002
					Nonpoint/Point Source		
				Total Dissolved Solids		3.5 Miles	2019
					Nonpoint/Point Source		
4	R	Calleguas Creek Reach 4 (was Revolon Slough Main Branch: Mugu Lagoon to Central Avenue on 1998 303d list)	40311000				
				Boron		7.2 Miles	2019
				This listing was made by USEPA.			
					Nonpoint Source		
				Fecal Coliform		7.2 Miles	2006
					Nonpoint/Point Source		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
				Selenium	Nonpoint Source	7.2 Miles	2006
				Sulfates *This listing was made by USEPA.*	Nonpoint Source	7.2 Miles	2019
				Total Dissolved Solids *This listing was made by USEPA.*	Nonpoint Source	7.2 Miles	2019
				Trash	Nonpoint Source	7.2 Miles	2019
4	R	Calleguas Creek Reach 5 (was Beardsley Channel on 1998 303d list)	40311000				
				Trash	Nonpoint Source	4.3 Miles	2019
4	R	Calleguas Creek Reach 6 (was Arroyo Las Posas Reaches 1 and 2 on 1998 303d list)	40362000				
				Chloride	Nonpoint/Point Source	15 Miles	2002
				Fecal Coliform	Nonpoint/Point Source	15 Miles	2006
				Sulfates	Nonpoint/Point Source	15 Miles	2019
				Total Dissolved Solids	Nonpoint/Point Source	15 Miles	2019
4	R	Calleguas Creek Reach 7 (was Arroyo Simi Reaches 1 and 2 on 1998 303d list)	40367000				
				Boron	Nonpoint Source	14 Miles	2019

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
				Chloride	Nonpoint Source	14 Miles	2002
				Fecal Coliform	Nonpoint Source	14 Miles	2006
				Sulfates	Nonpoint Source	14 Miles	2019
				Total Dissolved Solids	Nonpoint Source	14 Miles	2019
4	R	Calleguas Creek Reach 8 (was Tapo Canyon Reach 1)	40366000				
				Boron	Nonpoint/Point Source	7.2 Miles	2019
				Chloride	Nonpoint/Point Source	7.2 Miles	2002
				Sulfates	Nonpoint/Point Source	7.2 Miles	2019
				Total Dissolved Solids	Nonpoint/Point Source	7.2 Miles	2019
4	R	Calleguas Creek Reach 9A (was lower part of Conejo Creek Reach 1 on 1998 303d list)	40312000				
				Fecal Coliform	Nonpoint/Point Source	1.7 Miles	2006
				Sulfates	Nonpoint/Point Source	1.7 Miles	2019
				Total Dissolved Solids	Nonpoint/Point Source	1.7 Miles	2019

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
4	R	Calleguas Creek Reach 9B (was part of Conejo Creek Reaches 1 and 2 on 1998 303d list)	40363000				
				Chloride		6.2 Miles	2002
					Nonpoint/Point Source		
				Fecal Coliform		6.2 Miles	2006
					Nonpoint/Point Source		
				Sulfates		6.2 Miles	2019
					Nonpoint/Point Source		
				Total Dissolved Solids		6.2 Miles	2019
					Nonpoint/Point Source		
4	R	Calleguas Creek Reach 10 (Conejo Creek (Hill Canyon)-was part of Conejo Crk Reaches 2 & 3, and lower Conejo Crk/Arroyo Conejo N Fk on 1998 303d list)	40364000				
				Chloride		3 Miles	2019
					Nonpoint/Point Source		
				Fecal Coliform		3 Miles	2006
					Nonpoint Source		
				Sulfates		3 Miles	2019
					Nonpoint Source		
				Total Dissolved Solids		3 Miles	2019
					Nonpoint/Point Source		
4	R	Calleguas Creek Reach 11 (Arroyo Santa Rosa, was part of Conejo Creek Reach 3 on 1998 303d list)	40365000				
				Fecal Coliform		8.7 Miles	2006
					Nonpoint/Point Source		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
				Sulfates	Nonpoint/Point Source	8.7 Miles	2019
				Total Dissolved Solids	Nonpoint/Point Source	8.7 Miles	2019
4	R	Calleguas Creek Reach 12 (was Conejo Creek/Arroyo Conejo North Fork on 1998 303d list)	40364000				
				Sulfates	Nonpoint/Point Source	5.5 Miles	2019
				Total Dissolved Solids	Nonpoint/Point Source	5.5 Miles	2019
4	R	Calleguas Creek Reach 13 (Conejo Creek South Fork, was Conejo Cr Reach 4 and part of Reach 3 on 1998 303d list)	40368000				
				Chloride	Nonpoint/Point Source	17 Miles	2002
				Sulfates	Nonpoint/Point Source	17 Miles	2019
				Total Dissolved Solids	Nonpoint/Point Source	17 Miles	2019
4	R	Canada Larga (Ventura River Watershed)	40210010				
				Fecal Coliform	*Horse stables, land use, cattle, and wildlife may be sources.* Nonpoint Source	8 Miles	2019
				Low Dissolved Oxygen	Nonpoint Source	8 Miles	2019

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4	C	Carbon Beach	40416000				
				DDT		1.5 Miles	2019
				Fish consumption advisory for DDT.			
					Nonpoint Source		
				PCBs (Polychlorinated biphenyls)		1.5 Miles	2019
				Fish consumption advisory for PCBs.			
					Nonpoint Source		
4	C	Castlerock Beach	40513000				
				DDT		0.21 Miles	2019
				Fish Consumption Advisory for DDT.			
					Nonpoint Source		
				PCBs (Polychlorinated biphenyls)		0.21 Miles	2019
				Fish Consumption Advisory for PCBs.			
					Nonpoint Source		
4	B	Channel Islands Harbor	40311000				
				Lead (sediment)		209 Acres	2019
					Nonpoint Source		
				Zinc (sediment)		209 Acres	2019
					Nonpoint Source		
4	C	Channel Islands Harbor Beach	40311000				
				Indicator bacteria		0.08 Miles	2019
					Nonpoint/Point Source		
4	T	Colorado Lagoon	40512000				
				Chlordane (tissue & sediment)		13 Acres	2019
					Nonpoint Source		
				DDT (tissue)		13 Acres	2019
					Nonpoint Source		
				Dieldrin (tissue)		13 Acres	2019
					Nonpoint Source		
				Lead (sediment)		13 Acres	2019
					Nonpoint Source		
				PAHs (Polycyclic Aromatic Hydrocarbons) (sediment)		13 Acres	2019
					Nonpoint Source		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
				PCBs (Polychlorinated biphenyls) (tissue)		13 Acres	2019
					Nonpoint Source		
				Sediment Toxicity		13 Acres	2019
					Nonpoint Source		
				Zinc (sediment)		13 Acres	2019
					Nonpoint Source		
4	R	Compton Creek	40515010				
				Coliform Bacteria		8.5 Miles	2009
					Nonpoint/Point Source		
				Trash		8.5 Miles	2019
					Source Unknown		
4	R	Coyote Creek	40515010				
				Coliform Bacteria		13 Miles	2019
					Nonpoint/Point Source		
				Copper, Dissolved		13 Miles	2006
					Nonpoint Source		
				Diazinon		13 Miles	2019
					Source Unknown		
				pH		13 Miles	2019
					Source Unknown		
				Toxicity		13 Miles	2007
				This listing was made by USEPA.			
					Point Source		
4	L	Crystal Lake	40543000				
				Organic Enrichment/Low Dissolved Oxygen		3.7 Acres	2019
					Nonpoint Source		

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4	R	Dominguez Channel (lined portion above Vermont Ave)	40351000				
				Ammonia		6.7 Miles	2019
					Nonpoint/Point Source		
				Copper		6.7 Miles	2019
					Nonpoint/Point Source		
				Dieldrin (tissue)		6.7 Miles	2019
					Nonpoint/Point Source		
				Indicator bacteria		6.7 Miles	2007
					Nonpoint/Point Source		
				Lead (tissue)		6.7 Miles	2019
					Nonpoint/Point Source		
				Sediment Toxicity		6.7 Miles	2019
					Source Unknown		
				Zinc (sediment)		6.7 Miles	2019
					Nonpoint/Point Source		
4	E	Dominguez Channel Estuary (unlined portion below Vermont Ave)	40512000				
				Ammonia		140 Acres	2019
					Nonpoint/Point Source		
				Benthic Community Effects		140 Acres	2019
					Nonpoint/Point Source		
				Benzo(a)pyrene (PAHs)		140 Acres	2019
					Source Unknown		
				Benzo[a]anthracene		140 Acres	2019
					Source Unknown		

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				Chlordane (tissue)		140 Acres	2019
					Nonpoint/Point Source		
				Chrysene (C1-C4)		140 Acres	2019
					Source Unknown		
				Coliform Bacteria		140 Acres	2007
					Nonpoint/Point Source		
				DDT (tissue & sediment)		140 Acres	2019
					Nonpoint/Point Source		
				Dieldrin (tissue)		140 Acres	2019
					Nonpoint/Point Source		
				Lead (tissue)		140 Acres	2019
					Nonpoint/Point Source		
				PCBs (Polychlorinated biphenyls)		140 Acres	2019
					Source Unknown		
				Phenanthrene		140 Acres	2019
					Source Unknown		
				Pyrene		140 Acres	2019
					Source Unknown		
				Zinc (sediment)		140 Acres	2019
					Nonpoint/Point Source		
4	R	Dry Canyon Creek	40521000				
				Fecal Coliform		3.9 Miles	2009
					Urban Runoff/Storm Sewers		
					Natural Sources		

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4	L	Echo Park Lake	40515010				
				Algae		13 Acres	2019
					Nonpoint Source		
				Ammonia		13 Acres	2019
					Nonpoint Source		
				Copper		13 Acres	2019
					Nonpoint Source		
				Eutrophic		13 Acres	2019
					Nonpoint Source		
				Lead		13 Acres	2019
					Nonpoint Source		
				Odor		13 Acres	2019
					Nonpoint Source		
				PCBs (Polychlorinated biphenyls) (tissue)		13 Acres	2019
					Nonpoint Source		
				pH		13 Acres	2019
					Nonpoint Source		
				Trash		13 Acres	2007
					Source Unknown		
4	L	El Dorado Lakes	40515010				
				Algae		35 Acres	2019
					Nonpoint Source		
				Ammonia		35 Acres	2019
					Nonpoint Source		
				Copper		35 Acres	2019
					Nonpoint Source		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
				Eutrophic		35 Acres	2019
					Nonpoint Source		
				Lead		35 Acres	2019
					Nonpoint Source		
				Mercury (tissue)		35 Acres	2019
					Nonpoint Source		
				pH		35 Acres	2019
					Nonpoint Source		
4	L	Elizabeth Lake	40351000				
				Eutrophic		123 Acres	2019
					Nonpoint Source		
				Organic Enrichment/Low Dissolved Oxygen		123 Acres	2019
					Nonpoint Source		
				pH		123 Acres	2019
					Nonpoint Source		
				Trash		123 Acres	2019
					Nonpoint Source		
4	C	Escondido Beach	40434000				
				DDT		1.2 Miles	2019
				Fish consumption advisory for DDT.			
					Nonpoint Source		
				PCBs (Polychlorinated biphenyls)		1.2 Miles	2019
				Fish consumption advisory for PCBs.			
					Nonpoint Source		
4	C	Flat Rock Point Beach Area	40511000				
				DDT		0.11 Miles	2019
				Fish Consumption Advisory for DDT.			
					Nonpoint Source		
				PCBs (Polychlorinated biphenyls)		0.11 Miles	2019
				Fish Consumption Advisory for PCBs.			
					Nonpoint Source		

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4	R	Fox Barranca (tributary to Calleguas Creek Reach 6)	40362000				
				Boron		6.7 Miles	2019
					Nonpoint Source		
				Sulfates		6.7 Miles	2019
					Nonpoint Source		
				Total Dissolved Solids		6.7 Miles	2019
					Nonpoint Source		
4	C	Hobie Beach (Channel Islands Harbor)	40311000				
				Indicator bacteria		0.06 Miles	2019
					Nonpoint/Point Source		
4	R	Hopper Creek	40341000				
				Sulfates		13 Miles	2019
					Nonpoint/Point Source		
				Total Dissolved Solids		13 Miles	2019
					Nonpoint/Point Source		
4	C	Inspiration Point Beach	40511000				
				DDT		0.14 Miles	2019
				Fish Consumption Advisory for DDT.			
					Nonpoint Source		
				PCBs (Polychlorinated biphenyls)		0.14 Miles	2019
				Fish Consumption Advisroy for PCBs.			
					Nonpoint Source		
4	C	La Costa Beach	40416000				
				DDT		0.74 Miles	2019
				Fish Consumption Advisory for DDT.			
					Nonpoint Source		
				PCBs (Polychlorinated biphenyls)		0.74 Miles	2019
				Fish Consumption Advisory for PCBs.			
					Nonpoint Source		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
4	L	Lake Calabasas	40521000				
				Ammonia		18 Acres	2006
					Nonpoint Source		
				DDT (tissue)		18 Acres	2019
					Nonpoint Source		
				Eutrophic		18 Acres	2019
					Nonpoint Source		
				Odor		18 Acres	2019
					Nonpoint Source		
				Organic Enrichment/Low Dissolved Oxygen		18 Acres	2019
					Nonpoint Source		
				pH		18 Acres	2019
					Nonpoint Source		
4	L	Lake Hughes	40351000				
				Algae		21 Acres	2019
					Nonpoint Source		
				Eutrophic		21 Acres	2019
					Nonpoint Source		
				Fish Kills		21 Acres	2019
					Nonpoint Source		
				Odor		21 Acres	2019
					Nonpoint Source		
				Trash		21 Acres	2019
					Nonpoint Source		
4	L	Lake Lindero	40423000				
				Algae		15 Acres	2006
					Nonpoint Source		
				Chloride		15 Acres	2019
					Nonpoint Source		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
				Eutrophic		15 Acres	2006
					Nonpoint Source		
				Odor		15 Acres	2006
					Nonpoint Source		
				Selenium		15 Acres	2019
					Source Unknown		
				Specific Conductivity		15 Acres	2019
					Nonpoint Source		
				Trash		15 Acres	2019
					Nonpoint Source		
4	L	Lake Sherwood	40426000				
				Algae		135 Acres	2006
					Nonpoint Source		
				Ammonia		135 Acres	2006
					Nonpoint Source		
				Eutrophic		135 Acres	2006
					Nonpoint Source		
				Mercury (tissue)		135 Acres	2019
					Nonpoint Source		
				Organic Enrichment/Low Dissolved Oxygen		135 Acres	2006
					Nonpoint Source		
4	C	Las Flores Beach	40415000				
				DDT		1.1 Miles	2019
				Fish Consumption Advisory for DDT.			
					Nonpoint Source		
				PCBs (Polychlorinated biphenyls)		1.1 Miles	2019
				Fish Consumption Advisory for PCBs.			
					Nonpoint Source		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
4	C	Las Tunas Beach	40412000				
				DDT		1.2 Miles	2019
				Fish Consumption Advisory for DDT.			
					Nonpoint Source		
				PCBs (Polychlorinated biphenyls)		1.2 Miles	2019
				Fish Consumption Advisory for PCBs.			
					Nonpoint Source		
4	R	Las Virgenes Creek	40422010				
				Nutrients (Algae)		12 Miles	2006
					Nonpoint Source		
				Organic Enrichment/Low Dissolved Oxygen		12 Miles	2006
					Nonpoint Source		
				Scum/Foam-unnatural		12 Miles	2006
					Nonpoint Source		
				Sedimentation/Siltation		12 Miles	2019
					Source Unknown		
				Selenium		12 Miles	2019
					Nonpoint Source		
				Trash		12 Miles	2019
					Nonpoint Source		
4	L	Legg Lake	40531000				
				Ammonia		25 Acres	2019
					Nonpoint Source		
				Copper		25 Acres	2019
					Nonpoint Source		
				Lead		25 Acres	2019
					Nonpoint Source		
				Odor		25 Acres	2019
					Nonpoint Source		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
				pH		25 Acres	2019
					Nonpoint Source		
				Trash		25 Acres	2019
					Nonpoint Source		
4	L	Lincoln Park Lake	40515010				
				Ammonia		3.8 Acres	2019
					Nonpoint Source		
				Eutrophic		3.8 Acres	2019
					Nonpoint Source		
				Lead		3.8 Acres	2019
					Nonpoint Source		
				Odor		3.8 Acres	2019
					Nonpoint Source		
				Organic Enrichment/Low Dissolved Oxygen		3.8 Acres	2019
					Nonpoint Source		
				Trash		3.8 Acres	2007
					Source Unknown		
4	R	Lindero Creek Reach 1	40423000				
				Algae		3 Miles	2006
					Nonpoint Source		
				Scum/Foam-unnatural		3 Miles	2006
					Nonpoint Source		
				Selenium		3 Miles	2019
					Nonpoint Source		
				Trash		3 Miles	2019
					Nonpoint Source		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
4	R	Lindero Creek Reach 2 (Above Lake)	40425000				
				Algae		4.5 Miles	2006
					Nonpoint Source		
				Scum/Foam-unnatural		4.5 Miles	2006
					Nonpoint Source		
				Selenium		4.5 Miles	2019
					Nonpoint Source		
				Trash		4.5 Miles	2019
					Nonpoint Source		
4	C	Long Point Beach	40511000				
				DDT		0.7 Miles	2019
				Fish Consumption Advisory for DDT.			
					Nonpoint Source		
				PCBs (Polychlorinated biphenyls)		0.7 Miles	2019
				Fish Consumption Advisory for PCBs.			
					Nonpoint Source		
4	B	Los Angeles Harbor - Cabrillo Marina	40512000				
				DDT		77 Acres	2019
					Source Unknown		
				PCBs (Polychlorinated biphenyls)		77 Acres	2019
					Source Unknown		
4	B	Los Angeles Harbor - Consolidated Slip	40512000				
				Benthic Community Effects		36 Acres	2019
					Nonpoint Source		
				Cadmium (sediment)		36 Acres	2019
				Historical use of pesticides and lubricants, stormwater runoff, aerial deposition, and historical discharges for metals.			
					Nonpoint Source		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
				Chlordane (tissue & sediment)	Nonpoint Source	36 Acres	2019
				Chromium (sediment)	Nonpoint Source	36 Acres	2019
				Copper (sediment)	Nonpoint Source	36 Acres	2019
				DDT (tissue & sediment) *Fish Consumption Advisory for DDT.*	Nonpoint Source	36 Acres	2019
				Dieldrin	Nonpoint Source	36 Acres	2019
				Lead (sediment)	Nonpoint Source	36 Acres	2019
				Mercury (sediment) *Historical use of pesticides and lubricants, stormwater runoff, aerial deposition, and historical discharges for metals.*	Nonpoint Source	36 Acres	2019
				PCBs (Polychlorinated biphenyls) (tissue & sediment) *Fish Consumption Advisory for PCBs.*	Nonpoint Source	36 Acres	2019
				Sediment Toxicity	Nonpoint Source	36 Acres	2019
				Toxaphene (tissue)	Nonpoint Source	36 Acres	2019
				Zinc (sediment) *Historical use of pesticides and lubricants, stormwater runoff, aerial deposition, and historical discharges for metals.*	Nonpoint Source	36 Acres	2019

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
4	B	Los Angeles Harbor - Fish Harbor	40518000				
				Benzo[a]anthracene		91 Acres	2019
					Source Unknown		
				Chlordane		91 Acres	2019
					Source Unknown		
				Chrysene (C1-C4)		91 Acres	2019
					Source Unknown		
				Copper		91 Acres	2019
					Source Unknown		
				DDT		91 Acres	2019
					Nonpoint Source		
				Dibenz[a,h]anthracene		91 Acres	2019
					Source Unknown		
				Lead		91 Acres	2019
					Source Unknown		
				Mercury		91 Acres	2019
					Source Unknown		
				PAHs (Polycyclic Aromatic Hydrocarbons)		91 Acres	2019
					Nonpoint Source		
				PCBs (Polychlorinated biphenyls)		91 Acres	2019
					Nonpoint Source		
				Phenanthrene		91 Acres	2019
					Source Unknown		
				Pyrene		91 Acres	2019
					Source Unknown		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
				Sediment Toxicity	Source Unknown	91 Acres	2019
				Zinc	Source Unknown	91 Acres	2019
4	B	Los Angeles Harbor - Inner Cabrillo Beach Area	40512000				
				Copper	Source Unknown	82 Acres	2019
				DDT *Fish consumption advisory for DDT.*	Nonpoint Source	82 Acres	2019
				PCBs (Polychlorinated biphenyls) *Fish Consumption Advisory for PCBs.*	Nonpoint Source	82 Acres	2019
4	E	Los Angeles River Estuary (Queensway Bay)	40512000				
				Chlordane (sediment) *Historical use of pesticides and lubricants.*	Nonpoint Source	207 Acres	2019
				DDT (sediment) *Historical use of pesticides and lubricants.*	Nonpoint Source	207 Acres	2019
				Lead (sediment) *Historical use of pesticides and lubricants.*	Nonpoint Source	207 Acres	2019
				PCBs (Polychlorinated biphenyls) (sediment) *Historical use of pesticides and lubricants.*	Nonpoint Source	207 Acres	2019
				Sediment Toxicity	Source Unknown	207 Acres	2019
				Trash	Source Unknown	207 Acres	2007

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
				Zinc (sediment)		207 Acres	2019
				Historical use of pesticides and lubricants.			
					Nonpoint Source		
4	R	Los Angeles River Reach 1 (Estuary to Carson Street)	40512000				
				Coliform Bacteria		3.4 Miles	2009
					Nonpoint/Point Source		
				Cyanide		3.4 Miles	2019
					Source Unknown		
				Diazinon		3.4 Miles	2019
					Source Unknown		
				Trash		3.4 Miles	2007
					Nonpoint/Point Source		
4	R	Los Angeles River Reach 2 (Carson to Figueroa Street)	40515010				
				Coliform Bacteria		19 Miles	2009
					Nonpoint/Point Source		
				Oil		19 Miles	2019
					Nonpoint Source		
				Trash		19 Miles	2007
					Nonpoint/Point Source		
4	R	Los Angeles River Reach 3 (Figueroa St. to Riverside Dr.)	40521000				
				Trash		7.9 Miles	2007
					Source Unknown		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED		PROPOSED TMDL COMPLETION
4	R	Los Angeles River Reach 4 (Sepulveda Dr. to Sepulveda Dam)	40521000					
				Coliform Bacteria		11	Miles	2009
					Nonpoint/Point Source			
				Trash		11	Miles	2007
					Source Unknown			
4	R	Los Angeles River Reach 5 (within Sepulveda Basin)	40521000					
				Oil		1.9	Miles	2019
					Nonpoint/Point Source			
				Trash		1.9	Miles	2007
					Nonpoint/Point Source			
4	R	Los Angeles River Reach 6 (Above Sepulveda Flood Control Basin)	40521000					
				1,1-Dichloroethane (1,1-DCE)/Vinylidene chloride		7	Miles	2019
					Nonpoint Source			
				Coliform Bacteria		7	Miles	2009
					Nonpoint Source			
				Tetrachloroethylene/PCE		7	Miles	2019
					Nonpoint Source			
				Trichloroethylene/TCE		7	Miles	2019
					Nonpoint Source			
4	B	Los Angeles/Long Beach Inner Harbor	40518000					
				Beach Closures		3003	Acres	2004
					Nonpoint/Point Source			
				Benthic Community Effects		3003	Acres	2019
					Nonpoint Source			
				DDT		3003	Acres	2019
				.				
					Nonpoint/Point Source			

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				PCBs (Polychlorinated biphenyls)		3003 Acres	2019
				.	Nonpoint/Point Source		
				Sediment Toxicity		3003 Acres	2019
				.	Nonpoint/Point Source		
4	B	Los Angeles/Long Beach Outer Harbor (inside breakwater)	40512000				
				DDT		4042 Acres	2019
					Nonpoint Source		
				PCBs (Polychlorinated biphenyls)		4042 Acres	2019
					Nonpoint Source		
4	T	Los Cerritos Channel	40515010				
				Ammonia		31 Acres	2019
					Nonpoint Source		
				Bis(2ethylhexyl)phthalate/DEHP		31 Acres	2019
					Source Unknown		
				Chlordane (sediment)		31 Acres	2019
					Source Unknown		
				Coliform Bacteria		31 Acres	2019
					Nonpoint Source		
				Copper		31 Acres	2019
					Nonpoint Source		
				Lead		31 Acres	2019
					Nonpoint Source		
				Trash		31 Acres	2019
					Source Unknown		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
				Zinc		31 Acres	2019
					Nonpoint Source		
4	L	Machado Lake (Harbor Park Lake)	40512000				
				Algae		45 Acres	2019
					Nonpoint Source		
				Ammonia		45 Acres	2019
					Nonpoint Source		
				ChemA (tissue)		45 Acres	2019
				Historical use of pesticides and lubricants.			
					Nonpoint Source		
				Chlordane (tissue)		45 Acres	2019
				Fish Consumption Advisory.			
					Nonpoint Source		
				DDT (tissue)		45 Acres	2019
				Fish Consumption Advisory.			
					Nonpoint Source		
				Dieldrin (tissue)		45 Acres	2019
					Nonpoint Source		
				Eutrophic		45 Acres	2019
					Nonpoint Source		
				Odor		45 Acres	2019
					Nonpoint Source		
				PCBs (Polychlorinated biphenyls) (tissue)		45 Acres	2019
					Nonpoint Source		
				Trash		45 Acres	2019
					Nonpoint Source		
4	C	Malaga Cove Beach	40511000				
				DDT		0.39 Miles	2019
				Fish Consumption Advisory for DDT.			
					Nonpoint Source		
				PCBs (Polychlorinated biphenyls)		0.39 Miles	2019
				Fish Consumption Advisory for PCBs.			
					Nonpoint Source		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
4	L	Malibou Lake	40424000				
				Algae		40 Acres	2006
					Nonpoint Source		
				Eutrophic		40 Acres	2006
					Nonpoint Source		
				Organic Enrichment/Low Dissolved Oxygen		40 Acres	2006
					Nonpoint Source		
4	C	Malibu Beach	40421000				
				DDT		0.77 Miles	2019
				Fish Consumption Advisory for DDT.			
					Nonpoint Source		
4	R	Malibu Creek	40421000				
				Fish Barriers (Fish Passage)		11 Miles	2019
					Dam Construction		
				Nutrients (Algae)		11 Miles	2006
					Nonpoint/Point Source		
				Scum/Foam-unnatural		11 Miles	2006
					Nonpoint/Point Source		
				Sedimentation/Siltation		11 Miles	2019
					Source Unknown		
				Selenium		11 Miles	2019
					Source Unknown		
				Sulfates		11 Miles	2019
					Source Unknown		
				Trash		11 Miles	2019
					Nonpoint Source		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
4	E	Malibu Lagoon	40421000				
				Benthic Community Effects		15 Acres	2019
					Nonpoint/Point Source		
				Eutrophic		15 Acres	2006
					Nonpoint/Point Source		
				pH		15 Acres	2006
				Possible sources might be septic systems, storm drains, and birds.			
					Source Unknown		
				Shellfish Harvesting Advisory		15 Acres	2005
					Nonpoint/Point Source		
				Swimming Restrictions		15 Acres	2005
					Nonpoint/Point Source		
				Viruses (enteric)		15 Acres	2005
					Nonpoint/Point Source		
4	C	Malibu Lagoon Beach (Surfrider)	40421000				
				DDT		1 Miles	2019
				Fish Consumption Advisory for DDT.			
					Nonpoint Source		
				PCBs (Polychlorinated biphenyls)		1 Miles	2019
				Fish Consumption Advisory for PCBs.			
					Nonpoint Source		
4	R	Matilija Creek Reach 1 (Jct. With N. Fork to Reservoir)	40220012				
				Fish Barriers (Fish Passage)		0.63 Miles	2019
					Dam Construction		
4	R	Matilija Creek Reach 2 (Above Reservoir)	40220010				
				Fish Barriers (Fish Passage)		15 Miles	2019
					Dam Construction		

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4	L	Matilija Reservoir	40220012				
				Fish Barriers (Fish Passage)		121 Acres	2019
					Dam Construction		
4	R	McCoy Canyon Creek	40521000				
				Fecal Coliform		4 Miles	2009
					Nonpoint Source		
				Nitrate		4 Miles	2019
					Nonpoint Source		
				Nitrogen, Nitrate		4 Miles	2019
					Urban Runoff/Storm Sewers		
					Natural Sources		
4	L	McGrath Lake	40311000				
				Chlordane (sediment)		20 Acres	2019
					Nonpoint Source		
				DDT (sediment)		20 Acres	2019
					Nonpoint Source		
				Dieldrin (sediment)		20 Acres	2019
				Historical use of pesticides and lubricants, storm water runoff/aerial deposition from agricultural fields.			
					Nonpoint Source		
				Fecal Coliform		20 Acres	2019
					Agriculture		
					Landfills		
					Natural Sources		
				PCBs (Polychlorinated biphenyls) (sediment)		20 Acres	2019
				Historical use of pesticides and lubricants, storm water runoff/aerial deposition from agricultural fields.			
					Nonpoint Source		
				Sediment Toxicity		20 Acres	2019
					Nonpoint Source		

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4	R	Medea Creek Reach 1 (Lake to Confl. with Lindero)	40424000				
				Algae		2.6 Miles	2006
					Nonpoint Source		
				Sedimentation/Siltation		2.6 Miles	2019
					Source Unknown		
				Selenium		2.6 Miles	2019
					Nonpoint Source		
				Trash		2.6 Miles	2019
					Nonpoint Source		
4	R	Medea Creek Reach 2 (Abv Confl. with Lindero)	40423000				
				Algae		5.4 Miles	2006
					Nonpoint Source		
				Sedimentation/Siltation		5.4 Miles	2019
					Source Unknown		
				Selenium		5.4 Miles	2019
					Nonpoint Source		
				Trash		5.4 Miles	2019
					Nonpoint Source		
4	R	Mint Canyon Creek Reach 1 (Confl to Rowler Cyn)	40351000				
				Nitrate and Nitrite		8.1 Miles	2004
					Nonpoint Source		
4	L	Munz Lake	40351000				
				Eutrophic		6.6 Acres	2019
					Nonpoint Source		

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				Trash		6.6 Acres	2019
					Nonpoint Source		
4	C	Nicholas Canyon Beach	40444000				
				DDT		1.7 Miles	2019
				Fish Consumption Advisory for DDT.			
					Nonpoint Source		
				PCBs (Polychlorinated biphenyls)		1.7 Miles	2019
				Fish Consumption Advisory for PCBs.			
					Nonpoint Source		
4	C	Palo Verde Shoreline Park Beach	40511000				
				Pesticides		0.24 Miles	2019
					Source Unknown		
4	C	Paradise Cove Beach	40435000				
				DDT		1.7 Miles	2019
				Fish consumption advisory for DDT.			
					Nonpoint Source		
				PCBs (Polychlorinated biphenyls)		1.7 Miles	2019
				Fish consumption advisory for PCBs.			
					Nonpoint Source		
4	L	Peck Road Park Lake	40531000				
				Chlordane (tissue)		103 Acres	2019
					Nonpoint Source		
				DDT (tissue)		103 Acres	2019
					Nonpoint Source		
				Lead		103 Acres	2019
					Nonpoint Source		
				Odor		103 Acres	2019
					Nonpoint Source		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
				Organic Enrichment/Low Dissolved Oxygen		103 Acres	2019
					Nonpoint Source		
				Trash		103 Acres	2007
					Nonpoint Source		
4	C	Peninsula Beach	40311000				
				Indicator bacteria		0.2 Miles	2003
				Area affected is beach area north of South Jetty.			
					Nonpoint/Point Source		
4	R	Piru Creek (from gaging station below Santa Felicia Dam to headwaters)	40342000				
				Chloride		67 Miles	2019
					Source Unknown		
				pH		67 Miles	2019
					Nonpoint Source		
					Conservation Discharge Releases		
4	C	Point Dume Beach	40435000				
				DDT		2.5 Miles	2019
				Fish consumption advisory for DDT.			
					Nonpoint Source		
				PCBs (Polychlorinated biphenyls)		2.5 Miles	2019
				Fish consumtiion advisory for PCBs.			
					Nonpoint Source		
4	C	Point Fermin Park Beach	40512000				
				DDT		1.6 Miles	2019
				Fish consumption advisory for DDT.			
					Nonpoint Source		
				PCBs (Polychlorinated biphenyls)		1.6 Miles	2019
				Fish consumption advisory for PCBs.			
					Nonpoint Source		

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4	R	Pole Creek (trib to Santa Clara River Reach 3)	40331000				
				Sulfates		9 Miles	2019
					Nonpoint Source		
				Total Dissolved Solids		9 Miles	2019
					Nonpoint Source		
4	B	Port Hueneme Harbor (Back Basins)	40311000				
				DDT (tissue)		65 Acres	2019
					Nonpoint Source		
				PCBs (Polychlorinated biphenyls) (tissue)		65 Acres	2019
					Nonpoint Source		
4	C	Port Hueneme Pier	40311000				
				PCBs (Polychlorinated biphenyls)		0.33 Miles	2019
					Source Unknown		
4	C	Portuguese Bend Beach	40511000				
				DDT		1.4 Miles	2019
				Fish Consumption Advisory for DDT.			
					Nonpoint Source		
				PCBs (Polychlorinated biphenyls)		1.4 Miles	2019
				Fish Consumption Advisory for PCB.			
					Nonpoint Source		
4	L	Puddingstone Reservoir	40552000				
				Chlordane (tissue)		243 Acres	2019
					Nonpoint Source		
				DDT (tissue)		243 Acres	2019
					Nonpoint Source		
				Mercury (tissue)		243 Acres	2019
					Nonpoint Source		
				Organic Enrichment/Low Dissolved Oxygen		243 Acres	2019
					Nonpoint Source		
				PCBs (Polychlorinated biphenyls) (tissue)		243 Acres	2019
					Nonpoint Source		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
4	C	Puerco Beach	40431000				
				DDT		0.5 Miles	2019
				Fish Consumption Advisory for DDT.			
					Nonpoint Source		
				PCBs (Polychlorinated biphenyls)		0.5 Miles	2019
				Fish Consumption Advisory for PCBs.			
					Nonpoint Source		
4	C	Redondo Beach	40512000				
				DDT		1.5 Miles	2019
				Fish Consumption Advisory for DDT.			
					Nonpoint Source		
				PCBs (Polychlorinated biphenyls)		1.5 Miles	2019
				Fish Consumption Advisory for PCBs.			
					Nonpoint Source		
4	C	Rincon Beach	40100010				
				Indicator bacteria		0.09 Miles	2003
				Area affected is 50 and 150 yards south of mouth of Rincon Creek, and at the end of the footpath.			
					Nonpoint/Point Source		
4	R	Rio De Santa Clara/Oxnard Drain No. 3	40311000				
				ChemA (tissue)		1.9 Miles	2019
					Nonpoint Source		
				Chlordane (tissue)		1.9 Miles	2019
					Nonpoint Source		
				DDT (tissue)		1.9 Miles	2019
					Nonpoint Source		
				Nitrogen		1.9 Miles	2019
					Nonpoint Source		
				PCBs (Polychlorinated biphenyls) (tissue)		1.9 Miles	2019
					Nonpoint Source		
				Sediment Toxicity		1.9 Miles	2019
					Nonpoint Source		
				Toxaphene (tissue)		1.9 Miles	2019
					Nonpoint Source		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
4	R	Rio Hondo Reach 1 (Confl. LA River to Snt Ana Fwy)	40515010				
				Coliform Bacteria		4.6 Miles	2009
					Nonpoint/Point Source		
				Trash		4.6 Miles	2002
					Nonpoint/Point Source		
4	R	Rio Hondo Reach 2 (At Spreading Grounds)	40515010				
				Coliform Bacteria		4.9 Miles	2009
					Nonpoint/Point Source		
4	C	Robert H. Meyer Memorial Beach	40441000				
				Beach Closures		1.2 Miles	2019
					Nonpoint Source		
				DDT		1.2 Miles	2019
				Fish Consumption Advisory for DDT.			
					Nonpoint Source		
				PCBs (Polychlorinated biphenyls)		1.2 Miles	2019
				Fish Consumption Advisory for PCBs.			
					Nonpoint Source		
4	C	Royal Palms Beach	40511000				
				DDT		1.1 Miles	2019
				Fish consumption advisory for DDT.			
					Nonpoint Source		
				PCBs (Polychlorinated biphenyls)		1.1 Miles	2019
				Fish consumption advisory for PCBs.			
					Nonpoint Source		
4	R	San Antonio Creek (Tributary to Ventura River Reach 4)	40220023				
				Nitrogen		9.8 Miles	2019
					Nonpoint Source		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
4	R	San Gabriel River Reach 1 (Estuary to Firestone)	40515010				
				Coliform Bacteria		6.4 Miles	2019
					Nonpoint/Point Source		
				pH		6.4 Miles	2019
					Source Unknown		
4	R	San Gabriel River Reach 2 (Firestone to Whittier Narrows Dam	40515010				
				Coliform Bacteria		12 Miles	2019
					Nonpoint/Point Source		
				Lead		12 Miles	2019
					Nonpoint/Point Source		
4	R	San Jose Creek Reach 1 (SG Confluence to Temple St.)	40531000				
				Coliform Bacteria		2.7 Miles	2019
					Nonpoint/Point Source		
4	R	San Jose Creek Reach 2 (Temple to I-10 at White Ave.)	40531000				
				Coliform Bacteria		17 Miles	2019
					Nonpoint/Point Source		
4	B	San Pedro Bay Near/Off Shore Zones	40512000				
				Chlordane		8173 Acres	2019
					Source Unknown		
				Chromium (sediment)		8173 Acres	2019
					Nonpoint/Point Source		
				Copper (sediment)		8173 Acres	2019
					Nonpoint/Point Source		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
				DDT (tissue & sediment)		8173 Acres	2019
				Fish Consumption Advisory for DDT.			
					Nonpoint/Point Source		
				PAHs (Polycyclic Aromatic Hydrocarbons) (sediment)		8173 Acres	2019
					Nonpoint/Point Source		
				PCBs (Polychlorinated biphenyls)		8173 Acres	2019
				Fish consumption advisory for PCBs.			
					Nonpoint/Point Source		
				Sediment Toxicity		8173 Acres	2019
					Nonpoint/Point Source		
				Zinc (sediment)		8173 Acres	2019
					Nonpoint/Point Source		
4	E	Santa Clara River Estuary	40311000				
				ChemA		49 Acres	2019
					Source Unknown		
				Coliform Bacteria		49 Acres	2019
					Nonpoint Source		
				Toxaphene		49 Acres	2019
					Nonpoint Source		
4	R	Santa Clara River Reach 1 (Estuary to Hwy 101 Bridge)	40311000				
				Toxicity		10 Miles	2019
					Source Unknown		
4	R	Santa Clara River Reach 3 (Freeman Diversion to A Street)	40331000				
				Total Dissolved Solids		31 Miles	2019
					Nonpoint/Point Source		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
4	R	Santa Clara River Reach 5 (Blue Cut gaging station to West Pier Hwy 99 Bridge) (was named Santa Clara River Reach 7 on 2002 303(d) list)	40351000				
				Coliform Bacteria		9.4 Miles	2019
					Nonpoint/Point Source		
4	R	Santa Clara River Reach 6 (W Pier Hwy 99 to Bouquet Cyn Rd) (was named Santa Clara River Reach 8 on 2002 303(d) list)	40351000				
				Chlorpyrifos		5.2 Miles	2019
					Source Unknown		
				Coliform Bacteria		5.2 Miles	2019
					Nonpoint/Point Source		
				Diazinon		5.2 Miles	2019
					Source Unknown		
				Toxicity		5.2 Miles	2019
					Source Unknown		
4	R	Santa Clara River Reach 7 (Bouquet Canyon Rd to above Lang Gaging Station) (was named Santa Clara River Reach 9 on 2002 303(d) list)	40351000				
				Coliform Bacteria		21 Miles	2019
					Nonpoint/Point Source		
4	R	Santa Clara River Reach 11 (Piru Creek, from confluence with Santa Clara River Reach 4 to gaging station below Santa Felicia Dam)	40341000				
				Boron		6.2 Miles	2019
					Source Unknown		

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				Sulfates		6.2 Miles	2019
					Source Unknown		
4	L	Santa Fe Dam Park Lake	40531000				
				Copper		20 Acres	2019
					Nonpoint Source		
				Lead		20 Acres	2019
					Nonpoint Source		
				pH		20 Acres	2019
					Nonpoint Source		
4	B	Santa Monica Bay Offshore/Nearshore	40513000				
				DDT (tissue & sediment)		146645 Acres	2019
				Centered on Palos Verdes Shelf.			
					Nonpoint/Point Source		
				Debris		146645 Acres	2019
					Nonpoint/Point Source		
				Fish Consumption Advisory		146645 Acres	2019
					Nonpoint/Point Source		
				PCBs (Polychlorinated biphenyls) (tissue & sediment)		146645 Acres	2019
					Nonpoint/Point Source		
				Sediment Toxicity		146645 Acres	2019
					Nonpoint/Point Source		
4	R	Santa Monica Canyon	40513000				
				Lead		2.7 Miles	2019
					Nonpoint Source		
4	R	Sawpit Creek	40531000				
				Bis(2ethylhexyl)phthalate/DEHP		3.9 Miles	2019
					Source Unknown		

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				Fecal Coliform		3.9 Miles	2019
					Source Unknown		
4	C	Sea Level Beach	40441000				
				DDT		0.21 Miles	2019
				Fish Consumption Advisory for DDT.			
					Nonpoint Source		
				PCBs (Polychlorinated biphenyls)		0.21 Miles	2019
				Fish Consumption Advisory for PCBs.			
					Nonpoint Source		
4	R	Sepulveda Canyon	405.13				
				Ammonia		0.83 Miles	2019
					Nonpoint Source		
				Indicator bacteria		0.83 Miles	2002
					Nonpoint Source		
				Lead		0.83 Miles	2019
					Nonpoint Source		
4	R	Sespe Creek (from 500 ft below confluence with Little Sespe Cr to headwaters)	40332020				
				Chloride		54 Miles	2019
					Nonpoint Source		
				pH		54 Miles	2019
					Nonpoint Source		
4	C	Topanga Beach	40413000				
				DDT		2.5 Miles	2019
				Fish Consumption Advisory for DDT.			
					Nonpoint Source		
				PCBs (Polychlorinated biphenyls)		2.5 Miles	2019
				Fish Consumption Advisory for PCBs.			
					Nonpoint Source		

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4	R	Topanga Canyon Creek	40411000				
				Lead		8.6 Miles	2019
					Nonpoint Source		
4	R	Torrance Carson Channel	40512000				
				Coliform Bacteria		3.4 Miles	2007
					Nonpoint Source		
				Copper		3.4 Miles	2019
					Nonpoint Source		
				Lead		3.4 Miles	2019
					Nonpoint Source		
4	C	Trancas Beach (Broad Beach)	40437000				
				DDT		1.7 Miles	2019
				Fish Consumption Advisory for DDT.			
					Nonpoint Source		
				PCBs (Polychlorinated biphenyls)		1.7 Miles	2019
				Fish Consumption Advisory for PCBs.			
					Nonpoint Source		
4	R	Triunfo Canyon Creek Reach 1	40424000				
				Lead		2.5 Miles	2019
					Nonpoint Source		
				Mercury		2.5 Miles	2019
					Nonpoint Source		
				Sedimentation/Siltation		2.5 Miles	2019
					Source Unknown		
4	R	Triunfo Canyon Creek Reach 2	40424000				
				Lead		3.3 Miles	2019
					Nonpoint Source		
				Mercury		3.3 Miles	2019
					Nonpoint Source		
				Sedimentation/Siltation		3.3 Miles	2019
					Source Unknown		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
4	R	Tujunga Wash (LA River to Hansen Dam)	40521000				
				Coliform Bacteria		9.7 Miles	2009
					Nonpoint Source		
				Trash		9.7 Miles	2019
					Nonpoint Source		
4	B	Ventura Harbor: Ventura Keys	40311000				
				Coliform Bacteria		179 Acres	2019
					Nonpoint Source		
4	C	Ventura Marina Jetties	40311000				
				DDT		0.69 Miles	2019
					Source Unknown		
				PCBs (Polychlorinated biphenyls)		0.69 Miles	2019
					Source Unknown		
4	R	Ventura River Estuary	40210011				
				Algae		0.2 Miles	2019
					Nonpoint/Point Source		
				Eutrophic		0.2 Miles	2019
					Nonpoint/Point Source		
				Total Coliform		0.2 Miles	2019
				Stables and horse property may be the sources.			
					Nonpoint Source		
				Trash		0.2 Miles	2019
					Nonpoint/Point Source		
4	R	Ventura River Reach 1 and 2 (Estuary to Weldon Canyon)	40210011				
				Algae		4.5 Miles	2019
					Nonpoint/Point Source		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
4	R	Ventura River Reach 3 (Weldon Canyon to Confl. w/ Coyote Cr)	40210011				
				Pumping		2.8 Miles	2019
					Nonpoint Source		
				Water Diversion		2.8 Miles	2019
					Nonpoint Source		
4	R	Ventura River Reach 4 (Coyote Creek to Camino Cielo Rd)	40220021				
				Pumping		19 Miles	2019
					Nonpoint Source		
				Water Diversion		19 Miles	2019
					Nonpoint Source		
4	R	Verdugo Wash Reach 1 (LA River to Verdugo Rd.)	40521000				
				Coliform Bacteria		2 Miles	2009
					Nonpoint Source		
				Trash		2 Miles	2002
					Nonpoint Source		
4	R	Verdugo Wash Reach 2 (Above Verdugo Road)	40524000				
				Coliform Bacteria		7.6 Miles	2009
					Nonpoint Source		
				Trash		7.6 Miles	2002
					Nonpoint Source		
4	R	Walnut Creek Wash (Drains from Puddingstone Res)	40531000				
				pH		12 Miles	2007
					Nonpoint/Point Source		
				Toxicity		12 Miles	2007
					Nonpoint/Point Source		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED		PROPOSED TMDL COMPLETION
4	L	Westlake Lake	40425000					
				Algae		119	Acres	2006
					Nonpoint Source			
				Ammonia		119	Acres	2006
					Nonpoint Source			
				Eutrophic		119	Acres	2006
					Nonpoint Source			
				Lead		119	Acres	2019
					Nonpoint Source			
				Organic Enrichment/Low Dissolved Oxygen		119	Acres	2006
					Nonpoint Source			
4	R	Wheeler Canyon/Todd Barranca	40321000					
				Sulfates		10	Miles	2019
					Nonpoint Source			
				Total Dissolved Solids		10	Miles	2019
					Nonpoint Source			
4	C	Whites Point Beach	40511000					
				DDT		1.1	Miles	2019
				Fish Consumption Advisory for DDT.				
					Nonpoint Source			
				PCBs (Polychlorinated biphenyls)		1.1	Miles	2019
				Fish Consumption Advisory for PCBs.				
					Nonpoint Source			
4	R	Wilmington Drain	40342000					
				Ammonia		0.56	Miles	2019
					Nonpoint Source			
				Coliform Bacteria		0.56	Miles	2007
					Nonpoint Source			
				Copper		0.56	Miles	2019
					Nonpoint Source			
				Lead		0.56	Miles	2019
					Nonpoint Source			

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
4	C	Zuma Beach (Westward Beach)	40436000				
				DDT		1.6 Miles	2019
				Fish Consumption Advisory for DDT.			
					Nonpoint Source		
				PCBs (Polychlorinated biphenyls)		1.6 Miles	2019
				Fish Consumption Advisory for PCBs.			
					Nonpoint Source		
5	R	American River, Lower (Nimbus Dam to confluence with Sacramento River)	51921000				
				Mercury		27 Miles	2008
				All resource extraction sources are abandoned mines.			
					Resource Extraction		
				Unknown Toxicity		27 Miles	2019
					Source Unknown		
5	R	American River, South Fork (below Slab Creek Reservoir to Folsom Lake)	51432060				
				Mercury		37 Miles	2019
				.			
					Source Unknown		
5	R	Arcade Creek	51921000				
				Copper		9.9 Miles	2020
					Urban Runoff/Storm Sewers		
5	R	Avena Drain	53140000				
				Ammonia		6.4 Miles	2020
					Agriculture		
					Dairies		
				Pathogens		6.4 Miles	2020
					Agriculture		
					Dairies		
5	R	Bear River, Lower (below Camp Far West Reservoir)	51510000				
				Diazinon		21 Miles	2008
					Agriculture		

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5	R	Bear River, Upper	51633010					
				Mercury		10	Miles	2011
					Resource Extraction			
5	L	Berryessa, Lake	51221010					
				Mercury		19083	Acres	2015
					Resource Extraction			
5	L	Black Butte Reservoir	50432000					
				Mercury		4507	Acres	2015
					Resource Extraction			
5	R	Butte Slough	52030000					
				Diazinon		8.9	Miles	2008
					Crop-Related Sources			
5	R	Cache Creek, Lower (Clear Lake Dam to Cache Creek Settling Basin near Yolo Bypass)	51120000					
				Unknown Toxicity		96	Miles	2019
					Source Unknown			
5	R	Calaveras River, Lower	54400000					
				Diazinon		5.8	Miles	2006
					Urban Runoff/Storm Sewers			
				Organic Enrichment/Low Dissolved Oxygen		5.8	Miles	2008
					Urban Runoff/Storm Sewers			
				Pathogens		5.8	Miles	2008
					Urban Runoff/Storm Sewers			
					Recreational and Tourism Activities (non-boating)			
5	L	Camanche Reservoir	53120000					
				Copper		7389	Acres	2020
					Resource Extraction			

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				Zinc		7389 Acres	2020
					Resource Extraction		
5	L	Camp Far West Reservoir	51631013				
				Mercury		1945 Acres	2011
					Resource Extraction		
5	R	Carson Creek (from WWTP to Deer Creek)	53222013				
				Aluminum		12 Miles	2019
					Source Unknown		
				Manganese		12 Miles	2019
					Source Unknown		
5	L	Clear Lake	51352000				
				Nutrients		40070 Acres	2006
					Source Unknown		
5	R	Clover Creek	50732000				
				Fecal Coliform		11 Miles	2012
					Agriculture-grazing		
					Other		
5	R	Colusa Basin Drain	52010000				
				Azinphos-methyl		49 Miles	2008
					Agriculture		
				Carbofuran		49 Miles	2008
					Agriculture		
				Diazinon		49 Miles	2008
					Agriculture		
				Group A Pesticides		49 Miles	2011
					Agriculture		

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				Malathion		49 Miles	2008
					Agriculture		
				Methyl Parathion		49 Miles	2008
					Agriculture		
				Molinate/Ordram		49 Miles	2008
					Agriculture-irrigation tailwater		
				Unknown Toxicity		49 Miles	2019
					Agriculture		
5	L	Combie, Lake	51633011				
				Mercury		362 Acres	2011
				All resource extraction sources are abandoned mines.			
					Resource Extraction		
5	R	Cosumnes River	53111000				
				Exotic Species		53 Miles	2019
				This exotic species listing covers the entire watershed, i.e., the mainstem and the North, Middle and South Forks of the Cosumnes River.			
					Source Unknown		
5	L	Davis Creek Reservoir	51332010				
				Mercury		163 Acres	2010
					Resource Extraction		
5	R	Deer Creek (Sacramento County)	53222012				
				Iron		12 Miles	2019
					Source Unknown		
5	R	Deer Creek (Yuba County)	51712014				
				pH		4.3 Miles	2011
					Internal Nutrient Cycling (primarily lakes)		

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5	R	Del Puerto Creek	54110000					
				Chlorpyrifos		6.5	Miles	2008
					Agriculture			
				Diazinon		6.5	Miles	2008
					Agriculture			
				Pyrethroids		6.5	Miles	2019
				The pyrethroids of concern for this listing are bifenthrin, lamdba cyhalothrin, efenvalerate/fedvalerate, and permethrin.				
					Source Unknown			
5	E	Delta Waterways (central portion)	54400000					
				Chlorpyrifos		11425	Acres	2019
					Agriculture			
					Urban Runoff/Storm Sewers			
				DDT		11425	Acres	2011
					Agriculture			
				Diazinon		11425	Acres	2019
					Agriculture			
					Urban Runoff/Storm Sewers			
				Exotic Species		11425	Acres	2019
					Source Unknown			
				Group A Pesticides		11425	Acres	2011
					Agriculture			
				Mercury		11425	Acres	2006
				All resource extraction sources are abandoned mines.				
					Resource Extraction			
				Unknown Toxicity		11425	Acres	2019
					Source Unknown			

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5	E	Delta Waterways (eastern portion)	54400000				
				Chlorpyrifos		2972 Acres	2006
					Agriculture		
					Urban Runoff/Storm Sewers		
				DDT		2972 Acres	2011
					Agriculture		
				Diazinon		2972 Acres	2006
					Agriculture		
					Urban Runoff/Storm Sewers		
				Exotic Species		2972 Acres	2019
					Source Unknown		
				Group A Pesticides		2972 Acres	2011
					Agriculture		
				Mercury		2972 Acres	2006
				All resource extraction sources are abandoned mines.			
					Resource Extraction		
				Unknown Toxicity		2972 Acres	2019
					Source Unknown		
5	E	Delta Waterways (export area)	54400000				
				Chlorpyrifos		583 Acres	2019
					Agriculture		
					Urban Runoff/Storm Sewers		
				DDT		583 Acres	2011
					Agriculture		
				Diazinon		583 Acres	2019
					Agriculture		
					Urban Runoff/Storm Sewers		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
				Electrical Conductivity		583 Acres	2019
					Agriculture		
				Exotic Species		583 Acres	2019
					Source Unknown		
				Group A Pesticides		583 Acres	2011
					Agriculture		
				Mercury		583 Acres	2006
				All resource extraction sources are abandoned mines.			
					Resource Extraction		
				Unknown Toxicity		583 Acres	2019
					Source Unknown		
5	E	Delta Waterways (northern portion)	51000000				
				Chlorpyrifos		6795 Acres	2019
					Agriculture		
					Urban Runoff/Storm Sewers		
				DDT		6795 Acres	2011
					Agriculture		
				Diazinon		6795 Acres	2019
					Agriculture		
					Urban Runoff/Storm Sewers		
				Exotic Species		6795 Acres	2019
					Source Unknown		
				Group A Pesticides		6795 Acres	2011
					Agriculture		
				Mercury		6795 Acres	2006
				All resource extraction sources are abandoned mines.			
					Resource Extraction		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
				PCBs (Polychlorinated biphenyls)		6795 Acres	2019
					Source Unknown		
				Unknown Toxicity		6795 Acres	2019
					Source Unknown		
5	E	Delta Waterways (northwestern portion)	51000000				
				Chlorpyrifos		2587 Acres	2019
					Agriculture		
					Urban Runoff/Storm Sewers		
				DDT		2587 Acres	2011
					Agriculture		
				Diazinon		2587 Acres	2019
					Agriculture		
					Urban Runoff/Storm Sewers		
				Electrical Conductivity		2587 Acres	2019
					Agriculture		
				Exotic Species		2587 Acres	2019
					Source Unknown		
				Group A Pesticides		2587 Acres	2011
					Agriculture		
				Mercury		2587 Acres	2006
				All resource extraction sources are abandoned mines.			
					Resource Extraction		
				Unknown Toxicity		2587 Acres	2019
					Source Unknown		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
5	E	Delta Waterways (southern portion)	54400000				
				Chlorpyrifos		3125 Acres	2019
					Agriculture		
					Urban Runoff/Storm Sewers		
				DDT		3125 Acres	2011
					Agriculture		
				Diazinon		3125 Acres	2019
					Agriculture		
					Urban Runoff/Storm Sewers		
				Electrical Conductivity		3125 Acres	2019
					Agriculture		
				Exotic Species		3125 Acres	2019
					Source Unknown		
				Group A Pesticides		3125 Acres	2011
					Agriculture		
				Mercury		3125 Acres	2006
				All resource extraction sources are abandoned mines.			
					Resource Extraction		
				Unknown Toxicity		3125 Acres	2019
					Source Unknown		
5	E	Delta Waterways (Stockton Ship Channel)	54400000				
				Chlorpyrifos		1603 Acres	2006
					Agriculture		
					Urban Runoff/Storm Sewers		
				DDT		1603 Acres	2011
					Agriculture		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
				Diazinon		1603 Acres	2006
					Agriculture		
					Urban Runoff/Storm Sewers		
				Dioxin		1603 Acres	2019
				The areas of the ship channel impacted by dioxin contamination in sportfish encompass Old Mormon Slough, New Mormon Slough, McLeod Lake, Turning Basin, Morrelli Boat Ramp, and Louis Park Boat Ramp (California Department of Health Services 1998 warning). This listing was made by USEPA in 1998 and was under the Stockton Turning Basin, upper (Port Turning Basin) on previous lists. In order to consolidate listings for same areas, all listings for Stockton Turning Basin are now under the Delta Waterways (Stockton Ship Channel).			
					Point Source		
				Exotic Species		1603 Acres	2019
					Source Unknown		
				Furan Compounds		1603 Acres	2019
				This listing was previously under Stockton Turning Basin, upper (Port Turning Basin). In order to consolidate listings for same areas, all listings for Stockton Turning Basin are now under the Delta Waterways (Stockton Ship Channel).			
					Contaminated Sediments		
				Group A Pesticides		1603 Acres	2011
					Agriculture		
				Mercury		1603 Acres	2006
				All resource extraction sources are abandoned mines.			
					Resource Extraction		
				Pathogens		1603 Acres	2008
				This listing was previously under Stockton Turning Basin, upper (Port Turning Basin). In order to consolidate listings for same areas, all listings for Stockton Turning Basin are now under the Delta Waterways (Stockton Ship Channel).			
					Urban Runoff/Storm Sewers		
					Recreational and Tourism Activities (non-boating)		
				PCBs (Polychlorinated biphenyls)		1603 Acres	2019
				The areas of the ship channel impacted by PCB contamination in sportfish encompass Old Mormon Slough, New Mormon Slough, McLeod Lake, Turning Basin, Morrelli Boat Ramp, and Louis Park Boat Ramp (California Department of Health Services 1998 warning). This listing was made by USEPA in 1998 and was under the Stockton Turning Basin, upper (Port Turning Basin) on previous lists. In order to consolidate listings for same areas, all listings for Stockton Turning Basin are now under the Delta Waterways (Stockton Ship Channel).			
					Point Source		
				Unknown Toxicity		1603 Acres	2019
					Source Unknown		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
5	E	Delta Waterways (western portion)	54400000				
				Chlorpyrifos		14524 Acres	2006
					Agriculture		
					Urban Runoff/Storm Sewers		
				DDT		14524 Acres	2011
					Agriculture		
				Diazinon		14524 Acres	2006
					Agriculture		
					Urban Runoff/Storm Sewers		
				Electrical Conductivity		14524 Acres	2019
					Agriculture		
				Exotic Species		14524 Acres	2019
					Source Unknown		
				Group A Pesticides		14524 Acres	2011
					Agriculture		
				Mercury		14524 Acres	2006
				All resource extraction sources are abandoned mines.			
					Resource Extraction		
				Unknown Toxicity		14524 Acres	2019
					Source Unknown		
5	R	Dolly Creek	51854030				
				Copper		1.5 Miles	2020
				All resource extraction sources are abandoned mines.			
					Resource Extraction		
				Zinc		1.5 Miles	2020
				All resource extraction sources are abandoned mines.			
					Resource Extraction		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED		PROPOSED TMDL COMPLETION
5	L	Don Pedro Lake	53632010					
				Mercury		11056	Acres	2020
					Resource Extraction			
5	R	Dunn Creek (Mt Diablo Mine to Marsh Creek)	54300021					
				Mercury		0.7	Miles	2013
				All resource extraction sources are abandoned mines.				
					Resource Extraction			
				Metals		0.7	Miles	2020
				All resource extraction sources are abandoned mines.				
					Resource Extraction			
5	L	Englebright Lake	51714013					
				Mercury		754	Acres	2012
				All resource extraction sources are abandoned mines.				
					Resource Extraction			
5	R	Fall River (Pit)	52641031					
				Sedimentation/Siltation		8.6	Miles	2016
				The sedimentation is accumulated sand size sediment in the upper Fall River. The historic land management activities include logging, grazing, channelization, roads, and railroads.				
					Historic Land Management Activities			
5	R	Feather River, Lower (Lake Oroville Dam to Confluence with Sacramento River)	51922000					
				Chlorpyrifos		42	Miles	2019
					Source Unknown			
				Group A Pesticides		42	Miles	2011
					Agriculture			
				Mercury		42	Miles	2009
				All resource extraction sources are abandoned mines.				
					Resource Extraction			
				Unknown Toxicity		42	Miles	2019
					Source Unknown			

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED		PROPOSED TMDL COMPLETION
5	R	Feather River, North Fork (below Lake Almanor)	51812000					
				Mercury		49	Miles	2019
					Source Unknown			
				Temperature, water		49	Miles	2019
					Hydromodification			
					Flow Regulation/Modification			
5	R	Five Mile Slough (Alexandria Place to Fourteen Mile Slough)	54400000					
				Chlorpyrifos		1.6	Miles	2006
					Urban Runoff/Storm Sewers			
				Diazinon		1.6	Miles	2006
				The agricultural source of diazinon for this waterbody is from aerial deposition.				
					Agriculture			
					Urban Runoff/Storm Sewers			
				Organic Enrichment/Low Dissolved Oxygen		1.6	Miles	2008
					Urban Runoff/Storm Sewers			
				Pathogens		1.6	Miles	2008
					Other Urban Runoff			
					Recreational and Tourism Activities (non-boating)			
5	R	French Ravine	51632011					
				Bacteria		1.7	Miles	2019
					Land Disposal			
5	W	Grasslands Marshes	54120000					
				Electrical Conductivity		7962	Acres	2008
					Agriculture			

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
5	R	Grayson Drain (at outfall)	54110000				
				Sediment Toxicity		0.03 Miles	2019
					Source Unknown		
5	R	Harding Drain (Turlock Irrigation District Lateral #5)	53550000				
				Chlorpyrifos		8.3 Miles	2008
					Agriculture		
				Unknown Toxicity		8.3 Miles	2019
					Agriculture		
5	R	Horse Creek (Rising Star Mine to Shasta Lake)	50610000				
				Cadmium		0.52 Miles	2020
				All resource extraction sources are abandoned mines.			
					Resource Extraction		
				Copper		0.52 Miles	2020
				All resource extraction sources are abandoned mines.			
					Resource Extraction		
				Lead		0.52 Miles	2020
				All resource extraction sources are abandoned mines.			
					Resource Extraction		
				Zinc		0.52 Miles	2020
				All resource extraction sources are abandoned mines.			
					Resource Extraction		
5	R	Humbug Creek	51732030				
				Copper		2.2 Miles	2020
				All resource extraction sources are abandoned mines.			
					Resource Extraction		
				Mercury		2.2 Miles	2012
				All resource extraction sources are abandoned mines.			
					Resource Extraction		
				Sedimentation/Siltation		2.2 Miles	2012
				All resource extraction sources are abandoned mines.			
					Resource Extraction		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
				Zinc		2.2 Miles	2020
				All resource extraction sources are abandoned mines.			
					Resource Extraction		
5	R	Ingram Creek (from confluence with Hospital Creek to Hwy 33 crossing)	54110000				
				Pyrethroids		2.8 Miles	2019
				The pyrethroids of concern for this listing are bifenthrin, lamdba cyhalothrin, efenvalerate/fedvalerate, and permethrin.			
					Source Unknown		
5	R	Ingram Creek (from confluence with San Joaquin River to confluence with Hospital Creek)	54110000				
				Chlorpyrifos		2.1 Miles	2008
					Agricultural Return Flows		
				Diazinon		2.1 Miles	2008
					Agricultural Return Flows		
				Pyrethroids		2.1 Miles	2019
				The pyrethroids of concern for this listing are bifenthrin, lamdba cyhalothrin, efenvalerate/fedvalerate, and permethrin.			
					Source Unknown		
5	R	Jack Slough	51540000				
				Diazinon		14 Miles	2008
					Agriculture		
5	R	James Creek	51224010				
				Mercury		6.3 Miles	2015
				Resource extraction sources are abandoned mines.			
					Resource Extraction		
				Nickel		6.3 Miles	2020
				Resource extraction sources are abandoned mines.			
					Resource Extraction		
5	R	Kanaka Creek	51742022				
				Arsenic		9.7 Miles	2020
				All resource extraction sources are abandoned mines.			
					Resource Extraction		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
5	L	Kaweah Lake	55344010				
				Mercury		1702 Acres	2019
					Source Unknown		
5	L	Keswick Reservoir (portion downstream from Spring Creek)	52440013				
				Cadmium		135 Acres	2020
					Resource Extraction		
				Copper		135 Acres	2020
					Resource Extraction		
				Zinc		135 Acres	2020
					Resource Extraction		
5	R	Kings River, Lower (Island Weir to Stinson and Empire Weirs)	55190000				
				Electrical Conductivity		36 Miles	2015
					Agriculture		
				Molybdenum		36 Miles	2015
					Agriculture		
				Toxaphene		36 Miles	2015
					Agriculture		
5	R	Little Backbone Creek, Lower	50620010				
				Acid Mine Drainage		0.95 Miles	2020
					Resource Extraction		
				Cadmium		0.95 Miles	2020
				All resource extraction sources are abandoned mines.			
					Resource Extraction		
				Copper		0.95 Miles	2020
				All resource extraction sources are abandoned mines.			
					Resource Extraction		
				Zinc		0.95 Miles	2020
				All resource extraction sources are abandoned mines.			
					Resource Extraction		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
5	R	Little Cow Creek (downstream from Afterthought Mine)	50733023				
				Cadmium		1.1 Miles	2020
				Resource extraction sources are abandoned mines.			
					Resource Extraction		
				Copper		1.1 Miles	2020
				Resource extraction sources are abandoned mines.			
					Resource Extraction		
				Zinc		1.1 Miles	2020
				Resource extraction sources are abandoned mines.			
					Resource Extraction		
5	R	Little Deer Creek	51720012				
				Mercury		4.1 Miles	2012
					Resource Extraction		
5	R	Little Grizzly Creek	51854031				
				Copper		9.4 Miles	2020
					Mine Tailings		
				Zinc		9.4 Miles	2020
					Mine Tailings		
5	R	Lone Tree Creek	53140000				
				Ammonia		15 Miles	2020
					Dairies		
				BOD, Biochemical oxygen demand		15 Miles	2020
					Dairies		
				Electrical Conductivity		15 Miles	2020
					Dairies		
5	L	Lower Bear River Reservoir	53260043				
				Copper		725 Acres	2019
					Source Unknown		
5	R	Main Drainage Canal	52040000				
				Diazinon		9.2 Miles	2019
					Agriculture		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
5	R	Marsh Creek (Dunn Creek to Marsh Creek Reservoir)	54300023				
				Mercury		11 Miles	2019
				All resource extraction sources are abandoned mines.			
					Resource Extraction		
				Metals		11 Miles	2020
				All resource extraction sources are abandoned mines.			
					Resource Extraction		
5	R	Marsh Creek (Marsh Creek Reservoir to San Joaquin River)	54400000				
				Mercury		10 Miles	2013
				All resource extraction sources are abandoned mines.			
					Resource Extraction		
5	L	Marsh Creek Reservoir	54300023				
				Mercury		278 Acres	2013
					Resource Extraction		
5	R	Merced River, Lower (McSwain Reservoir to San Joaquin River)	53550000				
				Chlorpyrifos		50 Miles	2008
					Agriculture		
				Diazinon		50 Miles	2008
					Agriculture		
				Group A Pesticides		50 Miles	2011
					Agriculture		
				Mercury		50 Miles	2019
					Source Unknown		
5	R	Middle River	54400000				
				Low Dissolved Oxygen		9.7 Miles	2019
					Hydromodification		
					Source Unknown		

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5	R	Mokelumne River, Lower	54400000				
				Copper		29 Miles	2020
					Resource Extraction		
				Zinc		29 Miles	2020
					Resource Extraction		
5	R	Mormon Slough (Commerce Street to Stockton Deep Water Channel)	54400000				
				Organic Enrichment/Low Dissolved Oxygen		0.93 Miles	2008
					Urban Runoff/Storm Sewers		
				Pathogens		0.93 Miles	2008
					Urban Runoff/Storm Sewers		
					Recreational and Tourism Activities (non-boating)		
5	R	Mormon Slough (Stockton Diverting Canal to Commerce Street)	53130000				
				Pathogens		5.2 Miles	2008
					Urban Runoff/Storm Sewers		
					Recreational and Tourism Activities (non-boating)		
5	R	Morrison Creek	51911000				
				Chlorpyrifos		26 Miles	2019
				This chlorpyrifos listing on applies to the area of Morrison Creek from Elk Grove-Florin Rd to Beach Lake.			
					Source Unknown		
5	R	Mosher Slough (downstream of I-5)	54400000				
				Chlorpyrifos		1.3 Miles	2006
					Urban Runoff/Storm Sewers		
				Diazinon		1.3 Miles	2006
				The agricultural source of diazinon for this waterbody is from aerial deposition.			
					Agriculture		
					Urban Runoff/Storm Sewers		

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				Organic Enrichment/Low Dissolved Oxygen		1.3 Miles	2008
					Urban Runoff/Storm Sewers		
				Pathogens		1.3 Miles	2008
					Urban Runoff/Storm Sewers		
5	R	Mosher Slough (upstream of I-5)	54400000				
				Pathogens		3.5 Miles	2008
					Urban Runoff/Storm Sewers		
5	R	Mud Slough	54120000				
				Boron		13 Miles	2008
					Agriculture		
				Electrical Conductivity		13 Miles	2008
					Agriculture		
				Pesticides		13 Miles	2019
					Agriculture		
				Unknown Toxicity		13 Miles	2019
					Agriculture		
5	L	Natoma, Lake	51921000				
				Mercury		485 Acres	2019
					Source Unknown		
5	R	Natomas East Main Drainage Canal (aka Steelhead Creek, downstream of confluence with Arcade Creek)	51921000				
				Diazinon		3.5 Miles	2008
				The agricultural source is from aerial deposition.			
					Agriculture		
					Urban Runoff/Storm Sewers		
				PCBs (Polychlorinated biphenyls)		3.5 Miles	2020
					Industrial Point Sources		
					Agriculture		
					Urban Runoff/Storm Sewers		

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5	R	Natomas East Main Drainage Canal (aka Steelhead Creek, upstream of confluence with Arcade Creek)	51921000				
				PCBs (Polychlorinated biphenyls)		12 Miles	2020
					Industrial Point Sources		
					Agriculture		
					Urban Runoff/Storm Sewers		
5	R	Newman Wasteway	54120000				
				Chlorpyrifos		8.3 Miles	2008
					Agriculture		
				Diazinon		8.3 Miles	2008
					Agriculture		
5	R	Oak Run Creek	50733000				
				Fecal Coliform		5.6 Miles	2012
					Combined Sewer Overflow		
					Agriculture		
					Grazing-Related Sources		
					Pasture Grazing-Upland		
					Natural Sources		
5	R	Old River (San Joaquin River to Delta-Mendota Canal)	54400000				
				Low Dissolved Oxygen		15 Miles	2019
					Hydromodification		
					Source Unknown		
5	R	Orestimba Creek (above Kilburn Road)	54110000				
				Azinphos-methyl		9.1 Miles	2008
					Agriculture		
				Chlorpyrifos		9.1 Miles	2008
					Agriculture		
				DDE		9.1 Miles	2011
				Historical agricultural use.			
					Agriculture		

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				Diazinon		9.1 Miles	2008
					Agriculture		
5	R	Orestimba Creek (below Kilburn Road)	54110000				
				Azinphos-methyl		2.7 Miles	2008
					Agriculture		
				Chlorpyrifos		2.7 Miles	2008
					Agriculture		
				DDE		2.7 Miles	2011
					Agriculture		
				Diazinon		2.7 Miles	2008
					Agriculture		
				Sediment Toxicity		2.7 Miles	2019
					Source Unknown		
				Unknown Toxicity		2.7 Miles	2019
					Agriculture		
5	R	Panoche Creek (Silver Creek to Belmont Avenue)	55112000				
				Mercury		18 Miles	2020
				All resource extraction sources are abandoned mines.			
					Resource Extraction		
				Sedimentation/Siltation		18 Miles	2007
					Agriculture		
					Agriculture-grazing		
					Highway/Road/Bridge Construction		

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				Selenium		18 Miles	2007
					Agriculture		
					Agriculture-grazing		
					Highway/Road/Bridge Construction		
5	R	Pit River	52661080				
				Nutrients		123 Miles	2013
					Agriculture		
					Agriculture-grazing		
				Organic Enrichment/Low Dissolved Oxygen		123 Miles	2013
					Agriculture		
					Agriculture-grazing		
				Temperature, water		123 Miles	2013
					Agriculture		
					Agriculture-grazing		
5	R	Putah Creek (Solano Lake to Putah Creek Sinks)	51120000				
				Mercury		27 Miles	2015
				All resource extraction sources are abandoned mines.			
					Resource Extraction		
					Source Unknown		
5	L	Rollins Reservoir	51634033				
				Mercury		774 Acres	2012
					Resource Extraction		
5	R	Sacramento River (Keswick Dam to Cottonwood Creek)	52440014				
				Unknown Toxicity		15 Miles	2019
					Source Unknown		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
5	R	Sacramento River (Cottonwood Creek to Red Bluff)	50810000				
				Unknown Toxicity		16 Miles	2019
					Source Unknown		
5	R	Sacramento River (Red Bluff to Knights Landing)	50420070				
				Mercury		82 Miles	2019
				This mercury listing only applies to the area from Hamilton City downstream to Knights Landing.			
					Source Unknown		
				Unknown Toxicity		82 Miles	2019
					Source Unknown		
5	R	Sacramento River (Knights Landing to the Delta)	51000000				
				Mercury		16 Miles	2010
				All resource extraction sources are abandoned mines.			
					Resource Extraction		
				Unknown Toxicity		16 Miles	2019
					Source Unknown		
5	R	Sacramento Slough	51922000				
				Mercury		1.7 Miles	2020
					Source Unknown		
5	R	Salt Slough (upstream from confluence with San Joaquin River)	54120000				
				Boron		17 Miles	2008
					Agriculture		
				Chlorpyrifos		17 Miles	2008
					Agriculture		
				Diazinon		17 Miles	2008
					Agriculture		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
				Electrical Conductivity		17 Miles	2008
					Agriculture		
				Unknown Toxicity		17 Miles	2019
					Agriculture		
5	R	San Carlos Creek (downstream of New Idria Mine)	55911085				
				Mercury		5.1 Miles	2020
				All resource extraction sources are abandoned mines.			
					Resource Extraction		
					Acid Mine Drainage		
5	R	San Joaquin River (Mendota Pool to Bear Creek)	54110000				
				Boron		88 Miles	2006
					Agriculture		
				DDT		88 Miles	2011
					Agriculture		
				Electrical Conductivity		88 Miles	2006
					Agriculture		
				Group A Pesticides		88 Miles	2011
					Agriculture		
				Unknown Toxicity		88 Miles	2019
					Source Unknown		
5	R	San Joaquin River (Bear Creek to Mud Slough)	54120000				
				Boron		14 Miles	2006
					Agriculture		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
				DDT		14 Miles	2011
					Agriculture		
				Electrical Conductivity		14 Miles	2006
					Agriculture		
				Group A Pesticides		14 Miles	2011
					Agriculture		
				Mercury		14 Miles	2020
					Resource Extraction		
				Unknown Toxicity		14 Miles	2019
					Source Unknown		
5	R	San Joaquin River (Mud Slough to Merced River)	54110000				
				Boron		3 Miles	2006
					Agriculture		
				DDT		3 Miles	2011
					Agriculture		
				Electrical Conductivity		3 Miles	2006
					Agriculture		
				Group A Pesticides		3 Miles	2011
					Agriculture		
				Mercury		3 Miles	2020
					Resource Extraction		
				Selenium		3 Miles	1996
					Agriculture		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
				Unknown Toxicity		3 Miles	2019
					Source Unknown		
5	R	San Joaquin River (Merced River to Tuolumne River)	54110000				
				Boron		29 Miles	2006
					Agriculture		
				DDT		29 Miles	2011
					Agriculture		
				Electrical Conductivity		29 Miles	2006
					Agriculture		
				Group A Pesticides		29 Miles	2011
					Agriculture		
				Mercury		29 Miles	2020
					Resource Extraction		
				Unknown Toxicity		29 Miles	2019
					Source Unknown		
5	R	San Joaquin River (Tuolumne River to Stanislaus River)	53530000				
				Boron		8.4 Miles	2006
				.			
					Agriculture		
				DDT		8.4 Miles	2011
				.			
					Agriculture		
				Electrical Conductivity		8.4 Miles	2006
				.			
					Agriculture		
				Group A Pesticides		8.4 Miles	2011
				.			
					Agriculture		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
				Mercury	Resource Extraction	8.4 Miles	2020
				Unknown Toxicity	Agriculture	8.4 Miles	2019
5	R	San Joaquin River (Friant Dam to Mendota Pool)	54510000				
				Exotic Species	Source Unknown	70 Miles	2019
5	R	San Joaquin River (Stanislaus River to Delta Boundary)	54400000				
				Boron	Agriculture	3 Miles	2004
				DDT	Agriculture	3 Miles	2011
				Electrical Conductivity	Agriculture	3 Miles	2004
				Group A Pesticides	Agriculture	3 Miles	2011
				Mercury	Resource Extraction	3 Miles	2020
				Toxaphene	Source Unknown	3 Miles	2019
				Unknown Toxicity	Agriculture	3 Miles	2019

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
5	L	Scotts Flat Reservoir	51720011				
				Mercury		660 Acres	2012
					Resource Extraction		
5	L	Shasta Lake (area where West Squaw Creek enters)	50620010				
				Cadmium		20 Acres	2020
					Resource Extraction		
				Copper		20 Acres	2020
					Resource Extraction		
				Zinc		20 Acres	2020
					Resource Extraction		
5	R	Smith Canal	54400000				
				Organic Enrichment/Low Dissolved Oxygen		2.4 Miles	2008
					Urban Runoff/Storm Sewers		
				Organophosphorus Pesticides		2.4 Miles	2006
					Urban Runoff/Storm Sewers		
				Pathogens		2.4 Miles	2008
					Urban Runoff/Storm Sewers		
					Recreational and Tourism Activities (non-boating)		
5	R	South Cow Creek	50731000				
				Fecal Coliform		7.9 Miles	2012
					Agriculture		
					Grazing-Related Sources		
					Other		
5	R	Spring Creek, Lower (Iron Mountain Mine to Keswick Reservoir)	52440010				
				Acid Mine Drainage		2.6 Miles	2020
				All resource extraction sources are abandoned mines.			
					Resource Extraction		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
				Cadmium		2.6 Miles	2020
				All resource extraction sources are abandoned mines.			
					Resource Extraction		
				Copper		2.6 Miles	2020
				All resource extraction sources are abandoned mines.			
					Resource Extraction		
				Zinc		2.6 Miles	2020
				All resource extraction sources are abandoned mines.			
					Resource Extraction		
5	R	Stanislaus River, Lower	53530000				
				Diazinon		59 Miles	2008
					Agriculture		
				Group A Pesticides		59 Miles	2011
					Agriculture		
				Mercury		59 Miles	2020
					Resource Extraction		
				Unknown Toxicity		59 Miles	2019
					Source Unknown		
5	R	Sulphur Creek (Colusa County)	51320024				
				Mercury		14 Miles	2005
				All resource extraction sources are abandoned mines.			
					Resource Extraction		
5	R	Temple Creek	53140000				
				Ammonia		10 Miles	2020
					Dairies		
				Electrical Conductivity		10 Miles	2020
					Dairies		
5	R	Town Creek	50620010				
				Cadmium		0.98 Miles	2020
				All resource extraction sources are abandoned mines.			
					Resource Extraction		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
				Copper		0.98 Miles	2020
				All resource extraction sources are abandoned mines.			
					Resource Extraction		
				Lead		0.98 Miles	2020
				All resource extraction sources are abandoned mines.			
					Resource Extraction		
				Zinc		0.98 Miles	2020
				All resource extraction sources are abandoned mines.			
					Resource Extraction		
5	R	Tuolumne River, Lower (Don Pedro Reservoir to San Joaquin River)	53550000				
				Diazinon		60 Miles	2008
					Agriculture		
				Group A Pesticides		60 Miles	2011
					Agriculture		
				Unknown Toxicity		60 Miles	2019
					Source Unknown		
5	R	Wadsworth Canal	52030000				
				Diazinon		16 Miles	2019
					Agriculture		
5	R	Walker Slough	53140000				
				Pathogens		2.3 Miles	2008
					Urban Runoff/Storm Sewers		
					Recreational and Tourism Activities (non-boating)		
5	R	West Squaw Creek (below Balaklala Mine)	50620010				
				Cadmium		2 Miles	2020
				All resource extraction sources are abandoned mines.			
					Resource Extraction		
				Copper		2 Miles	2020
				All resource extraction sources are abandoned mines.			
					Resource Extraction		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
				Lead		2 Miles	2020
				All resource extraction sources are abandoned mines.			
					Resource Extraction		
				Zinc		2 Miles	2020
				All resource extraction sources are abandoned mines.			
					Resource Extraction		
5	L	Whiskeytown Reservoir (areas near Oak Bottom, Brandy Creek Campgrounds and Whiskeytown)	52463010				
				Coliform Bacteria		98 Acres	2019
					Septage Disposal		
5	R	Willow Creek (Madera County)	54021051				
				Temperature, water		6.2 Miles	2019
					Source Unknown		
5	R	Willow Creek (Shasta County, below Greenhorn Mine to Clear Creek)	52463010				
				Acid Mine Drainage		4 Miles	2020
				All resource extraction sources are abandoned mines.			
					Resource Extraction		
				Copper		4 Miles	2020
				All resource extraction sources are abandoned mines.			
					Resource Extraction		
				Zinc		4 Miles	2020
				All resource extraction sources are abandoned mines.			
					Resource Extraction		
5	R	Wolf Creek	51632010				
				Fecal Coliform		23 Miles	2019
					Agriculture		
					Urban Runoff/Storm Sewers		
					Recreational and Tourism Activities (non-boating)		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
6	R	Big Meadow Creek	63410011				
				Pathogens		1.4 Miles	2019
					Range Grazing-Riparian and/or Upland		
					Natural Sources		
					Recreational and Tourism Activities (non-boating)		
6	R	Blackwood Creek	63420021				
				Iron		5.9 Miles	2015
					Erosion/Siltation		
					Natural Sources		
					Nonpoint Source		
				Nitrogen		5.9 Miles	2008
				Nitrogen loading from creek to be addressed during development of Lake Tahoe TMDL, but a more specific TMDL may be needed for Blackwood Creek.			
					Silviculture		
					Resource Extraction		
					Hydromodification		
					Streambank Modification/Destabilization		
					Erosion/Siltation		
					Atmospheric Deposition		
					Natural Sources		
					Nonpoint Source		
				Phosphorus		5.9 Miles	2008
				Phosphorus loading from creek to be addressed during development of Lake Tahoe TMDL, but a more specific TMDL for creek may be needed.			
					Grazing-Related Sources		
					Silviculture		
					Resource Extraction		
					Hydromodification		
					Streambank Modification/Destabilization		
					Erosion/Siltation		
					Natural Sources		
					Nonpoint Source		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
				Sedimentation/Siltation		5.9 Miles	2008
				Creek affected by past gravel quarry operations and other watershed disturbance including grazing and timber harvest.			
					Range Grazing-Riparian and/or Upland		
					Silviculture		
					Construction/Land Development		
					Surface Runoff		
					Resource Extraction		
					Hydromodification		
					Streambank Modification/Destabilization		
					Erosion/Siltation		
					Atmospheric Deposition		
					Natural Sources		
					Recreational and Tourism Activities (non-boating)		
					Nonpoint Source		
6	R	Bodie Creek	63020031				
				Mercury		11 Miles	2019
					Source Unknown		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
6	L	Bridgeport Reservoir	63030050				
				Nitrogen		2614 Acres	2006
					Grazing-Related Sources		
					Pasture Grazing-Riparian and/or Upland		
					Other Urban Runoff		
					Highway/Road/Bridge Runoff		
					Wastewater - land disposal		
					Flow Regulation/Modification		
					Removal of Riparian Vegetation		
					Streambank Modification/Destabilization		
					Channel Erosion		
					Erosion/Siltation		
					Marinas and Recreational Boating		
					Atmospheric Deposition		
					Internal Nutrient Cycling (primarily lakes)		
					Sediment Resuspension		
					Natural Sources		
					Recreational and Tourism Activities (non-boating)		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
				Phosphorus		2614 Acres	2006
					Grazing-Related Sources		
					Pasture Grazing-Riparian and/or Upland		
					Other Urban Runoff		
					Highway/Road/Bridge Runoff		
					Wastewater - land disposal		
					Flow Regulation/Modification		
					Removal of Riparian Vegetation		
					Streambank Modification/Destabilization		
					Channel Erosion		
					Erosion/Siltation		
					Marinas and Recreational Boating		
					Atmospheric Deposition		
					Internal Nutrient Cycling (primarily lakes)		
					Natural Sources		
					Recreational and Tourism Activities (non-boating)		
				Sedimentation/Siltation		2614 Acres	2006
					Grazing-Related Sources		
					Streambank Modification/Destabilization		
					Erosion/Siltation		
					Sediment Resuspension		
6	R	Bronco Creek	63520053				
				Sedimentation/Siltation		1.3 Miles	2006
				Watershed disturbance in naturally highly erosive watershed.			
					Silviculture		
					Natural Sources		
					Nonpoint Source		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
6	R	Buckeye Creek	63040022				
				Pathogens		17 Miles	2019
					Grazing-Related Sources		
					Pasture Grazing-Riparian and/or Upland		
					Range Grazing-Riparian and/or Upland		
					Natural Sources		
					Recreational and Tourism Activities (non-boating)		
6	R	Carson River, West Fork (Headwaters to Woodfords)	63320014				
				Nitrogen		18 Miles	2019
					Silviculture		
					Onsite Wastewater Systems (Septic Tanks)		
					Habitat Modification		
					Removal of Riparian Vegetation		
					Streambank Modification/Destabilization		
					Channel Erosion		
					Erosion/Siltation		
					Atmospheric Deposition		
					Highway Maintenance and Runoff		
					Natural Sources		
					Recreational and Tourism Activities (non-boating)		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
				Phosphorus		18 Miles	2019
				Revision of standard may be considered.			
					Silviculture		
					Habitat Modification		
					Removal of Riparian Vegetation		
					Streambank Modification/Destabilization		
					Channel Erosion		
					Erosion/Siltation		
					Atmospheric Deposition		
					Highway Maintenance and Runoff		
					Natural Sources		
					Recreational and Tourism Activities (non-boating)		
				Sodium		18 Miles	2019
					Onsite Wastewater Systems (Septic Tanks)		
					Atmospheric Deposition		
					Highway Maintenance and Runoff		
					Natural Sources		
					Recreational and Tourism Activities (non-boating)		
6	R	Carson River, West Fork (Paynesville to State Line)	63310013				
				Pathogens		3.3 Miles	2019
					Pasture Grazing-Riparian and/or Upland		
					Agriculture-storm runoff		
					Agriculture-irrigation tailwater		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
6	R	Carson River, West Fork (Woodfords to Paynesville)	63310012				
				Nitrogen		3.6 Miles	2019
				Revision of standards may be considered.			
					Pasture Grazing-Riparian and/or Upland		
					Range Grazing-Riparian and/or Upland		
					Agriculture-storm runoff		
					Agriculture-subsurface drainage		
					Agriculture-irrigation tailwater		
					Silviculture		
					Wastewater - land disposal		
					Habitat Modification		
					Removal of Riparian Vegetation		
					Streambank Modification/Destabilization		
					Channel Erosion		
					Erosion/Siltation		
					Atmospheric Deposition		
					Highway Maintenance and Runoff		
					Natural Sources		
					Recreational and Tourism Activities (non-boating)		
				Pathogens		3.6 Miles	2019
					Pasture Grazing-Riparian and/or Upland		
					Agricultural Return Flows		
					Natural Sources		
					Recreational and Tourism Activities (non-boating)		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
				Sodium		3.6 Miles	2019
					Agriculture-storm runoff		
					Agriculture-irrigation tailwater		
					Agriculture-grazing		
					Wastewater - land disposal		
					Onsite Wastewater Systems (Septic Tanks)		
					Atmospheric Deposition		
					Highway Maintenance and Runoff		
					Natural Sources		
					Recreational and Tourism Activities (non-boating)		
6	R	Clearwater Creek	63040051				
				Sedimentation/Siltation		12 Miles	2006
				Listed on basis of limited information; additional monitoring may support delisting.			
					Range Grazing-Riparian and/or Upland		
					Construction/Land Development		
					Highway Maintenance and Runoff		
6	L	Crowley Lake	60310090				
				Ammonia		4861 Acres	2019
					Source Unknown		
				Oxygen, Dissolved		4861 Acres	2019
					Source Unknown		
6	L	Donner Lake	63520021				
				Priority Organics		819 Acres	2019
				OEHHA is studying the lake to determine whether a fish consumption advisory is needed. There may be a 6 to 13 year period for TMDL development.			
					Source Unknown		

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6	L	Eagle Lake (Lassen County)	63732000				
				Nitrogen		20704 Acres	2019
					Agriculture		
					Grazing-Related Sources		
					Silviculture		
					Other Urban Runoff		
					Highway/Road/Bridge Runoff		
					Wastewater		
					Onsite Wastewater Systems (Septic Tanks)		
					Marinas and Recreational Boating		
					Atmospheric Deposition		
					Internal Nutrient Cycling (primarily lakes)		
					Sediment Resuspension		
					Natural Sources		
					Recreational and Tourism Activities (non-boating)		
					Nonpoint Source		
				Phosphorus		20704 Acres	2019
					Grazing-Related Sources		
					Silviculture		
					Other Urban Runoff		
					Highway/Road/Bridge Runoff		
					Wastewater		
					Onsite Wastewater Systems (Septic Tanks)		
					Marinas and Recreational Boating		
					Atmospheric Deposition		
					Internal Nutrient Cycling (primarily lakes)		
					Sediment Resuspension		
					Natural Sources		
					Recreational and Tourism Activities (non-boating)		
					Nonpoint Source		

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6	R	East Walker River, above Bridgeport Reservoir	63030050				
				Pathogens		7.2 Miles	2019
					Pasture Grazing-Riparian and/or Upland		
					Other Urban Runoff		
					Natural Sources		
					Recreational and Tourism Activities (non-boating)		
6	R	East Walker River, below Bridgeport Reservoir	63030050				
				Nitrogen		8 Miles	2019
					Grazing-Related Sources		
					Pasture Grazing-Riparian and/or Upland		
					Range Grazing-Riparian and/or Upland		
					Highway/Road/Bridge Runoff		
					Upstream Impoundment		
					Flow Regulation/Modification		
					Streambank Modification/Destabilization		
					Erosion/Siltation		
					Atmospheric Deposition		
					Natural Sources		
				Phosphorus		8 Miles	2019
					Pasture Grazing-Riparian and/or Upland		
					Range Grazing-Riparian and/or Upland		
					Other Urban Runoff		
					Highway/Road/Bridge Runoff		
					Upstream Impoundment		
					Flow Regulation/Modification		
					Streambank Modification/Destabilization		
					Erosion/Siltation		
					Atmospheric Deposition		
					Natural Sources		

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				Sedimentation/Siltation		8 Miles	2019
					Grazing-Related Sources		
					Highway/Road/Bridge Runoff		
					Urban Runoff--Erosion and Sedimentation		
					Upstream Impoundment		
					Erosion/Siltation		
6	R	General Creek	63420030				
				Iron		9.1 Miles	2019
					Silviculture		
					Natural Sources		
				Phosphorus		9.1 Miles	2019
					Erosion/Siltation		
					Atmospheric Deposition		
					Natural Sources		
6	R	Gray Creek (Nevada County)	63520052				
				Sedimentation/Siltation		2.8 Miles	2006
				Sediment from disturbance of naturally highly erosive watershed.			
					Silviculture		
					Natural Sources		
					Nonpoint Source		
6	L	Haiwee Reservoir	62410071				
				Copper		1703 Acres	2004
				Copper problems related to algicide used to prevent taste/odor problems in drinking water supplies. TMDL development in progress. A determination of whether or not this water body is a water of the United States will be made by the Regional Water Quality Control Board.			
					Other		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
6	R	Heavenly Valley Creek (source to USFS boundary)	63410031				
				Chloride		2 Miles	2019
				Chloride standard may be revised.			
					Highway/Road/Bridge Runoff		
					Atmospheric Deposition		
					Natural Sources		
					Source Unknown		
				Phosphorus		2 Miles	2019
					Erosion/Siltation		
					Atmospheric Deposition		
					Natural Sources		
					Recreational and Tourism Activities (non-boating)		
6	R	Heavenly Valley Creek (USFS boundary to Trout Creek)	63410031				
				Chloride		1.4 Miles	2019
					Highway/Road/Bridge Runoff		
					Atmospheric Deposition		
					Natural Sources		
					Source Unknown		
				Sedimentation/Siltation		1.4 Miles	2019
					Construction/Land Development		
					Land Development		
					Hydromodification		
					Habitat Modification		
					Recreational and Tourism Activities (non-boating)		
					Nonpoint Source		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
6	S	Honey Lake	63710060				
				Arsenic		57756 Acres	2019
				Arsenic is ultimately from natural sources, but lake is affected by geothermal discharges. Further study needed to determine need for TMDL.			
					Geothermal Development		
					Flow Regulation/Modification		
					Natural Sources		
					Nonpoint Source		
				Salinity/TDS/Chlorides		57756 Acres	2019
				Further study needed to determine extent of impairment and need for TMDL.			
					Agriculture		
					Agricultural Return Flows		
					Geothermal Development		
					Agricultural Water Diversion		
					Sediment Resuspension		
					Natural Sources		
					Nonpoint Source		
6	W	Honey Lake Area Wetlands	63710060				
				Metals		62590 Acres	2019
				Additional monitoring needed to determine extent of impairment and need for TMDL			
					Agriculture		
					Geothermal Development		
					Natural Sources		
					Nonpoint Source		
6	S	Honey Lake Wildfowl Management Ponds	63720095				
				Metals		665 Acres	2019
				Further monitoring needed to determine extent of impairment and need for TMDL.			
					Agriculture		
					Geothermal Development		
					Natural Sources		
				Salinity/TDS/Chlorides		665 Acres	2019
				Further monitoring needed to determine extent of impairment and need for TMDL.			
					Agriculture		
					Geothermal Development		
					Natural Sources		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
				Trace Elements		665 Acres	2019
				Further monitoring needed to determine extent of impairment and need for TMDL.			
					Geothermal Development		
					Nurseries		
6	R	Hot Springs Canyon Creek	63030042				
				Sedimentation/Siltation		2.9 Miles	2008
				Listed on basis of limited data; further monitoring may support delisting.			
					Range Grazing-Riparian and/or Upland		
6	R	Indian Creek (Alpine County)	63220010				
				Pathogens		13 Miles	2019
					Grazing-Related Sources		
					Pasture Grazing-Riparian and/or Upland		
6	R	Mammoth Creek	60310053				
				Mercury		12 Miles	2019
					Source Unknown		
				Metals		12 Miles	2019
				Needs monitoring to determine current extent of impairment and need for TMDL.			
					Other Urban Runoff		
					Natural Sources		
					Nonpoint Source		
6	R	Monitor Creek	63210070				
				Aluminum		4 Miles	2019
				TMDL to be coordinated with CERCLA remediation.			
					Mill Tailings		
					Mine Tailings		
					Acid Mine Drainage		
					Inactive Mining		
					Natural Sources		
					Nonpoint/Point Source		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
				Iron		4 Miles	2019
				TMDL to be coordinated with CERCLA remediation.			
					Mill Tailings		
					Mine Tailings		
					Acid Mine Drainage		
					Inactive Mining		
					Natural Sources		
					Nonpoint/Point Source		
				Manganese		4 Miles	2019
				TMDL to be coordinated with CERCLA remediation.			
					Mill Tailings		
					Mine Tailings		
					Acid Mine Drainage		
					Inactive Mining		
					Natural Sources		
					Nonpoint/Point Source		
				Silver		4 Miles	2019
				TMDL to be coordinated with CERCLA remediation.			
					Mill Tailings		
					Mine Tailings		
					Acid Mine Drainage		
					Inactive Mining		
					Natural Sources		
					Nonpoint Source		
				Sulfates		4 Miles	2019
				TMDL to be coordinated with CERCLA remediation.			
					Mill Tailings		
					Mine Tailings		
					Acid Mine Drainage		
					Inactive Mining		
					Nonpoint/Point Source		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
				Total Dissolved Solids		4 Miles	2019
				TMDL to be coordinated with CERCLA remediation.			
					Mill Tailings		
					Mine Tailings		
					Acid Mine Drainage		
					Inactive Mining		
					Natural Sources		
					Nonpoint/Point Source		
6	L	Pleasant Valley Reservoir	60320000				
				Organic Enrichment/Low Dissolved Oxygen		99 Acres	2019
					Flow Regulation/Modification		
					Nonpoint Source		
6	R	Robinson Creek (Hwy 395 to Bridgeport Res)	63030050				
				Pathogens		1.8 Miles	2019
					Pasture Grazing-Riparian and/or Upland		
					Agricultural Return Flows		
					Onsite Wastewater Systems (Septic Tanks)		
					Natural Sources		
					Recreational and Tourism Activities (non-boating)		
6	R	Robinson Creek (Twin Lakes to Hwy 395)	63030050				
				Pathogens		9.1 Miles	2019
					Pasture Grazing-Riparian and/or Upland		
					Onsite Wastewater Systems (Septic Tanks)		
					Natural Sources		
					Recreational and Tourism Activities (non-boating)		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
6	R	Squaw Creek	63520011				
				Sedimentation/Siltation		5.8 Miles	2006
					Construction/Land Development		
					Other Urban Runoff		
					Hydromodification		
					Drainage/Filling Of Wetlands		
					Highway Maintenance and Runoff		
					Natural Sources		
					Recreational and Tourism Activities (non-boating)		
					Nonpoint Source		
6	R	Susan River	63720095				
				Mercury		58 Miles	2019
					Source Unknown		
				Unknown Toxicity		58 Miles	2007
					Source Unknown		
6	R	Swauger Creek	63040012				
				Pathogens		14 Miles	2019
					Pasture Grazing-Riparian and/or Upland		
					Range Grazing-Riparian and/or Upland		
					Onsite Wastewater Systems (Septic Tanks)		
					Natural Sources		
					Recreational and Tourism Activities (non-boating)		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
				Phosphorus		14 Miles	2019
					Pasture Grazing-Riparian and/or Upland		
					Range Grazing-Riparian and/or Upland		
					Highway/Road/Bridge Runoff		
					Surface Runoff		
					Streambank Modification/Destabilization		
					Erosion/Siltation		
					Atmospheric Deposition		
					Natural Sources		
					Nonpoint Source		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
6	L	Tahoe, Lake	63430010				
				Nitrogen		85364 Acres	2007
					Grazing-Related Sources		
					Silviculture		
					Construction/Land Development		
					Land Development		
					Urban Runoff/Storm Sewers		
					Urban Runoff--Non-industrial Permitted		
					Other Urban Runoff		
					Highway/Road/Bridge Runoff		
					Surface Runoff		
					Urban Runoff--Erosion and Sedimentation		
					Hydromodification		
					Habitat Modification		
					Removal of Riparian Vegetation		
					Streambank Modification/Destabilization		
					Drainage/Filling Of Wetlands		
					Channel Erosion		
					Erosion/Siltation		
					Marinas and Recreational Boating		
					Atmospheric Deposition		
					Highway Maintenance and Runoff		
					Internal Nutrient Cycling (primarily lakes)		
					Natural Sources		
					Recreational and Tourism Activities (non-boating)		
					Golf course activities		
					Groundwater Loadings		

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				Phosphorus		85364 Acres	2007
					Grazing-Related Sources		
					Silviculture		
					Highway/Road/Bridge Construction		
					Land Development		
					Urban Runoff/Storm Sewers		
					Urban Runoff--Non-industrial Permitted		
					Other Urban Runoff		
					Highway/Road/Bridge Runoff		
					Urban Runoff--Erosion and Sedimentation		
					Streambank Modification/Destabilization		
					Channel Erosion		
					Erosion/Siltation		
					Atmospheric Deposition		
					Highway Maintenance and Runoff		
					Internal Nutrient Cycling (primarily lakes)		
					Sediment Resuspension		
					Natural Sources		
					Recreational and Tourism Activities (non-boating)		
					Nonpoint Source		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
				Sedimentation/Siltation		85364 Acres	2007
					Grazing-Related Sources		
					Silviculture		
					Highway/Road/Bridge Construction		
					Land Development		
					Urban Runoff/Storm Sewers		
					Other Urban Runoff		
					Highway/Road/Bridge Runoff		
					Urban Runoff--Erosion and Sedimentation		
					Hydromodification		
					Channelization		
					Removal of Riparian Vegetation		
					Streambank Modification/Destabilization		
					Channel Erosion		
					Erosion/Siltation		
					Atmospheric Deposition		
					Sediment Resuspension		
					Natural Sources		
					Recreational and Tourism Activities (non-boating)		
					Nonpoint Source		
6	R	Tallac Creek (below Hwy 89)	63410041				
				Pathogens		1.3 Miles	2019
					Grazing-Related Sources		
					Pasture Grazing-Riparian		
6	R	Trout Creek (above Hwy 50)	63410020				
				Iron		10 Miles	2019
				Standards revision to be considered			
					Urban Runoff--Non-industrial Permitted		
					Erosion/Siltation		
					Natural Sources		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED		PROPOSED TMDL COMPLETION
				Nitrogen		10	Miles	2019
				Nitrogen loading from creek to be addressed during development of Lake Tahoe TMDL, but a more specific TMDL may be needed for Trout Creek.				
					Pasture Grazing-Riparian and/or Upland			
					Urban Runoff--Non-industrial Permitted			
					Erosion/Siltation			
					Atmospheric Deposition			
				Pathogens		10	Miles	2019
					Source Unknown			
				Phosphorus		10	Miles	2019
				Phosphorus loading from creek to be considered during development of Lake Tahoe TMDL, but a more specific TMDL may be needed for Trout Creek.				
					Pasture Grazing-Riparian and/or Upland			
					Urban Runoff--Non-industrial Permitted			
					Erosion/Siltation			
					Atmospheric Deposition			
6	R	Trout Creek (below Hwy 50)	63410042					
				Iron		0.78	Miles	2019
					Urban Runoff--Non-industrial Permitted			
					Erosion/Siltation			
					Natural Sources			
				Nitrogen		0.78	Miles	2019
				Nitrogen loading from creek to be addressed during development of Lake Tahoe TMDL, but a more specific TMDL may be needed for Trout Creek.				
					Urban Runoff--Non-industrial Permitted			
					Erosion/Siltation			
					Atmospheric Deposition			
				Pathogens		0.78	Miles	2019
					Pasture Grazing-Riparian			
					Natural Sources			
					Recreational and Tourism Activities (non-boating)			
					Transient encampments			

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
				Phosphorus		0.78 Miles	2019
				Phosphorus loading from creek to be addressed during development of Lake Tahoe TMDL, but a more specific TMDL may be needed for Trout Creek.			
					Urban Runoff--Non-industrial Permitted		
					Erosion/Siltation		
					Atmospheric Deposition		
6	R	Truckee River	63510010				
				Sedimentation/Siltation		39 Miles	2006
				Watershed disturbance including ski resorts, silvicultural activities, urban development, reservoir construction and management; highly erosive subwatersheds.			
					Range Grazing-Riparian and/or Upland		
					Silviculture		
					Construction/Land Development		
					Highway/Road/Bridge Construction		
					Streambank Modification/Destabilization		
					Channel Erosion		
					Erosion/Siltation		
					Natural Sources		
					Recreational and Tourism Activities (non-boating)		
					Snow skiing activities		
					Nonpoint Source		
6	R	Truckee River, Upper (above Christmas Valley)	63410010				
				Iron		4.5 Miles	2019
					Natural Sources		
				Pathogens		4.5 Miles	2019
					Grazing-Related Sources		
					Natural Sources		
					Recreational and Tourism Activities (non-boating)		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
				Phosphorus		4.5 Miles	2019
				Phosphorus loading from river to be addressed during development of Lake Tahoe TMDL, but a more specific TMDL may be needed for the Upper Truckee River.			
					Grazing-Related Sources		
					Silviculture		
					Natural Sources		
6	R	Truckee River, Upper (below Christmas Valley)	63410042				
				Iron		11 Miles	2019
					Erosion/Siltation		
					Natural Sources		
					Unknown Nonpoint Source		
				Phosphorus		11 Miles	2019
				Phosphorus loading from river to be addressed in development of Lake Tahoe TMDL, but a more specific TMDL may be needed for the Upper Truckee River.			
					Silviculture		
					Construction/Land Development		
					Hydromodification		
					Channelization		
					Removal of Riparian Vegetation		
					Streambank Modification/Destabilization		
					Erosion/Siltation		
					Atmospheric Deposition		
					Highway Maintenance and Runoff		
					Natural Sources		
					Unknown Nonpoint Source		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
6	L	Twin Lakes (Owens HU)	60310051				
				Nitrogen		26 Acres	2019
				Monitoring needed to confirm extent of impairment and need for TMDL.			
					Agriculture		
					Grazing-Related Sources		
					Construction/Land Development		
					Land Development		
					Other Urban Runoff		
					Atmospheric Deposition		
				Phosphorus		26 Acres	2019
				Monitoring needed to confirm degree of impairment and need for TMDL.			
					Agriculture		
					Grazing-Related Sources		
					Construction/Land Development		
					Land Development		
					Other Urban Runoff		
6	R	Ward Creek	63420020				
				Iron		5.7 Miles	2015
					Silviculture		
					Other Urban Runoff		
					Highway/Road/Bridge Runoff		
					Channel Erosion		
					Erosion/Siltation		
					Natural Sources		
				Nitrogen		5.7 Miles	2008
				Nitrogen loading from creek to be addressed during development of Lake Tahoe TMDL, but a more specific TMDL may be needed for Ward Creek.			
					Silviculture		
					Other Urban Runoff		
					Highway/Road/Bridge Runoff		
					Channel Erosion		
					Erosion/Siltation		
					Atmospheric Deposition		
					Natural Sources		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
				Phosphorus		5.7 Miles	2008
				Phosphorus loading from creek to be addressed during development of Lake Tahoe TMDL, but a more specific TMDL may be needed for Ward Creek.			
					Silviculture		
					Other Urban Runoff		
					Highway/Road/Bridge Runoff		
					Urban Runoff--Erosion and Sedimentation		
					Channel Erosion		
					Erosion/Siltation		
					Atmospheric Deposition		
					Natural Sources		
				Sedimentation/Siltation		5.7 Miles	2008
					Silviculture		
					Land Development		
					Urban Runoff/Storm Sewers		
					Highway/Road/Bridge Runoff		
					Channel Erosion		
					Nonpoint Source		
6	R	Wolf Creek (Alpine County)	63210031				
				Sedimentation/Siltation		12 Miles	2019
					Range Grazing-Riparian and/or Upland		
					Silviculture		
					Nonpoint Source		
7	R	Alamo River	72310000				
				Chlorpyrifos		57 Miles	2019
					Source Unknown		
				DDT		57 Miles	2019
					Source Unknown		
				Dieldrin		57 Miles	2019
					Source Unknown		

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				PCBs (Polychlorinated biphenyls)	Source Unknown	57 Miles	2019
				Toxaphene	Source Unknown	57 Miles	2019
7	R	Coachella Valley Storm Water Channel	71947000				
				Pathogens	Source Unknown	24 Miles	2006
				This listing for pathogens only applies to a 17 mile area of the Coachella Valley Storm Water Channel from Dillion Road to the Salton Sea.			
				Toxaphene	Source Unknown	24 Miles	2019
				This listing for toxaphene only applies to a 2 mile area of the Coachella Valley Storm Water Channel from Lincoln Street to the Salton Sea.			
7	R	Colorado River (Imperial Reservoir to California-Mexico Border)	72700000				
				Selenium	Source Unknown	11 Miles	2019
7	R	Imperial Valley Drains	72310000				
				DDT	Source Unknown	1225 Miles	2019
				The listing for DDT only applies to the Barbara Worth Drain, Peach Drain, and Rice Drain areas of the Imperial Valley drains.			
				Dieldrin	Source Unknown	1225 Miles	2019
				The listing for dieldrin only applies to the Barbara Worth Drain and Fig Drain areas of the Imperial Valley drains.			
				Endosulfan	Source Unknown	1225 Miles	2019
				The listing for endosulfan only applies to the Peach Drain area of the Imperial Valley drains.			
				PCBs (Polychlorinated biphenyls)	Source Unknown	1225 Miles	2019
				The listing for PCBs only applies to the Central Drain area of the Imperial Valley drains, from Meloland Road to the outlet into the Alamo River.			

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				Selenium		1225 Miles	2019
				Selenium originates from Upper Basin Portion of Colorado River. Elevated fish tissue levels.			
					Agricultural Return Flows		
				Toxaphene		1225 Miles	2019
				This listing for toxaphene only applies to the Barbara Worth Drain, Peach Drain, and Rice Drain of the Imperial Valley drains.			
					Source Unknown		
7	R	New River (Imperial County)	72800000				
				1,2,4-Trimethylbenzene		66 Miles	2006
					Industrial Point Sources		
					Out-of-state source		
				Chlordane		66 Miles	2019
					Source Unknown		
				Chloroform		66 Miles	2006
					Industrial Point Sources		
					Out-of-state source		
				Chlorpyrifos		66 Miles	2019
					Source Unknown		
				DDT		66 Miles	2019
					Source Unknown		
				Diazinon		66 Miles	2019
					Source Unknown		
				Dieldrin		66 Miles	2019
					Source Unknown		
				Mercury		66 Miles	2019
					Source Unknown		

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				meta-para xylenes		66 Miles	2006
					Industrial Point Sources		
					Out-of-state source		
				Nutrients		66 Miles	2006
				Regional Board proposes to establish TMDL in cooperation with U.S. EPA and Mexico.			
					Major Municipal Point Source-dry and/or wet weather discharge		
					Agricultural Return Flows		
					Out-of-state source		
				Organic Enrichment/Low Dissolved Oxygen		66 Miles	2006
					Wastewater		
					Inappropriate Waste Disposal/Wildcat Dumping		
					Out-of-state source		
					Unknown point source		
				o-Xylenes		66 Miles	2006
					Industrial Point Sources		
					Out-of-state source		
				PCBs (Polychlorinated biphenyls)		66 Miles	2019
					Source Unknown		
				p-Cymene		66 Miles	2006
					Industrial Point Sources		
					Out-of-state source		
				p-Dichlorobenzene/DCB		66 Miles	2006
					Industrial Point Sources		
					Out-of-state source		
				Pesticides		66 Miles	2019
					Agricultural Return Flows		
					Out-of-state source		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED		PROPOSED TMDL COMPLETION
				Selenium		66	Miles	2019
					Source Unknown			
				Toluene		66	Miles	2006
					Industrial Point Sources			
					Out-of-state source			
				Toxaphene		66	Miles	2019
					Source Unknown			
				Toxicity		66	Miles	2019
					Source Unknown			
				Trash		66	Miles	2006
					Out-of-state source			
7	R	Palo Verde Outfall Drain	71540000					
				DDT		17	Miles	2019
					Source Unknown			
7	S	Salton Sea	72800000					
				Nutrients		233340	Acres	2006
					Major Industrial Point Source			
					Agricultural Return Flows			
					Out-of-state source			
				Salinity		233340	Acres	2019
				TMDL development will not be effective in addressing this problem, which will require an engineering solution with federal, local, and state cooperation.				
					Agricultural Return Flows			
					Out-of-state source			
					Point Source			
				Selenium		233340	Acres	2019
					Agricultural Return Flows			

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
8	B	Anaheim Bay	80111000				
				Dieldrin (tissue)		402 Acres	2019
				This listing was made by USEPA.			
					Source Unknown		
				Nickel		402 Acres	2019
				This listing was made by USEPA.			
					Source Unknown		
				PCBs (Polychlorinated biphenyls) (tissue)		402 Acres	2019
				This listing was made by USEPA.			
					Source Unknown		
				Sediment Toxicity		402 Acres	2019
					Source Unknown		
8	C	Balboa Beach	80114000				
				DDT		1.8 Miles	2019
					Source Unknown		
				Dieldrin		1.8 Miles	2019
					Source Unknown		
				PCBs (Polychlorinated biphenyls)		1.8 Miles	2019
					Source Unknown		
8	L	Big Bear Lake	80171000				
				Copper		2865 Acres	2007
					Resource Extraction		
				Mercury		2865 Acres	2007
					Resource Extraction		
				Metals		2865 Acres	2007
					Resource Extraction		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
				Noxious aquatic plants		2865 Acres	2006
					Construction/Land Development		
					Unknown point source		
				Nutrients		2865 Acres	2006
					Construction/Land Development		
					Snow skiing activities		
				PCBs (Polychlorinated biphenyls)		2865 Acres	2019
					Source Unknown		
				Sedimentation/Siltation		2865 Acres	2006
					Construction/Land Development		
					Snow skiing activities		
					Unknown Nonpoint Source		
8	C	Bolsa Chica State Beach	80111000				
				Copper		2.6 Miles	2019
				This listing was made by USEPA.			
					Source Unknown		
				Nickel		2.6 Miles	2019
				This listing was made by USEPA.			
					Source Unknown		
8	R	Buck Gully Creek	80111000				
				Fecal Coliform		0.3 Miles	2019
				Listing is downstream of Pacific Coast Highway.			
					Source Unknown		
				Total Coliform		0.3 Miles	2019
				Listing is downstream of Pacific Coast Highway.			
					Source Unknown		
8	L	Canyon Lake (Railroad Canyon Reservoir)	80211000				
				Pathogens		453 Acres	2006
					Nonpoint Source		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED		PROPOSED TMDL COMPLETION
8	R	Chino Creek Reach 1	80121000					
				Nutrients		7.8	Miles	2019
					Agriculture			
					Dairies			
8	L	Elsinore, Lake	80231000					
				PCBs (Polychlorinated biphenyls)		2431	Acres	2019
					Source Unknown			
				Unknown Toxicity		2431	Acres	2007
					Unknown Nonpoint Source			
8	L	Fulmor, Lake	80221000					
				Pathogens		4.2	Acres	2019
					Unknown Nonpoint Source			
8	R	Grout Creek	80171000					
				Metals		3.5	Miles	2007
					Unknown Nonpoint Source			
				Nutrients		3.5	Miles	2008
					Unknown Nonpoint Source			
8	C	Huntington Beach State Park	80111000					
				Enterococcus		5.8	Miles	2019
				Impaired 50 yards around drain at Magnolia				
					Source Unknown			
				PCBs (Polychlorinated biphenyls)		5.8	Miles	2019
					Source Unknown			
8	B	Huntington Harbour	80111000					
				Chlordane		221	Acres	2019
					Source Unknown			
				Copper		221	Acres	2019
				This listing was made by USEPA.				
					Source Unknown			

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
				Lead		221 Acres	2019
					Source Unknown		
				Nickel		221 Acres	2019
				This listing was made by USEPA.			
					Source Unknown		
				Pathogens		221 Acres	2019
					Urban Runoff/Storm Sewers		
				PCBs (Polychlorinated biphenyls) (tissue)		221 Acres	2019
				This listing was made by USEPA.			
					Source Unknown		
				Sediment Toxicity		221 Acres	2019
					Source Unknown		
8	R	Knickerbocker Creek	80171000				
				Metals		2 Miles	2007
					Unknown Nonpoint Source		
8	R	Los Trancos Creek (Crystal Cove Creek)	80111000				
				Fecal Coliform		0.19 Miles	2019
				Listing is downstream of Pacific Coast Highway.			
					Source Unknown		
				Total Coliform		0.19 Miles	2019
				Listing is downstream of Pacific Coast Highway.			
					Source Unknown		
8	R	Lytle Creek	80141000				
				Pathogens		41 Miles	2019
					Unknown Nonpoint Source		
8	R	Mill Creek (Prado Area)	80121000				
				Nutrients		1.6 Miles	2019
					Agriculture		
					Dairies		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
				Total Suspended Solids (TSS)		1.6 Miles	2019
					Dairies		
8	R	Mill Creek Reach 1	80156000				
				Pathogens		12 Miles	2019
					Unknown Nonpoint Source		
8	R	Mill Creek Reach 2	80158000				
				Pathogens		12 Miles	2019
					Unknown Nonpoint Source		
8	R	Mountain Home Creek	80158000				
				Pathogens		3.7 Miles	2019
					Unknown Nonpoint Source		
8	R	Mountain Home Creek, East Fork	80158000				
				Pathogens		5.1 Miles	2019
					Unknown Nonpoint Source		
8	B	Newport Bay, Lower	80114000				
				Chlordane		767 Acres	2019
					Source Unknown		
				Copper		767 Acres	2007
					Source Unknown		
				DDT		767 Acres	2019
					Source Unknown		
				PCBs (Polychlorinated biphenyls)		767 Acres	2019
					Source Unknown		
				Sediment Toxicity		767 Acres	2019
					Source Unknown		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
8	E	Newport Bay, Upper (Ecological Reserve)	80111000				
				Chlordane		653 Acres	2019
					Source Unknown		
				Copper		653 Acres	2007
					Source Unknown		
				DDT		653 Acres	2019
					Source Unknown		
				Metals		653 Acres	2019
					Urban Runoff/Storm Sewers		
				PCBs (Polychlorinated biphenyls)		653 Acres	2019
					Source Unknown		
				Sediment Toxicity		653 Acres	2019
					Source Unknown		
8	R	Peters Canyon Channel	80111000				
				DDT		3 Miles	2019
					Source Unknown		
				Toxaphene		3 Miles	2019
					Source Unknown		
8	L	Prado Park Lake	80121000				
				Nutrients		90 Acres	2019
					Nonpoint Source		
8	R	Rathbone (Rathbun) Creek	80171000				
				Nutrients		4.7 Miles	2008
					Snow skiing activities		
					Unknown Nonpoint Source		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
				Sedimentation/Siltation		4.7 Miles	2006
					Snow skiing activities		
					Unknown Nonpoint Source		
8	B	Rhine Channel	80114000				
				Copper		20 Acres	2019
					Source Unknown		
				Lead		20 Acres	2019
					Source Unknown		
				Mercury		20 Acres	2019
					Source Unknown		
				PCBs (Polychlorinated biphenyls)		20 Acres	2019
					Source Unknown		
				Sediment Toxicity		20 Acres	2019
					Source Unknown		
				Zinc		20 Acres	2019
					Source Unknown		
8	R	San Diego Creek Reach 1	80111000				
				Fecal Coliform		7.8 Miles	2019
					Urban Runoff/Storm Sewers		
					Other Urban Runoff		
				Selenium		7.8 Miles	2007
					Source Unknown		
				Toxaphene		7.8 Miles	2019
					Source Unknown		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
8	R	San Diego Creek Reach 2	80111000				
				Metals		6.3 Miles	2007
					Urban Runoff/Storm Sewers		
8	R	Santa Ana River, Reach 4	80127000				
				Pathogens		14 Miles	2019
					Nonpoint Source		
8	R	Santiago Creek, Reach 4	80112000				
				Salinity/TDS/Chlorides		9.8 Miles	2019
					Source Unknown		
8	C	Seal Beach	80111000				
				Enterococcus		0.53 Miles	2019
				Impaired 50 yards around drain at 1st Street.			
					Source Unknown		
				PCBs (Polychlorinated biphenyls)		0.53 Miles	2019
					Source Unknown		
8	R	Silverado Creek	80112000				
				Pathogens		11 Miles	2019
					Unknown Nonpoint Source		
				Salinity/TDS/Chlorides		11 Miles	2019
					Unknown Nonpoint Source		
8	R	Summit Creek	80171000				
				Nutrients		1.5 Miles	2008
					Construction/Land Development		
9	R	Agua Hedionda Creek	90431000				
				Manganese		7 Miles	2019
					Source Unknown		
				Selenium		7 Miles	2019
					Source Unknown		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
				Sulfates		7 Miles	2019
					Source Unknown		
				Total Dissolved Solids		7 Miles	2019
					Urban Runoff/Storm Sewers		
					Unknown Nonpoint Source		
					Unknown point source		
9	E	Agua Hedionda Lagoon	90431000				
				Indicator bacteria		6.8 Acres	2006
					Nonpoint/Point Source		
				Sedimentation/Siltation		6.8 Acres	2019
					Nonpoint/Point Source		
9	R	Aliso Creek	90113000				
				Indicator bacteria		19 Miles	2005
				This listing for indicator bacteria applies to the Aliso Creek mainstem and all the major tributaries of Aliso Creek which are Sulphur Creek, Wood Canyon, Aliso Hills Canyon, Dairy Fork, and English Canyon.			
					Urban Runoff/Storm Sewers		
					Unknown point source		
					Nonpoint/Point Source		
				Phosphorus		19 Miles	2019
				This listing for phosphorus applies to the Aliso Creek mainstem and all the major tributaries of Aliso Creek which are Sulphur Creek, Wood Canyon, Aliso Hills Canyon, Dairy Fork, and English Canyon.			
					Urban Runoff/Storm Sewers		
					Unknown Nonpoint Source		
					Unknown point source		
				Toxicity		19 Miles	2019
				This listing for toxicity applies to the Aliso Creek mainstem and all the major tributaries of Aliso Creek which are Sulphur Creek, Wood Canyon, Aliso Hills Canyon, Dairy Fork, and English Canyon.			
					Urban Runoff/Storm Sewers		
					Unknown Nonpoint Source		
					Unknown point source		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
9	E	Aliso Creek (mouth)	90113000				
				Indicator bacteria		0.29 Acres	2005
					Nonpoint/Point Source		
9	L	Barrett Lake	91130000				
				Color		125 Acres	2019
					Source Unknown		
				Manganese		125 Acres	2019
					Source Unknown		
				pH		125 Acres	2019
					Source Unknown		
9	R	Buena Creek	90432000				
				DDT		4.8 Miles	2019
					Source Unknown		
				Nitrate and Nitrite		4.8 Miles	2019
					Source Unknown		
				Phosphate		4.8 Miles	2019
					Source Unknown		
9	R	Buena Vista Creek	90421000				
				Sediment Toxicity		11 Miles	2019
					Source Unknown		
9	E	Buena Vista Lagoon	90421000				
				Indicator bacteria		202 Acres	2008
					Nonpoint/Point Source		
				Nutrients		202 Acres	2019
				Estimated size of impairment is 150 acres located in upper portion of lagoon.			
					Nonpoint/Point Source		
				Sedimentation/Siltation		202 Acres	2019
					Nonpoint/Point Source		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
9	R	Chollas Creek	90822000				
				Copper		3.5 Miles	2004
					Nonpoint/Point Source		
				Indicator bacteria		3.5 Miles	2005
					Nonpoint/Point Source		
				Lead		3.5 Miles	2004
					Nonpoint/Point Source		
				Zinc		3.5 Miles	2004
					Nonpoint/Point Source		
9	R	Cloverdale Creek	90532000				
				Phosphorus		1.2 Miles	2019
					Urban Runoff/Storm Sewers		
					Unknown Nonpoint Source		
					Unknown point source		
				Total Dissolved Solids		1.2 Miles	2019
					Urban Runoff/Storm Sewers		
					Unknown Nonpoint Source		
					Unknown point source		
9	R	Cottonwood Creek (San Marcos Creek watershed)	90451000				
				DDT		1.9 Miles	2019
					Source Unknown		
				Phosphorus		1.9 Miles	2019
					Source Unknown		
				Sediment Toxicity		1.9 Miles	2019
					Source Unknown		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
9	B	Dana Point Harbor	90114000				
				Indicator bacteria		119 Acres	2006
				Impairment located at Baby Beach.			
					Urban Runoff/Storm Sewers		
					Marinas and Recreational Boating		
					Unknown Nonpoint Source		
					Unknown point source		
9	R	De Luz Creek	90221000				
				Iron		14 Miles	2019
					Source Unknown		
				Manganese		14 Miles	2019
					Source Unknown		
9	L	El Capitan Lake	90731000				
				Color		1454 Acres	2019
					Source Unknown		
				Manganese		1454 Acres	2019
					Source Unknown		
				pH		1454 Acres	2019
					Source Unknown		
9	R	Encinitas Creek	90451000				
				Phosphorus		3 Miles	2019
					Source Unknown		
9	R	English Canyon	90113000				
				Benzo[b]fluoranthene		3.6 Miles	2019
					Source Unknown		
				Dieldrin		3.6 Miles	2019
					Source Unknown		

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				Sediment Toxicity		3.6 Miles	2019
					Source Unknown		
9	R	Escondido Creek	90462000				
				DDT		26 Miles	2019
					Source Unknown		
				Manganese		26 Miles	2019
					Source Unknown		
				Phosphate		26 Miles	2019
					Source Unknown		
				Selenium		26 Miles	2019
					Source Unknown		
				Sulfates		26 Miles	2019
					Source Unknown		
				Total Dissolved Solids		26 Miles	2019
					Source Unknown		
9	E	Famosa Slough and Channel	90711000				
				Eutrophic		32 Acres	2019
					Nonpoint Source		
9	R	Felicita Creek	90523000				
				Aluminum		0.92 Miles	2019
					Source Unknown		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
				Total Dissolved Solids		0.92 Miles	2019
					Agricultural Return Flows		
					Urban Runoff/Storm Sewers		
					Flow Regulation/Modification		
					Unknown Nonpoint Source		
					Unknown point source		
9	R	Forester Creek	90712000				
				Fecal Coliform		6.4 Miles	2005
				Impairment Located at lower 1 mile.			
					Urban Runoff/Storm Sewers		
					Spills		
					Unknown Nonpoint Source		
					Unknown point source		
				Oxygen, Dissolved		6.4 Miles	2019
					Source Unknown		
				pH		6.4 Miles	2019
				Impairment Located at upper 3 miles.			
					Industrial Point Sources		
					Habitat Modification		
					Spills		
					Unknown Nonpoint Source		
					Unknown point source		
				Phosphorus		6.4 Miles	2019
					Source Unknown		
				Total Dissolved Solids		6.4 Miles	2019
				Impairment Located at lower 1 mile.			
					Agricultural Return Flows		
					Urban Runoff/Storm Sewers		
					Flow Regulation/Modification		
					Unknown Nonpoint Source		
					Unknown point source		

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9	R	Green Valley Creek	90521000				
				Chloride		0.98 Miles	2019
					Source Unknown		
				Manganese		0.98 Miles	2019
					Source Unknown		
				Pentachlorophenol (PCP)		0.98 Miles	2019
					Source Unknown		
				Sulfates		0.98 Miles	2019
					Urban Runoff/Storm Sewers		
					Natural Sources		
					Unknown Nonpoint Source		
					Unknown point source		
9	L	Guajome Lake	90311000				
				Eutrophic		33 Acres	2019
					Nonpoint/Point Source		
9	L	Hodges, Lake	90521000				
				Color		1104 Acres	2019
					Urban Runoff/Storm Sewers		
					Unknown Nonpoint Source		
					Unknown point source		
				Manganese		1104 Acres	2019
					Source Unknown		
				Nitrogen		1104 Acres	2019
					Agriculture		
					Dairies		
					Urban Runoff/Storm Sewers		
					Unknown Nonpoint Source		
					Unknown point source		

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				pH		1104 Acres	2019
					Source Unknown		
				Phosphorus		1104 Acres	2019
					Agriculture		
					Dairies		
					Urban Runoff/Storm Sewers		
					Unknown Nonpoint Source		
					Unknown point source		
				Turbidity		1104 Acres	2019
					Source Unknown		
9	R	Kit Carson Creek	90521000				
				Pentachlorophenol (PCP)		0.99 Miles	2019
					Source Unknown		
				Total Dissolved Solids		0.99 Miles	2019
					Agricultural Return Flows		
					Urban Runoff/Storm Sewers		
					Flow Regulation/Modification		
					Unknown Nonpoint Source		
					Unknown point source		
9	R	Laguna Canyon Channel	90112000				
				Sediment Toxicity		1.6 Miles	2019
					Source Unknown		
9	E	Loma Alta Slough	90410000				
				Eutrophic		8.2 Acres	2019
					Nonpoint Source		
				Indicator bacteria		8.2 Acres	2008
					Nonpoint Source		

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9	R	Long Canyon Creek	90283000				
				Total Dissolved Solids		8.3 Miles	2019
					Source Unknown		
9	R	Los Penasquitos Creek	90610000				
				Phosphate		12 Miles	2019
					Source Unknown		
				Total Dissolved Solids		12 Miles	2019
					Source Unknown		
9	E	Los Penasquitos Lagoon	90610000				
				Sedimentation/Siltation		469 Acres	2019
					Nonpoint/Point Source		
9	L	Loveland Reservoir	90931000				
				Aluminum		420 Acres	2019
					Source Unknown		
				Manganese		420 Acres	2019
					Source Unknown		
				Oxygen, Dissolved		420 Acres	2019
					Source Unknown		
9	B	Mission Bay (area at mouth of Rose Creek only)	90640000				
				Eutrophic		9.2 Acres	2019
				.			
					Nonpoint/Point Source		
				Lead		9.2 Acres	2019
				.			
					Nonpoint/Point Source		

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9	B	Mission Bay (area at mouth of Tecolote Creek only)	90650000				
				Eutrophic		3.1 Acres	2019
				.	Nonpoint/Point Source		
				Lead		3.1 Acres	2019
				.	Nonpoint/Point Source		
9	L	Morena Reservoir	91150000				
				Color		104 Acres	2019
					Source Unknown		
				Manganese		104 Acres	2019
					Source Unknown		
				pH		104 Acres	2019
					Source Unknown		
9	L	Murray Reservoir	90711000				
				pH		119 Acres	2019
					Source Unknown		
9	R	Murrieta Creek	90252000				
				Iron		12 Miles	2019
					Source Unknown		
				Manganese		12 Miles	2019
					Source Unknown		
				Nitrogen		12 Miles	2019
					Source Unknown		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
				Phosphorus		12 Miles	2019
					Urban Runoff/Storm Sewers		
					Unknown Nonpoint Source		
					Unknown point source		
9	R	Oso Creek (at Mission Viejo Golf Course)	90120000				
				Chloride		1 Miles	2019
					Source Unknown		
				Sulfates		1 Miles	2019
					Source Unknown		
				Total Dissolved Solids		1 Miles	2019
					Source Unknown		
9	L	Otay Reservoir, Lower	91031000				
				Color		1050 Acres	2019
					Source Unknown		
				Iron		1050 Acres	2019
					Source Unknown		
				Manganese		1050 Acres	2019
					Source Unknown		
				Nitrogen, ammonia (Total Ammonia)		1050 Acres	2019
					Source Unknown		
				pH (high)		1050 Acres	2019
					Source Unknown		
9	C	Pacific Ocean Shoreline, Aliso HSA	90113000				
				Indicator bacteria		0.65 Miles	2005
				Impairment located at Laguna Beach at Lagunita Place / Blue Lagoon Place, Aliso Beach.			
					Nonpoint/Point Source		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
9	C	Pacific Ocean Shoreline, Buena Vista Creek HA	90421000				
				Indicator bacteria		1.2 Miles	2008
				Impairment located at Buena Vista Creek, Carlsbad City Beach at Carlsbad Village Drive, Carlsbad State Beach at Pine Avenue.			
					Nonpoint/Point Source		
9	C	Pacific Ocean Shoreline, Dana Point HSA	90114000				
				Indicator bacteria		2 Miles	2005
				Impairment located at Aliso Beach at West Street, Aliso Beach at Table Rock Drive, 1000 Steps Beach at Pacific Coast Hwy (Hospital, 9th Ave), Salt Creek (large outlet), Salt Creek Beach at Salt Creek service road, Salt Creek Beach at Dana Strand Road.			
					Nonpoint/Point Source		
9	C	Pacific Ocean Shoreline, Escondido Creek HA	90461000				
				Indicator bacteria		0.44 Miles	2008
				Impairment located at San Elijo Lagoon outlet.			
					Nonpoint/Point Source		
9	C	Pacific Ocean Shoreline, Imperial Beach Pier	91010000				
				PCBs (Polychlorinated biphenyls)		0.42 Miles	2019
					Source Unknown		
9	C	Pacific Ocean Shoreline, Laguna Beach HSA	90112000				
				Indicator bacteria		1.8 Miles	2005
				Impairment located at Main Laguna Beach, Laguna Beach at Ocean Avenue, Laguna Beach at Laguna Avenue, Laguna Beach at Cleo Street, Arch Cove at Bluebird Canyon Road, Laguna Beach at Dumond Drive.			
					Nonpoint/Point Source		
9	C	Pacific Ocean Shoreline, Loma Alta HA	90410000				
				Indicator bacteria		1.1 Miles	2008
				Impairment located at Loma Alta Creek Mouth.			
					Nonpoint/Point Source		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
9	C	Pacific Ocean Shoreline, Lower San Juan HSA	90120000				
				Indicator bacteria		1.2 Miles	2008
				Impairment located at North Beach Creek, San Juan Creek (large outlet), Capistrano Beach, South Capistrano Beach at Beach Road.			
					Nonpoint/Point Source		
9	C	Pacific Ocean Shoreline, San Clemente HA	90130000				
				Indicator bacteria		3.7 Miles	2005
				Impairment located at Poche Beach (large outlet), Ole Hanson Beach Club Beach at Pico Drain, San Clemente City Beach at El Portal St. Stairs, San Clemente City Beach at Mariposa St., San Clemente City Beach at Linda Lane, San Clemente City Beach at South Linda Lane, San Clemente City Beach at Lifeguard Headquarters, Under San Clemente Municipal Pier, San Clemente City Beach at Trafalgar Canyon (Trafalgar Ln.), San Clemente State Beach at Riviera Beach, San Clemente State Beach at Cypress Shores.			
					Nonpoint/Point Source		
9	C	Pacific Ocean Shoreline, San Diego HU	90711000				
				Indicator bacteria		0.37 Miles	2005
				Impairment located at San Diego River Mouth (aka Dog Beach).			
					Nonpoint/Point Source		
9	C	Pacific Ocean Shoreline, San Diequito HU	90511000				
				Indicator bacteria		0.86 Miles	2005
				Impairment located at San Dieguito Lagoon Mouth, Solana Beach.			
					Nonpoint/Point Source		
9	C	Pacific Ocean Shoreline, San Joaquin Hills HSA	90111000				
				Indicator bacteria		0.63 Miles	2005
				Impairment located at Cameo Cove at Irvine Cove Dr./Riviera Way, Heisler Park-North			
					Urban Runoff/Storm Sewers		
					Unknown Nonpoint Source		
					Unknown point source		
9	C	Pacific Ocean Shoreline, San Luis Rey HU	90311000				
				Indicator bacteria		0.49 Miles	2005
				Impairment located at San Luis Rey River Mouth.			
					Nonpoint/Point Source		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
9	C	Pacific Ocean Shoreline, San Marcos HA	90451000				
				Indicator bacteria		0.5 Miles	2005
				Impairment located at Moonlight State Beach.			
					Nonpoint/Point Source		
9	C	Pacific Ocean Shoreline, Scripps HA	90630000				
				Indicator bacteria		3.9 Miles	2019
				This listing for indicator bacteria onliy applies to the Childrens Pool Beach area of this ocean shoreline segment.			
					Nonpoint/Point Source		
9	C	Pacific Ocean Shoreline, Tijuana HU	91111000				
				Indicator bacteria		3 Miles	2010
				Impairment located from the border, extending north along the shore.			
					Nonpoint/Point Source		
9	R	Pine Valley Creek (Upper)	91141000				
				Enterococcus		2.9 Miles	2010
					Grazing-Related Sources		
					Concentrated Animal Feeding Operations (permitted, point source)		
					Transient encampments		
				Phosphorus		2.9 Miles	2019
					Source Unknown		
				Turbidity		2.9 Miles	2019
					Source Unknown		
9	R	Pogi Canyon Creek	91020000				
				DDT		7.8 Miles	2019
					Source Unknown		
9	R	Prima Deshecha Creek	90130000				
				Phosphorus		1.2 Miles	2019
					Urban Runoff/Storm Sewers		
					Unknown Nonpoint Source		
					Unknown point source		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
				Turbidity		1.2 Miles	2019
					Urban Runoff/Storm Sewers		
					Unknown Nonpoint Source		
					Unknown point source		
9	R	Rainbow Creek	90222000				
				Iron		5 Miles	2019
					Source Unknown		
				Sulfates		5 Miles	2019
					Source Unknown		
				Total Dissolved Solids		5 Miles	2019
					Source Unknown		
9	R	Reidy Canyon Creek	90462000				
				Phosphorus		3.9 Miles	2019
					Source Unknown		
9	B	San Diego Bay	91010000				
				PCBs (Polychlorinated biphenyls)		10783 Acres	2019
					Source Unknown		
9	B	San Diego Bay Shoreline, 32nd St San Diego Naval Station	90822000				
				Benthic Community Effects		103 Acres	2019
					Nonpoint/Point Source		
				Sediment Toxicity		103 Acres	2019
					Nonpoint/Point Source		
9	B	San Diego Bay Shoreline, at Americas Cup Harbor	90810000				
				Copper		88 Acres	2019
					Source Unknown		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
9	B	San Diego Bay Shoreline, at Coronado Cays	91010000				
				Copper		47 Acres	2019
					Source Unknown		
9	B	San Diego Bay Shoreline, at Glorietta Bay	91010000				
				Copper		52 Acres	2019
					Source Unknown		
9	B	San Diego Bay Shoreline, at Harbor Island (East Basin)	90821000				
				Copper		73 Acres	2019
					Source Unknown		
9	B	San Diego Bay Shoreline, at Harbor Island (West Basin)	90810000				
				Copper		132 Acres	2019
					Source Unknown		
9	B	San Diego Bay Shoreline, at Marriott Marina	90821000				
				Copper		24 Acres	2019
					Source Unknown		
9	B	San Diego Bay Shoreline, between Sampson and 28th Streets	90822000				
				Copper		53 Acres	2005
					Nonpoint/Point Source		
				Mercury		53 Acres	2006
					Nonpoint/Point Source		
				PAHs (Polycyclic Aromatic Hydrocarbons)		53 Acres	2006
					Nonpoint/Point Source		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
				PCBs (Polychlorinated biphenyls)		53 Acres	2019
					Nonpoint/Point Source		
				Zinc		53 Acres	2019
					Nonpoint/Point Source		
9	C	San Diego Bay Shoreline, Chula Vista Marina	90912000				
				Copper		0.41 Miles	2019
					Source Unknown		
9	B	San Diego Bay Shoreline, Downtown Anchorage	90821000				
				Benthic Community Effects		7.4 Acres	2019
					Nonpoint/Point Source		
				Sediment Toxicity		7.4 Acres	2019
					Nonpoint/Point Source		
9	C	San Diego Bay Shoreline, G Street Pier	90821000				
				Indicator bacteria		0.42 Miles	2006
					Urban Runoff/Storm Sewers		
					Unknown Nonpoint Source		
					Unknown point source		
9	B	San Diego Bay Shoreline, near Chollas Creek	90822000				
				Benthic Community Effects		15 Acres	2006
					Nonpoint/Point Source		
				Sediment Toxicity		15 Acres	2006
					Nonpoint/Point Source		
9	B	San Diego Bay Shoreline, near Coronado Bridge	90822000				
				Benthic Community Effects		37 Acres	2019
					Nonpoint/Point Source		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
				Sediment Toxicity		37 Acres	2019
				Includes Crosby Street/Cesar Chavez Park area, that will receive additional monitoring.			
					Nonpoint/Point Source		
9	B	San Diego Bay Shoreline, near sub base	90810000				
				Benthic Community Effects		16 Acres	2019
					Nonpoint/Point Source		
				Sediment Toxicity		16 Acres	2019
					Nonpoint/Point Source		
9	B	San Diego Bay Shoreline, near Switzer Creek	90821000				
				Chlordane		5.5 Acres	2019
					Urban Runoff/Storm Sewers		
					Other		
					Boatyards		
					Nonpoint/Point Source		
				Lindane/Hexachlorocyclohexane (HCH)		5.5 Acres	2019
					Urban Runoff/Storm Sewers		
					Other		
					Boatyards		
					Nonpoint/Point Source		
				PAHs (Polycyclic Aromatic Hydrocarbons)		5.5 Acres	2019
					Urban Runoff/Storm Sewers		
					Other		
					Boatyards		
					Nonpoint/Point Source		
9	B	San Diego Bay Shoreline, North of 24th Street Marine Terminal	90832000				
				Benthic Community Effects		9.5 Acres	2019
					Nonpoint/Point Source		
				Sediment Toxicity		9.5 Acres	2019
					Nonpoint/Point Source		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
9	B	San Diego Bay Shoreline, Seventh Street Channel	90831000				
				Benthic Community Effects		9 Acres	2008
					Nonpoint/Point Source		
				Sediment Toxicity		9 Acres	2008
					Nonpoint/Point Source		
9	C	San Diego Bay Shoreline, Shelter Island Shoreline Park	90810000				
				Indicator bacteria		0.42 Miles	2006
					Unknown Nonpoint Source		
					Unknown point source		
9	B	San Diego Bay Shoreline, Vicinity of B St and Broadway Piers	90821000				
				Benthic Community Effects		9.9 Acres	2019
					Nonpoint/Point Source		
				Indicator bacteria		9.9 Acres	2006
				Estimated size of impairment is 0.4 miles around the shoreline of the bay.			
					Urban Runoff/Storm Sewers		
					Unknown Nonpoint Source		
					Unknown point source		
				Sediment Toxicity		9.9 Acres	2019
					Nonpoint/Point Source		
9	R	San Diego River (Lower)	90711000				
				Fecal Coliform		16 Miles	2005
				Lower 6 miles.			
					Urban Runoff/Storm Sewers		
					Wastewater		
					Nonpoint/Point Source		
				Low Dissolved Oxygen		16 Miles	2019
				Impairment transcends adjacent Calwater wtareshed 90712.			
					Urban Runoff/Storm Sewers		
					Unknown Nonpoint Source		
					Unknown point source		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
				Phosphorus		16 Miles	2019
				Impairment transcends adjacent Calwater watershed 90712.			
					Urban Runoff/Storm Sewers		
					Unknown Nonpoint Source		
					Unknown point source		
				Total Dissolved Solids		16 Miles	2019
				Impairment transcends adjacent Calwater watershed 90712.			
					Urban Runoff/Storm Sewers		
					Flow Regulation/Modification		
					Natural Sources		
					Unknown Nonpoint Source		
					Unknown point source		
9	E	San Elijo Lagoon	90461000				
				Eutrophic		566 Acres	2019
				Estimated size of impairment is 330 acres.			
					Nonpoint/Point Source		
				Indicator bacteria		566 Acres	2008
				Estimated size of impairment is 150 acres.			
					Nonpoint/Point Source		
				Sedimentation/Siltation		566 Acres	2019
				Estimated size of impairment is 150 acres.			
					Nonpoint/Point Source		
9	R	San Juan Creek	90120000				
				DDE		1 Miles	2019
					Source Unknown		
				Indicator bacteria		1 Miles	2005
					Nonpoint/Point Source		
9	E	San Juan Creek (mouth)	90120000				
				Indicator bacteria		6.3 Acres	2008
					Nonpoint/Point Source		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
9	R	San Luis Rey River	90311000				
				Chloride		19 Miles	2019
				Impairment located at lower 13 miles.			
					Urban Runoff/Storm Sewers		
					Unknown Nonpoint Source		
					Unknown point source		
				Total Dissolved Solids		19 Miles	2019
					Industrial Point Sources		
					Agriculture-storm runoff		
					Urban Runoff/Storm Sewers		
					Surface Mining		
					Flow Regulation/Modification		
					Natural Sources		
					Golf course activities		
					Unknown Nonpoint Source		
					Unknown point source		
9	R	San Marcos Creek	90451000				
				DDE		19 Miles	2019
					Source Unknown		
				Phosphorus		19 Miles	2019
					Source Unknown		
				Sediment Toxicity		19 Miles	2019
					Source Unknown		
9	L	San Marcos Lake	90452000				
				Ammonia as Nitrogen		17 Acres	2019
					Source Unknown		
				Nutrients		17 Acres	2019
					Source Unknown		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
				Phosphorus		17 Acres	2019
					Source Unknown		
9	L	San Vicente Reservoir	90721000				
				Chloride		1058 Acres	2019
					Source Unknown		
				Color		1058 Acres	2019
					Source Unknown		
				Manganese		1058 Acres	2019
					Source Unknown		
				pH (high)		1058 Acres	2019
					Source Unknown		
				Sulfates		1058 Acres	2019
					Source Unknown		
9	R	Sandia Creek	90222000				
				Iron		1.5 Miles	2019
					Source Unknown		
				Manganese		1.5 Miles	2019
					Source Unknown		
				Nitrogen		1.5 Miles	2019
					Source Unknown		
				Sulfates		1.5 Miles	2019
					Source Unknown		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
				Total Dissolved Solids		1.5 Miles	2019
					Urban Runoff/Storm Sewers		
					Flow Regulation/Modification		
					Natural Sources		
					Unknown Nonpoint Source		
					Unknown point source		
9	E	Santa Margarita Lagoon	90211000				
				Eutrophic		28 Acres	2019
					Nonpoint/Point Source		
9	R	Santa Margarita River (Upper)	90222000				
				Phosphorus		18 Miles	2019
					Urban Runoff/Storm Sewers		
					Unknown Nonpoint Source		
					Unknown point source		
9	R	Segunda Deshecha Creek	90130000				
				Phosphorus		0.92 Miles	2019
					Urban Runoff/Storm Sewers		
					Unknown Nonpoint Source		
					Unknown point source		
				Turbidity		0.92 Miles	2019
					Construction/Land Development		
					Urban Runoff/Storm Sewers		
					Channelization		
					Flow Regulation/Modification		
					Unknown Nonpoint Source		
					Unknown point source		
9	R	Soledad Canyon	90610000				
				Sediment Toxicity		1.7 Miles	2019
					Source Unknown		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
9	L	Sutherland Reservoir	90553000				
				Color		561 Acres	2019
					Urban Runoff/Storm Sewers		
					Unknown Nonpoint Source		
					Unknown point source		
				Manganese		561 Acres	2019
					Source Unknown		
				pH		561 Acres	2019
					Source Unknown		
9	L	Sweetwater Reservoir	90921000				
				Oxygen, Dissolved		925 Acres	2019
					Source Unknown		
9	R	Tecolote Creek	90650000				
				Cadmium		6.6 Miles	2019
					Nonpoint/Point Source		
				Copper		6.6 Miles	2019
					Nonpoint/Point Source		
				Indicator bacteria		6.6 Miles	2006
					Nonpoint/Point Source		
				Lead		6.6 Miles	2019
					Nonpoint/Point Source		
				Phosphorus		6.6 Miles	2019
					Source Unknown		
				Toxicity		6.6 Miles	2019
					Nonpoint/Point Source		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
				Turbidity		6.6 Miles	2019
					Source Unknown		
				Zinc		6.6 Miles	2019
					Nonpoint/Point Source		
9	R	Temecula Creek	90251000				
				Nitrogen		44 Miles	2019
					Source Unknown		
				Phosphorus		44 Miles	2019
					Source Unknown		
				Total Dissolved Solids		44 Miles	2019
					Source Unknown		
9	R	Tijuana River	91111000				
				Eutrophic		6 Miles	2019
					Nonpoint/Point Source		
				Indicator bacteria		6 Miles	2010
					Nonpoint/Point Source		
				Low Dissolved Oxygen		6 Miles	2019
					Nonpoint/Point Source		
				Pesticides		6 Miles	2019
					Nonpoint/Point Source		
				Solids		6 Miles	2019
					Nonpoint/Point Source		
				Synthetic Organics		6 Miles	2019
					Nonpoint/Point Source		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
				Trace Elements		6 Miles	2019
					Nonpoint/Point Source		
				Trash		6 Miles	2019
					Nonpoint/Point Source		
9	E	Tijuana River Estuary	91111000				
				Eutrophic		1319 Acres	2019
				Estimated size of impairment is 1 acre.			
					Nonpoint/Point Source		
				Indicator bacteria		1319 Acres	2010
				Estimated size of impairment is 150 acres.			
					Nonpoint/Point Source		
				Lead		1319 Acres	2019
				Estimated size of impairment is 1 acre.			
					Nonpoint/Point Source		
				Low Dissolved Oxygen		1319 Acres	2019
					Urban Runoff/Storm Sewers		
					Wastewater		
					Unknown Nonpoint Source		
					Unknown point source		
				Nickel		1319 Acres	2019
				Estimated size of impairment is 1 acre.			
					Nonpoint/Point Source		
				Pesticides		1319 Acres	2019
				Estimated size of impairment is 1 acre.			
					Nonpoint/Point Source		
				Thallium		1319 Acres	2019
				Estimated size of impairment is 1 acre.			
					Nonpoint/Point Source		
				Trash		1319 Acres	2019
				Estimated size of impairment is 1 acre.			
					Nonpoint/Point Source		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
				Turbidity		1319 Acres	2019
					Source Unknown		

ABBREVIATIONS

REGIONAL WATER QUALITY CONTROL BOARDS

1 North Coast
2 San Francisco Bay
3 Central Coast
4 Los Angeles
5 Central Valley
6 Lahontan
7 Colorado River Basin
8 Santa Ana
9 San Diego

WATER BODY TYPE

B = Bays and Harbors
C = Coastal Shorelines/Beaches
E = Estuaries
L = Lakes/Reserviors
R = Rivers and Streams
S = Saline Lakes
T = Wetlands, Tidal
W= Wetlands, Freshwater

CALWATER WATERSHED

"Calwater Watershed" is the State Water Resources Control Board hydrological subunit area or an even smaller area delineation.

GROUP A PESTICIDES OR CHEM A

aldrin, dieldrin, chlordane, endrin, heptachlor, heptachlor epoxide, hexachlorocyclohexane (including lindane), endosulfan, and toxaphene

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Barriers to the recovery of aquatic insect communities in urban streams

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SUMMARY

1. Worldwide, increasing numbers of stream restoration projects are being initiated to rehabilitate waterways modified by urbanisation. However, many of these projects have limited success in restoring stream communities. Prompted by this, we investigated previously unrecognised barriers to aquatic insect colonisation in urban streams.
2. To investigate whether the availability of suitable substrata for oviposition limited the longitudinal distribution of caddisflies, large boulders were added to the upstream reaches of one stream. Prior to the addition, more egg masses were observed downstream and this longitudinal pattern persisted subsequently.
3. Malaise trapping revealed that adult caddisfly diversity and abundance was greater downstream than upstream. Furthermore, in a previous study the authors found larval caddisflies reflected the longitudinal distribution of adults.
4. The only obvious potential obstructions between reaches were roads beneath which the stream flowed through culverted crossings. Malaise trapping was used to examine the effect of road culverts and bridges on caddisfly dispersal. Numbers of caddisflies caught declined upstream and about 2.5 × more individuals were taken in traps immediately below than above five culverts.
4. Bridges, which had a more open structure than culverts, had no significant effect on the size of catches made above and below them.
5. Road culverts could act as partial barriers to upstream flight, with consequences for larval recruitment in urban streams. We recommend that urban planners and designers of restoration projects consider possible synergistic effects of poor oviposition habitat and barriers to aquatic insect dispersal, which may be critical for the colonisation of urban headwater streams and for the maintenance of stream insect populations.

Keywords: dispersal barriers, oviposition, restoration, road culverts, Trichoptera

Introduction

Worldwide, numerous streams have been modified by urbanisation, which has resulted in the impairment of physicochemical conditions and the degradation of benthic communities (Suren, 2000; Paul & Meyer, 2001). In many developed nations organisations and community groups have sought to rehabilitate streams through restoration projects whose main focus often has been to improve physical habitat. Activities such as the replanting of riparian vegetation, the re-establishment of bed substrata and flow heterogeneity and the reinstatement of pool-riffle sequences have been undertaken (Riley, 1998). However, contrary to the 'field of dreams hypothesis' (i.e. build it and they will come, Palmer, Ambrose & Poff, 1997), many urban stream communities have failed to recover even after stream conditions have improved (Larson, Booth & Morely, 2001; Walsh & Breen, 2001;

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Blakely & Harding, 2005; Suren & McMurtrie, 2005). To facilitate their recovery, a much better understanding of limiting mechanisms is required.

Bond & Lake (2003) suggested that ecological processes such as dispersal and recruitment might limit biotic responses to physically restored streams; however, their importance for colonisation of urban streams by aquatic invertebrate taxa has received little attention. Aquatic insects can populate waterways in three main ways: downstream drift, upstream migration and oviposition via aerial dispersal (Williams & Hynes, 1976). Although all three ways can be important for repopulating stream reaches, aerial dispersal of winged adult stages, especially ovipositing females, is vital (Williams & Hynes, 1976; Bunn & Hughes, 1997). This is particularly clear of headwater tributaries, where an upstream source of colonists is lacking (Wallace, Vogel & Cuffney, 1986; Flory & Milner, 2000). Moreover, the dispersal ability of individual taxa may be critical when a local source of repopulating adults is not available, or is limited in size (Cushing & Gains, 1989; Milner *et al*., 2000). In addition, suitable oviposition habitat must be available if colonisation is to succeed.

Many freshwater insects have specific oviposition requirements. In particular, numerous caddisfly species deposit egg masses on the undersides of boulders in stream channels (Anderson & Wallace, 1984). Some Australian hydrobiosid caddisflies select emergent rocks where water velocities are >40 m s^{-1} as oviposition sites, whereas the size of the emergent rock is more important than water velocity for other hydrobiosid species (Reich & Downes, 2003a). Other caddisflies lay their eggs on overhanging vegetation, submerged organic matter, or emergent pieces of wood (Hoffmann & Resh, 2003). Because stream beds in urban areas are often dominated by fine substrata such as silt and sand and have a paucity of large cobbles, emergent boulders or wood (Paul & Meyer, 2001), the availability of suitable oviposition sites may limit caddisflies and other aquatic insects.

Successful recruitment also requires that egg-laying females have access to appropriate habitat. In relatively pristine systems adults can disperse along stream corridors (longitudinal dispersal) and/or overland between streams (e.g. Macneale, Peckarsky & Likens, 2005). In urban areas, however, longitudinal dispersal may be the dominant pathway used by most aquatic species as the highly modified landscape may impede or prevent lateral dispersal. Unfortunately, dispersal along urban waterways may also be obstructed by structures such as road crossings, bridges and culverts. Thus, Resh (2005) found that culverted stream crossings had a major effect on the upstream migration of diadromous shrimps and other non-insect taxa in French Polynesia, and few individuals of some species were found above stream crossings. Longitudinal connectivity and an absence of in-stream barriers, such as dams, piped sections of streams, waterfalls and weirs, have also been identified as critical for the successful recolonisation of waterways by many freshwater fish species (Concepçion & Nelson, 1999; Wiens, 2002; Wheeler, Angermeier & Rosenberger, 2005). Thick riparian vegetation and road networks may also pose significant barriers to dispersing aquatic insects (Collier & Smith, 1998; Briers, Cariss & Gee, 2002), although few studies have investigated their effects in urban streams (but see Wheeler *et al*., 2005).

In this study we investigated obstacles to insect colonisation of urban streams in Christchurch, New Zealand. Since the arrival of European settlers in the early 1840s, development of the city has resulted in dramatic changes to the extensive network of wetlands and meandering spring-fed streams that once covered the alluvial floodplains of the region (Dendy, 1900). During the establishment of Christchurch, wetlands were drained and streams were straightened to increase drainage efficiency during floods. As a consequence, the ecological health of streams was compromised, with many having low in-stream and riparian habitat heterogeneity, and being subject to inputs of pollutants in storm-water during heavy rainfall events. 'Clean-water taxa' that were once abundant (e.g. mayflies and caddisflies) have been replaced by more 'pollution tolerant' taxa such as oligochaete worms, chironomid larvae and snails (Robb, 1980, 1992). Despite the water quality of these primarily spring-fed streams generally being good during baseflow (Blakely & Harding, 2005), the biological communities are not responding well to restoration work by the Christchurch City Council (Blakely & Harding, 2005; Suren & McMurtrie, 2005). For example, in Okeover Stream, of where many reaches have been subjected to extensive riparian and in-stream restoration, the benthic macroinvertebrate community has shown little response to the changes with caddisfly numbers in particular remaining low over much of its length (Blakely & Harding, 2005).

To investigate obstacles to aquatic insect colonisation, we assessed the availability of oviposition substrata and considered potential barriers to adult dispersal in headwater reaches of four Christchurch urban streams. Specifically, we tested whether: (i) the availability of oviposition substrata suitable for caddisflies could be limiting their distribution and (ii) whether structures such as road culverts act as obstructions that impede upstream flight of adult caddisflies along stream channels.

Methods

Study sites

The study was undertaken in the upper reaches of four spring-fed, first and second order tributaries of the Avon and Heathcote rivers, which arise in the western suburbs of Christchurch (approximate population 345 000). An oviposition survey was carried out in Okeover Stream, and the effect of road culverts and bridges on adult caddisfly dispersal was examined in the Okeover and Waimairi streams and the Avon and Heathcote rivers (Fig. 1). All waterways were exposed to comparable levels of urbanisation: Okeover Stream and the Avon River headwaters flowed mainly through the University of Canterbury campus (established 1974), whereas Waimairi Stream and the Heathcote River were situated in long established residential areas. All waterways were shallow (0.05–0.15 m deep), narrow (<3.6 m wide wetted channels), with cobble and silt/sand-dominated riffles and pools with similar water velocities (0.15–0.3 m s^{-1}) at baseflow. Grasses, planted native shrubs (*Hebe*, *Pseudopanax* and *Coprosma* species), and sedges (*Carex*) were the dominant bank vegetation, and numerous stormwater pipes guided runoff directly into the streams. Gastropod snails [*Potamopyrgus antipodarum* (Smith), *Physella acuta* (Draparnaud)], the amphipod *Paracalliope fluviatilis* (Thomson), chironomid larvae and several caddisflies including *Pycnocentrodes aureola* (McLachlan), *Pycnocentria evecta* McLachlan (both Conoescuidae), the hydroptilid *Oxyethira albiceps* (McLachlan) and a hydrobiosid, *Hydrobiosis parumbripennis* McFarlane, dominated the benthic fauna. However, caddisfly richness and abundance was markedly greater in downstream reaches (Blakely & Harding, 2005). For example, at oviposition site 4 on Okeover Stream (Fig. 1) larvae of seven caddisfly species were present with a mean total abundance of 309 (± 34.9) m^{-2}, whereas 250 m upstream only five species were found and a mean total abundance 69 (± 29.7) m^{-2}. Furthermore, *H. parumbripennis* and *O. albiceps* were more abundant downstream [59 (± 14) and 5 (± 5) m^{-2}, respectively], than in the uppermost 400 m of the stream, where only *O. albiceps* was found at very low density [5 (± 5) m^{-2}; Blakely & Harding, 2005].

Availability and use of oviposition substrata

We assessed oviposition of the hydrobiosid caddisfly *H. parumbripennis*, over the peak oviposition period, from 7 to 23 January 2003 (austral summer) in four, 10-m long reaches along 700 m of Okeover Stream (Fig. 1). *Hydrobiosis parumbripennis* was the only caddisfly to deposit eggs on the undersides of boulders in this stream. Of the other caddisflies present, the conoescuids release loose spherical egg masses directly into the water (Pendergrast & Cowley, 1966) and little is known about oviposition of the New Zealand hydroptilid *O. albiceps*. The amount of substratum potentially available for egg laying females was determined by counting all emergent and submerged boulders (i.e. >256 mm, longest dimension) in each 10 m reach. Other potential oviposition sites, such as overhanging vegetation, logjams, bricks, concrete, bottles and wood panels (all common in urban waterways) were noted but not used for egg mass counts. The number of *H. parumbripennis* egg masses on five of the largest boulders (or cobbles in reaches where boulders were absent or few) in each reach was counted on 7 January 2003. To determine whether substratum availability might be limiting oviposition by *H. parumbripennis* in reaches where boulders were rare, five large clean boulders (256–350 mm, longest axis) were placed randomly in the middle of the stream channel at each of the four reaches on 8 January 2003. Two weeks later the number of egg masses on each boulder was counted.

An estimate of the numbers of all caddisfly species potentially ovipositing in each reach was obtained using standard Malaise traps (1.9 m high, with 36.8 m^3 of trapping area), on three occasions during the peak flight period in January 2003: before, during and after the artificial substrata were added. Traps (one per reach) were set across the stream channel with their bottom edges touching the water surface

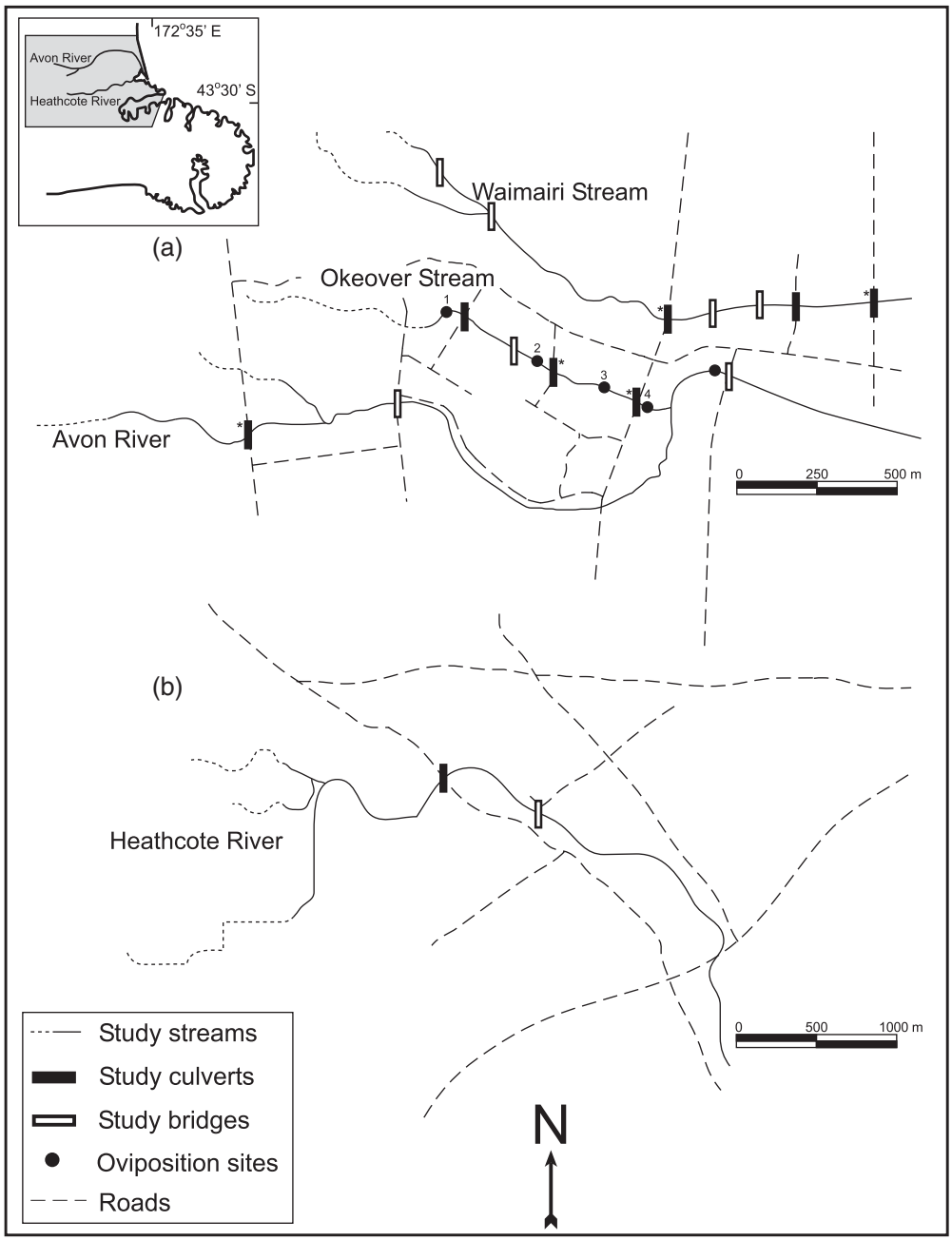

Fig. 1 Map of the four study streams in Christchurch, New Zealand. The four oviposition study reaches along Okeover Stream are indicated by numbers 1–4, and the study culverts and bridges are shown along (a) the Avon, Waimairi and Okeover streams and (b) the Heathcote River (*denotes the five culverts used in the first Malaise trapping survey). The location of the Avon and Heathcote rivers are shown in the inset, where grey shading indicates the Christchurch urban area.

and caught adults flying both up- and downstream, although they were not separated. Trapped insects accumulated in containers of 70% ethanol and were emptied after 48 h.

To determine whether the egg laying activity of *H. parumbripennis* differed when oviposition substrata were more readily available, numbers of egg masses on substrata naturally occurring along Okeover Stream were compared with numbers found after two weeks on the added boulders, using two-way ANOVA. Boulders were used as replicates, whereas study reaches and boulder addition were fixed main effects.

Numbers of all caddis species and *H. parumbripennis* adults caught over 48 h in each study reach were converted into 24-h catch rates and compared, separately using one-way ANOVAs, with the three sampling periods as replicates. The total number of all caddis species and *H. parumbripennis* adults potentially ovipositing in each reach were compared before and after the boulder additions, separately using *t*-tests. Catches from Malaise traps set at each site before the additions were compared with the mean values of catches from Malaise traps over the two weeks following boulder addition.

Road culverts as barriers to adult caddisfly dispersal

Three Malaise trapping studies were conducted to assess the impacts of road culverts as potential obstructions to upstream flight of adult caddisflies. First, we investigated the general effect of road culverts on caddisfly flight. This was carried out on three occasions at each of five replicate road culverts spanning the Okeover, Waimairi and Avon River headwater streams during the peak flight period (29 January to 4 February 2003). All culverts were approximately 22 m long, had similar internal dimensions (1.0–1.9 m high, 1.3–2.7 m wide) and external heights ranged from 1.3 to 4.5 m from the water surface to the road surface (Fig. 2a). A control trap was set 50 m downstream of each culvert in conjunction with a trap either directly upstream or downstream of the culvert. Because downstream traps may interfere with catches in traps upstream, if used simultaneously, the Malaise traps directly above and below culverts were used alternately over six consecutive days and nights; however, the control traps were always present. As most adult caddisflies

Fig. 2 A typical (a) road culvert spanning the Avon River headwaters and (b) road bridge crossing the Heathcote River headwaters.

(66–74%) have been caught (and therefore appear to fly) within 30 cm of the stream surface in these urban waterways (J. S. Harding, unpublished data), traps were positioned as close as possible (≤1 m) to the culvert opening to measure their effect on longitudinal dispersal. Malaise trap collecting jars were emptied every 24 h.

To assess the impact of road culverts as potential barriers to upstream flight, daily catches of caddisflies were expressed as average up- and downstream ratios at each culvert. Ratios were calculated by dividing up- and downstream catches by the control. The ratios were then ln-transformed and averaged for the three sampling periods at each culvert. MANOVA was used to test for differences in up- and downstream catch ratios of all caddis species, *O. albiceps* alone and all caddis species other than *O. albiceps*, using the five road culverts as replicates.

Cumulative effects of successive road culverts

The cumulative effect of successive road culverts on caddisfly catches was investigated in February 2004 using Malaise traps set across the stream channel directly upstream (≤1 m) of three road culverts along each of Okeover and Waimairi streams. Each culvert was no more than 650 m upstream of the previous one. Collecting jars were emptied after five days and nights.

To determine whether multiple culverts were associated with a successive reduction in the number of potentially reproducing adults present upstream, the total number of all caddisfly species, *O. albiceps* and all species except *O. albiceps* caught over 120 h at each site were converted into 24-h catch rates. These were tested with chi-squared Goodness-of-Fit tests, where equal numbers of adults were expected upstream of each of the three culverts if they had no effect on caddis abundance. The two streams were tested separately, using road culverts as replicates. Because this trial lacked a control in the form of streams lacking culverts that could be trapped at similar longitudinal intervals, the results obtained must be considered preliminary as they could have been influenced by confounding local factors.

Road culverts versus bridges as barriers

The relative effectiveness of road bridges and culverts as barriers to caddisfly flight was investigated in February 2004 by Malaise trapping directly upstream (≤1 m) and 50 m downstream of eight culverts and eight bridges along the four urban streams (Fig. 1). All road bridges covered a similar length of stream as culverts (22 m) but the space beneath them was much more open (Fig. 2). Catches were collected after 96 h and expressed as bridge and culvert catch ratios as described above. MANOVA was used to test for differences in catch ratios of all caddis species and *O. albiceps* alone at bridges and culverts, with individual bridges and culverts as replicates.

Adult caddisflies were counted and identified to species under 10–60 × magnification using taxonomic guides and published descriptions (Mosely & Kimmins, 1953; Neboiss, 1986). All analyses were performed on Systat version 10 (Wilkinson, 1989). Residual plots were used to check for normality and response variables were $\ln(x + 1)$ transformed where necessary to meet assumptions of normality and homogeneity of variances (Zar, 1999). Where appropriate, significant differences in site means were determined with Fisher's Least Significant Differences *post hoc* test.

Results

Availability and use of oviposition substrata

Boulders were naturally rare in Okeover Stream although more were present in the upstream than downstream reaches (Table 1). However, 91% of hydrobiosid egg masses were found on boulders in the furthest downstream reach (ANOVA reach effect: $F_{3,32} = 21.05$, $P < 0.001$) and none was found in the upper-most reach (Fig. 3). The average number of hydrobiosid egg masses found on emergent boulders added to the stream reaches was greater than on natural substrata but only in the two downstream

Table 1 Numbers of boulders and other potential oviposition substrata recorded in four 10 m reaches, numbered longitudinally downstream, along Okeover Stream in January 2003

Reach	Emergent boulders/10 m	Submerged boulders/10 m	Other*/10 m
1 (upstream)	13	2	0
2	10	1	2
3	1	0	0
4 (downstream)	1	0	2

*Other substrata included overhanging vegetation, logjams, bricks, concrete blocks, beer bottles and wood panels.

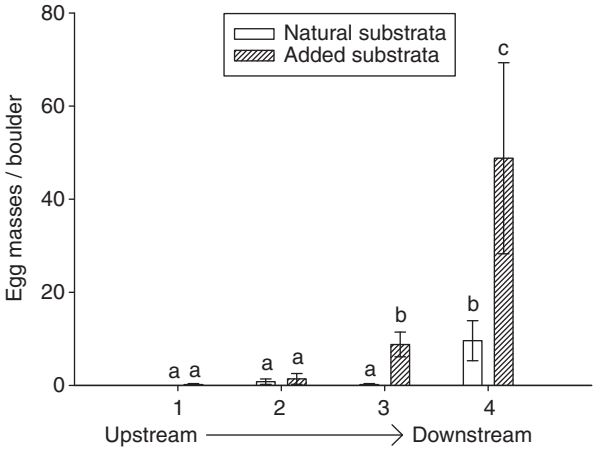

Fig. 3 Mean (±1 SE) number of *Hydrobiosis parumbripennis* egg masses found on natural ($n = 5$) substrata in four reaches and on boulders ($n = 5$) added to the reaches for 2 weeks in January 2003. Significantly different site means are indicated by different letters.

reaches. Thus, the original longitudinal pattern of egg mass distribution became more marked two weeks after the boulders were added (ANOVA reach: boulder interaction: $F_{3,32} = 3.64$, $P = 0.023$). Furthermore, the number of potentially ovipositing caddisflies in the four study reaches did not differ significantly over the two week boulder manipulation period ($t_{0.05,5} = 2.57$, all caddis species: $P = 0.705$; *H. parumbripennis*: $P = 0.580$).

Although only *H. parumbripennis* laid egg masses on boulders, the hydroptilid *O. albiceps* dominated (>60%) adult catches in all study reaches along Okeover Stream. Nevertheless, *H. parumbripennis* was encountered in all study reaches, albeit in small numbers (Table 2). Significantly more adult caddisflies were caught in the reach furthest downstream, than in the three upstream reaches (ANOVA: $F_{3,8} = 21.06$, $P = 0.001$; Fig. 4a). The distribution of trapped *H. parumbripennis* adults mirrored that of total caddis adults, with significantly more being caught downstream than upstream (ANOVA: $F_{3,8} = 44.45$, $P < 0.001$; Fig. 4b).

Road culverts as barriers to adult caddisfly dispersal

Upstream and downstream trapping resulted in many more adult caddis being caught below than above road culverts, although there was no difference in the number of adults captured in the downstream traps and their respective control traps (Fig. 5a). Downstream trap: control trap catch ratios were significantly greater than upstream trap: control trap ratios for all caddisfly species, *O. albiceps* and all caddis species except *O. albiceps* (Fig. 5b; Table 3). *Hydrobiosis parumbripennis* was captured in all traps, but in numbers too small to be tested statistically.

Cumulative effects of successive road culverts

Caddisfly abundance declined progressively above three successive culverts along Okeover Stream, with fewer adults being observed upstream of each road culvert than would be expected if adults were distributed equally (Fig. 6a; Table 4). This pattern was not found in Waimairi Stream where more adults were encountered upstream of the third culvert, than above the previous two (Fig. 6b; Table 4). However, when *O. albiceps* was excluded from the analysis a significant decline above successive road culverts was found in both Okeover and Waimairi streams (Fig. 6; Table 4).

Road culverts versus bridges as barriers

Significantly fewer caddis adults were captured upstream of road culverts than bridges (Fig. 7a).

Table 2 Mean number and relative abundances (%) of eight caddisfly species caught in Malaise traps on three sampling occasions, in four reaches along Okeover Stream, January 2003

		Reaches (upstream–downstream)			
Family	Species	1 ($n = 42$)	2 ($n = 28$)	3 ($n = 71$)	4 ($n = 390$)
Hydrobiosidae	*Hydrobiosis parumbripennis*	1 (2.4)	1 (3.6)	5 (7.0)	23 (5.9)
	Psilochorema tautoru	0 (0.0)	0 (0.0)	2 (2.8)	0 (0.0)
Hydroptilidae	*Oxyethira albiceps*	40 (95.2)	27 (96.4)	43 (60.6)	326 (83.6)
Conoesucidae	*Pycnocentrodes aureola*	0 (0.0)	0 (0.0)	6 (8.5)	13 (3.3)
	Pycnocentria evecta	0 (0.0)	0 (0.0)	12 (16.9)	24 (6.2)
Oeconesidae	*Oeconesus maori*	1 (2.4)	0 (0.0)	1 (1.4)	1 (0.3)
Leptoceridae	*Triplectides obsoletus*	0 (0.0)	0 (0.0)	1 (1.4)	1 (0.3)
Polycentropodidae	*Polyplectropus altera*	0 (0.0)	0 (0.0)	1 (1.4)	2 (0.5)

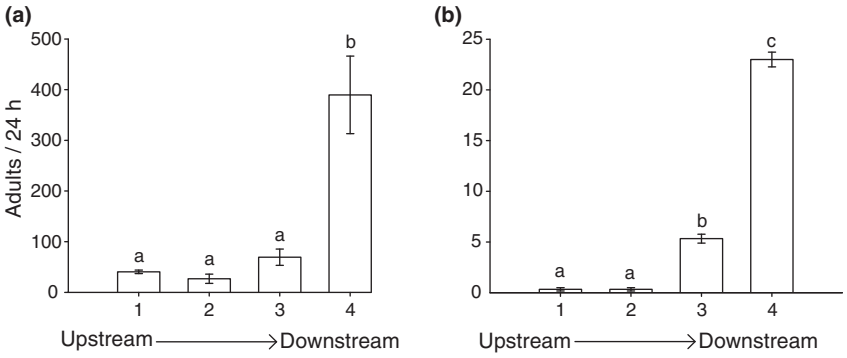

Fig. 4 Mean (±1 SE, $n = 3$) number of (a) all caddisflies, and (b) *Hydrobiosis parumbripennis* adults captured in four reaches along Okeover Stream in January 2003. Significantly different site means are indicated by different letters.

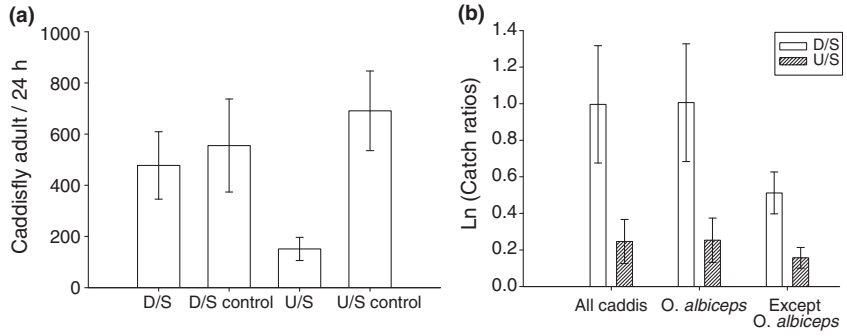

Fig. 5 Mean (±1 SE) (a) number of adult caddisflies captured downstream (D/S) and upstream (U/S) of five road culverts and in their respective control traps in three 24 h periods, in January and February 2004, and (b) ln-transformed catch ratios of all caddis adults, *Oxyethira albiceps* and all caddis except *O. albiceps*.

Table 3 Multivariate and univariate ANOVAs examining the effects of road culverts on upstream flight of adult caddisflies along Okeover and Waimairi streams and the Avon River headwaters in January and February 2004. Catches were calculated as ln-transformed ratios and significant differences ($P < 0.01$) were determined by Fisher's LSD *post hoc* tests, where D/S > U/S means catch ratios downstream of culverts were significantly greater than ratios upstream of culverts.

Response variable	Source	SS	d.f.	*F*-value	*P*-value	Differences
MANOVA	Model	0.23	3,6	6.89*	0.023	
All caddis	Model	1.14	1	6.08	0.039	D/S > U/S
	Error	1.50	8			
O. albiceps	Model	1.17	1	5. 95	0.041	D/S > U/S
	Error	1.57	8			
Except *O. albiceps*	Model	0.39	1	5.66	0.045	D/S > U/S
	Error	0.56	8			

*Wilks' lambda.

Furthermore, when catch ratios of all caddis species and *O. albiceps* were investigated, separately, all upstream trap: control trap ratios at bridges were significantly greater than those at culverts (Fig. 7b; Table 5), indicating that bridges had no effect on upstream caddisfly flight.

Discussion

Our results suggest that the availability of oviposition substrata may be affecting recruitment of the caddisfly *H. parumbripennis*. When suitable oviposition substrata were added to Okeover Stream, the number of egg masses deposited increased markedly. Although nothing has been reported on the oviposition requirements of hydrobiosid caddisflies in New Zealand, recent work in Australia has shown that females of several hydrobiosid species have very specific oviposition site requirements (Reich & Downes, 2003b). The cues that females use to determine suitable sites are likely to be diverse, but include water velocity around emergent boulders and 'landing pad' size (Reich & Downes, 2003a). The paucity or absence of boulders in New Zealand urban streams, which often have low in-

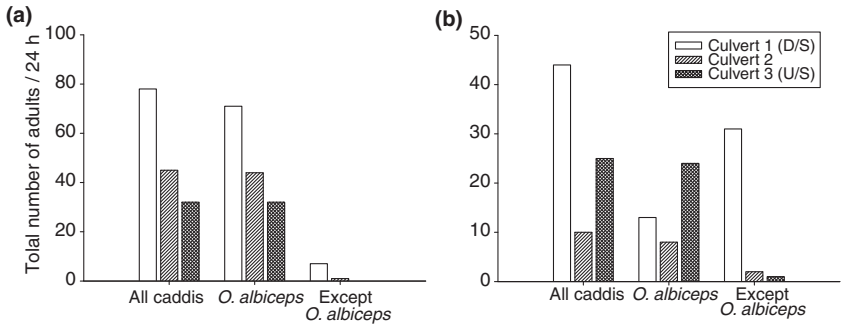

Fig. 6 Numbers of adult caddisflies (all caddis, *Oxyethira albiceps*, and all caddis except *O. albiceps*) caught in 24 h in Malaise traps directly upstream of three successive culverts, on (a) Okeover and (b) Waimairi streams, February 2004.

Table 4 Chi-squared goodness of fit tests on the effects of three successive road culverts on upstream flight of all caddisfly adults, *Oxyethira albiceps*, and all caddis species except *O. albiceps*, along Okeover and Waimairi streams in February 2004. Significant differences ($P < 0.01$) indicated, where 1 > 2 > 3 shows caddisfly catches were greatest at the first culvert (downstream) and decreased upstream being lowest above the third culvert.

	χ^2-value	d.f.	*P*-value	Differences
Okeover Stream				
All caddis	21.8	2	<0.001	1 > 2 > 3
Oxyethira albiceps	16.3	2	<0.001	1 > 2 > 3
Except *O. albiceps*	10.8	2	0.005	1 > 2 = 3
Waimairi Stream				
All caddis	22.1	2	<0.001	1 > 2 < 3
Oxyethira albiceps	8.9	2	0.011	1 = 2 < 3
Except *O. albiceps*	51.2	2	<0.001	1 > 2 > 3

stream habitat heterogeneity (Suren, 2000), may limit egg laying and translate into depauparate larval populations. Similarly, Purcell, Friedrich & Resh (2002) noted that the abundance and diversity of larval mayflies, stoneflies and caddis were only slightly higher in restored than unrestored reaches of an urban stream in California and concluded that this was because of a general lack of oviposition substrata throughout the stream.

The degree to which boulders are embedded in the streambed is also likely to limit oviposition by hydrobiosids as eggs are only laid on their under surfaces (Pendergrast & Cowley, 1966; J. G. Pendergrast & D. R. Cowley, personal observation) The larger numbers of egg masses laid on boulders placed on the streambed than on natural boulders (that were at least partially embedded) supports this view. Nevertheless, the availability of suitable oviposition substrata cannot be the only factor limiting the upstream distribution of caddisflies in our streams, as even when boulders were made more readily available along the stream many more egg masses of *H. parumbripennis* were still deposited in the furthest downstream reach.

Trapping of adults in the four reaches used to investigate oviposition revealed that adult caddisflies were also unevenly distributed along Okeover Stream, with about four times as many captured in the furthest downstream reach than in the three upstream reaches. *Oxyethira albiceps* was the most abundant caddis caught in all reaches and its longitudinal distribution mirrored that of the *H. parumbripennis* egg masses and (although taken in small numbers) the adults of that species. This consistent pattern suggests that the lack of *H. parumbripennis* egg masses upstream, even after adding boulders, was due not only to a paucity of oviposition substrata but

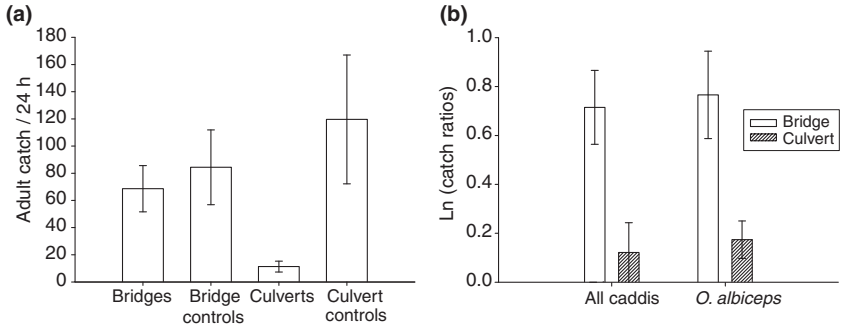

Fig. 7 Mean (±1 SE) (a) number of adult caddisflies captured upstream of eight road bridges, eight road culverts and in their respective control traps over 4 days in February 2004, and (b) ln-transformed catch ratios of all caddis adults and *Oxyethira albiceps*.

Table 5 Multivariate and univariate ANOVAs comparing the effects of road culverts with road bridges on upstream flight of adult caddisflies along Okeover and Waimairi streams and the Avon and Heathcote River headwaters in February 2004. Catches were calculated as ln-transformed ratios and significant differences ($P < 0.01$) were determined by Fisher's LSD *post hoc* tests, where bridges > culverts means catch ratios above bridges were significantly greater than above culverts.

Response variable	Source	SS	d.f.	*F*-value	*P*-value	LSDs
MANOVA	Model	0.47	3,12	4.47*	0.025	
All caddis	Model	1.41	1	13.85	0.002	Bridges > culverts
	Error	1.42	14			
O. albiceps	Model	1.40	1	9.27	0.009	Bridges > culverts
	Error	2.12	14			

*Wilks' lambda.

to few adults being present upstream. Of course, the lack of adults in upstream reaches could also reflect the scarcity of eggs, larvae or pupae of the previous generation at these sites. However, because many caddisflies including *H. parumbripennis* and *O. albiceps* are active flyers that were collected consistently at distances >50 m (and up to 200 m) from a stream by Collier & Smith (1998), they might be expected to disperse considerable distances along Okeover Stream if barriers to flight are absent. Larval distributions at the oviposition sites along Okeover Stream provide further evidence for this. Because Blakely & Harding (2005) found that larval caddisfly distributions mirrored the egg mass and adult abundances obtained in the present study, it is likely that barriers to dispersal limit the number of adults that reach the headwaters of the stream.

Roads were the only prominent physical features that divided our study reaches, and our Malaise trapping programme indicated that they and the culverts that ran beneath them, were impeding upstream flight. Thus, adult caddisfly abundance was greatly reduced above road culverts, with a 250% decline in adults encountered upstream, compared with downstream, of them. However, the number of adult caddisflies captured upstream of road culverts did not fall to zero, indicating that culverts were not absolute barriers to dispersal. Although steep mountainsides and dense vegetation are known to be barriers to insect flight (Jackson & Resh, 1989; Collier & Smith, 1998), very few studies have investigated the effects of anthropogenic barriers on aquatic insect dispersal. Smith & Collier (2001) suggested that the heavily urbanised Auckland isthmus could be a significant barrier to the caddisfly *Orthopsyche fimbriata* (McLachlan) and Purcell *et al.* (2002) speculated that underground piping and water pollution were likely barriers to aquatic insect dispersal in California. The waterways in our study are not piped underground except at road culverts and water chemistry did not vary along the study streams (Blakely & Harding, 2005), therefore, a lack of surface flow or reaches of poor water quality would not have been significant barriers to adult caddisfly dispersal.

Road culverts probably impede aerially dispersing aquatic insects in several ways. First, because they are narrow and constrict the stream channels culverts potentially limit the likely flight paths of low-flying insects. Stream corridors are the main 'highways' for the dispersal of adult aquatic insects (Petersen *et al.*, 2004) and are likely to be particularly important in highly modified urban landscapes. By acting as physical barriers, culverts might inhibit further upstream flight and induce oviposition below them. Our finding that bridges, which have less constricted space beneath them, had less impact on the upstream flight of caddisflies supports this contention. Secondly, the flight behaviour of individuals that attempt to fly through a culvert or across a road may be disrupted, but because we lack an understanding of the cues aquatic insects use to disperse this remains conjectural. It is also possible that individuals attempting to fly through culverts suffer high mortality through predation. We observed many spider webs inside some culverts and they potentially trap caddisflies as well as other insects that enter them. Adult aquatic insects can be an important food resource for terrestrial predators, including riparian spiders (Nakano, Miyasaka & Kuhara, 1999; Kato, Iwata & Wada, 2004), which have the potential to reduce their numbers considerably.

A final important question that remains is how many females are needed to 'replenish' upstream reaches? Bunn & Hughes (1997) suggested that recruit-

ment of some species in small streams could result from oviposition by only a few females. However, although some adult caddis were found along the entire length of Okeover Stream, larval populations were minimal in upstream reaches. Thus, the small numbers of adults in these upstream reaches appeared to be insufficient to sustain populations of comparable size to those found downstream. This was despite only small differences in riparian vegetation, water quality and in-stream habitat heterogeneity that might otherwise explain the significant longitudinal differences in the abundances of adults and larvae. Our results suggest, therefore, that in urban streams where dispersing adults are faced with multiple barriers and oviposition habitat is poor, recruitment can be reduced to levels at which populations are difficult to sustain. We propose that while urban stream restoration projects should continue to target the primary factors that degrade urban catchments, such as altered stream hydrology and channel morphology, stormwater runoff, and reductions in riparian cover (e.g. Suren, 2000; Paul & Meyer, 2001; Walsh *et al*., 2005), the introduction of in-stream substrata that can act as oviposition sites should be included in restoration programmes, and the constriction of streams by culverts and associated physical barriers should be minimised wherever possible in order to help sustain stream communities along the lengths of streams.

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EXECUTIVE SUMMARY

Municipal stormwater management for local governments has evolved over time from an urban flood control function, to a water and resource management function, to an environmental protection and regulatory function. All three functions now co-exist as responsibilities of local government. This evolution has forced changes in how stormwater systems are planned, designed, constructed, operated, and financed. More specifically, the stormwater function has evolved from a basic capital construction and maintenance program supported primarily by local taxes, to a program of integrated water resource management, environmental enhancement, and recreational services requiring a multi-faceted benefit based finance system.

The focus of this guidance is to provide a resource to local governments as they address contemporary stormwater program financing challenges. The guidance includes procedural, legal, and financial considerations in developing viable funding approaches. The guidance examines a range of possible approaches to paying for stormwater management, but the focus is on guidelines for developing service/user/utility fees to support these programs. The terms service fee, user fee, and utility fee may be used interchangeably in this guidance. Chapter 2 addresses various sources of funding. Chapter 3 covers legal considerations, and implementation of stormwater funding programs is discussed in Chapter 4.

SOURCES OF FUNDING

“Needs” are the key driver of stormwater programs and funding development. Without a well defined stormwater service need, there will not be basic support and success will be less likely. When considering how to develop and finance a stormwater program it is important to prepare a business plan that identifies strategic decisions and guides the program evolution and funding decisions. Emerging trends in funding practices include increasing complexity, blended funding, multi-jurisdictional funding, cost-sharing with other public programs, broader private sector participation, and increasing influence of technology and data.

Stormwater management has historically been supported by a range of funding methods and mechanisms that reflect a mix of federal, state and local programs. While the focus of this guidance is on service fees, other stormwater program funding mechanisms include general revenue appropriations; plan review, development inspection, and special user fees; special assessments; bonding for capital improvements; in-lieu of construction fees; capitalization recovery fees; impact fees; developer extension/latecomer fees; and federal and state funding opportunities such as grants, loans and cooperative programs.

There are several criteria that are commonly used to evaluate and select methods for design of service fee rate structures. They include legality, equity, revenue sufficiency, flexibility, balance of rates with level of service, data requirements, compatibility with data processing systems, consistency with other local funding and rate policies, and revenue stability and sensitivity. The fundamental objective of a service fee/utility is attainment of equity. Service fee rate methodologies are designed to attain a fair and reasonable apportionment of cost of providing services and facilities.

Design of stormwater service fees must meet general and technical standards. A rate structure analysis is performed to determine how costs might be apportioned among those who are served in various ways by expenditures for maintenance and operations, capital improvements, and support activities. Impervious area, gross area, percentage imperviousness, and land use are the parameters most frequently used to determine rate structures. Services fees are generally cost-based and are designed to reflect the impacts that each property has on stormwater service demands. Such costs are primarily a function of the peak stormwater runoff rate, the total volume of discharge, and pollutant contributions.

There are four rate structure concepts or methodologies used as examples in this guidance that are typical of those adopted in the more than five hundred communities that have established stormwater utilities. These examples base their fees on impervious area, a combination of impervious area and gross area, impervious area and the percentage of imperviousness, and gross property area and the intensity of development.

LEGAL CONSIDERATIONS

The type of funding mechanism selected for a stormwater utility or stormwater management program has a variety of legal consequences. Taxes, service fees, special assessments, impact fees and other revenue sources can be used, but each approach will have different implications in terms of who will pay, what procedures must be followed to implement and collect the charge, and how the money can be used. If the funding approach is deemed to be a tax, then tax-exempt entities such as churches, schools, state agencies and federal government facilities will contest their obligation to pay. If a service fee approach

is used, the reasonableness of the rate structure and its relationship to the service being provided may be challenged. In many states special taxpayer approval must be sought.

The distinctions between the various funding approaches are often blurred. In general, a tax is an enforced burden imposed by sovereign right for the support of the government, the administration of law, and the exercise of various functions the sovereign is called upon to perform. Many states have constitutional or statutory restrictions on the ability of local governments to levy taxes, which do not apply to fees or charges.

User/service fees are charges based upon the proprietary right of the governing body permitting the use of the instrumentality involved. Fees have traits that distinguish them from taxes. First, they are charged in exchange for a particular governmental service which benefits the party paying the fee. Second, they are voluntary, in that the party paying the fee has the option of not utilizing the governmental service and thereby avoiding the charge. Third, the amount of the fee is designed to recover the actual cost of the service being provided. In some cases there may be little practical difference between a tax and a fee, but the legal distinctions between the two are important.

Stormwater service fees have been the subject of litigation resulting in reported opinions from at least 17 states, including many cases involving final decisions by the state's highest court. In addition, there have been unreported decisions from lower courts in states that have involved similar challenges to local stormwater fees. Based on these cases, certain common themes have emerged.

The question of whether a service charge is actually a "tax" has been the issue most frequently litigated. Other reoccurring issues involve whether or not the charge is voluntary, is it a fee or special assessment, is the fee "reasonable" and directly related to the cost of providing the service, are the properties charged fees receiving proportionate benefit from the services provided, and must fees be confined to cost of providing stormwater services alone or may any surplus be applied to capital improvements.

Determining the legality of a specific financing mechanism chosen will depend upon a close analysis of state law. Nevertheless, certain general principals emerge from the cases examined. First, for a stormwater service charge to be regarded as a fee, rather than a tax, the overall cost of the program must be reasonably related to the service being provided, and the funds raised must be segregated for use by the stormwater program. Second, the fee should be proportional to the property's contribution to stormwater runoff. Third, participation in the program should be characterized as "voluntary". And forth, in states with constitutional provisions governing the imposition of any new tax, it may be necessary to seek voter approval for a fee even if it is designed to be service-based.

The imposition of stormwater service fees on federal facilities involves a special consideration of the tax vs. fee issue. In principal, states cannot tax the United States (Chief Justice Marshall's opinion in *McCulloch v. Maryland*, 1819). On the other hand, it is well-established law that the United States must pay reasonable user fees. Furthermore, the Clean Water Act contains an express waiver of sovereign immunity for certain pollution control related fees. Importantly, this waiver applies only to fees or service charges, and not to taxes.

The United States Supreme Court has established a three-pronged test for determining whether fees imposed on federal facilities are "reasonable service charges" or taxes. First, is the fee or service charge non-discriminatory? Second, is it a fair approximation of the cost of the benefits received? And third, is it structured to produce revenues that will not exceed the regulator's total cost of providing the benefits?

IMPLEMENTING USER-FEE BASED FUNDING

The evolution in stormwater program expectations, which is motivating the movement to utility based funding, requires that more than just the revenue mechanism be evaluated. The function, service and performance of the stormwater program itself become a focal point in the effort to develop a stormwater funding mechanism.

A stormwater utility should be seen as an umbrella under which individual communities address their own local problems, priorities and practices. A stormwater utility provides a vehicle for:

- consolidating or coordinating responsibilities previously dispersed among several departments;
- generating funding that is adequate, stable, equitable and dedicated solely to the stormwater function; and
- developing programs that are comprehensive, cohesive and consistent year-to-year.

Implementing user fee based funding involves a related set of actions and activities occurring within a flexible process framework. That framework promotes "due diligence" in five key areas of focus; political, financial, legal, informational, and technical. Bringing about change in the current stormwater program and implementing user based funding requires an understanding of current needs and problems, a vision for the future and a process framework. The use of a citizens/stakeholder participation group and a business plan approach can help build a compelling case for action.

The process framework should include a “quick concept study” which assesses the advisability of proceeding; a “feasibility study” which conducts the detailed assessment of the stormwater program and funding and develops recommendations; and, the “utility implementation process”.

The utility implementation process directs the planning and implementation effort along four tracks of activity. The “Public Track” insures stakeholder involvement and education. The “Program Track” matches program structure to stakeholder expectations. The “Finance Track” insures the legality, equity and adequacy of the funding mechanism; and, the “Database Track” determines the means to compute, deliver, collect and record the charge to be imposed on each property.

The analysis of stormwater utility funding has many policy implications. Policy making usually involves the mayor and council. Day-to-day policy decisions are often made at several levels under guidance set by the mayor and council. A recommended hierarchy for review of important issues is: key staff and consultants, other involved staff, advisory committee, manager’s office, and mayor and council.

CASE STUDIES

Five case studies are examined for City of Bellevue, Washington; City of Charlotte/Mecklenburg County, North Carolina; City of Tulsa, Oklahoma; Louisville/Jefferson County Metropolitan Service District, Kentucky; and Sarasota County Stormwater Environmental Utility, Florida. For each example the following is generally provided: keynotes, community profile, formation process, service area, role and program, local government structure, organization and staffing, funding, inter-governmental cooperation, and public participation.

The City of Bellevue stormwater management program was established in 1974 and was one of the first to give equal consideration to water quantity and quality. Bellevue’s Storm and Surface Water Utility provides a full range of capital infrastructure and operational services, primarily through in-house staff. Funding is primarily derived from a user fee that is based on gross property area and a factor reflecting the intensity of development of each property. Residential fees range from $3/month to over $20 per month with an average of about $10/month. The annual operating budget is approximately $6 million. The population of Bellevue was about 117,000 in 2005.

The Charlotte/Mecklenburg County approach relies on centralized funding and regional programs for major systems combined with local management of minor stormwater systems. The County, City of Charlotte, and towns have a high degree of self-determination in deciding service levels to be provided by local systems, programs and funding. Funding of the program is primarily supported by a composite stormwater service fee that includes both regional and local

components with the County controlling the regional component and local governance controlling the local component. The City of Charlotte and small towns typically employ a blend of funding from several sources while the County relies almost entirely on the service fee.

In 2005 the population of Mecklenburg County was about three quarter million and the population of Charlotte was about 650,000. The County utility was instituted in 1994. The total stormwater budget for all entities in 2005 was over $85 million with a large part allocated to capital betterments. The fee for a single-family house is $1.06/month throughout the County. Local stormwater programs of the County, cities and towns are funded by a separate additional rate component which ranges from $0.30/month to $6.72/month in Charlotte.

The Tulsa Stormwater Management Utility was founded in response to a devastating flood that killed 14 people and caused nearly $220 million in property damage in 1984. A Department of Stormwater Management was established in 1985 centralizing responsibility for all City stormwater activities, and a stormwater utility fee was established by ordinance in 1986 to fund the program. The stormwater program budget has recently ranged from $12 million to $14 million per year. All residential properties are charged a single rate of $3.49/month, and fees for other properties are based on the amount of imperviousness on each property. The population of Tulsa was about 400,000 in 2005. The program includes comprehensive watershed management, dedicated funds for maintenance and operation, and a $200 million capital improvements program.

The Louisville approach involves a consolidation of flood control and stormwater management with a regional wastewater collection and treatment program provided by the Metropolitan Sewer District (MSD). Most of the smaller cities and towns in Jefferson County do not perform stormwater management functions. Funding of MSD is primarily from wastewater and stormwater service fees, which are independently structured and billed. The accounting is kept separately for each function.

The methodology of determining the stormwater fees in Louisville/Jefferson County is based on impervious area. There is flat rate for single-family residential properties, and differential rates for other properties based on a impervious area equivalency unit. The single-family residential stormwater service fee in was $4.41/month. Stormwater service fee revenues in fiscal year 2005 were expected to be nearly $24 million. There are more than 90 cities and towns in Jefferson County. Most, but not all, cities are included in the stormwater program. Louisville had a population of about 700,000 in 2005.

Sarasota County, Florida established a Stormwater Environmental Utility in 1989. Primary objectives of the Utility are to reduce flooding, improve surface water quality, and attain responsible development practices. A Florida Supreme Court decision in 1996 determined that the Sarasota County charge is a special

assessment rather than a service fee. As such, it is subject to the standards applicable to assessments, which emphasize apportionment of special benefit, rather than reflecting the cost of service burden imposed on properties. The benefit assessments have three components that are consistent across the service area, and one component, system capitalization, that is variable by watershed.

The Utility budget in 2005 was approximately $23 million with about $10 million for capital projects. The benefit assessment takes both pervious and impervious areas on each property into account. On average, a medium size single-family residence is assessed $6.70/month. Sarasota County had a resident population of about 340,000 in 2005. There are four cities in the County. The city of Sarasota through an inter-governmental agreement relies on the County to improve its drainage system and perform most stormwater operations. The other three cities retain responsibility for local stormwater systems.

CHAPTER 1

BACKGROUND AND INTRODUCTION

Municipal stormwater management for local governments has evolved over time from an urban flood control function, to a water and resource management function, to an environmental protection and regulatory function. All three functions now co-exist as responsibilities of local government. This evolution has forced changes in how stormwater systems are planned, designed, constructed, operated, and financed. More specifically, the stormwater function has evolved from a basic capital construction and maintenance program supported primarily by local taxes, to a program of integrated water resource management, environmental enhancement, and recreational services requiring a multi-faceted benefit based finance system.

The focus of this guidance is to provide a resource to local governments as they address contemporary stormwater program financing challenges. The guidance includes procedural, legal, and financial considerations in developing viable funding approaches. The guidance will examine a range of possible approaches to paying for stormwater management, but the focus will be on guidelines for developing service/utility/user fees to support these programs. Chapter 2 will address various sources of funding. Chapter 3 will cover legal considerations, and implementation of stormwater funding programs is discussed in Chapter 4.

WHAT IS MUNICIPAL STORMWATER

Municipal stormwater is surface water runoff from public and private lands in urban areas. Typically municipal stormwater is collected in municipal separate storm sewer systems consisting of drains, pipes, and ditches, and conveyed to nearby streams, rivers, lakes, estuaries, basins, wetlands, and oceans carrying with it a variety of urban pollutants.

The United States Environmental Protection Administration (EPA) in their Phase I Municipal Stormwater regulations defined stormwater to mean "…storm water

runoff, snow melt runoff, and surface runoff and drainage." In their Phase II stormwater regulations EPA defined a "municipal separate storm sewer" to mean in part, a conveyance or system of conveyances, including roads with drainage systems and municipal streets, that is owned or operated by a State, city, town, borough, county, parish, district, association, or other public body designed or used for collecting of conveying storm water which is not a combined sewer and which is not part of a Publicly Owned Treatment Works.

The nature of stormwater runoff from a given rainfall or snow event changes as an area urbanizes and more impervious surfaces are created and the landscape and drainage patterns are modified. The volume of runoff, rate of flow, and quality of runoff all change as a result of this urbanization.

HISTORICAL DEVELOPMENT OF STORMWATER SYSTEMS

In the late 1800's and early 1900's combined sewers were built to convey and dispose of both sanitary sewage and stormwater. Eventually, local governments began to separate storm flows from wastewater flows and separate sanitary sewer and storm sewer systems replaced combined sewer systems in many areas. Early municipal storm sewer systems were designed to discharge stormwater rapidly, and included such physical elements as curbs, gutters, inlets, storm sewers, roadside ditches, and concrete and grassed lined open channels.

Thinking began to change in the 1960's and 1970's with the recognition that efficient stormwater systems also transferred problems downstream. With a need to reduce the rate and volume of these stormwater discharges, many local governments started requiring new developments to construct stormwater detention facilities.

In the 1980's and 1990's stormwater quality became a focus of federal regulatory requirements and local governments have had to develop stormwater quality programs in response. Under an evolving regulatory mandate a few local governments are beginning to recombine dry weather flows in storm sewers with sanitary sewage and directing both to treatment plants.

NEW PARADIGM

The character of the stormwater management function has, and continues to change significantly. Originally stormwater systems were built just for conveyance, but stormwater is now a component of a comprehensive integrated urban water resource, environmental enhancement, and recreational services system. Contemporary stormwater management is a multi-dimensional function which includes quantity and quality considerations, multiple-use facilities, riparian

corridors, recreation, wetland preservation and creation, and groundwater recharge.

Stormwater has become a part of the “total” water resources picture and is the third leg of the local government water service stool consisting of water development, treatment, and distribution; sewage collection, treatment, and disposal; and stormwater quantity and quality management. Other more specific changes include recognition of stormwater as a resource; restoration of streams and rivers; preservation of riparian areas and corridors; use of detention areas as parks, playfields, and wetlands; creation and/or restoration of wetlands to provide water quantity, quality, and environmental benefits; capturing stormwater to meet water supply needs; recognition that homes near greenbelts sell for a premium; and evaluation of stormwater from a comprehensive watershed perspective.

Most of these changes recognize stormwater as a resource, but liabilities have also evolved. For example, the disposal of “polluted” stormwater and of sediments accumulated in detention/retention facilities is now a performance issue for local governments. As a result of the evolving regulatory framework stormwater quality issues are now a required part of the urban water resources service sector. The reality is that stormwater quality and quantity are joined at the hip in today’s stormwater management programs.

The new paradigm has introduced a whole new array of issues that has resulted in basic changes in stormwater planning, design, operation and maintenance, construction, and financing. These changes have also resulted in greater public expectations. In addition to the effective control of drainage and flooding, the public also expects riparian corridors, wetlands, recreation amenities, trails, visually pleasing facilities, and a continued maintenance effort. Stormwater managers now must find the resources to effectively satisfy these expectations as well as the regulatory requirements.

To meet the challenges of the new paradigm some urban stormwater programs are evolving into multi-functional operations. Table 1-1 provides a listing of major stormwater management components for a utility/service fee type program. Not all programs will be this comprehensive, but many local governments in order to meet public expectations will likely move in this direction over a period of time.

Table 1-1: Major Stormwater Management Functional Centers[1]

Administration

General Administration
Prog Planning and Development
Interagency Coordination

Public Involvement & Education

Public Awareness & Education
Public Involvement
Standing Citizen's Group

Billing and Finance

Billing Operations
Database Management
Customer Service
Financial Management
Capital Outlay
Overhead Costs
Cost Control
Support Services

Stormwater Quality Mgmt

Quality Master Planning
Retrofitting Program
Monitoring Program
Struc and Non-Struc BMP Progs
Pest, Herb and Fertilizer
Used Oil & Toxic Materials
Street Maint Prog
Spill Response and Clean Up
Prog for Pub Ed and Reporting
Leakage and Cross Connections
Industrial Program
Gen Com and Residential Program
Illicit Con and Illegal Dumping
Landfills and Other Waste Facilities
Combined Sewer Overflow Program
Groundwater & Wellhead Protection
Drinking Water Protection
Watershed Assessment & TMDL
Septic and I&I Program

Engineering & Planning

Des Criteria, Stds and Guidance
Field Data Collection
Master Planning
Design, Field and Ops Engineering
Hazard Mitigation
Zoning support
Multi-objective Planning Support
GIS and Database Management
Mapping
Land Use Planning & Controls

Operations

General Maintenance Management
General Routine Maintenance
General Remedial Maintenance
Emergency Response Maintenance
Infrastructure Management
Public Assistance

Regulation and Enforcement

Code Dev and Enforcement
General Permit Administration
Drainage Sys Insp & Reg
Zoning and Land Use Reg
Special Inspection Programs
Flood Insurance Program
Multi-Obj Floodplain Management
Erosion Control Program

Capital Improvements

Major Capital Improvements
Minor Capital Improvements
Land, Easement, and Right-of-Way

[1] Table 1-1 provided by Hector Cyre, Water Resource Associates, Inc., Friday Harbor, Washington, 2005

LEGISLATIVE PERSPECTIVE

Legislative action has dramatically changed the face of contemporary stormwater management. This includes passage of laws, adoption of regulations, and interpretation of laws and enforcement of regulations by the courts at local, state and federal levels. These legislative activities impact all aspects of stormwater management by local governments, as well as the private sector, such as developers who provide basic infrastructure as a part of their developments, industrial facilities that discharge stormwater from their properties, and those conducting ground disturbing construction activities.

Initially stormwater was considered a common enemy and was solely a local issue. Local governments constructed stormwater systems to address local drainage service needs and flooding problems. Property owners had the right to protect their property from stormwater as long as unreasonable harm was not inflicted on other properties. Today as a result of the Clean Water Act (CWA), stormwater is also a state and federal issue, and landowners are required to detain stormwater on their property and provide a level of treatment.

Passage of the 1972 CWA signaled the beginning of a serious national effort to improve the quality of the nation's streams, rivers, lakes, wetlands, estuaries, bays, and oceans. The CWA required dischargers of "point sources" of pollution such as sewage treatment plants to obtain National Pollutant Discharge Elimination System (NPDES) permits in order to discharge pollutants into the nation's waters. Initially municipal stormwater was considered a non-point source of pollution and NPDES permits were not required of municipal stormwater dischargers.

However, stormwater was defined as a point source of pollution in the early 1980's pursuant to a federal court decision brought by the Natural Resources Defense Council against the EPA. This marked the beginning of the municipal stormwater quality mandate through the NPDES permit program. In addition to NPDES permit requirements, municipal stormwater systems are also now subject to Total Maximum Daily Load (TMDL) requirements of the CWA.

NPDES permits typically require pollutant dischargers to meet numerical effluent limits at the end of the discharge pipe. Because it is difficult to apply this standard to stormwater systems, the CWA was amended in 1987. Section 402(p) was added to the CWA defining basic permit compliance requirements for municipal stormwater runoff that are different than those for typical point source discharges such as from sewage treatment plants. Section 402(p) required municipal storm sewer systems to reduce pollutants discharged from municipal stormwater systems to the maximum extent practicable (MEP). MEP is thus the standard of treatment for municipal stormwater and its definition is very important.

The following, from the Federal Register, December 8, 1999, p. 68754 publishing NPDES Phase II stormwater regulations, is EPA's interpretation of the meaning and intent of the MEP standard.

> "Maximum extent practicable (MEP) is the statutory standard that establishes the level of pollutant reductions that operators of regulated MS4s must achieve. The CWA requires that NPDES permits for discharges from MS4s 'shall require controls to reduce the discharge of pollutants to the maximum extent practicable, including management practices, control techniques and system, design and engineering methods.' CWA Section 402(p)(3)(B)(iii). This section also calls for 'such other provisions as the (EPA) Administrator or the State determines appropriate for the control of such pollutants.' EPA interprets this standard to apply to all MS4s, including both existing regulated (large and medium) MS4s, as well as the small MS4s regulated under today's rule.
>
> For regulated small MS4s under today's rule, authorization to discharge may be under either a general permit or individual permit, but EPA anticipates and expects that general permits will be the most common permit mechanism. The general permit will explain the steps necessary to obtain permit authorization. Compliance with the conditions of the general permit and the series of steps associated with identification and implementation of the minimum control measures will satisfy the MEP standard.
>
> Implementation of the MEP standard under today's rule will typically require the permittee to develop and implement appropriate BMPs to satisfy each of the required six minimum control measures."

The federal/state/local relationship regarding stormwater management was fundamentally changed by the 1987 CWA amendments and subsequent regulations. There is now a federal mandate that local governments address stormwater quality through the NPDES permit mechanism, and there is federal and state oversight on how, and how well it is done. Drainage and flood control is still a discretionary activity, but stormwater quality management is now required of most all local governments

STORMWATER AS A SERVICE

Uncontrolled stormwater flows can be a danger to both the constructed and natural environments, and the control of stormwater and the pollutants it carries is a difficult and expensive task. Implementation of stormwater management programs and measures by local government, therefore, creates a service benefit for the lands and improvements so served.

Public and private properties are benefited in several ways through the new stormwater management paradigm. Benefits include recreation opportunities, community aesthetics, environmental enhancement, flood damage reduction, protection of transportation systems, development of urban trail corridors, handling of excess drainage from public and private properties, maintaining property access, protecting and providing water supply, providing regulatory compliance, protecting property values, and providing long term system maintenance. Also, where there is a community stormwater program with oversight and management, the service benefit can include system planning and engineering, development of design criteria, flood warning systems, NPDES compliance plans and BMP's; and publication of resource information.

It is important to realize that a long-term obligation is created when stormwater infrastructure is added and stormwater programs are developed. For example, all the stormwater facilities that have been constructed, and will be constructed as a result of new development or redevelopment, must be maintained in perpetuity. NPDES regulations require municipal permit holders to assure the maintenance and continuation of these new facilities and programs. Further, implementation of NPDES permit requirements will most likely intensify in the future.

The significant and continuing capital construction, operation and maintenance requirements for storm sewer systems, stormwater quality facilities, pollutant source control programs, flood control facilities, vector control, drainage corridors, detention facilities, wetlands, etc., is beyond the capacity of individual property owners, and are services provided by the local government stormwater service program.

ISSUES AND CHALLENGES FOR LOCAL GOVERNMENTS

The new stormwater paradigm presents many issues and challenges. What is to be the design and content of the stormwater program, what will it cost, who pays, who decides, and how will it be funded? Among these, cost and how to fund it is of significant importance to local government.

Local governments are expected by their citizens to provide and fund basic services such as police and fire protection, local transportation systems, sewage treatment, water supply, libraries, social services, and recreation. Stormwater quantity and quality must now be added to that list. The new paradigm requires the development of institutional and funding frameworks to support this long-term responsibility.

There are legal and equity issues imbedded in the funding considerations. Funding of stormwater systems must be relevant and proportional to services or

benefits provided, or in other words, it must be fair and legal. It will be critical for funding options, particularly those that include utility/user fees, to be based on sound legal principals to avoid challenges.

Local governments will likely be facing changing rules. Municipal stormwater management systems will need to have flexibility to adjust to changes in regulations, regulators, legislation, public demands, and court decisions. For example TMDLs are developing as a new performance issue for local governments. If stormwater discharges contain pollutants contributing to the impairment of a water of the nation, additional control requirements may be imposed and additional costs incurred.

Cost and effectiveness are major considerations for local government when developing stormwater management programs. MEP is the current CWA regulatory standard to which stormwater programs are held. Cost and effectiveness should be factors (others include regulatory compliance, public acceptance, and technical feasibility) in the selection of BMPs and in the approval by regulators of stormwater management programs.

Partnership opportunities are available to local government in implementing stormwater quality programs. Local governments can develop individual stormwater programs to meet regulatory requirements; or they can join together in partnership with other local governments, including cities, counties, and special districts in the conduct and financing of the stormwater program. There is good potential for cost savings when local governments work with others in implementing control measures required in their permit.

There are governance decisions to be made. Local governments can implement a stormwater program through an existing organization, they can set up a new department or organization, or they can develop some combination of the two. The decision could influence the funding structure that is used.

Ultimately, all issues and challenges focus attention on cost and how it is funded. The focus of this document is on service/user/utility fees which addresses an important element of the funding challenge.

CHAPTER 2

SOURCES OF FUNDING

FUNDING STRATEGIES

Money, Revenue, and Resources

In formulating a funding strategy for any local government program it is often helpful to think of a framework of money, revenue, and resources that can be selectively applied to specific needs. Cumulatively they provide the financial support required for the mix of capital, operating, and non-operating expenditures. It is important to recognize the distinctions that influence their capability and suitability for various tasks, and how they can best be orchestrated.

"Money" encompasses a range of sources and types of funds that can be tapped to support stormwater services and facilities. Appropriations of general revenues, proceeds of bond sales and special-purpose sales taxes, and transfers from other accounts represent "money" that have all been used to support stormwater programs, either on a one-time basis, temporarily, or as a part of a long-term funding strategy.

"Revenue" is a term usually used in specific reference to the cash flow generated by user fees of various sorts and other relatively consistent income streams such as charges, assessments, rentals, fines, etc. Most stormwater utilities have a periodic charge generally applied to all customers. They may also have other revenues generated through special fees applied to individual customers or classes of customers (e.g., plan review and inspection fees), special assessments, and capital recovery fees of various sorts. In some cases, revenue supports other funding mechanisms, as in the allocation of user fee revenue to service bond debt.

"Resources" that support stormwater programs take many forms, ranging from developer-contributed capital facilities, to federal and state grants and loans, to

maintenance of public drainage systems performed by homeowners' associations and private property managers, to land and easement dedications and other exactions. They also include a variety of funding mechanisms that are commonly used to structure how money and resources are applied to specific objectives, for example bond issues that are used to fund capital infrastructure and inter-fund loans to meet temporary cash flow needs.

Expensed Versus Debt Funding

Two principal categories of funding employed by stormwater management programs are expensed funding and debt funding. Most stormwater programs employ a mix of these.

Expensed funding is typified by "pay-as-you-go" strategies, in which expenditures are supported by a more or less concurrent revenue stream. For example, a city's stormwater utility may have a user fee that generates $5 million in annual revenues, an appropriation in its road budget for maintenance of roadway drainage systems of $1 million, and a total annual stormwater management budget of $6 million that essentially matches the combined income. Costs are "expensed" as they are incurred.

Debt funding is typified by bond sales, which are most commonly used to fund major capital expenditures, but debt funding may also include intergovernmental loans, warrants, and other mechanisms. Debt is sometimes also used to fund utility start-up costs, undertake system-wide remediation, or to make funds available to cooperating entities in the form of grants or loans. In all these examples, borrowing is utilized to enable a stormwater program to expedite improvements or activities so as to accomplish its goals more quickly, thereby reducing the time of exposure to certain risks. For example, bonding to build extensive flood protection works in two years rather than twenty years may be a prudent action if valuable property is protected more quickly.

CHARACTERISTICS OF SUCCESSFUL FUNDING STRATEGIES

A Business Plan Approach Is Based on Strategic Objectives

Some common characteristics are evident among successful stormwater utility programs. The most successful programs have relied heavily on a business plan model which guides both the program evolution and funding decisions. The strategy for accomplishing the program is defined, the type and magnitude of costs are projected, resource requirements are determined, and timing issues are resolved before the analysis of specific funding mechanisms takes place.

"Needs" are the key driver of program and funding strategies. Authority, capability, and a clear vision of the mission are essential, but in the absence of

compelling needs local government leaders apply their attention and resources elsewhere.

The demands of the diverse stormwater management activities identified in Table 1.1 challenge local governments' funding capabilities, and encourage them to use a variety of funding sources. State constitutions and legislation, governance structures and service responsibilities, drainage problems, needs and priorities, local politics and economics, and simply the different ways that communities conduct their business all differ and influence their decisions on stormwater program and funding strategies. These influences should cause local agencies to carefully examine their needs, and the most successful have crafted a detailed business plan as a guiding document.

Effective Stormwater Business Plans Identify Linkages and Dependencies

Stormwater business plans or program strategies contain many linkages and dependencies among program components and processes. Addressing some needs may require several years as preparatory steps are accomplished. For example, even if infrastructure improvements are the highest priority, they may have to be preceded by master planning studies, prioritization processes, engineering of specific projects, land acquisition, and contracting before a system improvement is actually realized. Formal approvals by elected officials may be needed at various points in this process, potentially creating additional delays.

Such linkages and dependencies make timing very influential in structuring the business plan. An extended schedule for addressing one program priority may present an opportunity to expedite others that do not require so much preparatory work or approvals. Routine maintenance is a function most easily expedited and can have the most immediate benefit in terms of service assurance. Regulatory measures that can be adopted at the discretion of managers and that do not require extensive analyses can also be easily activated. Other regulatory activities can involve several years, as in the case of developing and gaining adoption of design manuals. Education, public participation, and other efforts to improve water quality likewise can be initiated relatively quickly, but it may take years to demonstrate results. Some remedial repairs to deteriorated infrastructure can be accomplished quickly, although the process of identifying specific projects, prioritizing them, assembling necessary resources, acquiring land or easements, and contracting with vendors can delay others.

The negative experiences of communities that didn't recognize the relationship between program and funding strategies suggest that adopting funding strategies or mechanisms, without the benefit of a clear vision of the program strategy, creates a high potential for problems. This has proven especially true in the case of instituting stormwater utility user fees. One need only review the case law decisions in Chapter 3 of this guidance manual to find strong support for the

proposition that a clear program strategy buttresses funding decisions by local elected officials.

Community Expectations Are Represented in Business Plans

The most effective stormwater business plans recognize community expectations. In some cases, expectations must be elevated by convincing demonstrations that stormwater problems exist and can be solved. Stormwater management rarely captures public support unless problems impact the daily lives of citizens. Many drainage systems are underground and essentially invisible to the public. If they are designed, constructed, and maintained properly, most people are unaware of them. More visible problems such as potholes in roadways consistently rate higher than drainage problems. The most effective programs identify and publicize the problems they must address, seek public participation and support, and orchestrate the use of various tools and resources over time.

Effective Programs Respond to Change

Flexibility is an important attribute of utility user fee funding and the ability to change as circumstances dictate should be always be a consideration in formulating a business plan. User fees provide a stable revenue source, and offer equity advantages over traditional tax funding, but perhaps their most valuable attribute is their flexibility for funding a variety of operational and capital investment needs. A long-range program can be defined with a realistic expectation that funding will be available when needed and also suitable for changing priorities. However, as a primary funding source, a user fee may lend itself to a focus on short-term, rather than a long-term program strategy, which can be counterproductive.

Service Fee Rates Are Cost-Based

The funding philosophy represented by utility service fees of all types is that customers should pay in relation to the demands they impose on the services and facilities – characterized as a “user-pays” approach. This is a primary consideration in selecting parameters from which service fees will be calculated, and formulating a rate methodology that results in an apportionment of those cost deemed fair and reasonable by the responsible local officials. The most successful stormwater utilities are those that have clearly established and documented the rationale for linking their service fees to the cost of providing services and facilities.

Resources Are Dedicated and Stable

Whether in city, county, or special district entities, most successful stormwater utilities are accounted for as enterprise or special revenue funds that are separate and apart from the funding of general public services. As segregated accounts, enterprise and special revenue funds limit the use of revenues and other resources to a specific purpose, such as stormwater management. Also,

since reserves can be accumulated from one year to the next, there is no pressure to expedite funding at fiscal year-end if that is not prudent. This adds to program stability and efficient management of financial resources.

TRENDS IN FUNDING PRACTICES

Increasing Complexity

The emerging trends in the 21st Century suggest that funding issues will encourage tailoring of funding to specific program objectives, and funding practices will branch out in several directions. As stormwater programs become more sophisticated, unique local concerns and priorities gain greater visibility and support. Also, as more linkages are established with other governmental and even private-sector programs, the general trend in funding is toward greater complexity, and "standard practice" is increasingly likely to be supplanted by local innovations.

Stormwater utilities established in the 1970's and 1980's tended to be funded almost entirely from their service fees. Service fee rate methodologies were relatively consistent though rarely identical. They were cost-based, and rate structures were linked to peak and/or total volume of runoff by fee calculations employing parameters such as impervious area. Use of other funding methods and mechanisms in coordination with service fees was very limited.

Beginning in the 1990's a refinement trend emerged. The basic structure of funding and service fee rates remained relatively stable, but local entities began to push for more sophisticated and detailed cost, rate, and funding analysis. In part, this was due to the rapidly increasing technical capability offered by computerization and data gathering and processing. It also reflected the fact that more large cities instituted stormwater utilities as Phase I NPDES requirements were imposed. Their expectations were generally geared to more sophisticated cost and rate analyses and they often retained management and rate consultants with experience in other disciplines.

In the first decade of the 21st Century the trends in funding have been primarily in response to Phase II of the NPDES program, which impacts many more cities and towns than Phase I. This has had two somewhat conflicting effects. The introduction of a water quality objective caused many local governments to view stormwater management more broadly. However, as an increasing number of smaller cities and towns explored stormwater fee options to meet NPDES permit obligations, they tended to demand simpler and less expensive approaches than those preferred by large communities. These factors have been further compounded by federal and state initiatives to manage watersheds holistically, which is filtering down through regulatory programs and grant and loan opportunities. As a result, the key stormwater funding trends for the next decade include the following.

Blended Funding

Blending several sources of funding to support stormwater management program strategies has been a slowly emerging trend. The most successful stormwater programs are supported by several sources of funding, enabling them to spend more money to elevate the visibility of the program and improve cost accountability of specific functions or improvements.

Other sources of funding used in combination with service fees include general budget appropriations, dedicated special taxes (property, income, sales), special assessments, fees charged in lieu of requiring compliance with standards or requirements such as on-site detention, system capitalization or development impact fees to recover past expenditures or better allocate the cost of infrastructure over a period of time, and matching funds such as federal and state grants and loans. There are few constraints on local governments' authority to combine and selectively target several types and/or sources of funds to accomplish various purposes, see Appendix for examples.

Multi-jurisdictional Funding

Cooperative funding with other entities is a hallmark of many successful stormwater programs. Several factors have induced stormwater managers to participate in multi-jurisdictional funding, especially in recent years as water quality considerations became more prominent.

Stormwater runoff doesn't conform to jurisdictional boundaries. Drainage waters flow from jurisdiction to jurisdiction based on topography. Solving an upstream community's problem may become the source of a problem in another jurisdiction located downstream. Thus, the most efficient infrastructure solution for a given drainage problem may lie outside the jurisdiction where the impacts are manifested. For example, to relieve flooding a regional detention facility built in an upstream portion of a watershed in a rural unincorporated area may be less expensive and provide better protection than extensive flood protection works installed downstream within a major urban area. This may encourage several cities and towns in the downstream portion of a watershed to fund a common solution higher in the upstream reaches rather than attempt to install independent drainage improvements in each of their communities.

The availability of federal and state grants and loans and cooperative programs has also encouraged local governments to join in conducting activities associated with stormwater management. This has been a significant inducement to local governments to establish stormwater service fee funding. For example, the City of Griffin, Georgia was able to obtain more grant, loan, and shared funding from federal, state, and county sources during the first two years of its stormwater utility operation than was generated in service fees. A key factor in gaining other agencies' financial support was the City's ability to match their grants and loans with reliable local funding.

The presence of stormwater quality program mandates of state and federal agencies has also encouraged local governments to participate in cooperative programs. The emerging emphasis on stormwater quality has created both opportunities and incentives for cities, counties, and special-purpose districts to participate in cooperative efforts. Examples include public education, water quality monitoring and sample analysis, the development of drainage, erosion control, and other technical manuals, and even consolidated development plan review.

Cost-sharing With Other Public Programs

Successful stormwater utility programs have financial strength that has enabled them to venture into cost-sharing programs with entities that have different responsibilities but shared interests. Greater funding has broadened the scope of stormwater management to include related issues such as land use and development regulation, environmental protection, and habitat preservation. This in turn has revealed more opportunities for linkages with other programs, and sharing of resources to address mutual interests and needs is increasingly common.

Wastewater treatment, especially, lends itself to cooperative funding with stormwater management, due in large part to the extensive historic use of combined sanitary/stormwater sewerage systems in many areas of the country. Stormwater separation and inflow/infiltration corrections were often funded as wastewater treatment expenses in the past. Now some communities have recognized that the expense of separating stormwater and wastewater or eliminating stormwater inflows into wastewater sewer systems may be assigned to a stormwater cost center rather than wastewater. When a stormwater utility is present, the costs shift to properties that generate substantial runoff versus those that generate substantial amounts of sewage.

Watershed management practices and water quality protection also introduce opportunities to share costs with other programs. The City of Bellevue, Washington Storm and Surface Water Utility has a primary objective of preserving small streams. Protection of wetlands and construction of regional detention ponds were key elements of the City's stream preservation strategy. The Utility purchased extensive areas of wetlands and other areas along streams, and worked closely with the City's Park Department to manage them as passive-use parks and open space. Other properties used for detention and groundwater recharge have been developed into active recreation facilities such as neighborhood playgrounds, soccer pitches, and even tennis courts.

Countless other communities have built parks, greenways, and trails along streams, including examples such as the Mingo Creek linear park in Tulsa, Oklahoma and along Cherry Creek, South Platte River, and many other drainageways in the Denver, Colorado metro area. Salt Lake City, Utah modified

and improved a high school baseball field to serve as a major detention facility during severe storms and major snowmelt events.

Some communities have also used their stormwater utility funding resources to support program enhancements such as geographical information systems (GIS), upgrades to financial management and utility billing/collection systems, and transportation improvements such as construction of roadside curbs and gutters to replace open ditches. The linkage of stormwater management to other programs has justified funding in whole or in part activities such as leaf collection to reduce local flooding due to plugged inlets (e.g., Greensboro, North Carolina) and street sanding and snow removal/dumping to reduce stormwater quality pollution.

Broader Private Sector Participation

The importance of contributed capital infrastructure built by developers should not be underestimated. Though often unplanned and uncoordinated, many early components of local drainage systems that emerged in the 19th Century were built by the private sector coincidental to commercial, industrial, and residential projects. The economic boom of the 1920's spawned a major surge in private investment in public facilities, including stormwater drainage systems. In most suburban communities developed since World War II, a majority of the stormwater infrastructure has been built by developers and turned over to a public entity for long-term operation and maintenance.

More recently this approach has expanded to include cooperative efforts involving public entities and the private sector, with stormwater management requirements being integrated with other objectives. For example, a stormwater detention facility built by a developer might now be integrated with recreational facilities such as greenway corridors, golf courses, baseball fields, or soccer pitches. The financial participation in such improvements may be broadened to include several public agencies having primary responsibility for the long-term operation and maintenance of the facilities.

This trend has several important implications for stormwater managers. They will need to reach out to private-sector entities and programs to identify opportunities that serve their mutual benefit. They will need to broaden their community's vision of what stormwater management entails to ensure support for cooperative programs with private interests. Because many more developments are being built by larger, more competent and better financed development companies, local stormwater management programs will need to increase their skills and sophistication to keep pace and ensure that participation is optimized.

Increasing Influence of Technology and Data

Perhaps the most pervasive factor guiding changes in stormwater management in the past thirty years is rapid acceleration of new technology. This directly influences trends in stormwater funding practices as well as engineering and

other technical endeavors involving the availability and management of data. For example, the cost of creating or gathering data required to prepare a master account file for stormwater service fee billings has plummeted in the past decade, from as much as $6/account to less than $0.25/account depending on the parameters and rate structure involved. Satellite imagery of extensive land areas now renders digital information that is at least as precise as visual interpretation of aerial photography, with far greater consistency and reliability at much less cost.

Such increased efficiency encourages local governments to seek more sophisticated stormwater service fee rate methodologies, and to combine several funding mechanisms in much more complex approaches. However, is it practical and beneficial to refine a community's stormwater service fee rate structure when other parameters are not yet as precisely quantifiable? The trend is clearly toward more sophisticated rates, but optimizing the value of the rapidly increasing technological capability has not yet been adequately addressed.

FUNDING METHODS AND MECHANISMS

Local Governments' Funding Authority

Stormwater management has historically been supported by a range of funding methods and mechanisms that reflect the mix of federal, state, and local programs. Since this guidance is directed toward the funding of local stormwater management programs, especially stormwater utilities, we focus on the approaches used primarily by cities, counties, and special-purpose districts.

Cities and counties in most states are generally authorized by state legislation to conduct stormwater management. This general authority is supplemented in some states by home rule provisions. Cities and counties adopting such powers may gain greater latitude to undertake stormwater management functions, regardless of whether specific statutory authorization is available, subject to certain limitations and ballot approval requirements.

The changing nature of stormwater management is also providing greater flexibility in stormwater funding. Undeniably, stormwater management has now become fundamentally regulatory. Federal and state laws confer a water quality regulatory role upon local governments through the NPDES permit program. Similarly, adoption of local system design criteria and on-site control requirements for runoff quantity is rooted in a regulatory purpose of preventing problems. This regulatory foundation may expand and strengthen the local authority, especially as it relates to funding decisions. Generally speaking, locally-elected officials have greater latitude in adopting fees that are associated with regulatory purposes than for other objectives.

Funding Methods and Mechanisms

Funding methods and mechanisms commonly used for stormwater programs include:

- ► General revenue appropriations
- ► Stormwater user (service) fees
- ► Plan review, development inspection, and special user fees
- ► Special assessments
- ► Bonding for capital improvements
- ► In-lieu of construction fees
- ► Capitalization recovery fees
- ► Impact fees
- ► Developer extension/latecomer fees
- ► Federal and state funding opportunities such as grants, loans, and cooperative programs

General Revenue Appropriations

Despite the proliferation of stormwater utilities, general tax revenues remain the most common source of stormwater management funding. Substantial technical analysis is normally not needed to fund stormwater management from general revenues, which local governments may use for any legal purpose. The majority of most cities' and counties' general revenues are from taxes (e.g., property, sales, and income), exactions (e.g., franchise fees on utilities), and federal/state revenue sharing, and are simply appropriated for specific purposes, including stormwater management, through the normal budget process. Because they have limited purposes and, in most states, often do not have broad general taxing powers comparable to cities and counties, special-purpose districts are more likely to be funded through limited property taxes, special assessments and service fees.

The practice of funding stormwater management from general revenues has contributed to a dispersal of stormwater management responsibilities. Stormwater management is not typically an independent municipal function, either operationally or financially. Many city and county functions are peripherally involved in or impacted by stormwater runoff. Components of what might be collectively considered a consolidated stormwater program are often embedded in operational units such as public works, engineering, transportation, street maintenance, wastewater treatment, and even recreation. The funding of stormwater management in such cases is also typically embedded in whatever resources are assigned to the primary function. They may budget for costs that are essentially stormwater management, but not readily identifiable as such in their budgets. Such dispersion of functions and costs may obscure any discernible relationship between demands for stormwater services and facilities and how the cost burden is apportioned.

General revenues have several attractive attributes for stormwater management. Most cities' and counties' general revenues are, in the absence of other demands, sufficient to support effective stormwater management. The sources of general revenues are usually well-established, fully understood, and well-accepted by citizens and business interests. They are relatively stable from year to year, though economic downturns tend to excessively impact jurisdictions whose general revenues are highly reliant on sales and other business taxes rather than property value, which is more stable.

However, general revenues also have significant disadvantages as a source of stormwater management funding. Many worthy public purposes, including public safety and social services, are commonly funded from general revenues. Stormwater management has historically struggled to compete effectively against other needs, and major long-term reallocations of general revenues simply to enhance stormwater management capabilities are rare. In the absence of a major budget reallocation, increasing general revenues to support stormwater management implies approval of a tax increase of some sort. Neither option is politically attractive for most local officials.

Because they are not earmarked or dedicated to any specific purpose, annual appropriations of general revenues shift with elected officials' and administrators' perceived priorities. Stormwater management needs are more likely to receive better treatment in a year following severe storms and drainage problems than in a year following a drought. A lack of stable funding makes it difficult to plan and carry out a consistent, long-term program.

The sources of general revenues have little if any inherent association with the origin of stormwater management demands and costs. For example, property taxes are a major source of general revenues for many cities and counties. Such taxes are usually calculated based on the economic value of land and improvements, which have little direct relationship with stormwater runoff quantity or quality. Sales taxes are typically based on retail sales, which likewise have no identifiable link to stormwater management costs. Franchise fees are normally a percentage of the gross income of the activity utilizing the franchise rights.

Because general revenues are derived primarily from taxes and exactions imposed upon businesses and individuals, other parties that impose significant demands on stormwater systems and programs may be excluded from participating financially in solutions. For example, in cities which have state-owned properties, public universities or federal military installations, a substantial demand for stormwater services may be traced to such tax-exempt properties.

The disparity between the need for stormwater services and facilities and the source of general revenues does not end with tax-exempt properties. Some private properties, for example discount retail stores, parking lots and warehouses that have large expanses of relatively low value impervious

coverage, do not pay taxes commensurate with the demands they impose on the stormwater systems. Conversely, more valuable properties such as high-rise office and residential condominium towers that may have less impact on stormwater runoff pay substantial property taxes.

Stormwater User (Service) Fees

Stormwater utilities funded primarily through service fees are the focus of this guidance. Service fees are discussed only briefly in this section, but are covered in greater detail in other sections of this chapter. Specifically the sections on "Service Fee and Assessment Design Considerations" and "Service Fee Rate and Assessment Methodologies" further address this area.

Although user fee funding of stormwater programs is generally associated with the stormwater utility concept inaugurated in the 1970's, Billings, Montana adopted a "storm water charge" in June, 1964. Relying in part on that revenue stream, the voters of Billings also approved the issuance and sale of negotiable revenue bonds for the purpose of reconstructing and extending the City's stormwater and sanitary sewer systems. This action was challenged in court and was eventually upheld by the Montana Supreme Court in 1966[2]**.** Billings has since funded a majority of its stormwater management programs through the charge.

Billings' "storm water charge" represented a major departure from conventional stormwater funding but did not elicit widespread imitation. The transition to user fee funding did not become widespread until the early 1990's, although several cities and counties in Washington, Oregon, and Colorado established utilities during the 1970's and 1980's. The utility user fee concept has now been adopted by over five hundred cities and/or counties. It is generally referred to as the "stormwater utility" approach because it not only provides user fee funding but also incorporates accounting and management practices similar to those of other municipal utilities like water supply, wastewater treatment, and solid waste management. Similar approaches have been used in Canada and Germany.

Substantial latitude is available to local elected officials in structuring rates and fees, especially if they are associated with regulatory functions. Specific methods of calculating stormwater user fees are not mandated by law in most states, though some limitations do exist. For example, in Texas the state legislature has exempted public universities from local stormwater user fees. Most stormwater user fee rates account for conditions on properties that affect the peak rate of runoff, total volume discharged, and pollutant loadings on receiving waters. A majority are based on the amount of impervious area (roofs, paved areas, etc.),[3] which determines both the proportion of rainfall that runs off and the peak rate of discharge during and following storms.

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[2] City of Billings v. Ralph Nore, 148 Mont. 96; 417 P.2d 458 (1966)

[3] Stormwater Utility Survey 2004 – 2005, Black & Veach, Kansas City, MO, 2005

Stormwater rates have also been based on the gross area of properties and numerical factors that reflect the intensity of development. A few cities and counties have incorporated both gross area and impervious area or the percentage of imperviousness into their rate calculation. Other stormwater service fee rate parameters include land use classes, zoning classes, and water meter size, though these are generally not considered to offer comparable equity of cost allocation relative to impervious and gross area methodologies.

A stormwater user fee is highly flexible and can easily be tailored to individual situations and coordinated with other funding methods. Revenue from user fees and other funding sources can be blended together or a fee might be applied only in a limited service area rather than the entire jurisdiction, excluding other areas which do not require service or are impractical to serve. No fixed practice prevails; though most cities apply their user fees city-wide and many counties define more limited service areas where urban/suburban conditions exist.

User fees are also authorized for some types of special-purpose districts, which may apply them district-wide or designate them only for specific service zones. Such approaches can be combined, as in the case of a stormwater utility that has both a general service fee and also administers special-purpose improvement districts to fund localized improvements or services.

The stability of a dedicated user fee revenue stream ensures that long-range scheduling of capital improvements and operations can be done with reasonable assurance. User fees may also free up general revenues and other resources allocated to stormwater management for other purposes.

The greatest potential disadvantages of stormwater user fees are high visibility of the charge and the cost of its development and implementation. Regardless of technical distinctions between "taxes", "exactions", "assessments", and "service charges", any form of government funding may be viewed by some citizens as a "tax" and thus be unpopular. However, the high visibility of a defined stormwater user fee might also be beneficial if it convinces a community that long-standing flooding or pollution problems will be addressed.

The cost of developing and implementing utilities reflects the size of a community or the complexity of processes employed. Some of the formative costs such as program and cost analyses are essentially common to all situations. Others are “unit” costs. For example, data must be assembled to populate a master account file for billing. The cost of implementing a utility user fee is a function of the number of accounts, and the total cost typically amounts to eight to twelve weeks of the revenue stream that is created. This includes all costs associated with the necessary program and financial analyses, data assembly, modification of billing and other information systems (or activation of a new system), and public education and involvement.

Plan Review, Development Inspection, and Other Special Fees

A variety of special user fees could reasonably be included under the scope of a stormwater utility or adopted separately to support regulatory measures. Most often they are related to special services provided to a limited group, as opposed to user fees that are generally applicable to utility customers. Such fees apportion the costs only among those who require the service or cause the need for the regulatory measure.

Fees for the performance of regulatory activities are usually associated with protecting the public health, safety, and welfare in some manner. Some regulatory activities may be mandated by federal and/or state requirements or as conditions of NPDES or other permits. Regardless, to the extent special fees are associated with a regulatory function (e.g., development regulation); authority to institute them is typically a product of the police powers of the governance entity.

Special fees may also have other applications, such as a cost recovery mechanism that assigns certain expenses to a specific group. For example, experience has demonstrated that maintenance of on-site detention systems is frequently ignored or deferred by property owners, or alterations may be intentionally or unintentionally made to such facilities. Inspections may be necessary to ensure that on-site systems are properly maintained and not altered from their approved design. Placing the cost of such inspections on the specific property owners through special fees relieves the general taxpayers or utility ratepayers of the expense.

Special fees typically provide only a small additional amount of revenue for a stormwater utility, but enhance the equity of cost apportionment. Adoption of such fees may require that other fees associated with regulatory reviews, inspections, or special services be evaluated to ensure that individuals are not being charged twice for the same service.

Special Assessments

Special assessments have been used to fund capital improvement and operation of stormwater systems since colonial times. The assessment concept is predicated on apportioning costs in proportion to the direct and special benefits individually derived by specific properties. It has been applied to funding of various public facilities, ranging from sidewalks and roads to flood control channels and dikes. In application to stormwater management, the special assessment mechanism has evolved as the management paradigm changed.

The chief drawback of the traditional special assessment methodology is that the distribution of costs must be proportionate with the direct and special benefit accruing to each property being assessed. Although standards differ from state to state, generally the benefits must be definable, measurable in some economic manner, and available to the property being assessed within a practical timeframe. In most cases, general benefits accruing to all properties as a

consequence of a stormwater improvement or activity cannot be used to justify a special assessment.

The courts have established substantially different standards for special assessments versus service fees. Broader latitude is given to local elected officials in setting service fee rates, and especially those associated with regulatory purposes. Special assessments must conform to more restrictive technical standards based on apportioning costs to reflect the value of benefits accruing to individual properties. Fully complying with the standards the courts have set for special assessments may therefore require more precise and costly data than is needed to support a service fee, which must simply be fair and reasonable.

Special assessments for drainage are most workable in relatively localized or specific applications. For example, improving a ditch or channel that directly serves a few properties or a relatively small service area is an appropriate project for special assessment funding. A special assessment is less suitable for capital projects that serve a wide area, and may be wholly unsuited to facilities providing a general benefit to the community at large.

Much of what must be done to effectively manage stormwater quality may not be directly and specially beneficial to individual properties. Thus, special assessments are not widely used as a primary funding mechanism for that purpose, though in recent years several benefit assessment areas have been instituted in Southern California to support local water quality programs, and Florida counties fund stormwater management through assessments (as so defined in a Florida Supreme Court decision) that are similar to many stormwater service fees.

Bonding for Capital Improvements

The expense of major capital infrastructure, land, and equipment has posed a significant challenge for stormwater programs whose annual revenues and resources are limited. As a result, local governments have used bonding to fund major capital improvements for many years.

Bonds are sometimes used to fund operations as well as capital improvements, though that practice is not generally viewed as prudent and some states prohibit or limit such uses of bonding. However, some stormwater management costs can be viewed either as a capital or operating expense. For example, remedial repairs to aging infrastructure might legitimately be viewed as either a capital expenditure or an operating expense.

Bonds are not a revenue source, but rather a method of borrowing money to fund expenditures. Debt service of bonds is commonly derived from general revenues, service fees, or special assessments. In some cases, specific funding mechanisms or sources are identified in bond covenants. For example, a bond

might be issued with debt service to be paid from a special local option sales tax or a special assessment upon properties served by the improvement.

The chief advantage of bonding is that it allows expenditures that far exceed current revenues and resources. Construction of major improvements can be expedited in advance of what could be funded from annual budget appropriations by spreading the costs over time, much like a home mortgage or automobile loan enables a buyer to acquire assets they could not afford to buy for cash.

In the case of stormwater management, expediting a capital project by several years through bonding may result in significant public and private savings if flooding, other damaging impacts, and inflation of land acquisition and construction costs are avoided. The major disadvantage of bonding is that it is essentially a loan that incurs an interest expense, increasing the total cost of capital projects.

Two types of bonding are available, revenue bonding and general obligation bonding. General obligation bonding incurs a debt that has first standing with regard to public assets and is backed by the "full faith and credit" of the issuing agency. All revenues and resources of the entity, including various taxes, may be used to service a general obligation debt. Revenue bonding is supported and ensured only by specified revenues, such as service fees or assessments. As a result, the bond market sometimes imposes higher interest rates on revenue bonds and/or dictates that excess revenue be generated (termed coverage) to reduce the risk of non-payment. Recent experience suggests that the bond market has recognized the stability typical of stormwater utility service fee income, and has priced stormwater revenue bonds favorably.

Cities and counties in some states are also authorized to issue bond debt that is backed by the full faith and credit of the issuer but has debt service funded from a designated revenue source. This is commonly referred to as “double-barreling” of bonds. The full faith and credit provision is simply a fall-back if the revenue stream should fall short. Such bond issues typically attain the bond rating and interest rate of the issuing agency’s general obligation debt, but the entity’s general tax revenues and statutory debt limits are not burdened.

In-lieu of Construction Fees

In-lieu of construction fees are not specifically authorized under most state laws, but might be adopted in some circumstances as one element of a comprehensive stormwater utility user fee rate methodology or as a regulatory fee. Such fees have been charged in lieu of requiring construction of on-site stormwater systems for many years.[4]

[4] For example, Tulsa, Oklahoma instituted fees in lieu of requiring on-site stormwater detention improvements on each and every development project in more than a dozen watersheds during the 1970’s, and used the revenue to defray a portion of the expense of regional detention facilities in those areas.

In-lieu of construction fees are sometimes confused with impact fees. However, an in-lieu of construction fee is usually a substitute for requiring on-site solutions such as detention storage. They may be used even in instances when an on-site system would work but an offsite regional facility is preferable.

In contrast, impact fees are generally used to pay for off-site measures to compensate for the service-demand effects of development that are not solvable on-site. For example, the impact of a shopping center on stormwater runoff might be resolved either by requiring an on-site detention system or by building a regional facility off-sight that is paid for (in part) through the in-lieu of construction fee. Shopping center traffic that clogs nearby roads cannot be solved on-site, but an impact fee might be used to pay for additional traffic lanes and/or signalization to mitigate the impact.

The need for in-lieu of construction fees associated with stormwater management stems from problems that have emerged with on-site measures to mitigate development impacts. Experience has shown that requiring developers to install individual on-site detention and water quality facilities can lead to a regulatory and/or maintenance problem for a local government. Alternative regional solutions may be more efficient and reliable in controlling runoff volumes and pollutant discharges into public stormwater systems and streams. However, on-site systems are typically funded by the developers whereas the general public usually pays for regional systems. An issue of equity arises if general taxpayers or ratepayers have to fund regional solutions to mitigate the impacts of private development projects rather than requiring on-site control.

The flexibility to address issues either by on-site mitigation or by alternative actions elsewhere is advantageous if the financial conundrum can be resolved. An in-lieu of construction fee offers a practical option that may be preferable to both developers and local governments. Developers simply pay a fee in-lieu of designing and building an on-site system or facility, and the local government obtains financial support for more efficient and reliable regional systems.

The most significant disadvantage of in-lieu of construction fees is that they rarely generate sufficient revenue to fund construction of regional detention facilities, enlarge conveyance systems, or install water quality facilities in a timely manner. Also, they do not fund maintenance. This dictates that other revenues must be available to initially build and maintain regional facilities, and taxpayers or ratepayers are the parties burdened with those costs. However, over time, in-lieu of construction fees can contribute a meaningful component of the total long-term funding of regional facilities and equitably compensate those who have initially borne the costs.

In-lieu of construction fees are not necessarily easy to implement. They demand well-refined capital improvement plans and analyses of on-site versus regional alternatives, from which the alternative cost of the regional options can be

reliably determined as the basis for setting the fees. This may necessitate detailed and costly analysis of potential regional facilities when a simple regulatory approach would suffice. At least a portion of the cost of preparing suitable analyses and documentation should be incorporated into the structure of in-lieu fees.

Capitalization Recovery Fees

Capitalization recovery fees are also known as system development charges, capital facilities fees, utility expansion charges, and by other titles. They are not specifically provided for by authorizing legislation in most states, but have been incorporated into various utility user fee rate structures for many years.

Capitalization recovery fees are sometimes confused with impact fees and even with in-lieu of construction fees. Capitalization recovery fees are most often intended to recover a fair share of the prior public investment in infrastructure capacity installed to accommodate future development. The fees are applied to developers who make use of that provisional capacity when they develop projects. In some instances, capitalization fees may also be used to attain suitable apportionment of future capital costs. This is particularly applicable in cases where funds have been accumulated in preparation for major capital projects.

There are several ways of structuring and calculating capitalization charges, including the growth-related cost allocation method, the system buy-in approach, the marginal incremental cost approach, and the value of service methodology. They differ from in-lieu of construction fees and impact fees primarily in terms of: 1) the fundamental purpose of the charges; 2) the timing of improvements versus when the charges are collected; and 3) their relationship to the specific facilities that are funded through user fees. In most cases, capitalization recovery fees are related solely to capital costs, though some justification may exist in certain circumstances for incorporating long-term operating expenses.

Capitalization charges provide a mechanism whereby developers participate in paying for capacity that was previously built into public systems in anticipation of their needs or which is planned for the future and for which funding is being accumulated in anticipation of building the improvements. In effect, they allow a deferral of participation in the capital cost of facilities until a property is developed and either makes use of the provisional capacity already in place or buys into the previously accumulated fund reserves intended to build future improvements. The use of such fees for stormwater management capital costs is clearly appropriate since most drainage systems are consciously designed to provide capacity to accommodate future development in an economical manner.

Whether a stormwater capitalization charge is appropriate in specific cases may be related to the user fee rate methodology that is employed. For example, many stormwater user fees are based solely on impervious area where only

developed properties are charged. Undeveloped properties do not have impervious area and therefore are not charged. However, the capital facilities being funded by the fee are normally designed with future conditions in mind. This initially results in excess capacity being built into the system, which is paid for solely by currently developed properties. A capitalization charge may therefore be an appropriate recapture mechanism to ensure a fair and reasonable allocation of the capital costs among all properties using the facilities over time.

If the rate methodology allows user fees to be charged to undeveloped properties, a recovery mechanism may not be needed at the time properties are developed. The rate structure might have a system capitalization component that assigns an appropriate proportion of the capital costs to undeveloped properties based on expectations of the future developments and their stormwater system demands.

Impact Fees

Impact fees have been adopted by local government entities for a variety of public infrastructure components. They are based on the cost of mitigating development impacts of individual developments by building public off-site improvements where impacts can't be solved on-site. For example, traffic impact fees support the cost of additional lanes and/or signalization to accommodate the added traffic generated by projects such as shopping malls and high-rise condominiums. Such impacts cannot be effectively addressed by on-site facilities. Impact fees have also been employed to meet communities' park and recreation standards and other objectives.

Standards and requirements have evolved for adopting and applying such fees and have been institutionalized in legislation in several states. Some of these statutes impose so many administrative burdens and limitations on use of the impact fee revenues that they are essentially impractical. At least one state, Georgia, has adopted legislation that specifies limited uses of developer impact fees that do not include stormwater management. Specific applications of impact fees have also been the subject of a great deal of litigation nationally. An unusual aspect of impact fees is that state courts around the country have been notably inconsistent. Recent cases that have reached the United States Supreme Court have added some clarity. The following is a summary of pertinent cases provided by David Burchmore, author of Legal Considerations, Chapter 3.

> City of College Station v. Turtle Rock Corporation, 680 S.W.2d 802 (Texas 1982)
> College Station adopted an ordinance requiring developers to dedicate land or pay an in-lieu fee for new parks. Turtle Rock paid the fee and sued. The Texas Supreme Court ruled that the ordinance was

"reasonable" and "accomplished a legitimate goal substantially related to public health, safety, welfare."

Nollan v. California Coastal Commission, 483 U.S. 825 (1987)
Nollan wanted to replace his beachfront bungalow with a larger house. The Coastal Commission required public access across his property to the beach and an adjacent park. Nollan sued. The US Supreme Court supported Nollan, stating there was no "essential nexus" between imposed conditions and impact of use.

Northern Illinois Builders Association v. County of Du Page, 165 Ill. 2d 25 (Ill. 1995)
NIBA challenged the legality of two State enabling acts and three County ordinances imposing road impact fees. The court declared the first act and the first ordinance unconstitutional, and the second act and second ordinance constitutional. Monies collected under the first ordinance were ordered returned.

In Hillis Homes v. Snohomish County, 97 Wash. 2d 804 (Wash. 1982), the state Supreme Court invalidated an impact fee imposed on residential development to help pay for schools on the ground that the exaction was in effect a tax intended to raise revenue, rather than a fee intended to regulate land use, and that only the state legislature could levy such a tax.

Florence Dolan v. City of Tigard, 512 U.S. 374 (1994)
Ms. Dolan wanted to expand her hardware store and pave her parking lot. Tigard requested dedication of an adjacent floodplain and bikeway. Dolan refused and sued. The US Supreme Court ruled there was no "essential nexus" and that the City failed to demonstrate that the benefits justified the requirements.

Erlich v. City of Culver City, 114 S. Ct. 2731 (1994)
The Supreme Court extended the Dolan analysis from property dedications to development fee exactions. Erlich was the owner of a defunct private health and tennis club, and sought a building permit to construct condominium townhouses on the project site. The city approved the permit but conditioned it on payment of numerous fees, including $280,000 to enable the city to build tennis courts that would replace the facilities lost with the demolition of the tennis club. Erlich refused, and sued claiming that the fee exactions bore no relationship to the impact caused by the project. The Supreme Court granted certiorari, vacated the judgment of the lower court dismissing the case for failing to state a takings claim under the Fifth Amendment, and remanded the case "for further consideration in light of Dolan."

Impact fees are typically limited to situations in which the impact of new development on existing infrastructure systems is: 1) measurable and certain; 2) of definable geographic or systemic extent; and 3) quantifiable in terms of the incremental capital investment that will be required to maintain (not attain) an adequate service level in the face of the added growth attributable to the subject development. The final point is critically important in terms of stormwater management systems. Impact fees cannot be used to bring inadequate existing systems up to an adequate service level. Nor can they be used to address the impacts of other past, present, or future developments. Thus, they are not useful in correcting many deficiencies that already exist in stormwater systems. Impact fee revenues must also be earmarked for specific projects or uses, must be expended relatively quickly, and, if not, must be returned to the developer, often with interest.

Developer Extension/Latecomer Fees

Developer extension/latecomer fees are a good example of resources available to stormwater management entities that do not directly generate income but support attainment of important objectives. They are not a revenue mechanism, but rather a means of apportioning capital costs among several properties as they are developed. The most common use of this type of fee around the country is for water and sanitary sewer system extensions.

Extensions to utility systems and other infrastructure improvements are often built by developers. Under the developer extension/latecomer fee concept, the initial developer is later compensated for providing the facilities by fees applied to subsequent developers that tap onto or otherwise make use of the improvements. Although such fees are not specifically authorized in legislation in most states, they can be adopted as part of a comprehensive stormwater user fee rate structure or negotiated on a case by case basis.

A developer extension/latecomer fee works in the following way. Developer "A" proposes a project that requires a stormwater (or water, or sewer) system with "x" capacity for its own purposes. However, practical design considerations indicate that a larger system should be installed to properly serve other nearby properties that are currently undeveloped. Developer "A" therefore is required to build a larger system than necessary simply to serve his or her own property, and incurs an additional cost. Property owners subsequently tapping into the improved system when their development occurs are charged a one-time fee, and the fee is then transferred to Developer "A". This type of fee is structured so that Developer "A" and all other users of the facilities ultimately bear a fair proportion of the capital cost. The management entity typically receives no revenue from the fee, although some charge administrative expenses on top of the capital cost.

Federal and State Funding

Federal and state funding for local stormwater management takes many forms, including technical support, facility construction, cooperative programs, and grants and loans for various purposes. Local governments are generally authorized to make use of federal and state government funding, such as the State Revolving Fund Loans financed by EPA to achieve CWA objectives, for various purposes including stormwater management, flood control, and water quality protection.

SERVICE FEE AND ASSESSMENT DESIGN CONSIDERATIONS

The remainder of this chapter will focus on service fees and to a lesser extent assessments.

There are many reasons for local governments to adopt service fees to fund their stormwater programs. These include: 1) generation of sufficient revenue to meet capitalization and operational expenses; 2) customizing the apportionment of costs among various segments of the community; 3) support a growth management strategy, facilitate life-cycle asset management, or help segregate costs related to unfunded federal and/or state mandates; and 4) diminish a general revenue budget problem by moving stormwater off that source of funding and substituting service fees. Regardless of the specific motivation, the process of designing a stormwater utility funding strategy introduces the need for a higher level of analysis than that required for general fund revenue allocations.

Design of both service fees and assessments must meet general and technical standards. Standards differ between fees and assessments, and vary from state to state as a result of constitutional, legislative, and case law differences as addressed in Chapter 3. Selection of a preferred approach is not a purely technical issue. It is not required that the very best technical approach be selected. A user fee rate structure that fits local practices and meets basic industry standards may serve a community better than a highly detailed, very expensive approach that is confusing to the public. In many cases, decisions are influenced by practical considerations like public perceptions of equity, implementation and upkeep costs, timing, and ease of understanding. The following considerations are among those commonly used to evaluate and select preferred methods for design of user fee rate structures.

Legality

Nearly thirty (30) percent of the respondents to a recent national survey of stormwater utilities indicated that their stormwater utility funding decisions had

been subjected to a legal challenge of some sort.[5] That such a high percentage would be contested on legal grounds is probably not surprising given that the funding decisions and user fee rate structures involve money. The legal issues are addressed more thoroughly in Chapter 3, Legal Considerations, however the following is provided to help provide context for service fee and assessment design considerations.

Stormwater management is clearly a function that falls within the general authority of cities and counties in most states. Managing and funding that function as a utility is now an accepted practice, and both cities and counties have the latitude to adopt stormwater user fees in many states. The courts in several states have determined that there are certain characteristics that determine whether a charge is a tax, service fee, special assessment, or exaction. Although the detailed findings in the various states differ, they are influenced by both intent of the legislative body and the structure and application of the funding methods and charging mechanisms. Procedural issues that may have an impact on the legality of service fees and assessments include the following:

- ► What was the intent of the jurisdiction in establishing the charge, and how are funds being used?
- ► Was the service fee adopted simply to counter a budget deficit, or was it predicated on meeting stormwater program costs?
- ► Does the rate structure satisfy general standards of how service fees should be applied to individual properties?
- ► Are similar fees charged to similarly-situated properties or customers?
- ► Are charges to disparate properties or parties consistent and balanced?
- ► Did the local board or council act with adequate knowledge and consideration of the issues?
- ► Were all procedural steps scrupulously followed?
- ► Was adequate publication of notice of intent given for all of formal actions taken by elected officials?

Equity

Attainment of equity is a fundamental objective in the design of both fees and assessments, and one of the primary justifications commonly cited for establishing a utility. Equity has both technical and perceptual aspects. Service

[5] Survey of Stormwater Phase II Communities, National Association of Flood and Stormwater Management Agencies, Washington, DC, July 1999

fee rate methodologies are designed to attain “equity” as a fair and reasonable apportionment of cost of providing the needed services and facilities. Fees are expected to have a substantial relationship to the cost of providing the services and facilities to each customer. In contrast, assessments seek to equitably apportion benefits derived from facilities or services as the means of applying the cost of them. Exactions, such as stormwater impact fees, are not necessarily required to meet standards applicable to fees or assessments, but must exhibit a rational nexus or linkage between the exaction and the purpose of the fee. Taxes generally have to meet only the standards contained in authorizing legislation.

Equity must be weighed against simplicity and clarity. The best utility rate structures generate charges that clearly and simply relate to the services and facilities being provided. A utility service fee rate structure might be highly equitable in terms of assigning costs according to service demands, yet still be deficient politically if it is too complex for the public to grasp the linkage between service, costs, and charges. In the case of stormwater management, most people can understand that replacing natural earth with impervious pavement or structures will diminish infiltration of water and increase runoff. Thus, rate structures based in some manner on impervious area and gross area are common. A realistic objective is to be consistent within generally accepted technical standards that most people will view as fair.

Courts in most states have usually deferred to the judgment of local elected officials in determining what constitutes equity in local applications and have demonstrated a reluctance to intervene in the details of rate or assessment design. Applications accepted by various courts suggest that the relationship must only be sufficient to satisfy reasonable common sense. This leaves the structure and level of service fees, assessments, and some exactions largely at the discretion of locally elected officials. As a result, details of service fee rate methodologies, assessment formulae, and some exaction charges can vary significantly. However, a governance body may not act arbitrarily and capriciously in setting rates and the resulting service fees may be illegally discriminatory or confiscatory.

Technical Foundations

Stormwater service fee rate design practices are derived from an understanding of hydrology and stormwater runoff from individual properties. A rate structure analysis is performed to determine how costs might be apportioned among those who are served in various ways by expenditures for operations, capital improvements, and support activities. Since stormwater facilities and services cannot be metered or directly measured, they must be represented by one or more parameters believed to reflect the service demands and therefore the costs.

Timing is a consideration in formulating rate methodologies and setting the amount of fees. The structure of a rate methodology is intended to recover pertinent costs over a given period of time, most commonly a budget period or, in the case of bonded capital projects, a debt service period. For example, infrastructure is provided to collect, convey, and discharge stormwater runoff in a manner consistent with prudent design and applicable water quality standards. The resulting system capitalization is generally applicable to all properties served by the improvements, ranging from those at the top of the hill to those at the bottom of the hill who are protected from upland drainage. By using different rate parameters and finance mechanisms, a rate designer can alter the apportionment of costs among such customers over time.

Expensing capitalization costs through annual budgets focuses the financial impact on rates that customers pay during the budget period in which projects are constructed. Bonding to finance projects spreads capitalization cost over the debt service period. Accepted rate design standards do not dictate that costs be allocated on an annual, debt-service period, or service life basis. That is left to the discretion of locally elected officials. What is expected is that apportionment of costs is generally consistent with the service demands of the properties served by the facilities.

Life-cycle costing of stormwater infrastructure is an emerging issue. Because a large proportion of the cost of stormwater capital infrastructure is initially borne by private developers, their costs have not been allocated directly to stormwater ratepayers in most cost and rate analyses. However, much of the stormwater infrastructure built by developers is transferred to public stormwater service providers, and the long-term expense of recapitalizing the improvements as they wear out becomes a public cost. Cost of sustaining such infrastructure has not, however, been incorporated into financial planning and analyses of most local governments or stormwater utilities.

With the advent of the stormwater utility concept, the perspective on long-term life cycle accounting of stormwater infrastructure has begun to change. Most water, wastewater, electrical and other utilities have incorporated the life-cycle cost of capital assets in their rate projections and financial reporting for many years. In 1999 the Governmental Accounting Standards Board (GASB) introduced Statement 34 on infrastructure reporting which introduces comparable accounting for capital assets into general governmental practice. This reinforces the standard of full accounting for life-cycle costs of stormwater systems and facilities, and mandates incorporating them into cost and rate analyses.

Origin of Costs

Conditions on individual properties, which collectively dictate what types of systems, programs, and activities must be provided, are primary factors influencing stormwater costs. The objective of service fee rate design is to craft a schedule of fees for various users that reflect the cost of efficiently meeting

their cumulative service demands. Modern stormwater assessment design objectives are more often reflective of the cost of providing benefits to the subject properties rather than value of the benefit, which was the traditional approach employed when assessment were based on property value.

“Service” can be defined in much broader terms than just operational activities and physical facilities directly attributable to a given property’s stormwater runoff. For example, it is clearly a service to upland properties that their stormwater runoff is collected and safely conveyed to a discharge point. Such service relieves them of the responsibility of disposing of their runoff, and reduces their potential liability for downstream impacts. At the same time, a service is also clearly being provided to downhill properties in the form of protection from the upstream runoff. Flood protection and regulatory programs that protect floodprone areas reduce public emergency and recovery costs. Drainage of roads and sidewalks facilitates mobility essential for public safety services, commerce, education, and other aspects of modern life. Stormwater quality management protects and enhances environmental health.

Precision is not a defined standard in formulation of costs or service fee rates. Cost analyses produce estimates, some of which can be more exact than others. The cost of operating a particular piece of equipment can be rather accurately projected, but watershed capital infrastructure plans may provide only an engineer’s estimate of the future cost of acquiring land and constructing a stormwater facility. An estimate may be a valid reference point for incorporating projected capital costs into rate structure and fee analyses, but the actual costs may vary from the estimate. And the rate structure and/or fees may have to be adjusted from time to time.

A variety of approaches are used in assigning costs among customers. Some communities have opted to localize capital costs by watershed to attain a high degree of association of their infrastructure costs with the property owners served. Localizing capital costs by watershed is also common practice when stormwater utilities employ special assessments. Most, however, have determined that their system capitalization costs are relatively consistent, that the service provided by such improvements is not limited to individual properties in specific areas, and allocation of the costs can reasonably be applied to the entire jurisdiction or utility service area. They reason, for example, that adequate drainage system capitalization along roadways is a service to the entire community.

A community’s historic approach to capitalizing stormwater infrastructure may influence rate design. Many communities have historically funded stormwater system capitalization from general revenues, spreading the cost throughout the community, though facilities may not have been equally capitalized throughout the jurisdiction. After spreading the cost community-wide for years but not attaining uniform service capability, it would be inappropriate to localize future

capital costs by watershed even if that approach more closely reflects the origin of cost for specific facilities to be built by the stormwater utility.

Revenue Sufficiency

If a service charge is adopted, it is essential that the enhanced stormwater program provide visible results. A new fee that doesn't achieve a higher level of service is more likely to face opposition than one that provides demonstrable improvements. In order to ensure that is attained, a service fee, along with any other funding sources, must generate sufficient revenue.

Flexibility

A service fee offers extraordinary flexibility compared to other funding methods. Within reason, a rate structure can be designed to apportion costs as a board, council, or commission wishes. There is no absolute prescription that must be followed. For example, some communities charge properties located in floodplain areas less than upland areas, but the City of Boulder, Colorado imposes a surcharge for floodplain properties. Some communities only charge developed properties, while others also charge service fees to undeveloped lands.

The latitude given to local elected officials to make various decisions regarding the design of a rate structure is a distinct contrast to taxation concepts based on property value and assessments based on benefit. Taxation methods generally allow little flexibility, and cannot be selectively applied or tailored to specific needs. Although assessment methodologies are generally more flexible than taxes, they must reflect direct and special benefit.

A service fee rate structure can also be augmented by secondary funding mechanisms and altered by modifications to tailor the cost allocation to the local situation. For example, many stormwater utilities use credits to recognize on-site control systems or activities that reduce the public expense of stormwater management. Such credits can be creative. The City of Griffin, Georgia negotiated a service fee credit with the local school district. The district agreed to teach an environmental education program that satisfied most of the City's NPDES permit public education mandate. Mecklenburg County (Charlotte), North Carolina offers a partial service fee credit to industrial properties that have their own NPDES permits.

Balance of Rates with Level of Service

A general legal standard for a utility service fee rate structure is that it must be fair and reasonable. The resultant charges must bear a significant relationship to the cost of providing services and facilities. The balance between rates and service levels does not have to be precise or perfectly consistent. If significant differences in service levels prevail over time, however, a rate structure should reflect the variance to a reasonable degree. This can be accomplished in several ways. The rate structure itself might be altered in some way. The rate charged

per equivalent unit of the service might be reduced or increased. A modifying factor or surcharge might be applied to the basic rate to reflect a lower or higher service level provided to a specific geographical area or customer group.

Data Requirements

The data requirements of various rate structures differ, sometimes significantly. Two general rules usually prevail: 1) new data costs more than existing data; and 2) each additional increment of precision costs more than the previous one. As a result, many communities prefer to use existing data and apply a rate structure that is relative simple and gross. The number of parameters necessary to calculate a service fee for each customer is an important cost consideration, but it is not necessarily less costly to use a single parameter rather than two or more. If complete and accurate data is readily available from an existing source, it does not necessarily cost more to assemble a master account file based on a more precise parameter or several parameters, though that is usually the case.

Industry standards for stormwater service fee rate structures have coalesced around a few data parameters that have a demonstrated relationship to the cost of stormwater services and facilities. Impervious area is a common parameter, not only because it is closely related to runoff rates and pollutant loadings but also because many communities already have that data in the form of planimetric polygons defining building footprints, paving, etc contained in their geographical information systems. If, however, the data is available only as line definitions and not in closed polygons, the polygons have to be created to measure the area. This may involve interpreting satellite imagery, aerial photographs and property line maps, and may make impervious area a more expensive parameter to implement. In some cases, an algorithm can be applied to the line segment data to join segments into polygons that can be measured, but that approach requires a significant amount of quality assurance review.

The data requirements associated with implementing and maintaining a stormwater service fee depend more on the subtleties of the rate methodology and the use of modifying factors than on the basic parameters selected. If an impervious area method were to be applied to all properties individually, impervious area information would have to be generated for residential as well as non-residential parcels. However, if a simplified residential service fee is utilized, data requirements and costs might be reduced by as much as 70 percent regardless of the type of rate methodology employed.

Implementation costs of a tiered residential rate structure are usually higher than for a single flat-rate residential service fee. A two-tier or three-tier simplified rate structure for residences requires some additional analysis of the residential housing stock subject to the charge. If information available from other databases could be used to determine the proper assignment of residential properties to different tiers, the impervious area of individual properties would not have to be carefully measured. However, experience has shown that grouping

residential properties is only slightly less demanding than precisely measuring the impervious area on each property.

The cost of implementing an impervious area rate structure is a function of the number of properties that must be measured, the accuracy standards adopted for data, and the measurement technique employed. Techniques available for determining the impervious area and gross area of individual properties range from very time-consuming and expensive on-site measurements to photo-interpretive methods using scaled aerial photographs or satellite imagery. Cost of developing impervious area data has ranged from less than $1 to over $6 per unit, depending primarily on whether or not a simplified residential rate is used.

Accuracy standards also influence the cost of both initial implementation and subsequent data maintenance. Use of an equivalency unit for grouping properties into ranges subject to a rate schedule allows less exacting data standards to be used without diminishing the percentage of properties that are correctly charged according to the rate schedule. Automating the maintenance of the data file can significantly reduce the on-going administrative expense. If building permit applicants are required to provide impervious area coverage figures, the information can be transferred directly to a service fee master account file.

Some counties and cities use both gross and impervious area or gross area and a second data parameter reflecting the intensity of development (percentage of imperviousness) instead of the actual impervious area. These approaches involve two parameters, but do not necessarily increase the cost of implementation and upkeep if the required data is readily available from existing sources. Intensity of development can be interpreted relatively quickly and cheaply for each property, and properties can be assigned to general categories instead of assigning unique development intensities to each one.

A mistake sometimes made by cities and counties when they first adopt a rate structure is to use a parameter simply because they have an existing database, not because it correlates with the cost of stormwater services and facilities. For example, at least a few cities and towns have used water meter size or even water use as a stormwater service fee parameter, simply because the data was readily available. This can lead to serious problems if the stormwater rate structure is challenged in court because there is little if any correlation between such factors and the cost of providing stormwater management.

Compatibility with Data Processing Systems

The cost of implementing and applying a stormwater utility service fee includes the work required to assemble a master account file comprised of customer names and the data required to calculate a billing. A master account file must also be linked to or integrated in some manner with a billing system that enables

the service fee to be delivered to the proper party, payments received and processed, and proper accounting to be performed. All of these typically involve extensive use of a computer data processing system and one or more databases.

Degree of compatibility of a preferred service fee rate methodology with existing databases and data processing systems directly influences the cost of long-term maintenance and operation of utility funding. Service fee billing, collection, and accounting costs are often less if a stormwater charge can be added to an existing system rather than creating a new means of delivering the billing and processing payments.

A majority of city stormwater utilities bill their service charges on water, wastewater, solid waste, electric, gas, and other municipal utility service bills. Many counties are primarily rural service governments that do not operate such utilities, so another approach is needed. Most counties have local property tax assessment, billing, and collection responsibilities. Therefore, county stormwater utility service fees in some states are added to their property tax billings. Some counties have opted to prepare separate service fee billing systems so as to avoid any confusion between property taxes and stormwater service fees. Special service districts either integrate the master account file and billing with existing water, wastewater, or other billing systems or, in some states, they are able to attach stormwater billing to a county or city property tax billing.

Consistency with Other Local Funding and Rate Policies

Most urban communities have a variety of funding mechanisms in place and adopted policies that portray local practices. If, for example, a community has water and sewer service fee rate structures that use residential flat rates, a simple residential stormwater fee would probably be very acceptable. If, however, local water and sewer rates are very complex, the general public's expectations are likely to be geared to that level of refinement. A flat-rate stormwater service fee for all residential properties might not be perceived as sufficiently accurate.

Revenue Stability and Sensitivity

Fortunately, stormwater service fee rate structures are not prone to some of the revenue stability and sensitivity problems of water and wastewater (sewer) methodologies. Stormwater costs and rates are generally associated with providing and maintaining a provisional system capacity that is fully utilized only infrequently, rather than with delivering a certain amount of water or collecting and treating a relatively consistent quantity of wastewater each day. As a result, the revenue stream of a stormwater service fee is not susceptible to conservation measures like water and wastewater utilities. Stormwater utilities do not have to increase rates as a result of customers reducing their consumption of a commodity like potable water.

SERVICE FEE RATE AND ASSESSMENT METHODOLOGIES

Rate Design

Conventions are emerging as stormwater utility service fees and assessments become increasingly common. Impervious area, gross area, percentage imperviousness, and land use are the most frequently used parameters.

Service Fees

In most instances, service fees are cost-based, i.e., they are designed to reflect the impacts that each property has on stormwater service demands and thus the cost of providing facilities and operational and support activities. Such costs are primarily a function of peak stormwater runoff rate, total volume of discharge, and pollutant contributions, but design practices for stormwater service fees and assessments have yet to settle upon a single common standard or even a generally-accepted best model for calculating charges.

Empirical studies have demonstrated that impervious surface area on a property is the single most significant factor influencing all of these impacts. Impervious area is also relatively easy to identify and quantify numerically and is the most common parameter used in stormwater service fee calculations. However, the impact of a given area of impervious surface may also be influenced by its shape, slope, surface condition, vegetation, and nature of its discharge to a conveyance conduit or channel.

Location of impervious and pervious areas on a given site is also important in determining the degree of runoff mitigation that results due to the presence of pervious areas. Runoff from an impervious parking area draining across a broad grass slope of permeable soil to a roadside ditch may be significantly less compared to that of a similar impervious area collected and drained by storm sewers. This has led some to focus on “directly-connected impervious area” in their stormwater rate structures.

Percentage of imperviousness is also significant because pervious surfaces may mitigate runoff impacts from a given property. Relatively few stormwater service fee methodologies employ impervious percentage directly in the calculation of service fees, but it is indirectly accounted for in methodologies that use a combination of gross area and impervious area or gross area and intensity of development.

Permeability of soil and vegetative conditions may also influence the mitigation effects attained from pervious areas. However, soil and vegetative conditions are rarely considered because they can vary dramatically, even across a single site. There are very few reliable and accurate soil inventories, soil conditions may be altered in the course of development, and vegetative effects vary significantly from season to season.

Assessments

Modern urban stormwater benefit assessment parameters are different than those employed in earlier times. Stormwater assessments were historically derived from ditch law practices applied to drainage and protection of agricultural areas. Since agricultural income was closely tied to the area protected or improved by the drainage practices, property area was the most common parameter for apportioning the benefit and impervious area was not a common consideration. Because the systems subject to drainage and ditch law assessments were geographically and functionally limited, built to protect acres owned by relatively few farmers, assessments would typically be based on acreage each owned. In later periods, property value was often used as the parameter for assessment calculations.

In contrast, the service area of modern urban stormwater districts or utilities is typically much larger with thousands of properties and owners. In addition, urban stormwater management may not always have a distinct benefit that is direct and special to individual properties. Therefore, use of the special assessment process for urban drainage projects must carefully evaluate area to be served, benefit to be provided, and relationship of benefit to individual parcels which might be assessed. Present-day assessment calculations are frequently based on parameters similar to those employed for stormwater service fees, i.e., impervious area, gross area, and development intensity. Additional discussion of this topic is included in the section covering Special Assessments in this chapter.

Uniform and Tiered Charges

A majority of rate structures currently in force employ uniform (flat-rate) or tiered fees for some or all customers rather than a calculated charge based on conditions on each property. The most common form is a flat-rate for detached single-family residential properties, coupled with discrete rates applied to non-residential properties. Two or three tiers of residential rates are common in communities that have a diverse housing stock. Some rate methodologies also apply uniform or tiered rates of various sorts to other classes of customers. For example, individual mobile home parks, condominiums and townhouses are sometimes billed flat rates per unit.

Rate structures that classify and group properties by development intensity or land use and apply a fixed rate to the classes are a form of tiering. For example, gross area/intensity of development rate structures commonly group properties into five to ten descriptive classes ranging from undeveloped or very lightly developed to very heavily developed. Such rate methodologies also typically group customers into gross area increments, so dual tiers of area and development intensity are used in the fee calculation formulae. A few communities have adopted very simple rate structures that charge residential properties one flat rate and all other properties another. Given the diversity of non-residential development conditions, this approach does not attain a high degree of equity in apportionment of costs of service.

Service and Equivalency Units

Many communities have opted to use various service units or equivalent unit values in their utility rate methodologies. For example, water rates are often based on metered use of gallons or cubic feet of water, which are units of service. Solid waste charges are frequently based on service units such as the size and number of bins or the tonnage of waste dumped at a transfer station. Stormwater service units or equivalency unit values are usually based on impervious area or gross area, and are most commonly derived from the typical or average condition on a single-family residential property. Terms like "equivalent residential unit" or "equivalent service unit" are commonly used to describe these values.

Service units or equivalency units are typically applied as "block charges", where customers are billed for increments of use. Water customers may be billed in increments of 1000 gallons or 100 cubic feet, rather than for a precise number. Such practices have been adapted to stormwater service fees. For example, Columbia County, Georgia uses an impervious area stormwater rate structure and charges each customer a fixed rate for each 100 square feet of impervious coverage.

Some communities have opted to use a combination of flat rates for single-family residential customers with an equivalency unit applied to other types of properties. For example, an average residential property in a given community might be determined to have 3,000 square feet of impervious area (including roofs, drives, walks, patios, etc), and this value might be used as a service or equivalency unit for other customers. All single-family residential properties might be charged for one equivalent unit, or two or more tiers of that increment might be applied to residential properties. The impervious area on other types of properties would be measured and that figure divided by 3,000 to determine the number of equivalent units that each should be charged. It is common practice to bill for each equivalent unit or fraction thereof, effectively rounding up to the next full unit.

Water and sewage rate structures often include increasing or declining fee schedules to encourage or discourage consumption, in which incremental "blocks" are defined. For example, in water and sewer rates the first 10,000 gallons used or discharged in a month would be charged at one rate, the next 10,000 gallons at another, and so on. This practice is not common in stormwater rates, though a few jurisdictions that bill undeveloped as well as developed properties employ declining rates to moderate the charges on large undeveloped tracts of land.

One of the benefits of a service or equivalency unit value is that it allows easy comparisons of charges among dissimilar customers. For example, under the assumptions used in describing an impervious area rate methodology previously, a commercial or other non-residential property with ten times as much

impervious area as a typical residence (assumed to be 3,000 square feet) would be charged for ten units of use. A “big-box” retail store (or small shopping center or industrial site) with 600,000 square feet of impervious coverage (about fourteen acres) would be billed for 200 units.

Classification and Grouping of Like Customers

Classification and grouping of like customers having similar characteristics and/or service demands is a common practice in utility service fee rates. For example, wastewater treatment demands and costs are related not only to the volume of the waste to be treated, but also to the type of constituents found in the wastewater and their strength or concentration. Some users discharge wastes to public sewers that are radically different than a typical residence. Therefore, wastewater rates for some commercial and industrial customers may include both a volume component and a strength component.

This particular wastewater rate practice has not been directly adapted to stormwater rates, but a comparable classification or grouping of like customers based on their impacts on stormwater services and facilities has been incorporated into some rate structures. For example, all single-family detached residential properties are often grouped in a single user class or into tiers and each class is then billed a common rate. In a gross area/intensity of development rate methodology, properties having like land use may be grouped in a single intensity of development classification, e.g., all commercial office properties might be deemed heavily developed for rate calculation purposes. Industrial properties or those undergoing land disturbance activities might be grouped for NPDES impacts and erosion/sediment control service demands.

Service Fee Credits

Many communities have modified basic stormwater rate design practices to accommodate local circumstances. Perhaps the most widely-used modification to basic rate structures is application of a credit adjustment to service fees. Credits are typically conditional, i.e., they are premised on continuing specified performance by the customer. If the specified performance is not maintained, credits may be rescinded. The concept is similar to industrial pre-treatment credits commonly provided wastewater customers to reduce strength of sewage discharged into public systems.

Stormwater service fee credits are most commonly provided for properties that have on-site detention or retention facilities. In most cases detention or retention systems are designed to approximate pre-development conditions or to meet capacity limitations of downstream facilities. Such controls reduce capacity requirements (and cost) of downstream systems and may, if properly designed and maintained, enhance water quality. Credits have also been given for facilities or activities that assist in provision of services or reduce the public cost of providing services.

Credits have also been adopted in some jurisdictions for properties subject to and in compliance with National Pollutant Discharge Elimination System (NPDES) permits and for public and private schools providing approved water quality education programs. The rationale for the latter credit is that education is a minimum control measure in NPDES Phase 2 stormwater discharge permits. If not provided by local schools educational programs the service would have to be performed by the stormwater management entity at additional cost to the ratepayers.

Various means are employed to provide service fee credits to properties having on-site detention. For example:

- ► Boulder, Colorado, for properties providing on-site detention, has administratively adopted the practice of reducing the normal service fee twenty (20) percent for an on-site detention system that meets standards for a 5-year storm. Systems that meet 100-year storm requirements are eligible for an eighty (80) percent reduction.

- ► Bellevue, Washington changes the intensity of development classification of properties with detention systems to that of very lightly developed land, resulting in a variety of percentage reductions, depending on the intensity of development classification that would normally be applied to the subject property.

- ► Charlotte, North Carolina allows up to fifty (50) percent credit for peak runoff attenuation and up to twenty-five (25) percent credit for flow volume reductions.

Practices elsewhere reduce service fees between thirty-three (33) percent and seventy-five (75) percent in recognition of on-site control that reduces runoff rates. In most situations the long-term impact on revenue resulting from this type of adjustment is minor, typically no more than one or two percent. Ratepayers who do not have on-site systems have to pay slightly more to cover the minor deficit resulting from the credits.

The primary intent of credits is to recognize reductions in the cost of public stormwater services and facilities that can be attributed to private systems or activities. Credits only partially compensate developers who install and properly maintain facilities. Rarely do they offset loss of space such facilities occupy or the degree to which on-site systems disrupt the layout of commercial properties and subdivisions. Nor do most credits consider water quality impacts of on-site systems, or their influence on the cost of stormwater quality management. However, they do marginally improve equity of service fee cost allocations.

The balance of fees with level of service required and provided is, at least in theory, improved by use of credits. On-site control of peak flow of stormwater

runoff means that a property requires less service from the public stormwater system. Downstream reductions in peak runoff allow a higher level of service from a given size of facility or enable a community to build smaller systems in the future. A reduction in pollutant discharges into the public system could translate into lower NPDES permit compliance costs.

Developers' engineers can provide the information required to incorporate a credit for on-site measures. An allowable runoff release rate based on pre-development conditions and required on-site storage capacity can be used to determine the effectiveness of each on-site facility for crediting purposes.

Example Stormwater Rate Methodologies

The rate structure concepts used as examples in this guidance are typical of those adopted in the more than five hundred communities that have established stormwater utilities or special districts. Direct comparison with rate methodologies used in specific communities is not productive, however, since the general approaches examined in this guidance should be viewed in the specific context of the local needs, priorities, and circumstances of each community.

Generally speaking, any rate methodology that incorporates gross area tends to reduce the proportion of the service costs allocated to commercial and other intensely developed properties and increase the proportion of costs assigned to residential and less intensively developed properties.

Example stormwater rate methodologies examined in this guidance base stormwater fees on:

- impervious area;
- a combination of impervious area and gross area;
- impervious area and the percentage of imperviousness; and
- gross property area and the intensity of development.

Impervious Area

Stormwater rate structures based solely on impervious area have been widely used. They are simple, the concept is easily understood by the general public, and is generally perceived as equitable. Impervious area rate methodology reflects a philosophy of allocating costs based on each property's contribution of runoff to the system. Large expanses of roofs and paving in shopping centers and other commercial and industrial business areas are highly visible to the general public, and most people understand the hydrologic impact of covering natural ground with paving and rooftops. The approach is generally consistent with local service fee rate practices for wastewater services, wherein fees are

based on the amount of water used and strength of effluent discharged to the public treatment works.

Numerous technical studies, references, and citations in engineering literature technically validate the equity of an impervious area rate methodology. The coefficient of runoff value in hydrologic engineering tables closely approximates the percentage of impervious coverage. Empirical evidence gathered in the field by monitoring changes in runoff before and after development verifies that impervious coverage is the key factor influencing peak stormwater runoff. Data gathered during the National Urban Runoff Program (NURP) in the 1970's and 1980's and subsequent research showed that impervious area is the most dominant factor in pollutant loadings conveyed by stormwater runoff.

The impervious area approach may introduce a "timing" problem in the acquisition of capital assets. Impervious area service fees typically are applicable only to developed properties, but stormwater capital improvements are designed to accommodate future growth. Present ratepayers may be paying for capacity provisions far beyond their own use, and undeveloped properties (not subject to an impervious area fee) would not be charged for their future needs. Other funding mechanisms, such as development impact fees or system development charges, can be used in concert with an impervious area rate methodology to ensure that undeveloped properties ultimately participate in the cost of capital improvements designed with capacity to serve them.

An impervious area rate methodology is highly stable and insensitive to property alterations by ratepayers. The rate of revenue growth using an impervious area methodology would more or less correspond to the pace of development. Economic downturns would tend to diminish the addition of new impervious area and the stormwater revenue growth, while rapid growth would add to it. Reductions in impervious coverage on individual properties are rarely justified merely to reduce stormwater fees. Alterations that would reduce stormwater fees are essentially infeasible under all the rate structure scenarios examined in this guidance.

Most impervious area rate structures include simplified single-family residential service fees, often applied as flat-rate charges. Charges to non-residential properties may be structured in a variety of ways under an impervious area methodology. In some cases the single-family residential property, "equivalent unit" value, or ranges of impervious area (100, 500, or 1,000 square feet) are used as a billing unit.

Impervious area service fees are usually calculated by dividing the amount of impervious area on each parcel by an equivalent unit or a range value to determine the number of billing units and multiplying a charge per unit. Very few use the exact amount of impervious area on each property because the accuracy

of the impervious area data typically available does not support such a precise calculation.

The following example illustrates how service fees based on impervious area might be calculated. Assume that a typical single-family residential property is determined to have 3,000 square feet of impervious area including driveway and patio area as well as roof coverage. An annual rate of $.02 per square foot of impervious coverage would result in a typical residence being charged $60.00 per year, or $5 per month.

If a flat-rate fee were applied to all single-family residences, an equivalency value equal to the impervious area of the typical single-family residence might be used to determine charges to other properties, including multi-family apartments. The 3,000 square foot increment might also be used as a range value in the rate structure, with all non single-family residential properties grouped into impervious area ranges of 3,000 square feet which serve as a billing unit.

All properties in a given range are typically charged the same fee even though they might have slightly different impervious area. For example, using an equivalency unit of 3,000 square feet of impervious coverage, two commercial properties with 21,000 square feet of impervious area would be charged for seven equivalent units (7 X $60 = $420/year) even if their gross property areas differed. A large shopping center or discount store with 600,000 square feet of impervious coverage would be charged $12,000.

An impervious area rate methodology is not highly flexible or subject to judgment in its application to specific properties. It is based on a single parameter that can be accurately measured, although modifying factors might be applied to the basic rate calculation. Approaches based on parameters like intensity of development allow substantially more judgment to be applied, both in the design of the rate methodology and in its application to specific properties.

Other funding mechanisms can be blended with an impervious area service fee. For example, a system development charge could be adopted to recapture a system capitalization component from properties as they are developed. Other revenue sources can be used to supplement service fees, such as general revenue support for an NPDES stormwater quality program.

Impervious Area and Gross Area

Both total property area (gross area) and impervious coverage of properties influence amount, peak rate, and make up of stormwater discharged to public drainage systems. A combined impervious area and gross area rate methodology can account for both factors. Most stormwater rate methodologies utilize one or the other parameter in calculation of fees. A few (including Denver, Colorado) use both parameters to derive percentages or ratios used in rate calculations.

The concept underlying an impervious/gross area rate methodology is relatively easy to explain and grasp. It is consistent with the public's general understanding of hydrology and the impact that both gross area and impervious coverage have on stormwater runoff. This type of rate methodology tends to allocate more of the cost burden to lightly developed and undeveloped properties than methodologies that are based strictly on impervious area. Depending on the weighting factors and/or cost allocations, however, smaller properties that are almost entirely covered with impervious surfaces could conceivably be charged more than larger properties that are undeveloped or very lightly developed with little impervious coverage.

An impervious/gross area rate methodology requires that the mix of impervious and gross area in the service fee calculation be “tuned” to properly reflect the significance accorded to each parameter. This can be achieved in at least two ways: 1) by applying weighting factors to gross and impervious area; or, 2) by allocating certain costs of service to each parameter. Weighting assigned to gross and impervious area should be consistent with the local hydrologic conditions, patterns of development, program requirements (e.g., operating versus capital needs), balance of stormwater quantity and quality program costs, and the community's perceptions.

Rates could be structured in a variety of ways under this approach to reflect the importance assigned to each parameter. Units of gross area might be charged a basic rate, with a surcharge applied to units of impervious coverage. Alternatively, cost of service might be apportioned between impervious area and gross area instead of assigning specific costs to each parameter. For example, eighty (80) percent of total stormwater cost of service might be allocated to impervious area and twenty (20) percent to gross area.

Coefficients of runoff used in hydrologic engineering suggest that gross area to impervious area ratios in a service fee calculation might be as low as 1:4 or as high as 1:40. If costs are allocated to the two parameters, the significant influence of impervious coverage on peak runoff and pollutant loading suggests that seventy-five (75) percent or more of the costs should be assigned to the impervious area component of the rate.

Solely for the purpose of illustrating how fees might be calculated using an impervious/gross area methodology, assume that each 100 square feet of gross area might be charged $.10 (ten cents) per year. A surcharge of $1.60 per year might be applied to each 100 square feet that is covered by impervious area. This would yield an effective ratio of 1:17 between areas that are pervious and those that are impervious (i.e., areas covered by impervious surfaces would be charged seventeen times as much as areas that are not). That ratio is generally consistent with the difference in peak runoff between undeveloped and developed properties.

Applying the example values cited above to a twelve thousand (12,000) square foot residential property with 3,000 square feet of impervious coverage would result in a total service fee of $60 per year or $5 per month. The charge for the gross area of the property (12,000/100 @ $.10 = $12/year) would be added to the charge for the impervious coverage (3,000/100 @ $1.60 = $48/year). An undeveloped 12,000 square foot property would be charged $12/year in this scenario.

Applying the same values to a small commercial property of 30,000 square feet having 21,000 square feet impervious (70 %), the annual service fee would be $366 per year (30,000 sq ft / 100 x $0.10 = $30/year for the gross area and 21,000 sq ft / 100 x $1.60 = $336/year for the impervious coverage). Thus, the stormwater service fee would be more than six times as much as that for the example 12,000 square foot residential property even though the example commercial property is only two and one-half times larger in gross area. The proportionately greater increase reflects more intense development of the larger parcel in this example (70 % impervious coverage versus 25 % for the residential example).

Using the same formula, if it is assumed that a 600,000 square foot shopping center is completely covered with impervious rooftops and paving, the annual service fee would be $10,200 (600,000 sq ft / 100 x $0.10 = $600 for the gross area plus 600,000 sq ft / 100 x $1.60 = $9,600 for the impervious coverage). In both commercial examples cited, the gross area/impervious area rate methodology results in slightly lower fees for the non-residential properties than does the impervious area methodology examined previously, but that is purely a function of assigned values and is subject to modification.

A gross area/impervious area rate methodology facilitates charging undeveloped properties a service fee. Charging undeveloped properties would broaden the rate base, especially if extensive rural areas were included in the utility service area. It would also enable some operating and capital expenses to be distributed among all properties, although system development charges or other funding methods to recapture financial participation in infrastructure capitalization may still be needed. Using the above example values, an undeveloped 12,000 square foot property might be charged $ 12 per year (12,000 sq ft / 100 x $0.10), an undeveloped 30,000 square foot property would be charged $ 30 per year (30,000 sq ft / 100 x $0.10), and an undeveloped 600,000 square foot would be charged $600 per year (600,000 sq ft / 100 x $0.10). Because charges to very large undeveloped acreages quickly escalate, such rate methodologies might need to have a schedule of incrementally declining charges as the size of properties increases.

A residential flat-rate charge could also be used with this methodology, using a sample of residences to determine how much gross and impervious area is

typical in a given community. The residential rate could constitute equivalent unit values for both parameters. Obviously, different rates for gross area and impervious area might be applied in all of the above examples to meet the cost of services and facilities or apportion costs differently.

Both gross area and impervious area data are needed for this methodology, adding to the cost of developing a master account file, although fee calculations could be relatively simple. The gross area on each property might be divided by a billing unit increment (100 square feet in example above) and multiplied times a charge per unit. The same could be done for impervious area, with the two sub-totals added together to generate service fee amounts. Adjustments and credits might be applied to either or both of the parameters.

Cost of implementation and upkeep of this type of rate methodology is influenced by the cost of assembling data for a master account file and the computer programming associated with billing/collection and billing inquiry processes. Using a flat-rate charge for one or more classes of properties would substantially reduce costs. Maintenance of information might also be simplified by requiring data from developers' engineers and/or architects when plans are submitted.

Potential revenue capacity of this type of rate structure is somewhat greater than the impervious area approach because it could conceivably charge both undeveloped and developed properties. For the residential component, the revenue stream would probably be equal to or greater than other methods described in this guidance, depending on weighting factors and rates assigned and/or allocation of costs.

This approach is comparable to the other rate structure options in its stability and insensitivity to external influences. Being based on gross area and impervious area, there is little that can be done by a property owner to reduce parameters that drive the amount of the service fee.

Applying weighting factors or allocating costs to gross area and impervious area makes this approach especially flexible. A broad range of weights could be assigned to gross area and impervious area to account for unusual conditions, presence of modifying considerations like on-site detention or water quality impacts, or runoff mitigation normally realized on large undeveloped tracts. System development charges and other secondary funding methods could also be coordinated with parameters used in this type of rate structure.

Impervious Area and Percentage of Impervious Coverage

This type of rate methodology is currently used by the City/County of Denver, Colorado. Under this rate structure amount of impervious area and impervious percentage are both used to calculate service fees, dictating that data on both impervious and gross area be used. Gross area is not relevant to the service fee calculation, except that it is needed to determine the percentage of

imperviousness. Under this approach impervious area of each property is charged at varying rates depending on the percentage of imperviousness of the subject property. Each square foot of impervious area is typically charged more as the percentage of imperviousness increases. Because this rate methodology is based on impervious area, undeveloped lands are often not charged.

Some anomalies may occur in service fees that result from this type of rate methodology. Consider two properties of different sizes with the same amount of impervious coverage. Because its percentage of imperviousness could be a lot higher, the smaller property could be charged more than the larger property.

The key determinant of charges to individual properties (and of overall revenue capacity) under this rate concept is the schedule of charges per unit of impervious coverage. Properties may be divided into several classes based on their percentage of imperviousness (referred to as “ratio groups” or “imperviousness classes”), and a varying rate per impervious area unit might be applied to each class. For example, properties having ten (10) percent imperviousness or less might be charged $.06 per year for each 100 square feet of impervious coverage, while properties with eleven to twenty percent imperviousness might be charged $.15 per year for each 100 square feet. Proportionately higher values are usually applied as the percentage of impervious coverage increases.

Being based on two parameters which are accurately measurable, impervious area and gross area, from which the percentage of imperviousness is calculated, this approach gives an impression of greater accuracy than some other options. Judgment is introduced to the service fee calculation in the form of different charges for various imperviousness classes.

A community’s perception of equity resulting from this rate methodology may be mixed, and may depend on the number of classes or ranges used for percentage imperviousness and schedule of rates assigned to them. To the extent that a shift in the distribution of costs toward heavily developed properties benefits single-family residences, homeowners would likely see a lower bill than under other rate structures. They might view the balance of services and charges favorably. However, charges for intensely developed commercial properties would not be as favorable as they would bear a much higher proportion of cost of service.

Table 2-1, below, presents a schedule that is typical of what might be applied under this approach.

Table 2-1: Example Schedule of Rates

(per 100 square feet of Impervious Coverage)

Impervious Percentage	*Annual Rate/100 Sq. Ft. of Impervious Area*
1 to 10 %	$.50
11 to 20 %	$1.35
21 to 30 %	$2.00
31 to 40 %	$2.70
41 to 50 %	$3.35
51 to 60 %	$4.00
61 to 70 %	$4.70
71 to 80 %	$5.40
81 to 90 %	$6.00
91 to 100 %	$7.70

A typical residential property has between twenty and forty percent impervious coverage. Some houses are much larger but have a much lower percentage of imperviousness because they are on very large lots or acreage. Recent trends toward very large residential subdivisions with smaller lots and larger structures are resulting in much more intense residential development and increased stormwater runoff. This is being mitigated to some extent by the use of green design practices, such as retention of stormwater in rain gardens and detention ponds.

Both the size and density of residential development are common reference points in the design of impervious area/percentage of impervious area stormwater rates. An average residence in an urban community might have a 12,000 square foot lot and 3,000 total square feet of impervious area (25 %) including driveways and patios. When an impervious area/percentage of impervious area methodology is used, an annual service fee for such a residence under the example schedules of charges might be $60/year (3,000 sq ft/100 x $2), or $5.00/month. The previously-cited example of a commercial property of 30,000 square feet with 21,000 square feet of impervious coverage, 70 % imperviousness, would be billed $987/yr under this methodology with the schedule of rates shown in the table (21,000 sq ft/100 x $4.70 = $987). The 600,000 square foot commercial shopping center example property (100 % impervious) would be charged $46,200/yr. (600,000 sq ft / 100 x $7.70 = $46,200).

This example illustrates just one approach to a schedule of rates for different percentages of impervious coverage. With the same residential service fee as in the impervious and gross area/impervious area rate methodology examples

($60/year), the service fee both for the small commercial and the large retail shopping center would be much greater. It is entirely a function of the rate assigned to each range of imperviousness.

Obviously, care must be taken in designing the schedule of rates to ensure that appropriate allocations of cost of service result. It must also be recognized that this methodology can create anomalies relative to service fees as compared to other rate methods. These calculations are a function of specific schedule of rates used in this example and could be changed by adjusting the schedule.

This rate concept would require that both gross area and impervious area data be gathered. Incorporating a simplified charge for single-family residences could significantly reduce the number of properties requiring specific data. Future maintenance of data for developing properties could be accomplished by requiring that gross area and impervious area data is supplied by each developer's engineer or architect as part of project plans.

This approach would require that the file record be larger than for some other options in order to accommodate use of two parameters. A rate methodology could be written to calculate percentage of imperviousness and assign a property to a classification, or ratio group, based on the data. Some specialized programming might be required for this, but programming expenses would not be significantly greater than for other options.

Revenue capacity of this type of rate structure is greater than most of the other options examined in this guidance, especially if a highly progressive schedule is used. In Denver, Colorado this methodology generates perhaps twice as much revenue per square mile as some of the other rate methodologies because the very heavy weighting applied to the percentage of imperviousness results in much higher charges for intensely developed properties.

The stability and sensitivity of this rate methodology is consistent with the other options considered. Even using a highly progressive schedule of rates, the level of service fees would probably not induce property owners to remove impervious area from their properties. It simply is not cost-effective for most property owners to reduce the impervious area just to reduce a stormwater service charge.

Despite being based on two parameters, this rate concept retains a fair degree of flexibility. Flexibility is directly related to how classes of imperviousness are defined and the schedule of rates assigned. By tailoring number and size of the classes and schedule of rates, flexibility comparable to the other rate structures is achievable. Modifying factors and secondary funding methods such as system development charges can also be used.

Gross Area and Intensity of Development

Rate structures based on the gross area of each property and its intensity of development are currently used by the cities of Bellevue and Tacoma, Washington and Cincinnati, Ohio. An intensity of development factor is usually very similar to the coefficient of runoff. The term "intensity of development factors" is commonly used rather than a "coefficient of runoff", because the relationship of intensity of development to stormwater runoff is easily grasped.

If applied to every parcel, this type of rate methodology requires that gross area be determined for all residential as well as non-residential properties and an intensity of development rating be assigned to each. Most communities using this method have opted to apply a simplified service fee or schedule of fees to one or more categories of single-family residential parcels, but there is no uniform practice. Non-residential properties are usually categorized into five to ten descriptive groups ranging from “undeveloped” to “very heavily developed”. If a flat-rate residential charge is not used, all residential properties are typically assigned to one or two of the intensity of development categories.

Local development patterns may influence how residential properties are treated under this rate methodology. Only one residential intensity of development category might be needed in a community that has highly uniform residential development. More categories might be appropriate in another community that has residential lots ranging from 3,000 square feet to several acres.

Typically, the intensity of development values range from a low figure ranging between .02 and .20 for undeveloped or lightly developed properties up to .85 or even .95 for industrial and commercial uses. This approach groups similar properties and applies average values to all assigned to a given classification. For example, all apartments might be classified as multi-family residential with an intensity of development factor equal to .65 instead of assigning individual ratings ranging from .50 to .85 to individual apartment developments. The gross area parameter is the controlling element of rate calculation for all parcels in a given classification. An apartment building on 40,000 square feet of gross lot area would usually be billed one-half the amount charged to an equivalent apartment building on an 80,000 square foot property.

Calculation of service fees can be structured in several ways under a gross area/intensity of development rate structure. When a simplified residential charge is used, the service fee usually compares conditions on non-residential properties to a defined average specified for residential properties. For example, a typical residence is assumed to have a gross lot area of 12,000 square feet and an intensity of development of 0.25, and a commercial property of 30,000 square feet has an intensity of development of 0.70. The commercial property has an area 2.5 (30,000 sq ft/12,000 sq ft) times larger than the residential lot, and has an intensity of development 2.8 (0.70 / 0.25) times greater. The

example commercial property's stormwater charge would, therefore, be seven times that of the charge to a typical single family residence (2.5 x 2.8 = 7.0).

Using the example properties previously cited, the 12,000 square foot residential property assigned an intensity factor of .25 would be charged $5/month or $60/year (12,000 sq ft x 0.25 / 100 x $2.00/sq ft = $60/year). The 30,000 square foot commercial property with 21,000 square feet of impervious coverage assigned an intensity factor of 0.70 would be charged $35/month or $420/year (30,000 sq ft x.70 / 100 x $2.00/sq ft = $420/year). A 600,000 square foot shopping center property fifty times as large as the single-family residential property assigned an intensity of development factor of .90 would be charged $900/month or $10,800/year (600,000 sq ft x .90 / 100 x $2.00/sq ft = $10,800/year).

This approach allows service charges to undeveloped as well developed properties. For example, Bellevue, Washington assigns a very low intensity of development factor to undeveloped lands. It results in service fees that are about one-ninth (11 percent) of charges for comparably sized residential properties and even a lower percentage when compared with more intensely developed commercial or industrial parcels. Even at relatively low rates, this could generate a substantial amount of additional revenue compared to the impervious area rate methodology applicable only to developed properties when used in jurisdictions with extensive undeveloped areas.

The perceived equity of this type of rate structure is normally equal to or greater than that of other approaches, but the methodology requires a careful explanation to the community. Simplifying terminology associated with the rate methodology is desirable. That is why many jurisdictions use a phrase like "intensity of development factor".

Adjustments to individual bills or even entire classes of properties can be achieved by reducing or increasing the intensity of development factor for an individual parcel or for a class or other grouping. It is common for jurisdictions using this approach to assign an "effective" intensity of development to individual properties in response to service fee appeals, leaving the door open for adjustments that achieve a fair and reasonable rate when anomalous conditions exist.

Data requirements associated with this type of rate methodology would be less than for other options. Gross area information can often be extracted from existing databases and/or maps. Assignment of an intensity of development factor would require that judgment be used in reviewing conditions on each parcel, possibly using aerial photographs. Some additional work would be needed in the event that undeveloped properties were to be charged.

This type of rate structure tends to push a greater proportion of the cost of service onto residential and other lightly developed properties than methodologies based on impervious area, although the differential has diminished as average housing size has increased. Overall revenue capacity could be increased by also charging undeveloped properties. Like other stormwater rate structures examined in this guidance, revenue capacity of the gross area/intensity of development approach is relatively stable and insensitive to external influences

Flexibility of an intensity of development rate structure is equal to or somewhat better than other methods because of latitude available in defining categories and assigning intensity of development factors. A great deal of engineering judgment is involved in determining the intensity of development (coefficient of runoff) of a parcel in a given situation, and the engineering literature offers rather broad ranges of development intensity values. For example, values from .25 to .45 are not unusual for single-family residential parcels.

CHAPTER 3

LEGAL CONSIDERATIONS

OVERVIEW

The type of funding mechanism selected for a stormwater utility or stormwater management program has a variety of legal consequences. Taxes, user fees, special assessments, impact fees and other revenue sources can be used, but each approach will have different implications in terms of who will pay, what procedures must be followed to implement and collect the charge, and how the money can be used. If the funding approach is deemed to be a tax, then tax-exempt entities such as churches, schools, state agencies and federal government facilities will contest their obligation to pay. In many states special taxpayer approval must be sought. If a user fee approach is used, the reasonableness of the rate structure and its relationship to the service being provided may be challenged. If impact fees or special assessments are used, there will be limitations on how and where the funds can be applied.

The distinctions between the various funding approaches are often blurred. In general terms, a tax is an enforced burden imposed by sovereign right for the support of the government, the administration of law, and the exercise of various functions the sovereign is called upon to perform. In some cases there may be little practical difference between a tax and a fee, but the legal distinctions between the two are important. Many states have constitutional or statutory restrictions on the ability of local governments to levy taxes, such as requirements for special voter approval or super-majority votes in the state legislature, which do not apply in the case of fees or charges that are levied by the exercise of local regulatory authority.

State-imposed limits on property taxes have been part of the fiscal landscape for decades, but the nature of those limits changed dramatically in 1978, when California voters adopted Proposition 13, which rolled back property taxes to 1 percent of market value and limited annual increases in property values for tax purposes. Arizona, Massachusetts, New Mexico and Washington adopted very

strict limits soon after passage of Prop 13, and Colorado, Missouri, Montana and Oregon followed suit. Many states that do not fall under the strict limitation category require voter approval for local tax increases, and others require super-majority approval for tax hikes in the state legislature.

User fees are charges based upon the proprietary right of the governing body permitting the use of the instrumentality involved. Such fees have certain common traits that distinguish them from taxes. First, they are charged in exchange for a particular governmental service which benefits the party paying the fee in a manner not shared by other members of society. Second, they are voluntary or paid by choice, in that the party paying the fee has the option of not utilizing the governmental service and thereby avoiding the charge. Third, the amount of the fee is designed to recover the actual cost of the service being provided, rather than to raise general revenues for other government purposes.

The boundary between special assessments and user fees is not always clear. Generally, a fee is exchanged for a service rendered or a benefit conferred, and some reasonable relationship exists between the amount of the fee and the value of the service or benefit, while a special assessment is a specific levy designed to recover the costs of improvements that confer local and peculiar benefits upon property within a defined area.

Impact fees are one-time payments from property developers to municipal, county or school district governments for off-site improvements necessitated by new development. Such fees may be authorized by state enabling statutes or, in some states, may be imposed without legislative approval under the general home rule or regulatory authority granted by state constitutions and statutes. Impact fees differ from user charges in that they typically fund capital expenditures, not current services.

The legality of various funding mechanisms for stormwater management programs is primarily a question of state law. This guidance cannot survey or analyze the legal implications of different approaches in all 50 states, but it can highlight certain common issues that have arisen to date. Careful research will be needed to determine an appropriate fee structure in your jurisdiction, which will depend on the constitutional and statutory provisions governing the authority of local governments and special purpose districts in your state, as well as the case law interpreting those provisions.

For example, *City of Wichita, Kansas v. Kansas Taxpayers Network,* 874 P.2d 667 (Kan. 1994) involved the interpretation of certain substantive and procedural aspects of the city's home rule authority under Kansas law. Similarly, in *Densmore v. Jefferson County,* 813 So. 2d 844 (Ala. 2001), the Plaintiffs challenged a 1995 state statute as a "local" act (under Alabama state law) that had not been properly advertised under the state constitution. The Alabama Supreme Court held that the statute had been properly enacted in accordance

with the applicable state procedures. In *Billings v. Nore,* 148 Mont. 96; 417 P.2d 458 (1966), the Montana Supreme Court was called upon to determine, among other things, whether a stormwater ordinance enacted by the City of Billings was an administrative function or a legislative action that could be subject to repeal by special voter initiative under Montana law.

Stormwater management program fees have been the subject of litigation resulting in reported opinions from at least 17 states, including many cases involving final decisions by the state's highest court:

- Montana – 1966
- Colorado – 1986 and 1993
- Kentucky – 1989 and 1996
- Ohio – 1990
- Oregon – 1992 and 1993
- Kansas – 1994
- Florida – 1995, 1998 and 2003
- Washington – 1997
- Virginia – 1998
- Tennessee – 1998
- Michigan – 1998 and 2001
- North Carolina – 1998 and 1999
- South Carolina – 1999
- Alabama – 2001
- California – 2002
- Georgia – 2004
- Illinois – 2005

In addition, there have been unreported decisions from the lower courts in these and other states that have involved similar challenges to local stormwater fees, for example cases involving the cities of Tacoma and Bellevue, Washington (ca. 1984); and Atlanta, Georgia (1999).

In several instances, the results of such litigation have required a legislative "fix" to provide the proper authorization for the financing mechanism employed by the local stormwater utilities. In the state of Washington, for example, Washington RCW 90.03.525 was enacted to impose a stormwater charge on the Washington Department of Transportation at a level equal to 30% of the rates charged to other landowners. In North Carolina, GS Ch. 153A-277 was enacted in the wake of the 1999 state supreme court decision, in order to authorize the collection of fees for compliance with federal and state environmental regulations as well as for more traditional drainage services. In other cases, the courts have been called upon to determine the applicability or legality of existing statutory provisions authorizing the creation and funding of local stormwater utilities, such as Fla. Stat. § 403.031 and S.C. Code Ann. § 48-14-10.

COMMON THEMES

Based upon these cases, certain common themes or central issues have emerged. The question whether a stormwater service charge is actually a "tax" has been the issue most frequently litigated, along with related inquiries into whether the charge is actually a special assessment that cannot be levied against the parties challenging the fee. Subsidiary issues such as whether the charge is reasonably related to the cost of the services provided, and whether it is fairly imposed on the properties that are benefited by those services, have also been explored.

Tax vs. Fee

The most commonly litigated issue is whether a municipal stormwater service charge is a valid user "fee" or an impermissible "tax." This issue has frequently arisen in cases brought by tax exempt organizations such as churches, schools, and state agencies such as departments of transportation. As discussed in further detail below, it is also the central issue when local stormwater fees are levied against federal government facilities, which are exempt from local taxation but not from the requirement to pay normal utility charges.

The great majority of recent cases favor the position that stormwater service charges are a fee. Such cases continue to be filed because public perception has been shaped by the historical fact that stormwater drainage costs have traditionally been financed through general revenues, and, as noted above in Chapter 2, any new form of government funding is likely to be viewed as a "tax" regardless of technical distinctions in the manner in which it is structured. This phenomenon can be observed in cases such as those from California and Michigan where taxpayer groups are the plaintiffs and stormwater utility fees are derided as a "rain tax." In Oregon, where a state constitutional amendment (section 11b) defined a "tax" as "any charge imposed by a governmental unit upon property or upon a property owner as a direct consequence of ownership of that property except incurred charges and assessments for local improvements," the state tax court characterized a city storm drainage fee as follows:

> Respondent's storm drainage charge is exactly the kind of "johnny-come-lately" charge on property the public anticipated and intended to limit. Storm drainage systems are traditional municipal facilities. Like city streets, parks, street lights and street signs, storm drains are viewed as part of the infrastructure benefiting the public generally. Local governments may not avoid the limits of section 11b simply by calling something a "service" and requiring payment of a "fee." If that were the case, a city could impose a fire or police protection fee on all persons using improved property. These kinds of serpentine maneuvers, if accepted, would eviscerate the constitutional limitation. . . . [S]ection 11b was adopted as an

> initiative measure by angry, frustrated voters. Local governments which use sophistry, rationalization and self-justification in an attempt to evade the impact of [that section] do their citizens a disservice. *Roseburg School District v. City of Roseburg*, 12 OTR 329; 1992 Ore. Tax LEXIS 33 (Ore. Tax. Ct. 1992).

Although this decision was subsequently reversed by the Oregon Supreme Court, as described below, it is illustrative of the sentiment that continues to inspire protracted litigation on this issue in states across the country.

Found Not to Be a Tax

Stormwater funding mechanisms have been upheld as valid user fees in the cases arising in Kentucky (1989), Colorado, Florida, Washington, Tennessee, South Carolina, Georgia and Illinois.

In *Long Run Baptist Ass'n v. Louisville MSD*, 775 S.W.2d 520 (Ky. App. 1989), the Plaintiffs challenged the constitutionality of a stormwater service charge that was based on an "Equivalent Surface Unit" approach (1 ESU for all residential parcels; 1 ESU per 2500 sq. ft. for commercial and industrial parcels). The court of appeals found that the service charge was not a "tax" and was reasonable and uniform in its application.

In *City of Littleton v. State,* 855 P.2d 448 (Colo. 1993), the City sought to collect unpaid stormwater management fees from state-owned school properties. The Colorado Supreme Court found the charge was not a tax or special assessment, but a service fee reasonably designed to meet the overall costs of the service provided. The court also found that the portion of fee used to construct and maintain the drainage system was essential to provision of the services.

In an earlier case, *Zelinger v. City and County of Denver,* 724 P.2d 1356 (Colo. 1986), the Colorado Supreme Court denied a class action challenge to the City and County of Denver's Ordinance No. 160, which dealt with fees and service charges assessed for the city's storm drainage facilities. The plaintiffs claimed that the ordinance unconstitutionally denied equal protection and due process guarantees to property owners and also contended the ordinance was an unconstitutional property tax. The supreme court disagreed and affirmed the trial court's decision that the ordinance was rationally related to a legitimate state purpose of financing the maintenance and construction of new storm sewers, and that it established a valid service charge rather than an unconstitutional tax because the funds raised by the fee were not used for general revenue purposes but were segregated and used solely to pay for the costs of the "operation, repair, maintenance, improvement, renewal, replacement and reconstruction of storm drainage facilities."

In *Smith v. Spokane County,* 948 P.2d 1301 (Wash. App. 1997), the state court of appeals found that a fee charged for funding certain "Aquifer Protection Areas" was not an unconstitutional tax and would be upheld if it was reasonable and designed to cover only the costs of the program. In reaching this decision, the court relied upon an earlier Washington Supreme Court decision, in *Teter v. Clark County,* 704 P.2d 1171 (Wash. 1985), which held that charge for a county storm and surface water utility was not a tax but a valid regulatory fee.

In *Vandergriff v. City of Chattanooga,* 44 F. Supp. 2d 927 (E.D. Tenn. 1998), city taxpayers challenged validity of a local stormwater ordinance on various state and federal constitutional grounds. The federal District Court found the ordinance imposed a fee, not at tax, because the charges were based on use of the stormwater system, and applying a portion of fees to construct or expand facilities as well as to defray cost of operating the system was explicitly authorized by state statute.

In *South Carolina v. City of Charleston,* 513 S.E.2d 97 (S.C. 1999), the State of South Carolina brought a declaratory judgment action to determine whether city was authorized to impose stormwater fees on state facilities pursuant to a state statute, S.C. Code Ann. § 48-14-10, which authorized local governments to establish a “stormwater utility” and to fund it either through a fee or a tax assessment. The City of Charleston created its utility by local ordinance, and opted to fund it through a fee. The state argued that although denominated a fee, the charge involved was really a tax. The state supreme court found that the plain, ordinary and unambiguous language of the statute allowed local governments to fund the utility through either a fee or an assessment, and that the city had chosen to use a fee, which could properly be imposed on State property.

In *McCleod v. Columbia County,* 599 S.E. 2d 152 (Ga. 2004), the County imposed a stormwater fee based on impervious area of developed property. Property owners challenged the fee as an invalid tax. Noting that a charge is generally not a tax if it provides compensation for services rendered, the Georgia Supreme Court held in a unanimous decision that the fee was "not arbitrary and bears a reasonable relationship to the benefits received by the individual developed properties in the treatment and control of stormwater runoff."

An earlier, unpublished decision from the Georgia Superior court, *Fulton County Taxpayers Association v. City of Atlanta*, No. 1999CV05897, 1999 WL 1102795 (Ga. Super. Ct. Sept. 22, 1999), came to a different conclusion. However, the City of Atlanta stormwater utility charge, unlike the charge involved in the *McLeod* case, contained no provision for a landowner who has no street frontage or a landowner who has his or her own manner of disposing of stormwater runoff, such as ponds or other systems, to “opt out” or obtain a credit against the stormwater fee. The fee was also struck down because it was similar to a tax

used to raise money for general purposes. The city did not satisfy the court that the funds were dedicated to stormwater and water quality improvements.

In *Church of Peace v. City of Rock Island*, 2005 Ill. App. LEXIS 448 (2005), an Illinois appeals court found that the stormwater fee levied by the City of Rock Island is not a tax and that churches are not exempt from payment of the fee. The court found that, under Illinois law, a tax may be distinguished from a fee by observing that a tax is a charge having no relation to the service rendered and is assessed to provide general revenue rather than compensation. A fee, on the other hand, is proportional to a service or benefit rendered. Using this analysis, the court found the stormwater service charge was clearly a fee, because there was a direct and proportional relationship between imperviousness and stormwater runoff, thus creating a rational relationship between the amount of the fee and the contribution of a parcel to the use of the stormwater system. The court also found that the fee at issue was “voluntary,” because the “opt-out” provisions in the ordinance meant that persons choosing not to avail themselves of the stormwater drainage system provided by the city could do so and avoid paying the fee.

Found to Be a Tax

Stormwater fees have been struck down as invalid taxes requiring explicit voter approval under specific state laws or constitutional amendments (“taxpayer rebellion” provisions) in California and Michigan, and were also rejected in two lower court decisions interpreting a similar provision in Oregon before the later of those decisions was reversed by the Oregon Supreme Court.

In *Howard Jarvis Taxpayers Ass'n v. City of Salinas*, 98 Cal. App. 4th 1351 (2002), the City established a storm drainage fee on all developed property, based on impervious area. Taxpayers challenged the fee as a "property related" fee requiring voter approval under the Article XIII.D of the state constitution, which was added in the 1996 elections as a result of Proposition 218, the “Right to vote on Taxes Act.” The trial court found that the fee met an exception in the constitutional provision for “water and sewer services,” but the appellate court reversed because the fee was not directly based on or measured by use.

In *Bolt v. City of Lansing,* 587 N.W.2d 264 (Mich. 1998), the City established a stormwater fund to pay for sewer separation costs, based on an "equivalent hydraulic area" formula. The Appeals Court (1997) found it was a "user fee" and not a "tax." The Michigan Supreme Court, in a divided 4-3 decision, found that City was charging landowners a “rain tax,” requiring voter approval under the so-called “Headlee Amendment” to the state constitution, because the charge was being used to pay for the capital investment on the utilities and services. On remand to the lower court, the decision was found to be prospective only, and no refunds of previously collected fees were required. That decision was upheld by the Supreme Court in 2001.

However, in *Roseburg School District v. City of Roseburg,* 851 P.2d 595 (Or. 1993), the Oregon Supreme Court found that city's storm drainage utility fee was not a tax on property that would have been subject to the limitations of Article XI.11b of the Oregon Constitution (adopted in 1990 by a initiative petition known as "Ballot Measure 5"). The city had structured the utility fee in an effort to avoid the constitutional restriction, by making it "a fee for service and not a charge against property." The court found it significant that unpaid charges did not become a lien against the property, and that the person responsible for payment could seek a reduction or elimination of the storm drainage service charge by demonstrating that the service was not being used.

An earlier case decided by the Oregon Tax Court went the other way. *Denney v. City of Gresham*, 12 OTR 194, 1992 Ore. Tax LEXIS 7 (1992). In that case the user charge was related to the amount of impervious surface area on a property: $2.75 per month for all "residential property," and $2.75 per month for each 2,500 square feet of impervious surface on all other property, such as multifamily, commercial and industrial. The tax court found that the only way an owner of an improved property could avoid the charge was to destroy the improvements, removing impervious surfaces. The court also found that the charge could not be "controlled" or "avoided" by any practical means.

The City of Roseburg explicitly designed its ordinance to avoid the outcome in *City of Gresham*. The Oregon Tax Court was not persuaded, finding the charge to be a tax as it had in the *Gresham* case. *Roseburg School District v. City of Roseburg*, 12 OTR 329; 1992 Ore. Tax LEXIS 33 (1992). However, the Oregon Supreme Court found the refinements made in Roseburg's ordinance sufficient to distinguish it from the *City of Gresham* case and reversed the tax court's decision.

Voluntary Service and "Opt-Out" Provisions

One element that has been found to influence the question whether a stormwater service charge is a tax or a fee is whether the user has a choice to accept or decline the service (sometimes phrased in terms of whether there is a "voluntary contractual relationship" between the user and the service provider). In the *City of Roseburg* case, for example, the tax court found that it was "unrealistic to speak as if the property had a choice as to whether it allows runoff. Where the charge is being imposed on existing property, the 'choice' which can be obtained only through modification of the property is not a real choice." The tax court was not persuaded by the city's argument that the owner could control the fee by reducing or eliminating the discharge or water from the subject property. (The Oregon Supreme Court avoided the issue, and reversed the tax court on the ground that the Roseburg fee was not imposed upon the owner of real property as a direct consequence of ownership; rather, the fee was imposed on the occupant to whom the city water service was billed.)

In the recent *City of Rock Island* case, on the other hand, the Illinois appeals court found that the opt-out provisions of a similar ordinance were sufficient to make the charge voluntary. The Illinois court held that, "[w]hile it might be cost prohibitive for each plaintiff to construct its own storm water run-off containment system, each would certainly be able to calculate the cost of doing so versus the cost of paying for the use of the City's system. Voluntary participation involves nothing more than weighing the competing costs of participation."

The federal courts have addressed the same issue on several occasions. In *United States v. Columbia, Missouri*, 914 F.2d 151, 155-56 (8th Cir. 1990), the Eighth Circuit found that even the profit component of the city's water and electric utility rates was not an impermissible tax on the federal government, because [t]he United States' obligation to pay the [fee] arises only from its consensual purchase of the City's property; it does not arise automatically, as does tax liability, from the United States' status as a property owner, resident, or income earner. When the United States purchases water, electricity, and related services, and then pays the utility bill, it does so as a vendee pursuant to its voluntary, contractual relationship with the City."

On the other hand, in *United States v. City of Huntington, West Virginia*, 999 F.2d 71, 72-73 (4th Cir. 1993), the Fourth Circuit concluded that a city ordinance imposing a "fire service fee" and a "flood protection fee" on the United States, premised "on the basis of square footage of the buildings" was a tax, and not a user fee, based in part upon the fact that the charge was an "enforced contribution to provide for the support of government." The court found that "liability for the 'user fee' charged by the City arises from the General Services Administration's and United States Postal Service's status as property owners and not from their use of a city service." *Id*. at 74.

In the ongoing litigation involving the stormwater fees imposed by the City of Cincinnati (discussed further below), the courts have sent conflicting signals as to the importance of the "voluntary" nature of the fee. In the original Court of Claims decision, *City of Cincinnati v. United States,* 39 Fed. Cl. 271 (1997), the court held that the storm drainage charge, which was imposed on all property owners within the city and was not the product of a voluntary purchase decision by the federal government, constitutes a tax, not a fee for services, and therefore could not be exacted from a federal entity such as NIOSH.

On appeal, the Court of Appeals for the Federal Circuit agreed that the storm drainage service charge was not imposed as a result of a consensual arrangement between the city and the United States, as would be true in the case of a voluntary purchase of utilities or other services, and found that the stormwater drainage service charge was an assessment imposed on the United States involuntarily, by virtue of its status as a property owner. However, the Court of Appeals did not agree that this fact was dispositive of the question whether the service charge was a permissible fee for services or an

impermissible tax. The Court of Appeals stated that "[t]here may be some instances in which a municipal assessment is involuntarily imposed but would nonetheless be considered a permissible fee for services rather than an impermissible tax." *Cincinnati v. United States*, 153 F.3d 1375, 1378 (6th Cir. 1998).

Whether or not a service charge is mandatory or voluntary is thus a factor to be considered, but is not necessarily determinative of the question whether the charge is a tax or a fee. The Georgia Supreme Court has suggested that whether a charge is voluntary is a factor because, if it is not mandatory, it cannot be a tax. *McCleod v. Columbia County,* 599 S.E. 2d 152 (Ga. 2004) (finding that the county stormwater ordinance was not a tax in part because property owners could reduce the amount of the charge by creating and maintaining private stormwater management facilities).

The reverse, however, is not necessarily true – a charge which is mandatory may or may not be deemed a tax, depending on the circumstances of the particular case. Thus, mandatory fees for various types of municipal services have been upheld by a number of courts in recent years. *See, e.g., Bloom v. City of Fort Collins*, 784 P.2d 304, 304-05 (Colo. 1989) (approving mandatory transportation utility fee); *State of Hawaii v. Medeiros*, 973 P.2d 736, 741-42 (summarizing the declining importance of voluntariness in fees in many state courts); *Hochstedler v. St. Joseph County Solid Waste Mgmt. Dist.*, 770 N.E.2d 910, 916 (Ind. Ct. App. 2002) (approving mandatory recycling charge as a permissible fee); *Rogers v. Oktibbeha County Bd. of Supervisors*, 749 So. 2d 966, 967 (Miss. 1999) (upholding mandatory garbage disposal fee on residents who did not use county's disposal system). *See generally* Reynolds, "Taxes, Fees, Assessments, Dues, and the "Get What You Pay For" Model of Local Government," 56 Fla. L. Rev. 373, (April, 2004).

Fee vs. Special Assessment

The issue whether a stormwater service charge is a "user fee" or a "special assessment," giving rise to different procedural requirements, has arisen in Florida (2003) and Colorado.

In *Gainesville v. State of Florida,* 863 So. 2d 138 (Fla. 2003), the state DOT refused to pay the city's stormwater fee, and the city sued. A settlement was reached in 2001, but when the city sought to validate a bond issue for its stormwater utility in 2003 the state DOT objected, arguing that the fee (based on impervious area using an "Equivalent Residential Unit" formula) was not a "user fee" but a "special assessment" that did not apply to state agencies. The bonds that were issued by the city could not be approved if fees were invalid, since the stormwater fees were pledged as collateral for those bonds. The Florida Supreme Court found that the fees were valid user fees, and the bonds were validated. The city was supported in the Supreme Court by an *amicus* brief

jointly filed by the Florida Stormwater Association and several environmental groups, including Earthjustice and the Audubon Society.

In the earlier case of *City of Cocoa v. School Board of Brevard County*, 711 So. 2d 1322 (Fla. App. 1998), a Florida appeals court found that a stormwater utility fee was neither a "special assessment" nor an "impact or service availability fee," from which school districts were exempted by statute. The trial court had apparently determined that no portion of the fees sought by the city were "user" fees, but the appeals court determined that the record was not sufficient to establish that the school districts were "involuntary" users of the stormwater utility and remanded the case for further proceedings to determine whether the program established by the city was a valid utility established pursuant to the statutory authority granted by the Florida legislature in Fla. Stat. § 403.031(17). That statute authorized the funding of local stormwater management programs "by assessing the cost of the program to the beneficiaries based on their relative contribution to its need," with regular service bills "similar to water and wastewater services."

In *City of Littleton v. State, supra*, both the trial court and the state appeals court had found that the city's stormwater management fee constituted a special assessment under Colorado state law, which could not be charged against the state agencies involved in the case. The Colorado Supreme Court reversed, after reviewing the factors to be considered in determining the nature of a charge imposed by a municipality against property owners within its jurisdiction. Distinguishing between ad valorem property taxes, excise taxes, special assessments, and special fees, the court recognized that the essential characteristic of a special assessment is that it confers some special benefit to the subject property.

In this case, the services for which the fees were charged did not specially benefit the property owned by the agencies. The court stated that "[c]reating the capacity to remove excess water from property and prevent flooding are general services benefiting all property owners. While the performance of these services prevents diminution of the value of land, such services and the facilities necessary to the performance thereof do not directly enhance the value of the property . . . ." Consequently, the court concluded that the city's stormwater charge was not a special assessment, but a service fee reasonably designed to meet overall costs of the service for which the fee was imposed. Although a portion of the fee billed by the city was used to defray costs of constructing and maintaining a drainage system, such costs were found to be reasonably related and essential to the provision of the contemplated services.

Related to Cost of Services

Inquiry into whether the amount of the fee is "reasonable" and directly related to the cost of providing the services rendered has been conducted in cases from Kentucky, Colorado, Virginia, North Carolina and Georgia. One aspect of this

question that is often examined is whether the fees are reasonably related to the actual contribution of the property to the volume of stormwater runoff, or whether all properties are assessed a fixed amount regardless of size.

In *Twietmeyer v. City of Hampton*, 497 S.E. 2d 858 (Va. 1998), the City sued owners of seven residential properties for failure to pay fee based on flat rate. The property owners argued a flat rate fee was not based on contribution to stormwater runoff. The Court found that the city ordinance was not unreasonable because non-residential properties were charged a fee 5 times higher than residential properties ($12.50 per month rather than $2.50 per month).

In one case in North Carolina, the costs of complying with certain elements of U.S. EPA's "Phase II" municipal stormwater permit program were found to go beyond the costs to construct and operate the stormwater drainage system, and the city was ordered to refund that portion of the fee. *Smith Chapel Baptist Church v. City of Durham*, 517 S.E. 2d 874 (N.C. 1999). The City assessed fees on all developed property, based on impervious area. The state Supreme court found in a 1998 opinion that such fees were not covered by a particular state statute, but were nevertheless authorized under the state constitution. However, in its subsequent 1999 opinion after rehearing, the Supreme Court held that the applicable state statute limited fees to the actual cost of providing the stormwater drainage system, and did not cover the entire stormwater management program – in particular, costs incurred solely for compliance with federal environmental regulations (the Phase II stormwater permit requirements). A subsequent amendment to the statute was required to address this issue.

Properties Benefited

The question whether the properties burdened by the fees are receiving a proportionate benefit from the services provided has been examined in Florida (1995), Kentucky (1996) and Alabama.

In the often-cited case of *Sarasota County v. Sarasota Church of Christ*, 667 S. 2d 180 (Fla. 1995), the City imposed a stormwater utility fee on all developed property. The Church argued that the ordinance imposed a tax because it benefited the community at large and church received no specific benefit. The Florida Supreme Court held that the fee was valid because all properties with impervious surfaces benefited from the stormwater services.

In *Kentucky River Authority v. City of Danville, Kentucky,* 932 S.W.2d 374 (Ky. App. 1996), the city argued that it received no benefit from the activities of the Authority. The court disagreed, holding that the preservation of the watershed was a benefit that accrued to all within its boundaries. The court likened the fee to emission fees collected from entities that emit air pollutants and are used to fund the state air program, noting that although there may be no direct or immediate benefit to the payer of the fees, the use of the air and the contamination of it are sufficient to justify the imposition of the fee.

In *Densmore v. Jefferson County, supra*, the Plaintiffs alleged that a county stormwater fee was an unconstitutional tax with no relationship to benefit received by property owners. The Alabama Supreme Court held that the fees were valid because the benefit conferred on property owners need not relate directly to the exact amount paid.

Application to Capital Improvements

Whether or not the fees must be confined to the actual cost of providing stormwater services alone, or whether any surplus can be collected and applied to the cost of system expansion and capital improvements has been litigated in Ohio, Tennessee, Colorado and North Carolina.

In *Wooster v. Graines,* 556 N.E. 2d 1163 (Ohio 1990), the City of Wooster adopted an ordinance to establish a storm drainage utility for maintaining, repairing and improving the sewer system (fees were based on impervious area). The owner of a shopping center refused to pay, claiming the fee was invalid because city accumulated a surplus to fund capital improvements in new areas. The Ohio Supreme Court held that the ordinance was valid because sewer funds were segregated and reserved for future sewer projects in Wooster.

Application of stormwater fees to capital construction costs was also upheld in the *City of Littleton, Vandergriff,* and *Smith Chapel Baptist Church* cases, discussed above.

FEDERAL FACILITIES

The imposition of stormwater fees on federal facilities involves a special consideration of the tax vs. fee issue. The general principle that states cannot tax the United States derives from Chief Justice Marshall's opinion in *McCulloch v. Maryland*, 17 U.S. (4 Wheat.) 316, 4 L. Ed. 579 (1819). Although the immunity of the federal government and its instrumentalities has been the source of often conflicting decisions, "the one constant . . . is simple enough to express: a State may not, consistent with the Supremacy Clause, U.S. Const., Art. VI, cl. 2, lay a tax 'directly upon the United States'. . . . The Court has never questioned the propriety of absolute immunity from state taxation." *United States v. New Mexico*, 455 U.S. 720, 733, 71 L. Ed. 2d 580 , 102 S. Ct. 1373 (1982).

On the other hand, it is well-established law that the United States must pay reasonable user fees. For instance, charges for services from city-owned utilities are clearly fees for which the federal government would be liable to the same extent as any other customer. *See United States v. Harford County, Maryland*, 572 F. Supp. 239, 241 (D. Md. 1983) ("The federal government has . . . recognized its obligation to pay state or county charges based on the quantum of water or sewer services rendered.")

Furthermore, the Clean Water Act contains an express waiver of sovereign immunity for certain pollution-control related fees. Clean Water Act § 313(a) ("Federal facilities pollution control") expressly provides that:

> Each department, agency or instrumentality of the executive, legislative, and judicial branches of the Federal Government . . . shall be subject to, and comply with, all Federal, State, interstate, and local requirements . . . respecting the control and abatement of water pollution in the same manner, and to the same extent as any nongovernmental entity <u>including the payment of reasonable service charges</u>. . . . This subsection shall apply notwithstanding any immunity of such agencies, officers, agents, or employees under any law or rule of law.

Importantly, this waiver applies only to fees or service charges, and not to taxes. As seen in the numerous state cases discussed above, this distinction is often difficult to make in practice. The United States Supreme Court has established a three-pronged test for determining whether fees imposed by local governments on federal facilities are "reasonable service charges" or taxes (*Massachusetts v. United States*, 435 U.S. 444 (1978)):

- Is the fee or service charge non-discriminatory?
- Is it a fair approximation of the cost of the benefits received?
- Is it structured to produce revenues that will not exceed the regulator's total cost of providing the benefits?

Under the *Massachusetts* case, 1) the federal government must not be treated any differently in the enforcement of the fee requirement than other regulated entities; 2) the fee charged must be a fair approximation of the benefits received to be considered "reasonable;" and 3) the fee must be structured to produce revenues that will not exceed the total cost to the state of the benefits supplied. This test has been applied to environmental fees in several cases, most notably the long-running litigation involving the New York State Department of Environmental Conservation (NYSDEC) and the U.S. Department of Energy (USDOE).

That series of cases involved the question of whether certain hazardous waste regulatory charges imposed by New York on federal installations were "reasonable service charges" within the meaning of the sovereign immunity waiver provision in the Resource Conservation and Recovery Act, 42 U.S.C. 6961. In January 1989, NYSDEC brought four consolidated actions in New York State Supreme Court against USDOE to recover unpaid environmental program regulatory charges, including hazardous waste program and waste transporter program charges, assessed by the NYSDEC against ten federal facilities from 1983 to 1989. USDOE counterclaimed for a refund of approximately $ 400,000

and related relief for regulatory charges already paid. Those actions were subsequently removed to the District Court for the Northern District of New York.

Arguing that the waste regulatory charges were unreasonably high, USDOE asserted that in every year between 1983 and 1989, "total waste regulatory charges exceeded [NYSDEC]'s actual services [to the ten federal facilities] by a ratio of approximately nine to one ($1,163,591.58 vs. $ 126,792.13)." The District Court denied both parties' motions for summary judgment because neither party had submitted evidence "as to the value of the overall benefits the facilities receive in light of the programs and services made available to them by [NYSDEC] should the need for such assistance ever arise." *New York State Department of Environmental Conservation v. United States Department of Energy*, 772 F. Supp. 91, 99-100 (N.D.N.Y. 1991).

In later proceedings, the District Court granted NYSDEC's motion for partial summary judgment and denied USDOE's motion for summary judgment. *New York State Department of Environmental Conservation v. United States Department of Energy*, 850 F. Supp. 132 (N.D.N.Y. 1994) ("NYSDEC II"). The District Court explained that the *Massachusetts* test "requires only a rational relationship between the method used to calculate the fees and the benefits available to those who pay them." *Id*. at 143. The Court found such a relationship in this case because (1) larger facilities are more expensive to regulate and require more services than smaller facilities; (2) all services which NYSDEC provides pursuant to these regulatory programs, whether used or not, are available to the United States should they be needed in the future; and (3) the total receipts from these regulatory fees have been substantially less than the actual costs of these programs – all of which demonstrates that NYSDEC's method of calculating its charges results in a fair approximation of the cost of the use of the system.

Following two additional decisions by the district court in 1997 and 1999, the case reached the Second Circuit Court of Appeals. *Jorling v. United States Department of Energy*, 218 F.3d 96 (2d Cir. 2000). At that point, only the reasonableness of the hazardous waste fee was at issue. USDOE did not dispute the first or third parts of the *Massachusetts* test. It acknowledged that NYSDEC's waste regulatory charges were non-discriminatory and were not structured to produce revenues that would exceed the total cost to NYSDEC of the benefits to be supplied. However, it disputed the second part of the *Massachusetts* test, challenging the District Court's finding that no reasonable jury could find that the waste regulatory charges did not meet the "fair approximation" component of the *Massachusetts test*. USDOE argued that the charges cannot meet that component of the test because the charges from 1983 to 1989 exceeded the cost of supplying the services actually received by a nine to one ratio.

The Court of Appeals found that, under *Massachusetts*, a fair approximation of the use of the service adequately serves as a surrogate for an otherwise complicated and expensive attempt to allocate costs. The court cited *Brock v. Washington Metropolitan Area Transit Authority*, 254 U.S. App. D.C. 190, 796 F.2d 481, 485 (D.C. Cir. 1986) for the proposition that "*Massachusetts* did not hold that a user fee must represent retrospectively a close approximation of the actual, historical benefit to the user. Rather, *Massachusetts* held only that the method used to calculate the fee must rationally be designed to approximate prospectively the benefit to the user." The court also found that the *Massachusetts* test applies not only to services used but also to services available for use. Based on these principles, that court found that NYSDEC's waste regulatory charges meet the "fair approximation" component of the *Massachusetts* test, because the method of calculating the hazardous waste program charges was reasonably designed to fairly approximate use of the hazardous waste system's available services, and thereby to approximate the cost of supplying such services to particular generators of waste or operators of waste facilities.

The principles established in the *Massachusetts* case and explored in the *NYSDEC* litigation are currently the subject of ongoing litigation between the City of Cincinnati and the U.S. Department of Health & Human Services (HHS). The National Institute of Occupational Safety and Health (NIOSH), a part of HHS, refused to pay stormwater fees due under a 1985 city ordinance using formula based on size of property and "intensity of development" factor to determine "equivalent runoff units." The city initially attempted to bring suit in Federal Court of Claims based on "implied contract" for services. In *City of Cincinnati v. United States,* 39 Fed. Cl. 271 (1997), the Court of Claims dismissed the claim as an unconstitutional "tax" based on property size rather than services actually used. In *City of Cincinnati v. United States,* 153 F.3d 1375 (Fed. Cir. 1998), the Court of Appeals for the Federal Circuit upheld the lower court's dismissal of the case, but only because there was no "implied in fact" contract between the city and the federal government, and the Court of Claims therefore lacked jurisdiction to hear the case. The Court of Appeals expressly declined to rule whether or not the city's storm drainage service charge was a tax or a fee.

In October 2003, the City re-filed its claim in U.S. District Court, asserting jurisdiction under the Tucker Act and the Declaratory Judgment Act. *City of Cincinnati v. United States,* Case No. 03-731 (S.D. Ohio, filed 10/23/03). The United States filed a Motion for Judgment on the Pleadings in February 2004, arguing *res judicata* and lack of subject matter jurisdiction. In May 2004, the City moved for leave to file an Amended Complaint based on its local ordinance and the waiver of sovereign immunity in CWA § 313. The case was still pending before the District Court for the Southern District of Ohio as of October 2005.

SUMMARY AND CONCLUSIONS

Although stormwater management fees have been upheld in the majority of states where they have been challenged, the passions inspired by the general public perception that any new governmental fee is a disguised and unlawful tax ensures that challenges to such fees will continue to arise. Determining the legality of the financing mechanism chosen for any municipal or county stormwater program will depend upon a close analysis of local state law. Nevertheless, certain general principles emerge from the cases discussed above.

(1) In order for a stormwater service charge to be regarded as a fee, rather than a tax, the local government should be prepared to demonstrate that the overall cost of the program is reasonably related to the value of the service being provided, and that the funds raised are segregated for use by the stormwater program and not for general revenue purposes.

(2) The fee should be structured so that the amount charged to particular properties is proportional to those properties' contribution to stormwater runoff. The distinction may be as simple as a different fee for residential and commercial properties, or as elaborate as a sliding scale based upon "impervious area" or degree of development.

(3) Some provision should be made so that participation in the program can be characterized as "voluntary," whether it is accomplished through an "opt-out" provision for properties with their own stormwater management facilities or a more complex system of credits or offsets based upon the amount of volume actually contributed to the public stormwater system.

(4) In states such as California, Michigan and others with special constitutional provisions governing the imposition of any new tax, it may be wise to seek the requisite voter approval for implementation of local stormwater funding programs even if they are designed and intended to be fee-based rather than tax supported.

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CHAPTER 4

IMPLEMENTING USER-FEE BASED FUNDING

OVERVIEW

The dynamic change which has occurred in the expectations placed on the municipal stormwater program has overwhelmed traditional stormwater program funding. This has driven the exploration of new funding strategies and given rise to the increasing popularity of user fee/utility based approaches.

The breadth of the changes motivating this exploration has required that not just funding mechanisms be explored. The services delivered by the municipal stormwater program, the quality of those services, the degree to which they satisfy local expectations, and the degree to which they satisfy stakeholders needs, become critical elements in structuring user fee based funding. In the eyes of stakeholders, implementing a new stormwater funding mechanism is secondary to receiving good stormwater system service. The performance of the stormwater program, as perceived by the program's stakeholders, therefore, becomes a focal point of the effort to develop a functional stormwater funding program.

Implementation of user fee based funding involves a related set of actions and activities. These occur within a flexible framework that promotes due diligence in five key areas of focus: political, financial, legal, informational and technical. In some communities a simple vote of the governing body is all that is needed to implement a funding mechanism. In these cases, little program education, stakeholder involvement, and background information may be needed to secure the necessary authorization. In most cases, however, a much more involved process is necessary to bring about program and funding actions. This chapter discusses this framework and process.

FORCES DRIVING ACTION

As described in Chapter 1, over the last thirty years stormwater programs have gone through significant shifts in basic philosophy, approach and service expectation. Originally stormwater programs were intent on efficient drainage, taking runoff quickly to nearby streams. Resulting flooding then caused local communities to change their basic philosophy from "efficient drainage" to one of "flood control" through the imposition of detention requirements and stricter floodplain controls.

Later still the concept of "stormwater master planning" began to replace ineffective detention programs. Then, in the late 1980's stormwater program managers were faced with the need to also address stormwater quality through NPDES and other regulatory programs.

Today there is a convergent set of stormwater program forces that has moved stormwater to a full-fledged urban utility service stature similar to water and wastewater. These forces can vary from community to community, but generally can include:

- aesthetic and regulatory demands for "greener" environmentally friendly stormwater systems, sometimes without clear definition of what that means, or a track record in concept performance or sustainability;
- multi-objective disaggregated stormwater system components that integrate conservation and preservation practices, sometimes called, Low(er) Impact Development;
- integration of stormwater infrastructure planning and design with site layout and function, sometimes called Better Site Design;
- redevelopment that incorporates "micro-systems" of pollution removal
- a plethora of commercial and industrial site controls;
- the need, often mandated through endangered or threatened species considerations, to integrate ecological assessments and designs;
- mandated public education and involvement in stormwater program conception and implementation, and the emergence of non-profit interest groups;
- demanding regulatory requirements evolving in a fast changing legal arena, and on again/off again numeric pollutant criteria;
- ongoing program needs for maintenance and capitalization of the system, often with extended levels of service; and
- significant reductions in general fund dollars for stormwater programs concurrent with the doubling of stormwater program costs.

THE STORMWATER UTILITY, PROGRAM CONCEPT AND DUE DILIGENCE

Utility Program Concept

The stormwater utility is an umbrella under which individual communities can address their own specific needs in a manner consistent with local problems, priorities, and practices. A stormwater utility provides a vehicle for:

- ► consolidating or coordinating responsibilities that were previously dispersed among several departments and divisions;
- ► generating funding that is adequate, stable, equitable and dedicated solely to the stormwater function; and
- ► developing a program that is comprehensive, cohesive and consistent year-to-year.

A stormwater utility is equitable because the cost is borne by the user on the basis of demand placed on the drainage system. It is stable because it is not as dependent on the vagaries of the annual budgetary process as are taxes. And it is adequate because a typical stormwater program can be financed with charges within the limits of the customer's willingness to pay.

No two successful utilities are identical just as no two cities are just alike. Therefore, it is not prudent to follow a pre-fabricated "one size fits all" approach, but to carefully seek to understand the make-up of the community, its problems, its goals, and its resources. There must be a clear understanding of the community's stormwater related systems, capabilities, and issues.

Some communities have simply attempted to clone a stormwater program or utility rate methodology of another city or county. Some consulting firms have attempted to sell a uniform approach. A local community should carefully guard against such a temptation. A stormwater program, rate structure, or billing methodology cloned from somewhere else rarely can sustain intense scrutiny by a staff, advisory committee, elected officials, or interest groups or the community at-large if the program utility doesn't meet local needs. Such programs often fail.

The real danger of the cloning approach is that it inevitably falls short of meeting the local stormwater program expectations because it is not founded on addressing them. As was mentioned in Chapter 2, the local problems, needs, and circumstances must drive the form, priorities, and pace of the program. The success of leading stormwater utility programs is based on tailoring the program and financing strategies to the local needs and solving real short-term and long-term stormwater problems.

Due Diligence

"Due diligence" is the process of insuring that the community's program and funding expectations will be met. It includes the formulation and execution of a plan with appropriate levels of investigation, establishment of facts, estimation of future prospects, framing of assumptions and risks, and establishment of a plan of action and funding. It can also result in a decision not to act.

Attempted stormwater utility implementations have failed for a number of reasons, most of which have to do with inadequate due diligence. For example, some key reasons given in failure post mortems include:

- Not understanding the process and cutting key corners
- Failure to establish stakeholder support
- Failure to identify and account for hurdles
- Inadequate legal assessment of the authority for a particular rate structure
- Failing to work with media
- Inability to focus the stormwater program on citizen felt needs
- Inaccurate databases without ability to appeal
- Poor citizen or customer service
- Rate structures without rational nexus
- Rate structures too complex to explain and seemingly inequitable
- Failure to understand political timing

Due diligence must be pursued along four major areas of concern, or tracks. These tracks, which are foundational to the utility implementation process and which are discussed in the implementation section of this chapter, are as follows:

- **Public** – are there appropriate levels of involvement of key stakeholders, is the general public handled correctly, is the media appropriately involved, is customer service accounted for, are staff and political leadership elements accounted for and handled appropriately?
- **Program** – does the program make sense, is it compelling, is it within the community's ability and willingness to pay, does it meet citizen perceptions, is it action oriented?
- **Finance** – are legal tests satisfied, is it simple yet fitted to the local situation, does it have the perception of equity, are proper steps followed, does it support the stormwater program?
- **Database** – is the database accurate within legal requirements, is there an appeals process, is it maintainable within reasonable cost constraints, are anomalies accounted for, is customer service appropriate and responsive?

The cost of appropriate due diligence is not insignificant but should be kept in perspective. Experience has shown that, should a stormwater utility fail it takes

five to seven years for there to be a staff and political willingness to make another attempt. The opportunity cost of failure is then five to seven years of lost revenue. For example, for a stormwater utility that raises $2,000,000 per year the opportunity cost of failure is $10 to $14 million. The cost to do a thorough job of due diligence in this example, however, is rarely more than $350,000, one to three months' revenue.

Additional benefits of appropriate up front due diligence include:

- Better initial and long-term public knowledge and cooperation leading to greater support and participation.
- A funding rate structure that matches and meets short and long term program needs leading to stable, adequate funding.
- A stormwater program that can meet both the capital and operations needs of the local community, leading to better services and ability to meet regulatory demands.
- More efficient long-term database maintenance, leading to lower operating costs and better customer service.

Those communities that have cut corners in due diligence normally find themselves hampered in their ability to manage the database, meet customer expectations, solve flooding problems, meet regulatory needs, and modify the program or utility to meet changing demands. A process can be developed that facilitates such change while maintaining the effectiveness of the stormwater program and the utility.

CREATING MOMENTUM AND A PROCESS FOR PROGRAM ACTION

The ability to bring about action that moves a stormwater program forward and produces the necessary funding, depends on the ability to bring key leaders to an understanding of the problems, and a vision of the solutions. To achieve this understanding and to create such a vision requires a logical and acceptable process which leads a community to action.

Understanding Problems

Understanding of the problems involves building a "compelling case for action". In every community there are good, even compelling, reasons to improve the way stormwater programs are executed. It might be a popular stream that is becoming increasingly impacted, a lack of riparian park space, decaying drainage infrastructure and mounting complaints, unfunded regulatory mandates, local flooding, financial pressures, loss of fish, beach closings, a roadway or bridge collapse, or law suits. Such issues draw the attention and energy of stakeholders and leaders to opportunities for action.

Assembling a "compelling case" is step one in developing this understanding and bringing about action. People in general are motivated along two complimentary courses of persuasion – information (data) and stories. Some people want facts and statistics (data), while others are moved to action by horror stories and pictures. When we begin to quantify the community's perception of program need or make the case for change and new funding, we seek to address both types of people. Table 4-1 gives some examples taken from successful stormwater utilities.

Information	Stories
• Statistics on repair costs • Cost information • Infrastructure information • Lost revenue or tourist dollars • Regulatory Facts • Backlog information on flooding • Unfunded mandate information	• Flooding pictures • Horror stories • Movies • Testimonials • Environmental or aesthetic appeals • Drawings of a future greenway, trail, etc.

Table 4-1: Building Blocks for a Compelling Case

Building a compelling case and knowing when, how, and to whom to present it is more of a political and technical art form than it is a science. But taking time to build informed consent to move forward and to support program change and new funding methods is vitally necessary.

Vision for the Future

People rarely rally around simply solving problems. It is in creating a vision for what could or should be that causes people to begin to support the concept of a stormwater utility as a vehicle for action.

Building vision is a process of moving from recognizing problems, needs, issues and opportunities to seeing the way things could be. It involves seeing what others have done and showing how practical solutions can create significant improvement in the quality of life.

An artist's rendering of what an ugly polluted stream could become can help rally people. A seminar or workshop with representatives from other places telling about wonderful changes in their community gets people leaning into change. Sometimes simply showing how problems would be solved brings about a determination to move forward.

Bringing About Action

Leaders often agree that there must be action to bring about recommended improvements but are not sure how to begin. The use of a citizen's stakeholder group is an effective technique which facilitates development of problem understanding and of the vision for the future, and is a useful part of the process for action. Ten to fifteen people who adequately represent key positions or ideas can move together through the process.

Sometimes these meetings are over-controlled by well-meaning facilitators, or a citizen's group is asked to merely react to a fully developed solution. In both cases creativity can be stifled, citizen's can lose interest, and input can deteriorate. But if allowed true input, the group will have ownership of the plan and will often help sell it.

An effective tool in bringing about action is the business plan approach as discussed in Chapter 2. Facts are fine, but process, such as that produced by a stormwater business plan, moves things forward, formulating a road map and structure for action.

Business planning has not been a normal approach for local government. Local government has not typically thought of itself in terms of what it is selling, how it measures success, and who the customer is. A generic business plan asks and answers the following questions:

- Who we are?
- What business are we in?
- What's going on now?
- Where do we want to go?
- How do we want to get there?
- What are the steps to make it happen?
- How will we know when we have arrived and, how can we demonstrate it to someone else?
- How we will pay for it?

The business plan model, which measures goals in "program efficiency" and "program effectiveness", must be somewhat modified for local government use. Resistance to getting lost in too many technical details will help move the business plan to a useful conclusion.

Process Framework

The development of problem understanding and a future vision, and the exercise of such tools and techniques as a stormwater business plan and citizens impact groups require a structured format to insure a successful outcome. In this case, that outcome would be a utility structure for a comprehensive stormwater program. Figure 4-1 illustrates an overall process framework for development of

a utility funding mechanism. Only the first and third steps might be considered absolutely necessary. The steps are:

- ► Quick Concept Study – answers the question: "does the proposal make sense", and if the answer is "yes" the work goes forward.
- ► Feasibility Study – creates both information and momentum for implementation, and is used as an intermediate step if success is not fairly certain.
- ► Utility Implementation – is the process of working in a coordinated and logical way through the details of planning implementation and due diligence.

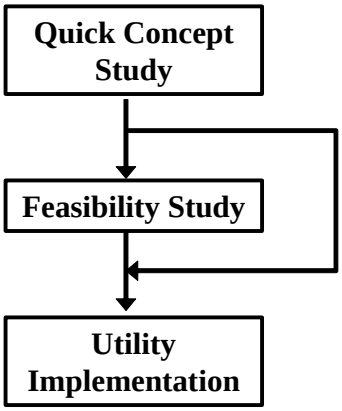

Figure 4-1: Overall Process Framework

PROCESS FRAMEWORK, QUICK CONCEPT STUDY

The purpose of this step is to assess the basic advisability of pursuing a stormwater program and funding assessment with the potential of implementing a stormwater user fee. Designed to be low cost, fast paced, and focused, it:

- ► Tests the water with very little political, financial, or emotional investment,
- ► Can normally be authorized without an RFP,
- ► Operates "under the radar" as an internal quick study,
- ► Builds internal vision for going forward,
- ► Can happen very quickly, taking only days to complete.

A consultant team or in-house facilitator typically takes the staff through a consideration of the following questions, and the answers leading to both a program and funding direction:

- ► What is the local government currently doing in terms of stormwater management?
- ► Why should the local government pursue a study and potential funding method like this, what is the compelling case?
- ► What stormwater program priorities should guide the local government in the next three to five years?
- ► What larger program improvements should be made and what would be the costs? What is the revenue potential of a utility fee or other major revenue source?
- ► What are the major hurdles or potential "show stoppers" to going forward?
- ► What are the immediate next steps should a "GO" decision come out of this study?

Integrated into this study is the potential for staff presentation of the findings and an educational/informational overview of a stormwater utility funding mechanism.

PROCESS FRAMEWORK, FEASIBILITY STUDY

The purpose of the feasibility study is to assess the local government's existing stormwater management program, to make recommendations for future directions and changes, and to assess the feasibility of funding the program with a stormwater utility (user fee) and other methods.

Figure 4-2 illustrates a typical "roadmap" for the feasibility study.

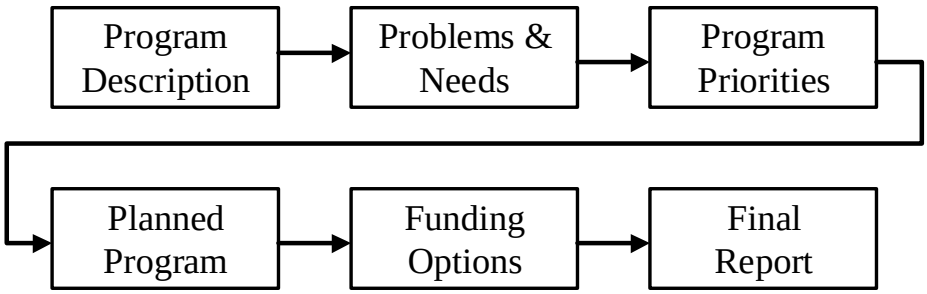

Figure 4-2: Feasibility Study Roadmap

Typically a group of citizens and staff are taken through a consideration of the following questions, the answers leading to both a program and funding direction:

- ► What is the local government currently doing in terms of stormwater management?
- ► What are the stormwater related problems, issues, needs, resources, and opportunities currently faced by the local government?
- ► What stormwater program priorities should guide the local government in the next three to five years?
- ► What specific program improvements should be made and what will be the costs?
- ► What is (are) the best way(s) to pay for these program improvements?
- ► How should the funding method(s) be implemented?

The feasibility study is used when there is an inclination to go forward with a stormwater utility but sufficient support has not been developed to insure adoption of a utility ordinance. The feasibility study essentially accomplishes the first few steps in establishing a stormwater utility without the commitment from elected officials to make the final decision.

The feasibility study can be a worthwhile endeavor because it:

- ► is low risk; even if implementation of a utility is found infeasible, the study is a success because it accurately determined a “no go” decision was best;
- ► tests the water before committing to a user fee, giving political leaders a sense of safety because the approach is phased and involves others in the “go” decision;
- ► provides broader backing and wider support among the community and brings them into the process early;
- ► builds momentum and support toward a “go” decision through logical consideration of program needs and concerns;
- ► provides an early warning of hurdles and pitfalls;
- ► saves time and money because implementation costs can be defined and may be lowered by anticipation and planning; and
- ► develops sufficient legal due diligence to allow for borrowing of the implementation costs, with later payback from the user fee revenue stream.

The advantage of this kind of feasibility study over some other approaches is its initial focus on problem solving. The focus of the feasibility study is not just revenue generation but program improvement. This initial concentration on

identifying and solving problems is key, and follows the process for bringing about action discussed previously.

Often the use of a citizen's group serves as the vehicle for taking the local government through the business plan approach and the roadmap in Figure 4-2. This can be accomplished in four to seven meetings and can be very participation oriented.

Other forms of stakeholder participation in the feasibility study can involve:

- citizen review of a previously completed consultant study where it is presented in a series of meetings with comment sought;
- public forums where issues are openly discussed by a panel with questions and input sought from the audience; or
- study groups where a specific need, such as flooding, is investigated leading to solution concepts and identification of funding needs.

PROCESS FRAMEWORK, UTILITY IMPLEMENTATION

Regardless of the use of a feasibility study, the implementation of a successful user fee follows four "tracks" of activity. Figure 4-3 outlines these four tracks in an overall utility implementation flow chart. It is crucial that these four tracks are coordinated and timed to occur as shown. While there are almost infinite variations on this figure, the key activities within the figure are all important and should not be skipped.

For larger communities there can be a manager for each of the four tracks. For smaller projects a single manager can handle multiple tracks, though it often makes sense and increases project success for each track to have an experienced expert in the lead.

The Public Track

Though not resulting in an "operational" part of the utility, this track serves the whole process. It involves four basic phases: planning the public involvement and information process; conducting the involvement and public education process; carrying out the implementation campaign; and monitoring utility implementation and customer service.

Often a citizen's stakeholder group is involved. A citizens group can assist in the work of all four tracks and is particularly useful in establishing policy and priorities and to serve as eventual proponents of the recommended action.

Stormwater utilities are rarely infeasible technically, and legal constraints can usually be overcome. It is in development of public, stakeholder, and political

support that the difficulties often arise. Thus the Public Track is often the key to success of utility development efforts.

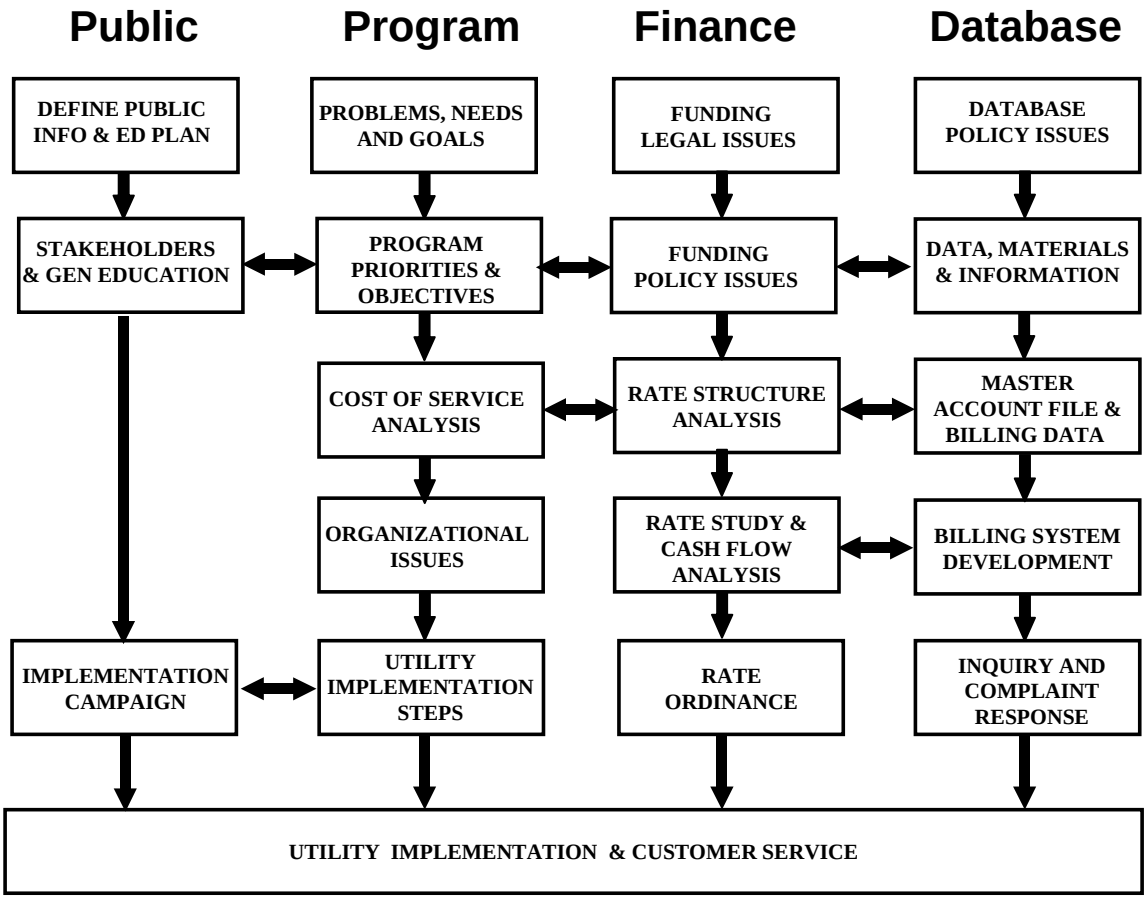

Figure 4-3: Utility Implementation Approach

It is important to remember that there are many "publics" in a local community, and that each has a stake or special interest in a stormwater utility with reasons to both support and oppose it. The following are examples:

"Public"	"Special Interest"
► Developers	Regulatory and Financial
► Environmentalists	Stormwater Quality, Habitat
► Neighborhoods	Flooding, Convenience, Property Values
► Clubs	Participation, Voice
► Social, Ethnic, Economic	Locations, Jobs, Costs
► Tax Exempt Entities	Utility vs. Tax
► Political Leaders	Timing, Message, Process
► Media	Is it "News"?
► Commercial/Industrial Entities	Costs, Credits, Service
► Technical Specialists	Standards, Criteria and Procedures

Early in the process, preferably during a feasibility study, a Public Information and Education Plan (PI&E Plan) which asks the following questions should be developed. This plan serves as the roadmap for the work of the Public Track.

- ► Who is the public?
- ► What is the message?
- ► When do we send the message?
- ► How is the message sent?
- ► What is the emergency response when trouble occurs?

Well crafted information, strong media involvement, a speakers' bureau, videos, citizen speakers, billboards, mailers, and public meetings, have all been used in effective public information programs. There is no one right approach as each community and sub-element within the community, may obtain its information and make decisions differently. In one, key decisions are made by leading business leaders. In another the council may make the decisions with little input. In one community environmental interests prevail; while in another, solving flooding is key. In some places environmental justice and the economically disadvantaged are primary, while for others it is not. Thus, it is important to understand the character and makeup of the community.

The Program Track

This track assesses the basic problems, needs and goals, establishes program priorities, lays out a three to five year program, develops a costing of that program, and finally, sets up implementation steps. The program is the final determinant of the revenue plan, utility rate and rate structure, although due regard must be given to the customer's willingness to pay for stormwater given other demands on citizens' resources.

The program is also what sells the utility concept, and it is the Program Track process which addresses the most fundamental of questions. How do we convince citizens and stakeholders of the need for an alternate funding source? Or, how do we craft a stormwater program that meets the needs of the local community without exceeding available funding?

The program track begins by identifying the compelling case discussed previously (problems/needs). This is translated into three to seven key program priorities and the new stormwater program is formulated with a cost of service analysis, into a detailed three to five-year program plan. Longer term planning in less detail is also useful.

Normally, for multiple jurisdiction utilities, the governance questions must be addressed in a preliminary way, early in the process. But it is normally prudent to address organizational and management issues at the end of the Program Track. It is better to first focus on the functions of the stormwater program rather on who

might perform them. This defers potential organizational issues to the end where they are more easily resolved by the completed program planning information.

The basic elements of a stormwater management program, which must be addressed by the Program Track, include both operational and financial functions. These might include:

- ► Operations and Maintenance
- ► Regulation and Enforcement
- ► Engineering and Planning
- ► Capital Construction
- ► Administration and Finance
- ► Regulatory Compliance
- ► Billing and Collections

The final assessment and planning step in the Program Track is the identification of the steps required to implement a utility. Those steps include a determination of the mix of revenue types to be used, the structure of the utility rate and the administrative functions which will implement and support the utility. These factors/elements are addressed in more detail in Chapter 2 of this guidance. The legal foundations of the revenue mix are addressed in Chapter 3 and are a principal focus of the Finance Track of the Utility Implementation Approach shown in Figure 4-3 of this chapter.

The Finance Track

The Finance Track sets up the legal and financial basis for the stormwater funding program. In this track the planning process examines legal parameters of the revenue options, explores and establishes policies which will govern the revenue program, analyzes factors which will determine the structure of the rates to be levied, determines the revenue needed, and develops ordinances needed to implement revenue policies, rates, enforcement and equities.

It is in this track that fundamental questions concerning financing of the stormwater program are addressed. Who should pay for the stormwater program? What is the appropriate cost share to be borne by each benefited segment of the community? When or how frequently should payment occur; and what mix of revenue types or methods should be used to accomplish this payment such as fees, assessments, taxes, and/or utility?

In addition to these policy questions, the Finance Track also addresses legal questions. What revenue authority already exists? What legal authority is needed to implement the desired revenue mix; and what legal foundation is needed to support the levy of each of the individual revenue types (nexus, benefits, service)? A more detailed discussion of these issues is found in Chapter 2 and 3 of this guidance.

It is very important to have established a logical and rational nexus for each revenue policy decision, for the rates to be charged, and for ancillary charges, credits, and offsets. The Finance Track establishes the myriad of basic financing policies needed. Then, based on appropriate legal authorities and foundations, and on program input, it moves from development of a revenue structure to meet the program needs, to a rate structure study and cash flow analysis and finally to an ordinance.

It must be stressed that the Finance Track must work in support of the Program Track. The development and implementation of a stormwater funding program in general, and a utility in particular, must be intricately linked to the functions, goals and beneficiaries of the stormwater program to assure both equity and adequacy of the revenue levies. Revenue levies not consistent with benefits or services received; or not adequate to address identified heeds, will quickly lose community support.

The Database Track

The Database Track has application to many stormwater revenue types, but is of foundational importance to the implementation of a stormwater utility. This tract has five main purposes:

- ► to determine the appropriate database and fields,
- ► to develop the master account file,
- ► to develop a mechanism to deliver the bill to the customer,
- ► to determine database maintenance processes, and
- ► to monitor customer service.

The Database Track is that portion of the planning process in which the decisions made in the preceding tracks are used to create the administrative infrastructure which will compute the revenue levy for each parcel, deliver the bill, record the payment, and monitor the results. The process involves policy assessment and development, evaluation of database options, design of the master account file and selection of a billing and record system. A database can also provide the means to track complaints and service deficiencies. During the Database Track, the revenue program policy decisions made in the Finance Track are given form and application, producing an actual revenue levy on real properties.

The master account file is a derivative of the rate methodology selected. For example, an impervious rate methodology requires the estimation of the impervious surfaces on each parcel. However, the availability of data could also influence the rate methodology decision. Should, for example, land use data be available then it might make sense to construct a rate methodology that uses development intensity factors to reflect the impervious fraction. In some cases the tax assessors file has sufficient number of relevant fields and accuracy to allow for a surrogate of development intensity without a lot of hand work. Addressing these decisions necessitates the connectedness of the Database

Track and the Finance Track as shown in Figure 3. An expanded discussion of rate methodologies is found in Chapter 2.

Some data sources may not be helpful. GIS coverage's, not made to generate stormwater billings and "impervious coverage's", may not contain all the impervious areas of properties. Often they simply approximate buildings and use lines to outline parking lots. Also, parcel information, scanned from paper files, is often warped in relation to the real world. The database developer must search for the best available information or develop information from scratch.

Newer methods involving satellite imagery are coming into popularity for larger areas, low tree cover, and limited budgets. There are, however, significant accuracy problems and the success of such a method depends on the image processing skills of the technician as much as technical specifications of the imagery.

There are generally four options for billing systems. The most common is to use an existing utility system, such as water or wastewater. This has advantages in that stormwater looks like water and wastewater and the charge is clearly a fee for service, not a tax. Another advantage is that delinquencies are low, and it may be possible to turn off water for partial payment of the combined bill even though the customer may have intended to pay the non-stormwater portion of the bill.

Billing the fee on a tax bill may have advantages and disadvantages as well. Using the tax parcel file has the advantage that stormwater is essentially a parcel-based function, creating a direct relationship to the vast majority of the parcels. A disadvantage is that the tax bill is mailed once per year for the majority of properties complicating program cash flow.

The stormwater bill can be placed on another type of utility bill (e.g. electric) but that typically lacks a clear nexus. The last option is to create a stand-alone billing system. This has all the advantages of control and focus, and all the disadvantages of high cost and lack of ability to enforce collections.

Recently local communities are looking at integrating the database support of many of their functions related to infrastructure and customer service. For example, some, or all of the following functions can use overlapping databases:

- Utility Billing systems
- Geographical Information Systems
- Dedicated Stand-alone Systems
- Maintenance Management Systems
- Customer Service Systems
- Complaint Tracking
- Accounting and Financial Management
- Property Tax Systems

Depending on the rate methodology the following fields may be required in the database:

Occupant	Impervious area*
Owner	Parcel ID number
Service address	Runoff coefficient*
Property address	Equivalent stormwater units*
Customer type	Customer account number
Land use code*	User fee
Gross area*	Optional fee or information fields

[* Factors which are required for various stormwater fee rate methodologies.]

POLICY ISSUES

The implementation of user fee or utility based funding for stormwater has numerous policy implications. The policies aggregate around the key issue of deciding how service charges should be implemented and applied to specific properties in a consistent and fair manner.

Timing of policy analysis is also important. Some issues must be decided early in the process, such as the extent to which a utility is to be the sole, primary, or secondary revenue source. Other issues will be addressed much later, such as the choice of the billing systems. Still other issues will not arise until the utility is functioning, such as the disposition of specific appeals and requested rate/levy adjustments.

Thought must also be given as to who will make specific policy decisions. The Council formally adopts through ordinance or policy edict many of the major policies which guide the municipality's stormwater revenue program. Although policy-making in the highest sense is reserved to the Mayor and Council, day-to-day policy decisions are, in fact, often made at several levels. .

The Mayor may make some policy decisions based on Council positions. Other policy decisions are made by municipal management and staff administrators pursuant to general directives spelled out by the Mayor and Council. It is important to recognize the need for and functioning of this dispersed policy-making environment, and create a defined hierarchy for the review of important issues. The following is a sample of possible decision levels. Issues which could be decided at each level must be determined by each community.

- key staff and consultants
- other involved staff
- advisory committee
- manager's office
- municipal council/mayor

An initial screening of issues for the purpose of weighing their significance and determining the appropriate decision level must consider the following:

- impacts of policy decision alternatives on costs and manpower;
- the potential impact on the equity of the utility rate;
- the relationship of each specific issue to other policy issues;
- the priority and timing associated with the issue given the municipality's objective of implementing alternative funding for stormwater management,
- the appropriate level(s) of municipal government at which the issue should be addressed and resolved.

Policy issues in the development of a stormwater utility can be divided into those dealing primarily with program, funding, and billing technical issues. Following is a list of typical policy issues in these three tracks:

Program Related Policy Issues (Program Track):

Program Mission
Program Service Description
Extent of Service
Stormwater Quality Strategy
Privatization
Relationship with other Programs
Public Relations
Major Program Priorities
Service Area
Levels of Service
Organization and Staffing
Interlocal Agreements and Responsibilities
Public Input or Advisory Groups

Funding Related Policy Issues (Finance Track):

Types of Stormwater Services Funded
Prior Investment
Accounting Method Rate
Basic Funding Methodology
Secondary Funding Methods
Credits Equiva
Public Streets and Property
Basis for Cost Distribution
Future Use of Stormwater Systems
Methodology
Modification Factors
Overall Funding Strategy
lent Residential Unit (ERU) Base
State and Federal Property

Billing Related Policy Issues (Database Track):

Billing and Collection Methods
Independent Database system Tie-in
Appeals and Adjustments
Collections and Delinquencies
Property Liens
Management Reporting
Use of other Databases
Number and Type of Data Fields
Rounding and Ranges
Impervious Measurement Accuracy
Customer Service Procedure
Information to Put on Bill
Billing Cost Allocations
Case Exceptions Including:
  Multiple Owners
  Multi-Story Condominiums
Consolidated Billing
New Stand-alone System
Modification of Existing Billing System
Billing Period
Water or Tax Bill Tie-in
Enforcement Procedural Issues
Master Account File Development Process
Accuracy Requirements
Resolution Procedures for Discrepancies
Impervious Area Methodology
Use of Street Centerline Data
Master Acct File Database Maintenance and Updating Process
Billing Owners or Tenants
Undivided Interest, Common Areas
Stormwater Only Accounts
Use of GIS, Mapping or CADD

SCHEDULE

Figure 4-4 illustrates a typical schedule using the four track process for utility establishment. The schedule shows that a comfortable time frame is 18 months from start to finish. The “M” letters indicate milestone meetings.

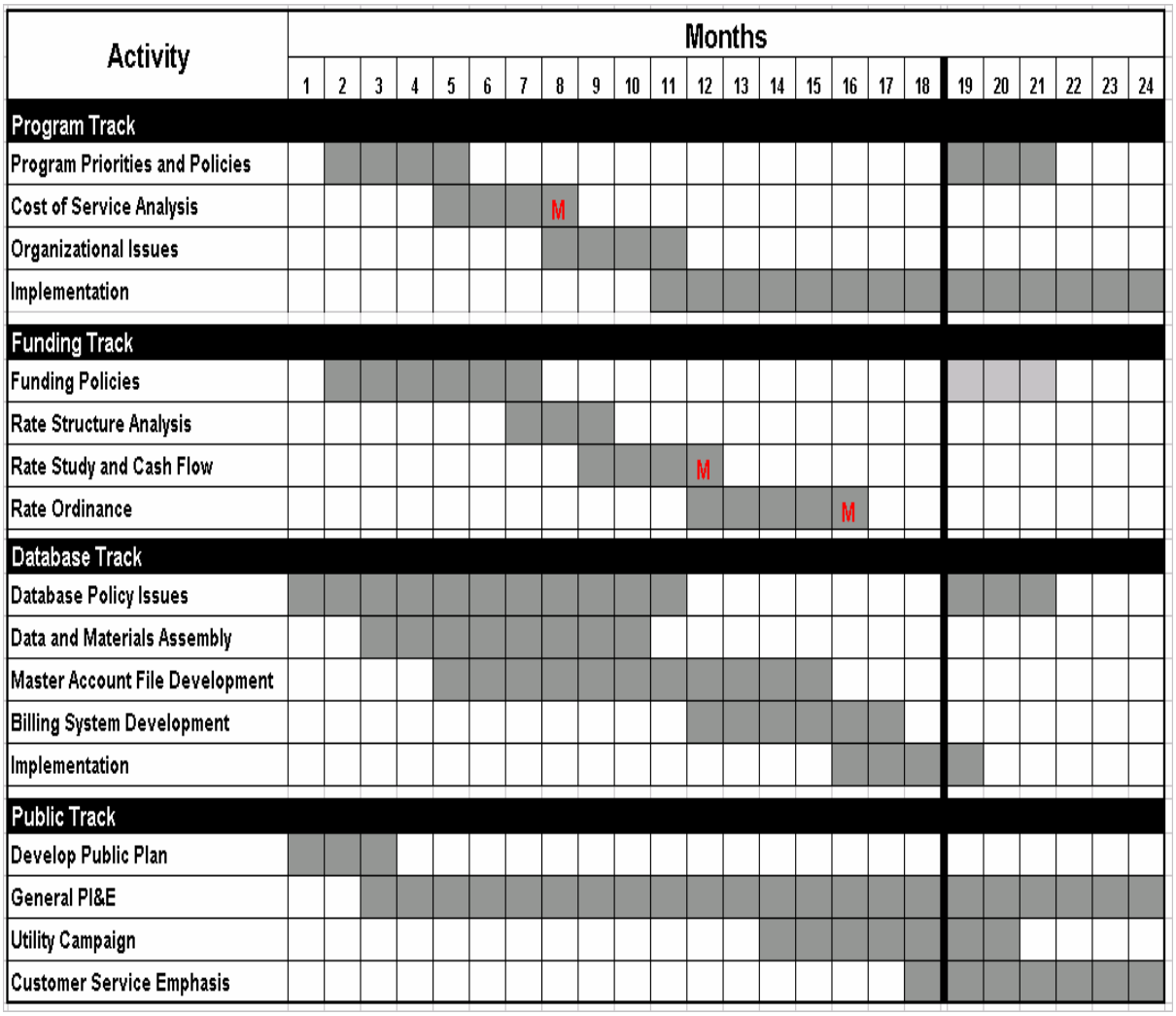

Figure 4-4: Utility Implementation Schedule

The critical path through the process can shift due to the requirements for citizen involvement, political timing, billing timing, and database development.

APPENDIX

EXAMPLE STORMWATER UTILITY PROGRAMS

CITY OF BELLEVUE, WASHINGTON

Keynotes

► The Bellevue stormwater management program was one of the first in the United States (established in 1974) and also the first to give equal consideration to water quality and quantity (flood) control.

► Bellevue's Storm and Surface Water Utility provides a full range of capital infrastructure and operational services, primarily through its in-house staff. In addition to roadway drainage systems, it is responsible for an extensive stream system outside road rights-of-way. It also provides an erosion and sediment control program.

► The Bellevue Utility is governed by the City Council and administered by professional staff as part of a consolidated Utilities Department (water, wastewater, stormwater management, and solid waste).

► Funding of the Bellevue stormwater program is primarily derived from a user fee.

► Key funding policies include:

- a user fee rate methodology based on gross property area and a factor reflecting the intensity of development of each property, with residential fees being discrete to each property and ranging from less than $3/month to more than $20/month;
- retiring debt from an earlier very aggressive bonding program that constructed capital infrastructure improvements to the urban stormwater systems in the city.
- A forward looking R& R funding program to replace infrastructure as it nears the end of its usable life (now pay-as-you-go R & R fund)

Key operational practices include:

- consistent, watershed-based, master planning of stormwater systems with emphasis on water quality and quantity control and aquatic wildlife habitat management; and
- stormwater management functions performed by a staff responsible only for stormwater management, including NPDES permit compliance.

Community Profile

Bellevue is a city of 117,000 citizens. It is the business and cultural center of an area of more than 250,000 referred to in local parlance as “The Eastside”, in reference to its location on the east shore of Lake Washington across from Seattle. Two major highway bridges cross Lake Washington to connect The Eastside with Seattle and thousands of people commute across the bridges each morning and evening. Bellevue is just 10 miles by road from Seattle across either bridge, and has emerged in the past twenty years as a business center in its own right. It has a daytime population of 172,000, with approximately 131,000 jobs, and is home to five of the top twenty-five publicly-traded business corporations in Washington State. Other major corporations such as Microsoft and Costco are headquartered in nearby Eastside communities.

Bellevue is a relatively young community, both in terms of history and demographics, although its population is aging now that the suburbanization has spread even farther east toward the Cascade Mountains. The current median age is Bellevue is 37, up from 28 just 25 years ago. It is an affluent community with high quality of life expectations, and ranks second in Washington State in both retail sales and property values. The per capita income is approximately $42,000/year.

Founded as a community in 1869, Bellevue was incorporated as a city government in 1953, with a population of less than 3,000. As suburban sprawl emanated from Seattle and multi-lane highway bridges spanned Lake Washington, Bellevue quickly transformed from a market crop agricultural area (primarily fruits and vegetables) to the local business center for The Eastside area. It became a preferred address in the region and underwent rapid suburban development in the 1960’s. By 1970 the population had reached 60,000.

The City expanded to its current 31 square miles through several annexations. As it grew, the City absorbed more than a dozen special-purpose agencies that provided local water and sewer services to the neighborhoods that now comprise Bellevue. These formed the basis of its Utilities Department. The City assumed governance responsibility for a full slate of urban community services, including stormwater management. However, other than storm sewer system construction improvements built by residential subdivision and commercial developers and in association with road construction projects, the community did very little stormwater management until about 1970.

Fortunately, the City had developed so rapidly that most of its open streams remained and served as the primary drainage conduits for stormwater runoff. Unfortunately, by 1970 the increased runoff from new pavement and roof tops was overtaxing the capacity of the natural channels that had evolved over thousands of years. Runoff was also causing extensive erosion, sedimentation in the streams, pollution of Lake Washington, and local flooding problems.

Formation Process

The Bellevue Storm and Surface Water Utility is generally regarded as the first stormwater utility in the United States. It was established in January, 1974. A master account file was developed and service fees were initiated as the primary funding mechanism later that year. The Utility was charged with developing and implementing a comprehensive program strategy that would address both water quantity control and water quality protection. Its first priorities were to enforce erosion and sediment control standards and prepare watershed master plans for system capitalization in nearly a dozen small drainage basins in the city.

Service Area

The Bellevue Storm and Surface Water Utility is responsible for stormwater management, flood control, and erosion and sediment control throughout the City's 31 square mile incorporated area.

Role and Program

Bellevue's Utility has broad authority for all aspects of stormwater quantity and quality management. Much of the success the Bellevue Utility experienced is attributed to the detailed program strategy that was assembled by the staff following its formation in 1974 and continuously refined since. It has provided a clear, cohesive vision of the City's objectives and priorities, and drove the transition in organization and funding. The program strategy proved to be critically important in retaining the support of the City Council when the initial service fee (1974) was challenged by citizens and businesses who perceived it to be "just another tax".

During the 1970s the Utility prepared a Drainage Master Plan (capital projects only) and initiated a program to acquire properties and easements and build the facilities identified in the Plan. The Plan consciously sought to preserve the open drainage system by limiting the peak flow of runoff into and through the streams. Engineering estimates suggested that significant savings would result if the open system could be retained by installing regional detention storage facilities at various points along the watercourses. That analysis proved correct, despite rapidly inflating land prices that drove costs up quickly.

The regional detention control strategy was augmented by regulatory standards requiring on-site detention on new development and aggressive soil erosion control measures. The design standards reduced post-development peak runoff to approximately the same as pre-development conditions. Implementation of the

Utility, plus the Master Plan project, justified the initial assembly of the City's geographical information system (GIS), which was then incrementally expanded to serve other City programs.

Other priorities were also addressed while the Master Plan was being developed. The Utility staff immediately became directly involved in land use and development reviews. Routine maintenance of drainage systems was significantly increased. In the late 1970s the City became the largest grantee of the National Urban Runoff Program (NURP), the Environmental Protection Agency's first major investigative study of water quality/stormwater runoff relationships. This placed Bellevue on the leading edge of stormwater quality management in the United States. It also attracted cooperative projects and funding from other state and federal agencies, most notably for stream monitoring and system construction. The Bellevue stormwater program continues to be one of the most highly regarded in the United States. The Utility service fees have evolved through several iterations, and are now relatively more sophisticated and precise than most.

Following the initial formation and implementation period, the Utility continued to expand its programs and build capital projects during the 1980s and 1990s. The infrastructure improvements identified in the initial Master Plan and subsequent updates were completed. A remedial maintenance program was initiated to repair and replace aging drainage systems before they failed. Aggressive development review and inspection efforts were instituted. Bellevue now has eleven major regional detention sites with 650 commercial and 335 neighborhood detention facilities in residential subdivisions. There are also several hundred on-site detention systems located on commercial properties. Several of the regional and neighborhood systems are wetlands that contribute environmental benefits as well as flood control during storms.

The maintenance program attained a fully preventive level of service within ten years. It was rigorously programmed, and remedial repairs became increasingly important as the systems aged and deteriorated. A permanent citizens' advisory commission was established to provide the City Council with community perspectives on stormwater issues. Public information and education morphed into public participation, with "stream teams" composed of interested citizens conducting various projects and activities to protect and improve the City's many small stream corridors. Volunteers are trained to collect scientific data at low cost for monitoring and adaptive management purposes.

One incident dramatically demonstrates the success that Bellevue achieved through its utility. In 1990 the Puget Sound region in western Washington State was struck by an intense and extended rain event over the four-day Thanksgiving holiday weekend. More than $20 million of flood damage occurred in other parts of King County, which is the 1,200 square mile governance jurisdiction that includes Seattle, Bellevue, and other cities. Snohomish County (immediately

north of King County) had more than twenty bridges damaged. One of the multi-lane Lake Washington floating bridges was under repair at the time. Stormwater invaded the floating structure and caused it to sink in rather dramatic fashion. Replacement of the bridge cost over $200 million.

In spite of such widespread problems during this extended storm event, Bellevue's stormwater system worked so effectively during and following the storm that the City did not even have to call out its maintenance crews in response to any problems. Several of the Utility's regional detention systems filled to their capacity, but they worked as designed together with the privately owned commercial systems and overflow was minimal. The drainage and stream systems absorbed the impact without major damage.

Governance Structure

The Bellevue Storm and Surface Water Utility program is guided by policies set by the seven-member City Council. Overall city administration is directed by a professional city manager who supervises a number of major departments including Utilities.

Organization and Staffing

The stormwater management program in Bellevue is administered by the Utilities Department, which also provides water and wastewater management services. The staffing level for stormwater management has been relatively constant for the last decade, fluctuating between 45 and 50 full-time equivalent (FTE) positions.

Funding

The Bellevue Utility is supported primarily by periodic user fees charged to virtually all properties in the city, including the roads and highways. The Utility's annual operating budget now is approximately $6 million. Capital expenditures for the latest fiscal year (FY 2003/2004) were budgeted to be $2 million on projects having a total estimated cost of $21 million. Several of the capital projects are long-term, incremental efforts to stabilize lengthy sections of stream channels and replace aging infrastructure. Total annual expenditures from the Storm and Surface Water Utility fund are nearly $10 million, including debt service payments on capital improvement bonds.

The initial service fee was based on impervious area, and billed only developed properties. In response to the citizen's committee formed to examine the fee concept in 1975, the City shifted to a rate methodology based on gross area and development conditions of every property. As a result, both developed and undeveloped properties are charged for stormwater management in Bellevue. The City Council has also enacted several rate increases over the years as the program revenue requirements grew.

Regardless of whether a property is in residential or commercial use, the rate methodology employs increments of one hundred (100) square feet to calculate the fees for each property, resulting in highly discrete charges. Service fees for single-family residential properties now range from less than $3 to more than $15/month, with a typical charge of approximately $10/month. The Utility is fully self-supporting and has never received allocations of general City revenues. A majority of its revenues are generated by the service fees, but the Utility also continues to receive federal and state grants and loans in support of specific activities and facilities. It also sponsors cooperative projects with private developers, other public agencies such as the local school district and neighboring general governments, and homeowners' associations in residential neighborhoods.

Inter-governmental Cooperation

The Bellevue Utility works closely with other jurisdictions in the region, but its physical location on a ridge between two major lakes reduces the degree to which it shares watersheds with neighboring cities and King County. The development of one major regional detention area illustrates the type of cooperation that the Utility has been able to obtain from other agencies. The Municipality of Metropolitan Seattle (Metro) (now King County) wished to locate its Eastside Transit Maintenance Facility in Bellevue in the mid-1970s because of the site's favorable central location. The City required that Metro (which coincidentally was also the wastewater treatment provider for the Greater Seattle area) preserve a small stream that traverses the property. Utility staff worked with Metro to optimize the use of the site for bus maintenance while also enhancing the stream corridor and installing containment controls to provide peak flow attenuation in the stream. Much of the collaborative effort was directed toward water quality management. Today, the utility works with other jurisdictions to develop capital facilities, protect water quality, manage lakes, and enhance aquatic habitat.

Public Participation

Public participation has been a hallmark of the Bellevue Utility since its inception in the late 1960s. A group of citizen activists approached the Bellevue City Council in 1969, requesting that the City government initiate studies and other actions to solve emerging drainage problems. They were especially concerned with the environmental impacts on the streams, their habitat, and riparian resources. The City Council appointed several of the citizens to an advisory committee to recommend a strategy for meeting with the challenge. Over the next three years the committee reported back to the City Council with a series of recommendations, the most significant of which (in hindsight) was that the City should establish a dedicated source of funding for its stormwater management program. The recommendations emerged as Bellevue's Storm and Surface Water Utility early in 1974.

In response to complaints about the initial user fees, a second citizen advisory committee was established that included several critics of the service fees, one of whom was challenging the Utility in court. That committee reviewed the initial decision to form the Utility. They concluded that the objectives, program strategy and policies were appropriate and recommended that the City continue with the service fee approach, but that citizens vote on the funding. This reassessment of the concept was pivotal in the ultimate success of the Utility concept in Bellevue. In their report to the City Council the committee cited the strategic plan developed for the Utility as a principal reason for supporting the concept. A series of advisory elections followed, which guided the evolution of the service fee funding methodology.

The public's participation in the work of the Bellevue Utility continues to be a hallmark of the community's approach and a key factor in its success. A permanent Storm and Surface Water Utility Commission formed in the late 1970's. It now guides Utility policy and advises the City Council on program and funding decisions not only for stormwater management issues, but for other utility programs as well. Volunteer groups are sponsored by the Utility and provide support for stream protection, collection and disposal of household waste and hazardous materials (paint, etc), and multiple use of riparian corridors along the City's streams.

CITY OF CHARLOTTE/MECKLENBURG COUNTY, NC

Keynotes

- The Charlotte/Mecklenburg County approach to stormwater management relies on centralized funding and regional programs for large systems combined with local management of minor stormwater systems and associated program elements. The County and individual towns have a high degree of self-determination in deciding the service level to be provided by local systems and programs, funding, and assignment of functional activities.

- Mecklenburg County provides the smaller towns with the option of a menu of available services, but the decision to use the County, City of Charlotte, in-house, or privately contracted vendors resides with the individual local entities. The City of Charlotte has a Phase 1 NPDES permit and the County and smaller communities have a Phase 2 permit.

- North Carolina statutes allow both counties and cities to establish stormwater utilities and adopt service fees to fund stormwater quantity and quality control efforts. However, a specific limitation in the statute prohibits creation of overlapping county and city utilities. Initially, the City of Charlotte established a utility. A year after, the utility was restructured to provide a countywide utility, with complementary programs run by the City and County to avoid any conflict with the statute.

- The Mecklenburg County Stormwater Utility is governed by the Board of County Commissioners and administered by professional staff. The City of Charlotte also has a substantial stormwater management program governed by the City Council and administered by the City Engineering and Property Management Department. Other City departments such as the Department of Transportation are also important players since they often provide maintenance of the stormwater systems in the roadways. City and town councils in the smaller communities in Mecklenburg County govern their local stormwater programs.

- Funding of the Charlotte/Mecklenburg County stormwater program is primarily supported by a composite stormwater service fee that includes both major (draining larger than one square mile) and minor (draining less than one square mile) components. The individual towns more often employ a blend of funding from several sources.

- Policies are adopted by the Board of County Commissioners and the city and town councils in the respective communities that are involved in stormwater management. Key funding policies include:

  - a composite regional major and minor service fee based on a consistent impervious area rate methodology;
  - County control of the major component of the composite service fee; and
  - local governance (county/city/town) control of the local component of the minor service fee.
  - the City of Charlotte has initiated a very aggressive bonding program to construct $198 million in improvements to the local urban stormwater systems in the city over five years.

  Key operational practices include:

  - consistent, watershed-based, planning of stormwater systems;
  - centralized stormwater quality management, including NPDES permits; and
  - a stormwater services menu provided to smaller entities by the County
  - Billing and collections and customer service are provided throughout all jurisdictions countywide by the City of Charlotte.

- Stormwater management staffing in the County and towns varies widely. Mecklenburg County and the City of Charlotte have relatively large and skilled staffs capable of managing both stormwater quantity and quality programs, while the smaller towns typically have few staff and rely on the County, City of Charlotte, or private vendors to provide contracted

services. The combined Charlotte/Mecklenburg County staffing exceeds 150 full-time equivalent positions.

Community Profile

Charlotte/Mecklenburg County is the largest urban center between Washington D. C. and Atlanta. Major businesses include banking, transportation, distribution, communications, and manufacturing. The City of Charlotte, Mecklenburg County, and smaller neighboring towns have collaborated in the development of one of the most highly regarded stormwater management programs in the United States.

Mecklenburg County is the core of a six-county metropolitan area that has a total population of 1.5 million. Approximately one half reside within Mecklenburg County, with 650,000 people residing in the City of Charlotte. Only 70,000 Mecklenburg County residents live in areas that are not within incorporated cities or towns.

The County encompasses about 526 square miles, nearly 280 of which are in Charlotte. Charlotte and the smaller towns in the County have adopted policies for on-going annexation. It is anticipated that there will be no remaining unincorporated areas of the County within a decade or so, but County government will continue to provide designated services such as floodplain management county-wide.

Mecklenburg County established a storm drainage district early in 20th century which built and maintained large, open-channel drainage systems to serve those portions of local watersheds with a tributary area of more than one square mile. Improved channels were provided throughout the County, regardless of whether the channel was located in an incorporated city or town government or in the unincorporated area. Of course many of the channels crossed the jurisdictional boundaries of the cities, towns, and county.

Improvement and operation of drainage systems to serve areas smaller than one square mile in the incorporated jurisdictions were left up the local government. The City of Charlotte and the smaller towns were nominally responsible for the small watershed systems. The County improved and maintained the smaller systems in the unincorporated area. Many of the smaller systems were installed by developers as residential subdivisions and commercial projects were constructed. This approach was employed for over seventy years, with mixed success. The larger channels tended to be funded adequately and were improved from time to time, while the smaller systems were largely ignored unless specific problems developed.

Today Mecklenburg County and the City of Charlotte manage different but complementary stormwater programs. The City and County work together in order that services to the community will not be duplicated. The County remains

responsible for managing FEMA regulated floodplains and their channels county-wide. This is comprised of a network of "named" large creeks (like McMullen Creek, Little Sugar Creek, and Briar Creek) that drain watersheds larger than one square mile. The City of Charlotte and the smaller towns are responsible for maintaining the smaller creeks and tributaries that feed into the large creeks. Both the county and town stormwater programs provide services for drainage pipes, ditches and drains on public property and within easements on private property in their respective jurisdictions.

Formation Process

Formation of the Mecklenburg County stormwater utility involved a relatively complex, and occasionally contentious, process that spanned over three years. This was in large part a function of local politics, but the North Carolina legislative authorization for stormwater utilities heavily influenced the process.

Initially, the County and City of Charlotte attempted to cooperatively identify a mutually agreeable approach to instituting a utility. An advisory committee comprised of County, City, and diverse interest group representatives met for more than a year to assess how local needs might best be addressed. Unfortunately, they reached a stalemate regarding which entity should be the lead management entity. This reflected the past history and differing needs of the County and City.

Since the early 1900's, Mecklenburg County had provided and maintained drainage improvements along creeks throughout the County below the point where the tributary area totaled 640 acres (one square mile). Such regional systems were locally termed the "regulated floodways". Drainage systems serving smaller watersheds in the unincorporated areas were also the responsibility of the County, but the cities and towns were responsible for the local drainage systems within their jurisdictions. The City of Charlotte Department of Transportation had maintained its urban stormwater systems associated with roads for many years, but drainage systems located outside road corridors had not been aggressively managed or maintained. When discussion of the utility option began in 1989, the County's principal priority was to enhance its regional systems, while the City's priority was to improve the local drainage systems. Both entities were concerned about their upcoming NPDES permits at that point.

North Carolina legislation was adopted in the late 1980's which allowed counties and cities to establish stormwater utilities. However, it specified that only one entity could establish a utility where two or more local entities provided drainage systems and services. Because Mecklenburg County managed the regulated floodways throughout the County, including areas in incorporated cities and towns, the County staff wished to have a utility that was county-wide. However, there was some reluctance among the County Commissioners to lead that approach. Once it was clear that a cooperative approach was not moving

forward, the City of Charlotte determined that it could not defer its solutions and would institute a stormwater utility to support its local drainage system programs including funding for compliance with Phase I stormwater requirements. The City utility was instituted by the City Council and service fees were initiated in January, 1993.

Once it became clear that the City was proceeding independently, the County Board of Commissioners determined that it would proceed with formation of its utility. This caused both entities to revisit the issue of a single county-wide utility. It was determined that the County utility would supplant the City utility as a legal entity when it was formally instituted in 1994. The structure and control of budgets, rates, and fees was a key to this agreement. This process was facilitated by the fact that the County and City had retained the same consultant team to assist both parties from the beginning of the process. That enabled the entities to arrive at consistent governance, rate, and program decisions, and implementation of the master account files and billing systems was eased.

Another aspect of the County and City of Charlotte negotiations involved the provision of services in the smaller towns that surround Charlotte. In order to obtain their agreement to participate in regional solutions and application of County utility service fees within their jurisdictions, the County agreed to extend control over many key policy issues such as rates to their elected Councils.

A permanent, nine-member Storm Water Advisory Committee (SWAC) is appointed by the Charlotte City Council, Mecklenburg County's Board of Commissioners, and Town Councils of Cornelius, Davidson, Huntersville, Matthews, Mint Hill, and Pineville. SWAC members represent diverse neighborhood, business, institutional, and environmental interests.

Service Area

The total area of Mecklenburg County is approximately 526 square miles. The City of Charlotte is approximately 280 square miles of the County, while the smaller six towns collectively contain (or maintain through Extra Territorial Jurisdiction) the remaining area of the County. North Carolina annexation laws allow aggressive annexation policies to be pursued by cities and towns. At the time the stormwater utility was being formed Charlotte and the satellite cities and towns had reached separate agreements on their respective spheres of influence which will control future annexations as urban/suburban development occurs. The County remains essentially a rural services provider, and the city and towns are urban services providers. Annexations tend to occur each year to two as urban/suburban development spreads into the unincorporated areas. This has directly influenced the initial division and gradual shift of stormwater management responsibilities.

Pursuant to state legislative limitations, the Mecklenburg County stormwater utility is the single, county-wide stormwater utility and encompasses the

incorporated areas by inter-governmental agreement. The individual cities and towns are stormwater service agencies within their respective jurisdictions, but utility service fees to support their programs are levied by the Board of County Commissioners.

It was decided that the County and, to a lesser degree, the City of Charlotte would support the smaller cities and towns stormwater management efforts by offering a "menu" of services to them. Since Mecklenburg County remained responsible for the regional drainage facilities throughout the County and also for the rural drainage systems in the unincorporated areas, it was judged to be best suited to provide those services to the smaller towns. Since the City of Charlotte performs street drainage maintenance, it was determined that it would offer similar services to the smaller cities and towns, though most currently maintain those systems in-house. (It should be noted that county governments in North Carolina do not operate road systems. There are state highways and city streets and highways only – no county roads. Thus, the State of North Carolina Department of Transportation is an important player in road-associated stormwater management in unincorporated areas of the state and is also responsible for some roads within incorporated cities and towns.)

One of the most notable differences in stormwater services in Charlotte/Mecklenburg is that systems located outside road rights-of-way and easements are also maintained by the City if "public water" is present. That includes runoff from any public street or property. This policy enables the City to actively manage nearly all of the drainage systems rather than just those components located in roadways. As a result, the County and municipal stormwater programs apply much more effort to stream protection and enhancement than in most communities.

Role and Program

Mecklenburg County and the City of Charlotte both continue to have substantial stormwater management roles and programs. The County has an engineering and operational staff geared to management of major drainage systems serving watersheds of more than one square mile and rural drainage systems serving smaller watersheds in the unincorporated areas. The City of Charlotte has a stormwater engineering staff in the City Engineering and Property Management Department and an operational staff in its Department of Transportation. Charlotte has a Phase 1 NPDES permit, which is supported by contracted County forces that provide water quality monitoring and data management. The County and towns have a Phase 2 permit.

Although the County focuses its program on the larger creeks, the role of both agencies is primarily urban stormwater management simply because the area is now extensively urbanized. Flood protection is an important objective, but the area is subject only to small drainage system flooding rather than major river flooding along the Catawba River, which traverses the County. The Catawba is

controlled by a series of dams and impoundments such as Lakes Norman and Wylie. The County's efforts focus on the regulated floodways of the major creeks throughout the County. Drainage systems in the unincorporated areas that are not within road corridors are also managed, but these are a lower priority. The State of North Carolina Department of Transportation is responsible for roadway drainage systems throughout the unincorporated area, and for some systems in the incorporated cities and towns.

Mecklenburg County recently consolidated several previously dispersed functions into a Land Use and Environmental Services Agency (LUESA). Its scope of responsibility includes floodplain management, stormwater services, water quality, land development, zoning, groundwater protection, on-site wastewater management, private water well permits, and others that were integrated in a Water and Land Resources organization. The County's objective in consolidating these programs in one operating unit is to ensure a clean and livable environment through the protection and enhancement of water and land resources.

The County's program also provides floodplain management county-wide. Federal flood insurance provisions mandate that floodplains be delineated where tributary watershed areas exceed 640 acres, which corresponds to the drainage area definition employed by Mecklenburg County for the major streams management program throughout the cities, towns, and unincorporated areas. The program relies on regulations that limit intrusions into the floodplain. The County's Water and Land Resources group maintains the flood insurance mapping for the entire County. Improvements to and maintenance of the major drainage channels carried out by the County provide effective flood control during most storms. The County also performs floodplain and stormwater service inspections for the cities and towns and is responsible for the small drainage systems in unincorporated areas.

The City of Charlotte program focuses on local drainage systems both within and outside road corridors. Its program heavily oriented toward infrastructure management, and the City recently initiated a capital improvement program that will invest $198 million in construction of system betterments to the local urban stormwater systems over the next five years, utilizing bonds and service fees.

Governance Structure

Mecklenburg County has a single, county-wide stormwater utility governed by the nine-member Stormwater Advisory Committee created for the purpose of levying varying service charges across the County and seven municipal jurisdictions. The utility service fees within incorporated areas are levied pursuant to inter-governmental agreements with the respective city and town councils. Decisions on program content, level of service fees, and how to provide service (in-house, inter-agency, outside contract, etc) in the incorporated areas are the province of the cities and towns. The seven city and town councils set the stormwater service

fees applicable to improvement and maintenance of the smaller systems within their limits, and the County Council adopts them as part of their rate methodology.

This stormwater management governance structure has now been in place for over a decade, and has enabled all of the local jurisdictions to perform stormwater management at the level desired by their local elected officials. Most of the smaller towns simply use the same rates that the County applies in the unincorporated area, although the Town of Davidson has opted to charge a lower service fee.

Organization and Staffing

The organization and staffing of the stormwater management units in Mecklenburg County, the City of Charlotte, and the smaller satellite cities and towns varies greatly. The County and City of Charlotte have in-house staffs of approximately thirty and seventy-five people (respectively) with the full range of engineering and operational skills required to administer their respective programs. Both also make substantial use of outside consultants and contractors. In addition, the City stormwater program pays the City's annually to maintain drainage systems located in roads. The smaller towns' stormwater staffs range from a portion of one full time equivalent position to several people dedicated to the stormwater management function. They rely heavily on the County, City of Charlotte, and outside contractors for engineering and operational support. Day to day activities associated with NPDES compliance, including extensive monitoring, is provided primarily by the County.

The differences in and dispersion of responsibilities among the County and the towns has resulted in the creation of some innovative concepts. For example, the City of Charlotte developed a program to expedite construction of small capital projects and remedial repairs. A list of pre-qualified local construction firms is maintained, and unit price bids are obtained annually for certain common activities and materials. When a complaint about a drainage problem is received, a City stormwater inspector determines the priority ranking of the problem. If it is in a high priority category (such as home flooding, street flooding, or other safety issue), a qualified vendor on the list is called in, any required engineering is done immediately (often in the field), and a work order is issued. This program enables the City to respond to many complaints within 30 to 60 days, which has gained high community and City Council approval. The County has a similar program.

Funding

The County stormwater utility service fee is the primary source of funding for stormwater management in Mecklenburg County. The total stormwater budget for all entities in Mecklenburg is over $85,000,000. A large part of this is for capital betterments to the systems primarily within the City of Charlotte. The

City's budget for capital projects in the current fiscal year is over $40 million, and the City's annual stormwater operating budget is an additional $32 million.

A consistent impervious area rate methodology is used throughout the County, with a flat rate for single-family detached residential properties and an equivalency unit of 2,613 square feet of impervious coverage applied to all other properties. Single-family residential customers are billed for one equivalent unit. The equivalent unit flat rate applied to single-family residential customers for the regional component of the program is $1.06/month throughout the County. The local stormwater program elements provided by the County and City and towns are funded by a separate rate component.

Because Mecklenburg County has a composite fee comprised of the regional system component and local fees determined by the City and towns, the rates vary by jurisdiction. Charlotte and Mecklenburg County have a dual flat-rate user fee for single-family residential properties, with the break being at 2,000 square feet of impervious coverage. The City's current single-family charges are $5.18/month and $6.72/month. The County's are $3.33/month and $4.03/month for the local component of the rates in the unincorporated areas. The local component of the rates applied in the other towns range from $.30/month to over $2.00/month.

Additional funds have also been appropriated for stormwater management by many of the entities, resulting in some novel blending and dedication of resources. For example, even after its utility service fee was adopted, the Charlotte City Council decided to continue to appropriate approximately the same amount from general revenues for stormwater management as was previously budgeted (about $5 million annually). Those funds were specifically assigned to water quality programs to avoid a potential problem within the state authorizing legislation (which was later rectified by statute). This allowed the City's initial service fee rate to be approximately sixteen (16) percent lower than would otherwise have been required to meet the cost of services and facilities. After the stormwater utility had been in place for three years, one-half of the general revenue support for stormwater management was incrementally reduced over a four year period, which transformed the City's general government capital program. The City continues to make a general fund contribution to the stormwater program..

Inter-governmental Cooperation

The strong emphasis on local control of the small-watershed programs combined with the regional responsibilities of Mecklenburg County has resulted in a great deal of collaboration and mutual support by the participating entities. Financial management offers a good example. Administration of the service fee master account file billing and collection is provided by the City of Charlotte's Finance Department. Accounting for the individual programs is performed separately by each entity.

This approach extends to engineering and operational functions as well. The County and City of Charlotte perform master planning and engineering for watersheds and drainage systems, often by employing outside consultants. Because the local watersheds cross many jurisdictional boundaries, this function commonly involves and benefits the smaller towns as well. The City of Charlotte is undertaking a $198 million capital projects program that will construct new drainage systems, improve existing facilities, and repair known deficiencies over five years. Some improvements will be done outside the City to attain the most efficient solutions to problems within Charlotte, resulting in incidental service benefits to other entities. The County and City of Charlotte operational forces also provide various services to the smaller towns per operating agreements or on an ad hoc basis at their request. The County performs over $1 million of monitoring, analysis, and data processing services for the City's Phase 1 NPDES compliance program. The water quality programs, including NPDES compliance efforts, also involve the County, City of Charlotte, and satellite communities in many cooperative efforts such as public education.

The City and County have also consolidated stormwater customer service. Service requests are coordinated through a single telephone contact number, [704] 336-RAIN (which translates to [704] 336-7246). Regardless of which local governance jurisdiction a person resides in, he or she can file complaints or inquiries and receive service assistance from the customer service center.

The Charlotte/Mecklenburg stormwater program receives support from several federal and state agencies for various program components. For example, the United States Geological Survey (USGS) operates a dense hydrologic data-collection network of seventy two (72) rain gauges and forty five (45) stream flow gauges within the city and County. The network of gauges provides valuable data for the documentation and interpretation of water-resources information, including rainfall and flooding events. During a rain event, data is transmitted from these gauges to base stations located at USGS and the Charlotte Mecklenburg Government Center (CMGC) where developing flood conditions are monitored by emergency services staff. In addition to rainfall and stream level data, four stations in the system are also set up to continuously collect water quality indicators such as temperature, conductivity, PH and dissolved oxygen levels in a stream. The cooperative program with the USGS has been in place without interruption since 1961.

Public Participation

Perhaps one of the most outstanding features of the Charlotte/Mecklenburg experience has been the high level of on-going public participation in the stormwater utility program from its formative stage. The County and City of Charlotte assembled a community advisory group and a technical guidance committee to assist with the feasibility investigation when they first considered a combined program. The City continued that effort with a committee of more than

twenty persons representing diverse interests as it formulated its initial utility concept. The County then initiated its own utility implementation effort, again with support and guidance from a committee.

Prior to its initial stormwater utility billing, the City conducted an extensive (and costly) public education program to explain the purpose of the stormwater utility and service fee concept. They also introduced the program to the media in the city with factual materials, and obtained strong support from the editorial board of influential local newspaper. Prior to the initial billing, notifications were sent to the largest ratepayers and explanations of the fee and its associated credit system were provided in several general and personal meetings with businesses and the local Chamber of Commerce. As a result, the Chamber of Commerce supported the utility program with its membership. A series of public information brochures were prepared and placed in public buildings, and articles highlighting drainage problems in the city were placed in the print media. A guest commentary article authored by the City was printed in a weekend edition of the major Charlotte newspaper.

After a detailed study of billing alternatives, the City decided to append the stormwater service fee to the Charlotte/Mecklenburg Utilities Department water and sewer billing as a separate line item. On the day the first stormwater service fee billings were mailed, a ground-breaking ceremony was held for a construction project to resolve a highly-visible, long-standing drainage problem. It received heavy coverage by local television news programs. The message of the day was that the City had begun to address its substantial backlog of known drainage problems, “And, by the way, you (i.e., the public) will be receiving a new line item on your utility bill to support this effort”. It might have easily been “There’s a new fee in town. What are they doing with your money?”

The City also prepared very well for public response to the initial service fee billing by assembling and training a cadre of special customer service agents, retained through a temporary employment agency. A contact telephone number was printed on the billings to direct calls to this group of specialists, relieving the potential burden on the utility billing customer service staff that normally responded to water and sewer billing inquiries. The twelve special customer service agents were retained for sixty days, or two full billing cycles. As the inquiries tapered off, the number of special agents was reduced accordingly, with all inquiries eventually being shifted to the in-house customer service staff, who had also received training on the proper responses to various questions.

In total, the City of Charlotte spent approximately $250,000 (in the early 1990s) to educate the community about the local stormwater needs and utility program, and prepare for the initial service fee billing. This represented approximately two weeks of the utility service fee revenue stream at that time, but resulted in a high level of public acceptance. There was (of course) some opposition by tax-limitation advocacy groups, but the high level of accountability provided by the

dedication of funding dispelled most of their objections. Within two years, a City Council member who represented that interest tax-limitation group stated publicly that, if every City program was as well run as efficiently and responsively as the stormwater utility, there would be no need for tax-limitation advocacy.

The high level of community education and involvement continues, with many educational materials, activities, and actively-involved support groups. The City commonly provides hyetographs from its rain gauging network on its website following severe rainfall events that cause flooding. This has educated the general public regarding the high variability of intense thunderstorm rainfall that occurs across Mecklenburg County, and reassures the public that the staff is aware of what is happening. The City's stormwater capital improvements program, funded in large part by sale of bonds, also features extensive public education and participation programs, such as Adopt-A-Stream and Storm Drain Marking.

CITY OF TULSA, OKLAHOMA

Keynotes

- ► The Tulsa Stormwater Management Utility was founded in response to a devastating one-day urban drainage system flood that killed 14 residents and did nearly US$200 million damage to public and private properties in 1984.

- ► Tulsa's Stormwater Management Program provides a full range of capital infrastructure and operational services. In addition to roadway drainage systems, it is responsible for an extensive stream system outside road rights-of-way. The City has a Phase 1 NPDES permit.

- ► Since forming its Utility, Tulsa has received over $100 million in federal support for capital infrastructure improvements, removal of structures from flood-prone areas, and hydrological data gathering.

- ► Funding of the Tulsa day-to-day stormwater program is primarily derived from a user fee.

- ► Key funding policies include:

    - o a user fee rate methodology based on the impervious area of each property, with residential fees being a single rate;
    - o use of general obligation bond sales and sales tax revenues to fund construction of capital infrastructure improvements; and
    - o aggressive pursuit of federal grants and loans to supplement local resources.

Key operational practices include:

- watershed-based master planning of stormwater systems throughout the City, with emphasis on flood control; and
- stormwater management functions performed by in-house staff, including NPDES permit compliance.

Community Profile

The City of Tulsa was incorporated as a municipality in 1898. With the discovery of oil in nearby Red Fork in 1901, Tulsa grew quickly and reached a population of more than 7,000 by 1907. After Oklahoma became the 46th state in the United States in 1907, the City voters adopted its first city charter on July 3, 1908. The City was governed by three elected commissioners from 1909 through 1989, when the voters amended the charter to adopt a mayor/council form of government. The Mayor is now elected every four years (at large) and nine City Council members are elected to two-year terms from geographic districts.

Tulsa lies in the heart of a fertile forested region of rolling hills in northeastern Oklahoma. It is the second largest city in Oklahoma, located 90 miles northeast of the state capital, Oklahoma City. The average annual rainfall is thirty-nine (39) inches. The region is sometimes referred to as “Tornado Alley” in recognition of the severe storms that often occur in the Spring. Violent windstorms are often accompanied by extraordinarily intense rainfall, which has been a key factor in Tulsa’s stormwater management problems and search for solutions.

The land area of the City today is approximately 198 square miles. It has a population of 392,000. The economy of the community is highlighted by higher education (seven universities), energy, telecommunications, and transportation/warehousing. Tulsa has an in-land deep water port located on the McClellan-Kerr Arkansas River Navigation System, offering a Foreign Trade Zone, two industrial parks and liquid and dry cargo storage.

Tulsa has grown up with flooding. Some consider it a “poster child” example of the stormwater management struggles that local governments experience. Many of the causes of Tulsa’s problems are a function of its location: the city is on a major river (the Arkansas), in a region of violent storms, and was initially developed on the American frontier, where one had a right to do as he (or she) wished with the land - including building structures in inappropriate, flood-prone locations.

Local flood records are sparse before 1900. In 1908, only a year after statehood, Arkansas River flooding at Tulsa caused $250,000 in damages (over $25 million in 2004 dollars). By 1920, the town had outgrown its raw, boomtown youth. As riches mounted from the oil industry and investors and speculators poured in, Tulsa grew into a wealthy city of 72,000. But development edged ever closer and closer toward the river banks. On June 13, 1923, the Arkansas River

flooded Tulsa's waterworks, caused $500,000 in damages ($20 million in 1994 dollars), and damaging homes leaving 4,000 citizens homeless. City fathers responded with Tulsa's first land-use plan, which envisioned upland boulevards and housing. In the lowlands, such as the Mingo Creek riparian stream corridor east of town, the plan indicated there would be generous parks and recreational trails.

Significant flooding occurred again in 1943. In response to the flooding, the U. S. Army Corps of Engineers (COE) built levees around Tulsa's oil refineries along the Arkansas River as a World War II national defense measure. By 1950, in the post-war building boom, housing fanned out onto the floodplains to the south and east of the downtown area. Land that had periodically flooded with little harm now was awash in wave after wave of development and, periodically, urban flooding. By the late 1950's, flooding of newly developed subdivisions along the Arkansas River spurred calls for flood control. In 1964, the COE completed Keystone Dam on the Arkansas River, fifteen miles upstream from Tulsa. For years to come, Tulsans would believe that the Arkansas River was forever tamed.

Tulsa enjoyed another economic boom based on energy resources in the 1960s, when the city's population grew 25 percent. Tulsa's rapid growth resulted in the paving and piping of vast areas of pastures and meadows, and new buildings continued to spill into the lowlands along the creeks and streams that etch the area. The rapidly urbanizing Mingo Creek watershed was annexed to the city in 1966. Localized floods struck every two to four years during the 1960s and early 1970s, but the response was classic “flood relief”: emergency response and recovery, reconstruction as quickly as possible, and denial of the possibility that damaging floods could reoccur. Victims petitioned for neighborhood flood control, with limited success.

A flood in the Spring of 1970 caused $163,000 in damages in the rapidly developing Mingo and Joe Creek watersheds. The City responded by joining the federal government’s National Flood Insurance Program's (NFIP) "emergency program" and promising to adopt federal floodplain regulations. In August 1971, the NFIP issued its block rate maps. A month later, floods hit Flat Rock, Bird and Haikey Creeks inundating many suburban neighborhoods once again. In December that year, Bird Creek flooded again. Tulsa joined the NFIP's "regular" program, adopted a new 100-year flood standard, and promised to regulate floodplain land use.

In April and May, 1974 floods left $744,000 in damages (over $6 million in 2004 dollars) on Bird Creek. Violent storms June 8 of that year caused widespread flooding on Joe, Fry, Haikey and Mingo Creeks, with more than $18 million in damages ($80 million in 2004 dollars). On September 19, 1974 Mingo Creek flooded yet again. For some citizens, it was the third flood in less than a year. Angry, drenched victims waded out of the floods to demand help from City

officials. They contended the City wasn't enforcing its NFIP regulations. They tried to halt development, to avoid deeper flooding until existing problems could be solved. Developers objected strenuously. Thus began a community debate over floodplain management, locally called "Tulsa's great drainage war," that was destined to last more than a decade. The city responded with a plan to widen part of Mingo Creek, including clearance of 33 houses in the most flood-prone area. The houses were removed just before the next flood in May, 1976.

The May, 1976, flood marked a milestone in Tulsa's search for solutions. A three-hour, 10-inch deluge was centered over the headwaters of Mingo, Joe and Haikey Creeks. The resulting flood killed three citizens and caused $40 million in damages ($140 million in 2004 dollars) to more than 3,000 buildings. By this time, the victims were becoming skilled lobbyists and gathering sympathizers citywide. They virtually stormed City Hall to demand solutions. Newly elected city commissioners responded with a wave of actions. They enacted a floodplain building moratorium; hired the city's first full-time hydrologist; developed comprehensive floodplain management policies, regulations and drainage criteria; enacted stormwater detention regulations for new developments; instituted a fledgling flood alert and warning system; and began master drainage planning for major creeks. In 1978, an earth change (erosion and sediment control) ordinance was also adopted, giving the city control over alterations to Tulsa's landscape, including floodplains and stream channels.

In the early 1980s the federal United States government developed the federal Inter-agency Hazard Mitigation process to curb repetitive flood losses. After flood disasters, federal teams were dispatched to identify hazard mitigation opportunities, i.e., ways to make the response to each disaster reduce the scope of the next one. The mitigation concept focused on correcting the causes of losses, including removing, raising, or flood proofing the most vulnerable of the damaged buildings. Tulsans worked with the Federal Emergency Management Agency (FEMA) to develop the process. Tulsa's early exposure to the new FEMA mitigation program was to have a significant impact on the city's response to future floods.

On the three-day weekend marking the Memorial Day holiday in May, 1984, the worst flood in Tulsa’s history struck. After a muggy Sunday a stalled cool weather front produced thunderstorms that dumped some fifteen (15) inches of rain overnight in just twelve hours. The rainfall was centered over the Mingo Creek watershed, but also extended across most of the city. The results were disastrous. The flooding killed 14, injured 288, damaged or destroyed nearly 7,000 buildings, and left $180 million in damages ($425 million in 2004 dollars). The Mingo Creek corridor alone accounted for $125 million of the damages. It was truly a localized, urban stormwater system flood. Local streams flooded while the nearby Arkansas River remained well below flood levels.

Problems continued in the years following despite formation of Tulsa's stormwater utility in 1985. In 1986, a major flood of the Arkansas River tested the new stormwater management program. It also served as a reminder of the finite protection provided by the Keystone Dam upstream from the city. Between September and October 1986, unrelenting upstream rains filled the Keystone Reservoir to capacity, forcing the COE to release water at the rate of 310,000 cubic feet per second. Downstream flooding was inevitable. At Tulsa, a privately maintained levee failed, causing $1.3 million ($5million in 2004 dollars) in damages to 64 buildings. The City fielded its hazard-mitigation team and cleared 13 substantially damaged structures, and more widespread damage was avoided.

Formation Process

A newly elected mayor and street commissioner had been in office for only 19 days when the Memorial Day flood struck in May, 1984, but both knew the issues well. In the darkest hours of their community's worst flood, they pledged to make their response reduce the likelihood that such a disaster would ever be repeated. Before daylight, they had assembled the city's first Flood Hazard Mitigation Team to develop the City's strategy. Within days, a new approach to Tulsa flood response and recovery was born.

The flood response effort was only the beginning. A unified stormwater program was created, with City leaders committing to make Tulsa flood-safe. As ultimately completed, the program included relocation of 300 flooded homes and a 228-pad mobile home park, $10.5 million in flood control works, and $2.1 million for master drainage plans. The total capital program topped $30 million, mostly from local capital sources, flood insurance claim checks, and federal funds.

The devastation of the 1984 flood persuaded Tulsans that a coordinated, comprehensive stormwater management program was needed from the rooftop to the river. A Department of Stormwater Management was established in 1985, centralizing responsibility for all city flood, drainage, and stormwater programs. A stormwater utility fee was established by ordinance in 1986 to fund the program. The utility fee ensured stable funding for maintenance and management, independent of fickle political winds. The service fee ordinance allots all fee revenues exclusively for floodplain and stormwater management activities. Over several years an extensive system of recreational greenways was created along the Mingo Creek and other streams, providing bicycle and walking paths as well as green space areas. When the Memorial Day flood devastated Tulsa in 1984, the City had 57 detention ponds. By 2000, there were 85 detention ponds plus many other stormwater facilities including improved conveyance channels.

Service Area

The Tulsa Stormwater Utility is responsible for stormwater management throughout the City's 198 square miles.

Role and Program

Simply establishing a stormwater utility could not instantly correct Tulsa's stormwater and flooding problems. A comprehensive, long-range stormwater program strategy was formulated by the utility staff, coupled with extensive capital infrastructure master planning during the 1980s. The City's objective was to manage stormwater both within public rights-of-way and easements and along the many creeks that drain the hilly terrain of the community.

The Public Works Department, in conjunction with a Stormwater Drainage Advisory Board and numerous citizen groups, developed a phased implementation program for projects identified in the City's basin drainage plans. The projects were funded in part by a combination of stormwater fees, sales tax revenues or bond issues. Construction of the improvements identified in the master planning project proceeded quickly based on the assured funding capability provided by the stormwater service fee. The City was also able to obtain more than $100 million of COE funding for various capital improvements to the stormwater systems.

By the early 1990s, FEMA ranked Tulsa first in the nation for its floodplain management program, allowing Tulsans to enjoy the nation's lowest flood insurance rates. The program was also honored with FEMA's 1992 Outstanding Public Service Award; and the Association of State Floodplain Managers has twice given Tulsa its Local Award for Excellence. This represented a significant turn around in just eight years following the devastating flood of 1984. Since adoption of the FEMA community rating system, Tulsa has had one of the best ratings including a 2.0 rating in 2005.

Today, Tulsa's floodplain and stormwater management program is based on respect for the natural systems. It is nationally regarded as a pacesetting program, and includes comprehensive watershed management, dedicated funds for maintenance and operation, a prototype flood alert system, and a $200 million capital improvements program.

Tulsa's drainage systems have not been tested by a catastrophic rainfall since 1986, but the system has handled less intense rainfall events well. City leaders believe improved maintenance, continuing capital projects, stringent regulations, and aggressive citizen awareness programs will reduce but cannot entirely eliminate future flood losses.

A powerful testimony to the program is that, since comprehensive regulations were adopted in 1977, the city has no record of flood damages to any building that complies with those regulations. Implementation of the user-pays service fee funding is also given enormous credit by staff and elected officials because it enabled the City to elevate its capital investment and operational expenditures to a level that complements regulatory measures by resolving inadequacies in the systems that had existed for decades.

Tulsa has instituted an aggressive floodplain program. The City's long experience with flooding showed that the National Flood Insurance Program's minimum standard is insufficient for Tulsa. Therefore, the city's regulations exceed NFIP's standard in several important ways. The NFIP floodplain maps are based on existing development. However, unless plans and regulations are based on future watershed urbanization, new development may well flood as uphill urbanization increases runoff. Tulsa enforces the NFIP minimum regulations and maps to retain eligibility for federal flood insurance but, in addition, the City enforces its own more extensive maps and regulations. Those regulations are based on ultimate watershed urbanization as forecast in the City's comprehensive plan.

The Tulsa stormwater program is much more than flood control. The City is also building parks in the floodplains, sports fields in stormwater detention basins, and greenway trails on creek banks. It has forged strong partnerships with federal and state agencies. Tulsans now enjoy the lowest flood insurance rates in the country, and the community is reaping benefits from national awards and favorable publicity. Tulsa's progress has been called an example of what can happen when a community fully commits to solving urban stormwater problems.

Organization and Staffing

The City staff was reorganized following a City Charter change in 1989 that substituted the mayor/council for a government for the commission approach. A new Department of Public Works consolidated all public works services, including stormwater management, but the dedicated stormwater service fee funding was retained. Today, stormwater management is an accepted and integrated part of the city's services.

Funding

The City's stormwater management program budget has ranged from $12 million to $14 million during the past three years. Current service fees are based on impervious area and are set at $3.49/month per "equivalent service unit" (ESU). The ESU is defined as 2,650 square feet of impervious coverage, representative of the average condition on single-family residential properties. Service fee revenues total over $12 million. Where does the stormwater fee money go?

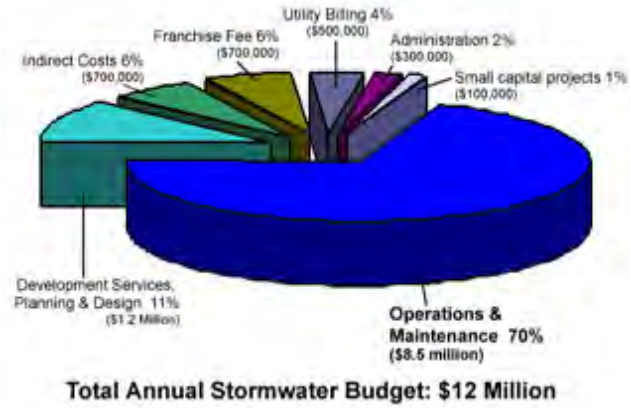

Expenditures for the City's FY 2002 are shown in the pie chart to the left. As it shows, stormwater fees are used primarily for maintenance of stormwater detention facilities, stream channels, pumping stations, culverts, ditches and other drainage facilities. After storms and when needed at other times, crews remove material blocking stormwater flow in channels and detention sites. On average, the City crews clean more than 22 miles of ditches and clear about 5 miles of drainage pipe each year. They remove tons of silt from channels and reconstruct eroded earthen channels.

Inter-governmental Cooperation

Tulsa assists the suburban satellite communities that surround it in their stormwater management efforts, but most of its attention to inter-governmental cooperation has involved federal agencies that offer funding for specific priorities such as flood protection and hydrologic monitoring and analysis.

Public Participation

The City of Tulsa involved the community in many of the major decisions as it formulated and implemented its stormwater utility program and associated funding mechanisms. A citizen advisory committee guided the initial response to the devastating flood in May, 1984, which included assembling a consulting team to assist with utility feasibility analysis and implementation.

Once the utility was formed and user fees were in place, the citizen advisory group shifted its attention to the content of the program and, especially, the capital improvement planning to address flooding problems. They have continued to be a major political force in support of the utility. The City also instituted a variety of community education and involvement initiatives aimed at improving flood emergency awareness, water quality management, and utilization of water resources in the riparian corridors.

LOUISVILLE/JEFFERSON COUNTY (KY) METROPOLITAN SERVICE DISTRICT (MSD)

Keynotes

- ► The Louisville approach involves a consolidation of flood control and stormwater management with a regional wastewater collection and

treatment program provided by the Metropolitan Sewer District, or MSD. Most of the smaller cities and towns in Jefferson County do not perform stormwater management functions.

► The MSD was authorized by special state legislation in 1946, and established by Jefferson County and the City of Louisville. The MSD service area is virtually county-wide. Its Board is appointed by the now consolidated Metro government council which directs the amalgamated County and City.

► MSD is funded principally by wastewater and stormwater service fees, which are independently structured, billed, and accounted for.

► Stormwater service fee attributes include:

- an impervious area rate methodology;
- a flat rate charge for single-family residential properties; and,
- differential rates for other properties based on an impervious area equivalency unit.

► Key operational practices include:

- watershed-based master planning throughout the County;
- a consolidated NPDES permit administered by MSD; and
- a broad range of functions that include a major flood control program responsible for approximately 29 miles of levees and protection works and fifteen large pump stations along the Ohio River.

► The MSD has a staff of more than 600 that performs both wastewater and stormwater administrative, engineering, operational, regulatory, and infrastructure improvement/management functions. The staff is extensively cross-trained to obtain efficient operations.

Community Profile

Louisville, 365 square miles and population 700,000, is the largest city in Kentucky. It is located on the south shore of the Ohio River, and was founded in 1778 by frontier explorer and military hero George Rogers Clark. It is located in Jefferson County, which is named for Thomas Jefferson, who was the Governor of Virginia when the city was founded and later served as the third President of the United States. It soon became a major shipping center along the Ohio River, which reaches almost 1,000 miles into the Midwest of the United States. Among other noteworthy claims to fame, it is the home of the Louisville Slugger baseball bat and hosts the Kentucky Derby, one of the premier annual horse races in the world. The county and city governments were recently consolidated into a “metro” government as provided for by state law.

As a community located on a major river, Louisville has always been concerned about flood control and stormwater management. Repetitive major flooding incidents of low areas along the river led eventually to the construction of more than 20 miles of flood protection levees and large pump stations beginning in the early 1900s. In the 1980's local officials determined that effective management of both the major flood control works and the smaller urban drainage systems required a consolidated program. The Louisville/Jefferson County Metropolitan Sewer District (MSD), then the regional wastewater service provider, was tapped to take over all stormwater management responsibilities.

Following detailed studies, MSD adopted a dedicated stormwater service fee to fund a full range of stormwater management and flood control services and facilities. The MSD stormwater service fee is separate from the agency's wastewater fee, though the staff is extensively cross-trained to efficiently perform both functions. The user fee has been tested in court and sustained at the Kentucky Court of Appeals level. MSD's responsibilities have been expanded to include stormwater quality in recent years in response to federal NPDES requirements.

Formation Process

The MSD was formed by the City of Louisville and Jefferson County pursuant to a state authorizing statute. Shifting the County's and City's flood control and stormwater management responsibilities to the MSD was accomplished by actions of the Board of County Commissioners and City's Board of Aldermen. The political decision to shift flood control and stormwater management to MSD was essentially made before the program and funding development and implementation work began, which enabled the process to be completed in just eight months. There was very little public participation in the formation process, though a concentrated effort to inform and educate the public about the new service fees was initiated immediately prior to the first MSD stormwater service fee billing.

Jefferson County had more than ninety cities and towns when the stormwater management function was appended to the MSD wastewater program. Towns of the fourth, fifth, and sixth class (per population as specified by state statutes) had no option whether or not to be included in the MSD stormwater program. Cities of the third and second class had statutory authority to decline to be included, but there were no second class cities in the County at that time (1986). A few of the third class cities declined to be included, and still are not. This created gaps and inconsistencies in stormwater services across the County as MSD's program grew. Those gaps still create some problems for both MSD and those cities.

Service Area

MSD's stormwater service area is now approximately 280 square miles and encompasses nearly all of Jefferson County. It is similar to but not precisely the

same as the wastewater collection and treatment service area. Substantial portions of the former City of Louisville have combined wastewater/stormwater sewers. Outlying areas have separated sewers and many open drainage components (creeks, ditches, roadside drainage).

Role and Program

MSD has two major program responsibilities, wastewater collection/treatment and stormwater management/flood control. Flood control is particularly important because Jefferson County is located on the Ohio River. Large areas of Louisville were historically flooded by the Ohio River, and an extensive system of flood protection levees and pump stations was constructed following the flood of record in1937. Maintenance of the flood protection works was originally a county responsibility under U.S. Army Corps of Engineers oversight. That function was transferred to MSD along with stormwater management responsibilities. MSD also assumed responsibility for development-associated erosion and sediment control programs, though it does not have land use authority.

Governance Structure

MSD has a seven member Board of Directors, included a chairperson, appointed by the Louisville/Jefferson County Mayor and Metro Council. The MSD Board guides policy and sets service fee rates.

Organization and Staffing

MSD has an appointed administration and a substantial staff of over 600 management, engineering, operational, and support personnel. It has reduced staff count from more than 860 in 1995 in part by outsourcing some operations. MSD continues to perform many stormwater management functions in-house. Outside contracting is used to attain greater efficiency or when special expertise or equipment is required. The engineering and operational staffs are highly cross-trained to perform both wastewater and stormwater services.

Funding

The wastewater and stormwater components of the MSD program are funded by separate service fees that are independent and dedicated to each purpose in terms of rates, revenues, expenditures, and accounting. The current single-family residential stormwater service fee is $4.70/month. Rates are based on impervious area, and an equivalency unit of 2,500 square feet is used to normalize non-residential charges to the single-family residential flat rate. Each equivalent unit on developed non-residential properties is charged $4.70/month. Consistent with MSD's wastewater rate practices, the stormwater service fee rate is adjusted annually to meet budget projections. Total stormwater service fee revenues in Fiscal Year 2006 (July 2005) are expected to be nearly $26,700,000.

Inter-governmental Cooperation

Because MSD provides a centralized flood control/stormwater management program for nearly all of Louisville/Jefferson County, the need for inter-government collaboration is low in comparison to the other communities cited in this guidance document. Coordination with the cities that opted out of the MSD stormwater service area is sought, and MSD performs many planning, public education, and other development review functions that are beneficial to those cities.

Public Participation

MSD's stormwater program was initiated with little public participation, but the agency has sought out public involvement in many aspects of its stormwater services over the years since then. Infrastructure management, most notably construction and remedial repair programs, is administered by teams that work closely with local elected officials and community groups to prioritize and undertake projects. Community relations are facilitated by a telephone hot line for service inquiries and complaints, and a designated staff is assigned to assuring effective response to customers. The staff maintains close contact with elected officials as capital improvement and remedial repairs projects are developed and undertaken. MSD also conducts numerous community involvement efforts associated with stormwater quality programs, and has developed brochures and other materials that are available throughout the community.

SARASOTA COUNTY (FL) STORMWATER ENVIRONMENTAL UTILITY

Keynotes

- ► The Sarasota County approach provides a strong, centralized stormwater management planning, improvement and operations program conducted by a large staff of more than 120 persons, with additional support for related activities performed by about 50 employees of other County work groups. The primary objectives of the Stormwater Environmental Utility are to reduce flooding, improve surface water quality, and attain responsible development practices.

- ► A Florida Supreme Court decision in 1996 determined that the Sarasota County stormwater charge is a special assessment rather than a service fee. As such, it is subject to the standards applicable to assessments, which emphasize the apportionment of special benefit (that not available generally to all) and rational nexus rather than the reflecting the demand burden (cost of service) imposed by each person or property on the public stormwater systems and programs.

- Sarasota County is a charter county governed by a five-member Board of Commissioners and directed by a professional County Administrator. The Public Works Business Center includes the Stormwater Environmental Utility. There are four cities in Sarasota County. The city of Sarasota relies on the County to improve its drainage system and perform most stormwater operations. The other three cities retain responsibility for local stormwater systems.

- The Sarasota County stormwater utility is funded by benefit assessments on properties in the County and by inter-governmental agreement in the City of Sarasota. The assessments have three components that are consistent across the service area, and one component (system capitalization) that is variable by watershed. The benefit assessments are billed on the County's property tax bills.

- Under constitutional changes adopted in 1968, Florida counties may adopt charters that give local elected officials great latitude in determining the functions of their county and the preferred method of funding. Sarasota County has adopted such a charter. The Florida Statutes Chapters 125 (County Government), 163 (Intergovernmental Programs), 197 (Tax Collections, Liens, and Sales), and 403 (Environment Control) also specifically enable both cities and counties to establish utilities and adopt service fees and special assessments, or otherwise influence how they organize for and fund stormwater management. The Florida Statutes also enable counties to use such other revenues as they determine to be appropriate, or guide their manner of doing so.

- Key policies adopted by the Board of Commissioners and practices instituted by the staff are applicable throughout Sarasota County and in the City of Sarasota. Core funding policies include:

  - Capital investments will be funded by benefit assessments peculiar to each watershed; and
  - funding of customer service and administration, master planning, and maintenance will be funded by benefit assessments that are the same for all watersheds.

  Key operational practices include:

  - watershed-based master planning has been conducted throughout the County (26 watersheds), and capital improvements are being made;
  - centralized stormwater quality management is performed by the County stormwater utility to ensure compliance with the local NPDES permit; and
  - a flood protection and response program is provided county-wide.

- Sarasota County has a large staff (120 +/-) within the Stormwater Environmental Utility and also allocates substantial portions of other employees' time to stormwater management activities (50 +/-). Master planning is contracted to private vendors.

Community Profile

Sarasota County is located on the Gulf of Mexico on Florida's West Coast approximately sixty miles south of Tampa. It was formed when Sarasota County separated from Manatee County in 1921. The area was first homesteaded in the 1840's, but true development did not occur until the railroads arrived at the beginning of 20th century. Citrus fruit growing, other agriculture, and tourism were the basis of the economy for many years, and the County was the winter home of the famed Ringling Brothers circus for decades. The County has become a regional healthcare and commercial business center since the end of World War II.

Sarasota County encompasses 620 square miles and has a resident population of 340,000. The population swells significantly during the winter months when many "snow birds" flee the harsh winters of the Northeast and Midwest United States for the balmy climate of Florida. There are three incorporated cities and one town in the County.

Stormwater management in Sarasota County was not a high priority before the 1980's, when the County increased regulatory activities in response to the pressures of urban/suburban development and the problems associated with drainage in a low-lying coastal community. A Stormwater Environmental Utility was formed in 1989, and studies led to the adoption of a user fee. Sarasota County's stormwater utility is perhaps best known for a Florida Supreme Court decision in 1996, which found that the County was authorized by state statutes to establish the utility and enact a special assessment to support capital improvements and operational programs.

Formation Process

Sarasota County's initial stormwater management program was an outgrowth of its Aquatic Plant Control Department, which was consolidated into the Transportation Department in 1981. In 1989 the Board of County Commissioners established the Stormwater Environmental Utility. An inter-governmental agreement was signed with the City of Sarasota in 1991 and revised in 1997.

Service Area

The Sarasota County stormwater service area encompasses the unincorporated portion of the County plus the city of Sarasota. The County is not responsible for areas lying within other incorporated municipalities in the County.

Role and Program

The Stormwater Environmental Utility is responsible for the County's NPDES permit, and performs master planning for those portions of watersheds that lie wholly or partially in the County. However, it does not perform monitoring associated with the NPDES permit. The Utility is also responsible for capital improvements to and maintenance of the stormwater systems in the unincorporated areas and within the city of Sarasota. County programs are limited to those facilities located in publicly-owned properties and rights-of-way and those within dedicated easements. Systems located on private property and not subject to easements are the responsibility of the property owners. The Utility is also responsible for regulation of the use, storage, and disposal of sediments, herbicides, and other materials, and performs public relations, customer service, development review, and administration of the master account files for benefit assessments. Street sweeping is done by the Road and Bridge Division (Public Works) using sweepers purchased by the Stormwater Environmental Utility. Water Quality monitoring and enforcement is performed by the County's Environmental Services/Pollution Control Department.

Governance Structure

The Stormwater Environmental Utility is a separate account unit operating as a division of the Public Works Business Center. It is governed by the five-member Board of County Commissioners and is within the County Administrator's organizational control.

Organization and Staffing

As a division of the Public Works Business Center, the Stormwater Environmental Utility interacts extensively with other County units. The Utility staff numbers 120 (+/-), and it also financial supports a portion of the personnel expense associated with nearly 50 other County employees whose roles involve them in various aspects of stormwater management.

Funding

The Stormwater Environmental Utility budget in 2005 is approximately $20,000,000, with about $6,000,000 being for capital projects. Funding for the Stormwater Environmental Utility is derived primarily from a composite special benefit unit assessment that has four components. The benefit assessment is based on a calculation methodology that takes both pervious and impervious areas on each property into account. An equivalency unit approach is employed that has several rate classifications for residential properties and individual charges for non-residential that reflects the hydrology of each property. The equivalency unit is referred to as the "Equivalent Stormwater Unit", or ESU, and represents an "effective impervious area" of 3,153 square feet.

The ESU was determined by statistical analysis to be the average condition on single-family residences in the County, i.e. the total area and condition of an

average single-family residence burdens the stormwater systems and programs in the manner attributable to 3,153 square feet of impervious coverage. The effective impervious area for non-residential properties is determined by applying a formula that considers both impervious and pervious areas on each property and the conditions present in each case. For example, the pervious areas of citrus groves and orchards are treated differently than pervious areas in pasture or meadow because of the land management practices in the citrus groves and orchards which alter the hydrology. "Urban pervious" surfaces, such as contoured mown lawns, have a much higher effective impervious value than other pervious conditions.

Three benefit unit assessment components are uniform throughout the service area, customer service (administration), master planning, and maintenance. The customer service benefit assessment is a fixed value for each account rather than a charge per ESU, and is presently $3.20/year. The master planning and maintenance benefit unit assessments are uniform throughout the County, and are based on the number of ESU on each property. The master planning assessment is currently $17.92/ESU/year, and the maintenance assessment is $59.33/ESU/year. On average, a medium size single-family residence is assessed $80.45 annually for these three components of the benefit assessment, or approximately $6.70 per month.

The capital infrastructure investment component of the benefit unit assessment is reflective of the costs in each designated watershed, and currently varies from $12 to $141 per ESU per year across the County. The result is that the total assessment applicable to comparable properties in different watersheds may be significantly different.

Credits are provided for in the County's assessment methodology, primarily in relation to the capital improvement benefit assessments. Calculation of the credits is based on three factors, runoff quantity, runoff quality, and peak discharge rate. The stormwater assessments are billed annually along with the County's property taxes. Collection of delinquent billings is accomplished by a lien process similar to that applicable to property taxes.

Inter-governmental Cooperation

The Sarasota County stormwater program is closely coordinated with the cities' programs in the area, especially in terms of NPDES permit compliance, master planning and construction of major systems, and flood control/emergency response. The city of Sarasota has contracted with the County to provide stormwater management services, but three other municipalities retain responsibility for management of the local drainage systems in their communities.

Public Participation

Public participation is focused primarily on NPDES education/involvement mandates, master planning, flood and emergency awareness, and capital project construction. The Utility conducts two public meetings during the master planning process (26 watersheds), and local meetings in areas where capital projects are to be built. The staff also makes presentations at the request of neighborhood association, professional organizations, and special interest groups. The County also responds to inquiries from the city council in the City of Sarasota.

Review of San Diego County MS4 Monitoring Program

Final 3/02/06

Prepared for: San Diego Regional Water Quality Control Board
Prepared by: Tetra Tech, Inc.

Task Overview

The San Diego Regional Water Quality Control Board (SDRWQCB) tasked Tetra Tech, Inc., (Tetra Tech) with the following:

1. Review the San Diego County Copermittees' existing monitoring program and proposed changes (Copermittee Monitoring Program) as provided in the Report of Waste Discharge (ROWD) for comparison with the recommendations in the Model Monitoring Program for Municipal Separate Storm Sewer Systems in Southern California (Model Monitoring Program, or MMP). Specifically, the ROWD monitoring elements were to be assessed to determine how well they answer the five core management questions and how closely they match the specific monitoring program design recommendations presented by the MMP. The analysis was also to determine if the proposed monitoring information is sufficient and defensible statistically.

   As a component of this analysis, Tetra Tech was specifically asked to respond to the following questions:

   - How will reduction in monitoring frequency from monitoring three wet-weather events every year to monitoring two wet-weather events every other year affect the ability to use the data to make statistically sound conclusions and to identify significant differences between watersheds or years?

   - How likely is it that the Copermittees' proposed Temporary Watershed Assessment Stations will provide useful data that can be used to make statistically sound conclusions, given the limited scope of the monitoring proposed for these stations? Are the proposed locations of the TWAS and the rationale for those locations adequate to answer the MMP core management questions they are designed to answer?

2. If appropriate, and in coordination with the SDRWQCB, identify a suite of recommendations that could improve the Copermittees' proposed monitoring program but were not specifically included in the ROWD. As part of this effort, Tetra Tech was also to review the Copermittees' recently completed Baseline Long-Term Effectiveness Assessment, San Diego Stormwater Copermittees Jurisdictional Urban Runoff Management Program (LTE) report to identify all interrelated recommendations. All recommendations identified were to be designed to ensure consistency of the Copermittees' monitoring program with the MMP.

This report presents a review and evaluation of the San Diego County Copermittees' monitoring program, both in its current state (CSD 2005a) and relative to a series of recommended changes (CSD 2005b). The report is organized into four sections: (1) brief overview of the MMP, (2) brief overview of the Copermittees' current monitoring program and proposed changes, (3) broad recommendations for the Copermittee Monitoring Program, and (4) detailed analysis of current and proposed monitoring program adherence to the MMP. Summarized findings are presented in both Sections 3 and 4; the detailed statistical analysis of the two primary questions posed by the SDRWQCB is presented in Appendix A.

The following materials were provided to support these tasks:

- San Diego Municipal Stormwater Copermittees Report of Waste Discharge, monitoring sections (August 2005)
- 2003–2004 Urban Runoff Monitoring Final Report (January 2005)
- 2003–2004 Coastal Storm Drain and Lagoon Monitoring Annual Report
- Model Municipal Program for Municipal Separate Storm Sewer Systems in Southern California, Technical Report No. 419 (August 2004)
- Baseline Long-Term Effectiveness Assessment, San Diego Stormwater Copermittees Jurisdictional Urban Runoff Management Program (Weston Solutions, Inc., et al. 2005)
- Draft 13267 Order (Investigation Order No. R9-2005-0216), which outlines proposed Copermittee monitoring requirements for impaired lagoons and adjacent beaches

1. Overview of Model Monitoring Program

The Model Monitoring Program was developed by the Stormwater Modeling Coalition (SMC 2004) and is designed to address five fundamental management questions, with the goal of achieving a basic degree of comparability across southern California monitoring programs while maintaining individual programs' ability to address local and site-specific concerns. The five core management questions are as follows:

1. Are conditions in receiving waters protective, or likely to be protective, of beneficial uses?
2. What are the extent and magnitude of the potential receiving water problems?
3. What is the relative urban runoff contribution to the receiving water problem(s)?
4. What are the sources to urban runoff that contribute to receiving water problem(s)?
5. Are conditions in receiving waters getting better or worse?

These questions define both a logical sequence of monitoring steps and steps in the evolution of an effective stormwater monitoring system.

The MMP focuses on two beneficial uses common to most urban runoff management programs in the region—human health (recreation) and habitat protection (benthic assemblage, biological integrity). For each of these uses, the model program defines monitoring objectives and study designs. Rather than a completely fixed program, the model program recommends several tools to serve as adaptive triggers for initiating more monitoring effort if an impact is observed or a reduction in monitoring effort if no impact (or potential for impact) is found. These tools include

triggers for toxicity identification evaluations, upstream source tracking, a prioritization scheme for special studies, and a computer program for estimating sample size on the basis of statistical power to detect trends.

The model program identifies several types of monitoring stations that could be integral parts of a local program that addresses each of the five key management questions:

- Long-term, fixed, bottom-of-watershed (above-tidal-influence) stations to assess cumulative water quality and aggregate loads, with monitoring based primarily on a mass emissions model including wet weather chemistry and toxicity
- Spatially extensive, perhaps randomly sited or rotating, stations to support statistically valid comparisons across multiple watersheds, and with monitoring based primarily on the Triad approach (chemistry, toxicity, and benthic community) for dry weather sampling and on chemistry and toxicity for wet-weather sampling
- Site-specific stations focused on the status of high-priority inland habitats of concern, with monitoring based primarily on the Triad approach for dry weather sampling and on chemistry and toxicity for wet weather sampling
- High-priority inland body contact recreation areas
- Site-specific stations designed to generate information to support key program goals, such as source prioritization or best management practice (BMP) implementation and evaluation
- Coastal estuarine stations to assess status in these key habitats, with monitoring based primarily on the Triad approach
- Coastal ocean stations to assess stormwater plume impacts, conducted primarily as part of the periodic Bight surveys.

The SMC intends that the model program be used as a template to guide incremental adaptation of local monitoring programs toward the goal of a comprehensive program to address the five core management questions. The SMC recommends that this process be accomplished through the following steps:

1. Evaluate a program's ability to answer each of the five management questions.
2. Identify critical gaps in knowledge (e.g., inability to document impacts, lack of knowledge about potential sources, absence of trend monitoring component) relevant to each program's circumstances.
3. Use the monitoring designs in the MMP as a framework for developing monitoring components suited to each program's circumstances.

2. Current Copermittee Monitoring Program and Proposed Changes

The existing Copermittee Monitoring Program (County of San Diego [CSD] 2005a) is organized around (1) stormwater monitoring, (2) rapid stream biological assessments, and (3) coastal monitoring, including storm drain discharge and ambient bay/lagoon monitoring. The Copermittees also participate in a watershed-based toxic hot spot monitoring program, although it is not specifically a component of the monitoring program. The proposed changes in the

Copermittee Monitoring Program (as outlined in CSD 2005b) are intended to increase consistency with the MMP developed by SMC.

Stormwater Monitoring

Existing Program

There are 11 mass loading stations (MLS) where water samples for chemical analysis, flow metering, and other measurements are taken. A single biological assessment site is collocated with each MLS (also discussed below). The mass loading sites were selected to directly measure pollutant loads being discharged into San Diego's receiving waters by the major watersheds within the San Diego region. Accordingly, the stations are located at the downstream ends of major watersheds, upstream of any tidal influences, but they also meet several other criteria such as accessibility, safety, and suitability for measurements and sampling.

Three storm events per year are captured at each MLS site by grab sampling, channel flow rate is measured, and samples are analyzed for the following characteristics:

- Temperature
- pH
- Specific conductance
- Biochemical oxygen demand
- Oil and grease
- Total coliform
- Fecal coliform
- Enterococcus
- Total and dissolved metals
- Organophosphate pesticides (diazinon, chlorpyrifos)

It should be noted that the last two bullets in the above list (metals and pesticides) were provided in the executive summary but did not appear in the methods section of the final 2003–2004 monitoring report (CSD 2005a). In addition, toxicity testing is performed on the grab samples using three freshwater species—*Ceriodaphnia dubia*, *Hyalella azteca*, and *Selenastrum capricornutum*. Both acute and chronic toxicity values are calculated for each, and results are taken to reflect the potential of instream aquatic life impacts resulting from the stormwater. Control organisms are used to determine the acceptability of the test results.

Data from MLS monitoring have been used for regional water quality assessment by comparing constituent of concern (COC) concentrations across watersheds and by grouping similar watersheds by COC relationships. Comparisons of estimated event mean concentrations (EMCs) with measured EMCs at mass loading stations were also performed to compare watershed areas.

The results contribute to identifying water quality impairments among the watersheds in the region. For example, among the MLS, the Tijuana River has consistently shown the highest concentrations for most of the COCs, particularly those associated with untreated wastewater and highly urbanized land use. This MLS has also had the most consistent toxicity results with respect to *Ceriodaphnia* and *Hyalella*. Other MLS data have documented strong relationships

for increasing toxicity with higher amounts of diazinon, total suspended solids (TSS), and dissolved nickel. Some trends have been suggested, including decreasing trends for lead, nickel, and zinc at Tecolote Creek; increasing TSS and turbidity at Agua Hedionda; and decreasing TSS and turbidity at Tecolote Creek and Chollas Creek.

Proposed Changes

Basic frequency of MLS sampling is reduced from annual to biannual (once every 2 years). Copermittees further propose to monitor two storm events and two dry weather events, rather than three storm events, every two years. There are no changes to the MLS with respect to location, constituents analyzed, and association with biological assessment stations. They will be assessed for the current constituent list (see list above).

Temporary Watershed Assessment Stations (TWAS) will be placed farther upstream in the watershed (placed to capture major land use changes and to be immediately downstream of tributaries) and will be temporary in that they will be moved if necessary to help track sources of pollutants to the watershed. Sampling will occur on the same schedule as the MLS and apparently will include two wet-weather events and two non-rain events per sample year. Also, as with the MLS, biological assessments will be associated with the TWAS.

Rapid Stream Biological Assessments

Existing Program

Stream bioassessments (BAs) are conducted to assess the ecological health of the watershed units in San Diego County, using the California Stream Bioassessment Protocol (CSBP) (CSD 2005a, page 3-11), which samples and analyzes populations of benthic macroinvertebrates and assesses the quality and condition of the physical habitat. Using species-specific tolerance values and community species composition, numerical biometric indices are calculated, allowing for comparison of relative habitat health between streams in a region. Over time, this information is used to identify ecological trends and aid analyses of the appropriateness of water quality management programs.

A minimum of 23 monitoring reaches were sampled in each survey, including 3 reference sites per survey. The primary goal for each survey was to sample 2 monitoring reaches in each of the 10 watershed management areas that have stormwater mass loading stations. Of the two monitoring reaches, one was located as far downstream in the watershed as was practicable and the other was located farther upstream in the watershed, but where it was still affected to some degree by urban development. From 2001 to 2004, 9 reference sites and 39 “urban-influenced” sites were sampled. They were intermittently sampled twice a year (May-June and October); some reaches were sampled every sampling period (thus, up to seven times) and some as few as a single time.

Taxonomic identification of samples collected in October 2003 produced 90 taxa from a total of 17,302 individuals. The May 2004 samples produced 104 taxa from 20,012 individuals. The majority of organisms from the urban affected sites were moderately or highly tolerant to stream impairments. Organisms highly intolerant to impairments were encountered infrequently at the urban-influenced sites, but several sites supported highly intolerant organisms. The Index of

Biotic Integrity ratings of the monitoring sites ranged from Very Good to Very Poor in October 2003 and May 2004; IBI scores for the reference sites were always higher than the scores for the urban-influenced sites.

Among watersheds in San Diego County, the Santa Margarita River watershed was the least impaired. The remaining watersheds have substantially greater amounts of urbanization, and the IBI results generally indicate that greater water quality impairment occurs in the lower portions of the watersheds, as the impacts of urban runoff become cumulative. Trend analysis has become possible after more than 3 years of bioassessment. However, macroinvertebrate community quality has not shown any trend toward degradation or improvement.

Proposed Changes

Benthic macroinvertebrate sampling will continue to occur twice a year (late spring and late summer) with the intent of spatial and temporal association with the stormwater and non-stormwater chemistry (MLS, TWAS). Thus, BA will be performed at the same number of locations as previously, but with a reduced frequency on a biannual schedule (once every 2 years).

Coastal Storm Drain Outfall Monitoring Program (CSDM)

Existing Program

The objectives of the current Coastal Storm Drain Monitoring (CSDM) program are as follows:

1. Evaluate the impacts of storm drains on the recreational beneficial uses in coastal receiving waters.
2. Identify and eliminate sources of highly elevated bacteria from coastal storm drains.
3. Develop a coastal water quality database.

Objective 1 supports the first two core management questions (protection of beneficial uses and extent/magnitude of receiving water problems) by collecting total coliform, fecal coliform, and enterococcus data on outfalls and receiving waters during both dry- and wet-weather flows and comparing bacteria levels against water quality objectives for recreation. Activities associated with Objective 2 partially contribute to question 3 (sources of urban runoff receiving water problems) by investigating causes of documented exceedances of water quality standards. Achievement of Objective 3 will result in a database that can be applied to core management question 5 (whether conditions in receiving waters are getting better or worse) through trend analysis.

CSDM sites were selected in 2001 on the basis of storm drains having the greatest potential to adversely affect the bacterial water quality of coastal and lagoon receiving waters. Paired samples (simultaneous storm drain discharge and receiving water samples) are collected monthly during the wet season and every 2 weeks during the dry season at the coastal storm drains and lagoon sites. Water samples are analyzed for total and fecal coliform and for enterococcus indicators. Resulting data are used to characterize use support at the sites at the time of sampling, to identify receiving water exceedances, and to trigger source investigations.

Sampling frequency can also be reduced at sites that exhibit consistently low bacteria levels. Exceedances of public health standards for bacteria are reported to the County Department of Environmental Health, and exceedance of the 95th percentile observations of the previous year's bacteria data (pooled from all CSDM stations) triggers investigation and potential remediation of the source(s) of bacteria in the storm drain catchment area.

The CSDM program has been effective in evaluating the impacts of storm drains on the recreational beneficial uses in coastal and lagoon receiving waters. In 2003–2004, only three samples of the paired sample results (< 1 percent) showed both a storm drain action level exceedance and a receiving water exceedance at coastal locations. Similarly, only 7 of 116 paired lagoon samples (6 percent) exceeded both criteria for lagoons. Data collected during the last two reporting periods indicate comparable results. Although there was not a demonstrated decrease in bacteria levels between the 2002–2003 and 2003–2004 programs, overall bacteria levels at the majority of the sites are currently below action levels. Furthermore, approximately 75 percent of all monitoring locations had no exceedances in the receiving water. In 2003–2004, 15 investigations of 95th percentile exceedances were conducted, resulting in successful and ongoing efforts to correct the source activities. During the most recent permit year, data management and transfer were improved as part of the building of a coastal water quality database. Finally, analysis of lagoon data suggested that the current lagoon program might need to be revised to achieve a better interpretation of (1) bacteria concentrations in lagoons and (2) the effects that storm drains and other MS4 drainages might have on lagoon waters.

Proposed Changes

Coastal Storm Drain Monitoring sites where receiving water samples cannot be collected will be moved to the respective Copermittee's dry-weather monitoring program. Five years of data evaluation have shown that the single sample locations tend to have low levels of bacteria, cannot adequately assess the bacteria inputs to the receiving waters, and do not provide useful data to meet the SMC objectives. Furthermore, none of the single sample sites flow directly into the receiving water. These sites should be treated similarly to dry-weather sites, relying on action level exceedances to trigger IC/ID investigations. Therefore, these monitoring sites will be added to the respective Copermittee dry-weather monitoring program.

Monthly sampling of paired storm drain and receiving waters can adequately assess the bacterial impacts from dry-weather storm drain flows. This represents a reduction of dry-weather sampling frequency from twice monthly. Monthly sampling of both coastal and lagoon sites, during both the dry and wet seasons, appears adequate, according to the Copermittees.

Realignment of the Coastal Storm Drain Monitoring Program will provide a consistent dataset for use in regional data analyses. The Permit requires that the monitoring season start on October 1 and end on September 30. The Copermittees intend to align the CSDM sampling and reporting periods to begin and end in accordance with this time frame. Therefore, the CSDM wet weather season will begin on October 1 and end on April 30, while the dry-weather season will occur May 1 through September 30. Storm drain action levels will be reassessed annually, and the new action levels will start on October 1 of each year. This will provide a coastal dataset that uses dry/wet-weather periods similar to the rest of the Copermittee monitoring programs.

Ambient Bay and Lagoon Monitoring Program (ABLM)

Existing Program

The first phase of the Ambient Bay and Lagoon Monitoring (ABLM) Program (2001–2002) collected data on bay and lagoon sediment characteristics as a basis for the design of an appropriate plan to assess habitat conditions in receiving waters. Following completion of the initial phase, ABLM Program sampling was implemented in 2002–2003 with the following objectives:

1. Assess the overall health of the receiving waters and monitor the impact of urban runoff on ambient receiving water quality.
2. Provide an indication of how aquatic life in the bays and lagoons is affected by pollution.
3. Allow prioritization of outfall areas of coastal embayments for additional investigation in subsequent years.

Objectives 1 and 2 support core management questions 1 and 2 (protection of beneficial uses, extent and magnitude of receiving water problems). If continued through time, the ABLM Program could provide information for trend analysis of bay and lagoon condition (question 5). However, because the program is deliberately biased toward "worst-case" locations (see below), data from the ABLM Program will be of limited utility in addressing core questions 3 and 4 (relative contributions of urban runoff and identification of sources of receiving water problems).

As a result of physical characteristics and depositional patterns within coastal embayments, there are wide variations in sediment characteristics within coastal embayments. Rather than trying to directly measure contaminant loading in the water, the ABLM Program focuses on the receiving water sediments where contaminants are most likely to be found. In the study design phase, the ABLM Program used the association between small grain size, high total organic carbon (TOC) levels, and contaminants to target areas in each of 12 embayments where contaminants were most likely to be found. The three sites in each embayment with the highest ranks for grain size and TOC were assessed in the next phase of the program, which began in July 2003. **Note that the subsequent assessments represent a *worst-case scenario* rather than a representative assessment of the embayment.**

At each bay station, several water quality parameters are measured and sediment samples collected for analysis:

- **In situ water quality**: depth, temperature, DO, pH, and conductivity
- **Sediment chemistry**: top 5 cm analyzed for metals, organochlorine and organophosphate pesticides, PCBs, and PAHs
- **Sediment toxicity**: 10-day static amphipod toxicity test
- **Benthic infauna**: species list, relative abundance, species diversity or richness, Shannon-Wiener Species Diversity Index, and an evaluation of the presence of sensitive and pollutant tolerant species.

Once all the ABLM data were collected, a Triad matrix (sediment chemistry/sediment toxicity/benthic community) was developed representing the combination of sediment chemistry, sediment toxicity, and benthic infauna data. The matrix was used to develop a ranking of the embayments across the County.

Results from the first sampling year (2003–2003) indicate that the mean Effects Range Medium Quotients (ERM-Q, the concentration of each COC divided by its ERM to produce a proportion of the ERM equivalent to the magnitude by which the ERM value is exceeded or not exceeded) were low for all of the 12 coastal embayments, reflecting the low concentrations of metals, PAHs, PCBs, and pesticides. Arsenic, chromium, copper, lead, nickel, and zinc were found above the detection limit at all embayments assessed, but at low concentrations. Concentrations of metals exceeded the Effects Range Low (ERL) in only 12 of the 108 analyses conducted. ERLs of only four metals were exceeded; copper was exceeded most frequently, followed by arsenic , zinc, and lead. In most cases, the ERL was exceeded only slightly, suggesting minimal impacts on the biota from individual COCs. PCBs were not found above the detection limit at any assessed embayment. PAHs were found above the detection limit at only two sites at concentrations at least 10 times lower than their ERLs. These results suggest minimal if any impacts on the biota from PAHs in the sediments of the coastal embayments. Neither of the two pesticides assessed in the ABLM Program (chlorpyrifos and diazinon) was found above the detection limit in sediments from any of the coastal embayments assessed.

Sediment toxicity testing showed that survival of the test organisms varied from 88 percent to 27 percent among the embayments. Mean survival of test organisms exposed to sediments from eight sites assessed in the study was significantly different from control sediment survival: two of these sites had much lower survival rates than the other sites assessed, suggesting elevated sediment toxicity in these embayments.

Groupings of benthic infauna based on various metrics were largely based on physical and hydrologic conditions at the sampling sites.

Monitored embayments were ranked on the basis of sediment chemistry, sediment toxicity, and benthos, but consistent relationships between sediment chemistry, toxicity, and benthic community structure have not yet emerged.

Proposed Changes

Continuation of the ABLM Program to collect 3 years of data will facilitate evaluation of associations between mass loading stations and bays/lagoons. Following 3 years of monitoring, the monitoring design will be adapted by assessing the information/data to evaluate associations between the mass loading stations and the ambient bay and lagoon. If a relationship is observed, the ambient bay and lagoon monitoring program will be linked into the program design as a monitoring element to be conducted with the MLS, TWAS, and BA monitoring and the information/data will be assessed as an additional weight-of-evidence element. However, if a relationship between the mass loading stations and the ambient bay and lagoon program is not observed, the ABLM program will be adapted to conduct special investigations on bays and lagoons.

Additional ABLM data will help document relationships between sediment chemistry, sediment toxicity, and benthic community structure. The Copermittees' 2003–2004 Final Report on monitoring points out that such relationships are weak, based on the initial dataset. This is attributed to both the complex dynamics of coastal estuaries and the limited number of samples. The report suggests that data collected in subsequent years might strengthen these relationships.

The ABLM Program will be suspended in 2006/2007 and 2007/2008, supplanted by regional monitoring associated with the Southern California Bight Program, followed by implementation of a "refined" program in Permit Years 4 and 5. No criteria are presented for the "refined" program.

Toxics Hotspots Monitoring Program

The hot spot monitoring component is composed of parts of other programs whose data will contribute to the Copermittees Monitoring Program. The SDRWQCB and select Copermittees (primarily the City of San Diego) have responsibility for its implementation and oversight, and to date the program has focused largely on San Diego Bay. Therefore, only a brief overview of the objectives, monitoring plan, and findings are provided in this report to provide context to the overall Copermittee Monitoring Program. Furthermore, the Toxic Hotspots Monitoring Program was not evaluated against the MMP.

The *California Bay Protection and Toxic Cleanup Program* (BPTCP) has four major goals: (1) protect existing and future beneficial uses of bay and estuarine waters; (2) identify and characterize toxic hot spots; (3) plan for the prevention and control of further pollution at toxic hot spots; and (4) develop plans for remedial actions of existing toxic hot spots and prevent the creation of new toxic hot spots. The BPTCP designates toxic hot spots as areas within enclosed bays, estuaries, or the ocean where pollutants have accumulated in the water or sediment to levels that might pose a hazard to aquatic life, wildlife, fisheries, or human health; affect beneficial uses; or exceed state adopted water quality or sediment quality objectives. Each RWQCB must complete a toxic hot spot cleanup plan, and the SWRCB must prepare a statewide consolidated toxic hot spot cleanup plan that includes a priority listing of all known toxic hot spots, a description of each toxic hot spot including a characterization of the pollutants present at the site, and an assessment of the most likely source or sources of pollutants.

In 1997 the SDRWQCB completed the Proposed Regional Toxic Hotspot Cleanup Plan, which designates five specific areas as toxic hot spots in San Diego Bay. Based on results of the BCTCP completed in the 1990s, sediments in three locations are contaminated with chemicals, including PAHs, PCBs, chlorinated pesticides, and metals. These sites contain degraded benthic macroinvertebrate communities, and samples from these areas have been demonstrated to be toxic to various marine invertebrate species in laboratory toxicity tests. As a consequence, these sites have been identified as areas having impaired water quality. In response to this contamination, the SDRWQCB has initiated efforts to develop Total Maximum Daily Loads (TMDLs) for these sites to reduce ongoing loadings of contaminants of concern, to minimize benthic community impairment, and to minimize human health and wildlife impacts that might result from accumulation and biomagnification of contaminants in the food web.

A watershed monitoring component of this program was scheduled to begin in early 2005 to collect water quality and resource data in three drainage channels upstream of the identified hot spots.

To determine the potential contribution of upstream stormwater to pollutant levels in San Diego Bay, the City and San Diego County Municipal Copermittees developed an upstream source investigation study looking at contaminant levels in fine grain sediments at several locations along creeks. The data were to be used in support of a spatial assessment of marine sediments at the mouths of Chollas and Paleta Creeks in San Diego Bay. Marine sediment assessment at the mouths of the creeks was conducted for the Regional Water Quality Board Toxic Hot Spot/Total Maximum Daily Load (THS/TMDL) Program.

In 2003 the University of California Marine Pollution Studies Laboratory and others performed a sediment quality assessment study at three locations in San Diego Bay to examine the spatial extent and severity of sediment quality impairment in the study areas in order to provide information for TMDL planning and cleanup efforts. This monitoring has been completed and data review is ongoing.

Unlike the ABLM Program, the hot spots investigation program does attempt to relate Bay sediment hot spots to activities in watershed source areas through some of the abovementioned upstream investigations, additional dry-weather sampling in the watersheds, and the use of a model to calculate the runoff and pollutant concentrations based on land use values in the watershed areas above the hot spots. The model demonstrates that a large amount of sediment is entering San Diego Bay adjacent to the hot spots; however, the fate of the sediment and associated contaminants is difficult to determine because of the complex nature of sediment transport.

To date, studies in the Bay have identified several hot spots of concern, especially for PCBs, PAHs, and metals. Most of these areas are in nearshore locations. Wet- and dry-weather monitoring have identified some constituents at high enough levels to suggest that they might end up in Bay sediments. However, given the short data record and a lack of information regarding sediment and pollutant transport processes in San Diego Bay, it is difficult to predict the fate of sediment and pollutants from upstream urban areas that reach San Diego Bay.

3. Broad Recommendations for the Copermittee Monitoring Program

Overview

Based on a review of existing documentation, the current Copermitee Monitoring Program appears extensive and has provided valuable information concerning the impacts of stormwater on receiving waters. The monitoring program has helped to develop an understanding of wet-weather conditions at the outlets of major watersheds and has established baseline information about the condition of stream benthic communities throughout the region. It has provided important data on the contributions of storm drains to impairment of coastal waters for recreation and on toxic hot spots in the region's bays and lagoons. Monitoring data have provided the foundation for documentation of long-term trends in water quality throughout the County. Evaluation of monitoring data from the program has facilitated preliminary priority ranking of watersheds by pollutant, as well as regional evaluation of constituents of concern and environmental stressors (Weston Solutions, Inc., et al. 2005).

As previously noted, however, one particular objective of this report was to review the Copermittees' current and proposed monitoring plan with respect to the MMP. A thorough analysis shows that the Copermittees' current and proposed monitoring programs do not fully adhere to the MMP and that certain aspects of monitoring could be improved to more effectively address the core questions posed by the MMP. In addition, some changes to the monitoring program recommended in the *Baseline Long-term Effectiveness Assessment* need to be addressed. It should be noted that one major purpose of monitoring is the assessment of program effectiveness, in this case, the evaluation of load reduction efforts underway in the County. Monitoring data can evaluate the success of stormwater BMPs implemented in the watershed, of IC/ID programs aimed at dry-weather discharge, of source abatement or of a TMDL process. In doing so, monitoring data can provide feedback essential to the design and management of load reduction programs, showing what works and what does not. Perhaps most importantly, monitoring can document ultimate compliance with water quality criteria and restoration of aquatic biota. Answers to the five questions posed by the MMP will provide a solid basis for evaluation of load reduction programs. Some recommendations for changes in the Copermitees' monitoring program directed toward improving the ability of monitoring data to help document the effectiveness of pollution control efforts are given below, particularly in the areas of increased attention to identification of sources of urban runoff, collection of watershed land use and source activity data, and trend analysis.

The following broad recommendations are presented to address these issues. Section 4 of this report provides a detailed analysis of the relationship between the current and proposed Copermitees' programs and the MMP, along with specific recommendations in each case.

Finally, note that monitoring activities must always be evaluated with respect to the appropriate objectives. In some cases, the current monitoring program might be adequate to address core question 1 (Are conditions in receiving waters protective, or likely to be protective, of beneficial uses?) but inadequate to fully address question 2 (What are the extent and magnitude of the current or potential receiving water problems?) or question 5 (Are conditions in receiving waters getting better or worse?). Thus, a statement that a monitoring activity meets the MMP for one question does not guarantee that the same activity fully meets the objectives of another core question.

Broad Recommendations

Following are six broad recommendations that, if implemented, will maximize the ability of the Copermittees' monitoring program to address the core questions of the MMP and to evaluate the effectiveness of the region's stormwater management program. Note that although complete alignment with the MMP might not always be achievable in a single step, the foundation for further evolution of the monitoring program toward that ideal should be established in each iteration of the Copermittees' monitoring. This is especially important given that the proposed changes presented in the ROWD could likely remain in effect for the next 5 years.

1. Maximize the utility of the TWAS sites

The proposed TWAS program is a critical addition to the Copermittees' monitoring program, particularly with respect to fully characterizing the magnitude and extent of water quality problems and the process of source identification. As noted in the LTE, the current monitoring

programs provide a snapshot of the wet-weather freshwater toxicity, chemical, bacterial, and general physical parameters at the base of each of the 11 watersheds, but they have not been designed to fully assess the magnitude and extent of water quality impacts. Furthermore, the current monitoring programs do not provide the ability to conduct a weight-of-evidence assessment of water quality because the sites are not holistically linked to allow for the most effective spatial and temporal assessment. A refocused monitoring program that includes TWAS sites would provide water quality data that are more spatially and temporally varied. However, the proposed number of TWAS sites might be insufficient to fully achieve this purpose and to fulfill the intended purpose, a systematic plan—one that does not currently appear in the proposed changes—is required. The following is a list of principal recommendations and their corresponding reference points in the detailed analysis in Section 4.

- The number of proposed TWAS sites is limited. The TWAS in the proposed program modifications should be sufficient in number to address extent and magnitude issues effectively and to provide statistically useful information. (1.1 E, 2.1 D, O)
- Site TWAS to improve spatial coverage within monitored watersheds, to monitor previously un-assessed subwatershed areas and to focus on specific areas of concern. TWAS should include BA as third leg of Triad, unless all BA stations are collocated with TWAS sites. (1.1 J; 2.1 A, B; 2.1 F)
- Using TWAS and/or additional temporary, targeted monitoring, isolate subdrainages of particular land use or other characteristics as part of source identification efforts. (3.1 E)
- Locate TWAS carefully and in sufficient numbers to target high-priority areas in monitored watershed and to bracket high-priority inputs. In this application, TWAS stations should remain in place long enough to provide a solid basis for trend detection. (4.1 H)
- Assess the location of water quality samples to address long-term questions of trends in water quality that demonstrate long-term effectiveness of implemented load reduction activities. (LTE, p. ES-8). Because they are intended to be mobile, TWAS could be vital in demonstrating effectiveness of load reduction activities if, for example, TWAS are sited downstream of pollution control activities before and after they are implemented. Good data on watershed land use and source activity are also essential in this regard (see Recommendation 5 below).

2. Improve the focus of the sampling locations and schedules

The MMP generally calls for higher sampling intensity in space and time to fully characterize the magnitude and extent of pollutant emissions and impacts, especially where impacts have been documented by a baseline sampling regime. For some objectives, the current Copermittee Monitoring Program does not fully adhere to the MMP; proposed reductions in sampling frequency will tend to compound this problem. Sampling locations and frequencies should be adjusted to focus more closely on the intent of the MMP. In some cases, this will require increased sampling intensity; to some degree such increases can be offset by reductions in intensity in areas where little or no impacts have been observed (adaptive monitoring). The following is a list of principal recommendations and their corresponding reference points in the detailed analysis in Section 4.

- Broaden both current and future ABLM monitoring to include a more spatially representative assessment beyond the worst-case areas. Worst-case data do not provide a representative picture of the extent of habitat problems. Periodic synoptic surveys, probability-based

sampling, or rotating sampling stations encompassing a full range of embayment environments (e.g., different sediment grain size and TOC levels, different exposure to currents and tributary and/or storm drain discharge) would help to provide a more unbiased picture of the extent and magnitude of sediment toxicity and impacts on biota in the bays. (1.3 B, H, 2.3 A)

- At MLS, BA, and CSDM sites where consistent impairments have been documented, add additional sampling in space and time to define spatial extent and magnitude of the problem(s). (2.1 A, D, 2.3 E)
- For the ~25 percent of CSDM sites where some sampling showed exceedance of receiving water criteria or where both samples from drains discharging to the ocean and receiving water samples exceeded relevant thresholds, conduct additional sampling down-current in receiving water to document the extent of the problem. (2.2 A, B, D, 2.3 B)
- Measure indicator bacteria more frequently, especially during the high-use season, both in discharges and instream above/below discharges. Sites should be prioritized by risk, i.e., use intensity and contamination level. Sampling frequency for bacterial indicators should be increased at heavily used beaches or beaches with known or suspected sources of bacteria. (1.1 B, I, 1.2 G, 2.1 B)
- Conduct additional sampling upstream and downstream of recreational impacts and at additional times to determine the persistence and extent of elevated bacteria levels. (2.1 J, K)
- At sites where habitat impairment has been documented, add repeated measurements and additional sampling locations for appropriate Triad components to define the magnitude and spatial extent of the problem. (2.1 P)
- Evaluate MLS and other indicator bacteria data to determine patterns of seasonal variability. If significant seasonality is observed, consider restructuring the bacteria monitoring program to account for seasonal patterns. (2.1 G, 4.1 F)

- Evaluate the need for focused sediment sampling up into the watershed to identify the largest contributors to impacted sediments identified in the receiving estuaries. (LTE, p. 2-50)
- The current monitoring program does not address trends in dry weather flows because sampling locations have not been established for trend evaluation. Refocusing the current monitoring program to establish dry-weather sampling locations based on water quality priorities, loading potential of sources within the watershed and available resources, and conducting sampling and analysis of these locations over a period of time could facilitate trend evaluation for dry-weather flows. (LTE, p. 2-47)

3. Reevaluate the consequences of changes in sampling frequency

The proposed reduction of MLS sampling frequency will reduce the program's ability to document differences between stations and trends over time with statistical confidence; that is, larger differences or changes will be required to conclude that the changes are significant at a given level of confidence. Stormwater monitoring in alternate years risks missing significant transient conditions or events. Furthermore, reducing sampling frequency and skipping years will likely impair the use of monitoring data as feedback in evaluating the effectiveness of land-based pollution control activities (e.g., stormwater treatment, improved management practices). A detailed analysis of some of the statistical implications of the proposed reduction in monitoring frequency is provided in Appendix A. The following is a list of principal recommendations and their corresponding reference points in the detailed analysis in Section 4.

- Maintain the present sampling frequency at MLS that show consistent impairment. (2.1 D, Appendix A)
- Examine the existing database to evaluate sampling frequency required to adequately define temporal/seasonal patterns and adjust frequency accordingly. (2.1 G)
- Evaluate the sampling frequency necessary to characterize annual bacteria loads. (2.1 H, J)
- Increase the sampling intensity (spatial and temporal) at stations where impacts have been consistently observed (2.3 D); apply adaptive monitoring to reduce the sampling intensity where impairments are not observed (e.g., reduced bacteria sampling at some CSDM sites).
- Establish goals for trend analysis, and then conduct power analysis and minimum detectable change analysis to determine the sampling frequency necessary to achieve the goals. Reevaluate the effects of reduced monitoring frequency on trend detection; if current trends change direction, magnitude, or both, the proposed changes in sampling regime will have a significantly reduced sensitivity to detect change. (4.1 B)
- Conduct power analysis and minimum detectable change analysis on the CSDM data in the preliminary trend analysis of the existing dataset as called for in the MMP. (4.2 B, C)
- For the CSDM program, reevaluate the proposed reduction of sampling frequency to monthly, especially with respect to alignment of current sampling schedules with recreational use periods, and consider adjustment to enhance sampling during peak periods. (4.2 G)

4. Give substantially more attention to Questions 3 and 4

After some years of assessment monitoring, it is time to look more systematically at determining the relative urban contributions and the sources of urban runoff that contribute to identified receiving water problems. This appears to be the greatest weakness of the current and proposed Copermittees' monitoring programs with respect to the MMP. Working toward source identification will require additional water quality sampling in some areas, better use of existing data, or both. The following is a list of principal recommendations and their corresponding reference points in the detailed analysis in Section 4.

- Use additional methods such as sanitary surveys, bacterial genotyping, and additional bioassessment at MLS and BA sites to gain additional information on impacts that can contribute to source identification. (3.1 H)
- Pursue upstream source identification of documented water quality impacts at MLS sites using the approaches recommended in section 5.4 of the MMP. (3.1 K)
- Assess the need for focused sampling up into the watershed based on the water quality priority rating and the number and location of sources with likely and unknown source loading ratings. Focused sampling should use a weight-of-evidence approach and co-locate wet- and dry-weather samples, toxicity testing, and bioassessment stations where feasible. (LTE, p. ES-6)
- Use source inventories and "Threats to Water Quality" analysis to guide monitoring efforts (LTE)

- Use TWAS and/or additional targeted monitoring to isolate subdrainages of particular characteristics as part of source identification efforts (3.1 E.)
- Future monitoring under the ABLM Program might include focused sediment sampling up into the watershed to identify which specific subwatersheds and related sources are the

largest contributors to sediments impacts at the outfalls of these watersheds, where potential toxic effects are identified. (LTE, p 2-5)

- Answering the question of "relative" contribution requires knowledge of baseline conditions or a reference (non-urbanized) area for comparison. The current monitoring program does not directly address this question. (LTE, p. 2-48)
- Because the majority of dry-weather flows in San Diego County result mainly from urban runoff, additional dry-weather data will help address Question 4. (LTE, p. 2-48)

5. Collect watershed land use and source activity data

Determining the relative urban runoff contributions and identifying specific sources of urban runoff will require not only highly focused water quality monitoring but also data on land use and source activities in watersheds and stormwater drainage areas. Such activity is almost entirely absent from the current and proposed monitoring programs. The following is a list of principal recommendations and their corresponding reference points in the detailed analysis in Section 4.

- As called for in the Copermittees' recommendations, a larger dataset from the ABLM should be assessed to look for a relationship/linkage between the MLS and the ABLM results. This might require collection of additional land use/source activity data from tributary watersheds. If a relationship is observed, then the ABLM Program should be better integrated into the program design as a monitoring element to be conducted with the MLS, TWAS, and BA. (1.3 G)
- Based on land use, population, and published information (as proposed in Section 5.3.2 of MMP), describe the nature and magnitude of potential sources of inputs from watershed management areas. (3.1 B)
- Evaluate the loads at MLS with respect to land use, population, and other characteristics in watershed management areas using tools such as multiple linear regression, factor analysis, cluster analysis. (3.2 A, B, 3.2 B)
- Use land use modeling, reconnaissance, tracers, and other approaches to assess sources upstream of MLS sites. (2.3 F)
- Collect land use, population, and source activity data from source area draining to each drain to allow analysis relating potential source activities/conditions to observed impacts. (3.2 A)
- Conduct an inventory of potential sources of pollutants involved in documented impacts at ABLM stations. (3.3. B)
- Use existing data, relevant literature, and simple tools to estimate the relative magnitudes of pollutant loads from watershed sources. (3.3 B)
- To fully assess pollutant sources, obtain the following type of information (LTE, p. ES-3):
    - Update and expand inventory to include all of the prioritized sources.
    - Provide geo-spatial information (coordinates) of known prioritized sources.
    - Verify unknown pollutant-specific source loading potential for known prioritized sources.
    - Obtain water quality data specific to the area and scale of the implemented activities.
    - Identify and track pollutant-specific activities.
    - Develop means to quantify and track activities implemented.

- Linkage of BMP implementation in the County to changes in runoff/discharge quality is needed to assess the long-term effectiveness of program implementation. Dry-weather data should be targeted to downstream discharge points of prioritized sources to assess load reductions from BMP implementation. Assessment of dry-weather data should be compiled with BMP implementation data. (LTE, Table ES-1)

6. Improve data tracking, analysis, and reporting

The Copermittees' current monitoring program collects a tremendous amount of data from a variety of sources. The utility of these data can be improved by some changes in how the data are tracked, analyzed, and reported. As a general rule, all data collection and analysis activities should be conducted so that performance characteristics such as precision, accuracy, bias, representativeness, and completeness can be documented and reported. The following is a list of specific recommendations and their corresponding reference points in the detailed analysis in Section 4.

- In both the MLS and CSDM programs, analyze and present absolute indicator bacteria numbers even when water quality standards are not exceeded. (1.2 D; 3.2 F, J)
- Flow and mass data from MLS should be reported and used in the regional assessment. (1.1 G, H, O)
- Use the 95th percentile calculated for each individual storm drain to trigger investigations into the cause of exceedance in that drain. Consider setting a lower threshold as a "red flag" that would note a potential problem in the making and be useful in setting priorities for source investigation. (1.2 J, 3.2 C)
- Additional trend analysis techniques should be explored, such as the nonparametric Mann-Kendall test, which is robust against departures from normality. Trend analysis often needs to account for sources of variability in a time series in addition to an underlying trend. Additional approaches to trend analysis, such as including exogenous variables in a multiple-regression model or using a seasonal nonparametric trend model, should be applied. (4.1 A, C)
- Evaluate data concerning habitat indicators from watershed monitoring stations, and conduct power analyses to refine the monitoring design for trend detection, as called for in the MMP. (4.1 I)
- Use load reduction estimates of BMPs implemented (LTE, p. 5-9) as a gauge of the possible magnitude of change in pollutant loadings anticipated; use such estimates in a minimum detectable change analysis to establish sampling frequency for effective trend monitoring at MLS.

4. **Analysis of Current and Proposed Monitoring Programs' Adherence to MMP**

The following tables compare elements of the Copermittees' existing and proposed monitoring programs with the five core management questions and corresponding criteria and design elements suggested in the MMP. For each question, the comparisons are organized into sections representing the major components of the Copermittee Monitoring Program; stormwater monitoring (mass loading stations [MLS] and stream bioassessment [BA]), coastal storm drain monitoring (CSDM), and ambient bay and lagoon monitoring (ABLM). Criteria and design

elements are drawn from specific sections of the MMP, as noted in the second column; in some cases, elements listed in more than one section of the MMP have been combined into a single row.

Information contained in the column labeled "Status" is based on San Diego County Municipal Copermittees 2003–2004 Urban Runoff Monitoring Final Report, the Coastal Storm Drain and Lagoon Monitoring 2003-2004 Annual Report, and the Copermittees' proposed changes to the existing program. The column labeled "Adherence to MMP" characterizes the extent to which the Copermittees' current and proposed monitoring programs follow the guidance presented in the MMP. Where adherence is partial or minimal, a brief explanation is given and recommendations are presented in the last column, where appropriate. These recommendations include two types of actions—those that would bring the Copermittees' program more into line with the MMP and those that would strengthen the overall monitoring program, even if not specifically called for in the MMP.

Once again, the core management questions presented in the MMP are as follows:

- **Question 1:** Are conditions in receiving waters protective, or likely to be protective, of beneficial uses?
- **Question 2:** What is the extent and magnitude of the current or potential receiving water problems?
- **Question 3:** What is the relative urban runoff contribution to the receiving water problem(s)?
- **Question 4:** What are the sources to urban runoff that contribute to receiving water problem(s)?
- **Question 5:** Are conditions in receiving waters getting better or worse?

Questions 1, 2, and 5 are addressed in individual tables. Analysis of Questions 3 and 4 has been combined because they are interrelated aspects of a single strategy. According to the MMP, once monitoring demonstrates the nature, magnitude, and extent of water impacts to receiving waters, decisions about any management responses require information about the source(s) of the problem. The MMP breaks this source identification into two parts. Question 3 begins this process by taking the information from Questions 1 and 2 and beginning to work upstream to better define the overall contribution of urban runoff to receiving water problems. Information on Question 3 is used to prioritize more detailed source identification efforts in Question 4 for only those problems for which urban runoff is a significant contributor.

Table 1.1 Question 1: Are conditions in receiving waters protective, or likely to be protective, of beneficial uses?
Stormwater Monitoring—Mass Loading Stations, Temporary Watershed Assessment Stations, Stream Bioassessment

Criterion/Design Element/Design Issue			Status	Adherence to MMP	Recommendations
A.	4.1.1	Two approaches: compliance vs. assessment	Current program and proposed changes move toward a combined compliance and weight-of-evidence assessment approach.	Yes	
B.	4.1.2 5.1.1	Monitor bacterial indicators at high-priority sites selected based on a combination of level of contamination by urban runoff and degree of human body contact use.	MLS stations include sampling for TC, FC, and enterococcus. Proposed TWAS sites may be located to address this element.	Partial MLS sites selected to represent wide areas and measure pollutant loads delivered to receiving waters rather than to evaluate water quality at high-priority sites.	Bacterial indicators should be monitored at sites representing high contamination and high use; proposed TWAS might accomplish this.
C.	4.1.2	Data products: frequent measures of indicators, tables of individual measurements and relevant averages	2003–2004 Report includes individual measurement results.	Partial Current sampling frequency for indicators at MLS is not sufficient to make report of averages or other statistics meaningful.	If (as recommended below) sampling frequency is increased, averages and other appropriate statistics should be included in data products.
D.	4.1.2	Data products: comparisons of bacterial indicator values with relevant standards, highlighting exceedances	2003–2004 Report indicates exceedance of water quality objectives and presents cross-watershed comparisons	Yes	

			in regional assessment		
E.	4.1.3	Use the Triad approach as a basis for monitoring both specific sites of high concern and a set of random watershed sites, at least yearly, and assess overall habitat health by comparing a suite of measurements to relevant reference conditions.	MLS stations monitor pollutant loads (chemistry) and include toxicity testing; stream bioassessment completes the Triad and includes reference sites as well as standard metrics. TWAS will potentially address sites of high concern.	Partial Fixed MLS and BA stations monitor habitat health (although current bioassessment sites are not located with MLS sites). However, lack of random sites impairs conclusions about overall habitat health in watershed.	Collocation of MLS and bioassessment sites and addition of TWAS sites can improve this aspect of monitoring. TWAS should be located to give better and more representative spatial coverage of watershed conditions. The major importance of the TWAS lies in the monitoring of previously un-assessed subwatershed areas. Thus, the key to the utility of TWAS data will be in their location. Scattering TWAS around a watershed could be useful in characterizing watershed health. The statistical utility of the TWAS will be limited by sample number and frequency just as for the MLS.
F.	4.1.3	Use the Triad results to trigger an appropriate set of adaptive follow-up studies intended to better characterize conditions.	Wet weather Toxicity Identification Evaluation (TIE) testing has been conducted on sites with persistent toxicity to identify the causes of toxicity.	Yes.	Recommend a systematic approach to follow-up studies, not only for toxicity but also for pollutant loads measured at MLS. For example, an adaptation of the 95th percentile trigger for bacteria counts in the CSDM Program could be applied to follow up on extremes in event pollutant loads. Recommend continued use of decision framework outlined in Table 5-4 of MMP for interpreting and acting on Triad results.
G.	4.1.3	Data product: Site-by-site summaries, interpretations, and conclusions re: each sampled leg of the Triad	2003–2004 Report includes data summaries and interpretations for chemistry, toxicity testing, and bioassessment for each watershed (MLS and BA stations).	Partial No flow or mass data are reported from MLS.	Flow and mass data from MLS should be reported.

H.	4.1.3	Data product: Comparisons across sites for each leg of the Triad and synthesized results	2003–2004 Report includes a regional assessment comparing data across sites for chemistry, toxicity, and bioassessment using ANOVA, cluster analysis, functional feeding groups, and other approaches.	Partial No flow or mass data are reported from MLS.	Flow and mass data from MLS should be reported and used in the regional assessment.
I.	5.1.1	Monitoring of creeks, streams, and rivers should measure indicator levels (weekly during high-use season) in targeted discharges themselves, as well as upstream and downstream of the discharge, with monitoring prioritized by risk-based reports.	Indicator bacteria levels measured by grab samples 3x/yr at MLS sites.	No No reports of measurement of indicators except 3x/year at MLS.	Indicator bacteria should be measured more frequently, especially during the high-use season, both in discharges and instream above/below discharges. Sites should be prioritized by risk, i.e., use intensity and contamination level.
J.	5.1.2.2	Monitoring stations for assessing habitat conditions at the watershed scale: • **Long-term, fixed, bottom-of-watershed mass emissions stations** to assess cumulative water quality and aggregate loads, with monitoring based primarily on a mass emissions model and including wet-weather chemistry and toxicity • **Spatially extensive, randomly sited or rotating stations to support statistically valid comparisons across multiple watersheds**, and with monitoring based primarily on the Triad approach for dry-weather sampling and on chemistry and toxicity for wet-weather (regional station) sampling • **Site-specific stations** focused on the status of high-priority inland habitats of concern, with	MLS are fixed bottom-of-the-watershed stations to assess cumulative water quality and loads. TWAS are proposed to be spatially extensive, rotating sites to supplement MLS; siting criteria for TWAS include ability to focus on specific locations of concern.	Partial Only fixed station, watershed outlet MLS are in current program. TWAS (including both bacteria, chemistry, and Bioassessment) have potential to characterize spatial and temporal extent.	If sufficient in number, TWAS stations in proposed program modifications should be sited to improve spatial coverage within monitored watersheds and to focus on specific areas of concern. TWAS should include bioassessment as third leg of Triad, unless all BA stations are collocated with TWAS sites. The most defensible approach to assess habitat conditions at the watershed scale is to randomly select a number of reaches every year that would be sampled (a stratified random, rotating-basin schedule). The number of reaches sampled would be based on data quality objectives.

		monitoring based primarily on the Triad approach for dry-weather sampling and on chemistry and toxicity for wet-weather (core station) sampling • **Site-specific stations** designed to generate information to support key program goals, such as source prioritization or BMP implementation and evaluation		of water quality problems, but number of proposed TWAS is limited. Reduction of sampling frequency will weaken characterization of temporal extent of water quality problems. Current/proposed program for BA does not include the replication necessary to quantify uncertainty in watershed-scale assessments.	Three reference sites might or might not be sufficient to estimate unimpaired conditions against which to judge the two urban sites (per watershed). For all future bioassessments using benthic macroinvertebrates in San Diego County, reference condition thresholds developed by Ode et al. (2005) will provide the most defensible foundation for assessing impairment and also circumvents the need to sample the three reference sites. Replication of benthic macroinvertebrate sampling is performed within a reach (CSD 2005a, Section 3); results of these samples would allow calculation of within-reach precision (among riffles). Precision estimates for field sampling would improve understanding of sampling is necessary to be able to detect a meaningful change. Results from the same (repeated) samples can also be used to perform quality control (QC) evaluation of the field sampling.
K.	5.1.2.2	Monitoring within any particular watershed integrated to achieve design efficiencies as well as an overall picture of the watershed	MLS sited near watershed outlets to assess pollutant loading to receiving water. BA stations located in upper and lower watershed to bracket major urban influences. BA sites to be co-located with proposed TWAS sites whenever possible.	Partial The elements of the Triad are separated in space and time. Fixed BA stations do not necessarily give representative picture of watershed biological conditions.	For the purpose of characterizing overall watershed condition and support of designated uses for habitat, consider adding random or rotating BA sites, consistent with TWAS sites. Indicators assessed for BA monitoring are a suite of mostly stressor variables and are not focused on stream or ecosystem response. Recommend making **response** indicators the primary indicators measured and evaluated; base interpretation of reach or watershed conditions on quantitative comparison to regional reference conditions and the impairment/ nonimpairment threshold as developed by

					the CDFG (Ode et al. 2005). Use stressor identification process (SI) (Norton et al. 2002, Suter et al. 2002) to determine which or how many of the stressors (physical, chemical, or hydrologic) are most probably the cause of the biological degradation. Those stressor variables then become the targets for restoration or remediation activities (and the basis of TMDL stressor reduction models).
L.	5.1.2.2	Chemistry and toxicity could be used in wet weather when the bioassessment leg of the Triad is not feasible.	Water chemistry and toxicity measured by MLS, sampled in wet weather.	Yes	
M.	5.1.2.2	Bioassessment could be used in lieu of toxicity tests and chemistry scans where the primary concern is the status of a particular habitat.	BA stations located in upper and lower watershed to bracket major urban influences.	Partial BA sampling sites not always tied to particular habitat of concern.	Bioassessment at TWAS sites should be focused on habitats of concern.
N.	5.1.2.2	**Common constituents**: Trace metals Nutrients Bacteria Pesticides Conventionals PAHs Suspended solids Priority pollutants every 5 years, with Bight Program	MLS sampling includes full suite of conventional, physical, wet chemistry, dissolved and total metals, pesticides, priority pollutants.	Yes	
O.	5.1.2.2	Flow-proportional sampling recommended as most cost-effective approach to accurate load estimation.	Flow is measured at MLS by stage/discharge ratings obtained by USGS methods; flow-proportional samples collected for water chemistry.	Unclear Methods describe flow-proportional sampling, however neither flow nor mass data are reported in available	Flow and mass data should be presented, evaluated, and discussed in reports.

				documents.	
P.	Table 5-3	Monitoring for mass emissions: • Bottom of watershed • 3 storms/year for 3 years, then evaluate by statistical power analysis • Analyze for chemistry, toxicity	MLS located at watershed outlets, sampled for chemistry and toxicity; monitor 3 storms/year. Frequency reduction to 2 storms/year in alternate years is proposed, with arguments supported by power analysis.	Yes	Change in frequency is minimally acceptable from the point of view of Question 1 alone, although monitoring in alternate years risks missing significant transient conditions or events.
Q.	Table 5-3	Monitoring for watershed assessment: • Random or rotating • Triad (dry weather)/chemistry/toxicity (wet weather)	MLS are fixed at watershed outlet; BA stations are fixed in upper and lower watershed areas. TWAS proposed to focus on specific areas of concern and to address unmonitored watershed areas.	Partial Fixed stations do not give broad watershed assessment.	Proposed TWAS should be sited to accommodate breadth of watershed conditions; see comments re: TWAS in item E. Consider adding random or rotating BA sites
R.	Table 5-3	High-priority inland habitat: • High-value habitat either impacted or threatened • 1–2/yr dry weather • Triad	BA stations located as far downstream as practicable and upstream, but still with urban runoff influence. Some attempts to select for high-quality riffle habitat for BA sites. Proposed changes would collocate BA sites to MLS and TWAS sites. Sampled twice a year—once in dry season, once in wet season	Partial No mention of whether high-quality habitats are specifically selected as impacted or threatened; separation of BA from ML sites separates Triad data.	BA sites, especially in TWAS program, should be directed more systematically toward high-value habitat. Collocation of core BA sites with MLS sites will improve Triad monitoring. Quantify uncertainty associated with watershed-scale biological assessments. By taking replicate samples as a matter of sampling routine, at 10% of the locations, randomly selected from the total.

Table 1.2 Question 1: Are conditions in receiving waters protective, or likely to be protective, of beneficial uses?
Coastal Storm Drain Monitoring Program

Criterion/Design Element/Design Issue			Status	Adherence to MMP	Recommendations
A.	4.1.1	Two approaches: compliance vs. assessment	Compliance	Yes	
B.	4.1.2 5.1.1	Monitor at high-priority sites (both high use and elevated levels of indicator bacteria)	Drains selected as having greatest potential to affect water quality. Site selection narrative mentions "number of people using coastal area" as selection criterion, but no data presented on use levels of coastal areas sampled. Lagoons sampled are mostly classified as "infrequent" use.	Partial Inadequate characterization of use level of coastal sampling sites	1. Sample all storm drains discharging to receiving waters or establish knowledge base and rational criteria for selecting "representative" drains. 2. Sample additional drains discharging to high-use areas or justify current sampling locations with respect to use level.
C.	4.1.2	Data product: frequent measures of *E. coli*, fecal coliform, total coliform, enterococcus at high-priority sites	Monthly (wet and dry weather) sampling for TC, FC, enterococcus	Yes	Consider reevaluating use of obsolete indicator groups (total coliform) and explore monitoring for true pathogens like *Cryptosporidium.*
D.	4.1.2	Data product: Comparisons of indicators against relevant standards	Extensive discussion of exceedances in both storm drains and receiving waters	Yes	Analyze and present absolute numbers in addition to frequency of exceedance.
E.	4.1.2	Data product: Summaries of relative degree of contamination at monitored locations	Exceedance rates reported for coastal and lagoon sites;	Partial Frequency of exceedance does not tell full story of degree of contamination.	Analyze and present absolute numbers even when water quality standards are not exceeded.
F.	5.1.1 Table 5-1	Monitoring should measure indicator levels in the discharge itself, as well as upcoast and downcoast.	Paired samples collected where possible; drains not directly discharging to receiving waters moved to dry-weather monitoring program at reduced	Yes	Track and analyze bacteria data from storm drains not flowing into receiving waters consistently with comparable data from storm drains that do discharge into receiving waters. Use these combined data to evaluate relative bacteria contributions

			frequency.		from different source areas and activities, as well as to investigate and remediate illegal connections/illegal discharges.
G.	5.1.1	The highest monitoring frequency of daily to five times per week is targeted at beaches with lifeguards and many potential sources of bacteria, and a lower monitoring frequency (e.g., weekly to monthly) is applied to less heavily used beaches and/or beaches with only a few probable sources.	Monthly frequency used, appropriate to low use levels of lagoon sites, but use level of coastal sites unspecified.	Partial Cannot determine compliance with recommended frequency without additional use data of coastal sites.	Data on frequency of use of coastal beaches should be reported. Sampling frequency for bacterial indicators should be increased at heavily used beaches or beaches with known of suspected sources of bacteria. This type of monitoring is conducted outside the Copermittees' stormwater program by the County Dept. of Health. Sharing and reporting of all relevant data should be improved.
H.	5.1.1	Where the monitoring objective is to determine whether overall conditions constitute a problem, monitoring might focus on the portion of the year that represents the worst-case scenario.	Monthly (wet and dry weather) sampling for TC, FC, enterococcus	Yes	Consider increasing sampling frequency during season(s) characterized by highest levels of indicator bacteria.
I.	5.1.1 Table 5-1	Stormwater agencies should build upon the existing recreational water monitoring programs already implemented by local county health agencies and fill gaps in those programs.	Unknown; no mention of interaction with local health agencies in documents reviewed	No	1. Evaluate CSDM sampling sites against existing/historical health agency sampling sites. 2. Use data from other sources as available. 3. If available, provide analysis of existing data generated and maintained by local health agencies.
J.	5.1.1	Application of adaptive triggers that would initiate upstream source identification studies by stormwater management agencies when receiving water monitoring has identified a receiving water problem.	Uses exceedance of 95th percentile to trigger upstream investigation/ remediation; uses adaptive monitoring diagrams to partition data results.	Yes	Use the 95th percentile calculated for each individual storm drain to trigger investigations into the cause of exceedance in that drain. Consider setting a lower threshold as a "red flag" that would not necessarily trigger a full-scale investigation but would note a potential problem in the making.

Table 1.3 Question 1: Are conditions in receiving waters protective, or likely to be protective, of beneficial uses?
Ambient Bay and Lagoon Monitoring Program

Criterion/Design Element/Design Issue			Status	Adherence to MMP	Recommendations
A.	4.1.1	Two approaches: compliance vs. assessment	Assessment	Yes	
B.	5.1.2	Monitoring based primarily on the Triad Approach—bioassessment, chemical, and toxicity data.	Yes; Phase II monitoring includes water quality, sediment chemistry and toxicity, and benthic infauna assessment	Yes	
C.	4.1.3	Use the Triad approach as a basis for monitoring both specific sites of high concern and a set of random watershed sites, at least yearly, and assess overall habitat health by comparing a suite of measurements to relevant reference conditions.	Uses Triad approach to monitor sites of specific concern annually, i.e., worst-case sites based on preliminary assessment of sediment characteristics.	Partial No reference sites monitored (for either chemistry or biology); worst-case site bias does not allow assessment of overall habitat health or level of impairment.	Add bay/lagoon monitoring sites, including: • More representative sites based on probability or systematic designs to permit assessment of overall habitat health • Uncontaminated sites to be used as reference sites for both toxicity and benthic assemblages Improve sharing and reporting of data on bays and lagoons collected by other agencies.
D.	4.1.3	Use the Triad results to trigger an appropriate set of adaptive follow-up studies intended to better characterize conditions.	ABLM Program scheduled to continue for 3 years to facilitate evaluation of associations between mass loading stations and bays/lagoons. Following 3 years of monitoring, the monitoring design will be adapted by assessing the information/data to evaluate associations between the mass loading stations and the ambient bay and lagoon.	Partial No system yet in place for follow-up on areas of concern.	Develop program to respond to areas of concern identified through ABLM, both in bays and lagoons and up into contributing watersheds. This will require data on watershed activities and sources currently not being collected (see questions 3 and 4).

E.	4.1.3	Data product: Site-by-site summaries, interpretations, and conclusions re: each sampled leg of the Triad	Each embayment has own chapter in annual monitoring report, including extensive data reporting, ERM/ERL values.	Yes	
F.	4.1.3	Data product: Comparisons across sites for each leg of the Triad and synthesized results	Cross-watershed comparisons and embayments ranked by Triad matrix for sediment chemistry, toxicity, benthos. Bays ranked by ERM-quotients.	Yes	
G.	5.1.2	Coastal ocean stations to assess stormwater plume impacts, conducted primarily as part of the periodic Bight surveys (regional station).	Monitoring stations focused on presumed worst-case sites based on sediment characteristics.	Minimal No apparent tie-in to plumes, tributary loads, or land sources.	As called for in Copermittees' recommendations, a larger dataset from the ABLM should be assessed to look for a relationship/linkage between the mass loading stations and the ambient bay and lagoon results. This might require collection of additional land use/source activity data from tributary watersheds. If a relationship is observed, the ambient bay and lagoon monitoring program should be better integrated into the program design as a monitoring element to be conducted with the MLS, TWAS, and BA.
H.	5.1.2	Types of regional assessment designs: • **Probability-based designs**, similar to the Bight Program design, in which stations are located randomly to provide the ability to draw statistically valid inferences about an area as a whole, rather than just the site itself. • **Systematic designs**, in which stations are located at set intervals along one or more underlying spatial or conceptual frameworks. • **Early warning designs**, in which stations that are considered to be particularly vulnerable to a particular impact are monitored as "canaries in the coal mine." • **Rotating designs**, in which a different subset of	Phase I: stratified random design to assess bay sediment characteristics to set priorities for Phase II sampling Phase II: fixed-station sampling of worst-case (early-warning) sites	Partial Results are biased toward worst-case sites; no ability to draw inferences about entire system(s).	The current exclusive focus of the ABLM Program on sites likely to be contaminated but not on other sites does not provide a representative view of the status of bay and lagoon sediment habitats with respect to support of beneficial uses. Both current and potential future ABLM monitoring should be broadened to include a more spatially representative assessment beyond the worst-case areas. Worst-case data do not provide a representative picture of the extent of habitat problems. Periodic synoptic surveys, probability-based sampling, or rotating sampling stations encompassing a full range

		stations in sampled during each sampling event, with the goal of sampling the entire set of stations over a certain period.			of embayment environments (e.g., different sediment grain size and TOC levels, different exposure to currents and tributary and/or storm drain discharge) would help provide a more unbiased picture of the extent and magnitude of sediment toxicity and impacts on biota in the bays.
I.	5.1.2	Estuaries and nearshore ocean sites should be located randomly and/or clustered in plumes or downstream of major inputs.	Monitoring sites focused on presumed worst-case sites based on sediment characteristics.	Minimal ABLM sites not deliberately associated with plumes/major inputs or arrayed randomly.	ABLM sites should be broadened to capture the purpose of this design element (see point H).
J.	5.1.2	**Common constituents**: Trace metals Nutrients Bacteria Pesticides Conventionals PAHs Suspended solids Priority pollutants every 5 years, with Bight Program	Water quality: temperature, DO, conductance, turbidity Sediment: metals, pesticides, PCBs, PAHs	Partial Limited monitoring of priority pollutants as of yet; no sampling of bacteria in sediment or water column.	Copermittees should consider monitoring for indicator bacteria in both the water column and sediments. Monitoring of priority pollutants should be conducted unless also done by Bight Program.
K.	5.1.2	**Habitat monitoring** can involve a wide range of methods: • Water chemistry • Sediment chemistry • Aqueous toxicity • Sediment toxicity • Bioaccumulation • Bioassessment • Hydrology	ABLM Program includes monitoring for: Water chemistry Sediment chemistry Sediment toxicity Benthic infauna	Yes	

Table 2.1 Question 2: What are the extent and magnitude of the current or potential receiving water problems?
Stormwater Monitoring——Mass Loading Stations, Temporary Watershed Assessment Stations, Stream Bioassessment

Criterion/Design Element/Design Issue			Status	Adherence to MMP	Recommendations
A.	4.2	Broader studies required to characterize the spatial and temporal extent and magnitude of problem(s) found in Q1; foundation for scoping of source identification (Q 3 and 4).	Current program includes single MLS at bottom of watershed and BA stations bracketing urban influences. Proposed revisions to program include TWAS located upstream of MLS. Proposed revisions also include reduction of sampling frequency to 2 events in alternate years.	Partial TWAS (including bacteria, chemistry, and bioassessment) has potential to characterize spatial and temporal extent of water quality problems, but number of proposed TWAS is limited. Reduction of sampling frequency will weaken characterization of temporal extent of water quality problems. Current/proposed program for BA does not include the replication necessary to quantify uncertainty in watershed-scale assessments.	TWAS should be located to give better and more representative spatial coverage of watershed conditions. At sites where impairments have been documented, additional sampling in space and time should be added. Within each watershed, proportionally distribute BA sampling site allocation among additional substrate, e.g., a-upper, b-middle, and c-lower watershed; or 1st, 2nd, and 3rd order stream channel segments; or other. Regardless of the stratification approach, efforts should be made to minimize bias associated with the site selection process. This design would allow statistically defensible statements of watershed condition to be made. Begin taking replicate samples as a matter of sampling routine, at 10% of the BA locations, randomly selected from the total, to quantify variability/uncertainty associated with watershed-scale assessments.
B.	4.2.2	Monitor a suite of bacterial indicators at a spatially and temporally more intensive set of stations around sites, prioritized by risk, to	Current program includes single MLS at bottom of watershed	Partial New TWAS will help with spatial	A sufficient number of TWAS should be located to give better and more representative spatial coverage of

		define the extent of problems; compare indicator levels to relevant marine and freshwater standards to define the relative severity of the problem	where indicators are monitored and compared against water quality standards. Reduction in sampling frequency coupled with additional TWAS sites is proposed.	characterization, but number is limited. Reduction in sampling frequency will not help.	watershed conditions. At sites where exceedances of bacteria standards have been documented, additional sampling around sites and over time should be added.
C.	4.2.2	Data products: • Measures of the spatial extent of bacterial contamination (maps) • Measures of the temporal patterns of bacterial contamination (figures that show temporal patterns, measures of variance) • Measures of the relative magnitude of indicator values over space and time (graphs of concentration over time or by site)	2003–2004 Annual Report includes presentation of raw data, exceedances of relevant standards, time plots, map of exceedance value ratios, and analysis of monitoring results and relationships.	Yes	Representations of data currently collected are adequate; as additional samples are collected around impaired sites, maps and figures will be even more important to convey spatial and temporal patterns.
D.	4.2.3 5.2.2	Monitor specific aspects of the Triad, including adaptive elements such as additional chemistry measurements or TIEs, at a spatially and temporally more intensive set of stations where impacts have been observed to define the extent of problems; compare measurements to relevant marine and freshwater standards to define the relative severity of the problem.	TIEs conducted based on Triad decision matrix. No expansion of spatial or temporal monitoring. Proposed changes in sampling frequency affect all sites, both impacted and nonimpacted. Additional BA sites proposed to be co-located with TWAS sites.	Partial Lack of additional sampling sites, and expanded monitoring of other Triad components does not fully define the extent of the problem(s).	Maintain present sampling frequency at MLS sites that show consistent impairment. Increase spatial and temporal coverage around MLS sites that show consistent impairment. Sufficient numbers of TWAS should be located to give better spatial coverage of problem areas.
E.	4.2.3	Data products: • Measures of the spatial extent of modified communities, chemical contamination, and/or elevated toxicity (maps) • Measures of the temporal patterns of modified communities, chemical contamination, and/or elevated toxicity (figures that show temporal patterns, measures of variance) • Measures of the relative magnitude of indicator values over space and time (graphs of concentration or toxicity over time or by site)	2003–2004 Annual Report includes presentation of raw data, exceedances of relevant standards, time plots, map of exceedance value ratios, and analysis of monitoring results and relationships.	Yes	

F.	Tables 4-1 4-4	One-time or periodic short-term sampling at broader spatial extent (depends on Question 1)	TWAS stations proposed to be spatially extensive, rotating sites to supplement MLS; siting criteria for TWAS include ability to focus on specific locations of concern.	Partial Number of proposed TWAS might not be sufficient to fully characterize spatial extent.	TWAS or other one-time or short-term sampling efforts should be expanded to characterize broad spatial extent of water quality problems.
G.	Table 4-4	Sampling appropriate to define temporal patterns at weekly to seasonal scales.	MLS sampled 3 storms/year; frequency reduction to 2 storms/year in alternate years is proposed.	Minimal Current program might not be adequate to fully characterize seasonal/temporal patterns; proposed reduction in sampling intensity will not improve.	Change in frequency is minimally acceptable for question 1, but probably not for question 2. Reconsider reduction in sampling frequency; examine existing database to evaluate sampling frequency required to adequately define temporal/seasonal patterns and adjust frequency accordingly.
H.	Table 4-5	• Adaptive toxicity testing • Adaptive upstream toxicity testing	TIEs conducted based on Triad decision matrix.	Partial No additional upstream toxicity testing reported.	Adaptive upstream toxicity testing would help lay the foundation for source identification efforts (Q 3 and 4).
I.	5.2.1	Stormwater agency will work with local health departments to determine those high-priority (i.e., combination of human use and contamination) locations where extent and magnitude of a bacteria problem should be defined.	Unknown; no mention of interaction with local health agencies.	No	Evaluate current MLS and proposed TWAS sites against existing/historical health agency sampling sites. Use data from other sources as available.
J.	5.2.1	A monitoring design to establish the extent and magnitude of bacterial contamination must have the ability to determine: • The degree of temporal persistence of a particular receiving water problem • The spatial extent of a particular receiving water problem • The relative severity of a particular receiving water problem, compared to other parts of the	Grab sampling for indicator bacteria 3 events/year at MLS; frequency reduction proposed, addition of TWAS proposed.	No Occasional grab sampling at single site does not allow determination of persistence or extent of bacteria problems.	Conduct additional sampling upstream and downstream and at additional times to determine persistence and extent of elevated bacteria levels.

		Region			
K.	Table 4-4 5.2.1	The monitoring design for this question should include: • The core or regional monitoring assessment site(s) in the location of interest • Measures of bacteria loads, which require flow estimates • Measures of the spatial extent of actual impact in receiving waters, which require an array of upstream/downstream samples in creeks • Measures of temporal persistence or pattern, such as between wet and dry weather, which require at a minimum samples through one calendar year.	Current program includes single MLS at bottom of watershed where flow is measured and indicators are monitored and compared against relevant standards. Additional TWAS proposed to be added. No bacteria loads appear to be calculated or reported from grab samples.	Partial MLS monitoring measures water quality at one point; TWAS sites will expand coverage, but limited in number. No bacteria loading data are reported; 3 grab samples/year unlikely to be sufficient to characterize annual loads. Current and proposed reduced sampling frequency will not provide adequate measure of temporal persistence.	Calculate and report point load for bacteria from sampling events at MLS. Evaluate sampling frequency necessary to characterize annual bacteria loads. Conduct additional sampling upstream and downstream and at additional times to determine persistence and extent of elevated bacteria levels.
L.	5.2.1	Depending on the extent of existing knowledge, design elements might be scaled to fill data gaps. For example, where the spatial extent of contamination is well understood, additional sampling at only a few representative stations might be required to define the temporal extent of contamination. Where the spatial extent is not well understood, a survey of shorter-term but more intensive monitoring at an array of stations might be necessary to define the boundary of contamination during periods when human use and contamination combine to create a high-priority period.	TWAS proposed to improve spatial coverage to fill data gaps.	Partial TWAS can define temporal extent of contamination in cases where spatial extent is well known; could improve understanding of spatial extent through short-term intensive monitoring. However, limited	Proposed TWAS should be sufficient in number and sited appropriately to serve appropriate function in individual watersheds. Add additional BA stations randomly distributed throughout each monitored watershed (stratified random).

				number of TWAS proposed might limit capability. The arrangement of BA locations bracketing the urbanized landscape provides some information to evaluate urban effects on stream conditions but does not contribute to estimating overall watershed conditions.	
M.	5.2.1	Indicators should include the levels and loads of the three main bacterial indicators along with other measures that might add useful information (e.g., stream or channel flow, patterns of human use).	Grab samples collected at MLS and proposed TWAS for three bacterial indicators—total coliform, fecal coliform, and enterococcus.	Partial Loads not reported. Information lacking on patterns of human use in drainage areas.	See comments about bacteria loads in item K. Although use of three main indicators is consistent with MMP, the common bacterial indicators alone might not provide an accurate picture of the extent and magnitude of actual pathogen contamination or risk to human health. Copermittees should consider monitoring for true pathogens like *Cryptosporidium.* Collect data on land use and human activities in drainage areas as foundation for source identification (Q 3 and 4).
N.	Table 5-7	Regular grid throughout high-priority use area—one calendar year to establish basic pattern, then daily within subsample of high-use period. Sample for total coliform or *E. coli*, fecal coliform, enterococcus	Grab samples collected at MLS and proposed TWAS for three bacterial indicators.	Partial Point sampling does not define spatial patterns; MLS stations not tied to high-priority areas for	Conduct sampling for bacterial indicators on grid pattern in high-priority areas at frequency adequate to characterize high-use period.

				recreation.	
O.	5.2.2	Variety of approaches for allocating sites including stratified random, systematic, or rotating designs depending on the specific area to be evaluated and indicators to be measured. Integrate the extent and magnitude designs into design(s) for assessment, which will maximize continuity and cost-efficiency.	TWAS proposed to improve spatial coverage, monitor land use changes, major tributaries.	Partial Number of TWAS sites might limit effectiveness.	Proposed TWAS should be sufficient in number and sited appropriately to address extent and magnitude issues effectively.
P.	5.2.2	Use the Triad approach by adding repeated measurements to characterize temporal persistence, upstream sampling of the Triad components to describe spatial extent, and/or adaptive features such as TIEs or targeted upstream source identification studies to better define the magnitude of the problem	TIEs conducted based on Triad decision matrix. No expansion of spatial or temporal monitoring. Proposed changes in sampling frequency affect all sites, both impacted and nonimpacted.	Partial Lack of additional sampling sites, repeated measurements, and expanded monitoring of other Triad components does not fully define the magnitude of the problem(s).	At sites where contamination has been documented, add repeated measurements and additional sampling location for appropriate Triad components to define spatial extent and magnitude of the problem(s).

Table 2.2 Question 2: What are the extent and magnitude of the current or potential receiving water problems?
Coastal Storm Drain Monitoring Program

Criterion/Design Element/Design Issue			Status	Adherence to MMP	Recommendations
A.	4.2	Additional studies required to characterize the full extent and magnitude of problem(s) found in Q1; foundation for scoping of source identification (Q 3 and 4)	CSDM program proposed to continue with changes: • Move CSDM sites that do not discharge into receiving waters into the dry weather. monitoring program • Reduce sampling frequency to monthly. • Reduce sampling frequency at sites with consistently low bacteria counts.	No Other than source identification investigations when bacteria levels exceed receiving water criteria or 95th percentile action levels, no additional sampling to characterize full extent of problem at coastal sites where bacteria exceeded criteria.	For the ~25 percent of CSDM sites where some sampling showed exceedance of receiving water criteria or where both samples from drains discharging to the ocean and receiving water samples exceeded relevant thresholds, conduct additional sampling down-current in receiving water to document the extent of the problem. For drains where bacteria standards are exceeded, link to MLS and TWAS programs to document the extent and magnitude of the problem upstream.
B.	4.2.2	Monitor bacterial indicators at a spatially and temporally more intensive set of stations around sites, prioritized by risk, to define the extent of problems; compare indicator levels to relevant marine and freshwater standards to define the relative severity of the problem.	Sites focus on storm drains having the greatest potential to adversely affect the bacterial water quality of receiving waters. Monitoring results compared against water quality standards and exceedances noted. Contaminated storm drain discharges with sufficient flow to reach the receiving water were assigned the	Partial Current and proposed CSDM programs do not appear to include increased intensity of monitoring around high-priority sites.	For drains and receiving waters where bacteria standards are exceeded, increase sampling intensity (spatial and temporal). For coastal sites, document use level of beach sites and confirm priority of sites by risk. [Use level of coastal sites not presented in available reports.]

			next-highest priority for additional investigation and source elimination.		
C.	4.2.2	Data products: • Measures of the spatial extent of bacterial contamination (maps) • Measures of the temporal patterns of bacterial contamination (figures that show temporal patterns, measures of variance) • Measures of the relative magnitude of indicator values over space and time (graphs of concentration over time or by site)	Map of CSDM sites, tables of bacteria by city and sampling station, report of exceedances in appendices to annual report	Partial Presentations of raw data by site/date and maps of site locations do not show the spatial or temporal extent of bacterial contamination	Present maps showing the spatial and temporal patterns of bacteria levels in drains and receiving waters.
D.	5.2.1	A monitoring design to establish the extent and magnitude of bacterial contamination must have the ability to determine: • The degree of temporal persistence of a particular receiving water problem • The spatial extent of a particular receiving water problem • The relative severity of a particular receiving water problem, compared to other parts of the region.	Receiving water sampled 25 yards down-current from drain discharge where possible.	Partial Raw data and exceedance reports allow comparison of receiving water quality across the region. However, single sampling point and single event sampling in receiving water do not allow determination of spatial extent or temporal persistence of high bacteria levels.	For CSDM sites/receiving waters where repeated exceedances of bacteria standards or thresholds occur, initiate additional down-current sampling points and sample on several successive days to determine extent and persistence of receiving water quality impairment.
E.	5.2.1	The monitoring design should include: • The core or regional monitoring assessment site(s) in the location of interest • Measures of bacteria loads, which require flow estimates	Sites focus on storm drains having the greatest potential to adversely affect the bacterial water quality of receiving waters. Only	Partial Current and proposed CSDM program will	Measure storm drain discharge at time of sampling to estimate bacteria load. Improve spatial/temporal distribution of sampling (see item D).

		• Measures of the spatial extent of actual impact in receiving waters, which require an array of upcoast/downcoast samples, regularly spaced grids, or random arrays on the beach and in bays/estuaries • Measures of temporal persistence or pattern, such as between wet and dry weather, which require at a minimum samples through one calendar year	bacteria counts reported. Receiving water monitoring includes concurrent sampling 25 yd down-current or in mixing zone in front of drain.	focus on drains/receiving waters having demonstrated elevated bacteria counts. However, lack of flow data prevent measurement of bacterial loads and single down-current sample (see item D) limit ability to measure spatial extent or temporal persistence.	
F.	5.2.1	Stormwater agency will work with local health departments to determine those high-priority (i.e., combination of human use and contamination) locations where extent and magnitude of a bacteria problem should be defined.	Initial program design based on elements of the AB 411 Recreational Water Monitoring Program conducted by the County of San Diego Department of Environmental Health.	Partial Program initially designed in consultation with DEH, but no reported cooperation since initial phase.	Work with local health department to document high-priority sites for additional definition of magnitude and extent of bacteria problems; share data from ongoing programs.
G.	Table 5-7	Open-coast beach input(s) of concern: • Spaced array upcoast and downcoast of input of concern • One calendar year to establish basic pattern, then daily within representative periods (e.g., storms, dry weather, dominant current regimes) Enclosed bays and estuaries input(s) of concern Based on nature of problem, either: • Spaced array around input of concern	Current and proposed program samples drain discharge and one point in receiving water monthly, with possible elimination of station based on adaptive triggers of consistently low bacteria counts in both bays and lagoons.	No Single receiving water sample monthly does not represent spatial or temporal patterns in open-coast	Where bacteria levels exceed standards or thresholds: At open-coast beaches, sample additional locations up- and down-current from input of concern. For enclosed bays, estuaries, lagoons, collect samples on a regular grid or random array throughout area of concern. In both types of receiving waters, collect daily samples during periods representing

		• Regular grid throughout area of concern • Random array throughout area of concern • Gradient array down-current of input of concern One calendar year to establish basic pattern, then daily within representative periods (e.g., storms, dry weather, dominant current regimes)		beaches or closed lagoons.	high risk of exposure.

Table 2.3 Question 2: What are the extent and magnitude of the current or potential receiving water problems?
Ambient Bay and Lagoon Monitoring Program

Criterion/Design Element/Design Issue			Status	Adherence to MMP	Recommendations
A.	4.2	Additional studies required to characterize the full extent and magnitude of problem(s) found in Q1; foundation for scoping of source identification (Q 3 and 4).	Monitoring stations focused on presumed worst-case sites based on sediment characteristics. Following 3 years of monitoring, the monitoring design will be adapted by assessing the information/data to evaluate associations between the mass loading stations and the ambient bay and lagoon.	Partial Evaluation of associations between MLS and ABLM stations will provide foundation for source identification (Q 3 and 4). However, exclusive focus on presumed worst-case sites does not characterize full extent and magnitude of problem.	ABLM monitoring should be broadened to include a more spatially representative assessment beyond the worst-case areas. Periodic synoptic surveys, probability-based sampling, or rotating sampling stations encompassing a full range of embayment environments (e.g., different sediment grain size and TOC levels, different exposure to currents and tributary and/or storm drain discharge) would help provide a more unbiased picture of the extent and magnitude of sediment toxicity and impacts on biota in the bays. This effort should not divert resources from efforts to fully document magnitude of problem at stations where impacts have been observed.
B.	4.2.3	Monitor specific aspects of the Triad, including adaptive elements such as additional chemistry measurements or TIEs, at a spatially and temporally more intensive set of stations where impacts have been observed; compare measurements to relevant marine and freshwater standards in to define the relative severity of the problem.	Continuing monitoring on the current ABLM schedule/sites is proposed.	Partial ERM-Q evaluated for sediment chemistry allows comparison against standards. However, no changes in spatial or temporal sampling	Increase sampling intensity (spatial and temporal) at stations where impacts have been observed. Apply decision framework in Table 5-4 of MMP for interpreting Triad results and pursuing further actions.

				intensity have been proposed for sites where impacts have been observed.	
C.	4.2.3	Data products: • Measures of the spatial extent of modified communities, chemical contamination, and/or elevated toxicity (maps) • Measures of the temporal patterns of modified communities, chemical contamination, and/or elevated toxicity (figures that show temporal patterns, measures of variance) • Measures of the relative magnitude of indicator values over space and time (graphs of concentration or toxicity over time or by site).	2003–2004 Report includes maps of sampling locations, data on sediment chemistry, toxicity tests, benthic community, and relative rankings of each bay's sediment chemistry, toxicity, and biota.	Partial No maps of chemical contamination, elevated toxicity, or impaired biotic communities presented. No measures of temporal patterns of impacts reported.	Present Triad results on maps to show spatial patterns of sediment impairment across region. Present data and figures on temporal patterns and variability of ABLM results.
D.	5.2.2	Adaptive monitoring and special study responses to a receiving water problem, focused on determining the magnitude, extent, and/or severity of any such problem.	Continuing monitoring on the current ABLM schedule/sites is proposed.	No No special studies or additional monitoring proposed for problem areas.	Increase sampling intensity (spatial and temporal) at stations where impacts have been observed. Apply decision framework in Table 5-4 of MMP for interpreting Triad results and pursuing further actions.
E.	5.2.2	Repeated measurements to characterize temporal persistence, upstream sampling of the Triad components to describe spatial extent, and/or adaptive features such as TIEs or targeted upstream source identification studies to better define the magnitude of the problem	Continuing monitoring on the current ABLM schedule/sites is proposed. Following 3 years of monitoring, the monitoring design will be adapted by assessing the information/data to evaluate associations between the mass loading stations and the ambient bay and lagoon.	No Beyond future reassessment of ABLM design, no additional measurements proposed.	Expand monitoring of Triad components around sites with documented impacts. As soon as possible, document associations between ABLM sites and plumes and/or tributary discharges.
F.	5.2.2	Stations should be located in receiving waters	Monitoring stations	Partial	Expand ABLM to include sites of key

		with key beneficial uses, where significant contamination problems related to urban runoff are known to exist, where the likelihood of such problems is high, in high-value habitats whose continued protection is a high priority, at core mass emissions stations, and at distributed locations that will provide a basis for comparisons between watersheds.	focused on presumed worst-case sites based on sediment characteristics.	Current stations are located where significant contamination problems are likely to exist. However, site selection criteria do not appear to include presence of key beneficial uses or high-value habitats.	beneficial uses, high-value habitat, or known urban runoff sources.
G.	Table 5-4	Use decision framework for interpreting Triad results, e.g., toxicity tests at higher dilutions to better quantify toxicity; use TIE to identify contaminants of concern	Continuing monitoring on the current ABLM schedule/sites is proposed.	Partial No changes in spatial or temporal sampling intensity have been proposed for sites where impacts have been observed.	At sites where impacts have been observed, use decision framework in Table 5-4 of MMP for interpreting Triad results and planning further actions, e.g., toxicity tests at higher dilutions to better quantify toxicity; use TIE to identify contaminants of concern

Table 3.1 Question 3: What is the relative urban runoff contribution to the receiving water problem(s)?
Question 4: What are the sources to urban runoff that contribute to receiving water problem(s)?
Stormwater Monitoring—Mass Loading Stations, Temporary Watershed Assessment Stations, Stream Bioassessment

Criterion/Design Element/Design Issue			Status	Adherence to MMP	Recommendations
A.	4.3.2	Using parameters relevant to the nature of the receiving water problem, estimate the proportional contribution of urban runoff at the most downstream point of input to the receiving water, based on a loads study and repeated every several years as needed.	MLS selected to directly measure pollutant loads being discharged into receiving waters by the major watersheds. Water quality problems (Q1) (chemistry, bacterial indicators, toxicity, bioassessment) documented at monitoring stations. Land use, population, and other watershed data reported in 2003–2004 Annual Report	No Most information needed to address Q3 and begin to address Q4 appears to be available, but no analysis of contributions of different sources or urban runoff component is reported. Loads not presented in annual reports.	Evaluate loads at MLS with respect to land use, population, and other characteristics in Watershed Management Areas using tools such as multiple linear regression, factor analysis, and cluster analysis.
B.	4.3.2	Data products: • Description of all potential sources of inputs to the receiving water (maps of potential sources) • Rough estimates of the relative magnitude of loads from all sources (table of concentrations or loads by source) • Rough estimates of the proportional contribution of urban runoff to total loads (pie charts or stacked bar charts).	Background data for Watershed Management Area provided in description of monitoring sites General mention of potential sources of impacts in narrative of each Watershed Management Area	No No systematic analysis or discussion of potential sources of inputs to measured loads or to receiving waters.	Based on land use, population, and published information (as proposed in Section 5.3.2 of MMP), describe nature and magnitude of potential sources of inputs from Watershed Management Areas . Use simple models (e.g., Rational Method) to estimate proportional contributions by different land uses to total loads. Use care in applying wet-weather models to conditions in San Diego County.
C.	4.4.2	Using parameters relevant to the nature of the receiving water problem, prioritize receiving water sites for upstream source identification	Regional Assessment section of 2003–2004 Annual Report provides	No There appears to be no discussion	Use comparative analyses already conducted to prioritize Watershed Management Areas for upstream source

		studies and perform source identification studies at the watershed scale and to a moderate degree of resolution until the appropriate stopping rules are reached.	extensive analysis and documentation of differences and similarities among MLS with respect to chemistry, toxicity, and bioassessment.	of prioritization of MLS sites for upstream source identification efforts, although comparative analysis already conducted is an excellent basis for prioritization.	identification. Perform source identification studies based on priorities.
D.	4.4.2	Data products: • Prioritization of receiving water sites in terms of severity of impact (ranked list of sites) • Description of all potential urban runoff sources of inputs to the higher-priority receiving waters (map of potential sources) • Determination of actual sources of urban runoff and their relative magnitude (table of concentrations and flows by source with estimated levels of confidence) • Quantitative estimates of the loads from urban runoff sources (table of loads by source with estimated levels of confidence)	Extensive comparative analysis of results from MLS sites presented, including tables, graphs.	No Sites have not been ranked by severity of impact. Sources have not been identified or discussed except in very general terms.	Use comparative analyses already conducted to rank MLS sites. Evaluate potential sources as recommended in item B, and present results in tabular and map form.
E.	Table 4-1	Source identification involves targeted, site-specific, one-time special efforts.	MLS monitoring proposed to continue at present sites at reduced frequency; TWAS proposed to fill gaps in Watershed Management Area monitoring.	Minimal Depending on location and number, TWAS could contribute to geographic source identification; however, limited number might impair such effort.	Using TWAS and/or additional temporary, targeted monitoring, isolate subdrainages of particular land use or other characteristics as part of source identification efforts.
F.	5.3.1 5.3.2	Load estimation at a fixed downstream reference point that is in or near the affected receiving water, using expert judgment, visual reconnaissance, land use modeling, empirical tributary monitoring, conservative tracers, and	MLS monitoring proposed to continue at present sites at reduced frequency.	No No source assessment work proposed.	Use land use modeling, reconnaissance, tracers, and other approaches to assess sources upstream of MLS sites.

		the evaluation of existing data to assess sources.			
G.	5.4.1	Use a basic indicator of impact (e.g., bacterial indicator, toxicity) to trace the strength of the impact signal upstream, in either wet or dry weather, combined with more powerful and/or targeted methods (e.g., genetic source identification, TIEs, chemical reconnaissance, physical reconnaissance) to locate the specific source(s) of pollution.	MLS monitoring proposed to continue at present sites at reduced frequency; TWAS proposed to fill gaps in Watershed Management Area monitoring. MLS targeted for TIE testing based upon the Triad Decision Matrix.	Minimal TIE testing identifies sources of toxicity in water at MLS sites, but no geographic or land use analysis by other methods to locate sources of pollutants.	Use methods targeted on indicator(s) of impacts documented at MLS sites in upstream investigations to locate specific sources of pollution.
H.	5.4.1	Detailed source identification involves studies at downstream stations to gain additional insight into the sources of the problem. For bacteria, this might include more traditional sanitary survey methods and/or more sophisticated biological testing. For habitat, this might include toxicity tests with a broader suite of test organisms, TIEs, or more detailed analyses of the pattern of impact in communities or on key organisms.	MLS targeted for TIE testing based on the Triad Decision Matrix.	Partial TIE testing provides insight into chemical sources of toxicity problems. However, no other investigations of this type, such as additional BAs or sanitary surveys, are reported.	Use additional methods such as sanitary surveys, bacterial genotyping, additional bioassessment at MLS and BA sites to gain additional information on impacts that can contribute to source identification.
I.	5.4.1	Detailed source identification involves upstream source tracking and source identification studies that might use a variety of methods.	MLS monitoring proposed to continue at present sites at reduced frequency; TWAS proposed to fill gaps in Watershed Management Area monitoring.	No No detailed source tracking is proposed.	Pursue detailed upstream source tracking as outlined in MMP.
J.	5.4.3	For habitat, monitoring results should be evaluated, using Table 5-4 as guidance, to determine whether the probable source(s) of impact is physical, chemical, or unknown.	MLS targeted for TIE testing based upon the Triad Decision Matrix.	Yes	
K.	5.4.4	Upstream source identification efforts include:	MLS monitoring	Minimal	Upstream source identification of

		1. Evaluation of existing data 2. Visual reconnaissance and observation 3. Empirical tributary monitoring, which involves sampling tributary mouths upstream of the receiving water impact to identify the most likely point(s) of input 4. Sampling, or chemical "fingerprinting" of individual sources, including farther upstream along tributaries, which can include the use of unique and/or conservative tracers	proposed to continue at present sites at reduced frequency; TWAS proposed to fill gaps in WMA monitoring.	Limited number of proposed TWAS unlikely to be sufficient to isolate impacts from tributaries. No additional reconnaissance, sampling, or fingerprinting proposed.	documented water quality impacts at MLS sites should be pursued using approaches recommended in section 5.4 of the MMP.
L.	Tables 5-10 5-11	Use adaptive triggers based on Triad results to prioritize studies to identify potential sources of impacts.	MLS targeted for TIE testing based on the Triad Decision Matrix.	Partial TIE testing does not address all potential sources of impacts.	Use adaptive triggers as outlined in Tables 5-10 and 5-11 to prioritize studies to identify potential sources of impacts.
M.	5.4.4	Use explicit starting and stopping rules for detailed source identification studies. Starting rules are necessary for ensuring that source identification studies, which can be costly and time-consuming, are triggered where and when monitoring data strongly suggest the presence of a persistent problem. Such rules are also needed to focus available resources on the highest-priority problems. Stopping rules are essential for ensuring that source identification studies do not continue indefinitely but end when reasonable and realistic expectations have been met.	Nothing in current or proposed monitoring plan that addresses this issue.	No	Develop and apply starting and stopping rules for detailed source identification studies as described in section 5.4 of MMP.

Table 3.2 Question 3: What is the relative urban runoff contribution to the receiving water problem(s)?
Question 4: What are the sources to urban runoff that contribute to receiving water problem(s)?
Coastal Storm Drain Monitoring Program

Criterion/Design Element/Design Issue			Status[1]	Adherence to MMP	Recommendations
A.	4.3.2	Using parameters relevant to the nature of the receiving water problem, estimate the proportional contribution of urban runoff at the most downstream point of input to the receiving water, based on a loads study and repeated every several years as needed.	CSDM program proposed to continue with changes: • Move CSDM sites that do not discharge into receiving waters into the dry-weather monitoring program • Reduce sampling frequency to monthly Reduce sampling frequency at sites with consistently low bacteria counts. Only bacteria counts reported; no load data.	No No bacteria load data available. No information on land use, population, source activity in drain contributing area presented.	Measure storm drain discharge at time of sampling to estimate bacteria load. Collect land use, population, source activity data from source area draining to each drain to allow analysis relating potential source activities/conditions to observed impacts.
B.	4.3.2	Data products: • Description of all potential sources of inputs to the receiving water (maps of potential sources) • Rough estimates of the relative magnitude of loads from all sources (table of concentrations or loads by source) • Rough estimate of the proportional contribution of urban runoff to total loads (pie charts or stacked bar charts).	No relevant activities reported.	No No information presented on potential sources in contributing areas of monitored drains.	Based on collection of land use, population, and source data from drain source areas, use published information (as proposed in Section 5.3.2 of MMP) to describe nature and magnitude of potential sources of inputs from drain source areas. Use simple models (e.g., Rational Method) to estimate proportional contributions by different land uses to total loads. Use care in applying wet-weather models to conditions in San Diego County. Note: similar analysis done for MLS watersheds could apply to the extent that drainage areas overlap.
C.	4.4.2	Using parameters relevant to the nature of	Extensive data presented	Partial	Set a lower threshold, e.g., pooled 75th

		the receiving water problem, prioritize receiving water sites for upstream source identification studies and perform source identification studies at the watershed scale and to a moderate degree of resolution until the appropriate stopping rules are reached.	on exceedances of bacterial water quality standards. Adaptive monitoring diagrams used to identify drains where elevated bacteria levels from the storm drains might be affecting adjacent receiving waters. 95th percentile bacterial counts used as threshold for upstream source investigation on a case-by-case basis.	Adaptive diagrams used to identify priority drains actually affecting receiving waters. Nearly exclusive reliance on exceedance rather than raw data and use of pooled 95th percentile threshold reduce sensitivity of prioritization.	percentile to prioritize drains for source investigation. Reduce reliance on exceedance frequencies for bacterial indicator data alone; report and analyze actual numbers to help set priorities for upstream source identification studies. Use the 95th percentile calculated for each storm drain to trigger investigations into the cause of exceedance in that drain. Results from a particular drain would be compared against the 95th percentile observation from the last year for that drain, and exceedance would trigger an investigation upstream.
D.	4.4.2	Data products: • Prioritization of receiving water sites in terms of severity of impact (ranked list of sites) • Description of all potential urban runoff sources of inputs to the higher-priority receiving waters (map of potential sources) • Determination of actual sources of urban runoff and their relative magnitude (table of concentrations and flows by source with estimated levels of confidence) • Quantitative estimates of the loads from urban runoff sources (table of loads by source with estimated levels of confidence)	Tables reporting exceedances of bacterial indicator standards by individual CSDM stations.	No No information presented on potential sources of inputs in drain source areas, their relative magnitude, or estimates of loads.	Pursuant to recommendations in items A and B, present data and analyses as suggested in MMP Section 4.4.2.
E.	Table 4-1	Source identification involves targeted, one-time special efforts.	Source identification investigations initiated when bacteria levels exceeded receiving water criteria or 95th percentile action levels.	Partial Source investigations limited to highest observed bacteria levels.	Source investigations should be triggered by lower threshold (see item C).
F.	5.3.1 5.3.2	Load estimation at a fixed downstream reference point, which is in or near the affected receiving water, using expert	Source identification investigations initiated when bacteria levels	No No attempt made to associate general	Evaluate all bacteria data with data collected pursuant to recommendations in items A and B to identify patterns of

		judgment, visual reconnaissance, land use modeling, empirical tributary monitoring, conservative tracers, and the evaluation of existing data to assess sources	exceeded receiving water criteria or 95th percentile action levels.	bacteria levels with characteristics/activities in source area. No effort to generalize results of source investigations is apparent.	sources of indicator bacteria in storm drains. Use judgment, reconnaissance, land use modeling, tracers, etc. to assess sources of bacteria observed at CSDM sites.
G.	5.4.1 5.4.2	Use bacterial indicators to trace the strength of the impact signal upstream, in either wet or dry weather, combined with more powerful and/or targeted methods (e.g., genetic source identification, conceptual model of bacteria dynamics in section 5.4.2, physical reconnaissance) to locate the specific source(s) of pollution.	No relevant activities reported other than individual source investigations triggered by threshold exceedance.	Partial Investigations limited to physical reconnaissance.	Where applicable, use tools and approaches outlined in section 5.4.2 of MMP to conduct more definitive source identifications.
H.	5.4.1	Detailed source identification involves studies at downstream stations to gain additional insight into the sources of the problem. For bacteria, this might include more traditional sanitary survey methods and/or more sophisticated biological testing.	CSDM sampling in receiving water consists of single down-current sample when drain discharges into waterbody. Basic bacterial indicators tested.	Minimal Single sample with basic indicator analysis does not provide additional insight into sources.	Consider more extensive sampling in receiving waters to better characterize impacts. Consider evaluating additional microorganisms or associated tracers and/or bacterial genotyping to obtain better information about sources.
I.	5.4.1	Detailed source identification involves upstream source tracking and source identification studies that might use a variety of methods.	Source identification investigations initiated when bacteria levels exceeded receiving water criteria or 95th percentile action levels.	Partial Source investigations limited to highest observed bacteria levels using physical reconnaissance methods.	Where applicable, use tools and approaches outlined in section 5.4.2 of MMP to conduct more definitive source identifications.
J.	5.4.4	Upstream source identification efforts include: 1. Evaluation of existing data 2. Visual reconnaissance and observation 3. Empirical tributary monitoring, which involves sampling tributary mouths upstream of the receiving water impact to identify the most likely point(s) of input 4. Sampling, or chemical “fingerprinting” of	Source investigations and IC/ID investigations use visual reconnaissance and observation.	Partial Source investigations limited to highest observed bacteria levels.	Use lower threshold to trigger source identification efforts using additional approaches. Evaluate all bacteria data with data collected pursuant to recommendations in items A and B to relate observed patterns of sources of indicator bacteria in storm drains to potential sources and

		individual sources, including further upstream along tributaries, which can include the use of unique and/or conservative tracers.			indicate need for source investigations.
K.	5.4.4	Use explicit starting and stopping rules for detailed source identification studies. Starting rules are necessary for ensuring that source identification studies, which can be costly and time-consuming, are triggered where and when monitoring data strongly suggest the presence of a persistent problem. Such rules are also needed to focus available resources on the highest priority problems. Stopping rules are essential for ensuring that source identification studies do not continue indefinitely but end when reasonable and realistic expectations have been met.	Nothing in current or proposed monitoring plan that addresses this issue.	No	Develop and apply starting and stopping rules for detailed source identification studies as described in section 5.4 of MMP.

Table 3.3 Question 3: What is the relative urban runoff contribution to the receiving water problem(s)?
Question 4: What are the sources to urban runoff that contribute to receiving water problem(s)?
Ambient Bay and Lagoon Monitoring Program

Overall Note: Associations between watershed MLS and ABLM stations are currently not well understood. The Copermittees' proposed program states that results of future monitoring will be used to assess such associations. If a relationship is observed, the ABLM Program will be linked into the program design as a monitoring element to be conducted with the MLS, TWAS, and BA monitoring and the information/data assessed as an additional weight-of-evidence element. Assessment of such associations is essential; effective source identification for impacted ABLM sites cannot be determined with certainty until such associations are defined. However, prioritization of ABLM sites/receiving waters can proceed in a preliminary way. Knowledge of activities in watersheds, combined with data from MLS, TWAS, and CSDM programs, may point to potential sources that are worthy of investigation under the present state of knowledge.

Criterion/Design Element/Design Issue			Status	Adherence to MMP	Recommendations
A.	4.4.2	Using parameters relevant to the nature of the receiving water problem, prioritize receiving water sites for upstream source identification studies and perform source identification studies at the watershed scale and to a moderate degree of resolution until the appropriate stopping rules are reached.	2003–2004 Annual Report presents regional assessment including ranking of embayments on sediment chemistry, toxicity, and biological metrics.	Yes	
B.	4.4.2	Data products: • Prioritization of receiving water sites in terms of severity of impact (ranked list of sites) • Description of all potential urban runoff sources of inputs to the higher-priority receiving waters (map of potential sources) • Determination of actual sources of urban runoff and their relative magnitude (table of concentrations and flows by source with estimated levels of confidence) • Quantitative estimates of the loads from urban runoff sources (table of loads by source with estimated levels of confidence).	Embayments ranked on sediment chemistry, toxicity, and biological metrics.	Partial No systematic description of potential or actual sources of toxics in drainage area. No estimates of loads from urban runoff sources.	Pending better understanding of relationships between watershed MLS and ABLM stations, conduct inventory of potential sources of pollutants involved in documented impacts at ABLM stations. Use existing data, relevant literature, and simple tools to estimate relative magnitudes of pollutant loads from watershed sources. Use care in applying wet-weather models to conditions in San Diego County.
C.	Table 4-1	Source identification involves targeted, one-time special efforts.	Nothing in current or proposed monitoring plan	No	Pending better understanding of relationships between watershed MLS and

			that addresses this issue.		ABLM stations.
D.	5.4.1	Use a basic indicator of impact (e.g., bacterial indicator, toxicity) to trace the strength of the impact signal upstream, in wet or dry weather, combined with more powerful and/or targeted methods (e.g., genetic source identification, TIEs, chemical reconnaissance, physical reconnaissance) to locate the specific source(s) of pollution.	Pending future monitoring, linkage of ABLM with MLS, TWAS, and BA monitoring will occur.	No	Pending better understanding of relationships between watershed MLS and ABLM stations.
E.	5.4.1	Detailed source identification involves upstream source tracking and source identification studies that might use a variety of methods.	Nothing in current or proposed monitoring plan that addresses this issue. Pending future monitoring.	No	Pending better understanding of relationships between watershed MLS and ABLM stations.
F.	Tables 5-10 5-11	Use adaptive triggers based on Triad results to prioritize studies to identify potential sources of impacts.	Nothing in current or proposed monitoring plan that addresses this issue. Pending future monitoring.	No	Pending better understanding of relationships between watershed MLS and ABLM stations.
G.	5.4.3	For habitat, monitoring results should be evaluated, using Table 5-4 as guidance, to determine whether the probable source(s) of impact is physical, chemical, or unknown.	Triad data collected and ranked for each ABLM site.	Partial Data exist to use Table 5-4 to assess probable cause of impact. Response must wait for better understanding of watershed/tributary contributions.	Pending better understanding of relationships between watershed MLS and ABLM stations.
H.	5.4.4	Conduct upstream source identification efforts as in Table 3.1, items K and M.	Nothing in current or proposed monitoring plan that addresses this issue. Pending future monitoring.	No	Pending better understanding of relationships between watershed MLS and ABLM stations.

Table 4.1 Question 5: Are conditions in receiving waters getting better or worse?
Stormwater Monitoring—Mass Loading Stations, Temporary Watershed Assessment Stations, Stream Bioassessment

Criterion/Design Element/Design Issue			Status	Adherence to MMP	Recommendations
A.	4.5.1 4.5.2 4.5.3	Monitor bacterial and habitat indicators at fixed stations over a number of years to determine, whether levels have increased or decreased compared to historical data and to relevant standards.	Fixed MLS sites directly measure pollutant loads being discharged to receiving waters by the major watersheds. Trend analysis conducted using simple linear regression against time.	Yes	Other trend analysis techniques should be explored, such as the nonparametric Mann-Kendall test, which is robust against departures from normality.
B.	4.5.1	Trend monitoring program should conduct its own site-specific power analyses, after obtaining 3 years of trend data, and revise its monitoring design accordingly based on these results.	Power analysis conducted to address consequences of proposed reduction in monitoring frequency at MLS to compensate for expanded monitoring upstream.	Partial Power analysis conducted to justify reduction in sampling frequency, not to assess current program ability to achieve monitoring/management goals. Interpretation of power analysis is based on the highly uncertain assumption that current observed trends will continue in same direction and at a constant rate into the future.	Establish goals for trend analysis, and then conduct power analysis to determine sampling frequency necessary to achieve the goals. Reevaluate effects of reduced monitoring frequency on trend detection; if current trends change direction, magnitude, or both, the proposed changes in sampling regime will have a significantly reduced sensitivity to detect change.
C.	4.5.1	Analysis of monitoring data should include efforts to quantify sources of variability in monitoring data, with the overall goal of reducing any controllable variability	Data are collected on precipitation for monitored storm events, flow.	No Simple linear regression of constituents of concern against time	Trend analysis often needs to account for other sources of variability in the time series in addition to an underlying trend. Additional approaches to trend

				does not account for other sources of variability.	analysis, such as including exogenous variables in a multiple-regression model or using a seasonal nonparametric trend model, should be applied.
D.	4.5.2 4.5.3	Types of data products: • Graphs of the levels of indicators over time at each station of concern • Periodic statistical power analysis results to confirm the power of the trend monitoring Design	Scatterplots and trend graphs of chemistry data presented in appendix to 2003–2004 Report. Power analysis used to address consequences of proposed reduction in monitoring frequency at MLS.	Yes	
E.	5.5.1	Programs begin trend monitoring for recreational water quality with 10 to 15 weekly samples per year for 3 years and then conduct site-specific power analyses.	MLS sampled 3x/year since 1998 or before.	No Sampling frequency substantially less than recommended.	
F.	5.5.1	Because of high variability in indicator bacteria levels, stratify trend analyses by month, with separate trend analyses for each month.	MLS sampled 3x/year since 1998 or before; reduction in frequency proposed.	No Cannot stratify data with current or proposed sample numbers.	Evaluate MLS and other indicator bacteria data to determine patterns of seasonal variability. If significant seasonality is observed, consider restructuring bacteria monitoring program.
G.	5.5.1	Target a trend monitoring program at one or more of the months in that portion of the year when peak bacteria levels coincide with the period of highest recreational use	MLS sampled 3x/year since 1998 or before; reduction in frequency proposed.	No Neither peak bacteria levels nor high recreational use are mentioned as criteria in sampling at MLS.	As appropriate, evaluate bacteria data base and use intensity information for targeting sampling at MLS sites.
H.	5.5.1 Table 5-12	Trend monitoring to target high-priority use areas and high-priority inputs, and include both loads and concentration, with analysis of trends in inputs, impacts, and the difference between stations upstream and downstream of the discharge	Fixed MLS sites located at bottom of WMA; TWAS proposed to fill gaps in spatial coverage in WMA.	Partial If number and location of TWAS are sufficient, improved spatial coverage could address this element as long as TWAS monitoring is sustained over time.	Locate TWAS carefully in sufficient numbers to target high-priority areas in WMA and to bracket high-priority inputs. In this application, TWAS stations should remain in place long enough to provide a solid basis for trend detection.
I.	5.5.2	Trend monitoring programs for habitat should begin by collecting two or three samples per	MLS sampled 3x/year since 1998 or before;	Partial No information or	Evaluate data concerning habitat indicators from watershed monitoring

		year for 3 years and then use these data to conduct site-specific power analyses to refine the following aspects of the design: • The amount of change expected or desired • The number of samples to be collected per year • The number of years before the expected change is detected	reduction in frequency proposed. BA sites proposed to collocate. TWAS sites proposed to improve spatial coverage.	discussion found concerning trends analysis for habitat—toxicity, bioassessment.	stations and conduct power analyses to refine the monitoring design for trend detection. Select the primary response indicator as biological (e.g., the benthic IBI), perform statistical power analysis to determine the number of samples necessary to detect a specified amount of change in THAT indicator. If the primary reporting units are the 10–12 subwatersheds, randomly distribute that number of sample locations throughout each of the subwatersheds (stratified random). Also, within each subwatershed, proportionally distribute sampling site allocation among additional substrate, e.g., a-upper, b-middle, and c-lower watershed; or 1st, 2nd, and 3rd order stream channel segments; or other. Regardless of the stratification approach, efforts should be made to minimize bias associated with the site selection process.

Table 4.2 Question 5: Are conditions in receiving waters getting better or worse?
Coastal Storm Drain Monitoring Program

Criterion/Design Element/Design Issue			Status	Adherence to MMP	Recommendations
A.	4.5.1 4.5.2 4.5.3	Monitor bacterial indicators at fixed stations over a number of years to determine whether levels have increased or decreased compared to historical data and relevant standards.	Fixed sites on storm drains discharging to bays and lagoons since 2001.	Yes	
B.	4.5.1	Trend monitoring program conduct its own site-specific power analyses after obtaining 3 years of trend data, and revise its monitoring design accordingly based on these results.	No relevant material found.	No No power analysis of CSDM data found in available materials.	Conduct power and minimum detectable change analysis on each monitored drain. Conduct preliminary trend analysis on available dataset. Conduct trend analysis on raw data for bacterial indicators, not limited to exceedances.
C.	4.5.1	Analysis of monitoring data should include efforts to quantify sources of variability in monitoring data, with the overall goal of reducing any controllable variability.	Flow is measured at CSDM sites.	No No discussion of variability or sources of variability in data.	Assess variability of dataset from each monitored drain, including evaluation of minimum detectable change. Collect data on important covariates such as flow, precipitation, season, and source activity and evaluate their incorporation into an appropriate trend model.
D.	4.5.2 4.5.3	Types of data products: • Graphs of the levels of indicators over time at each station of concern • Periodic statistical power analysis results to confirm the power of the trend monitoring Design	Results are presented as raw sample data, exceedance of water quality standards, and plotted on adaptive monitoring diagram.	No No presentation or discussion of levels of indicators over time or power analysis.	For each monitored drain and downcoast site, plot levels of indicators over time. Conduct power and minimum detectable change analysis on each monitored drain.
E.	5.5.1	Programs begin trend monitoring for recreational water quality with 10 to 15 weekly samples per year for 3 years and then conduct site-specific power analyses.	Initial prescriptive program design initiated in 2001; Adaptive Sampling Program in 2003. Lagoons monitored since 2002. Samples collected monthly	Yes	

			(wet period) and 2x/mo (dry period). Reduction to all monthly proposed.		
F.	5.5.1	Because of high variability in indicator bacteria levels, stratify trend analyses by month, with separate trend analyses for each month.	See sampling frequencies cited in item E above.	No Sample numbers insufficient to stratify in monthly aggregates.	Evaluate dataset for stratification scheme (e.g., quarterly, seasonal) that will address issue of high variability.
G.	5.5.1	Target a trend monitoring program at one or more of the months in that portion of the year when peak bacteria levels coincide with the period of highest recreational use.	See sampling frequencies cited in item E above.	Partial Recreational use of monitored bays unspecified. Current sampling frequency could partially address this issue; proposed all monthly schedule does not.	Reevaluate proposed reduction of sampling frequency to monthly with respect to this criterion. Reevaluate alignment of current sampling schedules with recreational use periods and consider adjustment to enhance sampling during peak periods. Obtain, analyze, and incorporate monitoring data from local health agencies, as appropriate.
H.	5.5.1 Table 5-12	Trend monitoring to target high-priority use areas and high-priority inputs, and include both loads and concentration, with analysis of trends in inputs, impacts.	Drains selected as having greatest potential to affect water quality. Site selection narrative mentions "number of people using coastal area" as selection criterion, but no data presented on use levels of coastal areas sampled. Lagoons sampled are mostly classified as "infrequent" use.	Partial Inadequate characterization of use level of coastal sampling sites to assess degree of targeting for trend monitoring. No flow or bacteria load data reported.	Document current sampling locations with respect to use level. Target monitoring to high-use, high-input locations. Evaluate both concentrations and loads of indicators.

I.	Table 5-12	Trend monitoring at stations bracketing inputs, upcoast and downcoast locations.	Drains flowing into receiving waters sampled down-current from input.	Partial No trend analysis reported for either input or down-current data.	Conduct trend analysis on input and down-current data from appropriate CSDM sites.

Table 4.3 Question 5: Are conditions in receiving waters getting better or worse?
Ambient Bay and Lagoon Monitoring Program

Overall Note: Because samples (Phase II) have been collected only since 2003, ABLM sampling has not developed a sufficient database for trend analysis. Thus, there is no basis to assess adherence to the MMP. Proposed monitoring includes continuation of ABLM to better assess relationships between watershed contributions/tributary inflows and impacts at ABLM Program sites. The criteria and design elements listed below should be applied at that time and preliminary trend analysis conducted. Note that the recommendation provided in Question 1, Table 1.3, Item C, for more representative sampling in bays and lagoons would apply to the trend analysis considerations as well.

Criterion/Design Element/Design Issue			Status	Adherence to MMP	Recommendations
A.	4.5.1 4.5.2 4.5.3	Monitor habitat indicators at fixed stations over a number of years to determine whether levels have increased or decreased compared to historical data and to relevant standards.	ABLM sites are fixed, worst-case locations to be sampled for Triad evaluation for several years.	Yes, preliminary	Representative sites (both highly ranked by the Triad approach and other less-impacted sites) should be monitored to build an unbiased database suitable for trend analysis. The proposed suspension of the ABLM Program until 2009 might be an unwise interruption of a data collection effort that could be used to address trends in receiving water conditions.
B.	4.5.1	Trend monitoring program conduct its own site-specific power analyses after obtaining 3 years of trend data, and revise its monitoring design accordingly based on these results.			
C.	4.5.1	Analysis of monitoring data should include efforts to quantify sources of variability in monitoring data, with the overall goal of reducing any controllable variability.			
D.	4.5.2 4.5.3	Types of data products: • Graphs of the levels of indicators over time at each station of concern • Periodic statistical power analysis results to confirm the power of the trend monitoring Design			

E.	5.5.2	Trend monitoring programs for habitat should begin by collecting two or three samples per year for 3 years and then use these data to conduct site specific power analyses to refine the following aspects of the design: • The amount of change expected or desired • The number of samples to be collected per year • The number of years before the expected change is detected			
F.	Table 5-13	Trend monitoring to target key habitats and/or downstream of major inputs; sites random or clustered in plumes			

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APPENDIX A

Detailed Statistical Analysis of Proposed Reduced Monitoring Frequency at Mass Loading Stations and Assessment of Proposed Temporary Watershed Assessment Stations

The following is an analysis in response to some of the statistical questions raised concerning proposed changes in the Copermittees' monitoring regime. Note that the importance of these changes—and their impact on the effectiveness of the monitoring program—will tend to be greatest for issues of source identification and evaluation of water quality trends (Questions 3–5) than for assessment monitoring (Questions 1 and 2).

Question: *How will reduction in monitoring frequency from monitoring three wet weather events every year to monitoring two wet weather events every other year affect the ability to use the data to make statistically sound conclusions and to identify significant differences between watersheds or years?*

Point 1: Documenting differences between stations/watersheds. The short answer to this question is that the proposed reduction in MLS sampling frequency will reduce the program's ability to document differences between stations and trends over time with statistical confidence; that is, larger differences or changes will be required to conclude that the changes are significant at a given level of confidence. Although the magnitude might not be huge, the resulting reduction in the sensitivity of the program to detect difference/change is very likely a significant cost that should be recognized and considered against the benefit of allocation of monitoring resources to other activities or programs.

There will in fact be some information cost resulting from the proposed decrease in sampling frequency. Collection of fewer samples means that the estimate of the population concentration will be less precise, variability will be more poorly defined, and differences between groups will be more difficult to confirm. For comparisons between multiple stations or years (e.g., by ANOVA) and for comparisons of two stations or years (e.g., by t-test), it is true that variability does not necessarily increase when n (the number of observations) decreases (as stated in Appendix A of Attachment 3). However, it is certain that degrees of freedom (df, the number of independent pieces of information that go into the estimate of a statistical parameter) will necessarily decrease as n decreases. This means that even for the same data distribution, the critical values of the t statistic (for the t-test) and the F statistic (for ANOVA) will increase with decreasing n, especially at the current small sample size. For example, the critical value of t (the value that the calculated t statistic must equal or exceed to conclude that sample means are not equal) at 4 df (n=6; i.e., two sets of three samples) is 2.776 at α=0.05. The critical value of t at 2 df (n=4; i.e., two sets of two samples) is 4.303. Thus, a larger critical t, and hence a larger difference between means calculated from two samples, will be required to conclude significant difference than for means based on three samples.

This effect is also illustrated in the ANOVA results for total dissolved solids (TDS) and nickel (Ni) shown in the response to question 1 in Appendix A. Although it might be true that reducing n from 3 to 2 has little meaningful effect on resolving differences among the 11 stations, in fact the reduction in sampling frequency has the effect of lowering the ability to significantly differentiate stations with respect to mean TDS. With three sample events, for example, station CC has significantly lower mean TDS than SDC, SR, SLR, PC, and TC stations; with two sample events, it can be concluded only that mean TDS at station CC is lower than mean TDS at stations SDC and TC. For Ni, reducing frequency from three to two events per year eliminates

the ability to conclude that any significant differences exist among the monitored stations. Although the differences in mean dissolved Ni concentration among the stations with three sampling events might be only slight and not meaningful, the loss of ability to recognize significant differences between groups must be recognized.

Point 2: Documenting differences between years. Decreasing sampling frequency will have the effect of decreasing the ability to document significant differences in mean COC concentrations between years; larger differences will be required to conclude with statistical confidence that a real difference exists. Again, this loss in sensitivity should be balanced against the benefits of other uses of monitoring resources.

The narrative in Appendix A (question 2) states that the present monitoring program has not been designed to answer the question of differences between years, whether two or three annual storm events are considered. At the present sampling frequency of three events per year, only very large differences between years are likely to be detectable, suggesting that the current MLS program might not adequately address some aspects of question 5 of the MMP.

The above issue notwithstanding, the narrative states that in seeking to determine significant differences between years, "the results would be more dependent on the magnitude of differences between years and the variability of the data within each of the years than the number of storm events sampled." The meaning of this statement in this context is unclear. In any comparison of means between periods, the magnitude of difference and the variability of the data of course play a major role. However, the sensitivity of any means test is also highly dependent on the number of observations, and that sensitivity will decrease with decreasing sample size (see Point 1). It is agreed in principle that at the very low sample sizes (three per year or two per year), the absolute values and variability of the data probably have a larger influence than they would at a higher sampling frequency. It is not believed, however, that this is a particularly strong argument for reducing sample frequency.

Some of the same principles discussed in Point 1 apply to evaluating year-to-year differences. Reducing sampling frequency will have the effect of reducing the sensitivity of the monitoring dataset to detect year-to-year differences by comparing means. The effects of reducing sample frequency from three per year to two per year are evident in the tables comparing pairs of years in Appendix A (pages 5–6). In almost every case, the probability (P) level at n=2 is higher than the P level for n=3. It is technically true that in no case did a t-test change from non-significant (>0.05) to significant (or vice versa) with a reduction of n. However, there is more information in this comparison than simply the binary choice between P>0.05 and P<0.05. Note that in some cases, going from n=3 to n=2 resulted in relatively large increases in the probability of finding a t greater than the calculated value. For example, for the comparison of 2001–2002 with 2002–2003:

Location	Measure	P value for n=3	P value for n=2
CC	Nitrite	0.097	0.408
EC	Dissolved Cd	0.199	0.500
SR	Total Zn	0.463	0.710
TJ	Oil and grease	0.388	0.826

Although not statistically significant, the P values for nitrite and Cd above are suggestive of a difference that might be meaningful and perhaps deserve further investigation or at least close observation in the future. The fact that P values decline substantially with a small increase in n from 2 to 3 is suggestive of differences that might be meaningful, but that low n and high variability are preventing the documentation of statistical significance. Such information might be lost when considering only P < or > 0.05. Furthermore, this pattern is indicative of the cost of reduced sampling frequency.

Instead of focusing on only changes resulting from reducing sampling frequency from 3 to 2 per year, it might be more useful to look at the problem from the other direction and ask the following: What is the magnitude of change desired or expected and what sampling frequency is necessary to detect that change with statistical confidence? To answer this question, in would be valuable to conduct an evaluation of **minimum detectable change** (mdc) with respect to the monitoring program. MDC analysis uses knowledge of a water quality constituent (e.g., variability) to determine how much change must occur for the change to be statistically significant at a given sampling intensity. MDC is calculated based on a critical value of t at the appropriate degrees of freedom, the mean square error (a measure of variability), and the number of observations in each period or watershed (Spooner et al. 1987, Richards and Grabow 2003). MDC analysis can be used to estimate the degree of change detectable in a given situation or to calculate the number of samples required to detect a given level of change. A decision to change sampling frequency in the Copermittees' monitoring program should be based on MDC analysis, as well as on the considerations presented in Appendix A.

It is difficult to assess the effect the proposed change in sampling to alternate years on the ability to make statistical inferences. In an obvious impact, not monitoring over a particular year risks missing or at least delaying information about water quality. The effects of a major but transient event such as a chemical spill, a sewer line break, or construction site erosion could be missed entirely. The net effect on long-term trend analysis is not so clear. In general, most trend analysis techniques require a consistent time series of observations; short monitoring periods and small sample sizes make documentation of trends difficult and uncertain. Skipping years might be considered equivalent to having missing data; excessive levels of missing data might mean that a two-sample test must be used. Furthermore, unless the earlier annual data are re-aggregated, the resulting irregularly spaced observations might require the application of different statistical tools, such as nonparametric trend tests. Even if this is not the case, the period of time required to document a trend or the achievement of a water quality objective will be extended. This might be acceptable if the purpose of the program is only to track a long-term trend. However, reducing sampling frequency and skipping years will likely impair the use of monitoring data as feedback in evaluating the effectiveness of land-based pollution control activities (e.g., stormwater treatment, improved management practices).

The analysis presented in Appendix A shows that reducing sampling frequency extends the time horizon for documenting achievement of a water quality objective by only a few years over a period of many years. Although this analysis is correct as far as it goes, it is based on the assumption that existing trends continue in the same direction at a constant rate into the future. This is a highly uncertain assumption. If the trend changes direction, magnitude, or both, the proposed changes in sampling regime will have a significantly reduced sensitivity to detect the change.

As a final observation, it appears that the current approach to trend analysis is inadequate and that more attention should be given to this important question. The only test for trend reported is simple linear regression of a COC (Y) on time (T). This is not the only approach to trend analysis, nor is it necessarily the best one in every case. There are two major shortcomings.

First, parametric linear regression is an optimal trend analysis tool if Y is linear with respect to T and if the residuals are normally distributed. However, if the data depart even to a small degree from these assumptions, other tests will perform as well or better. The narrative in Appendix A states that the COC data were $\log_{10}$ transformed, but it presents no discussion or evidence that the results of the transformation were satisfactory. It is recommended that other trend analysis techniques be evaluated, such as the nonparametric Mann-Kendall test, which is robust against departures from normality. Especially in situations like this one where numerous trend tests must be repeated, it is often simpler to use a nonparametric test than to evaluate, transform, and interpret back-transformations for numerous datasets to satisfy assumptions of normality.

Second, trend analysis often needs to account for other sources of variability in the time series in addition to an underlying trend. Precipitation or streamflow are examples of exogenous variables that can have strong influences on observed water quality data; removing the variation in Y caused by such exogenous variables can reduce the background “noise” and improve the ability to detect an actual trend. Seasonal effects can also be important. Techniques of trend analysis, such as multiple linear regression with flow or precipitation as an independent variable and the nonparametric Seasonal Kendall test, exist to account for such influences. We recommend that additional approaches to trend analysis be explored.

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Question: *How likely is it that the Copermittees' proposed Temporary Watershed Assessment Stations will provide useful data that can be used to make statistically sound conclusions, given the limited scope of the monitoring proposed for these stations? Are the proposed locations of the TWAS and the rationale for those locations sufficient to answer the Model Monitoring Program core management questions they are designed to answer?*

Because the TWAS will be sampled in the same manner and at the same frequency as the MLS, data from the TWAS will have a comparable statistical basis in terms of detecting differences between stations and between years. However, the major importance of the TWAS lies in the monitoring of previously unassessed subwatershed areas of the major watersheds. The key to the utility of TWAS data will be in their location. Locating two TWAS above and below a tributary, for example, will certainly help document the significance of that subwatershed as a pollutant source, although the statistical sensitivity will be limited by sample number just as at the mass loading stations. Scattering TWAS around a major watershed at points draining areas of different land use(s) could also be useful in evaluating sources of pollutants and evaluating the urban contribution (Questions 3 and 4). However, again, their ability to document differences between subwatersheds will be limited by sample number just as with the MLS. In this context and with these limitations, the TWAS should be applicable to address core questions 3 and 4 and to supplement data relevant to questions 1 and 2. However, most watersheds appear to be scheduled to receive only one TWAS; without specific information on the siting of these stations relative to land use, drainage, and pollutant sources in the watersheds, it is difficult to conclude that the TWAS will achieve all of their objectives.

Storm Water Panel Recommendations to the California State Water Resources Control Board

The Feasibility of Numeric Effluent Limits Applicable to Discharges of Storm Water Associated with Municipal, Industrial and Construction Activities

June 19, 2006

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Background

The NPDES storm water permit program came into being as a result of the 1987 amendments to the federal Clean Water Act and its implementing regulations. In California, the State Water Resources Control Board (State Water Board) and the nine Regional Water Quality Control Boards (Regional Water Boards) implement the NPDES storm water program.

The Clean Water Act amendments, Section 402(p) require that discharges of storm water from large and medium municipal separate storm sewer systems (MS4s) and discharges of storm water associated with industrial activities be in compliance with NPDES permits. MS4 permits require that the discharge of pollutants be reduced to the maximum extent practicable (MEP). Discharges associated with industrial activities, were required to meet the technology based standards of best available technology economically achievable (BAT) or best conventional pollutant control technology (BCT), and to meet water quality standards.

In 1990, USEPA promulgated regulations (40 CFR Part 122.26) for the NPDES storm water program. These regulations clarified what industrial activities were subject to storm water permit. Construction that resulted in a land disturbance of five or more acres was included as an industrial activity subject to NPDES storm water permit. The regulations also delineated what was to be included in permit applications and the programmatic elements that were to be in a permit and storm water management program for MS4s or storm water pollution prevention plan for industrial activities.

California's Permits

In 1990, MS4 permits were issued to Santa Clara County by the San Francisco Bay Regional Water Board and to Los Angeles County by the Los Angeles Regional Water Board. These permits were appealed to the State Water Board. The primary basis of the appeals was the lack of numeric limits in the permits. The entities that brought the appeals argued that the permits needed to include numeric limits, as the discharges of pollutants must not only be reduced to the MEP, but they must also meet water quality standards. The State Water Board, in hearing these appeals, determined that it was not feasible at the time to develop numeric limits for MS4 permits, and that water quality standards could and should be achieved through the implementation of best management practices (BMPs). Since this ruling, the Regional Water Boards have typically not included numeric limits in storm water permits.

The State Water Board has adopted NPDES General Permits for the Discharge of Storm Water Associated with Industrial Activities and for the Discharge of Storm Water Associated with Construction Activities. Both of these permits contain language stating that developing numeric limitations is infeasible.

Court Decisions

In addition to these actions on MS4 permits at the State level, there have been a number of rulings from the federal courts regarding the NPDES Storm Water program.

One of the most significant is from the federal court, 9th District Court of Appeals from 1999. In its published opinion on Defenders of Wildlife vs. Browner, the Court held that MS4 permits need not require strict compliance with water quality standards. Rather, compliance was to be based upon the MEP standard. However, the permitting authority (the State Water Board/Regional Water Boards for California) could at their option require compliance with standards. The State Water Board through the permit and appeals process has in fact required that the discharges from MS4s meet water quality standards, but has stated that compliance with numeric standards can be achieved through the implementation of BMPs in an iterative fashion.

The Browner decision also found that discharges of storm water associated with industrial activities must be in strict compliance with water quality standards.

In 2004 the State Water Board conducted a public hearing on a draft General Industrial Storm Water permit. This draft permit met with significant opposition from non-government or non-industrial organizations (NGOs) due to the absence of numeric limits. Staff revised the draft permit to include the benchmarks contained in the USEPA multi-sector general permit. This change resulted in strong opposition from the regulated community.

The concerns that have been raised by the NGOs and the regulated community are similar, though they do not necessarily agree on the best way to address them. Both believe that permitting has become overly complex, and that it is extremely difficult, if not impossible to objectively determine if a facility, operation or municipality is in compliance with its permit requirements. The NGOs argue that requiring storm water permittees to comply with numeric effluent limits will result in an easier way to measure compliance. The regulated community agrees, to a degree, but they argue that it is not simply a matter of selecting a number that is suitable for a POTW or industrial waste discharge. Due to the unique nature of storm events and storm water discharges, any numeric limit that is placed in a storm water permit must take into consideration the episodic nature of storm events and be truly representative of storm water discharges. In addition, the regulated community has argued that there are going to be pollutants in storm water discharges that did not originate in the MS4 (run on) or that they do not have the means to control, and therefore should be given special consideration.

In response to these arguments, State Water Board directed staff to convene a panel of storm water experts to examine the feasibility of developing numeric

limits for storm water permits. Specifically, this panel of experts was asked to consider the following:

> "Is it technically feasible to establish numeric effluent limitations, or some other quantifiable limit, for inclusion in storm water permits? How would such limitations or criteria be established, and what information and data would be required?"
>
> "The answers should address industrial general permits, construction general permits, and area-wide municipal permits. The answers should also address both technology-based limitations or criteria and water quality-based limitations or criteria. In evaluating establishment of any objective criteria, the panel should address all of the following:
>
> (1) The ability of the State Water Board to establish appropriate objective limitations or criteria; (2) how compliance determinations would be made; (3) the ability of dischargers and inspectors to monitor for compliance; and (4) the technical and financial ability of dischargers to comply with the limitations or criteria."

Staff invited 10 individuals from the academic and scientific community to participate on the panel. Of the 10, eight agreed to participate. These eight met in a public session on September 14, 2005 and heard presentations from the regulated and NGO communities. They also heard comments from the public at large. They met again on September 15, 2005 to discuss the public comments and to begin to formulate a response. It was also decided at this meeting that they would form sub-committees to address municipal (MS4), industrial and construction discharges separately. These sub-committees worked on drafts statements for each of these, circulating them over the course of a number of months.

The panel met again in private session on April 3 and 4, 2006. The purpose of these meetings was to address unresolved issues and to develop the final response to the State Water Board. It was also decided to combine the three working statements into one Statement of Findings. The following discussion is the panel's findings and is broken into three program element areas: municipal, construction, and industrial.

Panel's Findings on Feasibility of Numeric Effluent Limits Applicable to Municipal Activities

Municipal Observations

1. The current practice for permitting, designing, and maintaining municipal stormwater treatment facilities (called BMPs herein) on the urban landscape does not lend itself to reliable and efficient performance of the BMPs because:

    - Permitting agencies, including EPA, States, and local governments, have rarely developed BMP design requirements that consider the pollutants and/or parameters of concern, the form(s) that the pollutants or parameters are in, the hydrologic and hydraulic nature of how they pollutants and flow arrive, and then the resulting unit processes (treatment and/or flow management processes) that would be required to address these pollutants or parameters.
    - The permitting agencies generally are not accountable for the performance of the BMP, and thus give much leeway to the developer with respect to the type of BMPs to be constructed, and to the details of the design, although some states do have detailed design standards and have conducted performance tests to identify acceptable devices for their area.
    - The developer is not responsible in most all cases for the performance of the BMP, so the treatment facilities are designed to minimize the cost and/or area of the facility and/or ease of permitting, not maximize the pollutant removal efficiency and/or flow management of the BMP
    - Because BMPs are not held to any, or very few, long-term performance criteria, they are typically not maintained except for aesthetic purposes. Very few stormwater agencies are responsible for BMP maintenance on private property, and public facilities are maintained mostly in response to clogging and/or resultant drainage or aesthetic problems. Even for stormwater agency facilities, maintenance is often limited.

2. The principal reasons for the failure of BMP performance is improper BMP selection, design and/or lack of maintenance.

    - The California BMP Handbooks and other local requirements leave too much of the BMP selection and design to the discretion of the designer, and thus do not address many if not all of the receiving water quality issues

- BMPs need to be *designed to facilitate maintenance*; this is rarely done because it costs the developer money and the BMP designer is rarely responsible for the maintenance.

- Given the amount of debris in urban runoff, and the fact that the hydraulic capacity of many BMPs may be exceeded several to many times per year, BMPs require more maintenance than other types of stormwater control facilities. Since urban BMP maintenance is generally left to untrained homeowner associations and maintenance personnel for commercial properties, inadequate maintenance is a near certainty. Even stormwater agencies often do not have and/or apply the resources necessary to maintain agency owned BMPs.

3. Improvements in the design of municipal BMPs, including residential and commercial as well as municipally owned facilities are necessary to ensure better performance (i.e. sizing, geometry, inlet and outlet design, etc.) and to specifically target receiving water quality issues.

<u>The Problem with Existing Effluent Limit Approaches</u>

Effluent limit approaches usually focus only on conventional water quality constituents that may not be solely or at all responsible for the receiving water beneficial use impairments in urban receiving waters. The important stressors that affect many use impairments can include one or more of the following and may vary in importance from system to system:

- The effect of increased flows and/or volumes (i.e. hydromodification) that can lead to stream channel erosion/sedimentation with resulting habitat destruction

- Sediment contamination (such as enrichment of urban stream sediments with fine-grained heavily polluted particulates; large organic debris masses causing low sediment DO; settled bacteria causing large bacteria gradients with sediment depth etc.)

- Impaired aesthetic value (caused by gross floatables, noxious sediments, etc.)

- Unsafe conditions (caused by dangerous debris, highly fluctuating stream flows and stages, etc.)

- Dissolved and suspended pollutants that are bioavailable in the water column and/or result in downstream sediment contamination

- Elevated temperatures from urban heating effects on runoff and on open conveyances and permanent pool BMPs

It is very difficult to determine specific causative agents or the level of control needed, for a specific beneficial use impairment in a receiving water body. The *Stormwater Effects Handbook: A Tool Box for Watershed Managers, Scientists, and Engineers* (Burton, G.A. Jr., and R. Pitt, ISBN 0-87371-924-7. CRC Press, Inc., Boca Raton, FL. 2002. 911 pages) was written to be used as a guide for stormwater managers to identify their local receiving water problems and to assist in identifying the causative factors. The methods described would need to be applied to a specific area or region to obtain an understanding of local conditions and problems. Although expensive, comprehensive investigations such as these should be considered an investment to help minimize wasteful expenditures due to the application of inappropriate control practices in a watershed.

Monitoring for enforcement of numeric effluent limits would also be challenging. While spot checks could be made at some of the many outfalls in an area, there is wide variation in stormwater quality from place to place, facility to facility, and storm to storm. Coefficients of variation approaching 1 or higher are not uncommon and there are few factors that can be used to significantly reduce this variation. Analysis of the National Stormwater Quality Database indicates that geographical location and land use are the most important factors affecting stormwater quality for most constituents. Some are also affected by the antecedent dry period before the rain and more highly developed watersheds (containing large fractions of impervious areas) often show elevated “first-flush” concentrations in the first portion of the storms for some, but not all pollutants. Since the storm-to-storm variation at any outfall can be high, it may be unreasonable to expect all events to be below a numeric value. In a similar circumstance, there are a number of storms each year that are sufficiently large in volume and/or intensity, to exceed the design capacity volume or flow rates of most BMPs. Assessing compliance during these larger events represents yet another challenge to regulators and the regulated community.

Technical Issues

Even for conventional pollutants, there presently is no protocol that enables an engineer to design with certainty a BMP that will produce a desired outflow concentration for a constituent of concern. A possible exception is removal of Total Suspended Solids in extended detention basins, and some types of media filters. The typical approach for evaluating BMP pollutant removal efficiency has been *percent removal*; but observed removal efficiencies vary greatly from facility to facility and it has been demonstrated that percent removal varies directly with the inflow concentration.

Few, if any, BMPs are designed using the first principles laws of physics, chemistry and/or biology for pollutant removal and/or flow-duration control. It will

take a substantial research effort, including data gathering on well-designed BMPs, to develop design criteria for the removal of pollutants with confidence intervals that enable us to make reliable estimates of the median and variance of the effluent concentrations to be expected from the various types of BMPs. Until this is done, it will be very difficult to assign legally enforceable numerical effluent limitations to any particular BMP.

Drawing upon the body of knowledge that currently exists regarding pollutant removal efficiency, it is possible to estimate mean effluent concentrations and variances for a number of constituents for different types of BMPs, albeit not in a legally enforceable sense. Effluent concentration distributions for a number of BMPs are available in the International BMP Database (www.bmpdatabase.org) from more then 250 studies throughout the US. The following outlines key issues that have been identified regarding the technical feasibility of setting objective criteria for both existing areas and new or redeveloping areas:

- Effluent concentration estimates could be made for a given constituent and a particular BMP from a larger number of BMPs than available in the BMP Database using literature values of percent removal and local or national data on stormwater runoff EMC data. However, the results from this work would be significantly less reliable then the BMP Database data as it could be biased if the influent concentrations for the studied BMP types did not match general urban runoff.
- Designing the facility more rigorously with respect to the physical, chemical and biological processes (e.g. unit processes) that are active in the BMP would give confidence that the BMP would perform at least as well, if not better than the average performance determined from the literature. A WEF/ASCE task force is currently updating their Urban Runoff Quality Management Manual of Practice; design guidance of BMPS will make better use of the physical, chemical, and biologic processes taking place in the BMP before, during and after a storm event. This manual will build upon recent research efforts employing a unit process based approach for BMP design and selection. These research efforts were supported by the Water Environment Research Foundation (WERF) and the National Cooperative Highway Research Program (NCHRP).
- A BMP *designed* and *constructed* according to a set of criteria described above, could be ***presumed*** to deliver an effluent with a mean constituent concentration and variance similar to the performance numbers developed from the literature ***if it is properly maintained***. Enforcement would comprise periodic inspection of the facility using a checklist of items to be inspected. While not an effluent limit, this seems practical and quantifiable.

- Most all existing development rely on non-structural control measures, making it difficult, if not impossible to set numeric effluent limits for these areas because little is known about the quantity and quality performance of non-structural controls. However, certain development characteristics in some existing development areas that minimize the amounts of impervious areas in a drainage area have been shown to be quite effective in reducing adverse hydromodifications in the receiving waters, and should be encouraged.

Municipal Recommendations

It is not feasible at this time to set enforceable numeric effluent criteria for municipal BMPs and in particular urban discharges. However, it is possible to select and design them much more rigorously with respect to the physical, chemical and/or biological processes that take place within them, providing more confidence that the estimated mean concentrations of constituents in the effluents will be close to the design target. Moreover, with this more rigorous design and an enforceable maintenance program, it can be presumed that these facilities will continue to deliver effluent qualities that are reasonably close to the design effluent concentrations over the life of the facility. And if proper maintenance is performed (enforced), the facilities can be expected to perform throughout their design life at the same or better efficiency as when newly constructed. Depending on the pollutants and parameters of concern and BMP choices, it is very likely that treatment trains of structural BMPs will be required in many cases.

For catchments not treated by a structural or treatment BMP, setting a numeric effluent limit is basically not possible. However, the approach of setting an "upset" value, which is clearly above the normal observed variability, may be an interim approach that would allow "bad actor" catchments to receive additional attention. For the purposes of this document, we are calling this "upset" value an ***Action Level*** because the water quality discharged from such locations are enough of a concern that most all could agree that some action should be taken. Action Levels could be developed using at least three different approaches. These approaches include: 1) consensus based approach; 2) ranked percentile distributions; 3) statistically-based population parameters.

The consensus-based approach would be to agree upon effluent concentrations that all parties feel are not acceptable. For example, most parties would likely agree that an average concentration of dissolved copper above 100 ug/l from an urban catchment would not be acceptable. This would be an Action Level value that would trigger an appropriate management response. This approach may not directly address the issue of establishing numeric effluent criteria and achieving desired effluent quality, but the consensus-based approach would ensure that the "bad actor" watersheds received needed attention.

The ranked percentile approach (also a statistical approach) relies on the average cumulative distribution of water quality data for each constituent developed from many water quality samples taken for many events at many locations. The Action Level would then be defined as those concentrations that consistently exceed some percentage of all water quality events (i.e. the 90th percentile). In this case, action would be required at those locations that were consistently in the outer limit (i.e. uppermost 10th percentile) of the distribution of observed effluent qualities from urban runoff.

The statistically based population approach would once again rely on the average distribution of measured water quality values developed from many water quality samples taken for many events at many locations. In this case, however, the Action Level would be defined by the central tendency and variance estimates from the population of data. For example, the Action Level could be set as two standard deviations above the mean, i.e. if measured concentrations are consistently higher than two standard deviations above the mean, an Action situation would be triggered. Other population based estimators of central tendency could be used (i.e. geomean, median, etc.) or estimates of variance (i.e. prediction intervals, etc.). Regardless of which population-based estimators are used (or percentile from above), the idea would be to identify the [statistically-derived] point at which managers feel concentrations are significantly beyond the norm.

The ranked percentile and population-based estimators are highly dependent upon the data sets used to calculate them. There are a number of options that were considered by the Panel, but ultimately they were broken into two distinct categories. The first category was for new development/redevelopment and the second was for built out urban environments. For new development/redevelopment, the panel recommends using the data set associated with the international BMP database (www.bmpdatabase.org). This data set represents the variety of water quality from the most up to date, best conducted and reported BMP studies. The database effort does not limit itself to BMPs types or designs; it focuses on technically sound monitoring studies and reporting information. Therefore there could be some screening of studies to those thought to be well designed BMPs to then develop effluent quality distributions and statistics on performance. Certainly, there is no expectation that urban stormwater managers could improve water quality beyond what would be reported in this dataset.

In built-out urbanized environments, there are greater opportunities to examine various data sets for setting Action Levels. For the Panel, these opportunities were a function of spatial scale. The first opportunity would be at the local scale. Some urban stormwater monitoring programs have been in existence for 10 years or longer. Examples include the Los Angeles County Department of Public Works, City of Sacramento, Orange County, San Diego County, amongst others. Using permit specific data sets may make sense if issues of climatic variability or

localized geomorphology are important. The next scale would be to combine these California municipal permit monitoring data sets, especially if lack of data for specific constituents of concern in any one location or region is an important issue. The largest scale would be the National Stormwater Quality Database (NSQD) from municipal monitoring programs across the nation (http://unix.eng.ua.edu/~rpitt/Research/ms4/Paper/Mainms4paper.html). This data set includes monitoring data from urban areas such as residential, commercial, industrial, freeway, institutional, and mixed use which is especially useful if small sample size limits the use of local data. One advantage of using smaller (and local), rather than larger, spatial scales is the ability to update data sets for revising Action Levels. The NSQD may not be updated for quite some time, but local data sets can be updated periodically (annual amendments, 10-year rolling averages, every permit cycle, etc). Ultimately, Action Levels would be expected to become lower as outliers are removed from data sets and as improved water quality data are collected through targeted management actions. It may be appropriate to eliminate older data sets as well over time.

One element to consider when comparing monitoring data to Action Levels is the concept of a design volume for water quality (also known as the Water Quality Capture Volume – WQCV, WEF #23 and ASCE publication #87, 1998) or a design flow rate. The WERF and NCHRP efforts mentioned above include recommendations regarding design sizing using continuous simulation techniques for both volume-based and rate-based BMPs. The Panel acknowledged that several to more times each year, the runoff volume or flow rate from a storm will exceed the design volume or rate capacity of the BMP. Stormwater agencies should not be held accountable for pollutant removal from storms beyond the size for which a BMP is designed.

A Technically Sound and Pragmatically Enforceable BMP Design and the Permit Process

The diagram below provides guidance for determining what BMPs are required in a newly developing watershed. Under ***Condition 1*** where the receiving water quality is not impaired, determination of the appropriate BMP would be by Best Professional Judgment (BPJ). Any of the "state approved" BMPs could be used. The permittee would be required to design the treatment facilities in accordance with the California BMP Handbook, ***which should be revised as a criteria manual***, rather than a guidance manual *and include more physiobiochemically based design criteria designed to address an agreed upon set of "Pollutants and Parameters of Concern" based upon knowledge of the pollutants and parameters that generally are of concern in urban runoff, with perhaps some differences on receiving water type.*

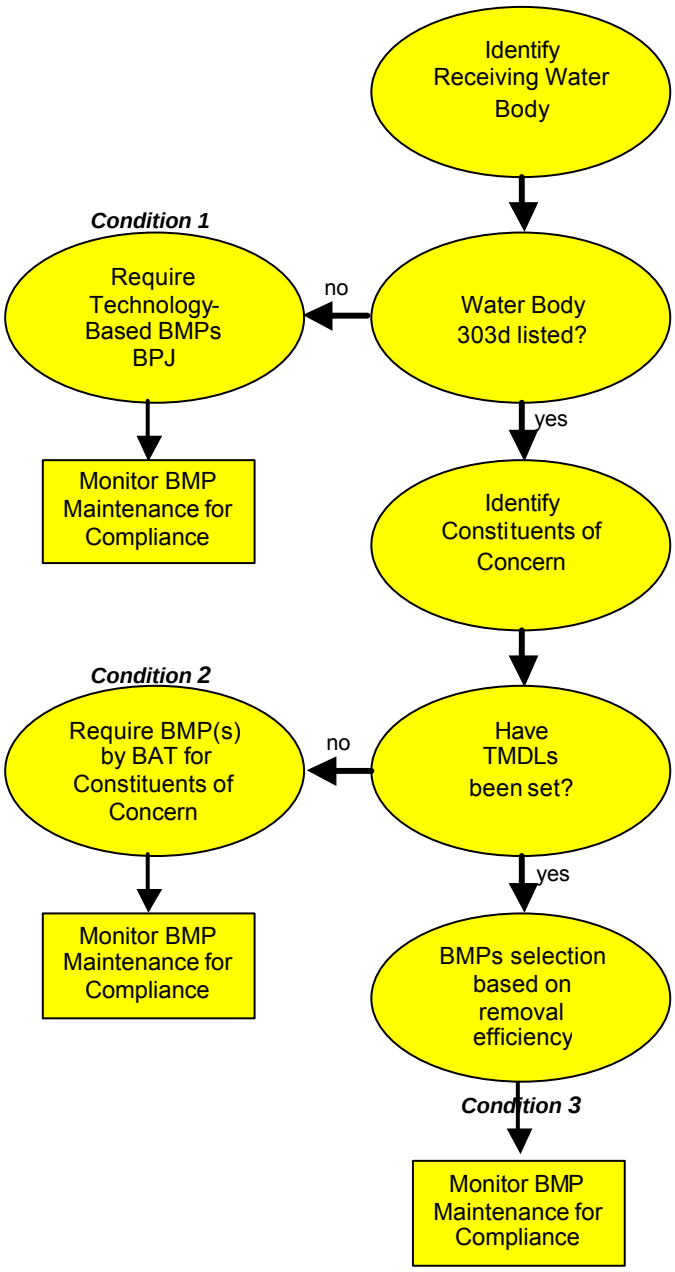

A detailed maintenance plan and schedule would be required that includes:

1. Actions to be taken and when,
2. Designation of the party legally accountable for the facility maintenance, and
3. A whole-life cost estimate for the facility that include maintenance.

Compliance with the design criteria and the maintenance plan and schedule would constitute achievement of the design effluent criteria. In the event of failure by the responsible party to perform the required maintenance and/or to perform it to the required level of quality, the whole-life cost schedule could be used to determine the consideration that the defaulting responsible party would pay to the new responsible party that takes over the maintenance.

Under ***Condition 2*** where water quality impairment exists but a TMDL has not yet been performed, BAT would be required, which means applying the BMPs that can practicably (to be defined) be employed to produce the lowest effluent concentrations (e.g. the lower grouping of BMP effluent quality) of the constituent(s) of concern. Several types of BMPs may fulfill the BAT standard if these BMPs have performance that is not statistically or practically differentiable. This case will allow flexibility in choosing among that sets of BMPs that demonstrate superior performance. As in the case of C*ondition 1,* compliance with the maintenance plan and schedule would constitute compliance with the design effluent criteria.

Condition 3, which occurs when a TMDL has been specified for the BMP or for the tributary watershed, may (or may not be) actually be less stringent that *Condition 2* if the TMDL allows for a higher effluent concentration of the constituents of concern than that discharged by a BAT facility. The same requirements would apply for the design criteria, and the maintenance plan and schedule would constitute the guarantee of design effluent concentrations from the BMP.

<u>Strategies for Stormwater Management to Protect Urban Water Environments</u>

Stormwater effluent limits can become very complex if all the issues are to be directly addressed. If complex, they are not likely to be workable. However, too much simplification can also lead to ineffective programs. Therefore, a reasonable first step is needed, based on local data. Compliance monitoring (e.g. BMP inspections) is also needed to ensure that the goals are likely to be met. Most likely goals will have to be revised over time. The overall strategy should contain these objectives:

- Effectiveness
- Affordability
- Enforceability, and
- Flexibility

Table 1 - Effects of Urbanization on Hydrologic Regime in Colorado and Georgia

Location	Annual Precipitation	Mean Storm Depth*	Runoff Events per Year		Annual Runoff (mm)	
	Millimeters per Year	Millimeters	Undeveloped	Developed	Undeveloped	Developed
Fort Collins, CO	335	11	27	47	12	124
Atlanta, GA	1262	18	48	78	36	500
* Values obtained from Fig. 5.3 ASCE MOP (1998)						

Runoff volume and peak flows have been recognized as two of the most important stormwater factors needing control. **Table 1** (Roesner and Nehrke) shows that urbanization dramatically changes the hydrologic regime of urban waterways. In both Atlanta (a higher rainfall area) and Fort Collins (a semiarid area), the number of runoff events per year on developed land increases by a factor of 2 times the number of runoff events that occur in the undeveloped state; and the runoff volume increases by a factor of ten! The peak flows also increase dramatically as shown in **Figure 1** below, but as also seen on the figure, the peak flow frequency curve can be adjusted back to its predevelopment character by the proper application of runoff controls. But while these controls restore the peak flow frequency to its natural regime, the duration of flows at the low end (but still channel "working") of the flow frequency curve is greatly increased, which raises potential for channel scour in stream channels with erosive soils.

Figure 1 - Exceedance Frequencies for Detention Basins in Fort Collins, Colorado

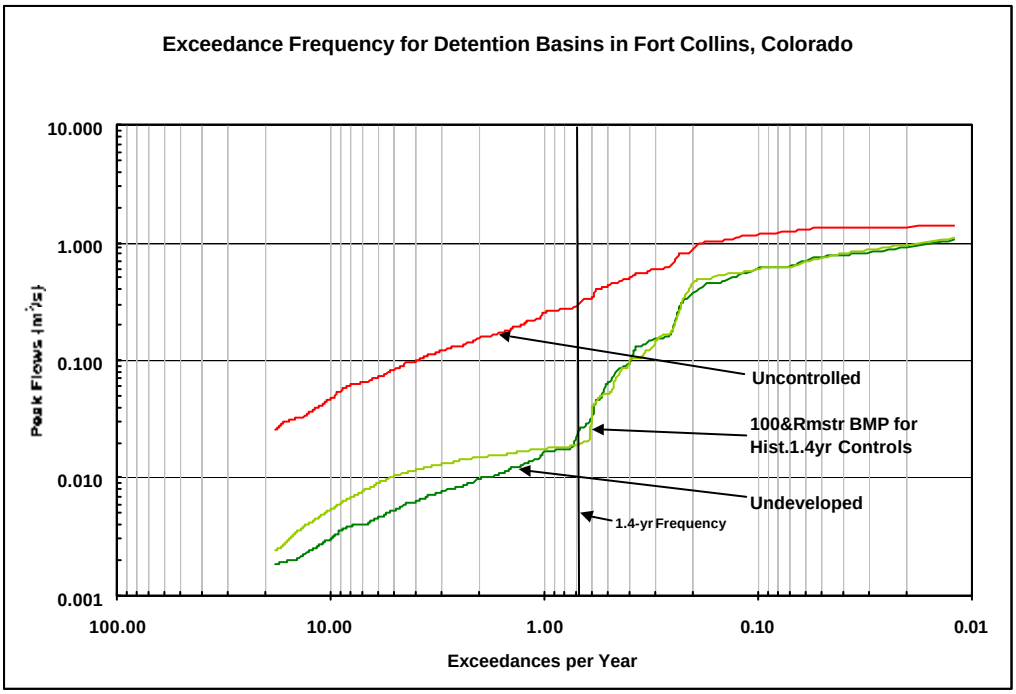

Since many of the stormwater pollutants are strongly associated with particulates, stormwater particulate control is also often a component of stormwater control programs. Therefore, an effective stormwater control strategy that could be encouraged is a combination of several practices, listed below in the order of increasing events:

- On-site stormwater reuse, evapotranspiration and infiltration for the smallest storms and up to specific targeted events, depending on site limitations (soil characteristics and groundwater contamination potential) (usually by conservation design emphasizing infiltration, disconnecting paved areas, etc.)
- Treatment of excess runoff that cannot be infiltrated, again, up to a specific targeted runoff volume (usually by sedimentation or filtration) For pollutants of concern, it should be demonstrated that the BMP(s) need to include the physical, biological, and/or chemical treatment processes that address the typical pollutants of concern and/or specific pollutants in the case of 303D listed water bodies or those with established TMDLs.
- Control of energy discharges for the channel forming events (such as through storage-release, focusing on flow-duration analyses and peak flow frequency analyses). To be most effective, this should to be completed under a watershed management plan and not site-by-site.
- Provide safe drainage for damaging events (conventional drainage, plus secondary drainage systems)
- In watersheds that are already experiencing damaging flow impacts to streams, it could be in many circumstances much more cost-effective (and effective period) to develop through a watershed plan a natural stream stabilization approach that could address both the existing development and the remaining smaller infill or otherwise smaller new development. In these cases, requiring the remaining new development to implement flow-duration control would not solve the issue in a measurable way and resources would be better spent restoring the functions of the creek with instream enhancements.

Panel's Findings on Feasibility of Numeric Effluent Limits Applicable to Construction Activities

Construction Observations

Regarding the question of the technical feasibility of Numeric Limits for stormwater discharges from construction activities, the Panel bases its recommendations on the following observations.

1. Limited field studies indicate that traditional erosion and sediment controls are highly variable in performance, resulting in highly variable turbidity levels in the site discharge.
2. Site-to-site variability in runoff turbidity from undeveloped sites can also be quite large in many areas of California, particularly in more arid regions with less natural vegetative cover and steep slopes.
3. Active treatment technologies involving the use of polymers with relatively large storage systems now exist that can provide much more consistent and very low discharge turbidity. However, these technologies have as yet only been applied to larger construction sites, generally five acres or greater. Furthermore, toxicity has been observed at some locations, although at the vast majority of sites, toxicity has not occurred. There is also the potential for an accidental large release of such chemicals with their use
4. To date most of the construction permits have focused on TSS and turbidity, but have not addressed other, potentially significant pollutants such as phosphorus and an assortment of chemicals used at construction sites.
5. Currently, there is no required training or certification program for contractors, preparers of soil erosion and sediment control Stormwater Pollution Prevention Plans, or field inspectors.
6. The quality of stormwater discharges from construction sites that effectively employ BMPs likely varies due to site conditions such as climate, soil, and topography.
7. The States of Oregon and Washington have recently adopted similar concepts to the Action Levels described earlier.

Construction Recommendations

It is the consensus of the Panel that active treatment technologies make Numeric Limits technically feasible for pollutants commonly associated with stormwater discharges from construction sites (e.g. TSS and turbidity) for larger construction sites. Technical practicalities and cost-effectiveness may make these technologies less feasible for smaller sites, including small drainages within a larger site, as these technologies have seen limited use at small construction sites. If chemical addition is not permitted, then Numeric Limits are not likely feasible. Whether the use of Numeric Limits is prudent, practical or necessary to more effectively achieve nonpoint pollution control is a separate question that

needs to be answered, but is outside the scope of this Panel. However, Action Levels are likely to be more commonly feasible. For small sites or smaller drainages within larger sites, or where chemicals cannot be used, the Panel recommends that Action Levels be specified.

Advanced systems lend themselves to Numeric Limits because of historically reliable treatment, while non-active controls are less predictable. Advanced systems have been in use in some form since the mid-1990s. At this time, there are two general types of systems. With each general system the stormwater is retained on-site, treated, and released more slowly. One system employs polymer coagulation and sedimentation. The second system employs polymer coagulation with direct filtration. Both types of systems are considered reliable, and can consistently produce a discharge less than 10 NTU. These systems have been used successfully at many sites in several states since 1995 to reduce turbidity to very low levels. Non-active erosion and sediment control BMPs, while effective when applied and adequately maintained, produce more highly variable in effluent quality, making setting Numeric Limits difficult, if not impossible.

An important consideration in setting Numeric Limits or Action Levels is that in many locations in California the natural background turbidity and/or TSS levels in stormwater runoff are quite high. This is particularly true in semi-arid or arid regions, which tend to have less vegetative cover. For example, natural runoff concentrations in Emerald Creek, on the Newport Coast, above any developed areas have been over 5,000 mg/l during runoff events. The Los Angeles County Monitoring Data sets included an open land use watershed that also showed TSS levels significantly above other types of urban land uses. Therefore, it is important to consider natural background levels of turbidity or TSS in setting Numerical Limits or Action Levels for construction activities. The difficulty in determining natural background concentrations/levels for all areas of the state could make the setting of Numeric Limits or Action Levels impractical from an agency resource perspective.

While the Panel concludes that Numeric Limits or Action Levels are technically feasible, the Panel has several reservations and concerns.

1. The active treatment systems have generally been employed on sites five acres or larger. While the systems are technically feasible for sites of any size, including sites or drainages as small as an acre or less, the cost may be prohibitive. The cost-effectiveness of active treatment systems is greatly enhanced for large drainage areas, at which construction occurs for an extended period of time, over one or more wet season. There is also a more “passive” active system that is employed in New Zealand that uses captured rainfall to release the chemical into flows entering a detention system that requires less instrumentation and flow measurement infrastructure. Even more passive systems such as the use of polymer

logs and filter bags are currently under development for small sites. Regardless, the Panel recommends that the Board give particular attention to improving the application of cost-effective source controls to small construction sites.

2. In considering widespread use of active treatment systems, full consideration must be given to whether issues related to toxicity or other environmental effects of the use of chemicals has been fully answered. Consideration should be given to longer-term effects of chemical use, including operational and equipment failures or other accidental excess releases.
3. Consideration should be given to the seasonality of applying Numerical Limits. There may be sites where summer only construction that complies with Action Levels may be preferred to year-round that sites that include winter construction that complies with Numeric Limits. In such cases, applying Numeric Limits to summer construction may be a disincentive to scheduling active grading during dry periods. Allowing summer only construction sites to comply with action levels would discourage winter construction activities.
4. Consideration should be given to whether Numeric Limits would apply to all construction sites or only those with significant disturbed soil areas (e.g. active grading, un-vegetated and/or un-stabilized soils). A site could meet certain conditions to be considered "Stabilized" for the runoff season.
5. Where Numeric Limits are not feasible or where they would not apply during designated seasons or site conditions, the Panel recommends that the Board consider the concept of Action Levels for sites where only traditional erosion and sediment controls are applied or construction sites that are considered "stabilized" for the runoff season. An Action Level indicates a failure of BMPs (within some storm size limits).
6. The Board should consider Numeric Limits or Action Levels for other pollutants of relevance to construction sites, but in particular pH. It is of particular concern where fresh concrete or wash water from cement mixers/equipment is exposed to stormwater.
7. The Board should consider the phased implementation of Numeric Limits and Action Levels, commensurate with the capacity of the dischargers and support industry to respond.
8. The Panel recommends that a Numeric Limit or Action Level should be compared to the average discharge concentration. The minimum number of individual samples required to represent the average discharge concentration for a storm will need to be defined.
9. The Board should set different Action Levels that consider the site's climate region, soil condition, and slopes, and natural background conditions (e.g. vegetative cover) as appropriate and as data is available. With active treatment systems, discharge quality is relatively independent of these conditions. In fact, active treatment systems could result in turbidity and TSS levels well below natural levels, which can also be a problem for receiving waters.

10. The Board should consider whether the Numeric Limits or Action Levels should differ between receiving waters that are water quality limited with respect to turbidity, sediment or other pollutants associated with construction, from those water bodies that are not water quality limited.
11. The Panel recommends that Numeric Limits and Action Levels not apply to storms of unusual event size and/or pattern (e.g. flood events). The determination of Water Quality Capture Volume should consider the differing climate regions to specify these events.
12. The Board should set Numeric Limits and Action Levels to encourage loading reductions as appropriate as opposed to only numeric concentrations. Examples include phased construction (e.g. limited exposed soil areas or their duration), infiltration, and spraying captured runoff in vegetated areas as means to reduce loading.
13. The Panel is concerned that the monitoring of discharges to meet either the Action Levels or Numeric Limits may be costly. The Panel recommends that the Board consider this aspect.

Panel's Findings on Feasibility of Numeric Effluent Limits Applicable to Industrial Activities

Industrial Observations

The Panel believes that Numeric Limits are feasible for some industrial categories. Industries have control over their facilities. They control access, construction practices, product substitution to affect pollution prevention and the types of treatment systems to be used to mitigate stormwater runoff. There are many treatment systems or prevention practices that have been in place for lengthy periods, extending back to the 1980s in many cases. For example, there is much known today about construction materials, such as roofing materials (roofing composition, gutters, paints and coatings, products that abrade or tend to create solids or litter, etc). Other examples include development of pervious surfaces, or infiltration methods.

The decision for the value of Numeric Limits should be made in one of two ways. When there is a TMDL that defines the permissible load for a watershed, the Numeric Limits should be set to meet the TMDL. Consideration must be given for both the pollutant concentration as well as the volume of runoff, since both contribute to the impacts that required the TMDL to be implemented.

When there is no TMDL, the Numeric Limits should be based upon sound and established practices for storm water pollution prevention and treatment, using an approach analogous to that used in the NPDES wastewater process in the 1970s. In this approach phased, Numeric Limits were first set that were based upon the use of best currently available technology, and permittees were given a defined period for compliance. Permits were established based upon industry types or categories, with the recognition that each industry has its own specific problems and financial viability.

To establish Numeric Limits for industrial sites requires a reliable database, describing current emissions by industry types or categories, and performance of existing BMPs. The current industrial permit has not produced such a database for most industrial categories because of inconsistencies in monitoring or compliance with monitoring requirements. The Board needs to reexamine the existing data sources, collect new data as required and for additional water quality parameters (the current permit requires only pH, conductivity, total suspended solids, and either total organic carbon or oil and grease) to establish practical and achievable Numeric Limits.

In cases where the industrial activity is similar to activities covered by the MS4 permit (roofs, parking lots, etc), the approach or limits for industries should be the same as for MS4 permittees. In cases where the industrial activity is similar to land disturbance activities (e.g. landfills, gravel mines, etc.), there exists data and design experience with runoff control, capture and advanced treatments systems (e.g. systems using polymer to enhance total suspended solids removal – see

the construction section) that may make Numeric Limits feasible for new facilities, and the approach and limits should be the same as for construction permittees. The same conditions and issues related to active treatment discussed in the construction section apply here.

In cases where there is less certainty in the data for both stormwater characterization or BMP performance to establish Numeric Limits, there maybe sufficient data to establish Action Levels. Action Levels set for industrial sites that discharge to MS4s should not exceed those set for MS4 permittees.

The Panel recognizes that existing and new facilities may have to be treated differently and recommends the approach in **Table 2**.

Table 2- Approach to Establish Numeric Limits or Action Levels at Existing or New Facilities

		Numeric Limits	Action Levels	Notes
Existing Facility	Indoor	No	Yes, similar to MS4	
	Outdoor	Yes if data are adequate for the specific industrial activity and BMP	Yes, using industrial database	Action Levels should approach MS4 action levels.
New Facility	Indoor	Yes – BMP Database		Technology based, similar to MS4 New Development
	Outdoor	No, unless sufficient data exist for the specific industrial activity and BMP	Yes when sufficient data are available	

Industrial Recommendations

The Panel has several reservations and concerns:

- The Panel recognizes the inadequacy of current monitoring data sets and recommends improved monitoring to collect data useful for establishing Numeric Limits and Action Levels.
- Required parameters for future monitoring should be consistent with the type of industrial activity instead of the current parameters (i.e., monitor for heavy metals when there is reasonable expectation that the industrial activity will cause greater heavy metals concentrations in the storm water).
- Insofar as possible, the Panel prefers the use of California data (or National data if it can be shown to be applicable to CA) in setting Numeric Limits and Action Levels.
- The Panel recognizes that economies of scale exist for large facilities and large groups of single facilities.
- Industrial facilities that do not discharge to MS4s should have to implement BMPs for their non-industrial exposure (e.g., parking lots, roof runoff) similar to commercial facilities in MS4 jurisdictions.
- Regardless of Action Levels or Numeric Limits, the permittees should implement a suite of minimum BMPs – good housekeeping, employee training, preventing materials from exposure to rain, etc.
- SIC categories are not a satisfactory way of identifying industrial activities at any given site. The Board should develop a better method of characterizing industrial activities that can impact storm water.
- The Panel recognizes this is a large task and recommends prioritizing the implementation of this approach to achieve the greatest reduction of pollutants statewide.
- Increasingly, a number of industries have moved industrial activities indoors, preventing storm water pollution. The Panel recognizes that these facilities should be granted some sort of regulatory relief from industrial Numeric Limits or action levels, but should still be required to comply with MS4 permit requirements.

The Panel recognizes the need to make progress in monitoring and reducing storm water discharge from industrial facilities, but urges the Board to consider the total economic impact and not unduly penalize California industries with respect to industries outside of California.

Assessment Report on Tetra Tech's Support of California's MS4 Stormwater Program

Produced for:
U.S. EPA Region IX

California State and Regional Water Quality Control Boards

Produced by:
Tetra Tech, Inc.
www.ttwater.com

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Assessment Report on Tetra Tech's Support of California's MS4 Stormwater Program

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1.0 Introduction

Tetra Tech, Inc. (Tetra Tech) has supported the California State and Regional Water Quality Control Boards with implementation of the MS4 stormwater program since July 2001 under and EPA Region 9 contract. This support has largely consisted of on-site audits of municipal separate storm sewer system (MS4) programs, along with training and special projects. Tetra Tech has completed 36 MS4 audits in the state that addressed 122 permittees. Special projects have included an evaluation of post-construction development standards, review of a series of stormwater Phase II stormwater management plans (SWMPs), MS4 permit development, and evaluations of stormwater monitoring programs.

Information and data collected during these activities were compiled and disseminated to EPA Region 9, the State Board, and the Regional Water Quality Control Boards through audit reports, progress reports, and presentations to the California Stormwater Quality Association, and telephone conversations with regulatory staff. Prior to this report, Tetra Tech had not performed a holistic analysis of information collected during MS4 audits to identify broader trends, lessons learned, and opportunities for advancing these regulatory programs. This report is intended to do the following:

- Describe MS4 audit procedures
- Discuss special projects completed
- Present an analysis of the MS4 audit findings

The focus of this report is on summarizing the work that Tetra Tech has performed to assist EPA Region 9 and California in assessing the compliance status and quality of MS4 stormwater programs throughout the state. The report also includes a discussion of lessons learned from conducting the MS4 audits and provides some brief recommendations for improvements to California's MS4 stormwater program.

EPA Region 9 has placed copies of the MS4 audit reports on their web site at http://www.epa.gov/region9/water/npdes/ms4audits.html. This web site also includes a link to a series of stormwater case studies that describes how MS4s have implemented specific aspects of the stormwater program.

1.1 Purpose and Goals of an MS4 Audit

MS4 audits are conducted to address several goals. These goals, discussed further below, include determination of compliance status, providing assistance with permit issuance or renewal, developing Phase II stormwater management programs (SWMPs), and assessing pollutants of concern and assigning wasteload allocations.

Determining Compliance Status

The principal goal of an audit is usually to assess the compliance status of a permittee with respect to its NPDES MS4 permit and SWMP. Where

NPDES permits and SWMPs are specific (e.g., inspect construction sites monthly), then determining compliance status is straightforward. When NPDES permits and SWMPs are written more generally (e.g., retrofit flood control BMPs where applicable), then compliance can be more subjective. If previous audits found permittees to be noncompliant, follow-up reviews might be performed to determine whether issues resulting in permit violations areas for program improvement were addressed adequately.

Assisting with Permit Issuance or Renewal

Tetra Tech has performed audits of municipalities in advance of permit renewals to identify areas of the permit that might require further clarification, detail, or refinement. The audits are especially helpful in opening a dialog between permittees and the Regional Water Quality Control Board (Water Board) about the meaning of specific permit language or the intended goal of an individual requirement, for example. On-site program audits also can be helpful after the issuance or renewal of a permit to address implementation questions and clear up potential misunderstandings about the nature and intent of the permit requirements.

Assisting with Phase II SWMP Development

Tetra Tech has performed audits of Phase II MS4 stormwater programs in part as a compliance assistance tool to correct deficiencies in permittees' SWMPs at an early stage of the program. Phase II municipalities are relatively new to the stormwater permitting world and can benefit from the combined knowledge and experience of the auditors, EPA, and Water Board staff, as well as from *lessons learned* from Phase I municipalities who have been implementing the program for more than a decade.

Assessing Pollutants of Concern and Assigning Wasteload Allocations

Where waterbodies have been determined to be impaired for pollutants that are commonly found in urban stormwater, TMDLs are developed and wasteload allocations assigned to dischargers of those pollutants, including MS4 stormwater programs. Therefore, it is helpful to identify and assess the effectiveness of the activities and best management practices (BMPs) of each MS4 stormwater program in the watershed. This assessment can assist the Water Board in assigning wasteload allocations that are appropriate for each stormwater discharger.

1.2 Benefits of an MS4 Audit

In addition to the goals listed above, numerous ancillary benefits are achieved through the audit process, both for the permittee and the Water Board. These include the following benefits:

- Three days discussing the details of the stormwater program foster stronger coordination and improved working relationships between the Water Board and permittees
- In-depth examinations of permit requirements and program elements yield greater understanding by the permittees of expectations and permit requirements
- Audits provide an opportunity to clarify any misunderstandings in the permit requirements or SWMP
- Direct contact with permittee staff yields improved Water Board knowledge of permittees' operations, priorities, constraints, and challenges faced when implementing a municipal stormwater program

1.3 Roles of Tetra Tech, the Water Board, and EPA

For the past 5 years, Tetra Tech has been assisting the state of California and EPA Region 9 with MS4 stormwater audits. These audits have included large cities, small towns, counties, port authorities, and a California Department of Transportation (Caltrans) district program. Audits covered both Phase I programs and a few Phase II programs, as well as new Phase II programs throughout eight of the Water Board regions. Tetra Tech has enjoyed a strong, effective relationship with Water Board, State Water Quality Control Board, and EPA Region 9 staff.

Typically, Water Board staff members select the programs to be audited; however, Tetra Tech has assisted in making this determination when requested. Once the programs are selected, Water Board staff work with Tetra Tech to determine what type of audit is needed and if any program component focus is necessary. Audit logistics are coordinated with MS4 staff by both Water Board staff and Tetra Tech. Often Water Board staff members participate in the audits as well.

Tetra Tech staff generate audit reports. These reports are subject to rigorous internal Tetra Tech quality assurance protocols before being sent to the Water Board and EPA Region 9 for review and comment. Any requested changes are made, and the reports are then submitted to the Water Board for distribution to the MS4s audited.

2.0 Tetra Tech MS4 Stormwater Audit Approach

2.1 MS4 Audit Preparation

Selecting Permittees

Tetra Tech staff work with Water Board contacts to maximize the value to be gained from each audit. For example, auditing one-fourth to one-half of the permittees covered under a single permit can be very useful in determining the *big picture* of the MS4 program. Of course, an audit of a specific MS4 is sometimes necessary to determine individual compliance with a permit.

Determining Audit Focus

Once the Water Board determines which programs are to be audited, the type of audit must be determined. A component-specific audit focuses on a specific stormwater program area, such as construction activities or new and significant redevelopment. This type of audit is especially helpful if the Water Board has specific concerns about implementation of a particular component (i.e., National Pollution Discharge Elimination System [NPDES] inspections of construction sites

Advance Preparation

- Select permittees
- Identify audit focus
- Organize logistics
- Review documentation
- Hold conference call

To prepare in advance of an audit, Tetra Tech works with RWQCB staff to identify which permittees will be audited and which topics will be covered. Then Tetra Tech organizes logistics with the permittee contacts and obtains and reviews permits, annual reports, SWMPs, and other relevant documents. Tetra Tech then holds a conference call to brief all parties about the purpose and details of the audit and to answer questions about the audit and logistics.

within the MS4 revealed a high degree of noncompliance with the MS4's construction requirements).

In contrast, a comprehensive audit addresses all the generally accepted primary stormwater program areas (i.e., program management, municipal activities, construction, post-construction, industrial/commercial, illicit discharge detection and elimination, and public education/participation). The intent of a comprehensive audit is to assess the MS4's entire program and possibly identify specific areas or issues that might require a more detailed, component-specific audit in the future.

A third type of audit, which Tetra Tech has not yet performed, is a program compliance screening. This type of audit is composed of a basic interview with the MS4 SWMP coordinator or main contact with the program. A program compliance screening could be an efficient and cost-effective method for getting a basic impression regarding the compliance status of the program. This type of review might be the precursor to an in-depth compliance audit at a later date.

MS4 Audit Logistics

The number of permittees and the type of audit determines the logistics necessary to conduct the audit. Tetra Tech staff typically work with Water Board staff and primary MS4 contacts in setting up the audit dates, developing the schedule, identifying meeting places, and creating the audit teams. Depending on the type of audit and size of the program, one to two auditors are necessary for each permittee being audited. Tetra Tech typically organizes a pre-audit conference call 1 to 2 weeks before the audit and includes the audit teams and all interested contacts at the MS4s. Tetra Tech and the Water Board review the schedule, the audit process is explained, and any questions are answered.

Materials to Review before the Audit

Tetra Tech typically reviews the following information before conducting an on-site audit:

- MS4 permit
- Stormwater Management Plan document
- Latest annual report
- Water Board correspondence with the permittee
- Water Board inspections within the MS4
- Permittee Web sites
- Legal authority (i.e., ordinances, memorandums of understanding)

Conducting the Audit

- Kickoff meeting
- Staff interviews
- Inspector evaluations
- Maintenance yard inspection
- Outbrief

On the first day of the audit, Tetra Tech leads a kickoff meeting, providing an overview of the agenda and facilitating introductions. Tetra Tech then interviews staff regarding specific SWMP activities, accompanies inspectors in the field, and inspects the permittee's primary maintenance yard.

Once the interviews and site visits are complete, Tetra Tech provides a brief overview of the positive program elements and program deficiencies seen during the audit. This allows the permittees to provide feedback and clarification directly and in a timely manner. When multiple permittees are audited during the same week, Tetra Tech holds a joint outbrief so the permittees, Regional Board staff, and EPA staff can hear what the other permittees are doing.

If this information is not available prior to the audit, Tetra Tech staff members obtain it during the audit for consideration and review using the audit process.

MS4 Program Audit Guidance

For the State Board's Water Training Academy, Tetra Tech developed a 2-day course and training manual on *Conducting Audits of Municipal Storm Water Programs*, June 2004. Tetra Tech uses this manual to prepare for and conduct audits in California. The manual was developed to assist state and EPA NPDES permitting authority staff in assessing the compliance and effectiveness of Phase I and Phase II MS4 programs.

2.2 Conducting the MS4 Audit

Depending on the size of the MS4 area, the scope of the SWMP, and the type of audit to be conducted, Tetra Tech requires a maximum of 3 days for a comprehensive, in-depth office and in-field program audit.

Kickoff Meeting and Audit Overview

Tetra Tech auditors prefer to organize a *kickoff* meeting at the start of the audit. The kickoff is typically held separately with each permittee. An audit overview is given and any remaining questions are asked and answered by all parties. The logistics are reviewed and the audit teams are introduced.

Audit Process

Approximately 2 to 4 hours are necessary for an adequate in-depth office audit of each program component. The office audit consists of interviews with essential staff and a review of applicable documents. For example, when auditing the construction component of an MS4 program, Tetra Tech staff reviews ordinances, plan review checklists, any relevant guidance or BMP specifications used, and 3–5 approved and pending erosion and sediment control site plans.

In addition, 4 hours per component (e.g., construction, industrial/commercial) is necessary to audit inspection staff in the field. Tetra Tech staff accompany MS4 inspectors to determine their understanding of the MS4 permit, ordinances, and required stormwater BMPs.

Outbrief

Tetra Tech staff perform an outbrief at the conclusion of each audit to present a tentative summary of findings from the audit. Tetra Tech staff are careful to caveat all findings as preliminary at that time subject to change on the basis of further review of audit materials, permit or SWMP and consideration by Water Board staff.

2.3 MS4 Audit Reporting

Documenting MS4 Audit Findings

After the audit is completed, Tetra Tech staff review all notes and supporting information then write a report summarizing all findings. The findings are divided into three categories: (1) permit violations, (2) deficiencies, and (3) positive or commendable program elements. Permit violations are areas where the audit found the permittee not in compliance with a specific permit requirement or SWMP commitment. Use of the qualifier *potential* is used depending on the severity of the violation.

After an MS4 audit report is developed, the Water Board typically distributes the report to the permittee(s) audited with a cover letter summarizing the findings of the audit and any enforcement action being taken or corrections required.

Using Photographs

Tetra Tech staff sometimes use photos to highlight issues on-site that could lend credence to an issue described in the MS4 audit report or to help recall conditions at the sites visited. For example, stormwater problems at a municipal maintenance yard should be documented with photos to provide additional documentation of problems.

After the Audit

- Prepare the report
- Follow up if needed
- Review and comments
- Distribute final report

Once back in the office, Tetra Tech prepares the report, summarizing key findings and providing examples of model programs where appropriate. If needed, Tetra Tech contacts permittee staff to clarify any ambiguities. The report is then submitted to the RWQCB and EPA for review and comment. A final version is then sent via the RWQCB to the permittees.

3.0 Special Projects

Tetra Tech has conducted a number of special projects for the Water Boards that do not fit in with a typical MS4 audit. A summary of these projects is provided below.

3.1 Los Angeles Construction Inspections

For the Los Angeles Water Board, Tetra Tech conducted a series of 31 NPDES compliance inspections at construction sites primarily in Santa Clarita and Simi Valley. Over half the construction sites were residential development projects, with the average site size approximately 10 acres. Tetra Tech inspectors reviewed the stormwater pollution prevention plans (SWPPPs), inspected BMPs on-site, and documented their inspection findings in an inspection report and photo log.

3.2 Review of Post-Construction Development Standards Implementation

To assist the associated Water Board, Tetra Tech conducted audits to determine the implementation of post-construction development standards in three different permit geographic areas—Los Angeles Region (CAS004001, Board Order No. 01–182), Ventura County Region (CAS004002, Board Order No. 00–108), and the San Diego Region (CAS0108758). The primary goal of each audit was to determine the status of each permittee's implementation of the post-construction controls permit requirements. Secondary goals included collecting program implementation information that could be used by the Water Board to compile a model or *recommended* post-construction program and verifying the plan review process itself, collecting information for permit reissuance, and providing assistance to the permittees in implementation of the post-construction requirements. Each permittee was assessed regarding overall success in meeting post-construction conditions and requirements contained within each permit, with a focus on how each permittee reviewed, approved, and implemented the requirements for individual development projects.

The Los Angeles report summarized the findings from the four permittees audited, described the type of development planning program (or post-construction program) recommended by the Water Board, and described recommendations for conducting future SUSMP program reviews. The Water Board used this report to describe to the other 80+ MS4 permittees in the Los Angeles program not audited what type of development planning program they should implement.

3.3 Review of Phase II SWMPs

In June 2005 Tetra Tech audited two Phase II MS4 SWMPs—the cities of Napa and Petaluma. Each SWMP was audited for compliance with permit conditions and implementation of the six minimum measures:

- Public Education and Outreach
- Public Participation/Involvement
- Illicit Discharge Detection and Elimination
- Construction Site Runoff Control
- Post-Construction Runoff Control
- Pollution Prevention/Good Housekeeping

The goals of the audit were to review the overall effectiveness of the program, identify and document positive elements of the program that could benefit other Phase I and Phase II municipalities, and identify program areas for further review by the Water Board.

Each audit took approximately 2 days and resulted in a report of findings that was divided into program deficiencies with recommendations and positive attributes.

Tetra Tech also reviewed approximately 14 city/county stormwater Phase II SWMPs, and over 50 school district stormwater Phase II SWMPs.

3.4 City of Salinas Phase I MS4 Permit Development

In September of 2003 Tetra Tech developed a draft permit and fact sheet for the city of Salinas to regulate stormwater discharges from the MS4. The draft permit package was written in conjunction with the Central Coast Water Board. The permit and fact sheet included the following 10 components:

- Development of a stormwater management plan
- Development of an annual work plan
- Determination of legal authority
- Construction site management
- Development standards
- Commercial/Industrial facilities
- Municipal maintenance
- Illicit discharge detection and elimination
- Public education and participation
- Assessment of program effectiveness

To facilitate developing the permit and fact sheet, Tetra Tech performed an audit of the city of Salinas to identify program areas that required more detailed requirements and direction.

3.5 Stormwater Monitoring Program Evaluations

Tetra Tech has evaluated the monitoring programs of two MS4 programs in California—the Santa Clara Valley Urban Runoff Pollution Prevention Program (SCVURPPP) and San Diego County. Tetra Tech supported the California Water Boards (San Francisco and San Diego) in their assessment of permit-required monitoring activities, reporting, and continuity in the long-term monitoring plan for these two MS4 programs.

The SCVURPPP assessment and evaluation included detailed review of monitoring plans and reports for consistency and compliance with permit requirements and continuing initiatives, as well as for responsiveness to specific requests and requirements of the Water Board. The purposes of this evaluation were to evaluate the overall monitoring program components and their respective contributions toward satisfying the requirements of the permit (CAS029718 and Board Order No. 01–024 and 01–119) and to evaluate the current implementation status of the multiyear monitoring plan with respect to the overall purposes of the monitoring program: to characterize drainage areas and stormwater discharges; assess existing or potential adverse impacts on beneficial uses; identify potential pollutant sources; and collect data that will assist in the evaluation of the effectiveness of the overall stormwater pollution prevention program. Other goals of this evaluation included reviewing the overall effectiveness of the monitoring program relative to the permit goals and requirements, identifying strengths of the program that could benefit other Phase I and Phase II municipalities, and identifying weaknesses in the program that might prevent satisfaction of permit requirements.

The San Diego monitoring program evaluation was conducted differently in that the following two specific requests were presented to the evaluation audit team:

1. Review the existing monitoring program and proposed changes for comparison with the recommendations included in the Model Monitoring Program for Municipal Separate Storm Sewer Systems in Southern California (Model Monitoring Program, or MMP)

2. If appropriate, identify a suite of recommendations that could improve the proposed monitoring program but were not specifically included in the proposed changes

A report was generated to address these requests and was organized into four sections: (1) brief overview of the MMP, (2) brief overview of the current monitoring program and proposed changes, (3) broad recommendations for the San Diego monitoring program, and (4) detailed analysis of current and proposed monitoring program adherence to the MMP.

3.6 Stormwater Training

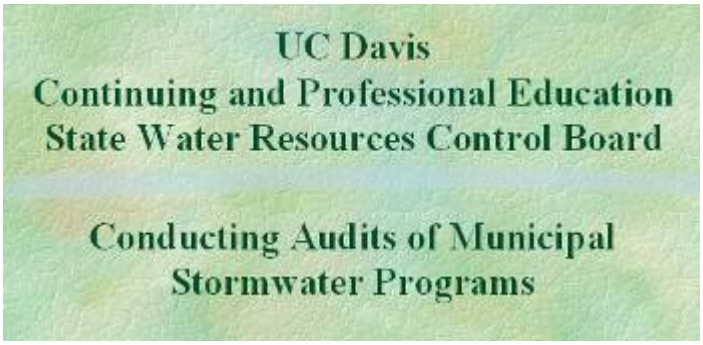

Tetra Tech developed three 2-day stormwater training courses for state water quality staff as part of the State Water Training Academy. The courses were intended to instruct the staff on all aspects related to managing, reviewing, auditing and issuing municipal stormwater permits. These courses were developed and taught in the first half of 2004 and covered the following topics:

- Reviewing Stormwater Management Plans
- Conducting Audits of Municipal Stormwater Programs
- Municipal Stormwater Permit Writer's Course

Each course was presented by two Tetra Tech stormwater experts, and consisted of a series of modules covering specific program topics, examples, and photographs. Exercises were also included, and ample discussion time was allotted for attendees. In addition to development of the course materials, Tetra Tech also developed an *MS4 Audit Guide* as a reference for the municipal audit course.

4.0 MS4 Audit Analysis

Tetra Tech has audited 84 different MS4 permittees during the past 5 years. These permittees are covered by 23 different permits from eight of the nine Regional Water Boards and one statewide permit issue by the State Board. Most audits were program-wide audits, but some assessed only certain program components. Tetra Tech performed stormwater audits of small municipalities (e.g., Walnut Grove) and of very large urban areas such as Orange County. Several nontraditional MS4s have also been audited such as Caltrans District 5 and the Sonoma County Water Agency.

Table 1: Summary of Phase I MS4 audits performed by Tetra Tech

Permit no.	Permit name or sole permittee	Water Board	Co-permittees	Co-permittees audited[1]	Program components audited						
					Program management	Municipal activities	Construction	Post-construction	IDDE	Public education participation	Industrial/ commercial
CAS004003	Long Beach	Los Angeles	1	1	●		●	●	●	●	
CAS0029831	Alameda Countywide	San Francisco	17	5	●				●		●
CAS004002	Ventura Countywide	Los Angeles	12	5	●	●	●	●	●	●	●
CA0025038	Santa Rosa	North Coast	3	3	◘	●	●	●	●	●	●
CAS0082597	Sacramento Area	Central Valley	4	4	◘	●	●	●	●	●	●
CAS108758	San Diego Area (County)	San Diego	20	19	●	●	●	●	●	●	●
CAG616001	Lake Tahoe Hydrologic Unit	Lahontan	3	3		●	●	●	●	●	●
CAS0029921	San Mateo Area	San Francisco	21	6	●	●	●	●	●	●	●
Order No. 99-06-DWQ	Caltrans, District 5	Central Coast	1	1	●	●	●			●	
CAS0108758	City of San Diego	San Diego	20	1	●	●	●	●	●	●	●
CA00883399	Bakersfield/Kern County	Central Valley	2	2	●	●	●	●	●	●	●
CAS083470	City of Stockton/ Joaquin County	Central Valley	2	2	●	●	●	●	●	●	●
CA0029912	Contra Costa Clean Water Program	San Francisco	18	7	◘	†	†	†	†		†
CAS0108740	Orange County	San Diego	13	8	●	●	●	●	●	●	●
CA0049981	City of Salinas	Central Coast	1	1	●	●	●	●	●	●	●
CAS029718	Santa Clara	San Francisco	15	2	●	●	●		●		●
CAS083526	City of Modesto	Central Valley	1	1	◘	●	●	●	●		●
CAS6188033	Riverside Area	Santa Ana	14	3	●	●	●	●	●	●	●
CAS618036	San Bernardino	Santa Ana	16	3	●	●	●	●	●	●	●
CA0083313	Contra Costa Clean Water Program	Central Valley	5	3	●	●	●	●	†	†	
CA0083800	Fresno Metropolitan	Central Valley	5	3	●	●	●	●	●	●	●
CAS082597	City of Elk Grove	Central Valley	1	1	●	●	●	●			●

◘ Includes an evaluation of the water quality monitoring program
† Components not audited for each co-permittee
[1] Includes all co-permittees audited by Tetra Tech to date, possibly during multiple audits

4.1 Summary of Positive Findings

In summary, many permittees have found unique and notable ways to implement aspects of their stormwater programs. Even small programs have invested creativity, staff time, and capital into building strong procedures and practices. Some of the key positive elements to highlight include

- Effectively using technology to organize data and schedule day-to-day activities
- Involving multiple stakeholders in stormwater decision making (e.g., interdepartmental, elected officials, members of the public) using stormwater committees
- Developing concise, transparent, enforcement escalation procedures to address stormwater-related violations
- Focusing BMPs and activities to address pollutants of concern that are specific to local water quality problems
- Allocating staff efficiently, either by training staff from other departments to address stormwater concerns as part of their work or by dedicating one or more positions solely to stormwater compliance
- Actively tracking and assessing progress using measurable goals and performance standards

The following are 10 positive findings that have recurred in multiple audit reports. They are not ranked because they had nearly the same frequency of incidence.

Using GIS to track the location of projects, priority facilities, inspections, and illicit discharges

Many permittees are using a geographic information system to geo-locate potential and actual sources of illicit discharges, which allows staff to target resources and educational efforts most effectively.

Using well-organized (often electronic) methods to track and document inspection and enforcement activities

Effective tracking and documentation is not only crucial to developing the annual reports, but is absolutely necessary to effectively follow up on noncompliance activities. Reinspections must be conducted in a timely manner, and enforcement actions must be issued according to an established timeline. These activities are best tracked using a database or time management software. Some MS4s are able to effectively track these activities using hard copy files, but an electronic system typically works best to remind staff of important deadlines. In addition, very effective tracking systems allow staff to geo-locate noncompliant sites using addresses or GIS.

Performing routine dry-weather inspections of outfalls

All permits issued in California do not require that permittees conduct dry-weather inspections; however, the Tetra Tech audit teams feel that they are a valuable illicit discharge detection tool. The appropriate location and necessary frequency of the inspections vary among permittees on the basis of land uses, size of the MS4, *hotspots* for illicit dischargers, or other factors.

Implementing exemplary public education programs

Permittees are required to educate the general public about stormwater issues; however, several MS4s that were audited had implemented exceptional educational efforts. The audit teams

especially recognize those that are based on pollutants of concern, behaviors of concern, are assessed regularly for effectiveness, and carefully consider the method of delivery according to the desired audience.

Using enforcement response plans to respond to illicit discharge reports

Permittees are typically required to *eliminate illicit discharges*, however, few develop an approved enforcement response plan (ERP) to consistently deal with discharge cases. It is critical that permittees have a documented protocol for the receipt of reports, investigation and follow up, and the issuance of enforcement actions. Some MS4s modify existing ERPs, such as those developed for pretreatment violations or code enforcement.

Using stormwater committees to manage various aspects of the stormwater program

This finding describes committees that are composed of representatives from each of the co-permittees or of staff members from various applicable departments within the same MS4. Regardless of whether the permit covers multiple permittees, managing an MS4 stormwater program generally requires the cooperation of many different departments or agencies. Even in small MS4s, the stormwater coordinator will typically communicate with other departments or contractors to implement various programs. A central committee or task force helps to encourage ownership in the program by various departments, facilitate the necessary reporting, assist in the education of the necessary staff people, and establish a responsible party or contact person from each affected department or agency.

Dedicating staff members solely to inspect construction sites or industrial facilities for stormwater compliance

While it is often impossible for some MS4s to dedicate an inspector to stormwater issues, some MS4s have budgeted for this level of staffing. Typically, having staff dedicated to stormwater issues increases the frequency of project and facility inspections, improves the level of follow up for noncompliance, and improves facility compliance because of the heightened level of technical assistance and oversight provided by the inspector.

Targeting stormwater resources and activities to address pollutants of concern

Most MS4s have limited resources to dedicate to stormwater programs; therefore it is critical that funding and staff time are targeted appropriately. The audit team commends MS4 stormwater managers for proactively implementing programs that address specific pollutants of concern (i.e., 303(d) listed pollutants) and the associated behaviors of concern such as how the public handles pet waste. While general stormwater awareness is important (i.e., stormwater is not treated), to make real progress toward measurable stormwater goals, it is important to focus resources on the most important water quality issues.

Using measurable goals or other performance standards to assess the effectiveness of the program and compliance with the permit

All Phase I MS4 programs are required to assess the effectiveness of the SWMP components; however, many permits in California do not specify that official measurable goals be developed and assessed as is required of Phase II MS4s. Some permittees audited, however, have established stormwater management plans with appropriate goals or standards and regularly assess progress toward meeting those goals. These types of goals are essential in assessing the effectiveness of individual program components and the program in general. Being able to

quantify progress is important not only to the permitting authority, but to the permittee itself to justify budget requests, staffing requirements, and the like.

Using inspectors from other departments to monitor compliance with construction and industrial/commercial stormwater requirements

Often, inspectors from various departments or agencies within an MS4 will visit a construction site or industrial/commercial facility for different reasons. For example, a restaurant will be regularly inspected by the health department for food-related requirements and a pretreatment inspector will inspect the grease trap in the kitchen to determine compliance with source control regulations designed to protect the wastewater treatment plant. It is important that these inspectors be educated about stormwater issues to act as additional *eyes and ears* for the stormwater program during their regular inspections. Or if the MS4 does not have dedicated stormwater inspectors, these existing staff could be used to monitor stormwater compliance at the industrial/commercial facilities they regulate or at additional facilities as necessary. The same concept applies to the various inspectors that visit a site during active construction. Some MS4 programs train grading, right-of-way, electrical, plumbing, or other inspectors in basic erosion and sediment control principals to ensure that stormwater issues are being monitored during all phases of construction.

4.2 Innovative Approaches

Tetra Tech has observed a number of MS4 programs using new or innovative approaches to stormwater management. A few of these innovative approaches are summarized below.

Measuring the Effectiveness of Stormwater Programs

Many stormwater Phase I permittees analyze water quality samples and report the data, but are unable to determine whether their stormwater program is effective in protecting and improving water quality. In order to address the question of how effective MS4 programs are, the San Diego co-permittees formed a program effectiveness assessment workgroup to develop a regional approach to assessing the long-term effectiveness of municipal stormwater programs in San Diego County. The workgroup developed a *Framework for Assessing the Effectiveness of Jurisdictional Urban Runoff Management Programs* (the *Framework*), and a *Baseline Long-Term Effectiveness Assessment*. Both of these documents are available at http://www.projectcleanwater.org/html/wg_assessment.html. The workgroup is also coordinating closely with the California Stormwater Quality Association (CASQA) as it addresses effectiveness assessment on a statewide level.

The *Framework* describes six levels of targeted outcomes that municipalities can use to measure their efforts (illustrated below). The higher levels provide a more direct link to water quality improvements, but are much harder to measure. Municipalities must develop a plan that takes into account all levels of targeted outcomes in order to measure and quantify progress. San Diego's effectiveness assessment reports are a large step forward as municipal stormwater programs attempt to demonstrate how their activities protect water quality.

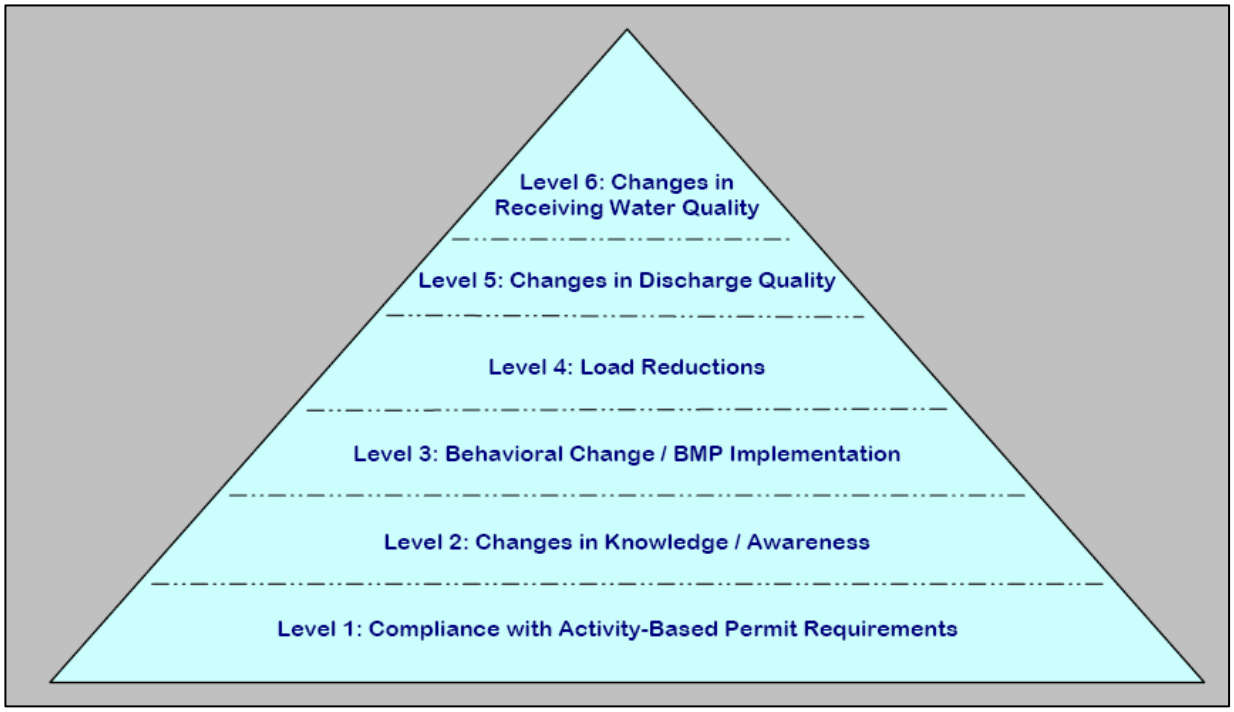

Corporation Yard BMPs

Not every innovation needs to be complicated or expensive. A county in southern California needed to cover a stockpile at their maintenance yard. They found that maintenance staff were not replacing the tarp used to cover the stockpile, so a maintenance supervisor came up with a solution to use a roll-on cover that is typically used on large trucks. Now, maintenance staff can quickly and easily access the stockpile and replace the cover.

Education/Outreach for Construction Operators

Providing clear outreach to construction operators is necessary to ensure they are aware of the local stormwater requirements and what the MS4 expects of them. The City of Coronado developed a simple and graphic brochure was developed for construction site operator. The brochure illustrates the typical construction project within the city and shows what type of BMPs should be installed and where. This gives the operator a clear idea of what the City expects to see at the site in an easy to use format.

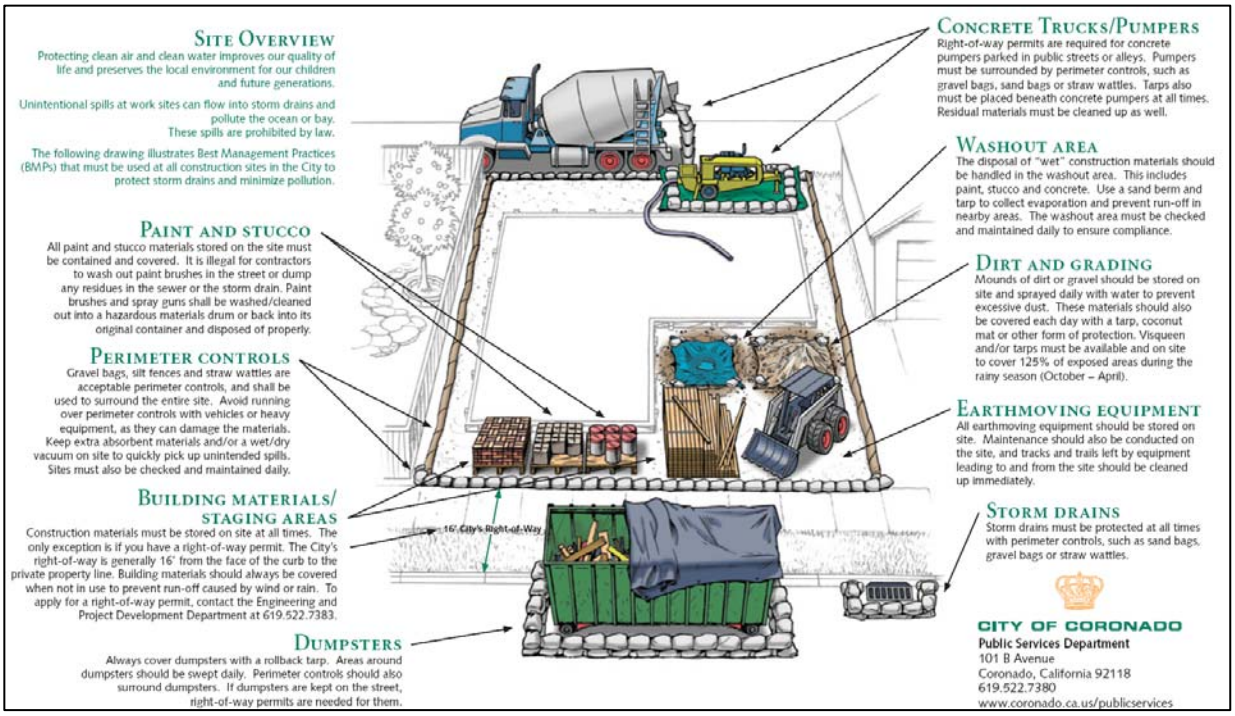

4.3 Summary of Program Deficiencies

For the purposes of this report, program deficiencies, potential permit violations, and permit violations all are considered *deficiencies*. Each Regional Water Board determines which, if any, audit finding constitutes a permit violation; therefore, it is too subjective a term to be categorized in this document. The deficiencies noted have been summarized and ranked according to incidence in the reports reviewed, as summarized in Figure 1.

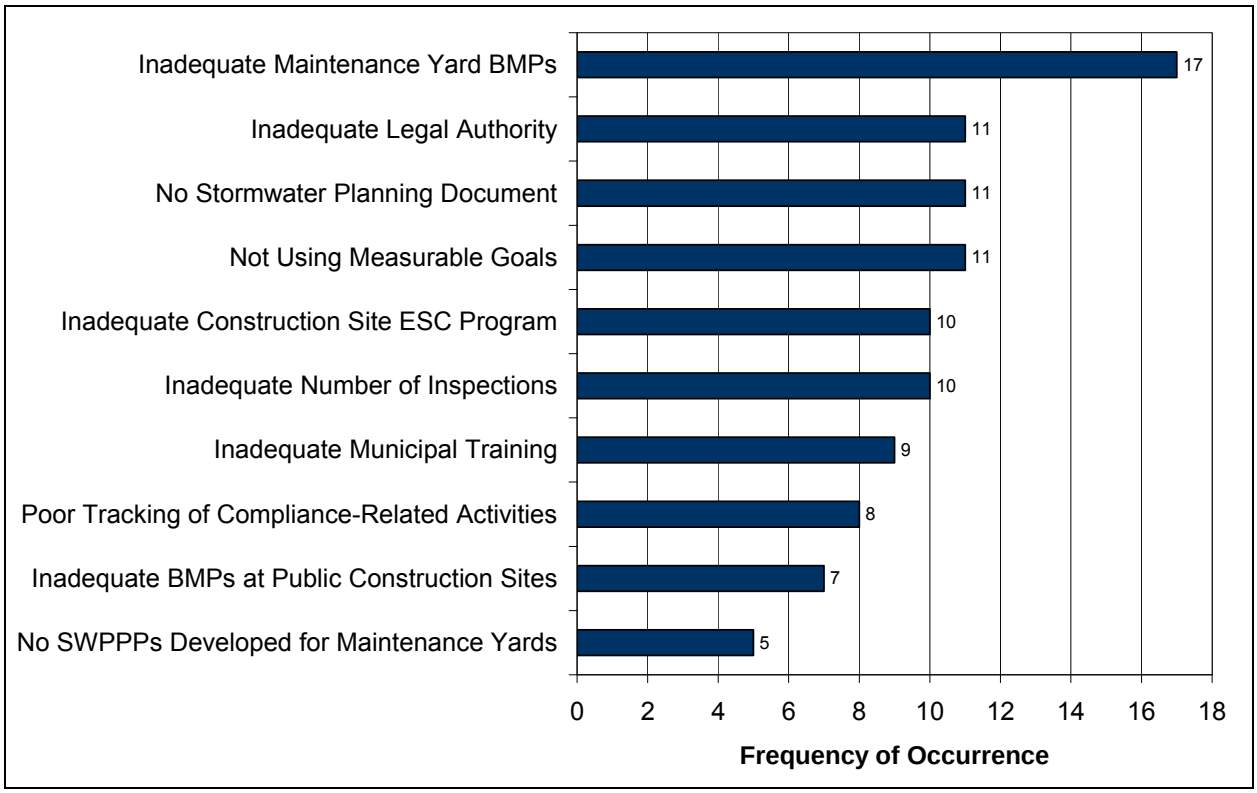

Figure 1. Summary of commonly cited program deficiencies.

Inadequate maintenance yard BMPs

By far the most prevalent program deficiency noted during the audits (17 instances) was the lack of appropriate BMPs at municipally owned and operated facilities, such as corporation or transportation yards. Problems included unprotected storm drains, lack of containment for potentially polluting materials, lack of spill-control measures, and generally poor housekeeping. Often evidence was found of spills that had entered storm drains.

No SWPPPs developed for maintenance yards

Many of the audited permittees had not developed SWPPPs for their corporation yards (5 instances). Typically, these facilities include auto maintenance shops, chemical storage areas, truck-washing facilities, refueling stations, and other facilities and activities that can pose a threat to water quality. Therefore, a plan should be in place that identifies potentially polluting locations and activities, specifies BMPs for each, and outlines spill control and response measures. The SWPPP or similar document should be in place even if the facility is not required to have permit coverage under the industrial stormwater general permit.

No stormwater planning document

Tetra Tech found that several permittees (11 instances) had not developed a stormwater management plan (SWMP) or other document that describes the different activities of the program and includes standard operating procedures and other details. Without a master planning document that lays out current program activities and future goals, it will be difficult for permittees to progress the program in a focused manner. This document also provides a detailed description of the program that state regulators can use to assess compliance, especially if the SWMP is a *living document* that is updated with new program elements and procedures.

Not using measurable goals

One important element that is commonly described in the SWMP but was often lacking in programs audited in California was a clear method for evaluating program effectiveness (11 instances). In many cases, permittees implement their programs and individual BMPs without developing measurable goals, monitoring programs, or other methods to track progress over time. One of the ways in which permittees can show progress is to demonstrate effectiveness, for example, that increased frequency of inspection yielded fewer violations or that field screening results showed fewer *hits* for bacteria the year after a focused effort to eliminate improper connections to the storm drain. Without these measures, permittees cannot know whether their activities are having a positive effect on stormwater quality, nor can they gauge which activities provide the most benefit.

Permittees can also measure program progress by comparing a current year's activities to past years' activities. Tracking and evaluating program data can provide insights into where improvements have been and still need to be made. For example, if after 5 years of program implementation there has been no change in the number or type of violations found at construction sites, a new approach might be needed that focuses on education or that includes increased penalties for noncompliance. If, on the other hand, repeated inspections at a sector of commercial businesses never or rarely yield a violation, the permittee might consider using those resources to target a different business type that is more likely to contribute to stormwater pollution.

Inadequate legal authority

Another common finding (11 instances) is that permittees lack adequate legal authority to implement one or more elements of their program. This could have resulted from a number of factors, including

- Lack of political support from elected officials
- Inability of inspectors to obtain code enforcement capabilities
- Lack of an ordinance that prohibits nonstormwater discharges to the MS4
- The permittee is a nontraditional institution that does not have enforcement authority

Because there are several different causes for this lack of legal authority, each instance would need to be addressed on a case-by-case basis in the context of the permittee's municipal structure, organization, and unique constraints.

Inadequate number of inspections

Many permittees were lax in performing inspections and enforcing their stormwater ordinance (10 instances). These permittees had no or few inspectors dedicated to addressing stormwater concerns, and they did not train inspectors in other departments, such as pretreatment, fire safety, or health department inspectors, to look for stormwater violations.

Inadequate construction site erosion and sediment control program

In some cases (10 instances), inspectors were performing inspections inadequately, using *drive by* inspection techniques that would not identify problems with individual BMPs, whether they be design flaws or poor maintenance. As a result, sites can be *in compliance* even though water quality is not being protected adequately. Better training and more careful oversight of inspectors can help to remedy this quality control situation. It is also important that permittees with multiple inspectors foster consistency in terms of inspection protocols, level of stringency, and types of BMPs that are acceptable. Permittees can team inspectors together from time to time to share knowledge and advice, develop a standardized checklist for all inspectors to use, or develop a BMP standards manual that clearly outlines a permittee's expectations for its inspectors and construction sites.

In addition, several programs had inspectors who were knowledgeable and thorough in their inspection technique but were unable to bring facilities into compliance because they lacked adequate authority to levy fines and other sanctions (see "Inadequate Legal Authority" above).

Inadequate BMPs at public construction sites

Many permittees had separate approval and oversight procedures for private construction projects when compared to procedures for public capital improvement projects. In several cases, this division has led to lax implementation of BMPs at publicly owned construction sites (7 instances). Permittees should hold their own project proponents and contractors to the same standards as private construction operators and developers, not only to maintain compliance with the permit and avoid illicit discharges from public construction sites, but also to set a good example for the regulated community.

Inadequate municipal training

Lack of training for municipal personnel was another common finding (9 instances). Many times when street or parks maintenance crews were observed working in the field, BMPs were either inadequate or absent, and storm drains were unprotected. Permittees either do not offer training to field crews or only provide minimal training that is not reinforced regularly. Stormwater-related training should be offered to all staff involved with spill response, those handling materials that could enter storm drains, and street crews who can spot spills or illicit discharges while they go about their daily routine in the permit area.

Poor tracking of compliance-related activities

Some permittees fail to track their compliance-related activities (8 instances) and, therefore, are unable to demonstrate that such activities were performed, nor can they document the compliance status of industrial facilities or construction sites. Paperwork might be lacking because it is not part of the permittee's protocols, individual inspectors are lax in filling out paperwork or only partially fill it out, or forms are not filed or entered into a database in such a way as to facilitate data retrieval.

A related problem is that the universe of construction sites or industrial and commercial facilities to be inspected is not updated regularly or systematically. Whether permittees track construction activities on the basis of grading permits issued or requests for engineering inspections or other methods, a list of active sites should be maintained at all times. The same is true for industrial and commercial facilities to be inspected—business licenses can be tracked, windshield surveys of commercial areas can be performed, and so on. Having these site and facility inventories allow inspectors to know where to go and how to schedule inspections and budget their time. It also allows permittees to track progress toward achieving one or more measurable goals in terms of the number or percentage of total sites inspected each year.

5.0 Lessons Learned

Over the past 5 years, a number of patterns have emerged from discussions with both state regulators and municipal stormwater permittees. The following is a set of *lessons learned* that can offer opportunities to streamline and improve both NPDES permits and local stormwater management programs.

5.1 MS4 Permit Language Greatly Affects SWMP Development and Compliance

Tetra Tech has found that programs with more specific permit requirements generally result in more comprehensive and progressive stormwater management programs. For example, the more specific permit requirements in the Los Angeles or San Diego MS4 permits require permittees to be more specific in how they implement their stormwater program. Programs with more general stormwater permit requirements, where the emphasis is on implementation of a stormwater management plan, generally did not have as comprehensive a stormwater program.

5.2 Need for Clear Guidance and Direction from the Water Boards

Beyond the NPDES permit requirements, many MS4s do not have clear guidance or direction from the Water Boards on how they should implement specific aspects of their stormwater program. Some municipal programs have developed guidance for specific topics, such as the C.3 new development requirements in Contra Costa County, or the SUSMP requirements in Los Angeles.

One example of where the Water Boards provided more specific direction on an MS4 program area is the November 2003 Development Planning Program Review Report for Los Angeles developed by Tetra Tech and the LA Water Board. The report included a section on a "development planning program recommended by the Water Board." MS4s were told to consider the recommended program as they implement their new development and SUSMP programs.

Providing this additional guidance is particularly effective in areas such as the LA Board where there are too many permittees for the Water Board to audit on a regular basis.

5.3 Communication Provides Many Benefits

Tetra Tech audit staff believe that almost all municipal stormwater programs want to be in compliance and implement effective programs. However, some municipalities stated they did not receive frequent communication and feedback from their Water Board contacts. The MS4 audits conducted with Water Board participation provide an opportunity for permittees and Water Board staff to spend three days together This often leads to a better understanding of the challenges each face in implementing a stormwater management program and regulating MS4 permit programs.

As an unbiased third party, Tetra Tech can interview staff to clarify program details, while at the same time establish a forum for discussion between the state regulators and permittees. This has been beneficial to the State and to the permittees. Many communities have expressed their appreciation of the feedback that Tetra Tech provides with respect to how their activities measure up to the state's expectations. One city engineer wrote,

> I really appreciate the time you spent with us and the feedback and suggestions you were able to provide. As I am sure you can imagine, from a local program standpoint the term "audit" naturally sparks apprehension and curiosity. I believe we all take this program seriously, but having an objective review for the first time gives us an opportunity to benchmark ourselves against the expectations of the RWQCB and outside experts. I can honestly say that your style and approach to the whole process made it a very enjoyable and enlightening experience. As an auditor it would be easy to be critical and judgmental, but instead you use your experience and insight to be helpful and constructive. I can't tell you how welcome that is from our end.

5.4 A Well-Written SWMP Plan is Critical for Compliance

MS4s without a document or plan describing stormwater management program components, implementation mechanisms and responsible parties are more apt to be disjointed, disorganized, and vulnerable to noncompliance, especially if staff turnover is high. Permits should include a requirement that a single planning document or a series of component-specific documents be developed that describe implementation procedures, BMPs, schedules, responsibilities, and goals. This SWMP Plan would also allow state regulators to assess a permittee's procedures through document review in lieu of, or in addition to, site visits.

5.5 Measurable Goals Should Be Outcome-Based

Permittees should be required to develop measurable goals based on the desired outcomes of the stormwater program. These goals should be developed on the basis of the pollutant of concern, sources of the pollutant, behaviors associated with the sources, and the indicator most appropriate to demonstrate a change in those behaviors. For example

Pollutant of concern	Sediment
Source	Erosion from construction sites

Behavior	Construction site operators install and maintain BMPs poorly
Goal	Increase the number of operators who are aware of, understand, and comply with the erosion control regulations and plans
Indicators	(1) percent of contractors in the city who have attended a training (to increase as the program progresses); (2) percent of operators who repeatedly violate regulations (to decrease as the program progresses)

5.6 Annual Reports are not Effective Indicators of Program Compliance

Largely due to the lack of specificity in annual reporting requirements, Tetra Tech has found that the annual reports submitted by Phase I MS4s are not always effective indicators of program compliance. Although annual reports are useful to review before an MS4 audit and should be used to spot compliance "red flags," they are usually inadequate determine compliance by themselves. This is because, without specific reporting requirements, municipalities are reluctant to voluntarily report non-compliance.

6.0 Recommendations for Improvements to California's MS4 Stormwater Program

The following brief recommendations, based on Tetra Tech's past experience in the state, are made to help improve the effectiveness of California's MS4 stormwater program:

6.1 Continue MS4 Audits and Conduct Targeted MS4 Audits of Specific Program Components

Some MS4s have not been audited yet. These MS4s could be prioritized for audits, along with MS4s for which the Water Boards will soon be reissuing their NPDES MS4 permit. In cases where the Water Board staff is familiar with the program, the audit could be brief and cover only what has changed since the last permit issuance.

Additionally, the Water Boards could conduct targeted MS4 audits of specific program areas. Tetra Tech has already conducted targeted MS4 audits of the new development, or SUSMP, programs in Los Angeles, Ventura, and San Diego Counties. Additional targeted MS4 audits could be conducted focusing on the illicit discharge, municipal maintenance, or construction components of a permittee's SWMP. Water Boards could select the MS4s and program components to audit based on watershed specific issues, pollutants of concern, TMDLs, or other factors. In addition to determining compliance, the findings from these targeted MS4 audits can also be used to develop guidance from the Water Board on these program components.

6.2 Develop Compliance Tools for Regulators and MS4s

A number of compliance tools should be developed to help MS4s implement the program and help Water Board staff ensure compliance. For example, Tetra Tech has developed an *MS4 Audit Guide* for the state and is currently expanding and revising this guide for U.S. EPA. The *MS4 Audit Guide* will help Water Board staff in conducting MS4 audits, but it also helps MS4 programs conduct a self-assessment to ensure they are complying with their permit requirements.

Additional tools could include a BMP selection guide MS4s would need to use to ensure they were in compliance with the MEP standard. The guide would also be used by Water Board staff to evaluate the adequacy and effectiveness of BMP programs and determine compliance with permit requirements. The guide could include:

- Minimum requirements for BMP siting, sizing and design standards, and operation and maintenance specifications,
- Assessment tools, methods to measure effectiveness, an surveillance and monitoring requirements for each BMP that must be implemented by the permittee to demonstrate compliance, and
- Minimum recording and reporting requirements.

6.3 Develop a Consistent Format for MS4 Permit Language

Presently, the State develops permits on a regional basis, and the level of specificity and individual requirements vary widely. Some permits detail individual BMPs that should be implemented for each program area and include guidance on how and to what extent they should be implemented. This specificity can assist the permittees in knowing how best to meet permit requirements and reduces ambiguity. However, this can result in municipalities implementing substantially similar programs but with significantly different details and requirements.

One factor for the state to consider when writing permit language is to be clear enough to set appropriate standards and establish required outcomes, but still allow permittees to be creative and innovate solutions to stormwater management that are appropriate for their situations. The audits of the past 5 years have shown that each permittee approaches implementation from its own unique perspective and with unique attributes and constraints that sometimes facilitate and other times confound implementation. The *one size fits all* mantra does not apply to MS4 stormwater programs because the ways in which they are implemented depend on each permittee's organizational structure, staff availability, and budget, along with legal constraints and more- or less-favorable political climates. Each MS4 may develop and work toward different measurable goals, but still be able to achieve the required outcome.

However, a consistent format to the MS4 permit and the basic requirements in the permit will provide some statewide consistency to the stormwater program and allow programs to share resources more easily. This consistent format will also require MS4s to be on more of a level playing field as they implement their programs.

6.4 Provide Guidance on Annual Reporting

Often annual reports are the only official communication from year to year between the permittee and the state, so it is important that the report be informative and relevant. Many times

permittees tend to send too much information, and, as a result, state regulators receive huge binders full of hard copy forms and outreach materials that do not provide useful information to assess compliance. Because of the time involved in preparing such large documents, less time could be spent preparing summary information and compiling data that would be useful to assess compliance.

To remedy this, the state could develop a set of guidelines that clearly describe the information they would like included in the report. For example, the following program information is necessary when assessing construction inspection programs:

- Number of active construction sites a permittee needs to inspect
- Number of staff are performing inspections
- Frequency of inspections
- Total number of inspections performed
- Number of violations found and follow-up actions performed

This information allows state regulators to determine if staffing levels are adequate, if inspections are being performed, and if enforcement activities are occurring. Other information, such as a list of "bad actor" operators with violation frequency and other summarized tracking data maintained by the permittee, could be helpful to provide a clearer picture of the permittee's procedures. Submission of materials such as individual forms or notices of violation would be burdensome for both the permittee and the reviewer and should be discouraged in the guidelines. The information included in the annual report should clearly demonstrate progress towards reaching measurable goals, and therefore may vary by permittee.

6.5 Provide Guidance on Developing Measurable Goals

The state should include guidance on how permittees can develop measurable goals and performance standards so they can track their own progress and share this information as part of the annual report. Permittees will need to tailor their measurable goals to their specific pollutant sources, behaviors, activities, and protocols; therefore, the state should provide examples of the types of quantifiable goals they would consider acceptable in different kinds of situations. For example, the state might want to know how effectively the permittee has been advertising household hazardous waste collection events. The permittee could track attendance at the event from year to year and, if their methods are effective, expect to see a steady increase in first-time attendees (10 percent, for example) over time. Permittees have in the past described measurable goals in non-numeric terms, such as "track the number of first-time attendees at events," but it is important that there be a numeric target or rate of change incorporated into each goal. This is particularly important for Phase II MS4s under the general permit.

EPA has issued guidance on developing measurable goals that could be referenced by the Water Boards or serve as the starting point for a new guidance (see http://cfpub.epa.gov/npdes/stormwater/measurablegoals/index.cfm).

Appendix A. MS4 Audits Conducted by Tetra Tech in California, July 2001 – July 2006

Location	MS4 Audited	Date of Audit
Alameda	Cities of Dublin, Fremont, Hayward, Livermore, and Oakland	November, 2001
American Canyon	City of American Canyon	June, 2005
Bakersfield	City of Bakersfield and Kern County	November, 2002
Caltrans	District 5	July, 2002
Contra Costa	Cities of Antioch, Brentwood, and Oakley	March, 2005
Contra Costa	Cities of Concord, Pinole, Pittsburg, Richmond, and San Pablo	September, 2004
Contra Costa	Cities of Hercules and Pittsburg, Walnut Creek, and Concord, Contra Costa County, and Contra Costa Clean Water Program	May, 2003
Elk Grove	City of Elk Grove	April, 2005
Fresno	Cities of Fresno and Clovis, and the Fresno Metropolitan Flood Control District	January, 2005
Lake Tahoe	City of South Lake Tahoe, El Dorado County and Placer County	June, 2002
Long Beach	City of Long Beach	August, 2001
Los Angeles	LA County and Cities of Glendale, Los Angeles, and Santa Monica. Review of Standard Urban Stormwater Mitigation Plan (SUSMP) requirements.	March, 2003
Los Angeles	Cities of Calabasas, Carson, Glendora, Pomona and Santa Clarita. Review of city's construction program	June, 2004
Modesto	City of Modesto	February, 2004
Napa	City of Napa	June, 2005
Orange County	Cities of Laguna Beach, Laguna Hills, Lake Forest, Rancho Santa Margarita	May, 2005
Orange County	Orange County and Cities of Mission Viejo, San Clemente, and San Juan Capistrano	June, 2003
Petaluma	City of Petaluma	June, 2005
Riverside	Cities of Corona, Moreno Valley and Riverside	May, 2004
Sacramento	County of Sacramento and the Cities of Folsom, Galt, and Sacramento	March, 2002
Salinas	City of Salinas	July, 2003
San Bernardino	Cities of Fontana and Redlands and San Bernardino County	October, 2004
Santa Clara	Cities of Milpitas, Palo Alto, Santa Clara, and Santa Clara County	April, 2005

Location	MS4 Audited	Date of Audit
Santa Clara	City of San Jose and County of Santa Clara	December, 2003
San Diego	Cities of Carlsbad, Chula Vista, and El Cajon	May, 2002
San Diego	Cities of Encinitas, Lemon Grove, Poway, and Santee	April, 2004
San Diego	Cities of Escondido, National City, Oceanside	February, 2003
San Diego	Cities of Imperial Beach, La Mesa, San Marcos, and Vista	October, 2003
San Diego	City of San Diego, County of San Diego	October, 2002
San Diego SUSMP	Cities of San Diego, Carlsbad, Lemon Grove, Chula Vista, Oceanside, National City, Poway, El Cajon, Escondido and San Diego County. Review of Standard Urban Stormwater Management Plans (SUSMPs)	March, 2005
San Diego	Cities of Solana Beach, Coronado, and Del Mar and Port of San Diego	November, 2004
San Mateo	County of San Mateo and Cities of South San Francisco, Foster City, Pacifica, Redwood City, and San Mateo	August, 2002
Santa Rosa	City of Santa Rosa, Sonoma County, and the Sonoma County Water Agency	March, 2002
Stockton	City of Stockton and San Joaquin County	December, 2002
Ventura	Ventura County Flood Control District and the Cities of Ojai, Oxnard, Santa Paula, and Simi Valley	October, 2001
Ventura SQUIMP	Cities of Fillmore, Moorpark, Port Hueneme, Ojai, Oxnard, Santa Paula, Simi Valley, the County of Ventura, and the Ventura County Watershed Protection District. Review of Stormwater Quality Urban Impact Mitigation Plan (SQUIMP) requirements	August, 2004

State Water Resources Control Board

Division of Water Quality
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Linda S. Adams
Secretary for
Environmental Protection

Arnold Schwarzenegger
Governor

GENERAL NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) PERMIT FOR DISCHARGES FROM UTILITY VAULTS AND UNDERGROUND STRUCTURES TO SURFACE WATERS

ORDER NO. 2006-0008-DWQ
NPDES NO. CAG990002

A Discharger, as described in the following table, that has complied with the requirements for coverage under this Order is authorized to discharge under this Order, once permit coverage is effective, as described in this Order.

Dischargers	**Utility companies with short-term intermittent discharges from utility vaults and underground structures to waters of the United States that do not cause, have the reasonable potential to cause, or contribute to an instream excursion above any applicable State or federal water quality objectives/criteria or cause acute or chronic toxicity in the receiving water.**

This Order was adopted by the State Water Board on:	**July 19, 2006**
This Order shall become effective on:	**January 1, 2007**
This Order shall expire on:	**July 19, 2011**
The U.S. Environmental Protection Agency (USEPA) and the State Water Board have classified this discharge as a **minor** discharge.	

IT IS HEREBY ORDERED that Order No. **2001-0011-DWQ** is rescinded upon the effective date of this Order except for enforcement purposes, and, in order to meet the provisions contained in Division 7 of the California Water Code (CWC) and regulations adopted thereunder, and the provisions of the federal Clean Water Act (CWA), and regulations and guidelines adopted thereunder, Dischargers shall comply with the requirements in this Order.

I, Song Her, Clerk to the Board, do hereby certify the following is a full, true, and correct copy of an Order adopted by the State Water Resources Control Board on July 19, 2006.

AYE: Tam M. Doduc
Gerald D. Secundy
Charles R. Hoppin
Gary Wolff, P.E., Ph.D.

NO:

ABSENT: Arthur G. Baggett, Jr.

ABSTAIN:

Song Her
Clerk to the Board

STATE WATER RESOURCES CONTROL BOARD

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I. DISCHARGE INFORMATION

Utility companies supply resources, excluding water, necessary for day-to-day living and/or operations. This includes, but is not limited to, suppliers of natural gas, electricity, and telephone services. Utility companies with short-term intermittent discharges from utility vaults and underground structures to waters of the United States that do not cause, have the reasonable potential to cause, or contribute to an in-stream excursion above any applicable State or federal water quality objectives/criteria or cause acute or chronic toxicity in the receiving water are authorized to discharge in accordance with the conditions set forth in this Order.

Due to the large number of vaults under each utility company, there is no single "facility." To avoid confusion, the term "site" will be used when referring to a vault or underground structure and the term "discharger" will be used when referring to the utility company.

II. NOTIFICATION REQUIREMENTS

A. **General Permit Application.** To obtain coverage under this National Pollutant Discharge Elimination System (NPDES) General Permit, a Notice of Intent (NOI), a project map(s), a Pollution Prevention Plan (PLAN), and the first annual fee must be submitted to the State Water Resources Control Board (State Water Board). A Discharger must submit a separate enrollment for discharges located within each Regional Water Quality Control Board (Regional Water Board) boundary as defined in section 13200 of the California Water Code (CWC). Each enrollment will cover all discharges occurring within the boundaries of that Regional Water Board. However, only one annual fee is required for each Discharger.

The NOI must include the name, address, and telephone number of the owner or operator. The NOI must also include the name and address of the utility, the type of utility or discharges, and the receiving waterbody(s). In addition, the NOI must include a project map(s) that shows the essential features of the distribution system within the Regional Water Board boundary and maps of the corresponding surface water or storm drain to which water may be discharged for five representative sites. The NOI form may be found within this General Permit package as Attachment B. Attachment C contains guidance on completing the NOI. The PLAN must contain the information detailed in VII.C.3.e of this Order.

The General Permit Application, including the NOI, map(s), PLAN, and fee, must be submitted to the following address:

Utility Vaults NOI - NPDES Unit
Division of Water Quality
State Water Resources Control Board
P.O. Box 100
Sacramento, CA 95812-0100

A copy of the PLAN must also be sent to the appropriate Regional Water Board(s). See the Regional Water Boards' map on page C-4 in Appendix C.

B. **General Permit Coverage.** Permit coverage will be effective when all of the following have occurred: (1) The Discharger has submitted a complete permit application; (2) Receipt of a complete application is noticed for a minimum of 30 days and copies provided to the public for review and comment upon request; (3) The proposed PLAN has been reviewed by Regional Water Board staff; and (4) The PLAN has been approved by the Regional Water Board Executive Officer, or by the Regional Water Board after a public hearing, if requested.

C. **Exclusion of Coverage.** The authorization to discharge under this General Permit is terminated upon receipt of a Notice of Exclusion (NOE) or if the appropriate Regional Water Board decides that the discharge would best be regulated under either an individual or another general permit. An NOE is a one-page notice that states that the Discharger is not eligible for coverage under this General Permit and provided the reason for the exclusion.

D. **Eligibility Criteria.** To be authorized by this General Permit, Dischargers must meet the following criteria:

1. Pollutant concentrations in the discharge do not cause, have a reasonable potential to cause, or contribute to an excursion above any applicable federal water quality criterion established by the U.S. Environmental Protection Agency (USEPA) pursuant to Clean Water Act (CWA) section 303. Pollutant concentrations in the discharge do not cause, have a reasonable potential to cause, or contribute to an excursion above any water quality objective adopted by the appropriate Regional or State Water Board, including prohibitions of discharge for the receiving waters.

2. The discharge does not cause acute or chronic toxicity in the receiving water.

E. **Discharge to a Municipal Separate Storm Sewer System.** Whenever there is a discharge of 50,000 gallons or more to a municipal separate storm sewer system (MS4), the Discharger shall contact the appropriate local agency with jurisdiction over the MS4 within 24 hours. It is the State Water Board's intention with this requirement to encourage communication between Dischargers under this General Permit and local agencies responsible for MS4s to reduce misunderstandings and concerns over the types of discharges covered by this General Permit.

F. **Termination of Discharges.** Dischargers shall submit a Notice of Termination or Transfer (NOTT) when coverage under this General Permit is no longer needed. An NOTT is a form that lists the Waste Discharge Identification Number (WDID), the name and address of the owner of the utility, and is signed and dated by the owner certifying that the Dischargers associated with Permit No. CAG990002 have been eliminated or that there has been a change in ownership. Upon submission, the Discharger is no longer authorized to discharge wastewater associated with this General Permit.

G. **Changes from Authorization Under General Permit to Individual Permit.** Dischargers already covered under the NPDES program, whether by general or individual permit, may elect to continue coverage under the existing permit or may submit a complete application for coverage under this General Permit. Dischargers who submit a complete application under this General Permit are not required to submit an individual permit application. The Regional Water Board may request additional information and determine that a Discharger is not eligible for coverage under this General Permit and would be better regulated under an individual or other general NPDES permit or, for discharges to land, under waste discharge requirements (WDRs). If a Regional Water Board issues an NPDES permit or WDRs, the applicability of this General Permit to the specified discharge is immediately terminated on the effective date of the NPDES permit or WDRs.

H. **Transferring Ownership.** In the event of any change in control or ownership of land or waste discharge facilities presently owned or controlled by the Discharger, the Discharger must notify the succeeding owner or operator of the existence of this General Permit by letter, a copy of which must be immediately forwarded to the Regional Water Board office. The Discharger must submit an NOTT to the Regional Water Board and a copy of the NOTT to the State Water Board. The succeeding owner or operator must then submit a new general permit application.

III. FINDINGS

The State Water Board finds:

A. **Background.** This Order replaces Order No. 2001-0011-DWQ. The NPDES No. CAG990002 remains the same. Utility companies with utility vaults and underground structures enrolled under previous Order No. 2001-0011-DWQ must obtain coverage under this new Order to continue their authorization to discharge. To obtain authorization for continued and future discharge to waters of the United States, Dischargers must submit a complete application, as described in II. A. above, and obtain coverage in order to be regulated under this General Permit as provided in 40 Code of Federal Regulations (CFR) section 122.28 (b)(2).

B. **Discharge Description.** Utility companies operate and maintain numerous vaults and underground structures within their service territories. These vaults and structures may be located in residential, agricultural, commercial, or industrial areas. Sizes can vary from 15 cubic feet to 1,500 cubic feet, depending on their intended use, type, or contents. For safety reasons, utility companies must de-water vaults and underground structures prior to performing any repair, maintenance, and/or installation of equipment. When the amount of water in the vaults or structures interferes with the safety and quality of the work to be done, water must be pumped out. Volume of discharges can vary from a few gallons to a few thousand gallons depending on the configuration and individual situation at each vault or structure. These intermittent discharges are routed to waters of the United States directly or indirectly via local storm conveyance systems.

C. **Legal Authorities.** This Order is issued pursuant to section 402 of the CWA and implementing regulations adopted by the USEPA and Chapter 5.5, Division 7 of the CWC. It shall serve as an NPDES permit for point source discharges from utility vaults and underground structures to surface waters. This Order also serves as WDRs pursuant to Article 4, Chapter 4 of the CWC.

States may request authority to issue general NPDES permits pursuant to 40 CFR section 122.28. On June 8, 1989, the State Water Board submitted an application to the USEPA requesting revisions to its NPDES Program in accordance with 40 CFR 122.28, 123.62, and 403.10. The application included a request to add general permit authority to its approved NPDES Program. On September 22, 1989, the USEPA, Region 9, approved the State Water Board's request and granted authorization for the State to issue general NPDES permits.

D. **Background and Rationale for Requirements**. The State Water Board developed the requirements in this Order based on information submitted as part of the applications for several like agencies, through monitoring and reporting programs, and through special studies. Attachments A through F, which contain background information and rationale for Order requirements, are hereby incorporated into this Order and constitute part of the Findings for this Order.

E. **California Environmental Quality Act (CEQA).** This action to adopt an NPDES permit is exempt from the provisions of CEQA (Public Resources Code section 21100, et seq.) in accordance with section 13389 of the CWC.

F. **Technology-based Effluent Limitations (TBELs)***.* Title 40 of the CFR section 122.44(a) requires that permits include applicable **TBELs** and standards. This Order does not include numeric-**TBELs** because USEPA has not promulgated effluent limitation guidelines for utility vaults. Instead, this Order requires Pollution Prevention Practices (PPPs), which are equivalent to Best Management Practices (BMPs), in Pollution Prevention Plans (PLANs) to control and abate the discharge of pollutants to surface waters and to achieve Best Available Technology Economically Achievable (BAT)/Best Conventional Pollutant Control Technology (BCT) requirements and comply with applicable water quality standards.

G. **Water Quality-based Effluent Limitations (WQBELs).** Section 122.44(d) of 40 CFR requires that permits include WQBELs to attain and maintain applicable numeric and narrative water quality criteria to protect the beneficial uses of the receiving water. Where numeric water quality criteria have not been established, 40 CFR section 122.44(d) specifies that WQBELs may be established using USEPA criteria guidance under CWA section 304(a), proposed State criteria or a State policy interpreting narrative criteria supplemented with other relevant information, or an indicator parameter. Section 122.44(k)(3) of 40 CFR allows the use of BMPs to control or abate the discharge of pollutants when numeric effluent limitations are infeasible or when practices are reasonably necessary to achieve effluent limitations and standards or to carry out the purposes and intent of the CWA. As discussed in detail in the Fact Sheet, it is not feasible to establish WQBELs for pollutants in discharges from utility vaults or

underground structures. Therefore, in lieu of WQBELs, this Order requires Dischargers to establish PPPs in PLANs for discharges from utility vaults and underground structures.

H. **Water Quality Control Plans.** The Regional Water Boards have adopted Water Quality Control Plans (hereinafter Basin Plans) that designate beneficial uses, establish water quality objectives, and contain implementation programs and policies to achieve those objectives for all waters addressed through the plans. In addition, State Water Board Resolution No. 88-63 establishes state policy that all waters, with certain exceptions, should be considered suitable or potentially suitable for municipal and domestic supplies. Requirements of this Order specifically implement the applicable Basin Plans.

I. **National Toxics Rule (NTR) and California Toxics Rule (CTR).** USEPA adopted the NTR on December 22, 1992, which was amended on May 4, 1995 and November 9, 1999, and the CTR on May 18, 2000, which was amended on February 13, 2001. These rules include water quality criteria for priority pollutants and are applicable to this discharge.

J. **State Implementation Policy.** On March 2, 2000, the State Water Board adopted the *Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California* (State Implementation Policy or SIP*).* The SIP became effective on April 28, 2000, with respect to the priority pollutant criteria promulgated for California by the USEPA through the NTR and to the priority pollutant objectives established by the Regional Water Boards in their Basin Plans, with the exception of the provision on alternate test procedures for individual discharges that have been approved by the USEPA Regional Administrator. The alternate test procedures provision was effective on May 22, 2000. The SIP became effective on May 18, 2000. The SIP includes procedures for determining the need for and calculating WQBELs and requires Dischargers to submit data sufficient to do so. As described in the Fact Sheet, Water Quality Order No. 2001-11-DWQ granted exceptions from sections 1.3 (Determination of Priority Pollutants Requiring WQBELs) and 1.4 (Calculations of Effluent Limitations) of the SIP because numeric effluent limitations are infeasible for discharges from utility vaults and underground structures. This Order continues the exceptions granted from sections 1.3 and 1.4 of the SIP.

K. **Compliance Schedules and Interim Requirements. (Not applicable)**

L. **Antidegradation Policy.** Section 131.12 of 40 CFR requires that State water quality standards include an antidegradation policy consistent with the federal policy. The State Water Board established California's antidegradation policy in State Water Board Resolution No. 68-16. Resolution No. 68-16 incorporates the federal antidegradation policy where the federal policy applies under federal law. Resolution No. 68-16 requires that existing quality of waters be maintained unless degradation is justified based on specific findings. The Regional Water Boards' Basin Plans implement, and incorporate by reference, both the State and federal antidegradation policies. As discussed in detail in the Fact Sheet, the permitted discharge is consistent with the antidegradation

provision of 40 CFR section 131.12 and State Water Board Resolution No. 68-16.

M. **Anti-Backsliding Requirements.** Sections 402(o)(2) and 303(d)(4) of the CWA and federal regulations of 40 CFR section 122.44(l) prohibit backsliding in NPDES permits. These anti-backsliding provisions require effluent limitations in a reissued permit to be as stringent as those in the previous permit, with some exceptions where limitations may be relaxed. All effluent limitations in this Order are at least as stringent as the effluent limitations in the previous Order.

N. **Monitoring and Reporting.** Section 122.48 of 40 CFR requires that all NPDES permits specify requirements for recording and reporting monitoring results. Sections 13267 and 13383 of the CWC authorize the Regional Water Boards to require technical and monitoring reports. The Monitoring and Reporting Program (MRP) establishes monitoring and reporting requirements to implement federal and State requirements. This MRP is provided in Attachment E.

O. **Standard and Special Provisions.** Standard Provisions, which in accordance with 40 CFR sections 122.41and 122.42 apply to all NPDES discharges and must be included in every NPDES permit, are provided in Attachment D. The State Water Board has also included in this Order special provisions applicable to the Discharger. A rationale for the special provisions contained in this Order is provided in the attached Fact Sheet (Attachment F).

P. **Notification of Interested Parties.** The State Water Board has notified the Dischargers and interested agencies and persons of its intent to prescribe WDRs for the discharge and has provided them with an opportunity to submit their written comments and recommendations. Details of notification are provided in the Fact Sheet of this Order.

Q. **Consideration of Public Comment.** The State Water Board, in a public meeting, heard and considered all comments pertaining to the discharge. Details of the Public Hearing are provided in the Fact Sheet of this Order.

R. **Alaska Rule.** On March 30, 2000, USEPA revised its regulation that specifies when new and revised State and Tribal water quality standards (WQS) become effective for CWA purposes (40 CFR section 131.21, 65 FR 24641, April 27, 2000). Under the revised regulation (also known as the Alaska rule), USEPA must approve new and revised standards submitted to USEPA after May 30, 2000 before being used for CWA purposes. The final rule also provides that standards already in effect and submitted to USEPA by May 30, 2000 may be used for CWA purposes, whether or not approved by USEPA.

S. **Stringency of Requirements for Individual Pollutants.** This Order contains restrictions that are no more stringent than required by CWA. Restrictions consist of TBELs and WQBELs. The TBELs consist of PPPs as indicated in a PLAN. The permit's technology-based pollutant restrictions are no more stringent than required by the CWA. The narrative WQBELs have been scientifically derived to implement water quality objectives that protect beneficial uses. Both the beneficial uses and the water

quality objectives have been approved pursuant to federal law and are the applicable federal WQS. Collectively, this Order's restrictions are no more stringent than required to implement the technology-based requirements of the CWA and the applicable WQS for purposes of the CWA.

IV. DISCHARGE PROHIBITIONS

A. The discharge of wastewater at a location or in a manner different from that described in the Findings is prohibited.

B. The discharge of wastewater shall not create or cause conditions of nuisance or pollution.

C. The discharge shall not cause, have a reasonable potential to cause, or contribute to an in-stream excursion above any applicable criterion promulgated by USEPA pursuant to section 303 of the CWA, or water quality objective adopted by the State or Regional Water Boards.

V. EFFLUENT LIMITATIONS AND DISCHARGE SPECIFICATIONS

A. Effluent Limitations (Not Applicable)

B. Land Discharge Specifications (Not Applicable)

C. Reclamation Specifications (Not Applicable)

VI. RECEIVING WATER LIMITATIONS

A. Surface Water Limitations

Receiving water limitations are based on water quality objectives contained in the Basin Plans and are a required part of this Order. The discharge shall not cause the following in the surface receiving water:

1. Concentrations of dissolved oxygen (DO) in the receiving waters to fall below 7.0 milligrams (mg/L). During any period when the receiving water DO concentration is already below 7.0 mg/L, the discharge shall not cause any further depression of the DO content.

2. Oils, greases, waxes, floating material (liquids, solids, foams, and scum), or suspended material to create a nuisance or adversely affect beneficial uses.

3. Alteration of the apparent color, taste, or odor beyond present natural background levels.

4. Biostimulatory substances to be present in concentrations that promote aquatic growths to the extent that such growths cause nuisance or adversely affect beneficial uses.

5. Turbidity in amounts that adversely affect beneficial uses in the receiving waters. Turbidity shall not increase more than 20 percent over background levels.

6. The ambient pH to fall below 6.5 or exceed 9.0.

7. Deposition of material that causes a nuisance or adversely affects beneficial uses.

8. Significant erosion or alteration of the watercourse.

9. The ambient receiving water temperature to be altered more than 5^0 F.

10. Total residual chlorine to be present at concentrations that are detectable using approved methods as specified in 40 CFR section 136.

11. Taste or odor-producing substances that impart undesirable tastes or odors to fish flesh or other edible products of aquatic origin or cause nuisance or adversely affect beneficial uses.

12. Radionuclides to be present in concentrations that exceed maximum contaminant levels specified in the California Code of Regulations (CCR), Title 22, that harm human, plant, animal, or aquatic life, or that result in the accumulation of radionuclides in the food web to an extent that presents a hazard to human, plant, animal, or aquatic life.

13. Toxic pollutants to be present in the water column, sediments, or biota in concentrations that adversely affect beneficial uses, that produce a detrimental response in human, plant, animal, or aquatic life, or that bioaccumulate in aquatic resources at levels harmful to human health.

14. Violation of any applicable water quality objective for receiving waters adopted by the State or applicable Regional Water Board or applicable water quality criterion adopted by USEPA pursuant to section 303 of the CWA.

These limitations apply unless more stringent provisions exist in either the Basin Plan or an applicable State plan. The more stringent limitation shall apply.

B. Groundwater Limitations (Not Applicable)

VII. PROVISIONS

A. Standard Provisions

1. The Discharger shall comply with all Standard Provisions included in Attachment D of this Order.

2. **State Water Board Standard Provisions.** The Discharger shall comply with the following provisions:

   For the Regional Water Board to receive immediate and accurate information regarding all points of discharge, the Discharger shall establish and maintain a liaison contact with the appropriate Regional Water Board. The Discharger must send the Regional Water Board(s) a list of designated liaison personnel, telephone number(s), and specific area(s) of responsibility within 30 days from the date of submittal of the NOI and after any update to the list.

   A copy of this General Permit and the PLAN shall be kept where key operating personnel can refer to the documents. Key operating and site management personnel shall be familiar with its contents.

   The Discharger is required to retain records, including all monitoring information and copies of all reports required by this General Permit, for five years unless directed otherwise by a Regional Water Board.

   This General Permit expires on **July 19, 2011.** Those enrollees who are covered under this General Permit at the time of expiration will continue to be covered under this General Permit until permit coverage becomes effective under the reissued General Permit unless an NOTT has been submitted to terminate coverage. Re-enrollees must complete, submit, and have their PLAN approved by a Regional Water Board Executive Officer or adopted by a Regional Water Boards if a hearing is requested, by the effective date to maintain coverage after January 1, 2007.

B. Monitoring and Reporting Program Requirements

The Discharger shall comply with the MRP, and future revisions thereto, in Attachment E of this Order.

C. Special Provisions

1. Reopener Provisions (Not Applicable)

2. Special Studies, Technical Reports and Additional Monitoring Requirements (Not Applicable)

3. Best Management Practices and Pollution Prevention Plan (PLAN)

a. Similar to BMPs, PPPs are designed to prevent or control the discharge of pollutants. They may include a schedule of activities, prohibition of practices, maintenance procedures, or other management practices. A PLAN is a written document that describes the operator's activities to comply with the requirements in the General Permit. The PLAN is intended to evaluate potential pollutant sources at the site and select and implement appropriate measures designed to prevent or control the discharge of pollutants.

b. Standard industrywide PPPs have not been developed for utility companies. The Discharger shall prepare a PLAN and implement it whenever there is a discharge. If standard industrywide PPPs are developed, then the Discharger may utilize those PPPs or develop a PLAN utilizing selected standard industrywide PPPs, as appropriate. All PLANs developed by utility companies must meet the minimum specifications as described below.

c. If an exceedance(s) of a receiving water limitation defined in “Section V. Receiving Water Limitations,” expressed as either narrative or numerical, has been identified by the Discharger or by the Regional Water Board as a result of a utility company discharge, either of the following actions shall be undertaken to ensure compliance with this General Permit:

   i. The Discharger shall submit a new PLAN, which demonstrates to the satisfaction of the Regional Water Board that the Discharger is fully in compliance with “VII.3. Pollution Prevention Practices & Pollution Prevention Plan” above and implementation of the new PLAN will prevent future exceedance(s) of the receiving water limits; or

   ii. The Discharger shall develop and submit a revised PLAN to Regional Water Board, with new or revised PPPs, to prevent future exceedance(s). The Discharger shall implement such PPPs and document the progress of implementation and effectiveness thereof in the Annual Report to the Regional Water Board Executive Officer.

d. Dischargers who are enrolling for the first time under this General Permit must submit the PLAN together with the NOI, map, and annual fee, as described in II.A. (Notification Requirements) above, to the State Water Board. Re-enrollees shall submit a copy of their previous PLAN, or if new information warrants, shall submit a revised or new PLAN as part of their application for coverage under this General Permit. The Discharger must indicate in the NOI the location where the PLAN is to be maintained and identify the appropriate contact person, with telephone number, for the PLAN. The Discharger must revise the PLAN as requested by the Regional Water Board.

e. The PLAN shall include, to the extent possible, at least the following items:

i. Provisions for Scheduled Discharges, Unscheduled Discharges, Reservoir Discharges (if any), and Emergency Operation Discharges.

ii. **Pollution Prevention Team.** Each PLAN shall identify a specific individual or individuals within the utility's organization as members of a Pollution Prevention Team that are responsible for developing the PLAN and assisting the utility or plant manager in its implementation, maintenance, and revision. The PLAN shall clearly identify the responsibilities of each team member. The activities and responsibilities of the team shall address all aspects of the utility's PLAN.

iii. **Description of Potential Pollutant Sources.** Each PLAN shall provide a description of potential sources that may add significant amounts of pollutants to discharges. Each PLAN shall identify all activities and significant materials that may potentially be significant pollutant sources. Each PLAN shall include at a minimum:

a) **Drainage map.** Provide a map showing the essential features of the distribution system for the service area within a specific Regional Water Board boundary and showing the corresponding surface waters to which water may be discharged.

b) **Inventory of Exposed Materials.** Include an inventory of the types of materials handled at the site that potentially may be exposed to precipitation. Such inventory shall include a description of significant materials that have been handled, treated, stored or disposed in a manner to allow exposure to storm water from 3 years prior to the submission of the NOI for coverage under this General Permit and the present; method and location of onsite storage or disposal; materials management practices employed to minimize contact of materials with storm water runoff from 3 years prior to the submission of the NOI for coverage under this General Permit and the present; the location and a description of existing structural and nonstructural control measures to reduce pollutants in storm water runoff; and a description of any treatment the storm water receives.

c) **Spills and Leaks.** Include a list of significant spills and significant leaks of toxic or hazardous pollutants that occurred at areas exposed to precipitation or that otherwise enter the discharge stream from 3 years prior to the date of the submission of NOI to be covered under this General Permit. The list shall be updated as appropriate during the term of this General Permit.

d) **Risk Identification and Summary of Potential Pollutant Sources.** Include a narrative description of the potential pollutant sources, such as from significant dust or particulate generating processes. The description shall specifically list any significant potential source of pollutants at the site and, for each potential source; any pollutant or pollutant parameter (for example, oil and grease, etc.) of concern shall be identified.

iv. **Measures and Controls.** Each discharger covered by this General Permit shall develop a description of PPPs appropriate for the site(s), and implement such controls. The appropriateness and priorities of PPPs in a PLAN must reflect identified potential sources of pollutants at the site. Also, the Discharger should discuss the advantages and limitations of the PPP. If relevant, include a structural diagram. The description of wastewater management controls shall address the following minimum components, including a schedule for implementing such controls:

a) **Good Housekeeping.** Maintain areas that may contribute pollutants to discharges so that they are kept clean and orderly. Store and contain liquid materials in such a manner that if the container is ruptured, the contents will not discharge, flow, or be washed into the storm drainage system, surface waters, or groundwater.

b) **Preventive Maintenance.** Inspect and maintain wastewater management devices as well as inspect and test site equipment and systems to uncover conditions that could cause breakdowns or failures resulting in discharges of pollutants to surface waters, and ensure appropriate maintenance of such equipment and systems.

c) **Spill Prevention and Response Procedures.** Identify areas where potential spills, which can contribute pollutants to discharge, can occur and their accompanying drainage points. Specify material handling procedures, storage requirements, and use of equipment. Make accessible to the appropriate personnel the procedures for cleaning up spills identified in the PLAN. Make accessible the necessary equipment to implement a clean up. Note that if the spilled material is hazardous, then the cleanup materials used are also hazardous and should be disposed of properly. For large spills, a private spill cleanup company or Hazmat may be necessary.

d) **Inspections.** Identify qualified personnel, by name or by job title, to inspect designated equipment and areas of the site, and ensure that appropriate actions are taken in response to the inspections. Maintain records of inspections. Inventory and inspect each discharge point during dry weather.

e) **Employee Training.** Train employees to implement activities identified in the PLAN. Address topics such as spill response, good housekeeping,

and material management practices. Identify how often training will take place.

f) **Record Keeping and Internal Reporting Procedures.** Federal regulation requires that any oil spill into a water body be reported to the National Response Center at (800) 424-8802 (24 hours). The Discharger shall report spills to the appropriate local agency, such as the fire department, to assist in cleanup. Provide a description of incidents (such as spills or other discharges), along with other information describing the quality and quantity of discharges. Document patterns in time of occurrence, mode of dumping, responsible parties, date and time of incident, weather conditions, duration and cause of spill/leak/discharge, response procedures, resulting environmental problems and persons notified. Document inspections and maintenance activities and maintain records of such activities. Include the date and time the inspection was performed, the name of the inspector, and the items inspected. If problems are noted, include the corrective action required and the date the action was taken.

g) **Sediment and Erosion Control.** Identify areas that, due to topography, activities, or other factors, have a high potential for significant soil erosion, and identify structural, vegetative, and/or stabilization measures to be used to limit erosion.

h) **Management of Runoff.** Include a narrative consideration of the appropriateness of traditional storm water management practices (practices other than those that control the generation or source(s) of pollutants) used to divert, infiltrate, reuse, or otherwise manage runoff in a manner that reduces pollutants in discharges from the site. The PLAN shall provide measures that the Discharger determines to be reasonable and appropriate measures.

v. **Comprehensive Site Compliance Evaluation.** Qualified personnel shall conduct site compliance evaluations upon each discharge event. Such evaluations shall provide:

a) The Discharger shall visually inspect for evidence of, or the potential for, pollutants entering the receiving water(s). Evaluate measures to reduce pollutant loadings to determine whether they are adequate and properly implemented in accordance with the terms of this General Permit or whether additional control measures are needed. Ensure that structural wastewater management measures, sediment and erosion control measures, and other structural PPPs identified in the PLAN are operating correctly. Perform a visual inspection of equipment needed to implement the PLAN, such as spill response equipment.

b) Based on the results of the evaluation, the Discharger shall revise, as appropriate, the description of potential pollutant sources identified in the PLAN in accordance with Item iii of this section (Description of Potential Pollutant Sources) and PPPs identified in the PLAN with Item iv of this section (Measures and Controls) within two weeks of such evaluation and shall provide timely implementation of any changes to the PLAN.

c) Write and retain for 3 years, a report summarizing the scope of the evaluation, personnel making the evaluation, the date(s) of the evaluation, major observations relating to the implementation of the PLAN, and actions taken in accordance with Item iv.b, above. Identify any incidents of noncompliance or certify that the site(s) is in compliance with the PLAN and this General Permit. The report shall be signed in accordance with signatory requirements of this General Permit.

f. Additional Requirements include:

i. The PLAN shall be designed to comply with BAT/BCT and to ensure compliance with WQS.

ii. The Discharger shall amend the PLAN whenever there is a change in construction, operation, or maintenance, when such amendment is necessary to ensure compliance with BAT/BCT and receiving water limits. The PLAN shall also be amended if it is in violation of any conditions of this General Permit or has not achieved the general objective of controlling pollutants in discharges to surface waters. The Discharger shall submit the amended PLAN to the Regional Water Board.

iii. The PLAN and any amendments thereto shall be certified in accordance with the signatory requirements of Standard Provision B.2.

4. Compliance Schedules (Not Applicable)

5. Construction, Operation and Maintenance Specifications (Not Applicable)

6. Special Provisions for Municipal Facilities (POTWs Only) (Not Applicable)

7. Other Special Provisions

a. Following adoption of this General Permit, Regional Water Boards shall review monitoring reports, review revisions to Discharges PLANs, conduct compliance inspections, and take enforcement actions.

b. The Dischargers shall dispose of solids removed from liquid wastes in a manner that is consistent with Title 27, of the CCR and approved by the appropriate Regional Water Board's Executive Office.

VIII. COMPLIANCE DETERMINATION (NOT APPLICABLE)

ATTACHMENT A – DEFINITIONS

Notice of Exclusion (NOE): A one-page notice that indicates that the proposed Discharger is NOT eligible for coverage under this General Permit and states the reason behind the decision.

Notice of Intent (NOI): A form completed and signed by an industrial utility owner/operator notifying the State and Regional Water Boards that the operator will comply with the General Permit for an industrial activity at a specific utility or site.

Notice of Termination or Transfer (NOTT): A form completed and signed by a utility operator notifying the State and Regional Water Boards that the owner/operator no longer wishes to operate under the General Permit. Submission of an NOTT constitutes notice that the owner (and his/her agent) of the utility identified on the form is no longer authorized to discharge wastewater associated with utility company maintenance activities under this General Permit.

Pollution Prevention Plan (PLAN): A written document that describes the operator's activities to comply with the requirements in this General Permit. The PLAN is intended to facilitate a process whereby the operator evaluates potential pollutant sources at the site and selects and implements appropriate measures designed to prevent or control the discharge of pollutants, such as PPPs.

Pollution Prevention Practices (PPP): Similar to Best Management Practices (BMP), PPPs are permit conditions used in place of or in conjunction with effluent limitations to prevent or control the discharge of pollutants. These may include a schedule of activities, prohibition of practices, maintenance procedures, or other management practices. PPPs may include, but are not limited to, employee training, treatment requirements, operating procedures, or practices to control plant site runoff, spillage, leaks, sludge or waste disposal, or drainage from raw material storage.

Utility Company: Any person, as defined in section 13050 of the California Water Code, whose business is to supply the resources, excluding water, necessary for day to day living and/or operations. This includes, but is not limited to, suppliers of natural gas, electricity, and telephone services.

ATTACHMENT B – NOTICE OF INTENT FORM

NOTICE OF INTENT (NOI)
WATER QUALITY ORDER NO. 2006-0008-DWQ
STATEWIDE GENERAL NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) PERMIT FOR DISCHARGES FROM UTILITY VAULTS AND UNDERGROUND STRUCTURES TO SURFACE WATERS OF THE UNITED STATES
GENERAL PERMIT NO. CAG990002

I. NOTICE OF INTENT STATUS (See Instructions)

MARK ONLY ONE ITEM	1.☐ New Discharger	2.☐ Change of Information – WDID #

II. OWNER/OPERATOR *(If additional owners/operators are involved, provide the information in a supplemental page.)*

A. Name		Owner/Operator Type (Check One) 1.☐ City 2.☐ County 3.☐ State 4.☐ Gov. Combo 5.☐ Private	
B. Mailing Address			
C. City	D. County	E. State	F. Zip Code
G. Contact Person	H. Title	I. Phone	

☐ **ADDITIONAL OWNERS** _____

III. BILLING ADDRESS *(Enter information only if different from above)*

Send to: ☐ **Owner/Operator** ☐ **Other**	A. Name	B. Title	
	C. Mailing Address		
D. City	E. County	F. State	G. Zip Code

IV. RECEIVING WATER INFORMATION

A. Receiving water(s):	B. Describe the types of receiving waters affected:
C. Regional Water Quality Control Board(s) where discharge sites are located List all regions where discharge of wastewater is proposed, i.e. Region(s) 1, 2, 3, 4, 5, 6, 7, 8, and/or 9:	

V. LAND DISPOSAL/RECLAMATION

The State Water Resources Control Board's water rights authority encourages the disposal of wastewater on land or re-use of wastewater where practical. You must evaluate and rule out this alternative prior to any discharge to surface water under this Order.

Is land disposal/reclamation feasible? ☐ **Yes** ☐ **No**

If **Yes**, you should contact the Regional Water Board. This Order does not apply if there is no discharge to surface waters. If **No**, explain:

.

VI. VERIFICATION

Have you contacted the appropriate Regional Water Board or verified in the appropriate Basin Plan that the proposed discharge will not violate prohibitions or orders of that Regional Water Board? ☐ **Yes** ☐ **No**

VII. TYPE (Check All That Apply)

☐ **Electric** ☐ **Natural Gas** ☐ **Telephone** ☐ **Other:**

VIII. POLLUTION PREVENTION PRACTICES PLAN INFORMATION

A. Company Name			B. Contact Person	
C. Street Address Where PLAN is Located			D. Title of Contact Person	
E. City	F. County	G. State CA	H. Zip Code	I. Phone

IX. DESCRIPTION OF DISCHARGE

Describe the discharge(s) proposed. List any potential pollutants in the discharge. Attach additional sheets if needed.

X. VICINITY MAP AND FEE

A. Have you included vicinity map(s) with this submittal? ☐ **Yes** ☐ **No**
Separate vicinity maps must be submitted for each Region where a proposed discharge will occur.
B. Have you included payment of the filing fee (for first-time enrollees only) with this submittal? ☐ **Yes** ☐ **No** ☐ **N/A**
C. Have you included your PLAN? ☐ **Yes** ☐ **No**

XI. CERTIFICATION

" I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to ensure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those directly responsible for gathering the information, the information submitted is true, accurate, and complete to the best of my knowledge and belief. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment. In addition, I certify that the provisions of the permit, including the criteria for eligibility and the development and implementation of Pollution Prevention Practices, if required, will be complied with."

A. Printed Name:	
B. Signature:	C. Date:
D. Title:	

PLEASE SUBMIT THE NOI, FIRST ANNUAL FEE, PLAN AND MAP TO THE FOLLOWING ADDRESS:

UTILITIES NOI
NPDES UNIT
DIVISION OF WATER QUALITY
STATE WATER RESOURCES CONTROL BOARD
P.O. BOX 100
SACRAMENTO, CA 95812-0100

STATE USE ONLY

WDID:	**Regional Board Office**	**Date NOI Received:**	**Date NOI Processed:**
		Fee Amount Received: $	**Check #:**

ATTACHMENT C – INSTRUCTIONS FOR COMPLETING THE NOI

WATER QUALITY ORDER NO. 2006-0008-DWQ
STATEWIDE GENERAL NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) PERMIT FOR DISCHARGES FROM UTILITY VAULTS & UNDERGROUND STRUCTURES TO SURFACE WATERS OF THE UNITED STATES
GENERAL PERMIT NO. CAG990002

These instructions are intended to help you, the Discharger, complete the NOI form for General Permit No. CAG990002. **Please print clearly or type when completing the NOI form and vicinity map(s). Illegible applications will not be processed.** For any field, if more space is needed, submit a supplementary letter with the NOI.

Send the completed and signed form, filing fee, PLAN, supporting documentation, and vicinity map(s) to the State Water Resources Control Board (State Water Board). Submit one permit application to cover all discharges within the boundaries of a Regional Water Quality Control Board (Regional Water Board). If the proposed discharges occur in more than one Region, submit a permit application for each Region where a discharge will occur. Only one annual fee is required.

Section I – Notice of Intent Status

Indicate whether this request is for first time coverage or a change of information for a utility already covered under this General Permit. For a change of information, enter the eleven-digit Waste Discharge Identification (WDID) number for the utility.

Section II – Owner/0perator

A. Name – Enter the name of the owner/operator. Check the appropriate box for which type of agency best describes the owner/operator. "Gov. Combo." is an abbreviation for "Government Combination" for a joint powers agency created by two or more government agencies. Private businesses should check the "Private" box.

B. Mailing Address – Enter the street number and name where correspondence should be sent (P.O. Box is acceptable).

C. City – Enter the city that applies to the mailing address given.

D. County – Enter the county that applies to the mailing address given.

E. State – Enter the state that applies to the mailing address given.

F. Zip Code – Enter the zip code that applies to the mailing address given.

G. Contact Person – Enter the name (first and last) of the contact person.

H. Title – Enter the contact person's title.

I. Telephone – Enter the daytime telephone number of the contact person.

Additional Owners - Please check this box if there is more than one owner/operator and list.

Section III – Billing Address

Send To: - Check the appropriate box and enter the information **only** if it is different from section II. above.

A. Name – Enter the name (first and last) of the person who will be responsible for the billing.

B. Title – Enter the title of the person responsible for the billing.

C. Mailing Address – Enter the street number and name where the billing should be sent
(P.O. Box is acceptable).

D. City – Enter the city that applies to the billing address.

E. County – Enter the county that applies to the billing address.

F. State – Enter the state that applies to the billing address.

G. Zip Code – Enter the zip code that applies to the billing address.

Section IV – Receiving Water Information

A. Enter the names(s) of the waterbody to which the wastewater is discharged.

B. Describe the type(s) of receiving waters affected (river, lake, creek, stream, bay, ocean, wetland).

C. List all Region numbers where discharge is proposed. Regional Water Board boundaries are defined in section 13200 of the California Water Code. Each Region number is given below and a map is attached to these instructions. For coverage in Region 5, send two additional copies of the map and for coverage in Region 6, send one additional copy.

1 - North Coast	2 - San Francisco Bay	3 - Central Coast
4 - Los Angeles	5 - Central Valley (Sacramento, Fresno, Redding)	6 - Lahontan (South Lake Tahoe, Victorville)
7 - Colorado River Basin	8 - Santa Ana	9 - San Diego

Section V - Land Disposal/Reclamation

Check "YES" if land disposal and/or reclamation is/are feasible. If you check "YES," contact the appropriate Regional Water Board. Your discharge may not be covered under the NPDES Program. If you checked "NO**,"** explain in the space provided the reason why these alternatives are not feasible.

Section VI – Verification

Indicate by checking "YES" or "NO" whether verification has been done to determine if the discharge(s) are in compliance with prohibitions or orders of the Regional Water Board.

Section VII - Type

Check the appropriate box(s) to indicate the type of utility for which you are seeking coverage.

Section VIII - Pollution Prevention Plan (PLAN) Information

A. **Company Name** – Enter the legal name of the company applying for coverage.
B. **Contact Person** – List the company contact person responsible for preparation and implementation of the PLAN.
C. **Street Address Where the PLAN is Located** - Indicate the street number and name where you will keep the PLAN for reference and review by personnel.
D. **Title of Contact Person** – Enter the official company title of the contact person.
E. **City –** Enter the city where the PLAN will be kept.
F. **County –** Enter the county where the PLAN will be kept.
G. **State –** Enter the state where the PLAN will be kept.
H. **Zip Code –** Enter the city zip code where the PLAN will be kept.
I. **Telephone –** Enter the daytime telephone number of the contact person.

Section IX- Description of Discharge

Describe the types of operations that occur and potential pollutants that may be found in the discharge.

Section X – Vicinity Map and Fee

A. If you have included vicinity map(s) with your NOI submittal, check the "YES" box. If not included, check "NO." **NOTE: Vicinity map(s) of the proposed discharge site must be received before you can obtain coverage under this General Permit.** Submit separate vicinity map(s) for each Regional Water Board where a discharge is proposed. If applying for coverage in the Central Valley Region, send two additional copies of the required map and if applying for coverage under Lahontan Region, send one additional copy of the required map.

   The map must show the essential features of the distribution system for the service area within a specific Regional Water Board boundary and show the corresponding surface waters to which water may be discharged.

B. Check "YES" if you have included the annual fee with your submittal. Check "NO" if you have not included payment. **NOTE: Payment of this fee must be received before you can obtain coverage under this General Permit.** You will be invoiced annually and payment is required to continue coverage.

C. Check "YES" if you have included the PLAN. Otherwise, check "NO." **NOTE: You must submit the PLAN to the State Water Board and appropriate Regional Water Board(s) to obtain coverage under this General Permit.**

Section XI - Certification

A. **Printed Name** – Print your name legibly. The person responsible according to the Signatory Requirements section of the Standard Provisions (Attachment D) must fill out this section.
B. **Signature –** Provide a signature of name printed above.
C. **Date –** Indicate the date signed.
D. **Title –** Include the professional title of the person signing the NOI.

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARDS

NORTH COAST REGION (1)
5550 Skylane Blvd, Ste. A
Santa Rose, CA 95403
(707) 576-2220 FAX: (707)523-0135
Web Page:
http://www.waterboards.ca.gov/northcoast

SAN FRANCISCO BAY REGION (2)
1515 Clay Street, Ste. 1400
Oakland, CA 94612
(510) 622-2300 FAX: (510) 622-2460
Web Page:
http://www.waterboards.ca.gov/sanfranciscobay

CENTRAL COAST REGION (3)
895 Aerovista Place, Ste 101
San Luis Obispo, CA 93401
(805) 549-3147 FAX: (805) 543-0397
Web Page:
http://www.waterboards.ca.gov/centralcoast

LOS ANGELES REGION (4)
320 W. 4th Street, Ste. 200
Los Angeles, CA 90013
(213) 576-6600 FAX: (213) 576-6640
Web Page:
http://www.waterboards.ca.gov/losangeles

CENTRAL VALLEY REGION (5S)
11020 Sun Center Dr., #200
Rancho Cordova, CA 95670-6114
(916) 464-3291 FAX: (916) 464-4645
Web Page:
http://www.waterboards.ca.gov/centralvalley

FRESNO BRANCH OFFICE (5F)
1685 E St.
Fresno, CA 93706
(559) 445-5116 FAX: (559) 445-5910
Web Page:
http://www.waterboards.ca.gov/centralvalley

REDDING BRANCH OFFICE (5R)
415 Knollcrest Drive, Ste. 100
Redding, CA 96002
(530) 224-4845 FAX: (530) 224-4857
Web Page:
http://www.waterboards.ca.gov/centralvalley

LAHONTAN REGION (6 SLT)
2501 Lake Tahoe Blvd.
South Lake Tahoe, CA 96150
(530) 542-5400 FAX: (530) 544-2271
Web Page:
http://www.waterboards.ca.gov/lahontan

VICTORVILLE OFFICE (6V)
14440 Civic Drive, Suite 200
Victorville, CA 92392
(760) 241-6583 FAX: (760) 241-7308
Web Page:
http://www.waterboards.ca.gov/lahontan

COLORADO RIVER BASIN REGION (7)
73-720 Fred Waring Dr., Ste. 100
Palm Desert, CA 92260
(760) 346-7491 FAX: (760) 341-6820
Web Page:
http://www.waterboards.ca.gov/coloradoriver

SANTA ANA REGION (8)
California Tower
3737 Main Street, Ste. 500
Riverside, CA 92501-3339
(951) 782-4130 FAX : (951) 781-6288
Web Page:
http://www.waterboards.ca.gov/santaana

SAN DIEGO REGION (9)
9174 Sky Park Court, Ste. 100
San Diego, CA 92123-4340
(858) 467-2952 FAX: (858) 571-6972
Web Page:
http://www.waterboards.ca.gov/sandiego

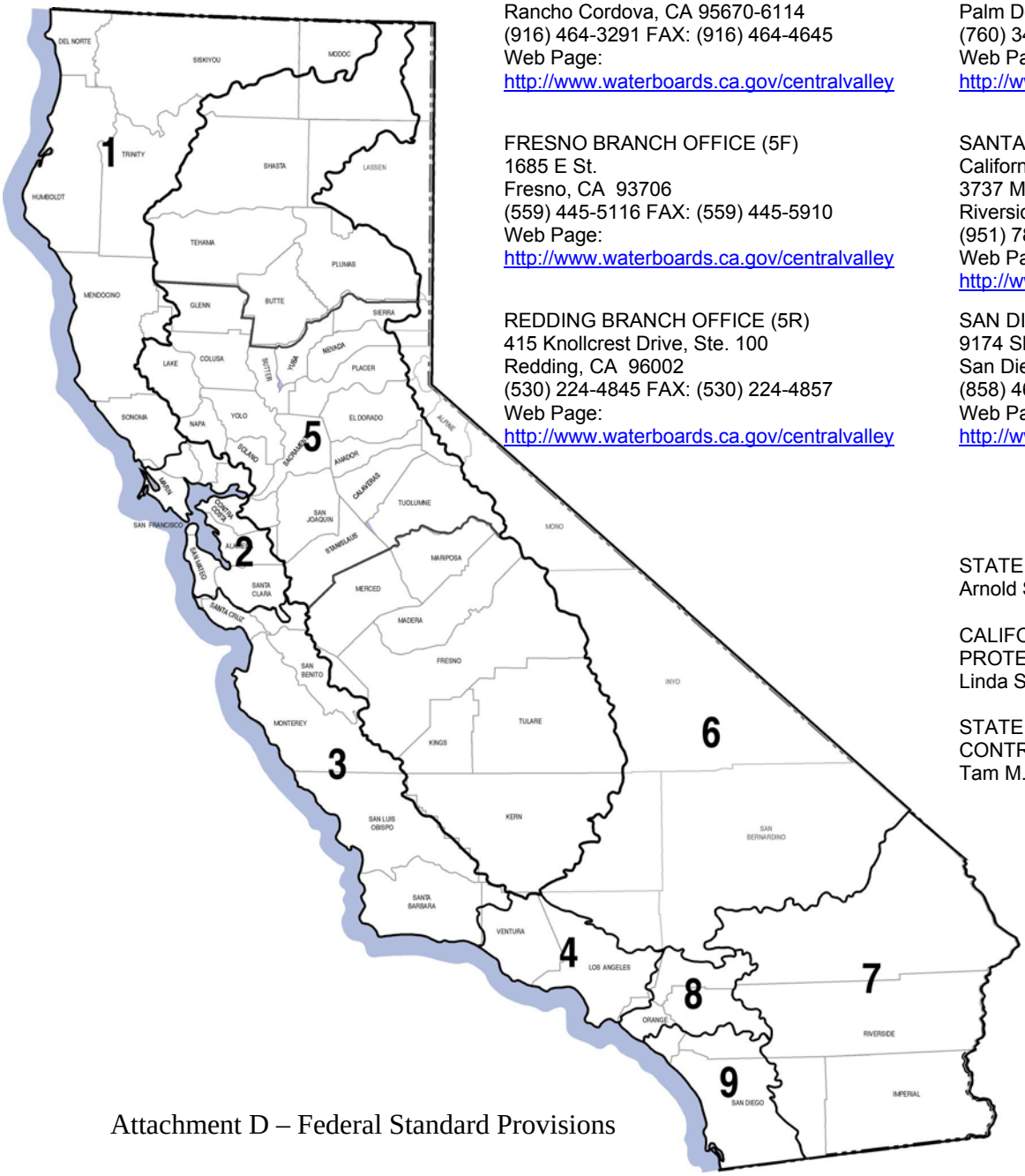

STATE OF CALIFORNIA
Arnold Schwarzenegger, Governor

CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY
Linda S. Adams, Agency Secretary

STATE WATER RESOURCES CONTROL BOARD
Tam M. Doduc, Board Chair

ATTACHMENT D – STANDARD PROVISIONS

I. STANDARD PROVISIONS – PERMIT COMPLIANCE

A. Duty to Comply

1. The Discharger must comply with all of the conditions of this Order. Any noncompliance constitutes a violation of the Clean Water Act (CWA) and the California Water Code (CWC) and is grounds for enforcement action, for permit termination, revocation and reissuance, or denial of a permit renewal application [*40 CFR §122.41(a)*].

2. The Discharger shall comply with effluent standards or prohibitions established under section 307(a) of the CWA for toxic pollutants and with standards for sewage sludge use or disposal established under section 405(d) of the CWA within the time provided in the regulations that establish these standards or prohibitions, even if this Order has not been modified to incorporate the requirement [*40 CFR §122.41(a)(1)*].

B. Need to Halt or Reduce Activity Not a Defense

It shall not be a defense for a Discharger in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this Order [*40 CFR §122.41(c)*].

C. Duty to Mitigate

The Discharger shall take all reasonable steps to minimize or prevent any discharge or sludge use or disposal in violation of this Order that has a reasonable likelihood of adversely affecting human health or the environment [*40 CFR §122.41(d)*].

D. Proper Operation and Maintenance

The Discharger shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the Discharger to achieve compliance with the conditions of this Order. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures. This provision requires the operation of backup or auxiliary facilities or similar systems that are installed by a Discharger only when necessary to achieve compliance with the conditions of this Order [*40 CFR §122.41(e)*].

E. Property Rights

1. This Order does not convey any property rights of any sort or any exclusive privileges [*40 CFR §122.41(g)*].

2. The issuance of this Order does not authorize any injury to persons or property or invasion of other private rights, or any infringement of State or local law or regulations [*40 CFR §122.5(c)*].

F. Inspection and Entry

The Discharger shall allow the Regional Water Quality Control Board (Regional Water Board), State Water Resources Control Board (State Water Board), United States Environmental Protection Agency (USEPA), and/or their authorized representatives (including an authorized contractor acting as their representative), upon the presentation of credentials and other documents, as may be required by law, to [*40 CFR §122.41(i)*] [*CWC 13383(c)*]:

1. Enter upon the Discharger's premises where a regulated facility or activity is located or conducted, or where records are kept under the conditions of this Order [*40 CFR §122.41(i)(1)*];

2. Have access to and copy, at reasonable times, any records that must be kept under the conditions of this Order [*40 CFR §122.41(i)(2)*];

3. Inspect and photograph, at reasonable times, any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this Order [*40 CFR §122.41(i)(3)*];

4. Sample or monitor, at reasonable times, for the purposes of assuring Order compliance or as otherwise authorized by the CWA or the CWC, any substances or parameters at any location [*40 CFR §122.41(i)(4)*].

G. Bypass

1. Definitions

   a. “Bypass” means the intentional diversion of waste streams from any portion of a treatment facility [*40 CFR §122.41(m)(1)(i)*].

   b. “Severe property damage” means substantial physical damage to property, damage to the treatment facilities, which causes them to become inoperable, or substantial and permanent loss of natural resources that can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production [*40 CFR §122.41(m)(1)(ii)*].

2. Bypass not exceeding limitations – The Discharger may allow any bypass to occur which does not cause exceedances of effluent limitations, but only if it is for essential maintenance to assure efficient operation. These bypasses are not subject to the provisions listed in Standard Provisions – Permit Compliance I.G.3 and I.G.5 below [*40 CFR §122.41(m)(2)*].

3. Prohibition of bypass – Bypass is prohibited, and the Regional Water Board may take enforcement action against a Discharger for bypass, unless [*40 CFR §122.41(m)(4)(i)*]:

    a. Bypass was unavoidable to prevent loss of life, personal injury, or severe property damage [*40 CFR §122.41(m)(4)(A)*];

    b. There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate back-up equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass that occurred during normal periods of equipment downtime or preventive maintenance [*40 CFR §122.41(m)(4)(B)*]; and

    c. The Discharger submitted notice to the Regional Water Board as required under Standard Provision – Permit Compliance I.G.5 below [*40 CFR §122.41(m)(4)(C)*].

4. The Regional Water Board may approve an anticipated bypass, after considering its adverse effects, if the Regional Water Board determines that it will meet the three conditions listed in Standard Provisions – Permit Compliance I.G.3 above [*40 CFR §122.41(m)(4)(ii)*].

5. Notice

    a. Anticipated bypass. If the Discharger knows in advance of the need for a bypass, it shall submit a notice, if possible at least 10 days before the date of the bypass [*40 CFR §122.41(m)(3)(i)*].

    b. Unanticipated bypass. The Discharger shall submit notice of an unanticipated bypass as required in Standard Provisions - Reporting V.E below [*40 CFR §122.41(m)(3)(ii)*].

H. Upset

Upset means an exceptional incident in which there is unintentional and temporary noncompliance with technology based permit effluent limitations because of factors beyond the reasonable control of the Discharger. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation [*40 CFR §122.41(n)(1)*].

1. Effect of an upset. An upset constitutes an affirmative defense to an action brought for noncompliance with such technology based permit effluent limitations if the requirements of paragraph H.2 of this section are met. No determination made during administrative review of claims that noncompliance was caused by upset,

and before an action for noncompliance, is final administrative action subject to judicial review [*40 CFR §122.41(n)(2)*].

2. Conditions necessary for a demonstration of upset. A Discharger who wishes to establish the affirmative defense of upset shall demonstrate, through properly signed, contemporaneous operating logs or other relevant evidence that [*40 CFR §122.41(n)(3)*]:

   a. An upset occurred and that the Discharger can identify the cause(s) of the upset [*40 CFR §122.41(n)(3)(i)*];

   b. The permitted facility was, at the time, being properly operated [*40 CFR §122.41(n)(3)(i)*];
   c. The Discharger submitted notice of the upset as required in Standard Provisions – Reporting V.E.2.b [*40 CFR §122.41(n)(3)(iii)*]; and

   d. The Discharger complied with any remedial measures required under Standard Provisions – Permit Compliance I.C above [*40 CFR §122.41(n)(3)(iv)*].

3. Burden of proof. In any enforcement proceeding, the Discharger seeking to establish the occurrence of an upset has the burden of proof [*40 CFR §122.41(n)(4)*].

II. STANDARD PROVISIONS – PERMIT ACTION

A. General

This Order may be modified, revoked and reissued, or terminated for cause. The filing of a request by the Discharger for modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance does not stay any Order condition [*40 CFR §122.41(f)*].

If any toxic effluent standard or prohibition (including any schedule of compliance specified in such effluent standard or prohibition) is promulgated under section 307(a) of the CWA for a toxic pollutant which is present in the discharge, and that standard or prohibition is more stringent than any limitation on the pollutant in this General permit, this General Permit shall be modified or revoked and reissued to conform to the toxic effluent standard or prohibition and the Discharger so notified.

B. Duty to Reapply

If the Discharger wishes to continue an activity regulated by this Order after the expiration date of this Order, the Discharger must apply for and obtain a new permit [*40 CFR §122.41(b)*].

C. Transfers

This Order is not transferable to any person except after notice to the Regional Water Board. The Regional Water Board may require modification or revocation and reissuance of the Order to change the name of the Discharger and incorporate such other requirements as may be necessary under the CWA and the CWC [*40 CFR §122.41(l)(3)*] [*40 CFR §122.61*].

D. Severability

The provisions of this General Permit are severable and if any provisions of this General Permit or the application of any provisions of this General Permit to any circumstance is held invalid, the applications of such provision to other circumstances and the remainder of this General Permit shall not be affected thereby.

E. Pollution, Contamination, or Nuisance [*CWC §13050*].

Neither the treatment nor the discharge shall create a condition of pollution, contamination or nuisance.

III. STANDARD PROVISIONS – MONITORING

A. Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity [*40 CFR §122.41(j)(1)*].

B. Monitoring results must be conducted according to test procedures under 40 CFR section 136 or, in the case of sludge use or disposal, approved under 40 CFR section 136 unless otherwise specified in 40 CFR section 503 unless other test procedures have been specified in this Order [*40 CFR §122.41(j)(4)*] [*40 CFR §122.44(i)(1)(iv)*].

IV. STANDARD PROVISIONS – RECORDS

A. Except for records of monitoring information required by this Order related to the Discharger's sewage sludge use and disposal activities, which shall be retained for a period of at least five years (or longer as required by 40 CFR section 503), the Discharger shall retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this Order, and records of all data used to complete the application for this Order, for a period of at least three (3) years from the date of the sample, measurement, report or application. This period may be extended by request of the Regional Water Board Executive Officer at any time [*40 CFR §122.41(j)(2)*].

B. Records of monitoring information shall include:

1. The date, exact place, and time of sampling or measurements [*40 CFR §122.41(j)(3)(i)*];

2. The individual(s) who performed the sampling or measurements [*40 CFR §122.41(j)(3)(ii)*];

3. The dimensions, size and/or volume of vault;

4. The duration of the discharge;

5. The estimated volume of discharge;

6. The date(s) analyses were performed [*40 CFR §122.41(j)(3)(iii)*];

7. The individual(s) who performed the analyses [*40 CFR §122.41(j)(3)(iv)*];

8. The analytical techniques or methods used [*40 CFR §122.41(j)(3)(v)*]; and

9. The results of such analyses [*40 CFR §122.41(j)(3)(vi)*].

C. Claims of confidentiality for the following information will be denied [*40 CFR §122.7(b)*]:

1. The name and address of any permit applicant or Discharger [*40 CFR §122.7(b)(1)*]; and

2. Permit applications and attachments, permits and effluent data [*40 CFR §122.7(b)(2)*].

V. STANDARD PROVISIONS – REPORTING

A. Duty to Provide Information

The Discharger shall furnish to the Regional Water Board, State Water Board, or USEPA within a reasonable time, any information which the Regional Water Board, State Water Board, or USEPA may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this Order or to determine compliance with this Order. Upon request, the Discharger shall also furnish to the Regional Water Board, State Water Board, or USEPA copies of records required to be kept by this Order [*40 CFR §122.41(h)*] [*CWC 13267*].

B. Signatory and Certification Requirements

1. All applications, reports, or information submitted to the Regional Water Board, State Water Board, and/or USEPA shall be signed and certified in accordance with paragraph (B.2) and (B.3) of this provision [*40 CFR §122.41(k)*].

2. All permit applications shall be signed as follows:

   a. For a corporation: By a responsible corporate officer. For the purpose of this section, a responsible corporate officer means: (i) A president, secretary,

treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy- or decision-making functions for the corporation, or (ii) the manager of one or more manufacturing, production, or operating facilities, provided the manager is authorized to make management decisions which govern the operation of the regulated facility including having the explicit or implicit duty of making major capital investment recommendations, and initiating and directing other comprehensive measures to assure long term environmental compliance with environmental laws and regulations; the manager can ensure that the necessary systems are established or actions taken to gather complete and accurate information for permit application requirements; and where authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures [*40 CFR §122.22(a)(1)*];

b. For a partnership or sole proprietorship: by a general partner or the proprietor, respectively [*40 CFR §122.22(a)(2)*]; or

c. For a municipality, State, federal, or other public agency: by either a principal executive officer or ranking elected official. For purposes of this provision, a principal executive officer of a federal agency includes: (i) the chief executive officer of the agency, or (ii) a senior executive officer having responsibility for the overall operations of a principal geographic unit of the agency (e.g., Regional Administrators of USEPA) [*40 CFR §122.22(a)(3)*].

3. All reports required by this Order and other information requested by the Regional Water Board, State Water Board, or USEPA shall be signed by a person described in paragraph (B.2) of this provision, or by a duly authorized representative of that person. A person is a duly authorized representative only if:

   a. The authorization is made in writing by a person described in paragraph (B.2) of this provision [*40 CFR §122.22(b)(1)*];

   b. The authorization specified either an individual or a position having responsibility for the overall operation of the regulated facility or activity such as the position of plant manager, operator of a well or a well field, superintendent, position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters for the company (a duly authorized representative may thus be either a named individual or any individual occupying a named position) [*40 CFR §122.22(b)(2)*]; and

   c. The written authorization is submitted to the Regional Water Board, State Water Board, or USEPA [*40 CFR §122.22(b)(3)*].

4. If an authorization under paragraph (B.3) of this provision is no longer accurate because a different individual or position has responsibility for the overall operation of the facility, a new authorization satisfying the requirements of paragraph (B.3) of this provision must be submitted to the Regional Water Board, State Water Board

or USEPA prior to or together with any reports, information, or applications, to be signed by an authorized representative [40 CFR §122.22(c)].

5. Any person signing a document under paragraph (B.2) or (B.3) of this provision shall make the following certification:

   "I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations" [*40 CFR §122.22(d)*].

C. Monitoring Reports

1. Monitoring results shall be reported at the intervals specified in the MRP in this Order [*40 CFR §122.41(l)(4)*].

2. Monitoring results must be reported on a Discharge Monitoring Report (DMR) form or forms provided or specified by the Regional Water Board or State Water Board for reporting results of monitoring of sludge use or disposal practices [*40 CFR §122.41(l)(4)(i)*].

3. If the Discharger monitors any pollutant more frequently than required by this Order using test procedures approved under 40 CFR section 136 or, in the case of sludge use or disposal, approved under 40 CFR section 136 unless otherwise specified in 40 CFR section 503, or as specified in this Order, the results of this monitoring shall be included in the calculation and reporting of the data submitted in the DMR or sludge reporting form specified by the Regional Water Board [*40 CFR §122.41(l)(4)(ii)*].
4. Calculations for all limitations, which require averaging of measurements, shall utilize an arithmetic mean unless otherwise specified in this Order [*40 CFR §122.41(l)(4)(iii)*].

D. Compliance Schedules

Reports of compliance or noncompliance with, or any progress reports on, interim and final requirements contained in any compliance schedule of this Order, shall be submitted no later than 14 days following each schedule date [*40 CFR §122.41(l)(5)*].

E. Twenty-Four Hour Reporting

1. The Discharger shall report any noncompliance that may endanger health or the environment. Any information shall be provided orally within 24 hours from the time the Discharger becomes aware of the circumstances. A written submission shall

also be provided within five (5) days of the time the Discharger becomes aware of the circumstances. The written submission shall contain a description of the noncompliance and its cause; the period of noncompliance, including exact dates and times, and if the noncompliance has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance [*40 CFR §122.41(l)(6)(i)*].

2. The following shall be included as information that must be reported within 24 hours under this paragraph [*40 CFR §122.41(l)(6)(ii)*]:

   a. Any unanticipated bypass that exceeds any effluent limitation in this Order [*40 CFR §122.41(l)(6)(ii)(A)*].

   b. Any upset that exceeds any effluent limitation in this Order [*40 CFR §122.41(l)(6)(ii)(B)*].

   c. Violation of a maximum daily discharge limitation for any of the pollutants listed in this Order to be reported within 24 hours [*40 CFR §122.41(l)(6)(ii)(C)*].

3. The Regional Water Board may waive the above-required written report under this provision on a case-by-case basis if an oral report has been received within 24 hours [*40 CFR §122.41(l)(6)(iii)*].

F. Planned Changes

The Discharger shall give notice to the Regional Water Board as soon as possible of any planned physical alterations or additions to the permitted facility. Notice is required under this provision only when [*40 CFR §122.41(l)(1)*]:

1. The alteration or addition to a permitted facility may meet one of the criteria for determining whether a facility is a new source in 40 CFR §122.29(b) [*40 CFR §122.41(l)(1)(i)*]; or

2. The alteration or addition could significantly change the nature or increase the quantity of pollutants discharged. This notification applies to pollutants which are subject neither to effluent limitations in this Order nor to notification requirements under 40 CFR section 122.42(a)(1) (see Additional Provisions—Notification Levels VII.A.1) [*40 CFR §122.41(l)(1)(ii)*]; or

3. The alteration or addition results in a significant change in the Discharger's sludge use or disposal practices, and such alteration, addition, or change may justify the application of permit conditions that are different from or absent in the existing permit, including notification of additional use or disposal sites not reported during the permit application process or not reported pursuant to an approved land application plan [*40 CFR §122.41(l)(1)(iii)*].

G. Anticipated Noncompliance

The Discharger shall give advance notice to the Regional Water Board or State Water Board of any planned changes in the permitted facility or activity that may result in noncompliance with General Order requirements [*40 CFR §122.41(l)(2)].*

H. Other Noncompliance

The Discharger shall report all instances of noncompliance not reported under Standard Provisions – Reporting E.3, E.4, and E.5 at the time monitoring reports are submitted. The reports shall contain the information listed in Standard Provision – Reporting V.E [*40 CFR §122.41(l)(7)*].

I. Discharge Monitoring Quality Assurance (DMQA) Program [*STATE WATER BOARD/USEPA 106 MOA*]

The Discharger shall conduct appropriate analyses on any sample provided by USEPA as part of the DMQA program. The results of such analyses shall be submitted to USEPA's DMQA manager.

J. Other Information

When the Discharger becomes aware that it failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application or in any report to the Regional Water Board, State Water Board, or USEPA, the Discharger shall promptly submit such facts or information [*40 CFR §122.41(l)(8)*].

VI. STANDARD PROVISIONS – ENFORCEMENT

A. NOT APPLICABLE. The CWA provides that any person who violates section 301, 302, 306, 307, 308, 318 or 405 of the Act, or any permit condition or limitation implementing any such sections in a permit issued under section 402, or any requirement imposed in a pretreatment program approved under sections 402(a)(3) or 402(b)(8) of the Act, is subject to a civil penalty not to exceed $25,000 per day for each violation. The CWA provides that any person who negligently violates sections 301, 302, 306, 307, 308, 318, or 405 of the Act, or any condition or limitation implementing any of such sections in a permit issued under section 402 of the Act, or any requirement imposed in a pretreatment program approved under section 402(a)(3) or 402(b)(8) of the Act, is subject to criminal penalties of $2,500 to $25,000 per day of violation, or imprisonment of not more than one (1) year, or both. In the case of a second or subsequent conviction for a negligent violation, a person shall be subject to criminal penalties of not more than $50,000 per day of violation, or by imprisonment of not more than two (2) years, or both. Any person who knowingly violates such sections, or such conditions or limitations is subject to criminal penalties of $5,000 to $50,000 per day of violation, or imprisonment for not more than three (3) years, or both. In the case of a second or subsequent conviction for a knowing violation, a person shall be subject to criminal penalties of not more than $100,000 per day of violation, or imprisonment of not more than six (6) years, or both. Any person

who knowingly violates section 301, 302, 303, 306, 307, 308, 318 or 405 of the Act, or any permit condition or limitation implementing any of such sections in a permit issued under section 402 of the Act, and who knows at that time that he thereby places another person in imminent danger of death or serious bodily injury, shall, upon conviction, be subject to a fine of not more than $250,000 or imprisonment of not more than 15 years, or both. In the case of a second or subsequent conviction for a knowing endangerment violation, a person shall be subject to a fine of not more than $500,000 or by imprisonment of not more than 30 years, or both. An organization, as defined in section 309(c)(3)(B)(iii) of the Clean Water Act, shall, upon conviction of violating the imminent danger provision, be subject to a fine of not more than $1,000,000 and can be fined up to $2,000,000 for second or subsequent convictions [*40 CFR §122.41(a)(2)*] [*CWC 13385 and 13387*].

B. NOT APPLICABLE. Any person may be assessed an administrative penalty by the Regional Water Board for violating section 301, 302, 306, 307, 308, 318 or 405 of this Act, or any permit condition or limitation implementing any of such sections in a permit issued under section 402 of this Act. Administrative penalties for Class I violations are not to exceed $10,000 per violation, with the maximum amount of any Class I penalty assessed not to exceed $25,000. Penalties for Class II violations are not to exceed $10,000 per day for each day, during which the violation continues, with the maximum amount of any Class II penalty not to exceed $125,000 [*40 CFR §122.41(a)(3)*].

C. The CWA provides that any person who falsifies, tampers with, or knowingly renders inaccurate any monitoring device or method required to be maintained under this permit shall, upon conviction, be punished by a fine of not more than $10,000, or by imprisonment for not more than two years, or both. If a conviction of a person is for a violation committed after a first conviction of such person under this paragraph, punishment is a fine of not more than $20,000 per day of violation, or by imprisonment of not more than four years, or both [*40 CFR §122.41(j)(5)*].

D. The CWA provides that any person who knowingly makes any false statement, representation, or certification in any record or other document submitted or required to be maintained under this Order, including monitoring reports or reports of compliance or noncompliance shall, upon conviction, be punished by a fine of not more than $10,000 per violation, or by imprisonment for not more than six months per violation, or by both [*40 CFR §122.41(k)(2)*].

VII. ADDITIONAL PROVISIONS – NOTIFICATION LEVELS

A. Non-Municipal Facilities

Existing manufacturing, commercial, mining, and silvicultural Dischargers shall notify the Regional Water Board as soon as they know or have reason to believe [*40 CFR §122.42(a)*]:

1. That any activity has occurred or will occur that would result in the discharge, on a routine or frequent basis, of any toxic pollutant that is not limited in this Order, if

that discharge will exceed the highest of the following "notification levels" [*40 CFR §122.42(a)(1)*]:

a. 100 micrograms per liter (µg/L) [*40 CFR §122.42(a)(1)(i)*];

b. 200 µg/L for acrolein and acrylonitrile; 500 µg/L for 2,4-dinitrophenol and 2-methyl-4,6-dinitrophenol; and 1 milligram per liter (mg/L) for antimony [*40 CFR §122.42(a)(1)(ii)*];

c. Five (5) times the maximum concentration value reported for that pollutant in the Report of Waste Discharge [*40 CFR §122.42(a)(1)(iii)*]; or

d. The level established by the Regional Water Board in accordance with 40 CFR section 122.44(f) [*40 CFR §122.42(a)(1)(iv)*].

2. That any activity has occurred or will occur that would result in the discharge, on a non-routine or infrequent basis, of any toxic pollutant that is not limited in this Order, if that discharge will exceed the highest of the following “notification levels" [*40 CFR §122.42(a)(2)*]:

a. 500 micrograms per liter (µg/L) [*40 CFR §122.42(a)(2)(i)*];

b. 1 milligram per liter (mg/L) for antimony [*40 CFR §122.42(a)(2)(ii)*];

c. Ten (10) times the maximum concentration value reported for that pollutant in the Report of Waste Discharge [*40 CFR §122.42(a)(2)(iii)*]; or

c. The level established by the Regional Water Board in accordance with 40 CFR §122.44(f) [*40 CFR §122.42(a)(2)(iv)*].

B. Publicly-Owned Treatment Works (POTWs) (Not Applicable)

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ATTACHMENT E – MONITORING AND REPORTING PROGRAM (MRP)

Title 40 of the Code of Federal Regulations (CFR) section 122.48 requires that all National Pollutant Discharge Elimination System (NPDES) permits specify monitoring and reporting requirements. California Water Code sections 13267 and 13383 also authorize the Regional Water Quality Control Board (Regional Water Board) to require technical and monitoring reports. This MRP establishes monitoring and reporting requirements, which implement the federal and California regulations.

I. GENERAL MONITORING PROVISIONS

A. Samples and measurements taken as required herein shall be representative of the volume and nature of the monitored discharge. All samples shall be taken at the monitoring location identified in the representative sampling and analysis program. Another waste stream, body of water, or substance shall not dilute the monitored discharge. Monitoring points shall not be changed without notification to and the approval of the appropriate Regional Water Board.

B. Monitoring must be conducted according to USEPA test procedures approved under 40 CFR section 136, *Guidelines Establishing Test Procedures for the Analysis of Pollutants Under the Clean Water Act* as amended, unless other test procedures are specified in this Order and/or by the appropriate Regional Water Board.

C. If the Discharger monitors any pollutant more frequently than required by this Order using test procedures approved under 40 CFR section 136, or as specified in this Order or by the appropriate Regional Water Board, the results of the monitoring shall be included in the calculation and reporting of the data submitted in the Discharger's Annual Report. The increased frequency of monitoring shall also be reported.

D. Calculations for all limitations, which require averaging of measurements, shall utilize an arithmetic mean unless otherwise specified in this Order.

E. All analyses shall be performed in a laboratory certified to perform such analyses by the California Department of Health Services or a laboratory approved by the appropriate Regional Water Board.

F. All monitoring instruments and devices used by the Discharger to fulfill the monitoring program shall be properly maintained and calibrated to ensure accuracy. All flow measurement devices shall be calibrated at least once per year to ensure accuracy of the devices.

II. MONITORING LOCATIONS

A. Dischargers enrolling for the first time under this General Permit shall develop a representative sampling and analysis program to be used as case studies to represent the typical types of discharges occurring within their service areas. This

study, to be submitted as the first annual report, will include the monitoring locations and rationale for choosing those locations.

B. Re-enrollees must submit a new case study defining monitoring locations and rationale for these locations, if there are new types of discharges.

III. INFLUENT MONITORING REQUIREMENTS (Not Applicable)

IV. EFFLUENT MONITORING REQUIREMENTS

A. Dischargers who are enrolling for the first time under this General Permit shall develop a representative sampling and analysis program to be used as case studies to represent the typical types of discharges from utility vaults and underground structures. Separate case studies are required for each region. Re-enrollees are required to submit case studies only for newly identified types of discharges not previously covered in the initial case studies. The case studies will be used to provide reasonable assurance that the discharges will comply with the requirements of the General Permit. The case studies shall be completed within six months of enrollment under the General Permit, or within twelve months when no discharge occurs within the first six months. In the case studies, the Discharger shall define the types of discharges that occur and take up to five[1] representative samples of each type of discharge and analyze the samples using test procedures specified in 40 CFR section 136 for the following constituents:

- Total Petroleum Hydrocarbons (TPH)
  - TPH as Gasoline (TPH-g) - Report Benzene, Ethylbenze, Toluene, and Xylene
  - TPH as Diesel (TPH-d)
- Oil and Grease
- pH
- Total Suspended Solids (TSS)

B. Samples taken shall be representative of the monitored activities and shall be performed after the implementation of the Pollution Prevention Practices (PPPs) outlined in the Pollution Prevention Plan (PLAN).

C. The Discharger shall provide in the case studies at least the following:

1. A list of the typical types of discharges that occur in the project area.
2. A rationale for the selection of sampling locations.
3. A description of the sampling methods, locations, and frequency of monitoring for each type of discharge.
4. The results of any analysis done for each type of discharge.

[1] If there are less than five discharges, the number samples should be equal to the number of discharges for that year. For example, if a small utility only dewaters three vaults in a year, only three samples can and should be submitted in the annual report. The discharger must include an explanation of this in the annual report's cover letter.

D. First time enrollees shall submit case studies with the first annual report, as described in Section II, which constitutes the first year's annual monitoring. Case studies for newly identified types of discharges not previously covered or submitted with the first annual report shall be submitted with the annual report for that same year.

E. The Discharger shall provide a map showing the location of the samples taken for the case studies with respect to the distribution system. The map must also show the surface waters within the boundaries of the service area to which water may be discharged.

F. Annually, the Discharger, using test procedures specified in 40 CFR section 136, shall analyze a representative sample for each type of discharge listed in the case studies required by Provision IV.A.1. above for the following constituents:

Parameter	Units	Sample Type	Minimum Sampling Frequency	Required Analytical Test Method
TPH	mg/L or ug/L	Grab	Case Study & Annual	
Oil and Grease	mg/L	Grab	Case Study & Annual	
pH	Standard Units	Grab	Case Study & Annual	
Total Suspended Solids (TSS)	mg/L	Grab	Case Study & Annual	

Laboratories analyzing monitoring samples shall be certified by the Department of Health Services, in accordance with the provision of Water Code Section 13176, and must include quality assurance/quality control data with their reports.

The results of such analysis shall be reported in the annual report. Grab samples shall be collected at the applicable point of discharge (either at the storm drain or the receiving water). If a Discharger monitors the above constituents more frequently than required by this General Permit, then the results of such monitoring shall be included in the calculation and reporting of the data submitted in the annual report. Separate annual reports are required for each region.

G. The Discharger shall retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this Order, and records of all data used to complete the application for this Order, for a period of at least five years from the date of the sample, measurement, report, or application. This period may be extended by request of this Regional Water Board. These records shall include:

1. The date, place, and time of site inspections, sampling, visual observation, and/or measurement;
2. The individual(s) who performed the site inspections, sampling, visual observations, and/or measurements;
3. The dimension, size and/or volume of vault;
4. Flow measurements (if required) and duration of discharge;

5. The estimated volume of discharge;
6. The date and time of analyses;
7. The laboratory, staff, or wholesaler who performed the analyses;
8. Analytical results.

V. WHOLE EFFLUENT TOXICITY TESTING REQUIREMENTS (Not Applicable)

VI. LAND DISCHARGE MONITORING REQUIREMENTS (Not Applicable)

VII. RECLAMATION MONITORING REQUIREMENTS (Not Applicable)

VIII. RECEIVING WATER MONITORING REQUIREMENTS – SURFACE WATER AND GROUNDWATER (Not Applicable)

IX. OTHER MONITORING REQUIREMENTS (Not Applicable)

X. REPORTING REQUIREMENTS

A. General Monitoring and Reporting Requirements

The Discharger will submit the case studies as the first annual report. All reports submitted in response to this General Permit shall comply with signatory requirements set forth in V.B.2 in Attachment D. All reports shall be submitted to the appropriate Regional Water Board Executive Officer.

B. Self Monitoring Reports (SMRs)

1. At any time during the term of this permit, the State or Regional Water Board may notify the Discharger to electronically submit Self-Monitoring Reports (SMRs) using the State Water Board's California Integrated Water Quality System (CIWQS) Program Web site (http://www.waterboards.ca.gov/ciwqs/index.html). Until such notification is given, the Discharger shall submit hard copy SMRs. The CIWQS Web site will provide additional directions for SMR submittal in the event there will be service interruption for electronic submittal.

2. The Discharger shall submit annual monitoring results to the Regional Water Board by the **20th day of March** for the preceding calendar year. The Discharger shall report in the SMR the results for all monitoring specified in this MRP under sections VI through IX. Additionally, the Discharger shall report in the SMR the results of any **PPP and PLAN** required by Special Provisions – VI.C.3 of this Order. The Discharger shall submit **annual** SMRs including the results of all required monitoring using USEPA-approved test methods or other test methods specified in this Order. If the Discharger monitors any pollutant more frequently than required by this Order, the results of this monitoring shall be included in the calculations and reporting of the data submitted in the SMR.

3. The Discharger shall submit SMRs in accordance with the following requirements:

a. The Discharger shall arrange all reported data in a tabular format. The data shall be summarized to clearly illustrate whether the facility is operating in compliance with interim and/or final effluent limitations. The Discharger is not required to duplicate the submittal of data that are entered in a tabular format within CIWQS. When electronic submittal of data is required and CIWQS does not provide for entry into a tabular format within the system, the Discharger shall electronically submit the data in a tabular format as an attachment.

b. The Discharger shall attach a cover letter to the SMR. The information contained in the cover letter shall clearly identify violations of this Order; discuss corrective actions taken or planned; and the proposed time schedule for corrective actions. Identified violations must include a description of the requirement that was violated and a description of the violation.

c. SMRs must be submitted to the appropriate Regional Water Board, signed and certified as required by the Standard Provisions (Attachment D).

C. Discharge Monitoring Reports (DMRs)

When requested by USEPA, the Discharger shall also complete and submit Discharge Monitoring Reports to USEPA. The submittal date shall be specified in the request.

D. Other Reports (Not Applicable)

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ATTACHMENT F – FACT SHEET

As described in section III of this Order, this Fact Sheet includes the legal requirements and technical rationale that serve as the basis for the requirements of this Order.

I. PERMIT INFORMATION

A. **Background.** In 1972, the Federal Water Pollution Control Act, currently referred to as the Federal Clean Water Act (CWA), was amended to provide that the discharge of pollutants to waters of the United States from any point source is prohibited, unless the discharge is in compliance with a National Pollutant Discharge Elimination System (NPDES) permit. The federal regulations allow authorized states to issue either general permits or individual permits to regulate discharges of pollutants to waters of the United States. On August 15, 1996, the State Water Resources Control Board (State Water Board) issued a General Permit for discharges from utility vaults and underground structures to surface waters. The permit was reissued on July 19, 2001.

In accordance with Title 40, Code of Federal Regulations (CFR), the State Water Board must meet general program requirements prior to the re-issuance and adoption of a general NPDES permit. General program requirements include preparing a draft General Permit, public noticing, allowing a public comment period, and conducting a public hearing. To meet these requirements, the State Water Board prepared a draft General Permit. The draft General Permit was sent to interested parties on May 9, 2006 for comments. A public hearing to receive testimony from interested parties was scheduled for July 19, 2006. The Notice of Public Hearing was sent to the interested party list at the same time the draft General Permit was sent. A public hearing notice was also posted in major newspapers throughout the State of California on May 9, 2006.

This General Permit reissues the 2001 permit Order No. 2001-11-DWQ. Since the original permit was adopted in 1996, the United States Environmental Protection Agency (USEPA) promulgated the California Toxics Rule (CTR) in May 2000. The CTR, which is codified in 40 CFR section 131.38, establishes numeric criteria for priority toxic pollutants for California. The CTR and National Toxics Rule (NTR) criteria and water quality objectives for priority pollutants in state-adopted water quality control plans (Basin Plans), together with designated beneficial uses in those plans, serve as priority pollutant standards for the state. Concurrently with the CTR adoption, the State Water Board adopted a *Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California* (SIP).

B. **General Criteria.** This General Permit is intended to cover short-term intermittent discharges of pollutants to surface waters from utility vaults and underground structures. To be covered by this General Permit, discharges must meet the following criteria:

1. Pollutant concentrations in the discharge do not cause, have a reasonable potential to cause, or contribute to an exceedance of any applicable criterion

established by the USEPA pursuant to CWA section 303. Likewise, pollutant concentrations in the discharge do not cause, have a reasonable potential to cause, or contribute to an exceedance of any water quality objective adopted by the State or Regional Water Board including prohibitions of discharge for the receiving water.

The discharge does not cause acute or chronic toxicity in the receiving water.

This General Permit does **not** cover:

1. Discharges from vehicle and equipment washing, vehicle maintenance, and/or groundwater cleanup activities by utility companies.

2. Utility service construction activities by utility companies engaged in developing service areas. These activities may be covered under the statewide general NPDES permit for storm water discharges associated with construction activities (CAS000002) and/or CWA section 401 certifications.

3. Discharges by utility companies that are Dischargers and/or co-Dischargers under Urban Areawide Storm Water Permits, which cover the intended discharges.

4. Discharges to a sanitary sewer. These discharges do not need regulatory coverage under the NPDES Program, although the agency controlling the sanitary sewer must approve discharges to its conveyance system.

II. NOTIFICATION REQUIREMENTS

The purpose of this General Permit is to facilitate regulation of discharges from the de-watering of utility vaults and underground structures. To obtain coverage under this General Permit, the Discharger must submit a Notice of Intent (NOI), a project map(s), a Pollution Prevention Plan (PLAN), and first annual fee. Discharges in more than one Regional Water Quality Control Board (Regional Water Board) boundary must be covered by a separate enrollment under this General Permit. Each enrollment will cover all discharges occurring within the boundaries of that Regional Water Board. Signing the certification on the NOI signifies that the Discharger intends to comply with the provisions of this General Permit. An NOI must be signed to be valid.

III. DISCHARGE DESCRIPTION

Vaults are used to house meters, filters, pressure regulators, and valves with or without actuators. Structures can be either wet or dry. Wet structures include manholes and hand holes containing cables, cable connections, and signal enhancers. Dry structures are sealed more tightly and are usually air conditioned since these contain switchgears, computers, and electronics that are sensitive to heat and moisture.

For safety reasons, utility companies must de-water vaults and underground structures prior to performing any repair, maintenance, and/or installation of equipment. When the amount of water in the vaults or structures interferes with the safety and quality of the work to be done, water must be pumped out. Volume of discharges can vary from a few gallons to a few thousand gallons depending on the configuration and individual situation at each vault or structure. The duration of the discharges could last a few minutes to a few hours depending on the amount of water present in the vaults and underground structures and the pump used. Typical pump rates are five gallons per minute (gpm) to 20 gpm but could be as high as 60 gpm.

A. Description of Wastewater and Biosolids Treatment or Controls (Not Applicable)

B. Discharge Points and Receiving Waters

Under the General Permit, there may be multiple discharge points. Information regarding the receiving waters can be found in the completed NOI.

C. Summary of Existing Requirements and Self-Monitoring Report Data

Order No. 2001-11-DWQ, which this General Permit replaces, also required the development of Pollution Prevention Practices (PPPs) and a PLAN. The significant change is in the Monitoring and Reporting Program (MRP) requirements. The 2001 Order required the monitoring of total petroleum hydrocarbons (TPH), but did not specify between diesel and gasoline. It also did not explicitly state that monitoring was required in every region for those Dischargers operating in more than one region. It was implied by the term “representative,” but not stated directly. On February 28, 2005, in *Waterkeeper Alliance Inc., et al. v. EPA*, the 2nd Circuit Court of Appeals determined that nutrient management plans must be submitted as part of the NPDES permit application and subject to review and approval. The changes to the PLAN requirements in this permit reflect this Court Decision.

D. Compliance Summary (Not Applicable)

E. Planned Changes (Not Applicable)

IV. APPLICABLE PLANS, POLICIES, AND REGULATIONS

The requirements contained in the proposed Order are based on the requirements and authorities described in this section.

A. Legal Authorities

This Order is issued pursuant to section 402 of the CWA and implementing regulations adopted by the USEPA and Chapter 5.5, Division 7 of the California Water Code (CWC). It shall serve as an NPDES permit for point source discharges from utility vaults and underground structures to surface waters. This Order also serves as

Waste Discharge Requirements (WDRs) pursuant to Article 4, Chapter 4 of the CWC for discharges that are not subject to regulation under CWA section 402.

States may request authority to issue general NPDES permits pursuant to 40 CFR section 122.28. On June 8, 1989, the State Water Board submitted an application to the USEPA requesting revisions to its NPDES Program in accordance with 40 CFR 122.28, 123.62, and 403.10. The application included a request to add general permit authority to its approved NPDES Program. On September 22, 1989, the USEPA, Region 9, approved the State Water Board's request and granted authorization for the State to issue general NPDES permits.

B. California Environmental Quality Act (CEQA)

This action to adopt an NPDES permit is exempt from the provisions of the CEQA (Public Resources Code section 21100, et seq.) in accordance with section 13389 of the CWC.
State Water Board action on case-by-case exceptions is subject to the California Environmental Quality Act (CEQA). Because a Discharger cannot obtain coverage under this General Permit if pollutants in the discharge, cause, contribute, or have the reasonable potential to cause or contribute to a water quality standards violation and the permit requires Dischargers to implement PPPs to ensure the Dischargers will not cause a violation, the State Water Board's granting of the exceptions does not have the potential for causing significant adverse environmental effects. This General Permit is, therefore, exempt from CEQA. See California Code of Regulations, Title 14, section 15061(b)(3).

C. State and Federal Regulations, Policies, and Plans

1. **Water Quality Control Plans.** The Regional Water Boards have adopted a Water Quality Control Plans (hereinafter Basin Plans) that designate beneficial uses, establish water quality objectives, and contain implementation programs and policies to achieve those objectives for all waters addressed through the plans. In addition, State Water Board Resolution No. 88-63 requires that, with certain exceptions, the Regional Water Boards assign the municipal and domestic supply use to water bodies that do not have beneficial uses listed in the Basin Plans. The limitations set forth in this General Permit shall apply as is unless there are more stringent provisions expressed in the Regional Water Boards' Basin Plans.

2. **National Toxics Rule (NTR) and California Toxics Rule (CTR).** USEPA adopted the NTR on December 22, 1992, which was amended on May 4, 1995 and November 9, 1999, and the CTR on May 18, 2000, which was amended on February 13, 2001. These rules include water quality criteria for priority pollutants and are applicable to this discharge.

3. **State Implementation Policy.** On March 2, 2000, the State Water Board adopted the SIP, which became effective on April 28, 2000, with respect to the priority pollutant criteria promulgated for California by the USEPA through the NTR and to the priority pollutant objectives established by the Regional Water Boards in their

basin plans, with the exception of the provision on alternate test procedures for individual discharges that have been approved by USEPA Regional Administrator. The alternate test procedures provision was effective on May 22, 2000. The SIP became effective on May 18, 2000 with respect to the priority pollutant criteria promulgated by the USEPA through the CTR. The State Water Board adopted amendments to the SIP on February 24, 2005 that became effective on July 13, 2005. The SIP includes procedures for determining the need for and calculating Water Quality-Based Effluent Limitations (WQBELs), and requires Dischargers to submit data sufficient to do so. In this permit the State Water Board grants an exception from sections 1.3 (Determination of Priority Pollutants Requiring WQBELs) and 1.4 (Calculations of Effluent Limitations) of the SIP because numeric effluent limitations are infeasible for discharges from utility vaults and underground structures. Granting an exception will not compromise protection of inland surface water, bay, or estuarine beneficial uses and will serve the public interest because:

a. A Discharger cannot be covered under this General Permit if the discharge can cause or contribute to a violation of any applicable water quality standard, including priority pollutant standards.
b. All Dischargers covered under this General Permit must implement a PLAN to ensure compliance with all applicable water quality standards, including standards for priority pollutants.

The SIP establishes procedures for selecting priority pollutants requiring WQBELS and for calculating the limits. The SIP also authorizes case-by-case exceptions if the State Water Board determines that (1) the exceptions will not compromise protection of surface water beneficial uses, and (2) the public interest will be served. This proposed revision of the General Permit approves case-by-case exceptions from the SIP provisions on the selection of priority pollutants requiring limits (section 1.3) and the calculation of numeric limitations (section 1.4). The permit proposes these exceptions because numeric effluent limitations for discharges from utility vaults and underground structures to surface waters are infeasible.

This General Permit meets the conditions for case-by-case exceptions from the SIP provisions on selection of pollutants requiring WQBELS and calculation of numeric limits. Although the permit does not contain numeric effluent limitations for toxic pollutants, granting the exceptions will not compromise the protection of surface water beneficial uses for several reasons. First, no Discharger can obtain coverage under the permit if pollutants in the discharge have the reasonable potential to cause or contribute to a water quality standards violation. Second, the permit requires Dischargers to implement pollutant prevention practices to ensure that the discharges will not cause a water quality standards violation.

Because the conditions of the case-by-case exception have been met, the State Water Board will continue to grant an exception based on the following:

a. A Discharger cannot obtain coverage under this General Permit if pollutants in the -discharge have the reasonable potential to cause or contribute to a water quality standards violation.

b. This General Permit requires Dischargers to implement PPPs to ensure that discharges will not cause a violation of any applicable objectives (or criteria) in the receiving waters.

c. Discharges from utility vaults and underground structures to surface waters will not have the potential to cause significant adverse environmental effects provided the conditions of the newly adopted General Permit are met.

4. **Antidegradation Policy.** Section 131.12 of 40 CFR requires that State water quality standards include an antidegradation policy consistent with the federal policy. The State Water Board established California's antidegradation policy in State Water Board Resolution No. 68-16, which incorporates the requirements of the federal antidegradation policy where applicable. Resolution No. 68-16 requires that existing water quality be maintained unless degradation is justified based on specific findings. As discussed in detail in this Fact Sheet, the permitted discharge is consistent with the antidegradation provision of 40 CFR section 131.12 and State Water Board Resolution No. 68-16.

5. **Anti-Backsliding Requirements.** Sections 402(o)(2) and 303(d)(4) of the CWA and 40 CFR section 122.44(l) prohibit backsliding in NPDES permits. These anti-backsliding provisions require that effluent limitations in a reissued permit must be as stringent as those in the previous permit, with some exceptions in which limitations may be relaxed. **All effluent limitations in the Order are at least as stringent as the effluent limitations in the previous Order.**

6. **Monitoring and Reporting Requirements.** Section 122.48 of 40 CFR requires that all NPDES permits specify requirements for recording and reporting monitoring results. Sections 13267 and 13383 of the CWC authorize the Regional Water Boards to require technical and monitoring reports. The MRP establishes monitoring and reporting requirements to implement Federal and State requirements. This MRP is provided in Attachment E.

D. Impaired Water Bodies on CWA 303(d) List (Not Applicable)

E. Other Plans, Polices and Regulations (Not Applicable)

V. RATIONALE FOR EFFLUENT LIMITATIONS AND DISCHARGE SPECIFICATIONS

The CWA requires point source Dischargers to control the amount of conventional, non-conventional, and toxic pollutants that are discharged into the waters of the United States. The control of pollutants discharged is established through effluent limitations and other requirements in NPDES permits. There are two principal bases for effluent limitations: 40 CFR section 122.44(a) requires that permits include applicable technology-based limitations and standards; and 40 CFR section 122.44(d) requires that permits include

water quality-based effluent limitations to attain and maintain applicable numeric and narrative water quality criteria to protect the beneficial uses of the receiving water. Where numeric water quality criteria have not been established, three options exist to protect water quality: 1) 40 CFR section 122.44(d) specifies that WQBELs may be established using USEPA criteria guidance under CWA section 304(a); 2) proposed state criteria or a state policy interpreting narrative criteria supplemented with other relevant information may be used; or 3) an indicator parameter may be established.

A. Discharge Prohibitions

Discharges under this Order are required to be nontoxic. Toxicity is the adverse response of organisms to chemicals or physical agents. This prohibition is based on the Regional Water Boards' Basin Plans, which require that all waters be maintained free of toxic substances in concentrations that are lethal or produce other detrimental responses in aquatic organisms. Detrimental responses include, but are not limited to, decreased growth rate and decreased reproductive success of resident or indicator species. Basin Plans also require waters to be free of toxic substances in concentrations that produce detrimental physiological responses in human, plant, or animal life. This objective applies regardless of whether the toxicity is caused by a single substance or the interactive effect of multiple substances.

B. Technology-Based Effluent Limitations (TBELs)

1. Scope and Authority

The CWA requires that TBELs be established based on several levels of controls:

A. Best Practicable Treatment Control Technology (BPT) represents the average of the best performance by plants within an industrial category or subcategory. BPT standards apply to toxic, conventional, and nonconventional pollutants.

B. Best Available Technology Economically Achievable (BAT) represents the best existing performance of treatment technologies that are economically achievable within an industrial point source category. BAT standards apply to toxic and nonconventional pollutants.

C. Best Conventional Pollutant Control Technology (BCT) represents the control from existing industrial point sources of conventional pollutants including BOD, TSS, fecal coliform, pH, and oil and grease. The BCT standard is established after considering the "cost reasonableness" of the relationship between the cost of attaining a reduction in effluent discharge and the benefits that would result, and also the cost effectiveness of additional industrial treatment beyond BPT.

D. New Source Performance Standards (NSPS) represent the best available demonstrated control technology standards. The intent of NSPS guidelines is to set limitations that represent state-of-the-art treatment technology for new sources.

The CWA requires USEPA to develop Effluent Limitations, Guidelines and Standards (ELGs) representing application of BPT, BAT, BCT, and NSPS. Section 402(a)(1) of the CWA and 40 CFR section 125.3 of the NPDES regulations authorize the use of Best Professional Judgment (BPJ) to derive technology-based effluent limitations on a case-by-case basis where ELGs are not available for certain industrial categories and/or pollutants of concern. Where BPJ is used, the permit writer must consider specific factors outlined in 40 CFR section 125.3.

2. Applicable Technology-Based Effluent Limitations

It is not feasible to establish numeric effluent limitations for pollutants in discharges from utility vaults and underground structures. Instead, the provisions of this General Permit require implementation of Pollution Prevention Practices (PPPs) to control and abate the discharge of pollutants to surface waters and to achieve compliance utilizing BAT and BCT requirements and with applicable water quality standards.

C. Water Quality-Based Effluent Limitations (WQBELs)

1. Scope and Authority

As specified in 40 CFR section 122.44(d)(1)(i), permits are required to include WQBELs for pollutants (including toxicity) that are or may be discharged at levels that cause, have reasonable potential to cause, or contribute to an excursion above any state water quality standard. The process for determining reasonable potential and calculating WQBELs when necessary is intended to protect the designated uses of the receiving water as specified in the Basin Plan, achieve applicable water quality objectives and criteria contained in state plans and policies, and meet water quality criteria in the CTR and NTR.

2. Applicable Beneficial Uses and Water Quality Criteria and Objectives

The designated beneficial uses of surface waters throughout the State may include municipal, domestic, industrial, and agricultural supply; water contact and non-contact recreation; navigation; groundwater recharge and freshwater replenishment; hydropower generation; wildlife habitat; cold freshwater and warm freshwater habitat; fish migration and fish spawning; marine habitat; estuarine habitat; shellfish harvesting; ocean commercial and sport fishing; areas of special biological significance; and preservation of rare and endangered species. To the extent that the applicable Basin Plan designates additional or different beneficial uses, the Basin Plan shall control.

3. Determining the Need for WQBELs

NPDES permits for discharges to surface waters must meet all applicable provisions of sections 301 and 402 of the CWA. These provisions require controls of pollutant discharges that utilize BAT and BCT to reduce pollutant and any more stringent controls necessary to meet water quality standards.

Utility companies may have multiple discharges from utility vaults and other underground structures as a result of storm water inflow, subterranean seepage, and/or water condensation from the air conditioning units of dry structures. These vaults and underground structures may have small quantities of oil and grease present due to the normal operation of equipment, as well as small quantities of other pollutants. Establishment of numeric effluent limitations for pollutants from utility vaults and underground structures is not feasible because: (1) utility companies have numerous short duration intermittent releases of water to surface waters from many different locations, and (2) treatment of all these releases to meet numeric effluent limitations would be impractical.

Therefore, the effluent limitations contained in this General Permit are narrative and include the requirement to implement appropriate PPPs, which are equivalent to Best Management Practices (BMPs). Section 122.44(k)(3) of 40 CFR allows the use of BMPs to control or abate the discharge of pollutants when "Numeric effluent limitations are infeasible; or (4) the practices are reasonably necessary to achieve effluent limitations and standards or to carry out the purposes and intent of the CWA." It is not feasible to establish WQBELs for pollutants in discharges from utility vaults or underground structures; therefore, in lieu of WQBELs, this Order requires Dischargers to establish PPPs in PLANs.

The PPPs, which may include treatment of discharges to surface waters, will constitute BAT and BCT and are required to achieve compliance with water quality standards. Receiving water requirements must be met by the Discharger and are stated as either numerical or narrative requirements, as appropriate. They are intended to cover all applicable Basin Plan objectives, including narrative toxicity objectives, total residual chlorine objectives (if applicable), and all applicable federal criteria, including CTR and NTR criteria.

4. WQBEL Calculations (Not Applicable)

5. Whole Effluent Toxicity (WET) (Not Applicable)

D. Final Effluent Limitations (Not Applicable)

E. Interim Effluent Limitations (Not Applicable)

F. Land Discharge Specifications (Not Applicable)

G. Reclamation Specifications (Not Applicable)

VI. RATIONALE FOR RECEIVING WATER LIMITATIONS

A. Surface Water

Receiving Water Limitations are based upon water quality objectives contained in appropriate Regional Water Board Basin Plans, statewide Water Quality Control Plan, or criteria promulgated by USEPA pursuant to CWA section 303.

B. Groundwater (Not Applicable)

VII. RATIONALE FOR MONITORING AND REPORTING REQUIREMENTS

Section 122.48 of 40 CFR requires all NPDES permits to specify recording and reporting of monitoring results. Sections 13267 and 13383 of the CWC authorize the Water Boards to require technical and monitoring reports. The MRP, Attachment E of this Order, establishes monitoring and reporting requirements to implement federal and state requirements. The following provides the rationale for the monitoring and reporting requirements contained in the MRP for utility vault and underground structure discharges.

A. Influent Monitoring (Not applicable)

B. Effluent Monitoring

In reviewing the monitoring reports, the State Water Board found that although Dischargers were reporting TPH, a distinction between diesel and gasoline was not always made. TPH should be reported as a total and as TPH diesel and TPH gasoline (TPH-g). Also, for detections of TPH-g, the amount of benzene, ethylbenzene, toluene, and xylene should be reported. Benzene, ethylbenzene, and toluene are priority pollutants per 40 CFR section 131.

C. Whole Effluent Toxicity Testing Requirements (Not Applicable)

A Whole Effluent Toxicity (WET) Limit is required if a discharge causes, has a reasonable potential to cause, or contributes to an exceedance of applicable water quality standards, including numeric and narrative. Since these types of discharges are prohibited under this General Permit, WET limits are not applicable.

D. Receiving Water Monitoring (Not Applicable)

E. Other Monitoring Requirements (Not Applicable)

VIII. RATIONALE FOR PROVISIONS

A. Standard Provisions

Standard Provisions, which in accordance with 40 CFR sections 122.41and 122.42, apply to all NPDES discharges and must be included in every NPDES permit, are provided in Attachment D.

B. Special Provisions

1. Reopener Provisions (Not Applicable)

2. Special Studies and Additional Monitoring Requirements (Not Applicable)

3. Best Management Practices and Pollution Prevention Plan (PLAN)

The development of PPPs provides the flexibility necessary to establish controls, which can appropriately address the different situations in which utility companies discharge water to surface waters. The PPPs have two major objectives:

a. To identify situations which allow water to collect in the vault or underground structure and lead to a discharge.

b. To describe and ensure the implementation of practices that will reduce pollutants in the discharge from the normal operations of utility companies.

At this time, standard industrywide PPPs have not been developed for utility companies. The Discharger must prepare a PLAN and implement it whenever there is a discharge. If standard industrywide PPPs are developed, then each utility company may utilize those standard PPPs or develop a PLAN utilizing selected standard PPPs as appropriate. PLANs must meet the specifications described in section VI.C.3. For help in developing a PLAN, refer to the following document: *California Stormwater BMP Handbook - Industrial/Commercial (January 2003 Edition),* published by the California Stormwater Quality Association. It is available online at: http://www.cabmphandbooks.com and provides references the Discharger may find useful.

Dischargers must show that no feasible alternatives to surface water discharge exist and that measures have been or will be employed to minimize potential impacts. Based on the authority contained in section 304(e) of the CWA and the regulations set forth in 40 CFR 122.44(k), the states may incorporate PPPs, which are equivalent to BMPs, into NPDES permits.

4. Compliance Schedules (Not Applicable)

5. Construction, Operation, and Maintenance Specifications (Not Applicable)

6. Special Provisions for Municipal Facilities (POTWs Only) (Not Applicable)

7. Other Special Provisions

a. Although this is a State Water Board permit, the Regional Water Boards are responsible for reviewing monitoring reports, reviewing and approving Discharger's PLANs, conducting compliance inspections, and taking enforcement actions in order to maintain water quality control in waters of their region.

b. Dispose of solids removed from liquid wastes in a manner that is consistent with Title 27, of the California Code of Regulations and approved by the appropriate Regional Water Board's Executive Office.

IX. PUBLIC PARTICIPATION

In considering the re-issuance and adoption of the General Permit for utility vaults and underground structures, the State Water Board staff has developed a draft General Permit. The State Water Board encouraged public participation in the WDR adoption process.

A. Notification of Interested Parties

The State Water Board notified interested agencies and persons of its intent to prescribe waste discharge requirements in this General Permit and provided them with an opportunity to submit their written comments and recommendations. On May 9, 2006 notification was provided on the State Water Board webpage and in the following newspapers: Santa Rosa Press Democrat, San Francisco Daily Journal, San Luis Obispo Tribune, Los Angeles Daily Journal, Sacramento Daily Recorder, Victorville Daily Press, Palm Springs Desert Sun, and San Diego Daily Transcript. On May 9, 2006, the State Water Board sent out notification through a Lyris electronic mail list and by U.S. Post.

B. Written Comments

The staff determinations were tentative. Interested persons were invited to submit written comments concerning this tentative General Permit. Comments were to be submitted either in person, or by fax, email, or mail to the Executive Office at the State Water Board at the address on the cover page of this permit.

To be fully addressed by staff and considered by the State Water Board, written comments must have been received at the State Water Board office by 5:00 p.m. on **June 9, 2006.**

C. Public Hearing

The State Water Board held a public hearing on the tentative General Permit during its regular Board meeting on the following date and time and at the following location:

Date: **July 19, 2006**
Time: **10 a.m.**
Location: **Coastal Hearing Room Joe Serna Jr./CAL/EPA Building**
1001 I Street, 2nd Floor
Sacramento, CA 95814

Interested persons were invited to attend. At the public hearing, the State Water Board heard testimony pertinent to the discharge and General Permit. Oral testimony was heard.

D. Information and Copying

Order-related documents, tentative effluent limitations and special provisions, comments received, and other information are on file and may be inspected at the address above at any time between 8:30 a.m. and 4:45 p.m., Monday through Friday. Copying of documents may be arranged through the State Water Board by calling (916) 341-5455.

E. Register of Interested Persons

Any person interested in being placed on the mailing list for information regarding the General Permit was invited to contact the State Water Board, reference this General Permit, and provide a name, address, and phone number.

F. Additional Information

Requests for additional information or questions regarding this General Permit were directed to **Erin Mustain** at **(916) 445-9379**.

This General Permit will expire on July 19, 2011. Enrollees covered under this General Permit at the time of expiration will automatically be re-enrolled under the reissued permit, until the effective date of this permit, unless a Notice of Termination or Transfer (NOTT) is submitted to terminate coverage.

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1.0 INTRODUCTION

1.1 Background

The Drainage Area Management Plan (DAMP) is the principal policy, programmatic guidance and planning document for the Orange County Stormwater Program (the Program), a municipal regulatory compliance initiative focused on the management and protection of Orange County's streams, rivers, creeks and coastal waters. The participants in this program are the County of Orange, the Orange County Flood Control District and the cities of Orange County.

The primary focus of the DAMP is addressing the impacts of urban runoff on water quality. Urbanization creates rooftops, driveways, roads and parking lots which increase the imperviousness of the land. This imperviousness increases the timing and volume of rainfall runoff (compared to pre-development conditions) and provides a source of pollutants that are flushed or leached by rainfall runoff into aquatic systems. The potential environmental consequences of these impacts are loss or impairment of the aquatic beneficial uses of streams, rivers, creeks, and coastal waters.

The stormwater program was initiated in 1990 as a cooperative local government response to requirements stemming from the Clean Water Act regulations. The 1972 Federal Water Pollution Control Act, subsequently known as the Clean Water Act (CWA), established the National Pollutant Discharge Elimination System (NPDES) permitting program. As a result of court decisions and the overriding need to clarify stormwater permitting requirements, the CWA required the Environmental Protection Agency (EPA) to issue regulations to be effective by 1983 that included stormwater runoff from rainfall. Congress passed a Clean Water Act Amendment in 1987, the Water Quality Act, which brought stormwater discharges into the NPDES Program. EPA issued subsequent regulations on November 16, 1990.

In response to those regulations, the County of Orange (subsequently referred to as the Principal Permittee), the Orange County Flood Control District and the incorporated cities of Orange County (collectively referred to as Permittees) have obtained, renewed and complied with the following NPDES Stormwater Permits from the Santa Ana and San Diego Regional Water Quality Control Boards (subsequently referred to as the Santa Ana Regional Board, the San Diego Regional Board or collectively as the Regional Boards):

Permit term	Santa Ana Regional Board			San Diego Regional Board		
	Order No.	*NPDES No.*	*Date Adopted*	*Order No.*	*NPDES No.*	*Date Adopted*
First (1990-1995)	90-71	CA 8000180	July 1990	90-38	CA 0108740	July 1990
Second (1996-2002)	96-31	CAS618030	March 1996	96-03	CAS0108740	August 1996
Third (2002-2007)	R8-2002-0010	CAS618030	January 2002	R9-2002-0001	CAS0108740	February 2002
Fourth						

Each permit renewal has required the Permittees to continue to implement ongoing stormwater quality management programs and update and develop additional programs in order to control pollutants in stormwater discharges. This "iterative management" approach which is based on a continuous improvement process of implementation is a fundamental underpinning of the Orange County program and consistent with the intent of the Permits.

One of the major challenges for the Permittees in updating the programs is the reconciliation between the two Regional Board permits and the resulting program requirements that had significant differences for the first time with the issuance of the Third Term Permits. As a result of the need to reconcile the differences between the two permits, the 2003 DAMP represented a departure from its 1993 predecessor. Previously, the 1993 DAMP constituted a self-contained policy and program for reducing the discharge of pollutants from municipal storm drains to the maximum extent practicable. It addressed the requirements of permits that, although issued by two separate Regional Boards, did not differ. Under the Third Term Permit period, the 2003 DAMP addressed the two permits that achieve similar objectives through different sets of requirements.

The reconciliation between the two Third Term Permits has also been achieved through the development by each Permittee of a Local Implementation Plan (LIP) (also termed Jurisdictional Urban Runoff Management Plan or JURMP in the San Diego Regional Board Third Term Permit **– DAMP Appendix A**). The 2003 DAMP laid the detailed foundation for Permittees to develop their LIPs by establishing Model Programs and providing a measure of accountability for each of the major program areas. In developing their Local Implementation Plans, the Permittees modified the DAMP Model Programs as necessary to ensure that their local conditions were addressed and developed a plan for the implementation of the program within their jurisdiction.

1.2 Regulatory Requirements

Section 402(p) of the CWA, as amended by the Water Quality Act of 1987, requires that municipal NPDES Permits include:

1. A requirement to effectively prohibit non-storm water discharges into municipal storm sewers; and

2. Controls to reduce the discharge of pollutants from municipal storm drains to the maximum extent practicable, including management practices, control techniques and system, design and engineering methods, and such other provisions as the Administrator or the State determines appropriate for the control of such pollutants.

Regulations promulgated by EPA on November 16, 1990 (40 CFR 122.26 (d)(2)(iv)) require municipal NPDES permit applicants to develop a management program to effectively address these requirements.

The federal regulations also indicate that the proposed management program, such as the DAMP, "*shall include a comprehensive planning process which involves public participation and where necessary intergovernmental coordination, to reduce the discharge of pollutants to the maximum extent practicable using management practices, control techniques and system, design and engineering methods, and such other provisions which are appropriate*".

The First Term Permits similarly required the development of a management program to address the regulatory requirements and defined "maximum extent practicable" as follows:

> "*Maximum extent practicable (MEP) means to the maximum extent possible, taking into account equitable considerations of synergistic, additive, and competing factors, including but not limited to, gravity of the problem, fiscal feasibility, public health risks, societal concern, and social benefits.*"

This definition set the foundation for the Orange County Stormwater Program and places upon the Permittees the continuing responsibility of weighing economic, societal, and equity issues as they define the policies and standards to be employed in implementing the program.

1.3 Objectives of the Drainage Area Management Plan

The main objectives of the DAMP are to fulfill the commitment of the Permittees to present a plan that satisfies NPDES permit requirements and to evaluate the impacts of urban stormwater discharges on receiving waters. An increasingly important aspect of the DAMP is to identify additional commitments for the municipal stormwater programs that may be needed to address urban Total Maximum Daily Load requirements that are being incorporated into the NPDES permits.

There are a number of important public policy issues which have influenced the Permittees in framing this DAMP and which consequently define the objectives. Resources, both public and private, are limited and public support is essential. In implementing this program it is the intent of the Permittees to proceed in a measured, deliberate way designed to obtain the maximum

benefit for the resources expended and to secure maximum public awareness, understanding and support.

The Permittees are aware that a successful stormwater quality management program depends on the awareness, commitment, cooperation and support of the various segments of the public, including businesses, industry, development, utilities, environmental groups, institutions, homeowners and the general public. Accordingly, it is a continuing objective of the plan to assure an open planning process, with ample opportunity for public participation and meaningful consideration of the input obtained. Accomplishment of this objective will be furthered by the management structure provided herein and by public meetings, hearings, workshop, and web postings as part of the planning and decision making process.
The DAMP is the principal policy, guidance and reporting document for the Orange County NPDES Stormwater Program that is implemented within each Permittee's jurisdiction as documented within its LIP.

The DAMP describes the programs that will serve to:

1. Provide the framework for the program management activities (**Section 2.0**).

2. Establish a plan for continuous program improvement and a Watershed Management context for the program (**Section 3.0**);

3. Provide the legal authority for prohibiting unpermitted discharges into the storm drain system and for requiring BMPs in new development and significant redevelopment (**Section 4.0**);

4. Improve existing municipal pollution prevention and removal BMPs to further reduce the amount of pollutants entering the storm drain system. (**Section 5.0**);

5. Educate the public about the issue of urban stormwater and non-stormwater pollution and obtain their support in implementing pollution prevention BMPs (**Section 6.0**);

6. Ensure that all new development and significant redevelopment incorporates appropriate Site Design, Source Control and Treatment Control BMPs to address specific water quality issues. (**Section 7.0**);

7. Ensure that construction sites implement control practices that address control of construction related pollutants discharges including erosion and sediment control and on-site hazardous materials and waste management (**Section 8.0**);

8. Ensure that existing development will address discharges from industrial facilities, selected commercial businesses, residential development and common interest areas/homeowner associations. (**Section 9.0**);

9. Detect and eliminate illegal discharges/illicit connections to the municipal storm drain system (**Section 10.0**);

10. Conduct a stormwater monitoring program to identify impacted receiving waters to assist in the prioritization of watersheds for analysis and planning, and to assist in the prioritization of pollutants to facilitate the development of specific controls to address these problems (**Section 11.0**); and

The emphasis of the program will continue to provide for equitable consideration of all DAMP objectives. This consideration involves the use of a strategic framework of water quality planning and BMP investigation and is a systematic and iterative process of:

1. Implementing additional BMPs and revising current BMPs based upon site specific water quality problems, technical, institutional and economic feasibility, and the protection of beneficial uses of the receiving waters;
2. Monitoring to ensure that the BMPs are correctly applied and to determine BMP effectiveness in achieving water quality standards; and
3. Adjustment of BMPs if water quality standards are not being achieved or possible adjustment of water quality standards if they are not appropriate.

This approach is consistent with the intent of the Permittees to reduce the discharge of pollutants from municipal storm drains to the MEP and to commit to the 2007 DAMP as an ongoing step in a comprehensive planning process rather than its culmination (**Figure 1-1**).

Figure 1-1
Stormwater Program Iterative Process

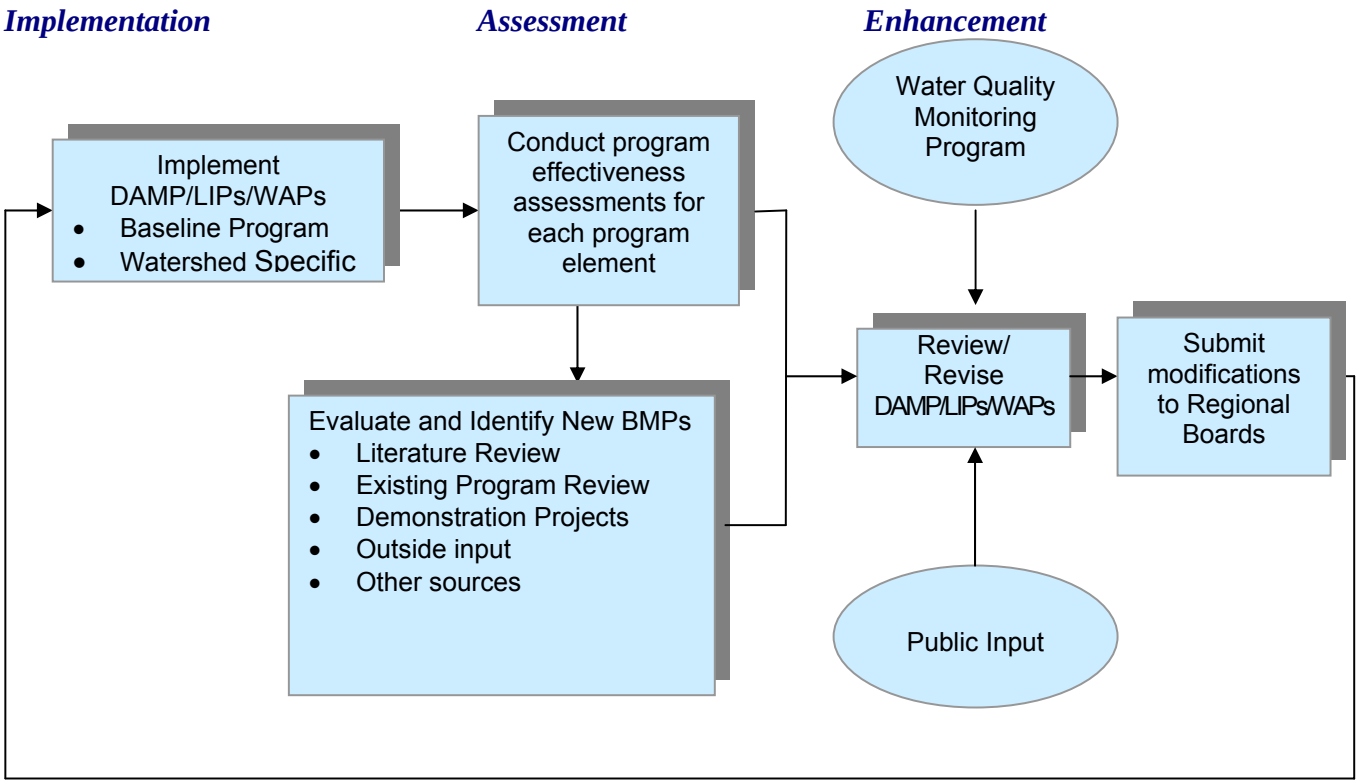

1.4 Permittee Commitments

The Permittees are committed to implementing a strategic and comprehensive public education program as a central program component in order to continue to raise the level of public awareness and, at the same time, reduce the impacts of urban stormwater runoff.

The Permittees are also committed to maintaining the integrity of the receiving waters and their ability to sustain beneficial uses. As such, the Permittees have designed and implemented a countywide baseline stormwater management program in order to be able to continually re-assess the conditions of the waters within Orange County and help determine the impact, if any, of urban stormwater discharges to the beneficial uses of those waters.

This baseline effort is informed by a water quality planning process, which focuses resources on the impacts of urban stormwater discharges on beneficial uses. The Permittees have begun to prioritize these initiatives (**Section 3**) and will continue to analyze and evaluate the existing and future baseline monitoring program data to identify those watersheds exhibiting the most urgent need for attention.

The Permittees presently own and operate an extensive system of flood control, drainage,

recreational, habitat and greenbelt corridor facilities. Some of these have already been modified to yield regional water quality benefits while still safely and reliably performing their primary function. The Permittees will continue to evaluate opportunities to incorporate stormwater control features into existing flood control structures in each Orange County watershed as they are designed and/or identified through the water quality planning process (**Section 3** and the watershed action plans (WAPs) **Appendix D**). The Permittees have considerable experience and expertise in the planning, design and operation of flood control and drainage systems. They are familiar with the regional watershed approach to drainage planning and they are aware of the economic benefit of regional flood control facilities. The Permittees will continue to approach the water quality management program on the same regional watershed basis, guided by the priorities as identified through the water quality monitoring program.

Research, technical and engineering design data indicate that pollution prevention and removal design parameters for stormwater are still in a developmental phase. The Permittees will continue to investigate and verify the effectiveness of the various treatment control BMP designs through experience, research and demonstration projects.

The Permittees will continue to vigorously detect and eliminate illegal discharges/illicit connections into the storm drain system.

Since the majority of the aquatic resources within Orange County are in marine or estuarine habitats, the Permittees are committed to participating in various regional research and/or monitoring programs which provide unique opportunities to gather valuable information about the impact on these habitats and place them in a larger regional context.

By applying this systematic and iterative process, the Permittees intend to further improve existing stormwater management practices, better understand water quality problems and implement remedial measures in order to protect the existing water quality and improve problem areas.

Program Assessments and Modifications
In order to develop an effective program for the Fourth Term Permit period, careful consideration was given to the objectives of the program and the relative importance of each element. Within each section of the DAMP, there is a discussion regarding the foundation of each Orange County Stormwater Program element, the development of the Program and the assessment of the program's effectiveness.

The Program Effectiveness Assessment (PEA) serves as the foundation for the submittal of the Annual Progress Report that is submitted each year to the Regional Boards and serves as the basis for the evaluation of the Local Implementation Plans (LIPs) and subsequently the Watershed Action Plans. By completing the effectiveness assessment, the Permittees will each have a baseline by which they can compare subsequent evaluations and identify trends on a jurisdictional, watershed and countywide basis. This information will then be used to determine where modifications within the program may be necessary and will ensure that the iterative evaluation and improvement process is applied to each of the program components and used as an effective management tool. This approach is illustrated in the following graphic:

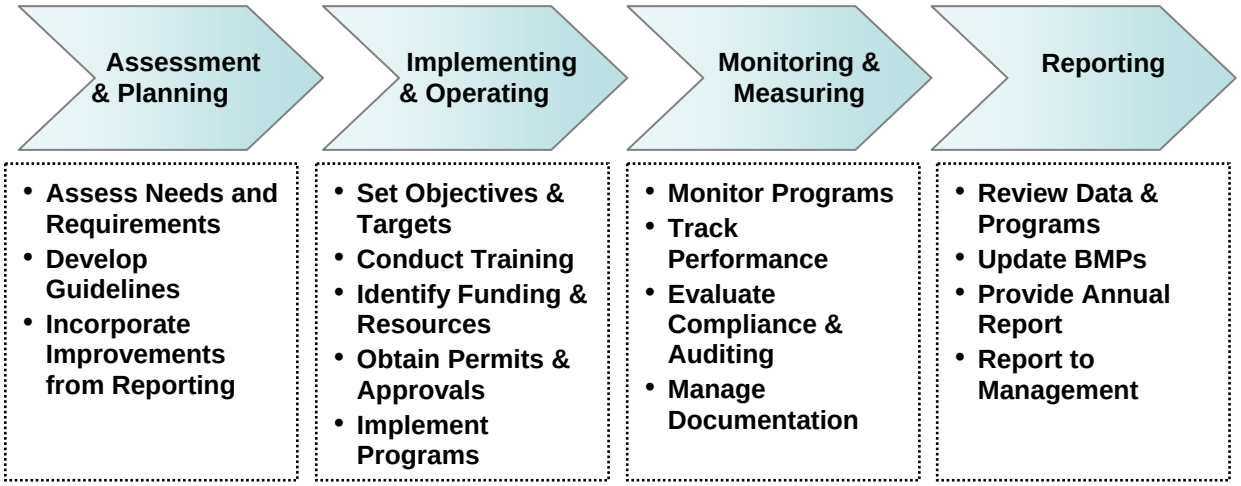

The current PEA approach is described in Appendix C of the DAMP. An updated PEA approach is being developed based on Environmental Management System principles.

1.5 DAMP Coverage

This DAMP is applicable to stormwater permits issued by the Regional Boards for areas of Orange County. The non-topographic boundary between Orange County and adjoining counties could result in certain Permittees being subjected to flows originating from or discharging to areas that are subject to separate NPDES municipal stormwater permits issued by the Regional Boards.

The common drainage issues with Orange, Riverside and San Bernardino counties began to be addressed during the Second Term Permit period through joint participation in integrated monitoring and research programs. Conversely, some drainage in the northwest portion of the county is tributary to the San Gabriel River watershed which is within the Los Angeles Regional Board's area.

The countywide drainage maps, which are used by the Permittees for most of the stormwater program components, have been included as **Exhibit 1.I.**

1.6 Description of Drainage Area and Climate

Drainage Area

Orange County has an area of 500,000 acres, beginning on a coastal plain and rising to an elevation of over 5,000 feet in the Puente Hills and Santa Ana Mountains to the north and east. Before urbanization, which began in the early 1950s, Orange County was drained by ephemeral streams and agricultural drainage ditches which were dry most of the year and carried measurable flow primarily during short duration flash floods and longer duration general winter storms.

As urbanization progressed, man-made agricultural drainage ditches were enlarged to flood control channels and the few natural streams such as Santa Ana River, San Diego Creek and San Juan Creek were constrained within levees to provide flood protection. Ephemeral flows in some of the man-made and natural channels have been replaced with continuous low flows from urban and agricultural irrigation.

Since the 1950's the population of Orange County has grown approximately 20% per year, so that now Orange County is predominantly an urban county encompassing 34 cities and a total population of 3 million people. Population growth has slowed as the County has become largely built out, and is projected at approximately 1% per year for the next 20 years.

Climate

Orange County's climate has hot dry summers and mild winters. Nearly all the annual precipitation falls in only a few storm events between October and April. During times of drought, it is not unusual for years to pass between major rainfalls. Precipitation results from three distinct mechanisms. The most important is the convergence mechanism associated with general winter storms originating in Alaska and picking up moisture as they travel south and east.

The second major precipitation mechanism is orographic lifting where moist air masses are deflected upward by local mountains, releasing rain. Orographic rainfall is also associated with winter rainfall. The third precipitation mechanism, which can cause extremely intense local precipitation, is the convective thunderstorm. One of the most intense convective rainfall events of record in Southern California dropped 11 inches of rainfall in about 80 minutes. On occasion, unstable tropical air masses move in from the south and produce rainfall. These tropical air masses combine convergence mechanisms with convective mechanisms to produce intense thunderstorms.

It is common for successive storms of varying durations and intensities to compound their effects, with the heavy rainfall of the second or third storm creating the most severe flood conditions. Regardless of the source of precipitation, Orange County only receives an average of 12 to 13 inches of rain per year. The present urban and former agricultural lifestyles are made possible only by large quantities of water imported from the Colorado River and Northern California.

This climate pattern creates unique challenges for stormwater quality program management. The extended dry periods result in a typical pattern of continuous base flow in most local storm drains, channels and creeks that is composed entirely of urban runoff with certain common pollutants from such activities as over-irrigation from landscaping, car washing and other routine uses of water. The more limited wet weather runoff periods and storm events result in rapidly rising and falling receiving water flows that can bring large quantities of water and associated pollutants over relatively short time periods. This can result in significant cost and land implications to manage or treat even relatively small storm events.

1.7 Model Programs

As noted above, the 2003 DAMP was redesigned to provide a series of model programs, local implementation plans, and watershed action plans rather than a single document as in the past. The 2003 DAMP was developed through a process that involved public and private sector input and public review through the California Environmental Quality Act (CEQA) process.

In 2006, the Permittees again undertook an update of the DAMP in response to anticipated requirements of fourth term permits that are expected to be issued by the two Regional Boards in early 2007.

The proposed 2007 DAMP includes the following program components:

- DAMP Model Programs
- Appendix A – Local Implementation Plans
- Appendix B – Training and Outreach Programs
- Appendix C – Program Effectiveness Assessments
- Appendix D – Watershed Action Plans
- Appendix E – Technical Reports

The following **Figure 1-2** shows this organizational layout:

Figure 1-2
Drainage Area Management Plan Structure

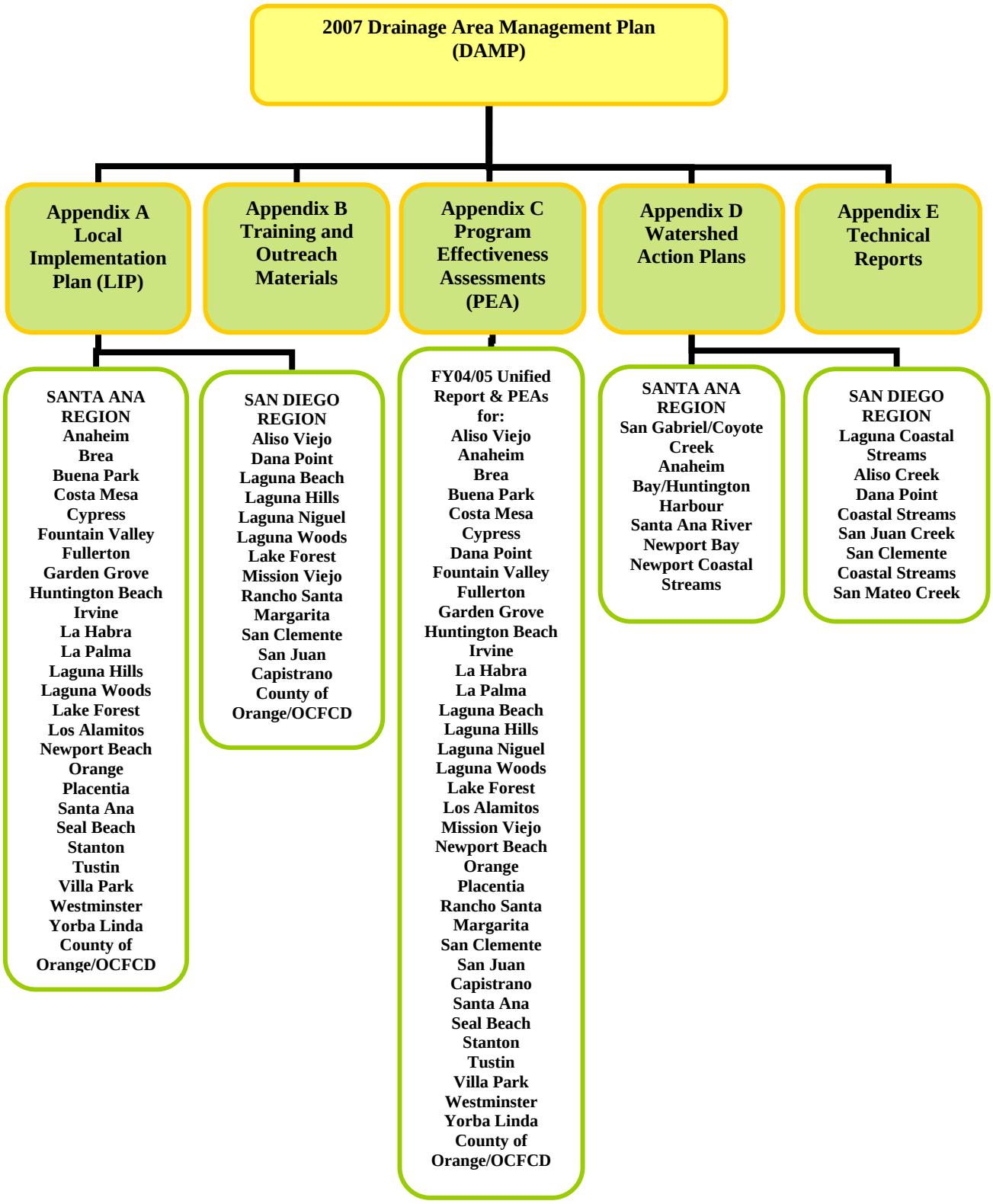

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Exhibits

Exhibit 2.I Management Framework
Exhibit 2.II Program Implementation Agreement

2.0 PROGRAM MANAGEMENT

2.1 Introduction

The major management activities for the Orange County NPDES Stormwater Program include:

- Providing administrative and technical support for the Permittees and the committees within the management structure;
- Developing and executing inter-governmental agreements necessary for program implementation;
- Planning and implementation needed to direct and implement the program;
- Developing BMPs;
- Developing reports and other materials required by the Fourth Term Permits;
- Developing budgets and fiscal analyses;
- Reviewing and developing policy positions and representing the NDPES Stormwater Program before appropriate agencies; and
- Program coordination with all affected local government agencies.

In order to more effectively carry out the requirements of the NPDES Stormwater Program, the Permittees in both Regional Board areas agreed during the First Term Permit period that the County of Orange would be the Principal Permittee and the Orange County Flood Control District and the incorporated cities would be Permittees on the permit.

The designation of the County of Orange as the Principal Permittee has provided for cost effective management of the overall stormwater program by combining resources to complete those activities which benefit all of the Permittees. During the Fourth Term Permit period, the County of Orange will continue as the Principal Permittee and conduct those tasks identified as being the responsibility of the Principal Permittee within the permits.

A more detailed discussion of these management tasks is provided below.

2.2 Major Management Activities

2.2.1 Management Framework

The management framework consists of four major levels of program overview and guidance to the Permittees who are ultimately responsible for program funding approval and permit compliance. As in the past, the Principal Permittee continues to provide administrative support for the various committees which includes maintenance of mailing lists, reserving meeting venues, preparing agendas, notifying participants and providing meeting summaries.

The Principal Permittee has a Stormwater Section that coordinates the countywide compliance activities and submittals to the Regional Boards under direction of the Permittees.

In addition there are a number of working groups - committees, sub-committees, ad hoc working groups, and task forces - that provide input and guidance to address various program implementation issues. These are further described below.

Committees

The following committees formed from the NPDES permittees and their roles are as follows:

City Manager's Water Quality Committee

The City Manager's Water Quality Committee meets annually and provides budget and overall program review and governance direction. The Committee is comprised of several City Managers and is attended by County staff.

City Engineer's Technical Advisory Committee (TAC)

The TAC serves in a program advisory role and provides policy direction on program development and program budget and implementation. The TAC is comprised of one City Engineer, or selected representative, from each of the County Supervisorial Districts and a representative from the County of Orange. It meets 4-6 times annually.

General Permittee Committee

The General Permittee Committee is the principal forum for disseminating information for program coordinators. The Committee meets monthly (except November). The Committee periodically evaluates the need for creating standing sub-committees and ad hoc committees as needed in order to accomplish the objectives of the Orange County NPDES Stormwater Program.

Sub-Committees and Ad-hoc Working Groups

Sub-Committees and ad-hoc working groups provide for the continued development of the program in a specified area of program responsibility and oversight. The groups currently active include the following:

- LIP/PEA Sub-Committee

  Purpose: To provide oversight and technical direction to the management of core DAMP/Local Implementation Plan (LIP) programs (Bi-monthly meeting schedule).

- Public Education Sub-Committee

  Purpose: To provide regional consistency and oversight for the stormwater public education program efforts (Monthly meeting schedule). The sub-committee directs development and dissemination of all education and outreach materials.

- Inspection Sub-Committee

  Purpose: To provide a forum for the coordination, investigation, enforcement and training aspects of the existing development inspection program and Illegal Discharges/Illicit Connections (ID/IC) programs (Bi-monthly meeting schedule). Recent products include the Investigative Guidance Manual and self-audit checklist

- Water Quality Sub-Committee

Purpose: To provide oversight and technical input for the revision of the water quality monitoring programs, ongoing water quality data evaluation, and special water quality investigations and BMP effectiveness studies (Quarterly meeting schedule).

- Ad-Hoc Group – Wastewater Disposal

  Purpose: To develop a list of BMPs for the disposal of washwater/wastewater generated by mobile businesses. The Group was convened specifically to address wastewater disposal issues and worked cooperatively with the sewering agencies to produce best practice guidance (BMP Fact Sheet IC24).

- Watershed Action Plan Sub-Committees

  Six Watershed Action Committees (Laguna Coastal streams, Aliso Creek, Dana Point Coastal Streams, San Juan Creek, San Clemente Coastal Streams, and San Mateo Creek) were established and have met bi-annually since their inception.

Task Forces

Periodically task forces are formed to address specific issues relevant to the Permittees and community. These tasks forces are characterized by external participation. The following task forces are currently in existence:

- Trash and Debris Task Force

  Purpose: To foster and sustain partnership approaches to dealing with trash and debris in stormwater and urban runoff with the goal of ensuring that such materials do not become the basis for a formal designation of coastal beneficial use impairment (quarterly meeting schedule). Recent products include a strategic assessment of Orange County's trash and debris control efforts.

- Legal/Regulatory Authority Task Force

  Purpose: To review the legal authorities that the Permittees have in complying with the permit requirements and recommend changes as needed and to track stormwater related litigation that may affect the Orange County Stormwater Program (quarterly meeting schedule).

- Water Use Efficiency Task Force

  Purpose: To study and support a comprehensive effort to curb urban runoff through efficient water usage in Orange County (Quarterly meeting schedule).

2.2.2 Agreement for Program Implementation

The agreement underpinning County and city cooperation is the NPDES Stormwater Permit Implementation Agreement (subsequently referred to as the Implementation Agreement) which establishes the responsibilities of the Permittees with respect to compliance with the Third Term Permits issued by the Regional Boards. The Implementation Agreement also establishes a funding mechanism for the shared costs of the Orange County NPDES Stormwater Program based on each municipality's area and resident population and includes a provision that allows newly incorporated cities to become additional parties to the Implementation Agreement.

The Implementation Agreement, originally entered into in December of 1990, was amended in October of 1993 to include two additional Permittees (Laguna Hills and Lake Forest) and formally established the TAC. The Implementation Agreement was amended again, effective June 25, 2002, to include three additional Permittees (Aliso Viejo, Laguna Woods and Rancho Santa Margarita) and to incorporate modifications to the management structure and cost-sharing formulas. The final, executed Implementation Agreement with the signature pages is included in **Exhibit 2.II**.

2.2.3 NPDES Permit Responsibilities

The responsibilities of the Principal Permittee and Permittees are defined within the Implementation Agreement, the Third Term Permits, or as otherwise identified within separate funding agreements.

Principal Permittee

The role of the Principal Permittee is the same as the other Permittees with the addition of certain overall programmatic and management responsibilities. However, the Principal Permittee has no regulatory authority over the Permittees. The primary responsibilities are:

- Initiating, developing and coordinating any area-wide programs and activities necessary to comply with the Third Term Permits;
- Developing and implementing mechanisms, performance standards, etc., to promote uniform and consistent implementation of BMPs among the Permittees;
- Monitoring the implementation of the plans and programs required by the Permit and determining their effectiveness in protecting beneficial uses;
- Providing administrative and technical support and informing the Permittees and the TAC of the progress of other pertinent municipal programs, pilot projects, research studies, etc.;
- Representing the Orange County NDPES Stormwater Program before appropriate agencies;
- Developing and executing inter-governmental agreements necessary for program implementation;
- Conducting chemical and biological water quality monitoring;
- Cooperating in watershed management programs and regional and/or statewide monitoring;
- Developing standardized formats for all reports;
- Preparing and submitting unified reports, plans and programs as required by the Fourth Term Permits including the unified Annual Progress Report, Program Effectiveness Assessment;
- Developing budgets and unified fiscal analyses and reports; and
- Coordinating the program with affected local government agencies.

Permittees

Each Permittee is responsible for implementing the NPDES Stormwater Program within its jurisdiction. The main responsibilities of each Permittee include:

- Reviewing, approving and commenting on budgets, plans, strategies, management programs and monitoring programs developed by the Principal Permittee or any sub-committee;
- Implementing the various stormwater management programs as outlined in the Third Term Permits and 2006 DAMP, including LIP and watershed chapters, within its jurisdiction;
- Establishing and maintaining adequate legal authority;
- Coordinating among internal departments and agencies, as appropriate, to facilitate the implementation of the Permit and the DAMP/LIP;
- Responding to/or arranging for response to emergency situations, such as accidental spills, leaks, illegal discharges/illicit connections, etc., to prevent or reduce the discharge of pollutants to the municipal storm drain systems and waters of the U.S. within its jurisdiction;
- Conducting inspections of and performing maintenance on the infrastructure within its jurisdiction;
- Taking appropriate enforcement actions as necessary within its jurisdiction to ensure compliance with applicable ordinances;
- Conducting and coordinating any surveys and source identification studies necessary to identify pollutant sources and drainage areas;
- Participating in the General Permittee Committee meetings and any sub-committee meetings as necessary; and
- Preparing and submitting all reports or requests of information to the Principal Permittee in a timely fashion.

2.2.4 NPDES Permit Reporting Requirements

The Fourth Term Permits will require the preparation of an Annual Progress Report for submittal to the Regional Boards and United States Environmental Protection Agency (USEPA) Region IX no later than November 15 of each year (it should be noted that the San Diego Regional Board administratively approved a Permittee request to modify the Annual Progress Report due date in the Third Term Permit from November 9 to November 15).

The Annual Progress Report is now an integral component of the Program Effectiveness Assessment in **Appendix C** and includes:

- Jurisdictional assessments completed individually by each Permittee
- Watershed assessments based on the watershed chapters with reporting commencing with the 2003-04 Annual Progress Report.

- Countywide assessment through a Unified Annual Progress Report

In addition to the Annual Progress Reports, the required submittals may also include any other requirements specified by the Regional Boards pursuant to permit conditions, California Water Code Section 13225 and 13267, or other regulatory provisions.

2.2.5 Fiscal Analysis

The Principal Permittee is responsible for preparing draft annual budgets for shared program costs, to be approved by the Permittees. In addition, the Principal Permittee is responsible for tracking shared program cost expenditures and preparing financial reports that are distributed to the Permittees.

The total cost to each Permittee for the area-wide stormwater program is the sum of shared costs plus individual costs.

Total Cost to Permittee = Shared Costs + Individual Costs

Shared Costs

Shared costs are those that fund activities performed by the Principal Permittee, under the stormwater program's Implementation Agreement. Each municipality's contribution to the shared costs is determined by a formula established in the Implementation Agreement, based on the population and land area of each jurisdiction.

The program management activities handled by the Principal Permittee include development of model compliance program, elements, development and execution of intergovernmental agreements, representation of the Permittees at meetings with other organizations, preparation of compliance reports, budgets and other program documentation, representation of the program before appropriate agencies such as the Regional Boards and the State Water Resources Control Board, procurement and subsequent coordination of consultant studies and coordination with Permittees representatives.

Individual Costs

Individual costs are those incurred by each Permittee through implementation of its LIP. These BMPs include a wide range of activities, such as street sweeping, litter control and emergency spill response, facility inspection; drain inlet/catch basin stenciling and dissemination of public education materials.

The individual costs are comprised of capital and operation and maintenance costs:

- Capital Costs – refers to expenditures for land, large equipment, and structures;
- Operation and Maintenance Costs - refer to normal costs of operation including the cost of keeping equipment and facilities in working order.

The sum of the capital and operation and maintenance costs is the total cost that each Permittee has incurred individually to meet the requirements of the Third Term Permits through the implementation of its LIP.

2.2.6 Program Representation

The Principal Permittee represents the Permittees on the California Stormwater Quality Association, the Stormwater Research Program of the Water Environment Research Foundation, and other stormwater forums. Information on the activities of these organizations is provided to the Permittees on a regular basis.

2.2.7 Coordination with Other Agencies

Successful implementation of the Orange County NPDES Stormwater Program requires cooperation and coordination with other public agencies or organizations within and adjacent to Orange County that have programs or activities that have an impact on stormwater.

Southern California Counties

During the Third Term Permit period, significant examples of such an approach were a greater level of participation in regional monitoring and research programs coordinated by SCCWRP, and the joint participation with Riverside and San Bernardino Counties in the Santa Ana Stormwater Quality Standards Study being undertaken through SAWPA These examples represented a collective opportunity for the County to cooperatively participate in an integrated watershed monitoring program and development of appropriate stormwater quality standards and cost-effective means of achieving water quality goals and meet a common permit objective.

This coordination on monitoring has further developed into a region-wide monitoring and research cooperative program with the neighboring counties, SCCWRP and the three Regional Boards. This coordination has resulted in several ongoing and planned cooperative projects.

California Department of Transportation (Caltrans) ***Richard had a ? next to this***

The Principal Permittee has actively coordinated with Caltrans through respective attendance at NPDES meetings. This joint participation has allowed for the sharing of information and resources and has provided for a greater understanding of the respective programs and challenges.

Phase II Agencies

The Permittees anticipate that there may be additional opportunities for cooperative efforts with other stormwater dischargers that may be permitted separately under Phase II of the federal stormwater regulations. These dischargers include federal and state lands, including, but not limited to military bases, national forest, hospitals, colleges and universities; and highways; utilities and special districts; and Native American tribal lands.

Orange County Agencies

Coordination with other county agencies has and continues to occur on many levels. The following are some examples (see later DAMP sections for more information.)

- Coordination on common public education messages. For example, joint public education flyers have been coordinated with Orange County Sanitation District for sewer spills and food facilities and with Orange County Integrated Waste Management on a brochure for household hazardous waste.

- Coordination on public outreach events. For example, municipal agencies participate together at the Orange County Fair and the Children's Water Festival.
- Coordination on school outreach programs. For example, after school programs have been developed in conjunction with the Department of Education to provide stormwater education materials.
- Coordination on preventing sanitary sewer overflows. For example, the Tustin Area Spill Control demonstration project has been coordinated with the Orange County Sanitation District.

EXHIBIT 2.I

MANAGEMENT FRAMEWORK

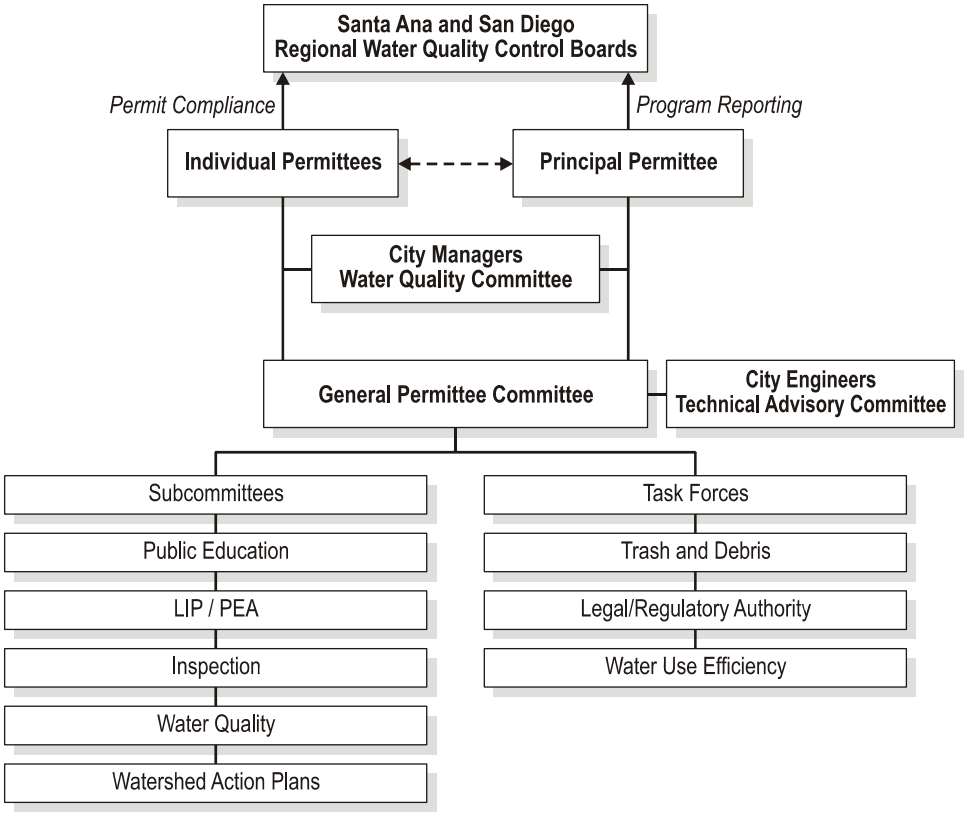
Santa Ana and San Diego
Regional Water Quality Control Boards
Permit Compliance
Program Reporting
Individual Permittees
Principal Permittee
City Managers
Water Quality Committee
General Permittee Committee
City Engineers
Technical Advisory Committee
Subcommittees
Public Education
LIP / PEA
Inspection
Water Quality
Watershed Action Plans
Task Forces
Trash and Debris
Legal/Regulatory Authority
Water Use Efficiency

EXHIBIT 2.II

PROGRAM IMPLEMENTATION AGREEMENT

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3.0 PLAN IMPROVEMENT AND WATERSHED PLANNING

3.1 Introduction

Program management of various water quality improvement programs within Orange County under the NPDES program occurs at two distinct levels: (1) activities conducted by the Permittees individually through implementing jurisdictional programs in their LIPs based on the model programs in the DAMP; and (2) activities conducted by the Permittees and others collectively to address specific water quality issues on a watershed scale. Since the program inception in the early 1990's, the Permittees to the Orange County Stormwater Program have been embarked on this two-tiered comprehensive approach to stormwater management which includes a water quality planning process, referred to throughout the DAMP. This planning process includes a systematic and detailed evaluation of the impacts of urban stormwater discharges on receiving waters to determine or validate that actual impairments exist that may warrant corrective action.

The DAMP sets forth this iterative approach for urban stormwater management at both of these levels:

- For the LIP programs, the DAMP establishes and periodically refines a baseline set of BMPs that are applicable to all areas and that are proven and cost-effective;
- For the Watershed based programs, the DAMP lays out a process for:
  - Focusing on solving water quality problems in receiving waters;
  - Prioritizing waterbodies for additional action, with those listed as impaired having a higher priority; and
  - Promoting a watershed-level approach and implementing enhanced BMPs on both an individual and collaborative basis to address watershed constituents of concern. This watershed-level planning approach is being further defined and described in detail in the Watershed Action Plans that identify enhanced BMPs to address specific watershed issues.

This Section, together with information collected through the Water Quality Monitoring Program, provides the foundation and underlying support to the program on both of these levels as illustrated in **Figure 3-1**. This approach has been gradually evolving through the first three Permit terms. Under the first term, the Permittees developed an inventory and basic understanding of their municipal storm drain systems and initiated implementation of a number of baseline BMPs on a county-wide basis. Under the Second and Third Term Permits the Permittees enhanced the existing program elements and baseline BMPs and developed additional ones; and updated the DAMP with the latest version completed in 2003. At the same time that the Permittees were refining and expanding implementation of baseline BMPs, they embarked on additional monitoring, and began looking more closely at watershed-specific issues, pollutants of concern, and priorities. It became apparent that implementation of baseline BMPs only, while important for significantly reducing pollutants and complying with NPDES permits, would not address all watershed priorities or necessarily assure that specific water quality impairments resulting from urban runoff impacts would be fully addressed.

Figure 3-1 Program Approach

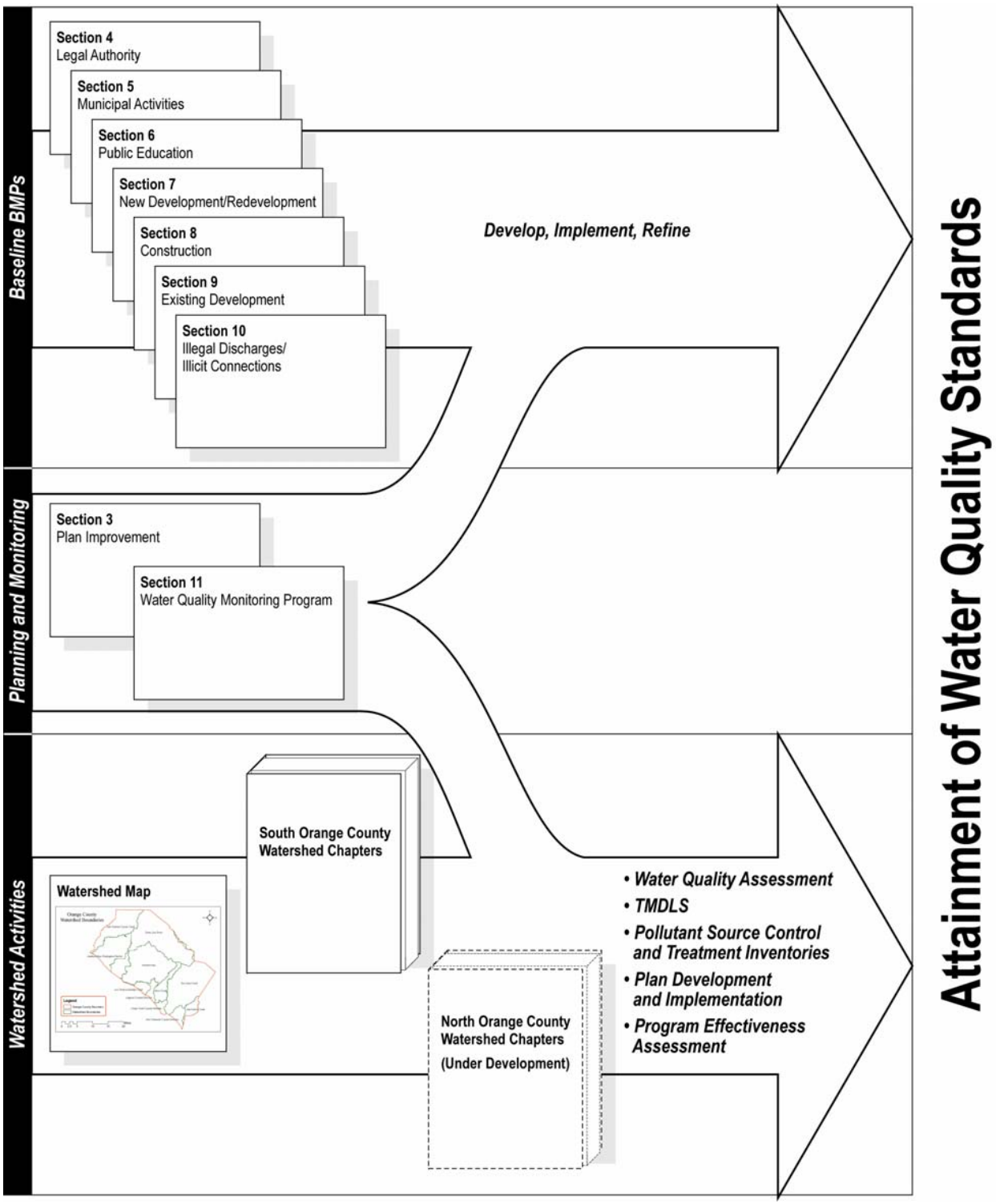

Under the Third Term Permits, the County initiated detailed Watershed Planning efforts for the major watersheds within the County, beginning with the San Diego Regional Water Quality Control Board region in the southern portion of the County. As these efforts are completed for a specific watershed, they are being incorporated into Appendix D of the DAMP. As of June 2006, the following Watershed Action Plans have been completed or are in progress:

- Laguna Coastal Streams
- Aliso Creek
- Dana Point Coastal Streams
- San Juan Creek
- San Clemente Coastal Streams
- San Mateo Creek
- Newport Bay (in progress)

This systematic approach utilizes information obtained from the countywide baseline water quality monitoring program (Section 11.0) and from the additional water quality planning initiatives that have been or are currently being conducted in a number of the watersheds to determine those with beneficial use impairments, potentially attributable to urban stormwater. Once a water quality problem is identified, additional or new Best Management Practices (BMPs) are evaluated for implementation to determine their effectiveness and applicability. Since the field of stormwater management is a dynamic one, it is necessary for the Permittees to continue this systematic and iterative process of revising, adding or deleting BMPs as necessary in order to maintain a successful and responsive program.

3.2 Regulatory Requirements

Federal regulations (40 CFR 122.26 (d)(2)(iv)) require that drainage area management plans include "a comprehensive planning process....to reduce the discharge of pollutants to the maximum extent practicable using management practices, control techniques and system, design and engineering methods, and such other provisions which are appropriate."

The regulations further state that "proposed programs may impose controls on a systemwide basis, a watershed basis, a jurisdiction basis, or on individual outfalls" and "shall describe priorities for implementing controls."

The regulations thus require the development, implementation and prioritization of BMPs to control the discharge of pollutants from municipal storm drains into waters of the United States. The vehicle for this BMP implementation is the DAMP, which includes new BMPs and modifications to existing BMPs and other stormwater management program elements to address stormwater runoff from industrial, commercial, and residential areas to reduce the discharge of pollutants from municipal storm drains to the MEP.

The Plan Improvement Program was developed as a model for fulfilling the requirements of:

- Section XVI of the Santa Ana Regional Water Quality Control Board (RWQCB) Municipal NPDES Stormwater permit, Order No. R8-2002-0010;

- Section J of the San Diego RWQCB Municipal NPDES Stormwater permit, Order No. R9-2002-0001.

While the permits describe in detail a programmatic approach to implementation of stormwater management, they contain a provision that discharges from the MS4s shall not cause or contribute to exceedances of receiving water quality standards (designated beneficial uses and water quality objectives) for surface waters or groundwaters. The permits presume that the DAMP and its components are designed to achieve compliance with receiving water limitations through an iterative process and the application of increasingly more effective BMPs.

If there is evidence that the permittees continue to cause or contribute to an exceedance of water quality standards, notwithstanding implementation of the DAMP the permittees shall promptly notify and submit a report to the Executive Officer of the Regional Board that describes BMPs that are currently being implemented and additional BMPs that will be implemented to prevent or reduce any pollutants that are causing or contributing to the exceedance of water quality standards. Once approved, the Permittees will implement the revised DAMP and monitoring program in accordance with the approved schedule.

3.3 Plan Evolution

3.3.1 Approach to Plan Development and Improvement

As noted above, the BMPs fall into two general categories:

- The "baseline BMPs" addressed in the DAMP include establishing adequate legal authority to control pollutant discharges (Section 4.0), implementing BMPs as part of routine municipal activities (Section 5.0), conducting an effective public and business education program (Section 6.0), implementing routine non-structural and structural BMPs in new developments and significant re-developments (Section 7.0), implementing structural and non-structural on-site BMPs for construction projects (Section 8.0), implementing BMPs for existing development (Section 9.0) and identifying and eliminating illegal discharges/illicit connections (Section 10.0). In general, these BMPs are implemented to the extent applicable throughout the County under all Permittees' Local Implementation Plans.
- The pollutant-specific watershed-based programs include enhanced BMPs such as structural BMPs identified through the water quality planning process and site specific or regional/watershed Treatment Control BMPs for new developments necessary pursuant to Section 7.0 of the DAMP. Water quality problems will be identified through the countywide water quality monitoring program and other water quality assessments.

The formation of special task groups or continued participation of individuals in the process is vital to the long-term viability of the water quality improvement process (and by extension, watershed management) in Watershed Committees. Consideration of protection of environmental resources, and not only water quality issues, needs to be constantly integrated into this process. The interdependency of many resources requires that public understanding of potential issues related to single-purpose projects must be sought and integrated into the planning process.

It is expected that one of the functions of the management group will be the continued education of the participants and general public on the progress of water quality improvement efforts.

The approach taken to develop the Watershed Chapter recognizes that each Permittee's LIP and this Watershed Chapter represent the principal planning documents for two separate but nonetheless similar and highly interdependent water quality planning processes targeting the control of pollutants in urban runoff. These iterative processes can be represented in each case as shown **Figure 3-2** and described in **Table 3-1**.

Figure 3-2 Water Quality Planning Process

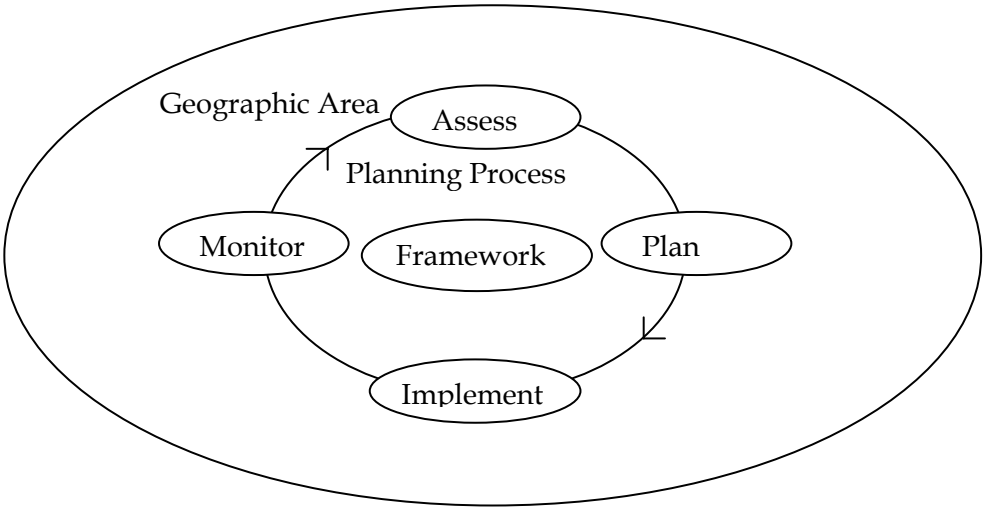

Based upon the annual watershed assessment, the Watershed Permittees and other participating jurisdictions will work together to address the priority water quality issues identified through this watershed planning process. It is anticipated that water quality issues that are determined to be specific to a jurisdiction would be referred to that jurisdiction and thereafter be addressed as a jurisdictional program initiative through the LIP. Alternatively, the issue may originate from multiple jurisdictions within the watershed. In this instance, the problem would be addressed as a watershed cooperative effort.

Updates to this program will be the subject of annual reporting which will include a water quality assessment and revisions to the listed water quality improvement initiatives.

Table 3-1 Watershed Management Processes

	Local Implementation Plan	Watershed Chapter
Geographic Area Covered by Plan	Defined by political (city/county) boundaries	Defined by hydrologic boundaries
Planning Process	Focused on reducing discharges of pollutants in urban runoff and stormwater pollution on a uniform countywide basis. Directed by DAMP/LIP in conformance with NPDES permits requirements.	Focused on improving local receiving water quality where it is adversely impacted by urban runoff and stormwater pollution. Directed by NPDES permit requirements and 303(d) list/TMDLs.
Framework	Directed by Orange County Stormwater Program committee structure and Regional Board review. Public consultation principally through California Environmental Quality Act (CEQA) process/Regional Board review.	Directed by municipal and public agency stakeholders. Characterized by public participation.
Assessment	Based on information from countywide municipal and regional cooperative investigations of stormwater and receiving water quality and are undertaken on an annual and 5 year basis.	Based on information from watershed specific investigations and are undertaken on an annual basis.
Planning	Broad based approach with emphasis on well established pollution prevention and source control measures.	Pollutant specific approach with emphasis on treatment controls and consideration of innovative regional solutions.
Implementation	Individually by the Watershed Permittees.	Individually and collaboratively by Watershed Permittees and other agencies.
Monitoring	Considers pollutant load reduction.	Considers beneficial use attainment.

The watershed planning process can form the basis for an administrative system, resource allocations, a communication mechanism with residents and community groups, and ultimately a means for tracking and measuring BMP implementation and effectiveness. By focusing on watersheds as the planning unit, the watershed becomes the geographic and administrative unit for a wide range of program activities and community involvement that can result in cost effective and measurable results. These include activities conducted by the Watershed Permittees while implementing their jurisdictional programs and activities conducted by the Watershed Permittees and others collectively to address issues on a watershed scale. The programs range from NPDES coordination to the establishment of a long-term Watershed Management Framework, which varies in structure by watershed.

The development of a forward thinking, cost-conscious watershed implementation plan requires that several factors associated with existing and possible future management practices be evaluated and prioritized. These factors range from cost and efficiency to location and source types, all of which should be evaluated at several different scales. Scale plays an important role in watershed management. It is associated with characterizing sources and their impacts to receiving waters, determining the types and locations of appropriate management practices, and the effectiveness of these practices on improving water quality. The need to address and understand how to bridge various scales has been an ongoing issue in the community of watershed management professionals (e.g., planners, scientists, engineers). How to address multiple scales in a meaningful way typically requires the development of assessment tools at multiple scales because the monitoring and/or modeling of thousands of BMPs is not necessarily cost effective or useful. The assessment tools should provide a means for balancing cost effectiveness, management practice efficiency, and ongoing assessment and adjustment needs at both regional and site scales.

Benefits of Watershed Management

- Locally driven needs, goals, and objectives
- Locally run and designed
- Consistency with federal and state programs
- Economies from streamlined analysis and implementation procedures
- Opportunity for flexibility in the development of management alternatives
- Decision-making based on environmental and local considerations
- Effective Capital Improvement Program planning and budgeting

The broadest scale considered in watershed planning is the watershed or basin scale. As an example, in the Newport Bay watershed, this scale would encompass a 154 square mile area (see the first box in **Figure 3-3**). This level of planning provides an accounting of existing and potential source controls in the watershed and an understanding of their basin-wide effectiveness. Evaluating BMPs at a watershed scale also takes into account the variety of activities contributing to pollution, often including both rural and urban land uses. Comprehensively addressing all of these sources may require many BMPs that work in tandem and are evaluated together since the overall effectiveness may be greater than the sum of the individual practices.

Evaluations of BMP effectiveness can also be concentrated on a smaller geographic area, such as a subwatershed. A subwatershed scale focuses BMP implementation on a limited set of "like" source types and pollutants. For example, the coastal zone or coastal subwatersheds may focus on bacteria sources (including birds) and select a subset of BMPs that could be applied in

coastal areas where available space may be limited. This assessment scale provides a better understanding of cause and effect relationships than the watershed scale although it requires more specific information on sources and controls.

Figure 3-3 Representation of Scale

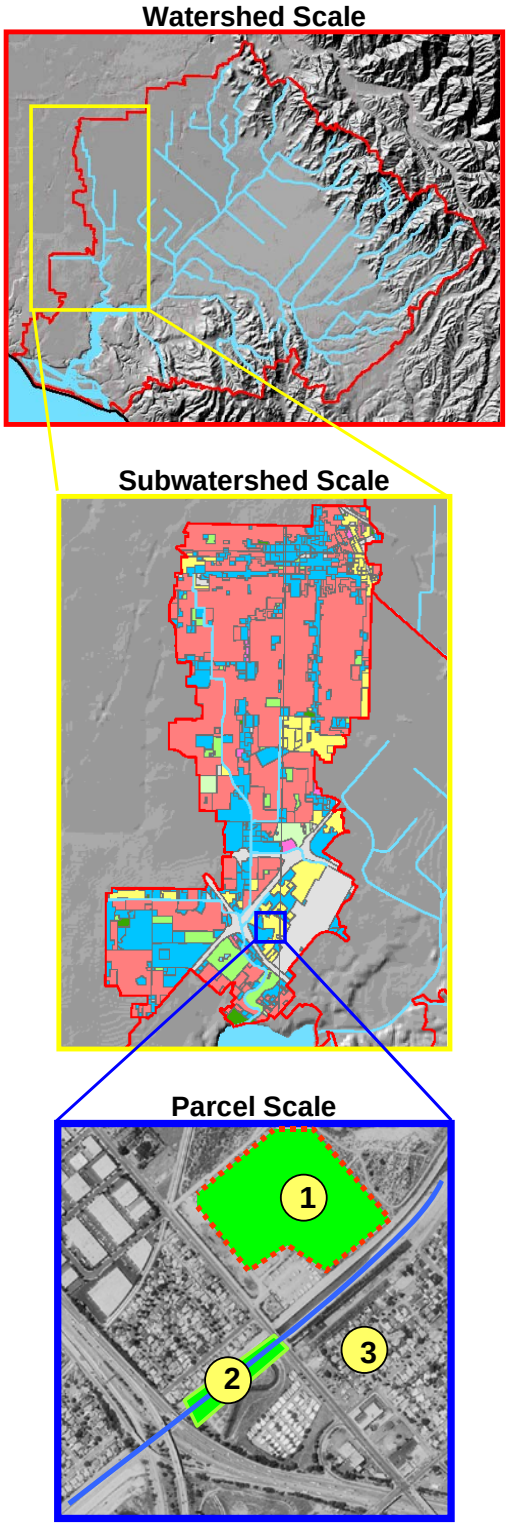

However, the more specific information provides a better foundation for defining a site's characteristics and using the characteristics to define other similar subwatersheds in the region. Again, as an example, in the Newport Bay Watershed, the Santa Ana-Delhi Channel represents a sample subwatershed (see the yellow box in **Figure 3-3**).

The most detailed scale is represented by a community or parcel and can be evaluated in much greater depth (see the blue box in **Figure 3-3**). For instance, detailed analyses or modeling can be performed to evaluate the impact(s) of individual BMPs (or a train of BMPs). These results can be used to estimate water quality improvements at similar locations or extrapolated to estimate impacts in a larger area with similar characteristics. For larger areas, rather than just extrapolating results, modeling may be helpful to ensure that the physical and chemical processes present in the watershed are appropriately represented and evaluated.

In practice, watershed planning efforts should consider the watershed, subwatershed, and parcel scales. Each scale provides meaningful information that can be scaled up or down to provide the basis for planning decisions and determining effectiveness of existing and/or planned BMPs. In addition, the impact of BMPs should be assessed to determine the effectiveness of both individual BMPs and the overall implementation plan (this is especially important for watersheds with TMDLs and approved implementation plans).

3.3.2 Methodology for Examining BMP Retrofit Opportunities

Watersheds determined to require additional BMPs have been surveyed for potential retrofitting. Where retrofitting opportunities are not found, new structural BMPs will be considered, consistent with the principles of MEP standard. Existing flood control, retarding, sediment control, water conservation, recreation, habitat, and greenbelt facilities will continue to be evaluated in terms of their potential for modification to provide water quality benefits.

To supplement these earlier efforts, a countywide evaluation was initiated in 2003 to identify opportunities within the existing storm drain infrastructure for configuring/reconfiguring storm drains or channel segments in order to improve water quality and maintain the designated beneficial uses. This effort is discussed further in the following section.

3.3.3 BMP Selection and Implementation

Current BMPs

The Permittees have historically conducted activities that provide ancillary water quality benefits (street sweeping, catch basin cleaning etc.). The DAMP and the Third Term permits continued to recognize the importance of continuing the BMPs that have been initiated and included new commitments to enhance these current countywide efforts. In many instances changes have been included to further improve their effectiveness over the Third Permit Term and to increase the Permittee commitment to their implementation.

New BMPs

Although the DAMP provides for the implementation of a successful Orange County NPDES Stormwater Program through the BMPs that have already been developed and implemented, the Permittees recognize that the field of stormwater management is highly dynamic and that the BMPs were identified within the 2003 DAMP have continued to be implemented and evaluated. In some cases BMPs have been or may in the future need to be revised, deleted or

added to in order for the program to remain successful. In addition, water quality degradation caused by urban stormwater discharges that is identified either through the water quality monitoring program or the water quality planning process may elevate the need for additional or new BMPs to be implemented in order to effectively address the problem.

New candidate BMPs can be prevention or removal oriented and can be considered either for updating baseline BMPs or for incorporation as watershed-based BMPs. New BMPs are generally identified from one or more of the following:

- A review of technical literature (such as the ASCE/EPA database);
- A review of existing control programs;
- Demonstration or research projects;
- Input from consulting firms and municipalities already involved in new BMP implementation; or
- Other sources.

New structural BMPs, chosen for broad implementation, should be selected from candidate BMPs that have been field-tested and evaluated as to their pollutant removal efficiency and cost effectiveness. They should also be planned and located to maximize their cost-effectiveness.

Assessment of BMP Effectiveness

Methodologies for assessing the performance of BMP effectiveness can include conventional monitoring (such as water quality monitoring) and non-conventional monitoring.

Conventional monitoring, while theoretically providing a more direct indication of actual BMP performance is very challenging for a number of reasons. Water quality monitoring is costly, particularly given the highly variable nature of stormwater runoff, and targeted on a limited number of BMPs. Furthermore, not all BMPs are readily evaluated through water quality monitoring. Therefore, an accurate, quantifiable assessment of the cumulative effectiveness of current BMPs is difficult for a variety of reasons, including:

- Non-structural BMPs began to be implemented prior to the first municipal stormwater permit requirements, meaning no "baseline" monitoring data representative of "pre-BMP" conditions can be identified;
- The BMPs identified in the 2003 DAMP are being implemented incrementally on a countywide basis. Since, to date, no watershed has been uniquely subject to a single BMP, the influence of an individual BMP upon the overall surface water quality cannot yet be readily determined;
- There is considerable variability in water quality data that complicates any statistical correlation of the data with storm frequency, storm length and intensity, land use, or land management practices. This is even more compounded by storm seasons in recent years that have varied much in their intensity, duration and volume;
- Many of the BMPs identified in the 2003 DAMP are implemented to address the issues associated with a specific land use. However, since the land uses are extremely varied

within the watersheds, it has not proven possible to characterize the effects of those specific BMPs; and

- Factors other than chemical water quality may be more directly responsible for impairment of beneficial uses, yet all these factors combine in their effects and are difficult to separate one from another.

A method for evaluating overall stormwater program effectiveness on both a programmatic and BMP level has been under development for the California Stormwater Quality Association and can be considered for incorporation into the Orange County Program. The concept approach, illustrated in **Figure 3-4**, provides a hierarchy of potential outcomes that can be evaluated ranging from programmatic permit compliance assessment to demonstrated changes in receiving water quality.

Figure 3-4 Concept Approach for Program Evaluation (From CASQA, 2005)

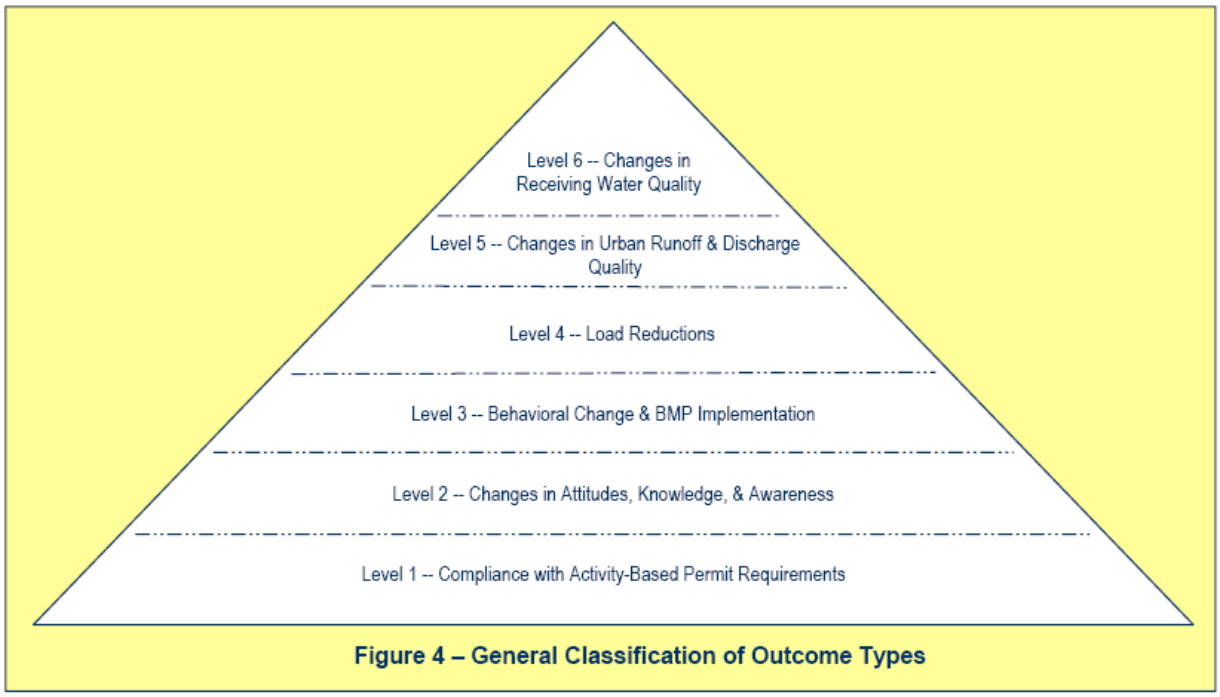

While assessing the cumulative effect of BMPs employed countywide on the water quality of receiving waterbodies may take a number of years, there are a number of programs that are currently contributing to the assessment of individual project BMP performance. The Permittees have conducted several studies discussed below to evaluate and assess BMP performance and efficiency.

Trash and Debris BMP Evaluation **-**The objectives of the study were to review characterization information on trash and debris in Orange County and to identify candidate structural BMPs. The study concluded that site characteristics may be the principal determinants of BMP selection. During the reporting period the findings of this study were developed into a BMP selection guide for retrofit applications to modify

an existing facility to provide a water quality (trash/debris removal) function. This guide will be finalized in 2006-07 and incorporated into **DAMP Appendix E**.

Erosion Control BMP Effectiveness Study - The study was conducted during the current permit period to evaluate selected erosion with the goal of providing information on (1) the effect of time and weathering on product condition; (2) the frequency a product must be applied to be effective; (3) the maximum slope on which a product will perform effectively; and (4) how product performance is affected by soil types. The study comprised an evaluation of two types of hydraulic mulch (paper and wood based), two types of polyacrylimide (low and high molecular weights), and wood mulch (without a binding agent). The findings of the evaluation will be reported in the **2005-06 Unified Report** and incorporated into **DAMP Appendix E**.

BMP Effectiveness and Applicability for Orange County - This study was commissioned to review existing information on available structural BMPs and to organize and present specific information to facilitate the selection, siting, design, construction and maintenance of the most appropriate and cost-effective BMPs for a particular site in Orange County. The study recommended consideration be given to using extended detention basins, vegetated swales, vegetated buffer strips, bioretention, sand and organic filters, infiltration basins and infiltration trenches. In 2005, the study report was updated to include the flow reduction BMPs developed under the auspices of the Nitrogen and Selenium Management Program.

BMP Retrofit Opportunities Study - In 1997-98, the feasibility of incorporating BMP retrofits to optimize beneficial use attainment began to be addressed in the context of the long-term water quality planning initiatives being conducted within Orange County, a number of which are in cooperation with the Army Corps of Engineers. To supplement these earlier efforts, during 2003-04, a countywide evaluation was initiated to identify opportunities within the existing storm drain infrastructure for configuring/reconfiguring storm drains or channel segments in order to improve the water quality and maintain the designated beneficial uses (see **DAMP Appendix E**). This effort was continued in 2005-05 with further use of the GIS-based model.

Tustin Area Spill Control (TASC) Demonstration Project - To address the various regulatory, technical and coordination issues associated with preventing and planning for sanitary sewer overflows (SSOs), the County and OCSD initiated a pilot project titled Tustin Area Spill Control (TASC) Demonstration Project. The project accomplished:

- Development of SSO response procedures;
- Completion of the Request for Proposal process for selecting primary and backup sewage spill response contractors for containment and recovery of sanitary sewer overflows;
- Conducting SSO hands-on field response training; and
- Development of a Memorandum of Understanding for delineating jurisdictional and financial responsibilities within the TASC project.

Assessment – Toward Better Assessment

A number of important initiatives are being supported by the Permittees aimed at the development of assessment techniques and methodologies to support more informed and consistent decision making across Southern California. Notable amongst these initiatives are the Regional Research Monitoring Program (Stormwater Monitoring Coalition) and the Development of the California Sustainable Watershed/Wetland Information Manager (CalSWIM) – prototype Database.

Regional Research Monitoring Program (Stormwater Monitoring Coalition) - The goal of the *Stormwater Monitoring Coalition* is to identify region-specific research needs to better understand stormwater mechanisms and impacts, and to collectively sponsor the development of assessment techniques and methodologies that will enable more informed and consistent stormwater management decision-making across the region.

The SMC has initiated several of the 15 research projects identified in the research agenda, including: Microbial Source Tracking Method Comparison, Development of Standardized Sampling and Analysis Protocols, Implementation of a Laboratory Intercalibration Program, Peak Flow Impact Assessment, and the Freshwater Stream Bioassessment Monitoring Program.

Development of California Sustainable Watershed/Wetland Information Manager (CalSWIM) – Prototype Database - In response to a commitment to develop a prototype watershed database for cumulative impact assessment, the County of Orange as Principal Permittee has joined with the University of California, Irvine (UCI) in developing and implementing a prototype database called the California Sustainable Watershed/Wetland Information Manager (CalSWIM). CalSWIM is a web-based expert system and database focused, initially, on Newport Bay and the Newport Bay watershed and can be viewed at www.calswim.org. The technical objective of CalSWIM is to provide an interactive platform for coastal wetland and watershed managers, planners, and engineers to explore alternative wetland and watershed management strategies.

The Permittees will continue to assess and evaluate the data from these and other studies in order to try and determine the overall effectiveness of the implementation of the BMPs on water quality within Orange County.

3.3.4 Plan Revision

This 2006 draft DAMP has been revised and updated from the 2003 DAMP and is being submitted in conjunction with the Report of Waste Discharge in as part of the Permit Renewal process in 2006-07. The TAC will review, and submit to the Permittees for local approval, the updated DAMP. The documents will then be submitted to the Regional Boards.

3.4 Funding of Structural Controls

3.4.1 New Development BMPs

Each developer will finance and implement the construction site controls specified in this plan and will institute the appropriate post-construction BMPs. If an approved regional or watershed plan is in place that anticipates the new development, the developer may be required to contribute to the implementation of the regional or watershed structural BMPs. This may be accomplished by establishing a water quality plan and funding program for each affected watershed (see Section 7.0 for more detail).

3.4.2 Watershed Structural BMPs

Financial requirements for the construction, operation and maintenance of watershed structural BMPs (water quality wetlands, biofiltration swales) will continue to be evaluated on a watershed scale on a case by case basis. Appropriate financing programs will be proposed, including consideration of means to assure appropriate participation by land developers, project proponents, and any other local stakeholders.

Those structural BMPs, which are retrofitted existing structures, will continue to be operated and maintained by the present owners for each new structure. The planning process will include consideration and determination of maintenance responsibility for each new structure.

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4.0 LEGAL AUTHORITY

4.1 Introduction

Permits issued by the Santa Ana and San Diego Regional Boards to the Permittees require the implementation of programs to address runoff from commercial, industrial, and residential areas to reduce the discharges of pollutants from the municipal storm drain system to the MEP. Central to these programs is the establishment, by each Permittee, of adequate legal authority to control the contribution of pollutants to the "Municipal Separate Storm Sewer System" or "MS4". The regulatory requirements and Permittees legal authority are described below.

4.2 Regulatory Requirements

Federal regulations 40 CFR 122.26 (d)(2)(i); Section VI of the Santa Ana Regional Water Quality Control Board Municipal NPDES Stormwater permit, Order No. R8-2002-0010; and Section D of the San Diego RWQCB Municipal NPDES Stormwater permit, Order No. R9-2002-0001, requires municipal NPDES Stormwater Permit applicants to demonstrate that they have adequate legal authority to:

- Control the contribution of pollutants to the municipal storm drain system by stormwater discharges associated with industrial activity;
- Prohibit illicit discharges to the municipal storm drain system;
- Control the discharge to the MS4 of spills, dumping or disposal of materials other than stormwater;
- Control through interagency agreements amongst the Permittees, the contribution of pollutants from one municipality into the common combined flood control and stormwater conveyance system managed by the Orange County Flood Control District;
- Require compliance with conditions in ordinances, permits, contracts or orders; and
- Carry out all inspection, surveillance and monitoring procedures necessary to determine compliance and noncompliance with permit conditions including the prohibition on illicit discharges to the municipal storm drain system.

4.3 Authority to Control Pollutant Discharges

Although adequate legal authority existed for most potential pollutant discharges at the inception of the Orange County NPDES Stormwater Program, the Permittees prepared a Model Water Quality Ordinance (Ordinance) to provide a more uniform countywide approach and to provide a legal underpinning to the entire Orange County NPDES Stormwater Program. Subsequently, by 1997, all of the Permittees had adopted largely similar versions of the Water Quality Ordinance and began to implement the corresponding Enforcement Consistency Guide (**Exhibit 4.I**) and provided certifications regarding this to the Regional Boards.

Each Permittee has designated Authorized Inspector(s) responsible for enforcing the Ordinance. The Authorized Inspector is the person designated to investigate compliance with, detect violations of, and/or take actions pursuant to the Ordinance.

The detection, elimination, and enforcement activities undertaken by the Permittees are described further in **Section 10.0**. In addition to prohibiting unpermitted discharges, the Ordinance also provides for requiring BMPs in new development and significant redevelopment (see **Section 7.0**).

4.4 Program Effectiveness Assessment

All ordinances will continue to be reviewed in order to determine if any modifications are necessary in order to comply with Permit requirements in accordance with the Program Effectiveness Assessment (PEA) as described in **Appendix C of the DAMP**. The overall PEA serves as the foundation for the annual progress report that is submitted each year to the Principal Permittee and subsequently to the Regional Boards and serves as the basis for evaluating each municipality's individual municipal activity efforts.

By completing the effectiveness assessment, the Permittees will each have a baseline by which they can compare subsequent evaluations and identify trends. This information can then be used to determine where modifications within the program may be necessary and ensures that the iterative evaluation and improvement process is applied to the program component and used as an effective management tool.

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5.0 MUNICIPAL ACTIVITIES

5.1 Program Summary

5.1.1 Program Overview

Permittees own and operate public facilities and, as a consequence, perform municipal activities including pest management over a large portion of their respective jurisdictions, which may constitute up to 20% to 30% of the land area. These activities represent both potential sources of pollutants (examples include public facilities landscape maintenance waste, materials resulting from street and road maintenance, litter and debris from solid waste collection activities, and petroleum hydrocarbons and metals resulting from equipment maintenance and repair; as well as activities to reduce pollutants generated by others (such as street sweeping and drain system cleaning). Under their Local Implementation Programs, Permittees will continue to implement BMPs in conjunction with municipal activities that can significantly contribute to the control of urban stormwater pollution. The DAMP provides Model Programs that Permittees use to formulate their local programs. In order to manage these activities and monitor progress, the Permittees will document and evaluate such activities as part of a Continuous Improvement Process.

Model programs are contained in the DAMP for both Municipal Activities and Integrated Pest Management as defined below:

Model Municipal Activities Program - The Municipal Activities Program provides the framework and a process for conducting the following NPDES permit compliance activities at municipal fixed facilities, field programs and drainage facilities.

Model Integrated Pest Management, Pesticides and Fertilizer Guidelines **-** The overall purpose of the Integrated Pest Management Program is to provide the permittees with general guidelines for the management activities associated with integrated pest management, pesticide and fertilizer applications. If desired, the guidelines may also be used to develop a comprehensive Integrated Pest Management (IPM) Program.

Performance Reporting of Existing BMPs **-** Performance indicators for certain existing BMPs have been tracked since the inception of the Program. These BMPs are Street Sweeping, Solid Waste Collection, Catch Basin Stenciling, Drainage Facility Maintenance, Trash & Debris Control (formerly Litter Control), Household Hazardous Waste Collection, and Used Oil Grant Participation. This is from the ROWD, see Richard's comments.

The objectives of these model programs are to provide the Permittees with:

- A program framework for reducing the adverse impacts that municipal activities may have on water quality;
- An iterative process by which they can effectively monitor and respond to problems as they are discovered; and
- Methodologies to meet NPDES permit requirements.

The Model Program is intended to be implemented as described in Section A-5 of each Permittee's Local Implementation Plan (LIP). In developing its LIP, the Permittee may modify the Model Program in response to local conditions. It is not the intent for this Model Program to restrict city or county governing bodies from imposing additional stormwater management requirements on their municipal activities, facilities, lessors and contracts.

5.1.2 Program Commitments

Although the Municipal Activities Program provides the framework and approach for complying with the NPDES permit requirements, the program is structured to assist the Permittees in the development of their LIPs (**Appendix A-5**).

The major program commitments and the subsections in which they are described in detail include:

- Maintain/update inventories of Fixed Facilities, Field Programs and Drainage Facilities that exist within the jurisdiction, including the watershed in which the facility is located, whether the facility/program activity is located adjacent to an ESA, the potential of the facility or activity to generate pollutants and whether the watershed is listed for any of the pollutants of concern generated by the facility or activity (5.2.1).
- Prioritize fixed facilities, for the purposes of determining the frequency of inspections (high – annually, medium – bi-annually, low – once/permit term). Field Programs and Drainage Facilities are all considered high priority and require annual inspections (5.2.2).
- Perform maintenance at all Fixed Facilities, Field Activities and Drainage Facilities in accordance with Model Maintenance Procedures and as determined by inspections. These include common baseline procedures and Best Management Practices as well as optional enhanced BMPs if operational history, inspection findings, or other special situations warrant implementation (5.2.3).
- Enforce the maintenance requirements through internal procedures and external contract language (5.2.4).
- Apply Integrated Pest Management activities to the maximum extent possible (5.3).
- Educate and train municipal staff as one of the keys to a successful stormwater program. To assist the responsible municipal and contract/lease staff in understanding the Municipal Activities Program Manual and the Model Maintenance Procedures, several different annual training sessions have been developed. Each municipality should have the appropriate number and type of personnel at each of the training sessions (5.4).
- Perform Environmental Performance Reports for Street Sweeping, Solid Waste Collection, Catch Basin Stenciling, Drainage Facility Maintenance, Trash & Debris Control (formerly Litter Control), Household Hazardous Waste Collection, and Used Oil Grant Participation BMPs annually and provide to the Principal Permittee and Water Board as part of the annual report (5. 5).

Definitions associated with the programs are included in Section 5.6.

5.1.3 Regulatory Requirements

Federal regulations require, as part of the DAMP, a description of municipal maintenance activities and schedules for structural controls, practices for operating and maintaining public streets, and programs to reduce to the maximum extent practicable (MEP) pollutants in discharges from Municipal Separate Storm Sewer Systems (MS4s) associated with the application of fertilizers, herbicides and pesticides.

The Model Municipal Activities Program and the Model Integrated Pest Management, Pesticide and Fertilizer Guidelines were developed in order to fulfill the municipal activity commitments and requirements of:

- Section XIV of the Santa Ana Regional Water Quality Control Board Municipal NPDES Stormwater permit, Order No. R8-2002-0010; and
- Section F.3.a of the San Diego Regional Water Quality Control Board Municipal NPDES Stormwater permit, Order No. R9-2002-0001.

5.2 Model Municipal Activities Program Details

The use of programs as presented below promotes countywide consistency among the Permittees, which provides for uniform receiving water quality protection and program effectiveness assessment. This section is structured to assist the Permittees with the development of jurisdictional implementation plans.

Figure 5-1 represents the flow of the program with a brief description of each section. Information gathered for each section of the program supports subsequent sections. The flow of the sections eliminates duplication and improves the efficiency of overall program efforts. Arrows represent the flow of information from each section.

Figure 5-1 – Model Program Structure

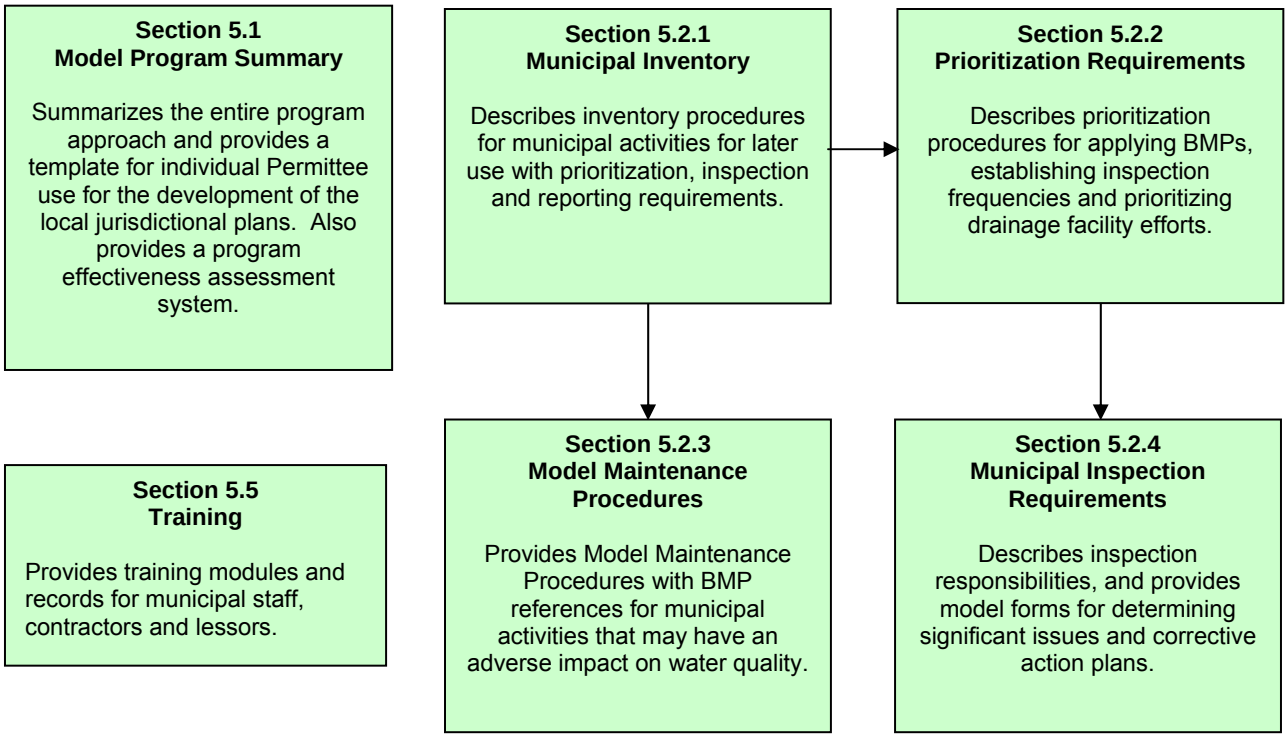

5.2.1 Municipal Inventories

This section describes the procedures to generate and maintain comprehensive inventories of the following three elements that a city owns, operates, leases and/or contracts within its jurisdiction:

- Fixed Facilities
- Field Programs
- Drainage Facilities

The inventories serve as the basis for the prioritization, inspection, enforcement, and reporting elements of the program, and assist the municipalities in identifying which model procedures and strategies should be implemented in order to reduce the discharge of pollutants to the storm drain system. Inventory procedures for Fixed Facilities and Field Programs are similar, and are therefore presented together in Section 5.2.1.1. Inventory procedures for Drainage Facilities are presented in Section 5.2.1.2. All municipalities should already have and be maintaining inventories of fixed facility and field programs. Permittees should review their inventories on an annual basis and update the inventories as appropriate to add new facilities or activities that have been added during the past year and/or deleted facilities or activities that the municipality no longer owns or conducts using the procedures noted below.

5.2.1.1 Fixed Facility and Field Program Inventory Procedures

The five steps involved in compiling the necessary inventory information on new facilities or updating the inventory information for previously listed Fixed Facilities and Field Programs includes:

- Identify all Fixed Facilities that exist within the jurisdiction.
- Identify the watershed where the Fixed Facilities/Field Programs are located.
- Determine whether the Fixed Facilities/Field Programs are adjacent to or discharge into an Environmentally Sensitive Area.
- Identify all activities with the potential to generate pollutants and identify all potential pollutants.
- Determine if any discharges into 303(d) listed water bodies include associated 303(d) pollutants of concern.

Details and references for each of these five steps are provided below:

Step 1 - Fixed Facilities and Field Programs Type Identification

The first step in the inventory process is to identify those Field Programs conducted by the municipality and those Fixed Facilities that are owned and operated or owned and leased by the municipality. Once those are identified, baseline information about each Fixed Facility or Field Program needs to be entered into the inventory, including the name, address and type of facility or program.

Each Fixed Facility and Field Program will be identified with a main and sub-category type within the inventory. **Table 5.1** below lists the main and sub-categories of Fixed Facilities that have the greatest potential for generating pollutants that may be discharged into receiving waters. **Table 5.2** below lists the main and sub-category Field Program types that have the greatest potential for discharging pollutants into receiving waters. The list of Fixed Facilities must include those facilities owned by a city and leased to another party. The list of Field Programs must include those that are contracted out by a city.

Table 5.1 Types of Municipal Fixed Facilities	
Main Facility Types	**Sub-Category Facility Types**
Municipal Waste Facilities	Active or Closed Municipal Landfills
	Publicly Owned Treatment Facilities
	Incinerators
	Solid Waste Transfer Facilities
	Land Application Sites
	Sites for Disposing and Treating Sewage Sludge
	Hazardous Waste Treatment, Disposal, and Recovery Facilities
	Uncontrolled Sanitary Landfills
Corporation Yards	Corporation Yards
	Maintenance Yards
	Storage Yards for Materials
Other Municipal Owned and/or Operated Facilities	Airfields (Landside Operations)
	Parks and Cemeteries
	Public Buildings (Police, Fire, Libraries, etc.)
	Stadiums
	Stables
	Boat/Shipping Yards
	Animal Shelters/Services
	Public Parking Facilities
	Fire Stations
	Other Facilities Identified by the Municipality

Table 5.2 Field Program Activities	
Main Field Program Types	**Sub-Category Types/Activities**
Lake Management	Fertilizer & Pesticide Management
	Mowing, Trimming, Weeding, and Planting
	Managing Landscape Waste
	Controlling Litter
	Erosion Control
	Controlling Illegal Dumping
	Bacteria Control
	Monitoring

Table 5.2 Field Program Activities (continued)	
Main Field Program Types	**Sub-Category Types/Activities**
Landscape Maintenance	Mowing, Trimming, Weeding, and Planting
	Irrigation
	Fertilizer and Pesticide Management
	Managing Landscape Waste
	Erosion Control
Roads, Streets, and Highways Operations and Maintenance	Sweeping and Cleaning
	Street Repair and Maintenance
	Bridge and Structure Maintenance
Fountains, Plazas, and Sidewalk Maintenance and Cleaning	Surface Cleaning
	Graffiti Cleaning
	Sidewalk Repair
	Controlling Litter
	Fountain Maintenance
Solid Waste Handling	Solid Waste Collection
	Waste Reduction & Recycling
	Hazardous Waste Collection
	Litter Control
Water and Sewer Utility O&M	Water Line Maintenance
	Sanitary Sewer Maintenance
	Spill/Leak/Overflow Control
Fire Department Activities	Emergency/Post-Emergency Fire Fighting Activities
	Fire Fighting Training
	Fire Station Activities

Step 2 – Watershed Identification

For each new or modified Fixed Facility and Field Program identified above, the watershed(s) in which the Fixed Facility or Field Program is located is determined and included in the inventory. It should be noted that since most Field Programs are conducted throughout a Permittee's jurisdiction, the inventory will likely reflect those watersheds in which the city is located and be the same for all types of field programs.

Orange County contains thirteen watersheds, which are summarized in **Table 5.3** and provided in maps available from the County. It should also be noted that ocean sections along the shore of a watershed are still considered a part of that watershed.

Table 5.3 Orange County Watersheds

Region	Watershed	Identifier
Region 8 Santa Ana	San Gabriel/Coyote Creek	A
	Anaheim Bay/Huntington Harbour	B
	Santa Ana River	C
	Newport Bay	D
	Newport Coastal Streams	
Region 9 San Diego	Laguna Coastal Streams	H
	Aliso Creek	I
	Dana Point Coastal Streams	J
	San Juan Creek	K
	San Clemente Coastal Streams	L
	San Mateo Creek	M

Step 3 - Environmentally Sensitive Area (ESA) Impacts

The next step in updating the inventory is to determine if the Fixed Facilities may potentially impact a water body considered to be an ESA by determining if they are either:

- Within or adjacent to, or
- Discharge pollutants directly to an ESA.

For the purposes of these procedures, the following terms are defined:

Adjacent - located within 200 feet of the listed water body

Discharging directly to - discharge from a drainage system that is composed entirely of flows from the subject facility or activity, i.e., discharge from an urban area that co-mingles with downstream flows prior to an ESA is not subject to this requirement.

An ESA exists if any of the following designations have been applied to the water body of concern:

- Clean Water Act 303(d) listed impaired water body (current list approved on July 25, 2003)
- A TMDL exists for the waterbody
- Areas designated as Areas of Special Biological Significance by the SWRCB in the Water Quality Control Plan for Ocean Waters of California (California Ocean Plan)

- Water bodies designated with the RARE beneficial use by the SWRCB in the Water Quality Control Plans for the Santa Ana River and San Diego Basins (Region 8 and Region 9 Basin Plans)
- Water bodies located within areas designated under the California Department of Fish and Game's Natural Community Conservation Planning (NCCP) Program as preserves or equivalent in subregional plans (http://www.dfg.ca.gov/nccp/status.htm)
- Areas designated as Critical Aquatic Resources in the Orange County Drainage Area Management Plan (DAMP)
- Any other equivalent Environmentally Sensitive Areas that contain water bodies that have been identified by the local jurisdiction to be of local concern

Table 5-4 below provides a summary of the 303(d) listed water bodies and associated pollutants of concern for Orange County. The maps in **Exhibit 5-I** may be used to assist in the identification and classification of Fixed Facilities and Field Programs in order to determine if they potentially impact an ESA.

Table 5.4 Summary of the 2002 303(d) List of Impaired Water Bodies for Orange County

Region	Water Body	Pollutant								
		Bacteria Indicators	Pathogens	Metals	Nutrients	Pesticides	Toxicity	Trash	Salinity/TDS/ Chlorides	Turbidity
Region 8 Santa Ana	Buck Gully Creek	X								
	Huntington Beach State Park	X								
	Huntington Harbour		X							
	Los Trancos Creek (Crystal Cove Creek)	X								
	Newport Bay, Lower			X		X				
	Newport Bay, Upper (Ecological Reserve)			X		X				
	Orange County Beaches							X		
	San Diego Creek, Reach 1	X				X				
	San Diego Creek, Reach 2			X			X			
	Seal Beach	X								
	Silverado Creek		X						X	
Region 9 San Diego	Aliso Creek (Mouth)	X								
	Aliso Creek (20 Miles)	X			X		X			
	Dana Point Harbor	X		X						
	Pacific Ocean Shoreline, Aliso Beach HSA	X								
	Pacific Ocean Shoreline, Dana Point HSA	X								
	Pacific Ocean Shoreline, Laguna Beach and San Joaquin Hills HSAs	X								
	Pacific Ocean Shoreline, Lowe San Juan HSA	X								
	Pacific Ocean Shoreline, San Clemente, San Mateo, and San Onofre HSAs	X								
	Prima Deshecha Creek				X					X
	San Juan Creek	X								
	San Juan Creek (Mouth)	X								
	Segunda Deshecha Creek				X					X

Step 4 - Potential Pollutant Generating Activities

In addition to the identification of the main and sub-categories of new or modified Fixed Facility types and Field Programs as described above, the potential pollutant generating activities and/or potential pollutants for each Fixed Facility or Field Program will be identified and included in the inventory. **Table 5.5** lists municipal activities that may occur at each Fixed Facility and the potential pollutants that may be associated with those activities.

The potential pollutant generating activities and/or potential pollutants for each Field Program will be identified and included in the inventory. **Table 5.6** lists municipal activities that may occur at each Field Program and the potential pollutants that may be associated with those activities.

Step 5 - Determination of Impaired Water Body Impacts

In order to complete the inventory for new or modified Fixed Facilities or Field Programs, it must be determined if any Fixed Facility or Field Program activities have the potential for discharging pollutants of concern to a water body with a TMDL or a 303(d) listed water body for which the water body is impaired. For example, does the activity discharge nutrients into a nutrient impaired water body?

In Step 3, 303(d) listed water bodies impacted by activities performed at Fixed Facilities or Field Programs were identified. In Step 4, potential pollutants associated with performed activities are identified. Refer to **Tables 5.5 and 5.6** to determine if pollutants associated with identified activities have the potential to discharge directly to water bodies with TMDLs or 303(d) listed water bodies for which the pollutant is listed and indicate as such in the inventory.

Table 5.5 Potential Pollutants from Fixed Facility Activities

Fixed Facility Activity	Sub-Activities	Potential Pollutants							
		Sediment	Nutrients	Trash	Metals	Bacteria	Oil & Grease	Organics	Pesticides
Bay / Harbor Activities	On Board Maintenance Disposal of Wastewater and Ballast Water Cleaning, Chipping, and Painting			X	X	X	X	X	X
Building Maintenance and Repair	Building Maintenance Material Storage Building Cleaning Graffiti Cleaning Painting	X		X	X			X	
Equipment Maintenance and Repair	General Maintenance and Repair Vehicle and Machine Repair Waste Handling/Disposal				X		X	X	
Fueling							X	X	
Landscape Maintenance	Mowing, Trimming, and Planting Irrigation Fertilizer and Pesticide Management Managing Landscape Waste Erosion Control	X	X	X		X			X
Material Loading & Unloading			X	X	X		X	X	X
Material Storage, Handling and Disposal	Materials Storage Chemical Material Handling and Disposal Hazardous Material Handling and Disposal	X		X	X		X	X	X
Minor Construction	General Construction Activities Interim Material Storage Concrete Work Building Work	X		X					
Parking Lot Maintenance	Sweeping and Cleaning Surface Repair	X		X	X		X		
Spill Prevention Control	Preparation and Prevention Spill Response Reporting Training		X	X			X	X	X
Vehicle and Equipment Cleaning		X	X	X	X		X	X	
Vehicle and Equipment Storage	Storing Vehicles and Equipment Wrecked Vehicle Storage Cleaning Storage Areas				X		X	X	
Waste Handling and Disposal	Litter Control Waste Collection Spill/Leak Control Run-on/Runoff Prevention		X	X	X	X	X	X	

Table 5.6 Field Program Activities and Associated Potential Pollutants

Field Programs	Activities	Potential Pollutants							
		Sediment	Nutrients	Trash	Metals	Bacteria	Oil & Grease	Organics	Pesticides
Lake Management	Fertilizer and Pesticide Management	X	X						X
	Mowing, Trimming, Weeding and Planting	X	X	X		X			X
	Managing Landscape Waste			X					X
	Controlling Litter	X		X		X	X		
	Erosion Control	X	X						
	Controlling Illegal Dumping		X	X			X	X	X
	Bacteria Control					X			
	Monitoring	X	X		X	X	X	X	X
Landscape Maintenance	Mowing, Trimming and Planting	X	X	X		X			X
	Irrigation	X	X			X	X	X	X
	Fertilizer and Pesticide Management	X	X						X
	Managing Landscape Wastes			X					X
	Erosion Control	X	X						
Roads, Streets, and Highways Operations and Maintenance	Sweeping and Cleaning	X		X	X		X		
	Street Repair and Maintenance	X		X	X		X	X	
	Bridge and Structure Maintenance	X		X	X		X	X	
Fountains, Plazas, and Sidewalk Maintenance and Cleaning	Surface Cleaning	X				X	X		
	Graffiti Cleaning	X			X			X	
	Sidewalk Repair	X		X					
	Controlling Litter	X		X		X	X		
	Fountain Maintenance	X		X		X			
Solid Waste Handling	Solid Waste Collection			X	X	X			
	Waste Reduction and Recycling			X	X				
	Household Hazardous Waste Collection			X	X			X	X
	Litter Control			X	X	X		X	
Water and Sewer Utility O&M	Water Line Maintenance	X							
	Sanitary Sewer Maintenance	X				X			
	Spill/Leak/Overflow Control, Response, and Containment	X	X			X		X	
Fire Department Activities	Emergency/Post-Emergency Fire Fighting Activities			X	X		X	X	
	Fire Fighting Training Activities			X				X	
	Fire Station Activities				X		X		

5.2.1.2 Drainage Facility Inventory Procedures

The three steps involved in compiling necessary inventory information for Drainage Facilities include:

- Identify and locate all Drainage Facilities within the jurisdiction.
- Identify the watershed where Drainage Facility discharges are located.
- Determine whether the Drainage Facility discharges into a 303(d) listed water body and/or an Environmentally Sensitive Area. A TMDL may also exist causing the water body to be impaired.

It is anticipated that all Permittees currently maintain an inventory of existing drainage facilities. Annually, Permittees should update the inventory if there have been any significant modifications/additions to the drainage facilities using the following procedures.

Step 1 - Drainage Facilities Type Identification

The first step in the inventory process will be to identify all those Drainage Facilities that are owned and operated by the municipality that have been added or modified since the last inventory (excluding storm drains). Once they are identified, baseline information needs to be entered into the inventory such as the identification, specifications, location and type of facility (**Appendix A-5**).

Each Drainage Facility will be identified with a main and sub-category type within the inventory. **Table 5.7** below lists the main and sub-categories that have the greatest potential for discharging pollutants into receiving waters. The list of Drainage Facilities must also include those within facilities owned by a city but leased to another party. Drainage Facilities owned by another party within a jurisdiction should only be included within the owner's inventory. For example, an open channel that is owned by the county but flows through a city's jurisdiction should only be included within the county's inventory.

Table 5.7 Types of Drainage Facilities

Main Drainage Facility Types	Sub-Category Drainage Facility Types
Flood Management Projects and Flood Control Devices	Detention/Infiltration Basins
	Sedimentation Basins
Drainage System	Catch Basins
	Other Inlet Structures
	Open Channels
	Pump Stations
	Dry Weather Diversions

The number of catch basins, detention basins, retention basins, sediment basins, lift stations, etc. will be identified, including the length or magnitude of open channels.

A basic inventory of Drainage Facilities, including number or magnitude, is included in **Exhibit A-5-I**.

Step 2 – Watershed Identification

For each Drainage Facility identified above, the watershed(s) in which the Drainage Facility is located will be determined and included in the inventory.

Orange County contains thirteen watersheds, which are summarized above in **Table 5.3** and provided in maps available from the County. It should also be noted that ocean sections along the shore of a watershed are still considered a part of that watershed.

Step 3 - Environmentally Sensitive Area (ESA) Impacts

The next step in conducting the inventory is to determine if the Drainage Facilities may potentially impact a water body considered to be an ESA by determining if:

- They are within or adjacent to, or
- They discharge pollutants directly to an ESA.

For the purposes of these procedures, the following terms are defined:

Adjacent - located within 200 feet of the listed water body

Discharging directly to - discharge from a drainage system that is composed entirely of flows from the subject facility or activity (i.e. discharge from an urban area that co-mingles with downstream flows prior to an ESA is not subject to this requirement).

An ESA exists if any of the following designations have been applied to the water body of concern:

- Clean Water Act 303(d) listed impaired water body;
- A TMDL has been developed;
- Areas designated as Areas of Special Biological Significance by the SWRCB in the Water Quality Control Plan for Ocean Waters of California (California Ocean Plan);
- Water bodies designated with the RARE beneficial use by the SWRCB in the Water Quality Control Plans for the Santa Ana River and San Diego Basins (Region 8 and Region 9 Basin Plans);
- Water bodies located within areas designated under the California Department of Fish and Game's Natural Community Conservation Planning (NCCP) Program as preserves or equivalent in sub-regional plans (http://www.dfg.ca.gov/nccp/status.htm);
- Areas designated as Critical Aquatic Resources within this Orange County DAMP;

- Any other equivalent Environmentally Sensitive Areas that contain water bodies which have been identified by the local jurisdiction to be of local concern.

The maps in **Exhibit 5-I** may be used to assist in the identification and classification of Fixed Facilities in order to determine if they potentially impact an ESA.

5.2.2 Prioritization

This section outlines the procedures for prioritizing the Fixed Facilities, Field Programs, and Drainage Facilities for the inspection frequency, based upon the threat to water quality. The prioritization will result in a high, medium or low threat categorization and corresponding inspection frequency. Inspections will occur within every permit term, or as needed if changes occur on-site within the permit term. Prioritization Checklists and Ranking Worksheets are provided as part of the LIP (**Appendix A-5**).

5.2.2.1 Prioritizing Fixed Facilities

The following Fixed Facility categories are automatically high priority:

- Active or closed municipal landfills
- Publicly owned treatment works (including water and wastewater treatment plants) and sanitary sewage collection systems
- Incinerators
- Solid waste transfer facilities
- Land application sites
- Uncontrolled sanitary landfills
- Corporate yards including maintenance and storage yards for materials, waste, equipment and vehicles
- Sites for disposing and treating sewage sludge (city owned sludge storage facilities, land application sites, incinerators, etc.)
- Hazardous waste treatment, disposal, and recovery facilities.
- Municipal airfields (landside operations only – parking garages, terminals, landscaping, etc.)
- Fixed Facilities that lie within, discharge directly to or adjacent to an ESA 303(d) listed impaired water body or a water body for which a TMDL has been established, and discharge the listed pollutant of concern (see **Tables 5-4 and 5-5** above**)**
- Other municipal areas and activities that a municipality determines may contribute a significant pollutant load to the MS4

For Fixed Facilities that are not identified as high priority as described above, a medium or low priority will be determined using a ranking system. The criteria include:

- Type of municipal area/activity

- Material(s) used
- Wastes generated
- Pollutant discharge potential
- Non-stormwater discharges
- Size of facility or area (impervious)
- Proximity to receiving water bodies

The ranking criteria and scores have been provided in **Table 5.8** below. The total from each line item is the total ranking for a specific Fixed Facility. If the Total Ranking is greater than 30, then a medium priority is assigned. Medium priority Fixed Facilities must be inspected bi-annually beginning with the first year of program implementation following approval of the fourth term Santa Ana Board permit or the third term San Diego Board permit. If the Total Ranking is less than 30, then a low priority is assigned. Low priority Fixed Facilities should be inspected at a minimum of once during the first year of program implementation following approval of the fourth term Santa Ana Board permit or the third term San Diego Board permit.

5.2.2.2 Prioritizing Field Programs

Since Field Programs that are conducted by a city occur jurisdiction-wide and it would be impractical to conduct field activities differently based upon location, all Field Programs are prioritized as high priority and should be inspected once per year. Prioritization Checklists and Ranking Worksheets are provided as part of the LIP (**Appendix A-5**).

5.2.2.3 Prioritizing Drainage Facilities

Drainage Facilities are defined in Section 5.1, and include such structures as catch basins (storm drain inlets), detention basins, retention basins, sediment basins, and lift stations. The resulting maintenance of the facilities that may be conducted based upon the results of the inspections includes cleaning and removing accumulated waste materials.

All Drainage Facilities (excluding storm drains), by Orange County definition, are categorized as high priority. These facilities will receive annual inspection and maintenance once per year prior to the wet season (between May 1 and September 30), and as often as necessary throughout the wet season. Prioritization Checklists and Ranking Worksheets are provided as part of the LIP (**Appendix A-5**).

5.2.3 Model Maintenance Procedures

5.2.3.1 Municipal Staff

Staff performing activities at municipal Fixed Facilities (including non-fire fighting activities at fire stations), during Field Programs, and at Drainage Facilities will follow the Model Maintenance Procedures that have been developed and are included in **Appendix A-5**. Available Model Maintenance Procedure Facts Sheets are listed below in **Tables 5.9** through **5.11** and contain procedures designed to reduce the potential impact of these activities on water

quality. Fertilizer and Pesticide guidance to help prevent misuse of fertilizers and pesticides and to assist in the handling of these materials is discussed below in Section 5.3

Staff performing operations at Fixed Facilities (including non-fire fighting activities at fire stations), within Field Programs, and at Drainage Facilities will implement the baseline procedures and Best Management Practices (BMPs) as described within the Model Maintenance Procedures. Optional enhanced BMPs described within the Model Maintenance Procedures will be implemented at high priority Fixed Facilities, Field Programs, and Drainage Facilities if operational history, inspection findings, or other special situations warrant implementation.

Table 5.8 Ranking System for Prioritization of Fixed Facilities

Category	0	1	2	3	4	5	Score
Area/Activity	Pollutant Generation Unlikely - 0% activities outdoors	Pollutant Generation Possible - 0-25% activities outdoors		Pollutant Generation Likely - 25-75% activities outdoors		Pollutant Generation Highly Likely - >75% activities outdoors	
Raw Materials Used	No raw materials used	Minimal used, not likely to generate pollutants		Some used, possible to generate pollutants		Significant amount used, highly likely to generate pollutants	
303(d) listed water body pollutants Generated	None identified					Wastes generated include 303(d) listed water pollutants	
Pollutant Discharge Potential		All identified BMPs are fully implemented		All identified BMPs are partially implemented		None of the identified BMPs are implemented, or unknown	
Non-Stormwater Discharges		No known non-stormwater discharges, all programs implemented		Suspected non-stormwater discharges may be occurring, but not observed		Non-stormwater discharges have been observed and/or verified	
Size of Facility		Small (<5,000 square feet)		Medium (>5,000 - <100,000 square feet)		Large (>100,000 square feet)	
Proximity to Receiving Water Body (303(d) water bodies or ESA)		Low (>200 feet)		Medium (< 200 feet)		High (direct discharge or adjacent)	

Table 5.9 Model Maintenance Procedure Fact sheets for Fixed Facilities	
Fixed Facility Fact sheets	
Bay / Harbor Activities	Minor Construction
Building Maintenance and Repair	Parking Lot Maintenance
Equipment Maintenance and Repair	Spill Prevention Control
Fueling	Vehicle and Equipment Cleaning
Landscape Maintenance	Vehicle and Equipment Storage
Material Loading and Unloading	Waste Handling and Disposal
Material Storage, Handling and Disposal	

Table 5.10 Model Maintenance Procedure Fact sheets for Field Programs
Field Program Fact sheets
Lake Management
Landscape Maintenance
Roads, Streets, and Highways Operations and Maintenance
Sidewalk, Plaza, and Fountain Maintenance and Cleaning
Solid Waste Handling
Water and Sewer Utility O&M
Fire Department Activities

Table 5.11 Model Maintenance Procedure Fact sheets for Drainage Facilities
Drainage Facility Fact sheets
Drainage Facility Operations and Maintenance

Although some of the model maintenance procedures refer to the disposal of certain types of wastewater to the sanitary sewer system, it should be noted that disposal to these systems should only be done in accordance with district policies and procedures which may include the following:

- No person shall discharge groundwater, surface or subsurface runoff directly or indirectly into the sewer without the expressed written authorization of the district for such an activity;

- Discharges shall only be authorized if no alternate method for disposal is reasonably available or to mitigate an environmental or health hazard;
- Any connections or discharges to the sanitary sewer system without specific authorization and permit are subject to administrative penalties;
- No connection for rainwater/stormwater is allowed to the sanitary sewer system; and
- Discharges to the sanitary sewer system may have to meet pre-established limits.

5.2.3.2 Implementation by Contract Staff

It is important that the leased facilities and contracted services are also included within the context of the program. Although municipal employees typically perform most maintenance activities, some cities (especially smaller ones) contract out these activities to other parties. For example, many smaller municipalities contract out services such as street sweeping and road maintenance.

Since measures should be taken to protect water quality while performing such activities, regardless of whether the activity is being performed by a municipality, contractor, or lessor, example contract and lease language is provided below for contractor/lessor responsibility.

Example Lease Language for Fixed Facilities

The following is example language that can be inserted into municipal leases:

The Santa Ana and San Diego Regional Water Quality Control Boards (RWQCB) have issued permits which govern stormwater and non-stormwater discharges resulting from municipal activities performed by or for the County of Orange, Orange County Flood Control District and incorporated cities of Orange County (collectively referred to as Permittees). The RWQCB Permits are National Pollutant Discharge Elimination System (NPDES) Permits No. R8-2002-0010 and R9-2002-0001 (to be updated), respectively. Copies of the RWQCB Permits are available for review.

In order to comply with the Permit requirements, the Permittees have developed a Drainage Area Management Plan (DAMP) which contains Model Maintenance Procedures with Best Management Practices (BMPs) that parties leasing municipal owned properties must adhere to. These Model Maintenance Procedures contain pollution prevention and source control techniques to minimize the impact of those activities upon dry-weather urban runoff, stormwater runoff, and receiving water quality.

Activities performed at the facility leased under this agreement shall conform to the Permits, the DAMP, and the Model Maintenance Procedures, and must be performed as described within all applicable Model Maintenance Procedures. The holder of this agreement shall fully understand the Model Maintenance Procedures applicable to activities conducted at the facility leased under this agreement prior to conducting them and maintain copies of the Model Maintenance Procedures at the leased facility throughout the agreement duration. The applicable Model Maintenance Procedures are included as Exhibit ___ of this agreement.

Evaluation of activities subject to DAMP requirements performed at the facility leased under this agreement will be conducted by the city to verify compliance with DAMP requirements and may be required through lessor self-evaluation as determined by the city.

Example Contract Language for Field Programs

The following is example language that can be inserted into municipal field program contracts:

The Santa Ana and San Diego Regional Water Quality Control Boards (RWQCB) have issued permits which govern stormwater and non-stormwater discharges resulting from areas owned and operated by the County of Orange, Orange County Flood Control District and incorporated cities of Orange County (collectively referred to as Permittees). The RWQCB Permits are National Pollutant Discharge Elimination System (NPDES) Permits No. R8-2002-0010 and R9-2002-0001 (to be updated), respectively. Copies of the RWQCB Permits are available for review.

In order to comply with the Permit requirements, the Permittees have developed a Drainage Area Management Plan (DAMP) which contains Model Maintenance Procedures with Best Management Practices (BMPs) that parties conducting the municipal activities must adhere to. These Model Maintenance Procedures apply to any party conducting municipal activities and contain pollution prevention and source control techniques to minimize the impact of those activities upon dry-weather urban runoff, stormwater runoff, and receiving water quality.

Work performed under this CONTRACT shall conform to the Permit requirements, the DAMP, and the Model Maintenance Procedures and must be performed as described within all applicable Model Maintenance Procedures. The CONTRACTOR shall fully understand the Model Maintenance Procedures applicable to activities that are being conducted under this CONTRACT prior to conducting them and maintain copies of the Model Maintenance Procedures throughout the CONTRACT duration. The applicable Model Maintenance Procedures are included as Exhibit ___ of this CONTRACT.

Evaluation of activities subject to DAMP requirements performed under this CONTRACT will be conducted to verify compliance with DAMP requirements and may be required through CONTRACTOR self-evaluation as determined by the city.

5.2.4 Municipal Inspection and Requirements

Inspections of municipal Fixed Facilities, Field Programs, and Drainage Facilities will be performed in order to verify that the Model Maintenance Procedures are being implemented, that they are appropriate for that facility or program, and that they continue to be protective of water quality.

Inspections generally consist of the following:

- Fixed Facilities – inspections are typically performed by a combination of stormwater program staff and on-site Fixed Facility managers. The inspection of a Fixed Facility may include spot checks of the facility and activities being performed at the facility, or interviews with key line staff.
- Field Programs – inspections are typically performed by a combination of stormwater program staff and Field Program supervisors. The inspection of a Field Program may include spot checks of activities being performed, or interviews with key line staff.
- Drainage Facilities – inspections are typically performed by a combination of stormwater program staff and Drainage Facility maintenance supervisors. Inspections of Drainage Facilities may include routine annual inspections plus spot checks during the wet season.

- Contracted Activities – inspections are typically performed by a combination of municipal staff as well as self-inspections and reporting by the management staff of the contract firm performing the activity. See model contract language in Section 5.4.
- Leased Facilities – inspections are typically performed by a combination of municipal staff as well as self-inspections and reporting by the management staff of the lessor. See model lease language in Section 5.4.4.1.

5.2.4.1 Inspection Frequencies

Inspections are based upon the priority of the Fixed Facility or Field Program and its threat to water quality (see Section 5.4). All Drainage Facilities are considered high priority and will be inspected as shown in **Table 5.12**. The inspection frequency is consistent whether a facility or program is operated and maintained by municipal staff, contracted staff, or lessors.

Inspection frequencies will be as follows:

Table 5.12 Inspection Frequencies

Facility/Program	Inspection Frequency
Fixed Facilities	
Municipal Corporation Yards	Annually
High Priority Fixed Facility	Annually
Medium Priority Fixed Facility	Biannually During First Year of Program Implementation
Low Priority Fixed Facility	Once During First Year of Program Implementation
Field Programs	
High Priority Field Programs	Annually
Drainage Facilities	
Drainage Facilities (San Diego Permittees)	Annually Before the Wet Season, with Additional Inspections as Needed During the Wet Season
Drainage Facilities (Santa Ana Permittees)	Annually (see specific indications below)

Municipal corporation yards are inspected annually. For drainage facilities located in the Santa Ana Region, at least 80 percent of drainage facilities are inspected, cleaned, and maintained on an annual basis, with 100 percent of the facilities included in a two-year period. Fixed Facilities and Field Programs will be inspected as indicated above, however in the event of an observed problem, such as ineffective maintenance procedures or detected non-stormwater discharges, the inspection frequency will be increased as appropriate to facilitate correction of the problem.

5.2.4.2 Inspection Documentation Procedures

In order to properly document all inspections and gather the necessary information for the Program Effectiveness Assessment, model inspection forms for Fixed Facilities, Field Programs, and Drainage Facilities have been developed (see **Appendix A-5**)

The inspection forms to be used during inspection consist of the following:

General Inspection Forms – This primary form provides for a general characterization of the Fixed Facility, Field Program, or Drainage Facility being inspected, including the type of facility or program, the reason for inspection, and activities that may take place. A general cover sheet inspection form is required for all inspections.

Activity Specific Inspection Forms – These secondary forms provide a series of questions about specific activities taking place at a Fixed Facility, Field Program or Drainage Facility, as well as a list of suggested corrective action plans that can be implemented should a problem be found. Available Model Activity Specific Inspection Forms are listed below in Tables 5-13, 5-14, and 5-15. One activity specific form should be filled out for each activity at each Fixed Facility, Field Program, or Drainage Facility.

Table 5.13 Model Activity Specific Inspection Forms for Fixed Facilities

Fixed Facility Fact sheets	
Bay / Harbor Activities	Minor Construction
Building Maintenance and Repair	Parking Lot Maintenance
Equipment Maintenance and Repair	Spill Prevention Control
Fueling	Vehicle and Equipment Cleaning
Landscape Maintenance	Vehicle and Equipment Storage
Material Loading and Unloading	Waste Handling and Disposal
Material Storage, Handling and Disposal	

Table 5.14 Model Activity Specific Inspection Forms for Field Programs
Field Program Fact sheets
Lake Management
Landscape Maintenance
Roads, Streets, and Highways Operations and Maintenance
Sidewalk, Plaza, and Fountain Maintenance and Cleaning
Solid Waste Handling
Water and Sewer Utility O&M
Fire Department Activities

Table 5.15 Model Activity Specific Inspection Form for Drainage Facilities
Drainage Facility Fact sheets
Drainage Facility Operations and Maintenance

5.2.4.3 Enforcement

In order to ensure compliance, in addition to the routine education and training that will take place, enforcement procedures and mechanisms must be established and implemented by each City for the municipal activities program. The City has many options in developing its policies and procedures and may choose its own disciplinary resources to implement and enforce its program.

Enforcement actions may occur as a result of a problem found during an inspection or in response to a complaint that is received. As such, there are several different types of enforcement mechanisms and penalties that the City may utilize in order to ensure compliance. For example, the City may choose to give a verbal warning as a method of requesting corrective action. If a deficiency that was noted in a prior verbal warning is not corrected, a written warning may be issued and enforcement will continue until the problem is solved. External enforcement action could range from the issuance of a notice of noncompliance to the loss of a contract or lease to a fine, as determined by each City on a case-by-case basis.

5.3 Model Integrated Pest Management, Pesticides and Fertilizer Guidelines

5.3.1 Introduction

Fertilizers and pesticides are a common tool for plant health and pest management. Used properly, fertilizers provide important nutrients for plants, and pesticides help to protect plants from potential harm due to insects, mites, plant diseases, nematodes, vertebrates (such as gophers and rats) and weeds.

Used improperly, fertilizers and pesticides may, among other things, impair surface and groundwater supplies. Careless management activities such as application, mixing, transportation, storage and disposal can allow these chemicals to enter surface and groundwater through runoff and infiltration. These practices may also endanger human and/or environmental health through exposure to these potentially toxic chemicals.

Due to these inherent risks that exist even under ideal conditions, and the importance of professional planning and management, the Management Guidelines for the Use of Fertilizers and Pesticides that were originally developed in 1993 were re-evaluated and significantly revised to provide the public agencies in Orange County with:

- A process by which they can effectively re-evaluate their approach to using fertilizers and pesticides as needed and begin to move toward reducing their dependence on them by developing a comprehensive Integrated Pest Management Program;
- A program framework for reducing the adverse impacts that the use of fertilizers and pesticides may have on water quality; and
- General guidelines that can be used in conjunction with the Landscape Model Maintenance Procedures (Municipal Activities Program Manual) in order to minimize the potential threat to human health and environmental resources.

Ultimately, the guidelines may be used and encouraged on a broader scale. They are based on the laws, management guidelines, research-based recommendations and "management measures and practices" established by other federal, state and local agencies and universities and they recognize that the safe management of fertilizers and pesticides is a shared responsibility between applicators, handlers and management.

In addition, general training for this program element will be conducted annually as a part of the overall Municipal Activities Program Manual. The Management Guidelines for Integrated Pest Management, Pesticides, and Fertilizers training module is generally targeted for stormwater program managers and addresses the overall program framework, objectives and approach so that they may gain a broader understanding of how the program was developed and should be implemented at a local level.

The training generally focuses on the proper application and handling of fertilizers and pesticides and the implementation of integrated pest management practices for management and municipal staff performing these activities. The training will be in a classroom setting, provided annually and approximately 2-3 hours in length. Additional training modules will be developed as needed. Additional details on the overall framework and approach of the training modules are included in the Municipal Activities Program Manual.

For the purpose of these guidelines:

- Fertilizers may be referred to as "nutrients" or "soil nutrients";
- "Pesticides" will encompass all herbicides, insecticides, fungicides and rodenticides;
- The California Food and Agricultural Code (FAC) and the California Code of Regulations, Title 3 (3 CCR), constitute the laws and regulations referred to in these guidelines. They are referenced often and usually referred to as the "State Laws";
- The Permittees are referred to as "public agencies", and employees working for these public agencies and responsible for the handling and/or application of fertilizers and pesticides will be referred to as "public employees".

5.3.2 Integrated Pest Management

5.3.2.1 Background on Pesticide Use and Integrated Pest Management

For most of the last 55 years, the trend in pest management has been toward a greater reliance on chemical pesticides. The result has been not only a tremendous increase in the use of many dangerous chemicals, but also an increase in the number of pests that are resistant to the pesticides or new organisms becoming pests. Additionally, some pesticides used for terrestrial pest management have been found in waterways causing additional problems in the environment.

Pest control managers are now moving away from their reliance on pesticides alone toward an integrated approach that combines limited pesticide use with more environmentally friendly pest control techniques. This system is know as integrated pest management (IPM), a strategy that focuses on the long-term prevention of pests or their damage through a combination of techniques, including preventative, cultural, mechanical, environmental, biological, and chemical control tactics (**Figure 5.7**). The techniques are utilized simultaneously to control pest populations in the most effective manner possible.

Developing a comprehensive Integrated Pest Management (IPM) Program and Approach allows the primary efforts to focus on pollution prevention by monitoring and preventing pests as well as minimizing heavy pest infestations, which reduces the need for chemicals and/or multiple applications.

IPM programs utilize monitoring techniques and economic thresholds to determine when to implement control strategies, which are then used according to established guidelines only after monitoring indicates that such treatment is appropriate. Pest control materials are selected and applied in a manner that minimizes risks to human health, beneficial and non-target organisms and the environment.

The use of pesticides is often a last resort measure. Because of this, the management guidelines for pesticide use are presented in a separate section immediately following the IPM guidelines.

Figure 5.7
Components of an Integrated Pest Management Program

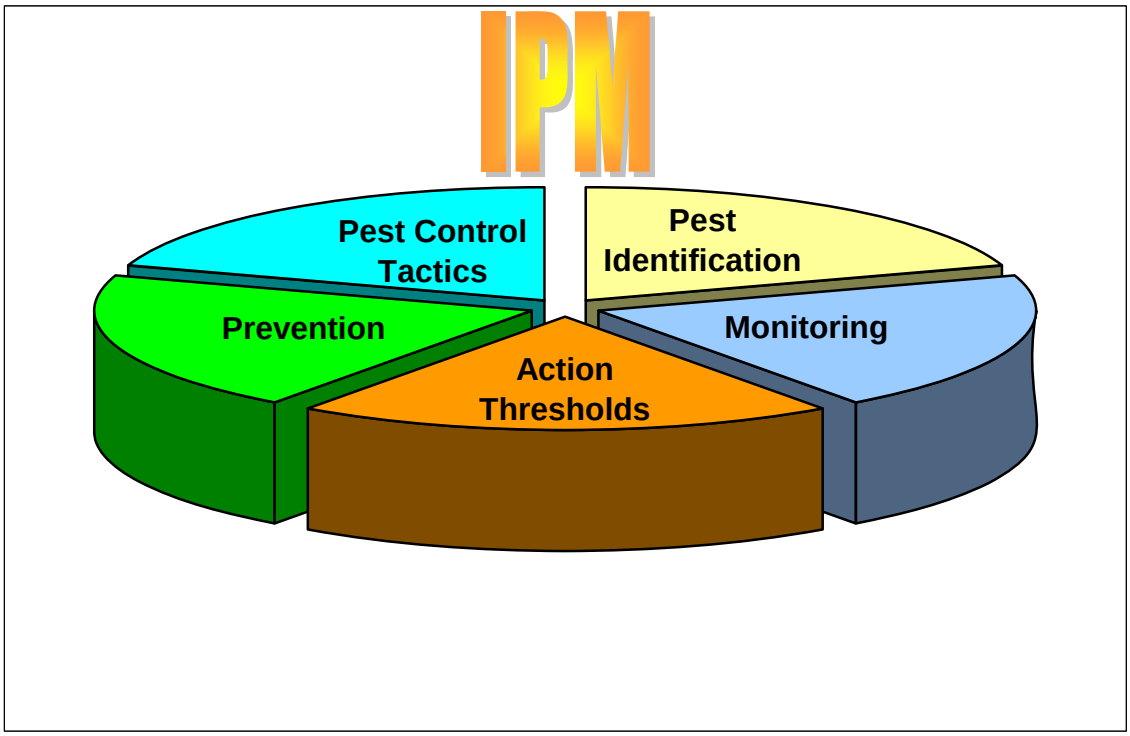

5.3.2.2 Scope of IPM Guidelines

IPM practices are encouraged over the sole use of pesticides as the primary means of pest management (**Table 5.16**). As a part of the Municipal Activities Program Manual, the public agencies and their contractors should evaluate the non-chemical components of IPM before intensive use of pesticides.

The goal of IPM is not to eliminate all pests, but to keep their populations at tolerable levels. Pesticides may be part of an IPM program, but they should only be used after the pests exceed established thresholds and only applied in the affected area. In general, pest control strategies should be those that are least disruptive to biological control organisms (natural enemies), least hazardous to humans and the environment (including non-target organisms), and have the best likelihood of long-term effectiveness.

Pesticides should not be applied until pests are approaching damaging levels. Because this requires early detection of the pests, monitoring on a regular basis is extremely important and should be used to determine if natural enemies are present and adequately controlling the pest. If possible, a person should be trained and designated to scout the sites on a regular basis.

Table 5.16 Advantages and Disadvantages of a Pesticide-Based Program Versus An IPM-Based Pest Control Program.

Pesticide Based Pest Control		IPM Based Pest Control	
Advantages	**Disadvantages**	**Advantages**	**Disadvantages**
Quick suppression of pests.	Loss of natural controls.	Long-term control.	Training is required to identify pests and natural enemies.
Labor is only for spraying.	Not long-term.	Safer to the environment.	Must have knowledge of pesticides and their effects on other organisms.
Not much preparation or follow-up needed.	More pesticides in environment.	Pesticides can be used (only used as last resort).	Must maintain a record-keeping system.
	Contamination of water bodies from runoff.	Reduces disruption of natural enemies.	Must scout regularly.
	Pesticide safety for applicators, public, animals.	Reduces contamination from runoff.	Labor is required for monitoring.
	Often get outbreaks of other pests.	Less exposure to pesticides.	
		Can be proactive in pest control actions.	

5.3.2.3 Components of an IPM Program

An IPM program is a long-term, multi-faceted system to manage pests (**Figure 5.7**). Use of pesticides is a short-term solution to pest problems and should be used only when the other components fail to maintain the pests or their damage below an acceptable level. Successful IPM practitioners are knowledgeable about the biology of the plants and

pests and successful IPM programs primarily use combinations of cultural practices as well as a combination of physical, mechanical and biological controls.

5.3.2.4 Pest Identification

It is important to learn to identify all stages of common pests at each site. For example, if you can identify weed seedlings, you can control them before they become larger and more difficult to control and before they flower, disseminating seeds throughout the site. It is also important to be sure that a pest is actually causing the problem. Often damage such as wilting is attributed to root disease but may actually be caused by under watering or wind damage.

5.3.2.5 Prevention

Good pest prevention practices are critical to any IPM program, and can be very effective in reducing pest incidence. Numerous practices can be used to prevent pest incidence and reduce pest population buildup such as the use of resistant varieties, good sanitary practices and proper plant culture. Examples of prevention include choosing an appropriate location for planting, making sure the root system is able to grow adequately and selecting plants that are compatible with the site's environment.

5.3.2.6 Monitoring

The basis of IPM is the development and use of a regular monitoring or scouting program. Monitoring involves examining plants and surrounding areas for pests, examining tools such as sticky traps for insect pests and quantitatively or qualitatively measuring the pest population size or injury. This information can be used to determine if pest populations are increasing, decreasing, or staying the same and to determine when to use a control tactic.

It is important to use a systematic approach. For example you should examine the same section of a plant each time you check for pests, rather than looking at the lower leaves on some plants and the upper ones on others. Otherwise, randomly looking at a plant or a section of a growing area does not allow you to track changes in pest population or damage over time. **Figure 5.8** illustrates an example of a form used to record monitoring or scouting information collected in the field.

It is important to establish and maintain a record-keeping system to evaluate and improve your IPM program. Records should include information such as date of examination, pests found, size and extent of the infestation, location of the infestation, control options utilized, effectiveness of the control options, labor and material costs.

Figure 5.8
Example of a Scouting Form for Monitoring Pests and Control Activities.

City: _____

Reported by: _____ Date: _____

Location: _____

Initial Report _____ Follow-up Report _____ 2nd Follow-up Report

Date reported to IPM Coordinator or Supervisor: _____

Arthropods

Pest name	Growth stages	Host	Count or estimate	Damage	Recommended Action

Weeds

Pest name	Growth stages		Count or estimate	Damage	Recommended Action

Diseases

Pest name	Growth stages	Host	Count or estimate	Damage	Recommended Action

Comments (include labor and materials cost or used):

5.3.2.6 Injury Levels and Action Thresholds

In order to have a way to determine when a control measure should be taken, injury levels and action thresholds must be set for each pest. An injury level is the pest population size where unacceptable damage occurs. Action thresholds are the set of conditions required to trigger a control action.

5.3.2.7 Pest Control Tactics

Integrated pest management programs use a variety of pest control tactics in a compatible manner that minimizes adverse effects to the environment. A combination of several control tactics is usually more effective in minimizing pest damage than any single control method. The type of control that an agency selects will likely vary on a case-by-case basis due to varying site conditions.

The primary pest control tactics to choose from include:

- Cultural
- Mechanical
- Environmental/Physical
- Biological
- Pesticide

5.3.2.8 Cultural Controls

Cultural controls are modifications of normal plant care activities that reduce or prevent pests. In addition to those methods used in the pest preventions, other cultural control methods include adjusting the frequency and amount of irrigation, fertilization, and mowing height. For example, spider mite infestations are worse on water-stressed plants, over-fertilization may cause succulent growth which then encourages aphids, too low of a mowing height may thin turf and allow weeds to become established.

5.3.2.9 Mechanical Controls

Mechanical control tactics involve the use of manual labor and machinery to reduce or eliminate pest problems using methods such as handpicking, physical barriers, or machinery to reduce pest abundance indirectly. Examples include hand-pulling or hoeing and applying mulch to control weeds, using trap boards for snails and slugs, and the use of traps for gophers.

5.3.2.10 Environmental/Physical Controls

The use of environmental manipulations that indirectly control or prevent pests by altering temperature, light, and humidity can be effective in controlling pests. Although in outdoor situations these tactics are difficult to use for most pests, they can be effective in controlling birds and mammals if their habitat can be modified such that they do not choose to live or roost

in the area. Examples include removing garbage in a timely manner and using netting or wire to prevent bird from roosting.

5.3.2.11 Biological Controls

Biological control practices use living organisms to reduce pest populations. These organisms are often also referred to as beneficials, natural enemies or biocontrols. They act to keep pest populations low enough to prevent significant economic damage. Biocontrols include pathogens, parasites, predators, competitive species, and antagonistic organisms. Beneficial organisms can occur naturally or can be purchased and released.

The most common organisms used for biological control in landscapes are predators, parasites, pathogens and herbivores.

- Predators are organisms that eat their prey (e.g. Ladybugs).
- Parasites spend part or all of their life cycle associated with their host. Common parasites lay their eggs in or on their host and then the eggs hatch, the larvae feed on the host, killing it (e.g. tiny stingless wasps for aphids and whiteflies).
- Pathogens are microscopic organisms, such as bacteria, viruses, and fungi that cause diseases in pest insects, mites, nematodes, or weeds (e.g. Bacillus thuringiensis or BT).
- Herbivores are insects or animals that feed on plants. These are effective for weed control. Biocontrols for weeds eat seeds, leaves, or tunnel into plant stems (e.g. goats and some seed and stem borers).

In order to conserve naturally occurring beneficials, broad-spectrum pesticides should not be used since the use of these types of pesticides may result in a secondary pest outbreak due to the mortality of natural enemies that may be keeping other pests under control (**Figure 5.9**).

Figure 5.9
Example of Secondary Pest Outbreak
Caused By Use of a Broad Spectrum Insecticide

A. Aphids and mites controlled by predators

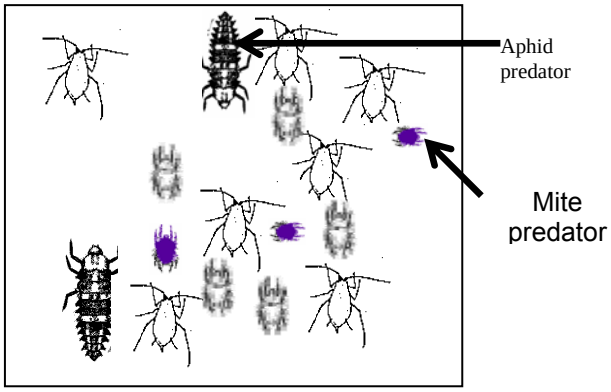

B. After a broad spectrum spray for aphids, predators for mites and aphids are also killed, resulting in an outbreak of mites

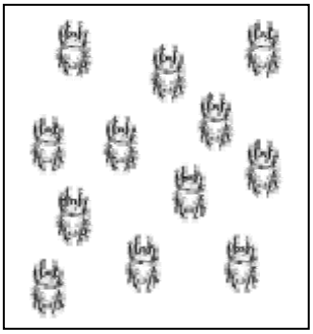

5.3.2.12 Pesticide Controls

Any substance used for defoliating plants, regulating plant growth or preventing, destroying, repelling or mitigating any pest, is a pesticide. Insecticides, herbicides, fungicides, and rodenticides are all pesticides.

Pesticides should only be used when other methods fail to provide adequate control of pests and just before pest populations cause unacceptable damage, since the overuse of pesticides can cause beneficial organisms to be killed and pest resistance to develop. When pesticides must be used, considerations should be made for how to use them most successfully. Avoid pesticides that are broad-spectrum and relatively persistent since these are the ones that can cause the most environmental damage and increase the likelihood of pesticide resistance. Always choose the least toxic but effective method.

In addition, considerations should be given to the proximity to water bodies, irrigation schedules, weather (rain or wind), the loss of use of an area (application in a park may result in the area being sectioned off), etc. that are all secondary factors that may result in the pesticide being moved off-site into the environment.

5.3.3 Pesticide Management - Planning

Pesticides are defined as any substance or mixture of substances designed to prevent, destroy, repel, or mitigate any pest. Used incorrectly or carelessly they are potentially dangerous. A heightened public awareness about pesticides and their use has created an increased concern that they be used according to the directions on the label. This ensures that the pesticides are

used correctly and safely. When products are used illegally, i.e. against label directions, it is more likely that regulatory activity on a federal and state level will increase.

Although safety concerns and the cost of complying with new regulations have encouraged some public agencies to reduce the use of pesticides, they are still used in certain situations, therefore guidelines for their proper use, handling, and storage are essential. In certain situations pesticides may be the most appropriate method. For example, pesticide use by public agencies often involves herbicide applications to keep flood control channels and roadways clear or to minimize health and safety hazards of disease-bearing rodents and insects. In landscape and turf maintenance, pesticides may be used to control pests that can reduce the aesthetic value of the site.

5.3.3.1 General Considerations

There are extensive federal and state laws and regulations that all public agencies must be in compliance with at all times.

The California Food and Agricultural Code (FAC) and the California Code of Regulations, Title 3 (3CCR), constitute the laws and regulations referred to in these guidelines. They are referenced often and usually referred to as the "State Laws".

5.3.3.2 Pesticide Labels and Material Safety Data Sheets (MSDS)

Pesticide Labels

Without exception, pesticide labels provided by the manufacturer of each pesticide are the first source of recommendations and instructions for chemical use. The label is the law. Whenever a pesticide is to be used by a worker or a contractor of a public agency, the user must read the label instructions and requirements. If the worker does not understand the label, they cannot handle or apply the pesticide until the information is explained.

As described in the 3CCR, section 6242, the label must appear on the immediate container of the pesticide and include, in prominent, bold type, the appropriate statement according to its toxicity classification: **Danger**, **Poison**, **Warning**, or **Caution**. If a chemical is transferred to another container, a copy of the label must be transferred with it. **Figure 5.10** depicts a portion of a typical pesticide label.

The section of the label entitled 'Precautionary Statements' contains information on the environmental hazards associated with use of the pesticide, such as toxicity to wildlife and aquatic organisms. Particular attention should be given to the application of pesticides near surface waters or inlets to surface waters, especially if a hazard is listed on the label.

Workers should never handle a container that does <u>not</u> have a label attached, and the supervisor in charge should be immediately advised of the situation. If a label is badly damaged and cannot be read, the supervisor must replace it.

Figure 5.10
Sample Pesticide Label

Specimen Label

Dow AgroSciences

Turflon* Ester

Specialty Herbicide

*Trademark of Dow AgroSciences LLC

For the control of annual and perennial broadleaf weeds and kikuyugrass in ornamental turf.

Active Ingredient:
triclopyr: 3,5,6-trichloro-2-pyridinyloxyacetic acid, butoxyethyl ester 61.6%
Inert Ingredients 38.4%
Total 100.0%

Contains petroleum distillates

Acid equivalent:
triclopyr - 44.3% - 4 lb/gal

EPA Reg. No. 62719-258

Precautionary Statements

Hazards to Humans and Domestic Animals
Keep Out of Reach of Children

CAUTION PRECAUCION

Si usted no entiende la etiqueta, busque a alguien para que se la explique a usted en detalle. (If you do not understand the label, find someone to explain it to you in detail.)

Harmful If Swallowed, Inhaled, Or Absorbed Through The Skin

Avoid contact with eyes, skin, or clothing. Avoid breathing mists or vapors. Avoid contamination of food.

Personal Protective Equipment (PPE)
Some materials that are chemical-resistant to this product are listed below. If you want more options, follow the instructions for category E on an EPA chemical resistance category selections chart.

Applicators and other handlers must wear:
- Long-sleeved shirt and long pants
- Chemical-resistant gloves such as Barrier Laminate, Nitrile Rubber, Neoprene Rubber, or Viton
- Shoes plus socks

Follow manufacturer's instructions for cleaning/maintaining PPE. If no such instructions for washables, use detergent and hot water. Keep and wash PPE separately from other laundry.

User Safety Recommendations
Users should:
- Wash hands before eating, drinking, chewing gum, using tobacco, or using the toilet.
- Remove clothing immediately if pesticide gets inside. Then wash thoroughly and put on clean clothing.

First Aid
In case of skin contact: Flush skin with plenty of water. Get medical attention if irritation persists.
If swallowed: Do not induce vomiting. **Call a physician.**

Environmental Hazards
This pesticide is toxic to fish. Keep out of lakes, streams, or ponds. Do not apply directly to water, or to areas where surface water is present or to intertidal areas below the mean high water mark. Do not contaminate water when disposing of equipment washwaters.

Physical or Chemical Hazards
Combustible - Do not use or store near heat or open flame. Do not cut or weld container.

Notice: Read the entire label. Use only according to label directions. **Before buying or using this product, read "Warranty Disclaimer" and "Limitation of Remedies" elsewhere on this label.**

In case of emergency endangering health or the environment involving this product, call 1-800-992-5994. If you wish to obtain additional product information, visit our web site at www.dowagro.com.

Agricultural Chemical: Do not ship or store with food, feeds, drugs or clothing.

Directions for Use
It is a violation of Federal law to use this product in a manner inconsistent with its labeling.
Read all Directions for Use carefully before applying.

Do not apply this product in a way that will contact workers or other persons, either directly or through drift. Only protected handlers may be in the area during application. For any requirements specific to your state or tribe, consult the agency responsible for pesticide regulation.

Agricultural Use Requirements
Use this product only in accordance with its labeling and with the Worker Protection Standard, 40 CFR part 170. This Standard contains requirements for the protection of agricultural workers on farms, forests, nurseries, and greenhouses, and handlers of agricultural pesticides. It contains requirements for training, decontamination, notifiction, and emergency assistance. It also contains specific instructions and exceptions pertaining to the statements on this label about personal protective equipment (PPE), and restricted-entry interval. The requirements in this box only apply to uses of this product that are covered by the Worker Protection Standard.

Do no enter or allow worker entry into treated areas during the restricted entry interval (REI) of 12 hours.

PPE required for early entry to treated areas that is permitted under the Worker Protection Standard and that involves contact with anything that has been treated, such as plants, soil, or water, is:
- Coveralls
- Chemical-resistant gloves such as Barrier Laminate, Nitrile Rubber, Neoprene Rubber, or Viton
- Shoes plus socks

Specimen label formatted for electronic distribution by CDMS

Material Data Safety Sheets (MSDS)

Workers using pesticides must have the Material Safety Data Sheets (MSDSs) for each chemical they are using readily available. Although the MSDS is a form that may vary in appearance for different chemicals, the information is the same, as required by law. Similar to the chemical labels, these sheets contain information necessary to handle each chemical safely, and all workers should be familiar with the information.

MSDS sheets include chemical identifications, hazardous ingredients, physical data, fire and explosion data, health hazards, reactivity data, spill or leak cleanup procedures, special protection and special precautions. The MSDS also contains information on the toxicity (LD_{50} and LC_{50}) of the pesticide to various test animals, providing the user with the pesticide's toxicity to off-target organisms, especially those in aquatic environments. It is recommended that MSDSs be kept in a notebook or file in a location readily accessible.

General Requirements

Following is a list of general requirements that should be followed when storing, using and transporting pesticides.

- Thoroughly investigate and consider all least toxic pest management practices.
- Maintain a complete list of all pesticides used and the use sites. (3CCR, section 6624 – unless exempt under FAC, section 11408).
- Use pesticides only according to label instructions. (FAC, section 12973).
- Consider weather conditions that could affect application. For example, wind conditions affect spray drift; rain may wash pesticide off of leaves. (3CCR, section 6614)
- Do not apply pesticides where there is a high chance of movement into water bodies; for example, they should not be applied near wetlands, streams, lakes, ponds or storm drains unless it is for an approved maintenance activity. (3CCR, section 6614).
- In most cases, triple-rinse empty pesticide containers before disposal. Particular information on the proper disposal of the pesticide and its container can be found on the label. For specific requirements see 3CCR, section 6684.
- Never clean or rinse pesticide equipment and containers in the vicinity of storm drains or other open water areas.
- Store pesticides in areas with cement floors and in areas insulated from temperature extremes.
- Secure chemicals and equipment during transportation to prevent tipping or excess jarring. (3CCR, section 6682).
- Pesticides must be transported completely isolated from people, food and clothing, for example, in the bed of the truck rather than in the passenger compartment. (3CCR, section 6682).

- Inspect pesticide equipment, storage containers and transportation vehicles frequently. (3CCR, sections 6702 & 6742).
- Develop a plan for dealing with pesticide spills and accidents.
- Unless their safety is compromised, workers must immediately clean up any chemical spills according to label instructions and notify the appropriate supervisors and agencies.
- Pesticide applications on public property, which take place on school grounds, parks, or other public rights-of-way where public exposure is possible, shall be posted with warning signs. The specific criteria for the signage can be found in FAC, section 12978. Pesticide applications by the Department of Transportation on public highway rights-of-way are exempt.

5.3.3.3 Selection of Appropriate Pesticides

When selecting pesticides, public agencies should rely on recommendations from a state-licensed pest control advisor (PCA) in order to ensure that the most appropriate pesticide is selected. Additional advice for pest identification and control strategies are also available from the Orange County Agricultural Commissioner (714) 447-7100, University of California Cooperative Extension (714) 708-1606 from other professionals and/or through professional publications.

Restricted pesticides and all other Category I pesticides should only be used under special circumstances and where other treatment options did not or could not work well.

5.3.3.4 Certification, Licensing and Permitting

Restricted use pesticides should only be applied by or under the direct supervision of an individual with a qualified applicators certificate (QAC). To receive a QAC, a person must take a test administered by Department of Pesticide Regulation (DPR). To obtain test materials, test schedules, and an application, see http://www.cdpr.ca.gov/docs/license/liccert.htm.

Pesticides listed as "restricted" in the State of California may be used only under a restricted materials permit (3CCR, section 6142) issued by the Orange County Agricultural Commissioner. The permit must be renewed annually for continued use. For more information, contact the Commissioner's office at (714) 447-7100.

All other guidelines concerning permits, licensing and certification requirements to be followed before pesticide application are detailed in FAC, sections 12971-12988 and 3CCR, sections 6500-6636.

5.3.3.5 Employee Training

Employees must know the information on the chemical label and the MSDS before using or handling pesticides. In addition, they should be trained annually or whenever a new pesticide is to be used.

The applicators should know:

- The immediate and long-term health hazards posed by chemicals to be used, the common symptoms of chemical poisoning and the ways poisoning could occur; and
- The safe work practices to be followed, including the appropriate protective clothing, equipment, mixing, transportation, storage, disposal and spill cleanup procedures that apply to the specific chemicals being used.

In addition to the training and annual continuing education required for licensing and certification as specified in 3CCR, section 6511, public employees are encouraged to participate in the annual Municipal Activities Program training (see Municipal Activities Program Manual) and continuing pesticide education programs whenever the programs are available. Supervisors are encouraged to conduct or schedule pesticide education programs for their workers more frequently than required by law.

5.3.3.6 Accident and Spill Mitigation

Public agencies using pesticides should have plans for dealing with potential accidents before they happen. These plans should consider:

- Labels and MSDS Sheets -- All workers handling pesticides must be familiar with these instructions. The steps for accident mitigation are spelled out on chemical labels and MSDS sheets.
- Spill Cleanup Kits -- Any time pesticides are being handled, there must be a cleanup kit on hand in case of an accident. This means there should always be a cleanup kit located in pesticide storage areas, on vehicles used to transport pesticides and on location where the chemicals are being applied.

  Although these kits may vary in what they contain, depending on the chemical type and the situation, at a minimum they should include:

  - Written spill-control procedures
  - A five gallon drum with seal-able lid
  - A dust pan and broom
  - A squeegee
  - A shovel
  - Protective goggles, gloves, boots, coveralls
  - A tarp (for covering dry spills)
  - Detergent and water (check label or MSDS for proper use)
  - Barricade tape, florescent traffic safety cones or string to cordon off an area
  - Large sponges, containment booms or other absorbent material

- Cleanup Procedures -- Spilled pesticides must be prevented from entering the local surface and/or groundwater supplies. Specific recommendations for spill cleanup should be available on the pesticide label or MSDS. Specific recommendations for the sequence of procedures may also vary depending on the situation. **Figure 5.11** provides a flowchart of the general steps that a worker should follow in case of a spill. A good overview of spill containment procedures can be found in the book "The Safe and Effective Use of Pesticides" (see Reference section).

Figure 5.11
General Steps to Follow in Case of a Spill

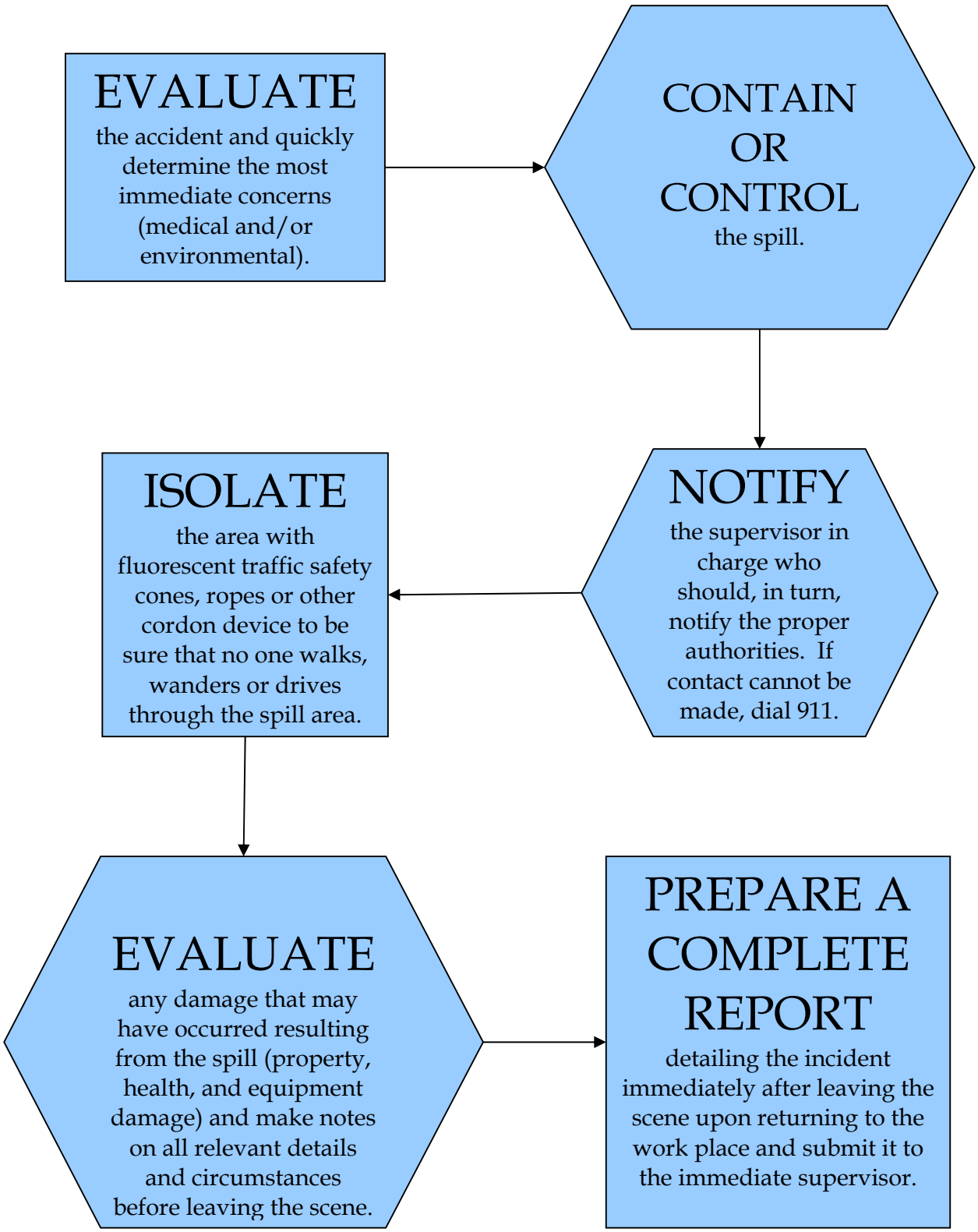

5.3.3.7 Emergency Medical Care

Accident situations requiring emergency medical care are likely to involve acute exposure to potentially toxic chemicals. Instructions for handling these exposures appear on the pesticide label.

Workers should:

- Be aware of the symptoms of acute exposures for each pesticide being used.
- Have a predetermined strategy for dealing with exposure scenarios, including knowing the label recommendations for dealing with acute exposures and the nearest medical facility where emergency care is available.

5.3.3.8 Equipment and Equipment Maintenance

All equipment for the handling of pesticides should be inspected and cleaned by workers each day before use, to ensure that there are no problems that could lead to chemical leaks, spills or accidents during the day's work (3CCR, section 6742).

The calibration of equipment should be done routinely to ensure that the proper amount of pesticide is applied. The maintenance of application rates within label recommendations also reduces the risk of surface and ground water contamination.

5.3.3.9 Groundwater and Surface Water Protection

The main factors determining the rate at which pesticides enter groundwater and surface water systems are chemical mobility, solubility, persistence and soil type. For example, potentially dangerous chemicals are likely to have a high solubility and an extremely long half-life, and they are not likely to be easily absorbed into the soil. Therefore, pesticides that decompose rapidly may be preferred under certain conditions.

However, it should be noted that if a less dangerous pesticide is chosen, but then applied two or three times as often, it may not make sense from a transportation and application risk standpoint to choose the pesticide. Therefore, because of these factors, regardless of the category of pesticides being used, pesticide advisors should always be aware of the compatibility of the pesticide with the characteristics of the site of application (soil type, slope, proximity to a water body, vegetation) before recommending pesticides for a specific area. For example, recommended surflan rates vary according to the amount of organic matter in the soil.

Furthermore, because the effect of these uses is not always immediately apparent, public agencies should periodically test areas where frequent pesticide applications occur and the area is identified as particularly vulnerable to contamination or deterioration.

PesticideWise (http://www.pw.ucr.edu/WQ_Homep.asp) is an informational database that public agencies can utilize to determine various properties of pesticides and their potential risk to water quality.

5.3.3.10 Pesticide Use in Aquatic Environments

The application of pesticides to aquatic environments for the control of pests requires coverage under the NPDES permit program. A General Permit, with January 31, 2004 expiration, was issued by the State Water Resources Control Board to authorize the application of pesticides directly to waters. The permit allows the application of aquatic pesticides by public entities as long as certain requirements are meet. These requirements state that dischargers must:

- Comply with all pesticide label instructions, DPR and Department of Health and Safety regulations, and any Use Permits issued by the local Agricultural Commissioner;
- Identify and implement BMPs to minimize adverse effects to the environment;
- Submit technical and monitoring reports as required by the local RWQCB.

Specific details of these requirements can be found in the General Permit available at the following link:

http://www.swrcb.ca.gov/resdec/wqorders/2001/wqo/wqo2001-12.doc

Further information on the direct application of pesticides to aquatic environments can be found in the University of California Division of Agriculture and Natural Resources publication titled 'Aquatic Pest Control' (see the References section). In addition, the publication entitled 'Pesticides and Aquatic Animals: A Guide to Reducing Impacts on Aquatic Systems' provides a review of aquatic pesticide management practices.

5.3.4 Application of Pesticides

In cases where State Laws require supervision of pesticide applications, supervision must be handled by a state-licensed or certified pesticide applicator. For all other pesticide applications, workers with equivalent training may handle supervision.

Public agencies that contract for pest control should periodically inspect contracted work crews to be certain that contractors are following the same or more stringent pesticide management guidelines as required by the County agencies. Public agencies handling their own applications should likewise inspect their work crews on a regular basis to ensure that safety standards are being met.

5.3.4.1 Proper Techniques

The pesticide label must be attached to the container and available on site. The label contains information regarding how to safely use the product. It is important that the applicator and handlers read the label carefully and follow application instructions exactly. Special attention should be paid to the list of pests that the pesticide will control to ensure that the right chemical is being used for the right job.

When a range of rates is given on the pesticide label, the applicator should use the lowest rate unless there are circumstances that warrant using a higher rate. These circumstances are provided on the label.

State regulations mandate that no pesticide application shall be made or continued when:

- There is a reasonable possibility of the pesticide contacting the body or clothing of persons not involved in the application process;
- There is a reasonable possibility of damage to non-target crops or animals; and
- There is a reasonable possibility of contamination of non-target public or private property. (3CCR, section 6614).

Weather conditions are a major factor in determining the likelihood of offsite movement from the application target (i.e. drift), and therefore must be incorporated into the planning of pesticide applications. This information can be found on the product label or supplemental labeling.

5.3.4.2 User Safety and Protection

The following is a list of suggestions for user safety and protection:

- Have personal protective equipment (PPE) available for application of pesticides. This includes eye protection, gloves, respiratory gear and impervious full-body, chemical resistant clothing when called for by the chemical label.
- Workers should avoid inhaling pesticide spray and dust at all times.
- Avoid working alone, especially at night. If it is necessary to work alone at night, the worker should be in contact with a supervisor via a phone or radio.
- Equipment should be cleaned at least at the end of the day's applications. The equipment should not be rinsed in an area where the wash water can contaminate surface or ground water. Workers doing the cleaning must wear the same safety equipment as required on the pesticide label, e.g., eye protection, gloves.
- Use of removable coveralls, gloves and shoes/boots is required when stated on the label, under PPE, when applying certain pesticides. Use of these protections is recommended for most applications, especially if the applicator does not have the opportunity to change clothes prior to driving or riding in a vehicle or eating or drinking. In this way, the applicator's clothing is less likely to become contaminated. The applicator should also wash his or her hands thoroughly after each application even though gloves are worn (3CCR, sections 6736 and 6738).
- State laws regarding re-entry into areas that have recently been treated with pesticides should be followed (3CCR, section 6770). For the most part, pesticides used for landscape and turf pest control allow entry after the product has dried. Nevertheless, treated areas must be blocked off or otherwise isolated until re-entry is allowed in order to reduce human exposure to the pesticide.
- Before workers come into contact with pesticides they need to be trained about the specific pesticides being used, including how to properly handle them, the dangers involved in their use, and proper training and safety procedures of the pesticides.

- Keep current records including a complete list of pesticides being used in the jurisdiction. This should include the pesticide name, amount in storage, dates, use site, rates of application and pests controlled with each application.
- Keep all relevant label and MSDS information for each pesticide updated and readily available at all times to workers handling the materials.

5.3.4.3 Storage, Disposal and Transportation

Storage of pesticides should be away from living areas and in a covered area that is well-insulated from temperature extremes; storage areas should have a cement floor and good ventilation. Also, storage areas should be clearly marked according to state standards and be securely locked at all times when not in use.

Signs, visible from any direction of probable approach, must be posted around all storage areas for containers that hold, or have held pesticides, that are required to be labeled with the signal words "warning" or "danger".

Each sign should be of such size that it is readable at a distance of 25 feet and contain the following statements:

DANGER

POISON STORAGE AREA
ALL UNAUTHORIZED PERSONS KEEP OUT
KEEP DOOR LOCKED WHEN NOT IN USE

The notice shall be repeated in an appropriate language other than English when it may reasonably be anticipated that persons who do not understand the English language will come to the enclosure (3CCR, section 6674).

Pesticide labels on pesticides being stored or used should be kept in good condition and attached to all containers holding pesticides (3CCR, section 6676 and 6678) and storage equipment and containers should be inspected frequently for leaks or defects before being taken on the job. Containers should also be inspected before storing at the end of the day.

Proper Disposal

Following are recommendations that should be followed in order to ensure the proper disposal the pesticide containers:

- Pesticide containers should be triple-rinsed before disposal (3CCR, section 6684).
- Cleaned containers should be sent back to the manufacturer for recycling whenever possible. However, once triple-rinsed most haulers will take them to most landfills.
- Leftover rinse water should be used as spray.
- Surplus or out-of-date pesticides should be given to a licensed hazardous waste hauler for disposal.

Safe Transportation Methods

The following is a list of recommendations that should be followed to ensure that workers utilize safe transportation methods when traveling to and from worksites:

- Pesticide containers should be tightly sealed and secured from tipping or excess jarring (3CCR, section 6682).
- Pesticide transportation compartments on vehicles should be isolated from the compartment carrying people, food and clothing (3CCR, section 6682) and should be securely locked.
- Only the amount of pesticide needed for the day should be transported to the site. If the pesticide is transferred to another container, a copy of the label or a service label must be attached. (3CCR, sections 6676 and 6678).
- *In no case shall a pesticide be placed or kept in any container of a type commonly used for food, drink or household products.* (3CCR, section 6680).
- Appropriate pesticide labels and MSDS sheets, a spill cleanup kit, and a first aid kit should always be brought along when transporting pesticides. Additionally, the location of an emergency medical care center should be known.
- All vehicles used for pesticide transportation should include radio or cellular communications for contacting help in case of a spill or some other emergency.

5.3.5 Fertilizer Management

Fertilizers are nutrients applied to soil or plants to promote plant growth or health. Fertilizers commonly used in landscapes contain both:

- Nitrogen (N); and
- Phosphorus (P)

Soluble forms of nitrogen and phosphorus can leach through soils or move off-site in surface runoff causing algal blooms or eutrophication within the local waterways.

Fertilizers also play an important role in promoting plant growth that protects soil from erosion and enhances landscape aesthetics. Because of the necessity for soil nutrients and the potential for adverse effects on local waterways due to the loss of these nutrients through runoff and leaching management guidelines are necessary as a means of reducing the loss of fertilizers into water bodies.

5.3.5.1 State and Federal Law

Fertilizer use is not regulated under state and federal law, as its use does not pose an immediate danger to public health and safety. However, it is well known that the misuse of fertilizers poses risks to the environment. As a result, various organizations have developed management guidelines for fertilizer use on specific crops. The California Plant Health Association (http://www.cpha.net) maintains a listing of fertilizer manufacturers, distributors, and associations that provide technical information on the proper use of fertilizer on their web site.

5.3.5.2 General Recommendations

The following is a list of general recommendations that should be followed when storing, applying and transporting fertilizers:

- Whenever possible use foliar and/or soil nutrient testing before applying fertilizers to verify application timing and rate.
- Use a higher percentage of fertilizers containing slow-release N, such as IBDU and sulfur-coated urea. Be aware that organics (i.e. bone meal) and some slow-release fertilizers are dependent on microbial activity for the release of nitrogen; therefore low soil temperature will decrease the release of nitrogen available for plant uptake.
- If highly soluble-N fertilizers are used, apply smaller amounts on a more frequent basis.
- Incorporate fertilizer directly into the soil around the plant, where possible, to minimize potential surface runoff.
- Although fertilizers must be watered in the soil in order to work, watering should occur with light irrigation just after the application. Due to the unpredictability of rain events, it is recommended that fertilizers not be applied in the rain or on the same day that rain is expected.
- Irrigation application rates and schedules should be adjusted to minimize surface runoff, especially immediately following the application of a fertilizer.
- Immediately clean up any spill of fertilizers using dry methods of cleanup such as by sweeping or scooping up the material.
- Fertilizer storage facilities should be covered and have an impermeable foundation so that potential spills cannot runoff into surface water or leach into groundwater systems.
- Fertilizers must be securely covered in the vehicle before being transported to application sites to avoid spillage or loss during transport.

5.3.5.3 Nutrient and Soil Assessment

Soluble fertilizers can easily leach through soil and potentially contaminate groundwater following excess irrigation, after heavy rains and where the water table is high. Generally, the most significant loss of fertilizer is from nitrate-nitrogen, but there is some evidence that phosphorus leaching can be significant in soils that have received regular applications of soluble phosphorus.

Foliar and soil analysis should be utilized whenever possible to assist in the determination of the nutrient status of plants and the soil where they are growing. Nutrient testing can be an important management tool for determining baseline nutrient levels in order to adjust application rates appropriately. Generally, soil testing is done only for newly developed sites, but valuable information can be obtained on established sites as well. For example, the chemical and physical properties of the soil affect the availability of nutrients. **Figure 5.12** illustrates the range of nutrient availability as the pH of the soil increases or decreases.

Nutrient analyses are often accompanied with an interpretation and recommendation from the testing laboratory in order to assist the applicator in choosing the proper type and rate of fertilizer. Fertilizer recommendations should be based on the type of plant material (i.e. mature tree versus groundcover), the growth stage, overall health of the plant, and the current nutrient status of the soil. If a public employee with expertise in plant nutrition is not available, the testing laboratory or a Certified Crop Advisor (CCA) with expertise in urban horticulture should be able to provide a useful interpretation of a foliar or soil analysis.

Figure 5.12
The Effect of pH on Plant Nutrient Availability

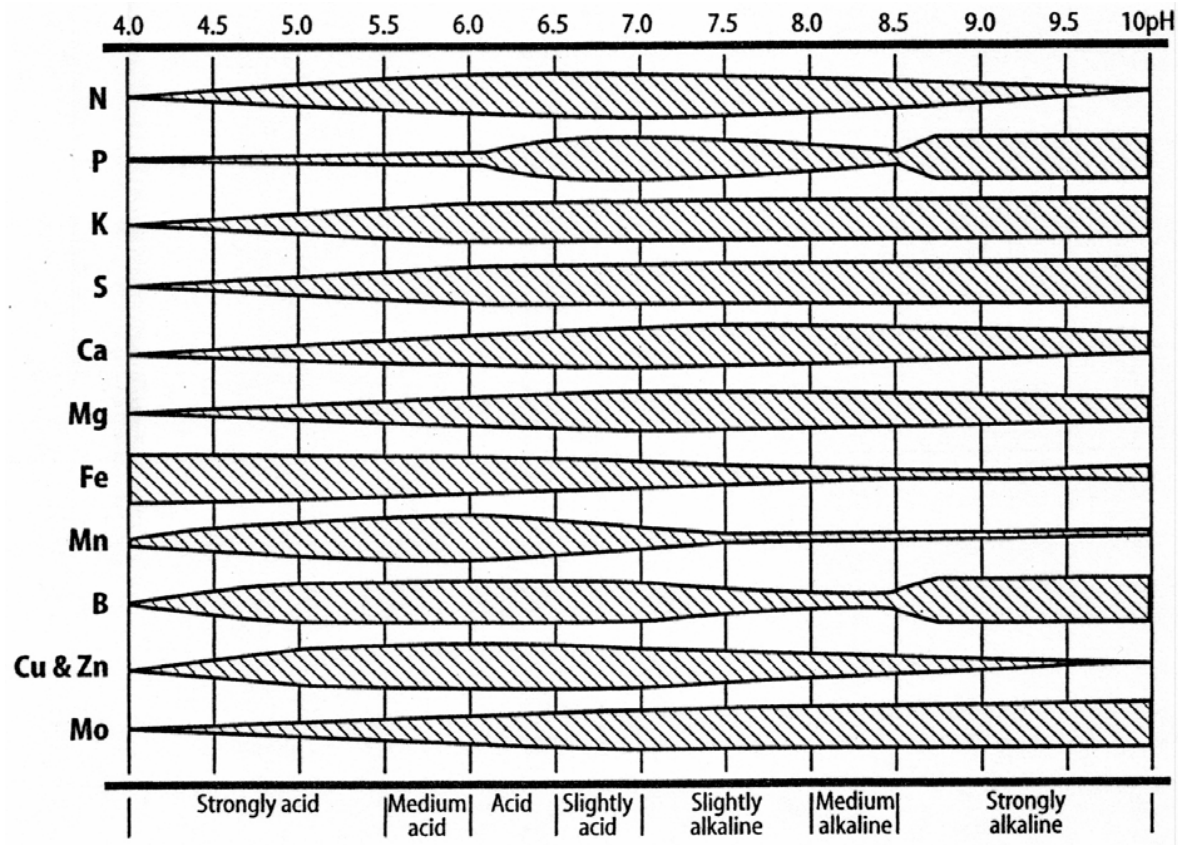

Source: California Master Gardener Handbook 2002, p. 54 (Dennis Pittenger, Editor)

5.3.5.4 Fertilizer Types

- Inorganic and Synthetic Fertilizers

The most widely used fertilizers are inorganics characterized as being relatively low in cost, easy to apply, and quick releasing. However, overuse of inorganic fertilizers can result in increased soil salinity and the need to leach soils to avoid salt damage to plants (i.e. leaf burn). Inorganic fertilizers are also available as slow-release fertilizers, but at a much higher cost.

The main advantage in using slow-release fertilizers is their ability to provide nitrogen to the root zone at rates that more closely match the growth of the plant, thereby minimizing the amount of nitrogen available for leaching below the root zone. One disadvantage is their use on steep slopes, where broadcast fertilizer prills (capsules) may easily become mobile during irrigation and storm events.

- Organic Fertilizers

  Manures and organic concentrates such as blood and fish meal are considered organic fertilizers and offer the advantage of releasing nitrogen at a slower rate. A significant advantage to the use of organic fertilizers is that many of them are also classified as soil amendments due to their effect on the soil's physical properties. Disadvantages include high salt content, presence of weed seeds, varying nutrient content, and a higher cost per pound than inorganic fertilizers rendering them cost ineffective for municipal use.

  It should also be noted that recent studies have indicated that organic fertilizers and amendments may be significant sources of fecal coliform in irrigation and storm water runoff. In contrast to the traditional assumption that fecal bacteria only multiply within the digestive tracts of warm-blooded animals, recent research suggests that fertilizers may contribute to the propagation of fecal bacteria in the warm, moist and dark environment of the storm drain infrastructure.

  Although State regulations require commercial composters to reduce fecal bacteria in manure-composted materials, green waste materials are not currently regulated for fecal bacteria and may contain incidental amounts of animal waste, such as from pets or wild birds. In addition, uncomposted animal manures and yard trimmings can have fecal coliform concentrations as high as Class B sewage biosolids.

Prior to choosing the type of fertilizer, the following should be taken into consideration:

- Ability of the plant material to uptake and utilize nitrogen (soil temperature, species, growth rate).
- Leaching requirements due to soil salinity.
- Severity of slope and potential for runoff to carry fertilizer.
- Proximity to storm drains or hard surfaces.
- Receiving water impairments (such as bacteriological impairments).
- Type of irrigation and scheduling.

5.3.5.3 Application Rates and Timing

The amount of fertilizer needed for different applications depends on a number of factors. The following factors should be considered prior to the application:

- Rooting characteristics of the vegetation (turf, shrubs, and trees).
- The growth stage of the plant.
- The ability of the plant to uptake the nutrients from the soil (temperature, water status, pH of the soil, salinity, etc.).
- The current nutrient content of the soil.
- Additional sources of nutrients (i.e. composts, reclaimed water, atmospheric deposition).
- Potential for loss of nutrients by leaching.
- Method of irrigation.
- Chemical properties of fertilizer being applied.

The application of fertilizers should coincide with the growth stage requirements of the plant. For mixed plantings having different growth stages, fertilizer applications should be divided into several applications targeting each of the growth stages.

The vegetation being managed should be researched and fertilizers applied only according to the amounts and at the time intervals recommended by the manufacturer or a public employee qualified to make fertilizer recommendations. This should minimize the waste of fertilizer and reduce the risk of water contamination. Although recommendations for the application of fertilizers to turf are well researched, there is more uncertainty in the rate and timing of the application of fertilizer to landscapes consisting of a mixture of trees, shrubs, turf, and groundcovers. As a result, foliar and soil nutrient testing should be used as a tool to assist in the determination of application rates and timing until more information is available.

5.3.5.6 Application Methods of Fertilizers

This section details the most common methods for application of fertilizers, however, these are not the only acceptable methods of fertilizer application since every application has its own circumstances and variables to consider. **Table 5.17** provides a summary of the major advantages and disadvantages of each application method.

The types of application methods included in this section are:

- Banding
- Sidedressing
- Foliar Fertilization
- Broadcast Application

Regardless of what type of application method is chosen, the method should strive to deliver nutrients to the location where maximum plant uptake and utilization occurs and the chosen

method should take into account the potential for surface runoff, dust, leaching into groundwater and the volatilization of materials. Proper calibration of application equipment insures that fertilizer is delivered at the recommended rate and record keeping for the amount applied, the location of the application, and the frequency of the application will assist in tracking fertilizer use and refining application timing and rates

- Banding of Fertilizer

  This method involves physically working small amounts of fertilizer into the soil in a band beneath and/or around the sides of a plant. It allows new roots to efficiently use the nutrients and minimizes potential nutrient loss to surface runoff. Banding is particularly useful for new plantings, however, given the labor involved, banding may not be practical for some fertilizer applications.

- Sidedressing

  Similar to the banding method of fertilizer application, sidedressing involves the placement of dry fertilizer in a band directly next to actively growing plants. Sidedressing is particularly effective for applying fertilizer to established plantings during critical growth stages. Although this method is labor intensive, it delivers nutrients directly to growing roots and minimizes the potential for fertilizer movement in surface runoff.

- Foliar Fertilization

  This type of application refers to fertilizer that is applied in liquid form directly to the leaves and stems. However, runoff problems may occur where the spray is allowed to drip off the leaves onto the ground or irrigation and rainfall occur immediately after the application.

  This method can reduce nutrient leaching into the soil when applied correctly and can often be performed at the same time as pesticide applications to avoid spraying twice (if this is done, it is important to check that the materials are compatible for spraying). In this case, the guidelines for pesticide applications must also apply and the pesticide label checked for appropriateness of this method.

- Broadcast Application

  The most common method utilized by public agencies is the application of dry or liquid fertilizer uniformly spread over the soil surface. This is often done mechanically with a:

  - Drop Spreader;
  - Rotary Spreader and Belly-Grinder;
  - Spray Booms; or
  - Spinning Disks.

    <u>Drop Spreader</u> - The simplest of mechanical applicators, the drop spreader is commonly mounted on wheels and pushed by hand or pulled by vehicle to drop

granular fertilizer out of the hopper. The use of a drop spreader in this way reduces the potential for off-target application of fertilizers.

Rotary Spreaders and Belly Grinders - These generally operate by "throwing" fertilizer in front of the spreader. These types of spreaders should not be utilized to fertilize vegetation adjacent to hardscapes, such as streets and sidewalks.

Spray Booms – Spray booms are for liquid fertilization. As with the use a rotary spreader, this method does not offer much control over fertilizer drift in adverse weather conditions and care should be taken to avoid spreading fertilizer onto impermeable surfaces such as sidewalks and driveways. If fertilizer lands on these types of surfaces, sweep or blow the material onto the vegetation or into a container for later use.

Spinning Disks – Spinning disks are mounted on a moving vehicle in a manner allowing for the throwing of dry fertilizer into the air. As with the use a rotary spreader, this method does not offer much control over fertilizer drift in adverse weather conditions and care should be taken to avoid spreading fertilizer onto impermeable surfaces such as sidewalks and driveways. If fertilizer lands on these types of surfaces, sweep or blow the material onto the vegetation or into a container for later use.

Table 5.17 Advantages and Disadvantages of Common Fertilizer Application Methods

Fertilizer Application Methods	Advantages	Disadvantages
Banding	Nutrients placed directly near roots. Minimizes nutrient loss in surface runoff.	Labor intensive. Generally only utilized for new plantings.
Sidedressing	Efficient application of nutrients to growing roots in established plantings.	Labor intensive
Foliar	Reduces leaching potential of nutrients below the rootzone. May be applied with pesticides under certain circumstances.	High potential for nutrients to be washed from plant surfaces during irrigation. Adverse conditions such as wind may cause drift on to hard surfaces.
Broadcast		

Table 5.17 Advantages and Disadvantages of Common Fertilizer Application Methods (continued)

Fertilizer Application Methods	Advantages	Disadvantages
Drop Spreader	Off-target application is minimized.	Coverage of large areas is time consuming.
Rotary Spreader or Belly Grinder	Ease of application. Covers large areas quickly and provides access to difficult areas.	Off-target application of fertilizers to hard surfaces is common.
Spray Booms	Useful for foliar applications over large areas.	Potential for drift under adverse weather conditions.
Spinning Disks	Allows for fertilizer applications over large areas quickly and easily.	Off-target application to hard surfaces is common.

5.3.5.7 Storage and Handling of Fertilizers

Although fertilizers present no hazard to the user's health when stored and handled properly, employees responsible for the storage and handling of fertilizers should be aware that some fertilizers have properties that can result in dangerous chemical reactions if mixed with other substances or under unusual circumstances.

Therefore, a dehumidifier may be necessary for storage areas where sensitive fertilizers are stored such as ammonium nitrate. In addition, since most fertilizers tend to be corrosive to metals, concrete structures are preferred for fertilizer storage facilities. These problems can be minimized by only purchasing those quantities that will be used in the immediate future instead of storing materials for long periods.

- Dry Fertilizer

  In most cases, dry fertilizers are safe to store, transport and handle. However, because some fertilizers have unique, potentially dangerous properties, it is advisable for public agencies to consult a qualified individual having knowledge of the safest storage and handling procedures for specific fertilizers. Fertilizer supplies are an excellent source of information on the proper handling and storage of fertilizers. In general, the following precautions should be taken when storing and handling fertilizers:

  - Keep away from open flame.
  - Keep chemicals separate from each other to avoid cross contamination.
  - Properly dispose of empty fertilizer bags.
  - Sweep up and dispose of all contaminated material (Do not wash with water).

- Store in a cool dry facility.

- Liquid Fertilizer

  Since fertilizers in liquid form are potentially more hazardous than dry fertilizers, employees responsible for storage and handling need to be aware of the specific properties of each liquid fertilizer in use, including corrosiveness and tolerable temperature and pressure ranges. In addition, protective equipment may be necessary for workers handling fertilizers such as sulfuric or phosphoric acid.

  Fertilizer suppliers should be consulted for recommendation on the safest handling and storage procedures for specific liquid fertilizers.

5.3.6 References

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Websites

California Department of Pesticide Regulation – www.cdpr.ca.gov

California Fertilizer Foundation (CFF) - http://www.calfertilizer.org/
The mission of the foundation is to enhance awareness of plant nutrients and agriculture in California through educational outreach such as a school garden grants program. .

The California Plant Health Association (CPHA) - http://www.cpha.net/
An organization represents the interests of the fertilizer and crop protection manufacturers, distributors, formulators and retailers in California, Arizona and Hawaii. CPHA members market commercial fertilizers, soil amendments, agricultural minerals and crop protection products. The purpose of the organization is to promote the environmentally sound use and handling of plant health products and services for the production of safe and high quality food, fiber and horticultural products.

The California Department of Food and Agriculture Fertilizer Research and Education Program (CDFA-FREP) - http://www.cdfa.ca.gov/is/frep/index.htm
Group created to advance the environmentally safe and agronomically sound use and handling of fertilizer materials. Most of FREP's current work is concerned specifically with nitrate contamination of groundwater. FREP facilitates and coordinates research and demonstration projects by providing funding, developing and disseminating information, and serving as a clearinghouse on information on this topic. FREP serves growers, agricultural supply and service professionals, extension personnel, public agencies, consultants, and other interested parties

University of California Statewide IPM Program – http://www.ipm.ucdavis.edu

The Fertilizer Institute - http://www.tfi.org/
An organization that provides educational information on fertilizers and a reference guide on public policy issues affecting the use of fertilizers.

PesticideWise - **http://www.pw.ucr.edu/**
Searches a comprehensive EPA-USDA database and presents critical information on a pesticide's properties and water quality risks.

5.4 Performance Reporting

Performance indicators for certain Established BMPs have been tracked since the inception of the Model Municipal Activities Program. These BMPs are street sweeping, solid waste collection, catch basin stenciling, drainage facility maintenance, trash & debris control (formerly litter control), household hazardous waste collection, and used oil grant participation. Annual evaluation of the routine preventive maintenance activities is conducted and, where appropriate, improvements or new practices are implemented to further reduce the amount of pollutants discharged into the storm drain system. An important component of this evaluation process is the documentation and collection of data related to these selected activities. Using the forms and procedures provided in Appendix A-5, reports regarding the performance of these activities must be provided to the Principal Permittee and ultimately the Water Board as part of the annual progress report:

- Street Sweeping: All Permittees maintain street sweeping programs in residential, commercial and/or industrial areas. In 1993 the Permittees compiled information regarding their existing street sweeping schedules and practices and have subsequently changed elements of their programs such as the types of sweepers purchased, the frequency of sweeping, and the use of parking restrictions in order for the street sweeping program to aid in water quality improvements.
- Solid Waste Collection: The Permittees have solid waste collection programs for public, residential, commercial and industrial areas.
- Catch basin Stenciling: Over 37,000 storm drain inlets have been stenciled. Each year 6,000 – 9,000 inlets are re-stenciled.
- Drainage Facility Maintenance: The Permittees inspect the drainage system within their jurisdictions annually and clean out accumulated debris on an as needed basis. Removal of accumulated debris and sediment is carried out either manually or by mechanical methods using flushing – in emergency situations only – in accordance with established maintenance procedures (Model Maintenance Procedure DF-1). By removing this material from the catch basin inlets and storm drain system, the Permittees make a significant contribution in preventing the passage of these materials in downstream receiving waters.
- Trash & Debris Control: Trash and debris control is an important element in the diversion of litter and other solid materials from the storm drain system. Although most

Permittees historically viewed litter control as a public service program (i.e., preventing visual blight, etc.), rather than as a pollution control problem, it is now considered important as a visual indicator of water quality and an aspect of the recreational use of a waterbody.

- Household Hazardous Waste Collection: Orange County has a household hazardous waste collection program administered by the Integrated Waste Management Department (IWMD). The program comprises four sites (Anaheim, Huntington Beach, San Juan Capistrano, and Irvine).
- Used Oil Grant Participation: Most of the Permittees, as well as the County's Health Care Agency, currently implement used oil recycling programs. These programs involve comprehensive public outreach including television and newspaper advertising, displays at community events, and the distribution of used oil containers at no cost to residents.

5.5 Training and Education

Education and training of municipal staff is one of the keys to a successful stormwater program. To assist the responsible municipal and contract/lease staff in understanding the Municipal Activities Program Manual and the Model Maintenance Procedures, several different annual training sessions have been or are being developed.

In order to adequately address the different areas of the Municipal Activities Program element, four training modules have been developed and are included in the Final Model Municipal Activities Program Manual (**Appendix B-5**).

In order to ensure that the program is being implemented properly, each municipality should have the appropriate number and type of personnel at each of the training sessions. In addition to Permittee sponsored training, staff is also encouraged to attend training seminars or workshops related to stormwater management and water quality conducted by other organizations.

Model Municipal Program Training Modules

In order to adequately address the different areas of the Municipal Activities Program element, five training modules have been developed and are included in **Appendix B-5.**

The following sections describe the five modules.

- The General Program Management training module is targeted towards stormwater program managers and addresses the overall program framework, objectives and approach so that they may gain a broad understanding of how the program is developed and implemented at a local level. The training will be in a classroom setting, provided annually, and approximately 2-3 hours in length.
- The Fixed Facility training module is targeted towards facility managers and field level staff and addresses the implementation and inspection of the actual procedures. This training is tailored to municipal staff supervising the performance of municipal activities, in a "train the trainer" style format for formal or tailgate-style use. The

training will be both classroom and field settings, provided annually, and approximately 2-3 hours in length.

- The Field Program training module is targeted towards facility managers and field level staff and addresses the general techniques municipal staff may implement to prevent pollution problems, how to respond to spills once they have occurred and how to recognize potential problems. The training will be in a classroom setting, provided annually, and approximately 2-3 hours in length.
- The Municipal IPM Fertilizer/Pesticide Guidelines training module is targeted towards stormwater program managers and addresses the overall program framework, objectives and approach so that they may gain a broader understanding of how the program was developed and should be implemented at a local level. The training generally focuses on the proper application and handling of fertilizers and pesticides for management and municipal staff performing application activities. The training will be in a classroom setting, provided annually, and approximately 2-3 hours in length.
- The Municipal IPM Approaches training module is targeted toward Permittee field staff and applicators. The training is specific regarding the different types of techniques and technologies that are available for municipal staff to implement while managing and applying pesticides and fertilizers.

5.6 Definitions

For the purposes of the program, the following definitions are provided:

California Code of Regulations, Title 3, Division 6 (3CCR) - California State Code regulating pesticides and pest control operations. **http://www.calregs.com**

Catch Basin – a box-like underground concrete structure with openings in curbs and gutters designed to collect runoff from streets and pavements; may also be referred to as a drain inlet.

Detention Basin – an excavated basin used for the temporary detention of stormwater and/or urban dry weather runoff, to delay and attenuate flow, with release usually by a measured but uncontrolled outlet.

Drainage Facility – structure that is designed to collect or temporarily store or convey urban dry weather and/or stormwater runoff which may or may not include catch basins (storm drain inlets), detention basins, retention basins, sediment basins, open drainage channels, and lift stations. Although street curbs, gutters and underground channels and piping are not included within the definition, they are addressed within the Program though the field program Model Maintenance Procedures. For example, the maintenance of street curbs and gutters is addressed through the Model Maintenance Procedure for street maintenance.

Equivalent Training - term referring to municipal employees dealing with the application of pesticides who have not received a qualified applicator's license or certificate (QAL or QAC) from the State of California, but who have completed a training course in pesticide application offered by the County of Orange.

Eutrophication - A response to an increase in the nutrient status (nitrogen and phosphorus) of a water body. The result is an increase in the growth of vegetation (usually algae), a decrease in dissolved oxygen, increased turbidity, and a general degradation in water quality.

Field Program - a set of related municipally performed activities that take place throughout the municipality instead of at stationary locations. These types of activities may also be privately contracted. Examples of municipal field programs include road, street and highway maintenance, as well as drainage system maintenance.

Fixed Facility - a stationary site that is municipally owned and operated and at which municipal activities may occur. These types of facilities may also be municipally owned but privately leased. Examples of fixed facility types include municipal waste facilities and corporation yards.

Food and Agricultural Code, Divisions 6, 7 & 13 (FAC) - California state statutes relating to pesticides. Laws passed by the California Legislature. Provides the authority for the Department of Pesticide Regulation (DPR) and 3CCR.

Integrated Pest Management (IPM) - A sustainable approach to pest management that combines the use of prevention, avoidance, monitoring and suppression strategies in a way that minimizes economic, health, and environmental risks.

Lift Station – a below grade structure and equipment designed to collect, store, and periodically transfer stormwater and/or urban dry weather runoff to flood control channels.

Materials Data Safety Sheet (MSDS) – sheets that contain all information necessary for the safe handling of pesticides. They include chemical identifications, hazardous ingredients, physical data, fire and explosion data, health hazards, reactivity data, spill or leak cleanup procedures, special protection and special precautions. Federal law requires them to be kept on file for every pesticide or other hazardous material stored or used.

Maximum Extent Practicable (MEP) - taking into account equitable considerations of competing factors, including, but not limited to, the gravity of the problem, fiscal feasibility, public health risks, societal concern and social benefit.

Open Drainage Channel – an above ground channel used for collecting and conveying stormwater and/or urban dry weather runoff.

Pest Control Advisor (PCA) - a person who offers a recommendation on any agricultural use (includes landscape and turf maintenance), who holds him or herself forth as an authority on any agricultural use, or who solicits services or sales for any agricultural use A PCA must possess a valid Agricultural Pest Control Adviser License. To obtain a license the applicant must meet certain educational requirements and successfully complete examinations relating to knowledge of pests, pesticides and laws and regulations concerning pesticide use. Officials of federal, state, and county departments of agriculture, and University of California personnel engaged in duties relating to agricultural use are not required to be licensed. A PCA must also register with the County Agricultural Commissioner (CAC).

Pesticide Labels - In California, all pesticide use is regulated through federal and state laws and regulations. Food and Agricultural Code (FAC), section 12973, states: 'the use of any pesticide shall not conflict with the registered label'. In other words "the label is the law". No pesticide

can be used in California until the Department of Pesticide Regulation (DPR) has registered it. The approved pesticide label contains all the regulations regarding the use of the particular product. This includes the EPA registration number, the active ingredient and percentage of inert ingredients, the allowed use sites, the solution and dilution rates, the personal protection equipment (PPE) needed, as well as precautionary statements, environmental hazards, use requirements and directions for use. To use a product in a manner inconsistent with its label is against the law. As required by federal law, manufacturers of pesticides must provide labels on the containers of all pesticides intended for sale and distribution.

Pollution Prevention - any practice that reduces or eliminates the creation of pollutants. One example would be reducing the amount of litter originally generated by training public employees to not create litter while performing tasks.

Qualified Applicator's Certificate (QAC) - a certificate obtained from the State of California after demonstrating adequate knowledge of the proper techniques for handling, storing, transporting and applying pesticides. Any person who uses or supervises the use of federally restricted use pesticides or state restricted materials for any purpose or on any property other than that provided by the definition of "private applicator" must have a QAC. A QAC is obtained by passing the Laws, Regulations, and Basic Principles examination and at least one pest control category examination.

Qualified Applicator's License (QAL) – a license required for any person who supervises pesticide applications made by a licensed Pest Control Business and who is responsible for the safe and legal operation of the pest control business. Those persons who supervise the use of federal or state restricted materials for any purpose (and on any property) other than that provided by the definition provided under "private applicator" must also obtain a QAL.

Restricted Materials Permit - a permit that must be acquired by any public agency before application of the pesticides listed as restricted in 3CCR, section 6000. In Orange County, this permit must be obtained from the County Agricultural Commissioner. A list of restricted materials can be found at **http://www.cdpr.ca.gov/docs/license/pr-pml-013a.pdf** or at the Agricultural Commissioner's Office.

Retention Basin – a basin or depression designed to provide storage of stormwater and/or urban dry weather runoff without a positive outlet, or with a specially regulated outlet, where all or a portion of the inflow is stored for a prolonged period.

Sediment Basin – a basin with controlled a stormwater release structure, formed by constructing an embankment across a drainage way that temporarily retains stormwater and/or urban dry weather runoff in order to allow sediment to settle out.

Source Controls – any practice that prevents pollution by reducing pollutants at their source. Street sweeping is an example of litter source control. Litter is removed from the street, which reduces the amount of litter that enters the storm water conveyance system.

State Laws - The California Food and Agricultural Code (FAC) and the California Code of Regulations, Title 3 (3CCR), constitute the laws and regulations referenced in these guidelines. They are referenced often and usually are referred to as "State Laws".

Treatment Controls – any practice that removes pollutants from water. Trash booms that remove litter from the water as it flows within a flood control channel is an example of a treatment control.

Toxicity Classification – categories by which the Environmental Protection Agency (EPA) groups pesticides according to their toxicity or potential to cause injury to people. Category I pesticides are often the most hazardous because they are the most toxic and their use is normally restricted; they will carry the word "danger" or "danger-poison" with the skull and crossbones on the label. Category II pesticides are moderately toxic and carry the word "warning" on the label. The least hazardous pesticides are Category III and IV pesticides. These are slightly toxic or relatively nontoxic but basic safety precautions should still be taken. These carry the word "caution" on the label.

6.0 PUBLIC EDUCATION

6.1 Program Summary

Public education is an essential part of a municipal stormwater program. Developing programs to increase the awareness of and involve the public can be an effective method for controlling non-point source pollution. Emphasizing the relevant impact of stormwater pollution to each particular target audience increases the likelihood that the messages will be noticed and that the audience will support and participate in program implementation. When a community has a clear idea where the pollution comes from, how it can affect them and what they can do to prevent those affects, it will be more willing to support and participate in program implementation.

6.1.1 Program Overview

Under their Local Implementation Programs, Permittees will continue to contribute to and participate in area-wide public education programs and conduct local programs to increase the awareness of and involve in controlling non-point source pollution. This section of the DAMP provides a Model Program that Permittees can use to formulate their local programs. The objectives of the Model Public Education Program are to provide the following:

- Increase awareness of all segments of the community of the importance of community involvement in controlling non-point source pollution
- Provide information on alternative behaviors and practices that can contribute to controlling non-point source pollution
- Track public awareness in the educational programs.

6.1.2 Program Commitments

The Public Education Program serves as an integral planning tool and presents an overall universal formula for developing and implementing various outreach campaigns. The formula can be applied to multi-year comprehensive outreach programs or short targeted outreach activities and will be utilized in the following areas in the upcoming years:

- Develop and create a materials plan to:
  - Prioritize revision and development of materials.
  - Define the common look and theme
  - Identify the additional materials necessary to communicate an effective overall pollution prevention message.
  - Translate all materials into Spanish and other languages as deemed necessary.
- Develop and implement a multi-media outreach plan and method to track impressions including:

  - Print Advertising
  - Radio Advertising
  - OCTA Bus Advertising
  - Movie Theatre Advertising
  - Cable Television Advertising
  - Internet Advertising
- Develop and implement a non-media outreach plan and method to track impressions including:
  - Outreach through Permittees
  - Outreach through Business Outreach
  - Outreach through Utilities Outreach
  - Outreach through Organizations
  - Outreach through Restaurants
  - Media Relations Campaign
- Conduct a school outreach program including:
  - Orange County Department of Education (OCDE)
  - Municipal Water District of Orange County (MWDOC)
  - Discovery Science Center
  - Ocean Institute
  - California Regional Environmental Educational Community (CREEC) Network

6.1.3 Regulatory Requirements

The federal regulations require, as part of the DAMP, a description of educational activities, public information activities, and other appropriate activities to facilitate the proper management and disposal of used oil and toxic materials (Federal Register/Vol. 55, No. 222, p. 48071). In addition, the regulations also specify education programs for construction site operators and a program to facilitate public reporting of illicit discharges.

The Public Education Program was developed as a model for fulfilling the public education requirements of:

- Section XIII of the Santa Ana Regional Water Quality Control Board (RWQCB) Municipal NPDES Stormwater permit, Order No. R8-2002-0010; and
- Section F.4 of the San Diego RWQCB Municipal NPDES Stormwater permit, Order No. R9-2002-0001.

6.2 Model Public Education Program

Permittee efforts will be focused in the following key areas.

6.2.1 Develop and create a materials plan

The first goal of the campaign was to review the current countywide public and business education materials that had been developed and create a materials plan to identify and develop the additional materials necessary to communicate an effective overall pollution prevention message. Based on this review a prioritized list of materials was created. The prioritization was based significantly on the materials already produced and in meeting the requirements of the Third Term Permits. In addition, the plan made specific recommendation for logos, tag lines, fonts, titles, paper stock, white space, colors, terminology, and messages to use in order for the materials to contain a common look and theme and be recognizable as consistent stormwater education materials. At a minimum, all of the developed and revised program materials should:

- Explain the difference between the storm drain and sanitary sewer system, and describe how water in the storm drain does not receive treatment before entering our waterways;
- Focus on specific pollution-causing behaviors and address them directly to increase the likelihood of changing those behaviors and reducing pollution;
- Emphasize the relevant impact of stormwater pollution to the target audience;
- Include a positive alternative to pollution-causing behaviors;
- Tailor the personality, focus and depth of program messages appropriately for each audience and venue;
- Facilitate a local and regional stormwater theme and look;
- Include the Project Pollution Prevention moniker.

In addition, the Permittees will explore partnership opportunities with religious institutions for ways to distribute prepared materials. They will also work with them to encourage good housekeeping practices around the campuses.

6.2.2 Develop and Implement a Multi-media Outreach Plan and a Method to Track Impressions

In order to support the countywide public and business education program, a strategic media relations campaign was developed and implemented to reach a majority of the selected target groups with sufficient frequency (three or more times) to measurably increase their knowledge and measurably change their behavior. A cost-efficient and strategic media plan for print, bus, theater, cable, and radio advertising was developed based on market research **(DAMP Exhibit 6.III)**. The media plan included the following criteria:

- Use targeted ad placement. Place print ads in sections or features that have a high probability of being read by the target audience.

- Take advantage of seasonal behaviors and activities. Schedule paid media and non-media activities to coincide with the seasonal nature of certain behaviors and activities associated with stormwater pollution.
- Use geographic targeting. Focus paid media and non-media activity in areas that have particular relevance.
- Take advantage of media spill from neighboring programs. Plan and schedule paid media to take advantage of media reaching Orange County from neighboring programs, particularly Los Angeles and San Diego counties.
- Coordinate paid media and non-media activities to maximize their impact and effectiveness
- Identify the expected number of impressions that may be achieved for each event

6.2.2.1 Print Advertising

Orange County is served by two major daily newspapers, the *Los Angeles Times and Orange County Register*. In addition to these daily newspapers, numerous weekly papers cater to varied segments of Orange County's population. The Register has 23 weekly community papers that serve Anaheim, Brea, Costa Mesa, Fountain Valley, Fullerton, Irvine, Newport Beach, Orange, Placentia, Tustin, Huntington Beach, Yorba Linda, San Juan Capistrano, Dana Point, Laguna Beach, Laguna Niguel, Aliso Viejo, Laguna Woods, Lake Forest, Mission Viejo, San Clemente, and unincorporated areas. The Times has weekly community papers that serve Huntington Beach and Laguna Beach, as well as a daily paper that serves Newport Beach and Costa Mesa. Advertisements were also placed in the OC Weekly and OC Metro, two popular weekly papers, Excelsior and Miniondas, the County's best read Spanish language newspapers, and News-Enterprise, to reach areas not served by the Times and Register community papers. To receive the most effective impact, the print advertising campaign will continue to focus mainly on weekly newspapers with some advertising in the Register and Times.

The six print ads have been developed:

- Pet waste – encourages pet owners to protect the environment by picking up after their pets;
- Used oil recycling – encourages residents to protect the environment by properly disposing of used oil;
- Fertilizer – encourages residents to protect the environment by properly using fertilizers;
- Residential car washing – encourage residents to protect the environment by using commercial washes;
- Earth Day – celebrates Earth Day by reminding people that the Ocean begins at their front door; and
- Cigarette – emphasizes the fact that cigarettes belong in the trash not the ocean.

The above ads with the exception of the Earth Day have been translated into Spanish. Additional, ads will be developed to address countywide water quality issues and constituents of concern.

6.2.2.2 Radio Advertising

Radio is an extremely effective means of communicating with the public. Although people are listening while they are driving, messages are still very well absorbed. Radio advertising has included advertising on the following radio stations:

- KLAC 570 AM
- 93.1 JACK FM
- Sonido 96.7 FM (Spanish)

Ten radio PSAs have been created, five in English and five in Spanish. Four are pollutant specific and focus on pet waste, used oil recycling, fertilizer and residential car washing. The fifth provides an overview of several pollutants. The program will continue to explore advertising opportunities on radio.

6.2.2.3 OCTA Bus Advertising

Orange County residents rely heavily on their cars, which makes advertising opportunities on streets very valuable. OCTA bus advertisements are largely seen by an urban demographic: people driving, commuters taking the bus and people walking along the street. OCTA bus advertising has included advertising on bus backs, bus sides and bus shelters. The artwork used illustrates the connection between our everyday activities and ocean pollution. The program will continue to explore advertising opportunities with OCTA.

6.2.2.4 Movie Theater Advertising

Movie theaters provide a highly effective advertising opportunity because the audience is captive to what is on the screen. Unlike newspapers, in which pages or sections can be discarded, or television, in which channels can be changed during commercials, theater audiences have no choice but to watch what is run on the screen.

Permission was obtained from the City of San Diego to use and edit their 30-second "rubber duck" public service announcement (PSA). The 30-second PSA shows trash turning into rubber ducks and flowing to the ocean, which is consistent with the theme of storm drains. Two additional PSAs have been developed for the program, one focuses on trash while the other provides an overview of several pollutants.

The program has advertised primarily with Edwards/Regal Cinema Theaters since they provide broad coverage of the county, offer a special pre-movie advertising/news segment and allowed economies of scale. Additional movie theater advertising includes: selected AMC Theaters in Orange County, San Clemente Kirkorkian and the Long Beach Town Center. The program will continue to explore movie theater advertising opportunities.

6.2.2.5 Cable Television Advertising

Running advertisements on cable television has the potential to reach a very large audience in a cost-efficient and strategic manner. Cable systems offer discounts, matching spots or free airtime for public service announcements. Four cable systems service Orange County: Adelphia, Comcast, Cox, and Time Warner. The cable advertising has used the 30-second "rubber duck" PSA as well as the English and Spanish versions of the general pollutant PSA. The program will continue to explore cable television advertising opportunities.

6.2.2.6 Internet Advertising

The internet has become a heavily relied upon source of information for the public therefore during the third permit term the program began advertising on the Orange County Registers on-line information website as well as JACK FM's website. The website as a whole gets 14 million hits per month. The program will continue to investigate on-line advertising as a means of providing Orange County residents with information.

6.2.3 Develop and Implement a Non-Media Outreach Plan and a Method to Track Impressions

A cost effective and strategic non-media outreach plan was developed and implemented in order to support the Orange County NPDES Stormwater Program's public and business education efforts and compliment the advertising media outreach (**DAMP Exhibit 6.III**). These implementation efforts will utilize existing resources and partnerships for free and low-cost exposure of the Orange County Stormwater Program. Combined with paid advertising, these approaches will help to enhance messages by increasing their frequency and the number of ways in which people receive them.

6.2.3.1 Outreach to Permittees

Included in this plan was the development of a "tool box" of materials to enable the Permittees to conduct local outreach both directly and indirectly through businesses, trade associations, chambers of commerce, utilities, restaurants and other organizations. Specifically, the "tool box" included:

- Outreach Materials - Artwork was created for use on outdoor locations such as bus shelters, streetlight banners, mouse pads and beach towels.
- The Quad - A series of newsletters, press releases, fact sheets and billing inserts focused on seasonal stormwater themes. Four seasonal quads were created.
- An Events Listing - Lists of upcoming utility sponsored events were developed where stormwater information could be provided to event participants.
- Employee Training Materials - Municipal stormwater training materials were developed to educate all Permittee employees about general stormwater pollution prevention principles.

Outreach to Businesses

This plan proposed implementation of programs based on relationships and partnerships that had been developed with groups receptive to public service requests.

- A list of key Orange County businesses that the Stormwater Program could foster relationships with was developed. The list included top businesses and major Orange County employers.

- A list of major Orange County events such as the Orange County Auto Show and Southern California Home & Garden Show was created. Event coordinators were contacted with a letter introducing the program and asking for the opportunity to participate and/or distribute Orange County Stormwater Program materials.

6.2.3.2 Outreach to Utilities

Major non-city utilities providing water, electricity, cable and refuse services were contacted and provided sample newsletters for use in their publications. Several utilities printed stormwater education materials in their newsletters and billing inserts.

6.2.3.3 Outreach to Organizations

A list of key Orange County organizations that the Stormwater Program could foster relationships with was developed. The list included organizations such as chambers of commerce, rotary clubs, and environmental groups.

6.2.3.4 Outreach to Restaurants

A specific outreach plan for the approximate 10,000 food service facilities in Orange County was developed and implemented. The outreach plan main objective is to educate the approximately 10,000 existing food facilities (the inventory is updated annually) countywide.

6.2.3.5 Media Relations Campaign

A media relations campaign centers on creating relationships with the media. The media is capable of getting your key messages to your target audiences. Public relations coverage often has greater credibility with target audiences than advertising, so when used consistently, media relations can be an invaluable component of public education campaign.

The media relations campaign uses the seasonal stormwater press releases created as part of "the Quad" to contact the media on a quarterly basis. The program also updates its media distribution lists quarterly.

6.2.4 Conduct a School Education Outreach Program

Educating school children about stormwater and urban runoff pollution is critical to the long-term success of the Orange County Stormwater Program. Today's children are tomorrow's adults, and the earlier they learn about protecting the environment, the less likely they will be as adults to engage in pollution causing behaviors. Children can also share information they learn in school with their parents and other relatives. Children are excellent "watchdogs" when it comes to their parents' activities, and they are likely to try to correct a parent's polluting behavior.

6.2.4.1 Orange County Department of Education (OCDE)

"Inside the Outdoors" is an environmental education program administered by the Orange County Department of Education (OCDE). The mission of Inside the Outdoors is to empower students, teachers, parents and the community to explore natural areas and expand their knowledge. There are three types of programs within Inside the Outdoors: Outdoor Science School, School Programs and Field Programs. The following is a summary of the programs implemented:

a) Outdoor Science School

Since 1974, OCDE has administered the Outdoor Science School. It currently operates at several sites in the San Bernardino Mountains where fifth and sixth grade students and their teachers participate in a weeklong science adventure. During the week, the students hike academic trails to cover the core curriculum. Students also go on an adventure hike, attend a science session and perform a skit. Students and teachers develop an awareness and appreciation of the environment and realize they affect its quality. Students are immersed in a natural environment during their Outdoor Science School experience. The curriculum is aligned with the California Science Content Standards and the California Science Framework.

In partnership with the Orange County Stormwater Program, OCDE included a science session on water pollution. This session includes information on sources of water for Southern California, pollution prevention, and watershed information. A two-page Project Pollution Prevention checklist on water and trash pollution is distributed. Once the checklist is completed, a discussion is facilitated by the teacher.

b) School Program

Another division of Inside the Outdoors is the school program whereby a Traveling Scientist (an actual science teacher) visits school sites providing the new "Drip Drop" program. During the 60-minute presentation, students become familiar with how their actions affect water quality, describe ways that water bodies become polluted, demonstrate at least one data collection technique scientists use to assess water quality, become familiar with water quality terms, regulations and monitoring methods, and develop a small project to improve water quality in their neighborhoods.

c) Field Program

The third division of Inside the Outdoors is the field program whereby fifth grade students move out of the classroom and into the real world of science and social science. In specially selected parks and preserved areas (Shipley Nature Center, Casper Park, Modjeska Canyon, Irvine Regional Park, Rancho Sonado, Dana point and Crystal Cove) students learn about the natural history of the area. The program "Where Do I Flow" is a hands-on station where students pretend to become water droplets moving through the water cycle. As droplets they travel through cities, people's homes, farms, wetlands and oceans. In the process, the students learn where water becomes polluted, cleaned and filtered.

6.2.4.2 Municipal Water District of Orange County (MWDOC)/ Discovery Science Center (DSC)

In the fall of 2002, the Principal Permittee met with MWDOC staff to discuss the goals and objectives of the Public Education Program. As a result, MWDOC agreed to distribute a low-cost, leave-behind, interactive, student-friendly booklet through their Elementary Water Science Education Program. The booklets are distributed to all fifth grade students attending the grade-specific, science lesson assemblies. In addition, instructors screen the Project Pollution Prevention video entitled "Go with the Flow." The video is seven minutes in length and features teenage actors explaining the water cycle, the everyday activities that cause pollution and the difference between sewers and storm drains.

In the fall of 2004 MWDOC formed a new partnership with the DSC that allowed both organizations to reach more Orange County students. The following is an overview of the programs implemented through this partnership:

a) MWDOC/DSC Assembly-style Program

Through MWDOC/DSC's Elementary Water Science Education Program, instructors regularly present grade-specific science lessons to elementary school students in an assembly format. Themes of water sources, water conservation, and water and trash pollution complement the science content standards.

b) 5th Grade Students Attending the DSC Field Trip Program

Through MWDOC/DSC's Elementary Water Science Education Program, instructors regularly present grade-specific science lessons to elementary school students who visit the DSC. For fifth grade students attending the DSC field trip instructors screen the Project Pollution Prevention video entitled "Go with the Flow" and distributed the Project Pollution Prevention water education-based booklet.

c) Project WET

Project WET is an international, interdisciplinary water science and education program for formal and non-formal educators of K-12 students. Each state has a coordinating agency, and in California, the Water Education Foundation (WEF) organizes the network of educators who use the program as part of their professional responsibilities. The goal of the Project WET program is to facilitate and promote awareness, appreciation, knowledge and stewardship of water resources through the development and dissemination of classroom-ready teaching aids and the establishment of state-sponsored Project WET programs.

The Project WET Curriculum and Activity Guide is a collection of innovative, interdisciplinary activities that are hands-on, easy to use and fun. Project WET includes many activities on pollution prevention including "Amazing Water," "Macro invertebrate Mayhem," "A Rainy Day Hike," and "Sum of the Parts." Based on the goals and objectives of the Orange County Stormwater Program, Project WET has developed curriculum specific to stormwater pollution. WEF uses the "train the trainer" model of education to magnify outreach efforts. WEF can assist Permittees in organizing educator workshops, which will be run by a Project WET facilitator.

6.2.4.3 Discovery Science Center

a) Water Education for Middle and High School Teachers

The Water Education Course provides fifth through twelfth grade teachers Professional Development classes complete with curriculum and a kit of scientific equipment to conduct water-focused and pollution awareness activities in their classrooms. The Professional Development classes increase the teachers' knowledge of and comfort with teaching the subject, while the kits enable the students to conduct chemical tests on water (such as determining the pH and phosphate levels) and simulated biological surveys (such as the pollution tolerance and diversity indices).

b) Public Program for General Visitors to the DSC

The DSC, in partnership with the Orange County Stormwater Program, developed a Project Pollution Prevention demonstration and learning station for the general public visitors and students on field trips to the DSC. Annually, more than 270,000 people visit the DSC. Designed for visitors of all ages but primarily students (and their chaperones, parents, teachers), Project Pollution Prevention demonstration's overarching messages are:

- The importance of water
- Water reclamation/water reuse
- Knowledge of urban pollutants, such as used motor oil and pet waste
- Stormwater and urban runoff pollution

6.2.4.4 California Regional Environmental Educational Community (CREEC) Network

The CREEC Network is a program of the California Department of Education, specifically the Office of Environmental Education. It was established to compile all environmental educational programs in one location and to make links between providers of environmental programs and the teachers who use them. The ultimate goal of the CREEC Network is to enhance the environmental literacy of students.

Regional coordinators gather and evaluate the environmental education opportunities in their local region and make this information available to teachers in a variety of ways. As "conduits of information" these coordinators link teachers to the most effective workshops, speakers, curriculum, outings, etc. Teachers with questions regarding environmental education and local resources get a personal response from their CREEC Network Coordinators. The regional

CREEC website (www.creec.org) guides teachers to a directory of resources in each region. The CREEC Network is available free of charge. In addition, e-mail updates are available by clicking the "join now" button on the site.

In addition to these efforts, the Public Education Program includes the following:

- Public Education Committee – The Permittees continued the Public Education Committee to provide regional consistency and oversight for the stormwater public education efforts.
- Regional Efforts - To assist in the implementation of the Public Education Program, promote regional consistency and coordinate the multiple educational efforts underway, the Permittees participated in regional public education efforts such as the California Stormwater Quality Task Association Public Information/Public Participation (PI/PP) Work Group.

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7.0 NEW DEVELOPMENT/SIGNIFICANT REDEVELOPMENT

7.1 Program Summary

7.1.1 Program Overview

Stormwater runoff naturally contains numerous constituents, however, urbanization and urban activities including development and redevelopment typically increase constituent concentrations to levels that impact water quality. Pollutants associated with stormwater include sediment, nutrients, bacteria and viruses, oil and grease, metals, organics, pesticides, and trash (floatables). Potential water quality impacts from completed development can include the following:

- Urban activities can result in the generation of new dry-weather runoff that may contain many of the pollutants listed above
- Impervious surfaces associated with development, such as streets, rooftops, and parking lots, prevent runoff infiltration and increase the rate and volume of stormwater runoff that may increase downstream erosion potential and associated potential water quality impairment
- Urban activities and increased impervious surfaces which can increase the concentration and/or total load of many of the pollutants listed above in wet weather stormwater runoff

The goals for the New Development/Significant Redevelopment Program are to provide the Permittees with:

- A program framework for reducing the adverse impacts that new development and significant redevelopment may have on water quality
- Methodologies to meet NPDES permit requirements.

Pollution Prevention controls are emphasized and will be used as the first line of defense and include measures such as education for property owners and tenants and occupants and common areas landscape maintenance. Source Control BMPs will be included in new development and significant redevelopment projects to further reduce the amount of pollutants released into the environment and Treatment Control BMPs will be incorporated as described later to further supplement the Pollution Prevention and Source Control BMPs by actually treating the water to remove the pollutants.

7.1.2 Regulatory Requirements

The federal stormwater regulations specify that drainage area management plans include "a description of planning procedures including a comprehensive master plan to develop, implement, and enforce controls to reduce the discharge of pollutants...from areas of new development and significant redevelopment."

The Regional Boards have identified a need for individual stormwater quality management plans to apply equally to private and public agency projects. Transportation corridors, schools, parks, flood control projects and other public facilities are thus subject to the same requirements as planned communities and mini-malls.

The New Development/Significant Redevelopment Program was developed as a model for fulfilling the new development and significant redevelopment commitments and requirements of:

- Section XII of the Santa Ana Regional Water Quality Control Board Municipal NPDES Stormwater permit, Order No. R8-2002-0010 (to be updated)
- Section F.1 of the San Diego Regional Water Quality Control Board Municipal NPDES Stormwater permit, Order No. R9-2002-0001 (to be updated)

Although there is a provision in the State regulations that school districts must obtain municipal approval for "improvements which affect drainage", the Government Code effectively prevents city/county regulating many federal and state agencies and local special districts. However, the expectation is that these entities will work cooperatively with the Permittees to manage urban runoff and stormwater pollution. These entities include: Caltrans, universities and colleges, Metropolitan Water District, Department of Defense, school districts, sanitation districts, water districts and railroads.

7.1.3 Program Commitments

Each Permittee is required to minimize short and long-term impacts on receiving water quality from new development and significant redevelopment to the maximum extent practicable and must at a minimum:

- Assess the need to revise and update General Plans to include watershed and stormwater quality and quantity management considerations.
- Review CEQA process for potential stormwater quality impacts and mitigation.
- Review Development Planning/Permit approval process for stormwater protection principles.
- Review existing BMPs and develop Model WQMP (also referred to as a Standard Urban Stormwater Mitigation Plan – SUSMP) to address impact from new and significant redevelopment.)
- Conduct education or training for Model Environmental Review Program elements.

7.2 Model New Development/Significant Redevelopment Program

7.2.1 Introduction

The Model Program provides a framework and a process for following the requirements to incorporate watershed protection/stormwater quality management principles into the

Permittees' General Plan process, environmental review process, and development permit approval process. The program covers initial project planning through design, construction and completion, including requirements for long-term maintenance of permanent BMPs. Detailed requirements for construction phase BMPs and procedures are contained in the Construction Model Program (**DAMP Section 8).**

7.2.2 Model Program Overview

The Model Program links new development BMP design, construction and operation to the earlier phases of new development project planning encompassed by the General Plan, environmental review process, and development permit approval processes. A city/county General Plan specifies policies that guide new development. The environmental review process examines impacts from proposed new development with respect to the General Plan policies and many environmental issues, including water quality, and includes consideration of mitigation measures to reduce any identified significant impacts.

The development permit approval process carries forth mitigation requirements in the form of conditions of approval, design specifications, tracking, inspection, and enforcement actions. These three "front-end" planning processes must be coordinated and linked to the later phases of BMP design, construction and operation for new development and significant redevelopment projects to help ensure stormwater quality protection features are planned, designed and evaluated in accordance with city/county goals for protection of water quality and other environmental resources. **Figure 7-2** is a generalized flow diagram that depicts the relationship of the General Plan, environmental review process and development planning and permit process, as well as the project design, construction, and operation phases.

Figure 7-2
Relationship between General Plan, Environmental Review Process and Development Permit Process

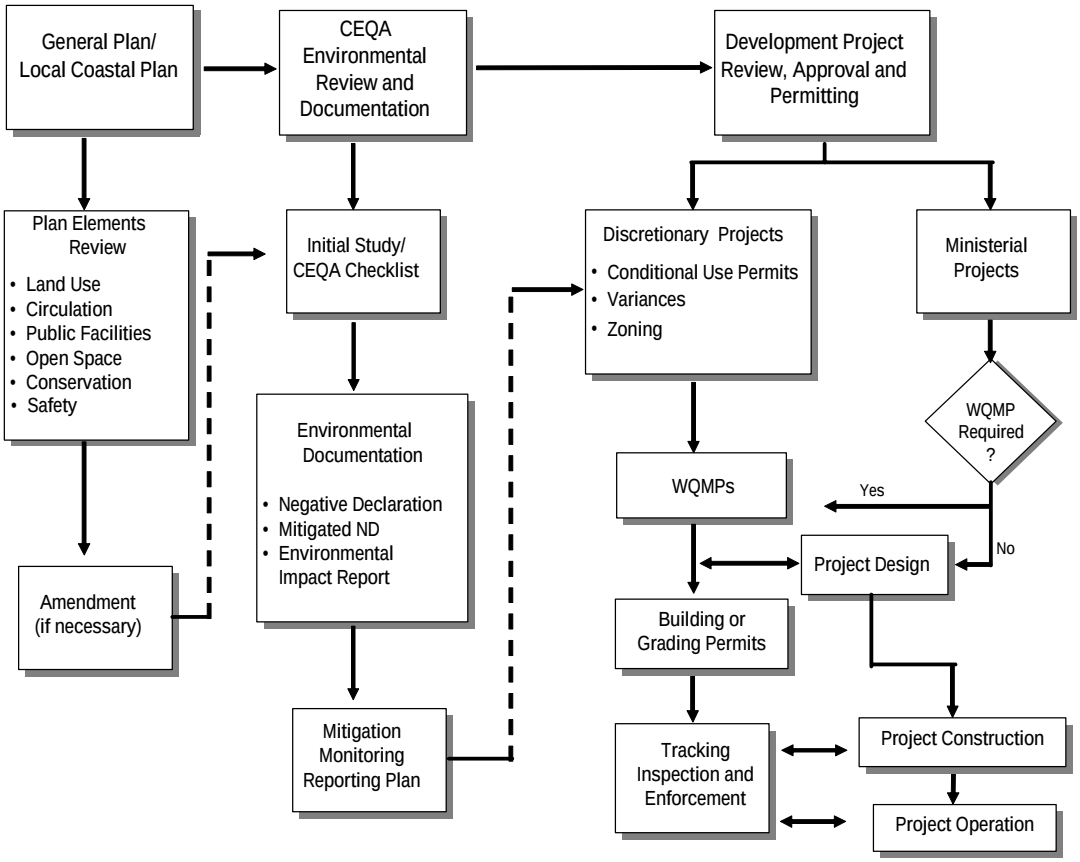

7.2.3 Contents of Model Program

The guidance provided by the Model Program is presented in the following subsections:

- Section 7.4 - General Plan Assessment and Amendment describes the process for the Permittees to assess their existing General Plans and make any needed amendments to include watershed and stormwater quality and quantity management considerations.
- Section 7.5 - CEQA Environmental Review Process provides guidance for utilizing/revising checklists and guidance for conducting environmental review for stormwater quality impact assessment.
- Section 7.6 - Development Project Review, Approval and Permitting provides policies and procedures for project plan review including information pertaining to discretionary permits, ministerial permits, Project WQMP requirements, tracking, inspection and enforcement. The guidance and procedures for Project WQMP preparation and for selection and design of regional/watershed and site specific BMPs are provided in Exhibit 7.II, Model WQMP.
- Section 7.7 - Post Construction BMP Inspection and Verification provides information on the periodic review of approved final Project WQMPs
- Section 7.8 - Model Program Training and Outreach provides general information on the training modules that have been developed for use by each Permittee in informing municipal staff, developers and contractors.
- Section 7.9 - Annual Reporting and Assessing Program Effectiveness describes the annual reporting on the implementation and effectiveness of the New Development /Significant Redevelopment Program by the Permittees.

7.3 General Plan Assessment and Amendment

7.3.1 Introduction

The Permittees must at a minimum review and update General Plans, as necessary, to ensure that watershed and stormwater quality and quantity management are considered.

7.3.2 Background on the General Plan and Local Coastal Program

7.3.2.1 General Plan

Under California State law (California Government Code §65300) each city and county in California must prepare a comprehensive, long-term General Plan for the physical development of its community. The General Plan must consist of a statement of development policies and include a diagram(s) and text setting forth objectives, principles, standards and plan proposals (California Government Code §65302).

The General Plan consists of seven mandatory elements and any optional element that a city or county chooses to adopt. The mandatory elements include:

- Land Use
- Open Space
- Circulation and Infrastructure
- Conservation
- Housing
- Safety
- Noise

Any optional elements that are adopted by a city/county, such as Public Facilities, have equal authority as the mandatory elements. The legislative body of each city (the city council) and each county (the board of supervisors) adopts zoning, subdivision and other ordinances to regulate land uses and to carry out the policies in the General Plan. The plan is also used to guide decision-makers in determining whether or not land use proposals are consistent with the applicable goals, objectives, and policies.

7.3.2.2 General Plan Amendment Process

A General Plan Amendment is a request to revise some component of the General Plan. This can include addition, deletion or modification of goals and policies; modifications to the land use map or other diagrams; or other changes. A General Plan Amendment is a legislative act and are allowed four times per year (California Government Code §65358(b)).

A General Plan Amendment must be approved by the planning commission and city council or at the county level by the Board of Supervisors at public hearings. In approving a General Plan Amendment, the approving body must assess the policy implications of the proposed General Plan Amendment and the impact and compatibility on the long-term goals and desires of the city or county and its citizens.

Most General Plan Amendments are carried out in conjunction with a specific development proposal, although the city, county, or any other agency or party can request an amendment without a specific development proposal in mind.

In evaluating a proposed General Plan Amendment, the approving body must look at the "global" impacts of the proposed amendment. Although a General Plan Amendment may be proposed in conjunction with a specific development proposal, the amendment proposed might have policy and/or land use impacts far beyond any given project or property. General Plan Amendments are frequently proposed in conjunction with other legislative acts such as zone changes, zone text amendments and Local Coastal Program amendments.

7.3.2.3 Local Coastal Program

The California Coastal Commission (Commission) was established in 1972 and made permanent by the Legislature in 1976 (via the Coastal Act). The primary mission of the Commission, as the lead agency responsible for carrying out California's federally approved coastal management program, is to plan for and regulate land and water uses in the coastal zone consistent with the policies of the Coastal Act.

California's coastal management program is carried out through a partnership between state and local governments. Implementation of Coastal Act policies is accomplished primarily through the preparation of local coastal programs (LCPs) that are required to be completed by each of the counties and cities located in whole or in part in the coastal zone. Completed LCPs must be submitted to the Commission for review and approval. In Orange County, the cities responsible for preparing an LCP include Seal Beach, Huntington Beach, Newport Beach, Laguna Beach, Dana Point and San Clemente. The county also has areas subject to an LCP.

The objective of an LCP is to protect coastal resources, provide greater access and recreational opportunities for the public's enjoyment, while allowing for orderly and well-planned urban development and the siting of coastal-dependent and coastal-related industry. The plan incorporates, to the maximum possible extent, local plans and policies that are consistent with the Coastal Act.

An LCP includes a land use plan, which is the relevant portion of the local General Plan, including any maps necessary to administer it, the zoning ordinances, zoning district maps, and other legal instruments necessary to implement the land use plan. Coastal Act policies are the standards by which the Commission evaluates the adequacy of LCPs (Public Resources Code §30108.6).

After certification of the land use plan and zoning components of the LCP, the review authority for new development within the coastal zone, which is now vested in the Coastal Commission, is returned to local government. Development within the coastal zone may not commence until a coastal development permit has been issued by either the Commission or a local government that has a Commission-certified LCP. The local government, in issuing coastal development permits after certification, must make the finding that the development is in conformity with the approved LCP.

7.3.2.4 Local Coastal Program Amendment Process

Any amendments to a certified LCP have to be approved by the State Coastal Commission. To ensure that coastal resources are effectively protected in light of changing circumstances, such as new information and changing development pressures and impacts, the Commission is required to review each certified LCP at least once every five years (California Coastal Commission 2002).

7.3.3 Plan for Assessing General Plan Elements and Local Coastal Program

The San Diego Region Permit states:

> "Each Permittee's General Plan or equivalent plan (e.g., Comprehensive, Master, or Community Plan) shall include water quality and watershed protection principles and policies to direct land use decisions and require implementation of consistent water quality protection measures for development projects."

The Santa Ana Region Permit states:

> "Permittees shall review their watershed protection principles and policies in their General Plan or related documents (such as Development Standards, Zoning Codes, Conditions of Approval, Development Project Guidance) to ensure that these principals and policies are properly considered and are incorporated into these documents."

The Permittees recognize the importance of addressing watershed protection and stormwater quality control in the land development process. The Permittees are requiring that stormwater quality BMPs be included in plans for new development and significant redevelopment.

Therefore, in accordance with State Planning and Zoning Law which provides that requirements placed on land development projects must be compatible with a community's General Plan and Local Coastal Program, watershed protection principles and stormwater pollution control objectives for land development should be reflected in the appropriate policies, goals, and objectives of each Permittee's General Plan and LCP.

Many of the General Plan Elements contain existing goals and policies that can be related to watershed protection and stormwater pollution control. For example, stormwater quality may be controlled by the type, location, and density of development. Such controls may be established through policies commonly found in the Land Use and Open Space Elements of the General Plan (e.g., development policies, development location guidelines, landscaping guidelines, open space policies, policies on preservation of and integration with natural features).

- The Permittees will review their General Plan Elements and relevant sections of the LCP (if a coastal city with an approved LCP) that cover land development issues and in which it may be appropriate to reflect watershed protection and stormwater quality management policies. This will include review of goals and policies in the following General Plan Elements:
    - Land Use
    - Open Space
    - Circulation and Infrastructure (i.e., transportation)
    - Conservation
    - Safety
    - Public Facilities

- Permittees will review development goals and policies, landscaping policies and requirements, open space goals and policies including preservation or integration with natural features, water conservation policies, and public facilities operation and maintenance policies of these Elements. When reviewing the General Plan Elements and LCPs, special attention will be given to how the Element/LCP addresses water quality protection from urban runoff and stormwater pollution.
- The Permittees will keep in mind the following questions during this review, which may trigger the need for specific urban runoff and stormwater pollution protection policies in the General Plan and LCP either as new policies and objectives or amended text to existing policies and objectives:
  - Are there sensitive water resources in or downstream of the jurisdiction?
  - Are there existing Total Maximum Daily Loads (TMDLs) or other such regulations pertaining to receiving waters within the jurisdiction?
  - Is major new development or significant redevelopment expected?
  - Are major new infrastructure projects anticipated (e.g. roads, sewer, flood control, storm drains)?
  - Does urban runoff and stormwater pollution affect recreational use of water bodies within the jurisdiction?
- Upon review of the General Plan Elements and LCP, as well as related documents (such as Development Standards, Zoning Codes, Conditions of Approval, Development Project Guidance, referred to collectively as Related Documents), the Permittees will determine which sections should be modified, if any, to include specific policies and objectives that address water quality protection as specified in the San Diego Region and Santa Ana Region Permits (See **DAMP Section 7.4.4** following).

If the General Plans or Related Documents of the Permittees do not contain the policies, goals and objectives of the relevant permits, then additional policies, goals, or objectives that stress the importance of stormwater quality control, or that are necessary in order to implement certain types of stormwater management programs, should be incorporated in the General Plans or Related Documents. Revisions to the General Plan or Related Documents should be coordinated with each Permittee's legal counsel.

7.3.4 Consideration of Additional Water Quality and Watershed Protection Concepts in General Plan and Local Coastal Program

The Permittees will review and consider the following additional objectives for the General Plan Elements and LCPs, as specified by the permits, respectively:

San Diego Region Permit:

- Minimize the amount of impervious surfaces and directly connected impervious surfaces in areas of new development and significant redevelopment and, where feasible, slow runoff and maximize on-site infiltration of runoff.

- Implement pollution prevention methods supplemented by pollutant source controls and treatment. Use small collection strategies located at, or as close as possible to, the source to minimize the transport of urban runoff and pollutants offsite and into an MS4 (municipal storm drain).
- Preserve, and where possible, create or restore areas that provide important water quality benefits, such as riparian corridors, wetlands, and buffer zones. Encourage land acquisition of such areas.
- Limit disturbances of natural water bodies and natural drainage systems caused by development including roads, highways, and bridges.
- Prior to making land use decisions, utilize methods available to estimate increases in pollutant loads and flows resulting from projected future development. Require incorporation of structural and non-structural BMPs to mitigate the projected increases in pollutant loads and flows.
- Avoid development of areas that are particularly susceptible to erosion and sediment loss; or establish development guidance that identifies these areas and protects them from erosion and sediment loss.
- Reduce pollutants associated with vehicles and increasing traffic resulting from development. Coordinate local traffic management reduction efforts with Orange County Transit Authority's Congestion Management Plan.
- Post-development runoff from a site shall not contain pollutant loads that cause or contribute to an exceedance of receiving water quality objectives and which have not been reduced to the maximum extent practicable.

Santa Ana Region Permit:

- Limit disturbance of natural water bodies and drainage systems; conserve natural areas; protect slopes and channels; and minimize impacts from stormwater and urban runoff on the biological integrity of natural drainage systems and water bodies.
- Minimize changes in hydrology and pollutant loading; require incorporation of control, including structural and non-structural BMPs, to mitigate the projected increases in pollutant loads and flows; ensure that post-development runoff rates and velocities from a site have no significant adverse impact on downstream erosion and stream habitat; minimize the quantity of stormwater directed to impermeable surfaces and the MS4s (municipal storm drain); and maximize the percentage of permeable surfaces to allow more percolation of stormwater into the ground;
- Preserve wetlands, riparian corridors, and buffer zones and establish reasonable limits on the clearing of vegetation from the project site;
- Encourage the use of water quality wetlands, biofiltration swales, watershed-scale retrofits, etc., where such measures are likely to be effective and technically and economically feasible;

- Provide for appropriate permanent measures to reduce stormwater pollutant loads in stormwater from the development site; and,
- Establish development guidelines for areas particularly susceptible to erosion and sediment loss.

For further reference, the Permittees may review the sample general plan amendment text and sample urban runoff water quality general plan element outlined in *Model Urban Runoff Program, A How to Guide for Developing Urban Runoff Programs for Small Municipalities (City of Monterey, et al, July 1998).*

7.4 CEQA Environmental Review Process Modifications

7.4.1 Introduction

Each Permittee is required by the permits to minimize short and long-term impacts on receiving water quality from new development and significant redevelopment to the maximum extent practicable. The Santa Ana Region Permit (Section XII.A.3) requires the Permittees to review their California Environmental Quality Act (CEQA) document preparation process to ensure urban runoff and stormwater pollution-related issues are properly considered and addressed. If necessary, the processes should be revised to consider and mitigate impacts to stormwater quality. The San Diego Region Permit (Section F.1.C) requires to the extent feasible that the Permittees revise their current environmental review process to include requirements for evaluation of water quality effects and identification of appropriate mitigation measures.

This section provides background on the CEQA environmental review process followed by a series of revisions that the Permittees will implement to ensure that urban runoff and stormwater pollution issues are incorporated in the process.

7.4.1.1 Background on CEQA

The California Environmental Quality Act (CEQA) applies to all discretionary activities proposed to be carried out or approved by the cities and county, unless an exemption applies. CEQA applies to public and private sector activities that require discretionary city/county approvals. The basic goal of CEQA (Public Resources Code §21000 *et seq.*) is to develop and maintain a high-quality environment now and in the future, while the specific goals of CEQA are for the cities/county and other public agencies to:

- Identify the significant environmental effects of their actions; and, either
- Avoid those significant environmental effects, where feasible; or
- Mitigate those significant environmental effects, where feasible.

The implementation of CEQA is regulated by the Secretary for Resources, via the Office of Planning and Research's "State CEQA Guidelines" (Guidelines) (California Code of Regulations Title 14, Chapter 3, §15000 through 15007). These Guidelines are binding on all cities/counties and other public agencies in California.

There are three phases for implementing CEQA. These include:

- Preliminary review of a project to determine whether it is subject to CEQA.
- Preparation of an Initial Study to determine whether the project may have a significant environmental effect.
- Preparation of an Environmental Impact Report (EIR) if the project may have a significant environmental effect or a Negative Declaration or Mitigated Negative Declaration if no significant effects will occur (Guidelines §15002(k)).

7.4.1.2 Preliminary Review

Once an application for permits, approvals, or other entitlements has been submitted to the Lead Agency for CEQA review, the Lead Agency has 30 days to review the application for completeness. For private sector projects, the Lead Agency may require submittal of baseline environmental setting and detailed project description information to enable the Lead Agency to prepare the Initial Study. Appendix H of the CEQA Guidelines provides a sample project application form. Lead Agencies can rely on the sample form, but are free to devise their own project application forms (Guidelines §15002(k)), to include, for example, specific information on BMPs.

7.4.1.3 Initial Study

The Lead Agency must conduct an Initial Study to determine if the project may have a significant effect on the environment. If the Lead Agency can determine that an EIR will clearly be required for the project, an Initial Study is not required but may still be desirable (§15063). The Initial Study typically consists of the project applicant information obtained during the preliminary review process, the completed Initial Study checklist and required checklist explanations. An Initial Study checklist is provided in Appendix G of the CEQA Guidelines that covers all environmental topics for the Lead Agency to consider during the Initial Study, including hydrology/water quality. All entries on the checklist must be explained during the Initial Study process. Lead agencies are free to devise their own Initial Study checklists for use in the Initial Study process (Guidelines §15002(k)). This may include more detailed questions related to urban runoff and stormwater pollution, if the Lead Agency deems appropriate for its jurisdiction.

7.4.1.4 Environmental Impact Report (EIR)

An EIR must be prepared if the proposed project may have a significant environmental effect. The most common type of EIR examines the environmental impacts of a specific development project. This type of EIR focuses primarily on the changes in the environment that would result from the development project. The EIR examines all phases of the project including planning, construction, and operation (§15161).

Immediately after deciding that an EIR is required for a project, the Lead Agency sends to each Responsible Agency a Notice of Preparation (NOP) stating that an EIR will be prepared. For water quality issues, responsible agencies would include the State Water Resources Control

Board (State Board), the respective Regional Boards, the U.S. Army Corps of Engineers (for projects with discharges of dredge/fill into waters of the U.S.) and California Department of Fish and Game (for alternations of streambeds affecting waters of the state). This notice is also sent to every federal and state agency involved in approving or funding the project and to each Trustee Agency responsible for natural resources affected by the project. The NOP must provide the Responsible Agencies with sufficient information describing the project and the potential environmental effects. The responses from the NOP assist in identifying the significant environmental issues and reasonable alternatives and mitigation measures that the Responsible Agency will need to explore in the draft EIR (§15082). If water quality issues are identified as a significant environmental issue, then water quality would be discussed in the environmental setting (baseline), impact, and, if applicable, mitigation sections of the EIR.

7.4.1.5 Negative Declaration

A public agency prepares a Negative Declaration or Mitigated Negative Declaration for a project subject to CEQA when:

- The initial study shows that there is no substantial evidence, in light of the whole record before the agency, that the project may have a significant effect on the environment, or
- The initial study identifies potentially significant effects, but:
  - Revisions in the project plans or proposals made by, or agreed to by the applicant before a proposed mitigated negative declaration and initial study are released for public review would avoid the effects or mitigate the effects to a point where clearly no significant effects would occur, and
  - There is no substantial evidence, in light of the whole record before the agency, that the project as revised may have a significant effect on the environment. (§15070)

A Negative Declaration circulated for public review must include a brief description of the project; the location of the project; a proposed finding that the project will not have a significant effect on the environment; an attached copy of the Initial Study documenting reasons to support the finding; and mitigation measures, if any, included in the project to avoid potentially significant effects. (§15071) Water quality issues are addressed in a Negative Declaration in the Initial Study and if applicable, mitigation measures are developed.

7.4.2 Revisions to the CEQA Initial Study Process

The **San Diego Region Permit** (Section F.1.C) requires, to the extent feasible, that the Permittees revise their current environmental review process to include requirements for evaluation of water quality effects and identification of appropriate mitigation measures. The San Diego Region Permit lists the following questions for consideration in the environmental review process to address increased pollutants and flows from proposed projects:

- Could the proposed project result in an increase in pollutant discharges to receiving waters? Consider water quality parameters such as temperature, dissolved oxygen, turbidity and other typical stormwater pollutants (e.g. heavy metals, pathogens,

petroleum derivatives, synthetic organics, sediment, nutrients, oxygen-demanding substances, and trash).

- Could the proposed project result in significant alternation of receiving water quality during or following construction?
- Could the proposed project result in increased impervious surfaces and associated increased runoff?
- Could the proposed project create a significant adverse environmental impact to drainage patterns due to changes in runoff flow rates or volumes?
- Could the proposed project result in increased erosion downstream?
- Is the project tributary to an already impaired water body, as listed on the Clean Water Act Section 303(d) list? If so, can it result in an increase in any pollutant for which the water body is already impaired?
- Is the project tributary to other environmentally sensitive areas? If so, can it exacerbate already existing sensitive conditions?
- Could the proposed project have a potentially significant environmental impact on surface water quality to either marine, fresh, or wetland waters?
- Could the proposed project have a potentially significant adverse impact on groundwater quality?
- Could the proposed project cause or contribute to an exceedance of applicable surface or groundwater receiving water quality objectives or degradation of beneficial uses?
- Can the project impact aquatic, wetland, or riparian habitat?

The **Santa Ana Region Permit** (Section XII.A.3) requires the Permittees to review their CEQA document preparation process to ensure urban runoff and stormwater pollution-related issues are properly considered and addressed. If necessary, the processes should be revised to consider and mitigate impacts to stormwater quality. The Santa Ana Region Permit lists the following potential impacts to be considered during CEQA review:

- Potential impact of project construction on stormwater runoff;
- Potential impact of project's post-construction activity on stormwater runoff;
- Potential for discharge of stormwater pollutants from areas of material storage, vehicle or equipment fueling, vehicle or equipment maintenance (including washing), waste handling, hazardous materials handling or storage, delivery areas, loading docks or other outdoor work areas;
- Potential for discharge of stormwater to affect the beneficial uses of the receiving waters;
- Potential for significant changes in the flow velocity or volume of stormwater runoff to cause environmental harm; and
- Potential for significant increases in erosion of the project site or surrounding areas.

These urban runoff and stormwater pollution issues will be considered in the Initial Study process (project application forms and checklists) and in the preparation and reviews of EIRs discussed in the following sections.

7.4.2.1 Project Application Form

The current project application form contained in Appendix H of the CEQA Guidelines (State of California Office of Planning and Research, February, 2001) contains many questions about the project to help environmental planners assess the potential for significant environmental impacts. However, there are no specific project description questions that help characterize the potential for urban runoff and stormwater pollution impacts. The Permittees will review their existing project application forms and, as deemed necessary, will revise the form to include line items for:

- Expected percent change in pervious surface area of the site; and
- Submittal of preliminary or conceptual Project WQMP, if applicable, (along with required submittal of other development plans).

7.4.2.2 Initial Study Checklist

The current Initial Study Checklist contained in Appendix G of the CEQA Guidelines (State of California Office of Planning and Research, February 2001) was recently updated and is used by nearly all Permittees in their environmental review process. This Checklist contains the following considerations under the environmental impact category "Hydrology and Water Quality (Section VIII):

Would the project:

- Violate any water quality standards or waste discharge requirements?
- Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted?
- Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner which would result in substantial erosion or siltation on- or off-site?
- Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner that would result in flooding on- or off-site?
- Create or contribute runoff water that would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff?
- Otherwise substantially degrade water quality?

- Place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map?
- Place within a 100-year flood hazard area structures that would impede or redirect flood flows?
- Expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam?
- Inundation by seiche, tsunami, or mudflow?

The Permittees have concluded that urban runoff and stormwater pollution considerations are generally covered in questions a) through f) of the CEQA Guidelines Appendix G checklist, but with less specificity than the questions provided in both the San Diego and Santa Ana Region Permits. To ensure that the Initial Study thoroughly considers all issues listed in the Permits, the Permittees will review the Initial Study checklist and make appropriate changes to assure that the additional considerations provided in the permits (or their equivalent) are reflected in the Permittees' CEQA review processes.

The Permittees will also consider adding the following question to the Hazardous and Hazardous Materials Section (Section VII) or Utilities and Service Systems Section (Section XVI) of the checklist:

> "Would the project include new or retrofitted stormwater Treatment Control BMPs, (e.g. water quality treatment basin, constructed treatment wetlands), the operation of which could result in significant environmental effects (e.g. increased vectors and odors)?"

To promote the consideration of all of the various impacts related to urban runoff and stormwater pollution as identified in the permits, the Permittees may provide the list of permit considerations to:

- Environmental planning staff for use in preparing and reviewing CEQA documents for internal city/county projects and when reviewing CEQA documents prepared by the private sector;
- Consultants and other members of the private sector for use in preparing CEQA documents for private and public sector projects;
- Project applicants during the CEQA preliminary review process; and
- Participants attending training programs.

7.4.3 Environmental Review Guidance for CEQA Initial Studies and CEQA Document Preparation and Review

The guidance in **Exhibit 7.I** may be used by the Permittees in evaluating the CEQA Initial Study checklist questions in Section VIII, Hydrology and Water Quality including any additional questions included by the Permittees in response to the San Diego and Santa Ana Region Permits. This guidance is also applicable to the review and preparation of CEQA documents including Negative Declarations, Mitigated Negative Declarations and EIRs. This guidance will

be reviewed annually, updated as needed, and its status/use will be discussed in the Annual Progress Report.

7.5 Development Project Review, Approval, and Permitting

Permittees throughout the county required all projects (not just Priority Projects) to prepare a WQMP to identify permanent BMPs that will be included in the project. The WQMP terminology will continue to be used within all jurisdictions, to allow Project WQMPs to be consistent with both the WQMP requirements of the Santa Ana Permit and the SUSMP requirements of the San Diego Permit.

This section describes the processes for incorporating the new Model WQMP requirements into the project planning and approval process and modifications to conditions of approval and plan check processes to assure consistency with permit requirements. A Model WQMP is provided as **Exhibit 7.II** and provides guidance for the development and review of Project WQMPs.

7.5.1 Project Review, Approval, and Permitting Process Overview

For all new development and significant redevelopment projects meeting the minimum requirements defined herein, a Project WQMP shall be developed to define the quality and quantity of stormwater runoff that must be considered during project planning to identify permanent (post-construction) BMPs that will be included in project design, constructed as part of the project, and ultimately implemented and maintained for the life of the project. Commitments from a project or permit applicant to incorporate, implement, and maintain the BMPs must be described in a Project WQMP.

Program Coverage and Definitions

Project WQMPs are required for private new development and significant redevelopment projects within Permittees' jurisdictions, and equivalent public agency capital projects undertaken by the Permittees that are either:

- "Priority Projects" meeting one of the criteria of **Exhibit 7.I**, regardless of project size.
- "Non-Priority Projects" that do not qualify as one of the Priority Project Categories but meet one of the following:
    - Require discretionary action that will include a precise plan of development, except for those projects exempted by the Water Quality Ordinance (as applicable)
    - Require issuance of a non-residential plumbing permit

The primary difference between a Priority Project and a Non-Priority Project is that Priority Projects will be required to include Treatment Control BMPs in project design. To ensure that Priority Projects, which require the incorporation of Treatment Control BMPs, are identified as early in the planning process as possible, the Permittees will utilize a checklist to document the identification of a project as a Priority Project or a Non-Priority Project (see the Local Implementation Plan DAMP **Appendix A-7**).

Private Development WQMP Submittal

Conceptual WQMP

It is advisable that a conceptual WQMP be submitted as early in the planning process as possible. The level of detail in a preliminary or conceptual Project WQMP submitted during the land use entitlement process will depend upon the level of detail known about the overall project design at the time project approval is sought. This will allow the developer and agency to consider site issues before the facilities are final designed.

The conceptual Project WQMP may be prepared and submitted at one of two different points in project planning and permitting:

- During the discretionary approval process (land use permit) of a proposed project, when the Permittee must exercise judgment or deliberation in order to approve or disapprove a development or significant redevelopment project, or
- During the ministerial approval process of issuing a grading, building, demolition, or similar "construction" permits in which only fixed standards or objective measures are applied.

A "discretionary action" under CEQA is defined as "an activity which requires the public agency to exercise judgment in deciding whether to approve or disapprove the particular activity, as distinguished from situations where the public agency merely has to determine whether there has been conformity with applicable ordinances or other laws." (California Public Resources Code § 21080(a); CEQA Guidelines § 15357)

"Ministerial actions" under CEQA are those where little or no judgment or deliberation by a Permittee is required. Some ministerial approvals, those projects meeting one or more criteria under Program Coverage and Definitions (see **Section 7.6.2**), require that the applicant prepare a Project WQMP, whereas ministerial approvals that do not meet these criteria may not necessitate a Project WQMP.

Final WQMP

Many projects will be subject to discretionary approval during the planning phase (land use entitlement) and ministerial approval for subsequent grading or building permits. For such projects, Project WQMPs may be submitted initially as "preliminary or conceptual" or during the discretionary approval process and submitted as "final" prior to approval of a grading or building permit. For projects subject to and consistent with regional or watershed programs, the project may rely upon the approved regional/watershed program document during the entitlement process, and may submit the final Project WQMP documentation in the format approved by the relevant permittee prior to obtaining ministerial permits.

All projects must develop a Final WQMP during the final design phase of the project. Final WQMPs must include all BMPs (Source Control, Site Design, and Treatment Control) committed to, additional details on the design of treatment BMPs, and all other information required should be completed.

Figure 7-3 depicts the primary steps in the process of reviewing, approving, and permitting a private new development or significant redevelopment project.

Figure 7-3
Development Project Review, Approval and Permitting

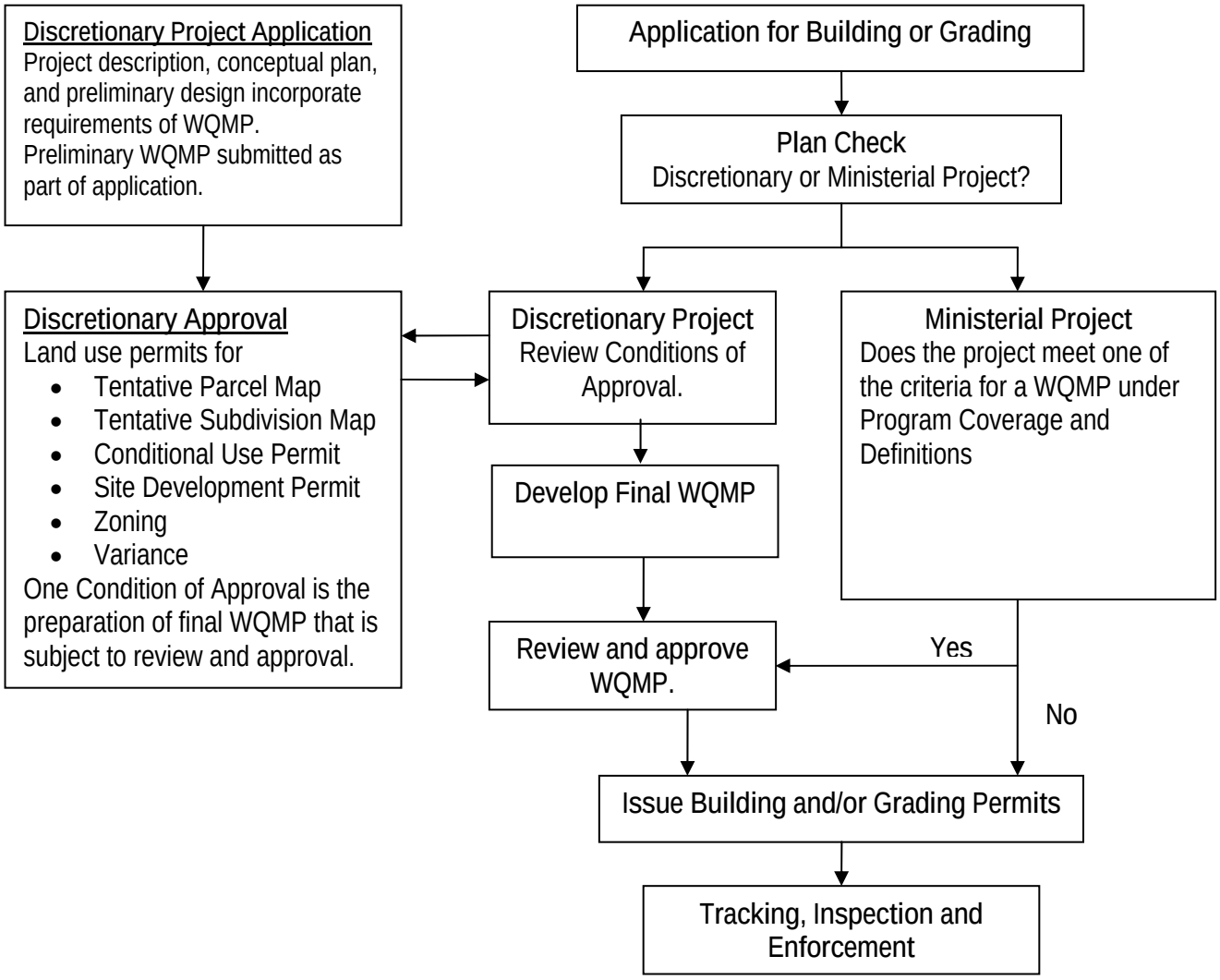

Public Agency WQMP Submittal

The requirement for managing the quality and quantity of stormwater runoff from new development or significant redevelopment applies equally to private sector and public agency projects meeting the minimum requirements. In many public agencies the process for planning, design, approval, and oversight of public facilities differs from the process for private sector development projects. For example, typically private development projects are regulated through a process of a development plan approval (i.e., conditions of approval); building or grading permit applications, and permit conditions.

Public agency projects in comparison may undergo design review by the contracting agency of the municipality; may or may not be issued permits or similar administrative authorizations; and are then regulated through the enforcement of contract terms and approved plans and

specifications. Recognizing the differences in the process, each Permittee will incorporate the requirement for a Project WQMP into the process of planning, design, approval, and oversight of their public agency projects or provide an equivalent approach. Typically, the Permittee's design/engineering department or the design architect/engineer contractor will prepare a WQMP for a public agency project.

Project WQMPs will not be required for public agency projects consisting of routine maintenance or emergency construction activities required to protect public health and safety; interior remodeling with no outside exposure of construction materials or construction waste to stormwater; mechanical permit work; electrical permit work; and sign permit work.

There are eight categories of Priority Projects. Although public agencies do not plan and design some of these categories of projects per se, public agency projects may have similar functions or characteristics or may conduct similar activities after construction is completed. Therefore, some public agency projects should be considered Priority Projects. For example, a corporation yard may include a vehicle and equipment maintenance facility, which is very similar to an automotive repair shop. Other examples are a civic center or library that is very similar in its characteristics to that of a commercial office building and a senior citizens center or a jail may have a cafeteria, which is very similar to a restaurant.

For other public agency projects that are not Priority Projects, the Permittees may decide on a project specific basis not to require a WQMP, but may elect instead to require that all routine structural Source Control BMPs applicable to the project features be identified and included in the project, and Site Design BMPs be considered where applicable. Project types include, but are not limited to:

- Parks and recreation facilities
- Public Buildings
- Streets and roadways
- Above ground drainage facilities (e.g. channels and basins)

7.5.2 Conditions of Approval

The Permittees will review and revise their standard conditions of approval to ensure that the standard conditions are not in conflict with any provisions of the Santa Ana Region Permit or the San Diego Region Permit, the DAMP, California's General Permit for Stormwater Discharges Associated with Construction Activity, California's General Permit for Stormwater Discharges Associated with Industrial Activity and adopted Total Maximum Daily Load allocations within their jurisdiction.

For example, a condition requiring "sweeping or washing public access points within 30 minutes of dirt deposition" should be revised to specify that "washing" must include capture and proper disposal of all wash water. A second example is that a standard condition requiring the applicant of a retail gasoline outlet or automotive vehicle repair facility to demonstrate coverage under the General Permit for Stormwater Discharges Associated with Industrial Activity prior to issuance of a preliminary or precise grading permit should not be used. Retail

gasoline outlets and automotive vehicle repair facilities are not required to comply with California's General Permit for Stormwater Discharges Associated with Industrial Activity.

To minimize the short-term and long-term impacts on receiving water quality from new development and significant redevelopment, Permittees will review and revise or supplement their standard conditions of approval that may be used for projects to include the following conditions or the equivalent, as determined appropriate:

General Conditions

- Prior to the issuance of any grading or building permits (*add grubbing, clearing, surface mining or paving permits as appropriate)* for projects that will result in soil disturbance of one or more acres of land, the applicant shall demonstrate that coverage has been obtained under California's General Permit for Stormwater Discharges Associated with Construction Activity by providing a copy of the Notice of Intent (NOI) submitted to the State Water Resources Control Board and a copy of the subsequent notification of the issuance of a Waste Discharge Identification (WDID) Number or other proof of filing. Projects subject to this requirement shall prepare and implement a Stormwater Pollution Prevention Plan (SWPPP). A copy of the current SWPPP shall be kept at the project site and be available for review on request.
- Prior to the issuance of any grading or building permits (add <u>or</u> prior to recordation upon subdivision of land if determined applicable), the applicant shall submit for review and approval a Project WQMP that:
  - Discusses regional or watershed programs (if applicable)
  - Addresses Site Design BMPs (as applicable) such as minimizing impervious areas, maximizing permeability, minimizing directly connected impervious areas, creating reduced or "zero discharge" areas, and conserving natural areas
  - Incorporates the applicable Routine Source Control BMPs as defined in the DAMP
  - Incorporates Treatment Control BMPs as defined in the DAMP
  - Generally describes the long-term operation and maintenance requirements for the Treatment Control BMPs,
  - Identifies the entity that will be responsible for long-term operation and maintenance of the Treatment Control BMPS, and
  - Describes the mechanism for funding the long-term operation and maintenance of the Treatment Control BMPs.
- Prior to grading or building permit close-out and/or the issuance of a certificate of use or a certificate of occupancy, the applicant shall:
  - Demonstrate that all structural best management practices (BMPs) described in the Project WQMP have been constructed and installed in conformance with approved plans and specifications,

- Demonstrate that applicant is prepared to implement all non-structural BMPs described in the Project WQMP,
- Demonstrate that an adequate number of copies of the project's approved final Project WQMP are available for the future occupiers,
- Submit for review and approval an Operations and Maintenance (O&M) Plan for all structural BMPs.

The following table lists certain classes of projects and applicable conditions:

Project Type	Conditions
Projects Adjacent to Beaches and Receiving Waters	During the construction phase, the applicant shall comply with the following requirements: • All construction materials, wastes, grading or demolition debris, and stockpiles of soil, aggregates, soil amendments, etc. shall be properly covered, stored, and secured to prevent transport into coastal and receiving waters by wind, rain, tracking, tidal erosion or dispersion.
Projects Adjacent to Beaches	Grading and Drainage Plans shall be prepared with the following design objectives: • All surface runoff and subsurface drainage shall be directed to the nearest acceptable drainage facility, via sump pumps if necessary, as determined by the Building Official. • Onsite surface drainage and subdrain systems shall not discharge over the blufftop or hilltop. • All roof drains shall be required to connect into a tight-line drainage pipe or concrete swales that drain to the nearest acceptable drainage facility as determined by the Building Official. • Landscaping plans shall utilize only native, drought-tolerant landscape materials. • Irrigation system plans shall not include irrigation lines for the bluff-side of the parcel. All grading and improvements shall be made in accordance with the Grading Ordinance and to the satisfaction of the Building Official or designee. Grading shall be in substantial compliance with the approved grading plans. Surety to guarantee the completion of grading, erosion and sediment control measures shall be posted satisfactory to the Building Official.
Project Type	**Conditions**
Projects in Hilly Areas	Drainage facilities discharging onto adjacent property shall be designed to imitate the manner in which runoff is currently produced from the project site. Alternatively, the project applicant may obtain a drainage acceptance and maintenance agreement, suitable for recordation, from the owner of said adjacent property
Industrial Facilities	For industrial facilities subject to California's General Permit for Stormwater Discharges Associated with Industrial Activity as defined by Standard Industrial Classification (SIC) code, prior to grading or building permit close-out and/or the issuance of a certificate of use or a certificate of occupancy, the applicant shall demonstrate that coverage under the permit has been obtained providing a copy of the Notice of Intent (NOI) submitted to the State Water Resources Control Board and a copy of the notification of the issuance of a Waste Discharge Identification (WDID) Number or other proof of filing.

Special Conditions

- Prior to the issuance of any grading and building permits, the applicant shall include in the plans all BMPs identified in the approved final Project WQMP and any other urban runoff and stormwater pollution control measures deemed necessary by the city/county planning director.
- Prior to issuance of certificates of use and occupancy or building permits for individual tenant improvements or construction permits for a tank or pipeline, uses shall be identified and, for specified uses, the applicant shall propose plans and measures for chemical management (including, but not limited to, storage, emergency response, employee training, spill contingencies and disposal). The chemical management measures shall be incorporated as an element of a Project WQMP and shall be subject to the approval of the Planning and Development Services Department and other specified agencies such as the Orange County Fire Authority, the Orange County Health Care Agency and sewering agencies (as appropriate) to ensure implementation of each agency's respective requirements. Certificates or permits may be ministerially withheld if features needed to properly manage chemicals cannot be incorporated into a previously completed building, center or complex.

7.5.3 Review and Approval of WQMPs

Project WQMPs may be submitted as "preliminary" during the discretionary or land use entitlement phase depending upon the level of detail known about the overall project design at the time project approval is sought. However, prior to issuance of grading or building permits, the project applicant must submit the final Project WQMP for review and approval.

The review and approval of a final Project WQMP is one of the last critical points at which a Permittee can impose conditions or standards that will minimize the impacts of urban runoff and stormwater pollution on local water resources. The Model WQMP (**Exhibit 7.II**) is expected to be used as a guide for preparation of a Project WQMP.

WQMP Elements

The Project WQMP is expected to address water quality BMPs applicable to the project to address pollutants or conditions of concern. The BMPs required vary for Priority Projects versus Non-Priority Projects.

The Project WQMP for a Priority Project must include:

- Regional or watershed programs (if applicable)
- Routine structural and non-structural Source Control BMPs
- Site Design BMPs (as appropriate)
    - Treatment Control BMPs (Treatment Control BMP requirements may be met through either project specific (on-site) controls or regional or watershed

management controls that provide equivalent or better treatment performance, subject to certain conditions described in the Model WQMP))

- The mechanism(s) by which long-term operation and maintenance of all structural BMPs will be provided.

The Project WQMP for a Non-Priority Project must include:

- Routine structural and non-structural Source Control BMPs
- Site Design BMPs (as appropriate)
- The mechanism(s) by which long-term operation and maintenance of all structural BMPs will be provided.

The categories of stormwater pollution control BMPs (Source Control, Site Design, and Treatment Control) are summarized in **Table 7- 2**, together with applicable projects and primary pollution prevention objectives of the BMPs. Each of the BMP categories is further defined in subsequent sections.

When reviewing Project WQMPs submitted for approval, Permittees will assess the potential project impacts on receiving waters and ensure that the Project WQMP adequately identifies such impacts, including all pollutants and conditions of concern. The Permittees will examine all identified BMPs, as a whole, to ensure that they address the pollutants and conditions of concern identified within the Project WQMP. Additionally, Permittees will consider potential cumulative impacts of build-out within the watershed based upon available watershed chapters of the DAMP (**DAMP Appendix D**), information learned from any CEQA documentation regarding the project, Permittee knowledge of watershed-wide and jurisdictional problems and programs and compliance with the requirements of the permits.

The Permittees recognize the importance of understanding the physical, chemical and biological conditions of the receiving waters at a watershed scale and the impact of incremental projects on these conditions and will continue to enlarge their understanding of receiving waters on a watershed scale through implementation of the watershed chapters of the DAMP. This information will assist in providing a strong linkage between the planning process and the development review and permitting process as required by the permits.

The Project WQMP is a project planning level document and as such is not expected to contain final BMP design drawings and details (these will be in the construction plans). However, the Project WQMP must identify and locate selected BMPs, provide design parameters including hydraulic sizing of treatment BMPs and convey final design concepts. BMP fact sheets can be

used in conjunction with project-specific design parameters and sizing to convey design intent.

Table 7- 2. Summary of BMPs for Development/Significant Redevelopment Projects

BMP Category		Applicable Projects	Pollution Prevention Objective
Source Control BMPs	**Routine Non-Structural BMPs**	Required for all projects – as applicable	Prevent pollution by educating the public on proper disposal of hazardous or toxic wastes, regulatory approaches, street sweeping and facility maintenance, and detection and elimination of illicit connections and illegal dumping
Source Control BMPs	**Routine Structural BMPs**	Required for the following project features: • Private roads • Residential driveways and guest parking • Loading dock areas • Maintenance bays • Vehicle wash areas • Outdoor processing areas • Equipment wash areas • Parking areas • Roadways • Fueling areas • Hillside landscaping • Wash water control for food preparation areas • Community car wash racks	Prevent potential pollutants from contacting rainwater or stormwater runoff and prevent discharge of contaminated runoff to the storm drain system or receiving waters. Reduce the creation or severity of potential pollutant sources and reduce the alteration of the project site's natural flow regime
Site Design BMPs		Shall incorporate - as appropriate	Minimize or prevent potential pollutants from contacting rainwater or stormwater runoff or to prevent discharge of contaminated runoff to the storm drain system or receiving waters.
Treatment Control BMPs or Regional Program		All priority projects	Remove pollutants from stormwater runoff prior to discharge to the storm drain system or receiving waters

There are a number of resources listed in the Model WQMP for Source Control, Site Design, and Treatment Control BMPs that should be considered to guide the design and implementation of the BMPs. Fact sheets from one available reference - the 2003 California Stormwater Quality Association the California Stormwater Best Management Practice Handbook – New Development and Redevelopment are provided in the Local Implementation Plan (**DAMP Appendix A-7**). The fact sheets contain detailed descriptions of each BMP, applications, advantages/disadvantages, design criteria, design procedure, and inspection and maintenance requirements to ensure optimal performance of the BMPs. (Also see **Appendix E-1**)

Structural Source Control BMPs

Structural Source Control BMPs are low-technology practices designed to prevent pollutants from contacting stormwater runoff or to prevent discharge of contaminated runoff to the storm drainage system. Site-specific structural Source Control BMPs have been established for a number of common site features such as outdoor material storage areas, trash storage, outdoor loading/unloading docks, outdoor repair and maintenance areas, outdoor washing areas, outdoor fueling areas, and parking lots. Typical required design features include berms, covers, screens, signage, grading, sanitary sewer connections, and emergency storm drain seals. Fact sheets detailing these BMPs are presented in the Local Implementation Plan (**DAMP Section A-7).** The fact sheets include design criteria established to ensure effective implementation of the required Source Control BMPs.

Site Design BMPs

Site Design BMPs aim to incorporate site features such as vegetation to reduce and control post-development runoff rates. Because Site Design BMPs reduce direct runoff and increase infiltration onsite, they reduce the transport mechanism for moving pollutants off site, and help mitigate the differences between pre- and post-development hydrographs. This minimizes changes in flow regime and reduces the size of necessary structural treatment control BMPs to treat runoff prior to discharge from the site or at regional facilities. Therefore, site design is usually the most efficient and cost effective way to minimize adverse impacts.

Fact sheets are presented in the Local Implementation Plan (**DAMP Appendix A-7)**. The fact sheets include design criteria established to ensure effective implementation of the required Site Design BMPs.

Treatment Control BMPs

Treatment Control BMPs are engineered technologies designed to remove pollutants from stormwater runoff and are required to augment Source Control and Site Design BMPs for Priority Projects to eliminate or reduce pollution from stormwater discharges. The type of Treatment Control BMP(s) to be implemented at a site depends on a number of factors including: type of pollutants in the stormwater runoff, volume or flow of stormwater runoff to be treated, project site conditions, receiving water conditions, and General Industrial Permit requirements, when applicable. Land requirements, and costs to design, construct and maintain Treatment Control BMPs vary by Treatment Control BMP.

Fact sheets are presented in the Local Implementation Plan (**DAMP Appendix A-7**). The fact sheets include design criteria established to ensure effective implementation of the required Treatment Control BMPs.

Regional or Watershed BMPs

Regional or watershed BMPs that are designed to address runoff from new development and significant redevelopment projects may be used to meet the treatment BMP requirement. If this method is selected, the BMPs must be designed to provide equivalent treatment objectives for the new development and significant redevelopment projects for the entire area or the new development and significant redevelopment projects served by the regional or watershed BMPs. Detailed analysis (such as detailed planning and modeling) should be employed and cross-jurisdictional issues must be clearly defined and coordinated.

Detailed guidelines are in Exhibit 7-II. Basically, the following steps need to be followed:

- Develop an Environmental Impact Report (EIR).
- Submit to the RWQCB extensive hydrology and hydraulic information to prove that the BMPs could retain and treat adequate storm volumes.
- Submit to the RWQCB information/proof of a long-term maintenance mechanism for the BMPs (funding).
- Request the RWQCB to issue determination that the BMPs were consistent with the CWA, DAMP, and the MS4 Permit.

BMP Design Standards

An intensive search was conducted in order to find agencies that may have developed standard plans (details) for Treatment Control BMPs. The search concluded that many entities throughout the country that have developed graphic depictions of Treatment Control BMPs, but no standard plan-level details have been developed at this time.

The California Department of Transportation (Caltrans) has "as-built" drawings for their pilot treatment BMPs. The "as-built" drawings are available directly from Caltrans. Design guidelines and detailed schematics are available from several sources including EPA (various dates), the Urban Drainage and Flood Control District (Denver Colorado, September 1999), and the Caltrans Project Planning and Design Guide (May 2002). These references provide schematics for biofilters (grass swales), extended detention basins, sand filters, wetlands, and other treatment BMPs. No standard BMP plans have been adopted by any of the Permittees.

One reference for designing permanent BMPs is the 2003 California Stormwater Best Management Practice Handbook – New Development and Redevelopment. Many other resources available for consultation are listed in the Model WQMP (**Exhibit 7.II Attachment D**) and in **Appendix E-1**.

7.5.4 Plan Check: Issuance of Grading or Building Permits

Once a project reaches the plan check phase, the applicant must have an approved final Project WQMP, since the construction plans submitted by the applicant for plan check must incorporate all of the structural BMPs identified in the approved final Project WQMP. Therefore, the Permittees will encourage (but not necessarily require) applicants to obtain approval of the project's final Project WQMP prior to submitting construction plans for plan check.

Standard Notes for Plan Sheets

Prior to the issuance of a grading or building permit, Permittees shall require the permit applicant to include the following as general or special notes on the plan sheets for new development or significant redevelopment projects:

- Sediment from areas disturbed by construction shall be retained on site using structural controls as required by the statewide General Construction Stormwater Permit.

- Stockpiles of soil shall be properly contained to eliminate or reduce sediment transport from the site to streets, drainage facilities or adjacent properties via runoff, vehicle tracking, or wind as required by the statewide General Construction Stormwater Permit.
- Appropriate BMPs for construction-related materials, wastes, spills or residues shall be implemented to eliminate or reduce transport from the site to streets, drainage facilities, or adjoining properties by wind or runoff as required by the statewide General Construction Stormwater Permit.
- Runoff from equipment and vehicle washing shall be contained at construction sites and must not be discharged to receiving waters or the local storm drain system.
- All construction contractor and subcontractor personnel are to be made aware of the required best management practices and good housekeeping measures for the project site and any associated construction staging areas.
- At the end of each day of construction activity all construction debris and waste materials shall be collected and properly disposed in trash or recycle bins.
- Construction sites shall be maintained in such a condition that a storm does not carry wastes or pollutants off the site. Discharges other than stormwater (non-stormwater discharges) are prohibited, except as authorized by an individual NPDES permit or the statewide General Construction Stormwater Permit.

  Potential pollutants include but are not limited to: solid or liquid chemical spills; wastes from paints, stains, sealants, solvents, detergents, glues, lime, pesticides, herbicides, fertilizers, wood preservatives, and asbestos fibers, paint flakes or stucco fragments; fuels, oils, lubricants, and hydraulic, radiator or battery fluids; concrete and related cutting or curing residues; floatable wastes; wastes from engine/equipment steam cleaning or chemical degreasing; wastes from street cleaning; and super-chlorinated potable water from line flushing and testing.

  During construction, disposal of such materials should occur in a specified and controlled temporary area on-site physically separated from potential stormwater runoff, with ultimate disposal in accordance with local, state and federal requirements.
- Discharging contaminated groundwater produced by dewatering groundwater that has infiltrated into the construction site is prohibited. Discharging of contaminated soils via surface erosion is also prohibited. Discharging non-contaminated groundwater produced by dewatering activities requires a National Pollutant Discharge Elimination System (NPDES) permit from the respective State Regional Water Quality Control Board.

Plan Check for Projects with Land Use Permits

For projects with land use permits, the environmental (CEQA) documentation (including the Mitigation Monitoring and Reporting Program), the conditions of approval, and the approved final Project WQMP shall be reviewed for an understanding of the water quality issues and structural BMPs required. Construction plans shall be reviewed for conformity with the project's approved final Project WQMP. If the selected BMPs were approved in concept during

the land use entitlement process, the applicant shall submit detailed construction plans showing locations and design details of all BMPs that are in substantial conformance with the preliminary approvals. The construction plans shall be reviewed to assure that the plans are consistent with the BMP design criteria and guidance provided in Exhibit 7.II.

Plan Check for Projects with By-Right Zoning (Ministerial Projects)

For projects with by-right zoning or projects that do not need discretionary review, applicants will typically submit a grading or building permit application consisting of a proposed Project WQMP and construction plans that incorporate the BMPs included in the proposed Project WQMP. The Permittee shall first review the proposed Project WQMP for conformity with the requirements described in **Exhibit 7.II**. The approved Project WQMP shall then be used in reviewing the construction plans for consistency with the BMP design criteria and guidance provided in **Exhibit 7.II**.

Design Review for Public Agency Projects

Prior to initiating grading or construction activities, Permittees shall ensure that the construction plans for public works projects reflect the structural BMPs described in the approved final Project WQMP. The design review for public agency projects shall include a review of construction plans and specifications for conformity with the approved final Project WQMP and for consistency with the BMP design criteria and guidance provided in **Exhibit 7.II.**

Plan Check for Projects with Alternative Treatment Control BMPs (see Exhibit 7.II, Section 3.3.4)

An applicant may choose to incorporate into a Project WQMP and construction plans Treatment Control BMPs that are not included in the Treatment Control BMP Selection Matrix provided in the Model WQMP. If an applicant chooses to utilize Alternative Treatment Control BMPs, the Permittee shall require the project's engineer of record to certify the Alternative Treatment Control BMPs as being equally or more effective in pollutant reduction than comparable BMPs found in the Model WQMP.

7.5.5 Permit Closeout, Certificates of Use, and Certificates of Occupancy

The Project WQMP continues to apply to the property owner after completion of the construction phase. The Permittees may require the property owner to record the terms, conditions and requirements of the WQMP with the County Recorder's office, as authorized by the Water Quality Ordinance, in order to assure that successive owners are also bound to comply with the WQMP, and/or implement other mechanisms designed to ensure ongoing long-term maintenance of all structural post-construction BMPs. If the WQMP includes structural BMPs, the Permittee shall require the property owner or, in the case of a subdivided property the homeowners association (HOA) or property owners association (POA), to provide access for inspection through an agreement or other mechanism. The property owner, the HOA or the POA shall be required to maintain the BMPs in operating condition.

The end of the construction phase therefore represents a transition from the New Development/Significant Redevelopment Program to the Existing Development Program (**DAMP Section 9**). Accompanying this is a close out of permits and issuance of certificates of

use and occupancy. The Permittees will use this juncture to assure satisfactory completion of all requirements in the Project WQMP by requiring the applicant to:

- Demonstrate that all structural BMPs described in the Project WQMP have been constructed and installed in conformance with approved plans and specifications,
- Prepare and submit for review and approval by the Permittee an O&M Plan for all structural BMPs.
- Demonstrate that a mechanism or agreement acceptable to the Permittee has been executed for the long-term funding and performance of BMP operation, maintenance, repair, and/or replacement,
- Demonstrate that the applicant is prepared to implement all non-structural BMPs described in the Project WQMP,
- Demonstrate that an adequate number of copies of the Project WQMP are available onsite, and
- For industrial facilities subject to California's General Permit for Stormwater Discharges Associated with Industrial Activity as defined by Standard Industrial Classification (SIC) code, demonstrate that coverage has been obtained by providing a copy of the Notice of Intent (NOI) submitted to the State Water Resources Control Board and a copy of the notification of the issuance of a Waste Discharge Identification (WDID) Number.

Long-term O& M

An approved final Project WQMP defines the permanent (post-construction) BMPs that will be implemented to provide long-term runoff management once the project is operational or occupied, and also describes the mechanism by which long-term operation and maintenance will be provided. A structural BMP is not considered effective unless a mechanism is in place to provide for long-term reliability, which is achieved through proper operation and maintenance. Therefore, once construction of a new development or significant redevelopment project is complete, assurance is required for the long-term operation and maintenance of structural BMPs, and most particularly for Treatment Control BMPs.

An O&M Plan for structural BMPs will be prepared by the applicant for private sector projects or by a Permittee's design/engineering department or the design architect/engineer contractor for public agency projects.

The O&M Plan that is prepared by the applicant for private sector projects shall include:

- Description of structural BMPs
- Description of employee responsibilities and training for BMP operation and maintenance
- Operating schedule
- Inspection/maintenance frequency and schedule
- Specific maintenance activities

- Required permits from resource agencies, if any
- Forms to be used in documenting maintenance activities
- Recordkeeping requirements (at least 5 years)

At a minimum, an annual inspection frequency will be established for all structural BMPs including inspection and performance of any required maintenance in the late summer/early fall, prior to the start of the rainy season.

The ownership, operation, and maintenance of structural BMPs may be the responsibility of a private entity or a public agency (for example, a Permittee) under various arrangements and with various funding sources. The responsibility to provide for the long-term operation and maintenance of structural BMPs associated with private development projects may:

- Remain with a private entity (property owner, home owners association, etc.); or
- Be transferred to a public entity (e.g., a city, county, special district, etc.) through dedication of the property; or
- Be transferred to a public entity, or another private party through a contract.

Following satisfactory inspection, the Permittee will accept structural BMPs within public right-of-ways, or on land dedicated to public ownership. Upon acceptance, responsibility for operation and maintenance will transfer from the developer or contractor to the appropriate Permittee department, including the funding mechanism identified in the approved final Project WQMP.

If a property owner or a private entity, such as a homeowners association (HOA), retains or assumes responsibility for operation and maintenance of structural BMPs, the Permittee shall require access for inspection through an agreement. The HOA shall be required to maintain the BMPs in operating condition. If they do not meet the requirements of this DAMP (as stated in the model ordinance, Exhibit 4.I), the Permittee may make necessary repairs and collect the costs from the owner.

If the Permittee will be responsible for operating and maintaining structural BMPs on private property, an easement will be established to allow for entry and proper management of the BMPs. Such access easements shall be binding throughout the life of the project, or until the BMPs requiring access are acceptably replaced with a BMP not requiring access. Funding for the long-term operation and maintenance of structural BMPs will be front-funded or otherwise guaranteed via mechanisms such as approved assessment districts, or other funding mechanisms.

7.5.6 Public Agency Project Close Out

For public agency projects, upon completion of construction when contract close-out occurs the responsibility for operation and maintenance of the structural BMPs will transfer from the contractor to the appropriate Permittee department and become part of the Municipal Activities Program (DAMP Section 5). The Permittee has the authority to approve the transfer of structural BMPs to any other public entity within its jurisdiction and shall negotiate satisfactory

operation and maintenance standards with the public agencies accepting the operation and maintenance responsibilities. Alternatively, the responsibility for the operation and maintenance of structural BMPs may be transferred to a private entity through contracts or lease agreements. In any such transfer agreement, the Permittee shall be identified as a third-party beneficiary empowered to enforce maintenance agreements.

7.6 Post Construction BMP Inspection and Verification

Verification of the implementation and O&M of structural and non-structural BMPs will be performed by the Permittee. Assessment of BMP effectiveness will take place during verification.

The city/county will perform verification at 90% of developments with approved final Project WQMPs. The number of verifications necessary to achieve the above goal will be based on either the total area of approved final Project WQMP projects, or the total number of Project WQMPs approved. The implementation of BMPs, and ongoing maintenance of BMPs by the mechanisms described in the Project WQMP, will be verified.

- By inspection, self-certifications, surveys, or other equally effective approaches. An assessment report will be produced each year describing BMP implementation and ongoing O&M effectiveness, for submittal with the Permittee's annual progress report.

Verification of BMP implementation of Public Agency Projects will be incorporated into each Permittees Municipal Activities Program.

7.7 Model Program Training and Outreach

Education and training of municipal and/or other agency staff is one of the keys to a successful stormwater program. To assist the responsible municipal and private development staff in understanding the Model Program, two training modules are currently being developed and will be held by the Principal Permittee (**DAMP Appendix B-7**).

In addition to the Permittee sponsored training, the Permittees are also encouraged to attend training seminars or workshops related to stormwater management and water quality conducted by other organizations.

7.7.1 Training Modules

Two training modules have been prepared that cover different aspects of the Model Program. These modules are provided in **DAMP Appendix B-7**.

New Development/Significant Redevelopment Program Management (DAMP Appendix B, Exhibit B-7.I)

This training module is generally targeted for Permittee Stormwater Program managers and the managers of a Permittee's planning and building departments. It provides an overview of the Stormwater Program as it pertains to a Permittee's General Plan, the preparation and review of environmental documents (Initial Studies, EIRs, EISs, Negative Declarations, Mitigated Negative Declarations, etc.), conditions of approval for projects, the review of Project WQMPs,

plan check, and permit closeout. The training module also briefly describes a Permittee's responsibility for verifying and inspecting permanent BMPs and for assessing the effectiveness of the New Development/Significant Redevelopment Program element.

Project Planning and Design: Environmental Review, Planning and Permitting, and WQMP Development (DAMP Appendix B, Exhibit B.7.II)

This training module is generally targeted for planners, plan checkers, developers and engineers, and will address: the laws and regulations applicable to new development and significant redevelopment; the connection between new development and significant redevelopment and water quality; how to review and prepare CEQA compliance documents with regard to urban runoff and stormwater pollution effects, how to develop and review a Project WQMP; and how to design and incorporate into a project Source Control, Site Design and Treatment Control BMPs to minimize impact to receiving waters.

7.8 Definitions

For the purposes of the program, the following definitions are provided:

New Development - means land disturbing activities; structural development, including construction or installation of a building or structure, the creation of impervious surfaces; and land subdivision.

Significant Redevelopment - means development that would add 5,000 or more square feet of impervious surface on an already developed site. Significant redevelopment includes, but is not limited to:

- Expansion of a building footprint;
- Addition of a building and/or structure;
- Addition of an impervious surface that is not part of a routine maintenance activity such as construction of a new parking lot; and
- Replacement of impervious surfaces, buildings and/or structures when 5,000 or more square feet of soil is exposed during replacement construction. Replacement does not include routine maintenance activities, trenching and resurfacing associated with utility work, resurfacing and reconfiguring the surface of parking lots (unless 5,000 or more square feet of impervious surface is added to the existing parking lot area) or reconfiguration of pedestrian ramps and replacement of damaged pavement.
- Where the significant redevelopment results in an increase of less than 50% of the impervious surface of a previously existing development, the treatment requirements apply only to the addition, and not to the entire development. In this circumstance, Permittees are encouraged to explore with project proponents ways by which treatment BMPs can be provided for the entire site (or a greater percentage of the site), consistent with the overall pollution reduction goals of the permits and DAMP.

- Where the significant redevelopment results in an increase of 50% or more of the impervious surface of a previously existing development, the treatment requirements apply to the entire development.

Routine structural BMPs - are economical, practicable, small scale-measures, which can be feasibly applied at the smallest unit of development, using standard plans developed by the New Development/ Construction Task Force. Routine structural BMPs may function either to minimize the introduction of pollutants into the drainage system or to remove pollutants from the drainage system and are intended to address drainage water quality impacts inherent in development, and need not be related to any identified water quality problem (i.e. filtration, efficient irrigation, landscape design, car wash racks, trash container areas, motor fuel concrete dispensing areas and canopies, catch basin stenciling, water quality inlets).

Special structural BMPs - are engineered facilities designed to address specific pollutant problems identified in the water quality planning process, runoff management plan, CEQA process, or similar watershed planning. However, it was not the intent of this program to restrict city or county planning commissions or their governing bodies from imposing additional stormwater management requirements as a condition of development (i.e. water quality ponds, dry/wet basins).

Pollution Prevention - any practice that reduces or eliminates the creation of pollutants.

Source Controls - practices that prevent pollution by reducing pollutants at their source.

Treatment Controls - practices that remove pollutants from the water.

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8.0 CONSTRUCTION

8.1 Program Summary

8.1.1 Overview

Concern over construction sites as a major source of sediment and other pollutants is addressed in the federal stormwater regulations. Sediment controls for construction activity directly impacting a watercourse should address sediment transport issues in the watercourse so that the natural quantity of sediment is not significantly changed. Contaminated sediment must be prevented from reaching the watercourse. In addition to sediment, activities and materials used on construction sites may be a source of pollutants such as paints, lacquers, and primers; herbicides and pesticides; landscaping and soil stabilization residues; soaps and detergents; wood preservatives; equipment fuels, lubricants, coolants, and hydraulic fluids; and cleaning solvents. These pollutants can leak from heavy equipment, be spilled, or can be eroded by rain from exposed stockpiles. Once released, they may adsorb onto sediment particles and can be transported into the aquatic environment, where they may become available to enter aquatic food chains, cause fish toxicity problems, contribute to algal blooms, impair recreational uses, and degrade drinking water sources.

Under their Local Implementation Programs, Permittees will continue to require private development and public agency construction projects to implement BMPs that can significantly contribute to the control of pollution from construction sites. This section of the DAMP provides a Model Programs that Permittees can use to formulate their local programs.

The objectives of the Model Construction Program are to provide the following:

- A program framework for implementation of policies and practices that minimize the impacts of construction activities on the region's receiving waters and other environmentally sensitive areas;
- An iterative process to inventory, prioritize, and inspect construction sites and provide direction to construction contractors to correct problems as they are discovered during construction, and enforce applicable laws and regulations; and
- Methodologies to meet NPDES permit requirements and other applicable environmental laws and regulations.

This Construction Model Program presents requirements and guidelines for pollution prevention methods that shall be used by construction site owners, developers, contractors, and other responsible parties, in order to reduce pollutants discharged to the MS4 in stormwater runoff from construction sites. The Model Construction Program is intended to be implemented as described in Section A-8 of each Permittee's Local Implementation Plan (LIP). In developing its LIP, the Permittee may modify the Model Construction Program in response to local conditions. It is not the intent for this Model Construction Program to restrict city or county planning commissions, building officials or their governing bodies from imposing additional stormwater management requirements as a condition on construction projects.

8.1.2 Program Commitments and Responsibilities

The Model Construction Program provides the framework and a process for the following key construction program requirements:

- Inventory of construction sites;
- Prioritization of construction sites based upon water quality threat;
- Preparation of Storm Water Pollution Prevention Plans (SWPPP) and other documentation;
- Implementation of temporary BMPs for construction sites;
- Inspections of construction sites and enforcement;
- Development of data for the Annual Progress Report, based on the inventory, prioritization, and inspections and enforcement of construction sites; and
- Training for municipal staff.

The relationship between the requirements and responsibilities for the different parties involved in the program are briefly summarized in **Table 8-1**, below.

Table 8-1 Construction Program Summary of Requirements & Responsibilities

		Municipal Permittee	Private Owner/Developer	Regional Water Quality Control Board
PRIVATE PROJECTS	**General Permit Projects** (≥ 1 Acre)	▪ Issue grading or building permit ▪ Require proof of General Permit coverage ▪ Inspect and enforce local permit(s) and ordinances ▪ Notify Regional Board of non-compliance of local ordinances when the violation(s) pose(s) a threat to human or environmental health.	▪ Apply for local grading or building permit ▪ Submit Notice of Intent (NOI) for General Permit Coverage ▪ Comply with grading or building permit and local ordinances ▪ Prepare and implement SWPPP ▪ Submit Notice of Termination (NOT)	▪ Inspect and enforce General Permit on Owner/Developer ▪ Evaluate Permittee's Construction Program for compliance with municipal permit
	Other Projects	▪ Issue grading or building permit ▪ Inspect and enforce local permit(s) and ordinances	▪ Apply for local grading or building permit ▪ Comply with grading or building permit and local ordinances	▪ Evaluate Permittee's Construction Program for compliance with municipal permit

Table 8-1 Construction Program Summary of Requirements & Responsibilities

		Municipal Permittee	Private Owner/Developer	Regional Water Quality Control Board
MUNICIPAL PROJECTS Santa Ana Permit Area	**General Permit Projects** (≥ 1 Acre)	▪ Submit Notification of Construction to RWQCB ▪ Prepare and implement SWPPP consistent with General Permit ▪ Inspect and enforce contract documents ▪ Notify Regional Board of non-compliance with General Permit ▪ Submit notice of completion	N/A	▪ Inspect and enforce General Permit on Permittee's projects ▪ Evaluate Permittee's Construction Program for compliance with municipal permit
	Other Projects	▪ Inspect and enforce local permit(s) and ordinances	N/A	N/A
MUNICIPAL PROJECTS San Diego Permit Area	**General Permit Projects** (≥ 1 Acre)	▪ Submit Notice of Intent (NOI) for General Permit Coverage to the State ▪ Prepare and implement SWPPP ▪ Inspect and enforce contract documents ▪ Notify Regional Board of non-compliance with General Permit ▪ Submit Notice of Termination (NOT)	N/A	▪ Inspect and enforce General Permit on Permittee's projects ▪ Evaluate Permittee's Construction Program for compliance with municipal permit
	Other Projects	▪ Inspect and enforce local permit(s) and ordinances	N/A	N/A

8.1.3 Regulatory Requirements

The federal stormwater regulations specify that drainage area management plans include a description of a program to implement and maintain structural and nonstructural BMPs to reduce pollutants in stormwater runoff from construction sites to the Municipal Storm Drain System (MS4).

The Construction Program was developed as a model for fulfilling the construction activity requirements of:

- Section VIII and XV of the Santa Ana Regional Water Quality Control Board (RWQCB) Municipal NPDES Stormwater permit, Order No. R8-2002-0010 (to be updated);
- Section F.2 of the San Diego RWQCB Municipal NPDES Stormwater permit, Order No. R9-2002-0001 (to be updated); and

All public works construction contracts administered by the Permittees are governed by *Standard Specifications for Public Works Construction* (Green Book). The Green Book, Section 7 - "Responsibilities of the Contractor" imposes specific construction practices which are included within **Appendix H** as Best Management Practices (BMPs) for public works construction. In general, the Green Book requires the Contractor has to keep informed of, and at all times observe and comply with state and federal laws and county and municipal ordinances and regulations.

Certain public works construction contracts administered by the Permittees may include special provisions as required by the Permittees and approved municipal sediment control standard plans. Applicable special provisions and standard plans are hereby included as BMPs for public works construction.

8.2 Model Construction Program Details

8.2.1 Model Program Overview

This model program provides guidance to Permittees in developing the Construction Activities element of their local stormwater programs for Permittees in the Santa Ana RWQCB region, and Jurisdictional Urban Runoff Management Programs (JURMPs) for Permittees in the San Diego RWQCB region, as required by the permits. **Figure 8-1** represents the flow of the model construction program with a brief description of each section. Information gathered for each section of the model program supports subsequent sections.

Model Local Implementation Plan

The Model LIP in **Appendix A-8** provides example language and structure, as well as forms and other tools, to assist Permittees in developing individual programs.

Figure 8-1
Model Construction Program Structure

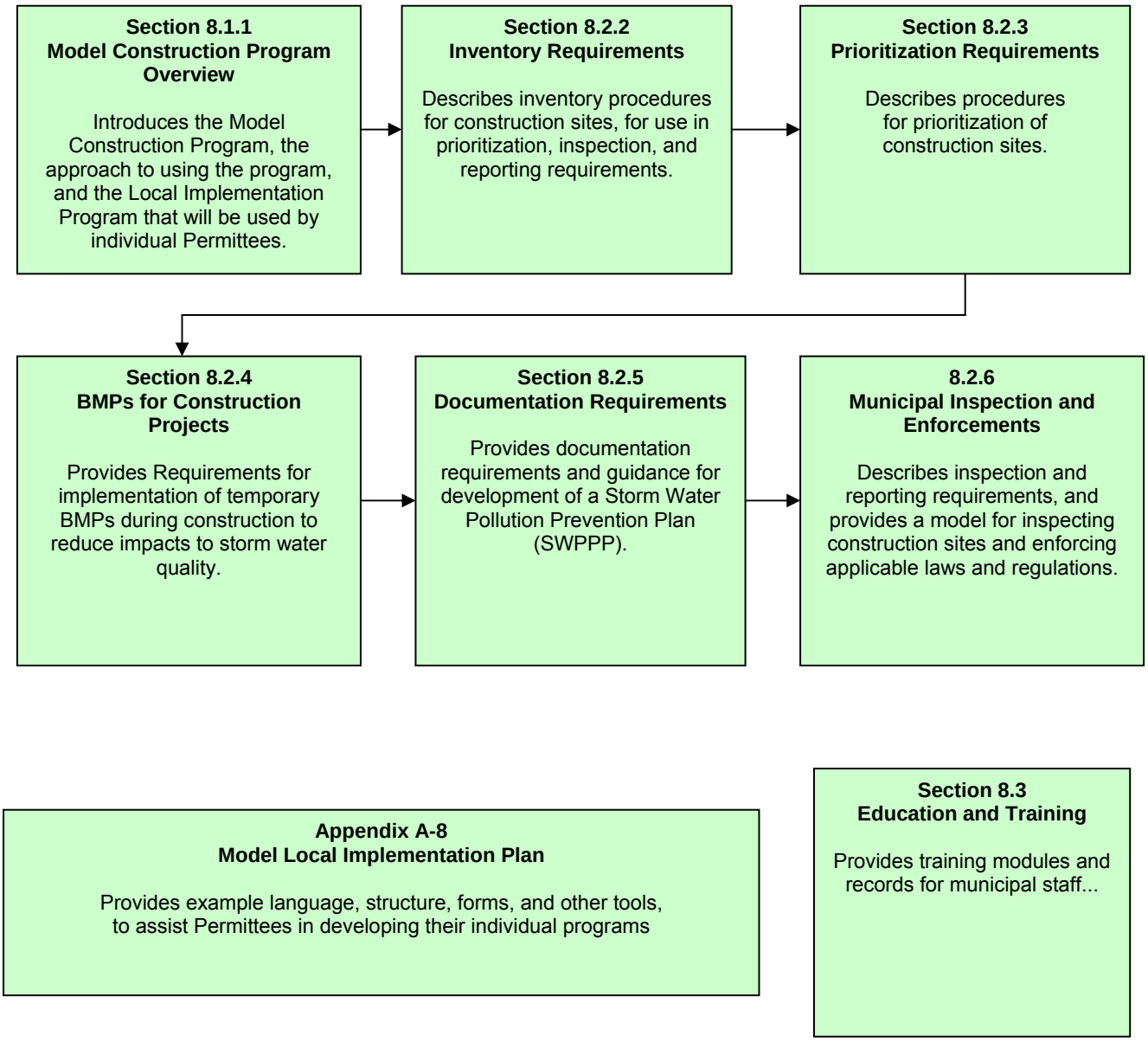

8.2.2 Inventory of Construction Sites

A watershed-based inventory of all construction sites, regardless of site size or ownership, will be developed and updated annually prior to the start of the wet season (October 1). These include all sites meeting the definition of a construction project provided in **Section 8.4**, covered by the General Permit, by a local Grading Permit or a local Building Permit, and public works construction with similar characteristics. This section describes the procedures that will be used to generate and maintain a comprehensive inventory.

This inventory will serve as the basis for prioritization, inspection, enforcement, and reporting elements of the program. Prioritization for construction sites is described in Section 8.2.3. The flow chart presented in **Figure 8-2** illustrates the process involved in compiling necessary inventory information for construction sites. The Construction Site Inventory Spreadsheet is provided in **Appendix A-8**.

Figure 8-2
Inventory Process for Construction Sites

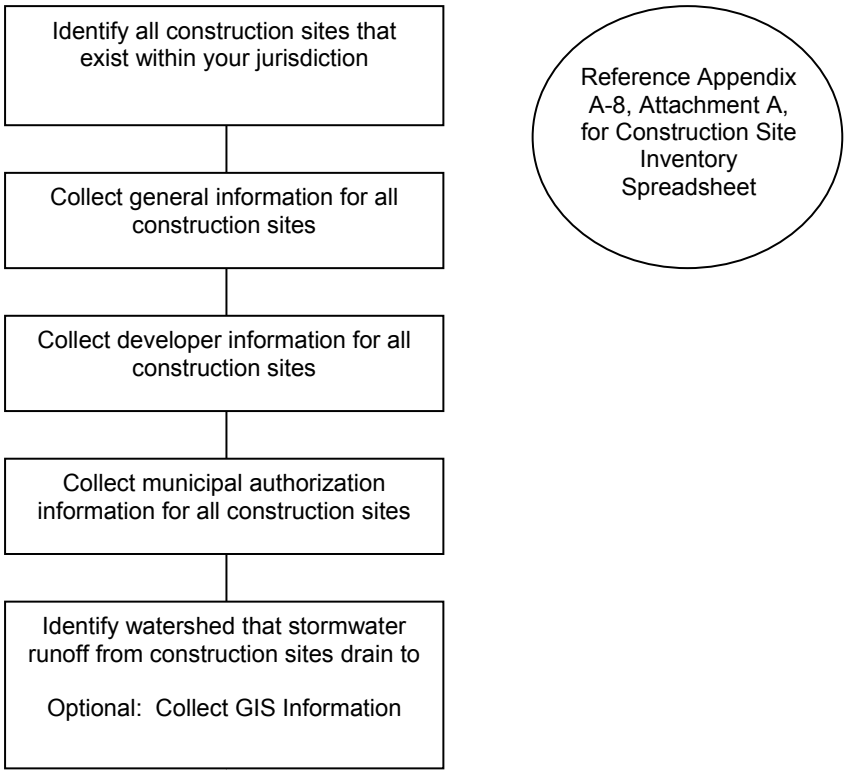

8.2.2.1 Identification of Construction Sites and General Information

The first step in the inventory process will be to identify all construction sites (as defined in **Section 8.4**) that are within the jurisdiction of the city (county), regardless of site size or ownership. Next, baseline information about each construction site will be collected and entered into the inventory spreadsheet provided in **Appendix A-8**. General relevant construction site information includes:

- Project name;
- Project location – Full address (if known), city, zip code;
- Tract number(s) and lot number(s);
- Parcel map number(s) and parcel number(s);
- Total site area and actual developed (disturbed soil) project size (acres);
- General Permit WDID Number (if subject to the General Permit);
- Description of project (i.e., commercial, residential, industrial, etc.);
- Type of project (new or retrofit construction);
- Source activities (grading and soil movement, uncovered storage of construction materials, etc.);
- Construction start and end dates (if known);
- Developer information (name, address, phone, fax, on-site contact(s) ;
- Responsible party or emergency contact(s);
- Municipal Grading and/or Building Permit number(s); and
- Comments

Resources used to assemble the information for the inventory spreadsheet include:

- California General Permit for construction activities lists;
- Other individual NPDES Permit lists;
- Building Permits issued;
- Grading Permits issued;
- Clearing Permits issued;
- Other construction-related permits issued;
- Municipal capital improvement projects with similar characteristics; and
- Encroachment Permits issued with similar characteristics.

8.2.2.2 Watershed Information

For each construction site identified above, the watershed(s) in which the construction site is located can be determined and included in the inventory. Orange County contains 13 watersheds, which are summarized in **Table 8-2** and illustrated in **Figure 8-3**. Ocean sections along the shore of a watershed are still considered a part of that watershed.

Table 8-2 Orange County Watersheds

Region	Watershed
Santa Ana RWQCB (Region 8)	San Gabriel/Coyote Creek
	Anaheim Bay/Huntington Harbour
	Santa Ana River
	Newport Bay
	Newport Coastal Streams
San Diego RWQCB (Region 9)	Laguna Coastal Streams
	Aliso Creek
	Dana Point
	San Juan Creek
	San Clemente Coastal Streams
	San Mateo Creek

Figure 8-3 Watershed Boundary Map for Orange County

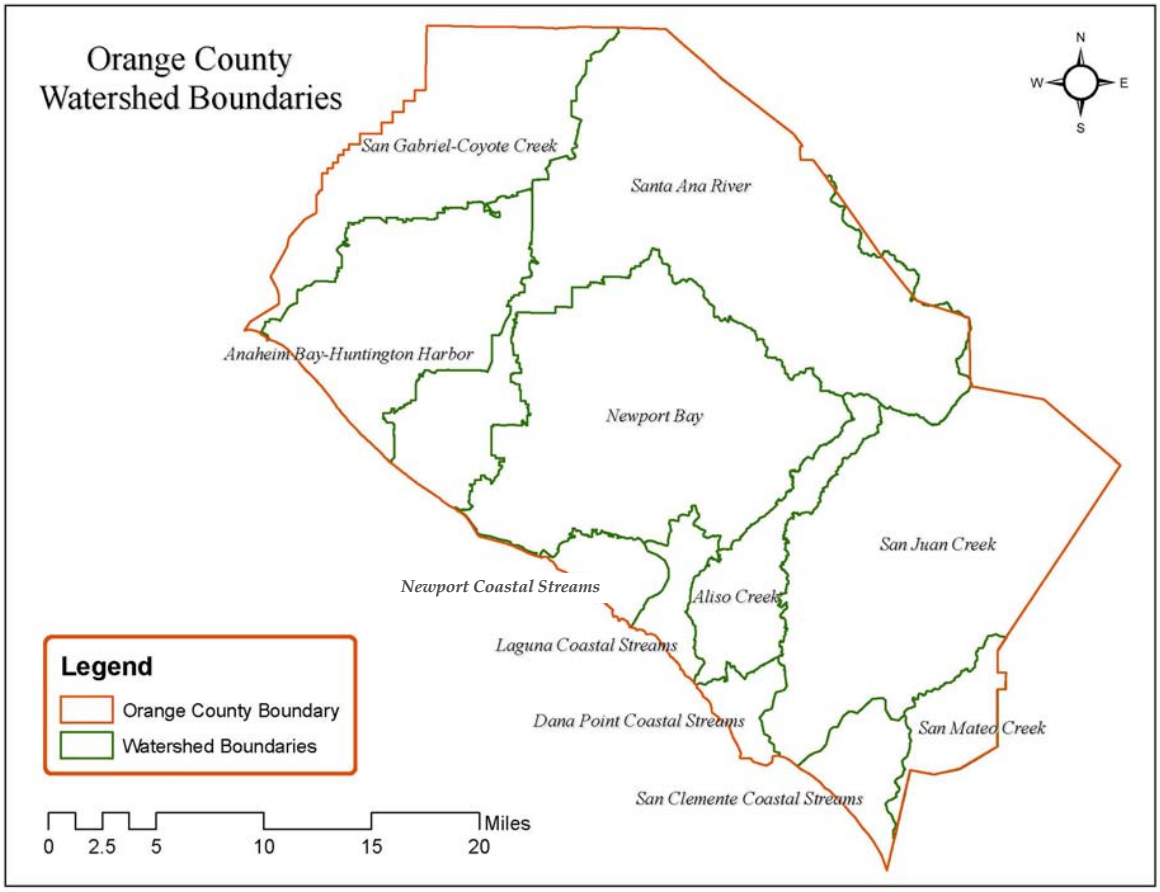

8.2.2.3 Inventory Update

At a minimum, the inventory will be updated prior to the start of the wet season (October 1) by adding new projects. During the update process, projects for which the building or grading permit(s) have expired or have been closed, and projects that have been completed, will be removed from the inventory.

8.2.3 Prioritization of Construction Sites

This section outlines the procedures for prioritizing construction. This will be used for BMP selection and for inspection frequency based on the threat to water quality. Priorities may be high, medium, or low. A current list of prioritized sites is in **Appendix A-8**. The construction site priority can be determined by using **Table 8-3**, below.

Table 8-3 Prioritization of Construction Sites

High Priority	Medium Priority	Low Priority
The construction site is 50 acres or more [and, for projects in the San Diego RWQCB jurisdiction, grading will occur during the wet season (October 1 – April 30)]; **OR**	Projects with between 1 and 50 disturbed acres and a prioritization rating less than 16 points (Section 8.2.3.6)	Projects that disturb less than one acre, and are not tributary to and/or within 500 feet of an ASBS within the Santa Ana RWQCB jurisdiction (minimal threat to water quality.)
The construction site is 5 acres or more and tributary to a Clean Water Act Section 303(d) water body impaired for sediment or turbidity; or water bodies for which a TMDL for sediment or turbidity has been established; **OR**		
The construction site is within the Santa Ana RWQCB jurisdiction, tributary to and within 500 feet of an area defined by the Ocean Plan as an Area of Special Biological Significance (ASBS); **OR**		
The construction site is 5 acres or more, within the San Diego RWQCB jurisdiction, and tributary to, directly adjacent to (within 200 feet), or discharging directly to, a receiving water within an Environmentally Sensitive Area (ESA); **OR**		
Construction sites with between 1 and 50 disturbed acres and a prioritization rating equal or greater to 16 points		

8.2.3.1 303(d) Water Bodies Listed for Sediment or Turbidity:

Any construction site five acres or greater and tributary to a Clean Water Act section 303(d) impaired water body listed for sediment or turbidity, or for which a TMDL for sediment or turbidity has been established, must be ranked as high priority. A summary of the 303(d) listed water bodies and associated pollutants of concern used as the basis for this program is provided in **Table 8-4**. The 303(d) (will update if 2006 list is finalized) listing is periodically updated by the State. Consequent adjustments to construction site priority will be updated in the unified Annual Report as needed for those sites still active as of June 30.

Table 8-4 Summary of the 2002 303(d) Listed Water Bodies and Associated Pollutants of Concern for Orange County

Region	Water Body	Watershed	Pollutant							
			Bacteria Indicators/ Pathogens	Metals	Nutrients	Pesticides	Toxicity	Trash	Salinity/TDS/ Chlorides	Turbidity
Region 8 Santa Ana	Anaheim Bay	C		X		X				
	Bolsa Chica			X						
	Buck Gully Creek	H	X							
	Huntington Beach State Park	C	X							
	Huntington Harbour	D	X	X		X				
	Los Trancos Creek (Crystal Cove Creek)	H	X							
	Newport Bay, Lower	G		X		X				
	Newport Bay, Upper (Ecological Reserve)	G		X		X				
	Santiago Creek Reach 4	E							X	
	San Diego Creek, Reach 1	F	X			X				
	San Diego Creek, Reach 2	F		X			X			
	Seal Beach	A	X							
	Silverado Creek	E	X						X	
Region 9 San Diego	Aliso Creek (Mouth)	J	X							
	Aliso Creek (20 Miles)	J	X		X		X			
	Dana Point Harbor	K	X							
	Pacific Ocean Shoreline, Aliso Beach HSA	J	X							
	Pacific Ocean Shoreline, Dana Point HSA	K	X							
	Pacific Ocean Shoreline, Laguna Beach and San Joaquin Hills HSAs	I	X							
	Pacific Ocean Shoreline, Lower San Juan HAS	L	X							
	Pacific Ocean Shoreline, San Clemente HAS	M	X							
	Prima Deshecha Creek	M			X					X
	San Juan Creek (Lower one Mile)	L	X							
	San Juan Creek (Mouth)	L	X							
	Segunda Deshecha Creek	M			X					X

8.2.3.2 Determine Site Watershed

After an inventory of construction sites is performed per Section 8.2.2, the watershed in which each construction site is located will have been determined.

A construction site is "tributary to" the 303(d) listed water body if it discharges runoff to ANY ONE of the following:

- Directly into the impaired water body as identified in the Basin Plan; OR
- Into concrete storm sewers that discharge directly into the impaired water body; OR
- Into streams that have water year-round due to groundwater, snow melt or other natural source, which reach the impaired water body even during the dry season.

Currently, San Diego Creek Reaches 1 and 2 in the San Diego Creek watershed and Upper Newport Bay in the Newport Bay watershed are the only water bodies listed for sediment. A construction site five acres or larger and tributary to watersheds for which a Total Maximum Daily Load (TMDL) for sediment or turbidity has been established shall be considered a high priority project.

8.2.3.3 Areas of Special Biological Significance (ASBS):

The Water Quality Control Plan for Ocean Waters of California (California Ocean Plan) designates 35 ASBS, 2 of which lie within the Irvine and Newport Coast areas.

- Newport Beach Marine Life Refuge (HU801.110)
- Irvine Coast Marine Life Refuge (HU801.110)

Any construction site within the Santa Ana RWQCB jurisdiction, which is tributary to and within 500 feet of an ASBS, must be ranked as high priority. A third ASBS in Orange County, Heisler Park Ecological Reserve (HU801.110), lies within the San Diego RWQCB. The San Diego Permit includes ASBS within the definition of ESA.

8.2.3.4 Environmentally Sensitive Areas (Applies to San Diego Region Permittees Only):

Any construction site five acres or greater located within the San Diego RWQCB jurisdiction, which is tributary to, directly adjacent to (within 200 feet of ESA), or discharging directly into a receiving water within an ESA must be ranked as high priority.

An ESA exists within the San Diego Region if any of the following designations have been applied to the water body of concern:

- All Clean Water Act 303(d) listed impaired water bodies;
- Areas designated as ASBS by the State Water Resources Control Board (Water Quality Control Plan for the San Diego Basin (1994) and amendments);
- Water bodies designated with the RARE beneficial use by the State Water Resources Control Board (Water Quality Control Plan for the San Diego Basin (1994) and amendments);

- Water bodies located within areas designated as preserves or equivalent under the Natural Community Conservation Planning Program;
- Areas designated within **Appendix K** as Critical Aquatic Resources (CARS); and
- Any other equivalent ESAs that contain water bodies, which have been identified by the Permittee to be of local concern.

The map provided in **Appendix A-8** may be used to assist in the identification and classification of construction sites in order to determine if they potentially impact an ESA. The 303(d) listing is periodically updated by the State. For 303(d) updates finalized prior to June 30, consequent adjustments to ESA mapping and prioritizations will be updated in the subsequent Annual Report.

8.2.3.5 Low Priority Construction Sites

Low priority construction sites are those that pose a minimal threat to water quality, and a minimal risk of discharge to receiving waters. These are defined as sites that are less than 1 acre and are not tributary to and/or within 500 feet of an ASBS within the Santa Ana RWQCB jurisdiction.

8.2.3.6 Ranking Other Construction Sites

Generally, projects between 1 and 50 disturbed acres are not categorically high or low priority. Construction sites that do not meet the mandatory criteria that automatically designates them as either high or low priority (Section 8.2.3) must be evaluated according to the ranking criteria described below to determine if they will be a medium or high priority site. Prioritization is performed by applying steps A through D. A point value (1, 2, 3, 4, or 5) will be assigned from each step, which will be totaled for a ranking score (**Table 8-5**).

Table 8-5 Ranking Criteria	
Criteria	**Points**
Size Construction sites less than 50 acres are ranked based upon the size of the area being developed. (1–5 points) 1pt = 1 – 10 acres 2 pt = 11 – 25 acres 3 pt = 26 – 40 acres 4 pt = 41 – 49 acres 5 pt = > 50 acres	
Proximity to ASBS/ESA Construction sites are ranked based upon distance from an ASBS or an ESA. (1–5 points) Santa Ana RWQCB 1 pt = > 5,000 feet 2 pt = 2,001 – 5,000 feet 3 pt = 1,001 – 2,000 feet 4 pt = 501 – 1,000 feet 5 pt = <500 feet San Diego RWQCB 1 pt = > 5,000 feet 2 pt = 1,001 – 5,000 feet 3 pt = 501 – 1,000 feet 4 pt = 201 – 500 feet 5 pt = <200 feet	
Maximum Slopes Construction sites are ranked based upon the maximum finished slopes within the site. (1–5 points) 1 pt = Slopes 20: 1 or flatter 2 pt = Slopes greater than 20:1 but less than 5:1 3 pt = Slopes greater than 5:1 but less than 3:1 4 pt = Slopes greater than 3:1 but less than 2:1 5 pt = Slopes 2: 1 or steeper	
Non-Stormwater Discharges Construction sites are ranked based upon potential non-stormwater discharges (1–5 points). 0 = Zero or low potential of non-stormwater discharges 3 = Potential non-stormwater discharges from uncovered construction materials on site (if known) 5 = Potential non-stormwater discharges from dewatering activities or use of soil amendments.	
Total Points	
Priority High Priority 16 pts or greater, Medium Priority less than 16 pts	

8.2.4 Best Management Practices for Construction Projects

This section presents minimum requirements for all projects, temporary BMPs for construction projects, and site management requirements for the various priorities of construction projects. The requirements apply equally to private development and public works projects. Permanent post-construction BMPs are discussed in detail within Section 7, Model New Development/Significant Redevelopment Program.

All construction projects, regardless of size or priority, must implement BMPs to reduce the discharge of pollutants into the storm drain system or waterbodies. Construction projects will be prioritized as presented in Section 8.2.3 of this document. The basic BMP implementation requirements are shown below in **Table 8-6**. Documentation requirements are further discussed in Section 8.2.5.

Table 8-6 BMP Implementation Requirements for Construction Sites

PRIORITY	BMP REQUIREMENT
LOW	▪ Meet minimum requirements (**Table 8-7**)
MEDIUM	▪ Meet minimum requirements (**Table 8-7**) ▪ Implement Site Management Requirements ▪ Implement all appropriate Construction BMPs
HIGH	▪ Meet minimum requirements (**Table 8-7**) ▪ Implement Site Management Requirements ▪ Implement all appropriate Construction BMPs
	▪ Meet minimum requirements (**Table 8-7**) ▪ Implement all appropriate Construction BMPs

8.2.4.1 Minimum Requirements

The minimum requirements apply to all construction projects, regardless of priority. All private and public works construction projects are required, at a minimum, to implement and be protected by an effective combination of erosion and sediment controls and waste and materials management BMPs. These minimum requirements must be conveyed to construction contractors as part of the plan notes and are summarized in **Table 8-7**.

Table 8-7 Minimum Requirements for All Construction Sites

CATEGORY	MINIMUM REQUIREMENTS
Erosion and Sediment Control	Sediments from areas disturbed by construction shall be retained on site using an effective combination of erosion and sediment controls to the maximum extent practicable, and stockpiles of soil shall be properly contained to minimize sediment transport from the site to streets, drainage facilities or adjacent properties via runoff, vehicle tracking, or wind.
Waste and Materials Management Control	Appropriate BMPs for construction-related materials, wastes, spills or residues shall be implemented and retained on site to minimize transport from the site to streets, drainage facilities, or adjoining property by wind or runoff.

BMPs that may be used to meet the minimum requirements are described later in this section.

8.2.4.2 Site Management Requirements for Medium and High Priority Construction Sites

The following requirements are for deployment of selected construction BMPs and apply to all medium and high priority projects. BMPs that may be used to meet the site management requirements are described later in this section.

Dry Season Requirements (May 1 through September 30)

A. Wind erosion BMPs (dust control) shall be implemented.

B. Sediment control BMPs shall be installed and maintained at all operational storm drain inlets.

C. BMPs to control off-site sediment tracking shall be implemented and maintained.

D. Appropriate waste management and materials pollution control BMPs shall be implemented to prevent the contamination of stormwater by wastes and construction materials.

E. Appropriate non-stormwater BMPs shall be implemented to prevent the contamination of stormwater from construction activities.

F. There shall be a "weather triggered" action plan and the ability to deploy standby sediment control BMPs as needed to completely protect the exposed portions of the site within 48 hours of a predicted storm event (a predicted storm event is defined as a forecasted, 50% chance of rain).

G. Sufficient materials needed to install standby sediment control BMPs (at the site perimeter, site slopes and operational inlets within the site) necessary to prevent sediment discharges from exposed portions of the site shall be stored on site. Areas that have already been protected from erosion using physical stabilization or established

vegetation stabilization BMPs as described in item H below are not considered to be "exposed" for purposes of this requirement.

H. Deployment of permanent erosion control BMPs (physical or vegetation) should commence as soon as practical on slopes that are completed for any portion of the site. Standby BMP materials should not be relied upon to prevent erosion of slopes that have been completed.

Wet Season Requirements (October 1 through April 30)

In addition to the Dry Season Requirements:

A. Where appropriate sediment control BMPs shall be implemented at the site perimeter, at all operational storm drain inlets and at all non-active slopes, to provide sufficient protection for storms likely to occur during the rainy season.

B. Adequate physical or vegetation erosion control BMPs (temporary or permanent) shall be installed and established for all completed slopes prior to the start of the rainy season. These BMPs must be maintained throughout the rainy season. If a selected BMP fails, it must be repaired and improved, or replaced with an acceptable alternate as soon as it is safe to do so. The failure of a BMP may indicate that the BMP, as installed, was not adequate for the circumstances in which it was used. Repairs or replacements must result in a more robust BMP, or additional BMPs should be installed to provide adequate protection.

C. The amount of exposed soil allowed at one time shall not exceed that which can be adequately protected by deploying standby erosion control and sediment control BMPs prior to a predicted rainstorm.

D. A disturbed area that is not completed but that is not being actively graded (non-active area) shall be fully protected from erosion with temporary or permanent BMPs (erosion and sediment control). The ability to deploy standby BMP materials is not sufficient for these areas. Erosion and sediment control BMPs must actually be deployed. This includes all building pads, unfinished roads and slopes.

E. Sufficient materials needed to install standby erosion and sediment control BMPs necessary to completely protect the exposed portions of the site from erosion and to prevent sediment discharges shall be stored on site. Areas that have already been protected from erosion using permanent physical stabilization or established vegetation stabilization BMPs are not considered to be "exposed" for purposes of this requirement.

8.2.4.3 Construction BMPs

In order to meet the Model Construction Program requirements, construction contractors must select, install and maintain appropriate BMPs on all construction projects. BMPs must be installed in accordance with an industry recommended standard, or in accordance with the General Permit. BMPs are tools which are use to ensure sites meet the requirements outlined above. Selection of BMPs is a site-specific process and as such, no specific BMPs or number of BMPs are required. Fact sheets are provided to assist site managers in selection of BMPs for compliance with the requirements of the DAMP.

Table 8-8 shows the listing of all construction BMPs from the California Stormwater Best Management Practice Handbook, Construction, 2003 Edition, (errata Sept. 2004), which has BMP fact sheets for six major categories shown below and guidelines on how to select erosion and sediment controls.

Erosion Control

- Sediment Control
- Wind Erosion Control
- Tracking Control
- Non-Stormwater Management
- Waste Management & Materials Pollution Control

Table 8-8 Construction BMPs

CATEGORY	BMP #	BMP NAME
Erosion Control BMPs	EC-1	Scheduling
	EC-2	Preservation of Existing Vegetation
	EC-3	Hydraulic Mulch
	EC-4	Hydroseeding
	EC-5	Soil Binders
	EC-6	Straw Mulch
	EC-7	Geotextiles and Mats
	EC-8	Wood Mulching
	EC-9	Earth Dikes & Drainage Swales
	EC-10	Outlet Protection/ Velocity Dissipation Devices
	EC -11	Slope Drains
	EC-12	Streambank Stabilization
	EC-13	Polyacrylamide
Sediment Control BMPs	SE-1	Silt Fence
	SE-2	Sediment Basin
	SE-3	Sediment Trap
	SE-4	Check Dam
	SE-5	Fiber Rolls
	SE-6	Gravel Bag Berm
	SE-7	Street Sweeping and Vacuuming
	SE-8	Sandbag Barrier
	SE-9	Straw Bale Barrier
	SE-10	Storm Drain Inlet Protection
Wind Erosion Control BMPs	WE-1	Wind Erosion Control
Tracking Control BMPs	TR-1	Stabilized Construction Entrance/ Exit
	TR-2	Stabilized Construction Roadway
	TR-3	Entrance/Outlet Tire Wash

Table 8-8 Construction BMPs (continued)

CATEGORY	BMP #	BMP NAME
Non-Stormwater Management BMPs	NS-1	Water Conservation Practices
	NS-2	Dewatering Operations
	NS-3	Paving and Grinding Operations
	NS-4	Temporary Stream Crossing
	NS-5	Clear Water Diversion
	NS-6	Illicit Connection/Discharge
	NS-7	Potable Water/Irrigation
	NS-8	Vehicle and Equipment Cleaning
	NS-9	Vehicle and Equipment Fueling
	NS-10	Vehicle and Equipment Maintenance
	NS-11	Pile Driving Operations
	NS-12	Concrete Curing
	NS-13	Concrete Finishing
	NS-14	Material Over Water
	NS-15	Demolition Adjacent to Water
	NS-16	Temporary Batch Plants
Waste Management BMPs	WM-1	Material Delivery and Storage
	WM-2	Material Use
	WM-3	Stockpile Management
	WM-4	Spill Prevention and Control
	WM-5	Solid Waste Management
	WM-6	Hazardous Waste Management
	WM-7	Contaminated Soil Management
	WM-8	Concrete Waste Management
	WM-9	Sanitary/ Septic Waste Management
	WM-10	Liquid Waste Management

8.2.4.4 Other References

The following sources contain useful information on construction BMPs:

- State of California Department of Transportation (Caltrans), Storm Water Quality Handbooks, Construction Site Best Management Practices (BMPs) Manual, November 2000.
- Urban Runoff Quality Management, Water Environment Federation (WEF) Manual of Practice No.23/American Society of Civil Engineers (ASCE) Manual and Report on Engineering Practice No. 87, 1998.
- Erosion and Sediment Control Handbook. Goldman, S.J., K. Jackson, and T.A. Bursztynsky. McGraw-Hill, 1986.
- Urban Storm Drainage Criteria Manual, Volume 3 – Best Management Practices, Urban Drainage Flood Control District, Denver, Colorado, September 1999.
- Construction Stormwater Pollution Prevention. Vol. II. Storm Water Management Manual for Western Washington, August 2001. Washington State Department of Ecology.
- Highway Runoff Manual, M31-16. Washington State Department of Transportation, Environmental and Engineering Service Center, February 1995.

- Erosion and Sediment Control Planning and Design Manual. North Carolina Sedimentation Control Commission, NC Dept. of Natural Resources and Community Development, Raleigh, NC. Smolen, M.D., D.W. Miller, L.C. Wyatt, J. Lichthardt, A.L. Lanier, W.W. Woodhouse, and S.W. Broome, 1988.
- Processes, Procedures, and Methods to Control Pollution Resulting from all Construction Activity, University of Washington, Center for Urban Water Resources Management, by Loren Reinelt, October 1991.
- Virginia Erosion and Sediment Control Handbook, 2nd Edition, 1980.
- Maryland Erosion and Sedimentation Control Manual, 1983.
- Michigan State Guidebook for Erosion and Sediment Control, 1975.
- Designing for Effective Sediment and Erosion Control of Construction Sites, Jerald S. Fifield, Ph.D., CPECS.
- Field Manual on Sediment and Erosion Control Best Management Practices for Contractors and Inspectors, Jerald S. Fifield, Ph.D., CPECS.
- Storm Water Pollution Control, Municipal, Industrial and Construction NPDES Compliance, Second Edition. Roy D. Dodson, P.E., 1999.

8.2.5 Documentation Requirements

This section presents documentation requirements for all projects. The documentation requirements are summarized in **Table 8-9.** These requirements apply equally to private development and public works projects.

Table 8-9 Documentation Requirements for Construction Sites

PRIORITY	DOCUMENTATION REQUIREMENT
LOW	Minimum Requirements as Standard Conditions in Permit or Plan Notes
MEDIUM	Storm Water Pollution Prevention Plan (SWPPP)
HIGH	Storm Water Pollution Prevention Plan (SWPPP)
	Minimum Requirements as Standard Conditions or Plan Notes (< 1 acre)

8.2.5.1 Documentation Requirements for General Permit Sites

Construction sites that are subject to the General Permit are required to prepare and implement a SWPPP meeting the requirements of the General Permit.

Private Construction Projects Covered by the General Permit

For private projects, the project owner, developer or contractor will prepare the NOI and submit it to the State Water Resources Control Board (SWRCB). Before issuing a grading or building permit, the city or county will require proof of General Permit coverage. Before the developer or contractor begins construction, the SWPPP must be prepared and must be implemented year-round throughout the duration of the project's construction.

Once construction begins, the city or county will inspect and enforce local permit(s) and ordinances, and will notify the appropriate RWQCB of any non-compliance with local permits or ordinances when the non-compliant condition meets the criteria of posing a threat to human or environmental health as discussed in Section 8.2.6.7.

It is important to note that city or county staff is not responsible for reviewing, approving or enforcing the SWPPP; these are responsibilities of the RWQCB. Cities (or county) may elect to have inspector(s) use the SWPPP as an internal tool for on-site inspections. Once project construction is completed and the site fully complies with the final stabilization requirements of the General Permit, the owner/developer will submit an NOT to the SWRCB.

Public Works Construction Projects Covered by the General Permit

For public works projects within the jurisdiction of the San Diego RWQCB, the city or county will prepare the NOI and submit it to the SWRCB. The SWPPP will then be prepared before the contractor is allowed to start construction activities. During construction, the city or county will inspect and enforce the contract documents and will notify the RWQCB of any non-compliance with the General Permit. Once the project is completed, the city or county will submit an NOT to the SWRCB.

For public works projects within the jurisdiction of the Santa Ana RWQCB, the city or county will notify the RWQCB via an informal Notification of Construction Activity. The SWPPP will then be prepared before the contractor is allowed to start construction activities. During construction, the city or county will inspect and enforce the contract documents and will notify the RWQCB of any non-compliance with the General Permit.

It is important to note that city or county inspectors are not responsible for reviewing, approving or enforcing the SWPPP; these are responsibilities of the RWQCB. Inspectors of public works projects will enforce the contract documents and should be familiar with the SWPPP as it is part of the contract documents. Once the project is completed, the city or county will inform the RWQCB when the project is completed.

SWPPP Template

The SWPPP is the document that addresses water pollution control during construction. A SWPPP Template has been developed and is included in the Local Implementation Plan (**Appendix A-8)** as an assistance tool. The template contains all elements required by the General Permit, but individual agencies may develop their own SWPPP template. It is important to note that a SWPPP does not need to match the template provided. The template is

directly applicable for public projects subject to the General Permit and is provided as a guidance document that was developed with the following objectives:

- Meet the requirements of the General Permit; and
- Provide easy data entry for owners, developers and/or contractors to prepare SWPPPs.

8.2.5.2 Documentation Requirements for Other Sites

Private Construction Projects Not Covered by the General Permit

Private construction projects not covered by the General Permit, but covered under a grading permit, are required to develop Erosion and Sediment Control Plans (ESCPs). These ESCPs must show proposed locations of the erosion and sediment control BMPs that will be implemented during the construction project to comply with the minimum requirements listed in **Table 8-7**.

Public Works Construction Projects Not Covered by the General Permit

Public works construction projects not covered by the General Permit are required to comply with appropriate pollution prevention control practices in accordance with the current Green Book and the provisions of this section, and shall develop and implement ESCPs. Low priority construction sites shall meet the minimum requirements listed in **Table 8-7**.

8.2.6 Municipal Inspections and Enforcements

Both public and private construction projects will be inspected by municipal inspectors or other Permittee or contract staff with enforcement authority to verify that the construction activities are being performed in accordance with the project plans, building and grading permits, and applicable municipal codes, regulations and ordinances. The inspection program includes inspection frequencies, inspection documentation procedures, municipal inspections of private and public construction sites, enforcement procedures, and non-compliance reporting.

8.2.6.1 Inspection Documentation Procedures

In order to properly document all inspection information and gather the necessary information for reporting results of the program, a sample basic construction site inspection checklist is included in **Appendix A-8**.

For public works projects covered by the General Permit, records of all inspections and non-compliance reporting will be retained for a period of at least three years. With the exception of non-compliance reporting, these records need not be submitted to the State.

8.2.6.2 Inspections of Private Construction Projects

Inspections of private construction projects will be conducted at the frequencies shown in **Table 8-10**. At a minimum, inspectors will address the following during inspections:

- Ensure that the owner/developer/contractor is meeting these construction program requirements;

- Ensure that there is an effective combination of erosion, sediment and non-stormwater BMPs being implemented and maintained in order to prevent or reduce pollutants in stormwater runoff from construction sites into stormwater conveyances or receiving waters;
- Ensure that the owner/developer/contractor implements and maintains appropriate BMPs on a year round basis; and
- Ensure that, if issues are noted during the inspections, appropriate corrective actions are taken.

The primary mechanism that inspectors will use to determine if the minimum requirements and BMPs for construction activities are being met will be to assess the site against the minimum requirements **(Table 8-7**). The minimum requirements are intended to be easy to interpret field observations that allow an assessment of site conditions during both dry and wet season conditions.

The inspector will utilize the following framework when conducting an inspection of private construction projects:

- Review the erosion and sediment control plans (if applicable) and determine whether they are being properly implemented;
- Determine if BMPs are being effectively implemented and maintained in accordance with the approved erosion and sediment control plans; and
- Determine whether the owner/developer/contractor is making appropriate adjustment when ineffective BMPs are found.

If BMPs are either not implemented or not being maintained properly, enforcement actions may be imposed on the contractor as discussed later in this section. Inspections of construction sites will be documented using the sample checklists provided in Appendix A-8. These forms are provided as guidelines and can be edited by the city or county to meet their own needs.

8.2.6.3 Inspections of Public Works Construction Projects

Inspections of public works construction projects will be conducted at the frequencies shown in **Table 8-10**. At a minimum, inspectors will address the following during inspections:

- Ensure that the contractor is meeting these construction program requirements;
- Ensure that there is an effective combination of erosion, sediment and non-stormwater BMPs being implemented and maintained in order to prevent;
- Ensure that the contractor implements and maintains appropriate BMPs on a year round basis; and
- Ensure that, if issues are noted during the inspections, appropriate corrective actions are taken.

The primary mechanism that inspectors will use to determine if minimum requirements and BMPs for construction activities are being met will be to assess the site against the minimum requirements (**Table 8-7**) and the contract documents. The minimum requirements are

intended to be easy to interpret field observations that allow an assessment of site conditions during both dry and wet season conditions.

The inspector will utilize the following framework when conducting an inspection of public works construction projects:

- Review the SWPPP (if applicable), erosion and sediment control plans and contract documents and determine whether they are being properly implemented;
- Determine if BMPs are being effectively implemented in accordance with the approved plans, and maintained properly; and
- Determine whether the contractor is making appropriate adjustment when ineffective BMPs are found.

If BMPs are either not implemented or not being maintained properly, contract enforcement actions may be imposed on developers/contractors as discussed later in this section. Inspections of public works construction sites will be documented using the sample checklists provided in **Appendix A-8**. These forms are provided as guidelines and can be edited by the municipality to meet their own needs.

8.2.6.4 Inspection of Construction Sites

Inspection of construction sites will be performed based upon the priority of the project. The frequency of routine construction site inspections is shown in **Table 8-10** below.

Table 8-10
Inspection Frequency of Construction Projects Based on Construction Site Priority

Construction Site Priority	Rainy Season (October 1 - April 30)		Dry Season (May 1 - September 30)
	Projects within the jurisdiction of the Santa Ana RWQCB	Projects within the jurisdiction of the San Diego RWQCB	
HIGH	Once per month	Once per week *	As needed
MEDIUM	Twice during the season		As needed
LOW	Once during the season	Twice during the season	As needed

* OR

Monthly for any site that the responsible Permittee certifies in a written statement to the SDRWQCB all of the following (certified statements may be submitted to the SDRWQCB at any time for one or more sites):

i. Permittee has record of construction site's Waste Discharge Identification Number (WDID#) documenting construction site's coverage under the statewide General Construction Permit; and
ii. Permittee has reviewed the constructions site's Storm Water Pollution Prevention Plan (SWPPP); and
iii. Permittee finds SWPPP to be in compliance with all local ordinances, permits, and plans; and
iv. Permittee finds that the SWPPP is being properly implemented on site.

8.2.6.5 Re-inspection Frequencies

If the inspected site is in violation of these permits or codes, does not meet the minimum requirements (**Table 8-7**), or there is a prohibited discharge related to construction activities, inspectors will immediately direct compliance and conduct follow-up inspections to confirm that compliance is attained. Sites will be re-inspected if deficiencies are found. The inspector can quantify the level of non-compliance and the required re-inspection frequency based on the rating system below (**Table 8-11**).

1 Rating - There are no significant deficiencies that require correction. Criteria meeting this rating include:

- Appropriate treatment controls provided for dewatering operations (if needed).
- Non-stormwater and waste management BMPs properly implemented.
- Sediment tracking is minimal to non-existent.
- No evidence of wind erosion.
- All temporary soil stabilization BMPs implemented in accordance with the SWPPP and the minimum requirements.
- Sediment control BMPs are implemented in accordance with the SWPPP and the minimum requirements.

2 Rating - The project has minor deficiencies. The inspector will list each of the minor deficiencies and can include corrective actions to be taken prior to the next scheduled inspection. Minor deficiencies include the following:

- Site inspections by private development are not being conducted in accordance with expected frequencies.
- Any non-stormwater or waste management BMPs improperly maintained.
- Soil stabilization or sediment controls are not properly maintained.
- Evidence of active wind erosion on unstabilized slopes/stock piles.
- Minor tracking less than approximately 50 feet from project entrance or exit points.

3 Rating - Excessive minor deficiencies and/or major deficiencies are encountered. Excessive minor deficiencies are a total of six or more minor deficiencies requiring correction. Major deficiencies are defined as follows:

- Hazardous materials or waste is stored within the project without implementation of BMPs.
- Any discharge of sediment or deleterious substances resulting from dewatering operations conducted without implementation of required BMPs for dewatering.
- Sediment tracking from the project construction equipment or vehicles approximately 50 feet from project entrances or exits.

- Soil stabilization and sediment BMPs are not installed in accordance with the minimum requirements and.
- Dust from construction visibly blowing off the site and into drainage conveyances or adjacent water bodies.

4 Rating - There are critical deficiencies that would likely result in a violation of the permit if a stormwater runoff event were to occur. The inspector will note the deficiencies and make recommendations for corrective action. Critical deficiencies are defined as follows:

- Any observed discharge of stormwater or non-stormwater from the project that, in the judgment of the inspector, is generated by the construction activity, and is uncontrolled.
- Excessive sediment tracking from project site for more than 50 feet from project access points
- Absence of erosion and sediment controls.
- Absence of waste and materials management controls.
- There are identified stormwater inlets or receiving waters within or adjacent to the project site in close proximity to disturbed surface areas without control measures in place that pose an immediate threat of untreated stormwater discharges.
- Evidence of non-stormwater discharges into stormwater inlets or receiving waters within or adjacent to the project site
- Working in an active stream channel or other water body without proper implementation of required BMPs.
- No corrective action taken for potential hazardous materials/waste deficiencies noted in (3) above.

Table 8-11
Re-inspection Frequency of Construction Projects Based on Construction Site Priority

Construction Site Priority	Season	Level of Compliance at Construction Site			
		1 No significant deficiencies	2 Minor deficiencies	3 Excessive minor deficiencies, and/or major deficiencies	4 Critical deficiencies
HIGH	Rainy	Continue inspections	As needed	Within one week	Within one week
	Dry		As needed	As needed	Within one week
MEDIUM	Rainy		As needed	Within two weeks	Within one week
	Dry		As needed	As needed	Within one week
LOW	Rainy		As needed	Within one month	Within one week
	Dry		As needed	As needed	Within one week

8.2.6.6 Enforcement Actions

Enforcement of construction projects will be undertaken by the city or county inspectors and/or other staff who possess internal enforcement authority through established policies and procedures. There are several enforcement mechanisms and penalties to ensure compliance with local ordinances and permits. It is important to note that city staff is not responsible for enforcing the SWPPP for private contracts, these are responsibilities of the SWRCB; but inspectors are required to become familiar with the SWPPP as it is part of public contract documents.

The levels of enforcement and associated penalties are typically issued at the discretion of the authorized municipal officer with consideration of relevant circumstances regarding the violation. Different types of enforcement actions are summarized below (**Table 8-12**).

Table 8-12 Enforcement Actions for Construction Projects

PRIVATE CONSTRUCTION PROJECTS		PUBLIC WORKS CONSTRUCTION PROJECTS
Verbal Warning	← WARNING PROGRESSION	Verbal Warning
Written Warning ▪ Notice of Non-Compliance ▪ Administrative Compliance Order ▪ Administrative Citations or Fines ▪ Cease and Desist Order		Written Warning ▪ Notice of Non-Compliance
Stop Work Order		Enforcement of Contract ▪ Stop Work Order ▪ Withholding of Payment ▪ Bond ▪ Fines ▪ Revocation of Contract
Revocation of Permit(s) and/or Denial of Future Permits		
Civil and Criminal Court Actions		Civil and Criminal Court Actions

Enforcement of Private Construction Projects

Inspectors will enforce compliance with the construction program, grading or building permit and local ordinances such as the Water Quality Ordinance. Depending on the severity of the violation(s), enforcement could range from a verbal warning, to a written notice, revocation of permit(s), stop work order and civil and/or criminal court actions or prosecution.

- Verbal Warnings

  The initial method of requesting corrective action and enforcing compliance will be a verbal warning from the inspector to the contractor. Verbal warnings are often sufficient to achieve correction of the violation, often while the inspector is present at the construction site. The inspector will notify the developer/contractor's project supervisor of the violation, and document the violation and the notification to the contractor's project supervisor in the inspection file. A specific time frame for correcting the problem and a follow-up inspection date will be documented by the inspector. In judging the degree of severity, the inspector may also take into account any history of similar or repeated violations by the same developer or contractor at this or other sites.

- Written Warnings

  If a deficiency that was noted in a prior verbal warning is not corrected by the next inspection, or the severity of the violation is such that a verbal warning is not strong enough, a written warning will be issued. The written warning will describe the deficiency that is to be corrected, suggested corrective action(s), and the specific time frame for correction and a date for a follow-up inspection.

  A copy of the written warning will be provided to the contractor's project supervisor and another copy will be provided to the owner/developer. A copy will be placed in the active inspection file. Once the violation has been corrected to the satisfaction of the inspector, the inspector will document compliance in the inspection file.

  Depending on the severity of the violation(s), the options for issuing written warnings for enforcement of local ordinances and grading/building permits on private construction projects are illustrated in **Figure 8-7**. Various examples of written warning forms are in **Appendix A-8** (note that use of the specific forms provided as examples is not required).

- Stop Work Orders:

  If a written warning has not been addressed by the next inspection, or if the developer/contractor has not complied with their permit requirements, or if a significant threat to water quality is observed (such as a failure of BMPs resulting in a significant release of sediment or other pollutants off site), a stop work order will be issued by the inspector or the appropriate official. Stop work orders prohibit further construction activity until the problem is resolved and provide a time frame for correcting the problem.

  The stop work order will describe the infraction and specify what corrective action must be taken. A copy of the stop work order will be given to the contractor's project supervisor and placed in the active inspection file. For a private construction project, a copy of the stop work order will also be sent to the owner/developer. To restart work once a stop work order has been issued, the contractor's project supervisor must request the inspector to re-inspect the project and verify that the deficiencies have been satisfactorily corrected. If the inspector is satisfied with the corrections, the inspector may sign off on that phase of the project, and work may proceed. In severe cases, the

building or grading permit may be revoked. A sample Stop All Work notice is provided in **Appendix A-8**.

Figure 8-7
Enforcement of Private Construction Sites

ENFORCEMENT OPTIONS	ACTIONS			CRIMINAL ACTIONS
	NOTICE OF NON-COMPLIANCE	ADMINISTRATIVE COMPLIANCE ORDER	CEASE & DESIST STOP WORK ORDER REVEOCATION OF PERMIT(S)	INFRACTIONS AND MISDEMEANORS
COMPLIANCE STRATEGY	EDUCATE VIOLATOR	AUTHORIZED INSPECTORS JUDGEMENT		CRIMINAL PROSECUTION
Threat Level	Insignificant	Not Significant	May be Significant	Significant
Environmental Harm	None	Not Immediate	Potential/IImmediate	Actual/Immediate
Event Duration	Short	Short	Long/Continuous	Long/Continuous
Event Frequency	Isolated	Infrequent	Frequent/Ongoing	Frequent/Ongoing
Cooperation	Readily Complies	Working to Comply	Uncooperative/ Slow to Comply	Non-Responsive
Intent	Unknowingly	Not Willful	Possibly Willful	Willful

- Revocation of Permit(s) and/or Denial of Future Permits:
- In severe cases of non-compliance or significant discharges, it may be necessary to revoke the grading and/or building permit that a developer/contractor is working under, withhold final approval, or deny future permits on the project. The developer/contractor would then have to re-apply for permits and meet any requirements that the Permittee may place on the project. Criteria and procedures will be developed in the permit-issuing program to implement this enforcement tool. Legal counsel should be sought before proceeding with revocation or denial of permits.
- Civil and Criminal Court Actions:
- In severe cases, the Permittee may also use Civil and or Criminal court actions under local ordinances, such as the Water Quality Ordinance, which may result in significant fines levied upon the non-compliant responsible parties.

Enforcement of Public Works Construction Projects

Authorized inspectors will enforce compliance with the contract documents and local ordinances such as the Water Quality Ordinance. Depending on the severity of the violation(s),

enforcement could range from a verbal warning, to a written notice of non-compliance, enforcement of the contract and or criminal court actions or prosecution.

- Verbal Warnings:

  The initial method of requesting corrective action and enforcing compliance will be a verbal warning from the inspector to the contractor. Verbal warnings are often sufficient to achieve correction of the violation, often while the inspector is present at the construction site. The inspector will notify the contractor's project supervisor of the violation, and document the violation and the notification to the contractor's project supervisor in the inspection file. A specific time frame for correcting the problem and a follow-up inspection date will be documented by the inspector. In judging the degree of severity, the inspector may also take into account any history of similar or repeated violations by the same contractor at this or other sites.

- Written Warnings:

  Depending on the severity of the violation(s), the options for issuing written warnings for enforcement of public works construction projects are illustrated in **Figure 8-8**.

Figure 8-8
Enforcement of Public Works Construction Sites

ENFORCEMENT OPTIONS	ACTIONS			CRIMINAL ACTIONS
	NOTICE OF NON-COMPLIANCE	CONTRACT REMEDIES		INFRACTIONS AND MISDEMEANORS
COMPLIANCE STRATEGY	INFORM CONTRACTOR	AUTHORIZED INSPECTORS JUDGEMENT		CRIMINAL PROSECUTION
Threat Level	Insignificant	Not Significant	May be Significant	Significant
Environmental Harm	None	Not Immediate	Potential/IImmediate	Actual/Immediate
Event Duration	Short	Short	Long/Continuous	Long/Continuous
Event Frequency	Isolated	Infrequent	Frequent/Ongoing	Frequent/Ongoing
Cooperation	Readily Complies	Working to Comply	Uncooperative/ Slow to Comply	Non-Responsive
Intent	Unknowingly	Not Willful	Possibly Willful	Willful

- Notice of Non-Compliance:

  If a deficiency that was noted in a prior verbal warning is not corrected by the next inspection, or the severity of the violation is such that a verbal warning is not strong

enough, a notice of non-compliance will be issued. The Notice of Non-Compliance is given when the violation occurred unknowingly; the threat level is insignificant; there is no environmental harm; the violation was isolated and had a short duration; and the contractor readily complies and corrects the problem. The notice will describe the deficiency that is to be corrected, suggested corrective action(s), and the specific time frame for correction and a date for a follow-up inspection.

- Contract Enforcement Mechanisms:
- If a contractor is performing construction of a public works project, the provisions within the contract will be used for enforcement of non-compliance. Language will be included into construction contracts that give the municipality the right to enforce established policies and procedures such as withhold payment(s), use contractor's bonds, apply fines, stop work (without time penalties) or termination of contracts if the contractor performing the construction activities does not comply with appropriate Permits, laws, regulations and ordinances.
- Civil and Criminal Court Actions:
- As a final resort, the Permittee may use Civil and or Criminal court actions under local ordinances, such as the Water Quality Ordinance, which may result in significant fines levied upon the non-compliant responsible parties.

8.2.6.7 Non-Compliance Reporting

Sites are considered non-compliant when one or more violations of local ordinances, or permits, are observed on the site. If a non-compliant private construction project meets the criteria of posing a threat to human or environmental health as discussed below, then the appropriate RWQCB will be notified by the city or county NPDES Program Manager or NPDES Coordinator as required in this section.

In the case of public works projects subject to the General Permit, the RWQCB will be notified if compliance with the General Permit cannot be certified and/or if there are other instances of non-compliance and if the non-compliance meets the criteria of posing a threat to human or environmental health as discussed below. For public works projects not subject to the General Permit, the NPDES Program Manager or NPDES Coordinator will notify the appropriate RWQCB when the project is found to be in non-compliance with contract requirements and if the non-compliant condition meets the criteria of posing a threat to human or environmental health as discussed below.

Oral notification to the RWQCB of non-compliant private construction sites that are determined to pose a threat to human or environmental health will be provided by the NPDES Program Manager or NPDES Coordinator within 24-hours of the discovery of non-compliance. Such oral notification shall be followed up by a written report and submitted to the RWQCB within 5 days of the incidence of non-compliance. Written notification(s) will identify the type(s) of non-compliance, describe the actions necessary to achieve compliance, and include a time schedule, subject to the modifications by the RWQCB, indicating when compliance will be achieved.

For the purpose of compliance with the NPDES Permits, instances of non-compliance will be summarized and reported in the annual status report. The monitoring records will be kept in the project files on each private and public works project.

Emergency Construction Projects

Emergency Construction Projects are defined here as construction projects deemed necessary for the protection of human health, safety and property. Any and all BMPs described in this section should be deployed to the Maximum Extent Practicable in order to reduce potential harmful effects offsite and/or downstream. If an Emergency Construction Project should arise, notify any all appropriate agencies, such as the SWRCB, Fish & Game, local law enforcement, local fire departments, Orange County Health Care Agency and Orange County PF&RD.

The County will not require a WQMP for public agency projects consisting of routine maintenance or emergency construction activities required to protect public health and safety.

Criteria for Evaluating Potential Impacts to Human or Environmental Health

Erosion and sediment transport are the primary pathways for introducing key pollutants such as nutrients (i.e. phosphorus), metals, and organic compounds into aquatic systems. Release of pollutants through spills, dumping, or other unauthorized non-stormwater discharges can also occur. Based on the potential for impacts by sediment transport to human or environmental health, the inspector will evaluate events of non-compliance to determine whether they pose a threat to human or environmental health.

Threat to water quality will be assessed by inspectors for construction site runoff that will not be reasonably controlled by the BMPs in place or if a failure of BMPs is resulting in the release of sediments or other pollutants. Violations observed will be documented by the inspectors. If a significant and/or immediate threat to water quality is observed by an inspector, action will be taken to require the developer/contractor to immediately cease the discharge.

The criteria to be used during evaluation of an event producing non-compliance, whether from stormwater or non-stormwater runoff, are as follows:

- If toxic materials were discharged from site (including estimated volume of discharge);
- Proximity of site to impaired water body (303d listed);
- Proximity of site to sensitive habitat/endangered species, ESAs, ASBSs;
- Proximity of site to a water body (i.e. is discharge to ocean, creek, river, etc);
- Beneficial uses for affected water bodies;
- Proximity of site to public water supply (well head, monitoring wells);
- If discharge to storm drain, condition of storm drain (clog, etc.);
- Other materials discharged from site (concrete washout, sanitary washes, etc.).

A sample form for evaluating the potential impacts to human or environmental health and sample notice of non-compliance are provided in **Appendix A-8** (note that use of the specific forms provided as examples is not required).

8.3 Education and Training

Education and training is one of the keys to a successful stormwater program. To assist responsible municipal and contract staff in understanding the Construction Program, training modules have developed and can be found in **Appendix B, Section B-8**.

- General Program Management training - consists of overall program administration and implementation materials tailored for the NPDES Program Manager(s), NPDES Coordinator(s) and other program management staff. The content of the training will include:
  - Goals and objectives of the revised program;
  - Overview of inventory of construction sites;
  - Overview of construction site prioritization;
  - Overview of BMPs for construction sites;
  - Overview of the SWPPP requirements and SWPPP template; and
  - Overview of the inspection program and reporting requirements, and how inspections are tied to the prioritization of construction projects.
- Construction Inspection Training - will consist of procedure materials for inspecting construction sites and what to look for in the field when inspecting BMPs. This training will be tailored to train building and grading permit inspectors and/or other staff involved in inspections of construction sites.

Non-Permittee Sponsored Training

In addition to the Permittee sponsored training, city or county staff may also attend various other workshop or training events as they take place throughout the year. These types of events may include local or national organization sponsored training.

8.4 Definitions

The following definitions are used for the purposes of this model construction program:

Adjacent - located within 200 feet of the ESA.

Construction project - Any site for which building or grading permits are issued and where an activity results in the disturbance of soil such as soil movement, grading, excavation, clearing, road construction, structure construction, or structure demolition; and sites where uncovered storage of materials and wastes such as dirt, sand or fertilizer occurs; or exterior mixing of cementaceous products such as concrete, mortar or stucco will occur.

Pollution Prevention - Any practice that reduces or eliminates the creation of pollutants.

Storm Water Pollution Prevention Plan (SWPPP) - Document required to be developed and implemented by the General Permit. The SWPPP emphasizes the use of appropriately selected, correctly installed and maintained pollution reduction BMPs.

This approach provides the flexibility necessary to establish BMPs that can effectively address source control of pollutants during changing construction activities.

Discharging directly to - discharge from a drainage conveyance system that is composed entirely of flows from the subject construction site and not commingled with flows from adjacent lands (i.e. discharge from an urban area that co-mingles with downstream flows prior to an Environmental Sensitive Area (ESA) is not subject to this requirement).

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10.0 ILLEGAL DISCHARGES/ILLICIT CONNECTIONS

10.1 Program Summary

10.1.1 Program Overview

Since illegal discharges and illicit connections can be a significant source of pollutants from the municipal storm drain system, the DAMP includes a comprehensive program for detecting, responding to, investigating and eliminating these types of discharges/connections in an efficient and timely manner. Illegal discharges may originate from illegal dumping or from internal floor drains, appliances, industrial processes, sinks, and toilets that are connected to the nearby storm drainage system. These discharges (which may include: process waste waters, cooling waters, wash waters, and sanitary wastewater) can carry substances (such as paint, oil, fuel and other automotive fluids, chemicals and other pollutants) into storm drains. In addition, spills and leaks, if not properly controlled, can adversely impact the storm drain system and receiving waters.

In order to ensure that the program is efficient and effective, the Permittees have instituted regular documentation procedures for their water pollution complaint and spill response activities. The objectives of this model program are:

- Effectively prohibit the discharge of non-storm flows into the municipal storm drain system
- Respond to non-stormwater discharges when they occur
- Link the detection, response and elimination of illegal discharges and illicit connections in an interactive process to increase the effectiveness of the ID/IC component and the overall stormwater program

This section details model procedures for conducting program administration (Section 10.2.2); an Illegal Discharge Program (Section 10.2.3); a Spill Response Program (Section 10.2.4) and a Sewage Spill Response Program (Section 10.2.5); an Illicit Connection Investigations program (Section 10.2.6).; and a Source Investigations Program (Section 10.2.7). The section also details model procedures for education and enforcement (Section 10.3) and a Training and Outreach Program (10.6).

To assist the Permittees with the implementation of this program component within their jurisdiction, a Model Local Implementation Plan (LIP) was developed (Appendix A-10).

10.1.2 Program Commitments

Key Commitments

Although the Municipal Activities Program provides the framework and approach for complying with the NPDES permit requirements, the program is structured to assist the Permittees in the maintenance and update of their LIPs (**Appendix A-10**). This is a requirement for the San Diego Region Permittees and an optional task for the Santa Ana Region Permittees.

The major program commitments include:

- Conduct inspections and monitoring to identify water pollution problems caused by various pollutant sources. Prohibited discharges typically are generated from poorly managed on-site operations, illegal dumping and/or contaminated stormwater discharges

- Operate and maintain public reporting hotlines for the detection of potential illegal discharges or illicit connections

- Operate and maintain a spill response program. While illegal discharge complaints are usually non-emergency and often do not involve hazardous materials, spill incidents are typically larger scale and may result from an accidental release or illegal discharge and often involves hazardous materials.

- Operate and maintain a sewage spill response program. While all spills to municipal storm drain systems are important and responses are often the same as other spills, sewage spills have merited special regulatory attention since coordination with other public agencies as well as private owners is often involved; for this reason, the sewage spill response procedures were developed separately.

- Conduct inspection and documentation program to identify illegal connections as part of the routine maintenance of storm drain facilities. Any illicit connection identified during routine inspection is investigated by the affected Permittee and appropriate actions are then taken to approve undocumented connections by permit procedure and/or pursue removal of those connections that are determined to be illicit connections and not permissible.

- Conduct source investigations when an illicit discharge is detected or suspected, and the source is not readily identifiable. The purpose of the investigation is to locate the source so that measures to eliminate the ID/IC can be implemented. Source investigations will be initiated when appropriate information suggests evidence of an ID/IC.

- Take Enforcement actions according to the adopted Water Quality Ordinances and accompanying Enforcement Consistency Guide (**DAMP Section 4.0, Exhibits 4.II and 4.I).** Water pollution cases may be handled administratively or in more serious instances, be prepared for prosecution by the Orange County District Attorney who may prosecute under the applicable sections of the Water Quality Ordinance, State Fish and Game Code, State Water Code, Uniform Fire Code, and Penal Code that address pollutant discharges.

- Conduct education and training of municipal and/or other agency staff in the illegal discharge/illicit connections program. This is especially true with the ID/IC Program because the Permittees will be in the public eye when conducting inspections, investigation efforts and proceeding with enforcement actions.

This Model Program is intended to be implemented as described in Section A-10 of each Permittee's Local Implementation Plan. In developing its Local Implementation Plan, the Permittee may modify the Model Program in response to local conditions. It is not the intent for this Model Program to restrict city or county governing bodies from imposing additional stormwater management requirements to control

Although each Permittee is ultimately responsible for responding to water pollution complaints and incidents of illegal discharges and illicit connections to the storm drain systems within their jurisdiction, a number of cities chose to contract with the Orange County Flood Control District (OCFCD) to perform these services by entering into a Water Quality Ordinance (WQO) Implementation Agreement. The agreement allows the Permittees to utilize OCFCD to provide scientific, technical, and enforcement services that the Permittees may be unable to provide. The Permittees may also have other alternatives than contracting with OCFCD. Outside service providers/contractors may be used by Permittees to implement the program. The description of general and specific responsibilities under the different approaches is described in Section 10.2.2.

10.1.3 Regulatory Requirements

The federal regulations require that municipal stormwater programs include a component to detect and effectively eliminate illegal discharges/illicit connections into the municipal storm drain systems. The Fourth Term Permits similarly specify that the Permittees continue to implement and the existing ID/IC program.

The ID/IC program component fulfills the municipal commitments and requirements of:

- Sections III 1 and VII 1&2 of the Santa Ana Regional Water Quality Control Board Municipal NPDES Stormwater permit, Order No. R8-2002-0010; and
- Sections B.1 and F.5[1], of the San Diego Regional Water Quality Control Board Municipal NPDES Stormwater permit, Order No. R9-2002-0001.

10.2 Illegal Discharges/Illicit Connections Program Details

10.2.1 Program Introduction

The ID/IC Program provides practical guidance for Permittees when identifying, responding to and mitigating the effects of illegal discharges, including sewage spills, eliminating illicit connections, and enforcing the ID/IC Program component for the protection of public health and the environment. The ID/IC Program provides the framework and a process for conducting the following NPDES permit compliance activities for illegal discharges and illicit connections:

- Program administration
- Detection of illegal discharges and illicit connections
- Responding to water pollution incidents and complaints including sewage spills
- Inspections/investigations

[1] Order WDR 2002-0014 grants a stay for provision F.5.f and part of Finding 26 of Order No. R9-2002-0001 issued by the San Diego Regional Water Quality Control Board for discharges of urban runoff from the municipal storm drain system draining the watersheds of the County of Orange, the Incorporated Cities of Orange County.

- Education/Enforcement
- Assessments of program effectiveness; and
- Annual training

In order to be effective, the ID/IC program has been integrated with the municipal, industrial, commercial, residential and construction inspection programs so that if an illegal discharge or illicit connection is discovered during an inspection it can be properly addressed and eliminated. In addition, on behalf of the Permittees, the Principal Permittee implements the water quality monitoring programs which can also assist in identifying illegal discharges and illicit connections. **Figure 10.2** represents the flow of the program with a brief description of each section. Information from one section supports subsequent sections. Definitions are provided in Section 10.5.

Figure 10.2
Model Program Structure

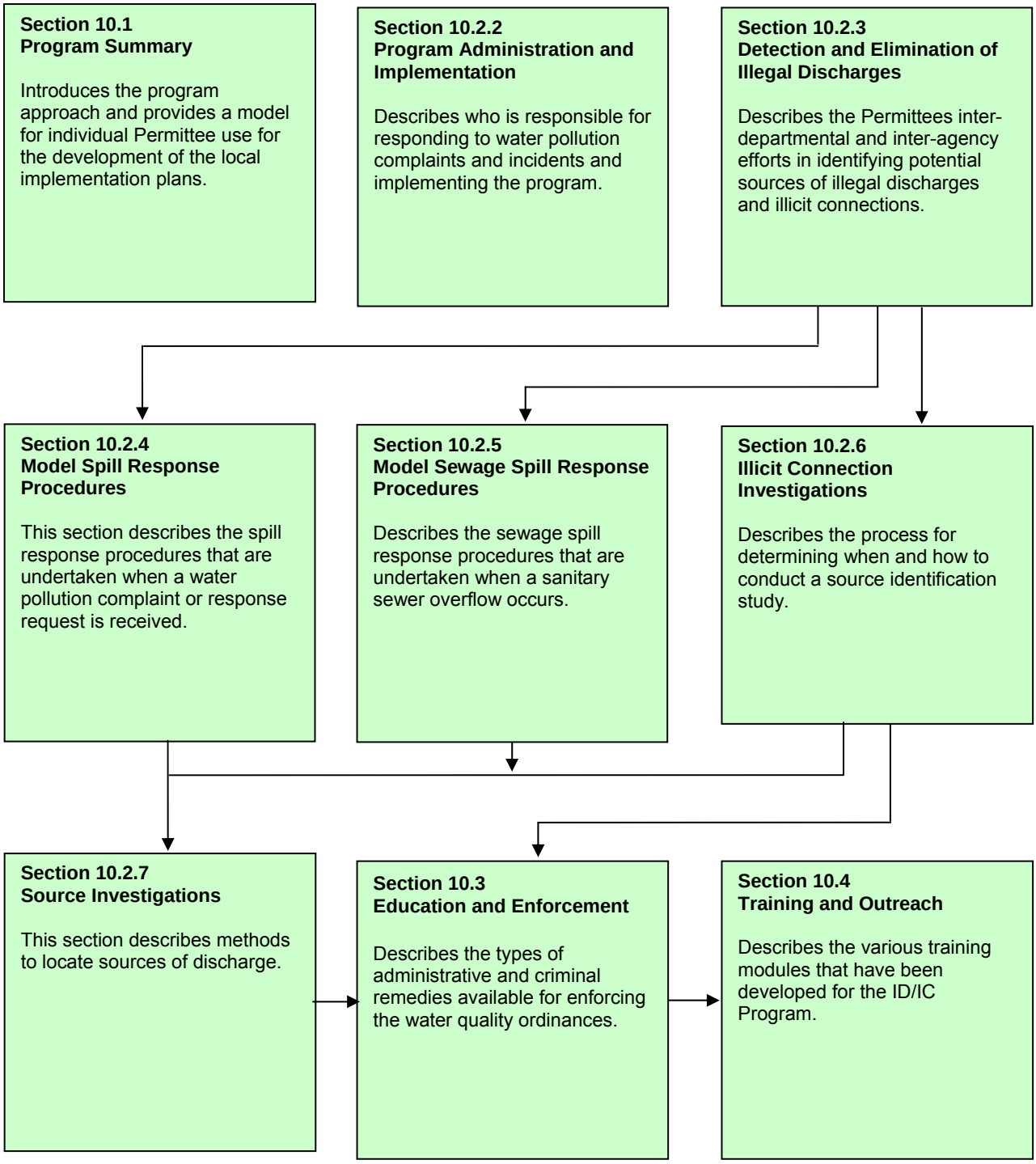

10.2.2 Program Administration and Implementation

The ID/IC Program is comprised of many elements, each with a specific defined set of roles and responsibilities for administration and implementation of the program. These elements are described below along with how they are integrated into the ID/IC Program.

10.2.2.1 Program Roles and Responsibilities

Assigning roles and responsibilities reduces the duplication of efforts and increases program efficiency and effectiveness.

The key roles for the ID/IC Program include the following:

- Authorized Inspector (AI) - The AI may be assigned to investigate compliance with and detect incidences of violations of the Ordinance and should be trained to recognize and appropriately respond to various types of incidents.

- Spill Responder - The spill response personnel may be Authorized Inspectors and other City/County personnel responsible for coordinating with the local fire department for the immediate response to any accidental spill, leak or prohibited discharge of pollutants requiring immediate cleanup.

- Enforcing Attorney - The Enforcing Attorney should be either the City Attorney [County Counsel] or District Attorney (DA) acting as counsel for the Permittee and their appointee. For purposes of criminal prosecution, only the DA or designee [and/or City Attorney, and Deputy District and City Attorneys as assigned] should act as the enforcing attorney.

For a more detailed discussion regarding the primary roles and responsibilities, the Model Water Quality Ordinance (**Section 4.0**, **Exhibit 4.II**), Enforcement Consistency Guide (**Section 4.0, Exhibit 4.I**), and/or the Model Investigative Guidance Manual (**Exhibit 10.III**) should be referenced.

For many of the Permittees and the Orange County Flood Control District (OCFCD), there are additional roles and responsibilities for implementing the program. Although each Permittee is responsible for responding to water pollution complaints and incidents within their jurisdiction, a number of cities chose to contract with the OCFCD to perform some of the Authorized Inspector and Spill Responder functions by entering into a Water Quality Ordinance (WQO) Implementation Agreement. The agreement allows the Permittees to utilize scientific, technical, and enforcement services provided by OCFCD to supplement their resources to implement their ID/IC Program.

The **Tables 10.1** and **10.2** below clarify the general differences in the roles and responsibilities between the Permittees that have chosen to contract with OCFCD and Permittees without the Agreement.

Table 10.1 Responsibilities of Permittee with OCFCD WQO Implementation Agreement	
Roles	*Responsibilities*
Reporting Hotline and Dispatch	Establish and maintain, receive complaints, and make notifications – *Contact OCFCD to respond when necessary*
Designated Authorized Inspector or Spill Responder	Assess and investigate non-hazardous incidents - *refer hazardous or after hours incidents to OCFCD*
Authorized Inspector or Code Enforcement	Initiate, track and report enforcement activities related to non-hazardous incidents – *refer hazardous or after hours incidents to OCFCD. Obtain information from OCFCD for annual report.*
Authorized Inspector, Public Works or Contractor	Initiate, supervise and report non-hazardous clean-up activities - *refer hazardous or after hours incidents to OCFCD. Obtain information from OCFCD for annual report.*
Authorized Inspector or NPDES Representative	Complete annual reporting requirements – *obtain information from OCFCD for annual report.*

Table 10.2 Responsibilities of Permittee without OCFCD WQO Implementation Agreement	
Roles	*Responsibilities*
Reporting Hotline and Dispatch	Establish and maintain, receive complaints, and make notifications
Designated Authorized Inspector or Spill Responder	Assess and investigate incidents.
Authorized Inspector or Code Enforcement	Initiate, track and report the enforcement activities
Authorized Inspector, Public Works or Contractor	Initiate, supervise and report the clean-up activities. Obtain contractor if necessary.
Authorized Inspector or NPDES Representative	Complete annual reporting requirements

In addition to OCFCD, a few Permittees also utilize other outside service providers/contractors for additional resources to implement their program.

Training and support for managing and implementing the ID/IC Program was initiated in early 2002 when, in response to the Third Term Permit requirements, the Permittees re-evaluated their program implementation structure and established a number of new committees and task force groups. The Authorized Inspectors Sub-Committee was established to provide a forum for the coordination, investigation, enforcement and training aspects of the water pollution response and enforcement program. The meetings were held quarterly and provided water quality enforcement program and authorized inspector responsibilities training and served as a forum to discuss ongoing or new issues and to profile cases or incidents.

10.2.3 Detection and Elimination of Illegal Discharges

10.2.3.1 Types of Illegal Discharges

The ID/IC Program provides guidance to the Permittees on how to detect, respond to, and investigate water pollution problems caused by various illegal discharges.

An illegal discharge is any discharge to the municipal separate storm sewer that is not composed entirely of stormwater and that is not covered by a NPDES permit. An illegal discharge refers to the disposal of non-stormwater materials such as paint or waste oil into the storm drain or the discharge of waste streams containing pollutants to the storm drain.

The Model Ordinance prohibits illegal discharges by defining the term "prohibited discharges" as any discharge from public or private property containing any pollutant to: the stormwater drainage system, any upstream flow which is tributary to the stormwater drainage system, groundwater, river, stream, creek, wash, dry weather arroyo, wetlands, marsh, coastal slough/bay/harbor, or Pacific Ocean.

Below are detailed descriptions of prohibited discharges that may be the result of illegal discharges, including sewage spills and illicit connections.

Water Pollution Incidents/Spills

Prohibited discharges may be generally result from poorly managed on-site operations, illegal disposal and/or polluted stormwater discharges. Examples of problematic site operations may include:

- Pressurized washing and steam cleaning areas;
- Auto repair shops where operations occur out of doors in unprotected areas and no provision is made for preventing contamination from leaving the site;
- A non-retail fueling area where vehicle washing occurs and flows offsite;
- Manufacturing storage yard for concrete materials where materials are uncovered and wash off flows directly to storm drain;
- Construction location where debris, materials, and silt flows off the construction site; or
- Trauma scene clean up operations.

Examples of illegal disposal activities may include:

- Home/yard debris discarded near curb inlet to stormwater drainage system;
- Trash, drums or discarded materials left on creek or wash area banks;
- Used oil poured on the ground or into storm drains; or
- Paint waste poured on the ground or discharged into storm drains.

Stormwater pollution can also occur when rain water is polluted after it comes into contact with and flows off of contaminated impervious surfaces. Although the runoff is occurring due to the storm event, poor housekeeping and/or materials management at a site can result in a prohibited discharge.

Examples of poor facility/site practices that can result in contaminated stormwater discharges leaving the site include the following:

- Construction or work on an exposed site where soils are being tracked onto the street;
- Exposed petroleum contaminated soils in equipment servicing areas;
- Uncovered areas of stockpiled construction materials;
- Uncovered materials storage areas;
- Outside storage of unsealed paint and solvent containers; and
- Exposed truck loading docks with uncovered materials.

Sewage Spills

Sewage spills are considered prohibited discharges; therefore the Permittees have begun to pay special attention to sewage spills to ensure that there is better coordination between the municipalities and the sanitation districts (**Section 10.4**). In addition, the Permittees conducted two focused studies in 2003 to estimate the potential impact associated with septic systems and portable toilets on receiving water quality.

- Septic Systems - The *Septic System Inventory and Assessment* (presented in **Appendix E4**) consisted of a GIS inventory of septic systems throughout the County and a random field survey of septic system owners within four selected major areas to evaluate existing system performance. Of the eighty field surveys that were conducted, only one failed system was noted, representing a failure rate of 1.25%. A spreadsheet model was also developed to estimate the loading of pathogen indicators and total Kjeldahl nitrogen (TKN) from the failed systems, which indicated that the load from the failed septic systems is a very marginal contributor to pathogen indicators in the receiving waters and is an insignificant contributor for TKN. The study concluded that septic systems do no represent a significant source of constituents of concern for Orange County receiving waters.

- Portable Toilets - The Permittees conducted an evaluation of practices and impacts associated with the use, maintenance, and oversight of portable toilets in Orange County. Industry standard practices related to siting, maintenance, transport, disposal, and storage were identified and water quality impacts associated with portable toilets were assessed based on a review of reported pollution incidents and anecdotal information derived from interviews. The assessment identified a small number of formal incidents over the past several years where an observed or potential direct impact to a drainage channel from a portable toilet occurred, probably through flooding or vandalism. The study also found that current standard industry practices for use,

maintenance, transport and storage of portable toilets within Orange County are generally sufficient to prevent impacts to receiving waters, but that these practices should be formalized and shared with suppliers and users within Orange County to ensure their consistent application. The *Portable Toilet Pollution Prevention Study* is presented in **Appendix E5**.

In 2004 the Permittees re-evaluated the need for each of the sub-committees. Due to the potential overlap between sub-committees, the Authorized Inspectors sub-committee was merged with the Existing Development Task Force to form a new Inspection sub-committee. The Inspection sub-committee is attended by the ID/IC and Existing Development inspectors and provides a forum for training, inspection, spill response and enforcement discussions.

10.2.3.2 Detection of Illegal Discharges

The Permittees have a number of programs in place that facilitate the proactive detection of sources of illegal discharges and illicit connections. These programs include the following:

- Municipal Activities (DAMP Section 5) – field inspectors and facility managers assist in the identification of illegal discharges and illicit connections during their daily activities. For example, during the routine maintenance of a drainage facility, a field inspector will report any dumped materials and/or undocumented connections to the NPDES representative.

- Public Education (DAMP Section 6) – assists with the distribution of public education materials that provide phone numbers and encourage the reporting of spills

- Construction Activities (DAMP Section 8) - assists with the identification of illegal discharges from construction sites

- Existing Development Programs (DAMP Section 9) – assists with the identification of actual or threatened illegal discharges from industrial, commercial and residential areas

- Water Quality Monitoring Program (DAMP Section 11) – assists with the identification of problem areas through the collection of water quality data

These programs are well integrated through the exchange of information and thus results in a more proactive ID/IC Program.

Industrial Facility Inspection

In addition to the integrated program coordination, the Permittees also participate with other departments and agencies for industrial facility inspections. On behalf of the Permittees, the Principal Permittee coordinates with a number of public agencies who routinely conduct inspections of industrial facilities in Orange County. These agencies and their areas of responsibility include the following:

- The Orange County Health Care Agency regulates the storage and disposal of hazardous wastes. Approximately 6,400 businesses are inspected annually to ensure proper waste management.

- The Fire Departments in Orange County regulate the storage of hazardous materials through disclosure ordinances such as OCC Sec 4-3-200-300 and Article 80 of the Fire Code. This regulation involves inspection at approximately 7,000 businesses.

- Agricultural chemicals, notably pesticides, are regulated by the Agriculture Commissioner through the State Agriculture Code (California Code of Regulations (CCR) Title 3, Sec. 6000 et seq.). The Commissioner's office performs facility inspections at about 200 facilities/year out of a total of approximately 700 facilities that use/store pesticides. The Commissioner's office also initiates enforcement action for non-compliance (NC).

- Discharges to the sanitary sewers are mostly regulated by the Orange County Sanitation District (OCSD) and the South Orange County Wastewater Authority (SOCWA), who routinely conduct pre-treatment facility inspections.

Routine coordination with staff of these inspection programs occurs through the Orange County Hazardous Materials Strike Force. The Strike Force is headed by the Orange County District Attorney's (DA) Office and includes representatives of a wide variety of local, regional, and state agencies.

In addition, the Principal Permittee provides Stormwater Awareness training for these inspectors so that they are cognizant of stormwater issues and as a result, notify the Principal Permittee of potential or observed water pollution problems.

Countywide Reconnaissance Monitoring

During the First Term Permit and part of the Second Term Permit, the Permittees conducted field screening/reconnaissance every year, which included conducting a site investigation and chemical analysis once during dry weather and once during storm events. While the primary objective of this component of the water quality monitoring program was to detect gross contamination from illegal discharges through field analyses, few incidences were detected.

New monitoring program objectives set in the Second Term Permit prompted a re-evaluation of the monitoring program starting in 1997. In May 1999, a final report outlining a new monitoring program that addressed the requirements of this permit was submitted to the Regional Boards and the program was implemented.

The reconnaissance and source identification section of the third term permit water quality monitoring program addresses the need to determine if an identified water quality problem is the result of an illegal discharge or illicit connection through a series of source identification studies. If problems are found, they are referred to the Permittees' Authorized Inspectors or NPDES program representatives.

Water Pollution Problem Reporting

The public reporting of water pollution complaints/incidents is also very important to the detection of illegal discharges and illicit connections. As the public becomes increasingly educated on urban runoff, they will serve as an important source of information for detecting illegal discharges and illicit connections.

The public reporting of water pollution problems is facilitated by the following:

- Permittee business telephone numbers in materials produced and distributed by the NPDES Stormwater Program's public education activities (brochures, posters, magnets);
- The inclusion of the countywide water pollution problem reporting telephone number in the Orange County "White Pages" telephone directories;
- The countywide 24 hour water pollution problem reporting hotline (714) 567-6363 and corresponding pollution notification web page (http://www.ocwatersheds.com/WQHotline/wqh_reporting.asp) in materials produced and distributed by the NPDES Stormwater Program's public education activities;
- The development and advertisement of the Principal Permittee's website (www.ocwatersheds.com) which contains information on behalf of the Permittees such as public education information, brochures and an online reporting form for reporting water pollution complaints.

10.2.3.3 Spill Response Program

In addition to the proactive detection and elimination of threatened or occurring discharges, a large portion of the Permittees' ID/IC Program is responding to water pollution complaints and incidents. Complaints are usually non-emergency and often do not involve hazardous materials. Spill incidents however are typically larger scale that may result from an accidental release or illegal discharge and often involves hazardous materials. Each Permittee is responsible for responding to complaints and spill incidents in their jurisdiction and have set up their own Spill Response Program within their ID/IC Program or as part of the fire department's hazardous materials response unit. To assist the Permittees in responding to complaints and spill incidents, a Model Spill Response Procedure has been developed and presented below in **Section 10.2.4**. In addition, model procedures for responding specifically to sewage spills are contained in **Section 10.2.5**.

10.2.4 Model Spill Response Procedures

10.2.4.1 Introduction

During the Third Term Permit the Permittees re-evaluated the ID/IC Program and determined the need to develop guidance for Authorized Inspectors and Spill Responders to follow in the investigation of spills and water pollution complaints. This guidance is the Model Spill Response Procedure which was designed so that Permittees may modify it to accommodate their local situation. After the Permittees develop their specific Spill Response Procedures it is incorporated into their Local Implementation Plan.

While spills to municipal storm drain system are important and responses are often the same, sewage spills have merited special regulatory attention as coordination with other public agencies as well as private owners is often involved; for this reason, sewage spill response procedures are covered separately in **Section 10.2.5**. The general response to a spill is illustrated in **Figure 10.3**.

Figure 10-3
Spill Response Procedures
(cont'd)

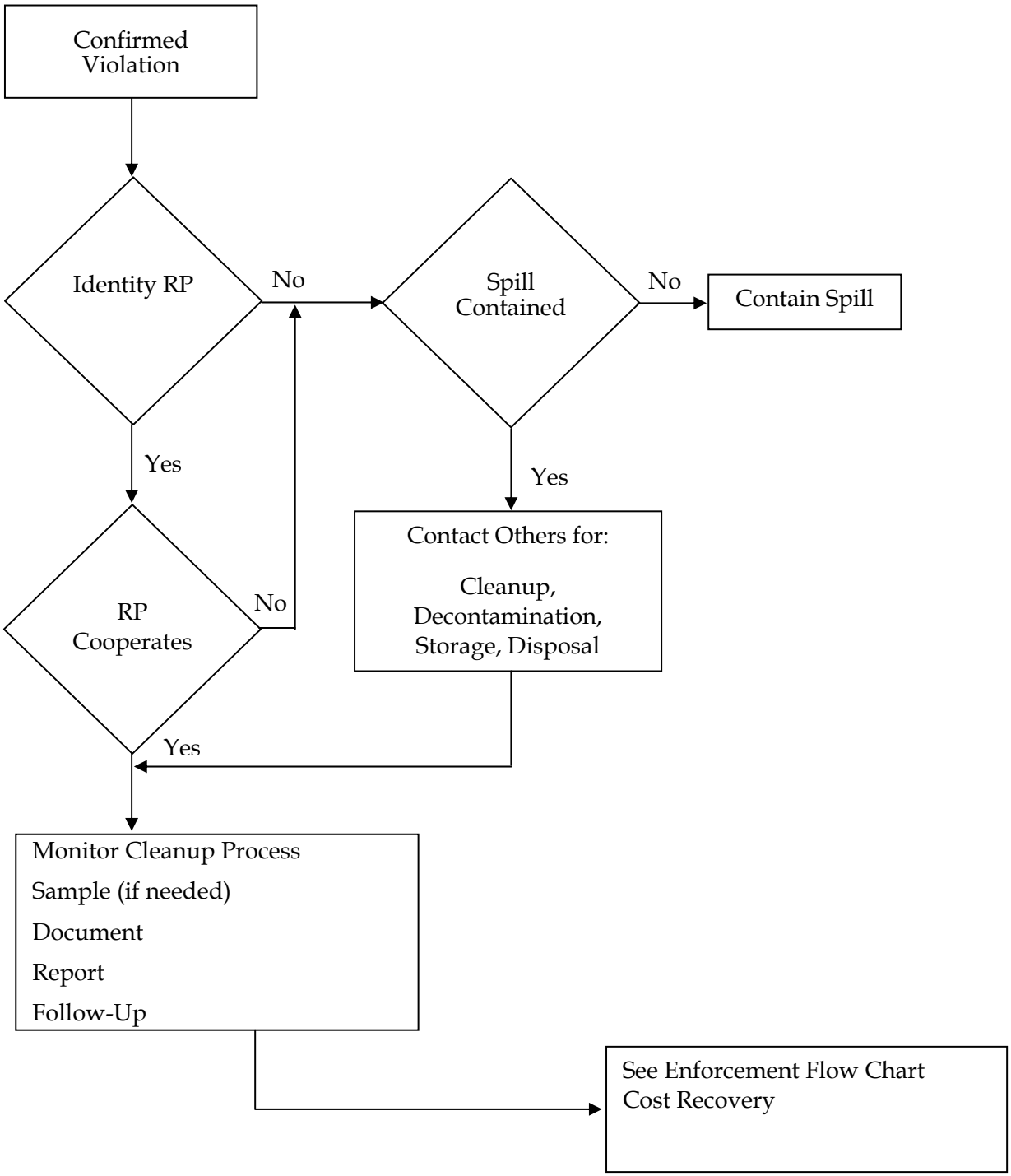

Protocols used in responding to any type of spill are essentially the same. The primary objectives in a response to a water pollution incident or spill include:

- Protection of human health and welfare
- Preservation of surface water quality and protection of environmentally sensitive areas
- Protection of personnel that may come in contact with the spill
- Protection of storm drain infrastructure
- Protection of private and public property

The response procedures consist of the following elements, each of which are briefly described below and described in further detail in the *Model Investigative Guidance Manual, December 2004* **(DAMP Section 10.0, Exhibit 10.III)** and related training modules:

- Record Keeping
- Notifications and Response Requests
- Response
- Investigations
- Clean-Up
  - Trauma Scene Cleanup
  - Cleanup Costs
  - Follow-up
  - Decontamination
  - Waste Storage and Disposal
- Reporting

10.2.4.2 Record Keeping

In order to ensure that the program is efficient and effective, the Permittees have instituted regular documentation procedures for their water pollution complaint and spill response activities. Information from a complaint, notification, or response request is documented throughout the entire process in order to:

- Provide accurate information for any personnel involved in the incident;
- Allow the data to be analyzed in order to determine if there are repeat offenders, problematic areas, problematic types of businesses, etc.
- Ensure that the required regulatory notification and/or reports are completed;

- Provide the required information for any enforcement actions and/or cost recovery;
- Assist with the annual reporting and program effectiveness evaluations; and
- Allow for better decision making for program improvements.

Documentation for each incident may include one or more of the following:

- A reporting form or field logbook;
- Photographs;
- The collection of samples;
- Detailed notes on observations;
- Witness interviews; and
- Other information relevant to the investigation.

After the initial entry of the information on the Pollution Notification/Investigation Request (PNIR) or related form, the information is typically entered into a database so that the data can be analyzed and future enforcement activities focused on either problematic responsible parties, locations or constituents. In addition, the use of a database allows the Permittees to quickly and accurately provide the information that is necessary for the annual Program Effectiveness Assessment **(Section C-10)**.

10.2.4.3 Notifications and Response Requests

In order to have a successful ID/IC program, the Permittees need to obtain information about potential or existing complaints and spills as soon as possible so that the problem can be mitigated as quickly as possible.

Notifications of water pollution complaints or spill response requests generally come from a variety of sources including:

- The general public;
- Permittee staff such as field inspectors;
- Other agency personnel such as Health Care inspectors or Regional Board staff; and
- Emergency personnel such as police and fire departments.
- In order to facilitate the reporting of problems by the general public, the Permittees advertise the County's 24 hour water pollution problem reporting hotline number (714-567-6363), the website reporting form (www.ocwatersheds.com) and/or their local hotline numbers on the of the public education brochures and posters. In addition, the Permittees created a magnet for the sole purpose of advertising the County's hotline number (DAMP Section 6).

- The Permittees also coordinate with internal staff and other agency and emergency response personnel and hold various training sessions and meetings so that they understand how to identify a problem and who to report it to. An example of this type of inter-agency coordination is Orange County Hazardous Materials Strike Force.

10.2.4.4 Response

After receiving a notification of a water pollution problem or spill, Permittee staff either refers the problem to their internal Authorized Inspector and/or Spill Responder or to the OCFCD's Authorized Inspector and/or Spill Responder if they are under contract. Each complaint or spill is investigated as soon as possible to ensure that valuable information is not lost and to minimize any potential human health and environmental impact.

The response typically consists of:

- An on scene assessment – Since the information collected during the initial report may, at times, be inaccurate, the on-scene assessment must be conducted in order to verify the complaint and gather more specific information.

- Notifications – After conducting the on-scene assessment, several notifications may be necessary including notifications to other agencies requesting assistance and/or notifications to regulating agencies for reporting purposes.

- Containment of the material(s) involved - The discharge or release of pollutants should be discontinued and contained as close to the originating site as possible after the initial assessment has been completed. This is critical in preventing further contamination or degradation downstream and can assist in an easier and less expensive cleanup.

10.2.4.5 Investigations

After the initial assessment and containment, the Inspector or Responder will try to determine why the incident occurred and whether the discharge or release was deliberate or accidental and if the incident is a repeat occurrence. The objective in conducting the investigation is to obtain legally defensible documentation of the incident.

A thorough investigation may include one of more of the following:

- Collection of Samples – in many cases, it may be necessary to collect samples for possible enforcement action. Samples may be collected of suspect runoff after the material(s) have been identified and contained.

- Photographs – During the course of an investigation, it may be necessary to take photographs to record visual observations and to document evidence for possible enforcement action.

- Interviews – Informal interviews are a useful tool in determining the cause of the discharge as well as the extent of pollutants involved. These types of interviews should be conducted as soon as possible after arriving at the site.

- Incident Report/Write Up - After the investigation, the Inspector or Responder may prepare a detailed written report, including a description of the site, the processes thereon, the location of each sample point, the names and addresses of the potential witnesses, recorded observation of physical conditions indicating possible discharge, the findings of the investigation.

The *Enforcement Consistency Guide* and/or the *Model Investigative Guidance Manual* should be consulted for further information on inspections and the collection of defensible data.

10.2.4.6 Clean-up

The main objective in a clean-up operation is to restore the impacted area back to its original state (to the maximum extent practicable) and prevent further environmental degradation in the surrounding area of the incident. During the clean-up phase of the response, the Inspector or Responder is generally overseeing and directing the cleanup and should re-evaluate the resources necessary to perform the clean-up and ensure that they are being prepared and sent to the site.

Typical clean-up measures may include pumping operations, absorbent booms and pads, granular absorbent, steam cleaning/power washing and/or soil removal. Although incident clean-up procedures are fairly similar, there are some special circumstances such as trauma scenes which may require slightly different approaches.

Trauma Scene Cleanup

Trauma scene cleanup requires special procedures in addition to the general cleanup procedures described above. Trauma scene wastes (i.e. blood and human tissue) may be generated at various types of crime or accident scenes. These types of wastes can pose a serious human health risk to those who are responsible for overseeing and conducting the cleanup. It is important that the procedures described below be employed when feasible to protect personnel and prevent any unnecessary discharges of material into the storm drain. The types of blood borne pathogens that may be encountered at a trauma scene include, but are not limited to HIV, Hepatitis B and Hepatitis C.

General Trauma Scene Cleanup Procedures

- Trauma scene cleanup operations must be performed in accordance with the Medical Waste Management Act, *California Health and Safety Code, Sections 117600 – 118360*. The Act may be viewed on the California Department of Health Services web page at: www.dhs./ca./gov/ps/ddwem/environmental/Med_Waste/mdm_act.pdf

- Fire Departments on emergency calls who clean up a scene themselves are not required to have a Biowaste Hauling Permit to remove liquid or solid trauma scene waste(s) from the scene for temporary storage or disposal. The County of Orange Medical Waste Section (Emergency Response through Control 1 after hours at (714) 628-7008) is available for consultation/assistance with trauma scene management.

- A Registered Trauma Scene Management Practitioner (RTSMP) is necessary when a scene requires decontamination and cleanup beyond the capability of Public Agency personnel on scene. RTSMP's are registered with the Department of Health Services pursuant to Section 118321 of the Medical Waste Management Act. A list of RTSMP's can be obtained from the California Department of Health Services web page at: (www.dhs./ca./gov/ps/ddwem/environmental/Med_Waste/medwasteindex.practitioners.pdf). Additional information may be obtained by calling the Department of Health Services at (916) 327-6904.

- Universal precautions and adequate personal protective equipment must be utilized during any clean-up operation. Additional information and guidance for cleanup policies and procedures for bodily fluids may be obtained 24 hours a day by contacting the Orange County Health Care Agency (HCA), Regulatory Health Services. During Business hours call (714) 433-6000, after hours, call Control One at (714) 628-7008.

- Implement appropriate BMPs and protect the storm drain system to the maximum extent practicable when conducting cleanup of trauma scenes. Notifications regarding significant potential impacts to the storm drain system and additional information and guidance on BMPs to be implemented may be obtained 24 hours a day by contacting the County of Orange Public Facilities and Resources Department at (714) 567-6363 or through Control One at (714) 628-7008.

<u>Cleanup of Trauma Scene Wastes on Public Property</u>

Public Agency personnel should observe the following points:

- Cleanup of trauma scene waste(s) on public property should be performed by properly trained (OSHA- blood borne pathogen trained) Public Agency personnel (police, fire or safety personnel), or by a Registered Trauma Scene Management Practitioner (RTSMP) called to the scene by the incident commander.

- Before proceeding with site cleanup, Public Agency personnel should possess proper personal protective equipment, adequate supplies of bleach and sufficient water to properly complete the cleanup operation.

- Wear gloves when washing or handling contaminated equipment, clothing or other materials. Wear other personal protective gear as necessary according to the potential for splashing.

- The Coroner's Office should remove any human tissue or body parts at the scene of a fatality. Coroner's Office personnel should follow their own departmental policies and procedures for removing any human tissue found on scene. The Coroner will not respond to a non-fatal incident for the purpose of human tissue removal.

- Human tissue, body parts, or blood/body fluids in a solid state can not be allowed to enter a storm drain. Appropriate BMPs should be implemented to prevent tissue from entering or being washed into the storm drain system; tissue found in the storm drain system should be removed to the maximum extent practicable.

- Dispose of sharps waste in a rigid sharps container. Dispose of the sealed container in an appropriate manner in compliance with the Medical Waste Management Act.

- The Orange County Health Care Agency (HCA), Regulatory Health Services may be contacted if needed for consultation/assistance in trauma scene management or questions regarding legal disposition of medical waste.

- For incidents on freeways, discuss with CHP the potential use of CALTRANS for cleanup of trauma scene waste.

- When a Registered Trauma Scene Management Practitioner (RTSMP) is called to a scene, each agency or jurisdiction shall have a policy in place that establishes which department (fire, law enforcement, public works, etc.) is responsible for staying on scene until the RTSMP arrives on scene. In no case shall the scene be abandoned prior to the arrival of the RTSMP.

<u>Specific Cleanup Procedure for Small Spills:</u>

Public Agency personnel may decontaminate and then wash down small amounts of human blood/body fluids that are still in a liquid state. A "small" spill shall be defined as a spill that can be thoroughly and completely disinfected with one gallon of 10% chlorine disinfectant. This determination should be made with the understanding that multiple applications may be necessary to accomplish full disinfection. When it is determined that the incident may be designated as small the following procedures may apply:

- Apparatus shall carry a Hudson sprayer, maximum capacity 1 gallon. The sprayer shall be filled to 90% capacity with clean tap water.

- In a separate container, apparatus shall carry liquid household chlorine bleach and the ability to measure ¼ cup quantities of it.

- When decontamination of a liquid trauma scene waste becomes necessary, personnel shall add a minimum of ¼ cup of the liquid bleach to the water in the Hudson sprayer. This will create a 10% solution.
  - *If an agency chooses to premix a 10:1 water to chlorine solution, they must replace it with fresh solution daily.*
  - *In lieu of using a 10% chlorine solution for decontamination, a Public Agency may follow a pre-described sanitization protocol outlined by OSHA (29 CFR 1910.1030) or other professionally recognized state or federal documents*

- Personnel shall wear PPE's to protect skin, mucus membranes, lungs and clothing from chlorine or trauma scene waste during the mixing and cleanup process.

- Personnel shall apply disinfectant to the liquid biowaste (they may see foam develop) and let it sit for a minimum of 10 minutes.

- After 10 minutes, personnel shall wash down the area using a fire hose, pressurized water extinguisher, etc.

- In non-emergency situations, and when circumstances permit, personnel should:
  - Attempt to move trash or miscellaneous debris from the path of the runoff so no additional or unnecessary material is discharged and carried into the storm drain.
  - If the incident location provides personnel with a choice between directing the runoff down a storm drain, or a sewer, always use the sewer (with permission from the sewering agency).
  - Porous surfaces such as asphalt may require multiple repetitions of the procedure to completely disinfect and thoroughly clean the area. Unless the repeat decontamination and wash down procedure can be accomplished until the area is thoroughly cleaned from start to finish with 1 gallon of 10% bleach solution, a RTSMP should be called.
  - No biowaste in a solid state, or the water associated with the clean up of this waste shall be washed down a storm drain. If present, call a RTSMP to handle the cleanup.

If the material requiring cleanup meets any of the following criteria, Public Agency personnel should call in a Registered Trauma Scene Management Practitioner (RTSMP).

- Criteria:
  - The amount of liquid trauma scene waste at the incident reasonably exceeds the ability to thoroughly disinfect the incident with 1 (one) gallon of 10% chorine disinfectant.
  - The material requiring clean up is human tissue or a body part, and Coroner's Office personnel will not be responding to the scene to remove the material because the incident did not involve a fatality.
- A Registered Trauma Scene Management Practitioner (RTSMP) can be requested through dispatch when needed.
- When a Registered Trauma Scene Management Practitioner (RTSMP) is called to a scene, each agency or jurisdiction shall have a policy in place that establishes which department (fire, law enforcement, public works, etc.) is responsible for staying on scene until the RTSMP arrives on scene. In no case shall the scene be abandoned prior to the arrival of the RTSMP.

<u>Cleanup of Trauma Scene Wastes on Private Property</u>

- The property owner has two options. Hire a Registered Trauma Scene Management Practitioner (RTSMP) or cleanup the affected area personally while observing the following restrictions.
  - Employees of the property owner who have not been given OSHA mandated Blood borne Pathogens training, proper personal protective equipment, and adequate supplies of bleach and water to complete the cleanup operation shall not be used for this task.
  - Trauma scene wastes must be disposed of properly and shall not be discharged to a storm drain.

- A list of RTSMP's that offer trauma scene waste cleanup service may be obtained from the California Department of Health Services web page at (www.dhs./ca./gov/ps/ddwem/environmental/Med_Waste/medwasteindex.practitioners.pdf). Note: List is not a recommendation for these companies.

Clean-up Costs

Since clean-up costs may be substantial, the Inspector or Responder should determine how clean-up costs may be recovered. Prior to initiating spill clean-up, it is essential that the RP be contacted and that they clearly accept or deny responsibility for clean-up and response costs.

If the clean-up is too large and the RP cannot be located or persuaded to assume clean-up responsibility, and the incident requires immediate action to protect life, property or the environment, the Inspector or Responder may need to immediately contract a clean-up company for clean-up. To prepare for this situation, the Inspector or Responder should be authorized to initiate clean-ups. This authorization states that the individual has signature authority for contracting private clean-up companies to conduct clean-up without the usual purchasing procedure.

After the cleanup is completed, if the RP is subsequently found or was previously uncooperative, the Ordinance contains a provision for the recovery of costs from the RP.

In certain situations, clean-ups that exceed $25,000 may be eligible for State and Federal emergency funds. Additional information may be obtained by contacting the State Water Resources Control Board or Coast Guard, respectively.

Follow-up

After clean-up is completed, a follow-up inspection is conducted to ensure that the clean-up is adequate. Follow-up inspection tasks may include:

- Verification that the problem has been mitigated;
- Inspect for any remaining residue in street curbside, storm drain or channel;
- Monitoring, using applicable field instrumentation, for pH, conductivity, or hydrocarbons at random locations, which may have been affected by the incident discharge;
- Collecting and analyzing random samples to verify extent of pollutant removal;
- Requesting additional clean-up of inadequately cleaned areas;

Each incident should be evaluated after its occurrence to determine if appropriate action and corrective measures were taken.

Decontamination

Decontamination refers to both the equipment and tools used by the clean-up personnel, as well as decontamination of the spill area. After the clean-up is completed the vehicles, equipment and Personal Protective Equipment should be decontaminated. Clean, non-contaminated equipment is essential for the safety of the next user.

Waste Storage and Disposal

Wastes generated from the mitigation and clean-up of pollutants need to be properly transported and stored for subsequent disposal. The wastes may be non-hazardous or hazardous

Non-hazardous wastes may be disposed of by common methods including disposing of solid wastes with the regular trash or rubbish. In some cases, non-hazardous wastewater may be diverted or discharged, with prior approval from the appropriate sewer collection agency, to the sanitary sewer system.

The hazardous wastes generated from the incident, including absorbents and decontamination items, should be properly packaged by a clean-up contractor in Department of Transportation (DOT) containers accompanied with manifest forms , transported, and disposed of in accordance with Resource Conservation and Recovery Act (RCRA) guidelines.

Whether the wastes are generated from clean-up performed by agency staff or a private contractor, if the RP has not been identified, the local jurisdiction has to assume responsibility for the transportation, storage, and disposal of the material.

10.2.4.7 Reporting

The ID program has a number of reporting requirements. These requirements are summarized below.

- Proposition 65 Notification – Health and Safety Code 25180.7 provides that "Any designated government employee who obtains information in the course of his official duties revealing the illegal discharge or threatened illegal discharge of a hazardous waste within the geographical area of his jurisdiction, and who knows that such discharge or threatened discharge is likely to cause substantial injury to public health or safety, should, within 72 hours, disclose such information to the local health officer." In Orange County, the Proposition 65 Hotline telephone number is (714) 433-6401.

- Regional Board Notifications – If a spill, leak or illegal dumping is determined to pose a threat to human health or the environment, the Permittees are required to report this information to the Regional Boards by phone or e-mail within 24 hours of the discovery followed by a written report within 5 days.

10.2.5 Model Sewage Spill Response Procedures

10.2.5.1 Introduction

While all spills to municipal storm drain systems are important and responses are often the same as other spills, sewage spills have merited special regulatory attention since coordination with other public agencies as well as private owners is often involved; for this reason, the sewage spill response procedures were developed separately. The Model Sewage Spill Response Procedure has been developed and the Permittees may develop their respective Spill Response Procedures for their Local Implementation Plans. The general response to a sewage spill is illustrated in **Figure 10.4**.

A sewage spill may be the result of an accidental or irregular discharge of raw (untreated) sewage from a sanitary sewer system or from private property tributary to a public sewage system. The definition has been expanded in recent years to include discharges of treated (partial, secondary or to Title 22 standards) wastewater as well as other human wastes (e.g., septic tank overflows, etc.).

While the protocols used in responding to any type of spill are essentially the same, the specific differences for sewage spills are described within this section.

Definitions of terms relevant for sewage spills are provided in Section 10.5.

The primary response procedures for sewage spills are the same as for other types of spills and consist of the following elements:

- Record Keeping
- Notifications and Response Requests
- Response
- Investigations
- Clean-Up
- Reporting

Figure 10.4 presents a flow chart that outlines the typical sewage spill response procedures.

10.2.5.2 Record Keeping

To ensure that the necessary information is collected, the Permittees use forms similar to the County's Pollution Notification and Investigation Request (PNIR) form. In addition to the information that is collected on the PNIR form, the following pieces of information are helpful when documenting a sewage spill:

- Information regarding whether a sewage spill entered a storm drain (i.e. where sewage is observed running into a drain, or directly to a receiving water, creek, channel, etc. or there is residual evidence thereof), including the location and name of the receiving water;
- Determination of spill start and stop time;
- A determination of spill volume

Figure 10.4
Sewage Spill Response Procedures

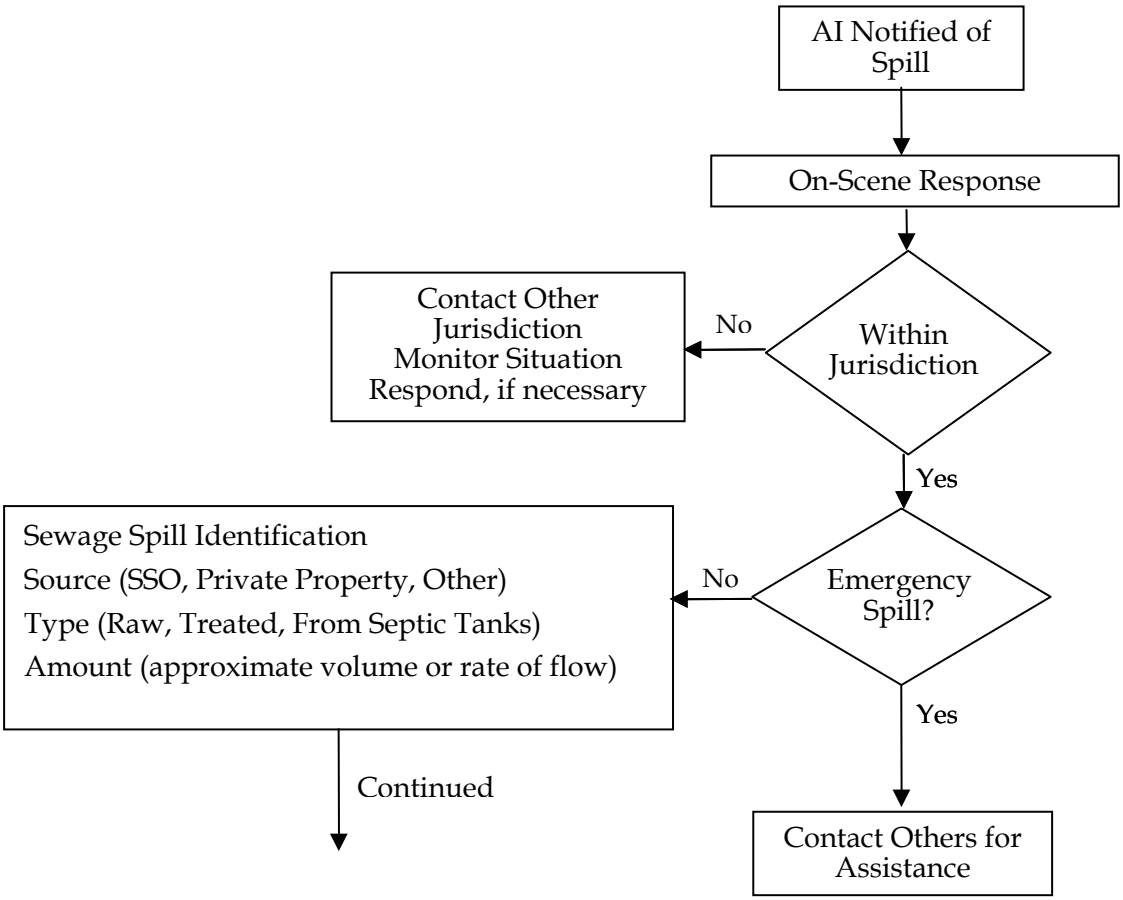

Figure 10.4
Sewage Spill Response Procedures (cont'd)

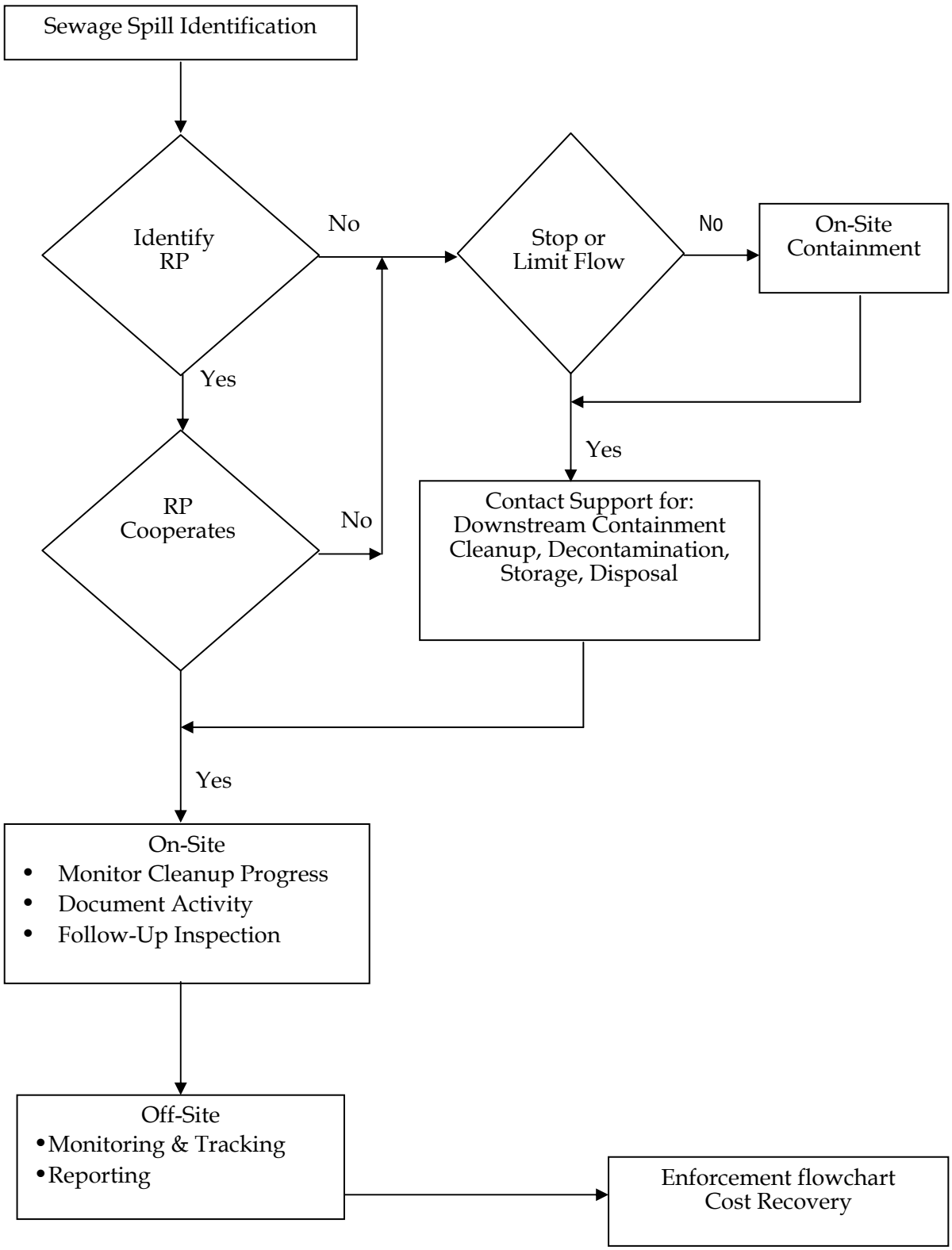

10.2.5.3 Response

Although there are instances where the municipal storm drain and sanitary sewage collection systems are under the same public agency (City) ownership, there are also many situations where there are several jurisdictions involved. Responding to overflows that reach the municipal storm drain system is, in these instances, a joint or shared responsibility of both (stormwater and waste water) Permittees.

Following is a list of the types of spills that may occur and who has primary responsibility for responding to them:

- Private Property – property owner has the responsibility of clearing the line from the sewer main to the property and typically contacts a plumber
- Local sewer system - local sewer collection agency has primary responsibility for responding to the spill and clearing the line
- Regional trunk sewers – Local sanitation district has the primary responsibility for responding the spill and clearing the line.

Regardless of where the spill originates, if the spill has entered or may enter the storm drain system, the Permittees respond to assist with the cleanup and remediation of the area.

If not already completed upon arriving on scene, the discharge or release of sewage should be discontinued and contained as close to the originating site as possible after the initial assessment has been completed. This is critical in preventing further contamination or degradation downstream and will ultimately result in an easier and less costly cleanup effort.

10.2.5.4 Clean-Up

The main objective in the clean-up operation is to restore the impacted area back to its original state (to the maximum extent practicable) and prevent further environmental degradation in the surrounding area of the incident. During this phase of the response, the Inspector or Responder is generally overseeing and directing the cleanup and should re-evaluate the resources necessary to perform the clean-up and ensure that they are being prepared and sent to the site.

The general responsibilities for sewage spill cleanup include:

- Coordinate with sanitation districts or others for clean-up actions;
- Provide list of clean-up companies for the RP to contact;
- Secure spill site to prevent contact by the public;
- Oversee clean-up—provide clean-up directions and verify pollutant removal. No readily identified residue, e.g., sewage solids, papers, etc. should remain;
- Ensure that any debris that the wastewater was in contact with is removed for proper disposal;
- Disinfect where appropriate. If disinfected, the wastewater should be contained and disposed of properly;

- Document clean-up company's activities (proper and safe procedures) and verify appropriate clean-up charges;

- Document amount of waste or pollutant removed for reporting purposes and to verify disposal costs;

10.2.5.5 Reporting

Sewage spill reporting to various regulatory agencies has parallel and overlapping requirements. However, reporting spills to one regulatory agency will not necessarily satisfy the requirements of the other. Therefore, the Permittees should report to each entity designated to receive sewage spill reports.

Storm Drain Dischargers Notifications

- Regional Board Notifications – If a spill, leak or illegal discharge is determined to pose a threat to human health or the environment the Permittees report this information to the Regional Boards by phone or e-mail within 24 hours of the discovery followed by a written report within 5 days.

Sewage Discharger Notifications

- Orange County Health Care Agency (HCA) - California Health and Safety Code Section 5411.5 requires that sewage spills be immediately reported to the HCA 24-hours a day. During standard work hours (M-F, 8:00 a.m. to 5:00 p.m.) sewage spills that may impact beaches or the ocean should be called in by phone directly to Regulatory Health Services, Environmental Health, Ocean Water Protection Program staff personnel at (714) 433-6000. After hours reports for emergency spills can be phoned in through the County Communications number (714) 628-7008.

- State Office of Emergency Services (OES) - California Water Code Section 13271 and the CCR Section 2250 require that the State OES be notified immediately of sewage spills of 1,000 gallons or more from public sewer systems by telephone (800) 852-7550.

- Santa Ana Regional Board - Order No. 2002-0014 requires that sewage dischargers immediately report SSOs entering a storm drain, drainage channel, or surface water body to the Board by telephone, voice mail, e-mail, or FAX. Completed SSO Report Forms, or equivalent, for each and every overflow event should be submitted within five days of the initial notice. Full reports for each SSO occurrence including photos and mitigation measures should be submitted electronically to the RWQCB at the end of each month. Submittal of SSO Summary Reports and certification statements are also required 30 days following the spill report period.

- San Diego Regional Board - Order No. 96-50 requires that sewage dischargers report spills of at least 1,000 gallons, or to surface waters, within 24-hours by FAX or telephone. In these instances the discharger should fax a SSO Report Form to the Board within five days of the spill. The completed SSO Form should also be faxed to the Department of Health Services (DHS). A quarterly report of the sanitary sewer spills, including those not meeting the criteria stated above, should be submitted electronically to the Regional Board.

10.2.5.6 Sewage Spill Response Planning

In an effort to develop more proactive response procedures for sewage spills, the County and the Orange County Sanitation District (OCSD) have been cooperatively coordinating a sewage spill prevention and response demonstration project called the "Tustin Area Spill Control Demonstration (TASC) Project".

The project includes portions of the City of Tustin and the unincorporated area of North Tustin. This geographical area was chosen due to the high number of "preventable" small sewage spills (those that occur in small diameter pipes and are less than 1,000 gallons) that occur primarily as a result of grease or root blockages.

The main objectives of the project are to:

- Create broader awareness on causes SSOs and measures to prevent them;
- Improve the interagency coordination when responding to SSOs;
- Understand the resource needs in responding and mitigating impacts:
- Develop predictive tools for identifying impacts; and
- Protect the beneficial uses of local water bodies.

Updates on the project are provided as a part of the annual Program Effectiveness Assessments.

10.2.6 Illicit Connection Investigations

An illicit connection to the storm drain system is an undocumented and/or unpermitted physical connection from a facility to the storm drain system. The First Term Permit required the Permittees to undertake programs to identify and effectively eliminate illicit connections to the storm drain system. The Permittees developed a facility inspection and documentation program to identify such connections and currently implement the program through the routine maintenance of their facilities.

The Ordinance defines the term "Illicit Connection" as any man-made conveyance or drainage system through which the discharge of any pollutant to the stormwater drainage system occurs or may occur. Constructed (man-made) Illicit Connections include: pipelines, conduits, inlets or outlets, connected impervious areas, channels or swales.

Examples of Illicit Connections include:

- Unpermitted pipes which discharge onto adjacent property;
- Facilities constructed adjacent to construction areas which allow dewatering runoff to flow to the stormwater drainage system (the dewatering activities, except those authorized by each respective permit, require coverage under either a general or individual permit from either of the RWQCBs);
- Storm drain inlets that drain from equipment, vehicle or similar wash areas directly into the stormwater drainage system

Any illicit connection identified during routine inspection is investigated by the affected Permittee. Appropriate actions are then taken to approve undocumented connections by permit procedure and/or pursue removal of those connections that are determined to be illicit connections and not permissible. If evidence of an illegal discharge is observed but the source could not be located, a source investigation may be conducted to determine if the discharge is being conveyed through an illicit connection.

10.2.7 Source Investigations

10.2.7.1 Introduction

Source investigations may be conducted when an ID/IC is detected or suspected, and the source is not readily identifiable. The purpose of the investigation is to locate the source so that measures to eliminate the ID/IC can be implemented. Source investigations will be initiated when appropriate information suggests evidence of an ID/IC.

Examples of potential ID/IC evidence include:

- The dry weather monitoring program detects constituent levels which meet or exceed action criteria (see below);
- Monitoring personnel determine that there is a reasonable evidence of a potential ID/IC due to observations and measurements; or
- A public or Permittee staff report indicates the possibility of an ID/IC with an unknown source

In order to facilitate the determination of when source investigation studies are warranted, the Dry Weather Monitoring Program (**DAMP Section 11.0**) includes a set of criteria that will trigger focused ID/IC studies by the Permittee when the monitoring data indicate the presence of a problem. These criteria are designed to identify sites that:

- Exceed the overall regional average by a substantial amount in one or more constituents
- Exhibit substantial changes in their characteristics over time that could be indicative of worsening or improving conditions. (It may be informative to continue monitoring where conditions are improving in order to gain information that could be useful elsewhere.)

When data from the routine Dry Weather Monitoring Program exceeds these criteria, this triggers a consideration that follow-up investigations are necessary. With this trigger, the County Dry Weather Monitoring Program will have identified a stormdrain that exceeded the criteria, and the Permittee will be notified that a follow-up ID/IC investigation may be necessary. For extreme conditions that represent a clear and immediate risk to human health or receiving water quality then the appropriate Permittee inspector will be notified immediately. This situation may require a hazardous materials response.

In instances, where the monitored site is near a jurisdictional boundary and the upstream drainage network for the site extends into a neighboring jurisdiction(s), all appropriate jurisdictions will be notified.

10.2.7.2 Tracking a Pollutant Upstream

Once the Permittee is notified of the potential problem and it is determined that a source investigation is warranted, the approach used for tracking a pollutant source upstream or identifying an illicit connection primarily involves the following steps:

- Step One - Initial Screening
- Step Two - Source Evaluations and Inspections
- Step Three – Monitoring
- Step Four – Document, Notify and Report

Figure 10.5 presents a flow chart that outlines the typical source investigation procedures.

Step One - Initial Screening

The purpose of the initial screening process is to collect information from data and available sources to proceed with further investigation and may consist of the following steps:

- Compile and analyze the available water quality data from the drainage area in question to determine if a potential source may be identified. Laboratory data used in conjunction with previous investigation notes may be reviewed to help identify pollutant sources;
- Review previous source investigations within the city to determine if there are any similarities;
- Contact other local agencies/Permittees who may have performed similar source investigation studies;
- Collect data and information on sources that have been identified in other jurisdictions with similar circumstances or conditions for comparison;
- Review land use maps or aerial photo images of the drainage area to determine the type of land use (industrial, commercial or agricultural … etc.); and,
- Review other records such as connections or encroachment permits to determine if a permitted connection may be the source.

In the search for potential sources of pollutant discharges, it is important to correlate the type of pollutant with type of industry or business in the area. Below are examples of pollutants and their potential associated industrial or business sources or chemical properties.

Figure 10.5
Source Investigation Procedures

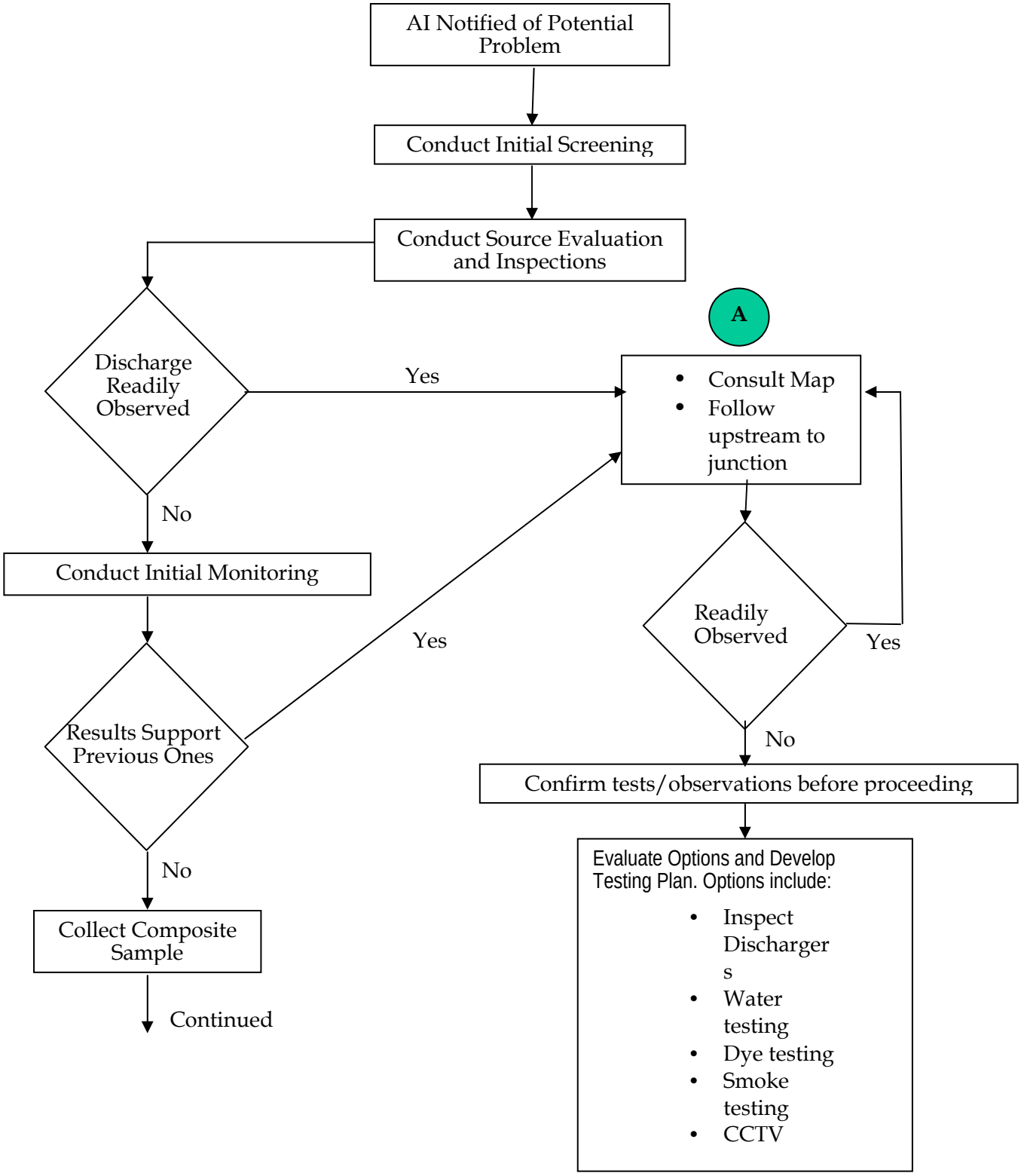

Figure 10.5
Source Investigation Procedures (Cont'd)

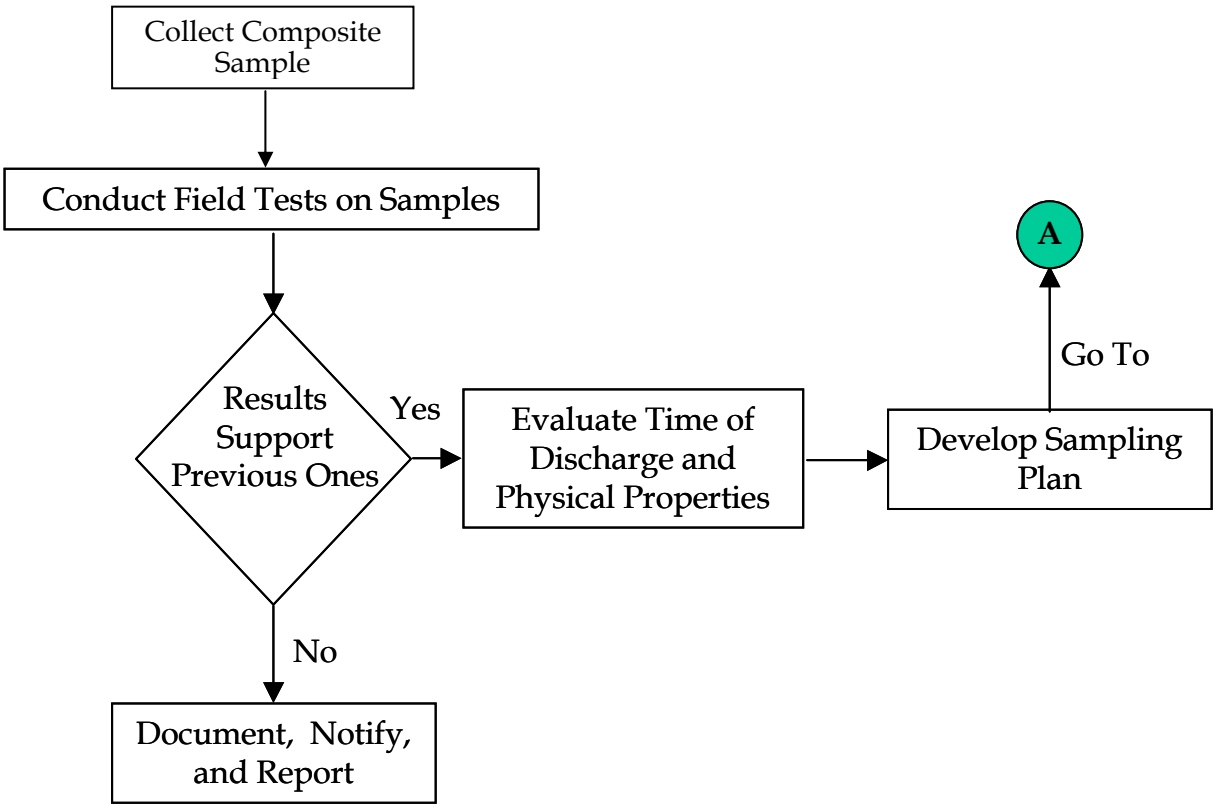

- Solid particle materials, such as: chips, dusts, plastic pellets, wood or metal shavings. The metals may be cadmium, lead, zinc, copper, silver, nickel or chromium. Non-metal solid materials may also include phosphorus and silica. These particles range in size from clearly visible pieces to microscopic granules, in which case they might appear as a layer or sediment. Potential sources for these pollutants may include manufacturing and textile facilities, lumber mills, and metal operations.

- Petroleum products and engine coolants, such as: fuels, oils, solvents, grease or coolants. These may be observed as oil or rainbow sheens on the surface of water, or brown staining of dry areas. Possible sources are petroleum refineries or vehicle storage facilities, or locations where vehicle maintenance takes place or petroleum products are stored.

- Miscellaneous physical indicators can include:
  - High or low pH in waters indicating acid or base discharge;
  - Liquids or stains colored yellow (indicating a chemical or textile source), brown (packing plants, printing, metal works, stone/concrete works, refineries), green (chemical or textile sources), red (meat packing plants), or gray (dairies);
  - Cloudy or opaque waters (indicating some form of suspended substance);
  - Foul odors typical to decomposing materials such as sewage or sulfide (rotten egg) or rancid-sour smells, indicating a release of decomposed organic compounds;
  - High BOD, COD, TOC, or temperature in waters;
  - Dying, stained, or burnt-appearing vegetation, indicating toxics; and
  - Residues, stains or actual etching damage to concrete or corroded metal storm drain structures, may indicate caustics.

- Pollutants from construction sites typically include sediments, petroleum products and engine coolants, metal shavings or materials, pesticides, fertilizers, toxic chemicals such as solvents, cleaners, sealers, adhesives, or paints. Construction sites are also sources of miscellaneous wastes such as wash waters, landscape or yard waste materials, packaging materials, trash and sewage.

- Pollutants from residential activities typically include petroleum products, engine coolants, pesticides, fertilizers, landscape or yard waste and trash.

<u>Step Two - Source Evaluations and Inspections</u>

When conducting an inspection in an above or below ground system with multiple inlets and flow is observed coming from more than one of the tributaries, track each inlet one at a time, using visual observations, odors, and/or sampling to determine the possible source(s).

It is generally easiest to track the largest flow first, however if they are about the same, start with the inlet that is easiest, shortest, or with the least number of junctions. Otherwise track those originating from areas with the greatest potential for illegal discharges based on the pollutant data and land use map.

The source evaluation may include the following steps:

- Review the drainage maps and identify key locations for physical inspections along the main stream or storm drain as well as the tributaries that are flowing into the storm drain

- Review the drainage facilities maps within the problem area and locate the upstream connections and drainage basins;

- Maintain notes of observations and interviews, as well as photographs, forms, items of evidence, and other documents in a formal dated Field Notebook. Information should be entered in ink and legible for others to read. If possible, each notation should also indicate the time of day it was entered to the nearest half-hour. Corrections should be in ink, initialed and dated. If additional information is entered at a later time, it should also be noted in the Field Notebook and dated as a subsequent entry in the Field Notebook.

- Conduct an above ground physical inspection in the drainage area to see if a source can be readily identified. Physical inspections of storm drains from manhole accesses, catch basins, and drainage channels may provide a safe and easy way to track underground flows upstream or to locate illicit connections. By observing the differences in flows and appearances from one manhole to the next, it may be possible to identify a pathway for the pollutant.

- During the inspection check catch-basins and gutters between manholes for evidence of flows such as runoff from steam-cleaning operations, car washing, irrigation runoff, etc. and look for evidence of recent or past discharges, such as wet or stained pavement or gutters.

- Conduct a below ground physical inspection - Facilities that are large enough for personnel to enter can also be physically inspected, however, entry into these facilities requires strict adherence to health and safety procedures, including confined space entry procedures.

  In general, a space is defined as confined if it is not intended for human occupancy, has limited openings for entry or exit, and has insufficient natural or mechanical ventilation. Information on safety procedures can be found in many documents, including the Occupational Safety and Health Guidance Manual, National Institute for Occupational Safety and Health; OSHA Safety and Health Standards 29 CFR 1910 (General Industry), US Department of Labor, and Title 8 of the CCR, General Industry Safety Order.

Once underground, the storm drain system can be inspected for inlet connections or other conveyance that may be directing a discharge into the storm drain facility. Observations include any flows, staining, etching or any other signs of a discharge.

Video Inspections

In addition to using personnel to conduct underground inspections, closed circuit television (CCTV) inspections can also reveal evidence of illicit connections. Robotized or mobile television cameras allow visual inspection of storm drains (pipes) too small or dangerous for personnel to enter. Although an excellent method of identifying and documenting illicit connections, CCTV inspection carries higher costs for longer lengths of pipe unless equipment is owned or borrowed from neighboring agencies.

- Once completed, evaluate the information and narrow the investigation based upon the results and repeat as necessary.

Step Three - Monitoring

Monitoring for illegal discharges and illicit connections may include the following steps:

- Review the drainage maps and identify key locations for monitoring locations along the main stream or storm drain as well as the tributaries that are flowing into the storm drain.

- Visit the identified sampling locations and determine their suitability for the investigation. Items to consider include vehicle traffic, accessibility, flows within the channel, etc.

- Conducting initial field screening monitoring

  Field screening consists of a series of qualitative field observations, flow measurement, and field analyses of selected water quality parameters. Information relating to weather conditions, the amount of time since last rainfall/storm discharge, and type of stormwater conveyance facility should also be recorded. Specific observations and results of the field water quality analyses are recorded on a standard field data sheet. The data sheet can also serve as a record of the field visit and should be completed for every site visit regardless of whether samples are collected or not.

  Qualitative field observations should be made during each site visit regardless of whether ponded or flowing water is observed or not. Such observations are intended to provide a general assessment of the site and include variables like odor, water clarity, presence of floatables, visible deposits/stains, and biological status. Evidence of present or past illegal discharges to a municipal storm drain system can often be ascertained by careful field observations. Each field screening location should be photographed to provide additional information and documentation of site conditions. While conducting observations, if evidence of hazardous materials or waste is suspected, appropriate safety precautions must be implemented. If there is imminent danger, immediate notifications to the fire department should be made through 911. Otherwise, notify appropriate AI or spill responder for follow-up action.

- Obtaining flow measurements. Flow measurements should be obtained for each site visit. Flows can be used to estimate pollutant mass loading, prioritize storm drains for future investigation, and/or identify significant changes in discharge that may be indicative of an illegal release upstream. In the absence of a permanent flow measurement installation, several field methods may be employed to measure discharge rates.

- Prepare a monitoring plan and identify the following:
  - Locations and descriptions of the sampling sites;
  - Types of analyses that will be conducted on the samples (nutrients, metals, coliform, etc);
  - Field crews and analytical laboratories that will be used;
  - Days and times that the samples will be collected;
  - Types of samples that will be collected (grab or composite);
  - Types of sample bottles that will be used (plastic, glass, etc.);
  - Types of preservatives that will be used;
  - Holding times that the samples must be analyzed within;
  - Types of Quality Assurance/Quality Control (QA/QC) that will be followed both in the field as well as within the laboratory; and
  - Chain of Custody procedures that will be followed.

- Conduct monitoring according to Sections 10.5.2.1 and/or 10.5.2.2 below

Field Water Quality Analysis

At the start of the investigation, characterization of a suspected illegal discharge source through field water quality analysis. Both flow and concentration measurements are necessary to determine the mass emission of pollutant being discharged and assist Permittee staff to locate a source should there be more than one flow to the site.

In following flows upstream, Permittee staff may find more than one flow converging into a manhole access or junction box. In this case, Permittee staff can use color, clarity, or temperature to distinguish which flow should be followed to determine the source. If these physical indicators are cannot be differentiated, field water quality sampling can be used to determine which is the likely flow source. Water quality testing is also used to verify that a flow being investigated by Permittee staff shows the same characteristics as the original flow identified as being the problem. When the source is identified, Permittee staff should also use field water quality testing to confirm that the source has the same characteristics as the original flow.

Dry weather flow sampling typically involves collection of grab samples using the following sampling procedures:

- Inspect the sample container to confirm that it is clean and dry;
- If practical, collect a grab sample from at about 60 percent of the stream depth (from the surface) in an area of maximum turbulence. Avoid stagnant pools near the edge of flowing streams. Enter the channel downstream of the sampling location and move upstream, disturbing as little of the bottom material as possible;
- Rinse the sample container with the sample at least twice;
- Carry the sample container out of the stream to a stable location where you can perform the field analysis;
- Follow the field water quality analysis kit instructions for the test;
- Record the qualitative observations and field testing results on the field data sheet for subsequent entry into the database. Estimate the flow rate and note any deviations from the standard procedures (for whatever reason), and describe any unusual or noteworthy conditions or results in detail on the bottom of the sheet;
- Water quality meters should be calibrated in the laboratory or office before field use. Calibration solutions should be protected from contamination and not be used after their expiration dates;
- Field meters and cameras should be in proper working order. Make sure that batteries have sufficient voltage to power the equipment for the entire field trip. Recharge or replace them as necessary. Keep extra batteries in the instrument case. Probes should be inspected, cleaned and reconditioned regularly;
- Clean and rinse sampling equipment after returning from the field. Store clean equipment in clear polyethylene bags or storage cases;
- Glassware used in the field (e.g., graduated cylinders for sample dilutions, test kit flasks and/or beakers) should be cleaned immediately after usage. Use laboratory detergent, a brush, and hot tap water or 10% Analytical Grade hydrochloric acid. Rinse three to four times with deionized water and wipe the outside of the glassware dry with a white paper towel. Dry in an inverted position. Store the dry glassware in the cabinets with stoppers intact (volumetric flasks) or in an inverted position (beakers).

Sample Collection for Laboratory Testing

Permittee staff may need to collect samples for analysis by a certified laboratory for water quality monitoring, confirmation sample for a cleanup or evidentiary sample in a civil or criminal case. Reasons for laboratory analysis include: field test kits are not able to obtain results at low concentrations, confirmation of field results, or there is no field test kits for the pollutant of concern and no surrogate parameter. The duties for equipment maintenance and safety are the same as those described above.

Laboratory Sampling Procedures

Laboratory samples are typically grab samples. If a composite sample is required, it is best to use an automatic sampler unless for volatile organics. Sample collection procedures are as follows:

- Use appropriate containers. Laboratories routinely provide pre-cleaned sample bottles with preservatives already added.
  - Rinse the container with the sample at least twice. Do not rinse pre-cleaned, preserved containers, as the preservative will be lost.
  - Use the proper preservatives. Use only analytical or higher grade reagents for preserving samples. Store samples in an ice chest (at 4° C) until custody is transferred to the analytical laboratory directly or via contracted courier.
  - Avoid contaminating the sample. Wear latex or vinyl gloves.
- Collect a representative sample from the stream as described in above sampling procedures for field water quality analysis;
- Record the qualitative observations and field testing results on the field data sheet, noting any deviations from standard procedures (for whatever reason), and describe any unusual or noteworthy conditions or results in detail on the bottom of the sheet;
- Dispose spent reagents, reacted samples, and rinse solutions in the appropriate waste containers. Upon returning to the office or laboratory, decant these wastes into the office or laboratory sewer unless otherwise instructed by the sewering agency. Be sure to clean the equipment (recheck calibration if any results were questionable), and restock reagents (if necessary);
- If filtering samples in the field for dissolved trace metals analysis, do not preserve with HNO3 until after the sample is filtered. If field personnel are submitting unfiltered samples for dissolved trace metals analysis those samples should not be preserved with HNO3;
- Samples collected for laboratory analysis should be submitted to the laboratory as soon as possible after collection. Complete the following tasks:
  - Fill out the chain-of custody form making sure that the sample bottles are correctly labeled;
  - Carefully pack the sample bottles in the cooler;
  - Transport the samples to the laboratory;
  - Complete the chain-of-custody form to transfer the samples to the laboratory.
- Samples should be analyzed using the same methods and detection limits as used by the Dry Weather Monitoring Program (See **DAMP Section 11**) to ensure comparable results.

Step Four – Document, Notify and Report

Once the source investigation is completed it should be properly documented and followed up so that any identified sources are eliminated and necessary notifications are made.

If an illegal discharge or illicit connection is found, the site visit should be documented and appropriate actions taken to ensure that the source of flow is eliminated. If the flow originates in another jurisdiction, investigators should immediately inform the neighboring agency of the situation.

If the source is still not found, and the discharge has ceased, the field investigation should document and map the location of the last observed flow so that the area can be further investigated at a later date.

10.3 Education and Enforcement

10.3.1 Introduction

Enforcement actions are undertaken according to the adopted Water Quality Ordinances and accompanying Enforcement Consistency Guide (**DAMP Section 4.0, Exhibits 4.II and 4.I).** Water pollution cases may be handled administratively or in more serious instances, be prepared for prosecution by the Orange County District Attorney who may prosecute under the applicable sections of the Water Quality Ordinance, State Fish and Game Code, State Water Code, Uniform Fire Code, and Penal Code that address pollutant discharges.

The Permittees have formally designated the staff responsible for carrying out the enforcement actions according to the Enforcement Consistency Guide and update these designations every year as a part of Program Effectiveness Assessment.

As provided for in the Enforcement Consistency Guide, when selecting enforcement options, it is important that the Permittees ensure that violations of a similar nature are subjected to similar types of enforcement remedies. Nonetheless, a more severe enforcement option may be selected when a violator has either a history of noncompliance or has failed to take good faith actions to eliminate continuing violations or to meet a previously imposed compliance schedule.

The Permittees generally utilize four types of remedies including:

- Educational letters;
- Administrative Remedies - Notices of Noncompliance, Administrative Compliance Orders, Cease and Desist Orders;
- Criminal Remedies – Misdemeanors, Infractions, Issuance of Citations or Complaints; and
- Other civil or criminal remedies as appropriate

10.3.2 Choosing the Type of Enforcement

The Enforcement Consistency Guide provides a framework to the Permittees for selecting the type of enforcement that may be pursued. Some of the factors that influence this decision include: the duration and significance of the violation; cooperation and willingness of the responsible party to remedy the conditions; whether the incident is isolated or re-occurring; and whether the violation or potential impacts will affect or harm human health or the environment.

Although the discussion below provides some guidelines on the use of various enforcement options and the Enforcement Consistency Guide is the primary reference for enforcement procedures and processes, each Permittee reserves the right to determine, by their own discretion, how to enforce each violation.

10.3.2.1 Educational Letters

Although the Authorized Inspectors primarily rely on the administrative remedies as discussed below, there are still a few occasions when an enforcement letter is appropriate.

These situations may occur when:

- An authorized inspector believes that the water pollution complaint may be valid, but does not have evidence to substantiate it; and/or
- A second party, or resident, hires a contractor who causes an incident. In this case the contractor should receive the administrative remedy and the resident should receive an educational letter.

A couple of examples include:

- A complaint is filed against a private residence and, upon investigation, the authorized inspector determines that a contractor hired by the resident caused the violation. The appropriate action may be to issue the contractor a Notice of Noncompliance in the field and an enforcement letter to the resident.
- A group of adjacent businesses are suspected of chronic violations, but several inspections produce no hard evidence. An enforcement letter to each shop may be appropriate in this situation, to make the business owners/managers aware of exactly what the regulations are and why they should comply.

Educational brochures, pamphlets, posters, magnets, etc. are included with the letter so that the responsible party has additional information regarding the proper handling/disposal of the materials involved in the complaint (e.g. pool water, concrete, dog waste, etc.).

Educational materials include, but are not limited to, the following topics:

- Carpet Cleaners
- Restaurant Cleaning
- Automotive Service Center
- Gas Station
- Horse and Livestock
- Dog Waste
- Pool Maintenance
- Waste Oil Collection
- Pest Control Products
- Permitted Lot and Pool Drains
- Car Wash Fundraisers

10.3.2.2 Administrative Remedies

The Permittees generally utilize four types of administrative remedies

- Notices of Non-compliance – This is the least onerous enforcement tool and constitutes a basic request that the RP rectify the condition causing or threatening to cause non-compliance with the Ordinance.

  The Notice of Non-compliance may be issued when one or more of the following circumstances exist:

  - The violation or potential impact is not significant and has been short in duration;
  - The RP is cooperative and has indicated a willingness to remedy the conditions;
  - The violation or potential impact is an isolated incident; and,
  - The violation or potential impact does not affect and will not harm human health or the environment.

  Prior to the issuance of an Administrative Compliance Order or a Cease and Desist Order to a responsible party (RP), the Permittee may consider issuing a Notice of Non-compliance, which states the act or acts constituting the violation and directs that the violation be corrected. The Notice of Non-compliance should provide the RP with a reasonable time period to correct the violation before further proceedings are brought against the RP. However, a Notice of Non-compliance should not be the first enforcement method used if circumstances indicate that a more stringent enforcement method is appropriate.

- Administrative Compliance Orders – This is an appropriate enforcement tool in the following circumstances:
  - An actual condition of Non-compliance exists, but the condition cannot be remedied within a relatively short period of time
  - The owner of the property or facility operator has indicated willingness to come into compliance by meeting milestones established in a reasonable schedule
  - The violation causes a discharge to the storm drain system but does not pose an immediate threat to human health or the environment
- Cease and Desist Orders – This is appropriate when the immediate action of the RP is necessary to stop an existing discharge, which is occurring in violation of the Ordinance. The cease and desist order may also be appropriately issued as a first step in ordering the removal of nuisance conditions, which threaten to cause an unauthorized discharge of pollutants if exposed to rain or surface water runoff.

  The cease and desist order may be issued when one or more of the following circumstances exist:
  - The violation or threat is immediate in nature and may require an emergency spill response or immediate nuisance abatement if left unattended;
  - The violation or threat exhibits a potential situation that may harm human health or the environment;
  - The AI's contacts with the property owner or facility operator indicate that further authority may need to be demonstrated before remedial action is forthcoming; and,
  - The AI's prior Notices of Non-compliance have not obtained a favorable response.
- Other Administrative Procedures or Civil Actions
  - Where the Permittee has issued a local permit, the AI may elect to initiate administrative proceedings to suspend, revoke or modify the permit if the permit terms are violated or if changed conditions occur; and
  - In consultation with the Enforcing Attorney, the AI may also consider the use of an injunction or other civil enforcement proceedings.

10.3.2.3 Criminal Remedies

Criminal enforcement is appropriate when evidence indicates that the responsible party has acted willfully with intent to cause, allow to continue, or conceal a discharge in violation of the Ordinance.

The Permittees generally utilize three types of criminal remedies

- Issuance of Citation - Where criminal enforcement is indicated, and the AI witnesses the violation, the AI may cause issuance of a citation to the responsible party. The citation shall include:

- The name and address of the violator
- The provisions of the Ordinance violated
- The time and place of required appearance before a magistrate

The responsible party should sign the citation thereby promising to appear. If the cited party refuses to sign the citation, the AI may cause the arrest of the discharger, or may refer the matter to the Enforcing Attorney for the filing of a criminal complaint and the issuance of a warrant for arrest.

- Infractions - At the discretion of the Enforcing Attorney, misdemeanor acts may be treated as infractions. Factors that the EA may use in determining whether the misdemeanor is more appropriately treated as an infraction may include but are not limited to:
  - The duration of the violation or threatened violation
  - The compliance history of the person, business or entity
  - The effort made to comply with an established compliance schedule
  - The existence of prior enforcement actions
  - The actual harm to human health or the environment from the violation

  An infraction is punishable by a fine of not more than $100 for a first violation, $200 for a second violation, and a fine not exceeding $500 for each additional violation occurring within one year.

- Misdemeanors – Criminal enforcement is appropriate when the evidence indicates that the violator of the Ordinance has acted willfully with intent to cause, allow to continue or conceal a discharge in violation of the Ordinance.

10.3.2.4 Administrative Hearings

The ordinance provides for appeals of the Authorized Inspector's decisions to a designated Hearing Officer. The final decisions of Hearing Officers (or city counsel, if a hearing officer's decision is not final or is appeal able to the city counsel) are appeal able to the court with proper jurisdiction under statutory review procedures. For further information on the administrative hearing process, see the Enforcement Consistency Guide (**DAMP Section 4.0, Exhibit 4.I**).

10.4 Training and Outreach

Education and training of municipal and/or other agency staff is one of the keys to a successful stormwater program. This is especially true with the ID/IC Program because the Permittees will be in the public eye when conducting inspections, investigation efforts and proceeding with enforcement actions. To assist the responsible municipal and/or other agency staff in understanding the ID/IC Program, a number of different training modules have been or are being developed.

In addition to Permittee sponsored training, staff are also encouraged to attend training seminars or workshops related to stormwater management and water quality conducted by other organizations.

In order to adequately address the different areas of the ID/IC Program, seven training modules have been developed and are included in **Appendix B-10.**

The training modules include:

- Program Management Training- Introductory (Exhibit B-10.I-A)

  This training module is targeted towards new stormwater program managers and addresses the overall program framework, objectives and approach. Its goal is to help program managers gain a broader understanding of how the program is developed and implemented at a local level. It also includes the tools necessary to: determine program responsibilities, conduct investigations, implement proper enforcement procedures and report incidents of non-compliance.

- Program Management Training - Experienced **(Exhibit B-10.I-B)**

  This training module is generally targeted for experienced stormwater program managers and provides an annual refresher on the overall program framework, objectives and approach so that the managers understand how the program is implemented and reported on at a local level. It also includes information on the goals, objectives and information needs for the Program Effectiveness Assessment.

- Authorized Inspector Training - Introductory **(Exhibit B-10.II-A)**

  This training module is generally targeted for new authorized inspectors, spill responders and/or code enforcement officers and addresses the responsibilities of the field personnel implementing the ID/IC Program. This training includes reporting requirements, spill response, inspection, clean-up and enforcement procedures.

- Authorized Inspector Field Implementation **(Exhibit B-10.II-B)**

  This training module is targeted towards authorized inspectors, spill responders and/or code enforcement officers and addresses the responsibilities of the field personnel implementing the ID/IC Program. This training module helps staff understand various difficult field situations that may be encountered by providing visual examples and explanations of BMP implementation, previous inspections and water pollution complaints/spill incident responses. More specifically, it addresses these issues using "hands-on" case specific information and encourages exchange of experience and insight among inspectors/responders.

- Sewage Spill Response Training - Introductory **(Exhibit B-10.III-A)**

  This training module is targeted towards municipal authorized inspectors or spill responders as well as sanitation/sanitary district and city utility staff responsible for responding to sewage spills and specifically focuses on the responsibilities of the field personnel in responding to sanitary sewer overflows (SSOs). The training addresses a sewage spill from both the sanitation and municipal stormwater perspective and provides a framework for responders to follow to ensure that both sets regulatory requirements are met. This module stresses the importance of inter-agency coordination, sanitary sewer overflow response plan and notification and reporting requirements.

- "Hands-On" Sewage Spill Response Training - Experienced **(Exhibit B-10.III-B)**

  This training module is targeted towards experienced municipal authorized inspectors and spill responders as well as sanitation district staff and specifically focuses on the key steps involved when responding to sewage spills. The training includes a classroom and field portion and walks the inspectors through a simulated sewage spill so that the responders can identify the key issues and understand how to respond.

- Fire Department Activities **(Exhibit B-10.IV)**

  This training module was developed as a train the trainer module and is targeted towards fire department personnel. The module provides an overview of the ID/IC program framework and focuses on fire department personnel responsibilities in implementing BMPs during non-emergency activities. In addition, the module also provides BMP guidance during various types of emergency incidents.

- Investigative Guidance Manual **(Exhibit B-V)**

  This training module is targeted towards authorized inspectors, spill responders and/or code enforcement staff responsible for responding to and investigating illegal discharges. The module provides detailed instruction on the use of the Model Investigative Guidance Manual and addresses: fundamental techniques necessary for conducting legally defensible investigations, investigative procedures, environmental sampling, photographs, and enforcement. This module was conducted in a "hands-on" format which allows the attendees to participate in exercises for record keeping, hazards identification, environmental sampling, photography and enforcement.

10.5 Definitions

For the purposes of this program, the following definitions are provided:

Illegal discharge - any discharge to a municipal separate storm sewer that is not composed entirely of stormwater and that is not covered by a National Pollutant Discharge Elimination System (NPDES) permit. An illegal discharge or "prohibited discharge" refers to the disposal of non-stormwater materials such as paint or waste oil into the storm drain or the discharge of waste streams containing pollutants to the storm drain.

Illicit connection - an undocumented and/or unpermitted physical connection from a facility to the storm drain system.

The following definitions of terms are relevant for sewage spills:

- Sanitary Sewer System—A wastewater collection system including sewers, pipes, pumps or other conveyances that convey sewage wastewater (e.g. domestic, commercial and industrial wastewaters) to a treatment plant. The sanitary sewer collection system also includes the temporary storage and conveyance facilities.

- Sewage Collection Agency—City or any other public entity (e.g., water, sewer, sanitary, sanitation district) responsible for the operation, maintenance, repair and replacement of the sanitary sewer system (from a regulatory standpoint, considered as a wastewater discharger even if responsibility is placed with a regional treatment and disposal agency).

- Sewage Spill/Sanitary Sewer Overflow (SSO) — Any spill, release, discharge or diversion of wastewater from a sanitary sewer system. The definition has been expanded in recent years to include the discharges of treated (partial, secondary or to Title 22 standards) wastewater as well as other human wastes (e.g., septic tank overflows, etc.) that are explicitly prohibited from entering municipal storm drain system and subsequently the waters of the US. Sewage spills/overflows, irrespective of source or level of processing, constitute an illegal discharge to the municipal storm drain system.

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9.0 EXISTING DEVELOPMENT

9.1 Program Summary

9.1.1 Program Overview

Stormwater runoff naturally contains numerous constituents; however, urbanization and urban activities (including industrial and commercial activities and general public activities in residential areas typically increase constituent concentrations to levels that may impact water quality. Pollutants associated with stormwater include sediment, nutrients, bacteria and viruses, oil and grease, metals, organics, pesticides, and gross pollutants (floatables).

The Existing Development Program addresses implementation of BMPs to manage discharges from industrial facilities, selected commercial businesses, restaurants and food facilities, residential development, and common interest areas/homeowner associations (CIA/HOA). To address the five distinct sectors of existing development the program consists of five separate components: Industrial, Commercial, Food Facility, Residential, and CIA/HOA Model Programs, although due to sufficient similarities the industrial and commercial programs have been combined together for the description of program elements in this section.

The objectives of the Model Existing Development Program are to provide the following:

- A program framework for reducing the adverse impact that industrial/commercial sites and residential areas may have on water quality;
- An iterative process to promote effective monitoring and response to problems as they are discovered, and
- Methodologies to meet specific NPDES Permit requirements.

The Program is intended to be implemented as described in **Section A-9** of each Permittee's Local Implementation Plan. Use of the procedures in the Model Program are intended to promote countywide consistency among the Permittees, which provides for uniform receiving water quality protection and program effectiveness assessment.

9.1.2 Program Commitments

Program commitments can be summarized under two distinct program areas commercial/industrial (including food facilities) and residential and CIA/HOAs, as follow:

Commercial/Industrial Facilities:

- Inventory: An inventory of specified categories commercial/industrial sites must be established and maintained. The inventory must include site characteristic, permitting, and watershed information and be updated annually.
- Prioritization: Commercial/industrial facilities must be prioritized as High, Medium, or Low threat to water quality. There are mandatory High priority industrial (SAR and SDR) and commercial (SDR only) sits based upon site activity and proximity

to environmentally sensitive areas. Sites that are more distant from sensitive receiving waters are determined to be High, Medium, or Low priority based upon a consideration of size, activities, and likelihood of a pollutant discharge.

- BMP Requirements: BMP requirements emphasize Pollution Prevention and Source Control BMPs. BMP fact sheets have been compiled and are recommended for particular industrial and commercial activities.
- Inspection: Inspection of commercial/industrial facilities must be performed to verify that BMPs are being implemented and maintained to protect water quality. Specified inspection frequencies are determined by the type of activity (industrial or commercial) and the prioritization of the site.
- Enforcement: Compliance with ordinances must be enforced. Any enforcement action must be consistent with the Enforcement Consistency Guide (i.e. involve consideration of water quality threat and harm, event duration and frequency and a site manager's intent and cooperation).

Residential and CIA/HOA, San Diego Region:

- Inventory: A map-based inventory of residential and CIA/HOA areas, incorporating drainage and receiving water information, must be established and maintained.
- Prioritization: There are mandatory High priority areas based upon certain activities and proximity to environmentally sensitive areas.
- BMP Requirements: Minimum BMP requirements emphasize pollution prevention. BMP fact sheets have been complied and are recommended for particular residential activities. An enhanced level of implementation and outreach is required in High priority areas.
- Implementation: Baseline implementation involves jurisdiction-wide education and outreach. Enhanced Implementation involves geographically targeted outreach.
- Enforcement: Compliance with ordinances must be enforced. Any enforcement action must be consistent with the Enforcement Consistency Guide (i.e. involve consideration of water quality threat and harm, event duration and frequency and a site manager's intent and cooperation).

9.1.3 Regulatory Requirements

Regulatory Framework for the Model Industrial/Commercial Program

The Commercial/Industrial Model Program was developed in order to fulfill the Commercial/Industrial activity commitments and requirements of:

- Sections IX and X of the Santa Ana Regional Water Quality Control Board Municipal NPDES Stormwater permit, Order No. R8-2002-0010
- Sections F.3.b and F.3.c of the San Diego Regional Water Quality Control Board Municipal NPDES Stormwater permit, Order No. R9-2002-0001

The implementation of industrial storm water pollution reduction programs takes place at the Federal, State and local level. Code of Federal Regulations Part 40 Section 122.26(a) (4) requires industrial stormwater dischargers to notify operators of municipal storm drain systems receiving industrial stormwater discharges. Although the Regional Boards administer and enforce the Industrial and Construction Permit, in many cases, discharges in violation of the Industrial and Construction Permit may also be a violation of the Permittees' Water Quality Ordinance. When this occurs, the Permittees coordinate enforcement under their Water Quality Ordinance with the Regional Board.

Regulatory Framework for the Model Food Facility Inspection Program

The *Food Facility Inspection Program* was developed to fulfill the commitments and requirements of:

- Section VI-7 of the Santa Ana Regional Water Quality Control Board Municipal NPDES Stormwater permit, Order No. R8-2002-0010.
- Section F.3.c of the San Diego Regional Water Quality Control Board Municipal NPDES Stormwater Permit (SD Permit), Order No. R9-2002-0001.

The program described in this section is intended to respond to the specific requirement within Santa Ana Order No. R8-2002-0010 referenced above, but at the same time attempts to bridge compliance requirements with those in San Diego Order No. 9-2002-0001. While the San Diego Order contains no specific requirement for a separate food facility inspection program, Permittees are required by Section F.3.c to inventory all eating establishments within their jurisdiction as high priority commercial sites/sources and inspect them on an "as needed" frequency.

Regulatory Framework for the Model Residential Program

The Residential Model Program fulfills the residential activity and related commitments and requirements of:

- Section F.3.d of the San Diego Regional Water Quality Control Board Municipal NPDES Stormwater Permit (SD Permit), Order No. R9-2002-0001.

These permits include requirements for either public education and outreach, or a specific residential component. The San Diego permit explicitly outlines a residential component; the Santa Ana permit is more general about residential requirements.

Regulatory Framework for the Model Common Interest Area and Homeowners Association Activities Program

The *Common Interest Areas/Homeowners Associations (CIA/HOA) Activities Program* was developed to fulfill the existing CIA/HOA activity commitments and requirements of:

- Section F.6 of the San Diego Regional Water Quality Control Board Municipal NPDES stormwater Permit (SD Permit), Order No. R9-2002-0001.

New developments containing CIA/HOA areas are also required to develop Water Quality Management Plans (WQMPs) in order to ensure that permanent post-construction BMPs are incorporated into the development. Nevertheless, applicable portions of this program will also

apply to newly constructed developments once those developments are complete and are in the operation phase.

9.1.4 Program Evaluation and Assessment

In order to determine the effectiveness of the program element, every year the Permittees prepare an Annual Report providing a comprehensive description of all of the activities they have conducted to meet the requirements of each component of the DAMP. Permittees will be required to provide quantitative information and qualitative information (narrative) for the implementation of key elements of their Existing Development programs. Collection and reporting of the key elements will allow for the identification of trends that can be evaluated to identify where modifications may be necessary to improve effectiveness.

Key elements for reporting and assessment effectiveness include:

- Number of BMPs implemented
- Prioritization of facilities
- Number and level of enforcement actions

Once the determination is made that modifications are necessary to a program, a schedule for implementation of changes will need to be determined. Once the modifications are in place, effectiveness assessment will continue as outlined in this section, and the iterative evaluation and improvement cycle will continue.

Questionnaires have been developed to assist the Permittees in compiling their Annual Reports for each of the program elements. Specific details are summarized in each of the model program sections, questionnaires and detailed instructions are provided in **Appendix A-9**.

9.2 Model Industrial/Commercial Program Details

Implementation of this Program promotes countywide consistency among the Permittees and provides for uniform receiving water quality protection and program effectiveness assessment. This Program also provides each Permittee with the tools to develop jurisdictional implementation plans (see **Appendices A-9.1 and A-9.2**).

The Program consists of six components as depicted in **Figure 9-1,** which represents the relationship of each component to the others and to the program as a whole. Information gathered for each section of the Model Program supports subsequent sections.

Figure 9-1 Commercial/Industrial Model Program Structure

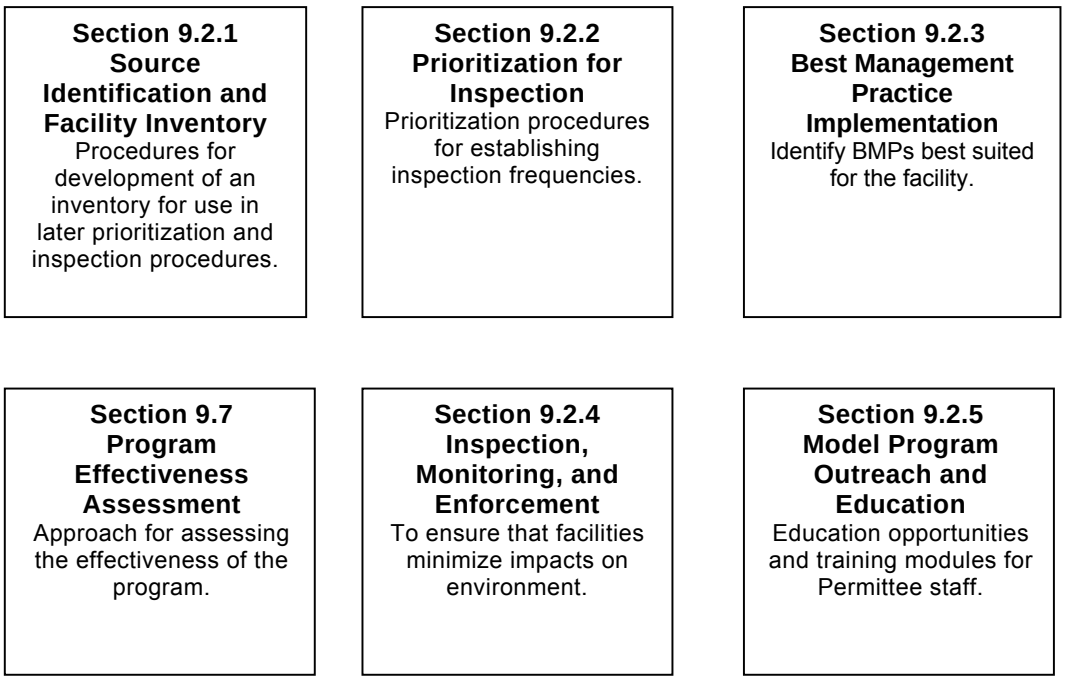

The implementation of industrial storm water pollution reduction program is unique in that it takes place at the Federal, State and local level as illustrated in **Figure 9-2**. Storm water regulations associated with the Federal Clean Water Act (CWA) require specific categories of industrial facilities, which discharge storm water associated with industrial activity (industrial storm water), to obtain an NPDES permit. Those facilities which discharge industrial storm water either directly to surface waters or indirectly, through municipal separate storm drains, must be covered by a permit.

Figure 9-2 Regulatory Framework Associated with Industrial Stormwater

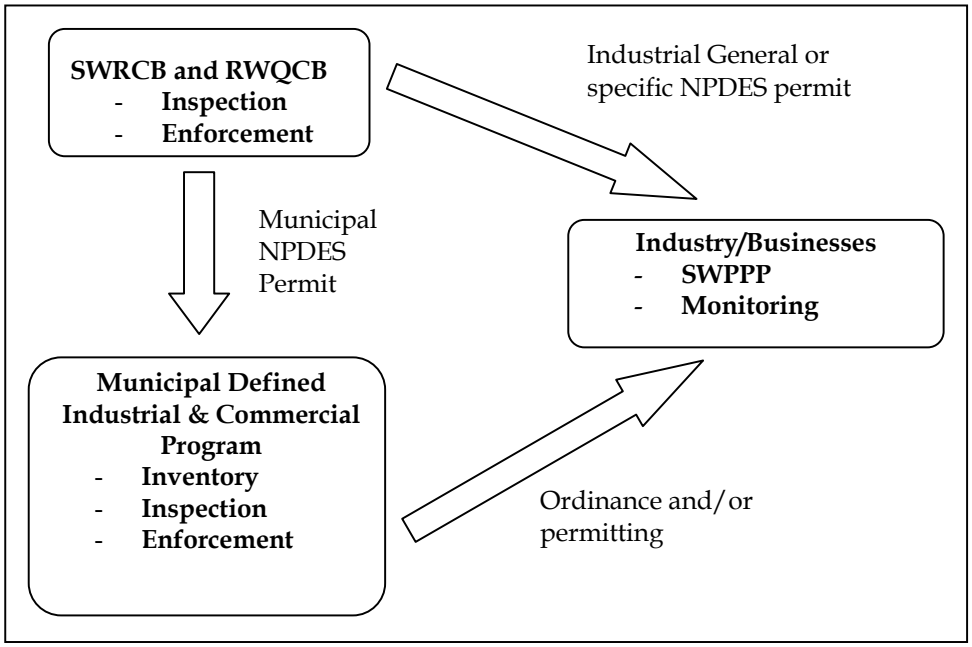

In California, the SWRCB through the nine RWQCB administers the NPDES stormwater permitting program. For industrial facilities the SWRCB elected to issue a statewide general permit that applies to all storm water discharges requiring a NPDES permit.

Parallel to the State Industrial General Permit is individual NPDES permits issued by the Regional Boards to the municipal separate storm sewer system (MS4). Two such permits have been issued to Orange County and the corresponding municipalities, one for the south County issued by the San Diego RWQCB and one for the north County issued by the Santa Ana RWQCB. Common to both permits is the requirement to prepare an Industrial/ Commercial program, which requires the municipality to address industries covered by the State Industrial General Permit.

9.2.1 Source Identification and Facility Inventory

9.2.1.1 Commercial/Industrial Facility Inventory Procedure

This section describes procedures that are used to generate and maintain comprehensive inventories of commercial/industrial facilities operating within a Permittee's jurisdiction. The list of commercial/industrial facilities should be updated annually.

The inventories serve as the basis for the prioritization, inspection, enforcement, and reporting elements of the program, and assist a Permittee in identifying which best management practices or controls should be implemented in order to reduce potential pollutant discharges to the storm drain system. The steps involved in compiling necessary inventory information for commercial/industrial program are listed below. The first three steps of the inventory process are the same for all Permittees, however the fourth step varies for San Diego and Santa Ana Permittees.

- Identify the commercial/industrial facilities within the jurisdiction (using the regional and local information sources listed below)
- Identify watershed where commercial/industrial facilities are located
- Identify potential pollutants and activities with the potential to discharge pollutants
- Identify any commercial/industrial that:
  - (San Diego Permittees) discharges into or is adjacent to an ESA. Facilities that do discharge into or is adjacent to an ESA will also have to determine if the facility discharge includes pollutants of concern
  - (Santa Ana Permittees) are tributary to and within 500 feet of an ASBS

STEP 1- Identify Commercial/Industrial Facilities within Jurisdiction

Industrial Facilities to be Included in the Inventory

Industrial facilities within a Permittee's jurisdiction must be inventoried. This requirement is applicable to all types of industrial sites regardless of whether the industrial site is subject to the State General NPDES permit or other individual NPDES permit. To properly identify which facilities should be included in the industrial inventory follow these procedures:

- Review the complete list of Standard Industrial Classification (SIC) codes (http://www.swrcb.ca.gov/stormwtr/industrial.html) and assign each facility an SIC code.
- Once SIC codes are assigned, consult United States Environmental Protection Agency (USEPA) guidance on specific categories of storm water discharges associated with industrial facilities. The USEPA provides eleven categories of industrial facilities which may produce "storm water discharges associated with industrial activity": (http://www.epa.gov/npdes/pubs/list.pdf) These are listed in **Table 9-1** at the end of this step.

- Consult **Appendix A-9** for the specific SIC codes included in each of the categories outlined by USEPA.

Commercial Facilities to be Included in the Inventory

The range of facilities to be inventoried varies between the San Diego RWQCB and Santa Ana RWQCB jurisdictions:

- Permittees in the San Diego RWQCB jurisdiction are only required to inventory those sites/sources shown in **Table 9-2**.
- Permittees in the Santa Ana RWQCB jurisdiction are required to inventory only those commercial sites/sources shown in **Table 9-3.**

If any commercial site/source listed in **Table 9-2** or **Table 9-3** is inventoried as an industrial site, it is not necessary to also inventory it as a commercial site/source.

Information to be Collected

Baseline information about the facility must be collected and entered into the Commercial/Industrial inventory spreadsheet (**See Appendix A-9**). The baseline information includes:

- Business name
- Physical address
- Mailing address
- Contact information (names and phone numbers of key personnel)
- SIC code (for industrial facilities) and narrative description of services/products provided
- General industrial WDID number (if applicable)

Refer to **Section 9.2.2.3**, Inventory Database Protocols and Maintenance, for a full accounting of additional information to be entered into the spreadsheet. As much of this information as possible should be entered into the spreadsheet during the initial inventory and should be verified during inspections. Following inspections the inventory should be revised to included corrected or additional information.

Sources of Inventory Information

Several regional and local information sources have been identified by the County to provide the Permittees with existing data to populate the inventory spreadsheet. The information sources are divided into two separate categories, Regional and Local.

- The County of Orange will assist the Permittees by obtaining and distributing the data from the Regional sources.
- Each Permittee will be responsible individually for obtaining the data from the Local sources.

- Each Permittee is ultimately responsible for populating its inventory spreadsheets with data from both sources. Permittees should review databases, business listings, and other available sources to identify facilities currently operating within the Permittee's jurisdiction. Examples of regional and local sources include:

Regional – to be obtained from the County

- Orange County Fire Authority
- Orange County Health Care Agency

Local – to be obtained by each Permittee

- SWRCB Regional Databases of Statewide General Industrial Permitted Facilities (http://www.swrcb.ca.gov/stormwtr/indpmt.html)
- City Fire Departments
- City Business Licensing and Permitting Offices
- Chambers of Commerce
- Local solid waste haulers
- Commercially available business listing (e.g., Yellow Pages, Dun and Bradstreet database, etc.)

Table 9-1 USEPA Categories of Industrial Facilities
Category One (i): Facilities with Storm Water Effluent Limitations or Toxic Effluent Standards
Category Two (ii): Manufacturing Facilities
Category Three (iii): Active or Inactive Mineral, Metal, Oil and Gas Mining or Extraction Facilities
Category Four (iv): Hazardous Waste, Treatment or Disposal Facilities
Category Five (v): Landfills
Category Six (vi): Recycling Facilities
Category Seven (vii): Steam Electric Plants
Category Eight (viii): Transportation Facilities
Category Nine (ix): Treatment Works
Category Ten (x): Construction Activity*
Category Eleven (xi): Light Industrial Activity
*Although Category Ten (x), Construction Activity is included in the definition of "storm water discharges associated with industrial activity", construction activities require construction storm water permits, not industrial storm water permits, under the NPDES Storm Water Program. Refer to the Construction Model Program (Section 8.0) for further guidance.

Table 9-2 San Diego RWQCB Jurisdiction High Priority Commercial Sites/Sources to be Inventoried[1,2]
Automobile mechanical repair, maintenance, fueling, or cleaning
Airplane mechanical repair, maintenance, fueling, or cleaning
Boat mechanical repair, maintenance, fueling, or cleaning
Equipment repair, maintenance, fueling, or cleaning
Automobile and other vehicle body repair or painting
Mobile automobile or other vehicle washing
Automobile (or other vehicle) parking lots and storage facilities
Retail or wholesale fueling
Pest control services[3]
Eating or drinking establishments[4]
Mobile carpet, drape or furniture cleaning[3]
Cement mixing or cutting
Masonry
Painting and coating
Botanical or zoological gardens and exhibits
Landscaping
Nurseries and greenhouses
Golf courses, parks and other recreational areas/facilities
Cemeteries
Pool and fountain cleaning
Marinas
Port-a-Potty servicing

1. SDRWQCB Permittees are also responsible for identifying and inventorying other high priority commercial sites/sources that may contribute a significant pollutant load to the MS4, are tributary to a 303(d) impaired water body, where the site or source generates pollutants for which the water body is impaired, and are within or directly adjacent to or discharging directly to a coastal lagoon or other receiving water within an environmentally sensitive area (ESA).
2. For the purposes of this program, sources/activities are considered to be associated with businesses that provide services related to the particular source/activity. For example, landscaping may include landscaping businesses such as retailers, installers, and maintenance. Automobile parking lots and storage facilities may include car dealerships, car rental companies, RV storage lots, and facilities or businesses (e.g. shopping malls) with large parking areas.
3. Businesses that may operate within several cities but are housed/have offices in another city are assumed to be formally inventoried within the home city.
4. Note that although eating and drinking establishments are explicitly covered in the Commercial component section of the San Diego RWQCB permit, Permittees in this jurisdiction are NOT required to conduct inventory and inspection procedures for these facilities. These responsibilities will be undertaken by the County Health Care Agency which is required to implement the Existing Development – Restaurant Inspection Program within this jurisdiction. This program involves at a minimum an annual inventory of these facilities and inspection on an annual basis.

Table 9-3 Santa Ana RWQCB Jurisdiction Commercial Sites/Sources to be Inventoried[1, 2]
Automobile mechanical repair, maintenance, fueling, or cleaning
Automobile and other vehicle body repair or painting
Mobile automobile or other vehicle washing[3]
Mobile carpet, drape or furniture cleaning[3]
Mobile high pressure or steam cleaning[3]
Painting and coating
Nurseries and greenhouses
Landscape and hardscape installations
Pool, lake and fountain cleaning[3]
Eating and drinking establishments[4]

1. SARWQCB Permittees are also responsible for identifying and inventorying other commercial sites/sources that may contribute a significant pollutant load to the MS4, are tributary to and within 500 feet of an area defined by the Ocean Plan as an Area of Special Biological Significance.
2. For the purposes of this program, sources/activities are considered to be associated with businesses that provide services related to the particular source/activity. For example, landscaping may include landscaping businesses such as retailers, installers, and maintenance. Automobile parking lots and storage facilities may include car dealerships, car rental companies, RV storage lots, and facilities or businesses (e.g. shopping malls) with large parking areas.
3. Businesses that may operate within several cities but are housed/have offices in another city are assumed to be formally inventoried within the home city.
4. Note that eating and drinking establishments in the Santa Ana RWQCB jurisdiction are not explicitly covered in the Commercial component section of the permit. However, Santa Ana Permittees are required to implement the Existing Development – Restaurant Inspection Program required by Section VI (Legal Authority/Enforcement) of the Santa Ana permit. This program involves at a minimum an annual inventory of these facilities and inspection as determined by the prioritization process outlined in Section 9.4.3. Based on these requirements, eating and drinking establishments should be incorporated into this program along with the other listed commercial sites/sources.

STEP 2- Identify Watershed to which Commercial/Industrial Facility Discharges are Tributary

For each commercial/industrial facility identified, the watershed(s) in which the facility is located must be determined and included in the inventory.

Orange County contains thirteen watersheds, which are summarized in **Table 9-4** and illustrated in **Figure 9-3**. It should also be noted that ocean sections along the shore of a watershed are still considered a part of that watershed.

Table 9-4 Orange County Watersheds

Region	Watershed
Santa Ana RWQCB (Region 8)	San Gabriel/Coyote Creek
	Anaheim Bay/Huntington Harbour
	Santa Ana River
	Newport Bay
	Newport Coastal Streams
San Diego RWQCB (Region 9)	Laguna Coastal Streams
	Aliso Creek
	Dana Point Coastal Streams
	San Juan Creek
	San Clemente Coastal Streams
	San Mateo Creek

Figure 9-3 Watershed Boundary Map for Orange County

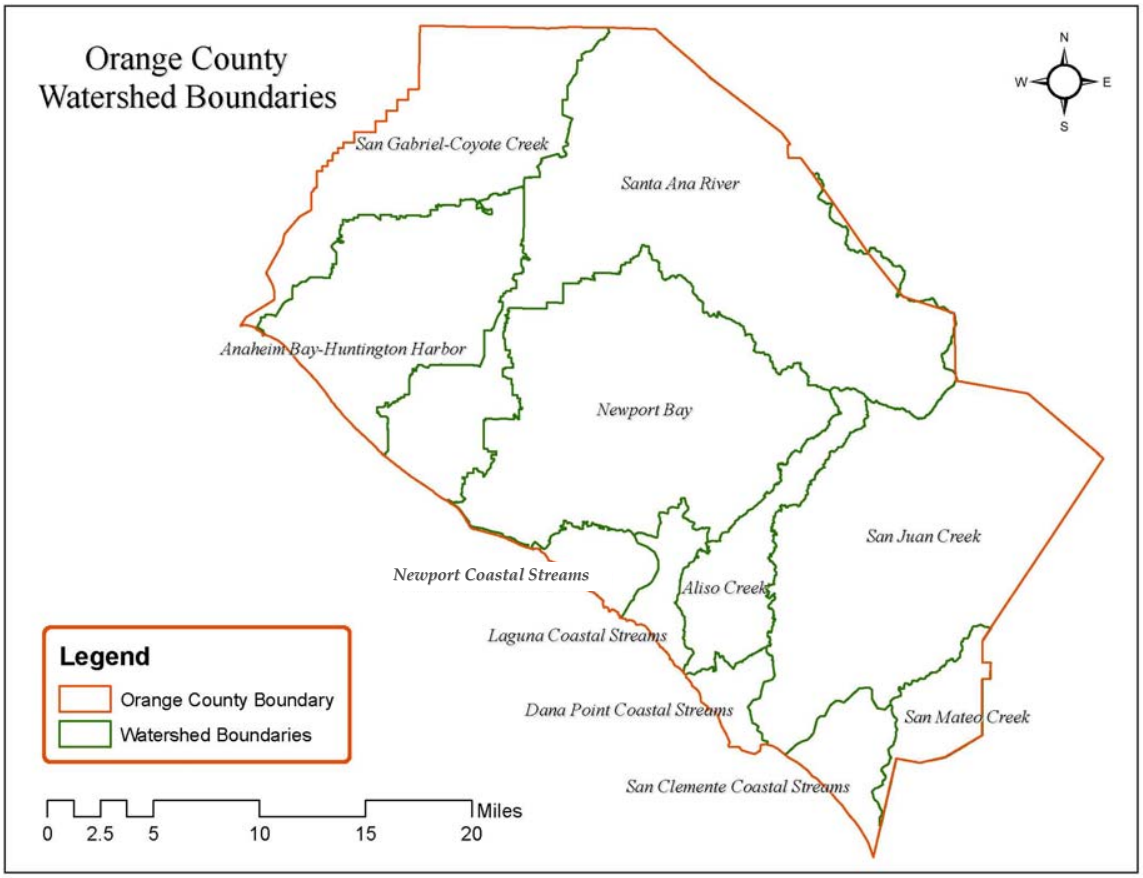

STEP 3- Identify Potential Pollutants and all Activities with the Potential to Discharge Pollutants

The potential pollutant generating activities and/or potential pollutants for each commercial/industrial facility will be identified and included in the inventory. A list of commercial/industrial activities that have the potential to generate pollutants and their corresponding pollutants are presented in **Table 9- 5**.

Table 9-5 Potential Pollutants Generated by Commercial/Industrial Activities

Activity	Potential Pollutants								
	Sediments	Nutrients	Metals	Organics & Toxicants[1]	Floatable Materials	Oxygen-Demanding Substances	Oil & Grease	Bacteria	Pesticides
Automobile mechanical repair, maintenance, fueling, or cleaning	X	X	X	X		X	X		
Airplane mechanical repair, maintenance, fueling, or cleaning	X	X	X	X		X	X		
Boat mechanical repair, maintenance, fueling, or cleaning	X	X	X	X		X	X		
Equipment repair, maintenance, fueling, or cleaning	X	X	X	X		X	X		
Automobile and other vehicle body repair or painting			X	X			X		
Mobile automobile or other vehicle washing	X	X	X			X	X		
Automobile (or other vehicle) parking lots and storage facilities			X		X		X		
Retail or wholesale fueling			X	X	X		X		
Pest control services									X
Eating or drinking establishments		X		X	X	X	X	X	X
Mobile carpet, drape or furniture cleaning	X			X					
Cement mixing or cutting	X								
Masonry	X								
Painting and coating			X	X			X		
Botanical or zoological gardens and exhibits	X	X			X	X		X	X
Landscaping and hardscape installations	X	X			X	X		X	X
Nurseries and greenhouses	X	X			X	X		X	X
Golf courses, parks and other recreational areas/facilities	X	X			X	X		X	X
Cemeteries	X	X			X	X		X	X
Pool, fountain, and lake cleaning		X	X	X	X	X		X	
Marinas			X	X	X	X	X	X	
Port-a-Potty servicing		X			X	X		X	

[1] This includes all toxic materials other than pesticides.

STEP 4- Identify any Commercial/Industrial Facilities Located Adjacent to and/or Discharging to an Environmentally Sensitive Water Body or Area of Special Biological Significance

Determine if commercial/industrial facilities may potentially impact a water body considered to be environmentally sensitive water body (ESA) or Area of Special Biological Significance (ASBS). The extent of this determination depends on whether the Permittee is in the San Diego RWQCB or Santa Ana RWQCB jurisdiction. Specific guidance is presented below.

San Diego RWQCB Jurisdiction

In the San Diego area the Permittees must determine whether the facility is adjacent to and/or discharging to an ESA, and if that ESA is a 303(d) listed water body, is the does the facility have the potential to discharge pollutants of concern.

ESA Identification

An ESA exists if any of the following designations have been applied to the water body of concern:

- Clean Water Act 303(d) listed impaired water body (see **Table 9-6**)
- Areas designated as Areas of Special biological Significance (ASBS) by the SWRCB
- Water bodies designated with the RARE beneficial use by the SWRCB
- Water bodies located within areas designated as preserves or equivalent under the Natural Community Conservation Planning Program
- Areas designated as Critical Aquatic Resources
- Any other equivalent ESAs that contain water bodies which have been identified to be of local concern.

The map provided by the County **(see Appendix A-9)** may be used to assist in the identification and classification of commercial/industrial facilities to determine if they potentially impact an ESA.

Directly Adjacent Definition

A facility is considered "directly adjacent" when located within **200 feet** of an Environmentally Sensitive Area (ESA). A facility is "discharging directly to" an ESA when discharge from a drainage system that is composed entirely of flows from the subject facility or activity enters an ESA. Alternatively, discharge from an urban area that co-mingles with downstream flows prior to an ESA is not subject to this requirement.

Pollutants of Concern Identification

In order to complete the inventory of commercial/industrial facilities, it must be determined whether any facility activities have the potential for discharging pollutants of concern to a 303(d) listed water body *for which the water body is impaired*. For example, does the activity discharge heavy metals into a heavy metal impaired water body?

The Permittee must combine the information collected in Step 3 (identification of pollutants from the commercial/industrial business) and cross-reference it with the information from **Table 9-6** regarding impaired water bodies and associated pollutants of concern to determine if the business is discharging the pollutant of concern.

Santa Ana RWQCB Jurisdiction

In the Santa Ana region the Permittees must determine whether the facility is adjacent to and/or discharging to an ASBS.

An ASBS is a designation applied by the SWRCB. The map provided by the County **(see Appendix A-9)** may be used to assist in the identification and classification of commercial/industrial facilities to determine if they potentially impact an ASBS.

A facility is considered "directly adjacent" when located within **500 feet** of an ASBS. A facility is discharging directly to an ASBS when discharge from a drainage system that is composed entirely of flows from the subject facility or activity enters an ASBS. Alternatively, discharge from an urban area that co-mingles with downstream flows prior to an ASBS is not subject to this requirement.

Table 9-6 Waterbody Pollutants of Concern

Region	Orange County Water Body	Watershed	Bacteria Indicators/ Pathogens	Metals	Nutrients	Pesticides	Toxicity	Trash	Salinity/TDS/Chlorides	Turbidity
Region 8 Santa Ana	Anaheim Bay	C		X		X				
	Bolsa Chica			X						
	Buck Gully Creek	H	X							
	Huntington Beach State Park	C	X							
	Huntington Harbour	D	X	X		X				
	Los Trancos Creek (Crystal Cove Creek)	H	X							
	Newport Bay, Lower	G		X		X				
	Newport Bay, Upper (Ecological Reserve)	G		X		X				
	Santiago Creek Reach 4	E								
	San Diego Creek, Reach 1	F	X			X				
	San Diego Creek, Reach 2	F		X			X			
	Seal Beach	A	X							
	Silverado Creek	E	X						X	
Region 9 San Diego	Aliso Creek (Mouth)	J	X							
	Aliso Creek (20 miles)	J	X		X		X			
	Dana Point Harbor	K	X							
	Pacific Ocean Shoreline, Aliso Beach HAS	J	X							
	Pacific Ocean Shoreline, Dana Point HAS	K	X							
	Pacific Ocean Shoreline, Laguna Beach and San Joaquin Hills HSAs	I	X							
	Pacific Ocean Shoreline, Lowe San Juan HAS	L	X							
	Pacific Ocean Shoreline, San Clemente HAS	M	X							
	Prima Deshecha Creek	M			X					X
	San Juan Creek (lower one mile)	L	X							
	San Juan Creek (Mouth)	L	X							
	Segunda Deshecha Creek	M			X					X

Intentionally Blank

9.2.1.3 Inventory Database Protocols and Maintenance

The Permittee will be inspecting commercial/industrial facilities at the frequencies specified in **Section 9.2.4** of this Model Program. The inspections provide current information on commercial/industrial facilities that is used to annually update the inventory database and map of commercial/industrial facilities. Information that should be collected during the inspection and included in the inventory database includes:

Characteristic or Criteria	**Information Collected or Verified**
Business Name	Business Name
Physical Address Information	Street Number, Street Direction, Street Name, Street Suffix, City or Unincorporated Area, Zip Code, Business Phone Number, Business Fax Number, email address, APN.
Mailing Address Information	Street Number, Direction, Street Name, Street Suffix, Suite Number/Letter, City or Unincorporated Area, Zip.
Business Contact Name	Full Name of Owner, Operator, Manager, etc.
Emergency Contact	24 hour Emergency Contact Phone Number
Lot Size	Total Square Feet of Lot (or if Multi-Tennant Lot: Enter Total Square Feet of Business).
SIC Code	SIC Code 1 and Other Pertinent SIC Codes if Applicable.
Industrial-Specific Info	WDID Number (Statewide Industrial Permit), Is Facility Subject to SARA Sect. 313, Title III?
Commercial-Specific Info	Description of Commercial Activity
Watershed	The hydrologic unit within the Permittee's jurisdiction where the facility resides, Longitude and Latitude.
GIS Information (optional)	Latitude, Longitude, etc.
Local Licensing/Permits	Business License Number, Special Permits, etc.
Potential pollutants	Outcome of Step 3
Adjacent to and/or Discharge to ESA/ASBS	Outcome of Step 4
Pollutants of concern into an ESA	Outcome of Step 4 (SDRWQCB only)
Comments/Notes	

9.2.2 Prioritization for Inspection

9.2.2.1 Introduction

This section outlines the procedures for prioritizing commercial/industrial facilities for inspection frequency, based on the threat to water quality. Potential threats to water quality at each commercial/industrial facility can be determined by evaluating a variety of site-specific factors according to the criteria outlined below. Priorities may be high, medium or low.

The prioritization processes for commercial and industrial facilities are discussed separately in this section. Although the processes are similar, specific permit requirements necessitate that commercial and industrial facilities be prioritized separately.

9.2.2.2 Prioritization of Industrial Facilities

Prioritization involves two phases:

- Initially classifying a facility as being a high, medium or low priority for inspection based on site information; and
- Subsequently confirming or reclassifying the facility based on inspections, field observations and additional information.

The first phase can be accomplished administratively using the data provided in the inventory of industrial facilities. The latter phase is completed following the initial inspection of each industrial facility.

Initial Prioritization

The following industrial facilities are mandatory high priority facilities:

San Diego RWQCB Jurisdiction

- Facilities subject to section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA).
- Facilities which are tributary to a Clean Water Act Section 303(d) impaired water body, where the facility generates pollutants for which the water body is impaired.
- Facilities within or directly adjacent to (i.e. within 200 feet) or discharging directly to a receiving water within an Environmentally Sensitive Area (ESA).
- Facilities subject to the state Industrial General Permit (excluding those facilities that have been approved for a No Exposure Certification).
- All other facilities that the Permittee determines are contributing significant pollutant loading to its MS4, regardless of whether such facilities are covered under the statewide General Industrial Permit or other NPDES permits.

Santa Ana RWQCB Jurisdiction

- Facilities subject to section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA).
- Facilities which are tributary to or directly adjacent to (i.e. within 500 feet) an area defined by the Ocean Plan as an Area of Special Biological Significance (ASBS).
- Facilities subject to the state Industrial General Permit.
- Facilities with a high potential for, or history of, unauthorized, non-storm water discharges.

In addition to the industrial facilities noted above, the Permittee should review other facilities to determine whether they should be high priority sites. In some cases, the Permittees may not have all the required information necessary to properly evaluate a facility for prioritization. In this case, a preliminary site visit may be warranted such that the Permittee can collect the needed information and verify the prioritization.

A ranking system using the following criteria is used to prioritize the sites:

- Type of activity (SIC code)
- Materials used in the industrial process
- Type(s) and quantities of waste products generated
- Potential for discharge of pollutants
- Non-stormwater discharges
- Size of the facility (% impervious surface)
- Proximity to a receiving water bodies

The ranking criteria and scores have been provided in **Table 9-7** below. The recommended prioritization may be adjusted within a LIP to fit the needs of individual Permittees. The sum from each line item is the total ranking for a specific Industrial Facility. If the total ranking is equal to or greater than 25, then a high priority is assigned. If the total ranking is less than 25 but equal to or greater than 15, then a medium priority is assigned. If the total ranking is less than 15, then a low priority is assigned. Each prioritized facility should be inspected at a minimum in accordance with the inspection schedule presented below in **Section 9.2.4.**

Field Verification of Prioritization

After initial prioritization, the Permittee should perform facility inspections; subsequently, each site is re-evaluated to determine whether the initial prioritization was adequate. Facilities possessing a No Exposure Certification (NEC) may be eligible for a lesser priority classification. Permittees should contact the RWQCB to obtain information regarding which facilities have NECs.

Table 9-7 Ranking System for Prioritization of Industrial Facilities

Category	0	1	2	3	4	5	Score
Area/Activity	Pollutant Generation Unlikely - 0% activities outdoors	Pollutant Generation Possible - 0-25% activities outdoors		Pollutant Generation Likely - 25-75% activities outdoors		Pollutant Generation Highly Likely - >75% activities outdoors	
Raw Materials Used	No raw materials used or no ability to generate pollutants (e.g., all materials kept indoors or properly stored outdoors)	Minimal used, likely to generate pollutants (e.g., nearly all materials kept indoors or properly stored outdoors)		Some used or stored at this facility, possible to generate pollutants ((e.g., some materials not fully covered during storage or some material may occasionally be left uncovered outside))		Materials are routinely stored or handled outdoors and discharge may carry pollutants to storm drains (e.g., routine outdoor storage of uncovered raw materials)	
Wastes Generated (Pollutants of Concern)	Pollutants of concern not generated or are properly disposed					Pollutants of concern are generated and improperly disposed	
Pollutant Discharge Potential	All identified BMPs are fully implemented			All identified BMPs are partially implemented		None of the identified BMPs are implemented, or unknown	
Non-Stormwater Discharges	No known non-stormwater discharges, all programs implemented			Suspected non-stormwater discharges may be occurring, but not observed		Non-stormwater discharges have been observed and/or verified	
Size of Facility		Small (<5,000 square feet)		Medium (>5,000 - <100,000 square feet)		Large (>100,000 square feet)	
Proximity to ESA Water Body (San Diego Permit ONLY)		Low (>I mile from ESA)		Medium (> 200 feet, < 1 mile from ESA)		*High (direct discharge or adjacent – within 200 feet)	
Proximity to ASBS (Santa Ana Permit ONLY)		Low (>I mile from ASBS)		Medium (> 500 feet, < 1 mile from ASBS)		*High (direct discharge or adjacent – within 500 feet)	
* Facilities with a high proximity to and ESA or ASBS are automatically considered to be high priority facilities. If the total ranking is equal to or greater than 25, then a high priority is assigned. If the total ranking is less than 25 but equal to or greater than 15, then a medium priority is assigned. If the total ranking is less than 15, then a low priority is assigned.							

9.2.2.3 Prioritization of Commercial Facilities

San Diego RWQCB Jurisdiction

Permittees within the San Diego RWQCB jurisdiction are **NOT** required to prioritize commercial facilities. However, they are required to inventory a set of pre-determined high priority commercial facilities/activities. See **Table 9-2** for a list of those commercial facilities/activities that are automatically considered "high priority" within the San Diego RWQCB jurisdiction. However, if field observations, monitoring data or complaints indicate that another commercial site/source may contribute a significant pollutant load, the site should be inspected and ranked in accordance with the prioritization scheme outlined below, or as adjusted within an individual LIP.

Santa Ana RWQCB Jurisdiction

Permittees within the Santa Ana RWQCB jurisdiction are required to prioritize commercial facilities. See **Table 9-3** for a list of those commercial facilities/activities that must be inventoried and prioritized within the Santa Ana RWQCB jurisdiction. However, these are NOT automatically considered "high priority".

Prioritization for commercial facilities in the Santa Ana RWQCB jurisdiction involves two phases:

- Initially classifying a facility as being a high, medium or low priority for inspection based on site information; and
- Subsequently confirming or reclassifying the facility based on inspections, field observations and additional information.

Initial Prioritization

The first phase can be accomplished administratively using the data provided in the inventory of commercial/industrial facilities. The latter phase will be completed following the initial inspection of each commercial/industrial facility.

Santa Ana RWQCB Permittees must consider the following site attributes to evaluate the potential threat to water quality and subsequent inspection priority for commercial facilities:

- Type of Commercial Activity
- Magnitude of Commercial Activity
- Location of Commercial Activity
- Potential for Discharge of Pollutants to the MS4
- History of Un-Authorized Stormwater Discharges

The ranking criteria and scores have been provided in **Table 9-8** below. The recommended prioritization may be adjusted within a LIP to fit the needs of individual Permittees. The sum from each line item is the total ranking for a specific Commercial

facility. If the total ranking is equal to or greater than 20, then a high priority is assigned. If the total ranking is less than 20 but equal to or greater than 10, then a medium priority is assigned. If the total ranking is less than 10, then a low priority is assigned. Each prioritized facility should be inspected at a minimum in accordance with the inspection schedule presented below in **Section 9.2.4.1**.

Field Verification of Prioritization

Initially, the Permittees may not have all the required information necessary to properly evaluate a facility for prioritization. In this case, a preliminary site visit may be warranted such that the Permittee can collect the needed information and verify the prioritization. Facilities possessing a No Exposure Certification (NEC) may be eligible for a lesser priority classification. An NEC designation must be accomplished through the jurisdictional regional board and is awarded if the facility meets the No Exposure criterion.

Table 9-8
Ranking System for Prioritization of Commercial Facilities

Category	0	1	2	3	4	5	Score
Area/Activity	Pollutant Generation Unlikely - 0% activities outdoors	Pollutant Generation Possible - 0-25% activities outdoors		Pollutant Generation Likely - 25-75% activities outdoors		Pollutant Generation Highly Likely - >75% activities outdoors	
Pollutant Discharge Potential	All identified BMPs are fully implemented			All identified BMPs are partially implemented		None of the identified BMPs are implemented, or unknown	
Non-Stormwater Discharges	No known non-stormwater discharges, all programs implemented			Suspected non-stormwater discharges may be occurring, but not observed		Non-stormwater discharges have been observed and/or verified	
Size of Facility		Small (<5,000 square feet)		Medium (>5,000 - <100,000 square feet)		Large (>100,000 square feet)	
Proximity to ASBS		Low (>I mile from ASBS)		Medium (> 500 feet, < 1 miles from ASBS)		*High (direct discharge or adjacent – within 500 feet)	
* Facilities with a high proximity to and ASAB are automatically considered to be a high priority facilities If the total ranking is equal to or greater than 20, then a high priority is assigned. If the total ranking is less than 20 but equal to or greater than 10, then a medium priority is assigned. If the total ranking is less than 10, then a low priority is assigned.							

9.2.3 Best Management Practice (BMP) Implementation

The purpose of this section is to identify those BMPs best suited for deployment at a commercial/industrial facility based upon the type of facility and activities that are conducted on-site.

9.2.3.1 BMP Implementation

BMPs are crucial to the success of storm water pollution control. In order to be effective, BMPs must be appropriate to the application and properly implemented. If the desired result is not being achieved, the BMPs should be assessed and modified or, if necessary, changed. The change could mean utilizing a new BMP technology or use of an existing BMP technology. BMPs must be selected that are appropriate to prevent or mitigate pollution generated from the specific activities at the site, and should be selected based on the information gained from facility inspections.

Each Permittee should require the implementation of any number of the designated BMPs at each commercial/industrial facility based on site-specific conditions in order to limit that facility's impact upon receiving water quality. If particular BMPs are infeasible at any specific site, other equivalent BMPs should be implemented. Permittees may find it necessary to develop a schedule for implementation of the BMPs. In addition, each Permittee may require implementation of additional controls for commercial/ industrial facilities tributary to 303(d) impaired water bodies (where a site generates pollutants for which the water body is impaired) or discharging directly to coastal lagoons or other receiving water bodies within environmentally sensitive areas. Where applicable, additional controls are identified in the fact sheets as optional.

Pollution prevention controls will be used as the first line of defense and include measures such as staff training and public education. For the purposes of this Model Program, pollution prevention is defined as any practice that reduces or eliminates the creation of pollutants. Reducing the amount of wastes generated by training employees to create as little waste as possible while performing daily activities is an example of pollution prevention. Source controls will be implemented to further reduce the amount of water and pollutants released into the environment resulting from commercial/industrial activities.

9.2.3.2 BMP Activity Fact Sheets

Model BMP fact sheets have been compiled and include a description of specific minimum source control BMPs for common industrial and commercial activities that may discharge pollutants (see **Appendix A-9**). Specific BMP recommendations may be adjusted within an individual LIP. Where applicable, optional controls have been identified that should be considered for implementation at high priority facilities.

Typically each fact sheet contains the following sections:

- Pollution Prevention
- Suggested Best Management Practices

- Training
- References and Resources

Common Commercial/Industrial activities/sources and their corresponding BMP fact sheets are presented in **Table 9-9**.

Table 9-9 Commercial/Industrial Activities/Sources and Corresponding Fact Sheets

Activities/Sources[1]	Fact Sheets
Automobile mechanical repair, maintenance, fueling, or cleaning	IC18. VEHICLE AND EQUIPMENT FUELING IC19. VEHICLE AND EQUIPMENT MAINTENANCE AND REPAIR IC20. VEHICLE AND EQUIPMENT WASHING AND STEAM CLEANING
Airplane mechanical repair, maintenance, fueling, or cleaning	IC1. AIRPLANE MAINTENANCE AND REPAIR IC18. VEHICLE AND EQUIPMENT FUELING IC19. VEHICLE AND EQUIPMENT MAINTENANCE AND REPAIR IC20. VEHICLE AND EQUIPMENT WASHING AND STEAM CLEANING
Boat mechanical repair, maintenance, fueling, or cleaning	IC13. OVER WATER ACTIVITIES IC18. VEHICLE AND EQUIPMENT FUELING IC19. VEHICLE AND EQUIPMENT MAINTENANCE AND REPAIR IC20. VEHICLE AND EQUIPMENT WASHING AND STEAM CLEANING
Equipment repair, maintenance, fueling, or cleaning	IC18. VEHICLE AND EQUIPMENT FUELING IC19. VEHICLE AND EQUIPMENT MAINTENANCE AND REPAIR IC20. VEHICLE AND EQUIPMENT WASHING AND STEAM CLEANING
Automobile and other vehicle body repair or painting	IC14. PAINTING, FINISHING, AND COATINGS OF VEHICLES, BOATS, BUILDINGS, AND EQUIPMENT IC19. VEHICLE AND EQUIPMENT MAINTENANCE AND REPAIR
Mobile automobile or other vehicle washing	IC20. VEHICLE AND EQUIPMENT WASHING AND STEAM CLEANING
Automobile (or other vehicle) parking lots and storage facilities	IC15. PARKING AND STORAGE AREA MAINTENANCE
Retail or wholesale fueling	IC18. VEHICLE AND EQUIPMENT FUELING
Pest control services	IC7. LANDSCAPE MAINTENANCE IC21. WASTE HANDLING AND DISPOSAL
Eating or drinking establishments	IC22. EATING AND DRINKING ESTABLISHMENTS
Mobile carpet, drape or furniture cleaning	IC4. CARPET CLEANING
Cement mixing or cutting	IC5. CONCRETE AND ASPHALT PRODUCTION, APPLICATION, AND CUTTING
Masonry	IC5. CONCRETE AND ASPHALT PRODUCTION, APPLICATION, AND CUTTING

Table 9-9 Commercial/Industrial Activities/Sources and Corresponding Fact Sheets	
Building Maintenance and Light Construction	IC3. BUILDING MAINTENANCE IC5. CONCRETE AND ASPHALT PRODUCTION, APPLICATION, AND CUTTING IC6. CONTAMINATED OR ERODIBLE SURFACES AREAS
Outdoor Activities	IC6. CONTAMINATED OR ERODIBLE SURFACES AREAS IC9. OUTDOOR DRAINAGE FROM INDOOR AREAS IC10. OUTDOOR LOADING/UNLOADING OF MATERIALS IC11. OUTDOOR PROCESS EQUIPMENT OPERATIONS AND MAINTENANCE IC12. OUTDOOR STORAGE OF RAW MATERIALS, PRODUCTS, AND CONTAINERS
Painting and coating	IC14. PAINTING, FINISHING, AND COATINGS OF VEHICLES, BOATS, BUILDINGS, AND EQUIPMENT
Botanical or zoological gardens and exhibits	IC2. ANIMAL HANDLING AREAS IC7. LANDSCAPE MAINTENANCE IC8. NURSERIES AND GREENHOUSES
Landscaping and hardscape cleaning	IC7. LANDSCAPE MAINTENANCE
Nurseries and greenhouses	IC8. NURSERIES AND GREENHOUSES
Golf courses, parks and other recreational areas/facilities	IC6. CONTAMINATED OR ERODIBLE SURFACES AREAS IC7. LANDSCAPE MAINTENANCE
Cemeteries	IC7. LANDSCAPE MAINTENANCE
Pool and fountain cleaning	IC16. POOL AND FOUNTAIN CLEANING
Marinas	IC13. OVER WATER ACTIVITIES
Port-a-Potty servicing	IC21. WASTE HANDLING AND DISPOSAL
1. All activities should refer to IC 17 SPILL PREVENTION AND CLEANUP	

9.2.4 Inspection, Monitoring, and Enforcement

The inspection and monitoring program will help to ensure that commercial and industrial facilities are minimizing their impacts on the environment. This chapter describes procedures for the inspection and monitoring of commercial and industrial facilities operating within a Permittee's jurisdiction. The first part of this chapter addresses the inspection requirements that a Permittee should address in its Commercial/ Industrial Jurisdictional Urban Runoff Management Program. The second part provides information on the monitoring program for use by San Diego RWQCB jurisdiction Permittees. In addition, notification and enforcement procedures for facilities found to be out of compliance are discussed.

9.2.4.1 Inspection

Both the Santa Ana RWQCB permit and the San Diego RWQCB permit require the inspection of commercial and industrial facilities identified in the inventory and prioritization procedures described in **Sections 9.4.2 and 9.4.3**. The Permittee will generally conduct one of two types of inspections: compliance inspections and follow-up inspections.

Compliance Inspections

- Initial compliance inspections should be announced so that the inspector can meet with responsible facility official(s) (e.g., owner, superintendent, compliance

manager, engineering consultant, etc.) in order to provide more efficient communication of the storm water requirements and inspection goals. The inspection will focus on current facility operations and activities, BMPs currently in use, and the effectiveness of those BMPs. This inspection will also focus on verifying inventory spreadsheet information and, whenever possible, provide out reach education to facility staff. All re-occurring compliance inspections will cover the same information as an initial compliance inspection, but will typically be unannounced in order to verify compliance and that BMPs are being effectively implemented.

Follow-up Inspections

- Generally, these inspections will be similar to an initial compliance inspection except that a) they will focus primarily on areas where a facility was deemed to be non-compliant, and b) the inspections may be announced or unannounced, depending on which course of action the Permittee deems will be most conducive to continued facility compliance.

Compliance Inspection Frequency

The language regarding frequency of inspections differs somewhat between the two permits; **9-10** outlines these differences and the subsequent sections give practical guidance on inspection frequency for Permittees to follow.

Table 9-10 Compliance Inspection Frequencies for Commercial/Industrial Facilities

	Priority	Santa Ana RWQCB	San Diego RWQCB
Industrial	High	Annually	Annually or biannually[1]
	Medium	Biannually	As-needed[2]
	Low	Once per permit cycle	As-needed[2]
Commercial	High	Once per permit cycle	As-needed[2]
	Medium	As-needed[2]	N/A
	Low	As-needed[2]	N/A

1. See explanation below
2. At least once per permit cycle (every 5 years) is recommended

Both the San Diego RWQCB and the Santa Ana RWQCB permits require that high priority industrial facilities be inspected, at a minimum:

- Annually,
- OR (for those Permittees covered under the San Diego RWQCB permit)
    - Bi-annually (once every two years) for any site that the Permittee certifies all of the following in a written statement to the RWQCB:
    - Permittee has record of the industrial facility's Waste Discharge Identification Number (WDID#) documenting facility's coverage under the statewide General Industrial Permit; and
    - Permittee has reviewed the Industrial facility's Storm Water Pollution Prevention Plan (SWPPP); and
    - Permittee finds SWPPP to be in compliance with all local ordinances, permits, and plans; and
    - Permittee finds that the SWPPP is being properly implemented on site.

In addition to the information provided in above in **Table 9-10**, Permittees should note:

- As a practical matter, "as needed" should be understood to mean at least once per permit cycle, so that the requirements of both permits are essentially the same.
- If the San Diego RWQCB has conducted an inspection of a site during a particular year, the requirement for the responsible Permittee to inspect this site during the same year is satisfied. Permittees in the San Diego RWQCB jurisdiction should contact the RWQCB to determine which facilities have been inspected.
- In addition to the inspection frequencies described above, the Permittee must also investigate all complaints of illegal discharges from a Commercial/Industrial facility made by the public or by another agency or those violations arising from the results of dry-weather field screening or analytical monitoring program.
- Inspections of “restaurants” and “eating and drinking establishments” will be conducted by the County Health Care Agency as part of its Restaurant Inspection Program.

Follow-up Inspection Frequency

In accordance with the Santa Ana permit, for those industrial facilities deemed to be non-compliant in the Santa Ana RWQCB jurisdiction, the Permittee will perform compliance inspections once a month until said industrial facilities are shown to be compliant, and then once every four months for a full calendar year after the facility achieves compliance. The Santa Ana Permit does not specify a follow-up inspection frequency for commercial facilities. The San Diego Permit does not specify a follow-up inspection frequency for either industrial or commercial facilities. The rating system below can be used by an inspector to quantify the level of non-compliance and a recommended re-inspection frequency to assure compliance (**Tables 9-11 and 9-12**).

1 Rating - There are no significant deficiencies that require correction.

2 Rating - The project has minor deficiencies and do not present a likely threat of non-compliant discharge. The inspector will list each of the minor deficiencies and can include corrective actions. Minor deficiencies include the following:

- Any non-stormwater or waste management BMPs improperly maintained.
- Evidence of active wind erosion on unstabilized slopes/stock piles.

3 Rating - Major deficiencies that result in or present a potential threat of non-compliant discharge. Any 3 rating may trigger RWQCB notification requirements described below. Major deficiencies are defined as follows:

- Hazardous materials or waste is stored within the facility without implementation of BMPs.
- Approved BMPs not installed or operating correctly.
- Any observed discharge of stormwater or non-stormwater that, in the judgment of the inspector, is generated by facility, and is uncontrolled.

Table 9-11
Recommended Follow-up Inspection Frequency of Industrial Facilities

Facility Priority	RWQCB Area	Level of Compliance at each Site		
		1 No significant deficiencies	**2** Minor deficiencies	**3** Major deficiencies
HIGH	Santa Ana	As needed[1]	Facility self-certification then as needed[1]	Once per Month (minimum) until in Compliance then every Four Months for one Calendar Year
	San Diego	As needed[1]	Facility self-certification As needed[1]	Once per Month until in Compliance then as needed[1]
MEDIUM	Santa Ana	As needed[1]	Facility self-certification As needed[1]	Once per Month until in Compliance then as needed[1]
	San Diego	As needed[1]	Facility self-certification As needed[1]	Once per Month (minimum) until in Compliance then every Four Months for one Calendar Year
LOW	Santa Ana	As needed[1]	Facility self-certification As needed[1]	Once per Month until in Compliance then as needed[1]
	San Diego	As needed[1]	Facility self-certification As needed[1]	Once per Month until in Compliance then as needed[1]

(1) As determined appropriate by inspector to assure compliance

Table 9-12
Recommended Follow-up Inspection Frequency of Commercial Facilities

Facility Priority	RWQCB Area	Level of Compliance at each Site		
		1 No significant deficiencies	**2** Minor deficiencies	**3** Major deficiencies
HIGH	Santa Ana	As needed[1]	Facility self-certification then as needed[1]	Once per Month (minimum) until in Compliance then as needed[1]
	San Diego	As needed[1]	Facility self-certification or as-needed[1]	Once per Month until in Compliance then as needed[1]
MEDIUM	Santa Ana	As needed[1]	Facility self-certification or as-needed[1]	Once per Month until in Compliance then as needed[1]
	San Diego	N/A	N/A	N/A
LOW	Santa Ana	As needed[1]	Facility self-certification As needed[1]	Once per Month until in Compliance then as needed[1]
	San Diego	N/A	N/A	N/A

(1) As determined appropriate by inspector to assure compliance

Site Inspection Procedures and Documentation

Each Permittee must conduct site inspections for compliance with its ordinances and permits. Such inspections include review of:

- Material and waste handling and storage practices,
- Pollution control BMP implementation and maintenance, and
- Evidence of past or present unauthorized, non-storm water discharges.

The Permittee must inspect Commercial/ Industrial facilities to determine if the facilities and operations are in compliance with applicable permits and local ordinances, to review BMP implementation, to assess BMP effectiveness and to verify inventory information used for facility prioritization. Equally important, Permittees must document their visits and findings.

The typical site inspection effort consists of four stages:

- Pre-inspection preparation
- Approaching a site
- Facility inspection
- Record-keeping

In order to properly document all inspections and gather the necessary information for the reporting program effectiveness assessment (see **Section 9.1.4**), inspection procedures and inspection forms have been developed (**see Appendix A-9**). The inspection forms provide a series of questions about specific activities taking place at a facility, as well as a list of suggested corrective actions that can be implemented should a problem be found.

For those facilities that require self-certification, Permittee must request the following information in addition to any basic facility information normally collected at an inspection:

- Identification of the reason a follow-up inspection/self-certification was required
- Photographs documenting any corrective measures taken
- Written, dated description of what corrective measures were taken and when those measure went into effect at the facility

Permittees will need to confirm receipt and acceptance of any self certification submittals with facilities in a timely matter.

9.2.4.2 Industrial Analytical Monitoring (San Diego Permit Area)

The basic approach followed for the monitoring program is to ensure compliance with guidelines developed based upon requirements laid out in the Monitoring and Reporting Program No. R9-2002-0001, NPDES No. CAS0108740 (San Diego NPDES permit), issued by the San Diego Regional Water Quality Control Board (Section F.3.b(5)). The San Diego jurisdiction Permittees may either conduct the monitoring themselves or require the industries to conduct the monitoring.

Facilities Required to Monitor

Each high threat industrial facility within the San Diego RWQCB's jurisdiction is required to conduct monitoring of runoff. As discussed previously in this report, industrial facilities are classified as high priority industries based on a number of factors, including type(s) of industrial activity, wastes generated, pollutant discharge potential, and proximity to environmentally sensitive areas.

Specific industrial classifications covered by this monitoring program include:

- Facilities subject to storm water effluent limitations guidelines, new source performance standards, or toxic pollutant effluent standards
- Manufacturing facilities
- Oil and gas / mining facilities
- Hazardous waste treatment, storage, or disposal facilities
- Landfills, land application sites, and open dumps
- Recycling facilities
- Steam electric power generating facilities
- Transportation facilities
- Sewage or wastewater treatment works
- Manufacturing facilities where industrial materials equipment or activities are exposed to storm water

Monitoring Objectives

Monitoring is focused on characterizing the nature of stormwater discharges from industrial facilities, tracking changes in these characteristics over time, targeting management actions to address any identified problems, and assessing the effectiveness of those management actions implemented. Thus, monitoring is an essential part of a long-term, results-based assessment strategy intended to improve water quality through the reduction of problematic industrial discharges.

Minimum Monitoring Requirements

At a minimum the monitoring program for industrial sites should include data collection from two storm events per year on the following constituents:

- Any pollutant listed in effluent guidelines subcategories where applicable;
- Any pollutant for which an effluent limit has been established in an existing NPDES permit for the facility.
- Oil and grease or total organic carbon (TOC)
- pH

- Total suspended solids (TSS)
- Specific conductance; and
- Toxic chemicals and other pollutants that are likely to be present in storm water discharges.
- Any pollutant that may be used, stored, or generated at the facility, which may be discharged to a water body or a tributary to a 303(d) water body, unless the facility can demonstrate approval of No Exposure Certification.

Monitoring Approach

The specific monitoring approaches used for stormwater monitoring, including information on implementation, design, methods, frequency, documentation, etc. are presented in **Appendix A, Section A-9**.

9.2.4.3 RWQCB Notification and Enforcement

Non-Compliance Notification

Permittees are required to notify the appropriate RWQCB when non-compliance is noted. The following 3-step notification procedure should be followed:

STEP 1: Determine whether an event of non-compliance presents a threat to human or environmental health

The Permittees may use the following criteria to determine whether an event of non-compliance poses a threat to human or environmental health:

- The event poses a significant or imminent threat to the quality of surface or ground waters and/or their beneficial uses.
- The event results in a spill or discharge of hazardous materials in excess of reportable quantities (as listed in 40 CFR Part 117 or 302).
- The event results in a spill or discharge of hazardous materials requiring a hazardous materials emergency response (see **Section 10**).

STEP 2: Identify procedures for notifying the RWQCB

The Permittee must provide oral notification to the RWQCB within 24 hours of the discovery of a non-compliant site meeting the aforementioned criteria. This must be followed by written notification within 5 days of the discovery.

STEP 3: Follow-Up Inspections

Should an inspected site demonstrate non-compliance, the Permittee must adjust the inspection frequency as detailed above in **Section 9.2.4.1**.

Enforcement Procedures

Permittee inspectors with enforcement authority must issue enforcement actions to commercial/ industrial facility owners and operators determined to be out of compliance. The

inspectors must document each observed violation. Depending on the severity of the violation, enforcement actions can range from a verbal warning to civil or criminal court actions with monetary fines.

Because enforcement will be conducted in steps for specific facilities, the Permittees must provide for an inventorying of violations, and where a particular facility is in the enforcement scheme. The enforcement steps include:

- Notice of Non-compliance
- Administrative Compliance Order
- Cease and Desist Orders
- Infractions and Misdemeanors

Enforcement for the Commercial/Industrial Program should follow the Enforcement Consistency Guidelines (see **Section 10**).

9.2.5 Model Program Outreach and Education

In this section additional Permittee business outreach options are presented. In addition to County sponsored training, Permittees may also attend training seminars or workshops related to stormwater management and water quality conducted by other organizations.

Additional outreach efforts for the commercial and industrial program may include the following:

Webpage - The Permittee should consider including a stormwater page on their webpage. The commercial/industrial page could include:

- Links to on-line versions of the Fact Sheets.
- An on-line version of the Permittee's customized version of the Commercial/Industrial Program.
- Links to other pollution prevention sites and regulator sites (USEPA, SWRCB, etc.). A few examples include:

  http://www.epa.gov/
  http://www.swrcb.ca.gov/
  http://www.swrcb.ca.gov/stormwtr
  http://cfpub.epa.gov/npdes/stormwater/menuofbmps/menu.cfm

- Any other information identified as relevant to post on the commercial/industrial program page.

Mailings - Either general in nature or tailored to specific inventoried businesses. Mailings represent an important business outreach tool and would include information on the State General Permit, tips for protecting water quality, list of training programs or conferences, municipal contacts, etc.

Workshops - Probably one of the most common and effective methods for educating the regulated communities is the workshop. Workshops may be aimed at specific businesses or at

the entire regulated community. Workshops should be no longer than one day (preferably a half day) and be conveniently located close to the audience. Workshops may address the overall stormwater program and the municipality/business responsibilities or be hands on and address a specific subject (e.g. spill prevention).

Business Outreach - Outreach targeting specific businesses can be an effective way to educate owners/operators in the proper implementation of best management practices. Outreach may include distribution of business category fact sheets that provide technical information on implementing pollution prevention for sectors such as automobile service facilities, mobile cleaning, food service facilities, and landscape maintenance. Business specific presentations, workshops, and training may also be conducted.

Brochures and Posters – An important component of an outreach program is the development and distribution of brochures, posters, fact sheets, etc. These materials are usually business specific and provide short and succinct summaries of the issues, BMPs requirements, and follow up information. They can range from multi-color glossy brochures to black and white summary sheets. The following materials have been developed by the Public Education Committee and are available for use by the Permittees:

Brochures
Mobile Detailing and the Water Quality Act
Water Quality Guidelines for Exterior Restaurant Cleaning Operations
Water Quality Guidelines for Carpet Cleaning Activities
Water Quality Guidelines for Permitted Lot & Pool Drains Pool Maintenance
Water Quality Guidelines for Horse & Livestock Activities

Posters
Food/Restaurant Industry
Auto Repair Industry
Good Gas Station Operating Practices

9.3 Food Facility Inspection Program Details

The definition of "restaurants" and "eating and drinking facilities" used for the program will be those fixed facilities that process unpackaged food that have been identified by the Orange County Health Care Agency (HCA). The Countywide HCA inventory of food facilities will be reviewed each year and revised to reflect:

- The addition of new or redeveloped food facilities from the prior year
- The removal of food facilities that have no potential to impact the storm drain system

9.3.1 Pollution Prevention Inspections for Wastes, Washwater and Trash Bin Enclosures

Pollution prevention inspections will be conducted a minimum of once per reporting period (July to June) at the food facilities identified in the inventory in order to meet Santa Ana Order No. R8-2002-0010, Section VI -7 a-d requirements. A program goal is to conduct additional inspections up to an optimal level of three times a year based on the experience of HCA in maintaining standards during their food facility inspections. Such additional inspections would be subject to resource availability.

9.3.2 Pollution Prevention Inspections for Grease Traps and Interceptors

Pollution prevention inspections will be conducted a minimum of once per reporting period (July to June) at the food facilities identified in the inventory in order to meet Santa Ana Order No. R8-2002-0010, Section VI -7 e requirements. A program goal is to conduct additional inspections up to an optimal level of three times a year based on the experience of HCA in maintaining standards during their food facility inspections. Such additional inspections would be subject to resource availability.

9.3.3 Enforcement

While education on appropriate practices is a key element of achieving improved water quality at food facilities, enforcement is a component of the pollution prevention inspections. Facilities that are unresponsive to BMP requirements or have a spill that enters the storm drain system as a result of improper maintenance of grease traps/interceptors would be subject to the following enforcement actions:

- Actions taken by HCA under its authority under the Health and Safety Code
- Administrative and criminal remedies available to the Permittees under the Water Quality Ordinance
- Referral to the District Attorney or the Regional Board

Enforcement actions will be reported annually in the Annual Progress Report and spills of sewage that enter the storm drain system will be reported according to existing requirements.

9.4 Model Residential Program Details (San Diego Permit Area)

9.4.1 Program Overview

Residential areas comprise a significant portion of the land area of each Permittee's jurisdiction. The residential program is structured to minimize potential pollutants in runoff from residential areas to the maximum extent practicable. The Permittees are committed to reducing the potential impact of residential activities on water quality.

The baseline implementation of the Residential Program is the countywide promotion of a designated set of pollution prevention and source control BMPs for high threat to water quality residential activities. Based on the proximity to environmentally sensitive areas (ESAs), the implementation will be enhanced through targeted education and outreach activities.

The Model Program is illustrated in **Figure 9-4.** Information gathered for each section of the model program supports subsequent sections. The flow of information eliminates duplication of efforts and improves the efficiency of the overall program.

Pollution prevention controls are used as the first line of defense against water quality degradation. For the purposes of the Residential Model Program, pollution prevention is defined as any practice that reduces or eliminates the creation of pollutants. A resident choosing to use integrated pest management (IPM) practices in their garden instead of organophosphorus pesticides is an example of pollution prevention, because if a resident does not apply the chemicals, the potential for the pesticide to runoff their property and into the storm drain system is eliminated.

Source controls are implemented to further reduce the amount of water and pollutants potentially released into the environment resulting from residential activities. Source controls are practices that prevent pollution by reducing potential pollutants at their source. A resident applying the proper amount of an appropriate pesticide for problem insects is an example of source control, because minimizing the amount of pesticide application minimizes the potential for runoff to the storm drain system.

9.4.2 Source Identification and Inventory

The residential program is designed to operate with two levels of implementation, a base level to be implemented for all high threat to water quality residential activities in a consistent manner countywide, and an enhanced level of implementation tailored to address residential areas tributary to environmentally sensitive areas (ESAs) and 303(d) listed waterbodies. The inventory consists of a series of maps, compiled to assist the Permittee in identifying residential areas that should receive enhanced implementation, in effect prioritizing residential areas within a Permittee's jurisdiction.

Figure 9-4 Model Residential Program Flow Diagram

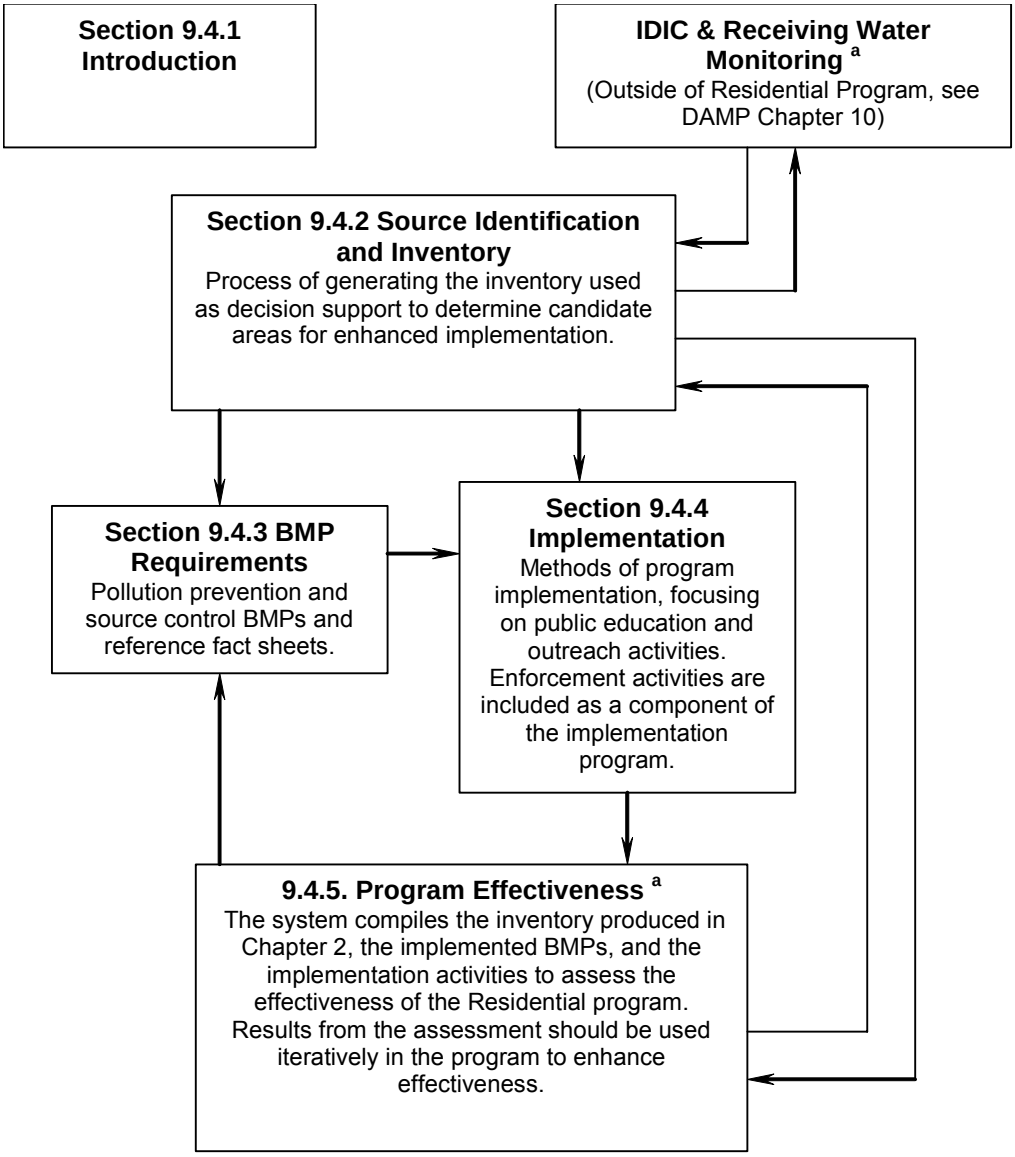

9.4.2.1 Source Identification Procedure

For the purpose of the residential program, all residential areas are assumed to produce uniform amounts and types of pollutants, based on the presumption that the activities of concern are consistent across residential areas. The ESAs and 303(d) listed waterbodies are exceptionally sensitive to runoff containing pollutants of concern (POCs), hence, residential areas adjacent to these areas will be the focus for enhanced implementation.

Source locations and sensitive waterbodies are the two categories of maps in the source identification procedure. Residential areas in or discharging to sensitive receiving waters should be considered for the enhanced implementation (see **Section 9.2** for identification of waterbodies and pollutants of concern). The details of which POCs are being generated in the residential areas will be used to tailor the enhanced program.

Source locations include the combination of residential land use, the pollutants typically generated during residential activities, and the storm drainage system. Maps required for determining the source locations are as follows:

- Residential land use areas (including common interest areas and areas with homeowner associations, i.e. CIA/HOAs).
- Watershed(s) within municipality boundaries
- List of pollutants generated by residential activities
- Drainage facilities

Sensitive waterbodies are ESAs, and include 303(d) listed waterbodies impaired by pollutants potentially generated by residential activities, and areas identified as hot spots by Permittee monitoring activities.

Maps required for determining the sensitive waterbodies within a Permittee's jurisdiction are as follows:

- Environmentally sensitive areas (including 303(d) waterbodies and pollutant(s) causing impairment).
- Monitoring results

The map based inventory is used as the basis for determining level of implementation and enforcement, and reporting elements of the program. The inventory is used to identify which BMPs and strategies should be used in different areas to reduce potential discharge of pollutants to the storm sewer system. Each of these maps/information items if further explained below.

Residential Land Use Area Maps

Residential land use maps may be developed from Permittee zoning maps, tax maps, etc. Because activities are assumed to be homogenous when integrated over local

neighborhoods, coarse-scale land-use maps (i.e. to zone level) are sufficient for the purpose of source identification, and subsequent prioritization components.

Watersheds within Municipality Boundary Maps

Each Permittee should incorporate GIS based overlays of jurisdictional area with watershed boundaries. Locating the Permittee jurisdiction within the watershed boundaries will allow assessment of potential impacts on 303(d) listed waterbodies. **Table 9-4** is a listing of major watersheds within the County of Orange and serves as a legend for the watershed boundary map, previously presented in **Figure 9-3**.

Drainage Facility Maps

To determine how stormwater is directed upon entering the storm drain system, the inventory of drainage facilities developed, as part of the Permittee's municipal program, should be linked with the residential inventories. The drainage facility map detail the storm drain watersheds within the Permittee's jurisdiction.

List of Pollutants Generated by Residential Activities

Residential activities have the potential to produce pollutants that may adversely affect receiving water quality. As part of the prioritization procedures, the list of pollutants generated by residential activities will be cross-referenced against the list of impairments compiled as part of mapping sensitive waterbody activities. Typical pollutants associated with residential activities are listed in **Table 9-13**.

Environmentally Sensitive Areas (ESAs)

Comparison of drainage facility maps with an ESA map allows Permittees to determine locations of high priority residential areas.

Monitoring Results

The residential program does not carry with it monitoring requirements. However, if results are available for residential areas from the Illicit Discharge and Illicit Connection (ICID) Program monitoring or the receiving water monitoring, they may be used to identify hot spots of high pollutant loads from specific residential areas. Follow-up studies and targeted outreach would be initiated for the identified hot spots as part of the enhanced implementation triggered by the high pollutant loadings.

Permittees should ensure the coordination between the various programs and promote data and resource sharing.

9.4.2.2 Mandatory High Threat Areas and Activities

The San Diego Permit Section F.3.d.(2) identifies the minimum high priority residential areas and activities that pose a threat to the water quality of receiving waters, including:

- Automobile repair and maintenance
- Automobile washing

- Automobile parking
- Home and garden care activities
- Disposal of household hazardous waste
- Disposal of pet waste
- Disposal of green waste
- Any other residential source that the Permittee determines may contribute a significant pollutant load to the storm sewer system.
- Any residence tributary to a Clean Water Act Section 303(d) impaired waterbody, where residence generates pollutants for which the water body is impaired.
- Any residence within or directly adjacent to or discharging directly to coastal waters or other receiving waters within an environmentally sensitive area.[1]

A list of high priority residential activities and the typical pollutants that may result from the activities is shown in **Table 9-13**. BMPs for the activities listed above are typically pollution prevention and good housekeeping practices. Specific BMPs for these activities are discussed in **Section 9.4.3.** Minimum BMPs have been designated for the identified residential areas and activities.

Table 9-13 Potential Residential Pollutant Generating Activities

Residential Activity	Potential Pollutants								
	Sediments	Nutrients [a]	Bacteria [b]	Foaming Agents	Metals	Hydrocarbons [c]	Hazardous Materials [d]	Pesticides and herbicides	Other [e]
Automobile repair and maintenance	X				X	X	X		
Automobile washing	X	X		X	X	X	X		
Automobile parking	X				X	X	X		
Home and garden care	X	X	X	X	X	X	X	X	X
Household Hazardous Waste				X	X	X	X	X	X
Pet waste	X	X	X						
Garden waste	X	X	X				X	X	

Notes a Nitrogen and Phosphorous compounds.
b Including fecal and total coliform, E. coli, etc.
c Various organic carbon based compounds.

[1] For the purposes of these procedures, the following terms are defined:
Adjacent – located within 200 feet of the listed waterbody.
Discharging directly to – discharge from a drainage system that is composed entirely of flows from the subject facility or activity (i.e. discharge from an urban area that commingles with downstream flows prior to an ESA is not subject to this requirement).

d Including chlorinated hydrocarbons, paint, etc. **e Including bleach, etc.**

9.4.2.3 Procedure for Inventory Implementation

The inventory maps should be referenced to determine which residential activities and areas should be subject to enhanced implementation. GIS mapping of residential areas superimposed on 303(d) and environmentally sensitive areas is an invaluable tool for determining which parcels and areas should be considered for enhanced implementation.

The results from the ID/IC and Receiving Water Monitoring programs may be used to determine if any significant pollutant loads might be attributed to any residential areas. If a residential area is found to contribute a significant pollutant load, the area should be subject to enhanced implementation.

Results from dry weather monitoring may also be used in an effort to isolate additional residential activities and areas for follow-up investigation. Any residential activity or area found to cause or contribute to a water quality objective violation should be subject to enhanced implementation.

9.4.2.4 Ongoing Determinations

The monitoring program established in both the Santa Ana and San Diego permits should be consulted periodically to determine if additional residential areas should be classified to receive enhanced implementation. In addition the Permittees should review results from the ID/IC program and dry weather monitoring to identify similar reclassification needs.

9.4.3 Best Management Practice Requirements

This section presents the BMP requirements Permittees must employ for the residential activities. A factsheet has been developed for each high threat residential activity (see **Appendix A-9**) and lists a designated set of BMPs specific to each activity. A set of optional BMPs is also included in each factsheet. All residences countywide will be required to implement the designated set of BMPs for the base implementation of the residential program.

Many of the BMPs advocated for use in residential areas correspond to water conservation methods. An active campaign to conserve water, specifically in regards to lawn irrigation, reduces the quantity of discharges from residential areas to the storm drain system. Ordinances established by the Permittees to limit or prohibit existing residential activities should meet the designated BMP requirements for residential areas.

9.4.3.1 BMPs for Residential Areas and Activities

A set of BMPs has been designated for high threat residential areas and activities. All high priority activities are assumed to occur in all residential areas and that no other

residential activities are known to be a significant threat to receiving water quality. As part of the program assessment, Permittees will review available data to determine if additional activities should be considered high threat, if the designated set of BMPs should be expanded, and whether additional residential areas should be considered for enhanced implementation.

Where residential areas and activities generate pollutants for which the receiving water is 303(d) listed, the Permittees may require the implementation of optional BMP controls as part of their enhanced implementation program (see **Section 9.7**). For residential areas directly adjacent to or directly discharging to ESAs, including coastal waters, the Permittees may also be required to implement additional controls to sufficiently reduce pollutant loads. It is recommended that that Permittees review the residential BMP programs on an annual basis to ensure appropriate BMPs are being implemented and to ensure newly completed developments are included in the Permittee's BMP program.

9.4.3.2 BMP Fact Sheets

BMP factsheets have been prepared for the following residential activities:

- Automobile repair and maintenance
- Automobile washing
- Automobile parking
- Home and garden care
- Disposal of pet wastes
- Disposal of green waste
- Household hazardous waste
- Water conservation

Public education and outreach activities designed to inform residents about BMPs are critical components to the implementation of the residential program. Pollution prevention BMPs for the residential program rely on public education and outreach to affect change in behavior, either in curtailing activities generating pollutants, or to purchase alternative products with lower risk of contaminating runoff. Outreach and education activities can describe the environmental benefits of "going the extra mile" in adhering to source control BMPs. A list of possible education and outreach activities is discussed in **Section 9.4.4.1**.

The bulk of the designated BMPs for residential activities fall into the source control category (which include pollution prevention practices). For example, if fluid is spilled during automobile maintenance, the resident should contain and clean the spill using the appropriate dry cleaning method (e.g. adsorption by "kitty litter", removal by sweeping, and appropriate disposal at a hazardous waste collection station).

Controlling pollutants at the source is an effective means to control pollutant loadings in stormwater discharges.

9.4.3.3 Optional BMPs

High priority residential areas identified in **Section 9.4.2.2** will receive an enhanced level of implementation tailoring education and outreach activities. One possible method of enhanced implementation is to encourage the use of the optional BMPs listed on the factsheets. Initially, residential areas tributary to 303(d) and ESA areas will not be required to implement optional BMPs. However, monitoring and effectiveness assessment may reveal the need for requiring optional BMPs.

The effectiveness assessment outlined in **Section 9.7** will dictate as to whether optional BMPs will be required for residential areas tributary to 303(d) impacted waterbody impaired for a pollutant typically found in runoff from residential areas and ESAs.

9.4.4 Implementation Strategy

The implementation strategy for the residential program is outlined in this section. A multi-tiered strategy is used for the implementation of the residential program. The strategy includes:

- Residential education and outreach program
- Training municipal personnel
- Field Reviews and water pollution complaint follow-up.
- Enforcement.

The residential program is implemented on two levels, the baseline level of implementing designated BMPs countywide, and enhanced implementation tailored to residential areas in or tributary to ESAs.

Baseline Implementation

The baseline implementation relies on education and outreach to notify and require residents to observe the designated sets of BMPs for each of the high threat to water quality residential activities. An example of education efforts for the designated BMPs may include inserting a brochure in a resident's autumn water/utilities bill reminding them to adjust their lawn sprinkling settings to reflect the changing seasons.

Enhanced Implementation

The enhanced implementation rests on targeted education and outreach to specific residential areas in or tributary to ESAs. Because ESAs are environmentally sensitive for a diverse range of reasons, no one implementation strategy is easily devised to address all ESAs in a blanket fashion. The Model Residential Program embodies a toolbox approach wherein the Permittee will evaluate each ESA in its jurisdiction and develop an appropriate enhanced implementation plan using any of the various

methods, to address the needs of each specific ESA. Enhanced implementation may include:

- Door-to-door level of outreach.
- Urging residents to observe optional BMPs.
- Regular field review patrols.

An example of the targeted implementation effort may include door hangers discussing use of IPM to residential areas surrounding a waterbody impaired for pesticides.

9.4.4.1 Residential Education and Outreach

Additional outreach efforts for the residential program may include the following:

Hotline

A hotline should be maintained for residents to call in illicit discharge, or Stormwater Ordinance violations. Enforcement officers trained in Stormwater Ordinances should respond as appropriate to the hotline calls. The County of Orange hotline, (714) 567-6363 is available for reporting illicit behavior and complaints. In emergency situations, residents should be directed to call 911.

Hotline calls should be tallied, summarized, and included in the annual report.

Webpage

The Watershed & Coastal Resources Division at the County of Orange maintains a complete website (www.ocwatersheds.com) containing information from general information on pollution, to specific information on the different aspects of the stormwater program.

The Permittee should consider including a stormwater page on their city webpage or providing a link to the count's website. The residential page could include:

- The Hotline telephone number.
- Links to digitized versions of the Permittee's Fact Sheets.
- A digital version of the Permittee's customized version of the Existing Residential Jurisdictional Urban Runoff Management Program.
- Links to other Pollution Prevention sites (EPA, IPM, etc.).
- Links to proper lawn care practices, including appropriate seasonal levels of irrigation for lawn watering, and fertilizer application rates.
- Listing of hazardous waste collection sites, and dates and times of operation.
- Any other information identified as relevant to post on the residential stormwater pollution prevention page.

Mailings

Mailings may be tailored to specific residential areas for specific water quality problems. Mailings should include specific information, detailing a particular problem, why there is a problem, and how the residents can alleviate the problem.

Media Public Service Announcement

Public Service Announcements (PSAs) are effective means to get one point across via radio, or pick one topic and describe the environmentally friendly method via newspaper article.

Utility Bill Inserts

Opportunity to tie excessive water use to the dollars spent. Informational snippets on how runoff water from over irrigation costs money and may be carrying away fertilizers, requiring more frequent application and more money, and may be carrying away other pollutants of concern.

Informational Packet as part of Building Permit Application

Home and garden care factsheets could be included with building permit applications. Nearly every home improvement project involves some type of excavation, or hazardous materials. Residents should be aware of the consequences to the environment of leaving an uncovered soil on their property, or improper disposal of paint and other materials leading to discharge to the MS4.

Waste Handling Facilities

Many of the residential BMPs are pollution prevention (P2) activities. To ensure an effective P2 program, residents must have access to applicable waste handling facilities. Motor oil may be recycled free of charge at the State Certified Used Oil Collection Centers located in the County of Orange: Each Permittee should list name and address of all certified motor oil collection centers within their jurisdiction for dissemination to the public.

Each Permittee should maintain a waste material handling facility capable of accepting any waste material used to maintain house, garden, or automobile. Dates and time for household hazardous waste drop-off should be publicly available.

9.4.4.2 Field Review and Enforcement

Inspection actions for the residential program should be conducted to advise residents of a suspected violation of a Stormwater ordinance, and the appropriate BMP to mitigate the violation. Enforcement actions are to be carried out against individual residents that refuse to comply with city ordinances.

Field Review

The Residential Model Program does not provide for a formal inspection program. Municipal employees working or assigned to residential areas should receive training to serve as program inspectors. The candidate employees will be trained to look for suspicious activities. As appropriate, the resident will be advised that their activity is

illegal, and of the appropriate BMPs to address the activity; or the appropriate enforcement personnel should be informed for follow-up enforcement action.

Water Pollution Complaint

Besides field review the Permittees may periodically receive water pollution complains. These complaints may come to the Permittee directly or through the county 24 hour water pollution problem reporting hotline. In either case, the Permittees must provide follow-up review to assess the extent of the pollution problem (see **Section 10** for more details).

Follow-up Enforcement

Because enforcement will be conducted in steps for specific residences, the Permittee must provide for an inventorying of violations, and where a particular resident is in the enforcement scheme. The enforcement steps include:

- Notice of Non-compliance
- Administrative Compliance Order
- Cease and Desist Orders
- Infractions and Misdemeanors

Enforcement for the Residential Program should follow the Enforcement Consistency Guidelines (see **Section 10**). In general, authorized field review personnel use their judgment to assess a potential problem situation. The goal of a field review should be educate a resident to appropriate methods of handling situations with the potential to discharge pollutants to the storm sewer system. In extreme situations (e.g. willful dumping of pollutants causing immanent environmental harm) the field review personnel will be required to initiate criminal proceedings against the resident.

The number of administrative and criminal enforcement actions issued to residents should be maintained and reported annually. The residence, the offence, and other pertinent information should be recorded by the Permittee for inclusion in the annual report and for use in the program effectiveness assessment.

9.5 Model Common Interest Area and Homeowners Association Activities Program Details

9.5.1 Program Overview

The Davis-Stirling Common Interest Development Act defines "common interest development" as any of the following:

- A community apartment project
- A condominium project (includes townhouses)
- A planned unit development
- A stock cooperative

It should be noted that the San Diego permit explicitly outlines a CIA/HOA stormwater program component whereas the Santa Ana permit is more general about elements that apply to residential areas, including common interest areas and HOAs.

The diagram shown in **Figure 9-5** depicted represents the relationship of each component to the others and to the program as a whole. Information gathered for each section of the Model Program supports subsequent sections. The flow of information eliminates duplication of efforts and improves the efficiency of the overall program. If additional controls are deemed necessary by monitoring results or program assessment, the process may be repeated with the new information. **Section 9.5.2** provides an assessment procedure for current CIA/HOA practices and to identify those activities that may affect water quality. **Section 9.5.3** details the designated pollution prevention and source control BMPs recommended to be adopted, or adapted with individual LIPs for the high priority activities. The designated BMPs should be implemented for all high priority activities within the Permittee's jurisdiction. Education and outreach should be focused to the identified enhanced implementation areas. **Section 9.5.4** reviews the enforcement mechanisms included in the program implementation strategy.

Figure 9-5 CIA/HOA Program Organization

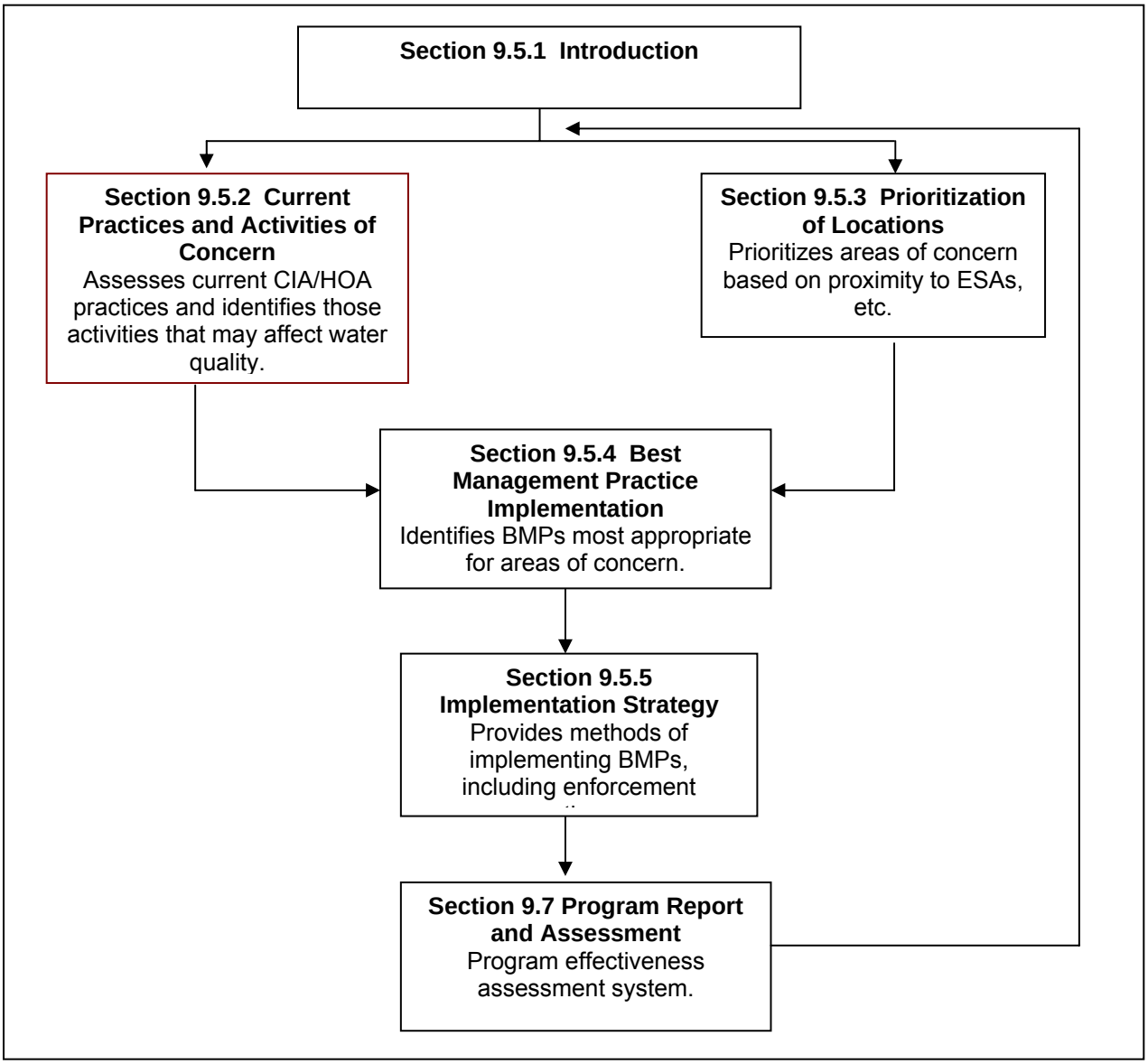

9.5.2 Current Practices and Activities of Concern

In order to create a working CIA/HOA Activities Program, the current maintenance practices and procedures used by CIA/HOA maintenance associations must be assessed. As stated in **Section 9.5.1**, the CIA/HOA Activities Program will apply to existing developments with common interest areas and/or homeowners associations; new developments will be required to develop and implement a Water Quality Management Plan (WQMP) to ensure NPDES compliance. Nevertheless, applicable portions of this program will also apply to newly constructed developments once those developments are complete and are in the operation phase.

Many maintenance activities within CIA/HOA areas have the potential to produce pollutants that may pose a threat to receiving water quality. Once current practices and procedures have been assessed, these activities of concern can be identified.

9.5.2.1 Review of Current Procedures

Orange County is home to over 3,000 CIAs/HOAs, and common interest developments account for 80% of all new housing in the County. Within Orange County, approximately 90% of incorporated residential areas lie within the purview of the maintenance associations that govern CIAs/HOAs. These maintenance associations establish community guidelines and covenants, conditions and restrictions (CC&Rs) for the maintenance and upkeep of common interest areas within residential developments, pursuant to the Davis-Stirling Common Interest Development Act.

More than half of these maintenance associations oversee fewer than 50 units; however, approximately 1% of CIAs/HOAs consist of over 1,000 separate units. The maintenance procedures used by these maintenance associates are largely similar. The one area in which their activities differ considerably is related to whether or not the streets and storm drains within the CIAs/HOAs are owned by the Permittee or by the Association (Note that for the purposes of the model program, those CIAs/HOAs with public streets and public storm drains are addressed separately from CIAs/HOAs with private streets and private storm drains).

CIAs/HOAs with Publicly-Owned and Maintained Streets and Storm Drains

Common interest developments with publicly-owned and maintained streets and storm drains operate similarly to more traditional residential areas within a Permittee's jurisdiction, in that activities such as street sweeping, refuse removal and drainage and utility operation and maintenance are generally performed by the Permittee (these activities are addressed in **Section 5**). The CIA/HOA maintenance duties may include, but not be limited to, the following activities:

- Automobile parking
- Sidewalk, plaza and entry monument fountain maintenance
- Landscaping and irrigation, of:
    - Planter strips and medians

  - Parks and open spaces
- Community center operation and maintenance, including:
  - Pools
  - Clubhouses
- Recreation area operation and maintenance, including:
  - Tot lots and playgrounds
  - Riding and walking trails
  - Golf courses
  - Stables
- Maintenance yard operation

CIAs/HOAs with Privately-Owned and Maintained Streets and Storm Drains

On the other hand, maintenance duties for CIAs/HOAs with privately-owned and maintained streets and storm drains may not fall on the Permittee, but on the maintenance associations, which are responsible for the maintenance of "common" areas within a CIA/HOA, often including infrastructure, such as storm drains (in rare cases, sewer and water systems may also be privately owned and maintained; such instances should be inventoried and the CIA/HOA noted as performing high-priority activities). These maintenance duties include, but are not limited to, the following activities:

- Street sweeping
- Sidewalk, plaza and entry monument, and fountain maintenance
- Landscaping and irrigation, of:
  - Planter strips and medians
  - Parks and open spaces
- Community center operation and maintenance, including:
  - Pools
  - Clubhouses
- Recreation area operation and maintenance, including:
  - Tot lots and playgrounds
  - Riding and walking trails
  - Golf courses
  - Stables
- Maintenance yard operation

- Refuse pick-up and removal, including:
  - Yard waste
  - Pet waste
  - Hazardous household materials
- Automobile parking
- Drainage system operation and maintenance
- Roadway maintenance, including water and sewer service lines

Other activities common to CIAs/HOAs, while not prohibited, still pose considerable risk to water quality; these activities must be identified and prioritized in order to effectively address potential impacts to water quality. The following sections described how the Permittee can identify these activities of concern and determine which pose the highest threats to receiving waters.

9.5.2.2 Determination of High Priority Activities

The following high priority activities may pose a threat to the water quality of receiving waters and are of concern to CIAs/HOAs:

- Automobile parking
- Home and garden care activities
- Disposal of pet waste
- Disposal of green waste
- Other areas or activities identified as contributing a significant pollutant load to runoff, such as:
  - Community centers/pools
  - Recreation centers
  - Maintenance yards
  - Any residence tributary to a Clean Water Act Section 303(d) impaired water body, listed for a pollutant(s) potentially found in residential discharges.
  - Any residence within or directly adjacent to coastal waters or other environmentally sensitive area (i.e., within 200 feet)
  - Maintenance of streets and storm drains

Table 9-14 lists high priority CIA/HOA activities and the types of pollutants that may result from these activities. Any other activities that may pose a significant risk to human or environmental health (such as hazardous materials) may also be considered high priority activities, and should be included in the Permittee's high priority list. Specific BMPs for these activities are presented in **Section 9.5.4**.

Table 9-14 Potential Pollutants from CIA/HOA Activities

Activity	Potential Pollutants								
	Sediments	Nutrients [a]	Pathogens/ Coliform [b]	Foaming Agents	Metals	Hydrocarbons	Hazardous Materials [c]	Pesticides and herbicides	Other [d]
Sidewalk, plaza and fountain cleaning	X	X	X	X			X		
Landscape maintenance	X	X	X				X	X	
Home and garden care	X	X	X	X	X		X	X	X
Pet waste	X	X	X						
Garden waste	X	X	X				X	X	
Automobile parking	X				X	X	X		
Community center O&M	X	X	X						X
Recreation area O&M	X	X	X					X	
Maintenance yard operation	X	X	X	X	X	X	X	X	X

[a]Nitrogen and Phosphorous compounds.
[b]Including fecal and total coliform, E. coli, etc.
[c]Including chlorinated hydrocarbons, paint, etc.
[d]Including bleach, etc.

9.5.3 Prioritization of Locations

The focus of the previous section was on the identification of CIA/HOA activities that are considered high priority in terms of BMP implementation and schedule for implementation. This section focuses on the identification of CIA/HOA high priority locations. The prioritization procedure is largely an exercise in overlaying maps of CIA/HOA areas and sensitive receiving waters and is accomplished chiefly through the inventory of residential areas (which includes common interest areas and homeowners associations). The following section summarizes this procedure will highlights those aspects of the prioritization process unique to CIAs/HOAs.

9.5.3.1 Prioritization Procedure for Implementation

The creation of geographic information system (GIS) maps identifying common interest developments characterizes the prioritization procedure for CIAs/HOAs. These maps are used in conjunction with the residential overlays developed as part of the Residential Program (**Section 9.4**). The County has developed GIS maps that identify ESAs and 303(d) listed water bodies.

Each Permittee should incorporate GIS based overlays of CIA/HOA areas with watershed boundaries. Locating the CIA/HOA areas within a particular watershed will allow for assessment of proximity to 303(d) listed water bodies in that watershed. Refer to **Table 9-4** for a listing of major watersheds within the County of Orange and to **Figure 9-3** for the map of these watersheds.

The threat prioritization procedure for CIA/HOA areas can be summarized as follows:

STEP 1: Locate all CIA/HOA areas on a GIS overlay (may be accomplished as part of the Existing Residential Program JURMP) that shows watershed boundaries.

STEP 2: Overlay County-generated GIS maps that identify ESAs and 303(d) listed water bodies.

STEP 3: Identify receiving waters for all CIAs/HOAs.

STEP 4: Determine if a CIA/HOA area is considered high priority through answering the following questions:

- Is the CIA/HOA directly tributary to a 303(d) listed water body? Water bodies in Orange County that are listed on the 2002 303(d) list of impaired water bodies are shown in **Table 9-6**.

  If YES, then CIA/HOA is high priority.

- Does the CIA/HOA discharge directly to an ESA? Comparison of drainage facility maps with an ESA map will allow determination of discharge areas.

  If YES, then CIA/HOA is high priority.

- Does the CIA/HOA contribute significant pollutant loads to the storm drain system via evaluation of IDIC and receiving water monitoring data?

  Significant pollutant load should be interpreted to mean any discharge that causes or contributes to a violation of a receiving water quality standard. The results from the ID/IC and Receiving Water Monitoring programs should be used to determine if significant pollutant loads occur as a result of CIA/HOA activities or discharges from residential areas. Results from dry weather monitoring may be used in an effort to isolate additional CIA/HOA activities and areas for follow-up investigation. Any residential activity or area found to cause or contribute to a water quality objective violation should be categorized as high priority.

  If YES, then CIA/HOA is high priority.

- Is the CIA/HOA responsible for street and storm drain maintenance?

  If YES, then CIA/HOA is high priority.

STEP 5: Implement best management practices as described in **Section 9.5.4**.

Note that Steps 1 – 4 occur throughout a Permittee's jurisdiction, whereas Step 5 is reserved for those CIA/HOA areas within that jurisdiction that are considered high priority.

9.5.3.2 Ongoing Determinations

The Receiving Water Monitoring program established in compliance with the San Diego Permit, Attachment B, should be used as one facet of determining the effectiveness of the Common Interest Area/Homeowners Associations Activities JURMP, and if CIA/HOA activities and areas are in compliance with the Permit Orders and DAMP commitments.

Permittees should ensure that the dry weather monitoring program developed as part of Illegal Discharge/Illicit Connection Program (ID/IC), **Section 10**, is of sufficient scope (i.e., with samples taken at outfalls exclusively serving CIAs/HOAs) to aid in assessment of Permittee efforts and actions as part of the CIA/HOA Program. Coordination between the CIA/HOA program and the ID/IC program is necessary to determine permit compliance and the need for further investigation.

9.5.4 Best Management Practices Implementation

This section presents the best management practices and procedures that Permittees can provide to CIAs/HOAs in order to protect receiving water quality.

CIA/HOA areas can be divided in terms of activities of concern based on those common interest developments that have publicly-owned and maintained streets and storm drains and those in which these facilities are owned and maintained by the maintenance association. Likewise, the best management practice programs for publicly-owned and maintained streets and storm drain systems within CIAs/HOAs differ from those used in CIA/HOA areas that have privately owned and maintained streets and storm drain systems.

The following sections describe a minimum set of BMPs appropriate for both types of common interest developments.

CIAs/HOAs with Publicly-owned and Maintained Streets and Storm Drains

CIAs/HOAs with publicly-owned and maintained streets and storm drains operate similarly to more traditional residential areas within a Permittee's jurisdiction, in that activities such as street sweeping, refuse removal and drainage and utility operation and maintenance are generally performed by the Permittee. Therefore, the BMPs appropriate to these types of CIAs/HOAs will not include practices for such typically Permittee-performed activities as street sweeping. BMP fact sheets, as identified in

Table 9-15 have been developed for the activities expected to occur these types of CIAs/HOAs.

CIAs/HOAs with Privately-owned and Maintained Streets and Storm Drains

Maintenance duties for CIAs/HOAs with privately-owned and maintained streets and storm drains may not fall on the Permittee, but on the maintenance associations, which are responsible for the maintenance of "common" areas within a CIA/HOA, often including infrastructure, such as storm drains and potentially sewer and water (including reclaimed water) systems. Therefore, the BMPs appropriate to these types of CIAs/HOAs will include additional practices for activities normally performed by the Permittee, such as street sweeping. Only those BMPs unique to these types of CIAs/HOAs will be listed in this section. BMP fact sheets, as identified in **Table 9-9** have been developed for the activities expected to occur these types of CIAs/HOAs.

Optional BMPs

If program effectiveness assessment indicates that the required BMPs are inadequate, the Permittee may implement or require implementation of the optional BMPs may be necessary to achieve a satisfactory effectiveness assessment. Permittees should consider developing a schedule for BMP implementation.

CIA/HOA areas tributary to a Clean Water Act section 303(d) impacted water body and/or environmentally sensitive areas

High priority CIA/HOA areas will receive focused implementation of education and outreach, as well as elevated levels of enforcement. Initially, residential areas tributary to 303(d) and ESA areas will not be required to implement additional BMPs. Monitoring and effectiveness assessment may reveal the need for additional BMPs, including implementation of source control measures.

The effectiveness assessment outlined in **Section 9.7** will dictate as to whether additional BMPs will be required for CIA/HOA areas tributary to a 303(d) impacted water body or ESA impaired for a pollutant typically found in runoff from CIA/HOA.

Table 9-15 BMPs for CIAs/HOAs with Publicly-Owned and Maintained Streets and Storm Drains

ACTIVITY	BMP	Fact Sheet
Parking vehicles on residential streets, in driveways, or in common area parking lots	Automobile parking BMPs	R-3
Washing vehicles in residential driveways or street	Automobile washing BMPs	R-2
Disposal of household hazardous wastes such as paint, bleach, etc.	Household Hazardous waste BMPs	R-7
Cleaning of CIA/HOA sidewalks, plaza, and entry monuments and fountains	Sidewalk, plaza, and entry monument and fountain maintenance BMPs	FP-4
Landscape maintenance including irrigation and fertilization	Landscape maintenance BMPs	FP-2
Operation and maintenance of community pools	Pool cleaning BMPs	IC-16

Table 9-15 BMPs for CIAs/HOAs with Publicly-Owned and Maintained Streets and Storm Drains		
ACTIVITY	**BMP**	**Fact Sheet**
Operations and maintenance of recreation areas such as stables, golf courses, and parks	Disposal of Pet Waste BMPs Landscape Maintenance BMPs Disposal of Green Waste BMPs	R-5 FP-2 R-6
Maintenance Yard BMPs		
Activity	**BMP**	**Fact Sheet**
Vehicle maintenance and repair	Equipment maintenance and repair BMPs	FF-3
Vehicle fueling	Vehicle fueling BMPs	FF-4
Storage of vehicles and equipment	Vehicle and equipment storage BMPs	FF-12
Cleaning of vehicles and equipment	Vehicle and equipment cleaning BMPs	FF-11
Storage, handling, and disposal of various materials such as cleaners	Material storage, handling, and disposal BMPs	FF-13
Loading and unloading of materials	Material loading and unloading BMPs	FF-6

Table 9-15 BMPs for CIAs/HOAs with Privately-Owned and Maintained Streets and Storm Drains[1]		
ACTIVITY	**BMP**	**Fact Sheet**
Street sweeping	Street sweeping BMPs	FP-3
Trash collection, recycling, and disposal	Solid waste handling BMPs	FF-13
Inspection and cleaning of storm drains	Drainage system operation and maintenance BMPs	DF-1
Operation and maintenance of water and sewer lined (not controlled by utility company)	Water and sewer utility operation and maintenance BMPs	FP-6

9.5.5 Implementation Strategy

Implementation efforts will vary depending on whether or not a CIA/HOA area is performing high priority activities. Overall implementation requirements include the following:

- Permittees are required to develop public education materials to encourage the public to report illegal dumping and unauthorized, non-storm water discharges from residential sites (which would include CIAs/HOAs) into public streets, storm drains and other water bodies.
- Additionally, each Permittee must perform educational and outreach programs to aid maintenance associations in implementing the CIA/HOA BMPs. Education and outreach programs are covered in detail in **Section 6**. Below are a few methods that may be particularly effective for reaching CIA/HOA managers and residents.
- Enforcement efforts should follow in response to hotline reports and focus on high priority areas.

9.5.5.1 Implementation Requirements for Non-High Priority Areas

For areas not performing high priority activities, the following implementation efforts are required:

- Mail letter explaining CIA/HOA program to maintenance association governing board
- Mail BMP fact sheets to maintenance association governing board
- Mail questionnaire to all residents based on BMPs appropriate for that CIA/HOA (for example, CIAs/HOAs where automobile washing is allowed, the questionnaire should contain questions such as:
    - "How many times per month do you wash your vehicle at home?"
    - "What materials do you use to wash your vehicle (e.g., soap, detergent, etc.)?"
    - "Do you wash you vehicle over a pervious surface?"

9.5.5.2 Implementation Requirements for High Priority Areas

If a CIA/HOA discharges to 303(d) listed water body, directly to an ESA, has discharges that include significant pollutant loads, then the Permittees should consider a field inspection and additional outreach efforts. Inspection efforts should be targeted to those areas identified as being high priority that engage in commercial activities (i.e., those that operate maintenance yards, etc.). For larger common interest developments (i.e., those comprised of 50 or more units), it may be assumed that such high priority activities do occur, without the need for specific inspection.

9.5.5.3 Association Education and Outreach Methods

Association Employee Education

Training workshops, posters, memos, etc. should be available for association employees to develop an eye for inappropriate activities in CIA/HOA areas.

Hotline

A hotline should be maintained for residents to report illicit discharges or Stormwater Ordinance violations within their CIA/HOA. Enforcement officers trained in Stormwater Ordinances and the knowledgeable about the CIA/HOA program should respond as appropriate to the hotline calls.
The County 24-Hour Water Pollution Problem Reporting Hotline is 714-567-6363. For chemical spill emergencies, call 911.

Hotline calls should be tracked and included in the annual report.

Webpage

If applicable, the Permittee should include a CIA/HOA page in the stormwater section of their webpage, which should provide:

- The hotline telephone number
- Links to digitized versions of the BMP factsheets included in **Appendix C**.
- A digital version of the Permittee's customized version of the CIA/HOA Jurisdictional Urban Runoff Management Plan
- Links to other Pollution Prevention sites (EPA, IPM, etc.)
- Links to proper lawn care practices, including appropriate seasonal levels of irrigation for lawn watering, and fertilizer application rates
- Listing of hazardous waste collection sites, and dates and times of operation
- Any other information identified as relevant to post on the CIA/HOA stormwater pollution prevention page.

The County stormwater webpage is located at www.ocwatershed.com.

Mailings

For CIAs/HOAs in non high-priority areas, a letter of introduction explaining the CIA/HOA program should be forwarded to the maintenance associations. The letter should indicate where the Permittee's CIA/HOA program is located on the Internet and should provide a mechanism for requesting a copy of the CIA/HOA program in the mail.

9.5.5.4 Enforcement

Each Permittee should review their Municipal Code to determine the most appropriate method to implement the Enforcement section of the CIA/HOA program.

Enforcement of BMPs in common interest developments will be conducted using the following mechanisms: public reporting hotline, analysis of dry weather/illicit discharge monitoring results, and municipal employee observations.

Enforcement of Requirements through CC&Rs

Covenants, conditions and restrictions (CC&Rs) are the governing documents of CIAs/HOAs and provide legal authority for maintenance associations to set and enforce rules for the operation and maintenance of common interest developments.

The California Legislature enacted the existing laws authorizing CC&Rs in 1872. The law assumes that real estate transfers are contractual transactions and that binding obligations may be included within these contracts. When a resident of a CIA/HOA signs these documents, they are obligating themselves under law to comply with the rules contained therein. CC&Rs then, are an ideal vehicle for pollution prevention and other controls to protect water quality.

Most new common interest developments are required to include NPDES compliance language in their CC&Rs; this language can be adapted for inclusion into the CC&Rs for existing CIAs/HOAs. However, it should be noted that changes to existing CC&Rs require a vote by homeowners within an association. Therefore, residents of CIAs/HOAs must be made aware of the need for NPDES compliance and of the penalties for non-compliance. **Section 9.4.4.2** discusses several ways of getting this information to CIAs/HOAs.

Steps of Enforcement

Because enforcement will be conducted in steps for CIAs/HOAs, the Permittee must provide for an inventorying of violations, and where a particular CIA/HOA is in the enforcement scheme. The numbers of enforcement actions should be maintained and reported annually. The enforcement steps include:

- Notice of Non-compliance (verbal and/or written warnings, to individual resident or CIA/HOA Board)
- Administrative Compliance Order (written notice to CIA/HOA Board)
- Cease and Desist Order (written notice to CIA/HOA Board)
- Civil or Criminal Enforcement (includes fines and assessments levied on CIA/HOA Board and/or individual resident)

Enforcement for the CIA/HOA Program should follow the Enforcement Consistency Guide (see **Section 10.0**).

9.6 Training Program Details

Education and training of municipal staff is one of the keys to a successful stormwater program. To assist responsible municipal staff in understanding the each program, several training modules have been developed and can be found in **Appendix B, Section B-9**.

9.6.1 Training Modules for the Model Industrial/Commercial Program

Six training modules are available that cover different aspects of the Existing Development Program. The following sections describe the types of training and corresponding documentation that should be maintained by the Permittees.

Existing Development Program Management Module (Exhibit B-9.I)

This training module is targeted to Stormwater Program Managers. The module includes an overview of the Existing Development Program and then detailed discussions of the requirements that stormwater managers must address in their local implementation plans. Step by step instructions are provided to aid the managers in preparing their LIPs for industry, commercial businesses, residential, and common interest areas.

Field Implementation of Existing Development Program Module (Exhibit B-9.II)

This training module is targeted to staff responsible for code enforcement and inspection of industries facilities. The module addresses the basic program element requirements and then provides detailed instruction on conducting inspections, including inspection forms, record keeping requirements, and enforcement tools available for code violations.

Existing Development Program Training – Automobile Mechanical Repair, Maintenance, Fueling and Cleaning Businesses Module (Exhibit B-9.III)

This training module is for business owners and operators of automobile maintenance related businesses. The module explains the overall effort by Orange County to address stormwater and what the business can do to improve water quality. The module provides examples of good source control Best Management Practices, including BMPs for fueling, maintenance & repair, and vehicle washing. References are provided for the business owner to pursue for more information.

Existing Development Program Training – Landscape Maintenance Businesses Module (Exhibit B-9.IV)

This training module is for business owners and operators of landscape maintenance related businesses. The module explains the overall effort by Orange County to address stormwater and what the business can do to improve water quality. The module provides examples of good source control Best Management Practices in the areas of pest control, yard fertilizing and safer alternatives. References for the business owner to pursue for more information are also provided.

Existing Development Program Training – Common Interest Areas/Homeowner Associations Module (Exhibit B-9.V)

This training module is for Homeowner Associations and their corresponding staff responsible for common interest areas. The module provides an overview of the County's stormwater program and what the HOA can do to improve water quality. Examples of source control Best

Management Practices are provided, including BMPs for landscaping and irrigation, disposal of animal waste, and pool cleaning.

Existing Development Program Training – Industrial Stormwater Monitoring Module (Exhibit B-9.VI)

This training module is used in conjunction with the Field Implementation of Existing Development module (Exhibit B-9.II); consequently the audience is staff responsible for code enforcement and inspection of industries facilities, as well as the managers of industrial facilities subject to monitoring requirements. The module provides an overview of the regulatory requirements for industrial monitoring and then specifics on analytical monitoring. This includes specifics regarding determining if a facility is subject to monitoring requirements, the location of monitoring sites and the selection of constituents to be monitored, sampling and analysis methods, and reporting requirements. In particular, the module emphasizes the importance of using standardized methods for sampling, analysis, and reporting.

9.6.2 Municipal Employee Education for the Residential Model Program

Many types of municipality employees spend a considerable amount of their workday in residential areas, these employees may function as program inspectors. Candidate municipal employees for residential program education efforts include:

- Flood control field crews
- Solid waste collection personnel
- Street sweeping personnel
- Street maintenance field crews
- Planning department personnel
- Parks and Recreation maintenance personnel
- Utilities department field personnel

Training modules will be available to the Permittees for training their employees. Training should also be available for enforcement officers so they understand the magnitude residential activities play in receiving water quality.

9.7 Program Effectiveness Assessment (PEA)

9.7.1 PEA for the Commercial/Industrial Facilities Model Program

The Commercial/Industrial Facilities Model Program consists of five main sections that provide information for the Annual Report:

Source Identification and Facility Inventory

- Watershed-based inventory of commercial and industrial facilities pursuant to the guidance document, including the following information:
  - Facility address
  - Name of facility manager
  - Emergency contacts
  - SIC code
  - Hydrologic unit
  - Pollutant (303(d) listed and others) types
  - "Automatic high priority" designation
- Significant changes in inventory (i.e., increase/decrease in number of facilities, reclassification of facilities, etc.)

Prioritization

- Summary list of high priority commercial sites
- Summary of medium priority commercial sites (Santa Ana RWQCB jurisdiction only)
- Summary list of low priority commercial sites (Santa Ana RWQCB jurisdiction only)
- Changes in prioritization since last report

Best Management Practice (BMP) Implementation

- Business categories
- List of source control BMPs in use
- List of treatment control BMPs in use
- Modifications to BMPs since last report

Inspection and Monitoring of Commercial/Industrial Sites

- Summary of inspection efforts
- Summary of enforcement actions

- Summary of Monitoring efforts

Outreach

- Summary of outreach material
- Summary of distribution and implementation effort
- Summary of training efforts

Please note that some of the information necessary for input into the Annual Report will be common to more than one section; where this is the case, that information is listed only once, in the section to which the given information is most pertinent. A questionnaire has been developed to assist the Permittees in submitting appropriate information to the principal Permittee for the Annual Report (see **Appendix A-9**).

9.7.2 PEA for the Residential Model Program

Each Permittee is required to prepare a program report regarding their efforts in the residential program. The residential program report will in turn become part of the Permittee's Annual Report submitted to the Principle Permittee and the appropriate RWQCB. The Residential Reporting Program (RRP) provides the opportunity for each Permittee to compile and summarize pertinent existing residential activity and to assess the effectiveness of the Residential Program.

In preparing the RRP, the Permittee must describe all efforts undertaken or is undertaking to implement the requirements for the residential component. The following information describing the goals and milestones of the residential program are addressed in the RRP:

- Which pollution prevention methods will be encouraged for implementation, and how and where they will be encouraged.
- A completed inventory of high priority residential areas and activities.
- How BMPs will be implemented, or required to be implemented, for high priority areas and activities.
- A description of enforcement mechanisms and how they will be used.

The RRP also provides the basis for the residential program effectiveness assessment. RRP reports are submitted each year to the Principal Permittee as a part of annual status reports, and provide the basis for evaluating each city's long-term water pollution reduction efforts.

Program Report

Each Permittee is required to compose an Annual Report documenting all activities conducted during the past annual reporting period for each component of the residential program, including:

- Source Identification and Inventory

- BMP Requirements
- Implementation Strategy

A questionnaire has been developed to assist the Permittees in compiling their Annual Reports (see **Appendix A-9**).

Source Identification

A summary of the following source identification and inventorying procedures should be integrated into the RRP:

- Map combining residential areas, and drainage facilities for the residential areas within the Permittee's jurisdiction.
- Map representing the environmentally sensitive areas, and 303(d) listed waterbodies within the Permittee's jurisdiction.
- Map of high priority residential areas within Permittee's jurisdiction.
- Map of areas where priority classification changed since last report.
- Summary list of high priority residential activities.

Best Management Practice (BMP) Requirements

The following information for residential areas and activities should be collected, summarized, and integrated into the RRP:

- Summary list of implemented BMPs for the baseline program.
- Summary list of implemented BMPs for the enhanced program.
- Modification of BMP designations since last report.

Implementation Strategy

The following information for residential areas and activities should be collected, summarized, and integrated into the RRP:

- Summary of municipality employee education activities.
- Summary of residential education and outreach campaign.
- Summary of hotline calls regarding residential areas and activities.
- Summary of enforcement actions.

Effectiveness Assessment Strategy

The RRP demonstrates a Permittee's commitment to pollution prevention and source reduction by providing an iterative evaluation process. The process results in an annual assessment and a report that outlines, for the residential program:

- Program elements with past and present problems in need of improvement.

- Improvements that occurred during the reporting year.
- Specific action plans and timeframes for implementing necessary improvements.

Each reporting year serves as the benchmark for the next year's resource effort and process evaluation.

In assessing the effectiveness of the Permittee's residential program, the following items are addressed:

- Assessment of Permittee's effort to implement goals established in the residential program.
- Adequacy of existing BMPs.
- Assessment of public input to the residential program.
  - Response to public outreach
  - Number of complaints
- Assessment of amount and type of disseminated information.
- Assessment of enforcement activities.
- Specific action plans and timeframes for implementing necessary improvements.

Determination of Needed Modifications

Through collection and analysis of the above information for the RRP, a baseline for comparison can be established that will be built upon with each successive Annual Report. This in turn will allow for the identification of trends that can be evaluated to establish the efficacy of the residential program and to determine where modifications may be necessary to improve effectiveness.

Once the determination is made that modifications are necessary to the residential program, a schedule for implementation of changes will need to be determined. Once the modifications are in place, effectiveness assessment will continue as outlined in above, and the iterative evaluation and improvement cycle will continue.

9.7.3 PEA for the CIA/HOA Model Program

Each of the sections of the CIA/HOA Activities Program provides for the collection of information that will be input into the CIA/HOA Program Report (Program Report). The Program Report, in turn, is a subset of the Annual Report, compiling and summarizing pertinent CIA/HOA activity data from each Permittee for ease of use and review by the Regional Board.

Information in the Program Report must describe all efforts the Permittee has undertaken or is undertaking to implement the requirements for the CIA/HOA Activities Program.

In addition to detailing what information must be included in the Program Report, this section also discusses methods for assessing the effectiveness of the CIA/HOA Activities Program and mechanisms for modifying the guidance document to improve effectiveness.

In order to determine the effectiveness of the program element, every year the Permittees provide a comprehensive description of all of the activities they have conducted to meet the requirements of each component of the DAMP. Permittees will be required to provide quantitative information and qualitative information (narrative) for the implementation of their stormwater/urban runoff program.

Although the exact format has not been developed, for the Program every year each Permittee will be expected to report the following types of information:

The CIA/HOA Activities Model Program Guidance document consists of five main sections that provide information for the Annual Report:

- Current Practices and Activities of Concern for CIAs/HOAs
  - Summary list of CIAs/HOAs with publicly owned and maintained streets and storm drains
  - Summary list of activities in CIAs/HOAs with publicly owned and maintained streets and storm drains
  - Summary list of CIAs/HOAs with privately owned and maintained streets and storm drains
  - Summary list of activities in CIAs/HOAs with privately owned and maintained streets and storm drains
  - Changes in type of CIA/HOA (i.e., whether or not the CIA/HOA maintains its own streets and storm drains) since last report
  - Changes in activities for either type of CIA/HOA area since last report
- Prioritization
  - Summary list of CIAs/HOAs directly tributary to 303(d) listed water bodies
  - Summary list of CIAs/HOAs adjacent to or discharging to ESAs
  - Summary list of CIAs/HOAs contributing significant pollutant loads to the storm drain system
  - Summary list of CIAs/HOAs that maintain streets and storm drains.
  - Changes in prioritization since last report
- Best Management Practices for CIAs/HOAs
  - List of pollution prevention controls in use
  - List of source control BMPs in use

  - List of treatment control BMPs in use
  - Modifications to BMPs since last report
- Implementation Strategy
  - Summary of implementation efforts
  - Summary of outreach material
  - Summary of distribution and implementation effort (including number of CIA/HOA inspections, direct mailings, etc.)
  - Summary of training efforts

The information contained in these sections can be easily recorded and analyzed using various software programs that allow for field recording of inspection and inventory data, management of large inventory databases, and electronic compilation and reporting of results. It is anticipated that the information required as part of the CIA/HOA Activities Program will be largely collected via the use of this software.

Please note that some of the information necessary for input into the Annual Report will be common to more than one section; where this is the case, that information is listed only once, in the section to which the given information is most pertinent.

Determination of Needed Modifications

Through collection and analysis of the above information for the CIA/HOA Activities Program, utilizing software and other means, a baseline for comparison can be established that will be built upon with each successive Annual Report. Inspections and timely reporting will allow for the identification of trends that can be evaluated to establish the efficacy of the CIA/HOA Activities Program and to determine where modifications may be necessary to improve effectiveness.

Once the determination is made that modifications are necessary to a CIA/HOA Activities Program, a schedule for implementation of changes will need to be determined. Once the modifications are in place, effectiveness assessment will continue as outlined in this section, and the iterative evaluation and improvement cycle will continue.

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11.0 WATER QUALITY MONITORING PROGRAM

11.1 Program Summary

11.1.1 Program Overview

The main theme underlying the Regional Board's objectives (listed below) is maintaining the integrity of receiving waters and their ability to sustain beneficial uses identified in the Basin Plan. This parallels the Permittees' long-standing concern with the management of environmental resources. For example, many of the monitoring stations have been sampled since the mid-1970s, and there are many past instances of cooperation with other agencies regarding specific environmental problems and/or areas of concern.

Thus, while the Permittees view compliance with the terms of the Permits as of paramount importance, there is also an underlying role of governmental stewardship for key environmental resources that are highly valued by residents of Orange County.

This monitoring plan strives to link permit compliance with this larger set of management issues.

11.1.2 Program Commitments

The monitoring program was developed to help Permittees ensure compliance with the Santa Ana and San Diego Permits and reduce any impact urban storm water may have on overall water quality and beneficial uses.

The major program commitments and the subsections in which they are described in detail include:

- Review and implementation of the dry- and wet-weather programs for both the Santa Ana and San Diego regions within Orange County (**Section 11.2**).
- Continued review and identification of water quality planning initiatives to better address site-specific urban water quality issues (**Section 11.3**).

In addition to the major program monitoring commitments listed above, the following performance commitments provide consistency among the programs, define requirements for permit compliance, and measure performance:

- The Permittees will revise the water quality monitoring program and associated timelines annually. These changes may be due to necessary timeline adjustments, newly identified water quality problems or information gained through experience or the research/monitoring programs. The revisions will be discussed in the Annual Status Reports.
- The Permittees will participate in future Southern California Bight Regional Monitoring Programs. This will be reported in the Annual Status Report.

- The Permittees will participate in the Southern California Stormwater Monitoring/Research Cooperative Program. The key focus of the program is to develop the methodologies and assessment tools to more effectively understand urban municipal stormwater and non-stormwater impacts to receiving waters. This will be reported in the Annual Status Reports.
- The Permittees will re-evaluate and revise the elements of the water quality monitoring program in 2003. The revised program will be submitted with the 2003 Annual Status Report. Design of the dry weather portions of the monitoring program in the San Diego region of the County were completed in February 2003. Design of both the wet and dry weather portions of the Santa Ana region permits will be completed mid-2003.

11.1.3 Regulatory Requirements

The requirements and objective of the Monitoring Program have been laid out in the Santa Ana and San Diego Regional Board Permits for each respective area.

Objectives of San Diego Region Monitoring Programs - As laid out in the San Diego Regional Board Permit the following are the major objectives of the monitoring program:

- Assess compliance with the NPDES permit;
- Measure the effectiveness of Urban Runoff Management Plans;
- Assess the chemical, physical, and biological impacts to receiving waters resulting from urban runoff; and
- Assess the overall health and evaluating long-term trends in receiving water quality.

Objectives of Santa Ana Region Monitoring Programs - As laid out in the Santa Ana Regional Board Permit the following are the major objectives of the monitoring program:

- Develop and support an effective municipal urban runoff and non-point source control program
- Define water quality status, trends, and pollutants of concern associated with urban storm water and non-storm water discharges and their impact on the beneficial uses of the receiving waters
- Characterize pollutants associated with urban storm water and non-storm water discharges and to assess the influence of urban land uses on water quality and the beneficial uses of receiving waters
- Identify significant water quality problems related to urban storm water and non-storm water discharges
- Identify other sources of pollutants in storm water and non-storm water runoff to the maximum extent possible (e.g., atmospheric deposition, contaminated sediments, other non-point sources, etc.)

- Identify and prohibit illicit discharges
- Identify those waters, which without additional action to control pollution from urban storm water discharges, cannot reasonably be expected to attain or maintain applicable water quality standards required to sustain the beneficial uses in the Basin Plan (TMDL monitoring)
- Evaluate the effectiveness of existing municipal storm water quality management programs, including an estimate of pollutant reductions achieved by the structural and nonstructural BMPs implemented by the Permittees
- Evaluate costs and benefits of proposed municipal storm water quality control programs to the stakeholders, including public development.

11.2 Water Quality Monitoring Program

11.2.1 San Diego Region

The monitoring program developed for the San Diego region includes wet weather and dry weather monitoring components.

11.2.1.1 San Diego Wet Weather Monitoring Program

Details on development and implementation of the wet weather monitoring program are included in Exhibit 11-I. The wet weather monitoring program includes the following components:

- Urban stream bioassessment - Using a "triad" of indicators (bioassessment, chemistry, toxicity), describe impacts on stream communities and the relationship of any impacts to runoff, based on comparisons with reference locations on a year-to-year time frame
- Long-term mass loading - Using measurements of key pollutants, measure loads over a time frame of years to decades to compare with past and present levels
- Coastal storm drains - Using a suite of bacterial indicators at high priority drain outfalls, track compliance with regulatory standards and any improvements due to BMP implementation
- Coastal receiving waters - Using measurement of runoff plume characteristics and extent, as well as measures of a suite of physical, chemical, and biological indicators, improve understanding of the impacts of runoff plumes on near shore ecosystems

11.2.1.2 San Diego Dry Weather Monitoring Program

Details on development and implementation of the dry weather monitoring program are included in Exhibit 11-II. The dry weather monitoring program includes the following three main components:

- A set of randomly located stations intended to characterize the average area-wide conditions in urban runoff
- A set of rotating targeted stations intended to provide additional information about specific sites thought to have a high potential for contaminated runoff and to provide coverage of the entire MS4 system over the period of the permit term
- A set of criteria that will trigger focused IC/ID (illegal connection and illicit discharge) studies by the Permittees when the monitoring data indicate the presence of a problem.

11.2.1.3 San Diego Monitoring Program Components

Specific monitoring tasks, sampling sites, and frequencies for the entire San Diego region are detailed in **Table 11-1**. A template for individual jurisdictions to use in describing their contribution to monitoring efforts is provided in Appendix A-11.

Table 11-1. San Diego Region Water Quality Monitoring Program Components

Jurisdiction	Urban Stream Bioassessment	Mass Emission	Coastal Stormdrain Outlet	Ambient Coastal Receiving H_20	Dry Weather Monitoring Program	
					Targeted Sites	Random Sites
Aliso Viejo					J01P28 J01P27	J01P26 J01P33 J02P05
Dana Point	Salt Creek (K01) @ Monarch Beach Golf Links		Salt Creek (K01) North Beach Creek San Juan Creek (L01) Doheney St. Beach 100 yards south of overpass Doheney St. Beach @ restroom Bldg. 6	Doheney St. Beach (DSB 1) south end Doheny St. Beach (DSB 4) restroom Bldg. 6 Doheney St. Beach (DSB 5) creek at north end Dana Pt. Harbor (DPH 1) at Golden Lantern Dana Pt. Harbor (DPH 2) between Adventure & Marina Dana Pt. Harbor (DPH 3) N/W of DPH 2 Dana Cove (DC 1) left of pier Niguel MLR (NI 1) near Selva & PCH	Beach Rd. west of Palisades Rd. Doheney Park Rd. south of Camino Capistrano Sepulveda Ave. south or Domingo Ave.	K01P02 K01P04 M00P01 L01S04

Table 11-1. San Diego Region Water Quality Monitoring Program Components

Jurisdiction	Urban Stream Bioassessment	Mass Emission	Coastal Stormdrain Outlet	Ambient Coastal Receiving H_20	Dry Weather Monitoring Program	
					Targeted Sites	Random Sites
Laguna Beach	Aliso Creek(J01) @ Country Club Rd	Laguna Canyon (I02) @ Woodland	El Morro Creek	Aliso Creek (ACM 1) Creek mouth	N. Main Beach Stormdrain #13	J00P02
			Emerald Bay Drain	Aliso Beach (AB 01) 300 yards north of creek		I00P02
			Laguna Avenue	Laguna Beach Marine Life Refuge (LB 1) Diver's Cove		
			Heisler Park - North (Diver's Cove)	Laguna Beach MLR (LB 2) north part of Main Beach		
			Main Beach Boardwalk (I02)	Laguna Beach MLR (LB 3) end of Broadway		
			Cleo Street Storm Drain (I00P02)	Laguna Beach MLR (LB 4) south end of Main Beach		
			Bluebird Canyon Road			
			Ocean Way (Agate/Pearl)			
			Dumond Drive			
			Lagunita/Blue Lagoon 300 yards north of J01			
			West Street			

Table 11-1. San Diego Region Water Quality Monitoring Program Components

Jurisdiction	Urban Stream Bioassessment	Mass Emission	Coastal Stormdrain Outlet	Ambient Coastal Receiving H_20	Dry Weather Monitoring Program	
					Targeted Sites	Random Sites
			Aliso Creek (J01)			
Laguna Hills					J04P04	
Laguna Niguel				Salt Creek (SCM 1) at creek mouth	J03TBN –Golden Lantern & Moulton L03P06 J04 @ J03 K01S02 K01P08 K01S01	J03P01 K01P08 K01P09 K01P07 L03P04 K01P04
Laguna Woods					Moulton at Calle Cortez J01 at Aliso Blvd.	
Lake Forest					J01P08	J01P02 J01P05
Mission Viejo	Trabuco Creek (L02) @ Avery Parkway				J01P03	J07P02 L02P20 L03P04

Table 11-1. San Diego Region Water Quality Monitoring Program Components

Jurisdiction	Urban Stream Bioassessment	Mass Emission	Coastal Stormdrain Outlet	Ambient Coastal Receiving H_20	Dry Weather Monitoring Program	
					Targeted Sites	Random Sites
						L03P11
San Clemente	Prima Descheca (M01) @ Calla Grande Vista Segunda Descheca (M02) u/s of Avenida Presido	Prima Descheca (M01) @ Calla Grande Vista Segunda Descheca (M02) @ El Camino Real	Capistrano Co. Beach Drain (Concession) M00S01 at 35067 Beach Road Poche Beach (M01) Pico Drain (M02) Mariposa Linda Lane Under Pier Trafalgar Canyon La Ladera Riviera Capo Shores at House 52 Capo Shores at House entrance		Lapata & Calle del Cerro Bonita Stormdrain at M02	M03P01 M00P03 M00P05
San Juan Capistrano	San Juan Creek (L01) @ La Novia Trabuco Creek (L02)	San Juan Creek (L01) @ La Novia Trabuco Creek (L02)			L05 & L01 L01 & S02	L01P03 L02P02

Table 11-1. San Diego Region Water Quality Monitoring Program Components

Jurisdiction	Urban Stream Bioassessment	Mass Emission	Coastal Stormdrain Outlet	Ambient Coastal Receiving H_20	Dry Weather Monitoring Program	
					Targeted Sites	Random Sites
San Juan Capistrano (continued)	at Del Obispo Rd.	at Del Obispo Rd.			L01S03 (Dohoeney Park Rd. & Camino Capistrano West end of Avenida Veropuerto L01 & Camino Capistrano	
Rancho Santa Margarita						L02P28 L02P32
County of Orange	Aliso Creek (J01) at Pacific Park Dr. Aliso Creek (J01) @ Aliso/Woods Canyon Park Wood Canyon (J02) on Wood Canyon Trail	Aliso Creek (J01) @ Aliso/Woods Canyon Park			L11P01	L02P20 L02P25

Table 11-1. San Diego Region Water Quality Monitoring Program Components

Jurisdiction	Urban Stream Bioassessment	Mass Emission	Coastal Stormdrain Outlet	Ambient Coastal Receiving H_20	Dry Weather Monitoring Program	
					Targeted Sites	Random Sites
	Laguna Canyon Creek along Highway 133					L02P29
County of Orange	San Juan Creek (L01) @ Cold Spring (Reference Site) Silverado Cyn. d/s of Belha Way (Reference Site) Sandia Creek on De Luz Road (Reference Site)					L02P45 L02P50 L02P55 L11P02 M02XXX @ Talega Valley

Note: Shaded areas indicates sites at which flows are diverted during the dry season

11.2.2 Santa Ana Region

The monitoring program developed for the San Diego region includes wet weather and dry weather monitoring components.

11.2.2.1 Santa Ana Water Quality Monitoring Program

Details on development and implementation of the Santa Ana region Water Quality Monitoring Program are included in **Exhibit 11-III.** The Third Term Permit monitoring program includes the following components:

- Mass Emissions Monitoring – Estimates the total mass emissions form MS4, assesses mass emission trends over time and determines if the MS4 is contributing to exceedances of water quality objectives or beneficial uses.
- Estuary/Wetlands Monitoring – Monitors the Upper Newport estuary, Talbert Marsh and the Bolsa Chica wetlands area to determine the effects of stormwater and non-stormwater runoff.
- Water Column Toxicity Monitoring – Analyzes mass emission samples for freshwater and marine species toxicity to determine the impacts of stormwater and non-stormwater runoff on toxicity of receiving waters.
- Bacteriological/Pathogen – Determines the impacts of stormwater and non-stormwater runoff on loss of beneficial uses to receiving waters via monitoring of the coastline and six selected inland locations for total coliform, fecal coliform and Enterococcus.
- Bioassessment – In cooperation with the Southern California Costal Water Research Project, will evaluate the biological index approach for Southern California.
- Reconnaissance – Identifies and prohibits illicit discharges.
- Land Use Correlations – Develops and implements strategies for determining the effects of land use on the quality of receiving waters. At a minimum, focuses on the conversion from agricultural land to developed in Orange County and its correlation to the sediment loading in Upper Newport Bay.
- TMDL/303(d) Listed Waterbody Monitoring – Continues Permittee participation in the Regional Monitoring Program for the San Diego Creek Nutrient TMDL. In addition, evaluates the impacts of stormwater and non-stormwater runoff on all impairments within the Newport Bay watershed and other 303(d) listed waterbodies.

11.2.2.2 Santa Ana Monitoring Program Components

Specific monitoring tasks, sampling sites, and frequencies for the entire Santa Ana Regional Board area are include in Exhibit 11-III. Individual jurisdictions have described their contribution to monitoring efforts in **Appendix A-11**.

11.3 Water Quality Planning Initiatives

The Permittees have initiated several water quality planning efforts intended to identify and better understand site-specific urban water quality problems in Newport Bay / San Diego Creek Watershed (nutrients), Aliso Creek (bacteria) and Talbert/Lower Santa Ana River (bacteria). These water quality planning initiatives have been integrated with the development of watershed chapter (**Section 12.0**).

11.3.1 Newport Bay Watershed

Newport Bay and certain sections of San Diego Creek have been listed as impaired for the presence of excess levels of fecal coliform, sediment and nutrients as well as toxicity to organisms.

The development of Total Maximum Daily Loads (TMDLs) allocations pursuant to Section 303(d) of the Clean Water Act has imposed additional requirements on the Newport Watershed Permittees (The County, Orange County Flood Control District and the cities of Costa Mesa, Irvine, Lake Forest, Laguna Hills, Laguna Woods, Newport Beach, Orange, Santa Ana, and Tustin) which include significant additional requirements on these Permittees for monitoring and program development.

11.3.2 Santa Ana River Watershed

Elevated bacteria indicator levels in the surf zone off Huntington State Beach in 1999 were attributed, in part, to the storm drain system of the Talbert/Lower Santa Ana River Watershed. In response to a Section 13267 letter from the Regional Board, the Talbert/Lower Santa Ana River Watershed Permittees (The County, Orange County Flood Control District, and the cities of Costa Mesa, Fountain Valley, Huntington Beach, Newport Beach and Santa Ana) committed to conducting monitoring investigations and research studies in conjunction with the University of California at Irvine and the National Water Research Institute.

These studies were initiated by these Permittees and subsequently expanded to include watershed-scale monitoring and investigations, including extensive dispersion monitoring in the surf zone. These studies were completed in a final report entitled *Huntington Beach Water Quality Investigation Phase II: An Analysis of Ocean, Surf zone, Watershed, Sediment and Groundwater Data Collected from June 1998 through September 2000 - December 15, 2000*. A follow-up study was initiated based on the results of the initial investigation.

As part of an early action plan, all storm drain and pump station discharges in this watershed were temporarily diverted during the summer months to the sanitary district. A number of these diversions are now becoming more permanent and are scheduled to extend through all dry season conditions. A considerable portion of the watershed is now being diverted, and the focus for continuing investigations is now on the remaining un-diverted drains previously identified as a potential significant source. Additional investigations will also be completed in the Talbert Marsh for critical ecological resources as part of the monitoring program.

11.3.3 Aliso Creek Watershed

The lower mile of Aliso Creek has been listed as impaired for the presence of elevated levels of fecal coliform. Pursuant to a 205(j) grant the County initiated a water quality planning study to complement ongoing watershed restoration efforts being conducted by the Corps of Engineers in conjunction with Aliso Creek watershed cities and special districts.

One of the results of the 205(j) study was the identification of elevated fecal coliform levels at many points along Aliso Creek and in its tributaries. One storm drain (identified as J03P02) exhibited higher fecal coliform levels than the rest and was issued a Clean Up and Abatement Order by the San Diego Regional Board pursuant to violations of the NPDES Stormwater Permit. The Order, as one action, assigns additional monitoring requirements to the J03P02 Permittees (The County, Orange County Flood Control District, and City of Laguna Niguel).

The Corps of Engineers Feasibility studies and the 205(j) water quality planning study provided the first comprehensive restoration plan for an entire watershed in Orange County. The 205(j) report was made available in late 2001.

As an early action, the flows from J03P02 were initially diverted during the summer months to the sanitary sewer. At the present time, these flows are being treated by a Clear Creek™ System, and the treated, bacteria-free water is being discharged into Sulphur Creek. However, this is considered a temporary measure until a treatment wetland currently under construction becomes operational.

Permittees have reported on additional technical information requests and special studies they have been involved with such as the collection of data/information for 13267 letters or clean up and abatement orders. The Permittees produced six quarterly reports examining characteristics of bacterial contamination and describing the results of source investigations following up on earlier work in the 205(j) study.

Storm Water
Clean Water
PROTECTION PROGRAM

RIVERSIDE COUNTY
WATER QUALITY MANAGEMENT PLAN
FOR URBAN RUNOFF

Santa Ana River Region

Santa Margarita River Region

July 24, 2006

Errata corrected 10-10-06

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1.0 Introduction

This Water Quality Management Plan (WQMP)[1] has been developed to further address post-construction Urban Runoff from New Development and Significant Redevelopment projects under the jurisdiction of the Co-Permittees. Since 1996 the Permittees have addressed the potential post-construction impacts associated with Urban Runoff through Supplement A, New Development Guidelines, to the Santa Ana River Region and Santa Margarita River Region Drainage Area Management Plans (DAMPs) and the Whitewater River Watershed Stormwater Management Plan (SMP).

The three municipal separate storm sewer system National Pollutant Discharge Elimination System permits (MS4 Permits) applicable within portions of Riverside County are:

- Order No. R8-2002-0011, NPDES No. CAS 618033 adopted by the Santa Ana Regional Water Quality Control Board on October 25, 2002 for the Santa Ana River region.
- Order No. 01-077, NPDES No. CAS 617002 adopted by the Colorado River Basin Regional Water Quality Control Board on September 5, 2001 for the Whitewater River region.
- Order No. R9-2004-001, NPDES No. CAS 108766 adopted by the San Diego Regional Water Quality Control Board on July 14, 2004 for the Santa Margarita River region.

The WQMP will be implemented with watershed-specific variations to reflect the differences in the MS4 Permits applicable within portions of Riverside County[2]. When approved the WQMP becomes an enforceable element of the MS4 Permit and is applicable to all Co-Permittees.

The WQMP is intended to provide guidelines for project-specific post-construction Best Management Practices (BMPs) and for regional and sub-regional Source Control BMPs and Structural BMPs to address management of Urban Runoff quantity and quality to protect Receiving Waters. The WQMP identifies the BMPs, including design criteria for Treatment Control BMPs that may be applicable when considering any map or permit for which discretionary approval is sought. Examples may include tentative tract maps, parcel maps with land disturbing activity, discretionary grading permits where the Project is not part of a master plan of development and conditional use permits.

Implementation of the WQMP will occur through the review and approval by the Co-Permittee of a project-specific WQMP prepared by the project applicant. The project-specific WQMP will address management of Urban Runoff from a Project site, represented by a map or permit for which discretionary approval is sought from a Co-Permittee. The primary objective of the WQMP, by addressing Site Design, Source Control, and Treatment Control BMPs applied on a project-specific and/or sub-regional or regional basis, is to ensure that the land use approval and permitting process of each Co-Permittee will minimize the impact of Urban Runoff.

This WQMP will be implemented by the Co-Permittees as follows:

- For the Santa Ana River Region, New Development and Significant Redevelopment projects submitted to the Co-Permittees after December 31, 2004 shall be required to submit a project-specific WQMP prior to the first discretionary project approval or permit. A Co-Permittee may require a project-specific WQMP for Projects submitted to them prior to December 31, 2004. Since some projects will be subject to discretionary approval during the planning phase (land use entitlement) and ministerial approval for subsequent grading or building permits, Project applicants may be required to submit a preliminary project-specific WQMP for discretionary project approval (land use entitlement). Project applicants shall be required to submit for Co-

[1] Some of the Regional Water Quality Control Boards utilize the term Standard Urban Stormwater Mitigation Plan (SUSMP) rather than Water Quality Management Plan (WQMP).

[2] The requirements for New Development and Significant Redevelopment are addressed in the Stormwater Management Plan for the Whitewater River Watershed.

Permittee review and approval a final project-specific WQMP that is in substantial conformance with the preliminary project-specific WQMP prior to the issuance of any building or grading permit.

- For the Santa Margarita River Region, development Projects that do not have Conditions of Approval or Tentative Tract, Subdivision, or Parcel map approval by July 13, 2005 will be required to submit a project-specific WQMP for review and approval prior to discretionary approval of the map or permit. Since some projects will be subject to discretionary approval during the planning phase (land use entitlement) and ministerial approval for subsequent grading or building permits, Project applicants may be required to submit a preliminary project-specific WQMP for discretionary project approval (land use entitlement). Project applicants shall be required to submit for Co-Permittee review and approval a final project-specific WQMP that is in substantial conformance with the preliminary project-specific WQMP prior to the issuance of any building or grading permit.

2.0 Development Planning and Permitting Process

2.1 Overview

The planning and permitting process to implement the WQMP requirements for Projects is incorporated in three primary elements of the development approval process:

- General Plan
- Environmental Review and Documentation
- Project Review, Approval, and Permitting.

The relationship between these elements of the development approval process and WQMP implementation is depicted in the flowchart below.

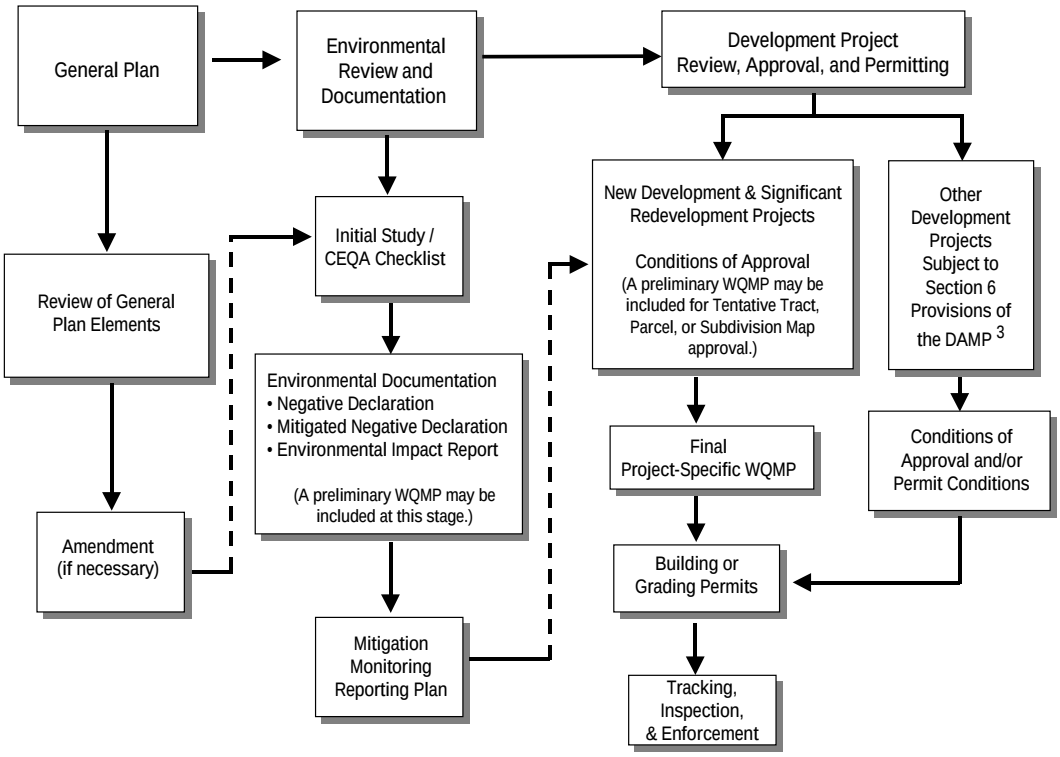

Section 6 of the DAMP provides the overall framework for the planning, design, review, approval, and permitting of land use development to manage Urban Runoff for the protection of Receiving Waters. This WQMP is only one component of the overall framework, and as stated previously, it provides guidelines for project-specific post-construction BMPs, as well as, alternatives for regional and sub-regional

[3] Until the revised DAMP, due to be submitted to the Regional Board on January 1, 2005, has been approved by the Executive Officer, other development projects shall continue to comply with the April 1996 Supplement A to the 1993 DAMP.

Treatment Control BMPs. New Development and Significant Redevelopment projects as defined by the MS4 Permits will be conditioned to require the preparation, review, and approval of a project-specific WQMP. Other development projects will be required to incorporate site, source, and/or treatment control BMPs through Co-Permittee Conditions of Approval or permit conditions in accordance with Section 6 of the DAMP[4].

2.2 Conditions of Approval

The Co-Permittees will utilize conditions of approval to implement the WQMP requirements. Each Co-Permittee will utilize the following (or substantially similar) conditions of approval for Projects:

- Prior to the issuance of a building or grading permit, the applicant shall submit to the Co-Permittee for review and approval a project-specific WQMP that:
  - Addresses Site Design BMPs such as minimizing impervious areas, maximizing permeability, minimizing directly connected impervious areas, creating reduced or "zero discharge" areas, and conserving natural areas;
  - Incorporates the applicable Source Control BMPs as described in the Santa Ana River (or Santa Margarita River) Region WQMP and provides a detailed description of their implementation;
  - Incorporates Treatment Control BMPs as described in the Santa Ana River (or Santa Margarita River) Region WQMP and provides information regarding design considerations;
  - Describes the long-term operation and maintenance requirements for BMPs requiring long-term maintenance; and
  - Describes the mechanism for funding the long-term operation and maintenance of the BMPs requiring long-term maintenance.
- Prior to issuance of any building or grading permits, the property owner shall record a "Covenant and Agreement" with the County-Clerk Recorder or other instrument acceptable to the Co-Permittee on a form provided by the Co-Permittee to inform future property owners of the requirement to implement the approved project-specific WQMP. Other alternative instruments for requiring implementation of the approved project-specific WQMP include: requiring the implementation of the project-specific WQMP in Home Owners Association or Property Owner Association Conditions, Covenants and Restrictions (CC&Rs); formation of Landscape, Lighting and Maintenance Districts, Assessment Districts or Community Service Areas responsible for implementing the project-specific WQMP; or equivalent may also be considered. Alternative instruments must be approved by the Co-Permittee prior to the issuance of any building or grading permits.
- If the project will cause land disturbance of one acre or more, it must comply with the statewide General Permit for Storm Water Discharges Associated with Construction Activity (or the San Jacinto Watershed General Permit for Storm Water Discharges Associated with Construction Activity). The project applicant shall cause the approved final project-specific WQMP to be incorporated by reference or attached to the project's Storm Water Pollution Prevention Plan as the Post-Construction Management Plan.
- Prior to building or grading permit close-out or the issuance of a certificate of occupancy or certificate of use, the applicant shall:

[4] Until the revised DAMP, due to be submitted to the Regional Board on January 1, 2005, has been approved by the Executive Officer, other development projects shall continue to comply with the April 1996 Supplement A to the 1993 DAMP.

- Demonstrate that all structural BMPs described in the project-specific WQMP have been constructed and installed in conformance with approved plans and specifications;
- Demonstrate that applicant is prepared to implement all non-structural BMPs described in the approved project-specific WQMP; and
- Demonstrate that an adequate number of copies of the approved project-specific WQMP are available for the future owners/occupants.

2.3 Implementation of WQMP Requirements

Co-Permittees may have several departments involved in implementing and/or administering WQMP requirements. Table 1 identifies those departments with WQMP implementation responsibility for each Co-Permittee. However, as the Co-Permittee's organizational structures are dynamic to reflect the changing needs of their jurisdictions, the assignment of these responsibilities may change. Therefore, the Co-Permittees will update this table in each Annual Report.

Prior to January 1, 2005 each Co-Permittee in the Santa Ana Region must document their procedures for implementation of the WQMP, including a description of departmental responsibilities. The Co-Permittees' documented procedures must be included in their 2004/2005 Annual Report.

Table 1. Co-Permittee Departments Responsible for Conditions of Approval and Project-Specific WQMP Review

Co-Permittee	Primary Responsibility	Secondary Responsibility
County of Riverside	Planning Department with assistance of Riverside County Flood Control & Water Conservation District	Transportation and Land Management Agency – Building and Safety Department
Beaumont	Public Works	Planning
Calimesa	Planning Department	Public Works Department
Canyon Lake	Building and Safety	Code Enforcement
Corona	Public Works Department – Land Development Section	Public Works Department – Special Projects Section (NPDES)
Hemet	Public Works Department – Development Engineering	Public Works Department
Lake Elsinore	Engineering Division	Community Services
Moreno Valley	Public Works Department – Land Development Division	Public Works Department – Enterprise Services Administration Division
Murrieta	Engineering Department	Planning Department
Norco	Engineering/Public Works Department	Planning Department
Perris	Public Works	City Engineering
Riverside	Public Works Department	Planning Department
San Jacinto	City Engineer/Public Works Inspections	Building Division/Building Inspections
Temecula	Public Works	Public Works

3.0 Projects Requiring a Project-Specific WQMP

The MS4 Permits specify the types of development that require the preparation, approval, and implementation of a project-specific WQMP. Those types of development are Significant Redevelopment and New Development (individually "Project" or collectively "Projects") represented by a map or permit for which discretionary approval is sought from a Co-Permittee. However, a Co-Permittee may require development of a WQMP for any project.

3.1 Significant Redevelopment

"Significant Redevelopment" is the addition or creation of 5,000 or more square feet of impervious surface on an existing developed site. Significant Redevelopment includes, but is not limited to, construction of additional buildings and/or structures, extension of the existing footprint of a building, and construction of impervious or compacted soil parking lots. Where Significant Redevelopment results in an increase of less than 50 percent of the existing impervious surfaces of an existing developed site, and the existing developed site received its discretionary land use approvals prior to the adoption of the WQMP, the WQMP would apply only to the addition, and not the existing development. However, if the redevelopment results in an increase of more than fifty percent of the impervious surface, then a WQMP is required for the entire development. Significant Redevelopment does not include routine maintenance activities that are conducted to maintain original line and grade, hydraulic capacity, the original purpose of the constructed facility or emergency actions required to protect public health and safety.

For those Significant Redevelopment projects that result in an increase of less than 50 percent of the existing impervious surfaces, the Project proponents should be encouraged to consider ways to incorporate the entire development into the WQMP to achieve possible economies of scale.

3.2 New Development

New Development is defined in the Santa Ana Region to include:

1. Residential development of 10 dwelling units or more, including single family and multi-family dwelling units, condominiums, or apartments.
2. Industrial and commercial development where the land area represented by the proposed map or permit is 100,000 square feet or more[5], including, but not limited to, non-residential developments such as hospitals, educational institutions, recreational facilities, mini-malls, hotels, office buildings, warehouses, light industrial, and heavy industrial facilities.
3. Automotive repair shops [Standard Industrial Classification (SIC) codes[6] 5013, 7532, 7533, 7534, 7537, 7538, and 7539].
4. Restaurants (SIC code 5812) where the project site is 5,000 square feet or more[5].
5. Hillside development that creates 10,000 square feet or more, of impervious surface(s) including developments in areas with known erosive soil conditions or where natural slope is 25 percent or more.
6. Developments creating 2,500 square feet or more of impervious surface that is adjacent to (within 200 feet) or discharging directly into areas designated in the Basin Plan as waters supporting habitats necessary for the survival and successful maintenance of plant or animal species designated under state or federal law are rare, threatened, or endangered species (denoted in the

[5] Land area is based on acreage disturbed.

[6] SIC codes can be searched at website http://www.osha.gov/oshstats/sicser.html.

Basin Plan[7] as the "RARE" beneficial use) or waterbodies listed on the CWA Section 303(d) list of Impaired Waterbodies[8]. "Discharging directly to" means Urban Runoff from subject Development or Redevelopment site flows directly into aforementioned waterbodies. Urban Runoff is considered a direct discharge unless it first flows through a) A municipal separate storm sewer system (MS4) that has been formally accepted by and is under control and operation of a municipal entity; b) A separate conveyance system where there is co-mingling of flows with off-site sources; or c) A tributary or segment of a water body that is not designated with "RARE" beneficial uses nor listed on the 303(d) list before reaching the water body or segment designated as RARE or 303(d) listed.

7. Parking lots of 5,000 square feet or more of impervious surface exposed to Urban Runoff, where "parking lot" is defined as a site or facility for the temporary storage of motor vehicles.

3.3 Additional Requirements for Santa Margarita River Region

In the Santa Margarita Region:

Hillside Development is defined as any development which creates 5,000 square feet of impervious surface which is located in an area with known erosive soil conditions, where the development grade on any natural slope that is twenty-five percent or greater.

Additionally, in the Santa Margarita River Region the following types of development also require the preparation, approval, and implementation of a WQMP:

- Automotive repair shops also include facilities that would have SIC codes 5014, 5541, and 7536.
- Restaurants where land development is less than 5,000 square feet shall meet all WQMP requirements with the exception of structural Treatment Control BMPs and peak flow management.
- Retail gasoline outlets of 5,000 square feet or more or with projected average daily traffic of 100 or more vehicles per day.
- Parking lots with 15 or more parking spaces and potentially exposed to Urban Runoff.
- Street, roads, highways, and freeways, which includes any paved surface that is 5,000 square feet or greater used for the transportation of automobiles, trucks, motorcycles, and other vehicles.
- Environmentally Sensitive Areas (ESAs). All development located within or directly adjacent to or discharging directly to an ESA (where discharges from the development or redevelopment will enter receiving waters within the ESA), which either creates 2,500 square feet of impervious surface on a proposed project site or increases the area of imperviousness of a proposed project site to 10% or more of its naturally occurring condition. "Directly adjacent" means situated within 200 feet of the ESA. "Discharging directly to" means outflow from a drainage conveyance system that is composed entirely of flows from the subject development or redevelopment site, and not commingled with flows from adjacent lands.

[7] The Basin Plan for the Santa Ana River Basin can be viewed or downloaded from website www.waterboards.ca.gov/santaana/pdf/R8BPlan.pdf and has beneficial uses for Receiving Waters listed in Chapter 3. The Basin Plan for the San Diego Basin can be viewed or downloaded from website www.waterboards.ca.gov/sandiego/programs/basinplan.html and has beneficial uses for Receiving Waters listed in Chapter 2.

[8] The most recent CWA Section 303(d) list of Impaired Waterbodies can be found at website www.waterboards.ca.gov/tmdl/303d_lists.html.

4.0 Project-Specific WQMP Preparation

Category projects must submit a project-specific WQMP to the Co-Permittee for review and approval. Project applicants (owners and/developers) must submit a project-specific WQMP based on the template provided in Exhibit A, or other Co-Permittee approved template, that includes:

1. A project description and site characterization including preparation of a site plan and vicinity map
2. Pollutants and Hydrologic Conditions of Concern related to the project and project site
3. Site Design BMPs
4. Source Control BMPs
5. Where applicable, project-specific Treatment Control BMPs or a regional, watershed approach; including basis for selection, sizing, and incorporation of Treatment Control BMPs (where used, a watershed or regional program must be identified)
6. An operation and maintenance requirements program, including responsible entities, for BMPs
7. Proposed funding source for operations and maintenance of BMPs. Where a public agency is identified as the funding source and responsible party for BMPs, a written agreement that states acceptance of these responsibilities by the public agency must be provided.

For Projects not participating in a regional or watershed-based Treatment Control BMP program, a preliminary or final project-specific WQMP must be prepared and submitted to the Co-Permittee for review and approval in conjunction with considering any map or permit for which discretionary approval is sought.

For Projects participating in regional or watershed-based Treatment Control BMP programs, the regional or watershed-based Treatment Control BMP program may be relied upon during the discretionary review process subject to a discussion of how the project will participate in the program. However, a preliminary project-specific WQMP shall be developed, submitted and approved by the Co-Permittee concurrently with any map or permit for which discretionary approval is sought. The preliminary project-specific WQMP shall identify which pollutants and Hydrologic Conditions of Concern will be addressed by the regional or watershed-based Treatment Control BMP and any additional on-site Treatment Control BMPs that will be needed to address pollutants and Hydrologic Conditions of Concern not controlled by the regional or watershed-based facilities.

The level of detail in a preliminary project-specific WQMP submitted during the land use entitlement process will depend upon the level of detail known about the overall project design at the time project approval is sought. The preliminary project-specific WQMP must clearly identify the Co-Permittee's case number (tract number, use case number, design review number, etc.) for the project. The preliminary project-specific WQMP shall include a Site Plan (e.g., copy of the tentative map, use exhibit, or other equivalent figure) identifying the major features of the proposed project. Locations of activities, storage areas, or other features that could expose Urban Runoff to pollutants must be clearly identified on the Site Plan (e.g., map, exhibit, or figure).

A final project-specific WQMP shall be submitted and approved by the Co-Permittee prior to the issuance of any building or grading permit and the final project-specific WQMP shall be in substantial conformance with the preliminary WQMP submitted and approved by the Co-Permittee during the land use entitlement process. The final project-specific WQMP must clearly identify the Co-Permittee's case number (tract number, use case number, design review number, etc.) for the project. The final project-specific WQMP shall include a Site Plan (e.g., the approved final map, use exhibit, or other equivalent figure or figures) identifying the major features of the proposed project. Locations of activities, storage areas, or other features that could expose Urban Runoff to pollutants and locations of BMPs must be clearly identified on the Site Plan (e.g., map, exhibit, or figure).

4.1 Project Description

The project description shall completely and accurately describe in narrative form, and with supporting figures (maps or exhibits), where facilities will be located, what activities will be conducted and where, what kinds of materials will be used and/or stored, how and where materials will be delivered, and the types of wastes that will be generated. The following information shall be described, provided and/or addressed in the "Project Description" section of a project-specific WQMP:

- The name(s), address(es), and phone number(s) of the project owner, project proponent and project-specific WQMP preparer
- The project's site address, including APN number(s) and Thomas Brothers map page(s) and grids
- Planning Area/Community Name
- The watershed in which the project is located (Santa Ana or Santa Margarita) and sub-watershed (Salt Creek, San Jacinto, Warm Springs, Temescal, etc.) and Reach (found in Table 3-1 of the Water Quality Control Plan for the Santa Ana River Basin –Basin Plan)[9]
- Project site size to the nearest 0.1 acre, and the pre-project and post-project quantity (square feet or acres) and percentage of pervious to impervious surface
- Standard Industrial Classification (SIC) code for commercial or industrial projects.
- Identification of whether a Home Owners Association (HOA) or Property Owners Association (POA)[10] will be formed.
- The final project-specific WQMP shall include a copy of the final conditions of approval included as an appendix
- A copy of CC&Rs for the project, if applicable, included as an appendix.
- A vicinity map showing the project site and surrounding planning areas in sufficient detail to allow project site to be plotted on a base map of the Co-Permittee.
- A site map (or maps) depicting the following project features:
  - Number and type of structures and the intended use (buildings, tenant spaces, dwelling units, community facilities such as pools, recreation facilities, tot lots, etc.)
  - Paved areas and the intended use (parking, outdoor work area, outdoor material storage area, sidewalks, patios, tennis courts, etc.)
  - Landscaped areas
  - Infrastructure (streets, storm drains, etc.) that will revert to public agency ownership and operation
  - Location of existing and proposed drainage facilities (storm drains, channels, basins, etc), including catch basins and other inlets/outlet structures. Existing and proposed drainage facilities should be clearly differentiated.
  - All proposed structural BMPs (source control and treatment control), their location, references to details, specifications, and product information
  - Location(s) of Receiving Waters to which the project directly or indirectly discharges

[9] The Basin Plan for the Santa Ana River Basin can be viewed or downloaded from website www.waterboards.ca.gov/santaana/pdf/R8BPlan.pdf

[10] As used herein, a Home Owners Association (HOA) or Property Owners Association (POA) means a nonprofit corporation or unincorporated association created for the purpose of managing a common interest development [California Civil Code § 1351(a)].

- Location of points where onsite (or tributary offsite) flows exit the project site
- Delineation of proposed tributary areas boundaries, including tributary offsite areas, for each location where flow exits the property. Each tributary area should be clearly denoted (A, B, C, etc.)
- Pre-project and post-project topography

4.2 Site Characterization

The following information shall be addressed in the "Site Characterization" section of a project-specific WQMP:

- Current and proposed zoning or land use designation
- Current actual use of project site (undeveloped, previously developed but vacant, existing structures, etc.)
- Name(s) of Receiving Water(s)[11] to which the project site discharges directly or indirectly
- Identification of any 303(d) listed impairments[12] or Total Maximum Daily Loads (TMDLs)[13] for the identified Receiving Waters.
- Designated beneficial uses for Receiving Waters to which the project site discharges, including proximity to Receiving Waters with a "RARE" beneficial use.
- If a Phase 1 environmental site assessment has been prepared for the project site, a summary of the site remediation conducted (or to be conducted) and any site use restrictions.
- If infiltration BMPs are proposed, a soils report should be included as an appendix identifying the soil type(s), infiltration capacity of the soils, and depth to groundwater.

4.3 Identify Pollutants of Concern

Potential Urban Runoff pollutants associated with the proposed project must be identified. Exhibit B to this WQMP provides brief descriptions of typical pollutants associated with Urban Runoff and a table that associates typical potential pollutants with types of development (land use). It should be noted that at the Co-Permittees discretion, the Co-Permittees may also accept updated studies from the California Association of Stormwater Quality Agencies (CASQA), USEPA, SWRCB and/or other commonly accepted agencies/associations acceptable to the Co-Permittee for determination of Pollutants of Concern associated with given land use. Additionally, in identifying Pollutants of Concern, the presence of legacy pesticides, nutrients, or hazardous substances in the site's soils as a result of past uses and their potential for exposure to Urban Runoff must be addressed in project-specific WQMPs. The Permittees should also require specific pollutants commonly associated with Urban Runoff to be considered as Pollutants of Concern for a specific project based on known problems, such as water quality standards exceedances or 303(d) impairment, in the Receiving Waters and suspected association with that land use. The list of potential Urban Runoff pollutants identified for the project must be compared with the pollutants identified as causing an impairment of Receiving Waters, if any. To identify pollutants impairing proximate Receiving Waters, each project proponent preparing a project-specific WQMP shall, at a minimum, do the following:

a) For each of the proposed project discharge points, identify the proximate Receiving Water for each discharge point, using hydrologic unit basin numbers as identified in the most recent

[11] The Basin Plan for the Santa Ana River Basin can be viewed or downloaded from website www.waterboards.ca.gov/santaana/pdf/R8BPlan.pdfand has beneficial uses for Receiving Waters listed in Chapter 3. The Basin Plan for the San Diego Basin can be viewed or downloaded from website www.waterboards.ca.gov/sandiego/programs/basinplan.html and has beneficial uses for Receiving Waters listed in Chapter 2.

[12] The most recent CWA Section 303(d) list of Impaired Waterbodies can be found at website www.waterboards.ca.gov/tmdl/303d_lists.html.

[13] Information regarding adopted TMDLs or TMDLs pending resolution can be found at websitewww.waterboards.ca.gov/tmdl/docs_lists.html.

version of the Water Quality Control Plan for the Santa Ana River Basin or the San Diego Basin, as appropriate.

b) Identify each proximate Receiving Water identified above that is listed on the most recent list of Clean Water Act Section 303(d) list of impaired water bodies, which can be found at websitewww.waterboards.ca.gov/tmdl/303d_lists.html. List all pollutants for which the proximate Receiving Waters are impaired.

c) Compare the list of pollutants for which the proximate Receiving Waters are impaired with the potential pollutants of concern generated by the project.

The combination of Site Design BMPs, Source Control BMPs, and Treatment Control BMPs incorporated into the project plans must address the potential Pollutants of Concern identified for the project. Further, the selection of a Treatment Control BMP (or BMPs) for the project must specifically consider the effectiveness of the Treatment Control BMP for pollutants identified as causing an impairment of Receiving Waters to which the project will discharge Urban Runoff. See Section 4.5.3, BMP Selection, for additional guidance in selecting appropriate BMPs to address Pollutants of Concern.

4.4 Identify Hydrologic Conditions of Concern

Impacts to the hydrologic regime resulting from Projects may include increased runoff volume and velocity; reduced infiltration; increased flow frequency, duration, and peaks; faster time to reach peak flow; and water quality degradation. Under certain circumstances, changes could also result in the reduction in the amount of available sediment for transport; storm flows could fill this sediment-carrying capacity by eroding the downstream channel. These changes have the potential to permanently impact downstream channels and habitat integrity.

The Permit requires that developments minimize changes to hydrology to ensure that post-development runoff rates and velocities from a site do not adversely impact downstream erosion, sedimentation or stream habitat. Urban Runoff and associated impacts may be reduced by minimizing impervious surfaces and incorporating other site-design concepts that replicate or reduce impacts to the pre-development condition. The goal of these site design techniques is to achieve post development runoff flow rates, volumes, velocities and durations that prevent significant increases in downstream erosion compared to the pre-development condition and prevent significant adverse impacts to stream habitat during the 2-year and 10-year, 24-hour rainfall event. More information on maximizing onsite infiltration and minimizing impacts to stream channels can be found in Start at the Source (Bay Area Stormwater Management Agencies Association, 1999) and Low Impact Development Design Strategies, An Integrated Design Approach (Prince George's County, Maryland; Department of Environmental Resources, 1999).

Studies are currently underway (conducted by Ventura County Watershed Protection District and the Stormwater Monitoring Coalition under guidance of the Southern California Coastal Water Research Project) to determine the susceptibility of Southern California streams to excessive erosion and habitat degradation due to urbanization and to provide recommendations on methods to minimize negative impacts. In the future, the Principal Permittee may develop protective guidelines for Hydrologic Conditions of Concern for development projects, based on recommendations from these or other studies. However, until such guidelines are developed and approved, the following procedure must be followed.

A project-specific WQMP must address the issue of Hydrologic Conditions of Concern unless one of the following conditions are met:

- **Condition A:** Runoff from the Project is discharged directly to a publicly-owned, operated and maintained MS4; the discharge is in full compliance with Co-Permittee requirements for connections and discharges to the MS4 (including both quality and quantity requirements); the discharge would not significantly impact stream habitat in proximate Receiving Waters; and the discharge is authorized by the Co-Permittee.

- **Condition B:** The project disturbs less than 1 acre. The disturbed area calculation should include all disturbances associated with larger common plans of development.
- **Condition C:** The project's runoff flow rate, volume, velocity and duration for the post-development condition do not exceed the pre-development condition for the 2-year, 24-hour and 10-year, 24-hour rainfall events. This condition can be achieved by minimizing impervious area on a site and incorporating other site-design concepts that mimic pre-development conditions. This condition must be substantiated by hydrologic modeling methods acceptable to the Co-Permittee.

For all other Projects, the project-specific WQMP shall demonstrate that discharge flow rates, velocities, durations, and volumes from a 2-year and 10-year, 24-hour rainfall event will not significantly impact downstream erosion or stream habitat. The project applicant shall provide sufficient information to demonstrate to the Co-Permittee that the Project will not cause significant adverse impacts, or has mitigated significant impacts to downstream erosion or stream habitat.

To comply with this requirement the Project Applicant must include an evaluation of potential of the project to cause a significant increase in downstream erosion compared to the pre-development condition and/or cause significant adverse impacts to stream habitat. Project applicants must consider the hydrology of the entire tributary watershed. Watershed plans, drainage area master plans, or other planning documents should be reviewed to the extent available, to identify the BMP requirements necessary to address cumulative impacts from Projects in the subarea of the watershed. Project applicants proposing new developments that fall into Category 1 with 20 or more units or Category 2 of section 3.2 of this WQMP shall be required to submit to the Co-Permittee a drainage study report prepared by a registered Civil Engineer in the State of California, with experience in water resources management. Other new development or redevelopment projects may be required to submit a detailed drainage study depending on specific site conditions. Such a drainage study must evaluate the impacts of the Project on downstream channel reaches impacted during a 2-year, 24-hour and 10-year, 24-hour rainfall event. A drainage study report shall also consider the Project's location (from the larger watershed perspective), topography, soil and vegetation conditions, percent impervious area, natural and infrastructure drainage features, and any other relevant hydrologic and environmental factors to be protected. A field reconnaissance to evaluate natural downstream reaches and/or areas containing sensitive habitat may be required to assess undercutting erosion, slope/bank stability, vegetative stress, and susceptibility to other adverse hydrologic impacts from the project.

If adverse hydrologic impacts are identified and they are not fully mitigated by the implementation of Site Design BMP concepts, then the Project proponent shall, based upon consultation with the Co-Permittee, use one of the following methodologies to address identified adverse impacts:

Methodology A

Project applicant shall design a detention basin capable of all of the following:

1. Releasing the post-development 2-year and 10-year, 24-hour volume at flow rates less than or equal to the pre-development 2-year and 10 year, 24-hour peak flow rates, respectively.
2. Passing the 100-year storm event without damage to the facility.
3. Controlling outlet velocities such that downstream erosion and habitat loss is minimized.

The basin may also function as a water quality extended detention basin, or serve other multi-use functions, with the approval of the local agency.

Methodology B

Any method acceptable to the Co-Permittee that:

1. Implements Site Design, Source Control, Treatment Control BMPs and/or other measures capable of mitigating the assessed hydrologic impacts. The method must be supported by hydrologic modeling or other sufficient documentation. Sufficient documentation could include reference to EPA, CASQA, SWRCB and/or other approved studies supporting the use of the method.
2. Ensures that the project will be consistent with any approved master plans of drainage or analogous plans or programs.

Hydrologic Condition of Concern BMPs should be designed in accordance with local vector control regulations and requirements. If a particular BMP does not meet vector control requirements, other BMPs should be considered. However, when the Co-Permittee determines that a detention basin is the most effective way to address Hydrologic Conditions of Concern, the Permittee may approve minor deviations from the design criteria specified in this section to ensure that local vector control requirements are not violated (e.g. 72 hour drain times from a basin full condition).

4.5 BMP Selection

BMPs shall be incorporated into the project-specific WQMP to minimize the impact from the Pollutants of Concern and Hydrologic Conditions of Concern identified for the Project. Where Pollutants of Concern include pollutants that are listed as causing or contributing to impairments of Receiving Waters, BMPs must be selected so that the project does not cause or contribute to an exceedance of water quality objectives. Strategies to minimize the Pollutants of Concern in runoff from the project site and minimize hydrologic impact include Site Design BMPs, Source Control BMPs, and Treatment Control BMPs. In preparing a project-specific WQMP, BMPs should be considered and incorporated into the project design plans, in the following progression:

- Site Design BMPs
- Source Control BMPs (Non-Structural and Structural)
- Treatment Control BMPs (or participation in a regional or watershed program)

Site Design BMPs aim to incorporate site features such as vegetation to reduce and control post-development runoff rates. Because Site Design BMPs reduce runoff, incorporating them into project design plans minimizes the:

- transport mechanism (runoff) for moving pollutants off site,
- difference between pre- and post-development hydrology thereby reducing changes in flow regime, and
- size of necessary Treatment Control BMPs to treat Pollutants of Concern in Urban Runoff prior to discharge from the site or at regional facilities.

Source Control BMPs reduce the potential for Urban Runoff and pollutants from coming into contact with one another. Source Control BMPs are defined as any administrative action, design of a structural facility, usage of alternative materials, and operation, maintenance, and inspection procedures that eliminate or reduce Urban Runoff pollution. Each Project is required to implement appropriate Source Control BMPs.

Treatment Control BMPs are defined as any engineered system designed and constructed to treat the adverse impacts of Urban Runoff pollution. These BMPs may remove Pollutants of Concern by filtration, media absorption, or other physical, biological, or chemical process. It should be noted that where the project proponent believes that design criteria adequately addresses Pollutants of Concern and Treatment Controls are not needed, a request for a waiver must be submitted to and approved by the Permittee.

Site Design BMPs, Source Control BMPs, and Treatment Control BMPs most effectively protect water quality when used in combination. Site Design and Source Control BMPs may be implemented to a level that significantly reduces the size or extent to which Treatment Control BMPs need to be implemented. BMPs should be located as close to the pollutant source as appropriate and economically/technologically feasible, and before Urban Runoff is discharged into Receiving Waters. A summary of the BMP requirements for New Development and Significant Redevelopment is shown in Table 2. Co-Permittees should also incorporate vector control requirements into the selection and design process of site, source and treatment control BMPs.

Table 2. Summary of BMPs for New Development & Significant Redevelopment

BMP Category		Applicable Projects
Site Design BMPs (See Section 4.5.1)		All New Development & Significant Redevelopment shall incorporate Site Design BMPs to the extent applicable and feasible.
Source Control BMPs	**Non-Structural BMPs** (See Section 4.5.2.1)	Required for all New Development & Significant Redevelopment. • Education/Training for Property Owners, Operators, Tenants, Occupants, or Employees • Activity Restrictions • Irrigation System and Landscape Maintenance • Common Area Litter Control • Street Sweeping Private Streets and Parking Lots • Drainage Facility Inspection and Maintenance
Source Control BMPs	**Structural BMPs** (See Section 4.5.2.2)	Required for all New Development & Significant Redevelopment, as applicable to the specific project. Include incorporating requirements applicable to individual priority project categories • MS4 Stenciling and Signage • Landscape and Irrigation System Design • Protection of Slopes and Channels • Provide: – Community Car Wash Racks – Wash Water Controls for Food Preparation Areas • Properly Design and Maintain: – Fueling Areas – Air/Water Supply Area Drainage – Trash Storage Areas – Loading Docks – Maintenance Bays – Vehicle and Equipment Wash Areas – Outdoor Material Storage Areas – Outdoor Work Areas or Processing Areas
Treatment Control BMPs: Project-Specific, Regional, or Sub-Regional (See Sections 4.5.3 and 5.0)		At least one Treatment Control BMP is required for all New Development and Significant Redevelopment unless a waiver is granted by Co-Permittee. (See Section 7.0)

Additional BMP reference material is contained within the CASQA "Stormwater Best Management Practices Handbook for New Development and Redevelopment" and the "Stormwater Best Management Practices Handbook for Industrial and Commercial" (CASQA, 2003). The most recent editions of the CASQA handbooks are acceptable for use in identifying and selecting BMPs for a project-specific WQMP. The most recent editions of the CASQA handbooks can be downloaded at www.cabmphandbooks.com, and supercede references in the Permit to the 1993 handbooks published by the Stormwater Quality Task Force (the predecessor of CASQA).

4.5.1 Site Design BMPs

Site Design BMPs are intended to create a hydrologically functional project design that attempts to mimic the natural hydrologic regime. Mimicking a site's natural hydrologic regime can be pursued by:

- Reducing imperviousness, conserving natural resources and areas, maintaining and using natural drainage courses in the MS4, and minimizing clearing and grading.
- Providing runoff storage measures dispersed uniformly throughout a site's landscape with the use of a variety of detention, retention, and runoff practices.
- Implementing on-lot hydrologically functional landscape design and management practices.

These same practices, because they reduce the volume and usually the rate of runoff, also have the benefit of reducing the amount of storm water that must be treated before being discharged or to be treated in regional facilities. These design principles offer an innovative approach to urban storm water management by uniformly or strategically integrating storm water controls throughout the urban landscape. Resources for applying these principles include Start at the Source (Bay Area Storm Water Management Agencies Association, 1999)[14], and Low Impact Development Design Strategies, An Integrated Design Approach (Prince George's County, Maryland; Department of Environmental Resources, 1999)[15].

Site Design Concept 1: Minimize Urban Runoff, Minimize Impervious Footprint, and Conserve Natural Areas

Site Design BMPs to minimize Urban Runoff, minimize impervious footprint and conserve natural areas must be incorporated where applicable as determined by the Co-Permittee during the site planning and approval process consistent with applicable General Plan policies, other development standards and regulations and with any Site Design BMPs included in an applicable regional or watershed program. Examples include:

- Maximize the permeable area. This can be achieved in various ways, including, but not limited to increasing building floor area ratio (number of stories above or below ground) and developing land use regulations seeking to limit impervious surfaces. Decreasing the project's footprint can substantially reduce the project's impacts to water quality and hydrologic conditions, provided that the undeveloped area remains open space. Runoff from developed areas may be reduced by using alternative materials or surfaces with a lower Runoff Coefficient (C factor). The C factor is a representation of the ability of a surface to produce runoff. Surfaces that provide higher runoff volumes are represented by higher C factors. By incorporating more pervious, lower C factor surfaces into a development, lower volumes of runoff will be produced. Lower volumes and rates of runoff translate directly to lowering treatment requirements.
- Conserve natural areas. This can be achieved by concentrating or clustering development on the least environmentally sensitive portions of a site while leaving the remaining land in a natural, undisturbed condition. The Co-Permittees and Project applicants should refer to Multiple Species Habitat Conservation Plans or other natural resource plans, as appropriate to assist in identifying sensitive portions of the site. Sensitive areas include, but are not limited to, areas necessary to maintain the viability of wildlife corridors, occupied habitat of sensitive species and all wetlands, and coastal scrub and other upland communities.
- Construct walkways, trails, patios, overflow parking lots, alleys, driveways, low-traffic streets and other low -traffic areas with open-jointed paving materials or permeable surfaces, such as pervious concrete, porous asphalt, unit pavers, and granular materials.

[14] http://www.oaklandpw.com/creeks/bmps.html
[15] http://www.epa.gov/owow/nps/lid/lidnatl.pdf

- Construct streets, sidewalks and parking lot aisles to the minimum widths necessary, provided that public safety and a walk able environment for pedestrians are not compromised.[16]
- Incorporate landscaped buffer areas between sidewalks and streets.
- Reduce widths of street where off-street parking is available.[17]
- Maximize canopy interception and water conservation by preserving existing native trees and shrubs, and planting additional native or drought tolerant trees and large shrubs.
- Minimize the use of impervious surfaces, such as decorative concrete, in the landscape design.
- Use natural drainage systems.
- Where soils conditions are suitable, use perforated pipe or gravel filtration pits for low flow infiltration.[18]
- Construct onsite ponding areas or retention facilities to increase opportunities for infiltration consistent with vector control objectives.
- Other comparable and equally effective site design concepts as approved by the Co-Permittee.

Site Design Concept 2: Minimize Directly Connected Impervious Areas (DCIAs)

Site Design BMPs to minimize DCIAs must be incorporated where applicable, during the site planning and approval process consistent with applicable development standards and regulations and with any Site Design BMPs included in an applicable regional or watershed program. Examples include:

- Residential and commercial sites must be designed to contain and infiltrate roof runoff, or direct roof runoff to vegetative swales or buffer areas, where feasible.
- Where landscaping is proposed, drain impervious sidewalks, walkways, trails, and patios into adjacent landscaping
- Increase the use of vegetated drainage swales in lieu of underground piping or imperviously lined swales
- Use one or more of the following (for further guidance, see Start at the Source [1999]):
  - Rural swale system: street sheet flows to vegetated swale or gravel shoulder, curbs at street corners, culverts under driveways and street crossings
  - Urban curb/swale system: street slopes to curb; periodic swale inlets drain to vegetated swale/biofilter
  - Dual drainage system: First flush captured in street catch basins and discharged to adjacent vegetated swale or gravel shoulder, high flows connect directly to MS4s
  - Other design concepts that are comparable and equally effective as approved by the Co-Permittee.
- Use one or more of the following features for design of driveways and private residential parking areas:
  - Design driveways with shared access, flared (single lane at street) or wheel strips (paving only under tires); or, drain into landscaping prior to discharging to the MS4

[16] Sidewalk widths must still comply with Americans with Disabilities Act regulations and other life safety requirements.

[17] However, street widths must still comply with life safety requirements for fire and emergency vehicle access in addition to waste collection and facility maintenance needs.

[18] However, projects must still comply with hillside grading ordinances that limit or restrict infiltration of runoff.

- Uncovered temporary or guest parking on private residential lots may be: paved with a permeable surface; or, designed to drain into landscaping prior to discharging to the MS4
- Other design concepts that are comparable and equally effective as approved by the Co-Permittee.

- Use one or more of the following design concepts for the design of parking areas:
  - Where landscaping is proposed in parking areas, incorporate landscape areas into the drainage design
  - Overflow parking (parking stalls provided in excess of the Co-Permittee's minimum parking requirements) may be constructed with permeable paving
  - Other comparable and equally effective design concepts as approved by the Co-Permittee.
- Other comparable and equally effective design characteristics as approved by the Co-Permittee.

4.5.2 Source Control BMPs

The following Source Control BMPs must be addressed in each project-specific WQMP unless they do not apply given project features as determined by the Co-Permittee. If any of the following Source Control BMPs are not included in the project-specific WQMP, adequate justification must be provided before the project-specific WQMP will be approved.

4.5.2.1 *Non-Structural Source Control BMPs*

Education/Training for Property Owners, Operators, Tenants, Occupants, or Employees

For Projects with an HOA/POA of less than fifty (50) dwelling units and for Projects with no HOA/POA, practical informational materials to promote the prevention of Urban Runoff pollution will be provided by the project proponent to the first residents/occupants/tenants. These materials shall include general housekeeping practices that contribute to the protection of Urban Runoff quality and BMPs that eliminate or reduce pollution during subsequent property improvements. These materials or a resource list for obtaining these materials will be made available through the Co-Permittee or can be found at http://www.floodcontrol.co.riverside.ca.us/YouCanHelp.asp. However, the Co-Permittee may elect to recover printing costs for such materials. The project applicant shall request these materials at least 30 days prior to the intended distribution date and shall then be responsible for timely distribution at the time of occupancy.

For Projects with an HOA/POA of more than fifty (50) dwelling units, conditions of approval will require the HOA/POA to annually provide environmental awareness education materials to all members. These materials shall include general housekeeping practices that contribute to the protection of Urban Runoff quality and BMPs that eliminate or reduce pollution during subsequent property improvements. These materials or a resource list for obtaining these materials will be available through the Co-Permittee. However, the Co-Permittee may elect to recover printing costs for such materials. The HOA/POA shall request these materials (in writing) at least 30 days prior to the intended distribution date.

For Projects where people will be employed or contracted to perform activities that may impact Urban Runoff, BMP training and education programs must be provided to all new employees within 6 months of hire date and annually thereafter. Employee training materials may be derived from educational materials available through the Co-Permittee or from other resources such as "Stormwater Best Management Practices Handbook for Industrial and Commercial" (CASQA, 2003). The most recent editions of the CASQA handbooks can be downloaded at www.cabmphandbooks.com. The project-specific WQMP must describe the frequency of employee training and indicate the party responsible for conducting the training.

Activity Restrictions

At the discretion of the Co-Permittee, if an HOA/POA is formed, the developer shall prepare CC&Rs for the purpose of Receiving Water quality protection. Alternatively, use restrictions may be developed by a building operator through lease terms, etc. These restrictions must be included in the project-specific WQMP. Examples of activity restrictions are:

- Prohibiting the blowing, sweeping, or hosing of debris (leaf litter, grass clippings, litter, etc.) into streets, storm drain inlets, or other conveyances.
- Require dumpster lids to be closed at all times.
- Prohibit vehicle washing, maintenance, or repair on the premises or restrict those activities to designated areas (such as repair within maintenance bays and vehicle washing on properly designed wash racks).

Irrigation System and Landscape Maintenance

Maintenance of irrigation systems and landscaping shall be consistent with the Co-Permittee's water conservation ordinance, which can be accessed through the Co-Permittee's website or obtained through the Co-Permittee's planning/permitting counter. Fertilizer and pesticide usage shall be consistent with the instructions contained on product labels and with regulations administered by California's Department of Pesticide Regulation. Additionally, landscape maintenance must address replacement of dead vegetation, repair of erosion rills, proper disposal of green waste, etc. Irrigation system maintenance must address periodic testing and observation of the irrigation system to detect overspray, broken sprinkler heads, and other system failures. The project-specific WQMP should describe the anticipated frequency of irrigation system and landscape maintenance activities and identify the responsible party.

Common Area Litter Control

For industrial/commercial Projects and for Projects with HOAs/POAs, the project-specific WQMP must address litter control for common areas. Litter control must address whether or not trash receptacles will be provided in common areas, emptying of trash receptacles, the frequency with which trash receptacles will be emptied, patrolling common areas and perimeter fences or walls to collect litter, noting trash disposal violations by tenants/home owners or businesses and reporting such observations to the owner, operator, manager, or HOA/POA for investigation, and identification of the party responsible for litter control.

Street Sweeping Private Streets and Parking Lots

For industrial/commercial Projects and for other Projects with HOAs/POAs, the frequency of sweeping privately owned streets shall be described in the project-specific WQMP. The frequency shall be no less than the frequency of street sweeping by the Co-Permittee on public streets. For Projects with parking lots, the parking lots shall be swept at least quarterly, including just prior to the start of the rainy season (October 1st). The project-specific WQMP should identify the anticipated sweeping frequency, source of funding and the party responsible for conducting the periodic sweeping.

Drainage Facility Inspection and Maintenance

For industrial/commercial Projects and for Projects with HOAs/POAs, the frequency for cleaning privately owned drainage facilities (catch basins, open channels and storm drain inlets) shall be described in the project-specific WQMP. The frequency shall be no less than the frequency of drainage facility cleaning conducted by the Co-Permittee. At a minimum, routine maintenance of privately owned drainage facilities should take place in the late summer or early fall prior to the start of the rainy season (October 1st). The drainage facilities must be cleaned if accumulated sediment/debris fills 25% or more of the sediment/debris storage capacity. Privately owned drainage facilities shall be inspected annually and

the cleaning frequency shall be assessed. The project-specific WQMP should identify the party responsible for conducting the drainage facility inspection and maintenance.

4.5.2.2 *Structural Source Control BMPs*

MS4 Stenciling and Signage

The following requirements must be addressed in a project-specific WQMP and/or shall be denoted on Project plan sheets:

- Provide stenciling or labeling of all storm drain inlets and catch basins, constructed or modified, within the project area with prohibitive language (such as: "NO DUMPING ONLY RAIN IN THE DRAIN") and/or graphical icons to discourage illegal dumping.
- Post signs and prohibitive language and/or graphical icons, which prohibit illegal dumping at public access points along channels and creeks within the project area.
- Identify the party responsible for maintaining the legibility of stencils and signs.

The stencils contain a brief statement that prohibits dumping into the MS4. Graphical icons, either illustrating anti-dumping symbols or images of Receiving Water fauna, are effective supplements to the text message. Stencils and signs alert the public to the destination of pollutants discharged into Urban Runoff.

Landscape and Irrigation System Design

A project-specific WQMP must describe how the following concepts have been incorporated into project design features:

- Employing rain shutoff devices to prevent irrigation during and after precipitation events.
- Designing irrigation systems to each landscape area's specific water requirements.
- Using flow reducers or shutoff valves triggered by a pressure drop to control water loss due to broken sprinkler heads or lines.
- The timing and application methods of irrigation water shall be designed to minimize the runoff of excess irrigation water into the MS4.
- Other comparable, equally effective, methods to reduce irrigation water runoff.
- Preparation and implementation of a landscape plan consistent with the Co-Permittee's water conservation ordinance, which may include the use of water sensors, programmable irrigation times (for short cycles), etc.
- Preparation and implementation of a landscape plan that:
  - Utilizes plants with low irrigation requirements (for example, native or drought tolerant species)
  - Groups plants with similar water requirements in order to reduce excess irrigation runoff and promote surface infiltration.
  - Use mulches (such as wood chips or shredded wood products) in planter areas without ground cover to minimize sediment in runoff.
  - Install appropriate plant materials for the location, in accordance with amount of sunlight and climate, and use native plant material where possible and/or as recommended by the landscape architect.
  - Maintaining or creating a vegetative barrier along the property boundary and interior watercourses, to act as a pollutant filter, where appropriate and feasible.

– Choose plants that minimize or eliminate the use of fertilizer or pesticides to sustain growth.

Protection of Slopes and Channels

Project plans shall include Source Control BMPs to decrease the potential for erosion of slopes and/or channels, consistent with local codes and ordinances and with the approval of all agencies with jurisdiction, e.g., the U.S. Army Corps of Engineers, the Regional Boards and the California Department of Fish and Game. The following design principles shall be considered, and incorporated and implemented where determined applicable and feasible by the Co-Permittee:

- Convey runoff safely from the tops of slopes.
- Avoid disturbing steep or unstable slopes and natural channels.
- Install permanent stabilization BMPs on disturbed slopes as quickly as possible.
- Plant slopes with native or drought tolerant vegetation. Hillside areas that are disturbed shall be landscaped with deep-rooted, drought tolerant plant species selected for erosion control.
- Control and treat flows in landscaping and/or other controls prior to reaching existing natural drainage systems.
- Install permanent stabilization BMPs in channel crossings as quickly as possible, and ensure that increases in runoff velocity and frequency caused by the project do not erode the channel.
- Install energy dissipaters at the outlets of new MS4s, culverts, conduits, or channels that enter unlined channels in accordance with applicable specifications to minimize erosion. Energy dissipaters shall be installed in such a way as to minimize impacts to Receiving Waters.
- Onsite conveyance channels should be lined, where appropriate, to reduce erosion caused by increased flow velocity due to increases in tributary impervious area. The first choice for linings should be grass or some other vegetative surface, since these materials not only reduce runoff velocities, but also provide water quality benefits from filtration and infiltration. If velocities in the channel are large enough to erode grass or other vegetative linings, riprap, concrete soil cement or geo-grid stabilization may be substituted or used in combination with grass or other vegetation stabilization.
- Other comparable and equally effective site design options as approved by the Co-Permittee.

Provide Community Car Wash Racks

In multi-family Projects where car washing or rinsing is not specifically prohibited via CC&Rs or other acceptable means, and in Projects having a common parking area where car washing or rinsing is not specifically prohibited via CC&Rs or other acceptable means, a designated car washing and rinsing area that does not drain directly to a MS4 shall be provided for common usage. Wash and rinse waters from this area must either be directed to the sanitary sewer (with prior approval of the sewering agency), to an engineered filtration system, or an equally effective alternative prior to discharging to the MS4.

Properly Design Fueling Areas

Fuel dispensing areas shall include the following design features:

1. At a minimum, the fuel dispensing area must extend 6.5 feet (2.0 meters) from the corner of each fuel dispenser, or the length at which the hose and nozzle assembly may be operated plus 1 foot (0.3 meter), whichever is less.
2. The fuel dispensing area shall be paved with Portland cement concrete (or equivalent smooth impervious surface). The use of asphalt concrete is prohibited.

3. The fuel dispensing area shall have an appropriate slope (2% - 4%) to prevent ponding, and must be separated from the rest of the site by a grade break that prevents run-on of stormwater and to eliminate stormwater flow through the concrete fueling area.
4. An overhanging roof structure or canopy shall be provided. The cover's minimum dimensions must be equal to or greater than the area within the grade break or the fuel dispensing area. The cover must not drain onto the fuel dispensing area and facility downspouts (roof drains) must be routed to prevent drainage across the fueling area. The fueling area shall drain to an appropriate Treatment Control BMP prior to discharging to the MS4.
5. The fuel dispensing area must be designed to prohibit spills from draining to the street, MS4, or offsite.

Properly Design Air/Water Supply Area Drainage

Areas used for air/water supply must be graded and constructed so as to contain spilled material for cleanup.

Properly Design Trash Storage Areas

All trash container areas shall meet the following requirements:

1. Paved with an impervious surface, designed not to allow run-on from adjoining areas, designed to divert drainage from adjoining roofs and pavements diverted around the area, screened or walled to prevent off-site transport of trash.
2. Trash dumpsters (containers) shall be leak proof and have attached covers or lids.
3. Connection of trash area drains to the MS4 is prohibited.
4. Trash compactors shall be roofed and set on a concrete pad. The pad shall be a minimum of one foot larger all around than the trash compactor and sloped to drain to a sanitary sewer line.

Properly Design and Maintain Loading Docks

The design of loading/unloading dock areas shall include the following:

- Cover loading dock areas, or design drainage to preclude run-on and runoff.
- Direct connections to the MS4 from below-grade loading docks (truck wells) or similar structures are prohibited. Urban Runoff from a below-grade loading dock may only be discharged to the MS4 when designed to use a Treatment Control BMP applicable to the use.

Loading docks shall be kept in a clean and orderly condition through a regular program of sweeping and litter control and immediate cleanup of spills and broken containers. Cleanup procedures should minimize or eliminate the use of water. If washdown water is used, it must be properly disposed (containment, collection, and disposal to sanitary sewer) and not discharged to the MS4. The project-specific WQMP shall describe the frequency for implementing loading dock housekeeping measures and the party responsible.

Properly Design Maintenance Bays

Maintenance bays shall include the following:

- Repair/maintenance bays shall be indoors; or, designed to preclude run-on and runoff.
- Design a repair/maintenance bay drainage system to capture all wash water, leaks and spills. Provide impermeable berms, drop inlets, trench catch basins, or overflow containment structures around repair bays to prevent spilled materials and washdown waters from entering the MS4. Connect drains to a sump for collection and disposal. Discharge from the repair/maintenance bays to the MS4 is prohibited.

Properly Design Vehicle and Equipment Wash Areas

The discharge of wash waters to the MS4 is prohibited. Therefore, Projects that include areas for washing/steam cleaning of vehicles or equipment shall include the following design features:

- Wash areas shall be contained and covered with a roof or overhang or adequate surplus storage to contain and utilize all precipitation.
- Provide a wash rack or wash racks connected to the sanitary sewer in accordance with sewering agency guidelines and prior approval. The sewering agency may require discharge monitoring. If the facility recycles wash water and is not connected to the sanitary sewer, wastes must be properly contained and disposed.
- Design an equipment wash area drainage system to capture all wash water. Provide impermeable berms, drop inlets, trench catch basins, or overflow containment structures around equipment wash areas to prevent wash waters from entering the MS4. Connect drains to a sump for collection and disposal.
- Surface runoff and roof drains shall be directed away from wash racks unless approved by the sanitary sewering agency.

Properly Design Outdoor Material Storage Areas

Where plans propose outdoor storage containers for oils, fuels, solvents, coolants, wastes, and other chemicals, the areas where these materials are to be used or stored must be protected by secondary containment structures such as a low containment berm, dike, or curb, designed to the satisfaction of the Co-Permittee. Materials or products that are stored outside and that have the potential to cause pollutant discharges shall be protected from rainfall, runoff, run-on, and wind erosion by design and use of a:

- cabinet, shed, or similar structure that prevents contact with runoff or spillage to the MS4;
- paved storage area and sufficiently impervious to contain leaks and spills; and/or
- roof or awning to minimize direct precipitation and collection of stormwater within the secondary containment area. Stormwater that collects within a secondary containment structure must not be discharged to the street or the MS4.

Properly Design Outdoor Work Areas or Processing Areas

Where vehicle or equipment repair/maintenance occurs, impermeable berms, trench drains, or containment structures shall be provided around the areas to eliminate or reduce spilled materials and wash-down waters from entering the street or the MS4. Surface runoff or roof drains shall be directed away from these contained work areas. Sidewalls and canopies may be used to meet this requirement.

Outdoor process equipment operations, such as rock grinding or crushing, painting or coating, grinding or sanding, degreasing or parts cleaning, landfills, waste piles, and wastewater and solid waste handling, treatment, and disposal, and other operations shall adhere to the following requirements.

- Cover or enclose areas that would be the sources of pollutants or slope the area toward a sump.
- Grade or berm area to prevent run-on from surrounding areas.
- Storm drain inlets connected to the MS4 are prohibited within these outdoor work or process areas.
- Where wet material processing occurs (e.g. electroplating), secondary containment structures (not double wall containers) shall be provided to hold spills resulting from accidents or leaking tanks or equipment.
- Salvage yards and recycle facilities must direct all runoff to appropriate Treatment Control BMP(s).

Provide Wash Water Controls for Food Preparation Areas

Food establishments (per State Health & Safety Code 27520) shall have either contained areas or sinks, each with connections to the sanitary sewer for disposal of wash waters containing kitchen and food wastes. If located outside, the contained areas or sinks shall also be structurally covered to prevent entry of Urban Runoff. Adequate signs shall be provided and appropriately placed stating the prohibition of discharging wash water to the MS4.

4.5.3 Treatment Control BMPs

Treatment Control BMPs must be selected with respect to identified Pollutants and Hydrologic Conditions of Concern. Treatment Control BMPs must be designed to treat the Flow Based Design (Section 4.5.3.4) or the Volume Based Design (Section 4.5.3.5) from a Project. Treatment Control BMPs may also be provided offsite or through a regionally-based Treatment Control BMP (see Section 5.0).

Table 3 summarizes expected performance of several common Treatment Control BMPs in removing various Pollutants of Concern. It should be noted that, at the discretion of the Co-Permittee, updated studies from CASQA, EPA, SWRCB and/or other commonly accepted agencies/associations acceptable to the Co-Permittee for determination of Treatment Control BMP pollutant removal efficiency may be accepted. For identified Pollutants of Concern that are causing impairments in receiving waters, the Project-Specific WQMP shall incorporate one or more Treatment Control BMPs of at least medium effectiveness in reducing those pollutants.

For more specific information on the pollutant removal capabilities of various BMPs, refer to the CASQA "Stormwater Best Management Practices Handbook for New Development and Redevelopment" (CASQA, 2003). Subsequent sections of this WQMP provide guidance for determining the flow (Section 4.5.3.4) or volume (Section 4.5.3.5) of runoff from a Project to be treated via Treatment Control BMPs. The Riverside County Stormwater Quality Best Management Practice Design Handbook, which is included as Exhibit C, provides more detailed guidance.

The obligation to install Treatment Control BMPs at Project site is met if, for a common scheme of development, BMPs are constructed with the requisite capacity to serve the entire common scheme, even if certain phases of the common scheme may not have BMP capacity located on that phase. BMP capacity must be functional prior to the issuance of occupancy permits, or certificates of use (or equivalent), if no occupancy permits are issued.

If the Treatment Control BMP selected for the project functions by infiltration, the BMP shall not violate the requirements set forth in 40 CFR 144 for Class V Injection Wells[19] or any potential local infiltration requirements. For purposes of identifying local infiltration requirements, the Co-Permittee will assist Project applicants in identifying groundwater management agencies that may have established such requirements. In addition, Treatment Control BMPs that allow infiltration shall not cause or contribute to an exceedance of groundwater quality objectives, shall not be used in industrial or high vehicular traffic areas (25,000 or greater average daily traffic), must be located at least 100 feet horizontally from any water supply well, must be at least 10 feet vertically above the historic high groundwater mark, and shall not cause a nuisance or pollution as defined in Water Code Section 13050.[20] Additional resources for the appropriate siting of infiltration BMPs include Caltrans Report No. CTSW-RT-03-025, Infiltration Basin Site Selection Study (June 2003)[21] and USEPA Report No. EPA/600/R-94-051, Potential Groundwater Contamination from Intentional and Non-Intentional Stormwater Infiltration (1994).

[19] http://frwebgate.access.gpo.gov/cgi-bin/multidb.cgi

[20] http://www.leginfo.ca.gov/cgi-bin/displaycode?section=wat&group=13001-14000&file=13050-13051

[21] http://www.dot.ca.gov/hq/env/stormwater/special/newsetup/_pdfs/new_technology/CTSW-RT-03-025/IFB_Final_Report.pdf

Table 3. Treatment Control BMP Selection Matrix (1)

(Excerpted, with minor revision, from the Orange County Water Quality Management Plan dated September 26, 2003 and the San Bernardino Water Quality Management Plan dated April 14, 2004)

Pollutant of Concern	Biofilters (2)	Detention Basins (3)	Infiltration BMPs (4)	Wet Ponds or Wetlands (5)	Filtration Systems (6)	Water Quality Inlets	Hydrodynamic Separator Systems (7)	Manufactured or Proprietary Devices (8)
Sediment/Turbidity	H/M	M	H/M	H/M	H/M	L	H/M (L for Turbidity)	U
Nutrients	L	M	H/M	H/M	L/M	L	L	U
Organic Compounds	U	U	U	U	H/M	L	L	U
Trash & Debris	L	M	U	U	H/M	M	H/M	U
Oxygen Demanding Substances	L	M	H/M	H/M	H/M	L	L	U
Bacteria & Viruses	U	U	H/M	U	H/M	L	L	U
Oil & Grease	H/M	M	U	U	H/M	M	L/M	U
Pesticides (non-soil bound)	U	U	U	U	U	L	L	U
Metals	H/M	M	H	H	H	L	L	U

Abbreviations:

L: Low removal efficiency H/M: High or medium removal efficiency U: Unknown removal efficiency

Notes:

(1) Periodic performance assessment and updating of the guidance provided by this table may be necessary.

(2) Includes grass swales, grass strips, wetland vegetation swales, and bioretention.

(3) Includes extended/dry detention basins with grass lining and extended/dry detention basins with impervious lining. Effectiveness based upon minimum 36-48-hour drawdown time.

(4) Includes infiltration basins, infiltration trenches, and porous pavements.

(5) Includes permanent pool wet ponds and constructed wetlands.

(6) Includes sand filters and media filters.

(7) Also known as hydrodynamic devices, baffle boxes, swirl concentrators, or cyclone separators.

(8) Includes proprietary stormwater treatment devices as listed in the CASQA Stormwater Best Management Practices Handbooks, other stormwater treatment BMPs not specifically listed in this WQMP, or newly developed/emerging stormwater treatment technologies.

4.5.3.1 *Flow Based Treatment Control BMPs*

Vegetated Filter Strips

Vegetated filter strips are uniformly graded areas of dense vegetation designed to treat sheet flow Urban Runoff. Pollutants are removed by filtering and through settling of sediment and other solid particles as the design flow passes through (not over) the vegetation. Filter strips are usually as wide as the tributary area and must be long enough in the flow direction to adequately treat the runoff. Concentrated flows are redistributed uniformly across the top of the strip with a level spreader. A grass swale, sand filter, or infiltration BMP is recommended in conjunction with a filter strip[22].

Vegetated filter strips require frequent landscape maintenance. Maintenance requirements typically include grass or shrub-growing activities such as irrigation, mowing, trimming, removal of invasive species, and replanting when necessary. Consider use of duplicate facilities such that one one-half of the facility can be taken out of service to allow for maintenance without reducing the required level of

[22] However, projects must still comply with hillside grading ordinances that limit or restrict infiltration of runoff.

treatment performance. This is especially helpful for vegetated filter strips that need to be dry before they can be mowed.

Vegetated Swales

A vegetated swale is a wide, shallow densely vegetated channel that treats Urban Runoff as it is slowly conveyed into a downstream system. These swales have very shallow slopes in order to allow maximum contact time with the vegetation. The depth of the design flow should be less than the height of the vegetation[23]. Contact with vegetation improves water quality by plant uptake of pollutants, removal of sediment, and an increase in infiltration. Overall the effectiveness of grass swales is limited and they are recommended in combination with other BMPs.

Vegetated swales require a thick vegetative cover to function properly. They usually require normal landscape maintenance activities such as irrigation and mowing to maintain pollutant removal efficiency. The application of fertilizers and pesticides should be minimized. Consider use of duplicate facilities such that one one-half of the facility can be taken out of service to allow for maintenance without reducing the required level of treatment performance. This is especially helpful for vegetated swales that need to be dry before they can be mowed.

Water Quality Inlet

A water quality inlet is a device that removes oil and grit from Urban Runoff before the water enters the MS4. It consists of one or more chambers that promote sedimentation of coarse materials and separation of free oil from Urban Runoff. Manufacturers have created a variety of configurations to accomplish this. A specific model can be selected from the manufacturer based on the design flow rate. A water quality inlet is generally used for pretreatment before discharging into another type of BMP.

Water quality inlet (WQI) maintenance is site-specific due to variations in sediment and hydrocarbon by-products, which may require disposal as hazardous waste. Establishment of a maintenance schedule is helpful for ensuring proper maintenance, because the WQIs are underground and can easily be neglected. High sediment loads can interfere with the ability of the WQI to effectively separate oil and grease from the runoff.

Other BMPs

In some cases, other flow-based BMPs, proprietary BMPs or combinations of BMPs may be appropriate for a development. Such BMPs or combinations of BMPs may be employed on a site-specific basis as approved by the Co-Permittee. The appropriate BMP(s) for a Project should be determined based on the size of the project area and the types of pollutants that will be found in the development runoff.

4.5.3.2 *Volume Based Treatment Control BMPs*

Extended Detention Basin

An extended detention Basin is a permanent basin sized to detain and slowly release the design volume of Urban Runoff, allowing particles and associated pollutants to settle out. The basin outlet is designed to slowly release this runoff over a set drawdown period. An inlet forebay section and an inlet energy dissipater minimize erosion from entering flows, while erosion protection at the outlet prevents damage from exiting flows. The bottom of the basin slopes towards the outlet at an approximate grade of two percent, and a low flow channel conveys incidental flows directly to the outlet end of the basin. The basin should be vegetated earth in order to allow some infiltration to occur, although highly pervious soils may require an impermeable liner to prevent groundwater contamination. Proper turf management is also required to ensure that the vegetation does not contribute to water pollution through pesticides, herbicides,

[23] However, projects must still comply with hillside grading ordinances that limit or restrict infiltration of runoff.

or fertilizers. A permanent micro-pool should not be included due to vector concerns. Extended detention basins can also be used to reduce the peaks of small run-off events for flood control purposes.

Extended detention basins require inspection semi-annually and after significant storm events to identify potential problems early. Most maintenance efforts will need to be directed toward vegetation management and vector control, which may focus on basic housekeeping practices such as removal of debris accumulations and vegetation management to ensure that the basin dewaters completely, within the set drawdown time, to prevent creating vector habitats.

Infiltration Basin

Infiltration basins perform better in well-drained permeable soils. Infiltration basins in areas of low permeability can clog within a couple of years, and require more frequent inspection and maintenance. The use and regular maintenance of pretreatment BMPs will significantly minimize maintenance requirements for the basin. Spill response procedures and controls should be implemented to prevent spills from reaching the infiltration basin. Particular care is required where the area upstream of the infiltration BMP may not be fully stabilized, or in existing developments where upstream areas may become destabilized due to construction work, lack of maintenance, fire, or other actions. In these cases, measures to prevent sediment from entering and clogging the BMP are necessary until the tributary area is stabilized. This BMP may require groundwater monitoring. Basins should not be put into operation until the upstream tributary area is stabilized.

Infiltration Trench

An infiltration trench is an excavated trench that has been refilled with a gravel and sand bed capable of holding the design volume of Urban Runoff. The runoff is stored in the trench over a period of time during which it slowly infiltrates back into the naturally pervious surrounding soil. This infiltration process effectively removes soluble and particulate pollutants, however it is not intended to trap coarse sediments. These trenches also include a bypass system for volumes greater than the design capture volume, and a perforated pipe observation well to monitor water depth.

Infiltration trenches require an effective pretreatment, such as vegetated buffer strips, to remove sediment and minimize clogging. If the trench clogs, it may be necessary to remove and replace all or part of the filter fabric and possibly the coarse aggregate. Maintenance should be concentrated on the pretreatment practices, such as buffer strips and swales upstream of the trench to ensure that sediment does not reach the infiltration trench. Particular care is required where the area upstream of the infiltration BMP may not be fully stabilized, or in existing developments where upstream areas may become destabilized due to construction work, lack of maintenance, fire, or other actions. In these cases, measures to prevent sediment from entering and clogging the BMP are necessary until the tributary area is stabilized. Regular inspection should determine if the sediment removal structures require routine maintenance. Infiltration basins should not be put into operation until the upstream tributary area is stabilized.

Sand Filter

Sand filters clog easily when subjected to heavy sediment loads. Sediment reducing pretreatment practices, such as vegetated buffer strips or vegetated swales, placed upstream of the filter should be maintained properly to reduce sediment loads into the filter. Media filters should drain within the set drawdown time to minimize vector habitat. Maintenance will need to focus on basic housekeeping practices such as removal of debris accumulations and vegetation management (within media filter) to prevent clogs and/ or standing water. Materials such as sand, gravel, filter cloth, or filter media must be disposed of properly and in accordance with all applicable laws.

Porous Pavement

Porous Pavement is an infiltration BMP that consists of porous pavement blocks placed over a shallow recharge bed of sand and gravel. It is typically restricted to low volume parking areas that do not receive

significant offsite runoff. The modular pavement blocks allow water to seep into the recharge bed, where the sand and gravel layers percolate the design volume into the natural surrounding soils. Porous Pavement can be used for areas of up to 10 acres.

Other BMPs

In some cases, other volume-based BMPs, proprietary BMPs or combinations of BMPs may be appropriate for a development. Such BMPs or combinations of BMPs may be employed on a site-specific basis as approved by the Co-Permittee. The appropriate BMP(s) for a Project should be determined based on the size of the project area and the types of pollutants that will be found in the development runoff.

4.5.3.3 *Design Basis for Treatment Control BMPs*

The primary parameter for designing Treatment Control BMPs is to treat the stormwater quality design flow (Q_{BMP}) or the stormwater quality design volume (V_{BMP}) of the stormwater runoff. Table 4 lists Treatment Control BMPs and the primary design basis (flow-based or volume-based) to be used for designing BMPs.

Table 4. Design Basis for Treatment Control BMPs

Treatment Control BMP	Design Basis
Vegetated Filter Strips	Q_{BMP}
Vegetated Swales	
Water Quality Inlets	
Extended Detention Basin	V_{BMP}
Sand Filter	
Porous Pavement Detention	
Infiltration Basin	
Infiltration Trench	
Other BMPs	Q_{BMP} or V_{BMP} on Case-Specific Basis

4.5.3.4 *Flow-Based Design*

Flow-based BMP design standards apply to BMPs whose primary mode of pollutant removal depends on the rate of flow of runoff through the BMP. The following steps describe the approach for application of the flow-based BMP design criteria. A detailed design procedure and worksheet are provided in the Riverside County Stormwater Quality Best Management Practice Design Handbook (see Exhibit C).

- **Identify the tributary area** that drains to the proposed BMP. This includes all areas that will contribute runoff to the proposed BMP, including pervious areas, impervious areas, and runoff from off-site areas that commingle with site runoff, whether or not they are directly or indirectly connected to the BMP. Calculate this area in units of acres. Determine the impervious percentage of area in the tributary area.
- **Determine the Runoff Coefficient for each soil type** using the table included as Exhibit D for each type of soil with the site's impervious area percentage. This is based on a uniform rainfall intensity of 0.2 inch/hour.
- **Determine the percentages of each soil type** within the tributary area.
- **Determine the Site's Aggregate Runoff Coefficient** by multiplying the fraction of tributary area for each soil type by its associated Runoff Coefficient.

- **Determine the BMP Design Flow Rate** using the equation $Q_{BMP} = C \times I \times A$

  Where A = Tributary Area to the BMP
  I = Design Rainfall intensity, 0.2 inch/hour
  C = Runoff Coefficient, based upon a Rainfall Intensity = 0.2 inch/hour

4.5.3.5 *Volume-Based Design*

Volume-based BMP design standards apply to BMPs whose primary mode of pollutant removal depends on the volumetric capacity of the BMP. Volume-based Treatment Control BMPs shall be designed to infiltrate or treat the design volume of runoff. Use the following steps to determine the design volume. A detailed design procedure and worksheet are provided in the Riverside County Stormwater Quality Best Management Practice Design Handbook (see Exhibit C). This method for determining the design volume is based on capturing a 24-hour 85th percentile storm event as determined using rain gages throughout Riverside County with the greatest periods of record

- **Determine the BMP Tributary Area** that drains to the proposed BMP. This includes all areas that will contribute runoff to the proposed BMP, including pervious areas, and runoff from off-site areas that commingle with site runoff, whether or not they are directly or indirectly connected to the BMP. Calculate this area in acres. Determine the impervious percentage of area in the tributary area.
- **Calculate the composite Runoff Coefficient "C-Factor"** for the BMP Tributary Area. Use the following equation based on the WEF/ASCE Method: $C = 0.858i^3 - 0.78i^2 + 0.774i + 0.04$, where i = tributary area imperviousness ratio, which is equal to the total impervious area divided by the total tributary area.
- **Determine the Unit Storage Volume** for the 85% annual runoff event by following methodology specified in the Riverside County Stormwater Quality BMP Design Handbook (see Exhibit C).
- **Calculate the required capture volume of the BMP** by multiplying the BMP Tributary Area by the Unit Storage Volume to give the BMP Design Storage Volume. Due to the mixed units that result (e.g., acre-inches, acre-feet) it is recommended that the resulting volume be converted to cubic feet for use during design.

4.5.4 Equivalent Treatment Control Alternatives

Where off-site Treatment Control BMPs are determined to be more feasible or practicable, equivalent treatment may be provided off site when approved by the Co-Permittee. Off-site Treatment Control BMPs must:

- Be located in the same watershed as the project site.
- Treat a volume and/or flow equal to or greater than the treatment volume and/or flow calculated for the project site using the guidance in this WQMP.
- Treat a pollutant loading equal to or greater than the pollutant loading from the project site.
- Address the Pollutants of Concern and Hydrologic Conditions of Concern not addressed at the project site.

Have BMP Capacity functional prior to the issuance of occupancy permits, or certificates of use (or equivalent), if no occupancy permits are issued.

- Off-site BMPs must be implemented prior to proximate Receiving Waters.
- Off-site Treatment Control BMPs shall not cause water quality impairment or contribute to an exceedance of water quality objectives.

In addition, Site Design and Source Control BMPs must continue to be implemented at the project site in accordance with this WQMP.

Subject to approval by the Co-Permittee, off-site Treatment Control BMPs with excess capacity may be used to meet the treatment needs of additional Projects as long as each Project meets the requirements of this section and such that the requirements are met when the Projects are combined. For example, if the treatment volume for Project 1 is "A" and the treatment volume for Project 2 is "B", then an off-site Treatment Control BMP would need to have a treatment volume capacity of at least "A+B" in order to treat the runoff from both Project 1 and Project 2. Similar provisions apply for flows and pollutants.

These provisions are supplemental to the provisions in Section 5 for regionally-based water quality control programs. While similar in nature, these provisions are intended to be implemented primarily on a smaller, more local basis. For example, a single developer of separate but adjacent Projects might utilize the provisions of this section to propose that controls for both Projects be located on one of the two separate sites, or possibly even propose that the controls for both sites be located on a third site.

4.6 Operation and Maintenance

Operation and maintenance (O&M) requirements for all structural Source Control and Treatment Control BMPs shall be identified in the project-specific WQMP. The project-specific WQMP shall address the following:

- Identification of each BMP that requires O&M.
- Thorough description of O&M activities, the O&M process, and the handling and placement of any wastes.
- BMP start-up dates.
- Schedule of the frequency of O&M for each BMP.
- Identification of the parties (name, address, and telephone number) responsible for O&M, including a written agreement with the entities responsible for O&M. This agreement can take the form of a Covenant and Agreement recorded by the Project Proponent with the County Recorder, HOA or POA CC&Rs, formation of a maintenance district or assessment district or other instrument sufficient to guarantee perpetual O&M. Examples of requirements for typical maintenance mechanisms and a sample of a Covenant and Agreement are available in Exhibit E and F, respectively. Project proponents should speak to the Co-Permittee for Co-Permittee specific requirements.
- Self-inspections and record-keeping requirements for BMPs (review local specific requirements regarding self-inspections and/or annual reporting), including identification of responsible parties for inspection and record- keeping.
- Thorough descriptions of water quality monitoring, if required by the Co-Permittee.
- Co-Permittees should have authority to maintain the BMP, if necessary, and invoice the owner for costs.

4.7 Funding

A funding source or sources for the O&M of each Treatment Control BMP identified in the project-specific WQMP must be identified. By certifying the project-specific WQMP (see Section 4.8), the Project applicant is certifying that the funding responsibilities have been addressed and will be transferred to future owners. One example of how to adhere to the requirement to transfer O&M responsibilities is to record the project-specific WQMP against the title to the property.

4.8 WQMP Certification

A project-specific WQMP shall include a notarized certification by the project owner/developer accepting responsibility for implementation, operation, maintenance, repair, replacement, and inspection of all BMPs described in the approved project-specific WQMP. The following certification, or a substantially similar version, shall be included in each project-specific WQMP prior to approval by the Co-Permittee. This certification statement is included in the Project-Specific WQMP Template provided in Exhibit A.

Owner's Certification

This project-specific Water Quality Management Plan (WQMP) has been prepared for ____[insert owner of project]__ by __[insert name of firm preparing WQMP]_ for the project known as _____ at_[insert street address]__. This WQMP in intended to comply with the requirements of the __City/County__ of ____[insert City/County name]_____ for Tract No._____/Parcel No._____, which includes the requirement for the preparation and implementation of a project-specific WQMP.

The undersigned, while owning the property/project described in the preceding paragraph, shall be responsible for the implementation of this WQMP and will ensure that this WQMP is amended as appropriate to reflect up-to-date conditions on the site. This WQMP will be reviewed with the facility operator, facility supervisors, employees, tenants, maintenance and service contractors, or any other party (or parties) having responsibility for implementing portions of this WQMP. At least one copy of this WQMP will be maintained at the project site or project office in perpetuity.

The undersigned is authorized to certify and to approve implementation of this WQMP. The undersigned is aware that implementation of this WQMP is enforceable under the City/County of ____[insert City/County name]_____ Water Quality Ordinance (Municipal Code Section _____).

If the undersigned transfers its interest in the subject property/project, its successor in interest the undersigned shall notify the successor in interest of its responsibility to implement this WQMP.

"I certify under penalty of law that the provision of this WQMP have been reviewed and accepted and that the WQMP will be transferred to future successors in interest."

_____
Owner's Signature Date

_____
Owner's Printed Name

_____
Owner's Title/Position

5.0 Regionally-Based Treatment Control

For watersheds, sub-watershed, tributary areas, and other areas covered by a comprehensive Master Plan of Drainage approved by the Co-Permittee(s) (or developed as part of a Master Plan of Drainage for a Specific Plan or a cooperative group of developments), regionally-based Treatment Control BMPs are an alternative approach to project-specific (onsite) Treatment Control BMP implementation. Regionally-based BMPs may provide a more effective and cost efficient runoff Treatment Control mechanism for multiple Projects within the area covered by the comprehensive master plan of drainage and water quality. Regional BMPs may also provide opportunities for public/private partnerships where pollutants of concern from existing developments within the area covered by the master plan of drainage can also be addressed by the Regional BMPs capacity.

It may be possible that a regionally-based Treatment Control BMP will address all Pollutants of Concern and Hydrologic Conditions of Concern for a particular project. The operating entity of an existing regionally based Treatment Control BMP (Regional BMP) shall be able to provide project proponents in the vicinity of the Regional BMP with information describing the tributary area the Regional BMP was designed to mitigate and the Pollutants of Concern and/or Hydrologic Conditions of Concern the Regional BMP addresses. The project proponent is responsible for identifying the Pollutants of Concern and/or Hydrologic Conditions of Concern associated with the project, comparing those with the Pollutants of Concern and/or Hydrologic Conditions of Concern addressed by the Regional BMP, and determining what additional on-site BMPs are required to treat Pollutants of Concern and/or Hydrologic Conditions of Concern not addressed by the Regional BMP.

When regionally-based Treatment Control BMPs are utilized, the Project must continue to implement Site Design and Source Control BMPs. Regionally-based Treatment Control BMPs can treat Urban Runoff from several source areas at a single or multiple downstream location(s). This approach can be effective when limited space is available for structural BMPs in Project areas. Regionally-based Treatment Control BMPs will be considered for acceptance by the Co-Permittee as an alternative to on-site measures if the Project applicant demonstrates the following (italicized requirements apply only to project proponents proposing new regionally-based BMPs):

- There is adequate capacity in the regionally-based Treatment Control BMP to address the volume-based and flow-based treatment needs of the project.
- The regionally-based Treatment Control BMP addresses the project's Pollutants of Concern (after considering Site Design and Source Control BMPs that must still be implemented at the project site).
- Projects intending to rely on the regionally-based Treatment Control BMP must incorporate Project-specific BMPs to address any pollutant of concern from the project not addressed by the regionally-based Treatment Control BMP.
- *The Project applicant identifies the party responsible for the funding, operation, maintenance, and administration of the regionally-based Treatment Control BMP.*
- The Project applicant has secured rights from the owner/operator to participate in the regionally-based BMP solution.
- The Project applicant has met all of the requirements imposed for participation in the regionally-based BMP, including funding and operation and maintenance requirements, and contingency planning.

Regional BMP capacity must be functional prior to the issuance of occupancy permits, or certificates of use (or equivalent), if no occupancy permits are issued.

- Waters of the United States will not be utilized to transport untreated Urban Runoff to the regional facility.
- The ability of the regionally-based BMP to address Total Maximum Daily Load (TMDL) requirements for any adopted TMDLs. If a regionally-based BMP does not address TMDL requirements, additional on-site BMPs may be required to address applicable TMDL related Pollutants of Concern.

Projects participating in regional Treatment Control BMPs may rely upon the regional program during the discretionary review process subject to a discussion of how the Project will participate in the program. At the discretion of the Co-Permittee(s) with jurisdiction, the Project-specific WQMP may be required to identify its Urban Runoff contribution to the regional program and how it will affect cumulative water quality impacts in the regional watershed. Removal effectiveness, cost, maintenance, and construction timing affect whether a regional-based approach is more appropriate than site-specific approaches.

Regional facilities proposed as part of the Lake Mathews Master Drainage Plan and the Retrofit Siting Study conducted by the Permittees could provide Regional Treatment for Projects. The Permittee(s) with jurisdiction over the Project should be contacted to determine if other applicable regional BMPs exist or are proposed. A Project that proposes to utilize a regional BMP must verify that the regional BMP addresses all Pollutants of Concern from the Project. A Project's Pollutants of Concern that are not addressed by the regional BMP will require a separate Treatment Control BMP (or BMPs).

6.0 Changes in Site Development or Ownership

6.1 Changes in Site Development

The WQMP must be updated to reflect significant proposed changes in the site's runoff characteristics. Potentially significant changes in the site runoff characteristics are deemed to exist whenever site work requiring a grading permit is proposed or where exterior work requiring a building permit is proposed. Under these circumstances, the owner/developer shall contact the Co-Permittee and provide sufficient information for the Co-Permittee to determine whether the existing project-specific WQMP is still appropriate. If deemed inappropriate by the Co-Permittee for proposed conditions, the owner/developer shall revise the WQMP to address the cumulative changes to the site and submit the revised project-specific WQMP to the Co-Permittee for review and approval prior to issuance of the first discretionary permit.

Significant changes in the site's runoff characteristics shall be deemed to occur whenever there is a change in use necessitating a conditional use permit (for example, changing from retail to restaurant), or when proposed changes to the site fall into one or more of the Project categories that require a project-specific WQMP. Under these conditions, a revised or completely new project-specific WQMP shall be developed and submitted for review and approval by the Co-Permittee.

6.2 Changes in Site Ownership

For sites with a fully implemented WQMP, the WQMP requirements shall transfer to all future owners of the project site. The method to ensure transferability will depend on the method of O&M specified in the WQMP. Several O&M mechanisms, including a Covenant and Agreement recorded by the Project Proponent with the County Recorder, HOA or POA CC&Rs, formation of a maintenance district or assessment district or other instrument are considered sufficient to guarantee perpetual O&M. These mechanisms can also be used to ensure transferability of the project-specific WQMP. For example, when recording the WQMP requirements against the title to the property via a Covenant and Agreement, the Covenant and Agreement can also effectively notify potential buyers and future owners of properties of their responsibilities for the WQMP. An example of a Covenant and Agreement ensuring ongoing O&M and project-specific WQMP transferability is contained in Appendix F of this WQMP. Under this agreement, new owners have the option to adopt the existing project-specific WQMP, to amend the project-specific WQMP, or to develop a new project-specific WQMP. If the project-specific WQMP is amended or if a new project-specific WQMP is developed, the amended or new project-specific WQMP must be in accordance with this WQMP, must address cumulative changes to the project site, and must be submitted to the Co-Permittee for review and approval. Similar requirements should be included as part of other O&M mechanisms or through separate agreements, if necessary.

7.0 Waiver of Treatment Control BMP Requirements

A waiver of Treatment Control BMP Requirements can be granted for any one of the following three conditions. For Conditions B and C, the Permittee must notify the appropriate Regional Water Quality Control Board of the Waiver, per the provisions of the applicable MS4 NPDES permit:

Condition A: Treatment Control BMPs may be eliminated, with the approval of the Co-Permittee, if Site Design BMPs and Source Control BMPs are demonstrated to effectively eliminate discharges of Pollutants of Concern for the Flow Based Design (Section 4.5.3.4) or Volume Based Design (Section 4.5.3.5) criteria (Design Criteria). Upon presentation of a project-specific WQMP with sufficient Site Design and Source Control BMPs to meet the WQMP Design Criteria for discharges of Pollutants of Concern, and upon specific written request by the Project Applicant for a Treatment Control Waiver, the Co-Permittee may approve a project-specific WQMP that does not include Treatment Control BMPs. The Project applicant is responsible for the presentation of evidence, potentially including but not limited to monitoring data and special studies, to support the attainment of the WQMP objectives without the use of Treatment Control BMPs.

Condition B: A Co-Permittee may waive the requirement of incorporating Treatment Control BMPs into a project-specific WQMP for Projects within those portions of the Permit Area that will not result in a discharge to Receiving Waters under the Design Criteria. Upon presentation of a project-specific WQMP with sufficient evidence of no discharge to Receiving Waters under the WQMP Design Criteria, and upon specific written request by the Project applicant for a Treatment Control Waiver, the Co-Permittee may approve a project-specific WQMP that does not include Treatment Control BMPs. The Project applicant is responsible for the presentation of evidence, potentially including but not limited to monitoring data and special studies, to support the attainment of the WQMP objectives without the use of Treatment Control BMPs. Co-Permittees shall notify the Executive Officer of the Regional Water Quality Control Board by Certified Mail (with Return Receipt) within thirty (30) calendar days after issuing a waiver. The notification shall include a copy of documentation justifying the waiver.

Condition C: The Co-Permittee may waive the requirement of incorporating Treatment Control BMPs into a project-specific WQMP on a case-by-case basis if infeasibility can be established. In considering a waiver of infeasibility, the Co-Permittees should review the CEQA documentation for the Project to determine whether a significant unmitigated impact or cumulative impact was identified that was the subject of a statement of overriding considerations. A Co-Permittee shall only grant a waiver of infeasibility when all available Treatment Control BMPs have been considered and rejected as infeasible and/or the cost of implementing Treatment Control BMPs greatly outweighs the pollution control benefit. The burden of proof is on the Project applicant to demonstrate that all available Treatment Control BMPs are infeasible. The Co-Permittee shall notify the Executive Officer of the appropriate Regional Water Quality Control Board by Certified Mail (with Return Receipt) within thirty (30) calendar days after issuing a waiver. The notification shall include a copy of the documentation justifying the waiver.

Exhibit A

Project-Specific WQMP Template

Project Specific
Water Quality Management Plan

For: **Project Title**

Location Address

DEVELOPMENT NO. **TRACT, PARCEL OR OTHER ID NUMBER**
DESIGN REVIEW NO. **DESIGN REVIEW NO.**

Prepared for:

Name of Owner/Developer
Street Address
City, State Zip
Telephone: Telephone Number

Prepared by:
Name and Title of Preparer
Company Name
Street Address
City, State ZIP
Telephone: Telephone

WQMP Preparation/Revision Date: Date

OWNER'S CERTIFICATION

This project-specific Water Quality Management Plan (WQMP) has been prepared for:

Name of Owner/Developer

by Company Name for the project known as **Project Title** at **Location Address**.

This WQMP is intended to comply with the requirements of Insert City or County Name for **TRACT, PARCEL OR OTHER ID NUMBER**, which includes the requirement for the preparation and implementation of a project-specific WQMP.

The undersigned, while owning the property/project described in the preceding paragraph, shall be responsible for the implementation of this WQMP and will ensure that this WQMP is amended as appropriate to reflect up-to-date conditions on the site. This WQMP will be reviewed with the facility operator, facility supervisors, employees, tenants, maintenance and service contractors, or any other party (or parties) having responsibility for implementing portions of this WQMP. At least one copy of this WQMP will be maintained at the project site or project office in perpetuity.

The undersigned is authorized to certify and to approve implementation of this WQMP. The undersigned is aware that implementation of this WQMP is enforceable under Insert City or County Name Water Quality Ordinance (Municipal Code Section).

If the undersigned transfers its interest in the subject property/project, its successor in interest the undersigned shall notify the successor in interest of its responsibility to implement this WQMP.

"I, the undersigned, certify under penalty of law that the provisions of this WQMP have been reviewed and accepted and that the WQMP will be transferred to future successors in interest."

Owner's Signature	Date
Owner's Printed Name	Owner's Title/Position

Street Address
City, State Zip
Telephone Number

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APPENDICES

A. CONDITIONS OF APPROVAL

B. VICINITY MAP, WQMP SITE PLAN, AND RECEIVING WATERS MAP

C. SUPPORTING DETAIL RELATED TO HYDRAULIC CONDITIONS OF CONCERN (IF APPLICABLE)

D. EDUCATIONAL MATERIALS

E. SOILS REPORT (IF APPLICABLE)

F. TREATMENT CONTROL BMP SIZING CALCULATIONS AND DESIGN DETAILS

G. AGREEMENTS – CC&RS, COVENANT AND AGREEMENTS AND/OR OTHER MECHANISMS FOR ENSURING ONGOING OPERATION, MAINTENANCE, FUNDING AND TRANSFER OF REQUIREMENTS FOR THIS PROJECT-SPECIFIC WQMP

H. PHASE 1 ENVIRONMENTAL SITE ASSESSMENT – SUMMARY OF SITE REMEDIATION CONDUCTED AND USE RESTRICTIONS

I. Project Description

Instructions:

The project description shall be completely and accurately described in narrative form. In the field provided on page A-3, describe and with supporting figures (maps or exhibits), where facilities will be located, what activities will be conducted and where, what kinds of materials will be used and/or stored, how and where materials will be delivered, and the types of wastes that will be generated. The following information shall be described and/or addressed in the "Project Description" section of the project-specific WQMP:

- Project owner and WQMP preparer;
- Project location;
- Project size;
- Standard Industrial Classification (SIC), if applicable;
- Location of facilities;
- Activities and location of activities;
- Materials Storage and Delivery Areas;
- Wastes generated by project activities.

Project Owner: Name of Owner/Developer
Street Address
City, State Zip
Telephone: Telephone Number

WQMP Preparer: Name and Title of Preparer
Street Address
City, State ZIP
Telephone: Telephone

Project Site Address:	Insert Project Street Address Insert Project City, State, ZIP
Planning Area/ Community Name/ Development Name:	Insert Planning Area / Community Name/ Development Name, if known
APN Number(s):	Insert APN Number(s) - ENTER for new line
Thomas Bros. Map:	Insert Thomas Bros. Map page(s) and corresponding grid(s)
Project Watershed:	Enter appropriate watershed: Santa Ana, Santa Margarita or Whitewater
Sub-watershed:	Enter sub-watershed and reach, from Table 3-1 of the Santa Ana River Basin - Basin Plan or from San Diego Basin Plan
Project Site Size:	Insert site size (indicate to 0.1 acres)

Standard Industrial Classification (SIC) Code: Insert SIC, code, if applicable

Formation of Home Owners' Association (HOA) or Property Owners Association (POA):

Y ☐ N ☐

Additional Permits/Approvals required for the Project

AGENCY	Permit required
State Department of Fish and Game, 1601 Streambed Alteration Agreement	Y ☐ N☐
State Water Resources Control Board, Clean Water Act (CWA) section 401 Water Quality Certification	Y ☐ N☐
US Army Corps of Engineers, CWA section 404 permit	Y ☐ N☐
US Fish and Wildlife, Endangered Species Act section 7 biological opinion	Y ☐ N☐
Other *(please list in the space below as required)*	

Describe Project here.

Appendix A of this project-specific WQMP includes a complete copy of the final Conditions of Approval. Appendix B of this project-specific WQMP shall include:

a. A Vicinity Map identifying the project site and surrounding planning areas in sufficient detail to allow the project site to be plotted on Co-Permittee base mapping; and

b. A Site Plan for the project. The Site Plan included as part of Appendix B depicts the following project features:

- Location and identification of all structural BMPs, including Treatment Control BMPs.
- Landscaped areas.
- Paved areas and intended uses (i.e., parking, outdoor work area, outdoor material storage area, sidewalks, patios, tennis courts, etc.).
- Number and type of structures and intended uses (i.e., buildings, tenant spaces, dwelling units, community facilities such as pools, recreation facilities, tot lots, etc.).
- Infrastructure (i.e., streets, storm drains, etc.) that will revert to public agency ownership and operation.
- Location of existing and proposed public and private storm drainage facilities (i.e., storm drains, channels, basins, etc.), including catch basins and other inlets/outlet structures. Existing and proposed drainage facilities should be clearly differentiated.
- Location(s) of Receiving Waters to which the project directly or indirectly discharges.
- Location of points where onsite (or tributary offsite) flows exit the property/project site.
- Proposed drainage areas boundaries, including tributary offsite areas, for each location where flows exits the property/project site. Each tributary area should be clearly denoted.
- Pre- and post-project topography.

Appendix G of this project-specific WQMP shall include copies of CC&Rs, Covenant and Agreements, and/or other mechanisms used to ensure the ongoing operation, maintenance, funding, transfer and implementation of the project-specific WQMP requirements.

II. Site Characterization

Land Use Designation or Zoning: Insert current and proposed zoning or land use designation

Current Property Use: Insert actual use of property (i.e., undeveloped, previously developed but vacant, etc.)

Proposed Property Use: Insert proposed use of property

Availability of Soils Report: Y ☐ N ☐ *Note: A soils report is required if infiltration BMPs are utilized. Attach report in Appendix E.*

Phase 1 Site Assessment: Y ☐ N ☐ *Note: If prepared, attached remediation summary and use restrictions in Appendix H.*

Receiving Waters for Urban Runoff from Site

Instructions:

On the following page, list in order of upstream to downstream, the receiving waters that the project is tributary to. Continue to fill each row with the receiving water's 303(d) listed impairments, designated beneficial uses, and proximity, if any, to a RARE beneficial use.

Receiving Waters for Urban Runoff from Site

Receiving Waters	303(d) List Impairments	Designated Beneficial Uses	Proximity to RARE Beneficial Use
Insert name of 1st receiving water	List any 303(d) impairments of 1st receiving water, including TMDL pollutant limitations	Insert designated beneficial use of 1st receiving water	Insert distance of project to RARE-designated waters (indicate whether feet, yards, or miles)
insert name of 2nd receiving water	List any 303(d) impairments of 2nd receiving water, including TMDL pollutant limitations	Insert designated beneficial use of 2nd receiving water	Insert distance of project to RARE-designated waters (indicate whether feet, yards, or miles)
Insert name of 3rd receiving water	List any 303(d) impairments of 3rd receiving water, including TMDL pollutant limitations	Insert designated beneficial use of 3rd receiving water	Insert distance of project to RARE-designated waters (indicate whether feet, yards, or miles)
Insert Name Of 4th Receiving Water	List any 303(d) impairments of 4th receiving water, including TMDL pollutant limitations	Insert designated beneficial use of 4th receiving water	Insert distance of project to RARE-designated waters (indicate whether feet, yards, or miles)
Insert Name Of 5th Receiving Water	List any 303(d) impairments of 4th receiving water, including TMDL pollutant limitations	Insert designated beneficial use of 4th receiving water	Insert distance of project to RARE-designated waters (indicate whether feet, yards, or miles)
Insert Name Of 6th Receiving Water	List any 303(d) impairments of 4th receiving water, including TMDL pollutant limitations	Insert designated beneficial use of 4th receiving water	Insert distance of project to RARE-designated waters (indicate whether feet, yards, or miles)
Insert Name Of 7th Receiving Water	List any 303(d) impairments of 4th receiving water, including TMDL pollutant limitations	Insert designated beneficial use of 4th receiving water	Insert distance of project to RARE-designated waters (indicate whether feet, yards, or miles)
Insert Name Of 8th Receiving Water	List any 303(d) impairments of 4th receiving water, including TMDL pollutant limitations	Insert designated beneficial use of 4th receiving water	Insert distance of project to RARE-designated waters (indicate whether feet, yards, or miles)

III. Pollutants of Concern

Potential pollutants associated with Urban Runoff from the proposed project must be identified. Exhibit B of the WQMP provides brief descriptions of typical pollutants associated with Urban Runoff and a table that associates typical potential pollutants with types of development (land use). It should be noted that at the Co-Permittees discretion, the Co-Permittees may also accept updated studies from the California Association of Stormwater Quality Agencies (CASQA), USEPA, SWRCB and/or other commonly accepted agencies/associations acceptable to the Co-Permittee for determination of Pollutants of Concern associated with given land use. Additionally, in identifying Pollutants of Concern, the presence of legacy pesticides, nutrients, or hazardous substances in the site's soils as a result of past uses and their potential for exposure to Urban Runoff must be addressed in project-specific WQMPs. The Co-Permittee may also require specific pollutants commonly associated with urban runoff to be addressed based on known problems in the watershed. The list of potential Urban Runoff pollutants identified for the project must be compared with the pollutants identified as causing an impairment of Receiving Waters, if any. To identify pollutants impairing proximate Receiving Waters, each project proponent preparing a project-specific WQMP shall, at a minimum, do the following:

a. For each of the proposed project discharge points, identify the proximate Receiving Water for each discharge point, using hydrologic unit basin numbers as identified in the most recent version of the Water Quality Control Plan for the Santa Ana River Basin or the San Diego Region.

b. Identify each proximate identified above that is listed on the most recent list of Clean Water Act Section 303(d) list of impaired water bodies, which can be found at website www.swrcb.ca.gov/tmdl/303d_lists.html. List all pollutants for which the proximate Receiving Waters are impaired.

c. Compare the list of pollutants for which the proximate Receiving Waters are impaired with the potential pollutants to be generated by the project.

Urban Runoff Pollutants: Insert potential stormwater pollutants associated with project type as presented in Exhibit B of Riverside County WQMP. Additionally, any other potential stormwater pollutants that are project-specific must also be identified.

IV. Hydrologic Conditions of Concern

Impacts to the hydrologic regime resulting from the Project may include increased runoff volume and velocity; reduced infiltration; increased flow frequency, duration, and peaks; faster time to reach peak flow; and water quality degradation. Under certain circumstances, changes could also result in the reduction in the amount of available sediment for transport; storm flows could fill this sediment-carrying capacity by eroding the downstream channel. These changes have the potential to permanently impact downstream channels and habitat integrity. A change to the hydrologic regime of a Project's site would be considered a hydrologic condition of concern if the change would have a significant impact on downstream erosion compared to the pre-development condition or have significant impacts on stream habitat, alone or as part of a cumulative impact from development in the watershed.

This project-specific WQMP must address the issue of Hydrologic Conditions of Concern unless one of the following conditions are met:

- **Condition A:** Runoff from the Project is discharged directly to a publicly-owned, operated and maintained MS4; the discharge is in full compliance with Co-Permittee requirements for connections and discharges to the MS4 (including both quality and quantity requirements); the discharge would not significantly impact stream habitat in proximate Receiving Waters; and the discharge is authorized by the Co-Permittee.
- **Condition B:** The project disturbs less than 1 acre. The disturbed area calculation should include all disturbances associated with larger plans of development.
- **Condition C:** The project's runoff flow rate, volume, velocity and duration for the post-development condition do not exceed the pre-development condition for the 2-year, 24-hour and 10-year 24-hour rainfall events. This condition can be achieved by minimizing impervious area on a site and incorporating other site-design concepts that mimic pre-development conditions. This condition must be substantiated by hydrologic modeling methods acceptable to the Co-Permittee.

  This Project meets the following condition: INSERT CONDITION A, CONDITION B, CONDITION C, OR NONE. IF NONE, REFER TO SECTION 4.4 OF RIVERSIDE COUNTY WQMP FOR ADDITIONAL REQUIREMENTS.

  Supporting engineering studies, calculations, and reports are included in Appendix C.

	2 year – 24 hour		10 year – 24 hour	
	Precondition	**Post-condition**	**Precondition**	**Post-condition**
Discharge (cfs)	INSERT VALUE	INSERT VALUE	INSERT VALUE	INSERT VALUE
Velocity (fps)	INSERT VALUE	INSERT VALUE	INSERT VALUE	INSERT VALUE
Volume (cubic feet)	INSERT VALUE	INSERT VALUE	INSERT VALUE	INSERT VALUE
Duration (minutes)	INSERT VALUE	INSERT VALUE	INSERT VALUE	INSERT VALUE

V. Best Management Practices

V.1 SITE DESIGN BMPS

Project proponents shall implement Site Design concepts that achieve each of the following:

1) Minimize Urban Runoff
2) Minimize Impervious Footprint
3) Conserve Natural Areas
4) Minimize Directly Connected Impervious Areas (DCIAs)

The project proponent should identify the specific BMPs implemented to achieve each Site Design concept and provide a brief explanation for those Site Design concepts considered not applicable.

Instructions:

In field below, provide narrative describing which site design concepts were incorporated into project plans. If the project proponent implements a Co-Permittee approved alternative or equally-effective Site Design BMP not specifically described below, the Site Design BMP checkbox in Table I should be marked and an additional description indicating the nature of the BMP and how it addresses the Site Design concept should be provided. Continue with completion of Table 1.

Note: *The Co-Permittees general plan or other land use regulations/documents may require several measures that are effectively site design BMPs (such as minimization of directly connected impervious areas and/or setbacks from natural stream courses). The Project Proponent should work with Co-Permittee staff to determine if those requirements may be interpreted as site design BMPs for use in this table/narrative. See Section 4.5.1 of the WQMP for additional guidance on Site Design BMPs.*

Following Table 1: if a particular Site Design BMP concept is found to be not applicable, please provide a brief explanation as to why the concept cannot be implemented. Also include descriptions explaining how each ***included*** *BMP will be implemented. In those areas where Site Design BMPs require ongoing maintenance, the inspection and maintenance frequency, the inspection criteria, and the entity or party responsible for implementation, maintenance, and/or inspection shall be described. The location of each Site Design BMP must also be shown on the WQMP Site Plan included in Appendix B.*

Insert text here describing site design concepts incorporated into project plans.

Table 1. Site Design BMPs

Design Concept	Technique	Specific BMP	Included: Yes	Included: No	Included: N/A
Site Design Concept 1	*Minimize Urban Runoff*	Maximize the permeable area (See Section 4.5.1 of the WQMP).	☐	☐	☐
		Incorporate landscaped buffer areas between sidewalks and streets.	☐	☐	☐
		Maximize canopy interception and water conservation by preserving existing native trees and shrubs, and planting additional native or drought tolerant trees and large shrubs.	☐	☐	☐
		Use natural drainage systems.	☐	☐	☐
		Where soils conditions are suitable, use perforated pipe or gravel filtration pits for low flow infiltration.	☐	☐	☐
		Construct onsite ponding areas or retention facilities to increase opportunities for infiltration consistent with vector control objectives.	☐	☐	☐
		Other comparable and equally effective site design concepts as approved by the Co-Permittee (Note: Additional narrative required to describe BMP and how it addresses Site Design concept).	☐	☐	☐

Table 1. Site Design BMPs (Cont.)

Design Concept	Technique	Specific BMP	Included: Yes	Included: No	Included: N/A
Site Design Concept 2	*Minimize Impervious Footprint*	Maximize the permeable area (See Section 4.5.1 of the WQMP).	☐	☐	☐
		Construct walkways, trails, patios, overflow parking lots, alleys, driveways, low-traffic streets and other low -traffic areas with open-jointed paving materials or permeable surfaces, such as pervious concrete, porous asphalt, unit pavers, and granular materials.	☐	☐	☐
		Construct streets, sidewalks and parking lot aisles to the minimum widths necessary, provided that public safety and a walk able environment for pedestrians are not compromised.	☐	☐	☐
		Reduce widths of street where off-street parking is available.	☐	☐	☐
		Minimize the use of impervious surfaces, such as decorative concrete, in the landscape design.	☐	☐	☐
Site Design Concept 3	*Conserve Natural Areas*	Other comparable and equally effective site design concepts as approved by the Co-Permittee (Note: Additional narrative required describing BMP and how it addresses Site Design concept).	☐	☐	☐
		Conserve natural areas (See WQMP Section 4.5.1).	☐	☐	☐
		Maximize canopy interception and water conservation by preserving existing native trees and shrubs, and planting additional native or drought tolerant trees and large shrubs.	☐	☐	☐
		Use natural drainage systems.	☐	☐	☐
		Other comparable and equally effective site design concepts as approved by the Co-Permittee (Note: Additional narrative required describing BMP and how it addresses Site Design concept).	☐	☐	☐

Table 1. Site Design BMPs (Cont.)

Design Concept	Technique	Specific BMP	Included		
			Yes	No	N/A
Site Design Concept 4	*Minimize Directly Connected Impervious Areas (DCIAs)*	Residential and commercial sites must be designed to contain and infiltrate roof runoff, or direct roof runoff to vegetative swales or buffer areas, where feasible.	☐	☐	☐
		Where landscaping is proposed, drain impervious sidewalks, walkways, trails, and patios into adjacent landscaping.	☐	☐	☐
		Increase the use of vegetated drainage swales in lieu of underground piping or imperviously lined swales.	☐	☐	☐
		Rural swale system: street sheet flows to vegetated swale or gravel shoulder, curbs at street corners, culverts under driveways and street crossings.	☐	☐	☐
		Urban curb/swale system: street slopes to curb; periodic swale inlets drain to vegetated swale/biofilter.	☐	☐	☐
		Dual drainage system: First flush captured in street catch basins and discharged to adjacent vegetated swale or gravel shoulder, high flows connect directly to MS4s.	☐	☐	☐
		Design driveways with shared access, flared (single lane at street) or wheel strips (paving only under tires); or, drain into landscaping prior to discharging to the MS4.	☐	☐	☐
		Uncovered temporary or guest parking on private residential lots may be paved with a permeable surface, or designed to drain into landscaping prior to discharging to the MS4.	☐	☐	☐
		Where landscaping is proposed in parking areas, incorporate landscape areas into the drainage design.	☐	☐	☐
		Overflow parking (parking stalls provided in excess of the Co-Permittee's minimum parking requirements) may be constructed with permeable paving.	☐	☐	☐
		Other comparable and equally effective design concepts as approved by the Co-Permittee (Note: Additional narrative required describing BMP and how it addresses Site Design concept).	☐	☐	☐

Non-applicable Site Design BMPs:

Insert text here describing why a particular Site Design BMP concept found to be not-applicable cannot be implemented.

Project Site Design BMPs:

Insert text here describing how each included Site Design BMP will be implemented.

V.2 SOURCE CONTROL BMPS

Instructions: *Complete Table 2.*

Table 2. Source Control BMPs

BMP Name	Check One		If not applicable, state brief reason
	Included	Not Applicable	
Non-Structural Source Control BMPs			
Education for Property Owners, Operators, Tenants, Occupants, or Employees	☐	☐	
Activity Restrictions	☐	☐	
Irrigation System and Landscape Maintenance	☐	☐	
Common Area Litter Control	☐	☐	
Street Sweeping Private Streets and Parking Lots	☐	☐	
Drainage Facility Inspection and Maintenance	☐	☐	
Structural Source Control BMPs			
MS4 Stenciling and Signage	☐	☐	
Landscape and Irrigation System Design	☐	☐	
Protect Slopes and Channels	☐	☐	
Provide Community Car Wash Racks	☐	☐	
Properly Design:	☐	☐	
Fueling Areas	☐	☐	
Air/Water Supply Area Drainage	☐	☐	
Trash Storage Areas	☐	☐	
Loading Docks	☐	☐	
Maintenance Bays	☐	☐	
Vehicle and Equipment Wash Areas	☐	☐	
Outdoor Material Storage Areas	☐	☐	
Outdoor Work Areas or Processing Areas	☐	☐	
Provide Wash Water Controls for Food Preparation Areas	☐	☐	

Instructions: *Provide narrative below describing how each* ***included*** *BMP will be implemented, the implementation frequency, inspection and maintenance frequency, inspection criteria, and the entity or party responsible for implementation, maintenance, and/or inspection. The location of each structural BMP must also be shown on the WQMP Site Plan included in Appendix B.*

Insert text here as instructed above.

Appendix D includes copies of the educational materials that will be used in implementing this project-specific WQMP.

V.3 TREATMENT CONTROL BMPS

Instructions:

1. *Provide narrative below describing each Treatment Control BMP. Include location, identify the sizing criteria [i.e., Urban Runoff quality design flow (QBMP) or the Urban Runoff quality design volume (VBMP), preliminary design calculations, for sizing BMPs, maintenance procedures, and the frequency of maintenance procedures necessary to sustain BMP effectiveness. The location of each Treatment Control BMP must also be shown on the Site Plan included in Appendix B.*
2. *Complete Table 3: Treatment Control BMP Selection Matrix*

   Directions for completing Table 3:

   - *For each pollutant of concern enter "yes" if identified using Exhibit B (Riverside County WQMP - General Categories of Pollutants of Concern per the instructions specified in Section III of this Template), or "no" if not identified for the project.*
   - *Check the boxes of selected BMPs that will be implemented for the project to address each pollutant of concern from the project as identified using Exhibit B. Treatment Control BMPs must be selected and installed with respect to identified pollutant characteristics and concentrations that will be discharged from the site.*
   - *For any identified pollutants of concern not listed in the Treatment Control BMP Selection Matrix, provide an explanation (in space below) of how they will be addressed by Treatment Control BMPs.*
3. *In addition to completing Table 3, provide detailed descriptions on the location, implementation, installation, and long-term O&M of planned Treatment* Control BMPs.

For identified pollutants of concern that are ***causing an impairment in receiving waters****, the project WQMP shall incorporate one or more Treatment Control BMPs of medium or high effectiveness in reducing those pollutants. It is the responsibility of the project proponent to demonstrate, and document in the project WQMP, that all pollutants of concern will be fully addressed. The Agency may require information beyond the minimum requirements of this WQMP to demonstrate that adequate pollutant treatment is being accomplished.*

Supporting engineering calculations for Q_{BMP} and/or V_{BMP}, and Treatment Control BMP design details are included in Appendix F.

Note*: Projects that will utilize infiltration-based Treatment Control BMPs (e.g., Infiltration Basins, Infiltration Trenches, Porous Pavement) must include a copy of the property/project soils report as Appendix E to the project-specific WQMP. The selection of a Treatment Control BMP (or BMPs) for the project must specifically consider the effectiveness of the Treatment Control BMP for pollutants identified as causing an impairment of Receiving Waters to which the project will discharge Urban Runoff.*

Insert text describing Treatment Control BMPs as instructed above.

Table 3: Treatment Control BMP Selection Matrix

Pollutant of Concern	Treatment Control BMP Categories[9]							
	Veg. Swale /Veg. Filter Strips	Detention Basins[2]	Infiltration Basins & Trenches/Porous Pavement[3][10]	Wet Ponds or Wetlands	Sand Filter or Filtration	Water Quality Inlets	Hydrodynamic Separator Systems [4]	Manufactured/ Proprietary Devices
Sediment/Turbidity Y ☐ N ☐	H/M ☐	M ☐	H/M ☐	H/M ☐	H/M ☐	L ☐	H/M (L for turbidity) ☐	U ☐
Nutrients Y ☐ N ☐	L ☐	M ☐	H/M ☐	H/M ☐	L/M ☐	L ☐	L ☐	U ☐
Organic Compounds Y ☐ N ☐	U ☐	U ☐	U ☐	U ☐	H/M ☐	L ☐	L ☐	U ☐
Trash & Debris Y ☐ N ☐	L ☐	M ☐	U ☐	U ☐	H/M ☐	M ☐	H/M ☐	U ☐
Oxygen Demanding Substances Y ☐ N ☐	L ☐	M ☐	H/M ☐	H/M ☐	H/M ☐	L ☐	L ☐	U ☐
Bacteria & Viruses Y ☐ N ☐	U ☐	U ☐	H/M ☐	U ☐	H/M ☐	L ☐	L ☐	U ☐
Oils & Grease Y ☐ N ☐	H/M ☐	M ☐	U ☐	U ☐	H/M ☐	M ☐	L/M ☐	U ☐
Pesticides (non-soil bound) Y ☐ N ☐	U ☐	U ☐	U ☐	U ☐	U ☐	L ☐	L ☐	U ☐
Metals Y ☐ N ☐	H/M ☐	M ☐	H ☐	H ☐	H ☐	L ☐	L ☐	U ☐

Abbreviations:

L: Low removal efficiency H/M: High or medium removal efficiency U: Unknown removal efficiency

Notes:

(1) Periodic performance assessment and updating of the guidance provided by this table may be necessary.

(2) Includes grass swales, grass strips, wetland vegetation swales, and bioretention.

(3) Includes extended/dry detention basins with grass lining and extended/dry detention basins with impervious lining. Effectiveness based upon minimum 36-48-hour drawdown time.

(4) Includes infiltration basins, infiltration trenches, and porous pavements.

(5) Includes permanent pool wet ponds and constructed wetlands.

(6) Includes sand filters and media filters.

(7) Also known as hydrodynamic devices, baffle boxes, swirl concentrators, or cyclone separators.

(8) Includes proprietary stormwater treatment devices as listed in the CASQA Stormwater Best Management Practices Handbooks, other stormwater treatment BMPs not specifically listed in this WQMP, or newly developed/emerging stormwater treatment technologies.

(9) Project proponents should base BMP designs on the Riverside County Stormwater Quality Best Management Practice Design Handbook. However, project proponents may also wish to reference the California Stormwater BMP Handbook – New Development and Redevelopment (www.cabmphandbooks.com). The Handbook contains additional information on BMP operation and maintenance.

(10) Note: Projects that will utilize infiltration-based Treatment Control BMPs (e.g., Infiltration Basins, Infiltration Trenches, Porous Pavement) must include a copy of the property/project soils report as Appendix E to the project-specific WQMP. The selection of a Treatment Control BMP (or BMPs) for the project must specifically consider the effectiveness of the Treatment Control BMP for pollutants identified as causing an impairment of Receiving Waters to which the project will discharge Urban Runoff.

V.4 EQUIVALENT TREATMENT CONTROL ALTERNATIVES

Insert Text or state "Not applicable." Note: The WQMP Preparer should refer to Section 4.5.4 of the Riverside County WQMP

V.5 REGIONALLY-BASED TREATMENT CONTROL BMPS

Insert Text or state "Not applicable." Note: The WQMP Preparer should refer to Section 6.0 of the Riverside County WQMP.

VI. Operation and Maintenance Responsibility for Treatment Control BMPs

Operation and maintenance (O&M) requirements for all structural Source Control and Treatment Control BMPs shall be identified in the project-specific WQMP. The project-specific WQMP shall address the following:

- Identification of each BMP that requires O&M.
- Thorough description of O&M activities, the O&M process, and the handling and placement of any wastes.
- BMP start-up dates.
- Schedule of the frequency of O&M for each BMP.
- Identification of the parties (name, address, and telephone number) responsible for O&M, including a written agreement with the entities responsible for O&M. This agreement can take the form of a Covenant and Agreement recorded by the Project Proponent with the County Recorder, HOA or POA CC&Rs, formation of a maintenance district or assessment district or other instrument sufficient to guarantee perpetual O&M. The preparer of this project-specific WQMP should carefully review Section 4.6 of the WQMP prior to completing this section of the project-specific WQMP.
- Self-inspections and record-keeping requirements for BMPs (review local specific requirements regarding self-inspections and/or annual reporting), including identification of responsible parties for inspection and record- keeping.
- Thorough descriptions of water quality monitoring, if required by the Co-Permittee.

Instructions: *Identify below all operations and maintenance requirements, as described above, for each structural BMP. Where a public agency is identified as the funding source and responsible party for a Treatment Control BMP, a copy of the written agreement stating the public agency's acceptance of these responsibilities must be provided in Appendix G.*

Insert text as instructed above.

7.1.1.1.1.1.1 Funding

A funding source or sources for the O&M of each Treatment Control BMP identified in the project-specific WQMP must be identified. By certifying the project-specific WQMP, the Project applicant is certifying that the funding responsibilities have been addressed and will be transferred to future owners. One example of how to adhere to the requirement to transfer O&M responsibilities is to record the project-specific WQMP against the title to the property.

Insert text identifying the funding source or sources for the operation and maintenance of each Treatment Control BMP included in the project.

Appendix A

Conditions of Approval

Planning Commission Resolution _____

Dated _____

Appendix B

Vicinity Map, WQMP Site Plan, and Receiving Waters Map

Appendix C

Supporting Detail Related to Hydraulic Conditions of Concern

Appendix D

Educational Materials

Appendix E

Soils Report

Appendix F

Treatment Control BMP Sizing Calculations and Design Details

Appendix G

AGREEMENTS – CC&RS, COVENANT AND AGREEMENTS AND/OR OTHER MECHANISMS FOR ENSURING ONGOING OPERATION, MAINTENANCE, FUNDING AND TRANSFER OF REQUIREMENTS FOR THIS PROJECT-SPECIFIC WQMP

Appendix H

PHASE 1 ENVIRONMENTAL SITE ASSESSMENT – SUMMARY OF SITE REMEDIATION CONDUCTED AND USE RESTRICTIONS

Exhibit B

General Categories of Pollutants of Concern

General Categories of Pollutants of Concern

- ***Pathogens*** – Pathogens (bacteria and viruses) are ubiquitous microorganisms that thrive under certain environmental conditions. Their proliferation is typically caused by the transport of animal or human fecal wastes from the watershed. Water, containing excessive bacteria and viruses can alter the aquatic habitat and create a harmful environment for humans and aquatic life. Also, the decomposition of excess organic waste causes increased growth of undesirable organisms in the water.
- ***Metals*** – The primary source of metal pollution in Urban Runoff is typically commercially available metals and metal products. Metals of concern include cadmium, chromium, copper, lead, mercury, and zinc. Lead and chromium have been used as corrosion inhibitors in primer coatings and cooling tower systems. Metals are also raw material components in non-metal products such as fuels, adhesives, paints, and other coatings. At low concentrations naturally occurring in soil, metals may not be toxic. However, at higher concentrations, certain metals can be toxic to aquatic life. Humans can be impacted from contaminated groundwater resources, and bioaccumulation of metals in fish and shellfish. Environmental concerns, regarding the potential for release of metals to the environment, have already led to restricted metal usage in certain applications.
- ***Nutrients*** – Nutrients are inorganic substances, such as nitrogen and phosphorus. They commonly exist in the form of mineral salts that are either dissolved or suspended in water. Primary sources of nutrients in Urban Runoff are fertilizers and eroded soils. Excessive discharge of nutrients to water bodies and streams can cause excessive aquatic algae and plant growth. Such excessive production, referred to as cultural eutrophication, may lead to excessive decay of organic matter in the water body, loss of oxygen in the water, release of toxins in sediment, and the eventual death of aquatic organisms.
- ***Pesticides*** – Pesticides (including herbicides) are chemical compounds commonly used to control nuisance growth or prevalence of organisms. Excessive or improper application of a pesticide may result in runoff containing toxic levels of its active ingredient.
- ***Organic Compounds*** – Organic compounds are carbon-based. Commercially available or naturally occurring organic compounds are found in pesticides, solvents, and hydrocarbons. Organic compounds can, at certain concentrations, indirectly or directly constitute a hazard to life or health. When rinsing off objects, toxic levels of solvents and cleaning compounds can be discharged to the MS4. Dirt, grease, and grime retained in the cleaning fluid or rinse water may also adsorb levels of organic compounds that are harmful or hazardous to aquatic life.
- ***Sediments*** – Sediments are soils or other surficial materials eroded and then transported or deposited by the action of wind, water, ice, or gravity. Sediments can increase turbidity, clog fish gills, reduce spawning habitat, lower young aquatic organisms survival rates, smother bottom dwelling organisms, and suppress aquatic vegetation growth.
- ***Trash and Debris*** – Trash (such as paper, plastic, polystyrene packing foam, and aluminum materials) and biodegradable organic matter (such as leaves, grass cuttings, and food waste) are general waste products on the landscape. The presence of trash and debris may have a significant impact on the recreational value of a water body and aquatic habitat. Excess organic matter can create a high biochemical oxygen demand in a stream and thereby lower its water quality. In addition, in areas where stagnant water exists, the presence of excess organic matter can promote septic conditions resulting in the growth of undesirable organisms and the release of odorous and hazardous compounds such as hydrogen sulfide.
- ***Oxygen-Demanding Substances*** – This category includes biodegradable organic material as well as chemicals that react with dissolved oxygen in water to form other compounds. Proteins,

carbohydrates, and fats are examples of biodegradable organic compounds. Compounds such as ammonia and hydrogen sulfide are examples of oxygen-demanding compounds. The oxygen demand of a substance can lead to depletion of dissolved oxygen in a water body and possibly the development of septic conditions.

- ***Oil and Grease*** – Oil and grease are characterized as high-molecular weight organic compounds. Primary sources of oil and grease are petroleum hydrocarbon products, motor products from leaking vehicles, esters, oils, fats, waxes, and high molecular-weight fatty acids. Introduction of these pollutants to the water bodies are very possible due to the wide uses and applications of some of these products in municipal, residential, commercial, industrial, and construction areas. Elevated oil and grease content can decrease the aesthetic value of the water body, as well as the water quality.

Potential Pollutants Generated by Land Use Type

(Excerpted, with minor revision, from the San Bernardino Water Quality Management Plan dated April 14, 2004)

Type of Development (Land Use)	Sediment/ Turbidity	Nutrients	Organic Compounds	Trash & Debris	Oxygen Demanding Substances	Bacteria & Viruses	Oil & Grease	Pesticides	Metals
Detached Residential Development	P	P	N	P	P	P	P	P	N
Attached Residential Development	P	P	N	P	P(1)	P	P(2)	P	N
Commercial/ Industrial Development	P(1)	P(1)	P(5)	P	P(1)	P(3)	P	P(1)	P
Automotive Repair Shops	N	N	P(4,5)	P	N	N	P	N	P
Restaurants	N	N	N	P	P	P	P	N	N
Hillside Development	P	P	N	P	P	P	P	P	N
Parking Lots	P(1)	P(1)	P(4)	P	P(1)	P(6)	P	P(1)	P
Streets, Highways & Freeways	P	P(1)	P(4)	P	P(1)	P(6)	P	P(1)	P

Abbreviations:
P = Potential N = Not potential

Notes:
(1) A potential pollutant if landscaping or open area exists on the Project site.
(2) A potential pollutant if the project includes uncovered parking areas.
(3) A potential pollutant if land use involves animal waste.
(4) Specifically, petroleum hydrocarbons.
(5) Specifically, solvents.
(6) Bacterial indicators are routinely detected in pavement runoff.

Exhibit C

Riverside County
Stormwater Quality Best Management Practice
Design Handbook

Riverside County

Stormwater Quality Best Management Practice

Design Handbook

Riverside County Flood Control and Water Conservation District
1995 Market Street
Riverside CA 92501

July 21, 2006

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BMP Design Criteria

Introduction

The purpose of this handbook is to provide design procedures for structural Best Management Practices (BMPs) for new development and redevelopment within Riverside County. This report expands on the BMP information given in the Attachment to Supplement A of the Riverside County DAMP (1996). Design procedures are based on guidance manuals from Ventura County (2002) and the City of Modesto (2001) with some criteria taken from the California BMP Handbook (2003). These sources were found to give the most detailed and clear design steps for the BMPs listed in the Attachment. BMP design concepts were combined and adapted to provide a straight-forward method for designing BMPs within Riverside County.

This handbook considers the seven types of BMPs listed in the Attachment in addition to extended detention basins. In some cases, variations or combination of these BMPs or the use of other BMPs (such as proprietary BMPs) may be more appropriate for a development. BMP selection will depend on the size of the project area and the types of pollutants to be treated. Once the BMP(s) has been selected, design guidelines are governed by either volume or flow criteria. Table 1 lists the BMPs and the design parameter that they are governed by.

Table 1: BMP Design Basis

BMP Type	Volume-Based Design	Flow-Based Design
Extended Detention Basins	X	
Infiltration Basins	X	
Infiltration Trenches	X	
Porous Pavement	X	
Sand Filters	X	
Grass Swales		X
Filter Strips		X
Water Quality Inlets		X

In order to meet NPDES regulations, the design volume or design flow to be treated must reduce pollutants to the Maximum Extent Practicable (MEP), The standard is the maximum extent possible taking into account equitable consideration and competing facts, including but not limited to: public health risk, environmental benefits, pollutant removal effectiveness, regulatory compliance, public acceptance, implementability, cost and technical feasibility. The methods used in this handbook for determining design volumes and flow, are based on studies from the ASCE Manual of Practice No. 87 (1998) and the California BMP Handbook respectively. These methods meet the criteria established by the Santa Ana, San Diego, and Colorado River Basin Regional Water Quality Control Boards (RWQCB) that have jurisdiction within Riverside County.

To ensure long-term performance of the BMPs, ongoing and proper maintenance should be considered. Proof of a viable maintenance mechanism may be required prior to plan approval. Some information on cost and maintenance considerations may be found at the EPA internet site (www.epa.gov) under their NPDES/Stormwater page.

BMP Selection

Different types of development result in different types of stormwater pollution. Most BMPs only treat some of these pollutants. To effectively protect water quality, the BMP(s) selected for a project must treat each of the project's identified pollutants. Table 2 identifies potential pollutants based on the type of development proposed. Table 3 can be used to select BMPs to treat these pollutants.

Table 2: *Potential Pollutants Generated by Land Use Type*

(Excerpted, with minor revision, from the San Bernardino Water Quality Management Plan dated April 14, 2004)

Type of Development (Land Use)	Sediment/ Turbidity	Nutrients	Organic Compounds	Trash & Debris	Oxygen Demanding Substances	Bacteria & Viruses	Oil & Grease	Pesticides	Metals
Detached Residential Development	P	P	N	P	P	P	P	P	N
Attached Residential Development	P	P	N	P	P(1)	P	P(2)	P	N
Commercial/ Industrial Development	P(1)	P(1)	P(5)	P	P(1)	P(3)	P	P(1)	P
Automotive Repair Shops	N	N	P(4,5)	P	N	N	P	N	P
Restaurants	N	N	N	P	P	P	P	N	N
Hillside Development	P	P	N	P	P	P	P	P	N
Parking Lots	P(1)	P(1)	P(4)	P	P(1)	P(6)	P	P(1)	P
Streets, Highways & Freeways	P	P(1)	P(4)	P	P(1)	P(6)	P	P(1)	P

Abbreviations:
P = Potential N = Not potential

Notes:
(1) A potential pollutant if landscaping or open area exists on the Project site.
(2) A potential pollutant if the project includes uncovered parking areas.
(3) A potential pollutant if land use involves animal waste.
(4) Specifically, petroleum hydrocarbons.
(5) Specifically, solvents.
(6) Bacterial indicators are routinely detected in pavement runoff.

Table 3: Treatment Control BMP Selection Matrix(1)

(Excerpted, with minor revision, from the Orange County Water Quality Management Plan dated September 26, 2003 and the San Bernardino Water Quality Management Plan dated April 14, 2004)

Pollutant of Concern	Biofilters (2)	Detention Basins (3)	Infiltration BMPs (4)	Wet Ponds or Wetlands (5)	Filtration Systems (6)	Water Quality Inlets	Hydrodynamic Separator Systems (7)	Manufactured or Proprietary Devices (8)
Sediment/Turbidity	H/M	M	H/M	H/M	H/M	L	H/M (L for Turbidity)	U
Nutrients	L	M	H/M	H/M	L/M	L	L	U
Organic Compounds	U	U	U	U	H/M	L	L	U
Trash & Debris	L	M	U	U	H/M	M	H/M	U
Oxygen Demanding Substances	L	M	H/M	H/M	H/M	L	L	U
Bacteria & Viruses	U	U	H/M	U	H/M	L	L	U
Oil & Grease	H/M	M	U	U	H/M	M	L/M	U
Pesticides (non-soil bound)	U	U	U	U	U	L	L	U
Metals	H/M	M	H	H	H	L	L	U

Abbreviations:

L: Low removal efficiency H/M: High or medium removal efficiency U: Unknown removal efficiency

Notes:

(1) Periodic performance assessment and updating of the guidance provided by this table may be necessary.

(2) Includes grass swales, grass strips, wetland vegetation swales, and bioretention.

(3) Includes extended/dry detention basins with grass lining and extended/dry detention basins with impervious lining. Effectiveness based upon minimum 36-48-hour drawdown time.

(4) Includes infiltration basins, infiltration trenches, and porous pavements.

(5) Includes permanent pool wet ponds and constructed wetlands.

(6) Includes sand filters and media filters.

(7) Also known as hydrodynamic devices, baffle boxes, swirl concentrators, or cyclone separators.

(8) Includes proprietary stormwater treatment devices as listed in the CASQA Stormwater Best Management Practices Handbooks, other stormwater treatment BMPs not specifically listed in this WQMP, or newly developed/emerging stormwater treatment technologies.

Volume Based BMPs

General

The largest concentrations of pollutants are found in runoff from small volume storms and from the first flush of larger storms. Therefore, volume based BMPs should be sized to capture and treat the initial and more frequent runoff surges that convey the greatest concentration of pollutants. To maximize treatment and avoid health hazards, volume-based BMPs must retain and release the runoff between a 24 and 72 hour period. This handbook typically recommends a draw down time of 48 hours, as recommended by the California BMP Handbook. The drawdown time refers to the minimum amount of time the design volume must be retained.

In order to meet RWQCB requirements, the method for determining the design volume is based on capturing 85 percent of the total annual runoff. These 85 percent capture values were determined throughout Riverside County using rain gages with the greatest periods of record. Key model assumptions are based on studies used in the *Urban Runoff Quality Management, WEF Manual of Practice No. 23/ASCE Manual of Practice No. 87, (1998)* and *the California Best Management Practice Handbook*. This handbook gives a simple procedure for determining the design volume of a BMP based on the location of the project.

BMP Design Volume Calculations

Following is a step-by-step procedure for determining design volume for BMPs using Worksheet 1. Examples of the following procedure can be found in Appendix B.

1. Create Unit Storage Volume Graph:
   a) Locate the project site on the Slope of the Design Volume Curve contained in Appendix A.
   b) Read the slope value at this location. This value is the Unit Storage Volume for a runoff coefficient of 1.0.
   c) Plot this value as a point (corresponding to a coefficient of 1.0) on the Unit Storage Volume Graph shown on Figure 2.
   d) Draw a straight line from this point to the origin, to create the graph.

2. Determine the runoff coefficient (C) from Figure 1 or the following relationship:

$$C = .858i^3 - .78i^2 + .774i + .04$$

where i = impervious percentage

3. Using the runoff coefficient found in step 2, determine 85th percentile unit storage volume (V_u) using Figure 2 (created in step 1).

4. Determine the design storage volume (V_{BMP}). This is the volume to be used in the design of selected BMPs presented in this handbook.

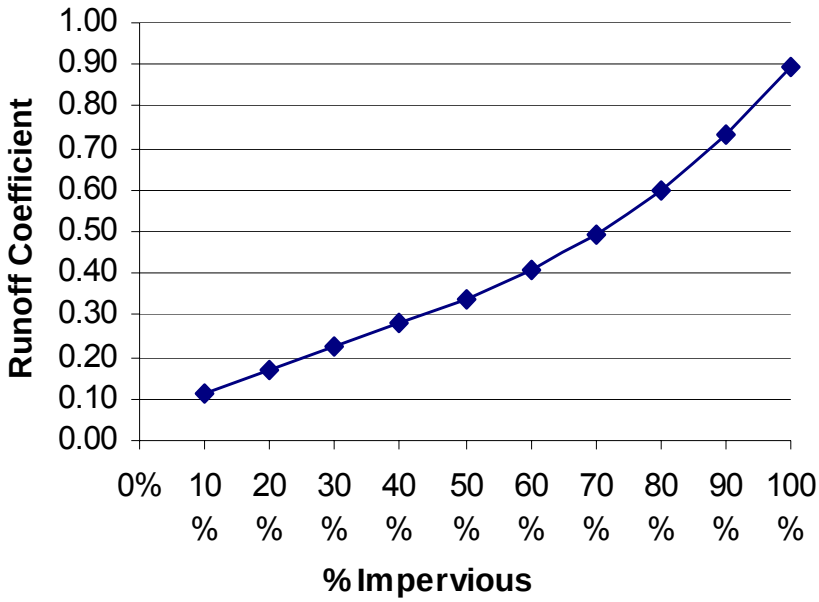

Figure 1. Impervious – Coefficient Curve (WEF/ASCE Method[24])

[24] Imperviousness is the decimal fraction of the total catchment covered by the sum of roads, parking lots, sidewalks, rooftops, and other impermeable surfaces of an urban landscape.

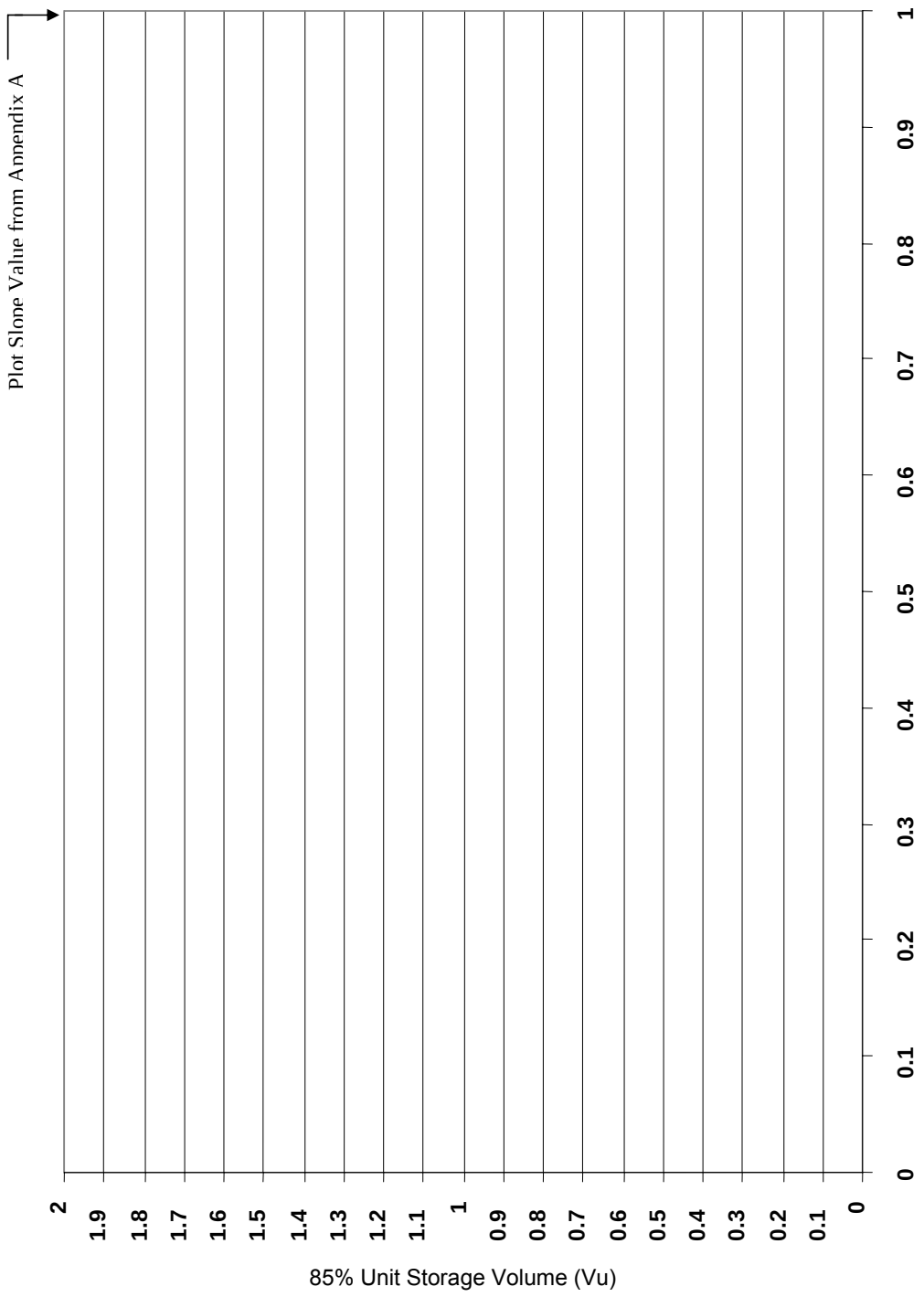

Figure 2 Unit Storage Volume Graph

Worksheet 1

Design Procedure for BMP Design Volume

85th percentile runoff event

Designer: _____

Company: _____

Date: _____

Project: _____

Location: _____

1. Create Unit Storage Volume Graph a. Site location (Township, Range, and Section). b. Slope value from the Design Volume Curve in **Appendix A**. c. Plot this value on the Unit Storage Volume Graph shown on **Figure 2.** d. Draw a straight line form this point to the origin, to create the graph	T &R Section Slope = _____ Is this graph attached? Yes ☐ No ☐	***(1)*** ***(2)***
2. Determine Runoff Coefficient a. Determine total impervious area b. Determine total tributary area c. Determine Impervious fraction i = ***(5)*** / ***(6)*** d. Use ***(7)*** in **Figure 1** to find Runoff OR $C = .858i^3 - .78i^2 + .774i + .04$	$A_{impervious}$ = _____ acres A_{total} = _____ acres i = _____ C = _____	***(5)*** ***(6)*** ***(7)*** ***(8)***
3. Determine 85% Unit Storage Volume a. Use ***(8)*** in **Figure 2** Draw a Vertical line from ***(8)*** to the graph, then a Horizontal line to the desired V_u value.	V_u = _____ in-acre / acre	***(9)***
4. Determine Design Storage Volume a. V_{BMP} = ***(9)*** x ***(6)*** [in- acres] b. V_{BMP} = ***(10)*** / 12 [ft- acres] c. V_{BMP} = ***(11)*** x 43560 [ft^3]	V_{BMP} = _____ in-acre V_{BMP} = _____ ft-acre V_{BMP} = _____ ft^3	***(10)*** ***(11)*** ***(12)***

Notes: _____

Flow Based BMPs

General

Flow based BMPs are sized to treat flows up to the design flow rate, which will remove pollutants to the MEP. This handbook bases the design flow rate on a uniform rainfall intensity of 0.2 inches per hour, as recommended by the California BMP Handbook. The flow rate is also dependent on the type of soil and percentage of impervious area in the development.

Uniform Intensity Approach

The Uniform Intensity Approach is where the Design Rainfall Intensity, I is specified as:

$$I = 0.2\ ^{in}/_{hr}$$

That Intensity is then plugged into the Rational Equation to find the BMP design flow rate (Q).

$$Q_{BMP} = CIA$$

Where A = Tributary Area to the BMP
C = Runoff Coefficient, based upon a Rainfall Intensity = 0.2 $^{in}/_{hr}$
I = Design Rainfall intensity, 0.2 $^{in}/_{hr}$

A step-by-step procedure for calculating the design flow rate is presented on Worksheet 2. Table 4 shows runoff coefficient values pertaining to the type of soils and percent imperviousness.

Table 4. Runoff Coefficients for an Intensity = 0.2 $^{in}/_{hr}$ for Urban Soil Types*

Impervious %	A Soil RI =32	B Soil RI =56	C Soil RI =69	D Soil RI =75
0 (Natural)	0.06	0.14	0.23	0.28
5	0.10	0.18	0.26	0.31
10	0.14	0.22	0.29	0.34
15	0.19	0.26	0.33	0.37
20 (1-Acre)	0.23	0.30	0.36	0.40
25	0.27	0.33	0.39	0.43
30	0.31	0.37	0.43	0.47
35	0.35	0.41	0.46	0.50
40 (1/2-Acre)	0.40	0.45	0.50	0.53
45	0.44	0.48	0.53	0.56
50 (1/4-Acre)	0.48	0.52	0.56	0.59
55	0.52	0.56	0.60	0.62
60	0.56	0.60	0.63	0.65
65 (Condominiums)	0.61	0.64	0.66	0.68
70	0.65	0.67	0.70	0.71
75 (Mobilehomes)	0.69	0.71	0.73	0.74
80 (Apartments)	0.73	0.75	0.77	0.78
85	0.77	0.79	0.80	0.81
90 (Commercial)	0.82	0.82	0.83	0.84
95	0.86	0.86	0.87	0.87
100	0.90	0.90	0.90	0.90

*Complete District's standards can be found in the Riverside County Flood Control Hydrology Manual

Worksheet 2

Design Procedure Form for Design Flow

Uniform Intensity Design Flow

Designer: _____

Company: _____

Date: _____

Project: _____

Location: _____

1. Determine Impervious Percentage		
a. Determine total tributary area	A_{total} = _____ acres	***(1)***
b. Determine Impervious %	i = _____ %	***(2)***
2. Determine Runoff Coefficient Values Use **Table 4** and impervious % found in step 1		
a. A Soil Runoff Coefficient	C_a = _____	***(3)***
b. B Soil Runoff Coefficient	C_b = _____	***(4)***
c. C Soil Runoff Coefficient	C_c = _____	***(5)***
d. D Soil Runoff Coefficient	C_d = _____	***(6)***
3. Determine the Area decimal fraction of each soil type in tributary area		
a. Area of A Soil / ***(1)*** =	A_a = _____	***(7)***
b. Area of B Soil / ***(1)*** =	A_b = _____	***(8)***
c. Area of C Soil / ***(1)*** =	A_c = _____	***(9)***
d. Area of D Soil / ***(1)*** =	A_d = _____	***(10)***
4. Determine Runoff Coefficient		
a. C = ***(3)***x***(7)*** + ***(4)***x***(8)*** + ***(5)***x***(9)*** + ***(6)***x***(10)*** =	C = _____	***(11)***
5. Determine BMP Design flow		
a. Q_{BMP} = C x I x A = ***(11)*** x 0.2 x ***(1)***	Q_{BMP} = _____ $\frac{ft^3}{s}$	***(12)***

Extended Detention Basins

General

An extended detention Basin is a permanent basin sized to detain and slowly release the design volume of stormwater, allowing particles and associated pollutants to settle out. An inlet forebay section and an inlet energy dissipater minimize erosion from entering flows, while erosion protection at the outlet prevents damage from exiting flows. The bottom of the basin slopes towards the outlet at an approximate grade of two percent, and a low flow channel conveys incidental flows directly to the outlet end of the basin. The basin should be vegetated earth in order to allow some infiltration to occur, although highly pervious soils may require an impermeable liner to prevent groundwater contamination. Proper turf management is also required to ensure that the vegetation does not contribute to water pollution through pesticides, herbicides, or fertilizers. A permanent micropool should not be included due to vector concerns. See Figure 3 for a typical basin design and Figure 5 for several outlet options. Extended detention basins can also be used to reduce the peaks of storm events for flood control purposes.

The basin outlet is designed to release the design runoff over a 48-hour drawdown period. The drawdown time refers to the minimum amount of time the design volume must be retained. In order to avoid vector breeding problems, the design volume should always empty within 72 hours. To function properly, the outlet must also be sized to retain the first half of the design volume for a minimum of 24 hours.

Extended Detention Basin Design Criteria:

Design Parameter	Unit	Design Criteria
Design Volume	ft^3	V_{BMP}
Drawdown time (total)	hrs	48 hrs [3]
Drawdown time for 50% V_{BMP} (minimum)	hrs	24 hrs [3]
Minimum tributary area	acre	5 acres [3]
Inlet/outlet erosion control	-	Energy dissipater to reduce velocities [1]
Forebay volume	%	5 to 10 % of V_{BMP} [1]
Forebay drain time	min	Drain time < 45 minutes [1]
Low-flow channel depth	in	9 [1]
Low-flow chan. flow capacity	-	2 times the forebay outlet rate [1]
Bottom slope of upper stage	%	2.0 [1]
Length to width ratio (min.)	-	2:1 (larger preferred) [1]
Upper stage depth/width (min.)	ft	2' depth / 30' width [1]
Bottom stage volume	%	10 to 25 % of V_{BMP} [1]
Bottom stage depth	ft	1.5 to 3 ft deeper than top stage [1]
Freeboard (minimum)	ft	1.0 [1]
Embankment side slope	-	≥ 2:1 inside / ≥ 4:1 outside (w/o retaining

(H:V)		walls) [1]
Maintenance access ramp slope	%	10 % or flatter [1]
Maintenance access ramp width	ft	15' – approach paved with asphalt concrete [1]

1. Ventura County's Technical Guidance Manual for Stormwater Quality Control Measures
2. City of Modesto's Guidance Manual for New Development Stormwater Quality Control Measures
3. CA Stormwater BMP Handbook for New Development and Significant Redevelopment
4. Riverside County DAMP Supplement A Attachment

Extended Detention Basin Design Procedure

1. Design Volume
   Use Worksheet 1- Design Procedure Form for Design Volume, V_{BMP}.

Formatted: Bullets and Numbering

1. Basin Shape
   Whenever possible, shape the basin with a gradual expansion from the inlet toward the middle and a gradual contraction from middle toward the outlet. The length to width ratio should be a minimum of 2:1. Internal baffling with berms may be necessary to achieve this ratio.

2. Two-Stage Design
   Whenever feasible, provide a two-stage design with a pool that fills often with frequently occurring runoff. This minimizes standing water and sediment deposition in the remainder of the basin.

   a. Upper stage: The upper stage should be a minimum of 2 feet deep with the bottom sloped at 2 percent toward the low flow channel. Minimum width of the upper stage should be 30 feet.

   b. Bottom stage: The active storage basin of the bottom stage should be 1.5 to 3 feet deeper than the top stage and store 10 to 25 percent of the design volume.

3. Forebay Design
   The forebay provides a location for sedimentation of larger particles that has a solid bottom surface to facilitate mechanical removal of accumulated sediment. The forebay volume should be 5 to 10 percent of the V_{BMP}. A berm should separate the forebay from the upper stage of the basin. The outlet pipe from the forebay to the low-flow channel should be sized to drain the forebay volume in 45 minutes. The outlet pipe entrance should be offset from the forebay inlet to prevent short circuiting.

4. Low-flow Channel
   The low flow channel conveys flow from the forebay to the bottom stage. Erosion protection should be provided where the low-flow channel enters the bottom stage. Lining of the low flow channel with concrete is recommended. The depth of the

channel should be at least 9 inches. The flow capacity of the channel should be twice the release capacity of the forebay outlet.

5. Trash Rack/Gravel Pack
   A trash rack or gravel pack around perforated risers shall be provided to protect outlet orifices from clogging. Trash racks are better suited for use with perforated vertical plates for outlet control and allow easier access to outlet orifices for purposes of inspection and cleaning. Trash rack shall be sized to prevent clogging of the primary water quality outlet without restricting the hydraulic capacity of the outlet control orifices.

6. Basin Outlet
   The basin outlet should be sized to release the design volume, V_{BMP} over a 48-hour period, with no more than 50 percent released in 24 hours. The outflow structure should have a trash rack or other acceptable means to prevent clogging, and a valve that can stop discharge from being released in case of an accidental spill in the watershed (Figure 5). The discharge through a control orifice can be calculated using the following steps:

   a. Develop a Stage vs. Discharge curve for the outlet structure
   b. For example: If using an orifice, select the orifice size and use the following equation to develop a Stage vs. Discharge relationship for this outlet:

      $$Q = CA[2g(H-H_o)]^{0.5}$$

      Where: Q = discharge (ft^3/s)

      C = orifice coefficient
      A = area of the orifice (ft)
      G = gravitational constant (32.2 ft^2/s)
      H = water surface elevation (ft)
      H_o = orifice elevation (ft)

      Recommended values for C are 0.66 for thin material (e.g. CMP riser) and 0.8 when the material is thicker than the orifice diameter (e.g. concrete riser). Alternative non-mechanical hydraulic control structures are acceptable (e.g. weirs, risers, etc).

   c. Develop a Stage vs. Volume curve for the basin
      Based on the shape and size of the basin, develop a relationship between the stage and the volume of water in the basin.

   d. Create an Inflow Hydrograph
      Create an inflow hydrograph that delivers the design volume V_{BMP} instantaneously to the basin. This can be approximated by creating a hydrograph with two 5-minute intervals that together convey the entire V_{BMP}.

   e. Route the Volume through the Basin

Route the volume of water through the basin using these curves. If this meets the hydraulic retention time requirements (50% of the volume empties in not less than 24 hours, 100% of the volume empties in not less than 48 hours and not more than 72 hours) the outlet is correctly sized. If these requirements are not met, select a new outlet size or configuration and repeat the process.

7. Inlet/Outlet Design
   Basin inlet and outlet points should be provided with an energy dissipation structure and/or erosion protection.

8. Turf Management
   Basin vegetation provides erosion protection and improves sediment entrapment. Basin bottoms, berms, and side slopes may be planted with native grasses or with irrigated turf. Several BMPs must be implemented to ensure that this vegetation does not contribute to water pollution through pesticides, herbicides, or fertilizers. These BMPs shall include, at a minimum: (1) educational activities, permits, certifications, and other measures for local applicators and distributors; (2) integrated pest management measures that rely on non-chemical solutions; (3) the use of native vegetation; (4) schedules for irrigation and chemical application; and (5) the collection and proper disposal of unused pesticides, herbicides, and fertilizers.

9. Embankment
   Embankment designs must conform to requirements of the State of California Division of Safety of Dams, if the basin dimensions cause it to fall under that agency's jurisdiction. Interior slopes should be no steeper than 2:1 and exterior slopes no steeper than 4:1. Flatter slopes are preferable. Embankment fill is discouraged and should never be higher than three feet unless the basin is to be publicly maintained.

10. Access
    All-weather access to the bottom, forebay, and outlet works shall be provided for maintenance vehicles. Maximum grades of access ramps should be 10 percent and minimum width should be 15 feet.

11. Bypass
    Provide for bypass or overflow of runoff volumes in excess of the design volume. Spillway and overflow structures should be designed in accordance with applicable standards of the Riverside County Flood Control District.

12. Geotextile Fabric
    Non-woven geotextile fabric used in conjunction with gravel packs around perforated risers shall conform with the specifications located in Table 5.

Table 5. Non-woven Geotextile Fabric Specifications

Property	Test Reference	Minimum Specification
Grab Strength	7.1.1.1.1.1.2 ASTM D4632	90 lbs
Elongation at peak load	ASTM D4632	50 %
7.1.1.1.1.1.3 Puncture Strength	ASTM D3787	45 lbs
Permitivity	ASTM D4491	0.7 sec^{-1}
Burst Strength	ASTM D3786	180 psi
Toughness	% Elongation x Grab Strength	5,500 lbs
Ultraviolet Resistance (% strength retained at 500 Weatherometer hours)	ASTM D4355	70 %

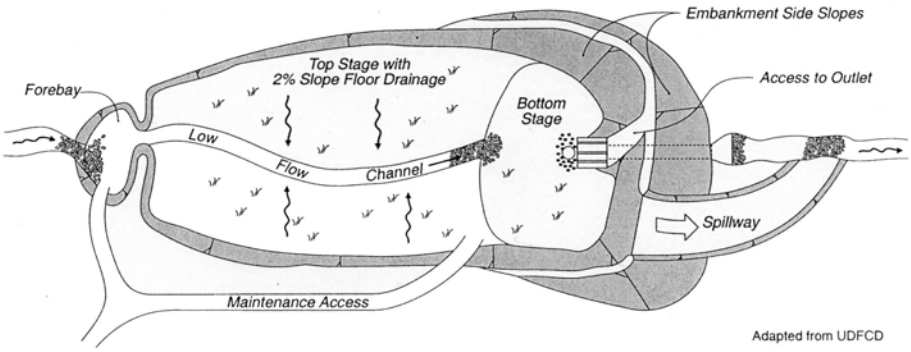

Plan View

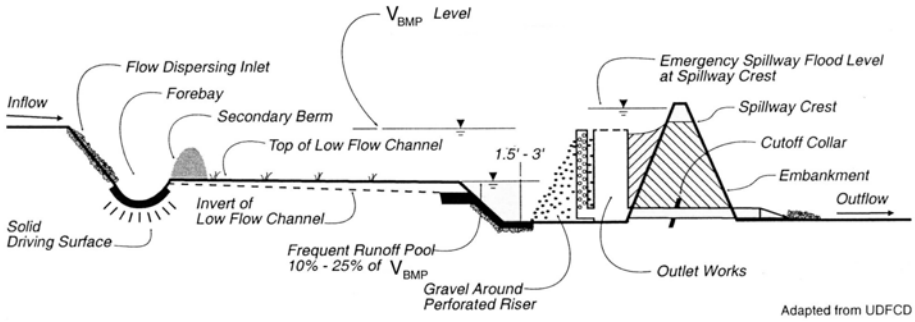

Section View

Figure 3: EXTENDED DETENTION BASIN

Source: Ventura County Guidance Manual

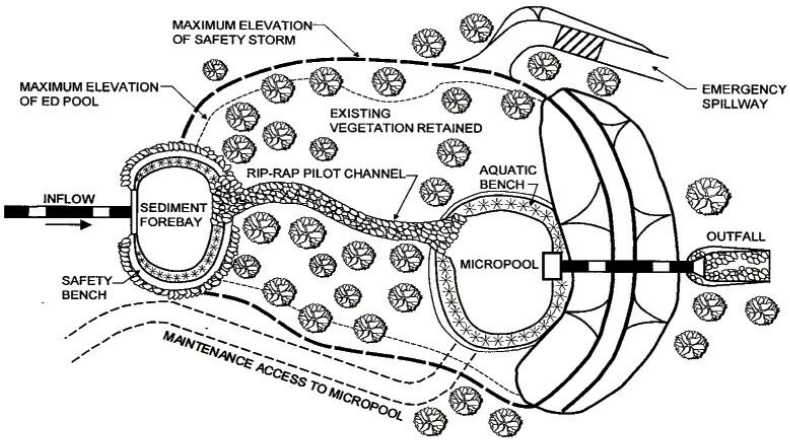

PLAN VIEW

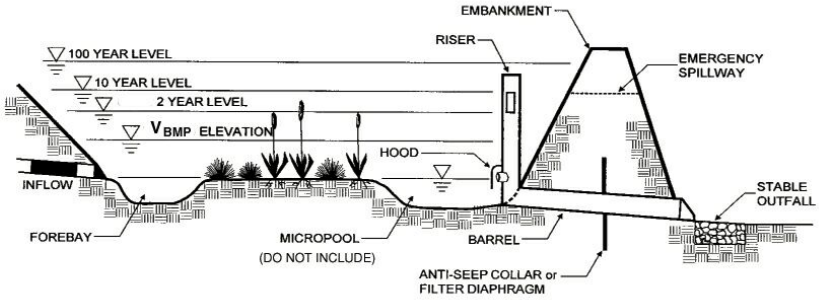

PROFILE

Figure 4: EXTENDED DETENTION / INCREASED RUNOFF BASIN

Source: CA BMP Handbook (2003)

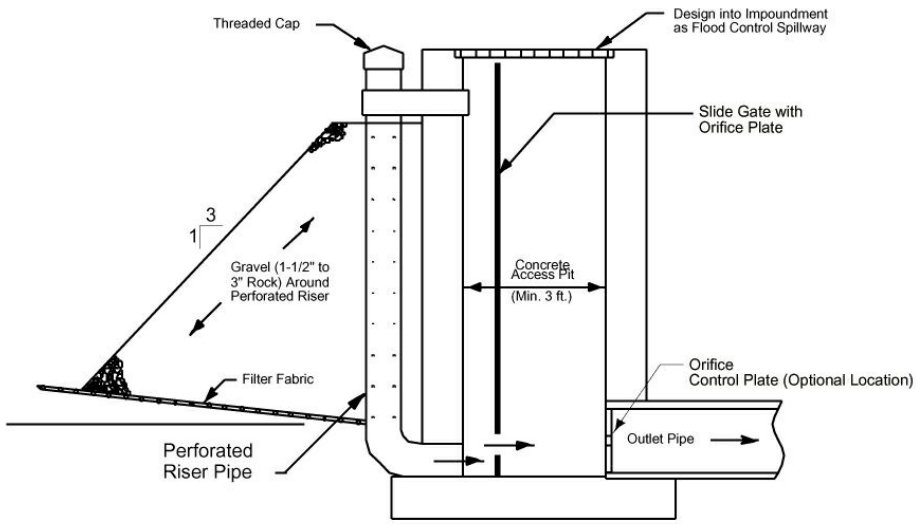

PERFORATED RISER PIPE WITH VERTICAL FLOW CONTROL ORIFICE

NOT TO SCALE

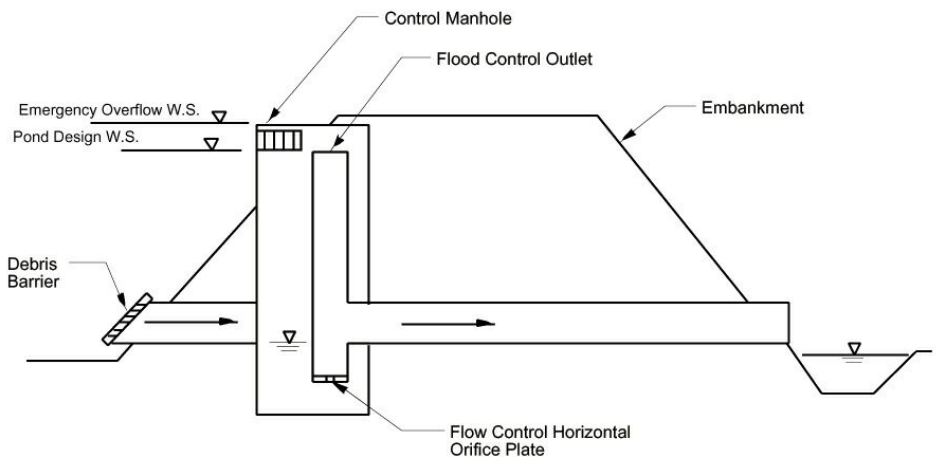

CONTROL MANHOLE WITH SUBMERGED HORIZONTAL ORIFICE PLATE

NOT TO SCALE

Figure 5: EXTENDED DETENTION BASIN TYPICAL OUTLETS

Source: Ventura County Guidance Manual

Worksheet 3

Design Procedure Form for Extended Detention Basin

Designer:_____
Company:_____
Date:_____
Project:_____
Location:_____

1. Determine Design Volume (Use Worksheet 1) a. Total Tributary Area (minimum 5 ac.) b. Design Volume, V_{BMP}	A_{total} = _____ acres V_{BMP} = _____ ft^3
2. Basin Length to Width Ratio (2:1 min.)	Ratio = _____ L:W
3. Two-Stage Design a. Overall Design 1) Depth (3.5' min.) 2) Width (30' min.) 3) Length (60' min.) 4) Volume (must be ≥ V_{BMP}) b. Upper Stage 1) Depth (2' min.) 2) Bottom Slope (2% to low flow channel recommended) c. Bottom Stage 1) Depth (1.5' to 3') 2) Length 3) Volume (10 to 25% of V_{BMP})	Depth = _____ ft Width = _____ ft Length = _____ ft Volume = _____ ft^3 Depth = _____ ft Slope = _____ % Depth = _____ ft Length = _____ ft Volume = _____ ft^3
4. Forebay Design a. Forebay Volume (5 to 10% of V_{BMP}) b. Outlet pipe drainage time (≅ 45 min)	Volume = _____ ft^3 Drain time = _____ minutes
5. Low-flow Channel a. Depth (9" minimum) b. Flow Capacity (2 * Forebay Q_{OUT})	Depth = _____ ft $Q_{Low\ Flow}$ = _____ cfs
6. Trash Rack or Gravel Pack (check one)	Trash Rack _____ Gravel Pack _____

7. Basin Outlet a. Outlet type (check one) b. Orifice Area c. Orifice Type d. Maximum Depth of water above bottom orifice e. Length of time for 50% V_{BMP} drainage (24 hour minimum) f. Length of time for 100% V_{BMP} drainage (between 48 and 72 hours) g. Attached Documents (all required) 1) Stage vs. Discharge 2) Stage vs. Volume 3) Inflow Hydrograph 4) Basin Routing	Single orifice _____ Multi-orifice plate _____ Perforated Pipe _____ Other _____ Area = _____ ft^2 Type _____ Depth = _____ ft Time 50% = _____ hrs Time 100% = _____ hrs Attached Documents (check) 1) _____ 2) _____ 3) _____ 4) _____
8. Increased Runoff (optional) Is this basin also mitigating increased runoff? Attached Documents (all required) for 2, 5, & 10-year storms: 1) Stage vs. Discharge 2) Stage vs. Volume 3) Inflow Hydrograph 4) Basin Routing	Yes _____ No _____ (if No, skip to #9) Attached Documents (check) 1) _____ 2) _____ 3) _____ 4) _____
9. Vegetation (check type)	____ Native Grasses ____ Irrigated Turf ____ Other _____
10. Embankment a. Interior slope (4:1 max.) b. Exterior slope (3:1 max.)	Interior Slope = _____ % Exterior Slope = _____ %
11. Access a. Slope (10% max.) b. Width (16 feet min.)	Slope = _____ % Width = _____ ft

Notes:

Infiltration Basins

General

An infiltration basin is an earthen basin designed to capture the design volume of runoff and infiltrate that stormwater back into the pervious natural surrounding soil. These basins have only an emergency spillway, not a standard outlet, although a relief underdrain will drain the basin if standing water conditions occur. Flows that exceed the design volume should be diverted around the infiltration basin. The basin is designed to retain the design volume and allow it to percolate into the underlying soil over a period of 48 hours, which removes soluble and fine particulate pollutants. Sediment clogging can be avoided by including a settling basin near the inlet as well as the required energy dissipater. The sides and bottom of the basin include vegetation to protect the basin from erosion. Infiltration basins typically treat developments up to 50 acres in size.

Infiltration basins have select applications. Their use is often sharply restricted by concerns over ground water contamination, soils, and clogging at the site. These basins are not appropriate for the following site conditions: industrial sites or locations where spills occur, sites with C or D type soils, and sites with high infiltration rates where pollutants can affect ground water quality. The upstream tributary area must be completely stabilized before construction. In addition, some studies have shown relatively high failure rates compared with other management practices. Finally, infiltration basins are difficult to restore infiltration once the basin has been clogged.

Infiltration Basin Design Criteria:

Design Parameter	Unit	Design Criteria
Design Volume	ft^3	V_{BMP}
Drawdown time	hrs	48 hrs [3]
Maximum Tributary Area	acre	50 acres [4]
Minimum Infiltration Rate	in/hr	0.5 in/hr [4]
Bottom Basin elevation	ft	5 feet or more above seasonally high groundwater table [1]
Minimum Freeboard	ft	1.0 ft [1]
Setbacks	ft	100 feet from wells, tanks, fields, springs [1] 20 feet down slope of 100 feet up slope from foundations [1]
Inlet/outlet erosion control	-	Energy dissipater to reduce inlet/outlet velocity [1]
Embankment side slope (H:V)	-	4:1 or flatter inside slope/ 3:1 or flatter outside slope (without retaining walls) [1]
Maintenance access ramp slope (H:V)	-	10:1 or flatter [1]
Maintenance access ramp width	ft	16.0 – approach paved with asphalt concrete[1]
Vegetation	-	Side slopes and bottom (may require

		irrigation during summer) [1]
Relief Underdrain	-	A perforated PVC pipe with valve is to be installed to serve as a relief drain in the event of system failure. [2]

1 Ventura County's Technical Guidance Manual for Stormwater Quality Control Measures
2 City of Modesto's Guidance Manual for New Development Stormwater Quality Control Measures
3 CA Stormwater BMP Handbook for New Development and Significant Redevelopment
4 Riverside County DAMP Supplement A Attachment

Infiltration Basin Design Procedure

1. Design Storage Volume
   Use Worksheet 1- Design Procedure Form for Design Storage Volume, V_{BMP}.

2. Basin Surface Area
   Calculate the minimum surface area:

$$A_m = V_{BMP} / D_m$$

Where A_m = minimum area required (ft^2)
V_{BMP} = volume of the infiltration basin (ft^3)
D_m = maximum allowable depth (ft)

$$D_m = [(t) \times (I)] / 12s$$

Where I = site infiltration rate (in/hr)
s = safety factor
t = minimum drawdown time (48 hours)

In the formula for maximum allowable depth, the safety factor accounts for the possibility of inaccuracy in the infiltration rate measurement. The less certain the infiltration rate the higher the safety factor shall be. Minimum safety factors shall be as follows:

- Without site-specific borings and percolation tests, use s = 10
- With borings (but no percolation test), use s = 6
- With percolation test (but no borings), use s = 5
- With borings and percolation test, use s = 3

It is recommended that the infiltration rate be determined through site-specific soils tests. The Infiltration rate can also be estimated by using the District's Hydrology Manual. To estimate the infiltration rate with the District's Hydrology Manual determine a RI number using plate D-5.5, then use plate E-6.2 to find the loss rate (keep in mind this loss rate is for pervious areas only).

3. Inline/Offline

Basins may be on-line or off-line with flood control facilities. For on-line basins, the water quality outlet may be superimposed on the flood control outlet or may be constructed as a separate outlet.

4. Basin Inlet
   The inlet structure should dissipate energy of incoming flow to avoid scouring of the basin. If high sediment loads are anticipated a settling basin with a volume of 10 to 20 percent of the design volume should be placed at the inlet of the basin.

5. Vegetation
   Bottom vegetation provides erosion protection and sediment entrapment. Basin bottoms, berms, and side slopes may be planted with native grasses or with irrigated turf.

6. Embankments
   Design embankments to conform to requirements of State of California Division of Safety of Dams, if the basin dimensions cause it to fall under that agency's jurisdiction. Interior slopes should be no steeper than 4:1 and exterior slopes no steeper than 3:1. Flatter slopes are preferable.

7. Access
   All-weather access to the bottom, forebay, and outlet works shall be provided for maintenance vehicles. Maximum grades of access ramps should be 10 percent and minimum width should be 16 feet. Ramps should be paved with concrete. Provide security fencing, except when used as a recreation area.

8. Bypass
   Provide for bypass or overflow of runoff volumes in excess of the design volume. Spillway and overflow structures should be designed in accordance with applicable standards of the Riverside County Flood Control District.

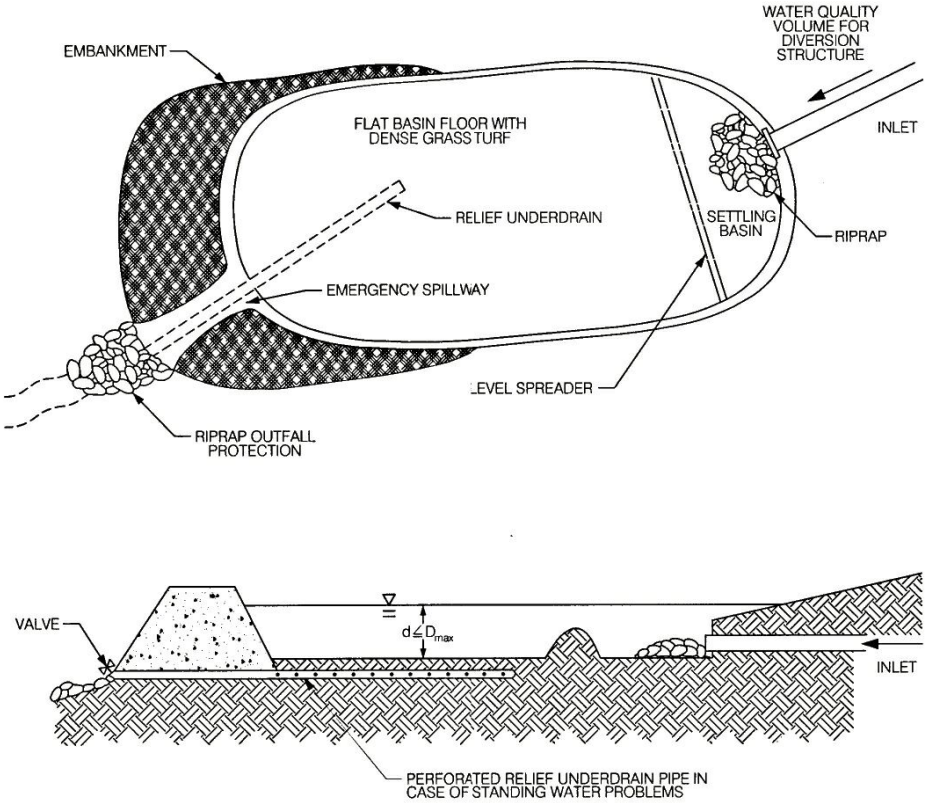

Figure 6: INFILTRATION BASIN

Source: City of Modesto Guidance Manual

Worksheet 4

Design Procedure Form for Infiltration Basin

Designer:_____
Company:_____
Date:_____
Project:_____
Location:_____

1. Determine Design Storage Volume (Use Worksheet 1) a. Total Tributary Area (maximum 50) b. Design Storage Volume, V_{BMP}	A_{total} = _____ acres V_{BMP} = _____ ft^3
2. Maximum Allowable Depth (D_m) a. Site infiltration rate (I) b. Minimum drawdown time (48 hrs) c. Safety factor (s) d. D_m = [(t) x (I)]/[12s]	I = _____ in/hr t = _____ hrs s = _____ D_m = _____ ft
3. Basin Surface Area $A_m = V_{BMP} / D_m$	A_m = _____ ft^2
4. Vegetation (check type used or describe "other")	____ Native Grasses ____ Irrigated Turf Grass ____ Other _____ _____

Notes:

Infiltration Trenches

General

An infiltration trench is an excavated trench that has been refilled with a gravel and sand bed capable of holding the design volume of stormwater runoff. The runoff is stored in the trench over a period of time (48 hours) during which it slowly infiltrates back into the naturally pervious surrounding soil. This infiltration process effectively removes soluble and particulate pollutants, however it is not intended to trap course sediments. It is recommended that an upstream control measure such as a grass swale or filter strip be combined with an infiltration trench to remove sediments that might clog the trench. These trenches also include a bypass system for volumes greater than the design capture volume, and a perforated pipe as an observation well to monitor water depth. An infiltration trench can typically treat developments up to 10 acres.

Infiltration Trench Design Criteria

Design Parameter	Unit	Design Criteria
Design Volume	ft^3	V_{BMP}
Drawdown time	hrs	48 hrs [3]
Maximum Tributary Area	acre	10 acres [2 & 3]
Minimum Infiltration Rate of Soil	in/hr	0.27 in/hr [4]
Trench bottom elevation	ft	5 feet or more above seasonally high groundwater table [1]
Maximum Trench depth (Dm)	ft	8.0 ft [1]
Gravel bed material	ft	Clean, washed aggregate 1 to 3 inches in diameter [1]
Trench lining material	-	Geotextile fabric [1] or 6" layer of sand [4]
Setbacks	ft	100 feet from wells, tanks, fields, or springs [1] 20 feet down slope or 100 feet up slope from foundations [1] Do not locate under tree drip-lines [1]

1 Ventura County's Technical Guidance Manual for Stormwater Quality Control Measures
2 City of Modesto's Guidance Manual for New Development Stormwater Quality Control Measures
3 CA Stormwater BMP Handbook for New Development and Significant Redevelopment
4 Riverside County DAMP Supplement A Attachment

Infiltration Trench Design Procedure

1. Design Storage Volume
   Use Worksheet 1- Design Procedure Form for Design Storage Volume, V_{BMP}.

2. Trench Water Depth
   Calculate the maximum allowable depth of water in the trench, D_m, in feet. Maximum depth should not exceed 8 feet:

   $$D_m = [(t) \times (I)] / (12s)$$

   Where I = site infiltration rate (in/hr)
   s = safety factor
   t = minimum drawdown time (48 hours)

   In the formula for maximum allowable depth, the safety factor accounts for the possibility of inaccuracy in the infiltration rate measurement. The less certain the infiltration rate, the higher the safety factor should be. Minimum safety factors shall be as follows:
   - Without site-specific borings and percolation tests, use s = 10
   - With borings (but no percolation test), use s = 6
   - With percolation test (but no borings), use s = 5
   - With borings and percolation test, use s = 3

3. Trench Surface Area
   Calculate the minimum surface area of the trench bottom:

   $$A_m = V_{BMP} / D_m$$

   Where A_m = minimum area required (ft^2)
   V_{BMP} = Detention Volume (ft^3)
   D_m = maximum allowable depth (ft)

4. Observation Well
   Provide a vertical section of perforated PVC pipe, 4 to 6 inches in diameter, installed flush with top of trench on a foot-plate and with a locking, removable cap.

5. Bypass
   Provide for bypass or overflow of runoff volumes in excess of the SQDV by means of a screened overflow pipe connected to downstream storm drainage or grated overflow outlet.

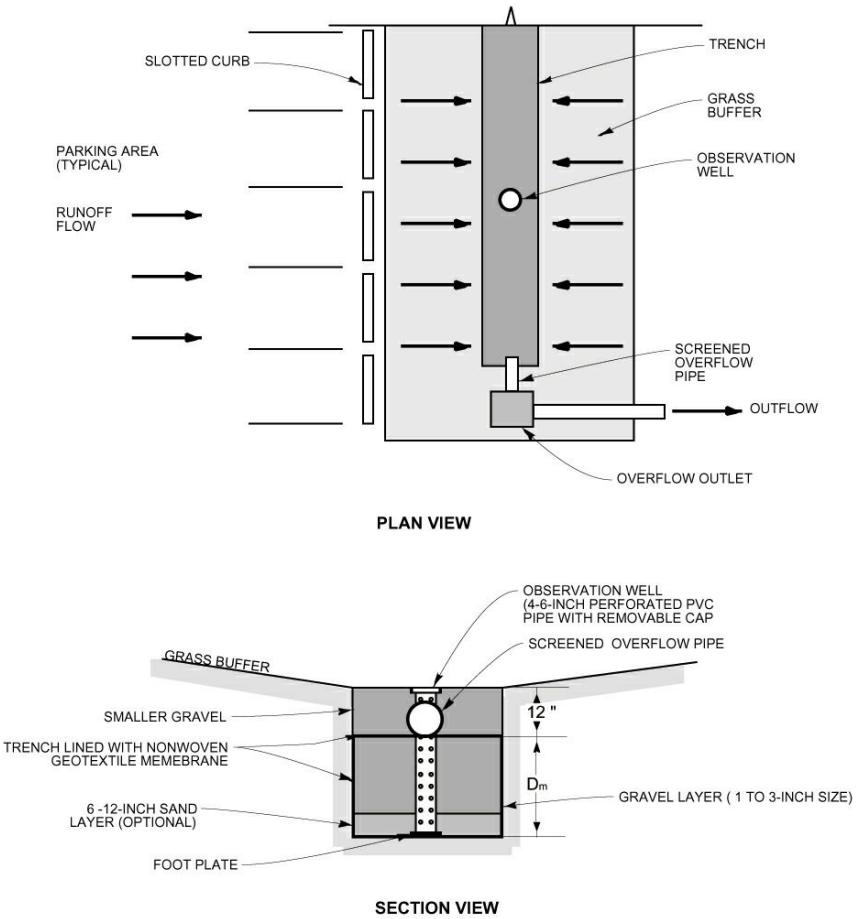

Figure 7: INFILTRATION TRENCH

Source: Ventura County Guidance Manual

Worksheet 5

Design Procedure Form for Infiltration Trench

Designer:_____
Company:_____
Date:_____
Project:_____
Location:_____

1. Determine Design Storage Volume (Use worksheet 1) a. Total Tributary Area (maximum 10) b. Design Storage Volume, V_{BMP}	A_{total} = _____ acres V_{BMP} = _____ ft^3
2. Maximum Allowable Depth (D_m = tI/12s) a. Site infiltration rate (I) b. Minimum drawdown time (t = 48 hrs) c. Safety factor (s) d. D_m = tI/12s	I = _____ in/hr t = _____ hrs s = _____ D_m = _____ ft
3. Trench Bottom Surface Area $A_m = V_{BMP} / D_m$	A_m = _____ ft^2

Notes:

Porous Pavement

General

Porous Pavement is an infiltration BMP that consists of porous pavement blocks placed over a shallow recharge bed of sand and gravel. It is typically restricted to low volume parking areas that do not receive significant offsite runoff. The modular pavement blocks allow water to seep into the recharge bed, where the sand and gravel layers percolate the design volume into the natural surrounding soils. Porous Pavement can be used for areas of up to 10 acres.

Porous Pavement Design Criteria:

Design Parameter	Unit	Design Criteria
Design Volume	ft^3	V_{BMP}
Drawdown Time	hrs	12 hours [1]
Maximum Tributary Area	acre	10 acres [2,4]
Maximum contributing area slope	%	5 % [2,4]
Traffic Use	-	Locate in areas of low intensity traffic use [2,4]
Erosion	-	Avoid areas of high wind erosion [2]
Placement	-	Do not locate in narrow strips between areas of impervious pavement [2]
Land use	-	Do not use in high-risk land uses, i.e. service/gas stations, truck stops, heavy industrial sites [2]
Sediment	-	Sediment-laden runoff must be directed away from the porous pavement/recharge bed. Place filter fabric on the floor and sides of the recharge bed. [2]
Modular Porous Block Type	%	40% surface area open [1]
Porous Pavement Infill	-	ASTM C-33 Sand or equivalent [1]
Base Course	inches	1" sand (ASTM C-33) over 9" gravel [1]
Perimeter Wall Width	inches	6 inches [1]

1 Ventura County's Technical Guidance Manual for Stormwater Quality Control Measures
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3 CA Stormwater BMP Handbook for New Development and Significant Redevelopment
4 Riverside County DAMP Supplement A Attachment

Porous Pavement Design Procedure

1. Design Storage Volume
   Use Worksheet 1- Design Procedure Form for Design Storage Volume, V_{BMP}.

2. *Basin Surface Area*

   Calculate minimum required surface area, A_m, based on surcharge depth of 2 inches as follows:

   $$A_m = V_{BMP} / 0.17 \text{ ft}$$

3. Select Block Type
   Select appropriate modular blocks that have no less than 40 percent of the surface area open. The manufacturer's installation requirements shall be followed with the exception of the infill material and base dimensions, which will meet the criteria listed in this manual.

4. Porous Pavement Infill
   The pavement block openings should be filled with ASTM C-33 graded sand (fine concrete aggregate, not sandy loam turf).

5. Base Courses
   Provide a 1-inch thick sand base course over a 9-inch thick gravel base course.

6. Perimeter Wall
   Provide a concrete perimeter wall to confine the edges of the pavement area. The wall should be minimum 6-inch wide and at least 6 inches deeper than all the porous media and modular block depth combined.

7. Sub-base
   If expansive soils or rock are a concern or the tributary catchment has chemical or petroleum products handled or stored, install an impermeable membrane below the base course. Otherwise install a non-woven geotextile membrane to encourage filtration.

8. Overflow
   Provide an overflow, possibly with an inlet to a storm sewer, set at 2 inches above the level of the porous pavement surface. Make sure the 2-inch ponding depth is contained and does not flow out of the area at ends or sides.

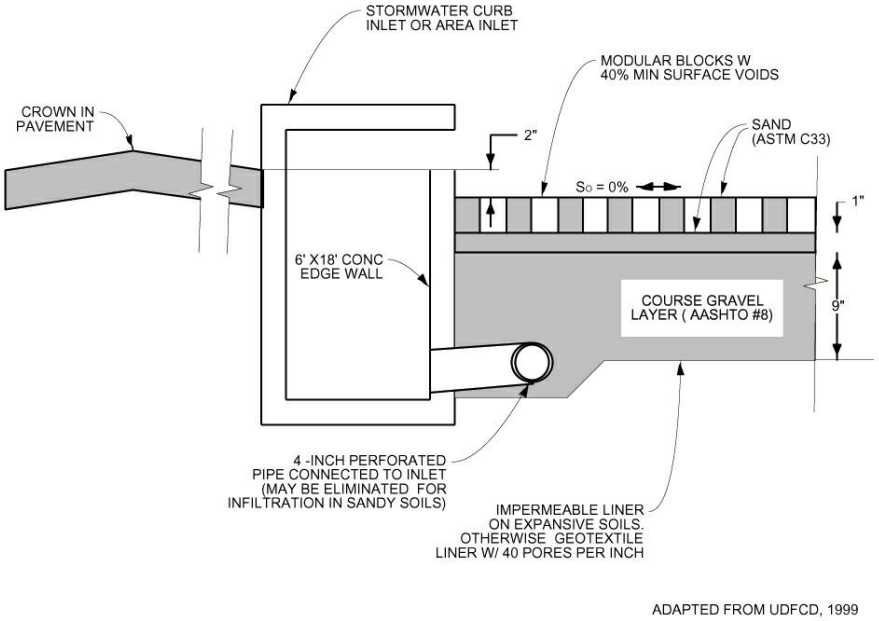

Figure 8: Porous Pavement Detention

Source: Ventura County Guidance Manual

Worksheet 6

Design Procedure Form for Porous Pavement

Designer:_____
Company:_____
Date:_____
Project:_____
Location:_____

1. Determine Design Storage Volume (Use Worksheet 1) a. Total Tributary Area (maximum 10) b. Design Storage Volume, V_{BMP}	A_{total} = _____ acres V_{BMP} = _____ ft^3
1. Basin Surface Area a. Detention Volume V_{BMP} b. $A_m = V_{BMP} / (0.17\ ft)$	V_{BMP} = _____ ft^3 A_m = _____ ft^2
2. Block Type a. Minimum open area = 40% b. Minimum thickness = 4 inches	Block Name = _____ Manufacturer = _____ Open Area = _____ % Thickness = _____ inches
3. Base Course a. ASTM C33 Sand Layer (1 inch) b. ASSHTO M43-No.8 Gravel Layer (9 inches)	Sand Layer _____ (check) Gravel Layer _____ (check)

Notes:

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Sand Filters

General

Sand Filters capture and treat the design runoff in a two-part system, first a settling basin, then a filter bed. The settling basin collects large sediment and prevents these particles from clogging the filter bed. The sand bed then strains the water, removing soluble and particulate pollutants. The treated water is conveyed through pipes back into a stream or channel. Sand Filters are especially useful where water quality concerns might preclude the use of infiltration BMPs.

> There are many variations of sand filter designs, and it is up to the designer to determine the most effective sand filter to use in each case. Two of the most common sand filters, the Austin sand filter and the Delaware sand filter, have been conditioned in this manual. Although the Austin filter was not included in the Attachment, it was added to this manual because it can treat a very large tributary area and because it is well suited to southern California. Other sand filter designs may be used if it is shown that they are more appropriate.

Some of the limitations associated with Sand Filters include: higher requirement for hydraulic head (typically > 4'), they work best for small tributary areas, vector problems with permanent standing water for certain Sand Filters, and the addition of concrete walls may cause aesthetic and safety problems.

Austin Sand Filter

The Austin Sand Filter, as developed by the city of Austin, Texas, is an aboveground sand filter that does not include a permanent wet pool. The filter inlet captures the design volume, while directing larger flows past. The first chamber of the filter is the sedimentation basin, which holds the entire design volume (this handbook conditions a full sedimentation design). The design volume drains into the second chamber, which is the filtration basin, over a period of 48 hours. This allows large particles to settle in the sedimentation basin and protects the filter bed from clogging. The sand and gravel filter bed removes soluble and particulate pollutants, and the treated water is returned to a storm drain. In order to drain by gravity, an Austin sand filter must be located in an area where the topography has sufficient vertical drops. These filters can be used to treat runoff from areas up to 100 acres large.

Austin Sand Filter Basin Design Criteria:

Design Parameter	Unit	Design Criteria
Design Volume	ft^3	V_{BMP}
Maximum tributary area	acre	100[1]
Minimum sedimentation basin depth	ft	3 [1]
Minimum sedimentation basin area (A_s)	ft^2	V_{BMP} / 10 ft [1]
Length to Width ratio (L:W)	-	2 to 1 or greater[1]
Draw-down time	hrs	48 [3]
Freeboard	ft	1.0 ft above maximum water surface elevation [1]
Minimum sedimentation basin volume	ft^3	V_{BMP} + freeboard volume [1]
Maximum inlet velocity	fps	3.0 [1]
Minimum particle size removed	micron	20 (specific gravity =2.65) [1]
Minimum gravel depth over sand filter	inches	2 [1]
Maximum water depth over filter, 2h	ft	Between 2 and 10 feet [3]
Minimum sand depth, d_s	inches	18 [1]
Minimum filtration rate of filter, k	ft/d	3.5 [1]
Slope of sand filter surface	%	0 [1]
Minimum gravel cover over underdrain	inches	2 [1]
Sand size, diameter	inches	0.02 – 0.04 [1]
Underdrain gravel diameter size	inches	0.5 – 2.0 [1]
Minimum inside diameter underdrain	inches	6 [1]
Underdrain pipe type	-	PVC schedule 40 (or thicker) [1]
Minimum slope of underdrain	%	1.0 [1]
Minimum underdrain perforation diameter	inches	0.375 [1]
Minimum perforations per row	-	6 [1]
Minimum space between perforation rows	inches	6 [1]
Minimum gravel bed depth, d_g	inches	16 [1]

1 Ventura County's Technical Guidance Manual for Stormwater Quality Control Measures
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4 Riverside County DAMP Supplement A Attachment

Austin Sand Filter Design Procedure

Part I – Sedimentation Basin Design

1. Design Storage Volume
   Use Worksheet 1- Design Procedure Form for Design Storage Volume, V_{BMP}.

2. Maximum Water Depth
   Determine maximum allowable depth of water (2h) in the sedimentation basin considering elevation differences between inlet and outlet inverts of the sedimentation basin and filter surface. (This sets the height or elevation of the inlet invert for bypass pipes and orifices).

3. Sedimentation Basin Design
   The sedimentation basin design should maximize the distance from the inlet to the outlet while avoiding short circuiting (flow reaching the outlet structure before it passes through the sedimentation basin volume) and dead storage areas (areas in the basin that are bypassed by the main flow). The basin shape should include a gradual expansion from the inlet and a gradual contraction toward the outlet. The length to width ratio should be a minimum of 2:1. Internal baffling with berms may be necessary to achieve this ratio.
   a. Find the sedimentation basin area, A_s
      $A_s = V_{BMP} / (2h)$
   b. Determine the basin length and width
      $A_s = 2 \times W^2$
      length = 2 x width

4. Energy Dissipation Structure
   Basin inlet and outlet points should include an energy dissipation structure and/or erosion protection. An energy dissipation structure is required when inlet velocities exceed 3 feet per second.

5. Sedimentation Inlet
   The inlet structure design must isolate the water quality volume and convey flows greater than the V_{BMP} past the basin. The water quality volume should be discharged uniformly and at low velocities into the sedimentation basin.

6. Sedimentation Outlet
   The outlet structure conveys the water quality volume from the sedimentation basin to the filtration basin. The outlet structure shall be designed to outlet the design volume (ponded to a height of 2h) into the filter basin over a drawdown period of 48 hours.

7. Trash Rack/Gravel Pack
   A trash rack or gravel pack around perforated risers shall be provided to protect outlet orifices from clogging.

8. Sediment Trap (optional)
   Placing a sediment trap in the basin can improve long-term removal efficiency and reduce maintenance requirements.

Part II – Filter Basin Design

9. Filter Basin Surface Area
   The required filter basin surface area (A_f) can be calculated using the following simplified equation from the CA BMP Handbook:

   $A_f = V_{BMP} / 18$

10. Filter Basin Volume
    The storage capacity of the filtration basin, above the surface of the filter media, should be greater than or equal to 20 percent of the V_{BMP}. This capacity is necessary in order to account for backwater effects resulting from partially clogged filter media. If the filter basin volume is less than the required volume, redesign with an increased filter depth or increase the filter area.

11. Filter Basin Inlet Structure
    The inlet structure should spread the flow uniformly across the surface of the media filter. Flow spreaders, weirs or multiple orifice openings are recommended.

12. Filter Bed
    The sand bed may be a choice of one of the two configurations given below. Note: Sand bed depths are final, consolidated depths. Consolidated effects must be taken into account.

    1) Sand Bed with Gravel Layer (Figure 9A)
       The sand layer is a minimum depth of 18 inches consisting of 0.02-0.04 inch diameter sand. Under the sand is a layer of 0.5 to 2.0 inch diameter gravel which provides a minimum of two inches of cover over the top of the underdrain lateral pipes. No gravel is required under the lateral pipes. A layer of geotextile fabric meeting the following specifications must separate the sand and gravel and must be wrapped around the lateral pipes:

Table 6. Geotextile Fabric Specifications

Property	Test Method	Unit	Specification
Material			Nonwoven geotextile fabric
Unit Weight		Oz/yd^2	8 (minimum)
Filtration Rate		In/sec	0.08 (minimum)
Puncture Strength	ASTM D-751 (modified)	Lb.	125 (minimum)

Mullen Burst Strength	ASTM D-751	PSI	400 (minimum)
Tensile Strength	ASTM-D-1682	Lb.	300 (minimum)
Equiv. Opening Size	US Standard Sieve	No.	80 (minimum)

Drainage matting meeting the following specifications should be placed under the laterals to provide for adequate vertical and horizontal hydraulic conductivity to the laterals:

Table 7. Drainage Matting Specifications

Property	Test Method	Unit	Specification
Material			Nonwoven geotextile fabric
Unit Weight		Oz/yd^2	20
Flow Rate (fabric)		GPM/ft^2	180 (minimum)
Permeability	ASTM D-2434	Cm/sec	12.4×10^{-2}
Grab strength (fabric)	ASTM D-1682	Lb.	Dry Lg. 90 Dry Wd. 70 Wet Lg. 95 Wet Wd. 70
Puncture Strength (fabric)	COE CW-02215	Lb.	42 (minimum)
Mullen burst strength	ASTM D-1117	Psi	140 (minimum)
Equiv. opening size	US Standard Sieve	No.	100 (70 – 120)
Flow rate (drainage core)	Drexel Univ. Test Method	GPM/ft. width	14

In areas with high sediment load (total suspended solids concentration ≥ 200 mg/L), the two-inch layer of stone on top of the sand filter should be underlain with Enkadrain 9120 filter fabric or equivalent with the following specifications:

Table 8. Filter Fabric Specifications

Property	Test Method	Unit	Specification
Material			Nonwoven geotextile fabric
Unit Weight	ASTM D-1777	Oz/yd^2	4.3 (minimum)
Flow Rate	Failing Head Test	GPM/ft^2	120 (minimum)
Puncture Strength	ASTM-D751 (modified)	Lb.	60 (minimum)
Thickness		inches	0.8 (minimum)

2) Sand Bed with Trench Design (Figure 9B)

The top layer shall be 12-18 inches of 0.02-0.04 inch diameter sand. Laterals shall be placed in trenches with a covering of 0.5 to 2.0-inch gravel and geotextile fabric. The laterals shall be underlain by a layer of drainage matting. The geotextile fabric is needed to prevent the filter media from infiltrating into the lateral piping. The drainage matting is needed to provide for adequate vertical and horizontal hydraulic conductivity to the laterals. The geotextile fabric and drainage matting specifications are listed above in Tables 6 and 7 respectively. A minimum 2" layer of stone will be place on top of the sand bed underlain with filter fabric (Table 8) in tributary areas with high sediment loads (TSS ≥ 200 mg/L).

13. Underdrain Piping

The underdrain piping consists of the main collector pipe(s) and perforated lateral branch pipes. The piping should be reinforced to withstand the weight of the overburden. Internal diameters of lateral branch pipes should be six inches or greater and perforations should be 3/8 inch. Each row of perforations should contain at least six holes and the maximum spacing between rows of perforations should not exceed six inches. All piping is to be schedule 40 polyvinyl chloride or greater strength. The minimum grade of piping shall be 1 percent slope (slopes down to 0.5% are acceptable with prior approval). Access for cleaning all underdrain piping is needed.

Note: No draw-down time is to be associated with sand filtration basins, only with sedimentation basins. Thus, it is not necessary to have a specifically designed orifice for the filtration outlet structure.

14. Filter Basin Liner

If an impermeable liner is required to protect ground water quality it shall meet the specifications for clay liner given in Table 9. The clay liner should have a minimum thickness of 12 inches. If an impermeable liner is not required then a geotextile fabric liner shall be installed that meets the specifications listed in Table 6 unless the pond has been excavated to bedrock. If a geomembrane is used it should have a minimum thickness of 30 mils and be ultraviolet resistant.

Table 9. Clay Liner Specifications

Property	Test Method	Unit	Specification
Permeability	ASTM D-2434	cm/sec	$1x10^{-6}$
Plasticity Index of Clay	ASTM D-423 & D-424	%	Not less than 15
Liquid Limit of Clay	ASTM D-2216	%	Not less than 30
Clay Particles Passing	ASTM-D422	%	Not less than 30
Clay Compaction	ASTM-D2216	%	95% of Std. Proctor Density

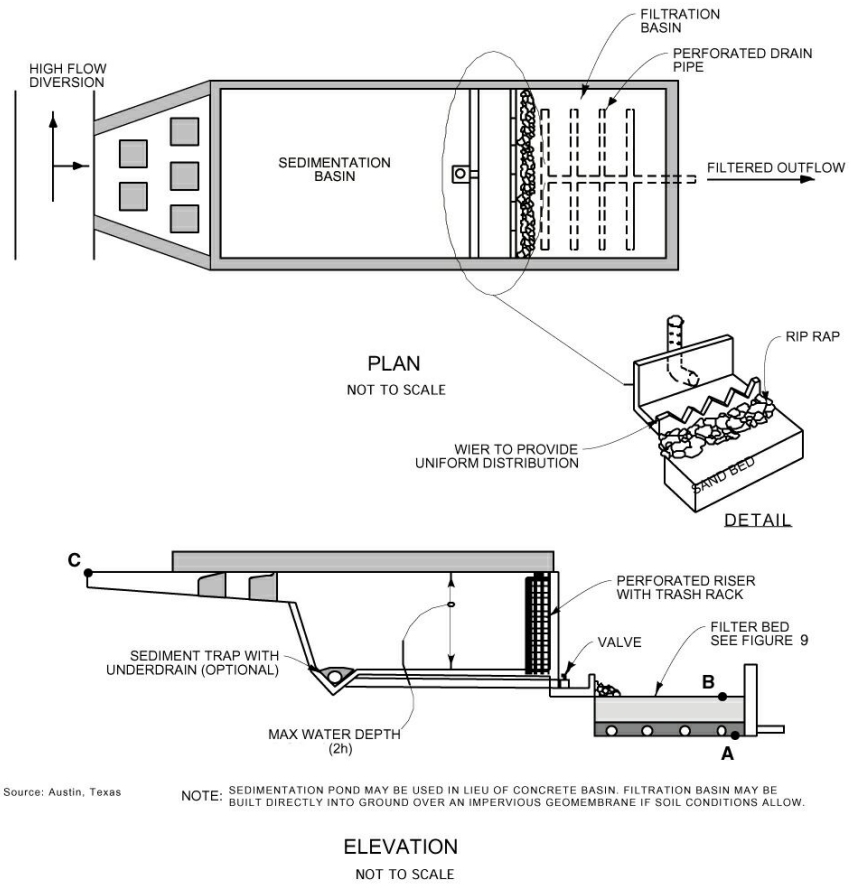

Figure 9: Austin Sand Filter

Source: Ventura County Guidance Manual

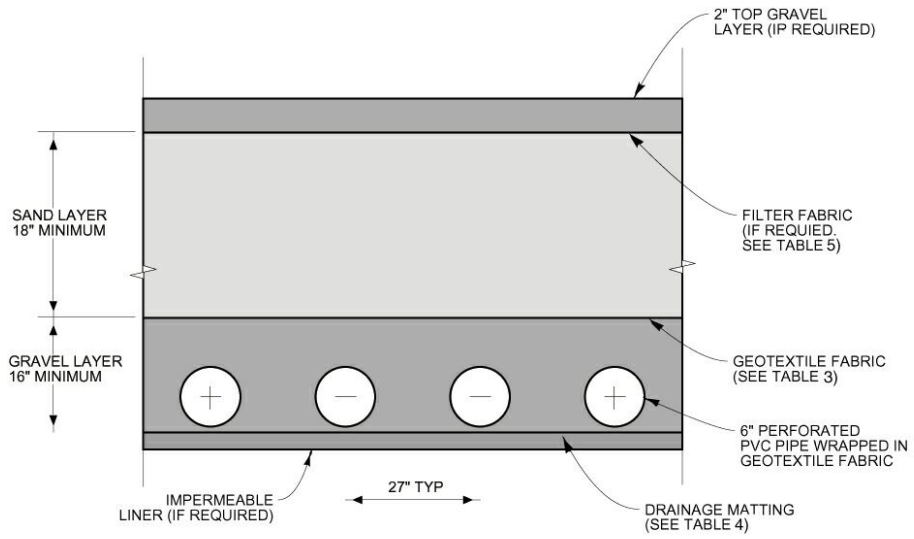

Figure 9A: Filter Bed with Gravel Underdrain

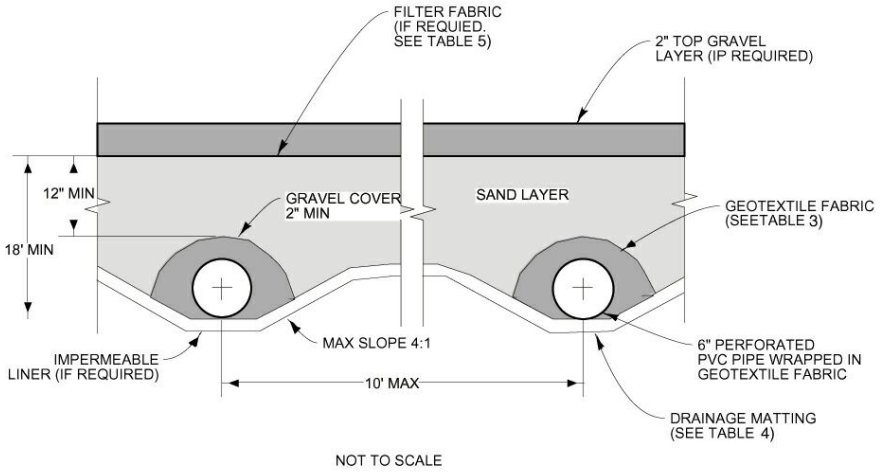

Figure 9B: Filter Bed with Trench Underdrain

Source: Ventura County Guidance Manual

Worksheet 7

Design Procedure Form for Austin Sand Filter

Designer:_____
Company:_____
Date:_____
Project:_____
Location:_____

1. Determine Design Storage Volume (Use Worksheet 1) a. Total Tributary Area (maximum 100) b. Design Storage Volume, V_{BMP}	A_{total} = _____ acres V_{BMP} = _____ ft^3
2. Maximum Water Height in Sedimentation Basin* a. Invert elevation at connection to storm drain system. b. Sand Filter invert elevation (consider min. grade (1%) from storm drain). Point A, Figure 9. c. Estimate filter depth or use min. (3'). d. Top elevation of filter bed. Point B, Figure 9. e. Surface elevation at BMP inlet. Point C, Figure 9. f. Determine max. allowable height (2h) of water in the sedimentation basin using the elevation difference between points C and B. (min. 2', max. 10') 2h = [(C-B) – 1' Freeboard]	Elev. Storm Drain = _____ ft Elev. Pt A = _____ ft Filter Depth = _____ ft Elev. Pt B = _____ ft Elev. Pt C = _____ ft 2h = _____ ft
3. Size Sedimentation Basin a. Find Sedimentation Basin Area, A_s $A_s = V_{BMP} / (2h)$ b. Determine basin length and width, using a length to width ratio ≥ 2:1 $A_s = 2 \times W^2$ length = 2 x width	A_s = _____ ft^2 width = _____ ft length = _____ ft
4. Size Filter Basin a. Determine Filter Basin Area, A_f $A_f = V_{BMP} / 18$ b. Determine Filter Basin Volume	A_f = _____ ft^2

$V_f = A_f$ x filter depth (part 2c) c. Determine Required Volume, V_r $V_r = 0.2 \times V_{BMP}$ d. Check if $V_r \geq V_f$? If no, redesign with an increased filter depth or increase filter area.	V_f = _____ ft^3 V_r = _____ ft^3 Check $V_r \geq V_f$ _____

Notes:

_____

_____

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* Based on these elevations, is there a sufficient elevation drop to allow gravity flow from the outlet of the control measure to the storm drain system? If no, investigate alternative on-site locations for treatment control, consider another treatment control measure more suitable for site conditions, or contact the District to discuss on-site pumping requirements.

Delaware Sand Filter

General

A Delaware sand filter is an underground filter consisting of two parallel concrete trenches divided by a close-spaced wall. Water enters the sedimentation trench through grated covers or a storm drain system. After this permanent pool fills, water overflows through the weir notches at the top of the dividing wall into the filter chamber. This assures that water enters the filter chamber as sheet flow and protects the sand bed from scouring. The permanent pool in the sedimentation chamber is dead storage, which allows heavier sediment to settle out and inhibits resuspension of particles from earlier storms. After passing through the filter bed, water flows into a clearwell area and into the storm drain system. Flows greater than the design volume can enter the sedimentation trench as long as an overflow weir is installed into the clearwell. A Delaware filter can treat tributary areas up to 5 acres.

Delaware Sand Filter Basin Design Criteria:

Design Parameter	Unit	Design Criteria [1]
Design Volume	ft^3	V_{BMP}
Maximum tributary area	acre	5
Weir height between sedimentation chamber and sand filter	in	2” above sand filter bed
Draw-down time	hrs	48 [3]
Minimum gravel depth over sand	in	2
Minimum sand depth, ds	in	18
Minimum gravel underdrain depth, dg	in	16
Filter Coefficient, k	ft/day	2
Top layer and underdrain gravel size	in	0.5 to 2-inch diameter stone
Sand size	-	ASTM C33 concrete sand
Slope of top layer	%	0 (horizontal)
Minimum slope of underdrain or bottom of filter	%	0.5%
Minimum size underdrain	-	6” PVC schedule 40
Minimum size diameter perforation	in	3/8
Minimum number of holes per row	-	6
Minimum spacing between rows	in	6
Minimum weephole diameter	in	3
Minimum spacing between weepholes	in	9 (center to center)
Sedimentation chamber and sand filter width	in	18 to 30

1 Ventura County’s Technical Guidance Manual for Stormwater Quality Control Measures
2 City of Modesto’s Guidance Manual for New Development Stormwater Quality Control Measures
3 CA Stormwater BMP Handbook for New Development and Significant Redevelopment
4 Riverside County DAMP Supplement A Attachment

Delaware Sand Filter Design Procedure

1. Design Storage Volume
   Use Worksheet 1- Design Procedure Form for Design Storage Volume, V_{BMP}.

2. Maximum Water Depth
   Determine maximum allowable height (2h) of water that can pond over the filter based on elevation differences between the filter bed top and the BMP inlet. An overflow weir should be designed to allow flows greater than the design volume to pass into the clearwell.

3. Sand Filter/Sediment Chamber Surface Area
   The DSF shell must have the capacity to accept and store the design volume. The dimensions are sized to provide a filter area that processes the design volume in the desired time frame (48 hrs). The areas of the sedimentation chamber A_s and filter bed A_f are typically set equal. The required areas are calculated as follows depending on the maximum depth of water above the filter bed:

   a. If 2h < 2.67 ft Use: $A_s = A_f = V_{BMP} / (4.1h + 0.9)$
   b. If 2h > 2.67 ft Use: $A_s = A_f = [V_{BMP} \times d_s] / [k (h + d_s) t]$

   where: V_{BMP} = Design Volume ft^3
   A_f = filter bed surface area, ft^2
   A_s = sediment chamber surface area, ft^2
   d_s = depth of sand, ft
   k = filter coefficient 0.0833 ft/hr
   h = one half of maximum allowable water depth (2h), ft
   t = 48 hour draw-down time

4. Select sediment chamber and filter width ($W_s = W_f$)
   Site considerations usually dictate the final dimensions of the facility. Sediment chambers and filter chambers are normally 18-30 inches wide. Use of standard grates requires a width of 26 inches.

5. Sediment Chamber and Filter Length

   $L_s = L_f = A_f / W_f$

   Round length up as appropriate and compute adjusted Area

   $A_s = A_f = W_f \times L_f$

6. Storage volume in Filter Voids Vv

   $V_v = A_f \times 0.4(d_s + d_g)$ {assume 40% voids}
   Where d_g = underdrain gravel depth

7. Volume of flow through filter during filling, V_Q

   $V_Q = [k \times A_f \times (d_s + h) \times t_v] / [d_s]$
   Use t_v = 1 hour to fill voids

8. Net Volume Required to be Stored in Chambers Awaiting Filtration V_r

   $V_r = V_{BMP} - V_v - V_Q$

9. Available Storage in Chambers V_a

   $V_a = 2h(A_f + A_s)$

   If $V_a \geq V_r$, proceed with design
   If $V_a < V_r$, adjust width and/or length and repeat steps 3-8.

10. Filter Bed
    a. Top Gravel Layer
       The washed gravel layer at the top of the filter should be two inches thick, composed of stone 0.5 to 2.0 inches in diameter. In areas with high sediment load (TSS concentration >200 mg/L), the two-inch layer of stone on top of the sand filter should be underlain with filter fabric meeting the specifications in Table 8.
    b. Sand Layer
       The sand layer should be a minimum depth of 18 inches consisting of ASTM C33 concrete sand. A layer of geotextile fabric meeting the specifications in Table 6 must separate the sand and gravel layer below.
    c. Gravel Layer
       The gravel layer surrounding the collector pipes should be at least 16 inches thick and be composed of 0.5 to 2-inch diameter stone and provide at least two inches of cover over the tops of the drainage pipes.

10. Underdrain Piping
    The underdrain piping should follow the same criteria and design as the Austin Sand Filter. Shallow rectangular drain tiles may be fabricated from such materials as fiberglass structural channels, saving several inches of filter depth. Drain tiles should be in two-foot lengths and spaced to provide gaps 1/8-inch less than the smallest gravel sizes on all four sides. Sections of tile may be cast in the dividing wall between the filter and the clearwell to provide shallow outflow orifices.

11. Weep Holes
    In addition to the underdrain pipes, weepholes should be installed between the filter chamber and the clearwell to provide relief in case of pipe clogging. The weepholes should be three (3) inches in diameter. Minimum spacing should be nine (9) inches center to center. The openings on the filter side of the dividing wall should be covered to the width of the trench with 12-inch high plastic hardware cloth of ¼ inch mesh or galvanized steel wire, minimum wire diameter 0.03-inch, number 4 mesh

hardware cloth anchored firmly to the dividing wall structure and folded a minimum of six (6) inches back under the bottom stone.

12. Grates and Covers
    Grates and cast steel covers are designed to take the same wheel loads as the adjacent pavement. Where possible, use standard grates to reduce costs. Grates and covers should be supported by a galvanized steel perimeter frame.

13. Hoods/Traps
    In applications where trapping of hydrocarbons and other floating pollutants is required, large-storm overflow weirs should be equipped with a 10-gauge aluminum hood or commercially available catch basin trap. The hood or trap should extend a minimum of one foot into the permanent pool.

14. Dewatering Drain
    A six inch diameter dewatering drain with gate valve is to be installed at the top of the stone/sand filter bed through the partition separating the filter chamber from the clearwell chamber.

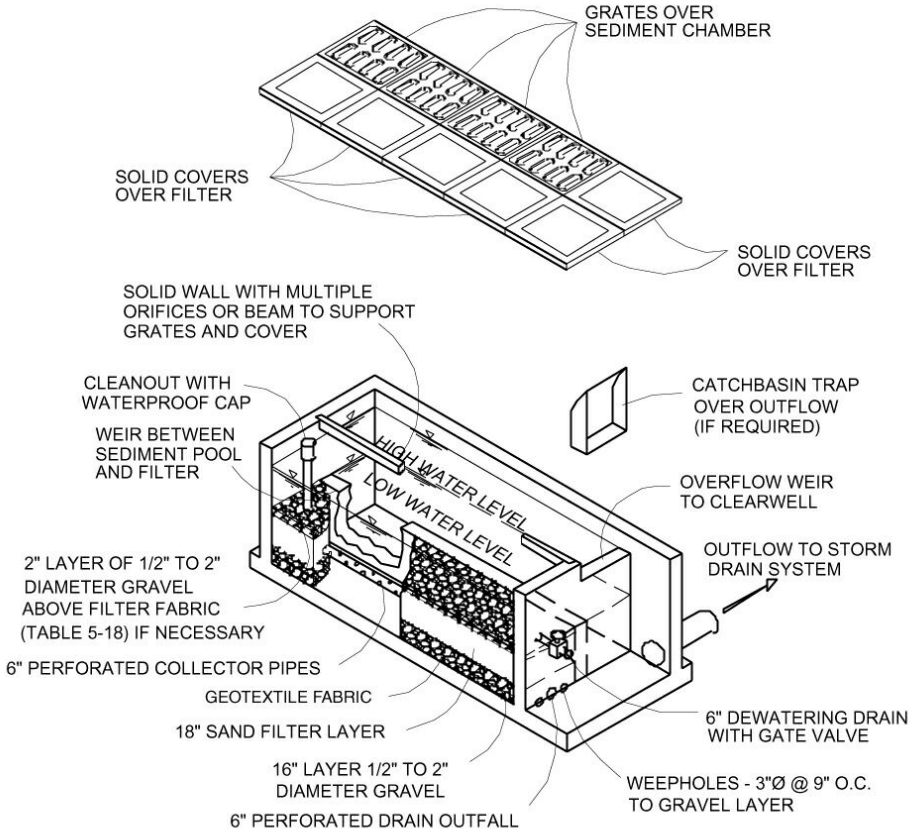

Figure 10: Delaware Sand Filter

Source: Ventura County Guidance Manual

Worksheet 8

Design Procedure Form for Delaware Sand Filter

Designer:_____
Company:_____
Date:_____
Project:_____
Location:_____

1. Determine Design Storage Volume (Use Worksheet 1) a. Total Tributary Area (maximum 100) b. Design Storage Volume, V_{BMP}	A_{total} = _____ acres V_{BMP} = _____ ft^3
2. Maximum Water Height in Sedimentation Basin* a. Invert elevation at connection to storm drain system. b. Sand Filter invert elevation (consider min. grade (1%) from storm drain). c. Estimate filter depth or use min. (3'). d. Top elevation of filter bed. e. Surface elevation at BMP inlet. f. Determine max. allowable height (2h) of water that can pond over the filter using the elevation difference between the filter bed top and the BMP inlet. 2h = [(C-B) – 1' Freeboard]	Elev. Storm Drain = _____ ft Elev. Filter Bottom = _____ ft Filter Depth = _____ ft Filter bed top elev. (pt B) = _____ ft BMP inlet Elev. (pt C) = _____ ft 2h = _____ ft
3. Minimum Surface Area of the Chambers If 2h < 2.67 feet (2'-8") $A_f = A_s = V_{BMP} / (4.1h + 0.9)$ If 2h > 2.67 feet (2'-8") $A_f = A_s = [V_{BMP} \times d_s] / [k(h+d_s)t_f]$ a. Sand bed depth, ds b. Filter Coefficient, k c. Draw-down time, t d. ½ max. allowable water depth over filter, h e. Sediment Chamber Area A_s, and Filter Surface Area A_f	d_s = _____ ft k = _____ ft/hr t = _____ hr h = _____ ft A_s and A_f = _____ ft^2

4. Sediment Chamber and Filter Dimensions a. Select width ($W_s = W_f$ = 18" to 30") b. Filter length ($L_s = L_f = A_{fm}/W_f$) c. Adjusted length (rounded) d. Adjusted area ($A_s = A_f = W_f \times L_f$)	 $W_s = W_f$ = _____ ft $L_s = L_f$ = _____ ft $L_s = L_f$ = _____ ft $A_s = A_f$ = _____ ft^2
5. System Storage Volume a. Storage in filter voids ($V_v = A_f \times 0.4(d_g + d_s)$) b. Volume of flow through filter ($V_Q = k \times A_f(d_s+h)$ 1hr / d_s) c. Required net storage ($V_r = V_{BMP} - V_v - V_Q$) d. Available storage ($V_a = 2h(A_f + A_s)$) If $V_a \geq V_r$, sizing is complete If $V_a < V_r$, repeat steps 4 and 5	 V_v = _____ ft^3 V_Q = _____ ft^3 V_r = _____ ft^3 V_a = _____ ft^3 Check $V_r \geq V_a$ _____

Notes:

_____

* Based on these elevations, is there a sufficient elevation drop to allow gravity flow from the outlet of the control measure to the storm drain system? If no, investigate alternative on-site locations for treatment control, consider another treatment control measure more suitable for site conditions, or contact the District to discuss on-site pumping requirements.

Grassed Swales

General

A Grass swale is a wide, shallow densely vegetated channel that treats stormwater runoff as it is slowly conveyed into a downstream system. These swales have very shallow slopes in order to allow maximum contact time with the vegetation. The depth of water of the design flow should be less than the height of the vegetation. Contact with vegetation improves water quality by plant uptake of pollutants, removal of sediment, and an increase in infiltration. Overall the effectiveness of a grass swale is limited and it is recommended that they are used in combination with other BMPs.

This BMP is not appropriate for industrial sites or locations where spills occur. Important factors to consider when using this BMP include: natural channelization should be avoided to maintain this BMP's effectiveness, large areas must be divided and treated with multiple swales, thick cover is required to function properly, impractical for steep topography, and not effective with high flow velocities.

Grass Swale Design Criteria:

Design Parameter	Unit	Design Criteria
Design Flow	cfs	Q_{BMP}
Minimum bottom width	ft	2 ft [2]
Maximum channel side slope	H:V	3:1 [2]
Minimum slope in flow direction	%	0.2 (provide underdrains for slopes < 0.5) [1]
Maximum slope in flow direction	%	2.0 (provide grade-control checks for slopes >2.0) [1]
Maximum flow velocity	ft/sec	1.0 (based on Manning n = 0.20) [1]
Maximum depth of flow	inches	3 to 5 (1 inch below top of grass) [1]
Minimum contact time	minutes	7 [1]
Minimum length	ft	Sufficient length to provide minimum contact time [1]
Vegetation	-	Turf grass or approved equal [1]
Grass height	inches	4 to 6 (mow to maintain height) [1]

1 Ventura County's Technical Guidance Manual for Stormwater Quality Control Measures
2 City of Modesto's Guidance Manual for New Development Stormwater Quality Control Measures
3 CA Stormwater BMP Handbook for New Development and Significant Redevelopment
4 Riverside County DAMP Supplement A Attachment

Grass Swale Design Procedure

1. Design Flow
   Use Worksheet 2 - Design Procedure Form for Design Flow Rate, Q_{BMP}.

2. Swale Geometry
   a. Determine bottom width of swale (must be at least 2 feet).
   b. Determine side slopes (must not be steeper than 3:1; flatter is preferred).
   c. Determine flow direction slope (must be between 0.2% and 2%; provide underdrains for slopes less than 0.5% and provide grade control checks for slopes greater than 2.0%

3. Flow Velocity
   Maximum flow velocity should not exceed 1.0 ft/sec based on a Mannings n = 0.20

4. Flow Depth
   Maximum depth of flow should not exceed 3 to 5 inches based on a Manning n = 0.20

5. Swale Length
   Provide length in the flow direction sufficient to yield a minimum contact time of 7 minutes.
   L = (7 min) x (flow velocity ft/s) x (60 sec/min)

6. Vegetation
   Provide irrigated perennial turf grass to yield full, dense cover. Mow to maintain height of 4 to 6 inches.

7. Provide sufficient flow depth for flood event flows to avoid flooding of critical areas or structures.

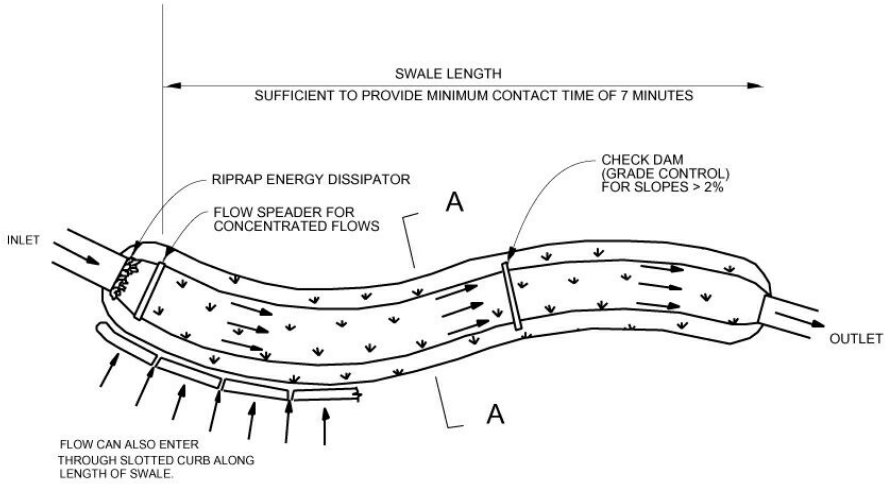

TRAPEZOIDAL GRASS SWALE PLAN

NOT TO SCALE

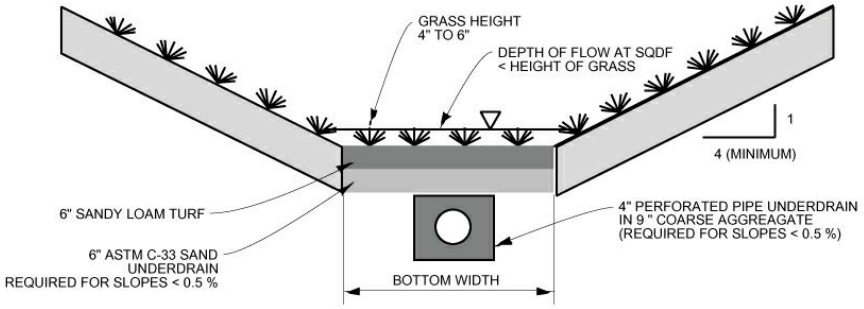

TRAPEZOIDAL GRASS SWALE SECTION

NOT TO SCALE

Figure 11: Grassed Swale

Source: Ventura County Guidance Manual

Worksheet 9

Design Procedure Form for Grassed Swale

Designer:_____
Company:_____
Date:_____
Project:_____
Location:_____

1. Determine Design Flow (Use Worksheet 2)	Q_{BMP} = _____ cfs
2. Swale Geometry a. Swale bottom width (b) b. Side slope (z) c. Flow direction slope (s)	 b = _____ ft z = _____ s = _____ %
3. Design flow velocity (Manning n = 0.2)	v = _____ ft/s
4. Depth of flow (D)	D = _____ ft
5. Design Length (L) L = (7 min) x (flow velocity, ft/sec) x 60	L = _____ ft
6. Vegetation (describe)	_____ _____
8. Outflow Collection (check type used or describe "other")	___ Grated Inlet' ___ Infiltration Trench ___ Underdrain ___ Other_____

Notes:

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Filter Strips

General

Filter Strips are uniformly graded areas of dense vegetation designed to treat sheet flow stormwater runoff. Pollutants are removed by filtering and through settling of sediment and other solid particles as the design flow passes through (not over) the vegetation. Filter strips are usually as wide as the tributary area and must be long enough in the flow direction to adequately treat the runoff. Concentrated flows are redistributed uniformly across the top of the strip with a level spreader. A grass swale, sand filter, or infiltration BMP is recommended in conjunction with a filter strip.

This BMP is not appropriate for industrial sites or locations where spills occur. Important factors to consider when using this BMP include: thick vegetated cover is required to work properly, and not effective if length and flow characteristics are not met.

Filter Strip Design Criteria:

Design Parameter	Unit	Design Criteria
Design Flow	cfs	Q_{BMP} [1]
Maximum tributary area	acres	5[1]
Maximum linear unit application rate (q_a)	cfs/ft x width	0.005 [1]
Minimum width (normal to flow)	ft	(Q_{BMP}) / (q_a) [1]
Minimum length (flow direction)	ft	15 [1]
Maximum slope (flow direction)	%	4 [1]
Vegetation	-	Turf grass (irrigated) or approved equal [1]
Minimum grass height	inches	2 [1]
Maximum grass height	inches	4 (typical) or as required to prevent lodging or shading [1]
Level Spreader	-	A level spreader must be applied to the flows before reaching the strip [4]
Recommendation	-	This BMP is recommended in conjunction with a grass swale, sand filter, or infiltration BMP [3]

1 Ventura County's Technical Guidance Manual for Stormwater Quality Control Measures
2 City of Modesto's Guidance Manual for New Development Stormwater Quality Control Measures
3 CA Stormwater BMP Handbook for New Development and Significant Redevelopment
4 Riverside County DAMP Supplement A Attachment

Filter Strip Design Procedure

1. Design Flow
   Use Worksheet 2 - Design Procedure Form for Design Flow Rate, Q_{BMP}.

2. Minimum Width
   Calculate minimum width of the grass strip filter (W_m) normal to flow direction:
   $W_m = (Q_{BMP})/(q_a)$
   $W_m = (Q_{BMP})/0.005$ cfs/ft (minimum)

3. Minimum Length
   Length of the grass strip filter (Lm) in the direction of flow shall not be less than 15 feet.
   L_m = 15 feet (minimum)

4. Maximum Slope
   Slope of the ground in the direction of flow shall not be greater than 4 percent.

5. Flow Distribution
   Incorporate a device at the upstream end of the filter strip to evenly distribute flows along the top width, such as slotted curbing, modular block porous pavement, or other spreader devices. Concentrated flow delivered to the filter strip must be distributed evenly by means of a level spreader of similar concept.

6. Vegetation
   Provide irrigated perennial turf grass to yield full, dense cover. Submit a Landscape Plan for stormwater agency review. Plan shall be prepared by a landscape or other appropriate specialist and shall include a site plan showing location and type of vegetation. Mow grass to maintain height approximately between 2 and 4 inches.

7. Outflow Collection
   Provide a means for outflow collection and conveyance (e.g. grass channel/swale, storm sewer, street gutter).

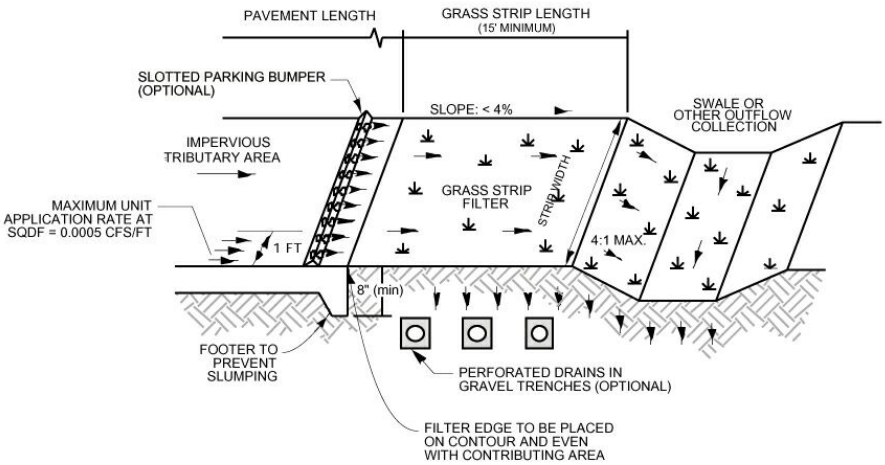

SHEET FLOW CONTROL

NOT TO SCALE

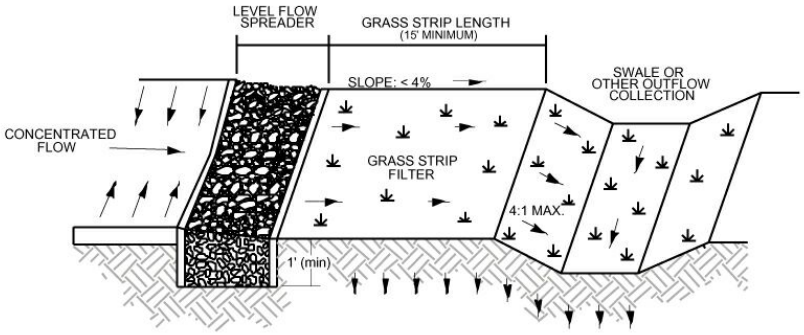

CONCENTRATED FLOW CONTROL

NOT TO SCALE

Figure 12: Grass Filter Strip

Source: Ventura County Guidance Manual

Worksheet 10

Design Procedure Form for Filter Strip

Designer:_____
Company:_____
Date:_____
Project:_____
Location:_____

1. Determine Design Flow (Use Worksheet 2)	Q_{BMP} = _____ cfs
2. Design Width $W_m = (Q_{BMP})/0.005$ cfs/ft	W_m = _____ ft
3. Design Length (15 ft minimum)	L_m = _____ ft
4. Design Slope (4 % maximum)	S_D = _____ %
5. Flow Distribution (check type used or describe "other")	___ slotted curbing ___ Modular Block Porous Pavement ___ Level Spreader ___other_____
6. Vegetation (describe)	_____ _____
5. Outflow Collection (check type used or describe "other")	___ Grass Swale ___ Street Gutter ___ Storm Drain ___ Underdrain ___ Other_____

Notes:

_____
_____
_____
_____
_____
_____

Water Quality Inlets

General

A water quality inlet is a device that removes oil and grit from stormwater runoff before the water enters the stormdrain system. It consists of one or more chambers that promote sedimentation of coarse materials and separation of free oil from stormwater. Manufacturers have created a variety of configurations to accomplish this. A specific model can be selected from the manufactuer based on the design flow rate. A water quality inlet is generally used for pretreatment before discharging into another type of BMP.

Water Quality Inlet Design Criteria:

Design Parameter	Unit	Design Criteria
Design Flow	cfs	Q_{BMP}
Maximum Tributary Area	acres	1 [4]
Clean-out Schedule	-	At least twice per year [4]

1 Ventura County's Technical Guidance Manual for Stormwater Quality Control Measures
2 City of Modesto's Guidance Manual for New Development Stormwater Quality Control Measures
3 CA Stormwater BMP Handbook for New Development and Significant Redevelopment
4 Riverside County DAMP Supplement A Attachment

Water Quailty Inlet Design Procedure

1. Design Flow
   Use Worksheet 2 - Design Procedure Form for Design Flow Rate, Q_{BMP}.

2. Select Model
   Select a water quality inlet model that will appropriately treat the design flow using manufacturer specifications.

3. Maintenance Requirements
   In order to maintain its ability to treat stormwater, the inlet must be cleaned at least twice a year. Arrangements should be made to do this.

Worksheet 11

Design Procedure Form for Water Quality Inlets

Designer:_____
Company:_____
Date:_____
Project:_____
Location:_____

1. Determine Design Flow Rate (Use Worksheet 2)	Q_{BMP} = _____ cfs
2. Water Quality Inlet Manufacturer Name Model Flow Capacity of Model Please include a technical sheet from the manufacturer with information on this model.	Make _____ Model _____ Capacity _____ cfs

Notes:

_____
_____
_____
_____
_____
_____
_____
_____

REFERENCES

California Stormwater Quality Association, January 2003. *Stormwater Best Management Practice Handbook for New Development and Redevelopment*, prepared by Camp Dresser & McKee and Larry Walker Associates

City of Modesto, Operations and Maintenance Department, January 2001. *Guidance Manual for New Development Stormwater Quality Control Measures*

Attachment to Supplement "A" of the Riverside County Drainage Area Management Plans , April 1996. *Selection and Design of Stormwater Quality Controls*, prepared by Riverside County Flood Control and Water Conservation District

Ventura Countywide Stormwater Quality Management Program July 2002. *Technical Guidance Manual for Stormwater Quality Control Measures*

APPENDIX A

Slope of the Design Volume Curve

INSERT

Slope of the Design Volume Curve

HERE

APPENDIX B

BMP Design Examples

1. Extended Detention Basin
2. Grass Swales
3. Austin Sand Filter
4. Infiltration Basin
5. Filter Strip

Exhibit D

Runoff Coefficients for Urban Soil Types

Runoff Coefficients for an Intensity = 0.2 inch/hour for Urban Soil Types*

Impervious %	A Soil RI = 32	B Soil RI = 56	C Soil RI = 69	D Soil RI = 75
0 (Natural)	0.06	0.14	0.23	0.28
5	0.10	0.18	0.26	0.31
10	0.14	0.22	0.29	0.34
15	0.19	0.26	0.33	0.37
20 (1-Acre)	0.23	0.30	0.36	0.40
25	0.27	0.33	0.39	0.43
30	0.31	0.37	0.43	0.47
35	0.35	0.41	0.46	0.50
40 (1/2-Acre)	0.40	0.45	0.50	0.53
45	0.44	0.48	0.53	0.56
50 (1/4-Acre)	0.48	0.52	0.56	0.59
55	0.52	0.56	0.60	0.62
60	0.56	0.60	0.63	0.65
65 (Condominiums)	0.61	0.64	0.66	0.68
70	0.65	0.67	0.70	0.71
75 (Mobilehomes)	0.69	0.71	0.73	0.74
80 (Apartments)	0.73	0.75	0.77	0.78
85	0.77	0.79	0.80	0.81
90 (Commercial)	0.82	0.82	0.83	0.84
95	0.86	0.86	0.87	0.87
100	0.90	0.90	0.90	0.90

*Complete District's standards can be found in the Riverside County Flood Control Hydrology Manual

Exhibit E

Typical Requirements for Common Maintenance Mechanisms

Typical Requirements for Common Maintenance Mechanisms

1. **Public entity maintenance**: The Co-Permittee may approve a public or acceptable quasi-public entity (e.g., the Riverside County Flood Control District, or annex to an existing assessment district, an existing utility district, a state or federal resource agency, or a conservation conservancy) to assume responsibility for operation, maintenance, repair and replacement of the BMP. Unless otherwise acceptable to individual Co-Permittees, public entity maintenance agreements shall ensure estimated costs are front-funded or reliably guaranteed, (e.g., through a trust fund, assessment district fees, bond, letter of credit or similar means). In addition, the Co-Permittees may seek protection from liability by appropriate releases and indemnities.

   The Co-Permittee shall have the authority to approve Urban Runoff BMPs proposed for transfer to any other public entity within its jurisdiction before installation. The Co-Permittee shall be involved in the negotiation of maintenance requirements with any other public entities accepting maintenance responsibilities within their respective jurisdictions; and in negotiations with the resource agencies responsible for issuing permits for the construction and/or maintenance of the facilities. The Co-Permittee must be identified as a third party beneficiary empowered to enforce any such maintenance agreement within their respective jurisdictions.

2. **Project proponent agreement to maintain Urban Runoff BMPs:** The Co-Permittee may enter into a contract with the project proponent obliging the project proponent to maintain, repair and replace the Urban Runoff BMP as necessary into perpetuity. Security or a funding mechanism with a “no sunset” clause may be required.

3. **Assessment districts:** The Co-Permittee may approve an Assessment District or other funding mechanism created by the project proponent to provide funds for Urban Runoff BMP maintenance, repair and replacement on an ongoing basis. Any agreement with such a District shall be subject to the Public Entity Maintenance Provisions above.

4. **Lease provisions:** In those cases where the Co-Permittee holds title to the land in question, and the land is being leased to another party for private or public use, the Co-Permittee may assure Urban Runoff BMP maintenance, repair and replacement through conditions in the lease.

5. **Conditional use permits:** For discretionary projects only, the Co-Permittee may assure maintenance of Urban Runoff BMPs through the inclusion of maintenance conditions in the conditional use permit. Security may be required.

6. **Alternative mechanisms:** The Co-Permittee may accept alternative maintenance mechanisms if such mechanisms are as protective as those listed above.

Exhibit F

Sample Covenant and Agreement

Example Covenant and Agreement

Water Quality Management Plan and Urban Runoff BMP Transfer, Access and Maintenance Agreement (adapted from documents from the Ventura County Stormwater Management Program)

Recorded at the request of:

City of _____

After recording, return to:

City of _____

City Clerk _____

Water Quality Management Plan and Urban Runoff BMP Transfer, Access and Maintenance Agreement

OWNER: _____

PROPERTY ADDRESS: _____

_____

APN: _____

THIS AGREEMENT is made and entered into in

_____, California, this _____ day of

_____ , by and between

_____, herein after

referred to as "Owner" and the CITY OF _____, a municipal corporation, located in the County of Riverside, State of California hereinafter referred to as "CITY";

WHEREAS, the Owner owns real property ("Property") in the City of

_____, County of Riverside, State of California, more specifically described in Exhibit "A" and depicted in Exhibit "B", each of which exhibits is attached hereto and incorporated herein by this reference;

WHEREAS, at the time of initial approval of development project known as

_____ within the Property described herein, the City required the project to employ Best Management Practices, hereinafter referred to as "BMPs," to minimize pollutants in urban runoff;

WHEREAS, the Owner has chosen to install and/or implement BMPs as described in the Water Quality Management Plan, on file with the City, hereinafter referred to as "WQMP", to minimize pollutants in urban runoff and to minimize other adverse impacts of urban runoff;

WHEREAS, said WQMP has been certified by the Owner and reviewed and approved by the City;

WHEREAS, said BMPs, with installation and/or implementation on private property and draining only private property, are part of a private facility with all maintenance or replacement, therefore, the sole responsibility of the Owner in accordance with the terms of this Agreement;

WHEREAS, the Owner is aware that periodic and continuous maintenance, including, but not necessarily limited to, filter material replacement and sediment removal, is required to assure peak performance of all BMPs in the WQMP and that, furthermore, such maintenance activity will require compliance with all Local, State, or Federal laws and regulations, including those pertaining to confined space and waste disposal methods, in effect at the time such maintenance occurs;

NOW THEREFORE, it is mutually stipulated and agreed as follows:

1. Owner hereby provides the City of City's designee complete access, of any duration, to the BMPs and their immediate vicinity at any time, upon reasonable notice, or in the event of emergency, as determined by City's Director of Public Works no advance notice, for the purpose of inspection, sampling, testing of the Device, and in case of emergency, to undertake all necessary repairs or other preventative measures at owner's expense as provided in paragraph 3 below. City shall make every effort at all times to minimize or avoid interference with Owner's use of the Property.

2. Owner shall use its best efforts diligently to maintain all BMPs in a manner assuring peak performance at all times. All reasonable precautions shall be exercised by Owner and Owner's representative or contractor in the removal and extraction of any material(s) from the BMPs and the ultimate disposal of the material(s) in a manner consistent with all relevant laws and regulations in effect at the time. As may be requested from time to time by the City, the Owner shall provide the City with documentation identifying the material(s) removed, the quantity, and disposal destination.

3. In the event Owner, or its successors or assigns, fails to accomplish the necessary maintenance contemplated by this Agreement, within five (5) days of being given written notice by the City, the City is hereby authorized to cause any maintenance necessary to be done and charge the entire cost and expense to the Owner or Owner's successors or assigns, including administrative costs, attorneys fees and interest thereon at the maximum rate authorized by the Civil Code from the date of the notice of expense until paid in full.

4. The City may require the owner to post security in form and for a time period satisfactory to the city to guarantee the performance of the obligations state herein. Should the Owner fail to perform the obligations under the Agreement, the City may, in the case of a cash bond, act for the Owner using the proceeds from it, or in the case of a surety bond, require the sureties to perform the obligations of the Agreement. As an additional remedy, the Director may withdraw any previous Urban Runoff-related approval with respect to the property on which BMPs have been installed and/or implemented until such time as Owner repays to City its reasonable costs incurred in accordance with paragraph 3 above.

5. This agreement shall be recorded in the Office of the Recorder of Riverside County, California, at the expense of the Owner and shall constitute notice to all successors and assigns of the title to said Property of the obligation herein set forth, and also a lien in such amount as will fully reimburse the City, including interest as herein above set forth, subject to foreclosure in event of default in payment.

6. In event of legal action occasioned by any default or action of the Owner, or its successors or assigns, then the Owner and its successors or assigns agree(s) to pay all costs incurred by the City in enforcing the terms of this Agreement, including reasonable attorney's fees and costs, and that the same shall become a part of the lien against said Property.

7. It is the intent of the parties hereto that burdens and benefits herein undertaken shall constitute covenants that run with said Property and constitute a lien there against.

8. The obligations herein undertaken shall be binding upon the heirs, successors, executors, administrators and assigns of the parties hereto. The term "Owner" shall include not only the present Owner, but also its heirs, successors, executors, administrators, and assigns. Owner shall notify any successor to title of all or part of the Property about the existence of this Agreement. Owner shall provide such notice prior to such successor obtaining an interest in all or part of the Property. Owner shall provide a copy of such notice to the City at the same time such notice is provided to the successor.

9. Time is of the essence in the performance of this Agreement.

10. Any notice to a party required or called for in this Agreement shall be served in person, or by deposit in the U.S. Mail, first class postage prepaid, to the address set forth below. Notice(s) shall be deemed effective upon receipt, or seventy-two (72) hours after deposit in the U.S. Mail, whichever is earlier. A party may change a notice address only by providing written notice thereof to the other party.

IF TO CITY:

_____

_____

_____

_____

IF TO OWNER:

_____

_____

_____

_____

IN WITNESS THEREOF, the parties hereto have affixed their signatures as of the date first written above.

APPROVED AS TO FORM:

_____
City Attorney

_____
CITY OF

_____
Name

_____
Title

ATTEST:

_____
City Clerk Date

OWNER:

_____
Name

_____
Title

OWNER:

_____
Name

_____
Title

NOTARIES ON FOLLOWING PAGE

EXHIBIT A
(Legal Description)

EXHIBIT B
(Map/Illustration)

Exhibit G

Glossary

Best Management Practices (BMPs) – Defined in 40 CFR 122.2 as schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the pollution of Waters of the U.S. BMPs also include treatment requirements, operating procedures and practices to control plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage. In the case of MS4 permits, BMPs are typically used in place of numeric effluent limits.

Hydrologic Conditions of Concern - Changes caused by a New Development or Redevelopment Project to Urban Runoff flow rates, velocities, durations and/or volumes that cause significant downstream erosion beyond the pre-development condition or cause significant adverse impacts to stream habitat.

Municipal Separate Storm Sewer System (MS4) – An MS4 is a conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, natural drainage features or channels, modified natural channels, man-made channels, or storm drains): (i) Owned or operated by a State, city town, borough, county, parish, district, association, or other public body (created by or pursuant to State law) having jurisdiction over disposal of sewage, industrial wastes, storm water, or other wastes, including special districts under State law such as a sewer district, flood control district or drainage district, or similar entity, or an Indian tribe or an authorized Indian tribal organization, or designated and approved management agency under Section 208 of the CWA that discharges to Waters of the U.S.; (ii) Designated or used for collecting of conveying storm water; (iii) Which is not a combined sewer; (iv) Which is not part of the POTW as defined at 40 CFR 122.26.

Historic and current developments make use of natural drainage patterns and features as conveyances for urban runoff. Urban streams used in this manner are part of the municipalities MS4 regardless of whether they are natural, man-made, or partially modified features. In these cases, the urban stream is both an MS4 and a receiving water.

New Development – In the Santa Ana Region of Riverside County: The categories of development identified in subsections VIII.B.1.b of Order No. R8-2002-0011. New developments do not include routine maintenance to maintain original line and grade, hydraulic capacity, or original purpose of a facility, nor do they include emergency new developments required to protect public health and safety. Dischargers should confirm with Regional Board staff whether or not a particular routine maintenance activity is subject to Order No. R8-2002-0011.

In the Santa Margarita Region of Riverside County: The categories of development identified in Provision F. 2.b.1 of San Diego Region RWQCB Order R9-2004-001.

Pollutants of Concern – For the purposes of the WQMP, those Urban Runoff pollutants generated by a New Development or Redevelopment project. Pollutants of Concern may include urban runoff pollutants typically associated with the proposed land use, legacy pollutants that are associated with the project site, project related pollutants for which Receiving Waters downstream of and proximate to the project are listed as impaired under CWA section 303(d), and pollutants commonly associated with Urban Runoff. Please see the Santa Ana, Santa Margarita, or Whitewater River NPDES MS4 Permit, as appropriate, for a full list of pollutants commonly associated with Urban Runoff.

Receiving Water(s) – The receiving waters within the Permit Area

Santa Ana Region Co-Permittees – The County of Riverside and the Cities of Beaumont, Calimesa, Canyon Lake, Corona, Hemet, Lake Elsinore, Moreno Valley, Murrieta, Norco, Perris, Riverside, and San Jacinto.

Santa Margarita Region Co-Permittees – The County of Riverside and the Cities of Murrieta and Temecula.

Significant Redevelopment – In the Santa Ana Region of Riverside County: As defined in Section VIII.B.1.a of Order No. R8-2002-0011, Significant Redevelopment is the addition or creation of 5,000 square feet or more of impervious surface on an existing developed site. This includes, but is not limited to, construction of additional buildings and/or structures, extension of the existing footprint of a building, construction of impervious or compacted soil parking lots. Where Significant Redevelopment results in an increase of less than 50 percent of the existing impervious surfaces of an existing developed site, and the existing developed site received its discretionary land use approvals prior to the adoption of the WQMP, the WQMP would apply only to the addition, and not the existing development. Significant Redevelopment does not include routine maintenance activities that are conducted to maintain original line and grade, hydraulic capacity, the original purpose of the constructed facility or emergency actions required to protect public health and safety.

In the Santa Margarita Region of Riverside County: Significant Redevelopment is defined in Provision F. 2.b as redevelopment projects that create, add or replace at least 5,000 square feet of impervious surfaces on an already developed New Development category site. Redevelopment includes, but is not limited to: the expansion of a building footprint or addition or replacement of a structure; structural development including an increase in gross floor area and/or exterior maintenance activity; and land disturbing activities related with structural or impervious surfaces.

Site Design BMPs – Any project design feature that reduces the creation or severity of potential pollutant sources or reduces the alteration of the project site's natural flow regime. Redevelopment projects that are undertaken to remove pollutant sources (such as existing surface parking lots and other impervious surfaces) or to reduce the need for new roads and other impervious surfaces (as compared to conventional or low-density new development) by incorporating higher densities and/or mixed land uses into the project design, are also considered site design BMPs.

Source Control BMPs – In general, activities or programs to educate the public or provide low cost non-physical solutions, as well as facility design or practices aimed to limit the contact between pollutant sources and Urban Runoff or authorized non-storm water. Examples include activity schedules, prohibitions of practices, street sweeping, facility maintenance, detection and elimination of illicit connections and illegal dumping, and other non-structural measures. Facility design examples include providing attached lids to trash containers, or roof or awning over material and trash storage areas to prevent direct contact between water and pollutants. Additional examples are provided in Section 4 of Supplement A to the DAMP dated April 1996.

Structural BMPs – Physical facilities or controls which may include secondary containment, treatment measures, (e.g. first flush diversion, detention/retention basins, and oil/grease separators), run-off controls (e.g., grass swales, infiltration trenches/basins, etc.), and engineering and design modification of existing structures. Additional examples are provided in Section 4 of Supplement A to the Riverside County DAMP dated April 1996.

Treatment Control BMPs – Any engineered system designed and constructed to remove pollutants from urban runoff. Pollutant removal is achieved by simple gravity settling of particulate pollutants, filtration, biological uptake, media adsorption or any other physical, biological, or chemical process.

Urban Runoff – In the Santa Ana Region of Riverside County: Urban Runoff includes those discharges from residential, commercial, industrial, and construction areas within the Permit Area and excludes discharges from feedlots, dairies, farms, and open space. Urban Runoff discharges consist of storm water and non-storm water surface runoff from drainage sub-areas with various, often mixed, land uses within

all of the hydrologic tributary areas that discharge into the Waters of the U.S. In addition to Urban Runoff, the MS4s regulated by Order No. R8-2002-0011.receive flows from agricultural activities, open space, state and federal properties and other non-urban land uses not under the control of the Permittees. The quality of the discharges from the MS4s varies considerably and is affected by, among other things, past and present land use activities, basin hydrology, geography and geology, season, the frequency and duration of storm events, and the presence of past or present illegal and allowed disposal practices and illicit connections. The Permittees lack legal jurisdiction over storm water discharges into their respective MS4s from agricultural activities, California and federal facilities, utilities and special districts, Native American tribal lands, wastewater management agencies and other point and non-point source discharges otherwise permitted by or under the jurisdiction of the Regional Board. The Regional Board recognizes that the Permittees should not be held responsible for such facilities and/or discharges. Similarly, certain activities that generate pollutants present in Urban Runoff are beyond the ability of the Permittees to eliminate. Examples of these include operation of internal combustion engines, atmospheric deposition, brake pad wear, tire wear, residues from lawful application of pesticides, nutrient runoff from agricultural activities, and leaching of naturally occurring minerals from local geography.

In the Santa Margarita Region of Riverside County: All flows in a stormwater conveyance system and consists of the following components: (1) storm water (wet weather flows) and (2) non-stormwater illicit discharges (dry weather flows).

Waters of the United States – Waters of the U.S. can broadly be defined as navigable surface waters and all tributary surface waters to navigable surface waters. Groundwater is not considered Waters of the U.S. As defined in 40 CFR 122.2, the Waters of the U.S. are defined as: (a) All waters, which are currently used, were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide; (b) All interstate waters, including interstate "wetlands;" (c) All other waters such as intrastate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, "wetlands," sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds the use, degradation or destruction of which would affect or could affect interstate or foreign commerce including any such waters: (1) Which are or could be used I interstate or foreign travelers for recreation or other purposes; (2) From which fish or shellfish are or could be taken and sold in interstate or foreign commerce; or (3) Which are used or could be used for industrial purposes by industries in interstate commerce; (d) All impoundments of waters otherwise defined as Waters of the U.S. under this definition; (e) Tributaries of waters identified in paragraphs (a) through (d) of this definition; (f) The territorial seas; and (g) "wetlands" adjacent to waters (other than waters that are themselves wetlands) identified in paragraphs (a) through (f) of this definition. Waters of the U.S. do not include prior converted cropland. Notwithstanding the determination of an area's status as prior converted cropland by any other federal agency, for the purposes of the Clean Water Act, the final authority regarding the Clean Water Act jurisdiction remains with the United States Environmental Protection Agency.

Assembly Bill No. 1881

CHAPTER 559

An act to add Section 1353.8 to the Civil Code, to repeal and add Article 10.8 (commencing with Section 65591) of Chapter 3 of Division 1 of Title 7 of the Government Code, to add Section 25401.9 to the Public Resources Code, and to add Article 4.5 (commencing with Section 535) to Chapter 8 of Division 1 of the Water Code, relating to water conservation.

[Approved by Governor September 28, 2006. Filed with Secretary of State September 28, 2006.]

LEGISLATIVE COUNSEL'S DIGEST

AB 1881, Laird. Water conservation.

(1) Existing law, the Davis-Sterling Common Interest Development Act, defines and regulates common interest developments, which include community apartment projects, condominium projects, planned developments, and stock cooperatives.

This bill would provide that the architectural guidelines of a common interest development shall not prohibit or include conditions that have the effect of prohibiting the use of low water-using plants as a group.

(2) The Water Conservation in Landscaping Act requires the Department of Water Resources to appoint an advisory task force to work with the department to draft a model local water efficient landscape ordinance that local agencies may adopt, requires the task force to submit the ordinance to the department on or before May 1, 1991, and requires the task force to cease to exist on the date the department adopts the model ordinance or January 1, 1992, whichever occurs first. The act requires the department, not later than January 1, 1992, to adopt a model local water efficient landscape ordinance which each local agency may adopt. The act makes the model local water efficient landscape ordinance adopted by the department applicable within the jurisdiction of a local agency if that local agency, by January 1, 1993, has not adopted a water efficient landscape ordinance or has not adopted certain findings that the adoption of the ordinance is unnecessary.

This bill would specify that the provision making the model ordinance applicable to a local agency on and after January 1, 1993, does not apply to chartered cities. The bill would require the department, to the extent funds are appropriated, not later than January 1, 2009, by regulation, to update the model ordinance in accordance with specified requirements. The bill would require the department to prepare and submit to the Legislature a prescribed report before the adoption of the updated model ordinance. The bill would require a local agency, not later than January 1, 2010, to adopt the updated model ordinance or other water efficient

landscape ordinance that is at least as effective in conserving water as the updated model ordinance. The bill would make the updated model ordinance applicable within the jurisdiction of a local agency, including a chartered city, if, by January 1, 2010, the local agency has not adopted its own water efficient landscape ordinance or the updated model ordinance. The bill would require each local agency, not later than January 31, 2010, to notify the department as to whether the local agency is subject to the department's updated model ordinance and, if not, to submit to the department a copy of the water efficient landscape ordinance adopted by the local agency, among other documents. The bill would require the department, to the extent funds are appropriated, not later than January 31, 2011, to prepare and submit a report to the Legislature relating to the status of water efficient landscape ordinances adopted by local agencies.

By imposing requirements on local agencies in connection with the adoption of water efficient landscape ordinances, the bill would impose a state-mandated local program.

(3) Existing law requires the State Energy Resources Conservation and Development Commission (Energy Commission), after one or more public hearings, to take specified action to reduce the wasteful, uneconomic, inefficient, or unnecessary consumption of energy. Existing law requires the Energy Commission, by January 1, 2004, to amend specified regulations to require that residential clothes washers manufactured on or after January 1, 2007, be at least as water efficient as commercial clothes washers, and to take certain other related action.

This bill would require the Energy Commission, in consultation with the department, to adopt, to the extent funds are available, by regulation performance standards and labeling requirements for landscape irrigation equipment, including irrigation controllers, moisture sensors, emission devices, and valves to reduce the wasteful, uneconomic, inefficient, or unnecessary consumption of energy or water. The bill would require the Energy Commission to adopt those requirements for landscape irrigation controllers and moisture sensors by January 1, 2010, and, on and after January 1, 2012, would prohibit the sale or installation of an irrigation controller or moisture sensor for landscape use unless the controller or sensor meets those adopted requirements. The bill would require the Energy Commission, on or before January 1, 2010, to prepare and submit to the Legislature a report that sets forth a proposed schedule for adopting performance standards and labeling requirements for emission devices and valves.

(4) Existing law generally requires an urban water supplier to install water meters on all municipal and industrial service connections located within its service area on or before January 1, 2025.

This bill would require a water purveyor as defined, to require as a condition of new retail water service on and after January 1, 2008, the installation of separate water meters to measure the volume of water used exclusively for landscape purposes. The bill would make this requirement applicable to specified service connections.

(5) The California Constitution requires the state to reimburse local agencies and school districts for certain costs mandated by the state. Statutory provisions establish procedures for making that reimbursement.

This bill would provide that, if the Commission on State Mandates determines that the bill contains costs mandated by the state, reimbursement for those costs shall be made pursuant to these statutory provisions.

The people of the State of California do enact as follows:

SECTION 1. Section 1353.8 is added to the Civil Code, to read:

1353.8. The architectural guidelines of a common interest development shall not prohibit or include conditions that have the effect of prohibiting the use of low water-using plants as a group.

SEC. 2. Article 10.8 (commencing with Section 65591) of Chapter 3 of Division 1 of Title 7 of the Government Code is repealed.

SEC. 3. Article 10.8 (commencing with Section 65591) is added to Chapter 3 of Division 1 of Title 7 of the Government Code, to read:

Article 10.8. Water Conservation in Landscaping

65591. This article shall be known and may be cited as the Water Conservation in Landscaping Act.

65592. Unless the context requires otherwise, the following definitions govern the construction of this article:

(a) "Department" means the Department of Water Resources.

(b) "Local agency" means any city, county, or city and county, including a charter city or charter county.

(c) "Water efficient landscape ordinance" means an ordinance or resolution adopted by a local agency, or prepared by the department, to address the efficient use of water in landscaping.

65593. The Legislature finds and declares all of the following:

(a) The waters of the state are of limited supply and are subject to ever increasing demands.

(b) The continuation of California's economic prosperity is dependent on adequate supplies of water being available for future uses.

(c) It is the policy of the state to promote the conservation and efficient use of water and to prevent the waste of this valuable resource.

(d) Landscapes are essential to the quality of life in California by providing areas for active and passive recreation and as an enhancement to the environment by cleaning air and water, preventing erosion, offering fire protection, and replacing ecosystems lost to development.

(e) Landscape design, installation, maintenance, and management can and should be water efficient.

(f) Section 2 of Article X of the California Constitution specifies that the right to use water is limited to the amount reasonably required for the

beneficial use to be served and the right does not and shall not extend to waste or unreasonable use or unreasonable method of use.

(g) (1) The Legislature, pursuant to Chapter 682 of the Statutes of 2004, requested the California Urban Water Conservation Council to convene a stakeholders work group to develop recommendations for improving the efficiency of water use in urban irrigated landscapes.

(2) The work group report includes a recommendation to update the model water efficient landscape ordinance adopted by the department pursuant to Chapter 1145 of the Statutes of 1990.

(3) It is the intent of the Legislature that the department promote the use of this updated model ordinance.

(h) Notwithstanding Article 13 (commencing with Section 65700), this article addresses a matter that is of statewide concern and is not a municipal affair as that term is used in Section 5 of Article XI of the California Constitution. Accordingly, it is the intent of the Legislature that this article, except as provided in Section 65594, apply to all cities and counties, including charter cities and charter counties.

65594. (a) Except as provided in Section 65595, if by January 1, 1993, a local agency did not adopt a water efficient landscape ordinance and did not adopt findings based on climatic, geological, or topographical conditions, or water availability that state that a water efficient landscape ordinance is unnecessary, the model water efficient landscape ordinance adopted by the department pursuant to Chapter 1145 of the Statutes of 1990 shall apply within the jurisdiction of the local agency as of that date, shall be enforced by the local agency, and shall have the same force and effect as if adopted by the local agency.

(b) Notwithstanding subdivision (b) of Section 65592, subdivision (a) does not apply to chartered cities.

(c) This section shall apply only until the department updates the model ordinance.

65595. (a) (1) To the extent funds are appropriated, not later than January 1, 2009, by regulation, the department shall update the model water efficient landscape ordinance adopted pursuant to Chapter 1145 of the Statutes of 1990, after holding one or more public hearings. The updated model ordinance shall be based on the recommendations set forth in the report prepared pursuant to Chapter 682 of the Statutes of 2004 and shall meet the requirements of Section 65596.

(2) Before the adoption of the updated model ordinance pursuant to paragraph (1), the department shall prepare and submit to the Legislature a report relating to both of the following:

(A) The extent to which local agencies have complied with the model water efficient landscape ordinance adopted pursuant to Chapter 1145 of the Statutes of 1990.

(B) The department's recommendations regarding the landscape water budget component of the updated model ordinance described in subdivision (b) of Section 65596.

(b) Not later than January 31, 2009, the department shall distribute the updated model ordinance adopted pursuant to subdivision (a) to all local agencies and other interested parties.

(c) On or before January 1, 2010, a local agency shall adopt one of the following:

(1) A water efficient landscape ordinance that is, based on evidence in the record, at least as effective in conserving water as the updated model ordinance adopted by the department pursuant to subdivision (a).

(2) The updated model ordinance described in paragraph (1).

(d) If the local agency has not adopted, on or before January 1, 2010, a water efficient landscape ordinance pursuant to subdivision (c), the updated model ordinance adopted by the department pursuant to subdivision (a) shall apply within the jurisdiction of the local agency as of that date, shall be enforced by the local agency, and shall have the same force and effect as if adopted by the local agency.

(e) Nothing in this article shall be construed to require the local agency's water efficient landscape ordinance to duplicate, or to conflict with, a water efficiency program or measure implemented by a public water system, as defined in Section 116275 of the Health and Safety Code, within the jurisdictional boundaries of the local agency.

65596. The updated model ordinance adopted pursuant to Section 65595 shall do all the following in order to reduce water use:

(a) Include provisions for water conservation and the appropriate use and groupings of plants that are well-adapted to particular sites and to particular climatic, soil, or topographic conditions. The model ordinance shall not prohibit or require specific plant species, but it may include conditions for the use of plant species or encourage water conserving plants. However, the model ordinance shall not include conditions that have the effect of prohibiting or requiring specific plant species.

(b) Include a landscape water budget component that establishes the maximum amount of water to be applied through the irrigation system, based on climate, landscape size, irrigation efficiency, and plant needs.

(c) Promote the benefits of consistent local ordinances in neighboring areas.

(d) Encourage the capture and retention of stormwater onsite to improve water use efficiency or water quality.

(e) Include provisions for the use of automatic irrigation systems and irrigation schedules based on climatic conditions, specific terrains and soil types, and other environmental conditions. The model ordinance shall include references to local, state, and federal laws and regulations regarding standards for water-conserving irrigation equipment. The model ordinance may include climate information for irrigation scheduling based on the California Irrigation Management Information System.

(f) Include provisions for onsite soil assessment and soil management plans that include grading and drainage to promote healthy plant growth and to prevent excessive erosion and runoff, and the use of mulches in shrub areas, garden beds, and landscaped areas where appropriate.

(g) Promote the use of recycled water consistent with Article 4 (commencing with Section 13520) of Chapter 7 of Division 7 of the Water Code.

(h) Seek to educate water users on the efficient use of water and the benefits of doing so.

(i) Address regional differences, including fire prevention needs.

(j) Exempt landscaping that is part of a registered historical site.

(k) Encourage the use of economic incentives to promote the efficient use of water.

(*l*) Include provisions for landscape maintenance practices that foster long-term landscape water conservation. Landscape maintenance practices may include, but are not limited to, performing routine irrigation system repair and adjustments, conducting water audits, and prescribing the amount of water applied per landscaped acre.

(m) Include provisions to minimize landscape irrigation overspray and runoff.

65597. Not later than January 31, 2010, each local agency shall notify the department as to whether the local agency is subject to the department's updated model ordinance adopted pursuant to Section 65595, and if not, shall submit to the department a copy of the water efficient landscape ordinance adopted by the local agency, and a copy of the local agency's findings and evidence in the record that its water efficient landscape ordinance is at least as effective in conserving water as the department's updated model ordinance. Not later than January 31, 2011, the department shall, to the extent funds are appropriated, prepare and submit a report to the Legislature summarizing the status of water efficient landscape ordinances adopted by local agencies.

65598. Any model ordinance adopted pursuant to this article shall exempt cemeteries from all provisions of the ordinance except those set forth in subdivisions (h), (k), and (*l*) of Section 65596. In adopting language specific to cemeteries, the department shall recognize the special landscape management needs of cemeteries.

65599. Any actions or proceedings to attach, review, set aside, void, or annul the act, decision, or findings of a local agency on the ground of noncompliance with this article shall be brought pursuant to Section 1085 of the Code of Civil Procedure.

SEC. 4. Section 25401.9 is added to the Public Resources Code, to read:

25401.9. (a) To the extent that funds are available, the commission, in consultation with the Department of Water Resources, shall adopt by regulation, after holding one or more public hearings, performance standards and labeling requirements for landscape irrigation equipment, including, but not limited to, irrigation controllers, moisture sensors, emission devices, and valves, for the purpose of reducing the wasteful, uneconomic, inefficient, or unnecessary consumption of energy or water.

(b) For the purposes of complying with subdivision (a), the commission shall do all of the following:

(1) Adopt performance standards and labeling requirements for landscape irrigation controllers and moisture sensors on or before January 1, 2010.

(2) Consider the Irrigation Association's Smart Water Application Technology Program testing protocols when adopting performance standards for landscape irrigation equipment, including, but not limited to, irrigation controllers, moisture sensors, emission devices, and valves.

(3) Prepare and submit a report to the Legislature, on or before January 1, 2010, that sets forth on a proposed schedule for adopting performance standards and labeling requirements for emission devices and valves.

(c) On and after January 1, 2012, an irrigation controller or moisture sensor for landscape irrigation uses may not be sold or installed in the state unless the controller or sensor meets the performance standards and labeling requirements established pursuant to this section.

SEC. 5. Article 4.5 (commencing with Section 535) is added to Chapter 8 of Division 1 of the Water Code, to read:

Article 4.5. Irrigated Landscape

535. (a) A water purveyor shall require as a condition of new retail water service on and after January 1, 2008, the installation of separate water meters to measure the volume of water used exclusively for landscape purposes.

(b) Subdivision (a) does not apply to either of the following:

(1) Single-family residential connections.

(2) Connections used to supply water for the commercial production of agricultural crops or livestock.

(c) Subdivision (a) applies only to a service connection for which both of the following apply:

(1) The connection serves property with more than 5,000 square feet of irrigated landscape.

(2) The connection is supplied by a water purveyor that serves 15 or more service connections.

(d) For the purposes of this section, "new retail water service" means the installation of a new water meter where water service has not been previously provided, and does not include applications for new water service submitted before January 1, 2007.

SEC. 6. If the Commission on State Mandates determines that this act contains costs mandated by the state, reimbursement to local agencies and school districts for those costs shall be made pursuant to Part 7 (commencing with Section 17500) of Division 4 of Title 2 of the Government Code.

O

Filed 11/6/06

CERTIFIED FOR PARTIAL PUBLICATION*

IN THE COURT OF APPEAL OF THE STATE OF CALIFORNIA

SECOND APPELLATE DISTRICT

DIVISION FIVE

COUNTY OF LOS ANGELES et al., Plaintiffs and Appellants, v. CALIFORNIA STATE WATER RESOURCES CONTROL BOARD et al., Defendants and Respondents.	B184034 (Los Angeles County Super. Ct. No. BS080792) ORDER MODIFYING OPINION [CHANGE IN JUDGMENT]

The published portion of the opinion filed on October 5, 2006 is modified as follows.

1. On page 1, delete:

"Affirmed in part; reversed in part with directions."

In its place, insert:

"Affirmed."

2. After the first paragraph of page 2, insert the following sentence:

"We affirm the judgment in its entirety."

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* Pursuant to California Rules of Court, rules 976(b) and 976.1, this opinion is certified for publication with the exception of part IV (G)-(L).

3. Delete in its entirety the second paragraph on page 2 beginning with "We agree with plaintiffs . . . ."

4. Delete: the second paragraph on page 21, beginning with "We agree that Water Code . . . "; all of page 22 including the footnote; and all of pages 23 through 25. In its place, insert:

"Chapter 3 of the California Environmental Quality Act was originally adopted in 1970. (Stats. 1970, ch. 1433, § 1, pp. 2781-2782.) The original chapter 3 of the California Environmental Quality Act required all state agencies, boards, and commissions, that proposed a project which would have a significant effect on the environment to prepare a "detailed statement" setting forth the environmental effect of the contemplated undertaking.[1] (See *Russian Hill Improvement Assn. v. Board of Permit Appeals* (1974) 44 Cal.App.3d 158, 166; *City of Orange v. Valenti* (1974) 37 Cal.App.3d 240, 246.) Water Code section 13389 was adopted as urgency legislation to comply with certain provisions of the Clean Water Act provisions establishing the National Pollution Discharge Elimination System. (Stats. 1972, ch. 1256, § 3, p. 2490.) Expressly for that purpose, the California Legislature enacted chapter 5.5, the "Water Quality" division, which includes Water Code section 13389. (Wat. Code, § 13370[2]; *City of Brentwood v.*

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[1] Public Resources Code section 21100 as enacted in 1970 stated: "All state agencies, boards, and commissions shall include in any report on any project they propose to carry out which could have a significant effect on the environment of the state, a detailed statement by the responsible state official setting forth the following: [¶] (a) The environmental impact of the proposed action. [¶] (b) Any adverse environmental effects which cannot be avoided if the proposal is implemented. [¶] (c) Mitigation measures proposed to minimize the impact. [¶] (d) Alternatives to the proposed action. [¶] (e) The relationship between local short-term uses of man's environment and the maintenance and enhancement of long-term productivity. [¶] (f) Any irreversible environmental changes which would be involved in the proposed action should it be implemented." (Stats. 1970, ch. 1433, § 1, pp. 2781-2782.)

[2] Water Code section 13370 states: "The Federal Water Pollution Control Act (33 U.S.C. Sec. 1251 et seq.), as amended, provides for permit systems to regulate the

Central Valley Regional Water Quality Control Bd. (2004) 123 Cal.App.4th 714, 723; *Sierra Club v. Union Oil Co. of California* (9th Cir.1987) 813 F.2d 1480, 1483.) When Water Code section 13389 became effective on December 19, 1972, chapter 2.6 of the California Environmental Quality Act had just been enacted, also as urgency legislation, and it consisted of Public Resources Code sections 21080 through 21090. The new chapter 2.6 of the California Environmental Quality Act became effective on December 5, 1972. (Stats. 1972, ch. 1154, § 19, p. 2280.) Chapter 3 of the California Environmental Quality Act was also amended effective December 5, 1972, and it which applied to all environmental assessments by state agencies, boards, and commissions. Former Public Resource Code section 21100, the core provision of the 1972 version of the California Environmental Quality Act as it related to state agencies, boards, and commissions, stated: "All state agencies, boards, and commissions shall prepare, or cause to be prepared . . . and certify the completion of an environmental impact report on any project they propose to carry out or approve which may have a significant effect on the environment." (Stats. 1972, ch. 1154, § 2.5, p. 2274; see *Desert Environment Conservation Assn. v. Public Utilities Com.* (1973) 8 Cal.3d 739, 742; *San Francisco Ecology Center v. City and County of San Francisco* (1975) 48 Cal.App.3d 584, 594, fn. 8.) Beyond question, the Legislature intended that chapter 3 of the California

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discharge of pollutants and dredged or fill material to the navigable waters of the United States and to regulate the use and disposal of sewage sludge. [¶] (b) The Federal Water Pollution Control Act, as amended, provides that permits may be issued by states which are authorized to implement the provisions of that act. [¶] (c) It is in the interest of the people of the state, in order to avoid direct regulation by the federal government of persons already subject to regulation under state law pursuant to this division, to enact this chapter in order to authorize the state to implement the provisions of the Federal Water Pollution Control Act and acts amendatory thereof or supplementary thereto, and federal regulations and guidelines issued pursuant thereto, provided, that the state board shall request federal funding under the Federal Water Pollution Control Act for the purpose of carrying out its responsibilities under this program."

Environmental Quality Act not apply to National Pollution Discharge Elimination System permits—in that respect Water Code section 13389 is entirely clear.

But on December 19, 1972, when Water Code section 13389 was enacted, chapter 2.6 of the California Environmental Quality Act, which contains generalized requirements for the preparation of environmental impact reports for discretionary projects, had just been adopted effective December 5, 1972. Chapter 2.6 of the California Environmental Quality Act applies to discretionary projects proposed by public agencies. (Former Pub. Resources Code, § 21080.) Pursuant to new chapter 2.6 of the California Environmental Quality Act, all public agencies were required to adopt by ordinance, resolution, or the like procedures for preparation of environmental impact reports. (Former Pub. Resources Code, § 21082.) The Office of Planning and Research was directed to adopt proposed guidelines for the preparation of environmental impact reports including a listing of projects determined not to have a significant impact on the environment. (Former Pub. Resources Code, §§ 21083-21088.) Finally, chapter 2.6, as adopted in 1972, allowed a public agency to charge fees for the preparation an environmental impact report and defined public and private developments pursuant to a redevelopment plan as a single project. (Former Pub. Resources Code, §§ 21089-21090.)

It can be argued that even though chapter 3 with its environmental impact preparation requirement for state agencies, boards, and commissions was not to apply to National Pollution Discharge Elimination System permits, the discretionary projects requirements in chapter 2.6 of the California Environmental Quality Act mandated environmental review. Hence, the argument would be that the Legislature in enacting Water Code section 13389 did not intend to obviate the duty pursuant to chapter 2.6 of the California Environmental Quality Act to prepare an environmental impact report. We are unpersuaded by this analysis. Former Public Resources Code section 20180, subdivision (a), the core provision relating to discretionary projects, stated: "(a) Except as otherwise provided in this division, this division shall apply to discretionary projects proposed to be carried out or approved by public agencies including, but not limited to,

the enactment and amendment of zoning ordinances, the issuance of zoning variances, the issuance of conditional use permits and the approval of tentative subdivision maps (except where such a project is exempt from the preparation of an environmental impact report pursuant to Section 21166)." (Stats. 1972, ch. 1154, § 2.3, p. 2272; see *People v. County of Kern* (1974) 39 Cal.App.3d 830, 839; *Friends of Lake Arrowhead v. Board of Supervisors* (1974) 38 Cal.App.3d 497, 510.) As can be noted, Public Resources Code section 21080, subdivision (a) established that a discretionary project was subject to the environmental impact requirement. But the requirement that a state agency, board, and commission prepare an environmental report was found in Public Resources Code section 21110 which was, and is now, located in chapter 3 of the California Environmental Quality Act. The obligation imposed on a state agency, board, and commission to prepare an environmental impact report existed in chapter 3 before the adoption of Water Code section 13389 and it remained there after the 1972 amendments to the California Environmental Quality Act. No doubt, since 1972 when the Legislature adopted Water Code section 13389 and the then new chapter 2.6, the California Environmental Quality Act has been repeatedly amended. But defendants cite no evidence the Legislature ever intended to: impose a duty on regional boards to prepare environmental impact reports; require regional boards to engage in any other form of environmental review specified in the California Environmental Quality Act; or to otherwise modify Water Code section 13389.

Defendants rely on the analysis of our colleague Presiding Justice Judith D. McConnell of Division One of the Fourth Appellate District in *City of Arcadia v. State Water Resources Control Bd.*, *supra*, 135 Cal.App.4th at pages 1420-1430 that regional board basin plans are subject to limited California Environmental Quality Act review. The *City of Arcadia* decision does not involve the issuance of a National Pollution Discharge Elimination System permit. Rather, it involves the development of a basin plan. (*Ibid.*) We agree with the Attorney General that a basin plan is subject to limited environmental review pursuant to Public Resources Code section 21080.5. Public

Resources Code section 21080.5, subdivision (a) vests the Secretary of the Resources Agency with the authority to require limited environmental review: "(a) Except as provided in Section 21158.1, when the regulatory program of a state agency requires a plan or other written documentation containing environmental information and complying with paragraph (3) of subdivision (d) to be submitted in support of an activity listed in subdivision (b), the plan or other written documentation may be submitted in lieu of the environmental impact report required by this division if the Secretary of the Resources Agency has certified the regulatory program pursuant to this section." The secretary's authority extends to requiring limited environmental review when an agency adopts "standards, rules, regulations, or plans for use" in a regulatory program. (Pub. Resources Code, § 21080.5, subd. (b)(2).) The secretary has certified the regional boards' basin plan program as requiring limited environmental review. (*City of Arcadia v. State Water Resources Control Bd.*, *supra*, 135 Cal.App.4th at p. 1422; Cal. Code Regs. tit.14, § 15251, subd. (g).[3]) The resources secretary has never identified the National Pollution Discharge Elimination System permit system as a Public Resources Code section 21080.5 certified program. Thus, *City of Arcadia* does not require California Environmental Quality Act review prior to the issuance of a National Pollution Discharge Elimination System permit.

[The portions of the opinion that follow, parts IV (G)-(L) are deleted from publication. See *post* at part V, where publication is to resume.]"

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[3] California Code of Regulations, title 14, section 15251, subdivision (g) states: "The following programs of state regulatory agencies have been certified by the Secretary for Resources as meeting the requirements of Section 21080.5: [¶] . . . (g)

5. On page 46, delete the first four sentences under DISPOSITION. In their place, insert:

"The judgment is affirmed. "

The unpublished portion of the opinion filed October 5, 2006, is modified as follows:

1. On page 29, line 3, delete:

"is permitted" and insert in its place "may not"

2. On page 29, line 5, delete: "136" and insert in its place "135"

Renumber all subsequent footnotes affected by the insertion of the new footnotes.

TURNER, P. J.	ARMSTRONG, J.	KRIEGLER, J.

The Water Quality Control (Basin)/208 Planning Program of the State Water Resources Control Board and the Regional Water Quality Control Boards."

017437

WETLANDS & WATERSHEDS

Direct and Indirect Impacts of Urbanization on Wetland Quality

1

CENTER FOR WATERSHED PROTECTION

DECEMBER 2006

Direct and Indirect Impacts of Urbanization on Wetland Quality

Wetlands & Watersheds Article #1

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December 2006

Direct and Indirect Impacts of Urbanization on Wetland Quality

Article 1 of the Wetlands & Watersheds Article Series

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Executive Summary

This article synthesizes more than 100 scientific studies on the direct and indirect impacts of urbanization on wetlands and the key role wetlands play in watershed quality. Some of the major findings include:

- Wetlands provide important ecological services that contribute to watershed functions, most notably in pollutant removal, flood attenuation, groundwater recharge and discharge, shoreline protection, and wildlife habitat. The benefit of wetland ecological services generally increases as total wetland cover increases in a watershed. Numerous researchers have quantified the economic benefits provided by wetlands in a watershed. When wetlands are lost or degraded by land development, these services must often be replaced by costly water treatment and flood control infrastructure. Given the many watershed services wetlands provide, wetland conservation and restoration should be an integral part of a comprehensive local watershed management strategy.

- Although the national rate of wetland loss has dropped sharply in recent years, the goal of no net loss in wetland quality remains elusive. Development in urban and rural areas now is the cause of more than 60% of national wetland loss. Several national assessments have noted deficiencies in current federal and state regulatory programs that allow direct and indirect impacts to wetlands that reduce their function and quality to continue. These regulatory gaps can best be closed by increased local management and regulation of wetlands.

- More than 50 of the studies reviewed document indirect impacts to wetlands caused by land alteration in the contributing drainage area to wetlands. Upland development increases stormwater to wetlands, and downstream crossings create flow constrictions. Together these changes lead to increased ponding, greater water level fluctuation and/or hydrologic drought in urban wetlands. In addition, urban wetlands receive greater inputs of sediment, nutrients, chlorides, and other pollutants; concentrations in urban stormwater are typically one to two orders of magnitude greater than predevelopment conditions (Schueler, 1987).

- Numerous studies describe how urban wetlands respond to these stressors. Although the precise response depends on the sensitivity and landscape position of the wetland, the

> general trend is a sharp decline in the diversity of the native plant and animal community and an increase in invasive plant species that can tolerate stressed conditions. Research has shown that degraded urban wetlands lose many of their important watershed functions. The indirect impact of upland development on wetlands is currently not regulated by state or federal agencies.

More research is needed to fully define the indirect impacts of land development on wetlands, and several priority research strategies are outlined at the end of the article. Taken as a whole, however, the current science on wetland impacts from development presents a strong and persuasive case to support greater local regulation and management of wetlands and their contributing drainage areas. The recommended local watershed planning approach to wetland management is outlined in Articles 2, 3 and 4 of this series.

About the Wetlands & Watersheds Article Series

The Wetlands & Watersheds article series was developed by the Center for Watershed Protection (CWP) in cooperation with the United States Environmental Protection Agency (USEPA). Funding for this project was provided by USEPA under cooperative agreements number CD-83192901-0 and WD-83264101-0.

Collectively, wetlands provide many watershed benefits, including pollutant removal, flood storage, wildlife habitat, groundwater recharge, and erosion control. While watersheds and wetlands are interconnected systems, their management is often segregated along regulatory and jurisdictional lines. Recent initiatives, such as the National Wetlands Mitigation Action Plan, provide a potential framework to integrate wetland protection in the context of larger local and state watershed planning efforts. However, no specific guidance exists for managing wetlands in the context of local watershed plans, and local governments often lack the tools and knowledge to effectively protect critical wetlands. This project was designed to fill this gap by expanding CWP's current watershed protection guidance, tools, and resources to integrate wetlands into larger watershed protection efforts. A key message conveyed in this new guidance is that wetlands should not be managed separately from other water resources because they are integral to water resource management.

This project included *research* on urban wetlands and local protection tools, *synthesis* of the research into a series of articles, and *transfer* of wetland protection tools and resources to wetland and watershed professionals across the country. The audience for the articles includes local natural resources managers and land planners who would benefit from guidance on local tools for protecting wetlands. The Wetlands & Watersheds article series includes the following:

Article 1: Direct and Indirect Impacts of Urbanization on Wetland Quality
This article reviews the direct and indirect impacts of urbanization on wetlands, and describes how impacts to wetlands affect watershed health.

Article 2: Using Local Watershed Plans to Protect Wetlands
This article presents detailed methods for integrating wetland management into the local watershed planning process.

Article 3: Adapting Watershed Tools to Protect Wetlands
This article describes 37 techniques for protecting wetlands through local programs and ordinances.

Article 4: A Local Ordinance to Protect Wetland Functions
This article outlines the key elements of an effective ordinance to protect existing wetlands from the indirect impacts of land development by regulating land use in their watersheds, and provides adaptable model ordinance language.

Article 5: Urban Wetland Restoration Techniques
This article features a watershed approach to identify and assess priority sites for wetland restoration and creation in urban areas.

Article 6: The Importance of Protecting Vulnerable Streams and Wetlands at the Local Level

This article makes the case for expanded local protection of vulnerable wetlands and streams that may not be fully protected by state or federal law due to their small size or geographic isolation.

Other wetland-related products of this project include wetland slideshows, an annotated bibliography of wetland research, a listing of key wetland web resources, and more products available on the newly expanded wetlands section of the CWP website at http://www.cwp.org

The CWP project team included:

- Karen Cappiella
- David Hirschman
- Neely Law
- Jennifer Tomlinson
- Lisa Fraley-McNeal
- Anne Kitchell
- Tom Schueler
- Tiffany Wright

Thanks are extended to our project officers Tracie Nadeau and Rebecca Dils, U. S. Environmental Protection Agency, Office of Wetlands, Oceans, and Watersheds, for their guidance and support throughout this project. Thanks are also extended to the following individuals who helped review the article or otherwise contributed to this project:

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Direct and Indirect Impacts of Urbanization on Wetland Quality

Article 1 of the Wetlands & Watersheds Article Series

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Introduction

The purpose of this article is to review the current state of wetland science as it pertains to impacts from urbanization, and to explore the possible management implications for local natural resource managers and land use planners who are the principal audience for this article. It is always difficult to generalize about wetlands because they are so diverse with respect to their hydrology, plant communities and landscape position. In a real sense, no two wetlands are similar in their quality or function. In addition, the nature of urbanization (also referred to as land development in this article) in the area draining to wetlands often differs greatly from site to site. Despite this variability, several consistent and recurring impacts have been observed in different wetlands around the country. At the outset, it is important to define the terminology that will be used throughout this article. Box 1 provides definitions for various terms used in this article and subsequent articles.

The scope of this literature review includes more than 100 research studies and reports on the relationship between land development and wetland quality. This topic is certainly an emerging area of interest, as more than 40% of the research was published in the last five years. The research was scattered among a very wide range of academic disciplines that do not generally interact with each other – hydrology, herpetology, landscape ecology, botany, wildlife management, conservation biology, toxicology, stormwater management and wetland science to name a few. In addition, researchers have worked in many different regions of the country, examined many different wetland types and utilized a wide range of assessment methods. Consequently, this is the first national review to synthesize this diverse and scattered literature into a comprehensive and unified framework.

This article synthesizes more than 100 scientific studies on the direct and indirect impacts of land development on wetlands and the key role wetlands play in watershed quality. First, it describes some of the functions and services wetlands provide and summarizes available replacement cost data when these services are lost. Next, the article discusses how land alterations introduce specific stressors to wetlands, such as increased sediment and nutrient loads, changes in hydrology, and disconnection with the floodplain. These stressors ultimately affect the function and condition of the wetland, so the rest of the article illustrates the link between these stressors and the ultimate impacts they have on wetland plant, animal and vegetative communities.

Box 1. Important Wetland Definitions Used in this Article

- *Contributing Drainage Area (CDA)*: Specific landscape features that transmit water to wetlands (e.g., surface drainage areas, groundwater recharge areas, stormwater outfalls)
- *Impact*: Response of a wetland to one or more stressors. Examples include changes in water level fluctuations, die-out of native species, decline in amphibian abundance and diversity, and growth of invasive plants.
    - Direct Impact*:* wetland loss or degradation resulting from activities that occur within wetlands, such as dredging, filling and draining. Activities that cause direct impacts are largely regulated through the federal and state wetland permitting process.
    - Indirect Impact: Impact to wetlands caused by inputs of stormwater and pollutants generated by land development or other activities within the wetland CDA.
- *Land Development*: The conversion of rural land to urban land use; it should not be construed to mean conversion to agricultural land uses.
- *Sensitive Wetland*: Wetland types that have a very low tolerance for indirect impacts of stormwater. Examples include bogs, fens, and vernal pools.
- *Stressor*: The negative result of land alteration in a wetland's CDA. Examples include increased water level fluctuations and sediment deposition. Cumulatively, these stressors result in impacts that can change the type of wetland or eventual loss of the wetland.
- *Wetland functions*: Ecological or hydrologic benefits provided by wetlands. Examples include flood attenuation, water quality improvement, wildlife habitat, and groundwater recharge.
- *Wetland services*: Free benefits that result from a wetland's function. This may include benefits such as natural flood control and water treatment, recreation and education, or reduction in damages from storm surges and hurricanes.

Why are Wetlands Important to Watersheds?

Wetlands provide many functions and services within local watersheds, yet the economic benefits of wetlands are seldom appreciated by growing communities. The precise functions and services provided by wetlands depend on their size, type, and location within an urban watershed. Brinson (1993a) developed the HGM (hydrogeomorphic) approach of classifying wetlands based on their hydrologic regimes and landscape position. The HGM classification of wetlands also determines the types of functions provided by the wetland (Table 1). Urban wetlands can improve water quality by removing pollutants, minimizing flood damage by slowing and storing floodwaters, and protecting shorelines from erosion by absorbing storm surges. Wetlands also supply habitat for birds and wildlife and create recreational opportunities. On a global basis, the aggregate value of the ecological services generated by wetlands has been estimated to be $4.9 trillion/year (Costanza *et al.* 1997).

Table 1. Watershed Functions Provided by HGM Wetland Types		
HGM Wetland Type	**Description**	**Common Functions and Values**
Depressional	Topographic depression with closed contours that may have inlets or outlets, or lack them	• Flood storage • Habitat • Pollution treatment • Erosion control
Slope	Surface discharge of groundwater on sloping land that does not accumulate	• Habitat • Pollution prevention • Erosion control
Flat	Low topographic gradients, such as old glacial lake beds, with moderate to abundant rainfall	• Habitat • Pollution prevention • Flood storage • Limited recreational
Riverine	Occur in the floodplain and riparian corridor of larger streams and rivers (e.g., 2nd order and higher)	• Flood conveyance and storage • Shoreline protection and erosion control • Pollution treatment • Fish and waterfowl habitat • Recreation
Fringe	Adjacent to lakes or estuaries	• Habitat • Pollution treatment • Water supply protection (lake fringe only) • Shoreline protection and erosion control • Recreation
Adapted from Kusler (2003), Brinson (1993a), Brinson (1993b), Gwin et al. (1999), and Spivey and Ainslie (no date)		

These "free" services are often taken for granted, but they can easily be lost as wetlands are altered or degraded in a watershed. Richardson (1995) states that when less than 10% of a watershed is wetlands, higher peak stormwater flows will occur. Similarly, Mitsch and Gosselink (2000) estimate that watersheds should retain 3-7% of its area in wetland coverage, at a minimum, to retain adequate flood control and water quality services (Table 2), while phosphorus removal requires as much as 15% wetland coverage per watershed.[1] Preventing the loss of wetland services can be challenging, particularly when financial gains for individual parcel development seemingly outweigh non-market wetland values reaped by the community at large.

However, replacing the lost ecological services of wetlands can be expensive, assuming they can be replaced at all. For example, a community that loses wetland services may need to invest in more costly drinking water treatment, stormwater management, and flood control infrastructure. Similarly, residents may also face higher flood insurance premiums, lower property values, and reduced recreational amenities when wetland services are diminished (Box 2). Communities need to manage wetlands on a watershed basis rather than an individual basis to maximize the watershed value of wetland services.

[1] The percent wetland cover needed in a watershed to maintain these services can vary significantly and depends on factors such as wetland type, watershed size, topography, and area of the country.

Table 2. Estimated Wetland Cover Required in Watersheds for Specific Functions
(from Mitsch and Gosselink, 2000)

Function (*location*)	Watershed area (mi^2)	% Wetland Cover	Reference
Water quality improvement *(IL)*	145	1-5 %	Hay *et al.* (1994)
Phosphorus retention *(Great Lakes Basin, MI)*	80	15%	Wang and Mitsch (1998)
Nitrogen removal *(Sweden)*	341	5%	Arheimer and Wittgren (1994)
Flood control *(Upper Mississippi Basin)*	733,594	7%	Hey and Philippi (1995)
Nitrogen retention *(Mississippi River Basin)*	1,158,306	3.4% - 8.8%	Mitsch *et al.* (1999)

Box 2. Services Lost as Wetland Quality and Function Decrease

As wetlands are degraded or lost within the watershed, communities can expect to pay the price in:

- Decline in water quality as pollutant removal capacity is reduced, triggering additional federal requirements (e.g., TMDLs) for waters not meeting designated use standards
- Increased flood frequency and peak discharges as wetland storage capacity is diminished, resulting in increased property damage, higher flood insurance premiums, and increased public safety concerns
- Increased local costs for infrastructure related to drinking water filtration, stormwater facility maintenance, and flood prevention
- Loss of biodiversity and habitat for aquatic and terrestrial species
- Reduced recreational, educational, and aesthetic open space affecting the quality of life for watershed residents

While a full discussion of the economics of wetlands is beyond the scope of this article, extensive research has been published on the monetary value of wetlands. For a general review of basic wetland valuation techniques, the reader may consult Boyer and Polaski (2004) or Faber and Costanza (1987). The economic value of wetland services can be estimated based on several factors such as:

- The cost to replace wetland services
- What people are willing to pay to enjoy recreational or aesthetic benefits (e.g., travel costs, fees)
- The cost of avoided damages (e.g., flood insurance claims)
- The value of market goods produced (e.g., tons of fish caught)
- The discount or premium in land prices adjacent to wetlands (e.g., home prices adjacent to wetlands)

Estimates of the per acre value of wetland services run as high as $370,000/acre in 1992 dollars (Heimlich *et al*. 1998). The exact value can be attributed to the type and location of the wetland, the services it provides, and the economic methods and assumptions used. More information on the value of various wetland services can be found in Heimlich *et al*. (1998), which summarizes more than 35 wetland valuation studies. Some case studies of the watershed value of wetland services are also presented in Box 3 at the end of this section.

Table 3 summarizes wetland functions and describes the various infrastructure needed to replace those services, most of which are extremely expensive. The next section describes in detail how the following common wetland functions translate into wetland services:

- Pollutant removal
- Flood attenuation
- Groundwater recharge
- Shoreline protection
- Wildlife habitat
- Other services

Table 3. Wetland Functions, Services, and Replacement Options

Function	Services	Alternatives
Pollutant removal	Maintain drinking water quality; process sewage; cycle nutrients; retain sediment; filter runoff; transport organic matter	Water filtration plants; Wastewater treatment plants/ package plants; stormwater facilities with water quality criteria (WQv); Inter-watershed transfer; animal waste storage
Flood attenuation	Storage capacity to reduce downstream flood volume; slow flow to reduce peak discharges and encourage particulates to settle out; protect downstream property; public safety	Stormwater treatment practices (storage); dikes and levees; advanced floodplain construction design
Groundwater recharge and discharge	Maintain baseflow conditions in streams; minimize salt water intrusion	Deeper wells; alternative water source; injection wells
Shoreline protection	Fringe wetlands provide vegetative bank protection; absorb storm surges	Revetments; stream bank stabilization and repair practices; Stormwater treatment practices for channel protection
Wildlife habitat	Habitat for aquatic, terrestrial, and avian species; protective spawning and nursery areas; support biodiversity; biomass production; connective wildlife corridors; habitat for RTE species; foraging grounds for migrating birds	Wetland restoration; species stocking
Other	Recreation, education, and aesthetics (*e.g.*, duck hunting, angling, bird watching, hiking, canoeing, science curriculum, research opportunities, open space, quality of life); commercial products (peat, timber, fish and shellfish, cranberries, and rice)	Wetland restoration

Pollutant Removal

One of the primary watershed functions wetlands provide is maintenance of water quality in lakes, rivers, streams, and groundwater through pollutant removal. Wetlands are natural filters that can remove, retain, or transform a variety of pollutants. Through biological and chemical processes, wetlands intercept surface runoff and remove or assimilate sediment, nutrients, pesticides, metals and other pollutants, and reduce suspended sediment transport (Mitsch and Gosselink, 1993). The actual capability of an individual wetland to remove pollutants is complex and variable. Removal rates vary from wetland to wetland and season to season, and are related to wetland size and type, landscape position, soil properties, groundwater connection, and vegetation among other factors (Mitsch and Gosselink, 1993). In fact, some wetlands can act as sinks for certain pollutants (sediment and nutrients) and sources of others (bacteria). Gabor *et al.* (2004) summarizes key factors that shape nutrient and sediment removal from natural and constructed wetlands.

A few studies have documented the cumulative value of wetlands in reducing watershed sediment loads. Watersheds with more wetland coverage tend to have lower concentrations of suspended solids in receiving waters than watersheds with fewer wetlands (Carter, 1997). In a comparative study in Wisconsin, Novitzki (1979) reported that sediment loads were 90% lower in a watershed with 40% wetland/open water coverage compared to a watershed containing no wetlands.

Nutrient removal by wetlands is important to reduce downstream eutrophication whose symptoms include algal blooms, decreased water clarity, anoxia and fish kills. In freshwater systems, phosphorus frequently causes eutrophication, while nitrogen is more often the culprit in coastal and estuarine watersheds. Wetlands remove nitrogen through settling, denitrification, microbial assimilation and plant uptake. A review of prairie pothole wetlands by Crumpton and Goldsbourough (1998) found that these wetlands were exceptional nitrogen sinks, where denitrification helped reduce nitrogen loads by 80%.

Phosphorus removal is accomplished in several ways in wetlands – settling, adsorption onto organic substrates, precipitation, and biological uptake. Floodplain wetlands have been shown to be particularly good at retaining phosphorus (Craft and Casey, 2000). Mitsch *et al.* (1999) estimated that if the measured phosphorus removal of an Ohio wetland were extrapolated to all of the existing wetlands surrounding Lake Erie, as much as 75-100 tons of phosphorus could be removed annually. Further, Mitsch estimated that if 25% of the original wetland area draining to Lake Erie were to be restored, an additional 24-33% reduction in phosphorus was possible.

Several studies have documented the ability of wetlands to improve the quality of groundwater. A natural marsh wetland was shown to effectively assimilate landfill leachate near Pembroke, Ontario (Fernandes *et al.*, 1996). Richard and Connell (2001) reported reductions in dissolved chlorinated compounds in groundwater for a wetland adjacent to a Minnesota manufacturing site. Wetlands with highly organic substrates and high densities of submerged aquatic plants appear to be able to remove pesticides (Brock *et al.*, 1992). The removal rate for pathogens in natural wetlands has not been widely studied, but research on constructed stormwater and wastewater treatment wetlands indicates that they can be extremely effective. Constructed wetlands designed

with long retention times, high light penetration, and emergent vegetation achieved higher pathogen removal rates (Schueler, 1999).

The capacity of wetlands to remove pollutants can be overwhelmed when they receive significant stormwater flows and pollutants from upland development. These stressors alter the chemical and biological processes needed to assimilate nutrients and retain organic matter and sediment. As such, impervious cover in the contributing drainage area can be a strong indicator of the declining performance of wetlands in removing pollutants – more on this topic is provided in Section 3.3. Table 4 summarizes some of the recently published studies on pollutant removal rates for both natural and restored wetlands.

Table 4. Percent Reduction in Common Pollutants in Natural and Restored Wetlands
(Taken from Gabor *et al*., 2004)

Type	Location	Pollutant Type*						
		TN	NO_3	NH_4	TP	SRP	TSS	Pathogens
Natural Wetlands	South Carolina; riparian wetland receiving golf course runoff	n/a	80	n/a	n/a	74	n/a	n/a
	North Carolina; natural wetland receiving stormwater runoff from agricultural land	>80	n/a	n/a	59	y	91	n/a
	China; natural multi-depression wetland system receiving continuous surface runoff	n/a	n/a	n/a	93.9	90.0	94.9	n/a
Restored Wetlands	Spain; restored wetland receiving rice field runoff	50 to 98	n/a	n/a	n/a	<50	n/a	n/a
	Maryland; restored wetland in agricultural watershed (two year average)	n/a	35	25	n/a	n/a	0	n/a
	Georgia; restored riparian wetland adjacent to manure application area	n/a	78	52	66	66	n/a	n/a
	Alberta; restored marsh receiving wastewater; summer	n/a	87	76	64	n/a	n/a	n/a
	Alberta; restored marsh receiving wastewater; winter	n/a	-26	46	n/a	26	n/a	n/a
	Maryland; restored wetland receiving agricultural runoff	n/a	68	n/a	43	n/a	n/a	n/a
	Illinois; restored wetland receiving agricultural runoff	n/a	36 to 45	n/a	20	n/a	n/a	n/a

* TN = Total Nitrogen; NO_3 = Nitrate; NH_4 = Ammonia; TP = Total Phosphorus; SRP = Soluble Reactive Phosphorus; TSS = Total Suspended Solids

Flood Attenuation

Wetlands have the potential to collect, store, and slowly release runoff and floodwaters gradually over time. The degree of flood control depends on the size and shape of the wetland, its landscape position, the depth to the water table, soil permeability and slope. The storage function helps to minimize flooding of downstream properties, slow erosive flows in stream channels, and delay the arrival of peak discharges. For example, one study indicates that wetlands can store almost all of the snowmelt runoff generated in their watersheds, which can be very important in regions of the country where snowmelt flooding is a concern (Hayashi *et al.*, 2003). The value of wetland flood storage is often greatest in urban watersheds where past development has sharply increased peak discharges during flood events.

Filling depressional wetlands and encroaching onto floodplain wetlands can reduce their capacity to attenuate flooding in a watershed. For example, Gosselink *et al.* (1981) reported that the loss of floodplain forested wetlands and confinement by levees has reduced the floodwater storage capacity of the Mississippi River by 80%. When the wetland flood control function is diminished, most communities resort to a patchwork of expensive engineering practices to fix recurring flooding problems such as floodways, channelization, stormwater detention ponds, and levees. These engineering "fixes" are not always effective, particularly during extreme storm events such as the Mississippi floods in 1997.

The ability of wetlands to attenuate floods is evident when a hydrograph from a watershed with extensive wetlands is compared to a watershed with fewer remaining wetlands (Figure 1). The dramatic flood attenuation depicted for the Charles River (MA) was used to justify the purchase of 8,500 acres of headwater wetlands in the watershed as a cost-effective and natural flood control strategy. In this case, the 8 million dollar cost to preserve the wetlands was far less than $30 million price tag to construct engineered flood control structure to prevent flood damages (Thibodeau and Ostro, 1981).

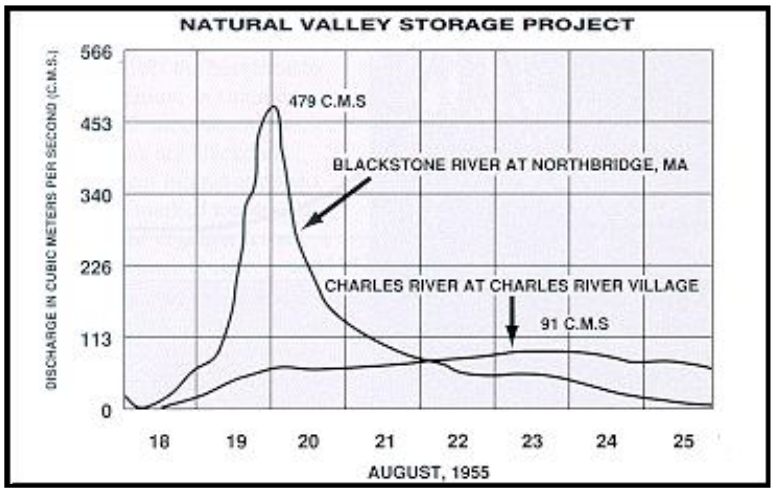

Figure 1. Hydrograph showing peak flows for the Charles River Watershed as compared to the Blackstone, which is a similar watershed with fewer remaining wetlands. Presented by Welsch et al. (1995) as derived from Thibodeau and Ostro (1981)

Groundwater Recharge and Discharge

Some wetlands help maintain water table levels by recharging groundwater, while other wetlands serve as discharge points for groundwater and thus provide a water source for adjacent wetlands and/or maintain baseflow discharges to streams (O'Brien, 1988 and Winter, 1988). These functions may be of particular importance when residents rely on groundwater as the source of their drinking water. In 1995, the U.S. Geological Survey (USGS) reported that groundwater supplied drinking water for 46% of the nation's overall population and 99% of the population in rural areas (in USEPA, 2002c).

The interaction between an individual wetland and local groundwater is complex and depends to a great extent on its landscape position. In addition, the magnitude of groundwater recharge rates is related to underlying soil permeability, vegetation density, and water table gradient (Carter and Novitzki, 1988; Weller, 1981). Peatlands, for example, are often separated from underlying groundwater by an impermeable layer of rock or soil. In these situations, groundwater recharge typically occurs through soils found around the perimeter of the wetland (Verry and Timmons, 1982).

Olewiler (2004) reports that forested wetlands overlying permeable soils can release up to 100,000 gallons per acre each day into groundwater. Groundwater levels can be greatly affected if wetlands are drained or developed. For example, a study by Ewel (1990) on a cypress swamp in FL suggests that if 80% of the wetland were drained, associated groundwater would be reduced by 45%.

Shoreline Protection

Because of their position in the landscape, fringe wetlands have the capacity to protect streams and shorelines from erosive winds, waves, and currents. These fringe wetlands contain vegetation and roots that consolidate soils, absorb wave energy, and help dissipate surface flows. The capacity of a wetland to dissipate erosive forces depends upon vegetative density and root structure, soil type, and the frequency and intensity that waves meet the shore or runoff cuts the bank. Wetland vegetation also increases local sedimentation, which can help build up streambanks and shorelines over time. When wetland vegetation is removed, increased shoreline and bank erosion can occur. This can result in loss of property, threatened infrastructure, or public safety concerns. States such as Florida and Louisiana are restoring coastal wetlands to serve as a buffer between development and hurricane storm surges.

When the shoreline protection services of wetlands are lost, the costs to stabilize eroding stream banks and shorelines rise sharply. The precise cost depends on the length stabilized, the types of engineering techniques employed (hard or soft), and site access. Large-scale projects such as beach renourishment, marsh restoration, and construction of revetment or bulkheads can be extremely expensive, require ongoing maintenance, and involve numerous state and federal permits. Even soft shoreline restoration projects are not inexpensive. Figure 2 depicts a fringe wetland restoration project along 175 feet of private shoreline. By adopting and enforcing shoreline criteria to fringe wetlands and their buffers, many of these costs can be minimized or avoided (see Article 3).

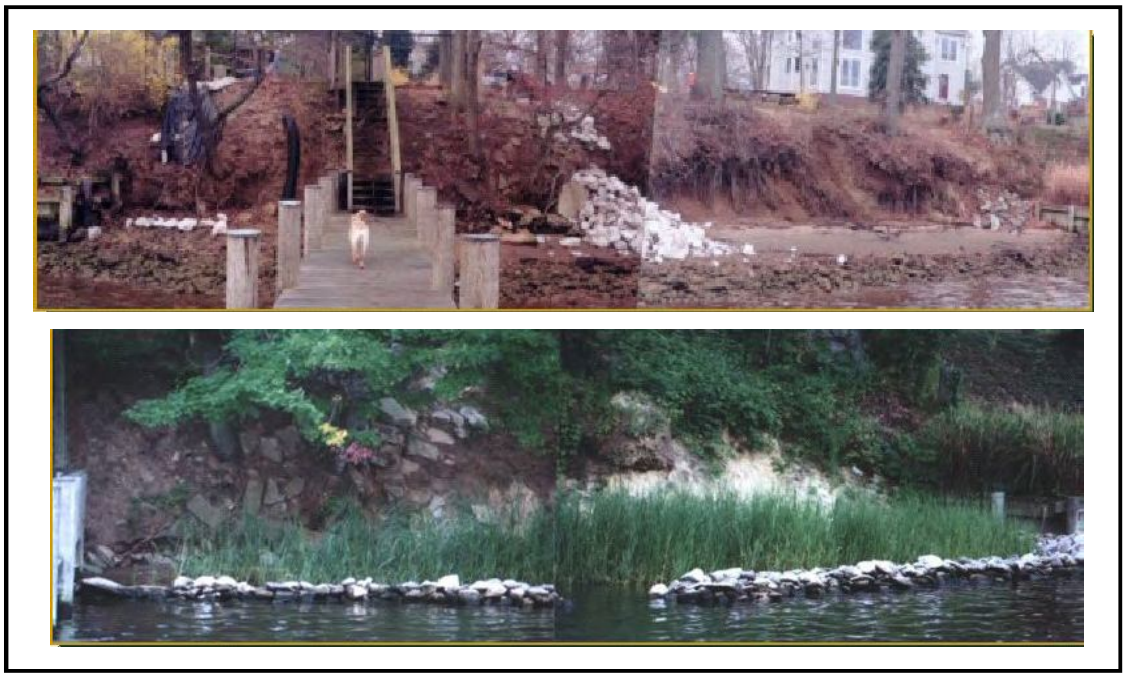

Figure 2. Before (top) and after (bottom) shots of a small shoreline restoration project. Here wetland plantings and rock sills were combined to prevent shoreline erosion. (Photos courtesy of South River Federation)

Wildlife Habitat

Comer *et al.* (2005) reported that wetlands provide habitat for more aquatic, terrestrial, and avian species on an area basis than any other habitat type, making them one of the most ecologically and economically important ecosystems on earth. In fact, more than 35,000 rare plants and animals are found in wetlands in the U.S. alone (Comer et al., 2005). Almost half of all federally threatened and endangered species rely on wetlands directly or indirectly during some stage of their life cycle, and all federally listed amphibian, fish, clam, and crustacean species depend on wetlands (NatureServe, 2003).

Wetlands produce considerable biomass and contain a mosaic of upland and wetland habitat features that helps support their high biodiversity. Each wetland type offers a unique mix of habitat elements such as cover, food, water, nesting and other life sustaining features. Many bird species rely on a variety of wetland types for foraging, breeding, and nesting habitat, particularly migrating waterfowl. For example, black ducks that winter in the coastal wetlands of the Chesapeake Bay rely on the prairie potholes in the upper mid-west for nesting. Coastal wetlands also serve as important nursery grounds for many recreationally and commercially important fish and shellfish, including shrimp. Some riparian and riverine wetlands in the Pacific Northwest are critical in the lifecycle of listed salmon runs.

Wetlands often form the remaining structure of wildlife corridors and open space in urban watersheds. The corridor function can be degraded, as shown by direct and indirect wetland impacts that commonly occur in urban watersheds. As will be documented in Section 2, changes

in wetland hydrology from upland development can have significant consequences on downstream aquatic species (Carter, 1997; Owen, 1999 and Kercher *et al.*, 2004).

Even degraded urban wetlands can still provide some degree of habitat function. For example, the Hackensack Meadowlands at one time were dominated by Atlantic white cedar swamps, salt marshes, and other wetland habitats. After centuries of development, these urban wetlands are now fragmented by dikes, fill and landfills and are extensively crossed by highways, railroads, and pipelines. Despite the cumulative loss of wetlands and the degradation of remaining wetlands, the Meadowlands still attract migrant and breeding waterfowl, are home to a moderate diversity of fish and other animals, and are host to a few rare plants (Kiviat, 2004).

Restoring degraded wetland habitat functions can be difficult and costly and can take many years. Some wetland types are more easily restored than others (fringe and open water wetlands versus bogs and fens). Wetland restoration may also never successfully replicate the original wetland community, particularly if hydrologic and water quality stressors in the contributing drainage area are not effectively managed.

Other Wetland Services

Wetlands provide many other services that generate a tangible economic benefit to communities including recreation, natural resources and education. For example, more than half of all adults hunt, fish, bird watch, boat, or photograph wildlife annually; much of this activity is centered around wetlands. In fact, more than 82 million Americans spent more than $108 billion on these activities in 2001 (USFWS, 2002).

Hunting and fishing are popular activities enjoyed by millions every year. An estimated $600 million is spent annually by waterfowl hunters on wetland bird species (USEPA, 1995). In 2001, nearly 10 million hunters spent more than $2.2 billion in pursuit of migratory birds and small mammals including muskrats and beaver that are often found in wetlands (USEPA, 2006). In 2004, harvested muskrat pelts were estimated to be worth about $124 million (USEPA, 2006).

The value of crab, shrimp and salmon in the U.S. was estimated at $1.167 trillion in 2004, all of which depend on wetlands for part of their life cycle. In fact, as much as 75% of commercially-harvested fish and shellfish and up to 90% of recreational fish in the U.S. rely on wetlands for some or all of their life cycles. (USEPA, 2006). A recent survey found that anglers spent an estimated $14.7 billion for fishing trips, $17 billion for equipment, and $4 billion in miscellaneous costs (e.g., licenses, stamps, land, magazines, etc.) in 2001 (USFWS, 2002).

As noted previously, the cost to replace lost wetland services is typically much higher than the cost of wetland protection. Box 3 reviews selected case studies that estimate the value of wetland services and/or estimate the cost to replace them with engineered practices.

The many functions and services provided by wetlands can be lost by both direct and indirect impacts to wetlands. The remainder of this article defines and describes direct impacts to wetlands and introduces the regulations that govern a portion of these impacts. The indirect impacts resulting from land development in the contributing drainage area are discussed. Studies that document the effects of these changes on wetlands are discussed, and the ultimate effects on wetland quality throughout a watershed are identified.

Box 3. Case Studies on the Value of Wetland Services and Costs to Replace Them

Pollutant Removal

- Replacing natural water filtration services such as wetlands is costly. More than $200 million is required to construct filtration plants and even more to operate (Barclay *et al.,* 2004). New York spent $1.4 billion on watershed protection for Catskills drinking water supply to avoid estimated filtration plant construction costs of $4-6 million dollars with annual operating costs of $300,000. To avoid building and operating a $200 million artificial water filtration plant, Portland, Oregon, spends $920,000 annually to protect the watershed (Krieger, 2001).
- Annual nitrogen and phosphorus waste treatment benefits received from existing 100,000 acres of wetlands in Lower Fraser Valley, British Columbia were estimated at $18 to $50 million dollars per year (Olewiler, 2004)
- Breaux *et al.* (1995) estimated annual wastewater treatment costs savings of $6,000-$10,000 per wetland acre at 15 Louisiana seafood processing plants (1992 dollars).

Flood Control

- The current flood protection benefits of wetlands in two Washington cities ranged between $36,000-$51,000 per acre (Leschine et al. 1997). The value of wetland flood control services increases as wetlands become more fragmented in urban watersheds.
- The cost to replace the flood control function of 5,000 acres of drained wetlands in Minnesota was found to be $1.5 million annually or about $300 to replace each acre/foot of flood water storage (Sipple, 2002).

Groundwater Recharge

- The value of a 550,000 acre swamp in Florida for aquifer recharge and flood storage was estimated to be $25 million/year (DU, no date)
- Acharya (2000) estimated the value of groundwater recharge for dry season agricultural irrigation and domestic use of the Hadejia-Nguru wetlands in northern Nigeria to be 6% of the yearly income per farmer.

Habitat

- More than $100 million in state and federal funds has been allocated for salmon recovery and habitat protection in the Pacific Northwest between 2000-2003 (Barclay *et al*., 2004).
- Residents of Tillamook, Oregon, value additional salmon habitat at $5,000/acre (Gregory and Wellman, 2001).
- Imus (2003) presents estimated project costs for wetland habitat restoration ranging from $50,000 to $300,000/per acre for projects under 50 acres.

Direct Impacts to Wetlands

Direct impacts occur when a wetland is dredged, filled, drained or otherwise altered by activities occurring inside the wetland boundary. Most direct wetland impacts are regulated to some degree under federal, state, and local wetland permit programs. Examples of direct impacts include draining wetlands for agricultural use by constructing drainage ditches or installing underground drainage tiles (Figure 3) and filling wetlands to provide useable land on which to build (Figure 4). Direct impacts usually result in wetland loss.

Figure 3. Drainage tiles are installed to convert wetlands to useable land for agriculture, a major cause of wetland loss
(Source: Michigan State University Department of Geography)

Figure 4. A portion of this wooded swamp (left) was filled to build a new subdivision in the Buzzard's Bay watershed, Massachusetts (Source: Buzzard's Bay National Estuary Program)

National Estimates of Wetland Loss from Direct Impacts

Dahl (1990) estimated that 221 million acres of wetlands existed in the lower 48 states in 1780. In the two centuries since then, more than 53% of wetland cover has been lost due to draining, dredging, filling, and flooding, which equates to a loss rate of 60 acres of wetlands per hour. Wetland loss has slowed considerably in the last two decades due to federal and state wetland permitting and increased wetland restoration (Table 5).

Table 5. Summary of Wetland Loss from the 1950s through 2004

Time Period	Net Loss of Wetlands	Net Annual Rate of Loss	Types Lost	Major Causes of Loss	Source
1950s to 1970s	9.1 million acres	458,000 acres per year	Majority of losses were freshwater wetlands	Agriculture (87%) Urban Development (8%) Other (5%)	Frayer *et al.* (1983)
Mid-1970s to mid-1980s	2.6 million acres	290,000 acres per year	98% of losses were freshwater wetlands	Agriculture (54%) Other* (41%) Urban Development (5%)	Dahl and Johnson (1991)
1986 to 1997	644,000 acres	58,500 acres per year	98% of losses were freshwater wetlands	Urban and Rural Development (51%) Agriculture (26%) Silviculture (23%)	Dahl (2000)
1998 to 2004	Net gain of 191,000 acres	Net gain of 32,000 acres	Net gain due to creation of 695,400 acres of ponds	Urban and Rural Development (61%) Agriculture (17% increase) Silviculture (8%)	Dahl (2006)

*Wetlands that have been cleared and drained but not yet put to a definable use

The U.S. Fish and Wildlife Service tracks the status and trends in wetland loss in the conterminous United States at regular intervals. Wetlands trend data are derived from remote sensing data and field surveys of randomly selected sample plots (Dahl, 2000 and Dahl, 2006). It is important to keep in mind that national wetland tracking efforts are subject to some limitations that may cause wetland loss to be underestimated. For example, the National Wetland Inventory (NWI) methods exclude very small or ephemeral wetlands and do not easily distinguish losses by wetland type, quality, or function (see Box 4).

Dahl (2000) estimates that 105.5 million acres of wetlands were present in 1997, which comprises about 5.5% of the land surface of the lower 48 states. Historically, most wetland loss has occurred in freshwater wetlands. Loss of estuarine wetlands has been smaller, but also reflects the fact that estuarine wetlands comprise less than 5% of the national total (Figure 5).

Box 4. Concerns About National Estimates of Wetland Loss

- Data collection methods used by USFWS have improved in accuracy over the years, allowing the NWI to capture smaller wetlands or wetland types that would not have been included in previous inventories. This may result in an overestimate of wetland gains.
- USFWS methods do not include ephemeral wetlands (wetlands that are dry for some portion of the year), wetlands smaller than one to three acres, Pacific coast estuarine wetlands, or wetlands that were previously converted for agricultural use (Dahl, 2000). The exclusion of ephemeral wetlands is particularly troublesome because they are often the most vulnerable to wetland loss since they are easily converted for development or agriculture. The NWI also does not effectively capture narrow, riverine wetlands and forested wetlands. (http://www.ag.iastate.edu/centers/iawetlands/NWIhome.html)
- USFWS reports do not consider the *quality* of the wetlands in question. For example, open water ponds were found to have the largest gain in area of all freshwater wetland types, probably due to creation of retention ponds to treat runoff from new developments (Dahl, 2006). Although the acreage of these ponds has increased, they arguably do not provide the same functions as other wetland types and therefore cannot be used to replace natural wetlands lost to direct impacts. Similarly, wetland creation, mitigation and restoration efforts that counted as gains may not replicate the quality or functions of the original wetlands lost.
- The watershed is generally a more accurate scale to track losses and gains in wetland acreage and functions than national estimates.

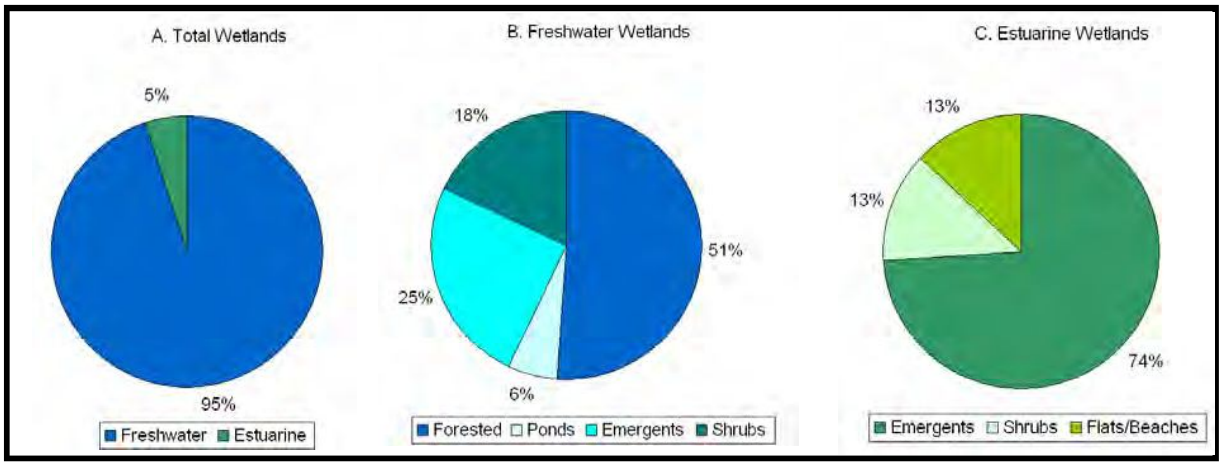

Figure 5. Distribution of Wetland Types in the U.S. (Source: Dahl, 2000)

As was shown in Table 5, the annual rate of wetland loss has decreased sharply, and a slight gain in wetland cover was actually reported in the most recent survey period (1998 to 2004). This slowdown in wetland loss may reflect more active enforcement of federal, state, and local wetland permits, and changing perceptions about wetland values and benefits. In addition, wetland area losses have been partially offset by gains in the creation of new wetlands in agricultural areas. Farm Bill programs such as the Wetlands Reserve, Conservation Reserve, Farmed Wetland Option and Conservation Reserve Enhancement have resulted in the creation of extensive amounts of freshwater wetlands. Dahl (2006) estimates that 564,300 acres of wetlands on agricultural lands were created from 1998 to 2004. This was offset by 488,200 acres of loss due to agricultural land use[2] during the same period, resulting in a net gain of 76,100 acres.

Two other key findings emerged from the most recent tracking survey. First, urban and rural development now account for more than 60% of national freshwater wetland loss with the balance lost to silviculture and conversion to deepwater habitat. The share of wetland loss due to development has steadily risen in each reporting period. Most of the losses due to land development occur in rather small increments- usually less than five acres at a time. The finding that development is now the leading cause of wetland loss argues for a stronger role for local governments to protect wetlands from the direct and indirect impacts of land development.

The second key finding is that nearly 700,000 acres of ponds were created from 1998 to 2004 period that are now classified as wetlands. Without these gains due to ponds, national net loss of wetlands would have continued in the last reporting period. The surge in pond creation was attributed to construction of ponds on agricultural as well as non-agricultural lands and may also reflect the construction of stormwater ponds in many parts of the country to comply with new state and federal stormwater rules. Most wetland scientists, however, do not consider ponds to have the same functional quality as a natural wetland. Indeed, research profiled in Section 3 argues that most stormwater ponds and wetlands are particularly degraded systems. This finding

[2] Agricultural land uses included horticultural crops, row and close grown crops, hayland, pastureland, native pastures and range land and farm infrastructures.

underscores the need for communities to go beyond the goal of no net loss in wetland acreage and seek to maintain overall wetland quality and function. Watersheds are often the most accurate and appropriate geographic unit to track losses and gains in wetland acreage and functions at the local scale.

Federal Programs to Reduce Direct Impacts to Urban Wetlands

Direct impacts to wetlands have historically been regulated by the federal government, although states, tribes, and local governments also have been involved. Tiner (1984) estimates that only about 0.5% of privately-owned wetlands in the lower 48 states are under some form of conservation easement or protection. The remaining 99.5% are potentially subject to direct impacts.

The primary federal authority to protect wetlands from the direct impact of land development is Section 404 of the Clean Water Act (CWA). Section 404 regulates the discharge of dredged or fill material into waters of the U.S., including wetlands. A Section 404 permit must be secured from the U.S. Army Corps of Engineers (USACE) or a delegated state agency before any of these activities can be undertaken. The permit applicant must demonstrate that they have taken steps to avoid impacts to a wetland, minimized any potential impacts, and performed mitigation to compensate for any unavoidable wetland impacts, to the extent practicable. Compensation can be provided by restoring a former wetland, enhancing a degraded wetland, creating a new wetland, or more rarely, preserving an existing wetland. The USACE administers the Section 404 wetland permit program with support from the U.S. Environmental Protection Agency (USEPA). USFWS and the National Marine Fisheries Service serve in an advisory capacity.

An *individual* permit is required for potentially significant wetland impacts, which are reviewed individually by the USACE. However, a *general* permit can be issued for discharges to wetlands that are deemed to only have a minimal adverse impact. General permits are issued on a nationwide, regional, or state basis for particular categories of activities, such as minor road repairs, utility line backfill, and surveying within wetlands. Nearly 85% of all wetland permit applications fall under *general* rather than *individual* permits (Davis, 1997).

Activities covered by general permits do not require public notice, and the general public and state and federal agencies do not have the opportunity to comment on individual projects. In some instances, the general permit process may eliminate individual review and allow certain activities to proceed with little or no delay, provided that applicants meet specific conditions outlined in the general permit. Under some nationwide general permits, permittees can proceed with activities without notifying the USACE (e.g., projects that disturb less than a specific acreage threshold) and are not required to perform mitigation (NRC, 2001). General permits cover projects thought to have minimal adverse environmental impacts, such as minor road crossings. As can be seen in Figure 6, the term “minimal” is subjective and is not defined in the CWA, so it is clearly subject to broad interpretation by the USACE and other review authorities.

The Section 404 wetland permit program does not regulate all activities in all wetlands. Section 404 exempts certain activities that may result in direct impacts to wetlands, such as farming, silviculture, and ranching activities that are part of an established and ongoing operation, as well as certain maintenance and construction activities. The Section 404 program only regulates

disposal of dredge or fill material into wetlands, but does not always regulate other activities, such as removal of material, drainage, or removal of vegetation. Box 5 outlines the limitations of the Section 404 program in protecting wetlands from direct and indirect impacts.

The scope of the 404 permit program has been profoundly influenced by several recent Supreme Court decisions. For example, in a 2001 case, the so-called SWANCC ruling (Solid Waste Agency of Northern Cook County) potentially reduced the acreage of wetlands subject to Section 404 permits. SWANCC appealed the denial of a Section 404 permit to fill an abandoned sand and gravel pit that had turned into a wetland and was being used by migratory birds. The Supreme Court ruled that the Corps of Engineers could not deny a Section 404 permit to alter isolated wetlands and other waters based on use by migratory waterfowl alone. Because the Supreme Court did not clearly define what was meant by "isolated" waters, it has been left to individual lower courts to decide which wetlands are still subject to the 404 permit program. According to some estimates, as many as 20 million acres of wetlands are at risk due to the SWANCC ruling – approximately 20% of the nation's wetland inventory (NRDC, 2003; Figure 7).

Figure 6. Wetland fills for road crossings such as this one in Minnesota are often covered under general permits (Source: Minnesotans for Responsible Recreation)

Box 5. Limitations of the Section 404 Program

- Does not protect wetlands from indirect impacts that occur within wetland contributing drainage areas (e.g., increased stormwater runoff or pollutant loads).
- Some isolated wetlands may be outside the geographic jurisdiction of the program.
- Some activities are not subject to regulation (e.g., drainage; removal of vegetation; activities that result in only incidental fallback; normal agricultural, silvicultural or ranching activities that are part of an established and ongoing operation).
- Most activities that are subject to regulations are authorized by general permits, which do not have as extensive a review process and may not require any mitigation.
- Does not address cumulative impacts to wetlands due to the permit-by-permit approach as opposed to a watershed approach.
- Does not successfully replace wetland types or functions because mitigation wetlands are often not of the same type as the wetland they are replacing, and insufficient guidance exists on how to mitigate for functions and measure success.
- Does not always replace lost wetland acreage due to high failure rates of mitigation wetlands or lack of implementation and enforcement.

Figure 7. Prairie pothole wetlands such as these in South Dakota are generally considered isolated and may be vulnerable to direct impacts in light of the SWANCC ruling (Source: NRCS photo gallery)

In June 2006, the Supreme Court ruling in *Rapanos v. U.S.* and *Carabell v. U.S. Army Corps of Engineers*, potentially increased the vulnerability of many smaller streams and wetlands. In these cases, the Corps sued two Michigan property owners (Rapanos and Carabell) for filling in some infrequently saturated wetlands. The Court's split decision ultimately sent the cases back to the lower courts to decide, but the controlling opinion was that in order to assert jurisdiction over such waters, the Corps would have to establish a "significant connection" between wetlands and "navigable waters" on a case-by-case basis.

Because the Court did not define what constitutes a "significant connection," this ruling, along with the SWANCC decision, may leave isolated wetlands and ephemeral and intermittent streams vulnerable to loss under the Clean Water Act (e.g., Section 404 permits, National Pollutant Discharge Elimination System, and Section 401 Water Quality Certification). Article 6 provides further discussion of this issue.

Another wetland enforcement issue involves what is known as the "Tulloch Rule," which allowed developers to ditch or drain wetlands, provided the activity did not result in a redeposit of material back into the wetland (referred to as "incidental fallback"). In 2001, USEPA and USACE attempted to reduce wetland losses from this loophole by defining specific activities, such as ditching, draining, in-stream mining, and channelization that cause more than incidental fallback and are therefore subject to 404 regulation, unless project-specific evidence shows otherwise. As can be seen in Figure 8, ditching under the Tulloch Rule still continues in some regions of the country.

Figure 8. This South Carolina wetland was being drained and ditched in July 2006.

Another limitation of the Section 404 permit program occurs when mitigation is used to compensate for unavoidable wetland loss. Two independent reports conducted in 2001 by the National Research Council (NRC) and the U.S. Government Accountability Office (GAO) questioned the effectiveness of mitigation efforts. The GAO report focused on mitigation that occurred under an in-lieu-fee arrangement, where developers pay fees to public or private wetland banks that fund creation or restoration wetlands. The GAO report concluded that "the extent to which the in-lieu-fee option has achieved its purpose of mitigating adverse impacts to wetlands is uncertain." No data was available to determine whether wetland banks were actually mitigating wetland losses, and in some cases, whether required mitigation was ever performed. Some USACE district offices considered mitigation to be successful as soon as the developer wrote a check, even if no mitigation was performed.

NRC (2001) concluded that the goal of no net loss of wetlands was not being met from the standpoint of wetland function. A review of Section 404 wetland permits issued from 1993 to 2000 indicated that about 24,000 acres of wetlands were permitted to be filled each year at the same time that 42,000 wetland acres were created as part of compensatory mitigation, yielding a net gain in wetland acreage on paper. NRC found, however, that data was inadequate to determine if mitigation was actually successful in replacing lost functions because wetland functions lost due to permitted fills were never reported. In other cases, the review found that as many as 34% of required mitigation projects failed to meet permit conditions or were not implemented.

Indirect Impacts to Urban Wetlands

Indirect impacts are caused by increased stormwater and pollutants generated by land development within a wetland's contributing drainage area (CDA) that stress the plant and animal community. Because wetlands are often located at the topographic low point of a watershed, they are often profoundly influenced by activity in upland areas. It is important to note that most federal, state, and local wetland permit programs start and stop at the wetland boundary and do not consider or regulate activities that occur within wetland CDAs.

This section reviews research on the indirect impacts to wetlands in three steps. First, research is profiled that documents changes in hydrology as land development occurs in the CDA. The next part reviews research that shows how these factors alter the hydrologic conditions and water quality within urban wetlands. Lastly, the research on how plants and animals respond to these urban wetland stressors is summarized.

Finally, the section concludes with a review of the research on the cumulative impact of land development on wetland plant, aquatic invertebrate, amphibian, bird, and mammal communities. Based on this review, the section examines whether it is possible to predict biological response based on a CDA metric such as impervious cover. Although impacts are frequently seen at low levels of development, there is not enough comparable data to warrant an Impervious Cover

Model[3] approach at this time. Instead, the concept of sensitive wetlands is introduced as a management alternative, and a preliminary list of sensitive wetland communities is presented.

Hydrologic Changes in the Contributing Drainage Area

Three main processes associated with land development significantly change the hydrology of the CDA. First, native vegetation that once intercepted rainfall is removed and soils are compacted. Second, impervious cover is created when roads, rooftops, and parking lots are constructed, which greatly increases runoff volumes. Lastly, efficient storm drainage systems are installed to quickly convey runoff to downstream waters, including wetlands. As a result of these changes, infiltration and recharge of groundwater is diminished.

The construction of roads across streams and wetlands can also cause hydrologic changes that extend a significant distance upstream and/or downstream. Crossings of an individual wetland can cause direct wetland impacts, which may be regulated under Section 401 or 404 of the CWA. However, wetlands can also be indirectly impacted by roads that cross the wetland, tributaries to the wetland in the CDA, or just downstream of the wetland. The primary indirect impact is flow constriction.

The three changes from land development with the most potential to impact wetlands include:

- Increased stormwater runoff
- Decreased groundwater recharge
- Flow constrictions

Stormwater runoff to wetlands is strongly influenced by impervious cover within the CDA and may increase annual surface runoff to a wetland by one to two orders of magnitude.

This section describes how land development contributes to each of these hydrologic changes. The following section then describes how these changes result in specific hydrologic stressors to wetlands. Kercher and Zedler (2004) summarize a wide range of studies that indicate how land development in the CDA alters the natural hydrologic regime of wetlands.

<u>Increased Stormwater Runoff</u>

Stormwater engineers have shown how increases in impervious cover in a watershed can dramatically increase the rate and volume of stormwater runoff compared to pre-development levels (Schueler, 1987). Stormwater runoff can increase by one to two orders of magnitude, depending on the nature of the predevelopment land cover (Schueler, 1987). The predictable increase in runoff generation as a function of impervious cover is illustrated in Figure 9. Depending on how much of the CDA is covered by impervious surfaces, stormwater runoff to a downgradient wetland can increase dramatically -- particularly if stormwater is directly discharged to a wetland through a ditch, channel or storm drain pipe.

For example, Schueler (2001a) reported that the total runoff volume from a one-acre parking lot is about 16 times greater than that produced by an undeveloped meadow. Cappiella *et al.* (2005)

[3] The Impervious Cover Model (ICM) illustrates the relationship between subwatershed IC and expected stream quality, and defines three broad urban subwatershed categories–impacted streams, non-supporting streams, and urban drainage. For additional information on the ICM, see Schueler (2004).

noted that the same sized parking lot generates 19 times more runoff than an acre of mature forest. Table 6 shows the changes in the runoff coefficient, which expresses the fraction of annual rainfall converted to stormwater runoff, for forest, turf and impervious cover. It is important to note that the impact of increased stormwater runoff largely depends on the wetland's landscape position. For example, fringe wetlands in lacustrine, riverine or estuarine settings tend to be impacted less because they are more affected by water levels in the adjacent lake, estuary or river than by local surface runoff in the watershed.

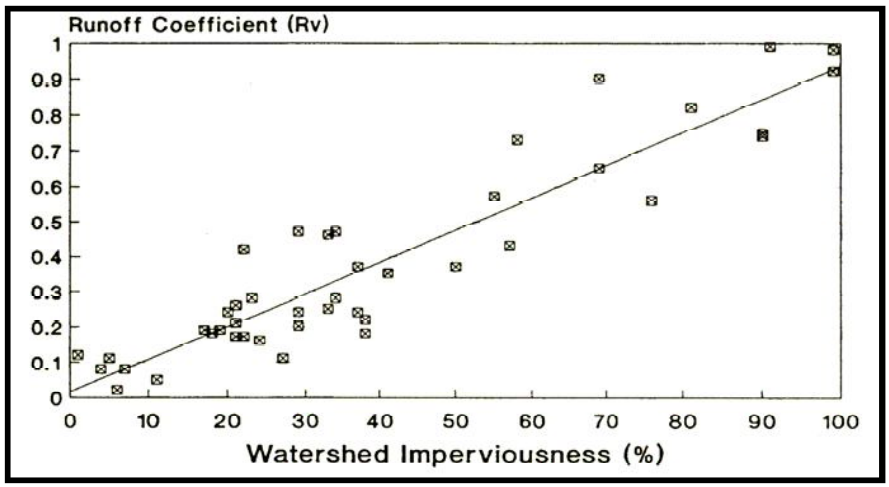

Figure 9. Increased runoff coefficients with changes in watershed imperviousness
Source: Schueler, 2000

Table 6. Runoff Coefficients for Various Land Uses

Forest Cover [1]	Turf Cover [2]	Impervious Cover[3]
0.05	0.10	0.95

1: Measured runoff coefficient from Mostaghimi, *et al.* (1994).
2: Average from Legg, *et al*. (1996) and Pitt (1987) for B and C soil types.
3: Regression of 40 sites nationally in Schueler (1987).

Decreased Groundwater Recharge

As impervious cover increases within the wetland CDA, infiltration of rainfall into the soil is proportionately reduced. Compaction of upland soils during the construction process can also sharply reduce soil infiltration rates (Schueler, 2001). This reduced infiltration translates into reduced groundwater recharge that is needed to sustain many wetlands. Numerous studies have also shown that impervious cover can reduce groundwater recharge in small urban watersheds (e.g., CWP, 2003 and Saravanapavan *et al*., 2004).

Flow Constrictions

Flow constrictions can be caused by the construction of roads, bridges, pipelines or other structures across individual wetlands, or upstream or downstream of them (Figure 10). Perhaps the most common cause of flow constriction is when culverts are installed to provide a conduit to move water underneath a road. Although most culverts are sized to carry flow from 10 to 100-year recurrence design storms, they often lose hydraulic capacity due to sedimentation and increased peak flows from new upstream development. Undersized culverts cannot fully convey the increased flows from the watershed and create a constriction to flow that can impact the hydrology of both upstream and downstream wetlands. This disconnection is often very significant for tidal wetlands as the crossing impedes the natural flux of water from storms and tides.

While much research has focused on the hydrologic impact of larger road and highway crossings (see Richardson *et al*., 2003; Forman and Deblinger, 2000; Richardson and Nunnery, 1998), smaller, local road crossings are much more common in the urbanized landscape and may exert a stronger hydrologic impact (Gailbrath *et al*. 2005). May *et al*. (2000) observed that road density in urban watersheds is a direct function of impervious cover, and Schueler (2004) reported the density in urban watersheds at two to 10 crossings per stream mile. The high road and stream crossing density observed in urban watersheds suggests that there is a high probability that many urban wetlands will experience flow constriction to some degree.

Researchers have documented the upstream and downstream hydrologic impacts of crossings on wetlands, and the high crossing density expected in most urban watersheds suggests that constrictions may be a common problem for many urban wetlands.

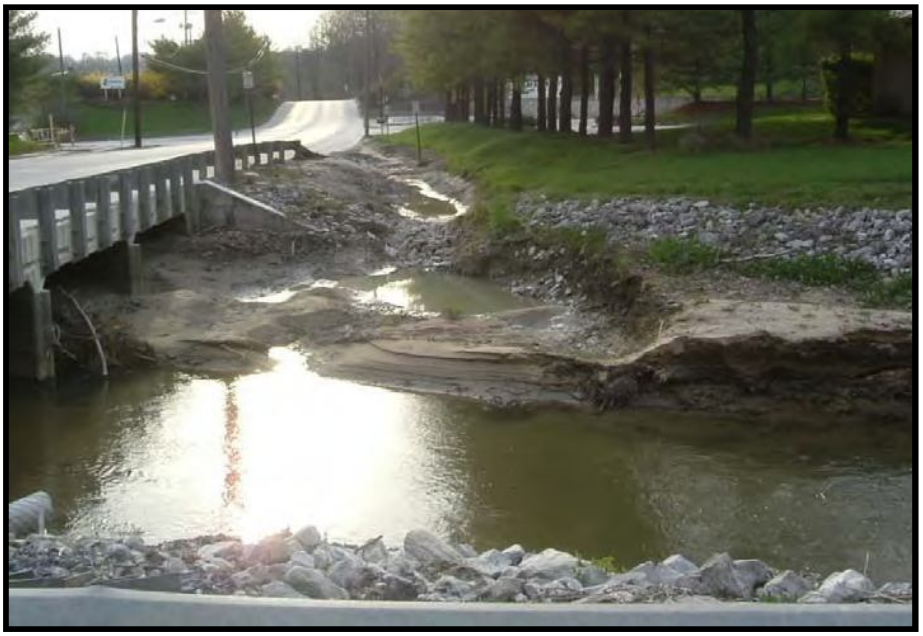

Figure 10. Road crossings interrupt urban streams and can affect hydrology of streams and wetlands.

Hydrologic Stressors to Urban Wetlands

Wetland scientists consistently regard hydrology as a critical factor in determining the type and functions of a wetland and the kinds of plants and animals that will inhabit it (Welsh, *et al.*, 1995; Mitsch and Gosselink, 1993). Hydrology is one of the three defining factors to delineate a wetland and is used in most wetland classification schemes. The natural hydrology of a wetland evolves in response to groundwater contributions, adjacent surface waters, and gains and losses from surface flows, precipitation, and evapotranspiration.

The previous section demonstrated how development in the CDA can alter many of the variables of a wetland water balance. The key question is at what point do these hydrologic changes create significant wetland alterations that stress the plant or animal community? Researchers have reported five possible ways that changes in CDA hydrology can become a stressor within an urban wetland:

1. Increased ponding
2. Increased water level fluctuation
3. Flow constrictions
4. Decreased groundwater discharge
5. Hydrologic drought in riparian wetlands

Each hydrologic stressor and its resulting impacts on the plant and animal community are described below.

Increased Ponding

Increased stormwater runoff can lead to increased ponding depth within a wetland, particularly if the wetland has a water budget that was previously dominated by precipitation, or if it does not have the capability to rapidly discharge excess stormwater runoff via groundwater, surface water discharge, evapotranspiration, or other outlets. When this occurs, there inevitably will be deeper water in the wetland throughout much or all of the year. Increased ponding can also be caused by constrictions below wetland outlets such as undersized culverts.

Table 7 summarizes the rather limited research on the effects of increased ponding on wetlands. An excellent example of the ponding effect is reported by Owen (1999) who analyzed historical changes in water depth in a wetland adjacent to the Yahara River in Wisconsin. By 1990, the wetland's watershed had become 63% impervious, and stormwater runoff was conveyed to the wetland through ditches. Increased stormwater runoff due to land development produced a 20-fold increase in surface depth in the wetland from levels measured in 1850. The increased ponding promoted conditions favoring the spread of invasive wetland plants. Ernst and Brooks (2003) observed that increased ponding in forested wetlands can shift the community composition to more flood tolerant tree species.

Increased ponding also creates favorable habitats suitable for nonnative and predatory fish, which can impact native amphibian populations (USGS, 2004; Delis *et al.*, 1996). In a study of Ontario wetlands, Hecnar and M'Closkey (1998) found a correlation between amphibian species richness and increased water depth. Other studies have determined that increased ponding resulted in a decrease in sensitive amphibian species and an increase in tolerant species such as the bullfrog, *Rana catesbeiana,* shown in Figure 11 (Delis e*t al.*, 1996; Rubbo and Kiesecker, 2005). In some cases, the most urbanized wetlands were found to contain only one species, the bullfrog (Reinelt *et al*. 1998).

Stormwater runoff can cause deeper ponding in wetlands that cannot rapidly discharge flows. This leads to changes in wetland type, function and quality.

Table 7. Recent Research on the Effects of Increased Ponding		
Key Finding(s)	**Location**	**Reference**
The functional responses of impacted forested wetlands were compared with non-impacted "reference" wetlands to determine the effects of highway construction. Water surface elevation, water depth, and tree stand density and mortality were indicative of changes in wetland functional change due to the presence of highways.	NC	Richardson and Nunnery, 1998
Excavated wetlands had deeper water levels (increased volume) and longer hydroperiods than natural wetlands. Water depth changes led to a change in plant community composition in disturbed wetlands. 90% of the experimental shallow-marsh plot areas of excavated wetlands lacked vegetation throughout the wetland	ND	Euliss and Mushet, 2004
Changes in land use resulted in increased ponding, which produced large scale changes in wetland vegetation.	WI	Owen, 1999
Changes in wetland hydrology affected plant communities (increase in exotic grasses) and species richness (50% decline over a few decades) within a wetland.	Ontario	Chow-Fraser *et al.*, 1998
Declines in plant species richness were observed in Puget Sound wetlands when water ponding depth exceeded two feet.	WA	Azous *et al.*, 1997
Invasive wetland plants outgrew perennials in four differing hydrologic regimes. Species sensitive to flooding were found in drier, groundwater-fed, and nutrient-poor environments. Noninvasive plants tolerated flooding but produced less biomass and were shorter lived than the invasive plants.	WI	Kercher and Zedler, 2004

Figure 11. Pollutant-tolerant bullfrog, *Rana catesbeiana*
Photograph by Jason Tomlinson

Increased Water Level Fluctuation

Water level fluctuation (WLF) is defined as the difference in the minimum and maximum water levels in a wetland for a given period of time and is often used to quantify a wetland's hydroperiod. The difference between ponding and water level fluctuation is the duration of time in which water levels remain elevated. In the case of ponding, the high water elevations are maintained for several seasons or even the entire year, whereas water level fluctuations are a temporary event measured in days or weeks. High water levels occur in response to moderate and large storms, but quickly return to a base level. Some researchers refer to WLF as the "bounce" in water levels during and after a storm event.

Water levels in most wetlands are dynamic and change on a seasonal or annual basis. Water levels tend to vary seasonally in wetlands that rely on local precipitation, while wetlands that rely more on groundwater tend to have more stable water levels (Mitsch and Gosselink, 1993). In urban watersheds, excessive stormwater runoff can sharply increase the amplitude of WLF for many wetland types.

The link between development in the CDA and increased WLF was first reported for palustrine wetlands in the Puget Sound lowlands of western Washington. Several researchers has confirmed a strong relationship between greater mean WLF and percent impervious cover (IC) in the CDA (Table 8). Taylor *et al*. (1995) found that when IC in the CDA exceeded about 4%, significant increases in both mean and maximum WLF could be detected in wetlands and determined that IC was the most important predictor of WLF.

Table 8. Recent Research on the Effects of Changes in Water Level Fluctuation

Key Finding(s)	Location	Reference
In a study of the impacts of urbanization on Puget sound wetlands, 78% of watersheds with >21% impervious area had wetland WLF ranges greater than 33.4 inches. Watersheds with more than 21% total imperviousness were more likely to have mean annual water level fluctuations greater than 7.9 inches. The relative frequency of thin-stemmed emergent plants in the wetlands decreased over time due to increasing WLF and mean depth. These species are important for amphibian breeding and egg attachment sites.	WA	Chin, 1996
Watersheds with < 5.5% IC had a mean wetland WLF < 8.3 inches. With IC > 21%, WLF exceeded 8.3 inches 89% of the time. Declines in plant species richness in emergent and scrub/shrub wetland zones occurred as WLF increased - in both zones where WLF was greater than 8.7 inches, richness decreased significantly.	WA	Horner *et al.*, 1997a
Significant increases in WLF were noted for wetlands draining the most developed watersheds.	WA	Reinelt and Horner, 1991
In Puget Sound wetlands, species richness was found to be significantly lower when water depths were more than two feet. Emergent plant zones with WLF >9.4 inches had fewer plant species than in zones with <9.4 inches. Wetlands with higher WLF had lower species richness and increasing dominance by invasive plants. Urbanization causes emergent meadows to become dominated by cattail or reed canary grass.	WA	Azous *et al.*, 1997

Table 8. Recent Research on the Effects of Changes in Water Level Fluctuation		
Key Finding(s)	**Location**	**Reference**
20% impervious cover from upstream development increased peak and volume of stormwater runoff to the point that it began to dominate the hydroperiod of downstream wetlands. Watershed forest cover, watershed IC, constriction of wetland outlet and ratio of wetland to watershed area had strongest influence on WLF.	WA	Reinelt and Taylor, 2001
From 1988-1995, 19 Puget Sound wetlands showed changes in wetland hydrology resulting from urbanization. In both scrub/shrub and emergent wetlands, plant richness was significantly negatively correlated with percentage impervious area within the watershed and mean WLF.	WA	Reinelt *et al.*, 1998
In the same study of 19 Puget Sound lowland wetlands (Reinelt *et al*, 1998), the ratio of wetland area to watershed area had a strong influence on WLF. As impervious area exceeded certain thresholds (3.5% and 20%), mean and maximum WLF were significantly higher in wetlands, respectively.	WA	Taylor *et al.*, 1995
Depth, duration, and frequency of inundation negatively influenced wetland plant community composition but depth was least important. Species and biomass differed by WLF. Sites that never flooded had the greatest biomass and richness, while those that continuously flooded had the least.	Australia	Cassanova and Brock, 2000
Large scale vegetation changes, such as increased dominance by invasive plants and fewer native species, occurred in emergent zones of palustrine wetlands receiving urban runoff, caused by WLF and other hydrologic changes.	WI	Owen, 1999
The growth of reed canary grass and native grass species were compared under four hydroperiods at two water depths. Reed canary grass was dominant due to high ratio of shoot length to biomass and its adaptable morphology.	WI	Ellison and Bedford, 1995
In a model, seed germination of annuals declined as water levels increased, but perennials germinated best in moderately flooded to drawdown conditions. The results explain the trend in increasing *Typha latifolia* (invasive) dominance in a Wisconsin wetland subject to water level increases.	WI	Ellison and Bedford, 1995
Changes in wetland hydrology affected plant communities (increase in exotic grasses) and species richness (50% decline over a few decades) within a wetland.	Ontario	Chow-Fraser *et al.*, 1998

A second distinct threshold in WLF amplitude has been observed for wetlands with more than 20% IC in their CDA (Chin, 1996 and Horner *et al.*, 1997a). The mean WLF for wetlands in this group was about eight inches and appeared to have a major impact on wetland biota. Subsequent work by Reinelt and Taylor (2001) confirmed that increased stormwater was the primary factor dominating the hydroperiods of urban wetlands that had CDAs with more than 20% IC.

While IC was found by most researchers to be the most important variable to predict WLF for urban wetlands, forest cover and outlet constriction were also useful (Reinelt *et al.*, 1998). Taylor *et al.* (1995) reported that the ratio of wetland area to the CDA area had a strong influence. The same basic relationship between urbanization and increasing wetland WLF has been reported for wetlands in Australia and Wisconsin (Cassanova and Brock, 2000 and Owen, 1999).

The impact of increased WLF on urban wetland function and quality has been extensively studied (summarized in Table 8). The response of the plant and animal communities within the

wetland to increased WLF is a consistent decline in diversity and often an increase in invasive species (e.g., Cooke and Azous, 1993; Ehrenfeld and Schneider, 1993; Owen, 1999).

Most wetland plant species are closely adapted to specific wetland hydroperiods and are not very tolerant of major changes in WLF. Thus, most wetland plant communities develop in response to a fairly narrow WLF range. As WLF increases, plant communities respond in a predictable manner—a loss in species richness, a loss of sensitive species, and an increase in invasive plant coverage (see review in Table 8). Invasive species tend to dominate the wetland community as they are often more tolerant of hydrologic change than native species.

Considerable evidence demonstrates that wetland communities are particularly vulnerable to increases in water level fluctuation (WLF) caused by excessive stormwater runoff and that WLF provides more favorable conditions for the spread of invasive plant species.

Plant richness declined sharply when WLF exceeded nine to 10 inches in Puget Sound wetlands, especially during the growing season (Azous *et al.*, 1997; Horner *et al.*, 1997a). Plant richness was also diminished in wetlands that experienced WLF fluctuations more than three times per month (Azous *et al.*, 1997). Invasive species, on the other hand, appear to tolerate and even thrive under high WLF conditions. Several studies have noted that invasive plant species such as *Phalaris* and *Typha* grow best in wetlands with variable WLF generated by stormwater runoff (Azous and Horner, 1997; Owen, 1999; Kercher and Zedler, 2004; Mahaney *et al.*, 2004; Miller and Zedler, 2003).

In Washington wetlands, invasive reed canary grass grew best in drier areas with very high seasonal WLF, whereas cattail and soft rush, *Juncus effusus,* were found in areas which had WLF during the growing season (Cooke and Azous, 1997; see Figure 12). Likewise, the combination of WLF and runoff resulted in invasive *Phalaris* dominance and the loss of native species in wetlands receiving stormwater runoff (Miller and Zedler, 2003). For more information, Zedler and Kercher (2004) provide an in-depth review of the causes and consequences of invasive plants in wetlands.

Water level fluctuation appears to be a primary factor influencing amphibian populations in urban wetlands (Figure 13). For example, Chin (1996) observed that wetlands with an annual WLF greater than 8.7 inches and impervious cover greater than 21% had fewer than three amphibian species. Richter and Azous (1995) found that wetlands with WLF less than eight inches had higher amphibian species richness (average of 5 species). Declines in amphibian species richness may be caused by diminished reproductive success (Chin, 1996). For example, Richter and Azous (1995) determined that declining water levels can strand larvae or expose amphibian eggs attached to emergent vegetation.

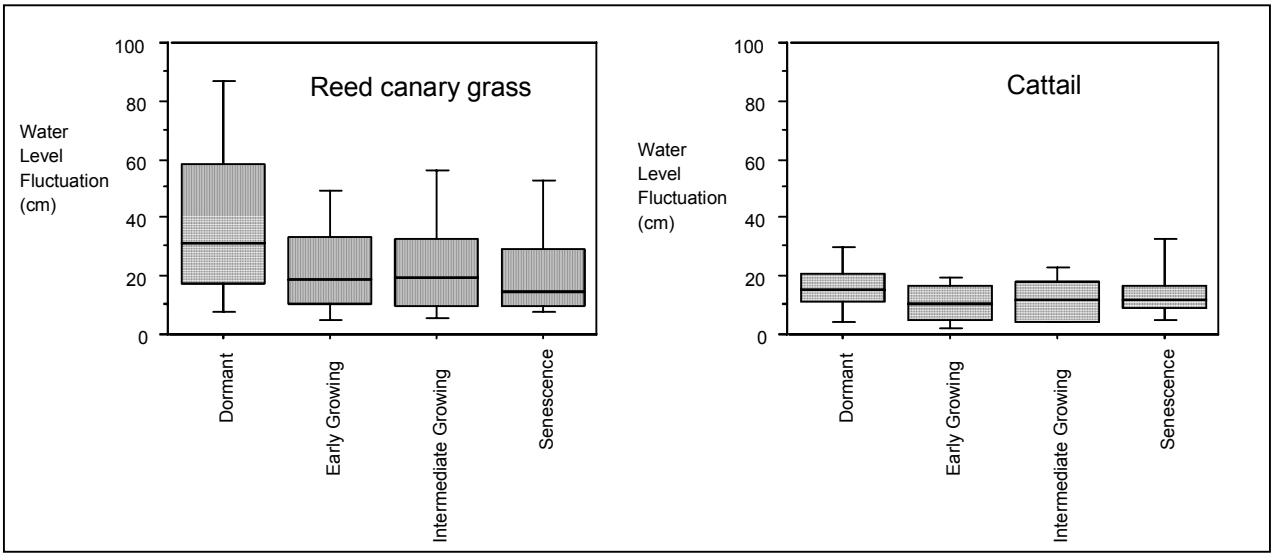

Figure 12. Hydrology and water level fluctuation of reed canary grass and cattail
Source: Cooke and Azous, 1997

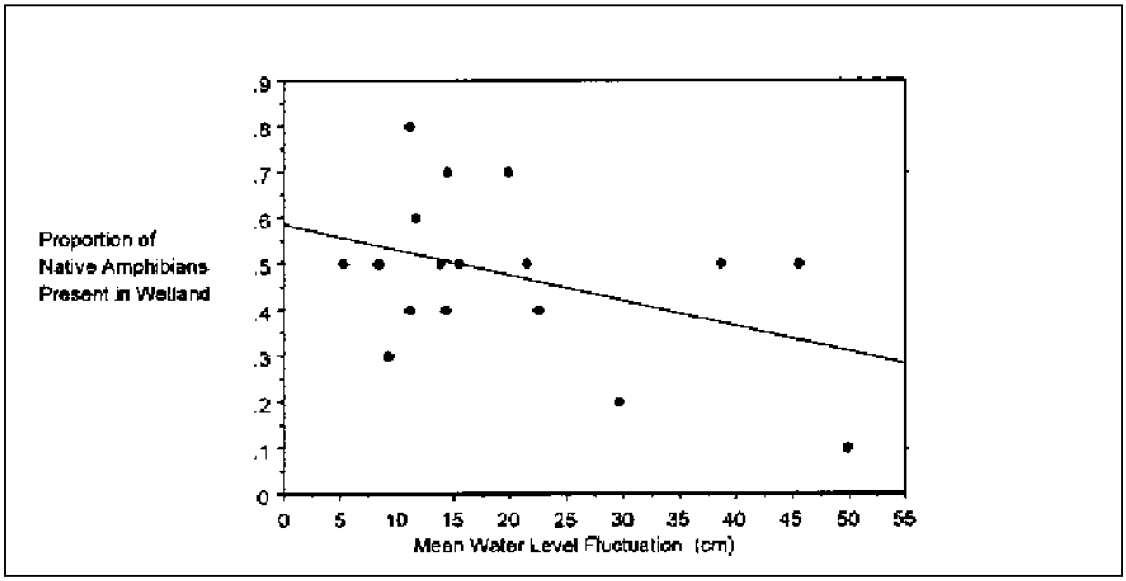

Figure 13: Relationship between amphibian species presence and water level fluctuations (Source: Reinelt *et al*., 1998b; used with kind permission from Springer Science and Business Media)

Flow Constrictions

The impact of flow constrictions on wetlands has been documented by several researchers. The hydrologic changes caused by the constriction may involve increased ponding, greater water level fluctuation, or hydrologic drought, depending on whether the wetland is located above or below the crossing. For this reason, the literature on the impact of crossing-related flow constrictions on wetlands is discussed separately and is summarized in Table 9.

Researchers have shown that crossings can exert a localized impact on wetland quality that extends in an upstream and downstream direction. The impact to plant and animal communities appears to be greatest for freshwater wetlands above the crossing due to increased ponding and WLF.

Richardson and Nunnery (1998) found that wetlands upstream from highway culverts had higher water surface elevations, greater surface area, and greater ponding depths compared to downstream reference wetlands. These hydrologic changes, in turn, caused increased tree mortality and sediment accumulation, and reduced availability of soil nutrients. Richardson and Nunnery (2001) compared wetland function at the upstream and downstream wetland sites, and found upstream wetlands experienced a 68% reduction in functional quality. Levine *et al*. (2003) found that pool habitat in stream sections above and below channel constrictions tends to decrease, which may alter the water table elevation and hydrology of adjacent wetlands.

Flow constrictions caused by road crossings have also been shown to alter aquatic invertebrate community structure in urban wetlands (King *et al*., 2000). In a study of highway crossings at forested wetlands in North Carolina, King reported a surprising increase in aquatic invertebrate species richness and percent herbivores within 125 feet of highway crossings (King *et al*., 2000). These changes were attributed to a loss of forest canopy at the road crossing, which increased sunlight penetration, shifted primary production from trees to macrophytes and algae, and increased the number of herbivorous taxa present. Other aquatic invertebrate species responded negatively to crossings, such as the damselfly (*Ischnura* sp.) and fingernail clam (*Sphaerium* sp.). Wetland aquatic invertebrate communities appear to be closely related to habitat factors produced by the crossing such as water quality, forest cover, and/or flow levels.

Crossings of tidal wetlands were observed to increase sediment deposition and nutrient loadings. Reduced salinity in these tidal wetlands shifted populations of aquatic invertebrates and fish and led to a barrier for fish moving upstream to spawn (Richardson *et al*., 2003). Sturdevant *et al*. (2002) studied an urban salt marsh adjacent to the New York/New Jersey Harbor that had once been tidally inundated, but was subsequently ditched and impounded. The ecological function of the impounded tidal marsh was greatly reduced in comparison to three adjacent tidal marshes that were not impounded. *Phragmites australis* dominated the impounded marsh, while two of the three unimpounded marshes were dominated by native *Spartina* grasses.

Table 9. Recent Research on the Indirect Physical Impacts of Road Crossings on Wetlands		
Key Finding(s)	**Location**	**Reference**
Findings include decreased pool habitat 165-330 feet upstream and downstream of bridges; road crossings caused changes in bank stability upstream and downstream.	NC	Levine *et al*., 2003
The functional responses of impacted forested wetlands were compared with a non-impacted "reference" wetland to determine the effects of highway construction. Water surface elevation, water depth, and tree stand density and mortality were indicative of declines in wetland function due to the presence of highways.	NC	Richardson and Nunnery, 1998
Research showed a 68% decline in ecosystem function of a disturbed wetland upstream of a highway crossing.	NC	Richardson and Nunnery, 2001
Temporary culverts appeared to increase runoff, impede fluxes of water from floods and tides, and change soil surface elevations. These impacts may be temporary, but further research is needed.	NC	Richardson, Flanagan, and King, 2003
The effects of dams and road construction included modified water flow and increased variability of hydrologic patterns (WLF) in Atlantic cedar wetlands.	NJ	Ehrenfeld and Schneider, 1990
Nine wetlands that are crossed by a highway showed signs of wetland drainage, and the wetlands are smaller than before construction. Wetland drainage effects extended outward from the road for distances varying from 54.6 to 546 yards. Five wetlands were affected at about 328 feet from road.	MA	Forman and Deblinger, 2000
In forested wetlands, highway crossing impacts were likely highly correlated with change in forest canopy coverage. Significant decrease in crown closure and basal area were found in proximity to the highway.	NC	King *et al.*, 2000
Plant species richness decreased relative to increases in paved road density at all distances studied with the most impact on species richness found within 0.6 miles of the road.	Ontario	Findlay and Houlahan, 1997

Decreased Groundwater Discharge

There are virtually no research studies that have examined the link between the diminished groundwater recharge in the CDA and wetland quality. The lack of research is not surprising given how challenging it is to monitor the movement of groundwater into and out of wetlands. One study by Ehrenfeld and Schneider (1990) noted changes in the water table at wetlands with residential land use and found some evidence that they had been altered as a result of adjacent development.

While the link between decreased groundwater recharge in the CDA and diminished wetland quality seems tempting, there is simply not enough scientific evidence to determine whether it actually exists.

A greater number of studies have documented how decreased groundwater recharge influences dry weather flow in small headwater streams. The basic process is that urbanization reduces the volume of groundwater available to sustain baseflow in small streams. Indeed, several studies

have shown a decrease in dry weather stream flows in response to urbanization in humid watersheds (Klein, 1979; Saravanapavan, 2002; Simmons and Reynolds, 1982;), although the opposite may occur in streams in arid and semi-arid climates due to water from irrigation nuisance flows. Therefore, it is conceivable that diminished groundwater recharge in the CDA can influence the water budget of riparian wetlands that depend on streams as their primary source of water. The effect of diminished recharge may also be significant for other wetland types whose water budget is dominated by groundwater. In any event, additional research is needed to define the extent to which development in the CDA diminishes groundwater discharge to wetlands, and what the expected hydrologic and biological response of the wetland will be.

Hydrologic Drought in Riparian Wetlands

Development in the CDA of headwater streams has been strongly linked to active channel enlargement by widening of the stream banks or lowering of the streambed (Schueler, 2001b). These urban stream channels may incise over time following the general process depicted in Figure 14. As the channel deepens, the local water table drops, often to the point where it is below the rooting depth of riparian forests and plants (Schueler and Brown, 2004). A second consequence of stream incision is that channels deepen and enlarge such that riparian wetlands become disconnected from the stream. The floodwaters that once spilled over the banks to supply water to riparian wetlands are now confined within the deeper and enlarged stream channel. Riparian wetlands that depend on occasional flooding and baseflow to sustain their hydroperiod can face a condition termed hydrologic drought as urbanization increases in the CDA. Hydrologic drought occurs when a riparian wetland does not receive adequate water to sustain its hydric soils and vegetation.

The influence of urban stream channel incision, dropping water tables and floodplain disconnection may well play a negative role in riparian wetlands, but much more research is needed to define over which stream sizes and floodplain widths it can occur.

Although most urban stream geomorphologists recognize how urban stream channel incision disconnects floodplains and drops water tables, researchers have yet to examine how these changes influence riparian wetland quality. At this point, the only research study on hydrologic drought in urban riparian wetlands is by Groffman *et al* (2003) and references cited therein. Groffman *et al*. (2003) suggests that urban stream incision, declining water tables, and floodplain disconnection have secondary effects on the soils and plants of riparian wetlands. Although considerable anecdotal evidence exists for the concept of hydrologic drought, it is not clear over which stream orders it is most pronounced and how far laterally it extends into the floodplain. Clearly, greater collaboration between wetland scientists and urban stream geomorphologists is needed to understand the wetland dynamics associated with hydrologic drought.

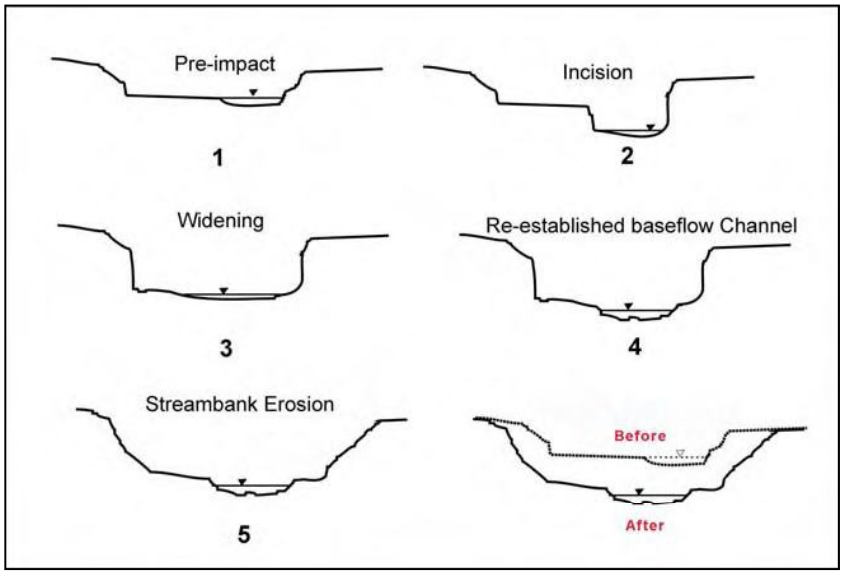

Figure 14. Progressive Stages of Channel Incision
Source: Schumm,1999

Water Quality Stressors
While wetlands can provide some pollutant removal function, wetland communities can also be stressed when pollutant loads are excessive. This section reviews what is known about water quality stressors to wetlands, with an emphasis on wetland types that are most sensitive to changes in water quality. The four major water quality stressors described in this section include:

1. Sediment Deposition
2. Pollutant Accumulation in Wetland Sediments
3. Nutrient Enrichment
4. Chloride Discharges

Each of the four water quality stressors can produce significant changes in the functions and quality of urban wetlands, including excessive primary productivity, spread of invasive species, and loss of sensitive plant and animal species. This section reviews research on each stressor in a progressive manner. It begins by quantifying how pollutant loads increase as a result of land development in the contributing drainage areas. Next, research is profiled to show how pollutants alter water quality within urban wetlands. Lastly, research on how plants and animals respond to declining water quality in urban wetlands is described. In some cases, our understanding of wetland water quality stressors can be inferred from research conducted on created wetlands specifically designed for stormwater treatment.

<u>Sediment Deposition</u>
Sediment is generated from three major sources in the CDA: stormwater runoff from impervious surfaces, erosion from exposed construction sites, and upstream channel erosion. Construction sites can be a significant source of sediment to a wetland, particularly if adequate erosion and sediment control practices are not installed. Sediment loads from uncontrolled construction sites

are estimated at 100 tons per acre per year, while sediment loads from cropland with poor conservation practices can reach 20 tons per acre per year. This is as much as 500 times more sediment than from a forest with deep soils, where sediment loads range from 200 to 400 pounds per acre per year (Envirocast 2003).

Most urban wetlands receive greater sediment loads than wetlands located in undisturbed settings.

Schueler and Lugbill (1990) studied sediment concentrations from construction sites in Maryland and found that uncontrolled sites can deliver seven times more sediment than controlled sites. Other studies show sediment concentrations from uncontrolled construction sites as high as 7,363 mg/l (Horner *et al*., 1990). Streambank erosion can often be the dominant sediment source to downstream wetlands, when increased runoff in the CDA creates higher stream flows that erode stream channels. In fact, urban streambank erosion can comprise as much as 75% of the sediment budget of urban streams (Dartiguenave *et al*., 1997; Trimble, 1997; CWP, 2003).

As land is developed in the CDA, sediment loadings to downgradient wetlands increase. Even if soils and streambanks in the CDA are stable, urban wetlands can expect to receive greater sediment loads than non-urban wetlands. Reinelt and Horner (1991) found that suspended sediment concentrations were significantly higher in urban wetlands compared to non-urban ones.

Relatively few researchers have measured sediment deposition rates within urban wetlands. One study by Bazemore *et al.* (1991) evaluated sediment deposition within forested wetlands near highway crossings and found greater deposition rates at wetlands with longer hydroperiods. While no significant overall increase in sediment deposition rates at highway crossings was observed, greater sediment deposition rates were noted upstream and downstream of constricted crossings. King *et al*. (2000) investigated sediment deposition rates at road crossings in forested wetlands and found that deposition within 33 feet of highway crossing was significantly higher than in reference wetlands more than 130 feet distant from the crossing.

A much larger number of studies have tested the impact of sediment deposition on wetland plants in field and greenhouse experiments. The research generally indicates that sediment deposition can harm the wetland plant community by reducing germination of wetland plant seeds, reducing growth and survival of native species, and favoring conditions for invasive wetland plants. A summary of research of the impact of sediment deposition on wetland plant communities can be found in Table 10.

When sediments from the CDA are deposited in urban wetlands, the structure of the plant community shifts away from sensitive species and towards invasive species.

Werner and Zedler (2002) correlated higher sediment deposition rates to a decrease in native sedge meadow plant species, and reported that an average of 1.2 native species were lost for every 4 inches of sediment deposited. The authors concluded that sediment deposition reduces microtopographic variation and surface area in the wetland that was critical for the growth of native species. At the same time, higher sediment deposition rates favored invasive species tolerant of sediment such as reed canary grass (Werner and Zedler, 2002).

Increased sediment transport to wetlands can cause alterations in plant community dynamics. Wardrop and Brooks (1998) found that sedimentation influences the ability of seeds to germinate and grow by altering light availability, temperature, and oxygen levels in the soil. Another study of three common wetland species showed sediment deposition generally reduced seedling establishment and was responsible for a decline in species richness and density (Mahaney *et al*., 2004). Germination experiments by Gleason *et al*. (2003) and Wardrop and Brooks (1998) found that as little as 0.2 inches of sediment deposition was enough to reduce wetland seedling emergence, although plant response varied by species.

Sediment deposition can alter the diversity of the wetland aquatic invertebrate community. For example, Martin and Neely (2001) found that aquatic invertebrate density was lower in wetland plots that received higher sediment loads than those that received less sediment. Species that were adversely affected by sediment include *Coleoptera* and *Diptera* larvae, *Megaloptera, Odonata*, *Gastropoda,* and *Spaeriidae* clams. The scraper functional feeding group displayed the most adverse response to sediment deposition, likely due to the loss of the periphyton on which they feed (Martin and Neely, 2001). Similarly, experiments in North Dakota indicated that even sediment deposition as little as 0.2 inches caused a 99.7% reduction in invertebrate emergence from wetland soils (Gleason *et al*., 2003).

Table 10. Recent Studies on the Impacts of Sediment Accumulation on Wetlands

Key Finding(s)	Location	Reference
Three different wetland types were simulated in a greenhouse. Sediment lowered community biomass, diversity, and richness and reduced seedling establishment.	PA	Mahaney *et al.*, 2004
Sedimentation was measured in 25 wetlands representing a variety of HGM subclasses. Sedimentation rates differed by HGM class and were highest in headwater floodplains, riparian depressions, impoundments, and slopes. Plant species that were intolerant of sediment deposition had a significant decrease in germination with as little as 0.2 inches of sediment accumulation.	PA	Wardrop and Brooks, 1998
Different sediment depths (0 to 0.8 inches) caused various impacts on plants. The minimum experimental depth of 0.5 cm of sediment reduced the total seedling emergence by 91.7% and caused a reduction of 99.7 in total invertebrate emergence.	MT, ND, SD, MN	Gleason *et al.,* 2003
In sedge meadows, increased sediment deposition resulted in a decrease in native species richness and increase in invasive reed canary grass. An estimated 1.2 species were lost for every four inches of sediment deposition in sedge meadows.	WI	Werner and Zedler, 2002
In forested wetlands, sedimentation rates were highest immediately adjacent to highway crossings (33 feet) but similar to the reference wetland beyond 130 feet.	NC	King *et al.*, 2000
Greenhouse experiments showed 0.8 inches of sediment significantly increased aboveground biomass of broadleaf arrowhead (*Sagittaria latifolia*), while field plots showed no differences in plant diversity, biomass, or stem density. Paired field and greenhouse studies showed increases in bulk density, which would alter hydrologic functions of wetland if these sediment depths occurred over a larger area.	NH	Koning, 2004

Pollutant Accumulation in Wetland Sediments

Urban stormwater runoff carries with it many different pollutants, including hydrocarbons and metals such as cadmium, copper, lead, nickel, and zinc. Research has shown that vehicle emissions are a dominant source for many metals of concern (EOA, Inc., 2001), although atmospheric deposition, roof surfaces, and snowmelt may also be important sources. Table 11 presents median national Event Mean Concentrations (EMC) for trace metals found in urban stormwater runoff from different land uses as reported in the most recent National Stormwater Quality Database (Pitt *et al*., 2004).

The top sediments of urban wetlands receiving stormwater inputs are enriched with a distinct signature of elevated trace metals and hydrocarbons.

The term hydrocarbons refers to a large group of organic chemicals present in petroleum products that are produced during combustion (Note: In this discussion, the term Polycyclic Aromatic Hydrocarbons, or PAH is used interchangeably with hydrocarbons although they are not exactly the same). Hydrocarbons tend to persist in the environment and may accumulate in sediment organisms and shellfish, yet toxicity levels are not well established. Hydrocarbons concentrations are significantly greater in runoff from industrial areas, gas stations, and roads; recent studies in Texas indicate that PAH concentrations in runoff from coal-tar sealed parking lots are significantly higher than other types of urban land cover (Schueler and Shepp, 1992; Mahler *et al*., 2005). Therefore, wetlands with these uses in their CDAs may be at risk. Typical concentrations of hydrocarbons found in stormwater runoff are presented in Table 12.

Table 11. Median National Event Mean Concentrations of Five Trace Metals in Stormwater Runoff for Different Land Uses

Parameter (µg/L)	Residential	Commercial	Industrial	Freeways	Open Space
Total Cadmium	0.5	0.9	2	1	0.5
Total Copper	12	17	22	35	5.3
Total Lead	12	18	25	25	5
Total Nickel	5.4	7	16	9	ND
Total Zinc	73	150	210	200	39

ND = not detected, or insufficient data to present as a median value.
Source: Pitt *et al.*, 2004

Table 12. Hydrocarbon EMCs in Urban Stormwater Runoff

Hydrocarbon Indicator	EMC (land use)	Number of Events	Location	Source
PAH (µg/l)	3.2*	12	MA	Menzie-Cura, 1995
	7.1	19	MA	Menzie-Cura, 1995
	13.4	N/R	WI	Crunkilton *et al*., 1995
Oil and Grease (mg/l)	1.7**, 9 (C), 3 (I)	30	TX	Baird *et al*., 1996
	3	N/R	U.S.	USEPA, 1983
	5.4*	8	MA	Menzie-Cura, 1995

Table 12. Hydrocarbon EMCs in Urban Stormwater Runoff				
Hydrocarbon Indicator	**EMC (land use)**	**Number of Events**	**Location**	**Source**
	3.5	10	MA	Menzie-Cura, 1995
	3.89 (R), 13.13 (C), 7.10 (I)	N/R	CA	Silverman *et al*., 1988
	2.35 (R), 5.63 (C), 4.86 (I)	107	MD	Barr, 1997
* Geometric mean N/R - Not Reported **Median R - Residential, C - Commercial, I - Industrial				

When metals and hydrocarbons in stormwater runoff from the CDA enter wetlands, they eventually accumulate in wetland sediments. Pollutants trapped in wetland sediments can re-enter the water phase or migrate downward, and in some cases, into the groundwater. The primary concern with metals and hydrocarbons are their potential toxicity and bioaccumulation in aquatic organisms and plants. For a complete review of wetland sediment toxicity, consult Burton *et al*. (1992) or Baudo *et al*. (1990).

There is growing evidence that both metals and hydrocarbons are accumulating in urban wetland sediments due to stormwater pollution. For example, in a review of sediment chemistry in more than 50 stormwater wetlands and ponds, trace metal concentrations were five to 30 times higher in the muck layer than underlying soils and had a distinct signature and vertical distribution (Schueler, 2000a). A similar pattern in metal distribution was found over time in a natural urban forested wetland that received urban stormwater runoff (Sanders, 2002). Significant increases in cadmium, copper, zinc, and nickel were reported in sediments deposited over a 30-year period (Table 13). Gernes and Helgen (2002) found higher concentrations of copper, zinc, and lead in natural depressional wetlands with increased urbanization as compared to a reference natural depressional wetland. Horner *et al*. (1997b) also reported that sediments in an urban stormwater wetland in Puget Sound region had copper, zinc, and arsenic levels that were up to four times greater than non-urban wetlands. This suggests that natural wetlands that receive stormwater runoff may also receive similar elevated levels of pollutants.

Table 13. Comparison of Historic and Current Mean Metal Concentrations in the Sediment of an Urban Forested Wetland (Sanders, 2002)		
Metal	**Pre-1963 sediment**	**Post-1963 sediment**
Zn	56.2	95*
Pb	32	45
Cr	11	10.7
Ni	11.1	17*
Cu	5.32	22.7*
Cd	0.32	2.0*
*Mean is significantly different from pre-1963 sediment		

Only a handful of studies have explored hydrocarbon accumulation in the sediments of urban wetlands, but the few reports indicate urban wetlands have elevated levels (Seattle Metro, 1993 and Watts, 2006). Bryan and Langston (1992) reported that hydrocarbon concentration in urban wetland sediments were frequently three to five orders of magnitude greater than those found in the water column. Paul *et al*., (2002) found that sediment contamination in small estuaries increased with increasing percentage of urban land use and decreasing area of non-forested wetlands.

Research on the possible biological impact of metal and hydrocarbon accumulation in wetland sediments is inconclusive, and is summarized in Table 14 below. While metal concentrations in stormwater are not usually high enough to cause acute toxicity to aquatic organisms, the concentration of metals in bottom sediments are of greater concern (Field and Pitt, 1990). Pollutants trapped in sediment may re-enter the food webs either through uptake by plants or aquatic organisms. The primary concern is the potential for bioaccumulation and toxicity to aquatic organisms.

Table 14. Review of Contaminants in Wetland Sediments

Parameter	Key Finding(s)	Location	Reference
Metals	In leaf analysis of plants receiving stormwater runoff, concentrations of Zn and Cu were higher than Pb, and Cd.	WA	Cooke and Azous, 1993
	Sewage sludge was applied to a freshwater tidal wetland to examine retention of heavy metals. Results showed that soil in treatment areas retained significantly higher levels of all metals than the control.	NJ	Dubinski *et al.*, 1986
	Natural urban depressional wetlands had considerably higher concentrations of heavy metals (Cu, Pb, Zn) than non-urbanized, natural, depressional, reference wetlands.	MN	Gernes and Helgen, 2002
	Urbanized wetlands had higher sediment levels (up to four times greater) of copper, zinc, arsenic compared with those in non-urban wetlands.	WA	Horner *et al*., 1997b
Metals, cont.	Two wetlands in Florida were compared to assess the effect of highway runoff. One wetland had pre-treatment of runoff before discharging it to the wetland, while the second wetland received untreated stormwater. Metal concentrations in sediments in the wetland receiving untreated runoff were an order of magnitude higher than in the wetland receiving untreated stormwater.	FL	Schiffer, 1989
	A study of stormwater wetlands in Seattle found that Zn and Pb were higher in the roots than in the emergent vegetation	WA	Seattle Metro, 1993
PAHs and oil/grease	PAH and oil and grease concentrations in stormwater ponds exceeded Ontario standards.	Ontario	Bishop *et al*., 1999

Research on urban wetland plants indicates that a larger proportion of metals are stored in the roots. A study of stormwater wetlands in Seattle found that zinc and lead were higher in the roots than in the emergent vegetation except in burreed (*Sparganium sp.*; Figure 15; Seattle Metro, 1993). In general, metal uptake and allocation is species specific. The bulk of the contaminants are stored in the roots, not the stem or leaves, but there are exceptions (Lepp, 1981; Dunbabin and Bowmer, 1992).

Trace metals and hydrocarbons are clearly accumulating in the tissues of plants and animals in urban wetlands exposed to stormwater, although it is unclear whether the reported levels are causing toxicity in the food chain.

As metals accumulate in plant and animal tissue, they may have the potential to cause toxicity. Although extensive literature exists on metal toxicity for estuarine sediments, very little research is available on sediment metal toxicity for freshwater wetlands exposed to stormwater runoff. In general, symptoms of metal toxicity include vulnerability to disease, stunted growth, and alterations of the food web for bottom dwelling organisms. Because metals are so concentrated in sediments that the bioavailability of even small amounts of the total sediment metal is highly important for bottom dwelling organisms (Bryan and Langston, 1992).

Predicting toxicity of metals in sediment is difficult due to a host of processes that control bioavailability and fate. Temperature, pH, and salinity are just a few of the factors that can impact metal toxicity and availability (Resh and Rosenberg, 1984; Cherry *et al.*, 2001; Tomson *et al.*, 2003; Du Laing *et al.*, 2002). Lastly, the amount of metals in sediment depends on the size of the sediment, as more metals will accumulate on fine sediment (Gibbs, 1973). For a complete discussion of metal bioavailability, see John and Leventhal (1995).

Plants absorb hydrocarbons from bottom sediment and readily move them to above-ground tissue, although hydrocarbons, like metals, tend to be found in higher concentrations in wetland plant roots than in the leaves (Seattle Metro, 1993 and Watts *et al.*, 2006). Watts *et al.* (2006) reported that hydrocarbon levels in the roots of *Spartina alterniflora* were strongly correlated with PAH concentrations in contaminated sediment, although hydrocarbon levels were much lower in the roots than in the sediment. Bioaccumulation as a result of wetland herbivory does not appear to be a significant route of hydrocarbon exposure, and biomagnification does not occur for terrestrial species (USEPA, 2003). Still, researchers have documented elevated PAH levels in dragonflies, crayfish, clams, and fish (Masterson and Bannerman,1994; Moring and Rose 1997; and Velinsky and Cummins 1994). Possible effects of hydrocarbon toxicity on aquatic organisms include reduced diversity, inhibited reproduction, delayed emergence, sediment avoidance, and mortality (USEPA, 2003). Culbertson *et al.* (2005) found that more than 30 years after an oil spill, hydrocarbon contamination still existed to depths of 10-14 inches in salt marsh sediments of Massachusetts. While vegetation appeared to have recovered from the spill, fiddler crab populations, *Uca pugnax*, still showed measurable effects.

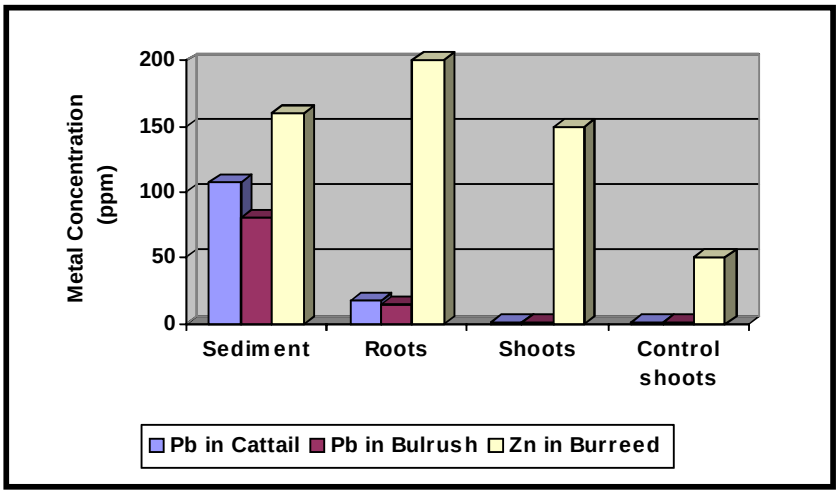

Figure 15. Pollutant levels found in sediment and in three species of wetland plants (Source: Seattle Metro, 1993)

Nutrient Enrichment

Nitrogen and phosphorus are essential nutrients in a wetland ecosystem, but when present in excess concentrations, they can become a stressor. The nutrient load generated by the CDA is influenced by many factors, but turf and impervious cover are perhaps the most important. Both turf and impervious cover generate higher nitrogen and phosphorus concentrations in stormwater runoff than forest cover, and together they comprise the majority of land cover created during land development (Table 15). In addition, turf and impervious cover generate more runoff during each storm event as compared to meadow or forest, so the total nutrient load discharged to a wetland from developed areas can increase by a factor of 5 to 20. Annual nutrient loading is the product of runoff volume and pollutant concentration yields the annual nutrient load. Figure 16 presents a comparison of the annual nutrient loading from forest, turf, and impervious cover; these loadings were calculated using the Simple Method (Schueler, 1987) and the runoff coefficients and nutrient concentrations shown in Table 6 and Table 15, assuming an average annual rainfall of 40 inches.

Urban wetlands exposed to stormwater runoff may receive nutrient loadings 5 to 20 times greater than undisturbed CDAs managed in a natural condition.

Table 15. Median Nutrient Concentrations in Stormwater

Constituent	Forest Cover [1]	Turf Cover [2]	Impervious Cover[3]
Total Phosphorus	0.25 mg/l	1.9 mg/l	0.4 mg/l
Total Nitrogen	1.5 mg/l	9.7 mg/l	1.9 mg/l

1: From Mostaghimi, *et al*. (1994) and USGS (1999).
2: Grand mean of Garn (2002); Waschbusch, *et al*. (2000); Steuer, *et al*. (1997); and Bannerman, *et al*. (1993) turf runoff monitoring data.
3: Grand mean of all reported impervious cover source area monitoring data in CWP, 2003 (Table 19).

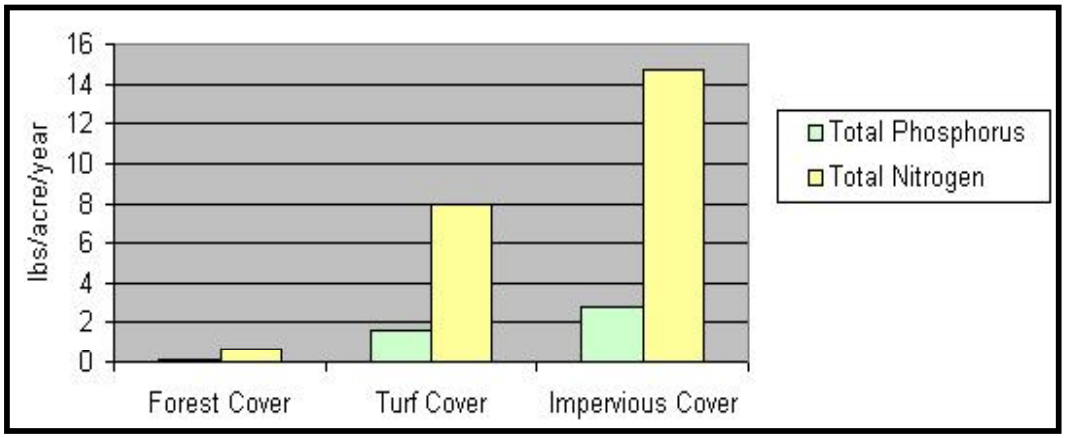

Figure 16. Nutrient loading from three different land covers

Brenner *et al*. (2000) used sediment cores to track nutrient accumulation rates in 11 Florida marshes since the early 20th century. Nitrogen accumulation rates in wetland sediment increased 1.6-3.7 fold, and phosphorus accumulation rates increased 2.3-17.0 fold since 1920. The sediment nutrient enrichment was attributed to agricultural and urban nonpoint source pollution. Houlahan and Findlay (2003) found a negative correlation between nitrogen levels in an Ontario wetland and the amount of adjacent forest cover present.

Table 16 summarizes some recent studies on the impact of nutrient enrichment on urban wetlands. Although only a few studies have addressed this topic, nutrient enrichment appears to be an important factor influencing the vegetation dynamics within wetlands (see U.S.EPA, 2002d). Wetlands enriched by nutrients often increase their plant productivity and may also shift their community structure – the most common scenario is that nutrient-sensitive species are replaced by species tolerant of high nutrient loading (USEPA, 2002d). Frequently these species can outgrow and out-compete native species.

Nutrient enrichment can alter the composition of urban wetland plant communities. For example, Woo and Zedler (2002) conducted greenhouse and field experiments to determine if nutrients could cause a sedge meadow to become dominated by an invasive species of cattails. They found that after one season with added fertilizer, the cattails more easily incorporated the excess nutrients into its tissues, outgrew native vegetation in density, height and biomass, and began to dominate a sedge meadow.

Miller and Zedler (2003) conducted experiments to determine the effects of flooding on the growth of native and invasive species. They concluded that water quality changes due to nutrient-rich stormwater runoff delivery were more likely the cause for the spread of the invasive *Phalaris arundinacea*. They also concluded that a reduction in stormwater volume could also reduce nutrient transport to wetlands, which may reduce the risk for remnant natural wetlands to become dominated by *Phalaris*.

Nutrient enrichment in urban wetlands increases overall productivity of the wetland but favors the spread of invasive wetland plants.

Gernes and Helgen (2002) reported that intolerant invertebrate taxa were absent from urban wetlands in Minnesota wetlands exposed to high levels of phosphorus and nitrogen (Figure 17). They reported that both invertebrate community index scores and the composite number of genera of *Ephemeroptera* (mayflies), *Trichoptera* (caddisflies), *Sphaeriidae* (fingernail clam), and *Odonata* (dragonflies) were negatively related to concentrations of phosphorus and nitrogen in wetlands.

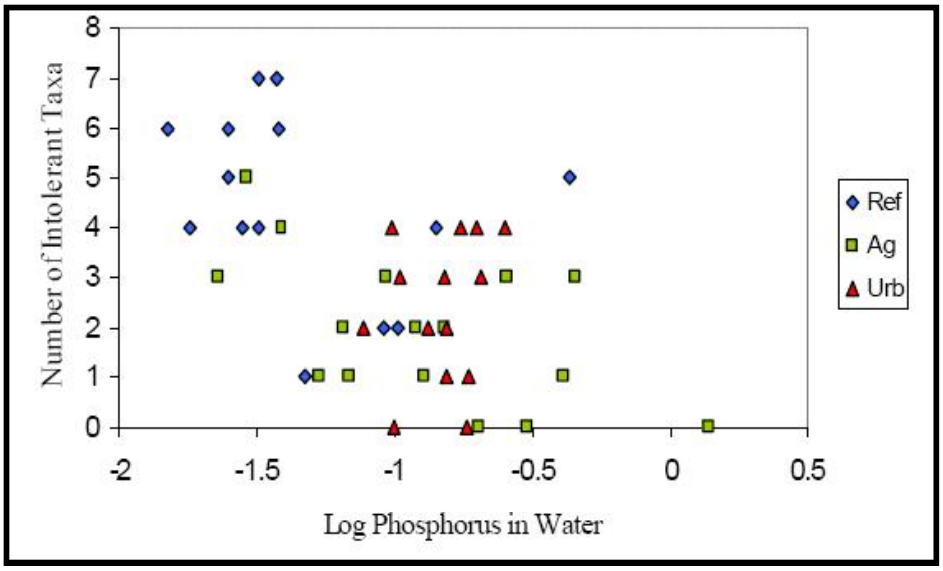

Figure 17. The effects of phosphorus on intolerant invertebrate taxa in Minnesota wetlands (from U.S. EPA, 2002a)

Table 16. Studies on Nutrient Enrichment of Wetlands		
Key Finding(s)	**Location**	**Reference**
Historical water quality changes in a Lake Ontario marsh were examined from 1973 to 1998. Changes in nutrient concentrations combined with increasing WLF have resulted in long-term changes in the planktonic and benthic communities.	Ontario	Chow-Fraser *et al*., 1998
Within approximately 1.4 miles of wetland's edge, nutrient (phosphorus and nitrogen) levels were negatively correlated with adjacent forest cover. Nitrate was found to be positively correlated with road density with the most significant effect found at 1,640 feet from the road. They concluded that in order to sustain a high wetland quality, a regional landscape conservation approach is needed (rather than narrow buffers around wetlands).	Ontario	Houlahan and Findlay, 2003
Nutrients were added to field plots of a sedge meadow that partially surrounded a stand of cattails. The native sedge meadow grass did not have additional growth, whereas the invasive cattails increased in size suggesting that nutrients can cause a natural wetland to be invaded by invasive species.	WI	Woo and Zedler, 2002
Atlantic white cedar swamps were studied to examine water quality, hydrology and changes in plant species composition. Degradation of water quality resulted from urbanization but changes in water quality (NH_4 and PO_4) at any particular site were not predictable.	NJ	Ehrenfeld and Schneider, 1993
Long term ecological effects of low level phosphorus enrichment were studied in the FL Everglades over 5 years. Concentrations of P in periphyton & detritus were elevated by the first year; macrophytes by years 3 and 4. Water Total P enrichment was detected in year 5.	FL	Gaiser *et al*., 2005

Chloride Discharges

Chloride can be a major wetland stressor in Northern latitudes due to the application of road salt in winter (Figure 18). Chloride is one of the main components of road salt, which is most often sodium chloride, but may also be blended with calcium or magnesium chloride. Nationally, road salt use ranges from 10 million to 20 million tons per year, with average annual application rates of up to 19.4 tons per lane mile (Salt Institute, 2001; TRB, 1991). Chloride in snowmelt runoff eventually makes its way into nearby streams, lakes, groundwater, and wetlands. Chloride is extremely soluble in water, so there is virtually no way to remove it once it gets into surface waters, and it can contaminate drinking water supplies (EC, 2001). Chloride moves freely through surface and groundwater, and its accumulation and persistence pose risks to wetlands.

Road salt accumulates in snowpacks and is ultimately released in snowmelt runoff in spring, although elevated levels of chloride can persist through summer (Demers and Sage, 1990). Typical event mean concentrations for chloride found in snowmelt and stormwater runoff are presented in Table 17.

Figure 18. Road salt is a major source of chloride to surface waters (Source: Beloit College)

Table 17. EMCs for Chloride in Snowmelt and Stormwater Runoff in Urban Areas

Form of Runoff	EMCs (mg/l)	# Events	Location	Source
Snowmelt	116*	49	MN	Oberts, 1994
	2119	N/R**	Ontario	Sherman, 1998
	474	N/R	NY	Novotny *et al.*, 1999
	1612	N/R	WI	Masterson and Bannerman, 1994
	397	282	Ontario	Environment Canada, 2001
Stormwater runoff (non-winter)	42	61	TX	Brush *et al*, 1995
	45	N/R	Ontario	Sherman, 1998
	40.5	N/R	WI	Masterson and Bannerman, 1994

* = median
**N/R = Not Reported

Chloride concentrations found in roadside soils often exceed the tolerance thresholds of roadside wetland vegetation, and these elevated chloride levels have been documented up to 1,000 feet or more from the road (Kaushal *et al*., 2005; Wenger and Yaggi, 2001; EC, 2001; Richburg *et al*., 2001). Many plant species are sensitive to high chloride levels and may dieback or fail to germinate under these conditions (Biesboer and Jacobson, 1994). According to Environment Canada, more than 50% of woody plant species are sensitive to road salt and have disappeared from roadside wetlands and ditches (EC, 2001).

Wetland in warmer climates can also be impacted by chloride. Changes in wetland salinity due to evaporation following impoundment by water control structures have primarily been documented in arid regions or in coastal salt marshes impounded for mosquito control or wildlife management (ABAG, 1991; Wenner, 1986; Sinicrope *et al*., 1990). . Salinity fluctuations from impoundments cause changes in vegetation patterns and impacts to fish populations (USEPA, 1993; Gilmore *et al*., 1981; Sinicrope *et al*., 1990).

Chloride concentrations in wetlands in Northern climates have been detected as high as 2,700 mg/l.

Both acute and chronic toxic effects of chloride on aquatic systems have been well documented. Chronic concentrations of chloride as low as 210 mg/l have been found to be harmful to some forms of aquatic life. Chloride levels exceeding 1,000 mg/l can have lethal and sublethal effects on a wide range of aquatic plants and invertebrates (EC, 2001). Chloride interferes with a plant's ability to regulate water absorption, leading to dehydration (Friederici, 2004). Increases in chloride levels can lead to the spread of salt-tolerant plant species, many of which are undesirable (e.g., cattails and purple loosestrife). Chloride may also combine with heavy metals in wetland soils, rendering them more water soluble and more available for uptake by plant roots thereby possibly increasing the plant uptake of toxic metals (EC, 2001).

Numerous studies document chloride discharges to wetlands in northern latitudes, and the subsequent impacts to wetland plant and animal communities. Table 18 summaries these studies. Literature suggests that urban wetlands receiving excessive chloride will experience reduced biodiversity, a loss of sensitive species, and an increase in salt tolerant invasive species (EC, 2001).

Table 18. Research Review of Chloride Discharges to Wetlands

Key Finding(s)	Location	Reference
Average salinity in vernal pools within 650 feet of a road was seven times higher than average salinity in non-roadside pools. 60% of roadside pools had elevated salinity.	NY	Karraker and Gibbs, in review
Ephemeral wetlands adjacent to roads receiving salt had higher salt and chloride levels compared to wetlands not exposed to salt. Chloride concentrations approached lethal concentrations for hatching tadpoles, and were significantly higher in samples collected at points nearest the road at salted sites. Values remained elevated for 5 months, and may also have negative impacts on other wetland species.	MI	Murawski, 2005

Table 18. Research Review of Chloride Discharges to Wetlands		
Key Finding(s)	**Location**	**Reference**
Chloride concentrations in 43 road salt-impacted wetlands ranged from 18 to 2,700 mg/l with 75% less than 334 mg/l. Macroinvertebrate tolerance of chloride was found to be higher than concentrations in most of the wetlands.	MI	Benbow and Merrit, 2004
Decreases in community measures (richness, evenness, and overall cover) and individual species abundances in a fen were attributed to high salt concentration from nearby turnpike. Chloride concentrations were highest closest to the turnpike (210 to 275 mg/l) and gradually decreased with distance from the road. High chloride concentrations (> 54 mg/l) were present up to 980 feet from the turnpike.	MA	Richburg *et al*., 2001
In a greenhouse study, species diversity, richness, evenness, and total biomass all decreased with increasing snowmelt concentration. Common cattail and purple loosestrife were tolerant of snowmelt.	N/A	Isabelle *et al*.,1987
High concentrations of chloride in groundwater of two fens were linked to nearby road salt application and caused a loss of biodiversity. Diverse vegetation was replaced by the more salt-tolerant narrow-leaf cattail.	IL	Panno *et al*., 1999
Chloride concentrations in Atlantic white cedar wetlands in developed areas were elevated compared with control sites. Changes in vegetative community composition and structure were linked to this decline in water quality.	NJ	Ehrenfeld and Schneider, 1990
Contamination of a bog with road salt from a nearby salt storage area resulted in die-off of tamarack trees, red maples, sedges, pitcher plants, and sphagnum mosses. These species were replaced by more salt-tolerant species such as cattails. The highest concentrations of chloride in the wetland were 1,215 mg/l.	IN	Wilcox, 1986

Several wetland types are particularly vulnerable to high chloride levels in runoff. For example, wetlands lacking distinct outlets, such as vernal pools or prairie potholes, tend to accumulate chloride in the bottom where it cannot easily be flushed (Karraker, 2006). Atlantic white cedar wetlands exposed to road runoff containing chloride were reported to have decreased *Sphagnum* coverage and reduced cedar seedling numbers (Ehrenfeld and Schneider, 1990). Increases in chloride decreased *Sphagnum* coverage, thus resulting in decreased number of cedar seedlings. The decline of *Sphagnum* as a result of increasing runoff is shown in Figure 19. Road salt has also been associated with declines in native plant species, including *Sphagnum*, in an Indiana bog (Bubeck *et al*. 1971).

Similar declines in the fen plant community have also been attributed to high chloride levels in Massachusetts (Richburg *et al*., 2001). Species richness and plant cover were considerably lower in plots with high concentrations of sodium (112 – 267 mg/l) and chloride (54 -114 mg/l). Furthermore, dominant native fen species, such as hoary willow (*Salix candida*) and cranberry (*Vaccinium macrocarpon*) were significantly less abundant in plots with high levels of salt (Richburg *et al*., 2001). Dense stands of *Phragmites* were present throughout the fen; the authors concluded that as the dominant native vegetation declines in the salt impacted areas, *Phragmites* will continue to spread (Richburg *et al*., 2001). Table 19 lists certain wetland plant species that have been shown to be sensitive to road salt impacts.

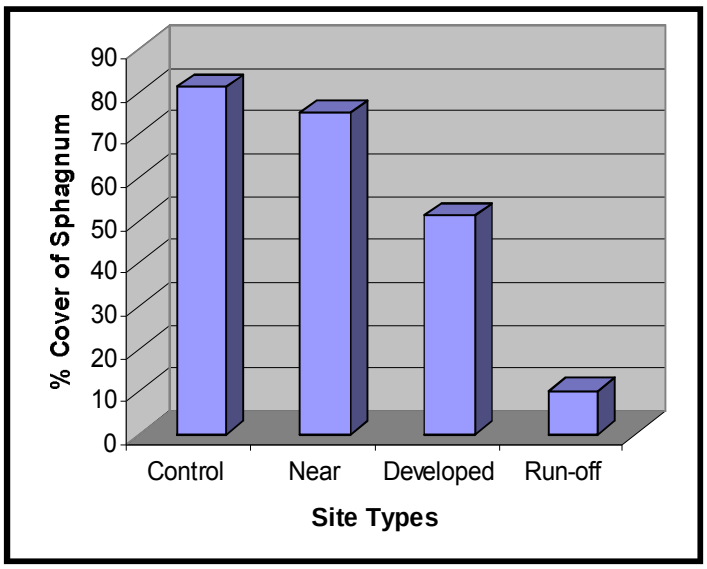

Figure 19. Mean percent cover of *Sphagnum* at each site type (compiled from Ehrenfeld and Schneider, 1991)

Table 19. Plant Species Sensitive to Runoff and Road Salt Impacts

Species affected	Location	Reference
• Atlantic white cedar (*Chamaecyparis thyoides*) • *Sphagnum* sp. • Tufted sedge *(Carex stricta)* • Round leaf sundew *(Drosera rotundifolia*) • Golden club (*Orontium aquaticum)* • Bog aster (*Aster nemoralis*) • Swamp pink (*Helonias bullata)* • Bladderwort *(Utricularia spp.)* • Cotton grass (*Eriophorum virginicum)* • Hazel alder (*Alnus serrulata*)	NJ	Ehrenfeld and Schneider, 1991
• Sedges (*Carex spp.)* • Red maple (*Acer rubrum*) • Pitcher plant (*Sarracenia purpurea)* • *Sphagnum* sp.	IN	Bubeck *et al.*, 1971
• Hoary willow (*Salix candida*) • Cranberry (*Vaccinium macrocarpon*)	MA	Richburg *et al.*, 2001

Several invasive species flourish when exposed to high chloride levels, and this can profoundly alter the wetland plant community. For example, researchers have noted that narrow-leaved cattail (*Typha augustifolia)* and common reed-grass (*Phragmites australis*) are frequently present in roadside swales and wetlands with high soil chloride levels (EC, 2001). Isabelle *et al.* (1987) determined that only two wetland plant species could germinate in pure roadside snowmelt conditions -- common cattail (*Typha latifolia*) and purple loosestrife (*Lythrum salicaria*). The tolerance of invasive species for both higher chloride levels and higher water level fluctuations allows them to rapidly establish and spread in wetlands that receive snowmelt and stormwater runoff (Isabella *et al.*, 1987).

Chloride can also degrade the quality of the wetland invertebrate community. Gernes and Helgen (2002) sampled Minnesota wetlands exposed to stormwater runoff and found that the number of invertebrate taxa and intolerant taxa decreased as chloride concentrations increased in urban wetlands (Figure 20). Toxicity studies indicate that chloride becomes acutely toxic to wetland invertebrates at concentrations in the 2,500 to 4,500 mg/l range; this range was seldom achieved in the majority of Michigan wetlands sampled by Benbow and Merritt (2004). Toxicity data from Canada suggest an LC_{50}[4] for the crustacean *Ceriodaphnia dubia* is 1,400 mg/l, which may be exceeded in some wetlands adjacent to roadways and at snow disposal sites (EC, 2001). Sanzo and Hecnar (2006) reported that road salt had toxic effects on wood frog tadpoles in Ontario wetlands typified by lower survivorship and increased physical abnormalities.

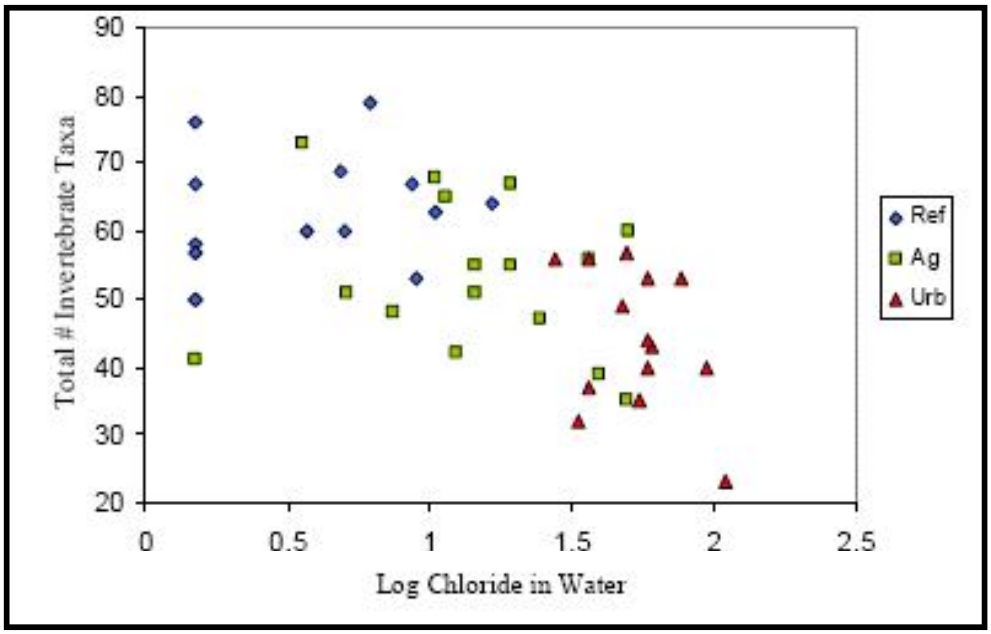

Figure 20. Effects of chloride on invertebrate abundance in Minnesota wetlands (from USEPA, 2002a)

Cumulative Impacts of Land Development on Wetland Communities

The preceding sections have reviewed how individual hydrologic and water quality stressors impact urban wetland quality. Most urban wetlands that are exposed to stormwater, however, are subject to a combination of different stressors. This section will review research on the cumulative impacts of land use change in the contributing drainage area on overall wetland quality. Cumulative impacts result in changes to habitat structure and ecosystem properties, which can have a domino effect on many plant and animal species in the wetland.

[4] LC_{50} denotes the "lethal concentration" at which 50% of the organisms die over a certain time period, which is four days in this study.

Cumulative Impact on the Wetland Plant Community

As might be expected, there are fewer studies that have examined the topic of cumulative impacts. Table 20 reviews the range of studies that have explored the cumulative impact of urbanization on the wetland plant community. The overall pattern is that changes in hydroperiod and pollutants influence the biological character of wetlands. The basic response is a decline in wetland plant diversity and a shift in plant community composition towards invasive and tolerant wetland plants.

Table 20. Recent Research on the Impacts of Urbanization on Wetland Plant Communities

Key findings	Location	Reference
Shrub-carr vegetation diversity and richness were highly correlated to land use at the 1,640 foot scale and diversity at the 3,280 foot scale.	MN	Mensing *et al*., 1998
As watershed development increased, indigenous plant species declined and community structure was altered due to water quality changes and invasive species.	NJ	Ehrenfeld and Schneider, 1991
Watershed conditions were examined for Atlantic White cedar swamps across differing urban disturbance regimes. Sites with high disturbance had lower understory richness, high canopy cover of red maple, and low *Sphagnum* cover.	NJ	Laidig and Zampella, 1999
Land use changes between 1926 and 1988 from extensive agriculture to urban land resulted in distinct changes to the dominant vegetation in New York wetlands, specifically in emergent, forested, and scrub/shrub communities.	NY	Thibault and Zipperer, 1994
Urbanization caused changes in wetland hydroperiod, affecting plant communities (increase in exotic grasses) and species richness (50% decline over a few decades) within a wetland.	Ontario	Chow-Fraser *et al.*, 1998
Plant species richness decreased relative to increases in paved road density at all distances studied with the most impact on species richness found within 0.6 miles of the road.	Ontario	Findlay and Houlahan, 1997
Wetlands surrounded by urban land had more introduced species than wetlands surrounded by undeveloped land. Community composition was strongly related to percent cover of water for both wetland types.	OR	Magee *et al.*, 1999
The relative frequency of thin-stemmed emergent plants in Puget sound wetlands decreased over time due to increasing WLF and mean depth. WLF is linked strongly to IC in CDA.	WA	Chin, 1996
In both scrub/shrub and emergent wetlands, plant richness was significantly negatively correlated with percentage impervious area within the watershed and mean WLF.	WA	Reinelt *et al.,* 1998
Urbanization caused emergent meadows to become dominated by cattail or reed canary grass.	WA	Cooke and Azous, 1993
Large scale vegetation changes (increased in dominance by invasives and loss of native species) in emergent zones of palustrine wetlands due to urban runoff from land development changes.	WI	Owen, 1999

Cumulative Impacts on Aquatic Invertebrates

Aquatic invertebrates are some of the most commonly used indicators to measure the health of aquatic ecosystems (Karr and Chu, 1999; Rosenberg and Resh, 1993). Aquatic invertebrates are good biological indicators because they are easy to sample and they respond to many kinds of stressors over extended periods of time. Several researchers have designed invertebrate sampling protocols and metrics specifically geared to measure wetland quality (Azous and Horner, 1997; U.S. EPA, 2002b). Wetland invertebrates are an important element of the food web and typically spend most or all of their life cycle within wetlands. This direct and regular exposure to wetland conditions and stressors makes them an excellent indicator of wetland quality (USEPA, 2002b).

The relatively few studies published to date show that land development is linked to declining wetland invertebrate quality (Table 21). For example, Hicks and Larson (1997) found that the wetland invertebrate community was impaired beyond 20% impervious cover in the CDA, while wetlands with low CDA impervious cover (less than 5%) were found to be similar to natural reference wetlands. In studies of Minnesota wetlands, wetland invertebrate community measures, including total abundance and sensitive taxa, were inversely correlated to urbanization (Gernes and Helgen, 2002).

Table 21. Recent Research on the Relationship Between Urbanization and Aquatic Macroinvertebrate Communities

Key Finding(s)	Location	Reference
Macroinvertebrate species richness was greater in well-vegetated wetlands and abundance was greater in highly nutrient-enriched wetlands.	Australia	Balla and Davis, 1995
Changes in wetland hydrology and plant cover over a 50-year period have altered the benthic community in an Ontario wetland. Pollution-tolerant chironomids and oligochaetes and other worms have increased and pollution sensitive Trichopterans and Plecopterans have decreased.	Ontario	Chow-Fraser *et al.*, 1998
An index of biological integrity was established by studying invertebrates in 44 natural, depressional, forested wetlands with varying levels of urbanization. Total abundance and species richness of sensitive taxa decreased as urbanization increased.	MN	Gernes and Helgen, 2002
Invertebrate community indices declined with increasing imperviousness (greater than 3%). Wetlands with more than 20% imperviousness had moderately to severely impaired habitat.	CT	Hicks and Larson, 1997

Cumulative Impacts on Amphibians and Reptiles

Amphibians are frequently cited as excellent indicators of wetland health given that they spend much of their life cycle in wetlands and select specific habitats on the basis of hydroperiod and other wetland conditions (Wake, 1991). Thus, amphibian populations are unusually attuned to wetland conditions and are extremely sensitive to alterations in wetland quality (US. EPA, 2002b). Less frequently, research has been conducted using reptiles as an indicator of wetland quality. Some reptiles such as turtles do spend critical parts of their life cycle in wetlands and rely on them for food and shelter. However, reptiles are less reliant on wetlands than amphibians.

The numerous studies that have linked urbanization to declines in amphibian abundance and richness in wetlands are profiled in Table 22. Early work by Richter and Azous (1995) found that wetlands with 40% urban land in their CDA had significantly lower amphibian richness than wetlands with less development in their CDA. Further work by Reinelt *et al*. (1998) in the same ecoregion found that the most urbanized wetlands had the lowest amphibian richness and the lowest proportion of native amphibian species.

Other researchers have reported correlations between forest cover (both in wetland buffers and upland areas) and amphibian and reptile populations in wetlands (Burke and Gibbons, 1995; Hecnar and M'Closkey, 1998; Knutson *et al*., 1999; Semlitsch, 1998; Rubbo and Kiesecker, 2005). These studies suggest the need to link terrestrial forest habitats adjacent to wetlands to sustain amphibian and reptile species. For example, Burke and Gibbons (1995) demonstrated that three species of freshwater turtle utilized a 900-foot radius of upland habitat adjacent to a wetland for nesting and hibernation. The core terrestrial habitat of adult salamanders was estimated by Semlitsch (1998) to be approximately 500 feet from the boundary of a study wetland, while Semlitsch and Bodie (2003) suggest a range of 384 to 1207 feet, depending on the species (Table 23). These studies illustrate the need to protect wetlands and the upland buffers that surround them to sustain amphibian and reptile populations, especially in urbanized areas.

Table 22. Research on the Effects of Urbanization on Amphibians and Reptiles

Key Finding(s)	Location	Reference
Both richness and abundance were lower in a residential development than in an undeveloped park. Sensitive species decreased and tolerant species (e.g., bullfrog) increased. This trend is possibly related to the increase in permanent water.	FL	Delis *et al.*, 1996
Amphibian abundance and richness were negatively associated with the presence of urban land use. Positive associations were found between frogs/toads and upland and wetland forest.	IA, WI	Knutson *et al.*, 1999
Changes in hydrology due to development will impact bog turtle habitat.	MD	Brennan *et al.,* 2001
Amphibian abundance was significantly related to land use at both 1,640 feet and 3,280 feet.	MN	Mensing *et al.* 1998
Traffic density on roads within a radius of approximately one mile wetland ponds had a significant negative effect on leopard frog abundance, but not green frogs.	Ontario	Carr and Fahrig, 2001
Amphibian species richness and abundance were negatively correlated with road density near wetlands.	Ontario	Houlahan and Findlay, 2004
Urbanized wetlands had lower amphibian species richness – mainly loss of wood frogs and salamanders, which are negatively associated with hydroperiod and positively associated with amount of forest habitat.	PA	Rubbo and Kiesecker, 2005
Wetlands with urban area coverage >40% had lowest amphibian species richness; < 5% had high richness. Mean WLF < 7.9 inches had highest species richness.	WA	Richter and Azous, 1995
As impervious cover and WLF increase, amphibian richness and abundance declined.	WA	Chin, 1996

Table 22. Research on the Effects of Urbanization on Amphibians and Reptiles		
Key Finding(s)	**Location**	**Reference**
Decline in amphibian species richness as WLF increased above 8.7 inches in emergent and scrub/shrub wetland zones.	WA	Horner, *et al.* 1997a
Amphibian richness in wetlands was related to the degree of urbanization within the watershed. The most urbanized wetlands had the lowest species richness.	WA	Reinelt *et al*., 1998
In 30 wetlands, species richness of amphibians and reptiles was significantly related to the density of paved roads within 1.2 miles of the wetland edge.	Ontario	Findlay and Houlahan, 1997

Table 23. Core Terrestrial Habitat for Wetland Amphibians and Reptiles (from Semlitsch and Bodie, 2003)		
	Mean minimum in feet	**Mean maximum in feet**
Frogs	672	1,207
Salamanders	384	715
Amphibians	522	951
Snakes	551	997
Turtles	403	941
Reptiles	417	948
Herpetofauna	466	948

Other researchers note that the location of impervious cover in the CDA is important – roads located near wetlands are often a major source of amphibian and reptile mortality. Roads adjacent to wetlands can impact amphibian and reptile populations through direct mortality, reduced habitat access, and population fragmentation and isolation (Jackson, 2000). Amphibians and reptiles are vulnerable to road effects because their life histories involve migrating between wetlands and upland habitat (Ashley and Robinson, 1996; Trombulak and Frissell, 2000). Studies have shown that amphibian species richness declines with increasing road density near wetlands (Houlahan and Findlay, 2004; Findlay and Houlahan, 1997). Similarly, population abundance of the leopard frog (*Rana pipiens*) was negatively affected by traffic density within approximately a one-mile radius of the wetland or pond (Carr and Fahrig, 2001). Even roads with low traffic density produced high mortality for the American toad (*Bufo americanus*) and *Ranid* frogs (green, wood and leopard frogs) (Mazerolle, 2004). Aresco (2005) found that increases in traffic adjacent to wetlands has increased mortality of many turtles species.

Cumulative Impacts on Birds

Most bird species rely on wetland habitats during some portion of their life cycle. Consequently, birds may be directly and indirectly impacted by the degradation of wetland quality. Urbanization can degrade wetland habitats used for breeding, nesting or feeding, and change competitive interactions among and between species that modify populations (Richter and Azous, 1997a). For example, Mensing *et al*. (1998) and DeLuca *et al*. (2004) investigated the influence of adjacent land use on bird communities in riparian wetlands and estuarine wetlands.

They found that land development had a pronounced negative impact on wetland bird species richness at distances of 1,640 to 3,280 feet from the wetland. DeLuca *et al*. (2004) further concluded that land development covering as little of 14% of the area within 1,640 feet of a wetland was enough disturbance for certain bird species to abandon estuarine wetlands entirely. The proximity and density of roads can also have a significant effect on wetland bird communities.

Findlay and Houlahan (1997) concluded that roads and other forms of linear development reduced connectivity between wetland habitat patches, thereby reducing bird species richness. Table 24 presents a summary of research available on the relationship between wetland bird species and urbanization.

Richter and Azous (1997a) reported a correlation between watershed urbanization and declines in bird species richness as well as a higher number of non-native bird species. They also found that most of the bird species that were less tolerant of urbanization were found in forested areas within 1,640 to 3,280 feet of existing wetlands. Dowd (1992) investigated forested wetlands in New York that were surrounded by urban land and reported that they were dominated by non-forest, urban resident and human-attracted bird species. Likewise, DeLuca *et al*. (2004) found that wetlands located in heavily developed areas had bird communities with low species richness. Wetland specialist species, such as the least bittern (*Ixobrychus exilis)* were absent and were replaced by habitat generalists, such as red-winged blackbirds (*Agelaius phoeniceus)* and common grackles (*Quiscalus quiscula)*.

Table 24. Recent Research on the Relationship Between Wetland Bird Species and Urbanization

Indicator	Key finding(s)	Location	Reference
Community Index	In Chesapeake Bay wetlands, development had a pronounced negative impact on bird integrity at both the 1,640 and 3,280 foot scales. A specific land development threshold of 14% was identified.	Chesapeake Bay	Deluca *et al*., 2004
Community composition	Bird species composition at a fragmented forested wetland consisted of more urban and non-forest species than a larger, unfragmented parcel.	NY	Dowd, 1992
Species Diversity	Diversity of birds was significantly negatively correlated with urban land use within 1,640 feet of the wetland.	MN	Mensing *et al*., 1998
Species richness	Bird species richness decreased relative to increases in paved road density at all distances studied with the most impact on species richness found in the first 1,640 feet out from the road.	Ontario	Findlay and Houlahan, 1997
Species richness	In Puget Sound palustrine wetlands, bird species richness decreased in developing watersheds. Within 0.6 miles of the wetland, diversity was influenced by urbanization.	WA	Richter and Azous, 1997a

Cumulative Impacts on Mammals

Few wetland mammals depend entirely on wetlands in North America (Gibbs, 1995). The majority of mammal species inhabit upland ecosystems as opposed to wetland areas (Adamus and Brandt, 1990). The most prominent wetland-dependent mammals include the muskrat (*Ondatra zibethicus*) and beaver (*Castor canadensis*). Other obligate mammals commonly found in wetlands include carnivorous shrews, lagomorphs, the swamp and marsh rabbits, mustelid, and river otter (Gibbs, 1995). Mammals that utilize wetlands extensively for feeding and cover, but also rely on upland habitat include raccoons, black bears, white-tailed deer, and moose (Gibbs, 1995; and May, 2001). Many wetland mammals are either herbivores or omnivores; consuming wetland plants directly or having a mixed animal-plant diet (Adamus and Brandt, 1990).

The distribution and abundance of small mammals can be indicative of the environmental health of wetlands. However, it is generally difficult to determine “normal” levels for parameters, such as mammal density, species richness, or biomass because quantitative data on the structure of the entire mammalian community of wetlands has not been uniformly collected in any region of the country. Information on the impacts to wetland mammals due to urbanization is limited mostly to studies of hydrologic effects and vegetation removal.

Several hypotheses and preliminary investigations exist regarding wetland mammal stressors due to urbanization. In terms of organic loading and acidification, the community composition is believed to shift from fish-eating species to vegetarian or invertebrate-eating species and opportunists. Another hypothesis is that as the distance between wetlands containing wetland-dependent mammals becomes greater and hydrologic connections and vegetated corridors become severed, the more sensitive mammals could be affected (Adamus and Brandt, 1990).

Several studies have found that species richness of small mammals in wetlands is positively correlated with the complexity of vegetation structure (Arner et al., 1976; Landin, 1985; Maki et al., 1980; Nordquist and Birney, 1980; Stockwell, 1985; Searls, 1974; and Simons, 1985). Small mammal communities change due to vegetation removal and den site destruction (Krapu et al., 1970; Malecki and Sullivan, 1987; and Possardt and Dodge, 1978). However, overstory removal increases the density of herbaceous ground cover, thereby increasing the abundance of small mammals (Adamus and Brandt, 1990).

Changes in wetland water levels and soil moisture also alter the community structure of mammals. During hibernation, the effects of dehydration can be severe due to exposure (Bellrose and Low, 1943). Mammals that inhabit subsurface areas are particularly sensitive to moisture level changes. However, local changes are not typically reflected by indicator species of mammals because they have the ability to move between impacted areas (Adamus and Brandt, 1990).

A study by Richter and Azous (1997b) focused on the distribution and abundance of small mammals across Puget Sound wetlands and compared wetland conditions to habitat characteristics important for maintaining diversity and unique species. They found that the percentage of forested land immediately adjacent to the wetland was positively correlated with mammal community diversity. The combined factors of wetland size, adjacent land use and the

relative quantity of large woody debris within the wetland buffer were found to be associated with small mammal richness. Figure 21 shows this relationship. This suggests that a limited amount of development can occur if enough forest land remains available for cover, food, shelter, and microclimatic relief.

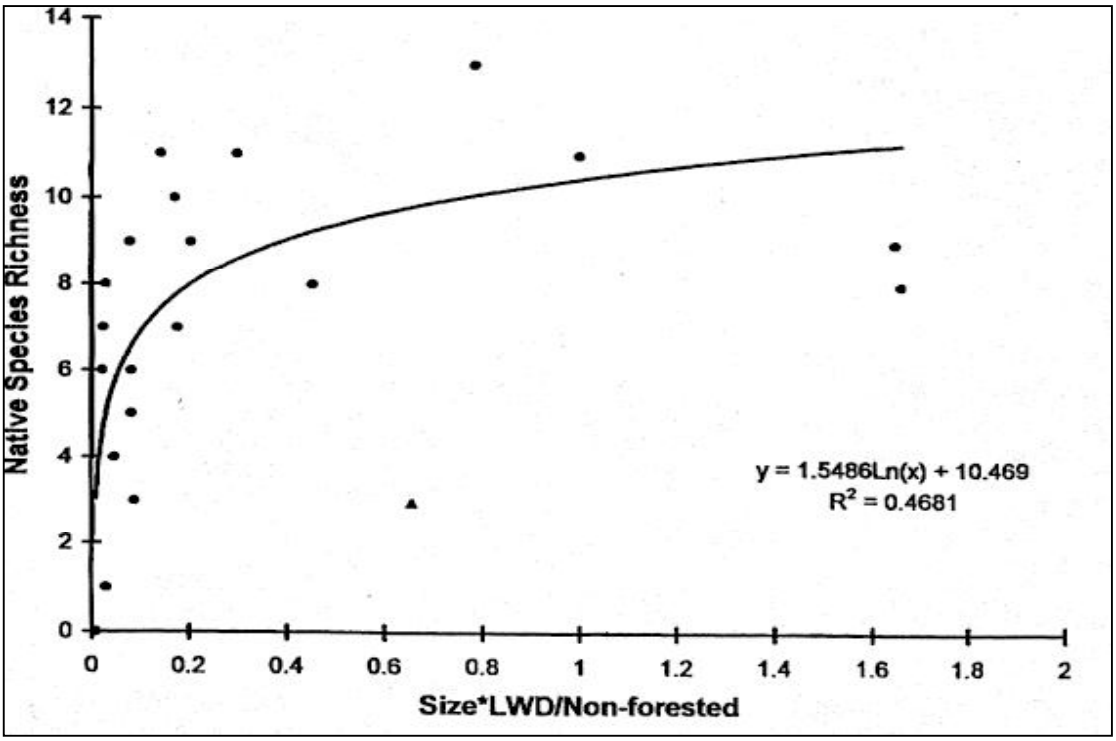

Figure 21. Relationship between small mammal species richness and habitat variables, including wetland size, land use cover, and large woody debris (Source: Richter and Azous, 1997)

Can CDA Impervious Cover Predict Cumulative Impacts?

While it is clear that even small amounts of land development can impair wetland quality, it is not yet possible to define a specific threshold of development that causes impairment. The most work to date is a collection of a dozen Puget Sound research studies that measured total impervious cover (IC) in the CDA to each wetland studied (e.g., Taylor et al., 1995; Chin, 1996; Horner et al. 1997a). One study from Connecticut also relates impervious cover thresholds to wetland quality (Hicks and Larson, 1997). These studies indicate a threshold of 3% to 5% IC where changes in wetland quality are detected and a second threshold at about 20% IC where wetland quality is sharply degraded. It is unclear, however, whether these findings from western Washington can be transferred or extended to other regions of the country.

Researchers in other parts of the country have not adopted the CDA impervious cover metric to define land development. Instead, they have used a diversity of alternative metrics such as percent urban land use, percent residential land use, road density, percent forest cover, and

percent developed land to characterize land use. In a few cases, researchers compute the development metric based on CDA characteristics, but it is more frequently computed based on adjacent land or distance from the wetland.
As a result, comparison among the research studies is difficult, and it is not currently possible to organize them into an overarching framework such as the Impervious Cover Model. The ICM is based on more than 150 research studies on the relationship between watershed impervious cover and various indicators of stream quality. As such, it has become a powerful tool for planners and engineers to predict future stream quality.

While it may not be possible to construct a wetland-based ICM at this time, it is clear that even low levels of development in the CDA can impact wetlands. Therefore, from a local wetland management standpoint, it makes sense to define and identify the wetlands most sensitive to land development in their CDA, and then regulate development activities within their CDAs to minimize indirect wetland impacts.

Designation of Sensitive Wetlands as an Alternative Management Approach

The research profiled in this article suggests that certain wetland types are sensitive to even low levels of land development or stormwater runoff. Other wetland types are less sensitive to adjacent land development, either due to their landscape position, plant communities, or the fact that they have already been degraded by urbanization or other disturbance. Table 25 presents a preliminary list of wetland types shown to be sensitive to urban stressors in the research profiled here. Communities should identify sensitive wetlands in their area as part of the local watershed planning process. Some states, such as Minnesota and New Hampshire, have designated wetland community types they consider sensitive to land disturbance (MNSWAG, 1997; Mitchell, 1996). Wetlands designated as sensitive should be afforded extra protection when development occurs in their CDA (see Article 3). Methods for defining and ground-truthing sensitive wetlands are presented in Article 2.

It is important to note that wetland sensitivity varies regionally, and a community should always develop its own locally-adapted list of sensitive and non-sensitive wetlands. As communities develop their lists, they should consult local wetland scientists to identify the wetland plant communities that have the greatest diversity, functional quality, and the least coverage of invasive plants. In general, high quality wetlands, or wetlands that contain rare, threatened, and endangered plant species should be automatically included on the list.

Table 25. Examples of Sensitive Wetlands	
Wetlands found to be sensitive in this literature review	
• Atlantic white cedar wetlands • Shrub-carr wetlands • Fens • Bogs • Vernal pools • Prairie potholes • Sedge meadows • Emergent meadows • Shallow marshes	• Ephemeral wetlands • Freshwater tidal wetlands • Shrub/scrub wetlands • Emergent wetlands • Forested wetlands • Palustrine wetlands • Headwater riparian wetlands • Depressional wetlands • Impoundments • Slope wetlands

Summary of Key Findings and Urban Wetland Research Gaps

This literature synthesis clearly documents that land development causes both direct and indirect impacts to wetlands that impair their function and quality. More systematic research is needed on the indirect impacts to wetlands, since it is extremely difficult to compare across wetland types, regions, plant communities, and landscape positions. In addition, it is not yet possible to directly link individual stressors generated in the CDA to predict impacts and biological responses within individual wetlands due to the interactions among many different stressors. With this in mind, several recommendations are provided to improve the future of urban wetland research.

- The current research on indirect impacts to wetlands has been produced by a great number of different academic disciplines that rarely interact with each other. Urban wetland research has been published by hydrologists, herpetologists, landscape ecologists, botanists, wildlife managers, conservation biologist, toxicologists, stormwater engineers and wetland scientists. It is recommended that a national meeting be convened or a network be launched to improve communication among the diverse research community currently working on the topic of indirect impacts to wetlands.

- Researchers have used many different metrics to describe the impact of upland development on wetlands (% urban land use, impervious cover, land cover, adjacent land use, forest cover, and percent developed). The lack of a uniform metric or index of land development as well as differences in how the CDA is defined and delineated has hindered comparison of studies. It is strongly recommended that researchers adopt a common convention for defining the CDA to wetlands and agree to measure a series of different land development metrics within the CDA.

- In addition, researchers may want to explore whether a common method (or methods) can be used to assess direct and indirect impacts to wetlands from the CDA in the field. The rapid Wetland Impact survey described in Article 2 of this series, may be a useful tool to start. Researchers should engage in a dialogue to develop more standard methods for monitoring and modeling hydrologic changes to wetlands.

- More systematic sampling of a large population of watersheds would be helpful in defining how watershed functions and indicators change in relation to percent wetland cover. This watershed-level wetland information could be important to help managers understand the importance of protecting wetlands to maximize watershed services.

- Perhaps the most critical research gap is the lack of understanding about wetlands whose water balance is dominated by groundwater, and more specifically, how these wetlands are impacted by upland changes in groundwater recharge rates due to land development. Although it is understandably difficult to track groundwater movement, more directed groundwater research is needed on this important topic.

- More research is warranted to explore how hydrologic changes, pollutants and other stressors promote the spread of invasive wetland plants. Current research indicates a general link, but does not yet indicate what causal factors can be manipulated by local wetland and watershed managers to reduce the spread of invasive species.

- A few studies have shown impacts to riparian wetlands due to stream constrictions. These studies are not necessarily conclusive as to the permanent effects on these wetlands, if any. Further research into the long-term impacts resulting from culverts, stream crossings, and other causes of flow constrictions is needed.

The research profiled here has shown that indirect impacts on wetlands from land development can have devastating and long-lasting impacts on many different wetlands, especially sensitive ones. This underscores the need for local protection of wetlands, since land use control is in the hands of local governments. A framework for using watershed planning to incorporate local wetland protection is provided in Article 2. Further tools available to local governments for protecting wetlands are specified in Article 3.

Local governments that wish to enact stronger local protection for wetlands and their functions can find a model ordinance to protect wetlands that are typically considered sensitive to stormwater runoff in Article 4. Article 5 deals with the topic of restoration, while the last article in the series addresses protection of small, isolated wetlands and other vulnerable aquatic resources that may not be fully protected by federal laws, especially in light of recent Supreme Court decisions.

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Persistent organic pollutants carried by synthetic polymers in the ocean environment

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Abstract

Thermoplastic resin pellets are melted and formed into an enormous number of inexpensive consumer goods, many of which are discarded after a relatively short period of use, dropped haphazardly onto watersheds and then make their way to the ocean where some get ingested by marine life. In 2003 and 2004 pre-production thermoplastic resin pellets and post-consumer plastic fragments were collected and analyzed for contamination for persistent organic pollutants (POPs). Samples were taken from the North Pacific Gyre, and selected sites in California, Hawaii, and from Guadalupe Island, Mexico. The total concentration of PCBs ranged from 27 to 980 ng/g; DDTs from 22 to 7100 ng/g and PAHs from 39 to 1200 ng/g, and aliphatic hydrocarbons from 1.1 to 8600 μg/g. Analytical methods were developed to extract, concentrate and identify POPs that may have accumulated on plastic fragments and plastic pellets. The results of this study confirm that plastic debris is a trap for POPs.
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Keywords: Persistent organic pollutants; Plastic contaminants; PCBs in plastics; DDTs in plastics; PAHs in plastics; Plastic debris; Plastic pellets

1. Introduction

Plastic materials comprise one of the most persistent macroscopic pollutants in oceanic waters and beaches in the world. There are many published reports about plastic debris found throughout the world's oceans (Colton et al., 1974; Shiber, 1979; Ryan, 1988; Shaw and Day, 1994; Golberg, 1995; Gregory, 1996; Guillet, 1997; Henderson, 2001; Ericksson and Burton, 2003; Otley and Ingham, 2003; McDermid and McMullen, 2004; Moore et al., 2001, 2002; Barnes, 2005).

The proliferation of plastic can be mainly attributed to inexpensive production costs and the light weight and varied properties of plastics. One pound of the most common pellets costs about $1US and contains approximately 25,000 pellets. Synthetic polymers are used to package almost everything in the consumer society. These favorable properties result in the production of high volumes of plastic goods, many classified as "throwaways" – single use products.

The physical characteristics of polyethylene- and polypropylene-based plastics show a high resistance to aging and minimal biological degradation. Marine litter is consistently between 60% and 80% plastic by mass (Derraik, 2002).

Plastics are primarily synthetic organic polymers derived from petroleum. When exposed to UV radiation in sunlight, these polymers break into smaller and smaller pieces, but they are still present as plastic, and they are not biodegradable in any practical human scale of time. This persistence of plastic leads to an increasing abundance in the ocean environment, which makes plastic debris more accessible to plankton and other marine life. Plastic debris and minute plastic particles, including pre-production plastic pellets, sometimes called nurdles or resin beads, are found floating in the ocean and stranded on beaches. Forty-four percent of all seabird species ingest floating plastic while feeding on or near the surface of the ocean,

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picking up anything that might resemble their natural food (Minchin, 1996; Auman et al., 1997; Blight and Burger, 1997; Bugoni et al., 2001; Cadée, 2002; Page et al., 2004).

Andrady (2000) found that degradation of plastic materials occurs slower in the ocean than on land, because cool ocean water inhibits the thermal loading that accelerates degradation on land. The length of time various plastic polymers persist in the ocean is not reliably known. Moore et al. (2001, 2002) found the mass of plastic material is 6 times that of plankton in the North Pacific Central Gyre and, 2.5 times that of plankton in California's southern coastal waters.

Most literature on plastic debris focuses on the classification and enumeration of the different kinds of plastic found on beaches and in seawater samples. Some papers report the measurement of PCBs and DDTs on plastic pellets made of polypropylene (PP) and polyethylene (PE) (Mato et al., 2001; Endo et al., 2005). We focus on these pollutants as well as other POPs to determine the amounts that are sorbed by various plastic samples.

The objective of this research is to analyze pre-production pellets, and post-consumer plastic fragments found in marine debris to quantify the concentration of pollutants including PCBs, PAHs, and organochlorine pesticides, such as DDTs, and aliphatic hydrocarbons. The existence and amount of many of these POPs in plastic marine debris has not been previously reported in the literature.

POPs are synthetic organic compounds which are widespread on land and in aquatic environments. They are considered among the most persistent anthropogenic organic compounds introduced into the environment. Some of these are highly toxic and have a wide range of chronic effects, including endocrine disruption, mutagenicity and carcinogenicity (Singh et al., 1998; Pauwels et al., 1999; Sultan et al., 2001; Tanabe, 2004). Furthermore, POPs are chemically stable, and therefore not easily degraded in the environment or in organisms. They are lipophilic and accumulate in the food chain.

Polychlorinated biphenyl's (PCB's) are mixtures of up to 209 individual chlorinated compounds (known as congeners), of which 113 are known to be present in the environment (Pascal et al., 2005; NWF, 1994). At least half of the PCBs produced are still in use, especially in older electrical equipment, or in storage. Thus, there remains a huge reservoir of PCBs with the potential to be released into the environment either through spills or leakage from transformers and other devices. Additionally, the migration of these chemicals from sediments that are known to contain high concentrations of PCBs to water provides an ongoing supply of the materials to the water phase (Brasher and Wolff, 2004; Barreira et al., 2005).

Organo-chlorine pesticides are synthetic compounds that are chemically stable and hydrophobic. They include DDT (dichloro-diphenyl-trichloroethane), a pesticide used in agriculture and as an insecticide. This pesticide was used in the late 1940s, greatly restricted in the 1970s and now banned for general use in the US and Canada. BHC (hexachlorocyclohexane), chlordane, and dieldrin, are other chlorinated pesticides used in agriculture.

Polycyclic aromatic hydrocarbons (PAHs) are a group of over 100 different chemicals that are formed during the incomplete burning of coal, oil, and gas, garbage, or other organic substances like tobacco or charbroiled meat. PAHs are usually found as a mixture containing two or more of these compounds. Soot contains PAHs. Some PAHs are manufactured. These pure PAHs usually exist as colorless, white, or pale yellow–green solids. PAHs are found also in coal tar, crude oil, creosote, and roofing tar. A few are used in medicines or to make dyes, plastics, and pesticides. These compounds are produced in many cases by anthropogenic activities. They can be separated into three non-exclusive categories based on their source: biogenic (PAHs formed by from natural processes like diagenesis), petrogenic (PAHs derived from petroleum), and pyrogenic (PAHs formed as a result of incomplete combustion of fuel) (Zeng and Vista, 1997). Many PAHs are toxic, and tend to bioaccumulate in aquatic organisms. There are 16 of these PAH compounds that are classified by the USEPA as priority pollutants based on their toxicity for humans (Bojes and Pope, 2007).

n-Alkanes, aliphatic hydrocarbons have not been found to affect the biota, however, they can help to differentiate between biogenic (marine or terrestrial) and petrogenic sources of organic matter. These compounds are microbially degraded relatively rapidly as compared to PAHs and organochlorine pesticides (Webster et al., 2003). However, biodegradation is more difficult in some *n*-alkanes, namely those in the C_{28}–C_{40} group (Brakstad and Bonaunet, 2006; Okoh, 2006)

2. Materials and methods

In 2003 and 2004, plastic samples were collected from the North Pacific Ocean, and from coastal sites in California, Hawaii and regurgitated stomach contents from a Laysan albatross colony on Guadalupe Island, Mexico (Fig. 1). Ocean samples were taken by the Oceanographic Research Vessel *Alguita*, and the others were taken using tweeze, scoops or taking directly into glass storage jars. In total, there were 26 sets of plastic samples. Some of the Industrial-site samples were taken from railyards where plastic pellets had been spilled while being offloaded to plastic processing facilities. The samples were stored at −20 °C until laboratory analysis.

The primary synthetic polymers in the sample of plastic fragments and pre-production pellets were identified by infrared spectroscopy, using a Shimadzu model 8300 Fourier Transform Infrared Spectrophotometer (FT-IR). Physical properties including buoyancy, color of flame, odor and melt characteristics were also recorded as supporting evidence.

The plastic samples were analyzed according to the method used by Partida-Gutiérrez et al. (2003) with the following modification; 1 or 2 g of dry plastic fragments

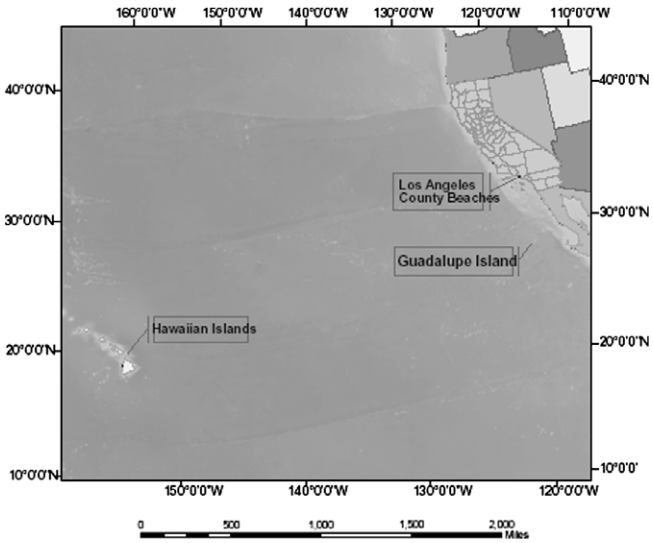

Fig. 1. Collection sites of plastic debris samples.

or/and pellets were placed in a glass extraction thimble, and a mixture of recovery standards was added. It is important to highlight that the samples were not sorted by size and shape. The sizes are listed in Table 1.

The plastic samples selected for examination for possible POP contaminants were Soxhlet extracted for 12 h (6 cycles/h) with 150 ml of dichloromethane. The aromatic and chlorinated hydrocarbon (PCBs, PAHs and Pesticides) fraction was analyzed by GC/MS using a JEOL GC/Mate II ™ (double-focusing, reverse geometry mass spectrometer), with an Agilent 6890 gas chromatograph. The sample was injected in splitless mode (solvent delay: 1.5 min) into a BPX-5 column, 30 m × 0.25 mm i.d. × 0.5 μm thick film. The injector temperature was 270 °C and transfer line was 310 °C. The column temperature was programmed from 70 °C (1 min) to 300 °C (25 min), at a rate of 5 °C/min. The carrier gas was Helium (ultra high purity), programmed for a constant flow of 1.2 ml/min. The mass spectrometer was operated under selected ion monitoring mode (electron ionization, 70 eV, detector at 450 V), GC-interface 310 °C temperature and ion-chamber temperature 280 °C, resolving power 1000 with 10% valley. Quantification was done using the internal standard method, adding a known mixture of deuterated PAHs (1,4-dichlorobenzene-*d*4, naphthalene-*d*8, phenanthrene-*d*10, acenaphthene-*d*10, perylene-*d*12, chysene-*d*12), and a mixture of tetrachloro-*m*-xylene (TCMX) and PCB-209, and to aliphatic hydrocarbons the *n*-dodecane-*d*26 was added prior to extraction.

The identification and quantification of POPs was made by injection of mixtures of the following standards: PCB standard individuals, IUPAC numbers of congeners – 1, 11, 29, 47, 121, 136, 185, 194, 206, 5, 50, 104, 188, 87, 77, 154, 200, 208, 8,18, 28, 44, 52, 66, 101, 105, 118, 126, 128, 138, 153, 170, 180, 187, 195, 209; PAHs standard individuals – acenaphthene, acenaphthylene, antracene, Benzo(*a*)anthracene, benzo(*a*)pyrene, benzo(*b*+*k*) fluoranthene, benzo(*ghi*)perylene, benzo(*k*)fluoranthene, chysene, dibenz(*a*,*h*)anthracene, fluoranthene, fluorene, indeno(1,2,3,*c*,*d*)pyrene, naphthalene, phenanthrene, pyrene; DDT's and Pesticides standards-2,4′-DDD, 2,4′-DDE, 2,4′-DDT, aldrin, *a*-BHC, *b*-BHC, *d*-BHC, *d*-BHC, *g*-BHC, 4,4′-DDD, 4,4′-DDE, 4,4′-DDT, dieldrin, endosulfan I, endosulfan II, endosulfan sulfate, endrin, endrin aldehido, heptachlor, heptachlor epoxide-isomer B, methoxychlor; and aliphatic hydrocarbon standards-*n*-dodecane, *n*-tetradecane, *n*-hexadecane, *n*-octadecane, *n*-eicosane, *n*-docosane, *n*-tetracosane, *n*-hexacosane, *n*-octacosane, *n*-triacontane, *n*-dotriacontane, *n*-tetratriacontane, *n*-hexatriacontane.

The extraction recovery fraction was obtained using the standard DBOFB (4,4-dibromooctafluorobiphenyl) for PCBs and Pesticides, and *p*-terphenyl-*d*14 for PAHs prior to quantification. Procedural blanks were analyzed with each batch of samples (six samples per batch) and were taken through all phases of the analytical procedure. For every eight samples one duplicated sample was analyzed. The samples analyzed were found to fall in the range from 70% to 98% recovery. The detection limit of the organic compounds was calculated according to the methods proposed by Vial and Jardy (1999). The values ranged from 0.02 to 0.15 ng/g for PCBs, 0.05 to 0.8 ng/g for PAHs, 0.03 to 2.03 ng/g for pesticides and 0.02 to 6.18 μg/g for aliphatic hydrocarbons.

The quantification was based on the integrated peak area for the appropriate *m*/*z* value at the expected retention time with positive identification confirmed by the ion representing the base peak and the presence of two confirming ions. The retention time shift in the chromatogram was corrected using the internal standard and positive confirmation of the analyte within 0.2 min of expected retention time.

3. Results and discussion

The analyzed samples contained plastic fragments and pre-production pellets of different sizes and shapes (Table 1). The FT-IR analysis showed that the primary synthetic polymers in the samples were PP (polypropylene) and PE (polyethylene). The type of plastic fragments and pre-production pellets collected are shown in Fig. 2a, b and c. The main component in all plastic samples was PP (80–90%), and the remaining component was PE (Table 1). The authors recognize that the total surface area of the sample pieces was not uniform due to the nature of the debris material collected. The samples were taken from widely differing environments and it was not always possible to obtain samples of similar dimensions. In all cases, however, the samples analyzed were made up of multiples pieces and the process of averaging the measured pollutant per mass of sample provides a way to report the findings recognizing that the total surface are may vary with each sample. The extraction process is also an averaging process that pulls

Table 1
Description of plastic debris collected at each site

Sample ID (localization)	Color	Size (mm)	Type plastic
Tern Island I (*Hawaii Island*)	Red, orange, blue, white, blue–green, dark blue	27 × 13, 5 × 3, 16 × 4, 20 × 5, 15 × 5, 5 × 5, 20 × 18, 13 × 10, 13 × 5, 10 × 2, 20 × 8, 15 × 13	PP 90%; PE 10% (*Fragments*)
Tern Island II (*Hawaii Island*)	Black, green, blue, white, pink	16 × 9, 1 × 1, 8 × 6, 8 × 2, 3 × 4, 7 × 3	PP 90%; PE 10% (*fragments and pellets*)
Kamilo Beach (*Hawaii Island*)	White, clear, gray, black, pink	8 × 8, 5 × 3, 5 × 5, 5 × 8, 4 × 3	PE 85%; PP 15% (*pellets*)
Kualoa Park (*Hawaii Island*)	Blue, orange, black, pink, green, white	20 × 10, 7 × 5, 20 × 15, 10 × 8, 25 × 25, 70 × 1	PE 90%; PP 10% (*fragments and pellets*)
Guadalupe *Island*, *Mex.* (Albatross bolus)	Yellow, blue, green, light blue, white clear, orange	42 × 18, 32 × 15, 12 × 7, 20 × 10, 10 × 5, 5 × 3, 16 × 5, 9 × 4	PP 90%; PE 10% (*Fragments)*
Hermosa Beach (*L.A. USA*)	Purple, blue, white, green, pink	10 × 5, 32 × 4, 10 × 4, 14 × 8	PP 100% (*fragments*) PP 50%, PE 50% (*pellets*)
Golden Shore M.R. (*L.A. USA*)	White, clear, yellow, red, pink	4 × 2, 8 × 7, 10 × 7, 13 × 5, 20 × 10, 20 × 20,4 × 4	PP 50%, PE 50% (*fragments and pellets*)
Redondo Beach (*L.A. USA*)	Green, red, white, dark blue, clear	25 × 15, 10 × 5, 7 × 4, 20 × 15, 10 × 5,3 × 3, 20 × 9	PP 90%; PE 10% (*fragments and pellets*)
CCHW1 (a) (*L.A. USA – Industrial area)*	Red, blue(dark/light), white, purple, black, transparent, pink–green	6 × 5, 3 × 6, 5 × 5, 2 × 5, 2 × 4, 3 × 5, 3 × 8	PE 100% (*fragments*)
LB1311a (*L.A. USA – Industrial area*)	White, gray, green, red, purple, blue (light/dark), yellow, orange, transparent	40 × 4, 20 × 10, 10 × 6, 60 × 5, 30 × 15, 15 × 15, 24 × 7, 40 × 6, 10 × 9, 15 × 8	PE 20%, PP 80% (F*ragments*)
LB1312a (*L.A. USA – Industrial area*)	Transparent, yellow, black, white, gray, light green, red and white	3 × 4, 3 × 3, 4 × 5, 4 × 2	PE 10%, PP 90% (*pellets*)
SB1310 a (*L.A. USA – Industrial area)*	White, Clear, blue, yellow, light brown and gray	2 × 5, 4 × 6, 3 × 3	ABS 10%, PP 90% (*pellets*)
CCHW2 (a) (*L.A. USA – Industrial area*)	White, clear, light green–blue, light blue	2 × 5, 4 × 4	PE 10%, PP 90% (*pellets*)
LARHW2 (a) (*L.A. USA – Industria area*)	Green, light blue, dark blue, pink, orange, purple, black, clear, white, gray, neon green	23 × 15, 46 × 4, 21 × 7, 25 × 12, 15 × 15, 20 × 8, 23 × 17, 8 × 5	PE 20%, PP 80% (*fragments*)
LARHW1 (a) (*L.A. USA – Industrial area*)	White, transparent, blue (light), gray and black	2 × 5, 4 × 4, 4 × 3	PE 10%, PP 90% (*pellets*)
SB1309 a (*L.A. USA – Industrial area*)	Dark blue, light blue, green, pink, black, purple, white, transparent, light green, and yellow	13 × 9, 18 × 4, 8 × 4, 7 × 6, 11 × 10, 12 × 6, 14 × 5, 3 × 5, 22 × 4, 15 × 7	PE 50%, PP 50% (*fragments*)
San Gabriel River (1) (*L.A. USA*)	White, transparent, green, blue, black, yellowish, orange	5 × 3, 4 × 4, 3 × 3, 4 × 3	PE 80%, PP 10% (*pellets)*
San Gabriel River (2) (*L.A. USA*)	White, transparent, green, blue, black, yellowish, grey, red, pink	5 × 4, 6 × 4, 2 × 5, 7 × 5, 45 × 3, 15 × 7, 5 × 2, 7 × 5, 12 × 5, 12 × 1, 3 × 7	PE 20%, PP 10% (*fragments and pellets*)
TRM-1 (*L.A. USA – Industrial area*)	White, yellowish	5 × 3, 5 × 2, 4 × 3, 3 × 3	PE 100% (*pellets*)
TRM-2 (*L.A. USA – Industrial area*)	White, white dirty	5 × 3, 5 × 2, 4 × 3, 3 × 3	PE 100% (*pellets*)
TRM-3 (*L.A. USA – Industrial area*)	white	5 × 3, 5 × 2, 4 × 3, 3 × 3	PE 100% (*pellets*)
TRM-4 (*L.A. USA – Industrial area*)	White, yellowish, blue, white dirty	5 × 3, 5 × 2, 4 × 3, 3 × 3	PP 100% (*pellets*)
Site No. 6-1 (*L.A. USA – Industrial area*)	White, yellowish	5 × 3, 5 × 2, 4 × 3	PE 100% (*pellets*)
Site No. 6-2 (*L.A. USA – Industrial area*)	white	5 × 3, 5 × 2, 4 × 3, 3 × 3	PE 100% (*pellets and dust pellets*)
Site No. 6-3 (*L.A. USA – Industrial area*)	White, blue, grey, yellowish	5 × 3, 5 × 2, 4 × 3	PE 90% and PP 10% (*pellets*)
Surface seawater (*L.A. USA*)	Green, red, blue, white, transparent, orange	48 × 10, 150 × 5, 80 × 2, 35 × 8, 30 × 15, 5 × 4	PE 80% and PP 20% (*fragments*)

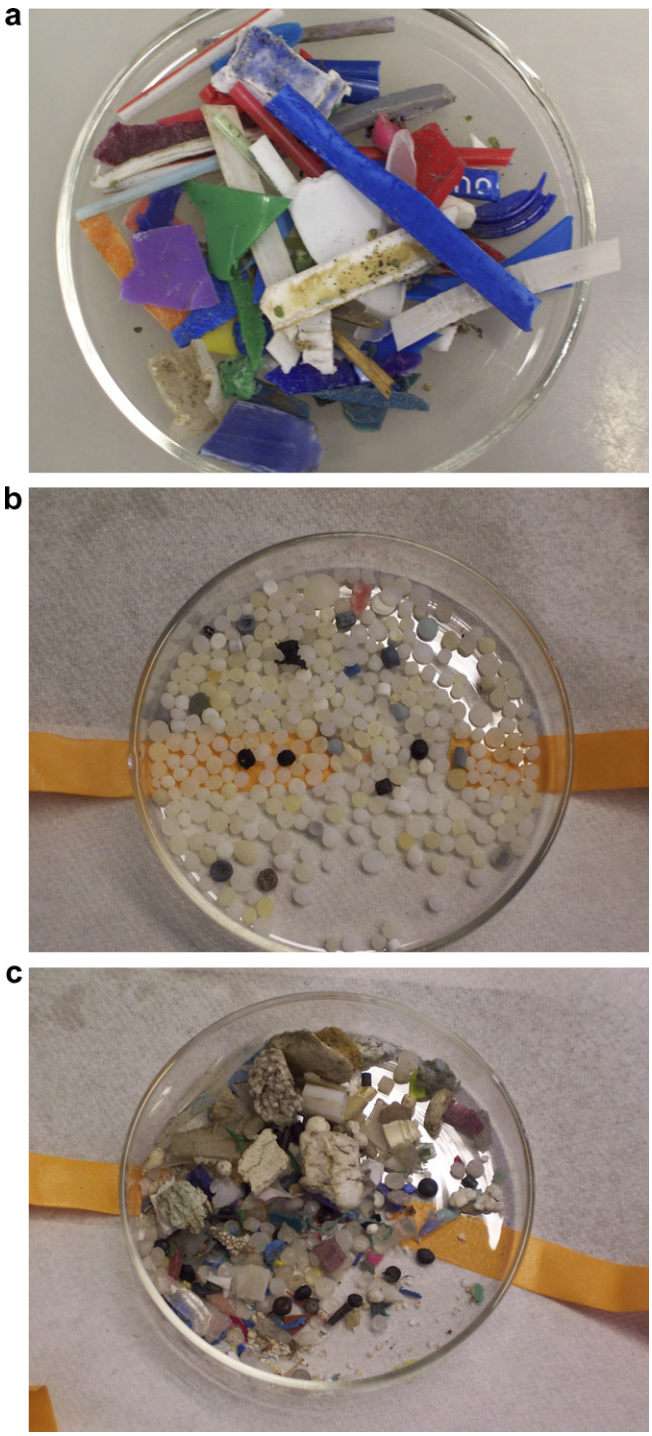

Fig. 2. Typical post-consumer plastic fragments and pre-production thermoplastic resin pellets from samples. (a) Plastic fragments, (b) plastic pellets, (c) mixed plastic (fragments and pellets).

adsorbed materials off the surface exposed to the surrounding environmental conditions.

The quantities of persistent organic pollutants are presented in groupings of samples from beaches and samples from industrial sites as shown in Tables 2 and 3. All the samples contained detectable amounts of PAHs, except for four samples: Tern Island II, Kailua Beach, Kamilo Beach and Hermosa Beach. The PAH, pyrene, was detected in 65% of the samples. Fluoranthene was present in 62% of the samples. Naphthalene and phenanthrene were present in 54% of the samples. Acenaphthene was present in 42% of the samples. The remaining PAHs were present in smaller percentages.

The highest concentration of PAHs was found in the industrial-site samples. The sum of all observed PAHs (classified as priority pollutants by USEPA) was in the range of 39–1200 ng/g. The TRM-1, TRM-4 samples from a plastic pellet processor showed the highest concentration of total PAHs, with 6100 and 12,000 ng/g respectively. The pellets from TRM-1 and TRM-4 did not look new. In fact, many of these pellets were discolored (yellowed) and had cracks, characteristic of old pellets (Gregory, 1978; Endo et al., 2005). The fragment samples taken from the bank of the San Gabriel River, at the beach, and on the sea

Table 2
Persistent organic pollutants on samples from Beaches

Sample ID	∑PAH (ng/g)	∑PCBs (ng/g)	∑DDTs (ng/g)
Kamilo Beach (Hawaii)	nd	55	nd
Kualua Beach (Hawaii)	nd	nd	22
Tern Island (Hawaii)	500	70	nd
Tern Island II (Hawaii)	nd	980	nd
Albatross (Guadalupe Island, Mexico)	640	nd	nd
Hermosa Beach (California, USA)	nd	nd	140
Redondo Beach (California, USA)	1400	730	nd
Golden Shore Marine Reserve beach (California, USA)	1700	27	nd
San Gabriel River (1) (California, USA)	1200	nd	1100
San Gabriel River (2) (California, USA)	6200	nd	1000

nd, not detected at detection limit. Limit detection PCBs 0.02–0.15 ng/g, PAHs 0.05–0.8 ng/g and pesticides 0.03–2.03 ng/g.

Table 3
Persistent organic pollutants on samples from Industrial sites

Sample ID	∑PAH (ng/g)	∑PCBs (ng/g)	∑DDTs (ng/g)
CCHW1(a)	39	nd	nd
CCHW2 (a)	360	nd	nd
LB1311 (a)	150	nd	nd
LB1312 (a)	3900	nd	nd
LARHW1 (a)	1700	nd	nd
LARHW2 (a)	210	nd	nd
SB1309 a	1800	nd	nd
SB 1310 a	770	nd	170
Industry TRM-1	12,000	nd	1900
Industry TRM-2	88	nd	42
Industry TRM-3	74	nd	nd
Industry TRM-4	6100	nd	7100
Site No. 6-1	1800	nd	nd
Site No. 6-2	2600	nd	nd
Site No. 6-3	390	nd	nd
Surface sea water	9200	nd	nd

nd, not detected at detection limit. Limit detection PCBs 0.02–0.15 ng/g, PAHs 0.05–0.8 ng/g and pesticides 0.03–2.03 ng/g.

surface also presented high concentrations (6200–9200 ng/g).

The compositional patterns of PAHs may provide information about petrogenic sources. Oil seeps or petroleum spills are made up mostly of two- and three-ring PAHs. Pyrogenic PAHs from combustion, for example, vehicle exhaust, domestic heating with coal, and many industrial processes, produce mostly four- and five-ring PAHs. The ratio of the sum of the two- and three-ring PAHs to the sum of four- and five-ring is an indication of the source of the PAHs.

The presence of the EPA priority PAHs found in this study showed a dominance of four- and five-ring PAHs over the two- and three-ring PAHs. A decrease in this ratio indicates a shift from uncombusted to combusted organic matter as the dominant PAH source. The results of our study showed the ratio was 0.23, indicating that combusted fossil fuels were the principal source of PAHs.

There is another ratio that can aid source identification. This is the ratio of fluoranthene to pyrene. A fluoranthene/pyrene ratio of greater than 1 is considered to be a pyrolytic source. In our results, this ratio was of 1.53, providing additional evidence of combusted fuel as the source of the PAHs in our samples (Webster et al., 2003; Headley et al., 2002; Boonyatumanond et al., 2007).

The concentration of total PCBs detected (sum of all congeners detected) in plastic samples are summarized in Tables 2 and 3, ranging from 27 to 980 ng/g. These results are from the sampling sites at Tern Island I and II, Kamilo Beach, Redondo Beach, and Golden Shore Marine Reserve Beach. The highest concentration of total PCBs was found in Tern Island II and the lowest concentration of total PCBs was at Golden Shore Marine Reserve. The most abundant congeners were CB-52, 101, 118 and 170, where the highest concentration of PCB-101 was 200 ng/g. The second most abundant group of PCBs was congener CB-105, 138, and 153, showing a high concentration of PCB-138 (190 ng/g). Because there is no standard from previous studies with which to compare these results, we compared our results with data from sediments and found that the concentrations are very similar to the concentrations found in sediments from Baja California (Mexico) to California (USA) border zone, Salton Sea, and tidal marsh zones along coastal California, USA (Gutiérrez-Galindo et al., 1998; Partida-Gutiérrez et al., 2003; Sapozhnikova et al., 2004; Hwang et al., 2006).

The only pesticide detected in all the plastic samples was 4,4-DDT and its metabolites 4,4-DDE and 4,4-DDD. The measured sum of all DDT metabolites ranged from 22 to 7100 ng/g. All the samples contained 4,4-DDE, with the highest concentration (5600 ng/g) in the site called TRM-4, which is an industrial site. This result suggests that DDT may have been used as a pesticide in that area, probably in past decades when it was legal. Pellets analyzed from this site were weathered or discolored typical of old pellets. These results are presented in Tables 2 and 3 (sum of DDT and its metabolites). In Fig. 3, we observed

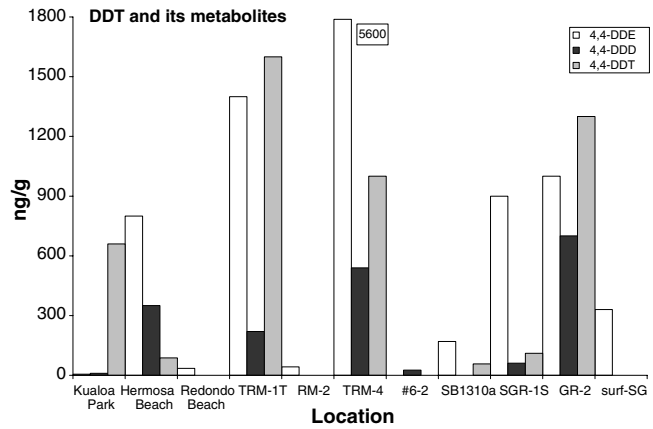

Fig. 3. Concentration of DDT and its metabolites, DDE and DDD in ng/g.

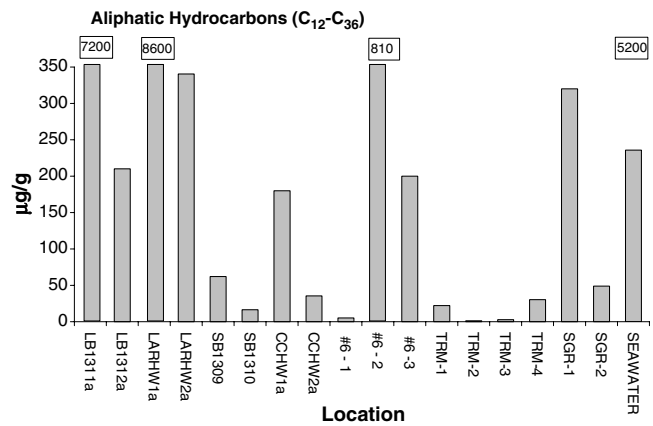

Fig. 4. Sum of total of aliphatic hydrocarbons (µg/g).

that the samples with the highest concentration of total DDTs were samples TRM-1 and TRM-4, San Gabriel River 1 and San Gabriel River 2, in accordance with Endo et al. (2005). However, we were not able to detect PCBs on these pellets.

The concentration of total aliphatic hydrocarbons (sum of all normal alkanes present in the plastic samples, ranging in carbon chain length from C_{12} to C_{36} detected) is shown in Fig. 4. The samples in this graph are from the same sites listed in Table 1. The average total of *n*-alkanes relative to dry weight was 140 µg/g (17 samples), if we do not include the highest concentration samples (three samples) discussed below.

The three samples with the highest levels of *n*-alkanes were LB1311a with 7200 µg/g, LARHW1a, with 8600 µg/g, and the surface sea water sample, with 5200 µg/g. The first two are from industry sites and the third is from the ocean off the mouth of the San Gabriel River. We used dichloromethane to extract the samples to avoid potential problems using hexane. We believe that these observed *n*-alkanes hydrocarbons were adsorbed on the plastic's surface and were not extracted hydrocarbons from the synthetic polymers of the plastic samples.

4. Conclusions

The main plastic components of the samples of marine debris were polypropylene and polyethylene. Plastic debris was found to accumulate contaminants, perhaps because of its permeable lipophilic nature. We found PAHs in all the samples. The main source of these PAHs was pyrolytic, and the samples from California showed a strong influence from industrial and urban areas. The only pesticide that we found associated with the plastic debris was DDT and its metabolites DDD and DDE. PCBs were found only in the plastic debris collected on the beaches. The Tern Island site, while remote from civilization, was the site of a military base and is known to be contaminated with PCBs at a level requiring clean-up efforts (Miao et al., 2000). The plastic pieces taken from Laysan albatross regurgitated stomach contents on Guadalupe Island probably were originally foraged from an area north of the Island off the Pacific Coastal of the United States (Henry, unpublished data). There is a small military colony currently on the island, with some burning of fossil fuel for energy production.

The concentration ranges of the POPs are as follows: total PCBs 27–980 ng/g, total PAHs 39–1200 ng/g, DDTs 22–7100 ng/g, and aliphatic hydrocarbons 1.1–8600 μg/g.

The results of this study show that PCB-52, 101, 118, and 170 were the most common POPs detected, and fluoranthene was the most abundant PAH compound in plastic debris samples. Observations made during this study and by Mato et al. (2001), indicate the concentration of POPs in this plastic debris may be a function of the age of the plastic.

The work reported here is the first study showing the concentrations of persistent organic pollutants in post-consumer plastic debris samples. The increasing abundance of plastic debris allows marine organisms to mistake more plastic for their natural food and ingest more plastic as they feed. These plastics are important point sources carrying POPs. It is not only the initial organism that ingests the plastics that may be affected by the POPs, but also the organisms within its food web. Future studies should try to obtain fragments in the range of 1–5 mm in order to make possible comparison with the results reported by Mato and Endo.

It appears that the plastic debris fragments studied to adsorb, accumulate and transport persistent organic pollutants. Further study could be initiated to evaluate the possibility of the transfer of POPs between the plastic carrier particles and the tissues found in living organisms.

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2007-2008
ANNUAL PROGRESS REPORT

TO THE
SANTA ANA REGIONAL WATER QUALITY CONTROL BOARD

SARWQCB ORDER NO. R8-2002-0011
NPDES NO. CAS 618033

(Volume 1 of 5)

NOVEMBER 30, 2008

BY THE RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT, COUNTY OF RIVERSIDE AND CITIES OF RIVERSIDE COUNTY (SANTA ANA REGION)

N P D E S

CERTIFICATION

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Signed: Mark H. Wills

Mark H. Wills
Chief of Regulatory Division
Riverside County Flood Control
And Water Conservation District

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Canyon Lake	**Mr. Bob Bohan**
Corona	**Ms. Michele Hindersinn**
County of Riverside	**Mr. Alex Gann**
Hemet	**Ms. Linda Nixon**
Lake Elsinore	**Mr. Alex Gutierrez**
Moreno Valley	**Mr. Kent Wegelin**
Murrieta	**Ms. Bill Woolsey**
Norco	**Ms. Lori Askew**
Perris	**Mr. Michael Morales**
Riverside	**Ms. Jessica Chin**
San Jacinto	**Mr. Tim Hults**

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INTRODUCTION

On October 25, 2002 the Santa Ana Regional Water Quality Control Board (SARWQCB) issued a "third-round" area-wide National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) Stormwater Permit (MS4 Permit) to the Riverside County Flood Control and Water Conservation District (District), the County of Riverside (County) and the Cities of Beaumont, Calimesa, Canyon Lake, Corona, Hemet, Lake Elsinore, Moreno Valley, Murrieta, Norco, Perris, Riverside, and San Jacinto (Cities), for the portion of the Santa Ana River watershed located within Riverside County (Order No.R8-2002-0011). The City of Murrieta was included in this third-round MS4 Permit since approximately 325 acres of the city drains to the Santa Ana River Watershed via the San Jacinto River Watershed. The MS4 Permit designates the District as the Principal Permittee. The County and incorporated Cities are designated as Co-Permittees. **Figure I-1** shows the portion of Riverside County that is within the jurisdiction of the SARWQCB.

Previous MS4 Permits were adopted by the SARWQCB on July 13, 1990 (Order No. 90-04) and on March 8, 1996 (Order No. 96-30). Throughout this Annual Report, the MS4 Permits adopted by the SARWQCB for Riverside County will be identified as follows:

- Order No. 90-04 referred to as the 1990 MS4 Permit
- Order No. 96-30 referred to as the 1996 MS4 Permit
- Order No. R8-2002-0011 referred to as the 2002 MS4 Permit

Pursuant to the 1990 MS4 Permit, the Permittees developed a Drainage Area Management Plan (DAMP) for the Santa Ana permit area in February 1993. The 1993 Santa Ana Regional DAMP (1993 SAR-DAMP) described 34 BMPs to be implemented by the Permittees in the effort to control stormwater pollution to the maximum extent practicable.

The 2002 MS4 Permit requires the continued implementation of control measures (BMPs) in the 1993 SAR-DAMP, and development of a revised DAMP to be submitted to the SARWQCB by January 1, 2005. The Permittees developed a revised DAMP, circulated it for public review and comment, and submitted it to the SARWQCB on December 30, 2004. Thus, the Permittees operated under the 1993 SAR-DAMP up to December 31, 2004 and transitioned to the 2005 DAMP beginning in January 2005.

While the 2005 DAMP provides an outline for the implementation of specific BMPs, the actual process of implementing the overall municipal stormwater program is comprised of a series of actions and ongoing activities carried out by the Permittees over the duration of the MS4 Permit. This report summarizes these actions and chronicles the Santa Ana Permittees' progress in implementing BMPs and the other provisions of the 2002 MS4 Permit during the period from July 1, 2007 through June 30, 2008.

Recent Permittee activities have been focused on addressing TMDL impaired waterbodies such as Canyon Lake, Lake Elsinore, and the Middle Santa Ana River. The Permittees have developed Task Forces, pursued grants, and re-evaluated their compliance programs as necessary to ensure that urban runoff does not contribute to these impairments.

Major program updates and accomplishments described in this report include:

PROGRAM MANAGEMENT/ADMINISTRATION

- Completion of the Integrated Regional Watershed Management Plan for the San Jacinto River Watershed in December 2007. The plan integrates water resources planning at a watershed scale. It addresses the sustainability of water supplies and surface and groundwater quality among other issues.
- Participation in the Santa Ana One Water One Watershed (OWOW) planning process which focuses on establishing regional solutions for water problems within the Santa Ana Watershed and is intended to develop linkages between all water interests. The objective of OWOW is to encourage the development of multi-benefit projects that use resources and expertise from across disciplines;
- Active participation with California Stormwater Quality Association (CASQA) with leadership roles in the organization. Specifically: Steve Stump, Board Member from 2004-2008; Mark Wills, Board from 2008-present; Jason Uhley, Legislative Chair since 2003 and Conference Chair in 2009; Linda Garcia, Monitoring Co-Chair 2004 – 2007;
- Continuation of the Permittees' Management Steering Committee quarterly meetings. The Management Steering Committee consists of the City Managers, Directors of Public Works and other essential municipal staff. The District's Chief Engineer chairs the Committee. The Committee was established to address Urban Runoff management policies for the Permit Area and coordinate the review and necessary revisions to the DAMP, Implementation Agreement, and development of the WQMP. In addition, the Management Steering Committee facilitates coordination with related water quality management programs and monitoring. It also responds to new legislative and regulatory initiatives;

- Participation in the CASQA Pesticide Subcommittee. The CASQA Pesticide Subcommittee addresses pesticide uses that impact stormwater discharges and focuses on providing input to the USEPA and the California Department of Pesticide Regulation (DPR) to improve implementation of pesticides regulations so that pesticides more fully protect water quality and are better aligned with the Clean Water Act and California Water Code. The District staff's roles included; Jason Uhley peer-reviewed the 2008 Summary of Pesticide Use Report prepared by the UP3 project; Arlene Chun, sub-committee member; District staff provided input and comments on several letters to DPR regarding proposed Pesticide Working Group Studies and DPR and USEPA proposed voluntary Pesticide Labeling modifications; Participation and presentation of urban pesticide issues at the September 2008 Western Regional Urban Pest Ant Work Group at UCR. The Work Group is analyzing alternative methods to control ants including IPM, changes in pesticide application requirements, and changes to the types and methods of pesticide application; Coordination meetings with the U.C. Extension and Riverside County; and
- District NPDES staff attended CASQA Effectiveness Training to assist with developing and implementing an effective program that will contribute to reduced pollution of our waterways. This training will help the District develop appropriate measureable goals in the assessment of their individual compliance programs and of the watershed based activities;

MONITORING

- Participated in the Southern California Coastal Water Research Program (SCCWRP) Bacteria Reference Study;
- Participated in the Bacterial Source Identification Study for the Santa Ana River;
- Participated in a study conducted by Dr. Grant of UC Irvine to evaluate the Dynamics of Point and Non-Point Source Fecal Pollution in the Santa Ana River;
- Through the Stormwater Monitoring Coalition (SMC), the Permittees participated in the development of:
  - A Regional Watershed Monitoring Program (RWMP) to address key questions regarding the health of receiving waters in Southern California;
  - A Model Monitoring Program that presents a common design framework that MS4 programs and Regional Board staff can use in developing and/or revising monitoring requirements for assessing receiving water impacts, status and trends, toxicity, mass emissions, and source identification;
  - A Peak Flow Study that will evaluate how stream erosion impacts natural stream habitat. A mathematical model will be developed that will help define a cause-effect

relationship between the geomorphic identity of selected streams and their susceptibility to erosion.

- Through LESJWA, the Permittees have funded activities that will improve Lake Elsinore via projects such as fish removal and disposal; Lake Elsinore island well improvements; and the installation and operation of a Lake Elsinore aeration system. Monitoring efforts are also being conducted to develop and refine a compliance strategy that was likely to achieve compliance;
- Participated in the Stormwater Quality Standards Task Force (SWQSTF). The multi-stakeholder Task Force was formed by Orange, San Bernardino, and Riverside counties to assist the Santa Ana Regional Board in reevaluating the application of the water contact beneficial uses (REC-1, REC-2) for receiving waters in the Santa Ana watershed. The Task Force's goal is to recommend revised beneficial use designations for sections of the Santa Ana River and its tributaries, develop water quality objectives to protect each designated use, and re-examine the appropriateness of the fecal coliform bacteria as the most appropriate water quality objective indicator organism;
- Permittees supported SCCWRP's Index of Biological Integrity (IBI) study. The study is evaluating the San Diego IBI to see if it is valid for all areas of southern California. The results of SCCWRP's study and the California Department of Fish and Game's IBI studies will be evaluated to determine their applicability for bioassessment within the Santa Ana Region;
- Continued implementation in the Consolidated Program for Water Quality Monitoring (Consolidated Monitoring Program) in accordance with NPDES Permit requirements that includes collection of water quality samples at Municipal Separate Storm Sewer Systems (MS4) outfalls and Receiving Waters for a variety of constituents as well as coordinate monitoring efforts for the Canyon Lake/Lake Elsinore TMDL and for the Middle Santa Ana River TMDL development;

TMDL

- The Permittees helped to develop a Watershed Monitoring and Urban Source Evaluation Plan for the Middle Santa Ana River to meet TMDL and grant requirements;
- The Permittees helped to identify BMP testing locations for a pilot study of BMP effectiveness for the Middle Santa Ana River TMDL;
- For the Lake Elsinore TMDL, the Permittees developed a draft Septic System Management Plan, lake monitoring plans, and revised the TMDL schedule to help identify the appropriate BMPs for the TMDL;

NEW DEVELOPMENT

- The District continued to develop an enhanced BMP guidance manual, focused on Low Impact Development (LID), and landscape based BMPs capable of addressing identified water quality impairments within the Santa Ana watershed;
- Continued progress for the District's LID Project, which proposes to construct, test and evaluate a variety of integrated management practices (IMPs) that serve as hydraulic and hydrologic controls consistent with the LID planning and design approach. In addition, the project proposes monitoring and testing components.

  The project will also provide a facility that can be used for demonstrating and evaluating the effectiveness of LID IMP techniques in southern California. The centralized location is convenient for training residents, regulators, developers, municipal employees, engineers and other interested stakeholders from many southern California communities;
- Participated in the SMC Hydromodification Study which consists of four technical tasks. In the first task, a mapping and classification system for streams based on their susceptibility to the effects of hydromodification was developed. The second task of the study is establishing protocols for ongoing monitoring to assess the effects of hydromodification. The objective for development of the standard monitoring protocols is to facilitate regional information sharing on project performance. The third task of the Regional Hydromodification Study involves development and calibration of dynamic models to assess the effects of hydromodification on stream condition. The fourth task is to develop a series of tools that watershed managers can apply to make recommendations or set requirements relative to hydromodification for Priority Development Projects. When completed, the Regional Hydromodification Study will provide tools to improve water quality and overall condition of streams in southern California by reducing channel degradation, excessive erosion and sedimentation of downstream receiving waters, and delivery of particle-bound pollutants;
- Participated in the SMC LID BMP study which would ultimately produce an LID BMP Design Manual and Training Materials that could be used by programs throughout southern California. The LID BMP Testing and Demonstration Facility at the District's headquarters in Riverside will be implemented in cooperation with the SMC project. The facility will be used to monitor the performance of LID features in the field, to illustrate LID features in training workshops, and to assist in the development of technical guidance regarding LID features;
- The District and County partnered with Metropolitan Water District (MWD) to update the Lake Matthews Area Drainage Plan. The existing Lake Matthews Area Drainage Plan was a joint effort of the County, District and MWD. It was adopted in 1994 and was one of the first ADPs in Riverside County to incorporate water quality mitigation features. The features were intended to provide protection to Lake Matthews. The costs

of the ADP facilities are partially offset by associated ADP Developer Fees charged to developments within the watershed. Unfortunately, several of the proposed water quality features were "regional" in nature and incorporated into receiving waters. Recent NPDES MS4 Permits include language that indicates regional treatment systems can not be incorporated into receiving waters. Further, the ADP was adopted prior to NPDES MS4 Permit requirements for WQMPs for new development and redevelopment. The WQMP requires new developments to incorporate onsite mitigation that may obviate the need for some of the regional water quality features proposed in the original ADP. For these reasons, the District, County and MWD are partnering to update the Lake Matthews ADP based on current regulatory requirements. The study will include the development of a watershed model that will attempt to evaluate the effectiveness of the existing water quality mitigation features protecting Lake Matthews, as well as the potential benefits of continued WQMP implementation. The need for additional regional water quality mitigation features will then be evaluated based on the modeling results. A schedule for the revised ADP has not been established yet;

- The District partnered with Western Municipal Water District (WMWD) to examine the feasibility of infiltrating urban runoff/stormwater into the Arlington Groundwater Basin. The recharge project would be part of a larger effort to increase the sustainable yield of the Arlington Basin. WMWD has selected a consultant (Wildermuth Environmental) who is currently developing a study evaluating alternative scenarios. Wildermuth is also evaluating any potential negative impacts from the recharge project on the groundwater basin. Proposed recharge facilities will incorporate any necessary mitigation measures to protect the groundwater. The project is expected to incorporate multiple benefits, including increasing the sustainable yield of the Arlington Basin and decreasing pollutant loads (particularly bacteria) to the Santa Ana River. A draft of the study is expected in late 2009/early 2010;

PUBLIC ED/TRAINING

- The District contributed $10,000 per year as part of Riverside County's support of the Southern California Water Committee. This organization is a nonprofit, nonpartisan, public education partnership dedicated to informing Southern Californians about their water needs and the state's water resources. It is a cooperative effort of business, government, water agencies, agriculture, and public interests;
- Continued to track program effectiveness such as resident surveys, tracking hotline inquiries, and web counters;
- Continued implementation of the Storm Water Protection website that offers educational resources and free brochures targeting residents, businesses, developers, contractors, and elementary school children;

- Continued offering of several municipal employee-training sessions to provide a general orientation of the Municipal Stormwater Program including topics such as stormwater regulations and permits, storage and disposal of hazardous materials, BMPs for parks and recreation activities, animal control facilities, vehicle and equipment cleaning, outdoor cleaning activities, pesticides/fertilizers, painting, dumpster areas, etc. to all Santa Ana Permittees' staff. Attendees included code enforcement and field maintenance staff, construction site inspectors, and personnel involved in conducting industrial/commercial facility inspections. Training focused on compliance requirements and ordinance enforcement processes required by the October 2002 Municipal Stormwater Permit;
- Continued promotion (advertising) of proper household hazardous waste disposal at special hazardous waste collection events and at the Pedley "ABOP" collection center through placement of numerous newspaper advertisements. Attending various community events to provide information and brochures on stormwater pollution prevention, recycling and proper disposal of household hazardous waste;
- Continued coordination with the Riverside-Corona Resource Conservation District to present the Stormwater Pollution Prevention Patrol Program in elementary school classrooms and conduct slide-show presentations on stormwater pollution prevention to local service clubs and civic groups;
- Continued coordination with the Riverside-Corona Resource Conservation District to develop and present a series of Home Gardening Workshops at local nurseries and garden centers to promote alternatives to fertilizer and pesticide usage;

IC/ID

- Identified the need and initiated the effort to develop an on-line database to track allowable 3rd party discharges into Permittee MS4 systems for complaint calls;
- Update of the complaint call database to increase its utility for District staff;
- Developed an Access database to help provide complaint summaries in a more organized fashion;
- Continued financial support for area-wide Stormwater Pollution Prevention Programs, including Hazardous Materials (HAZMAT) Response Team, the Household Hazardous Waste (HHW) collection events and "ABOP" (Anti-freeze, Batteries, Oil and Paint) program;
- Eliminated a sewer cross-connection to Box Springs Channel. Bacteriodes sampling of various MS4 tributary to the Santa Ana River indicated that Box Springs Channel had a persistent human bacteria source. As a follow up to bacteriodes monitoring conducted by the Middle Santa Ana River TMDL Task Force, the District and City of Riverside

initiated an IC/ID investigation of the Box Springs Channel in January 2008 to identify any potential sources of human fecal contamination to the channel. No obvious sources were determined based on multiple field investigations conducted through late February. However, in late April, the City of Riverside notified the District that they had discovered a sewer cross-connection to Box Springs Channel as part of ongoing work on a sewer improvement project. The 4" cross-connected sewer served a maintenance worker bathroom that belonged to Riverside Community College. The bathroom was located near the RCC baseball fields just north of Magnolia Avenue. The sewer line had been inadvertently connected to a small RCC-owned storm drain tributary to the Box Springs Channel. The City and District worked with RCC to eliminate the cross connection and conduct necessary clean-up work (clean-up work completed May 9). Subsequent bacteriodes samples indicate that the bathroom was the source of human contamination in the channel;

CONSTRUCTION

- Coordinated comments on draft General Construction Permit;

MUNICIPAL

- Provided comments on SWRCB Numeric Effluent Limits Blue Ribbon Panel Report;
- Analyzed the effectiveness of the District's Facility Pollution Prevention Plan via annual inspection process;
- Continued implementation of a Commercial/Industrial Compliance Assistance Program (CAP) to conduct focused outreach to restaurants, automotive repair shops and certain other commercial and industrial establishments to encourage implementation of stormwater BMPs and facilitate consistent and coordinated enforcement of local stormwater quality ordinances. Site visits included use of a survey checklist to document stormwater management practices for each facility;

REPORTING FORMAT

The current MS4 Permit requires the Permittees to report on the progress and status of their stormwater program activities in an Annual Report. This document is intended to comply with that requirement. The primary purpose of the Annual Report is to chronicle the Permittees' progress in implementing the provisions of the MS4 Permit. In addition, the Annual Report serves to identify potential problem areas.

As lead Permittee, the District has attempted to focus attention on the principal components of the Permittees' municipal stormwater management programs and convey relevant information to the SARWQCB in a clear and concise manner. To facilitate the reporting process, District staff prepared the annual reporting forms and summary tables that appear throughout this report. These forms are intended to focus to the reporting effort, summarize the information pertaining to the various program activities, and facilitate a consistent annual reporting process. While the District strives to ensure the accuracy of the information presented in the summary Tables, readers of this report should always verify the summarized information by referring to the individual Permittee reporting forms provided in **Appendix G** – Permittee Reports.

The remainder of this report reviews the Permittees' accomplishments over the course of the reporting period and presents the status of the Permittees' ongoing efforts and planned activities to implement their respective municipal stormwater programs and comply with the provisions of the current MS4 Permit.

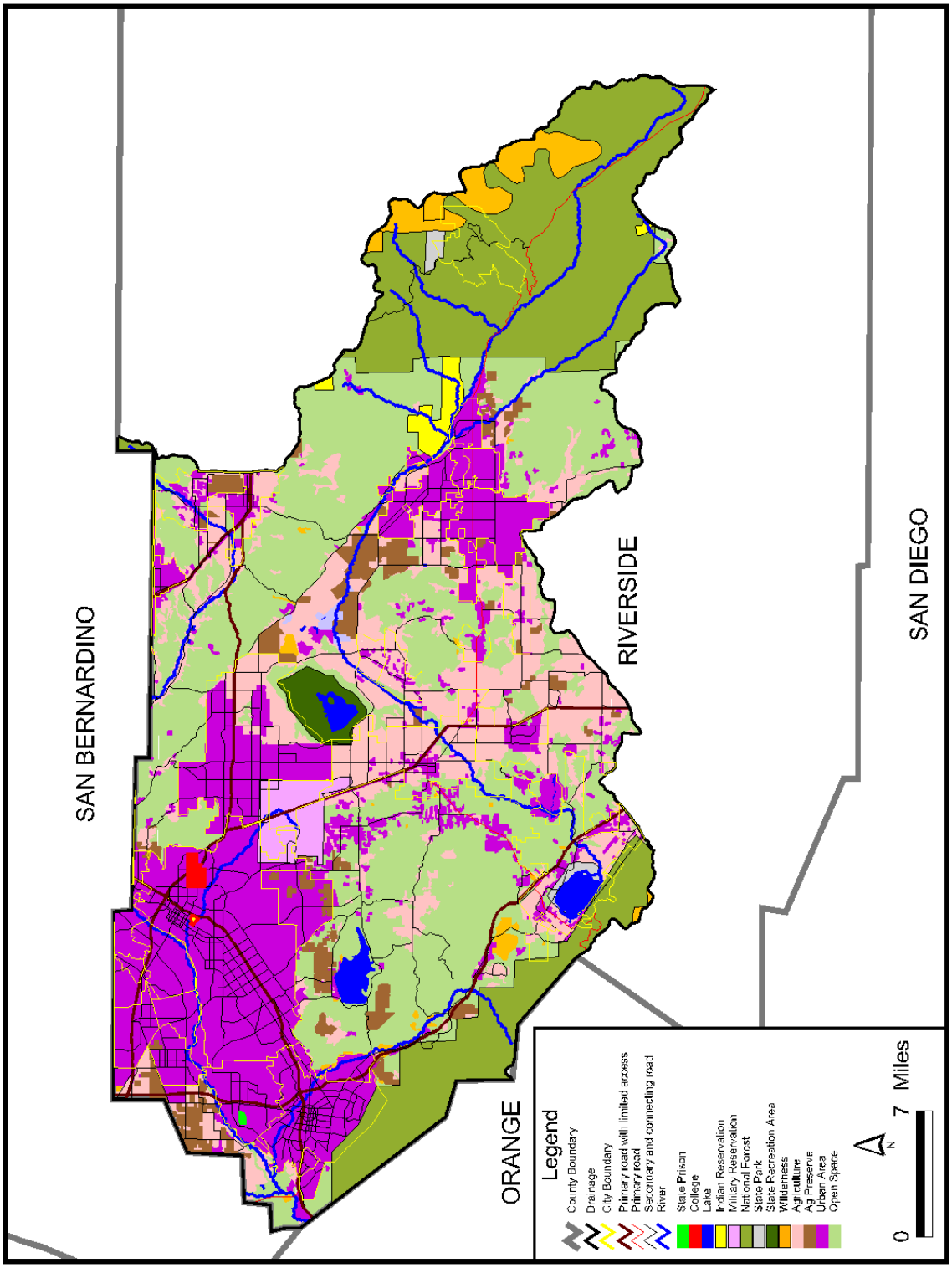
SAN BERNARDINO
ORANGE
RIVERSIDE
SAN DIEGO
Legend
County Boundary
Drainage
City Boundary
Primary road with limited access
Primary road
Secondary and connecting road
River
State Prison
College
Lake
Indian Reservation
Military Reservation
National Forest
State Park
State Recreation Area
Wilderness
Agriculture
Ag Preserve
Urban Area
Open Space
N
0
7 Miles

Figure I-1

1. PROGRAM ORGANIZATION

The MS4 Permit adopted October 25, 2002 by the SARWQCB designates the District as Principal Permittee; the County of Riverside, and the Cities of Beaumont, Calimesa, Canyon Lake, Corona, Hemet, Lake Elsinore, Moreno Valley, Murrieta, Norco, Perris, Riverside, and San Jacinto are designated as Co-Permittees. The responsibilities of the Principal Permittee and the Co-Permittees are defined in Section I of the Permit. **Figure 1-1** illustrates the relationships between the regulatory agencies, the Principal Permittee, the Co-Permittees, and the other municipal stormwater permit areas in the County. **Figure 1-2** depicts the Permittees' organizational structure.

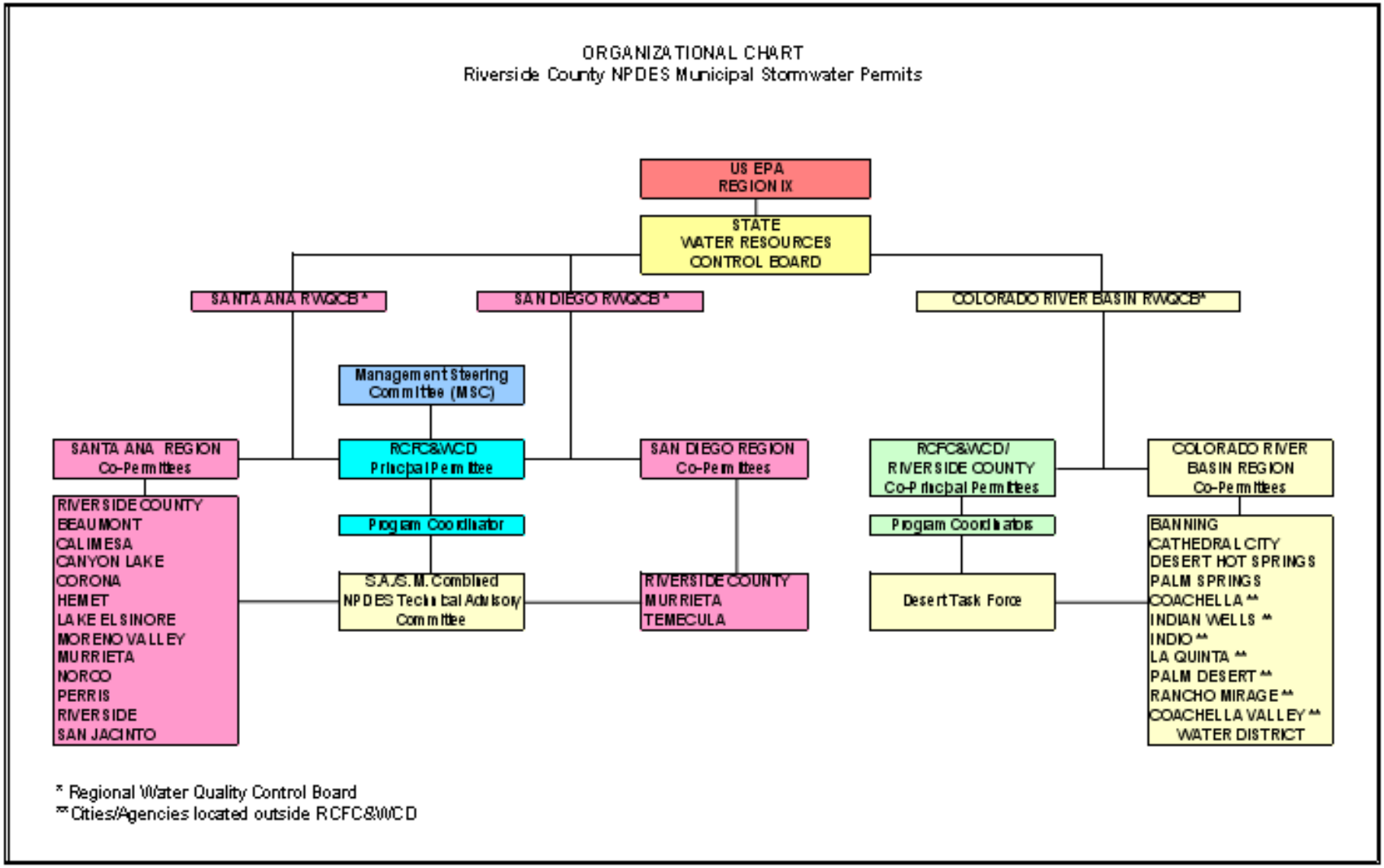

FIGURE 1-1. ORGANIZATIONAL CHART – RIVERSIDE COUNTY NPDES MUNICIPAL STORMWATER PERMITS

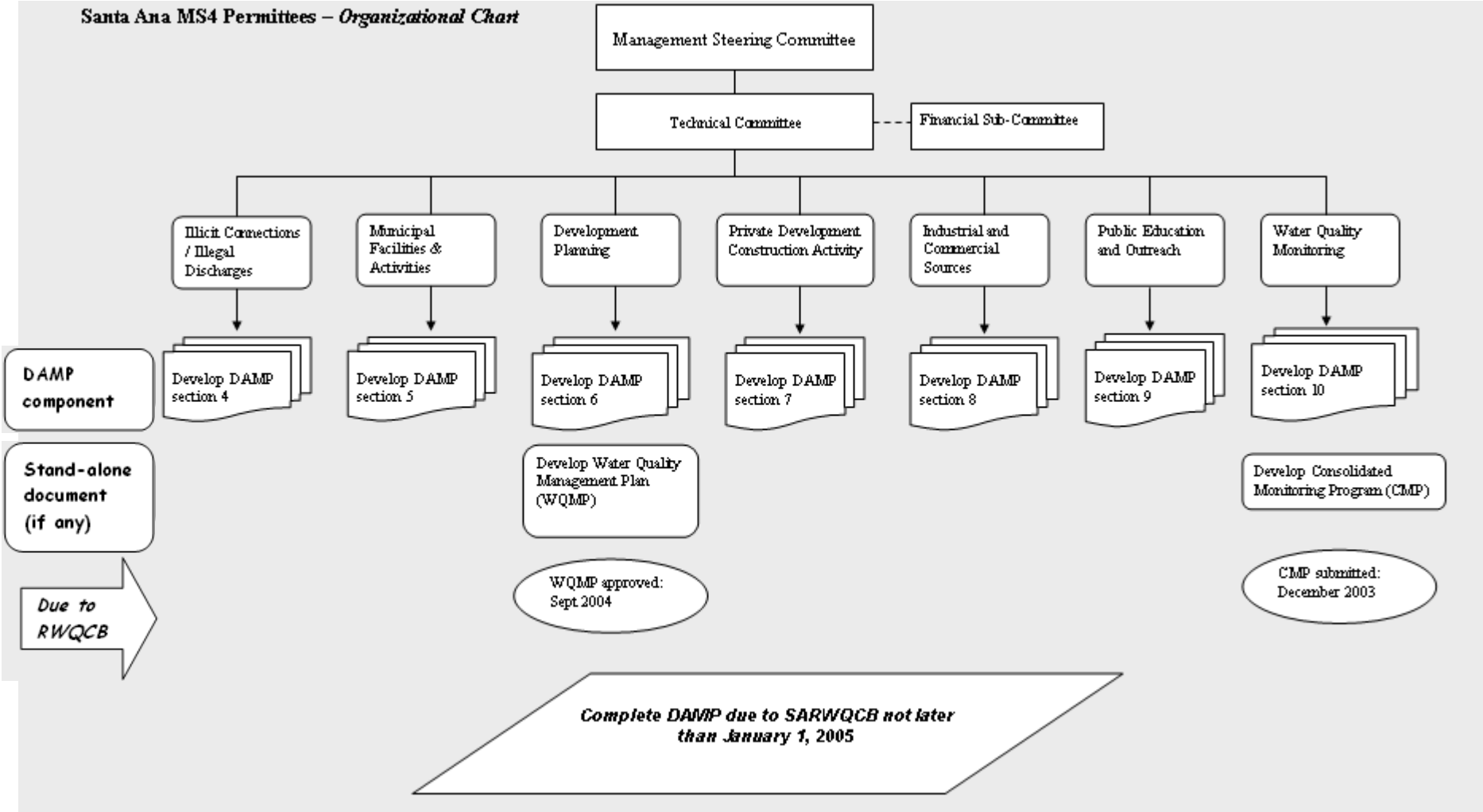

Figure 1-2. Permittee Organization

pc\91308v1

Management Steering Committee

The Permittees established the Management Steering Committee (MSC) to address Urban Runoff management policies for the SAR and SMR and to review and approve revisions to the DAMP and the SAR and SMR Implementation Agreements. In addition, the MSC facilitates coordination with related water quality management programs and monitoring and establishes positions relative to legislative and regulatory initiatives. The MSC consists of city managers or equivalent representatives from each of the Co-Permittees and an executive-level representative from the County. The District participates on the MSC as Chair. The District provides staff support to the MSC. The MSC meets quarterly or as determined by the Chair. MSC meeting agendas and minutes are included in **Appendix A**

The 2002 MS4 Permit required that the Permittees form the MSC and that the MSC meet at least quarterly or more frequently as determined by the chairperson. The MSC convened four times during the reporting period.

Table 1-1 provides the record of attendance for the MSC meetings.

At the September 20, 2007 meeting, the MSC was briefed with a legislative update on various bills in our State government dealing with water quality issues. Meeting attendees were also briefed on the Draft General Construction Permit. Attendees were informed that NOVs can lead to an Administrative Civil Liability (ACL) if the Regional Board was not satisfied by the municipality's response. The Committee was also briefed on the Lake Elsinore/Canyon Lake Nutrient TMDL and informed that final Implementation Plans had been submitted to the Regional Board. The Committee received an update on the Middle Santa Ana River Watershed Bacteria Indicator TMDL. The Committee was also briefed on the Canyon Lake Bacteria Indicator TMDL and informed that the stakeholders are anticipating basin plan amendments that would effectively remove the impairment.

At the October18, 2007 meeting, the MSC was informed that the District LID testing project had been approved. The Committee was also informed that the draft MS4 permit was pending.
The Committee was briefed on the Lake Elsinore/Canyon Lake Nutrient TMDL, including the Implementation Plan for the Lake Elsinore TDML is moving forward and the monitoring plan for Canyon Lake has been released. The Committee was briefed on the Middle Santa Ana River Watershed Bacteria Indicator TMDL and informed that consistent Bacteria spikes with human markers in the Box Spring Watershed had been noted.

At the February 21, 2008 meeting, the MSC was briefed on the Santa Ana/Santa Margarita Program Status. A presentation was given on the Box Springs Channel as a site that had a consistent human bacterial indicator. The Committee was given a permit renewal update and informed that the draft Orange County NPDES MS4 Permit issued by the San Diego RWQCB was recently opposed by USEPA. The Committee was given a presentation on the requirements of the draft provisions of several MS4 Permits.

At the April 17, 2008 meeting, the MSC was given a Legislative Update. The Committee was given an update on Permit renewals. The Committee was given an update on Audits/NOVs. The Committee was briefed on Board Appointments and a handout regarding the qualification requirements for Regional Board member appointments was provided. The Committee was briefed on the Middle Santa Ana River TMDL. The Committee was briefed on the Canyon Lake Bacteria Indicator TMDL.

TABLE 1-1. ATTENDANCE AT NPDES SANTA ANA/SANTA MARGARITA MSC MEETINGS

Attendance at FY 2007-2008 NPDES Santa Ana/Santa Margarita MSC Meetings
And Future 2008 MSC Meetings
**** indicates the meeting is part of the 07/08 FY meeting attendance**

	**9/20/07	**10/18/07	**2/21/08	**4/17/08	8/21/08 (Cancelled)	10/16/08
RCFC	✓	✓	✓	✓	-	✓
County	✓	✓	✓	✓	-	✓
SAR Watershed						
Beaumont	✓	✓	✓	✓	-	✓
Calimesa	✓	X	X	✓	-	✓
Canyon Lake	✓	✓	✓	✓	-	✓
Corona	✓	✓	✓	✓	-	✓
Hemet	X	✓	✓	✓	-	X
Lake Elsinore	X	X	X	X	-	X
Moreno Valley	✓	✓	✓	✓	-	✓
Norco	✓	✓	✓	✓	-	✓
Perris	X	X	X	X	-	X
Riverside	✓	✓	✓	✓	-	✓
San Jacinto	X	✓	X	✓	-	✓
SAR and SMR Watershed						
Murrieta	X	X	X	X	-	✓
SMR Watershed						
Temecula	X	X	X	X	-	✓

✓ **Attended Meeting**

X **Did Not Attend**

Technical Committee

Shortly after the first Santa Ana MS4 Permit was issued in 1990, the original Santa Ana NPDES Advisory Committee was formed. The Committee served as the primary forum for discussion of issues relating to development and implementation of the Permit's requirements. In 1994, the Santa Ana NPDES Advisory Committee and the Santa Margarita NPDES Advisory Committee were combined to reduce administrative overhead and to coordinate the activities between two areas that, at the time, had similar permit requirements. The Santa Ana/Santa Margarita Combined NPDES Advisory Committee included representatives from each of the Permittees and met throughout the year on an ad-hoc basis, typically once each month. The Combined NPDES Advisory Committee provided a regular opportunity for discourse between the Permittees, SARWQCB staff, and other interested parties.

The Combined NPDES Advisory Committee was re-designated the "Technical Committee" with the 2002 MS4 Permit and charged with development of the SAR-DAMP and coordinating the implementation of the overall stormwater management program. The Technical Committee is focused on providing technical support to facilitate coordination with related water quality management programs, monitoring program development and responding to new legislative and regulatory initiatives.

The Technical Committee consists of representatives formally appointed by each Permittee's City Manager or equivalent. The purpose of the Technical Committee is to coordinate the implementation of the DAMP and overall MS4 Permit compliance program. The District chairs and provides staff support to the Technical Committee. TAC meeting agendas and minutes are included in **Appendix A.**

In summary meeting agendas have focused on implementation of the 2002 MS4 Permit requirements and coordination of various program elements. A majority of the meetings have particularly focused on the TMDL efforts, Storm Water Quality Task Force efforts, WQMP implementation, and the pursuit of various grants. **Table 1-2** provides the record of attendance for the Technical Committee meetings.

Table 1-2. Attendance at NPDES Santa Ana/Santa Margarita Technical Advisory Committee Meetings

Attendance at FY 2007-2008 Santa Ana/Santa Margarita Technical Advisory Committee Meetings

	26-Jul-07	23-Aug-07	27-Sep-07	25-Oct-07	15-Nov-07	27-Dec-07	31-Jan-08	28-Feb-08	27-Mar-08	24-Apr-08	22-May-08	26-Jun-08
RCFC	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
County	✓	✓	✓	✓	✗	✓	✓	✓	✓	✓	✓	✓
Beaumont	✓	✓	✓	✓	✓	✓	✗	✓	✓	✓	✗	✓
Calimesa	✗	✗	✓	✓	✗	✓	✓	✗	✓	✓	✓	✗
Canyon Lake	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Corona	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Hemet	✓	✗	✓	✓	✓	✓	✓	✓	✓	✓	✓	✗
Lake Elsinore	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗
Moreno Valley	✗	✓	✓	✓	✓	✓	✓	✓	✓	✗	✓	✓
Murrieta	✗	✓	✓	✓	✓	✓	✓	✗	✓	✗	✗	✓
Norco	✓	✓	✓	✓	✓	✓	✓	✓	✗	✓	✗	✓
Perris	✗	✓	✓	✗	✗	✗	✓	✗	✗	✓	✗	✓
Riverside	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
San Jacinto	✓	✓	✓	✗	✗	✓	✗	✓	✗	✓	✗	✗
Temecula	✓	✗	✓	✓	✓	✗	✓	✓	✓	✓	✗	✗
CRWQCB San Diego	✓	✓	✓	✓	✗	✗	✗	✗	✗	✓	✓	✓
CRWQCB Santa Ana	✓	✓	✓	✓	✓	✓	✓	✓	✗	✓	✓	✓

✓ Attended Meeting
✗ Did Not Attend

Sub-committees

The Technical Committee established discrete Work Groups to oversee the development and implementation of the-DAMP program components. The Work Groups include Permittee representatives and may also include industry representatives, representatives of environmental/special interest groups, and other stakeholders as appropriate. Work Groups have been established to guide the following program components:

- Permit Renewal
- Construction Activities
- Industrial/Commercial Activities
- New Development/Re-development
- Public Education
- Municipal Facilities & Activities
- Monitoring & IC/ID
- Finance
- TMDL Compliance
- Other Key Meetings

In many cases multiple topics may be addressed in a single meeting. In addition the Permittees make extensive use of informal meetings via email and phone to transact business due to the difficulties of coordinating a large number of entities. Further, the priority work of most of these committees was completed with the submission of the DAMP. Please note that agendas and meeting notes are not commonly prepared for sub-committee meetings. When the meeting agenda was available they are provided in **Appendix A.**

A schematic showing the relationships among the work groups and their expected final products is shown in **Figure 1-2**.

Permit Renewal

The Permittees established a Work Group to guide preparation of the ROWD to ensure that it fully met all of the requirements, including provisions specified in Section XVI of the 2002 Santa Ana Region NPDES MS4 Permit for Riverside County. This Work Group met on a bi-weekly or as needed schedule, through November 2006 and April 2007. The development of

the ROWD required a substantial investment of public agency time and resources. However, it was the goal of the Work Group to develop a strong consensus and thoroughly meet high expectations for the Permit renewal.

In addition to developing a comprehensive ROWD submittal, the Work Group produced a redline draft Permit and revised DAMP that communicated a unified proposal for the next iteration of the Municipal MS4 permit. This sub-committee identified program enhancements and recommended revisions that would make the Permit work more cohesively with the DAMP. The goal of this effort was to create a more adaptive program, which improves the integrity of the DAMP and helps to facilitate consistent implementation. Furthermore, the redline Permit and DAMP included whole new sections and findings that addressed TDML compliance. The Work Group considered the current regulatory environment and applicable EPA rules and regulations to ensure that the proposed redline Permit and DAMP represented a thoughtful and comprehensive proposal which included good-faith commitments from the Permittees that will lead to protecting water quality in a productive and meaningful way.

This Work Group proactively set additional meetings with the Regional Board staff and, on occasion, the County of San Bernardino to discuss permits renewal strategies, timelines, expectations, and to comparatively assess the Riverside County Permit with other local permits. In addition to meeting numerous times as a Work Group, the Work Group also met with Regional Board staff to ensure that the ROWD would be complete and meet or exceed Regional Board expectations and to discuss expectations for the Permit Renewal process. Representatives of this Work Group met with Regional Board staff to ensure that the Permittees provided an acceptable response to the Regional Board's ROWD comment letter. San Bernardino representatives attended meetings hosted and facilitated by this Work Group.

As the ROWD was completed and submitted to the Santa Ana Regional Board in April 2007, the sub-committees did not meet during this reporting period. They are awaiting the release of the new draft Santa Ana Region NPDES MS4 permit prior to commencing new meetings. The summaries listed below are for informational purposes of the work that has been completed in previous reporting periods.

Construction Activities

The Construction Activities sub-committee met during previous reporting periods to develop several program elements including options for the electronic database, Annual Report summary spreadsheet (MS Excel format), a template site inspection checklist, and site prioritization criteria. The sub-committee also developed a list of erosion control BMPs that is included in the Private Development Construction Activities section of the DAMP.

Members of this sub-committee convened to identify enhancements that could be made to the portions of the 2002 MS4 Permit that relate to construction activities. This sub-committee identified enhancements and recommended revisions that would make the Permit work more cohesively with the DAMP. The suggested revisions were documented in a redline markup of the 2002 MS4 Permit and submitted as part of the 2007 ROWD submittal to the Regional Board. The sub-committee has convened on an as-needed e-mail basis to discuss and develop comments on the draft construction Permit.

Industrial/Commercial Activities

The Industrial/Commercial Activities sub-committee also met during previous reporting periods to address Permittee programs, documentation, and reporting to implement 2002 MS4 Permit provisions in IX.B. Options for processing of Riverside County Department of Environmental Health CAP inspection forms, facility prioritization for follow up inspections, documentation, and database were identified.

Members of this sub-committee met to identify enhancements that could be made to the portions of the 2002 MS4 Permit that relate to industrial/commercial activities. This sub-committee identified enhancements and recommended revisions that would make the Permit work more cohesively with the DAMP. The suggested revisions were documented in a redline markup of the 2002 MS4 Permit and submitted as part of the 2007 ROWD submittal to the Regional Board.

New Development/Redevelopment

The New Development/Redevelopment sub-committee met during previous reporting periods to implement 2002 MS4 Permit's New Development/Redevelopment provisions (Section VIII). This sub-committee focused on finalizing the WQMP for re-submittal to the SARWQCB. The WQMP was approved by the Regional Board in September 2004. Additionally, the sub-committee directed development of training programs for employees prior to implementation, coordinated preparing for actual implementation beginning on January 1, 2005, and composed the Development Planning Section 6 of the revised DAMP. This committee compiled Frequently Asked Questions to ensure that the intent of the WQMP was documented and to ensure consistent implementation of the WQMP. The group intends to meet approximately quarterly to continue its work including the development of expanded treatment control BMP design guidance with focus placed specific BMPS to address the TMDL impairments. This committee met to inform the Regional Board staff about a future proposal for the public maintenance of BMPs for new development.

Members of this sub-committee also met to identify enhancements that could be made to the portions of the 2002 MS4 Permit that relate to new development activities. This sub-committee identified enhancements and recommended revisions that would make the Permit work more cohesively with the DAMP. The suggested revisions were documented in a redline markup of the 2002 MS4 Permit and submitted as part of the 2007 ROWD submittal to the Regional Board.

Additionally, the Permittees are continuing to participate in regional efforts through the Stormwater Monitoring Coalition (SMC) and Southern California Coastal Watershed Research Project (SCCWRP) to further new development standards. The Permittees are working with the SMC to develop a regional low impact development manual and with SCCWRP to develop tools to address hydromodification impacts from development.

Public Education

The Riverside County NPDES Permittees have established an ongoing watershed based public education and outreach program known as the "**Only Rain Down the Storm Drain"** pollution prevention program. The specific objectives of the public education program include:

- Fostering a broad public awareness of water pollution concerns;
- Increasing public acceptance of pollution prevention activities to curtail everyday human behaviors that contribute to water quality problems;
- Educating/informing the general public, regulators and key local government and state decision makers on Urban Runoff conditions in Riverside County; and
- Promoting stewardship of local water resources.

The "Only Rain Down the Storm Drain" program implements the public awareness objectives by focusing on three areas of pollutant reduction/prevention:

- Public Behavior;
- Proper Management of Pollutants; and
- Business Specific Education Outreach.

In addition, when attempting to make use of the finite resources available to the Public Education Program, the Permittees use these management goals to ensure that resources are used effectively:

- Focusing on pollutants of concern specific to each watershed region;
- Coordinating public education efforts with adjacent storm water management programs and other related education programs to share resources, coordinate outreach efforts, and avoid costly duplication of effort; and
- Adapt public education programs and objectives, based on effectiveness analysis, to address changing MS4 programs and objectives.
- Retained CDM as an independent party to review the effectiveness of the NPDES training and provide recommendations to ultimately improve the effectiveness of the programs. This study was completed August 2006.

This committee functions mostly as a virtual committee, doing most of its work via email. In addition, members of this group met to identify enhancements that could be made to the portions of the 2002 MS4 Permit that relate to public education activities. This sub-committee identified enhancements and recommended revisions that would make the Permit work more cohesively with the DAMP. The suggested revisions were documented in a redline markup of the 2002 MS4 Permit and submitted as part of the 2007 ROWD submittal to the Regional Board.

Major revisions to the Public Education program including implementation of the billboard campaign and updates to the Public Education Material are approved through this group.

Municipal Facilities & Activities

The Municipal Facilities & Activities sub-committee met with priority on developing an approach to meeting the requirements set forth in Provision XI of 2002 MS4 Permit and reviewing annual reporting items such as a description of criteria for MS4 inspections and maintenance. Provision XI elements that required a status or report are addressed in Section 8 of this report. The Municipal Facilities Strategy (MFS), initially a requirement of the 1996 MS4 Permit, has been reviewed and revised, and has been incorporated as Section 5 "Permittee Facilities and Activities" in the revised DAMP.

Members of this group met to the identify enhancements that could be made to the portions of the 2002 MS4 Permit that relate to municipal facility compliance activities. This sub-committee identified enhancements and recommended revisions that would make the Permit work more cohesively with the DAMP. The suggested revisions were documented in a redline markup of the 2002 MS4 Permit and submitted as part of the 2007 ROWD submittal to the Regional Board.

Monitoring

The Monitoring sub-committee met to develop revisions to the area-wide Consolidated Monitoring Program (CMP) and consider specific requirements for each of the three MS4 Permits issued to Riverside County Permittees. This committee has been meeting through the Lake Elsinore and Middle Santa Ana River TMDL Task Forces. The purpose has been to assist in the development of the TMDL monitoring programs.

The Monitoring sub-committee also met during previous reporting periods to implement 2002 MS4 Permit provisions. On January 31, 2006 District staff met with the District's Information Technology staff to improve the web interface for NPDES complaints. This complaint database compiles complaints collected through the too-free NPDES complaint phone number provided in public education material distributed throughout the watershed. The improvements to this database improved the Permittees' ability to locate complaints

using a GIS environment and to enter and track the data, the database will ultimately improve the Permittees' ability to identify and curtail Illicit Connections and Illegal Discharges.

Members of this group also met to identify enhancements that could be made to the 2002 MS4 Permit's monitoring provisions. This sub-committee identified enhancements and recommended revisions that would make the Permit work more cohesively with the DAMP. The suggested revisions were documented in a redline markup of the 2002 MS4 Permit and submitted as part of the 2007 ROWD submittal to the Regional Board. In addition representatives from this subcommittee met with Regional Board staff to discuss the Regional Board's ROWD comments which primarily pertained to monitoring requests from the Regional Board.

Finance

As previously described, the MSC directed the formation of a Finance Sub-committee. The sub-committee reviews current funding sources and examines potential funding options for program compliance. There have been no changes in regulations that warranted meeting of this sub committee in the 2007-2008 fiscal year; however, the District continues to closely track the progress of the Los Angeles County Funding work group and other local efforts to develop additional funding streams for NPDES programs. In addition, the District and Permittees have been coordinating with the other stakeholders on several grant opportunities that will assist with addressing TMDL implementation.

TMDL Committees

The Permittees, in conjunction with other TMDL stakeholders, have been working to address the urban runoff contribution to impaired waterbodies. The Permittees have met through existing Task Forces and independently, as necessary, for this purpose. The following paragraphs summarize the Permittees participation in various TMDL and Watershed related efforts

Lake Elsinore / Canyon Lake TMDL Task Force

The Lake Elsinore / Canyon Lake TMDL Task Force worked with SAWPA to complete the Task Force agreement, creating strategies for TMDL compliance, and successfully pursued grant opportunities to help fund the activities required by this TMDL.

In addition several Permittees also participate in the Lake Elsinore and San Jacinto Watersheds Authority (LESJWA) meetings which were attended by this committee.

Middle Santa Ana River (MSAR) TMDL

The MSAR TMDL Task Force met to develop strategies to develop and comply with for the Middle Santa Ana River TMDL. This committee has worked with other stakeholders to final a Task Force agreement and process agreement. Stakeholders were able to obtain a $600,000 grant to conduct an Urban Source Evaluation Plan (USEP) to help comply with Task 4 of the TMDL. Permittees have also actively participated in a BMP pilot study for this TMDL, by offering or identifying BMP testing locations and providing comments on the overall methodology and direction of the study.

In addition, the Storm Water Quality Standards Task Force (SWQSTF) was created to review the recreational beneficial uses of the Santa Ana watershed. The goal of the SWQSTF is to effectively direct the limited funding sources allocated for TMDL compliance toward the activities that would result in the greatest measurable benefits toward attaining beneficial uses. The SWQSTF and MSAR TMDL Task Force meetings are coordinated by SAWPA.

SMC – SCCWRP

The District participates in the Stormwater Monitoring Coalition (SMC) on behalf of the Permittees. The SMC includes representatives from the Los Angeles, San Diego and Santa Ana Regional Boards and each of the Principal Permittees in Southern California (i.e., the counties of Los Angeles, Orange, San Bernardino, San Diego and Ventura), and other interested municipalities. The overall goal for the SMC is to establish a Southern California stormwater research and monitoring agenda that would focus on improving stormwater monitoring science, coordinate data collection efforts, and evaluating the effects of stormwater discharges to receiving waters specific to Southern California. **Appendix A** contains the SMC Annual Report, which highlights activities completed during the past fiscal year. Copies of meeting agendas are also contained in **Appendix A**.

The Permittees' participation and cooperation with other stakeholders in the pursuit of grant opportunities has resulted in several successful grant projects for TMDL compliance. The following is a list of grants that were able to be procured with the help of committee participation:

- Proposition 40 grant for Lake Elsinore TMDL;
- Proposition 40 grant for Middle Santa Ana River TMDL;
- Proposition 50 IRWM planning grant for San Jacinto Watershed; and
- A second Proposition 40 grant for the "Lake Elsinore Recharge Pipeline" project and the Lake Elsinore TMDL

As previously discussed, the Work Group developed a redline Permit and DAMP which included whole new sections and findings that addressed TDML compliance. The ROWD Work Group met to update the DAMP. The Work Group considered the current regulatory environment and applicable EPA rules and regulations to ensure that the proposed redline Permit and DAMP represented a thoughtful and comprehensive proposal which included good-faith commitments from the Permittees that will lead to protecting water quality in a productive and meaningful way.

Other Key Meetings

The Permittees work closely to coordinate with CASQA. The Permittees at a minimum participated in various CASQA meetings throughout the reporting periods.

2. FISCAL ANALYSIS

Securing and sustaining adequate funding resources is arguably one of the most difficult issues MS4 Permittees must face. The overall economic climate has continued to be difficult. Consequently, a number of Riverside County municipalities are still facing extreme financial challenges in providing basic municipal services such as fire and police protection.

The costs incurred by the Permittees in implementing the Santa Ana Regional DAMP fall into two broad categories:

- Shared Costs. These are costs that fund activities that are principally performed by the District under the Implementation Agreement. These activities include: overall storm water program coordination; interagency agreements; participation in the California Stormwater Quality Association, attending meetings of the San Diego Regional Board or State Water Resources Control Board; and coordination of consultant studies, Permittee meetings and training seminars.
- Individual Permittee Costs for DAMP Implementation. These are costs incurred by each Permittee for implementing within its jurisdiction the BMPs (drainage facility inspections for illicit connections, illegal discharges, drainage facility maintenance, drain inlet/catch basin stenciling, emergency spill response, street sweeping, litter control, public education, etc.) comprising the Santa Ana Regional DAMP.

PERMITTEE BUDGETS AND EXPENDITURES

The Permittees' individual budgets for Fiscal Year (FY) 2008-2009 and the reported expenditures for FY 2007-2008 are presented in each Permittee's individual annual report. A summary showing the FY 2007-2008 budget and FY 2008-2009 expenditures reported by the Permittees is provided in **Table 2-1.**

TABLE 2-1. PERMITTEE BUDGETS AND EXPENDITURES

AGENCY	2008-2009 BUDGET	2007-2008 EXPENDITURES	POPULATION [1]
Beaumont	Not reported	Not reported	31,477
Calimesa	$ 51,162.00	$ 85,518.00	7,536
Canyon Lake	$ 54,425.00	$ 58,265.00	11,051
Corona	$ 1,162,928.00	$ 1,151,779.48	147,428
Hemet	$ 797,843.00	$ 812,525.00	74,185
Lake Elsinore	$ 179,250.00	$ 179,250.00	49,807
Moreno Valley	$ 1,858,094.00	$ 1,471,449.00	183,860
Murrieta	*See Permittee's Annual Report*		100,173
Norco	$ 96,438.00	$ 87,832.22	27,255
Perris	$ 202,530.00	$ 203,086.00	53,605
Riverside	$ 3,649,727.00	$ 3,986,240.00	296,842
San Jacinto	$ 178,125.00	$ 206,953.00	35,672
County	$ 6,807,486.00	$ 6,152,402.00	554,571
RCFC&WCD	$ 2,826,930.00	$ 2,110,290.00	N/A
TOTALS	$ 17,865,378[2]	$ 16,505,589.70[2]	2,514,152

[1] Source: California Department of Finance, January 2008

[2] Financial totals do not include City of Murrieta fiscal information

AREA-WIDE PROGRAMS

The District provides financial support for several area-wide BMP programs including Hazardous Materials Emergency Spill Response (HazMat Team), Household Hazardous Waste Collection (HHW), Only Rain Down the Storm Drain (Public Education), and the Commercial/Industrial Compliance Assistance Program (CAP). In addition, the District implements the stormwater monitoring program on behalf of all Permittees. A table summarizing the FY 2008-2009 budget and FY 2007-2008 expenditures for these activities is provided in **Table 2-2**, on the following page.

TABLE 2-2. BUDGETS AND EXPENDITURES – AREA WIDE PROGRAMS (SANTA ANA REGION)

PROGRAM/ACTIVITY	2008-2009 Budget BUDGET	2007-2008 Expenditures
Consulting Services	$ 150,880	$ 66,936
Public Education	$ 381,560	$ 300,357
Water Quality Monitoring	$ 233,500	$ 158,632
Regulatory Pollution Prevention	$ 1,053,590	$ 877,353
Staff and Administration	$ 944,150	$ 707,012
TOTAL	$2,763,680	$2,110,290

FUNDING SOURCES

The Permittees currently employ four distinct funding methods alone or in combination to finance their MS4 NPDES permit compliance activities.

Santa Ana Watershed Benefit Assessment Area

The District established the Santa Ana Watershed Benefit Assessment Area (SAWBAA) in May 1991. SAWBAA revenues fund both area-wide, or "umbrella" Drainage Area Management Plan (DAMP) activities and the District's individual MS4 Permit compliance activities. The SAWBAA covers the "urbanized" portions of the Santa Ana River Watershed within Riverside County including both incorporated (City) and unincorporated (County) areas. Property owners are assessed for the benefit derived from the development and implementation of the DAMP activities supported or conducted by the District. Certain areas, e.g., the more rural and remote mountainous regions were excluded from the SAWBAA, since little or no Urban Runoff is generated in those areas. Undeveloped vacant parcels and agricultural parcels are exempted from the benefit assessment. Assessments are calculated by the District and enrolled on the property tax bills generated by the County Tax Assessor's Office. The amount of the assessment is based on a parcel's proportionate contribution to Urban Runoff, which is a function of parcel size and its use.

Since the SAWBAA is an area-wide revenue source, certain activities and programs that are considered of common and equal benefit to the entire area are financed, either wholly or in part, by the funds generated by the District's annual benefit assessment revenue. These area-wide activities include:

- Monitoring Program (Consolidated Program for Water Quality Monitoring),

- Hazardous Materials Emergency Response Team (HazMat Team) – (HazMat Response Team Annual Report provided as **Appendix D**)

- ABOP/Household Hazardous Waste (HHW) Collection Program – (Information regarding HHW Collection Events provided as **Appendix C**)

- "Only Rain Down the Storm Drain" Program (Public Education),

- Commercial/Industrial Compliance/Assistance Program; and

- Administrative/Program Management

County Service Area 152

The County of Riverside formed County Service Area 152 (CSA 152) in December 1991 to provide funding for MS4 NPDES Permit compliance activities. Originally, the CSA 152 assessment was collected through property tax bills as an annual parcel charge in the unincorporated portions of the County. In FY 1993-94, the County adopted the same methodology (proportional runoff) for assessment calculations used by the District. In FY 1995-96, the County developed a modified assessment methodology and began using the Transportation and Land Management Agency's Geographic Information System (GIS) to perform the assessment calculations.

Under the laws that govern CSAs, sub-areas may be established within the overall service area with different assessment rates set within each sub-area. For example, the Cities of Corona, Moreno Valley, Murrieta, Norco, Riverside, Lake Elsinore, and San Jacinto elected to participate in CSA 152. Under the CSA 152 program, individual cities determine their respective assessment rates and have broad discretion over how to allocate the funds. Several of these Cities also reported that they supplement their CSA 152 revenue with General Fund and other sources of revenue.

Street Sweeping Assessment

In response to the provisions of Proposition 218, the County restructured its CSA 152 funding program as a voter approved street sweeping assessment certain unincorporated areas. At the same time, the County has allowed the participating cities to continue their previously existing CSA 152 assessments relatively unchanged.

Utility Charge

The City of Hemet funds a portion of its NPDES Program activities through a utility charge. The charge is collected via the monthly utility bills issued by the City of Hemet, the Lake Hemet Water District, or Eastern Municipal Water District according to the respective service areas within the city. In addition, the City of Hemet reports using gas tax, general fund and other revenues to support certain stormwater management activities.

General Fund / Other Revenues

The remaining Permittees utilize general fund revenue to finance their NPDES activities. Several of the Permittees currently rely on their general fund to finance their DAMP activities.

In November 1996, California voters approved Proposition 218 ("The Right to Vote on Taxes Initiatives") amending Article XIII of the State Constitution.[1] Proposition 218 produced changes to some of the Permittees' historic funding sources and still looms as a potential threat to others. For example, the County dropped CSA 152 fees in unincorporated areas over concerns regarding compliance with Proposition 218 provisions.

As with other municipal programs, the level of funding available for DAMP activities depends to a large extent on the public's willingness to provide financial resources. In general, funds available for DAMP Programs have become increasingly scarce as sources of municipal revenues have declined for many local agencies. The provisions of Proposition 218, requiring voter approval of new taxes and assessments, have significantly diminished the prospects for developing new or alternative funding sources.

[1] The Proposition 218 amendments require voter approval of any new taxes, fees, assessments, etc. In addition, certain existing taxes and assessments were subject to the Initiative's voter approval requirements. "Special taxes," as defined by the Initiative, require a 2/3rds majority while other types of assessments may only require a simple majority. In addition, voter approval is required to raise any existing special tax or assessment rates by the Initiative, require a 2/3rds majority while other types of assessments may only require a simple majority. In addition, voter approval is required to raise any existing special tax or assessment rates.

3. LEGAL AUTHORITY

Provision No. V of the 2002 MS4 Permit requires each Permittee to adopt a Stormwater/Urban Runoff Discharge Control Ordinance, or equivalent, and enact and revise policies and ordinances necessary to establish and maintain adequate legal authority as required by the NPDES Municipal Stormwater Permit program [40 CFR Part 122.26(d)(2)(i)(A-F)]. In 1996, each Permittee established legal authority as appropriate to comply with previous permit conditions.

Provision No. V.F requires the Permittees to provide a report containing a review of their Storm Water Ordinances and their ordinance enforcement practices to assess their effectiveness in prohibiting non-exempt, non-storm water discharges[1] to the MS4

A summary of each Permittee's legal authority status, as reported to the District, is presented in **Table 3-1.**

[1] Non-exempt, non-storm water discharges are described in Provision V.F of the 2002 MS4 Permit

Table 3-1 – Legal Authority

LEGAL AUTHORITY

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Santa Ana NPDES Municipal Stormwater Permit

Provision No. LB.1.a and V of the Permit (Board Order No. R8-2002-011) requires each Permittee to maintain adequate legal authority as required by the NPDES Municipal Stormwater Permit program [40 CFR Part 122.26(d)(2)(I)(A-F)]	
PERMITTEE	**1. Have your stormwater ordinances or other legal authorities for implementing the NPDES Permit changed during the reporting period? If so, please provide a summary of the changes.**
Beaumont	No.
Calimesa	Ordinance 275 was adopted by the City Council on February 19, 2008, establishing the authority to impose administrative fines for violation of the Municipal Code which includes the Storm Water Quality Ordinance for the City of Calimesa. Copy attached.
Canyon Lake	No.
Corona	No.
Hemet	Storm water ordinance was not changed during this reporting period.
Lake Elsinore	No.
Moreno Valley	No change.
Murrieta	*See Permittee's individual annual report*
Norco	On August 4, 2007, the City Manager issued an Administrative Policy on "Storm Water Inspections and Compliance Policy." This policy provided guidelines and general procedures for regular inspection and maintenance of the City's MS4's. The intent was for all departments to be aware of the issues and when they observe any item that needs action, they would work together on reporting and follow-up. On May 7, 2008, the Norco City Council adopted Ordinance No. 889, entitled "Adoption of Best Manure Management Practices Ordinance for Manure Handling, Collection and Storage and Participation in the City's Manure Collection Service". The ordinance added Chapter 6.45, entitled "City of Norco Manure Management and Disposal", to the Norco Municipal Code. This ordinance requires property owners of livestock to clean up and have manure regularly removed from their property. Spreading and disking in of manure on properties is now a violation of the Chapter. The intent of the Chapter is to promote BMP's for manure collection, storage and handling thus preventing runoff of manure from properties into MS4s. Residents are encouraged to contact City Hall if they feel a property is not in compliance with the ordinance. A complaint form is filled out and appropriate staff will visit the site and take appropriate action. A database has been created to track manure issues.
Perris	No.

LEGAL AUTHORITY

2008 Annual Progress Report
Santa Ana NPDES Municipal Stormwater Permit

Provision No. LB.1.a and V of the Permit (Board Order No. R8-2002-011) requires each Permittee to maintain adequate legal authority as required by the NPDES Municipal Stormwater Permit program [40 CFR Part 122.26(d)(2)(I)(A-F)]

PERMITTEE	1. Have your stormwater ordinances or other legal authorities for implementing the NPDES Permit changed during the reporting period? If so, please provide a summary of the changes.
Riverside	No.
Riverside County	See Executive Summary in Permittee Submittal for list of ordinances that can be used in conjunction with stormwater activities and events.
RCFC&WCD	No.
San Jacinto	Dust Control Ordinance – Attached

LEGAL AUTHORITY

2008 Annual Progress Report
Santa Ana NPDES Municipal Stormwater Permit

PERMITTEE	V.F. Does your agency's Stormwater Ordinance prohibit:				
	1. Sewage where Co-Permittee operates a POTW and associated sewage collection system?	2. Wash water resulting from hosing or cleaning of gas stations and other types of automobile service stations?	3. Discharges resulting from the cleaning, repair, or maintenance of equipment, machinery or facilities, including motor vehicles, concrete mixing equipment, portable toilet servicing, etc?	4. Wash water from mobile auto detailing and washing, steam and pressure cleaning, carpet cleaning, etc?	5. Water from cleaning of municipal, industrial, and commercial areas including parking lots, streets, sidewalks, driveways, patios, plazas, work yards and outdoor eating or drinking areas, containing chemicals or detergents and without prior sweeping, etc?
Beaumont	YES	YES	YES	YES	YES
Calimesa		YES	YES	YES	YES
Canyon Lake	N/A	YES	YES	YES	YES
Corona	YES	YES	YES	YES	YES
Hemet	YES	YES	YES	YES	YES
Lake Elsinore	YES	YES	YES	YES	YES
Moreno Valley	NO	YES	YES	YES	YES
Murrieta	*See Permittee's individual annual report*	*See Permittee's individual annual report*	*See Permittee's individual annual report*	*See Permittee's individual annual report*	*See Permittee's individual annual report*
Norco	YES	YES	YES	YES	YES
Perris	YES	YES	YES	YES	YES
Riverside	YES	YES	YES	YES	YES
Riverside County	NO	YES	YES	YES	YES
RCFC&WCD	NO	NO	NO	NO	NO
San Jacinto	NO	YES	YES	YES	YES

LEGAL AUTHORITY

2008 Annual Progress Report
Santa Ana NPDES Municipal Stormwater Permit

PERMITTEE	V.F. Does your agency's Stormwater Ordinance prohibit:				
	6. Runoff from material storage areas or uncovered receptacles that contain chemicals, fuels, grease, oil or other hazardous materials?	7. Discharges of runoff from the washing of toxic materials from paved or unpaved areas?	8. Discharges from pool or fountain water containing chlorine, biocides, or other chemicals; pool filter backwash containing debris and chlorine?	9. Pet waste, yard waste, debris, sediment, etc?	10. Restaurant or food processing facility wastes such as grease, floor mat and trash bin wash water, food waste?
Beaumont	YES	YES	YES	YES	YES
Calimesa	YES	YES	YES	YES	YES
Canyon Lake	YES	YES	YES	YES	YES
Corona	YES	YES	YES	YES	YES
Hemet	YES	YES	YES	YES	YES
Lake Elsinore	YES	YES	NO	NO	YES
Moreno Valley	YES	YES	YES	YES	YES
Murrieta	*See Permittee's individual annual report*	*See Permittee's individual annual report*	*See Permittee's individual annual report*	*See Permittee's individual annual report*	*See Permittee's individual annual report*
Norco	YES	YES	YES	YES	YES
Perris	YES	YES	YES	YES	YES
Riverside	YES	YES	YES	YES	YES
Riverside County	YES	YES	YES	YES	YES
RCFC&WCD	NO	NO	NO	NO	NO
San Jacinto	YES	YES	YES	YES	YES

LEGAL AUTHORITY

2008 Annual Progress Report
Santa Ana NPDES Municipal Stormwater Permit

PERMITTEE	11. If any of the above points have not been met, please describe what actions are being taken to satisfy these requirements.
Beaumont	
Calimesa	Sewer Service to the City of Calimesa is provided by the Yucaipa Valley Water District. The District operates both the sewer system and the POTW.
Canyon Lake	#1 - Elsinore Valley Municipal Water District sole operator of sewage system
Corona	N/A
Hemet	
Lake Elsinore	Staff is working with Legal Council to develop a Stormwater ordinance to address the potential discharge of pool water and other domestic pollutants in such a manner that it can be effectively implemented and monitored by code enforcement officers.
Moreno Valley	No. 1 – Not applicable to Moreno Valley, since we do not own/operate a POTW.
Murrieta	*See Permittee's individual annual report*
Norco	
Perris	
Riverside	Not applicable.
Riverside County	VF1-The County does not operate a POTW or associated sewage system
RCFC & WCD	The District has not adopted a separate Storm Water/Urban Runoff Ordinance. The District relies on the combined authority of the Co-Permittees as described in the USEPA's Part 2 Permit Application Guidance.
San Jacinto	We do not operate a POTW.

LEGAL AUTHORITY

2008 Annual Progress Report
Santa Ana NPDES Municipal Stormwater Permit

PERMITTEE	12. Please summarize the effectiveness evaluation of your ordinance, ordinance enforcement practices with regard to prohibiting non-exempt, non-stormwater discharges to the MS4
Beaumont	Enforcement of our Storm Water Ordinance has been very successful.
Calimesa	Due to the economic down turn that is affecting the Home Building Industry in the Country, Calimesa has been working with the Regional Board to obtain viable erosion and sediment control on the current projects in the City. Because Developers have locked up their Bank Accounts forcing them to comply requires a Joint effort between the City and the Regional Board. Through this effort it is believed that the City Ordinance is effective.
Canyon Lake	The City's ordinance is effective and we are not experiencing any difficulty with enforcement.
Corona	a) The City of Corona is a co-participant in the County Health Department administered "Compliance Assistance Program" and performs follow-up inspections on facilities with potential illicit discharges and ordinance violations b) The City of Corona currently has staff members devoted to providing prompt follow-up to telephone calls and complaints concerning illicit discharges and/or improper disposal of pollutants into storm drain facilities c) We currently have an illegal dumping report and phone number available on the City's website. d) DWP, Code Enforcement, Fire and Public Works departments work together to respond to violation events. The NPDES Section follows up on all events to ensure proper notification and reporting requirements are followed as specified in the EC/S. Enforcement depends on the severity of the violation and may require immediate containment and clean up, verbal warnings, notices of violation, recovery of costs, and public education to the violator including handing out public education materials. e) All City field staff are trained on the City's storm water ordinance and what constitutes a non-storm water discharge or illicit connection and how to report to their supervisors so that they can be investigated
Hemet	Efforts are continuing to update the City of Hemet Storm Water Ordinance to more adequately define prohibited discharges and activities, document enforcement measures, and identify staff responsible for enforcement.
Lake Elsinore	Staff has gone through the Local ordinances and determined that the current ordinances in place do an adequate job of regulating non-stormwater discharges into the MS4's as well as providing material to the public to minimize the any potential negative effects from permitted and allowable non-storm water discharges as defined in section 14.08 of the lake Elsinore Municipal Code.

LEGAL AUTHORITY

2008 Annual Progress Report
Santa Ana NPDES Municipal Stormwater Permit

PERMITTEE	12. Please summarize the effectiveness evaluation of your ordinance, ordinance enforcement practices with regard to prohibiting non-exempt, non-stormwater discharges to the MS4
Lake Elsinore Continued	Enforcement of City Ordinances is becoming more successful due to an increase of City Personnel and training. Increased awareness and communication between divisions is broadening inspection coverage and enforcement. Currently City Personnel is in the process of revising Storm Water ordinances to insure they comply with the Current NPDES permit and new WQMP requirements.
Moreno Valley	The Ordinance has overall, been effective in prohibiting non-exempt, non-stormwater discharges to the MS4. The City also has an aggressive commercial, industrial, restaurant and construction inspection program to ensure that the illegal/illicit discharges do not occur. Should enforcement actions be necessary due to any illegal/illicit discharges to its MS4, the Ordinance allows for the City to take enforcement actions to ensure compliance.
Murrieta	*See Permittee's individual annual report*
Norco	The Storm Drain Ordinance covers the Provisions outlined in No. V.F. Inspections are covered by the City Inspectors. Building and Engineering Inspectors are aware of what is a legal connection and monitor these while inspecting construction phases. The Public Works Inspectors are looking for illegal connections when they do the cleaning and videotaping of the storm drain systems and in the course of daily work. When issues arise, verbal warnings of enforcement are usually enough to obtain compliance. Should further action be required the appropriate department issues a notice of violation and compliance is tracked by that department. In the event compliance cannot be reached, citations will be issued by Code Enforcement.
Perris	In March, 2003 the City of Perris City Attorney's Office reviewed the requirements of NPDES Permit No. CAS618033 (Order No. R8-2002-001) and revised the City's old NPDES Ordinance 1018 to address necessary changes. The City's new NPDES Ordinance #1194 was adopted in 2006 and has been highly successful in addressing required permit elements. Several City departments have been committed to implementing Ordinance #1194 over the past two years.
Riverside	Overall, the City of Riverside's ordinance and ordinance enforcement practices to prohibit non-exempt, non-stormwater discharges to the MS4 have been effective. In accordance with the City's ordinance and enforcement practices, the City has stopped construction work on sites not following effective water quality management practices. Likewise, the City continues to enforce water quality practices among industrial and commercial businesses, including pro-active investigation. However, the City has trouble funding continual improvements and maintenance to the citywide Urban Runoff management program due to state-imposed limits on raising resources for citywide improvements. Moreover, state-imposed limits on financial penalties for non-compliance also limit increasing the effectiveness of City ordinance for cleaner Urban Runoff.

LEGAL AUTHORITY

2008 Annual Progress Report
Santa Ana NPDES Municipal Stormwater Permit

PERMITTEE	**12. Please summarize the effectiveness evaluation of your ordinance, ordinance enforcement practices with regard to prohibiting non-exempt, non-stormwater discharges to the MS4**
Riverside County	See comments under Program Implementation and Evaluation and Executive Summary.
RCFC & WCD	N/A
San Jacinto	We have found one (1) prohibited discharge to the MS4. All field personnel including those in parks, streets, water, building and code enforcement are continuously on alert for potential discharges. Furthermore, the city has enacted operation clean sweep to remove abandoned vehicles from City Right of way and private property, to enhance code enforcement activities related to property maintenance and debris removal, and to strengthen the penalties against illegal dumping. Additionally, the City has established an abandoned vehicle program, which is run through our Code Enforcement and Police Departments. Furthermore, our Code Enforcement Department has initiated the City's new Administrative citation ordinance. For example: a progressive fine system to gain compliance. Lastly, the City has a program that involves the community in assisting with Neighborhood clean ups in the downtown area.

4. RIVERSIDE COUNTY DRAINAGE AREA MANAGEMENT PLAN (DAMP) - SANTA ANA and SANTA MARGARITA REGIONS

During this reporting period, the Permittees transitioned from the 1993 Santa Ana River DAMP (1993 SAR-DAMP) to the revised Riverside County DAMP - Santa Ana and Santa Margarita Regions (2005 DAMP).

The 2002 MS4 Permit requires the continued implementation of the approved 1993 SAR-DAMP and provides a schedule for the submittal of a revised DAMP:

> *§XIII.A. "The Permittees shall continue to implement all elements of the approved DAMP. Program elements revised in compliance with the requirements of this Order shall be implemented in conformance with the schedules specified in this Order following approval of the Executive Officer. Within six (6) months of approval of the WQMP by the Executive Officer, or no later than January 1, 2005, whichever comes first, the Permittees shall submit a revised DAMP incorporating the revised program elements and other information as specified by this Order for approval by the Executive Officer. The Permittees shall implement all elements of the approved DAMP."*

Background

The 1993 SAR-DAMP was organized based on the requirements of the 1990 MS4 Permit. Program elements required by the 1996 MS4 Permit were developed, but were not incorporated into a single, comprehensive DAMP document. As noted in the Santa Ana Region Report of Waste Discharge (2002), elements of the approved 1993 SAR-DAMP are outdated or are no longer relevant. The development of watershed planning efforts, 2002 MS4 Permit requirements, and Total Maximum Daily Loads (TMDLs) are examples of factors that will affect management of municipal stormwater discharges in the Region, but which are not addressed in the approved 1994 SAR-DAMP.

Since the adoption of the 2002 MS4 Permit, the Permittees have been working together to provide reviews and recommendations for many of the existing regional municipal stormwater program elements.

Based on these efforts, the objectives for revising the 1993 SAR-DAMP were:

- Improve management of municipal stormwater discharges to protect the beneficial uses of receiving waters in the region.

- Address the elements of the stormwater management program in one core document (Enforcement/Compliance Strategy (E/CS), Municipal Facilities Strategy, the Water Quality Management Plan).
- Address requirements of the 2002 MS4 Permit.
- Remove obsolete information.
- Facilitate more consistent implementation of the 1993 SAR-DAMP.
- Improve the clarity and usefulness of the guidance provided to the Permittees.
- Provide for coordination with watershed management initiatives, TMDL programs and other programs affecting management of municipal stormwater discharges.
- Provide a clear schedule of MS4 Permit requirements and program goals to assist the Permittees in long-term fiscal planning.

Process for Revising the 1993 SAR-DAMP

During this reporting period, the Permittees have been revising the SAR-DAMP as a single, comprehensive document that includes all of the elements of the stormwater program for the SARWQCB MS4 Permit Area.

As a first step toward revising the SAR-DAMP, the Permittee Technical Committee reviewed the objectives, a proposed outline, and schedule. The second step was to upgrade of each program element in the DAMP to address the requirements of the 2002 Permit. Permittee Sub-committees guided the development of specific program element (e.g., Construction Activities, New Development and significant Redevelopment, Industrial/Commercial Activities, etc.) of the 1993 SAR-DAMP consistent with the objectives and schedule. In developing each program component, the Sub-committees also identified staff training improvements to facilitate effective implementation.

The following program elements were revised during FY 2002/2003 and included as draft DAMP sections in the 2003 Annual Report:

- Construction Site Inspection Program,
- Industrial/Commercial Site Inspection Program, and
- Portions of the Municipal Facilities Strategy

The remaining program elements were reviewed by the Permittee Technical Committee and Sub-Committees, and were developed into revised sections of the draft DAMP through the end of FY 2003/2004.

Public Notice, Comment Period, and Submittal

The Permittees implemented established procedures for public involvement by all interested parties in the development of the draft revised DAMP. The Permittee Technical Committee developed a series of tasks and milestones to finalize the DAMP elements and prepare the document for public review and comment.

The project Gantt chart (**Figure 4-1**) illustrates the specific tasks and milestones involved during the public review and finalization of the draft DAMP.

- Initial Public Notice was made on September 7, 2004 that revisions of the DAMP were being initiated in compliance with the Santa Ana Region MS4 Permit.

- Second Public Notice for a 30-day comment period was made on November 1, 2004. The Public Review Draft Riverside County DAMP was posted on the Permittees' web sites from November 1st through November 30th. Comments regarding the revised DAMP were requested by December 1, 2004.

- A public workshop to discuss the Public Review Draft DAMP was held on November 17, 2004 at the District office in Riverside, during which Santa Ana Regional Board staff was in attendance.

- Comments on the Public Review Draft DAMP were received from the staff of the Santa Ana Regional Board on December 13, 2004.

- Draft DAMP submitted to the Santa Ana Regional Board on December 31, 2004 to meet the January 1, 2005 submittal due date in fulfillment of provision XIII.A of the Santa Ana Region MS4 Permit.

- As of January 1, 2005, the Permittees began work to modify the DAMP to additionally address the revised MS4 Permit requirements for the Santa Margarita Region of Riverside County (Santa Margarita Region MS4 Permit) adopted on July 14, 2004 by the San Diego Regional Board (Board Order R9-2004-001, NPDES No. CAS0108766). The Santa Margarita Region MS4 Permit covers the same general categories of compliance requirements as the Santa Ana Region MS4 Permit.

- On April 12, 2005 the Permittees met Santa Ana Regional Board staff to discuss modifications that were made to the DAMP in response to their comments, modifications to the DAMP that were necessary to incorporate Santa Margarita Permit provisions, and to discuss a timeframe for submittal of the final revision of the DAMP. The DAMP was then updated to its present format to respond to both Santa Ana and San Diego RWQCB staff comments.

- The final DAMP was resubmitted to the Santa Ana Regional Board on July 14, 2005.

DAMP Updates

In preparation for the Report of Waste Discharge, the Permittees worked on developing a list of necessary changes to the DAMP to better protect water quality, correct errors, and address TMDL requirements. Recommended revisions to the DAMP were submitted on August 1, 2006 in compliance with Task 7.1 and 7.2 of the Lake Elsinore TMDL.

As previously discussed, the ROWD Work Group developed a redline Permit and DAMP which included whole new sections and findings that addressed TDML compliance. The ROWD Work Group met to update the DAMP. The Work Group considered the current regulatory environment and applicable EPA rules and regulations to ensure that the proposed redline Permit and DAMP represented a thoughtful and comprehensive proposal which included good-faith commitments from the Permittees that will lead to protecting water quality in a productive and meaningful way. The Permittees are awaiting a draft permit from the Regional Board prior to finalizing the above mentioned DAMP changes.

DAMP Development schedule - Aug 19, 2004

ID	Task Name	Duration	Start	Finish
1	Kick off strategy meeting	0 days	Fri 8/13/04	Fri 8/13/04
2	Send draft DAMP to permittees	0 days	Thu 8/19/04	Thu 8/19/04
3	Begin prepare 1st draft	22 days	Mon 8/16/04	Tue 9/14/04
4	SA/SM Tech Comm meeting	0 days	Thu 8/26/04	Thu 8/26/04
5	Initial public notice preparation of DAMP	0 days	Fri 9/3/04	Fri 9/3/04
6	1st draft to permittees for review	0 days	Wed 9/15/04	Wed 9/15/04
7	Permittees review, prepare input	12 days	Thu 9/16/04	Fri 10/1/04
8	SA/SM Tech Comm meeting	0 days	Thu 9/23/04	Thu 9/23/04
9	Deadline permittees comments	0 days	Fri 10/1/04	Fri 10/1/04
10	End initial public comment period	0 days	Mon 10/4/04	Mon 10/4/04
11	Prepare 2nd draft	11 days	Mon 10/4/04	Mon 10/18/04
12	2nd draft to permittees for review	0 days	Mon 10/18/04	Mon 10/18/04
13	Permittees review, prepare input	6 days	Mon 10/18/04	Mon 10/25/04
14	Deadline permittee comments prior to web posting	0 days	Mon 10/25/04	Mon 10/25/04
15	Finalize 2nd draft prior to web posting	4 days	Tue 10/26/04	Fri 10/29/04
16	SA/SM Tech Comm meeting	0 days	Thu 10/28/04	Thu 10/28/04
17	Draft DAMP on web sites & 2nd public notice	0 days	Fri 10/29/04	Fri 10/29/04
18	Prepare 3rd draft, revise based on comments received	12 days	Tue 11/9/04	Wed 11/24/04
19	Public workshop	0 days	Mon 11/15/04	Mon 11/15/04
20	End public comment period	0 days	Wed 12/1/04	Wed 12/1/04
21	Staff meeting, finalize DAMP	0 days	Thu 12/2/04	Thu 12/2/04
22	Final input, revisions	11 days	Thu 12/2/04	Thu 12/16/04
23	Complete, deliver to SARWQCB	0 days	Fri 12/17/04	Fri 12/17/04

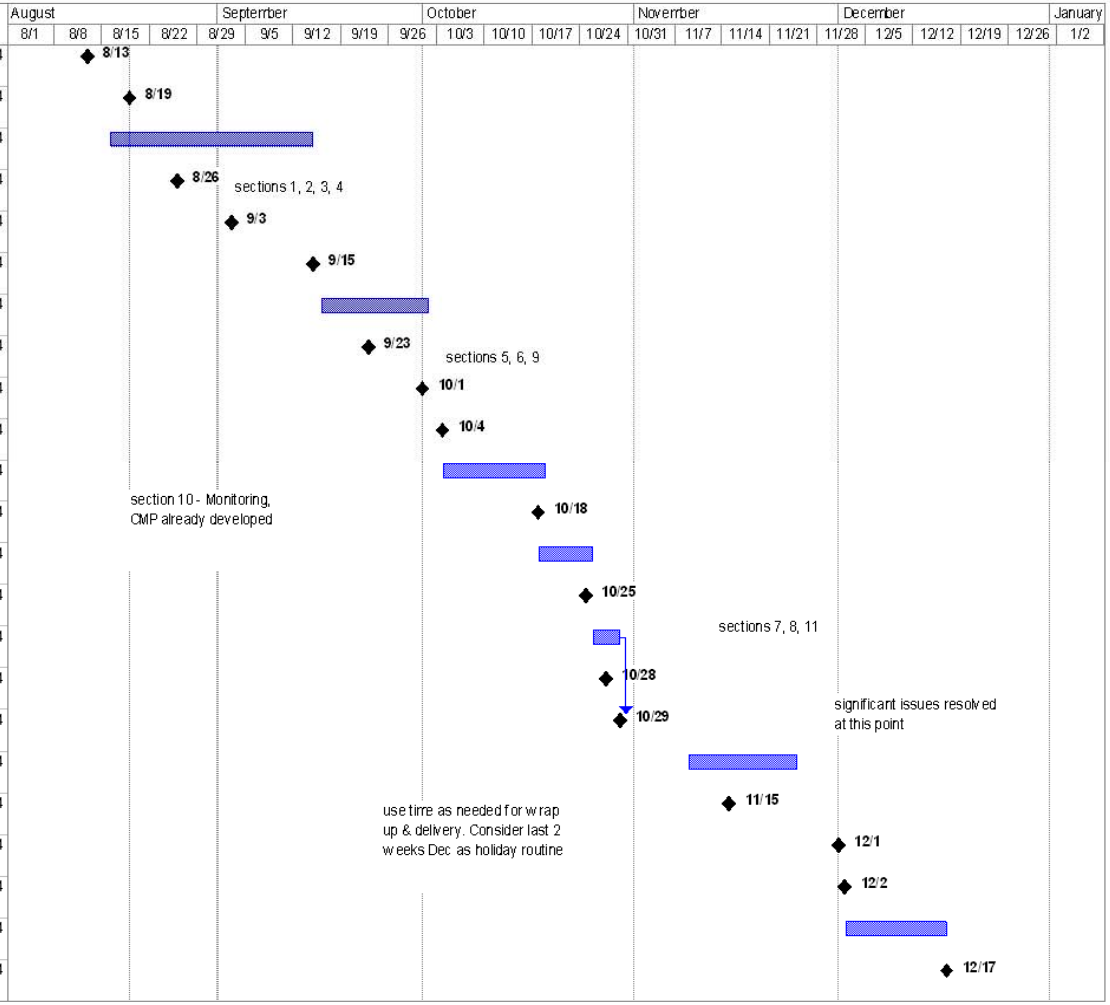

Figure 4-1 DAMP Development Gantt Chart

Program Implementation & Evaluation

Provision No. IV.B of the Santa Ana Region NPDES Municipal Stormwater Permit, Board Order No. R8-2002-0011 (Permit) requires the Permittees to evaluate their Urban Runoff Management Programs and the Implementation Agreement and determine the need, if any, for revision.

Provision No. IV.B. 1 of the Monitoring and Reporting Program requires a review of the status of program implementation and compliance (or non-compliance) with the schedules contained in the Permit.

A summary of the Permittees' review of the current program implementation is presented in **Table 4-1** which follows.

Table 4-1- Program Implementation and Evaluation

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PERMITTEE	**1. Please provide a summary of the findings of your review and any needed revisions.**
Beaumont	Expenditures cannot be accurately tracked without a detailed accounting program.
Calimesa	The City has not adopted a formal Urban Runoff Management Plan. A template plan has been provided by the County. The City will modify the plan to meet the unique character of Calimesa. The target date of July 2008 was not me de to conflicting priorities that did not allow staff to focus on the URMP. The City is considering the use of a Consultant to allow the necessary time to focus on the plan preparation.
Canyon Lake	The City of Canyon Lake has two major roadways with culverts and pipes within the gated community that are inspected and maintained annually, or more often as needed. Within the gated community there is a system of private storm drains that are mapped and inventoried. Inspections and clean outs occur annually or more often as needed. The maintenance is performed by Property Owner Association full time staff New construction is almost entirely single family residential and monitored by both building inspectors and special enforcement officers that are trained annually. The city staff has reviewed our program of compliance with provisions of the NPDES Municipal Stormwater permit and determined it in order and not in need of revision at this time.
Corona	The City of Corona has met all program implementation schedules contained in the permit. This year, the City has continued to implement the Water Quality Management Plan for Urban Runoff requirements per Permit section VIII.B., and inspected industrial commercial facilities, and construction sites per the compliance schedules outlined in permit section IX. Overall, staffing dedicated to implementation of the NPDES program has maintained the same level for this fiscal year. This year we investigated 40 incidences of spills and/ or potential illegal pollutant discharges to the stormdrain system. This is approximately the same number of incidences reported for FY 06/07. No illicit connections were observed. Enforcement to achieve compliance involved distributing educational materials, verbal warnings, and follow-up inspections. In one case, civil fines were issued to a citizen for illegal dumping from a motor vehicle in the public right-of-way. The City's public outreach and education program continued with the same efforts this year to increase public awareness through residential, commercial and industrial outreach programs. These activities are described in our narrative report.

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PERMITTEE	1. **Please provide a summary of the findings of your review and any needed revisions.**
Hemet	**Legal Authority** *Program Status 2007-2008* Existing storm water ordinance, adopted in 1995, provides general legal authority to implement NPDES permit requirements. Draft amendment prepared for review by city attorney *Implementation Goals for 2008-2009* Continue process to amend the city storm water ordinance to more adequately define prohibited discharges and activities, document enforcement measures, and identify staff responsible for enforcement **Illegal Connection / Illicit Discharge Control** *Program Status 2007-2008* Illegal connections and illicit discharges to MS4 are prohibited, maintenance program in place. *Implementation Goals for 2008-2009* Continue with development of formal inspection program for MS4 to detect and eliminate illegal connections and illicit discharges; Utilize new work order tracking system to improve summarizing and reporting of information concerning instances of illegal dumping or illicit discharges to the storm drain system; Continue with development of a process for reporting spill and illegal discharge incidents; **New Development – WQMP** *Program Status 2007-2008* Public Works Development Engineering is responsible for reviewing and approving project-specific WQMPs *Implementation Goals for 2008-2009* Continue WQMP review and approval program; Develop a database for tracking maintenance of post-construction treatment control BMPs required by WQMPs

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PERMITTEE	1. **Please provide a summary of the findings of your review and any needed revisions.**
Hemet Continued	**Construction Activities** *Program Status 2007-2008* Inspection of construction sites is ongoing; inspection database is being maintained; staff attended required training courses. *Implementation Goals for 2008-2009* Continue to work with inspection staff to develop a procedure for documenting actions taken as the result of construction site inspections to measure program effectiveness; Continue to provide additional in-house training on scheduling and documenting stormwater compliance inspections on construction sites **Industrial / Commercial Facilities** *Program Status 2007-2008* Majority of required inspections completed; inspection database maintained; staff training completed *Implementation Goals for 2008-2009* Develop and implement program for conducting follow-up inspections of commercial and industrial facilities initially inspected by Riverside County CAP; Continue efforts to develop and implement a process to identify new businesses that require inspection and, potentially, coverage under the State general industrial permit; **Public Education & Outreach** *Program Status 2007-2008* Participated in Riverside County Flood Control sponsored public education program; distributed educational information at local event; provided stormwater pollution prevention information to 23,000 City of Hemet water department customers in the Annual Drinking Water Quality Report

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PERMITTEE	1. **Please provide a summary of the findings of your review and any needed revisions.**
Hemet Continued	*Implementation Goals for 2008-2009* Continue public education and outreach program efforts, including distribution of materials at local events and in utility bills; Develop a storm water pollution prevention page for posting on the city's website, with links to other websites and stormwater program information; Continue efforts to label of all curb inlets in the city with message to prevent illegal dumping; **Municipal Facilities Programs and Activities** *Program Status 2007-2008* Continued regular maintenance of MS4 system; continued street sweeping program; developed pollution prevention plan for the corporation yard; selected municipal staff attended NPDES training *Implementation Goals for 2008-2009* Continue development of a prescribed, formal program for regular inspection of the city's MS4 facilities; Develop and implement an in-house training program for municipal maintenance staff; Monitor and document implementation of pollution prevention plan at corporation yard; Continue development of pollution prevention plans for other city facilities; Utilize new work order tracking system to improve summarizing and reporting of inspections and maintenance;

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PERMITTEE	**1. Please provide a summary of the findings of your review and any needed revisions.**
Lake Elsinore	Staff has reviewed the City's current reporting program and found an overall level of compliance with very few items not in compliance with the Schedules found in the permit. Within the next few months staff will be reviewing the DAMP, Policies, and Procedures that pertain to the NPDES program. The items found to be in non compliance with the permit have been identified below and are currently being revised to better the program. Legal Authority: ▪Discharges from pool or fountain water containing chlorine, biocides, or chemicals; pool filter back wash containing debris and chlorine. ▪Pet waste, yard waste, debris, sediment. Staff's review of the city's current legal authority identified a deficiency in managing and prohibiting the discharges from single family homes including but no limited to chlorinated pool, spa, fountain water, as well as biological and green waste. Staff will be working with Legal counsel and code enforcement to prepare an ordinance to prohibit domestic discharges into the MS4 and a public outreach program to educate the public on the concerns of such discharges and out water quality objective. Illegal Connection/Illicit Discharge Control: ▪Maintenance of an incident log, database, or other records of illegal dumping/illicit discharge reports. Currently the NPDES Coordinator does not keep a log of illegal dumping and illicit discharge reports. All documentation regarding dumping and discharges are kept in by the Code enforcement officer assigned to the case. All transmittals and enforcement actions are kept together for easier access. Staff will be developing a log that will be used by both Code Enforcement and the NPDES Coordinator to keep track of all reports along with enforcement actions and follow-up inspection date.

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PERMITTEE	**1. Please provide a summary of the findings of your review and any needed revisions.**
Lake Elsinore Continued	Construction activities Training: During the 2007-2008 reporting year Staff did not provide updated or new training to existing City Employees. Training will resume for the 2008-2009 reporting year to address any new changes in the City's Legal Authority and NPDES permit. All new hires will be trained per the permit. Industrial/Commercial Activities: Staff has begun the development of a database containing the NOI and SIC code information for all active industrial and commercial operators that are required to have coverage under the General Industrial Permit. Training Will resume in 2009 to reflect the new database as well as any new permit requirements. Public Education and Outreach: Staff did not hold any public meetings or commenting periods to update or revise the DAMP for the 2008 reporting year. The Damp will be revised for 2009 and will be put out for public comment and discussion. Any public input that is received will be documented an implemented into the damp if possible. Overall, Staff feels that the City is meeting the requirements and schedules set forth under the NPDES permit, and Riverside County DAMP. With few revisions and updates the program should be operating at maximum efficiency and further increasing the quality of the water in our local receiving waters.

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PERMITTEE	1. **Please provide a summary of the findings of your review and any needed revisions.**
Moreno Valley	a) Regularly participates in the quarterly Management Steering Committee. b) Regularly participates in the monthly NPDES TAC. c) Maintains adequate legal authority to comply with this order. d) Investigates spills, leaks, and/or illegal discharges. e) Reviewed its current litter/trash control ordinance for compliance with this order. f) Maintains a control mechanism to address septic system failures and ensures repair of the system prior to allowing re-occupancy of the affected property. g) Conditions new development projects to seek coverage under the appropriate State stormwater permits. h) Reviewed its planning and CEQA process for order compliance. i) Is in the process of updating its General Plan and ensuring watershed protection principles and policies <u>remain</u> in the document. j) Reviewed its grading and erosion control ordinance to ensure compliance with this order. k) Maintains a listing of BMPs for construction projects. l) Implements WQMP for all new development and significant redevelopment projects as defined in this order. m) Maintains a comprehensive database and performs inspections of construction sites, industrial and commercial facilities in compliance with this order. n) Provides or requires training to affected staff and consultants for construction site and industrial and commercial inspections. o) Maintains a public information booth for the storm water management program at its annual Fourth of July Celebration. Moreno Valley also participates, as a Co-Permittee in various public education events sponsored by Riverside County Flood Control District. p) Prepared Urban Runoff Pollution Prevention Plans for its Municipal Facilities. q) Incorporated appropriate storm water language into municipal contract documents and enforces the language. r) Continues to clean its MS4 per its clean out schedule and evaluates the same to determine needs for revision. s) Provides and or requires training for fertilizer and pesticide management for affected staff and contractors.

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PERMITTEE	**1. Please provide a summary of the findings of your review and any needed revisions.**
Murrieta	*See Permittee's individual annual report*
Norco	While the City's Stormwater Program is always open for review and improvement, 2007-08 has seen some major changes which compliment and enhance the program. New Ordinances have been passed and are being implemented which make property owners responsible for maintaining their animal keeping properties and allows the City to impose penalties and fines if not properly maintained. Inspection forms for residential properties that require stormwater compliance have been created and are being utilized. Information obtained from the inspection forms are being input into a database and tracked.
Perris	Appendix 3 of the Santa Ana Region NPDES Permit provides a summary of the scheduled activities required by the permit. The City of Perris has made substantial progress with implementing each of the required activities, and has determined that its Urban Runoff Management Program is in substantial conformance or moving towards completion of each of the required permit elements. During the 2005-2006 reporting period, the Santa Ana Regional Water Quality Control Board conducted a comprehensive program evaluation of the City's municipal storm water management program. The City of Perris did not receive an evaluation report from the Regional Board, but verbal feedback was provided on areas of exemplary practices and areas of suggested improvement. The City's Storm Water Ordinance #1194 (enacted in 2006), the Water Quality Management Plan (WQMP) review process, and Commercial/Industrial Inspection Program all received positive feedback after the Regional Board's program evaluation. The primary area of suggested improvement included training for construction site inspectors. During the 2007-2008 reporting period training was provided to City construction inspectors to provide information on the stormwater ordinance, resolutions, codes, DAMP requirements, Construction Activity Permits, enforcement and compliance procedures, SWPPPs, and BMPs.

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PERMITTEE	**1. Please provide a summary of the findings of your review and any needed revisions.**
Perris Continued	The City has also updated it's site specific storm water management plan for the Public Works Yard (Corporate Yard) by combining the City's existing municipal facilities strategy developed by Woodward-Clyde (1997) with the existing written operational procedures for the corporate yard as contained in the City's Storm Water Management Plan. As suggested by the Board in their comprehensive program evaluation conducted during the 2005-2006 reporting period, the Corporate Yard now maintains a site specific Storm Water Management Plan. Although the city adopted BMPs and management strategies from the Municipal Facilities Strategy addressing site specific pollutants at the Corporate Yard, a site specific map has not yet been updated to reflect current changes at the Corporate Yard. The Board indicated their acceptance of the unified sanitary sewer spill response program, developed jointly by the co-permittees, as the City's plan of action. The Board also indicated that the City's limited public outreach program, consisting of Channel 3 announcements, storm drain stencils, and handouts at public counters and events was found to be adequate. This year the City completed an updated inventory of catch basin locations throughout the City through July 2008, and developed a program to inspect, improve, and maintain catch basins and hydrodynamic separators throughout the city. The City of Perris document entitled "Installation and Maintenance of Post Construction BMPs" (FCD 1 2007-08-02) describes the City's effort to inspect and maintain catch basins and underground end-of-the-line clean water filter units to ensure catch basin BMPs are functioning effectively. The City has also installed carports at the Corporate Yard for city vehicle and employee parking. The City was also included in the nominations of "Resolution of Appreciation No. R8-2008-0018 for Stakeholder Participation in Basin Planning and Regulatory Activities" issued on January 18, 2008. This resolution recognizes stakeholders who have made contributions to basin planning and task force participation efforts. (See Exhibit A).

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PERMITTEE	1. **Please provide a summary of the findings of your review and any needed revisions.**
Riverside	The City of Riverside's Public Works Department has made tremendous strides towards achieving improved water quality. As a result of continual evaluation of the street sweeping program, new changes have been developed and implemented, with additional improvements planned for upcoming years. A practice that the City has not highlighted in recent years is clearing the drainage areas on the sides of dirt roads. Annually, prior to the rainy season, the City's Public Works Department clears drainage areas near dirt roads to remove illegal dumping, debris, and weeds that may block drainage paths. Weeds are sprayed only during the dry season, in order to minimize mixing the chemicals with runoff water that might pollute Receiving Waters. Continuing development of last year's Graffiti Reduction program, the City has implemented public education efforts to deter graffiti. The City also completed installation of water recycling and filtration pumps in all of its graffiti trucks to collect all liquid used during graffiti removal, filter it, then re-use it, instead of allowing the used water to run off. The City's Public Utilities-Water Operations and Maintenance Division reviewed its clean-up procedures. After completing any activity, streets are now swept either manually or with a sweeper machine. Also, when possible, maintenance work that requires digging in streets is vacuumed to a vacuum truck and hauled away for disposal. Based on the proven effectiveness of the current vacuum truck over the last year, a second is planned for purchase. Material maintenance procedures also continue to be reviewed and improved. Materials are not stockpiled on site, but brought daily, as needed. Also, all waste materials are transported daily to Agua Mansa for disposal, or a holding location to be contained within a City facility. During emergency situations, waste materials are transferred from the emergency site location to the City facility for later disposal. The City's Public Works Department also has continued to develop and implement public outreach efforts for urban runoff management in conjunction with some of its other programs. For example, this year, Public Works began a public education program in schools to encourage people not to graffiti. Deterring people from performing graffiti results in fewer chemicals to be washed off and fewer chemicals used to clean the graffiti. Fewer chemicals used reduces the chance that the chemicals or washoff could harm Receiving Waters.

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PERMITTEE	1. **Please provide a summary of the findings of your review and any needed revisions.**
Riverside County	**See Executive Summary in Permittee Submittal for program overview as identified in IV.B.. See Flood Control and Water Conservation District Report for Monitoring and Reporting as identified in IV.B.I** The most significant change in program delivery will be the inclusion of the industrial commercial stormwater inspection program (ICSIP) being developed by the Department of Building and Safety. This program will supplant the Compliance Assistance Program (CAP) in the unincorporated portions of the County. The CAP will continue to be provided to those cities that do not have an industrial stormwater inspection program. The ICSIP will include businesses not currently inspected by either the HAZMAT or District Environmental Services Divisions of the Department of Environmental Health and will focus on post construction BMPs and facility pollution prevention plans that are in place at regulated businesses. The County also instituted a business registration and licensing program for the unincorporated portions of the county as a mechanism to identify a list of businesses not otherwise inspected by other ancillary environmental programs.

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PERMITTEE	1. **Please provide a summary of the findings of your review and any needed revisions.**
RCFC&WCD	PROGRAM MANAGEMENT/ADMINISTRATION • Completion of the Integrated Regional Watershed Management Plan for the San Jacinto River Watershed in December 2007. The plan integrates water resources planning at a watershed scale. It addresses the sustainability of water supplies and surface and groundwater quality among other issues. • Participation in the Santa Ana One Water One Watershed (OWOW) planning process which focuses on establishing regional solutions for water problems within the Santa Ana Watershed and is intended to develop linkages between all water interests. The objective of OWOW is to encourage the development of multi-benefit projects that use resources and expertise from across disciplines; • Active participation with California Stormwater Quality Association (CASQA) with leadership roles in the organization. Specifically: Steve Stump, Board Member from 2004-2008; Mark Wills, Board from 2008-present; Jason Uhley, Legislative Chair since 2003 and Conference Chair in 2009; Linda Garcia, Monitoring Co-Chair 2004 – 2007; • Continuation of the Permittees' Management Steering Committee quarterly meetings. The Management Steering Committee consists of the City Managers, Directors of Public Works and other essential municipal staff. The District's Chief Engineer chairs the Committee. The Committee was established to address Urban Runoff management policies for the Permit Area and coordinate the review and necessary revisions to the DAMP, Implementation Agreement, and development of the WQMP. In addition, the Management Steering Committee facilitates coordination with related water quality management programs and monitoring. It also responds to new legislative and regulatory initiatives;

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Provision No IV.B of the Santa Ana Region NPDES Municipal Stormwater Permit, Board Order No. R8-2002-0011 (Permit) requires the Permittees to evaluate their Urban Runoff Management Programs and the Implementation Agreement and determine the need, if any, for revision. Provision No. IV.B.1 of the Monitoring and Reporting Program requires a review of the status of program implementation and compliance (or non-compliance) with the schedules contained in the Permit.	
PERMITTEE	1. **Please provide a summary of the findings of your review and any needed revisions.**
RCFC&WCD Continued	• Participation in the CASQA Pesticide Subcommittee. The CASQA Pesticide Subcommittee addresses pesticide uses that impact stormwater discharges and focuses on providing input to the USEPA and the California Department of Pesticide Regulation (DPR) to improve implementation of pesticides regulations so that pesticides more fully protect water quality and are better aligned with the Clean Water Act and California Water Code. The District staff's roles included; Jason Uhley peer-reviewed the 2008 Summary of Pesticide Use Report prepared by the UP3 project; Arlene Chun, sub-committee member; District staff provided input and comments on several letters to DPR regarding proposed Pesticide Working Group Studies and DPR and USEPA proposed voluntary Pesticide Labeling modifications; Participation and presentation of urban pesticide issues at the September 2008 Western Regional Urban Pest Ant Work Group at UCR. The Work Group is analyzing alternative methods to control ants including IPM, changes in pesticide application requirements, and changes to the types and methods of pesticide application; Coordination meetings with the U.C. Extension and Riverside County; and • District NPDES staff attended CASQA Effectiveness Training to assist with developing and implementing an effective program that will contribute to reduced pollution of our waterways. This training will help the District develop appropriate measureable goals in the assessment of their individual compliance programs and of the watershed based activities; MONITORING • Participated in the Southern California Coastal Water Research Program (SCCWRP) Bacteria Reference Study; • Participated in the Bacterial Source Identification Study for the Santa Ana River; • Participated in a study conducted by Dr. Grant of UC Irvine to evaluate the Dynamics of Point and Non-Point Source Fecal Pollution in the Santa Ana River;

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PERMITTEE	1. **Please provide a summary of the findings of your review and any needed revisions.**
RCFC&WCD Continued	• Through the Stormwater Monitoring Coalition (SMC), the Permittees participated in the development of: o A Regional Watershed Monitoring Program (RWMP) to address key questions regarding the health of receiving waters in Southern California; o A Model Monitoring Program that presents a common design framework that MS4 programs and Regional Board staff can use in developing and/or revising monitoring requirements for assessing receiving water impacts, status and trends, toxicity, mass emissions, and source identification; o A Peak Flow Study that will evaluate how stream erosion impacts natural stream habitat. A mathematical model will be developed that will help define a cause-effect relationship between the geomorphic identity of selected streams and their susceptibility to erosion. • Through LESJWA, the Permittees have funded activities that will improve Lake Elsinore via projects such as fish removal and disposal; Lake Elsinore island well improvements; and the installation and operation of a Lake Elsinore aeration system. Monitoring efforts are also being conducted to develop and refine a compliance strategy that was likely to achieve compliance; • Participated in the Stormwater Quality Standards Task Force (SWQSTF). The multi-stakeholder Task Force was formed by Orange, San Bernardino, and Riverside counties to assist the Santa Ana Regional Board in reevaluating the application of the water contact beneficial uses (REC-1, REC-2) for receiving waters in the Santa Ana watershed. The Task Force's goal is to recommend revised beneficial use designations for sections of the Santa Ana River and its tributaries, develop water quality objectives to protect each designated use, and re-examine the appropriateness of the fecal coliform bacteria as the most appropriate water quality objective indicator organism; • Permittees supported SCCWRP's Index of Biological Integrity (IBI) study. The study is evaluating the San Diego IBI to see if it is valid for all areas of southern California. The results of SCCWRP's study and the California Department of Fish and Game's IBI studies will be evaluated to determine their applicability for bioassessment within the Santa Ana Region;

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PERMITTEE	1. **Please provide a summary of the findings of your review and any needed revisions.**
RCFC&WCD Continued	• Continued implementation in the Consolidated Program for Water Quality Monitoring (Consolidated Monitoring Program) in accordance with NPDES Permit requirements that includes collection of water quality samples at Municipal Separate Storm Sewer Systems (MS4) outfalls and Receiving Waters for a variety of constituents as well as coordinate monitoring efforts for the Canyon Lake/Lake Elsinore TMDL and for the Middle Santa Ana River TMDL development; TMDL • The Permittees helped to develop a Watershed Monitoring and Urban Source Evaluation Plan for the Middle Santa Ana River to meet TMDL and grant requirements; • The Permittees helped to identify BMP testing locations for a pilot study of BMP effectiveness for the Middle Santa Ana River TMDL; • For the Lake Elsinore TMDL, the Permittees developed a draft Septic System Management Plan, lake monitoring plans, and revised the TMDL schedule to help identify the appropriate BMPs for the TMDL; NEW DEVELOPMENT • The District continued to develop an enhanced BMP guidance manual, focused on Low Impact Development (LID), and landscape based BMPs capable of addressing identified water quality impairments within the Santa Ana watershed; • Continued progress for the District's LID Project, which proposes to construct, test and evaluate a variety of integrated management practices (IMPs) that serve as hydraulic and hydrologic controls consistent with the LID planning and design approach. In addition, the project proposes monitoring and testing components. The project will also provide a facility that can be used for demonstrating and evaluating the effectiveness of LID IMP techniques in southern California. The centralized location is convenient for training residents, regulators, developers, municipal employees, engineers and other interested stakeholders from many southern California

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PERMITTEE	**1. Please provide a summary of the findings of your review and any needed revisions.**
RCFC&WCD Continued	• Participated in the SMC Hydromodification Study which consists of four technical tasks. In the first task, a mapping and classification system for streams based on their susceptibility to the effects of hydromodification was developed. The second task of the study is establishing protocols for ongoing monitoring to assess the effects of hydromodification. The objective for development of the standard monitoring protocols is to facilitate regional information sharing on project performance. The third task of the Regional Hydromodification Study involves development and calibration of dynamic models to assess the effects of hydromodification on stream condition. The fourth task is to develop a series of tools that watershed managers can apply to make recommendations or set requirements relative to hydromodification for Priority Development Projects. When completed, the Regional Hydromodification Study will provide tools to improve water quality and overall condition of streams in southern California by reducing channel degradation, excessive erosion and sedimentation of downstream receiving waters, and delivery of particle-bound pollutants; • Participated in the SMC LID BMP study which would ultimately produce an LID BMP Design Manual and Training Materials that could be used by programs throughout southern California. The LID BMP Testing and Demonstration Facility at the District's headquarters in Riverside will be implemented in cooperation with the SMC project. The facility will be used to monitor the performance of LID features in the field, to illustrate LID features in training workshops, and to assist in the development of technical guidance regarding LID features;

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PERMITTEE	**1. Please provide a summary of the findings of your review and any needed revisions.**
RCFC&WCD Continued	• The District and County partnered with Metropolitan Water District (MWD) to update the Lake Matthews Area Drainage Plan. The existing Lake Matthews Area Drainage Plan was a joint effort of the County, District and MWD. It was adopted in 1994 and was one of the first ADPs in Riverside County to incorporate water quality mitigation features. The features were intended to provide protection to Lake Matthews. The costs of the ADP facilities are partially offset by associated ADP Developer Fees charged to developments within the watershed. Unfortunately, several of the proposed water quality features were "regional" in nature and incorporated into receiving waters. Recent NPDES MS4 Permits include language that indicates regional treatment systems can not be incorporated into receiving waters. Further, the ADP was adopted prior to NPDES MS4 Permit requirements for WQMPs for new development and redevelopment. The WQMP requires new developments to incorporate onsite mitigation that may obviate the need for some of the regional water quality features proposed in the original ADP. For these reasons, the District, County and MWD are partnering to update the Lake Matthews ADP based on current regulatory requirements. The study will include the development of a watershed model that will attempt to evaluate the effectiveness of the existing water quality mitigation features protecting Lake Matthews, as well as the potential benefits of continued WQMP implementation. The need for additional regional water quality mitigation features will then be evaluated based on the modeling results. A schedule for the revised ADP has not been established yet; • The District partnered with Western Municipal Water District (WMWD) to examine the feasibility of infiltrating urban runoff/stormwater into the Arlington Groundwater Basin. The recharge project would be part of a larger effort to increase the sustainable yield of the Arlington Basin. WMWD has selected a consultant (Wildermuth Environmental) who is currently developing a study evaluating alternative scenarios. Wildermuth is also evaluating any potential negative impacts from the recharge project on the groundwater basin. Proposed recharge facilities will incorporate any necessary mitigation measures to protect the groundwater. The project is expected to incorporate multiple benefits, including increasing the sustainable yield of the Arlington Basin and decreasing pollutant loads (particularly bacteria) to the Santa Ana River. A draft of the study is expected in late 2009/early 2010;

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PERMITTEE	1. **Please provide a summary of the findings of your review and any needed revisions.**
RCFC&WCD Continued	PUBLIC ED/TRAINING • The District contributed $10,000 per year as part of Riverside County's support of the Southern California Water Committee. This organization is a nonprofit, nonpartisan, public education partnership dedicated to informing Southern Californians about their water needs and the state's water resources. It is a cooperative effort of business, government, water agencies, agriculture, and public interests; • Continued to track program effectiveness such as resident surveys, tracking hotline inquiries, and web counters; • Continued implementation of the Storm Water Protection website that offers educational resources and free brochures targeting residents, businesses, developers, contractors, and elementary school children; • Continued offering of several municipal employee-training sessions to provide a general orientation of the Municipal Stormwater Program including topics such as stormwater regulations and permits, storage and disposal of hazardous materials, BMPs for parks and recreation activities, animal control facilities, vehicle and equipment cleaning, outdoor cleaning activities, pesticides/fertilizers, painting, dumpster areas, etc. to all Santa Ana Permittees' staff. Attendees included code enforcement and field maintenance staff, construction site inspectors, and personnel involved in conducting industrial/commercial facility inspections. Training focused on compliance requirements and ordinance enforcement processes required by the October 2002 Municipal Stormwater Permit; • Continued promotion (advertising) of proper household hazardous waste disposal at special hazardous waste collection events and at the Pedley "ABOP" collection center through placement of numerous newspaper advertisements. Attending various community events to provide information and brochures on stormwater pollution prevention, recycling and proper disposal of household hazardous waste; • Continued coordination with the Riverside-Corona Resource Conservation District to present the Stormwater Pollution Prevention Patrol Program in elementary school classrooms and conduct slide-show presentations on stormwater pollution prevention to local service clubs and civic groups; • Continued coordination with the Riverside-Corona Resource Conservation District to develop and present a series of Home Gardening Workshops at local nurseries and garden centers to promote alternatives to fertilizer and pesticide usage;

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PERMITTEE	1. **Please provide a summary of the findings of your review and any needed revisions.**
RCFC&WCD Continued	IC/ID • Identified the need and initiated the effort to develop an on-line database to track allowable 3rd party discharges into Permittee MS4 systems for complaint calls; • Update of the complaint call database to increase its utility for District staff; • Developed an Access database to help provide complaint summaries in a more organized fashion; • Continued financial support for area-wide Stormwater Pollution Prevention Programs, including Hazardous Materials (HAZMAT) Response Team, the Household Hazardous Waste (HHW) collection events and "ABOP" (Anti-freeze, Batteries, Oil and Paint) program; • Eliminated a sewer cross-connection to Box Springs Channel. Bacteriodes sampling of various MS4 tributary to the Santa Ana River indicated that Box Springs Channel had a persistent human bacteria source. As a follow up to bacteriodes monitoring conducted by the Middle Santa Ana River TMDL Task Force, the District and City of Riverside initiated an IC/ID investigation of the Box Springs Channel in January 2008 to identify any potential sources of human fecal contamination to the channel. No obvious sources were determined based on multiple field investigations conducted through late February. However, in late April, the City of Riverside notified the District that they had discovered a sewer cross-connection to Box Springs Channel as part of ongoing work on a sewer improvement project. The 4" cross-connected sewer served a maintenance worker bathroom that belonged to Riverside Community College. The bathroom was located near the RCC baseball fields just north of Magnolia Avenue. The sewer line had been inadvertently connected to a small RCC-owned storm drain tributary to the Box Springs Channel. The City and District worked with RCC to eliminate the cross connection and conduct necessary clean-up work (clean-up work completed May 9). Subsequent bacteriodes samples indicate that the bathroom was the source of human contamination in the channel; CONSTRUCTION • Coordinated comments on draft General Construction Permit;

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PERMITTEE	1. **Please provide a summary of the findings of your review and any needed revisions.**
RCFC&WCD Continued	MUNICIPAL • Provided comments on SWRCB Numeric Effluent Limits Blue Ribbon Panel Report; • Analyzed the effectiveness of the District's Facility Pollution Prevention Plan via annual inspection process; • Continued implementation of a Commercial/Industrial Compliance Assistance Program (CAP) to conduct focused outreach to restaurants, automotive repair shops and certain other commercial and industrial establishments to encourage implementation of stormwater BMPs and facilitate consistent and coordinated enforcement of local stormwater quality ordinances. Site visits included use of a survey checklist to document stormwater management practices for each facility;
San Jacinto	We have updated our storm water management ordinance no. 13.44 to specifically reference prohibited activities. Additionally, we will be further developing our commercial/industrial inspection program and enhancing our GIS database related to such uses.

5. ILLICIT CONNECTIONS/ILLEGAL DISCHARGES

Actions to Investigate and Eliminate IC/ID

Provision VI.A and VI.B of the 2002 MS4 Permit requires the Permittees to continue to prohibit illicit connections and illegal discharges to the MS4s through their Storm Water Ordinances. In addition, the Permittees are required to continue to implement and improve routine inspection and monitoring and reporting programs for their MS4s. If routine inspections or dry weather monitoring indicate illicit connections or illegal discharges, they are to be investigated and eliminated or permitted within sixty (60) calendar days of receipt of notice by its staff or from a third party. A summary of these actions is required to be reported annually beginning with the 2003-2004 Annual Report.

Trash Debris Control Measures

Provision VI.C requires the Permittees to implement control measures to reduce and/or eliminate the discharge of pollutants, including trash and debris from the MS4 to Receiving Waters.

Litter BMP Review and Assessment

Provision VI.D requires the Permittees to establish a system to record visual observation information regarding the materials collected from the MS4 (e.g. paper, plastic, wood, glass, vegetative litter, and other similar debris), descriptions of its main sources (e.g. office, residential, commercial, and industrial waste), and problem areas. The findings of this review are described on page 5-23.

The Permittees' current efforts to control illicit connections and discharges are summarized in **Table 5-1** which follows.

Table 5-1 – Illicit Connections/Illegal Discharges

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PERMITTEE	1. Estimate the amount of pipe and/or open channel facilities currently owned, operated or maintained by your agency:		2. Describe your agency's current program/plans for detecting illegal connections to the MS4.
	Pipe L.F.	Channel L.F.	
Beaumont	2,500	2,000	City and staff notification of visual detection. Code enforcement & Police Department to be notified.
Calimesa	840	2,500	We intend to continue using the visual observation method to check for illegal connections.
Canyon Lake	900	n/a	Visual inspections and water quality testing at discharge sites into lake.
Corona	825,479	22,861	The City's Development Plan Review process incorporates guidelines for the Public Works Department review of plans to make sure potential illegal connections are prevented. On-going reconnaissance is part of the yearly tasks and assignments of various streets maintenance crews. Public Works Inspection, NPDES and Source Control Sections incorporate detection of illegal connections as part of regular construction and industrial/commercial inspections.
Hemet	9,400	15,600	The City of Hemet Public Works Department storm drain crew and road shoulder crew routinely monitor and clean the storm drain system, which includes detection and reporting of illegal discharges.
Lake Elsinore	4,600	1,000	City's field crews regularly inspect and maintain the MS4's as part of the Day to Day duties. In depth Camera inspections are performed upon the discovery of a potential illicit discharge in order to determine the origin.
Moreno Valley	100,000	950	The City of Moreno Valley receives daily reports from Underground Service Alert (USA). Staff reviews the reports to determine if any proposed excavations will affect city storm drains or channels. Staff then compares the USA reports to approved encroachment permits. IF a permit was not authorized, a Stop Work Order is issued.
Murrieta			
Norco	21,000	300	All reports of possible illegal connections are investigated with enforcement actions taken as necessary. Routine maintenance and inspections are made and if any illegal connections are noted, follow-up actions/enforcement is taken.

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PERMITTEE	1. Estimate the amount of pipe and/or open channel facilities currently owned, operated or maintained by your agency:		2. Describe your agency's current program/plans for detecting illegal connections to the MS4.
Perris	174,933	21,506	The Public Works Department routinely inspects the storm drain system for debris or other materials that may impede the system from functioning properly. If any such illicit connections were detected during those inspections, the matter would be referred to the Code Compliance Division for appropriate action. In addition, the Code Compliance Division responds to inquiries or complaints by anonymous residents.
Riverside	250 mi.	50 mi.	Public Works Environmental Compliance Inspectors review all commercial and industrial businesses in the sewage pretreatment program at least annually. Drainage to the storm drain system is evaluated during these inspections. Sewer Services Division personnel review storm drain facilities for illegal connections during routine maintenance. Public complaints and reports, CCTV inspections, visual inspections are additional sources for inspections to detect illegal connections to the MS4.
Riverside County	7,000	64,000	The County uses several departments within the Transportation Land Management Agency, Flood Control and Water Conservation District and Environmental Health to monitor, document, and follow up on illegal connections to the MS4 system. Depending on the risk to public health and the environmental will dictate the enforcement actions taken by the County.
RCFC&WCD	300 mi.	103 mi.	Prior to the issuance of an encroachment permit, planned connections are reviewed by District staff, staff provide prompt responses to inquiries and complaints, maintenance crews report inspected facilities, as an additional measure annual storm patrol inspections evaluate every mile of flood control infrastructure.
San Jacinto	18,000	17,000	The City's Park Department personnel, Public Works Department personnel and Lighting & Landscaping Maintenance District (LLMPD) contractor routinely patrol and regularly remove debris from the City's storm drain system. In addition, the City Code Enforcement Officer and Building Inspectors provide additional oversight and ensure that industrial and commercial users are not illegally connected or discharging into the city's storm drain system.

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PERMITTEE	3. Describe your agency's current program/plans for enforcing the elimination of illegal connections to the MS4.	4. Over the past year, has your agency's overall level of effort substantially increased, decreased, or stayed the same?		
		Increased	Decreased	No Change
Beaumont	Notice of violation and/or citation issued with restoration or permitting requirements.			✓
Calimesa	The City is a young City that has had the Sewer Systems installed in the last 25 years. Since construction, except within the new subdivisions is relatively slow and between the City and the Water District we have two groups watching for any attempt to connect to sewers or storm drains in an illegal manner.			✓
Canyon Lake	Community Patrol, Marine Patrol and Code Enforcement monitor discharge sites also periodic water quality tests.			✓
Corona	Enforcement is accomplished through the Public Works Inspection, NPDES and Source Control Sections. Through strong public education and awareness of City's ordinances and fines, and plan review and reconnaissance programs, we have been effective in eliminating potential illegal connections.			✓
Hemet	Illegal connections to the City's MS4 are reported to the Storm Water Program Compliance Coordinator who investigates all reports and, if necessary, coordinates with the City code compliance staff to enforce the City of Hemet Storm Water/Urban Runoff Management and Discharge Controls Ordinance No. 1531.			✓

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PERMITTEE	3. Describe your agency's current program/plans for enforcing the elimination of illegal connections to the MS4.	4. Over the past year, has your agency's overall level of effort substantially increased, decreased, or stayed the same?		
		Increased	Decreased	No Change
Lake Elsinore	City's Code Enforcement and Engineering staff are authorized to inspect and issue citations to the operator of any business found to be discharging and un treated discharges into a city maintained or operated MS4. An immediate Cease and Desist Stop work notice is issued as well as direction to contain and clean up all observed discharges and remove the illicit connection with 72hours. Failure to comply results in a revocation of the Business license and further legal action.			✓
Moreno Valley	Pursuant to the most recent inspections of the City, no illegal connections were found. The City utilizes the above described detection program (see response to #2) to monitor proposed connections to the City's MS4.			✓
Murrieta	*See Permittee's individual annual report*			
Norco	NMC Section 15.80.080 covers Illicit Connections/Discharges. The City has incorporated an electronic permit database which allows for all departments to access and view property information. When the appropriate division has been notified of a violation on a certain property, a hold is put on that property for any permitting until the issue is resolved.			✓
Perris	The Public Works Department routinely inspects the storm drain system for debris or other materials that may impede the system from functioning properly. If any such illicit connections were detected during those inspections, the matter would be referred to the Code Compliance Division for appropriate action. In addition, the Code Compliance Division responds to inquiries or complaints by anonymous residents. Most of the City's storm drains are relatively new and are observed for connections during construction.			✓

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PERMITTEE	3. Describe your agency's current program/plans for enforcing the elimination of illegal connections to the MS4.	4. Over the past year, has your agency's overall level of effort substantially increased, decreased, or stayed the same?		
		Increased	Decreased	No Change
Riverside	The City's Construction Inspection Section, Environmental Compliance Section and Code Compliance Section enforce City municipal code provisions regarding storm drain regulations. Should an illegal connection be detected, appropriate enforcement action is taken, including verbal warnings, written warnings, notices of non-compliance, fines, stop work orders and notification to the Regional Board.	✓		
Riverside County	See Flood Control and Water Conservation District Report and question 5 below.	✓		
RCFC&WCD	Unpermitted connections are investigated and the responsible party is notified in writing to either obtain a permit or remove the connection.			✓
San Jacinto	This is an on going process. City staff are very diligent in their observations of the MS4 system. As the majority of it is open to view (ie.. open, rural drainage channels and basins), little gets by without us noticing a problem. Additionally, the City has implemented the Administrative Citation process to be used when violations are noted.	✓		

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PERMITTEE	5. Describe your agency's program for enforcing regulations regarding illicit discharges and improper disposal of pollutants into storm drains/channels.	6. Over the past year, has your agency's overall level of effort substantially increased, decreased, or stayed the same?		
		Increased	Decreased	No Change
Beaumont	Code enforcement and/or Police Department and SARWQCB notified.			✓
Calimesa	The City patrols with Public Works and Citizen Patrol personnel everyday. When illegal dumping if identified, Public Works staff and local police try to identify the party responsible for the dumping to charge cleanup fees or times. In most cases the spill or dumping cannot be tied to any individual, in which case the dumping is cleaned up at city expense. See Exhibit A attached for a list of dumping activity identified during the reporting year.			✓
Canyon Lake	Correction Notices, Citations, Administrative Fines			✓
Corona	a) The City of Corona is a co-participant in the County Health Department administered "Compliance Assistance Program" and performs follow-up inspections on facilities with potential illicit discharges and ordinance violations b) The City of Corona currently has staff members devoted to providing prompt follow-up to telephone calls and complaints concerning illicit discharges and/or improper disposal of pollutants into storm drain facilities c) We currently have an illegal dumping report and phone number available on the City's web site. d) DWP, Code Enforcement, Fire and Public Works departments work together to respond to violation events. Field staff also report potential violations as they are observed in the field to the NPDES Section. A response procedure flow chart was developed to better define department responsibilities. The NPDES Section follows up on all events to ensure proper notification and reporting requirements are followed as specified in the EC/S. Enforcement depends on the severity of the violation and may require immediate containment and clean up, verbal warnings, notices of violation, recovery of costs, and public education to the violator including handing out public education materials.			

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PERMITTEE	5. Describe your agency's program for enforcing regulations regarding illicit discharges and improper disposal of pollutants into storm drains/channels.	6. Over the past year, has your agency's overall level of effort substantially increased, decreased, or stayed the same?		
		Increased	Decreased	No Change
Corona Continued	e) Catch basin markers are placed on all catch basin inlets inspected throughout the City to convey "only rain in the storm drain" message to reinforce behavior regarding potential disposal of pollutants into storm drains. New Developments are required to place these markers on new catch basins and standards are incorporated into the land development review process.			✓
Hemet	Illicit discharges and improper disposal of pollutants to the City's MS4 are reported to the Storm Water Program Coordinator who investigates each incident and coordinates with City code compliance staff if a notice of violation is appropriate.			✓
Lake Elsinore	The operator responsible for illicit discharge is notified by staff of the illicit discharge and issued a Stop work notice. The Operator is instructed in the proper procedure to clean and contain the discharge, as well as the evidence that must be provided by to the City regarding the proper disposal of the contaminated material before work can resume. Educational materials may be given to the operator if available to demonstrate the proper treatment and discharge of potential pollutants into the MS4. Depending on the severity of the discharge the Operator may be reported to Local law Enforcement or the Regional Water Quality Control Board.			✓
Moreno Valley	The City of Moreno Valley enforces Ordinance Nos. 359 and 665 through its Code & Neighborhood Services Division and Storm Water Management Program section. Through the enforcement actions, suspects are notified of the violation(s) and ordered to cease and desist all illegal activities. If illegal activities continue, judicial remedies are sought.			✓
Murrieta	*See Permittee's individual annual report*			

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PERMITTEE	5. Describe your agency's program for enforcing regulations regarding illicit discharges and improper disposal of pollutants into storm drains/channels.	6. Over the past year, has your agency's overall level of effort substantially increased, decreased, or stayed the same?		
		Increased	Decreased	No Change
Norco	All citizen reports as well as field personnel observations of possible illicit discharges are referred to the appropriate department for coordination of investigation and enforcement of the applicable section of the NMC.	✓		
Perris	The Public Works Department routinely inspects the storm drain system for debris or other materials that may impede the system from functioning properly. If any such illicit connections were detected during those inspections, the matter would be referred to the Code Compliance Division for appropriate action. In addition, the Code Compliance Division responds to inquiries or complaints by anonymous residents. The Code Compliance Division implemented a new software program COMCATE to track and follow-p on reports. Exhibit C shows an example of the new summary report and case report that the program outputs. This tool assists the division in report investigation and enforcement. If deemed appropriate, the officer may be able to determine the source of the pollution, and may have sufficient evidence to prosecute the violator.			✓
Riverside	The City's construction inspectors inspect construction sites for compliance regarding compliance with storm water regulations. Environmental Compliance Inspectors inspect businesses within the City for compliance with storm water regulations. Enforcement actions are taken when violations are discovered pursuant to the City's Enforcement Response Plan.	✓		

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PERMITTEE	5. Describe your agency's program for enforcing regulations regarding illicit discharges and improper disposal of pollutants into storm drains/channels.	6. Over the past year, has your agency's overall level of effort substantially increased, decreased, or stayed the same?		
		Increased	Decreased	No Change
Riverside County	Water quality complaints are received by the County Executive Office and triaged to the appropriate county department for follow-up. Depending on the complexity and severity of the complaint a case referral may be made to the Environmental Crimes Task Force. Most cases are directed to the Code Enforcement Department with support from the Building and Safety Department and Department of Environmental Health. All maintenance staff for the Transportation Department and the Flood Control and Water Conservation District actively look for potential illegal connections, illicit discharges and illegal dumping to the MS4 infrastructure. Close attention is paid to the drainage facilities located in traditionally known problem areas.	✓		
RCFC&WCD	Complaint calls are coordinated by the NPDES section. A written log is maintained and each call is evaluated. Incidents located within permittee (City or County) jurisdiction and within their respective MS4 right-of-way are referred to the appropriate agency. Incidents within District right-of-way are verified.			✓
San Jacinto	Police Department and Code enforcement is informed of suspicious activity and/or violations. The City Attorney addresses each violation enforcing all ordinances and penalties. The city has incorporated a we-tip reward program within the ordinance.	✓		

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PERMITTEE	7. Did your agency conduct any reconnaissance inspections of its storm water facilities for the 2007-2008 fiscal year? If yes, please identify the amount of pipe or channel inspected.				8. What percentage of your agency's stormwater facilities have been inspected?	
	Yes	No	Pipe L.F.	Channel L.F.	Amount of Pipe %	Amount of Channel %
Beaumont	✓		250	2000	10	100
Calimesa	✓		200	2500	100	100
Canyon Lake	✓		900	n/a	100	n/a
Corona	✓		39,204	22,861	5	100
Hemet	✓		0	15,600	0	100
Lake Elsinore	✓		4600	1000	100	100
Moreno Valley		✓			100	100
Murrieta	*See Permittee's individual annual report*					
Norco	✓		17,000	4,400	62	100
Perris	✓		28,041	10,320	16	48
Riverside		✓			10	100
Riverside County	✓		All components that can be visually inspected		100	100
RCFC&WCD	✓		300 mi.	103 mi.	100	100
San Jacinto	✓		9,000	19,000	50	100

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PERMITTEE	9. What method of inspection was used?					10. To date, how many illicit connections have been found?	
	Visual	Smoke Testing	Dye Testing	Video	Other	Number into Pipes	Number into Channels
Beaumont	✓					0	0
Calimesa	✓					0	0
Canyon Lake	✓					0	0
Corona	✓				Video inspection available, but only used when potential illicit connection has been detected	0	0
Hemet	✓					0	0
Lake Elsinore	✓					0	0
Moreno Valley	✓					0	0
Murrieta	*See Permittee's individual annual report*						
Norco	✓				Jet vacuum	0	0
Perris	✓			✓		0	1
Riverside	✓			✓			
Riverside County	✓					N/A	N/A
RCFC&WCD	✓					0	1
San Jacinto	✓			✓		2	0

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PERMITTEE	11. Has your agency designated an employee or department to receive, log, and follow up on reports of illegal dumping or suspicious discharges? If yes, please identify the principal point(s) of contact. If no, please describe your current plans (including a time schedule) for responding to reports of illegal dumping or suspicious discharges.					
	Yes	No	Department	Section	Name	Telephone
Beaumont	✓		Public Works Building and Safety	Code Enforcement	John Wilder Cynthia Overby	951.769.8520 951.769.8520
Calimesa	✓		Public Works		Robert French	909.795.9801
Canyon Lake	✓		Special Enforcement	City of Canyon Lake	Robert Bohan	951.244.2955
Corona	✓		Public Works Public Works	NPDES NPDES	Jeff Potts Michele Hindersinn	951.736.2442 951.736.2248
Hemet	✓		Public Works Dept.; Public Works Engineering	Water / Waste Water; Storm Water Program	Ron Proze; Linda Nixon	951.765.3710; 951.765.3880
Lake Elsinore	✓		Public Works Public Works	Street Maintenance Engineering	Lupe Gomez Alex Gutierrez	951.674.5170 951.674.3124
Moreno Valley	✓		Community Development	Code & Neighborhood Service	Officer of the Day	951.413.3341
Murrieta	*See Permittee's individual annual report*					
Norco	✓		Public Works Public Works	Field Engineering	Terri Piorkowski Lori J. Askew	951.270.5602 951.270.5678
Perris	✓		Development Services Dept.	Code Compliance	Rene Avila	951.943.5003
Riverside	✓		Public Utilities Public Works	311 Call Center Environmental Compliance	Call Center Berlinda McCadney	951.826.5311 951.351.6011
Riverside County	✓		Code Enforcement Environmental Health Transportation Department Environmental Health	Special Enforcement Team HazMat Division Highway Operations District Environmental Services	SET Supv HazMat Supv Receptionist DEH Supv.	951.955.6835 951.358.5055 951.955.6899 951.358.5172
RCFC&WCD	✓		Regulatory	NPDES	David Ortega Steve Clark	951-955-4390 951-955-1346
San Jacinto	✓		Public Works Code Enforcement	Streets/Stormwater	Barry Mulcock Marcee Maupin	951.487.7386 951.487.7321

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PERMITTEE	12. Does your agency maintain an incident log, database, or other records of illegal dumping/illicit discharge reports? If yes, please attach a sample listing of the incident log or database report.	13. Please identify the location where these records are kept.		
		Department	Name	Telephone
Beaumont	Yes	Public Works	John Wilder	909.769.8520
Calimesa	Yes, (See Permittee Submittal)	Public Works	Robert French	909.795.9801
Canyon Lake	Yes	City Clerk	Sarah Manwaring	951.244.2955
Corona	Yes	Public Works-NPDES	Michele Hindersinn	951.736.2248
Hemet	Yes, (See Permittee Submittal)	Public Works Engineering	Linda Nixon	951.765.3880
Lake Elsinore	Yes	Engineering Department	Alex Gutierrez	951.674.3124
Moreno Valley	Yes, (See Permittee Submittal)	Community Development	Officer of the Day	951.413.3341
Murrieta	*See Permittee's individual annual report*			
Norco	Yes, Public works maintains a work order log. If a code violation is found to exist, Code Enforcement creates a file.	Public Works – Work Order Norco Fire - Code Enforcement	Rose Mathews Jack Frye	951.270.5607 951.737.8097, ext. 2210
Perris	Yes, See attached Exhibit C	Development Svcs. Dept., Code Compliance Division	Rebecca Miranda	951.443.1796
Riverside	Yes, A sample listing of the incident log is attached.	Public Works Department, Environmental Compliance	Berlinda McCadney, Environmental Compliance Supervisor	951.351.6011

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PERMITTEE	12. Does your agency maintain an incident log, database, or other records of illegal dumping/illicit discharge reports? If yes, please attach a sample listing of the incident log or database report.	13. Please identify the location where these records are kept.		
Riverside County	Yes	Code Enforcement Dept. Community Health Agency – Dept. of Env. Health Community Health Agency – Dept. of Env. Health Flood Control District	SET Team Supervisor DES Supervisor HAZMAT Supervisor Stormwater Program	951.955.6835 951-358-5172 951-358-5055 951-955-4390
RCFC&WCD	Yes	Regulatory/NPDES	Albert Martinez	951.955.2901
San Jacinto	Yes	Code Enforcement & Public Works	Marcee Maupin Barry Mulcock	951.487.7321 951.487.7386

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Provision No. VLC Has your agency implemented control measures to reduce and/or to eliminate the discharge of pollutants, including trash and debris, from MS4s to the Receiving Water?	
PERMITTEE	**1. Has your agency implemented control measures to reduce and/or to eliminate the discharge of pollutants, including trash and debris, from MS4s to the Receiving Water? If yes, please describe the measures implemented.**
Beaumont	Catch Basin Filters, Detention Basins
Calimesa	Implemented the Field Monitoring Policy (see attached 'B')
Canyon Lake	No.
Corona	Catch basin inspection/cleaning conducted to minimize pollutant discharge and maintain program efficiency. HIGH, MED, LOW criteria given to inspection areas within City to better allocate resources and increase efficiency. Regular street sweeping program reduces pollutant load and therefore overall less frequency required for catch basin cleaning. Catch basin markers "Only Rain Down the Drain" installed by streets maintenance crews. Education on trash bin maintenance and recycling for business owners and households integrated with ind/comm. inspections and litter/recycling campaign program "Keep Corona Beautiful" present at various community events. City has Green Waste Recycling Program. Residents may also request bulky item pick-up up to 3 times per year. City has a fenced Dog Park with waste baggie dispenser for proper disposal of pet waste. Catch basin inserts or other treatment controls are required for new development projects with potential of pollutant discharge. New Developments are required to place "only rain down the drain" markers on new catch basins and standards are incorporated into the land development review process.
Hemet	It is a violation of the City of Hemet Municipal Code (Section 14-491) "to throw, deposit, leave, maintain, keep, or permit to be thrown, deposited, placed, left or maintained, any pollutant in or upon any street, alley, sidewalk, storm drain, inlet, catch basin, conduit or other drainage structure, business place, or upon any public or private plot of land in the city." The Public Works Department cleans and maintains the storm drain system, including retention / detention basins, open channels, and roadside ditches on a regular basis to remove pollutants, including trash and debris, from the MS4. If the source of the pollutant(s) can be identified, this information is provided to the Storm Water Program Coordinator and/or City Code Compliance Division for investigation and possible enforcement action.

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PERMITTEE	**1. Has your agency implemented control measures to reduce and/or to eliminate the discharge of pollutants, including trash and debris, from MS4s to the Receiving Water? If yes, please describe the measures implemented.**
Lake Elsinore	All new Projects within the Corporate limits are required to implement both a Storm Water Pollution Plan (SWPPP) and Post Construction Water Quality Management Plan (WQMP). The SWPPP is responsible for addressing the erosion/sediment/trash control for the construction phase of the project. Each Site is inspected at least once a week to insure that the SWPPP plan is being implemented and modified if necessary to treat for any increased pollutants or to address any deficiencies in the original document. The WQMP is a document that addresses post construction site activities. Storm water discharges, how they are to be treated as well as implementation and maintenance for the Site BMP's. The Operator of the property is responsible for the inspection and maintenance identified in the WQMP. All commercial and industrial sites within the city are inspected depending on the priority of the site. It is at this time that the city not only inspects the site, but the Operators inspection logs to determine whether or not it is in compliance.
Moreno Valley	Bi-weekly street sweeping, annual catch basin cleaning, public education, construction and commercial/industrial site inspections, HHW events and neighborhood clean-up days.
Murrieta	*See Permittee's individual annual report*
Norco	Public Works and Building Inspectors along with Fire Department and other field personnel are made aware of the importance of keeping pollutants out of MS4s and have been instructed to notify the appropriate department if they observe any potential issue in their day to day work routine. The City has continued in its effort to protect MS4s from erosion based pollutants by permitting alternative trail materials to be installed across driveway approaches within the horse trail. Replacement of many of the drop inlets located in the horse trail with curb opening catch basins and local depressions within street right of way is also continuing as budget allows.

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PERMITTEE	**1. Has your agency implemented control measures to reduce and/or to eliminate the discharge of pollutants, including trash and debris, from MS4s to the Receiving Water? If yes, please describe the measures implemented.**
Perris	The City engages in several activities to reduce and/or eliminate the discharge of pollutants, including trash and debris from MS4's to receiving waters. Ongoing programs and activities included the Annual Community-Wide Clean-up Day and the Abandoned Vehicle Abatement Program. At no cost to residents, the City of Perris Code Compliance Division will remove partially dismantled, wrecked, or inoperable vehicles from public rights-of-way. During the reporting period the City and a contract waste hauler (CR&R) also hosted a community wide clean-up day event on April 26, 2008, during which 209.8 tons of debris were collected. (See Exhibit D) The City also engages in various methods to detect and abate, and thereby reduce or eliminate trash and debris within the MS4. City Code Compliance Inspectors, along with the Public Works Department's maintenance workers conduct a daily inventory of streets, alleys, and unimproved lands within the City. When trash and debris are found City work crews remove the pollutants from the MS4. The preceding proactive approach is supplemented by reactive responses to the anonymous complaints forwarded to the Code Compliance Division. City residents may call and report illegal dumping or the accumulation of trash and debris within the City's MS4's. Each report is followed-up by field staff and an appropriate abatement strategy is devised.
Riverside	The City has implemented a variety of control measures to reduce and/or eliminate the discharge of pollutants, including trash and debris, from MS4s to Receiving Waters. Some of the measures include a variety of design review, inspection programs and street sweeping.
Riverside County	Yes. The County utilizes various departments including the Transportation Department, Code Enforcement Department , Environmental Health, Flood Control and Water Conservation District, Building and Safety Department and Waste Management Department to daily inspect infrastructure and respond to complaints for illegal dumping. In addition the County provides community cleanup events throughout the region. A new program instituted by the Code Enforcement Department is the Community Improvement and Impact planning effort that brings together the community to evaluate blight code violations and illegal dumping areas. This program has had several successes including the communities of El Cerrito, Mecca, Thermal and Mead Valley. See Code Enforcement newsletter and Community Improvement plan attached.
RCFC&WCD	Yes, Operations and Maintenance crews remove trash, litter, and debris from District facilities during routine maintenance.

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PERMITTEE	**1. Has your agency implemented control measures to reduce and/or to eliminate the discharge of pollutants, including trash and debris, from MS4s to the Receiving Water? If yes, please describe the measures implemented.**
San Jacinto	Code Enforcement officers are equipped and required to remove roadside trash they encounter. Quarterly community clean-up program.

Litter Management Best Management Plan Evaluation

The Riverside County NPDES MS4 Permit Technical Advisory Committee (TAC) has assessed the relative efficiency and cost effectiveness of anthropogenic litter management best management practices (BMPs). This assessment included available BMPs and the BMPs currently implemented for the control of anthropogenic litter including street sweeping, catch basin cleaning, deployment of trash receptacles, public education, and MS4 maintenance. The Permittees also augment the litter management program through employee/contractor training, industrial/commercial activity inspections, recycling programs including bulk-item collection, participation in watershed clean-up efforts, and illegal dumping retrieval.

The BMP assessment included a review of visual observation information collected by the Permittees regarding the materials collected from the MS4 (e.g., paper, plastic, wood, glass, vegetative litter and other similar debris) and descriptions of the main sources (e.g., office, residential, commercial and industrial waste) and problem areas. Based on this assessment, recommendations are provided for improving the effectiveness of the currently implemented measures and other appropriate BMPs to control anthropogenic litter in Urban Runoff.

Visual Observation Procedures

The Permittees recorded visual observations of anthropogenic litter removed from streets, storm drain inlets and the MS4 during the 2004-2005 fiscal year. The purpose of these visual observations was to collect information regarding the types of anthropogenic litter and their relative sources. A Visual Observation Form (attached) was developed by the TAC to record field observations of sources and types of litter found in the MS4. The Visual Observation Form was used by Permittee maintenance crews to record visual observations during catch basin cleaning and channel maintenance.

Training on making the visual observations and completing the Visual Observation Form was provided to the maintenance crews by the maintenance supervisors and guidelines were also listed on the back of the form. One form was filled out per catch basin or other inlet structure when the structure was maintained and when anthropogenic sources of litter were collected from the system. The amount of each type of litter was calculated based on visual estimates of the total weight of the litter and the estimated percentage of each type of litter present. The total percentage of litter had to equal 100%. The surrounding land use observed in the field was also checked on the form to correlate the type of litter with the surrounding land use. Visual observation data is provided in the Permittee Annual Report submittals.

Review of Results of Visual Observations

Materials Collected from the MS4 and Sources of Litter

The majority of litter appears to originate from residential sources, with the remaining attributed to commercial activities. Litter associated with residential activities included common household waste including newspapers, cardboard, cans, glass, plastic bottles and landscaping wastes. Larger items collected consisted of building lumber, discarded propane tanks, signs and wooden posts, children's toys, furniture, and household appliances. Another noteworthy finding was the presence of larger quantities of litter in catch basins located near freeway interchanges and along commercial corridors.

Preliminary findings of the visual observations indicate that on a weight basis, paper was the most prevalent type of litter. Paper was found to be distributed equally in residential and commercial areas and slightly less in industrial areas. The second most prevalent litter type was plastic. Plastic litter was found to be distributed equally amongst residential, commercial and industrial sources. Vegetative litter was not found in industrial areas, however wood and other types of litter (such as cement, plaster, Styrofoam, and brick) were found to be predominant in industrial areas.

BMP Evaluation

The Permittees intend to utilize the information collected in this study to identify areas where street sweeping or catch basin cleaning may need to be intensified. Some conclusions can also be drawn based on the type of pollutants found (or not found) in land uses, which can be useful in developing targeted BMP programs. Street sweeping is performed on a regular basis and has been found to be adequate. Maintenance departments also include newly developed areas in sweeping and catch basin cleaning. Sweeping is typically increased as needed to address specific problem areas, seasonal (leaf season) or storm event considerations, or special public events.

Recommendations for Improving the Effectiveness of Litter Management based on Survey Results

Based on the litter assessment, the TAC has determined that anthropogenic litter is not evenly distributed throughout the Permit area. To more effectively manage litter, the priority for implementation of litter BMPs should be in those locations with heaviest and most frequent litter accumulations. These areas vary and are known by Permittee maintenance staff. Examples of recommended improvements to litter management include the following:

- streets are swept at higher frequencies in those areas that have higher accumulations of litter;
- catch basins that are known to accumulate more litter are cleaned on a more frequent basis;
- portions of the MS4 that accumulate more litter are cleaned more frequently; and
- consideration of parking controls or sweeping notices in residential areas where vehicles parked along the street prevent the sweeper from clearing trash and debris.

Litter Removal Inspection Form

Date:_____

FACILITY NAME:_____ LOCATION/ID:_____

Facility Type: _____Catch Basin _____Channel _____Basin _____Other inlet structure

Litter Problem Area? Yes _____ No_____

_____Estimated Quantity of Litter (do not count sediment, rocks, vegetation unless intentionally dumped in facility, measure may be in any appropriate unit (cubic feet, yards, pounds))

Type of Litter Removed (estimated percentage of total litter quantity), include additional comment if necessary

_____Paper
_____

_____Plastic
_____

_____Wood (lumber and other wood building materials)
_____

_____Glass
_____

_____Metal
_____

_____Vegetative Litter (green waste, tree trimmings etc.)
_____

_____Other man-made debris (describe)
_____

_____Total Litter (must be 100%)

Sources of Litter (check suspected sources of litter)

_____Residential
_____Commercial (including office)
_____Industrial

Other observations: _____
_____
_____
_____

Litter Removal Inspection Form Guidance

The County/District/City is conducting a survey of litter accumulated in and removed from the storm drainage facilities. This survey is required by federal and state law under provision VI.D of Order No. R8-2002-0011 issued by the Santa Ana Regional Water Quality Control Board. Failure to comply with this requirement may result in significant penalties. Your cooperation is critical to the City/County/District in complying with this requirement.

To comply with provision VI.D, the County/District/City is required to establish a system to record visual observation information regarding the litter collected from the storm drain system including catch basins, open drainage channels, retention or detention basins, and other elements of the storm drainage system. The objective of the survey is to provide a general idea of the types, sources and quantities of man-made litter to assist the County/City/District in identifying problem areas and scheduling litter removal activities and prioritizing and targeting other litter management programs. The survey will be conducted from July 2004 through June 2005. Findings of this survey must be reported to the Santa Ana Regional Water Quality Control Board in November 2005.

The attached Litter Removal Inspection Form has been provided to assist field staff in recording their observations of accumulated litter during storm drain facility maintenance activities. Following are instructions for completing the inspection form:

Facility Information: Identify the Facility Name, facility type, and location/id of the inlet/basin/channel being clean out. Examples of location/id entries are "storm drain inlet on the southwest corner of Main and Sixth streets", "Magnolia Channel between Oak and Second Street", “Catch Basin #12C”.

Litter Problem Area: Most maintenance staff have an idea which facilities accumulate litter most quickly and the types and general quantities of materials found. Based on this knowledge and/or observations in conducting the survey, identify if the element of the storm drainage system accumulates litter more rapidly than similar facilities.

Estimated Quantity: Although natural materials including dirt, trees, brush, rocks, etc. also accumulate in the storm drainage system, this survey is intended to focus on man-made litter, including landscaping wastes intentionally deposited in the storm drainage system. Based on what you see, provide your best estimate of the quantity of litter accumulated in the facility being cleaned, e.g., 3 cubic feet, 2 loader buckets, 5 pounds, etc. It is possible that a facility could accumulate a lot of natural materials, but not any litter. For example, the Flood Control District maintains basins downstream of mountainous National Forest lands that collect large amounts of

rock, sediment and vegetative debris - but no man-made litter. In such an instance, the volume of litter would be zero, although there were significant natural materials removed.

Type of Litter Removed: Based on what you see, provide your best estimate of the relative amounts of each of the general categories of litter accumulated in the facility being cleaned. If some of the litter does not fit into one of the provided categories, provide a description and estimate of relative amount.

Observed Sources of Litter: Several common sources of litter are listed. Again, based on what you see, provide the relative amounts of litter from each of these sources found in the facility being cleaned. For example, litter from a fast food outlet would be noted in the "commercial" category, landscaping wastes in a residential area may be noted in the "residential" category, packaging materials in an industrial area may be noted in the "industrial" category, etc.

6. PRIVATE DEVELOPMENT CONSTRUCTION ACTIVITY

The initial construction site inspection program element was described in the Enforcement/Compliance Strategy (E/CS) as required by the 1996 MS4 Permit. The construction site inspection program has been an effective element of the Santa Ana Regional DAMP. However, this program element has been revised to address the requirements of the 2002 MS4 Permit, and is now described in the DAMP Section 7.

INVENTORY DATABASE

In conformance with Provision No. IX.A.1, each Co-Permittee developed and maintains an inventory database (or databases) of construction sites 1-acre or larger for which they have issued a building or grading permit. These databases are updated with new projects added when the project is issued a building or grading permit or when the pre-construction meeting has occurred. Projects are removed from the database when construction is completed and the project's building or grading permit is closed. The inventory and database was initiated in October 2003 and was reported in the 2003 Annual Report. An example of the inventory database is included as **Figure 6-1** at the end of this section. Permittee databases are included with the respective Permittee submittal section of this report under **Appendix G.**

Provision IX.A.2 requires each Co-Permittee to inspect all inventoried construction sites, document relevant site information and include into the inventory database. In establishing priorities for inspection of construction sites, each Co-Permittee shall also prioritize construction sites as high, medium or low threat to Receiving Water quality.

Provision IX.A.3 and 10 require that each Co-Permittee also conduct construction site inspections for compliance with its ordinances, including its Storm Water Ordinance, regulations, codes and the WQMP and that each Permittee document the number of inspections and actions taken and summarize those actions and report on them annually.

When conducting construction site inspections, the Co-Permittees' construction site inspectors, at a minimum, address the following items:

- For projects of one acre or more, verify that an NOI has been submitted to the State Board or to the Santa Ana Regional Board (projects in the San Jacinto watershed). Verification may be in the form of a copy of the NOI and cancelled check or copy of the NOI Receipt letter from the State Board showing the Waste Discharge Identification (WDID) Number issued for the site.

- For projects of one acre or more, verify that a SWPPP is on-site.
- Confirm compliance with the local jurisdiction's stormwater ordinance.
- Check for poorly managed authorized non-stormwater discharges or evidence of unauthorized non-stormwater discharges that may be potential illicit connections or illegal discharges to a MS4.

Some Co-Permittees have chosen to document this construction site inspection information on a separate form, while other Co-Permittees have chosen to incorporate this information into existing inspection forms. An example construction site inspection form is shown as **Figure 6-2** at the end of this section.

INSPECTOR TRAINING REQUIREMENTS

Provision Nos. IX.A.5 & 6 require the Co-Permittees to provide training to staff involved in inspecting construction sites.

Co-Permittee staff responsible for conducting construction site inspections receive annual training regarding the following topics:

- The local jurisdiction's Storm Water Ordinance and other local jurisdiction resolutions and codes related to protection of water quality,
- The 2002 MS4 Permit,
- The Construction Activity Permits, and
- The local jurisdiction's enforcement and compliance strategy/policy for construction sites.

This annual training for construction site inspectors is conducted prior to October 1, the start of the rainy season. The Co-Permittees ensure that newly-hired municipal staff or transferred municipal staff receive formal training within 6 months of beginning their inspection duties. A summary of the Permittees' efforts is provided in **Table 6-1.**

TABLE 6-1. CONSTRUCTION ACTIVITIES SUMMARY TABLE

CONSTRUCTION ACTIVITIES

2008 Annual Progress Report
Santa Ana NPDES Municipal Stormwater Permit

Provision No. IX.A. of the Permit require each Permittee to develop an inventory of active construction sites and maintain the inventory in a computer database system.

PERMITTEE	1. Has your agency developed and maintained an electronic database of active construction sites as specified in Section IX.A.1 on the Permit? If yes, attach a completed summary Construction Site Inspection form as specified in Section IX.A.1 & 10.		2. Has your agency inspected and prioritized all inventoried construction sites as specified in Section IX.A.2 & 3 of the Permit?	
	Yes	No	Yes	No
Beaumont	✓		✓	
Calimesa		✓	✓	
Canyon Lake		✓	✓	
Corona	✓		✓	
Hemet	✓		✓	
Lake Elsinore	✓		✓	
Moreno Valley	✓		✓	
Murrieta				
Norco	✓		✓	
Perris	✓		✓	
Riverside	✓		✓	
Riverside County	✓		✓	
RCFC&WCD	✓ RCFC&WCD maintains an electronic database of active construction sites. However, RCFC&WCD does not issue grading or building permits.		✓	
San Jacinto	✓		✓	

CONSTRUCTION ACTIVITIES

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Santa Ana NPDES Municipal Stormwater Permit

Provision No. IX.A.5 & 6 of the Permit requires each Permittee to provide training to staff involved in inspecting construction sites.

PERMITTEE	F. Has your agency provided training to staff involved in conducting inspections at construction sites in the following areas? If yes, please identify the training session information. Attach additional sheets if necessary.										
	A. Stormwater Ordinance, resolution and codes	B. The Order and the DAMP	C. The Construction Activity Permits	D. Enforcement and Compliance Procedures	E. Storm water Pollution Prevention Plans	F. Selection & Maint. Of appropriate BMPS for Construction sites, including erosion and sediment ✓	Date	Location	Sponsor	No. of Participants	Department
Beaumont	✓	✓	✓	✓	✓	✓	09/24/07 09/25/07	RCFC&WCD RCFC&WCD	RCFC&WCD RCFC&WCD	4 6	Public Works
Calimesa	✓	✓	✓	✓	✓	✓	09/25/07 09/27/07	RCFC&WCD RCFC&WCD	RCFC&WCD RCFC&WCD	1 3	Building Dept. Public Works
Canyon Lake	✓	✓	✓	✓	✓	✓	01/17/08	Murrieta, CA	RCFC&WCD	3	Special Enforcement
Corona	✓	✓	✓	✓	✓	✓	04/16/08 04/17/08	RCFC&WCD RCFC&WCD	RCFC&WCD RCFC&WCD	6 4	Public Work Public Work

CONSTRUCTION ACTIVITIES

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Santa Ana NPDES Municipal Stormwater Permit

Provision No. IX.A.5 & 6 of the Permit requires each Permittee to provide training to staff involved in inspecting construction sites.

PERMITTEE	F. Has your agency provided training to staff involved in conducting inspections at construction sites in the following areas? If yes, please identify the training session information. Attach additional sheets if necessary.										
	A. Stormwater Ordinance, resolution and codes	B. The Order and the DAMP	C. The Construction Activity Permits	D. Enforcement and Compliance Procedures	E. Storm water Pollution Prevention Plans	F. Selection & Maint. Of appropriate BMPS for Construction sites, including erosion and sediment control	Date	Location	Sponsor	No. of Participants	Department
Hemet	✓	✓	✓	✓	✓	✓	Ongoing	Hemet, CA	City of Hemet	5	Public Works Eng.
Lake Elsinore											
Moreno Valley	✓	✓	✓	✓	✓	✓	09/24/07 09/25/07 01/17/08 04/16/08 04/22/08	RCFC&WCD RCFC&WCD Murrieta, CA RCFC&WCD CVWD	RCFC&WCD RCFC&WCD RCFC&WCD RCFC&WCD RCFC&WCD	3 8 11 1 1	Public Works (All)
Murrieta	*See Permittee's individual annual report*										

CONSTRUCTION ACTIVITIES

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Santa Ana NPDES Municipal Stormwater Permit

Provision No. IX.A.5 & 6 of the Permit requires each Permittee to provide training to staff involved in inspecting construction sites.

PERMITTEE	F. Has your agency provided training to staff involved in conducting inspections at construction sites in the following areas? If yes, please identify the training session information. Attach additional sheets if necessary.										
	A. Stormwater Ordinance, resolution and codes	B. The Order and the DAMP	C. The Construction Activity Permits	D. Enforcement and Compliance Procedures	E. Storm water Pollution Prevention Plans	F. Selection & Maint. Of appropriate BMPS for Construction sites, including erosion and sediment control	Date	Location	Sponsor	No. of Participants	Department
Norco	✓	✓	✓	✓	✓	✓	09/24/07 09/24/07 09/25/07 09/25/07	RCFC&WCD RCFC&WCD RCFC&WCD RCFC&WCD	RCFC&WCD RCFC&WCD RCFC&WCD RCFC&WCD	1 2 1 1	Public Works B&S Public Works B&S
Perris	✓	✓	✓	✓	✓	✓	09/25/07 09/27/07 05/20/08 09/29/08	RCFC&WCD RCFC&WCD Palm Desert RCFC&WCD	RCFC&WCD RCFC&WCD Lorman RCFC&WCD	2 1 1 5	Public Works
Riverside	✓	✓	✓	✓	✓	✓	09/07 09/07 04/08 04/08 04/08	RCFC&WCD RCFC&WCD RCFC&WCD RCFC&WCD RCFC&WCD	RCFC&WCD RCFC&WCD RCFC&WCD RCFC&WCD RCFC&WCD	3 12 16 22 1	Public Works Public Utilities Public Works Public Utilities Bldg. & Safety

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Santa Ana NPDES Municipal Stormwater Permit

Provision No. IX.A.5 & 6 of the Permit requires each Permittee to provide training to staff involved in inspecting construction sites.

PERMITTEE	F. Has your agency provided training to staff involved in conducting inspections at construction sites in the following areas? If yes, please identify the training session information. Attach additional sheets if necessary.										
	A. Stormwater Ordinance, resolution and codes	B. The Order and the DAMP	C. The Construction Activity Permits	D. Enforcement and Compliance Procedures	E. Storm water Pollution Prevention Plans	F. Selection & Maint. Of appropriate BMPS for Construction sites, including erosion and sediment control	Date	Location	Sponsor	No. of Participants	Department
Riverside County	✓	✓	✓	✓	✓	✓	05/08/07 04/22/08 06/25/08 08/14/08	B&S Newport Beach B&S B&S	B&S/RCFC LID Seminar HASWOPER AQMD	4 2 4 4	Bldg. & Safety Bldg. & Safety Bldg. & Safety Bldg. & Safety
RCFC&WCD	✓	✓	✓	✓	✓	✓	09/24/07 09/25/07	RCFC&WCD RCFC&WCD	RCFC&WCD RCFC&WCD	5 5	Design & Construction
San Jacinto											

CONSTRUCTION ACTIVITIES

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Provision No. IX.A.5 & 6 of the Permit requires each Permittee to provide training to staff involved in inspecting construction sites.

PERMITTEE	7A. Have staff members in the public works, engineering, building, or planning departments attended any training classes on construction site BMPs? If yes, please identify the training session information. Attach additional sheets if necessary.						
	Yes	No	Date	Location	Sponsor	No. of Participants	Department
Beaumont	✓		09/24/07 09/25/07	RCFC&WCD RCFC&WCD	RCFC&WCD RCFC&WCD	4 6	Public Works Public Works
Calimesa	✓		09/24/07 09/25/07	RCFC&WCD RCFC&WCD	RCFC&WCD RCFC&WCD	3 1	Public Works Building Dept.
Canyon Lake	✓		09/25/07 09/25/07	RCFC&WCD RCFC&WCD	RCFC&WCD RCFC&WCD	2 2	Public Works Building & Safety
Corona	✓		09/25/07	RCFC&WCD	RCFC&WCD	1	Public Works
Hemet	✓		9/10/07 02/06/08	Costa Mesa, CA Webcast: BMP Performance	CASQA US EPA	1 1	Public Works Eng. Public Works Eng.
Lake Elsinore	✓		04/08	Poway, CA	Bureau Veritas	2	Engineering
Moreno Valley	✓		09/24/07 09/25/07 01/17/08 04/16/08 04/22/08	RCFC&WCD RCFC&WCD Murrieta, CA RCFC&WCD CVWD	RCFC&WCD RCFC&WCD RCFC&WCD RCFC&WCD RCFC&WCD	3 8 11 1 1	Public Works (All)
Murrieta	*See Permittee's individual annual report*						
Norco			09/24/07 09/24/07 09/25/07 09/25/07	RCFC&WCD RCFC&WCD RCFC&WCD RCFC&WCD	RCFC&WCD RCFC&WCD RCFC&WCD RCFC&WCD	1 2 1 1	Public Works Bldg. & Safety Public Works Bldg. & Safety

CONSTRUCTION ACTIVITIES

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Provision No. IX.A.5 & 6 of the Permit requires each Permittee to provide training to staff involved in inspecting construction sites.

PERMITTEE	2A. Have staff members in the public works, engineering, building, or planning departments attended any training classes on construction site BMPs? If yes, please identify the training session information. Attach additional sheets if necessary.						
	Yes	No	Date	Location	Sponsor	No. of Participants	Department
Perris	✓		07/25/08 03/27/08	LEED AP Completion Moreno Valley, CA	Green Building Certification Institute: LEED Certification ASCE Inland Empire Stormwater Committee	1 1	Planning Dept. Planning Dept.
Riverside	✓		09/07 09/07 04/08 04/08	RCFC&WCD RCFC&WCD RCFC&WCD RCFC&WCD	RCFC&WCD RCFC&WCD RCFC&WCD RCFC&WCD	4 1 2 1	Public Works Parks and Recreation Public Utilities - Water Public Utilities - Electric
Riverside County	✓		04/22/08 06/25/08 08/20/08 08/25/08	Newport Beach Building + Safety Building + Safety Temecula	LID Seminar HAZWOPER Recert. Constr. NPDES Training Inland Erosion Control	2 3 4 2	Bldg. & Safety Bldg. & Safety Bldg. & Safety Bldg. & Safety
RCFC&WCD		✓					
San Jacinto							

CONSTRUCTION ACTIVITIES

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Santa Ana NPDES Municipal Stormwater Permit

Provision No. IX.A.5 & 6 of the Permit requires each Permittee to provide training to staff involved in inspecting construction sites.

PERMITTEE	2. B. What did the training emphasize (IX.A.5)?								
	BMP Selection	Material Management Practices	Water Quality Impacts	The Order, WQMP and the DAMP	BMP Installation	BMP Maintenance	Construction Activity Permits	Enforcement & Compliance Procedures	Other (describe)
Beaumont	✓	✓	✓	✓	✓	✓	✓	✓	
Calimesa	✓	✓	✓		✓	✓	✓		
Canyon Lake	✓				✓	✓	✓	✓	
Corona	✓	✓	✓	✓	✓	✓	✓	✓	
Hemet	✓	✓	✓	✓	✓	✓	✓	✓	
Lake Elsinore	✓	✓	✓		✓	✓			
Moreno Valley	✓	✓	✓	✓	✓	✓	✓	✓	
Murrieta	*See Permittee's individual annual report*								
Norco	✓	✓	✓		✓	✓	✓		
Perris	✓	✓	✓	✓	✓	✓	✓	✓	
Riverside	✓	✓	✓	✓	✓	✓	✓	✓	
Riverside County	✓	✓	✓	✓	✓	✓	✓	✓	Underground storage tank construction
RCFC&WCD									
San Jacinto									

CONSTRUCTION ACTIVITIES

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Santa Ana NPDES Municipal Stormwater Permit

Provision No. IX.A.5 & 6 of the Permit requires each Permittee to provide training to staff involved in inspecting construction sites.

PERMITTEE	3. If any of the above points have not been met, please describe what action is currently being taken to satisfy the requirement(s). Also, please provide an estimate of completion for any outstanding tasks.
Beaumont	
Calimesa	
Canyon Lake	
Corona	N/A
Hemet	All above points have been met.
Lake Elsinore	During the 2007-2008 reporting year City Staff did not attend any new Construction Compliance courses. All staff currently involved in inspecting construction sites have attended training during the previous reporting years. New staff and existing staff will be scheduled for training courses during the 2009 year to reflect any new requirements that may com of the adoption of the new permit.
Moreno Valley	
Murrieta	*See Permittee's individual annual report*
Norco	The City maintains a library containing the 4 volume CASQA Stormwater BMP Handbooks. Staff is directed to use as reference and research material for any BMP related issues.
Perris	
Riverside	Not applicable.
Riverside County	N/A

CONSTRUCTION ACTIVITIES

2008 Annual Progress Report
Santa Ana NPDES Municipal Stormwater Permit

Provision No. IX.A.5 & 6 of the Permit requires each Permittee to provide training to staff involved in inspecting construction sites.	
PERMITTEE	3. If any of the above points have not been met, please describe what action is currently being taken to satisfy the requirement(s). Also, please provide an estimate of completion for any outstanding tasks.
RCFC&WCD	
San Jacinto	

PROJECT GENERAL INFORMATION											
Facility Name (dba) See Note A.	Project Location						Project Type	Project Priority	No. of Stormwater Inspections	Site Size	WDID No. (General Permit)
	Street Address	Cross Street	City	Zip	Tract Nos. or Assessor Parcel Nos. See Note B.	Watershed					

Figure 6-2 Example Construction Site Inspection Form **Page 6-11**

Your logo here

NPDES Construction Activity Compliance Inspection Notice

Public Works Department and/or Division
City address here, CA

			Date:
TRACT/PARCEL #:	WDID#:	WEATHER:	SITE INSPECTION PRIORITY LEVEL: ☐--HIGH ☐--MEDIUM ☐--LOW
APN:	GRADING PERMIT #:	SIZE/DISTURBED ACREAGE:	OFFICE USE: ☐--PAID ☐--INVOICE

SITE NAME AND ADDRESS:	PROPERTY OWNER AND MAILING ADDRESS (IF DIFFERENT):

CROSS STREETS:	INSPECTED BY:	PHONE #:	DATE FOR REINSPECTION:

FUTURE SITE USAGE: RESIDENTIAL INDUSTRIAL (CIRCLE ONE) COMMERCIAL MIXED-USE	POST-CONSTRUCTION BMPS ON-SITE: YES NO NOTES-

☞ **NOTICE:** In conformance with the most recent National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) Permit for the Santa Ana River Watershed, the City and County are mandated to perform a NPDES construction site inspection to determine if the site is in compliance or not in compliance with the City/County Storm Water Ordinance, regulations, code, and the Water Quality Management Plan.

1. PERMITS: (MS4 Permit Ref: Section IX.A.3.a)
- ☐ Copy of NOI located at the project site?
- ☐ Copy of WDID located at the project site?
- ☐ Copy of City permit at project site?

2. STORM WATER POLLUTION PREVENTION PLAN (SWPPP): (MS4 Permit Ref: Section IX.A.3.b)
- ☐ Copy of SWPPP located at the project site?
- ☐ SWPPP being updated in accordance with actual construction sequence/phasing?
- ☐ SWPPP includes sufficient BMPs to ensure erosion and sediment will be controlled?

3. BEST MANAGEMENT PRACTICES (BMPS):
- ☐ BMPs installed in conformance with the SWPPP, i.e. perimeter controls, SD inlet protection, etc?
- ☐ BMPs in place for the various subcontractor trades, i.e. PCC cleanout, material storage, waste storage, etc?
- ☐ Project site BMPs effective?
- ☐ Effective **combination** of erosion and sediment controls on site?

4. EROSION CONTROL:
- ☐ No evidence of erosion present on manufactured and/or denuded slopes?
- ☐ No evidence of rill or gully erosion present?
- ☐ Erosion control BMPs installed in accordance with the SWPPP?

5. SEDIMENT CONTROL:
- ☐ No evidence of sediment present outside the permit area or present on the site in an area that requires protection?
- ☐ No evidence of construction site sediment buildup on City-maintained streets, downstream storm drains and/or drainage ways?
- ☐ No evidence of "Track-out" observed on surface streets adjoining the project site?
- ☐ Sediment controls installed and maintained in accordance with the SWPPP?

6. ILLEGAL/ILLICIT DISCHARGES:
- ☐ No evidence that structural controls are breached or failed under storm events of minor intensity?
- ☐ No evidence that active non-storm water discharges or potential illicit connections or illegal discharges to the streets or storm drains?

VIOLATIONS:	
☐ Verbal warning:	☐ Written warning: (attach copy)
☐ NOV: (attach copy)	☐ Stop Work: (attach copy)
☐ Other:	
ADDITIONAL:	

☞ **NOTICE**: The Porter-Cologne Water Quality Control Act of the State of California states in part that persons violating water quality objectives can be held civilly and criminally liable. The federal Clean Water Act states in part that persons violating the Act may be held civilly and criminally liable.

RECEIVED BY:	NAME/SITE CONTACT (PRINT):	24-HOUR PHONE:
DATE:	VIOLATIONS: ☐ CORRECTED ☐ NOT CORRECTED	PAGE OF
REGIONAL BOARD NOTFICIATION: YES NO	DATE: TIME:	CONTACT:

White—Owner/Contact Yellow—Project File Pink—Storm Water Program Coordinator

FIGURE 6-2 EXAMPLE CONSTRUCTION SITE INSPECTION FORM

7. INDUSTRIAL AND COMMERCIAL SOURCES

The Permittees' initial industrial and commercial sources program element was described in the Enforcement/Compliance Strategy as required by the 1996 MS4 Permit. The industrial and commercial sources program has been an effective element of the SAR-DAMP. However, this program element has been revised to address the requirements of the 2002 MS4 Permit, including an expansion of the commercial businesses covered by the inspection program, required inventories/databases, prioritization of industrial and commercial sources relative to the potential to impact water quality, and specified inspection frequencies based upon facility priority. The industrial and commercial sources program will continue to have both regional and local jurisdiction components.

CURRENT INDUSTRIAL AND COMMERCIAL FACILITY INSPECTIONS

The Permittees have developed a mechanism to identify compliance of industrial and commercial facilities with local storm water ordinances and, where applicable, potential non-compliance with California's General Permit for Storm Water Discharges Associated with Industrial Activities. There are two main components of this existing program: the Compliance Assistance Program and the local POTW inspection programs.

Compliance Assistance Program

Regionally, the County implements the Compliance Assistance Program for oversight and inspection of industrial and commercial sources. This is the baseline program for the Santa Ana Region through the County's Department of Environmental Health. The inspections are performed at frequencies required for other State mandated programs.

The Compliance Assistance Program involves a detailed storm water compliance survey for:

1. Facilities that must secure a hazardous materials permit for storing, handling or generating such materials, and
2. Retail food facilities.

Many types of industrial and commercial establishments are inspected by the County's Department of Environmental Health Hazardous Materials Management staff including those that conduct automobile mechanical repair, maintenance, fueling, or cleaning operation, automobile or other vehicle body repair or painting operations, and painting or coating operations. There are approximately 5,500 facilities having a hazardous materials permit of which approximately 2,300 are inspected annually and all facilities are inspected at least once

during a two-year cycle. There are approximately 6,750 retail food facilities, all of which are inspected one to three times annually.

The Compliance Assistance Program includes educational outreach to the inspected facilities and completion of a detailed storm water compliance survey. Completed survey forms are forwarded to the respective municipality for inclusion into its database. The completed survey forms are prioritized and the respective jurisdiction's representative identifies those surveys that indicate non-compliance to initiate a follow-up inspection. In conducting a facility inspection, if it appears that the facility may be required to have coverage under the General Permit for Storm Water Discharges Associated with Industrial Activities and the facility operator indicated that an NOI has not been filed, the inspector provides the facility operator with an informational sheet on the requirements of the General Permit for Storm Water Discharges Associated with Industrial Activities. The inspector also documents the name, address, and Standard Industrial Classification (SIC) code of the facility.

Blank copies of the forms used by the County's Department of Environmental Health when conducting these storm water compliance surveys are included as **Figures 7-1 (a)** and **(b)** at the end of this section. The 2002 MS4 Permit required the Permittees to ensure that the storm water compliance surveys of restaurants conducted as part of the Compliance Assistance Program include verification that:

- Oil and grease wastes are not discharged onto a parking lot, street or adjacent catch basin;
- Trash bin areas are clean, the bin lids are closed, the bins are not filled with liquid, and the bins have not been washed out into the MS4;
- Floor mats, filters and garbage containers are not washed in adjacent parking lots, alleys, sidewalks, or streets and that no wash water is discharged to MS4s; and
- Parking lot areas are cleaned by sweeping, not by hosing down, and that the facility operator uses dry methods for spill cleanup.

These specific topics are addressed in Questions 1-8 of the "Food Facility Storm Water Compliance Survey" form included in **Figure 7-1(a).**

Industrial/Commercial Facility Database

Provision Nos. IX.B & C of the Santa Ana Region MS4 Permit requires each Permittee to develop and update its industrial and commercial facilities database, including facility information, priority, and inspection information. The database content may be Permittee specific, but contains minimum information as described in Provision IX.B.1.f and C.1.

Provision Nos. IX.B.9 & C.9 require a summary of the number of industrial and commercial facilities compliance surveys/inspections and the actions taken. A template spreadsheet was developed by the Permittees and is provided as **Figure 7-2.**

Provision Nos. IX.B.2 & 3 and C.4 & 5 require each agency to prioritize and inspect all inventoried industrial and commercial facilities.

Provision IX.C.2 requires each Permittee to develop an inventory of the following commercial facilities/companies within its jurisdiction:

- Mobile automobile or other vehicle washing (base of operations);
- Mobile carpet, drape or furniture cleaning (base of operations);
- Mobile high pressure or steam cleaning (base of operations);
- Nurseries and greenhouses;
- Landscape and hardscape installation (base of operations); and
- Other commercial sites/sources that the Permittee determines may contribute a significant pollutant load to the MS4.

Permittee databases are included with the respective Permittee submittal section of this report under **Appendix G** – Permittee Reports.

Inspection Requirements

Provision No. IX.B.4 requires each agency's industrial facility compliance surveys and inspections to address the following items:

- Check for submittal of NOI to comply with the General Industrial Permit;
- Confirm compliance with your agency's Storm Water Ordinance;
- Check for active non-storm water discharges, potential illicit connections, and illegal discharges to the MS4;
- Potential for discharge of pollutants in Urban Runoff from material storage areas, vehicle or equipment fueling or maintenance, waste handling, hazardous materials handling or storage, delivery areas or loading docks, or other hazardous outdoor work areas; and
- Implementation and maintenance of appropriate BMPs for industrial facilities.

The Permittees developed a template form to use during follow up site inspections. This form is provided as **Figure 7-3.** A summary of the Permittees' efforts is provided in **Table 7-1.**

Industrial/Commercial Facility Inspector Training

Provision Nos. IX.B.10-12 & IX.C.13-15 of the Santa Ana NPDES Municipal Stormwater Permit require each Permittee to provide training to staff involved in conducting industrial facilities compliance surveys/inspections.

Co-Permittee staff responsible for conducting inspections as part of the Compliance Assistance Program or a Wastewater Pretreatment Inspection Program receive annual training regarding the following topics:

- The local jurisdiction's Storm Water Ordinance and other local jurisdiction resolutions and codes related to protection of water quality;
- The 2002 MS4 Permit and the Santa Ana Regional DAMP;
- The General Industrial Activities Storm Water Permit; and
- The local jurisdiction's enforcement and compliance strategy/policy for industrial and commercial facilities.

The Co-Permittees ensure that newly hired municipal staff or transferred municipal staff receives formal training within 6 months of beginning their inspection duties. When planning formal classroom training related to conducting inspections of industrial or commercial facilities, the Co-Permittees will notify, and coordinate with, Santa Ana Regional Board staff.

Co-Permittee staff responsible for conducting industrial or commercial facility inspections may also attend training sponsored by professional associations (e.g., American Society of Civil Engineers, American Public Works Association, etc.), the California Storm Water Quality Association, other area-wide MS4 Permittees, or other entities.

A summary of the Permittees' training efforts is provided in **Table 7-1.**

Figure 7-1(a) – CAP Program Food Facility Storm Water Survey Form

FOOD FACILITY STORMWATER COMPLIANCE SURVEY

FACILITY DBA	FACILITY #	DATE	
ADDRESS	ACTIVITY	SERVICE CODE: 410	
COMPLIANCE AREAS	**YES**	**NO**	**N/A**
GREASE BARRELS/ INTERCEPTORS			
1. Grease pumped/removed on a regular basis.			
2. Grease interceptor located outside facility, maintained properly.			
EQUIPMENT CLEANING			
3. The following items are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Grease filters			
b. Floor mats			
c. Floors (mop water and rinse water)			
d. Grills			
OUTSIDE AREAS			
4. The following areas are cleaned in such a manner that all wash water is discharged to the sanitary sewer or is collected for proper disposal:			
a. Sidewalk or outdoor seating			
b. Drive thru			
DUMPSTERS AND RECYCLING CONTAINERS			
5. Food waste bagged and sealed before disposal.			
6. Dumpsters and recycling containers are covered.			
7. Spilled materials around containers are picked up regularly.			
8. Wash water is discharged to the sanitary sewer or is collected for proper disposal.			
EMPLOYEE EDUCATION/ AWARENESS			
9. Brochures or posters displayed.			
10. BMPs observed.			
OVERALL RATING	GOOD	AVERAGE	NEEDS IMPROVEMENT
COMMENTS:			
Received by:	Env. Health Specialist:		Badge #

If additional information is required, contact the Storm Water /Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Storm Water Clean Water PROTECTION PROGRAM

Local Agency Contacts

For questions about the program in a specific city, contact the local agency.

City of Banning
Public Works Department
Banning, CA 92220
Ph: (951) 922-3130

City of Beaumont
Beaumont, CA 92223
Ph: (951) 769-8520

City of Calimesa
Department of Public Works
Calimesa, CA 92320
Ph: (951) 795-9801

City of Canyon Lake
Canyon Lake, CA 92587
Ph: (951) 244-2955

City of Cathedral City
Environmental Conservation
Cathedral City, CA 92234
Ph: (760) 770-0340

City of Coachella
Department of Public Works
Coachella, CA 92236
Ph: (760) 398-5744

Coachella Valley Water District
Coachella, CA 92236
Ph: (760) 398-2651

City of Corona
Corona, CA 91720
Ph: (951) 736-2447

City of Desert Hot Springs
Public Works Department
Ph: (760) 329-6411, Ex 232

City of Hemet
Hemet, CA 92545
Ph: (951) 765-3712

City of Indian Wells
Indian Wells, CA 92210
Ph: (760) 776-0237

City of Indio
Indio, CA 92201
Ph: (760) 342-6530

City of Lake Elsinore
Lake Elsinore, CA 92530
Ph: (951) 674-3124

City of La Quinta
La Quinta, CA 92253
Ph: (760) 777-7043

City of Moreno Valley
Moreno Valley, CA 92552
Ph: (951) 413-3115

City of Murrieta
Murrieta, CA 92562
Ph: (951) 698-1040

City of Norco
Engineering Department
Norco CA 92860-0428
Ph: (951) 270-5628

City of Palm Desert
Palm Desert, CA 92260
Ph: (760) 346-0611 (Main)
Ph: (760) 776-6218 (Direct)

City of Palm Springs
Palm Springs, CA 92263
Ph: (760) 323-8242

City of Perris
Perris, CA 92570
Ph: (951) 943-5003

City of Rancho Mirage
Rancho Mirage, CA 92270
Ph: (760) 770-3224

City of Riverside
Industrial Waste Section
Ph: (951) 351-6145

City of San Jacinto
San Jacinto, CA 92583
Ph: (951) 487-7330

City of Temecula
Temecula, CA 92590
Ph: (951) 694-6411

For questions about the program in the unincorporated area of Riverside County, contact the following:

Riverside County Flood Control
& Water Conservation District
Ph: (951) 955-2901

Figure 7-1(b) – CAP Program Hazardous Materials Storm Water Survey Form

HAZARDOUS WASTE/ HAZARDOUS MATERIALS FACILITY STORM WATER COMPLIANCE SURVEY FORM

FACILITY DBA	TELEPHONE	DATE
ADDRESS	CITY, ZIP	
MAILING ADDRESS (if different from site address)	MAILING CITY, ZIP	
CONTACT	FACILITY#	SIC CODE

Compliance Areas	YES	NO	N/A
*OUTSIDE AREAS (Free of staining & debris; provides good housekeeping; maintained in a manner to prevent runoff.)		Requires follow up	
1. CHEMICAL STORAGE * The outside storage area is kept to minimize the possibility of a release. Chemicals / materials are protected from precipitation / storm water runoff and the containers show no signs of leaking.			
2. DUMPSTER * No liquids are leaking from dumpster; surrounding area is free of trash.			
3. ABOVEGROUND TANKS * No ground staining, no spillage observed and no discharge to storm drain. Tanks are maintained to minimize the possibility of a release (secondary containment).			
4. ONSITE STORM DRAIN* Protected from accidental discharge other than water.			
5. POWER WASH OR STEAM CLEAN* (discharge to sewer) Drains to oil/water separator connected to a sanitary sewer and not a septic system. Steam cleaning not discharged to parking lot, storm drain or soil.			
6. PARKING LOT / DRIVE WAY* Free of excess trash, chemical staining or liquids other than water.			
7. OTHER* Non-storm water discharge (i.e. non-hazardous process discharge).			
8. MOP WATER TO SANITARY SEWER VIA CLARIFIER. Mop water is not dumped to the soil, parking lot, gutter, or other areas susceptible to storm water drainage.			
9. STORM WATER EDUCATIONAL BROCHURES GIVEN TO FACILITY OR POSTERS DISPLAYED FOR EMPLOYEES. If no, what informational material should be sent to the facility?			
10. IF A SWPPP IS REQUIRED, WAS IT AVAILABLE FOR REVEIW? See storm water handout for industrial facilities.			

OVERALL EVALUATION/ COMMENTS:

RECEIVED BY:	HAZ MAT SPEC:	BADGE #

Agency referred to as indicated on the back of this page.

If additional information is required, contact the Storm Water /Clean Water Protection Program of the Cities and County of Riverside at (800) 506-2555.

Local Agency Contacts

For questions about the program in a specific city, contact the local agency.

City of Banning
Public Works Department
Banning, CA 92220
Ph: (951) 922-3130

City of Beaumont
Beaumont, CA 92223
Ph: (951) 769-8520

City of Calimesa
Department of Public Works
Calimesa, CA 92320
Ph: (951) 795-9801

City of Canyon Lake
Canyon Lake, CA 92587
Ph: (951) 244-2955

City of Cathedral City
Environmental Conservation
Cathedral City, CA 92234
Ph: (760) 770-0340

City of Coachella
Department of Public Works
Coachella, CA 92236
Ph: (760) 398-5744

Coachella Valley Water District
Coachella, CA 92236
Ph: (760) 398-2651

City of Corona
Corona, CA 91720
Ph: (951) 736-2447

City of Desert Hot Springs
Public Works Department
Ph: (760) 329-6411, Ex 232

City of Hemet
Hemet, CA 92545
Ph: (951) 765-3712

City of Indian Wells
Indian Wells, CA 92210
Ph: (760) 776-0237

City of Indio
Indio, CA 92201
Ph: (760) 342-6530

City of Lake Elsinore
Lake Elsinore, CA 92530
Ph: (951) 674-3124

City of La Quinta
La Quinta, CA 92253
Ph: (760) 777-7043

City of Moreno Valley
Moreno Valley, CA 92552
Ph: (951) 413-3115

City of Murrieta
Murrieta, CA 92562
Ph: (951) 698-1040

City of Norco
Engineering Department
Norco CA 92860-0428
Ph: (951) 270-5628

City of Palm Desert
Palm Desert, CA 92260
Ph: (760) 346-0611 (Main)
Ph: (760) 776-6218 (Direct)

City of Palm Springs
Plan/Bldg. Dept
Ph: (760) 323-8186

City of Perris
Perris, CA 92570
Ph: (951) 943-5003

City of Rancho Mirage
Rancho Mirage, CA 92270
Ph: (760) 770-3224

City of Riverside
Industrial Waste Section
Ph: (951) 351-6145

City of San Jacinto
San Jacinto, CA 92583
Ph: (951) 487-7330

City of Temecula
Temecula, CA 92590
Ph: (951) 694-6411

For questions about the program in the unincorporated area of Riverside County, contact the following:

Riverside County Flood Control
& Water Conservation District
Ph: (951) 955-2901

ANNUAL REPORTING FOR INDUSTRIAL COMMERCIAL FACILITY INSPECTIONS

FACILITY GENERAL INFORMATION										MUNICIPAL PERMITS	FACILITY CONTACT INFORMATION					INSPECTION / ENFORCEMENT STATUS (See Note B.)						
	Facility Location												Mailing Address (if different from street address)									
Facility Name (dba) See Note A.	Street Address	Cross Street	City	Zip	Watershed	Facility SIC Code	Facility Site Size	APN	WDID No. (General Permit)	Business License, Wastewater Permit, etc. (if applicable)	Contact Name	Contact Phone Number	Street Address	City	Zip	Number of Stormwater Inspections	Satisfactory	Verbal Warning	Written Warning	Notice of Violation	Cease & Desist Order	Referred to RWQCB

Notes: A. Name of facility. If the facility is covered by the General Permit for Stormwater Discharges Associated with Industrial Activity, the facility name as used by Regional Boards can be obtained from the State Water Resources Control Board Industrial General Permit database (Column titled "Facility_SiteName") or from a copy of the applicant's Notice of Intent.
B. Enter the number of inspections and the number of each type of enforcement action for each Facility.

Figure 7-2 – Industrial and Commercial Facilities Spreadsheet Template

Your Agency Name, Address, Phone

NPDES STORMWATER INSPECTION FORM

(reference for below items: XI.B.1.f and XI.C.1)

Facility Name (dba)	Address (site)	City	Zip
Location Reference (GIS, cross streets)	Mailing Address (if different from site)	Facility Contact	Contact Phone
State WDID No. (if any)	APN	Site Size	SIC

INSPECTION CHECKLIST							
Yes	No	N/A	(all facilities)	Yes	No	N/A	(restaurant specific)
☐	☐	☐	Does the facility require a NOI to comply with the General Industrial Activities Stormwater Permit? (XI.B.4.a)	☐	☐	☐	OIL & GREASE DISPOSAL - Verify that wastes are not discharged onto parking lot, street, or adjacent catch basin. (XI.C.3.a)
☐	☐	☐	Is the facility in compliance with the local stormwater ordinance? (XI.B.4.b)	☐	☐	☐	TRASH & DUMPSTER AREAS - Verify that areas are clean, bin lids closed, bins not filled with liquid, and no wash water discharged into MS4. (XI.C.3.b)
☐	☐	☐	Are there active non-stormwater discharges, potential illicit connections, and/or illegal discharges to the MS4? (XI.B.4.c)	☐	☐	☐	EQUIPMENT CLEANING PRACTICES - Check parking lot, alley, sidewalk, and street areas to verify that floor mats, filters, and gargabe containers are not washed in those areas and that no wash water is discharged into MS4. (XI.C.3.c)
☐	☐	☐	Is there a potential for discharge from areas of material storage, vehicle or equipment fueling, vehicle or equipment maintenance (including washing), waste handling, hazardous materials handling or storage, delivery areas or loading docks, or other outdoor work areas? (XI.B.4.d)	☐	☐	☐	OUTSIDE AREAS/SPILL CONTAINMENT - Check parking lot areas to verify that they are cleande by sweeping, not by hosing down, and that the facility operator uses dry methods for spill cleanup. (XI.C.3.d)
☐	☐	☐	Are appropriate Best Management Practices (BMPs) implemented and maintained? (XI.B.4.e)	☐	☐	☐	Other
☐	☐	☐	Other	☐	☐	☐	
☐	☐	☐		☐	☐	☐	
☐	☐	☐		☐	☐	☐	
☐	☐	☐		☐	☐	☐	
☐	☐	☐		☐	☐	☐	

ENFORCEMENT/COMPLIANCE ACTION (reference: Enforcement/Compliance Strategy process, draft DAMP, section 8)			
☐ Education and Information	☐ Written Warning	☐ Cease and Desist Order	☐ Referral to RWQCB
☐ Verbal Warning	☐ Notice of Violation	☐ Administrative Compliance Order	☐ Referral to other agency (specify)

INSPECTION CONTACT INFORMATION:

INSPECTOR:

SITE OPERATOR:

Figure 7-3 NPDES Stormwater Inspection Form Page 7-10

Figure 7-3 – NPDES Stormwater Inspection Form

Table 7-1. Industrial / Commercial Activities Summary Table

INDUSTRIAL/COMMERCIAL ACTIVITIES

2008 Annual Progress Report
Santa Ana NPDES Municipal Stormwater Permit

Provision No. IX.B. & C of the Permit requires each Permittee to develop and update an industrial and commercial facilities database, including facility information, priority, and inspection information.

PERMITTEE	1. Attach the database with a summary of the number of industrial and commercial facilities compliance surveys/inspections and the actions taken as specified in Section IX.B 9 & C 9	2. Has your agency prioritized and inspected all inventoried industrial and commercial facilities as specified in Section IX.B 2 & 3 and C 4 & 5?	
		Yes	No
Beaumont	See Permittee submittals.	✓	
Calimesa	See Permittee submittals.	✓	
Canyon Lake	See Permittee submittals.	✓	
Corona	See Permittee submittals.	✓	
Hemet	See Permittee submittals. Attachment "C"		
Lake Elsinore	See Permittee submittals.	✓	
Moreno Valley	See Permittee submittals.	✓	
Murrieta	See Permittee submittals.		
Norco	See Permittee submittals.	✓	
Perris	See Permittee submittals.	✓	
Riverside	See Permittee submittals.	✓	
Riverside County	See Permittee submittals.	In progress	In progress
RCFC&WCD	Not Applicable	✓	✓
San Jacinto	See Permittee submittals.		✓

INDUSTRIAL/COMMERCIAL ACTIVITIES

2008 Annual Progress Report
Santa Ana NPDES Municipal Stormwater Permit

Provision No. IX.B. & C of the Permit requires each Permittee to develop and update an industrial and commercial facilities database, including facility information, priority, and inspection information.

PERMITTEE	3. As specified in Section IX.B.4, do your agency's industrial facility compliance surveys and inspections address the following?				
	A. Check for submittal of NOI to comply with the General Industrial Permit?	B. Confirm compliance with your agency's Storm Water Ordinance?	C. Check for active non-storm water discharges, potential illicit connections, and illegal discharges to the MS4?	D. Potential for discharge of pollutants in Urban Runoff form material storage areas, vehicle or equipment fueling or maintenance, waste handling, hazardous materials handling or storage, delivery areas or loading docks, or other hazardous outdoor work areas.	E. Implementation and maintenance of appropriate BMPs for industrial facilities?
Beaumont	YES	YES	YES	YES	YES
Calimesa	YES	YES	YES	YES	YES
Canyon Lake	YES	YES	YES	YES	YES
Corona	YES	YES	YES	YES	YES
Hemet	YES	YES	YES	YES	YES
Lake Elsinore		YES	YES	YES	YES
Moreno Valley	YES	YES	YES	YES	YES
Murrieta	*See Permittee's individual annual report*				
Norco	YES	YES	YES	YES	YES
Perris	YES	YES	YES	YES	YES
Riverside	YES	YES	YES	YES	YES
Riverside County	YES	YES	YES	YES	YES

INDUSTRIAL/COMMERCIAL ACTIVITIES

2008 Annual Progress Report
Santa Ana NPDES Municipal Stormwater Permit

Provision No. IX.B. & C of the Permit requires each Permittee to develop and update an industrial and commercial facilities database, including facility information, priority, and inspection information.

PERMITTEE	3. As specified in Section IX.B.4, do your agency's industrial facility compliance surveys and inspections address the following?				
	A. Check for submittal of NOI to comply with the General Industrial Permit?	B. Confirm compliance with your agency's Storm Water Ordinance?	C. Check for active non-storm water discharges, potential illicit connections, and illegal discharges to the MS4?	D. Potential for discharge of pollutants in Urban Runoff form material storage areas, vehicle or equipment fueling or maintenance, waste handling, hazardous materials handling or storage, delivery areas or loading docks, or other hazardous outdoor work areas.	E. Implementation and maintenance of appropriate BMPs for industrial facilities?
RCFC&WCD	NO	NO	NO	NO	NO
San Jacinto		YES	YES	YES	YES

INDUSTRIAL/COMMERCIAL ACTIVITIES

2008 Annual Progress Report
Santa Ana NPDES Municipal Stormwater Permit

Provision No. IX.B. 10-12 & IX.C.13-15 of the Permit require each Permittee to Provide training to staff involved in conducting industrial facilities compliance surveys/inspections.

PERMITTEE	1. Has your agency provided training to staff, involved in conducting inspections at industrial facilities, that addresses the following areas: If yes, please identify the training session information and documentation of notification of the regional Board of such training. Attach additional sheets if necessary.										
	A. Storm Water Ordinance	B. The Order and the DAMP	C. The General Industrial Activities Storm Water permit and any other Permit issued to industrial facilities within the Permit area	D. Enforcement and Compliance Procedure	E. Pollution Prevention Plans	F. Implementation of appropriate BMPs for industrial facilities	Date (s)	Location	Sponsor	No. of Participant	Department
Beaumont	YES	YES	YES	YES	YES	YES	4/15/07 11/27/07 11/27/07	RCFC&WCD RCFC&WCD RCFC&WCD	RCFC&WCD RCFC&WCD RCFC&WCD	2 4 1	Bldg. & Safety Code Enforcement Public Works
Calimesa	YES	YES	YES	YES	YES	YES	11/27/07	RCFC&WCD	RCFC&WCD	3	Public Works
Canyon Lake	YES	YES	YES	YES	YES	YES	01/17/08	Murrieta, CA	RCFC&WCD	3	Special Enforcement
Corona	YES	YES	YES	YES	YES	YES	11/27/07 04/15/08	RCFC&WCD RCFC&WCD	RCFC&WCD RCFC&WCD	3 3	Fire Dept. DWP Public Works
Hemet	YES	YES	YES	YES	YES	YES	09/10-12/08	Costa Mesa, CA	CASQA	1	Public Works Engineering
Lake Elsinore											
Moreno Valley	YES	YES	YES	YES	YES	YES	11/27/07 04/15/08	RCFC&WCD RCFC&WCD	RCFC&WCD RCFC&WCD	0 0	

INDUSTRIAL/COMMERCIAL ACTIVITIES

2008 Annual Progress Report
Santa Ana NPDES Municipal Stormwater Permit

Provision No. IX.B. 10-12 & IX.C.13-15 of the Permit require each Permittee to Provide training to staff involved in conducting industrial facilities compliance surveys/inspections.

PERMITTEE	1. Has your agency provided training to staff, involved in conducting inspections at industrial facilities, that addresses the following areas: If yes, please identify the training session information and documentation of notification of the regional Board of such training. Attach additional sheets if necessary.										
	A. Storm Water Ordinance	B. The Order and the DAMP	C. The General Industrial Activities Storm Water permit and any other Permit issued to industrial facilities within the Permit area	D. Enforcement and Compliance Procedures	E. Pollution Prevention Plans	F. Implementation of appropriate BMPs for industrial facilities	Date	Location	Sponsor	No. of Participant	Department
Murrieta	*See Permittee's individual annual report*										
Norco											
Perris											
Riverside	YES	YES	YES	YES	YES	YES	11/07 11/07 04/08 04/08 04/08	RCFC&WCD RCFC&WCD RCFC&WCD RCFC&WCD RCFC&WCD	RCFC&WCD RCFC&WCD RCFC&WCD RCFC&WCD RCFC&WCD	19 1 6 2 1	Public Works Code Enforcement Public Works Bldg & Safety Code Enforcement

INDUSTRIAL/COMMERCIAL ACTIVITIES

2008 Annual Progress Report
Santa Ana NPDES Municipal Stormwater Permit

Provision No. IX.B. 10-12 & IX.C.13-15 of the Permit require each Permittee to Provide training to staff involved in conducting industrial facilities compliance surveys/inspections.

PERMITTEE	1. Has your agency provided training to staff, involved in conducting inspections at industrial facilities, that addresses the following areas: If yes, please identify the training session information and documentation of notification of the regional Board of such training. Attach additional sheets if necessary.										
	A. Storm Water Ordinance	B. The Order and the DAMP	C. The General Industrial Activities Storm Water permit and any other Permit issued to industrial facilities within the Permit area	D. Enforcement and Compliance Procedures	E. Pollution Prevention Plans	F. Implementation of appropriate BMPs for industrial facilities	Date	Location	Sponsor	No. of Participant	Department
Riverside County	YES	YES	YES	YES	YES	YES	01/23/08	Bldg. & Safety	WQMP Inspection and Plan Check	20	Bldg. & Safety
							04/25/08	Const. Teamster	HAZWOPER Recert.	7	Bldg. & Safety
							07/30/08	Bldg. & Safety	Inspection Training for Ind./Comm.	14	Bldg. & Safety
							08/20/08	Bldg. & Safety	Inspection Training for Ind./Comm.	7	Bldg. & Safety
							09/09/08	Bldg. & Safety	Inspection Training for Ind./Comm.	7	Bldg. & Safety

INDUSTRIAL/COMMERCIAL ACTIVITIES

2008 Annual Progress Report
Santa Ana NPDES Municipal Stormwater Permit

Provision No. IX.B. 10-12 & IX.C.13-15 of the Permit require each Permittee to Provide training to staff involved in conducting industrial facilities compliance surveys/inspections.											
PERMITTEE	1. Has your agency provided training to staff, involved in conducting inspections at industrial facilities, that addresses the following areas: If yes, please identify the training session information and documentation of notification of the regional Board of such training. Attach additional sheets if necessary.										
RCFC&WCD	N/A										
San Jacinto											

INDUSTRIAL/COMMERCIAL ACTIVITIES

2008 Annual Progress Report
Santa Ana NPDES Municipal Stormwater Permit

Provision No. IX.B. 10-12 & IX.C.13-15 of the Permit require each Permittee to Provide training to staff involved in conducting industrial facilities compliance surveys/inspections.

PERMITTEE	2.A. Have staff members in the public works, engineering, building, or planning departments attended any training classes on industrial facility BMPs? If yes, please identify the training session information. Attach additional sheets if necessary.						
	Yes	No	Date	Location	Sponsor	No. of Participants	Department
Beaumont	✓		4/15/07 11/27/07 11/27/07	RCFC&WCD RCFC&WCD RCFC&WCD	RCFC&WCD RCFC&WCD RCFC&WCD	2 4 1	Bldg. & Safety Code Enforcement Public Works
Calimesa	✓		11/27/07	RCFC&WCD	RCFC&WCD	3	Public Works
Canyon Lake			04/17/08	RCFC&WCD	RCFC&WCD	3	Special Enforcement
Corona		✓					
Hemet	✓		09/10-12/08	Costa Mesa, CA	CASQA	1	Public Works Eng.
Lake Elsinore	✓		4/08	Poway, CA	Bureau Veritas	2	Engineering
Moreno Valley		✓					
Murrieta	*See Permittee's individual annual report*						
Norco		✓					
Perris		✓					
Riverside	✓		11/07 04/08	RCFC&WCD RCFC&WCD	RCFC&WCD RCFC&WCD	1 1	Public Works Public Works

INDUSTRIAL/COMMERCIAL ACTIVITIES

2008 Annual Progress Report
Santa Ana NPDES Municipal Stormwater Permit

Provision No. IX.B. 10-12 & IX.C.13-15 of the Permit require each Permittee to Provide training to staff involved in conducting industrial facilities compliance surveys/inspections.

PERMITTEE	2 A. Have staff members in the public works, engineering, building, or planning departments attended any training classes on industrial facility BMPs? If yes, please identify the training session information. Attach additional sheets if necessary.						
	Yes	No	Date	Location	Sponsor	No. of Participants	Department
Riverside County	✓		07/30/08	Bldg. & Safety	Inspection Training for Ind./Comm.	4	Bldg. & Safety
			08/20/08	Bldg. & Safety	Inspection Training for Ind./Comm.	4	Bldg. & Safety
			09/09/08	Bldg. & Safety	Inspection Training for Ind./Comm.	4	Bldg. & Safety
			Various	RCFC&WCD	RCFC&WCD	82	Transportation
			Various	RCFC&WCD	RCFC&WCD	10	Code Enforcement
			Various	RCFC&WCD	RCFC&WCD	102	Environmental Health
			Various	RCFC&WCD	RCFC&WCD	10	EDA
			Various	RCFC&WCD	RCFC&WCD	7	Facilities
			Various	RCFC&WCD	RCFC&WCD	5	Parks Dept.
RCFC&WCD		✓					
San Jacinto							

INDUSTRIAL/COMMERCIAL ACTIVITIES

2008 Annual Progress Report
Santa Ana NPDES Municipal Stormwater Permit

Provision No. IX.B. 10-12 & IX.C.13-15 of the Permit require each Permittee to Provide training to staff involved in conducting industrial facilities compliance surveys/inspections.

PERMITTEE	3. What did the training emphasize?					
	BMP Selection	Material Management Practices	Water Quality Impacts	Installation	BMP Maintenance	Other (describe)
Beaumont	✓	✓	✓	✓	✓	
Calimesa	✓	✓	✓	✓	✓	
Canyon Lake	✓	✓	✓	✓	✓	
Corona	✓	✓	✓	✓	✓	
Hemet	✓	✓	✓	✓	✓	
Lake Elsinore	✓	✓	✓	✓	✓	
Moreno Valley						
Murrieta	*See Permittee's individual annual report*					
Norco						
Perris						
Riverside	✓	✓	✓	✓	✓	
Riverside County	✓	✓	✓	✓	✓	
RCFC&WCD	N/A					
San Jacinto						

INDUSTRIAL/COMMERCIAL ACTIVITIES

2008 Annual Progress Report
Santa Ana NPDES Municipal Stormwater Permit

Provision No. IX.B. 10-12 & IX.C.13-15 of the Permit require each Permittee to Provide training to staff involved in conducting industrial facilities compliance surveys/inspections.	
PERMITTEE	**4. If any of the above points have not been met, please describe what action is being taken to satisfy the requirement(s). Also, please provide an estimate of completion for any outstanding tasks.**
Beaumont	
Calimesa	
Canyon Lake	See attached training sheets.
Corona	n/a
Hemet	As in prior years, during FY 2007-2008 the City of Hemet relied on the Riverside County Compliance Assistance Program to inspect industrial and commercial facilities in the City's jurisdiction. Follow up inspections for facilities with compliance issues have not been completed due to lack of staff time.
Lake Elsinore	During the 2007-2008 reporting year City Staff did not attend any new Industrial Compliance courses. All staff currently involved in inspecting construction sites have attended training during the previous reporting years. New staff and existing staff will be scheduled for training courses during the 2009 year to reflect any new requirements that may com of the adoption of the new permit. Staff procedures are being amended to reflect the need to cross reference the Industrial use to all applicable SIC codes and Determine whether or not a NOI is required. A database will be developed to keep track of current industrial facilities with active NOI's and those that need them.
Moreno Valley	Training for industrial/commercial activities inspections were provided, however, no employees attended the training.
Murrieta	*See Permittee's individual annual report*
Norco	Fiscal Year 2007/08 did not have any staff members attending Industrial/Commercial training. However, three staff members attended training in 2006/07. When training schedules are provided by RCFC & WCD, they are forwarded to all departments for supervisory staff to determine who attends what and when.

INDUSTRIAL/COMMERCIAL ACTIVITIES

2008 Annual Progress Report
Santa Ana NPDES Municipal Stormwater Permit

Provision No. IX.B. 10-12 & IX.C.13-15 of the Permit require each Permittee to Provide training to staff involved in conducting industrial facilities compliance surveys/inspections.	
PERMITTEE	**4. If any of the above points have not been met, please describe what action is being taken to satisfy the requirement(s). Also, please provide an estimate of completion for any outstanding tasks.**
Perris	The City has completed its inventory of all active commercial and industrial businesses that are inspected as part of the Commercial/Industrial Storm Water Inspection Program. The facilities are inventoried in a database where inspection information is logged including status of CAP inspection (e.g. good, average, needs improvement, written notice, violation, etc), inspection priority (high, medium, low), and date of next inspection. The frequency of inspection is determined by the results of the CAP inspection. If a facility inspection has an overall rating of "good", the facility will be a low priority and the next required inspection will be in two years. If an inspection rating is "average" the facility is a medium priority and will be inspected in one year. A facility that "needs improvement" is considered a high priority and will be inspected in six months. A formal prioritization and inspection schedule is still in development. The Industrial/commercial program organization and this schedule will be completed early in the 2009 calendar year as part of additional program development. Based on the City's limited resources, Industrial/Commercial inspections are currently conducted by County CAP Restaurant and Hazardous Materials inspectors, and follow-up inspections, as determined by the City of Perris, are currently occurring, but infrequently. However, the City is currently working on developing a fee resolution to be presented for Council adoption that would support additional resources for Industrial/Commercial inspections. The fee resolution adoption will likely be in early 2009. This resolution will be based on a per inspection cost and will be an annual fee. Currently the City has one Code Enforcement Officer following up on many of the NPDES related complaints and follow-up CAP inspections. Training will also increase for the City inspectors once the Commercial/Industrial Inspection Fee Schedule is adopted, thereby adding to the Code Enforce staff currently conducting inspections and investigations on NPDES related matters. In the interim, the City will also inform the Code Enforcement Staff as to upcoming training opportunities and encourage them to complete the required training.
Riverside	Industrial/Commercial facility compliance survey and inspection assignments now require verification of submittal of the facility's General Industrial Permit.
Riverside County	N/A
RCFC&WCD	N/A

INDUSTRIAL/COMMERCIAL ACTIVITIES

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Provision No. IX.B. 10-12 & IX.C.13-15 of the Permit require each Permittee to Provide training to staff involved in conducting industrial facilities compliance surveys/inspections.	
PERMITTEE	**4. If any of the above points have not been met, please describe what action is being taken to satisfy the requirement(s). Also, please provide an estimate of completion for any outstanding tasks.**
San Jacinto	

8. MUNICIPAL FACILITIES PROGRAMS AND ACTIVITIES

MUNICIPAL FACILITIES STRATEGY

Provision XI.C of the 2002 MS4 Permit requires the Permittees to continue to implement the recommendations in the Municipal Facilities Strategy (MFS) to ensure that public agency facilities and activities do not contribute pollutants to receiving waters.

By August 1 of each year, the Permittees are to review their activities and facilities to determine the need for revisions to the MFS. The 2002 MS4 Permit requires that the Annual Report include the findings of a review of the MFS, and a schedule for needed revisions. The MFS was initially developed during the 1996 MS4 Permit term and designed to provide guidance for identifying potential storm water pollution problems and selecting candidate BMPs applicable to specific sources of storm water pollutants associate with facilities identified by a Permittee.

The 2002 MS4 Permit also requires the Permittees to develop a revised DAMP and submit it to the SARWQCB by January 1, 2005. The DAMP revision process involved incorporating the MFS into a specific "stand-alone" section entitled "Permittee Facilities and Activities". As such, the guidance and information previously contained in the MFS is now contained in section 5 of the revised DAMP. During the reporting period from August to November 2004, the draft DAMP was prepared by the Permittees for public review and contained the recommended revisions and format for BMP implementation at municipal facilities and activities. The DAMP also contained Fire Fighting BMPs that were developed in accordance with Permit provision XI.B.

CRITERIA FOR MS4 INSPECTION AND MAINTENANCE

Provision XI.D requires the Permittees to evaluate their established criteria for inspections of the MS4s and establish criteria for regular maintenance. The MS4 includes catch basins, open channels, and retention/detention basins. This information was initially required within six months of adoption of the 2002 MS4 Permit (by April 25, 2003) and is to be evaluated and reported annually. The current status of the Permittees' efforts is shown in **Table 8-1.**

When evaluating the criteria for regular inspections of MS4 facilities, the following factors are considered:

Time of year

- Type of facility (storm drain inlet, open channel, retention/detention basins);
- Tributary watershed/land use considerations;

- Proximity to Receiving Water;
- Receiving Water beneficial uses and impairments of beneficial uses, historical pollutant types and loads from past inspections/cleanings;
- Regulatory restrictions (TMDL); and
- Cost/benefit.

While establishing the criteria for regular maintenance of MS4 facilities, the following factors are considered:

- Time of year (pre-storm season, post storm season);
- Type of facility (storm drain inlet, open channel, retention/detention basins);
- Type of material accumulated in facility (hazardous, sanitary waste, litter, sediment, vegetation);
- Type of structural restoration needed;
- Tributary watershed/land use considerations (urban/non-urban, industrial, commercial, residential);
- Proximity to Receiving Water;
- Receiving Water beneficial uses and impairments of beneficial uses;
- Historical pollutant types and loads from past inspections/cleanings;
- Regulatory restrictions (TMDL); and
- Cost/benefit.

BMP SITING STUDY

Provision XI.E of the 2002 MS4 Permit requires the Permittees to perform an assessment of the MS4 to identify potential BMP siting opportunities as follows:

> "Within twenty (20) months of this Order's adoption, the Permittees shall complete an assessment of their MS4s to evaluate opportunities to configure and/or to reconfigure channel segments to function as pollution control devices and to optimize beneficial uses. These modifications may include in-channel sediment basins, bank stabilization, water treatment wetlands, etc. This shall be reported in the 2004-2005 Annual Report".

The Permittees completed the MS4 assessment in April, 2004 to identify opportunities within the existing storm drain infrastructure for incorporating regional BMP retrofits to improve water quality and maintain receiving water designated beneficial uses. A Geographical Information

System (GIS) model was used to initially identify possible retrofit locations that met selected search criteria. Sixteen sites were identified using the GIS model, and after coordination with the Permittees, ultimately eight sites from the GIS model were identified as potential opportunities for incorporating a regional BMP retrofit project. The Permittees also identified over 50 sites that currently provide a regional water quality function, as well as another five sites that may have the potential for a regional BMP retrofit.

The intent of this study was to identify potential BMP retrofit sites by developing and applying a logical, iterative selection and screening approach. The result of this study is not a defined implementation plan or water quality capital improvement program. Rather, the Santa Ana Region BMP Siting Study was undertaken to identify sites throughout the Santa Ana Region of Riverside County where there appear to be opportunities to further pursue regional projects for water quality improvement. Before potential sites identified herein can be implemented, additional site reconnaissance, design, environmental and permitting work would need to be conducted. Coordination with property owners would also be needed to determine if implementation of a BMP would be compatible with existing or planned site uses. As the Permittees are implementing source control measures and pursuing other potential water quality initiatives as discussed in the Drainage Area Management Plan (DAMP), a process would need to be developed to determine how the potential BMP sites identified in this study would be prioritized and evaluated against other water quality initiatives. How to best implement retrofit BMPs also needs to be addressed, and funding sources need to be identified and budgeted. This BMP Siting Study is intended as an additional tool for the Permittees to use when considering which BMPs to implement from the array of source control and treatment control BMP options. This study also ensures that potential BMP retrofits aren't inadvertently foreclosed by other future and possibly less beneficial projects, and supports collaboration and decision making for incorporating regional BMPs where deemed feasible.

MS4 MAINTENANCE PROGRAM

Provision XI.G of the 2002 MS4 Permit requires the Permittees to review and report MS4 maintenance procedures.

The status of the Permittees' maintenance programs is also shown in **Table 8-1.**

FERTILIZER/PESTICIDE APPLICATOR TRAINING REQUIREMENTS

Provision XI.K requires that, at least on an annual basis, each Permittee provide training to the public agency staff and to contract field operations staff on fertilizer and pesticide management,

model maintenance procedures, and other pollution control measures. Permittee staff responsible for application of fertilizer or pesticides shall attend at least three of these training sessions during the five-year term of this Order (from 2002 – 2007).

Fertilizers are applied by certain Permittees on a limited basis. In these cases, Permittee staff either applies the fertilizer or supervise contract staff performing the application.

Permittee staff who are licensed to apply pesticides are required by the California Department of Pesticide Regulation (DPR) to meet continuing education standards. Licensing standards and procedures are established by the DPR and are described in:

- 1998 California Code of Regulations, Title 3 (Food and Agriculture)
- 1997 California Food and Agriculture Code (Divisions 6, 7, and 13)

The Permittees' efforts to provide training to agency staff and contract field operations staff for fertilizer and pesticide management, model maintenance procedures and other pollution control measures are summarized in **Table 8-1.**

STREET SWEEPING

Provision XI.M requires each Permittee to annually evaluate their street/road sweeping frequency based on land use and historical information to determine the need to revise their sweeping frequency. The Permittees efforts are summarized in **Table 8-1.**

COUNTY LINE CHANNEL STATUS

The project was completed and there is nothing further to report.

Table 8-1. Municipal Facilities Programs and Activities

MUNICIPAL FACILITIES PROGRAMS AND ACTIVITIES

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Provision No. XI.D of the Permit requires each Permittee to evaluate their established *criteria for inspections* **of the MS4s and establish** *criteria for regular maintenance* **thereof. The MS4 includes catch basins, open channels, and retention/detention basins. This information was initially required in the 2003 Annual Report and is to be evaluated and reported annually.**	
PERMITTEE	**1. Describe your agency's criteria for regular inspections of the elements of your MS4 facilities considering the following factors as applicable:** ▪ **Time of year** ▪ **Type of Facility (storm drain inlet, open channel, retention/detention basins)** ▪ **Tributary watershed/land use considerations** ▪ **Proximity to receiving water** ▪ **Receiving water beneficial uses and impairments of beneficial uses, historical pollutant types and loads from past inspections/cleanups** ▪ **Regulatory restrictions (TMDL)** ▪ **Cost/Benefit**
Beaumont	Catch basins and open channels are inspected prior to the rainy season. Visual inspections continue throughout the year.
Calimesa	The City of Calimesa inspects storm drain facilities and inlets prior to the start of the rainy season in October and after each significant event that may have generated significant debris that would affect storm drain operations. We are removed from any significant receiving waters with designated beneficial uses so this is not a factor in our inspection routine. With large projects being developed currently we hold pre-job meetings and do routine inspections to assure contractors and developers are aware of potential problems and the requirement of the SWPPP for their projects.
Canyon Lake	All city portions of MS 4 are inspected and cleaned annually. Almost all MS 4 Facilities are owned and inspected by private home owners association.

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Corona	The City of Corona conducts inspections of municipal facilities to minimize the discharge of pollutants and maintain an efficient pollutant reduction program. It also allows the City to determine when cleaning, repairs, or improvements are necessary. For definition purposes, an inspection of a fixed facility may include visual check and/or discussions with key field staff members regarding storm drain facilities. Annual inspection is typical for the City of Corona's storm drain system, with more frequent schedules for facilities that pose a greater threat to discharge pollutants into the receiving waters. Our criteria are as follows: 1. Document field data (type, amount of debris, etc.) indicating need for service. 2. Requests or complaints generated by outside sources. Common outside sources are: residents, contractors, city employees, or inter-agency contacts. These inspections are generally in response to offensive smell and/or debris collection such as hazardous waste, sanitary sewer, litter, sediment and vegetation. 3. Localized activity or notification of possible debris or sediment. 4. Location of facility and common challenges associated with the various factors such as: population density, pedestrian traffic, multi-dwelling units and availability of proper refuse disposal facility. 5. Seasonal inspection/cleaning based on proximity of receiving waters 6. Seasonal based on inspection of invasive vegetative material. 7. Seasonal based on projected or anticipated precipitation events. May include storm watch/storm patrol activities. 8. Post precipitation event follow-up. 9. Response as a result of spill or illicit discharge.

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Hemet	City of Hemet MS4 facilities, including storm drain inlets, lined and unlined open channels, and retention/detention basins are inspected at least once each year, and cleaned if necessary. Additional inspections and maintenance occur in response to complaints and/or during/after storm events. Development of a prescribed program for regular inspection of the city's MS4 facilities is continuing and will include the following elements: Written program defining required inspection and maintenance frequency for all MS4 facilities, including open channels, storm drain inlets, catch basins, and retention/detention basins; Set procedures for documenting all inspections and maintenance activities, including land use in tributary area, pollutant types and loads removed, and cost of maintenance; Set procedures for recording, summarizing and reporting information on MS4 facility inspections and maintenance activities.
Lake Elsinore	Inspection of MS4 facilities are conducted on a year round basis. Public works teams assigned to MS4 maintenance regularly inspect storm drains, drop inlets, and open channels to insure they are free of trash, debris and sediment. After the initial inspection and maintenance activity's staff will conduct routine inspections during the rainy season to insure the effectiveness of the facility.
Moreno Valley	Regular inspections of the MS4 system occur on almost a daily basis as the City maintenance crews implement the MS4 maintenance program. Catch basins and inlets are inspected on a year-round basis. Open channels are inspected each fall in preparation for the storm season. Due to the frequency of the MS4 inspection program, criteria such a tributary watershed/land use types, distance to Receiving Waters, i.e., Canyon Lake (approx. 16 miles downstream) and beneficial uses of the Receiving Waters were not considered factors for the inspection program. Cost/benefit is considered a factor with the street sweeping and storm drain maintenance programs and is described in more details in No. 2 below. Currently, the City does not maintain or operate any retention/detention facilities.
Murrieta	*See Permittee's individual annual report*

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PERMITTEE	**1. Describe your agency's criteria for regular inspections of the elements of your MS4 facilities considering the following factors as applicable:** ▪ **Time of year** ▪ **Type of Facility (storm drain inlet, open channel, retention/detention basins)** ▪ **Tributary watershed/land use considerations** ▪ **Proximity to receiving water** ▪ **Receiving water beneficial uses and impairments of beneficial uses, historical pollutant types and loads from past inspections/cleanups** ▪ **Regulatory restrictions (TMDL)** ▪ **Cost/Benefit**
Norco	Inspections are performed prior to the rainy season, beginning in September. Every inlet/catch basin is scheduled for inspection.
Perris	The Public Works Department provides a variety of services intended to provide pro-active maintenance of the City's municipal storm drain system. In order to achieve this objective, the department has instituted a street sweeping program. During the summer months, when water flows are rare, street right-of-way inspections are increased to once in a week in all commercial and residential areas. This will prevent accumulated trash, household debris, sediment, and other contaminants from entering catch basins, open channels, and other storm drain facilities. Additionally, in December of 2007 a new car port structure was completed for the Public Works Yard. The overhead coverage provided by the car ports prevents rain water from hitting the equipment and carrying pollutants to the storm drain. The Public Works Department is responsible for conducting routine inspections of city storm drains, to insure that system does not become clogged or impaired by the accumulation of miscellaneous debris. This includes above ground inspection of catch basins, storm drains, detention basins, French drains, piping, and open channels. Based on available resources, the City has determined that it can manage a total of two inspections and maintenance periods per year. In January, or during the wet/rainy season, individual storm drains will be inspected for clogged and impaired structures. Facilities with standing water indicate blocked pipe or storm drains, and will be cleaned or repaired accordingly. In July, or during the summer months, priority will be given to inspection and maintenance of individual storm drains as well.

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PERMITTEE	**1. Describe your agency's criteria for regular inspections of the elements of your MS4 facilities considering the following factors as applicable:** ▪ **Time of year** ▪ **Type of Facility (storm drain inlet, open channel, retention/detention basins)** ▪ **Tributary watershed/land use considerations** ▪ **Proximity to receiving water** ▪ **Receiving water beneficial uses and impairments of beneficial uses, historical pollutant types and loads from past inspections/cleanups** ▪ **Regulatory restrictions (TMDL)** ▪ **Cost/Benefit**
Perris Continued	During the 2007-2008 reporting period, the City completed Phase I of an extensive inventory of all Post-Construction BMP's installed throughout the City's Flood Control District #1 (FCD #1). The First phase of the inventory included Post Construction BMP's installed at 13 residential housing tracts. The Post construction BMP's consisted of catch basin insert filters and underground hydrodynamic separators (end-of-the-line clean water filter units. Inspections of a portion of FCD #1 catch basins, filters, below ground hydrodynamic separators, as well as a plan and maintenance schedule for the post-construction BMPs was completed. The cleanings are scheduled to occur twice during the dry season and once during the wet season. It is estimated that the program will be implemented during the next reporting period and the city will be able to track the tons of debris and other materials removed from the storm drain system during the regularly scheduled maintenance activities.
Riverside	During Fiscal Year 2007-08, storm drain system inspections were conducted according to a map grid system. Storm drain inspections are due for completion before the rainy season. Critical components of the storm drain system, including storm water pumping stations, open channels and canals, are inspected prior to major storm events. Backup generators for the storm water pump stations are tested prior to the rainy season to determine operational status and identify maintenance requirements. Other inspections occur as a result of complaints or requests from other staff.
Riverside County	See supplemental report from Transportation Department and NPDES Progress Map in Permittee Submittal.

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RCFC&WCD	RCFC&WCD considers the following criteria in performing MS4 facility inspections: Time of Year – Inspections are regularly conducted three times annually and prior to and following forecast rainfall events. Criteria for inspections are also governed by wildlife concerns such as nesting, spawning, and other habitat issues. Type of facility – Larger capacity basins with dam structures are regulated by the State Division of Safety of Dams. As such, regular inspections are conducted prior tot the rainy season and as required to confirm structural integrity. Other MS4 facility areas are regularly inspected three times annually and prior to forecast rainfall events. Tributary Watershed/land use – Debris Basin are regularly inspected following fire damage for large objects and floatable material. RCFC&WCD inspectors pay particular attention to construction sites where mass grading occurs. Inspection items include confirmation that site SWPPPs are current and reflect proper implementation of BMPs. Proximity to Receiving Waters – Basins and channel reaches upstream of receiving waters are inspected prior to forecast rainfall events. Examples include Wasson Basin (adjacent to Lake Elsinore) and Day & San Sevaine Creeks (tributary to the Santa Ana River). Regulatory restrictions (TMDL) – As described above, facilities upstream of receiving waters are inspected prior to the rainy season to ensure adequate conveyance capacity and minimize sediment transport downstream. Cost/benefit – Sediment removal from basins is a more efficient use of resources than clearing sediment and debris that has reached channels and pipes. Therefore inspections and subsequent maintenance are focus on keeping basins clear and minimizing potential sedimentation in channels and pipes.
San Jacinto	The City has three full time employees engaged in storm water facility maintenance and inspection on a daily basis. Through visual inspections, storm drain facilities such as open channels, inlets, retention basins and culverts are prioritize for on-going maintenance scheduling, taking into account time of year and weather conditions.

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PERMITTEE	**2. Describe your agency's criteria for regular maintenance of your MS4 facilities considering the following factors as applicable:** ▪ **Time of year** ▪ **Type of Facility (storm drain inlet, open channel, retention/detention basins)** ▪ **Tributary watershed/land use considerations** ▪ **Proximity to receiving water** ▪ **Receiving water beneficial uses and impairments of beneficial uses, historical pollutant types and loads from past inspections/cleanups** ▪ **Regulatory restrictions (TMDL)** ▪ **Cost/Benefit**
Beaumont	Catch basins and open channels are inspected and cleaned prior to the rainy season.
Calimesa	Refer to above comment; maintenance is performed at the same time as inspections (see attached 'c')
Canyon Lake	All city portions of MS 4 are inspected and cleaned annually. Almost all MS 4 facilities are owned and inspected by private home owners association.
Corona	The City of Corona conducts regular maintenance as a result of schedules and inspections. Typically, maintenance is routine and is a result of the following: Follow up actions to correct deficiencies noted during inspections. 2. Documented field data (type and/or amount of debris) indicating maintenance provisions. Other documented field data indicating necessary regular maintenance. 3. Type of facility (i.e. storm drain, open channel, retention/detention basins) 4. Response to resolve complaints and/or requests form outside sources (i.e. residents, contractors, city employees, inter-agency, etc.) 5. City utilizes a contracted street sweeping company to reduce facility debris

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PERMITTEE	**2. Describe your agency's criteria for regular maintenance of your MS4 facilities considering the following factors as applicable:** ▪ **Time of year** ▪ **Type of Facility (storm drain inlet, open channel, retention/detention basins)** ▪ **Tributary watershed/land use considerations** ▪ **Proximity to receiving water** ▪ **Receiving water beneficial uses and impairments of beneficial uses, historical pollutant types and loads from past inspections/cleanups** ▪ **Regulatory restrictions (TMDL)** ▪ **Cost/Benefit**
Hemet	Regular maintenance of City MS4 facilities, including storm drain inlets, lined and unlined open channels, and retention/detention basins occurs a minimum of once each year. Routine maintenance procedures include removal of vegetation, removal of sediments and debris, and repair of erosion damage. Maintenance activities in certain identified facilities are subject to jurisdictional restrictions imposed by other agencies, including the Army Corp of Engineers and California Department of Fish and Game. As described above, a prescribed program for regular inspection of the city's MS4 facilities is currently in development.
Lake Elsinore	Maintenance of MS4 facilities are conducted on a year round basis. Public works teams assigned to MS4 maintenance regularly inspect storm drains, drop inlets, and open channels to insure they are free of trash, debris and sediment. After the initial maintenance activity's staff will conduct routine inspections during the rainy season to insure the effectiveness of the facility. Problem areas are documented and checked before and after each rain event regardless of location.

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Moreno Valley	Our agency's street sweeping crew works year-round to sweep one hundred (100%) of the City's maintained streets with curb and gutter on a bi-weekly basis. This aspect of the maintenance program significantly reduces and or eliminates most sediment and debris loads from reaching the maintained catch basins and other inlet types. The street sweeping program is an integral part of the MS4 maintenance program. The aggressive street sweeping program provides significant benefits to the storm drain cleaning program, i.e. reduced program costs, cleaner catch basins on a year-round basis and allows the storm drain maintenance crews to focus additional cleaning efforts on those known problem-area MS4 facilities. Our storm drain maintenance crew operates on a year-round basis to inspect at a minimum one hundred (100%) of the catch basins and cleans, as warranted, based upon visual inspection those catch basins that have accumulated fair amounts of litter, sediment and/or other debris. If a catch basin needs cleaning, it is cleaned at the time of the inspection thus reducing any chance that a future storm event could wash the accumulated material into the storm drain system. Open channels are cleaned annually in the fall in preparation to the rainy season. Typically, the materials collected during the cleaning efforts include, litter, dirt/sediment and organic debris. The overall condition of our existing storm drain system is good; therefore, staff does not foresee any type of structural restoration in the near future. By design of the City's street sweeping program and storm drain programs, criteria such as tributary watershed/land use types, distance to Receiving Waters and beneficial uses of Receiving Waters were not considered factors for the maintenance program.
Murrieta	*See Permittee's individual annual report*

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Norco	Every inlet/catch basin that is inspected is evaluated for maintenance needs. Maintenance will be scheduled depending on condition of structure. During cleaning of inlets and basins, the storm drain system is monitored for irregularities and maintenance follows pending needs. Replacement is usually done in kind except for CMP structure in roadway areas which are not replaced with RCP.
Perris	The city contracts with a private company to provide sweeping of approximately 2,329 residential (swept bi-monthly) and commercial (swept bi-weekly) curb miles combined. Approximately 46% of these miles are located within residential areas, while the remaining 54% are commercial areas. During the summer months, when water flows are rare, street sweeping may be increased to once a week in all areas to prevent the accumulation of large volumes of materials. Between April and June of 2008, 460 storm drain catch basins were cleaned and maintained by the Public Works Department. Other above ground open channels have also been identified and are cleaned regularly. Due to limited staffing, the locations are cleaned twice a year, once during the summer months-July, and once during the rainy season January. This year the Public Works Department inspected and cleaned a number of open channels, underground pipe, detention basins, and catch basins throughout the City. This year the Public Works Department cleaned and inspected a total of approximately 10,320 lineal feet of open channel including: Avocado, B and Ellis, Bradley Channel, Richards & David's Road, Diana, and cross channels of Enchanted Heights/Indian Hills. In addition, over 90,000 gallons of stagnant water and 1,100 cubic yards of green waste were removed from earthen detention basins within the City. Finally, approximately 15,392 linear feet of earthen type channels located on thoroughfares throughout the City (i.e. Case Road, Murrieta Road, Goetz Road) were maintained during the 2007-2008 reporting period.

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PERMITTEE	**2. Describe your agency's criteria for regular maintenance of your MS4 facilities considering the following factors as applicable:** ▪ **Time of year** ▪ **Type of Facility (storm drain inlet, open channel, retention/detention basins)** ▪ **Tributary watershed/land use considerations** ▪ **Proximity to receiving water** ▪ **Receiving water beneficial uses and impairments of beneficial uses, historical pollutant types and loads from past inspections/cleanups** ▪ **Regulatory restrictions (TMDL)** ▪ **Cost/Benefit**
Perris Continued	The Public Works Department follows a routine schedule for the disposal of trash receptacles located in public parks, rights-of-way, retention basins, detention basins, and city facilities. This department is also responsible for emptying special trash receptacles set-up for community events or public gatherings. The Public Works Department sponsors the Toxic Substances Control Program, which provides residents of the City with a cost effective way to dispose of used motor oil. Residents transport their used oil to the City Public Works Yard, where it is disposed for free. Residents may deliver up to 5 gallons of used motor oil per month per household. These wastes are then disposed of with wastes generated by the routine maintenance of City vehicles. Every month an independent contractor is brought in to recycle the used motor oil. During the 2007-2008 reporting period the City collected 500 gallons of used motor oil and an additional 3,905 gallons of liquid/latex waste. (See Exhibit H) Public Works engages in a number of measures to implement its Municipal Facilities Strategy at the City's Public Works Yard. The City has an approved SWMP from the Water Board, which is a policy document that outlines initial training procedures that each effected public works employee is required to complete in BMP's and good housekeeping practices. The City of Perris maintains a wash rack to clean and wash fleet vehicles and equipment. All waste water generated by this process is channeled into an interceptor, where sediment and liquids are diluted or strained. This interceptor is routinely inspected and maintained. Vehicle maintenance and repair are also conducted within a shop area. The shop is kept clean and free of grease, oil, and solvent build-up. In addition, only designated areas are used for oil changes, vehicle repair, and other shop operations. Finally, outdoor storage areas are covered with canopies, or other covers to reduce the discharge of pollutants by stormwater. Carports were also installed this year on-site.

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PERMITTEE	**2. Describe your agency's criteria for regular maintenance of your MS4 facilities considering the following factors as applicable:** ▪ **Time of year** ▪ **Type of Facility (storm drain inlet, open channel, retention/detention basins)** ▪ **Tributary watershed/land use considerations** ▪ **Proximity to receiving water** ▪ **Receiving water beneficial uses and impairments of beneficial uses, historical pollutant types and loads from past inspections/cleanups** ▪ **Regulatory restrictions (TMDL)** ▪ **Cost/Benefit**
Perris Continued	The Department of Community Development routinely implements several clean-up activities designed to provide regular maintenance of the MS4. The Annual Community Clean-up Day is one of the most successful events with a total of 209.8 tons of wastes collected during the 2007-2008 annual event. (See Exhibit D)
Riverside	MS4 maintenance is conducted as a result of inspections and the identified maintenance requirements.
Riverside County	During daily routine maintenance field personnel look for evidence of illegal discharges or illicit connects and record locations of apparent illicit connections and illegal discharges and track flows to their origin. Once locations are identified referrals are made to the appropriate lead agency for follow-up and enforcement. Routine maintenance of the MS4 system is based on a prioritized list. High priority facilities are inspected routinely and maintenance performed at a minimum one time prior to the rainy season and as often as needed during the rainy season. Medium priority facilities are inspected biannually and maintenance is performed prior to the rainy season and as needed during the rainy season. Low priority facilities are inspected prior to the rainy season and maintenance is on an as needs basis.

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RCFC&WCD	Time of Year – Maintenance is generally scheduled as a result of the inspection program described above. Facilities are maintained prior to the beginning of the rainy season (October) so as to be clear to convey design storm flows. Wildlife nesting, spawning, and similar habitat issues are addressed and maintenance is scheduled around specific timeframes for habitat and nesting seasons. Type of facility – As with inspections, larger basins with dams regulated by the Division of Safety of Dams receive regular maintenance. Maintenance of other MS4 facilities is performed as a result of the inspection program and specifically conducted prior to and following rainfall events. Type of material – Material types generally include either soil/sediment that can be reused or debris/litter/vegetation. Soil/sediment material can be removed and utilized by either RCFC or local contractors. Type of structural restoration needed – MS4 facilities generally require maintenance following rainfall events. Maintenance measures are anticipated for areas that are known to require particular sediment & debris removal, or maintenance. Examples include maintenance improvements following storm events at Perris Valley storm drain near Nuevo Road and Day Creek downstream of Limonite.

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RCFC&WCD Continued	Tributary watershed/land use – Maintenance for areas with exposed (unvegetated) surfaces includes hydroseeding prior to the rainy season for stabilization and to prevent erosion/sediment transport to Receiving Waters. Hydroseeding is also a cost effective measure to prevent sediment and debris accumulation in MS4 facilities as opposed to channel maintenance after sedimentation has occurred. Proximity to Receiving Waters & consideration of Beneficial Uses – Criteria for maintenance is similar to criteria for inspections described above. Maintenance priority is a result of inspections and maintenance is anticipated and planned in areas directly upstream of Receiving Waters following rainfall events. Historical pollutant types & loads from past inspections/cleanings – Areas that are known to accumulate sediment and debris early in the rainy season are targeted for maintenance following the first rainfall events. An example includes the Woodcrest Dam in the city of Riverside. Maintenance of other facilities follows pre-storm and post-storm inspections. Regulatory restrictions (TMDL) – As described for inspection criteria, facilities upstream of Receiving Waters are inspected and maintained prior to the rainy season to ensure conveyance capacity and minimize sediment transport downstream. Cost/benefit – As in criteria for inspections, sediment removal from basins is a more efficient use of resources than clearing sediment and debris that has reached channels and pipes. Therefore, inspections and subsequent maintenance are focused on keeping basins clear and minimizing sediment accumulation in channels and pipes.

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PERMITTEE	**2. Describe your agency's criteria for regular maintenance of your MS4 facilities considering the following factors as applicable:** ▪ **Time of year** ▪ **Type of Facility (storm drain inlet, open channel, retention/detention basins)** ▪ **Tributary watershed/land use considerations** ▪ **Proximity to receiving water** ▪ **Receiving water beneficial uses and impairments of beneficial uses, historical pollutant types and loads from past inspections/cleanups** ▪ **Regulatory restrictions (TMDL)** ▪ **Cost/Benefit**
San Jacinto	Three full time employees are maintaining storm drain facilities and systems throughout the city, including performing visual inspections on a daily basis, incorporating pre/post seasonal weather, and prioritizing storm drain maintenance condition and imminent weather conditions. Employees are removing all debris, trash, leaves, weeds and silt from storm water facilities, retention basins and channels on a frequent basis. A 3 ½ cu Yd. vacuum / jetter truck was acquired this year and utilized to enhance productivity storm water maintenance activities.

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PERMITTEE	**3. Have you identified any changes in municipal activities that would help to ensure that public agency facilities and activities do not cause or contribute to a pollution or nuisance in Receiving Waters? If yes, please describe those changes below.**
Beaumont	No
Calimesa	No
Canyon Lake	No
Corona	Yes. City staff responsible for street maintenance have begun implementation of a computerized database and program that assists in identifying catch basin location, maintenance and cleaning schedules, debris description including type and volume of debris collected and stencil/label information. The in-house system can accurately track costs, materials, time and actions and allows for immediate data to be input by staff in the field, assigning work orders timely, and tracking progress on jobs accurately. DWP Staff in conjunction with Public Works staff developed a mandatory in-house municipal activity storm water training program for all City field staff. The in-house training will ensure all field staff will attend training on municipal BMPs and meet Permit training requirements. Training will begin next fiscal year. The Auburndale Pool was renovated with a new storage building for pool chemicals and materials. The new building was constructed to better protect the materials from storm water.
Hemet	No
Lake Elsinore	No
Moreno Valley	No
Murrieta	*See Permittee's individual annual report*

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PERMITTEE	**3. Have you identified any changes in municipal activities that would help to ensure that public agency facilities and activities do not cause or contribute to a pollution or nuisance in Receiving Waters? If yes, please describe those changes below.**
Norco	Yes The City is continuing to implement a conversion of rolled curb to vertical curb where erosion, due to flows not being contained in gutters, is a problem. In addition, all new street improvement projects are incorporating vertical curb and gutter into street improvements where design and budget allow. The City is continuing to address horse trail erosion by approving several alternative trail materials to be used by citizens and businesses. This past year the latest approved alternative material was brick pavers which are allowed to be placed a driveway locations across the horse trail. The City has budgeted funds for trail rehabilitation in steeply sloped areas of the City and are doing several different test methods.
Perris	Yes. In December of 2007 the City completed a new car port structure for the Corporate Yard. The overhead coverage provided by the car port prevents rain water from hitting the equipment and carrying pollutants to the storm drain.
Riverside	Yes. During the last year, the Public Works Department purchased two new street sweepers. The new vehicles are expected to provide sweeping efficiency improvements, while emitting less pollution.
Riverside County	No
RCFC&WCD	No
San Jacinto	Yes. Increased staffing level has allowed increased storm water facility inspections and maintenance identifying problematic incidents with increased response levels. Also, the addition of vacuum / jetter truck has enhanced storm drain maintenance procedures and activities.

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Provision No. XI.G of the Permit requires each Permittee to evaluate the inspection and maintenance frequency for the MS4 on an annual basis.	
PERMITTEE	**1. Has your agency evaluated your program for the MS4 inspection and maintenance frequency? Describe the results of the evaluation and identify modifications to your agency's program as a result of this evaluation.**
Beaumont	Current programs are sufficient for the limited facilities within this agency.
Calimesa	No Change. The City has deemed the implementation measures are adequate.
Canyon Lake	Evaluation completed and the program was found to be satisfactory as to inspection and maintenance.
Corona	Yes. As noted in Item 1 above, annual inspection is typical for the storm drain system, with more frequent schedules for facilities that pose greater threat to discharge pollutants into the receiving waters. Regular maintenance is conducted as a results of schedules and inspections. Cleaning frequency is based on the following priorities; Low: Low density residential areas, areas with no prior history of illegal dumping, problems and/or complaints Medium: Medium density residential areas, areas with modest amount of landscaping, collector streets, storm drain facilities with few complaints, problems or history of an isolated incident that occured in the past with no visible reoccurring pattern, facilities that had significant types and amounts from past inspections or cleaning. High: High density residential, commercial and industrial area, areas with significant amount of landscaping, major arterial, primary and secondary streets, facilities that discharge directly to Receiving Water and are classified under the Medium category above, facilities that have been found to contain significant amounts of toxic pollutant based on past inspection cleaning. Analysis of the data collected during the litter characterization study indicated that this method has been found to be sufficient in meeting program goals and objectives. Catch basin cleaning and street sweeping has been intensified in areas found to contribute significantly greater amounts of litter found during the study.
Hemet	Development of procedures is continuing for a system-wide annual evaluation of the MS4 inspection and maintenance program that will allow the Public Works Department to determine and document the need for increasing inspection and/or maintenance frequency.
Lake Elsinore	Staff has Evaluated and Determined that the current inspection and maintenance programs are adequate and insure that the MS4's are operating normally. Per the evaluation staff does not believe the MS4's pose a potential for becoming point source pollutants and impairing water quality within the lake.
Moreno Valley	Yes. See #2 above.

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Provision No. XI.G of the Permit requires each Permittee to evaluate the inspection and maintenance frequency for the MS4 on an annual basis.	
PERMITTEE	**1. Has your agency evaluated your program for the MS4 inspection and maintenance frequency? Describe the results of the evaluation and identify modifications to your agency's program as a result of this evaluation.**
Murrieta	*See Permittee's individual annual report*
Norco	Before and after the rainy season, the MS4s are inspected. Based on time of year the appropriate maintenance is conducted.
Perris	During the summer months, when water flows are rare, street sweeping may be increased to once in a week in all commercial and residential areas to prevent the accumulation of large volumes of materials. Due to limited staffing, catch basin and open channel locations are cleaned twice a year, once during the summer months-July, and once during the rainy season-January. The Public Works Department follows a routine weekly schedule for the disposal of trash receptacles located in public parks, rights-of-way, retention basins, and city facilities.
Riverside	A systematic approach has been developed to clean and repair storm drain facilities. A tracking system has been developed to monitor the cleaning activities.
Riverside County	Current inspection protocols and frequencies have been reviewed and no changes have been identified
RCFC&WCD	Yes, Using the framework (see above) of criteria for inspection and maintenance, RCFC&WCD inspects and maintains 100% of its facilities annually.
San Jacinto	Contracted landscape maintenance or street maintenance work through contractors or private companies is supervised and enforced by city staff on a daily basis. Contractors are required to remove and dispose of debris and landscape clippings properly.

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Provision No. XI.K of the Permit requires each Permittee to provide training to the public agency staff and to contract field operations staff on fertilizer and pesticide management, model maintenance procedures, and other pollution control measures. Permittee staff responsible for application of fertilizer or pesticides shall attend at least three of these training sessions during the five-year term of this Order (from 2002 to 2007).	
PERMITTEE	**1. Describe the training that your agency staff and/or contract field operations staff have received regarding fertilizer and pesticide management, model maintenance procedures, and other pollution control measures.**
Beaumont	Key field personnel involved in maintenance have previously received training sponsored by RCFCWD.
Calimesa	See attached Rene's Commercial Property Management Training Information (D)
Canyon Lake	The Canyon lake Property Owners Association (POA) personnel have attended training sessions sponsored by the Riverside County Flood Control District. The City will continue to encourage POA participation in training. The POA has also provided training to staff and implemented written policies.
Corona	All City of Corona staff responsible for application of fertilizers and pesticides are licensed Pesticide Applicators through the Department of Pesticide Regulation and receive annual certification training and continuing educational units through the Pesticide Applicators Professional Association (PAPA) and the Continuing Education Center for Pest Management. In addition, employees who handle pesticides also at minimum annually attend a Pesticide Safety Information Series as part of their Pesticide Safety Training Program. Staff involved with field operations for catch basin cleaning, building maintenance, fertilizer and pesticide management, and utility maintenance also attend the Municipal Activities annual training that is provided through Riverside County Flood Control that covers model maintenance procedures and pollutant control measures. Fleet management staff attend annual Spill Prevention Control and Countermeasure Plan training which covers storm water pollution prevention procedures.
Hemet	City of Hemet Public Works Department staff responsible for the application of pesticides attends continuing education training provided by the Pesticide Applicators Professional Association (PAPA), a California non-profit, public benefit corporation. PAPA sponsors statewide educational programs in cooperation with the University of California, municipal agencies and industry, providing training in safety, rules and regulations, current technology and field-tested research for pest management professionals.
Lake Elsinore	City staff is not responsible for landscape maintenance within and along the MS4's. Accel Greenscapes contracts with the City for the maintenance and application of fertilizers and Pesticides. Accel is responsible for providing their Staff with the specific training required for the application of pesticides and fertilizers.
Moreno Valley	Staff responsible for fertilizer and pesticide management attend training at regular intervals, as prescribed by law in order to maintain their applicators license.

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PERMITTEE	**1. Describe the training that your agency staff and/or contract field operations staff have received regarding fertilizer and pesticide management, model maintenance procedures, and other pollution control measures.**
Murrieta	*See Permittee's individual annual report*
Norco	The Department of Parks & Recreation has three employees that have attained state licensing to apply pesticides/herbicides. No City staff apply fertilizers. Fertilizing is done through contract.
Perris	The City's Public Works Supervisor is licensed to apply pesticides/herbicides. This licensed applicator has continued to receive training in accordance with the training requirements established by the California Department of Pesticide Regulation (DPR). Training is provided by a private company called Horticultural Pest Management. The City does not apply any "restricted products", and as such does not have any similar model procedures for the application of those restricted materials.
Riverside	City staff receives two days of training for their annual weeds spraying certificate. Additional staff cross training is being implemented, as storm drain maintenance crews also take on some weed management.
Riverside County	Staff assigned to apply pesticides have been trained on their proper use.
RCFC&WCD	RCFC&WCD staff do not apply fertilizer. Staff who are licensed to apply herbicides are required by the California Department of Pesticide Regulation (DPR) to meet continuing education standards. Licensing standards and procedures are established by the DPR and are described in the 1998 CCR, Title 3 (Food and Agriculture) and the 1997 California Food and Agriculture Code (Divisions 6, 7, & 13).
San Jacinto	Employees attend Pesticide Applicators Professional Association seminars for continuing education credits to maintain qualified applicator certificate for herbicide awareness including laws and regulations pertaining to herbicides and application processes. Employees also attend storm water awareness training at Riverside County Flood Control District.

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Provision No. XLM of the Permit requires each Permittee to annually evaluate their street/road sweeping frequency based on land use and historical information to determine the need to revise their sweeping frequency.	
PERMITTEE	**1. Describe the measures that your agency has taken to evaluate the street/road sweeping frequency based on land use and historical information to determine the need to revise their sweeping frequency.**
Beaumont	Through visual inspection the current program of once every other month has been very successful.
Calimesa	The City currently sweeps streets in the urbanized area of the City once a month (see attached 'E'). Due to the rural nature of the community, trash and debris is not a major problem. The one time per month sweep is deemed to be adequate at this time.
Canyon Lake	Evaluation completed of the street sweeping program conducted by the Property Owner Association (see attached). The City of Canyon Lake is responsible for the street sweeping of Railroad Canyon and Goetz Roads. The City contracts for weekly sweeping (every Tuesday) with CR&R (waste handler). The evaluation of both programs proved to be adequate.
Corona	Streets maintenance division is notified when new developments are accepted by City Council and instructed to add any new City streets for maintenance. The litter characterization study performed 2004/05 fiscal year attempted to identify litter quantities associated with land uses. The frequency of sweeping currently varies by land use area and is found to be sufficient in meeting program goals and objectives. Additional sweeping may be performed through a service request for unusual circumstances or special events and has been intensified in areas identified during the study as contributing significant amounts of litter.
Hemet	The City of Hemet evaluates the street sweeping schedule frequently throughout the year and makes adjustments as necessary. During the 2007-2008 fiscal year, residential streets (with curb and gutter) were swept once each month. Commercial areas were swept more often. Sweeping frequency is increased as needed to address specific problem areas, time of year (leaf season) or in response to storm events.
Lake Elsinore	Staff has reviewed current land use designations along with traffic trends to determine the most effective means for street sweeping and road maintenance. Currently all local residential roads are swept Twice a month, traffic citations are issued during the sweeping times to discourage the public from parking in the streets during the Designated times. By minimizing the vehicles along the curb the sweeper is able to more effectively sweep the streets with fewer areas left unswept. City Circulation element roads are swept twice a Year. City staff has the ability to maintain problem areas more frequently with the use of a small city owned and operated vacuum truck.

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PERMITTEE	**1. Describe the measures that your agency has taken to evaluate the street/road sweeping frequency based on land use and historical information to determine the need to revise their sweeping frequency.**
Moreno Valley	Moreno Valley has reviewed published data on street sweeping frequency and intervals. Moreno Valley sweeps its maintained public streets with continuous curb and gutter bi-weekly. This schedule is confirmed in the article, "A Clean Sweep to Swipe Pollutants", found in Stormwater Magazine, May/June, Volume 2 Number 4. The article states, "In terms of water quality, the ideal timing for sweeping isn't an interval at all. Small particles will hang out largely unseen and are not a danger until the rains come. If there is a trick, it's to accurately predict rain so that the streets are all swept moments before the rain hits. Since this kind of prediction and speed is highly impossible, it is easy to see why many look at biweekly sweeping as being a limit before returns start to diminish."
Murrieta	*See Permittee's individual annual report*
Norco	The City did not add the proposed 16 miles of curbside street sweeping service as anticipated for FY 2007/08. Negotiations with the City contractual street sweeping company is under current negotiations.
Perris	The city contracts with a private company to provide sweeping of approximately 2,329 residential and commercial curb miles combined. Approximately 46% of these miles are located within residential areas and are swept bi-monthly, while the remaining 54% are commercial areas swept bi-weekly. During the summer months, when water flows are rare, street sweeping may be increased to once a week in all areas to prevent the accumulation of large volumes of materials. This frequency has proved to be sufficient to address the prevention of storm water pollution prevention. In 2007, 1,320 tons of debris were removed from residential and commercial streets as part of the street sweeping program.
Riverside	During Fiscal Year 2007-08, the City's street sweeping program continued to be evaluated. One result includes continued implementation of fined enforcement of no parking for street sweeping. As a result of this enforcement, vehicles are detered from parking along streets scheduled for street sweeping that day, which thereby allows street sweepers to be more effective at removing debris and sediment from streets and gutters.
Riverside County	New developments are required to annex into CSA 152 for street sweeping services. On average street sweeping services are provided two times per month. For established neighborhoods within a Landscape Lighting and Maintenance District street sweeping is performed twice a month. In the Second Supervisorial District street sweeping is provided as part of the mandatory trash haulers agreement. Other service areas within the county are swept on an as needed basis.
RCFC&WCD	Street sweeping is performed within RCFC&WCD maintenance area.

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PERMITTEE	**1. Describe the measures that your agency has taken to evaluate the street/road sweeping frequency based on land use and historical information to determine the need to revise their sweeping frequency.**
San Jacinto	Street sweeping is performed on a monthly basis in residential areas and twice per month on arterial roadways as the City Of San Jacinto is primarily a residential community. A mechanical broom propane powered street sweeper was acquired this year to enhance street sweeping operations due to the areas geographic soil type. The street sweeping schedule has increased this year from 12 to 14 scheduled sweeping routes due to increase in development. A total of 416 tons of street sweeping waste was removed from city streets.

9. DEVELOPMENT PLANNING

Water Quality Management Plan

The 2002 MS4 Permit required that within 20 months of the 2002 MS4 Permit adoption (i.e. by June 25, 2004) the Permittees develop a Water Quality Management Plan (WQMP) identifying BMPs, including design standards for source control and structural BMPs, that are to be applied for certain categories of new development and significant redevelopment. Specific requirements are contained in 2002 MS4 Permit provision VIII.

WQMP Development, Public Notice, Comment Period, and Submittal

The Permittees initiated the process during FY 2003-2004 to develop the WQMP for submittal to the SARWQCB within the timeframes to comply with provision VIII. Final revisions and submittal to the Santa Ana RWQCB occurred during FY 2004-2005 based on the following chronology of events.

Significant Events - FY 2003-2004

- January-May — Permittees developed draft WQMP, noticed on web site
- April 6 — Permittees posted the draft WQMP on web sites, public notice appeared in the newspaper (Press Enterprise)
- April 30-June 1 — 30-day comment period
- May 18 — Public workshop
- June 1-24 — Permittees refined the draft WQMP, addressed & incorporated comments
- June 25 — Submitted the draft WQMP to the SARWQCB

Significant Events - FY 2004-2005

- August 5 — Permittees addressed comments that were received after the 30-day comment period and incorporated the revisions into the draft WQMP. Re-submit with revisions and errata clarifications to Santa Ana RWQCB.

- September 17 — Draft WQMP approved at Santa Ana RWQCB meeting.

- November 10 & 15 — Permittees host employee training sessions for development review staff on WQMP implementation.

- January 1, 2005 — WQMP effective for New Development and Significant Re-development projects in the Santa Ana region.

Significant Events - FY 2005-2006

- July 24, 2005 — Coordinated with the San Timoteo Watershed Management Authority to develop a watershed management plan that analyzed the effect of new development on water quality and water supply.
- May 23, 2006 — The Santa Margarita and Santa Ana co-permittees facilitated a meeting to discuss WQMP implementation issues and experiences. Attendees included representatives from various cities/county planning and engineering departments. The Permittees initiated development of a Frequently Asked Question (FAQ) committee to facilitate consistent implementation of the WQMP. The WQMP meeting is anticipated to be held, as needed, but at least quarterly. The Permittees are also working on revised BMP guidance to ensure the maintainability and functionality of BMPs. The guidance will focus on BMPs to address TMDL impairments.

Significant Events - FY 2006-2007

- October 10, 2006 — The Permittees recognized the need to provide guidance to help ensure consistent WQMP implementation. The Permittees began developing a Frequently Asked Questions (FAQ) document through a number of email exchanges between Work Group members. On October 5, 2006, Permittees met to develop a consensus on a final version of the FAQ document. In this

meeting participants thoroughly discussed the concepts and the wording for each of the 28 questions in the FAQ. The result of this effort is documented in the final FAQ completed on October 10, 2006.

- November 14, 2006 District staff met with Metropolitan Water District (MWD) to evaluate opportunities to discuss how WQMP implementation would address MWD's concerns with protecting water quality in Lake Mathews.

Significant Events - FY 2007-2008

- August 2, 2007 The Flood Control District, Riverside County and the MWD discussed assessing the current level of water quality protection for Lake Mathews, and maximizing existing programs (i.e. the WQMP) to address MWD's concerns with protecting water quality in Lake Mathews.

WQMP implementation provides further protection of Receiving Waters by building on existing programs to manage Urban Runoff from New Development and Significant Redevelopment projects under the jurisdiction of the Permittees. The WQMP provides a project planning and design framework that identifies the post-construction Best Management Practices (BMPs) that must be implemented those projects that require discretionary approval.

The WQMP identifies three major categories of post-construction BMPs to be addressed by New Development and Significant Redevelopment during the project planning and design phase:

- Site Design BMPs;
- Source Control BMPs; and
- Treatment Control BMPs.

The WQMP provides guidelines for project-specific post-construction BMPs, as well as the option of utilizing regional and sub-regional Treatment Control BMPs to manage Urban Runoff quantity and quality. In addition, the WQMP provides an outline for preparation of project-specific WQMPs. Project applicants must submit a project-specific WQMP to the local jurisdiction for review and approval prior to discretionary approval of a map or permit.

The impact of WQMP requirements on project proponents and the planning and permitting function of the local jurisdiction will vary greatly depending upon the size of the project under consideration.

The Riverside County WQMP Section 2.3 requires the Co-Permittees to document their procedures for WQMP administration and include a description of departments with implementation responsibility. WQMP implementation procedures are contained in each agency's specific Annual Report (**Appendix G**). The Co-Permittees have several departments involved in implementing and/or administering WQMP requirements. **Table 9-1** (shown below) has been edited to reflect the current departments with primary and secondary responsibility for providing conditions of approval.

Table 9-1. Department Responsible for Conditions of Approval

Co-Permittee	Primary Responsibility	Secondary Responsibility
County of Riverside	Planning Department with assistance of Riverside County Flood Control & Water Conservation District	Transportation and Land Management Agency – Building and Safety Department
Beaumont	Public Works	Planning
Calimesa	Planning Department	Public Works Department
Canyon Lake	Building and Safety	Code Enforcement
Corona	Public Works Department – Land Development Section	Public Works Department – Special Projects Section (NPDES)
Hemet	Public Works Department – Development Engineering	Public Works Department
Lake Elsinore	Engineering Division	Public Works
Moreno Valley	Public Works Department – Land Development Division	Public Works Department – Land Development Division
Murrieta	Engineering Department	Planning Department
Norco	Engineering/Public Works Department	Planning Department
Perris	Development Services Department-Planning Division (Preliminary WQMPs)	Public Works Department-Engineering Administration Division (Final WQMPs)
Riverside	Public Works Department	Community Development Department
San Jacinto	Planning	Engineering
Temecula	Public Works	Public Works

Hydromodification

The Permittees are also continuing to coordinate with Southern California Coastal Water Research Project (SCCWRP) to develop technical hydromodification guidance for Southern California. The Permittees have been actively participating with this effort by providing comments on the monitoring protocols used in the study, identifying sites that fit the site selection criteria, and by offering in-kind services for the survey work needed.

The goal of this project is to develop a series of tools for implementation of hydromodification management measures that could be used to better protect the physical, chemical, and biological integrity of streams and the associated beneficial uses. The project would consist of four technical tasks. The first task involves developing a mapping and classification system for streams based on their susceptibility to the effects of hydromodification. The second task establishes protocols for ongoing monitoring that is carefully designed to assess the effects of hydromodification. The third task involves development and calibration of dynamic models to assess the effects of hydromodification on stream condition. The fourth task would involve development of a series of tools that managers can easily apply to make recommendations or set requirements relative to hydromodification for new development and redevelopment.

The District used a specific site selection criterion to identify 14 locations in the Santa Ana and Santa Margarita Watersheds. SCCWRP staff visited each of these sites and made assessments on the scientific usefulness of each location. Each site was evaluated to determine whether it would be appropriate for the study. If a site is deemed appropriate for the study, it is then further characterized as a *Modeling* or a *Screening site*. *Modeling sites* will be physically surveyed with precise accuracy limits and will be used to determine how a particular stream will react for a variety of hypothetical situations. *Screening sites* will be used to identify the threshold between single and braided channels and will need only simple hand measurements. Out of the fourteen (14) possible sites, five (5) monitoring sites were selected as modeling sites based on their value toward the goals of this study. The District has offered to conduct the survey work for the five (5) modeling sites identified for the study. In addition, the District has identified at least 5 possible screening sites, with the final number of sites to be determined by SCCWRP's staff.

All of the three possible sites in the Santa Margarita watershed were eliminated because it was determined by SCCWRP staff that the sites in the Santa Ana and other watersheds in this study would provide better data for the goals of this study. The District has been assured by SCCWRP staff that the sites available in this study will provide enough data to be representative of the specific conditions in the Santa Margarita watershed. The SCCWRP staff has conducted a gap

analysis to ensure that all of the various watershed conditions necessary to complete the study are analyzed. Therefore, Santa Ana and other watershed sites will act as surrogates for Santa Margarita sites. The District has participated by offering the most number of sites and providing comprehensive support for implementing project tasks.

10. PUBLIC EDUCATION AND OUTREACH

WATERSHED SPECIFIC EDUCATIONAL ACTIVITIES CONDUCTED DURING THE REPORTING PERIOD

This section provides an overview of watershed specific education activities conducted by the Permittees during the reporting period. **Appendix E** contains images of most public education materials that are described in this section.

Program Overview

The Riverside County NPDES Permittees have established an ongoing watershed based public education and outreach program known as the "***Only Rain Down the Storm Drain"*** pollution prevention program. The specific objectives of the public education program include:

- Fostering a broad public awareness of water pollution concerns;
- Increasing public acceptance of pollution prevention activities to curtail everyday human behaviors that contribute to water quality problems;
- Educating/informing the general public, regulators and key local government and state decision makers on Urban Runoff conditions in Riverside County; and
- Promoting stewardship of local water resources.

The *"Only Rain Down the Storm Drain"* program implements the public awareness objectives by focusing on three areas of pollutant reduction/prevention:

- Public Behavior;
- Proper Management of Pollutants; and
- Business Specific Education Outreach.

In addition, when attempting to make use of the finite resources available to the Public Education Program, the Permittees use these management goals to ensure that resources are used effectively:

- Focusing on pollutants of concern specific to each watershed region;
- Coordinating public education efforts with adjacent storm water management programs and other related education programs to share resources, coordinate outreach efforts, and avoid costly duplication of effort; and
- Adapt public education programs and objectives, based on effectiveness analysis, to address changing MS4 programs and objectives.

Program Highlights

The public education program continues to develop changes for the better. Highlights include:

- The public education program has developed surveys in both English and Spanish. The purpose of these surveys is to evaluate the effectiveness of the public education program and distributed to the public at community events. The results of these surveys are contained in **Appendix E.** The public education web page continues to be revamped and improved.
- The program continues to update brochures and develop outreach programs specific to the needs of the MS4.
- Each month, the County hosts a New Employee Orientation to an average of forty (40) new employees. All the attendees receive "Only Rain Down the Storm Drain" materials and promotionals. The message to call the Toll Free 800 Number to report illegal storm drain disposal is incorporated into all materials.
- Monthly public outreach news via an e-message is issued to well over 230 members who request our materials for their own outreach efforts and distribution within their agency.

Santa Ana Pollutants of Concern

Based on monitoring data collected to date, the current 303(d) List and discussions among the Co-Permittees and stakeholders, the following preventative pollutants of concern were established for this watershed. More discussion on the selection of preventative pollutants of concern can be found in the monitoring section of this report. After each identified pollutant, specific BMP outreach activities are identified to address the pollutant:

- Sedimentation associated with Urban Development and Land Uses

    - Specific section on construction, municipal, industrial/commercial and new development training focusing on the need to address sedimentation within the watershed;
    - Distribution of dust pans at public education outreach events to promote dry cleaning of drive ways and impervious surfaces;
    - Construction BMP Poster;
    - School/Student program incorporates education on controlling soil erosion;
    - The "After the Storm" and Storm Water Pollution, what you should know brochures
    - General Construction Activities & Outdoor Activities brochure

- Nutrients and pathogens associated with Urban Development and Land Uses

- Specific section on construction, municipal, industrial/commercial and new development training focusing on the need to address increased nutrients within the watershed;
- Pet Waste "What's the Scoop" brochure;
- Partnership with SGA Advertising to place pet waste information in pet stores, veterinarian clinics, kennels and pet grooming facilities;
- Coordination with Riverside County Animal Control Department to distribute "What's the Scoop" and "After the Storm" brochures to families adopting pets;
- The Agricultural Commissioner assist in educating on water conservation, fertilizer management and integrated pest management practices. In conjunction with County Waste Management's Composting Workshop, the "After the Storm" brochure and Household Hazardous Waste flyer is included in the adult informational packet.
- "Keep Our Water Clean" video to cover proper use of fertilizers as well as excess runoff from sprinklers;
- Earth Day mailing inserts were developed to inform residents about the problem of storm water pollution and provide simple pollution prevention activities in gardening;
- Adult presentations conducted by RCRCD discussing the effects of fertilizers and pesticides on local waterways;
- The "After the Storm" brochure; and
- Construction BMP Activities brochure and poster.

In addition, the District has developed other outreach materials to focus on other pollutants and pollutant causing activities/businesses commonly associated with urban runoff. Outreach methods can be combined to focus on specific pollutants that may exist within the watershed.

24-hour Watershed-Wide Outreach Portals

The Permittees maintain three 24-hour/7 days per week watershed wide portals to receive and distribute information regarding the "Only Rain Down the Storm Drain" program. These portals include a website, 1-800 number and an e-mail address.

Storm Water Protection Program Website

The District operates a website that provides information on how to report illegal dumping, clogged storm drains, facility signage and worn or missing curb markers, as well as provide information on upcoming activities, opportunities for public participation in program development and general information about Urban Runoff pollution prevention techniques. The website address is: http://www.rcflood.org/stormwater/

Almost all of the District's outreach materials have been scanned into an electronic .Pdf format and are available for download. Online order forms and phone numbers are also available to assist in obtaining information that might not otherwise be available online.

The website contains pages specific to the following target audiences:

- General Public/Residents
- Businesses
- Developers
- Contractors
- Schools and Teachers
- Kids Page

In addition, the website contains links to:

- Assist viewers in locating their watershed
- An online media library
- Materials order form
- Reporting illegal storm drain disposal

The District tracks the number of hits to its public education website. The website was completely revamped during the previous reporting period and the web-page counter replaced this reporting period. Results of the webpage counter report are included in **Appendix E.**

Storm Water toll free 1-800 Hotline

On October 1994, a Toll Free "800" telephone number for reporting suspected Urban Runoff pollution and obtaining pollution prevention information was established.

1. This call line offers easy to understand instructions for connecting to County Environmental Health or Waste Management to obtain grasscycling, composting, or household hazardous waste collection dates and locations.
2. The 24-hour Hotline also allows callers to report clogged catch basin inlets, illegal dumping and other illicit discharge violations.
3. Finally, the hotline allows people to order public education materials and/or request storm water presentations for schools or community groups. The Permittees advertise the hotline in all appropriate County telephone directories, public education outreach materials, and in other appropriate venues and locations. Callers to the hotline are given options to seek emergency services if the spill is of a suspicious origin or a safety issue.

The 1-800 line diverts callers to appropriate Permittee departments based on caller selections. Callers requesting information on pollution collection activities are diverted to either County Environmental Health or Waste Management depending on their specific selection. Callers reporting illicit discharges are directed to County Code Enforcement, who accepts the calls and then re-directs them to appropriate Permittee Code Enforcement Departments. Calls for public education materials or presentations are directed to the district's front desk and then to the District's Public Education Staff. School presentation inquiries are directed to either the Riverside-Corona Resource Conservation District office, who have been contracted to provide education to elementary schools in the Santa Ana Region. Mission Resource Conservation District covers a small area in the Santa Ana region, due to the increase demand for school presentations in that area. The specific text to the hotline is included as **Exhibit A**.

The provider of the 1-800 line, the Riverside County Communications Department, tracks the number of incoming calls to the line. This tracking mechanism was discontinued during past reporting period but restored this reporting period.

Exhibit A

"ONLY RAIN DOWN THE STORM DRAIN" POLLUTION PREVENTION PROGRAM

TOLL FREE 1-800 LINE DIALOGUE

Thank you for calling the "Only Rain Down the Storm Drain" Pollution Prevention Program. To better serve the needs of our County communities, please listen carefully to the following options:

If this is an emergency, or you wish to report a significant release or threatened releases of hazardous material into the storm drain or elsewhere in the environment, please hang up and immediately Dial 911.

(Si esta llamada es una emergencia o decea reportar desechos de contaminantes peligrosos en las alcantarillas o en el medio ambiente, por favor cuelge y llame 911.)

For water service connection, disconnection, or any other water utility information, call your local water service provider.

To report illegal dumping at residential, commercial, industrial or construction sites, please call Environmental Health at 951.955.8982, or press #1 to be directly connected.

For information regarding Household Hazardous Waste Collection Events, please Press #2.

To report clogged storm drains, please call your local municipal public works department. To report faded or missing "Only Rain Down the Storm Drain" storm drain markers, please press #3.

For General or specific business pollution prevention information or to receive other pollution prevention information please press #3.

(Drop Off Dialogue)

Thank you for your interest in obtaining information on storm drain pollution protection. Basic, construction, industrial, commercial and children's storm water protection outreach packets are available. For a quick response to your request, please slowly and clearly leave your name, address, city and zip code. Also state the type and quantity of the materials you are interested in receiving. Should you need additional assistance, provide your area code and phone number and someone will contact you as soon as possible.

To inquire about our free storm water classroom presentations, workshops, youth group activities and other outreach programs, please press #4.

(Drop Off Dialogue)

The "Only Rain Down the Storm Drain" public education program offers classroom presentations, workshops, youth group activities, special event opportunities and other programs. For inquiries for the Temecula or Murrieta area, please press #1 (Drops to Mission Resource Conservation District)

For inquiries in all other Riverside County areas, press 2 (drops to Riverside-Corona Resource Conservation District).

For Grasscycling and composting information or workshops, please PRESS #5. (to 951.486.3200)

For additional assistance regarding our storm drain pollution prevention program during regular business office hours, Monday through Thursday from 7:30 am to 5:30 pm and on Friday from 7:30 am to 4:30 pm

E-mail

The Permittees also maintain an e-mail address that can be used to report illicit discharges or request storm water related public information. The e-mail address is fcnpdes@rcflood.org

E-mails are received by the District's Public Information Specialist and are responded to, in most cases, within 2 business days.

Program Coordination with other Stakeholders

The "Only Rain Down the Storm Drain" program has used partnerships to leverage and increase available resources. The Permittees utilize every opportunity to work with Co-Permittees, local environmental groups, and other public, private and business organizations to maximize use of existing distribution outlets, events, programs and materials. Impressions, attendance, and other measures of effectiveness relative to these programs are included in **Appendix E** (Public Education) of this Watershed Annual Report.

To facilitate statewide awareness of storm water public education, educate local and state decision makers, and assist in the development of more effective public education outreach programs, the District participates in the following public education committees:

- Public Information Public Participation Committee (PIPP) – A sub-committee of the California Storm Water Quality Association, and
- Western Regional Pollution Prevention Network (WRPPN)

To leverage education outreach resources and coordinate public education activities with other environmental programs, the Permittees closely coordinate and/or have existing partnerships with the following entities/organizations:

- **Household Hazardous Waste Information Exchange (HHWIE);** This is an eGroup that provides household hazardous waste affiliates the ability to better communicate, share ideas and the latest in legislative rulings;
- **Riverside-Corona Resource Conservation District (RCRCD);**
- Partnership to provide student education outreach in the Santa Ana and Whitewater Watersheds;
- Partnership to provide adult education outreach activities in the Santa Ana and Whitewater Watersheds;
- Partnership to provide support services for public education outreach activities at community events;

- **Mission Resource Conservation District (RCRCD);**
- Partnership to provide student education outreach in the Santa Ana and Santa Margarita Watersheds;
- Partnership to provide adult education outreach activities in the Santa Ana and Santa Margarita Watersheds:
    - Partnership to provide support services for public education outreach activities at community events

- **California Regional Environmental Education Community Network (CREEC)**
  A network whose mission is to develop a communication network which provides educators with access to high quality environmental education resources to enhance the environmental literacy of California students.

- **Santa Ana River Watershed Clean Up Stakeholders Group** in coordination with Riverside Corona Conservation District, Keep Riverside Clean and Beautiful and the California Coastal Commission's Coast. This collaboration of environmental partners support and encourage volunteers, allies and groups to gather for a day to remove trash and debris from the Santa Ana River that might otherwise flow downstream, through the river to the ocean.

- In addition the "Only Rain Down the Storm Drain" program also coordinates with the following City/County departments to distribute appropriate storm water education outreach materials:

    - Cities/County/Districts Front Counters
    - County Waste Management
    - County Public Health Department
    - County Agriculture Department
    - County Executive Offices
    - County Code Enforcement
    - County Parks
    - County Animal Control
    - County Economic Development Agency
    - County Assessor/Recorder's Office
    - Bio-terrorism
    - County Fleet Services
    - County Human Resources
    - County/City Library System

- County Safety
- County DPSS
- County Transportation and Land Management

In general, brochures and promotional items are provided to these departments for distribution in public lobbies, training sessions, through customer interactions and new employee orientations.

Finally, the "Only Drain Down the Storm Drain" Program also coordinates with the following state and/or local government or business entities to distribute public education information:

- Western Riverside Council of Governments
- Santa Ana Regional Water Quality Control Board
- Orange County Watershed & Coastal Resources Division
- Santa Ana Watershed Project Authority
- South Coast Air Quality Management District
- Santa Rosa Plateau Reserve
- United States Bureau of Reclamation
- Elsinore Valley Municipal Water District
- Metropolitan Water District
- Lake Elsinore/San Jacinto Watershed Authority
- Eastern Municipal Water District
- The Water Education Center
- Rancho California Water District
- Habitat for Humanity
- Department of Water Resources Southern District
- Western Municipal Water District
- Business Industrial Association (BIA)
- Caltrans
- Riverside Unified School District After School Programs

Outreach Tools to Change Public Behavior

The "Only Rain Down the Storm Drain" program conducts a wide range of outreach activities to residents, students, community groups, new home owners, homeowner associations; informing them of how their "everyday activities" may contribute to the pollution of Receiving Waters, and encouraging them to adopt alternatives that will lessen or eliminate pollution-causing behaviors. Program efforts include providing information on pollution prevention techniques and informing

residents about the proper disposal of household hazardous wastes, construction materials, used motor oil, pet waste and litter. Public education materials and media emphasize the theme that all citizens have a role to play in reducing and preventing the polluting of Receiving Waters. The goal is to present a clear and consistent message that explains the simple connections between people's everyday activities and their impacts upon Receiving Water quality.

As the public education and outreach program continues to be implemented and enhanced, the Permittees hope to broaden public awareness of Urban Runoff quality problems, promote proper disposal of household hazardous waste and motor oil, encourage illegal discharge reporting, foster good stewardship of Receiving Waters, and take personal responsibility for their actions in preventing pollution.

While public education outreach at events indicates that most people are willing to act in an environmentally responsible manner if given simple ways to change their behavior to avoid polluting our water bodies; most are unaware of the sources of pollution from everyday urban land use. The "Only Rain Down the Storm Drain" pollution prevention program using various media forms educates the County's population about modified behaviors to prevent storm water pollution by focusing on residents, general public, students, home gardeners, do-it-yourselfers, mobile businesses, etc.

Direct Outreach Methods

The "Only Rain Down the Storm Drain" program interfaces directly via program staff, or through contracts and partnerships, to the public through attendance at community events, school education programs, adult education programs and/or by providing classroom based training. Specific outreach activities, segregated by target audiences, are described below.

E-list of 230 storm water partners who are contacted monthly about new brochures, upcoming events and invitation to solicit purchasing partnerships.

General Community Outreach

The "Only Rain Down the Storm Drain" program participates in various community events to ensure that our message is delivered to the largest possible municipal audience. At these community events, surveys, to assess overall program effectiveness, have been used.

In addition, the "Only Rain Down the Storm Drain" program has partnered with County Environmental Health to ensure that a storm drain pollution prevention material is available and distributed at all Household Hazardous Waste and Antifreeze, Batteries, Oil and Paint Collection Centers and/or events throughout each of the Watershed Regions within Riverside County. These

events provide free disposal sites for receiving common pollutants that can impair Receiving Waters.

Elementary School Outreach

Elementary (K-6)

The Riverside–Corona Resource Conservation District (RCRCD) continues to provide a variety of K-6 education programs for the "Only Rain Down the Storm Drain" Program. The K-6 education program includes materials such as the Storm Water Pollution Prevention Patrol workbook, the Fancy Fin hands-on classroom presentation and accompanying coloring book, various word match and crossword activity sheets and videos. A second story line featuring Fancy Fin and her friend Phinnious J. Green (a Pacific Tree Frog) educate students about point and non-point pollution and their effects on the environment and other creatures in the watershed. School materials are offered to all public and private schools in the Santa Ana Watershed Region, as well as to youth groups such as the Boy and Girl Scouts and clubs.

Secondary Schools

A video entitled "How to Conduct an Environmentally Friendly Car Wash and Make Money Too" was developed for the "Car Wash Challenge" program. An accompanying flyer is also used which informs students/groups of the potential storm water problems generated from car wash runoff, and provides practical BMPs to minimize or eliminate contaminated runoff. The original focus of the program was high school clubs. However, after contacting several high schools, it was discovered that car washing fundraisers are relatively rare and revenue deficient in comparison with other high school fund raising activities. Nevertheless, church groups, scout troops and other organizations do conduct car wash fundraisers. Thus, the scope of the Car Wash Challenge program has been expanded to include these additional fundraising organizations.

Adult Outreach

Valley Greeters is a "Welcoming Wagon" business taking discount coupons, product samples and general vicinity information door to door to new residents and homeowners to the Temecula, Murrieta and Lake Elsinore area. For the past four years, Valley Greeters has included our MS4 materials, (After the Storm; What's the Scoop; Pool, Spa and Fountain Maintenance and HHW Collection Schedule). This information is accompanied with a handy full size dustpan, shop cloth and vehicle air freshener. Every material and promotional is clearly imprinted with the 1-800 Toll Free number for reporting illegal discharges into the storm drain. Young family members receive a copy of Fancy Finn and box of crayons. This business is solely dependent on the status of the

construction economy and since January, 2007, the number of newcomers to the area had diminished significantly and Valley Greeters have since closed their doors. .

Adult Outreach is now carried out through Back to School Night events in the Santa Ana Region. The Public Information's Specialist gives presentations to families attending the Orientation and from that forum distributes the MS4 materials and promotionals mentioned above.

The "Only Rain Down the Storm Drain" program contracts with the Riverside-Corona Resource Conservation District for public outreach. Storm Water Pollution Prevention presentations are given to community groups who call and request such services.

Steve Groner & Associates has been retained to prepare and present workshops at major home improvement stores throughout Riverside County. The workshops include passing out reading material regarding targeted BMPs to the public through established corporate partnerships (paint, hardware, home show coordinators, home improvement, garden centers, nurseries and pet stores). All commercial employees are informed about storm water impacts that could occur from the improper application of all types of home and garden hazardous chemicals. In turn, the employees are then able to share with customers on the proper use and disposal of products that are potential storm drain pollutants. Attendees at the workshop receive "Only Rain Down the Storm Drain" promotionals to help earn the support of the public to protect receiving waters. Fixed advertising tools such as counter displays, tear sheets have been placed throughout to attract attention. Their outreach details are included in this report.

Brochures

Residential: After the Storm; Storm Water Pollution and the Solutions, Household Hazardous Waste Collection Schedule, Outdoor Activities; Swimming Pool, Jacuzzi and Fountain Maintenance; and What's the Scoop (Pet waste).

Outreach Materials

In addition to the brochures mentioned above, the program utilizes other effective outreach materials such as, magnets, a billboard ad, videos, newspaper supplements, flyers, door knob hangers, calendars, promotionals items, workbooks, curriculum, shop rags, shelf talkers, tear sheets, posters and print ads to cultivate interest in the program.

A door hanger is also being utilized to help address problem discharges that are commonly observed in residential settings. The door hanger notifies the recipient that a problem discharge was observed flowing in to the street and offering help by following recommended pollution

prevention activities. The door hanger is provided to all cities and is used by NPDES staff and various County departments when conducting field or site activities/inspections.

Mailing Inserts/Slugs

The "Only Rain Down the Storm Drain" Pollution Prevention Program encourages advertising the County's Household Hazardous Waste Collection events via the use of mail inserts. The inserts are included in various utility bills and special notice mass mailings.

In addition, the "Only Rain Down the Storm Drain" program has coordinated with the County Mail Department to have the postage meter carry the "Only Rain Down the Storm Drain" message and the 1-800 Toll Free number to report an illegal storm drain disposal or spill. In 2005/2006, over 5,000,000 pieces of outgoing County mail were stamped with the message. *In November of 2006, the postage system was replaced with sophisticated postage meter units but the cost of the ink in the new system far exceeded the benefits from this media option, therefore, this media preference was discontinued.*

Media Outreach

The "Only Rain Down the Storm Drain" Program continues to utilize various mass media to reach the public and promote the storm water pollution prevention. Special newspaper inserts, fliers, and advertisements help increase public awareness of storm water pollution and environmental protection.

- Our Sixth Edition of a four-page insert called the National Pollution Prevention or P-2, (National Pollution Prevention Week recognition), is distributed Countywide through the PennySaver publication. The insert included topics on proper disposal of pet waste, non-toxic pesticide recipes, motor oil recycling, grass-cycling, pool and spa best management practices, storm drain marking program, storm water school presentations, general storm drain pollution protection, business storm water pollution information, household hazardous waste (HHW) collection events, syringe disposal program, composting workshops and motor oil specific recycling locations. The insert is released to over 650,500 Riverside County homes generating an increase of pollution prevention awareness, Toll Free 800 Hotline activity and District IC/ID investigations.

Cooperative Used Oil Program

The Western Riverside Council of Governments (WRCOG) is responsible for administering the Used Oil Block Cycle Grant on behalf of ten cities within WRCOG's boundaries. These cities

include: Banning, Beaumont, Canyon Lake, Lake Elsinore, Murrieta, Norco, Perris, Riverside, San Jacinto and Temecula. The target audience is the D Yourselfer (DIYers).

The objective of the Used Oil Block Grant is to make it convenient for Do-It-Yourselfers (DIYers) to recycle their used oil and to make it easy for them to find a Certified Center accepting used oil. In order for these centers to be certified, they need to apply for certification with the California Integrated Waste Management Board (CIWMB). As the lead grant recipient, WRCOG contacts non-certified centers in the jurisdiction to interest them in becoming certified used motor oil collection centers. The goal is to see a significant decrease in the amount of illegally dumped motor oil by adding more oil collection centers within close proximity to users.

Through the same grant funding source, WRCOG also provides tight and secure used oil containers for distribution, at no cost, to DIYer's who need containers. Through WRCOG efforts, all certified centers in the County are in compliance to state and local mandates. During this fiscal year, *144 motor oil drain containers were distributed and 148,606 gallons of motor oil were collected.*

The Storm Drain Pollution Prevention Program assists WRCOG's efforts by making available our MS4 information and supporting promotionals for distributions to their targeted groups.

At various venues, WRCOG staff obtain participant responses to a ten question survey. The survey examines the public's understanding on:

- used oil recycling,
- used oil drop-off locations,
- curbside programs, and other local recycling programs.

The program also maintains a Toll Free 800 Hotline to obtain answers to any recycling question a resident may have regarding, "The nearest Certified Center is located?" and "Where can I find a used oil container?". The phone number is printed on all District distributed materials including the oil containers that on occasion are provided by other organizations.

Cleanest County in the West Program

Through another grant funding source, WRCOG created the "Cleanest County in the West" program to address issues relating to litter and illegal dumping. The program was designed to assist jurisdictions in meeting the 50% diversion goals mandated by Assembly Bill 939. AB 939 was a state mandate signed in 1989 that required cities to reduce their waste by 50% by the Year 2000.

WRCOG also participates in large venue events to promote the use of alternative vehicle fuels. Car Care for Clean Air whose objective is to increase public awareness regarding the benefits of proper vehicle maintenance and repair. These events give staff an opportunity to assess how informed the local community is regarding recycling and also allows us to distributed brochures and informationals flyers that will assist people in finding the nearest recycling center.

The District partners with WRCOG with either the provision of staff or with providing storm water pollution prevention materials and promotionals for their efforts.

WRCOG provides equal services to all jurisdictions regardless of their grant contribution. The goal is the same with all the jurisdictions, an increase in used oil recycling. WRCOG offers these services to make it more convenient for the DIYers to recycle and result in the increase of recycled used oil.

Like the "Only Rain Down the Storm Drain" Program which promotes litter reduction through reuse and recycling throughout the Santa Ana Region, WRCOG also participates in events to promote litter reduction and beverage container recycling. These events provide staff an opportunity to assess how informed the local community is regarding recycling and provisions for distributing brochures and informational flyers that will assist people in finding the nearest recycling center. During these events promotional items made from recycled content are also given out to show examples on how used items such as money can be recycled into other items, such as the pencil made from shredded currency, a promotional product first used by the "Only Rain Down the Storm Drain" Program. Promotional items made from discards especially draw the interest of the people visiting the booth and demonstrating how almost anything can be recycled and reused.

Outreach tools specific to Business Specific

The "Only Rain Down the Storm Drain" Program conducts a wide range of outreach activities to businesses; informing them of how their "everyday activities" may contribute to the pollution of Receiving Waters, and encouraging them to adopt alternatives that will lessen or eliminate polluting-causing activities. Program efforts include providing information on pollution prevention techniques and informing businesses about the proper disposal of wastes. Public education materials and media emphasize the theme that all businesses have a role to play in reducing and preventing the polluting of Receiving Waters. The goal is to present a clear and consistent message that explains the simple connections between a business' everyday activities and their impacts upon Receiving Water quality.

Originally, the business education program mainly consisted of the development and distribution of formal BMP guidance and outreach through business associations and publications. The program has now expanded to include direct outreach to businesses through business licenses applications and renewals and placing exhibits at various business specific symposiums.

Discussion of the current Business Specific Outreach tools implemented by the Permittees are discussed below.

Direct Business Outreach Activities

Through the *Compliance Assistance Program (CAP),* a partnership with County Environmental Health, restaurants and businesses that handle hazardous wastes are reviewed for potential storm water impacts from their activities. Each business is provided with storm drain pollution prevention public education outreach information specific to their activities.

Within the 07/08 Fiscal Year, the Board of Supervisors passed legislation to require all businesses in Riverside County to obtain a business license. Billing inserts were developed for the *County's Transportation and land Management's, Business License Division* and are included in all license renewal notices. New businesses receive their storm water education that is affixed to their application.

The first year of the business license program 979 storm water pollution prevention informationals were distributed. The *07/08 Year* resulted in *7,503* urban runoff awareness inserts were issued.

Steve Groner Associates has been retained to prepare and present workshops at major home improvement stores throughout Riverside County. The workshops include a handout educating the store's employees about storm water impacts that could occur from the improper application of paint, pesticides or fertilizers. Attendees at the workshop also receive "Only Rain Down the Storm Drain" information and promotionals to help highlight the storm water protection message. Employees are then able to share with customers the proper use and disposal of products that are potential storm drain pollutants. Point of purchase displays, tear sheets, and counter displays have been installed at strategic locations to brief the public on storm water pollution prevention. SGA's complete report can be found at the end of this section.

Brochures

<u>*Commercial:*</u> After the Storm; Food Facilities; Outdoor Cleaning Activities, and Automotive Maintenance & Car Care and Storm Water Pollution and the Solutions. Note: The Outdoor

Activity brochure will include broader examples of urban pollution causing activities such as, power washers and mobile vehicle maintenance operators.

Industrial: After the Storm; Outdoor Cleaning Activities; and Your Facility May Need a Storm Water Permit. The Permit brochure is scheduled to be revised in 08/09.

Construction: After the Storm; Outdoor Cleaning Activities; General Construction & Site Supervision. Once the General Construction permit has been finalized, revisions to the construction brochure will reflect the new permit requirements. .

Posters

BMP posters for automotive, food service establishments (available in Spanish) and construction employees are available. The posters address activities associated with the automotive repair industry, and the food/restaurant industry that may pose a threat to water quality. There are also two posters for the commercial Fueling Stations and Service Bay Service centers. All the posters recommend storm water BMPs and are designed to serve as an informative and attractive visual reminder for employees.

Media Outreach

Since an opportunity to reach business owners directly through the County's Business Licensing Program availed itself, there was no need to advertise in and out of the County area through the Inland Business Press trade newspaper. In the County's Program, all new business license applicants and renewals receive an insert informing readers on the types of activities that threaten water quality. The insert also refers to both the County and CASQA's website.

Supplemental Environmental Projects (SEP)

In an effort to encourage behavioral change from large storm drain pollution prevention offenders in the County, Environmental Health established a Supplemental Environmental Project (SEP). The SEP requires a monetary fine from the violator and/or the violator's cooperation for the development of a public education tool on the effects of polluted urban run off, to be paid by the violator. SEP's have included:

- A Downs Energy SEP resulted in the development of a billboard ad that has been greeting commuters traveling Westbound on the 60 Freeway lanes.
- Connoco Phillips SEP resulted in a development of two posters which address the retail fueling and service bay stations.

- No other SEP violations have been delegated to the storm water program.

Outreach tools specific to Pollutants

"Only Rain Down the Storm Drain" Pollution Prevention Program conducts a wide range of outreach activities focusing on reduction of certain pollutants in the receiving waters. These outreach activities focus on sources of those pollutants whether it is residential, business, municipal or some other state or federal source. Education materials explain how "everyday activities" of potential sources may contribute to the pollution of receiving waters, and encourage the sources to adopt alternative approaches to pollutant management that will lessen or eliminate pollution-causing activities. Program efforts include providing information on pollution prevention techniques and informing sources about the proper disposal of pollutants. Public education materials and media emphasize the theme that all citizens/businesses have a role to play in reducing and preventing the polluting of receiving waters. The goal is to present a clear and consistent message that explains the simple connections between a business' everyday activities and their impacts upon Receiving Water quality.

Each subsection that follows identifies how existing outreach materials previously described address specific potential pollutant sources in the watershed.

Use of pesticides, fertilizers, and herbicides

A. *The Riverside County Agricultural Commissioner's Pesticide Applicator's License* renewal information package includes materials on the proper use of pesticides and offers information on training workshops. The license renewal process requires continuing education of applicants and detailed record keeping of pesticide applications. Municipal employees that are responsible for the application of pesticides are encouraged to obtain and maintain credentials as Certified Applicators and/or licensed Pest Control Advisors.

B. Available information on the use of pesticides, fertilizers and herbicides has been expanded to include Home Composting Made Easy booklet; Southern California Heritage Gardening Guide (DVD), and spray bottles with non-toxic garden and household recipes. In addition, local nurseries assist in the distribution of this material along with information on the County's FREE Compost Workshops.
C. Western Municipal Water District provides free Garden Friendly Garden tours and distributes storm water pollution prevention materials and promotionals to all visitors. Items such as the spray bottle with non-toxic garden and household recipes are popular and become their regular give-away item.

D. The "Keep Our Water Clean" video covers proper use of pesticides, fertilizers and herbicides, as well as limit excess runoff from sprinklers.

E. Every September the "Only Rain Down The Storm Drain's" participation in the National Pollution Prevention Week insert publication informs residents on the problems of storm water pollution and provides simple pollution prevention activities in gardening.

F. The "Only Rain Down The Storm Drain" adult presentations conducted by the Riverside Corona Resource Conservation District (RCRCD) provides slide show and program was presented two times to more than *235* people. The presentation discusses the effects of pesticides and fertilizers on local waterways. The materials distributed following the presentation promote alternatives to pesticide use in the yard and garden.

G. The 2008 Environmental Calendar included a wide array of storm water protection information. It is designed to attract the adult audience by listing best management practices, scheduled special events, household hazardous waste collection sites, used oil collection sites, composting workshops, citywide clean ups, and each of the watersheds along with geographical information. Steve Groner & Associates has been retained to prepare and present employee workshops at major home improvement stores throughout Riverside County. The workshops include information on BMPs the public should be aware of for pesticide and fertilizer application, use, and storage. This information is then passed on to the consumer. Throughout the calendar the main message is "Only Rain Down The Storm Drain" and the hotline number is referenced for obtaining additional home garden care information.

Educate/inform on impacts from littering and improper waste disposal

The brochure "Household Hazardous Waste – A Guide For the Proper Disposal of HHW and the Use of Environmentally Friendly Products" informs residents of the effects of improper disposal of HHW and offers recipes for less toxic alternatives to commonly used household products. This brochure has since been tabled and information provided in the form of a useable spray bottle that is imprinted with non-hazardous recipes and accompanied with the After the Storm brochure.

Through classroom activity books, work sheets, coloring books and presentations, children are taught to put trash in its proper place, the function of Household Hazardous Waste Collection Centers and recycling.

The "Only Rain Down the Storm Drain" brochures and the dual picture frame magnet encourage residents to report illegal dumping to the "Only Rain Down the Storm Drain" toll-free phone number. The magnet design will be changed to a more colorful and original graphic that will be discussed in more detail in the next Annual Report.

The Riverside Corona Conservation District's adult presentation discusses the various pollutants of concern that contribute to storm water pollution – including trash and debris – residents are reminded to always pick-up waste and dispose of it properly.

The door hanger "A Storm Drain Dumping violation has been found in YOUR neighborhood" informs residents about the effects of improper waste disposal and encourages them to participate in simple, pollution prevention activities.

Educate/inform on impacts from dumping pollutants into storm drainage systems.

The "After the Storm" brochure informs residents of the negative environmental impacts caused by pollutants allowed to enter storm drains.

The "Keep Our Water Clean" DAVD and PSAs inform residents about the problem of storm water pollution and describes pollution prevention activities.

The school program stresses the importance of never dumping anything into the storm drain. Both the Santa Ana classroom activity book and the "Fancy Fin" presentation specifically address this issue.

Riverside Corona Resource Conservation District works with organized volunteer groups for catch basin marking events throughout the Riverside County, Santa Ana Watershed limits. These colorful, durable markers remind residents to NEVER pour anything down a storm drain.

The "Only Rain in the Drain" song, produced by the NPDES Program is distributed to and played for the elementary school audience. The lyrics recite the improper disposal into the storm drain.

The Riverside Corona Resource Conservation District's adult presentation addresses the issue of improperly dumping pollutants into the storm drain and advises residents that storm drains connect directly – without treatment – to local waterways.

The *2008 Environmental Calendar* contains various instructive statements reminding users to keep all wastes out of the storm drain system, more specifically, to remember and act on the *ONLY RAIN DOWN THE STORM DRAIN* slogan.

The door hanger "A Storm Drain Dumping Violation has been found in YOUR neighborhood" informs residents about the effects of dumping pollutants into the storm drains, encourages them to follow simple pollution prevention activities and curtails illegal dumping behavior.

Steve Groner Associates has been retained to prepare and present employee workshops at major home improvement stores throughout Riverside County, so that employees can properly communicate this message to their customers. The workshops also discuss that paints or paint-related products should **never** be disposed of in a storm drain or gutter.

Educate on impacts from gasoline, fuel oil, and oil and grease

The *"Automotive Maintenance & Car Care"* BMP brochure specifically identifies recommended BMPs that address the problem of gasoline, oil and grease entering into storm drains.

Nearly all of the *Only Rain Down the Storm Drain* brochures, utility inserts, advertisements, school programs and audio and video PSAs provide information about negative water quality impacts from improper disposals and spills from gasoline, oil and chemicals in simple language.

The "Keep our Water Clean" DVD specifically covers the topic of grease and oil from vehicles.

The *"Only Rain Down the Storm Drain"* program works cooperatively with the Permittees' motor oil recycling programs to distribute information on the "why" and "how to" of used motor oil disposal. The motor oil recycling programs actively distribute the *"Only Rain Down the Storm Drain"* materials in conjunction with their outreach efforts, since both programs are working towards the same goal of protecting the environment through pollution prevention.

The new and expanded *"What you should know for…Outdoor cleaning Activities"* brochure informs customers that vehicle fluids pose a threat to local waterways and groundwater resources and provides BMPs to keep these pollutants out of the storm drains.

The *2008 "Environmental Calendar"* provided a full page section on section on recycling motor oil. The calendar included information on the environmental problems spilled motor oil can cause. The State's 1-800-CLEANUP toll free number is provided and is used to locate the nearest motor oil collection center in Riverside County. The calendar also lists the State's Clean Up Website www.1800cleanup.org as a reference.

County's Environmental Health HHW Collection Agency is provided with storm water related materials and promotionals. The schedule covers the time, dates and locations of both the temporary and permanent facilities from September through June.

Educate/inform on impacts from airborne particles.

The County of Riverside has an active Employee Rideshare Program, which encourages employees to carpool, vanpool, use transit, cycle or walk to work. Also, the County actively supports the use of zero/low emission vehicles. The County's Fleet Service includes a variety of alternative vehicles include CNG, propane, electric and methanol powered vehicles.

Various County facilities are installing alternative fuel fueling stations to expand the use of alternative energy vehicles. This is a direct result of the County Board Policy to use alternative fuel vehicles as the "first choice" when purchasing or leasing vehicles.

The County of Riverside is an active member of the Clean Cities Coalition and provides financial support for various clean air efforts/activities throughout Riverside County.

Educate on the need to keep storm water form contacting potential contaminants

The *"Storm Water Pollution…What you Should Know"* brochure informs residents about keeping storm water from contacting potential contaminants and explains various pollution prevention activities. It also advises residents to keep common storm water pollutants from entering our storm drains.

The *Automotive Maintenance & Car Care, The Food Service Industry*, and the *General Construction & Site Supervision* BMP brochures all advise facility and site operations to properly manage pollutant sources and prevent polluted storm water from entering the storm drains. The brochures also inform owner/operators that local ordinances strictly prohibit the discharge of pollutants to the storm drain system or local waste ways without a permit.

Educate on the clean-up and proper disposal of pet waste

The *"What's the Scoop"* and *"After the Storm"* brochures address the need to pick up animal waste and to dispose of it properly.

The school activity book and the *"Fancy Fin"* presentation discuss the proper disposal of pet waste.

The *"Keep Our Water Clean"* DVD also addresses the topic of the proper disposal of pet waste and the negative impacts to our waterways.

The *"Only Rain Down the Storm Drain"* adult storm water presentation discusses proper disposal of pet waste and actually includes a DVD showing how bad this problem can be. The show presents, from a distance, small yellow flags marking pet waste deposits in what is obviously a very popular dog walking area.

The Pollution Prevention Week is recognized in a flyer-type of information and is released every September. Along with other useful BMP's guidelines, the flyer does have an article that specifically addresses pet waste under the article *"What's the Scoop…Tips For a Healthy Pet and A Healthier Environment"*.

Earth Day flyers, which contain user-friendly suggestions on reducing the use of chemicals, integrated pest management helps and the hazardous of pet waste, left unrecovered.

The *"2008 Environmental Calendar"* reminds us to always "pick up animal waste". The accompanying message informs residents of the negative effects of pet waste to local waterways.

The District does not allow the disposal of pet waste or other trash within its facilities. Signage has been installed at access gates to discourage illegal dumping and encourage reporting thereof. At the start of the program, the District purchased "Dogipots," (containers that hold pet waste bags) and installed them in County Parks. The upkeep and additional purchases of the Dogipots are the responsibility of each County Park staff. The District has also purchased pet leash tags with the storm water hotline number imprinted and repeating the *"Only Rain Down the Storm Drain"* message.

Develop programs for landowners on erosion and sediment control practices

The *"After the Storm"* brochure and the school program addresses the topic of controlling soil erosion.

The *"After the Storm"* brochure identifies erosion and sediment loads as a storm water pollutant.

The *"Only Rain Down the Storm Drain"* continues to work cooperatively with both MRCD and RCRCD to offer various workshops on the topic and has conducted additional workshops for the needs of the storm water program. These workshops have been offered to both Permittee staff and the general public.

The *"Only Rain Down the Storm Drain"* storm water presentation was modified to specifically address soil erosion as it relates to the Santa Ana Watershed and what homeowners and businesses can do to minimize soil erosion.

SGA's Home Improvement Outreach efforts at Lowe's, Home Depot and Orchard's Stores reach DIY's and construction professionals on erosion and sediment loads through the "After the Storm" brochure.

Cover contaminants and prevent runoff through polluted areas

The BMP brochures for the outdoor, restaurant, automotive and construction industry all include specific BMPs to cover outside work areas; keep dumpster lids closed; prevent run-off at work and material storage areas; cover exposed stockpiles; avoid wash down of paved surfaces that drain to storm drains; and many other BMPs that help prevent pollutants from entering the storm drains.

The *industrial/commercial training* workshop included specific segments on covering outside materials to prevent contaminated runoff. The target group for this workshop is staff that is responsible for conducting NPDES urban Runoff inspections of industrial/commercial facilities.

Educate municipalities/agencies on the need for vehicle inspections.

As part of the municipal employee-training program, various departments have been instructed to inform employees about the need for vehicle inspections and have been provided with a complete training package to help in this area. Included in the training

information are brochures, posters and vehicle air fresheners that Fleet Services personnel have distributed at their garage/work sites.

Departments and agencies are also encouraged to use alternative fuel vehicles that not only help reduce vehicle emissions but also, in some cases (e.g., electric vehicles), eliminate the use of motor oil and antifreeze. The County highly encourages its Departments to convert to these types of vehicles, whenever possible.

The *municipal employee training workshops* are conducted by AEI-CASC and cover such topics as inspecting vehicles and equipment for fluid leakages.

12. PROGRAM EVALUATION

Program Evaluation

The Permittees regularly assess the component programs to identify improvements that will promote the reduction of pollutants in Urban Runoff to the MEP while also supporting the responsible management and allocation of the public resources available to implement their programs. A quantitative and qualitative assessment of each Permittee's program can be found in the Permittee's individual annual report.

Evaluation of the DAMP includes short term and long term strategies. The long-term strategy for assessing effectiveness will focus on water quality data obtained as part of the CMP. This is by necessity a long-term strategy since the first step will be to develop and understand baseline data. Due to the inherent variability of Urban Runoff, years of monitoring data are necessary to identify statistically significant trends or draw conclusions on program effectiveness. Additionally, because (i) there are numerous program elements being implemented and revised concurrently, (ii) other environmental programs and regulations indirectly impact Urban Runoff (e.g., pesticide regulation and (iii) numerous other climatological, man-made, and environmental changes that occur within the watershed over time, the ability to identify specific cause-and-effect relationships between a specific program element and/or BMP and improvement in the quality of Urban Runoff is complicated, if not infeasible, in many cases.

The short-term strategy for assessing program effectiveness focuses on quantitative, indirect methods (that is, not directly based on the quality of Urban Runoff or receiving water quality) of assessment. Each year the District will collect various metrics defined in the DAMP to assist with program evaluation. As part of the ROWD, the Permittees will evaluate these metrics, including water quality data, in an effort to assess overall DAMP effectiveness. On an annual basis, the District will review the metrics to determine if any course corrections on existing BMPs are required. The following regional metrics have been collected in compliance with the DAMP:

Section 12 of the DAMP identifies how the Permittees will regularly assess the component programs of the DAMP to identify improvements that will promote the reduction of pollutants in Urban Runoff to the MEP while also supporting the responsible management and allocation of the public resources available to implement the DAMP.

PERMITTEE	1. The estimated quantity of material removed from the MS4. (Regional and Permittees)
Beaumont	Average 50 tons per year
Calimesa	32,235 pounds of rock and silt debris
Canyon Lake	Approximately one and a half tons were removed from Salt Creek in the City.
Corona	117.34 tons removed from catch basins and streets (non-street sweeping)
Hemet	Estimated 5.4 tons of material was removed from the City of Hemet MS4 in FY 2007-2008.
Lake Elsinore	-
Moreno Valley	753 cu.ft. (Co-Permittees)
Murrieta	*See Permittee's Individual Annual Report*
Norco	32,000 pounds
Perris	During the 2007-2008 reporting period, over 16 tons of trash and debris were removed from catch basins and detention basins. Additionally, the City implemented the first phase of a post-construction BMP inspection and maintenance program this year. During the 2007-2008 reporting period, a portion of catch basins and underground hydrodynamic separators within the City Flood Control District #1 were inspected. During the next phase of implementation, catch basin filter inserts will be installed/replaced, underground end-of-the-line clean water filter units will be cleaned, and a regular maintenance program will be in place that tracks the amount of debris and materials removed from the storm drain system.
Riverside	6,996 tons from street sweeping.
San Jacinto	-
County	See table provided by Transportation Department for Countywide totals in Individual Permittee Report.
RCFC&WCD	RCFC&WCD: 180 tons of Trash; 56,803 CY of Sediment; 1010 tons of Debris

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PERMITTEE	**2. The estimated quantity of material collected under litter removal and street sweeping programs. (Co-Permittees)**
Beaumont	Average 50 tons per year
Calimesa	9095 pounds of trash and debris collected plus 157 cubic Yards of street sweeping material (approximately 14,800 pounds of sweeping debris)
Canyon Lake	Approximately four tons were removed or collected from Railroad Canyon and Goetz Road.
Corona	2,796 tons removed with street sweeping program
Hemet	Estimated material collected through litter removal and street sweeping programs in 2007-2008 was 2,000 tons (three street sweepers @ one x month & Caltrans sweeping weekly).
Lake Elsinore	-
Moreno Valley	2,222 Tons
Murrieta	*See Permittee's Individual Annual Report*
Norco	361.0 tons
Perris	During the 2007-2008 reporting period it is estimated that 1,320 tons of materials were removed by the City's contracted street sweepers.
Riverside	7 tons of litter removed through Clean Up Riverside's Environment (CURE)/Keep Riverside Clean and Beautiful (KRCB) events.
San Jacinto	An approx total of 416 tons of sweeper waste was removed from city streets.
County	See table provided by Transportation Department for Countywide totals in Individual Permittee Report.
RCFC&WCD	N/A

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PERMITTEE	**3. The total number of construction sites inspections for stormwater compliance. (Co-Permittees)**
Beaumont	75
Calimesa	15
Canyon Lake	263 construction permits inspected 7-07 through 6-08.
Corona	128 inspections on 29 active construction sites.
Hemet	City of Hemet Public Works inspectors conducted 8 formal construction site inspections for storm water compliance in FY 2007-2008.
Lake Elsinore	159 construction inspections where performed during the 2007-2008 rainy season.
Moreno Valley	1122
Murrieta	*See Permittee's Individual Annual Report*
Norco	154. Every time inspectors visit site they are required to look for stormwater compliance.
Perris	A total of 21 construction sites were inspected for stormwater compliance during the 2007-2008 reporting period. (See Exhibit I).
Riverside	180 construction site inspections.
San Jacinto	23 - Attached list
County	451 Single Family Residential, 20 Commercial and 133 Tract site inspections were conducted during the 2007·08 Storm Season
RCFC&WCD	N/A

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PERMITTEE	4. The total number of industrial and commercial facility inspections for stormwater compliance (Co-Permittees).
Beaumont	50
Calimesa	15
Canyon Lake	Enforcement conducted through a contract with Riverside County Environmental Health Department.
Corona	723 inspections conducted by NPDES, DWP-Source Control, and Fire Dept. staff
Hemet	Riverside County Environmental Health Inspectors conducted 66 inspections of industrial and commercial facilities in the City of Hemet during FY 2007-2008.
Lake Elsinore	710 Industrial and Commercial Facility Inspections where conducted during the 2007- 2008 reporting year not including follow-up Environmental compliance inspections.
Moreno Valley	729
Murrieta	*See Permittee's Individual Annual Report*
Norco	Approx. 800. Fire Dept. inspects every facility and notifies appropriate staff if stormwater compliance is an issue.
Perris	A total of 62 commercial and industrial facilities were inspected for stormwater compliance during the 2007-2008 reporting period. (See Exhibit J)
Riverside	1,426 inspections, including 872 restaurants, 453 non-significant industrial users and 101 industrial permit holders.
San Jacinto	-
County	See inspection logs in Individual Permittee Report.
RCFC&WCD	N/A

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PERMITTEE	**5. The quantity of household hazardous waste material collected through the HHW Collection and ABOP Programs. (Regional)**
Beaumont	--
Calimesa	County Health reported .14 tons of HHW collected at a City collection event.
Canyon Lake	Enforcement conducted through a contract with Riverside County Environmental Health Department.
Corona	88.59 tons total from four different events held in City of Corona (County-wide data to be included in the County and/or District report)
Hemet	An estimated six tons of waste material was collected through HHW Collection and ABOP programs in the City of Hemet in FY 2007-2008.
Lake Elsinore	-
Moreno Valley	Not applicable
Murrieta	*See Permittee's Individual Annual Report*
Norco	-
Perris	The City of Perris Annual Clean-up Day collected 209.8 tons of waste. (See Exhibit D)
Riverside	92 tons, partly in conjunction with Riverside County Permittees' events.
San Jacinto	
County	See Table provide by Waste Management Department in Individual Permittee Report.
RCFC&WCD	1,562,797 lbs. of total HHW material was collected on behalf of the Permittees.

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PERMITTEE	**6. The number of Permittee staff receiving training for activities related to DAMP implementation. (Regional and Permittees)**
Beaumont	21
Calimesa	3
Canyon Lake	Six
Corona	47 City of Corona staff attended formal training sessions
Hemet	A total of 16 City of Hemet staff members in various departments received training for activities related to DAMP implementation during FY 2007-2008.
Lake Elsinore	Two staff members received training for DAMP implementation
Moreno Valley	24 employees (Co-permittee)
Murrieta	*See Permittee's Individual Annual Report*
Norco	9
Perris	A total of 11 employees from the City of Perris received training related to the DAMP implementation activities.
Riverside	137 staff.
San Jacinto	See attached
County	See Training Logs in Individual Permittee Report.
RCFC&WCD	The District sponsored training for the Permittees - In Fiscal Year 2007-2008 there were 695 enrollees in the Fall Training & 424 enrollees in the Spring Training. In Fiscal Year 2007-2008 there were 561 attendees in the Fall Training & 374 attendees in the Spring Training. In Fiscal Year 2007-2008 there were 45 District attendees in the Fall Training & 13 District attendees in the Spring Training.

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PERMITTEE	7. The number of Urban Runoff complaints received through hotlines. (Regional and Permittees)
Beaumont	0
Calimesa	0
Canyon Lake	Ten/Fifteen per year
Corona	21 illegal dumping and/or illicit connection complaints received from the public (40 total complaints received, including other agencies and/or City departments)
Hemet	Calls received through the Riverside County Flood Control Hotline 1-800-506-2555 are forwarded to the City of Hemet when appropriate.
Lake Elsinore	5 complaints where received and investigated
Moreno Valley	None (Co-permittee)
Murrieta	*See Permittee's Individual Annual Report*
Norco	-
Perris	The City receives approximately 80 to 120 calls per year about storm water related issues, most are in regard to stagnant water and odors.
Riverside	Approximately 415 calls were received through the City's Call Center. This number is based on keyword summaries of calls received; upon City response and investigation, not all concerns were related to urban runoff. Additional concerns and questions may have been raised through the Riverside County Permittees' hotline.
San Jacinto	None reported.
County	See RCFC& WCD Individual Permittee Report.
RCFC&WCD	375 complaints were received by the District's NPDES section to be responded to and addressed. The total number of calls to the toll-free line were 1,317.

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PERMITTEE	8. The number of illicit connections detected and eliminated. (Permittees)
Beaumont	0
Calimesa	0
Canyon Lake	Zero
Corona	No illicit connections detected
Hemet	No illicit connections were detected in the City of Hemet storm drain system during FY 2007-2008.
Lake Elsinore	No illicit connections where detected or eliminated during the reporting year
Moreno Valley	None (Co-permittee)
Murrieta	*See Permittee's Individual Annual Report*
Norco	0
Perris	There was one illicit discharge eliminated during the 2007-2008 reporting period.
Riverside	No illicit connections to the City's MS4 system were detected. However, one illicit connection to a Riverside County Flood Control box culvert was found and eliminated.
San Jacinto	
County	See RCFC& WCD Individual Permittee Report.
RCFC&WCD	Eliminated a sewer cross-connection to Box Springs Channel. The City and District worked with RCC to eliminate the cross connection and conduct necessary clean-up work (clean-up work completed May 9). More details can be found in the Introduction portion of this report.

Section 12 of the DAMP identifies how the Permittees will regularly assess the component programs of the DAMP to identify improvements that will promote the reduction of pollutants in Urban Runoff to the MEP while also supporting the responsible management and allocation of the public resources available to implement the DAMP.

PERMITTEE	9. Construction outreach events conducted. (Regional and Co-Permittees)
Beaumont	0
Calimesa	0
Canyon Lake	See outreach section
Corona	Wet weather notification letter given to all facilities (approximately 30)
Hemet	No formal construction outreach events were conducted in the City of Hemet, however Public Works inspectors regularly educate contractors on appropriate erosion and sediment controls.
Lake Elsinore	No Construction outreach products where conducted during the 2007-2008 year.
Moreno Valley	None (Co-Permittee)
Murrieta	*See Permittee's Individual Annual Report*
Norco	0
Perris	During the Public Works Week community outreach event held on May 15, 2008 the "*What You Should Know for General Construction & Site Supervision*" brochure was handed out. This brochure included information on the General Construction Activities Stormwater Permit and BMPs for construction sites. Construction Pamphlets are available at all permitting counters.
Riverside	30 pre-contract meetings; 30 pre-construction meetings.
San Jacinto	Ongoing
County	See RCFC& WCD Individual Permittee Report.
RCFC&WCD	Prior to any District construction projects the District meets with contractors to discuss all NPDES-related issues. In addition, the District provides outreach materials to developers and municipalities on a regional basis.

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PERMITTEE	**10. Industrial/Commercial outreach events conducted. (Regional and Co-Permittees)**
Beaumont	0
Calimesa	2
Canyon Lake	See outreach section
Corona	Outreach materials given to all facilities inspected (approximately 720)
Hemet	No formal industrial/commercial outreach events were conducted in the City of Hemet, however, business owners receive educational materials when inspections are completed.
Lake Elsinore	No industrial/Commercial outreach products where conducted during the 2007-2008 year.
Moreno Valley	None (Co-permittee)
Murrieta	*See Permittee's Individual Annual Report*
Norco	0
Perris	During the Public Works Week community outreach event held on May 15, 2008 the "*Did You Know…Your Facility May Need a Storm Water Permit?*" brochure was handed out. This brochure included information on the NPDES permit program, Industrial Activities Storm Water General Permit, BMPs, and Non-Storm Water Discharges.
Riverside	1,426 industrial site inspections related to stormwater protection and compliance.
San Jacinto	N/A
County	See RCFC& WCD Individual Permittee Report.
RCFC&WCD	The District provides outreach through the CAP Program and the County/City business license programs. For additional information please see Appendix E.

Section 12 of the DAMP identifies how the Permittees will regularly assess the component programs of the DAMP to identify improvements that will promote the reduction of pollutants in Urban Runoff to the MEP while also supporting the responsible management and allocation of the public resources available to implement the DAMP.

PERMITTEE	11. Media impressions. (Regional and Co-Permittees)
Beaumont	0
Calimesa	0
Canyon Lake	See outreach section
Corona	Tracked by the District
Hemet	The City of Hemet distributed nearly 10,000 2007 Drinking Water Quality Report to water system customers during May and June 2008. This publication included information on water conservation and prevention of storm water pollution.
Lake Elsinore	No Media Impressions/publications where produced during the 2007-2008 reporting year
Moreno Valley	Aired on cable TV- 120 times and had 2514 hits on the City's NPDES website
Murrieta	*See Permittee's Individual Annual Report*
Norco	45,000 (6 mailings of ~ 7,500) plus information on City's website.
Perris	Advertisements promoting the Annual Community Clean-up Day were run on the City of Perris' local television station (channel 3).
Riverside	The City joined with other Permittees to coordinate media impressions.
San Jacinto	Regional
County	See RCFC& WCD Individual Permittee Report.
RCFC&WCD	During the 2007-2008 Fiscal Year, 21,824,545 media impressions were made.

Section 12 of the DAMP identifies how the Permittees will regularly assess the component programs of the DAMP to identify improvements that will promote the reduction of pollutants in Urban Runoff to the MEP while also supporting the responsible management and allocation of the public resources available to implement the DAMP.

PERMITTEE	12. Classroom presentations. (Regional)
Beaumont	-
Calimesa	0
Canyon Lake	This is completed via a contract with Riverside County Flood Control, Contact person Florence Mowrer.
Corona	Reported by the District.
Hemet	Classroom presentations on stormwater pollution prevention were made in 41 classrooms, reaching 995 students, in the Hemet Unified School District during FY 2007-2008.
Lake Elsinore	No Classroom presentations where made during the 2007-2008 reporting year.
Moreno Valley	Not applicable
Murrieta	*See Permittee's Individual Annual Report*
Norco	-
Perris	Riverside County Flood Control & Water Conservation District provides all classroom training. See Principal Permittee Report.
Riverside	The City joined with other Permittees to coordinate classroom impressions.
San Jacinto	N/A
County	See RCFC& WCD Individual Permittee Report.
RCFC&WCD	During the 2007-2008 Fiscal Year, 231 classroom presentations were made.

Section 12 of the DAMP identifies how the Permittees will regularly assess the component programs of the DAMP to identify improvements that will promote the reduction of pollutants in Urban Runoff to the MEP while also supporting the responsible management and allocation of the public resources available to implement the DAMP.

PERMITTEE	13. Public education events conducted. (Regional and Co-Permittees)
Beaumont	0
Calimesa	0
Canyon Lake	This is completed via a contract with Riverside County Flood Control, Contact person Florence Mowrer.
Corona	One public event conducted this year by City staff. See narrative report for public education outreach summary and District report for regional events.
Hemet	The City of Hemet participates in the Riverside County Flood Control sponsored joint outreach project with other MS4 permittees in the region. Public education materials were distributed from booths at regional and countywide events throughout the year. In addition, the Riverside Corona Resource Conservation District supervised students from Diamond Valley Middle School in a project to affix storm drain markers at 26 inlets to Salt Creek on October 27, 2008.
Lake Elsinore	No NPDES specific public Education events where help. NPDES handouts and flyers are available at all city sponsored or staffed community events. Residents with questions are encouraged to go to city hall to speak with staff in further detail.
Moreno Valley	None (Co-Permittee)
Murrieta	*See Permittee's Individual Annual Report*
Norco	-
Perris	Annual Public Works Week Event held on May 15, 2008. (See Exhibit G)
Riverside	The City continues to participate in the Permittee-wide public education and outreach program. This year, the program included sponsoring bill highway side billboards, calendars, and public event booths. In addition, 5 events were staffed by Environmental Compliance, focused on pollution prevention.
San Jacinto	Senior Fair, Safety Fair, Fourth of July Festival

PROGRAM IMPLEMENTATION

County	See RCFC& WCD Individual Permittee Report.
RCFC&WCD	During the 2007-2008 Fiscal Year, 70 public education events were conducted.

Effectiveness Assessment

The Permittees have incorporated the Revised DAMP program effectiveness assessment requirements described in Section 12 of the DAMP into their compliance activities. The Permittees' Effectiveness Assessment for the Fiscal Year 2007-2008 focused on ensuring that the Permittees had adequate control on nutrient and pathogen sources in the Santa Ana Watershed.

On August 1, 2006 the Permittees submitted a recommended revision to the DAMP and WQMP in compliance with Task 7 of the Lake Elsinore and Canyon Lake TMDL to ensure that nutrient sources were adequately addressed. A copy of this letter was included in **Appendix F of the 2006-2007 Annual Report.**

Based on evaluations made by the Permittees geared toward improving municipal programs, the Permittees have made the following programmatic changes.

1. Ensuring that the CEQA process incorporates questions regarding impacts to 303(d) and TMDL listed waterbodies;

2. Enhancing the New Development BMP handbook to incorporate additional BMPs focused on nutrient (and pathogen) removal, incorporate additional design guidance to ensure function and maintainability, and incorporate Low Impact Design (LID) concepts to reduce runoff volumes and pollutant discharges to the Maximum Extent Practicable (MEP);

3. Revisions to public education programs to further focus on nutrient and pathogen sources:

    - An update of our Outdoor Activities Brochure to ensure that it adequately addresses issues related to mobile operators, power washers and carpet cleaners. Additional resource information and phone numbers will be added, as well quoting specific legislative mandates.

    - Update the Watershed map from its basic layout to one that clearly characterizes the significant tributaries to the main watershed.

    - Production and continued development of new brochure addressing:

      Septic System Management
      Equestrian Care
      Landscape Management
      Car Care

Outdoor Activities & Power Washers

4. Enhanced municipal employee training programs to focus on TMDL impairments and appropriate BMPs;

5. Prioritized Illicit Connections/Illegal Discharge violations related to impairing pollutants to high priority where appropriate;

6. Focus on revisions to the WQMP and the WQMP template to assist developers with developing a WQMP. In addition, the Permittees create a WQMP FAQ document that will assist in increasing the consistency and quality of WQMP submittals;

7. Continue annual updates to Sanitary Sewer Overflow Procedures to ensure proper contact information for outside agencies; and

8. The Permittee's ROWD included whole new sections that addressed TDML compliance, which consider the current regulatory environment and applicable EPA rules and regulations to ensure that the updates represented a thoughtful and comprehensive proposal which included good-faith commitments from the Permittees that will lead to protecting water quality in a productive and meaningful way.

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PUBLICATION 8262

Rural Roads: A Construction and Maintenance Guide for California Landowners

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Many thousands of miles of privately maintained rural roads extend throughout California, and they are used for resource management as well as residential and recreational access by over 500,000 landowners (fig. 1). The California Department of Forestry and Fire Protection (CAL FIRE) estimates that another 2.7 million acres of forest and rangeland will be developed over the next 40 years, requiring the construction of thousands of miles of new roads (CAL FIRE 2003). Poorly located, designed, or maintained roads are the primary cause of water quality degradation in rural watersheds.

This publication is designed to help rural landowners understand how to improve and maintain existing roads. It also provides guidance on planning new roads. It is written for people who have little to no previous experience in managing a road. If you have recently purchased a rural parcel or have become responsible for road maintenance on an existing parcel—or otherwise feel unprepared for maintaining roads—this publication should help you. It mainly addresses single-lane dirt or rock-surfaced rural roads, also known as "low-volume" roads because they are not expected to carry high traffic levels.

This publication should enable you to

- understand the basic principles of good road design and maintenance
- recognize current and potential road erosion and drainage problems
- consider remedial treatments that may be needed
- develop rough estimates for the costs of road improvements and maintenance
- communicate clearly with contractors who may perform work on your roads

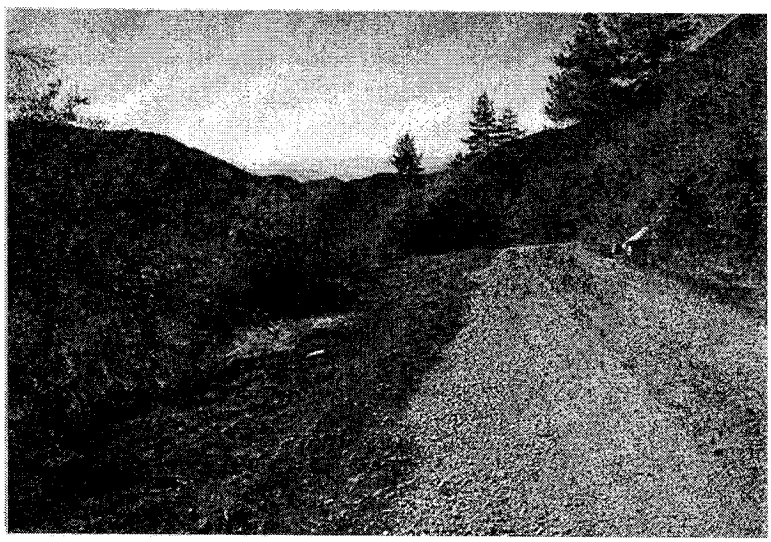

Figure 1. Low-volume road that has been newly graveled and out-sloped, San Bernardino County. *Photo:* Richard Harris.

UC PEER REVIEWED

Figure 2. This cross drain delivers sediment from the roadside ditch under the road surface to a nearby stream. The road fill is also eroding. *Photo:* Jared Gerstein.

WHY WORRY ABOUT ROAD DESIGN AND MAINTENANCE?

Road maintenance should be considered an unavoidable necessity of living in a rural area. Landowners should take the time to learn about roads because when they are well designed and maintained they have fewer impacts on the environment, are more reliable, and cost less to maintain than problem roads.

Environmental impacts

Rural roads are a major source of sediment that ends up in stream channels (fig. 2). This is especially true for unpaved roads located near streams that are used year-round. Sediment delivered to streams from roads causes streams to run muddy and take a long time to clear after storms. Sediment can end up depositing in pools and adversely affect habitat for fish and other aquatic organisms.

Reliability

Poorly designed, located, or maintained roads have a higher risk of failing during storms than roads that are well constructed and maintained. Adequately sized culverts, free-flowing ditches, and properly drained road surfaces are essential elements of a reliable road network. Without these elements in place, even a moderate winter storm can render a road impassable.

Cost of repetitive maintenance

The bottom line is that it can be extremely expensive to maintain roads that are designed, located, or constructed poorly. It is usually more cost effective to identify and remedy chronic road problems than to treat only the symptoms of the problem year after year. For example, it will cost less in the long run to install proper drainage structures and rock surfacing on a road that gets muddy and rutted every winter than to regrade the road surface every spring.

UNDERSTANDING ROAD COMPONENTS

Although roads vary in their configuration and design, they have common elements that affect their functionality and durability. Roads must create a flat surface for vehicle travel on sloped land. To do this, part of the hillslope is cut away (the *cut slope*) and the removed soils are placed below (the *fill slope*) and compacted to create a flat bench or *traveled way*. This is called *cut-and-fill* construction (fig. 3). A *balanced cut-and-fill* project uses all the cut material to generate the fill. In *full-bench* construction, the cut is made wide enough to accommodate the entire traveled way (fig. 4). The cut mate-

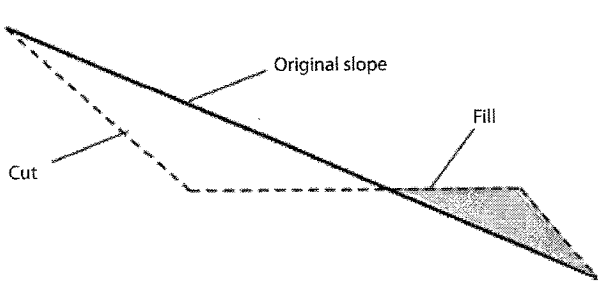

Figure 3. Cut-and-fill road construction design. *Source:* Kramer 2001.

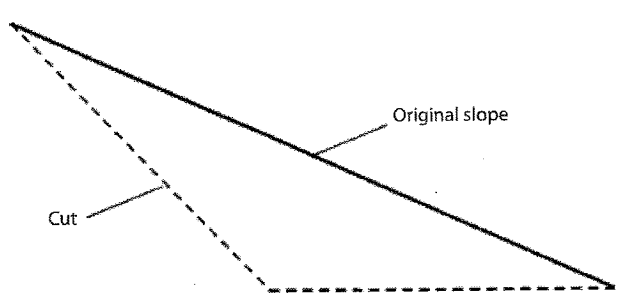

Figure 4. Full-bench road construction design. *Source:* Redrawn from Kramer 2001.

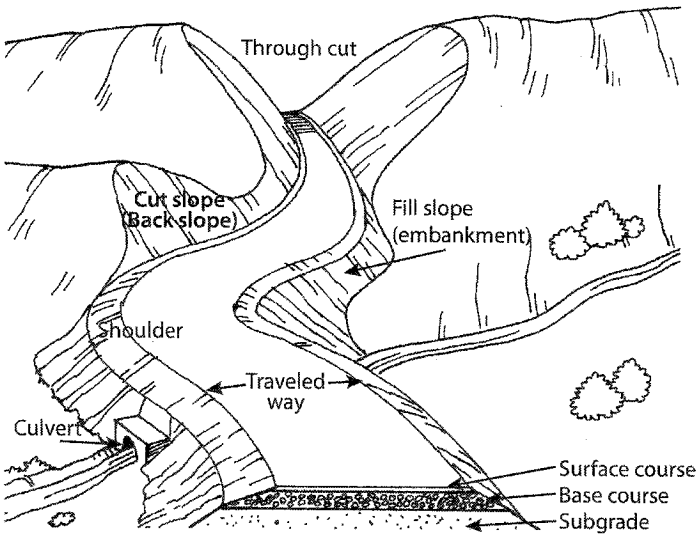

Figure 5. Components of a road. *Source:* Keller and Sherar 2003.

rial is not used in the road construction and must be hauled (*end-hauled*) to an off-site disposal area. Full-bench construction reduces the risk of fill slope failure but is usually more expensive due to hauling costs.

Ideally, a road should consist of three layers (fig. 5). The *subgrade* is the bottommost layer at the level of the in-place material. The *base course* is the main load-spreading layer and typically consists of gravels or gravelly soils, with sand and/or clay intermixed. The *surface course* or *surfacing* may consist of native materials, imported rock, or asphalt. It is placed on top of the base course to improve rider comfort, provide structural support, and weatherproof the road for wet season use. As a practical matter, many rural roads are not constructed in this way but consist entirely of native materials encountered during grading. This can be a factor contributing to poor performance.

All roads must incorporate features to drain water off the road surface and allow it to cross from one side to the other. Road drainage is the key to a road's integrity. *Culverts* are metal, concrete, or plastic pipes set beneath the road surface to drain ditches, springs, or streams crossed by the road. Culverts move water from the inside of the road (next to the cut slope) through a pipe to the outside of the road (to the fill slope or edge of bench). *Ditches* are used to collect water that accumulates from the road surface or hillslope on the inside or cut-slope side of an in-sloped road. *Ditch relief culverts* drain the accumulated water from the inside ditch to the outside of the road.

Besides culverts, common stream-crossing structures include bridges and low-water crossings or fords. *Bridges* usually cause fewer environmental impacts than culverts because they may not alter the natural channel form or require placement of fill in the channel. However, they are often more expensive to install than culverts. *Low-water fords* involve modifying and sometimes hardening a swale or stream channel to allow vehicles to drive through during low-flow periods (figs. 6 and 7). Less fill is introduced to the stream channel; however, vehicles driving through may input sediment to the stream continuously. Fords are typically impassable during high flows and so are rarely suitable for permanent roads.

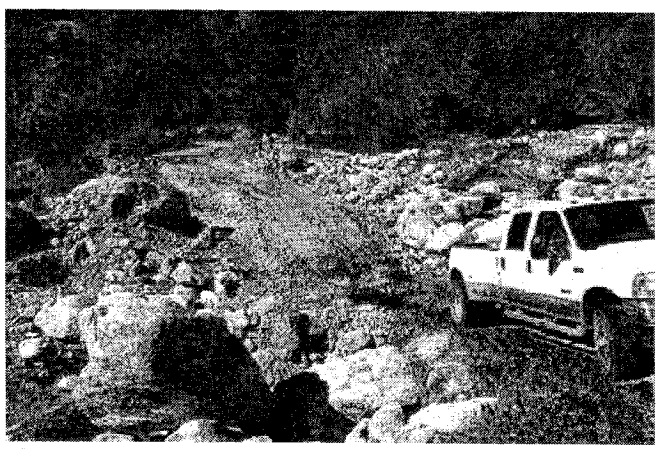

Figure 6. Low-water crossing on a perennial stream, San Bernardino County. *Photo:* Richard Harris.

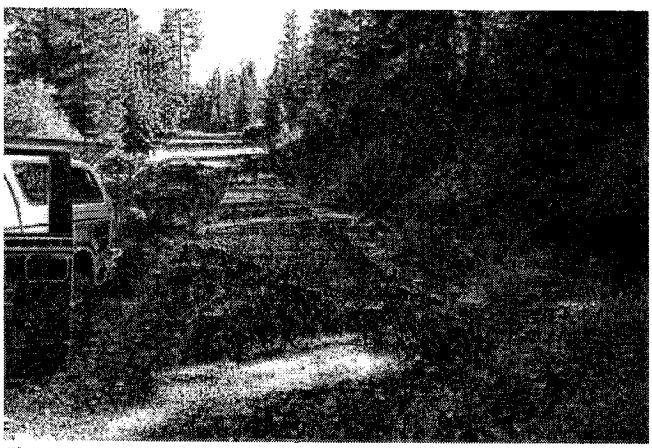

Figure 7. Concreted low-water crossing placed on bedrock outcrop in intermittent stream. *Photo:* Angela Wilson, Central Valley Regional Water Quality Control Board.

Figure 8. Rolling dips installed to drain an out-sloped road. *Source:* Bill Weaver, Pacific Watershed Associates.

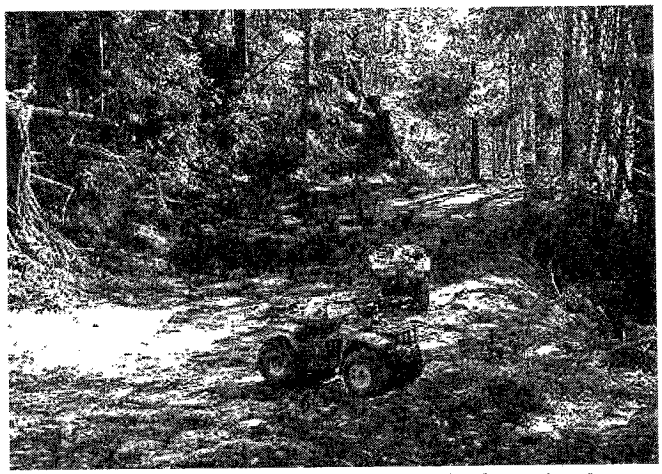

Figure 9. Water bars installed on a road after timber harvesting. *Source:* Angela Wilson, Central Valley Regional Water Quality Control Board.

Rolling dips are constructed breaks in the road grade designed to drain water directly from the road surface to the outside of a road without using an inside ditch or ditch relief culvert (fig. 8). They require vehicles to slow their speed of travel.

A *water bar* is a mound of soil and an accompanying ditch on the road surface that interrupts water flow and diverts it off the road surface (fig. 9). It is typically not passable by vehicles and so is not used on permanent roads. A *berm* is a ridge of rock, soil, or asphalt usually found on the outside of a road shoulder to control surface water. It directs runoff to specific locations where water can be discharged without causing erosion. *Armoring* is the placement of a layer of rock on cut or fill slopes or ditches to prevent water from eroding the soil.

UNDERSTANDING ROAD DESIGN AND DRAINAGE

Draining water from the road surface quickly, without letting it concentrate, is key to preventing erosion and thus to maintaining a stable driving surface. Two characteristics influence how well water drains from the road surface: the steepness of the road (i.e. its *grade* or *gradient*), and the shape and cross slope of the traveled way. The gradient of the road is determined by its location and routing; thus, it cannot be changed without moving the road. The cross-sectional shape and slope of a road are the primary design features that may be manipulated to improve drainage.

Figure 10. These ruts were created by wet-weather use of an unsurfaced, poorly drained road. *Photo:* Angela Wilson, Central Valley Regional Water Quality Control Board.

Gradient

Roads with a gentle gradient are easiest to maintain as long as the slope is adequate to drain the water off the road surface. In general, road grades need to be a minimum of two percent to facilitate drainage, so that water will not accumulate on the surface and saturate the subgrade. Saturated subgrades in combination with repetitive splash erosion due to vehicle traffic are responsible for potholes and ruts (fig. 10). Steeper roads drain water more quickly, but this allows the water to develop more erosive power, necessitating measures to prevent erosion and destabilization.

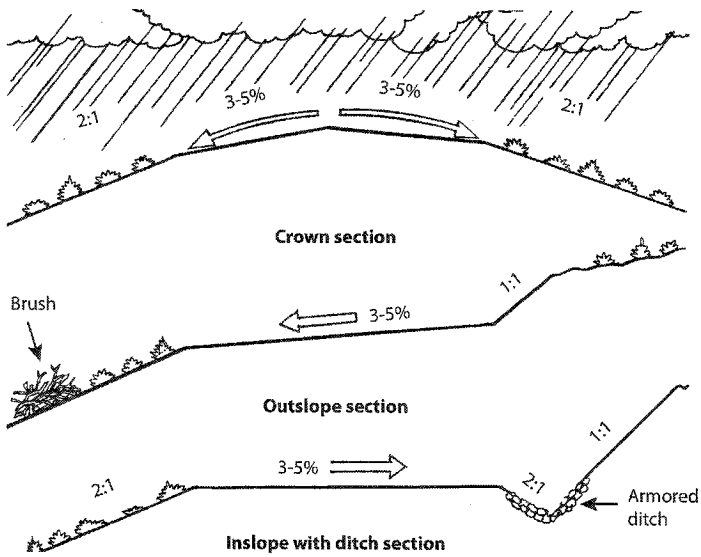

Figure 11. Typical road drainage options. *Source:* Keller and Sherar 2003.

Shape and slope of the surface

The shape and slope of the road surface determines how water will drain from it (fig. 11). In-sloped, out-sloped, and crowned roads drain water differently. The surface of an *in-sloped* road has a gentle tilt towards the cut slope of the hillside. Water collecting on the surface is drained into a ditch constructed between the road surface and the cut slope. Until recently, most roads in California were designed and constructed as in-sloped roads. When constructed in native materials, in-sloped roads are prone to erosion. Erosion can occur in the ditch, due to concentrated flow; on the road surface when ditch capacity is exceeded; or at the outfalls of culverts and cross drains receiving ditch flow. Ditch relief culverts must be installed frequently to accept ditch flow and dispose of it in a nonerosive manner.

Out-sloped roads are built with a slight angle of the road surface towards the fill slope. This allows the road surface runoff to sheet flow in a dispersed manner over the fill slope onto the adjacent hillside. Continuously concentrated runoff is avoided. Assuming that the fill slope and hillside are adequately vegetated or otherwise protected, no erosion occurs. Without a ditch, no ditch relief culverts are needed. This minimizes costs, reduces the chance of road failure due to culvert plugging, and may require less road width. Fill slopes may be armored to avoid erosion. Out-sloped roads may be difficult to drain on steep hillslopes and on road grades over 10 to 12 percent. They may be unsafe in areas with slippery soils or snow cover or in places where roads become icy, especially on curves where momentum would carry vehicles to the edge.

Crowned roads disperse water to each side of the road. They often require a system of ditches and cross drains which can be difficult to create and maintain. Therefore, they work best on two-lane roads with gentle grades or on the crest of hills.

UNDERSTANDING THE TYPE OF ROAD NEEDED

Deciding what kinds of roads you need for access to and on your property is an important step towards good stewardship. This includes considering whether or not existing roads are adequately designed for the intended uses. In some cases, existing roads may need to be upgraded to accommodate your uses or entirely new roads may be required.

The appropriate road design depends on the intended use. Roads with relatively high traffic levels, heavy truck use, or all-season use require a higher design standard and possibly a higher level of maintenance. In any case, the guiding principles should be to minimize erosion and ensure that the road is designed and maintained according to its use.

All-season roads

These are used year-round and are intended to be in continuous service for the foreseeable future. In rural subdivisions, these tend to be the "community roads" that run across multiple parcels and collect traffic from individual driveways. On timberlands or ranches, these permanent roads are the "haul roads" that can be used year-round, but receive most traffic during the dry season. Typically, all-season roads have rock

Figure 12. Grass cover on the surface of a road used for dry-season access. *Source:* Julie Bawcom, California Geological Survey.

or other surfacing (at least on steep hills and near stream channels) and bridges or culverts at stream crossings. They may be in-sloped, out-sloped, or crowned alone or in combination. They may be graded and resurfaced regularly to maintain a smooth running surface.

Seasonal roads

These may be constructed to a lower standard because they are used only during the dry season (fig. 12). They are often permanent roads so they require provisions for drainage even if they are not used in the winter. Rock surfacing may not be required. Fords, rather than culverts or bridges, may be used at stream crossings, particularly if the streams do not flow in the summer. Seasonal roads may have a steeper gradient than all-season roads and utilize an out-sloping drainage design. They may be closed after seasonal use and winterized by installation of water bars and revegetation of the road surface.

Temporary roads

These are used for only a short time and for a dedicated purpose, such as a timber harvest. Use is generally confined to the dry season and design standards may be minimal. Construction should minimize the volume of material excavated by following existing contours and cutting as little as possible. The road is closed after use, although the road bed may be retained for future use. Adequate closure should include removal of stream-crossing structures and associated fills along with installation of water bars to prevent any accumulation of water on the road surface. If vegetation cannot grow back on the road surface, it may be necessary to break up compaction and loosen the soil by 'ripping' it with a bulldozer. When closed, the entrance to the road should be blocked off to prevent all vehicle access.

ROAD DESIGN PRINCIPLES

Construction

- Minimize the number and length of roads in the watershed.
- Minimize the width of the road and the area disturbed during construction.
- Minimize road gradient. Gradient should be 12 percent or less.
- Use balanced cut-and-fill construction in gentle terrain.
- Avoid construction on steep slopes over 60 percent. Use full-bench construction where slopes over 60 percent cannot be avoided.
- Minimize cuts, fills, and vegetation clearing. Construct cut slopes on a ¾:1 or flatter slope.
- Build fill slopes on a 1½:1 or flatter slope.

Streams

- Stay as far away from streams as possible and minimize the number of crossings.
- Design crossings with adequate capacity to pass the 100-year storm flow plus the debris and sediment carried through the culvert during the storm.

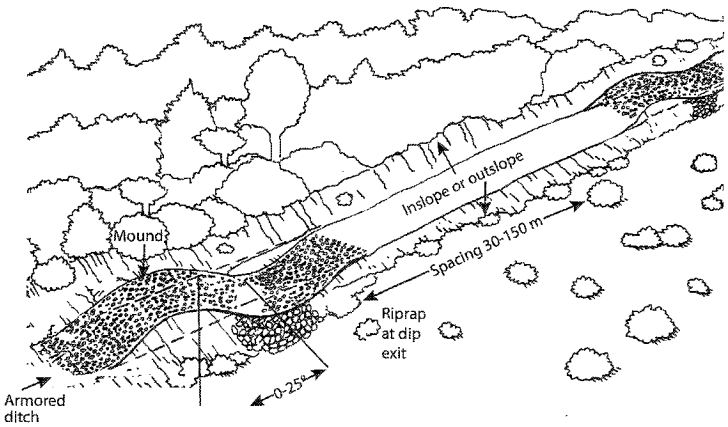

Figure 13A. Rolling dip on an out-sloped road. Proportions are exaggerated for clarity. (In practice, rolling dips can be subtle and still be effective.) *Source:* Keller and Sherar 2003.

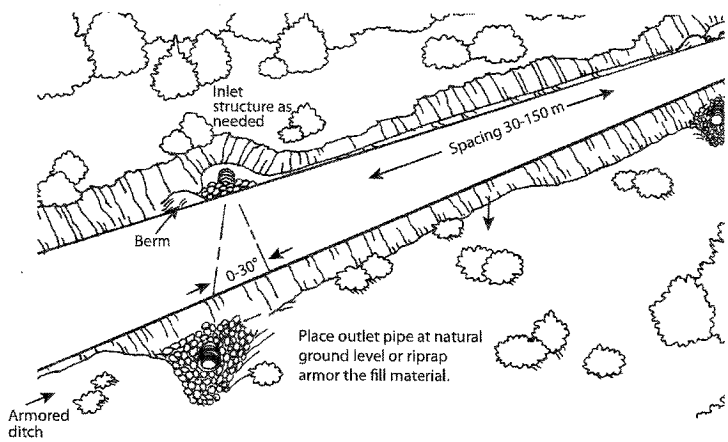

Figure 13B. Installation of ditch relief culverts on an in-sloped road section. *Source:* Keller and Sherar 2003.

- Reduce the potential for streams to be diverted onto the road surface by installing dips and trash barriers on streams that are not fish bearing.
- Protect crossing outlets with erosion control measures or downspouts.
- Facilitate fish passage, preferably by installing bridges, on fish-bearing streams.
- Use special techniques to cross meadows and other wet areas.

Drainage

- Provide adequate road surface drainage and minimize the concentration of runoff.
- Out-slope roads whenever practical. Road surfaces should slope 3 to 5 percent for road grades less than 10 percent. Install rolling dips for drainage (fig. 13A).
- In-slope road surfaces at an angle of 3 to 5 percent. Install ditch relief culverts (fig. 13B).
- Crown road sections with gentle slopes to prevent standing water on the road.
- Avoid wet and unstable areas.

Table 1. Rolling dip and ditch relief culvert recommendations

Road grade (%)	Soil erodibility	
	Low to non-erosive soils (ft)	Erosive soils (ft)
0–3	400	250
4–6	300	160
7–9	250	130
10–12	200	115
12+	160	100

Source: Adapted from Keller and Sherar 2003.

Table 2. Water bar spacing recommendations

Road or trail grade (%)	Soil erodibility	
	Low to non-erosive soils (ft)	Erosive soils (ft)
0–5	250	130
6–10	200	100
11–15	150	65
16–20	115	50
21–30	100	40
30+	50	30

Source: Adapted from Keller and Sherar 2003.

LOW-VOLUME ROAD DRAINAGE PRINCIPLES

Situating and designing roads correctly from the outset will save a landowner years of worry and maintenance costs caused by avoidable road problems. The key to proper road design is to abide by established guidelines and hire good help. These guidelines can also be used to address maintenance problems on existing roads.

It is often said that the three most important considerations for road design are drainage, drainage, drainage! Drainage features should include ditch relief culverts for in-sloped roads and rolling dips for out-sloped roads. Rolling dips or ditch relief culverts of at least 12 inches in diameter should be spaced as necessary to effectively drain the road, and no further apart than every 400 feet (table 1). Adequate drainage control during the winter is also critical for seasonal and temporary roads. Water bars should be installed every 250 feet or closer when the road is closed (table 2). Drainage features should be spaced more closely on roads with steep grades or erodible soils composed of silt or fine sands. (A conversion table is provided at the end of this publication for calculating equivalents between English and metric systems of measurement.)

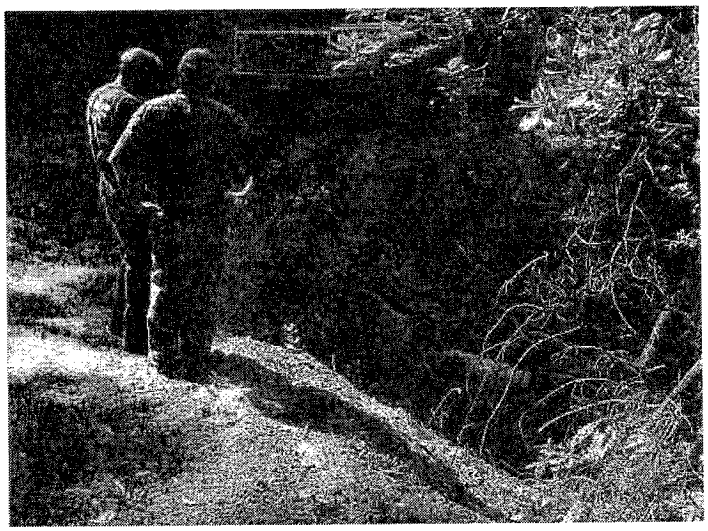

Figure 14. This fill slope erosion was caused by a plugged cross-drain inlet that diverted ditch flow over the road surface. *Photo:* Angela Wilson, Central Valley Regional Water Quality Control Board.

RECOMMENDED ROAD MAINTENANCE PRACTICES

Even properly designed and constructed roads need inspection and maintenance to function well and avoid road and environmental damage. Maintenance should be performed when needed. The longer the delay in needed maintenance, the more damage will occur and the more costly the repairs will be (fig. 14).

Maintenance should focus on correcting problems that may lead to road failure. This involves ensuring that the established drainage system is not compromised. Culverts plugged with debris often lead to ditch or stream water flowing on to the road surface, which can cause surface erosion or even wash away the entire road prism. Preventing such occurrences should be a top priority. Closing a road during the rainy season can reduce damage caused by vehicles and avoid substantial maintenance costs.

KEY MAINTENANCE PRACTICES

- Inspect roads regularly, especially before the winter season and following heavy rains.
- Keep ditches and culverts free from debris.
- Remove slide material from the road or ditches where it blocks normal drainage.
- Regrade and shape the road surface periodically to maintain proper surface drainage.
  - Keep rolling dips shaped and graded.
  - Keep the downhill side of the road free of berms unless they are intentionally placed to control water or traffic.
  - As necessary, apply surfacing such as aggregate or pavement to protect the roadbed.
- Avoid disturbing soil and vegetation in ditches, shoulders, and on cut-and-fill slopes.
- Maintain an erosion-resistant surfacing such as grass or rock in ditches.
- Close the road during very wet conditions.
- Carry a shovel in your vehicle during the rainy season to clean out ditches, redirect water off the road surface, etc.

The key to good maintenance is identification of maintenance needs through frequent inspections. Road inspections should focus on identifying areas where problems may occur in future storms (fig. 15). All parts of the road including the road surface and cut-and-fill slopes should be inspected, as well as drainage structures such as culverts, bridges, and water bars. Ideally, inspections should be done in time to allow for repairs before the rainy season.

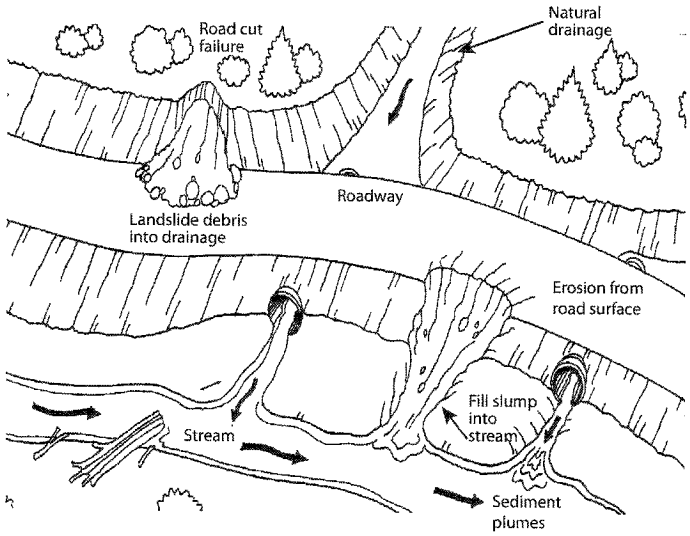

Figure 15. Road system problems to look for during a road inspection. *Source:* Keller and Sherar 2003.

Figure 16. Culvert plugged with sediment at inlet. *Photo:* Angela Wilson, Central Valley Regional Water Quality Control Board.

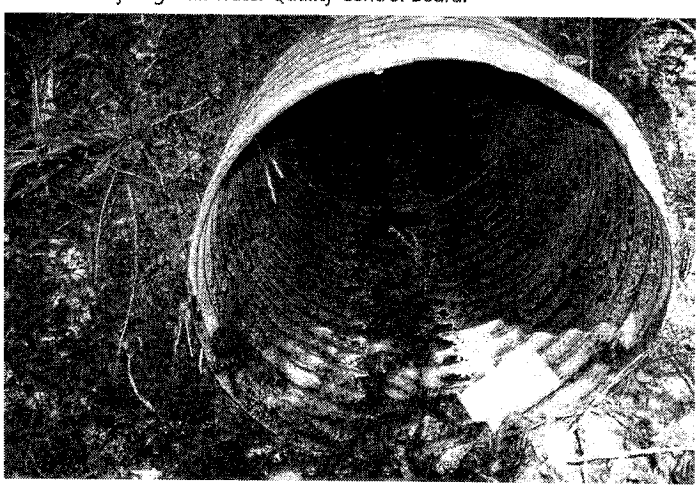

Figure 17. Culvert with rusted bottom and breakage caused by sediment. *Photo:* Angela Wilson, Central Valley Regional Water Quality Control Board.

WHAT TO LOOK FOR DURING A ROAD INSPECTION

- Culverts: Clear debris and sediment from culvert inlets (see figs. 16 and 17). Straighten bent culvert ends. If erosion has occurred at outlets, install energy dissipaters or armoring.
- Bridges: Inspect bridge abutments. Remove logs or branches lodged in the bridge structure.
- Water bars: Confirm that the water bars are working properly and directing drainage off the side of the road. Inspect the area downslope of the water bars for evidence of rills or gullies indicating that the slope requires additional protection from concentrated roadside drainage.
- Rolling dips: If erosion has occurred at the outside edge of the dip, install energy dissipaters or armoring.
- Inside ditches: Use a shovel to clear debris from the ditch. Avoid grading in ditches.
- Cut-and-fill slopes: Inspect for rilling, slumping, or cracks. Install more drainage structures if problems are found. Remove unstable material with an excavator.

RECOGNIZING AND FIXING COMMON ROAD PROBLEMS

Many road problems are quite easy to detect because they result in reduced driving comfort (e.g., rutting, potholes or wash boarding, erosion of portions of the roadbed, and deposition of soil on the road surface). Obvious problems such as these may cause impacts to streams and aquatic organisms by, for example, depositing sediment or creating barriers to fish passage. Road treatments can be designed to alleviate problems for traffic as well as aquatic habitat without much additional cost. Appropriate treatments for specific kinds of problems are identified here. Before initiating a treatment on your property, it is advisable to consult a professional erosion control or geotechnical specialist.

Figure 18. Water collecting on a forest road because of poor drainage. *Photo:* Jared Gerstein.

Potholes, Gullies, Extensive Rilling, Mud, and Other Road Surface Problems

Symptom

Potholes, ruts, and mud on the surface of the road are symptoms of drainage problems (fig. 18). A properly designed and maintained road will have very little standing or running water on the road surface, even during rain storms.

Finding the underlying problem

In order to locate the source of the problem, follow the water. Water may be originating from springs in the cut bank or under the road, from small creeks diverted onto the road surface, or from retained rain water due to improper drainage. The problem may also be caused by a combination of these.

First, look for springs on the cutbank or under the road. Water-loving vegetation, such as ferns or rushes, is a good indicator of the existence of springs. After a storm ends, puddles will dry out elsewhere on the road but remain much longer where you have springs. If no springs are found, look for streams diverting water onto the road surface. Small swales that are dry most of the year may flow during rain storms; go look for them while it is raining. Look for the original stream on the downhill side of the road.

If the road is retaining rain water on the surface during and shortly after rains, the road may need to be reshaped in order to drain water more efficiently. It is common for roads that have been poorly maintained for years to develop berms on one or both sides of the road, preventing water from draining from the road surface.

Solutions

Possible treatments for spring seepage onto roads are installing deeper inboard ditches and culverts to drain the water under the road, building up the road surface with base rock, or others as appropriate. Stream diversions onto the road surface may be treated by installing a culvert or rocked dip to place the stream back in its natural channel. Standing water due to poor drainage should be treated by changing the shape of the road to out-sloped, in-sloped, or crowned. Breach berms at strategic nonerosive locations to allow drainage and prevent their re-creation during grading. Out-sloping roads and installing rolling dips should be done whenever possible. Rock surfacing may also need to be added.

Dysfunctional Ditches

Symptom

One of the liabilities of a ditch system is the possibility of ditches plugging with debris, causing water to flow onto the road surface. Ditch water "captured" by the road surface can cause severe erosion (fig. 19) and even wash out the road completely.

Finding the underlying problem

Water may flow out of a ditch onto a road when the capacity of the ditch is exceeded. This occurs when the volume of runoff exceeds the ditch capacity or, more commonly, when a ditch relief culvert is plugged with debris. In the latter instance, the plugged cul-

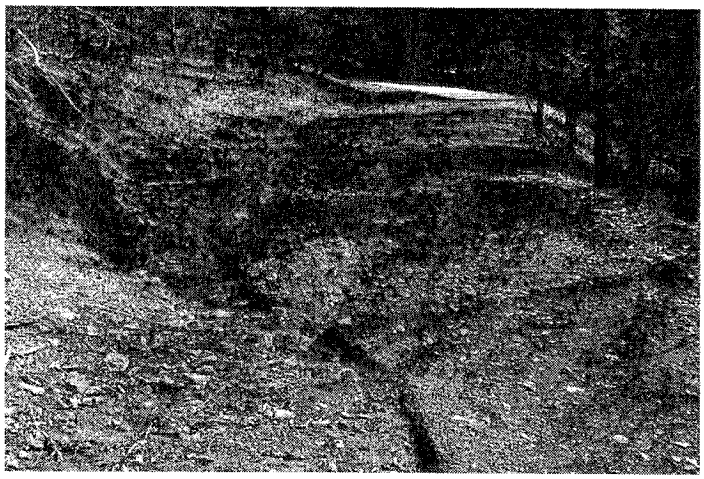

Figure 19. Erosion caused by ditch water leaving the ditch and traveling across the road. *Photo:* Susan Kocher.

vert may be located at the point where water flows onto the road or it may be uphill from there. Once the plugged culvert is located, examine its size and alignment. If a culvert plugs regularly, especially with sediment, there may be a design problem. If the culvert is less than 18 inches in diameter, it may be too small. If the culvert is installed at too sharp of an angle at the inlet, ditch water may not be directed into the culvert at high flow. If the cross-drain grade is too flat, sediment may settle out in the culvert rather than passing through it, causing blockage.

Solution

Once the plugged culvert is located, material blocking the culvert inlet should be removed. If this is the first time the culvert has plugged and the blockage was caused by a recently fallen tree or branch, simply removing the blockage may be sufficient. If the culvert repeatedly plugs, it may be undersized or misaligned and need to be replaced or realigned. In some cases, excess sediment may be evidence of upslope instabilities that need to be addressed.

Symptom

Another liability of ditch systems can be inadequate cross drains. Without a sufficient number of cross drains or ditch relief culverts, ditch water may become increasingly concentrated, gain erosive power, and cause ditch erosion in larger storms. Deeply incised ditches can be a hazard to driving, especially when they become large enough to accommodate a car tire (fig. 20).

Finding the underlying problem

Ditches incise when they carry too much flow for their design capacity and they erode rather than spill water out onto the road. Too much flow in the ditch occurs because there are not enough ditch relief structures and/or because there are sources of water other than road runoff contributing to ditch flow. Examine the ditch system to see if the ditch has captured the flow from a stream channel or spring and diverted it down the ditch. If not, the most likely problem is too few ditch relief culverts or cross drains.

Figure 20. Eroding inboard ditch on an in-sloped road. This is a symptom of inadequate cross drains for conveying ditch flow across the road. *Photo:* Richard Harris.

Solution

Ditch-captured stream channels should be treated by installing a culvert under the road and reconnecting the stream channel to its original course below the road. Problems arising from inadequate drainage should be treated by adding more ditch relief culverts. A more effective long-term solution may be to out-slope the road, if feasible, and remove the ditch altogether. Armoring ditches without treating the underlying drainage problem may reduce erosion in the short term but is not considered a permanent solution.

Symptom

Ditches may become filled in with sediment, rock, or woody debris (fig. 21). This reduces their

Figure 21. Cut bank failure blocking inboard ditch. Cut bank failures cause operational and maintenance problems, especially when chronic. *Source:* Keller and Sherar 2003.

capacity to convey ditch flow. The inlets to ditch relief culverts can become filled with sediment, causing ditch water to flow over and erode the road surface.

Finding the underlying problem

Examine the cut slope along the road to identify the source of the sediment. A slump or failure in the cut slope may have delivered dirt and rocks to the ditch. Or, a tree or branch may have fallen into the ditch, causing sediment to accumulate. Sediment may have accumulated in sections of ditch that have a flat gradient.

Solution

Filled-in ditches should be cleaned out with hand tools or heavy equipment, depending on the scale of the problem. If this is a recurring problem, the cut slope may need treatment to reduce its chances of slumping. A number of slope stabilization techniques are available and can be developed with the help of a professional erosion control or geotechnical specialist. Road surface sediment can be reduced by rocking the road. A ditch relief culvert may need to be installed before the grade flattens out, to carry water through the culvert before the sediment settles out in the ditch.

Gullies Caused by Roads

Symptom

Gullies are caused when increased or concentrated flow from the road system flows onto erosive soil. Most often, gullies originate from a road system's drainage features. They can be identified by their bare dirt banks and occurrence in places where natural streams do not occur, such as smooth hillslopes or ridges (fig. 22). Gullies may or may not threaten the roadbed itself, but they are always a significant source of sediment and thus a detriment to streams.

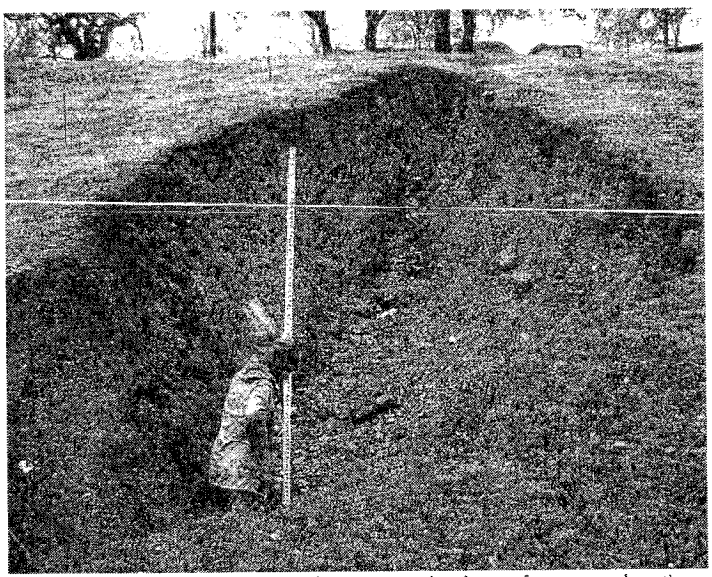

Figure 22. Gully caused by through-cut on road at base of steep road section. *Photo:* Jared Gerstein.

Finding the underlying problem

Inspect for gullies at the outlets of ditch relief culverts and rolling dips or where inboard ditches leave the road at a corner. Most gullies are caused by a concentration of water from the road and ditch system. Walk the road system to identify the drainage structures releasing flow that leads to gullies. Gullies can also occur when a stream has been diverted out of its natural channel. If this is the case, it is important to locate the original stream channel by walking up the gully to find where it starts.

Another cause of gullies can be culverts that have been installed improperly, with outlets set on the hillside rather than back in the natural channel. Examine culverts located at the origin of the gully flow to see if misalignment is causing the erosion.

Solution

The solution to gullies is to remove the concentrated flow from the soil it is eroding. Gullies should be dewatered by returning the flow to a controlled conveyance, either back into the ditch or stream system from which the flow escaped, or by realigning the culvert that allowed its escape. Alternatively, flow can be rerouted around the most erosive soils by installing downspouts. The goal of the treatment is typically to stabilize the gully and halt further erosion since it usually is not feasible or cost effective to fill in and restore a gully's original slope.

Stream Crossings

Stream crossings on roads can be the most significant source of sediment to streams. They are also the most likely locations to become impassable during a storm. Because of their importance to both stream health and accessibility, these sites should be carefully watched and maintained. Typical problems include culvert plugging, fill eroding, outlet scouring, and blocking of the migration of fish and other aquatic life such as amphibians.

Symptom

Culverts that convey streams under roads must be large enough to transport the flow plus the tree branches, sediment, and rocks that often accompany the flow during large rain storms (fig. 23). Stream culverts may plug when debris blocks the inlet, allowing water to overtop the crossing and possibly wash out the crossing and road altogether.

Finding the underlying problem

Culverts that plug frequently with debris may be undersized for the flow of the stream and the debris it carries, or they may be misaligned, blocking the flow of water and debris through the culvert. When material collects behind a culvert, it is likely that the culvert is too small.

Figure 23. This culvert is nearly plugged by woody debris, endangering the road. *Photo:* Angela Wilson, Central Valley Regional Water Quality Control Board.

Solution

The ideal treatment for an undersized culvert is replacement with a larger one, capable of carrying flow and debris. Appropriately sizing a culvert for the stream and watershed it drains is a fairly technical task and should be done by a knowledgeable professional (Cafferata et al. 2004). In some relatively simple cases, it may be feasible to install trash and debris racks upstream from the culvert to capture and retain the debris so that it does not flow into the culvert (fig. 24). This, however, should be discouraged on fish-bearing watercourses because debris accumulations may become a barrier to migrating fish. Remember that debris racks need to be cleaned regularly to continue to function.

Symptom

Installing a culvert to convey a stream under a road involves placing a significant amount

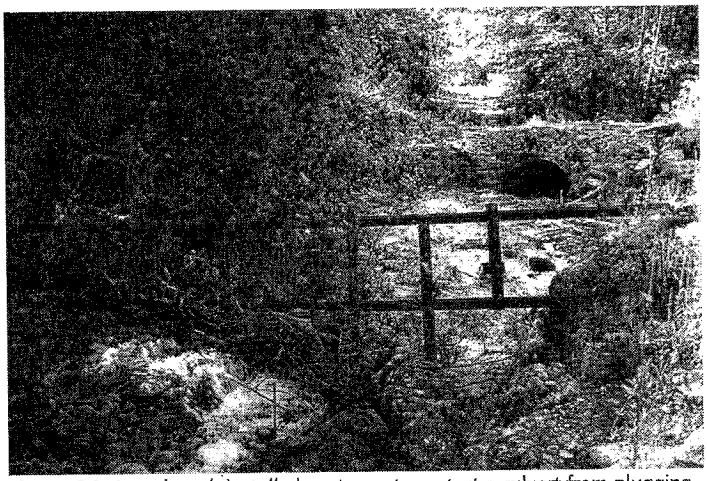

Figure 24. A trash rack installed upstream to protect a culvert from plugging. *Source:* Keller and Sherar 2003.

of fill in the channel above and below the culvert, and then building the road base on that fill. The fill over the culvert may erode, narrowing the traveled way (fig. 25).

Finding the underlying problem

Road fill is most often eroded by water plunging from the outlet of a culvert that is too short. "Shotgun" culverts shoot the water down to the streambed while eroding the fill under the culvert. Inspect road culverts at the downslope ends, looking for any that stick out into the air rather than carry their flow to the base of the fill slope.

Solution

The most thorough solution to shotgun culverts is to replace them with longer pipes that are placed at the grade of the natural stream channel rather than high in the fill above the stream. Alternatively, a downspout or rock armor can be added below the outlet if erosion has not been too severe (fig. 26).

Symptom

Culverts may create barriers to fish migration (fig. 27). Problems include excessive water velocity, insufficient water depth, lack of a downstream jump pool, and excessive jump height. Culverts that are relatively

Figure 25. Eroding fill slope and culvert failure due to plugging at inlet and diversion of flow across the road. *Photo:* Bill Weaver, Pacific Watershed Associates.

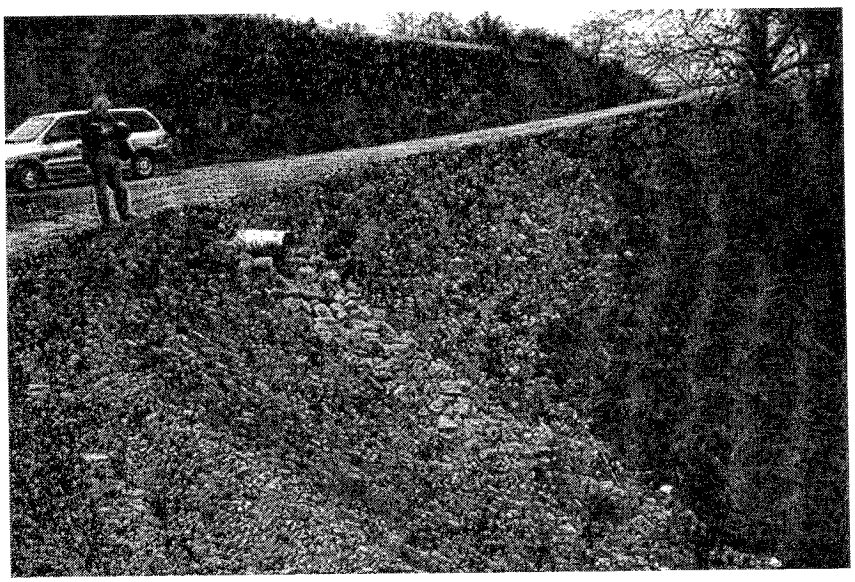

Figure 26. Rock armoring at ditch relief culvert outfall to reduce potential for downstream erosion. Note also the berm around the fill slope to prevent road runoff from eroding it. Also, straw mulch has been placed on the fill slope to reduce erosion. *Photo:* Jared Gerstein.

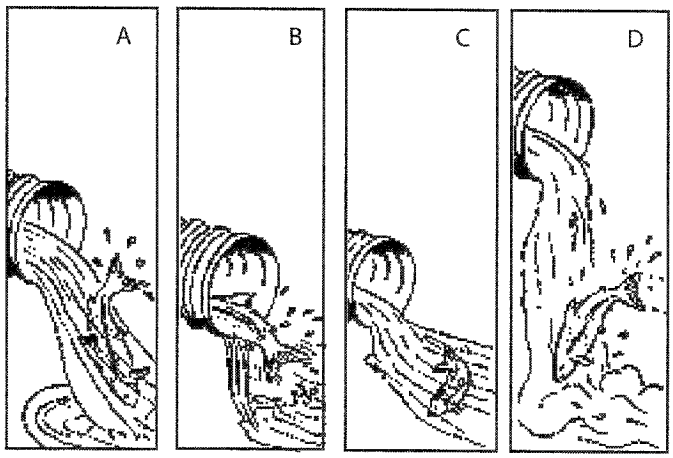

Figure 27. Barriers to fish migration caused by culverts. *Source:* Keller and Sherar 2003.

small for the size of the stream accelerate the speed of the flow, sometimes rendering it too fast for an adult or juvenile fish to swim against when heading upstream (fig. 27A). Culverts too large for the stream they carry may dissipate the flow to the point where it is too shallow for the fish to navigate (fig. 27B). Culverts with no natural resting place downstream may not allow fish to find a spot from which to make their jump (fig. 27C). Some culverts may be positioned too high above the stream and so require a jump that is too high for an adult or juvenile fish to make (fig. 27D).

Finding the underlying problem

All culverts and bridges over fish-bearing streams should be inspected for the existence of problems such as those shown in figure 27. Some barrier problems will be quite obvious. Unfortunately, many are not. Therefore, the best way to identify whether your crossings are blocking fish is to consult a fisheries biologist from a state, federal, or local agency.

Solution

Replacement of problem culverts with bridges and arched culverts of adequate size is preferred because they modify the channel less and so avoid many problems that can block migration (fig. 28). Appropriate assistance should be sought in designing and constructing crossings where migrating fish must be accommodated. Contact your local Department of Fish and Game office. In some cases, passage through existing culverts may be improved by installing baffles or weirs to slow and funnel stream water. In other cases, the upstream and/or downstream channels may be modified to create resting pools and reduce the jump height.

GETTING ROAD WORK DONE

There are some things that a landowner can do to maintain his or her roads and there are other actions that are best left to professionals. If you are contemplating new road construction or major road upgrading and you are not experienced with this work, you need to get help. County public works and planning departments, your local California Department of Forestry and Fire Protection or Resource Conservation District office, UC Cooperative Extension Office, and your neighbors may be able to recommend someone who can help you plan and implement a road construction or improvement project. Depending on your location and the type of work, you may even qualify for grants and cost sharing programs (see "Sources").

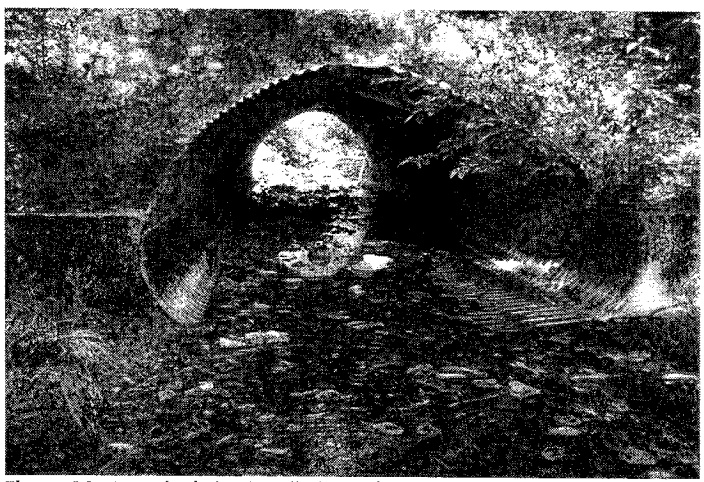

Figure 28. An arched pipe installed on a fish-bearing stream to minimize impacts on fish habitat and migration. *Source:* Keller and Sherar 2003.

Before undertaking extensive road work, it is important to have a good plan. You may retain professionals trained in road assessment to evaluate your roads in relation to your land management and use objectives. The objectives might be to reduce maintenance costs, to reduce sediment production, to protect natural resources, or to

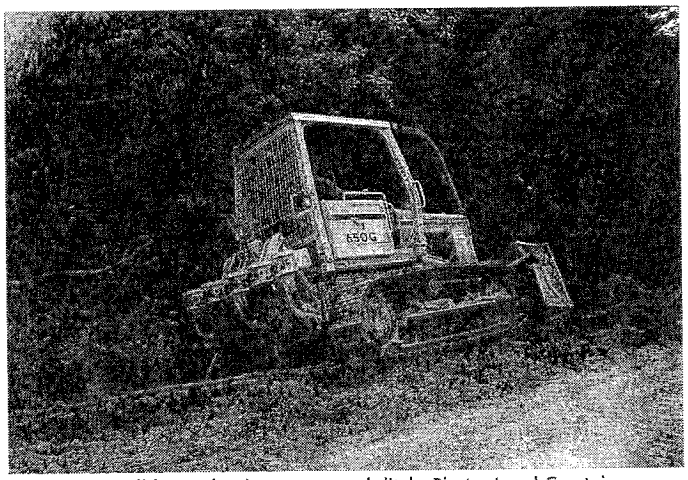

Figure 29. Bulldozer clearing out a road ditch. *Photo:* Jared Gerstein.

Figure 30. Installation of a new culvert after the old one was excavated. *Photo:* Jared Gerstein.

assure accessibility in all conditions. A road assessment may be used to help decide whether a road is worth maintaining in its current condition and location. Many roads were built in locations because of property boundaries, with little regard for geologic, geomorphic, biologic, or hydrologic conditions. If the road is tied to an easement and there are multiple landowners, relocation may not be an option. If a road is a chronic problem, however, relocation should be considered because it may be the cheapest and most effective remedy. A thorough road assessment will help you decide the best course of action and develop a plan for implementing road work.

Constructing or upgrading a road may require the services of a licensed civil engineer. Especially difficult projects may require other professionals including a licensed geologist or structural engineer. Simpler projects may only require a qualified equipment operator or grading contractor. When choosing an engineer or a contractor, it is important to carefully review their qualifications to do the work, their experience, and their ability to perform on time and on budget. Always ask for references and always follow up by checking them. Never hire someone who is not adequately insured against liabilities resulting from the work. You also want to make sure your contractor is licensed. Get the contractor's license number, and check with the State Contractors Licensing Board to see if there are any complaints or violations for the operator you intend to hire.

Routine road maintenance is another matter and there are many things you can do to ensure that your roads function well under all weather conditions. In some instances when a road is shared by several landowners, there may already be a road association or homeowners' association that is responsible for road maintenance. Generally, if you do not know if you are part of a road association, you probably are not. Road and homeowners' associations assess landowners a fee used to offset costs for road maintenance. The fee is either paid on a yearly basis or as the need for maintenance arises. If you have a neglected road that serves several properties and there is no road maintenance agreement between them, you might consider initiating one. One of the major problems in rural areas is "orphan roads" that no one takes responsibility for maintaining.

For the roads on your property that are your sole responsibility, the key to good maintenance is a system of inspection and record-keeping. Inspections should be performed on all your roads and stream crossings before the winter, during storm events, and after the winter. Use the diagnostic tips previously described to identify

maintenance needs. Simple tasks such as culvert and ditch clearing can be performed by most landowners (fig. 29). More complex tasks, such as roadside brushing, remedial grading repair, or installation of culverts (fig. 30), will probably require outside assistance. Keeping good maintenance records can help landowners evaluate the cost of correcting on-going problems and judge whether road upgrading projects would be cost effective. It is also essential for tax purposes.

ELEMENTS OF GOOD ROAD MAINTENANCE RECORD KEEPING

- Identify and prepare sketch maps of problem areas and treatments applied.
- For each site, describe the problem, when it started, and what caused it.
- Document the things done to fix the problem.
- List the equipment and labor hours needed to fix the problem.
- Quantify the amount of armor or rock imported to fix the problem (cubic yards).
- Quantify the amount of sediment or spoils removed (cubic yards).
- Measure the length, width, and depth of any erosion features.
- Take photos before and after the maintenance activities.

PERMITS FOR ROAD WORK

Depending on where you live, extensive road work may require a grading permit from the county public works or planning department, particularly if the project involves new road construction. Not all counties have grading ordinances but all have stipulations in their building codes that apply to grading for home sites and driveways. These are typically triggered by the extent of planned disturbance. Before undertaking any grading on your property, check with your county planning staff.

If you are planning on crossing or otherwise altering a stream or creek, you may be required to obtain a Streambed Alteration Agreement from the California Department of Fish and Game. Activities requiring these agreements include installing culverts, bridges, or fords; rip-rapping the banks of stream channels; or skidding logs across temporary crossings. Many projects that require a Streambed Alteration Agreement will also require a permit from the U.S. Army Corps of Engineers. If the project involves a stream that has anadromous fish (i.e., salmon, cutthroat trout, or steelhead), additional consultation or permits may be required from the National Marine Fisheries Service or from the U.S. Fish and Wildlife Service. Your local Department of Fish and Game staff should be aware of the permit requirements of these agencies.

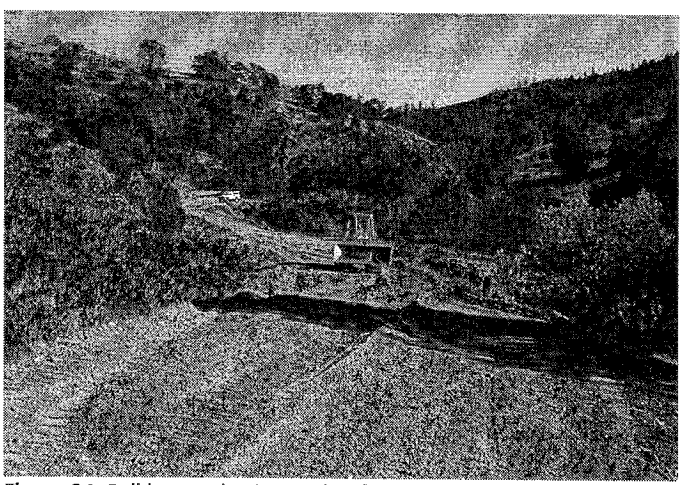

Figure 31. Bulldozer reshaping road surface to out-sloped condition to improve drainage. *Photo:* Jared Gerstein.

ESTABLISHING A WRITTEN CONTRACT FOR ROAD WORK

Landowners should establish a clear written contract for contractors providing road services. Contracts should include the necessary road specifications and standards to be constructed or maintained. The various parts of a new road to be constructed should be listed, including the subgrade and surface and the cut-and-fill slope. The standards to which these should be built, including the width of the subgrade and surface, slope of cut and fill, and depth and size of the base and surface rock, should be specified.

TYPES OF EQUIPMENT USED IN ROAD MAINTENANCE

A variety of heavy equipment may be used when constructing or maintaining a road. *Bulldozers* are often used to make road cuts, shape the road, and develop the subgrade (fig. 31). *Excavators* can be used to replace crossings and develop new road alignments (fig. 32). *Backhoes* have many uses, including replacing small crossings, loading rock, and road shaping. *Graders* are used for final road shaping, spreading surface rock, and smoothing the surface (fig. 33). *Dump trucks* are used to transport rock to the construction site and to haul away any excess cut materials (fig. 33). *Rollers* are specialized to roll over the road surface and compact rock and road materials.

ROAD WORK COSTS

Upgrading an existing road is less expensive than constructing a new one, but may still involve substantial costs. Cost depends on the heavy equipment used, hourly equipment rental or contract rates, the skill and experience of the operator, design standards of the road, and the choice of the specific drainage structures and features to be installed. Examples of costs for road improvements are listed in table 3. When

Table 3. Costs to modify and improve existing roads

Activity	Ideal equipment	Cost rate*	Production rates†	Costs
out-sloping road and filling ditch	motor grader with rippers	$140/hr	500 ft/hr for a 20 ft wide road	$280/1,000 ft
installing rolling dip	small dozer with rippers (John Deere 450)	$130/hr	1 hr each (30 to 40 ft long on flat roads) 2 hr each (50 to 100 ft long on steep roads)	$130 to $260 each
removing berm or cleaning ditch	motor grader	$140/hr	1,000 ft/hr	$140/1,000 ft
rock-surfacing road (1.5 in. minus crushed)	dump truck spread	$25 to $50/ yd³ delivered‡	4 in. deep × 20 ft wide = 250 yd³/1,000 ft road	$6,250 to $12,500/1,000 ft
installing ditch relief culvert (40 ft of 18 in. culvert)	backhoe or tractor, laborer	$120/hr or $95/hr $55/hr	3 hr each + culvert ($35/ft + $25 coupler + $165 labor)	$1,950 each
installing stream crossing (36 in. × 40 ft culvert with 200 yd³ fill)	excavator, small dozer, water truck, laborer	$175/hr $130/hr $95/hr $55/hr	$2,350 culvert (w/coupler) + $1,225 excavator +$910 dozer + $190 water truck + $165 labor + $125 tamper	$4,965 each
installing culvert downspout	hand labor, equipment (>24 in. culvert)	$55/hr $125/hr	2 hr labor for 20 ft × 24 in. 3 hr labor for 40ft × 36 in.	$110 + materials $375 + materials
straw mulching of bare soils areas	labor	$55/hr $7.50/straw bale incl. tax/delivery	1 bale/600 ft² to 700 ft² + spreading at 4 bales/hr	$36 to $40/1,000 ft²
upgrading road completely	motor grader, skip loader, dump truck water truck riding compactor	$140/hr $110/hr $85/hr $95/hr $95/hr	Average mid-slope road requiring stream crossing upgrades	$45,000 to $77,000 per mi

Source: Adapted from CDFG 2004 by Joe Carri Jr.
Notes: *Additional equipment mobilization costs apply (4-hour minimum for small equipment and an 8-hour minimum for large equipment).
†Production rates do not account for rocky soil or soft soil conditions.
‡Trucking and material costs for bulk rock or sand assume a round trip time from 1 to 2½ hours. Longer hauls require additional trucking costs.

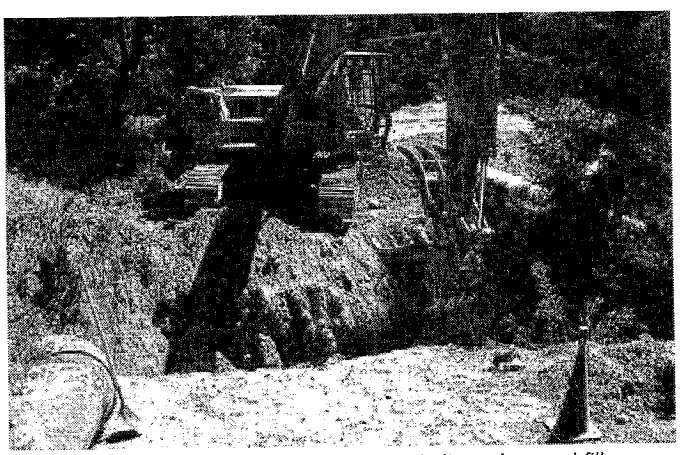

Figure 32. Excavator removing a crossing, including culvert and fill. *Photo:* Jared Gerstein.

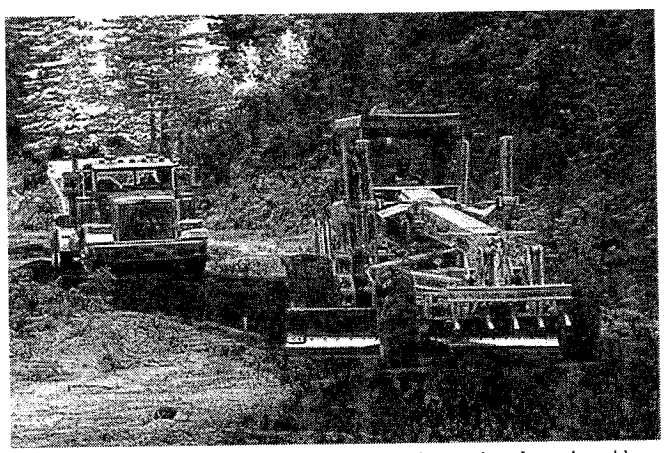

Figure 33. A grader spreading the gravel on the road surface placed by a dump truck. *Source:* Joe Hoffman, Plumas National Forest.

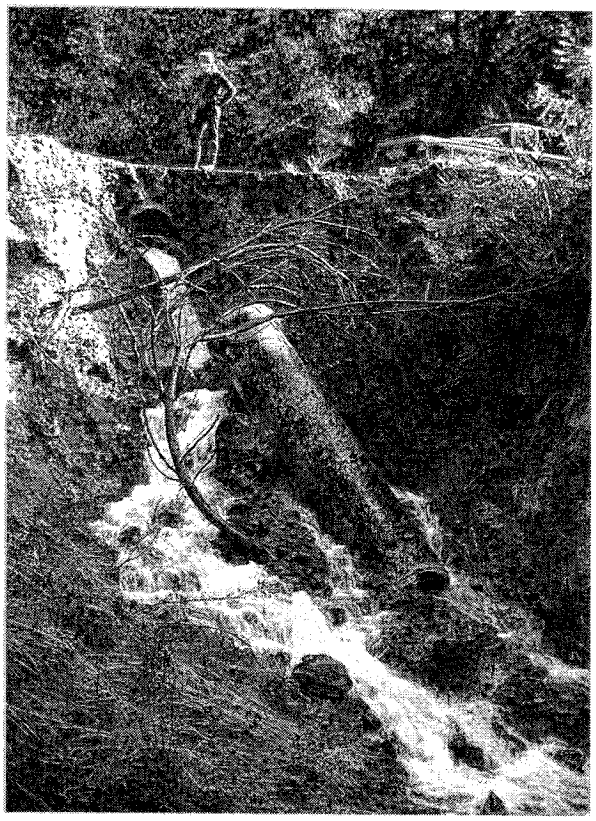

Figure 34. Outlet of a concrete culvert (30 inches in diameter) before the project. The culvert was placed too high in the fill, resulting in a 10-foot drop to the channel at the outlet. This caused erosion of the road fill and stream banks, eventually undermining the outer section of the culvert. *Photo:* Jared Gerstein.

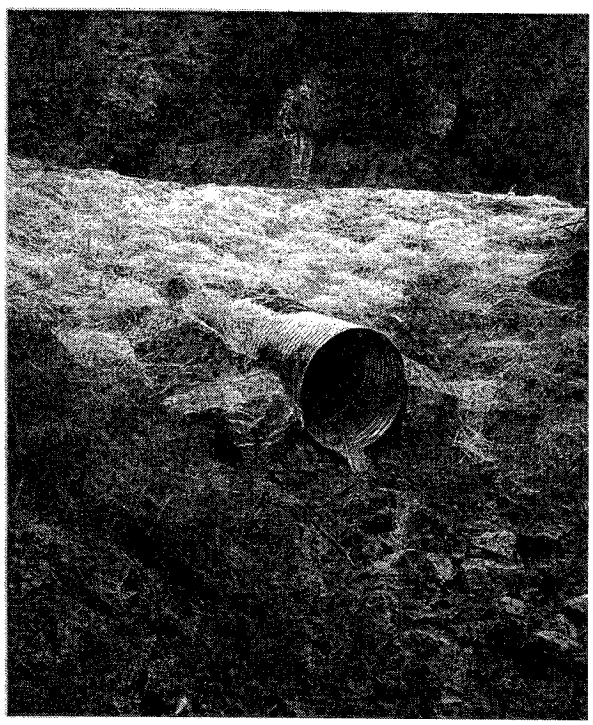

Figure 35. The culvert was replaced with a metal pipe (48 inches in diameter) at the correct slope. The road surface was lowered, reducing the fill volume by 100 cubic yards. The outlet and fill were armored to prevent future diversion. *Photo:* Jared Gerstein.

using different equipment, the rates for some treatments may differ from those listed here. Tasks accomplished by manual labor, such as culvert downspout installation and straw mulching for erosion control, are much less expensive than tasks requiring heavy equipment. Installing rolling dips is substantially less expensive than installing ditch relief culverts because only one type of equipment and one worker is needed, and there is no culvert to purchase. The most expensive aspect of building or upgrading a permanent rural road is placing rock on the roadbed and road surface. The drainage structures and road shaping need to be done first, but rock surfacing is the final ingredient necessary to make the road durable for year-round travel.

ROAD WORK CASE STUDIES

Some examples of road upgrading projects are described below. These projects were undertaken by private landowners, the U.S. Forest Service, and the University of California.

Tom Long Watershed

The Tom Long Watershed in Humboldt County is like many other rural areas that have been subdivided for residential use. The road system was put in for harvesting timber during the 1950s and '60s. Harvesting was only done during the dry season and roads were only intended to handle seasonal access. In the 1970s the watershed was subdivided into 40-acre parcels with the layout based largely on the location of the original logging roads. No formal road association or methods for funding road betterment or maintenance were established in the subdivision process. After the subdivision, roads were maintained on an emergency basis, meaning that bridges and culverts were only replaced if the road was no longer passable. Roads were rarely graded and rock surfacing was seldom if ever applied. The watershed became notorious for some of the worst roads in the region.

In the late 1990s residents organized in response to the threat of increased water quality regulation and out of exasperation with degraded road conditions. Following an evaluation of the road system, a number of sites were identified for remedial treatment. The highest priority sites were problem roads and crossings nearest the fish-bearing reaches of Tom Long Creek (figs. 34 and 35). Eventually, remedial work included replacing and upgrading 17 culverts and fixing two active creek diversions at a cost of approximately $120,000. The majority of the work was funded with a combination of local, state, and federal grant dollars intended to improve fisheries and water quality conditions.

These efforts addressed major issues, but road surfacing, drainage, and other needed improvements have not been completed. All this work requires funding, especially for equipment operators, and funds available from grant programs are limited. Gradually, the work will get accom-

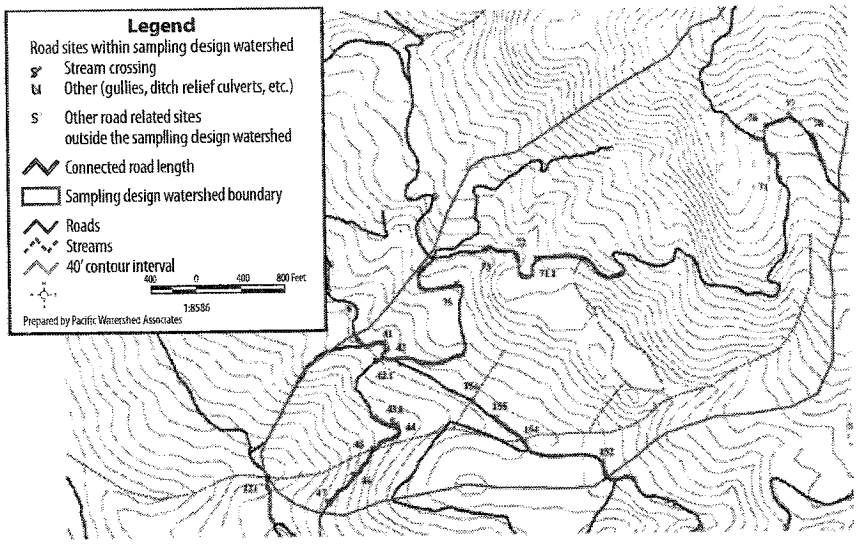

Figure 36. Road upgrading sites at the experimental watershed, Hopland Field Research and Extension Station. *Source:* Bill Weaver, Pacific Watershed Associates.

plished. As one resident said, "The grant resources enabled us to complete the root canals in the watershed and now we have to find the money to pay for the routine cleanings."

University of California Hopland Field Station Research and Extension Center

Over a period of about five years, beginning in the late 1990s, the University of California implemented a program to upgrade the road system at Hopland Field Station Research and Extension Center, located in Mendocino County. The work was largely funded by grants from the Department of Fish and Game (1999 SB 271 funds), Fisheries Restoration Grant Program. After an inventory and assessment of roads throughout the property, over 200 stream crossings and sections of road were prioritized for remedial treatment (fig. 36). Proposed treatments included replacement of culverts, installation of rolling dips and ditch relief culverts, and other measures intended to improve drainage, reduce sediment production, and generally reduce maintenance problems.

The entire program was implemented successfully by 2004. Although some newly installed culverts and fills experienced significant erosion during the first winter after construction, most post-project adjustments have diminished over time. Nearly all treatments have performed well, with a few fill failures at the outlets of rolling dips during spring 2006 (with very high precipitation). Maintenance needs and costs have declined dramatically. Personnel at the Field Station Center are especially satisfied with the superior performance of rolling dips as an alternative to cross drains for both reducing maintenance requirements and adequately draining road surfaces.

Pinchard Creek Project

The U.S. Forest Service partnered with Sierra Pacific Industries and Plumas County to upgrade a section of national forest road with serious erosion problems. The road's native surface was very erosive and lacked drainage structures. The surface was heavily rutted with rills over 2 inches deep and over 20 feet long (fig. 37). Road cut banks were unstable and eroding with more than 5 cubic yards of material moved, 40 percent of which was delivered to the stream channel. Roadside ditches were overloaded and degrading. One stream-crossing culvert entrance was more than 30 percent blocked with sediment and debris.

The project involved out-sloping the road surface, covering it with crushed rock, and installing drainage dips (fig. 38). Two years after the completion of the project, no surface ruts or road bank erosion has occurred, roadside drainage ditches are stable with little or no sediment delivery to the stream, and culvert entrances remain clear (fig. 39). The cost of the project was $221,603, with 35 percent from National Forest road maintenance funds, 9 percent from Sierra Pacific Industries, and 56 percent from the Plumas County Resource Advisory Committee.

Figure 37. Pinchard Creek road with rilling along the road surface before the project, 2002. *Photo:* Joe Hoffman, Plumas National Forest.

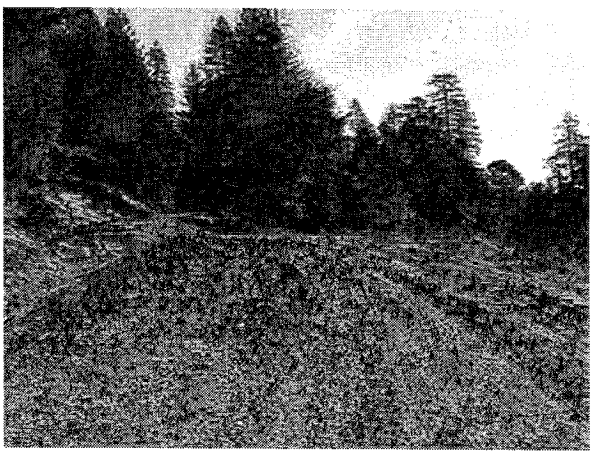

Figure 38. Pinchard Creek road immediately after project construction, 2002. *Photo:* Joe Hoffman, Plumas National Forest.

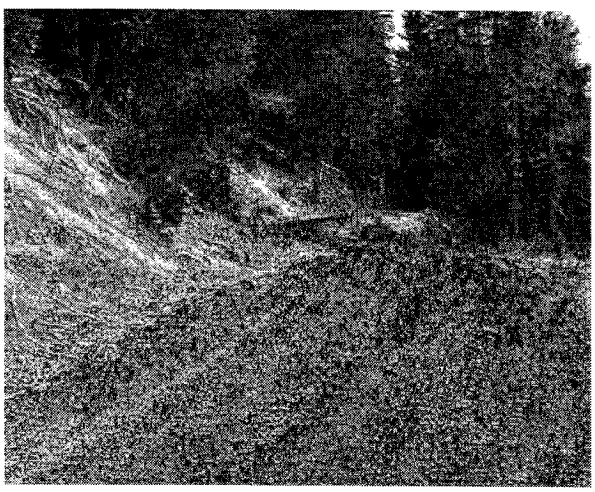

Figure 39. Pinchard Creek road two years after project construction, 2004. Note that the road surface remains in good shape without additional maintenance. *Photo:* Joe Hoffman, Plumas National Forest.

BEST MANAGEMENT PRACTICES DURING CONSTRUCTION

Construction of a new road necessarily involves a great deal of earth moving and soil disturbance. It is important that construction be managed wisely to avoid environmental impacts and damage to your property. One important thing a landowner can do is visit the site regularly during construction to ensure that the job is being done correctly. Sometimes plans made before construction are no longer feasible due to site constraints, and new decisions must be made. You need to be accessible to your contractor to help make these decisions when the situation arises.

Some general principles for best practices during construction are listed below:

- Minimize grading and soil disturbance.
- Develop an erosion control plan that includes measures on cut-and-fill slopes, drainage outlets, and disturbed areas (fig. 40).
- Avoid construction and soil disturbance in the winter.
- If construction does occur in the rainy season, ensure that the site has been storm proofed with erosion control measures when rains are forecast.
- Avoid incorporating logs or brush in the fill slope.
- Haul away excess sediment generated rather than side cast it onto the slope.
- Locate any stockpiled sediment in areas where it can be protected from erosion and will not deliver sediment to streams.
- Do not service or fuel heavy equipment where spills could enter a watercourse.

POST-PROJECT ADJUSTMENT

No matter how well planned and executed a road project has been, winter rains and traffic will lead to some adjustment of the final as-built condition during the first winter after improvements are made. Assuming that the road is in otherwise stable terrain, the adjustments will usually be minor and easily corrected. Adjustments may include some erosion of cut-and-fill slopes or culvert inlets and outlets (fig. 41). Road inspections should be done frequently during the new road's first winter season to identify any emerging problems for remediation. Developing problems may be averted with timely action. Plan for follow-up maintenance and put aside funds to perform the maintenance.

Figure 40. Using a portable blower to spread straw mulch on a disturbed road site. *Photo:* Julie Bawcom, California Geological Survey.

Figure 41. Fill surface erosion occurring after a road upgrading project. *Photo:* Bill Weaver, Pacific Watershed Associates.

SOURCES

For information on grants and cost sharing programs, check the online guides at

http://ceres.ca.gov/foresteward/html/financial.html
http://www.calwatershedfunds.org/
http://cwp.resources.ca.gov/grant_programs.html

For more information on road design and maintenance, consult the following resources:

Caferrata, P., T. Spittler, M. Wopat, G. Bundros, and S. Flanagan. 2004. Designing watercourse crossings for passage of 100-year flood flows, wood and sediment. California Forestry Report No. 1. Sacramento: California Department of Forestry and Fire Protection.

California Department of Forestry and Fire Protection (CAL FIRE). 2003. The changing California: Forest and range 2003 assessment. Sacramento: Fire and Resource Assessment Program (FRAP).

California Department of Fish and Game (CAL FIRE). 2004. Salmonid stream habitat restoration manual, part X: Upslope assessment and restoration practices. Sacramento: California Department of Fish and Game, Inland Fisheries Division.

Keller, G., and J. Sherar. 2003. Low volume roads engineering: Best management practices field guide. USDA Forest Service/USAID. National Transportation Library Web site, http://ntl.bts.gov/lib/24000/24600/24650/Index_BMP_Field_Guide.htm

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Weaver, W. E., and D. K. Hagans. 1994. The handbook for forest and ranch roads: A guide for planning, designing, constructing, reconstructing, maintaining and closing wildland roads. Ukiah, California: Pacific Watershed Associates for the Mendocino County Resource Conservation District.

Wiest, R. L. 1998. A landowner's guide to building forest access roads. Radnor, PA: U.S. Department of Agriculture, Forest Service. Northeastern Area, State and Private Forestry NA-TP-06-98.

Metric Equivalents

English unit	Metric equivalent
1 inch (in)	2.54 centimeters cm)
1 foot (ft)	0.3048 meters (m)
1 mile (mi)	1.609 kilometers (km)
1 acre	0.4047 hectares (ha)

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California Stormwater Quality Association
An Introduction to Stormwater Program Effectiveness Assessment

A. Introduction

This paper introduces and discusses key concepts and provides a standardized terminology related to the development of a comprehensive framework for assessing the effectiveness of stormwater management programs. It briefly defines and categorizes potential outcomes, measures, and methods to be used in conducting assessments, and provides examples of how several programs are already utilizing these tools to assess their effectiveness. It also discusses the current needs of stormwater program managers with respect to program assessment. The issues addressed in this paper will form the basis for more detailed guidance on effectiveness assessment that will be developed by the California Stormwater Quality Association (CASQA) Effectiveness Assessment Subcommittee during 2005-06.

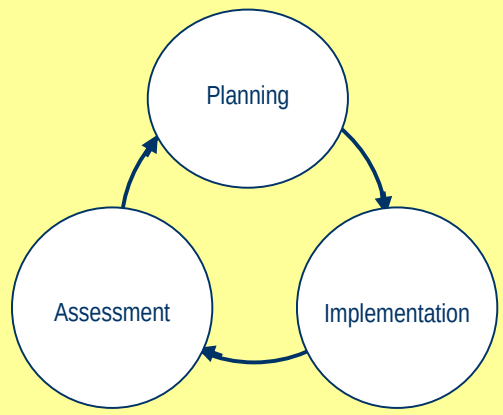

Figure 1 – Iterative Program Management Process

Effectiveness assessment is a fundamental and necessary component of developing and implementing successful programs. It begins with the establishment of goals, objectives, and desired outcomes during program planning, and continues throughout subsequent implementation and review stages. A well-executed assessment element can provide managers the feedback necessary to determine whether their programs are achieving intended outcomes (complying with permit requirements, increasing public awareness, changing behaviors, etc.), and ultimately whether continued implementation will result in water quality and/or habitat improvement. Figure 1 illustrates an idealized model in which each of three management elements continuously informs the next in an iterative cycle of feedback and improvement. While this model is useful for illustration, it bears emphasis that the most successful programs are those that address assessment during all stages of program activity, especially planning.

Municipal stormwater management programs in California are broadly focused on reducing pollutants in stormwater and non-stormwater discharges to the maximum extent practicable (MEP), and on ensuring that these discharges do not cause or contribute to violations of applicable water quality standards. To achieve these objectives, they employ a variety of strategies to bring about the implementation of best management practices (BMPs) in a manner that will most effectively and cost-efficiently achieve regulatory compliance and protect the beneficial uses of receiving waters. To ensure that programs are measurable and effective, most municipal separate storm sewer system (MS4) National Pollutant Discharge Elimination System (NPDES) stormwater permits contain specific requirements for periodic assessment. Most programs report on effectiveness as part of their annual report, but effectiveness assessment should be integral to the program and an ongoing process used throughout the year.

Stormwater managers currently find themselves at an important crossroads. Faced with a continually increasing need to demonstrate measurability and accountability, they must have a reasonable expectation of success before committing resources toward specific activities. Therefore, good effectiveness assessment tools are critical. Managers have historically relied on a combination of programmatic or implementation evaluations and direct water quality evaluations to determine whether their efforts are effective in achieving intended outcomes. In addition, some program managers are still in need of basic information on useful assessment methods.

Developing consensus on how to continue improving these approaches and providing guidance on selecting

and using applicable assessment methods must remain priorities. More importantly, a critical need has emerged to work toward integration of assessment methods so that linkages between program activities and measurable changes in water quality can be definitively established and continually refined. A well-conceived integrated approach for assessing the effectiveness of stormwater programs is necessary to ensure their measurability and success in the future.

B. What is Effectiveness Assessment?

Clarifying what is meant by effectiveness assessment, as well as the factors that need to be considered when assessing programs, is an important first step toward developing useful methods and approaches.

Effectiveness Assessment is the process that managers use to evaluate whether their programs are resulting in desired outcomes, and whether these outcomes are being achieved efficiently and cost-effectively. The specific approach to be used in assessing effectiveness will depend on a variety of factors including the type of program element or activity being evaluated and the stage of program development (i.e., planning, implementation, completion). However, as noted earlier, a comprehensive effectiveness assessment strategy should evaluate program implementation and water quality, and seek to find the relationship between the two (Figure 2).

Implementation Assessment provides managers feedback on the effectiveness of their programs in achieving targeted objectives. This type of assessment is essential in determining whether priority sources of pollution are being effectively addressed. Implementation assessment may include any of three levels of analysis: the overall program, the elements that comprise the program (construction sources, municipal sources, etc.), or the specific activities that are conducted within these program elements. Figure 3 shows these levels and provides examples to illustrate their relationship. While assessment strategies most commonly focus on specific activities such as inspections, street sweeping, debris collection, or implementation of best management practices, a comprehensive strategy should also encompass individual program elements and the overall program. Depending on the intended objectives at each level, assessment approaches will necessarily vary. These may range in complexity from simple activities such as verifying the completion of activities to more sophisticated techniques such as assessing the probable or actual locations of these activities and the significance of their spatial distribution.

Water Quality Assessment is the use of sampling data and related information to evaluate the condition of non-stormwater or stormwater discharges, and the water bodies that receive these discharges. This can include a variety of chemical, biological, and physical parameters or outcomes. In instances where water quality assessment is used to draw conclusions about overall program effectiveness, results are usually very general and require extended periods of analysis.

Integrated Assessment is the process of evaluating whether program implementation is resulting in the protection or improvement of water quality. In this process, relationships between program activities and water quality improvements are explored and refined. Because of the number and variety of BMPs and control programs being implemented at any given time, and because many factors external to stormwater programs affect water quality, establishing these relationships is difficult. Efforts to date have included speculative or hypothetical exercises aimed at better understanding likely program outcomes and potential

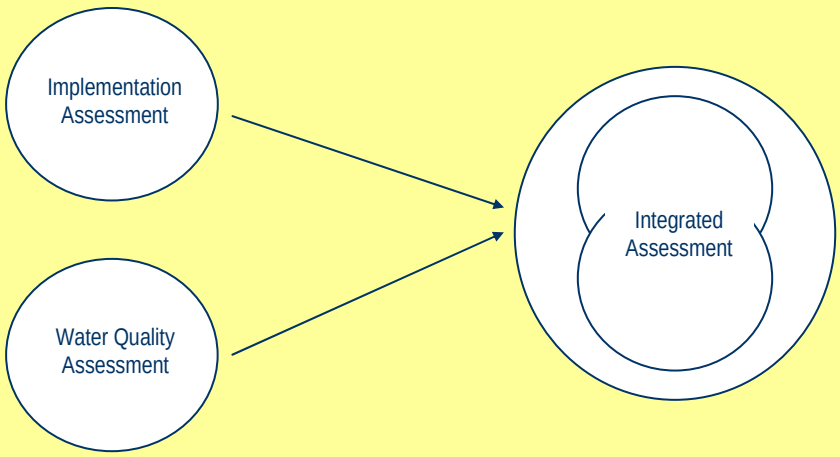

Figure 2 – The Relationship of Major Effectiveness Assessment Elements

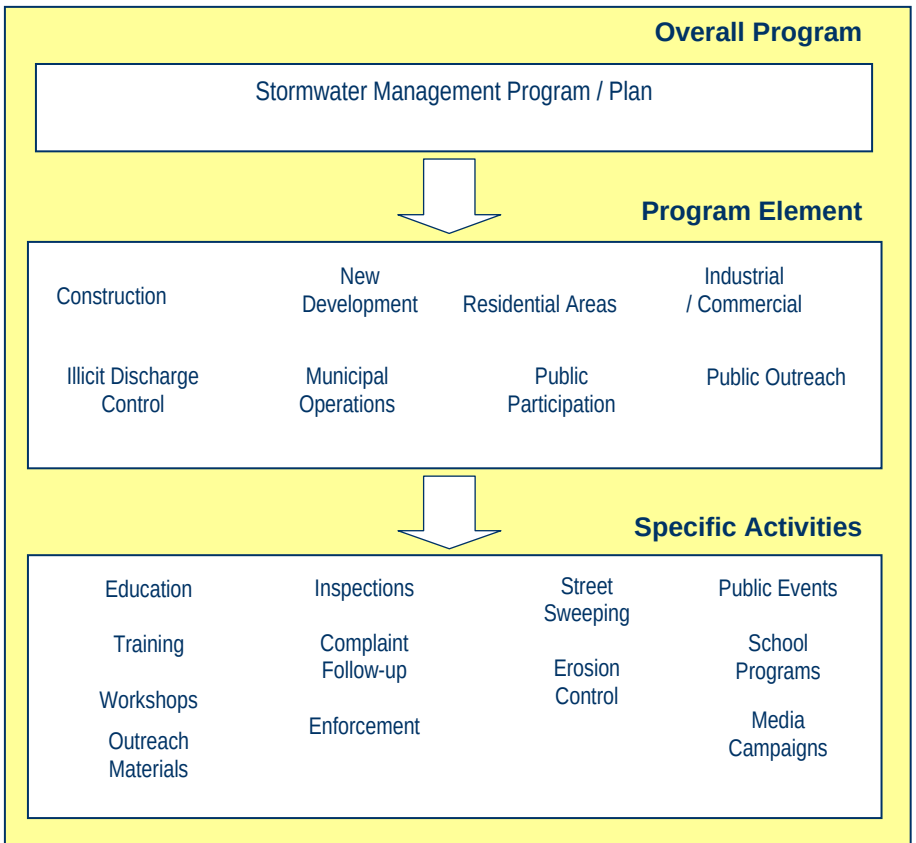

Figure 3 – Levels of Stormwater Management Program Activity

relationships to water quality. Quantitative "cause and effect" relationships will increasingly be sought in the future. This is a critical linkage because implementation assessment is, in many cases, simpler and less costly than water quality assessment. In addition, the time frame needed to see measurable results is shorter for implementation assessments. Over time, correlating water quality improvement to programmatic results will assist stormwater managers in identifying the most expedient and cost-effective approaches to planning and assessing their programs.

C. Types of Assessment Outcomes

Stormwater managers currently use a number of different approaches to draw conclusions about the effectiveness of their activities and programs. This involves the evaluation and measurement of various types of programmatic and environmental outcomes.

Outcomes are the results of an activity, program element, or overall program. The discussion below characterizes the possible types of outcomes in terms of six levels. As illustrated in Figure 4, these levels represent a gradation from activity-based to water quality-based outcomes. Though each level has value in informing management decisions, it bears emphasis that not all are necessary or possible in every instance. For example, in many instances Level 2 or 3 Outcomes will be sufficient for evaluating the effectiveness of implementation of outreach or training programs.

The pyramidal structure of Figure 4 is intended to illustrate the progression of each successive step toward the ultimate goal of environmental improvement. In general, Levels 1 to 3 can be considered Implementation Outcomes, Levels 5 and 6 Water Quality Outcomes and Level 4 a combination of the two types. While an important objective of the effectiveness assessment process is to establish relationships between Levels 1 and 6, this often becomes increasingly difficult as one moves toward higher levels of assessment. It should also be noted that, while these levels are presented in sequence, efforts to address each are independent and ongoing. For example, increases in awareness and knowledge may continue to be assessed even as strategies are broadened to include load reduction estimates.

Level 1: Compliance with Activity-based Permit Requirements. Many specific activities are either prescribed by or established under stormwater NPDES permits. Examples include conducting education to encourage BMP implementation, inspecting facilities, and enforcing discharge prohibitions. The most basic means of assessing effectiveness is to determine compliance with activity-based permit requirements. Level 1 Outcomes may therefore take the form of a simple yes/no answer. They may also be quantified, counted, or tracked over time to demonstrate effort or progress. Level 1 Outcomes are assumed to be beneficial to water quality, but often lack a factual basis to support these assumptions. Their fundamental characteristic is that they reflect program activity only; they are not indicators of the effect of implementation on people or the environment.

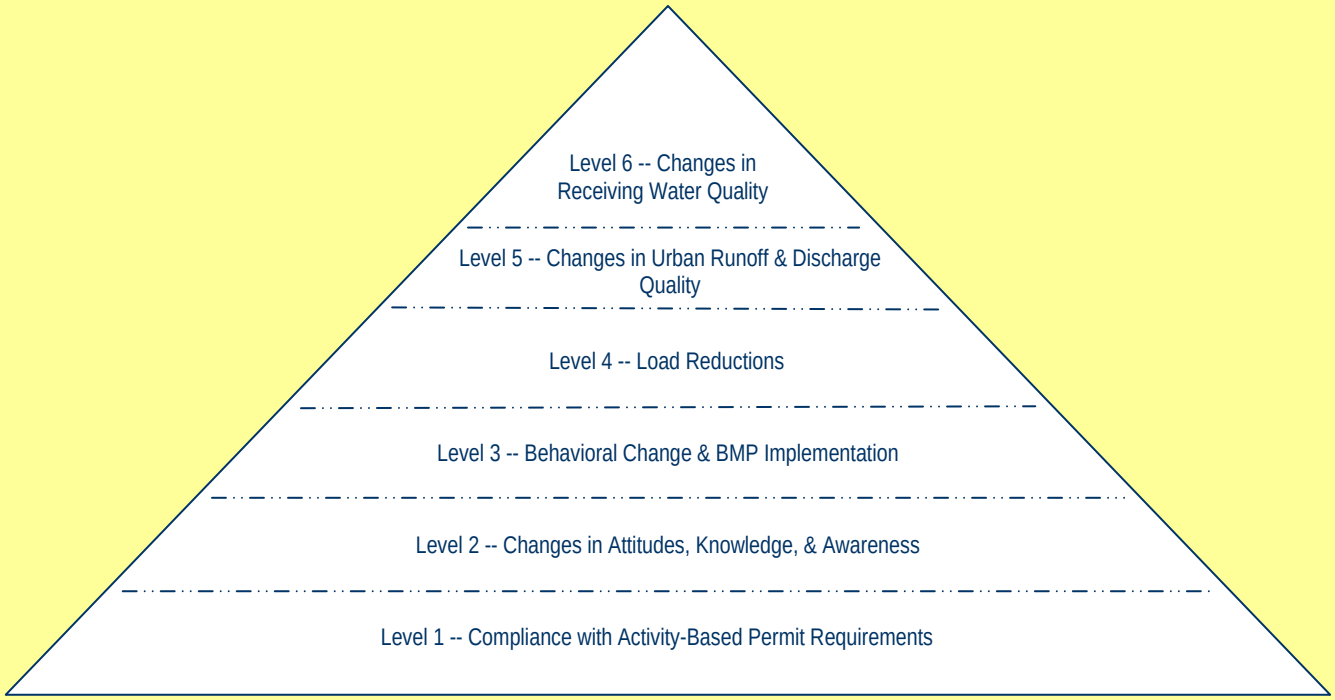

Figure 4 – General Classification of Outcome Types

-- Assessing Level 1 Outcomes --
Program Activity

Basic measurements of program activity are a crucial part of the overall assessment process. Level 1 Outcomes provide managers direct feedback on how well implementation is progressing and whether targeted goals and objectives are being met. Typical examples of targeted outcomes include the following:

- How many trainings or outreach events were conducted?
- How many people were reached?
- How many inspections were conducted?
- Were minimum inspection frequencies met?
- Did the number of inspections increase from previous years?
- How many illicit discharges were identified?
- How many were eliminated?
- Are illicit discharges increasing or decreasing over time?

Level 2: Changes in Attitudes, Knowledge, & Awareness. An important goal of stormwater programs is to increase the level of knowledge and awareness among target audiences such as residents, businesses, and municipal employees. Similar to the discussion above, augmenting awareness and changing attitudes about stormwater pollution and BMPs is generally assumed to be beneficial to the environment because increased awareness and attitudinal changes provide the basis for behavioral change. Measuring Level 2 Outcomes is a useful way of gauging whether educational efforts are progressing toward these changes.

Various methods and tools, both quantitative and qualitative, are currently utilized to measure changes in knowledge and awareness. These generally take the form of surveys and quizzes. Changes may also be inferred by tracking levels of public involvement (e.g., through complaints or requests for information received via stormwater hotlines). However, there may be limitations to using this method because many different factors influence levels of public involvement.

-- Assessing Level 2 Outcomes --
Attitudes, Knowledge, & Awareness

Understanding what people know and care about is the first step in developing effective outreach programs. Two programs in Northern California recently utilized surveys as a tool for refining and evaluating their outreach efforts.

Davis Healthy Gardens Program – During 2000, the City of Davis conducted phone and mail surveys to evaluate general levels of awareness and to help target potential behavioral changes for pesticide use and disposal. The City was able to use this information to determine if the basic program message was being effectively communicated, and which outreach methods and locations worked best for creating awareness and for changing behavior.

Woodland Oil and Grease Reduction Project – In 2000, the City of Woodland developed an outreach program to encourage the proper disposal of used cooking oil by residents. The primary means of assessing program effectiveness was the use of intercept surveys. These surveys provided vital information on whether outreach messages were understood, whether identifiable factors influenced the likelihood of improper disposal (e.g., family size, high density vs. low density neighborhoods, renting vs. owning, cooking habits, etc.), and ultimately on which outreach approaches worked the best (e.g., use of more than one language for outreach).

Level 3: Behavioral Change & BMP Implementation. Building on increases in knowledge and awareness, a key focus of management programs is to effect changes in behavior. Level 3 Outcomes measure the effectiveness of programs in motivating target audiences to change their behaviors and implement appropriate BMPs. Methods used to measure behavioral changes include those described above for Level 2 Outcomes, as well as direct observation via site visits and reporting by dischargers or third parties.

Level 4: Load Reductions. Most activities implemented through stormwater programs are intended to reduce the loading of pollutants from targeted sources. Load reductions should in turn result in improvements to discharge and receiving water quality. Load reductions quantify changes in the amounts of pollutants associated with specific sources before and after a BMP or other control strategy is employed.

-- Assessing Level 3 Outcomes --
Behavioral Change & BMP Implementation

Managers are increasingly utilizing a variety of methods to determine whether program implementation is resulting in targeted behavioral changes such as decreases in discharges and increased BMP implementation.

ACCWP Evaluation of Effectiveness Business Inspections – In 2000, the Alameda Countywide Clean Water Program (ACCWP) completed a comprehensive assessment of its facility inspection program using data collected between 1996 and 1999. Data were assessed to determine how well program objectives were being met, whether program implementation was resulting in corresponding behavioral changes, and to provide recommendations for prioritizing facilities and improving inspections. At the end of the four-year study, ACCWP staff was able to determine that non-stormwater discharges had decreased and BMP implementation increased at regulated businesses.

San Francisco Mercury Reduction Project – To evaluate the effectiveness of efforts to educate the public regarding the environmental impact of improperly disposing of mercury fever thermometers, San Francisco Water Pollution Prevention Program staff conducted intercept surveys and tracked the number of thermometers turned in at collection events. A random-digit-dial phone survey was also used to evaluate overall program effectiveness in discouraging the use of thermometers. A separate element of the project utilized site visits to assess whether outreach to dentists is facilitating proper amalgam waste management. This project provides an excellent example of how a variety of simple, low cost approaches to evaluating behavioral change can be used to evaluate the effectiveness of specific activities.

They are most valuable for making broad comparisons or for helping managers to distinguish where resource allocations are likely to be most useful. Developing a baseline of data and information to support load reduction estimates is key to their application. In the future, it is hoped that the development of such a baseline, as well as approaches for incorporating direct measurement, will enable a significant expansion of the use of load reduction estimates.

Level 5: Changes in Urban Runoff & Discharge Quality. As discussed above, a primary focus of stormwater management programs is to reduce pollutants in stormwater and non-stormwater discharges to the maximum extent practicable, and to

-- Assessing Level 4 Outcomes --
Pollutant Load Reductions

Load reduction estimates provide an important focal point for determining whether program implementation is achieving, or likely to achieve, meaningful outcomes. In recent years, many jurisdictions have increasingly used such methods to estimate the benefits of implementation and to prioritize program spending.

ACCWP Street Sweeping Assessment – As part of their annual reporting process, Alameda Countywide Clean Water Program (ACCWP) copermittees track the amount of street sweeping waste collected. ACCWP combines this information with PCB and mercury concentrations measured in sediment samples taken from inlets, catch basins, and pump stations to estimate the loads of these compounds diverted from the storm drain system as a result of street sweeping. Results allow the identification of potential improvements to street sweeping operations (e.g., to determine whether load diversions could be increased relative to costs), as well as comparison to results from storm drain cleaning and desilting operations.

County of San Diego Construction Activities Assessment – Since FY 2002-03, the County of San Diego has estimated load reductions resulting from BMP implementation at construction sites. Because of the extremely large number of permitted sites open throughout the year, the County determined that the collection and analysis of detailed site-specific data and information would generally be infeasible. Instead, the County employed a less direct approach of estimating levels of site protection and projecting loading rates before and after BMP implementation. In other words, reductions were calculated as the difference between completely unprotected and completely protected sites. This analysis relied heavily on the use of literature values and assumptions about site conditions.

-- Assessing Level 5 Outcomes --
Urban Runoff & Discharge Quality

Measuring changes in the quality of urban runoff and conveyance system discharges (before the water reaches receiving waters) is possibly the most direct expression of program effectiveness.

Davis Healthy Gardens Outreach Program – Pesticide levels in runoff from a residential outfall decreased over the same time frame that the Healthy Gardens Outreach Program was implemented in Davis, California. In general, spatial and temporal variability in pollutant concentrations in stormwater make it difficult to establish such cause and effect relationships. In this example, it was possible to isolate a residential area in Davis that had been targeted by the outreach program. This is not always the case. Outfalls typically drain large urbanized areas and the effects of activities and programs implemented are generally not seen in discharge quality measurements.

Ventura Countywide Stormwater Quality Management Program trend analysis - Ventura County has been able to assess long term impacts based on trend analysis. In 2003, all runoff monitoring data collected since 1993 was used to evaluate trends in water quality. While some organics and metals appeared problematic at sampling locations throughout the watershed, the number of detected organics had decreased significantly since the Program was implemented. More importantly, an analysis of Pollutants of Concern (POCs) showed that Sediment/Total Suspended Solids (TSS), initially identified as a POC in 1998, was no longer of concern. This improvement was attributed to the efforts of the copermittees to decrease sediment contributions from construction sites to stormwater runoff. In addition, Mercury and PAHs were no longer top-ranked POCs.

ensure that these discharges do not cause or contribute to violations of water quality standards in receiving waters. In many respects, Level 5 Outcomes are the most direct expression of successful program implementation. They may be measured as reductions in one or more specific pollutants, and may reflect effectiveness at a variety of scales ranging from site-specific to programmatic.

Level 6: Changes in Receiving Water Quality. The ultimate objective of stormwater management programs is the protection of water bodies receiving discharges from MS4s. Changes to receiving water and environmental quality may be expressed through a variety of outcomes such as compliance with regulatory benchmarks, protection of biological integrity, and beneficial use attainment. Regardless of the outcomes targeted, it is useful to keep in mind that receiving water quality often reflects more than the quality of stormwater discharges alone.

D. Assessment Measures and Methods

Once the desired outcomes of program implementation have been clearly defined, specific measures and methods can be developed for evaluating success in achieving them. **Assessment Measures** are established to determine whether or how successfully a

-- Assessing Level 6 Outcomes --
Receiving Water Quality

Improvements in environmental and water quality represent the ultimate goal of stormwater programs. Observable changes in receiving waters may require long time frames to be measurable.

Lead reductions in gasoline – Lead levels in gasoline were reduced by greater than 90% in the 1980s. This drastic source control action cascaded through the environment as evidenced by an approximate reduction of 90% in lead levels in air by the 1990s. Similarly, there has been an approximate 90% reduction in lead–related lung diseases and approximate 90% reduction in lead levels in runoff. As is often the case with environmental improvements resulting from source control, the time frame over which this was observed was several years.

Diazinon phase-out – In the mid-1990's aquatic toxicity in San Francisco Bay Urban Creeks was substantial and linked to relatively high concentrations of the organophosphate pesticide diazinon. Consequently, these creeks were listed as impaired on the 303(d) list as impaired. To address this impairment, wastewater and stormwater programs throughout Northern California conducted extensive outreach and education programs regarding the impacts of diazinon and alternative pest control methods. In addition, the wastewater and stormwater programs worked with EPA, Department of Pesticide Regulation, and the diazinon manufacturers to identify solutions to the impairment. In 2000, the USEPA announced the phase out of diazinon products and since then, the amount of reported diazinon applications has decreased substantially. In turn, aquatic toxicity and diazinon concentration in urban creeks have decreased dramatically.

programmatic or water quality outcome has been achieved. They may be qualitative (e.g., yes / no) or quantitative (% of targeted audience reached, % reduction in a constituent level, etc.). All priority outcomes should have at least one assessment measure associated with them, but some may have multiple measures. As discussed in Section B above, assessment measures can be focused on implementation or water quality assessment.

They should be selected based on their ability to provide useful information to the program manager. Attributes of a good assessment measure include:

- Measurability (statistically measurable on a frequent basis)
- Relevance (significant, demonstrable relation to strategy and objectives)
- Reliability (easily documented and reproducible)
- Availability (based upon data obtainable at reasonable cost)
- Scientific Validity (based on sound science)
- Replicability (capable of being regularly updated)
- Appropriately Focused (ideally measures outcomes, not inputs or outputs)

As noted above in the discussion of outcome levels, some effectiveness measures are based on assumptions and will have significant uncertainties associated with them. Other measures may be more statistically significant, allowing assessment of central tendencies (e.g., mean or median values) and data variability (e.g., standard deviations). Clearly, measuring the impact of stormwater programs is much easier and more meaningful if baseline levels can be established. It is therefore useful to evaluate available data at each outcome level prior to implementing a program (e.g., awareness levels before an outreach campaign is conducted, water quality before a series of BMPs is implemented). Example assessment measures are listed in Table 1 and are categorized by assessment method.

Assessment Methods are the specific activities, actions, or processes used to obtain and evaluate assessment data or information. Depending on the particular outcome in question, numerous assessment methods may be possible. Reasons for selecting a particular method include cost, ease of use, need for statistical rigor, applicability, and clarity in communicating progress to the general public. For example, headline indicators are objective measurements that reflect in simple terms how a stormwater program is progressing towards its goals. They are based on fundamental factors determining environmental quality and how easily they are understood. Assessment methods can be broadly categorized according to the following types of activity:

- **Confirmation** consists of documenting whether an activity or task has been completed. It is always expressed as a positive or negative outcome (i.e., yes or no), and should be used almost exclusively at Outcome Level 1.

Table 1 -- Examples of Assessment Methods and Measures by Outcome Level

	Outcome Level	Assessment Method Type	Assessment Measure	Examples
1	Activity-based	Confirmation	o Task completion (Y/N)	o Completed update of source inventory
		Tabulation	o Implementation (# or %) o Change	o Number of inspections completed o Increase since 2001
2	Attitudes, Knowledge, & Awareness	Survey	o Knowledge	o Knowledge of storm drain vs. sanitary sewer
		Tabulation	o Change o Action o Change	o Increase in awareness since last survey o Number of hotline calls/ website hits o Increase over last year
3	Behavioral Change & BMP Implementation	Inspection	o Implementation (# or %) o Change	o Installation of berms around trash areas o Increase since beginning of program
		Reporting (discharger)	o Implementation (# or %) o Change	o Installation of storm drain inserts o % increase
		Reporting (3rd party)	o Implementation / non-compliance (# or %) o Change	o No. of Complaints reported o Decrease since beginning of program
		Survey	o Implementation (# or %) o Change	o No. of people picking up pet waste o Increase over last year
4	Load Reduction	Quantification	o Loading o Change	o Copper released from brake pads o Decrease since 1996
		Monitoring (Sampling)	o Loading o Change	o Diazinon loading from lawns o Decrease since 2002
5	Urban Runoff & Discharge Quality	Monitoring (Sampling)	o Benchmark	o Comparison of Cu to Water Quality Objective
			o Loading o Change	o Phosphorous loading to MS4 o Increase since 1993
			o Concentration o Change	o TSS levels in runoff o Increase since 1995
6	Receiving Water Quality	Monitoring (Sampling)	o Benchmark	o Comparison of Zn to Water Quality Standard
			o Concentration	o Nitrate concentration in Rainbow Creek
		Monitoring (Observation)	o Biological condition o Physical habitat	o Stream biodiversity o Scouring of Stream bank
			o Biological condition o Physical habitat	o Loss of riparian canopy o Erosion of stream bank

- **Tabulation** consists of simple accounting, and can be expressed in both absolute (e.g., the number of people participating in an event) and relative terms (e.g., percent increase in pounds of household hazardous waste collected). Tabulation is an extremely common and useful method for assessing activities at Outcome Levels 1 through 3.

- **Surveying** encompasses a variety of methods (e.g., random-digit-dial phone surveys, intercept surveys in a shopping mall) designed to discern the knowledge, attitudes, awareness, or behaviors of a specific population (residents, schoolchildren, automotive enthusiasts, etc.). Surveys vary greatly in the degree to which they are quantitative and statistically valid. Surveys are applicable for Outcome Levels 2 and 3.

- **Quantification** applies primarily to Outcome Levels 4-6 and refers to efforts to quantify reductions in loading or runoff discharges, or to improvements in environmental quality. Often,

particularly at Outcome Level 4, quantification requires the use of estimates that are based on various untested assumptions. Estimation will remain a highly utilized method until many of these assumptions can be verified or refined.

- **Inspections or Site Visits** include any method utilized to directly observe or assess practices used by a targeted audience. They may be regulatory or conducted as part of an information gathering exercise or educational outreach effort. Inspections may be proactive or reactive. Proactive, or scheduled, inspections are most commonly conducted to assess practices at commercial or industrial facilities, construction sites, and municipal facilities. In addition to each of these source types, reactive, or complaint-initiated, inspections are also conducted at residences in addition to commercial and industrial sites.

- **Reporting** is the receipt of implementation, compliance, or other assessment-related information generated by other parties. This may include discharger reporting or third party audits.

- **Monitoring** is the measurement of environmental or water quality conditions, including changes over time. Monitoring methods apply exclusively at Outcome Levels 4, 5, and 6. Monitoring is accomplished through sampling or through observation. Sampling involves collecting water, sediment, or biota in order to directly measure pollutant levels in the environment. Observation involves visual surveys of habitat condition and the use of remote sensing to assess environmental conditions such as vegetative cover or imperviousness.

E. Effectiveness Assessment Needs and Future Directions

The goals of the CASQA Effectiveness Assessment Subcommittee are to continue developing consensus on general approaches, and to further the development of specific tools that will improve the state-of-the-art in this field. Stormwater program managers need guidance on which assessment methods are effective and how to use them to ensure that useful information will be obtained. To evaluate managers' needs, a survey of CASQA members was conducted. The results of this survey are found in Attachment A.

Survey findings include the following:

- The most common reason stormwater management programs conduct effectiveness assessments is to demonstrate compliance with NPDES permit requirements, but several programs reported using assessment results to plan program activities.

- Although direct measures of effectiveness are included in most current stormwater NPDES permits, indirect measurements are used to a much greater extent by stormwater management programs. In particular, programs are most likely to measure the implementation of program elements rather than the impacts resulting from them.

- Survey results indicate that guidance is needed for all program elements and outcome levels. However, respondents ranked post-construction stormwater runoff, water quality monitoring, and watershed assessment as the program areas with the greatest needs. Results also indicated that specific guidance is needed on methods to measure pollutant load reductions, changes in public knowledge and awareness, stormwater discharge quality, and behavior change and BMP implementation.

As noted, there are certain levels at which evaluation is difficult due to resource limitations or the complexity of the measurement needs. Certain evaluation measures, particularly those associated with monitoring or measurement over long time frames, would benefit from development and research conducted on a regional or statewide level. Identification of these evaluation measures, approaches to developing such measures so they are more widely useful, and identification of funding mechanisms to facilitate their development, may be appropriate tasks for an organization such as CASQA.

Process and methods for conducting integrated assessment need to be established. As noted above, assessment methods at the higher outcome levels (i.e., levels 4-6) may be costly and require longer timeframes. The cost-effectiveness of assessment is a critical factor. Assessment tools that are more costly

than the program or activity being evaluated are not practical. Therefore, efforts to pool resources and to develop low cost tools are needed. It may be possible to identify correlations between effective implementation and water quality improvement. This would allow program managers to use implementation assessments (which are simpler and less costly) as indicators of water quality and environmental improvement. Approaches to more definitively linking stormwater program implementation to resulting environmental improvements may also benefit from a regional or statewide approach making this another potential future task for CASQA.

Future efforts should include the following:

- Development of a guidance document describing the process for identifying effectiveness measures and incorporating these measures into both existing and new stormwater programs. Assessment measures for all outcome levels should be included.

- Identification of cost-effective approaches to assessment measurement. One of the critical roles of assessment measurement is to assist program managers in optimizing their resources when developing successful programs. Clearly, low-cost approaches to effectiveness assessment are needed to accomplish this.

- Development of the tools needed to facilitate water quality assessment. Most stormwater programs are required to directly measure improvements in water quality. However, this type of assessment is conducted to a far lesser extent than implementation assessment, often due to a lack of readily available and understandable methods.

- Creation of opportunities for stormwater programs to pool their resources to develop the tools, data, and information needed to assess program costs effectively. Specifically, statewide efforts should be initiated to develop the methods needed to correlate water quality and environmental assessment with implementation assessments.

MS4 Program Evaluation Guidance

U.S. Environmental Protection Agency Office of Wastewater Management

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1. Introduction and Background

1.1 Overview

Purpose of the Guidance

The National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) Program Evaluation Guidance (Guidance) is intended to assist State and NPDES permitting authority staff to:

- Assess the compliance and effectiveness of Phase I and Phase II MS4 programs;
- Develop Phase II MS4 stormwater management programs (SWMPs);
- Assess pollutants of concern;
- Provide technical assistance.

TIP:

The questions and issues addressed in this MS4 Evaluation Guidance are intended to be used as a reference during an MS4 program evaluation, not as a script or checklist during the review.

Each evaluation should be customized to the issues and requirements specific to that MS4.

Unlike NPDES industrial wastewater permits which typically contain specific end-of-pipe effluent limits based on water quality standards or available treatment technology, MS4 permits usually include programmatic requirements involving the implementation of **best management practices** (BMPs) in order to reduce pollutants discharged to the "maximum extent practicable" (MEP). In addition, the permittees often are allowed flexibility in the types of BMPs and activities implemented to meet permit requirements. This flexibility, as well as the multifaceted nature of the requirements, makes it difficult to evaluate the effectiveness of MS4 stormwater programs. The purpose of this Guidance is to provide NPDES permitting authority staff the information and questions necessary to conduct a comprehensive MS4 program evaluation and determine if the permittee is implementing the program in order to reduce pollutants discharged to the MEP. This Guidance is not intended to be used as a checklist, rather as a reference to prepare for and conduct an MS4 evaluation. The evaluator must ultimately rely on personal experience and **best professional judgment** (BPJ) to conduct a comprehensive MS4 program evaluation.

An MS4 program evaluation is ultimately based on the requirements in the MS4 permit and commitments made in the stormwater management program (SWMP). These should serve as the primary references for a specific MS4 program evaluation, with this Guidance used as a tool to help assess compliance with the SWMP Plan and the permit. The evaluator may also recommend additional activities that should be conducted by the permittee to improve the SWMP. The term evaluation can refer to an audit, inspection or screening process depending on the level of detail utilized. These terms are defined under "Common Terms" below.

It is important to keep in mind that this Guidance is not an enforcement "how to" document, but can be used to *assist* in the enforcement process by describing a process for consistently and accurately assessing and documenting the compliance status of permittees based on permit or SWMP requirements. Notes, checklists, and reports developed as a result of an evaluation will be helpful when justifying and generating enforcement actions.

TIP:

Permittees may find this Guidance useful in conducting a self-audit to identify and proactively address issues.

Intended Audience

This Guidance is written for State and EPA staff responsible for NPDES MS4 permit issuance, compliance and inspections.

Permittees may also find the information in this Guidance useful in conducting a self-audit to improve the effectiveness of their SWMP.

Resources:

Information regarding permitting authorities or other NPDES information can be found at www.epa.gov/npdes/stormwater

Objective Evaluation

This Guidance is intended to provide information to evaluators to help them objectively evaluate if the permittee is implementing the SWMP to the MEP. This is going to vary from state to state and by permittee. For example, some states have requirements that go beyond the federal regulations, or have state programs or policies that affect the way in which certain requirements are articulated in a permit. In addition, individual NPDES MS4 permits may provide some details on the type of program elements the permittee must implement, but not describe in detail all activities necessary to implement each element. Typically these permits require that the permittee's SMWP Plan include this detail, however, and be submitted for approval. Or permits may specify goals or performance standards that the permittee must meet and then require them to develop the necessary program components to reach those goals or standards and describe them in their SWMP.

Each permittee may have a different approach to complying with a specific permit requirement based on MS4-specific traits or issues. For example, EPA regulations require permittees to develop "procedures for site inspection and enforcement" for addressing construction activities. MS4 permits will likely elaborate on this requirement in more detail, such as by specifying a minimum frequency for inspection. However, few MS4 permits will specify how the permittee should inventory their active construction projects or track enforcement activities. A permittee with only a few construction projects a year may be able to use a paper system to inventory and track construction projects. A permittee with hundreds or thousands of construction projects would likely need a database or similar electronic tracking system to ensure it was implementing the program to the MEP.

Some MS4 permits will not include any specific requirements at all and will only generally dictate that the required MS4 SMWP components are developed and implemented. These MS4 programs are often the hardest to objectively evaluate because there is no prescribed benchmarks to measure against. In these cases, the evaluator will need to subjectively assess the MS4's SWMP program against the intent of the associated regulations to reduce pollutants to the MEP. Evaluation techniques and tools (i.e. checklists) may need to be altered in these cases to best ascertain and assess the effectiveness and compliance status of such a program.

Common Terms

For purposes of this guidance, it is important to note that the term "evaluation" is generally used to define any assessment of an MS4 program. Evaluations are further defined as either "inspections", "audits", or "screenings" depending upon the level of review performed. These and other common terms used throughout this Guidance are defined as follows:

- Audit—comprehensive evaluation of all components of an MS4 program to assess overall implementation and identify problems
- MS4—the municipal separate storm sewer system (full text definition included in Appendix A); can refer to the conveyance system in addition to the jurisdiction(s) which own/operate the system.
- Permittee—the permitted owner/operator(s) of the MS4; the entity being evaluated
- Evaluation—any screening, audit or inspection of an MS4 program
- Evaluator—the NPDES permitting authority staff person who is conducting the evaluation of the MS4 program

- Inspection—focused evaluation of specific components of an MS4 program to verify compliance with permit requirements
- Municipal permittee—a general reference to a municipality that is the owner/operator of an MS4 and is covered by an NPDES MS4 permit
- Permit Area—Geographic area covered by the MS4 permit
- Permitting Authority—the State or EPA Region authorized to issue NPDES permits
- Screening—evaluation method used to get a basic impression of a program or uncover "red flags;" may be used as a precursor to a program evaluation
- Stormwater Management Program, or SWMP—the stormwater management program implemented by the permittee; also referred to as the "program"
- SWMP Plan—the document often used by permittees to document SWMP elements implemented or planned

How to Use this Guidance

The first part of this Guidance includes background information useful for review. Subsequent sections lead the evaluator through a series of steps to conduct an evaluation, which can be categorized into three parts: Advance Preparation, Conducting the Evaluation, and Post-Evaluation Activities.

The section titled "Conducting the Evaluation" is divided into subsections that describe in depth how to evaluate overall program management as well as each of the major SWMP components:

- MS4 public education and participation
- MS4 maintenance activities
- Construction activities
- Post-construction controls
- Industrial/commercial facilities
- Illicit discharge detection and elimination

For each subsection, the following information is provided:

- A description of regulatory requirements
- Resources for more information
- Common activities related to the SWMP component
- Materials to review prior to the evaluation
- Elements to address and questions to ask during the evaluation
- A description of any recommended in-field evaluation activities
- Common issues identified during evaluations

In addition, a glossary as well as multiple worksheets and checklists have been included in appendices as tools for the evaluator to prepare for and conduct an MS4 SWMP evaluation.

Appendix A—Glossary & Acronym List
Appendix B—Evaluation Worksheets

Appendix C—Field Visit Worksheets
Appendix D—Annual Report Review and Evaluation Worksheet

Note that this Guidance is best used as a preparatory tool and except for the worksheets in Appendices B and C does not lend itself well as a reference to be used *during* an evaluation.

1.2 Regulatory Overview

For More Information:
For information on stormwater programs and regulations visit www.epa.gov/npdes/stormwater

Background

A brief summary of EPA's stormwater regulations are presented below. Sections of relevant regulatory text are included in the Chapter 4 of this Guidance, however, MS4 stormwater program evaluators are referred to the NPDES Phase I and Phase II regulations, preamble, and other EPA guidance for detailed information on the stormwater regulations. State programs that wish to adopt this Guidance may want to add state-specific elements.

In 1987, Congress amended the **Clean Water Act** (CWA) to require implementation, in two phases, of a comprehensive national program for addressing stormwater discharges.

Stormwater Phase I

The first phase of the program, commonly referred to as "Phase I," was promulgated on November 16, 1990 (55 *Federal Regulations* (FR) 47990) and addresses MS4, active construction and industrial facilities.

Phase I requires NPDES permits for stormwater discharges from a large number of priority sources including medium and large MS4s generally serving populations of 100,000 or more, and several categories of industrial activity, including construction activity that disturbs five or more acres of land.

The Phase I permits mostly covered larger cities, and required them to develop a SWMP, conduct some monitoring, and submit periodic reports.

According to 40 CFR 122.26(b)(8), **municipal separate storm sewer system** means a "conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, or storm drains): (i) Owned or operated by a State, city, town, borough, county, parish, district, association, or other public body (created by or pursuant to State law)...including special districts under State law such as a sewer district, flood control district or drainage district, or similar entity, or an Indian tribe or an authorized Indian tribal organization, or a designated and approved management agency under section 208 of the Clean Water Act that discharges into waters of the United States. (ii) Designed or used for collecting or conveying stormwater; (iii) Which is not a combined sewer; and (iv) Which is not part of a **Publicly Owned Treatment Works** (POTW) as defined at 40 CFR 122.2."

TIP:
MS4 systems can be linear or more complex, open, piped, manmade, natural, or a combination of all of these things. Some carry groundwater or piped streams, are tidally influenced, or have some other constant source of non-stormwater discharge.

What constitutes an MS4 is often misinterpreted and misunderstood. An MS4 is not always just a system of underground pipes—it can include roads with drainage systems, gutters, and ditches. Although most entities with MS4s are local municipal governments (e.g., cities and counties), there are other governmental entities that manage storm drain systems at their facility, including state departments of transportation, universities, local sewer districts, hospitals, military installations, and prisons. As

previously stated in the "Common Terms" section, the term "MS4" can refer to the system itself or the entities which own and operate the system.

The operators of construction activities disturbing greater than 5 acres have been required to obtain NPDES permit coverage since 1992. General permits for large construction activity require construction operators to develop and implement a stormwater pollution prevention plan to control erosion, sediment and other wastes on the site.

The Phase I industrial stormwater program regulates eleven industrial categories, which EPA has further broken out into 30 sectors. Similar to construction activities, these industrial facilities have been required to obtain NPDES permit coverage since 1992. General permits require regulated industries to develop and implement a stormwater pollution prevention plan, including monitoring for some industries.

Stormwater Phase II

The second phase of the stormwater program, promulgated on December 8, 1999 (64 FR 68722) and amends existing Phase I regulations dealing with MS4s, active construction and industrial facilities.

The Phase II regulations require NPDES permits for stormwater discharges from certain small municipal separate storm sewer systems and construction activity generally disturbing between 1 and 5 acres. The construction requirements essentially extended the Phase I threshold for construction activities from 5 acres down to 1 acre.

Under the Phase II MS4 stormwater program, operators of regulated small MS4s are required to

- Apply for NPDES permit coverage
- Develop a SWMP that addresses six minimum control measures
  - Public Education and Outreach on Stormwater Impacts
  - Public Involvement/Participation
  - Illicit Discharge Detection and Elimination
  - Construction Site Runoff Control
  - Post-Construction Stormwater Management in New Development and Redevelopment
  - Pollution Prevention/Good Housekeeping for Municipal Operations
- Implement the SWMP using appropriate stormwater management controls, or BMPs
- Develop measurable goals for the SWMP
- Evaluate the effectiveness of the SWMP
- Provide reports on program status

Phase II Stormwater Minimum Measures

- ✓ Public education and outreach
- ✓ Public involvement/ participation
- ✓ Illicit discharge detection and elimination
- ✓ Construction site runoff control
- ✓ Post-construction stormwater management
- ✓ Pollution prevention/ good housekeeping for municipal operations

The Phase II regulations also required certain regulated industrial facilities, with no industrial activities exposed to stormwater runoff, to submit a certification of "no exposure" if the facility fell into one of the regulated eleven industrial categories but did not have an NPDES permit.

MS4 Permits

Phase I MS4 permittees were subject to the permit application requirements found at 40 *Code of Federal Regulations* (CFR) 122.26(d). The permit application consisted of two parts that provided the NPDES permitting authority comprehensive information to use in developing permit requirements. Information required in the application included a physical description of the MS4, legal authority of the MS4 operator, a characterization of the surrounding sources and the pollutants found in the stormwater discharge, and a description of fiscal resources. The most significant portion of the application was the development of a proposed SWMP that would meet the standard of "reducing pollutants to the MEP." Using the information submitted in the permit application, the NPDES permitting authority would then develop appropriate permit requirements. Phase I MS4 permittees were covered under individual permits issued to either single permittees or groups of co-permittees.

Although there are some exceptions, phase II MS4 permittees are primarily covered by general permits that require implementation of the six minimum control measures.

The specific requirements in MS4 permits vary greatly around the country. Some MS4 permits contain broad requirements that outline the basic SWMP components the permittee is required to implement, giving the permittee the flexibility to develop a program to meet these broad requirements. Other MS4 permits are more prescriptive and specify in detail the minimum activities and BMPs for each program element.

1.3 Types of Permittees

Traditional MS4 Programs

Many MS4 operators permitted under the NPDES program are either city or county governments. To evaluate this type of an MS4 program, an evaluator must have a basic understanding of the structure, operation and function of local governments. The structure and authority of local governments can vary by state (for example, the use of towns, townships, villages or parishes), therefore a general description of a common city/county local government structure is provided below.

TIP:
City and county stormwater management programs can be administered by various programs including: public works, building, and environmental program, or wastewater management staff, usually pretreatment.

Cities provide a variety of functions including fire and police protection, construction and maintenance of streets, stormwater and wastewater services, and providing for health, recreation, and social needs. Counties provide many of these same services in unincorporated areas. Cities are governed by a city council that establishes municipal policy and enacts local ordinances. Many cities are run by the council-manager system, where the elected council appoints a full-time professional manager to direct city departments and implement policy. Some cities are run by the mayor-council system, where a mayor (either elected or appointed by the council) works with the council to direct city departments and implement policy.

City boundaries can change through the annexation process. Unincorporated county land that is adjacent to the city can be annexed through a formal process.

Stormwater management responsibilities vary depending on the city or county. Some permittees assign stormwater program oversight and implementation to the public works department, while others assign stormwater to an environmental services department. Still others combine stormwater program implementation with wastewater treatment agencies, flood control authorities, or other regional entities. Also, some counties perform stormwater activities within incorporated cities (such as inspections). Each

permittee should clearly describe in the SWMP Plan the roles and responsibilities of each department involved in stormwater management.

Nontraditional MS4 Programs

As stated previously, the term MS4 does not solely refer to municipally owned storm sewer systems. Examples include, but are not limited to non-traditional entities such as state departments of transportation (DOTs), airports, universities, local sewer districts, hospitals, military installations, post offices, prisons, or irrigation districts.

Because of the unique structure and features of many non-traditional MS4s, some of the traditional SWMP elements may need to be modified or may not be entirely applicable. For example, a public education program for a state DOT or military base would be very different from a public education program for a traditional city.

In other instances, some non-traditional MS4s may lack the legal authority or employ a different type of enforcement mechanism than a city/county government to implement a SWMP component. For example, a state DOT may not have the legal authority to enforce controls on illicit discharges into its system. In these situations the DOT is encouraged to work with the neighboring regulated permittees to develop and implement a shared SWMP in which each permittee is responsible for activities that are within their individual legal authorities and abilities. The DOT could work closely with the permittees that surround the DOT MS4 (i.e. country or city) and use their enforcement authority to eliminate illicit discharges. In other words, a municipal permittee can utilize regulations which prohibit polluted runoff from leaving an individual property and entering the DOT MS4 if the property is covered under an appropriate municipal code (e.g. building, health, etc.) An evaluation of a non-traditional MS4 program must be very specific to the particular circumstances, permittee relationships, and permit requirements applicable.

For More Information:

The California Department of Transportation is a non-traditional MS4. To review the permit, programs, reporting, etc. visit: http://www.dot.ca.gov/hq/construc/stormwater/stormwater1.htm

TIP:

When evaluating non-traditional MS4 SWMPs, be sure to adjust interview topics and questions, field inspections, and documents evaluated to accommodate any unique characteristics of the MS4.

2. Pre-Evaluation Preparation

2.1 Evaluation Goals and Benefits

Evaluation Goals

A permitting authority can have one or more overall goals when conducting an MS4 program evaluation. Identifying the overall goals of the evaluation will help in developing an appropriate schedule and focus. The primary goals in conducting an MS4 SWMP evaluation can include

TIP:

An MS4 evaluation should not be confrontational. The evaluation process works smoothly if both parties use the evaluation as a mechanism to improve the program and increase coordination.

- **Determination of compliance status.** Assessing the compliance status of a permittee with its MS4 permit and SWMP Plan is often a principal goal of an evaluation.
- **Assistance with permit issuance or renewal process.** An on-site program evaluation might be very helpful after the issuance or during renewal of a permit. The evaluation process can be used to identify and answer questions about implementation of program components within the first year of permit issuance. Towards the end of the permit term, the permitting authority can use the evaluation to assist the permittee with the permit application or SWMP Plan revision and/or the evaluation may provide valuable information to the MS4 permit writer to assist in the permit renewal process (including the drafting of a new Phase II General Permit).
- **Phase II SWMP development.** Because most Phase II permittees are just beginning to implement SWMPs, a full compliance evaluation might not be necessary. Nevertheless, an evaluation can also be a compliance assistance tool that can help to correct deficiencies early in the program. Permitting authorities could conduct evaluations geared toward compliance assistance early in the Phase II program development process.
- **Assessing pollutants of concern.** If a water body is impaired or there is a concern regarding pollutants common in urban stormwater, it may be helpful to assess the implementation effectiveness of MS4 programs in the watershed to reduce those pollutants. If a **total maximum daily load** (TMDL) has been developed for a waterway receiving a discharge from a permittee, a program evaluation may assist the permitting authority in assigning an applicable **wasteload allocation**, and/or assist the permittee in implementing the steps necessary to comply with the wasteload allocation.
- **Technical assistance**. Providing technical assistance is an important goal of an MS4 SWMP evaluation. Often it is the only time that the permitting authority staff and the permittees meet face-to-face and can be a valuable opportunity to share technical expertise, advice, reference materials, and examples of successful SWMPs implemented elsewhere.

Benefits of an Evaluation

There are a number of benefits from conducting an MS4 SWMP evaluation of a permittee, including:

- Determination of compliance and assistance with execution of appropriate enforcement actions
- Stronger coordination and working relationship between the permitting authority and the permittee
- Better understanding by the permittee of the expectations and permit requirements of the permitting authority
- An opportunity to clarify any misunderstandings in the MS4 permit requirements or SWMP Plan

- Improved permitting authority knowledge of the permittee's operations, priorities, constraints and challenges faced when implementing a municipal stormwater program
- A more effective SWMP resulting in better water quality

2.2 Advance Preparation

Evaluation Options

Which permittee(s) should be evaluated?
The first question to be answered is which permittee should be evaluated. If the permitting authority has jurisdiction over numerous MS4 permits, ideally all MS4s would be evaluated on an annual basis. If staff resources are limited and only a select number of evaluations can be conducted in a given year, a permitting authority may want to evaluate those MS4s with suspected compliance issues, those located in watersheds of concern, or those with pending permit renewals most frequently. However, permitting authorities should visit each permittee on a regular basis, even if they are not considered "bad actors" however, as evaluations provide many valuable benefits beyond compliance determination or assistance with permit renewal.

If a selected permit covers more than one co-permittee, the evaluator then must determine which co-permittee or co-permittees should be evaluated during a single evaluation. Some permits may cover 20-30 or more co-permittees and it may be impossible to evaluate them all in a single evaluation or year. Evaluations conducted early in the permit cycle may focus on the larger MS4s or those that coordinate activities for smaller permittees. Subsequent evaluations may focus on the smaller co-permittees that have compliance issues or located in watersheds of concern.

After the evaluator has determined which permittees are to be evaluated, the evaluator must consider several questions when determining the level of detail for the evaluation and how best to facilitate and coordinate the process.

What Level of Detail is Possible or Necessary?
If limited time is available, a screening-level evaluation may be an efficient and effective method for developing a basic impression of the program's compliance status or as a way to determine if a more in-depth evaluation is necessary (see Chapter 3). A screening is a way to uncover "red flags" or obvious instances of noncompliance with the MS4 permit. A screening-level evaluation is comprised of a basic interview with the MS4 coordinator or main contact of the program along with a review of the most recent annual report and the SWMP Plan. Documents can be obtained during the screening and reviewed by the evaluator at a later date. The screening-level evaluation should take a minimal amount of time but should be thorough enough to answer general questions about permit compliance. This type of screening may be the precursor to a detailed evaluation (see Chapter 4) at a later date.

A detailed on-site evaluation involves a more intensive review of files and detailed interviews with all or most applicable office and field staff. This type of review is more time-consuming but will provide a more comprehensive picture of SWMP development, coordination, and implementation.

Type of Evaluation	Typical Allotted Time[1]
Screening-level	2-6 hours per permittee
Detailed on-site evaluation	2-3 days per permittee

[1] Assumes one evaluator

Which Program Component(s) will be Evaluated?
A program component-specific evaluation focuses on a specific stormwater program area, such as construction activities or new and significant redevelopment. This type of evaluation may allow the evaluator to get more details through a more extensive file review or more numerous field inspections. For example, during an evaluation focused strictly on the construction component the evaluator may be able to interview all plan reviewers on staff, do an in-depth review of multiple erosion and sediment control plans, review those site's compliance histories, and perform inspections of each. This type of a review is especially helpful if the permitting authority has specific concerns about implementation of a particular component. Such an in-depth evaluation will typically take 1 to 2 days, depending on the complexity of the program and the amount of information to be covered.

Primary Phase I Stormwater Components
- ✓ Program management
- ✓ Maintenance activities
- ✓ Construction
- ✓ Post-construction
- ✓ Illicit discharge detection and elimination
- ✓ Public education/Participation
- ✓ Industrial/Commercial

A detailed on-site evaluation addresses all of the generally accepted primary stormwater program components (i.e., program management, MS4 maintenance activities, construction, post-construction, illicit discharge detection and elimination, public education/participation and industrial/commercial for Phase I MS4 permittees). The intent of a detailed on-site evaluation is to assess the permittee's entire SWMP and possibly identify specific areas or issues that might require a component-specific review in the future.

The level of detail that can be achieved during either type of evaluation is often dictated by the amount of time devoted to each program area. Both the screening-level and detailed on-site evaluation can vary in terms of level of detail.

Will the Evaluation be Conducted in the Office, the Field, or Both?
To get an accurate picture of "on the ground" implementation of the construction and industrial/commercial components of a typical SWMP, the evaluator will need to accompany inspection staff into the field. In addition, many permittees manage municipal facilities such as maintenance yards, material storage facilities, or other municipal facilities that would be helpful to visit during the evaluation to ascertain the permittee's municipal housekeeping practices. If time allows and the evaluator has questions about implementation of these aspects of the SWMP, field time should be built into the evaluation schedule.

As previously stated, this level of detail may not be necessary for a compliance screening or component-specific inspection. In addition, if the program areas being evaluated do not have a field element (i.e., public education), then field activities will not be necessary.

Evaluation Logistics

The MS4 program coordinator or primary contact should be notified well in advance to allow for proper coordination and scheduling amongst parties responsible for program implementation. The contact should be in charge of determining who the appropriate people are to include in the evaluation. Some examples of pertinent staff includes:

TIP:
It is helpful to exchange cell phone numbers to facilitate schedule changes, alternative meeting places, inspection schedules, etc.

- Program managers
- Inspectors

- Administrative staff
- Outreach specialists
- Legal staff

One or more conference calls prior to the evaluation may be necessary to establish the schedule, determine appropriate participants, and answer any questions. Establishing email contact with all of the players well in advance is key to providing necessary information, resources, as well. A final call is helpful the week before the evaluation to answer any last-minute questions, exchange contact information (especially cell phone numbers), confirm the schedule and meeting locations, and make necessary changes. A final evaluation schedule should be developed and distributed to all contacts well in advance to ensure everyone is prepared and expecting the evaluator(s) on the correct dates.

When conducting a component-specific inspection, depending on the complexity of the program, roughly 2 – 4 hours should be assumed for an adequate in-depth office review of each program component. Evaluation of inspection activities in the field can be time consuming due to travel times between sites and facilities, so it is important to allow adequate time in the field as well. Normally, four hours per component (e.g., construction, industrial/commercial) is adequate to evaluate inspection staff. Evaluation of municipal maintenance activities should include adequate field time to inspect the municipal public works yard or similar facility, but normally this should not take more than 1 – 2 hours. All of these time estimates should be confirmed with the permittee when establishing the draft schedule.

Depending upon the size of the area covered under the MS4 permit, the scope of the SWMP, and the type of evaluation to be conducted, a single evaluator could require three days for a comprehensive, in-depth office and in-field program audit.

More than one evaluator can be used to conduct a comprehensive audit as well. This allows one person to interview office staff and another to perform field activities thereby minimizing the number of days to complete the audit.

In addition, multiple evaluators can be used to assess multiple permittees covered under one permit simultaneously. This can be accomplished either by assigning evaluators or "teams" to a particular permittee or to a specific component for all permittees. For example, Team 1 would assess all construction programs for three separate permittees covered under the same permit during a three day period. This approach allows for a consistent review of the all three permittees' construction programs and helps to ensure an equitable assessment between them. Or, Team 1 could review all program components for the City of Pleasantville, while another evaluator reviews the Town of Bliss. This allows the evaluators to become intimately familiar with all facets of their respective MS4 permittees, SMWP, implementation challenges, etc.

It is helpful to try and minimize travel between office locations whenever possible and establish a central meeting place, such as a conference room in a city hall, to save time.

Often it is helpful for the evaluator to coordinate a "kickoff" meeting at the start of the evaluation to review the schedule, answer any last minute questions and finalize logistics. An outbrief session is helpful to coordinate at the conclusion the audit to give a tentative summary of findings from the evaluation. Care must be taken to caveat all

TIP:

Outbrief sessions should be limited to the findings the evaluator feels comfortable revealing prior to a more thorough review of documents, interview responses, and inspection results. In addition, it should be stated that the outbrief findings are subject to change. Rebuttals and questions by the MS4 staff should be limited to clarification of incorrect findings or misunderstandings.

findings as preliminary at that time subject to change based on further review of evaluation materials, the permit, or the SWMP Plan.

Below is an example of a comprehensive, 3-day MS4 program evaluation schedule that addresses the major SWMP components for typical Phase I and Phase II permittees.

Example Schedule for a Phase I Permittee

Monday

8:30 – 9:00	Evaluation Kickoff
9:00 – 12:00	Illicit Discharge Detection and Elimination & Industrial and Commercial Facilities (office)
1:30 – 5:00	Industrial and Commercial Facilities (field)

Tuesday

8:30 – 12:00	MS4 Maintenance Activities (office and field)
1:00 – 5:00	New Development/Redevelopment & Construction Activities (office)

Wednesday

8:30 – 12:00	Construction Inspections (field)
1:30 – 3:00	Outbrief Session

Example Schedule for a Phase II Permittee

Monday

8:30 – 9:00	Kick-off Meeting
9:00 – 10:30	Program Management, Effectiveness and Assessment
10:30 – 12:00	Public Education and Outreach Public Involvement/Participation
1:00 – 5:00	Post-Construction Stormwater Management Construction Activities (office)

Tuesday

8:30 – 12:00	Pollution Prevention/Good Housekeeping for Municipal Operations (office and field)
1:00 – 4:00	Construction Site Runoff Control (field)

Wednesday

8:30 – 10-30	Illicit Discharge Detection and Elimination
10:30 – 12:00	Outbrief Session

2.3 Materials to Review Before the Evaluation

The information provided below should be reviewed before an on-site evaluation. The level of review varies depending on the evaluator's experience with the particular permittee program being evaluated and the type of evaluation being conducted.

- **MS4 NPDES permit.** Because the evaluation is ultimately an assessment of the permittee's compliance with its NPDES permit, the evaluator must be very familiar with the permit and its requirements.
- **SWMP Plan.** The evaluator must review the permittee's latest SWMP planning document(s) and note the commitments and schedules for specific activities.
- **Latest annual report.** The most recent annual report must be reviewed to establish the current status of implementation. Previous annual reports could be reviewed if time permits and if the evaluator wants to assess trends before the on-site evaluation. See Chapter 2.4 below for guidance on Annual Report review.
- **Permitting authority correspondence with the permittee.** Review any relevant correspondence with the permittee regarding its stormwater program. This material might include permitting authority comments on the permittee's SWMP Plan, comments on annual reports, notices of violation (NOVs), or other notices.
- **Permitting authority inspections within the MS4.** Ideally, the evaluator should be aware if an NPDES permitting authority industrial or construction inspector has found violations within the permittee's jurisdiction. If this review is not completed before an evaluation is conducted, it should occur after the on-site evaluation and before the final evaluation report is developed. Any findings should be incorporated into the final report.
- **Permittee Web sites.** Often, permittees have developed stormwater Web sites that can provide copies of reports, guidance documents, and other more current information on the stormwater program.
- **Legal authority.** Review the permittee's legal authority, especially with respect to any exemptions or exclusions from the applicable ordinance.
- **Special water quality concerns.** Be aware of any impaired waters, TMDLs, high quality or protected status, or other water quality-related designations for water bodies to which the MS4 discharges.
- **Other water programs affecting the permittee.** A significant source of frustration to permittees is trying to meet requirements for multiple programs arising from a single agency (i.e. EPA or state environmental protection agency) when program staff within that agency do not understand the trade-offs (sometimes even contradictions) in funding and implementing the requirements of various regulations and programs. For example, an MS4 SWMP evaluator should at least be aware if the municipality being evaluated has a drinking water program, a state revolving fund loan, wastewater permit(s), **combined sewer overflow** (CSO) long-term control plan, or other requirement for which it must also account to the permitting authority. If there is time, it is helpful to find out a little bit about the program requirements applicable to the municipality. There may even be ways to streamline, modify or combine certain requirements to meet multiple program goals.

For More Information:

Chittendon County, Vermont, has developed a Web site to educate the general public about stormwater and the regional management program. Visit http://www.smartwaterways.org

Resources

✓ TMDLs http://www.epa.gov/owow/tmdl/

Resources

✓ Combined Sewer Overflows www.epa.gov/npdes/cso

✓ State Revolving Fund www.epa.gov/owm/cwfinance/cwsrf/index.htm

2.4 Annual Report Reviews

Applicable federal regulations for the NPDES stormwater Phase I regulations and Phase II Rule require that annual reports be submitted. Many permitting authorities include more specific requirements for reporting in their MS4 permits. These reporting requirements can include specific information required for each program component, or it can specify the format for the annual report. For permits with multiple co-permittees, often a central organization or lead co-permittee will coordinate the annual report and submit one to cover all co-permittees.

In general, an annual report should document implementation of the SWMP during the previous year; evaluate program results and describe planned changes towards continuous improvement. Generally written for the permitting authority, an annual report can also be written for the citizens of the community as a way to report progress in meeting water quality goals. To this end, an annual report should clearly illustrate three key items for each SWMP area:

- **Permit and SWMP Requirements.** These requirements either will be specifically prescribed in the permit itself, or described in the permittee's SWMP. The SWMP normally is considered a binding document and part of the permit once it is submitted and approved by the permitting authority. A description of applicable goals or performance standards for each SWMP component should be stated in this summary as well.

- **Summary of Year's Activities.** The summary should describe and quantify program activities for each SWMP component. Responsible persons, agency, department or copermittee should be included. Each activity should be described in relation to achievement of established goals or performance standards.

- **Planned Activities and Changes.** The annual report should describe activities planned for the next year highlighting any changes made to improve BMP or program effectiveness.

An annual report should describe not only the activities during the previous year, but should highlight the SMWP's effectiveness as well. It should be assumed that the ultimate goal of the SWMP is the protection or improvement of water quality; however, there may be multiple, smaller program goals. Identification of direct measures of success for a stormwater program is very difficult, therefore, what is considered 'effective' and how the permittee chooses to assess this effectiveness will vary. Ideally the permittee and permitting authority will establish performance standards or goals in an attempt to define and quantify what is "effective" when the permit is issued. If the performance standards or goals include definitive milestones or schedules, the annual report should highlight these as well.

In addition to the items described above, the annual report should include appropriate program budget information, and a summary of any required monitoring data.

It is important to remember that annual reporting and program assessment are valuable exercises for the permittee as well as the permitting authority. Reporting should not be seen as merely a 'bean counting' effort. The permittee benefits greatly as an annual program assessment guides program focus, helps to budget and target resources, helps justify program support, and facilitates participation among the affected departments and permittees.

Step 1: Related Document Review and Preparation

Prior to beginning the annual report review, an evaluator should review or obtain the following information:

- **NPDES permit provisions.** The NPDES permit requirements will serve as the primary basis for the annual report review. The permit should describe basic program requirements, discharge prohibitions and reporting requirements.

- **SWMP provisions.** The permittee's SWMP document will describe the overall management structure of the program, planned activities, milestones, schedules and any established performance standards or goals. The SWMP should describe if there is a blanket organization which coordinates the co-permittees and if the organization is coordinated by co-permittee staff or a consultant.

- **Previous annual report review comments.** If the previous year's annual report was received and reviewed by the permitting authority, any comments or response should be reviewed to determine if requested changes to report were made, requested information was provided, etc.

- **Previous annual reports.** It is helpful to have access to previous years' reports as certain documents may have been submitted which may be helpful to have on hand (i.e., an ordinance which established legal authority).

Step 2: Background Information

It is helpful to first document basic information about the permittee and permit. Each permittee has different land use, socioeconomic, and water quality issues which will shape the SWMP. All of this information may not be included in the annual report, but can be obtained through a cursory internet search.

- What is the population served by the permittee?
- What is the primary industry within the permittee's boundary?
- What are the primary land uses within the permittee's boundary?
- What are the priority pollutants within the watersheds of the permittee's boundary?
- Are there impaired waterways impacted by the permittee?
- Have TMDLs been established?
- Are there other sensitive areas of concern within the permittee's boundary?

Step 3: Legal Authority

While most important during the first permit year annual report review, it is helpful to confirm a permittee's legal authority to implement all components of the SWMP on an annual basis. Note any described changes to the SMWP and confirm that existing legal authority will support the implementation of those changes (i.e., requiring existing gas stations to install catch basin insert treatment BMPs). Any changes to applicable ordinances should be included in the annual report as well. If the actual codes or ordinances are not included in the annual report or previous annual reports, they should be obtained during an on-site evaluation.

Step 4: Fiscal Analysis

Phase I regulations require that annual expenditures and budget for the year following be included in each annual report. No such requirement exists for Phase II. If included, this information should be reviewed to determine if budget changes are being made. If funding changes are planned, an explanation should be provided (i.e., an additional inspector is being added or additional expenditures are not expected for the development of new outreach materials as they were developed during year one of the permit).

Step 5: SWMP Component Review

While each MS4 SWMP will differ based on various factors (i.e., permit requirements, priority pollutants), the Worksheet lists some basic information that should be provided for each program component. In addition, each target established in the permit or SWMP should be documented and verified on the Worksheet as well. It is helpful to document all quantifiable data during the review to highlight what vital information may be missing and what, if any "red flags" need to be addressed with the permittee. For example, if the permittee provides the total number of construction inspections conducted, but does not provide the prioritized list of active construction sites, the reviewer cannot determine the frequency of inspections or whether high-priority sites were adequately monitored and assessed. Further if the permittee had established a goal of inspecting all active sites within 48 hours of every rain event, the reviewer would be unable to ascertain whether this goal had been met.

TIP:

When reviewing an annual report with the Worksheet provided, pay special attention to questions in the Worksheet answered "unknown." Program components for which little information was provided may be good candidates for an on-site evaluation.

For each program component, the annual report should describe applicable training of staff which occurred during the previous year. It is helpful if agendas or presentation materials are included.

As described in the Conducting an Evaluation section of this Guidance, information regarding the implementation of the following SWMP components should be provided in a Phase I MS4 annual report (additional components may be required by the MS4 permitting authority):

- Program to detect and eliminate illicit discharges to the system
- Program to prevent, contain, and respond to spills
- Program to educate and allow citizens to report illicit discharges or other potential impacts to water quality
- Educational program to encourage the proper disposal of used oil and other toxic materials
- Program to reduce infiltration of sewage into the storm sewer system
- Program to reduce pollutants from active construction sites
- Programs to reduce pollutants in runoff from industrial, commercial, and residential areas

Phase II permittees are required to develop SWMPs which include similar minimum measures, each of which should be addressed in an annual report:

- Public education and outreach program
- Public involvement/participation program
- Illicit discharge detection and elimination program
- Construction site stormwater runoff control program
- Post-construction SWMP for new development and redevelopment (for development greater than or equal to one acre)
- Pollution prevention/good housekeeping program for municipal operations

For purposes of this Guidance and annual report review Worksheet, the above SWMP requirements have been combined and categorized into the following components for both Phase I and Phase II MS4s:

- Program Management
- Public Education and Public Participation
- Municipal Maintenance/Good Housekeeping
- Construction Activities
- New Development and Significant Redevelopment
- Industrial/Commercial Facilities
- Illicit Discharge Detection and Elimination

Step 6: Follow-Up Activities

The information obtained during the annual report review can be used in various ways.

1. To provide feedback to the permittee regarding program development or implementation. Often, permittees have limited contact with permitting authority staff and the submittal of an annual report is the primary means of communication during the year. It is important that the permitting authority review annual reports in a timely manner and respond with any comments, suggestions or criticisms.

2. To determine the need for an on-site evaluation. If the annual report elicited numerous questions about SWMP implementation, an on-site evaluation may be very helpful in determining compliance or effectiveness of the MS4 program.

3. To prepare for an on-site program evaluation. If a permittee has been selected for an on-site evaluation, the most recent and historic annual reports should be reviewed prior.

4. To determine the compliance status of the permittee and progress towards achieving permit requirements, milestones or measurable goals. The permitting authority may choose to use the annual report to determine compliance and issue necessary enforcement actions.

5. To note exceptional approaches, programs, or BMPs used by the permittee that might be helpful to other permittees. Often it is beneficial for permittees to share information, program ideas, educational tools or implementation approaches and annual reports are a good way to facilitate the distribution of ideas.

3. Conducting a Screening-Level Evaluation

3.1 Screening-Level Procedures

The majority of this Guidance (Chapter 4 and the worksheets in Appendix B) describes how to conduct a detailed on-site evaluation of an MS4 program. However, if an evaluator does not have enough time to conduct a detailed on-site evaluation, a more limited screening-level evaluation could be conducted. The intent of the screening-level evaluation is to quickly identify the program areas that are deficient or noncompliance and should be targeted for a more in-depth evaluation. The screening-level evaluation is not intended to be an assessment of compliance with all permit conditions.

TIP:

Conduct a screening-level evaluation when you have limited time and want a "quick" assessment of the MS4.

The screening-level evaluation ideally should be conducted on-site at the permittee's offices after a review of the permittee's annual report (see chapter 2.4). The screening-level evaluation could cover all program components or focus on specific program components that are of particular interest due to pollutants of concern, past compliance issues, or other factors. Depending on the level of detail, the complexity of the program and the number of program components to be reviewed, the screening-level evaluation could last from 2 hours to a full day.

TIP:

Benefits of a screening-level evaluation:

- A quick "snapshot" of MS4 compliance
- Identify major strengths and weaknesses of a program
- Can be conducted in a relatively short amount of time

To conduct a screening-level evaluation, the evaluator should be familiar with the permittee's NPDES permit and most recent annual report. The screening-level evaluation will need to be customized to the unique permit requirements and issues of each MS4, however, some of the more common questions and information to review during a screening-level evaluation are listed below. An evaluator should use this list as a guide to help them quickly assess whether a more comprehensive evaluation is necessary for a certain program component or to review the entire SWMP.

3.2 Common Screening-Level Questions

Program Management

Key questions to ask:

- ✓ Does your written stormwater management plan include specific milestones and quantities for each program/BMP?
- ✓ Describe how your SWMP is coordinated across departments.
- ✓ Describe the impaired waters, pollutants of concern and TMDLs for the waterbodies you discharge to. Does your SWMP include programs or BMPs specifically addressing these impairments?
- ✓ Describe how you evaluate the success of your stormwater management program.

Potential information to review:

- ✓ Stormwater management plan document
- ✓ Most recent annual report
- ✓ Organizational chart showing departments with stormwater responsibilities

Public Education and Participation

Key questions to ask:

- ✓ Describe your overall approach to educating the public on stormwater issues.
- ✓ What are the primary pollutants or behaviors you target with your public education program?
- ✓ Describe your top three target audiences and the messages you plan to deliver. How do they relate to the primary pollutants or behaviors?
- ✓ How do you evaluate the effectiveness of your outreach activities? Have you conducted any public awareness surveys?

Potential information to review:

- ✓ Public outreach strategy
- ✓ Results of any public awareness surveys
- ✓ Information tracking the distribution of outreach materials

MS4 Maintenance Activities

Key questions to ask:

- ✓ Describe your current MS4 mapping resources (e.g., has the permittee mapped storm drains, outfalls, inlets, municipal facilities, etc.).
- ✓ Describe your procedures for catch basin cleaning, street sweeping and MS4 maintenance.
- ✓ Do your municipal facilities have SWPPPs? If not, why?
- ✓ How are maintenance staff trained with respect to stormwater activities and BMPs?

Potential information to review:

- ✓ Catch basin cleaning records for the month of _____
- ✓ Stormwater plan or SWPPP for main municipal maintenance facility (including any self-inspection records)
- ✓ Standard Operating Procedures (SOPs) for stormwater-related maintenance activities

Construction Activities

Key questions to ask:

- ✓ Describe your legal authority to require erosion and sediment control BMPs and enforce stormwater requirements.
- ✓ Describe your system for tracking construction plans, active construction projects, inspections, and enforcement actions (including the number of projects disturbing greater than one acre last year).
- ✓ How do you coordinate implementation of your local erosion and sediment control requirements with the States (or EPA's) NPDES construction general permit requirements?
- ✓ Describe your process for reviewing plans to ensure stormwater BMPs are addressed. What BMPs does a plan reviewer look for on a plan?

- ✓ Interview an inspector to assess how stormwater inspections are conducted at construction sites. Ask about the frequency of inspections and the number of inspectors.
- ✓ Describe the most recent training attended by inspectors and plan review staff

Potential information to review:

- ✓ List of active construction projects disturbing greater than one acre for the month of _____
- ✓ Erosion and sediment control plan reviewed and approved by permittee (selected from list)
- ✓ Inspection reports for a selected project (including any enforcement actions for noncompliance)

Post-Construction Controls

Key questions to ask:

- ✓ Describe your post-construction design standards and legal authority.
- ✓ Describe your process for reviewing plans to ensure post-construction BMPs are addressed. Do plan reviewers use checklists to ensure consistent plan review?
- ✓ Describe your post-construction operation and maintenance (O&M) program (including your inventory of post-construction BMPs and your inspection and maintenance schedule).

Potential information to review:

- ✓ Post-construction plan reviewed and approved by MS4
- ✓ Records for post-construction BMP inspection and maintenance; both private and public if applicable
- ✓ An O&M plan for post-construction BMPs from a recently approved project

Industrial/Commercial Facilities

Key questions to ask:

- ✓ Describe your industrial/commercial facility program, including the types and numbers of facilities covered. How were these facilities selected?
- ✓ Describe the types of BMPs or stormwater requirements these facilities must meet.
- ✓ Describe your industrial/commercial inspection program (including the frequency of inspections and the number of inspectors)
- ✓ Interview an inspector to assess how industrial/commercial stormwater inspections are conducted. Ask about the frequency of inspections and the number of inspectors.

Potential information to review:

- ✓ List of industrial/commercial facilities subject to stormwater requirements
- ✓ Inspection report(s) for selected facilities
- ✓ Enforcement records for a facility out of compliance

Illicit Discharge Detection and Elimination

Key questions to ask:

- ✓ Describe your legal authority to prohibit illicit discharges and illegal dumping to the MS4 (including an exemptions).

- ✓ Describe any field screening activities. If an illicit discharge is discovered during screening, what is the process for determining the source and eliminating the discharge.
- ✓ Describe your illicit discharge investigation and spill response programs, including staff and equipment available.
- ✓ How are the locations of illicit discharges tracked and used to steer other SWMP components (i.e. industrial inspections, public education, etc).

Potential information to review:

- ✓ List of illicit discharge events investigated over the past _____
- ✓ Records on investigation, follow-up and enforcement relating to one or more event(s)

3.3 Screening-Level Evaluation Follow-Up

After a screening-level evaluation, an evaluator has several options:

- Submit a report to the permittee summarizing the findings and asking for deficiencies to be corrected
- Conduct a detailed on-site evaluation of those program components found deficient
- Conduct a detailed on-site evaluation of all program components

If an evaluator conducted a screening-level assessment of multiple permittees, common deficiencies can be used to target either more detailed evaluations or additional compliance assistance on those program components. Additional information on post-evaluation activities, including preparing a written report and follow-up activities, are described in Chapter 5.

4. Conducting a Detailed On-Site Evaluation

The following chapter describes the process and content of a detailed on-site evaluation. The following program areas are covered:

- Program Management
- Public Education and Participation
- MS4 Maintenance Activities
- Construction Activities
- Post-Construction Controls
- Industrial/Commercial Facilities
- Illicit Discharge Detection and Elimination

Each program area section includes a list of regulatory requirements that apply to that program area and describes activities that typically are performed by permittees to meet permit requirements. The sections also include a description of documents to be reviewed before the evaluation and a series of questions to be asked during the interviews. Also included is a list of common problems identified during evaluations.

Approach and Demeanor

An evaluator's approach and demeanor can have a significant impact on the success of the interviews by putting the interviewees at ease. Evaluations can be a stressful process for the permittee, which could result in stilted discussions and overly brief answers to questions. It is best to use a friendly approach and start by asking open-ended, broad questions that allow the interviewees to talk freely about their programs. Since MS4 stormwater programs are not "one size fits all," it is sometimes best to have the interviewees describe their approach to each program area up front rather than ask questions from a list that may not be organized in a way that makes sense in the context of their program's activities. To ensure that all topics are covered in sufficient depth, the evaluator should ask for clarification throughout and take a break at the end of the session to review the list of topics and ask follow-up questions if needed. Maintaining a conversational style will allow the interviewees to explain their answers and feel as though they can provide input into the interview process.

Kick-off Meeting

The first day of an evaluation should begin with a kickoff meeting to allow for introductions and an overview of the process and goals of the evaluation. The meeting usually includes all staff who will be interviewed, and it is a good time for higher-level managers and officials to be introduced to the process and understand what will be happening over the next few days.

The following is a sample agenda for the kickoff meeting. The evaluator should tailor the agenda to suit his or her own objectives:

- **Introductions.** The evaluator should introduce him- or herself and can provide a brief overview of his or her background in stormwater program evaluations. Then each person in the room can introduce him- or herself in turn. It is helpful to distribute a sign-in sheet at this time to collect the names, positions, and contact information for the people being interviewed throughout the week in case follow up is needed.

- **Goals and benefits.** Describe the goals and outline some of the benefits of the evaluation process. These are described in depth in Section 2.1 of this guidance.
- **Schedule.** Review the schedule for the week's interviews and discuss which topics will be discussed during each session. It is also helpful to clarify what type or level of staff should participate in each session and what documentation should be available for review.
- **Products and timeline.** The evaluator should describe the general content and organization of the report and provide a timeline for when a final report will be produced.
- **Questions.** Limit questions to the evaluation process, procedures, and report. Questions about a specific program topic can be addressed during that session.

4.1 Program Management

Regulatory Requirements

Applicable federal regulations for the Phase I and Phase II NPDES regulations are listed at right. NPDES MS4 permits must address these requirements and often more specific state requirements as well.

Common Activities

Comprehensive Stormwater Management Planning

Phase I and Phase II permittees are required to develop SWMPs designed to reduce the discharge of pollutants from the MS4 to the MEP. Ideally, a SWMP is developed with input from internal and external stakeholders including, but not limited to, departments, agencies, and co-permittees within the permitted area, the general public, nonprofit organizations, state agencies, and watershed groups. This program should be described in a planning document (SWMP Plan) that details organizational structure and coordination scheme and a detailed description of the proposed controls or program components (i.e., public education and outreach) that includes performance standards or goals, standards, or timelines and a prioritization of existing resources.

Multiple co-permittees or different agencies may be involved in the development and implementation of the MS4 SWMP programs and Plan. To ensure that the program is implemented consistently by all, it is important that the SWMP describe the communication mechanisms between the co-permittees, and between the co-permittees and other agencies. Within a permittee's stormwater management structure there might be different departments that are to develop, implement, and enforce various components of the program. The SWMP should describe how the various departments communicate and coordinate activities.

Performance standards and goals are important tools for permittees to use to gauge the success of their programs in achieving measurable benefits and improving water quality. The development of performance standards or goals may not be required for many Phase I permittees, however, you should discuss the establishment of water quality-or performance-based goals for SWMP components and refer Phase I permittee's to available measurable goals guidance developed in response to the Phase II regulations (see Resources text box).

Assessment and Evaluation

SWMP evaluations not only demonstrate progress, but also allow the permittee to adjust programming, funding, or staffing levels for the upcoming year to best use existing resources to maximize water quality benefit. Evaluations should examine both direct measures, such as water quality indicators, and indirect measures of program

Federal NPDES Regulations

- ✓ Phase I MS4 Regulations
  40 CFR 122.26(d)(2)(iv)
  40 CFR 122.42(c)
- ✓ Phase II MS4 Regulations
  40 CFR 122.34(a)
  40 CFR 122.34(d)
  40 CFR 122.34(g)(1)
  40 CFR 122.34(g)(3)
  40 CFR 122.35(a)

Resources

- ✓ Menu of BMPs
  www.epa.gov/npdes/stormwater/menuofbmps
- ✓ Measurable Goals Guidance for Phase II Small MS4s
  http://cfpub.epa.gov/npdes/stormwater/measurablegoals/index.cfm
- ✓ Stormwater Phase II Fact Sheet Series
  http://cfpub.epa.gov/npdes/stormwater/swfinal.cfm
- ✓ National Management Measures to Control Nonpoint Source Pollution from Urban Areas
  www.epa.gov/owow/nps/urbanmm/index.html
- ✓ Stormwater Phase II Compliance Assistance Guide
  www.epa.gov/npdes/pubs/comguide.pdf
- ✓ Institutional Aspects of Urban Runoff Management
  www.stormwater.ucf.edu/publications/urban_runoff.pdf
- ✓ Stormwater Authority
  www.stormwaterauthority.com
- ✓ Stormwater Manager's Resource Center
  www.stormwatercenter.net

effectiveness, such as improved compliance rates of construction operations resulting from inspections.

Resources

- ✓ Measurable Goals Guidance for Phase II Small MS4s. http://cfpub.epa.gov/npdes/stormwater/measurablegoals/index.cfm
- ✓ Measurable Parameters http://cfpub.epa.gov/npdes/stormwater/measurablegoals/parameters.cfm
- ✓ California Stormwater Quality Association. An Introduction to Stormwater Program Effectiveness Assessment. http://www.casqa.org/resources/product.php

Measurable Goals

According to the Stormwater Phase II Regulations, small MS4 operators must reduce pollutants in stormwater to the MEP to protect water quality. The regulations specify that compliance with the MEP requirement can be attained by developing a SWMP that addresses the six minimum control measures previously described in this Guidance. One component required in the Phase II MS4 SWMP is the selection of measurable goals to evaluate the effectiveness of the individual control measures and the SWMP as a whole. Phase I MS4 regulations do not specify the creation of measurable goals per se, but require the assessment of water quality improvements or degradation and propose changes to the SWMP necessary to improve effectiveness. Requiring measurable goals of Phase I permittees allow permitting authorities to track the permittee's progress in implementing BMPs and the overall SWMP. The process for developing measurable goals and the benefits of incorporating them into the evaluation of a MS4 program are the same for Phase I or Phase II permittees.

To determine the effectiveness and success of a stormwater management program, managers must first determine the ultimate outcomes they wish to achieve. Then, programmatic, social, physical, and hydrological, or environmental indicators can be used to assess the achievement of the desired goals, or outcomes.

TIP:

Often, permittees do not develop measurable goals that truly quantify and track progress towards desired outcomes in the SWMP. Many times "performance standards" primarily consist of a list of BMPs. Performance standards should include quantifiable activities that can be tracked or criteria against which progress towards desired outcomes can be measured.

The California Stormwater Quality Association[1] (CASQA) asserts that there are six levels of stormwater management program outcomes. Each successive level represents increasingly difficult outcomes to not only achieve, but to assess.

The levels are:

1. Compliance with activity-based permit requirements
2. Changes in attitudes, knowledge and awareness
3. Behavioral change and BMP implementation
4. Pollutant load reductions
5. Changes in urban runoff and discharge quality
6. Changes in receiving water quality

Stormwater program managers may strive to achieve some or all of these outcomes; however, in general the "implementation outcomes" (1, 2, and 3 above) typically are easier to measure than the more complex goals of reducing loading and achieving changes in discharge and receiving water quality. In addition, these outcome levels are not independent of one another; the hope is that movement towards one will result in progress towards achieving another.

[1] CASQA. 2005. *An Introduction to Stormwater Program Effectiveness Assessment.* August 2005. http://www.casqa.org/resources/product.php

It is important that some measure of assessment be determined in conjunction with the establishment of each goal. A goal can be expressed qualitatively or quantitatively, and the associated index should be measurable, relevant, reliable, available, scientifically valid, replicable, and focused on measuring the outcome.

EPA has developed sets of "measurable parameters" for stormwater program managers to use as a guide when developing quantifiable goals. For example, the following implementation parameters could be used to quantify and track the effectiveness of an illicit discharge detection and elimination program component:

- Inventory conducted and sites prioritized for inspection
- Number of field tests conducted in high-risk areas
- Whether or not an ordinance was developed to allow entrance into private buildings for the purpose of conducting tests
- Number of illicit connections reported by business employees
- Number of survey responses indicating a possible illicit connection
- Number of illicit connections found
- Number of illicit connections repaired/replaced
- Whether or not an ordinance was developed for mandatory inspections of new buildings
- Number of new buildings inspected

CASQA asserts that depending on the outcome, various methods of obtaining necessary measurement data are available, including the following:

Method	Definition	Example
Confirmation	Documenting whether a task has been completed.	Development of an construction operator BMP outreach brochure
Tabulation	Tracking an absolute number or value of something	Number of brochures distributed to construction operators
Surveying	Determining knowledge, awareness, etc. of a group of people	Phone survey of 100 construction operators, 50 of whom had received the BMP brochure, to gauge any differences in stormwater awareness
Quantification	Estimating pollutant loading	Modeling to determine sediment load reductions prior to initiating construction operator outreach program – assumption made about BMP use before and after program
Inspections or site visits	Observing activities or BMPs	Inspections of construction projects before and after initiating construction operator outreach program
Reporting	Utilizing reports generated by third parties	Audit of construction component of the SWMP indicated that BMPs observed and the level of understanding demonstrated by operators had improved during the last year

Method	Definition	Example
Monitoring	Sampling or observation in the field to determine environmental or water quality conditions	Water quality monitoring above and below three comparable active construction sites (Site 1 – trained on construction BMPs, Site 2 – no training, Site 3 – random control, unknown level of BMP understanding) to determine any differences in per/acre disturbed loading of sediment

Permittees need to perform sampling and conduct scientific field assessments to assess specific water quality-related SWMP goals (i.e., pollutant load reductions, changes in urban runoff and discharge quality, and changes in receiving water quality). Some MS4 permits require water quality monitoring to establish baseline water quality conditions, determine the quality of discharges from different land uses or subwatersheds, measure the effectiveness of structural BMPs, or to participate in regional watershed monitoring efforts to track water quality trends.

Evaluating Program Management

Effective program management is essential to help guide SWMP development, implementation, administration, and continued assessment. Each program should have a management process that facilitates stormwater activity coordination between departments within each permittee, between co-permittees, and between the permittee and other organizations and agencies interested in stormwater quality. Some permits that regulate multiple co-permittees may allow for a separate "umbrella" management structure to perform certain functions, one of which may be management of certain components (e.g. public education) of the program and coordination among copermittees. These umbrella structures can be managed by the lead permittee or by consultants hired collectively by all co-permittees.

For More Information:

For an example of a program that uses an "umbrella" management structure, the Contra Costa Clean Water Program manages the stormwater program for nineteen co-permittees in Contra Costa County, California. Visit http://www.cccleanwater.org.

Another important aspect of program management is the development of goals or standards to measure effectiveness of the program from a water quality perspective. This is normally required by the permitting authority in addition to being helpful to MS4 SWMP coordinators for use in budgeting, staff allocation, and long-term planning. When evaluating a SWMP, you should question permittee staff regarding the desired outcomes for the program as a whole and for each individual program component. You should determine what, if any, assessment measures have been established for each goal and question the MS4 staff regarding progress.

The findings of the MS4 evaluation should not be based solely on the level of achievement of measurable goals. It is important, however, that the permittee's SWMP includes the use of measures to assess progress towards meeting goals that benefit water quality and not rely on "bean-counting." You should be confident that the SWMP is being regularly assessed and modified as necessary to improve effectiveness.

Typically, each MS4 SWMP would have a coordinator or other principal contact. This person would be the best to interview regarding program management procedures.

TIP:

Normally, it is not within the scope of a typical MS4 program evaluation to review or evaluate water quality monitoring data. Because of the amount of data, monitoring methods, and monitoring plans, this is an exercise best undertaken by NPDES staff that specializes in ambient water quality monitoring protocols and analysis.

Before the Program Evaluation

To prepare for the program management evaluation, an evaluator should review or obtain the following information prior to the evaluation:

Pre-Evaluation Checklist

- ✓ MS4 permit provisions
- ✓ SWMP provisions
- ✓ Most recent annual report
- ✓ Memorandums of understanding

- **MS4 NPDES permit provisions.** Review the permit requirements for program management to identify any specific requirements (such as annual reporting details). The NPDES permit will serve as the primary basis for the program evaluation.
- **SWMP provisions.** The permittee's SWMP planning document(s) should describe the overall management structure of the program.
- **Latest annual report.** The annual report should be reviewed to help you become familiar with the management structure of the program.
- **Memorandums of Understanding (MOUs)** or other written agreements between or among co-permittees or other agencies stipulating arrangements and responsibilities for meeting permit requirements.

Records Review

The following records might help in evaluating the permittee's program management structure. Ask for copies of relevant information where it will help in writing the report or documenting a permit violation.

Documentation	What to Look For
▪ Stormwater program staff lists ▪ Organizational charts ▪ Contact names and responsibilities	▪ Are specific departments and/or individual positions identified as responsible for each part of the SWMP? ▪ Are lines of authority and responsibility clear?
▪ Performance standards ▪ Program goals/measurable goals ▪ Implementation schedule	▪ Has the permittee documented a schedule and goals for guiding the SWMP in subsequent years? ▪ Are these goals specific enough for the SWMP to be evaluated?
MOUs or other agreements	▪ Does the permittee document partnerships with other agencies, nonprofit organizations, or other cooperating entities? ▪ Are the roles and responsibilities of each entity clearly identified?
▪ Tracking systems ▪ Reporting and assessment procedures	▪ Has the permittee established procedures or deadlines for reporting or program assessment, both within the permittee's structure and between agencies or co-permittees?
Coordination meeting schedules, task force rosters	▪ Do permittee staff responsible for implementing the SWMP meet periodically? ▪ Do municipal agency representatives meet to discuss SWMP implementation? ▪ Does the permittee meet with cooperating entities to discuss SWMP implementation?

Elements to Address During the Program Evaluation

A successful management structure will generally be composed of the following elements:

- Comprehensive stormwater management planning
  - Public participation
  - Intergovernmental, agency, and department coordination
  - Staff inventory and organization
  - Performance standards or goals
  - Prioritization of resources
- Data collection and reporting
- Assessment and evaluation
- Program adjustments based on ongoing assessments

The common program elements are the key issues to consider during the review. For each of the elements listed above, this Guidance presents common program activities and questions to consider during the program evaluation. The questions are suggested for you to address each program component. Of course, a comprehensive SWMP evaluation must be tailored to the specific issues associated with each permittee and should include more specific questions regarding the permittee's permit structure and management challenges.

COMPREHENSIVE STORMWATER MANAGEMENT PLANNING

SWMP Planning Documents

- ✓ Has a SWMP Plan been developed? If so, when? Last revised?
- ✓ If a SWMP plan has not been developed, what guidance does the permittee use to implement components of the SWMP?
- ✓ Is there a schedule for revision of the SWMP plan?
- ✓ If multiple co-permittees are included in the program, does each permittee have their own SWMP planning document?
- ✓ Is there an additional MS4-wide document, plan, or program? Who developed it?
- ✓ How were internal and external stakeholders included in the development or revision of the SWMP plan?

Intergovernmental, Agency, and Department Coordination

- ✓ If the permit covers more than one permittee, does the program contain a description of the roles and responsibilities of each permittee and procedures to ensure effective coordination?
- ✓ Is there an "umbrella" group that facilitates administration and coordination among the co-permittees?
  - What functions does this group perform?
  - Are there task forces or committees who are used to coordinate program-wide components and to address specific issues related to different program topics (e.g., Public Education and Outreach Committee)?

- Who are members of these committees?
- Are there regular meetings to coordinate amongst the co-permittees?

✓ Is there a formal agreement (e.g., an MOU) between the co-permittees?

✓ Discuss with the permittee the institutional arrangements between city departments that have been developed to ensure coordination and collaboration on stormwater management activities.

✓ Is there a stormwater committee (or equivalent) within the municipal permittee to help ensure coordination among city departments?

✓ How often does the committee meet? Who are the members, and are all the relevant city departments involved?

✓ Is the stormwater program coordinated with nonpoint source, **brownfield** redevelopment, transportation planning, underground injection control, coastal zone, household hazardous waste, recycling, and other relevant programs?

✓ Does the stormwater program use nonprofit organizations, watershed groups or other community organizations to administer required elements of their permit or minimum measures?

Staff Inventory and Organization

✓ Does the permittee have a person designated to lead and coordinate the stormwater program and activities?

✓ Does the SWMP planning document include an organization chart listing responsible parties for each SWMP component?

Performance Standards or Goals

✓ Has the permittee established measurable goals or performance standards for program components?

✓ If performance standards have been established, are they measurable or are they essentially BMP recommendations with level of service (i.e., number of miles swept) requirements?

✓ Does the permittee attempt to quantify or assess a program or a BMP's water quality impact or effectiveness as opposed to merely tracking level of service? For example, the percentage of violation recidivism for industrial facilities reinspected during a permit term may provide better information about the effectiveness of the industrial inspection program than the total number of facilities inspected in a year.

Prioritization of Resources

✓ Has the permittee identified specific pollutants of concern for its local water bodies?

✓ Are these pollutants of concern consistent with priorities identified in the **303(d)-listed** impairments for local water bodies?

✓ Are these pollutants of concern consistent with any water quality monitoring data or studies conducted by the permittee or another agency?

✓ Has the permittee developed strategies to specifically address those pollutants?

✓ How does the permittee decide on program priorities? Are these reassessed periodically?

✓ Does the SWMP include a schedule of activities?

✓ Does the MS4 discharge to a water body on the state's list of impaired waters?

- What pollutants are identified on the list?

- Has stormwater been identified as a source?
- Does the SWMP specifically address this pollutant?
- Does the SWMP identify BMPs specifically for sources or discharges to the listed water body?

✓ Has a TMDL been developed for a water body to which the MS4 discharges and for which stormwater has been identified as a pollutant source?

- What pollutants are addressed in the TMDL?
- Does the TMDL specifically address (or include wasteload allocations for) stormwater?
- Has the corrective action plan or other planning to address TMDLs been reviewed for integration with the SWMP?
- Does the permittee's stormwater program address the pollutants of concern identified in the TMDL?

✓ Is the permittee participating in any watershed planning efforts?

✓ Have any goals been developed based on watershed issues, strategies, or challenges?

✓ Has the permittee established a set of indicators or parameters to assess progress toward meeting the goal(s) of the watershed plan?

✓ Is the permittee's stormwater program implemented on a watershed basis?

ASSESSMENT AND EVALUATION

Programs

✓ Does the permittee regularly measure progress against the established performance standards and goals?

✓ Are the goals quantifiable?

✓ Is the permittee analyzing data in the annual report to identify program activities that may need to change to address problem areas?

✓ Has the SWMP been altered based on this evaluation?

BMPs

✓ Is the permittee able to track both structural BMPs and non-structural BMPs and activities?

✓ Has the permittee set measurable goals or performance standards to evaluate individual BMPs and activities or suites of BMPs that address a particular pollutant source?

✓ Is there a process to evaluate or revise individual BMPs and suites of BMPs when receiving water outcomes or endpoints are not being met?

✓ Do assessments evaluate impacts of BMPs on ground water?

✓ Is the permittee analyzing data in the annual report to identify individual BMPs or suites of BMPs that may need to change to address problem areas?

Water Quality

- ✓ Has the permittee documented environmental, water quality, stream corridor, habitat, or other types of improvements?
- ✓ Has the permittee estimated reductions in pollutant loadings from the MS4 or other quantifiable water quality benefits expected as the result of the municipal stormwater program?

MONITORING

Note: It is important to tailor these questions to each permittee's monitoring requirements as specified in their permit.

Wet Weather Outfall Screening and Monitoring

- ✓ Does the permittee conduct wet weather screening at outfalls to characterize stormwater flows from the MS4?
- ✓ Does the permittee have written screening procedures?
- ✓ What is the permittee's schedule for screening the sites?
- ✓ Are parts of the permit area prioritized for screening based on incidents of illicit discharges, land use, dumping reports, etc.?
- ✓ What parameters are being tested?
- ✓ How does the permittee prioritize sites for follow-up (e.g., magnitude and nature of suspected discharge)?
- ✓ Who conducts the sampling? What kind of training have sampling personnel received?
- ✓ What type of records are kept?
    - o Analytical results
    - o Date and duration (in hours) of the storm events sampled (rainfall data)
    - o Rainfall measurements or estimates (in inches) of the storm event which generated the sampled runoff (rainfall data)
    - o Duration (in hours) of the storm event sampled and the end of the previous measurable (greater than 0.1 inch rainfall) storm event (rainfall data)
    - o Estimate of the total flow of the discharge sampled (stage and velocity)
- ✓ What analytical methods are used (i.e., 40 CFR Part 136)?
- ✓ What are the results of the initial sampling and analysis?
- ✓ Has the permittee made any changes to the monitoring program based on past results and experience?
- ✓ How have monitoring results been used to assess program components?
- ✓ Are monitoring data used to estimate pollutant loads for a TMDL?

Dry Weather Outfall Screening and Monitoring

- ✓ Does the permittee conduct dry weather screening at outfalls to identify non-stormwater discharges?
- ✓ Does the permittee have written screening procedures?
- ✓ What is the permittee's schedule for screening the sites?
- ✓ Are parts of the permit area prioritized for screening based on incidents of illicit discharges, land use, dumping reports, etc.?
- ✓ What parameters are being tested?
- ✓ How does the permittee prioritize sites for follow-up (e.g., magnitude and nature of suspected discharge)?
- ✓ Who conducts the sampling? What kind of training have sampling personnel received?
- ✓ What type of records are kept?
    - Analytical results
    - Date and duration (in hours) of the storm events sampled (rainfall data)
    - Rainfall measurements or estimates (in inches) of the storm event which generated the sampled runoff (rainfall data)
    - Duration (in hours) of the storm event sampled and the end of the previous measurable (greater than 0.1 inch rainfall) storm event (rainfall data)
    - Estimate of the total flow of the discharge sampled (stage and velocity)
- ✓ What analytical methods are used (i.e., 40 CFR Part 136)?
- ✓ What are the results of the initial sampling and analysis?
- ✓ Has the permittee made any changes to the monitoring program based on past results and experience?
- ✓ How have monitoring results been used to assess program components?
- ✓ Are monitoring data used to estimate pollutant loads for a TMDL?

Biological Monitoring

- ✓ Does the permittee perform biological sampling?
- ✓ Has a plan been developed to conduct biological sampling? If so, does the plan include the following:
    - Identification of sampling stations and rationale for selection
    - Location of known major MS4 outfalls discharging to water bodies in which sampling stations were chosen
    - Land use activities near sampling stations
    - Frequency of monitoring
- ✓ Who conducts biological sampling and what training have they received?

- ✓ Has the permittee made any changes to the monitoring program based on past results and experience?
- ✓ How have monitoring results been used to assess program components?

Ambient Monitoring

- ✓ Does the permittee conduct ambient monitoring to characterize water quality conditions in receiving waters?
- ✓ How were the sampling sites selected?
- ✓ Is sampling conducted both during dry weather and wet weather?
- ✓ What is the frequency of sampling?
- ✓ What parameters are analyzed? What sampling and analytical methods have been used?
- ✓ Does the permittee have a written protocol or procedures for this sampling program?
- ✓ Who conducts the sampling and what training have they received?
- ✓ Has the permittee made any changes to the monitoring program based on past results and experience?
- ✓ How have monitoring results been used to assess program components?
- ✓ Are monitoring data used to estimate pollutant loads for a TMDL?

DATA COLLECTION AND REPORTING

- ✓ What reporting requirements are included in the MS4 NPDES permit?
- ✓ If multiple permittees are covered, are there different requirements for the co-permittees and the "umbrella" group?
- ✓ For co-permittees or Phase II permittees that rely on other entities to implement required elements of the program, how are data provided or reported?
- ✓ How are the required data collected, tracked, and reported?
    - o Is there a database?
    - o Are there reporting forms?
- ✓ Are there internal reporting deadlines within the municipal program structure?
- ✓ Are the appropriate data being collected by the permittee to be able to measure effectiveness and determine if performance standards are being met?
- ✓ How are data disseminated to those who use them, if at all?

<u>In-Field Program Evaluation Activities</u>
In-field activities are not necessary to evaluate program management.

Common Issues Identified During Program Evaluations

- ✓ The permittee lacks necessary intradepartmental coordination on stormwater issues.
- ✓ The permittee does not describe a formal, coordinated program framework.
- ✓ The SWMP does not identify pollutants of concern or program priorities.

- ✓ The program does not have measurable goals to track and quantify progress towards desired outcomes.
- ✓ The "umbrella" group for multiple co-permittees has a program or plan, but nothing has been developed for each specific co-permittee to detail actual implementation or goals specific to each co-permittee's program.
- ✓ No SWMP planning document(s) exist to guide the implementation of SWMP components.
- ✓ The SWMP has not been revised and updated based on evaluations of effectiveness.

4.2 Public Education and Participation

Regulatory Requirements

EPA's federal NPDES regulations for the stormwater Phase I and Phase II are listed at right. NPDES MS4 permits must address these requirements and often include more specific provisions.

Public education is not addressed as a separate program area in the Phase I regulations. Two general public education requirements are contained in the illicit discharge detection and elimination program requirements, as well requirements for education of pesticide, herbicide, and fertilizer applicators and construction site operators. The latter two programs are discussed in greater detail in the MS4 Maintenance and Construction Activities sections of Conducting an Evaluation.

The NPDES Phase II regulation's minimum control measures include requirements for Public Education and Public Participation.

Common Activities

Public education efforts aim to project information to the audience, while the goal of a public participation and involvement program is to encourage volunteerism, public comment and input on policy, and activism in the community. Many activities can and often do achieve both goals, therefore many permittees combine the two into one public outreach program component and develop joint materials. For example, a brochure about stormwater impacts could also invite residents to participate in a stream cleanup. In addition, it is common for several co-permittees to combine funds and produce one set of public outreach materials to distribute regionally or simply use another permittee's materials.

Goals and Objectives

Although not specified in NPDES regulations, ideally a stormwater outreach program should have a strategy to address public education and participation. The outreach strategy should be outlined in a document that may only be a few pages but should establish who is responsible for specific tasks, how much is budgeted, and the dates of implementation (especially if the permittee has to apply for funding support) and completion.

A permittee's outreach program should include goals based on specific stormwater quality issues in the community or pollutants of concern as well as specific target audiences. The goals can be quantitative (i.e., numbers of classroom presentations per year) or qualitative (i.e., increased stormwater awareness among Spanish-speaking residents regarding illegal dumping demonstrated by awareness surveys). Goals can be short-term or long-term but should be designed to be reassessed on a regular basis. Goals should also be progressive; for example, a goal for the first two years may be based on increasing public awareness of certain issues, whereas a goal for

Federal NPDES Regulations

NPDES MS4 permits must address these requirements and often include more specific state requirements:

✓ Phase I MS4 Regulations
Public Education
40 CFR 122.26(d)(2)(iv)(B)
40 CFR 122.26(d)(2)(iv)(D)(4)
40 CFR 122.26(d)(2)(iv)(A)(6)

Public Participation
40 CFR 122.26(d)(2)(iv)(D)

✓ Phase II MS4 Regulations
Public Education
40 CFR 122.34(b)(1)

Public Participation
40 CFR 122.34(b)(2)

Resources

✓ EPA Menu of BMPs http://cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm
✓ Getting In Step http://www.epa.gov/owow/watershed/outreach/documents/getnstep.pdf
✓ EPA Stormwater Month Outreach Materials and Reference Documents www.epa.gov/npdes/stormwatermonth
✓ Think Blue San Diego, an overview of San Diego's stormwater pollution prevention program http://www.thinkbluesd.org/why.htm
✓ CTIC Know Your Watershed http://www.ctic.purdue.edu/KYW/

subsequent years would be based on measurable changes in behavior as a result of increased awareness.

Though each permittee may select its own unique set of goals, the ultimate outcome of all programs should be to elicit specific changes in behavior that benefit water quality. Brochures and presentations are means to this end, but they do not necessarily indicate a meaningful and successful public education program.

Message Development
The permittee's stormwater outreach messages should be clear, specific, and tied directly to elements that each specific audience values, in addition to goals established in the SWMP. Multiple messages may be necessary to address various audiences or behaviors.

Target Audiences
An outreach strategy should identify target audiences a permittee wants to reach with appropriate messages. Target audiences can be segmented by geographic location, demographics, occupation, or behavior patterns. Selection of a target audience can be based on stormwater quality issues and behaviors to be altered. The permittee should determine what information the target audience needs, gather information on the profile of the target audience, and collect information on the barriers to reaching this target audience. As stormwater awareness is evaluated and the program evolves, the target audience may change as well.

Message Packaging
Permittees use various packages to deliver messages to different target audiences. The packages should be appropriate to the audience (i.e., demographic, employment, geographic location, etc.). Packages for messages can include brochures, TV and radio spots, videos, presentations, events, and other formats.

Distribution Mechanisms
There are many ways to distribute outreach messages and materials. Distribution methods should be specific to the message and audience. Often, co-permittees or other partners (i.e., nonprofit organizations, watershed groups, other government agencies) share the distribution costs to best use available resources. Often goals or permit requirements are tied to distribution; therefore, permittees should track distribution of materials, program-related presentations, and other delivery methods.

Evaluation Methods
Permittees can evaluate the effectiveness of an outreach strategy in a number of ways, but any method should be linked to established measurable goals. Some use public surveys to gauge changes in awareness or behavior of the target audiences. The surveys can be conducted in person at events, on the phone, or using Web-based survey tools. Others track quantifiable data such as brochures distributed, people trained, participation in events, volunteer hours, etc. Ultimately, permittees should track metrics showing the adoption of desirable behavior changes.

Public Participation Activities
Ideally, permittees give the public the opportunity to participate in the development, implementation, evaluation, and improvement of the stormwater program. At the very least, permittees need to notify the public about the availability of the SWMP and notice of intent and solicit comments. Some permittees have stakeholder workgroups that are involved in developing policy and programs. Many permittees encourage and facilitate involvement by coordinating or promoting community events and promoting volunteerism in the community through activities such as storm drain stenciling, stream cleanups, riparian tree plantings, and other programs.

Evaluating Public Education and Participation Programs

The public education and participation component of a SWMP may be implemented by one person or department (e.g., a communications office) or be a combination of efforts by many people, departments, or agencies. An evaluator should question the SWMP coordinator about key staff to talk with prior to the evaluation. It may be possible for the coordinator to relay all necessary information without having to track down numerous staff. It is also a good idea for you to request that copies of pertinent outreach materials be compiled to review during the evaluation or taken to review after.

Some permittees will want to present all stormwater public education activities as an independent program area, while other permittees describe education activities in each relevant SWMP component (for example, education of construction operators is addressed in the construction component or public education on illicit discharges is addressed in the illicit discharge component). An evaluator should take note of how the permittee organizes its education activities and adjust the evaluation process accordingly.

Before the Program Evaluation

An evaluator should review or obtain the following information prior to the evaluation:

Pre-Evaluation Checklist
- ✓ MS4 permit provisions
- ✓ SWMP provisions
- ✓ Most recent annual report

- **MS4 NPDES permit provisions.** Review the permit requirements for public education and public participation to identify any specific requirements (such as the type of activities the program must include or the pollutants the program must address). The NPDES permit will serve as the primary basis for the program evaluation.
- **SWMP provisions.** The permittee's SWMP should describe the overall outreach structure of the program and any measurable goals.
- **Latest annual report.** The annual report should be reviewed to help you become familiar with the activities that have been conducted in the past and the progress made towards achieving measurable goals of the program component.

Records Review

The following records might help in evaluating the compliance and performance of the permittee's public education and participation program. Ask for copies of relevant information where it will help in writing a report or documenting a permit violation.

Documentation	What to Look For
Public outreach or communication strategy	Target audiences, specific stormwater messages, tracking methods, measurable goals, a plan to review and modify the strategy over time.
Stormwater Web site	Pamphlets, calendars of events, hotlines, contact information, access to stormwater permit requirements and SWMP documentation, general stormwater information, volunteer opportunities
Public awareness survey	Public awareness surveys may be available to assess either baseline awareness or movement towards measurable goals.

Elements to Address During the Program Evaluation

This Guidance presents common program activities and questions to consider during the program evaluation. Of course, a comprehensive program evaluation must be tailored to the specific issues associated with each permittee and should include more specific questions regarding the permittee's permit structure and management challenges.

GOALS AND OBJECTIVES

- ✓ Does the permittee have a strategy document for education and participation?
- ✓ Does the document include specific goals?
- ✓ On what are the goals based?
- ✓ Are the goals measurable? How?

MESSAGE DEVELOPMENT

- ✓ Have specific messages been developed for stormwater outreach?
- ✓ On what are the messages based? Pollutants of concern? General awareness? Problem target audience? All of the above?
- ✓ Are different messages used for different target audiences (i.e., children, homeowners, industry, etc.) or is one central message used for all?
- ✓ Do the messages encourage participation in stormwater-related activities?
- ✓ Do the messages educate about behavior changes that the audience can make to contribute to a solution?
- ✓ Have messages been developed specific to reducing illicit discharges with information about how to report them to the appropriate authorities?
- ✓ Have messages been developed to educate pesticide, fertilizer, and herbicide applicators (including homeowners) about ways to reduce stormwater pollution?

TARGET AUDIENCES

- ✓ Has the permittee identified target audiences for outreach efforts? How are these target audiences selected? What are the target audiences?
- ✓ What land use groups (i.e. industry, commercial businesses) has the permittee targeted?
- ✓ Have certain ethnic groups or nationalities been identified as audiences to be targeted based on an evaluation of local demographics?
- ✓ Have the target groups been reevaluated based on evaluation of the strategy and progress that has been made?
- ✓ Has the Phase I permittee targeted pesticide, herbicide, and fertilizer applicators (including homeowners) and construction site operators for outreach?
- ✓ Has the Phase II permittee targeted industries or commercial businesses of concern for outreach?

MESSAGE PACKAGING

- ✓ Does the permittee have a variety of written educational materials?
- ✓ Does the permittee have a variety of other packages (i.e., Web site, presentations, displays) for educational materials?
- ✓ Did the permittee produce the education and outreach materials in the different languages that are spoken in the community?
- ✓ Do the permittee's materials explain stormwater issues in easy-to-understand terms?

DISTRIBUTION MECHANISMS

- ✓ Does the permittee track distribution of materials to measure effectiveness?
- ✓ Is the permittee focused solely on distribution or is an effort made to evaluate the impact of the messages?
- ✓ Does the permittee use a variety of distribution mechanisms to target various audiences?

EVALUATION METHODS

- ✓ How does the permittee evaluate the effectiveness of the outreach strategy?
- ✓ Has the permittee conducted a public awareness survey?
- ✓ Which outreach materials have been the most effective in soliciting public involvement and participation? Changing audience behaviors? Increasing general stormwater awareness?
- ✓ Have any changes been made to the outreach strategy or materials based on an evaluation of effectiveness?

PUBLIC PARTICIPATION ACTIVITIES

- ✓ What opportunities does the permittee give to the public to review and comment on any changes to the SWMP, such as public comment via a Web site, a public meeting, or a stormwater advisory group?
- ✓ What volunteer opportunities (i.e., stream cleanups, storm drain stenciling) does the permittee coordinate or publicize to encourage the public to participate in stormwater-related activities?
- ✓ Does the permittee sponsor or promote any of the following activities?
    - o Beach/stream/lake cleanups
    - o Volunteer stream monitoring
    - o Stream clean-ups or equivalent activities
    - o Stormwater citizen panel

<u>In-Field Program Evaluation Activities</u>

The evaluation for this program area will be primarily conducted with the permittee in the office or by reviewing materials before or after the evaluation. However, evaluators can take note during other field activities to observe the stormwater educational materials available and distributed. For example, when visiting the permittee's permit counter, assess the types of stormwater outreach materials available to applicants for new construction projects. When driving around the permit area, observe if posters,

billboards, or other signs display stormwater messages. These types of field observations about the permittee's public education activities can help assess the effectiveness of the program.

Common Issues Identified During Program Evaluations

The following should be closely considered during evaluations of permittees:

- ✓ Permittees set inappropriate or immeasurable goals for activities.
- ✓ Permittees are not including key target audiences.
- ✓ Permittees are not customizing the materials for the target audience.
- ✓ Permittees are not developing materials for commonly spoken languages.
- ✓ Permittees are not distributing the materials adequately using appropriate methods for the target audience.
- ✓ Permittees are not facilitating involvement in program development, implementation, and improvement during the course of the permit term.
- ✓ Permittees are not coordinating or promoting events or activities that would improve water quality or change behaviors of concern.

4.3 MS4 Maintenance Activities

Regulatory Requirements

Applicable Phase I and Phase II federal NPDES regulations are listed at right.

General Permits

Although MS4 maintenance activities are addressed in MS4 NPDES permits, it is important to note that some permittees will also have coverage under industrial stormwater general permits or have individual permits for maintenance facilities that fall under one of the covered industrial categories, such as landfills, waste transfer stations, or transportation facilities.

Common Activities

Infrastructure Mapping and Characterization

Debris, **floatables**, sediment, metals, and other pollutants are caught in the MS4 and a regular program to inspect, clean, and repair components of this infrastructure will reduce the pollutants leaving the system and entering surface waters. A map of the MS4 is important for the permittee to plan for and track proper maintenance of inlets, catch basins, outlets, conduits, and management structures such as detention basins.

Public Streets Operation and Maintenance

The SWMP should address and include various practices for operating and maintaining public streets, roads, and highways that reduce the impact on receiving waters of discharges from municipal storm sewer systems. These practices should include regular street sweeping and proper use of BMPs during street maintenance activities. In addition, where applicable, permittees should consider deicing agent application methods that minimize the discharge of pollutants into the MS4, as well as salt and sand storage, fleet maintenance, fueling, and washing.

Flood Management

Permittees should assure that the impacts on the water quality of receiving water bodies are assessed in municipal or regional flood management projects and that existing structural flood control devices have been evaluated to determine if retrofitting the device to provide additional pollutant removal from stormwater is feasible.

Public Facilities Operation and Maintenance

The SWMP should include a mechanism to inventory and assess the impact of stormwater runoff from municipal facilities. The inventory should include all facilities that treat, store, or transport municipal waste as well as industrial/commercial facilities (facilities covered by a general permit as well as those defined by the Industrial/Commercial Facilities program component). Facilities

Federal NPDES Regulations

NPDES MS4 permits must address these requirements and often include more specific state requirements:

- ✓ Phase I MS4 Regulations 40 CFR 122.26(d)(2)(iv)(A)
- ✓ Phase II MS4 Regulations 40 CFR 122.34(b)(6)(i)

Resources

- ✓ Menu of BMPs www.epa.gov/npdes/menuofbmps
- ✓ California Stormwater Quality Association's Municipal BMP Handbook www.cabmphandbooks.com/Municipal.asp
- ✓ National Management Measures to Control Nonpoint Source Pollution from Urban Areas http://www.epa.gov/owow/nps/urbanmm/index.html
- ✓ North Texas Council of Governments - Stormwater Pollution Prevention Training Module Series http://www.nctcog.org/envir/SEEclean/stormwater/program-areas/pollution_prevention/CD/Version_1/P2_Training_Materials.asp

MS4 Facilities

- ✓ Municipal maintenance yard
- ✓ Fleet maintenance facility
- ✓ Chemical storage facility
- ✓ Household hazardous waste facility
- ✓ Solid waste transfer station
- ✓ Animal control facility
- ✓ Salt storage facility

with activities characterized as a potential threat should be inspected and BMPs should be implemented to reduce water quality impact.

Pesticide, Herbicide and Fertilizer Application and Management
The SWMP should include a component to reduce pollutants associated with the application of pesticides, herbicides, and fertilizer. This program should include, as appropriate, educational activities, permits, certifications and other measures for commercial applicators and distributors, and controls for application in public right-of-ways and at permittee owned or operated facilities, such as playing fields and other recreational facilities.

Training and Education
To ensure that maintenance staff is knowledgeable and proficient in the newest and most effective approaches to minimizing stormwater pollution from facilities and activities, many permittees require annual BMP training for field staff. This training may be presented in-house or staff may attend trainings provided by the permitting authority or industry. It is important to cross-train or educate any contracted staff used for field work as well. Many permittees also provide general stormwater awareness training to all employees.

TIP:

MS4 permittees are not required to enforce the NPDES (state or federal) industrial stormwater general permit, but they are required to comply with this permit at their own facilities. This includes the submittal of a notice of intent, development of a stormwater pollution prevention plan (SWPPP) or equivalent, inspections, and other requirements specified in the applicable industrial stormwater general permit.

Evaluating MS4 Maintenance Programs

MS4 maintenance encompasses a large variety of facilities and activities necessary to operate and maintain a permittee's infrastructure, which include streets, facilities, and the storm drain system. MS4 maintenance activities typically are designed to maintain a certain level of service to maintain the aesthetics of public areas, provide public safety, maintain public infrastructure, and provide flood management, rather than for stormwater quality protection. When reviewing MS4 maintenance programs, however, an evaluator should focus on activities that might impact stormwater quality. The following should be evaluated:

1. How the permittee has inventoried all its infrastructure and facility maintenance activities
2. How the permittee has reviewed maintenance activities to assess potential impacts on stormwater quality
3. Whether the permittee has revised activities or implemented new measures to protect stormwater quality

MS4 maintenance staff should be trained on stormwater BMPs and principles, and have clear guidance on appropriate stormwater BMPs to use during typical maintenance operations and facilities management.

Various departments may be involved in the MS4 maintenance component of a SWMP. Within a municipality, the majority of functions normally are performed by public works staff. However, be sure to discuss the areas to be evaluated with the SWMP coordinator to ensure that the appropriate staff are available to interview during the evaluation. Departments or agencies that might need to be interviewed include streets and highways, facilities management, water authority, fire department, wastewater treatment plant, flood control district, solid waste, and parks and recreation. As previously stated, it is important to interview managers as well as field staff whenever possible.

Before the Program Evaluation

To prepare for the MS4 maintenance program evaluation, an evaluator should review or obtain the following information prior to the evaluation:

Pre-Evaluation Checklist

- ✓ MS4 permit provisions
- ✓ SWMP provisions
- ✓ Most recent annual report
- ✓ NPDES-permitted municipal facilities
- ✓ Municipal facility inspection reports

- **MS4 NPDES permit provisions.** Review the permit requirements for the MS4 maintenance program to identify any specific requirements (such as a minimum street sweeping frequency). The NPDES permit will serve as the primary basis for the program evaluation.
- **SWMP provisions.** The permittee's SWMP planning document(s) should describe the activities and BMPs that the permittee has committed to implement and may include measurable goals that provide deadlines for program implementation.
- **Latest annual report.** The annual report should be reviewed to identify past activities and help you become familiar with the permittee's SWMP.
- **List of permittee-owned or -operated facilities with NPDES permits.** Try to obtain a list of industrial facilities owned or operated by the permittee that are covered by an NPDES industrial stormwater permit issued by the permitting authority (i.e., household hazardous waste collection facility). This list can be used during the program evaluation to determine whether the permittee is including the facilities that are covered by an industrial stormwater general permit in the inspection program and to understand the types of facilities present in the permit area. The list can also help identify potential sites for the field inspections.
- **MS4 maintenance facility inspection reports.** Review reports from inspections performed by the permitting authority within the permit area and talk to state inspectors to determine if there have been past stormwater violations at facilities owned or operated by the permittee.

Records Review

The following records might help in evaluating the compliance and performance of the permittee's MS4 maintenance activities. Ask for copies of relevant information where it will help in writing the report or documenting a permit violation.

Documentation	What to Look For

Tracking systems
✓ Catch basin cleaning
✓ Street sweeping
✓ Pump station maintenance
✓ Structural BMP maintenance
	▪ What type of water quality-related information is tracked (i.e., tons of material swept)
	▪ Does the permittee set priorities and goals for MS4 maintenance activities each year?
	▪ How are these priorities and goals established?
	  ▪ Pollutants of concern
	  ▪ Watersheds of concern
	▪ Review how these activities are summarized for the annual report

In-field inspection sheets	▪ What guidance is provided to inspectors or maintenance crews to ensure they're properly inspecting and maintaining stormwater infrastructure?

Documentation	What to Look For
Maintenance SOPs	▪ Review standard operating procedures or any employee manuals or fact sheets used by permittee staff to conduct their day-to-day activities to determine if stormwater BMPs are described
List of municipal facilities	▪ Have the facilities been prioritized based on potential water quality impacts? ▪ Are the facilities inspected? How often? Who inspects?
MS4 maintenance facility SWPPPs	▪ Are SWPPPs (or equivalent) for permittee-owned or -operated maintenance yards, wastewater treatment plants, public transit facilities that perform maintenance, or other facilities adequately addressing stormwater? ▪ When were the SWPPPs last updated?
Training schedule	▪ Review training records to determine how often training is provided, who is required to attend
Pesticides, herbicides, and fertilizers ✓Application records and protocols ✓Applicator certifications and training	▪ Has the permittee tracked the types and amounts of chemicals applied in the permit area? ▪ Does the permittee have state-certified pesticide applicators? ▪ Are the applicators' certifications up to date?
Flood management program	▪ Review the permittee's capital improvement project list for flood drainage or flood management projects. ▪ Review the permittee's watershed master plans or flood drainage master plans for flood management projects. ▪ What types of evaluation criteria have been used to prioritize the projects on the (CIP) list or in the watershed master plan (e.g., water quality impacts)? ▪ Determine whether permittee has a documented evaluation showing why it is not feasible to retrofit existing flood management projects.

Elements to Address During the Program Evaluation

Although the specific nature of a successful municipal program is not specified in NPDES regulations, it will generally be composed of the following components:

- Stormwater infrastructure management and maintenance
- Public streets operation and maintenance
- Flood management
- Public facilities operations and maintenance
- Pesticide, herbicide and fertilizer application and management, as well as erosion control, landscaping, and turf grass care

- Standards, BMPs, and outreach for municipal staff
- Training and education

For each of the elements listed above, this Guidance presents questions to consider during the program evaluation. Of course, a comprehensive program evaluation must be tailored to the specific issues associated with each permittee and should include more specific questions regarding the permittee's permit structure and management challenges.

STORMWATER INFRASTRUCTURE OPERATION AND MAINTENANCE

Infrastructure Mapping and Characterization

- ✓ Does the permittee have a map showing all inlets, outfalls, storm drain conduits, stormwater management facilities, and receiving water bodies?
    - Does this map include catch basins and structural stormwater controls?
    - Is the map readily available and used by maintenance field staff when performing maintenance activities?
    - Is the map in hard copy format only or is it also in a geographic information system (GIS)?
- ✓ Are infrastructure assets or components named or numbered to better track necessary maintenance and repairs?
- ✓ Is information regarding stormwater infrastructure maintained in a database or mapping system? What types of data are maintained?
    - Type of structure or asset
    - Location (address, latitude/longitude)
    - Photo
    - Date built
    - Date last inspected
    - Date last cleaned/maintained

TIP:

A map is also required for the illegal connection and illicit discharge detection and elimination programs described in this Guidance. The maps developed for MS4 maintenance and illegal connection and illicit discharge programs can be the same to best use resources.

Catch Basin Cleaning

- ✓ Does the permittee have a schedule for routine maintenance or cleaning of catch basins?
    - How many are cleaned and how often?
    - Has the permittee targeted certain areas for more frequent maintenance? Does this targeting help minimize stormwater pollution?
    - Does the permittee set goals for how many basins are inspected and cleaned each year?
    - How does the permittee track and record cleaning and maintenance needs?
    - What information is documented? Does the permittee track which catch basins are cleaned, how much material is removed, and so forth?
    - How does the permittee use the data collected to further its program or evaluate program effectiveness? Are the data used to help prioritize cleaning frequency? Are they used to identify areas for targeted outreach?
- ✓ What are the permittee's procedures for disposing of waste removed from catch basins or storm drains?
    - Does the permittee flush material that could potentially discharge to surface water?

- If the material is removed using a wet vacuum, how is the material dewatered? How is the decanted water disposed?

- ✓ Does the permittee have a schedule for routine maintenance or inspection of storm drain pipes?
- ✓ What are the permittee's maintenance procedures for cleaning clogged storm drain pipes?

Stormwater Management Structures

- ✓ Are catch basins and other inlet structures marked so that the public knows they drain to surface waters?
- ✓ Has the permittee inventoried the type and location of public stormwater management structures in its jurisdiction? How are the data collected and stored?
  - Pump stations
  - Drainage structures (debris basins, detention basins, regional ponds, etc.)
  - Structural treatment controls
  - Open channels
- ✓ How is vegetation maintained in grassed swales, rain gardens, pond perimeters, and other vegetated stormwater controls?
- ✓ Has the permittee mapped private stormwater management structures?
- ✓ How often are these facilities inspected?
- ✓ Are the stormwater management structures regularly maintained by the permittee?
  - Are records kept of material and debris removed during maintenance?
  - How is maintenance conducted? Are chemicals used to maintain vegetation and pests?
- ✓ How does the permittee use the data collected to further its program or evaluate program effectiveness? Are the data used to help prioritize cleaning frequency? Are they used to identify areas for targeted outreach based on type and volume of materials removed?

TIP:

Governmental Accounting Standards Board (GASB) Statement No. 34, Basic Financial Statements and Management's Discussion and Analysis for State and Local Governments (Statement 34) establishes new requirements for the annual financial reports of state and local governments. The Statement was developed to make annual reports easier to understand and more useful to the people who use governmental financial information to make decisions. Statement 34 requires governments to document and report existing infrastructure and depreciate their capital assets.

Permittees can utilize the information obtained through this required reporting to inventory assets such as maintenance facilities, stormwater management structures and MS4 infrastructure (i.e. outfalls, storm sewer pipes, catch basin).

http://www.gasb.org/

PUBLIC STREETS OPERATION AND MAINTENANCE

Street Sweeping

- ✓ Does the permittee regularly sweep streets? Public parking lots?
- ✓ What is the schedule for street sweeping?
- ✓ Are areas scheduled for sweeping based on aesthetics only or is consideration given for reducing impacts on the stormwater management infrastructure and surface water?
- ✓ What types of sweepers are used? Wet or dry?

TIP:

It is a good idea to question both managers and field staff regarding BMPs used. It is helpful to ascertain the level of understanding at the field level as well what types of BMPs are deemed appropriate and feasible for the specific MS4.

- ✓ How is street-sweeping debris disposed? If the debris is dewatered, how is this done? How is the decanted water disposed?
- ✓ Are records kept of the amount of debris collected?
- ✓ How does the permittee use the data collected to further its program or evaluate program effectiveness? Are the data used to help prioritize cleaning frequency?

Yard Debris Reduction and Disposal

- ✓ Does the permittee offer guidance or services to encourage mulching and/or composting of grass clippings and other yard debris?
- ✓ Does the permittee offer seasonal recycling or disposal services to collect leaf litter, Christmas trees, yard debris, or other seasonal organic materials?

Public Streets, Roads, and Highways Maintenance

- ✓ What types of public streets, roads, and highways operation and maintenance practices and procedures are performed by the permittee?
- ✓ Are BMPs used by field crews to minimize stormwater impacts during road maintenance or repair activities?
- ✓ What types of BMPs are used? Discuss BMPs used for such activities as:
    - Ditch cleaning
    - Sidewalk repair
    - Asphalt patching
    - Curb and gutter repair
    - Street striping
    - Sign painting
    - Maintaining dirt and gravel roads (preventing erosion, dust control)

Deicing Activities

- ✓ What types of deicing agents does the permittee use? If salt is used, has the permittee investigated alternatives?
- ✓ How are deicing agents, sand, or other materials stored? Is the material covered and/or bermed to prevent runoff?
- ✓ Does the permittee track the locations and volumes of deicing agents, sand, or other materials applied?
- ✓ Is the material picked up after the snow/ice event is concluded? Is there a schedule for picking it up after an event?

FLOOD MANAGEMENT

- ✓ Does the permittee have an inventory of structural flood management structures?
- ✓ Have these structures been assessed to determine whether retrofitting could provide additional water quality benefits?
- ✓ How often are flood management projects inspected and/or maintained?
- ✓ Are new flood management projects being designed or planned to include water quality considerations?

PUBLIC FACILITIES OPERATION AND MAINTENANCE

Facility Inventory

- ✓ Does the permittee have an inventory of public facilities? At a minimum, this list should include the following:
  - Public works yards
  - Public transit facilities
  - Wastewater and domestic water treatment plants
  - Sanitary sewer system overflow locations
  - Public parks/open areas
  - Public parking lots
  - Public buildings
  - Landfills and hazardous waste disposal sites, transfer locations, or storage facilities
- ✓ Have the facilities been inspected and assessed for water quality impacts?
- ✓ Are any facilities required to apply for coverage under a general industrial permit? Do these facilities have SWPPPs?

Maintenance Yard Management

- ✓ If the permittee is a municipality, does the municipal public works yard have a SWPPP?
- ✓ Who is responsible for implementing and maintaining the SWPPP?
- ✓ Who is responsible for periodically inspecting the yard for stormwater compliance?

Parks Operation and Maintenance

- ✓ Are there adequate trash enclosures available at park facilities? Are they emptied regularly?
- ✓ Does the permittee provide any stormwater education or signage at parks and other areas?
- ✓ How are public restrooms cleaned and maintained? What chemicals are used? How is cleanup water disposed of?
- ✓ How are public pools maintained? How is the chlorinated water disposed of?
- ✓ Does the permittee include pet waste disposal stations with signage and baggies in public parks?
- ✓ What BMPs are used to address:
  - Stormwater impacts from turf grass maintenance?
  - The transport of pesticides, herbicides, and fertilizers by stormwater?
  - Erosion?
- ✓ What types of vegetated BMPs are implemented at parks (e.g., alternative landscaping to minimize high-maintenance turf grass, streamside buffers, reduced mowing frequency, etc.)
- ✓ Does the permittee implement water conservation measures at its park facilities?

Building Operation and Maintenance

- ✓ Are the permittee's parking lots regularly swept?
- ✓ How are enclosed parking structures and other public buildings cleaned? If power washing is used, are BMPs implemented to protect storm drain inlets?

Sanitary Sewer System Maintenance, Overflow, and Spill Prevention

- ✓ Does the permittee have a program to mitigate or prevent **sanitary sewer overflows (SSO)** from entering the MS4?
- ✓ Have flow pathways from SSO locations to catch basins or other points of entry to the MS4 been identified?
- ✓ Have spill prevention and cleanup plans been prepared?
- ✓ Does the permittee have a written procedure to ensure that the MS4 is protected from a sewage overflow or spill? Do the procedures include protection of the storm drain system during and after the cleanup of a spill or overflow?
- ✓ Does the permittee implement a reporting protocol to ensure that all spills and overflows are reported to the appropriate authorities or the department designated to collect and report the permittee's annual report?
- ✓ If the jurisdiction includes residential homes with septic tanks, how does the permittee educate homeowners about proper maintenance of the systems?

Water Supply Operation and Maintenance

- ✓ Have procedures been developed to ensure that field staff integrate stormwater management BMPs into their operation and maintenance activities?
- ✓ Are BMPs implemented to address the testing and flushing of new or existing water lines?
- ✓ Are BMPs implemented to address hydrant testing?
- ✓ Are BMPs implemented to address maintenance activities required to maintain underground water lines (e.g., trenching, excavation)?
- ✓ Does the permittee coordinate source water protection efforts with the stormwater program?

Chemical and Hazardous Material Use and Disposal

- ✓ What types of chemicals or hazardous materials are used by the permittee?
- ✓ Where are these materials stored?
- ✓ Has the permittee implemented an alternative materials program to reduce the use of hazardous materials?
- ✓ Has the permittee implemented an inventory reduction program to reduce the quantity of chemicals and hazardous materials stored and used?
- ✓ Does the permittee have a household hazardous waste collection center for the public?
    - Are records of the quantity of materials collected maintained by type of material?
    - How does the permittee notify the public of these sites?
    - Does the permittee have special household hazardous waste collection days?
- ✓ How does the permittee use the data collected to further its program or evaluate program effectiveness? Are the data used to help prioritize maintenance frequency? Are they used to identify areas of targeted outreach?

PESTICIDE, HERBICIDE AND FERTILIZER APPLICATION AND MANAGEMENT

- ✓ What kind of program has been established to address pollutants associated with the application of pesticides, herbicides, and fertilizer at public facilities?
- ✓ Are the permittee's fertilizer/pesticide applicators certified? Are permits or other certifications required?
- ✓ Where are the chemicals stored? Are appropriate procedures and secondary containment followed?
- ✓ Is there a pesticide/fertilizer application plan?
- ✓ Does the permittee practice integrated pest management (IPM) or use alternatives to pesticides?
- ✓ How does the permittee implement alternative landscaping to minimize the use of fertilizers and pesticides?
- ✓ What types of educational activities does the permittee conduct for applicators?
- ✓ What types of BMPs are used during application of pesticides in public rights-of-way?
- ✓ What types of BMPs are used during application of pesticides at municipal facilities such as parks?

STANDARDS, BMPS, AND OUTREACH

Municipal Staff

- ✓ Have standard operating procedures or their equivalent been developed to ensure that municipal field staff integrate stormwater quality BMPs into their daily activities?
- ✓ Have BMPs or standards been officially adopted by the permittee for use by municipal field staff?
- ✓ What reference materials or guidance documents are provided to field staff regarding BMP specifications and details?
- ✓ How does the permittee ensure that staff are fulfilling their responsibilities as outlined in standard operating procedures? Do managers provide oversight on a regular basis?

Contracted Services Staff

- ✓ Does the permittee require contractors to incorporate stormwater quality BMPs into their activities?
- ✓ How are BMPs required? Are the requirements outlined in requests for proposals? Are they included in contracts?
- ✓ Have BMPs or standards been officially adopted by the permittee for use by contractual staff?
- ✓ What reference materials or guidance documents are provided to contractual staff regarding BMP specifications and details?
- ✓ How does the permittee ensure that contractors are fulfilling their responsibilities as outlined in their contracts? Are inspections performed? Are periodic reports submitted?

TIP:

Educational programs for pesticide, herbicide, and fertilizer applicators used by the permittee may be addressed during the public education and participation portion of the evaluation.

General Public

- ✓ Does the permittee provide any information to the public regarding:

- Cleaning up after pets
- Household hazardous waste disposal
- Oil recycling
- Litter reduction

TRAINING AND EDUCATION

- ✓ What type of general stormwater training is provided to staff that are not involved in field activities? How often?
- ✓ How are new employees trained?
- ✓ What types of activity-specific training is provided to field staff? Is information on specific BMPs provided?
- ✓ Is any training provided to contract staff?

In-Field Program Evaluation Activities

The primary in-field evaluation activity is an inspection of the permittee's public works yard(s) or other type of permittee owned or operated facility (i.e. fleet maintenance). The intent of this inspection is to verify that activities are performed as described in the SWMP. The facility should be inspected as if it were a typical industrial facility. During the inspection, look for the following:

TIP:

Other MS4 facilities, such as parks, marinas, and household hazardous waste collection facilities, should be visited if there is adequate time.

- ✓ Are chemicals, bulk materials, or other potential pollutants stored outside? Is there secondary containment? Are the materials covered?
- ✓ Where are the permittee's vehicles washed? Are wash racks and dewatering areas plumbed to sanitary sewers, if allowed? If not allowed, are wastewaters from wash racks and dewatering areas prohibited from entering the MS4?
- ✓ Where are the permittee's vehicles maintained? If outside, what BMPs are used to prevent polluted runoff?
- ✓ Does the facility have structural stormwater BMPs (e.g., stormwater detention ponds, stormwater filter devices) installed?
    - If so, how are they maintained?
    - What is the frequency of maintenance?
- ✓ Are inoperable vehicles stored and maintained in a way to prevent polluted runoff and leaching of contaminants to groundwater?
- ✓ Are storm drain inlets at the yard free of debris and regularly cleaned?
- ✓ Is the yard swept regularly? Are there oil stains and spills at the yard?

An additional in-field evaluation activity could include visiting maintenance staff as they conduct maintenance. For example, you could visit staff as they clean catch basins, perform street repairs, or conduct other similar activities to ascertain whether stormwater BMPs are being implemented and identify whether staff are knowledgeable about BMPs.

Document all findings in the field in as much detail as possible. An MS4 Facilities Inspection Worksheet has been included as Appendix C to assist in this documentation.

Common Issues Identified During Program Evaluations

The following are some typical problem areas associated with MS4 maintenance programs. These areas should be closely considered during evaluations:

- ✓ The permittee's MS4 maintenance staff lack training on and awareness of stormwater management BMPs.
- ✓ Permittee staff lack adequate guidance (e.g., MS4 maintenance BMP manual, SOPs, fact sheets) on proper stormwater management BMPs.
- ✓ Stormwater BMPs and procedures are not incorporated during routine MS4 maintenance activities.
- ✓ Maintenance yards lack SWPPPs and adequate controls to prevent stormwater contamination.
- ✓ Contractual staff performing operation and maintenance activities for the permittee are not required to consider stormwater quality and implement appropriate BMPs.

4.4 Construction Activities

Regulatory Requirements

EPA's federal regulations for the stormwater NPDES Phase I and Phase II regulations are listed at right. NPDES MS4 permits must address these requirements and often include more specific state requirements.

General Permits

As described above, stormwater Phase I and Phase II MS4 permittees must implement a SWMP that includes erosion and sediment controls on construction sites disturbing at least one acre. In addition to the regulation of construction site stormwater at the local level, EPA regulations also require construction sites disturbing greater than one acre to obtain an NPDES permit. This permit can be issued by the state permitting authority or EPA, depending on whether the state has been delegated the NPDES authority. This dual regulation of construction sites at both the local and state or federal level can be confusing to permittees and construction operators.

Although there are many similarities between the NPDES construction general permit and the MS4 construction program requirements, Municipalities are not required to ensure that local construction projects comply with NPDES construction general permits. Federal NPDES MS4 regulations describe broad requirements for a stormwater program to control construction site runoff to the MS4 and give the permittees flexibility in designing a local program to meet their needs. However, to avoid duplication and confusion between the two programs, some permittees choose to require the same BMPs and plan submittals (i.e., SWPPPs) as required by NPDES regulations.

Common Activities

Ordinance/Legal Authority

Many municipal permittees address legal authority for construction site stormwater runoff control in a grading or stormwater ordinance. The ordinance(s) should specify which sites are required to implement controls (i.e., MS4 regulations require all sites greater than one acre, but many permittees use a smaller area or volume threshold, such as 50 cubic feet of earth moved or proximity to water bodies). The ordinance should require erosion and sediment control BMPs to be implemented and maintained, a performance standard, and penalties for noncompliance.

Construction Site Inventory

The permittee should have an inventory of active and completed construction projects that includes information about the site and inspections that the permittee has conducted, including inspection findings and follow-up (letters, enforcement actions, additional inspections). Permittees should consider prioritizing the inventory to

Federal NPDES Regulations

NPDES MS4 permits must address these requirements and often include more specific state requirements:

- ✓ Phase I MS4 Regulations 40 CFR 122.26(d)(2)(iv)(D)
- ✓ Phase II MS4 Regulations 40 CFR 122.34(b)(4)

TIP:

MS4 permittees are not required to enforce the NPDES (state or federal) construction general permit, but they are required to comply with this permit for their own public construction projects (e.g., capital improvement projects, road construction). This includes the submittal of a notice of intent, development of a SWPPP or equivalent, inspections, and other requirements specified in the state's construction general permit.

Resources

- ✓ Menu of BMPs http://www.epa.gov/npdes/menuofbmps
- ✓ Construction Industry Compliance Assistance Center http://www.cicacenter.org/
- ✓ International Erosion Control Association http://www.ieca.org/
- ✓ Kentucky Erosion Prevention and Sediment Control Field Guide http://www.tetratech-ffx.com/wstraining/pdf/esc_guide.pdf

better target inspections based on project size, location, threat to water quality, or other factors. The permittee should also develop procedures for the receipt and consideration of complaints submitted by the public. Ideally, this information would be managed in a database and linked to a GIS for optimum tracking.

Resources (continued)

- ✓ California Stormwater Quality Association's Stormwater Best Management Practice Handbooks http://www.cabmphandbooks.com/Construction.asp
- ✓ MPCA Inspection guide and compliance assistance toolkit http://www.pca.state.mn.us/water/stormwater/index.html

Construction Requirements and BMPs

While the legal authority described above should require BMPs at construction sites, a permittee should also have additional specifications or guidance on what types of BMPs are expected at sites. These requirements and standards and specifications for BMPs should be readily available to project applicants.

Plan Review Procedures

The review of erosion and sediment control plans (or SWPPPs if required under an NPDES construction permit) should be based on formal review specifications, a checklist, or similar criteria. Plan review staff should document the BMPs considered, whether they were addressed on the plans, and any identified deficiencies.

TIP:

You should have a clear understanding of the plan review and approval process and how stormwater and erosion and sediment control requirements are included in this process.

Some municipal permittees require that projects submit a copy of the **notice of intent (NOI)** that has been submitted to the State or EPA before approving a project. In some states, the state requires that the permittee receive local erosion and sediment control approval prior to submitting a NOI. At a minimum, permittees should make sure that project applicants are aware of the requirement to apply for NPDES permit coverage for projects disturbing greater than one acre.

Some municipal permittees use contract staff to review some or all plans. Be sure to review plans completed by contractual as well as municipal employees.

Construction Site Inspections

A key element of the construction component is the frequency at which sites are inspected. Some permittees identify a minimum frequency of inspections (such as weekly and/or following a rain event) for all projects. Other permittees will rely on building inspectors to conduct erosion and sediment control inspections at the same time as other types of required inspections (e.g., electrical). This approach, however, can result in sites not being inspected for long periods of time if the building inspector is not called out for an inspection. Also, building inspectors are not necessarily trained to recognize erosion and sediment control problems or have other priorities besides stormwater.

TIP:

Some municipal permittees have different inspectors for their public and private projects, be sure to evaluate each in the field.

Inspections are often targeted to specific types of sites or during specific periods (especially immediately following a rain event). For permittees with numerous active construction projects, it is recommended that a prioritization process be developed to ensure that the sites with the greatest threat to water quality are considered high priority and inspected more frequently. Inspection results should be documented using paper forms or electronic databases.

Program Support and Resources

Permittees should have an established source of funding for their construction program, including adequate resources for frequent inspections and plan review. Funds often come from fees paid by the construction operators. If general funds are used to support the program, permittees should ensure that construction inspections are a line-item appropriation not subject to reduction or elimination based on board politics or budget constraints.

Enforcement

Permittees should have an established, escalating enforcement policy that clearly describes the action to be taken for common violations. Enforcement authority typically includes verbal and written warnings, fines, and "stop work" orders. Verbal warnings should be documented in addition to all written violation notices. The enforcement policy should also address how repeat or serious violations will be addressed, including referral of the case to the NPDES permitting authority in the most egregious cases.

TIP:

Review enforcement cases to assess whether the permittee is adequately ensuring compliance. Lack of fines, "stop work" orders, or other enforcement actions do not necessarily indicate that the permittee's enforcement program is inadequate. A lack of enforcement cases could be the result of an effective inspection program, or it could indicate problems with the inspection records, inspector training, inspection procedures, or even the lack of commitment from the permittee to escalate enforcement.

Training and Education

A SWMP should include training to plan review and inspection staff. This training should include classroom presentations, in-field training, and follow-up evaluations to determine whether the training was effective. Although some permittees also provide training to construction operators, most simply provide educational materials such as fact sheets or brochures that describe local requirements and recommended BMPs.

Public Construction Projects

Public construction projects must comply with both the local program and the applicable NPDES construction general permit (state or federal). This requires the permittee to take on dual roles as both local regulator and permittee. Permittees must apply the same local requirements to public construction projects as are required of private projects. Some permittees develop and design public construction projects in-house without direct involvement from the department that reviews most private construction projects; therefore, it is important that the public project designers are trained and proficient in stormwater BMPs as well. If a permittee hires outside designers for public projects, it is important that stormwater guidelines be provided to them to ensure compliance with local and NPDES permit requirements.

After the project is designed, many permittees will hire contractors to build the project. Interested applicants submit proposals to bid on the project. To ensure that successful applicants will abide by all stormwater requirements, it is recommended that the request for proposals (RFP) include specific language regarding installation and maintenance of all BMPs. Many permittees also include additional language in subsequent contracts (if there is a document separate from the proposal) obligating contractors to appropriate stormwater measures and outlining potential enforcement penalties (i.e. delayed or reduced payment). An evaluation of public construction projects should include a review of RFP or contract language relating to stormwater controls.

Evaluating Construction Programs

The evaluation of a permittee's construction program should focus on the regulatory mechanism to require and enforce the program, plan review procedures, and erosion and sediment control inspection procedures. The evaluation should begin with a thorough review of the permittee's ordinances, standards,

approved plans, and other relevant written materials. Ask staff to walk through the planning and approval process from initial plan receipt to final approval.

You should determine how erosion and sediment control BMPs are required in construction site plans and how they are implemented and enforced in the field. Inspectors from multiple departments might also inspect different portions of a development project. For example, building department inspectors may be charged with site inspections during the construction of the buildings, whereas public works inspectors may be responsible for the inspection of construction activities within the right-of-way, such as streets, sewer, and water. Various departments may inspect a site during different stages of the project. You must be sure to interview all applicable staff and departments, which could include building, planning, engineering, or public works. Questioning planners and engineers in addition to questioning inspectors is helpful in determining how well various staff work together to achieve "on the ground" BMP implementation.

Some municipal permittees manage public construction projects (including capital improvement projects or CIPs) differently than private construction projects, for example, in some communities private projects are reviewed and approved by the planning or building department, whereas public projects may be entirely planned, reviewed, approved, and developed by the public works department. Make sure you distinguish between these two types of projects during the evaluation, and if necessary, repeat the same questions for both private and public projects.

Before the Program Evaluation

To prepare for the construction program evaluation, an evaluator should review or obtain the following information:

Pre-Evaluation Checklist

- ✓ MS4 permit provisions
- ✓ SWMP provisions
- ✓ Most recent annual report
- ✓ State or EPA Construction General Permit
- ✓ List of NPDES construction projects
- ✓ NPDES Construction inspection reports

- **MS4 NPDES permit provisions.** Review the permit requirements for the construction program to identify any specific requirements (such as a minimum inspection frequency). The NPDES permit will serve as the primary basis for the program evaluation.
- **SWMP provisions.** The permittee's SWMP planning document(s) will describe the activities and BMPs it is committed to implement and include measurable goals that provide deadlines for program implementation.
- **Latest annual report.** The most recent annual report should be reviewed to identify past activities and help the inspector become familiar with the permittee's program.
- **State or EPA NPDES Construction General Permit.** You should be very familiar with the requirements of the state or EPA's construction general permit, whichever applies, to ensure that conflicts between the SWMP and the state or EPA permit can be identified and violations of the state or EPA permit can be found.
- **List of NPDES construction projects.** Obtain a recent list of construction projects within the permit area that have been issued coverage under an NPDES general permit by the permitting authority (one acre or greater disturbed area). This list can be used during the program evaluation to determine whether the permittee has any public construction projects. The list can also help identify potential construction sites for field inspections. The list can also be crosschecked with a similar list requested and obtained from the permittee. Obtain information such as the operator name, name of the construction site, address, size, and other relevant information.
- **NPDES construction inspection reports.** Review inspection reports from construction inspections in the permittee's jurisdiction conducted by the permitting authority and/or EPA. Talk

to state or federal construction inspectors to determine if there have been past stormwater violations at construction sites in the permitted area and any role the permittee played in resolving the violations.

Records Review

The following records might help in evaluating the compliance and performance of the permittee's construction program. Ask for copies of relevant information where it will help in writing a report or documenting a permit violation.

Documentation	What to Look For
Local ordinances	One or more of the following ordinances may be used by a municipal permittee to regulate erosion and sediment control. ▪ Grading ordinance ▪ Erosion control ordinance ▪ Stormwater ordinance ▪ Landscaping ordinance ▪ Health and safety codes
Design standards, BMP manuals, and fact sheets.	These can be state or local standards or be taken from a non-regulatory source
Construction plans reviewed and approved by the permittee	Where possible, try to review the plans for projects that you will also visit during the field portion of the evaluation
Construction project inventory or database	▪ Does one exist? ▪ How often is it updated? ▪ What is the source for the inventory?
Enforcement escalation response plan or procedure	▪ Is the enforcement process documented and codified? ▪ Are roles of individuals or departments clearly defined?

Elements to Address During the Program Evaluation

Although not specified in detail in NPDES regulations, a successful construction program will generally be composed of the following elements:

- Ordinance/legal authority
- Construction project inventory
- Construction requirements and BMPs
- Plan review procedures
- Construction site inspections

- Program support and resources
- Enforcement/referrals
- Training and education

The common program elements are the key issues to consider during the review.

ORDINANCE/LEGAL AUTHORITY

- ✓ What legal authority does the permittee have to require erosion and sediment control BMPs on construction sites and to ensure compliance?
- ✓ Does the permittee's legal authority address stormwater quality for all projects disturbing at least one acre?
- ✓ What exemptions does the ordinance or other legal authority allow?
- ✓ Does the legal authority authorize the permittee to require erosion and sediment control plans?

CONSTRUCTION SITE INVENTORY

- ✓ How does the permittee track construction projects?
- ✓ What information is collected?
    - The number and status (active/inactive/completed) of construction sites
    - The number, frequency, results, and follow-up actions resulting from inspections
    - The actions taken to resolve the issues and dates when compliance was achieved.
    - The number and type of enforcement actions taken at sites in violation
    - Complaints submitted by the public
- ✓ Does the inventory include construction sites disturbing less than 1 acre?
- ✓ What is the threshold for tracking projects?
- ✓ Does the inventory track which sites have submitted an NOI for coverage under a state/EPA construction general permit?
- ✓ How is the inventory updated? How often?
- ✓ Does the permittee prioritize projects for more frequent or targeted inspections?
    - If yes, based on what criteria?

CONSTRUCTION REQUIREMENTS AND BMPS

- ✓ What technical guidance (e.g., BMP manual or fact sheets) does the permittee use as the standard for design and selection of nonstructural and structural construction BMPs?
    - Are project applicants required to follow these technical manuals?
    - Does the guidance set minimum operation and maintenance requirements for BMPs?

TIP:

You should ask the permittee for a copy of the information packet that they provide to new project applicants. What type of stormwater information is included? Does it describe the types of BMPs and stormwater requirements that could apply to their project?

- Does the guidance include installation requirements for the BMPs?
- Does the guidance provide proper siting and use criteria for BMPs to ensure that adequate BMPs are being selected and implemented?

✓ Does the permittee provide guidance as to recommended BMPs to be used?

✓ Does the permittee have different requirements or standards for different times of the year (i.e., during the rainy season vs. the dry season)?

PLAN REVIEW PROCEDURES

✓ Does the permittee hold pre-application meetings on any construction projects? Are stormwater and erosion and sediment control requirements addressed at these meetings?

✓ Is there any plan review coordination with other city departments such as smart growth, redevelopment, traffic engineering, etc.?

✓ What is the permittee's threshold for plan review? (For example, does the permittee review plans for all projects disturbing greater than 1 acre, or do they use another threshold?)

✓ Does the permittee apply standard conditions that incorporate erosion and sediment control requirements into its plan review process?

- Get a copy of the standard conditions to determine if they specifically address erosion and sediment control

✓ Do the plan reviewers verify whether the project applicant has submitted an NOI to the state or EPA? Is evidence of NOI submission required before a plan can be approved or a local permit issued?

✓ Do plan reviewers use specific criteria or a checklist when reviewing plans?

✓ Does the permittee consider during the review process whether the construction project discharges to a TMDL/impaired water?

✓ When reviewing plans approved by the permittee, you should:

- Look for whether adequate BMPs are included on plans, details, and drawings for the installation of certain BMPs when applicable, what types of standard conditions or notes are included, and whether maintenance requirements are specified.
- Are inadequate or incomplete plans automatically returned to the applicant? Are these returns accompanied by an explanation of what is needed for approval?
- Are BMPs addressing other construction activities, such as materials storage and waste disposal, incorporated into the construction plans?
- Do the plans include notes addressing the prohibition of non-stormwater discharges?
- Were comments provided by the permittee to the project proponent reasonable and appropriate?

TIP:

You should select at least 2 to 3 approved projects with erosion and sediment control plans to review with the permittee. Try to choose different project types (residential, commercial) and sizes. Also review at least one public project plan to see if the permittee is applying adequate standards to municipal construction.

CONSTRUCTION SITE INSPECTIONS

- ✓ Does the permittee adequately inspect all phases of construction?
  - o Clearing and grubbing and site preparation
  - o Mass grading and public infrastructure/utility construction
  - o Building construction and final grading
  - o Final stabilization
- ✓ What departments are charged with erosion and sediment control inspections? Is the department responsible based on the location of the site (i.e. right-of-way vs. building site) or phase of development (i.e., grading vs. building)?
- ✓ Do the inspectors use a checklist or inspection form during each inspection?
- ✓ How many inspectors does the permittee use to verify erosion and sediment control compliance at construction sites?
- ✓ Does this number appear adequate to assess active construction occurring in the permitted area? Compare this to the total number of construction sites that need to be inspected at any one time (number of inspections per construction site per year). Consider project durations and phasing, local conditions (e.g., dry vs. wet seasons), and additional duties assigned to inspectors.
- ✓ Does the permittee have an established prioritization process for establishing inspection frequency? If so, on what factors is the prioritization based (i.e., size, proximity to water body, sensitive areas)?
- ✓ How often are sites inspected?
- ✓ Does the permittee target inspections during and immediately after wet weather events? If so:
  - o What size rain event triggers an inspection?
  - o How soon after a rain event?
- ✓ Is there an established rainy season for the area? Are sites inspected prior to the start of the rainy season to determine preparedness?

TIP:

Review inspection records to determine how the permittee corrects identified problems. If an inspection report identifies missing BMPs or a non-stormwater discharge, verify that there is an inspection record showing that the site was reinspected within a reasonable timeframe. Was the problem corrected?

PROGRAM SUPPORT AND RESOURCES

- ✓ Does the program have a dedicated source of funding to support plan review staff and inspectors?

ENFORCEMENT

- ✓ What types of enforcement actions are provided for in applicable ordinances (e.g., notices of violation, “stop work” orders, fines)?
- ✓ Is use of these actions outlined in an established, escalating enforcement policy?
- ✓ Review with the permittee statistics on enforcement of construction site erosion and sediment controls.
  - o How many enforcement actions are taken per year?
  - o Are follow-up inspections conducted to verify compliance?

- ✓ Are there limitations on the permittee's enforcement authority (e.g., limits on the dollar amount of fines, inability to issue civil penalties)?
- ✓ Do staff feel that their enforcement authority is adequate to achieve compliance on construction projects?
- ✓ What is the relationship with the City Attorney or other relevant prosecuting authority?

TRAINING AND EDUCATION

Staff training

- ✓ What type of training do construction inspectors receive? Are plan reviewers trained on erosion and sediment control BMPs and requirements?
- ✓ How often is training conducted? How many staff have been trained?
- ✓ What type of follow-up is conducted by the permittee to verify that the training is effective?

Construction operator education

- ✓ What types of educational materials have been developed and distributed to construction operators?
- ✓ How are they distributed? At the permit desk? During inspections?
- ✓ What type of training does the permittee provide or advertise to local construction operators?
- ✓ How often is this training conducted? How many construction site operators have been trained?
- ✓ Are contractors and developers required to attend?
- ✓ Does the training cover any of the following?
  - o Local and state erosion and sediment control requirements and permits
  - o Proper erosion and sediment control BMP design and installation
  - o Maintenance requirements for BMPs
  - o General construction stormwater permit requirements (state or federal)
- ✓ Are training sessions held in cooperation with other local permittees or regional authorities?

TIP:

Permittees must train their primary inspectors, but they should also provide at least basic stormwater training to other field inspectors not directly involved in the stormwater program, such as building inspectors and code compliance staff. At a minimum, this will encourage these staff to refer stormwater problems to the permittee's designated stormwater inspector.

PUBLIC CONSTRUCTION PROJECTS

- ✓ Do RFPs or contracts include language specifying stormwater requirements?
- ✓ Are inspection and maintenance requirements specified in the contract?
- ✓ What oversight does the permittee implement to ensure the contractor is implementing all requirements appropriately and adequately?
- ✓ What penalties are in place to require compliance from the permittee's contractors?

In-Field Program Evaluation Activities

In-field activities to evaluate the construction inspection program typically consist of accompanying one or more construction inspectors in the field as they conduct inspections. The construction inspector is to conduct the inspection; you are to strictly observe. Discourage construction inspectors from merely describing the inspection process. It is best to accompany more than one construction inspector, if possible, to see whether the permittee is providing adequate training to all inspectors.

TIP:

Let the inspector lead the inspection—just observe. Don't let the inspector "explain" how they would conduct the inspection—tell them to show you.

The main purpose of the field evaluation is to assess the permittee's construction inspection program—how knowledgeable the inspectors are about stormwater requirements and BMPs, how thorough of an inspection they conduct, and how they handle problems identified at construction sites. This assessment can sometimes be made after only one or two construction site inspections, while for other permittees it may take multiple inspections and visits with several inspectors to assess their inspection program. Try to limit the number of people that join each inspection—too many staff can overwhelm a construction site, making it harder for the construction inspector to conduct an actual inspection.

Schedule at least a half-day for construction inspections. Travel time between sites may be significant, so plan accordingly. For a large permit area with a lot of active construction, schedule a full day if possible to visit both private and public projects. Stress the need to visit as many construction projects as possible while still following the inspector's standard procedures. Try to observe a large variety of sites, such as small residential projects, larger housing developments, commercial projects, and public construction projects, projects in mass grading, projects close to completion, and projects adjacent to waterways.

As the inspector conducts the construction inspection, observe the following:

- ✓ Is the inspector knowledgeable about stormwater BMPs, requirements, and ordinances?
- ✓ Is the inspector familiar with the applicable construction stormwater general permit?
- ✓ Does the inspector check the approved plans at the construction site? (Note that some inspectors visit sites frequently and this is not always practical. Also, plans at small construction sites might not be kept on-site.)
    - o Ask the inspector if he or she has visited this particular site before. If the answer is no, the inspector should ask to see the plans, have reviewed them ahead of time, or brought a copy so he or she knows what BMPs have been approved for that site.
- ✓ Does the inspector use a checklist or otherwise document inspection findings in the field?
- ✓ What kind of written feedback is provided to the operator and within what timeframe do violations need to be addressed?
- ✓ What kind of report is generated as a result of the inspection? Does it detail all problems found at the site or does it document only that the inspection occurred?
- ✓ Are findings from inspections tracked in a central location or database?

TIP:

Be aware that permittees will often match you up with their "best" inspectors and want to take you to the most compliant sites. Visiting sites that are "bad actors" or typically non-compliant can also be very helpful in characterizing the inspector's knowledge and abilities. "Dirty" projects do not necessarily indicate inadequate inspections or inept inspection staff. It is sometimes helpful to the inspectors to have another set of eyes at a problem site to assess the issues and provide insight for solutions.

- ✓ How does the inspector track required follow-up inspections or enforcement actions?
- ✓ Is the inspector thorough? Does the inspector walk the entire site and identify all potential problems?
- ✓ Does the inspector note flow pathways and check for discharges from the site at outfalls or to storm drain inlets?
- ✓ What type of stormwater training has the inspector received?

The in-field activity is a good opportunity for you to ask the inspectors some of the same questions asked during the office portion of the program evaluation to see if the answers differ. Often, inspectors are more open to discussing "problems" with the program than are the program managers. Try to spend some time with the construction inspector talking informally about the program. (The drive between inspections is a good time for this talk.)

Document all findings in the field in as much detail as possible. A Construction Inspection Worksheet has been included in Appendix C to assist in this documentation.

Common Issues Identified During Program Evaluations

The following are some common problems with construction programs. These areas should be closely considered during evaluations:

- ✓ When erosion and sediment control inspections are included as part of building inspections, erosion and sediment control is seen as a less important aspect of the inspection compared to other aspects, such as electrical or plumbing.
- ✓ The inspectors may lack the training and time necessary to conduct thorough erosion and sediment control inspections.
- ✓ Construction inspectors sometimes lack the authority to enforce the local ordinance.
- ✓ The inspectors may not follow a formal, written, escalating enforcement policy, or such a policy does not exist.
- ✓ Construction inspectors do not document inspection results using a checklist or other document.
- ✓ Inspectors do not conduct thorough inspections (i.e., drive-by inspections are common).
- ✓ Construction inspectors do not verify that BMPs approved on plans are actually installed at the project.
- ✓ Construction inspectors do not inspect to determine if BMPs are adequately maintained.
- ✓ The permittee is not adequately tracking inspections and inspection results.
- ✓ The permittee is not verifying general permit coverage before approving plans for construction disturbing one acre or more.
- ✓ Plan review staff lack adequate guidance and criteria for reviewing erosion and sediment control plans.
- ✓ Inspectors of public projects (in-house or contractual staff) are not knowledgeable about the applicable construction general permit (this is a significant liability because the inspector is usually responsible for ensuring compliance with this permit).

4.5 Post-Construction Controls

Regulatory Requirements

EPA's federal regulations for the stormwater Phase I and Phase II NPDES MS4 regulations are listed at right. NPDES MS4 permits must address these requirements and often include more specific requirements.

General Permits

As described above, stormwater Phase I and Phase II permittees must implement a SWMP that includes a post-construction component that addresses stormwater runoff at the completion of construction of new or redevelopment sites that disturb at least one acre.

Federal NPDES Regulations

NPDES MS4 permits must address these requirements and often include more specific state requirements:

- ✓ Phase I MS4 Regulations
  40 CFR 122.26(d)(2)(iv)(D)
- ✓ Phase II MS4 Regulations
  40 CFR 122.23(b)(5)
  40 CFR 122.23(b)(5)

Common Activities

Ordinance/Legal Authority

The ordinance should have language requiring that all new development and significant redevelopment projects incorporate stormwater management BMPs and submit a plan that complies with design standards, zoning codes and comprehensive or master plans. Some permittees review required construction general permit SWPPPs, while others require the development and submittal of a separate post-construction plan to address local stormwater requirements. In addition, some permittees require that projects smaller than one acre implement post-construction stormwater controls. These requirements should be detailed in an ordinance to establish legal authority. Ideally, the ordinance will outline the contents of an approvable plan and responsibilities for operation and maintenance of approved BMPs. The operation and maintenance section should also describe who is responsible for inspections and maintenance (e.g., the homeowner, homeowners' association, permittee, etc.).

Resources

- ✓ Menu of BMPs
  www.epa.gov/npdes/stormwater/menuofbmps
- ✓ California Stormwater Quality Association's New Development and Redevelopment Handbook
  http://www.cabmphandbooks.com/Development.asp
- ✓ Georgia Quality Growth Program
  www.georgiaqualitygrowth.com
- ✓ EPA Smart Growth Web site
  www.epa.gov/dced/
- ✓ Smart Growth Online
  www.smartgrowth.org/
- ✓ EPA Low Impact Development Resource Center
  www.epa.gov/owow/nps/lid/
- ✓ Low Impact Development Center
  www.lowimpactdevelopment.org

Comprehensive or Master Planning

Often, when the MS4 is a municipality, the permittees address stormwater management using the established local comprehensive or master planning process. Comprehensive or master planning typically is required by state law and is to be used as guide in decision-making about the built and natural environment by the governing body of the permittee (i.e., city council, planning commission, county board). A comprehensive plan contains long-term planning recommendations for the community and often addresses water quality issues either directly with specific water quality goals or indirectly through the encouragement of land use practices that minimize impervious surface (i.e., high density "villages") or encourage open space.

The inclusion of water quality-related goals in the comprehensive plan could assist local planners and policymakers to institutionalize the stormwater principles necessary to implement an effective SWMP.

However, the comprehensive plan is not a substitute for a SWMP Plan because it cannot be changed or updated readily and does not include necessary implementation details of the stormwater program.

Post-Construction BMP Standards

While the legal authority described above should require the installation of BMPs at sites, a permittee should also have additional specifications or guidance on what types of BMPs are expected or required. Ideally, the ordinance will include language that refers to a guidance manual for BMP design and implementation. The recommended manual should contain sizing criteria, performance criteria, and guidance on selection and location of BMPs. The manual and preferred BMPs should be available to project applicants early in the planning phase of a project. The standards should include guidance for proper district or subarea design (e.g., a redevelopment district), proper site design (e.g., sending gutter water into landscaping), source control (e.g., covering trash cans), and stormwater treatment BMPs (e.g., sand filters).

Plan Review and Approval Procedures

The review of post-construction plans should be based on formal review specifications, a checklist, or similar criteria. Plan review staff should document the BMPs considered, whether they were addressed on the plans, and any identified deficiencies. Some permittees use contract staff to review some or all plans. Be sure to review plans completed by contractual as well as permittee staff.

TIP:

Review several types of recent development projects that have gone through the review process. Include small residential and large commercial development projects as well as both new development and redevelopment projects, if applicable.

Post-Construction BMP Inventory

The permittee should maintain inventory detailing the types and locations of planned and installed post-construction BMPs projects. There may be two types of inventories: (1) a traditional database for site-level structural BMPs, and (2) a tracking system for planning or development practices BMPs. Ideally, both types of information would be managed in a database and linked to a GIS for optimum tracking. Structural post-construction BMPs must be inspected and maintained to remain effective. Tracking the locations, conditions, ages of the structural BMPs as well as the inspection findings is critical to ensuring the proper maintenance occurs for the life of the BMP. For planning-related BMPs, tracking systems may be linked to code revisions or development permits. Note that some revisions may occur with State or regional codes or standards, which might require a separate tracking system.

BMP Inspection and Maintenance

Proper BMP installation, operation, and maintenance are critical to optimizing the effectiveness of post-construction BMPs. If BMPs are not maintained, they can become concentrated sources of pollutants themselves. Comprehensive “as built” inspections are necessary at the conclusion of a project to ensure the BMP has been built properly and regular inspections are critical to ensure the BMP is being maintained as needed. Permittees may inspect private BMPs or require that the owners/operators of the facility inspect them through maintenance agreements or other mechanisms. Often, permittees require that facility owner/operators submit documentation detailing inspection dates and maintenance performed.

Enforcement

Legal authority is needed to require owner/operators to maintain BMPs. This can be outlined in a maintenance agreement or other binding contract, but it must be included in municipal code or regulation as well. The permittee should have available enforcement actions to require the owner/operator to perform necessary inspections and maintenance. Some permittees have authority to abate problem facilities (i.e., maintain the facility and charge the owner/operator) if necessary.

Public Construction Projects
Municipal permittees must apply the same local requirements to public construction projects as is required of private projects. Some municipal permittees develop and design public construction projects in-house without direct involvement from the department that reviews most private construction projects; therefore, it is important that the public project designers are trained and proficient in stormwater BMPs as well. If the permittee hires outside designers for public projects, stormwater guidelines should be provided to them to ensure compliance with local and general permit requirements. Permittees should have an inventory of publicly owned stormwater management and treatment facilities and should have an inspection and maintenance program established.

Training and Education
Permittees should provide training to plan review and BMP inspection staff (if applicable). This training should include classroom presentations and in-field training as well as follow-up evaluations to demonstrate that the training was effective.

TIP:

A review of existing codes and land development regulations can be extensive. The following are previous efforts to evaluate development codes that may be helpful in this process:

Center for Watershed Protection Codes and Ordinances worksheet
http://www.cwp.org/COW_worksheet.htm

EPA list of smart growth scorecards
www.epa.gov/smartgrowth/scorecards/project.htm

King County Washington "Built Green" Checklists
http://www.builtgreen.net/checklists.html

Evaluating Post-Construction Programs

Development can significantly alter landscapes by increasing imperviousness (e.g., roofs, driveways, parking lots) and changing drainage patterns, thereby increasing the volume and velocity of runoff from the site. Increased volume leads to degradation of receiving waters and increased flood frequency. Stormwater from newly developed impervious areas can also contain a variety of pollutants that are detrimental to water quality, such as sediment, nutrients, road salts, heavy metals, pathogenic bacteria, and petroleum hydrocarbons. Two groups of BMPs can minimize the impacts of stormwater from new development and redevelopment projects: nonstructural site design or source control measures, which prevent or reduce the generation of pollutants, and structural treatment BMPs that detain and treat stormwater to control the volume of runoff and reduce pollutant loading to receiving waters.

Postconstruction stormwater impacts are not likely to be controlled entirely with site-level BMPs. Thus regional, district and subarea planning is increasingly recognized as a means to control overall imperviousness. Postconstruction BMP standards are likely to include many interlinking requirements that affect common land development practices, such as street design, community layout, and land use mix. The aim of such standards is to revise building practices that drive impervious surface generation within a watershed to reduce the effects of the built environment at a meaningful scale. Note that this approach to stormwater management is new, so an evaluation of this area may address future planning activities in addition to current activities.

There are several approaches permittees may use to implement planning-level BMPs, each of which is are appropriate in different development settings and offers a unique set of benefits. Four of these approaches or frameworks—redevelopment, infill, compact design, and conservation development—are described below and may be found in a comprehensive plan or SWMP:

- *Redevelopment*: Under this framework, a permittee is looking to redevelop already impervious districts and lots. Programs to support redevelopment include downtown redevelopment plans, vacant property reforms, brownfields redevelopment, and corridor redevelopment plans. These programs are typically more successful when supported by financial programs (e.g., tax incentives and grants), policy support (e.g., priority infrastructure), and technical assistance and staffing support.

- *Infill*: Infill development, like redevelopment, takes place in areas supported by existing road, water, and sewer infrastructure. Infill development tends to have a smaller footprint than conventional new development projects. Infill sites, whether individual lots or larger parcels, are generally undeveloped and may be able to manage stormwater flows onsite. The policies described above for redevelopment would apply to infill development, as well as any policies to mitigate flows from infill.

- *Compact Design*: Compact designs seek to meet development needs on a smaller footprint to achieve both development and conservation goals. These designs can be used in redevelopment (e.g., transit-oriented development) or new development (e.g., cluster housing or rural or urban villages) situations and are suitable in urban, urbanizing, and rural settings. The key to successful designs lies in coordinating interlinking aspects of transportation, land use, and open spaces. This framework is particularly amenable to design guidelines for a district, including stormwater management.

- *Conservation Development*: This framework, typically used in rural areas or along the urbanizing fringe, is targeted for the lowest impact development. Successful programs will be tied to specific conservation objectives (e.g., habitat preservation, groundwater recharge) and will link the rural development scheme with rural economic development objectives.

TIP:

When permittees review development codes to identify areas where stormwater benefits can be incorporated, the following are typically examined:

- ✓ Review of parking demand or indications of overly high parking ratios
- ✓ Overlarge setbacks from the street or other lot lines
- ✓ Minimum lot size requirements in urbanizing areas
- ✓ Highly separated uses embedded in codes
- ✓ Subdivision and street requirements
- ✓ A review of barriers to low impact development, redevelopment or other land efficient forms, including State or institutional barriers and standards

When evaluating the post-construction, new and redevelopment component of a SWMP, it is helpful to discuss the process chronologically in the order that a project would occur. Ask the permittee's planning staff to walk you through the process as if you were a developer proposing a project. Discuss what post-construction stormwater BMPs are required for new and redevelopment projects, how and when developers are informed of the stormwater requirements in the initial planning stages, how plans are reviewed for stormwater standards, on what legal authority requirements and standards are based, what is required for plan approval, how the BMPs are inspected during and after construction, and how the permittee ensures that BMPs are adequately operated and maintained.

Typically, an on-site evaluation for post-construction BMPs will involve interviewing planning and engineering staff. Planners usually work with developers to determine what is required for plan submittal, but engineering staff may actually review the plans and verify design calculations.

Before the Program Evaluation

To prepare for the post-construction program evaluation, you should review or obtain the following information:

- **NPDES MS4 permit provisions.** Review the permit requirements for the post-construction program to identify any specific requirements (such as a design standard for post-construction controls). The NPDES permit will serve as the primary basis for the program evaluation.

Pre-Evaluation Checklist

- ✓ MS4 permit provisions
- ✓ SWMP provisions
- ✓ Most recent annual report
- ✓ Comprehensive plans
- ✓ Economic development plans

- **SWMP provisions.** The permittee's SWMP planning document(s) will describe the activities and BMPs the permittee has committed to implement and include measurable goals that provide deadlines for program implementation.
- **Latest annual report.** The annual report should be reviewed to identify past activities and help the inspector become familiar with the permittee's program.

Records Review

The following records might help in evaluating the compliance and performance of the permittee's post-construction program. Ask for copies of relevant information where it will help in writing a report or documenting a permit violation.

Documentation	What to Look For
Local ordinances	One or more of the following ordinances may be used by a permittee to regulate post-construction BMPs ▪ Grading ordinance ▪ Stormwater ordinance ▪ Landscaping ordinance ▪ Other portions of the code used by code enforcement staff to enforce aesthetic concerns ▪ Zoning codes or land development regulations (where the permittee chooses to amend existing codes to implement post-construction improvements) ▪ Economic development and capital improvement plans that support the district or comprehensive planning goals ▪ Design guidelines for larger development areas (e.g. subdivisions, mixed use districts, downtown redevelopment programs) ▪ Local and district open space and park plans that serve to support the post-construction program
Comprehensive or General Plans	Review for language that requires consideration of water quality concerns when evaluating development projects
Design standards, BMP manuals, or fact sheets	These can be state or local standards or be taken from a non-regulatory source
Post-construction plans reviewed and approved by the permittee	Where possible, try to review the plans for projects that you will also visit during the field portion of the evaluation
Post-construction BMP tracking system	Database or other system used to track the location of post-construction BMPs that have been installed and the maintenance performed or required for each BMP

Elements to Address During the Program Evaluation

Although not specified in detail in NPDES regulations, a successful post-construction program will generally be composed of the following elements:

- Ordinance/legal authority
- Comprehensive or master planning
- Post-construction BMP standards

- Plan Review and approval procedures
- Post-construction BMP inventory
- BMP inspections
- Enforcement
- Public construction projects
- Training and education

The common program elements are the key issues to consider during the review. For each of the elements listed above, this Guidance presents common program activities and questions to consider during the program evaluation. The questions are suggested for you to address each program component. Of course, a comprehensive program evaluation must be tailored to the specific issues associated with each permittee and should include more specific questions regarding the permittee's permit structure and management challenges.

ORDINANCE/LEGAL AUTHORITY

- ✓ What legal authority does the permittee have to require post-construction BMPs on development sites and to ensure maintenance?
- ✓ Does the permittee's legal authority address post-construction requirements for all projects disturbing one acre or more?
- ✓ Does the legal authority require site design, source control, and stormwater treatment BMPs?
- ✓ What exemptions does the ordinance or other legal authority allow?
- ✓ What procedures for alternative compliance (i.e., planning-level BMPs and other non-structural controls) are allowed?
- ✓ Does the legal authority authorize the permittee to require stormwater management plans to address post-construction impacts?

COMPREHENSIVE OR MASTER PLANNING

- ✓ Does the comprehensive or master plan include elements encouraging the control of water quality or quantity (e.g., flooding) from existing or new developments?
- ✓ Does the plan include elements to encourage protection of natural features (such as wetlands, buffer strips, etc.)?
- ✓ Does the comprehensive or master plan include elements to encourage minimization of impervious surfaces?
- ✓ Does the comprehensive plan include elements to encourage open space?

POST-CONSTRUCTION BMP STANDARDS

- ✓ What technical guidance (e.g., BMP manual) does the permittee use as the standard for design and selection of post-construction BMPs? It is not necessary to do a thorough review of the manual or standards used by the permittee. Question the planners regarding the following key items:
    - Are project proponents required to follow the technical manual?

- Does the guidance provide siting and use criteria for the BMPs to ensure proper and adequate BMPs are being selected and implemented?
- Does the guidance provide siting and use criteria for BMP selection based on the development context (i.e., BMP selection appropriate for ultra urban-areas versus those more appropriate for more rural settings with larger parcels)?
- Are pollutants of concern that are typically generated by the proposed development type considered when selecting or approving BMPs?
- Does the technical manual provide guidance on sizing, performance, and location of BMPs?
- When was the BMP manual last updated?

✓ Does the permittee have different requirements or standards for different types of developments (e.g., specific post-construction requirements for gas stations or automobile repair facilities)?

✓ Does the permittee have design manuals related to land-efficient site designs (e.g. better site design, better models for large retailers)?

✓ Does the permittee promote source control and site design standards to reduce the generation of pollutants in addition to treatment BMPs?

✓ Does the permittee include in standards and manuals specifications for innovative site design practices, such as low-impact development and other techniques that manage runoff on-site?

✓ Are project applicants encouraged or required to use vegetative BMPs that promote infiltration, such as swales, biofiltration practices, etc., where possible?

✓ Does the permittee offer financial incentives to support post-construction stormwater goals (e.g., programs to support redevelopment, such as enterprise zones, or stormwater utility credits)?

TIP:

Select 2 to 3 approved projects with post-construction BMPs to review with the permittee. Try to choose different project types (residential, commercial) and sizes. Also review at least one public project plan to see if the permittee is applying adequate standards to municipal developments.

PLAN REVIEW AND APPROVAL PROCEDURES

✓ What is the project size threshold for the permittee to require post-construction BMPs?

✓ Does the permittee apply standard conditions that incorporate post-construction installation and maintenance requirements into its plan review process?

- Obtain a copy of the standard conditions. Do they specifically address post-construction stormwater management?

✓ Do plan reviewers use specific criteria or a checklist when reviewing plans?

✓ Does the permittee consider pollutants of concern or whether the project discharges to a 303(d) listed impaired water when determining which BMPs are required?

✓ Does the permittee consider such regional concerns as smart growth initiatives, watershed master plans, and other larger-scale planning efforts to ensure that each new development and redevelopment plan is consistent with the goals of these initiatives?

✓ When reviewing plans approved by the permittee:

- Look for whether adequate BMPs are included on plans, details, and drawings, what types of standard conditions or notes are included, whether maintenance requirements are specified, and whether the location of BMPs would hinder maintenance.
- Look for BMPs that may not be easily characterized, in particular the comprehensive planning and land-efficient planning BMPs.
- For commercial/industrial projects, review whether adequate source control BMPs are required on plans.
- Were comments provided by the permittee to the project proponent reasonable and appropriate?

✓ What types of projects must be reviewed by the permittee for post-construction stormwater controls? Does the permittee have a process to identify priority projects identified in the MS4 NPDES permit?

✓ What types of standards or technical guidance do the permittee's reviewers use to review projects?

✓ Does the permittee condition improvements to existing developments with requirements for post-construction stormwater controls? How are these redevelopment requirements triggered?

POST-CONSTRUCTION BMP INVENTORY

✓ How does the permittee track the installation and maintenance of post-construction BMPs?

✓ What information is collected?

- Location
- Owner/operator
- Recommended maintenance schedule
- Inspection findings

BMP INSPECTION AND MAINTENANCE

✓ Does the permittee require maintenance agreements for all projects with post-construction BMPs?

✓ Are "as-built" inspections required at the conclusion of a development project?

- Do staff conduct these inspections or are they self-certified?

✓ Does the permittee inspect private facilities or require inspections by owner/operators?

✓ If the permittee performs the inspections, how often are they performed?

✓ If owner/operators are required to inspect and maintain their BMPs, how is this authorized? Through a MOU? Through conditions of approval? Through another type of agreement?

✓ How does the permittee ensure inspections are occurring?

- Does the permittee send reminder notices?
- Does the permittee require the owner/operator to submit inspection reports?

ENFORCEMENT

- ✓ How does the permittee require proper maintenance and repair after the inspection?
- ✓ What types of enforcement actions are provided by ordinance (e.g., notices of violation, abatement)?
- ✓ Is the permittee's enforcement authority limited (e.g., limits on the dollar amount of fines, inability to issue civil penalties)?

PUBLIC CONSTRUCTION PROJECTS

- ✓ Does the permittee use post-construction BMPs for public projects?
- ✓ Has the permittee instituted a pilot program to test and showcase innovative BMPs on public property or in public buildings?
- ✓ Are they tracking the location, inspection history, and condition of the BMPs?
- ✓ Who inspects them? How often?

TRAINING AND EDUCATION

Training for staff

- ✓ Are plan reviewers trained on post-construction BMPs and requirements?
- ✓ What type of training do staff performing "as built" and post-construction inspections receive?
- ✓ How often are the trainings conducted?
- ✓ How many staff have been trained?
- ✓ What type of training or education does the permittee provide to city-contracted developers and engineers on post-construction requirements?

Developer and plan designer education

- ✓ What types of educational materials have been developed and distributed to developers and designers regarding post-construction BMPs and application requirements?
- ✓ How are the materials distributed? At the permit desk? During inspections?
- ✓ What type of training does the permittee provide or advertise to local developers and designers?
    - o How often is this training conducted?
    - o How many developers and designers have been trained?
- ✓ Are they required to attend?

<u>In-Field Program Evaluation Activities</u>
In-field evaluation activities primarily focus on verifying that structural and source control BMPs approved by the permittee were installed and are being maintained properly in the field. Select several completed projects that were subject to post-construction requirements. Take along the approved plans so that the locations and types of BMPs can be verified.

Note whether BMPs are installed as designed or if BMPs have been modified or removed after the project has been completed. For example, trash storage areas could have been modified after installation, slopes might have become destabilized, or storm drain stenciling could have been removed or become illegible.

In addition, in-field evaluation activities should include inspections of publicly owned stormwater BMPs, such as detention basins, to verify that they are being adequately maintained.

Common Issues Identified During Program Evaluations

The following are some areas where past on-site evaluations have found problems in post-construction programs. These areas should be closely considered during evaluations:

- ✓ The plan review staff lack training on design requirements for development standards and conditioning of new development projects.
- ✓ The permittee lacks review criteria, checklists, or a formal plan review process to assist plan review staff in reviewing development projects.
- ✓ The permittee does not assess BMPs for effectiveness at more than one scale (e.g., at both the site and watershed scales).
- ✓ The permittee institutes blanket BMP requirements (i.e., those that apply to all projects) that do not take into account the development setting.
- ✓ The permittee institutes BMP requirements that act as unintended barriers to better models for development and redevelopment.
- ✓ The permittee developed its program from a "Menu of BMPs" that has resulted in BMPs that are easy to administer but are not the most effective or do not address target stressors.
- ✓ The permittee does not consistently condition plans with post-construction stormwater controls.
- ✓ The permittee does not require inspection and maintenance of post-construction controls.
- ✓ The permittee lacks a system to track approved structural and source control BMPs for inspections and ongoing maintenance.
- ✓ The permittee's BMP tracking system is based on conventional, structural measures that are more readily quantified than non-structural techniques that work on a watershed basis, such as comprehensive planning or improved street designs.
- ✓ The permittee has not updated approved BMP lists to reflect advances in low impact development or comprehensive planning-related BMPs.

4.6 Industrial/Commercial Facilities

Regulatory Requirements

Applicable federal regulations for the NPDES stormwater Phase I and Phase II MS4 regulations are listed at right. NPDES MS4 permits must address these requirements and often include more specific state requirements. This program area is mainly applicable to Phase I MS4 permittees; Phase II MS4 permittees address stormwater discharges from industrial facilities and commercial businesses as part of their education programs.

Federal Regulations

NPDES MS4 permits must address these requirements and often include more specific state requirements:

- ✓ Phase I MS4 Regulations
  40 CFR 122.26(d)(2)(iv)(C)
  40 CFR 122.26(d)(2)(i)(A)
  40 CFR 122.26(d)(2)(ii)
- ✓ Phase II MS4 Regulations
  40 CFR 122.34(b)(ii)

General Permits

To minimize the impact of stormwater discharges from industrial facilities, the NPDES program includes an industrial stormwater permitting component. Operators of industrial facilities included in one of the 11 categories of stormwater discharges associated with industrial activity that discharge or have the potential to discharge stormwater to an MS4 or directly to waters of the United States require authorization under an NPDES industrial stormwater permit. Construction activity is one of these 11 categories, but because of the nature of construction stormwater controls, the category is discussed separately from the other 10 categories. Most states are authorized to implement the NPDES stormwater permitting program. EPA remains the permitting authority in several states and territories, on Indian Country lands, and at some federal facilities.

Resources

- ✓ EPA Menu of BMPs www.epa.gov/npdes/stormwater/menuobmps
- ✓ Stormwater Management for Industrial Activities: Developing Pollution Prevention Plans and Best Management Practices www.epa.gov/npdes/pubs/contents_indguide.pdf
- ✓ Sacramento County Industrial Stormwater Compliance Program www.sactostormwater.org/industrial/compliance.asp
- ✓ Multi-Sector General Permit www.epa.gov/npdes/msgp

For those areas where EPA is the permitting authority, the **Multi-Sector General Permit (MSGP)** provides facility-specific requirements for many types of industrial facilities with a single permit. The permit outlines steps that facility operators must take prior to being eligible for permit coverage, including development and implementation of a SWPPP.

It is important to note that some permittees will also have coverage under industrial stormwater general permits or have individual permits for maintenance facilities that fall under one of the covered industrial categories, such as landfills, waste transfer stations, or transportation facilities. Please refer to the "MS4 Maintenance Activities" section of Conducting an Evaluation for information regarding municipal facilities that may also require industrial stormwater permit coverage.

Common Activities

The industrial and commercial facilities program component can be implemented by various departments and staff. Many municipal permittees use existing pretreatment and restaurant inspectors to fulfill the stormwater requirements. Some permittees choose to hire outside consultants to perform inspections and maintain the inventory of facilities.

Legal Authority

Many municipal permittees have adopted stormwater ordinances that outline general or specific discharge prohibitions that apply to industrial and commercial properties. These ordinances should list discharge exemptions, inspection requirements, and penalties for non-compliance. Some permittees, however, must

rely on multiple existing codes (i.e., health, building, hazardous materials) designed to protect health and human safety. In these cases, the program coordinator and inspection staff should be able to articulate the combination of codes that provide the authority to inspect, prohibit, or stop illegal discharges, require BMPs, and enforce instances of noncompliance.

Facility Inventory

The types of industrial and commercial facilities that a permittee needs to inspect can vary significantly from permittee to permittee. Some localities may have large industrial areas with few commercial businesses, while others may have a large number of restaurants and retail businesses but no industrial facilities at all. Still other permittees may have a mix of many different types of industrial and commercial facilities. Permittees should characterize the facilities and prioritize them based on their potential impact on stormwater quality, and the inspection program should be based on this prioritization approach.

Many permittees have developed a database to inventory industrial/commercial facilities and manage the inspection program. The inventory can be created using multiple resources, such as the permitting authority's list of facilities that are covered under the state industrial general permit, business licenses, list of pretreatment significant industrial users, and phone books or other professional directories. As per the federal regulations, the inventory should be organized by watershed with a description (such as standard industrial classification (SIC) codes) that "best reflects the principal products or services provided by each facility which may discharge, to the municipal separate storm sewer, stormwater associated with industrial activity." The database inventory should include facility type, past inspection or enforcement results, proximity to receiving waters, potential pollutant sources on-site, and other pertinent information to assist in inspection prioritization and management. Many permittees use the same database to manage the construction inspection program as well.

Standards, BMPs, and Outreach

Many municipal permittees have stormwater ordinances that include specific BMPs or standards for industrial and commercial facilities to protect water quality and minimize stormwater pollution. Others have adopted pollution prevention standards for new or redevelopment of industrial/commercial facilities that are required through conditions of approval, improvement permits, etc. Phase I MS4 permittees have developed brochures, fact sheets, and posters to hand out to operators during inspections to educate them about appropriate BMPs. Many permittees have developed these materials in multiple languages to use in a variety of communities. Some permittees have Web sites with links to relevant outside resources for more information. Many permittees also acknowledge that educating facility operators is essential to implementing BMPs and minimizing stormwater pollution and should be done, not only during inspections, but also through workshops, conferences, and professional meetings.

Staff Training

To ensure that inspectors are knowledgeable and proficient in the newest and most effective approaches to minimizing stormwater pollution from industrial/commercial facilities, many permittees require annual BMP training for inspection staff. This training may be presented in-house or staff may attend trainings provided by the permitting authority or industry. It is important to cross-train any other staff (e.g., pretreatment, health department) used for stormwater inspections as well.

Inspections

Most effective industrial/commercial inspection programs maintain a complete facility inventory and group them according to priorities established by the permittee. An inspection frequency is determined based on priority, and a database is used to manage such information as inspection findings, enforcement actions, and required follow-up activities. Many permittees use and cross-train existing staff to perform industrial/commercial inspections, but some permittees may need to maintain an exclusive stormwater inspector due to a potentially large number of high-priority facilities. There should be an inspection

standard operating procedure that has been formalized and documented. It should include a checklist to be used during the inspection and possibly a report format. Inspectors should be aware of federal, state, and local stormwater regulations that may apply to industrial/commercial facilities. Inspectors should be familiar with various types of BMPs commonly used at the types of facilities typically found in the permit area and should be able to educate facility operators about such BMPs. In addition, inspectors should understand and use the permittee's established enforcement escalation response plan to gain compliance as necessary. The inspection staff should be proficient in the enforcement escalation procedure and should properly document all enforcement actions accordingly. Inspections should be used not only to identify non-compliance issues, but as an opportunity to educate facility operators about proper stormwater BMPs.

Program Support and Resources

Permittees should have an established source of funding for their industrial/commercial facilities program, including adequate resources for frequent inspections. Funds can come from fees paid by the business owners. If general funds are used to support the program, permittees should ensure that industrial and commercial inspections are line-item appropriations not subject to reduction or elimination based on board politics or budget constraints.

Enforcement

The ordinance establishing legal authority for the industrial/commercial inspection component of the SMWP should define all stormwater discharge prohibitions, describe any exemptions or waivers, detail the enforcement escalation procedure, and outline any fines or other penalties for noncompliance. Inspectors should have the ability to levy a penalty such as a compliance directive, notice of violation (NOV), or administrative fine to the facility during an inspection if non-compliance is noted. Significant fines or penalties should be included in the ordinance for egregious violations or recidivism.

Evaluating Industrial/Commercial Inspection Programs

The evaluation of an industrial/commercial inspection program focuses on the permittee's legal authority to require and enforce their program, prioritization of facilities, and in-field inspection procedures. The evaluation should begin with a thorough review of the permittee's ordinances, standards, guidance, and other relevant written materials.

Before the Program Evaluation

To prepare for the industrial/commercial inspection program evaluation, you should review or obtain the following information prior to the evaluation:

Pre-Evaluation Checklist
- ✓ MS4 permit provisions
- ✓ SWMP provisions
- ✓ Most recent annual report
- ✓ List of NPDES facilities
- ✓ Inspection reports

- **MS4 NPDES permit provisions.** Review the permit requirements for the industrial/commercial inspection program to identify any specific requirements (such as a minimum inspection frequency). The NPDES permit will serve as the primary basis for the program evaluation.
- **SWMP provisions.** The permittee's SWMP planning document(s) will describe the activities and BMPs the permittee has committed to implement and may include measurable goals that provide deadlines for program implementation.
- **Latest annual report.** The most recent annual report should be reviewed to identify past activities and help you become familiar with the permittee's program.
- **List of NPDES industrial facilities.** Try to obtain a list of industrial facilities in the permit area that are covered under an industrial stormwater general permit issued by the permitting authority or are included in the pretreatment program of local or regional POTWs. This list can be used during the program evaluation to determine whether the permittee is including these facilities in

the inspection program and to understand the types of facilities that are found in the permit area. The list can also help identify potential sites for field inspections. The list can also be crosschecked with a similar list requested and obtained from the permittee.

- **Industrial inspection reports.** Review reports from inspections performed by the permitting authority and talk to state or EPA inspectors to determine if there have been past industrial stormwater violations at facilities located in the permit area.

Records Review

During the evaluation, you should ask for copies of relevant information to assist in writing the report or documenting a permit violation. The following records might help in evaluating the compliance and performance of the permittee's industrial/commercial inspection program.

Documentation	What to Look For
Local ordinances, regulations, or policies that might apply to industrial/commercial facilities	▪ Stormwater ordinance ▪ Health codes ▪ Municipal code sections dealing with aesthetics; vehicles; dumpsters, trash, solid waste; and litter, trash, sweeping ▪ Building codes
Enforcement escalation procedure or response plan	Flow chart or procedure that specifies a process by which fines can be levied and legal action taken against facility operators or business owners who violate stormwater rules and ordinances
Tracking system	Database or other system used to track the following information: ▪ The number and type of industrial facilities in the permit area ▪ Prioritization scheme or other method that determines inspection schedule and frequency ▪ The number, frequency, and results, along with follow-up actions resulting from inspections ▪ The number and type of enforcement actions at facilities
Examples of inspection reports	▪ Hand-written field notes and formal write-ups if both are used
Examples of enforcement files or cases	▪ Records should document enforcement and follow-up activities ▪ Review both a completed file and one that is in progress if possible
Training	▪ Review any records documenting how often training has been provided to municipal inspectors, who prepared and delivered the training, who attended, and how long the training lasted, as well as any examples of the training materials used ▪ Educational information, brochures, or other BMP guidance used by staff or distributed to facility operators

Elements to Address During a Phase I MS4 Program Evaluation

Although not specified in detail in the NPDES Phase I MS4 regulations, a successful industrial/commercial inspection program will generally be composed of the following elements:

- Legal authority
- Facility inventory/prioritization
- Standards, BMPs, and outreach
- Staff training
- Facility inspections
- Program support and resources
- Enforcement/referrals

The common program elements are the key issues to consider during the review.

LEGAL AUTHORITY

- ✓ Does the Phase I permittee have the authority to require industrial and commercial facilities to implement stormwater BMPs? Does the Phase I permittee have the authority to conduct inspections and enforce requirements?
    - What ordinance(s), code, or policy provides this legal authority?
- ✓ What types of facilities are covered under this legal authority?
- ✓ Who (e.g., specific staff, department, etc.) has the authority to enforce the ordinances and/or inspect the facilities?
- ✓ What exemptions does the ordinance or other legal authority allow?

FACILITY INVENTORY

- ✓ Has the permittee completed an inventory of industrial/commercial facilities discharging to the stormwater system?
- ✓ What types of facilities are included on the inventory?
- ✓ What sources were used to create the inventory?
    - Facilities that filed NOIs for EPA MSGP or state industrial general permit coverage?
    - Significant industrial users within the pretreatment program?
    - Business licenses?
    - Phone book?
    - "Windshield" survey?
- ✓ Does the inventory include all the industrial/commercial facilities subject to the industrial general permit?
    - Does the permittee periodically check to see if new facilities that must be covered by an industrial stormwater general permit have filed an NOI?
    - What is the process for notifying the permitting authority of non-filers?
- ✓ If applicable, does the inventory include all the facilities specified as required in the MS4 NPDES permit?
- ✓ How is the inventory updated? How often?

- ✓ What information is maintained about the facilities?
- ✓ How is the inventory maintained and stored?
- ✓ Does the permittee prioritize the facilities?
- ✓ Is the prioritization based on facility type, past inspection or enforcement results, proximity to receiving waters, potential pollutant sources on-site, and so forth?
- ✓ Is the prioritization used to determine frequency of inspections?
- ✓ Has the permittee mapped the locations of prioritized facilities to cross-reference reports of dumping, illicit discharges, or other water quality issues?

STANDARDS, BMPS, AND OUTREACH

- ✓ Has the permittee adopted standards or BMPs that industrial/commercial facilities are required to implement (e.g., all car dealerships must install a wash rack plumbed to the sanitary sewer)?
- ✓ Are the requirements for new developments only or are they triggered by improvements of existing facilities? Are there schedules for implementing retrofits?
- ✓ Are these standards applicable to existing facilities, new facilities, or both?
- ✓ Does the permittee refer facility operators to specific stormwater BMP or standards guidance documents?
- ✓ What type of educational program has been developed for industrial and commercial facility operators?
- ✓ What type of brochures, handouts, or guidance on BMPs is provided to these facilities by the permittee?
- ✓ When is this information provided? During inspections? During training events? During professional organization presentations?

STAFF TRAINING

- ✓ What type of training do the industrial and commercial inspectors receive?
- ✓ How often?
- ✓ If additional inspectors are used (e.g., food safety inspectors for restaurant inspections, pretreatment inspectors), are they trained specifically on stormwater BMPs and requirements? By whom?

INSPECTIONS

- ✓ Who performs inspections and for what types of facilities (e.g., health inspectors for restaurants, pretreatment inspectors for industrial facilities with a pretreatment permit)
- ✓ How often are industrial and commercial facilities inspected?
  - o How is the frequency determined?
- ✓ Does the permittee's industrial/commercial inspector(s) use a standard checklist during inspections?

TIP:

It is a good idea to ride with the inspector during the in-field portion of the evaluation. This is a good time to talk informally about the any program, staffing, and noncompliance issues.

- ✓ Is a report written after the inspection? How is the inspection documented in the file?
- ✓ Does the permittee verify NPDES permit coverage for facilities?
- ✓ For industrial facilities, does the inspector review the SWPPP and monitoring data during the inspection?
- ✓ Does the permittee refer non-filers to the permitting authority?
- ✓ Do inspectors provide educational materials during inspections? What types?
- ✓ If multiple departments or agencies perform inspections, how is information transferred or cataloged?

PROGRAM SUPPORT AND RESOURCES

- ✓ Does the program have a dedicated source of funding to support inspectors?

ENFORCEMENT

- ✓ In instances of noncompliance, do the inspection staff use a formalized, approved enforcement escalation procedure?
- ✓ How was the enforcement escalation procedure developed? Is it used? Is it effective?
- ✓ Who is authorized to apply various enforcement procedures (e.g., NOVs, fines)?
- ✓ What types of penalties are readily available to the inspection staff?
- ✓ What is the most common method of gaining compliance (e.g., NOVs, fines, abatement)?
- ✓ Have the permittee describe a recent non-compliance issue at an industrial/commercial facility to assess how compliance was achieved.
- ✓ At what point are non-compliance cases referred to the NPDES permitting authority? How many have been referred in the last 12 months?

<u>In-Field Phase I Program Evaluation Activities</u>
To determine whether the permittee is adequately inspecting for compliance at industrial/commercial facilities, it is necessary to observe the inspectors "in action." Discourage inspectors from merely describing the inspection process; you need to observe an actual inspection in process.

Schedule at least a half-day for this in-field activity being sure to allow enough time for travel between facilities. If the permittee is conducting both commercial and industrial inspections, try to observe inspections at each type of facility. If the permittee has more than one inspector, accompany a different inspector at each type of facility. In general, small, less complex facilities are better to visit than large industrial facilities. Work with the permittee to select typical facilities. For example, if the vast majority of facilities are vehicle maintenance facilities, visit several of those. It should be made clear that the inspectors are to conduct the inspections; you are only to observe.

Try to limit the number of people that attend each inspection. Too many staff can overwhelm a small facility, making it harder for the inspector to conduct a representative inspection. Discuss which facilities are to be inspected early in the evaluation process. This will allow enough time to schedule inspection staff and arrange transportation logistics.

CHAPTER 4.6: INDUSTRIAL/COMMERCIAL FACILITIES

Many times, inspectors do not participate in the office evaluation, so the in-field activity is a good opportunity to ask the same questions to see if the answers are consistent. Also, many inspectors are more open to discussing "problems" with the program than are stormwater program managers. Try to spend some time with the municipal inspector talking informally about the program.

First and foremost, during a site visit the municipal inspector should be able to determine whether illegal discharges are occurring or could be imminent from industrial/commercial facilities. Visiting a site during a rain event is optimal to observe potential issues. In the event that the inspector does feel immediate action is necessary, it is important that the inspector either have the legal authority to cease discharges and require immediate BMPs, or be aware of who does have this ability and under what legal authority. The inspector should be aware of all applicable ordinances, as well as administrative, civil, and criminal recourse in the event of non-compliance. The inspector should be aware of the enforcement escalation procedure or plan as well.

As the inspector conducts the industrial or commercial inspection, observe the following:

- ✓ Is the inspector knowledgeable about stormwater BMPs, requirements, and ordinances?
- ✓ Is the inspector familiar with the applicable industrial stormwater general permit (state or federal)?
- ✓ When inspecting an industrial facility, does the inspector check whether the facility has a waste discharge identification number, and does the inspector review the facility's SWPPP?
- ✓ Does the inspector use a checklist or otherwise document inspection findings in the field?
- ✓ What kind of written feedback is provided to the operator and within what timeframe do violations need to be addressed?
- ✓ What kind of report is generated as a result of the inspection? Does it detail all problems found at the facility or does it document only that the inspection occurred?
- ✓ Are findings from inspections tracked in a central location or database?
- ✓ How does the inspector track follow-up inspections or enforcement actions?
- ✓ Is the inspector thorough? Does the inspector walk the entire site and identify all potential pollutant sources?
- ✓ Does the inspector note flow pathways and check for discharges from the facility at outfalls or to storm drain inlets?
- ✓ Is the inspector able to educate the facility manager on proper BMPs or requirements? What educational material is provided?

TIP:

It is a good practice to visit at least one facility with historic or existing compliance issues. This can be an excellent way to demonstrate how effective the inspection and enforcement program is, and often the inspector will welcome outside assistance and advice.

Document all findings in the field in as much detail as possible. An Industrial/Commercial Inspection Worksheet has been included as Appendix C to assist in this documentation.

Elements to Address During a Phase II MS4 Program Evaluation

- ✓ Has the permittee identified specific business sectors that might be a significant source of stormwater pollutants to the MS4?
- ✓ What type of educational program has been developed to address stormwater discharges from industrial facilities and commercial businesses?
- ✓ What type of brochures, handouts, or guidance on BMPs is provided to these businesses by the permittee?
- ✓ How is this information provided? As a result of complaints or illicit discharge incidents? During training events? During professional organization presentations?
- ✓ How does the permittee evaluate the effectiveness of education and outreach efforts in terms of measuring changes in stormwater management and pollution prevention practices at industrial facilities and commercial businesses?

Common Issues Identified During Program Evaluations

The following are some typical problem areas associated with the industrial/commercial SWMP component. These areas should be closely considered during evaluations:

- ✓ The permittee has yet to fully implement an inspection program for industrial and/or commercial facilities.
- ✓ The inventory of industrial/commercial facilities is not complete and is not regularly updated.
- ✓ Facilities have not been prioritized according to water quality threat.
- ✓ The permittee has not conducted outreach to facilities on the types of stormwater BMPs that should be implemented.
- ✓ Industrial/commercial inspectors have not been trained on stormwater BMPs and requirements.
- ✓ The permittee does not have a process to identify non-filers to the permitting authority.
- ✓ The permittee lacks written procedures and standards for conducting industrial/commercial inspections and for enforcement.
- ✓ The permittee cross-trains existing inspectors (e.g., pretreatment, food safety) to perform stormwater inspections but does not provide adequate time and resources to perform them.

CHAPTER 4.7: ILLICIT DISCHARGE DETECTION AND ELIMINATION

4.7 Illicit Discharge Detection and Elimination

Regulatory Requirements
EPA's federal regulations for the stormwater Phase I and Phase II MS4 regulations are listed at right. NPDES MS4 permits must address these requirements and often include more specific requirements.

Federal Regulations
- ✓ Phase I MS4 Regulations 122.26(d)(2)(iv)(B)
- ✓ Phase II MS4 Regulations 40 CFR 122.34(b)(3)

Common Activities

Legal Authority
Permittees must develop and implement an effective program to prohibit illicit discharges from entering the MS4. The prohibition of illicit discharges should be linked to legal authority to ensure proper enforcement. This legal authority can be included in public health and safety regulations, specific stormwater regulations, sewer use bylaws, local ordinance, or a combination of several parts of the code.

Resources
- ✓ Menu of BMPs www.epa.gov/npdes/stormwater/menuofbmps
- ✓ Illicit Discharge Detection and Elimination: A Guidance Manual for Program Development and Technical Assessments www.cwp.org/
- ✓ Illicit Discharge Detection and Elimination Manual www.neiwpcc.org/PDF_Docs/iddmanual.pdf

Mapping
Phase I MS4 permittees should have developed a map of known municipal outfalls discharging to waters of the United States as part of their source identification conducted for Part I of their NPDES application. Phase II permittees are required to develop a map of outfalls and the names of locations of all waters of the United States that receive discharges from those outfalls. To be useful, these maps should also include the storm drain pipe network and catch basin locations, along with other relevant information such as the location of stormwater treatment facilities, watershed boundaries for each outfall, critical land uses and pollutant sources, and municipal facilities. Outfalls and drainage areas should be prioritized in order of their potential to be a source of illicit discharges. Ideally, this information would be managed in a database linked to a GIS.

Field Screening
Field screening of outfalls during dry weather can help to identify illicit discharges in priority areas. Of particular concern are areas of older development, areas with a high concentration of automobile-related industries, and areas with high concentrations of industrial facilities among others. Documentation of the illicit discharge detection and elimination (IDDE) program component in the SWMP Plan should include a detailed summary of the departmental responsibility for field activities, frequency of inspections, inspection procedures, inspection equipment, and documentation procedures for field activities.

Investigation of Potential Illicit Discharges
Municipalities should have a written procedure for how they will locate, eliminate, and prevent illicit discharges to the MS4. The procedure should address both spills and illegal connections to the MS4 and should be available to all staff responsible for responding to illicit discharges. The procedure should also specify how spills and illicit discharge incidents are tracked.

Spill Response and Prevention
The purpose of spill response programs is to reduce the risk of spills and improve response and cleanup when they occur. These programs usually require coordination among fire, police, health, and public works departments. The departments responsible for implementing the program should be identified and the SMWP should address employee training, reporting procedures, spill containment, storage and

disposal activities, documentation, and follow-up procedures. For each of these elements, particular attention should be given to good housekeeping and materials management practices. Procedures can be implemented through modification of ordinances and enforcement or through coordination with existing spill prevention or spill containment programs. Most permittees address this element through the development of a spill response plan.

Public Awareness and Reporting Program

Permittees should promote, publicize, and facilitate public reporting of illicit discharges or water quality impacts associated with discharges to the MS4 or receiving waters. Typical public awareness and reporting programs may include developing a hotline number, educating school students, using inserts in utility bills, and developing media announcements. Permittees should have a system in place to quickly route all public calls to appropriate staff, track the calls, and document response and enforcement, if used, for reporting purposes.

TIP:

IDDE public awareness efforts are often discussed during the evaluation of the public education and involvement program.

Proper Management of Used Oil and Toxics

Permittees should provide information on where the public can safely recycle or dispose of used oil and toxic materials to minimize illegal dumping.

Preventing Sanitary Sewer Discharges

Although not a specific requirement of Phase II programs, Phase I MS4 permittees are required to limit infiltration to the MS4 of seepage from municipal sanitary sewers. Many permittees have developed a sanitary sewer overflow program to address discharges from their sanitary sewers. Others have developed programs to promote proper maintenance of septic tanks.

Education and Training

Training for staff should include spill response procedures and procedures on how to locate, eliminate, and prevent illicit discharges. Permittees should also educate the public on the hazards of illegal dumping and illicit discharges to the MS4.

TIP:

Maintenance field crews are usually the best “eyes and ears” available to the permittee to detect illicit discharges and illegal dumping activities. It is important that the information observed in the field is communicated the appropriate staff for follow up and outreach.

Evaluating Illicit Discharge Detection and Elimination Programs

Common sources of illegal, non-stormwater discharges include sanitary wastewater, automobile maintenance waste products such as motor oil or antifreeze, laundry wastewater, household toxic substances, spills from car accidents, runoff from excess irrigation, and industrial sources of cooling waters, rinse water, and other process wastewater. Although these illicit discharges can enter the storm sewer system in various ways, they generally result from either direct connections (e.g., wastewater piping either mistakenly or deliberately connected to the storm drains) or indirect connections (e.g., infiltration into the storm drain system or spills). Illicit discharges can be further divided into those discharging continuously and those discharging intermittently.

Phase I NPDES MS4 regulations require that a program be developed to detect and remove illicit discharges into the storm sewer by prohibiting these discharges, field screening outfalls, investigating potential illicit discharges, controlling the infiltration of sanitary sewage into the storm sewer, and developing programs for spill response and prevention, public awareness and reporting, and used oil and toxics disposal.

CHAPTER 4.7: ILLICIT DISCHARGE DETECTION AND ELIMINATION

Typically, staff charged with implementing the IDDE SWMP component are from multiple departments and agencies, although this varies from permittee to permittee. The primary responsibility for detecting and investigating illicit discharges normally falls to the public works department. Public works field crews are in the field every day and are the best source of information about what is happening in the permit area. Also, public works departments often have access to the maps and equipment necessary to track discharges to their source. Normally, public works field staff are not authorized to use enforcement against dischargers, so code enforcement staff may be necessary to investigate cases. Many permittees use the fire department for cleanup of spills, and sometimes police departments are charged with manning a "hotline" for complaints called in by citizens and for ultimately investigating dumping or other illegal activities.

Before the Program Evaluation

To prepare for the IDDE program evaluation, an evaluator should review or obtain the following information prior to the evaluation:

Pre-Evaluation Checklist

- ✓ MS4 permit provisions
- ✓ SWMP provisions
- ✓ Most recent annual report

- **MS4 NPDES permit provisions.** Review the permit requirements for the IDDE program to identify any specific requirements, such as a proactive outfall screening. The NPDES permit will serve as the primary basis for the program evaluation.
- **SWMP provisions.** The permittee's SWMP planning document(s) will describe the activities and BMPs they have committed to implement and may include measurable goals that provide deadlines for program implementation.
- **Latest annual report.** The annual report should be reviewed to identify past activities and help you become familiar with the IDDE program.

Records Review

Consider reviewing the following records during the on-site evaluation to determine the permittee's capabilities and extent of implementation.

Documentation	What to Look For
Ordinance and policies	▪ Code which allows the permittee to prohibit illicit discharges from commercial, industrial, or residential sources ▪ Should include or reference an enforcement escalation policy
Enforcement escalation policy	▪ Should describe the process for eliminating the source of an illicit discharge and for obtaining recourse or abatement if necessary ▪ Should describe which staff are authorized to enforce the applicable ordinances and which enforcement mechanisms are available
Illicit discharge tracking records and databases	Database or other system used to track the following information: ▪ The number and type of illicit discharges located in the permit area ▪ Follow-up actions once discharges are located ▪ Locations of discharge incidents (e.g., on a map or in a GIS)

Documentation	What to Look For
Dry-weather monitoring or screening records	▪ Describes the location and description of dry weather flows ▪ Monitoring data associated with a discharge ▪ Information about the source of a discharge and actions take to identify sources
Spill Response Plan and records	▪ These records may be maintained by a different agency such as the fire department, but the permittee should have access to the information and be provided a regular report of spills that impact the MS4
Recycled oil and household hazardous waste educational materials	▪ These materials may be presented during the public outreach part of the evaluation
Web site or other educational materials for reporting illicit discharges and dumping	▪ Review educational materials to determine if the general public has adequate information to identify and report illicit discharges ▪ Materials should have a reporting number that is viable 24 hours a day
Training records	▪ Training records should be available to document that the permittee's employees are regularly trained on recognize an illicit discharge

Elements to Address During the Program Evaluation

The NPDES regulations specifically require the following elements in an IDDE program for both Phase I and Phase II programs:

- Legal authority
- Mapping
- Field screening
- Investigation of potential illicit discharges
- Spill response and prevention
- Public awareness and reporting program
- Proper management of used oil and toxics
- Preventing sanitary sewer discharges
- Education and training

The common program elements are the key issues to consider during the review. For each of the elements listed above, this Guidance presents common program activities and questions to consider during the program evaluation. The questions are suggested for you to address each program component. Of course, a comprehensive program evaluation must be tailored to the specific issues associated with each permittee and should include more specific questions regarding the permittee's permit structure and management challenges.

CHAPTER 4.7: ILLICIT DISCHARGE DETECTION AND ELIMINATION

LEGAL AUTHORITY

- ✓ Does the permittee have an ordinance to prohibit illicit discharges and dumping to the MS4?
- ✓ What exclusions are included in this ordinance?
- ✓ What enforcement mechanisms are authorized in the event of an illicit discharge being detected?
- ✓ Has an enforcement escalation plan been developed?

MAPPING

- ✓ Does the permittee have a map showing storm drain pipes, outfalls, and storm drain inlets?
- ✓ Is the map readily available to the personnel who would respond to an illicit discharge incident?
- ✓ Does the permittee have a map of the storm drain system showing the locations of outfalls and municipally maintained structural stormwater controls?

TIP:

The IDDE mapping and field screening discussion may need to be coordinated with the discussion of MS4 maintenance activities. Ideally, the maps developed for public agency activities and for IDDE would be the same because often public works field maintenance crews are involved with inspections of outfalls.

FIELD SCREENING

- ✓ How are field screening areas identified?
- ✓ Are areas of the MS4 prioritized based on incidents of illicit discharges, land use, dumping reports, etc.?
- ✓ How often are field screening areas evaluated?
- ✓ Are outfalls inspected during dry weather to identify any potential dry-weather discharges? What does the inspection include?
- ✓ If dry-weather flows are present, are they being sampled to determine potential sources of pollutants? For what parameters?
- ✓ Does the permittee have a database (or other method) to track locations of illicit discharges, spills, and illegal dumping?
- ✓ Does the database track dry-weather monitoring or screening data?

INVESTIGATION OF POTENTIAL ILLICIT DISCHARGES

- ✓ Does the permittee have a procedure for tracing the source of an active illicit discharge?
- ✓ Who performs the investigations?
- ✓ Are these procedures written in a document or plan?
- ✓ What equipment does the permittee use to find illicit discharges?
- ✓ Does the permittee have equipment to videotape storm drains, or can it quickly contract out this work?
- ✓ How are investigations tracked?
- ✓ Has an enforcement response plan been adopted for use when an illicit discharge source has been located?

- ✓ Review complete paperwork trails for several illicit discharge events (including a spill and an unknown illicit discharge in the storm drain system).
  - o Was the full investigation process documented?
  - o Are adequate enforcement actions taken when required?
- ✓ Does the permittee have the ability to collect cleanup and abatement costs from the responsible party?

SPILL RESPONSE AND PREVENTION

- ✓ Does the permittee have a clear set of procedures in place that details who is responsible for responding to spills and emergency situations?
- ✓ Do field staff have spill containment supplies in their vehicles, and are they trained to contain minor spills?
- ✓ Is a contractor or other entity available for larger spills?
- ✓ Does the permittee have the ability to collect cleanup and abatement costs from the responsible party?
- ✓ How are spills and spill response tracked to ensure adequate reporting?

PUBLIC AWARENESS AND REPORTING PROGRAM

- ✓ Does the permittee prioritize subwatersheds or neighborhoods and assign resources for educational efforts based on frequency and types of illicit discharge incidents?
- ✓ Is there a general phone number or “hotline” in the phone book or Web site that people can call to report a spill or dumping?
- ✓ What types of public outreach materials are available to publicize public reporting?
- ✓ Does the permittee track the number of public calls or complaints reporting illicit discharges?

PROPER MANAGEMENT OF USED OIL AND TOXICS

- ✓ Assess education activities, public information activities, and other appropriate activities to facilitate the proper management and disposal of used oil and toxic materials such as household hazardous waste.
- ✓ Does the permittee have recycling or collection facilities to which the public can take used oil and other toxics?
- ✓ What type of toxics does the permittee manage recycling and disposal?

PREVENTING SANITARY SEWER DISCHARGES

- ✓ Has the permittee conducted any studies or evaluations to determine whether sanitary sewers are contributing pollutants to the MS4?
- ✓ What is the extent of infiltration and inflow into the sanitary sewer system? How is this impacting discharge from the MS4?
- ✓ If the permittee also operates a sanitary sewer system, do they have procedures to prevent sewage spills and SSOs to the MS4?

EDUCATION AND TRAINING

- ✓ What type of training do field staff (e.g., storm sewer maintenance crews, street sweepers) receive on spill response and IDDE?
- ✓ Are staff generally educated about what illicit discharges are and how to report them?

In-Field Program Evaluation Activities

IDDE activities can be difficult to evaluate in the field. If, during an on-site evaluation, the permittee receives a report of a potential illicit discharge, you could accompany the response staff (if allowed) to view their response procedures. Other in-field activities include viewing the equipment available for responding to illicit discharge events (e.g., response trucks, spill containment equipment, video equipment for investigating storm drains) and talking to field staff about their knowledge of and training in illicit discharge identification, reporting, and response.

Another field activity is observing the dry-weather screening program. Staff can take you to screening/sampling points to demonstrate the permittee's dry-weather sampling procedures. An Outfall Visual Inspection Worksheet has been included in Appendix C to assist in this field inspection.

Although field activities are somewhat subjective, during all field activities you should get a sense of whether the staff are aware of illicit discharges and proactive in identifying and addressing them. For example, if the industrial inspector observes obvious illicit discharges while driving to an inspection, does the inspector ignore these incidents or stop and report them?

Common Issues Identified During Program Evaluations

The following are some areas in which past on-site program evaluations have found problems with IDDE program components. Consider these activities as you conduct evaluations:

- ✓ IDDE programs are largely reactionary spill response programs and do not contain a proactive element to detect or prevent discharges.
- ✓ The permittee lacks adequate documented procedures for how to conduct illicit connection and illegal discharge investigations (e.g., the permittee does not have written procedures for tracking and identifying the source of a discharge).
- ✓ The permittee fails to conduct any dry-weather screening to identify illicit discharges.
- ✓ If a discharge is found, the permittee does not have specific criteria, which could include numeric criteria, to determine whether the discharge is illicit. In most cases, unless the discharge is obviously illicit (e.g., presence of discoloration, oil sheen), the permittee assumes the discharge is either irrigation runoff or groundwater and does not conduct further investigation of the quality or source of the discharge.
- ✓ Staff are not adequately trained on illicit discharge identification, reporting, and response.
- ✓ The permittee does not track illicit discharge events and does not target areas of the MS4 for additional inspection based on areas with past incidents.

5. Post-Evaluation Activities

5.1 Preparing the Written Report

After the MS4 SWMP evaluation, it is important that a written description of findings is provided to the permittees. Using only an oral outbrief is not a sufficient way to convey any recommendations or requirements for program improvement. Keep in mind that an NPDES permit is a contract between the permittee and the permitting authority and all correspondence regarding that contract should be in writing. Also, remember that a SWMP evaluation is typically taken very seriously by MS4 staff and management. The written findings often are distributed amongst upper management or to the governing body of the MS4 (i.e., city council). And finally, the permittee has undoubtedly invested numerous staff hours preparing for the evaluation and providing you with necessary information during the on-site evaluation itself. Therefore, it is incumbent upon you to take the necessary time to develop a concise, thorough, and fair written assessment of the findings obtained.

As soon as possible after the evaluation, it is recommended that you review all notes and supporting information obtained prior to and during the on-site evaluation and document the findings and conclusions. As a general guideline, the final report should be provided to the permittee within 6 to 8 weeks after the evaluation. Less time may be needed to prepare a report for an abbreviated program evaluation or for a screening level evaluation. On the other hand, more time may be needed if contractors perform the evaluation because the draft report would need to be reviewed by permitting authority staff to approve all findings, conclusions, and recommendations.

Conclusions drawn should be defensible and based on permit requirements and conditions, the SWMP, measurable goals, or a best professional judgment interpretation of the NPDES regulations and Clean Water Act. In addition, it is critical that conclusions drawn are consistently applied to all permittees evaluated. If a permitting authority uses more than one staff person to conduct an evaluation, an effort should be made to calibrate assessment techniques to ensure equitable evaluations. This can be accomplished by daily discussions amongst the evaluators to compare findings during the evaluation as well as quality assurance reviews of the resulting evaluation report.

The report should state which permittee(s) were evaluated, for what SWMP components, the date, a basic description of how the evaluation was conducted, relevant findings, and any recommendations for future evaluations or follow-up activities.

Depending upon the goals of the evaluation, there are many different ways to document the findings:

- **Determination of compliance status.** If assessing the compliance status of a permittee with its MS4 permit and SWMP is the only goal of an evaluation, then the report can very simply, describe each permit requirement the MS4 is not complying with and the associated requirement. The report can also indicate the areas of compliance as well, or state up front that if the permit requirement is not discussed in the report, no recommendations or requirements apply to that item.
- **Assistance with permit issuance or renewal process.** If the evaluation is conducted after the issuance of a new permit or during renewal of an existing permit (Phase I or Phase II MS4s), the report might discuss recommendations for effective implementation of the new SMWP or discuss recommended changes to the existing SWMP determined during the audit.

- **Assessing pollutants of concern.** If the permitting authority conducted the evaluation to assign an applicable waste load allocation, or to assist the permittee in implementing the waste load allocation for a particular pollutant of concern, the report may focus on only those components which minimize that pollutant. Or the report may make recommendations about how the SWMP could be changed to better address an existing waste load allocation.

As previously stated, the most common goal of an evaluation is to determine compliance with an existing permit. In this instance, in addition to providing recommendations for improvement or required actions to gain compliance, the permitting authority may find it helpful to provide positive feedback as well. Typically, it is not advisable to describe SWMP components that are not associated with a particular evaluation finding as this type of descriptive detail is found in the annual reports.

Findings can be divided into three categories:

1. **Permit violations.** Permit violations are areas where the evaluation found the permittee not in compliance with a specific permit requirement or SWMP commitment. Use of the qualifier "potential" can be used depending on the severity of the violation.
2. **Program deficiencies or recommendations for improvement.** Program deficiencies are areas of concern impeding effective program implementation. They are typically areas where the permit or SWMP does not describe specifically how the permittee should conduct an activity, yet the permitting authority evaluator believes the permittee should alter how they conduct the activity to meet water quality goals. Deficiencies can also be areas where future permit violations could result if the permittee continues on its present path.
3. **Positive or commendable program elements.** Positive program elements indicate activities that are "above and beyond" the requirements of the permit and SWMP. It is always a good idea to commend innovative approaches and techniques utilized by permittees. Not only does this encourage the permittee to continue implementing the program, it allows other permittees to learn about the approach if they read the evaluation document.

EXAMPLE FINDING:

The Parks and Recreation Department has developed a pollutant-based BMP manual.

The manual is innovative in that a diverse work group first identified the pollutants of concern and then developed suites of BMPs to minimize their occurrence or impacts on receiving waters. The resulting manual provides about 30 individual BMPs grouped into four categories: organic, chemical, maintenance, and administrative.

Each BMP description provides procedures; maps; monitoring frequency; additional references; the names of city and non-city employees who perform the task; site-specific equipment needs; possible locations of use; possible surfaces affected; procedures for spilled, dumped, or mishandled products or activities; evaluation criteria; and the staff responsible for BMP development.

People from multiple department sections collaborated on the BMPs to ensure that they are appropriate and can be implemented. The manual could be a guide for other city departments or Phase I and II programs throughout the country because it describes the entire BMP development process from conception through field-testing.

The following are format suggestions to use when drafting findings from the MS4 program evaluation:

- Organize findings by program component (e.g., all findings related to the industrial/commercial facilities component)
- Group similar findings for that component together (i.e., all positive attributes)

- Provide a heading for each individual finding that is a complete sentence and that clearly summarizes the significant point. For example, if there is a permit violation, the heading should state what the permittee is doing that is a violation: "The City does not currently inspect all industrial facilities annually as required by the permit."
- Describe each finding in detail. The narrative description should clearly define the finding and then describe the supporting information obtained or observed during the evaluation that led to this conclusion. The finding narrative should describe what the permittee was required to do (which is particularly important for a permit violation), briefly restate (paraphrase) the finding, and then provide the information obtained during the evaluation that supports this finding in as much detail as possible. When describing a positive attribute the finding should clearly state how the activity being described is innovative and not merely compliant.
- Insert applicable permit citations and language in potential permit violations. If a program deficiency relates to a particular part of the permit or SWMP, be sure to cite the appropriate language as well.

EXAMPLE FINDING:

The City has failed to notify industries and commercial facilities of the stormwater requirements and appropriate BMPs for implementation.

Part F.3.b(4) of the permit requires the permittee to implement, or require the implementation of, designated minimum BMPs (based on the site's threat to water quality rating) at each industrial site within its jurisdiction. BMP implementation was to occur by no later than 365 days after the permit was adopted. At the time of the evaluation, the City had yet to implement, or inform applicable industrial sites of their responsibility to implement, appropriate BMPs. The City needs to inform all applicable industrial sites of their responsibility and also needs to provide them with the minimum BMPs outlined in the SWMP.

In some cases, it might not be possible to determine compliance with a program component because of the limitations of the MS4 program evaluation process (i.e., not reviewing each industrial inspection report), because of time constraints, or because the requirement itself is not definable. The written report should then state that this is the case and provide as much supporting information as possible, such as "Compliance with public education and participation permit requirements could not be determined because…" If there were no findings of note for a particular SWMP component, it is important to state this fact so it is clear that the component was reviewed: "No recommendations or requirements were identified for this program component."

After an MS4 program evaluation report is developed, the permitting authority typically distributes the report to the permittee(s) evaluated with a cover letter summarizing the findings of the evaluation and any enforcement action being taken or corrections required. It is important that the report be distributed in a timely manner to ensure that requirements and recommendations can be instituted by the permittee(s).

The cover letter should request a written response within a specific time period (e.g., 30 to 60 days) addressing any permit violations or deficiencies noted. Normally, permittees are given an opportunity to refute findings or appeal violations noted. A meeting also can be scheduled with the permittee(s) to discuss proposed modifications to its SWMP to address the permit violations and deficiencies described in the report. In either case, the permitting authority should request a formal response describing the compliance process and schedule including appropriate milestones. The permitting authority should review the response and continue to work with the permittee(s) to improve the SWMP per the evaluations findings.

Photo Logs

Photo logs are used to visually illustrate items noted during field inspections. A photo log can be an important part of an MS4 program evaluation report and can assist a permitting authority in assessing potential permit violations. It is important to keep in mind that you are not inspecting the actual construction sites and industrial facilities visited for compliance with general permit or SWPPP conditions, but documenting the condition of these facilities with photos can help to assess compliance with MS4 permit conditions.

TIP:

Photos do not need to be used in the MS4 program evaluation report. An evaluator can take photos to help remember issues identified during field visits. The photos can also help you build a photo library of stormwater BMPs and problems.

To address potential legal concerns related to digital photographs, EPA published a guidance document on the use of digital photographs—*Digital Camera Guidance for EPA Civil Inspections and Investigations*. This document identifies requirements necessary to ensure the integrity of digital pictures. It addresses image capturing, storage, and handling and provides an overview of digital camera technology, peripheral equipment, and recommended steps. If digital images are to be used in court, their credibility usually depends on reliability, reproducibility, and security. As stated in the guidance, it is acceptable to make changes to digital images such as cropping, enlarging, or making them lighter/darker to improve the sharpness, provided the evaluator does all the following:

- Records how, when, and where the picture was taken,
- Logs the steps used in processing the image when they include techniques other than those used in a traditional photographic darkroom,
- Complies with a written SOP that includes the recommended steps set forth in this document, and
- Ensures the preservation of the original digital image.

To view EPA's *Digital Camera Guidance for EPA Civil Inspections and Investigations*, visit http://www.epa.gov/compliance/resources/publications/monitoring/cwa/inspections/npdesinspect/npdesinspectapph.pdf.

In general, it is important to keep careful notes of the photographs taken, including location and why the photograph was taken. It is helpful for the first photo taken to be of the facility sign or building. This helps to orient the photo log layout when photos are viewed after the evaluation.

For an MS4 program evaluation, it is not necessary to photo document all aspects of the facilities inspected, however, photos should be used to highlight issues on site that may lend credence to an issue described in the MS4 program evaluation report. For example, stormwater problems at a municipal maintenance yard should be documented with photos to provide additional documentation of problems. During inspections of construction sites or industrial facilities, photos can help document the issues the permittee's inspector addressed. At a minimum, even if the photos are not used in a formal report, the photos can help recall conditions at the sites visited.

Taking Photos

A digital camera should be used to take pictures where possible. Also, it is usually not necessary to set the resolution of the camera to its highest settings—most photo logs do not need high-resolution photos. Additional tips on taking good photos during an MS4 program evaluation include:

- **Take lots of pictures.** With digital cameras, deleting extra photos is easy. For something particularly important, take at least 4-5 pictures.
- **Use photos to identify sites.** When inspecting multiple sites, use the first picture to photograph the sign, SWPPP cover, or file name to be able to identify the facility later.
- **Consider perspective.** Have someone stand in the photo or place something of recognizable size, like a hard hat or clip board, to gain perspective.

Creating Photo Logs
Photo logs are often created using word processing software or presentation (e.g., PowerPoint) software. The following steps for creating a photo log are based on Microsoft Word:

- It is recommended that photo logs be created in Microsoft Word and the photos saved in a standard format such as jpeg or gif. Consider the resolution of the photos: many reports are made available electronically, and high-resolution photos can cause file size to exceed many users' download capabilities.
- Size the photos to be 3.5" tall with the width set by Microsoft Word for landscape view and 3.5" width with the height set by Microsoft Word for portrait view.
- Center the photos and captions on the page. (Note: Microsoft Word requires that the picture layout not be "in line with text" in order for the photo to be centered on the page.) Generally a page will have two landscape oriented photos or one portrait.
- Each photo should be numbered.
- Document the date and/or time to help identify photos.
- Photo captions should briefly describe what is observed in the picture and the location (both the facility or site name and the location within the facility or site).
- A photo log can contain a separate narrative to describe the findings, or individual photos can be referred to within the body of the MS4 program evaluation report.

Photo 1: Improperly installed silt fence

5.2 Follow-Up Activities

An MS4 program evaluation can result in several different follow-up activities, from enforcement to technical assistance to permit reissuance. Several of these activities are described below.

Technical Assistance

Many MS4 program evaluation findings will result in a deficiency that requires the permittee to modify or improve a program area to achieve compliance. The permitting authority can help ensure compliance by providing technical assistance to the permittee on issues related to these deficiencies. As a reference and useful tool for permittees, EPA has developed case studies of selected stormwater programs available at http://cfpub.epa.gov/npdes/stormwater/casestudies.cfm

Where necessary, the permitting authority may wish to provide additional technical assistance or training to address specific deficiencies identified during the evaluation.

Follow-Up MS4 Program Evaluations

Follow-up MS4 program evaluations should be conducted where major deficiencies have been identified and the permittee needs additional time to correct them. The permittee should be given time to correct any deficiencies, but a follow-up evaluation should be scheduled for deficiencies that cannot be documented via annual reports or written correspondence.

Targeted Evaluations

If an MS4 program evaluation identifies a program area that appears to be a common problem amongst several permittees, then the permitting authority may want to conduct targeted evaluations of that program area at additional permittees. For example, if stormwater compliance problems are identified at most of the public works yards visited, the permitting authority might want to target additional inspections for those yards.

Permit Issuance or Renewal

A thorough review of submitted annual reports along with an on-site evaluation is very helpful when issuing MS4 permits. Specific permit requirements could be drafted to address any deficiencies identified during the evaluation. Also, the evaluation may reveal current permit requirements that are no longer applicable or need to be revised to meet current conditions. An MS4 program evaluation is also an excellent time to collect additional data for permit reissuance, or verify data or clarify information submitted with the permit reapplication.

MS4 Enforcement

Taking enforcement on a violation identified during an evaluation will obviously depend on a variety of factors including the severity of the violation, any discharge to a water of the U.S., history of past violations, and other factors. To make a case for an enforcement action, it is important to collect information that documents the violation, including copies of records, photographs, or other documentation. An enforcement action is the last course of action to ensure compliance, but even the possible threat of an enforcement action will usually help bring about compliance.

Appendix A – Glossary & Acronyms

Authorized Program Or Authorized State – A state, Territorial, Tribal, or interstate NPDES program which has been approved or authorized by EPA under 40 CFR Part 123.

Best Management Practice (BMP) – Policies or practices that prevent, reduce, or mitigate the impacts of stormwater runoff. These methods can be structural (e.g., devices, ponds) or non-structural (e.g., policies to reduce imperviousness). BMPs classified as "non-structural" are those that rely predominantly on behavioral changes rather than construction in order to be effective. "Structural" BMPs are engineered or constructed to prevent or manage stormwater. BMPs are often further classified into (1) source control BMPs to prevent pollution, (2) water quality BMPs to reduce or prevent pollutants in runoff, (3) flow control BMPs to reduce the volume of stormwater and (4) infiltration BMPs to increase infiltration.

Best Professional Judgment (BPJ) – Using all reasonably available and relevant data to make a decision.

CIP – Capital Improvement Project

Clean Water Act – Clean Water Act or the Federal Water Pollution Control Act, 33 U.S.C. section 1251 et seq.

Construction General Permit (CGP) – Where EPA is the permitting authority, the Construction General Permit (CGP) outlines a set of provisions construction operators must follow to comply with the requirements of the NPDES stormwater regulations. The CGP covers any site one acre and above, including smaller sites that are part of a larger common plan of development or sale, and replaces and updates previous EPA permits.

Co-permittee – A permittee to a NPDES permit that is only responsible for permit conditions relating to the discharge for which it is operator.

Combined Sewer Overflow (CSO) – A discharge of untreated wastewater from a combined sewer system at a point prior to the headworks of a publicly owned treatment works. CSOs generally occur during wet weather (rainfall or snowmelt). During periods of wet weather, these systems become overloaded, bypass treatment works, and discharge directly to receiving waters.

Comprehensive Plan – A general plan that identifies a community's long-range growth and development goals. Comprehensive plans and watershed plans often overlap in areas of natural resources, analysis of current conditions, and growth trends. Comprehensive and/or watershed plans often include smaller subarea plans, with additional details on infrastructure, open space, parks, neighborhood design, drainage, and circulation.

DOT – Department of Transportation

EPA – United States Environmental Protection Agency

Floatables – Plastics and other floating debris (e.g., oil, grease, toilet paper).

General permit – An NPDES permit issued under 40 CFR 122.28 that authorizes a category of discharges under the CWA within a geographical area. A general permit is not specifically tailored for an individual discharger.

Geographic Information System (GIS) – A computer application used to store, view, and analyze geographical information, especially maps (*taken from the American Heritage Dictionary*).

IDDE – Illicit Discharge Elimination and Detection

Illicit Discharge – Any discharge to a municipal separate storm sewer that is not composed entirely of stormwater, except discharges pursuant to a NPDES permit and discharges resulting from fire fighting activities.

Impervious Surface – A hard surface area that either prevents or retards the entry of water into the soil mantle as occurs under natural conditions (prior to development), and from which water runs off at an increased rate of flow or in increased volumes. Common impervious surfaces include, but are not limited to, rooftops, walkways, patios, driveways, parking lots, compacted soil, and roadways. "Effective impervious surface" is commonly used to describe impervious surfaces connected to receiving water directly or with a conveyance device (e.g., curbs, pipes, gutters).

Integrated Pest Management (IPM) – Planned program that coordinates economically and environmentally acceptable methods of pest control with the judicious and minimal use of toxic pesticides. IPM programs are based on a careful assessment of local conditions, including such factors as climate, crop characteristics, the biology of the pest species, agricultural practices, soil quality, and government regulations. The tactics employed range from changes in agricultural methods, such as better tillage to prevent soil erosion and interplanting of different crop varieties; natural biological weapons, such as the introduction of beneficial insects that eat the harmful species; and mechanical tools, such as vacuums that pull the insects off of the crops. Toxic pesticides are used only when all other methods have failed (*taken from the Columbia Press Encyclopedia*).

MOU – Memorandum of Understanding

MEP – Maximum extent practicable

Multi-Sector General Permit (MSGP) – Authorizes the discharge of stormwater from industrial facilities, consistent with the terms of the permit, in areas of the United States where EPA manages the NPDES permit program.

Municipal Separate Storm Sewer System (MS4) – A conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, or storm drains): (i) Owned or operated by a State, city, town, borough, county, parish, district, association, or other public body (created by or pursuant to State law)...including special districts under State law such as a sewer district, flood control district or drainage district, or similar entity, or an Indian tribe or an authorized Indian tribal organization, or a designated and approved management agency under section 208 of the Clean Water Act that discharges into waters of the United States. (ii) Designed or used for collecting or conveying stormwater; (iii) Which is not a combined sewer; and (iv) Which is not part of a Publicly Owned Treatment Works (POTW) as defined at 40 CFR 122.2.

National Pollutant Discharge Elimination System (NPDES) – A national program under Section 402 of the Clean Water Act for regulation of discharges of pollutants from point sources to waters of the United States. Discharges are illegal unless authorized by an NPDES permit.

Notice of Intent (NOI) – Submission of a completed NOI constitutes notice that the entity intends to be authorized to discharge pollutants to waters of the United States, from the facility or site identified in the

form, under a State or EPA general permit such as the Phase II MS4 General Permit, the Multi-Sector General Permit (MSGP) for industrial stormwater, or the Construction General Permit (CGP).

Notice of Violation (NOV) – Enforcement mechanism used to inform regulated entities of noncompliance

Outfall – A point source as defined by 40 CFR 122.2 at the point where a municipal separate storm sewer discharges to waters of the United States and does not include open conveyances connecting two municipal separate storm sewers, or pipes, tunnels or other conveyances which connect segments of the same stream or other waters of the United States and are used to convey waters of the United States.

Permitting Authority – The United States Environmental Protection Agency, EPA, a Regional Administrator of the Environmental Protection Agency or an authorized representative.

Pollutant of concern (POC) – Any pollutant that has been identified as a cause of impairment in any water body to which the MS4 discharges.

Publicly Owned Treatment Works (POTW) – A treatment works, as defined by Section 212 of the CWA, that is owned by the state or municipality. This definition includes any devices and systems used in the storage, treatment, recycling, and reclamation of municipal sewage or industrial wastes of a liquid nature. It also includes sewers, pipes, and other conveyances only if they convey wastewater to a POTW treatment plant [40 CFR 403.3]. Privately-owned treatment works, Federally-owned treatment works, and other treatment plants not owned by municipalities are not considered POTWs.

Sanitary sewer overflow (SSO) – Occasional unintentional discharges of raw sewage from municipal sanitary sewers. SSOs have a variety of causes, including but not limited to severe weather, improper system operation and maintenance, and vandalism. EPA **estimates that there are at least 40,000 SSOs each year**.

Stormwater – Stormwater runoff, snow melt runoff, and surface runoff and drainage.

Stormwater Pollution Prevention Plan (SWPPP) – Plan developed to minimize the discharge of pollutants from an industrial site (including construction activities) to the maximum extent practicable using BMPs.

Total Maximum Daily Load (TMDL) – A water quality assessment that determines the source or sources of pollutants of concern for a particular waterbody, considers the maximum amount of pollutants the waterbody can assimilate, and then allocates to each source a set level of pollutants that it is allowed to discharge (i.e., a wasteload allocation).

Waters of the United States – 1. All waters which are currently used, were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide; 2. All interstate waters, including interstate wetlands"; 3. All other waters such as interstate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds the use, degradation, or destruction of which would affect or could affect interstate or foreign commerce including any such waters: a. Which are or could be used by interstate or foreign travelers for recreational or other purposes; b. From which fish or shellfish are or could be taken and sold in interstate or foreign commerce; or c. Which are used or could be used for industrial purposes by industries in interstate commerce; 4. All impoundments of waters otherwise defined as waters of the United States under this definition; 5. Tributaries of waters identified

in paragraphs (1) through (4) of this definition; 6. The territorial sea; and 7. Wetlands adjacent to waters (other than waters that are themselves wetlands) identified in paragraphs 1. through 6. of this definition.

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CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN DIEGO REGION
ORDER NO. R9-2007-0001
NPDES NO. CAS0108758
WASTE DISCHARGE REQUIREMENTS
FOR DISCHARGES OF URBAN RUNOFF FROM
THE MUNICIPAL SEPARATE STORM SEWER SYSTEMS (MS4s)
DRAINING THE WATERSHEDS OF THE COUNTY OF SAN DIEGO,
THE INCORPORATED CITIES OF SAN DIEGO COUNTY,
THE SAN DIEGO UNIFIED PORT DISTRICT,
AND THE SAN DIEGO COUNTY REGIONAL AIRPORT AUTHORITY

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RECEIVING WATERS AND URBAN RUNOFF MONITORING AND REPORTING PROGRAM NO. R9-2007-0001

The California Regional Water Quality Control Board, San Diego Region (hereinafter Regional Board), finds that:

A. BASIS FOR THE ORDER

1. This Order is based on the federal Clean Water Act (CWA), the Porter-Cologne Water Quality Control Act (Division 7 of the Water Code, commencing with Section 13000), applicable state and federal regulations, all applicable provisions of statewide Water Quality Control Plans and Policies adopted by the State Water Resources Control Board (SWRCB), the Water Quality Control Plan for the San Diego Basin adopted by the Regional Board, the California Toxics Rule, and the California Toxics Rule Implementation Plan.

2. This Order renews National Pollutant Discharge Elimination System (NPDES) Permit No. CAS0108758, which was first issued on July 16, 1990 (Order No. 90-42), and then renewed on February 21, 2001 (Order No. 2001-01). On August 25, 2005, in accordance with Order No. 2001-01, the County of San Diego, as the Principal Permittee, submitted a Report of Waste Discharge (ROWD) for renewal of their MS4 Permit.

B. REGULATED PARTIES

1. Each of the persons in Table 1 below, hereinafter called Copermittees or dischargers, owns or operates a municipal separate storm sewer system (MS4), through which it discharges urban runoff into waters of the United States within the San Diego Region. These MS4s fall into one or more of the following categories: (1) a medium or large MS4 that services a population of greater than 100,000 or 250,000 respectively; or (2) a small MS4 that is "interrelated" to a medium or large MS4; or (3) an MS4 which contributes to a violation of a water quality standard; or (4) an MS4 which is a significant contributor of pollutants to waters of the United States.

Table 1. Municipal Copermittees

1.	City of Carlsbad	12.	City of Oceanside
2.	City of Chula Vista	13.	City of Poway
3.	City of Coronado	14.	City of San Diego
4.	City of Del Mar	15.	City of San Marcos
5.	City of El Cajon	16.	City of Santee
6.	City of Encinitas	17.	City of Solana Beach
7.	City of Escondido	18.	City of Vista
8.	City of Imperial Beach	19.	County of San Diego
9.	City of La Mesa	20.	San Diego Unified Port District
10.	City of Lemon Grove	21.	San Diego County Regional Airport Authority
11.	City of National City		

C. DISCHARGE CHARACTERISTICS

1. Urban runoff contains waste, as defined in the California Water Code (CWC), and pollutants that adversely affect the quality of the waters of the State. The discharge of urban runoff from an MS4 is a "discharge of pollutants from a point source" into waters of the U.S. as defined in the CWA.

2. The most common categories of pollutants in urban runoff include total suspended solids, sediment (due to anthropogenic activities); pathogens (e.g., bacteria, viruses, protozoa);

heavy metals (e.g., copper, lead, zinc and cadmium); petroleum products and polynuclear aromatic hydrocarbons; synthetic organics (e.g., pesticides, herbicides, and PCBs); nutrients (e.g., nitrogen and phosphorus fertilizers), oxygen-demanding substances (decaying vegetation, animal waste), and trash.

3. The discharge of pollutants and/or increased flows from MS4s may cause or threaten to cause the concentration of pollutants to exceed applicable receiving water quality objectives and impair or threaten to impair designated beneficial uses resulting in a condition of pollution (i.e., unreasonable impairment of water quality for designated beneficial uses), contamination, or nuisance.

4. Pollutants in urban runoff can threaten human health. Human illnesses have been clearly linked to recreating near storm drains flowing to coastal waters. Also, urban runoff pollutants in receiving waters can bioaccumulate in the tissues of invertebrates and fish, which may be eventually consumed by humans.

5. Urban runoff discharges from MS4s often contain pollutants that cause toxicity to aquatic organisms (i.e., adverse responses of organisms to chemicals or physical agents ranging from mortality to physiological responses such as impaired reproduction or growth anomalies). Toxic pollutants impact the overall quality of aquatic systems and beneficial uses of receiving waters.

6. The Copermittees discharge urban runoff into lakes, drinking water reservoirs, rivers, streams, creeks, bays, estuaries, coastal lagoons, the Pacific Ocean, and tributaries thereto within ten of the eleven hydrologic units (watersheds) comprising the San Diego Region as shown in Table 2 below. Some of the receiving water bodies have been designated as impaired by the Regional Board and the United States Environmental Protection Agency (USEPA) in 2002 pursuant to CWA section 303(d). Also shown below are the watershed management areas (WMAs) as defined in the Regional Board report, Watershed Management Approach, January 2002.

Table 2. Common Watersheds and CWA Section 303(d) Impaired Waters

REGIONAL BOARD WATERSHED MANAGEMENT AREA (WMA)	HYDROLOGIC UNIT(S)	MAJOR SURFACE WATER BODIES	303(d) POLLUTANT(S) OF CONCERN OR WATER QUALITY EFFECT[1]	COPERMITTEES
Santa Margarita River	Santa Margarita (902.00)	Santa Margarita River and Estuary, Pacific Ocean	1. Eutrophic 2. Nitrogen 3. Phosphorus 4. Total Dissolved Solids	1. County of San Diego
San Luis Rey River	San Luis Rey (903.00)	San Luis Rey River and Estuary, Pacific Ocean	1. Bacterial Indicators 2. Eutrophic 3. Chloride 4. Total Dissolved Solids	1. City of Escondido 2. City of Oceanside 3. City of Vista 4. County of San Diego
Carlsbad	Carlsbad (904.00)	Batiquitos Lagoon San Elijo Lagoon Agua Hedionda Lagoon Buena Vista Lagoon And Tributary Streams Pacific Ocean	1. Bacterial Indicators 2. Eutrophic 3. Sedimentation/Siltation 4. Nutrients 5. Total Dissolved Solids	1. City of Carlsbad 2. City of Encinitas 3. City of Escondido 4. City of Oceanside 5. City of San Marcos 6. City of Solana Beach 7. City of Vista 8. County of San Diego

[1] The listed 303(d) pollutant(s) of concern do not necessarily reflect impairment of the entire corresponding WMA or all corresponding major surface water bodies. The specific impaired portions of each WMA are listed in the State Water Resources Control Board's 2002 Section 303(d) List of Water Quality Limited Segments.

REGIONAL BOARD WATERSHED MANAGEMENT AREA (WMA)	HYDROLOGIC UNIT(S)	MAJOR SURFACE WATER BODIES	303(d) POLLUTANT(S) OF CONCERN OR WATER QUALITY EFFECT[1]	COPERMITTEES
San Dieguito River	San Dieguito (905.00)	San Dieguito River and Estuary, Pacific Ocean	1. Bacterial Indicators 2. Sulfate 3. Color 4. Nitrogen 5. Phosphorus 6. Total Dissolved Solids	1. City of Del Mar 2. City of Escondido 3. City of Poway 4. City of San Diego 5. City of Solana Beach 6. County of San Diego
Mission Bay	Peñasquitos (906.00)	Los Peñasquitos Lagoon Mission Bay, Pacific Ocean	1. Bacterial Indicators 2. Metals 3. Eutrophic 4. Sedimentation/Siltation 5. Toxicity	1. City of Del Mar 2. City of Poway 3. City of San Diego 4. County of San Diego
San Diego River	San Diego (907.00)	San Diego River, Pacific Ocean	1. Bacterial Indicators 2. Eutrophic 3. pH 4. Total Dissolved Solids 5. Oxygen (Dissolved)	1. City of El Cajon 2. City of La Mesa 3. City of Poway 4. City of San Diego 5. City of Santee 6. County of San Diego
San Diego Bay	Pueblo San Diego (908.00) Sweetwater (909.00) Otay (910.00)	San Diego Bay Sweetwater River Otay River Pacific Ocean	1. Bacterial Indicators 2. Metals 3. Sediment Toxicity 4. Benthic Community Degradation 5. Diazinon 6. Chlordane 7. Lindane 8. PAHs 9. PCBs	1. City of Chula Vista 2. City of Coronado 3. City of Imperial Beach 4. City of La Mesa 5. City of Lemon Grove 6. City of National City 7. City of San Diego 8. County of San Diego 9. San Diego Unified Port District 10.San Diego County Regional Airport Authority
Tijuana River	Tijuana (911.00)	Tijuana River and Estuary Pacific Ocean	1. Bacterial Indicators 2. Low Dissolved Oxygen 3. Metals 4. Eutrophic 5. Pesticides 6. Synthetic Organics 7. Trace Elements 8. Trash 9. Solids	1. City of Imperial Beach 2. City of San Diego 3. County of San Diego

7. The Copermittees' water quality monitoring data submitted to date documents persistent exceedances of Basin Plan water quality objectives for various urban runoff-related pollutants (diazinon, fecal coliform bacteria, total suspended solids, turbidity, metals, etc.) at various watershed monitoring stations. At some monitoring stations, such as Agua Hedionda, statistically significant upward trends in pollutant concentrations have been observed. Persistent toxicity has also been observed at some watershed monitoring stations. In addition, bioassessment data indicates that the majority of watersheds have Poor to Very Poor Index of Biotic Integrity ratings. In sum, the above findings indicate that urban runoff discharges are causing or contributing to water quality impairments, and are a leading cause of such impairments in San Diego County.

8. When natural vegetated pervious ground cover is converted to impervious surfaces such as paved highways, streets, rooftops, and parking lots, the natural absorption and infiltration abilities of the land are lost. Therefore, runoff leaving a developed urban area is significantly greater in runoff volume, velocity, and peak flow rate than pre-development runoff from the same area. Runoff durations can also increase as a result of flood control and other efforts to control peak flow rates. Increased volume, velocity, rate, and duration of runoff greatly accelerate the erosion of downstream natural channels. Significant declines in the biological integrity and physical habitat of streams and other receiving waters have been found to occur

with as little as a 10% conversion from natural to impervious surfaces. The increased runoff characteristics from new development must be controlled to protect against increased erosion of channel beds and banks, sediment pollutant generation, or other impacts to beneficial uses and stream habitat due to increased erosive force.

9. Urban development creates new pollution sources as human population density increases and brings with it proportionately higher levels of car emissions, car maintenance wastes, municipal sewage, pesticides, household hazardous wastes, pet wastes, trash, etc. which can either be washed or directly dumped into the MS4. As a result, the runoff leaving the developed urban area is significantly greater in pollutant load than the pre-development runoff from the same area. These increased pollutant loads must be controlled to protect downstream receiving water quality.

10. Development and urbanization especially threaten environmentally sensitive areas (ESAs), such as water bodies designated as supporting a RARE beneficial use (supporting rare, threatened or endangered species) and CWA 303(d) impaired water bodies. Such areas have a much lower capacity to withstand pollutant shocks than might be acceptable in the general circumstance. In essence, development that is ordinarily insignificant in its impact on the environment may become significant in a particular sensitive environment. Therefore, additional control to reduce pollutants from new and existing development may be necessary for areas adjacent to or discharging directly to an ESA.

11. Although dependent on several factors, the risks typically associated with properly managed infiltration of runoff (especially from residential land use areas) are not significant. The risks associated with infiltration can be managed by many techniques, including (1) designing landscape drainage features that promote infiltration of runoff, but do not "inject" runoff (injection bypasses the natural processes of filtering and transformation that occur in the soil); (2) taking reasonable steps to prevent the illegal disposal of wastes; (3) protecting footings and foundations; and (4) ensuring that each drainage feature is adequately maintained in perpetuity.

D. URBAN RUNOFF MANAGEMENT PROGRAMS

1. General

a. This Order specifies requirements necessary for the Copermittees to reduce the discharge of pollutants in urban runoff to the maximum extent practicable (MEP). However, since MEP is a dynamic performance standard which evolves over time as urban runoff management knowledge increases, the Copermittees' urban runoff management programs must continually be assessed and modified to incorporate improved programs, control measures, best management practices (BMPs), etc. in order to achieve the evolving MEP standard. Absent evidence to the contrary, this continual assessment, revision, and improvement of urban runoff management program implementation is expected to ultimately achieve compliance with water quality standards.

b. Although the Copermittees have generally been implementing the jurisdictional urban runoff management programs required pursuant to Order No. 2001-01 since February 21, 2002, urban runoff discharges continue to cause or contribute to violations of water quality standards. This Order contains new or modified requirements that are necessary to improve Copermittees' efforts to reduce the discharge of pollutants in urban runoff to the MEP and achieve water quality

standards. Some of the new or modified requirements, such as the expanded Watershed Urban Runoff Management Program section, are designed to specifically address these high priority water quality problems. Other new or modified requirements address program deficiencies that have been noted during audits, report reviews, and other Regional Board compliance assessment activities.

c. Updated Jurisdictional Urban Runoff Management Plans (JURMPs) and Watershed Urban Runoff Management Plans (WURMPs), and a new Regional Urban Runoff Management Plan (RURMP), which describe the Copermittees' urban runoff management programs in their entirety, are needed to guide the Copermittees' urban runoff management efforts and aid the Copermittees in tracking urban runoff management program implementation. It is practicable for the Copermittees to update the JURMPs and WURMPs, and create the RURMP, within one year, since significant efforts to develop these programs have already occurred.

d. Pollutants can be effectively reduced in urban runoff by the application of a combination of pollution prevention, source control, and treatment control BMPs. Pollution prevention is the reduction or elimination of pollutant generation at its source and is the best "first line of defense". Source control BMPs (both structural and non-structural) minimize the contact between pollutants and flows (e.g., rerouting run-on around pollutant sources or keeping pollutants on-site and out of receiving waters). Treatment control BMPs remove pollutants from urban runoff.

e. Urban runoff needs to be addressed during the three major phases of development (planning, construction, and use) in order to reduce the discharge of pollutants to the MEP and protect receiving waters. Development which is not guided by water quality planning policies and principles can unnecessarily result in increased pollutant load discharges, flow rates, and flow durations which can impact receiving water beneficial uses. Construction sites without adequate BMP implementation result in sediment runoff rates which greatly exceed natural erosion rates of undisturbed lands, causing siltation and impairment of receiving waters. Existing development generates substantial pollutant loads which are discharged in urban runoff to receiving waters.

f. Annual reporting requirements included in this Order are necessary to meet federal requirements and to evaluate the effectiveness and compliance of the Copermittees' programs.

2. Development Planning

a. The Standard Urban Storm Water Mitigation Plan (SUSMP) requirements contained in this Order are consistent with Order WQ-2000-11 adopted by the SWRCB on October 5, 2000. In the precedential order, the SWRCB found that the design standards, which essentially require that urban runoff generated by 85 percent of storm events from specific development categories be infiltrated or treated, reflect the MEP standard. The order also found that the SUSMP requirements are appropriately applied to the majority of the Priority Development Project categories contained in Section D.1 of this Order. The SWRCB also gave Regional Water Quality Control Boards the discretion to include additional categories and locations, such as retail gasoline outlets (RGOs), in future SUSMPs.

b. Controlling urban runoff pollution by using a combination of onsite source control and Low Impact Development (LID) BMPs augmented with treatment control BMPs before the runoff enters the MS4 is important for the following reasons: (1) Many end-of-pipe BMPs (such as diversion to the sanitary sewer) are typically ineffective during significant storm events. Whereas, onsite source control BMPs can be applied during all runoff conditions; (2) End-of-pipe BMPs are often incapable of capturing and treating the wide range of pollutants which can be generated on a sub-watershed scale; (3) End-of-pipe BMPs are more effective when used as polishing BMPs, rather than the sole BMP to be implemented; (4) End-of-pipe BMPs do not protect the quality or beneficial uses of receiving waters between the source and the BMP; and (5) Offsite end-of-pipe BMPs do not aid in the effort to educate the public regarding sources of pollution and their prevention.

c. Use of LID BMPs at new development projects can be an effective means for minimizing the impact of urban runoff discharges from the development projects on receiving waters. LID BMPs help preserve and restore the natural hydrologic cycle of the site, allowing for filtration and infiltration which can greatly reduce the volume, peak flow rate, velocity, and pollutant loads of urban runoff.

d. Retail Gasoline Outlets (RGOs) are significant sources of pollutants in urban runoff. RGOs are points of convergence for motor vehicles for automotive related services such as repair, refueling, tire inflation, and radiator fill-up and consequently produce significantly higher loadings of hydrocarbons and trace metals (including copper and zinc) than other urban areas. To meet MEP, LID, source control, and treatment control BMPs are needed at RGOs that meet the following criteria: (a) 5,000 square feet or more, or (b) a projected Average Daily Traffic (ADT) of 100 or more vehicles per day. These are appropriate thresholds since vehicular development size and volume of traffic are good indicators of potential impacts of urban runoff from RGOs on receiving waters.

e. Sites of heavy industry are significant sources of pollutants in urban runoff. Pollutant concentrations and loads in runoff from industrial sites are similar or exceed pollutant concentrations and loads in runoff from other land uses, such as commercial or residential land uses. As with other land uses, LID, source control, and treatment control BMPs are needed at sites of heavy industry in order to meet the MEP standard. These BMPs are necessary where the site of heavy industry is larger than one acre. The one acre threshold is appropriate, since it is consistent with requirements in the Phase II NPDES storm water regulations.

f. If not properly designed or maintained, certain BMPs implemented or required by municipalities for urban runoff management may create a habitat for vectors (e.g. mosquitoes and rodents). However, proper BMP design and maintenance can prevent the creation of vector habitat. Nuisances and public health impacts resulting from vector breeding can be prevented with close collaboration and cooperative effort between municipalities and local vector control agencies and the State Department of Health Services during the development and implementation of urban runoff management programs.

3. Construction and Existing Development

a. In accordance with federal NPDES regulations and to ensure the most effective oversight of industrial and construction site discharges, discharges of runoff from

industrial and construction sites are subject to dual (state and local) storm water regulation. Under this dual system, the Regional Board is responsible for enforcing the General Construction Activities Storm Water Permit, SWRCB Order 99-08 DWQ, NPDES No. CAS000002 (General Construction Permit) and the General Industrial Activities Storm Water Permit, SWRCB Order 97-03 DWQ, NPDES No. CAS000001 (General Industrial Permit), and each municipal Copermittee is responsible for enforcing its local permits, plans, and ordinances, which may require the implementation of additional BMPs than required under the statewide general permits.

b. Identification of sources of pollutants in urban runoff (such as municipal areas and activities, industrial and commercial sites/sources, construction sites, and residential areas), development and implementation of BMPs to address those sources, and updating ordinances and approval processes are necessary for the Copermittees to ensure that discharges of pollutants into and from its MS4 are reduced to the MEP. Inspections and other compliance verification methods are needed to ensure minimum BMPs are implemented. Inspections are especially important at high risk areas for pollutant discharges.

c. Historic and current development makes use of natural drainage patterns and features as conveyances for urban runoff. Urban streams used in this manner are part of the municipalities MS4 regardless of whether they are natural, man-made, or partially modified features. In these cases, the urban stream is both an MS4 and a receiving water.

d. As operators of the MS4s, the Copermittees cannot passively receive and discharge pollutants from third parties. By providing free and open access to an MS4 that conveys discharges to waters of the U.S., the operator essentially accepts responsibility for discharges into the MS4 that it does not prohibit or control. These discharges may cause or contribute to a condition of contamination or a violation of water quality standards.

e. Waste and pollutants which are deposited and accumulate in MS4 drainage structures will be discharged from these structures to waters of the U.S. unless they are removed or treated. These discharges may cause or contribute to, or threaten to cause or contribute to, a condition of pollution in receiving waters. For this reason, pollutant discharges into MS4s must be reduced to the MEP unless treatment within the MS4 occurs.

f. Enforcement of local urban runoff related ordinances, permits, and plans is an essential component of every urban runoff management program and is specifically required in the federal storm water regulations and this Order. Each Copermittee is individually responsible for adoption and enforcement of ordinances and/or policies, implementation of identified control measures/BMPs needed to prevent or reduce pollutants in storm water runoff, and for the allocation of funds for the capital, operation and maintenance, administrative, and enforcement expenditures necessary to implement and enforce such control measures/BMPs under its jurisdiction.

g. Education is an important aspect of every effective urban runoff management program and the basis for changes in behavior at a societal level. Education of municipal planning, inspection, and maintenance department staffs is especially critical to ensure that in-house staffs understand how their activities impact water

quality, how to accomplish their jobs while protecting water quality, and their specific roles and responsibilities for compliance with this Order. Public education, designed to target various urban land users and other audiences, is also essential to inform the public of how individual actions impact receiving water quality and how these impacts can be minimized.

h. Public participation during the development of urban runoff management programs is necessary to ensure that all stakeholder interests and a variety of creative solutions are considered.

4. Watershed and Regional Urban Runoff Management

a. Since urban runoff does not recognize political boundaries, watershed-based urban runoff management can greatly enhance the protection of receiving waters within a watershed. Such management provides a means to focus on the most important water quality problems in each watershed. By focusing on the most important water quality problems, watershed efforts can maximize protection of beneficial use in an efficient manner. Effective watershed-based urban runoff management actively reduces pollutant discharges and abates pollutant sources causing or contributing to watershed water quality problems; watershed-based urban runoff management that does not actively reduce pollutant discharges and abate pollutant sources causing or contributing to watershed water quality problems can necessitate implementation of the iterative process outlined in section A.3 of the Order. Watershed management of urban runoff does not require Copermittees to expend resources outside of their jurisdictions. Watershed management requires the Copermittees within a watershed to develop a watershed-based management strategy, which can then be implemented on a jurisdictional basis.

b. Some urban runoff issues, such as residential education, can be effectively addressed on a regional basis. Regional approaches to urban runoff management can improve program consistency and promote sharing of resources, which can result in implementation of more efficient programs.

c. Both regionally and on a watershed basis, it is important for the Copermittees to coordinate their water quality protection and land use planning activities to achieve the greatest protection of receiving water bodies. Copermittee coordination with other watershed stakeholders, especially Caltrans, the Department of Defense, and Native American Tribes, is also important. Establishment of a management structure, within which the Copermittees subject to this Order will fund and coordinate those aspects of their joint obligations, will help promote implementation of urban runoff management programs on a watershed and regional basis in a most cost effective manner.

E. STATUTE AND REGULATORY CONSIDERATIONS

1. The Receiving Water Limitations (RWL) language specified in this Order is consistent with language recommended by the USEPA and established in SWRCB Water Quality Order 99-05, adopted by the SWRCB on June 17, 1999. The RWL in this Order require compliance with water quality standards, which is to be achieved through an iterative approach requiring the implementation of improved and better-tailored BMPs over time. Compliance with receiving water limits based on applicable water quality standards is necessary to ensure that MS4 discharges will not cause or contribute to violations of water quality standards and the

creation of conditions of pollution.

2. The Water Quality Control Plan for the San Diego Basin (Basin Plan), identifies the following beneficial uses for surface waters in San Diego County: Municipal and Domestic Supply (MUN), Agricultural Supply (AGR), Industrial Process Supply (PROC), Industrial Service Supply (IND), Ground Water Recharge (GWR), Contact Water Recreation (REC1) Non-contact Water Recreation (REC2), Warm Freshwater Habitat (WARM), Cold Freshwater Habitat (COLD), Wildlife Habitat (WILD), Rare, Threatened, or Endangered Species (RARE), Freshwater Replenishment (FRSH), Hydropower Generation (POW), and Preservation of Biological Habitats of Special Significance (BIOL). The following additional beneficial uses are identified for coastal waters of San Diego County: Navigation (NAV), Commercial and Sport Fishing (COMM), Estuarine Habitat (EST), Marine Habitat (MAR), Aquaculture (AQUA), Migration of Aquatic Organisms (MIGR), Spawning, Reproduction, and/or Early Development (SPWN), and Shellfish Harvesting (SHELL).

3. This Order is in conformance with SWRCB Resolution No. 68-16 and the federal Antidegradation Policy described in 40 CFR 131.12.

4. Section 6217(g) of the Coastal Zone Act Reauthorization Amendments of 1990 (CZARA) requires coastal states with approved coastal zone management programs to address non-point pollution impacting or threatening coastal water quality. CZARA addresses five sources of non-point pollution: agriculture, silviculture, urban, marinas, and hydromodification. This NPDES permit addresses the management measures required for the urban category, with the exception of septic systems. The adoption and implementation of this NPDES permit relieves the Permittee from developing a non-point source plan, for the urban category, under CZARA. The Regional Board addresses septic systems through the administration of other programs.

5. Section 303(d)(1)(A) of the CWA requires that "Each state shall identify those waters within its boundaries for which the effluent limitations…are not stringent enough to implement any water quality standard (WQS) applicable to such waters." The CWA also requires states to establish a priority ranking of impaired waterbodies known as Water Quality Limited Segments and to establish Total Maximum Daily Loads (TMDLs) for such waters. This priority list of impaired waterbodies is called the Section 303(d) List. The current Section 303(d) List was approved by the SWRCB on February 4, 2003 and on July 25, 2003 by USEPA.

6. This Order fulfills a component of the TMDL Implementation Plan adopted by this Regional Board on August 14, 2002 for diazinon in Chollas Creek by establishing Water Quality Based Effluent Limits (WQBELs) for the Cities of San Diego, Lemon Grove, and La Mesa, the County of San Diego, and the San Diego Unified Port District; and by requiring: 1) legal authority, 2) implementation of a diazinon toxicity control plan and a diazinon public outreach/ education program, 3) achievement of the Compliance Schedule, and 4) a monitoring program. The establishment of WQBELs expressed as iterative BMPs to achieve the Waste Load Allocation (WLA) compliance schedule is appropriate and is expected to be sufficient to achieve the WLAs specified in the TMDL.

7. This Order fulfills a component of the TMDL Implementation Plan adopted by this Regional Board on February 9, 2005 for dissolved copper in Shelter Island Yacht Basin (SIYB) by establishing WQBELs expressed as BMPs to achieve the WLA of 30 kg copper / year for the City of San Diego and the San Diego Unified Port District. The establishment of WQBELs expressed as BMPs is appropriate and is expected to be sufficient to achieve the WLA

specified in the TMDL.

8. This Order establishes WQBELs and conditions consistent with the requirements and assumptions of the WLAs in the TMDLs as required by 40 CFR 122.44(d)(1)(vii)(B).

9. Requirements in this Order that are more explicit than the federal storm water regulations in 40 CFR 122.26 are prescribed in accordance with the CWA section 402(p)(3)(B)(iii) and are necessary to meet the MEP standard.

10. Urban runoff treatment and/or mitigation must occur prior to the discharge of urban runoff into a receiving water. Federal regulations at 40 CFR 131.10(a) state that in no case shall a state adopt waste transport or waste assimilation as a designated use for any waters of the U.S. Authorizing the construction of an urban runoff treatment facility within a water of the U.S., or using the water body itself as a treatment system or for conveyance to a treatment system, would be tantamount to accepting waste assimilation as an appropriate use for that water body. Furthermore, the construction, operation, and maintenance of a pollution control facility in a water body can negatively impact the physical, chemical, and biological integrity, as well as the beneficial uses, of the water body. This is consistent with USEPA guidance to avoid locating structural controls in natural wetlands.

11. The issuance of waste discharge requirements and an NPDES permit for the discharge of urban runoff from MS4s to waters of the U.S. is exempt from the requirement for preparation of environmental documents under the California Environmental Quality Act (CEQA) (Public Resources Code, Division 13, Chapter 3, section 21000 et seq.) in accordance with the CWC section 13389.

F. PUBLIC PROCESS

1. The Regional Board has notified the Copermittees, all known interested parties, and the public of its intent to consider adoption of an Order prescribing waste discharge requirements that would serve to renew an NPDES permit for the existing discharge of urban runoff.

2. The Regional Board has, at public meetings on (date), held public hearings and heard and considered all comments pertaining to the terms and conditions of this Order.

IT IS HEREBY ORDERED that the Copermittees, in order to meet the provisions contained in Division 7 of the California Water Code (CWC) and regulations adopted thereunder, and the provisions of the Clean Water Act (CWA) and regulations adopted thereunder, shall each comply with the following:

A. PROHIBITIONS AND RECEIVING WATER LIMITATIONS

1. Discharges into and from municipal separate storm sewer systems (MS4s) in a manner causing, or threatening to cause, a condition of pollution, contamination, or nuisance (as defined in CWC section 13050), in waters of the state are prohibited.

2. Discharges from MS4s containing pollutants which have not been reduced to the maximum extent practicable (MEP) are prohibited.[2]

[2] This prohibition does not apply to MS4 discharges which receive subsequent treatment to reduce pollutants to the MEP prior to entering receiving waters (e.g., low flow diversions to the sanitary sewer).

3. Discharges from MS4s that cause or contribute to the violation of water quality standards (designated beneficial uses and water quality objectives developed to protect beneficial uses) are prohibited.

   a. Each Copermittee shall comply with section A.3 and section A.4 as it applies to Prohibition 5 in Attachment A of this Order through timely implementation of control measures and other actions to reduce pollutants in urban runoff discharges in accordance with the Jurisdictional Urban Runoff Management Program and other requirements of this Order including any modifications. The Jurisdictional Urban Runoff Management Program shall be designed to achieve compliance with section A.3 and section A.4 as it applies to Prohibition 5 in Attachment A of this Order. If exceedance(s) of water quality standards persist notwithstanding implementation of the Jurisdictional Urban Runoff Management Program and other requirements of this Order, the Copermittee shall assure compliance with section A.3 and section A.4 as it applies to Prohibition 5 in Attachment A of this Order by complying with the following procedure:

      (1) Upon a determination by either the Copermittee or the Regional Board that MS4 discharges are causing or contributing to an exceedance of an applicable water quality standard, the Copermittee shall promptly notify and thereafter submit a report to the Regional Board that describes best management practices (BMPs) that are currently being implemented and additional BMPs that will be implemented to prevent or reduce any pollutants that are causing or contributing to the exceedance of water quality standards. The report may be incorporated in the annual update to the Jurisdictional Urban Runoff Management Program unless the Regional Board directs an earlier submittal. The report shall include an implementation schedule. The Regional Board may require modifications to the report;

      (2) Submit any modifications to the report required by the Regional Board within 30 days of notification;

      (3) Within 30 days following approval of the report described above by the Regional Board, the Copermittee shall revise its Jurisdictional Urban Runoff Management Program and monitoring program to incorporate the approved modified BMPs that have been and will be implemented, the implementation schedule, and any additional monitoring required;

      (4) Implement the revised Jurisdictional Urban Runoff Management Program and monitoring program in accordance with the approved schedule.

   b. So long as the Copermittee has complied with the procedures set forth above and is implementing the revised Jurisdictional Urban Runoff Management Program, the Copermittee does not have to repeat the same procedure for continuing or recurring exceedances of the same receiving water limitations unless directed by the Regional Board to do so.

   c. Nothing in section A.3 shall prevent the Regional Board from enforcing any provision of this Order while the Copermittee prepares and implements the above report.

4. In addition to the above prohibitions, discharges from MS4s are subject to all Basin Plan prohibitions cited in Attachment A to this Order.

B. NON-STORM WATER DISCHARGES

1. Each Copermittee shall effectively prohibit all types of non-storm water discharges into its MS4 unless such discharges are either authorized by a separate National Pollutant Discharge Elimination System (NPDES) permit; or not prohibited in accordance with sections B.2 and B.3 below.

2. The following categories of non-storm water discharges are not prohibited unless a Copermittee or the Regional Board identifies the discharge category as a significant source of pollutants to waters of the U.S. For such a discharge category, the Copermittee shall either prohibit the discharge category or develop and implement appropriate control measures to reduce the discharge of pollutants to the MEP and report to the Regional Board pursuant to section J.

   a. Diverted stream flows;
   b. Rising ground waters;
   c. Uncontaminated ground water infiltration [as defined at 40 CFR 35.2005(20)] to MS4s;
   d. Uncontaminated pumped ground water;
   e. Foundation drains;
   f. Springs;
   g. Water from crawl space pumps;
   h. Footing drains;
   i. Air conditioning condensation;
   j. Flows from riparian habitats and wetlands;
   k. Water line flushing;
   l. Landscape irrigation;
   m. Discharges from potable water sources not subject to NPDES Permit No. CAG679001, other than water main breaks;
   n. Irrigation water;
   o. Lawn watering;
   p. Individual residential car washing; and
   q. Dechlorinated swimming pool discharges.

3. Emergency fire fighting flows (i.e., flows necessary for the protection of life or property) do not require BMPs and need not be prohibited. As part of the Jurisdictional Urban Runoff Management Plan (JURMP), each Copermittee shall develop and implement a program to reduce pollutants from non-emergency fire fighting flows (i.e., flows from controlled or practice blazes and maintenance activities) identified by the Copermittee to be significant sources of pollutants to waters of the United States.

4. Each Copermittee shall examine all dry weather field screening and analytical monitoring results collected in accordance with section D.4 of this Order and Receiving Waters Monitoring and Reporting Program No. R9-2007-0001 to identify water quality problems which may be the result of any non-prohibited discharge category(ies) identified above in section B.2. Follow-up investigations shall be conducted as necessary to identify and control any non-prohibited discharge category(ies) listed above.

C. LEGAL AUTHORITY

1. Each Copermittee shall establish, maintain, and enforce adequate legal authority to control pollutant discharges into and from its MS4 through ordinance, statute, permit, contract or similar means. This legal authority must, at a minimum, authorize the Copermittee to:

   a. Control the contribution of pollutants in discharges of runoff associated with industrial and construction activity to its MS4 and control the quality of runoff from industrial and construction sites. This requirement applies both to industrial and construction sites which have coverage under the statewide general industrial or construction storm water permits, as well as to those sites which do not. Grading ordinances shall be upgraded and enforced as necessary to comply with this Order.

   b. Prohibit all identified illicit discharges not otherwise allowed pursuant to section B.2 including but not limited to:

      (1) Sewage;
      (2) Discharges of wash water resulting from the hosing or cleaning of gas stations, auto repair garages, or other types of automotive services facilities;
      (3) Discharges resulting from the cleaning, repair, or maintenance of any type of equipment, machinery, or facility including motor vehicles, cement-related equipment, and port-a-potty servicing, etc.;
      (4) Discharges of wash water from mobile operations such as mobile automobile washing, steam cleaning, power washing, and carpet cleaning, etc.;
      (5) Discharges of wash water from the cleaning or hosing of impervious surfaces in municipal, industrial, commercial, and residential areas including parking lots, streets, sidewalks, driveways, patios, plazas, work yards and outdoor eating or drinking areas, etc.;
      (6) Discharges of runoff from material storage areas containing chemicals, fuels, grease, oil, or other hazardous materials;
      (7) Discharges of pool or fountain water containing chlorine, biocides, or other chemicals; discharges of pool or fountain filter backwash water;
      (8) Discharges of sediment, pet waste, vegetation clippings, or other landscape or construction-related wastes; and
      (9) Discharges of food-related wastes (e.g., grease, fish processing, and restaurant kitchen mat and trash bin wash water, etc.).

   c. Prohibit and eliminate illicit connections to the MS4;

   d. Control the discharge of spills, dumping, or disposal of materials other than storm water to its MS4;

   e. Require compliance with conditions in Copermittee ordinances, permits, contracts or orders (i.e., hold dischargers to its MS4 accountable for their contributions of pollutants and flows);

   f. Utilize enforcement mechanisms to require compliance with Copermittee storm water ordinances, permits, contracts, or orders;

   g. Control the contribution of pollutants from one portion of the shared MS4 to another portion of the MS4 through interagency agreements among Copermittees. Control of

the contribution of pollutants from one portion of the shared MS4 to another portion of the MS4 through interagency agreements with other owners of the MS4 such as Caltrans, the Department of Defense, or Native American Tribes is encouraged;

h. Carry out all inspections, surveillance, and monitoring necessary to determine compliance and noncompliance with local ordinances and permits and with this Order, including the prohibition on illicit discharges to the MS4. This means the Copermittee must have authority to enter, monitor, inspect, take measurements, review and copy records, and require regular reports from industrial facilities discharging into its MS4, including construction sites;

i. Require the use of BMPs to prevent or reduce the discharge of pollutants into MS4s to the MEP; and

j. Require documentation on the effectiveness of BMPs implemented to reduce the discharge of pollutants to the MS4 to the MEP.

2. Each Permittee shall include as part of its JURMP a statement certified by its chief legal counsel that the Copermittee has taken the necessary steps to obtain and maintain full legal authority to implement and enforce each of the requirements contained in 40 CFR 122.26(d)(2)(i)(A-F) and this Order. This statement shall include:

a. Identification of all departments within the jurisdiction that conduct urban runoff related activities, and their roles and responsibilities under this Order. Include an up to date organizational chart specifying these departments and key personnel.

b. Citation of urban runoff related ordinances and the reasons they are enforceable;

c. Identification of the local administrative and legal procedures available to mandate compliance with urban runoff related ordinances and therefore with the conditions of this Order;

d. A description of how urban runoff related ordinances are implemented and appealed; and

e. Description of whether the municipality can issue administrative orders and injunctions or if it must go through the court system for enforcement actions.

D. JURISDICTIONAL URBAN RUNOFF MANAGEMENT PROGRAM

Each Copermittee shall implement all requirements of section D of this Order no later than 365 days after adoption of the Order, unless otherwise specified in this Order. Prior to 365 days after adoption of the Order, each Copermittee shall at a minimum implement its Jurisdictional URMP document, as the document was developed and amended to comply with the requirements of Order No. 2001-01.

Each Copermittee shall develop and implement an updated Jurisdictional Urban Runoff Management Program for its jurisdiction. Each updated Jurisdictional Urban Runoff Management Program shall meet the requirements of section D of this Order, reduce the discharge of pollutants from the MS4 to the MEP, and prevent urban runoff discharges from the MS4 from causing or contributing to a violation of water quality standards.

1. Development Planning Component

Each Copermittee shall implement a program which meets the requirements of this section and (1) reduces Development Project discharges of pollutants from the MS4 to the MEP, (2) prevents Development Project discharges from the MS4 from causing or contributing to a violation of water quality standards, and (3) manages increases in runoff discharge rates and durations from Development Projects that are likely to cause increased erosion of stream beds and banks, silt pollutant generation, or other impacts to beneficial uses and stream habitat due to increased erosive force.

a. GENERAL PLAN

Each Copermittee shall revise as needed its General Plan or equivalent plan (e.g., Comprehensive, Master, or Community Plan) for the purpose of providing effective water quality and watershed protection principles and policies that direct land-use decisions and require implementation of consistent water quality protection measures for Development Projects.

b. ENVIRONMENTAL REVIEW PROCESS

Each Copermittee shall revise as needed their current environmental review processes to accurately evaluate water quality impacts and cumulative impacts and identify appropriate measures to avoid, minimize and mitigate those impacts for all Development Projects.

c. APPROVAL PROCESS CRITERIA AND REQUIREMENTS FOR ALL DEVELOPMENT PROJECTS

For all proposed Development Projects, each Copermittee during the planning process and prior to project approval and issuance of local permits shall prescribe the necessary requirements so that Development Project discharges of pollutants from the MS4 will be reduced to the MEP, will not cause or contribute to a violation of water quality standards, and will comply with Copermittee's ordinances, permits, plans, and requirements, and with this Order. The requirements shall include, but not be limited to, implementation by the project proponent of the following:

(1) Source control BMPs that reduce storm water pollutants of concern in urban runoff, including storm drain system stenciling and signage, properly designed outdoor material storage areas, properly designed trash storage areas, and implementation of efficient irrigation systems;
(2) LID BMPs where feasible which maximize infiltration, provide retention, slow runoff, minimize impervious footprint, direct runoff from impervious areas into landscaping, and construct impervious surfaces to minimum widths necessary;
(3) Buffer zones for natural water bodies, where feasible. Where buffer zones are infeasible, require project proponent to implement other buffers such as trees, access restrictions, etc., where feasible;
(4) Measures necessary so that grading or other construction activities meet the provisions specified in section D.2 of this Order; and
(5) Submittal of proof of a mechanism under which ongoing long-term maintenance of all structural post-construction BMPs will be conducted.

d. STANDARD URBAN STORM WATER MITIGATION PLANS (SUSMPS) – APPROVAL PROCESS CRITERIA AND REQUIREMENTS FOR PRIORITY DEVELOPMENT PROJECTS

Each Copermittee shall implement an updated local SUSMP which meets the requirements of section D.1.d of this Order and (1) reduces Priority Development Project discharges of pollutants from the MS4 to the MEP, (2) prevents Priority Development Project runoff discharges from the MS4 from causing or contributing to a violation of water quality standards, and (3) manages increases in runoff discharge rates and durations from Priority Development Projects that are likely to cause increased erosion of stream beds and banks, silt pollutant generation, or other impacts to beneficial uses and stream habitat due to increased erosive force.[3]

(1) Definition of Priority Development Project

(a) Priority Development Projects are: a) all new Development Projects that fall under the project categories or locations listed in section D.1.d.(2), and b) those redevelopment projects that create, add or replace at least 5,000 square feet of impervious surfaces on an already developed site that falls under the project categories or locations listed in section D.1.d.(2). Where redevelopment results in an increase of less than fifty percent of the impervious surfaces of a previously existing development, and the existing development was not subject to SUSMP requirements, the numeric sizing criteria discussed in section D.1.d.(6)(c) applies only to the addition, and not to the entire development. Where redevelopment results in an increase of more than fifty percent of the impervious surfaces of a previously existing development, the numeric sizing criteria applies to the entire development. Where a new Development Project feature, such as a parking lot, falls into a Priority Development Project Category, the entire project footprint is subject to SUSMP requirements.

(b) In addition to the Priority Development Project Categories identified in section D.1.d.(2), within three years of adoption of this Order Priority Development Projects shall also include all other pollutant generating Development Projects that result in the disturbance of one acre or more of land.[4] As an alternative to this one acre threshold, the Copermittees may collectively identify a different threshold, provided the Copermittees' threshold is at least as inclusive of Development Projects as the one acre threshold.

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[3] Updated SUSMP and hydromodification requirements shall apply to all priority projects or phases of priority projects which have not yet begun grading or construction activities at the time any updated SUSMP or hydromodification requirement commences. If a Copermittee determines that lawful prior approval of a project exists, whereby application of an updated SUSMP or hydromodification requirement to the project is infeasible, the updated SUSMP or hydromodification requirement need not apply to the project. Where feasible, the Copermittees shall utilize the SUSMP and hydromodification update periods to ensure that projects undergoing approval processes include application of the updated SUSMP and hydromodification requirements in their plans.

[4] Pollutant generating Development Projects are those projects that generate pollutants at levels greater than background levels.

(2) Priority Development Project Categories

(a) Housing subdivisions of 10 or more dwelling units. This category includes single-family homes, multi-family homes, condominiums, and apartments.
(b) Commercial developments greater than one acre. This category is defined as any development on private land that is not for heavy industrial or residential uses where the land area for development is greater than one acre. The category includes, but is not limited to: hospitals; laboratories and other medical facilities; educational institutions; recreational facilities; municipal facilities; commercial nurseries; multi-apartment buildings; car wash facilities; mini-malls and other business complexes; shopping malls; hotels; office buildings; public warehouses; automotive dealerships; airfields; and other light industrial facilities.
(c) Developments of heavy industry greater than one acre. This category includes, but is not limited to, manufacturing plants, food processing plants, metal working facilities, printing plants, and fleet storage areas (bus, truck, etc.).
(d) Automotive repair shops. This category is defined as a facility that is categorized in any one of the following Standard Industrial Classification (SIC) codes: 5013, 5014, 5541, 7532-7534, or 7536-7539.
(e) Restaurants. This category is defined as a facility that sells prepared foods and drinks for consumption, including stationary lunch counters and refreshment stands selling prepared foods and drinks for immediate consumption (SIC code 5812), where the land area for development is greater than 5,000 square feet. Restaurants where land development is less than 5,000 square feet shall meet all SUSMP requirements except for structural treatment BMP and numeric sizing criteria requirement D.1.d.(6)(c) and hydromodification requirement D.1.g.
(f) All hillside development greater than 5,000 square feet. This category is defined as any development which creates 5,000 square feet of impervious surface which is located in an area with known erosive soil conditions, where the development will grade on any natural slope that is twenty-five percent or greater.
(g) Environmentally Sensitive Areas (ESAs). All development located within or directly adjacent to or discharging directly to an ESA (where discharges from the development or redevelopment will enter receiving waters within the ESA), which either creates 2,500 square feet of impervious surface on a proposed project site or increases the area of imperviousness of a proposed project site to 10% or more of its naturally occurring condition. "Directly adjacent" means situated within 200 feet of the ESA. "Discharging directly to" means outflow from a drainage conveyance system that is composed entirely of flows from the subject development or redevelopment site, and not commingled with flows from adjacent lands.
(h) Parking lots 5,000 square feet or more or with 15 or more parking spaces and potentially exposed to urban runoff. Parking lot is defined as a land area or facility for the temporary parking or storage of motor vehicles used personally, for business, or for commerce.
(i) Street, roads, highways, and freeways. This category includes any paved surface that is 5,000 square feet or greater used for the transportation of automobiles, trucks, motorcycles, and other vehicles.
(j) Retail Gasoline Outlets (RGOs). This category includes RGOs that meet the following criteria: (a) 5,000 square feet or more or (b) a projected Average

Daily Traffic (ADT) of 100 or more vehicles per day.

(3) Pollutants of Concern

As part of its local SUSMP, each Copermittee shall develop and implement a procedure for pollutants of concern to be identified for each Priority Development Project. The procedure shall address, at a minimum: (1) Receiving water quality (including pollutants for which receiving waters are listed as impaired under CWA section 303(d)); (2) Land use type of the Development Project and pollutants associated with that land use type; and (3) Pollutants expected to be present on site.

(4) Low Impact Development (LID) BMP Requirements

Each Copermittee shall require each Priority Development Project to implement LID BMPs which will collectively minimize directly connected impervious areas and promote infiltration at Priority Development Projects:

(a) The following LID site design BMPs shall be implemented at all Priority Development Projects as required below:

i. For Priority Development Projects with landscaped or other pervious areas, drain a portion of impervious areas (rooftops, parking lots, sidewalks, walkways, patios, etc) into pervious areas prior to discharge to the MS4. The amount of runoff from impervious areas that is to drain to pervious areas shall correspond with the total capacity of the project's pervious areas to infiltrate or treat runoff, taking into consideration the pervious areas' soil conditions, slope, and other pertinent factors.
ii. For Priority Development Projects with landscaped or other pervious areas, properly design and construct the pervious areas to effectively receive and infiltrate or treat runoff from impervious areas, taking into consideration the pervious areas' soil conditions, slope, and other pertinent factors.
iii. For Priority Development Projects with low traffic areas and appropriate soil conditions, construct a portion of walkways, trails, overflow parking lots, alleys, or other low-traffic areas with permeable surfaces, such as pervious concrete, porous asphalt, unit pavers, and granular materials.

(b) The following LID BMPs listed below shall be implemented at all Priority Development Projects where applicable and feasible.

i. Conserve natural areas, including existing trees, other vegetation, and soils.
ii. Construct streets, sidewalks, or parking lot aisles to the minimum widths necessary, provided that public safety and a walkable environment for pedestrians are not compromised.
iii. Minimize the impervious footprint of the project.
iv. Minimize soil compaction.
v. Minimize disturbances to natural drainages (e.g., natural swales, topographic depressions, etc.)

(5) Source Control BMP Requirements

Each Copermittee shall require each Priority Development Project to implement source control BMPs. The source control BMPs to be required shall:

(a) Minimize storm water pollutants of concern in urban runoff.
(b) Include storm drain system stenciling or signage.
(c) Include properly designed outdoor material storage areas.
(d) Include properly designed trash storage areas.
(e) Include efficient irrigation systems.
(f) Include water quality requirements applicable to individual priority project categories.

(6) Treatment Control BMP Requirements[5]

Each Copermittee shall require each Priority Development Project to implement treatment control BMPs which meet the following treatment control BMP requirements:

(a) Treatment control BMPs for all Priority Development Projects shall mitigate (infiltrate, filter, or treat) the required volume or flow of runoff (identified in section D.1.d.(6)(c)) from all developed portions of the project, including landscaped areas.

(b) All treatment control BMPs shall be located so as to infiltrate, filter, or treat the required runoff volume or flow prior to its discharge to any waters of the U.S. Multiple Priority Development Projects may use shared treatment control BMPs as long as construction of any shared treatment control BMP is completed prior to the use or occupation of any Priority Development Project from which the treatment control BMP will receive runoff.

(c) All treatment control BMPs for a single Priority Development Project shall collectively be sized to comply with the following numeric sizing criteria:

i. Volume-based treatment control BMPs shall be designed to mitigate (infiltrate, filter, or treat) the volume of runoff produced from a 24-hour 85th percentile storm event, as determined from the County of San Diego's 85th Percentile Precipitation Isopluvial Map; or

ii. Flow-based treatment control BMPs shall be designed to mitigate (infiltrate, filter, or treat) either: a) the maximum flow rate of runoff produced from a rainfall intensity of 0.2 inch of rainfall per hour, for each hour of a storm event; or b) the maximum flow rate of runoff produced by the 85th percentile hourly rainfall intensity (for each hour of a storm event), as determined from the local historical rainfall record, multiplied by a factor of two.

[5] LID BMPs that are correctly designed to effectively infiltrate, filter, or treat runoff can be considered treatment control BMPs.

(d) All treatment control BMPs for Priority Development Projects shall, at a minimum:

i. Be ranked with a high or medium pollutant removal efficiency for the project's most significant pollutants of concern, as the pollutant removal efficiencies are identified in the Copermittees' Model SUSMP and the most current updates thereto. Treatment control BMPs with a low removal efficiency ranking shall only be approved by a Copermittee when a feasibility analysis has been conducted which exhibits that implementation of treatment control BMPs with high or medium removal efficiency rankings are infeasible for a Priority Development Project or portion of a Priority Development Project.
ii. Be correctly sized and designed so as to remove pollutants to the MEP.
iii. Target removal of pollutants of concern from urban runoff.
iv. Be implemented close to pollutant sources (where shared BMPs are not proposed), and prior to discharging into waters of the U.S.
v. Not be constructed within a receiving water.
vi. Include proof of a mechanism, to be provided by the project proponent or Copermittee, under which ongoing long-term maintenance will be conducted.

(7) Update of SUSMP BMP Requirements

The Copermittees shall collectively review and update the BMP requirements that are listed in their local SUSMPs. At a minimum, the update shall include removal of obsolete or ineffective BMPs, addition of LID and source control BMP requirements that meet or exceed the requirements of sections D.1.d.(4) and D.1.d.(5), and addition of LID BMPs that can be used for treatment, such as bioretention cells, bioretention swales, etc. The update shall also add appropriate LID BMPs to any tables or discussions in the local SUSMPs addressing pollutant removal efficiencies of treatment control BMPs. In addition, the update shall include review, and revision where necessary, of treatment control BMP pollutant removal efficiencies.

(8) Update of SUSMPs to Incorporate LID and Other BMP Requirements

(a) In addition to the implementation of the BMP requirements of sections D.1.d.(4-7) within one year of adoption of this Order, the Copermittees shall also develop and submit an updated Model SUSMP that defines minimum LID and other BMP requirements to be incorporated into the Copermittees' local SUSMPs for application to Priority Development Projects. The purpose of the updated Model SUSMP shall be to establish minimum standards to maximize the use of LID practices and principles in local Copermittee programs as a means of reducing stormwater runoff. It shall meet the following minimum requirements:

i. Establishment of LID BMP requirements that meet or exceed the minimum requirements listed in section D.1.d.(4) above.
ii. Establishment of source control BMP requirements that meet or exceed the minimum requirements listed in section D.1.d.(5) above.
iii. Establishment of treatment control BMP requirements that meet or exceed the minimum requirements listed in section D.1.d.(6) above.

iv. Establishment of siting, design, and maintenance criteria for each LID and treatment control BMP listed in the Model SUSMP, so that implemented LID and treatment control BMPs are constructed correctly and are effective at pollutant removal and/or runoff control. LID techniques, such as soil amendments, shall be incorporated into the criteria for appropriate treatment control BMPs.

v. Establishment of criteria to aid in determining Priority Development Project conditions where implementation of each LID BMP listed in section D.1.d.(4)(b) is applicable and feasible.

vi. Establishment of a requirement for Priority Development Projects with low traffic areas and appropriate or amendable soil conditions to construct a portion of walkways, trails, overflow parking lots, alleys, or other low-traffic areas with permeable surfaces, such a pervious concrete, porous asphalt, unit pavers, and granular materials.

vii. Establishment of restrictions on infiltration of runoff from Priority Development Project categories or Priority Development Project areas that generate high levels of pollutants, if necessary.

(b) The updated Model SUSMP shall be submitted within 18 months of adoption of this Order. If, within 60 days of submittal of the updated Model SUSMP, the Copermittees have not received in writing from the Regional Board either (1) a finding of adequacy of the updated Model SUSMP or (2) a modified schedule for its review and revision, the updated Model SUSMP shall be deemed adequate, and the Copermittees shall implement its provisions in accordance with section D.1.d.(8)(c) below.

(c) Within 365 days of Regional Board acceptance of the updated Model SUSMP, each Copermittee shall update its local SUSMP to implement the requirements established pursuant to section D.1.d.(8)(a). In addition to the requirements of section D.1.d.(8)(a), each Copermittee's updated local SUSMP shall include the following:

i. A requirement that each Priority Development Project use the criteria established pursuant to section D.1.d.(8)(a)v to demonstrate applicability and feasibility, or lack thereof, of implementation of the LID BMPs listed in section D.1.d.(4)(b).

ii. A review process which verifies that all BMPs to be implemented will meet the designated siting, design, and maintenance criteria, and that each Priority Development Project is in compliance with all applicable SUSMP requirements.

(9) <u>Implementation Process</u>

As part of its local SUSMP, each Copermittee shall implement a process to verify compliance with SUSMP requirements. The process shall identify at what point in the planning process Priority Development Projects will be required to meet SUSMP requirements. The process shall also include identification of the roles and responsibilities of various municipal departments in implementing the SUSMP requirements, as well as any other measures necessary for the implementation of SUSMP requirements.

(10) Downstream Erosion

As part of its local SUSMP, each Copermittee shall develop and apply criteria to Priority Development Projects so that runoff discharge rates, durations, and velocities from Priority Development Projects are controlled to maintain or reduce downstream erosion conditions and protect stream habitat. Upon adoption of the Hydromodification Management Plan (HMP) by the Regional Board (section D.1.g), individual Copermittee criteria for control of downstream erosion shall be superseded by criteria identified in the HMP.

(11) Waiver Provision

(a) A Copermittee may provide for a project to be waived from the requirement of meeting numeric sizing criteria (sections D.1.d.(6)(c) or D.1.d.(8)(a)iii) if infeasibility can be established. A waiver of infeasibility shall only be granted by a Copermittee when all available BMPs have been considered and rejected as infeasible. Copermittees shall notify the Regional Board within 5 days of each waiver issued and shall include the following information in the notification:

i. Name of the person granting each waiver;
ii. Name of developer receiving the waiver;
iii. Site location;
iv. Reason for waiver; and
v. Description of BMPs required.

(b) The Copermittees may collectively or individually develop a program to require project proponents who have received waivers to transfer the savings in cost, as determined by the Copermittee(s), to a storm water mitigation fund. This program may be implemented by all Copermittees that issue waivers. Funds may be used on projects to improve urban runoff quality within the watershed of the waived project. The waiver mitigation program should, at a minimum, identify:

i. The entity or entities that will manage the storm water mitigation fund (i.e., assume full responsibility for);
ii. The range and types of acceptable projects for which mitigation funds may be expended;
iii. The entity or entities that will assume full responsibility for each mitigation project including its successful completion; and
iv. How the dollar amount of fund contributions will be determined.

(12) Infiltration and Groundwater Protection

To protect groundwater quality, each Copermittee shall apply restrictions to the use of treatment control BMPs that are designed to primarily function as centralized infiltration devices (such as large infiltration trenches and infiltration basins). Such restrictions shall be designed so that the use of such infiltration treatment control BMPs shall not cause or contribute to an exceedance of groundwater quality objectives. At a minimum, each treatment control BMP designed to primarily function as a centralized infiltration device shall meet the restrictions below, unless it is demonstrated that a restriction is not necessary to

protect groundwater quality. The Copermittees may collectively or individually develop alternative restrictions on the use of treatment control BMPs which are designed to primarily function as centralized infiltration devices. Alternative restrictions developed by the Copermittees can partially or wholly replace the restrictions listed below. The restrictions are not intended to be applied to small infiltration systems dispersed throughout a development project.

(a) Urban runoff shall undergo pretreatment such as sedimentation or filtration prior to infiltration;
(b) All dry weather flows containing significant pollutant loads shall be diverted from infiltration devices;
(c) Pollution prevention and source control BMPs shall be implemented at a level appropriate to protect groundwater quality at sites where infiltration treatment control BMPs are to be used;
(d) Infiltration treatment control BMPs shall be adequately maintained so that they remove pollutants to the MEP;
(e) The vertical distance from the base of any infiltration treatment control BMP to the seasonal high groundwater mark shall be at least 10 feet. Where groundwater basins do not support beneficial uses, this vertical distance criteria may be reduced, provided groundwater quality is maintained;
(f) The soil through which infiltration is to occur shall have physical and chemical characteristics (such as appropriate cation exchange capacity, organic content, clay content, and infiltration rate) which are adequate for proper infiltration durations and treatment of urban runoff for the protection of groundwater beneficial uses;
(g) Infiltration treatment control BMPs shall not be used for areas of industrial or light industrial activity; areas subject to high vehicular traffic (25,000 or greater average daily traffic on main roadway or 15,000 or more average daily traffic on any intersecting roadway); automotive repair shops; car washes; fleet storage areas (bus, truck, etc.); nurseries[6]; and other high threat to water quality land uses and activities as designated by each Permittee; and
(h) Infiltration treatment control BMPs shall be located a minimum of 100 feet horizontally from any water supply wells.

e. TREATMENT CONTROL BMP MAINTENANCE TRACKING

(1) Each Copermittee shall develop and utilize a watershed-based database to track and inventory approved treatment control BMPs and treatment control BMP maintenance within its jurisdiction. At a minimum, the database shall include information on treatment control BMP type, location, watershed, date of construction, party responsible for maintenance, maintenance certifications or verifications, inspections, inspection findings, and corrective actions.

(2) Each Copermittee shall develop and implement a program to verify that approved treatment control BMPs are operating effectively and have been adequately maintained. At a minimum, the program shall include the following:

(a) An annual inventory of all approved treatment control BMPs within the Copermittee's jurisdiction. The inventory shall also include all treatment control BMPs approved during the previous permit cycle.

[6] Except with regard to treated nursery runoff or clean storm water runoff.

(b) The prioritization of all projects with approved treatment control BMPs into high, medium, and low priority categories. At a minimum, projects with drainage insert treatment control BMPs shall be designated as at least a medium priority. Prioritization of other projects with treatment control BMPs shall include consideration of treatment control BMP size, recommended maintenance frequency, likelihood of operational and maintenance issues, location, receiving water quality, and other pertinent factors.

(c) 100% of projects with treatment control BMPs that are high priority shall be inspected by the Copermittee annually. 50% of projects with drainage insert treatment control BMPs shall be inspected by the Copermittee annually. Treatment control BMPs that are low priority shall be inspected as needed. All inspections shall verify effective operation and maintenance of the treatment control BMPs, as well as compliance with all ordinances, permits, and this Order. A minimum of 20% of the total number of projects with approved treatment control BMPs, and a maximum of 200% of the average number of projects with treatment control BMPs approved per year, shall be inspected annually.

(d) Requirement of annual verification of effective operation and maintenance of each approved treatment control BMP by the party responsible for the treatment control BMP maintenance.

(3) Operation and maintenance verifications shall be required prior to each rainy season.

(4) Inspections of high priority treatment control BMPs shall be conducted prior to each rainy season.

f. BMP VERIFICATION

Prior to occupancy of each Priority Development Project subject to SUSMP requirements, each Copermittee shall inspect the constructed LID, source control, and treatment control BMPs to verify that they have been constructed in compliance with all specifications, plans, permits, ordinances, and this Order. This initial BMP verification inspection does not constitute an operation and maintenance inspection, as required above in section D.1.e.(2)(c).

g. HYDROMODIFICATION - LIMITATIONS ON INCREASES OF RUNOFF DISCHARGE RATES AND DURATIONS[7]

Each Copermittee shall collaborate with the other Copermittees to develop and implement a Hydromodification Management Plan (HMP) to manage increases in runoff discharge rates and durations from all Priority Development Projects, where such increased rates and durations are likely to cause increased erosion of channel

[7] Updated SUSMP and hydromodification requirements shall apply to all priority projects or phases of priority projects which have not yet begun grading or construction activities at the time any updated SUSMP or hydromodification requirement commences. If a Copermittee determines that lawful prior approval of a project exists, whereby application of an updated SUSMP or hydromodification requirement to the project is infeasible, the updated SUSMP or hydromodification requirement need not apply to the project. Where feasible, the Copermittees shall utilize the SUSMP and hydromodification update periods to ensure that projects undergoing approval processes include application of the updated SUSMP and hydromodification requirements in their plans.

beds and banks, sediment pollutant generation, or other impacts to beneficial uses and stream habitat due to increased erosive force. The HMP, once approved by the Regional Board, shall be incorporated into the local SUSMP and implemented by each Copermittee so that post-project runoff discharge rates and durations shall not exceed estimated pre-project discharge rates and durations where the increased discharge rates and durations will result in increased potential for erosion or other significant adverse impacts to beneficial uses, attributable to changes in the discharge rates and durations.

(1) The HMP shall:

(a) Identify a standard for channel segments which receive urban runoff discharges from Priority Development Projects. The channel standard shall maintain the pre-project erosion and deposition characteristics of channel segments receiving urban runoff discharges from Priority Development Projects as necessary to maintain or improve the channel segments' stability conditions.
(b) Utilize continuous simulation of the entire rainfall record to identify a range of runoff flows[8] for which Priority Development Project post-project runoff flow rates and durations shall not exceed pre-project runoff flow rates and durations, where the increased flow rates and durations will result in increased potential for erosion or other significant adverse impacts to beneficial uses, attributable to changes in the flow rates and durations. The lower boundary of the range of runoff flows identified shall correspond with the critical channel flow that produces the critical shear stress that initiates channel bed movement or that erodes the toe of channel banks. The identified range of runoff flows may be different for specific watersheds, channels, or channel reaches.
(c) Require Priority Development Projects to implement hydrologic control measures so that Priority Development Projects' post-project runoff flow rates and durations (1) do not exceed pre-project runoff flow rates and durations for the range of runoff flows identified under section D.1.g.(1)(b), where the increased flow rates and durations will result in increased potential for erosion or other significant adverse impacts to beneficial uses, attributable to changes in the flow rates and durations, and (2) do not result in channel conditions which do not meet the channel standard developed under section D.1.g.(1)(a) for channel segments downstream of Priority Development Project discharge points.
(d) Include other performance criteria (numeric or otherwise) for Priority Development Projects as necessary to prevent urban runoff from the projects from increasing erosion of channel beds and banks, silt pollutant generation, or other impacts to beneficial uses and stream habitat due to increased erosive force.
(e) Include a review of pertinent literature.
(f) Include a protocol to evaluate potential hydrograph change impacts to downstream watercourses from Priority Development Projects.
(g) Include a description of how the Copermittees will incorporate the HMP requirements into their local approval processes.

[8] The identified range of runoff flows to be controlled should be expressed in terms of peak flow rates of rainfall events, such as "10% of the pre-project 2-year peak flow up to the pre-project 10-year peak flow."

(h) Include criteria on selection and design of management practices and measures (such as detention, retention, and infiltration) to control flow rates and durations and address potential hydromodification impacts.
(i) Include technical information supporting any standards and criteria proposed.
(j) Include a description of inspections and maintenance to be conducted for management practices and measures to control flow rates and durations and address potential hydromodification impacts.
(k) Include a description of pre- and post-project monitoring and other program evaluations to be conducted to assess the effectiveness of implementation of the HMP.
(l) Include mechanisms for addressing cumulative impacts within a watershed on channel morphology.
(m) Include information on evaluation of channel form and condition, including slope, discharge, vegetation, underlying geology, and other information, as appropriate.

(2) The HMP may include implementation of planning measures (e.g., buffers and restoration activities, including revegetation, use of less-impacting facilities at the point(s) of discharge, etc.) to allow expected changes in stream channel cross sections, vegetation, and discharge rates, velocities, and/or durations without adverse impacts to channel beneficial uses. Such measures shall not include utilization of non-naturally occurring hardscape materials such as concrete, riprap, gabions, etc.

(3) Section D.1.g.(1)(c) does not apply to Development Projects where the project discharges stormwater runoff into channels or storm drains where the pre-existing channel or storm drain conditions result in minimal potential for erosion or other impacts to beneficial uses. Such situations may include discharges into channels that are concrete-lined or significantly hardened (e.g., with rip-rap, sackrete, etc.) downstream to their outfall in bays or the ocean; underground storm drains discharging to bays or the ocean; and construction of projects where the sub-watersheds below the projects' discharge points are highly impervious (e.g., >70%) and the potential for single-project and/or cumulative impacts is minimal. Specific criteria for identification of such situations shall be included as a part of the HMP. However, plans to restore a channel reach may re-introduce the applicability of HMP controls, and would need to be addressed in the HMP.

(4) <u>HMP Reporting</u>

The Copermittees shall collaborate to report on HMP development as required in section J.2.a of this Order.

(5) <u>HMP Implementation</u>

180 days after approval of the HMP by the Regional Board, each Copermittee shall incorporate into its local SUSMP and implement the HMP for all applicable Priority Development Projects. Prior to approval of the HMP by the Regional Board, the early implementation of measures likely to be included in the HMP shall be encouraged by the Copermittees.

(6) Interim Hydromodification Criteria for Projects Disturbing 50 Acres or More

Within 365 days of adoption of this Order, the Copermittees shall collectively identify an interim range of runoff flow rates for which Priority Development Project post-project runoff flow rates and durations shall not exceed pre-project runoff flow rates and durations (Interim Hydromodification Criteria), where the increased discharge flow rates and durations will result in increased potential for erosion or other significant adverse impacts to beneficial uses, attributable to changes in flow rates and durations. Development of the Interim Hydromodification Criteria shall include identification of methods to be used by Priority Development Projects to exhibit compliance with the criteria, including continuous simulation of the entire rainfall record. Starting 365 days after adoption of this Order and until the final Hydromodification Management Plan standard and criteria are implemented, each Copermittee shall require Priority Development Projects disturbing 50 acres or more to implement hydrologic controls to manage post-project runoff flow rates and durations as required by the Interim Hydromodification Criteria. Development Projects disturbing 50 acres or more are exempt from this requirement when:

(a) The project would discharge into channels that are concrete-lined or significantly hardened (e.g., with rip-rap, sackcrete, etc.) downstream to their outfall in bays or the ocean;
(b) The project would discharge into underground storm drains discharging directly to bays or the ocean; or
(c) The project would discharge to a channel where the watershed areas below the project's discharge points are highly impervious (e.g. >70%).

h. ENFORCEMENT OF DEVELOPMENT SITES

Each Copermittee shall enforce its storm water ordinance for all Development Projects and at all development sites as necessary to maintain compliance with this Order. Copermittee ordinances or other regulatory mechanisms shall include appropriate sanctions to achieve compliance. Sanctions shall include the following or their equivalent: Non-monetary penalties, fines, bonding requirements, and/or permit or occupancy denials for non-compliance.

2. Construction Component

Each Copermittee shall implement a construction program which meets the requirements of this section, reduces construction site discharges of pollutants from the MS4 to the MEP, and prevents construction site discharges from the MS4 from causing or contributing to a violation of water quality standards.

a. ORDINANCE UPDATE AND APPROVAL PROCESS

(1) Within 365 days of adoption of this Order, each Copermittee shall review and update its grading ordinances and other ordinances as necessary to achieve full compliance with this Order, including requirements for the implementation of all designated BMPs and other measures.

(2) Prior to approval and issuance of local construction and grading permits, each Copermittee shall:

(a) Require all individual proposed construction sites to implement designated BMPs and other measures so that pollutants discharged from the site will be reduced to the maximum extent practicable and will not cause or contribute to a violation of water quality standards.
(b) Prior to permit issuance, require and review the project proponent's storm water management plan to verify compliance with their grading ordinance, other ordinances, and this Order.
(c) Verify that project proponents subject to California's statewide General NPDES Permit for Storm Water Discharges Associated With Construction Activities, (hereinafter General Construction Permit), have existing coverage under the General Construction Permit.

b. SOURCE IDENTIFICATION

Each Copermittee shall maintain and update monthly a watershed based inventory of all construction sites within its jurisdiction. The use of an automated database system, such as Geographical Information System (GIS) is highly recommended.

c. BMP IMPLEMENTATION

(1) Each Copermittee shall designate a minimum set of BMPs and other measures to be implemented at construction sites. The designated minimum set of BMPs shall include, at a minimum:

(a) General Site Management

i. Pollution prevention, where appropriate.
ii. Development and implementation of a storm water management plan.
iii. Minimization of areas that are cleared and graded to only the portion of the site that is necessary for construction;
iv. Minimization of exposure time of disturbed soil areas;
v. Minimization of grading during the wet season and correlation of grading with seasonal dry weather periods to the extent feasible.
vi. Limitation of grading to a maximum disturbed area as determined by each Copermittee before either temporary or permanent erosion controls are implemented to prevent storm water pollution. The Copermittee has the option of temporarily increasing the size of disturbed soil areas by a set amount beyond the maximum, if the individual site is in compliance with applicable storm water regulations and the site has adequate control practices implemented to prevent storm water pollution.
vii. Temporary stabilization and reseeding of disturbed soil areas as rapidly as feasible;
viii. Preservation of natural hydrologic features where feasible;
ix. Preservation of riparian buffers and corridors where feasible;
x. Maintenance of all BMPs, until removed; and
xi. Retention, reduction, and proper management of all pollutant discharges on site to the MEP standard.

(b) Erosion and Sediment Controls

i. Erosion prevention, to be used as the most important measure for keeping sediment on site during construction, but never as the single method;
ii. Sediment controls, to be used as a supplement to erosion prevention for keeping sediment on-site during construction;
iii. Slope stabilization on all inactive slopes during the rainy season and during rain events in the dry season;
iv. Slope stabilization on all active slopes during rain events regardless of the season; and
v. Permanent revegetation or landscaping as early as feasible.

(2) Each Copermittee shall require implementation of advanced treatment for sediment at construction sites that are determined by the Copermittee to be an exceptional threat to water quality. In evaluating the threat to water quality, the following factors shall be considered by the Copermittee:

(a) Soil erosion potential or soil type;
(b) The site's slopes;
(c) Project size and type;
(d) Sensitivity of receiving water bodies;
(e) Proximity to receiving water bodies;
(f) Non-storm water discharges;
(g) Ineffectiveness of other BMPs; and
(h) Any other relevant factors.

(3) Each Copermittee shall implement, or require the implementation of, the designated minimum BMPs and any additional measures necessary to comply with this Order at each construction site within its jurisdiction year round. However, BMP implementation requirements can vary based on wet and dry seasons. Dry season BMP implementation must plan for and address rain events that may occur during the dry season.

(4) Each Copermittee shall implement, or require implementation of, additional controls for construction sites tributary to CWA section 303(d) water body segments impaired for sediment as necessary to comply with this Order. Each Copermittee shall implement, or require implementation of, additional controls for construction sites within or adjacent to or discharging directly to coastal lagoons or other receiving waters within environmentally sensitive areas (as defined in section Attachment C of this Order) as necessary to comply with this Order.

d. INSPECTION OF CONSTRUCTION SITES

Each Copermittee shall conduct construction site inspections for compliance with its local ordinances (grading, storm water, etc.), permits (construction, grading, etc.), and this Order.

(1) During the wet season, each Copermittee shall inspect at least biweekly (every two weeks), all construction sites within its jurisdiction meeting the following

criteria:

(a) All sites 50 acres or more in size and grading will occur during the wet season;
(b) All sites 1 acre or more, and tributary to a CWA section 303(d) water body segment impaired for sediment or within or directly adjacent to or discharging directly to a receiving water within an ESA; and
(c) Other sites determined by the Copermittees or the Regional Board as a significant threat to water quality. In evaluating threat to water quality, the following factors shall be considered:

i. soil erosion potential;
ii. site slope;
iii. project size and type;
iv. sensitivity of receiving water bodies;
v. proximity to receiving water bodies;
vi. non-storm water discharges;
vii. past record of non-compliance by the operators of the construction site; and
viii. any other relevant factors.

(2) During the wet season, each Copermittee shall inspect at least monthly, all construction sites with one acre or more of soil disturbance not meeting the criteria specified above in section D.2.c.(1).

(3) During the wet season, each Copermittee shall inspect as needed, construction sites less than 1 acre in size.

(4) Each Copermittee shall inspect all construction sites as needed during the dry season.

(5) Based upon site inspection findings, each Copermittee shall implement all follow-up actions (i.e., reinspection, enforcement) necessary to comply with this Order.

(6) Inspections of construction sites shall include, but not be limited to:

(a) Check for coverage under the General Construction Permit (Notice of Intent (NOI) and/or Waste Discharge Identification No.) during initial inspections;
(b) Assessment of compliance with Permittee ordinances and permits related to urban runoff, including the implementation and maintenance of designated minimum BMPs;
(c) Assessment of BMP effectiveness;
(d) Visual observations for non-storm water discharges, potential illicit connections, and potential discharge of pollutants in storm water runoff;
(e) Education and outreach on storm water pollution prevention, as needed; and
(f) Creation of a written or electronic inspection report.

(7) The Copermittees shall track the number of inspections for the inventoried construction sites throughout the reporting period to verify that the sites are inspected at the minimum frequencies required.

e. ENFORCEMENT OF CONSTRUCTION SITES

Each Copermittee shall develop and implement an escalating enforcement process that achieves prompt corrective actions at construction sites for violations of the Copermittee's water quality protection permit requirements and ordinances. This enforcement process shall include authorizing the Copermittee's construction site inspectors to take immediate enforcement actions when appropriate and necessary. The enforcement process shall include appropriate sanctions such as stop work orders, non-monetary penalties, fines, bonding requirements, and/or permit denials for non-compliance.

f. REPORTING OF NON-COMPLIANT SITES

In addition to the notification requirements in section 5(e) of Attachment B, each Copermittee shall notify the Regional Board when the Copermittee issues a stop work order or other high level enforcement to a construction site in their jurisdiction as a result of storm water violations.

3. Existing Development Component

a. MUNICIPAL

Each Copermittee shall implement a municipal program which meets the requirements of this section, reduces municipal discharges of pollutants from the MS4 to the MEP, and prevents municipal discharges from the MS4 from causing or contributing to a violation of water quality standards.

(1) Source Identification

Each Copermittee shall annually update a watershed based inventory of municipal areas and activities. The inventory shall include the name, address (if applicable), and a description of the area/activity, which pollutants are potentially generated by the area/activity, and identification of whether the area/activity is tributary to a CWA section 303(d) water body segment and generates pollutants for which the water body segment is impaired. The use of an automated database system, such as Geographical Information System (GIS) is highly recommended when applicable, but not required.

(2) BMP Implementation

(a) Each Copermittee shall implement pollution prevention methods in its municipal program and shall require their use by appropriate municipal departments and personnel, where appropriate.

(b) Each Copermittee shall designate a minimum set of BMPs for all municipal areas and activities. The designated minimum BMPs for municipal areas and activities shall be area or activity specific as appropriate.

(c) Each Copermittee shall implement, or require the implementation of, the designated minimum BMPs and any additional measures necessary to comply with this Order for each municipal area or activity within its

jurisdiction.

(d) Each Copermittee shall evaluate existing flood control devices to determine if retrofitting the device to provide additional pollutant removal from urban runoff is feasible. When conducting flood control device retrofit projects, each Copermittee shall incorporate permanent pollutant removal measures into the projects, where feasible.

(e) Each Copermittee shall implement, or require implementation of, any additional controls for municipal areas and activities tributary to CWA section 303(d) impaired water body segments (where an area or activity generates pollutants for which the water body segment is impaired) as necessary to comply with this Order. Each Copermittee shall implement, or require implementation of, additional controls for municipal areas and activities within or directly adjacent to or discharging directly to coastal lagoons or other receiving waters within environmentally sensitive areas (as defined in Attachment C of this Order) as necessary to comply with this Order.

(f) Each Copermittee shall implement, or require implementation of, additional controls for special events within their jurisdiction that are expected to generate significant trash and litter. Controls to consider shall include:

i. Temporary screens on catch basins and storm drain inlets;
ii. Temporary fencing to prevent windblown trash from entering adjacent water bodies and MS4 channels;
iii. Proper management of trash and litter;
iv. Catch basin cleaning following the special event and prior to an anticipated rain event;
v. Street sweeping of roads, streets, highways and parking facilities following the special event; and
vi. Other equivalent controls.

(3) <u>Operation and Maintenance of Municipal Separate Storm Sewer System and Structural Controls</u>

(a) Each Copermittee shall implement a schedule of inspection and maintenance activities to verify proper operation of all municipal structural treatment controls designed to reduce pollutant discharges to or from its MS4s and related drainage structures.

(b) Each Copermittee shall implement a schedule of maintenance activities for the MS4 and MS4 facilities (catch basins, storm drain inlets, open channels, etc). The maintenance activities shall, at a minimum, include:

i. Inspection at least once a year between May 1 and September 30 of each year for all MS4 facilities that receive or collect high volumes of trash and debris. All other MS4 facilities shall be inspected at least annually throughout the year.
ii. Following two years of inspections, any MS4 facility that requires inspection and cleaning less than annually may be inspected as needed, but not less that every other year.

iii. Any catch basin or storm drain inlet that has accumulated trash and debris greater than 33% of design capacity shall be cleaned in a timely manner. Any MS4 facility that is designed to be self cleaning shall be cleaned of any accumulated trash and debris immediately. Open channels shall be cleaned of observed anthropogenic litter in a timely manner.
iv. Record keeping of the maintenance and cleaning activities including the overall quantity of waste removed.
v. Proper disposal of waste removed pursuant to applicable laws.
vi. Measures to eliminate waste discharges during MS4 maintenance and cleaning activities.

(4) Management of Pesticides, Herbicides, and Fertilizers

The Copermittees shall implement BMPs to reduce the contribution of pollutants associated with the application, storage, and disposal of pesticides, herbicides and fertilizers from municipal areas and activities to MS4s. Important municipal areas and activities include municipal facilities, public rights-of-way, parks, recreational facilities, golf courses, cemeteries, botanical or zoological gardens and exhibits, landscaped areas, etc.

Such BMPs shall include, at a minimum: (1) educational activities, permits, certifications and other measures for municipal applicators and distributors; (2) integrated pest management measures that rely on non-chemical solutions; (3) the use of native vegetation; (4) schedules for irrigation and chemical application; and (5) the collection and proper disposal of unused pesticides, herbicides, and fertilizers.

(5) Sweeping of Municipal Areas

Each Copermittee shall implement a program to sweep improved (possessing a curb and gutter) municipal roads, streets, highways, and parking facilities. The program shall include the following measures:

(a) Roads, streets, highways, and parking facilities identified as consistently generating the highest volumes of trash and/or debris shall be swept at least two times per month.

(b) Roads, streets, highways, and parking facilities identified as consistently generating moderate volumes of trash and/or debris shall be swept at least monthly.

(c) Roads, streets, highways, and parking facilities identified as generating low volumes of trash and/or debris shall be swept as necessary, but no less than once per year.

(6) Infiltration From Sanitary Sewer to MS4/Provide Preventive Maintenance of Both

Each Copermittee shall implement controls and measures to prevent and eliminate infiltration of seepage from municipal sanitary sewers to MS4s through thorough, routine preventive maintenance of the MS4. Each Copermittee that

operates both a municipal sanitary sewer system and a MS4 shall implement controls and measures to prevent and eliminate infiltration of seepage from the municipal sanitary sewers to the MS4s that shall include overall sanitary sewer and MS4 surveys and thorough, routine preventive maintenance of both.

(7) Inspection of Municipal Areas and Activities

(a) At a minimum, each Copermittee shall inspect the following high priority municipal areas and activities annually:

i. Roads, Streets, Highways, and Parking Facilities.
ii. Flood Management Projects and Flood Control Devices.
iii. Areas and activities tributary to a C WA section 303(d) impaired water body segment, where an area or activity generates pollutants for which the water body segment is impaired. Areas and activities within or adjacent to or discharging directly to coastal lagoons or other receiving waters within environmentally sensitive areas (as defined in Attachment C of this Order).
iv. Municipal Facilities.
[1] Active or closed municipal landfills;
[2] Publicly owned treatment works (including water and wastewater treatment plants) and sanitary sewage collection systems;
[3] Solid waste transfer facilities;
[4] Land application sites;
[5] Corporate yards including maintenance and storage yards for materials, waste, equipment and vehicles; and
[6] Household hazardous waste collection facilities.
v. Municipal airfields.
vi. Parks and recreation facilities.
vii. Special event venues following special events (festivals, sporting events, etc.)
viii. Power washing.
ix. Other municipal areas and activities that the Copermittee determines may contribute a significant pollutant load to the MS4.

(b) Other municipal areas and activities shall be inspected as needed.

(c) Based upon site inspection findings, each Copermittee shall implement all follow-up actions necessary to comply with this Order.

(8) Enforcement of Municipal Areas and Activities

Each Copermittee shall enforce its storm water ordinance for all municipal areas and activities as necessary to maintain compliance with this Order.

b. INDUSTRIAL AND COMMERCIAL

Each Copermittee shall implement an industrial and commercial program which meets the requirements of this section, reduces industrial and commercial discharges of pollutants from the MS4 to the MEP, and prevents industrial and commercial discharges from the MS4 from causing or contributing to a violation of water quality standards.

(1) Source Identification

Each Copermittee shall annually update a watershed-based inventory of all industrial and commercial sites/sources within its jurisdiction (regardless of ownership) that could contribute a significant pollutant load to the MS4. The inventory shall include the following minimum information for each industrial and commercial site/source: name; address; pollutants potentially generated by the site/source (and identification of whether the site/source is tributary to a Clean Water Act section 303(d) water body segment and generates pollutants for which the water body segment is impaired); and a narrative description including SIC codes which best reflects the principal products or services provided by each facility. The use of an automated database system, such as Geographical Information System (GIS) is highly recommended.

At a minimum, the following sites/sources shall be included in the inventory:

(a) Commercial Sites/Sources:

i. Automobile repair, maintenance, fueling, or cleaning;
ii. Airplane repair, maintenance, fueling, or cleaning;
iii. Boat repair, maintenance, fueling, or cleaning;
iv. Equipment repair, maintenance, fueling, or cleaning;
v. Automobile and other vehicle body repair or painting;
vi. Mobile automobile or other vehicle washing;
vii. Automobile (or other vehicle) parking lots and storage facilities;
viii. Retail or wholesale fueling;
ix. Pest control services;
x. Eating or drinking establishments, including food markets;
xi. Mobile carpet, drape or furniture cleaning;
xii. Cement mixing or cutting;
xiii. Masonry;
xiv. Painting and coating;
xv. Botanical or zoological gardens and exhibits;
xvi. Landscaping;
xvii. Nurseries and greenhouses;
xviii. Golf courses, parks and other recreational areas/facilities;
xix. Cemeteries;
xx. Pool and fountain cleaning;
xxi. Marinas;
xxii. Portable sanitary services;
xxiii. Building material retailers and storage;
xxiv. Animal facilities; and
xxv. Power washing services.

(b) Industrial Sites/Sources:

i. Industrial Facilities, as defined at 40 CFR § 122.26(b)(14), including those subject to the General Industrial Permit or other individual NPDES permit;
ii. Operating and closed landfills;
iii. Facilities subject to SARA Title III; and

iv. Hazardous waste treatment, disposal, storage and recovery facilities.

(c) All other commercial or industrial sites/sources tributary to a CWA Section 303(d) impaired water body segment, where the site/source generates pollutants for which the water body segment is impaired. All other commercial or industrial sites/sources within or directly adjacent to or discharging directly to coastal lagoons or other receiving waters within environmentally sensitive areas (as defined in Attachment C of this Order).

(d) All other commercial or industrial sites/sources that the Copermittee determines may contribute a significant pollutant load to the MS4.

(2) <u>BMP Implementation</u>

(a) Each Copermittee shall require the use of pollution prevention methods by industrial and commercial sites/sources, where appropriate.

(b) Each Copermittee shall designate a minimum set of BMPs for all industrial and commercial sites/sources. The designated minimum BMPs shall be specific to facility types and pollutant generating activities, as appropriate.

(c) Within the first three years of implementation of the updated Jurisdictional Urban Runoff Management Program, each Copermittee shall notify the owner/operator of each inventoried industrial and commercial site/source of the BMP requirements applicable to the site/source.

(d) Each Copermittee shall implement, or require the implementation of, the designated minimum BMPs and any additional measures necessary to comply with this Order at each industrial and commercial site/source within its jurisdiction.

(e) Each Copermittee shall implement, or require implementation of, additional controls for industrial and commercial sites/sources tributary to CWA section 303(d) impaired water body segments (where a site/source generates pollutants for which the water body segment is impaired) as necessary to comply with this Order. Each Copermittee shall implement, or require implementation of, additional controls for industrial and commercial sites/sources within or directly adjacent to or discharging directly to coastal lagoons or other receiving waters within environmentally sensitive areas (as defined in Attachment C of this Order) as necessary to comply with this Order.

(3) <u>Inspection of Industrial and Commercial Sites/Sources</u>

(a) Each Copermittee shall conduct industrial and commercial site inspections for compliance with its ordinances, permits, and this Order. Inspections shall include but not be limited to:

i. Review of BMP implementation plans, if the site uses or is required to use such a plan;
ii. Review of facility monitoring data, if the site monitors its runoff;

iii. Check for coverage under the General Industrial Permit (Notice of Intent (NOI) and/or Waste Discharge Identification No.), if applicable;
iv. Assessment of compliance with Copermittee ordinances and permits related to urban runoff;
v. Assessment of BMP implementation, maintenance and effectiveness;
vi. Visual observations for non-storm water discharges, potential illicit connections, and potential discharge of pollutants in storm water runoff; and
vii. Education and training on storm water pollution prevention, as conditions warrant.

(b) At a minimum, 50% of all sites (excluding mobile sources) determined to pose a high threat to water quality shall be inspected in the first year of implementation of the updated Jurisdictional Urban Runoff Management Program, regardless of whether this exceeds the number of inspections required in section D.3.b.(3)(c). This requirement shall increase to 100% of the sites in the second year, and 100% annually thereafter. In any year that the total number of required inspection per section D.3.b.(3)(c) exceeds the number of high threat to water quality sites, all high threat to water quality sites shall be inspected. In evaluating threat to water quality, each Copermittee shall address, at a minimum, the following:

i. Type of activity (SIC code);
ii. Materials used at the facility;
iii. Wastes generated;
iv. Pollutant discharge potential;
v. Non-storm water discharges;
vi. Size of facility;
vii. Proximity to receiving water bodies;
viii. Sensitivity of receiving water bodies;
ix. Whether the facility is subject to the General Industrial Permit or an individual NPDES permit;
x. Whether the facility has filed a No Exposure Certification/Notice of Non-Applicability;
xi. Facility design;
xii. Total area of the site, area of the site where industrial or commercial activities occur, and area of the site exposed to rainfall and runoff;
xiii. The facility's compliance history; and
xiv. Any other relevant factors.

(c) At a minimum, 20% of the sites inventoried as required in section D.3.b.(1) above (excluding mobile sources) shall be inspected in the first year of implementation of the updated Jurisdictional Urban Runoff Management Program. This requirement shall increase to 25% of the sites in the second year, and 25% annually thereafter.

(d) Each Copermittee may develop and implement a third party inspection program for verifying industrial and commercial site/source compliance with its ordinances, permits, and this Order. The third party inspections can satisfy up to 30% of the inspection requirements in section D.3.b(3)(c), with the Copermittee having to fulfill the remaining required inspections. To the extent that third party inspections are conducted to fulfill the requirements of

section D.3.b(3)(c), the Copermittee will be responsible for the inspection of an additional site for every three sites inspected by a third party. The additional inspections may be conducted by the Copermittee or a third party inspector. The Copermittees third party inspection program must include the following:

i. A description of facility types proposed to be inspected by third parties, including SIC codes;
ii. A third party inspector certification program;
iii. The inspection requirements described in section D.3.b.(3)(a);
iv. Inspection form templates for third party inspector use;
v. Photo documentation of potential storm water violations identified during the third party inspection;
vi. An annual Copermittee audit of random, representative sites that were inspected by a third party;
vii. An annual Copermittee audit of random, representative third party inspectors;
viii. Reporting to the Copermittee of identified significant potential violations within 24 hours of the third party inspection;
ix. Reporting to the Copermittee of all inspection findings within one week of the inspection being conducted; and
x. Copermittee follow-up and/or enforcement actions for identified potential storm water violations within 2 business days of the inspection or potential violation report receipt.

(e) Based upon site inspection findings, each Copermittee shall implement all follow-up actions and enforcement necessary to comply with this Order.

(f) To the extent that the Regional Board has conducted an inspection of an industrial site during a particular year, the requirement for the responsible Copermittee to inspect this facility during the same year will be satisfied.

(g) The Copermittees shall track the number of inspections for the inventoried industrial and commercial sites/sources throughout the reporting period to verify that the sites/sources are inspected at the minimum frequencies listed in sections D.3.b.(3)(b) and D.3.b.(3)(c).

(4) <u>Regulation of Mobile Businesses</u>

(a) Each Copermittee shall develop and implement a program to reduce the discharge of pollutants from mobile businesses to the MEP. Each Copermittee shall keep as part of their inventory (section D.3.b.(1) above), a listing of mobile businesses known to operate within its jurisdiction. The program shall include:

i. Development and implementation of minimum standards and BMPs to be required for each of the various types of mobile businesses.
ii. Development and implementation of an enforcement strategy which specifically addresses the unique characteristics of mobile businesses.
iii. Notification of those mobile businesses known to operate within the Copermittee's jurisdiction of the minimum standards and BMP requirements and local ordinances.

iv. Development and implementation of an outreach and education strategy.
v. Inspection of mobile businesses as needed.

(b) If they choose to, the Copermittees may cooperate in developing and implementing their programs for mobile businesses, including sharing of mobile business inventories, BMP requirements, enforcement action information, and education.

(5) Enforcement of Industrial and Commercial Sites/Sources

Each Copermittee shall enforce its storm water ordinance for all industrial and commercial sites/sources as necessary to maintain compliance with this Order. Copermittee ordinances or other regulatory mechanisms shall include appropriate sanctions to achieve compliance. Sanctions shall include the following or their equivalent: Non-monetary penalties, fines, bonding requirements, and/or permit denials for non-compliance.

(6) Reporting of Industrial Non-Filers

As part of each Annual Report, each Copermittee shall report a list of industrial sites, including the name, address, and SIC code, that may require coverage under the General Industrial Permit for which a NOI has not been filed.

c. RESIDENTIAL

Each Copermittee shall implement a residential program which meets the requirements of this section, reduces residential discharges of pollutants from the MS4 to the MEP, and prevents residential discharges from the MS4 from causing or contributing to a violation of water quality standards.

(1) Threat to Water Quality Prioritization

Each Copermittee shall identify high threat to water quality residential areas and activities. At a minimum, these shall include:

(a) Automobile repair, maintenance, washing, and parking;
(b) Home and garden care activities and product use (pesticides, herbicides, and fertilizers);
(c) Disposal of trash, pet waste, green waste, and household hazardous waste (e.g., paints, cleaning products);
(d) Any other residential source that the Copermittee determines may contribute a significant pollutant load to the MS4;
(e) Any residential areas tributary to a CWA section 303(d) impaired water body, where the residence generates pollutants for which the water body is impaired; and
(f) Any residential areas within or directly adjacent to or discharging directly to a coastal lagoon or other receiving waters within an environmentally sensitive area (as defined in Attachment C of this Order).

(2) BMP Implementation

(a) Each Copermittee shall designate minimum BMPs for high threat to water quality residential areas and activities. The designated minimum BMPs for high threat to water quality municipal areas and activities shall be area or activity specific.
(b) Each Copermittee shall encourage the use of pollution prevention methods by residents, where appropriate.
(c) Each Copermittee shall facilitate the proper management and disposal of used oil, toxic materials, and other household hazardous wastes. Such facilitation shall include educational activities, public information activities, and establishment of collection sites operated by the Copermittee or a private entity. Curbside collection of household hazardous wastes is encouraged.
(d) Each Copermittee shall implement, or require implementation of, the designated minimum BMPs and any additional measures necessary to comply with this Order for high threat to water quality residential areas and activities.
(e) Each Copermittee shall implement, or require implementation of, BMPs for residential areas and activities that have not been designated a high threat to water quality, as necessary.
(f) Each Copermittee shall implement, or require implementation of, any additional controls for residential areas and activities tributary to CWA section 303(d) impaired water body segments (where a residential area or activity generates pollutants for which the water body segment is impaired) as necessary to comply with this Order. Each Copermittee shall implement, or require implementation of, additional controls for residential areas within or directly adjacent to or discharging directly to coastal lagoons or other receiving waters within environmentally sensitive areas (as defined in section Attachment C of this Order) as necessary to comply with this Order.

(3) Enforcement of Residential Areas and Activities

Each Copermittee shall enforce its storm water ordinance for all residential areas and activities as necessary to maintain compliance with this Order.

(4) Evaluation of Oversight of Residential Areas and Activities

The Copermittees are encouraged to individually or collectively evaluate their methods used for oversight of residential areas and activities, including assessment of inspections of residential areas and activities. The evaluation should consider various oversight and inspection approaches to identify an effective and appropriate oversight and inspection approach for residential areas and activities.

(5) Regional Residential Education Program

Each Copermittee shall collaborate with the other Copermittees to develop and implement the Regional Residential Education Program required in section F.1 of this Order.

4. Illicit Discharge Detection and Elimination Component

Each Copermittee shall implement an Illicit Discharge Detection and Elimination program which meets the requirements of this section and actively seeks and eliminates illicit discharges and connections.

a. ILLICIT DISCHARGES AND CONNECTIONS

Each Copermittee shall implement a program to actively seek and eliminate illicit discharges and connections into its MS4. The program shall include utilization of appropriate municipal personnel to assist in identifying illicit discharges and connections during their daily activities. The program shall address all types of illicit discharges and connections excluding those non-storm water discharges not prohibited by the Copermittee in accordance with section B of this Order.

b. DEVELOP/MAINTAIN MS4 MAP

Each Copermittee shall develop and/or update its labeled map of its entire MS4 and the corresponding drainage areas within its jurisdiction. The use of a GIS is highly recommended. The accuracy of the MS4 map shall be confirmed during dry weather field screening and analytical monitoring and shall be updated at least annually.

c. DRY WEATHER FIELD SCREENING AND ANALYTICAL MONITORING

Each Copermittee shall conduct dry weather field screening and analytical monitoring of MS4 outfalls and other portions of its MS4 within its jurisdiction to detect illicit discharges and connections in accordance with Receiving Waters and Urban Runoff Monitoring and Reporting Program No. R9-2007-0001.

d. INVESTIGATION/INSPECTION AND FOLLOW-UP

(1) Each Copermittee shall investigate and inspect any portion of the MS4 that, based on visual observations, dry weather field screening and analytical monitoring results, or other appropriate information, indicates a reasonable potential for illicit discharges, illicit connections, or other sources of non-storm water (including non-prohibited discharge(s) identified in section B of this Order). Each Copermittee shall develop/update and utilize numeric criteria action levels (or other actions level criteria where appropriate) to determine when follow-up investigations will be performed.

(2) Within two business days of receiving dry weather field screening results that exceed action levels, the Copermittees shall either conduct an investigation to identify the source of the discharge or provide the rationale for why the discharge does not pose a threat to water quality and does not need further investigation. Within two business days, where applicable, of receiving analytical laboratory results that exceed action levels, the Copermittees shall either conduct an investigation to identify the source of the discharge or provide the rationale for why the discharge does not pose a threat to water quality and does not need further investigation. Obvious illicit discharges (i.e. color, odor, or significant exceedances of action levels) shall be investigated immediately.

e. ELIMINATION OF ILLICIT DISCHARGES AND CONNECTIONS

Each Copermittee shall take immediate action to eliminate all detected illicit discharges, illicit discharge sources, and illicit connections as soon as possible after detection. Elimination measures may include an escalating series of enforcement actions for those illicit discharges that are not a serious threat to public health or the environment. Illicit discharges that pose a serious threat to the public's health or the environment must be eliminated immediately.

f. ENFORCE ORDINANCES

Each Copermittee shall implement and enforce its ordinances, orders, or other legal authority to prevent illicit discharges and connections to its MS4. Each Copermittee shall also implement and enforce its ordinance, orders, or other legal authority to eliminate detected illicit discharges and connections to it MS4.

g. PREVENT AND RESPOND TO SEWAGE SPILLS (INCLUDING FROM PRIVATE LATERALS AND FAILING SEPTIC SYSTEMS) AND OTHER SPILLS

Each Copermittee shall prevent, respond to, contain and clean up all sewage and other spills that may discharge into its MS4 from any source (including private laterals and failing septic systems). Spill response teams shall prevent entry of spills into the MS4 and contamination of surface water, ground water and soil to the maximum extent practicable. Each Copermittee shall coordinate spill prevention, containment and response activities throughout all appropriate departments, programs and agencies so that maximum water quality protection is available at all times.

Each Copermittee shall develop and implement a mechanism whereby it is notified of all sewage spills from private laterals and failing septic systems into its MS4. Each Copermittee shall prevent, respond to, contain and clean up sewage from any such notification.

h. FACILITATE PUBLIC REPORTING OF ILLICIT DISCHARGES AND CONNECTIONS - PUBLIC HOTLINE

Each Copermittee shall promote, publicize and facilitate public reporting of illicit discharges or water quality impacts associated with discharges into or from MS4s. Each Copermittee shall facilitate public reporting through development and operation of a public hotline. Public hotlines can be Copermittee-specific or shared by Copermittees. All storm water hotlines shall be capable of receiving reports in both English and Spanish 24 hours per day / seven days per week. Copermittees shall respond to and resolve each reported incident in a timely manner. All reported incidents, and how each was resolved, shall be summarized in each Copermittee's individual JURMP Annual Report.

5. Education Component

Each Copermittee shall implement an education program using all media as appropriate to (1) measurably increase the knowledge of the target communities regarding MS4s, impacts of urban runoff on receiving waters, and potential BMP solutions for the target audience; and (2) to measurably change the behavior of target communities and thereby reduce pollutant releases to MS4s and the environment. At a minimum, the education

program shall meet the requirements of this section and address the following target communities:

- Municipal Departments and Personnel
- Construction Site Owners and Developers
- Industrial Owners and Operators
- Commercial Owners and Operators
- Residential Community, General Public, and School Children

a. GENERAL REQUIREMENTS

(1) Each Copermittee shall educate each target community on the following topics where appropriate:

Table 3. Education

Laws, Regulations, Permits, & Requirements	**Best Management Practices**
• Federal, state, and local water quality laws and regulations • Statewide General NPDES Permit for Storm Water Discharges Associated with Industrial Activities (Except Construction). • Statewide General NPDES Permit for Storm Water Discharges Associated with Construction Activities • Regional Board's General NPDES Permit for Ground Water Dewatering • Regional Board's 401 Water Quality Certification Program • Statewide General NPDES Utility Vault Permit • Requirements of local municipal permits and ordinances (e.g., storm water and grading ordinances and permits)	• Pollution prevention and safe alternatives • Good housekeeping (e.g., sweeping impervious surfaces instead of hosing) • Proper waste disposal (e.g., garbage, pet/animal waste, green waste, household hazardous materials, appliances, tires, furniture, vehicles, boat/recreational vehicle waste, catch basin/ MS4 cleanout waste) • Non-storm water disposal alternatives (e.g., all wash waters) • Methods to minimized the impact of land development and construction • Erosion prevention • Methods to reduce the impact of residential and charity car-washing • Preventive Maintenance • Equipment/vehicle maintenance and repair • Spill response, containment, and recovery • Recycling • BMP maintenance
General Urban Runoff Concepts	**Other Topics**
• Impacts of urban runoff on receiving waters • Distinction between MS4s and sanitary sewers • BMP types: facility or activity specific, LID, source control, and treatment control • Short- and long-term water quality impacts associated with urbanization (e.g., land-use decisions, development, construction) • Non-storm water discharge prohibitions • How to conduct a storm water inspections	• Public reporting mechanisms • Water quality awareness for Emergency/ First Responders • Illicit Discharge Detection and Elimination observations and follow-up during daily work activities • Potable water discharges to the MS4 • Dechlorination techniques • Hydrostatic testing • Integrated pest management • Benefits of native vegetation • Water conservation

	• Alternative materials and designs to maintain peak runoff values • Traffic reduction, alternative fuel use

(2) Copermittee educational programs shall emphasize underserved target audiences, high-risk behaviors, and "allowable" behaviors and discharges, including various ethnic and socioeconomic groups and mobile sources.

b. SPECIFIC REQUIREMENTS

(1) Municipal Departments and Personnel Education

(a) Municipal Development Planning – Each Copermittee shall implement an education program so that its planning and development review staffs (and Planning Boards and Elected Officials, if applicable) have an understanding of:

i. Federal, state, and local water quality laws and regulations applicable to Development Projects;
ii. The connection between land use decisions and short and long-term water quality impacts (i.e., impacts from land development and urbanization);
iii. How to integrate LID BMP requirements into the local regulatory program(s) and requirements; and
iv. Methods of minimizing impacts to receiving water quality resulting from development, including:
[1] Storm water management plan development and review;
[2] Methods to control downstream erosion impacts;
[3] Identification of pollutants of concern;
[4] LID BMP techniques;
[5] Source control BMPs; and
[6] Selection of the most effective treatment control BMPs for the pollutants of concern.

(b) Municipal Construction Activities – Each Copermittee shall implement an education program that includes annual training prior to the rainy season so that its construction, building, code enforcement, and grading review staffs, inspectors, and other responsible construction staff have, at a minimum, an understanding of the following topics, as appropriate for the target audience:

i. Federal, state, and local water quality laws and regulations applicable to construction and grading activities.
ii. The connection between construction activities and water quality impacts (i.e., impacts from land development and urbanization and impacts from construction material such as sediment).
iii. Proper implementation of erosion and sediment control and other BMPs to minimize the impacts to receiving water quality resulting from construction activities.
iv. The Copermittee's inspection, plan review, and enforcement policies and procedures to verify consistent application.
v. Current advancements in BMP technologies.

vi. SUSMP Requirements including treatment options, LID BMPs, source control, and applicable tracking mechanisms.

(c) Municipal Industrial/Commercial Activities - Each Copermittee shall train staff responsible for conducting storm water compliance inspections and enforcement of industrial and commercial facilities at least once a year. Training shall cover inspection and enforcement procedures, BMP implementation, and reviewing monitoring data.

(d) Municipal Other Activities – Each Copermittee shall implement an education program so that municipal personnel and contractors performing activities which generate pollutants have an understanding of the activity specific BMPs for each activity to be performed.

(2) New Development and Construction Education

As early in the planning and development process as possible and all through the permitting and construction process, each Copermittee shall implement a program to educate project applicants, developers, contractors, property owners, community planning groups, and other responsible parties. The education program shall provide an understanding of the topics listed in Sections D.5.b.(1)(a) and D.5.b.(1)(b) above, as appropriate for the audience being educated. The education program shall also educate project applicants, developers, contractors, property owners, and other responsible parties on the importance of educating all construction workers in the field about stormwater issues and BMPs though formal or informal training.

(3) Residential, General Public, and School Children Education

Each Copermittee shall collaboratively conduct or participate in development and implementation of a plan to educate residential, general public, and school children target communities. The plan shall evaluate use of mass media, mailers, door hangers, booths at public events, classroom education, field trips, hands-on experiences, or other educational methods.

6. Public Participation Component

Each Copermittee shall incorporate a mechanism for public participation in the updating, development, and implementation of the Jurisdictional Urban Runoff Management Program.

E. WATERSHED URBAN RUNOFF MANAGEMENT PROGRAM

1. Each Copermittee shall implement all requirements of section E of this Order no later than 365 days after adoption of this Order, unless otherwise specified in this Order. Prior to 365 days after adoption of this Order, each Copermittee shall collaborate with the other Copermittees within its Watershed Management Area(s) (WMA) to at a minimum implement its Watershed URMP document, as the document was developed and amended to comply with the requirements of Order No. 2001-01.

2. Each Copermittee shall collaborate with other Copermittees within its WMA(s) as shown in Table 4 below to develop and implement an updated Watershed Urban Runoff

Management Program for each watershed. Each updated Watershed Urban Runoff Management Program shall meet the requirements of section E of this Order, reduce the discharge of pollutants from the MS4 to the MEP, and prevent urban runoff discharges from the MS4 from causing or contributing to a violation of water quality standards. At a minimum, each Watershed Urban Runoff Management Program shall include the elements described below:

a. Lead Watershed Permittee Identification

Watershed Copermittees shall identify the Lead Watershed Permittee for their WMA. In the event that a Lead Watershed Permittee is not selected and identified by the Watershed Copermittees, by default the Copermittee identified in Table 4 as the Lead Watershed Permittee for that WMA shall be responsible for implementing the requirements of the Lead Watershed Permittee in that WMA. The Lead Watershed Copermittees shall serve as liaisons between the Copermittees and Regional Board, where appropriate.

b. Watershed Map

Watershed Copermittees shall develop and periodically update a map of the WMA to facilitate planning, assessment, and collaborative decision-making. As determined appropriate, the map shall include features such as receiving waters (including the Pacific Ocean); Clean Water Act section 303(d) impaired receiving waters; land uses, MS4s; major highways; jurisdictional boundaries; and inventoried commercial, industrial, and municipal sites.

c. Watershed Water Quality Assessment

Watershed Copermittees shall annually assess the water quality of receiving waters in their WMA. This assessment shall use applicable water quality data, reports, and analysis generated in accordance with the requirements of the Receiving Waters Monitoring and Reporting Program, as well as applicable information available from other public and private organizations.

The assessment and analysis shall annually identify the WMA's water quality problems that are partially or fully attributable to MS4 discharges. Identified water quality problems shall include CWA section 303(d) listings, persistent violations of water quality standards, toxicity, impacts to beneficial uses, and other pertinent conditions. From the list of water quality problems, the high priority water quality problems of the WMA shall be identified, which shall include those water quality problems which most significantly exceed or impact water quality standards (water quality objectives and beneficial uses).

The assessment shall include annual identification of the likely sources of the WMA's high priority water quality problems.

d. Watershed-based Land Use Planning

The Watershed Copermittees shall develop, implement, and modify, as necessary, a program for encouraging collaborative, watershed-based, land use planning in their jurisdictional planning departments.

e. Watershed Strategy

Watershed Copermittees shall develop and implement a collective watershed strategy to abate the sources and reduce the discharge of pollutants causing the high priority water quality problems of the WMA. The strategy shall guide Watershed Copermittee selection and implementation of Watershed Activities, so that the Watershed Activities selected and implemented are appropriate for each Watershed Copermittee's contribution to the WMA's high priority water quality problems.

f. Watershed Activities

(1) The Watershed Copermittees shall identify and implement Watershed Activities that address the high priority water quality problems in the WMA. Watershed Activities shall include both Watershed Water Quality Activities and Watershed Education Activities. These activities may be implemented individually or collectively, and may be implemented at the regional, watershed, or jurisdictional level.

(a) Watershed Water Quality Activities are activities other than education that address the high priority water quality problems in the WMA. A Watershed Water Quality Activity implemented on a jurisdictional basis must be organized and implemented to target a watershed's high priority water quality problems or must exceed the baseline jurisdictional requirements of section D of this Order.
(b) Watershed Education Activities are outreach and training activities that address high priority water quality problems in the WMA.

(2) A Watershed Activities List shall be submitted with each updated WURMP and updated annually thereafter. The Watershed Activities List shall include both Watershed Water Quality Activities and Watershed Education Activities, along with a description of how each activity was selected, and how all of the activities on the list will collectively abate sources and reduce pollutant discharges causing the identified high priority water quality problems in the WMA.

(3) Each activity on the Watershed Activities List shall include the following information:

(a) A description of the activity;
(b) A time schedule for implementation of the activity, including key milestones;
(c) An identification of the specific responsibilities of Watershed Copermittees in completing the activity;
(d) A description of how the activity will address the identified high priority water quality problem(s) of the watershed;
(e) A description of how the activity is consistent with the collective watershed strategy;
(f) A description of the expected benefits of implementing the activity; and
(g) A description of how implementation effectiveness will be measured.

(4) Each Watershed Copermittee shall implement identified Watershed Activities pursuant to established schedules. For each Permit year, no less than two Watershed Water Quality Activities and two Watershed Education Activities shall be in an active implementation phase. A Watershed Water Quality Activity

is in an active implementation phase when significant pollutant load reductions, source abatement, or other quantifiable benefits to discharge or receiving water quality can reasonably be established in relation to the watershed's high priority water quality problem(s). Watershed Water Quality Activities that are capital projects are in active implementation for the first year of implementation only. A Watershed Education Activity is in an active implementation phase when changes in attitudes, knowledge, awareness, or behavior can reasonably be established in target audiences.

g. Copermittee Collaboration

Watershed Copermittees shall collaborate to develop and implement the Watershed Urban Runoff Management Programs. Watershed Copermittee collaboration shall include frequent regularly scheduled meetings.

h. Public Participation

Watershed Copermittees shall implement a watershed-specific public participation mechanism within each watershed. The mechanism shall encourage participation from other organizations within the watershed (such as the Department of Defense, Caltrans, lagoon foundations, etc.)

i. WURMP Review and Updates

Each WURMP shall be reviewed annually to identify needed modifications and improvements. Pursuant to the requirements of Section I.2.b of this Order the Watershed Copermittees shall develop and implement a plan and schedule to address the identified modifications and improvements. All updates to the WURMP shall be documented in the Watershed Urban Runoff Management Program Annual Reports. Individual Watershed Copermittees shall also review and modify their jurisdictional activities and JURMPs as necessary so that they are consistent with the requirements of the WURMP.

Table 4. Watershed Management Areas and Watershed Copermittees

RESPONSIBLE WATERSHED COPERMITTEE(S)	WATERSHED MANAGEMENT AREA	HYDROLOGIC UNIT OR AREA	MAJOR RECEIVING WATER BODIES
1. County of San Diego	Santa Margarita River	Santa Margarita HU (902.00)	Santa Margarita River and Estuary, Pacific Ocean
2. City of Oceanside 3. City of Vista 4. County of San Diego	San Luis Rey River	San Luis Rey HU (903.00)	San Luis Rey River and Estuary, Pacific Ocean
1. City of Carlsbad **2. City of Encinitas** 3. City of Escondido 4. City of Oceanside 5. City of San Marcos 6. City of Solana Beach 7. City of Vista 8. County of San Diego	Carlsbad	Carlsbad HU (904.00)	Batiquitos Lagoon San Elijo Lagoon Agua Hedionda Lagoon Buena Vista Lagoon and Tributary Streams Pacific Ocean
1. City of Del Mar 2. **City of Escondido** 3. City of Poway 4. City of San Diego 5. City of Solana Beach 6. County of San Diego	San Dieguito River	San Dieguito HU (905.00)	San Dieguito River and Estuary Pacific Ocean

RESPONSIBLE WATERSHED COPERMITTEE(S)	WATERSHED MANAGEMENT AREA	HYDROLOGIC UNIT OR AREA	MAJOR RECEIVING WATER BODIES
1. City of Del Mar **2. City of Poway** 3. City of San Diego 4. County of San Diego	Peñasquitos	Miramar Reservoir HA (906.10) Poway HA (906.20)	Los Peñasquitos Creek Los Peñasquitos Lagoon Pacific Ocean
1. City of San Diego	Mission Bay	Scripps HA (906.30) Miramar HA(906.40) Tecolote HA (906.50)	Mission Bay Pacific Ocean
1. City of El Cajon 2. City of La Mesa 3. City of San Diego 4. City of Santee 5. County of San Diego	San Diego River	San Diego HU (907.00)	San Diego River Pacific Ocean
1. City of Chula Vista 2. City of Coronado 3. City of Imperial Beach 4. City of La Mesa 5. City of Lemon Grove 6. City of National City 7. City of San Diego 8. County of San Diego **9. San Diego Unified Port District** 10. San Diego County Regional Airport Authority	San Diego Bay	Pueblo San Diego HU (908.00) Sweetwater HU (909.00) Otay HU (910.00)	San Diego Bay Sweetwater River Otay River Pacific Ocean
1. City of Imperial Beach 2. City of San Diego **3. County of San Diego**	Tijuana River	Tijuana (911.00)	Tijuana River and Estuary Pacific Ocean

- The Lead Watershed Permittee for each watershed is highlighted

F. REGIONAL URBAN RUNOFF MANAGEMENT PROGRAM

The Copermittees shall implement all requirements of section F of this Order no later than 365 days after adoption of this Order, unless otherwise specified in this Order.

Each Copermittee shall collaborate with the other Copermittees to develop, implement, and update as necessary a Regional Urban Runoff Management Program. The Regional Urban Runoff Management Program shall meet the requirements of section F of this Order, reduce the discharge of pollutants from the MS4 to the MEP, and prevent urban runoff discharges from the MS4 from causing or contributing to a violation of water quality standards. The Regional Urban Runoff Management Program shall, at a minimum:

1. Develop and implement a Regional Residential Education Program. The program shall include:
   a. Pollutant specific education which focuses educational efforts on bacteria, nutrients, sediment, pesticides, and trash. If a different pollutant is determined to be more critical for the education program, the pollutant can be substituted for one of these pollutants.
   b. Education efforts focused on the specific residential sources of the pollutants listed in section F.1.a.
2. Develop the standardized fiscal analysis method required in section G of this Order.
3. Facilitate the assessment of the effectiveness of jurisdictional, watershed, and regional programs.

As options, the Regional Urban Runoff Management Program may:

1. Develop and implement urban runoff management activities on a regional level, as determined to be necessary by the Copermittees.

2. Develop and implement a strategy to integrate management, implementation, and reporting of jurisdictional, watershed, and regional activities, as determined to be necessary by the Copermittees. Any such integration shall assure compliance with the jurisdictional requirements of section D and the watershed requirements of section E.
3. Facilitate TMDL management and implementation, as determined to be necessary by the Copermittees.
4. Facilitate development of strategies for implementation of activities on a watershed level, as determined to be necessary by the Copermittees.

G. FISCAL ANALYSIS

1. Each Copermittee shall secure the resources necessary to meet all requirements of this Order.

2. As part of the Regional Urban Runoff Management Program, the Copermittees shall collectively develop a standardized method and format for annually conducting and reporting fiscal analyses of their urban runoff management programs in their entirety (including jurisdictional, watershed, and regional activities). This standardized method shall:

   a. Identify the various categories of expenditures attributable to the urban runoff management programs, including a description of the specific items to be accounted for in each category of expenditures.
   b. Identify expenditures that contribute to multiple programs or were in existence prior to implementation of the urban runoff management program.
   c. Identify a metric or metrics to be used to report program component and total program expenditures.

3. Each Copermittee shall conduct an annual fiscal analysis. Starting January 31, 2010, the annual fiscal analysis shall be conducted consistent with the standardized fiscal analysis method included in the January 31, 2009 Regional Urban Runoff Management Program Annual Report. The annual fiscal analysis shall be conducted and reported on as part of each Copermittee's Jurisdictional Urban Runoff Management Program Annual Reports. For convenience, the fiscal analysis included in the Jurisdictional Urban Runoff Management Program Annual Reports shall address the Copermittee's urban runoff management programs in their entirety, including jurisdictional, watershed, and regional activities. The fiscal analysis shall provide the Copermittee's urban runoff management program budget for the current reporting period. The fiscal analysis shall include a description of the source(s) of the funds that are proposed to be used to meet the necessary expenditures, including legal restrictions on the use of such funds.

H. TOTAL MAXIMUM DAILY LOADS

1. Chollas Creek Diazinon TMDL Water Quality Based Effluent Limits (WQBELs)

   a. The Copermittees in the Chollas Creek watershed shall implement BMPs capable of achieving the interim and final diazinon Waste Load Allocation (WLA) concentration in the storm water discharge in Chollas Creek listed in Table 5.

Table 5. Chollas Creek Diazinon Schedule

Calendar Year	Year	Waste Load Allocation	Interim TMDL Numeric Target	% Reduction
2004	1	0.460 µg/L	0.5 µg/L	0
2005	2	0.460 µg/L	0.5 µg/L	0
2006	3	0.460 µg/L	0.5 µg/L	0
2007	4	0.414 µg/L	0.45 µg/L	10
2008	5	0.322 µg/L	0.35 µg/L	20
2009	6	0.184 µg/L	0.20 µg/L	30
2010	7	0.045 µg/L	0.05 µg/L	30

b. The Copermittees in the Chollas Creek watershed shall not cause or contribute to the violation of the Interim TMDL Numeric Targets in Chollas Creek as listed in Table 5. If the Interim TMDL Numeric Target is violated in Chollas Creek in more than one sample in any three consecutive years, the Copermittees shall submit a report that either 1) documents compliance with the WLA through additional sampling of the urban runoff discharge or 2) demonstrates, using modeling or other technical or scientific basis, the effectiveness of additional BMPs that will be implemented to achieve the WLA. The report may be incorporated into the Watershed Urban Runoff Management Program Annual Report unless the Regional Board directs an earlier submittal. The report shall include an implementation schedule.

c. The Copermittees in the Chollas Creek watershed shall implement the Diazinon Toxicity Control Plan and Diazinon Public Outreach/Education Program as described in the report titled, "Technical Report for Total Maximum Daily Load for Diazinon in Chollas Creek Watershed, San Diego County, August 14, 2002," including subsequent modifications, in order to achieve the WLA listed in Table 5.

2. Shelter Island Yacht Basin WQBELs

a. The Copermittees in the Shelter Island Yacht Basin watershed shall implement BMPs to maintain a total annual copper discharge load of less than or equal to 30 kg copper / year.

b. The Copermittees in the Shelter Island Yacht Basin watershed shall implement, at a minimum, the BMPs included in the Copermittees' Jurisdictional Urban Runoff Management Plan, including subsequent modifications, which address the discharge of copper to achieve the annual copper load in Section H.2.a above.

I. PROGRAM EFFECTIVENESS ASSESSMENT

1. Jurisdictional

a. As part of its Jurisdictional Urban Runoff Management Program, each Copermittee shall annually assess the effectiveness of its Jurisdictional Urban Runoff Management Program implementation. At a minimum, the annual effectiveness assessment shall:

(1) Specifically assess the effectiveness of each of the following:

(a) Each significant jurisdictional activity/BMP or type of jurisdictional activity/BMP implemented;
(b) Implementation of each major component of the Jurisdictional Urban Runoff Management Program (Development Planning, Construction, Municipal, Industrial/Commercial, Residential, Illicit Discharge Detection and Elimination, and Education); and
(c) Implementation of the Jurisdictional Urban Runoff Management Program as a whole.

(2) Identify and utilize measurable targeted outcomes, assessment measures, and assessment methods for each of the items listed in section I.1.a.(1) above.

(3) Utilize outcome levels 1-6[9] to assess the effectiveness of each of the items listed in section I.1.a.(1) above, where applicable and feasible.

(4) Utilize monitoring data and analysis from the Receiving Waters Monitoring Program to assess the effectiveness each of the items listed in section I.1.a.(1) above, where applicable and feasible.

(5) Utilize Implementation Assessment, Water Quality Assessment, and Integrated Assessment, where applicable and feasible.[10]

b. Based on the results of the effectiveness assessment, each Copermittee shall annually review its jurisdictional activities or BMPs to identify modifications and improvements needed to maximize Jurisdictional Urban Runoff Management Program effectiveness, as necessary to achieve compliance with section A of this Order. The Copermittees shall develop and implement a plan and schedule to address the identified modifications and improvements. Jurisdictional activities/BMPs that are ineffective or less effective than other comparable jurisdictional activities/BMPs shall be replaced or improved upon by implementation of more effective jurisdictional activities/BMPs. Where monitoring data exhibits persistent water quality problems that are caused or contributed to by MS4 discharges, jurisdictional activities or BMPs applicable to the water quality problems shall be modified and improved to correct the water quality problems.

c. As part of its Jurisdictional Urban Runoff Management Program Annual Reports, each Copermittee shall report on its Jurisdictional Urban Runoff Management Program effectiveness assessment as implemented under each of the requirements of sections I.1.a and I.1.b above.

2. Watershed

a. As part of its Watershed Urban Runoff Management Program, each watershed group of Copermittees (as identified in Table 4) shall annually assess the effectiveness of its Watershed Urban Runoff Management Program implementation. At a minimum, the annual effectiveness assessment shall:

(1) Specifically assess the effectiveness of each of the following:

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[9] Effectiveness assessment outcome levels are defined in Attachment C of this Order.
[10] Implementation Assessment, Water Quality Assessment, and Integrated Assessment are defined in Attachment C of this Order.

(a) Each Watershed Water Quality Activity implemented;
(b) Each Watershed Education Activity implemented; and
(c) Implementation of the Watershed Urban Runoff Management Program as a whole.

(2) Identify and utilize measurable targeted outcomes, assessment measures, and assessment methods for each of the items listed in section I.2.a.(1) above.

(3) Utilize outcome levels 1-6 to assess the effectiveness of each of the items listed in sections I.2.a.(1)(a) and I.2.a.(1)(b) above, where applicable and feasible.

(4) Utilize outcome levels 1-4 to assess the effectiveness of implementation of the Watershed Urban Runoff Management Program as a whole, where applicable and feasible.

(5) Utilize outcome levels 5 and 6 to qualitatively assess the effectiveness of implementation of the Watershed Urban Runoff Management Program as a whole, focusing on the high priority water quality problem(s) of the watershed. These assessments shall attempt to exhibit the impact of Watershed Urban Runoff Management Program implementation on the high priority water quality problem(s) within the watershed.

(6) Utilize monitoring data and analysis from the Receiving Waters Monitoring Program to assess the effectiveness each of the items listed in section I.2.a.(1) above, where applicable and feasible.

(7) Utilize Implementation Assessment, Water Quality Assessment, and Integrated Assessment, where applicable and feasible.

b. Based on the results of the effectiveness assessment, the watershed Copermittees shall annually review their Watershed Water Quality Activities, Watershed Education Activities, and other aspects of the Watershed Urban Runoff Management Program to identify modifications and improvements needed to maximize Watershed Urban Runoff Management Program effectiveness, as necessary to achieve compliance with section A of this Order. The Copermittees shall develop and implement a plan and schedule to address the identified modifications and improvements. Watershed Water Quality Activities/Watershed Education Activities that are ineffective or less effective than other comparable Watershed Water Quality Activities/Watershed Education Activities shall be replaced or improved upon by implementation of more effective Watershed Water Quality Activities/Watershed Education Activities. Where monitoring data exhibits persistent water quality problems that are caused or contributed to by MS4 discharges, Watershed Water Quality Activities and Watershed Education Activities applicable to the water quality problems shall be modified and improved to correct the water quality problems.

c. As part of its Watershed Urban Runoff Management Program Annual Reports, each watershed group of Copermittees (as identified in Table 4) shall report on its Watershed Urban Runoff Management Program effectiveness assessment as implemented under each of the requirements of section I.2.a and I.2.b above.

3. Regional

a. As part of the Regional Urban Runoff Management Program, the Copermittees shall annually assess the effectiveness of Regional Urban Runoff Management Program implementation. At a minimum, the annual effectiveness assessment shall:

(1) Specifically assess the effectiveness of each of the following:

(a) Each regional activity/BMP or type of regional activity/BMP implemented, including regional residential education activities; and
(b) The Regional Urban Runoff Management Program as a whole.

(2) Identify and utilize measurable targeted outcomes, assessment measures, and assessment methods for each of the items listed in section I.3.a.(1) above.

(3) Utilize outcome levels 1-6 to assess the effectiveness of each of the items listed in sections I.3.a.(1) above, where applicable and feasible.

(4) Utilize monitoring data and analysis from the Receiving Waters Monitoring Program to assess the effectiveness each of the items listed in section I.3.a.(1) above, where applicable and feasible.

(5) Utilize Implementation Assessment, Water Quality Assessment, and Integrated Assessment, where applicable and feasible.

(6) Include evaluation of whether the Copermittees' jurisdictional, watershed, and regional effectiveness assessments are meeting the following objectives:

(a) Assessment of watershed health and identification of water quality issues and concerns.
(b) Evaluation of the degree to which existing source management priorities are properly targeted to, and effective in addressing, water quality issues and concerns.
(c) Evaluation of the need to address additional pollutant sources not already included in Copermittee programs.
(d) Assessment of progress in implementing Copermittee programs and activities.
(e) Assessment of the effectiveness of Copermittee activities in addressing priority constituents and sources.
(f) Assessment of changes in discharge and receiving water quality.
(g) Assessment of the relationship of program implementation to changes in pollutant loading, discharge quality, and receiving water quality.
(h) Identification of changes necessary to improve Copermittee programs, activities, and effectiveness assessment methods and strategies.

b. Based on the results of the effectiveness assessment, the Copermittees shall annually review their regional activities and other aspects of the Regional Urban Runoff Management Program to identify modifications and improvements needed maximize Regional Urban Runoff Management Program effectiveness, as necessary to achieve compliance with section A of this Order. The Copermittees shall develop and implement a plan and schedule to address the identified modifications and improvements. Regional activities that are ineffective or less effective than other

comparable regional activities shall be replaced or improved upon by implementation of more effective regional activities. Where monitoring data exhibits persistent water quality problems that are caused or contributed to by MS4 discharges, regional activities applicable to the water quality problems shall be modified and improved to correct the water quality problems.

c. Based on the results of the Copermittees' evaluation of their effectiveness assessments, the Copermittees shall modify their effectiveness assessment methods to improve their ability to accurately assess the effectiveness of their urban runoff management programs.

d. As part of its Regional Urban Runoff Management Program Annual Reports, the Copermittees shall report on its Regional Urban Runoff Management Program effectiveness assessment as implemented under each of the requirements of sections I.3.a, I.3.b, and I.3.c above.

4. TMDL BMP Implementation Plan

a. For each TMDL in a watershed, the Copermittees subject to the TMDL within the watershed shall annually assess the effectiveness of its TMDL BMP Implementation Plan or equivalent plan.[11] At a minimum, the annual effectiveness assessment shall:

(1) Specifically assess the effectiveness of each of the following:

(a) Each activity/BMP or type of activity/BMP implemented; and
(b) Implementation of the TMDL BMP Implementation Plan or equivalent plan as a whole.

(2) Identify and utilize measurable targeted outcomes, assessment measures, and assessment methods for each of the items listed in sections I.4.a.(1) above.

(3) Utilize outcome levels 1-6 to assess the effectiveness of each of the items listed in section I.4.a.(1)(a) above, where applicable and feasible.

(4) Utilize outcome levels 1-4 to assess the effectiveness of implementation of the TMDL BMP Implementation Plan or equivalent plan as a whole, where applicable and feasible.

(5) Utilize outcome levels 5 and 6 to qualitatively assess the effectiveness of the TMDL BMP Implementation Plan or equivalent plan as a whole. These assessments shall attempt to exhibit the effects of the TMDL BMP Implementation Plan or equivalent plan on the impairment that is targeted.

b. Based on the results of the effectiveness assessment, the Copermittees subject to the TMDL shall modify their BMPs and other aspects of the TMDL BMP Implementation Plan or equivalent plan in order to maximize TMDL BMP Implementation Plan or equivalent plan effectiveness. BMPs that are ineffective or less effective than other comparable BMPs shall be replaced or improved upon by implementation of more effective BMPs. Where monitoring data exhibits persistent

[11] This requirement applies to those TMDLs where a TMDL BMP Implementation Plan or equivalent plan has been developed and submitted to the Regional Board.

water quality problems that are caused or contributed to by MS4 discharges, BMPs applicable to the water quality problems shall be modified and improved to correct the water quality problems.

c. As part of its Watershed Urban Runoff Management Program Annual Reports, each group of Copermittees subject to a TMDL shall report on any TMDL BMP Implementation Plan or equivalent plan effectiveness assessments as implemented under each of the requirements of sections I.4.a and I.4.b above.

5. Long-term Effectiveness Assessment

a. Each Copermittee shall collaborate with the other Copermittees to develop a Long-term Effectiveness Assessment (LTEA), which shall build on the results of the Copermittees' August 2005 Baseline LTEA. The LTEA shall be submitted by the Principal Permittee to the Regional Board no later than 210 days in advance of the expiration of this Order.

b. The LTEA shall be designed to address each of the objectives listed in section I.3.a.(6) of this Order, and to serve as a basis for the Copermittees' Report of Waste Discharge for the next permit cycle.

c. The LTEA shall address outcome levels 1-6, and shall specifically include an evaluation of program implementation to changes in water quality (outcome levels 5 and 6).

d. The LTEA shall assess the effectiveness of the Receiving Waters Monitoring Program in meeting its objectives and its ability to answer the five core management questions. This shall include assessment of the frequency of monitoring conducted through the use of power analysis and other pertinent statistical methods. The power analysis shall identify the frequency and intensity of sampling needed to identify a 10% reduction in the concentration of constituents causing the high priority water quality problems within each watershed over the next permit term with 80% confidence.

e. The LTEA shall address the jurisdictional, watershed, and regional programs, with an emphasis on watershed assessment.

J. REPORTING

1. Urban Runoff Management Plans

a. JURISDICTIONAL URBAN RUNOFF MANAGEMENT PLANS

(1) Copermittees - The written account of the overall program to be conducted by each Copermittee to meet the jurisdictional requirements of section D of this Order is referred to as the Jurisdictional Urban Runoff Management Plan (JURMP). Each Copermittee shall revise and update its JURMP so that it describes all activities the Copermittee will undertake to implement the requirements of each component of Jurisdictional Urban Runoff Management Program section D of this Order. Each Copermittee shall submit its updated and revised JURMP to the Principal Permittee by the date specified by the Principal

Permittee.

(2) Principal Permittee –The Principal Permittee shall be responsible for collecting and assembling the individual JURMPs which cover the activities conducted by each individual Copermittee. The Principal Permittee shall submit the JURMPs to the Regional Board 365 days after adoption of this Order.

(3) At a minimum, each Copermittee's JURMP shall be updated and revised to contain the following information:

(a) Non-Storm Water Discharges
   i. Identification of non-storm water discharge categories identified as a source of pollutants to waters of the U.S.
   ii. A description of whether non-storm water discharge categories identified under section (a)i above will be prohibited or required to implement appropriate control measures to reduce the discharge of pollutants to the MEP.
   iii. Identification of any control measures to be required and implemented for non-storm water discharge categories identified under section (a)i above.
   iv. A description of a program to reduce pollutants from non-emergency fire fighting flows identified by the Copermittee to be significant sources of pollutants.

(b) Administrative and Legal Procedures
   i. Certified statement by the chief legal counsel that the Copermittee has adequate legal authority to implement and enforce each of the requirements contained in 40 CFR 122.26(d)(2)(i)(A-F) and this Order.
   ii. Identification of all departments within the jurisdiction that conduct urban runoff related activities, and their roles and responsibilities under the Order. Include an up-to-date organizational chart specifying these departments and key personnel.
   iii. Updated urban runoff related ordinances, with explanations of how they are enforceable.
   iv. Identification of the local administrative and legal procedures available to mandate compliance with urban runoff related ordinances and therefore with the conditions of the Order.
   v. Description of how urban runoff related ordinances are implemented and appealed.
   vi. Description of whether the municipality can issue administrative orders and injunctions or if it must go through the court system for enforcement actions.

(c) Development Planning
   i. A description of the water quality and watershed protection principles that have been or will be included in the Copermittee's General Plan, and a time schedule for when modifications are planned, if applicable.
   ii. A description of the Copermittee's current environmental review process and how it addresses impacts to water quality and appropriate mitigation measures. If the Copermittee plans to modify the process during the permit term, a time schedule for modifications shall be included.

iii. A description of the development project approval process and requirements.
iv. An updated SUSMP document that meets the applicable requirements specified in sections D.1.d and D.1.g(6), including a description of LID BMP requirements to be used prior to the Model SUSMP update. The updated SUSMP may be submitted under separate cover as an attachment to the JURMP.
v. A description of the database to be used to track and inventory approved treatment control BMPs and treatment control BMP maintenance.
vi. A completed watershed-based inventory of approved treatment control BMPs.
vii. A description of the program to be implemented to verify approved treatment control BMPs are operating effectively and have been adequately maintained, including information on treatment control BMP inventory, prioritization, inspection, and annual verification.
viii. A description of inspections that will be conducted to verify BMPs have been constructed according to requirements.
ix. A description of collaboration efforts to be conducted to develop the HMP.
x. A description of enforcement mechanisms and how they will be used.

(d) Construction
i. Updated grading and other applicable ordinances.
ii. A description of the construction and grading approval processes.
iii. Updated construction and grading project requirements.
iv. A completed watershed-based inventory of all construction sites.
v. A description of steps that will be taken to maintain and update monthly a watershed-based inventory of all construction sites.
vi. A list and description of the minimum BMPs that will be implemented, or required to be implemented, including pollution prevention.
vii. A description of the maximum disturbed area allowed for grading before either temporary or permanent erosion controls are implemented.
viii. A description of construction site conditions where advanced treatment will be required.
ix. A description of the steps that will be taken to require and verify the implementation of the designated BMPs at all construction sites.
x. A description of planned inspection frequencies.
xi. A description of inspection procedures.
xii. A description of steps that will be taken to track construction site inspections to verify that all construction sites are inspected at the minimum frequencies required.
xiii. A description of available enforcement mechanisms, under what conditions each will be used, and how they will escalate.
xiv. A description of notification procedures for non-compliant sites.

(e) Municipal
i. A completed inventory of all municipal facilities and activities.
ii. A description of which BMPs will be implemented, or required to be implemented, for municipal facilities and activities, including pollution prevention.
iii. A description of which BMPs will be implemented, or required to be implemented, for special events.

iv. A description of steps that will be taken to require and verify the implementation of designated BMPs at municipal facilities and activities.
v. A description of MS4 and MS4 facility inspection and maintenance activities and schedules.
vi. A description of the management strategy and BMPs to be implemented for pesticides, herbicides, and fertilizer use.
vii. A description of street and parking facility sweeping activities and schedules.
viii. A description of controls and measures to be implemented to prevent and eliminate infiltration of seepage from sanitary sewers to MS4s.
ix. A description of inspection frequencies and procedures.
x. A description of enforcement mechanisms and how they will be used.

(f) Industrial and Commercial
i. A completed and prioritized inventory of all industrial and commercial sites/sources that could contribute a significant pollutant load to the MS4.
ii. A list of minimum BMPs that will be implemented, or required to be implemented, for each facility type or pollutant-generating activity, including pollution prevention.
iii. A description of the steps that will be taken to require and verify the implementation of designated BMPs, including notification efforts.
iv. Identification of high priority sites/sources and sites/sources to be inspected during the first year of implementation.
v. A description of the steps taken to identify sites/sources to be inspected during the first year of implementation, including rationale for their selection.
vi. A description of steps that will be taken to identify sites/sources to be inspected in subsequent years.
vii. A description of inspection procedures.
viii. A description of any third party inspection program to be implemented.
ix. A description of the program to be implemented to regulate mobile businesses, including notification of BMP requirements and local ordinances.
x. A description of enforcement mechanisms and how they will be used.
xi. A description of steps that will be taken to identify non-filers and notify the Regional Board of non-filers.

(g) Residential
i. A list of residential areas and activities that have been identified as high priority.
ii. A list of minimum BMPs that will be implemented, or required to be implemented, for high priority residential activities.
iii. A description of which pollution prevention methods will be encouraged for implementation, and the steps that will be taken to encourage implementation.
iv. A description of the steps that will be taken to require and verify the implementation of prescribed BMPs for high priority residential activities.
v. A description of efforts to facilitate proper disposal of used oil and other toxic materials.

vi. A description of efforts to evaluate methods used for oversight of residential areas and activities.
vii. A description of enforcement mechanisms and how they will be used.

(h) Illicit Discharge Detection and Elimination
i. A description of the program to actively seek and eliminate illicit discharges and illicit connections.
ii. An updated MS4 map, including locations of the MS4, dry weather field screening and analytical monitoring sites, and watersheds.
iii. A description of dry weather field screening and analytical monitoring to be conducted (including procedures) which addresses all requirements included in sections B.1-4 of Receiving Waters Monitoring and Reporting Program No. R9-2006-0011.
iv. A description of investigation and inspection procedures to follow up on dry weather monitoring results or other information which indicate potential for illicit discharges and illicit connections.
v. A description of procedures to eliminate detected illicit discharges and illicit connections.
vi. A description of enforcement mechanisms and how they will be used.
vii. A description of the mechanism to receive notification of spills.
viii. A description of measures to prevent, respond to, contain, and clean up all sewage and other spills.
ix. A description of efforts to facilitate public reporting of illicit discharges and connections, including a public hotline.

(i) Education
i. A description of the content, form, and frequency of education efforts for each target community.
ii. A description of steps to be taken to educate underserved target audiences, high-risk behaviors, and "allowable" behaviors and discharges, including various ethnic and socioeconomic groups and mobile sources.
iii. A description of the content, form, and frequency of education efforts targeting municipal staff working on development planning, construction, municipal, industrial/commercial, and other aspects of the Jurisdictional Urban Runoff Management Program.
iv. A description of the content, form, and frequency of education efforts targeting new development and construction target communities.
v. A description of the content, form, and frequency of jurisdictional education efforts for the residential, general public, and school children target communities.

(j) Public Participation
i. A description of the steps that will be taken to include public participation in the development and implementation of each Copermittee's Jurisdictional Urban Runoff Management Program.

(k) Fiscal Analysis
i. A description of the fiscal analysis to be conducted annually, as required by section G of this Order.

(l) Program Effectiveness Assessment

i. A description of steps that will be taken to annually conduct program effectiveness assessments in compliance with section I.1 of the Order.

ii. Identify measurable targeted outcomes, assessment measures, and assessment methods to be used to assess the effectiveness of: (1) Each significant jurisdictional activity or BMP to be implemented; (2) Implementation of each major component of the Jurisdictional Urban Runoff Management Program; and (3) Implementation of the Jurisdictional Urban Runoff Management Program as a whole.

iii. Identify which of the outcome levels 1-6 will be utilized to assess the effectiveness of each of the items listed in sections J.1.a.(3)(l)ii(1-3). Where an outcome level is determined to not be applicable or feasible for an item listed in sections J.1.a.(3)(l)ii(1-3), the Copermittee shall provide a discussion exhibiting inapplicability or infeasibility.

iv. A description of the steps that will be taken to utilize monitoring data to assess the effectiveness of each of the items listed in sections J.1.a.(3)(l)ii(1-3).

v. A description of the steps that will be taken to improve the Copermittee's ability to assess program effectiveness using measurable targeted outcomes, assessment measures, assessment methods, and outcome levels 1-6. Include a time schedule for when improvement will occur.

vi. A description of the steps that will be taken to identify aspects of the Copermittee's Jurisdictional Urban Runoff Management Program that will be changed, based on the results of the effectiveness assessment.

(m) JURMP Modification

i. Identification of the location in the JURMP of any changes made to the JURMP in order to meet the requirements of Order No. R9-2007-0001.

b. WATERSHED URBAN RUNOFF MANAGEMENT PLANS

(1) Copermittees - The written account of the program conducted by each watershed group of Copermittees is referred to as the Watershed Urban Runoff Management Plan (WURMP). The Copermittees within each watershed shall be responsible for updating and revising each WURMP, as specified in Table 4 above. Each WURMP shall be updated and revised to describe all activities the watershed Copermittees will undertake to implement the Watershed Urban Runoff Management Program requirements of section E of this Order.

(2) Lead Watershed Permittee - Each Lead Watershed Permittee shall be responsible for producing its respective WURMP, as well as for coordination and meetings amongst all member watershed Copermittees. Each Lead Watershed Permittee is further responsible for the submittal of the WURMP to the Principal Permittee by the date specified by the Principal Permittee.

(3) Principal Permittee – The Principal Permittee shall assemble and submit the WURMPs to the Regional Board 365 days after adoption of this Order.

(4) Each WURMP shall include:

(a) Identification of the Lead Watershed Permittee for the watershed.
(b) An updated watershed map.

(c) Identification and description of all applicable water quality data, reports, analyses, and other information to be used to assess receiving water quality.
(d) Assessment and analysis of the watershed's water quality data, reports, analyses, and other information, including identification and prioritization of the watershed's water quality problems. Water quality problems and high priority water quality problems shall be identified.
(e) Identification of the likely sources, pollutant discharges, and/or other factors causing the high priority water quality problems within the watershed.
(f) A description of the program to be implemented to encourage collaborative, watershed-based, land-use planning.
(g) A description of the strategy to be used to guide Copermittee implementation of Watershed Water Quality Activities and Watershed Education Activities, including criteria for evaluating and identifying effective activities.
(h) A list of potential Watershed Water Quality Activities, including a description of each activity and its location(s).
(i) Identification and description of the Watershed Water Quality Activities to be implemented by each Copermittee for the first year of implementation, including justification for why the activities were chosen and a description of how the activities are expected to reduce discharged pollutant loads, abate pollutant sources, or result in other quantifiable benefits to discharge or receiving water quality, in relation to the watershed's high priority water quality problem(s). Plans for activity implementation beyond the first year of implementation should also be provided.
(j) A list of potential Watershed Education Activities.
(k) Identification and description of the Watershed Education Activities to be implemented by each Copermittee for the first year of implementation, including justification for why the activities were chosen and a description of how the activities are expected to directly target the sources and discharges of pollutants causing the watershed's high priority water quality problems. Plans for activity implementation beyond the first year of implementation should also be provided.
(l) A description of the public participation mechanisms to be used and the parties anticipated to be involved.
(m) A description of Copermittee collaboration to occur, including a schedule for WURMP meetings.
(n) A description of any TMDL BMP Implementation Plan or equivalent plan to be implemented under section H of this Order.[12]
(o) A detailed description of the effectiveness assessment to be conducted for the WURMP, including a description how each of the requirements in section I.2 of this Order will be met.

c. REGIONAL URBAN RUNOFF MANAGEMENT PLAN

(1) Copermittees - The written account of the regional program to be conducted is referred to as the Regional Urban Runoff Management Plan (RURMP). Each Copermittee shall collaborate with the other Copermittees to develop the RURMP. The RURMP shall describe all activities the Copermittees will undertake to implement the requirements of each component of Regional Urban

[12] For TMDLs not yet approved by the Office of Administrative Law at the time of adoption of this Order, TMDL BMP Implementation Plans shall be submitted separately 365 days following approval of the TMDL.

Runoff Management Program section F of this Order. At a minimum, the RURMP shall contain the following information:

(a) A common activities section that describes the urban runoff management activities to be implemented on a regional level. For regional activities which are to be implemented in compliance with any jurisdictional requirements of section D or watershed requirements of section E, it shall be described how the regional activities achieve compliance with the subject jurisdictional and/or watershed requirements.
(b) A description of steps that will be taken to facilitate assessment of the effectiveness of jurisdictional, watershed, and regional programs.
(c) A description of the regional residential education program to be implemented.
(d) A description of the strategy for development of the standardized fiscal analysis method required by section G of this Order.
(e) A detailed description of the effectiveness assessment to be conducted for the Regional Urban Runoff Management Program, including a description how each of the requirements in section I.3 of this Order will be met.

(2) The Principal Permittee shall be responsible for creating and submitting the RURMP. The Principal Permittee shall submit the RURMP to the Regional Board 365 days after adoption of this Order.

2. Other Required Reports and Plans

a. HYDROMODIFICATION MANAGEMENT PLAN

(1) Copermittees - Each Copermittee shall collaborate with the other Copermittees to develop the HMP. The HMP shall be submitted for approval by the Regional Board.

(2) Principal Permittee - The Principal Permittee shall be responsible for producing and submitting each document according to the schedule below.

(a) Within 180 days of adoption of the Order: Submit a detailed workplan and schedule for completion of the literature review, development of a protocol to identify an appropriate channel standard and limiting range of flow rates, development of guidance materials, and other required information;
(b) Within 18 months of adoption of the Order: Submit progress report on completion of requirements of the HMP;
(c) Within 2 years of adoption of the Order: Submit a draft HMP, including the analysis that identifies the appropriate limiting range of flow rates;
(d) Within 180 days of receiving comments from the Regional Board: Submit the HMP for Regional Board approval.

b. SUSMP UPDATES

Each Copermittee shall collaborate with the other Copermittees to update the Model SUSMP. The Principal Permittee shall be responsible for producing and submitting the updated Model SUSMP in accordance with the requirements of section D.1.d.(8)(b). Each Copermittee shall submit its updated local SUSMP, consistent

with the updated Model SUSMP, in accordance with the requirements of section D.1.d.(8)(c).

c. LONG-TERM EFFECTIVENESS ASSESSMENT

In accordance with section I.5 of this Order, the Principal Permittee shall submit the LTEA to the Regional Board no later than 210 days in advance of the expiration of this Order.

d. REPORT OF WASTE DISCHARGE

The Principal Permittee shall submit to the Regional Board, no later than 210 days in advance of the expiration date of this Order, a Report of Waste Discharge (ROWD) as an application for issuance of new waste discharge requirements. At a minimum, the ROWD shall include the following: (1) Proposed changes to the Copermittees' urban runoff management programs; (2) Proposed changes to monitoring programs; (3) Justification for proposed changes; (4) Name and mailing addresses of the Copermittees; (5) Names and titles of primary contacts of the Copermittees; and (6) Any other information necessary for the reissuance of this Order.

3. Annual Reports

a. JURISDICTIONAL URBAN RUNOFF MANAGEMENT PROGRAM ANNUAL REPORTS

Each Jurisdictional Urban Runoff Management Program Annual Report shall contain a comprehensive description of all activities conducted by the Copermittee to meet all requirements of section D. The reporting period for these annual reports shall be the previous fiscal year. For example, the report submitted September 30, 2008 shall cover the reporting period July 1, 2007 to June 30, 2008.

(1) Copermittees – Each Copermittee shall generate individual Jurisdictional Urban Runoff Management Program Annual Reports which cover implementation of its jurisdictional activities during the past annual reporting period. Each Copermittee shall submit to the Principal Permittee its individual Jurisdictional Urban Runoff Management Program Annual Report by the date specified by the Principal Permittee. Each individual Jurisdictional Urban Runoff Management Program Annual Report shall be a comprehensive description of all activities conducted by the Copermittees to meet all requirements of each component of section D of this Order.

(2) Principal Permittee – The Principal Permittee shall submit Unified Jurisdictional Urban Runoff Management Program Annual Reports to the Regional Board by September 30 of each year, beginning on September 30, 2008. The Unified Jurisdictional Urban Runoff Management Program Annual Report shall contain the twenty-one individual Jurisdictional Urban Runoff Management Program Annual Reports.

The Principal Permittee shall also be responsible for collecting and assembling each Copermittees' individual Jurisdictional Urban Runoff Management Program Annual Report.

(3) At a minimum, each Jurisdictional Urban Runoff Management Program Annual Report shall contain the following information:

(a) Development Planning

i. A description of any amendments to the General Plan, the environmental review process, development project approval processes, or development project requirements.

ii. Confirmation that all development projects were required to undergo the Copermittee's urban runoff approval process and meet the applicable project requirements, including a description of how this information was tracked.

iii. A listing of the development projects to which SUSMP requirements were applied.

iv. Confirmation that all applicable SUSMP BMP requirements were applied to all priority development projects, including a description of how this information was tracked.

v. At least one example of a priority development project that was conditioned to meet SUSMP requirements and a description of the required BMPs.

vi. A listing of the priority development projects which were allowed to implement treatment control BMPs with low removal efficiency rankings, including the feasibility analyses which were conducted to exhibit that more effective BMPs were infeasible.

vii. An updated treatment control BMP inventory.

viii. The number of treatment control BMPs inspected, including a summary of inspection results and findings.

ix. A description of the annual verification of operation and maintenance of treatment control BMPs, including a summary of verification results and findings.

x. Confirmation that BMP verification was conducted for all priority development projects prior to occupancy, including a description of how this information was tracked.

xi. A listing of any projects which received a SUSMP waiver.

xii. A description of implementation of any SUSMP waiver mitigation program.

xiii. A description of Hydromodification Management Plan (HMP) development collaboration and participation.

xiv. A listing of development projects required to meet HMP requirements, including a description of hydrologic control measures implemented.

xv. A listing of priority development projects not required to meet HMP requirements, including a description of why the projects were found to be exempt from the requirements.

xvi. A listing of development projects disturbing 50 acres or more, including information on whether Interim Hydromodification Criteria were met by each of the projects, together with a description of hydrologic control measures implemented for each applicable project.

xvii. The number of violations and enforcement actions (including types) taken for development projects, including information on any necessary follow-up actions taken. The discussion should exhibit that compliance has been achieved, or describe actions that are being taken to achieve compliance.

xviii. A description of notable activities conducted to manage urban runoff from development projects.

(b) Construction

i. Confirmation that all construction sites were required to undergo the Copermittee's construction urban runoff approval process and meet the applicable construction requirements, including a description of how this information was tracked.
ii. Confirmation that a regularly updated construction site inventory was maintained, including a description of how the inventory was managed.
iii. A description of modifications made to the construction and grading ordinances and approval processes.
iv. Confirmation that the designated BMPs were implemented, or required to be implemented, for all construction sites.
v. Confirmation that a maximum disturbed area for grading was applied to all applicable construction sites.
vi. A listing of all construction sites with conditions requiring advanced treatment, together with confirmation that advanced treatment was required at such construction sites.
vii. For each construction site within each priority category (high, medium, and low), identification of the period of time (weeks) the site was active within the rainy season, the number of inspections conducted during the rainy season, and the number of inspections conducted during the dry season, and the total number of inspections conducted for all sites.
viii. A description of the general results of the inspections.
ix. Confirmation that the inspections conducted addressed all the required inspection steps to determine full compliance.
x. The number of violations and enforcement actions (including types) taken for construction sites, including information on any necessary follow-up actions taken. The discussion should exhibit that compliance has been achieved, or describe actions that are being taken to achieve compliance.
xi. A description of notable activities conducted to manage urban runoff from construction sites.

(c) Municipal

i. Any updates to the municipal inventory and prioritization.
ii. Confirmation that the designated BMPs were implemented, or required to be implemented, for municipal areas and activities, as well as special events.
iii. A description of inspections and maintenance conducted for municipal treatment controls.
iv. Identification of the total number of catch basins and inlets, the number of catch basins and inlets inspected, the number of catch basins and inlets found with accumulated waste exceeding cleaning criteria, and the number of catch basins and inlets cleaned.
v. Identification of the total distance (miles) of the MS4, the distance of the MS4 inspected, the distance of the MS4 found with accumulated waste exceeding cleaning criteria, and the distance of the MS4 cleaned.
vi. Identification of the total distance (miles) of open channels, the distance of open channels inspected, the distance of open channels found with anthropogenic litter, and the distance of open channels cleaned.

vii. Amount of waste and litter (tons) removed from catch basins, inlets, the MS4, and open channels, by category.
viii. Identification of any MS4 facility found to require inspection less than annually following two years of inspection, including justification for the finding.
ix. Confirmation that the designated BMPs for pesticides, herbicides, and fertilizers were implemented, or required to be implemented, for municipal areas and activities.
x. Identification of the total distance of curb-miles of improved roads, streets, and highways identified as consistently generating the highest volumes of trash and/or debris, as well as the frequency of sweeping conducted for such roads, streets, and highways.
xi. Identification of the total distance of curb-miles of improved roads, streets, and highways identified as consistently generating moderate volumes of trash and/or debris, as well as the frequency of sweeping conducted for such roads, streets, and highways.
xii. Identification of the total distance of curb-miles of improved roads, streets, and highways identified as consistently generating low volumes of trash and/or debris, as well as the frequency of sweeping conducted for such roads, streets, and highways.
xiii. Identification of the total distance of curb-miles swept.
xiv. Identification of the number of municipal parking lots, the number of municipal parking lots swept, and the frequency of sweeping.
xv. Amount of material (tons) collected from street and parking lot sweeping.
xvi. A description of efforts implemented to prevent and eliminate infiltration from the sanitary sewer to the MS4
xvii. Identification of the number of sites requiring inspections, the number of sites inspected, and the frequency of the inspections.
xviii. A description of the general results of the inspections.
xix. Confirmation that the inspections conducted addressed all the required inspection steps to determine full compliance.
xx. The number of violations and enforcement actions (including types) taken for municipal areas and activities, including information on any necessary follow-up actions taken. The discussion should exhibit that compliance has been achieved, or describe actions that are being taken to achieve compliance.
xxi. A description of notable activities conducted to manage urban runoff from municipal areas and activities.

(d) Industrial and Commercial
i. Any updates to the industrial and commercial inventory.
ii. Confirmation that the designated BMPs were implemented, or required to be implemented, for industrial and commercial sites/sources.
iii. A description of efforts taken to notify owners/operators of industrial and commercial sites/sources of BMP requirements, including mobile businesses.
iv. Identification of the total number of industrial and commercial sites/sources inventoried and the total number inspected.
v. Justification and rationale for why the industrial and commercial sites/sources inspected were chosen for inspection.

vi. Confirmation that all inspections conducted addressed all the required inspection steps to determine full compliance.
vii. Identification of the number of third party inspections conducted.
viii. Identification of efforts conducted to verify third party inspection effectiveness.
ix. A description of efforts implemented to address mobile businesses.
x. The number of violations and enforcement actions (including types) taken for industrial and commercial sites/sources, including information on any necessary follow-up actions taken. The discussion should exhibit that compliance has been achieved, or describe actions that are being taken to achieve compliance.
xi. A description of steps taken to identify non-filers and a list of non-filers (under the General Industrial Permit) identified by the Copermittees.
xii. A description of notable activities conducted to manage urban runoff from industrial and commercial sites/sources.

(e) Residential
i. Identification of the high threat to water quality residential areas and activities that were focused on.
ii. Confirmation that the designated BMPs were implemented, or required to be implemented, for residential areas and activities.
iii. A description of efforts implemented to facilitate proper management and disposal of used oil and other household hazardous materials.
iv. Types and amounts of household hazardous wastes collected, if applicable.
v. A description of any evaluation of methods used for oversight of residential areas and activities, as well as any findings of the evaluation.
vi. The number of violations and enforcement actions (including types) taken for residential areas and activities, including information on any necessary follow-up actions taken. The discussion should exhibit that compliance has been achieved, or describe actions that are being taken to achieve compliance.
vii. A description of collaboration efforts taken to develop and implement the Regional Residential Education Program.
viii. A description of notable activities conducted to manage urban runoff from residential areas and activities.

(f) Illicit Discharge Detection and Elimination
i. Correction of any inaccuracies in either the MS4 map or the Dry Weather Field Screening and Analytical Stations Map.
ii. Reporting of all dry weather field screening and analytical monitoring results. The data should be presented in tabular and graphical form. The reporting shall include station locations, all dry weather field screening and analytical monitoring results, identification of sites where results exceeded action levels, follow-up and elimination activities for potential illicit discharges and connections, the rationale for why follow-up investigations were not conducted at sites where action levels were exceeded, any Copermittee or consultant program recommendations/changes resulting from the monitoring, and documentation that these recommendations/changes have been implemented. Dry weather field screening and analytical monitoring reporting shall comply with all monitoring and standard reporting

requirements in Attachment B of Order No. R9-2007-0001 and Receiving Waters Monitoring and Reporting Program No. R9-2007-0001.

iii. Any dry weather field screening and analytical monitoring consultant reports generated, to be provided as an attachment to the annual report.
iv. A brief description of any other investigations and follow-up activities for illicit discharges and connections.
v. The number and brief description of illicit discharges and connections identified.
vi. The number of illicit discharges and connections eliminated.
vii. Identification and description of all spills to the MS4 and response to the spills.
viii. A description of activities implemented to prevent sewage and other spills from entering the MS4.
ix. A description of the mechanism whereby notification of sewage spills from private laterals and septic systems is received.
x. Number of times the hotline was called, as compared to previous reporting periods, and a summary of the calls.
xi. A description of efforts to publicize and facilitate public reporting of illicit discharges.
xii. The number of violations and enforcement actions (including types) taken for illicit discharges and connections, including information on any necessary follow-up actions taken. The discussion should exhibit that compliance has been achieved, or describe actions that are being taken to achieve compliance.
xiii. A description of notable activities conducted to manage illicit discharges and connections.

(g) Education
i. A description of education efforts conducted for each target community.
ii. A description of how education efforts targeted underserved target audiences, high-risk behaviors, and "allowable" behaviors and discharges.
iii. A description of education efforts conducted for municipal departments and personnel.
iv. A description of education efforts conducted for the new development and construction communities.
v. A description of jurisdictional education efforts conducted for residents, the general public, and school children.

(h) Public Participation
i. A description of public participation efforts conducted.

(i) Program Effectiveness Assessment
i. An assessment of the effectiveness of the Jurisdictional Urban Runoff Management Program which meets all requirements of section I.1 of this Order.

(j) Fiscal Analysis
i. A fiscal analysis of the Copermittee's urban runoff management programs which meets all requirements of section G of this Order.

(k) Special Investigations
i. A description of any special investigations conducted.

(l) Non-Emergency Fire Fighting
i. A description of any efforts conducted to reduce pollutant discharges from non-emergency fire fighting flows.

(m) JURMP Revisions
i. A description of any proposed revisions to the JURMP.

b. WATERSHED URBAN RUNOFF MANAGEMENT PROGRAM ANNUAL REPORTS

(1) Lead Watershed Permittee - Each Lead Watershed Permittee shall generate watershed specific Watershed Urban Runoff Management Program Annual Reports for their respective watershed(s), as they are outlined in Table 4 of Order No. R9-2007-0001. Copermittees within each watershed shall collaborate with the Lead Watershed Permittee to generate the Watershed Urban Runoff Management Program Annual Reports.

(2) Each Watershed Urban Runoff Management Program Annual Report shall be a comprehensive documentation of all activities conducted by the watershed Copermittees during the previous annual reporting period to meet all requirements of section E of Order No. R9-2007-0001. Each Watershed Urban Runoff Management Program Annual Report shall also serve as an update to the WURMP.[13] Each Watershed Urban Runoff Management Program Annual Report shall, at a minimum, contain the following for its reporting period:

(a) A comprehensive description of all activities conducted by the watershed Copermittees to meet all requirements of section E of Order No. R9-2007-0001.

(b) Any updates to the watershed map.

(c) An updated assessment and analysis of the watershed's current and past applicable water quality data, reports, analyses, and other information, including identification of the watershed's water quality problems and high priority water quality problem(s) during the reporting period. The annual report shall clearly state if the watershed's high priority water quality problem(s) changed from the previous reporting period, and provide justification for the change(s).

(d) Identification of the likely sources, pollutant discharges, and/or other factors causing the high priority water quality problems within the watershed. The annual report shall clearly describe any changes to the identified sources, pollutant discharges, and/or other factors that have occurred since the previous reporting period, and provide justification for the changes.

[13] The first annual report to be submitted is not anticipated to be an update to the WURMP, since it will cover the reporting period which begins immediately after WURMP submittal.

(e) An updated list of potential Watershed Water Quality Activities. The annual report shall clearly describe any changes to the list of Watershed Water Quality Activities that have occurred since the previous reporting period, and provide justification for the changes.

(f) Identification and description of the Watershed Water Quality Activities implemented by each Copermittee during the reporting period, including information on the activities' location(s), as well as information exhibiting that the activities in active implementation phase reduced discharged pollutant loads, abated pollutant sources, or resulted in other quantifiable benefits to discharge or receiving water quality, in relation to the watershed's high priority water quality problem(s). The annual report shall clearly describe any changes to Watershed Water Quality Activities implementation that have occurred since the previous reporting period, and provide justification for the changes.

(g) An updated list of potential Watershed Education Activities. The annual report shall clearly describe any changes to the list of Watershed Education Activities that have occurred since the previous reporting period, and provide justification for the changes.

(h) Identification and description of the Watershed Education Activities implemented by each Copermittee for the reporting period, including information exhibiting that the activities directly targeted the sources and discharges of pollutants causing the watershed's high priority water quality problems, and that activities in active implementation phase changed target audience attitudes, knowledge, awareness, or behavior. The annual report shall clearly describe any changes to Watershed Education Activities implementation that have occurred since the previous reporting period, and provide justification for the changes.

(i) A description of the public participation mechanisms used during the reporting period and the parties that were involved.

(j) A description of Copermittee collaboration efforts.

(k) A description of efforts implemented to encourage collaborative, watershed-based, land-use planning.

(l) A description of all TMDL activities implemented (including BMP Implementation Plan or equivalent plan activities) for each approved TMDL in the watershed. The description shall include:

i. Any additional source identification information;
ii. The number, type, location, and other relevant information about BMP implementation, including any expanded or better tailored BMPs necessary to meet the WLAs;
iii. Updates in the BMP implementation prioritization and schedule;
iv. An assessment of the effectiveness of the BMP Implementation Plan, which meets the requirements of section I.4 Order No. R9-2007-0001; and

v. A discussion of the progress to date in meeting the TMDL Numeric Targets and WLAs, which incorporates the results of the effectiveness assessment, compliance monitoring, and an evaluation of additional efforts needed to date.

(m) An assessment of the effectiveness of the WURMP, which meets the requirements of section I.2 of Order No. R9-2007-0001. The effectiveness assessment shall attempt to qualitatively or quantitatively exhibit the impact that implementation of the Watershed Water Quality Activities and the Watershed Education Activities had on the high priority water quality problem(s) within the watershed. This information shall document changes in pollutant load discharges, urban runoff and discharge quality, and receiving water quality, where applicable and feasible.

(3) Principal Permittee – The Unified Watershed Urban Runoff Management Program Annual Report shall contain the nine separate Watershed Urban Runoff Management Program Annual Reports. Each Lead Watershed Copermittee shall submit to the Principal Permittee a Watershed Urban Runoff Management Program Annual Report by the date specified by the Principal Permittee. The Principal Permittee shall assemble and submit the Unified Watershed Urban Runoff Management Program Annual Report to the Regional Board by January 31, 2009 and every January 31 thereafter. The reporting period for these annual reports shall be the previous fiscal year. For example, the report submitted January 31, 2009 shall cover the reporting period July 1, 2007 to June 30, 2008.

c. REGIONAL URBAN RUNOFF MANAGEMENT PROGRAM ANNUAL REPORTS

The Principal Permittee shall generate the Regional Urban Runoff Management Program Annual Reports. All Copermittees shall collaborate with the Principal Permittee to generate the Regional Urban Runoff Management Program Annual Reports. Each Regional Urban Runoff Management Program Annual Report shall be a comprehensive documentation of all regional activities conducted by the Copermittees during the previous annual reporting period to meet all requirements of section F of Order No. R9-2007-0001.

The Principal Permittee shall submit the Regional Urban Runoff Management Program Annual Report to the Regional Board by January 31, 2009 and every January 31 thereafter. The reporting period for these annual reports shall be the previous fiscal year. For example, the report submitted January 31, 2009 shall cover the reporting period July 1, 2007 to June 30, 2008.

Each Regional Urban Runoff Management Program Annual Report shall, at a minimum, contain the following:

(1) A common activities section that describes the urban runoff management activities or BMPs implemented on a regional level, including information on how the activities complied with jurisdictional or watershed requirements, if applicable.
(2) A description of steps taken to facilitate assessment of the effectiveness of jurisdictional, watershed, and regional programs.

(3) A description of the regional residential education activities implemented as part of the regional residential education program.
(4) A description of steps taken to develop and implement the standardized fiscal analysis method.
(5) An assessment of the effectiveness of the Regional Urban Runoff Management Program which meets the requirements of section I.3 of Order No. R9-2007-0001.

4. **Interim Reporting Requirements -** For the July 2006–June 2007 reporting period, Jurisdictional URMP and Watershed URMP Annual Reports shall be submitted on January 31, 2008. Each Jurisdictional URMP and Watershed URMP Annual Report submitted for this reporting period shall at a minimum be comprehensive descriptions of all activities conducted to fully implement the Copermittees' Jurisdictional URMP and Watershed URMP documents, as those documents were developed to comply with the requirements of Order No. 2001-01. The Principal Permittee shall be responsible for submitting these documents in a unified manner, consistent with the unified reporting requirements of Order No. 2001-01.

5. **Annual Report Integration**

a. The Copermittees are encouraged to submit, for Regional Board review and approval, an annual reporting format which integrates the information submitted in the JURMP, WURMP, and RURMP Annual Reports and Monitoring Reports. This document shall be called the "Integrated Annual Report Format." The Integrated Annual Report Format should:

(1) Exhibit compliance with all requirements of JURMP, WURMP, and RURMP sections D, E, and F of Order No. R9-2007-0001.
(2) Report all information required in section J.3 of Order No. R9-2007-0001.
(3) Report all information required in the Monitoring and Reporting program.
(4) Provide consistent and comparable reporting of jurisdictional and watershed information by all Copermittees and watershed groups.
(5) Specifically identify all types of information that will be reported (e.g., amount of debris collected during street sweeping), including reporting criteria for each type of information (e.g., reported in tons).
(6) Describe quality assurance/quality control methods to be used to assess accuracy of jurisdictional and watershed information conveyed.
(7) Describe each Copermittee's reporting responsibilities under the format.
(8) Improve the Copermittees' ability to assess JURMP and WURMP effectiveness in terms of water quality.
(9) Include a separate section for reporting on each Copermittee's activities.
(10) Include a separate section for reporting on each watershed's activities.

b. Upon approval of the Integrated Annual Report Format by the Regional Board, an Integrated Annual Report shall be submitted annually, which may substitute for the JURMP Annual Reports, WURMP Annual Reports, RURMP Annual Report, and/or Monitoring Reports, as approved by the Regional Board. The Principal Permittee shall be responsible for the generation and submittal of the Integrated Annual Reports. Each Copermittee shall be responsible for the information in the Integrated Annual Report pertaining to its jurisdictional, watershed, regional, and monitoring responsibilities. The Integrated Annual Report shall be submitted the first January 31 following approval of the reporting format by the Regional Board, and every January

31 thereafter. The reporting period for Integrated Annual Reports shall be the previous fiscal year. For example, a report submitted January 31, 2010 shall cover the reporting period July 1, 2008 to June 30, 2009.

c. The format and information provided in Integrated Annual Reports shall match and be consistent with the format and information described in the Integrated Annual Report Format.

6. Universal Reporting Requirements

All submittals shall include an executive summary, introduction, conclusion, recommendations, and signed certified statement. Each Copermittee shall submit a signed certified statement covering its responsibilities for each applicable submittal. The Principal Permittee shall submit a signed certified statement covering its responsibilities for each applicable submittal and the sections of the submittals for which it is responsible.

K. MODIFICATION OF PROGRAMS

Modifications of Jurisdictional Urban Runoff Management Programs, Watershed Urban Runoff Management Programs, and/or the Regional Urban Runoff Management Program may be initiated by the Executive Officer or by the Copermittees. Requests by Copermittees shall be made to the Executive Officer, and shall be submitted during the annual review process. Requests for modifications should be incorporated, as appropriate, into the Annual Reports or other deliverables required or allowed under this Order.

1. Minor Modifications – Minor modifications to Jurisdictional Urban Runoff Management Programs, Watershed Urban Runoff Management Programs, and/or the Regional Urban Runoff Management Program may be accepted by the Executive Officer where the Executive Officer finds the proposed modification complies with all discharge prohibitions, receiving water limitations, and other requirements of this Order.

2. Modifications Requiring an Amendment to this Order – Proposed modifications that are not minor shall require amendment of this Order in accordance with this Order's rules, policies, and procedures.

L. ALL COPERMITTEE COLLABORATION

1. Each Copermittee collaborate with all other Copermittees regulated under this Order to address common issues, promote consistency among Jurisdictional Urban Runoff Management Programs and Watershed Urban Runoff Management Programs, and to plan and coordinate activities required under this Order.

   a. Management Structure - All Copermittees shall jointly execute and submit to the Regional Board no later than 180 days after adoption of this Order, a Memorandum of Understanding, Joint Powers Authority, or other instrument of formal agreement which at a minimum:

      (1) Identifies and defines the responsibilities of the Principal Permittee and Lead Watershed Permittees;
      (2) Identifies Copermittees and defines their individual and joint responsibilities, including watershed responsibilities;

(3) Establishes a management structure to promote consistency and develop and implement regional activities;
(4) Establishes standards for conducting meetings, decision-making, and cost-sharing;
(5) Provides guidelines for committee and workgroup structure and responsibilities;
(6) Lays out a process for addressing Copermittee non-compliance with the formal agreement; and
(7) Includes any and all other collaborative arrangements for compliance with this Order.

M. PRINCIPAL PERMITTEE RESPONSIBILITIES

Within 180 days of adoption of this Order, the Copermittees shall designate the Principal Permittee and notify the Regional Board of the name of the Principal Permittee. The Principal Permittee shall, at a minimum:

1. Serve as liaison between the Copermittees and the Regional Board on general permit issues, and when necessary and appropriate, represent the Copermittees before the Regional Board.

2. Coordinate permit activities among the Copermittees and facilitate collaboration on the development and implementation of programs required under this Order.

3. Integrate individual Copermittee documents and reports into single unified documents and reports for submittal to the Regional Board as required under this Order.

4. Produce and submit documents and reports as required by section J of this Order and Receiving Waters and Urban Runoff Monitoring and Reporting Program No. R9-2007-0001.

5. Submit to the Regional Board, within 180 days of adoption of this Order, a formal agreement between the Copermittees which provides a management structure for meeting the requirements of this Order (as described in section L).

6. Coordinate joint development by all of the Copermittees of standardized format(s) for all documents and reports required under this Order (e.g., JURMPs, WURMPs, annual reports, monitoring reports, etc.). The standardized reporting format(s) shall be used by all Copermittees. The Principal Permittee shall submit the standardized format(s) to the Regional Board for review no later than 180 days after adoption of this Order.

N. RECEIVING WATERS MONITORING AND REPORTING PROGRAM

Pursuant to CWC section 13267, the Copermittees shall comply with all the requirements contained in Receiving Waters and Urban Runoff Monitoring and Reporting Program No. R9-2007-0001.

O. STANDARD PROVISIONS, REPORTING REQUIREMENTS, AND NOTIFICATIONS

1. Each Copermittee shall comply with Standard Provisions, Reporting Requirements, and Notifications contained in Attachment B of this Order. This includes 24 hour/5day reporting requirements for any instance of non-compliance with this Order as described

in section 5.e of Attachment B.

2. All plans, reports and subsequent amendments submitted in compliance with this Order shall be implemented immediately (or as otherwise specified). All submittals by Copermittees must be adequate to implement the requirements of this Order.

I, John H. Robertus, Executive Officer, do hereby certify the foregoing is a full, true, and correct copy of an Order adopted by the California Regional Water Quality Control Board, San Diego Region, on January 24, 2007.

John H. Robertus
Executive Officer

ATTACHMENT A

BASIN PLAN PROHIBITIONS

California Water Code Section 13243 provides that a Regional Board, in a water quality control plan, may specify certain conditions or areas where the discharge of waste, or certain types of waste is not permitted. The following discharge prohibitions are applicable to any person, as defined by Section 13050(c) of the California Water Code, who is a citizen, domiciliary, or political agency or entity of California whose activities in California could affect the quality of waters of the state within the boundaries of the San Diego Region.

1. The discharge of waste to waters of the state in a manner causing, or threatening to cause a condition of pollution, contamination or nuisance as defined in California Water Code Section 13050, is prohibited.

2. The discharge of waste to land, except as authorized by waste discharge requirements or the terms described in California Water Code Section 13264 is prohibited.

3. The discharge of pollutants or dredged or fill material to waters of the United States except as authorized by a NPDES permit or a dredged or fill material permit (subject to the exemption described in California Water Code Section 13376) is prohibited.

4. Discharges of recycled water to lakes or reservoirs used for municipal water supply or to inland surface water tributaries thereto are prohibited, unless this Regional Board issues a NPDES permit authorizing such a discharge; the proposed discharge has been approved by the State Department of Health Services and the operating agency of the impacted reservoir; and the discharger has an approved fail-safe long-term disposal alternative.

5. The discharge of waste to inland surface waters, except in cases where the quality of the discharge complies with applicable receiving water quality objectives, is prohibited. Allowances for dilution may be made at the discretion of the Regional Board. Consideration would include streamflow data, the degree of treatment provided and safety measures to ensure reliability of facility performance. As an example, discharge of secondary effluent would probably be permitted if streamflow provided 100:1 dilution capability.

6. The discharge of waste in a manner causing flow, ponding, or surfacing on lands not owned or under the control of the discharger is prohibited, unless the discharge is authorized by the Regional Board.

7. The dumping, deposition, or discharge of waste directly into waters of the state, or adjacent to such waters in any manner which may permit its being transported into the waters, is prohibited unless authorized by the Regional Board.

8. Any discharge to a storm water conveyance system that is not composed entirely of "storm water" is prohibited unless authorized by the Regional Board. [The federal regulations, 40 CFR 122.26(b)(13), define storm water as storm water runoff, snow melt runoff, and surface runoff and drainage. 40 CFR 122.26(b)(2) defines an illicit discharge as any discharge to a storm water conveyance system that is not composed entirely of storm water except discharges pursuant to a NPDES permit and discharges resulting from

fire fighting activities. [§122.26 amended at 56 FR 56553, November 5, 1991; 57 FR 11412, April 2, 1992].

9. The unauthorized discharge of treated or untreated sewage to waters of the state or to a storm water conveyance system is prohibited.

10. The discharge of industrial wastes to conventional septic tank/subsurface disposal systems, except as authorized by the terms described in California Water Code Section 13264, is prohibited.

11. The discharge of radioactive wastes amenable to alternative methods of disposal into the waters of the state is prohibited.

12. The discharge of any radiological, chemical, or biological warfare agent into waters of the state is prohibited.

13. The discharge of waste into a natural or excavated site below historic water levels is prohibited unless the discharge is authorized by the Regional Board.

14. The discharge of sand, silt, clay, or other earthen materials from any activity, including land grading and construction, in quantities which cause deleterious bottom deposits, turbidity or discoloration in waters of the state or which unreasonably affect, or threaten to affect, beneficial uses of such waters is prohibited.

15. The discharge of treated or untreated sewage from vessels to Mission Bay, Oceanside Harbor, Dana Point Harbor, or other small boat harbors is prohibited.

16. The discharge of untreated sewage from vessels to San Diego Bay is prohibited.

17. The discharge of treated sewage from vessels to portions of San Diego Bay that are less than 30 feet deep at mean lower low water (MLLW) is prohibited.

18. The discharge of treated sewage from vessels, which do not have a properly functioning US Coast Guard certified Type I or Type II marine sanitation device, to portions of San Diego Bay that are greater than 30 feet deep at mean lower low water (MLLW) is prohibited.

ATTACHMENT B

STANDARD PROVISIONS, REPORTING REQUIREMENTS, AND NOTIFICATIONS

1. STANDARD PROVISIONS – PERMIT COMPLIANCE [40 CFR 122.41]

(a) *Duty to comply* [40 CFR 122.41(a)].

(1) The Copermittee must comply with all of the conditions of this Order. Any noncompliance constitutes a violation of the Clean Water Act (CWA) and the California Water Code (CWC) and is grounds for enforcement action, for permit termination, revocation and reissuance, or modification; or denial of a permit renewal application.

(2) The Copermittee shall comply with effluent standards or prohibitions established under section 307(a) of the CWA toxic pollutants and with standards for sewage sludge use or disposal established under section 405(d) of the CWA within the time provided in the regulations that establish these standards or prohibitions or standards for sewage sludge use or disposal, even if the Order has not yet been modified to incorporate the requirement.

(b) *Need to halt or reduce activity not a defense* [40 CFR 122.41(c)]. It shall not be a defense for the Copermittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this Order.

(c) *Duty to mitigate* [40 CFR 122.41(d)]. The Copermittee shall take all reasonable steps to minimize or prevent any discharge or prevent any discharge or sludge use or disposal in violation of this Order that has a reasonable likelihood of adversely affecting human health or the environment.

(d) *Proper operation and maintenance* [40 CFR 122.41(e)]. The Copermittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the Copermittee to achieve compliance with the conditions of this Order. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures. This provision requires the operation of back-up or auxiliary facilities or similar systems that are installed by the Copermittee only when necessary to achieve compliance with the conditions of this Order.

(e) *Property rights* [40 CFR 122.41(g)].

(1) This Order does not convey any property rights of any sort or any exclusive privilege.
(2) The issuance of this Order does not authorize any injury to persons or property or invasion of other private rights, or any infringement of State or local law or regulations.

(f) *Inspection and entry* [40 CFR 122.41(i)]. The Copermittee shall allow the Regional Water Quality Control Board, San Diego Region (Regional Board), State Water Resources Control Board (SWRCB), United States Environmental Protection Agency (USEPA), and/or their authorized representatives (including an authorized contractor acting as their representative), upon presentation of credentials and other documents as may be required by law, to:

(1) Enter upon the Copermittee's premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of this Order;
(2) Have access to and copy, at reasonable times, any records that must be kept under the conditions of this Order;
(3) Inspect and photograph, at reasonable times, any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this Order; and
(4) Sample or monitor, at reasonable times, for the purpose of assuring Order compliance or as otherwise authorized by the CWA or the CWC, any substances or parameters at any location.

(g) *Bypass* [40 CFR 122.41(m)]

(1) Definitions:

i) "Bypass" means the intentional diversion of waste streams from any portion of a treatment facility.
ii) "Severe property damage" means substantial physical damage to property, damage to the treatment facilities, which causes them to become inoperable, or substantial and permanent loss of natural resources that can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production.

(2) Bypass not exceeding limitations - The Copermittee may allow any bypass to occur which does not cause exceedances of effluent limitations, but only if it also is for essential maintenance to assure efficient operation. These bypasses are not subject to the provisions listed in Standard Provisions – Permit Compliance (g)(3), (g)(4) and (g)(5) below.

(3) Prohibition of Bypass - Bypass is prohibited, and the Regional Board may take enforcement action against a Copermittee for bypass, unless:

i) Bypass was unavoidable to prevent loss of life, personal injury, or severe property damage;
ii) There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate back-up equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass which occurred during normal periods of equipment downtime or preventive maintenance; and
iii) The Copermittee submitted notice as required under Standard Provisions – Permit Compliance (g)(3) above.

(4) Notice

i) Anticipated bypass. If the Copermittee knows in advance of the need for a bypass, it shall submit a notice, if possible at least ten days before the date of the bypass.
ii) Unanticipated bypass. The Copermittee shall submit notice of an unanticipated bypass as required in Standard Provisions 5(e) below (24-hour notice).

(h) *Upset* [40 CFR 122.41(n)] Upset means an exceptional incident in which there is unintentional and temporary noncompliance with technology based effluent limitations because of factors beyond the reasonable control of the Copermittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation.

(1) Effect of an upset. An upset constitutes an affirmative defense to an action brought for noncompliance with such technology based permit effluent limitations if the requirements of Standard Provisions – Permit Compliance (h)(2) below are met. No determination made during administrative review of claims that noncompliance was caused by upset, and before an action for noncompliance, is final administrative action subject to judicial review.

(2) Conditions necessary for a demonstration of upset. A Copermittee who wishes to establish the affirmative defense of upset shall demonstrate, through properly signed, contemporaneous operating logs, or other relevant evidence that:

i) An upset occurred and that the Copermittee can identify the cause(s) of the upset;
ii) The permitted facility was at the time being properly operated;
iii) The Copermittee submitted notice of the upset as required in Standard Provisions – Permit Compliance (5)(e)(ii)(B) below (24-hour notice); and
iv) The Copermittee complied with any remedial measures required under Standard Provisions – Permit Compliance 1(c) above.

(3) Burden of Proof. In any enforcement proceeding, the Copermittee seeking to establish the occurrence of an upset has the burden of proof.

2. STANDARD PROVISIONS – PERMIT ACTION

(a) *General* [40 CFR 122.41(f)] This Order may be modified, revoked and reissued, or terminated for cause. The filing of a request by the Copermittee for modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance does not stay any Order condition.

(b) *Duty to reapply* [40 CFR 122.41(b)]. If the Copermittee wishes to continue an activity regulated by this Order after the expiration date of this Order, the Copermittee must apply for and obtain new permit.

(c) *Transfers*. This Order is not transferable to any person except after notice to the Regional Board. The Regional Board may require modification or revocation and reissuance of the Order to change the name of the Copermittee and incorporate such other requirements as may be necessary under the CWA and the CWC.

3. STANDARD PROVISIONS – MONITORING

(a) Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity. [40 CFR Section 122.41 (j) (1)]

(b) Monitoring results must be conducted according to test procedures under 40 CFR Part 136, or in the case of sludge use or disposal, approved under 40 CFR Part 136 unless otherwise

specified in 40 CFR Part 503 unless other test procedures have been specified in this Order [40 CFR Section 122.41(j)(4)][40 CFR Section 122.44(i)(1)(iv)].

4. STANDARD PROVISIONS – RECORDS

(a) Except for records of monitoring information required by this Order related to the Copermittee's sewage sludge use and disposal activities, which shall be retained for a period of at least five years (or longer as required by 40 CFR Part 503), the Copermittee shall retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this Order, and records of all data used to complete the application for this Order, for a period of at least three (3) years from the date of the sample, measurement, report or application, This period may be extended by request of the Regional Water Board Executive Officer at any rime [40 CFR Section 122.41(j)(2)].

(b) *Records of monitoring information* [40 CFR 122.41(j) (3)] shall include:

(1) The date, exact place, and time of sampling or measurements;
(2) The individual(s) who performed the sampling or measurements;
(3) The date(s) analyses were performed;
(4) The individual(s) who performed the analyses;
(5) The analytical techniques or methods used; and
(6) The results of such analyses.

(c) *Claims of confidentiality* [40 CFR Section 122.7(b)] of the following information will be denied:

(1) The name and address of any permit applicant or Copermittee; and
(2) Permit applications and attachments, permits and effluent data.

5. STANDARD PROVISIONS – REPORTING

(a) *Duty to provide information* [40 CFR 122.41(h)]. The Copermittee shall furnish to the Regional Board, SWRCB, or USEPA within a reasonable time, any information which the Regional Board, SWRCB, or USPEA may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this Order or to determine compliance with this Order. Upon request, the Copermittee shall also furnish to the Regional Board, SWRCB, or USEPA, copies of records required to be kept by this Order.

(b) *Signatory and Certification Requirements* [40 CFR 122.41(k)]

(1) All applications, reports, or information submitted to the Regional Board, SWRCB, or USEPA shall be signed and certified in accordance with Standard Provisions – Reporting 5(b)ii), 5(b)iii), 5(b)iv), and 5(b) (see 40 CFR 122.22)

(2) *Applications* [40 CFR 122.22(a)(3)] All permit applications shall be signed by either a principal executive officer or ranking elected official.

(3) *Reports* [40 CFR 122.22(b)]. All reports required by this Order, and other information requested by the Regional Board, SWRCB, or USEPA shall be signed by a person described in Standard Provisions – Reporting 5(b)(2) above, or by a duly authorized

representative of that person. A person is a duly authorized representative only if:

i) The authorization is made in writing by a person described in Standard Provisions-Reporting 5(b)(2) above;

ii) The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity, such as the position of plant manager, operator of a well or a well field, superintendent, position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters for the company. (A duly authorized representative may thus be either a named individual or any individual occupying a named position.); and,

iii) The written authorization is submitted to the Regional Water Board and State Water Board.

(4) *Changes to authorization* [40 CFR Section 122.22(c)] If an authorization under Standard Provisions – Reporting 5(b)(3)of this reporting requirement is no longer accurate because a different individual or position has responsibility for the overall operation of the facility, a new authorization satisfying the requirements of Standard Provisions – Reporting 5(b)(3) above must be submitted to the Regional Water Board and State Water Board prior to or together with any reports, information, or applications to be signed by an authorized representative.

(5) *Certification* [40 CFR Section 122.22(d)] Any person signing a document under Standard Provisions – Reporting 5(b)(2), or 5(b)(3) above shall make the following certification:

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

(c) *Monitoring reports*. [40 CFR 122.41(l)(4)]

(1) Monitoring results shall be reported at the intervals specified in the Receiving Waters and Urban Runoff Monitoring and Reporting Program No. R9-2007-0001.

(2) Monitoring results must be reported on a Discharge Monitoring Report (DMR) form or forms provided or specified by the Regional Board or SWRCB for reporting results of mentoring of sludge use or disposal practices.

(3) If the Copermittee monitors any pollutant more frequently than required by this Order using test procedures approved under 40 CFR Part 136 or, in the case of sludge use or disposal, approved under 40 CFR Part 136 unless otherwise specified in 40 CFR Part 503, or as specified in this Order, the results of this monitoring shall be included in the calculation and reporting of the data submitted in the DMR or sludge reporting form specified by the Regional Board.

(4) Calculations for all limitations, which require averaging of measurements, shall utilize an arithmetic mean unless otherwise specified in this Order.

(d) *Compliance schedules*. [40 CFR Section 122.41(l)(5)] Reports of compliance or noncompliance with, or any progress reports on, interim and final requirements contained in any compliance schedule of this Order shall be submitted no later than 14 days following each schedule date.

(e) *Twenty-four hour reporting* [40 CFR Section 122.41(l)(6)]

(1) The Copermittee shall report any noncompliance that may endanger health or the environment. Any information shall be provided orally within 24 hours from the time the Copermittee becomes aware of the circumstances. A written submission shall also be provided within five (5) days of the time the Copermittee becomes aware of the circumstances. The written submission shall contain a description of the noncompliance and its cause; the period of noncompliance, including exact dates and times, and if the noncompliance has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance.

(2) The following shall be included as information, which must be reported within 24 hours under this paragraph:

i) Any unanticipated bypass that exceeds any effluent limitation in the Order (See 40 CFR 122.41(g)).
ii) Any upset which exceeds any effluent limitation in this Order.

(3) The Regional Board may waive the above-required written report under this provision on a case-by-case basis if the oral report has been received within 24 hours.

(f) *Planned changes*. [40 CFR Section 122.41(l)(1)] The Copermittee shall give notice to the Regional Board as soon as possible of any planned physical alterations or additions to the permitted facility. Notice is required under this provision only when:

(1) The alteration or addition to a permitted facility may meet one of the criteria for determining whether a facility is a new source in 40 CFR 122.29(b); or

(2) The alteration or addition could significantly change the nature or increase the quantity of pollutants discharged. This notification applies to pollutants, which are not subject to effluent limitations in this Order.

(3) The alteration or addition results in a significant change in the Copermittee's sludge use or disposal practices, and such alteration, addition, or change may justify the application of permit conditions that are different from or absent in the existing Order, including notification of additional use or disposal sites not reported during the permit application process or not reported pursuant to an approved land application plan.

(g) *Anticipated noncompliance*. [40 CFR Section 122.41(l)(7)] The Copermittee shall give advance notice to the Regional Board or SWRCB of any planned changes in the permitted facility or activity, which may result in noncompliance with Order requirements.

(h) *Other noncompliance* [40 CFR Section 122.41(l) 7)] The Copermittee shall report all instances of noncompliance not reported under Standard Provisions 5(c), 5(d), and 5(e) above, at the time monitoring reports are submitted. The reports shall contain the information listed in Standard Provision – Reporting 5(e) above.

(i) *Other information* [40 CFR Section 122.41(l)(8)] When the Copermittee becomes aware that it failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application or in any report to the Regional Board, SWRCB, or USEPA, the Copermittee shall promptly submit such facts or information.

6. STANDARD PROVISIONS – ENFORCEMENT

(a) The Regional Board is authorized to enforce the terms of this permit under several provisions of the CWC, including, but not limited to, Sections 13385, 13386, and 13387.

7. ADDITIONAL STANDARD PROVISIONS

(a) *Municipal separate storm sewer systems* [40 CFR 122.42(c)]. The operator of a large or medium municipal separate storm sewer system or a municipal separate storm sewer that has been designated by the Director under 40 CFR 122.26(a)(1)(v) must submit an annual report by the anniversary of the date of the issuance of the permit for such system. The report shall include:

(1) The status of implementing the components of the storm water management program that are established as permit conditions;

(2) Proposed changes to the storm water management programs that are established as permit conditions. Such proposed changes shall be consistent with 40 CFR 122.26(d)(2)(iii); and

(3) Revisions, if necessary, to the assessment of controls and the fiscal analysis reported in the permit application under 40 CFR 122.26(d)(2)(iv) and 40 CFR 122.26(d)(2)(v);

(4) A summary of data, including monitoring data, that is accumulated throughout the reporting year;

(5) Annual expenditures and budget for year following each annual report;

(6) A summary describing the number and nature of enforcement actions, inspections, and public education programs; and

(7) Identification of water quality improvements or degradation.

(b) *Storm water discharges* [40 CFR 122.42(d)]. The initial permits for discharges composed entirely of storm water issued pursuant to 40 CFR 122.26(e)(7) shall require compliance with the conditions of the permit as expeditiously as practicable, but in no event later than three years after the date of issuance of the permit.

(c) *Other Effluent Limitations and Standards* [40 CFR 122.44(b)(1)]. If any toxic effluent standard or prohibition (including any schedule of compliance specified in such effluent standard or prohibition) is promulgated under Section 307(a) of the CWA for a toxic pollutant which is present in the discharge and that standard or prohibition is more stringent than any limitation on the pollutant in this Order, the Regional Board may institute

proceedings under these regulations to modify or revoke and reissue the Order to conform to the toxic effluent standard or prohibition.

(d) *Discharge is a privilege* [CWC section 13263(g)]. No discharge of waste into the waters of the State, whether or not such discharge is made pursuant to waste discharge requirements, shall create a vested right to continue such discharge. All discharges of waste into waters of the State are privileges, not rights.

(e) *Review and revision of Order* [CWC section 13263(e)]. Upon application by any affected person, or on its own motion, the Regional Board may review and revise this permit.

(f) *Termination or modification of Order* [CWC section13381]. This permit may be terminated or modified for causes, including, but not limited to, all of the following:

(1) Violation of any condition contained in this Order;
(2) Obtaining this Order by misrepresentation, or failure to disclose fully all relevant facts.
(3) A change in any condition that requires either a temporary or permanent reduction or elimination of the permitted discharge.

(g) *Transfers*. When this Order is transferred to a new owner or operator, such requirements as may be necessary under the CWC may be incorporated into this Order.

(h) *Conditions not stayed*. The filing of a request by the Copermittee for modification, revocation and reissuance, or termination of this Order, or a notification of planned change in or anticipated noncompliance with this Order does not stay any condition of this Order.

(i) *Availability*. A copy of this Order shall be kept at a readily accessible location and shall be available to on-site personnel at all times.

(j) *Duty to minimize or correct adverse impacts*. The Copermittees shall take all reasonable steps to minimize or correct any adverse impact on the environment resulting from noncompliance with this Order, including such accelerated or additional monitoring as may be necessary to determine the nature and impact of the noncompliance.

(k) *Interim Effluent Limitations.* The Copermittee shall comply with any interim effluent limitations as established by addendum, enforcement action, or revised waste discharge requirements which have been, or may be, adopted by this Regional Board.

(l) *Responsibilities, liabilities, legal action, penalties* [CWC sections 13385 and 13387]. The Porter-Cologne Water Quality Control Act provides for civil and criminal penalties comparable to, and in some cases greater than, those provided for under the CWA.

Nothing in this Order shall be construed to protect the Copermittee from its liabilities under federal, state, or local laws.

Except as provided for in 40CFR 122.41(m) and (n), nothing in this Order shall be construed to relieve the Copermittee from civil or criminal penalties for noncompliance.

Nothing in this Order shall be construed to preclude the institution of any legal action or relieve the Copermittee from any responsibilities, liabilities, or penalties to which the Copermittee is or may be subject to under Section 311 of the CWA.

Nothing in this Order shall be construed to preclude institution of any legal action or relieve the Copermittee from any responsibilities, liabilities, or penalties established pursuant to any applicable state law or regulation under authoring preserved by Section 510 of the CWA.

(m) *Noncompliance*. Any noncompliance with this Order constitutes violation of the CWC and is grounds for denial of an application for modification of the Order (also see 40 CFR 122.41(a).

(n) *Director*. For purposes of this Order, the term "Director" used in parts of 40 CFR incorporated into this Order by reference and/or applicable to this Order shall have the same meaning as the term "Regional Board" used elsewhere in this Order, except that in 40 CFR 122.41(h) and (I), "Director" shall mean "Regional Board, SWRCB, and USEPA."

(o) The Regional Board has, in prior years, issued a limited number of individual NPDES permits for non-storm water discharges to MS4s. The Regional Board or SWRCB may in the future, upon prior notice to the Copermittee(s), issue an NPDES permit for any non-storm water discharge (or class of non-storm water discharges) to a MS4. Copermittees may prohibit any non-storm water discharge (or class of non-storm water discharges) to a MS4 that is authorized under such separate NPDES permits.

(p) *Effective date*. This Order shall become effective on the date of its adoption provided the USEPA has no objection. If the USEPA objects to its issuance, this Order shall not become effective until such objection is withdrawn. This Order supersedes Order No. 2001-01 upon the effective date of this Order.

(q) *Expiration*. This Order expires five years after adoption.

(r) *Continuation of expired order* [23 CCR 2235.4]. After this Order expires, the terms and conditions of this Order are automatically continued pending issuance of a new permit if all requirements of the federal NPDES regulations on the continuation of expired permits (40 CFR 122.6) are complied with.

(s) *Applications*. Any application submitted by a Copermittee for reissuance or modification of this Order shall satisfy all applicable requirements specified in federal regulations as well as any additional requirements for submittal of a Report of Waste Discharge specified in the CWC and the California Code of Regulations.

(t) *Confidentiality*. Except as provided for in 40 CFR 122.7, no information or documents submitted in accordance with or in application for this Order will be considered confidential, and all such information and documents shall be available for review by the public at the Regional Board office.

(u) *Severability*. The provisions of this Order are severable, and if any provision of this Order, or the application of any provisions of this Order to any circumstance, is held invalid, the application of such provision to other circumstances and the remainder of this Order shall not be affected thereby.

(v) *Report submittal*. The Copermittee shall submit reports and provide notifications as required by this Order to the following:

SOUTHERN WATERSHED PROTECTION UNIT
CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN DIEGO REGION
9174 SKY PARK COURT, SUITE 100
SAN DIEGO CA 92123-4340
Telephone: (858) 467-2952 Fax: (858) 571-6972

EUGENE BROMLEY
US ENVIRONMENTAL PROTECTION AGENCY
REGION IX
PERMITS ISSUANCE SECTION (W-5-1)
75 HAWTHORNE STREET
SAN FRANCISCO CA 94105

Unless otherwise directed, the Copermittee shall submit one hard copy for the official record and one electronic copy of each report required under this Order to the Regional Board and one electronic copy to the EPA.

ATTACHMENT C

DEFINITIONS

Advanced Treatment- Using mechanical or chemical means to flocculate and remove suspended sediment from runoff from construction sites prior to discharge.

Anthropogenic Litter – Trash generated from human activities, not including sediment.

Basin Plan – Water Quality Control Plan, San Diego Basin, Region 9, and amendments, developed by the Regional Board.

Beneficial Uses - The uses of water necessary for the survival or well being of man, plants, and wildlife. These uses of water serve to promote tangible and intangible economic, social, and environmental goals. "Beneficial Uses" of the waters of the State that may be protected include, but are not limited to, domestic, municipal, agricultural and industrial supply; power generation; recreation; aesthetic enjoyment; navigation; and preservation and enhancement of fish, wildlife, and other aquatic resources or preserves. Existing beneficial uses are uses that were attained in the surface or ground water on or after November 28, 1975; and potential beneficial uses are uses that would probably develop in future years through the implementation of various control measures. "Beneficial Uses" are equivalent to "Designated Uses" under federal law. [California Water Code Section 13050(f)].

Best Management Practices (BMPs) - Defined in 40 CFR 122.2 as schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the pollution of waters of the United States. BMPs also include treatment requirements, operating procedures and practices to control plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage. In the case of municipal storm water permits, BMPs are typically used in place of numeric effluent limits.

Bioassessment - The use of biological community information to evaluate the biological integrity of a water body and its watershed. With respect to aquatic ecosystems, bioassessment is the collection and analysis of samples of the benthic macroinvertebrate community together with physical/habitat quality measurements associated with the sampling site and the watershed to evaluate the biological condition (i.e. biological integrity) of a water body.

Biocriteria - Under the CWA, numerical values or narrative expressions that define a desired biological condition for a water body that are legally enforceable. The USEPA defines biocriteria as: "numerical values or narrative expressions that describe the reference biological integrity of aquatic communities inhabiting waters of a given designated aquatic life use…(that)…describe the characteristics of water body segments least impaired by human activities."

Biological Integrity - Defined in Karr J.R. and D.R. Dudley. 1981. Ecological perspective on water quality goals. Environmental Management 5:55-68 as: "A balanced, integrated, adaptive community of organisms having a species composition, diversity, and functional organization comparable to that of natural habitat of the region." Also referred to as ecosystem health.

Clean Water Act Section 402(p) [33 USC 1342(p)] - The federal statute requiring municipal and industrial dischargers to obtain NPDES permits for their discharges of storm water.

Clean Water Act Section 303(d) Water Body - An impaired water body in which water quality does not meet applicable water quality standards and/or is not expected to meet water quality standards, even after the application of technology based pollution controls required by the CWA. The discharge of urban runoff to these water bodies by the Copermittees is significant because these discharges can cause or contribute to violations of applicable water quality standards.

Construction Site – Any project, including projects requiring coverage under the General Construction Permit, that involves soil disturbing activities including, but not limited to, clearing, grading, disturbances to ground such as stockpiling, and excavation.

Contamination - As defined in the Porter-Cologne Water Quality Control Act, contamination is "an impairment of the quality of waters of the State by waste to a degree which creates a hazard to the public health through poisoning or through the spread of disease. 'Contamination' includes any equivalent effect resulting from the disposal of waste whether or not waters of the State are affected."

Critical Channel Flow (Qc) – The channel flow that produces the critical shear stress that initiates bed movement or that erodes the toe of channel banks. When measuring Qc, it should be based on the weakest boundary material – either bed or bank.

CWA – Federal Clean Water Act

CWC – California Water Code

Development Projects - New development or redevelopment with land disturbing activities; structural development, including construction or installation of a building or structure, the creation of impervious surfaces, public agency projects, and land subdivision.

Dry Season – May 1 through September 30 of each year.

Effectiveness Assessment Outcome Level 1 - Compliance with Activity-based Permit Requirements – Level 1 outcomes are those directly related to the implementation of specific activities prescribed by this Order or established pursuant to it.

Effectiveness Assessment Outcome Level 2 - Changes in Attitudes, Knowledge, and Awareness – Level 2 outcomes are measured as increases in knowledge and awareness among target audiences such as residents, businesses, and municipal employees.

Effectiveness Assessment Outcome Level 3 - Behavioral Change and BMP Implementation – Level 3 outcomes measure the effectiveness of activities in affecting behavioral change and BMP implementation.

Effectiveness Assessment Outcome Level 4 - Load Reductions – Level 4 outcomes measure load reductions which quantify changes in the amounts of pollutants associated with specific sources before and after a BMP or other control measure is employed.

Effectiveness Assessment Outcome Level 5 - Changes in Urban Runoff and Discharge Quality – Level 5 outcomes are measured as changes in one or more specific constituents or stressors in discharges into or from MS4s.

Effectiveness Assessment Outcome Level 6 - Changes in Receiving Water Quality – Level 6 outcomes measure changes to receiving water quality resulting from discharges into and from MS4s, and may be expressed through a variety of means such as compliance with water quality objectives or other regulatory benchmarks, protection of biological integrity, or beneficial use attainment.

Effluent Limitations – Any restriction imposed on quantities, discharge rates, and concentrations of pollutants, which are discharged from point sources into waters of the State. The limitations are designed to ensure that the discharge does not cause water quality objectives to be exceeded in the receiving water and does not adversely affect beneficial uses. Effluent limits are typically numeric (e.g., 10 mg/l), but can also be narrative (e.g., no toxics in toxic amounts).

Erosion – When land is diminished or worn away due to wind, water, or glacial ice. Often the eroded debris (silt or sediment) becomes a pollutant via storm water runoff. Erosion occurs naturally but can be intensified by land clearing activities such as farming, development, road building, and timber harvesting.

Environmentally Sensitive Areas (ESAs) - Areas that include but are not limited to all Clean Water Act Section 303(d) impaired water bodies; areas designated as Areas of Special Biological Significance by the State Water Resources Control Board (Water Quality Control Plan for the San Diego Basin (1994) and amendments); water bodies designated with the RARE beneficial use by the State Water Resources Control Board (Water Quality Control Plan for the San Diego Basin (1994) and amendments); areas designated as preserves or their equivalent under the Multi Species Conservation Program within the Cities and County of San Diego; and any other equivalent environmentally sensitive areas which have been identified by the Copermittees.

Feasibility Analysis – Detailed description of the selection process for the treatment control BMPs for a Priority Development Project, including justification of why one BMP is selected over another. For a Priority Development Project where a treatment control BMP with a low removal efficiency ranking (as identified by the Model SUSMP) is proposed, the analysis shall include a detailed and adequate justification exhibiting the reasons implementation of a treatment control BMP with a higher removal efficiency is infeasible for the Priority Development Project or portion of the Priority Development Project.

Flow Duration – The long-term period of time that flows occur above a threshold that causes significant sediment transport and may cause excessive erosion damage to creeks and streams (not a single storm event duration). The simplest way to visualize this is to consider a histogram of pre- and post-project flows using long-term records of hourly data. To maintain pre-project flow duration means that the total number of hours (counts) within each range of flows in a flow-duration histogram cannot increase between the pre- and post-project condition. Flow duration within the range of geomorphologically significant flows is important for managing erosion.

GIS – Geographic Information System

Grading - The cutting and/or filling of the land surface to a desired slope or elevation.

Hazardous Material – Any substance that poses a threat to human health or the environment due to its toxicity, corrosiveness, ignitability, explosive nature or chemical reactivity. These also include materials named by the USEPA in 40 CFR 116 to be reported if a designated quantity of the material is spilled into the waters of the U.S. or emitted into the environment.

Hazardous Waste - Hazardous waste is defined as "any waste which, under Section 600 of Title 22 of this code, is required to be managed according to Chapter 30 of Division 4.5 of Title 22 of this code" [CCR Title 22, Division 4.5, Chapter 11, Article 1].

Household Hazardous Waste – Paints, cleaning products, and other wastes generated during home improvement or maintenance activities.

Hydromodification – The change in the natural watershed hydrologic processes and runoff characteristics (i.e., interception, infiltration, overland flow, interflow and groundwater flow) caused by urbanization or other land use changes that result in increased stream flows and sediment transport. In addition, alteration of stream and river channels, installation of dams and water impoundments, and excessive streambank and shoreline erosion are also considered hydromodification, due to their disruption of natural watershed hydrologic processes.

Illicit Connection – Any connection to the MS4 that conveys an illicit discharge.

Illicit Discharge - Any discharge to the MS4 that is not composed entirely of storm water except discharges pursuant to a NPDES permit and discharges resulting from fire fighting activities [40 CFR 122.26(b)(2)].

Implementation Assessment – Assessment conducted to determine the effectiveness of Copermittee programs and activities in achieving measurable targeted outcomes, and in determining whether priority sources of water quality problems are being effectively addressed.

Inactive Slopes – Slopes on which no grading or other soil disturbing activities are conducted for 10 or more days.

Integrated Assessment – Assessment to be conducted to evaluate whether program implementation is properly targeted to and resulting in the protection and improvement of water quality.

Jurisdictional Urban Runoff Management Plan (JURMP) – A written description of the specific jurisdictional urban runoff management measures and programs that each Copermittee will implement to comply with this Order and ensure that pollutant discharges in urban runoff are reduced to the MEP and do not cause or contribute to a violation of water quality standards.

Low Impact Development (LID) – A storm water management and land development strategy that emphasizes conservation and the use of on-site natural features integrated with engineered, small-scale hydrologic controls to more closely reflect pre-development hydrologic functions.

Maximum Extent Practicable (MEP) – The technology-based standard established by Congress in CWA section 402(p)(3)(B)(iii) that operators of MS4s must meet. Technology-based standards establish the level of pollutant reductions that dischargers must achieve, typically by treatment or by a combination of source control and treatment control BMPs. MEP generally emphasizes pollution prevention and source control BMPs primarily (as the first line of defense) <u>in combination</u> with treatment methods serving as a backup (additional line of defense). MEP considers economics and is generally, but not necessarily, less stringent than BAT. A definition for MEP is not provided either in the statute or in the regulations. Instead the definition of MEP is dynamic and will be defined by the following process over time: municipalities propose their definition of MEP by way of their urban runoff management programs. Their total collective and individual activities conducted pursuant to the urban runoff management programs becomes their

proposal for MEP as it applies both to their overall effort, as well as to specific activities (e.g., MEP for street sweeping, or MEP for MS4 maintenance). In the absence of a proposal acceptable to the Regional Board, the Regional Board defines MEP.

In a memo dated February 11, 1993, entitled "Definition of Maximum Extent Practicable," Elizabeth Jennings, Senior Staff Counsel, SWRCB addressed the achievement of the MEP standard as follows:

> "*To achieve the MEP standard, municipalities must employ whatever Best Management Practices (BMPs) are technically feasible (i.e., are likely to be effective) and are not cost prohibitive. The major emphasis is on technical feasibility. Reducing pollutants to the MEP means choosing effective BMPs, and rejecting applicable BMPs only where other effective BMPs will serve the same purpose, or the BMPs would not be technically feasible, or the cost would be prohibitive. In selecting BMPs to achieve the MEP standard, the following factors may be useful to consider:*
>
> *a. Effectiveness: Will the BMPs address a pollutant (or pollutant source) of concern?*
> *b. Regulatory Compliance: Is the BMP in compliance with storm water regulations as well as other environmental regulations?*
> *c. Public Acceptance: Does the BMP have public support?*
> *d. Cost: Will the cost of implementing the BMP have a reasonable relationship to the pollution control benefits to be achieved?*
> *e. Technical Feasibility: Is the BMP technically feasible considering soils, geography, water resources, etc?*
>
> *The final determination regarding whether a municipality has reduced pollutants to the maximum extent practicable can only be made by the Regional or State Water Boards, and not by the municipal discharger. If a municipality reviews a lengthy menu of BMPs and chooses to select only a few of the least expensive, it is likely that MEP has not been met. On the other hand, if a municipal discharger employs all applicable BMPs except those where it can show that they are not technically feasible in the locality, or whose cost would exceed any benefit derived, it would have met the standard. Where a choice may be made between two BMPs that should provide generally comparable effectiveness, the discharger may choose the least expensive alternative and exclude the more expensive BMP. However, it would not be acceptable either to reject all BMPs that would address a pollutant source, or to pick a BMP base solely on cost, which would be clearly less effective. In selecting BMPs the municipality must make a serious attempt to comply and practical solutions may not be lightly rejected. In any case, the burden would be on the municipal discharger to show compliance with its permit. After selecting a menu of BMPs, it is the responsibility of the discharger to ensure that all BMPs are implemented."*

Municipal Separate Storm Sewer System (MS4) – A conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, or storm drains): (i) Owned or operated by a State, city town, borough, county, parish, district, association, or other public body (created by or pursuant to State law) having jurisdiction over disposal of sewage, industrial wastes, storm water, or other wastes, including special districts under State law such as a sewer district, flood control district or drainage district, or similar entity, or an Indian tribe or an authorized Indian tribal organization, or designated and approved management agency under section 208 of the CWA that discharges to

waters of the United States; (ii) Designated or used for collecting or conveying storm water; (iii) Which is not a combined sewer; (iv) Which is not part of the Publicly Owned Treatment Works (POTW) as defined at 40 CFR 122.26.

National Pollutant Discharge Elimination System (NPDES) - The national program for issuing, modifying, revoking and reissuing, terminating, monitoring and enforcing permits, and imposing and enforcing pretreatment requirements, under Sections 307, 318, 402, and 405 of the CWA.

NOI – Notice of Intent

Non-Storm Water - All discharges to and from a MS4 that do not originate from precipitation events (i.e., all discharges from a MS4 other than storm water). Non-storm water includes illicit discharges, non-prohibited discharges, and NPDES permitted discharges.

Nuisance - As defined in the Porter-Cologne Water Quality Control Act a nuisance is "anything which meets all of the following requirements: 1) Is injurious to health, or is indecent, or offensive to the senses, or an obstruction to the free use of property, so as to interfere with the comfortable enjoyment of life or property. 2) Affects at the same time an entire community or neighborhood, or any considerable number of persons, although the extent of the annoyance or damage inflicted upon individuals may be unequal. 3) Occurs during, or as a result of, the treatment or disposal of wastes."

Order – Order No. R9-2007-0001 (NPDES No. CAS0108758)

Person - A person is defined as an individual, association, partnership, corporation, municipality, State or Federal agency, or an agent or employee thereof [40 CFR 122.2].

Point Source - Any discernible, confined, and discrete conveyance, including, but not limited to, any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operations, landfill leachate collection systems, vessel, or other floating craft from which pollutants are or may be discharged. This term does not include return flows from irrigated agriculture or agricultural storm water runoff.

Pollutant - Any agent that may cause or contribute to the degradation of water quality such that a condition of pollution or contamination is created or aggravated.

Pollution - As defined in the Porter-Cologne Water Quality Control Act: "the alteration of the quality of the waters of the State by waste, to a degree that unreasonably affects the either of the following: 1) The waters for beneficial uses; or 2) Facilities that serve these beneficial uses." Pollution may include contamination.

Pollutants of Concern – Pollutants for which water bodies are listed as impaired under CWA section 303(d), pollutants associated with the land use type of a development, and/or pollutants commonly associated with urban runoff. Pollutants commonly associated with urban runoff include total suspended solids; sediment; pathogens (e.g., bacteria, viruses, protozoa); heavy metals (e.g., copper, lead, zinc, and cadmium); petroleum products and polynuclear aromatic hydrocarbons; synthetic organics (e.g., pesticides, herbicides, and PCBs); nutrients (e.g., nitrogen and phosphorus fertilizers); oxygen-demanding substances (decaying vegetation, animal waste, and anthropogenic litter).

Pollution Prevention - Pollution prevention is defined as practices and processes that reduce or eliminate the generation of pollutants, in contrast to source control BMPs, treatment control BMPs, or disposal.

Post-Construction BMPs - A subset of BMPs including structural and non-structural controls which detain, retain, filter, or educate to prevent the release of pollutants to surface waters during the final functional life of developments.

Pre-Project or Pre-Development Runoff Conditions (Discharge Rates, Durations, Etc.) – Runoff conditions that exist onsite immediately before the planned development activities occur. This definition is not intended to be interpreted as that period before any human-induces land activities occurred. This definition pertains to redevelopment as well as initial development.

Principal Permittee – County of San Diego

Priority Development Projects - New development and redevelopment project categories listed in Section D.1.d(2) of Order No. R9-2007-0001.

Receiving Waters – Waters of the U.S.

Receiving Water Limitations (RWLs) - Waste discharge requirements issued by the Regional Board typically include both: (1) "Effluent Limitations" (or "Discharge Limitations") that specify the technology-based or water-quality-based effluent limitations; and (2) "Receiving Water Limitations" that specify the water quality objectives in the Basin Plan as well as any other limitations necessary to attain those objectives. In summary, the "Receiving Water Limitations" provision is the provision used to implement the requirement of CWA section 301(b)(1)(C) that NPDES permits must include any more stringent limitations necessary to meet water quality standards.

Redevelopment - The creation, addition, and or replacement of impervious surface on an already developed site. Examples include the expansion of a building footprint, road widening, the addition to or replacement of a structure, and creation or addition of impervious surfaces. Replacement of impervious surfaces includes any activity that is not part of a routine maintenance activity where impervious material(s) are removed, exposing underlying soil during construction. Redevelopment does not include trenching and resurfacing associated with utility work; resurfacing and reconfiguring surface parking lots and existing roadways; new sidewalk construction, pedestrian ramps, or bikelane on existing roads; and routine replacement of damaged pavement, such as pothole repair.

Regional Urban Runoff Management Plan (RURMP) – A written description of the specific regional urban runoff management measures and programs that the Copermittees will collectively implement to comply with this Order and ensure that pollutant discharges in urban runoff are reduced to the MEP and do not cause or contribute to a violation of water quality standards.

Sediment - Soil, sand, and minerals washed from land into water. Sediment resulting from anthropogenic sources (i.e. human induced land disturbance activities) is considered a pollutant. This Order regulates only the discharges of sediment from anthropogenic sources and does not regulate naturally occurring sources of sediment. Sediment can destroy fish-nesting areas, clog animal habitats, and cloud waters so that sunlight does not reach aquatic plants.

Shared Treatment Control BMP - BMPs used by multiple developments to infiltrate, filter, or treat the required volume or flow prior to discharge to a receiving water. This could include, for example, a treatment BMP at the end of an enclosed storm drain that collects runoff from several commercial developments.

Source Control BMP – Land use or site planning practices, or structural or nonstructural measures that aim to prevent urban runoff pollution by reducing the potential for contamination at the source of pollution. Source control BMPs minimize the contact between pollutants and urban runoff.

Storm Water – Per 40 CFR 122.26(b)(13), means storm water runoff, snowmelt runoff and surface runoff and drainage.

Standard Urban Storm Water Mitigation Plan (SUSMP) – A plan developed to mitigate the impacts of urban runoff from Priority Development Projects.

Third Party Inspectors - Industrial and commercial facility inspectors who are not contracted or employed by a regulatory agency or group of regulatory agencies, such as the Regional Board or Copermittees. The third party inspector is not a regular facility employee self-inspecting their own facility. The third party inspector could be a contractor or consultant employed by a facility or group of businesses to conduct inspections.

Total Maximum Daily Load (TMDL) - The maximum amount of a pollutant that can be discharged into a water body from all sources (point and non-point) and still maintain water quality standards. Under CWA section 303(d), TMDLs must be developed for all water bodies that do not meet water quality standards after application of technology-based controls.

Toxicity - Adverse responses of organisms to chemicals or physical agents ranging from mortality to physiological responses such as impaired reproduction or growth anomalies). The water quality objectives for toxicity provided in the Water Quality Control Plan, San Diego Basin, Region 9, (Basin Plan), state in part…"All waters shall be free of toxic substances in concentrations that are toxic to, or that produce detrimental physiological responses in human, plant, animal, or aquatic life….The survival of aquatic life in surface waters subjected to a waste discharge or other controllable water quality factors, shall not be less than that for the same water body in areas unaffected by the waste discharge".

Treatment Control BMP – Any engineered system designed to remove pollutants by simple gravity settling of particulate pollutants, filtration, biological uptake, media absorption or any other physical, biological, or chemical process.

Urban Runoff - All flows in a storm water conveyance system and consists of the following components: (1) storm water (wet weather flows) and (2) non-storm water illicit discharges (dry weather flows).

Waste - As defined in CWC Section 13050(d), "waste includes sewage and any and all other waste substances, liquid, solid, gaseous, or radioactive, associated with human habitation, or of human or animal origin, or from any producing, manufacturing, or processing operation, including waste placed within containers of whatever nature prior to, and for purposes of, disposal."

Article 2 of CCR Title 23, Chapter 15 (Chapter 15) contains a waste classification system that applies to solid and semi-solid waste, which cannot be discharged directly or indirectly to water of the state and which therefore must be discharged to land for treatment, storage, or disposal in accordance with Chapter 15. There are four classifications of waste (listed in order of highest to lowest threat to water quality): hazardous waste, designated waste, non-hazardous solid waste, and inert waste.

Water Quality Assessment – Assessment conducted to evaluate the condition of non-storm water and storm water discharges, and the water bodies which receive these discharges.

Water Quality Objective - Numerical or narrative limits on constituents or characteristics of water designated to protect designated beneficial uses of the water. [California Water Code Section 13050 (h)]. California's water quality objectives are established by the State and Regional Water Boards in the Water Quality Control Plans.

Numeric or narrative limits for pollutants or characteristics of water designed to protect the beneficial uses of the water. In other words, a water quality objective is the maximum concentration of a pollutant that can exist in a receiving water and still generally ensure that the beneficial uses of the receiving water remain protected (i.e., not impaired). Since water quality objectives are designed specifically to protect the beneficial uses, when the objectives are violated the beneficial uses are, by definition, no longer protected and become impaired. This is a fundamental concept under the Porter Cologne Act. Equally fundamental is Porter Cologne's definition of pollution. A condition of pollution exists when the water quality needed to support designated beneficial uses has become unreasonably affected or impaired; in other words, when the water quality objectives have been violated. These underlying definitions (regarding beneficial use protection) are the reason why all waste discharge requirements implementing the federal NPDES regulations require compliance with water quality objectives. (Water quality objectives are also called water quality criteria in the CWA.)

Water Quality Standards - The beneficial uses (e.g., swimming, fishing, municipal drinking water supply, etc.,) of water and the water quality objectives necessary to protect those uses.

Waters of the State - Any water, surface or underground, including saline waters within the boundaries of the State [CWC section 13050 (e)]. The definition of the Waters of the State is broader than that for the Waters of the United States in that all water in the State is considered to be a Waters of the State regardless of circumstances or condition. Under this definition, a MS4 is always considered to be a Waters of the State.

Waters of the United States - As defined in the 40 CFR 122.2, the Waters of the U.S. are defined as: "(a) All waters, which are currently used, were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide; (b) All interstate waters, including interstate "wetlands;" (c) All other waters such as intrastate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, "wetlands," sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds the use, degradation or destruction of which would affect or could affect interstate or foreign commerce including any such waters: (1) Which are or could be used by interstate or foreign travelers for recreational or other purposes; (2) From which fish or shellfish are or could be taken and sold in interstate or foreign commerce; or (3) Which are used or could be used for industrial purposes by industries in interstate commerce; (d) All impoundments of waters otherwise defined as waters of the United States under this definition: (e) Tributaries of waters identified in paragraphs (a) through (d) of this definition; (f) The territorial seas; and (g) "Wetlands" adjacent to waters (other

than waters that are themselves wetlands) identified in paragraphs (a) through (f) of this definition. Waters of the United States do not include prior converted cropland. Notwithstanding the determination of an area's status as prior converted cropland by any other federal agency, for the purposes of the Clean Water Act, the final authority regarding Clean Water Act jurisdiction remains with the EPA."

Watershed - That geographical area which drains to a specified point on a water course, usually a confluence of streams or rivers (also known as drainage area, catchment, or river basin).

Watershed Urban Runoff Management Plan (WURMP) – A written description of the specific watershed urban runoff management measures and programs that each watershed group of Copermittees will implement to comply with this Order and ensure that pollutant discharges in urban runoff are reduced to the MEP and do not cause or contribute to a violation of water quality standards.

WDRs – Waste Discharge Requirements

Wet Season – October 1 through April 30 of each year.

ATTACHMENT D

SCHEDULED SUBMITTALS SUMMARY

Submittal	Permit Section	Completion Date	Frequency
Submit identification of discharges not to be prohibited and BMPs required for treatment of discharges not prohibited	B.2	365 days after adoption of the Order	One Time
Submit Certified Statement of Adequate Legal Authority	C.2	365 days after adoption of the Order	One Time
Long-Term Effectiveness Assessment	I.5 and J.2.b	210 days prior to Order expiration	One Time
Submit to Principal Permittee(s) individual JURMPs	J.1.a.(1)	Prior to 365 days after adoption of the Order (Principal Permittee specifies date of submittal)	One Time
Principal Permittee submits JURMPs to Regional Board	J.1.a.(2)	365 days after adoption of the Order	One Time
Lead Watershed Permittees submit WURMPs to Principal Permittee	J..1.b.(2)	Prior to 365 days after adoption of the Order (Principal Permittee specifies date of submittal)	One Time
Principal Permittee submits WURMPs to Regional Board	J.1.b.(3)	365 days after adoption of the Order	One Time
Principal Permittee submits RURMP to Regional Board	J.1.c.(2)	365 days after adoption of the Order	One Time
Principal Permittee submits Hydromodification Management Plan workplan	J.2.a.(2)(a)	180 days after adoption of the Order	One Time
Principal Permittee submits Hydromodification Management Plan progress report	J.2.a.(2)(b)	18 months after adoption of the Order	One Time
Principal Permittee submits draft Hydromodification Management Plan	J.2.a.(2)(c)	2 years after adoption of the Order	One Time
Principal Permittee submits final Hydromodification Management Plan	J.2.a.(2)(d)	180 days after receiving comments from Regional Board	One Time
Principal Permittee submits Model SUSMP update	J.2.b	18 months after adoption of the Order	One Time
Copermittees submit local SUSMP updates	J.2.b	365 days after acceptance of updated Model SUSMP	One Time
Principal Permittee submits Report of Waste Discharge and Long-Term Effectiveness Assessment	J.2.c-d	210 days prior to Order expiration	One Time
Principal Permittee submits Notification of Principal Permittee	M	180 days after adoption of the Order	One Time
Principal Permittee submits formal agreement between Copermittees which provides management structure for meeting Order requirements	M.5	180 days after adoption of Order	One Time
Submit to Principal Permittee individual Jurisdictional Urban Runoff Management Program Annual Reports	J.3.a.(1)	Prior to September 30, 2008, and annually thereafter (Principal Permittee specifies date of submittal)	Annually
Principal Permittee submits unified Jurisdictional Urban Runoff Management Program Annual Report to Regional Board	J.3.a.(2)	September 30, 2008, and annually thereafter	Annually
Lead Watershed Permittees submit to Principal Permittee Watershed Urban Runoff Management Program Annual Reports	J.3.b.(3)	Prior to January 31, 2009 and annually thereafter (Principal Permittee specifies date of submittal)	Annually
Principal Permittee submits unified Watershed Urban Runoff Management Program Annual Report to Regional Board	J.3.b.(3)	January 31, 2009 and annually thereafter	Annually
Principal Permittee submits Regional Urban Runoff	J.3.c	January 31, 2009 and	Annually

Submittal	Permit Section	Completion Date	Frequency
Management Program Annual Report to Regional Board		annually thereafter	
Principal Permittee submits description of Receiving Waters Monitoring Program	Monitoring and Reporting Program, III.A.1	September 1, 2007 and annually thereafter	Annually
Principal Permittee submits description of various monitoring program components	Monitoring and Reporting Program, III.A.3	July 1, 2007 and July 1, 2008	Twice
Principal Permittee submits Receiving Waters Monitoring Program Annual Report	Monitoring and Reporting Program, III.A.2	January 31, 2009 and annually thereafter	Annually
Principal Permittee submits interim Receiving Waters Monitoring Program Annual Report	Monitoring and Reporting Program, III.B	January 31, 2007 and January 31, 2008	Twice
Principal Permittee submits unified interim Jurisdictional URMP and Watershed URMP Annual Reports	J.4	January 31, 2007 and January 31, 2008	Twice
Principal Permittee(s) shall submit standardized formats for all reports required under this Order	M.6	180 days after adoption of Order	One Time

RECEIVING WATERS AND URBAN RUNOFF MONITORING AND REPORTING PROGRAM NO. R9-2007-0001

I. PURPOSE

A. This Receiving Waters and Urban Runoff Monitoring and Reporting Program is intended to meet the following goals:

1. Assess compliance with Order No. R9-2007-0001;
2. Measure and improve the effectiveness of the Copermittees' urban runoff management programs;
3. Assess the chemical, physical, and biological impacts to receiving waters resulting from urban runoff discharges;
4. Characterize urban runoff discharges;
5. Identify sources of specific pollutants;
6. Prioritize drainage and sub-drainage areas that need management actions;
7. Detect and eliminate illicit discharges and illicit connections to the MS4; and
8. Assess the overall health of receiving waters.

B. In addition, this Receiving Waters and Urban Runoff Monitoring and Reporting Program is designed to answer the following core management questions:

1. Are conditions in receiving waters protective, or likely to be protective, of beneficial uses?
2. What is the extent and magnitude of the current or potential receiving water problems?
3. What is the relative urban runoff contribution to the receiving water problem(s)?
4. What are the sources of urban runoff that contribute to receiving water problem(s)?
5. Are conditions in receiving waters getting better or worse?

II. MONITORING PROGRAM

A. Receiving Waters Monitoring Program

Each Copermittee shall collaborate with the other Copermittees to develop, conduct, and report on a year round watershed based Receiving Waters Monitoring Program. The monitoring program design, implementation, analysis, assessment, and reporting shall be conducted on a watershed basis for each of the hydrologic units. The monitoring program shall be designed to meet the goals and answer the questions listed in section I above. The monitoring program shall include the following components:

1. MASS LOADING STATION (MLS) MONITORING

   a. The following existing mass loading stations shall continue to be monitored: Santa Margarita River,[1] San Luis Rey River, Agua Hedionda Creek, Escondido Creek, San Dieguito River, Penasquitos, Tecolote Creek, San Diego River,

[1] For the Santa Margarita River mass loading station, if Camp Pendleton will not conduct the required monitoring or prevents access for the Copermittees to conduct the required monitoring, the mass loading station location shall be moved to where the County of San Diego has land-use jurisdiction.

Chollas Creek, Sweetwater River, and Tijuana River. The mass loading stations shall be monitored at the frequency identified in Table 1.

Table 1. Monitoring Rotation and Number of Stations in Watersheds

Watershed Management Area	Watershed	Permit Year 1 2007-2008				Permit Year 2 2008-2009				Permit Year 3 2009-2010				Permit Year 4 2010-2011				Permit Year 5 2011-2012			
		MLS	TWAS	ABLM	BA	MLS	TWAS	ABLM	BA	MLS	TWAS	ABLM	BA	MLS	TWAS	ABLM	BA	MLS	TWAS	ABLM	BA
Santa Margarita	Santa Margarita River	1		Implement refined program based on assessment	4	1	Bight '08					Implement refined program based on assessment		1		Implement refined program based on assessment	4			Implement refined program based on assessment	
San Luis Rey	San Luis Rey River	1	2		3	1								1	2		3				
Carlsbad	Buena Vista Creek		1		1										1		1				
	Agua Hedionda Creek	1	1		2	1								1	1		2				
	Escondido Creek	1	1		2	1								1	1		2				
San Dieguito	San Dieguito River	1	2		3	1								1	2		3				
Penasquitos	Penasquitos	1	2		3	1								1	2		3				
Mission Bay	Rose Creek										1		1						1		1
	Tecolote Creek					1				1	1		2					1	1		2
San Diego River	San Diego River					1				1	3		4					1	3		4
San Diego Bay	Chollas Creek	1			1	1				1			1	1			1	1			1
	Sweetwater River					1				1	1		2					1	1		2
	Otay River										1		1						1		1
Tijuana	Tijuana River					1				1	2		3					1	1		2

b. Each mass loading station to be monitored in a given year shall be monitored twice during wet weather events and twice during dry weather flow events. The exception is the 2008-2009 monitoring year, which shall include monitoring of all mass loading stations for one wet weather flow event only if the Copermittees participate in Bight '08.

c. Each mass loading station shall be monitored for the first wet weather event of the season which meets the USEPA's criteria as described in 40 CFR 122.21(g)(7). Monitoring of the second wet weather event shall be conducted after February 1. Dry weather mass loading monitoring events shall be sampled in September or October prior to the start of the wet weather season and in May or June after the end of the wet weather season. If flows are not evident in September or October, then sampling shall be conducted during non-rain events in the wet weather season.

d. Mass loading sampling and analysis protocols shall be consistent with 40 CFR 122.21(g)(7)(ii) and with the USEPA Storm Water Sampling Guidance Document (EPA 833-B-92-001). If practicable, the protocols for mass loading sampling and analysis should be SWAMP comparable. If the mass loading sampling and analysis are determined to be impracticable with the SWAMP standards, the Copermittees should provide explanation and discussion to this effect in the Receiving Waters and Urban Runoff Monitoring Annual Report. Wet weather samples shall be flow-weighted composites, collected for the duration of the entire runoff event, where practical. Where such monitoring is not practical, such as for large watersheds with significant groundwater recharge flows, composites shall be collected at a minimum during the first 3 hours of flow. Dry weather event samples shall be flow-weighted composites, collected for a time duration adequate to be representative of changes in pollutant concentrations and runoff flows which may occur over a typical 24 hour period. A minimum of 3 sample aliquots, separated by a minimum of 15 minutes, shall be taken for each hour of monitoring, unless the Regional Board Executive Officer approves an alternate protocol. Automatic samplers shall be used to collect samples from mass loading stations. Grab samples shall be taken for temperature, pH, specific conductance, biochemical oxygen demand, oil and grease, total coliform, fecal coliform, and enterococcus.

e. Copermittees shall measure or estimate flow rates and volumes for each mass loading station sampling event in order to determine mass loadings of pollutants. Data from nearby USGS gauging stations may be utilized, or flow rates may be estimated in accordance with the USEPA Storm Water Sampling Guidance Document (EPA-833-B-92-001), Section 3.2.1.

f. In the event that the required number of events are not sampled during one monitoring year at any given station, the Copermittees shall submit, with the subsequent Receiving Waters Monitoring Annual Report, a written explanation for a lack of sampling data, including streamflow data from the nearest USGS gauging station.

g. The following constituents shall be analyzed for each monitoring event at each station:

Table 2. Analytical Testing for Mass Loading and Temporary Watershed Assessment Stations

Conventionals, Nutrients, Hydrocarbons	**Pesticides**	**Metals (Total and Dissolved)**	**Bacteriological**
Total Dissolved Solids	Diazinon	Antimony	Total Coliform
Total Suspended Solids	Chlorpyrifos	Arsenic	Fecal Coliform
Turbidity	Malathion	Cadmium	Enterococcus
Total Hardness		Chromium	
pH		Copper	
Specific Conductance		Lead	
Temperature		Nickel	
Dissolved Phosphorus		Selenium	
Nitrite		Zinc	
Nitrate			
Total Kjeldahl Nitrogen			
Ammonia			
Biological Oxygen Demand, 5-day			
Chemical Oxygen Demand			
Total Organic Carbon			
Dissolved Organic Carbon			
Methylene Blue Active Substances			
Oil and Grease			

h. In addition to the constituents listed in Table 2 above, monitoring stations in the Chollas Creek watershed shall also analyze samples for polychlorinated biphenyls (PCBs), Chlordane, and polycyclic aromatic hydrocarbons (PAHs) for each monitoring event.

i. The following toxicity testing shall be conducted for each monitoring event at each station as follows:
   (1) 7-day chronic test with the cladoceran *Ceriodaphnia dubia* (USEPA protocol EPA-821-R-02-013).
   (2) Chronic test with the freshwater algae *Selenastrum capricornutum* (USEPA protocol EPA-821-R-02-013).
   (3) Acute survival test with amphipod *Hyalella azteca* (USEPA protocol EPA-821-R-02-012).

j. The presence of acute toxicity shall be determined in accordance with USEPA protocol (EPA-821-R-02-012). The presence of chronic toxicity shall be determined in accordance with USEPA protocol (EPA-821-R-02-013).

k. The Copermittees shall collaborate to develop and implement a program to assess the presence of trash (anthropogenic litter) in receiving waters. The program shall collect and evaluate trash data in conjunction with collection and evaluation of analytical data. This monitoring program shall be implemented within each watershed and shall begin no later than the 2007-2008 monitoring year.

2. TEMPORARY WATERSHED ASSESSMENT STATION (TWAS) MONITORING

a. The minimum number of temporary watershed assessment stations to be monitored in a given monitoring year is identified in Table 1. The number of stations located within each watershed may change from the number identified in Table 1, provided the total number of stations monitored in a given year is not reduced below the minimum number of stations identified in Table 1. The

temporary watershed assessment stations shall be monitored and located according to a systematic plan which:

(1) Ensures that the Copermittees' Receiving Waters Monitoring Program most effectively answers questions 1-5 of section I.B above.
(2) Provides statistically useful information.
(3) Identifies the extent and magnitude of receiving water problems within each watershed.
(4) Provides spatial coverage of each watershed.
(5) Monitors previously un-assessed sub-watershed areas.
(6) Focuses on specific areas of concern and high priority areas.
(7) Provides adequate information to assess the effectiveness of implemented programs and control measures in reducing discharged pollutant loads and improving urban runoff and receiving water quality.

b. For each temporary watershed assessment station identified to be monitored in a given year, the station shall be monitored twice during wet weather events and twice during dry weather flow events.

c. Temporary watershed assessment stations shall be monitored in the same manner as the mass loading stations in accordance with the monitoring protocols and requirements outlined in sections II.A.1.c-k above.

3. BIOASSESSMENT (BA) MONITORING

a. The minimum number of bioassessment stations to be monitored in each watershed in a given monitoring year is identified in Table 1. Bioassessment stations shall include an adequate number of reference stations, with locations of reference stations identified according to protocols outlined in "A Quantitative Tool for Assessing the Integrity of Southern Coastal California Streams," by Ode, et al. 2005.[2]

b. Bioassessment stations shall be collocated with both mass loading stations and temporary watershed assessment stations where feasible.

c. Bioassessment stations to be monitored in a given monitoring year shall be monitored in May or June (to represent the influence of wet weather on the communities) and September or October (to represent the influence of dry weather flows on the communities). The timing of monitoring of bioassessment stations shall coincide with dry weather monitoring of mass loading and temporary watershed assessment stations.

d. Monitoring of bioassessment stations shall utilize the targeted riffle composite approach, as specified in the Surface Water Ambient Monitoring Program (SWAMP) Quality Assurance Management Plan (QAMP), as amended.

[2] Ode, et al. 2005. "A Quantitative Tool for Assessing the Integrity of Southern Coastal California Streams." Environmental Management. Vol. 35, No. 1, pp. 1-13.

e. Monitoring of bioassessment stations shall incorporate assessment of periphyton in addition to macroinvertebrates, using the USEPA's 1999 Rapid Bioassessment Protocols for Use in Wadeable Streams and Rivers.[3]

f. Bioassessment analysis procedures shall include calculation of the Index of Biotic Integrity (IBI) for benthic macroinvertebrates for all bioassessment stations, as outlined in "A Quantitative Tool for Assessing the Integrity of Southern Coastal California Streams," by Ode, et al. 2005.

g. A professional environmental laboratory shall perform all sampling, laboratory, quality assurance, and analytical procedures.

4. FOLLOW-UP ANALYSIS AND ACTIONS

When results from the chemistry, toxicity, and bioassessment monitoring described above indicate urban runoff-induced degradation at a mass loading or temporary watershed assessment station, Copermittees within the watershed shall evaluate the extent and causes of urban runoff pollution in receiving waters and prioritize and implement management actions to eliminate or reduce sources. Toxicity Identification Evaluations (TIEs) shall be conducted to determine the cause of toxicity as outlined in Table 3 below. Other follow-up activities which shall be conducted by the Copermittees are also identified in Table 3. Once the cause of toxicity has been identified by a TIE, the Copermittees shall perform source identification projects as needed and implement the measures necessary to reduce the pollutant discharges and abate the sources causing the toxicity.

Table 3. Triad Approach to Determining Follow-Up Actions

	Chemistry[4]	**Toxicity[5]**	**Bioassessment[6]**	**Action**
1.	Persistent exceedance of water quality objectives (high frequency constituent of concern identified)	Evidence of persistent toxicity	Indications of alteration	Conduct TIE to identify contaminants of concern, based on TIE metric. Address upstream sources as a high priority.
2.	No persistent exceedances of water quality objectives	No evidence of persistent toxicity	No indications of alteration	No action necessary.

[3] USEPA, 1999. Rapid Bioassessment Protocols for Use in Wadeable Streams and Rivers. EPA-841-B-99-002.
[4] Persistent exceedance shall mean exceedances of established water quality objectives, benchmarks, or action levels by a pollutant known to cause toxicity for two wet weather and/or two dry weather samples in a given year.
[5] Toxicity shall mean when the Lowest Observed Effect Concentration (LOEC) (for chronic toxicity tests) or median lethal concentration (LC_{50}) (for acute toxicity tests) for any given species is less than or equal to 100% of the test sample and observed effects are significantly different from the control. Evidence of persistent toxicity shall mean toxicity to a specific test organism in more than 50% of the samples taken for a given location during a given monitoring year. When a monitoring event has the potential to indicate evidence of persistent toxicity (e.g. the third event of four monitoring events), sufficient samples shall be collected in order to conduct any TIEs that may be required. When a sample collected in order to conduct a TIE does not result in mortality or exhibit a toxic effect in at least 50% of the applicable test organisms in the 100% storm water sample, the TIE may be conducted with a sample collected during the next monitoring event.
[6] Indications of alteration shall mean an IBI score of Poor or Very Poor.

	Chemistry[4]	Toxicity[5]	Bioassessment[6]	Action
3.	Persistent exceedance of water quality objectives (high frequency constituent of concern identified)	No evidence of persistent toxicity	No indications of alteration	Address upstream sources as a low priority.
4.	No persistent exceedances of water quality objectives	Evidence of persistent toxicity	No indications of alteration	Conduct TIE to identify contaminants of concern, based on TIE metric. Address upstream sources as medium priority.
5.	No persistent exceedances of water quality objectives	No evidence of persistent toxicity	Indications of alteration	No action necessary to address toxic chemicals. Address potential role of urban runoff in causing physical habitat disturbance.
6.	Persistent exceedance of water quality objective (high frequency constituent of concern identified)	Evidence of persistent toxicity	No indications of alteration	If chemical and toxicity tests indicate persistent degradation, conduct TIE to identify contaminants of concern, based on TIE metric and address upstream source as a medium priority.
7.	No persistent exceedances of water quality objectives	Evidence of persistent toxicity	Indications of alteration	Conduct TIE to identify contaminants of concern, based on TIE metric. Address upstream sources as a high priority. Address potential role of urban runoff causing physical habitat disturbance.
8.	Persistent exceedance of water quality objectives objective (high frequency constituent of concern identified)	No evidence of persistent toxicity	Indications of alteration	Address upstream source as a high priority.

5. AMBIENT BAY AND LAGOON MONITORING (ABLM)

   a. Ambient Bay and Lagoon Monitoring shall be conducted according to the schedule identified in Table 1.

   b. If results of the Ambient Bay and Lagoon Monitoring assessment indicate a general relationship and/or linkage between conditions in bays/lagoons/estuaries with conditions at mass loading stations, then monitoring shall be conducted at the following locations: Santa Margarita River Estuary, Oceanside Harbor, San Luis Rey Estuary, Buena Vista Lagoon, Agua Hedionda Lagoon, Batiquitos Lagoon, San Elijo Lagoon, San Dieguito Lagoon, Los Penasquitos Lagoon, Mission Bay, Sweetwater River Estuary, and Tijuana River Estuary. This monitoring shall be designed to most effectively answer each of questions 1-5 of section I.B above as they pertain to bays/lagoons/estuaries.

c. If results of the Ambient Bay and Lagoon Monitoring assessment do not indicate a relationship and/or linkage between conditions in bays/lagoons/estuaries with conditions at mass loading stations, then monitoring shall be conducted for special investigations of the bays/lagoons/estuaries. These special investigations shall be designed to most effectively answer each of questions 1-5 of section I.B above as they pertain to bays/lagoons/estuaries, with an emphasis on answering question 4.

d. Ambient Bay and Lagoon Monitoring shall utilize the triad approach, analyzing chemistry, toxicity, and benthic infauna data.

e. Ambient Bay and Lagoon Monitoring shall include a water column monitoring component as necessary to supply information needed for the development, implementation, and assessment of Total Maximum Daily Loads (TMDLs).

6. COASTAL STORM DRAIN MONITORING

The Copermittees shall collaborate to develop and implement a coastal storm drain monitoring program. The monitoring program shall include:

a. Identification of coastal storm drains which discharge to coastal waters.

b. Monthly sampling of all flowing coastal storm drains identified in section II.A.6.a for total coliform, fecal coliform, and enterococcus.[7] Where flowing coastal storm drains are discharging to coastal waters, paired samples from the storm drain discharge and coastal water (25 yards down current of the discharge) shall be collected. If flowing coastal storm drains are not discharging to coastal waters, only the storm drain discharge needs to be sampled.

(1) Frequency of sampling of coastal storm drains may be reduced to every other month if the paired coastal storm drain data:

(a) Exhibits three consecutive storm drain samples with all bacterial indicators below the Copermittees' sampling frequency reduction criteria, as the sampling frequency reduction criteria was developed under Order No. 2001-01.
(b) Exhibits that the three consecutive samples discussed in (a) above are paired with receiving water samples that do not exceed Assembly Bill (AB) 411 or Basin Plan standards.
(c) Exhibits that less than 20% of the storm drain samples were above any of the sampling frequency reduction criteria during the previous year.

(2) The Copermittees shall notify the Regional Board of any coastal storm drains eligible for sampling frequency reduction prior to October 1 of each year. Sampling frequency reduction shall not occur prior to Regional Board

[7] Coastal storm drains where sampler safety, habitat impacts from sampling, or inaccessibility are issues need not be sampled. Such coastal storm drains shall be added to the Copermittee's dry weather field screening and analytical monitoring program where feasible.

notification.

(3) Re-sampling shall be implemented within one business day of receipt of analytical results for coastal storm drains where:

(a) Both storm drain and receiving water samples exceed AB 411 or Basin Plan standards for any bacterial indicator.
(b) The storm drain sample exceeds 95th percentile observations of the previous year's data for any bacterial indicator.

(4) If re-sampling conducted under section (3) above exhibits continued exceedances of a AB 411 or Basin Plan standards in either the storm drain or receiving water, investigations of sources of bacterial contamination shall commence within one business day of receipt of analytical results.

(5) Investigations of sources of bacterial contamination shall occur immediately if evidence of abnormally high flows, sewage releases, restaurant discharges, and/or similar evidence is observed during sampling.

(6) Exceedances of public health standards for bacterial indicators shall be reported to the County Department of Environmental Health as soon as possible.

7. PYRETHROIDS MONITORING

The Copermittees shall collaborate to develop and implement a monitoring program to measure and assess the presence of pyrethroids in receiving waters. This monitoring program shall be implemented within each watershed and shall begin no later than the 2007-2008 monitoring year.

B. Urban Runoff Monitoring

Each Copermittee shall collaborate with the other Copermittees to develop, conduct, and report on a year round watershed based Urban Runoff Monitoring Program. The monitoring program design, implementation, analysis, assessment, and reporting shall be conducted on a watershed basis for each of the hydrologic units. The monitoring program shall be designed to meet the goals and answer the questions listed in section I above. The monitoring program shall include the following components

1. MS4 OUTFALL MONITORING

The Copermittees shall collaborate to develop and implement a monitoring program to characterize pollutant discharges from MS4 outfalls in each watershed during wet and dry weather. The program shall include rationale and criteria for selection of outfalls to be monitored. The program shall at a minimum include collection of samples for those pollutants causing or contributing to violations of water quality standards within the watershed. This monitoring program shall be implemented within each watershed and shall begin within the 2007-2008 monitoring year.

2. SOURCE IDENTIFICATION MONITORING

The Copermittees shall collaborate to develop and implement a monitoring program to identify sources of discharges of pollutants causing the priority water quality problems within each watershed. The monitoring program shall include focused monitoring which moves upstream into each watershed as necessary to identify sources. The monitoring program shall use source inventories and "Threat to Water Quality" analysis to guide monitoring efforts. This monitoring program shall be implemented within each watershed and shall begin no later than the 2008-2009 monitoring year.

3. DRY WEATHER FIELD SCREENING AND ANALYTICAL MONITORING

As part of its Jurisdictional Urban Runoff Management Program, each Copermittee shall update as necessary its dry weather field screening and analytical monitoring program to meet or exceed the requirements of this section. Dry weather analytical and field screening monitoring consists of (1) field observations; (2) field screening monitoring; and (3) analytical monitoring at selected stations. The Dry Weather Field Screening and Analytical Monitoring program is not required to be SWAMP comparable. Each Copermittee's program shall be designed to detect and eliminate illicit connections and illegal discharges to the MS4 using frequent, geographically widespread dry weather discharge monitoring and follow-up investigations. Each Copermittee shall conduct the following dry weather field screening and analytical monitoring tasks:

a. Select Dry Weather Field Screening and Analytical Monitoring Stations

Based upon a review of its past Dry Weather Monitoring Program, each Copermittee shall select dry weather field screening and analytical monitoring stations within its jurisdiction. No more than 500 dry weather field screening and analytical monitoring stations (excluding alternate stations) need to be selected by any individual Copermittee for any given year. Stations shall be selected according to one of the following methods:

(1) Stations shall be either major outfalls or other outfall points (or any other point of access such as manholes) randomly located throughout the MS4 by placing a grid over a drainage system map and identifying those cells of the grid which contain a segment of the MS4 or major outfall. This random selection has to use the following guidelines and criteria:

(a) A grid system consisting of perpendicular north-south and east-west lines spaced ¼ mile apart shall be overlayed on a map of the MS4, creating a series of cells;
(b) All cells that contain a segment of the MS4 shall be identified and one dry weather analytical monitoring station shall be selected in each cell.
(c) Each Copermittee shall determine alternate stations to be sampled in place of selected stations that do not have flow.

(2) Stations may be selected non-randomly provided adequate coverage of the entire MS4 system is ensured and that the selection of stations meets,

exceeds, or provides equivalent coverage to the requirements given above. The dry weather analytical and field screening monitoring stations shall be established using the following guidelines and criteria:

(a) Stations should be located downstream of any sources of suspected illegal or illicit activity;
(b) Stations shall be located to the degree practicable at the farthest manhole or other accessible location downstream in the system within each cell;
(c) Hydrological conditions, total drainage area of the site, traffic density, age of the structures or buildings in the area, history of the area, and land use types shall be considered in locating stations;
(d) Each Copermittee shall determine alternate stations to be sampled in place of selected stations that do not have flow.

b. Complete MS4 Map

Each Copermittee shall clearly identify each dry weather field screening and analytical monitoring station on its MS4 Map as either a separate GIS layer or a map overlay hereafter referred to as a Dry Weather Field Screening and Analytical Stations Map. Each Copermittee shall confirm that each drainage area within its jurisdiction contains at least one station.

c. Develop Dry Weather Field Screening and Analytical Monitoring Procedures

Each Copermittee shall develop and/or update written procedures for dry weather field screening and analytical monitoring (for analytical monitoring only, these procedures must be consistent with 40 CFR part 136), including field observations, monitoring, and analyses to be conducted. At a minimum, the procedures must meet the following guidelines and criteria:

(1) Determining Sampling Frequency: Dry weather field screening and analytical monitoring shall be conducted at each identified station at least once between May 1st and September 30th of each year or as often as the Copermittee determines is necessary to comply with the requirements of section D.4 of Order No. R9-2007-0001.

(2) If flow or ponded runoff is observed at a dry weather field screening or analytical monitoring station and there has been at least seventy-two (72) hours of dry weather, make observations and collect at least one (1) grab sample. Record general information such as time since last rain, quantity of last rain, site descriptions (i.e., conveyance type, dominant watershed land uses), flow estimation (i.e., width of water surface, approximate depth of water, approximate flow velocity, flow rate), and visual observations (i.e., odor, color, clarity, floatables, deposits/stains, vegetation condition, structural condition, and biology).

(3) At a minimum, collect samples for analytical laboratory analysis of the following constituents for at least twenty five percent (25%) of the dry weather monitoring stations where water is present:

(a) Total Hardness
(b) Oil and Grease
(c) Diazinon and Chlorpyrifos
(d) Cadmium (Dissolved)
(e) Lead (Dissolved)
(f) Zinc (Dissolved)
(g) Copper (Dissolved)
(h) Enterococcus bacteria[8]
(i) Total Coliform bacteria[8]
(j) Fecal Coliform bacteria[8]

(4) At a minimum, conduct field screening analysis of the following constituents at all dry weather monitoring stations where water is present:

(a) Specific conductance (calculate estimated Total Dissolved Solids).
(b) Turbidity
(c) pH
(d) Reactive Phosphorous
(e) Nitrate Nitrogen
(f) Ammonia Nitrogen
(g) Surfactants (MBAS)

(5) If the station is dry (no flowing or ponded runoff), make and record all applicable observations and select another station from the list of alternate stations for monitoring.

(6) Develop and/or update criteria for dry weather field screening and analytical monitoring results whereby exceedance of the criteria will require follow-up investigations to be conducted to identify and eliminate the source causing the exceedance of the criteria.

(7) Assess the presence of trash in receiving waters and urban runoff at each dry weather field screening or analytical monitoring station. Assessments of trash shall provide information on the spatial extent and amount of trash present, as well as the nature of the types of trash present.

(8) Dry weather field screening and analytical monitoring stations identified to exceed dry weather monitoring criteria for any constituents shall continue to be screened in subsequent years.

(9) Develop and/or update procedures for source identification follow up investigations in the event of exceedance of dry weather field screening and analytical monitoring result criteria. These procedures shall be consistent with procedures required in section D.4.d of Order No. R9-2007-0001.

(10) Develop and/or update procedures to eliminate detected illicit discharges and connections. These procedures shall be consistent with each Copermittees

[8] Colilert and Enterolert may be used as alternative methods with Fecal Coliform determined by calculations.

Illicit Discharge and Elimination component of its Jurisdictional Urban Runoff Management Plan as discussed in section D.4 of Order No. R9-2007-0001.

d. Conduct Dry Weather Field Screening and Analytical Monitoring

The Copermittees shall commence implementation of dry weather field screening and analytical monitoring under the requirements of this Order by May 1, 2008. Each Copermittee shall conduct dry weather analytical and field screening monitoring in accordance with its storm water conveyance system map and dry weather analytical and field screening monitoring procedures as described in section II.B.3 above. If monitoring indicates an illicit connection or illegal discharge, conduct the follow-up investigation and elimination activities as described in submitted dry weather field screening and analytical monitoring procedures and sections D.4.d and D.4.e of Order No. R9-2007-0001. Until the dry weather field screening and analytical monitoring program is implemented under the requirements of this Order, each Copermittee shall continue to implement dry weather field screening and analytical monitoring as it was most recently implemented pursuant to Order No. 2001-01.

C. Regional Monitoring Program

1. The Copermittees shall participate and coordinate with federal, state, and local agencies and other dischargers in development and implementation of a regional watershed monitoring program as directed by the Executive Officer.

2. Bight ’08

a. During the 2008-2009 monitoring year (Permit Year 2), the Copermittees may participate in the Bight ’08 study. The Copermittees shall ensure that such participation results in collection and analysis of data useful in addressing the goals and management questions of the Receiving Waters Monitoring Program. Any participation shall include the contribution of all funds not otherwise spent on full implementation of mass loading station, temporary watershed assessment station, ambient bay and lagoon, and bioassessment monitoring. All other monitoring shall continue during the 2008-2009 monitoring year (Permit Year 2) as required.

b. If the Copermittees do not participate in Bight ’08, mass loading station, temporary watershed assessment station, ambient bay an lagoon, and bioassessment monitoring shall be conducted as follows:

(1) Permit Year 3 (2009-2010) monitoring shall be conducted in Permit Year 2 (2008-2009) (see Table 1).
(2) Permit Year 4 (2010-2011) monitoring shall be conducted in Permit Year 3 (2009-2010) (see Table 1).
(3) Permit Year 5 (2011-2012) monitoring shall be conducted in Permit Year 4 (2010-2011).

(4) Permit Year 1 (2007-2008) monitoring shall be conducted in Permit Year 5 (2011-2012).

c. If the Copermittees partially participate in Bight '08, monitoring shall be conducted as described in section II.C.2.b above, with the exception of any monitoring offset by the contribution of funds to Bight '08.

D. Special Studies

1. TMDL MONITORING

a. All monitoring shall be conducted as required in Investigation Order No. R9-2004-0277 for Chollas Creek.

2. REGIONAL HARBOR MONITORING

a. The Copermittees which discharge to harbors shall participate in the development and implementation of the Regional Harbor Monitoring Program.

3. The Copermittees shall conduct special studies, including any monitoring required for TMDL development and implementation, as directed by the Executive Officer.

E. Monitoring Provisions

All monitoring activities shall meet the following requirements:

1. Where procedures are not otherwise specified in this Receiving Waters Monitoring and Reporting Program (e.g., Dry Weather Field Screening and Analytical Monitoring), sampling, analysis and quality assurance/quality control must be conducted in accordance with the Quality Assurance Management Plan (QAMP) for the State of California's Surface Water Ambient Monitoring Program (SWAMP), adopted by the State Water Resources Control Board (SWRCB).

2. Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity [40 CFR 122.41(j)(1)].

3. The Copermittees shall retain records of all monitoring information, including all calibration and maintenance of monitoring instrumentation, copies of all reports required by this Order, and records of all data used to complete the Report of Waste Discharge and application for this Order, for a period of at least five (5) years from the date of the sample, measurement, report, or application. This period may be extended by request of the Regional Board or USEPA at any time and shall be extended during the course of any unresolved litigation regarding this discharge. [40 CFR 122.41(j)(2), CWC section 13383(a)]

4. Records of monitoring information shall include [40 CFR 122.41(j)(3)]:

a. The date, exact place, and time of sampling or measurements;
b. The individual(s) who performed the sampling or measurements;
c. The date(s) analyses were performed;

d. The individual(s) who performed the analyses;
e. The analytical techniques or methods used; and
f. The results of such analyses.

5. All sampling, sample preservation, and analyses must be conducted according to test procedures approved under 40 CFR part 136, unless other test procedures have been specified in this Receiving Waters Monitoring and Reporting Program or approved by the Executive Officer [40 CFR 122.41(j)(4)].

6. The CWA provides that any person who falsifies, tampers with, or knowingly renders inaccurate any monitoring device or method required to be maintained under this Order shall, upon conviction, be punished by a fine of not more than $10,000, or by imprisonment for not more than two years, or both. If a conviction of a person is for a violation committed after a first conviction of such person under this paragraph, punishment is a fine of not more than $20,000 per day of violation, or by imprisonment of not more than four years, or both. [40 CFR 122.41(j)(5)]

7. Calculations for all limitations which require averaging of measurements shall utilize an arithmetic mean unless otherwise specified in this Receiving Waters Monitoring and Reporting Program. [40 CFR 122.41(l)(4)(iii)]

8. All chemical, bacteriological, and toxicity analyses shall be conducted at a laboratory certified for such analyses by the California Department of Health Services or a laboratory approved by the Executive Officer.

9. For priority toxic pollutants that are identified in the California Toxics Rule (CTR) (65 Fed. Reg. 31682), the Copermittees shall instruct its laboratories to establish calibration standards that are equivalent to or lower than the Minimum Levels (MLs) published in Appendix 4 of the Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California (SIP). If a Copermittee can demonstrate that a particular ML is not attainable, in accordance with procedures set forth in 40 CFR 136, the lowest quantifiable concentration of the lowest calibration standard analyzed by a specific analytical procedure (assuming that all the method specified sample weights, volumes, and processing steps have been followed) may be used instead of the ML listed in Appendix 4 of the SIP. The Copermittee must submit documentation from the laboratory to the Regional Board for approval prior to raising the ML for any priority toxic pollutant.

10. The Regional Board Executive Officer or the Regional Board may make revisions to this Receiving Waters and Urban Runoff Monitoring and Reporting Program at any time during the term of Order No. R9-2007-0001, and may include a reduction or increase in the number of parameters to be monitored, locations monitored, the frequency of monitoring, or the number and size of samples collected.

11. The Clean Water Act provides that any person who knowingly makes any false statement, representation, or certification in any record or other document submitted or required to be maintained under this permit, including monitoring reports or reports of compliance or non-compliance shall, upon conviction, be punished by a fine of not more than $10,000 per violation, or by imprisonment for not more than six

months per violation, or by both. [40 CFR 122.41(k)(2)]

12. Monitoring shall be conducted according the USEPA test procedures approved under 40 CFR 136, "Guidelines Establishing Test Procedures for Analysis of Pollutants under the Clean Water Act" as amended, unless other test procedures have been specified in this Receiving Waters and Urban Runoff Monitoring and Reporting Program, in Order No. R9-2007-0001, or by the Executive Officer.

13. If the discharger monitors any pollutant more frequently than required by the permit using test procedures approved under 40 CFR part 136, unless otherwise specified in the Order, the results of this monitoring shall be included in the calculation and reporting of the data submitted in the reports requested by the Regional Board. [40 CFR 122.41(l)(4)(ii)]

III. REPORTING PROGRAM

A. Monitoring Reporting

1. The Principal Permittee shall submit a description of the Receiving Waters and Urban Runoff Monitoring Program to be implemented for every monitoring year. The submittals shall begin on September 1, 2007, and continue every year thereafter. The submittals shall describe all monitoring to be conducted during the upcoming monitoring year. For example, the September 1, 2007 submittal shall describe the monitoring to be conducted from October 1, 2007 through September 30, 2008.

   If the Copermittees participate in Bight '08, their submittal for the 2008-2009 monitoring year shall describe the monitoring to be conducted for Bight '08 and exhibit how the monitoring will result in collection and analysis of data useful in addressing the goals and management questions of the Receiving Waters and Urban Runoff Monitoring Program.

2. The Principal Permittee shall submit the Receiving Waters and Urban Runoff Monitoring Annual Report to the Regional Board on January 31 of each year, beginning on January 31, 2009. Receiving Waters and Urban Runoff Monitoring Annual Reports shall meet the following requirements:

   a. Annual monitoring reports shall include the data/results, methods of evaluating the data, graphical summaries of the data, and an explanation/discussion of the data for each monitoring program component.

   b. Annual monitoring reports shall include a watershed-based analysis of the findings of each monitoring program component. Each watershed-based analysis shall include:

      (1) Identification and prioritization of water quality problems within each watershed.
      (2) Identification and description of the nature and magnitude of potential sources of the water quality problems within each watershed.
      (3) Exhibition of pollutant load and concentration increases or decreases at each mass loading and temporary watershed assessment station.

(4) Evaluation of pollutant loads and concentrations at mass loading and temporary watershed assessment stations with respect to land use, population, sources, and other characteristics of watersheds using tools such as multiple linear regression, factor analysis, and cluster analysis.
(5) Identification of links between source activities/conditions and observed receiving water impacts.
(6) Identification of recommended future monitoring to identify and address sources of water quality problems.
(7) Results and discussion of any TIE conducted, together with actions that will be implemented to reduce the discharge of pollutants and abate the sources causing the toxicity.

c. Annual monitoring reports shall include a detailed description of all monitoring conducted under Investigation Order No. R9-2004-0277 for Chollas Creek. Annual monitoring reports shall also include all information required by Investigation Order No. R9-2004-0277.

d. Annual monitoring reports shall include discussions for each watershed which answer each of the management questions listed in section I.B of this Receiving Waters Monitoring and Reporting Program.

e. Annual monitoring reports shall identify how each of the goals listed in section I.A of this Receiving Waters Monitoring and Reporting Program has been addressed by the Copermittees' monitoring.

f. Annual monitoring reports shall include identification and analysis of any long-term trends in storm water or receiving water quality. Trend analysis shall use nonparametric approaches, such as the Mann-Kendall test, including exogenous variables in a multiple regression model, and/or using a seasonal nonparametric trend model, where applicable.

g. Annual monitoring reports shall provide an estimation of total pollutant loads (wet weather loads plus dry weather loads) due to urban runoff for each of the watersheds specified in Table 4 of Order No. R9-2007-0001.

h. Annual monitoring reports shall for each monitoring program component listed above, include an assessment of compliance with applicable water quality standards.

i. Annual monitoring reports shall describe monitoring station locations by latitude and longitude coordinates, frequency of sampling, quality assurance/quality control procedures, and sampling and analysis protocols.

j. Annual monitoring reports shall use a standard report format and shall include the following:

(1) A stand alone comprehensive executive summary addressing all sections of the monitoring report;
(2) Comprehensive interpretations and conclusions; and

(3) Recommendations for future actions.

k. All monitoring reports submitted to the Principal Permittee or the Regional Board shall contain the certified perjury statement described in Attachment B of Order No. R9-2007-0001.

l. Annual monitoring reports shall be reviewed prior to submittal to the Regional Board by a committee (consisting of no less than three members). All review comments shall also be submitted to the Regional Board.

m. Annual monitoring reports shall be submitted in both electronic and paper formats.

3. The Principal Permittee shall submit by July 1, 2007 a detailed description of the monitoring programs to be implemented under requirements II.A.1.k, II.A.7, and II.B.3.c.(7) of Receiving Waters and Urban Runoff Monitoring and Reporting Program No. R9-2007-0001. The Principal Permittee shall submit by July 1, 2008, a detailed description of the monitoring programs to be implemented under requirement II.B.1 and II.B.2 of Receiving Waters and Urban Runoff Monitoring and Reporting Program No. R9-2007-0001. The description shall identify and provide the rationale for the constituents monitored, locations of monitoring, frequency of monitoring, and analyses to be conducted with the data generated.

4. By January 31, 2010, the City of San Diego shall submit a report which evaluates the data and assumptions used to estimate the WLA to Shelter Island Yacht Basin of 30 kg Cu/year. The report shall evaluate if any changes have occurred in the watershed which could cause or contribute to a higher copper urban runoff discharge and any actions necessary to address these changes. The report shall be an attachment to the Watershed Urban Runoff Management Program Annual Report for the San Diego Bay watershed.

5. Monitoring programs and reports shall comply with section II.E of Receiving Waters and Urban Runoff Monitoring and Reporting Program No. R9-2007-0001 and Attachment B of Order No. R9-2007-0001.

6. Following completion of an annual cycle of monitoring in October, the Copermittees shall make the monitoring data and results available to the Regional Board at the Regional Board's request.

B. Interim Reporting Requirements

For the October 2005-October 2006 and October 2006-October 2007 monitoring periods, the Principal Permittee shall submit the Receiving Waters Monitoring Annual Reports on January 31, 2007 and January 31, 2008, respectively. The Receiving Waters Monitoring Annual Report shall address the monitoring conducted to comply with the requirements of Order No. 2001-01.

018007

SWAMP
Surface Water Ambient Monitoring Program

SWAMP Bioassessment Procedures 2007

Standard Operating Procedures for Collecting Benthic Macroinvertebrate Samples and Associated Physical and Chemical Data for Ambient Bioassessments in California

February 2007

CALIFORNIA Water Boards

www.waterboards.ca.gov/swamp

018008

Standard Operating Procedures for Collecting Benthic Macroinvertebrate Samples and Associated Physical and Chemical Data for Ambient Bioassessments in California

Prepared by: Peter R. Ode Peter Ode, SWAMP Bioassessment Coordinator, California Department of Fish and Game, Aquatic Bioassessment Laboratory

Preparation Date: January 23rd, 2007

Approved by: Beverly van Buuren, SWAMP QA Officer

Approval Date: 01/17/07

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ACKNOWLEDGEMENTS A

The protocols described here represent the contributions of a wide range of researchers and field crews. Most of the physical habitat methods are close modifications of those used in the U.S. Environmental Protection Agency's (EPA's) Environmental Monitoring and Assessment Program (EMAP) and developed by EPA's Office of Research and Development (ORD, Peck et al. 2004). The benthic macroinvertebrate collection methods are based on EMAP methods (EPA's targeted riffle methods were derived in turn from methods developed at Utah State University; Hawkins et al. 2003).

The current version of these protocols was established by Peter Ode (Department of Fish and Game's (DFG's) Aquatic Bioassessment Laboratory (ABL)) and David Herbst (UC Santa Barbara's Sierra Nevada Aquatic Research Laboratory) with significant contributions from staff at the ABL (Jim Harrington, Shawn McBride, Doug Post, Andy Rehn, and Jennifer York), the Surface Water Ambient Monitoring Program (SWAMP) Quality Assurance (QA) Team, Thomas Suk and other members of the SWAMP bioassessment committee (Mary Adams, Lilian Busse, Matt Cover, Robert Holmes, Sean Mundell, and Jay Rowan) and three external reviewers: Chuck Hawkins, Dave Peck, and Phil Kaufmann.

Ode, P.R.. 2007. Standard operating procedures for collecting macroinvertebrate samples and associated physical and chemical data for ambient bioassessments in California. California State Water Resources Control Board Surface Water Ambient Monitoring Program (SWAMP) Bioassessment SOP 001.

018012

SWAMP GUIDANCE SG

SWAMP GUIDANCE FOR MACROINVERTEBRATE FIELD PROTOCOLS FOR WADEABLE STREAMS

Background: The SWAMP Bioassessment Committee met in December, 2004, and agreed that the SWAMP Quality Assurance Management Plan (QAMP) should be amended to provide greater consistency in bioassessment sampling protocols for wadeable streams. The Committee's recommendations were reviewed and accepted by the full SWAMP Roundtable[1] in February, 2005 (some of the key considerations are contained in Appendix A).

The current guidance for macroinvertebrate sampling under the SWAMP program is as follows:

1. For ambient bioassessment monitoring of wadeable streams in California, two methods are to be used at sites with riffle habitats (i.e., one "multihabitat" sample, and one sample that targets the "richest" habitat):
   - **For sites with sufficient riffle habitat,** the two samples shall be: (1) the reachwide benthos (RWB) method (also known as "multihabitat" sampling.); and (2) the targeted-riffle composite (TRC) method.
   - **For low-gradient sites that do not have sufficient riffle habitat**, the RWB method is the standard method, but we also recommend the option of collecting a sample with (2) the "Margin-Center-Margin" (MCM) method until ongoing methods comparisons are completed (see Appendix A).
   - **Notes:** (1) The protocols for each method are provided in this document; (2) Other appropriate method(s) will be allowed if the specific monitoring objectives require use of alternative method(s). (See Item #2, below.); (3) The protocol recommendations specified above will be reevaluated as results become available from ongoing methods comparison studies. (See Appendix A for more information.)

2. The SWAMP QAMP allows flexibility in sampling methods so that the most appropriate method(s) may be used to address hypothesis tests and project-specific objectives that differ from program objectives. Such situations may include, but are not necessarily limited to, special studies (e.g., evaluation of point source discharges, above/below comparisons where statistical replication is needed), stressor identification investigations, and long-term monitoring projects where consistent data comparability is desired and an alternative method is needed to achieve that comparability. In addition, in some rare cases where funding limitations would make it cost-prohibitive to complete a project in compliance with the protocols listed in #1, above, the project proponent may request to complete laboratory analysis of only one sample, and "archive" one of the macroinvertebrate samples (i.e., the RWB sample in streams with riffles) to reduce lab costs. Deviations from the protocols specified in #1 above may be granted by the SWAMP Bioassessment Coordinator or the full SWAMP Roundtable.

1. The SWAMP Roundtable is the coordinating entity for the program. Participants include staff from the State and Regional Water Boards, USEPA, the Department of Fish and Game, the Marine Pollution Studies Laboratory, Moss Landing Marine Laboratories, contractors, and other interested entities.

018013

SECTION 1 INTRODUCTION

This document describes two standard procedures (TRC and RWB) for sampling benthic macroinvertebrate (BMI) assemblages for ambient bioassessments. This document also contains procedures for measuring instream and riparian habitats and ambient water chemistry associated with BMI samples. These sampling methods replace previous bioassessment protocols referred to as the California Stream Bioassessment Procedure (CSBP, Harrington 1995, 1999, 2002).

These procedures can produce quantitative and repeatable measures of a stream's physical/habitat condition and benthic invertebrate assemblages, but they require field training and implementation of QA measures throughout the field season.

The sampling layout described here provides a framework for systematically collecting a variety of physical, chemical, and biological data. The biological sampling methods are designed to nest within the overall framework for assessing the biotic, physical, and chemical condition of a reach. The layout used in these procedures and most of the physical habitat methods are close modifications of those used in EPA's EMAP and developed by EPA's ORD (Peck et al. 2004). Data collected using this methodology are generally directly comparable to equivalent EMAP data, except for the difference in reach length. Other exceptions are noted in the text.

The following steps are presented in an order suggested for efficient data collection. The specific order of collection for the physical parameters may be modified according to preferences of field crews, with the caveat that care must always be taken to not disturb the substrates within the streambed before BMI samples are collected.

PHYSICAL HABITAT METHODS

The physical habitat scoring methods described here can be used as a stand-alone evaluation or used in conjunction with a bioassessment sampling event. However, measurements of instream and riparian habitat and ambient water chemistry are essential to interpretation of bioassessment data and should always accompany bioassessment samples. This information can be used to classify stream reaches, associate physical and chemical condition with biotic condition, and explain patterns in the biological data.

018014

Because bioassessment samples can be collected to answer a variety of questions, this document describes the component measures of instream and riparian habitat as independent modules. Although individual modules can be added or subtracted from the procedure to reflect specific project objectives, a standard set of modules will normally accompany bioassessment samples. This document describes two standard groupings of modules that represent two different levels of intensity for characterizing the chemical and physical habitat data (Table 1). The BASIC physical habitat characterization represents a minimum amount of physical and chemical data that should be taken along with any ambient BMI sample, the FULL physical habitat characterization represents the suite of data that should be collected with most professional level bioassessment samples (e.g., SWAMP regional monitoring programs). In addition to these data, we also briefly introduce additional data modules (e.g., excess sediment, periphyton) that can be collected as supplements to the full set (OPTIONAL). Table 1 lists the physical and chemical variables that should be measured under the different levels.

Note: *SWAMP intends to develop guidance for selecting appropriate physical habitat modules to the intended uses of data. Until this guidance is available, users of these protocols should consult with representatives of the Regional Water Quality Control Boards (Regional Boards) or the SWAMP Bioassessment Coordinator when selecting modules.*

FIELD CREW SIZE AND TIME ESTIMATES

These methods are designed to be completed by either two or three (or more) person field crews. A very experienced field crew can expect to complete the full suite of physical habitat measurements and the two BMI sampling protocols in approximately two hours. Less experienced crews will probably take closer to three or four hours to complete the work depending on the complexity of the reach. Note that this estimate includes only time at the site, not travel time between sites.

Equipment and Supplies

Recommended equipment and supplies are listed in Table 2.

018015

Table 1. Summary of physical habitat and water chemistry and proposal for basic, full, and optional levels of effort.

Survey Task	Parameter(s)	Basic	Full	Option	Comments
REACH DELINEATION and WATER QUALITY [Conducted before entering stream to sample BMIs or conduct any habitat surveys]	Layout reach and mark transects, record GPS coordinates	X	X		Use 150-m reach length if wetted width ≤10 m; Use 250-m reach length if wetted width > 10 m
	Temperature, pH, specific conductance, DO, alkalinity	X	X		Multi-meter (e.g., YSI, Hydrolab, VWR Symphony)
	Turbidity, Silica			X	Use test kit or meter
	Notable field conditions	X	X		Recent rainfall, fire events, dominant local landuse
CROSS-SECTIONAL TRANSECTS BASIC Measurements at main 11 transects only FULL Measurements at 11 main transects (A, B, C, D, E, F, G, H, I, J, K) or 21 transects (11 main plus 10 inter-transects) for substrate size classes only	Wetted width	X	X		Stadia rod is useful here
	Flow habitat delineation	X	X		Record proportion of habitat classes in each inter-transect zone
	Depth and Pebble Count + CPOM		X		5 -point substrate size, depth and CPOM records at all 21 transects
	Cobble embeddedness		X		All cobble-sized particles in pebble count. Supplement with "random walk" if needed for 25
	Slope (%)	See reach scale	X		Average slope calculated from 10 transect to transect slope measurements. Use autolevel for slopes ≤ 1%; clinometer is OK for steeper gradients
	Sinuosity		X		Record compass readings between transect centers
	Canopy cover	X	X		Four densiometer readings at center of channel (facing L bank R bank, Upstream +Downstream)
	Riparian Vegetation		X		Record % or categories
	Instream Habitat		X		
	Human Influence		X		
	Bank Stability	X	X		Eroding / Vulnerable / Stable
	Bankfull Dimensions		X		
	Excess Sediment Transect Measures (optional)				
	Bankfull width and height, bank angles			X	
	Large woody debris counts			X	Tallies of woody debris in several size classes
	Thalweg profile			X	100 equidistant points along thalweg

018016

Survey Task	Parameter(s)	Basic	Full	Option	Comments
DISCHARGE TRANSECT	Discharge measurements		X		Velocity-Area Method or Neutrally Buoyant Object Method
REACH SCALE MEASUREMENTS:	EPA-RBP visual scoring of habitat features	*		X	*Used for citizen monitoring and comparison with legacy data
	Selected RBP visuals:		X		Channel alteration, sediment deposition, epifaunal substrate (redundant if doing EPA-RBP scoring)
	Slope (%, not degrees)	X	See transect scale		Single measurement for entire reach only for BASIC. Use autolevel for slopes ≤ 1%, clinometer is OK for higher gradients
	Photo documentation	X	X		Upstream (A, F, K) Downstream (F)
OTHER OPTIONAL COMPONENTS					
FOOD RESOURCE QUANTIFICATION	Periphyton (3 replicates)			X	Qualitative characterization of diatom growth and filamentous algal growth, quantification of biomass (AFDM, chl-a)
	CPOM & FPOM (3 replicates)			X	CPOM field measure of wet mass >1 mm particles, FPOM as 0.25 – 1 mm fraction (AFDM in lab)

Table 2. Field equipment and supplies

Physical Habitat	BMI Collection	General/ Ambient Chemistry
• GPS receiver • topographic maps • measuring tape (150-m) • small metric ruler or gravelometer for substrate measurements • digital watch, random number table or ten-sided die • stadia rod • clinometer • autolevel (for slopes < 1%) • handlevel (optional) • current velocity meter • stopwatch for velocity measurements • convex spherical densitometer • flags/ flagging tape • rangefinder	• D-frame kick net (fitted with 500-µ mesh bag) • standard # 35 sieve (500-µ mesh) • wide-mouth 500-mL or 1000 mL plastic jars • white sorting pan (enamel or plastic) • 95% EtOH • fine tipped forceps or soft forceps • waterproof paper and tape for attaching labels • 10-20-L plastic bucket for sample elutriation • preprinted waterproof labels (e.g., Rite-in-the-Rain™) • disposable gloves/ elbow length insulated gloves	• sampling SOP (this document) • hip or chest waders, or wading boots/shoes • field forms printed on waterproof paper (e.g., Rite-in-the-Rain™) • clip board and pencils • digital camera • centigrade thermometer • pH meter • DO meter • conductivity meter • field alkalinity meter • water chemistry containers • calibration standards • spare batteries for meters • first aid kit

018017

SECTION 2
REACH DELINEATION AND WATER QUALITY

REACH LAYOUT AND GENERAL DOCUMENTATION

The systematic positioning of transects is essential to collecting representative samples and to the objective quantification of physical habitat measures. The standard sampling layout consists of a 150-m reach (length measured along the bank) divided into 11 equidistant transects that are arranged perpendicular to the direction of flow (Figure 1, Figure 2). Ten additional transects (designated "inter-transects") located between the main transects give a total of 21 transects per reach. Main transects are designated A through K while inter-transects are designated by their nearest upstream and downstream transects (e.g., AB, BC, etc.). In extreme circumstances, reach length can be shorter than 150 m (e.g., if upstream and downstream barriers preclude a 150-m reach), but this should be avoided whenever possible. If the actual reach length is other than 150 m or 250 m this should be noted and explained on the field forms.

Note 1: *The standard reach length differs from that used in the EMAP design, in which reach length was defined as 40x stream width, with a minimum reach length of 150 m. The EMAP reach length approach is used to ensure that enough habitat is sampled to support accurate fish assemblage estimates and relatively precise characterization of channel characteristics (e.g., residual pool volumes and woody debris estimates, which that are critical for relative bed stability estimates). Programs wishing to sample fish assemblages or produce relative bed stability estimates should strongly consider adopting the EMAP guidance for setting reach length.*

Note 2: *Streams > 10 m wetted width should use a reach length of 250 m. Some very large streams (i.e., > 20-m wetted width) may not be adequately represented even by a 250-m reach. In these cases, field crews should define a reach length that is representative of the larger stream segment being studied (i.e., attempt to include two to three meander cycles, or four to six riffle-pool sequences when possible).*

Note 3: *When the exact reach location is not restricted by the sampling design, attempt to position reaches upstream of bridges to avoid this influence.*

Step 1. Upon arrival at the sampling site, fill out the reach documentation section of the field forms (site and project identification, stream and watershed name, crew members, and date/time). If known at the time of sampling, record the Site Code following SWAMP site code formats. Determine the geographic coordinates of the downstream end of the reach (preferably in decimal degrees to at least four decimal places) with a GPS receiver and record the datum setting of the unit (preferably NAD83/ WGS84).

018018

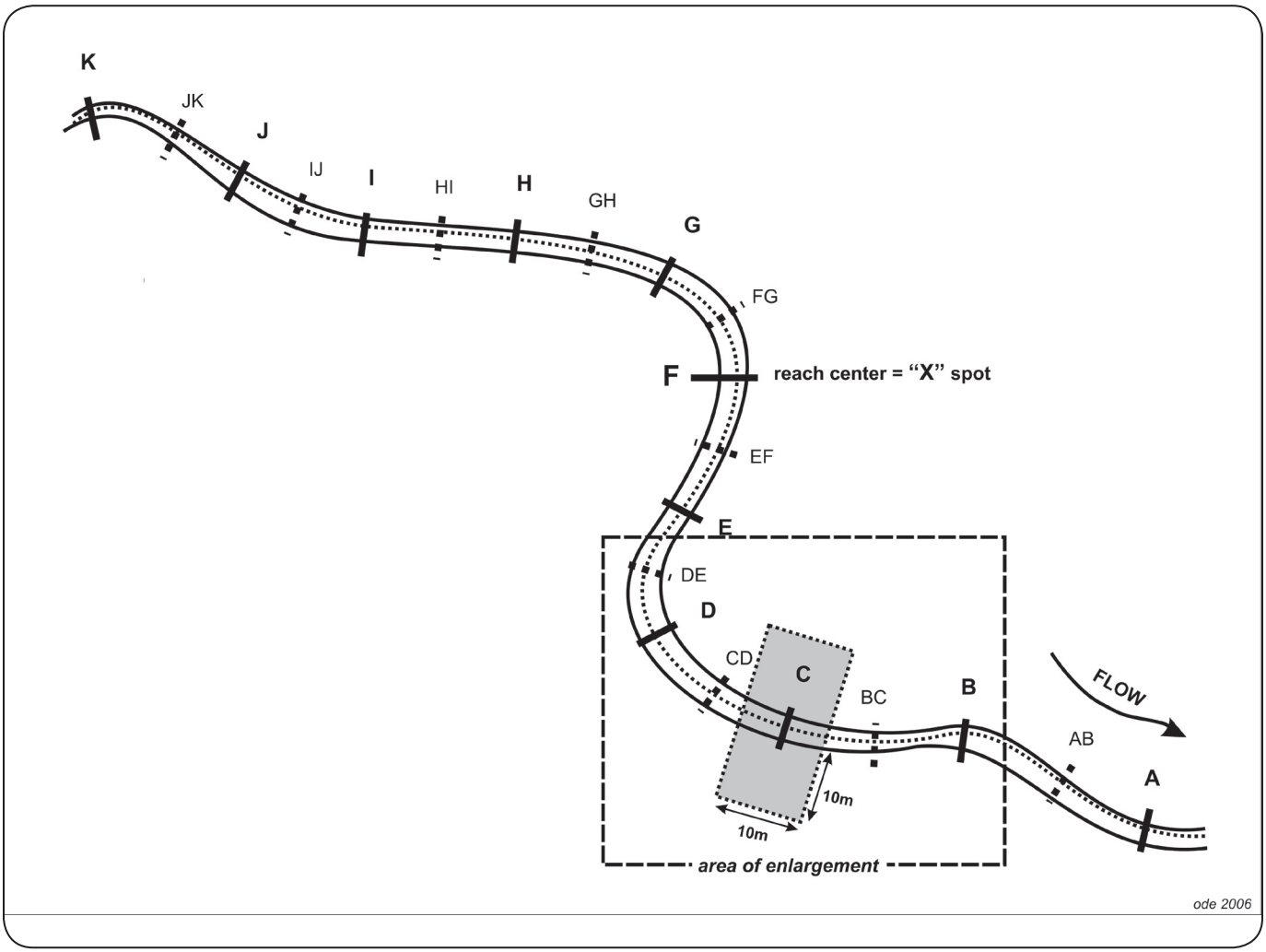

Figure 1. Reach layout geometry for physical habitat and biological sampling showing positions of 11 main transects (A – K) and the 10 supplemental inter-transects (AB- JK). The area highlighted in the figure is expanded in Figure 2. Note: reach length = 150 m for streams ≤ 10-m average wetted width, and reach length = 250 m for streams > 10-m average wetted width.

Step 2. Once a site has been identified, make an initial survey of the reach from the stream banks (being sure to not disturb the instream habitat). If TRC samples will be collected, identify all riffle habitats suitable for sampling (see Section IIIa for suitable habitat types) and note their positions so that a subset can be identified for sampling.

Step 3. Determine if the average wetted width is greater or less than 10 m. If the average wetted width ≤ 10 m, use a 150-m reach length. If the average wetted width > 10 m, use a 250-m reach length.

018019

Step 4. Starting at one end of the reach, establish the position of the 11 main transects (labeled A-K from downstream to upstream) by measuring 15 m (25 m for streams > 10 m wetted width) along the bank from the previous transect. The 10 inter-transects should be established equidistant from the adjacent main transects (i.e., 7.5 m from main transects for 150-m reaches, 12.5 m for 250-m reaches). Since the data collection will start at the downstream end, is often easiest to establish transects starting from the upstream end. For easy setup and breakdown, mark the main transects with easily removable markers (e.g., large washers tied with strips of flagging, surveyor's flags).

Note 1: *While it is usually easiest to establish transect positions from the banks (this also reduces disturbance to the stream channel), this can result in uneven spacing of transects in complex stream reaches. To avoid this, estimate transect positions by projecting from the mid-channel to the banks.*

Note 2: *Flagging of a single bank is recommended to reduce mistakes caused by missed markers.*

Step 5. Measure and record common ambient water chemistry measurements (pH, DO, specific conductance, alkalinity, water temperature) at the downstream end of the reach (near same location as the GPS coordinates were taken). These are typically taken with a handheld water quality meter (e.g., YSI, Hydrolab), but field test kits (e.g., Hach) can provide acceptable information if they are properly calibrated. For appropriate calibration methods and calibration frequency, consult the current SWAMP QAMP (Appendix F), or follow manufacturer's guidelines.

Note 1: *If characteristics of the site prohibit downstream entry, measurements may be taken at other points in the reach. In all cases, ambient chemistry measurements should be taken at the beginning of the reach survey.*

Note 2: *Alkalinity test kits may not perform well in low ionic strength waters. Programs should consider collecting lab samples for these sites (see SWAMP QAMP for guidance on collecting water chemistry samples).*

Step 6. Take a minimum of four (4) photographs of the reach at the following locations: a) Transect A facing upstream, b) Transect F facing upstream, c) Transect F facing downstream, and d) Transect K facing downstream. It may also be desirable to take a photograph at Transect A facing downstream and Transect K facing upstream to document conditions immediately adjacent to the reach. Digital photographs should be used when possible. Record the image numbers on the front page of the field form.

Note 1: *When possible, photograph names should follow SWAMP coding conventions ("StationCode_yyyy_mm_dd_uniquecode"). The unique code should include one of the following codes to indicate direction: RB (right bank), LB (left bank), BB (both banks), US (upstream), DS (downstream). SWAMP suggests using unique codes created by the camera to facilitate file organization. Example: 603WQLB02_2004_03_20_RBDS1253.*

018020

Step 7. Record the dominant land use and land cover in the area surrounding the reach (evaluate land cover within 50 m of either side of the stream reach).

Step 8. At the bottom of the form, record evidence of recent flooding, fire, or other disturbances that might influence bioassessment samples. Especially note if flow conditions have been affected by recent rainfall, which can cause significant under-sampling of BMI diversity (see note in the following section). If you are unaware of recent fire or rainfall events, select the "no" option on the forms.

018021

SECTION 3
COLLECT BENTHIC MACROINVERTEBRATES

MULTIPLE HABITAT AND TARGETED RIFFLE PROTOCOLS

Note 1: *BMI samples intended for ambient bioassessments are generally collected when streams are at or near base flow (i.e., not influenced by surface runoff) as sudden flow increases can dramatically alter local community composition.*

Note 2: *Guidance for choosing among TRC sampling, RWB sampling or both will be provided in a separate document (see Appendix A for current guidance for sampling under SWAMP).*

Once the reach transects have been laid out, the biological samples (BMIs and algae if included) should be collected before any other physical habitat measures so that substrates are not disturbed prior to sampling. Both TRC and RWB methods use 500-µ mesh D-frame nets (see list of BMI sampling equipment in Table 2). The two samples can be collected at the same time by carrying two D-nets and compositing the material from the two samples in their respective nets. If a two person field crew is responsible for both the physical habitat data and benthic invertebrate samples, it is generally best to collect the benthos at each transect, then immediately record the physical habitat data before moving to the next transect. Obviously, this requires especially careful handling of the D-nets during the course of sampling to avoid loss or contamination of the samples. It can be helpful to clearly label the two D nets as RWB and TRC. Larger field crews may choose to split the sampling between biological team and a physical habitat team and have the biological team go through the reach first. The positions of the TRC and RWB subsampling locations are illustrated in Figure 2.

SECTION III A. TARGETED RIFFLE COMPOSITE PROCEDURE

The TRC method is designed for sampling BMIs in wadeable streams that contain fast-water (riffle/run) habitats and is not appropriate for waterbodies without fastwater habitats. The RWB protocol should be used in these situations. Riffles are often used for collecting biological samples (e.g., the old CSBP methods) because they often have the highest BMI diversity in wadeable streams. This method expands the definition to include other fast water habitats, however care should be taken when attempting to apply this method in low gradient streams.

Note: *Since all streams (even low gradient streams) have variation in flow habitats within the channel, this guidance should not be interpreted as including areas within low gradient streams that are only marginally faster than the surrounding habitats. The RWB protocol should be applied in these situations.*

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The TRC was developed by the Western Center for Monitoring and Assessment of Freshwater Ecosystems (www.cnr.usu.edu/wmc) in Logan, Utah (Hawkins et al. 2003) and slightly modified by the EPA program (Peck et al. 2004). The TRC has been widely used in California (US Forest Service (USFS), the EMAP Western Pilot, and the California Monitoring and Assessment Program (CMAP)), and in the interest of methodological consistency between state and federal water resource agencies, has been adopted as the standard riffle protocol for bioassessment in California. The version described here is the EMAP modification, which distributes the sampling effort throughout the reach.

Sampling Locations – Acceptable Habitat Types

Riffles are the preferred habitat for TRC sampling, but other fast water habitats are acceptable for sampling if riffles are sparse. Common flow-defined habitat types are listed in Table 3 in decreasing order of energy. Most streams contain some or all of the following fast water habitat types: 1) cascades/falls, 2) rapids, 3) riffles, 4) runs. All of these are acceptable for TRC sampling if riffles are not available.

Note: *Because the common habitat types are arranged on a continuum between high to low energy environments, the categories grade into each other continuously and are not discrete. Thus, determination of habitat types requires somewhat subjective decision-making.*

Table 3. Common habitat types in stream channels, arranged in decreasing order of energy

Flow Habitat Type	Description
Cascades	Short, high gradient drop in stream bed elevation often accompanied by boulders and considerable turbulence
Falls	High gradient drop in elevation of the stream bed associated with an abrupt change in the bedrock
Rapids	Sections of stream with swiftly flowing water and considerable surface turbulence. Rapids tend to have larger substrate sizes than riffles
Riffles	Shallow sections where the water flows over coarse stream bed particles that create mild to moderate surface turbulence; (< 0.5 m deep, > 0.3 m/s)
Step-Runs	A series of runs that are separated by short riffles or flow obstructions that cause discontinuous breaks in slope
Runs	Long, relatively straight, low-gradient sections without flow obstructions. The stream bed is typically even and the water flows faster than it does in a pool; (> 0.5 m deep, > 0.3 m/s)
Glides	A section of stream with little or no turbulence, but faster velocity than pools; (< 0.5 m deep, < 0.3 m/s)
Pools	A reach of stream that is characterized by deep, low-velocity water and a smooth surface ; (> 0.5 m deep, < 0.3 m/s)

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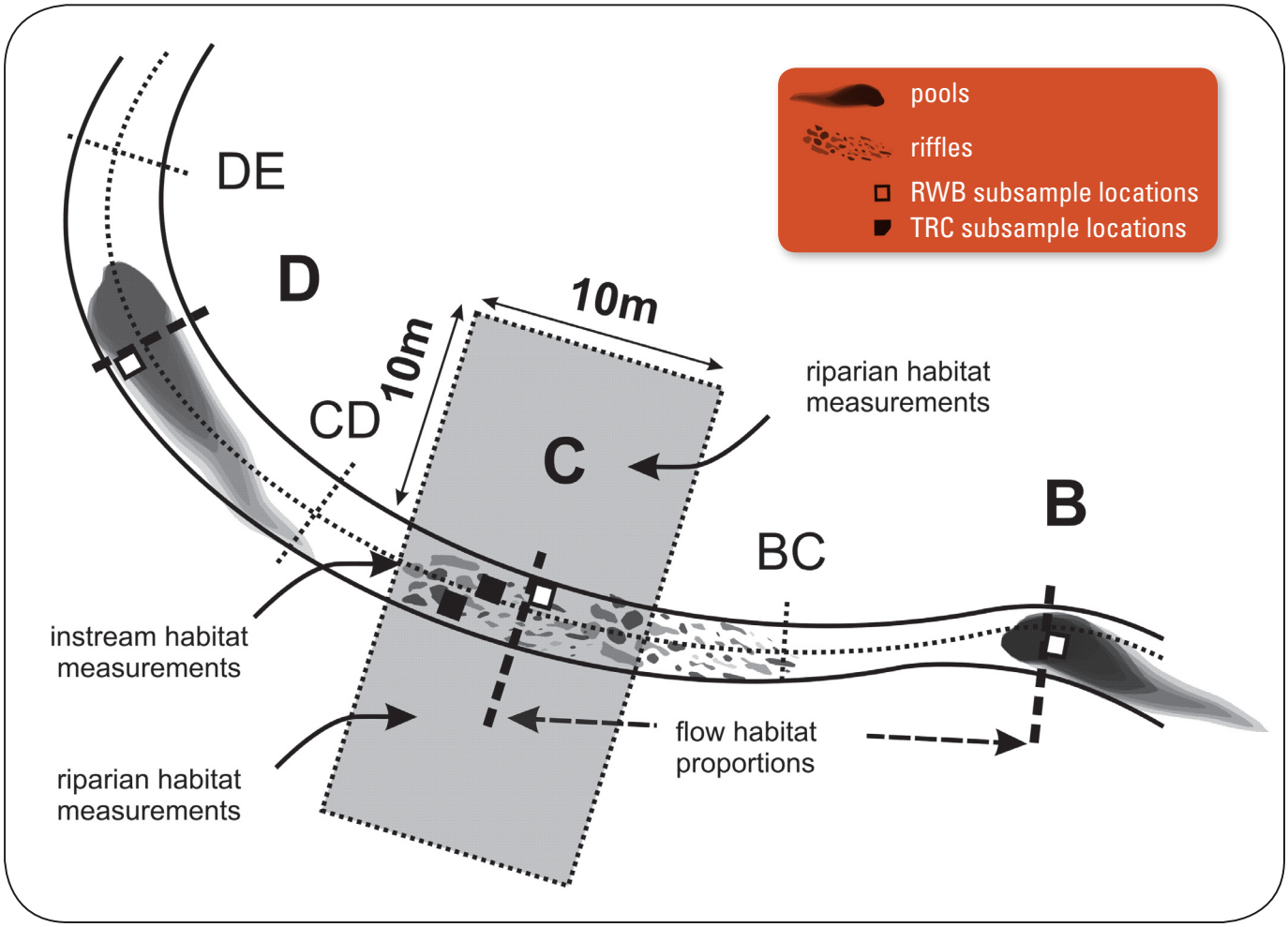

Figure 2. Section of the standard reach expanded from Figure 1 showing the appropriate positions for collecting benthic macroinvertebrate samples, instream and riparian habitat measurements and flow habitat proportion measurements.

Sampling Locations – Selecting Habitat Units

A TRC sample is a composite of eight individual kick samples of 1 ft^2 (0.09 m^2) of substrate each. During your initial layout of the reach, take a mental note of the number and position of the main riffles in a reach (and other fast water habitats if needed). Randomly distribute the eight sub-samples among the fast water habitats in the reach, giving preference to riffles where possible. Unless you are sampling in small streams, try to avoid very small riffle units (i.e., < 5 ft^2). If fewer than eight riffles are present in a reach, more than one sample may be taken from a single riffle, especially if the riffles are large.

Sampling Procedure

Begin sampling at the downstream end of the reach at the first randomly selected riffle and work your way upstream.

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TRC-Step 1. Determine net placement within each habitat unit by generating a pair of random numbers between 0 and 9. Examples of convenient random number generators include the hundredths place on the stopwatch feature of a digital watch, a 10 sided die and a random number chart. The first number in each pair (multiplied by 10) represents the percent upstream along the habitat unit's length. The second number in each pair represents the percent of the riffle width from right bank. For example, if the two generated random numbers are 4 and 7, you will walk upstream 40% of the distance of the riffle and then go 70% of the distance across the riffle (see Figure 3). This position is the center of the 1 ft^2 (0.09 m^2) sampling quadrat for that riffle. If you are unable to sample this location because it is too deep or it is occupied by a large boulder, select a new pair of random numbers and pick a new spot.

TRC-Step 2. Position a 500-µ D-net (with the net opening perpendicular to the flow and facing upstream) quickly and securely on the stream bottom to eliminate gaps under the frame. Avoid, and if necessary remove, large rocks that prevent the sampler from seating properly on the stream bottom.

TRC-Step 3. Holding the net in position on the substrate, visually define a square quadrat that is one net width wide and one net width long upstream of the net opening. Since D-nets are 12 inches wide, the area within this quadrat is 1ft^2 (0.09 m^2). Restrict your sampling to within that area. If desired, a wire frame of the correct dimensions can be placed in front of the net to help delineate the quadrat to be sampled, but it is often sufficient to use the net dimensions to keep the sampling area consistent.

TRC-Step 4. Working backward from the upstream edge of the sampling plot, check the quadrat for heavy organisms such as mussels, snails, and stone-cased caddisflies. Remove these organisms from the substrate by hand and place them into the net. Carefully pick up and rub stones directly in front of the net to remove attached animals. Remove and clean all of the rocks larger than a golf ball (~3 cm) within your sampling quadrat such that all the organisms attached to them are washed downstream into your net. Set these rocks outside your sampling quadrat after you have cleaned them. If the substrate is consolidated or comprised of large, heavy rocks, use your feet to kick and dislodge the substrate to displace BMIs into the net. If you cannot remove a rock from the stream bottom, rub it (concentrating on cracks or indentations) thereby loosening any attached insects. As you are disturbing the plot, let the water current carry all loosened material into the net.

Note 1: *Brushes are sometimes used in other bioassessment protocols to help loosen organisms, but in the interest of standardizing collections, do not use a brush when following this protocol.*

Note 2: *In sandy-bottomed streams, kicking within run habitats can quickly fill the sampling net with sand. In these situations, follow the standard procedures but use care to disturb the substrate gently and avoid kicking.*

TRC-Step 5. Once the coarser substrates have been removed from the quadrat, dig your fingers through the remaining underlying material to a depth of about 10 cm (this material is often comprised of gravels and finer particles). Thoroughly manipulate the substrates in the quadrat.

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Note: The sampler may spend as much time as necessary to inspect and clean larger substrates, but should take a standard time of 30 seconds to perform Step 5.

TRC-Step 6. Let the water run clear of any insects or organic material before carefully lifting the net. Immerse the net in the stream several times to remove fine sediments and to concentrate organisms at the end of the net, but be careful to avoid having any water or foreign material enter the mouth of the net during this operation.

TRC-Step 7. Move upstream to the next randomly selected habitat unit and repeat steps one through six, taking care to keep the net wet but uncontaminated by foreign material when moving the net from riffle to riffle. Sometimes, the net will become so full of material from the streambed that it is no longer effective at capturing BMIs. In these cases, the net should be emptied into sample jars as frequently as necessary, following guidelines described below in the "Preparation of BMI Sample Jars" section. Continue until you have sampled eight 1ft^2 (0.09 m^2) of benthos.

TRC-Step 8. PROCEED to Section IIIc. Filling and Labeling BMI Sample Jars.

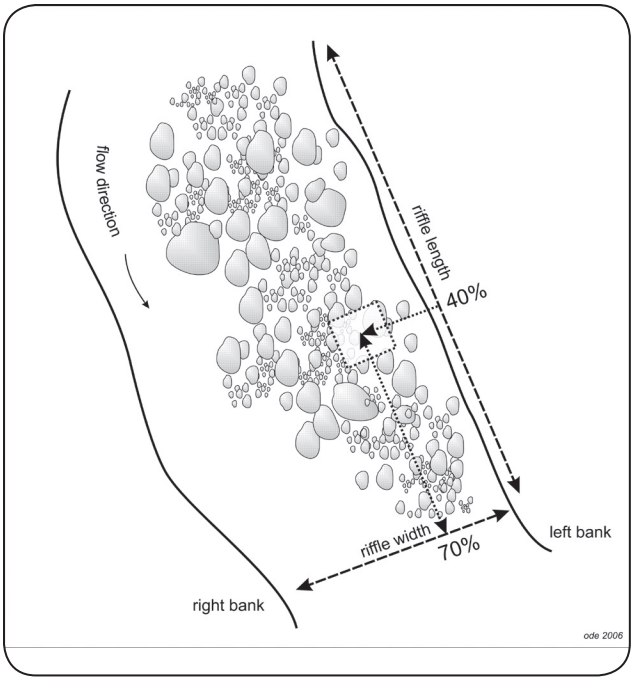

Figure 3. Example showing the method for selecting a subsampling position within a selected riffle under the TRC method. In this example, the random numbers 4 and 7 were selected

SECTION III B. REACHWIDE BENTHOS (MULTIHABITAT) PROCEDURE

The RWB procedure employs an objective method for selecting subsampling locations that is built upon the 11 transects used for physical habitat measurements. The RWB procedure can be used to sample any wadeable stream reach since it does not target specific habitats. Because sampling locations are defined by the transect layout, the position of individual sub-samples may fall in a variety of erosional or depositional habitats.

Note: Sampling locations should be displaced one meter downstream of the transects to avoid disturbing substrates for subsequent physical habitat assessments.

RWB -Step 1. The sampling position within each transect is alternated between the left, center and right positions along a transect (25%, 50% and 75% of wetted width, respectively) as you move upstream from transect to transect. Starting with the downstream transect (Transect

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A), identify a point that is 25% of the stream width from the right bank (note that the right bank will be on your left as you face upstream). If you cannot collect a sample at the designated point because of deep water obstacles or unsafe conditions, relocate the point as close as possible to the designated position.

Note: *A modification to this procedure is currently being investigated by SWAMP. This "margin-center-margin" (MCM) modification replaces the samples at 25% and 75% of wetted width with samples of the marginal habitats (including emergent and submergent vegetation).*

RWB -Step 2. Place a 500-µ D-net in the water so the mouth of the net is perpendicular to and facing into the flow of the water. If there is sufficient current in the area at the sampling point to fully extend the net, use the normal D-net collection technique to collect the sub-sample (TRC-Step 3 through TRC-Step 6 above). If flow volume and velocity is not sufficient to use the normal collection technique, use the sampling procedure for "slack water" habitats (RWB-Step 3 through RWB-Step 7 below).

RWB -Step 3. Visually define a 1 ft^2 (0.09 m^2) quadrat that is one net-width wide and one net-width long at the sampling point.

RWB -Step 4. Working backward from the upstream edge of the sampling plot, check the quadrat for heavy organisms such as mussels and snails. Remove these organisms from the substrate by hand and place them into the net. Carefully pick up and rub stones directly in front of the net to remove attached animals. Remove and clean all of the rocks larger than a golf ball within your sampling quadrat such that all the organisms attached to them are washed downstream into your net. Set these rocks outside your sampling quadrat after you have cleaned them. Large rocks that are less than halfway into the sampling area should be pushed aside. If the substrate is consolidated or comprised of large, heavy rocks, use your feet to kick and dislodge the substrate to displace BMIs into the net. If you cannot remove a rock from the stream bottom, rub it (concentrating on cracks or indentations) thereby loosening any attached insects.

RWB -Step 5. Vigorously kick the remaining finer substrate within the quadrat with your feet while dragging the net repeatedly through the disturbed area just above the bottom. Keep moving the net all the time so that the organisms trapped in the net will not escape. Continue kicking the substrate and moving the net for 30 seconds. For vegetation-choked sampling points, sweep the net through the vegetation within a 1ft^2 (0.09 m^2) quadrat for 30 seconds.

Note: *If flow volume is insufficient to use a D- net, spend 30 seconds hand picking a sample from 1ft^2 of substrate at the sampling point, then stir up the substrate with your gloved hands and use a sieve with 500-µ mesh size to collect the organisms from the water in the same way the net is used in larger pools.*

RWB -Step 6. After 30 seconds, remove the net from the water with a quick upstream motion to wash the organisms to the bottom of the net.

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RWB -Step 7. PROCEED to Section IIIc: Filling and Labeling BMI Sample Jars

SECTION III C. FILLING AND LABELING BENTHIC MACROINVERTEBRATE SAMPLE JARS

Step 1. Once all sub-samples (eight for TRC, 11 for RWB) have been collected, transfer benthos to a 500-mL or 1000-mL wide-mouth plastic sample jar using one of the following methods.

Note: *Field elutriation should only be used by well-trained field crews who are proficient at removing all benthic organisms from the discarded inorganic material. Training in the recognition of aquatic invertebrates is highly recommended.*

Step 1a. Complete Transfer of all Sampled Material – Invert the contents of the kick net into the sample jar. Perform this operation over a white enameled tray to avoid loss of any sampled material and make recovery of spilled organisms easier. If possible, remove the larger twigs and rocks by hand after carefully inspecting for clinging organisms, but be sure not to lose any organisms. Use forceps to remove any organisms clinging to the net and place these in the sample jar.

Step 1b. Field Elutriation of Samples – Empty the contents of the net into a large plastic bucket (10-20 L is sufficient). Use forceps to remove any organisms clinging to the net and place these in the bucket. Add stream water to the bucket and gently swirl the contents of the bucket in order to suspend the organic material (being certain to not introduce entrained organisms from the source water). Pour the organic matter from the bucket through a 500-µ sieve (or use the 500-µ net). Repeat this process until no additional material can be elutriated (i.e., only inorganic material is left in the bucket). If possible, remove the larger twigs and rocks by hand after carefully inspecting for clinging organisms, but be sure not to lose any organisms. Transfer all of the material in the sieve (invertebrates and organic matter) into the sample jar. Carefully inspect the gravel and debris remaining in the bottom of the bucket for any cased caddisflies, clams, snails, or other dense animals that might remain. Remove any remaining animals by hand and place them in the sample jar.

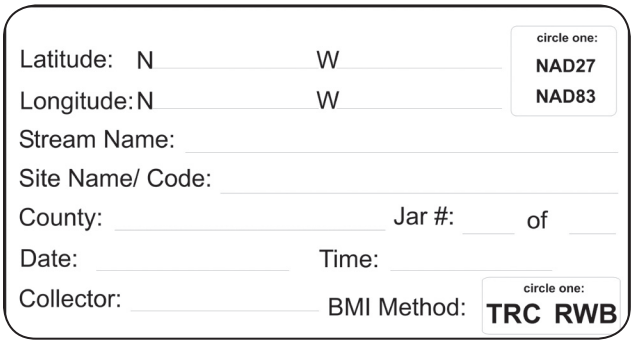
Latitude: N _____ W _____
Longitude: N _____ W _____
circle one: NAD27 NAD83
Stream Name: _____
Site Name/ Code: _____
County: _____ Jar #: ____ of ____
Date: _____ Time: _____
Collector: _____ BMI Method: circle one: TRC RWB

Figure 4. Example date - locality label for all BMI samples.

Step 2. Place a completed date/locality label (see Figure 4) on the inside of the jar (use pencil only as most "permanent" inks dissolve in ethanol) and completely fill with 95% ethanol. Place a second label on the outside of the jar. Note that the target concentration of ethanol is 70%, but 95% ethanol is used in the field to account for dilution from water in the sample. If organic and inorganic material does not accumulate in the net quickly, it may be possible to transfer all the material in the net into one jar. Otherwise, divide the material evenly among several jars

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(being careful to clearly label them as part of a set). To ensure proper preservation of benthic macroinvertebrates it is critical that the ethanol is in contact with the BMIs in the sample jar. Never fill a jar more than 2/3 full with sampled material, and gently rotate jars that contain mostly mud or sand to ensure that the ethanol is well distributed. If jars will be stored for longer than a month prior to processing, jars should not contain more than 50% sample material.

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SECTION 4 MAIN CROSS-SECTIONAL TRANSECT MEASURES

SECTION IVA. PHYSICAL MEASURES

The majority of physical habitat measurements in this protocol are made relative to the main cross-sectional transects (Figure 5). All the measures taken relative to each transect are recorded on forms specific to that transect. Start with the downstream transect (Transect A) and repeat steps 6-15 for all 11 main transects.

Module A. Transect Dimensions: Wetted Width and Bankfull Dimensions

Wetted Width – The wetted channel is the zone that is inundated with water and the wetted width is the distance between the sides of the channel at the point where substrates are no longer surrounded by surface water. Measure the wetted stream width and record this in the box at the top of the transect form.

Bankfull Width and Depth – The bankfull channel is the zone of maximum water inundation in a normal flow year (one to two year flood events). Since most channel formation processes are believed to act when flows are within this zone (Mount 1995), bankfull dimensions provide a valuable indication of relative size of the waterbody.

Note: *Bankfull dimensions are notoriously difficult to assess, even by experienced field crews (see Heil and Johnson 1995). It is often useful to discuss the interpretation of bankfull locations among the field crew members to reach a consensus. The USFS Stream Team provides a good set of instructional videos for improving consistency in accurate bankfull measurements (http://www.stream.fs.fed.us/publications/videos.html).*

Step 1. Scout along the stream margins to identify the location of the bankfull margins on either bank by looking for evidence of annual or semi-annual flood events. Examples of useful evidence includes topographic, vegetative, or geologic cues (changes in bank slope, changes from annual to perennial vegetation, changes in the size distribution of surface sediments). While the position of drift material caught in vegetation may be a helpful aid, this can lead to very misleading measurements.

Note: *The exact nature of this evidence varies widely across a range of stream types and geomorphic characteristics. It is helpful to investigate the entire reach when attempting to interpret this evidence because the true bankfull margin may be obscured at various points along the reach. Often the bankfull position is easier to interpret from one bank than the other; in these cases, it is easiest to infer the opposite bank position by projecting across the channel. Additionally, height can be verified by measuring the height from both edges of the wetted channel to the bankfull height (these heights should be equal).*

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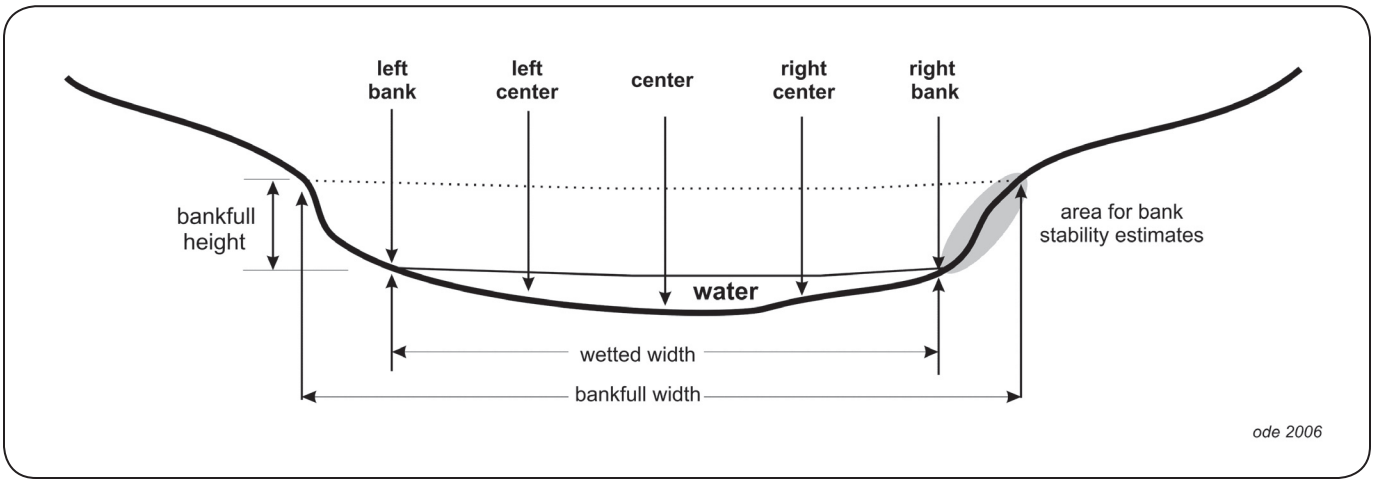

Figure 5. Cross sectional diagram of a typical stream channel showing locations of substrate measurements, wetted and bankfull width measurements, and bank stability visual estimates.

Step 2. Stretch a tape from bank to bank at the bankfull position. Measure the width of the bankfull channel from bank to bank at bankfull height and perpendicular to the direction of stream flow.

Step 3. Measure bankfull height (the vertical distance between the water height of the water and the height of the bank, Figure 5) and record.

Module B. Transect Substrate Measurements

Particle size frequency distributions often provide valuable information about instream habitat conditions that affect BMI distributions. The Wolman pebble count technique (Wolman 1954) is a widely used and cost-effective method for estimating the particle size distribution and produces data that correlates with costly, but more quantitative bulk sediment samples. The method described here follows the EMAP protocol, which records sizes of 105 particles in a reach (five particles from each of 11 main transects and 10 inter-transects).

Note: *The size cutoff for the finest particle sizes in the EMAP protocol (< 0.06 mm) differs from that used by the Sierra Nevada Aquatic Research Laboratory (SNARL) program (0.25 mm), although the narrative description for this cutoff is the same (the point at which fine particles rubbed between one's fingers no longer feel gritty).*

Coarse particulate organic matter (CPOM, particles of decaying organic material such as leaves that are greater than 1.0 mm in diameter) is a general indicator of the amount of allochthonous organic matter available at a site, and its measurement can provide valuable information about the basis of the food web in a stream reach. The presence of CPOM associated with each particle is quantified at the same time that particles are measured for the pebble counts.

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Step 1. Transect substrate measurements are taken at five equidistant points along each transect (Figure 5). Divide the wetted stream width by four to get the distance between the five points (Left Bank, Left Center, Center, Right Center and Right Bank) and use a measuring device to locate the positions of these points (a stadia rod is especially helpful here). Once the positions are identified, lower a graduated rod (e.g., a marked ski pole) though the water column perpendicular to both the flow and the transect to objectively select the particle located at the tip of the rod.

Step 2. Measure the depth from the water surface to the top of the particle with the graduated rod and record to the nearest cm.

Step 3. Record the presence or absence of CPOM >1mm within 1 cm of the particle.

Step 4. If the particle is cobble-sized (64-250 mm), record the percent of the cobble that is embedded by fine particles (<2 mm) to the nearest 5% (see cobble embeddedness text below).

Step 5. Remove the particle from the streambed, then measure and record the length of its intermediate axis to the nearest mm (see Figure 6). Alternatively, assign the particle to one of the size classes listed in the bottom of the transect form. Particle sizes classes can be estimated visually or with a quantitative measuring device (e.g., pass/ no-pass template, "gravelometer"). Regardless of the method, all particles less than 0.06 mm should be recorded as fines, all particles between 0.06mm and 2.0 mm recorded as sand. Field crews may want to carry vials containing sediment particles with these size ranges until they are familiar with these particles.

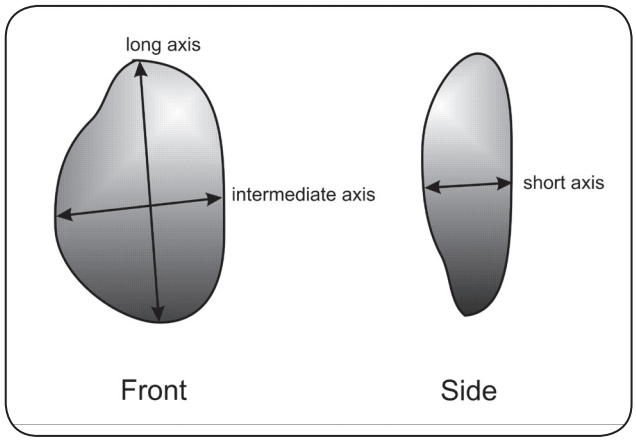

Figure 6. Diagram of three major perpendicular axes of substrate particles. The intermediate axis is recorded for pebble counts.

Module C. Cobble Embeddedness

The quantification of substrate embeddedness has long been a challenge to stream geomorphologists and ecologists (Klamt 1976, Kelley and Dettman 1980). It is generally agreed that the degree to which fine particles fill interstitial spaces has a significant impact on the ecology of benthic organisms and fish, but techniques for measuring this impact vary greatly (this is summarized well by Sylte and Fischenich 2002, http://stream.fs.fed.us/news/streamnt/pdf/StreamOCT4.pdf). Here we define embeddedness as the volume of cobble-sized particles (64-250 mm) that is buried by fine particles (<2.0 mm diameter).

Note: *This method differs from the EMAP method for measuring embeddedness, which measures embeddedness of all particles larger than 2 mm.*

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Table 4. Size class codes and definitions for particle size measurements

Size Class Code	Size Class Description	Common Size Reference	Size Class Range
RS	bedrock, smooth	larger than a car	> 4 m
RR	bedrock, rough	larger than a car	> 4 m
XB	boulder, large	meter stick to car	1 - 4 m
SB	boulder, small	basketball to meter stick	25 cm - 1.0 m
CB	cobble	tennis ball to basketball	64 - 250 mm
GC	gravel, coarse	marble to tennis ball	16 - 64 mm
GF	gravel, fine	ladybug to marble	2 – 16 mm
SA	sand	gritty to ladybug	0.06 – 2 mm
FN	fines	not gritty	< 0.06 mm
HP	hardpan (consolidated fines)		< 0.06 mm
WD	wood		
RC	concrete/ asphalt		
OT	other		

Step 1. Every time a cobble-sized particle is encountered during the pebble count, remove the cobble from the stream bed and visually estimate the percentage of the cobble's volume that has been buried by fine particles. Since visual estimates of volume and surface area are subject to large amounts of observer error, field crews should routinely calibrate their estimates with each other and with other field crews.

Step 2. In the spaces to the right of the pebble count data, record the embeddedness of all cobble-sized particles encountered during the pebble count.

Note: *The cobble embeddedness scores do not correspond with the specific particles in the pebble count cells to the left, but are merely a convenient place to record the data.*

Step 3. If 25 cobbles are not encountered during the pebble count, supplement the cobbles by conducting a "random walk" through the reach. Starting at a random point in the reach, follow a transect from one bank to the other at a randomly chosen angle. Once at the other bank reverse the process with a new randomly chosen angle. Record embeddedness of cobble-sized particles in the cobble embeddedness boxes on the transect forms until you reach 25 cobbles. If 25 cobble-sized particles are not present in the entire reach, then record the values for cobbles that are present.

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Module D. Canopy Cover

This method uses the Strickler (1959) modification of a convex spherical densiometer to correct for over-estimation of canopy density that occurs with unmodified readings. Read the densiometer by counting the number of line intersections that are obscured by overhanging vegetation (see Figure 7). Taping off the lower left and right portions of the mirror emphasizes overhead vegetation over foreground vegetation (the main source of bias in canopy density measurements). All densiometer readings should be taken with the bubble leveled and 0.3 m (1 ft) above the water surface.

Step 1. Using a modified convex spherical densitometer, take and record four 17-point readings all taken from the center of each transect: a) facing upstream, b) facing downstream, c) facing the left bank, d) facing the right bank.

Note: *This method deviates slightly from that of EMAP (in which two additional readings are taken at the left and right wetted edges to increase representation of bank vegetation).*

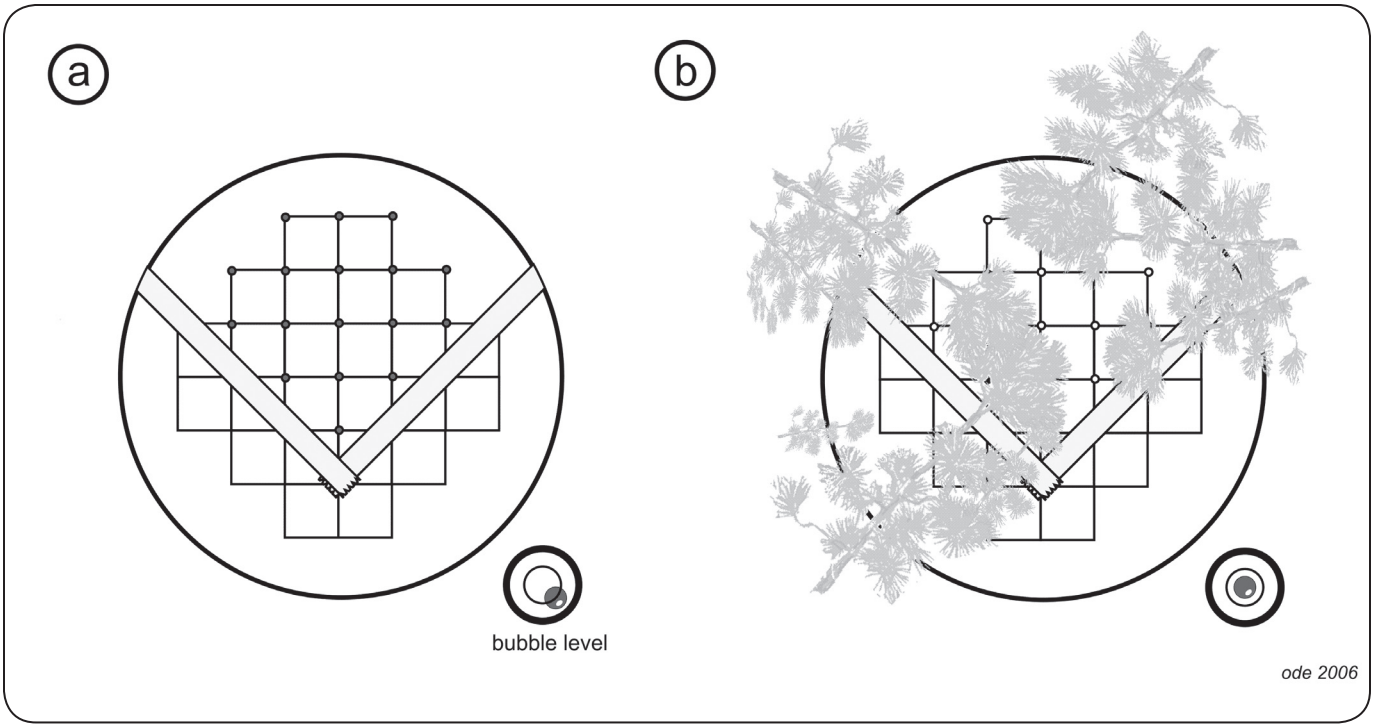

Figure 7. Representation of the mirrored surface of a convex spherical densiometer showing the position for taping the mirror and the intersection points used for the densiometer reading. The score for the hypothetical condition in (b) is 10 covered intersection points out of 17 possible. Note the position of the bubble level in (b) when the densiometer is leveled.

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Module E. Gradient and Sinuosity

The gradient of a stream reach is one of the major stream classification variables, giving an indication of potential water velocities and stream power, which are in turn important controls on aquatic habitat and sediment transport within the reach. The gradient (slope) of a stream reach is often strongly correlated with many BMI metrics and other physical habitat measures and is therefore very useful when interpreting BMI data.

The "full" physical habitat method uses 10 transect to transect measurements to calculate the average slope through a reach. Although this is a little more time intensive than the reach-scale transect measures used in the "basic" protocol, it results in more precise slope determination and the ability to quantify slope variability within a reach. Sinuosity (calculated as the ratio of the length of the flow path between the ends of the reach and the straight line distance between the ends of the reach, Kaufmann et al. 1999) is measured at the same time as slope. These two measurements work best with two people, one taking the readings at the upstream transect ("backsighting") and the other holding a stadia rod at the downstream transect. If you cannot see the mid point of the next transect from the starting point, use the supplemental sections (indicating the proportion of the total length represented by each section). Otherwise, leave these blank.

Note 1: *An auto level should be used for reaches with a percent slope of less than or equal to 1%. All methods (clinometer, hand level, or auto level) may be used for reaches with a percent slope of greater than 1%. The following description is for clinometer-based slope measurements, but the same principles apply to use of an auto or hand level.*

Note 2: *In reaches that are close to 1%, you will not know whether you are above or below the 1% slope cutoff before taking readings. In these cases, default to use of an autolevel.*

Step 1. Beginning with the upper transect (Transect K), one person (the measurer) should stand at the water margin with a clinometer held at eye level. A second person should stand at the margin of the next downstream transect (Transect J) with a stadia rod flagged at the eye level of the person taking the clinometer readings. Be sure you mark your eye level while standing on level ground! Adjust for water depth by measuring from the same height above the water surface at both transects. This is most easily accomplished by holding the base of the pole at water level.

Note: *An alternative technique is to use two stadia rods pre-flagged at the eye-height of the person taking the readings.*

Step 2. Use a clinometer to measure the percent slope of the water surface (not the streambed) between the upstream transect and the downstream transect by sighting to the flagged position on the stadia rod. The clinometer reads both percent slope and degree of the slope. Be careful to read and record percent slope rather than degrees slope (these measurements differ by a factor of ~ 2.2). Percent slope is the scale on the right hand side as you look through most clinometers (e.g., Suunto models).

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Note: *If an auto level or hand level is used, record the elevation difference (rise) between transects and the segment length (run) instead of the percent slope.*

Step 3. If the stream reach geometry makes it difficult to sight a line between transects, divide the distance into two or three sections and record the slope and the proportion of the total segment length between transects for each of these sections in the appropriate boxes on the slope form (supplemental segments).

Note: *Never measure slope across dry land (e.g., across a meander bend).*

Step 4. Take a compass reading from the center of each main transect to the center of the next main transect downstream and record this bearing to the nearest degree on the slope and bearing section of the form. Bearing measurements should always be taken from the upstream to downstream transect.

Step 5. Proceed downstream to the next transect pair (I-J) and continue to record slope and bearing between each pair of transects until measurements have been recorded for all transects.

SECTION IVB. VISUAL ESTIMATES OF HUMAN INFLUENCE, INSTREAM HABITAT, AND RIPARIAN VEGETATION

The transect-based approach used here permits semi-quantitative calculations from visual estimates even though most are categorical data (i.e., either presence/ absence or size classes) because we can calculate the percentage of transects that fall into different categories. These modules are adapted directly from EMAP protocols with some modifications as noted.

Module F. Human Influence

The influence of human activities on stream biota is of critical concern in bioassessment analyses. Quantification of human activities for these analyses is often performed with GIS techniques, which are very useful but are not capable of accounting for human activities occurring at the reach scale. Reach scale observations are often critical for explaining results that might seem anomalous on the basis of only remote mapping tools.

Step 1. For the left and right banks, estimate a 10 x 10 m riparian area centered on the edges of the transect (see Figure 2). Record the presence of 11 human influence categories in three spatial zones relative to this 10 x 10 m square (between the wetted edge and bankfull margin, between the bankfull margin and 10 m from the stream, and between 10 m and 50 m beyond the stream margins): 1) walls/rip-rap/dams, 2) buildings, 3) pavement/cleared lots, 4) roads/railroads, 5) pipes (inlets or outlets), 6) landfills or trash, 7) parks or lawns (e.g., golf courses), 8) row crops, 9) pasture/ rangelands, 10) logging/ timber harvest activities, 11) mining activities, 12) vegetative management (herbicides, brush removal, mowing), 13) bridges/ abutments, 14) orchards or vineyards. Circle all combinations of impacts and locations that apply, but be careful to not double-count any human influence observations.

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Step 2. Record the presence of any of the 11 human influence categories in the stream channel within a zone 5 m upstream and 5 m downstream of the transect.

Module G. Riparian Vegetation

Riparian vegetation (vegetation in the region beyond the bankfull margins) has a strong influence on the composition of stream communities through its direct and indirect roles in controlling the food base, moderating sediment inputs and acting as a buffer between the stream channel and the surrounding environment. These methods provide a cursory survey of the condition of the riparian corridor. Observations are made in the same 10 x 10 m riparian area used for assessing human influence (see Figure 2).

Note: *Riparian vegetation measurements should only include living or recently dead vegetation.*

The riparian vegetation categories used here were condensed from the EMAP version, which further breaks the canopy classes into different components. However, because we have consolidated EMAP categories into fewer categories rather than creating new categories, existing EMAP data can be easily converted to this format simply by combining the appropriate categories.

Step 1. Divide the riparian zone into three elevation zones: 1) ground cover (< 0.5 m), 2) lower canopy (0.5 m - 5 m), and 3) upper canopy (> 5 m). Record the density of the following riparian classes: 1) Upper Canopy–Trees and Saplings, 2) Lower Canopy–Woody Shrubs and Saplings, 3) Woody Ground Cover–Shrubs, Saplings, 4) Herbaceous Ground Cover–Herbs and Grasses, and 5) Ground Cover–Barren, Bare Soil and Duff. Artificial banks (e.g., rip-rap, concrete, asphalt) should be recorded as barren.

Step 2. Indicate the areal cover (i.e., shading) by each riparian vegetative class as either: 1) absent, 2) sparse (< 10%), 3) moderate (10-40%), 4) heavy (40-75%), or 5) very heavy (> 75%).

Module H. Instream Habitat Complexity

Instream habitat complexity was developed by the EMAP program to quantify fish concealment features in the stream channel, but it also provides good information about the general condition and complexity of the stream channel. Estimates should include features within the banks and outside the wetted margins of the stream.

Step 1. Record the amount of nine different channel features within a zone 5m upstream and 5m downstream of the transect (see Figure 2): 1) filamentous algae (long-stranded algal forms that are large enough to see with the naked eye), 2) aquatic macrophytes (include mosses and vascular plants), 3) boulders (> 25 cm), 4 and 5) woody debris (break into two classes- larger and smaller than 30 cm diameter), 6) undercut banks, 7) overhanging vegetation, 8) live tree roots and 9) artificial structures (includes any anthropogenic objects including large trash objects like tires and shopping carts). Indicate the areal cover of each feature as either: 1) absent, 2) sparse (< 10%), 3) moderate (10-40%), 4) heavy (40-75%), or 5) very heavy (> 75%).

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SECTION 5 INTER-TRANSECT MEASURES

While most measures are taken at or relative to the main transects, a few measures are recorded at transects located at the midpoint between main transects. These are called "inter-transects".

Module B (Part 2) Pebble Counts (same as for transects, but no cobble embeddedness measures)

Step 1. Divide the wetted stream width by four to get the distance between the five points (Left Bank, Left Center, Center, Right Center and Right Bank) and use a measuring device to locate the positions of these points (a stadia rod is especially helpful here, see Figure 5). Once the positions are identified, lower a graduated rod through the water column perpendicular to both the flow and the transect to objectively select the particle located at its tip.

Step 2. With the graduated rod, measure the depth from the water surface to the top of the particle and record to the nearest cm.

Step 3. Remove the particle from the streambed, then measure and record the length of its intermediate axis to the nearest mm (see Figure 6). Alternatively, assign the particle to one of the size classes listed in the bottom of the transect form (see Table 3 for a list of size classes). Particle size classes may be estimated visually or with a quantitative measuring device (e.g., pass/ no-pass template, gravelometer). Regardless of the method, all particles less than 0.06 mm should be recorded as fines, while all particles between 0.06 mm and 2.0 mm should be recorded as sand. Field crews may want to carry vials containing sediment particles with these size ranges until they are familiar with these particle size classes.

Step 4. Record the presence (P) or absence (A) of any CPOM within 1 cm of each particle.

Module J. Flow Habitats

Because many benthic macroinvertebrates prefer specific flow and substrate microhabitats, the proportional representation of these habitats in a reach is often of interest in bioassessments. There are many different ways to quantify the proportions of different flow habitats (for example, see text on EMAP's "thalweg profile" below). Like the riparian and instream measures listed above, this procedure produces a semi-quantitative measure consisting of 10 transect-based visual estimates.

Note: *The categories used here are based on those used in the EMAP protocol, with pools combined into one class and cascades and falls combined into another class.*

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Step 1. At each inter-transect, identify the proportion of six different habitat types in the region between the upstream transect and downstream transect: 1) cascades/falls, 2) rapids, 3) riffles, 4) runs, 5) glides, 6) pools, 7) dry areas. Record percentages to the nearest 5% — the total percentage of surface area for each section must total 100%.

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SECTION 6 DISCHARGE

Stream discharge is the volume of water that moves past a point in a given amount of time and is generally reported as either cubic meters per second (cms) or cubic feet per second (cfs). Because discharge is directly related to water volume, discharge affects the concentration of nutrients, fine sediments and pollutants; and discharge measurements are critical for understanding impacts of disturbances such as impoundments, water withdrawals and water augmentation. Discharge is also closely related to many habitat characteristics including temperature regimes, physical habitat diversity, and habitat connectivity. As a direct result of these relationships, stream discharge is often also a strong predictor of biotic community composition. Since stream volume can vary significantly on many different temporal scales (diurnal, seasonal, inter-annually), it can also be very useful for understanding variation in stream condition.

This procedure (modified from the EMAP protocol) provides for two different methods for calculating discharge. It is preferable to take discharge measurements in sections where flow velocities are greater than 0.15 m/s and most depths are greater than 15 cm, but slower velocities and shallower depths can be used. If flow volume is sufficient for a transect-based "velocity-area" discharge calculation, this is by far the preferred method. If flow volume is too low to permit this procedure or if your flow meter fails, use the "neutrally buoyant object/ timed flow" method.

Note: *Programs that sample fixed sites repeatedly may want to consider installing permanent discharge estimation structures (e.g., stage gauges, wiers).*

Module K. Discharge: Velocity Area Method

The layout for discharge measurements under the velocity-area (VA) method is illustrated in Figure 8. Flow velocity should be measured with either a Swoffer Instruments propeller-type flow meter or a Marsh-McBirney inductive probe flow meter. Refer to the manufacturers' instrument manuals for calibration procedures.

VA-Step 1. Select the best location in the reach for measuring discharge. To maximize the repeatability of the discharge measurement, choose a transect with the most uniform flow (select hydraulically smooth flow whenever possible) and simplest cross-sectional geometry. It is acceptable to move substrates or other obstacles to create a more uniform cross-section before beginning the discharge measurements.

VA-Step 2. Measure the wetted width of the discharge transect and divide this into 10 to 20 equal segments. The use of more segments gives a better discharge calculation, but is impractical in small channels. A minimum of 10 intervals should be used when stream width permits, but interval width should not be less than 15 cm.

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VA-Step 3. Record the distance from the bank to the end of the first interval. Using the top-setting rod that comes with the flow velocity meter, measure the median depth of the first interval.

VA-Step 4. Standing downstream of the transect to avoid interfering with the flow, use the top-setting rod to set the probe of the flow meter (either the propeller or the electromagnetic probe) at the midpoint of each interval, at 0.6 of the interval depth (this position generally approximates average velocity in the water column), and at right angles to the transect (facing upstream). See Figure 8 for positioning detail.

VA-Step 5. Allow the flow velocity meter to equilibrate for 10-20 seconds then record velocity to the nearest m/s. If the option is available, use the flow averaging setting on the flow meter.

Note: *Under very low flow conditions, flow velocity meters may register readings of zero even when there is noticeable flow. In these situations, record a velocity of 0.5x the minimum flow detection capabilities of the instrument.*

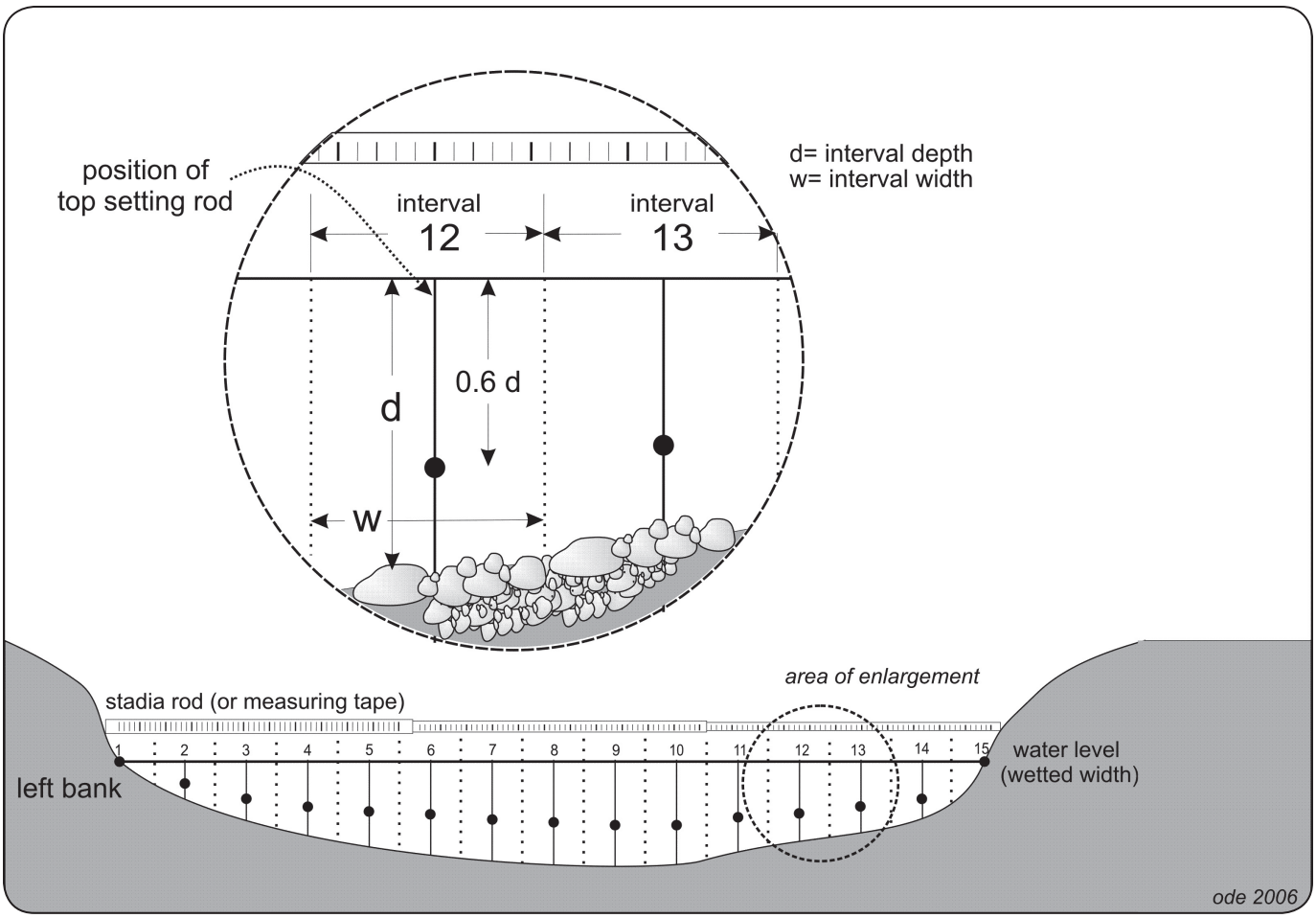

Figure 8. Diagram of layout for discharge measurements under the velocity-area method showing proper positions for velocity probe (black dots).

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VA-Step 6. Complete Steps 3 through 5 on the remaining intervals.

Note: *The first and last intervals usually have depths and velocities of zero.*

Module L. Discharge: Neutrally Buoyant Object Method

If streams are too shallow to use a flow velocity meter, the neutrally buoyant object (NBO) method should be used to measure flow velocity. However, since this method is less precise than the flow velocity meter it should only be used if absolutely necessary. A neutrally buoyant object (one whose density allows it to just balance between sinking and floating) will act as if it were nearly weightless, thus it's movement will approximate that of the water it floats in better than a light object. To estimate the flow velocity through a reach, three transects are used to measure the cross-sectional areas within the test section sub-reach and three flow velocity estimates are used to measure average velocity through the test reach. To improve precision in velocity measurements, the reach segment should be long enough for the float time to last at least 10-15 seconds.

NBO-Step 1. The position of the discharge sub-reach is not as critical as it is for the velocity-area method, but the same criteria for selection of a discharge reach apply to the neutrally buoyant object method. Identify a section that has relatively uniform flow and a uniform cross sectional shape.

NBO-Step 2. The cross sectional area is estimated in a manner that is similar but less precise than that used in the velocity area method. Measure the cross sectional area in one to three places in the section designated for the discharge measurement (three evenly-spaced cross sections are preferred, but one may be used if the cross section through the reach is very uniform). Record the width once for each cross section and measure depth at five equally-spaced positions along each transect.

NBO-Step 3. Record the length of the discharge reach.

NBO-Step 4. Place a neutrally buoyant object (e.g., orange, rubber ball, heavy piece of wood, etc.) in the water upstream of the discharge reach and record the length of time in seconds that it takes for the object to pass between the upstream and downstream boundaries of the reach. Repeat this timed float three times.

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SECTION 7
POST-SAMPLING OBSERVATIONS

Module M. Rapid Bioassessment Procedures Visual Assessment Scores (for Basic Physical Habitat, or optional supplement)

EPA's Rapid Bioassessment Procedures (RBPs, Barbour et al. 1999) include a set of 10 visual criteria for assessing instream and riparian habitat. The RBP has been used in the CSBP since its first edition (1995) and thus, this information is often valuable for comparison to legacy datasets. The criteria also have a useful didactic role since they help force the user to quantify key features of the physical environment where bioassessment samples are collected.

Module N. Additional Habitat Characterization (Full Physical Habitat only)

The RBP stream habitat visual estimates described in Step 1 are not included in the Full Physical Habitat version because they are generally replaced by more quantitative measurements of similar variables. However, we have found that three of the RBP measures are reasonably repeatable and include them in the reachwide assessment portion of the Full Physical Habitat version.

Note: *This is the only case in which a measurement included in the basic procedure is not included in the full.*

Module O. Reach Slope (for Basic Physical Habitat only)

Reach slope should be recorded as percent slope as opposed to degrees slope to avoid confusion. Slope measurements work best with two people, one taking the readings at the upstream transect and the other holding a stadia rod at the downstream transect. If you cannot see the mid point of the next transect from the starting point, use the supplemental sections (indicating the proportion of the total length represented by each section).

An auto level (with a tripod) should be used for reaches with a percent slope of less than or equal to 1%. All methods (clinometer, hand level, or auto level) may be used for reaches with a percent slope of greater than 1%. In reaches that are close to 1%, you will not know whether you are above or below the 1% slope cutoff. In these cases, default to use of an autolevel.

Step 1. Divide the reach into multiple segments such that stadia rod markings can be easily read with the measuring device to be employed (this is especially a factor for clinometer and hand level readings).

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Step 2. Use a clinometer, hand level, or auto level to measure the percent slope of the water surface (not the streambed) between the top and bottom of each segment. Be sure to adjust for water depth by measuring from the same height above the water surface at both transects. Also be sure to record percent slope, not degrees slope. Record the segment length for each of these sections in the appropriate boxes on the BASIC slope form.

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SECTION 8
OPTIONAL EXCESS SEDIMENT MEASURES

Future editions of these protocols will include supplemental modules, including a full discussion of the measurements used for calculating the excess sediment index (sometimes referred to as log relative bed stability, LRBS). However, since several of the measurements in EMAP's physical habitat protocols are interwoven into the layout of this protocol, a brief overview of the additional measurements collected for the LRBS calculations is included here for information purposes only. For detailed explanations of these measurements, consult Peck et al. 2004.

Woody Debris Tallies

Large woody debris (logs, snags, branches, etc.) that is capable of obstructing flow when the channel is at bankfull condition (just short of flood stage) contributes to the "roughness" of a channel. The effect of this variable is to reduce water velocity and thereby reduce the stream's competence to move substrate particles. The EMAP protocol tallies all woody debris with a diameter greater than 10 cm (~4") into one of 12 size classes based on the length and width of each object. Tallies are conducted in the zone between the main transects.

Thalweg Measurements

A stream's thalweg is a longitudinal profile that connects the deepest points of successive cross-sections of the stream. The thalweg defines the primary path of water flow through the reach. Thalweg measurements perform many functions in the EMAP protocols, producing measurements for the excess sediment calculations (residual pool volume, stream size, channel complexity) and flow habitat variability.

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SECTION 9
OPTIONAL PERIPHYTON QUANTIFICATION

Periphyton Quantification

Characterization of periphyton has a dual role in bioassessments, as periphyton is both a food and habitat resource for benthic macroinvertebrates and fish and an effective bioindicator on its own. Quantification of periphytic resources will be covered under a separate SWAMP bioassessment protocol, but will include procedures for qualitative characterization of diatom assemblages, documentation of filamentous algal growth, and biomass quantification (e.g., ash-free dry mass and chlorophyll a).

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SECTION 10
QUALITY ASSURANCE & CONTROL PROCEDURES

The SWAMP bioassessment group is currently developing guidelines for quality assurance and quality control for bioassessment procedures. Future revisions to this document will include guidance covering personnel qualifications, training and field audit procedures, procedures for field calibration, procedures for chain of custody documentation, requirements for measurement precision, health and safety warnings, cautions (actions that would result in instrument damage or compromised samples), and interferences (consequences of not following the standard operating procedure, SOP).

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DEFINITIONS OF TERMS USED IN SOP D

Terms & Definitions	
TERM	**DEFINITION**
ABL	California Department of Fish and Game's Aquatic Bioassessment Laboratory
Allocthonous	Derived from a source external to the stream channel (e.g., riparian vegetation) as opposed to autochthonous, which indicates a source inside the stream channel (e.g., periphyton).
Ambient Bioassessment	Biological monitoring that is intended to describe general biotic condition as opposed to a diagnosis of sources of impairment
Bankfull	The bankfull channel is the zone of maximum water inundation in a normal flow year (one to two year flood events)
BMI	Benthic macroinvertebrates: bottom-dwelling invertebrates large enough to be seen with the unaided eye
Cobble Embeddedness	The volume of cobble-sized particles (64-250 mm) that is buried by fine particles (<2.0 mm diameter)
CPOM	Coarse particulate organic matter (CPOM, particles of decaying organic material such as leaves that are greater than 1.0 mm in diameter)
CSBP	California State Bioassessment Procedures
DFG	California Department of Fish and Game
EMAP	The U.S. Environmental Protection Agency's Environmental Monitoring and Assessment Program
EPA	The U.S. Environmental Protection Agency
Fines	Substrate particles less than 0.06 mm diameter (not gritty to touch)
Inter-transects	Transects established at points equidistant between the main transects
MCM	Margin-Center-Margin alternative procedure for sampling low gradient habitats
ORD	EPA's Office of Research and Development
QAMP	Quality assurance management plan
RBP	EPA's Rapid Bioassessment Procedures
Reach	A segment of the stream channel
Riparian	An area of land and vegetation adjacent to a stream that has a direct effect on the stream.
RWB	Reach-wide benthos composite sampling method for benthic macroinvertebrates, also referred to as multi-habitat method
SCCWRP	Southern Coastal California Water Research Project
SNARL	Sierra Nevada Aquatic Research Laboratory
Substrate	The composition of a streambed, including both inorganic and organic particles
SWAMP	The State Water Resources Control Board's Surface Water Ambient Monitoring Program
Thalweg	A longitudinal profile that connects the deepest points at successive cross-sections of the stream. The thalweg defines the primary path of water flow through the reach

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TERM	DEFINITION
Transects	Lines drawn perpendicular to the path of flow used for standardizing sampling locations
TRC	Targeted riffle composite sampling method for benthic macroinvertebrates
USFS	The United States Forest Service
Wadeable Streams	Streams that can be sampled by field crews wearing chest waders (generally less that 0.5 m - 1.0 meters deep)

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APPENDIX A

FACTORS TO CONSIDER WHEN RECOMMENDING/ CHANGING BIOASSESSMENT METHODS

Beyond the primary considerations of precision and accuracy, there are at least five other key issues that SWAMP has considered and should consider in the future, when recommending or changing its official methods for bioassessment. These issues include:

1. Costs of Collecting Samples via Multiple Protocols – Collecting, processing, and interpreting samples using more than one method for each indicator (e.g., algae, macroinvertebrates, fish) per site adds significant costs to bioassessment monitoring programs. SWAMP should strive to identify the minimum set of protocols necessary for each indicator. However, this should not come at the expense of sound monitoring. If more than one method is needed to interpret the biological response, then this decision should be based on a cost-benefit assessment.

2. Costs of Maintaining Multiple SWAMP Protocols – While multiple methods for monitoring a given indicator may provide additional accuracy in specific habitats, there are significant costs to maintaining multiple protocols:

a. Need to maintain method-specific infrastructure (e.g., separate reference samples, separate indices of biotic integrity (IBIs), separate O/E models, etc.).
b. May lose or impair ability to compare across sites if different methods are used (see Issue 5 below).
c. Guidance on when to use methods becomes more complex. For example, we need to define very specifically which methods to use at each water body type; and thus, which tools can be used to interpret them.

Recommendation: *SWAMP should maintain as few protocols as necessary. If we elect to add new or modified protocols it should be because we have determined that the added value is worth all of the costs listed above.*

3. Separating Physical Impairment from Water Quality Impairment – One of the original reasons for adding a multihabitat component to SWAMP bioassessment programs was the potential for distinguishing physical and water quality impairment sources (see recommendations in Barbour and Hill 2002). In regards to macroinvertebrate indicators, the conventional wisdom has been that reachwide (RW, sometimes referred to as multihabitat or MH) samples should be relatively more responsive to physical habitat alteration (i.e., fine sediment inputs) than targeted-riffle (TR) samples because it is believed that erosional habitats take longer

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to respond to sediment stresses, and because pockets of riffle habitat are thought to act as refugia from habitat loss. To the extent that this is true, RW and TR samples may offer complementary information that allows us to separate these sources of impairment.

While very few studies have addressed this conventional wisdom directly, recent studies suggest that this may not be as much a factor as previously believed. In a recent comparison of TR and RW samples at nearly 200 sites statewide, the ABL found at most weak evidence to support this notion (Rehn et al. 2007). Gerth and Herlihy (2006) came to the same conclusion in their analysis of ~500 sites in the eastern and western United States. However, this issue is far from resolved and SWAMP scientists currently are not in agreement regarding this issue. Since the majority of bioassessment programs in California have emphasized targeted riffle sampling, SWAMP will undoubtedly want to evaluate this question further before making any policy decision to discontinue TR sampling.

Recommendation: *Until this issue can be evaluated further and resolved to SWAMP's satisfaction, ambient macroinvertebrate sampling should include collection of both RW samples and richest targeted habitat (TR or MCM) samples at every site. (The TR method should be used where sufficient riffles are present, and the MCM method should be used at low-gradient sites where sufficient riffle habitat is not available.)*

4. Compatibility with Previous Data – To address this issue, at least three sets of macroinvertebrate sampling method comparisons have been conducted in California.

a. **Targeted Riffle Methods –** Comparisons are complete. Samples collected under the current TR protocols are considered interchangeable with both CSBP and SNARL samples (Ode et al. 2005, Herbst and Silldorff 2006).
b. **Low Gradient Sand-Dominated Streams –** Collaborative studies are currently underway between Water Board Regions 3 and 5, the Southern California Coastal Water Research Project (SCCWRP), and ABL to compare the performance of: (1) the "low-gradient" CSBP; (2) RW samples; and (3) a modification of the RW method designed to emphasize habitats along stream margins (MCM). The results of these low-gradient methods comparisons are not yet available.
c. **Targeted Riffle vs. Reachwide Methods –** A recent comparison of RW and TR samples collected from nearly 200 EMAP/ CMAP sites is in peer review press (Rehn et al. 2007). Results demonstrate remarkably similar performance of the methods across a wide range of habitats. Gerth and Herlihy (2006) recently published a similar analysis with the same conclusions. However, the bioassessment committee has yet to carefully review and discuss these analyses and their implications for SWAMP biomonitoring.

5. Comparability Among Sites – The ability to compare biological condition across sites is a common requirement of most ambient bioassessment programs. This type of analysis is confounded if different methods are used at these sites. One of the big advantages of reachwide (i.e., multihabitat) methods is that they can be applied anywhere because they don't require a specific habitat for sampling. Statewide

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bioassessments and most regional programs will require the ability to compare their bioassessment results among multiple sites (e.g., within a watershed, within a region, statewide).

INTERIM RECOMMENDATIONS FOR MACROINVERTEBRATE SAMPLING (UPDATED DECEMBER 2006):

1. Until we can reach consensus on the outstanding issues (i.e., whether a single method for macroinvertebrate sampling will meet our needs, and the outcome of RW vs. MCM comparison studies for low-gradient wadeable streams/rivers), SWAMP recommends collecting both a reachwide (i.e., multihabitat) and a targeted habitat sample at each site. In high gradient streams, this means using both the RW and TR methods. In low-gradient streams, we recommend collecting both RW and MCM samples until the results are available from the low-gradient ("non-riffle") comparison. In rare cases where monitoring objectives cannot be met following these recommendations, the SWAMP Bioassessment Coordinator may authorize deviations. For example, where project-specific objectives differ from ambient monitoring, the SWAMP Bioassessment Coordinator may authorize alternate methods. In rare cases where funding is extremely limited and the cost of following the above recommendations would be prohibitive, the SWAMP Bioassessment Coordinator may authorize cost-saving options such as collecting both samples, but archiving one of the samples for later lab analysis.

2. SWAMP should develop guidance specifying when and where different methods should be used. For example, at "low gradient" sites, what is the slope cut-off (or other channel feature criteria to use) when deciding whether to apply TR or MCM? In addition, while SWAMP may eventually choose to adopt a single method (such as RW) at most sites, some regions may determine that the value of targeted habitat sampling merits continued sampling with supplemental protocols. In the latter case, or if SWAMP determines that distinct methods are needed for different habitat types, the guidance should specify the types of waterbodies or classes of waterbodies that require different methods.

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SWAMP
Surface Water
Ambient Monitoring
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National Management Measures to Control Nonpoint Source Pollution from Hydromodification

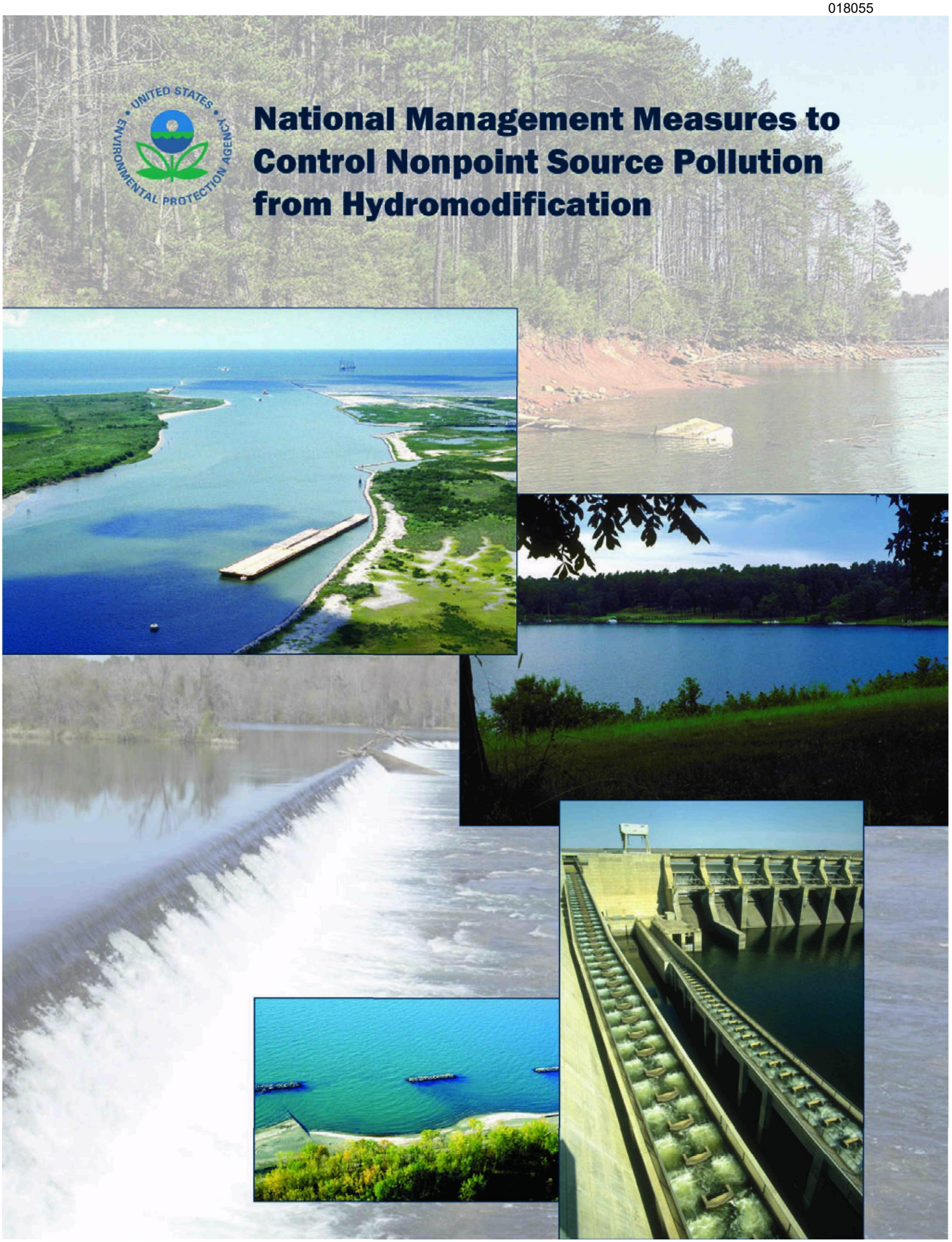

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Nonpoint Source Control Branch
Office of Wetlands, Oceans and Watersheds
U.S. Environmental Protection Agency
Office of Water

July 2007

Disclaimer

This document provides technical guidance to states, territories, authorized tribes, and the public for managing hydromodification and reducing associated nonpoint source pollution of surface and ground water. At times, this document refers to statutory and regulatory provisions, which contain legally binding requirements. This document does not substitute for those provisions or regulations, nor is it a regulation itself. Thus, it does not impose legally-binding requirements on EPA, states, territories, authorized tribes, or the public and may not apply to a particular situation based upon the circumstances. EPA, state, territory, and authorized tribe decision makers retain the discretion to adopt approaches to manage hydromodification and reduce associated NPS pollution of surface and ground water on a case-by-case basis that differ from this guidance where appropriate. EPA may change this guidance in the future.

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Chapter 1: Introduction

The Nation's aquatic resources are among its most valuable assets. Although environmental protection programs in the United States have improved water quality during the past 35 years, many challenges remain. Significant strides have been made in reducing the impacts of discrete pollutant sources, but some aquatic ecosystems remain impaired, due in part to complex pollution problems caused by nonpoint source (NPS) pollution.[1] Of special concern are the problems in our streams, lakes, estuaries, aquifers, and other water bodies caused by runoff that is inadequately controlled or treated. These problems include changes in flow, increased sedimentation, higher water temperature, lower dissolved oxygen, degradation of aquatic habitat structure, loss of fish and other aquatic populations, and decreased water quality due to increased levels of nutrients, metals, hydrocarbons, bacteria, and other constituents.

What is Hydromodification?

USEPA (1993) defines hydromodification as the "alteration of the hydrologic characteristics of coastal and non-coastal waters, which in turn could cause degradation of water resources." Examples of hydromodification in streams include dredging, straightening, and, in some cases, complete stream relocation. Other examples include construction in or along streams, construction and operation of dams and impoundments, channelization in streams, dredging, and land reclamation activities. Hydromodification can also include activities in streams that are being done to maintain the stream's integrity such as removing snags.[2] Some indirect forms of hydromodification, such as erosion along streambanks or shorelines, are caused by the introduction or maintenance of structures in or adjacent to a waterbody and other activities, including many upland activities, that change the natural physical properties of the waterbody.

EPA has grouped hydromodification activities into three categories: (1) channelization and channel modification, (2) dams, and (3) streambank and shoreline erosion. The following definitions are offered to clarify the hydromodification activities associated with these three categories:

> Channelization and channel modification include activities such as straightening, widening, deepening, and clearing channels of debris and sediment. Categories of channelization and channel modification projects include flood control and drainage, navigation, sediment control, infrastructure protection, mining, channel and bank instability, habitat improvement/enhancement, recreation, and flow control for water supply (Watson et al., 1999). Channelization activities can play a critical role in NPS pollution by increasing the timing and delivery of pollutants, including sediment, that enter the water. Channelization can also be a cause of higher flows during storm events, which potentially increases the risk of flooding.

[1] For more information on NPS pollution, go to EPA's website at http://www.epa.gov/owow/nps.
[2] A tree or branch embedded in a lake or stream bed and constituting a hazard to navigation; a standing dead tree.

Dams[3] are artificial barriers on waterbodies that impound or divert water and are built for a variety of purposes, including flood control, power generation, irrigation, navigation, and to create ponds, lakes, and reservoirs for uses such as livestock watering, municipal water supply, fish farming, and recreation. While these types of dams are constructed to provide benefits to society, they can contribute to NPS pollution. For example dams can alter flows, which ultimately can cause impacts to water quality (changes to temperature or dissolved gases) and biological/habitat (disruption of spawning or altering of plant and benthic communities) above and below the dam.

Streambank and shoreline erosion are the wearing away of material in the area landward of the bank along non-tidal streams and rivers. Streambank erosion occurs when the force of flowing water in a river or stream exceeds the ability of soil and vegetation to hold the banks in place. Eroded material is carried downstream and redeposited in the channel bottom or in point bars located along bends in the waterway. Shoreline erosion occurs in large open waterbodies, such as the Great Lakes or coastal bays and estuaries, when waves and currents sort coarser sands and gravels from eroded bank materials and move them in both directions along the shore away from the area undergoing erosion. While the underlying forces causing the erosion may be different for streambank and shoreline erosion, the results (erosion and its impacts) are usually similar. It is also important to note that streambank and shoreline erosion are natural processes and that natural background levels of erosion also exist. However, human activities along or adjacent to streambanks or shorelines may increase erosion and other nonpoint sources of pollution.

Why is NPS Guidance on Hydromodification Important?

Hydromodification is one of the leading sources of impairment in our nation's waters. According to the *National Water Quality Inventory: 2000 Report to Congress* (USEPA, 2002a), there are almost 3.7 million miles of rivers and streams[4] in the United States. Approximately 280,000 miles of assessed rivers and streams in the United States are impaired for one or more designated uses, which include aquatic life support, fish consumption, primary and contact recreation, drinking water supply, and agriculture. Many of the pollutants causing impairment are delivered to surface and ground waters from diffuse sources, such as agricultural runoff, urban runoff, hydrologic modification, and atmospheric deposition of contaminants. The leading causes of

[3] Dams are defined according to Title 33 of the Code of Federal Regulations, section 222.6(h) (2003) as all artificial barriers together with appurtenant works which impound or divert water and which (1) are 25-feet or more in height or (2) have an impounding capacity of 50 acre-feet or more. Barriers that are six-feet or less in height, regardless of storage capacity or barriers that have a storage capacity at maximum water storage elevation of fifteen acre-feet or less regardless of height are not included. Federal regulations define dams for the purpose of ensuring public safety. For example, 33 CFR 222.6 states objectives, assigns responsibilities, and prescribes procedures for implementation of a National Program for Inspection of Non-Federal Dams. Most states use this or a very similar definition, which creates a category of dams that requires some form of inspection to ensure that they are structurally sound. Dams smaller than those defined above, such as those used to create farm ponds, are authorized under the NRCS program.
[4] Approximately 700,000 miles (19%) of the total 3.7 million miles of rivers and streams in the United States were assessed for the *National Water Quality Inventory: 2000 Report to Congress* (USEPA, 2002a).

beneficial use impairment (partially or not supporting one or more uses) are nutrients, sediment, pathogens (bacteria), metals, pesticides, oxygen-depleting materials, and habitat alterations (USEPA, 2002a).

The *National Water Quality Inventory: 2000 Report to Congress* (USEPA, 2002a) identified hydrologic modifications (i.e., hydromodification) as a leading source of water quality impairment in assessed surface waters. Of the 11 pollution source categories listed in the report, hydromodification was ranked as the second leading source of impairment in assessed rivers, second in assessed lakes, and sixth in assessed estuaries (Table 1.1). Three major types of hydromodification activities—channelization and channel modification, dams, and streambank and shoreline erosion—change a waterbody's physical structure as well as its natural functions.

Many hydromodification activities are necessary because of human activities. For example, hardening of streambanks to correct headcutting and streambank erosion is often necessary because of changes in landuse that increase impervious surfaces. While hydromodification activities are intended to provide some form of benefit (e.g., levees for reducing flooding, electricity from hydroelectric dams, or bulkheads to reduce shoreline erosion and protect valuable property), there may be unintended consequences resulting from the activity. To illustrate, levees may provide local flood reduction by keeping storm flows from spreading onto flood plains. However, these same levees may alter riparian wetland habitat that once relied on seasonal flooding.

Table 1.1 Leading Sources of Water Quality Impairment Related to Human Activities for Rivers, Lakes, and Estuaries (USEPA, 2002a)

	Rivers and Streams	Lakes, Ponds, and Reservoirs	Estuaries
Sources[a]	Agriculture (48%)[b]	Agriculture (41%)	Municipal Point Sources (37%)
	Hydrologic Modification (20%)[c]	**Hydrologic Modification (18%)**	Urban Runoff/Storm Sewers (32%)
	Habitat Modification (14%)[d]	Urban Runoff/Storm Sewers (18%)	Industrial Discharges (26%)
	Urban Runoff /Storm Sewers (13%)	Nonpoint Sources (14%)	Atmospheric Deposition (23%)
	Forestry (10%)	Atmospheric Deposition (13%)	Agriculture (18%)
	Municipal Point Sources (10%)	Municipal Point Sources (12%)	**Hydrologic Modification (14%)**
	Resource Extraction (10%)	Land Disposal (10%)	Resource Extraction (12%)

[a] Excluding unknown, natural, and "other" sources.
[b] Values in parentheses represent the approximate percentage of surveyed river miles, lake acres, or estuary square miles that are classified as impaired due to the associated sources.
[c] Hydrologic modifications include flow regulation and modification, dredging, and construction of dams. These activities may alter a lake's habitat in such a way that it becomes less suitable for aquatic life (USEPA, 2002a).
[d] Habitat modifications result from human activities, such as flow regulation, logging, and land-clearing practices. Habitat modifications—changes such as the removal of riparian (stream bank) vegetation—can make a river or stream less suitable for the organisms inhabiting it (USEPA, 2002a).

Purpose and Scope of the Guidance

National summaries, such as those shown in Table 1.1, are useful in providing an overview of the magnitude of problems associated with hydromodification. Solutions, however, are usually applied at the local level. For example, in Maryland, the Shore Erosion Task Force, after investigating shore erosion in the state, published recommendations to be implemented under a Comprehensive Shore Erosion Control Plan. To initiate statewide planning, the Maryland Department of Natural Resources established partnerships with two coastal counties that were significantly affected by shoreline erosion. These state-local partnerships enable the state to better identify and correct shoreline erosion problems throughout Maryland (MDNR, 2001).

State and local elected officials and agencies, landowners, developers, environmental and conservation groups, and others play a crucial role in working together for protecting, maintaining, and restoring water resources that are impacted by hydromodification activities. These local efforts, in aggregate, form the basis for changing the status of hydromodification as a national problem.

This guidance document provides background information about NPS pollution and offers a variety of solutions for reducing NPS pollution resulting from hydromodification activities. The background information provided in Chapter 2 includes a discussion of sources of NPS pollution associated with hydromodification and how the generated pollutants enter the Nation's waters. Chapter 3 (Channelization and Channel Modification), Chapter 4 (Dams), and Chapter 5 (Streambank and Shoreline Erosion) present technical information about how certain types of NPS pollution can be reduced or eliminated.

Since hydromodification is not associated with localized impacts and solutions, Chapter 6 provides a discussion on the broad concept of assessing and addressing water quality problems on a watershed level. Chapter 7 provides detailed information for practices that can be used to implement the management measures presented in this guidance. Chapter 8 provides a discussion of available models and assessment approaches that could be used to determine the effects of hydromodification activities. Chapter 9 summarizes additional dam removal information, including permitting requirements, process, and techniques for dam removal. The primary goal of this guidance document is to provide technical assistance to states, territories, tribes, local governments, and the public for managing hydromodification and reducing associated NPS pollution.

Document Organization

This document is divided into the following chapters:

- Chapter 1: Introduction
- Chapter 2: Background
- Chapter 3: Channelization and Channel Modification
- Chapter 4: Dams
- Chapter 5: Streambank and Shoreline Erosion

- Chapter 6: Guiding Principles
- Chapter 7: Practices for Implementing Management Measures
- Chapter 8: Modeling Information
- Chapter 9: Dam Removal Requirements, Process, and Techniques
- References Cited
- Additional Resources
- Appendix A: Federal, State, Nonprofit, and Private Financial and Technical Assistance Programs
- Appendix B: U.S. Environmental Agency Contacts

Activities to Control NPS Pollution

Historical Perspective

During the first 15 years of the national program to abate and control water pollution (1972–1987), EPA and the states focused most of their water pollution control activities on traditional point sources, which are stationary locations or fixed facilities from which pollutants are discharged; any single identifiable source of pollution (e.g., a pipe, ditch). EPA and the states have regulated these point sources through the National Pollutant Discharge Elimination System (NPDES) permit program established by section 402 of the Clean Water Act (CWA).[5] The NPDES program functions as the primary regulatory tool for assuring that state water quality standards are met. NPDES permits, issued by an authorized state or EPA, contain discharge limits designed to meet water quality standards and national technology-based effluent regulations.

In 1987, in view of the progress achieved in controlling point sources and the growing national awareness of the increasingly dominant influence of NPS pollution on water quality, Congress amended the CWA to focus greater national efforts on nonpoint sources.

Federal Programs and Funding

The CWA establishes several reporting, funding, and regulatory programs that address pollutants carried in runoff that is not subject to confinement or treatment. These programs relate to watershed management and nonpoint source control. Readers are encouraged to use the information contained in this guidance to develop nonpoint source management programs/plans that comprehensively address the following EPA programs:

- *Section 319 Grant Program*. Under section 319 of the CWA, EPA awards funds to states and eligible tribes to implement NPS management programs. These funds can be used for projects that address nonpoint source related sources of pollution, including hydromodification.[6]

- *Clean Water State Revolving Fund.* The Clean Water State Revolving Fund (CWSRF) program is an innovative method of financing environmental projects. Under the

[5] For more information on the NPDES program, refer to EPA's NPDES website at http://cfpub.epa.gov/npdes.
[6] More information about the section 319 program is provided at http://www.epa.gov/owow/nps/cwact.html.

program, EPA provides grants or "seed money" to all 50 states plus Puerto Rico to capitalize state loan funds. The states, in turn, make loans to communities, individuals, and others for high-priority water quality activities. As money is paid back into the revolving fund, new loans are made to other recipients. When funded with a loan from this program, a project typically costs much less than it would if funded through the bond market. Many states offer low or no interest rate loans to small and disadvantaged communities. In recent years, state programs have begun to devote an increasing volume of loans to nonpoint source, estuary management, and other water-quality projects. Eligible NPS projects include almost any activity that a state has identified in its nonpoint source management plan. Such activities include projects to control runoff from agricultural land; conservation tillage and other projects to address soil erosion; development of streambank buffer zones; and wetlands protection and restoration.[7]

- *Total Maximum Daily Loads*. Under section 303(d) of the CWA, states are required to compile a list of impaired waters that fail to meet any of their applicable water quality standards. This list, called a 303(d) list, is submitted to Congress every 2 years, and states are required to develop a Total Maximum Daily Load (TMDL) for each pollutant causing impairment for waterbodies on the list.[8]

- *Water Quality Certification.* Section 401 of the CWA requires that any applicant for a federal license or permit to conduct any activity that "may result in any discharge" into navigable waters must obtain a certification from the state or tribe in which the discharge originates that the discharge will comply with various provisions of the CWA, including sections 301 and 303. The federal license or permit may not be issued unless the state or tribe has granted or waived certification. The certification shall include conditions, e.g., "effluent limitations or other limitations" necessary to assure that the permit will comply with the state's or tribe's water quality standards or other appropriate requirements of state or tribal law. Such conditions must be included in the federal license or permit.

- *National Estuary Program.* Under the National Estuary Program, states work together to evaluate water quality problems and their sources, collect and compile water quality data, and integrate management efforts to improve conditions in estuaries. To date, 28 estuaries have been accepted into the program. Estuary programs can be an excellent source of water quality data and can provide information on management practices.[9]

- *Safe Drinking Water Act.* Many areas, especially urban fringe areas, need to maintain or improve the quality of surface and ground waters that are used as drinking water sources. This act requires states to develop Source Water Assessment Reports and implement Source Water Protection Programs. Low- or no-interest loans are available under the Drinking Water State Revolving Fund (SRF) Program.[10]

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[7] Additional information about CWSRF is available at http://www.epa.gov/OWM/cwfinance/cwsrf/index.htm.
[8] More information on the TMDL program and 303(d) lists is provided at http://www.epa.gov/owow/tmdl.
[9] More information on the National Estuary Program is provided at http://www.epa.gov/nep.
[10] More information about the Safe Drinking Water Act and Source Water Protection Programs can be found at http://www.epa.gov/safewater/sdwa/index.html and http://www.epa.gov/safewater/protect.html.

- *Wildlife Habitat Incentives Program (WHIP)*. WHIP[11] is a voluntary program authorized by the Farm Security and Rural Investment Act of 2002 (Farm Bill)[12] that enables landowners to apply for technical and financial assistance to improve wildlife habitat. The program is administered by the Natural Resources Conservation Service (NRCS), which works with private landowners and operators, conservation districts, and federal, state, and tribal agencies to improve terrestrial and aquatic habitats. NRCS and participants work together to create a wildlife habitat development plan that includes a cost-share agreement. Continued assistance after habitat development includes monitoring, review of management guidelines, and technical advice. WHIP funds may also be used for dam removal. Additional information is available from an NRCS WHIP fact sheet.[13]

Two excellent resources for learning more about the CWA and the many programs established under it are *The Clean Water Act: An Owner's Manual* (Killam, 2005) and *The Clean Water Act Desk Reference* (WEF, 1997).

Introduction to Management Measures

Management measures may be implemented as part of state, tribal, or local programs to control nonpoint source pollution for a variety of purposes, including protection of water resources, aquatic wildlife habitat, and land downstream from increased pollution and flood risks. They can be used to guide in the development of a runoff management program. Management measures establish performance expectations and, in many cases, specify actions that can be taken to prevent or minimize nonpoint source pollution from hydromodification activities. Management measures might control the delivery of NPS pollutants to receiving water resources by:

- Minimizing pollutants available (source reduction)
- Retarding the transport and/or delivery of pollutants, either by reducing water transported, and thus the amount of the pollutant transported, or through deposition of the pollutant
- Remediating or intercepting the pollutant before or after it is delivered to the water resource through chemical or biological transformation

Management measures are generally designed to control a particular type of pollutant from specific activities and land uses. The intent of the six management measures in this guidance document is to provide information for addressing and considering the NPS pollution potential associated with hydromodification activities. Implementation of management measures can minimize and control hydromodification NPS pollution through erosion and sediment control, chemical and pollutant control, management of instream and riparian habitat restoration, and protection of surface water quality.

[11] http://www.nrcs.usda.gov/programs/whip
[12] http://www.nrcs.usda.gov/programs/farmbill/2002
[13] http://www.nrcs.usda.gov/programs/farmbill/2002/pdf/WHIPFct.pdf

Activities associated with these management measures may be regulated by federal, state, or local law (e.g., section 404 of the Clean Water Act). These measures do not supersede such requirements. Sometimes regulatory authorities may appear to conflict, as is sometimes the case of the CWA and water use and distribution. CWA sections 101(g) and 510 specifically allow for resolution of the conflict by placing water use and its distribution under the authority of the states, thus protecting any state agreements on "water rights." Users of this NPS guidance should recognize that the applicability of the guidance provided in this document will remain subject to state statutes, interstate compacts, and international treaties. As such, this guidance does not recommend or require any management measures or practices that hinder a state's ability to exercise existing water rights, which provide water for municipal, industrial, and agricultural needs. For further information regarding specific state policies on water rights and regulations of water use, contact the appropriate state water agency. Contact information is generally provided on state government Web sites.

This document also lists and describes management practices for each management measure. Management practices are specific actions taken to achieve, or aid in the achievement of, a management measure. A more familiar term might be best management practice (BMP). The word "best" has been dropped for the purposes of this guidance (as it was in the Coastal Management Measures Guidance (USEPA, 1993)) because the adjective is too subjective. The "best" practice in one area or situation might be entirely inappropriate in another area or situation. The practices listed in this document have been found by EPA to be representative of the types of practices that can be applied successfully to achieve the management measures. EPA recognizes that there is often site-specific, regional, and national variability in the selection of appropriate practices, as well as in the design constraints and pollution control effectiveness of practices. The practices presented for each management measure are not all-inclusive. States or local agencies and communities might wish to apply other technically and environmentally sound practices to achieve the goals of the management measures.

Channelization and Channel Modification (Chapter 3)

Channelization can cause a variety of instream flow changes and may result in the faster delivery of pollutants to downstream areas. Channel modification might result in a combination of harmful effects (higher flows or increased risk of downstream flooding) and beneficial effects (local flood control or enhanced flushing in a stream channel). The management measures for channelization and channel modification are intended to protect waterbodies by ensuring proper planning before a proposed project is implemented. Planning and evaluation can help to identify and prevent local and downstream problems before a project is started. An added benefit of planning and evaluation is to correct or prevent detrimental changes to the instream and riparian habitat associated with the project. Implementation of the management measures can also ensure that operation and maintenance programs for existing projects improve physical and chemical characteristics of surface waters and restore or maintain instream and riparian habitat when possible.

Management Measure 1: Physical and Chemical Characteristics of Surface Water: Ensure that the planning process for new hydromodification projects addresses changes to physical and chemical characteristics of surface waters that may occur as a result of the proposed work. For existing projects, ensure that operation and maintenance programs use any opportunities available to improve the physical and chemical characteristics of surface waters.

Management Measure 2: Instream and Riparian Habitat Restoration: Correct or prevent detrimental changes to instream and riparian habitat from the impacts of channelization and channel modification projects, both proposed and existing.

Dams (Chapter 4)

Because of their instream locations, any construction activities associated with dams have the potential to introduce sediment and other pollutants into adjacent waterbodies. Construction activities, chemical spills during dams operation or maintenance, and changes in the quantity and quality of water held and released by a dam may alter the nature of the waterbody. The management measures for dams are intended to be applied to the construction of new dams, as well as any construction activities associated with the maintenance of existing dams. They can also be applied to dam operations that result in the loss of desirable surface water quality, and instream and riparian habitat.

Management Measure 3: Erosion and Sediment Control: Prevent sediment from entering surface waters during the construction or maintenance of dams.

Management Measure 4: Chemical and Pollutant Control: Prevent downstream contamination from pollutants associated with dam construction and operation and maintenance activities.

Management Measure 5: Protection of Surface Water Quality and Instream and Riparian Habitat: Protect the quality of surface waters and aquatic habitat in reservoirs and in the downstream portions of rivers and streams that are influenced by the quality of water contained in the releases (tailwaters) from reservoir impoundments.

Streambank and Shoreline Erosion (Chapter 5)

NPS pollution might result from the rapid increase in erosion of streambanks caused by increased flow rates associated with urbanization in a watershed. Not only is the land adjacent to these eroding streambanks unnaturally carried away, but these eroded soils are carried downstream and deposited in often undesirable locations. Shorelines erode more severely as the result of poorly planned and implemented shoreline protection projects located nearby. Habitats can be buried and wetlands can be filled. As runoff upstream increases, more erosion results on downstream streambanks. The streambank and shoreline erosion management measure promotes the necessary actions required to correct streambank and shoreline erosion where it must be controlled. Because erosion is a natural process, this management measure is not intended to be applied to all erosion occurring on streambanks and shorelines.

> **Management Measure 6: Eroding Streambanks and Shorelines:** Protect streambanks and shorelines from erosion and promote institutional measures that establish minimum setback requirements or measures that allow a buffer zone to reduce concentrated flows and promote infiltration of surface water runoff in areas adjacent to the shoreline.

Channelization and channel modification and dams represent forms of hydromodification that are direct results of human activities—someone performs a construction activity directly in or along a stream, river, or shoreline. For example, a town constructs concrete lined channels along a stream passing through the city limits to reduce stream meandering and prevent flooding. Another example is the construction (many years ago) of a dam in a stream for hydropower at a grist mill. Streambank and shoreline erosion are forms of hydromodification that result from direct and indirect human activities. For example, a streambank is eroding at a much faster rate because of recent development activities on shore that result in increased runoff, which is causing increased bank erosion. Another example is a concrete seawall that is protecting property at one location, but causing increased erosion on adjacent properties.

This distinction between forms of hydromodification and impacts from hydromodification is important when contrasting the relationship between Chapter 3 (Channelization and Channel Modification) and Chapter 5 (Streambank and Shoreline Erosion). Many of the operation and maintenance solutions presented in Chapter 3 are also practices that can be used to stabilize streambanks and shorelines as presented in Chapter 5. For example, a stream channel that has been hardened with vertical concrete walls to prevent local flooding and limit the stream to its existing channel (to protect property built along the stream channel), may benefit from operation and maintenance practices that use opportunities to replace the concrete walls with an appropriate vegetative or combined vegetative and non-vegetative structures along the streambank when possible. These same practices may be applicable to stabilize downstream streambanks that are eroding and creating a nonpoint source pollution problem because of the upstream development and hardened streambanks.

Chapter 2: Background

There are differing views on defining the stability of a stream channel and other waterbodies. From a navigation perspective, a stream channel is considered stable if shipping channels are maintained to enable safe movement of vessels. Landowners with property adjacent to a stream or shoreline might consider the waterbody to be stable if it does not flood and erosion is minimal. Ecologists might find some erosion of streambanks and meandering channels to be a part of natural evolution (i.e., changes that are not induced by humans) and consider long-term changes like these to be quite acceptable (Watson et al., 1999). In any case, new and existing channelization projects, construction and maintenance of dams, and streambank and shoreline erosion problems should be evaluated with these differing perspectives in mind and a balance of these perspectives should be taken into account when constructing or maintaining a project. Often, multiple priorities can be maintained with good up-front planning and communication among the different stakeholders involved.

Key Geomorphic Functions of Streams

Discharge, Slope, and Sinuosity

Figure 2.1 is a cross-section of a typical stream channel. The thalweg is the deepest part of the channel. The sloped bank is known as the scarp. The term discharge is used to describe the volume of water moving down the channel per unit time (usually described in the United States as cubic foot per second (cfs)). Discharge is the product of the area through which the water is flowing (in square feet) and the average velocity of the water (in feet per second). If discharge in a channel increases or decreases, there must be a corresponding change in streamflow velocity and/or flow area.

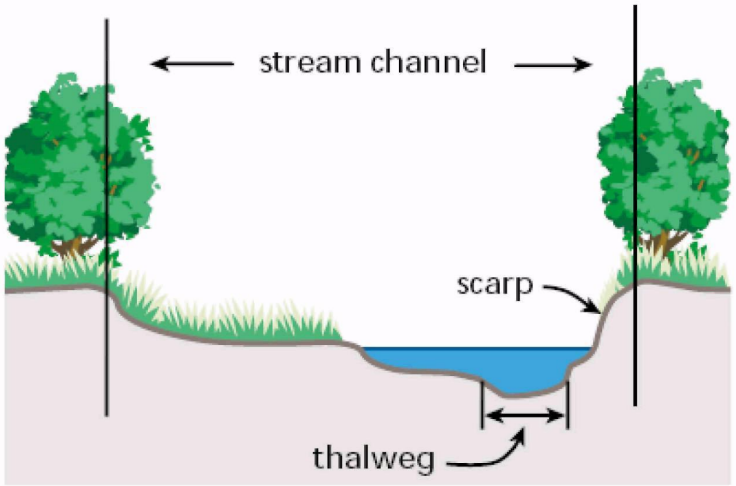

Figure 2.1 Cross-section of a Stream Channel (FISRWG, 1998)

Channel slope is an especially key concept when dealing with hydromodification projects. It is the difference in elevation between two points in the stream divided by the stream length

between the two points. Stream sinuosity greatly affects stream slope. Sinuosity is the stream length between two points on a stream divided by the valley length between the two points. A meandering stream moving through a valley has a lower slope than a straight stream.

Erosion, Transport, and Deposition of Sediment

All streams accomplish three basic geomorphic tasks:

- *Erosion*—the detachment of soil particles along the stream bed and banks
- *Sediment transport*—the movement of eroded soil particles in streamflow
- *Sediment deposition*—the settling of eroded soil particles in the water or on land as water recedes

These processes largely determine the size and shape of the channel, both laterally and longitudinally. The ability to accomplish these geomorphic tasks is related to stream power, the product of slope and discharge. Slope directly affects flow velocity. Consequently, a shallow, meandering stream with low slope generates less stream power, and has lower erosion and sediment-transport capacity, than a deep, straight stream.

In addition to sinuosity, roughness along the boundaries of a stream area is also important in determining streamflow velocity and stream power. The rougher the channel bottom and banks, the more they are able to slow down the flow of water. The level of roughness is determined by many conditions including:

- Type and spacing of bank vegetation
- Size and distribution of sediment particles
- Bedforms
- Bank irregularities
- Other miscellaneous obstructions

Tractive stress, also known as shear stress, describes the lift and drag forces that work to create erosion along the stream bed and banks. In general, the larger the sediment particle, the more stream power is needed to dislodge it and transport it downstream. When stream power decreases in the channel, larger sediment particles are deposited back to the stream bed.

Dynamic Equilibrium

One of the primary functions of a stream is to move particles out of the watershed. Erosion, sediment transport, and deposition occur all the time at both large and small scales within a channel. A channel is considered stable when the average tractive stress maintains a stable streambed and streambanks. That is, sediment particles that erode and are transported downstream from one area are replaced by particles of the same size and shape that have originated in areas upstream. Lane (1955) qualitatively described this relationship as:

$$Qs * D \propto Qw * S$$

Where: Qs = Sediment discharge, D = Sediment particle size, Qw = Streamflow, S = Stream slope

When all four variables are in balance, the channel is stable, or in dynamic equilibrium.

Lane's channel variable relationships can be visualized as a pan balance with sliding weights (Figure 2.2). Sediment discharge is placed on one pan and streamflow on the other. The hook holding the sediment load pan can slide back and forth based on changes in sediment size. Likewise, the hook holding the streamflow can slide according to changes in slope.

If a disturbance or stream modification occurs that causes a variable to change, one or more of the other variables must change in order to maintain the balance. During an imbalanced phase, the scale indicator will point to either degradation or aggradation. This indicates that the channel will try to adjust and regain equilibrium by either increasing sediment discharge by scouring the bottom or eroding its banks (degradation) or decreasing sediment discharge by depositing sediment on the bottom (aggradation), depending on the circumstance.

For example, if stream slope is decreased and streamflow remains the same (i.e., streamflow pan slides toward the center), the balance will tip and aggradation will occur (Figure 2.3). Alternatively, if streamflow increases and slope remains the same (i.e., more weight on the streamflow pan), degradation will occur. No matter the scenario, this basic relationship between the variables will hold true and aggradation or degradation will cease only when the system reaches equilibrium. This can occur naturally over time, or through management practices designed to deal with the "balancing" issue.

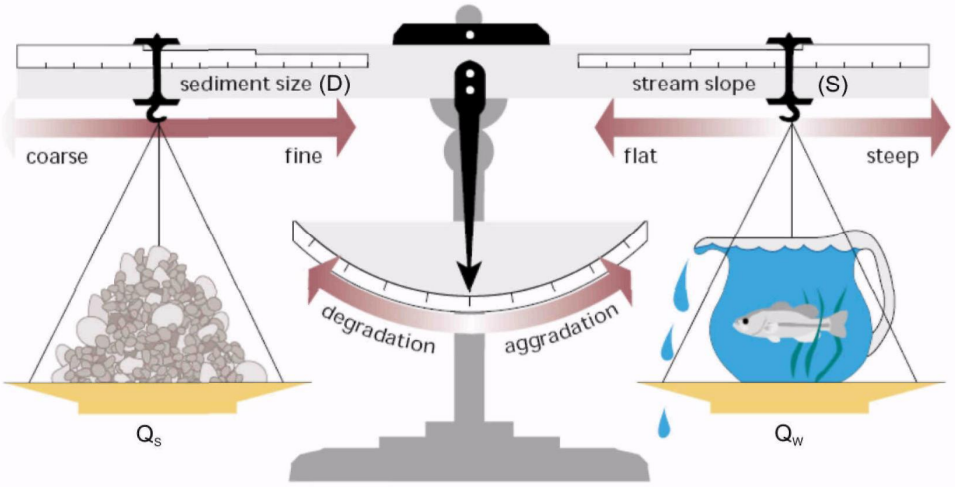

Figure 2.2 Factors Affecting Channel Degradation and Aggradation (FISRWG, 1998)

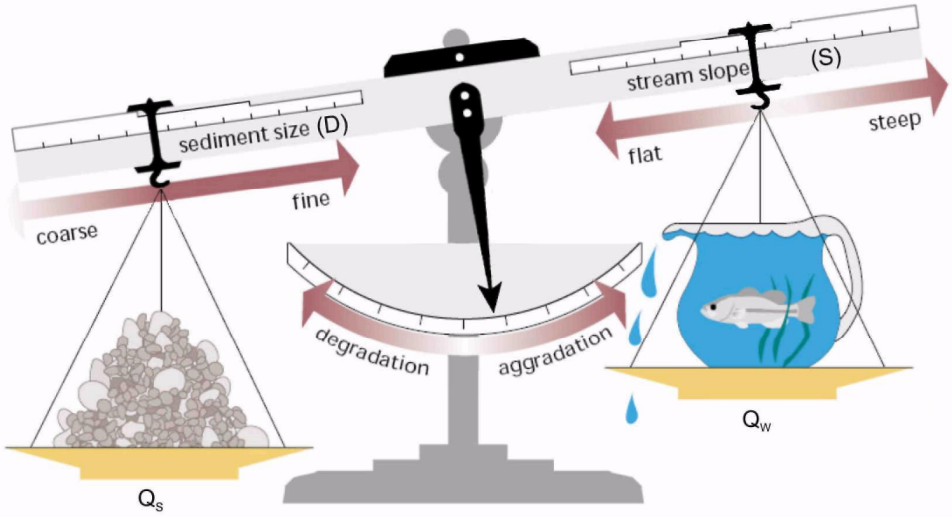

Figure 2.3 Example of Aggradation (Adapted from FISRWG, 1998)

Longitudinal View of Channels

The geomorphic processes that define the size and shape of channels can be observed in large and small scale longitudinal views. The overall longitudinal view of many streams can be divided into three general zones (Schumm, 1977):

- *Headwater zone*—characterized by steep slopes with sediment erosion as the most dominant geomorphic process.
- *Transfer zone*—characterized by more sinuous channel patterns and wider floodplains with sediment transfer as the most dominant geomorphic process.
- *Deposition zone*—characterized by lower slope and higher channel sinuosity than the other zone and is the primary deposition area for watershed sediment.

Key characteristics of each zone are summarized in Figure 2.4.

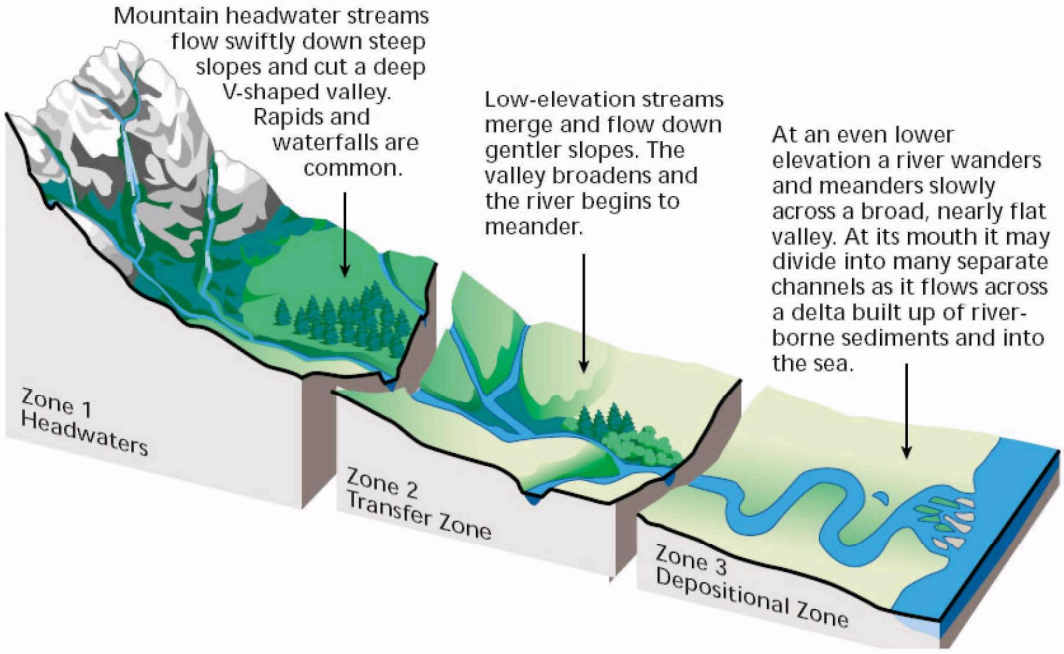

Figure 2.4 Three Longitudinal Profile Zones (FISRWG, 1998)

At a smaller scale, natural-forming channels are usually characterized by a series of riffles, pools, and runs. These structures are primarily associated with the thalweg, which meanders within the channel (Figure 2.5). Riffles are shallow, turbulent, and swiftly flowing stretches of water that flow over partially or totally submerged rocks. Deeper areas at stream bends are the pools and can be classified as large-shallow, large-deep, small-shallow, and small-deep. Runs are the sections of a stream with little or no surface turbulence that connect pools and riffles.

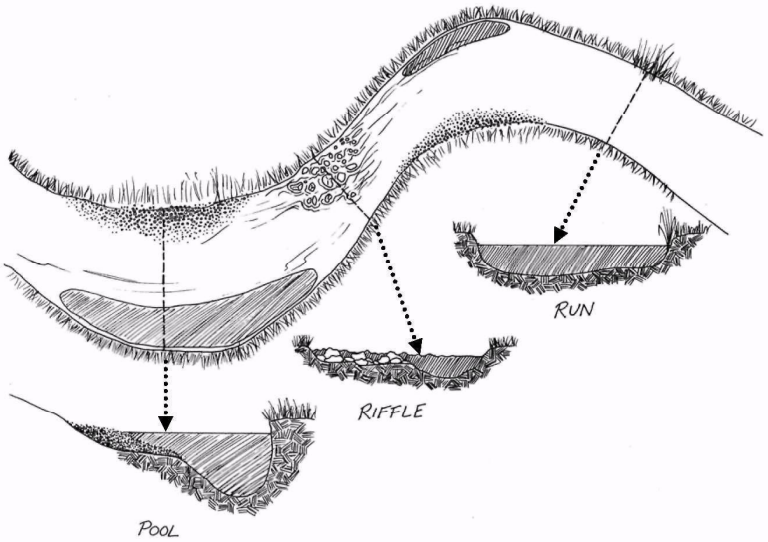

Figure 2.5 Overview of a Pool, Riffle, and Run (USEPA, 1997b)

The distribution in streamflow velocity and stream power throughout the riffle/pool/run sequence impact the geomorphic tasks. The stream bottom of a riffle is at a higher

elevation than the stream areas surrounding it. Consequently, the water flowing in a run from riffle to pool has the highest velocity near the center of the channel just under the surface (i.e., away from the roughness associated with channel boundaries). On reaching a bend, angular momentum forces the highest velocity flow to the outside of the bend and, given enough tractive stress, causes erosion to the bank (cutbanks). Meanwhile on the inside of the bend deposition often occurs because of decreasing flow velocity. Importantly, these and other characteristics of the riffle/pool/run sequence create unique habitats which allow different species to live, reproduce, and feed.

Disruption of Dynamic Equilibrium

Changes caused by (or exacerbated by) hydromodification projects and other human activities can lead to a disruption of the dynamic equilibrium of the stream channel. If, for example, a modification occurs that causes a change in sediment discharge, channel slope, or streamflow, one or more of the other variables will be imbalanced and the channel will usually try to adjust and regain equilibrium by either increasing sediment discharge by scouring the bottom or eroding its banks (degradation) or decreasing sediment discharge by depositing sediment on the bottom (aggradation) (Biedenharn et al., 1997; Watson et al., 1999). In some cases, alterations to a stream channel can result in local or system-wide channel instability (FISRWG, 1998).

General Impacts of Channelization and Channel Modifications

Channelization and channel modifications are undertaken for many purposes including flood control, navigation, drainage improvement, and reduction of channel migration potential. Modifications also occur in association with the installation of culverts and bridges, urbanization of the watershed, and agricultural drainage. These changes may result in several physical and chemical impacts.

Physical Impacts

The most significant physical impact of channelization and channel modifications is the movement or deposition of sediment. Sediment erodes from stream banks and beds, is washed downstream in faster moving water, deposited in areas of slower flows, and transported into new areas of streams or other receiving waters. Critical habitat can be changed when channelization or channel modification projects alter the dynamic equilibrium of a stream and change sediment transport or deposition characteristics. Re-establishing equilibrium may take some time to occur and have long-lasting effects to habitat and water quality conditions.

Channel modification and channelization can lead to increased erosion in some areas of the stream, which produces sediment. Sediment can be dislodged and transported directly from the waterbody's shoreline, bank, or bottom. Sediment being transported by a stream is referred to as the sediment load, which is further classified as the bed load (those particles moving on or near the bed, or bottom of the channel) and the suspended load (those particles moving in the water column). Hydromodification typically results in more uniform channel cross-sections, steeper stream gradients, and reduced average pool depths.

An increase in the sediment load could lead to increased turbidity, which then may cause an increase in stream temperature because the darker sediment particles absorb heat (USEPA, 1997b). Changes in water temperature can influence several abiotic chemical processes, such as dissolved oxygen concentrations, sorption of chemicals onto particles, and volatilization rates. Water temperature influences reaeration rates of oxygen from the atmosphere. Dissolved oxygen concentrations in water are inversely related to temperature; solubility of oxygen decreases with increasing water temperature. In addition, sorption of chemicals to particulate matter and volatilization rates are influenced by changes in water temperature. Sorption often decreases with increasing temperature and volatilization increases with increasing temperature (University of Texas, 1998).

An increased sediment load that contains significant organic matter can increase the sediment oxygen demand (SOD). The SOD is the total of all biological and chemical processes in sediment that consume oxygen (USEPA, 2003a). These processes occur at or just below the sediment-water interface. Most of the SOD at the surface of the sediment is due to the biological decomposition of organic material and the bacterially facilitated nitrification of ammonia, while the SOD several centimeters into the sediment is often dominated by the chemical oxidation of species such as iron, manganese, and sulfide (Walker and Snodgrass, 1986 from USGS, 1997; Wang, 1980). Increases in SOD can lead to lower levels of dissolved oxygen, which can be harmful to aquatic life.

A channel that is deepened or widened can result in slower and/or shallower flow. Reduced stream velocities can result in more sediment deposits to a stream segment. When more sediment is deposited in an area of a stream, critical habitats can be buried, channels may become unstable, and flooding increases. In tidal areas, channel modification activities, such as deepening a channel to allow for larger ships to access a shoreline, may require frequent maintenance to remove accumulating sediment because of changes in flow patterns.

Chemical Impacts

A variety of chemicals can be introduced into surface waters when channelization and channel modification activities alter flow and sediment transport characteristics. Nutrients, metals, toxic organic compounds, pesticides, and organic materials can enter the water in eroding soils along banks and move throughout a stream as flow characteristics change. Changing temperatures and dissolved oxygen levels may lead to alterations in the bioavailability of metals and toxic organics. Complex chemical conditions can significantly change when stream flow and sedimentation characteristics change, resulting in new and/or potentially harmful forms of chemicals affecting instream or benthic organisms.

It is important to remember that many of the physical and chemical changes are interrelated. For a more detailed discussion of the impacts associated with chemical and physical changes to surface waters, see *Restoration of Aquatic Ecosystems* (NRC, 1992). The following discussion provides examples of impacts that may be present as a result of different kinds of channelization. For a more detailed discussion of types of channelization projects and potential impacts, see Watson et al. (1999).

Biological and Habitat Impacts

Pools, riffles, and runs create a mixture of flows and depths and provide a variety of habitats to support fish and invertebrate life (USEPA, 1997b). The shallow, turbulent, and swiftly flowing stretches of riffle water are well oxygenated and have a "patchy distribution of organisms," which means that different types of organisms are naturally found in different parts of the riffle. Pools can also be large or small and shallow or deep and support a wide variety of aquatic species. Sediments can deposit in pools, which can lead to the formation of islands, shoals, or point bars.

Changes in habitat and biological communities following hydromodification of a channel can be highly site-specific and complex. The physical and chemical alterations resulting from channelization impact various habitats and biological communities, including instream algae, fish, macroinvertebrate populations, and bank or floodplain vegetation. Mathias and Moyle (1992) compared unchannelized and channelized sections of the same stream and found a much higher diversity of many organisms, including aquatic invertebrates, fish, and riparian vegetation, in the unchannelized sections of the stream. Adams and Maughan (1986) compared the benthic community in a small headwater stream, prior to and after channelization. They found that the pathways of organic input shifted from materials associated with leaf fall and runoff to materials associated with periphyton production. Accompanying this change was a shift of the assemblage from shredder domination to grazer domination and a decrease in diversity. Biological and habitat impacts caused by channelization can result from increased stream velocity, decreases in pool and riffle habitat complex, decrease in canopy cover, increase in the solar radiation reaching the channel, channel incision, and increases in sediment.

Channelization of a stream may increase velocity due to increased channel slope and decreased friction with the bank and bed material. Changes in the velocity may cause an impact to organisms within the channel. For example, fish may have to expend more energy to stay in swifter currents and their source of food may be swept downstream. Studies have demonstrated that fisheries associated with channelized streams can be far less productive that those of non-channelized streams (Jackson, 1989). Increased rates of erosion as a result of increased velocities downstream of a channelization feature can also create unstable streambanks, which could lead to increased streambank erosion, higher risks of flooding, and ultimately negative impacts to aquatic organisms.

Channelization can result in a more uniform stream channel that is void of the pool and riffle habitat complex or obstructions, such as woody debris inputs. As repeatedly observed, this can result in changes to the biological community. Negishi et al. (2002) observed a decrease in the total density of macroinvertebrates in the middle of a channelized stream and a decrease in taxon richness in the middle and edge of a channelized stream. An overall reduction in habitat heterogeneity is likely responsible for the reduction in species diversity and the increased abundance of those species favored by the altered flows that is typically observed (Allan, 1995). On medium-sized, unregulated rivers, Benke (2001) found that habitat-specific invertebrate biomass was highest on snags, followed by the main channel and then the floodplain. It was concluded that invertebrate productivity from these habitats has likely been significantly diminished as a result of snag removal, channelization, and floodplain drainage (Benke, 2001).

The survival of the Gulf Coast walleye (*Stizostedion vitreum*) relies on the availability of appropriate spawning habitat, such as large woody debris, that locally reduce current velocity. Channelization and the removal of structures have been identified as activities of concern that could threaten the survival of the species (VanderKooy and Peterson, 1998). In one experiment, an assessment of water quality using environmental indices, such as macroinvertebrate communities, found that channelization and deforestation resulted in a completely different and less varied biocommunity (Bis et al., 2000). A lower persistence of the macroinvertebrate assemblage in the channelized stream was attributed to the lower availability of flow such as backwaters and inundated habitats (Negishi et al., 2002). In a study by Kubecka and Vostradovsky (1995), low fish populations were attributed to channelization of the riverbed.

The channelization of a river can also result in a decrease in canopy cover and an increase in the solar radiation reaching the channel. Bis et al. (2000) found that an increase in incident radiation on a river resulted in increased algal productivity and a significant decrease in scrapers, a macroinvertebrate that feeds on periphyton or algae growing on plant surfaces. Increased water temperatures can also lead to a shift in the algal community to predominately planktonic algal communities, which disrupts the aquatic food chain (Galli, 1991). The combination of increased water temperatures and loss of riparian vegetation falling into the stream (which provides both food and cover) may be responsible for the decrease in macroinvertebrates. Increased solar radiation on a channelized stream can act to decrease productivity by reaching the level of photoinhibition; a decrease in productivity due to excessive amounts of solar radiation. The temperature of the water can also be increased to the extent that it adversely impacts organisms. Elevated temperatures disrupt aquatic organisms that have narrow temperature limits, such as trout, salmon, and many aquatic insects.

Incision of a channel, a common impact of channelization, disconnects the channel from the floodplain by lowering the riverbed relative to the floodplain and decreasing the occurrence of overbank flow. Channel incision or downcutting has rarely been found to directly affect the biotic ecosystem, but indirect changes in habitat conditions are significant. Channel incision decreases habitat heterogeneity and, as a result, biodiversity (Tachet, 1997). An analysis of forest overstory, understory, and herbaceous strata along a channelized and unchannelized stream showed that there was a difference in terms of size-class structure and woody debris quantity (Franklin et al., 2001). Loss of woody vegetation along riparian zones on a channel that is incised because of upstream channelization was attributed to a decrease in over bank flooding and a lowering of the water table as the stream became incised (Steiger et al., 1998). A comparison of a regulated and an unregulated river in Colorado's Green River Basin found a difference in riparian vegetation composition. The regulated river supported banks with wetland species that survive in anaerobic soils and terraces with desert species adapted to xeric soil conditions. The unregulated river supported riparian vegetation that changed along a more gradual environmental continuum from a river channel to a high floodplain (Merritt and Cooper, 2000).

Sediment affects the use of water in many ways. When the rate of erosion changes, transport and deposition of sediment also changes. Excessive quantities of sediment can bury benthic organisms and the habitat of fish and waterfowl. Suspended solids in the water reduce the amount of sunlight available to aquatic plants, cover fish spawning areas and food supplies, fill

rearing pools, reduce beneficial habitat structure in stream channels, smother coral reefs, clog the filtering capacity of filter feeders, and clog and harm the gills of fish. Those fish species that rely on visual means to get food may be restricted by increased turbidity. Sedimentation effects combine to reduce fish, shellfish, coral, and plant populations and decrease the overall productivity of lakes, streams, estuaries, and coastal waters.

Impacts Associated with Specific Hydromodification Actions

Channel Straightening and Deepening

Channels are straightened for a multitude of reasons, such as directing water away from a particular structure or area and reducing local flooding. Channelization that involves straightening of the stream channel increases the slope of the channel, which results in higher discharge velocities. Impacts associated with increased water velocities include more streambank and streambed erosion, higher sediment loads, changes in pools, riffle, and run structure, and increased transport of nutrients and other pollutants (FISRWG, 1998; Simons and Senturk, 1992).

Channelization can also result in alterations to the base level of the stream, including channel downcutting or incision of a section of the stream, which raise the height of the floodplain relative to the riverbed and decrease the frequency of overbank flow. When streams reach flood stage and flow into the floodplain, velocities decrease. The reduction in overbank flow reduces sediment deposition and the sediment storage potential of the floodplain (Wyzga, 2001). A change in the downstream base level of a stream can create an unstable stream system (Biedenharn et al., 1997).

Headcutting is the deepening of a waterway caused by channelization or localized stream-bed mining. Headcutting severely impacts the physical integrity of a stream, as streambanks become unstable and are more prone to eroding and sloughing. Bank failures may result, removing streamside vegetation and introducing significant amounts of sediment into the waterway. As sediments build on the stream bottom, natural substrate is covered and stream depth decreases. Water quality often diminishes as temperatures rise due to less shading by riparian vegetation and increased water surface area with decreased depth. The rapid alteration to stream habitat caused by headcutting is usually detrimental to aquatic wildlife. Various organizations, such as the U.S. Army Corps of Engineers, the Natural Resources Conservation Service (NRCS), and the Missouri Department of Conservation, are involved in projects to reduce headcutting (CSU, n.d.; MDC, 2007; USGS, 2000).

Channel Lining

The sides of channels can be lined with materials such as metal sheeting, concrete, wood, or stone to prevent erosion of a particular section of stream channel or stream bank. The artificially lined areas can reduce the friction between the channel and flowing water, leading to an increase in velocity. The increased velocity and thus the increased erosive potential of the flowing water are not able to erode the artificially lined channel area and can result in augmented erosion downstream as well as increased downstream flooding (Brookes, 1998). Lining the channel also removes aquatic habitat and important substrates that are essential to aquatic life.

Channel Narrowing

Narrowing of a stream channel often occurs when flood control measures such as levees and floodwalls are implemented. By narrowing a stream channel, the water is forced to flow through a more confined area and thus travels at an increased velocity (FISRWG, 1998). The increased velocity in turn increases the stream's erosive potential and ability to transport sediment. This can lead to increased erosion of the streambank and shoreline in downstream locations.

When a channel is made narrower, the water depth increases and the surface area exposed to the solar radiation and ambient temperature decreases, especially in the warmer months. This can cause a decrease in the water temperature. Increased depth may also reduce the surface area of the water in contact with the atmosphere and affect the transfer of oxygen into the water.

In a naturally flowing stream, floods are responsible for such processes as redistributing sediment from the river bottom to form sandbars and point bar deposits. Stream channel modifications to reduce flood damage, such as levees and floodwalls, often narrow the stream width, increasing the velocity of the water and thus its erosive potential. This can lead to increased erosion of the streambank and shoreline in downstream locations (FISRWG, 1998).

Channel Widening

Channel widening is often performed to increase a channel's ability to transport a larger volume of water. The design is often based on volumes of water that occur during flood events. The design of a channel modification project to increase the channel's ability to transport a large volume of water will determine the characteristic of the water flow. The widening of a channel can result in a channel with a capacity to transport water that far exceeds the typical daily discharge. This results in a typical flow that is shallow and wide. As a result of increased contact with the streambed and streambank, there is increased friction and a decreased water velocity. The decrease in velocity causes sediment to settle out of the water column and accumulate within the stream channel. This accumulation of sediment can decrease the capacity of the stream channel. The decreased depth and increased surface area of the water exposed to solar radiation and ambient air temperatures can lead to an increase in water temperature. A change in water temperature can influence dissolved oxygen concentrations as dissolved oxygen solubility decreases with increasing water temperature.

Where tidal flow restrictors cause impoundments, there may be a loss of streamside vegetation, disruption of riparian habitat, changes in the historic plant and animal communities, and decline in sediment quality. Restricted flows can impede the movement of fish or other aquatic life. Flow alteration can reduce the level of tidal flushing and the exchange rate for surface waters within coastal embayments, with resulting impacts on the quality of surface waters and on the rates and paths of sediment transport and deposition.

Culverts and Bridges

The presence of culverts and bridges along a channel can have an impact on the physical and chemical qualities of the water. A culvert can be in the form of an arch over a channel or a pipe that encircles a channel, and it functions to direct flow below a roadway or other land use. A culvert or the supports of a bridge can confine the width of a channel forcing the water to flow in a smaller area and thus at a higher velocity. Impacts associated with a higher flow velocity

include increased erosion. An arch culvert maintains the natural integrity of the stream bottom. In addition, as compared with the natural substrate that can be found using an arch culvert without concrete inverts (floors), a pipe culvert may create less friction with the water flow and result in an increased flow velocity. The chemical and physical changes associated with increased erosion and sediment transport capacity would then result.

The culvert acts as a fixed point with a fixed elevation within the stream channel and as the stream attempts to adjust over time, the culvert remains stationary. Placement of this type of structure disturbs the natural equilibrium of a channel. A culvert sometimes may have beneficial attributes when it acts as a grade control structure, and as such, may serve to prevent upstream migrating incision (headcutting) from moving further up the channel. Depending on the watershed processes, the culvert may act to preserve the natural equilibrium of a channel.

Urbanization

As humans develop watersheds, the proportions of pervious and impervious land within the watershed change (most often increasing impervious areas and decreasing pervious areas). Development also results in reductions in vegetative cover in exchange for increases in houses, buildings, roads, and other non-vegetative cover. The result is a change in the fate of water from rainfall events. Generally, as imperviousness increases and vegetative cover is lost:

- Runoff increases
- Soil percolation decreases
- Evaporation decreases
- Transpiration decreases

Increased volumes of runoff resulting from some types of watershed development can result in hydraulic changes in downstream areas including bank scouring, channel modifications, and flow alterations (Anderson, 1992; Schueler, 1987). The resulting changes to the distribution, amount, and timing of flows caused by flow alterations can affect a wide variety of living resources. As urbanization occurs, changes to the natural hydrology of an area are inevitable. During urbanization, pervious spaces, including vegetated and open forested areas, are converted to land uses that usually have increased areas of impervious surface, resulting in increased runoff volumes and pollutant loadings. Hydrologic and hydraulic changes occur in response to site clearing, grading, and change in landscape. Water that previously infiltrated the ground and was slowly released runs off quickly into stream networks. Development, with corresponding increases in imperviousness, can lead to:

- Increased magnitude and frequency of bankfull and subbankfull floods
- Dimensions of the stream channel that are no longer in equilibrium with its hydrologic regime
- Enlargement of channels
- Highly modified stream channels (from human activity)
- Upstream channel erosion that contributes greater sediment load to the stream
- Reduced dry weather flow to the stream
- Decreased wetland perimeter of the stream
- Degraded in-stream habitat structure

- Reduced large woody debris
- Increased stream crossings and potential fish barriers
- Fragmented riparian forests that are narrower and less diverse
- Decline in water quality
- Increased summer stream temperatures
- Reduced aquatic diversity

The hydraulic changes associated with urbanization have often been addressed with channelization and channel modification as a solution. Evaluating impacts from urbanization on a watershed scale and planning solutions on the same watershed scale can often prevent the transference of upstream problems to downstream locations. There are a variety of management activities that can reduce the impacts associated with urban development. When these urban impacts are reduced, additional hydromodification impacts, such as channelization and channel modification or streambank and shoreline erosion effects, may be reduced. Changes in urban development practices that result in reduced sediment in runoff can enhance reservoir quality and lessen the need for management activities to reduce nonpoint source impacts associated with the operation of dams.[1]

Agricultural Drainage

Some activities, including channelization and channel modification, that take place within a watershed, can lead to unintended adverse effects on watershed hydrology. Even when the intended effect of the watershed activity is to reduce pollution or erosion for an area within a watershed, the impact of the project to the entire watershed's hydrology should be evaluated. Since hydrology is important to the detachment, transport, and delivery of pollutants, better understanding of these effects can lead to reduction of nonpoint source pollution problems (USEPA, 2003b).

One example of an activity that has been shown to provide localized nonpoint source benefits, but can negatively affect the hydrology of a watershed, is an agricultural drainage system. The main purpose of agricultural drainage is to provide a root environment suitable for plant growth, but it can also be used as a means of reducing erosion and improving water quality. Despite the localized positive effects of drainage, when drainage water is poor in quality or contains elevated levels of pollutants, adverse impacts may occur downstream within a watershed. Concentrations of salts, nutrients, and other crop-related chemicals, such as fertilizers and pesticides can damage downstream aquatic ecosystems. Many agricultural drainage systems include drain tiles placed strategically throughout a field to create a network of gravity fed drains. The drain tiles empty into a collection pipe that drains to a waterbody nearby. With the drain system in place and operating, water will leave the affected area quicker and at one or more focused points. Water from the drainage system may erode the banks of unlined surface drains, contribute to flashier runoff events in the receiving water or downstream, and increase the load of sediment in drainage water (USEPA, 2003b).

[1] For additional information on hydrologic problems associated with urbanization and management practices that address urbanization issues, refer to *National Management Measures to Control Nonpoint Source Pollution from Urban Areas* (USEPA, 2005d): http://www.epa.gov/owow/nps/urbanmm/index.html.

Because of these adverse effects, drainage planners should analyze effluents from these systems for nutrients and pesticides to determine possible downstream impacts. Care should also be taken with drainage water so that it does not negatively alter the hydrology of a watershed (FAO, 1997). The degree to which management activities, such as agricultural drainage systems, affect watersheds beyond their intended purpose should be evaluated. In some cases, a thorough assessment and thoughtful discussion with key stakeholders is enough to evaluate the potential impacts of a project on hydrology. However, in many instances, some form of modeling is probably needed to integrate various small and large impacts of watershed activities. For more information on agricultural drainage and management practices related to agricultural drainage, refer to *National Management Measures for the Control of Nonpoint Pollution from Agriculture* (USEPA, 2003b).[2]

Shorelines

A shoreline is defined as the areas between low tide and the highest land affected by storm waves. The shape and position of shorelines are constantly being modified by the processes of erosion and deposition by waves and currents (Tarbuck and Lutgens, 2005). NOAA's Coastal Services Center defines shoreline as "the line of contact between the land and a body of water. On Coast and Geodetic Survey nautical charts and surveys the shoreline approximates the mean high water line" (NOAA, 2006).

The shoreline can be divided into three major areas:

1) *Coast*—the land inland from the base of the sea cliff (produced by the undercutting of bedrock at sea level by wave erosion).
2) *Beach (shore)*—the area between low tide level and dunes, sea cliff, or permanent vegetation. This can be separated into backshore and foreshore.
3) *Offshore*—the area continuously underwater, which can include a wave build platform.

Shoreline Processes

As mentioned above, the shape and position of shorelines are constantly modified by erosion and deposition by waves and currents. Waves are agents of erosion, transportation, and deposition of sediments. Waves can be formed by the following processes (Tulane University, n.d.; University of Alabama, 2006):

- *Wind-generated waves*—formed by shear stress between water and air when the wind speed is higher than about 3 km/hr. Factors that determine the size of waves are wind velocity, wind duration, and fetch (distance the wind blows over a continuous water surface).
- *Displacement of water*—can be caused by activities such as landslides.
- *Displacement of seafloor*—can be caused by faulting and volcanic eruptions.

[2] Available online at: http://www.epa.gov/owow/nps/agmm/index.html.

Wave refraction occurs where wave fronts approach the shore at an angle, but are bent to become more parallel to the shoreline by frictional drag on the bottom. The part of the wave in shallow water slows down because of bottom friction, while the part in the deep water keeps moving at regular speed. Wave refraction causes headland erosion and deposition in bays (Tulane University, n.d.; University of Alabama, 2006).

Nearshore currents occur in the area from the shoreline to beyond the surf zone and consist of (Tulane University, n.d.; University of Alabama, 2006):

- *Longshore currents* move parallel to shore in the same general direction as the approaching waves. They are produced by the movement of oblique waves in the surf zone, and can transport large amounts of sediment by longshore drift.
- *Rip currents* are strong, narrow currents of surface water that flow seaward through the surf into deeper water. The currents develop in areas with lower wave heights (deeper water depths).

Deposition and Erosion

Wave erosion and rivers that open into the ocean or lakes can deposit sediment, transported by longshore currents, developing the following depositional features (Tulane University, n.d.; University of Alabama, 2006):

1) *Beaches*—Any strip of sediment that extends from the low-water line inland to a cliff or zone of permanent vegetation, which is built of material eroded by waves from the headlands, and material brought down by rivers that carry the products of weathering and erosion from the land masses. Beaches are protected from the full force of water waves but are continually modified by wave and current erosion.
2) *Spits*—A narrow ridge or embankment of sediment forming a finger-like projection from the shore into the open ocean. Spits typically develop when the sediment being carried by long-shore drift is deposited where water becomes deeper, such as the mouth of a bay.
3) *Baymouth bars*—Sand bars that form as a result of longshore drift and completely cross a bay, sealing it off from the open ocean.
4) *Tombolo*—A ridge of sand that connects two islands or an island with the mainland, formed as the result of wave refraction around an island.
5) *Tidal inlet*—A break in a spit or baymouth bar, caused by storm erosion, through which tidal currents rush.
6) *Barrier islands*—Low offshore ridges of sediments that parallel the coast and are separated from the mainland by lagoons.

Wave erosion can also wear away land features, causing the following types of features to form (Tulane University, n.d.; University of Alabama, 2006):

1) *Sea cliffs*—formed by storm wave erosion which undercuts higher land, making it susceptible to mass wasting. Sea cliffs can erode very slowly or rapidly, depending on the rock type and wave energy.
2) *Wave-cut terrace or platform*—produced by the retreat of a sea cliff which slopes gently in a seaward direction.

3) *Headlands*—occur due to the seaward projections of shore eroded by wave refraction.

Common Natural and Anthropogenic Causes of Coastal Land Loss

Primary causes of coastal land loss, including both natural and anthropogenic causes, are summarized in Table 2.1 below (USGS, 2004).

Table 2.1 Common Causes of Coastal Land Loss

Agent	Examples
Natural Causes	
Erosion	Waves and currents, storms, landslides
Sediment reduction	Climate change, stream avulsion, source depletion
Submergence	Land subsidence, sea-level rise
Wetland deterioration	Herbivory, freezes, fires, saltwater intrusion
Anthropogenic Causes	
Transportation	Boat wakes, altered water circulation
Coastal construction	Sediment deprivation (bluff retention), coastal structures (jetties, groins, seawalls)
River modification	Control and diversion (dams, levees)
Fluid extraction	Water, oil, gas, sulfur
Climate alteration	Global warming and ocean expansion, increased frequency and intensity of storms
Excavation	Dredging (canals, pipelines, drainage), mineral extraction (sand, shell, heavy mines)
Wetland destruction	Pollutant discharge, traffic, failed reclamation, burning

Shorelines can also experience increased rates of erosion as a result of hydromodification activities. Alterations to the sediment sources for beaches can result in erosion. The sediment supplied to beaches or shorelines can come from a variety of sources including rivers, cliff and rocky foreshores, the seafloor, or windblown dune materials. Beaches and shorelines at the mouth of a river are often replenished by fluvial sediment. When changes within the river system decrease the sediment load carried to the mouth of the river, the result may be decreased sediment supplies to the shoreline or beach. While the design of each hydromodification system determines the impacts that will ensue, streambank and shoreline erosion is a common consequence.

Impacts Associated with Dams

The physical presence and operation of dams can result in changes in water quality and quantity. Some of the water quality impacts include changes in erosion, sedimentation, temperature, dissolved gases, and water chemistry. Examples of biological and habitat impacts, which may result from a combination of physical and chemical changes, include loss of habitat for existing or desirable fish, amphibian, and invertebrate species; changes from cold water to warm water species (or inversely, changes from warm water to cold water species); blockage of fish passage; or loss of spawning or necessary habitat.

The impacts associated with dams occur above (upstream) and below (downstream) the dam. Upstream impacts occur primarily in the impoundment/reservoir created by the presence and operation of the dam. The area and depth of the impoundment will determine the extent and

complexity of the upstream and downstream impacts. For example, small, low-head dams with little impounded areas will exhibit different impacts than large storage dams. Sedimentation and fish passage issues at the smaller, low-head dam contrast with sedimentation, temperature, fish passage, flow regulation, and water quality issues that may be associated with the larger storage dam. The existence of the dam and associated impoundment results in much different water quality interactions than those associated with the preexisting naturally flowing streams or rivers.

Above dams, activities within the watershed can have significant impacts on water quality within impoundments and in releases from dams to downstream areas. Watershed activities, such as agricultural land use, unpaved rural roads, forestry harvesting, or urbanization can lead to changes in runoff water quantity and quality. Agricultural and forestry practices that lead to sediment-laden runoff may result in increased sediment accumulation within an impoundment. Chemicals (e.g., pesticides and nutrients) that are applied on agricultural crops can be carried with sediment in runoff. Increases in urbanization that result in more impervious areas within a watershed often result in dramatic changes in the quantity and timing of runoff flows. These external sources are integrated by the dam and may result in short- and long-term water quality changes within an impoundment and dam releases.

Water quality in reservoirs and releases from dams are closely linked and scrutinized to uses of the water. Often, there are multiple potential users who may have differing quality needs and perceptions. Management of dams includes balancing dam operations, watershed activities, reservoirs, and downstream water and uses. Dortch (1997) provides an excellent assessment on water quality considerations in *Reservoir Management*. Dortch (1997) notes the following about water quality:

- *Temperature* regulates biotic growth rates and life stages and defines fishery habitat (warm, cool, and cold water).
- *Oxygen* sustains aquatic life.
- *Turbidity* affects light transmission and clarity.
- *Nutrient enrichment* is linked to primary productivity (algal growth) and can cause oxygen depletion, poor taste, and odor problems.
- *Organic chemicals and metals* may be toxic and accumulate when bound to sediment that settles in the reservoir.
- *Total dissolved solids* may be problematic for water supplies and other users.
- *Total suspended solids* are a transport mechanism for nutrients and contaminants. Solids may settle in reservoirs and displace water storage volume.
- *pH* regulates many chemical reactions.
- *Dissolved iron, manganese, and sulfide* can accumulate in reservoir hypolimnions that are depleted of oxygen and can cause water quality problems in the reservoir and release water.
- *Pathogens* include bacteria, viruses, and protozoa that can cause public health problems.

Water uses include water supply, flood control, hydropower, navigation, fish and wildlife conservation, and recreation (Dortch, 1997). All of the uses have varying water quality requirements, ranging from almost none for flood control to high quality needs for water supply, fish and wildlife conservation, and recreation.

Dams act as a barrier to the flow of water, as well as to materials being transported by the water. This can impact water quality both in the impoundment/reservoir created by the dam and downstream of the dam. Alteration to the chemical and physical qualities of water held behind a dam is often a function of the retention time of a reservoir or the amount of time the water is retained and not able to flow downstream. Water held in a small basin behind a run-of-river dam may undergo minimal alteration. In contrast, water stored for months or even years behind a large storage dam can undergo drastic changes that impact the downstream environment when released (McCully, 2001). A storage dam that impounds a large reservoir of water for an extended time period will cause more extensive impacts to the physical and chemical characteristics of the water than a smaller dam with little storage capacity.

Several physical changes are possible when dams are introduced into a stream or river, including changes in:

- Instream water velocities
- Timing and duration of flows
- Flow rates
- Sediment transport capacities
- Turbidity
- Temperature
- Dissolved gasses

Similarly, changes to water chemistry are possible as a result of damming rivers and streams, including changes to:

- Nutrients
- Alkalinity and pH
- Metals and other toxic pollutants
- Organic matter

The nature and severity of impacts will depend on the location in the river or stream, in relation to the upstream or downstream side of the dam, the storage time of the impounded water, and the operational practices at the dam. Many of the above impacts are also interrelated. For example, changes in temperature may result in changes in dissolved oxygen levels or changes to pH may result in changes to nutrient dynamics and the solubility of metals.

Water Quality in the Impoundment/Reservoir

As water approaches a dam from upstream, the stream velocity slows down considerably, creating a lake-like environment. The water builds up behind the dam and forms a basin (i.e., impoundment, reservoir) that is deeper than the previous stream flow. The height of the dam and its operational characteristics will determine how much water is stored and the length of storage. The extent of impacted stream area above the dam is influenced by the size of the dam installed, how much water is released, and how often water is released. For example, a small run-of-the river dam constructed to divert water for a millrace will have minimal storage capacity and may only store water for several hours or less. In this case, instream water velocities may decrease,

but with minimal upstream and downstream effects. Thus, the length of upstream channel that is impacted should be relatively small.

In contrast, a large flood control dam and reservoir may have many months of storage and severely alter instream velocities for long distances upstream. Topography surrounding the original stream channel and storage volume will be important parameters determining the length of stream channel affected by the large dam. The volume and frequency of discharges from the dam will also determine how much of the upstream channel is impacted with lower instream velocities as a result of the dam.

Dams act as a physical barrier to the movement of suspended sediments and nutrients downstream (McCully, 2001). When the stream flow behind a dam slows, the sediment carrying capacity of the water decreases and the suspended sediment settles onto the reservoir bottom. Any organic compounds, nutrients, and metals that are absorbed to the sediment also settle and can accumulate on the reservoir bottom.

Turbidity associated with sediment varies, depending on particle sizes of the sediment and the length of time water is held. Longer holding times in the reservoir could result in periodic episodes of high turbidity from upstream storm events that carry sediment rich stormwater, especially if the sediment is predominantly very fine clay particles. Turbidity may also increase as a result of planktonic algal growth in a reservoir.

The increased depth of the water in reservoirs reduces the volume of water exposed to solar radiation and ambient temperatures. Once the flow is controlled by the operation of the dam and the reservoir is mixed primarily by winds, temperature variations can become established within the reservoir. This can cause thermal stratification where, compared to the bottom, surface layers become warmer in the summer and cooler in the winter. In deeper reservoirs, the deepest layers may become nearly constant in temperature throughout the year. Changes in temperature can impact water quality and biological processes in the reservoir, including changes in predominant fish species. Since the density of water is a function of water temperature, thermal stratification creates density gradients within the impoundment. As density gradients become established, exchanges of gases and chemicals between gradients decrease. In a stratified impoundment well aerated surface waters often do not mix with hypolimnetic water and result in poorly oxygenated strata below the surface waters.

Nutrient transport is affected by dams, which can trap the nutrients in the impoundment/reservoir. When nutrients accumulate, the reservoir might become nutrient enriched (i.e., eutrophic). In warmer seasons, concentrated nutrients in waters exposed to light can promote growth of algae and other aquatic plants, which consume nutrients and release oxygen (during photosynthesis) and carbon dioxide (during respiration). When algae and other aquatic plants complete their growth cycles, they die and sink to the bottom of an impoundment. Microbial decomposition of the highly organic dead plant materials may release nutrients back into the water column. Microbial decomposition of the dead plant and algal cells in aerobic conditions consumes oxygen, which can rapidly deplete bottom waters of dissolved oxygen. Under anaerobic conditions, microbial decomposition can produce potentially toxic concentrations of gases, such as hydrogen sulfide.

The operational characteristics of a dam will influence nutrient levels in water releases. For example, water released from the surface of an impoundment may contain seasonally varying forms and levels of nutrients. During periods of algal growth, releases may contain lower levels of dissolved nutrients and higher levels of organic materials (algae) containing nutrients. When algal growth is not occurring, releases may contain higher levels of dissolved nutrients.

Anaerobic (oxygen-depleted) environments, which are typical of deeper waters in reservoirs, can result in several changes to the water chemistry. For example, as by-products of organic matter decomposition in an anaerobic environment, ammonia and hydrogen sulfide concentrations can become elevated (Freeman, 1977; Pozo et al., 1997). Highly acidic (or highly alkaline) waters tend to convert insoluble metal sulfides to soluble forms, which can increase the concentration of toxic metals in reservoir waters (FISRWG, 1998).

Changes in one water quality parameter in a reservoir/impoundment can impact other water quality parameters, causing a cycling of events to occur. For example, increased sedimentation (from internal or external sources) can lead to more organic matter remaining in the reservoir, resulting in more biochemical oxygen demand, potentially lower dissolved oxygen, and other changes to water chemistry, such as pH and metal solubility. Periodic growth and then die-off of aquatic plants and algae creates additional variable cycling of organic matter in the reservoir. The following references may provide additional detail on the complex water quality changes that can occur in impoundments and reservoirs:

- Holdren, C., W. Jones, and J. Taggart. 2001. *Managing Lakes and Reservoirs*. North American Lake Management Society and Terrene Institute, in cooperation with the Office of Water, Assessment and Watershed Protection Division, U.S. Environmental Protection Agency, Madison, WI.
- Thornton, K.W., B.L. Kimmel, and F.E. Payne. 1990. *Reservoir Limnology: Ecological Perspectives*. John Wiley & Sons, Inc., New York.
- U.S. Army Corps of Engineers. N.d. *The WES Handbook on Water Quality Enhancement Techniques for Reservoirs and Tailwaters*. U.S. Army Corps of Engineer Research and Development Center Waterways Experiment Station, Vicksburg, MS.

Water Quality Downstream of a Dam

The physical and chemical changes that occur to the water quality in an impoundment/reservoir have a large impact on the water released downstream of a dam. As previously stated, the presence of a dam can alter water velocities above and below the dam. In smaller dams with little storage capacity, velocities may slow locally and recover to an undisturbed state shortly downstream from the dam. When dams store large volumes of water in a reservoir, the operation of the dam will have a major impact on the downstream velocities and flows. Unless the dam is operated to consistently release water at flows near pre-dam levels, downstream areas will have flows and velocities that are directly related to the volume of water released in a given time period. The downstream flow characteristics will become a function of the operation of the dam, including the timing and duration of releases, the depth of reservoir intakes, and other physical characteristics of the release.

> *On the Columbia River, research found that prior to construction of dams, average water temperatures fluctuated more diurnally with cooler nighttime temperatures as compared with the existing average water temperatures. With the dams in place, cooler weather tends to cool the free flowing river but have little effect on the average temperature of the impounded river (USEPA, 2003c).*

When dams trap sediment upstream, water released from the dam may be starved of sediment and have an increase in erosive capacity. Along with trapping sediment, nutrients may also be trapped above the dam. When the nutrients are trapped and unavailable, sensitive downstream habitats and populations may be affected.

Whether the water is released from the surface or bottom of the reservoir can have a large impact on the characteristics of the water. The impacts of water outflows below a dam are an outcome of the seasonal temperature fluctuations and the outflow positioning. Seasonal temperature profiles in reservoirs are highly variable and dependent upon a complex set of factors including tributary inflow, basin morphometry, drawdown and discharge characteristics, and the degree of stratification (Wetzel, 2001). Compared to natural temperatures, in summer elevated temperatures in surface water releases can increase downstream river temperatures, whereas bottom water releases can be expected to decrease water temperatures. The opposite effect is generally observed in the winter due to changes in the water temperature gradient (USACE, 1999 in Fidler and Oliver, 2001).

Suspended Sediment and Reduced Discharge

Whether the release water originates from the surface or the bottom of the reservoir, the suspended sediment has typically settled out of the water column and thus the water released from behind the dam is usually relatively free from sediment (Simons and Senturk, 1992). This sediment-free water can easily pick up and carry a sediment load and have an increase in erosive capacity. Because of the rock lined channels of bank stabilization and navigation projects that usually occur below these reservoirs, the only place that the clear waters can find the sediments they need is in the streambed or navigation channel. This leads to channel deepening or bed degradation, which in turn lowers water tables and drains floodplain channels and backwaters (Rasmussen, 1999). Streambed and streambanks will continue to erode until an equilibrium suspended sediment load is established. Without sediment from upstream sources, downstream streambanks, streambeds, sandbars, and beaches can erode away more quickly (FISRWG, 1998).

A reduction in the discharge and sediment load generally results in degradation of the channel close to the dam and sedimentation downstream due to the increased supply from the erosion near the dam. Degradation may eventually migrate downstream, but is typically most dramatic the first few years following construction of the dam (Biedenharn et al., 1997). In addition, the physical impact of the discharge will depend, in part, on the channel substrate. A fine silt and sand channel bottom may experience more extensive erosion than a bed rock or cobble substrate.

Lower flow conditions below a dam within a tidally influenced basin can lead to changes in water chemistry. The impact of lower freshwater flow into estuaries was extensively studied in San Francisco Bay. Nichols et al. (1986) provide a detailed history of changes to freshwater inflows to San Francisco Bay. They also provide a summary of the impacts, which include the ecological and water quality effects. A study comparing an unregulated river and a dam regulated river found a significant difference in the water quality chemistry, including an analysis of levels of sodium, potassium, calcium, phosphorus, electrical conductivity, and pH in the middle and lower reaches of the rivers. These differences were attributed to increased tidal influence as a result of lower outflow volumes of fresh water from the dam (Colonnello, 2001). In addition, a decreased discharge from the dam and increased tidal influence can prolong the flushing time or the time it takes water to move through a system. This causes the nutrients and pollutants within the water to remain concentrated in areas below the dam near an estuary.

Biological and Habitat Impacts

The presence of a dam may cause physical and chemical changes to the water quality. These, in turn, can have an impact on the entire biological community including fish, macroinvertebrates, algae, and streamside vegetation. Impacts to the biological community differ upstream and downstream of a dam. Dams may disrupt spawning, increase mortalities from predation, change instream and riparian habitat, and alter plant and benthic communities. Resulting fish populations after dam construction may thrive and become well established, but could be very different than populations prior to installing the dam. For example, upstream of the dam, a fish population may change from a cold-water salmonid fishery to one that is dominated by cool- or warm-water species. A once thriving native trout population may become a largemouth bass (*Micropterus salmoides*) and bluegill (*Lepomis macrochirus*) dominated system. Similarly, downstream conditions may also change. In southern states, streams that once supported catfish and other tolerant warm-water species may now be able to support a trout fishery because of cold-water releases from bottom waters behind a dam. Although the trout fishery may be viewed as positive by some, the displaced native warmwater species may not be perceived as beneficial.

Dams prevent the movement of organisms throughout the river system (Morita and Yamamoto, 2002). Researchers found that fragmenting habitat by damming a river caused the disappearance of a fish species in several upstream locations and further disappearances were predicted (Morita and Yamamoto, 2002). Recently, some individual cases involving movement of invasive, non-native aquatic species note the presence of dams as a positive factor. In these cases, dams have blocked the movement of potentially harmful invasive species.

Flood control and hydropower projects influence a river's hydrograph. For example, in some regions normal river hydrographs featured a rise in water level elevation corresponding to spring

rains. Other geographic areas had stream hydrographs corresponding to snowmelt in the mountains, or fall rainfall. Native species evolved under these scenarios and used such water level rises to trigger spawning movements onto floodplains and in the case of birds, for nesting on islands. Additionally, the stream water level fluctuations were important in providing feeding and resting areas for spring and fall waterfowl migrations. Under managed scenarios for commercial navigation, river water level elevations are raised in the spring and held stable throughout the navigation season, virtually eliminating the triggering mechanisms native species used to reproduce and complete their life cycles. Because of this, many native riverine species often fail to spawn or nest, and are becoming increasingly threatened (Rasmussen, 1999). Additionally, stabilization of periodic flooding has also lead to the loss of ephemeral wetlands and may lead to the accumulation of sediments in nearshore areas, thus negatively affecting fish spawning areas (NRC, 1992).

Dams may lead to increased predation of fish in several ways. A dam may cause populations of fish to concentrate on the upstream and downstream sides, which might lead to the likelihood of increased predation. Changes in the habitat adjacent to a dam can make conditions more suitable to predation. Dams may cause the migration process to be delayed, which also leads to increased predation (Larinier, 2000).

The physical and chemical changes to water released from a dam, including reduced streamflow variability and decreased sediment loads, may also impact benthic communities. Increased water clarity and reduced streamflow variability just below a dam may result in a greater abundance of periphyton or other plants as compared with other locations in the river (Stanford and Ward, 1996). A slowed stream flow velocity with decreased turbulence can also encourage the growth of phytoplankton blooms (Décamps et al., 1988). In contrast, the operation of some hydroelectric dams with large, sudden releases of water may scour the bottom of the downstream channel to the extent that there is a nearly complete removal of the plant communities (Allan, 1995).

Impacts Associated with Dam Removal

Removing a dam affects the flow of water, movement of sediment and chemical constituents, and the overall channel morphology (Academy of Natural Sciences, 2002) on the waterway where the dam was located. The impacts of removing a dam differ for the upstream and downstream sections of a waterway.

Changes in the biological community following the removal of a dam are difficult to generalize, as they are highly site specific and can vary in recovery time from a few months to

> The effects of river damming were evaluated in a study comparing a regulated river to an unregulated river in the Green River Basin in Colorado. Prior to installation of the dam in Green River in 1962, Green River and the Yampa River were similar in riparian vegetation and fluvial processes. Comparison of the now regulated Green River and the free-flowing Yampa River found distinctive vegetation differences between the parks that surround the rivers. The channel form of Green River has undergone three stages of morphologic change that have transformed the historically deep river into a shallow braided channel. The Yampa River has remained relatively unchanged. The land surrounding the Green River now consists of marshes with anaerobic soil that supports wetland species and terraces with desert species adapted to xeric soil conditions. The meandering Yampa River has maintained its original surroundings. Its frequently flooded bars and high floodplains provide a wide range of habitats for succession of riparian vegetation (Merritt and Cooper, 2000).

more than a decade. With the removal of a dam, there are changes in the vegetative community surrounding the stream channel and changes in the biological community within the stream itself.

Physical Changes: Upstream Impacts

The removal of a dam allows the water formerly held behind the dam to flow and will likely cause the extent of the impoundment area or reservoir area to decrease. As a dam is removed and the water recedes, sediment is scoured from the bottom and a stream channel returns sometimes to its pre-dam pathway and sometimes to a newly carved channel. As a channel is formed, areas that were formerly beneath the impoundment area become exposed. This can leave large areas of unvegetated and unstable land exposed, which makes these areas likely to undergo erosion and gully development, increasing the sediment load to the stream.

In time, vegetation will stabilize the newly formed stream banks, reducing erosion and allowing sediment transport levels to return to natural levels. The nutrient and metal constituents associated with the sediment will also return to natural levels. As the newly established channel-like flow develops and the stagnant and deep conditions are removed, the natural temperature and oxygen levels will be reestablished.

Physical Changes: Downstream Impacts

Once the physical barrier of the dam is removed, a river can flow unrestricted. As the channel is reformed, the water discharge volume and the stream channel can reach equilibrium. As a result, a more natural stream flow rate is maintained.

With the removal of a dam, the fate of the trapped sediments is of concern because flooding and downstream pollution problems can result. On a short-term time scale, the redistribution of the fine silt and sand sediments that accumulated behind the dam wall may cause an increase in turbidity and water quality problems. In addition, the impact can be greater if the sediments contain toxic pollutants, such as metals or bioaccumulative compounds such as mercury or PCBs. On a short-term time scale, the redistribution of the fine silt and sand sediments increases the turbidity and can damage spawning grounds, water quality, habitat, and food quality (American Rivers, 2002a). Suspended sediment loads can have a negative impact on a biological community and reach lethal levels during dam removal if preventive measures are not implemented (Doyle et al., 2000).

After a dam is removed and the sediment that has been trapped behind the dam is redistributed, natural sediment transport levels return. As a result, the constituents typically sorbed to sediment, including nutrients and metals, are no longer found localized in excess. Normal sediment transport levels typically result in a river bottom with a higher percentage of rocky substrate. Gravel and cobblestones located below the sediment may be exposed or may be transported from upstream locations as the flow rate of the river increases. This unrestricted flow and transport of sediment and gravel may also play a key role in restoring sediments to downstream locations and coastal beaches (USDOI, 1995). The removal of a dam and the return of natural flow rates should also help to restore a river's natural water temperature range and oxygen levels.

Short-term chemical changes to the water quality, including the possibility of supersaturation of nitrogen gas directly following the removal of a dam, can cause aquatic animals to experience

adverse conditions. This can include gas bubble disease, in which nitrogen bubbles form in the blood and tissues and block capillaries by embolism (Colt, 1984; Soderberg, 1995). Adverse effects can be seen when the dissolved nitrogen level reaches 102% and at 105% widespread fish mortalities are possible (Dryden Aqua, 2002). Supersaturation was an issue in the 1992 removal of Little Goose Dam on the Snake River (American Rivers, 2002a). If a reservoir is drawn down slowly, the severity of the impact of supersaturation on aquatic organisms can be lessened (American Rivers, 2002a).

Biological Changes: Upstream Impacts

Following the removal of a dam, a return to the normal temperature range, flow rates, and oxygen levels supports the return of native aquatic vegetation species. Still water impoundments support aquatic vegetation that is free floating or that does not need to be strongly rooted, while free-flowing systems support plants that are rooted strongly enough to resist being uprooted by the water current (WRM, 2000).

As the water recedes and the formerly impounded area becomes exposed, vegetation can begin to colonize the area. Sometimes, the exposed area may be colonized by invasive plant species, which are able to remain for several years and prevent other vegetation from becoming established.

The removal of a dam and the subsequent drawdown of water from the impoundment area can affect the wetlands formerly bordering the impoundment area. As the dam is removed, the water table typically begins to drop. The elevation of the wetlands and the extent of the water table drawdown determine whether the wetland areas dry up and what changes will occur in the wetland species composition. Wetlands that develop alongside the newly carved channel are likely to be different than the wetlands formerly bordering the impoundment area in terms of plant and animal species composition.

The biological changes associated with the removal of a dam can be described in phases, as the waterbody makes the transition from reservoir to river. This includes a pattern of relatively rapid recovery for invertebrates or short-lived taxa, followed by a second phase of slower recovery for fish or longer-lived taxa if the dam removal is not an especially large or disruptive event. Overall, the initial impacts, such as colonization by invasive species, typically determine the ecological recovery that follows (Doyle et al., 2000).

Dam removal can allow for improved fish passage and unrestricted fish movement that provides access to spawning habitat upstream. For coastal rivers, the removal of a dam may enable tidal waters to reach upper portions of the stream that were formerly cut off by the dam, creating a spawning environment preferred by certain fish species. Access to upstream sections is particularly beneficial for some anadromous fish that live most of their lives in saltwater and swim upstream toward freshwater to spawn (Massachusetts River Restore Program, 2002).

A dam can also act as a barrier between upstream and downstream fish populations. If a downstream community of fish is an invasive fish species the dam serves as a physical barrier to separate the invasives from the upstream community (American Rivers, 2002a). Thus, the removal of the dam can negatively impact the ecosystem if it allows for the movement of a

population of an invasive species that was previously prevented from traveling to a section of the stream because of the presence of a dam.

Biological Changes: Downstream Impacts

Downstream of the former dam, wetlands are likely to reappear along side the stream channel where they occurred prior to the construction of the dam (WRM, 2000). Revegetation of river beds and banks typically occurs within one growing season, following removal of a dam (Massachusetts River Restore Program, 2002).

Recolonization of the stream banks by vegetation affects the biological community within the stream by providing shade, reducing water temperatures, and supplying a source of woody debris and organic matter to the stream.

As streamside vegetation begins to recover and suitable habitat is restored, fish begin to return. Changes in flow as a result of dam removal lead to the development of side channels and ponds that provide habitat for fish and wildlife. Increased flow rates also allow for the transport of larger debris, including gravel and logs, which create spawning beds and pool and riffle habitat (River Recovery, 2001). In addition, the rocky substrate environment, which is typically exposed as a result of dam removal, provides habitat for aquatic insects and spawning fish. In the long term, the return to natural stream temperatures, oxygen levels, and flow rates all contribute to the reestablishment of a healthy aquatic and riparian ecosystem.

Chapter 3: Channelization and Channel Modification

Channelization and channel modification describe river and stream channel engineering undertaken for flood control, navigation, drainage improvement, and reduction of channel migration potential. Activities that fall into this category include straightening, widening, deepening, or relocating existing stream channels and clearing or snagging operations. These forms of hydromodification typically result in more uniform channel cross-sections, steeper stream gradients, and reduced average pool depths. Channelization and channel modification also refer to the excavation of borrow pits, canals, underwater mining, or other practices that change the depth, width, or location of waterways, or embayments within waterways.

Channelization and channel modification activities can play a critical role in nonpoint source pollution by increasing the downstream delivery of pollutants and sediment that enter the water. Some channelization and channel modification activities can also cause higher flows, which increase the risk of downstream flooding.

Channelization and channel modification can:

- Disturb stream equilibrium
- Disrupt riffle and pool habitats
- Create changes in stream velocities
- Eliminate the function of floods to control channel-forming properties
- Alter the base level of a stream (streambed elevation)
- Increase erosion and sediment load

Many of these impacts are related. For example, straightening a stream channel can increase stream velocities and destroy downstream pool and riffle habitats. As a result of less structure in the stream to retard velocities, downstream velocities may continue to increase and lead to more frequent and severe erosion.

Management Measure 1: Physical and Chemical Characteristics of Channelized or Modified Surface Waters

Management Measure 1
1) Evaluate the potential effects of proposed channelization and channel modification on the physical and chemical characteristics of surface waters. 2) Plan and design channelization and channel modification to reduce undesirable impacts. 3) Develop an operation and maintenance program for existing modified channels that includes identification and implementation of opportunities to improve physical and chemical characteristics of surface waters in those channels.

This management measure applies to proposed channelization or channel modification projects and is intended to occur concurrently with the implementation of Management Measure 2 (Instream and Riparian Habitat Restoration). The intent of the management measure is for project planners to consider potential changes in surface water characteristics when evaluating proposed channelization or channel modification projects. Also, for existing modified channels, the planning process can include consideration of opportunities to improve the surface water characteristics necessary to support desired fish and wildlife.

The purpose of the management measure is to ensure that the planning process for new hydromodification projects addresses changes to physical and chemical characteristics of surface waters that may occur as a result of proposed work. For existing projects, this management measure can be used to ensure the operation and maintenance program uses any opportunities available to improve the physical and chemical characteristics of the surface waters.

Changes created by channelization and channel modification activities are problematic if they unexpectedly alter environmental parameters to levels outside normal or desired ranges. The physical and chemical characteristics of surface waters that may be influenced by channelization and channel modification include sedimentation, turbidity, salinity, temperature, nutrients, dissolved oxygen, oxygen demand, and contaminants. Changes in natural sediment supplies, reduced freshwater availability, and accelerated delivery of pollutants are examples of the types of changes that can be associated with channelization and channel modification.

Published case studies of existing channelization and channel modification projects describe alterations to physical and chemical characteristics of surface waters (Burch et al., 1984; Petersen, 1990; Reiser et al., 1985; Roy and Messier, 1989; Sandheinrich and Atchison, 1986; Sherwood et al., 1990; Shields et al., 1995). Frequently, the post-project conditions are intolerable to desirable fish and wildlife. The literature also describes instream benefits for fish and wildlife that can result from careful planning of channelization and channel modification

projects (Bowie, 1981; Los Angeles River Watershed, 1973; Sandheinrich and Atchison, 1986; Shields et al., 1990; Swanson et al., 1987; USACE, 1989).

Management Practices for Management Measure 1

Implementation of this management measure should begin during the planning process for new projects. For existing projects, implementation of this management measure can be included as part of a regular operation and maintenance program. The approach is two-pronged and should include:

1. *Planning and evaluation*, with numerical models for some situations, of the types of nonpoint source (NPS) pollution related to instream changes and watershed development.

2. *Operation and maintenance programs that apply* a combination of nonstructural and structural practices to address some types of NPS problems stemming from instream changes or watershed development.

Planning and Evaluation

In planning-level evaluations of proposed hydromodification projects, it is critical to understand that the surface water quality and ecological impact of the proposed project will be driven primarily by the alteration of physical transport processes. In addition, it is critical to realize that the most important environmental consequences of many hydromodification projects will occur over a long-term time scale of years to decades.

> Use models/methodologies as one means to evaluate the effects of proposed channelization and channel modification projects on the physical and chemical characteristics of surface waters. Evaluate these effects as part of watershed plans, land use plans, and new development plans.

The key element in the selection and application of models for the evaluation of the environmental consequences of hydromodification projects is the use of appropriate models to adequately characterize circulation and physical transport processes. Appropriate surface water quality and ecosystem models (e.g., salinity, sediment, cultural eutrophication, oxygen, bacteria, fisheries, etc.) are then selected for linkage with the transport model to evaluate the environmental impact of the proposed hydromodification project. There are several sophisticated two-dimensional (2D) and three-dimensional (3D) time-variable hydrodynamic models available for environmental assessments of hydromodification projects. Two-dimensional depth or laterally averaged hydrodynamic models can be routinely applied to assist with environmental assessments of beneficial and adverse effects on surface water quality by knowledgeable teams of physical scientists and engineers (Hamilton, 1990). Three-dimensional hydrodynamic models are also beginning to be more widely applied for large-scale environmental assessments of aquatic ecosystems (e.g., EPA/USACE-WES Chesapeake Bay 3D hydrodynamic and surface water quality model).

Refer to Chapter 8 for a list of some models available for studying the effects of channelization and channel modification activities (Table 8.1). Chapter 8 also provides examples of channelization and channel modification activities and associated models that can be used in the planning process.

Operation and Maintenance Programs

Several management practices can be implemented to avoid or mitigate the physical and chemical impacts generated by hydromodification projects. Many of these practices have been engineered and used for several decades, not only to mitigate human-induced impacts but also to rehabilitate hydrologic systems degraded by natural processes.

In cases where existing channelization or channel modification projects can be changed to enhance instream or streamside characteristics, several practices can be included as a part of regular operation and maintenance programs. New channelization and channel modification projects that are predicted to cause unavoidable physical or chemical changes in surface waters can also use one or more practices to mitigate the undesirable changes. Some of the types of practices include:

- Grade control structures
- Levees, setback levees, and floodwalls
- Noneroding roadways
- Streambank protection and instream sediment load controls
- Vegetative cover

Grade Control Structures

There are two basic types of grade control structures. The first type can be referred to as a bed control structure because it is designed to provide a hard point in the streambed that is capable of resisting the erosive forces of the degradational zone. The second type can be referred to as a hydraulic control structure because it is designed to function by reducing the energy slope along the degradational zone to the point where the stream is no longer capable of scouring the bed. The distinction between the operating processes of these two types is important whenever grade control structures are considered (Biedenharn and Hubbard, 2001).

Design considerations for siting of grade control structures include determining the type, location, and spacing of structures along the stream, along with the elevation and dimensions of structures. Siting grade control structures can be considered a simple optimization of hydraulics and economics. However, these factors alone are usually not sufficient to define optimum siting conditions. Hydraulic considerations must be integrated with a host of other factors that can vary from site to site to determine the final structure plan. Some of the more important factors to be considered when siting grade control structures are discussed more specifically in the U.S. Army Corps of Engineers' *Design Consideration for Siting Grade Control Structures* (Biedenharn and Hubbard, 2001).

When carefully applied, grade control structures can be highly versatile in establishing human and environmental benefits in stabilized channels. To be successful, application of grade control structures should be guided by analysis of the stream system both upstream and downstream from the area to be reclaimed (CASQA, 2003).

In some cases, grade control structures can be designed to allow fish passage. However, some grade control structures can obstruct fish passage. In many instances, fish passage is a primary consideration and may lead engineers to select several small fish passable structures in lieu of

one or more high drops that would restrict fish passage. In some cases, particularly when drop heights are small, fish are able to migrate upstream past a structure during high flows. In situations where structures are impassable, and where the migration of fish is an important concern, openings, fish ladders, or other passageways must be incorporated into the structure's design (Biedenharn and Hubbard, 2001). Fish passage practices are described in Chapter 7.

A type of grade control structure is a check dam. Refer to Chapter 7 for more information about this practice.

Levees, Setback Levees, and Floodwalls

Levees are embankments or shaped mounds constructed for flood control or hurricane protection (USACE, 1981). Setback levees and floodwalls are longitudinal structures used to reduce flooding and minimize sedimentation problems associated with fluvial systems. These practices can be used to reduce the impacts of channelization and channel modification. A more detailed discussion of levees, setback levees, and floodwalls is available in Chapter 7.

Noneroding Roadways

Disturbances along the streambank that result from activities associated with operation and maintenance of channelization projects can lead to additional nonpoint source pollution impacts to the stream. An example of human-induced activities is erosion associated with roadways. Rural road construction, streamside vehicle operation, and stream crossings usually result in significant soil disturbance and create a high potential for increased erosion processes and sediment transport to adjacent streams and surface waters. Erosion during and after construction of roadways can contribute large amounts of sediment and silt to runoff waters, which can deteriorate water quality and lead to fish kills and other ecological problems (USEPA, 1995b).

Road construction involves activities such as clearing of existing native vegetation along the road right-of-way; excavating and filling the roadbed to the desired grade; installation of culverts and other drainage systems; and installation, compaction, and surfacing of the roadbed.

Although most erosion from roadways occurs during the first few years after construction, significant impacts may result from maintenance operations using heavy equipment, especially when the road is located adjacent to a waterbody. In addition, improper construction and lack of maintenance may increase erosion processes and the risk for road failure. To minimize erosion and prevent sedimentation impacts on nearby waterbodies during construction and operation periods, streamside roadway management needs to combine proper design for site-specific conditions with appropriate maintenance practices. A discussion of how roadways can impact fish habitat and passage is available from EPA's *National Management Measures to Control Nonpoint Source Pollution from Forestry* (USEPA, 2005a).

More information about suggested practices to consider during design, construction, operation and maintenance, and general maintenance of noneroding roadways, is available from EPA's *National Management Measures to Control Nonpoint Source Pollution from Forestry* (USEPA, 2005a). This EPA guidance document also provides some suggested permanent control BMPs that may be used to prevent erosion from roadways. Additional information about noneroding roadways is available in Chapter 7 and the Resources section of this document.

Streambank Protection and Instream Sediment Load Controls

Streambank erosion is a natural process that occurs in fluvial systems. Streambank erosion can also be induced or exaggerated as a result of human activities. There are several factors within a watershed that can contribute to human induced streambank erosion. Accelerated streambank erosion related to human activity can typically be attributed to three major causes including channel modifications, reservoir construction, and land use changes (Henderson, 1986). When possible, streambank erosion problems should be addressed in the context of the entire watershed, using a systems approach that considers and accommodates natural stream processes. Approaches to addressing streambank erosion problems associated with channelization and channel modification activities can involve efforts to identify and address all significant contributing factors in addition to treating the immediate symptom, bank erosion.

In general, the design of streambank protection may involve the use of several techniques and materials. Nonstructural or programmatic management practices for the prevention of streambank failures include:

- Protection of existing vegetation along streambanks
- Careful use or regulation of irrigation near streambanks, such as rerouting of overbank drainage
- Minimization of loads on top of streambanks (such as prevention of building within a defined distance from the streambed)

Several structural practices are used to protect or rehabilitate eroded banks. These practices are usually implemented in combination to provide stability of the stream system, and they can be grouped into direct and indirect methods. Direct methods place protecting material in contact with the bank to shield it from erosion. Indirect methods function by deflecting channel flows away from the bank or by reducing the flow velocities to nonerosive levels (Henderson, 1986; Henderson and Shields, 1984). Indirect bank protection requires less bank grading and tree and snag removal. However, some structural methods like stone toe protection, as discussed below, can be placed with minimal disturbance to existing slope, habitat, and vegetation.

Feasibility of the practices at a site depends on the engineering design of the structure, availability of the protecting material, extent of the bank erosion, and specific site conditions such as the flow velocity, channel depth, inundation characteristics, and geotechnical characteristics of the bank. The use of vegetation alone or in combination with other structural practices, when appropriate, could further reduce the engineering and maintenance efforts.

Vegetation can be considered with respect to site-specific characteristics. When vegetation is combined with low cost building materials or engineered structures, numerous techniques can be created for streambank erosion control. It is important to consider the assets and limitations when planning to use planted vegetation for streambank protection. Advantages of vegetation include the following (Allen and Leech, 1997):

- Reinforces soil (increases bank stability).
- Increases resistance to flow and reduces flow velocities (from exposed stalks), causing the flow to dissipate energy against the plant (rather than the soil).

- Intercepts water.
- Enhances water infiltration.
- Depletes soil water by uptake and transpiration.
- Acts as a buffer against the abrasive effect of transported materials.
- Induces sediment deposition (from close-growing vegetation).
- Reduces costs, in some cases, when compared to most structural methods.
- Improves conditions for fisheries and wildlife.
- Improves water quality.
- Protects cultural/archeological resources.

Limits of vegetation include failure to grow; being subject to undermining; being uprooted by wind, water, and the freezing and thawing of ice; ingestion by wildlife or livestock; and maintenance requirements. Chapter 3 of *Bioengineering for Streambank Erosion Control* discusses plant acquisition, handling, and timing of planting (Allen and Leech, 1997).

Streambanks can be protected or restored either by increasing resistance of the bank to erosion or by decreasing the energy of the water at the point of contact with the bank, for example by deflecting or interrupting flows (Henderson, 1986). Instream sediment can be controlled by using several structural, vegetative, or bioengineered practices, depending on the management objective and the source of sediment. Streambank protection and channel stabilization practices, including various types of revetments, grade control structures, and flow restrictors, have been effective in controlling sediment production caused by streambank erosion. Designs should match the protection capability of the treatment to the erosion potential of each stream zone. For example, riprap may be needed at the toe of a slope to protect it from undercutting combined with tree revetments to deflect flows and provide protection for live stakings that will develop permanent support. The growing body of research indicates management techniques that emulate nature and work with natural stream processes are more successful and economical.

Significant amounts of instream sediment deposition can be prevented by controlling bank erosion processes and streambed degradation. Channel stabilization structures can also be designed to trap sediment and decrease the sediment delivery to desired areas by altering the transport capacity of the stream and creating sediment storage areas. In regulated streams, alteration of the natural streamflow, particularly the damping of peak flows caused by surface water regulation and diversion projects, can increase streambed sediment deposits by impairing the stream's transport capacity and its natural flushing power. Sediment deposits and reduced flow alter the channel morphology and stability, the flow area, the channel alignment and sinuosity, and the riffle and pool sequence. Such alterations have direct impacts on the aquatic habitat and the fish populations in the altered streams (Reiser et al., 1985).

Vegetative Cover

Streambank protection using vegetation is a commonly used practice, particularly in areas of low water velocities. Vegetative cover, also used in combination with structural practices, is often relatively easy to establish and maintain, and is visually attractive (USACE, 1983). Emergent vegetation provides two levels of protection. First, the root system helps hold soil together and increases overall bank stability by forming a binding network. Second, the exposed stalks, stems, branches, and foliage provide resistance to streamflow, causing the flow to lose part of its energy

by deforming the plants rather than by removing the soil particles. Above the waterline, vegetation protects against rainfall impact on the banks and reduces the velocity of the overland flow during storm events.

Vegetative controls are not suitable for all sites, especially those sites with severe erosion due to high flow rates or channel velocities. Refer to the Washington State Department of Transportation's (WSDOT's) *Hydraulics Manual*, Chapter 4[1] for information on calculating flow rates or channel velocities. Stabilization measures should only be implemented after a careful evaluation of the stream and the surrounding area. A knowledgeable fluvial geomorphologist may be helpful with this evaluation. In addition, plant species should be selected with care; native plant species should be used whenever possible. Appropriate species can be determined by consulting horticulturalists and botanists for plant selection assistance. The USDA-Forest Service guide, *A Soil Bioengineering Guide for Streambank and Lakeshore Stabilization*[2] provides a list of plants for soil bioengineering associated systems. The International Erosion Control Association (IECA)[3] publishes a products and services directory listing sources of plant material and professional assistance.

In addition to bank stabilization, vegetation can also offer pollutant filtering capacity. Pollutants and sediment transported by overland flow may be partly removed as a result of a combination of processes including reduction in flow pattern and transport capacity, settling and deposition of particulates, and eventual nutrient uptake by plants.

Summary of Physical and Chemical Practices

All of the following practices can be used to address the effects of channelization and channel modification activities on the physical and chemical characteristics of a waterbody:

- Bank shaping and planting
- Branch packing
- Brush layering
- Brush mattressing
- Bulkheads and seawalls
- Check dams
- Coconut fiber roll
- Dormant post plantings
- Erosion and Sediment Control (ESC) Plans
- Joint plantings
- Levees, setback levees, and floodwalls
- Live cribwalls
- Live fascines
- Live staking
- Noneroding roadways
- Return walls

[1] http://www.wsdot.wa.gov/eesc/design/hydraulics/Manual/Rev3Publications/Chapter%204.pdf
[2] http://www.fs.fed.us/publications/soil-bio-guide
[3] http://ieca.org

- Revetments
- Riprap
- Root wad revetments
- Rosgen's Stream Classification Method
- Setbacks
- Toe protection
- Tree revetments
- Vegetated buffers
- Vegetated gabions
- Vegetated geogrids
- Vegetated reinforced soil slope (VRSS)
- Wing deflectors

Additional information about each of the above practices is available in Chapter 7. The Additional Resources section provides a number of sources for obtaining information about the effectiveness, limitations, and cost estimates for these practices.

Management Measure 2: Instream and Riparian Habitat Restoration

Management Measure 2
1) Evaluate the potential effects of proposed channelization and channel modification on instream and riparian habitat. 2) Plan and design channelization and channel modification to reduce undesirable impacts. 3) Develop an operation and maintenance program for existing modified channels that includes identification and implementation of opportunities to restore instream and riparian habitat in those channels.

Implementation of this management measure is intended to occur concurrently with the implementation of the Management Measure for Physical and Chemical Characteristics of Channelized or Modified Surface Waters (see previous management measure discussion). This management measure pertains to surface waters where channelization and channel modification have altered or have the potential to alter instream and riparian habitat, such that historically present plants, fish, or wildlife are adversely affected. This management measure is intended to apply to any proposed channelization or channel modification project to determine changes in instream and riparian habitat and to existing modified channels to evaluate possible improvements to instream and riparian habitat. The purpose of this management measure is to correct or prevent detrimental changes to instream and riparian habitat from the impacts of channelization and channel modification projects.

Management Practices for Management Measure 2

Implementation of this management measure should begin during the planning process for new projects. For existing projects, implementation of this management measure can be included as part of a regular operation and maintenance program. Ensuring the involvement and participation of all partners is a place to start on any restoration project. Determining the extent of the restoration activity can help identify potential partners and other interested stakeholders. Each stakeholder may bring a certain expertise, historical information and data, and possibly funding to a project. Development of a stream corridor restoration plan can help organize the group, set goals for implementation of management practices, secure funding or other types of support, and facilitate the sharing of ideas and accomplishments within the group and to others in the community. The approach is two-pronged and should include:

1. *Planning and evaluation*, with numerical models for some situations, of the types of NPS pollution related to instream and riparian habitat changes and watershed development.

2. *Operation and maintenance* activities that restore habitat through the application of a combination of nonstructural and structural practices to address some types of NPS problems stemming from instream and riparian habitat changes or watershed development.

Planning and Evaluation

Several tools can be used to evaluate the instream and riparian health of a stream system. These approaches include:

- Biological methods/models
- Temperature restoration practices
- Geomorphic assessment techniques
- Expert judgment and checklists

Biological Methods/Models

To assess the biological impacts of channelization, it is necessary to evaluate both physical and biological attributes of the stream system. Assessment studies should be performed before and after channel modification, with samples being collected upstream from, within, and downstream from the modified reach to allow characterization of baseline conditions. It also may be desirable to identify and sample a reference site within the same ecoregion as part of the rapid bioassessment procedures discussed below.

> Use models/methodologies to evaluate the effects of proposed channelization and channel modification projects on instream and riparian habitat and to determine the effects after such projects are implemented.

There are a number of different methods that can be used to assess the biological impacts of channelization. Rapid Bioassessment Protocols (RBPs) were developed as inexpensive screening tools for determining whether a stream is supporting a designated aquatic life use (Barbour et al., 1999; Plafkin et al., 1989). One component of these protocols is an instream habitat assessment procedure that measures physical characteristics of the stream reach (Barbour and Stribling, 1991). An assessment of instream habitat quality based on 12 instream habitat parameters is performed in comparison to conditions at a "reference" site, which represents the "best attainable" instream habitat in nearby streams similar to the one being studied. The RBP habitat assessment procedure has been used in a number of locations across the United States. A small field crew of one or two persons typically can perform the procedure in approximately 20 minutes per sampling site.

Rapid Bioassessment Protocols (Barbour et al., 1999; Plafkin et al., 1989) were designed to be scientifically valid and cost-effective and to offer rapid return of results and assessments. Protocol III (RBP III) focuses on quantitative sampling of benthic macroinvertebrates in riffle/run habitats or on other submerged, fixed structures (e.g., boulders, logs, bridge abutments, etc.) where such riffles may not be available. The data collected are used to calculate various metrics pertaining to benthic community structure, community balance, and functional feeding groups. The metrics are assigned scores and compared to biological conditions as described by either an ecoregional reference database or reference sites chosen to represent the "best attainable" biological community in similarly sized streams. In conjunction with the instream

habitat quality assessment, an overall assessment of the biological and instream habitat quality at the site is derived. RBP III can be used to determine spatial and temporal differences in the modified stream reach. Application of RBP III requires a crew of two persons; field collections and lab processing require 4 to 7 hours per station and data analysis about 3 to 5 hours, totaling 7 to 12 hours per station. The RBP III has been extensively applied across the United States. More information about biological assessments is available from EPA's Biological Assessment Web site.[4]

Karr et al. (1986) describes an Index of Biological Integrity (IBI), which includes 12 metrics in three major categories of fish assemblage attributes: species composition, trophic composition, and fish abundance and condition. Data are collected at each site and compared to those collected at regional reference sites with relatively unimpacted biological conditions. A numerical rating is assigned to each metric based on its degree of agreement with expectations of biological condition provided by the reference sites. The sum of the metric ratings yields an overall score for the site. Application of the IBI requires a crew of two persons; field collections require 2 to 15 hours per station and data analysis about 1 to 2 hours, totaling 3 to 17 hours per station. The IBI, which was originally developed for Midwestern streams, can be readily adapted for use in other regions. It has been used in several states across the country to assess a wide range of impacts in streams and rivers.

Habitat Evaluation Procedures (HEPs) can be used to document the quality and quantity of available habitat, including aquatic habitat, for selected wildlife species. HEPs provide information for two general types of instream and riparian habitat comparisons:

- The relative value of different areas at the same point in time
- The relative value of the same area at future points in time

By combining the two types of comparisons, the impact of proposed or anticipated land and water use changes on instream and riparian habitat can be quantified (Ashley and Berger, 1997).

Additional information about the assessment methods discussed above, as well as other methods for assessing biological impacts is available in Table 8.2 of Chapter 8.

Temperature Restoration Practices

Channelization and channel modification activities can greatly impact stream temperature. All other factors remaining unchanged, when a channel is narrowed, the water depth increases and the surface area exposed to solar radiation and ambient temperature decreases. This can decrease water temperature. When a channel is widened, the opposite occurs; shallower depths and increased temperatures occur. Temperature may also be increased from increased turbidity because the sediment particles absorb heat. It is important to model how temperature will change in a stream, as a result of channelization and channel modification activities, to determine what other changes and impacts might occur in the stream.

[4] http://www.epa.gov/owow/monitoring/bioassess.html

Stream temperature has been widely studied, and heat transfer is one of the better-understood processes in natural watershed systems. Most available approaches use energy balance formulations based on the physical processes of heat transfer to describe and predict changes in stream temperature.

More information about temperature restoration models and practices is provided in Chapter 8 (Modeling).

Geomorphic Assessment Techniques

Fluvial geomorphology is the study of stream form and function. Geomorphic assessment focuses on qualitative and quantitative observations of stream form. It provides a "moment-in-time" characterization of the existing morphology of the stream. In addition, geomorphic assessment includes a stability component. Stability assessments place the stream in the context of past, present, and anticipated adjustment processes. Geomorphic assessments can be useful in predicting changes that could be created by channelization and channel modification activities.

Stream classification is a technique that is used to show the relationship between streams and their watersheds. There are several techniques for stream classification, all of which have advantages and limitations. Advantages of geomorphic assessment include (adapted from FISRWG, 1998):

- Promotes communication.
- Enables extrapolation of data collected on a few streams to a number of channels over a broader geographical area.
- Helps the restoration practitioner consider the landscape context and determine expected ranges of parameters.
- Enables practitioners to interpret the channel-forming or dominant processes active at the site.
- Uses reference reaches as the desired outcome of restoration.
- Provides an important cross-check to verify if the selected design values are within a reasonable range.

Limitations of geomorphic assessment include (adapted from FISRWG, 1998):

- Determination of bankfull or channel-forming flow depth may be difficult or inaccurate.
- The dynamic condition or the stream is not indicated in stream classification systems.
- River response to a perturbation or restoration action is normally not determined by classifying it alone.
- Biological health is not directly determined.
- Classifying a stream should not be used alone to determine the type, location, and purpose of restoration activities.

Schumm (1960) identified straight, meandering, and braided channels and related both channel pattern and stability to modes of sediment transport. Schumm recognized that stable straight and meandering channels have mostly suspended sediment loads and cohesive bank materials, as opposed to unstable braided streams characterized by mostly bedload sediment transport and

wide sandy channels with noncohesive bank materials. Meandering mixed-load channels are found at an intermediate condition (FISRWG, 1998).

Montgomery and Buffington (1993) proposed a classification system similar to Schumm for alluvial, colluvial, and bedrock streams in the Pacific Northwest. This system addresses channel response to sediment inputs throughout the drainage network. Six classes of alluvial channels were identified—cascade, step-pool, plane-bed, riffle-pool, regime, and braided. The stream types are differentiated based on channel response to sediment inputs. For example, steeper channels maintain their morphology while transporting sediment. Streams with lower gradients make more morphological adjustments with increased sediment loads (FISRWG, 1998).

A conceptual model of channel evolution in response to channelization (CEM-channel evolution model) was developed by Simon and Hupp (1986, 1987), Hupp and Simon (1986, 1991), and Simon (1989a, 1989b). The model identifies six geomorphic stages of channel response and was developed and extensively applied to predict empirical stream channel changes following large-scale channelization projects in western Tennessee. Data required for model application include bed elevation and gradient, channel top-width, and channel length before, during, and after modification. Gauging station data can be used to evaluate changes through time of the stage-discharge relationship and bed-level trends. Riparian vegetation is dated to provide ages of various geomorphic surfaces and thereby to deduce the temporal stability of a reach.

A component of Simon and Hupp's (1986, 1987) channel response model is the identification of specific groups of woody plants associated with each of the six geomorphic channel response stages. Their findings for western Tennessee streams suggest that the site preference or avoidance patterns of selected tree species allow their use as indicators of specific bank conditions. This method might require calibration for specific regions of the United States to account for differences in riparian zone plant communities, but it would allow simple vegetative reconnaissance of an area to be used for a preliminary estimate of stream recovery stage (Simon and Hupp, 1987).

Restoring or maintaining streams to a stable form through natural channel design requires detailed information about surface water hydrology and the interactions between rainfall and overland flow or runoff. The Rosgen classification system, developed by David L. Rosgen, and presented in *Applied River Morphology*, is currently the most comprehensive and widely used quantitative assessment method for geomorphology. It represents a compilation of much of the early work in applied fluvial geomorphology and relies largely on the identification of bankfull field indicators. The bankfull discharge is the flow event that fills a stable alluvial channel up to the elevation of the active floodplain (Rosgen, 1996). Dunne and Leopold (1978) first developed hydraulic geometry relationships for the bankfull stage, also called regional curves. Most river engineers and hydrologists work under the assumption that the bankfull discharge is equivalent to the channel forming or dominant discharge in geomorphic classification and in analog and empirical design methods. The bankfull discharge is the only discharge that can be easily identified in the field using physical indicators; therefore it is one of the most commonly used in natural channel design. Additional information about Rosgen is available in Chapter 7.

Moment-in-time stream classifications provide insights into the existing form of the stream and can help to define design parameters and understand potential modifications in reference to existing conditions. Stream classification offers a way to categorize streams based on channel morphology. The older classification systems were largely qualitative descriptions of stream features and landforms and were difficult to apply universally. In 1994, Rosgen published *A Classification of Natural Rivers*. Because of its relative simplicity and usefulness in stream restoration, the Rosgen classification system has become popular among hydrologists, engineers, geomorphologists, and biologists working to restore the biological function and stability of degraded streams. The classification consists of 41 major stream types for which stream channel stability and stream bank erosion potential can be assessed. From the assessment, structures for in-stream and stream bank restoration or modification can be selected. When planning stream restoration projects, it is important for the planning team to use a multidisciplinary approach that includes consideration of hydraulics, hydrology, water quality, geomorphological processes, and biological interactions to develop and implement a successful restoration. Chapter 7 provides additional detailed information on stream classification practices.

In site selection, geomorphic assessments can determine if a site is unstable and in need of some form of restoration activity. During design, geomorphic assessments can be used in combination with hydrologic, hydraulic, and/or sediment transport analyses to define design elements such as channel slope and hydraulic geometry.

Sediment transport analysis in rivers and streams is used to approximate the amount of sediment being moved by flow event scenarios and to determine where it will be deposited. Modeling the sediment transport capacity of a channel and its predicted sediment deposition patterns are important for assessing existing and proposed channel design projects to estimate potential project impacts. Sediment transport analysis is also useful for determining restoration opportunities in existing channelization and channel modification projects. Sediment transport analysis is often coupled with stable channel analyses methods to refine channel geometries to estimate optimal scour and deposition characteristics (Schulte et al., 2000). A good source of technical information on sediment transport analysis can be found in *River Engineering for Highway Encroachments* (FHWA, 2001).

Sediment transport analysis has been used in many projects, including:

- Channel design projects (Schulte et al., 2000)
- Stream restoration design (Copeland et al., 2001; Shields et al., 2003)
- Flood control projects (USACE, 1994)
- Highway projects that include stream crossings (FHWA, 2001)

In the design of new channelization projects and analysis of existing projects, channels are typically evaluated using channel stability methods and then the analysis is refined using sediment transport models. Sediment transport analysis is used to refine geometry so that scour and deposition are minimized. It is also used to determine the optimum grade control structure elevation and placement and to find the excavation depths in depositional zones to minimize operational costs for maintaining the channel geometry (Schulte et al., 2000).

The methods and techniques used to accomplish a geomorphic assessment should be project-specific and conducted by personnel trained in applied fluvial geomorphology. Geomorphic assessment of streams has evolved rapidly over the past 10–15 years. Initial methodologies tended to be tailored for localized applications and required extensive data collection and validation. Rosgen's methodology provides a more universal approach to stream classification that represents trade-offs between data collection needs and ease of application for many different stream types. The challenge to this type of modeling and assessment has always been to balance the complexity and need for extensive data collection with ease of use and reliability of the results. The key is that the geomorphic assessment must provide a fundamental understanding of the linkage between river form and process. The assessment should provide insight into where the stream has been, is now, and in what direction it is moving. It should also place the project reach in the context of broader system wide adjustment processes. Geomorphic assessment can be used to select sites for restoration and develop designs.

Expert Judgment and Checklists

Approaches using expert judgment and checklists developed based on experience acquired in previous projects and case studies may be very helpful in integrating environmental goals into project development. The USACE used this concept of incorporating environmental goals into project design (Shields and Schaefer, 1990) in the development of a computer-based system for the environmental design of waterways (ENDOW). The ENDOW system is composed of three modules: a streambank protection module, a flood control channel module, and a streamside levee module. The three modules require the definition of the pertinent environmental goals to be considered in the identification of design features. Depending on the environmental goals selected for each module, ENDOW will display a list of comments or cautions about anticipated impacts and other precautions to be taken into account in the design.

Another example of using expert judgment is the Proper Functioning Condition (PFC) technique. PFC was developed by the Bureau of Land Management (BLM) to rapidly assess whether a stream riparian area is functioning properly in terms of hydrology, landform/soils, channel characteristics, and vegetation. The assessment is performed by an interdisciplinary team and involves completing a checklist evaluating 17 factors concerning hydrology, vegetation, and erosional/depositional characteristics. The PFC field technique is not quantitative, but with adequate training, results are reproducible to a high degree (FISRWG, 1998).

Operation and Maintenance Activities

Implementation practices for instream and riparian habitat restoration in planned or existing modified channels are consistent with those management practices for physical and chemical characteristics of channelized or modified surface waters. To prevent future impacts to instream or riparian habitat or to solve current problems caused by channelization or channel modification projects, include one or more of the following practices to mitigate the undesirable changes:

- Bank shaping and planting
- Branch packing
- Brush layering
- Brush mattressing
- Bulkheads and seawalls

- Check dams
- Coconut fiber roll
- Dormant post plantings
- Erosion and Sediment Control (ESC) Plans
- Establish and protect stream buffers
- Joint plantings
- Levees, setback levees, and floodwalls
- Live cribwalls
- Live fascines
- Live staking
- Marsh creation and restoration
- Noneroding roadways
- Return walls
- Revetments
- Riparian improvements
- Riprap
- Root wad revetments
- Rosgen's Stream Classification Method
- Setbacks
- Toe protection
- Tree revetments
- Vegetated buffers
- Vegetated gabions
- Vegetated geogrids
- Vegetated reinforced soil slope (VRSS)
- Wing deflectors

Additional information about each of the above practices is available in Chapter 7. The Additional Resources section provides a number of sources for obtaining information about the effectiveness, limitations, and cost estimates for these practices.

Operation and maintenance programs should weigh the benefits of including practices such as those for mitigating any current or future impairments to instream or riparian habitat. Additional information about these practices can be found in Chapter 7. Also, Fischenich and Allen (2000) provide a comprehensive summary of practices that can be evaluated for use in operation and maintenance programs.

Chapter 4: Dams

Dams are a common form of hydromodification. The National Research Council estimated that there were more than 2.5 million dams in the United States in 1992 (NRC, 1992). These dams range in size from berms across small streams that create farm ponds to large concrete structures across major rivers for hydropower and flood control. The USACE estimates (of these 2.5 million dams in the United States) about 79,000 are large enough to be included in the National Inventory of Dams (USACE, n.d.b.).[1]

Dams generally were built to store and provide water for mechanical power generation (e.g., waterwheels to mill grain), industrial cooling, hydroelectric power generation, agricultural irrigation, municipal water supplies for human consumption, and impoundment-based recreation (e.g., boating and sport fishing). Dams are also used for flood control and to maintain channel depths for barge transportation.

Dams can be associated with a number of effects, including changes to hydrology, water quality, habitat, and river morphology. Lakes and reservoirs integrate many processes that take place in their contributing watersheds, including processes that contribute energy (heat), sediment, nutrients, and toxic substances. Human activities, such as agricultural and urban land use, contribute to contaminant and sediment loads to reservoirs. The presence and operation of dams can determine the fate of these pollutants in a reservoir or impoundment and potentially downstream as water is released from the dam. For example, the presence of a dam may lead to sediment accumulation in a reservoir. However, there are management practices that can mitigate this integrative effect of a reservoir. One example is selective withdrawals, which are an operational technique that can be used by some dam operators to provide water quality and temperatures necessary to sustain downstream fish populations.

When dams are built, depending on size and design, they may alter the river system structure, causing it to change from a river (flowing) to lake (static) and back to a river (flowing) system.

[1] With the National Dam Inspection Act (P.L. 92-367) of 1972, Congress authorized the U.S. Army Corps of Engineers (USACE) to inventory U.S. dams. The Water Resources Development Act of 1986 (P.L 99-662) authorized USACE to maintain and periodically publish an updated National Inventory of Dams (NID).

Dams with large storage capacities will, by design, retain water longer than those with little storage. This can change system flow patterns, which can affect water quality and habitat upstream and downstream of the dam. Most effects from dams are observed downstream. Table 4.1 provides a description of several common types of dams.

Table 4.1 Types of Dams (FEMA, 2003)

Type of Dam	Description
Ambursen dam	A buttress dam in which the upstream part is a relatively thin, flat slab usually made of reinforced concrete
Arch dam	A concrete, masonry, or timber dam with the alignment curved upstream so as to transmit the major part of the water load to the abutments
Buttress dam	A dam consisting of a watertight part supported at intervals on the downstream side by a series of buttresses
Crib dam	A gravity dam built up of boxes, crossed timbers, or gabions, filled with earth or rock
Diversion dam	A dam built to divert water from a waterway or stream into a different watercourse
Double curvature arch dam	An arch dam that is curved both vertically and horizontally
Earth dam	An embankment dam in which more than 50% of the total volume is formed of compacted earth layers that are generally smaller than 3-inch size
Embankment dam	Any dam constructed of excavated natural materials, such as both earthfill and rockfill dams, or of industrial waste materials, such as a tailings dam
Gravity dam	A dam constructed of concrete and/or masonry, which relies on its weight and internal strength for stability
Hollow gravity dam	A dam constructed of concrete and/or masonry on the outside but having a hollow interior and relying on its weight for stability
Hydraulic fill dam	An earth dam constructed of materials, often dredged, which are conveyed and placed by suspension in flowing water
Industrial waste dam	An embankment dam, usually built in stages, to create storage for the disposal of waste products from an industrial process
Masonry dam	Any dam constructed mainly of stone, brick, or concrete blocks pointed with mortar
Mine tailings dam (or tailings dam)	An industrial waste dam in which the waste materials come from mining operations or mineral processing
Multiple arch dam	A buttress dam comprised of a series of arches for the upstream face
Overflow dam	A dam designed to be overtopped
Regulating dam (or afterbay dam)	A dam impounding a reservoir from which water is released to regulate the flow downstream
Rock-fill dam	An embankment dam in which more than 50% of the total volume is comprised of compacted or dumped cobbles, boulders, rock fragments, or quarried rock generally larger than 3-inch size
Roller compacted concrete dam	A concrete gravity dam constructed by the use of a dry mix concrete transported by conventional construction equipment and compacted by rolling, usually with vibratory rollers
Rubble dam	A stone masonry dam in which the stones are unshaped or uncoursed
Saddle dam (or dike)	A subsidiary dam of any type constructed across a saddle or low point on the perimeter of a reservoir

Siting, construction, operation, maintenance, and removal of dams can lead to nonpoint source (NPS) effects. For example, siting of dams can result in inundation of wetlands, riparian areas, and fastland in areas upstream of the dam. During construction or maintenance, erosion and soil loss occurs. Proper siting and design help prevent erosion prone areas from being developed. For dams actively controlled by human operators, dam operation and the amount of water released can affect downstream areas when flood waters necessary to deliver sediment are restricted, or when controlled releases from dams change the timing, quantity, or quality of downstream flow. While removal of dams can lead to physical and biological impacts, such as temporary increased turbidity from redistribution of sediment previously stored behind the dam or displacement of warm-water species that prefer lake-like conditions, dam removal has many biological and habitat benefits, such as allowing for easier fish movement and a return of natural stream temperatures and dissolved oxygen. Sometimes, however, dams limit passage of undesirable invasive species. Therefore, a comprehensive evaluation of the benefits and limitations resulting from the presence of a dam should be completed when evaluating operation and maintenance procedures, as well as options for removal. A more detailed discussion of water quality, biological, habitat, physical, and chemical changes from dam removal is provided in Chapter 2.

One opportunity to evaluate and address the NPS impacts of some larger dams that are used for hydropower occurs during the licensing/relicensing process. The Federal Power Act (FPA) requires all nonfederal hydropower projects located on navigable waters to be licensed. The FPA (16 U.S.C. 791-828c) was originally enacted as the Federal Water Power Act in 1920 and was made part of the FPA in 1935. The Federal Energy Regulatory Commission (FERC) is the independent regulatory agency within the Department of Energy that has exclusive authority, under the FPA, to license such projects. The hydropower dam relicensing process offers an opportunity to assess the balance between natural resources and the generation of electricity and to address some areas that are determined to be problematic. Stakeholders, including dam owners and operators, local governments, environmental groups, and the public, often have different interests to be balanced. Through the FPA and the relicensing process, these varied interests can be evaluated and a balanced outcome can be derived. In conjunction with FPA licensing requirements, states and authorized tribes certify that discharges (including those that originate from dams) meet water quality standards under section 401 of the Clean Water Act (CWA).

The FPA also requires relicensing to be conducted in light of recent laws and regulations that are in effect at the time of renewal. As regulations related to hydropower dams change, it is possible that many dams that were previously licensed and are up for relicensing may no longer be in compliance with current regulatory standards. For example, many dams were built prior to the CWA, which includes regulatory requirements for protecting and maintaining designated uses (such as protecting desired aquatic life or maintaining bacterial water quality that is protective of human health for all recreational activities). Other regulatory requirements that may be evaluated during relicensing include protections for wetlands, aquatic habitat, and endangered species.[2]

[2] Additional information about FERC and hydropower licensing/relicensing is available at http://www.ferc.gov.

Management Measure 3: Erosion and Sediment Control for the Construction of New Dams and Maintenance of Existing Dams

Management Measure 3
1) Reduce erosion and, to the extent practicable, retain sediment onsite during and after construction. 2) Prior to land disturbance, prepare and implement an approved erosion and sediment control plan or similar administrative document that contains erosion and sediment control provisions.

The purpose of this management measure is to prevent sediment from entering surface waters during the construction or maintenance of dams. This management measure emphasizes the importance of minimizing sediment loss to surface waters during both dam construction and maintenance. It is essential that proper erosion and sediment control practices be used to protect surface water quality because of the high potential for sediment loss directly to surface waters. Sediment and erosion control practices can be borrowed from other applications, such as urban development and construction activities.

Two broad performance goals constitute this management measure: minimizing erosion and maximizing the retention of sediment onsite. These performance goals allow for site-specific flexibility in specifying practices appropriate for local conditions. Regular inspections of a dam are valuable opportunities for dam owners to identify erosion problems and implement sediment controls to protect the integrity of the dam. Since the number of new dam construction projects is relatively small compared to the number of existing dams, operation and maintenance activities offer significantly more opportunities to prevent NPS problems associated with erosion and sediment control.

Dam owners are encouraged to establish a program of regular safety inspection of the dam's infrastructure and dam maintenance. Safety inspection of a dam is a program of regular visual inspection using simple equipment and techniques. These inspections are often an economical means of ensuring the long-term safety and survival of a dam structure. By regularly monitoring the condition and performance of the dam and its surroundings, adequate warning of potentially unsafe conditions will enable timely maintenance. Being able to recognize the signs of potential problems and failure, as well as what to do and whom to contact, is vital. Partial or total failure of a dam may cause extensive damage to downstream areas, including loss of life, property damage, and impacts to wetlands, riparian areas, stream channels, and other ecologically important lands, for which the owner may be held liable. There are also potentially expensive repair costs and lost income that may result from failures or poorly maintained dam structures.

The primary areas of dam structural failure are:

- Loss of clay soils used in berms and other earthen structures
- Seepage and leakage at the base or along pipes
- Erosion, including wave action, stock damage and spillways
- Cracking and movement of structural components
- Defects in associated structures
- Vegetation, including catchment protection and weed control

Operation and maintenance should be applied to small, as well as large dams. Many owners of small dams, like those on farm ponds, should regularly inspect their dams for maintenance needs. Local NRCS staff can provide technical assistance to small dam owners for operation and maintenance activities.[3]

Regular operation and maintenance efforts can lead to some dams being in need of repairs and/or upgrades. Designs for repairs and upgrades can involve replacing reinforced concrete risers and impact basins, replacing rusted out corrugated metal pipe principal spillways, raising the top of the dams, widening the auxiliary spillways, and removing sediment from the flood pools. Examples of project costs for these types of maintenance activities reported in Ohio have ranged from $175,000 on a small dam to $775,000 on the largest dam (Brate, 2004).

At the state and local levels, this measure can be incorporated into existing erosion and sediment control (ESC) programs. This measure can also be effectively implemented as part of safety inspection requirements. Erosion and sediment control is also intended to be part of a comprehensive land use or watershed management program.

Management Practices for Management Measure 3

The management measure can be implemented by applying one or more management practices appropriate to the source, location, and climate. The practices described below can be applied successfully to implement the management measure for erosion and sediment control for construction of new dams and maintenance of existing dams.

Erosion Control Practices

Successful control of erosion and sedimentation from construction and maintenance activities can involve a system of management practices that targets each stage of the erosion process. The most efficient approach involves minimizing the potential sources of sediment from the onset. This means limiting the extent and duration of land disturbance to the minimum needed, and protecting surfaces once they are exposed. The second stage of the management practice system involves controlling the amount of runoff and its ability to carry sediment by diverting incoming flows and impeding internally generated flows. The third stage involves retaining sediment that is picked up on the project site through the use of sediment-capturing devices. On most sites

[3] Contact your local USDA Service Center (http://offices.sc.egov.usda.gov/locator/app) to access NRCS in your community.

successful erosion and sedimentation control requires a combination of structural and vegetative practices. All of these stages are better performed using advanced planning and good scheduling.

The timing of land disturbing activities and installation of erosion control measures must be coordinated to minimize water quality impacts. For large scale activities, the management practice system is typically installed in reverse order, starting with sediment capturing devices, followed by key runoff control measures and runoff conveyances, and then land clearing activities. Often, construction or maintenance activities that generate significant off-site sediment have failed to sequence activities in the proper order.

Erosion controls reduce the amount of sediment lost during dam construction and prevent sediment from entering surface waters. Erosion control is based on (1) minimizing the area and time of land disturbance and (2) quickly stabilizing disturbed soils to prevent erosion.

The effectiveness of erosion control practices can vary based on land slope, the size of the disturbed area, rainfall frequency and intensity, wind conditions, soil type, use of heavy machinery, length of time soils are exposed and unprotected, and other factors. In general, a system of erosion and sediment control practices can more effectively reduce offsite sediment transport than a single practice. Numerous nonstructural measures such as protecting natural or newly planted vegetation, minimizing the disturbance of vegetation on steep slopes and other highly erodible areas, maximizing the distance eroded material must travel before reaching the drainage system, and locating roads away from sensitive areas may be used to reduce erosion.

The following practices have proven to be useful in controlling erosion and can be incorporated into ESC plans and used during dam construction as appropriate. These practices can be used during and after construction and throughout ongoing maintenance activities.

- Bank shaping and planting
- Branch packing
- Brush layering
- Brush mattressing
- Bulkheads and seawalls
- Check dams
- Coconut fiber roll
- Construct runoff intercepts
- Construction management
- Dormant post plantings
- Erosion and sediment control (ESC) plans
- Erosion control blankets
- Joint planting
- Live cribwalls
- Live fascines
- Live staking
- Locate potential land disturbing activities away from critical areas
- Mulching

- Noneroding roadways
- Phase construction
- Preserve onsite vegetation
- Retaining walls
- Revegetate
- Revetment
- Riparian improvements
- Riprap
- Rootwad revetments
- Scheduling projects
- Sediment fences
- Seeding
- Site fingerprinting
- Sodding
- Soil protection
- Surface roughening
- Training—erosion and sediment control
- Tree armoring, fencing, and retaining walls or tree walls
- Tree revetments
- Vegetated buffers
- Vegetated filter strips
- Vegetated gabions
- Vegetated geogrids
- Vegetated reinforced soil slope (VRSS)
- Wildflower cover
- Wind erosions controls

A more detailed discussion of each of the above practices is provided in Chapter 7.

Runoff Control

To prevent the entry of sediment used during construction into surface waters, these precautionary steps should be followed:

- Identify areas with steep slopes, unstable soils, inadequate vegetation density, insufficient drainage, or other conditions that give rise to a high erosion potential.
- Identify measures to reduce runoff from such areas if disturbance of these areas cannot be avoided (Hynson et al., 1985).

Runoff diversions are structures that channel upslope runoff away from erosion source areas, divert sediment-laden runoff to appropriate traps or stable outlets, or capture runoff before it leaves the site, diverting it to locations where it can be used or released without erosion or flood damage. Diversions can be either temporary or permanent in nature.

Runoff control measures, mechanical sediment control measures, grassed filter strips, mulching, and/or sediment basins could be used to control runoff from the construction site. Scheduling

construction during drier seasons, exposing areas for only the time needed for completion of specific activities, and avoiding stream fording also help to reduce the amount of runoff created during construction.

The largest surface water pollution problem during construction is suspended sediment resulting from aggregate processing, excavation, and concrete work. Preventing the entry of these materials above and/or below a dam is always the preferable alternative because runoff due to these types of construction activities can add more sediment to a reservoir, harm aquatic life above and below the dam, or affect habitat in streams below a dam. Filtration and gravitational settling during detention are the main processes used to remove sediment from construction site runoff. Methods used to control runoff and associated sedimentation from construction sites include:

- Check dams
- Constructing runoff intercepts
- Locate potential land disturbing activities away from critical areas
- Preserve onsite vegetation
- Retaining walls
- Sediment basins/rock dams
- Sediment fences
- Sediment traps
- Vegetated buffers
- Vegetated filter strips

A more detailed discussion of each of the above practices is provided in Chapter 7.

Erosion and Sediment Control (ESC) Plans

ESC plans can be used to control erosion and sediment and incorporate such control in planning. Some states call for specific requirements to be included in state ESC plans. Table 4.2 provides examples of several state ESC plan requirements. Additional detail about ESC plans, including general objectives, and management techniques for ensure proper administration of plans, is available in Chapter 7.

Table 4.2 Examples of Erosion and Sediment Control Plan Requirements for Select States

Location	General Requirements for ESC Plan
Delaware	ESC plans required for sites over 5,000 ft^2. Temporary or permanent stabilization must occur within 14 days of disturbance.
Florida	ESC plans required on all sites that need a runoff management permit.
Georgia	ESC plan required for all land-disturbing activities.
Indiana	ESC plan required for sites over 5 acres.
Maine	ESC plans required for sites adjacent to a wetland or waterbody. Stabilization must occur at completion or if no construction activity is to occur for 7 days. If temporary stabilization is used, permanent stabilization must be implemented within 30 days.
Maryland	ESC plans required for sites over 5,000 ft^2 or 100 yd^3.
Michigan	ESC plans required for sites over 1 acre or within 500 ft of a waterbody. Permanent stabilization must occur within 15 days of final grading. Temporary stabilization is required within 30 days if construction ceases.

Location	General Requirements for ESC Plan
Minnesota	ESC plans required for land development over 1 acre.
New Jersey	ESC plans required for sites over 5,000 ft^2.
North Carolina	ESC plans required for sites over 1 acre. Controls must retain sediment on-site. Stabilization must occur within 30 days of completion of any phase of development.
Ohio	ESC plans required for sites over 5 acres. Permanent stabilization must occur within 7 days of final grading or when there is no construction activity for 45 days.
Oklahoma	ESC plans required for sites over 5 acres.
Pennsylvania	ESC plans required for all sites, but the state reviews only plans for sites over 25 acres. Permanent stabilization must occur as soon as possible after final grading. Temporary stabilization is required within 70 days if construction ceases for more than 30 days. Permanent stabilization is required if the site will be inactive for more than 1 year.
South Carolina	ESC plans required for all sites unless specifically exempted. Perimeter controls must be installed. Temporary or permanent stabilization is required for topsoil stockpiles and all other areas within 7 days of disturbance.
Virginia	For areas within the jurisdiction of the Chesapeake Bay Preservation Act, no more land is to be disturbed than necessary for the project. Indigenous vegetation must be preserved to the greatest extent possible.
Washington	ESC provisions are incorporated into the state runoff management plan.
Wisconsin	ESC plans required for all sites over 4,000 ft^3. Temporary or permanent stabilization is required within 7 days.

(Adapted from Environmental Law Institute, 1998; USEPA, 1993)

Management Measure 4: Chemical and Pollutant Control at Dams

Management Measure 4
1) Limit application, generation, and migration of toxic substances. 2) Ensure the proper storage and disposal of toxic materials. 3) Apply nutrients at rates necessary to establish and maintain vegetation without causing significant nutrient runoff to surface waters.

This management measure is intended to be applied to the construction of new dams, as well as to construction activities associated with the maintenance of dams. This management measure addresses fuel and chemical spills associated with dam construction and operation and maintenance activities, as well as concrete washout and related construction activities. The purpose of this management measure is to prevent downstream contamination from pollutants associated with dam construction and maintenance activities.

Although suspended sediment is the major pollutant generated at a construction site, other pollutants that may be present around dams (especially during construction and operation and maintenance activities) include:

- Petroleum products—fuels and lubricants, specifically gasoline, diesel oil, kerosene, lubricating oils, grease, and asphalt
- Pesticides—insecticides, herbicides, fungicides, and rodenticides
- Fertilizers
- Construction chemicals—acids, soil additives, and concrete-curing compounds
- Wastewater—aggregate wash water, herbicide wash water, concrete-curing water, core-drilling wastewater, or clean-up water from concrete mixers
- Solid wastes—paper, wood, metal, rubber, plastic, and roofing materials
- Garbage
- Sanitary wastes
- Cement
- Lime

This management measure is important because most erosion and sediment control practices are ineffective at retaining soluble NPS pollutants on a construction site. Many of the NPS pollutants, other than suspended sediment, generated at a construction site are carried offsite in solution or attached to clay particles in runoff. Some metals (e.g., manganese, iron, and nickel) attach to larger sediment particles and usually can be retained onsite. Other metals (e.g., copper, cobalt, and chromium) attach to fine clay particles and have greater potential to be carried offsite. Insoluble pollutants (e.g., oils, petrochemicals, and asphalt) form a surface film on runoff water and can be easily washed away (USEPA, 1973; USEPA, 2002b; USEPA, 2005d). Factors that influence the pollution potential of construction chemicals include:

- The nature of the construction and maintenance activity
- The physical characteristics of the construction site
- The characteristics of the receiving water

Dam construction sites are particularly sensitive areas and have the potential to severely impact surface waters with runoff containing construction chemical pollutants. Because dams are located on rivers or streams, pollutants generated at these construction sites have a much shorter distance to travel before entering surface waters. Therefore, chemicals and other NPS pollutants generated at a dam construction site should be controlled.

Management Practices for Management Measure 4

The management measure generally will be implemented by applying one or more management practices appropriate to the source, location, and climate. The practices described below can be applied successfully to implement the control of chemicals and pollutants at dams. This includes dam construction as well as routine maintenance. Practices for controlling chemicals and pollutants include the following:

- Equipment runoff control
- Fuel and maintenance staging areas
- Locate potential land disturbing activities away from critical areas
- Pesticide and fertilizer management
- Pollutant runoff control
- Spill prevention and control program

A more detailed discussion of each of the above practices is provided in Chapter 7.

Management Measure 5: Protection of Surface Water Quality and Instream and Riparian Habitat

Management Measure 5
Develop and implement a program to manage the operation of dams that includes an assessment of: 1) Surface water quality and instream and riparian habitat and potential for improvement. 2) Significant nonpoint source pollution problems that result from excessive surface water withdrawals.

This management measure is intended to be applied to dam operation, maintenance, and removal activities that result in the loss of desirable surface water quality, and of desirable instream and riparian habitat.

The purpose of the management measure is to protect the quality of surface waters and aquatic habitat (including riparian habitat) in the portion of rivers and streams that are impacted by dams. Operation, maintenance, and dam removal activities can be assessed to determine opportunities for potential improvements in water quality and aquatic habitat. These activities, as well as actions within the watershed, that contribute NPS pollutants to an impoundment should be collectively and periodically evaluated to help identify opportunities for cost-effective change.

The recommended overall programmatic approach is to evaluate a set of practices that can be applied individually or in combination to protect and improve surface water quality and aquatic habitat in reservoirs, as well as in areas downstream of dams. Then, a program can be implemented using the most cost-effective operation, maintenance, and removal activities to protect and improve surface water quality and aquatic and riparian habitat.

The individual application of any particular technique, such as aeration, change in operational procedure, restoration of an aquatic or riparian habitat, or implementation of a watershed protection best management practice (BMP), will, by itself, probably not improve water quality to an acceptable level within the reservoir impoundment or in tailwaters flowing through downstream areas. The individual practices discussed in this portion of the guidance may have to be implemented in some combination in order to improve water quality in the impoundment or in tailwaters to acceptable levels.

Selection of the management measure for the protection of surface water and instream and riparian habitat was based on:

- The availability and demonstrated effectiveness of practices to improve water quality in impoundments and in tailwaters of dams.

- The level of improvement in water quality of impoundments and tailwaters that can be measured from implementation of engineering practices, operational procedures, watershed protection approaches, or aquatic or riparian habitat improvements.

Successful implementation of the management measure should generally involve the following categories of practices undertaken individually or in combination to improve water quality and aquatic and riparian habitat in reservoir impoundments and in tailwaters:

- Artificial destratification and hypolimnetic aeration of reservoirs with deep withdrawal points that do not have multilevel outlets to improve dissolved oxygen (DO) levels in the impoundment and to decrease levels of other types of NPS pollutants, such as manganese, iron, hydrogen sulfide, methane, ammonia, and phosphorus in reservoir releases.

- Aeration of reservoir releases, through turbine venting, injection of air into turbine releases, installation of reregulation weirs, use of selective withdrawal structures, or modification of other turbine start-up or pulsing procedures.

- Providing both minimum flows to enhance the establishment of desirable instream habitat and scouring flows as necessary to maintain instream habitat.

- Establishing adequate fish passage or alternative spawning ground and instream habitat for fish species.

- Improving watershed protection by installing and maintaining BMPs in the drainage area above the dam to remove phosphorus, suspended sediment, and organic matter and otherwise improve the quality of surface waters flowing into the impoundment.

- Removing dams, which are unsafe, unwanted, or obsolete, after careful consideration of alternatives.

Since the presence and operation of a dam have the potential to cause impacts, periodic assessments of reservoir water quality, watershed activities, and operational practices may provide valuable information for evaluating management strategies. The types and severity of the impacts can serve as an indicator of the frequency and magnitude of the assessments. There are a variety of assessment tools that are available to assist decision-makers in the evaluation of impacts associated with dams. Watershed-related impacts and management activities can be evaluated with a variety of models. EPA supports several models that may be useful for watershed assessments, such as BASINS.[4]

[4] More information about EPA-supported watershed assessment tools can be found at http://www.epa.gov/waterscience/wqm.

Reservoir water quality can also be assessed with various models. Table 8-1 in this document provides a list of models that may be used to assess reservoir water quality. Also presented in Table 8-1 are models that could be used to evaluate downstream impacts of dams.[5]

Management Practices for Management Measure 5

The management measure generally can be implemented by applying one or more management practices appropriate to the source, location, and climate. Management practices that can be used to achieve the management measure include practices to improve water quality, restore or maintain aquatic and riparian habitat, and maintain fish passage, as well as possible removal of dams. The subsection on dam removal includes planning and evaluation considerations, descriptions of the removal process, permitting requests, sediment removal techniques, descriptions of changes associated with dam removal, and a discussion of potential biological impacts.

Practices for Improving Water Quality

Management practices for improving water quality associated with the operation and maintenance of dams can be categorized as:

- Watershed Protection Practices—activities to reduce NPS pollution that take place within the watershed surrounding a dam. Reduced NPS pollutant inputs, such as sediment or nutrients, can have a significant, positive effect on water quality within a reservoir and often in reservoir releases, as well.

- Practices for Aeration of Reservoir Water—aeration activities within the reservoir. The primary goal for aerating a large portion of reservoir water is to increase oxygen levels throughout the reservoir. Other water quality factors may also improve, including levels of dissolved metals and nutrients, destratification of the water column, and improved oxygen levels in releases.

- Practices for Aeration of Reservoir Releases — a variety of aeration techniques for improving water quality, specifically dissolved oxygen levels, are presented.

Management practices to protect surface water quality and instream and riparian habitat are discussed in the following subsections:

- Improving Water Quality
  - Watershed Protection
  - Aeration of Reservoir Water
  - Aeration of Reservoir Releases
- Improving Aquatic Habitat
- Maintaining Fish Passage
- Dam Removal

Improving water quality in impoundments and tailwaters often requires consideration of the interaction of several different factors. For example, achievement of desired DO levels at specific projects may require evaluation of several different technologies and management activities. The U.S. Army Corps of Engineers created a computer-modeling program, AERATE, that performs calculations to

[5] The USACE Environmental Laboratory develops and supports several models, such as QUAL2E, Bathtub, and CE-QUAL-RI that can be found at http://el.erdc.usace.army.mil/products.cfm?Topic=none.

evaluate several direct (e.g., active aeration technologies) and indirect (e.g., activities such as watershed management to reduce nitrogen and phosphorous runoff, which result in improved DO) reservoir aeration techniques. The program considers the following aeration techniques: improving water quality in the reservoir, modifying the withdrawal outlet location (and thereby changing which water is withdrawn and released from the reservoir), treating the release water to eliminate the poor quality as the flow passes through the outlet structure, and treating the release water in the tail water area (Wilhelms and Yates, 1995).

Watershed Protection Practices

Many NPS pollution problems in reservoirs and dam tailwaters frequently result from sources in the contributing watershed (e.g., sediment, nutrients, metals, and toxics). Management of pollution sources from a watershed has been found to be a cost-effective solution for improving reservoir and dam tailwater water quality (TVA, 1988). Watershed protection practices can be effective in producing long-term water quality benefits and lack the high operation and maintenance costs associated with structural controls.

> Additional information about watershed protection, specifically developing and implementing watershed plans, is available from EPA's draft *Handbook for Developing Watershed Plans to Restore and Protect Our Waters*. The handbook is available at http://www.epa.gov/nps.

Watershed protection is a technique that provides long-term water quality benefits, and many states and local communities have adopted this practice. Numerous state and local governments have already legislated and implemented detailed watershed planning programs that are consistent with this management measure. For example, Oregon, New Jersey, Delaware, and Florida have passed legislation that requires county and municipal governments to adopt comprehensive plans, including requirements to direct future development away from sensitive areas. Many municipalities and regions have adopted land use and growth controls, including the towns of Amherst and Norwood and the Cape Cod region of Massachusetts; Narragansett, Rhode Island; King County, Washington; and many others.

Watershed protection management practices fall under the following four categories:

- Encourage drainage protection—includes descriptions and applications of zoning techniques that can be used to limit development density or redirect density to less environmentally sensitive areas.
- Establish and protect stream buffers—describes important steps for protecting or establishing riparian buffer zones to enhance water quality and pollutant removal.
- Identify and address NPS contributions—involves identifying potential upstream sources of nonpoint source pollution, as well as providing solutions to minimize those impacts.
- Identify and preserve critical areas—entails identifying properties that if preserved or enhanced could maintain or improve water quality and reduce the impacts of urban runoff, as well as, preserving environmentally significant areas (includes land acquisition, easements, and development restrictions of various types).

Refer to Chapter 7 for additional information about each of the above practices.

Reservoir Aeration Practices

Systems that have been developed and tested for reservoir aeration rely on atmospheric air, compressed air, or liquid oxygen to increase DO concentrations in reservoir waters. Mixing of reservoir water to destratify warmer, oxygen rich, epilimnion and cooler, oxygen poor, hypolimnion waters can be used. However, this practice has not been used at large hydropower reservoirs because of the associated cost in deep, large volume reservoirs. Refer to Chapter 7 for additional information about reservoir aeration practices.

Practices to Improve Oxygen Levels in Tailwaters

Aeration of water as it passes through the dam or through the portion of the waterway immediately downstream from the dam is another approach to improving DO in water releases from dams. The systems in this category rely on agitation and turbulence to mix the reservoir releases with atmospheric air. One approach involves the increased use of spillways, which release surface water to prevent it from overtopping the dam. An alternative approach is to install barriers called weirs in the downstream areas. Weirs are designed to allow water to overtop them, which can increase DO through surface agitation and increased surface area contact. Some of these downstream systems create supersaturation of dissolved gases and may require additional modifications to prevent supersaturation, which may be harmful to aquatic organisms.

The quality of reservoir releases can be improved through adjustments in the operational procedures at dams. These include scheduling of releases or of the duration of shutoff periods, instituting procedures for the maintenance of minimum flows, making seasonal adjustments in the pool levels or in the timing and variation of the rate of drawdown, selecting the turbine unit that most increases DO (often increasing the DO levels by 1 mg/L), and operating more units simultaneously (often increasing DO levels by about 2 mg/L). The magnitude and duration of reservoir releases also should be evaluated to determine impacts to the salinity regime in coastal waters, which could be substantially altered from historical patterns.

Two factors should be considered when evaluating the suitability of hydraulic structures such as spillways and weirs for their application in raising the DO concentration in waterways:

- Most of the measurements of DO increases associated with hydraulic structures have been collected at low-head facilities. The effectiveness of these devices may be limited as the level of discharge increases (Wilhelms, 1988).

- The hydraulic functioning of these types of structures should be carefully considered since undesirable flow conditions may occur in some instances (Wilhelms, 1988).

Practices that improve oxygen levels in tailwaters include:

- Gated conduits
- Labyrinth weirs
- Modifying operational procedures
- Reregulation weirs
- Selective withdrawal

- Spillway modifications
- Turbine operation
- Turbine venting
- Water conveyances

Additional information about each of these practices is available in Chapter 7.

Practices to Restore or Maintain Aquatic and Riparian Habitat

Several options are available for the restoration or maintenance of aquatic and riparian habitat in the area of a reservoir impoundment or in portions of the waterway downstream from a dam. One set of practices is designed to augment existing flows that result from normal operation of the dam. These include operation of the facility to produce flushing flows, minimum flows, or turbine pulsing. Another approach to producing minimum flows is to install small turbines that operate continuously. Installation of reregulation weirs in the waterway downstream from the dam can also achieve minimum flows. Finally, riparian improvements are discussed for their importance and effectiveness in restoring or maintaining aquatic and riparian habitat in portions of the waterway affected by the location and operation of a dam.

A 2004 report from the National Academies' National Research Council (NRC, 2004) illustrates the importance of maintaining instream flows and critical wildlife habitat in streams where dams are present and notes that areas along Nebraska's Platte River are properly designated as "critical habitats" for the river's endangered whooping crane and threatened piping plover. A series of dams and reservoirs have been constructed in the river basin for flood control and to provide water for farm irrigation, power generation, recreation, and municipal use. The alterations to the river and surrounding land caused by this extensive water-control system, however, resulted in habitat changes that were at odds with the protection of the listed species.

Conflicts over the protection of federally listed species and water management in the Platte River Basin have existed for more than 25 years. In recent years, the Fish and Wildlife Service of the U.S. Department of the Interior issued a series of biological opinions indicating that new water depletions would have to be balanced by mitigation measures, and a lawsuit forced the designation of "critical habitat" for the piping plover. These and other controversies prompted the Department of the Interior and the Governance Committee of the Platte River Endangered Species Partnership to request that the National Research Council examine whether the current designations of "critical habitat" for the whooping crane and piping plover are supported by existing science. The National Research Council was also asked to assess whether current habitat conditions are affecting the survival of listed species or limiting their chances of recovery, and to examine the scientific basis for the department's instream-flow recommendations, habitat-suitability guidelines, and other decisions. The report concludes that in most instances habitat conditions are indeed affecting the likelihood of species survival and recovery.

Additional information about the following practices to restore or maintain aquatic and riparian habitat are available in Chapter 7:

- Constructed spawning beds
- Flow augmentation

- Riparian improvements
- Spillway modifications

Practices to Maintain Fish Passage

Migrating fish populations may be unable to travel up or downstream because of the presence of a dam or suffer losses when passing through the turbines of hydroelectric dams at facilities that have not been equipped with special design features to accommodate fish passage. The effect of dams and hydraulic structures on migrating fish has been studied since the early 1950s in an effort to develop systems or identify operating conditions that would minimize mortality rates. Selecting a device or management strategy for optimal fish passage in a stream or river with a dam requires careful analysis of a variety of factors, such as species, type and operational strategy of the dam, and the physical characteristics of the river system.

Larinier (2000) reports that devices such as fish ladders and bypass channels can help fish travel past dams, but may result in increased mortality due to the hardship and stress involved with passing through these structures. In addition, the fish passage structures have to be placed in a suitable entrance location, have a flow that is attractive to the species of concern, be continually maintained, and possess the hydraulic conditions necessary for the target species (Larinier, 2000). With all of these requirements, the success of a fish ladder or similar device is often uncertain. Passage through the hydraulic turbines of a hydropower dam can cause increased stress as a result of changes in velocity or pressure and the possibility of electric shocks from the turbines and can lead to increased mortality (Larinier, 2000).

The safe passage of fish either upstream or downstream through a dam requires a balance between operation of the facility for its intended uses and implementation of practices that will ensure safe passage of fish. The United States Congress' Office of Technology Assessment (OTA) report on fish passage technologies at hydropower facilities provides an excellent overview of fish passage technologies and discusses some of the economic considerations associated with the safe passage of fish (OTA, 1995).

The U.S. Fish and Wildlife Service and its partners have created a database that makes information about barriers to fish passage in the United States available to policy makers and the public. The database, known as the Fish Passage Decision Support System (FPDSS),[6] is part of the U.S. Fish and Wildlife Service's National Fish Passage Program.[7]

Available fish-protection systems for hydropower facilities fall into one of four categories based on their mode of action (Stone and Webster, 1986): behavioral barriers, physical barriers, collection systems, and diversion systems. These are discussed in separate sections below, along with additional practices that have been successfully used to maintain fish passage: spill and water budgets, fish ladders, fish lifts, advanced hydroelectric turbines, transference of fish runs, and constructed spawning beds.

[6] https://ecos.fws.gov/fpdss/index.do
[7] http://www.fws.gov/fisheries/fwma/fishpassage

Upstream fish passage systems have been constructed at approximately 10 percent of the FERC licensed hydropower plants. Upstream fish passage systems such as fish ladders and lifts are considered adequately developed for anadromous species such as salmon, American shad (*Alosa sapidissima*), alewives (*Alosa pseudoharengus*), and blueback herring (*Alosa aestivalis*). Fish passage systems for riverine fish have not been specifically designed, although some of these species will use fish passage systems designed for anadromous species (OTA, 1995).

Practices include:

- Advanced hydroelectric turbines
- Behavioral barriers
- Collection systems
- Fish ladders
- Fish lifts
- Physical barriers
- Spill and water budgets
- Transference of fish runs

Additional information about the above practices is available in Chapter 7.

Removal of Dams

The removal of dams has become an accepted practice for dam owners to deal with unsafe, unwanted, or obsolete dams. Dam removal may be necessary as dams deteriorate, sediments accumulate behind dams in reservoirs, human needs shift, and economics dictate (NRC, 1992). Dams serve a variety of important social and environmental purposes (e.g., water supply, flood control, power generation, wildlife habitat, and recreation). As a result, dam removal is often infrequent.

Dam Removal Resource

American Rivers is a nonprofit organization focusing on the health of U.S. river systems, fish, and wildlife. American Rivers' website hosts a variety of information related to hydromodification, including past and recent estimates of dam removals in the United States. http://www.americanrivers.org

Migratory fish passage throughout United States rivers and streams is obstructed by over 2 million dams and many other barriers such as blocked, collapsed, and perched culverts. The National Oceanic and Atmospheric Administration (NOAA) is expanding its community-based approach to restoring fish habitat through the recently developed Open Rivers Initiative (ORI).[8] Administered by NOAA Fisheries Service Office of Habitat Conservation, ORI is designed to help communities correct fish passage problems by focusing financial and technical resources on the removal of obsolete dams and other blockages. ORI strives to restore vital habitat for migrating fish like salmon, striped bass, sturgeon, and shad, as well as improve community safety and stimulate economic revitalization of riverfront communities. Through its more broadly focused Community-based Restoration Program (CRP), NOAA Fisheries Service has opened over 700 miles of stream habitat with financial and technical assistance provided to fish passage

[8] http://www.nmfs.noaa.gov/habitat/restoration/ORI

projects. Examples of successfully completed CRP projects that fit the Open Rivers Initiative model include:

- Culvert removal in the John Smith Creek (Mendocino County, CA)
- Mt. Scott Creek dam removal (Happy Valley, OR)
- Wyomissing Creek dam removal (Reading, PA)
- Town Brook dam removal and fish ladder (Plymouth, MA)
- Sennebec dam removal (Union, ME)

There are many things to consider when removing a dam, one of which is the function(s) of the dam and the status of that function (active vs. inactive). As discussed above, dams are used for various purposes, including water supply, hydroelectric power, recreation, and flood control benefits. When proposals are made to remove a dam with one or more of these active functions, the way in which these functions and benefits will be replaced or mitigated must be addressed (FOR, 1999). An example of this process can be seen with the Jackson Street Dam, located on Bear Creek in Medford, Oregon. The dam diverted water from the creek into the irrigation canals of Rogue River Valley Irrigation District (RRVID). Since the dam created a partial barrier to migratory fish, a loss of stream habitat, and an algae-filled impoundment near the city park, a consensus was reached that removing the dam was the most cost-efficient means of eliminating the problem. However, since the dam was currently providing irrigation diversion, another cost-efficient diversion had to be devised for RRVID. The decision was made to replace the old dam with a less damaging diversion structure. The new structure is approximately one-fourth the height of the Jackson Street Dam (about 3 feet) and is located 1,200 feet upstream. The new structure is also removed at the end of the irrigation season, which coincides with the time of the year when most upstream migration occurs. When the new structure is in place during the irrigation season, it allows fish to migrate (by well-designed fish ladders and screens), and it was designed so that little water will back up behind it. It is also equipped with fish screens to keep fish out of the irrigation canal (FOE et al., 1999).

It is also important to consider the cost of removing a dam, and who will pay for the removal. Removal costs can vary from tens of thousands of dollars to hundreds of millions of dollars, depending on the size and location of the dam. Who pays for dam removal can be a complex issue. Removal in the past has often been financed by the dam owner; local, state, and federal government; and in some cases agreements where multiple stakeholders cover the costs (American Rivers, n.d.a.). A guide to selected funding sources (*Paying for Dam Removal: A Guide to Selected Funding Sources)*[9] is available from American Rivers.

> Dam owners are responsible to keep the dam safe. When a dam begins to fail or breach, a decision must be made as to whether to keep or repair the structure. When a dam generates no revenue, the long-term costs of liability insurance, dam and impoundment maintenance, and operation weigh heavily on the side of dam removal. On average, dam removal costs 3–5 times less than repair.
>
> Source: Delaware Riverkeeper, n.d.

[9] http://www.americanrivers.org/site/DocServer/pdr-color.pdf?docID=727

In the case of the Jackson Street Dam, the most cost-effective alternative to solving the problems associated with the dam was to remove it. However, since it was currently functioning, an alternative means to provide that function was needed. In some instances, it is not more beneficial to remove the dam if it is functioning. For example, USACE expressed concern over the costs of air pollution created by fuel-burning power plants needed to replace the lost power from dams in the debate over the removal of the Snake River dams (Lee, 1999). There was much controversy over whether it was more cost-efficient to remove the dams, especially due to the functions the dams provided. USACE found that replacing the dams would be costly, both monetarily and ecologically. The estimated costs to replace the lower Snake hydropower were between $180 million to $380 million a year for 100 years (Lee, 1999). In addition, the cost of the resulting increase in pollution due to natural gas or coal replacement plants was very high, yet an actual amount was not determined.

Evaluations made by the USACE found that the costs associated with removing the Snake River dams greatly exceeded the costs of maintaining, improving, and keeping them (Associated Press, 2002). Therefore, the dams along the Snake River remain and have been repaired. USACE plans to pursue technical and operational changes at the Snake River dams to improve fish survival, in addition to barging or trucking juvenile salmon around the dams (Associated Press and the Herald Staff, 2002).

The entire decision-making process is a delicate balance that involves many stakeholders. One important step in this process is to decide if the ecological benefits of removing the dam outweigh the benefits of maintaining the dam.

When deciding whether to remove a dam, interested parties should collect as much information as possible about the potential removal project. American Rivers has published a fact sheet (*Data Collection: Researching Dams and Rivers Prior to Removal*),[10] which contains a variety of sources to help begin researching the particular dam that might be removed and the river on which it is located (American Rivers, n.d.b.).

American Rivers and Trout Unlimited have published a guide to help decide whether to remove a dam or not, *Exploring Dam Removal: A Decision-Making Guide* (American Rivers and Trout Unlimited, 2002).[11]

Repercussions of Unsafe Dams (American Rivers, 1999)

Unsafe dams may result in:

1. Loss of life from surging flows if a dam fails
2. Destruction of property
3. Harm to the downstream river environment (e.g., erosion)
4. Release of toxic sediments (e.g., dioxins, PCBs)
5. Risk to users of the river (i.e., users may not be able to avoid life threatening hazards if in close approximation to a failing dam)
6. Jeopardizing delivery of critical services to communities (e.g., power generation, flood control)

The decision-making process related to dam removal is often complex with inputs from stakeholders with opposing desired outcomes. Additional resources related to dam removal are available in the Resources chapter.

[10] http://www.americanrivers.org/site/DocServer/Reseaching_a_Dam_Data_Collection.pdf?docID=981
[11] http://www.americanrivers.org/site/DocServer/Exploring_Dam_Removal-A_Decision-Making_Guide.pdf?docID=3641

Chapter 5: Streambank and Shoreline Erosion

Figure 5.1 Shoreline Erosion: Before and After Photos (SEAS, 2007)

Streambanks and shorelines naturally erode. Water flowing along (parallel to) streambanks dislodges sediment and other materials that constitute the streambank. Similarly, water flowing perpendicular to shorelines, due to waves or tides, transports sediment and other materials away from the shoreline. Anthropogenic influences change the natural erosion processes, often increasing erosion locally and sedimentation downstream, along adjacent shorelines, or offshore. Many human activities change the hydraulic characteristics of stream flows or transfer energy to adjacent shorelines and contribute to increased streambank and shoreline erosion, for example:

- *Urbanization* that leads to changes in imperviousness creates changes in the hydraulics of water during wet weather events. Increased imperviousness can result in flashier runoff events that are shorter in duration with greater flow rates and more erosive force.
- *Agricultural practices*, such as drainage ditches, can change the characteristics of subsurface water flows into receiving streams. These changes result in less subsurface water storage and often increase stream flows during and after storms.
- *Livestock grazing* may reduce vegetative cover, which can result in more erosion on uplands and increased sediment and other pollutant loads in streams. Livestock that are allowed direct access to streams can significantly increase streambank erosion and destroy important riparian habitat.
- *Roads* built in rural areas, such as forest and recreational roads, alter the natural landscape and can destroy riparian habitat. If not properly installed and maintained, these types of roads erode and supply increased sediment and pollutants to adjacent streams. Additionally, roads may increase imperviousness, which leads to flashier runoff events. Stream crossings associated with rural roads can block fish passage, trap debris during storms, and lead to increased streambank erosion in nearby areas.
- *Marinas* can alter local wave and tidal flow patterns, resulting in transference of wave and tidal energy to adjacent shorelines.
- *Channelization or channel straightening* sometimes results in an increase in the slope of a channel, which causes an increase in stream flow velocities. Channel modifications to reduce flood damage, such as levees and floodwalls, often narrow the stream width, increasing the velocity of the water and thus its erosive potential. In addition, newly

constructed banks are generally more prone to erosion than "seasoned" banks and are more likely to require bank stabilization.

- *Dams* alter the flow of water, sediment, organic matter, and nutrients, resulting in both direct physical and indirect biological effects. The impact of a dam on a stream corridor can vary, depending on the purposes of the dam and its size in relation to stream flow. Varying discharges released from a hydropower dam can be a significant factor increasing streambank erosion. When dams are a barrier to the flow of sediment and organic materials, the decreased suspended sediment load in release waters may lead to scouring of downstream streambeds and streambanks.

In summary, these anthropogenic factors can affect the state of equilibrium in streams or along shorelines. The typical chain of events that follows the disturbance to a stream corridor or shoreline can be described as changes in:

- Hydrology
- Stream hydraulics
- Morphology
- Factors such as sediment transport and storage
- Alterations to the biological community
- Impervious cover

Management Measure 6: Eroding Streambanks and Shorelines

Management Measure 6
1) Where streambank or shoreline erosion is a nonpoint source (NPS) pollution problem, streambanks and shorelines should be stabilized. Vegetative methods are strongly preferred unless structural methods are more effective, considering the severity of stream flow discharge, wave and wind erosion, and offshore bathymetry, and the potential adverse impact on other streambanks, shorelines, and offshore areas. 2) Protect streambank and shoreline features with the potential to reduce NPS pollution. 3) Protect streambanks and shorelines from erosion due to uses of either the shorelands or adjacent surface waters.

Typically, several streambank and shoreline stabilization techniques may be used to effectively control erosion wherever it is a source of nonpoint pollution. Often a combination of techniques may be necessary to effectively control conditions that are causing the increased erosion. Techniques involving marsh creation and vegetative bank stabilization ("soil bioengineering") will usually be effective at sites with limited exposure to strong currents or wind-generated waves. In cases with increased erosional forces, an integrated approach that employs the use of structural systems in combination with soil bioengineering techniques can be utilized. The use of harder, more structural approaches, including beach nourishment and coastal or riparian structures, may need to be considered in areas facing severe water velocities or wave energy. In addition to controlling the sources of sediment contributed to surface waters, which are causing nonpoint source (NPS) pollution, these techniques can halt the destruction of wetlands and riparian areas located along the shoreline. Once affected streambanks and shorelines are protected, they can serve as a filter for surface water runoff from upland areas, or as a temporary sink for nutrients, contaminants, or sediment already present as NPS pollution in surface waters.

Stabilization practices involving vegetation or engineering structures should be properly designed and installed. These techniques should be applied only when there will be no adverse effects to aquatic or riparian habitat, or to the stability of adjacent shorelines. In addition to activities that are applied directly to an eroding streambank or shoreline, there may be opportunities to promote institutional measures that establish minimum setback requirements or a buffer zone to reduce concentrated flows and promote infiltration of surface water runoff in areas adjacent to the shoreline.

Stream-friendly Project Tips

Before Construction
Involve your neighbors to increase project success
Get the necessary permits
Flag and avoid disturbing wetlands
Preserve existing native trees and shrubs
Cut trees and shrubs rather than ripping them out of the ground (many may resprout)
Make a plan to replant disturbed areas and use native plants
Install sediment-control practices (e.g., coffer dams)

During Construction
Stockpile fertile topsoil for later use for plants
Use hand equipment rather than heavy equipment
If using heavy equipment, use wide-tracks or rubberized tires
Work from the streambank, preferably on the higher, non-wetland side
Avoid instream work except as authorized by your local fishery and wildlife authority
Stay 100 feet away from water when refueling or adding oil
Avoid using wood treated with creosote or copper compounds

After Construction
Keep out people and livestock during plant establishment
Check project after high flows
Water plants during *droughts*
Control grass until trees and shrubs overtop grass, usually two to three years

Source: SWCD. No date. *Protecting Streambanks from Erosion: Tips for Small Acreages in Oregon*. Washington County Soil and Water Conservation District and the Small Acreage Steering Committee, Oregon Association of Conservation Districts. http://www.or.nrcs.usda.gov/news/factsheets/fs4.pdf. Accessed June 2003.

Initially project planners can consider whether a complete removal or reversal of the causative effects is possible. For example, when evaluating restoration sites affected by upstream armoring and urbanization, rather than adding armoring to the downstream site that is eroding, the planning team may consider whether changes to operations up stream can be made. Next, activities to improve existing erosion damage may be examined. The alteration of operation approaches in combination with management and restoration efforts can reduce future impacts. Similarly, removal of channelization structures may allow for a greater recovery of the integrity of a stream corridor. If feasible, the objective of a restoration design should be to eliminate or moderate disruptive influences to allow for equilibrium (NRC, 1992). If this is not possible, restoration may have limited effectiveness in the long term or may require a closer look at an entire watershed to determine alternate restoration activities. See Chapter 6 for additional information on watershed planning and restoration information.

A glossary of stream restoration terms is available from U.S. Army Corps of Engineers' Ecosystem Management and Restoration Research Program at http://el.erdc.usace.army.mil/elpubs/pdf/sr01.pdf.

This management measure was selected for the following reasons:

- Many anthropogenic activities can destabilize streambanks and shorelines, resulting in erosion that contributes significant amounts of NPS pollution in surface waters.
- The loss of coastal land and streambanks due to shoreline and streambank erosion results in reduction of riparian areas and wetlands that have NPS pollution abatement potential.
- A variety of activities related to use of shorelands or adjacent surface waters can result in erosion of land along coastal bays or estuaries and loss of land along rivers and streams.

Preservation and protection of shorelines and streambanks can be accomplished through many approaches, but preference in this guidance is for vegetative practices, such as soil bioengineering and marsh creation, where their use is appropriate.

Management Practices for Management Measure 6

The management measure generally will be implemented by applying one or more management practices appropriate to the source, location, and climate. A variety of vegetative and structural practices are presented and are examples of activities that can be used as a single practice or in combination with other practices to achieve the desired project goals. An example of a source of information is the USACE publication *Stream Management* (Fischenich and Allen, 2000), which provides a good summary of vegetative and structural practices as well as a comprehensive review of processes related to stream and streambank erosion. The document also presents a thorough overview of planning activities for approaching streambank erosion issues.

The types of practices that can be used to accomplish the elements of Management Measure 6, including the following groups of practices:

- Vegetative practices
- Structural practices
- Integrated systems
- Planning and regulatory approaches

Vegetative Practices

Vegetative practices have a long history of use in Europe for streambank and shoreline protection and for slope stabilization. Prior to the 1980s, they have been practiced in the United States only to a limited extent, primarily because other engineering options, such as the use of riprap, have been more commonly accepted practices (Allen and Klimas, 1986). The use of vegetative streambank and shoreline stabilization practices have become more common in the United States over the past several decades as their implementation has shown to be physically and ecologically successful. Economically, less costly alternatives of stabilization, such as vegetative practices, are being pursued as alternatives to engineering structures for controlling erosion of streambanks and shorelines.

Vegetative practices, sometimes referred to as soil bioengineering, refer to the installation of plant materials as a main structural component in controlling problems of land instability where

erosion and sedimentation are occurring (USDA-NRCS, 1992). Vegetative practices can be defined as, "the use of live and dead plant materials, in combination with natural and synthetic support materials, for slope stabilization, erosion reduction, and vegetative establishment" (FISRWG, 1998).

Basic principles of soil bioengineering include the following (USDA-NRCS, 1992):

- Fit the soil bioengineering system to the site
  - Topography and exposure (e.g., note the degree of slope, presence of moisture)
  - Geology and soils (e.g., determine soil depth and type)
  - Hydrology (e.g., calculate peak flows in the project area)
- Retain existing vegetation whenever possible
- Limit removal of vegetation
- Stockpile and protect topsoil
- Protect areas exposed during construction
- Divert, drain, or store excess water

Additionally, vegetative approaches have the advantage of providing food, cover, and instream and riparian habitat for fish and wildlife and result in a more aesthetically appealing environment than traditional engineering approaches (Allen and Klimas, 1986). Many planners of vegetative practices try to utilize native plants and materials that can be obtained from local stands of species. These plants are already well adapted to the climate and soil conditions of the area and thus have an increased chance of becoming established and surviving. The use of locally available plants also cuts the costs of a restoration project (Gray and Sotir, 1996). Vegetative systems that use locally available plants have the added advantage of blending in with natural vegetation over time.

Additional benefits of using bioengineering methods include (USEPA, 2003c):

- Designed to be low maintenance or maintenance-free in the long run
- Enhance habitat not only by providing food and cover sources, but by serving as a temperature control for aquatic and terrestrial animals
- If successful, can stabilize slopes effectively in a short period of time (e.g., one growing season)
- Self-repairing after establishment
- Filter overland runoff, increase infiltration, and attenuate flood peaks

The limitations of vegetative practices include the need for skilled laborers and the difficulty of locating plant materials, particularly during the dormant season, which is the optimal time for installation. To properly establish a soil bioengineering planting, orientation, on-site training, and careful supervision of the labor crews are required. Another limitation, which is avoidable, is that projects that promote the growth of thick vegetation may increase roughness values or increase friction and raise floodwater elevations. This should be taken into consideration during the planning stages of a project and prevented.

Additional information about soil bioengineering principles is available from the *Engineering Field Handbook, Chapter 18* (USDA-NRCS, 1992).[1] Local agencies, such as the USDA Natural Resources Conservation Service (NRCS) and the Cooperative Extension Service, can be useful sources of information on appropriate native plant species to consider in bioengineering projects.

The USDA Forest Service has published *A Soil Bioengineering Guide for Streambank and Lakeshore Stabilization*,[2] which provides information on how to successfully plan and implement a soil bioengineering project, including the application of soil bioengineering techniques. The guide also provides specific tips for using soil bioengineering techniques successfully.

Specific vegetative practices include (USDA-NRCS, 1992):

- Branch packing
- Brush layering
- Brush mattressing
- Coconut fiber roll
- Dormant post plantings
- Live fascines
- Live staking
- Marsh creation and restoration
- Tree revetments
- Vegetated buffers

Refer to Chapter 7 for additional information about the above practices. The Additional Resources section provides a number of sources for obtaining information about the effectiveness, limitations, and cost estimates for these practices.

Structural Approaches

Soil bioengineering alone is not suitable in all instances. When considering an approach to streambank or shoreline stabilization, it is important to take several factors into account. For example, it is inappropriate to stabilize slopes with vegetative systems in areas that would not support plant growth, such as those areas with soils that are toxic to plants, areas of high water velocity, or where there is significant wave action (Gray and Sotir, 1996). Shores subject to wave erosion will usually require structures or beach nourishment to dampen wave or stream flow energy.

Properly designed and constructed shoreline and streambank erosion control structures are used in areas where higher water velocity or wave energy make vegetative stabilization and marsh creation ineffective. In addition to careful consideration of the engineering design, the proper planning for a shoreline or streambank protection project will include a thorough evaluation of

[1] The soil bioengineering chapter of the handbook is available at http://www.info.usda.gov/CED/ftp/CED/EFH-Ch18.pdf.
[2] Available at http://www.fs.fed.us/publications/soil-bio-guide.

the physical processes causing the erosion. To complete the analysis of physical factors, the following steps are suggested (Hobbs et al., 1981):

- Determine the limits of the shoreline reach
- Determine the rates and patterns of erosion and accretion and the active processes of erosion within the reach
- Determine, within the reach of the sites of erosion-induced sediment supply, the volumes of that sediment supply available for redistribution within the reach, as well as the volumes of that sediment supply lost from the reach
- Determine the direction of sediment transport and, if possible, estimation of the magnitude of the gross and net sediment transport rates
- Estimate factors such as ground-water seepage or surface water runoff that contribute to erosion

Some of the most widely accepted alternative engineering practices for streambank or shoreline erosion control are described below. These practices will have varying levels of effectiveness depending on the strength of waves, tides, streamflow, or currents at the project site. They will also have varying degrees of suitability at different sites and may have varying types of secondary impacts. One important impact that must always be considered is secondary effects, such as the transfer of wave or streamflow energy, which can cause erosion elsewhere, either offshore or alongshore. Finding a satisfactory balance between these three factors (effectiveness, suitability, and secondary impacts) is often the key to a successful streambank or shoreline erosion control project.

Examples of structural approaches include:

- Beach nourishment
- Breakwaters
- Bulkheads and seawalls
- Check dams
- Groins
- Levees, setback levees, and floodwalls
- Return walls
- Revetment
- Riprap
- Toe protection
- Wing deflectors

Refer to Chapter 7 for additional information about the above practices. The Additional Resources section provides a number of sources for obtaining information about the effectiveness, limitations, and cost estimates for these practices.

Integrated Systems

The use of structural systems alone may raise concern because these systems lack vegetation, which can be effective at stabilizing soils in most conditions. Additionally, vegetated systems

can help to restore damaged habitat along shorelines and streambanks. Integrated systems, which combine structural systems and vegetation, can be very effective in many settings where vegetation adds support and habitat to structural systems. An example of an integrated system is the use of stones for toe protection (structural) and soil bioengineering techniques (vegetative) for the upper banks of a waterway. Integrated slope protection designs that employ the traditional structural methods and the soil bioengineering techniques have proven to be more cost effective than either method independently. Where construction methods are labor-intensive and labor costs are reasonable, the combination of methods may be especially cost effective (Gray and Sotir, 1996).

Integrated systems include:

- Bank shaping and planting
- Joint planting
- Live cribwalls
- Riparian improvements
- Root wad revetments
- Vegetated gabions
- Vegetated geogrids
- Vegetated reinforced soil slope (VRSS)

Refer to Chapter 7 for additional information regarding the above practices. The Additional Resources section provides a number of sources for obtaining information about the effectiveness, limitations, and cost estimates for these practices.

Planning and Regulatory Approaches

In addition to the vegetative, structural, and integrated practices discussed above, another group of practices that can be used to protect streambanks and shorelines includes planning and regulatory approaches. The variety of planning activities include practices in waters adjacent to eroding streambanks and shorelines (e.g., evaluating the erosion potential) and on land areas adjacent to eroding streambanks and shorelines (e.g., watershed planning processes). There are also a variety of local policy and regulatory activities that can be used to protect sensitive or eroding streambanks and shorelines ranging from setback requirements and vegetated buffer minimum widths to requirements for erosion and sediment control plans for various types of construction activities. The following are examples (with complete descriptions located in Chapter 7) of planning and regulatory protection activities that could be used to protect vulnerable streambanks or shorelines:

- Erosion and sediment control plans
- Establishment and protection of stream buffers
- Rosgen's stream classification method
- Setbacks
- Shoreline sensitivity assessment

Chapter 6: Guiding Principles

Many of the management measures and practices recommended by EPA to reduce the nonpoint source (NPS) pollutant impacts associated with hydromodification activities stress the need to incorporate planning as a tool. States, local governments, or community groups should begin the planning process early when trying to determine how to address a particular NPS issue associated with a new or existing hydromodification project. The planning process should bring key stakeholders together so that a variety of options can be explored to adequately define the problem and potential solutions. Once the issues are identified according to the various perspectives, project goals can be established to solve one or more environmental problems.

One important part of the planning process is the identification of the goals of the different stakeholders. Once these goals, which are sometimes different for the different groups of stakeholders, are identified and defined, the planning team can strive to achieve a balance among the needs of the various stakeholders. Often restoration compromises can be made to meet differing goals of the stakeholders to achieve a balance of the needs of the different groups. For example, changes in hydroelectric dam operation may be possible to produce minimum base flows downstream from the dam to support a variety of aquatic habitats, while still providing energy in a profitable manner. In addition, solutions that only allow for complete removal of the dam and restoration to preexisting stream conditions may not be possible because of other changes in the watershed (e.g., urbanization, other hydromodification projects, or the need for affordable and environmentally friendly electricity). A compromise solution that enables the dam to continue to operate while minimizing environmental impacts and to enhance critical downstream habitats that support a desirable fish population may be the best solution.

Part of the planning process and achievement of balance when evaluating techniques for restoring areas impacted by NPS pollution associated with hydromodification activities can be termed “creating opportunities.” For example, an opportunity may be found by working with stakeholders such as local homeowners who are concerned about the unsightly algae present in a community reservoir. Reducing runoff containing an abundant supply of nitrogen and phosphorous pollutants from lawns surrounding the reservoir may lead to reductions in the algal bloom. Changes in land use that result in increasing the permeability of land adjacent to a channelized stream can reduce the overall volume and velocity of water in the stream. As flooding conditions are reduced, “hard” structures like bulkheads can be replaced with softer, vegetative solutions along the stream channel. The combination of reduced scouring flows associated with the greater stream velocities and vegetated channel banks can lead to improved instream ecological conditions. There are many other possible opportunities waiting to be found and implemented when projects are evaluated at the watershed level.

Project planning and analysis are essential parts of success when trying to reduce the impact of NPS pollution from new or existing hydromodification activities. One example of a planning process is explained in the EPA document *Ecological Restoration: A Tool to Manage Stream Quality* (USEPA, 1995a). This document outlines the key steps in the ecological restoration decision framework as:

- Identification of impaired or threatened watersheds

- Inventory of the watershed
- Identification of the restoration goals
- Selection of candidate restoration techniques
- Implementation of selected restoration techniques
- Monitoring

Other EPA guidance documents offer similar approaches to the restoration planning process, including *Community-Based Environmental Protection: A Resource Book for Protecting Ecosystems and Communities* (USEPA, 1997a). Both guidance documents offer a variety of case studies to provide readers with examples of the frameworks as they are applied to real-world situations. EPA's *Draft Handbook for Developing Watershed Plans to Restore and Protect Our Waters* (USEPA, 2005c) also provides useful planning information related to watershed plans.

The Natural Resources Conservation Service (NRCS) is also a source of information for planning. NRCS provides assistance through their Watershed Protection and Flood Prevention Program, whose purpose is to assist federal, state, local agencies, local government sponsors, tribal governments, and program participants to protect and restore watersheds from damage caused by erosion, floodwater, and sediment; to conserve and develop water and land resources; and to solve natural resource and related economic problems on a watershed basis. The program provides technical and financial assistance to local people or project sponsors, builds partnerships, and requires local and state funding contribution.[1]

NRCS uses locally-led conservation programs, which are an extension of the agency's traditional assistance to individual farmers and ranchers, for planning and installing conservation practices for soil erosion control, water management, and other purposes. Through this effort, local people, generally with the leadership of conservation districts along with NRCS technical assistance, will assess their natural resource conditions and needs, set goals, identify ways to solve resource problems, utilize a broad array of programs to implement solutions, and measure their success.

When planning any new development activities or restoration of already developed or impacted activities, it is important to account for the guiding principles:

- Using a watershed approach
- Smart growth principles
- Project design principles
- Monitoring and maintenance of structures

Each of these principles is discussed in more detail below.

[1] Additional information about this program, as well as contact information is available at http://www.nrcs.usda.gov/programs/watershed.

Using a Watershed Approach

EPA recommends the use of a watershed approach as the key framework for dealing with problems caused by runoff and other sources that impair surface waters (USEPA, 1998). The watershed protection approach is a comprehensive planning process that considers all natural resources in the watershed, as well as social, cultural, and economic factors. Using a watershed approach, multiple stakeholders integrate regional and locally-led activities with local, state, tribal, and federal environmental management programs. EPA works with federal agencies, states, tribes, local communities, and non-governmental sectors to make a watershed approach the key coordinating framework of planning, restoration, and protection efforts to achieve "clean and safe" water and healthy aquatic habitat.

The watershed approach framework can be applied to address impacts caused by hydromodification activities throughout a watershed. Additionally, the watershed approach can help to identify and address problems within a watershed that increase NPS pollution associated with hydromodification activities.

Major elements of successful watershed approaches include:

- Focusing on hydrologically-defined areas—watersheds and aquifers have hydrologic features that converge to a common point of flow; watersheds range in size from very large (e.g., the Mississippi River Basin) to a drainage basin for a small creek.

- Using an integrated set of tools and programs (regulatory and voluntary, federal/state/tribal/local and non-governmental sectors) to address the myriad problems facing the Nation's water resources, including NPS and point source pollution, habitat degradation, invasive species, and air deposition of pollutants (e.g., mercury and nutrients).

- Involving all parties that have a stake or interest in developing collaborative solutions to a watershed's water resource problems.

- Using an iterative planning or adaptive management process of assessment and setting environmental, water quality, and habitat goals (e.g., water quality standards).

- Planning, implementation, and monitoring to ensure that plans and implementation actions are revised to reflect new data.

- Breaking down barriers between plan development and implementation to enhance prospects for success.

A key attribute of the watershed approach is that it can be applied with equal success to large- and small-scale watersheds. Federal agencies, states, interstate commissions, and tribes usually apply the approach on larger scales, such as in watersheds greater than 100 square miles in size.

However, local agencies and urban communities can apply the approach to watersheds as small as several acres in size.

Although specifics may vary from large scale to small scale, the basic goals of the watershed approach remain the same—protecting, maintaining, and restoring water resources, based on the geomorphology, ecology, and other natural characteristics of the waterbody. Local runoff management program officials must be especially conscious of watershed scale when planning and implementing specific management practices. For example, programmatic practices, such as stream protection ordinances and public education campaigns, are usually applied community wide. Consequently, the results benefit many small watersheds. In contrast, structural practices, such as vegetative approaches, usually provide direct benefits to a single stream. Regional structural management practices such as headland breakwater systems for larger watersheds can be used, but they do not protect smaller contributing streams. Given limited resources, program officials must often analyze cost and benefits and choose between large- and small-scale practices. Often, a combination of nonstructural and structural practices implemented across the watershed and at regional and local levels is the most cost effective approach.

An example of the watershed approach being used for hydromodification activities is the South Myrtle Creek Ditch Project. South Myrtle Creek, which flows into the South Umpqua River in Oregon, was historically populated with cutthroat trout (*Oncorhynchus clarki*) and coho salmon (*Oncorhynchus kisutch*). However, since the early 20th century, diversion structures, used primarily to provide water for irrigating agricultural crops, have blocked the passage of fish through creek waters (USEPA, 2002c). One example of the diversion structures was a diversion dam with a concrete apron, which was installed in a portion of South Myrtle Creek to raise the water level in an impoundment to provide irrigation water for adjacent and downstream landowners. During the summer, water levels in the creek would elevate 14 feet above natural levels and were diverted into a 2.5 mile irrigation ditch. Ultimately, hydromodification of this stream caused flow modifications and high stream temperatures, which degraded water quality for the native trout and salmon populations.

9 Elements of Watershed Planning

EPA has identified a minimum of nine elements that are critical for achieving improvements in water quality. EPA requires that these nine elements be addressed for section 319-funded watershed plans and strongly recommends that they be included in all other watershed plans that are intended to remediate water quality impairments. Additional information is available from FY 2004 Guidelines for the Award of Section 319 Nonpoint Source Grants to States and Territories *at* http://www.epa.gov/owow/nps/cwact.html. *The nine elements are listed below:*

a. Identification of causes of impairment and pollutant sources or groups of similar sources that need to be controlled to achieve needed load reductions, and any other goals identified in the watershed plan. Sources that need to be controlled should be identified at the significant subcategory level along with estimates of the extent to which they are present in the watershed (e.g., X linear miles of eroded streambank needing remediation).

b. An estimate of the load reductions expected from management measures.

c. A description of the nonpoint source management measures that will need to be implemented to achieve load reductions and a description of the critical areas in which those measures will be needed to implement this plan.

d. Estimate of the amounts of technical and financial assistance needed, associated costs, and/or the sources and authorities that will be relied upon to implement this plan.

e. An information and education component used to enhance public understanding of the project and encourage their early and continued participation in selecting, designing, and implementing the nonpoint source management measures that will be implemented.

f. Schedule for implementing the nonpoint source management measures identified in this plan that is reasonably expeditious.

g. A description of interim measurable milestones for determining whether nonpoint source management measures or other control actions are being implemented.

h. A set of criteria that can be used to determine whether loading reductions are being achieved over time and substantial progress is being made toward attaining water quality standards.

i. A monitoring component to evaluate the effectiveness of the implementation efforts over time, measured against the criteria established under item h immediately above.

In 1998 one of the landowners initiated a project to restore flow and improve water quality in South Myrtle Creek. The project used the guiding principles of the watershed approach to restore the health of the creek.

- *Partnership*. The project was a collaborative effort of landowners, who donated services and supplies. The project received funding and support from government agencies, such as the U.S. Fish and Wildlife Service, the Oregon Water Resources Department, the Oregon Watershed Enhancement Board, the Bureau of Land Management, the Natural Resources Conservation Service, and the Douglas County Watermaster.

- *Geographic focus*. Resource management activities were directed specifically to the creek and the drainage ditch, where flow restoration and improved water quality were desired.

- *Sound management techniques based on strong science and data*. An assessment of South Myrtle Creek identified water quality problems from flow modification and high stream temperatures as the priority problems in the creek. The diversion dam and concrete apron were found to be causing the problems. Landowners, the Water Resources Department, and the Watershed Enhancement Board developed a plan, the goal of which was to restore flow and improve water quality in the creek. The plan was implemented by removing the diversion dam and concrete apron. The irrigation system was switched to a sprinkler type system, which is more efficient than the original ditch irrigation. In addition, the denuded riparian area was revegetated to help lower stream temperatures and new seedlings were protected with fencing to keep away livestock.

With the cooperation of the landowners, the county and state governments, and other interested parties, the South Myrtle Creek Ditch Project was a success. Water temperatures have improved and flows have increased by 2.5 cubic feet per second during the summer. Restoration of the streambed to its historical level has allowed passage of salmon and trout to the 10 miles of stream above the dam (USEPA, 2002c).[2]

Smart Growth

Smart growth practices cover a range of development and conservation strategies that are environmentally sensitive, economically viable, community-oriented, and sustainable. Environmental impacts of development can be reduced with techniques that include compact development, reduced impervious surfaces and improved water detention, safeguarding of environmentally sensitive areas, mixing of land uses (e.g., homes, offices, and shops), transit accessibility, and better pedestrian and bicycle amenities.

Through smart growth approaches that enhance neighborhoods and involve local residents in development decisions, these communities are creating vibrant places to live, work, and play. The high quality of life in these communities makes them economically competitive, creates business opportunities, and improves the local tax base. Smart growth practices have also been shown to help protect water quality by reducing the amount of paved surfaces and allowing natural lands to filter rainwater and runoff before it reaches downstream areas.

Based on the experience of communities around the nation that have used smart growth approaches to create and maintain great neighborhoods, the Smart Growth Network[3] developed a set of ten basic principles:

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[2] Additional information about the project is available at http://www.epa.gov/owow/nps/Section319III/OR.htm.
[3] Smart Growth Network (SGN) is a partnership of government, business, and civic organizations that support smart growth. The SGN Web site, Smart Growth Online (http://www.smartgrowth.org/Default.asp?res=1024), features an extensive array of smart growth-related news, events, information, research, presentations, and publications.

1. Mix land uses
2. Take advantage of compact building design
3. Create a range of housing opportunities and choices
4. Create walkable neighborhoods
5. Foster distinctive, attractive communities with a strong sense of place
6. Preserve open space, farmland, natural beauty, and critical environmental areas
7. Strengthen and direct development towards existing communities
8. Provide a variety of transportation choices
9. Make development decisions predictable, fair, and cost effective
10. Encourage community and stakeholder collaboration in development decisions

EPA offers help to communities through the EPA smart growth program to improve development practices and get the type of development they want. They work with local, state, and national experts to discover and encourage successful, environmentally sensitive development strategies. EPA is engaged in conducting research, publishing reports and other publications,[4] showcasing outstanding communities, working with communities through grants[5] and technical assistance (Smart Growth Implementation Assistance Program),[6] and bringing together diverse interests to encourage better growth and development.[7]

Low Impact Development

Low Impact Development (LID) is an innovative stormwater management approach. The goal of LID is to mimic a site's predevelopment hydrology by using design techniques that infiltrate, filter, store, evaporate, and detain runoff close to its source (Low Impact Development Center, Inc., n.d.).

LID is based on the paradigm that stormwater management should not be viewed as stormwater disposal and that numerous opportunities exist within the developed landscape to control stormwater runoff close to the source. These principles include (NRDC, n.d.):

- Integrate stormwater management early in site planning activities
- Use natural hydrologic functions as the integrating framework
- Focus on prevention rather than mitigation
- Emphasize simple, low-tech, and low cost methods
- Manage as close to the source as possible
- Distribute small-scale practices throughout the landscape
- Rely on natural features and processes
- Create a multifunctional landscape

[4] http://www.epa.gov/piedpage/publications.htm
[5] http://www.epa.gov/piedpage/grants/index.htm
[6] http://www.epa.gov/piedpage/sgia.htm
[7] Links to technical assistance, tools, partnerships and grants and other funding are at "Making Smart Growth Happen" at http://www.epa.gov/piedpage/sg_implementation.htm.

The use of LID practices offers both economic and environmental benefits. LID measures result in less disturbance of the development area and conservation of natural features, and they can be less cost intensive than traditional stormwater control mechanisms. Cost savings for control mechanisms are not only for construction, but also for long-term maintenance and life cycle cost considerations (USEPA, 2000).

Ten common LID practices are the following (NRDC, n.d.):

- Impervious surface reduction and disconnection
- Permeable pavers
- Pollution prevention and good housekeeping
- Rain barrels and cisterns
- Rain gardens and bioretention
- Roof leader disconnection
- Rooftop gardens
- Sidewalk storage
- Soil amendments
- Tree preservation
- Vegetated swales, buffers, and strips

Project Design Considerations

General Design Factors

When designing any type of restoration project, it is important to consider the watershed as a whole as well as the specific site where restoration will occur. A watershed survey, or visual assessment, evaluates an entire watershed and can be used to help identify and verify pollutants, sources, and causes of impairments that lead to changes in streambank erosion. Additional monitoring of chemical, physical, and biological conditions may be necessary to determine if water quality is actually being affected by observed pollutants and sources. Watershed surveys can provide an accurate picture of what is occurring in the watershed. EPA's *Volunteer Stream Monitoring: A Methods Manual*[8] provides a watershed survey visual assessment form that may be used. In addition to EPA's method, a variety of visual assessment protocols have been developed by states and agencies. Designers of watershed restoration plans should look for assessment protocols that are already being used in their state or local area (USEPA, 2005c). Another general resource for planning and implementing restoration projects associated with hydromodification activities is EPA's *National Management Measures to Protect and Restore Wetlands* (USEPA, 2005b).

Photographs may also be a powerful tool that can be incorporated into watershed surveys. Photos serve as a visual reference for the site and provide before and after pictures that may be used to analyze restoration or remediation activities. In addition to taking individual photographs, aerial photographs may also provide important before and after information and can be obtained from

[8] http://www.epa.gov/owow/monitoring/volunteer/stream/vms32.html

USGS (Earth Science Information Center), USDA (Consolidated Farm Service Agencies, Aerial Photography Field Office), and other agencies (USEPA, 2005c). Refer to EPA's draft *Handbook for Developing Watershed Plans to Restore and Protect Our Waters* (USEPA, 2005c) for more information about watershed assessments.

Assessment

Tools to analyze channels on a site-by-site basis may include geomorphic assessments such as the methodology developed by Rosgen. Geomorphic assessments help to determine river and stream characteristics such as channel dimensions, reach slope, and channel enlargement and stability. This information about stream physical characteristics might help the restoration team to understand current stream conditions and may be evaluated over time to describe degradation or improvements in the stream. Geomorphic assessment may also be useful for predicting future stream conditions, which can help in selecting suitable restoration or protection approaches (USEPA, 2005c).

The Rosgen geomorphic assessment approach groups streams into different geomorphic classes, based on a set of criteria that include entrenchment ratio, width/depth ratio, sinuosity, channel slope, and channel materials. Assessment methodologies, such as Rosgen's Stream Classification System, can help identify streams at different levels of impairment, determine the types of hydrologic and physical factors affecting stream morphologic conditions, and choose appropriate management measures to implement if needed.[9] Another common geomorphic assessment method is the Modified Wolman Pebble Count (Harrelson et al., 1994), which characterizes the texture (particle size) in the stream or riverbeds of flowing surface waters. It can be used alone or with Rosgen-type assessments. The composition of the streambed can provide information about the characteristics of the stream, including effects of flooding, sedimentation, and other physical impacts on a stream (USEPA, 2005c). Other assessment methods may be available from state agencies or environmental organizations.

The physical conditions of a site can provide important information about factors affecting overall stream integrity, such as agricultural activities and urban development. Runoff from cropland and feedlots can carry sediment into streams, clog existing habitat, and change geomorphological characteristics. An understanding of stream physical conditions can facilitate identification of sources and pollutants and allow for designing and implementing more effective restoration and protection strategies. Physical characterization should also extend beyond the streambanks or shore and include a look at conditions in riparian areas (USEPA, 2005c).

Before choosing a practice to restore an area impacted by hydromodification activities, it is also important to determine what biological endpoints are desired and to consider other environmental or water quality goals. Biological endpoints may include metrics such as the number of fish surviving, number of offspring produced, impairment of reproductive capability, or morbidity. Biological endpoints can be used to evaluate the effectiveness of treatment schemes and can serve as a design parameter during restoration planning. Water quality goals, such as increasing low dissolved oxygen levels, reducing nitrogen or phosphorous pollutant

[9] More information about the Rosgen Stream Classification System is available at http://www.epa.gov/watertrain/stream_class/index.htm.

levels, or decreasing turbidity, are also important to consider when planning restoration. For example, if turbidity is a major problem in the waterbody, planners will want to choose a method of restoration that prevents erosion, is efficient at trapping sediment before it enters the waterbody, or one that will help sediment to settle in desired locations of the stream or river. Looking at endpoints and goals before designing the method of restoration can help planners and stakeholders achieve the desired results.

Engineering Considerations

When choosing from the various alternatives of engineering practices for addressing impacts associated with hydromodification, such as protecting and restoring eroding streambanks and shorelines, the following factors should be taken into consideration:

- Foundation conditions
- Level of exposure to erosive forces
- Availability of materials
- Initial and annual costs
- Past performance

Foundation conditions may have a significant influence on the selection of the specific practice or combination of practices to be used for restoring areas impacted by hydromodification, including shoreline or streambank stabilization. Foundation characteristics at the site must be compatible with the structure that is to be installed for erosion control. A structure such as a bulkhead, which must penetrate through the existing substrate for stability, will generally not be suitable for shorelines with a rocky bottom. Where foundation conditions are poor or where little penetration is possible, a gravity-type structure such as a stone revetment may be preferable. However, all vertical protective structures (revetments, seawalls, and bulkheads) built on sites with soft or unconsolidated bottom materials can experience scouring as incoming waves are reflected off the structures. In the absence of additional toe protection in these circumstances, the level of scouring and erosion of bottom sediments at the base of the structure may be severe enough to contribute to structural failure at some point in the lifetime of the installation.

Along streambanks, the erosive force of the current during periods of high streamflow will influence the selection of bank stabilization techniques and details of the design. For shorelines, the levels of wave exposure at the site will also generally influence the selection of shoreline stabilization techniques and details of the design. In areas of severe levels of exposure to erosive forces, such as strong wave action or currents, light structures such as vegetative techniques, timber cribbing, or light riprap revetment may not provide adequate protection. The effects of winter ice along the shoreline or streambank may also need to be considered in the selection and design of erosion control projects.

The availability of materials is another key factor influencing the selection of suitable techniques for protecting and restoring areas affected by hydromodification activities. For a vegetative approach, availability of plant materials of sufficient quantity and quality is an important design consideration. A particular type of bulkhead, seawall, or revetment may not be economically feasible if materials are not readily available near the construction site. Installation methods may also preclude the use of specific structures in certain situations. For instance, the installation of

bulkhead pilings in coastal areas near wetlands may not always be permissible due to disruptive impacts in locating pile-driving equipment at the project site.

Costs should also be included in the decision making process for implementing hydromodification practices. The total cost of a project should be viewed as including both the initial costs (materials, labor, and planning) and the annual costs of operation and maintenance. To the extent possible, practices should be compared by their total costs. Although a particular practice may be cheaper initially, it could have operation and maintenance costs that make it more expensive in the long run. For example, in some parts of the country, the initial costs of timber bulkheads may be less than the cost of stone revetments. However, stone structures typically require less maintenance and have a longer life than timber structures. Other types of structures whose installation costs are similar may actually have a wide difference in overall cost when annual maintenance and the anticipated lifetime of the structure are considered (USACE, 1984). Environmental benefits, such as creation of habitat, should also be factored into cost evaluations.

An example of a valuable resource that provides specific cost information for practices to protect or reduce streambank and shoreline erosion is your local USDA Service Center, which makes available services provided by the NRCS.[10]

The engineering designers should also evaluate similar existing projects and practice designs to determine how well they performed compared to design specifications. An important consideration for determining past performance is to compare the physical, water quality, and biological endpoints specified in the design with the corresponding endpoints that were observed in the monitoring results. For example, if an operation and maintenance program for an urban channelization project incorporates establishment of vegetative cover along many of the low energy areas of an urban stream, the long-term performance of the vegetative cover can be evaluated with metrics such as:

- Percent of riparian area with erosion problems
- Number of recreationally important fish species present
- Annual operation and maintenance costs
- Changes in important water quality parameter values (e.g., dissolved oxygen, turbidity)

Incorporating Monitoring and Maintenance of Structures

Generally, the monitoring program will help to determine how well the project is performing with respect to the design goals and the extent of any maintenance activities needed (NRC, 1992). The project monitoring plan should be an integral part of the overall design and will be an important consideration for developing long-term project costs and resource needs. Once the project's goals are established, performance indicators are then matched to the goals to create the

[10] A list of USDA Service Centers is available at http://offices.sc.egov.usda.gov/locator/app. A list of regional and state NRCS offices is available at http://www.nrcs.usda.gov/about/organization/regions.html#state.

monitoring program (NRC, 1992). The monitoring program should also be appropriate to the scope of the project (NRC, 1992) by including considerations such as:

- The area covered by the monitoring compared to the area of the overall project—both should be similar.
- The frequency and intensity of sampling to provide reliable assessments of the performance indicators.
- The cost and resources required for monitoring should reflect the overall cost and resources of the project.
- The performance indicators provide information to enable effective assessments of the project goals and decision-making for project maintenance activities.

Each project will have unique goals and corresponding monitoring needs. Chapter 3 of The National Research Council's document *Restoration of Aquatic Ecosystems* (NRC, 1992) provides detailed advice on considerations for planning a monitoring program for restoration activities such as those associated with hydromodification activities. Some additional monitoring considerations can be found in the USDA Forest Service document *A Soil Bioengineering Guide for Streambank and Lakeshore Stabilization* (USDA-FS, 2002):

- Keeping track of where plants were harvested—is there a correlation between growth rate of certain cuttings and the "mother" plants?
- Is the installation functioning as designed?
- Which areas are maturing more rapidly than others?
- Are seeds sprouting in the newly formed beds?
- Which plants have invaded the site through natural succession?
- What has sprouted in the second season?
- Which areas are experiencing difficulty and why?
- Is the bank stabilizing or washing away and why?
- Is something occurring that is unexpected?
- Which techniques are succeeding?
- Are any of the structures failing?

USDA NRCS' *The Practical Streambank Bioengineering Guide*[11] (Bentrup and Hoag, 1998) provides an example monitoring form. The monitoring sheet is also available in Appendix C of *A Soil Bioengineering Guide for Streambank and Lakeshore Stabilization* (USDA-FS, 2002).[12]

During the first few years after installation, maintenance is necessary until vegetation becomes established and the bank stabilizes. Structures may shift or you may notice something that was left undone. Once vegetation is established, projects should become self-sustaining and require little or no maintenance. Be sure the site is managed to give the treatment every chance to be effective over a long period of time (USDA-FS, 2002).

[11] http://www.engr.colostate.edu/~bbledsoe/CE413/idpmcpustguid.pdf
[12] http://www.fs.fed.us/publications/soil-bio-guide/guide/appendices.pdf

Common maintenance tasks include (USDA-FS, 2002; Bentrup and Hoag, 1998):

- Remove debris and weeds that may shade and compete with cuttings
- Secure stakes, wire, twine, etc.
- Control weeds
- Repair weakened or damaged structures (including fences)
- Replant and reseed as necessary (it is not uncommon for a flood to occur days after installation)

Planting success varies from project to project. Bentrup and Hoag (1998) provide the following potential growth success rates:

Pole Plantings	*70-100%*
Live Fascines	*20-50%*
Brush Layering	*10-70%*
Post Plantings	*50-70%*

It is beneficial to inspect the project every other week for the first 2 months after installation, once a month for the next 6 months, and then every other month for 2 years, at least. One should also inspect the project after heavy precipitation, flooding, snowmelt, drought, or any extraordinary occurrence. Assess damage from flooding, wildlife, grazing, boat wakes, trampling, drought, and high precipitation (USDA-FS, 2002). Additional information about monitoring is available from USDA NRCS' *The Practical Streambank Bioengineering Guide* (Bentrup and Hoag, 1998).

Plan and design all streambank, shoreline, and navigation structures so that they do not transfer erosion energy or otherwise cause visible loss of surrounding streambanks or shorelines.

Maintenance varies with the structural type. For stone revetments, the replacement of stones that have been dislodged is necessary; timber bulkheads need to be backfilled if there has been a loss of upland material, and broken sheet pile should be replaced as necessary. Gabion baskets should be inspected for corrosion failure of the wire, usually caused either by improper handling during construction or by abrasion from the stones inside the baskets. Baskets should be replaced as necessary since waves will rapidly empty failed baskets.

Steel, timber, and aluminum bulkheads should be inspected for sheet pile failure due to active earth pressure or debris impact and for loss of backfill. For all structural types not contiguous to other structures, lengthening of flanking walls may be necessary every few years. Through periodic monitoring and required maintenance, a substantially greater percentage of coastal structures will perform effectively over their design life. Since streambank or shoreline protection projects can transfer energy from one area to another, which causes increased erosion in the adjacent area, the possible effects of erosion control measures on adjacent properties should be routinely monitored.

Chapter 7: Practices for Implementing Management Measures

Many of the operation and maintenance solutions presented in Chapter 3 (Channelization and Channel Modification) are also practices that can be used to stabilize streambanks and shorelines as presented in Chapter 5 (Streambank and Shoreline Erosion). For example, a stream channel that has been hardened with vertical concrete walls to prevent local flooding and limit the stream to its existing channel (to protect property built along the stream channel), may benefit from operation and maintenance practices that use opportunities to replace the concrete walls with appropriate vegetative or combined vegetative and non-vegetative structures along the streambank when possible. These same practices may be applicable to stabilize downstream streambanks that are eroding and creating a nonpoint source (NPS) pollution problem because of the upstream development and hardened streambanks.

The following practices apply to one or more management measures. The descriptions and illustrations presented in this chapter are intended to provide a starting point for stakeholders and decision-makers for selecting possible practices to address NPS pollution problems associated with hydromodification activities. Table 7.1 provides a cross-reference of the practices with possible applications for the various hydromodification management measure components (e.g., instream and riparian restoration corresponds to the second component of Management Measures 1 and 2 described in detail in Chapter 3). Users of the information provided in the following table and descriptions evaluate the attributes of the possible practices with site-specific conditions in mind.

Table 7.1 Practices for Hydromodification Management Measures

	Channelization		Dams								Streambanks				Shorelines			
	Physical & chemical	Instream/riparian restoration	Erosion control	Runoff control	Chemical/pollutant control	Watershed protection	Aerate reservoir water	Improve tailwater oxygen	Restore/maintain habitat	Maintain fish passage	Vegetative	Structural	Integrated	Planning & regulatory	Vegetative	Structural	Integrated	Planning & regulatory
Practices	MM1	MM2	MM3		MM4	MM5					MM6							
Advanced Hydroelectric Turbines (7-7)										●								
Bank Shaping and Planting (7-9)	●	●	●										●				●	
Beach Nourishment (7-10)												●				●		
Behavioral Barriers (7-12)										●								
Branch Packing (7-14)	●	●	●								●							
Breakwaters (7-15)																●		
Brush Layering (7-17)	●	●	●								●							
Brush Mattressing (7-19)	●	●	●								●							
Bulkheads and Seawalls (7-21)	●	●	●									●				●		
Check Dams (7-22)	●	●	●	●								●						
Coconut Fiber Roll (7-23)	●	●	●								●							
Collection Systems (7-25)										●								
Construct Runoff Intercepts (7-26)			●	●														
Constructed Spawning Beds (7-27)									●									
Construction Management (7-28)			●															
Dormant Post Plantings (7-29)	●	●	●								●				●			

	Channelization		Dams								Streambanks				Shorelines			
	Physical & chemical	Instream/riparian restoration	Erosion control	Runoff control	Chemical/pollutant control	Watershed protection	Aerate reservoir water	Improve tailwater oxygen	Restore/maintain habitat	Maintain fish passage	Vegetative	Structural	Integrated	Planning & regulatory	Vegetative	Structural	Integrated	Planning & regulatory
Encourage Drainage Protection (7-30)						●												
Equipment Runoff Control (7-31)					●													
Erosion and Sediment Control (ESC) Plans (7-32)	●	●	●											●				●
Erosion Control Blankets (7-35)			●															
Establish and Protect Stream Buffers (7-37)		●				●								●				
Fish Ladders(7-38)										●								
Fish Lifts (7-40)										●								
Flow Augmentation (7-41)									●									
Fuel and Maintenance Staging Areas (7-43)					●													
Gated Conduits (7-44)								●										
Groins (7-45)																●		
Identify and Address NPS Contributions (7-46)						●												
Identify and Preserve Critical Areas (7-48)						●												
Joint Planting (7-50)	●	●	●										●					
Labyrinth Weir (7-51)								●										
Levees, Setback Levees, and Floodwalls (7-52)	●	●										●				●		

	Channelization		Dams								Streambanks				Shorelines			
	Physical & chemical	Instream/riparian restoration	Erosion control	Runoff control	Chemical/pollutant control	Watershed protection	Aerate reservoir water	Improve tailwater oxygen	Restore/maintain habitat	Maintain fish passage	Vegetative	Structural	Integrated	Planning & regulatory	Vegetative	Structural	Integrated	Planning & regulatory
Live Cribwalls (7-54)	●	●	●										●					
Live Fascines (7-56)	●	●	●								●							
Live Staking (7-58)	●	●	●								●							
Locate Potential Land Disturbing Activities Away from Critical Areas (7-60)			●	●	●													
Marsh Creation and Restoration (7-61)		●									●				●			
Modifying Operational Procedures (7-62)								●										
Mulching (7-63)			●															
Noneroding Roadways (7-64)	●	●	●															
Pesticide and Fertilizer Management (7-67)					●													
Phase Construction (7-69)			●															
Physical Barriers (7-70)										●								
Pollutant Runoff Control (7-72)					●													
Preserve Onsite Vegetation (7-73)			●	●														
Reregulation Weir (7-74)								●										
Reservoir Aeration (7-75)							●											
Retaining Walls (7-77)			●	●														
Return Walls (7-78)	●	●										●				●		
Revegetate (7-79)			●															

	Channelization		Dams								Streambanks				Shorelines			
	Physical & chemical	Instream/riparian restoration	Erosion control	Runoff control	Chemical/pollutant control	Watershed protection	Aerate reservoir water	Improve tailwater oxygen	Restore/maintain habitat	Maintain fish passage	Vegetative	Structural	Integrated	Planning & regulatory	Vegetative	Structural	Integrated	Planning & regulatory
Revetment (7-80)	●	●	●									●				●		
Riparian Improvements (7-82)		●	●						●				●				●	
Riprap (7-83)	●	●	●									●				●		
Root Wad Revetments (7-84)	●	●	●										●					
Rosgen's Stream Classification Method (7-86)	●	●												●				
Scheduling Projects (7-88)			●															
Sediment Basins/Rock Dams (7-89)				●														
Sediment Fences (7-91)			●	●														
Sediment Traps (7-92)				●														
Seeding (7-93)			●															
Selective Withdrawal (7-94)								●										
Setbacks (7-95)	●	●												●				●
Shoreline Sensitivity Assessment (7-97)																		●
Site Fingerprinting (7-99)			●															
Sodding (7-100)			●															
Soil Protection (7-101)			●															
Spill and Water Budgets (7-102)										●								
Spill Prevention and Control Program (7-103)					●													
Spillway Modifications (7-104)								●	●									
Surface Roughening (7-105)			●															

	Channelization		Dams								Streambanks				Shorelines			
	Physical & chemical	Instream/riparian restoration	Erosion control	Runoff control	Chemical/pollutant control	Watershed protection	Aerate reservoir water	Improve tailwater oxygen	Restore/maintain habitat	Maintain fish passage	Vegetative	Structural	Integrated	Planning & regulatory	Vegetative	Structural	Integrated	Planning & regulatory
Toe Protection (7-106)	●	●										●				●		
Training—ESC (7-107)			●															
Transference of Fish Runs (7-108)										●								
Tree Armoring, Fencing, and Retaining Walls or Tree Wells (7-109)			●															
Tree Revetments (7-110)	●	●	●								●				●			
Turbine Operation (7-112)								●										
Turbine Venting (7-113)								●										
Vegetated Buffers (7-114)	●	●	●	●							●				●			
Vegetated Filter Strips (7-115)			●	●														
Vegetated Gabions (7-116)	●	●	●										●				●	
Vegetated Geogrids (7-118)	●	●	●										●				●	
Vegetated Reinforced Soil Slope (VRSS) (7-120)	●	●	●										●				●	
Water Conveyances (7-121)								●										
Wildflower Cover (7-122)			●															
Wind Erosion Controls (7-123)			●															
Wing Deflectors (7-124)	●	●										●				●		

Advanced Hydroelectric Turbines

Channelization
- ☐ Physical & chemical
- ☐ Instream/riparian restoration

Dams
- ☐ Erosion control
- ☐ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☑ Maintain fish passage

Erosion
- ☐ Streambanks ☐ Shorelines
  - ☐ Vegetative
  - ☐ Structural
  - ☐ Integrated
  - ☐ Planning & regulatory

Hydroelectric turbines can be designed to reduce impacts to juvenile fish passing through the turbine as it operates. Most research on advanced hydroelectric turbines is being carried out by power producers in the Columbia River basin (U.S. Army Corps of Engineers (USACE) and public utility districts) who are looking to improve the survival of hydroelectric turbine-passed juvenile fish by modifying the operation and design of turbines. Development of low impact turbines is also being pursued on a national scale by the U.S. Department of Energy (DOE) (Cada, 2001).

In the last few years, field studies have shown that improvements in the design of turbines have increased the survival of juvenile fish. Researchers continue to examine the causes and extent of injuries from turbine systems, as well as the significance of indirect mortality and the effects of turbine passage on adult fish. Overall, improvements in turbine design and operation, and new field, laboratory, and modeling techniques to assess turbine-passage survival, are contributing towards improving downstream fish passage at hydroelectric power plants (Cada, 2001).

The redesign of conventional turbines for fish passage has focused on strategies to reduce obstructions and to narrow the gaps between moveable elements of the turbine that are thought to injure fish. The effects of changes in the number, size, orientation, or shape of the blades that make up the runner (the rotating element of a turbine which converts hydraulic energy into mechanical energy) are being investigated (Cada, 2001).

The USACE has put considerable resources into improving turbine passage survival. The USACE Turbine Passage Survival Program (TSP) was developed to investigate means to improve the survival of juvenile salmon as they pass through turbines located at Columbia and Snake River dams. The TSP is organized along three functional elements that are integrated to achieve the objectives (Cada, 2001):[1]

- Biological studies of turbine passage at field sites
- Hydraulic model investigations
- Engineering studies of the biological studies, hydraulic components, and optimization of turbine operations

DOE supports development of low impact turbines under the Advanced Hydropower Turbine System (AHTS) Program. The AHTS program explores innovative concepts for turbine design that will have environmental benefits and maintain efficient electrical generation. The AHTS program awarded contracts for conceptual designs of advanced turbines to different firms/companies. Early in the development of conceptual designs, it became clear that there were

[1] Additional information about USACE efforts with advanced hydroelectric turbines is available at http://hydropower.inel.gov/turbines/pdfs/amfishsoc-fall2001.pdf.

significant gaps in the knowledge of fish responses to physical stresses (injury mechanisms) experienced during turbine passage. Consequently, the AHTS program expanded its activities to include studies to develop biological criteria for turbines (Cada, 2001).[2]

[2] Additional information about DOE efforts with advanced hydroelectric turbines is available at http://hydropower.inel.gov/turbines/pdfs/amfishsoc-fall2001.pdf.

Bank Shaping and Planting

Channelization
- ☑ Physical & chemical
- ☑ Instream/riparian restoration

Dams
- ☑ Erosion control
- ☐ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☑ Streambanks ☑ Shorelines
  - ☐ Vegetative
  - ☐ Structural
  - ☑ Integrated
  - ☐ Planning & regulatory

Bank shaping and planting involve regrading a streambank to establish a stable slope angle, placing topsoil and other material needed for plant growth on the streambank, and selecting and installing appropriate plant species on the streambank. This design is most successful on streambanks where moderate erosion and channel migration are anticipated. Reinforcement at the toe of the bank is often required, particularly where flow velocities exceed the tolerance range for plantings and where erosion occurs below base flows. To determine the appropriate slope angle, slope stability analyses that take into account streambank materials, groundwater fluctuations, and bank loading conditions are recommended (FISRWG, 1998).

Additional Resources

- FISRWG. 1998. *Stream Corridor Restoration: Principles, Processes, and Practices*. Federal Interagency Stream Restoration Working Group. http://www.nrcs.usda.gov/technical/stream_restoration/PDFFILES/APPENDIX.pdf.

- Mississippi State University, Center for Sustainable Design. 1999. *Water Related Best Management Practices in the Landscape: Bank Shaping and Vegetating.* Created for United States Department of Agriculture, Natural Resource Conservation Service, Watershed Science Institute. http://www.abe.msstate.edu/csd/NRCS-BMPs/pdf/streams/bank/bankshaping.pdf.

Beach Nourishment

Channelization
- ☐ Physical & chemical
- ☐ Instream/riparian restoration

Dams
- ☐ Erosion control
- ☐ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☑ Streambanks ☑ Shorelines
  - ☐ Vegetative
  - ☑ Structural
  - ☐ Integrated
  - ☐ Planning & regulatory

The creation or nourishment of existing beaches provides protection to the eroding area and can also provide a riparian habitat function, particularly when portions of the finished project are planted with beach or dune grasses (Woodhouse, 1978). Beach nourishment (Figures 7.1 through 7.4) requires a readily available source of suitable fill material that can be effectively transported to the erosion site for reconstruction of the beach (Hobson, 1977). Dredging or pumping from offshore deposits is the method most frequently used to obtain fill material for beach nourishment. A second possibility is the mining of suitable sand from inland areas and overland hauling and dumping by trucks. To restore an eroded beach and stabilize it at the restored position, fill is placed directly along the eroded sector (USACE, 1984). In most cases, plans must be made to periodically obtain and place additional fill on the nourished beach to replace sand that is carried offshore into the zone of breaking waves or alongshore in littoral drift (Houston, 1991; Pilkey, 1992).

One important task that should not be overlooked in the planning process for beach nourishment projects is the proper identification and assessment of the ecological and hydrodynamic effects of obtaining fill material from nearby submerged coastal areas. Removal of substantial amounts of bottom sediments in coastal areas can disrupt populations of fish, shellfish, and benthic organisms (Atlantic States Marine Fisheries Commission, 2002). Grain size analysis should be performed on sand from both the borrow area and the beach area to be nourished. Analysis of grain size should include both size and size distribution, and fill material should match both of these parameters (Stauble, 2005). Fill materials should also be analyzed for the presence of contaminants, and contaminated sediment should not be used (CA Department of Boating and Waterways and State Coastal Conservancy, 2002). Turbidity levels in the overlying waters can also be raised to undesirable levels (EUCC, 1999). Certain

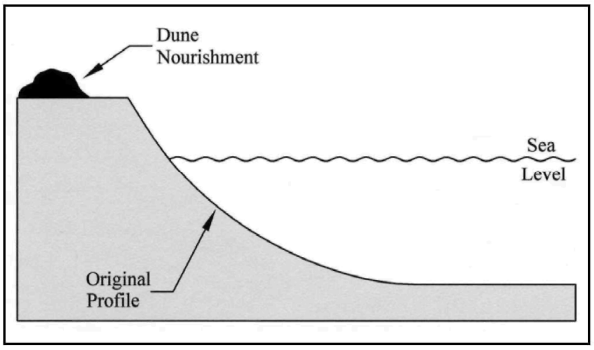

Figure 7.1 Dune Nourishment (CA Dept. of Boating and Waterways and State Coastal Conservancy, 2002)

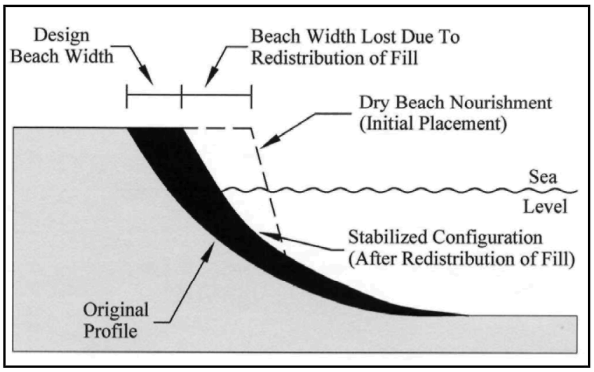

Figure 7.2 Dry Beach Nourishment (CA Dept. of Boating and Waterways and State Coastal Conservancy, 2002)

areas may have seasonal restrictions on obtaining fill from nearby submerged areas (TRB, 2001). Timing of nourishment activities is frequently a critical factor since the recreational demand for beach use frequently coincides with the best months for completing the beach nourishment. These may also be the worst months from the standpoint of impacts to aquatic life and the beach community such as turtles seeking nesting sites.

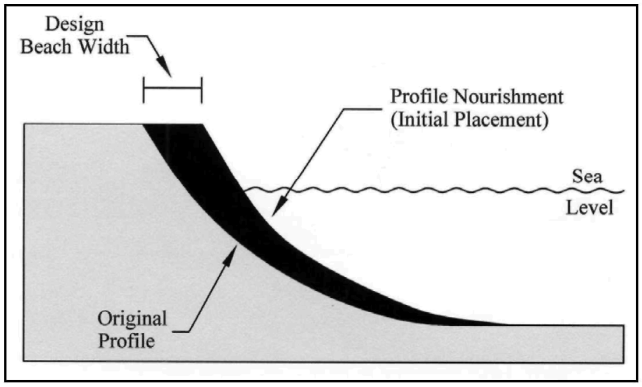

Figure 7.3 Profile Nourishment (CA Dept. of Boating and Waterways and State Coastal Conservancy, 2002)

Design criteria should include proper methods for stabilizing the newly created beach and provisions for long-term monitoring of the project to document the stability of the newly created beach and the recovery of the riparian habitat and wildlife in the area.

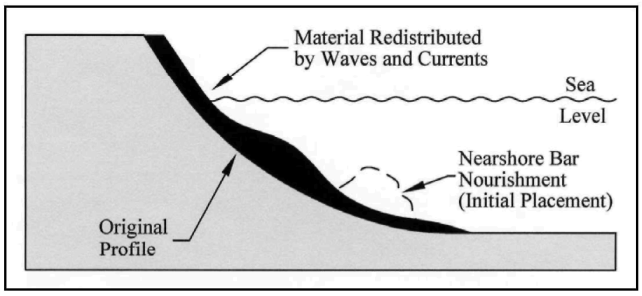

Figure 7.4 Nearshore Bar Nourishment (CA Dept. of Boating and Waterways and State Coastal Conservancy, 2002)

Additional Resources

- Barber, D. No date. *Beach Nourishment Basics.* http://www.brynmawr.edu/geology/geomorph/beachnourishmentinfo.html.
- NOAA. No date. *Beach Nourishment: A Guide for Local Government Officials.* U.S. Department of Commerce, NOAA Coastal Services Center. http://www.csc.noaa.gov/beachnourishment.
- Scottish National Heritage. No date. *A Guide to Managing Coastal Erosion in Beach/Dune Systems: Beach Nourishment.* http://www.snh.org.uk/publications/on-line/heritagemanagement/erosion/appendix_1.7.shtml.

Behavioral Barriers

Channelization
- ☐ Physical & chemical
- ☐ Instream/riparian restoration

Dams
- ☐ Erosion control
- ☐ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☑ Maintain fish passage

Erosion
- ☐ Streambanks ☐ Shorelines
  - ☐ Vegetative
  - ☐ Structural
  - ☐ Integrated
  - ☐ Planning & regulatory

Behavioral barriers use fish responses to external stimuli to keep fish away from intakes or to attract them to a bypass. Since fish behavior is notably variable both within and among species, behavioral barriers cannot be expected to prevent all fish from entering hydropower intakes. Environmental conditions such as high turbidity levels can obscure some behavioral barriers, such as lighting systems and curtains. Competing behaviors such as feeding or predator avoidance can also be a factor influencing the effectiveness of behavioral barriers at a particular time.

Electric screens, bubble and chain curtains, light, sound, and water jets have been evaluated in laboratory or field studies and show mixed results. Despite numerous studies, very few permanent applications of behavioral barriers have been realized (EPRI, 1999). Some authors suggest using behavioral barriers in combination with physical barriers (Mueller et al., 1999).

Electrical screens keep fish away from structures and guide them into bypass areas for removal. Fish seem to respond to the electrical stimulus best when water velocities are low. Tests of an electrical guidance system at the Chandler Canal diversion (Yakima River, Washington) showed efficiency ranging from 70 to 84 percent for velocities of less than 1 ft/sec. Efficiencies decreased to less than 50 percent when water velocities were higher than 2 ft/sec (Pugh et al., 1971). Success of electrical screens may be specific to species and fish size. An electrical field strength suitable to deter small fish may result in injury or death to large fish, since total fish body voltage is directly proportional to fish body length (Stone and Webster, 1986). Electrical screens require constant maintenance of electrodes and associated underwater hardware to maintain effectiveness. Surface water quality can affect the life and performance of electrodes.

Bubble and chain curtains are created by pumping air through a diffuser to create a continuous, dense curtain of bubbles, which can cause an avoidance response. Many factors affect fish response to the curtains, including temperature, turbidity, light, and water velocity. Bubbler systems should be constructed from corrosion-resistant materials and be installed with adequate positioning of the diffuser away from areas where siltation might clog the air ducts. Hanging chains provide a physical, visible obstacle that fish avoid. They are species-specific and lifestage-specific. Efficiency of hanging chains is affected by such variables as velocity, instream flow, turbidity, and illumination levels. Debris can limit their performance. In particular, buildup of debris can deflect chains into a nonuniform pattern and disrupt hydraulic flow patterns.

Strobe lights repel fish by producing an avoidance response. A strobe light system at Saunders Generating Station in Ontario, Canada was found to be 67 to 92 percent effective at repelling or diverting eels (EPRI, 1999). Turbidity levels can affect strobe light efficiency. The intensity and duration of the flash can also affect the response of the fish; for instance, an increase in flash duration has been associated with less avoidance. Strobe lights have the potential for far-field

fish attraction, since they can appear to fish as a constant light source due to light attenuation over a long distance (Stone and Webster, 1986). Strobe lights at Hiram M. Chittenden Locks in Seattle, Washington were examined to determine how fish respond, depending on strobe light distance. Vertical avoidance was 90 to 100 percent when lights were 0.5 meters away, 45 percent when 2.5 meters away, and 19 percent when 4.5 to 6.5 meters away (EPRI, 1999).

Mercury lights have successfully attracted fish to passage systems and repelled them from dams. Studies suggest their effectiveness is species-specific; alewives (*Alosa pseudoharengus*) were attracted to mercury light, whereas coho salmon (*Oncorhynchus kisutch*) and rainbow trout (*Oncorhynchus mykiss*) displayed no attraction to the light (Stone and Webster, 1986). In a test on the Susquehanna River (Maryland, Pennsylvania, and New York), mercury lights attracted gizzard shad (OTA, 1995). Although results have been mixed, low overall cost of the systems has led to continued research on their effectiveness (Duke Engineering & Services, Inc., 2000).

Underwater sound, broadcast at different frequencies and amplitudes, has been effective in attracting fish away from dams or repelling fish from dangers around dams, although the results of field tests are not consistent. Fish have been attracted, repelled, or guided by the sound. A study prepared for DOE showed that low-frequency, high particle motion was effective at invoking flight and avoidance responses in salmonids (Mueller et al., 1998). These finding agree with Knudsen et al. (1994), who found that low frequencies are efficient for evoking awareness reactions and avoidance responses in juvenile Atlantic salmon. Not all fish possess the ability to perceive sound or localized acoustical sources (Harris and Van Bergeijk, 1962). Fish also frequently seem to become habituated to the sound source.

Poppers are pneumatic sound generators that create a high-energy acoustic output to repel fish. Poppers have effectively repelled warm-water fish from water intakes. Laboratory and field studies in California indicate avoidance by several freshwater species such as alewives (*Alosa pseudoharengus*), perch, and smelt. Salmonids do not seem to be effectively repelled (Stone and Webster, 1986). Operation and maintenance considerations include frequent replacement of "O" rings, air entrainment in water inlets, and vibration of structures associated with the inlets.

Water jet curtains create hydraulic conditions that repel fish. Effectiveness is influenced by the angle at which water is jetted. Although effectiveness averages 75 percent (Stone and Webster, 1986), not enough is known to determine what variables affect performance of water jet curtains. Important operation and maintenance concerns would be clogging of the jet nozzles by debris or rust and the acceptable range of stream flow conditions, which contribute to effective results.

Hybrid barriers or combinations of different barriers can enhance the effectiveness of individual behavioral barriers. Laboratory studies showed a chain net barrier combined with strobe lights to be up to 90 percent effective at repelling some species and sizes of fish. Tests of combining rope-net and chain-rope barriers have shown good results. Barriers with horizontal and vertical components in the water column are more effective than those with vertical components alone. Barriers with a large diameter are more effective than those with a small diameter, and thicker barriers are more effective than thinner barriers. Effectiveness of hanging chains was increased when used in combination with strobe lights. Effectiveness also increased when strobe lights were added to air bubble curtains and poppers (Stone and Webster, 1986).

Branch Packing

Channelization
- ☑ Physical & chemical
- ☑ Instream/riparian restoration

Dams
- ☑ Erosion control
- ☐ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☑ Streambanks ☐ Shorelines
  - ☑ Vegetative
  - ☐ Structural
  - ☐ Integrated
  - ☐ Planning & regulatory

Branch packing consists of alternating layers of live branch cuttings and compacted backfill to repair small, localized slumps and holes in slopes (Figure 7.5). Live branch cuttings may range from 0.5 to 2 inches in diameter. They should be long enough to touch undisturbed soil at the back of the trench and extend slightly outward from the rebuilt slope face. Wooden stakes should be 5 to 8 feet long, depending on the depth of the slump or hole being repaired. Stakes should also be made from poles that are 3 to 4 inches in diameter or 2 by 4 feet lumber. Live posts can be substituted. As plant tops begin to grow, the branch packing system becomes more effective in retarding runoff and reducing surface erosion. Trapped sediment refills the localized slumps or holes, while roots spread throughout the backfill and surrounding earth to form a unified mass. Branch packing is not effective in slump areas greater than 4 feet deep or 5 feet wide (USDA-NRCS, 1992). Installation guidelines are available from the USDA-FS Soil Bioengineering Guide (USDA-FS, 2002) and the USDA Natural Resources Conservation Service's (NRCS's) *Engineering Field Handbook, Chapter 18* (USDA-NRCS, 1992).

Additional Resources

- FISRWG. 1998. *Stream Corridor Restoration: Principles, Processes, and Practices*. Federal Interagency Stream Restoration Working Group. http://www.nrcs.usda.gov/technical/stream_restoration/PDFFILES/APPENDIX.pdf.
- ISU. 2006. *How to Control Streambank Erosion: Branchpacking*. Iowa State University. http://www.ctre.iastate.edu/erosion/manuals/streambank/branchpacking.pdf.

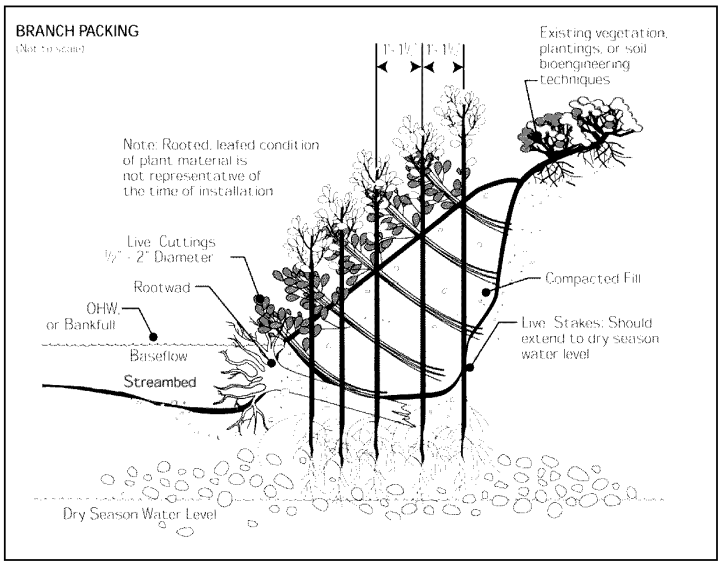

Figure 7.5 Branch Packing (USDA-FS, 2002)

Breakwaters

Channelization
- ☐ Physical & chemical
- ☐ Instream/riparian restoration

Dams
- ☐ Erosion control
- ☐ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☐ Streambanks ☑ Shorelines
  - ☐ Vegetative
  - ☑ Structural
  - ☐ Integrated
  - ☐ Planning & regulatory

Breakwaters are wave energy barriers designed to protect the land or nearshore area behind them from the direct assault of waves. Breakwaters have traditionally been used only for harbor protection and navigational purposes; in recent years, however, designs of shore-parallel segmented breakwaters have been used for shore protection purposes (Fulford, 1985; Hardaway and Gunn, 1989; Hardaway and Gunn, 1991; USACE, 1990). Segmented breakwaters can be used to provide protection over longer sections of shoreline than is generally affordable through the use of bulkheads or revetments. Wave energy is able to pass through the breakwater gaps, allowing for the maintenance of some level of longshore sediment transport, as well as mixing and flushing of the sheltered waters behind the structures. The cost per foot of shore for the installation of segmented offshore breakwaters is generally competitive with the costs of stone revetments and bulkheads (Hardaway et al., 1991).

Figure 7.6 provides a view of breakwaters off the coast of Pennsylvania and Figure 7.7 illustrates single and multiple breakwaters.

Figure 7.6 Breakwaters – View of Presque Isle, Pennsylvania (USACE, 2003)

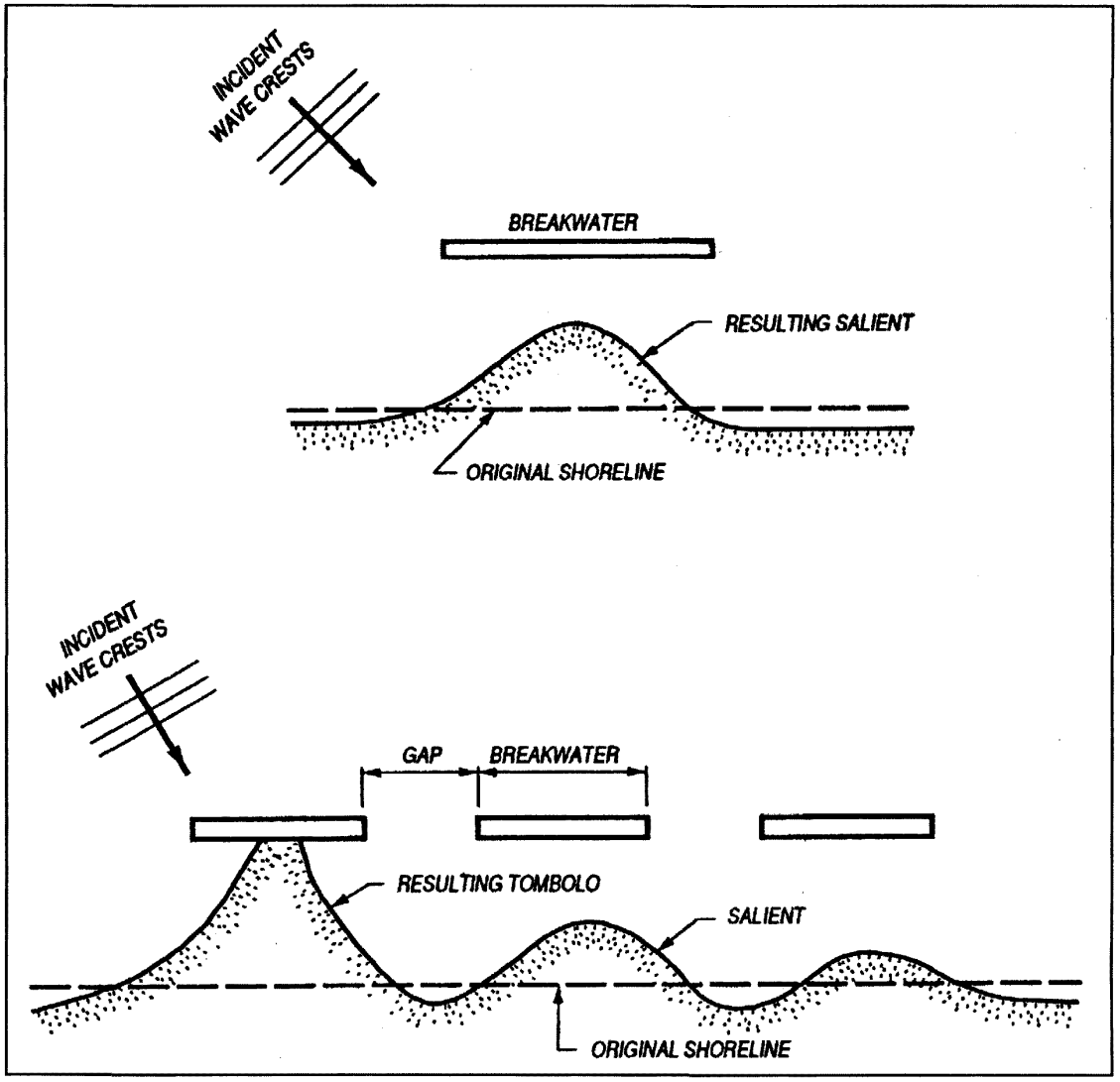

Figure 7.7 Single and Multiple Breakwaters (USACE, 2003)

Additional Resource

- USACE. No date. *Breakwaters.* http://www.usna.edu/NAOE/courses/en420/bonnette/breakwater_design.html.

Brush Layering

Channelization
- ☑ Physical & chemical
- ☑ Instream/riparian restoration

Dams
- ☑ Erosion control
- ☐ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☑ Streambanks ☐ Shorelines
  - ☑ Vegetative
  - ☐ Structural
  - ☐ Integrated
  - ☐ Planning & regulatory

Brush layering consists of placing live branch cuttings interspersed between layers of soil on cut slopes or fill slopes (Figures 7.8 and 7.9). These systems are recommended on slopes up to 2:1 in steepness and not to exceed 15 feet in vertical height. Branch cuttings, which are placed in a crisscross or overlapping pattern, should be long enough to reach the back of the bench and still protrude from the bank (growing tips facing the outside of the slope). The portions of the brush that protrude from the slope face assist in retarding runoff and reducing surface erosion. Backfill is then placed on the branches and compacted.

Brush layering can be used to stabilize a slope against shallow sliding or mass wasting, as well as to provide erosion protection. Brush layers can stabilize and reinforce the outside edge or face of drained earthen buttresses placed against cut slopes or embankment fills. Brush layering works better on fill slopes than cut slopes, because much longer stems can be used in fill (Mississippi State University, 1999). It is most applicable for areas subjected to cut or fill operations or areas that are highly disturbed and/or eroded (ECY, 2007)

Brush layering is somewhat similar to live fascine systems because both involve the cutting and placement of live branch cuttings on slopes. The two techniques differ principally in the orientation of the branches and the depth to which they are placed in the slope. In brush layering, the cuttings are oriented more or less perpendicular to the slope contour. In live fascine systems, the cuttings are oriented more or less parallel to the slope contour. The perpendicular orientation is more effective from the point of view of earth reinforcement and mass stability of the slope (USDA-NRCS, 1992). Thus, brush layering is more effective than live fascines in terms of earth reinforcement and mass stability (Mississippi State University, 1999). When used on a fill slope, brush layering is similar to vegetated geogrids, except the technique does not use geotextile fabric (USDA-FS, 2002).

Brush layering can disrupt native soils. Therefore, installation should be completed in phases and no more area should be excavated than is necessary (ECY, 2007).

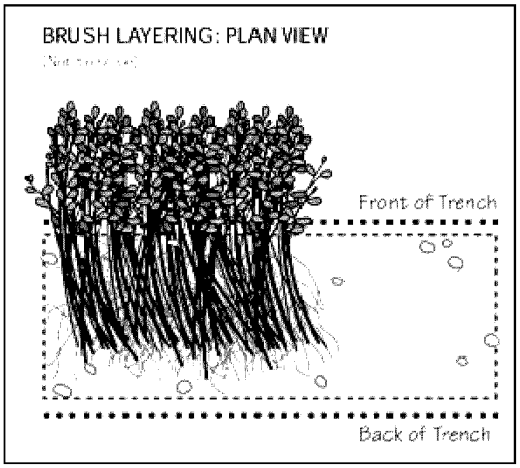

Figure 7.8 Brush Layering: Plan View (USDA-FS, 2002)

Additional Resources

- Mississippi State University, Center for Sustainable Design. 1999. *Water Related Best Management Practices in the Landscape: Brush Layering.* Created for United States Department of Agriculture, Natural Resource Conservation Service, Watershed Science Institute. http://www.abe.msstate.edu/csd/NRCS-BMPs/pdf/streams/bank/brushlayer.pdf.

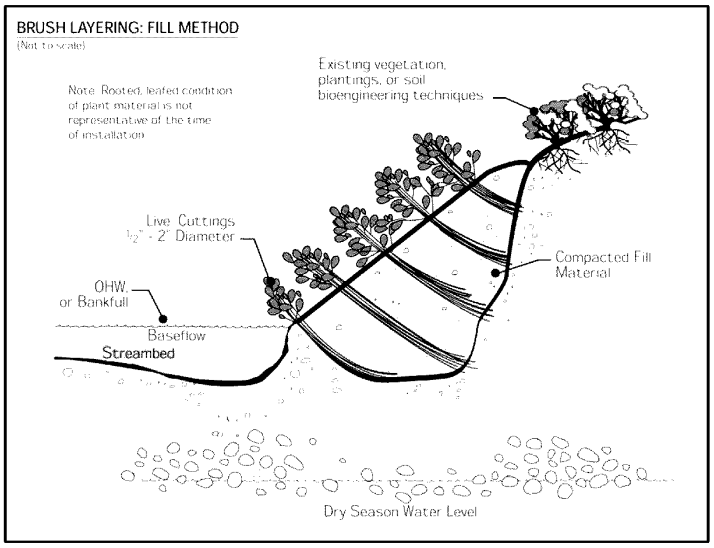

Figure 7.9 Brush Layering: Fill Method (USDA-FS, 2002)

- Myers, R.D. 1993. *Slope Stabilization and Erosion Control Using Vegetation: A Manual of Practice for Coastal Property Owners: Brush Layering.* Shorelands and Coastal Zone Management Program, Washington Department of Ecology. Olympia, WA. Publication 93-30. http://www.ecy.wa.gov/programs/sea/pubs/93-30/brush.html.

- Walter, J., D. Hughes, and N.J. Moore. 2005. *Streambank Revegetation and Protection: A Guide for Alaska. Revegetation Techniques: Brush/Hedge – Brush Layering.* Revised Edition. Alaska Department of Fish and Game, Division of Sport Fish. http://www.sf.adfg.state.ak.us/SARR/restoration/techniques/hedgebrush.cfm.

Brush Mattressing

Channelization
- ☑ Physical & chemical
- ☑ Instream/riparian restoration

Dams
- ☑ Erosion control
- ☐ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☑ Streambanks ☐ Shorelines
  - ☑ Vegetative
  - ☐ Structural
  - ☐ Integrated
  - ☐ Planning & regulatory

Brush mattressing is commonly used in Europe for streambank protection (Figure 7.10). It involves digging a slight depression on the bank and creating a mat or mattress from woven wire or single strands of wire and live, freshly cut branches from sprouting trees or shrubs. Branches approximately 1 inch in diameter are normally cut 6 to 9 feet long (the height of the bank to be covered) and laid in criss-cross layers with the butts in alternating directions to create a uniform mattress with few voids. The mattress is then covered with wire secured with wooden stakes 2.5 to 4 feet long. It is then covered with soil and watered repeatedly to fill voids with soil and facilitate sprouting; however, some branches should be left partially exposed on the surface. The structure may require protection from undercutting by placement of stones or burial of the lower edge. Brush mattresses are generally resistant to waves and currents and provide protection from the digging out of plants by animals. Disadvantages include possible burial with sediment in some situations and difficulty in making later plantings through the mattress.

Installation guidelines are available from the USDA-FS Soil Bioengineering Guide (USDA-FS, 2002). Under the Ecosystem Management and Restoration Research Program (EMRRP), the USACE has presented research on brush mattresses in a technical note (*Brush Mattresses for Streambank Erosion Control*).[3]

Additional Resources

- Allen, H.H. and C. Fischenich. 2001. *Brush Mattresses for Streambank Erosion Control.* U.S. Army Corps of Engineers, Ecosystem Management and Restoration Research Program. http://el.erdc.usace.army.mil/elpubs/pdf/sr23.pdf.

- FISRWG. 1998. *Stream Corridor Restoration: Principles, Processes, and Practices.* Federal Interagency Stream Restoration Working Group. http://www.nrcs.usda.gov/technical/stream_restoration/PDFFILES/APPENDIX.pdf.

- ISU. 2006. *How to Control Streambank Erosion*: *Brushmattress.* Iowa State University. http://www.ctre.iastate.edu/erosion/manuals/streambank/brushmattress.pdf.

- Mississippi State University, Center for Sustainable Design. 1999. *Water Related Best Management Practices in the Landscape: Brush Mattress.* Created for United States Department of Agriculture, Natural Resource Conservation Service, Watershed Science Institute. http://www.abe.msstate.edu/csd/NRCS-BMPs/pdf/streams/bank/brushmattress.pdf.

[3] http://el.erdc.usace.army.mil/elpubs/pdf/sr23.pdf

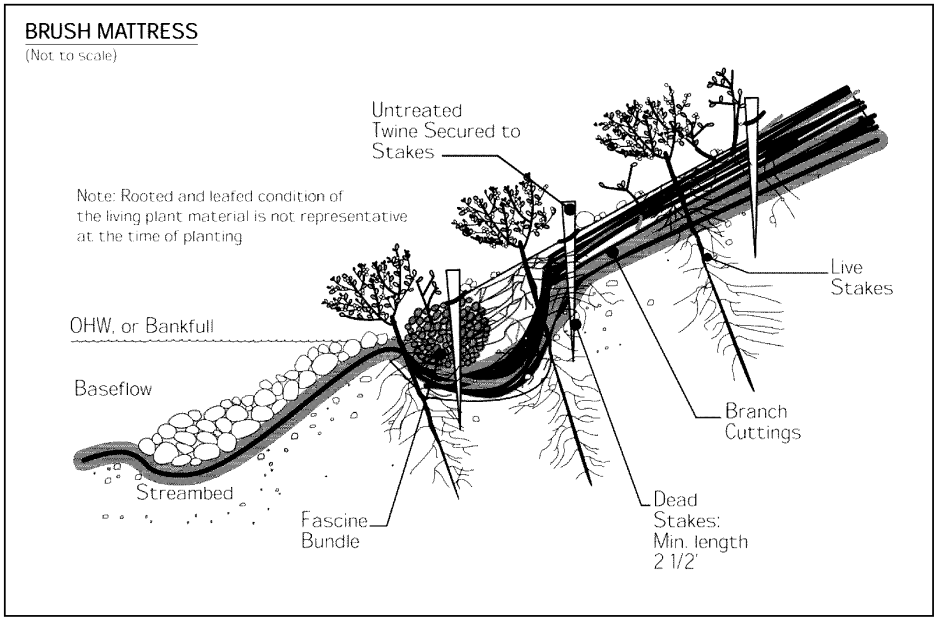

Figure 7.10 Brush Mattress (USDA-FS, 2002)

Bulkheads and Seawalls

Channelization
- ☑ Physical & chemical
- ☑ Instream/riparian restoration

Dams
- ☑ Erosion control
- ☐ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☑ Streambanks ☑ Shorelines
  - ☐ Vegetative
  - ☑ Structural
  - ☐ Integrated
  - ☐ Planning & regulatory

Bulkheads (Figure 7.11) are primarily soil-retaining structures designed to also resist wave attack. Seawalls are principally structures designed to resist wave attack, but they also may retain some soil (USACE, 1984). Both bulkheads and seawalls may be built of many materials, including steel, timber, or aluminum sheet pile, gabions, or rubble-mound structures. Although bulkheads and seawalls protect the upland area against further erosion and land loss, they often create a local problem. Downward forces of water, produced by waves striking the wall, can produce a transfer of wave energy and rapidly remove sand from the wall (Pilkey and Wright, 1988). A stone apron is often necessary to prevent scouring and undermining. With vertical protective structures built from treated wood, there are also concerns about the leaching of chemicals used in the wood preservatives. Chromated copper arsenate (CCA), the most popular chemical used for treating the wood used in docks, pilings, and bulkheads, contains elements of chromium, copper, and arsenic that are toxic above trace levels (CSWRCB, 2005; Kahler et al., 2000).

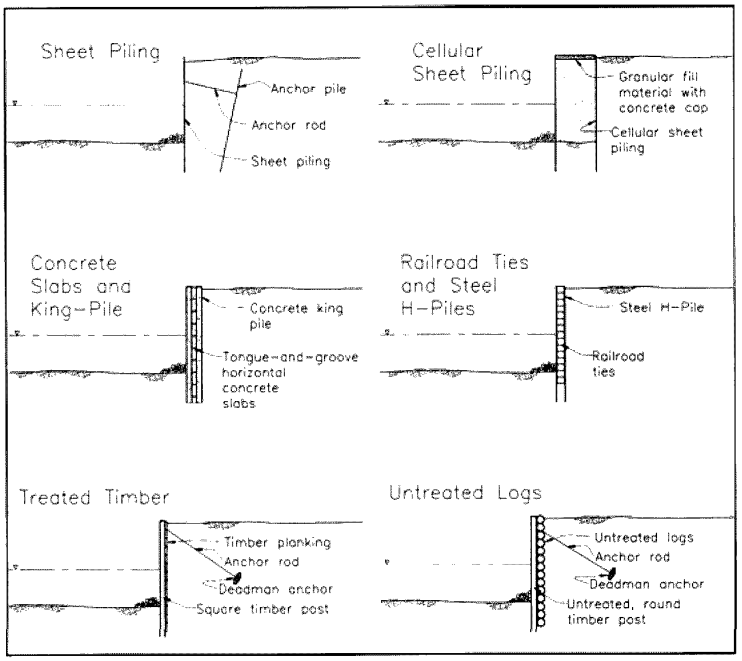

Figure 7.11 Typical Bulkhead Types (USACE, 2003)

Additional Resources

- Scottish National Heritage. No date. *A Guide to Managing Coastal Erosion in Beach/Dune Systems: Seawalls.* http://www.snh.org.uk/publications/on-line/heritagemanagement/erosion/appendix_1.12.shtml.
- USACE. No date. *Bulkheads and Seawalls.* http://www.usna.edu/NAOE/courses/en420/bonnette/Seawall_Design.html.

Check Dams

Channelization
- ☑ Physical & chemical
- ☑ Instream/riparian restoration

Dams
- ☑ Erosion control
- ☑ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☑ Streambanks ☐ Shorelines
  - ☐ Vegetative
  - ☑ Structural
  - ☐ Integrated
  - ☐ Planning & regulatory

Check dams, a type of grade control structure, are small dams constructed across an influent, intermittent stream, or drainageway to reduce channel erosion by restricting flow velocity. They can serve as emergency or temporary measures in small eroding channels that will be filled or permanently stabilized at a later date. Check dams can be installed in eroding gullies as permanent measures that fill up with sediment over time. In permanent usage, when the impounded area is filled, a relatively level surface or delta is formed over which water flows at a noneroding gradient. The water then cascades over the dam through a spillway onto a hardened apron. A series of check dams may be constructed along a stream channel of comparatively steep slope or gradient to create a channel consisting of a succession of gentle slopes with cascades in between.

Check dams can be nonporous (constructed from concrete, sheet steel, or wet masonry) or porous (using available materials such as straw bales, rock, brush, wire netting, boards, and posts). Porous dams release part of the flow through the structure, decreasing the head of flow over the spillway and the dynamic and hydrostatic forces against the dam. Nonporous dams are durable, permanent, and more expensive, while porous dams are simpler, more economical to construct, and temporary. Maintenance of check dams is important, especially the areas to the sides of the dam. Regular inspections, particularly after high flow events, should be performed to observe and repair erosion at the sides of the check dams. Excessive erosion could dislodge the check dam, create additional channel erosion, and add more sediment to the streambed.

Additional Resources

- CASQA. 2003. *California Stormwater BMP Construction Handbook*: *Check Dams.* California Stormwater Quality Association, Sacramento, CA. http://www.cabmphandbooks.com/Documents/Construction/SE-4.pdf.
- ISU. 2006. *Iowa Construction Site Erosion Control Manual: Check Dam.* Iowa State University. http://www.ctre.iastate.edu/erosion/manuals/construction/3.3_check_dam.pdf.
- Mississippi State University, Center for Sustainable Design. 1999. *Water Related Best Management Practices in the Landscape: Check Dam.* Created for United States Department of Agriculture, Natural Resource Conservation Service, Watershed Science Institute. http://www.abe.msstate.edu/csd/NRCS-BMPs/pdf/water/erosion/checkdam.pdf.
- SMRC. No date. *Stream Restoration: Grade Control Practices.* The Stormwater Manager's Resource Center. http://www.stormwatercenter.net/Assorted%20Fact%20Sheets/Restoration/grade_control.htm.
- Tennessee Department of Environment and Conservation. 2002. *Erosion and Sediment Control Handbook: Check Dams.* Tennessee Department of Environment and Conservation, Nashville, TN. http://state.tn.us/environment/wpc/sed_ero_controlhandbook/cd.pdf.

Coconut Fiber Roll

Channelization
- ☑ Physical & chemical
- ☑ Instream/riparian restoration

Dams
- ☑ Erosion control
- ☐ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☑ Streambanks ☐ Shorelines
  - ☑ Vegetative
  - ☐ Structural
  - ☐ Integrated
  - ☐ Planning & regulatory

The coconut fiber roll technique consists of cylindrical structures composed of coconut husk fibers held together with twine woven from coconut material (Figures 7.12 and 7.13). The fiber rolls are typically manufactured in 12-inch diameters and lengths of 20 feet, which serves to protect slopes from erosion, trap sediment, and as a result, encourage plant growth within the fiber roll. The system is typically installed near the toe of the streambank with dormant cuttings and rooted plants inserted into holes cut into the fiber rolls. Once installed, the system provides a good substrate for promoting plant growth and is appropriate where short-term moderate toe stabilization is needed. Installation of this design requires minimal site disturbance and is ideal for sites that are especially sensitive to disturbance. A limitation of this system is that it cannot withstand high velocities or large ice buildup, and it can be fairly expensive to construct. Coconut fiber rolls have an effective life of 6 to 10 years. In some locations, similar and abundant locally available materials, such as corn stalks, are being used instead of coconut materials (FISRWG, 1998).

Installation guidelines are available from the USDA-FS Soil Bioengineering Guide (USDA-FS, 2002). Under EMRRP, the USACE has presented research on coconut rolls in a technical note (*Coir Geotextile Roll and Wetland Plants for Streambank Erosion Control*), which is available at http://el.erdc.usace.army.mil/elpubs/pdf/sr04.pdf.

Figure 7.12 Coconut Fiber Roll (Montgomery Watson, 2001)

Additional Resources

- CASQA. 2003. *California Stormwater BMP Construction Handbook: Fiber Rolls.* California Stormwater Quality Association, Sacramento, CA. http://www.cabmphandbooks.com/Documents/Construction/SE-5.pdf.
- FISRWG. 1998. *Stream Corridor Restoration: Principles, Processes, and Practices.* Federal Interagency Stream Restoration Working Group. http://www.nrcs.usda.gov/technical/stream_restoration/PDFFILES/APPENDIX.pdf.
- ISU. 2006. *How to Control Streambank Erosion: Coconut Fiber Rolls.* Iowa State University. http://www.ctre.iastate.edu/erosion/manuals/streambank/coconut_fiber.pdf.

- Mississippi State University, Center for Sustainable Design. 1999. *Water Related Best Management Practices in the Landscape: Coconut Fiber Roll.* Created for United States Department of Agriculture, Natural Resource Conservation Service, Watershed Science Institute. http://www.abe.msstate.edu/csd/NRCS-BMPs/pdf/streams/bank/coconutfiberroll.pdf.

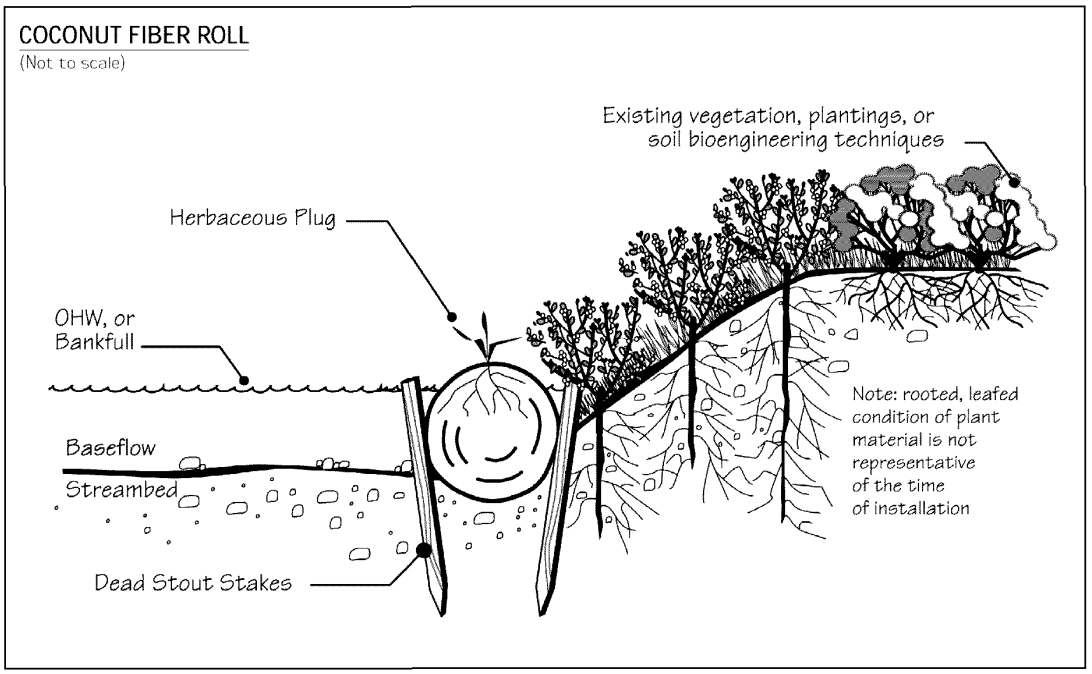

Figure 7.13 Coconut Fiber Roll (USDA-FS, 2002)

Collection Systems

Channelization
- ☐ Physical & chemical
- ☐ Instream/riparian restoration

Dams
- ☐ Erosion control
- ☐ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☑ Maintain fish passage

Erosion
- ☐ Streambanks ☐ Shorelines
  - ☐ Vegetative
  - ☐ Structural
  - ☐ Integrated
  - ☐ Planning & regulatory

Collection systems involve capture of fish by screening and/or netting followed with transport by truck or barge to a downstream location. Since the late 1970s, the USACE has successfully implemented a program that takes juvenile salmon from the uppermost dams in the Columbia River system (Pacific Northwest) and transports them by barge or truck to below the last dam. The program improves the travel time of fish through the river system, reduces most of the exposure to reservoir predators, and eliminates the mortality associated with passing through a series of turbines (van der Borg and Ferguson, 1989). Survivability rates for the collected fish are in excess of 95 percent, as opposed to survival rates of about 60 percent when the fish remain in the river system and pass through the dams (Dodge, 1989). However, the collection efficiency can range from 70 percent to as low as 30 percent. At the McNary Dam on the Columbia River, spill budgets are also implemented to improve overall passage (discussed in greater detail below) when the collection rate achieves less than 70 percent efficiency (Dodge, 1989).

Additional Resource

- Chelan County Public Utility District. No date. *Juvenile Fish Bypass*. http://www.chelanpud.org/juvenile-fish-passage.html.

Construct Runoff Intercepts

Channelization
- ☐ Physical & chemical
- ☐ Instream/riparian restoration

Dams
- ☑ Erosion control
- ☑ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☐ Streambanks ☐ Shorelines
  - ☐ Vegetative
  - ☐ Structural
  - ☐ Integrated
  - ☐ Planning & regulatory

Benches, terraces, or ditches break up a slope by providing areas of low slope in the reverse direction. This keeps water from proceeding down the slope at increasing volume and velocity. Instead, the flow is directed to a suitable outlet or protected drainage system. The frequency of benches, terraces, or ditches will depend on the erodibility of the soils, steepness and length of the slope, and rock outcrops. This practice can be used if there is a potential for erosion along the slope.

Earth dikes, perimeter dikes or swales, or diversions can intercept and convey runoff from above disturbed areas to undisturbed areas or drainage systems. An earth dike is a temporary berm or ridge of compacted soil that channels water to a desired location. A perimeter dike/swale or diversion is a swale with a supporting ridge on the lower side that is constructed from the soil excavated from the adjoining swale (Delaware DNREC, 2003). These practices can intercept flow from denuded areas or newly seeded areas and keep clean runoff away from disturbed areas. The structures can be stabilized within 14 days of installation. A pipe slope drain, also known as a pipe drop structure, is a temporary pipe placed from the top of a slope to the bottom of the slope to convey concentrated runoff down the slope without causing erosion (Delaware DNREC, 2003).

Additional Resources

- CASQA. 2003. *California Stormwater BMP Construction Handbook: Earth Dikes and Drainage Swales.* California Stormwater Quality Association, Sacramento, CA. http://www.cabmphandbooks.com/Documents/Construction/EC-9.pdf.

- Fifield, J. 2000. *Design and Implementation of Runoff Control Structures: Diversion Dikes and Swales.* http://www.forester.net/ec_0001_design.html#diversion.

- Lake Superior/Duluth Streams. 2005. *Grassed Swales.* http://www.duluthstreams.org/stormwater/toolkit/swales.html.

Constructed Spawning Beds

Channelization
- ☐ Physical & chemical
- ☐ Instream/riparian restoration

Dams
- ☐ Erosion control
- ☐ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☑ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☐ Streambanks ☐ Shorelines
  - ☐ Vegetative
  - ☐ Structural
  - ☐ Integrated
  - ☐ Planning & regulatory

When a dam adversely affects the aquatic habitat of an anadromous fish species, one option may be to construct replacement spawning beds. Additional facilities such as electric barriers, fish ladders, or bypass channels would be required to channel the fish to these spawning beds.

Merz et al., (2004) tested whether spawning bed enhancement increases survival and growth of Chinook salmon (*Oncorhynchus tshawytscha*) embryos in a regulated stream with a gravel deficit. The authors also examined a dozen physical parameters correlated with spawning sites (e.g., stream velocity, average turbidity, distance from the dam) and how they predicted survival and growth of Chinook salmon and steelhead (*Oncorhynchus mykiss*). The results suggest that spawning bed enhancement can improve embryo survival in degraded habitat. Measuring observed physical parameters before and after spawning bed manipulation can also accurately predict benefits. The National Oceanic and Atmospheric Administration's (NOAA's) S*tatus Review of Chinook Salmon from Washington, Idaho, Oregon, and California* (1998) states that artificial spawning beds for ocean-type Chinook salmon operated near three different dams was discontinued because of high pre-spawning mortality in adult fish and poor egg survival in the spawning beds. Success of constructed spawning beds in increasing survival and development of fish varies and often depends on the site.

Construction Management

Channelization
- ☐ Physical & chemical
- ☐ Instream/riparian restoration

Dams
- ☑ Erosion control
- ☐ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☐ Streambanks ☐ Shorelines
  - ☐ Vegetative
  - ☐ Structural
  - ☐ Integrated
  - ☐ Planning & regulatory

Construction areas can be managed properly to control erosion by stabilizing entrances and proper traffic routing. A construction entrance is a pad of gravel or rock over filter cloth located where traffic enters and leaves a construction site. As construction vehicles drive over the gravel, mud and sediment are collected from the vehicles' wheels. To maximize effectiveness, the rock pad should be at least 50 feet long and 10 to 12 feet wide. The gravel should be 1- to 2-inch aggregate 6 inches deep laid over a layer of filter fabric. Maintenance might include pressure washing the gravel to remove accumulated sediment and adding more rock to maintain thickness. Runoff from this entrance should be treated before exiting the site. This practice can be combined with a designated truck wash-down station to ensure sediment is not transported off-site.

Where possible, construction traffic should be directed to avoid existing or newly planted vegetation. Instead, it should be directed over areas that must be disturbed for other construction activity. This practice reduces the net total area that is cleared and susceptible to erosion.

Additional Resources

- CASQA. 2003. *California Stormwater BMP Construction Handbook*: *Stabilized Construction Entrance/Exit.* California Stormwater Quality Association, Sacramento, CA. http://www.cabmphandbooks.com/Documents/Construction/TR-1.pdf.

- ISU. 2006. *Iowa Construction Site Erosion Control Manual: Stabilized Construction Entrance.* Iowa State University. http://www.ctre.iastate.edu/erosion/manuals/construction/3.14_stabilized_entrance.pdf.

Dormant Post Plantings

Channelization
- ☑ Physical & chemical
- ☑ Instream/riparian restoration

Dams
- ☑ Erosion control
- ☐ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☑ Streambanks ☑ Shorelines
  - ☑ Vegetative
  - ☐ Structural
  - ☐ Integrated
  - ☐ Planning & regulatory

Dormant post plantings include planting of either cottonwood, willow, poplar, or other sprouting species embedded vertically into streambanks to increase channel roughness, reduce flow velocities near the slope face, and trap sediment (Figure 7.14). Dormant posts are made up of large cuttings installed in streambanks in square or triangular patterns. Live posts should be 7 to 20 feet long and 3 to 5 inches in diameter. This method is effective for quickly establishing riparian vegetation particularly in arid regions. By decreasing near bank flow velocities, this design causes sediment deposition and reduces streambank erosion. This design is more resistant to erosion than live staking or similar designs that use smaller cuttings. Success of this design is most likely on streambanks that are not gravel dominated and where ice build up is not common. The exclusion of certain herbivores aids in the success of this design. This method should be combined with other soil bioengineering techniques to achieve a comprehensive streambank restoration design (FISRWG, 1998). Installation guidelines are available from the USDA-FS Soil Bioengineering Guide (USDA-FS, 2002).

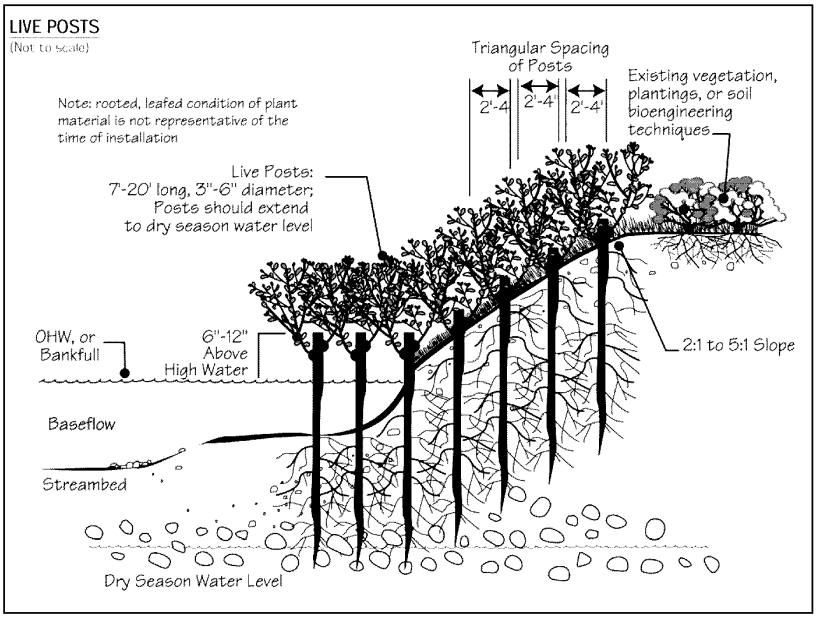

Figure 7.14 Live Posts (USDA-FS, 2002)

Additional Resources

- FISRWG. 1998. *Stream Corridor Restoration: Principles, Processes, and Practices*. Federal Interagency Stream Restoration Working Group. http://www.nrcs.usda.gov/technical/stream_restoration/PDFFILES/APPENDIX.pdf.
- ISU. 2006. *How to Control Streambank Erosion: Dormant Post Plantings*. Iowa State University. http://www.ctre.iastate.edu/erosion/manuals/streambank/dormant_post.pdf.

Encourage Drainage Protection

A complete understanding of watershed protection should include the implementation of practices that guide future development and land use activities. This will not only help to identify existing sources of NPS pollution but also to prevent future impairments that may impact dam construction or operations and reservoir management. Watershed protection practices can include zoning for natural resource protection. Several zoning techniques are:

- Use cluster zoning and planned unit development
- Consider resource protection zones
- Practice performance-based zoning
- Establish overlay zones
- Establish bonus or incentive zoning
- Consider large lot zoning
- Practice agricultural protection zoning
- Use watershed-based zoning
- Delineate urban growth boundaries

Channelization
- ☐ Physical & chemical
- ☐ Instream/riparian restoration

Dams
- ☐ Erosion control
- ☐ Runoff control
- ☐ Chemical/pollutant control
- ☑ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☐ Streambanks ☐ Shorelines
  - ☐ Vegetative
  - ☐ Structural
  - ☐ Integrated
  - ☐ Planning & regulatory

More details about these techniques and case studies can be found in *Protecting Wetlands: Tools for Local Governments in the Chesapeake Bay Region* (Chesapeake Bay Program, 1997).

Equipment Runoff Control

Channelization
- ☐ Physical & chemical
- ☐ Instream/riparian restoration

Dams
- ☐ Erosion control
- ☐ Runoff control
- ☑ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☐ Streambanks ☐ Shorelines
  - ☐ Vegetative
  - ☐ Structural
  - ☐ Integrated
  - ☐ Planning & regulatory

During construction and maintenance activities at dams, equipment and machinery can be a potential source of pollution to the surface and ground water. Thinners or solvents should not be discharged into sanitary or storm sewer systems or into surface water systems, when cleaning machinery. Use alternative methods for cleaning larger equipment parts, such as high-pressure, high-temperature water washes or steam cleaning. Equipment-washing detergents can be used and wash water appropriately discharged. Small parts should be cleaned with degreasing solvents that can be reused or recycled. Washout from concrete trucks should never be dumped directly into surface waters or into a drainage leading to surface waters but can be disposed of into:

- A designated area that will later be backfilled
- An area where the concrete wash can harden, can be broken up, and can then be appropriately disposed
- A location not subject to surface water runoff and more than 50 feet away from a receiving water

Erosion and Sediment Control (ESC) Plans

Channelization
- ☑ Physical & chemical
- ☑ Instream/riparian restoration

Dams
- ☑ Erosion control
- ☐ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☑ Streambanks ☑ Shorelines
  - ☐ Vegetative
  - ☐ Structural
  - ☐ Integrated
  - ☑ Planning & regulatory

ESC plans are important for controlling the adverse impacts of dam construction. ESC plans ensure that provisions for control measures are incorporated into the site planning stage of development. ESC plans also provide for prevention of erosion and sediment problems and accountability if a problem occurs (MDEP, 1990). In many municipalities, ESC plans are required under ordinances enacted to protect water resources. These plans describe the activities construction and maintenance personnel will use to reduce soil erosion and contain and treat runoff that is carrying eroded sediments. ESC plans typically include descriptions and locations of soil stabilization practices, perimeter controls, and runoff treatment facilities that will be installed and maintained before and during construction activities. In addition to special area considerations, the full ESC plan review inventory should include:

- Topographic and vicinity maps
- Site development plan
- Construction schedule
- Erosion and sedimentation control plan drawings
- Detailed drawings and specifications for practices
- Design calculations
- Vegetation plan
- Detailed drawings and specifications for control or management practices

Some erosion and soil loss is unavoidable during land-disturbing activities. Although proper siting and design help prevent areas prone to erosion from being developed, construction activities invariably produce conditions where erosion can occur. To reduce the adverse impacts associated with construction activities at dams, the construction management measure suggests a system of nonstructural and structural ESCs for incorporation into an ESC plan.

Nonstructural controls address erosion control by decreasing erosion potential, whereas structural controls are both preventive and mitigative because they control erosion and sediment movement. Brown and Caraco (1997) identified several general objectives that should be addressed in an effective ESC plan:

- *Minimize clearing and grading* – clearing and grading should occur only where absolutely necessary to build and provide access to structures and infrastructure. Clearing should be done immediately before construction, rather than leaving soils exposed for months or years (SQI, 2000).
- *Protect waterways and stabilize drainage ways* – all natural waterways within a development site should be clearly identified before construction activities begin. Clearing should generally be prohibited in or adjacent to waterways. Sediment control

practices such as check dams might be needed to stabilize drainage ways and retain sediment on-site.

- *Phase construction to limit soil exposure* – construction phasing is a process where only a portion of the site is disturbed at any one time to complete the required building in that phase. Other portions of the site are not cleared and graded until exposed soils from the earlier phase have been stabilized and the construction nearly completed.
- *Stabilize exposed soils immediately* – seeding or other stabilization practices should occur as soon as possible after grading. In colder climates, a mulch cover is needed to stabilize the soil during the winter months when grass does not grow or grows poorly.
- *Protect steep slopes and cuts* - wherever possible, clearing and grading of existing steep slopes should be completely avoided. If clearing cannot be avoided, practices should be implemented to prevent runoff from flowing down slopes.
- *Install perimeter controls to filter sediments* – perimeter controls are used to retain sediment-laden runoff or filter it before it exits the site. The two most common perimeter control options are silt fences and earthen dikes or diversions.
- *Employ advanced sediment-settling controls* – traditional sediment basins are limited in their ability to trap sediments because fine-grained particles tend to remain suspended and the design of the basin themselves is often simplistic. Sediment basins can be designed to improve trapping efficiency through the use of perforated risers; better internal geometry; the installation of baffles, skimmers, and other outlet devices; gentler side slopes; and multiple-cell construction.

ESC plans ensure that provisions for control measures that are incorporated into the site planning stage of development help to reduce the incidence of erosion and sediment problems, and improve accountability if a problem occurs. An effective plan for runoff management on construction sites controls erosion, retains sediments on-site to the extent practicable, and reduces the adverse effects of runoff. Climate, topography, soils, drainage patterns, and vegetation affect how erosion and sediment should be controlled on a site (Washington State Department of Ecology, 1989).

ESC plans should be flexible to account for unexpected events that occur after the plans have been approved, including:

- Discrepancies between planned and as-built grades
- Weather conditions
- Altered drainage
- Unforeseen construction requirements

Changes to an ESC plan should be made based on regular inspections that identify whether the ESC practices were appropriate or properly installed or maintained. Inspecting an ESC practice after storm events shows whether the practice was installed or maintained properly. Such inspections also show whether a practice requires cleanout, repair, reinforcement, or replacement with a more appropriate practice. Inspecting after storms is the best way to ensure that ESC practices remain in place and effective at all times during construction activities.

Because funding for ESC programs is not always dedicated, budgetary and staffing constraints may thwart effective program implementation. Brown and Caraco (1997) recommend several management techniques to ensure that ESC programs are properly administered:

- Local leadership committed to the ESC program
- Redeployment of existing staff from the office to the field or training room
- Cross-training of local review and inspection staff
- Submission of erosion prevention elements for early planning reviews.
- Prioritization of inspections based on erosion risk
- Requirement of designers to certify the initial installation of ESC practices
- Investment in contractor certification and private inspector programs
- Use of public-sector construction projects to demonstrate effective ESC controls
- Enlistment of the talents of developers and engineering consultants in the ESC program
- Revision and update of the local ESC manual

An allowance item that acts as an additional "insurance policy" for complying with the erosion and sediment control plan can be added to bid or contract documents (Deering, 2000a). This allowance covers costs to repair storm damage to ESC measures as specified in the ESC plan. This allowance does not cover storm damage to property that is not related to the ESC plan, because this would be covered under traditional liability insurance. Damage caused by severe and continuous rain events, windblown objects, fallen trees or limbs, or high-velocity, short-term rain events on steep slopes and existing grades would be covered by the allowance, as would deterioration from exposure to the elements or excessive maintenance for silt removal. The contractor is responsible for being in compliance with the ESC plan by properly implementing and maintaining all specified measures and structures. The allowance does not cover damage to practices caused by improper installation or maintenance.

Additional Resources

- ISU. 2006. *Iowa Construction Site Erosion Control Manual: Infiltration Basin and Trench.* Iowa State University. http://www.ctre.iastate.edu/erosion/manuals/construction/4.1_infiltration.pdf.

- Milwaukee River Basin Partnership. 2003. *Detention & Infiltration Basins.* http://clean-water.uwex.edu/plan/drbasins.htm.

- Tennessee Department of Environment and Conservation. 2002. *Erosion and Sediment Control Handbook: Vegetative Practices*. Tennessee Department of Environment and Conservation, Nashville, TN. http://state.tn.us/environment/wpc/sed_ero_controlhandbook/2.%20Vegetative%20Practices.pdf.

Erosion Control Blankets

Channelization
- ☐ Physical & chemical
- ☐ Instream/riparian restoration

Dams
- ☑ Erosion control
- ☐ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☐ Streambanks ☐ Shorelines
  - ☐ Vegetative
  - ☐ Structural
  - ☐ Integrated
  - ☐ Planning & regulatory

Turf reinforcement mats (TRMs) combine vegetative growth and synthetic materials to form a high-strength mat that helps prevent soil erosion in drainage areas and on steep slopes (Figure 7.15) (USEPA, 1999). TRMs enhance vegetation's natural ability to protect soil from erosion. They are composed of interwoven layers of nondegradable geosynthetic materials (e.g., nylon, polypropylene) stitched together to form a three-dimensional matrix. They are thick and porous enough to allow for soil filling and retention. In addition to providing scour protection, the mesh netting of TRMs is designed to enhance vegetative root and stem development. By protecting the soil from scouring forces and enhancing vegetative growth, TRMs can raise the threshold of natural vegetation to withstand higher hydraulic forces on stabilization slopes, streambanks, and channels. In addition to reducing flow velocities, natural vegetation removes particulates through sedimentation and soil infiltration and improves site aesthetics. In general, TRMs should not be used for the following:

- To prevent deep-seated slope failure due to causes other than surficial erosion
- If anticipated hydraulic conditions are beyond the limits of TRMs and natural vegetation
- Directly beneath drop outlets to dissipate impact force (can be used beyond impact zone)
- Where wave height might exceed 1 foot (can protect areas upslope of wave impact zone)

The performance of a TRM-lined conveyance system depends on the duration of the runoff event. For short-term events, TRMs are typically effective at flow velocities of up to 15 feet per second and shear stresses of up to 8 lb/ft^2. However, specific high-performance TRMs may be effective under more severe hydraulic conditions. Practitioners should check with manufacturers for specifications and performance limits of different products. Factors influencing the cost of TRMs include the type of material required, site conditions (e.g., underlying soils, slope steepness), and installation-specific factors (e.g., local construction costs). TRMs typically cost considerably less than concrete and riprap solutions.

Figure 7.15 Erosion Control Blanket (Conwed Fibers, n.d.)

Additional Resources

- Barr Engineering Company. 2001. *Minnesota Urban Small Sites BMP Manual: Stormwater Best Management Practices for Cold Climates. Soil Erosion Control: Mulches, Blankets and Mats.* Prepared for the Metropolitan Council by Barr Engineering Company, St. Paul, MN. http://www.metrocouncil.org/Environment/Watershed/BMP/CH3_RPPSoilMulch.pdf.

- CASQA. 2003. *California Stormwater BMP Construction Handbook: Geotextiles and Mats.* California Stormwater Quality Association, Sacramento, CA. http://www.cabmphandbooks.com/Documents/Construction/EC-7.pdf.

- California Department of Transportation. 1999. *Soil Stabilization Using Erosion Control Blankets.* Construction Storm Water Pollution Prevention Bulletin. Vol. 3, No. 8. California Department of Transportation, Division of Environmental Analysis, Sacramento, CA. http://www.dot.ca.gov/hq/env/stormwater/publicat/const/Aug_1999.pdf.

- Matthews, M. 1998. *What are RECPs? Soil Stabilization Using Erosion Control Blankets*. Erosion Control Technology Council, St. Paul, MN. http://www.ectc.org/what.html.

- North American Green. 2004. *Green Views: Turn Reinforcement Mats as an Alternative to Rock Riprap*. North American Green, Evansville, IN. http://www.nagreen.com/resources/literature/GV_AltToRockRiprap.pdf.

- Tennessee Department of Environment and Conservation. 2002. *Erosion and Sediment Control Handbook: Vegetative Practices: Erosion Control Blanket/Matting*. Tennessee Department of Environment and Conservation, Nashville, TN. http://state.tn.us/environment/wpc/sed_ero_controlhandbook/2.%20Vegetative%20Practices.pdf.

Establish and Protect Stream Buffers

Channelization
- ☐ Physical & chemical
- ☑ Instream/riparian restoration

Dams
- ☐ Erosion control
- ☐ Runoff control
- ☐ Chemical/pollutant control
- ☑ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☑ Streambanks ☐ Shorelines
  - ☐ Vegetative
  - ☐ Structural
  - ☐ Integrated
  - ☑ Planning & regulatory

Riparian buffers and wetlands can provide long-term pollutant removal capabilities without the comparatively high costs usually associated with constructing and maintaining structural controls. Conservation or preservation of these areas is important to water quality protection. Land acquisition programs help to preserve areas considered critical to maintaining surface water quality. Adequate buffer strips along streambanks provide protection for stream ecosystems, help stabilize the stream, and can prevent streambank erosion (Holler, 1989). Buffer strips can also protect and maintain near-stream vegetation that attenuates the release of sediment into stream channels. Levels of suspended solids have been shown to increase at a slower rate in stream channel sections with well-developed riparian vegetation (Holler, 1989).

Stream buffers should be protected and preserved as a conservation area because these areas provide many important functions and benefits, including:

- Providing a "right-of-way" for lateral movement
- Conveying floodwaters
- Protecting streambanks from erosion
- Treating runoff and reducing drainage problems from adjacent areas
- Providing nesting areas and other wildlife habitat functions
- Mitigating stream warming
- Protecting wetlands
- Providing recreational opportunities and aesthetic benefits
- Increasing adjacent property values

Specific stream buffer practices could include:

- Establishing a stream buffer ordinance
- Developing vegetative and use strategies within management zones
- Establishing provisions for stream buffer crossings
- Integration of structural runoff management practices where appropriate
- Developing stream buffer education and awareness programs

More information on establishing and protecting stream buffers is available from EPA's *National Management Measures to Control Nonpoint Source Pollution from Urban Areas*,[4] a document for use by state, local, and tribal managers in the implementation of nonpoint source pollution management programs. It contains a variety of practices and management activities for reducing pollution of surface and ground water from urban areas (USEPA, 2005d).

[4] http://www.epa.gov/owow/nps/urbanmm/index.html

Fish Ladders

Channelization
- ☐ Physical & chemical
- ☐ Instream/riparian restoration

Dams
- ☐ Erosion control
- ☐ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☑ Maintain fish passage

Erosion
- ☐ Streambanks ☐ Shorelines
  - ☐ Vegetative
  - ☐ Structural
  - ☐ Integrated
  - ☐ Planning & regulatory

Fish ladders have been a commonly used structure to enable the safe upstream and downstream passage of mature fish (see Figure 7.16). There are four basic designs: pool-weir, Denil, vertical slot, and steeppass.

Pool-weir fish ladders are one of the oldest and most commonly designed fish passage structures, which consists of stepped pools and weirs that allow fish to pass from pool to pool over the weirs that separate each. Pool-weir fish ladders are normally used on slopes of about 10-degrees. Some pool-weir fish ladders can be modified to increase the possible number of fish that are passed by including submerged orifices that allow fish to pass the fish ladder without cresting the weirs.

Pool-weir fish ladders will pass many different species of fish if they are designed correctly for the environment in which they are employed. OTA (1995) provides details on design and operation of various forms of fish ladders.

Figure 7.16 Fish Ladder at Feather River Hatchery, Oroville Dam, CA (Feather River, n.d.)

Denil fish ladders are elongated rectangular channels that use internal baffles to dissipate flow energy and allow fish passage. They are widely used in the eastern United States due to their ability to pass a wide range of species (from salmonids to riverine) over a wider range of flows than pool-weir ladders. Denil ladders can be used on slopes from 10 to 25 degrees although 10 to 15 degrees is optimal. Most Denil fish ladders are 2–4 feet wide and 4–8 feet deep. This fish ladder design allows fish to pass at a preferred depth instead of through a jumping action. Denil ladders do not have resting areas and therefore fish must either be able to pass the ladder in one burst or resting pools must be provided between sections. Resting pools should be provided every 16 to 50 feet depending upon the species being passed. The high flow rates and turbulence

associated with Denil fish ladders reduces the demand for attraction flow, which is commonly added to insure good attraction over varying flow rates.

Vertical slot fish ladders are elongated rectangular channels that use regularly spaced baffles to create steps and resting pools. The vertically oriented slots in the baffles allow fish to pass through the ladder at a preferred depth. Unlike Denil fishways, vertical slot fishways provide a resting area behind each baffle allowing fish to pass in a "burst-rest" manner instead of one sustained motion. The channel created by the baffles is off-center making the baffles on one side of the ladder wider than the opposing side. Eddies that form behind longer baffles allow fish to rest and end the need for resting areas. Although vertical slot ladders are usually operated at slopes of about 10 degrees, they can be operated over a larger variety of flows. The vertical slots create a water jet that is regulated by the pool on the downstream side of it. This creates a uniform, level flow throughout the ladder.

The steeppass fish ladder, often referred to as the "Alaska steeppass," is a modified Denil fish ladder most commonly used in remote areas for the passage of salmonids. Steeppass fish ladders are usually constructed of lightweight materials such as aluminum and can operate on slopes up to 33 percent. The construction materials and design allow this type of fish ladder to be deployed as a single unit to remote areas. The baffles used in steeppass ladders are more aggressively designed, which allow the ladder to more effectively control water flow. The steeppass ladder is not without its limitations. Due to their narrow design, steeppass ladders are more susceptible to clogging due to debris and changes in flow upstream or downstream of the ladder.

Although fish ladders can be extremely efficient at passing fish, small changes in design have been shown to significantly improve their functionality. A good example of this is the John Day Dam located on the Columbia River. The original design focused on the passage of salmonids and therefore only passed about 17 percent of the American shad (*Alosa sapidissima*) using the ladder. Research indicated that simple design changes could allow for the passage of riverine species such as American shad. By changing the placement of the weirs within the fish ladder, the fish ladder was able to pass 94 percent of the salmonids, and American shad passage increased to 74 percent (Monk et al., 1989).

According to the USACE, Portland District (1997), the success rate for adults negotiating fish ladders at dams in the Columbia River Basin is about 95 percent. The U.S. Fish and Wildlife Agency designs fishways assuming a 90 percent efficiency rate. Few studies document actual efficiency of fish ladders, but it is recognized that not all fishways are equally effective (for various reasons, such as predation or physical damage to passing fish). Some fishways installed in the last 20 years are less effective than newer ones (when federal licenses began to include fish passage requirements). Maine Department of Marine Resources (DMR) estimates efficiency between 75 and 90 percent (Presumpscot River Plan Steering Committee, 2002).

Additional Resource

- Michigan DNR. No date. *What is a fish ladder?* Michigan Department of Natural Resources, Lansing, MI. http://www.michigan.gov/dnr/0,1607,7-153-10364_19092-46291--,00.html.

Fish Lifts

Channelization
- ☐ Physical & chemical
- ☐ Instream/riparian restoration

Dams
- ☐ Erosion control
- ☐ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☑ Maintain fish passage

Erosion
- ☐ Streambanks ☐ Shorelines
  - ☐ Vegetative
  - ☐ Structural
  - ☐ Integrated
  - ☐ Planning & regulatory

Fish lifts describe both fish elevators and locks, which are used to capture fish at the downstream side of a structure and then move them above the structure. Like fish ladders, these systems require sufficient attraction flow to move fish into the lift area. Lift systems can be advantageous because they are not species or flow specific. They can also be employed at structures too tall for fish ladders and to pass species with reduced swimming ability.

Lift systems have the potential to move large numbers of fish if they are operated efficiently. These systems can be automated to allow operation much like fish ladders. Fish lift systems do require additional operation and maintenance costs and are subject to mechanical failures not associated with fish ladders.

Most lift systems require either an active or passive bypass system to move fish far enough upstream to avoid entrainment in the flow through the dam. Passive bypass systems may include constructed waterways or pipes that discharge passed fish sufficiently up-steam of the structure. Active bypass systems include trucking and pumping operations that discharge the fish safely upstream of the structure. Active bypass systems, especially pumping systems, have come under scrutiny for fish behavior and health reasons. During the pumping process, fish may be subject to descaling and/or death due to overcrowding. After release, the fish may have orientation problems and therefore be subject to higher rates of predation mortality. Due to these concerns the United States Fish and Wildlife service has generally opposed the use of fish pumps (OTA, 1995).

Flow Augmentation

Channelization
- ☐ Physical & chemical
- ☐ Instream/riparian restoration

Dams
- ☐ Erosion control
- ☐ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☑ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☐ Streambanks ☐ Shorelines
  - ☐ Vegetative
  - ☐ Structural
  - ☐ Integrated
  - ☐ Planning & regulatory

Operational procedures such as flow regulation, flood releases, or fluctuating flow releases all have the potential for detrimental impacts on downstream aquatic and riparian habitat. When evaluating solutions associated with degraded aquatic and riparian habitat, stakeholders must balance operational procedures to address the needs of downstream aquatic and riparian habitat with the requirements of dam operation. There are often legal and jurisdictional requirements for an operational procedure at a particular dam that should also be considered (USDOI, 1988).

A flushing flow is a high-magnitude, short-duration release for the purpose of maintaining channel capacity and the quality of instream habitat by scouring the accumulation of fine-grained sediments from the streambed. Availability of suitable instream habitat is a key factor limiting spawning success. Flushing flows wash away the sediments without removing the gravel. Flushing flows also prevent the encroachment of riparian vegetation.

However, it is important to keep in mind that flushing flows are not recommended in all cases. Flushing flows of a large magnitude may cause flooding in the old floodplain or depletion of gravel below a dam. Flushing flows are more efficient and predictable for small, shallow, high-velocity mountain streams unaltered by dams, diversions, or intensive land use. Routine maintenance generally requires a combination of practices including high flows coupled with sediment dams or channel dredging, rather than simply relying on flushing or scouring flows (Nelson et al., 1988).

Several options exist for creating minimum flows in the tailwaters below dams. The selection of any particular technique as the most cost-effective is site-specific and depends on several factors including adequate performance to achieve the desired instream and riparian habitat characteristic, compatibility with other requirements for operation of the hydropower facility, availability of materials, and cost.

Sluicing is the practice of releasing water through the sluice gate rather than through the turbines. For portions of the waterway immediately below the dam, the steady release of water by sluicing provides minimum flows with the least amount of water expenditure. At some facilities, this practice may dictate that modifications be made to the existing sluice outlets to maintain continuous low releases. Continuous low-level sluice releases at Eufala Lake and Fort Gibson Lake (Oklahoma) provided minimum flows needed to sustain downstream fish populations. The sluicing also had the benefit of improving DO levels in tailwaters downstream of these two dams such that fish mortalities, which had been experienced in the tailwaters below these two dams prior to initiating this practice, no longer occurred (USDOE, 1991).

Turbine pulsing is a practice involving the release of water through the turbines at regular intervals to improve minimum flows. In the absence of turbine pulsing, water is released from large hydropower dams only when the turbines are operating, which is typically when the demand for power is high.

A study undertaken at the Douglas Dam (French Broad River, Tennessee) suggests some of the site-specific factors that should be considered when evaluating the advantages of practices such as turbine pulsing, sluicing, or other alternatives for providing minimum flows and improving dissolved oxygen (DO) levels in reservoir releases. Two options for maintaining minimum flows (turbine pulsing and sluicing), and two aeration alternatives (operation of surface water pumps and diffusers) were evaluated for their effectiveness, advantages, and disadvantages in providing minimum flows and aeration of reservoir releases. Computer modeling indicated that either turbine pulsing or sluicing could improve DO concentrations in releases by levels ranging from 0.7 to 1.5 mg/L. This is slightly below the level of improvement that might be expected from operation of a diffuser system for aeration. A trade-off can also be expected at this facility between water saved by frequent short-release pulses and the higher maintenance costs due to operating turbines on and off frequently (Hauser et al., 1989). Hauser et al. (1989) found that schemes of turbine pulsing ranging from 15-minute intervals to 60-minute intervals every 2 to 6 hours were found to provide fairly stable flow regimes after the first 3 to 8 miles downstream at several Tennessee Valley Authority (TVA) projects. However, at points farther downstream, less overall flow would be produced by sluicing than by pulsing. Turbine pulsing may also cause waters to rise rapidly, which could endanger people wading or swimming in the tailwaters downstream of the dam (TVA, 1990).

Fuel and Maintenance Staging Areas

Proper maintenance of equipment and installation of proper stream crossings will further reduce pollution of water by these sources. Vehicles need to be inspected for leaks. To prevent runoff, fuel and maintain vehicles on site only in a bermed area or over a drip pan. Fuel tanks should be protected and have containment systems. Stream crossings can be minimized through proper planning of access roads. This will help to keep potential sources of pollution away from direct contact with surface waters.

Channelization
- ☐ Physical & chemical
- ☐ Instream/riparian restoration

Dams
- ☐ Erosion control
- ☐ Runoff control
- ☑ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☐ Streambanks ☐ Shorelines
  - ☐ Vegetative
  - ☐ Structural
  - ☐ Integrated
  - ☐ Planning & regulatory

Gated Conduits

Gated conduits are hydraulic structures that divert the flow of water under the dam. They are designed to create turbulent mixing to enhance oxygen transfer. Gates are used to control the cross-sectional area of flow. Gated conduits have been extensively analyzed for their performance and effectiveness (Wilhelms and Smith, 1981), although the available data are mostly from high-head projects (Wilhelms, 1988). An example of the effectiveness found that gated conduit structures were able to achieve 90 percent aeration and a minimum DO standard of 5 mg/L (Wilhelms and Smith, 1981).

Channelization
- ☐ Physical & chemical
- ☐ Instream/riparian restoration

Dams
- ☐ Erosion control
- ☐ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☑ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☐ Streambanks ☐ Shorelines
  - ☐ Vegetative
  - ☐ Structural
  - ☐ Integrated
  - ☐ Planning & regulatory

Groins

Channelization
- ☐ Physical & chemical
- ☐ Instream/riparian restoration

Dams
- ☐ Erosion control
- ☐ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☐ Streambanks ☑ Shorelines
  - ☐ Vegetative
  - ☑ Structural
  - ☐ Integrated
  - ☐ Planning & regulatory

Groins are structures that are built perpendicular to the shore and extend into the water. Examples of possible planform shapes for groins are illustrated in Figure 7.17. They are generally constructed in series, referred to as a groin field, along the entire length of shore to be protected. Groins trap sand in littoral drift and halt its longshore movement along beaches. The sand trapped by each groin acts as a protective barrier that waves can attack and erode without damaging previously unprotected upland areas. Unless the groin field is artificially filled with sand from other sources, sand is trapped in each groin by interrupting the natural supply of sand moving along the shore in the natural littoral drift. This frequently results in an inadequate natural supply of sand to replace the sand carried away from beaches located farther along the shore in the direction of the littoral drift. If "downdrift" beaches are kept starved of sand for long periods of time, severe beach erosion in unprotected areas can result. As with bulkheads and revetments, the most durable materials for construction of groins are timber and stone. Less expensive techniques for building groins use sand- or concrete-filled bags or tires. It must be recognized that the use of lower-cost materials in the construction of bulkheads, revetments, or groins frequently results in less durability and reduced project life. Figure 7.18 illustrates transition from a groin field to a natural shoreline.

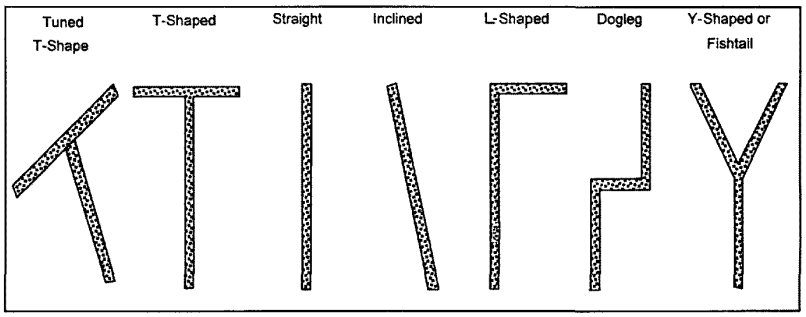

Figure 7.17 Possible Planform Shapes for Groins (USACE, 2003)

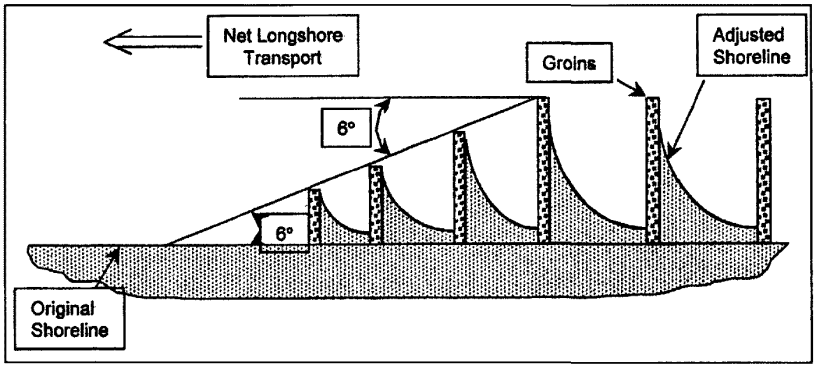

Figure 7.18 Transition from Groin Field to Natural Shoreline (USACE, 2003)

Additional Resource

- USACE. No date. *Groins.* U.S. Army Corps of Engineers, Coastal & Hydraulics Laboratory. http://chl.erdc.usace.army.mil/chl.aspx?p=s&a=ARTICLES!188.

Identify and Address NPS Contributions

Channelization
- ☐ Physical & chemical
- ☐ Instream/riparian restoration

Dams
- ☐ Erosion control
- ☐ Runoff control
- ☐ Chemical/pollutant control
- ☑ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☐ Streambanks ☐ Shorelines
  - ☐ Vegetative
  - ☐ Structural
  - ☐ Integrated
  - ☐ Planning & regulatory

Another watershed protection practice involves the evaluation of the total NPS pollution contributions in the watershed. NPS contributions can stem from different land use activities upstream from a dam. For example, the analysis and interpretation of stereoscopic color infrared aerial photographs can be used to find and map specific areas of concern where a high probability of NPS pollution exists from septic tank systems, animal wastes, soil erosion, and other similar types of NPS pollution (TVA, 1988). Other remote sensing techniques, such as analysis of satellite imagery, can be used to map areas of concern within a watershed. Historically, TVA has used analysis of aerial photography images to survey about 25 percent of the Tennessee Valley to identify sources of nonpoint pollution in a period of less than 5 years at a cost of a few cents per acre (TVA, 1988). Modern geographic information systems (GIS) enable watershed planners and modelers to rapidly assess large watersheds in a cost-effective manner.

The development of Total Maximum Daily Loads (TMDLs) in watersheds with impaired waterbodies is a way to identify all sources of pollution. TMDLs are planning documents that provide load allocations, for both point and nonpoint sources, and identify potential contributions of pollutants to an impaired waterbody. TMDLs often include the involvement of stakeholders throughout the watershed, in not only the development, but also with implementation of specific activities within the watershed. TMDL documents can provide a plan for addressing pollution sources throughout a watershed.

Different practices can be used to control NPS pollution once sources have been identified. These practices may include the following:

Soil Erosion Control

Soil erosion has been determined to be the major source of suspended solids, nutrients, organic wastes, pesticides, and sediment that combined form the most problematic form of NPS pollution (TVA, 1988). Soil erosion and runoff controls have been addressed throughout earlier management measures in this document.

Mine Reclamation

Abandoned mines may have the potential to contribute significant sediment, metals, acidified water, and other pollutants to reservoirs (TVA, 1988). Old mines need to be located and reclaimed to reduce NPS pollutants emanating from them. Revegetation is a cost-effective method of reclaiming denuded strip-mined lands, and agencies such as the Natural Resource Conservation Service (NRCS) can provide technical insight for revegetation practices.

Animal Waste Control

A major contributor to reservoir pollution in some watersheds is waste from animal confinement facilities. TVA (1988) estimated that in the Tennessee Valley, farms produced about six times the organic wastes of the population of the valley. EPA also has available the *National Management Measures to Control Nonpoint Source Pollution from Agriculture*,[5] which is a technical guidance and reference document for use by state, local, and tribal managers in the implementation of NPS pollution management programs. It contains information on a variety of practices and management strategies for reducing pollution of surface and ground water from agriculture (USEPA, 2003b).

Correcting Failing Septic Systems

The objective of this practice is to protect waterbodies from pollutants discharged by onsite sewage disposal systems (OSDS). They should be sited, designed, and installed so that impacts to waterbodies will be reduced to the extent practicable. Factors such as soil type, soil depth, depth to water table, rate of sea level rise, and topography should be considered. The installation of OSDS should be prevented in areas where soil absorption systems will not provide adequate treatment of effluents containing solids, phosphorus, pathogens, nitrogen, and nonconventional pollution prior to entry into surface waters and ground water. Setbacks, separation distances, and maintenance requirements should be established.

Failing septic tank or OSDS are another source of NPS pollution in reservoirs. TVA has found septic tank failures to be a problem in some of its reservoirs and has identified them through an aerial survey (TVA, 1988). Additional guidance on OSDS is available from EPA's *Onsite Wastewater Treatment Systems Manual* (EPA 625-R-00-008), which is available through EPA's National Service Center for Environmental Publications.[6]

Land Use Planning

Land use plans that establish guidelines for permissible uses of land within a watershed serve as a guide for reservoir management programs addressing NPS pollution (TVA, 1988). Watershed land use plans identify suitable uses for land surrounding a reservoir, establish sites for economic development and natural resource management activities, and facilitate improved land management (TVA, 1988). Land use plans must be flexible documents that account for the needs of the landowners, state and local land use goals, the characteristics of the land and its ability to support various uses, and the control of NPS pollution (TVA, 1988).

Comprehensive planning is an effective nonstructural tool to control NPS pollution. Where possible, growth should be directed toward areas where it can be sustained with minimal impact on the environment (Meeks, 1990). Poorly planned growth and development have the potential to degrade and destroy natural drainage systems and surface waters (Mantell et al., 1990). Proper planning and zoning decisions allow water quality managers to direct development and land disturbance away from areas that drain to sensitive waters. Land use designations and zoning laws can also be used to protect environmentally sensitive areas such as riparian corridors and wetlands.

[5] http://www.epa.gov/owow/nps/pubs.html
[6] http://www.epa.gov/ncepihom

Identify and Preserve Critical Areas

Channelization
- ☐ Physical & chemical
- ☐ Instream/riparian restoration

Dams
- ☐ Erosion control
- ☐ Runoff control
- ☐ Chemical/pollutant control
- ☑ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☐ Streambanks ☐ Shorelines
  - ☐ Vegetative
  - ☐ Structural
  - ☐ Integrated
  - ☐ Planning & regulatory

Protection of sensitive areas and areas that provide water quality benefits (e.g., natural wetlands and riparian areas) is integral to maintaining or minimizing the impacts of development on receiving waters and associated habitat. Without a comprehensive planning approach that includes the use of riparian buffers, open space, bioretention, and structural controls to maintain the predevelopment hydrologic characteristics of the site, significant water quality and habitat impacts are likely. The experience of various communities has shown that the use of structural controls in the absence of adequate local land use planning and zoning often does not adequately protect water quality and might even cause detrimental effects, such as increased temperature.

An initial step for incorporating targeted land conservation into a runoff management program is to identify critical conservation areas on a watershed map and superimpose this information on a tax map. Owners of potential conservation lands could include a mix of individuals, corporations or other business entities, homeowner associations, government agencies, and land trusts.

Land conservation includes more than simply preserving land in its current state. It also means that an individual or organization should take responsibility for restoration of areas of the property that are contributing to runoff problems or have been adversely affected by runoff. Stewardship activities for land conservation might include:

- Resource monitoring
- General maintenance
- Control of exotic species
- Installation of structural runoff management practices and maintenance

There are several options for landowners who would like to retain ownership of the parcel but relinquish stewardship and conservation management to another organization. These nonexclusive management options, discussed below, include establishing conservation easements, leases, deed restrictions, covenants, or transfer of development rights (TDRs).

Conservation Easements

A conservation easement is a legal agreement that transfers specific rights concerning the use of land by sale or donation to a government agency (municipal, county, or state), a qualified nonprofit organization (e.g., land trust or conservancy), or other legal entity without transferring title of the land (Cwikiel, 1996).

Leases

Even though government agencies, land trusts, and other nonprofit organizations would prefer that conservation lands be acquired by donation or that conservation easements be placed on the property, some lands hold so much value as conservation areas that leasing is worth the expense and effort. Leasing a property allows the agency, trust, or organization to actively manage the land for conservation.

Deed Restrictions

Restrictions can be included in deeds for the purpose of constraining use of the land. In theory, deed restrictions are designed to perform functions similar to those of conservation easements. In practice, however, deed restrictions have proven to be much weaker substitutes because unlike conservation easements, deed restrictions do not necessarily designate or convey oversight responsibilities to a particular agency or organization to enforce protection and maintenance provisions. Also, deed restrictions can be relatively easy to modify or vacate through litigation. Modifying or nullifying an easement is difficult, especially if tax benefits have already been realized. For these reasons, conservation easements are generally preferred over deed restrictions.

Covenants

A covenant is similar to a deed restriction in that it restricts activities on a property, but it is in the form of a contract between the landowner and another party. The term *mutual covenants* is used to describe a situation where one or more nearby or adjacent landowners are contracted and covered by the same restrictions.

Transfer of Development Rights (TDRs)

The concept of TDRs as a watershed protection tool is based on the premise that ownership of land includes a "bundle" of property rights. One of these rights is the right to develop the property to its "highest and best use." Although this right can be restricted by zoning building codes, environmental constraints, and other types of restrictions, the basic right to develop remains. A TDR system creates an opportunity for property owners to transfer development potential or density at one property, called a sending area to another property, called a receiving area. In the context of watershed planning objectives, TDR programs can be an effective way to transfer development potential from sensitive subwatersheds to subwatersheds that can better deal with increased imperviousness.

Joint Planting

Channelization
- ☑ Physical & chemical
- ☑ Instream/riparian restoration

Dams
- ☑ Erosion control
- ☐ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☑ Streambanks ☐ Shorelines
  - ☐ Vegetative
  - ☐ Structural
  - ☑ Integrated
  - ☐ Planning & regulatory

Joint planting (or vegetated riprap) involves tamping live cuttings of rootable plant material into soil between the joints or open spaces in rocks that have previously been placed on a slope (Figure 7.19). Alternatively, the cuttings can be tamped into place at the same time that rock is being placed on the slope face. Joint planting is useful where rock riprap is required or already in place. It is successful 30 to 50 percent of the time, with first year irrigation improving survival rates. Live cuttings must have side branches removed and bark intact. They should range from 0.5 to 1.5 inches in diameter and be long enough to extend well into the soil, reaching into the dry season water level. Installation guidelines are available from the USDA-FS Soil Bioengineering Guide (USDA-FS, 2002) and the USDA NRCS *Engineering Field Handbook, Chapter 18* (USDA-NRCS, 1992).

Additional Resources

- FISRWG. 1998. *Stream Corridor Restoration: Principles, Processes, and Practices*. Federal Interagency Stream Restoration Working Group. http://www.nrcs.usda.gov/technical/stream_restoration/PDFFILES/APPENDIX.pdf.

- ISU. 2006. *How to Control Streambank Erosion: Joint Planting*. Iowa State University. http://www.ctre.iastate.edu/erosion/manuals/streambank/joint_planting.pdf.

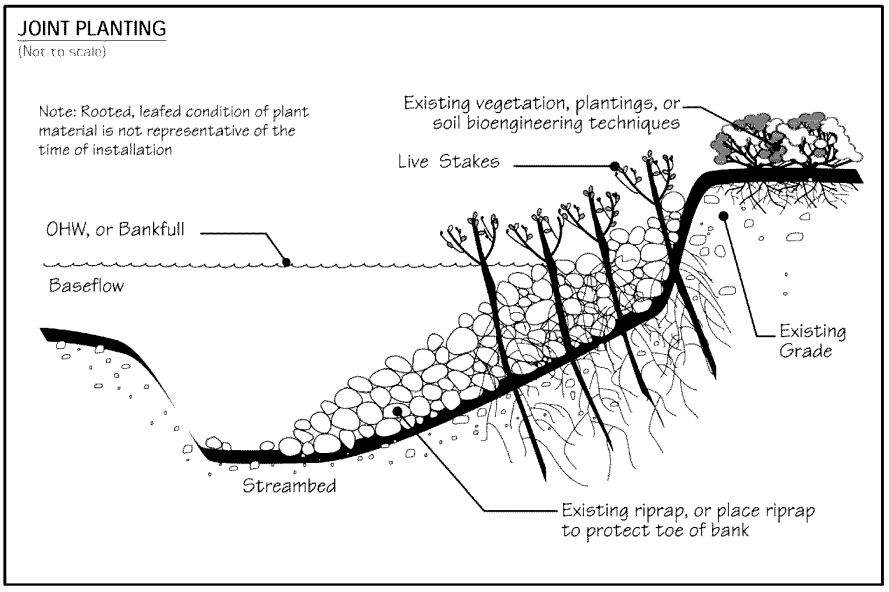

Figure 7.19 Joint Planting (USDA-FS, 2002)

Labyrinth Weir

Labyrinth weirs have extended crest length and are usually W-shaped. These weirs spread the flow out to prevent dangerous undertows in the plunge pool. A labyrinth weir at South Holston Dam (Tennessee) was constructed for the dual purpose of providing minimum flows and improving DO in reservoir releases. The weir aerates to up to 60 percent of the oxygen deficit. For instance, projected performance at the end of the summer is an increase in the DO from 3 mg/L to 7 mg/L (or an increase of 4 mg/L) (Hauser, 1992). Actual increases in the DO will depend on the temperature and the level of DO in the incoming water.

Channelization
- ☐ Physical & chemical
- ☐ Instream/riparian restoration

Dams
- ☐ Erosion control
- ☐ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☑ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☐ Streambanks ☐ Shorelines
  - ☐ Vegetative
  - ☐ Structural
  - ☐ Integrated
  - ☐ Planning & regulatory

Levees, Setback Levees, and Floodwalls

Channelization
- ☑ Physical & chemical
- ☑ Instream/riparian restoration

Dams
- ☐ Erosion control
- ☐ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☑ Streambanks ☑ Shorelines
  - ☐ Vegetative
  - ☑ Structural
  - ☐ Integrated
  - ☐ Planning & regulatory

Many valuable techniques can be used, when applied correctly, to protect, operate, and maintain levees (Hynson et al., 1985). Evaluation of site-specific conditions and the use of best professional judgment are the best methods for selecting the proper levee protection and operation and maintenance plan. According to Hynson and others (1985), maintenance activities generally consist of vegetation management, burrowing animal control, upkeep of recreational areas, and levee repairs.

Care must be taken during construction to prevent disturbing the natural channel vegetation, cross section, or bottom slope. No immediate instream effects from sedimentation are usually caused by implementing this type of modification. The potential for long-term channel adjustments can be evaluated using methods outlined in *Channel Stability Assessment for Flood Control Projects* (USACE, 1994).

Methods to control vegetation include mowing, grazing, burning, and using chemicals. Selection of a vegetation control method should consider the existing and surrounding vegetation, desired instream and riparian habitat types and values, timing of controls to avoid critical periods, selection of livestock grazing periods, and timing of prescribed burns to be consistent with historical fire patterns. Additionally, a balance between the vegetation management practices for instream and riparian habitat and engineering considerations should be maintained to avoid structural compromise. Animal control methods are most effective when used as a part of an integrated pest management program and might include instream and riparian habitat manipulation or biological controls. Recreational area management includes upkeep of planted areas, disposal of solid waste, and repairing of facilities (Hynson et al., 1985).

The prevention of floods by dams and levees can eliminate or diminish essential ecological functions. Dams, levees and channel training structures have dramatically altered or eliminated the frequency, duration, magnitude, and timing of periodic high flows. These projects significantly reduce the likelihood of floodplain inundation, block the transfer of organic matter and nutrients between river and floodplain, block plant succession, eliminate fish access to spawning areas, and rob rivers of the erosive power to restore and create a diversity of habitats (Environmental Defense, 2002). Levees have had several impacts on the Snake River in Wyoming. Anthony (1998) found habitat losses, including changes in vegetation (including losses of cottonwood and riparian habitats from 1956) and changes in channel and floodplain complexity from a braided to a single channel pattern.

Siting of levees and floodwalls should be addressed prior to design and implementation of these types of projects. Proper siting of such structures can avoid several types of problems. First, construction activities should not disturb the physical integrity of adjacent riparian areas and/or

wetlands. Second, by setting back the structures (offsetting them from the streambank), the relationship between the channel and adjacent riparian areas can be preserved. Proper siting and alignment of proposed structures can be established based on hydraulic calculations, historical flood data, and geotechnical analysis of riverbank stability.

Additional Resource

- LSU AgCenter. 1999. *Floodwalls*. Louisiana State University Agricultural Center, Louisiana Cooperative Extension Service. http://www.louisianafloods.org/NR/rdonlyres/7A01F7C8-703B-47D1-BCCD-63CD0A57721F/2995/pub2745Floodwall6.pdf.

Live Cribwalls

Channelization
- ☑ Physical & chemical
- ☑ Instream/riparian restoration

Dams
- ☑ Erosion control
- ☐ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☑ Streambanks ☐ Shorelines
  - ☐ Vegetative
  - ☐ Structural
  - ☑ Integrated
  - ☐ Planning & regulatory

A live cribwall is used to rebuild a bank in a nearly vertical setting. It consists of a hollow, box-like interlocking arrangement of untreated log or timber members (Figure 7.20). The structure is filled with suitable backfill material and layers of live branch cuttings, which root inside the crib structure and extend into the slope. Logs or untreated timbers should range from 4 to 6 inches in diameter. Lengths will vary with the size of the crib structure. Fill rock should be 6 inches in diameter. Live branch cuttings should be 0.5 to 2.5 inches in diameter and long enough to reach the back of the wooden crib structure. Once the live cuttings root and become established, the subsequent vegetation gradually takes over the structural functions of the wood members. Live cribwalls are appropriate where space is limited and at the base of a slope where a low wall may be required to stabilize the toe of the slope and to reduce its steepness. They are also appropriate above and below the water level where stable streambeds exist. They are not designed for or intended to resist large, lateral earth stress. Installation guidelines are available from the USDA-FS Soil Bioengineering Guide (USDA-FS, 2002) and the USDA NRCS *Engineering Field Handbook, Chapter 18* (USDA-NRCS, 1992).

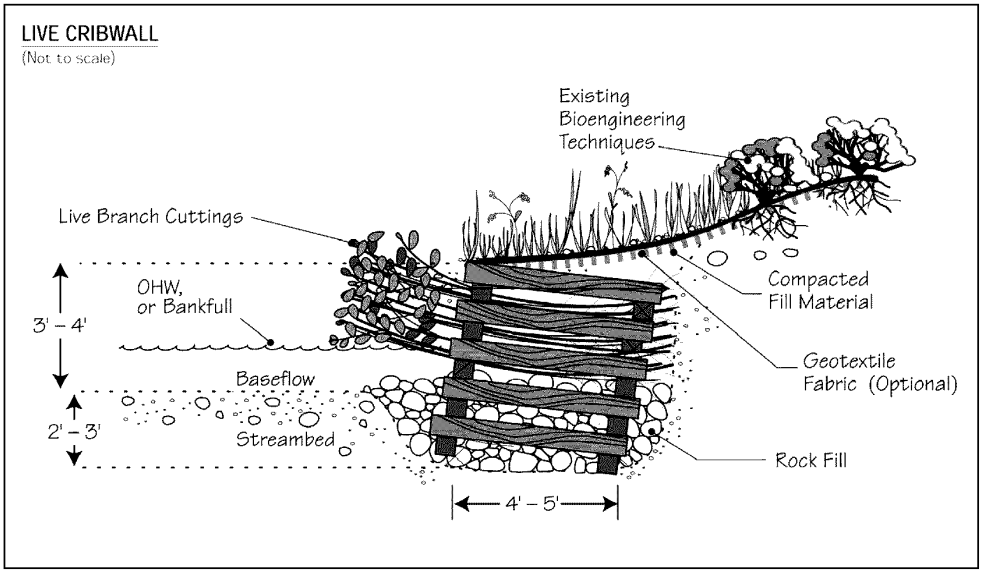

Figure 7.20 Live Cribwall (USDA-FS, 2002)

Additional Resources

- FISRWG. 1998. *Stream Corridor Restoration: Principles, Processes, and Practices*. Federal Interagency Stream Restoration Working Group. http://www.nrcs.usda.gov/technical/stream_restoration/PDFFILES/APPENDIX.pdf.

- ISU. 2006. *How to Control Streambank Erosion: Live Cribwall.* Iowa State University. http://www.ctre.iastate.edu/erosion/manuals/streambank/live_cribwall.pdf.

- Mississippi State University, Center for Sustainable Design. 1999. *Water Related Best Management Practices in the Landscape: Live Cribwall.* Created for United States Department of Agriculture, Natural Resource Conservation Service, Watershed Science Institute. http://www.abe.msstate.edu/csd/NRCS-BMPs/pdf/streams/bank/livecribwall.pdf.

- Ohio DNR. No date. *Ohio Stream Management Guide: Live Cribwalls.* Ohio Department of Natural Resources. http://www.ohiodnr.com/water/pubs/fs_st/stfs17.htm.

Live Fascines

Channelization
- ☑ Physical & chemical
- ☑ Instream/riparian restoration

Dams
- ☑ Erosion control
- ☐ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☑ Streambanks ☐ Shorelines
  - ☑ Vegetative
  - ☐ Structural
  - ☐ Integrated
  - ☐ Planning & regulatory

Live fascines are long bundles of branch cuttings bound together in a cylindrical structure (Figure 7.21). They are suited to steep, rocky slopes, where digging is difficult (USDA-NRCS, 1992). When cut from appropriate species (e.g., young willows or shrub dogwoods) that root easily and have long straight branches, and when properly installed, they immediately begin to stabilize slopes. The cuttings (0.5 to 1.5 inches in diameter) form live fascine bundles that vary in length from 5 to 10 feet or longer, depending on site conditions and handling limitations. Completed bundles should be 6 to 8 inches in diameter. The goal is for natural recruitment to follow once slopes are secured. Live fascines should be placed in shallow contour trenches on dry slopes and at an angle on wet slopes to reduce erosion and shallow face sliding. Live fascines should be applied above ordinary high-water mark or bankfull level except on very small drainage area sites. In arid climates, they should be used between the high and low water marks on the bank. This system, installed by a trained crew, does not cause much site disturbance.

Installation guidelines are available from the USDA-FS Soil Bioengineering Guide (USDA-FS, 2002) and the USDA NRCS *Engineering Field Handbook, Chapter 18* (USDA-NRCS, 1992). Under their Ecosystem Management and Restoration Research Program (EMRRP), the U.S. Army Corps of Engineers presents research on live fascines in a technical note (*Live and Inert Fascine Streambank Erosion Control*).[7]

Additional Resources

- Massachusetts DEP. 2006. *Massachusetts Nonpoint Source Pollution Management Manual: Live Fascines.* Massachusetts Department of Environmental Protection, Boston, MA. http://projects.geosyntec.com/NPSManual/Fact%20Sheets/Live%20Fascines.pdf.

- Greene County Soil & Water Conservation District. No date. *Construction Specification VS-01: Live Fascines.* http://www.gcswcd.com/stream/library/pdfdocs/vs-01.pdf.

- ISU. 2006. *How to Control Streambank Erosion: Live Fascine.* Iowa State University. http://www.ctre.iastate.edu/erosion/manuals/streambank/live_fascine.pdf.

- Mississippi State University, Center for Sustainable Design. 1999. *Water Related Best Management Practices in the Landscape: Live Fascine.* Created for United States Department of Agriculture, Natural Resource Conservation Service, Watershed Science Institute. http://abe.msstate.edu/csd/NRCS-BMPs/pdf/streams/bank/livefacine.pdf.

[7] http://el.erdc.usace.army.mil/elpubs/pdf/sr31.pdf

- Ohio DNR. No date. *Ohio Stream Management Guide: Live Fascines.* Ohio Department of Natural Resources. http://www.ohiodnr.com/water/pubs/fs_st/stfs14.pdf.

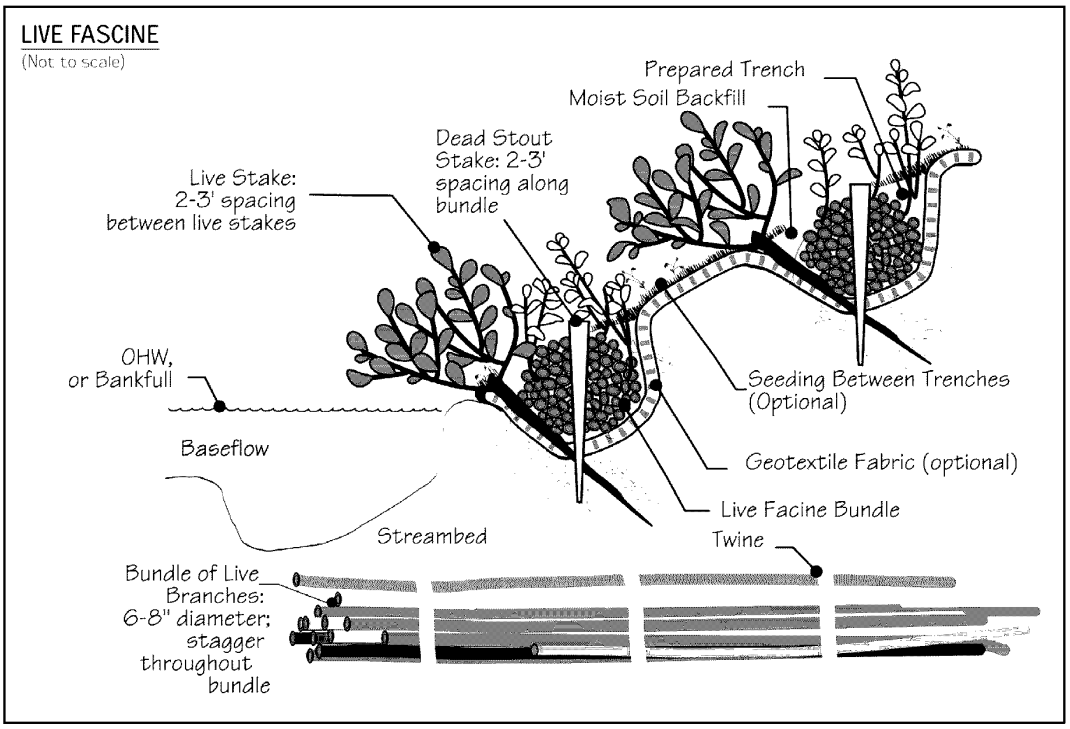

Note: OHW (Ordinary High Water) is the mark along a streambank where the waters are common and usual. This mark is generally recognized by the difference in the character of the vegetation above and below the mark or the absence of vegetation below the mark (USDA-FS, 2002).

Figure 7.21 Live Fascine (USDA-FS, 2002)

Live Staking

Channelization
- ☑ Physical & chemical
- ☑ Instream/riparian restoration

Dams
- ☑ Erosion control
- ☐ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☑ Streambanks ☐ Shorelines
  - ☑ Vegetative
  - ☐ Structural
  - ☐ Integrated
  - ☐ Planning & regulatory

Live staking (Figure 7.22) is appropriate for relatively uncomplicated site conditions when construction time is limited. It can also be used to stabilize intervening areas between other soil bioengineering techniques (USDA-NRCS, 1992). Live staking involves the insertion and tamping of live, rootable vegetative cuttings into the ground. If correctly prepared and placed, the live stake will root and grow. A system of stakes creates a living root mat that stabilizes the soil by reinforcing and binding soil particles together and by extracting excess soil moisture. Stakes are generally 1 to 2 inches in diameter and 2 to 3 feet long. Specific site requirements and available cutting source will determine size. Vegetation selected should be able to withstand the degree of anticipated inundation, provide year round protection, have the capacity to become well established under sometimes adverse soil conditions, and have root, stem, and branch systems capable of resisting erosive flows. Most willow species are ideal for live staking because they root rapidly and begin to dry out a slope soon after installation. Sycamore and cottonwood are also species commonly used for live staking. This is an appropriate technique for repair of small earth slips and slumps that are frequently wet. Installation guidelines are available from the USDA-FS Soil Bioengineering Guide (USDA-FS, 2002) and the USDA NRCS *Engineering Field Handbook, Chapter 18* (USDA-NRCS, 1992).

Additional Resources

- ISU. 2006. *How to Control Streambank Erosion: Live Stakes.* Iowa State University. http://www.ctre.iastate.edu/erosion/manuals/streambank/live_stakes.pdf.

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- Walter, J., D. Hughes, and N.J. Moore. 2005. *Streambank Revegetation and Protection: A Guide for Alaska. Revegetation Techniques: Live Staking.* Revised Edition. Alaska Department of Fish and Game, Division of Sport Fish. http://www.sf.adfg.state.ak.us/SARR/restoration/techniques/livestake.cfm.

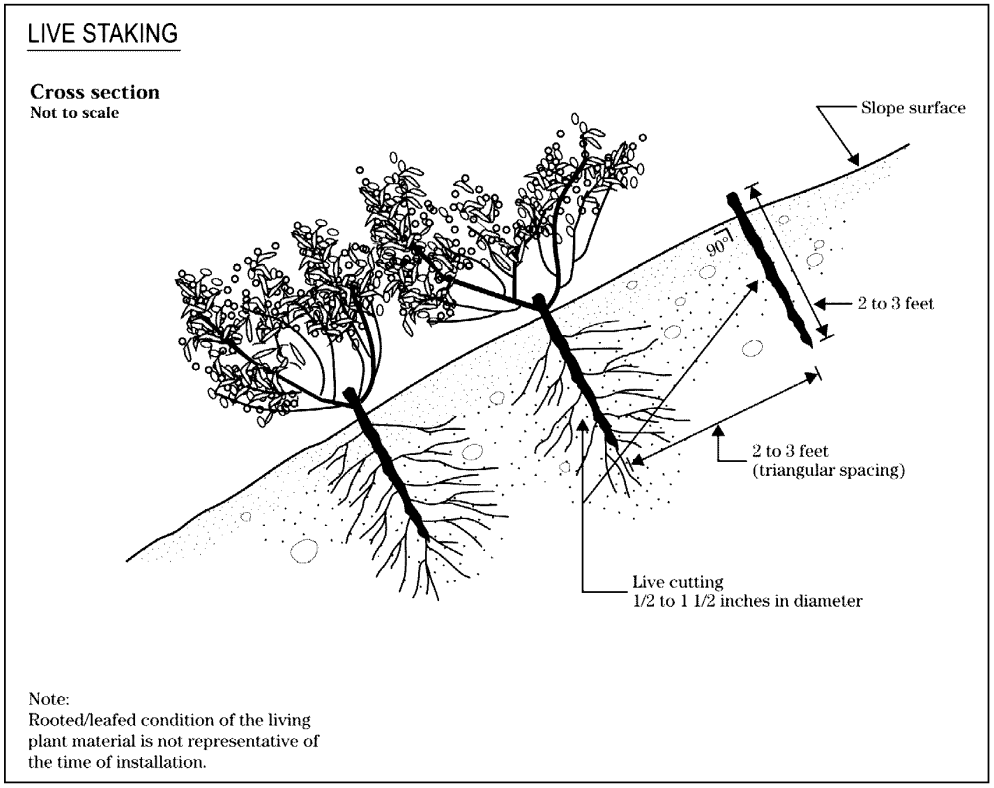

Figure 7.22 Live Staking (USDA-NRCS, 1992)

Locate Potential Land Disturbing Activities Away from Critical Areas

Material stockpiles, borrow areas, access roads, and other land-disturbing activities can often be located away from critical areas such as steep slopes, highly erodible soils, and areas that drain directly into sensitive waterbodies.

Channelization
- ☐ Physical & chemical
- ☐ Instream/riparian restoration

Dams
- ☑ Erosion control
- ☑ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☐ Streambanks ☐ Shorelines
  - ☐ Vegetative
  - ☐ Structural
  - ☐ Integrated
  - ☐ Planning & regulatory

Marsh Creation and Restoration

Channelization
- ☐ Physical & chemical
- ☑ Instream/riparian restoration

Dams
- ☐ Erosion control
- ☐ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☑ Streambanks ☑ Shorelines
  - ☑ Vegetative
  - ☐ Structural
  - ☐ Integrated
  - ☐ Planning & regulatory

Marsh creation and restoration is a useful vegetative technique that can address problems with erosion of shorelines. Marsh plants perform two functions in controlling shore erosion (Knutson, 1988). First, their exposed stems form a flexible mass that dissipates wave energy. As wave energy is diminished, the offshore transport and longshore transport of sediment are reduced. Ideally, dense stands of marsh vegetation can create a depositional environment, causing accretion of sediments along the intertidal zone rather than continued shore erosion. Second, marsh plants form a dense mat of roots, which can add stability to the shoreline sediments. The basic approach for marsh creation is to plant a shoreline area in the vicinity of the tide line with appropriate marsh grass species. Suitable fill material may be placed in the intertidal zone to create a wetlands planting terrace of sufficient width (at least 18 to 25 feet) if such a terrace does not already exist at the project site. For shoreline sites that are highly sheltered from the effects of wind, waves, or boat wakes, the fill material is usually stabilized with small structures, similar to groins, which extend out into the water from the land. For shorelines with higher levels of wave energy, the newly planted marsh can be protected with an offshore installation of stone that is built either in a continuous configuration or in a series of breakwaters.

Additional Resource

- Maryland Department of the Environment. 2006. *Shore Erosion Control Guidelines: Marsh Creation*. http://www.mde.state.md.us/assets/document/wetlandswaterways/Shoreerosion.pdf.

Modifying Operational Procedures

Channelization
- ☐ Physical & chemical
- ☐ Instream/riparian restoration

Dams
- ☐ Erosion control
- ☐ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☑ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☐ Streambanks ☐ Shorelines
  - ☐ Vegetative
  - ☐ Structural
  - ☐ Integrated
  - ☐ Planning & regulatory

A useful tool for evaluating the effects of operational procedures on the quality of tailwaters is computer modeling. For instance, computer models can describe the vertical withdrawal zone that would be expected under different scenarios of turbine operation (Smith et al., 1987). Zimmerman and Dortch (1989) modeled release operations for a series of dams on a Georgia river and found that procedures that were maintaining cool temperatures in summer were causing undesirable decreases in DO and increases in dissolved iron in autumn. The suggested solution was a seasonal release plan that is flexible, depending on variations in the in-pool water quality and predicted local weather conditions. Care should be taken with this sort of approach to accommodate the needs of both the fishery resource and reservoir recreationalists, particularly in late summer.

Modeling has also been undertaken for a variety of TVA and USACE facilities to evaluate the downstream impacts on DO and temperature that would result from changes in several operational procedures, including (Hauser et al., 1990a; Hauser et al., 1990b; Higgins and Kim, 1982; Nestler et al., 1986):

- Maintenance of minimum flows
- Timing and duration of shutoff periods
- Seasonal adjustments to the pool levels
- Timing and variation of the rate of drawdown

Mulching

Channelization
- ☐ Physical & chemical
- ☐ Instream/riparian restoration

Dams
- ☑ Erosion control
- ☐ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☐ Streambanks ☐ Shorelines
  - ☐ Vegetative
  - ☐ Structural
  - ☐ Integrated
  - ☐ Planning & regulatory

Newly established vegetation does not have as extensive a root system as existing vegetation and therefore is more prone to erosion, especially on steep slopes. Additional stabilization should be considered during the early stages of seeding. This extra stabilization can be accomplished using mulches or mulch mats, which are applied to disturbed soil surfaces and can protect the area while vegetation becomes established.

Mulches and mulch mats include tacked straw, wood chips, and jute netting and are often covered by blankets or netting. Mulching alone should be used only for temporary protection of the soil surface or when permanent seeding is not feasible. The useful life of mulch varies with the material used and the amount of precipitation, but, generally, is approximately 2 to 6 months. Mulching and/or sodding may be necessary as slopes become moderate to steep, as soils become more erosive, and as areas become more sensitive. During the times of the year when vegetation cannot be established, mulch can be applied to moderate slopes and soils that are not highly erodible. On steep slopes or highly erodible soils, mulching may need to be reapplied if washed away.

Additional Resources

- Barr Engineering Company. 2001. *Minnesota Urban Small Sites BMP Manual: Stormwater Best Management Practices for Cold Climates. Soil Erosion Control: Mulches, Blankets and Mats.* Prepared for the Metropolitan Council by Barr Engineering Company, St. Paul, MN. http://www.metrocouncil.org/Environment/Watershed/BMP/CH3_RPPSoilMulch.pdf.

- CASQA. 2004. *California Stormwater BMP Construction Handbook*: *Hydraulic Mulch.* California Stormwater Quality Association, Sacramento, CA. http://www.cabmphandbooks.com/Documents/Construction/EC-3.pdf.

- ISU. 2006. *Iowa Construction Site Erosion Control Manual: Mulching.* Iowa State University. http://www.ctre.iastate.edu/erosion/manuals/construction/2.3_mulching.pdf.

Noneroding Roadways

Channelization
- ☑ Physical & chemical
- ☑ Instream/riparian restoration

Dams
- ☑ Erosion control
- ☐ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☐ Streambanks ☐ Shorelines
  - ☐ Vegetative
  - ☐ Structural
  - ☐ Integrated
  - ☐ Planning & regulatory

General Road Construction Considerations

Road design and construction activities that are tailored to topography and soils and take into consideration the overall drainage pattern in the watershed where the road is being constructed can prevent road-related water quality problems. Lack of adequate consideration of watershed and site characteristics, road system design, and construction techniques appropriate to the site can result in mass soil movements, extensive surface erosion, and severe sedimentation in nearby waterbodies. The effect that a road network has on stream networks largely depends on the extent to which the networks are interconnected. Road networks can be hydrologically connected to stream networks where road surface runoff is delivered directly to stream channels (at stream crossings or via ditches or gullies that direct flow off the road into a stream) and where road cuts transform subsurface flow into surface flow (in road ditches or on road surfaces that deliver sediment and water to streams much more quickly than without a road present). The combined effects of these drainage network connections are increased sedimentation and peak flows that are higher and arrive more quickly after storms. This can lead to increased instream erosion and stream channel changes, especially in small watersheds (USEPA, 2005a).

Site characteristics should be considered during construction planning. On-site verification of information from topographic maps, soil maps, and aerial photos can ensure that locations where roads are to be cut into slopes or built on steep slopes or where skid trails, landings, and equipment maintenance areas are to be located are appropriate to the use. If an on-site visit indicates that construction changes can reduce the risk of erosion, the project manager can make these changes prior to construction, and in some cases as the project progresses (USEPA, 2005a).

Road drainage features tailored to the site prevent water from pooling or collecting on road surfaces. This prevents saturation of the road surface, which can lead to rutting, road slumping, and channel washout. Many roads associated with channelization projects are temporary or seasonal-use roads, and their construction should not involve the high level of disturbance generated by construction of permanent, high-standard roads. However, these types of roads still need to be constructed and maintained to prevent erosion and sedimentation (USEPA, 2005a).

Erosion control practices need to be applied while a road is being constructed, when soils are most susceptible to erosion, to minimize soil loss to waterbodies. Since sedimentation from roads often does not occur incrementally and continuously, but in pulses during large rainstorms, it is important that road, drainage structure, and stream crossing design take into consideration a sufficiently large design storm that has a good chance of occurring during the life of the project. Such a storm might be the 10-year, 25-year, 50-year, or even 100-year, 12- to 24-hour return period storm. Sedimentation cannot be completely prevented during or after road construction,

but the process is exacerbated if the road construction and design are inappropriate for the site conditions or if the road drainage or stream crossing structures are insufficient (USEPA, 2005a).

When constructing a new road, it is useful to consider road surface shape and composition, slope stabilization, and wetlands. A more detailed discussion of these topics is provided below. More information about potential impacts to fish habitat and passage are provided in EPA's *National Management Measures to Control Nonpoint Source Pollution from Forestry*.[8]

Road Shape and Composition

The shape of a road is an important runoff control component. Road drainage and runoff control are obtained by shaping the road surface to be insloping, outsloping, or crowned. Insloping roads can be effective where soils are highly erodible and directing runoff directly to the fill slope would be detrimental. Outsloped roads tend to dissipate runoff more than insloped roads, which concentrate runoff at cross drain locations, and are useful where erosion of backfill or ditch soil might be a problem. Crowned roads are suited to two lane roads and to steep single-lane roads that have frequent cross drains or ditches and ditch relief culverts (USEPA, 2005a). These road surface shapes are illustrated in Figure 7.23. Maintain one of these shapes to ensure good drainage. Crowns, inslopes, and outslopes will quickly lose effectiveness if not maintained frequently, due to ruts created by traffic when the road surface is damp or wet (USEPA, 2005a).

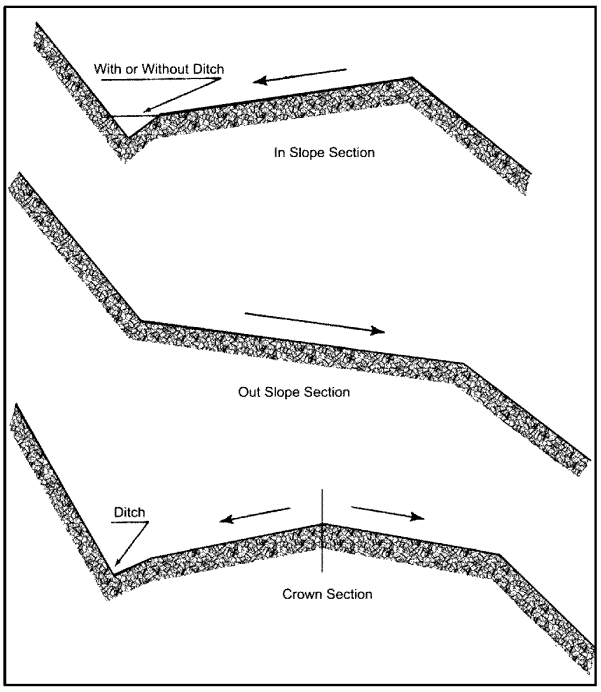

Figure 7.23 Types of Road Surface Shapes (USEPA, 2005a)

Road surface composition can effectively control erosion from road surfaces and slopes. It is important to choose a surface that is suitable to the topography, soils, and intended use. Surface protection of the roadbed and cut-and-fill slopes with a suitable material can minimize soil losses during storms, reduce frost heave erosion production, restrain downslope movement of soil slumps, and minimize erosion from softened roadbeds (USEPA, 2005a).

Slope Stabilization

Road cuts and fills can be a large source of sediment when constructing a rural road. Stabilizing back slopes and fill slopes as they are constructed is important in minimizing erosion from these areas. Combined with gravel or other surfacing, establishing grass or another form of slope stabilization can significantly reduce soil loss from road construction. If constructing on an unstable slope is necessary, consider consulting with an engineering geologist or geotechnical

[8] Available online at http://www.epa.gov/owow/nps/forestrymgmt.

engineer for recommended construction methods and to develop plans for the road segment. Unstable slopes that threaten water quality should be considered unsuitable for road building.

Planting grass on cut-and-fill slopes of new roads can effectively reduce erosion, and placing forest floor litter or brush barriers on downslopes in combination with establishing grass is also effective for reducing downslope sediment transport. Grass-covered fill is generally more effective than mulched fill in reducing soil erosion from newly constructed roads because of the roots that hold the soil in place, which are lacking with other cover. Because grass needs some time to establish itself, a combination of straw mulch with netting to hold it in place can be used to cover a seeded area and effectively reduce erosion while grass is growing. The mulch and netting provide immediate erosion control and promote grass growth (USEPA, 2005a).

Wetland Road Considerations

Sedimentation is a concern when considering road construction through wetlands. It is better to avoid putting a road through a wetland when an alternative route exists. If no alternative exists, make sure to implement best management practices (BMPs) suggested by the state. Road construction or maintenance for certain farming, forestry, or mining activities might be exempt under Clean Water Act (CWA) section 404. However, to qualify for the exemption, the roads must be constructed and maintained following application of specific BMPs designed to protect the aquatic environment (USEPA, 2005a).

Pesticide and Fertilizer Management

Channelization
- ☐ Physical & chemical
- ☐ Instream/riparian restoration

Dams
- ☐ Erosion control
- ☐ Runoff control
- ☑ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☐ Streambanks ☐ Shorelines
  - ☐ Vegetative
  - ☐ Structural
  - ☐ Integrated
  - ☐ Planning & regulatory

Chemicals used in dam management include pesticides (insecticides, herbicides, and fungicides) and fertilizers. Since pesticides can be toxic, they have to be mixed, transported, loaded, and applied correctly and their containers disposed properly to prevent potential nonpoint source pollution. Since fertilizers can also be toxic or can damage the ecosystem, it is important that they be handled and applied properly, according to label instructions.

Even though a limited number of applications might be made at a specific dam site, consider that throughout a watershed many sites could receive applications of fertilizers and pesticides, which can accumulate in soils and in waterbodies. Application techniques also partly determine the potential risk to the aquatic environment from infrequent applications of pesticides and fertilizers. These chemicals can directly enter surface waters through five major pathways—direct application, drift, mobilization in ephemeral streams, overland flow, and leaching. Direct application is the most important source of increased chemical concentrations and is also one of the most easily controlled.

Some more specific implementation practices for pesticide maintenance include:

- Apply pesticides during favorable atmospheric conditions. Do not apply pesticides when wind conditions increase the likelihood of significant drift. It is also best to avoid pesticide application when temperatures are high or relative humidity is low because these conditions influence the rate of evaporation and enhance losses of volatile pesticides.
- Ensure that pesticide users abide by the current pesticide label, which might specify whether users be trained and certified in the proper use of the pesticide; allowable use rates; safe handling, storage, and disposal requirements; and whether the pesticide may be used under the provisions of an approved State Pesticide Management Plan.
- Locate mixing and loading areas, and clean all mixing and loading equipment thoroughly after each use, where pesticide residues will not enter streams or other waterbodies.
- Dispose of pesticide wastes and containers according to state and federal laws.
- Consider the use of pesticides as only one part of an overall program to control pest problems. Integrated Pest Management (IPM) strategies have been developed to control pests without total reliance on chemical pesticides.
- Base selection of pesticide on site factors and pesticide characteristics. These factors include vegetation height, target pest, adsorption (attachment) to soil organic matter, persistence or half-life, toxicity, and type of formulation.
- Check all equipment carefully, particularly for leaking hoses and connections and plugged or worn nozzles. Calibrate spray equipment periodically to achieve uniform pesticide distribution and rate.

- Always use pesticides in accordance with label instructions, and adhere to all federal and state policies and regulations governing pesticide use.

Specific implementation practices for fertilizer maintenance include:

- Apply slow-release fertilizers when possible. This practice reduces potential nutrient leaching to ground water, and it increase the availability of nutrients for plant uptake.
- Apply fertilizer during favorable atmospheric conditions. Do not apply fertilizer when wind conditions increase the likelihood of significant drift.
- Apply fertilizers during maximum plant uptake periods to minimize leaching.
- Base fertilizer type and application rate on soil and/or foliar analysis.

Phase Construction

Channelization
- ☐ Physical & chemical
- ☐ Instream/riparian restoration

Dams
- ☑ Erosion control
- ☐ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☐ Streambanks ☐ Shorelines
  - ☐ Vegetative
  - ☐ Structural
  - ☐ Integrated
  - ☐ Planning & regulatory

Construction site phasing involves disturbing only small portions of a site at a time to prevent erosion from dormant parts (CWP, 1997c). Grading activities and construction are completed and soils are effectively stabilized on one part of the site before grading and construction commence at another. This is different from the more traditional practice of construction site sequencing, in which construction occurs at only one part of the site at a time but site grading and other site-disturbing activities typically occur all at once, leaving portions of the disturbed site vulnerable to erosion. To be effective, construction site phasing must be incorporated into the overall site plan early. Elements to consider when phasing construction activities include (CWP, 1997c):

- Managing runoff separately in each phase
- Determining whether water and sewer connections and extensions can be accommodated
- Determining the fate of already completed downhill phases
- Providing separate construction and residential accesses to prevent conflicts between residents living in completed stages of the site and construction equipment working on later stages

A comparison of sediment loss from a typical development and from a comparable phased project showed a 42 percent reduction in sediment export in the phased project (CWP, 1997c). Phasing can also provide protection from complete enforcement and shutdown of the entire project. If a contractor is in noncompliance in one phase or zone of a site, that will be the only zone affected by enforcement. This approach can help to minimize liability exposure and protect the contractor financially (Deering, 2000b).

Physical Barriers

Channelization
- ☐ Physical & chemical
- ☐ Instream/riparian restoration

Dams
- ☐ Erosion control
- ☐ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☑ Maintain fish passage

Erosion
- ☐ Streambanks ☐ Shorelines
  - ☐ Vegetative
  - ☐ Structural
  - ☐ Integrated
  - ☐ Planning & regulatory

Physical barriers are diversion systems that lead or force fish to bypasses that transport them above or below the dam (FAO, 2001). Physical diversion structures deployed at dams include angled screens, drum screens, inclined plane screens, louvers, and traveling screens. The success and effectiveness of physical barriers has been found to be specific to individual hydropower facilities (Mattice, 1990).

Angled screens are used to guide fish to a bypass by guiding them through the channel at some angle to the flow. Coarse-mesh angled screens have been shown to be highly effective with numerous warm- and cold-water species at adult life stages. Fine-mesh angled screens have been shown in laboratory studies to be highly effective in diverting larval and juvenile fish to a bypass with resultant high survival. Performance of angled screens can vary by species, stream velocity, fish length, screen mesh size, screen type, and temperature (Stone and Webster, 1986). Clogging from debris and fouling organisms is a maintenance problem associated with angled screens.

Angled rotary drum screens oriented perpendicular to the flow direction have been used extensively to lead fish to a bypass. Angled rotary drum screens tend not to experience the major operational and maintenance clogging problems of stationary screens, such as angled vertical screens. Maintenance of angled rotary drum screens typically consists of routine inspection, cleaning, lubrication, and periodic replacement of the screen mesh (Stone and Webster, 1986).

An inclined plane screen is used to divert fish upward in the water column into a bypass. Once concentrated, the fish are transported to a release point below the dam. An inclined plane pressure screen at the T.W. Sullivan Hydroelectric Project (Willamette Falls, Oregon) is located in the penstock of one unit. The design is effective in diverting fish, with a high survival rate. However, this device has been linked to injuries in some species of migrating fish, and it has not been accepted for routine use (Stone and Webster, 1986).

Louvers consist of an array of evenly spaced, vertical slats aligned across a channel at an angle leading to a bypass. The turbulence they create is sensed and avoided by the fish (Stone and Webster, 1986). Louver systems rely on a fish's instincts to use senses other than sight to move around obstacles. Once the louver is sensed, the fish tend to reverse their head first downstream orientation (to head upstream, tail to the louver) and move laterally along it until they reach the bypass (OTA, 1995).

Submerged traveling screens are used to divert downstream migrating fish out of turbine intakes to adjoining gatewell structures, where the fish are concentrated for release downstream. This device has been tested extensively at hydropower facilities on the Snake and Columbia Rivers. Because of their complexity, submerged traveling screens must be continually maintained. The

screens must be serviced seasonally, depending on the debris load, and trash racks and bypass orifices must be kept free of debris (Stone and Webster, 1986).

Physical barrier fish diversion systems have been found to work best when specifically designed to the structure and fish being passed. Small differences in design, such as the spacing or depth of the louvers, can mean the difference in success and failure. A successful louver system has been installed at the Holyoke Hydroelectric Power Station, on the Connecticut River. This partial depth louver system was installed in the intake channel at the power plant and successfully passed 86 percent of the juvenile clupeids and 97 percent of the Atlantic salmon (*Salmo salar*) smolts (Marmulla, 2001). Another partial depth louver system on the same river has experienced less successful results. The system installed at the Vernon Dam on the Connecticut River is successfully passing about 50 percent of the Atlantic salmon smolts (OTA, 1995).

Pollutant Runoff Control

Store, cover, and isolate construction materials, refuse, garbage, sewage, debris, oil and other petroleum products, mineral salts, industrial chemicals, and topsoil to prevent runoff of pollutants and contamination of ground water.

Channelization
- ☐ Physical & chemical
- ☐ Instream/riparian restoration

Dams
- ☐ Erosion control
- ☐ Runoff control
- ☑ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☐ Streambanks ☐ Shorelines
  - ☐ Vegetative
  - ☐ Structural
  - ☐ Integrated
  - ☐ Planning & regulatory

Preserve Onsite Vegetation

Preserving onsite vegetation retains soil and limits runoff of water, sediment, and pollutants. The destruction of existing onsite vegetation can be minimized by initially surveying the site to plan access routes, locations of equipment storage areas, and the location and alignment of the dam. Construction workers can be encouraged to limit activities to designated areas only. Reducing the disturbance of vegetation also reduces the need for revegetation after construction is completed, including the required fertilization, replanting, and grading that are associated with revegetation. Additionally, as much natural vegetation as possible should be left next to the waterbody where construction is occurring. This vegetation provides a buffer to reduce the NPS pollution effects of runoff originating from areas associated with the construction activities.

Channelization
- ☐ Physical & chemical
- ☐ Instream/riparian restoration

Dams
- ☑ Erosion control
- ☑ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☐ Streambanks ☐ Shorelines
  - ☐ Vegetative
  - ☐ Structural
  - ☐ Integrated
  - ☐ Planning & regulatory

Additional Resource

- CASQA. 2004. *California Stormwater BMP Construction Handbook*: *Preservation of Existing Vegetation.* California Stormwater Quality Association, Sacramento, CA. http://www.cabmphandbooks.com/Documents/Construction/EC-2.pdf.

Reregulation Weir

Channelization
- ☐ Physical & chemical
- ☐ Instream/riparian restoration

Dams
- ☐ Erosion control
- ☐ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☑ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☐ Streambanks ☐ Shorelines
  - ☐ Vegetative
  - ☐ Structural
  - ☐ Integrated
  - ☐ Planning & regulatory

Reregulation weirs have been constructed from stone, wood, and aggregate. In addition to increasing the levels of DO in the tailwaters, reregulation weirs result in a more constant rate of flow farther downstream during periods when turbines are not in operation. A reregulation weir constructed downstream of the Canyon Dam (Guadalupe River, Texas) increased DO levels in waters leaving the turbine from 3.3 mg/L to 6.7 mg/L (EPRI, 1990).

The USACE Waterways Experiment Station (Wilhelms, 1988) has compared the effectiveness with which various hydraulic structures accomplished the reaeration of reservoir releases. The study concluded that, whenever operationally feasible, more discharge should be passed over weirs to improve DO concentrations in releases. Results indicated that overflow weirs aerate releases more effectively than low-sill spillways (Wilhelms, 1988).

Reservoir Aeration

Channelization
- ☐ Physical & chemical
- ☐ Instream/riparian restoration

Dams
- ☐ Erosion control
- ☐ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☑ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☐ Streambanks ☐ Shorelines
  - ☐ Vegetative
  - ☐ Structural
  - ☐ Integrated
  - ☐ Planning & regulatory

Some techniques for reservoir aeration include:

- Air injection systems
- Diffused air systems
- Oxygen injection systems
- U-tube design

Air injection systems mix water from different strata in the impoundment by using air or pure oxygen injected into a pumping system. Air injection systems are categorized as partial air lift systems and full air lift systems. In the partial air lift system, compressed air is injected at the bottom of the unit; then the air and water are separated at depth and the air is vented to the surface. In the full air lift system, compressed air is injected at the bottom of the unit (as in the partial air lift system), but the air-water mixture rises to the surface. The full air lift design has a higher efficiency than the partial-air lift and has a lesser tendency to elevate dissolved nitrogen levels (Thornton et al., 1990).

Diffused air systems provide effective transfer of oxygen to water by forcing compressed air through small pores in diffuser systems to form bubbles. One diffuser system test in the Delaware River near Philadelphia, Pennsylvania in 1969–1970 demonstrated the efficiency of this practice. Coarse-bubble diffusers were deployed at depths ranging from 13 to 38 feet. Depending on the depth of deployment, the oxygen transfer efficiency varied from 1 to 12 percent. When compared with other systems discussed below, this efficiency rate is rather low. But the results of this test determined that river aeration was more economical than advanced wastewater treatment as a strategy for improving the levels of DO in the river (EPRI, 1990). Another type of oxygen injection system, which pumps gaseous oxygen into the hypolimnion through diffusers, has effectively improved DO levels in the reservoir behind the Richard B. Russell Dam (Savannah River, on the Georgia-South Carolina border). The system is operated 1 mile upstream of the dam, with occasional supplemental injection of oxygen at the dam face when DO levels are especially low. The system has successfully maintained DO levels above 6 mg/L in the releases, with an average oxygen transfer efficiency of 75 percent (EPRI, 1990; Gallagher and Mauldin, 1987).

The diffused air system has been found to be a cost-effective method to raise low DO levels within a reservoir (Henderson and Shields, 1984). However, the costs of air diffuser operation may be high for deep reservoirs because of hydraulic pressures that must be overcome. Destratification that results from deployment of an air diffuser system may also mix nutrient-rich waters located deep in the impoundment into layers located closer to the surface, increasing the potential for stimulation of algal populations. Barbiero et al. (1996), in a study on the effects of artificial circulation on a small northeastern impoundment, found that artificial circulation ultimately had no effect on the magnitude of summer phytoplankton populations. However, the authors note that intermittent mixing events tend to promote increased transport of phosphorus

into the epilimnion. While this had no effect on phytoplankton populations in the studied lake, it demonstrates the potential of artificial circulation to impact water quality and the need for careful evaluation of potential impacts.

Oxygen injection systems use pure oxygen to increase levels of dissolved oxygen in reservoirs. One type of design, termed side stream pumping, carries water from the impoundment onto the shore and through a piping system into which pure oxygen is injected. After passing through this system, the water is returned to the impoundment (EPRI, 1990).

The U-tube design, in which water from deep in the impoundment is pumped to the surface layer, provides a means to aerate reservoir waters. Oxygen transfer is increased as a mixture of water and oxygen gas is subjected to greater hydrostatic pressure. Water moves down the U-tube and pressure increases as a function of depth, dissolving the oxygen gas into the water. The oxygenated water then travels back up through the system and is released to the waterway (Jones and Stokes, 2004). The inducement of artificial circulation through aeration of the impoundment may also provide the opportunity for a "two-story" fishery, reduce internal phosphorus loading, and eliminate problems with iron and manganese in drinking water (Thornton et al., 1990).

If the principal objective is to improve DO levels only in the reservoir releases and not throughout the entire impoundment, then aeration can be applied selectively to discrete layers of water immediately surrounding the intakes or as water passes through release structures such as hydroelectric turbines. Localized mixing is a practice to improve releases from thermally stratified reservoirs by destratifying the reservoir in the immediate vicinity of the outlet structure. This practice differs from the practice of artificial destratification, where mixing is designed to destratify all or most of the reservoir volume (Holland, 1984). Localized mixing is provided by forcing a jet of high-quality surface water downward into the hypolimnion. Pumps used to create the jet generally fall into two categories, axial flow propellers and direct drive mixers (Price, 1989). Axial flow pumps usually have a large-diameter propeller (6 to 15 feet) that produces a high-discharge, low-velocity jet. Direct drive mixers have small propellers (1 to 2 feet) that rotate at high speeds and produce a high-velocity jet. The axial flow pumps are suitable for shallow reservoirs because they can force large quantities of water down to shallow depths. The high-momentum jets produced by direct drive mixers are necessary to penetrate deeper reservoirs (Price, 1989).

Additional Resource

- Thornton, K.W., B.L. Kimmel, and F.E. Payne. 1990. *Reservoir Limnology: Ecological Perspectives*. John Wiley & Sons, Inc., New York.

Retaining Walls

Channelization
- ☐ Physical & chemical
- ☐ Instream/riparian restoration

Dams
- ☑ Erosion control
- ☑ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☐ Streambanks ☐ Shorelines
  - ☐ Vegetative
  - ☐ Structural
  - ☐ Integrated
  - ☐ Planning & regulatory

Retaining walls are used in areas where soils are unstable, where slopes are steeper than the angle of repose, and where the horizontal distance is limited. They help stabilize slopes and can decrease the steepness of a slope. If the steepness of a slope is reduced, the runoff velocity is decreased and, therefore, the erosion potential is decreased.

According to the *Iowa Construction Site Erosion Control Manual*, a variety of materials can be used for construction of retaining walls, including concrete masonry, concrete cribbing, steel piling, gabions, precast stone, rock riprap, reinforced earth, stone drywall, and treated wood timbers. Costs vary by the material selected for construction. When designing a retaining wall, the following factors should be taken into account: drainage, bearing value of the soil, wall thickness, stress, foundation design, and wall height.

Additional Resources

- ISU. 2006. *Iowa Construction Site Erosion Control Manual: Retaining Wall.* Iowa State University. http://www.ctre.iastate.edu/erosion/manuals/construction/3.13_retaining_wall.pdf.

- Leposky, R.E. 2004. *Retaining Walls: What You See and What You Don't.* http://www.forester.net/ecm_0401_retaining.html.

Return Walls

Channelization
- ☑ Physical & chemical
- ☑ Instream/riparian restoration

Dams
- ☐ Erosion control
- ☐ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☑ Streambanks ☑ Shorelines
  - ☐ Vegetative
  - ☑ Structural
  - ☐ Integrated
  - ☐ Planning & regulatory

Whenever shorelines or streambanks are "hardened" through the installation of bulkheads, seawalls, or revetments, the design process must include consideration that waves and currents can continue to dislodge the substrate at both ends of the structure, resulting in very concentrated erosion and rapid loss of fastland. This process is called flanking. To prevent flanking, return walls should be provided at either end of a vertical protective structure and should extend landward for a horizontal distance consistent with the local erosion rate and the design life of the structure.

Additional Resource

- USACE. 1985. *Coastal Engineering Technical Note: Determining Lengths of Return Walls*. U.S. Army Engineer Waterways Experiment Station. http://chl.erdc.usace.army.mil/library/publications/chetn/pdf/cetn-iii-25.pdf.

Revegetate

Channelization
- ☐ Physical & chemical
- ☐ Instream/riparian restoration

Dams
- ☑ Erosion control
- ☐ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☐ Streambanks ☐ Shorelines
  - ☐ Vegetative
  - ☐ Structural
  - ☐ Integrated
  - ☐ Planning & regulatory

Revegetation of construction sites during and after construction is the most effective way to permanently control erosion (Hynson et al., 1985). To select the right plants for your bioengineering project, note what native plant communities grow in the area. Avoid planting noxious or invasive grasses, such as reed canary grass or ryegrass. Remove invasive plants such as yellow starthistle, English ivy, deadly nightshade, field morning glory, scotch broom, cheatgrass, and purple loosestrife. Use more of the same native plants in the bioengineering design, as these plants are most likely adapted to conditions to the area.

Plants like willow, red osier dogwood, alder, ash, and cottonwood can be well suited for bioengineering. They establish easily, grow quickly, and have thick root systems. Cuttings are available from native plant nurseries. They may also be collected next to the project site, if the area is well vegetated (Oregon Association of Conservation Districts, 2004).

Ecological and vegetational areas vary throughout the country. Therefore, other plant materials may be more suitable for a project. Contact local cooperative extension services for more plant information.[9]

Additional Resources

- Barr Engineering Company. 2001. *Minnesota Urban Small Sites BMP Manual: Stormwater Best Management Practices for Cold Climates. Soil Erosion Control: Vegetative Methods.* Prepared for the Metropolitan Council by Barr Engineering Company, St. Paul, MN. http://www.metrocouncil.org/environment/Watershed/BMP/CH3_RPPSoilVeget.pdf.

- Ohio DNR. No date. *Ohio Stream Management Guide: Restoring Streambanks with Vegetation.* Ohio Department of Natural Resources. http://www.ohiodnr.com/water/pubs/fs_st/stfs07.htm.

[9] http://www.csrees.usda.gov/qlinks/partners/state_partners.html

Revetment

Channelization
- ☑ Physical & chemical
- ☑ Instream/riparian restoration

Dams
- ☑ Erosion control
- ☐ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☑ Streambanks ☑ Shorelines
  - ☐ Vegetative
  - ☑ Structural
  - ☐ Integrated
  - ☐ Planning & regulatory

A revetment (Figure 7.24) is a type of vertical protective structure used for shoreline protection. One revetment design contains several layers of randomly shaped and randomly placed stones, protected with several layers of selected armor units or quarry stone. The armor units in the cover layer should be placed in an orderly manner to obtain good wedging and interlocking between individual stones. The cover layer may also be constructed of specially shaped concrete units (USACE, 1984). Sometimes gabions (stone-filled wire baskets) or interlocking blocks of precast concrete are used in the construction of revetments. In addition to the surface layer of armor stone, gabions, or rigid blocks, successful revetment designs also include an underlying layer composed of either geotextile filter fabric and gravel or a crushed stone filter and bedding layer. This lower layer functions to redistribute hydrostatic uplift pressure caused by wave action in the foundation substrate. Precast cellular blocks, with openings to provide drainage and to allow vegetation to grow through the blocks, can be used in the construction of revetments to stabilize banks. Vegetation roots add additional strength to the bank. In situations where erosion can occur under the blocks, fabric filters can be used to prevent the erosion. Technical assistance should be obtained to properly match the filter and soil characteristics. Typically blocks are hand placed when mechanical access to the bank is limited or costs need to be minimized. Cellular block revetments have the additional benefit of being flexible to conform to minor changes in the bank shape (USACE, 1983).

Additional Resource

- Ohio DNR. No date. *Ohio Stream Management Guide: Riprap Revetments.* Ohio Department of Natural Resources. http://www.ohiodnr.com/water/pubs/fs_st/stfs16.pdf.

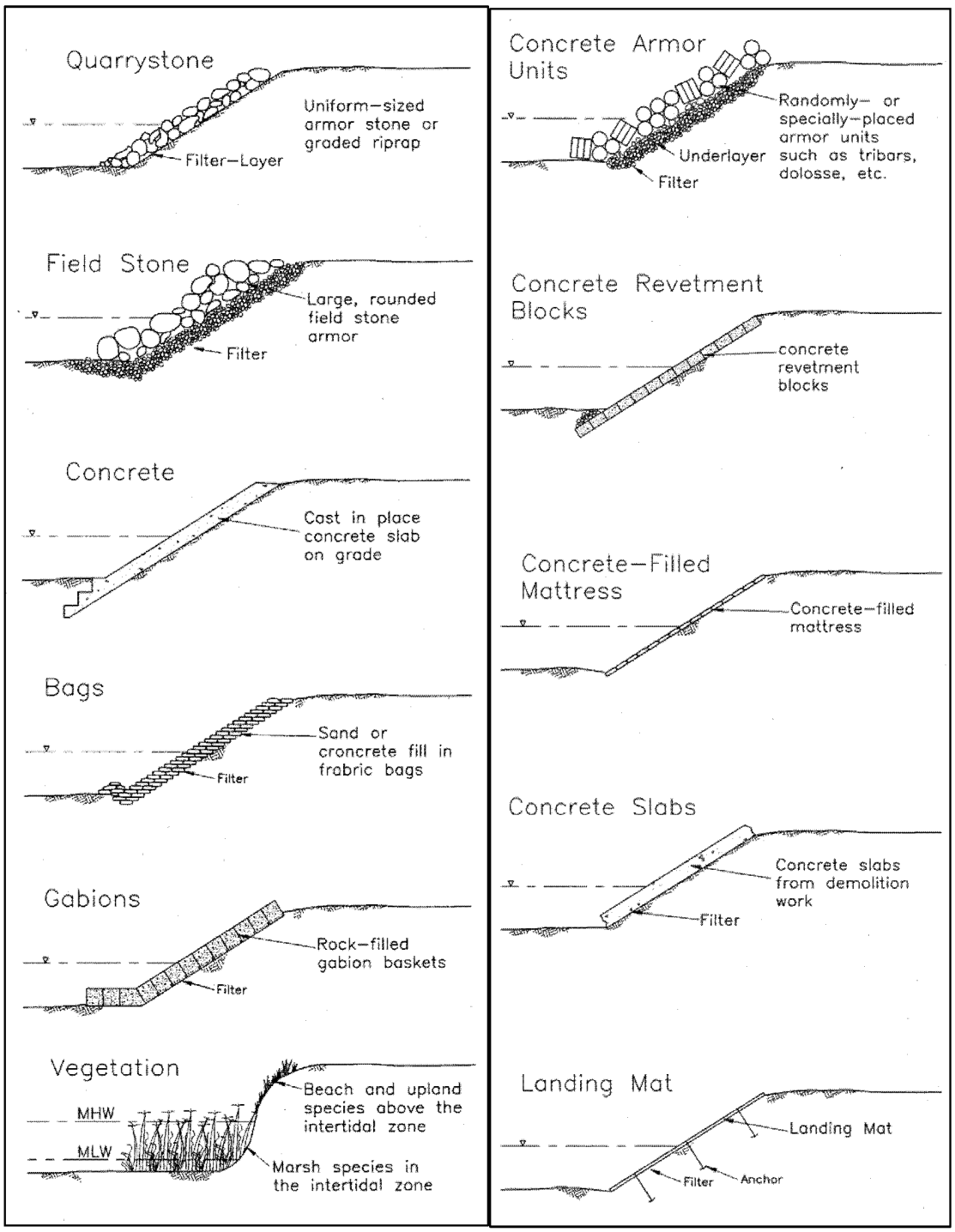

Figure 7.24 Revetment Alternatives (USACE, 2003)

Riparian Improvements

Channelization
- ☑ Physical & chemical
- ☑ Instream/riparian restoration

Dams
- ☑ Erosion control
- ☐ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☑ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☑ Streambanks ☑ Shorelines
  - ☐ Vegetative
  - ☐ Structural
  - ☑ Integrated
  - ☐ Planning & regulatory

Riparian improvements are another strategy that can be used to restore or maintain aquatic and riparian habitat around reservoir impoundments or along the waterways downstream from dams. In fact, Johnson and LaBounty (1988) found that riparian improvements were more effective, in some cases, than flow augmentation for protection of instream habitat. In the Salmon River (Idaho), a variety of instream and riparian habitat improvements have been recommended to improve the indigenous stocks of Chinook salmon (*Oncorhynchus tshawytscha*). These improvements include reducing sediment loading in the watershed, improving riparian vegetation, eliminating barriers to fish migration (see sections discussing this practice below), and providing greater instream and riparian habitat diversity (Andrews, 1988).

Maintaining and improving riparian areas upstream of a dam may also be an important consideration for reducing flow-related impacts to dams. Riparian areas along brooks and smaller streams are sometimes altered in a manner that impairs their ability to detain and absorb floodwater and stormwater (e.g., removal of forest cover or increased imperviousness). The cumulative impact of the riparian changes results in the smaller streams discharging increased volumes and velocities of water, which then result in more severe downstream flooding and increased storm damage and/or maintenance to existing structures (such as dams). These downstream impacts may occur even though main stem floodplains and riparian areas are safeguarded and remain close to their natural condition (Cohen, 1997).

Riprap

Channelization
- ☑ Physical & chemical
- ☑ Instream/riparian restoration

Dams
- ☑ Erosion control
- ☐ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☑ Streambanks ☑ Shorelines
  - ☐ Vegetative
  - ☑ Structural
  - ☐ Integrated
  - ☐ Planning & regulatory

Riprap is a layer of appropriately sized stones designed to protect and stabilize areas subject to erosion, slopes subject to seepage, or areas with poor soil structure. Riprap extends from the toe of the slope to a height needed for long term durability (Figure 7.25).

Riprap can be used where vegetation cannot be established or in combination with vegetative approaches. This method is suitable where stream flow velocity is high or where there is a threat to life or property. This method can be expensive, particularly if materials are not locally available. This method should be combined with soil bioengineering techniques, particularly revegetation efforts, to achieve a comprehensive streambank restoration design (FISRWG, 1998).

Additional Resources

- FISRWG. 1998. *Stream Corridor Restoration: Principles, Processes, and Practices.* Federal Interagency Stream Restoration Working Group. http://www.nrcs.usda.gov/technical/stream_restoration/PDFFILES/APPENDIX.pdf.

- ISU. 2006. *Iowa Construction Site Erosion Control Manual: Riprap.* Iowa State University. http://www.ctre.iastate.edu/erosion/manuals/construction/3.15_riprap.pdf.

- Tennessee Department of Environment and Conservation. 2002. *Erosion and Sediment Control Handbook: Riprap.* Tennessee Department of Environment and Conservation, Nashville, TN. http://state.tn.us/environment/wpc/sed_ero_controlhandbook/rr.pdf.

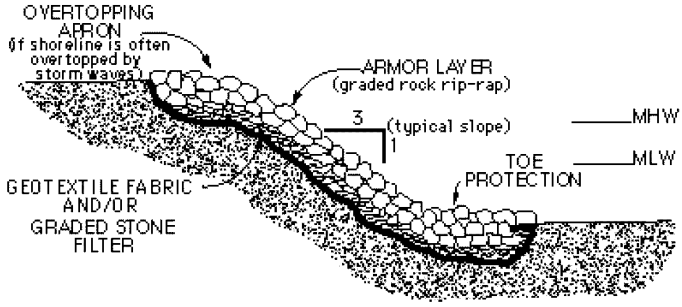

Proper riprap placement (MHW=mean high water, MLW=mean low water).

Figure 7.25 Riprap Diagram (http://www.extension.umn.edu/distribution/naturalresources/components/DD6946g.html)

Root Wad Revetments

Channelization
- ☑ Physical & chemical
- ☑ Instream/riparian restoration

Dams
- ☑ Erosion control
- ☐ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☑ Streambanks ☐ Shorelines
  - ☐ Vegetative
  - ☐ Structural
  - ☑ Integrated
  - ☐ Planning & regulatory

Root wads armor a bank by keeping faster moving currents away from the bank (Figures 7.26 and 7.27). They are most useful for low energy streams that meander and have out-of-bank flow conditions. Root wads should be used in combination with other soil bioengineering techniques to stabilize a bank and ensure plant establishment on the upper portions of the streambank. Stabilizing the bank will reduce streambank erosion, trap sediment, and improve habitat diversity. There are a number of ways to install root wads. The trunk can be driven into the bank, laid in a deep trench, or installed as part of a log and boulder revetment. Use tree wads that have brushy top and durable wood, such as Douglas fir, oak, hard maple, juniper, spruce, cedar, red pine, white pine, larch, or beech. Ponderosa pine and aspen are too inflexible, and alder decomposes rapidly.

With the added support of a log and boulder revetment, root wads can stabilize banks of high-energy streams. Root wad span should be approximately 5 feet with numerous root protrusions. The trunk should be at least 8 to 12 feet long. Boulders should be as large as possible, but at least one and a half times the log's diameter. They should also have an irregular surface. Logs are to be used as footers or revetments and should be over 16 inches in diameter.

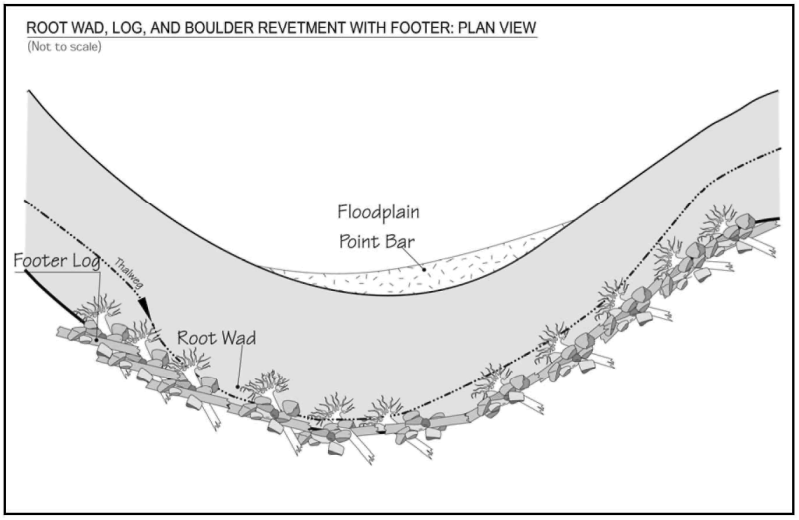

Figure 7.26 Root Wad, Log, and Boulder Revetment with Footer: Plan View (USDA-FS, 2002)

When logs and root wads are well anchored, this design will tolerate high boundary shear stress. However, local scour and erosion is possible. Varying with climate and tree species used, the decomposition of the logs and rootwads will limit the life span of this design. If colonization of streambank vegetation does not take place, replacement may be required. The project site must be accessible to heavy equipment. Locating materials may be difficult in some locations and this method can be expensive (FISRWG, 1998).

Installation guidelines are available from the USDA-FS Soil Bioengineering Guide (USDA-FS, 2002). Under EMRRP, the USACE has presented research on rootwad composites in a technical note (*Rootwad Composites for Streambank Erosion Control and Fish Habitat Enhancement*).[10]

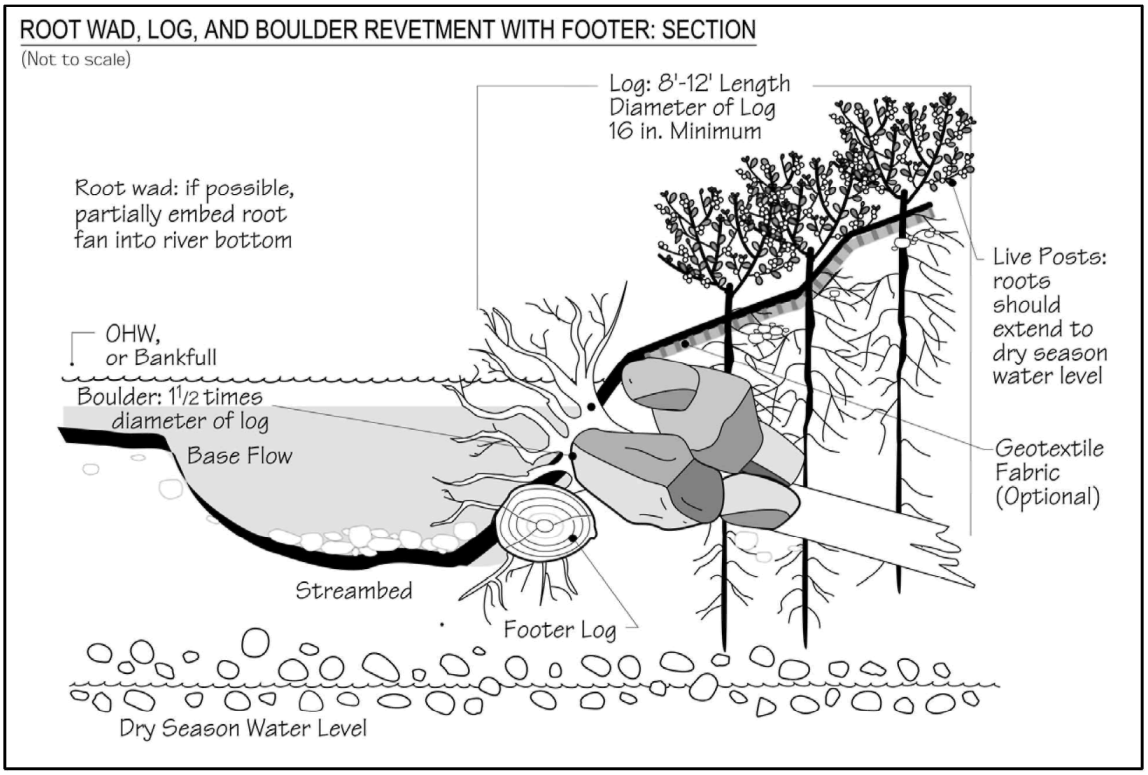

Figure 7.27 Rootwad, Log, and Boulder Revetment with Footer: Section (USDA-FS, 2002)

Additional Resources

- FISRWG. 1998. *Stream Corridor Restoration: Principles, Processes, and Practices.* Federal Interagency Stream Restoration Working Group. http://www.nrcs.usda.gov/technical/stream_restoration/PDFFILES/APPENDIX.pdf.

- Harmon, W.A. and R. Smith. 2000. *Using Root Wads and Rock Vanes for Streambank Stabilization.* River Course Fact Sheet Number 4. North Carolina Cooperative Extension Service. http://www.bae.ncsu.edu/programs/extension/wqg/sri/rv-crs-4.pdf.

- Walter, J., D. Hughes, and N.J. Moore. 2005. *Streambank Revegetation and Protection: A Guide for Alaska. Revegetation Techniques: Root Wads.* Revised Edition. Alaska Department of Fish and Game, Division of Sport Fish. http://www.sf.adfg.state.ak.us/SARR/restoration/techniques/rootwad.cfm.

[10] http://el.erdc.usace.army.mil/elpubs/pdf/sr21.pdf

Rosgen's Stream Classification Method

Channelization
- ☑ Physical & chemical
- ☑ Instream/riparian restoration

Dams
- ☐ Erosion control
- ☐ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☑ Streambanks ☐ Shorelines
  - ☐ Vegetative
  - ☐ Structural
  - ☐ Integrated
  - ☑ Planning & regulatory

Rosgen's stream channel stability method provides a sequence of steps for the field practitioner to use in reaching final conclusions and making recommendations for management, stream design, or restoration. The field practitioner uses field-measured variables to assess:

- Stream state or channel condition variables
- Vertical stability (degradation/aggradation)
- Lateral stability
- Channel patterns
- Stream profile and bed features
- Channel dimension factor
- Channel scour/deposition (with competence calculations of field verified critical dimensionless shear stress and change in bed and bar material size distribution)
- Stability ratings adjusted by stream type
- Dimensionless ratio sediment rating curves by stream type and stability ratings
- Selection of position in stream type evolutionary scenario as quantified by morphological variables by stream type to determine state and potential of stream reach.

The stability assessment is conducted on a reference reach and a departure analysis is performed when compared to an unstable reach of the same stream type. Changes in the variables controlling river channel form, primarily streamflow, sediment regime, riparian vegetation, and direct physical modifications can cause stream channel instability. Separating the differences between anthropogenic versus geologic processes in channel adjustment is a key to prevention, mitigation, and restoration of disturbed systems.

Rosgen (1996) has also created a river inventory hierarchy involving four levels that would allow a stream assessment to be conducted at various levels, ranging from broad qualitative descriptions to detailed quantitative descriptions. The idea is to provide documented measurements, coupled with consistent, quantitative indices of stability, to make the approach to stream assessments less subjective and more consistent and reproducible. Level I and Level II are used to do the initial stratification of a reach by valley and stream type. Level III is used to predict stability. Level IV is used for validation, and requires the greatest amount of detail over a longer time period. For example, vertical stability and bank erosion can be estimated at Level III. But, in a Level IV assessment, permanent cross-sections are revisited over time to verify shifts in bed elevation and measure actual erosion that occurred.

The four hierarchal levels, and the measurements and determinations they include, are shown below along with their objectives.

Level I—Geomorphic characterization: Used to describe generalized fluvial features using remote sensing and existing inventories of geology, landform evolution, valley morphology, depositional history and associated river slopes, relief and patterns utilized for generalized categories of major stream types, and associated interpretations.

Level II—Morphological description: To delineate homogeneous stream types that describe specific slopes, channel materials, dimensions and patterns from reference reach measurements and provide a more detailed level of interpretation than Level I. Includes measurements such as sinuosity, width/depth ration, slope, entrenchment ratio, and channel patterns and material.

Level III—Stream "state" or condition: The "state" of streams further describes existing conditions that influence the response of channels to imposed change and provide specific information for prediction methodologies (such as stream bank erosion calculations). Provides for very detailed descriptions and associated interpretation and predictions. Includes such measurements and/or characterizations of vegetation, deposition, debris, meander patterns, channel stability index, and flow regime.

Level IV—Reach specific studies (validation level): Provides reach-specific information on channel processes. Used to evaluate prediction methodologies; to provide sediment, hydraulic and biological information related to specific stream types; and to evaluate effectiveness of mitigation and impact assessments for activities by stream type. Involves direct measurements of sediment transport, bank erosion rates, aggradation/degradation, hydraulics, and biological data.

Rosgen's stream classification methodologies can assist in stream restoration design by:

- Enabling more precise estimates of quantitative hydraulic relationships associated with specific stream and valley morphologies.
- Establishing guidelines for selecting stable stream types for a range of dimensions, patterns, and profiles that are in balance with the river's valley slope, valley confinement, depositional materials, streamflow, and sediment regime of the watershed.
- Providing a method for extrapolating hydraulic parameters and developing empirical relationships for use in the resistance equations and hydraulic geometry equations needed for restoration design.
- Developing a series of meander geometry relationships that are uniquely related to stream types and their bankfull dimensions.
- Identifying the stable characteristics for a given stream type by comparing the stable form to its unstable or disequilibrium condition.

Refer to *Applied River Morphology* (Rosgen, 1996) for more information on this stream classification system and potential applications.

Scheduling Projects

Often clearing and grading for a project can be scheduled during the time of year that the erosion potential of the site is relatively low. In many parts of the country, there is a certain period of the year when erosion potential is relatively low and construction scheduling could be very effective. For example, in the Pacific region if construction can be completed during the 6-month dry season (e.g., May 1 to October 31), temporary erosion and sediment controls might not be needed. In some parts of the country erosion potential is very high during certain parts of the year, such as the spring thaw in northern and high-elevation areas. During that time of year, snowmelt generates a constant runoff that can erode soil. In addition, construction vehicles can easily turn the soft, wet ground into mud, which is more easily washed off-site. Therefore, in the north, limitations could be placed on clearing and grading during the spring thaw (Goldman et al., 1986).

Channelization
- ☐ Physical & chemical
- ☐ Instream/riparian restoration

Dams
- ☑ Erosion control
- ☐ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☐ Streambanks ☐ Shorelines
  - ☐ Vegetative
  - ☐ Structural
  - ☐ Integrated
  - ☐ Planning & regulatory

Additional Resource

- CASQA. 2004. *California Stormwater BMP Construction Handbook: Scheduling.* California Stormwater Quality Association, Sacramento, CA. http://www.cabmphandbooks.com/Documents/Construction/EC-1.pdf.

Sediment Basins/Rock Dams

Channelization
- ☐ Physical & chemical
- ☐ Instream/riparian restoration

Dams
- ☐ Erosion control
- ☑ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☐ Streambanks ☐ Shorelines
  - ☐ Vegetative
  - ☐ Structural
  - ☐ Integrated
  - ☐ Planning & regulatory

An earthen or rock embankment that is located to capture sediment from runoff and retain it on the construction site.

Sediment basins, also known as silt basins, are engineered impoundment structures that allow sediment to settle out of the urban runoff. They are installed prior to full-scale grading and remain in place until the disturbed portions of the drainage area are fully stabilized. They are generally located at the low point of sites, away from construction traffic, where they will be able to trap sediment-laden runoff. Basin dewatering is achieved either through a single riser and drainage hole leading to a suitable outlet on the downstream side of the embankment or through the gravel of the rock dam. In both cases, water is released at a substantially slower rate than would be possible without the control structure.

The following are general specifications for sediment basin design criteria as presented in Schueler (1997):

- Provide 1,800 to 3,600 ft^3 of storage per contributing acre (a number of states, including Maryland, Pennsylvania, Georgia, and Delaware, recently increased the storage requirement to 3,600 ft^3 or more [CWP, 1997b]).
- Surface area equivalent to 1 percent of drainage area (optional, seldom required).
- Riser with spillway capacity of 0.2 ft^3/s/ac of drainage area (peak discharge for 2-year storm with 1-foot freeboard).
- Length-to-width ratio of 2 or greater.
- Basin side slopes no steeper than 2:1 (h:v).
- Safety fencing, perforated riser, dewatering (optional, seldom required).

Sediment basins can be classified as either temporary or permanent structures, depending on the length of service of the structure. If they are designed to function for less than 36 months, they are classified as temporary; otherwise, they are considered permanent. Temporary sediment basins can also be converted into permanent runoff management ponds. When sediment basins are designed as permanent structures, they must meet all standards for wet ponds. It is important to note that even the best-designed sediment basin seldom exceeds 60 to 75 percent total suspended solids (TSS) removal, which should be considered when selecting a sediment control practice.

Basins are most commonly used at the outlets of diversions, channels, slope drains, or other runoff conveyances that discharge sediment-laden water.

Additional Resources

- CASQA. 2003. *California Stormwater BMP Construction Handbook*: *Sediment Basin.* California Stormwater Quality Association, Sacramento, CA. http://www.cabmphandbooks.com/Documents/Construction/SE-2.pdf.

- ISU. 2006. *Iowa Construction Site Erosion Control Manual: Sediment Basin.* Iowa State University. http://www.ctre.iastate.edu/erosion/manuals/construction/3.17_sediment_basin.pdf.

- Michigan Department of Environmental Quality. 1992. *SESC Training Manual*: *Sedimentation Basin*. Michigan Department of Environmental Quality, Lansing, MI. http://www.deq.state.mi.us/documents/deq-swq-nps-sb.pdf.

- Tennessee Department of Environment and Conservation. 2002. *Erosion and Sediment Control Handbook: Sediment Basin*. Tennessee Department of Environment and Conservation, Nashville, TN. http://state.tn.us/environment/wpc/sed_ero_controlhandbook/sb.pdf.

Sediment Fences

Channelization
- ☐ Physical & chemical
- ☐ Instream/riparian restoration

Dams
- ☑ Erosion control
- ☑ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☐ Streambanks ☐ Shorelines
  - ☐ Vegetative
  - ☐ Structural
  - ☐ Integrated
  - ☐ Planning & regulatory

Silt fence, also known as filter fabric fence, is available in several mesh sizes from many manufacturers. Sediment is filtered out as runoff flows through the fabric. Such fences should be used only where there is sheet flow (no concentrated flow), and the maximum drainage area to the fence should be 0.5 acre or less per 100 feet of fence. To ensure sheet flow, a gravel collar or level spreader can be used upslope of the fence. Many types of fabrics are available commercially. The characteristics that determine a fence's effectiveness include filtration efficiency, permeability, tensile strength, tear strength, ultraviolet resistance, pH effects, and creep resistance. The longevity of silt fences depends heavily on proper installation and maintenance, however they typically last 6 to 12 months. CWP (1997d) identified several conditions that increase the effectiveness of silt fences:

- The length of the slope does not exceed 50 feet for slopes of 5 to 10 percent, 25 feet for slopes of 10 to 20 percent, or 15 feet for slopes greater than 20 percent.
- The silt fence is aligned parallel to the slope contours.
- Edges of the silt fence are curved uphill, which does not allow flow to bypass the fence.
- The contributing length to the fence is less than 100 feet.
- The fence has reinforcement if receiving concentrated flow.
- The fence was installed above an outlet pipe or weir.
- The fence is down slope of the exposed area and alignment considers construction traffic.
- Sediment is not allowed to accumulate behind the fence (increases capacity and decreases breach potential).
- Alignment of the silt fence mirrors the property line or limits of disturbance.

Additional Resources

- CASQA. 2003. *California Stormwater BMP Construction Handbook: Straw Bale Barrier.* California Stormwater Quality Association, Sacramento, CA. http://www.cabmphandbooks.com/Documents/Construction/SE-9.pdf.

- ISU. 2006. *Iowa Construction Site Erosion Control Manual: Sediment Barrier.* Iowa State University. http://www.ctre.iastate.edu/erosion/manuals/construction/3.16_sediment_barrier.pdf.

- Missouri Department of Natural Resources. 2006. *Protecting Water Quality, A Construction Site Water Quality Field Guide: Sediment Fence*. Missouri Department of Natural Resources. http://www.dnr.mo.gov/env/wpp/field-guide/fg05_06_sedimentcontrol.pdf.

- Tennessee Department of Environment and Conservation. 2002. *Erosion and Sediment Control Handbook: Silt Fence*. Tennessee Department of Environment and Conservation, Nashville, TN. http://state.tn.us/environment/wpc/sed_ero_controlhandbook/sf.pdf.

Sediment Traps

Sediment traps are small impoundments that allow sediment to settle out of runoff water. They are typically installed in a drainage way or other point of discharge from a disturbed area. Temporary diversions can be used to direct runoff to the sediment trap. Sediment traps are ideal for sites 1 acre and smaller and should not be used for areas greater than 5 acres. They typically have a useful life of approximately 18 to 24 months. A sediment trap should be designed to maximize surface area for infiltration and sediment settling. This design increases the effectiveness of the trap and decreases the likeliness of backup during and after periods of high runoff intensity. The approximate storage capacity of each trap should be at least 1,800 ft^3/acre of disturbed land draining into the trap (Smolen et al., 1988).

Channelization
- ☐ Physical & chemical
- ☐ Instream/riparian restoration

Dams
- ☐ Erosion control
- ☑ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☐ Streambanks ☐ Shorelines
  - ☐ Vegetative
  - ☐ Structural
  - ☐ Integrated
  - ☐ Planning & regulatory

Additional Resources

- British Columbia Ministry of Agriculture, Food and Fisheries. 2004. *Constructed Ditch Fact Sheet: Sediment Traps.* No. 9. http://www.agf.gov.bc.ca/resmgmt/publist/600Series/641310-1.pdf.

- CASQA. 2003. *California Stormwater BMP Construction Handbook*: *Sediment Traps.* California Stormwater Quality Association, Sacramento, CA. http://www.cabmphandbooks.com/Documents/Construction/SE-3.pdf.

- Tennessee Department of Environment and Conservation. 2002. *Erosion and Sediment Control Handbook: Sediment Trap.* Tennessee Department of Environment and Conservation, Nashville, TN. http://www.state.tn.us/environment/wpc/sed_ero_controlhandbook/st.pdf.

Seeding

Channelization
- ☐ Physical & chemical
- ☐ Instream/riparian restoration

Dams
- ☑ Erosion control
- ☐ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☐ Streambanks ☐ Shorelines
  - ☐ Vegetative
  - ☐ Structural
  - ☐ Integrated
  - ☐ Planning & regulatory

Seeding establishes a vegetative cover on disturbed areas and is very effective in controlling soil erosion once a dense vegetative cover has been established. Seeding establishes permanent erosion control in a relatively short amount of time and has been shown to decrease solids load by 99 percent (CWP, 1997a). The three most common seeding methods are (1) broadcast seeding, in which seeds are scattered on the soil surface; (2) hydroseeding, in which seeds are sprayed on the surface of the soil with a slurry of water; and (3) drill seeding, in which a tractordrawn implement injects seeds into the soil surface. Broadcast seeding is most appropriate for small areas and for augmenting sparse and patchy grass covers. Hydroseeding is often used for large areas (in excess of 5,000 square feet) and is typically combined with tackifiers, fertilizers, and fiber mulch. Drill seeding is expensive and is cost-effective only on sites greater than 2 acres. For best results, bare soils should be seeded or otherwise stabilized within 15 calendar days after final grading. Denuded areas that are inactive and will be exposed to rain for 15 days or more can also be temporarily stabilized, usually by planting seeds and establishing vegetation during favorable seasons in areas where vegetation can be established. In very flat, nonsensitive areas with favorable soils, stabilization may involve simply seeding and fertilizing. The Soil Quality Institute (SQI, 2000) recommends that soils that have been compacted by grading should be broken up or tilled before vegetating.

To establish a vegetative cover, it is important to use seeds from adapted plant species and varieties that have a high germination capacity. Supplying essential plant nutrients, testing the soil for toxic materials, and applying an adequate amount of lime and fertilizer can overcome many unfavorable soil conditions and establish adequate vegetative cover. Specific information about seeds, various species, establishment techniques, and maintenance can be obtained from *Erosion Control & Conservation Plantings on Noncropland* (Landschoot, 1997) or a local Cooperative State Research, Education, and Extension Service[11] or Natural Resources Conservation Service[12] office.

Additional Resources

- CASQA. 2003. *California Stormwater BMP Construction Handbook: Hydroseeding.* California Stormwater Quality Association, Sacramento, CA. http://www.cabmphandbooks.com/Documents/Construction/EC-4.pdf.

- Wisconsin Department of Natural Resources. 2003. *Seeding for Construction Site Erosion Control.* Wisconsin Department of Natural Resources, Madison, WI. http://dnr.wi.gov/org/water/wm/nps/pdf/stormwater/techstds/erosion/Seeding%20For%20Construction%20Site%20Erosion%20Control%20_1059.pdf.

[11] http://www.csrees.usda.gov
[12] http://www.nrcs.usda.gov

Selective Withdrawal

Channelization
- ☐ Physical & chemical
- ☐ Instream/riparian restoration

Dams
- ☐ Erosion control
- ☐ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☑ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☐ Streambanks ☐ Shorelines
  - ☐ Vegetative
  - ☐ Structural
  - ☐ Integrated
  - ☐ Planning & regulatory

Temperature control in reservoir releases depends on the volume of water storage in the reservoir, the timing of the release relative to storage time, and the level from which the water is withdrawn. Dams capable of selectively releasing waters of different temperatures can provide cooler or warmer water temperatures downstream at times that are critical for other instream resources, such as during periods of fish spawning and development of fry (Fontane et al., 1981; Hansen and Crumrine, 1991). Stratified reservoirs are operated to meet downstream temperature objectives such as to enhance a cold-water or warm-water fishery or to maintain preproject stream temperature conditions. Release temperature may also be important for irrigation (Fontane et al., 1981).

Multilevel intake devices in storage reservoirs allow selective withdrawal of water based on temperature and DO levels. These devices minimize the withdrawal of surface water high in blue-green algae, or of deep water enriched in iron and manganese. Care should be taken in the design of these systems not to position the multilevel intakes too far apart because this will increase the difficulty with which withdrawals can be controlled, making the discharge of poor-quality hypolimnetic water more likely (Howington, 1990; Johnson and LaBounty, 1988; Smith et al., 1987).

Setbacks

Channelization
- ☑ Physical & chemical
- ☑ Instream/riparian restoration

Dams
- ☐ Erosion control
- ☐ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☑ Streambanks ☑ Shorelines
  - ☐ Vegetative
  - ☐ Structural
  - ☐ Integrated
  - ☑ Planning & regulatory

Where setbacks have been implemented to reduce the hazard of coastal land loss, they have also included requirements for the relocation of existing structures located within the designated setback area. Setbacks can also include restrictions on uses of waterfront areas that are not related to the construction of new buildings (Davis, 1987). Upland drainage from development should be directed away from bluffs and banks so as to avoid accelerating slope erosion.

In most cases, states have used the local unit of government to administer the program on either a mandatory or voluntary basis. This allows local government to retain control of its land use activities and to exceed the minimum state requirements if this is deemed desirable (NRC, 1990).

Technical standards for defining and delineating setbacks also vary from state to state. One approach is to establish setback requirements for any "high hazard area" eroding at greater than 1 foot per year. Another approach is to establish setback requirements along all erodible shores because even a small amount of erosion can threaten homes constructed too close to the streambank or shoreline. Several states have general setback requirements that, while not based on erosion hazards, have the effect of limiting construction near the streambank or shoreline.

The basis for variations in setback regulations between states seems to be based on several factors, including (NRC, 1990):

- The language of the law being enacted
- The geomorphology of the coast
- The result of discretionary decisions
- The years of protection afforded by the setback
- Other variables decided at the local level of government

From the perspective of controlling NPS pollution resulting from erosion of shorelines and streambanks, the use of setbacks has the immediate benefit of discouraging concentrated flows and other impacts of storm water runoff from new development in areas close to the streambank or shoreline. In particular, the concentration of storm water runoff can aggravate the erosion of shorelines and streambanks, leading to the formation of gullies, which are not easily repaired. Therefore, drainage of storm water from developed areas and development activities located along the shoreline should be directed inland to avoid accelerating slope erosion.

The most significant NPS benefits are provided by setbacks that not only include restrictions on new construction along the shore but also contain additional provisions aimed at preserving and protecting coastal features such as beaches, wetlands, and riparian forests. This approach

promotes the natural infiltration of surface water runoff before it passes over the edge of the bank or bluff and flows directly into the coastal waterbody. Setbacks also help protect zones of naturally occurring vegetation growing along the shore. As discussed in the section on "bioengineering practices," the presence of undisturbed shoreline vegetation itself can help to control erosion by removing excess water from the bank and by anchoring the individual soil particles of the substrate.

Almost all states and territories with setback regulations have modified their original programs to improve effectiveness or correct unforeseen problems (NRC, 1990). Experiences have shown that procedures for updating or modifying the setback width need to be included in the regulations. For instance, application of a typical 30-year setback standard in an area whose rate of erosion is 2 feet per year results in the designation of a setback width of 60 feet. This width may not be sufficient to protect the beaches, wetlands, or riparian forests whose presence improves the ability of the streambank or shoreline to respond to severe wave and flood conditions, or to high levels of surface water runoff during extreme precipitation events. A setback standard based on the landward edge of streambank or shoreline vegetation is one alternative that has been considered (NRC, 1990; Davis, 1987).

From the standpoint of NPS pollution control, an approach that designates streambanks, shorelines, wetlands, beaches, or riparian forests as a special protective feature, allows no development on the feature, and measures the setback from the landward side of the feature is recommended (NRC, 1990). In some cases, provisions for soil bioengineering, marsh creation, beach nourishment, or engineering structures may also be appropriate since the special protective features within the designated setbacks can continue to be threatened by uncontrolled erosion of the shoreline or streambank. Finally, setback regulations should recognize that some special features of the streambank or shoreline will change position. For instance, beaches and wetlands can be expected to migrate landward if water levels continue to rise. Alternatives for managing these situations include flexible criteria for designating setbacks, vigorous maintenance of beaches and other special features within the setback area, and frequent monitoring of the rate of streambank or shoreline erosion and corresponding adjustment of the setback area.

Shoreline Sensitivity Assessment

Channelization
- ☐ Physical & chemical
- ☐ Instream/riparian restoration

Dams
- ☐ Erosion control
- ☐ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☐ Streambanks ☑ Shorelines
  - ☐ Vegetative
  - ☐ Structural
  - ☐ Integrated
  - ☑ Planning & regulatory

Currently there are no complete, universal assessment methodologies that apply to all shorelines and assess erosion vulnerabilities in various types of lakes, reservoirs, estuaries, and coasts. The methods presented by NOAA and the U.S. Geological Survey (USGS) were originally developed for other purposes and are being applied for other shoreline assessments:

- Environmental Sensitivity Mapping
- USGS Coastal Classification (Coastal & Marine Geology Program)
- Coastal Vulnerability Index (CVI) (focus is on SLR—the "erosion" factor may be the only relevant factor in CVI)

Environmental Sensitivity Mapping

The Environmental Sensitivity Index (ESI) was originally created for NOAA to prioritize areas for environmental cleanup (mainly oil-spills), to assist spill-response coordinators in evaluating the potential impact of oil along a shoreline, and to facilitate the allocation of resources during and after a spill.

ESI maps are comprised of three general types of information (NOAA, 1997):

- Shoreline Classification—ranked according to a scale relating to sensitivity, natural persistence of oil, and ease of cleanup.
- Biological Resources—including oil-sensitive animals and rare plants as well as habitats that are used by oil-sensitive species or are themselves sensitive to oil spills, such as submersed aquatic vegetation and coral reefs.
- Human-Use Resources—specific areas that have added sensitivity and value because of their use, such as beaches, parks and marine sanctuaries, water intakes, and archaeological sites.

The standardized ESI shoreline guideline rankings include estuarine, lacustrine, riverine, and palustrine habitats (NOAA, 1997). The classification scheme is based on an understanding of the physical and biological character of the shoreline environment, not just the substrate type and grain size. Relationships among physical processes, substrate type, and associated biota produce specific geomorphic/ecologic shoreline types, sediment transport patterns, and predictable patterns in oil behavior and biological impact. The concepts relating natural factors to the relative sensitivity of coastline, mostly developed in the estuarine setting, were slightly modified for lakes and rivers. The sensitivity ranking is controlled by the following factors:

- Relative exposure to wave and tidal energy
- Shoreline slope

- Substrate type (grain size, mobility, penetration and/or burial, and trafficability)
- Biological productivity and sensitivity

ESI maps have proven to have a long-term use, and they are excellent tools for studying shoreline change and its effects on the distribution and concentration of plants and animals living near the coast. Environmental sensitivity mapping is still evolving, and NOAA researchers are working with federal, state, and private industry partners to improve the ESI mapping system to extend beyond spill response.

USGS Coastal Classification (Coastal & Marine Geology Program)

The objective of the Coastal Classification Map is to determine the hazard vulnerability of an area. The coastal geomorphic classification scheme utilizes morphology and human modifications of the coast as the primary basis for hazard assessment. It emphasizes physical factors that influence erosion, overwash of sandy beaches and barrier islands, and landward sediment transport during storms along and across those features (USGS, 2004).

USGS National Assessment of Coastal Vulnerability to Sea-Level Rise

The USGS Coastal and Marine Geology Program's National Assessment, seeks to determine the relative risks due to future sea-level rise for the U.S. Atlantic, Pacific, and Gulf of Mexico coasts USGS, 2002). Through the use of a CVI, the relative risk that physical changes will occur as sea-level rises is quantified based on the following criteria: tidal range, wave height, coastal slope, shoreline change, geomorphology, and historical rate of relative sea-level rise. This approach combines a coastal system's susceptibility to change with its natural ability to adapt to changing environmental conditions, and yields a relative measure of the system's natural vulnerability to the effects of sea-level rise.

In 2001, USGS in partnership with the National Park Service (NPS) Geologic Resources Division, began conducting hazard assessments and creating map products to assist the NPS in managing vulnerable coastal resources. One of the most important and practical issues in coastal geology is determining the physical response of coastal environments to water-level changes.

Additional Resources

- NOAA. 1997. *Environmental Sensitivity Index Guidelines (Version 3)* Chapter 2. Seattle, WA. http://response.restoration.noaa.gov/book_shelf/876_chapter2.pdf.

- USGS. 2002. *Vulnerability of US National Parks to Sea-Level Rise and Coastal Change*. U.S. Geological Survey. http://pubs.usgs.gov/fs/fs095-02/fs095-02.html.

- USGS. 2004. *Coastal Classification Mapping Project*. U.S. Geological Survey, Coastal & Marine Geology Program. http://coastal.er.usgs.gov/coastal-classification/class.html.

Site Fingerprinting

Channelization
- ☐ Physical & chemical
- ☐ Instream/riparian restoration

Dams
- ☑ Erosion control
- ☐ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☐ Streambanks ☐ Shorelines
  - ☐ Vegetative
  - ☐ Structural
  - ☐ Integrated
  - ☐ Planning & regulatory

Often areas of a construction site are unnecessarily cleared. The total amount of disturbed area can be reduced with site fingerprinting, which involves placing development in the most environmentally sound locations on the site and minimizing the size of disturbed area. With site fingerprinting, only those areas essential for completing construction activities are cleared. The remaining area is left undisturbed.

Fingerprinting places development away from environmentally sensitive areas (wetlands, steep slopes, etc.), areas for future open space and restoration, areas where trees are to be saved, and temporary and permanent vegetative buffer zones.

The proposed limits of land disturbance can be physically marked off to ensure that only the land area required for buildings, roads, and other infrastructure is cleared. Existing vegetation, especially vegetation on steep slopes, can be avoided.

Sodding

Channelization
- ☐ Physical & chemical
- ☐ Instream/riparian restoration

Dams
- ☑ Erosion control
- ☐ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☐ Streambanks ☐ Shorelines
  - ☐ Vegetative
  - ☐ Structural
  - ☐ Integrated
  - ☐ Planning & regulatory

Sodding permanently stabilizes an area with a thick vegetative cover. Sodding provides immediate stabilization of an area and can be used in critical areas or where establishing permanent vegetation by seeding and mulching would be difficult. Sodding is also a preferred option when there is high erosion potential during the period of vegetative establishment from seeding. According to the Soil Quality Institute (SQI, 2000), soils that have been compacted by grading should be broken up or tilled before placing sod.

Additional Resources

- Barr Engineering Company. 2001. *Minnesota Urban Small Sites BMP Manual: Stormwater Best Management Practices for Cold Climates. Soil Erosion Control: Vegetative Methods.* Prepared for the Metropolitan Council by Barr Engineering Company, St. Paul, MN. http://www.metrocouncil.org/environment/Watershed/BMP/CH3_RPPSoilVeget.pdf.

- ISU. 2006. *Iowa Construction Site Erosion Control Manual: Sodding.* Iowa State University. http://www.ctre.iastate.edu/erosion/manuals/construction/2.6_sodding.pdf.

Soil Protection

Unprotected stockpiles are very prone to erosion, and they must be protected. Small stockpiles can be covered with a tarp to prevent erosion. Large stockpiles can be stabilized by erosion blankets, seeding, or mulching.

Because of the high organic content of topsoil, it is not recommended for use as fill material or under pavement. After a site is cleared, the topsoil is typically removed. Since topsoil is essential to establish new vegetation, it should be stockpiled and then reapplied to the site for revegetation, if appropriate. Although topsoil salvaged from the existing site can often be used, it must meet certain standards, and topsoil might need to be imported onto the site if the existing topsoil is not adequate for establishing new vegetation.

Channelization
- ☐ Physical & chemical
- ☐ Instream/riparian restoration

Dams
- ☑ Erosion control
- ☐ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☐ Streambanks ☐ Shorelines
  - ☐ Vegetative
  - ☐ Structural
  - ☐ Integrated
  - ☐ Planning & regulatory

Spill and Water Budgets

Channelization
- ☐ Physical & chemical
- ☐ Instream/riparian restoration

Dams
- ☐ Erosion control
- ☐ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☑ Maintain fish passage

Erosion
- ☐ Streambanks ☐ Shorelines
  - ☐ Vegetative
  - ☐ Structural
  - ☐ Integrated
  - ☐ Planning & regulatory

Although often used together, spill and water budgets are independent methods of facilitating downstream fish migration. Spill budgets provide alternative methods for fish passage that are less dangerous than passage through turbines. Spillways are used to allow fish to leave the reservoir by passing over the dam rather than through the turbines. The spillways must be designed to ensure that hydraulic conditions do not induce injury to the passing fish from scraping and abrasion, turbulence, rapid pressure changes, or supersaturation of dissolved gases in water passing through plunge pools (Stone and Webster, 1986).

In the Columbia River basin (Pacific Northwest), the USACE provides spill on a limited basis to pass fish around specific dams to improve survival rates. At key dams, spill is used in special operations to protect hatchery releases or provide better passage conditions until bypass systems are fully developed or, in some cases, improved (van der Borg and Ferguson, 1989). The cost of this alternative depends on the volume of water lost for power production (Mattice, 1990). Analyses of this practice, using a USACE model called FISHPASS, historically has shown that application of spill budgets in the Columbia River basin is consistently the most costly and least efficient method of improving overall downstream migration efficiency (Dodge, 1989).

In 1995 the National Marine Fisheries Service (NMFS) released a draft biological opinion to save Columbia River Basin salmon. The opinion was issued after concluding that current operations of the hydropower system were jeopardizing Columbia Basin salmon. The opinion addresses safer passage for young fish through the dams and modification to a number of hydropower operations and facilities. It calls for using as much water as possible during fish-passage season to improve flow for fish moving through the system. Specifically the draft called for spilling water over dams to increase passage of juvenile salmon via non-turbine routes to at least 80 percent. The USACE now runs the Juvenile Fish Transportation Program in cooperation with NMFS (NOAA, 1995; USACE, 2002b).

Water budgets increase flows through dams during the out-migration of anadromous fish species. They are used to speed smolt migration through reservoirs and dams. Water normally released from the impoundment during the winter period to generate power is instead released in May or June, when it can be sold only as secondary energy. This concept has been used in some regions of the United States, although quantification of the overall benefits is lacking (Dodge, 1989).

The volume of a typical water budget is generally not adequate to sustain minimum desirable flows for fish passage during the entire migration period. The Columbia Basin Fish and Wildlife Authority has proposed replacement of the water budget on the Columbia River system with a minimum flow requirement to prevent problems of inadequate water volume in discharge during low-flow years (Muckleston, 1990).

Spill Prevention and Control Program

Channelization
- ☐ Physical & chemical
- ☐ Instream/riparian restoration

Dams
- ☐ Erosion control
- ☐ Runoff control
- ☑ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☐ Streambanks ☐ Shorelines
  - ☐ Vegetative
  - ☐ Structural
  - ☐ Integrated
  - ☐ Planning & regulatory

Spill procedure information can be posted, and persons trained in spill handling should be onsite or on call at all times. Materials for cleaning up spills can be kept onsite and easily available. Spills should be cleaned up immediately and the contaminated material properly disposed.

In general, a spill prevention, control, and countermeasure (SPCC) plan can include guidance to site personnel on:

- Proper notification when a spill occurs
- Site responsibility with respect to addressing the cleanup of a spill
- Stopping the source of a spill
- Cleaning up a spill
- Proper disposal of materials contaminated by the spill
- Location of spill response equipment programs
- Training program for designated on-site personnel

A periodic spill "fire drill" can be conducted to help train personnel on proper responses to spill events and to keep response actions fresh in the minds of personnel. It is important to maintain an adequate spill and cleaning kit, which could include the following:

- Detergent or soap, hand cleaner, and water
- Activated charcoal, adsorptive clay, vermiculite, kitty litter, sawdust, or other adsorptive materials
- Lime or bleach to neutralize pesticides or other spills in emergency situations
- Tools such as a shovel, broom, and dustpan and containers for disposal
- Proper protective clothing

Spillway Modifications

Channelization
- ☐ Physical & chemical
- ☐ Instream/riparian restoration

Dams
- ☐ Erosion control
- ☐ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☑ Improve tailwater oxygen
- ☑ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☐ Streambanks ☐ Shorelines
  - ☐ Vegetative
  - ☐ Structural
  - ☐ Integrated
  - ☐ Planning & regulatory

Spill at hydroelectric dams is routinely required during periods of high runoff when the river discharge exceeds what can be passed through the powerhouse turbines. In some cases, spill has been associated with gas supersaturation problems. The USACE has proposed several practices for solving the gas supersaturation problem. These include (1) passing more headwater storage through turbines, installing new fish bypass structures, and installing additional power units to reduce the need for spill; (2) incorporating "flip-lip" deflectors in spillway-stilling basins, transferring power generation to high-dissolved-gas-producing dams, and altering spill patterns at individual dams to minimize nitrogen mass entrainment; and (3) collecting and transporting juvenile salmonids around affected river reaches. Only a few of these practices have been implemented (Tanovan, 1987). As more attention is being paid to maintaining minimum flows in rivers for fish passage and spawning, mangers are balancing the need for spills with the potential impacts of gas supersaturation (Anderson, 2004; Anderson, 1995; DeHart, 2003; USFWS, 2001; Van Holmes and Anderson, 2004). For example, the U.S. Fish and Wildlife Service has routinely monitored gas supersaturation in reaches below Bonneville Dam (Columbia River, Oregon) to protect migrating salmon, many of which are endangered species (USFWS, 2001).

Surface Roughening

Roughening is the scarifying of a bare sloped soil surface with horizontal grooves or benches running across the slope. Roughening aids the establishment of vegetative cover, improves water infiltration, and decreases runoff velocity.

Additional Resource

- Tennessee Department of Environment and Conservation. 2002. *Erosion and Sediment Control Handbook: Surface Roughening*. Tennessee Department of Environment and Conservation, Nashville, TN. http://www.state.tn.us/environment/wpc/sed_ero_controlhandbook/sr.pdf.

Channelization
- ☐ Physical & chemical
- ☐ Instream/riparian restoration

Dams
- ☑ Erosion control
- ☐ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☐ Streambanks ☐ Shorelines
  - ☐ Vegetative
  - ☐ Structural
  - ☐ Integrated
  - ☐ Planning & regulatory

Toe Protection

Channelization
- ☑ Physical & chemical
- ☑ Instream/riparian restoration

Dams
- ☐ Erosion control
- ☐ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☑ Streambanks ☑ Shorelines
  - ☐ Vegetative
  - ☑ Structural
  - ☐ Integrated
  - ☐ Planning & regulatory

A number of qualitative advantages are to be gained by providing toe protection for vertical bulkheads. Toe protection usually takes the form of a stone apron installed at the base of the vertical structure to reduce wave reflection and scour of bottom sediments during storms. The installation of rubble toe protection should include filter cloth and perhaps a bedding of small stone to reduce the possibility of rupture of the filter cloth. Ideally, the rubble should extend to an elevation such that waves will break on the rubble during storms.

Additional Resources

- Massachusetts DEP. 2006. *Massachusetts Nonpoint Source Pollution Management Manual: Stone Toe Protection.* Massachusetts Department of Environmental Protection, Boston, MA. http://projects.geosyntec.com/NPSManual/Fact%20Sheets/Stone%20Toe%20Protection.pdf.

- Wisconsin Department of Natural Resources. 2006. *Vegetated Armoring Erosion Control Methods.* http://dnr.wi.gov/org/water/fhp/waterway/erosioncontrol-vegetated.html.

Training—ESC

Channelization
- ☐ Physical & chemical
- ☐ Instream/riparian restoration

Dams
- ☑ Erosion control
- ☐ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☐ Streambanks ☐ Shorelines
  - ☐ Vegetative
  - ☐ Structural
  - ☐ Integrated
  - ☐ Planning & regulatory

Provide education and training opportunities for designers, developers, and contractors. One of the most important factors determining whether ESCs will be properly installed and maintained on a construction site is the knowledge and experience of the contractor and onsite personnel. Many communities require certification for key on-site employees who are responsible for implementing the ESC plan. Certification can be accomplished through municipally sponsored training courses; more informally, municipalities can hold mandatory preconstruction or prewintering meetings and conduct regular and final inspection visits to transfer information to contractors (Brown and Caraco, 1997). Information that can be covered in training courses and meetings includes the importance of ESC for water quality protection; developing and implementing ESC plans; the importance of proper installation, regular inspection, and diligent maintenance of ESC practices; and record keeping for inspections and maintenance activities.

Transference of Fish Runs

Channelization
- ☐ Physical & chemical
- ☐ Instream/riparian restoration

Dams
- ☐ Erosion control
- ☐ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☑ Maintain fish passage

Erosion
- ☐ Streambanks ☐ Shorelines
  - ☐ Vegetative
  - ☐ Structural
  - ☐ Integrated
  - ☐ Planning & regulatory

Transference of fish runs involves inducing anadromous fish species to use different spawning grounds in the vicinity of an impoundment. To implement this practice, the nature and extent of the spawning grounds that were lost due to the blockage in the river need to be assessed, and suitable alternative spawning grounds need to be identified. The feasibility of successfully collecting the fish and transporting them to alternative tributaries also needs to be carefully determined.

One strategy for mitigating the impacts of diversions on fisheries is the use of ephemeral streams as conveyance channels for all or a portion of the diverted water. If flow releases are controlled and uninterrupted, a perennial stream is created, along with new instream and riparian habitat. However, the biota that had been adapted to preexisting conditions in the ephemeral stream will probably be eliminated.

Tree Armoring, Fencing, and Retaining Walls or Tree Wells

Tree armoring protects tree trunks and natural vegetation from being damaged by construction equipment. Fencing can also protect tree trunks, but it should be placed at the tree's drip line so that construction equipment is kept away from the tree. A tree's drip line is the minimum area around the tree in which the tree's root system should not be disturbed by cut, fill, or soil compaction caused by heavy equipment. When cutting or filling must be done near a tree, a retaining wall or tree well can be used to minimize the cutting of the tree's roots or the quantity of fill placed over the tree's roots. It is recommended that cutting or filling be done only when absolutely necessary. Fill placement over the tree root flare or within the dripline will eventually kill the tree.

Channelization
- ☐ Physical & chemical
- ☐ Instream/riparian restoration

Dams
- ☑ Erosion control
- ☐ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☐ Streambanks ☐ Shorelines
  - ☐ Vegetative
  - ☐ Structural
  - ☐ Integrated
  - ☐ Planning & regulatory

Tree Revetments

Channelization
- ☑ Physical & chemical
- ☑ Instream/riparian restoration

Dams
- ☑ Erosion control
- ☐ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☑ Streambanks ☑ Shorelines
  - ☑ Vegetative
  - ☐ Structural
  - ☐ Integrated
  - ☐ Planning & regulatory

Tree revetments consist of a row of interconnected trees anchored to the toe of the streambank or to the upper streambank (Figures 7.28 and 7.29). This serves to reduce flow velocities along eroding streambanks, trap sediment, and provide a substrate for plant establishment and erosion control. This design relies on the installation of an adequate anchoring system and is best suited for streambank heights under 12 feet and bankfull velocities under 6 feet per second. In addition, this structure should occupy no more than 15 percent of the channel at bankfull. Toe protection is needed to accompany this design if scour is anticipated and upper bank soil bioengineering techniques are recommended to ensure streamside regeneration. This design allows for the use of local materials if they are readily available. Decay resistant species are recommended for the logs to extend the life of the structure and thus the ability of vegetation to become established. Due to decomposition, these structures have a limited life and might require periodic replacement. It is considered beneficial that decomposition of the logs over time allows the streambank to return to a natural state with protection provided by mature streambank vegetation. There is a potential for the logs to dislodge, and these structures should not be located upstream of bridges or other structures sensitive to damage. Tree revetments are susceptible to damage by ice (FISRWG, 1998). Installation guidelines are available from the USDA-FS Soil Bioengineering Guide (USDA-FS, 2002).

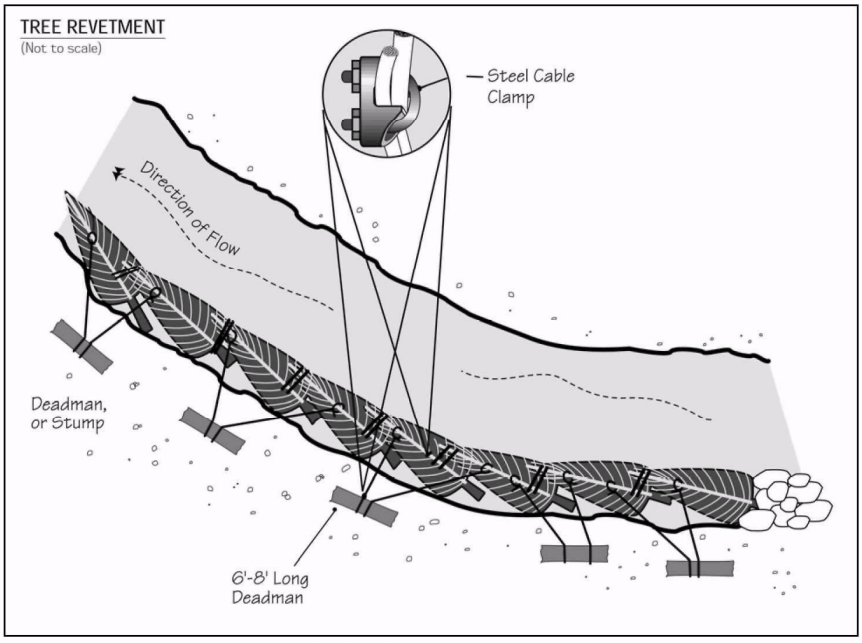

Figure 7.28 Tree Revetment (USDA-FS, 2002)

Additional Resources

- Alaska Department of Fish and Game. 2005. *Spruce Tree Revetment.* http://www.sf.adfg.state.ak.us/sarr/restoration/techniques/images/csbs_strevet.pdf.

- FISRWG. 1998. *Stream Corridor Restoration: Principles, Processes, and Practices.* Federal Interagency Stream Restoration Working Group. http://www.nrcs.usda.gov/technical/stream_restoration/PDFFILES/APPENDIX.pdf.

- Goard, D. 2006. *Riparian Forest Best Management Practices: Tree Revetments.* Kansas State University, Manhattan, KS. http://www.oznet.ksu.edu/library/forst2/MF2750.pdf.

- Gough, S. 2004. *Tree Revetments for Streambank Revitalization.* Missouri Department of Conservation, Fisheries Division, Jefferson City, MO. http://mdc.mo.gov/fish/streams/revetmen/.

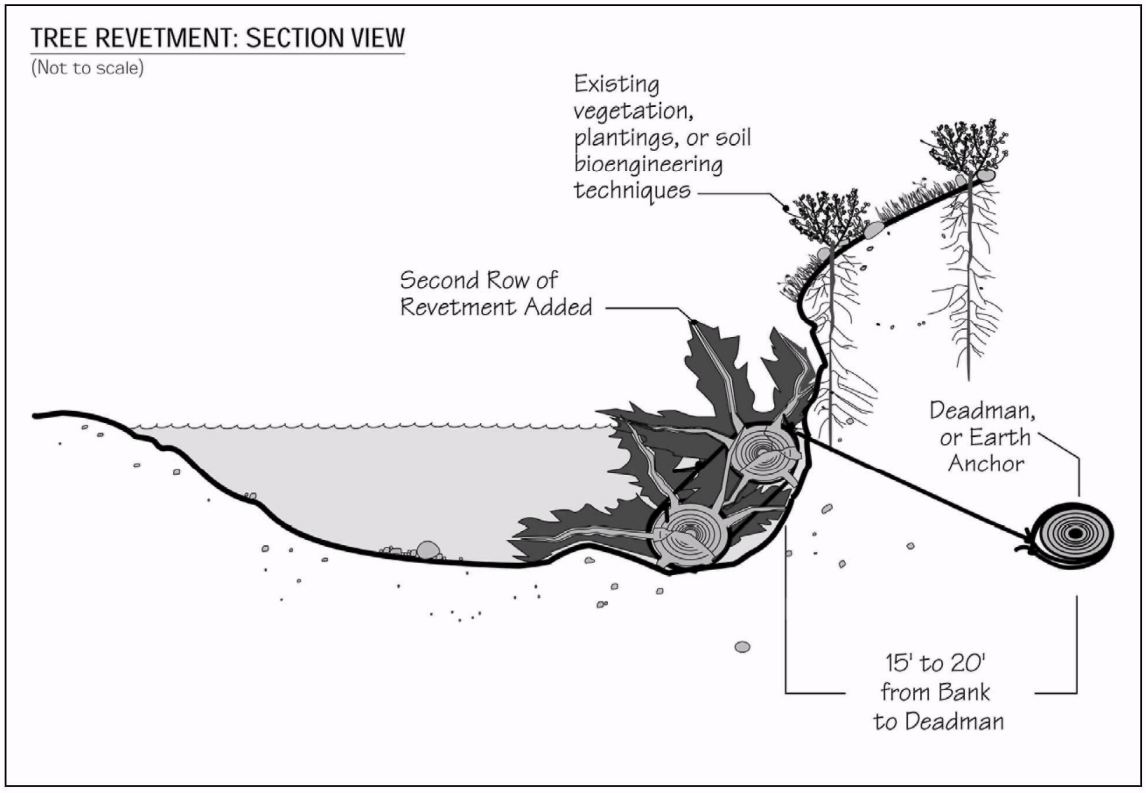

Figure 7.29 Tree Revetment: Section View (USDA-FS, 2002)

Turbine Operation

Implementation of changes in the turbine start-up procedures can also enlarge the zone of withdrawal to include more of the epilimnetic waters in the downstream releases. Monitoring of the releases at the Walter F. George lock and dam (Chattahoochee River, Georgia), showed levels of DO declined sharply at the start-up of hydropower production. The severity and duration of the DO drop were found to be reduced by starting up all the generator units within a minute of each other (Findley and Day, 1987).

Channelization
- ☐ Physical & chemical
- ☐ Instream/riparian restoration

Dams
- ☐ Erosion control
- ☐ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☑ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☐ Streambanks ☐ Shorelines
  - ☐ Vegetative
  - ☐ Structural
  - ☐ Integrated
  - ☐ Planning & regulatory

Turbine Venting

Channelization
- ☐ Physical & chemical
- ☐ Instream/riparian restoration

Dams
- ☐ Erosion control
- ☐ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☑ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☐ Streambanks ☐ Shorelines
  - ☐ Vegetative
  - ☐ Structural
  - ☐ Integrated
  - ☐ Planning & regulatory

Turbine venting is the practice of injecting air into water as it passes through a turbine. If vents are provided inside the turbine chamber, the turbine will aspirate air from the atmosphere and mix it with water passing through the turbine as part of its normal operation. In early designs, the turbine was vented through existing openings, such as the draft tube opening or the vacuum breaker valve in the turbine assembly. Air forced by compressors into the draft tube opening enriched reservoir waters with little detectable DO to concentrations of 3 to 4 mg/L. Overriding the automatic closure of the vacuum breaker valve (at high turbine discharges) increased DO by only 2 mg/L (Harshbarger, 1987).

Turbine venting uses the low-pressure region just below the turbine wheel to aspirate air into the discharges (Wilhelms, 1984). Autoventing turbines are constructed with hub baffles, or deflector plates placed on the turbine hub upstream of the vent holes to enhance the low-pressure zone in the vicinity of the vent and thereby increase the amount of air aspirated through the venting system. Turbine efficiency relates to the amount of energy output from a turbine per unit of water passing through the turbine. Efficiency decreases as less power is produced for the same volume of water. In systems where the water is aerated before passing through the turbine, part of the water volume is displaced by the air, thus leading to decreased efficiency. Hub baffles have also been added to autoventing turbines at the Norris Dam (Clinch River, Tennessee) to further improve the DO levels in the turbine releases (Jones and March, 1991).

Developments in autoventing turbine technology show that it may be possible to aspirate air with no resulting decrease in turbine efficiency. In one test of an autoventing turbine at the Norris Dam, the turbine efficiency increased by 1.8 percent (March et al., 1991; Waldrop, 1992). Technologies like autoventing turbines are very site-specific and outcomes will vary considerably.

Vegetated Buffers

Channelization
- ☑ Physical & chemical
- ☑ Instream/riparian restoration

Dams
- ☑ Erosion control
- ☑ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☑ Streambanks ☑ Shorelines
  - ☑ Vegetative
  - ☐ Structural
  - ☐ Integrated
  - ☐ Planning & regulatory

Like filter strips, vegetated buffers provide a physical separation between a construction site and a waterbody. The difference between a filter strip and a vegetated buffer area is that a filter strip is an engineered device, whereas a buffer is a naturally occurring filter system. Vegetated buffers remove nutrients and other pollutants from runoff, trap sediments, and shade the waterbody to optimize light and temperature conditions for aquatic plants and animals (Welsch, n.d.). Preservation of vegetation for a buffer can be planned before any site-disturbing activities begin so as to minimize the impact of construction activities on existing vegetation. Trees can be clearly marked at the dripline to preserve them and to protect them from ground disturbances around the base of the tree.

Proper maintenance of buffer vegetation is important. Maintenance requirements depend on the plant species chosen, soil types, and climatic conditions. Maintenance activities typically include fertilizing, liming, irrigating, pruning, controlling weeds and pests, and repairing protective markers (e.g., fluorescent fences and flags).

Additional Resources

- CASQA. 2003. *California Stormwater BMP Construction Handbook: Vegetated Buffer Strips.* California Stormwater Quality Association, Sacramento, CA. http://www.cabmphandbooks.com/Documents/Development/TC-31.pdf.

- Ohio DNR. No date. *Ohio Stream Management Guide: Forested Buffer Strips.* Ohio Department of Natural Resources. http://www.ohiodnr.com/water/pubs/fs_st/stfs13.htm.

- River Alliance of Wisconsin. No date. *Benefits of Vegetated Buffers.* River Alliance of Wisconsin, Madison, WI. http://www.wisconsinrivers.org/documents/policy/Fact%20Sheet%20-%20Benefits%20of%20Vegetated%20Buffers.pdf.

- Tennessee Department of Environment and Conservation. 2002. *Erosion and Sediment Control Handbook: Vegetative Practices*. Tennessee Department of Environment and Conservation, Nashville, TN. http://state.tn.us/environment/wpc/sed_ero_controlhandbook/2.%20Vegetative%20Practices.pdf.

Vegetated Filter Strips

Channelization
- ☐ Physical & chemical
- ☐ Instream/riparian restoration

Dams
- ☑ Erosion control
- ☑ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☐ Streambanks ☐ Shorelines
  - ☐ Vegetative
  - ☐ Structural
  - ☐ Integrated
  - ☐ Planning & regulatory

Vegetated filter strips are low-gradient vegetated areas that filter overland sheet flow. Runoff must be evenly distributed across the filter strip. Channelized flows decrease the effectiveness of filter strips. Level spreading devices are often used to distribute the runoff evenly across the strip (Dillaha et al., 1989).

Vegetated filter strips should have relatively low slopes and adequate length to provide optimal sediment control and should be planted with erosion-resistant plant species. The main factors that influence the removal efficiency are the vegetation type, soil infiltration rate, and flow depth and travel time. These factors are dependent on the contributing drainage area, slope of strip, degree and type of vegetative cover, and strip length. Maintenance requirements for vegetated filter strips include sediment removal and inspections to ensure that dense, vigorous vegetation is established and concentrated flows do not occur. For more information on vegetated filter strips, refer to EPA's *National Management Measures to Protect and Restore Wetlands and Riparian Areas for the Abatement of Nonpoint Source Pollution* (USEPA, 2005b).

Additional Resources

- ISU. 2006. *Iowa Construction Site Erosion Control Manual: Vegetative Filter Strip.* Iowa State University. http://www.ctre.iastate.edu/erosion/manuals/construction/2.8_veg_filter_strip.pdf.

- Leeds, R., L.C. Brown, M.R. Sulc, and L. VanLieshout. No date. *Vegetative Filter Strips: Application, Installation and Maintenance*. The Ohio State University, Food, Agriculture and Biological Engineering, Columbus, OH. http://ohioline.osu.edu/aex-fact/0467.html.

- USDA. 2003. *Grass Filter Strips.* U.S. Department of Agriculture, Natural Resources Conservation Service. http://www.oh.nrcs.usda.gov/programs/Lake_Erie_Buffer/filter_strips.html.

Vegetated Gabions

Channelization
- ☑ Physical & chemical
- ☑ Instream/riparian restoration

Dams
- ☑ Erosion control
- ☐ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☑ Streambanks ☑ Shorelines
  - ☐ Vegetative
  - ☐ Structural
  - ☑ Integrated
  - ☐ Planning & regulatory

Vegetated gabions (Figure 7.30) start with wire-mesh, rectangular baskets filled with small to medium rock and soil. The baskets are then laced together to form a structural toe or sidewall. Live branches (0.5 to 1 inch in diameter) are then placed on each consecutive layer between the rock filled baskets to take root, join together the structure, and bind it to the slope. This method is effective for protecting steep slopes where scouring or undercutting is occurring. However, this method is not appropriate in streams with heavy bed load or where severe ice damage occurs. This method provides moderate structural support and should be placed at the base of a slope to stabilize the slope and reduce slope steepness. A stable foundation is required for the installation of these structures. When the rock size needed is not locally available, this design is effective because smaller rocks can be used. A limiting factor of this method is that it is expensive to install and to replace. These structures are relatively expensive to construct and frequently require costly repairs. This method should be combined with other soil bioengineering techniques, particularly revegetation efforts, to achieve a comprehensive streambank restoration design (FISRWG, 1998). There is often opposition to these structures based on their inability to blend in with natural settings and their general lack of aesthetically pleasing qualities (Gore, 1985).

Installation guidelines are available from the USDA NRCS *Engineering Field Handbook, Chapter 18* (USDA-NRCS, 1992). Under EMRRP, the USACE has presented research on vegetated gabions in a technical note (*Gabions for Streambank Erosion Control*).[13]

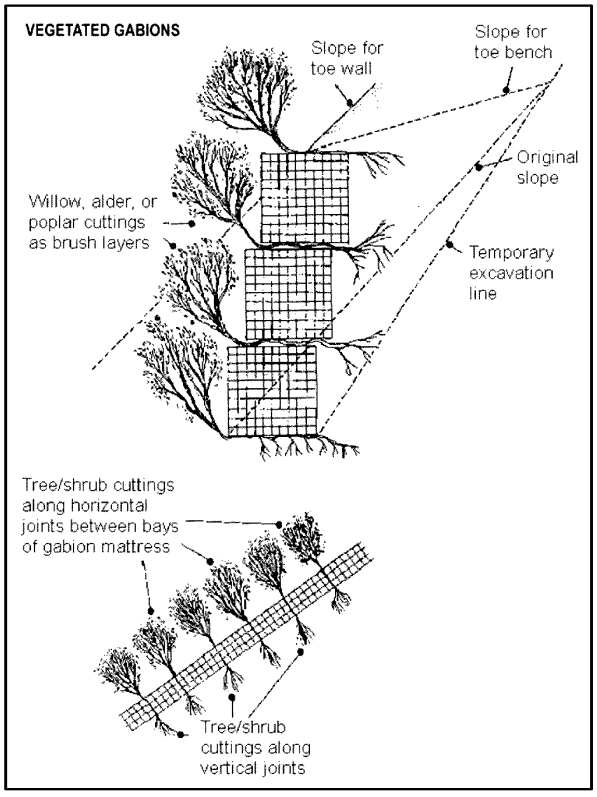

Figure 7.30 Vegetated Gabion (Allen and Leech, 1997)

[13] http://el.erdc.usace.army.mil/elpubs/pdf/sr22.pdf

Additional Resources

- FISRWG. 1998. *Stream Corridor Restoration: Principles, Processes, and Practices*. Federal Interagency Stream Restoration Working Group. http://www.nrcs.usda.gov/technical/stream_restoration/PDFFILES/APPENDIX.pdf.

- ISU. 2006. *Iowa Construction Site Erosion Control Manual: Gabion.* Iowa State University. http://www.ctre.iastate.edu/erosion/manuals/construction/3.8_gabion.pdf.

- Mississippi State University, Center for Sustainable Design. 1999. *Water Related Best Management Practices in the Landscape: Vegetated Rock Gabions/Gabions.* Created for United States Department of Agriculture, Natural Resource Conservation Service, Watershed Science Institute. http://www.abe.msstate.edu/csd/NRCS-BMPs/pdf/streams/bank/veg_rockgabions.pdf.

- MMG Civil Engineering Systems, Ltd. 2001. *Vegetated Gabions*. MMG Civil Engineering Systems, Ltd., St. Germans, Kings Lynn, Norfolk, England. http://www.verdantsolutions.ltd.uk/acrobat/vegsod.pdf.

- Ohio DNR. No date. *Ohio Stream Management Guide: Gabion Revetments.* Ohio Department of Natural Resources. http://www.ohiodnr.com/water/pubs/fs_st/stfs15.htm.

- Tennessee Department of Environment and Conservation. 2002. *Erosion and Sediment Control Handbook: Gabion*. Tennessee Department of Environment and Conservation, Nashville, TN. http://state.tn.us/environment/wpc/sed_ero_controlhandbook/ga.pdf.

Vegetated Geogrids

Channelization
- ☑ Physical & chemical
- ☑ Instream/riparian restoration

Dams
- ☑ Erosion control
- ☐ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☑ Streambanks ☑ Shorelines
  - ☐ Vegetative
  - ☐ Structural
  - ☑ Integrated
  - ☐ Planning & regulatory

Vegetated geogrids consist of layers of live branch cuttings and compacted soil with natural or synthetic geotextile materials wrapped around each soil layer (Figure 7.31). This serves to rebuild and vegetate eroded streambanks, particularly on outside bends where erosion can be a problem. This system is designed to capture sediment providing a substrate for plant establishment and if properly designed and installed, these systems help to quickly establish riparian vegetation. Its benefits are similar to those of brush layering (e.g., dries excessively wet sites, reinforces soil as roots develop, which adds significant resistance to sliding or shear displacement). Due to the strength of this design and the higher initial tolerance to flow velocity, these systems can be installed on a 1:1 or steeper streambank or lakeshore. Limitations of this design include the complexity involved with constructing this system and the fairly high expense (FISRWG, 1998). When constructing this type of system, use live branch cuttings that are brushy and root readily. Also use cuttings that are 0.5 to 2 inches in diameter and 4 to 6 feet long. This type of system requires biodegradable erosion control fabric. Installation guidelines are available from the USDA-FS Soil Bioengineering Guide (USDA-FS, 2002).

Additional Resources

- FISRWG. 1998. *Stream Corridor Restoration: Principles, Processes, and Practices.* Federal Interagency Stream Restoration Working Group. http://www.nrcs.usda.gov/technical/stream_restoration/PDFFILES/APPENDIX.pdf.

- Massachusetts DEP. 2006. *Massachusetts Nonpoint Source Pollution Management Manual: Vegetated Geogrids.* Massachusetts Department of Environmental Protection, Boston, MA. http://projects.geosyntec.com/NPSManual/Fact%20Sheets/Vegetated%20Geogrids.pdf.

- ISU. 2006. *How to Control Streambank Erosion: Vegetated Geogrids.* Iowa State University. http://www.ctre.iastate.edu/erosion/manuals/streambank/vegetated_geogrids.pdf.

- Mississippi State University, Center for Sustainable Design. 1999. *Water Related Best Management Practices in the Landscape: Vegetated Geogrids.* Created for United States Department of Agriculture, Natural Resource Conservation Service, Watershed Science Institute. http://www.abe.msstate.edu/csd/NRCS-BMPs/pdf/streams/bank/vegegeogrids.pdf.

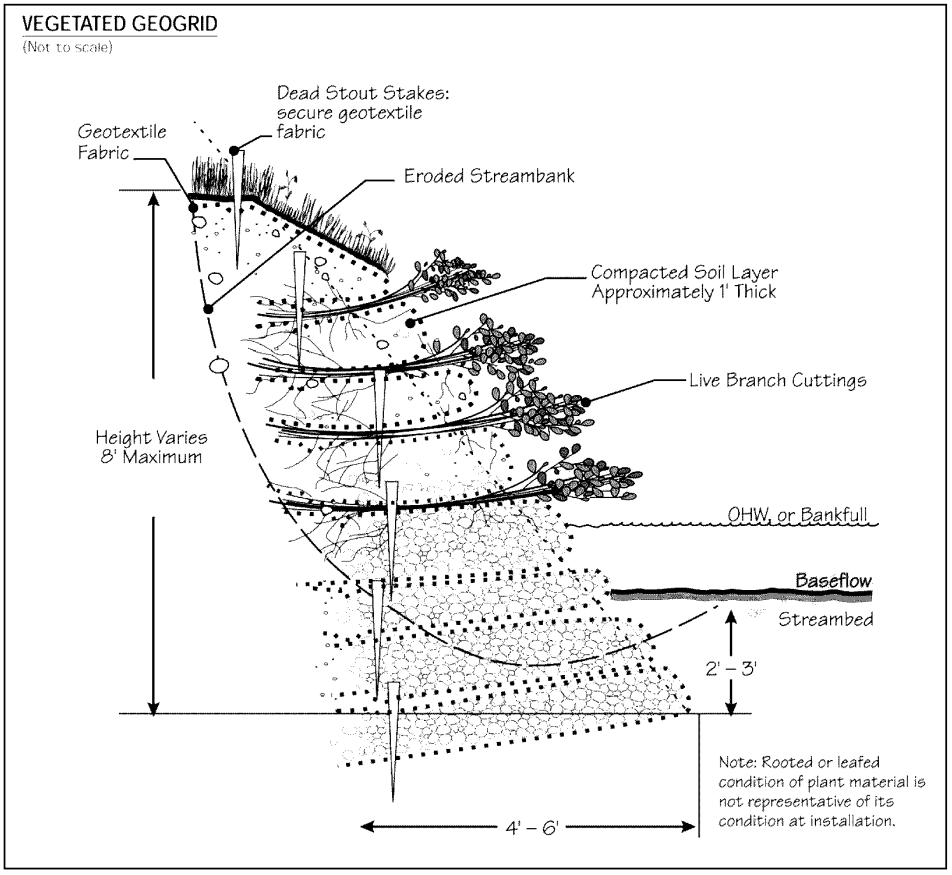

Figure 7.31 Vegetated Geogrid (USDA-FS, 2002)

Vegetated Reinforced Soil Slope (VRSS)

Channelization
- ☑ Physical & chemical
- ☑ Instream/riparian restoration

Dams
- ☑ Erosion control
- ☐ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☑ Streambanks ☑ Shorelines
  - ☐ Vegetative
  - ☐ Structural
  - ☑ Integrated
  - ☐ Planning & regulatory

The vegetated reinforced soil slope (VRSS) soil system (Figures 7.32 and 7.33) is an earthen structure constructed from living, rootable, live-cut, woody plant material branches, bare root, tubling or container plant stock, along with rock, geosynthetics, geogrids, and/or geocomposites. The VRSS system is useful for immediately repairing or preventing deeper failures, providing a structurally sound system with soil reinforcement, drainage, and erosion control (typically on steepened slope sites with limited space). Living cut branches and plants grow and perform additional soil reinforcement via the roots and surface protection via the top growth (Sotir and Fischenich, 2003).

Live vegetation is typically installed from just above baseflow elevation and up the face of the reconstructed streambank, acting to protect the bank through immediate soil reinforcement and confinement, drainage, and, in the toe area, with rock. The system extends below the depth of scour, typically with rock, which improves infiltration and supports the riparian zone. Internal systems (e.g., rock, live cut branches) can be configured to act as drains that redirect or collect internal bank seepage and transport water to the stream via a rock toe (Sotir and Fischenich, 2003).

Figure 7.32 VRSS Structure After Construction
(Sotir and Fischenich, 2003)

Plants may be selected to provide color, texture, and other attributes to add a natural landscape appearance. Examples of plants include dogwood, willow, hybiscus, and *Viburnum* spp. Check with your local NRCS office to make sure these are appropriate for the location. If a compound channel cross section is desirable near or just below the baseflow elevation, a step-back terrace may be incorporated to offer an enhanced riparian zone where emergent aquatic plants may invade over time. Although the total mass uptake may be small, they assimilate contaminants within the water column. Aquatic wetland plants that may be installed adjacent to the stream include blueflag, monkey flower, and pickerelweed. Again, check with your local NRCS office to ensure these are appropriate. VRSS systems can be constructed on slopes ranging from 1V on 2H (1:2) to 1:0.5. When constructed in step or terrace fashion, they improve pollutant control by intercepting sediment and attached pollutants during overbank flows (Sotir and Fischenich, 2003). Additional information about VRSS systems is available from USACE's *Vegetated Reinforced Soil Slope Streambank Erosion Control*.[14]

Figure 7.33 Established VRSS Structure (Sotir and Fischenich, 2003)

[14] http://el.erdc.usace.army.mil/elpubs/pdf/sr30.pdf

Water Conveyances

Channelization
- ☐ Physical & chemical
- ☐ Instream/riparian restoration

Dams
- ☐ Erosion control
- ☐ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☑ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☐ Streambanks ☐ Shorelines
  - ☐ Vegetative
  - ☐ Structural
  - ☐ Integrated
  - ☐ Planning & regulatory

These are the open or closed channel, conduit, or drop structure used to convey water from a reservoir. The USACE has studied the performance of spillways and overflow weirs at its facilities to determine the importance of these structures in improving DO levels. For example, data have been analyzed for the test spill done in 1999 at Canyon Ferry Dam in Montana, which found that allowing a portion of the releases to go over the spillways resulted in a significant increase in DO in the river downstream of the dam. Initially the use of spillways appeared to be a viable solution to the problem of low dissolved oxygen in the river below the dam. However, there was a problem with nitrogen supersaturation.

The operation of some types of hydraulic structures has been linked to problems of the supersaturation. An unexpected fish kill occurred in spring 1978 due to supersaturation of nitrogen gas in the Lake of the Ozarks (Missouri) within 5 miles of Truman Dam, caused by water plunging over the spillway and entraining air. The vertical drop between the spillway crest and the tailwaters was only 5 feet. The maximum total gas saturation was 143 percent, which is well above desired saturation levels. In this case, the spillway was modified by cutting a notch to prevent water from plunging directly into the stilling basin (ASCE, 1986).

Wildflower Cover

Channelization
- ☐ Physical & chemical
- ☐ Instream/riparian restoration

Dams
- ☑ Erosion control
- ☐ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☐ Streambanks ☐ Shorelines
  - ☐ Vegetative
  - ☐ Structural
  - ☐ Integrated
  - ☐ Planning & regulatory

Because of the hardy, drought-resistant nature of wildflowers, they may be more beneficial as an erosion control practice than turf grass. Though not as dense as turfgrass, wildflower thatches and associated grasses are expected to be as effective in erosion control and contaminant absorption. An additional benefit of wildflower thatches is that they provide habitat for wildlife, including insects and small mammals. Because thatches of wildflowers do not need fertilizers, pesticides, or herbicides and watering is minimal, implementation of this practice may result in cost savings.

A wildflower stand requires several years to become established, but maintenance requirements are minimal once established. Prices vary greatly, from less than $15 (Stock Seed Farms, n.d.) to $40 (Albright Seed Company, 2002) a pound, for wildflower seed mixes. The amount of wildflower seeds applied depends on the desired coverage of wildflowers. However, Stock Seed Farms recommends that one pound of seed can cover 3,500 ft^2 (Stock Seed Farms, n.d.). Keep in mind that species selection should focus on those wildflowers and grasses native to the given area or appropriate to the site.

Wind Erosion Controls

Wind erosion controls limit the movement of dust from disturbed soil surfaces and include many different practices. Wind barriers block air currents and are effective in controlling soil blowing. Many different materials can be used as wind barriers, including solid board fences, snow fences, and bales of hay. Sprinkling moistens the soil surface with water and must be repeated as needed to be effective for preventing wind erosion (Delaware DNREC, 2003); however, applications must be monitored to prevent excessive runoff and erosion.

Channelization
- ☐ Physical & chemical
- ☐ Instream/riparian restoration

Dams
- ☑ Erosion control
- ☐ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☐ Streambanks ☐ Shorelines
  - ☐ Vegetative
  - ☐ Structural
  - ☐ Integrated
  - ☐ Planning & regulatory

Wing Deflectors

Channelization
- ☑ Physical & chemical
- ☑ Instream/riparian restoration

Dams
- ☐ Erosion control
- ☐ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☑ Streambanks ☑ Shorelines
  - ☐ Vegetative
  - ☑ Structural
  - ☐ Integrated
  - ☐ Planning & regulatory

Wing deflectors are structures that protrude from either streambank but do not extend entirely across a channel. The structures are designed to deflect flows away from the bank, and create scour pools by constricting the channel and accelerating flow. The structures can be installed in series on alternative streambanks to produce a meandering thalweg and stream diversity. The most common design is a rock and rock-filled log crib deflector structure. The design bases the size of the structure on anticipated scour. These structures need to be installed far enough downstream from riffle areas to avoid backwater effects that could drown out or damage the riffle. This design should be employed in streams with low physical habitat diversity, particularly channels that lack pool habitats. Construction on a sand bed stream may be susceptible to failure and should be constructed with the use a filter layer or geotextile fabric beneath the wing deflector structure (FISRWG, 1998).

Additional Resources

- FISRWG. 1998. *Stream Corridor Restoration: Principles, Processes, and Practices.* Federal Interagency Stream Restoration Working Group. http://www.nrcs.usda.gov/technical/stream_restoration/PDFFILES/APPENDIX.pdf.

- Massachusetts DEP. 2006. *Massachusetts Nonpoint Source Pollution Management Manual: Wing Deflectors.* Massachusetts Department of Environmental Protection, Boston, MA. http://projects.geosyntec.com/NPSManual/Fact%20Sheets/Wing%20Deflectors.pdf.

- Mississippi State University, Center for Sustainable Design. 1999. *Water Related Best Management Practices in the Landscape: Single Wing Deflector.* Created for United States Department of Agriculture, Natural Resource Conservation Service, Watershed Science Institute. http://www.abe.msstate.edu/csd/NRCS-BMPs/pdf/streams/bank/singlewing.pdf.

- Mississippi State University, Center for Sustainable Design. 1999. *Water Related Best Management Practices in the Landscape: Double Wing Deflector.* Created for United States Department of Agriculture, Natural Resource Conservation Service, Watershed Science Institute. http://abe.msstate.edu/csd/NRCS-BMPs/pdf/streams/bank/doublewing.pdf.

- Ohio DNR. No date. *Ohio Stream Management Guide: Deflectors.* Ohio Department of Natural Resources. http://www.ohiodnr.com/water/pubs/fs_st/stfs19.pdf.

- SMRC. No date. *Stream Restoration: Flow Deflection/Concentration Practices.* The Stormwater Manager's Resource Center. http://www.stormwatercenter.net/Assorted%20Fact%20Sheets/Restoration/flow_deflection.htm.

Chapter 8: Modeling Information

Physical and chemical effects of hydraulic and hydrologic changes to streams, rivers, or other surface water systems can often be estimated with models and past experience (expert judgment). Several different models are available that can simulate many of the complex physical, chemical, and biological interactions that occur when hydraulic changes are imposed on surface water systems. Additionally, models can sometimes be used to determine a combination of practices to mitigate the unavoidable effects that occur even when a project is properly planned. Models, however, cannot be used independently of expert judgment gained through past experience. When properly applied models are used in conjunction with expert judgment, the effects of hydromodification activities (both potential and existing projects) can be evaluated and many undesirable effects prevented or eliminated. Models combined with expert judgment can also be used to evaluate existing hydromodification activities as part of operation and maintenance programs to identify possible opportunities to reduce or eliminate water quality impacts.

In the U.S. Army Corps of Engineers' (USACE's) report, *Review of Watershed Water Quality Models*[1] (Deliman et al., 1999), the authors compare and evaluate existing hydrologic and watershed water quality models, make recommendations for base model(s) for predicting nonpoint source (NPS) pollution, and identify areas for model improvement. The authors review commonly used and well validated models used in urban or nonurban settings. Users of the models can use the report to obtain basic model information and to review how well the models simulate NPS pollution and where the authors think improvements could be made. This information might be useful to readers who are trying to select the best model for analyzing how to reduce NPS pollution in their watersheds (Deliman et al., 1999).

Tables 8.1 and 8.2 below provided example of models and assessment approaches that could be used to determine the effects of hydromodification activities.

[1] http://el.erdc.usace.army.mil/elpubs/pdf/trw99-1.pdf

Available Models and Assessment Approaches

Table 8.1 lists some of the models available for studying the effects of channelization and channel modification activities, as well as models to analyze watershed runoff and to assess BMPs and low impact development to reduce impacts (of hydromodification activities.) The table also provides a quick description of each model and the dimension in which it models, as well as source and contact information.

Table 8.1 Models Applicable to Hydromodification Activities

Model	Dimension	Description	Model Resources
Channelization and Channel Modification Models			
BRANCH	1	The Branch-Network Dynamic Flow Model is used to simulate steady state flow in a single open channel reach or throughout a system of branches connected in a dendritic or looped pattern. The model is typically applied to assess flow and transport in upland rivers where flows are highly regulated or backwater effects are evident, or in coastal networks of open channels where flow and transport are governed by the interaction of freshwater inflows, tidal action, and meteorological conditions. (Last updated: 1997)	http://water.usgs.gov/cgi-bin/man_wrdapp?branch
CE-QUAL-RIV1	1	CE-QUAL-RIV1 is a one-dimensional (cross-sectionally averaged) hydrodynamic and water quality model, meaning that the model resolves longitudinal variations in hydraulic and quality characteristics and is applicable where lateral and vertical variations are small. CE-QUAL-RIV1 consists of two parts, a hydrodynamic code (RIV1H) and a water quality code (RIV1Q). The hydrodynamic code is applied first to predict water transport and its results are written to a file, which is then read by the quality model. It can be used to predict one-dimensional hydraulic and water quality variations in streams and rivers with highly unsteady flows, although it can also be used for prediction under steady flow conditions.	http://www.wes.army.mil/el/elmodels/riv1info.html

Model	Dimension	Description	Model Resources
CE-QUAL-W2	2	CE-QUAL-W2 is a two-dimensional, laterally averaged, finite difference hydrodynamic and water quality model for rivers, reservoirs, and estuaries. Because the model assumes lateral homogeneity, it is best suited for relatively long and narrow waterbodies exhibiting longitudinal and vertical water quality gradients. Branched networks can be modeled. The model accommodates variable grid spacing (segment lengths and layer thicknesses) so that greater resolution in the grid can be specified where needed.	http://smig.usgs.gov/cgi-bin/SMIC/model_home_pages/model_home?selection=cequalw2 http://www.ce.pdx.edu/w2
CH3D-SED	1, 2, or 3	The CH3D numerical modeling system can be used to investigate sedimentation on bendways, crossings, and distributaries. Applications address dredging, channel evolution, and channel training structure evaluations.	http://chl.erdc.usace.army.mil/chl.aspx?p=s&a=Software;22
EFDC	1, 2, or 3	The Environmental Fluid Dynamics Code is a single source, three-dimensional, finite-difference modeling system having hydrodynamic, water quality-eutrophication, sediment transport and toxic contaminant transport components linked together.	John Hamrick developed this at the Virginia Institute of Marine Science 1990-1991. Dr. John Hamrick, Tetra Tech, Inc. 10306 Eaton Place, Suite 340 Fairfax, VA 22030
EFM	1	Ecosystem Functions Model (EFM) is a planning tool that analyzes ecosystem response to changes in flow regime. EFM allows environmental planners, biologists, and engineers to determine whether proposed alternatives (e.g., reservoir operations, levee alignments) would maintain, enhance, or diminish ecosystem health. Project teams can use EFM software to visualize existing ecologic conditions, highlight promising restoration sites, and assess and rank alternatives according to the relative enhancement (or decline) of ecosystem aspects. The hydraulic modeling portion of the EFM process is performed by existing independent software, such as HEC-RAS.	http://el.erdc.usace.army.mil/elpubs/pdf/smartnote04-4.pdf

Model	Dimension	Description	Model Resources
FESWMS-2DH	2	FESWMS-2DH is a finite element surface water modeling system for two-dimensional flow in a horizontal plane. The model can simulate steady and unsteady surface water flow and is useful for simulating two-dimensional flow where complicated hydraulic conditions exist (e.g., highway crossings of streams and flood rivers). It can also be applied to many types of steady or unsteady flow problems. (Last updated: 1995)	http://water.usgs.gov/cgi-bin/man_wrdapp?feswms-2dh
HEC-6	1	HEC-6 is a one-dimensional, moveable boundary, open channel flow numeric model designed to simulate and predict changes in river profiles resulting from scour and deposition over moderate time periods, typically years. Latest revision occurred in 1993.	http://www.hec.usace.army.mil/software/legacysoftware/hec6/hec6.htm
HEC-HMS	1	The HEC-HMS model is designed to simulate the precipitation-runoff processes of dendritic watershed systems. It is applicable in a wide range of geographic areas for solving the widest possible range of problems, including large river basin water supply and flood hydrology, and small urban or natural watershed runoff. Hydrographs produced by the program are used directly or in conjunction with other software for studies of water availability, urban drainage, flow forecasting, future urbanization impact, reservoir spillway design, flood damage reduction, floodplain regulation, and systems operation.	http://www.hec.usace.army.mil/software/hec-hms/index.html http://el.erdc.usace.army.mil/elpubs/pdf/smartnote04-3.pdf

Model	Dimension	Description	Model Resources
HEC-RAS	1	HEC-RAS is an integrated system of software, designed for interactive use in a multi-tasking, multi-user network environment. The system is comprised of a graphical interface (GUI), separate hydraulic analysis components, data storage and management capabilities, graphics and reporting facilities. The model performs one-dimensional steady flow, unsteady flow, and sediment transport calculations. The key element is that all three components will use a common geometric data representation and common geometric and hydraulic computation routines. In addition to the three hydraulic analysis components, the system contains several hydraulic design features that can be invoked once basic water surface profiles are computed. The HEC-RAS modeling system was developed as a part of the Hydrologic Engineering Center's "Next Generation" (NexGen) of hydrologic engineering software. The NexGen project encompasses several aspects of hydrologic engineering, including: rainfall-runoff analysis; river hydraulics; reservoir system simulation; flood damage analysis; and real-time river forecasting for reservoir operations.	http://www.hec.usace.army.mil/software/hec-ras
HIVEL2D	1, 2	HIVEL2D is a free-surface, depth averaged model designed specifically to simulate flow in typical high-velocity channels.	http://chl.erdc.usace.army.mil/CHL.aspx?p=s&a=Software;6
RiverWare™	1	RiverWare™ is a reservoir and river modeling software decision support tool. With RiverWare™, users can model the topology, physical processes and operating policies of river and reservoir systems, and make better decisions about how to operate these systems by understanding and evaluating the trade-offs among the various management objectives. Water management professionals can improve their management of river and reservoir systems by using the software. The Bureau of Reclamation, the Tennessee Valley Authority, and the USACE sponsor ongoing RiverWare™ research and development.	http://cadswes.colorado.edu/riverware

Model	Dimension	Description	Model Resources
SAM	1	The model calculates the width, depth, slope and n-values for stable channels in alluvial material. SAM can be used to evaluate erosion, entrainment, transportation, and deposition in alluvial streams. Channel stability can be evaluated, and the evaluation used to determine the cost of maintaining a constructed project. The model is currently being improved and enhanced at WES.	http://chl.erdc.usace.army.mil/CHL.aspx?p=s&a=Software;2
SIAM	N/A	SIAM is a model designed to simulate the movement of sediment through a drainage network from source to outlet. It allows for evaluation of numerous sediment management alternatives relatively quickly. The model provides an intermediate level of analysis more quantitative than a conventional geomorphic evaluation, but less specific than a numerical, mobile-boundary simulation. SIAM is to be incorporated into a future release of HEC-RAS.	http://www.usbr.gov/pmts/sediment/model/srhsiam/index.html http://www.wes.army.mil/rsm/pubs/pdfs/RSM-2-WS04.pdf
SMS (RMA2 and RMA4)	1, 2	The Surface-Water Modeling System is a generalized numerical modeling system for open-channel flows, sedimentation, and constituent transport.	http://chl.erdc.usace.army.mil/CHL.aspx?p=s&a=Software;4
TABS-MD (RMA2, RMA4, RMA10, SED2D)	1, 2, or 3	The multi-dimensional numerical modeling system is a collection of generalized computer programs and utility codes, designed for studying multidimensional hydrodynamics in rivers, reservoirs, bays, and estuaries. The models can be applied to study project impacts of flows, sedimentation, constituent transport, and salinity.	http://chl.erdc.usace.army.mil/CHL.aspx?p=s&a=Software;10
WASP	1, 2, or 3	Water Quality Analysis Simulation Program. Framework for modeling contaminant fate and transport in surface waters. The WASP framework can be used to model biochemical oxygen demand and dissolved oxygen dynamics, nutrients and eutrophication, bacterial contamination, and organic chemical and heavy metal contamination.	http://www.epa.gov/athens/wwqtsc/html/wasp.html

Model	Dimension	Description	Model Resources
Models to Analyze Watershed Runoff and Assess Practices to Reduce Impacts of Hydromodification			
BMP Decision Support System (BMP-DSS)	1	BMP-DSS is a decision-making tool for placement of BMPs/LID practices at strategic locations in urban watersheds based on integrated data collection and hydrologic/hydraulic/water quality modeling. The system uses GIS technology, integrates BMP processes simulation models, and applies system optimization techniques for BMP placement and selection. The system also provides interfaces for BMP placement, BMP attribute data input, and decision optimization management. The system includes a stand-alone BMP simulation and evaluation module, which complements both research and regulatory nonpoint source control assessment efforts and allows flexibility in examining various BMP design alternatives.	Developed by the EPA and Prince George's County Department of Environmental Resources. Contact Dr. Mow-Soung Cheng at 301-883-5836 for more information.
HSPF	1	Hydrological Simulation Program—FORTRAN (HSPF) is a comprehensive package for simulation of watershed hydrology and water quality for both conventional and toxic organic pollutants. HSPF incorporates watershed-scale ARM and NPS models into a basin-scale analysis framework that includes fate and transport in one dimensional stream channels. It is the only comprehensive model of watershed hydrology and water quality that allows the integrated simulation of land and soil contaminant runoff processes with In-stream hydraulic and sediment-chemical interactions. The result of this simulation is a time history of the runoff flow rate, sediment load, and nutrient and pesticide concentrations, along with a time history of water quantity and quality at any point in a watershed. HSPF simulates three sediment types (sand, silt, and clay) in addition to a single organic chemical and transformation products of that chemical.	http://www.epa.gov/ceampubl/swater/hspf/index.htm

Model	Dimension	Description	Model Resources
LSPC	1	LSPC is the Loading Simulation Program in C++, a watershed modeling system that includes streamlined Hydrologic Simulation Program Fortran (HSPF) algorithms for simulating hydrology, sediment, and general water quality on land as well as a simplified stream transport model. LSPC is derived from the Mining Data Analysis System (MDAS), which was developed by EPA Region 3 and has been widely used for mining applications and TMDLs. A key data management feature of this system is that it uses a Microsoft Access database to manage model data and weather text files for driving the simulation. The system also contains a module to assist in TMDL calculation and source allocations. For each model run, it automatically generates comprehensive text-file output by subwatershed for all land-layers, reaches, and simulated modules, which can be expressed on hourly or daily intervals. Output from LSPC has been linked to other model applications such as EFDC, WASP, and CE-QUAL-W2.	http://www.epa.gov/ATHENS/wwqtsc/html/lspc.html
Program for Predicting Polluting Particle Passage through Pits, Puddles, and Ponds—Urban Catchment Model (P8–UCM)	1	P8–UCM is a model for predicting the generation and transport of stormwater pollutants in urban watersheds. Continuous water balance and mass balance calculations are performed on a user-defined system consisting of watersheds, devices (runoff storage/treatment areas, BMPs), particle classes, and water quality components. Simulations are driven by continuous hourly rainfall and daily air temperature time series data. The model simulates pollutant transport and removal in a variety of treatment devices (BMPs).	http://wwwalker.net/p8

Model	Dimension	Description	Model Resources
Storm Water Management Model (SWMM)	1	SWMM is a dynamic rainfall-runoff simulation model used for single event or long-term (continuous) simulation of runoff quantity and quality from primarily urban areas. The runoff component of SWMM operates on a collection of subcatchment areas that receive precipitation and generate runoff and pollutant loads. The routing portion of SWMM transports this runoff through a system of pipes, channels, storage/treatment devices, pumps, and regulators. SWMM tracks the quantity and quality of runoff generated within each subcatchment, and the flow rate, flow depth, and quality of water in each pipe and channel during a simulation period comprised of multiple time steps.	http://www.epa.gov/ednnrmrl/models/swmm/index.htm

Table 8.2 lists some of the available assessment models and approaches for assessing the biological impacts of channelization. The table also provides a quick description of the model or approach, as well as sources of additional information.

Table 8.2 Assessment Models and Approaches

Model or Assessment Approach	Description	Model Resources
Assessment Models		
AQUATOX	A freshwater ecosystem simulation model designed to predict the fate of various pollutants such as nutrients and organic toxicants and their effects on the ecosystem, including fish, invertebrates, and aquatic plants (including periphyton).	http://epa.gov/waterscience/models/aquatox
Cornell Mixing Zone Expert System (CORMIX)	A water quality modeling and decision support system designed for environmental impact assessment of mixing zones resulting from wastewater discharge from point sources. The system emphasizes the role of boundary interaction to predict plume geometry and dilution in relation to regulatory mixing zone requirements.	http://www.epa.gov/waterscience/models/cormix.html
HEC-HMS, Hydrologic Modeling System	A system designed to simulate the precipitation-runoff processes of dendritic watershed systems. In addition to unit hydrograph and hydrologic routing options, capabilities include a linear quasi-distributed runoff transform (ModClark) for use with gridded precipitation, continuous simulation with either a one-layer or more complex five-layer soil moisture method, and a versatile parameter estimation option.	http://www.hec.usace.army.mil/software/hec-hms/index.html
HEC-RAS, River Analysis System	The HEC-RAS system is used to calculate water surface profiles for both steady and unsteady gradually varied flow. The system can handle a full network of channels, a dendritic system, or a single river reach.	http://www.hec.usace.army.mil/software/hec-ras/hecras-hecras.html http://www.wsi.nrcs.usda.gov/products/W2Q/H&H/Tools_Models/Ras.html

Model or Assessment Approach	Description	Model Resources
Physical Habitat Simulation Model (PHABSIM)	A set of computer programs designed to predict the microhabitat (depth, velocities, channel indices) conditions in rivers at different flow levels and the relative suitability of those conditions for different life stages of aquatic life. (Serves as the key microhabitat simulation component of IFIM.)	http://www.fort.usgs.gov/Products/Software/PHABSIM
Riverine Community Habitat Assessment and Restoration Concept (RCHARC)	A simulation approach using computer models to compare hydraulic conditions and microhabitats of a reference reach to alternative study reach(es).	Nestler, J., T. Schneider, and D. Latka. 1993. RCHARC: A new method for physical habitat analysis. *Engineering Hydrology*, 294-99.
RiverWare™	RiverWare™ is a reservoir and river modeling software decision support tool. With RiverWare™, users can model the topology, physical processes, and operating policies of river and reservoir systems, and make better decisions about how to operate these systems by understanding and evaluating the trade-offs among the various management objectives. Water management professionals can improve their management of river and reservoir systems by using the software. The Bureau of Reclamation, the Tennessee Valley Authority, and the Army Corps of Engineers sponsor ongoing RiverWare™ research and development.	http://cadswes.colorado.edu/riverware
Salmonid Population Model (SALMOD)	A computer model that simulates the dynamics (spawning, growth, movement, and mortality) of freshwater salmonid populations, both anadromous and resident, under various habitat quality and capacities.	http://www.fort.usgs.gov/Products/Software/SALMOD
Assessment Approaches		
A Procedure to Estimate the Response of Aquatic Systems to Changes in Phosphorus and Nitrogen Inputs	A simple tool to estimate the responsiveness of a waterbody to changes in the loading of phosphorus and nitrogen using a dichotomous key that classifies it according to key characteristics.	ftp://ftp.wcc.nrcs.usda.gov/downloads/wqam/aqusens.pdf

Model or Assessment Approach	Description	Model Resources
EPA Volunteer Stream Monitoring Methods	A series of methods geared for volunteer monitoring programs offering simple to advanced techniques for monitoring macroinvertebrates, habitat, water quality, and physical conditions.	http://www.epa.gov/owow/monitoring/volunteer/stream
Habitat Evaluation Procedures/Habitat Suitability Index (HEP/HSI)	HEP is an evaluation method that determines the suitability of available habitat for select aquatic and terrestrial wildlife species and measures the impact of proposed land or water use changes on that habitat. HSI is a measure of habitat suitability.	http://policy.fws.gov/870fw1.html http://www.fort.usgs.gov/Products/Software/HEP http://www.fort.usgs.gov/Products/Software/HSI
Index of Biological Integrity (IBI)	An aquatic ecosystem health index using measures of total native fish species composition, indicator species composition, pollutant intolerant and tolerant species composition, and fish condition.	http://www.epa.gov/owow/wetlands/wqual/bio_fact/fact5.html
Indicators of Hydrologic Alteration (IHA)	A method for assessing the degree of hydrologic alteration attributable to human impacts within an ecosystem. The method takes daily stream flow values and calculates indices relating to the five components of flow regime critical for ecological processes: magnitude, frequency, duration, timing, and rate of change of hydrologic conditions.	http://www.nature.org/initiatives/freshwater/conservationtools/art17004.html
Instream Flow Incremental Methodology (IFIM)	A river network analysis that incorporates fish habitat, recreational opportunity, and woody vegetation responses to alternative water management schemes. Information is presented as a time series of flow and habitat at select points within the network.	http://www.fort.usgs.gov/Products/Software/IFIM
Invertebrate Community Index (ICI)	An invertebrate community health index using ten structural and compositional invertebrate community metrics including number of mayfly, caddisfly, and dipteran taxa.	http://www.epa.state.oh.us/dsw/bioassess/BioCriteriaProtAqLife.html

Model or Assessment Approach	Description	Model Resources
(Modified) Index of Well-Being (IWB)	The IWB is a fish community health index using measures of fish species abundance and diversity estimates. The *modified* index of well being factors out 13 pollutant tolerant species of fish from certain calculations to prevent false high readings on polluted streams which have large populations of pollutant tolerant fish.	http://www.epa.state.oh.us/dsw/bioassess/BioCriteriaProtAqLife.html
Rapid Bioassessment Protocols (RBP)	A set of protocols that offer cost-effective techniques of varying complexity to characterize the biological integrity of streams and rivers using the collection and analysis of biological, physical, and chemical data. It focuses on periphyton, benthic macroinvertebrates, and fish assemblages, and on assessing the quality of the physical habitat.	http://www.epa.gov/owow/monitoring/rbp
Rapid Channel Assessment (RCA)	A reference stream/integrated ranking approach to evaluate the physical condition of a stream channel based on channel geometry, percent channel-bank scour, sediment size distribution and embeddedness, large wood debris, and thalweg profiles.	CWP. 1998. *Rapid Watershed Planning Handbook: A Comprehensive Guide for Managing Urbanizing Watersheds*. Center for Watershed Protection, Ellicott City, MD. For a copy contact: The Center for Watershed Protection, 8391 Main Street Ellicott City, MD 21043, email: center@cwp.org.
Rapid Stream Assessment Technique (RSAT)	A reference stream/integrated ranking approach to evaluate steam health based on chemical stability, channel scouring/sediment deposition, physical instream habitat, water quality, riparian habitat, and biological indicators.	CWP. 1998. *Rapid Watershed Planning Handbook: A Comprehensive Guide for Managing Urbanizing Watersheds*. Center for Watershed Protection, Ellicott City, MD. For a copy contact: The Center for Watershed Protection, 8391 Main Street Ellicott City, MD 21043, email: center@cwp.org. http://www.stormwatercenter.net
Rosgen's Stream Classification Method	A classification method that uses morphological stream characteristics to organize streams into relatively homogeneous stream types to predict stream behavior and to apply interpretive information.	Reference: Rosgen, D. 1996. *Applied River Morphology*. Wildland Hydrology, Pagosa Springs, CO. For a copy contact: Wildland Hydrology Books, 1481 Stevens Lake Road, Pagosa Springs, CO 81147.

Model or Assessment Approach	Description	Model Resources
Stream Network/Stream Segment Temperature Models (SNTEMP/SSTEMP)	Developed to help predict the consequences of stream manipulation on water temperatures, these computer models simulate mean daily water temperatures for streams and rivers from data describing the stream's geometry, meteorology, and hydrology. SNTEMP is for a stream network with multiple tributaries for multiple time periods. SSTEMP is a scaled down version suitable for single (to a few) reaches and single (to a few) time periods.	http://www.fort.usgs.gov/Products/Software/SNTEMP
Stream Visual Assessment Protocol (SVAP)	A simple procedure to evaluate the condition of a stream based on visual characteristics. It also identifies opportunities to enhance biological value and conveys information on how streams function.	ftp://ftp.wcc.nrcs.usda.gov/downloads/wqam/svapfnl.pdf
Systems Impact Assessment Model (SIAM)	An integrated set of models used to aid the evaluation of water management alternatives, it address significant interrelationships among selected physical (temperature, microhabitat), chemical (dissolved oxygen, water temperature), and biological variables (young-of-year Chinook salmon production), and stream flow. Developed for the Klamath River in northern California.	http://www.fort.usgs.gov/Products/Software/SIAM
Time-Series Library (TSLIB)	A set of DOS-based computer programs to create monthly or daily habitat time-series and habitat-duration curves using the habitat-discharge relationship produced by PHABSIM. (Can serve as the hydraulic component of IFIM).	http://www.fort.usgs.gov/Products/Software/TSLIB
TR-20, Computer Program for Project Formulation Hydrology	A physically based watershed scale runoff event model that computes direct runoff and develops hydrographs resulting from any synthetic or natural rainstorm. Developed hydrographs are routed through stream and valley reaches as well as through reservoirs.	http://www.wsi.nrcs.usda.gov/products/W2Q/H&H/Tools_Models/WinTR20.html
TR-55, Urban Hydrology for Small Watersheds	Simplified procedures to calculate storm runoff volume, peak rate of discharge, hydrographs, and storage volumes required for floodwater reservoirs.	http://www.info.usda.gov/CED/ftp/CED/tr55.pdf

Examples of Channel Modification Activities and Associated Models/Practices

Modeling for Impoundments

A low-complexity option for modeling impoundments is to use simple models like the Bathtub model to simulate the waterbody. Compared to more complex multi-dimensional models, which use multiple computational cells to estimate volumetric and contaminant fluxes between the cells, Bathtub-type models typically use a single cell. This single cell, while a simplification of the system, may be appropriate if the system is fully mixed in both the horizontal and vertical dimensions. This approach can also be economically developed using spreadsheets (such as Excel) to calculate the results. However, a Bathtub-type model has limited utility if the water body is stratified or if results are required at more than one location in the system.

Another example of a modeling tool that has the ability to simulate impoundments is CE-QUAL-W2, a two-dimensional hydrodynamic water quality model. CE-QUAL-W2 provides results for either a horizontal or cross-sectional, two-dimensional plane. Because the model assumes a vertically or horizontally-mixed environment, it is best suited for relatively long and narrow water bodies (rivers, lakes, reservoirs, and estuaries) that exhibit longitudinal or vertical water quality stratification. The water quality portion of CE-QUAL-W2 includes the major processes of eutrophication kinetics and a single algal compartment. The bottom sediment compartment stores settled particles, releases nutrients to the water column, and exerts sediment oxygen demand based on user-supplied fluxes; a full sediment diagenesis (i.e., the process of chemical and physical change in deposited sediment during its conversion to rock) model is under development.

The Environmental Fluid Dynamics Code (EFDC) is a general-purpose modeling package for simulating one- or multi-dimensional flow, transport, and bio-geochemical processes in surface water systems including rivers, lakes, estuaries, reservoirs, wetlands, and coastal regions. The EFDC model was originally developed by Hamrick in 1992 at the Virginia Institute of Marine Science for estuarine and coastal applications and is considered public domain software. This model is now EPA-supported as a component of EPA Region 2's PRVI BASINS software system and EPA's TMDL Toolbox,[2] and has been used extensively to support TMDL development throughout the country. In addition to hydrodynamic, salinity, and temperature transport simulation capabilities, EFDC is capable of simulating cohesive and non-cohesive sediment transport, near field and far field discharge dilution from multiple sources, eutrophication processes, the transport and fate of toxic contaminants in the water and sediment phases, and the transport and fate of various life stages of finfish and shellfish.

Modeling for Estuary Tidal Flow Restrictions

Artificial hydraulic structures have the ability to alter natural flow patterns (hydrodynamic) in an estuary, which may modify erosion patterns, salinity regimes, and the fate and transport of pollutants. Some examples of artificial hydraulic structures include culverts, bridges, tide gates,

[2] http://www.epa.gov/athens/wwqtsc/html/efdc.html

and weir structures. Installation or removal of these structures may cause a significant change in local hydrodynamics, and tools may be used to estimate the impacts prior to the modification.

The EFDC model, as described above, allows modelers to evaluate the impacts of hydraulic structures, such as culverts, bridges, tide gates, and weirs. Due to the flexibility of EFDC, each of these structures can also be conceptually represented in a variety of ways. For example, the weir equation can be applied to locations in the modeling grid to estimate water surface-dependent flow through one or more grid cells. This enables a modeler to evaluate the effect of placement of structures that modify surface flow patterns (such as a weir). Structures such as piers and impermeable barriers (e.g. jetties, breakwaters) can also be simulated using this code.

Another modeling tool that can address estuary tidal flow restrictions is the Finite Element Surface Water Modeling System (FESWMS) model. This modeling code was developed by the Federal Highway Administration (FHA) and is distributed by the U.S Geological Survey (USGS). FESWMS is a hydrodynamic modeling code that simulates two-dimensional, depth-integrated, steady or unsteady surface-water flows. It supports both super and subcritical flow analysis, and area wetting and drying. FESWMS is also suited for modeling regions involving flow control structures, such as are encountered at the intersection of roadways and waterways. Specifically, the FESWMS model allows the user to include weirs, culverts, drop inlets, and bridge piers into a standard two-dimensional finite element model. FESWMS does not have three-dimensional capabilities.

Modeling for Estuary Flow Regime Alterations

A number of structures or processes can alter the flow regime of a system. Flow contributions to an estuary can be altered by upstream rediversions or basin transfers, dams and dam releases, or other channel modifications. For example, when freshwater flows patterns are altered by the presence and operation of a dam, EFDC can be used to model the impact to downstream estuaries. EFDC can provide modelers with a time series representation of flow that is withdrawn from a simulated reservoir/dam system. Coupling the time series flow projections with hydrodynamic analysis of the receiving esturay enables modelers to determine potential impacts of altered flow patterms and to evaluate various spill options for the dam operation. Structures within the estuary that may alter the flow patterns include marinas, piers, jetties, and other similar type structures. Flow regime alterations due to these structures can be simulated using the same modeling tools described in the Flow Restrictions section above. Flow restrictions are the cause of most changes in the flow regime, so the simulation of the causes of restriction using a process-based modeling tool produces the desired flow alterations. Therefore, EFDC and FESWMS can be utilized in the same manner to obtain flow regime results.

Temperature Restoration Practices

Several computer models that predict instream water temperature are currently available. These models vary in the complexity of detail with which site characteristics, including meteorology, hydrology, stream geometry, and riparian vegetation, are described. The U.S. Fish and Wildlife Service developed an instream surface water temperature model (Theurer et al., 1984) to predict mean daily temperature and diurnal fluctuations in surface water temperatures throughout a stream system. The model, Stream Network Temperature Model (SNTEMP), can be applied to any size watershed or river system. This predictive model uses either historical or synthetic

hydrological, meteorological, and stream geometry characteristics to describe the ambient conditions. The purpose of the model is to predict the longitudinal temperature and its temporal variations. The instream surface water temperature model has been used satisfactorily to evaluate the impacts of riparian vegetation, reservoir releases, and stream withdrawal and returns on surface water temperature. In the Upper Colorado River Basin, the model was used to study the impact of temperature on endangered species (Theurer et al., 1982). It also has been used in smaller ungauged watersheds to study the impacts of riparian vegetation on salmonid habitat.[3]

The Stream Segment Temperature Model (SSTEMP) is a much-scaled down version of the SNTEMP model developed by the USGS Biological Resource Division. Unlike the large network model (SNTEMP), this program only handles single stream segments for a single time period (e.g., month, week, day) for any given "run." Initially designed as a training tool, SSTEMP may be used satisfactorily for a variety of simple cases that one might face on a day-to-day basis. It is especially useful to perform sensitivity and uncertainty analysis. The model predicts minimum 24-hour temperatures, mean 24-hour temperatures, and maximum 24-hour stream temperatures for a given day, as well as a variety of intermediate values. The SSTEMP model identifies current stream and/or watershed characteristics that control stream temperatures. The model also quantifies the maximum loading capacity of the stream to meet water quality standards for temperature. This model is important for estimating the effect of changing controls or factors (such as riparian grazing, stream channel alteration, and reduced streamflow) on stream temperature. The model can also be used to help identify possible implementation activities to improve stream temperature by targeting those factors causing impairment to the stream. Good input data and an awareness of the model's assumptions are critical to obtaining reliable predictions. SSTEMP may be used to evaluate alternative reservoir release proposals, analyze the effects of changing riparian shade or the physical features of a stream, and examine the effects of different withdrawals and returns on instream temperature.[4]

Selecting Appropriate Models

Although a wide range of adequate hydrodynamic and surface water quality models are available, the central issue in selecting appropriate models for evaluating hydromodification projects is the appropriate match of the financial and geographical scale of the proposed project with the cost required to perform a credible technical evaluation of the projected environmental impact. It is highly unlikely, for example, that a proposal for a relatively small stream channel modification project, such as installing culverts in a stream segment, would be expected or required to contain a state-of-the-art hydrodynamic and surface water quality analysis that requires one or more person-years of effort. In such projects, a simplified, desktop approach (e.g., HEC-RAS Model) requiring less time and money would most likely be sufficient (USACE, 2002a). In contrast, substantial technical assessment of the long-term environmental impacts would be expected for channelization proposed as part of construction of a major harbor facility or as part of a system of navigation and flood control locks and dams. The assessment should

[3] For more information or to download SNTEMP, see the U.S. Geological Survey Web site: http://www.fort.usgs.gov/Products/Software/SNTEMP.

[4] More information about the model is available on the U.S. Geological Survey Web site: http://www.mesc.usgs.gov/products/software/default.asp (navigate to Stream Network Temperature Model and Stream Segment Temperature Model).

incorporate the use of detailed 2D or 3D hydrodynamic models coupled with sediment transport and surface water quality models.

In general, six criteria can be used to review available models for potential application in a given hydromodification project:

1. Time and resources available for model application
2. Ease of application
3. Availability of documentation
4. Applicability of modeled processes and constituents to project objectives and concerns
5. Hydrodynamic modeling capabilities
6. Demonstrated applicability to size and type of project

The Center for Exposure Assessment Modeling (CEAM),[5] EPA Environmental Research Laboratory, Athens, Georgia, provides continual support for several hydrodynamic and surface water quality models, such as HSCTM2D, HSPF, PRZM3, and SED3D. Another source of information and technical support is the Waterways Experiment Station, USACE, Vicksburg, Mississippi.[6] Although a number of available models are in the public domain, costs associated with setting up and operating these models may exceed the project's available resources. For a simple to moderately difficult application, the approximate level of effort varies, but could range from 1 to 12 person-months.

Several factors need to be considered in the application of mathematical models to predict impacts from hydromodification projects including:

- Variations and uncertainties in the accuracy of these models when they are applied to the short- and long-term response of natural systems.
- Availability of relevant information (data collection) to derive the simulations and validate the modeling results.

The cost of a given modeling project depends on a number of factors. Questions need to be asked prior to the start of a modeling project to determine the purpose and future use of the model, and/or its results. For example, the modeler needs to know if the model results are to be used deterministically (the model assumes there is only one possible result that is known for each alternative course or action), or if the model is to be used for a heuristic (involving or serving as an aid to learning, discovery, or problem-solving by experimental and especially trial-and-error methods) scoping exercise to identify data gaps in a system. In a deterministic study, the results are traditionally compared to observed data in an effort regarded as calibration and validation. The model must therefore be rigorous enough to represent the system accurately. The complexity of the system under study is also a consideration that must be made prior to the project. The complexity of the system generally correlates well with the level of complexity of the model required to simulate it. Likewise, the more complex the model is, the more intensive it is to develop and run, and the more costly the modeling project is.

[5] http://www.epa.gov/ceampubl
[6] http://www.erdc.usace.army.mil

A number of approaches are available to model a given system, and the discussion above only highlights a few of the modeling tools currently available. The cost to set up a model for a given system varies tremendously, based not only on the modeling code selected, but also on what the modeler decides to simulate. For example, a modeler may aim to obtain flow results for an estuary using a given model. In reality, surface winds in that estuary may or may not be influencing the flow regime. If observed wind data is available from a weather station nearby, the modeler may choose to incorporate these data into the model to better represent that influence. The modeler may also choose not to incorporate these data, or the data may not be available. Although the modeler is utilizing the same modeling code, the decision regarding whether or not to simulate the wind conditions is not only a question regarding the model's purpose, but also what the development of this model will cost.

Modeling tools can range from simple spreadsheet tools using "back of the envelope" type calculations, to complex processed based models that must be run on high performance computing systems. As discussed previously, the tool selected for a given modeling project needs to be chosen with a number of questions in mind. As a result, each system can be modeled in a number of different ways with a number of different modeling codes. Therefore, the range in cost for even a single estuary or impoundment may range tenfold depending on the model's purpose. Typically, the cost of developing a model may range from a few thousand dollars for a simple spreadsheet model, to in excess of one million dollars for a more robust modeling system.

Chapter 9: Dam Removal Requirements, Process, and Techniques

Chapter 2 provided a discussion of specific impacts from dams, water quality above and below the dam, suspended sediment and recharge issues, and biological and habitat impacts. Chapter 4 then provided a discussion of types of dams, Federal Energy Regulatory Commission (FERC) requirements, management measures and practices that can be used to mitigate for some of the effects of dams, and information to consider when contemplating removing a dam. Chapter 9 focuses on what occurs after the decision has been made to remove a dam. This chapter provides a more detailed discussion on some permitting requirements for removing dams, the dam removal process, and sediment removal techniques to consider when removing a dam.

Requirements for Removing Dams

Removing a dam may require evaluations and permits from state, federal, and local authorities. These requirements are typically to ensure that the removal is done is a manner that is safe and minimizes short and long term impacts to the river and floodplain. States and local governments have different requirements. The following federal requirements may apply to dam removal:

- Rivers and Harbors Act Permit
- FERC License Surrender or Non-power License Approval
- National Environmental Policy Act (NEPA) Review
- Federal Consultations (Endangered Species Act Section 7 Consultation, Magnuson-Stevenson Act Consultation, National Historic Preservation Act Compliance)
- State Certifications (Water Quality Certification, Coastal Zone Management Act Certification)

The following state requirements might apply to dam removal:

- Clean Water Act (CWA) Section 404 Dredge and Fill Permit
- Waterway Development Permits
- Dam Safety Permits
- State Environmental Policy Act Review
- Historic Preservation Review
- Resetting the Floodplain
- State Certifications

Demolition and building permits may also be required for dam removal. Individual state and local governments may have additional requirements as well.

Tips for a Successful Permitting Process (American Rivers, 2002b)

Dam removal is relatively new and the permitting process can be difficult. Most state and federal agencies are not yet practiced at moving dam removal through the permitting process. The relevant permitting requirements were designed for more destructive activities, and dam removal does not easily fit into the requirements. Tips to help make the process smoother include:

Schedule Time

- *Expect dam removal projects to take longer than construction efforts.*
- *Schedule more lead-time into the permitting process to avoid delays and frustrations.*

Establish a Relationship with the Permitting Agencies

- *Hold a pre-application meeting with key agency staff once your project is well thought out.*
- *Do not attempt to circumvent the process and stick with the permitting timeline.*
- *Do not provide inconsistent information.*
- *A single point of contact for the group applying for the permit will help avoid confusion and maintain communication.*

Providing Information about the Proposed Project

- *Create clear and simple descriptions and drawings (to scale) of the proposed project.*
- *Be sure to identify complicating conditions, schedules, seasonal constraints, etc.*
- *Provide and discuss alternatives, but make it clear why the chosen approach should be used.*
- *Assume the reviewers know nothing about your project.*

Dam Removal Process

The complexity of the removal process of a dam is specific to each particular case of removal. There are two major components of the removal process: the stakeholders involved in the decision-making process of removing the dam and the actual physical removal of the dam itself. The authorities that govern dams are numerous, yet overlapping. These entities include: USACE, Bureau of Reclamation, FERC, and other federal agencies; interest groups; and state and local governments. There are also various state programs that have been created to keep dams safe and environmentally friendly, as well as to help owners finance dam removal. A study by the Aspen Institute (2002) provides a list of priority issues to consider when dam removal may be a possibility. Among the considerations listed are dam and public safety, economics, environmental concerns, risk, social values and community interests, scientific information, and stakeholder participation. This report suggests that success of dam removal is dependent upon a thorough analysis of these competing factors and input from all interested parties (Aspen Institute, 2002). Often, the dam owner makes the decision to remove a dam, deciding that the costs of continuing operation and maintenance are greater than the cost of removing the dam. However, state dam safety offices can order for a dam to be removed if there are safety concerns; FERC can order removal of dams under their jurisdiction for environmental and safety reasons (American Rivers, n.d.a.).

State governments have authority over the dams in their jurisdiction. Other state and local government agencies dealing with issues such as water quality, water rights, and fish and wildlife protection can also play a role in overseeing dams within their jurisdiction if they so choose

(FOE et al., 1999). Certain states have implemented stringent rules for dams that are and are not regulated by FERC or USACE. For example, the state of Wisconsin has a Dam Safety Inspection Program that requires dams to be inspected every 10 years by the Wisconsin Department of Natural Resources (WDNR) (Doyle et al., 2000). Any dam that fails to meet safety requirements set by WDNR must be repaired or removed. The state of Pennsylvania has implemented a law that was written under the order of the Pennsylvania Fish and Boat Commission that states that any newly constructed or existing dam that requires a state permit for construction or modification must also include provisions for fish passage (Doyle et al., 2000).

Some states have programs that aid dam owners in the process of removing their structures. The Pennsylvania Department of Environmental Protection (DEP) has adopted procedures to make it easier and less expensive for dam owners to remove unsafe, unused, or unwanted dams. In this process, owners of dams on third order or larger streams are contacted and asked if they are interested in removing their dams. If they are, then all the landowners affected by the removal are contacted, and a public meeting is held if interest warrants one. After public comments, an engineering design is created, followed by an environmental assessment, then sediment and erosion control (ESC) plans are established, and finally approval is sought by the USACE. This program was used in the removal of seven dams on Conestoga River and also in the removal of the Williamsburg Station Dam on the Juniata River. This approval process takes between 12 and 18 weeks (FOE et al., 1999). However, the physical decommissioning and removing of a dam can still be a lengthy and diversified process.

Sediment Removal Techniques

Large dams can trap thousands to millions of cubic yards of sediment over time, eliminating the flood control or storage capacity of the dam. Removal or control of sediment behind a dam can represent a large portion of the cost and planning effort of a dam removal project. There are several methods available to project planners and dam owners that target different pollution concerns and budgetary limitations (International Rivers Network, 2003). The options in terms of sediment removal range from complete removal and relocation of all accumulated material from the inundated regions; removing sediment only from the anticipated channel of the river, or allowing the river to erode a new channel through the sediment (Wunderlich et al., 1994).

If the sediment is basically clean and the main concern is turbidity and clogging downstream streambed spawning areas, gradual incremental drawdowns of the reservoir behind the dam allow the sediment to be transported downstream in smaller portions and avoids the release one large, lethal volume of sediment. If contaminated sediment is the main concern, dredging is an option that can be used. While the use of silt curtains can minimize turbidity during dredging, silt curtains do not contain dissolved substances such as metals, which can pose a threat to downstream ecosystems (EMC2, 2001). Another option for contaminated sediments is to stabilize the sediment in place within the stream. This can be accomplished by leaving a portion of the dam in place to hold back an area of sediment that is of concern. The strategic placement of boulders can also contain the sediment from moving downstream.

For more information on issues associated with dam removal, see the Additional Resources section of this document.

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Additional Resources

The following are additional resources that may be used to obtain supplementary information for topics presented in this document.

Background on Streams, Restoration, and Hydrology

The following are basic references regarding stream ecology, restoration, and hydrology:

Allan, J.D. 1995. *Stream Ecology—Structure and Function of Running Waters*. Chapman and Hall, New York.

Brookes, A. and F.D. Shields, eds. 1999. *River Channel Restoration: Guiding Principles for Sustainable Projects*. John Wiley and Sons, Chichester, U.K.

Cooke, G.D., E.B. Welch, S.A. Peterson, and P.R. Newroth. 1993. *Restoration and Management of Lakes and Reservoirs*. 2nd ed. Lewis Publishers, Boca Raton, FL.

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Gordon, N.D., T.A. McMahon, and B.L. Finlayson. 1992. *Stream Hydrology: An Introduction for Ecologists*. John Wiley and Sons, Chichester, U.K.

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Kondolf, G.M., and E.R. Micheli. 1995. Evaluating stream restoration projects. *Environmental Management* 19(1):1-15.

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Poff, N., J.D. Allan, M.B. Bain, J.R. Karr, K.L. Prestegaard, B.D. Richter, R.E. Sparks, and J.C. Stromberg. 1997. The natural flow regime: A paradigm for river conservation and restoration. *BioScience* 47:769-784.

Ponce, V.M. 1989. *Engineering Hydrology: Principles and Practices*. Prentice-Hall, Englewood Cliffs, New Jersey.

Rosgen, D.L. 1996. *Applied River Morphology*. Wildland Hydrology, Colorado.

USEPA. 1995. *Ecological Restoration: A Tool to Manage Stream Quality*. EPA 841-F-95-007, U.S. Environmental Protection Agency, Office of Wetlands, Oceans, and Watersheds, Washington, DC. http://www.epa.gov/owow/nps/Ecology.

Detailed Information for Practices to Achieve Management Measures

Additional information about practices, their effectiveness, limitations, and cost estimates are available from a number of sources, including:

Allen, H.H. and J.R. Leech. 1997. *Bioengineering for Streambank Erosion Control: Report 1 Guidelines*. U.S. Army Corps of Engineers, Environmental Impact Research Program, Technical Report EL-97-8. http://el.erdc.usace.army.mil/elpubs/pdf/trel97-8.pdf.

American Society of Civil Engineers and the U.S. Environmental Protection Agency (ASCE and USEPA). 2007. *International Stormwater Best Management Practices (BMPs) Database*. http://www.bmpdatabase.org.

Center for Watershed Protection (CWP). 2007. *The Stormwater Manager's Resource Center*. http://www.stormwatercenter.net.

Federal Interagency Stream Restoration Working Group (FISRWG). 1998. *Stream Corridor Restoration: Principles, Processes, and Practices*. http://www.nrcs.usda.gov/technical/stream_restoration.

Fischenich, J. C. and H. Allen. 2000. *Stream Management*. ERDC/EL SR-W-00-1, U.S. Army Engineer Research and Development Center, Vicksburg, MS. http://el.erdc.usace.army.mil/elpubs/pdf/srw00-1/srw00-1.pdf. Accessed October 2004.

Knutson, P.L., and M.R. Inskeep. 1982. *Shore Erosion Control with Salt Marsh Vegetation*. Coastal Engineering Technical Aid No. 82-3. U.S. Army Corps of Engineers Coastal Engineering Research Center, Vicksburg, MS.

National Association of Home Builders (NAHB). 1995. *Storm Water Runoff & Nonpoint Source Pollution Control Guide for Builders and Developers*. National Association of Home Builders, Washington, DC. http://www.nahbrc.org.

Oregon Association of Conservation Districts. 1999. *Protecting Streambanks from Erosion: Tips for Small Acreages in Oregon*. http://www.or.nrcs.usda.gov/news/factsheets/fs4.pdf.

Urban Drainage and Flood Control District. 1999. *Urban Storm Drainage Criteria Manual: Volume 3—Best Management Practices*. Urban Drainage and Flood Control District, Denver, CO. http://www.udfcd.org.

U.S. Army Corps of Engineers (USACE). 2007. *Engineer Research and Development Center (ERDC) Web site*. http://www.erdc.usace.army.mil.

U.S. Department of Agriculture, Forest Service (USDA-FS). 2002. *A Soil Bioengineering Guide for Streambank and Lakeshore Stabilization*. http://www.fs.fed.us/publications/soil-bio-guide.

U.S. Environmental Protection Agency (USEPA). 2002. *Development Document for Proposed Effluent Guidelines and Standards for the Construction and Development Category*. EPA-821-R-02-007. http://www.epa.gov/waterscience/guide/construction/devdoc.htm.

U.S. Environmental Protection Agency (USEPA). 2007. *National Menu of Stormwater Best Management Practices*. http://cfpub.epa.gov/npdes/stormwater/menuofbmps/menu.cfm.

Additional information about hydromodification, soil bioengineering, and restoration is available from the following:

- *Ann Riley, Urban Stream Restoration: A Video Tour of Ecological Restoration Techniques* (http://www.noltemedia.com/nm/urbanstream): This video, which can be ordered online, is a documentary tour of six urban stream restoration sites. It provides background information on funding, community involvement, and the history and principles of restoration. The demonstration includes examples of stream restoration in very urbanized areas, re-creating stream shapes and meanders, creek daylighting, soil bioengineering, and ecological flood control projects. Ann Riley, a nationally known hydrologist, stream restoration professional, and executive director of the Waterways Restoration Institute in Berkley, California, leads the tour.

- *California Forest Stewardship Program*. Bioengineering to Control Streambank Erosion (http://ceres.ca.gov/foreststeward/html/bioengineering.html): This fact sheet discusses various bioengineering techniques applicable to California streams.

- *Lower American River Corridor River Management Plan* (http://www.safca.com): The plan provides information on aquatic habitat management goals, including restoration to improve aquatic habitat impaired by low flows from channel modification of the Lower American River.

- *Natural Resources Conservation Service, Watershed Technology Electronic Catalog* (http://www.wcc.nrcs.usda.gov/wtec/wtec.html): This online catalog is a source of technical guidance on a variety of restoration techniques and management practices, to provide direction for watershed managers and restoration practitioners. The site is focused on providing images and conceptual diagrams.

- *North Delta Improvements Project* (http://ndelta.water.ca.gov/index.html): The North Delta Improvements Project (NDIP), which is under the California Department of Water Resources, presents unique opportunities for synergy in achieving flood control and ecosystem restoration goals.

- *Ohio Department of Natural Resources*. Stream Management Guide Fact Sheets (http://www.dnr.state.oh.us/water/pubs/fs_st/streamfs.htm): This is a compilation of fact sheets offering technical guidance for streambank and instream practices, general stream management, and stream processes.

- *Sacramento River Riparian Habitat Program* (http://www.sacramentoriver.ca.gov): The Sacramento River Riparian Habitat Program is working to ensure that riparian habitat management along the river addresses the dynamics of the riparian ecosystem and the reality of the local agricultural economy.

- Schueler, T. 1987. *Controlling Urban Runoff: A Practical Manual for Planning and Designing Urban BMPs*. Metropolitan Washington Council of Governments, Washington, DC.

- *South Delta Improvements Program* (http://baydeltaoffice.water.ca.gov/sdb/sdip/index_sdip.cfm): The purpose of the South Delta Improvements Program (SDIP) is to incrementally maximize diversion capability into Clifton Court Forebay, while providing an adequate water supply for diverters within the South Delta Water Agency and reducing the effects of State Water Project exports on both aquatic resources and direct losses of fish in the South Delta.

- *South Sacramento County Streams Project* (http://www.spk.usace.army.mil): South Sacramento County Streams Project provides flood damage reduction to the urban areas of the Morrison Creek and Beach Stone Lake drainage basins in the southern area of Sacramento, as well as around the Sacramento Regional Waste Water Treatment Plant. The project will fund stream restoration in southern Sacramento County.

- *USDA Natural Resources Conservation Service, Stream Visual Assessment Protocol* (http://www.nrcs.usda.gov/technical/ECS/aquatic/svapfnl.pdf): This document outlines methods for field conservationists and landowners to evaluate stream ecological conditions.

- *Washington State Department of Transportation, Soil Bioengineering Web site* (http://www.wsdot.wa.gov/eesc/design/roadside/sb.htm): This is a comprehensive Web site, with information on cost, specifications for project design, funding, and case studies.

- *WATERSHEDSS:Water, Soil and Hydro-Environmental Decision Support System* (http://www.water.ncsu.edu/watershedss): The "Educational Component" of this Web site contains fact sheets with information on a variety of techniques for management practices, including soil bioengineering and structural streambank stabilization.

Resources for Dams

Thornton, K.W., B.L. Kimmel, and F.E. Payne, eds. 1990. *Reservoir Limnology: Ecological Perspectives*. John Wiley and Sons, Inc., New York, NY.

U.S. Army Corps of Engineers. No date. *The WES Handbook on Water Quality Enhancement Techniques for Reservoirs and Tailwaters*. U.S. Army Engineer Research and Development Center Waterways Experiment Station, Vicksburg, MS.

Web sites for dam removal include the following:

- American Rivers' Rivers Unplugged Program: http://www.americanrivers.org/site/PageServer?pagename=AMR_content_1270
- Association of State Dam Safety Officials: http://www.damsafety.org
- Friends of the Earth's River Restoration: http://www.foe.org/camps/reg/nw/river/index.html
- International River Network's River Revival Program: http://www.irn.org/revival/decom
- Massachusetts Department of Fisheries, Wildlife, and Environmental Law Enforcement River Restore Program: http://www.mass.gov/dfwele/river/programs/riverrestore/riverrestore.htm
- National Performance of Dams Program Stanford University: http://www.stanford.edu/group/strgeo/researchcenters.html
- New Hampshire Department of Environmental Services: http://www.des.state.nh.us/dam.htm
- Pennsylvania Department of Environmental Protection, Division of Dam Safety, Dam Safety Program: http://www.dep.state.pa.us/dep/deputate/watermgt/we/damprogram/Main.htm
- Pennsylvania Fish & Boat Commission: http://www.fish.state.pa.us
- River Recovery—Restoring Rivers through Dam Decommissioning: http://www.recovery.bcit.ca/index.html
- United States Society on Dams: http://www.ussdams.org
- Wisconsin Department of Natural Resources: http://www.dnr.state.wi.us/org/water/wm/dsfm/dams/removal.html

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- International Rivers Network: http://www.irn.org/pubs/wrr.
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- United States Society on Dams Publications: http://www.ussdams.org/pubs.html.
- University of Wisconsin-Madison/Extension. 1996. *The Removal of Small Dams: An Institutional Analysis of the Wisconsin Experience*. Extension Report 96-1, May. Department of Urban and Regional Planning.
- Wisconsin Department of Natural Resources Projects: http://www.dnr.state.wi.us/org/gmu/sidebar/iem/lowerwis/index.htm#baraboo or http://www.dnr.state.wi.us/org/gmu/lowerwis/baraboo.htm; http://www.dnr.state.wi.us/org/gmu/sidebar/iem/milw/index.htm; http://www.dnr.state.wi.us/org/gmu/sidebar/iem/superior/index.htm; http://www.dnr.state.wi.us/org/gmu/sidebar/iem/sheboygan/index.htm

Noneroding Roadways

The following sources may be used to obtain additional information on noneroding roadways:

- *Controlling Nonpoint Source Runoff Pollution from Roads, Highways, and Bridges* http://www.epa.gov/owow/nps/roads.html
- *Erosion, Sediment, and Runoff Control for Roads and Highways* http://www.epa.gov/owow/nps/education/runoff.html
- *Gravel Roads: Maintenance and Design Manual*—the purpose of the manual is to provide clear and helpful information for doing a better job of maintaining gravel roads. The manual is designed for the benefit of elected officials, mangers, and grader operators who are responsible for designing and maintaining gravel roads. http://www.epa.gov/owow/nps/gravelroads
- *Low-Volume Roads Engineering Best Management Practices Field Guide* http://zietlow.com/manual/gk1/web.doc
- *Massachusetts Unpaved Roads BMP Manual* http://berkshireplanning.org/4/download/dirt_roads.pdf
- *Planning Considerations for Roads, Highways, and Bridges* http://www.epa.gov/owow/nps/education/planroad.html
- *Pollution Control Programs for Roads, Highways, and Bridges* http://www.epa.gov/owow/nps/education/control.html
- *Recommended Practices Manual: A Guideline for Maintenance and Service of Unpaved Roads* http://www.epa.gov/owow/nps/unpavedroads.html
- The "Road Maintenance Video Set" is a five-part video series developed for USDA Forest Service equipment operators that focuses on environmentally sensitive ways of maintaining low volume roads. http://www.epa.gov/owow/nps/maint_videoset.html

Additional Information

Barbour, M.T., J. Gerritsen, B.D. Snyder, and J.B. Stribling. 1999. *Rapid Bioassessment Protocols for Use in Streams and Wadeable Rivers: Periphyton, Benthic Macroinvertebrates and Fish*, Second Edition. EPA 841-B-99-002. U.S. Environmental Protection Agency; Office of Water; Washington, D.C. http://www.epa.gov/owow/monitoring/rbp/ Accessed July 2007.

International Commission on Large Dams
http://www.icold-cigb.org

International Rivers Network
http://www.irn.org

U.S. Army Corps of Engineers, Engineer Research and Development Center
http://www.erdc.usace.army.mil

U.S. Department of Agriculture, Farm Service Agency
http://www.fsa.usda.gov/pas

U.S. Department of Agriculture, Natural Resources Conservation Service
http://www.nrcs.usda.gov

U.S. Department of the Interior, Bureau of Reclamation
http://www.usbr.gov

U.S. Department of the Interior, National Park Service
http://www.nps.gov

U.S. Department of the Interior, U.S. Fish and Wildlife Service
http://www.fws.gov

U.S. Department of the Interior, U.S. Geological Survey
http://www.usgs.gov

USEPA. 1994. *A State and Local Government Guide to Environmental Program Funding Alternatives*. EPA 841-K-94-001. http://www.epa.gov/owow/nps/MMGI/funding.html

USEPA. 1994. *A Tribal Guide to the Section 319(h) Nonpoint Source Grant Program*. EPA 841-S-94-003.

USEPA. 1994. *Section 319 Success Stories: Volume I*. EPA 841-S-94-004.
http://www.epa.gov/owow/nps/Success319

USEPA. *Catalog of Federal Funding Sources for Watershed Protection*
http://cfpub.epa.gov/fedfund

USEPA. 1997. *Section 319 Success Stories: Volume II—Highlights of State and Tribal Nonpoint Source Programs*. EPA 841-R-97-001.
http://www.epa.gov/owow/nps/Section319II

USEPA. 2002. *Section 319 Success Stories: Volume III*.
http://www.epa.gov/owow/nps/Section319III

USEPA Clean Lakes Program
http://www.epa.gov/owow/lakes/cllkspgm.html

USEPA Environmental Finance Information Network (EFIN)
http://www.epa.gov/efinpage/efin.htm

USEPA Nonpoint Source Pollution Control Program Homepage
http://www.epa.gov/OWOW/NPS

USEPA Surf Your Watershed
http://www.epa.gov/surf

USEPA Watershed Academy
http://www.epa.gov/owow/watershed/wacademy

Watershedss, (Water, Soil, and HydroEnvironmental Decision Support System)—North Carolina State University
http://www.water.ncsu.edu/watershedss

Appendix A
U.S. Environmental Protection Agency Contacts

This appendix provides wetlands contacts, nonpoint source regional contacts, and Clean Water State Revolving Fund Contacts.

U.S. Environmental Protection Agency Contacts

EPA is grouped into 10 Regions. For questions about a particular state, contact the appropriate EPA Regional Coordinator listed below.

EPA Region	Wetland Contact	Nonpoint Source Regional Coordinators	Clean Water State Revolving Fund Regional Coordinators
Region 1: CT, MA, ME, NH, RI, VT http://www.epa.gov/region01/	U.S. EPA-Region 1 Wetlands Protection Unit One Congress Street Boston, MA 02114-2023 http://www.epa.gov/region01/topics/ecosystems/wetlands.html	U.S. EPA-Region 1 Nonpoint Source Coordinator One Congress Street, Boston, MA 02114-2023 http://www.epa.gov/region01/topics/water/npsources.html	U.S. EPA-Region 1 SRF Program Contact One Congress Street Boston, MA 02114-2023 http://www.epa.gov/ne/cwsrf/index.html
Region 2: NJ, NY, PR, VI http://www.epa.gov/Region2	U.S. EPA-Region 2 Water Programs Branch Wetlands Section 290 Broadway New York, NY 10007-1866 http://www.epa.gov/region02/water/wetlands/	U.S. EPA-Region 2 Water Programs Branch Nonpoint Source Coordinator 290 Broadway New York, NY 10007-1866 http://www.epa.gov/region02/water/npspage.htm	U.S. EPA-Region 2 Water Programs Branch SRF Program Contact 290 Broadway New York, NY 10007-1866 http://www.epa.gov/Region2/water/wpb/staterev.htm
Region 3: DC, DE, MD, PA, VA, WV http://www.epa.gov/region03	U.S. EPA-Region 3 Wetlands Protection Section 1650 Arch Street (3WP12) Philadelphia, PA 19103 http://www.epa.gov/reg3esd1/hydricsoils/index.htm	U.S. EPA-Region 3 Nonpoint Source Coordinator 1650 Arch Street (3WP12) Philadelphia, PA 19103 http://www.epa.gov/reg3wapd/nps/	U.S. EPA-Region 3 Construction Grants Branch SRF Program Contact 1650 Arch Street (3WP12) Philadelphia, PA 19103 http://www.epa.gov/reg3wapd/srf/index.htm
Region 4: AL, FL, GA, KY, MS, NC, SC, TN http://www.epa.gov/region4/	U.S. EPA-Region 4 Wetlands Section 61 Forsyth Street, SW Atlanta, GA 30303 http://www.epa.gov/region4/water/wetlands/	U.S. EPA-Region 4 Nonpoint Source Coordinator 61 Forsyth Street, SW Atlanta, GA 30303 http://www.epa.gov/region4/water/nps/	U.S. EPA-Region 4 Surface Water Permits & Facilities SRF Program Contact 61 Forsyth St. Atlanta GA, 30303 http://www.epa.gov/Region4/water/gtas/grantprograms.html
Region 5: IL, IN, MI, MN, OH, WI http://www.epa.gov/region5/	U.S. EPA-Region 5 Watersheds and Wetlands Water Division (W-15J) 77 West Jackson Blvd. Chicago, IL 60604 http://www.epa.gov/region5/water/wshednps/topic_wetlands.htm	U.S. EPA-Region 5 Nonpoint Source Coordinator Water Division (W-15J) 77 West Jackson Blvd. Chicago, IL 60604 http://www.epa.gov/region5/water/wshednps/topic_nps.htm	U.S. EPA-Region 5 SRF Program Contact Water Division (W-15J) 77 West Jackson Blvd. Chicago, IL 60604 http://www.epa.gov/region5/business/fs-cwsrf.htm

EPA Region	Wetland Contact	Nonpoint Source Regional Coordinators	Clean Water State Revolving Fund Regional Coordinators
Region 6: AR, LA, NM, OK, TX http://www.epa.gov/region6	U.S. EPA-Region 6 Marine and Wetlands Section 1445 Ross Ave., Suite 1200 Dallas, TX 75202 http://www.epa.gov/region6/water/ecopro/index.htm	U.S. EPA-Region 6 Nonpoint Source Coordinator 1445 Ross Ave., Suite 1200 Dallas, TX 75202 http://www.epa.gov/region6/water/ecopro/watershd/nonpoint/	U.S. EPA-Region 6 SRF Program Contact 1445 Ross Ave., Suite 1200 Dallas, TX 75202 http://www.epa.gov/Arkansas/6en/xp/enxp2c4.htm
Region 7: IA, KS, MO, NE http://www.epa.gov/region7	U.S. EPA-Region 7 Wetlands Protection Section (ENRV) 901 N. 5th St. Kansas City, KS 66101 http://www.epa.gov/region7/wetlands/index.htm	U.S. EPA-Region 7 Nonpoint Source Coordinator 901 N. 5th St. Kansas City, KS 66101	U.S. EPA-Region 7 SRF Program Contact 901 N. 5th St. Kansas City, KS 66101 http://www.epa.gov/Region7/water/srf.htm
Region 8: CO, MT, ND, SD, UT, WY http://www.epa.gov/region8	U.S. EPA-Region 8 Wetlands Program 999 18th Street, Suite 500 Denver, CO 80202-2405 http://www.epa.gov/region8/water/wetlands/wetlands.html	U.S. EPA-Region 8 Nonpoint Source Coordinator 999 18th Street, Suite 300 Denver, CO 80202-2405 http://www.epa.gov/region8/water/nps/contacts.html	U.S. EPA-Region 8 SRF Program Contact 999 18th Street, Suite 300 Denver, CO 80202-2405
Region 9: AZ, CA, HI, NV, Pacific Islands http://www.epa.gov/region9/	U.S. EPA-Region 9 Water Division, Wetlands 75 Hawthorne Street San Francisco, CA 94105 http://www.epa.gov/region09/water/wetlands/index.html	U.S. EPA-Region 9 Nonpoint Source Coordinator 75 Hawthorne Street San Francisco, CA 94105 http://www.epa.gov/region09/water/nonpoint/index.html	U.S. EPA-Region 9 Construction Grants Branch SRF Program Contact 75 Hawthorne Street San Francisco, CA 94105 http://www.epa.gov/region9/funding/
Region 10: AK, ID, OR, WA http://www.epa.gov/region10/	U.S. EPA-Region 10 Wetlands Section 1200 Sixth Ave. Seattle, WA 98101 http://yosemite.epa.gov/R10/ECOCOMM.NSF/webpage/Wetlands	U.S. EPA-Region 10 Nonpoint Source Coordinator 1200 Sixth Ave. Seattle, WA 98101	U.S. EPA-Region 10 Ecosystems & Communities SRF Program Contact 1200 Sixth Ave. Seattle, WA 98101 http://yosemite.epa.gov/r10/ecocomm.nsf/webpage/Clean+Water+State+Revolving+Fund+in+Region+10
General Program Information	U.S. EPA Wetlands Division (4502F) Mail Code RC-4100T 1200 Pennsylvania Ave., NW Washington, DC 20460 http://www.epa.gov/owow/wetlands/	U.S. EPA Nonpoint Source Control Branch (4503-T) Ariel Rios Bldg. 1200 Pennsylvania Ave., NW Washington, DC 20460 http://www.epa.gov/owow/nps	U.S. EPA The Clean Water State Revolving Fund Branch (4204M) 1201 Constitution Ave., NW Washington, DC 20004 http://www.epa.gov/owm/cwfinance/cwsrf/index.htm

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National Management Measures to Control Nonpoint Source Pollution from Hydromodification

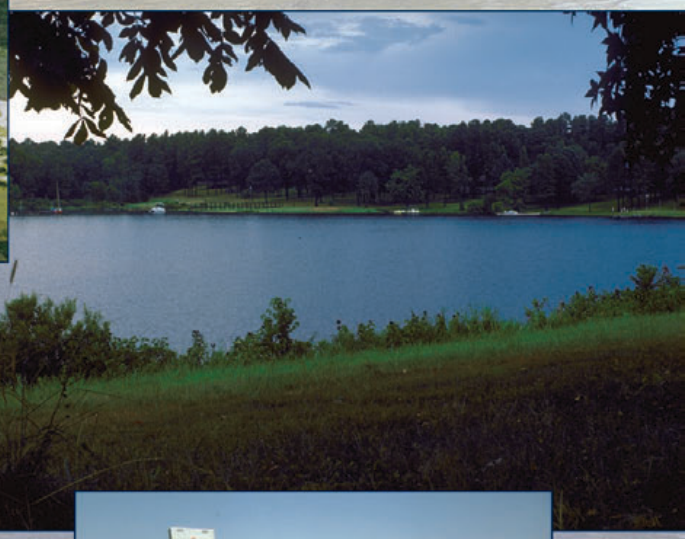

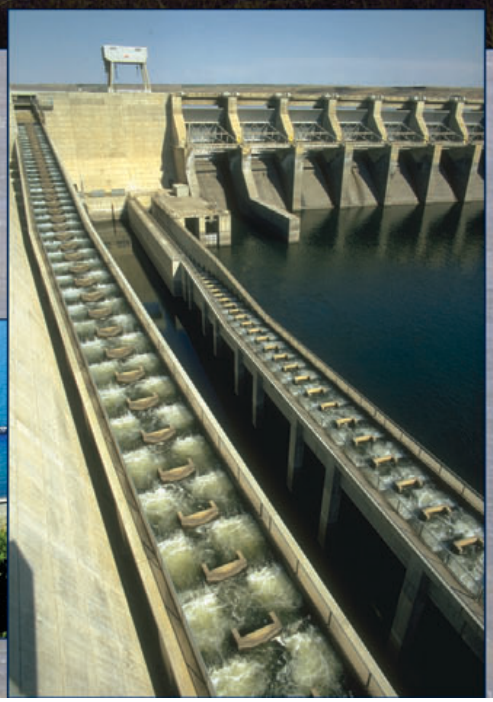

United States Environmental Protection Agency
Office of Water
Washington, DC 20460
(4503T)

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July 2007

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National Management Measures to Control Nonpoint Source Pollution from Hydromodification

Nonpoint Source Control Branch
Office of Wetlands, Oceans and Watersheds
U.S. Environmental Protection Agency
Office of Water

July 2007

Disclaimer

This document provides technical guidance to states, territories, authorized tribes, and the public for managing hydromodification and reducing associated nonpoint source pollution of surface and ground water. At times, this document refers to statutory and regulatory provisions, which contain legally binding requirements. This document does not substitute for those provisions or regulations, nor is it a regulation itself. Thus, it does not impose legally-binding requirements on EPA, states, territories, authorized tribes, or the public and may not apply to a particular situation based upon the circumstances. EPA, state, territory, and authorized tribe decision makers retain the discretion to adopt approaches to manage hydromodification and reduce associated NPS pollution of surface and ground water on a case-by-case basis that differ from this guidance where appropriate. EPA may change this guidance in the future.

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Chapter 1: Introduction

The Nation's aquatic resources are among its most valuable assets. Although environmental protection programs in the United States have improved water quality during the past 35 years, many challenges remain. Significant strides have been made in reducing the impacts of discrete pollutant sources, but some aquatic ecosystems remain impaired, due in part to complex pollution problems caused by nonpoint source (NPS) pollution.[1] Of special concern are the problems in our streams, lakes, estuaries, aquifers, and other water bodies caused by runoff that is inadequately controlled or treated. These problems include changes in flow, increased sedimentation, higher water temperature, lower dissolved oxygen, degradation of aquatic habitat structure, loss of fish and other aquatic populations, and decreased water quality due to increased levels of nutrients, metals, hydrocarbons, bacteria, and other constituents.

What is Hydromodification?

USEPA (1993) defines hydromodification as the "alteration of the hydrologic characteristics of coastal and non-coastal waters, which in turn could cause degradation of water resources." Examples of hydromodification in streams include dredging, straightening, and, in some cases, complete stream relocation. Other examples include construction in or along streams, construction and operation of dams and impoundments, channelization in streams, dredging, and land reclamation activities. Hydromodification can also include activities in streams that are being done to maintain the stream's integrity such as removing snags.[2] Some indirect forms of hydromodification, such as erosion along streambanks or shorelines, are caused by the introduction or maintenance of structures in or adjacent to a waterbody and other activities, including many upland activities, that change the natural physical properties of the waterbody.

EPA has grouped hydromodification activities into three categories: (1) channelization and channel modification, (2) dams, and (3) streambank and shoreline erosion. The following definitions are offered to clarify the hydromodification activities associated with these three categories:

> Channelization and channel modification include activities such as straightening, widening, deepening, and clearing channels of debris and sediment. Categories of channelization and channel modification projects include flood control and drainage, navigation, sediment control, infrastructure protection, mining, channel and bank instability, habitat improvement/enhancement, recreation, and flow control for water supply (Watson et al., 1999). Channelization activities can play a critical role in NPS pollution by increasing the timing and delivery of pollutants, including sediment, that enter the water. Channelization can also be a cause of higher flows during storm events, which potentially increases the risk of flooding.

[1] For more information on NPS pollution, go to EPA's website at http://www.epa.gov/owow/nps.
[2] A tree or branch embedded in a lake or stream bed and constituting a hazard to navigation; a standing dead tree.

Dams[3] are artificial barriers on waterbodies that impound or divert water and are built for a variety of purposes, including flood control, power generation, irrigation, navigation, and to create ponds, lakes, and reservoirs for uses such as livestock watering, municipal water supply, fish farming, and recreation. While these types of dams are constructed to provide benefits to society, they can contribute to NPS pollution. For example dams can alter flows, which ultimately can cause impacts to water quality (changes to temperature or dissolved gases) and biological/habitat (disruption of spawning or altering of plant and benthic communities) above and below the dam.

Streambank and shoreline erosion are the wearing away of material in the area landward of the bank along non-tidal streams and rivers. Streambank erosion occurs when the force of flowing water in a river or stream exceeds the ability of soil and vegetation to hold the banks in place. Eroded material is carried downstream and redeposited in the channel bottom or in point bars located along bends in the waterway. Shoreline erosion occurs in large open waterbodies, such as the Great Lakes or coastal bays and estuaries, when waves and currents sort coarser sands and gravels from eroded bank materials and move them in both directions along the shore away from the area undergoing erosion. While the underlying forces causing the erosion may be different for streambank and shoreline erosion, the results (erosion and its impacts) are usually similar. It is also important to note that streambank and shoreline erosion are natural processes and that natural background levels of erosion also exist. However, human activities along or adjacent to streambanks or shorelines may increase erosion and other nonpoint sources of pollution.

Why is NPS Guidance on Hydromodification Important?

Hydromodification is one of the leading sources of impairment in our nation's waters. According to the *National Water Quality Inventory: 2000 Report to Congress* (USEPA, 2002a), there are almost 3.7 million miles of rivers and streams[4] in the United States. Approximately 280,000 miles of assessed rivers and streams in the United States are impaired for one or more designated uses, which include aquatic life support, fish consumption, primary and contact recreation, drinking water supply, and agriculture. Many of the pollutants causing impairment are delivered to surface and ground waters from diffuse sources, such as agricultural runoff, urban runoff, hydrologic modification, and atmospheric deposition of contaminants. The leading causes of

[3] Dams are defined according to Title 33 of the Code of Federal Regulations, section 222.6(h) (2003) as all artificial barriers together with appurtenant works which impound or divert water and which (1) are 25-feet or more in height or (2) have an impounding capacity of 50 acre-feet or more. Barriers that are six-feet or less in height, regardless of storage capacity or barriers that have a storage capacity at maximum water storage elevation of fifteen acre-feet or less regardless of height are not included. Federal regulations define dams for the purpose of ensuring public safety. For example, 33 CFR 222.6 states objectives, assigns responsibilities, and prescribes procedures for implementation of a National Program for Inspection of Non-Federal Dams. Most states use this or a very similar definition, which creates a category of dams that requires some form of inspection to ensure that they are structurally sound. Dams smaller than those defined above, such as those used to create farm ponds, are authorized under the NRCS program.
[4] Approximately 700,000 miles (19%) of the total 3.7 million miles of rivers and streams in the United States were assessed for the *National Water Quality Inventory: 2000 Report to Congress* (USEPA, 2002a).

beneficial use impairment (partially or not supporting one or more uses) are nutrients, sediment, pathogens (bacteria), metals, pesticides, oxygen-depleting materials, and habitat alterations (USEPA, 2002a).

The *National Water Quality Inventory: 2000 Report to Congress* (USEPA, 2002a) identified hydrologic modifications (i.e., hydromodification) as a leading source of water quality impairment in assessed surface waters. Of the 11 pollution source categories listed in the report, hydromodification was ranked as the second leading source of impairment in assessed rivers, second in assessed lakes, and sixth in assessed estuaries (Table 1.1). Three major types of hydromodification activities—channelization and channel modification, dams, and streambank and shoreline erosion—change a waterbody's physical structure as well as its natural functions.

Many hydromodification activities are necessary because of human activities. For example, hardening of streambanks to correct headcutting and streambank erosion is often necessary because of changes in landuse that increase impervious surfaces. While hydromodification activities are intended to provide some form of benefit (e.g., levees for reducing flooding, electricity from hydroelectric dams, or bulkheads to reduce shoreline erosion and protect valuable property), there may be unintended consequences resulting from the activity. To illustrate, levees may provide local flood reduction by keeping storm flows from spreading onto flood plains. However, these same levees may alter riparian wetland habitat that once relied on seasonal flooding.

Table 1.1 Leading Sources of Water Quality Impairment Related to Human Activities for Rivers, Lakes, and Estuaries (USEPA, 2002a)

	Rivers and Streams	Lakes, Ponds, and Reservoirs	Estuaries
Sources[a]	Agriculture (48%)[b]	Agriculture (41%)	Municipal Point Sources (37%)
	Hydrologic Modification (20%)[c]	**Hydrologic Modification (18%)**	Urban Runoff/Storm Sewers (32%)
	Habitat Modification (14%)[d]	Urban Runoff/Storm Sewers (18%)	Industrial Discharges (26%)
	Urban Runoff /Storm Sewers (13%)	Nonpoint Sources (14%)	Atmospheric Deposition (23%)
	Forestry (10%)	Atmospheric Deposition (13%)	Agriculture (18%)
	Municipal Point Sources (10%)	Municipal Point Sources (12%)	**Hydrologic Modification (14%)**
	Resource Extraction (10%)	Land Disposal (10%)	Resource Extraction (12%)

[a] Excluding unknown, natural, and "other" sources.
[b] Values in parentheses represent the approximate percentage of surveyed river miles, lake acres, or estuary square miles that are classified as impaired due to the associated sources.
[c] Hydrologic modifications include flow regulation and modification, dredging, and construction of dams. These activities may alter a lake's habitat in such a way that it becomes less suitable for aquatic life (USEPA, 2002a).
[d] Habitat modifications result from human activities, such as flow regulation, logging, and land-clearing practices. Habitat modifications—changes such as the removal of riparian (stream bank) vegetation—can make a river or stream less suitable for the organisms inhabiting it (USEPA, 2002a).

Purpose and Scope of the Guidance

National summaries, such as those shown in Table 1.1, are useful in providing an overview of the magnitude of problems associated with hydromodification. Solutions, however, are usually applied at the local level. For example, in Maryland, the Shore Erosion Task Force, after investigating shore erosion in the state, published recommendations to be implemented under a Comprehensive Shore Erosion Control Plan. To initiate statewide planning, the Maryland Department of Natural Resources established partnerships with two coastal counties that were significantly affected by shoreline erosion. These state-local partnerships enable the state to better identify and correct shoreline erosion problems throughout Maryland (MDNR, 2001).

State and local elected officials and agencies, landowners, developers, environmental and conservation groups, and others play a crucial role in working together for protecting, maintaining, and restoring water resources that are impacted by hydromodification activities. These local efforts, in aggregate, form the basis for changing the status of hydromodification as a national problem.

This guidance document provides background information about NPS pollution and offers a variety of solutions for reducing NPS pollution resulting from hydromodification activities. The background information provided in Chapter 2 includes a discussion of sources of NPS pollution associated with hydromodification and how the generated pollutants enter the Nation's waters. Chapter 3 (Channelization and Channel Modification), Chapter 4 (Dams), and Chapter 5 (Streambank and Shoreline Erosion) present technical information about how certain types of NPS pollution can be reduced or eliminated.

Since hydromodification is not associated with localized impacts and solutions, Chapter 6 provides a discussion on the broad concept of assessing and addressing water quality problems on a watershed level. Chapter 7 provides detailed information for practices that can be used to implement the management measures presented in this guidance. Chapter 8 provides a discussion of available models and assessment approaches that could be used to determine the effects of hydromodification activities. Chapter 9 summarizes additional dam removal information, including permitting requirements, process, and techniques for dam removal. The primary goal of this guidance document is to provide technical assistance to states, territories, tribes, local governments, and the public for managing hydromodification and reducing associated NPS pollution.

Document Organization

This document is divided into the following chapters:

- Chapter 1: Introduction
- Chapter 2: Background
- Chapter 3: Channelization and Channel Modification
- Chapter 4: Dams
- Chapter 5: Streambank and Shoreline Erosion

- Chapter 6: Guiding Principles
- Chapter 7: Practices for Implementing Management Measures
- Chapter 8: Modeling Information
- Chapter 9: Dam Removal Requirements, Process, and Techniques
- References Cited
- Additional Resources
- Appendix A: Federal, State, Nonprofit, and Private Financial and Technical Assistance Programs
- Appendix B: U.S. Environmental Agency Contacts

Activities to Control NPS Pollution

Historical Perspective

During the first 15 years of the national program to abate and control water pollution (1972–1987), EPA and the states focused most of their water pollution control activities on traditional point sources, which are stationary locations or fixed facilities from which pollutants are discharged; any single identifiable source of pollution (e.g., a pipe, ditch). EPA and the states have regulated these point sources through the National Pollutant Discharge Elimination System (NPDES) permit program established by section 402 of the Clean Water Act (CWA).[5] The NPDES program functions as the primary regulatory tool for assuring that state water quality standards are met. NPDES permits, issued by an authorized state or EPA, contain discharge limits designed to meet water quality standards and national technology-based effluent regulations.

In 1987, in view of the progress achieved in controlling point sources and the growing national awareness of the increasingly dominant influence of NPS pollution on water quality, Congress amended the CWA to focus greater national efforts on nonpoint sources.

Federal Programs and Funding

The CWA establishes several reporting, funding, and regulatory programs that address pollutants carried in runoff that is not subject to confinement or treatment. These programs relate to watershed management and nonpoint source control. Readers are encouraged to use the information contained in this guidance to develop nonpoint source management programs/plans that comprehensively address the following EPA programs:

- *Section 319 Grant Program*. Under section 319 of the CWA, EPA awards funds to states and eligible tribes to implement NPS management programs. These funds can be used for projects that address nonpoint source related sources of pollution, including hydromodification.[6]

- *Clean Water State Revolving Fund*. The Clean Water State Revolving Fund (CWSRF) program is an innovative method of financing environmental projects. Under the

[5] For more information on the NPDES program, refer to EPA's NPDES website at http://cfpub.epa.gov/npdes.
[6] More information about the section 319 program is provided at http://www.epa.gov/owow/nps/cwact.html.

program, EPA provides grants or "seed money" to all 50 states plus Puerto Rico to capitalize state loan funds. The states, in turn, make loans to communities, individuals, and others for high-priority water quality activities. As money is paid back into the revolving fund, new loans are made to other recipients. When funded with a loan from this program, a project typically costs much less than it would if funded through the bond market. Many states offer low or no interest rate loans to small and disadvantaged communities. In recent years, state programs have begun to devote an increasing volume of loans to nonpoint source, estuary management, and other water-quality projects. Eligible NPS projects include almost any activity that a state has identified in its nonpoint source management plan. Such activities include projects to control runoff from agricultural land; conservation tillage and other projects to address soil erosion; development of streambank buffer zones; and wetlands protection and restoration.[7]

- *Total Maximum Daily Loads*. Under section 303(d) of the CWA, states are required to compile a list of impaired waters that fail to meet any of their applicable water quality standards. This list, called a 303(d) list, is submitted to Congress every 2 years, and states are required to develop a Total Maximum Daily Load (TMDL) for each pollutant causing impairment for waterbodies on the list.[8]

- *Water Quality Certification.* Section 401 of the CWA requires that any applicant for a federal license or permit to conduct any activity that "may result in any discharge" into navigable waters must obtain a certification from the state or tribe in which the discharge originates that the discharge will comply with various provisions of the CWA, including sections 301 and 303. The federal license or permit may not be issued unless the state or tribe has granted or waived certification. The certification shall include conditions, e.g., "effluent limitations or other limitations" necessary to assure that the permit will comply with the state's or tribe's water quality standards or other appropriate requirements of state or tribal law. Such conditions must be included in the federal license or permit.

- *National Estuary Program.* Under the National Estuary Program, states work together to evaluate water quality problems and their sources, collect and compile water quality data, and integrate management efforts to improve conditions in estuaries. To date, 28 estuaries have been accepted into the program. Estuary programs can be an excellent source of water quality data and can provide information on management practices.[9]

- *Safe Drinking Water Act.* Many areas, especially urban fringe areas, need to maintain or improve the quality of surface and ground waters that are used as drinking water sources. This act requires states to develop Source Water Assessment Reports and implement Source Water Protection Programs. Low- or no-interest loans are available under the Drinking Water State Revolving Fund (SRF) Program.[10]

[7] Additional information about CWSRF is available at http://www.epa.gov/OWM/cwfinance/cwsrf/index.htm.
[8] More information on the TMDL program and 303(d) lists is provided at http://www.epa.gov/owow/tmdl.
[9] More information on the National Estuary Program is provided at http://www.epa.gov/nep.
[10] More information about the Safe Drinking Water Act and Source Water Protection Programs can be found at http://www.epa.gov/safewater/sdwa/index.html and http://www.epa.gov/safewater/protect.html.

- *Wildlife Habitat Incentives Program (WHIP)*. WHIP[11] is a voluntary program authorized by the Farm Security and Rural Investment Act of 2002 (Farm Bill)[12] that enables landowners to apply for technical and financial assistance to improve wildlife habitat. The program is administered by the Natural Resources Conservation Service (NRCS), which works with private landowners and operators, conservation districts, and federal, state, and tribal agencies to improve terrestrial and aquatic habitats. NRCS and participants work together to create a wildlife habitat development plan that includes a cost-share agreement. Continued assistance after habitat development includes monitoring, review of management guidelines, and technical advice. WHIP funds may also be used for dam removal. Additional information is available from an NRCS WHIP fact sheet.[13]

Two excellent resources for learning more about the CWA and the many programs established under it are *The Clean Water Act: An Owner's Manual* (Killam, 2005) and *The Clean Water Act Desk Reference* (WEF, 1997).

Introduction to Management Measures

Management measures may be implemented as part of state, tribal, or local programs to control nonpoint source pollution for a variety of purposes, including protection of water resources, aquatic wildlife habitat, and land downstream from increased pollution and flood risks. They can be used to guide in the development of a runoff management program. Management measures establish performance expectations and, in many cases, specify actions that can be taken to prevent or minimize nonpoint source pollution from hydromodification activities. Management measures might control the delivery of NPS pollutants to receiving water resources by:

- Minimizing pollutants available (source reduction)
- Retarding the transport and/or delivery of pollutants, either by reducing water transported, and thus the amount of the pollutant transported, or through deposition of the pollutant
- Remediating or intercepting the pollutant before or after it is delivered to the water resource through chemical or biological transformation

Management measures are generally designed to control a particular type of pollutant from specific activities and land uses. The intent of the six management measures in this guidance document is to provide information for addressing and considering the NPS pollution potential associated with hydromodification activities. Implementation of management measures can minimize and control hydromodification NPS pollution through erosion and sediment control, chemical and pollutant control, management of instream and riparian habitat restoration, and protection of surface water quality.

[11] http://www.nrcs.usda.gov/programs/whip
[12] http://www.nrcs.usda.gov/programs/farmbill/2002
[13] http://www.nrcs.usda.gov/programs/farmbill/2002/pdf/WHIPFct.pdf

Activities associated with these management measures may be regulated by federal, state, or local law (e.g., section 404 of the Clean Water Act). These measures do not supersede such requirements. Sometimes regulatory authorities may appear to conflict, as is sometimes the case of the CWA and water use and distribution. CWA sections 101(g) and 510 specifically allow for resolution of the conflict by placing water use and its distribution under the authority of the states, thus protecting any state agreements on "water rights." Users of this NPS guidance should recognize that the applicability of the guidance provided in this document will remain subject to state statutes, interstate compacts, and international treaties. As such, this guidance does not recommend or require any management measures or practices that hinder a state's ability to exercise existing water rights, which provide water for municipal, industrial, and agricultural needs. For further information regarding specific state policies on water rights and regulations of water use, contact the appropriate state water agency. Contact information is generally provided on state government Web sites.

This document also lists and describes management practices for each management measure. Management practices are specific actions taken to achieve, or aid in the achievement of, a management measure. A more familiar term might be best management practice (BMP). The word "best" has been dropped for the purposes of this guidance (as it was in the Coastal Management Measures Guidance (USEPA, 1993)) because the adjective is too subjective. The "best" practice in one area or situation might be entirely inappropriate in another area or situation. The practices listed in this document have been found by EPA to be representative of the types of practices that can be applied successfully to achieve the management measures. EPA recognizes that there is often site-specific, regional, and national variability in the selection of appropriate practices, as well as in the design constraints and pollution control effectiveness of practices. The practices presented for each management measure are not all-inclusive. States or local agencies and communities might wish to apply other technically and environmentally sound practices to achieve the goals of the management measures.

Channelization and Channel Modification (Chapter 3)

Channelization can cause a variety of instream flow changes and may result in the faster delivery of pollutants to downstream areas. Channel modification might result in a combination of harmful effects (higher flows or increased risk of downstream flooding) and beneficial effects (local flood control or enhanced flushing in a stream channel). The management measures for channelization and channel modification are intended to protect waterbodies by ensuring proper planning before a proposed project is implemented. Planning and evaluation can help to identify and prevent local and downstream problems before a project is started. An added benefit of planning and evaluation is to correct or prevent detrimental changes to the instream and riparian habitat associated with the project. Implementation of the management measures can also ensure that operation and maintenance programs for existing projects improve physical and chemical characteristics of surface waters and restore or maintain instream and riparian habitat when possible.

Management Measure 1: Physical and Chemical Characteristics of Surface Water: Ensure that the planning process for new hydromodification projects addresses changes to physical and chemical characteristics of surface waters that may occur as a result of the proposed work. For existing projects, ensure that operation and maintenance programs use any opportunities available to improve the physical and chemical characteristics of surface waters.

Management Measure 2: Instream and Riparian Habitat Restoration: Correct or prevent detrimental changes to instream and riparian habitat from the impacts of channelization and channel modification projects, both proposed and existing.

Dams (Chapter 4)

Because of their instream locations, any construction activities associated with dams have the potential to introduce sediment and other pollutants into adjacent waterbodies. Construction activities, chemical spills during dams operation or maintenance, and changes in the quantity and quality of water held and released by a dam may alter the nature of the waterbody. The management measures for dams are intended to be applied to the construction of new dams, as well as any construction activities associated with the maintenance of existing dams. They can also be applied to dam operations that result in the loss of desirable surface water quality, and instream and riparian habitat.

Management Measure 3: Erosion and Sediment Control: Prevent sediment from entering surface waters during the construction or maintenance of dams.

Management Measure 4: Chemical and Pollutant Control: Prevent downstream contamination from pollutants associated with dam construction and operation and maintenance activities.

Management Measure 5: Protection of Surface Water Quality and Instream and Riparian Habitat: Protect the quality of surface waters and aquatic habitat in reservoirs and in the downstream portions of rivers and streams that are influenced by the quality of water contained in the releases (tailwaters) from reservoir impoundments.

Streambank and Shoreline Erosion (Chapter 5)

NPS pollution might result from the rapid increase in erosion of streambanks caused by increased flow rates associated with urbanization in a watershed. Not only is the land adjacent to these eroding streambanks unnaturally carried away, but these eroded soils are carried downstream and deposited in often undesirable locations. Shorelines erode more severely as the result of poorly planned and implemented shoreline protection projects located nearby. Habitats can be buried and wetlands can be filled. As runoff upstream increases, more erosion results on downstream streambanks. The streambank and shoreline erosion management measure promotes the necessary actions required to correct streambank and shoreline erosion where it must be controlled. Because erosion is a natural process, this management measure is not intended to be applied to all erosion occurring on streambanks and shorelines.

Management Measure 6: Eroding Streambanks and Shorelines: Protect streambanks and shorelines from erosion and promote institutional measures that establish minimum setback requirements or measures that allow a buffer zone to reduce concentrated flows and promote infiltration of surface water runoff in areas adjacent to the shoreline.

Channelization and channel modification and dams represent forms of hydromodification that are direct results of human activities—someone performs a construction activity directly in or along a stream, river, or shoreline. For example, a town constructs concrete lined channels along a stream passing through the city limits to reduce stream meandering and prevent flooding. Another example is the construction (many years ago) of a dam in a stream for hydropower at a grist mill. Streambank and shoreline erosion are forms of hydromodification that result from direct and indirect human activities. For example, a streambank is eroding at a much faster rate because of recent development activities on shore that result in increased runoff, which is causing increased bank erosion. Another example is a concrete seawall that is protecting property at one location, but causing increased erosion on adjacent properties.

This distinction between forms of hydromodification and impacts from hydromodification is important when contrasting the relationship between Chapter 3 (Channelization and Channel Modification) and Chapter 5 (Streambank and Shoreline Erosion). Many of the operation and maintenance solutions presented in Chapter 3 are also practices that can be used to stabilize streambanks and shorelines as presented in Chapter 5. For example, a stream channel that has been hardened with vertical concrete walls to prevent local flooding and limit the stream to its existing channel (to protect property built along the stream channel), may benefit from operation and maintenance practices that use opportunities to replace the concrete walls with an appropriate vegetative or combined vegetative and non-vegetative structures along the streambank when possible. These same practices may be applicable to stabilize downstream streambanks that are eroding and creating a nonpoint source pollution problem because of the upstream development and hardened streambanks.

Chapter 2: Background

There are differing views on defining the stability of a stream channel and other waterbodies. From a navigation perspective, a stream channel is considered stable if shipping channels are maintained to enable safe movement of vessels. Landowners with property adjacent to a stream or shoreline might consider the waterbody to be stable if it does not flood and erosion is minimal. Ecologists might find some erosion of streambanks and meandering channels to be a part of natural evolution (i.e., changes that are not induced by humans) and consider long-term changes like these to be quite acceptable (Watson et al., 1999). In any case, new and existing channelization projects, construction and maintenance of dams, and streambank and shoreline erosion problems should be evaluated with these differing perspectives in mind and a balance of these perspectives should be taken into account when constructing or maintaining a project. Often, multiple priorities can be maintained with good up-front planning and communication among the different stakeholders involved.

Key Geomorphic Functions of Streams

Discharge, Slope, and Sinuosity

Figure 2.1 is a cross-section of a typical stream channel. The thalweg is the deepest part of the channel. The sloped bank is known as the scarp. The term discharge is used to describe the volume of water moving down the channel per unit time (usually described in the United States as cubic foot per second (cfs)). Discharge is the product of the area through which the water is flowing (in square feet) and the average velocity of the water (in feet per second). If discharge in a channel increases or decreases, there must be a corresponding change in streamflow velocity and/or flow area.

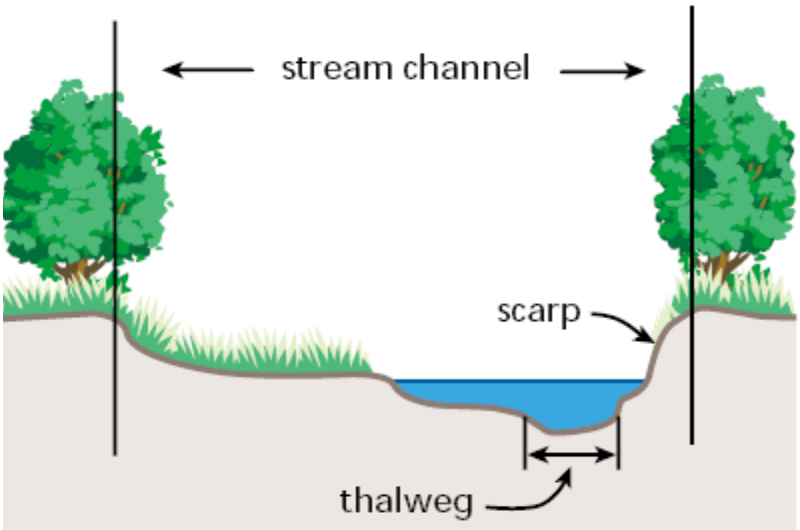

Figure 2.1 Cross-section of a Stream Channel (FISRWG, 1998)

Channel slope is an especially key concept when dealing with hydromodification projects. It is the difference in elevation between two points in the stream divided by the stream length

between the two points. Stream sinuosity greatly affects stream slope. Sinuosity is the stream length between two points on a stream divided by the valley length between the two points. A meandering stream moving through a valley has a lower slope than a straight stream.

Erosion, Transport, and Deposition of Sediment

All streams accomplish three basic geomorphic tasks:

- *Erosion*—the detachment of soil particles along the stream bed and banks
- *Sediment transport*—the movement of eroded soil particles in streamflow
- *Sediment deposition*—the settling of eroded soil particles in the water or on land as water recedes

These processes largely determine the size and shape of the channel, both laterally and longitudinally. The ability to accomplish these geomorphic tasks is related to stream power, the product of slope and discharge. Slope directly affects flow velocity. Consequently, a shallow, meandering stream with low slope generates less stream power, and has lower erosion and sediment-transport capacity, than a deep, straight stream.

In addition to sinuosity, roughness along the boundaries of a stream area is also important in determining streamflow velocity and stream power. The rougher the channel bottom and banks, the more they are able to slow down the flow of water. The level of roughness is determined by many conditions including:

- Type and spacing of bank vegetation
- Size and distribution of sediment particles
- Bedforms
- Bank irregularities
- Other miscellaneous obstructions

Tractive stress, also known as shear stress, describes the lift and drag forces that work to create erosion along the stream bed and banks. In general, the larger the sediment particle, the more stream power is needed to dislodge it and transport it downstream. When stream power decreases in the channel, larger sediment particles are deposited back to the stream bed.

Dynamic Equilibrium

One of the primary functions of a stream is to move particles out of the watershed. Erosion, sediment transport, and deposition occur all the time at both large and small scales within a channel. A channel is considered stable when the average tractive stress maintains a stable streambed and streambanks. That is, sediment particles that erode and are transported downstream from one area are replaced by particles of the same size and shape that have originated in areas upstream. Lane (1955) qualitatively described this relationship as:

$$Qs * D \propto Qw * S$$

Where: Qs = Sediment discharge, D = Sediment particle size, Qw = Streamflow, S = Stream slope

When all four variables are in balance, the channel is stable, or in dynamic equilibrium.

Lane's channel variable relationships can be visualized as a pan balance with sliding weights (Figure 2.2). Sediment discharge is placed on one pan and streamflow on the other. The hook holding the sediment load pan can slide back and forth based on changes in sediment size. Likewise, the hook holding the streamflow can slide according to changes in slope.

If a disturbance or stream modification occurs that causes a variable to change, one or more of the other variables must change in order to maintain the balance. During an imbalanced phase, the scale indicator will point to either degradation or aggradation. This indicates that the channel will try to adjust and regain equilibrium by either increasing sediment discharge by scouring the bottom or eroding its banks (degradation) or decreasing sediment discharge by depositing sediment on the bottom (aggradation), depending on the circumstance.

For example, if stream slope is decreased and streamflow remains the same (i.e., streamflow pan slides toward the center), the balance will tip and aggradation will occur (Figure 2.3). Alternatively, if streamflow increases and slope remains the same (i.e., more weight on the streamflow pan), degradation will occur. No matter the scenario, this basic relationship between the variables will hold true and aggradation or degradation will cease only when the system reaches equilibrium. This can occur naturally over time, or through management practices designed to deal with the "balancing" issue.

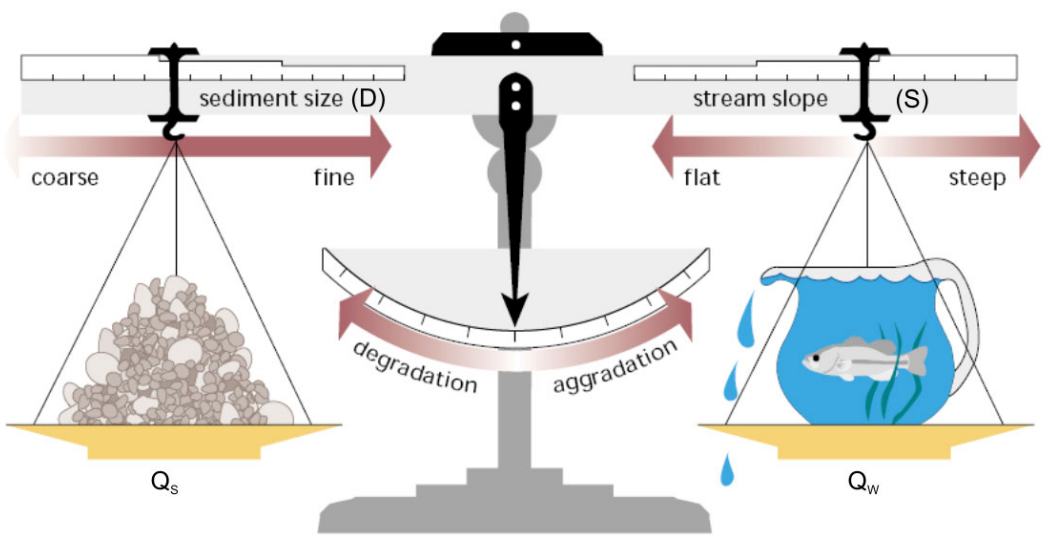

Figure 2.2 Factors Affecting Channel Degradation and Aggradation (FISRWG, 1998)

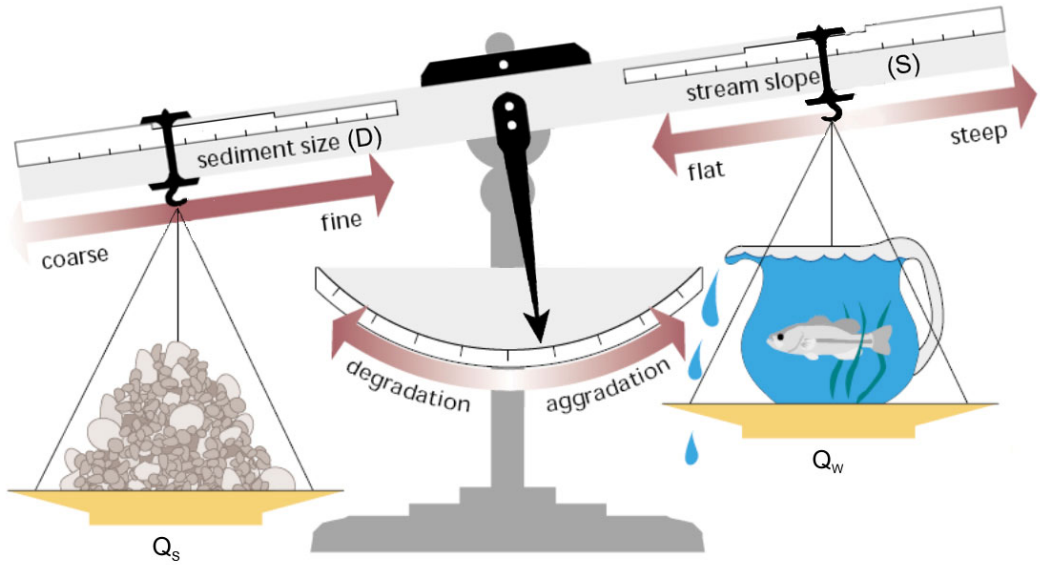

Figure 2.3 Example of Aggradation (Adapted from FISRWG, 1998)

Longitudinal View of Channels

The geomorphic processes that define the size and shape of channels can be observed in large and small scale longitudinal views. The overall longitudinal view of many streams can be divided into three general zones (Schumm, 1977):

- *Headwater zone*—characterized by steep slopes with sediment erosion as the most dominant geomorphic process.
- *Transfer zone*—characterized by more sinuous channel patterns and wider floodplains with sediment transfer as the most dominant geomorphic process.
- *Deposition zone*—characterized by lower slope and higher channel sinuosity than the other zone and is the primary deposition area for watershed sediment.

Key characteristics of each zone are summarized in Figure 2.4.

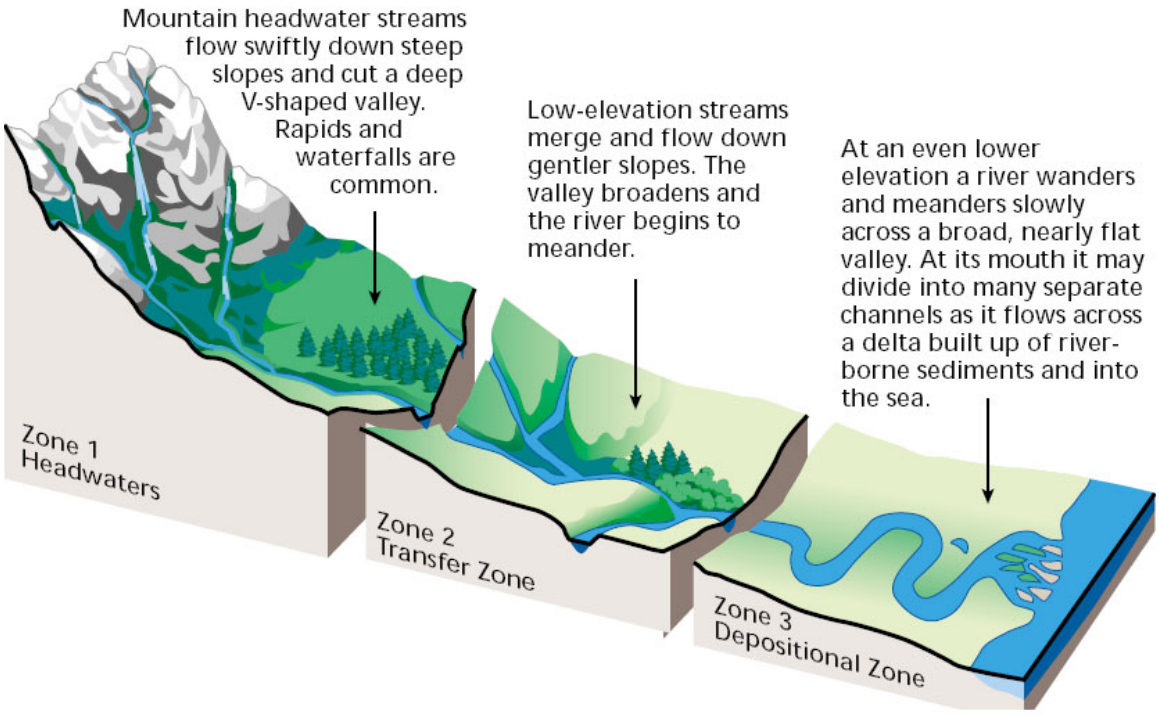

Figure 2.4 Three Longitudinal Profile Zones (FISRWG, 1998)

At a smaller scale, natural-forming channels are usually characterized by a series of riffles, pools, and runs. These structures are primarily associated with the thalweg, which meanders within the channel (Figure 2.5). Riffles are shallow, turbulent, and swiftly flowing stretches of water that flow over partially or totally submerged rocks. Deeper areas at stream bends are the pools and can be classified as large-shallow, large-deep, small-shallow, and small-deep. Runs are the sections of a stream with little or no surface turbulence that connect pools and riffles.

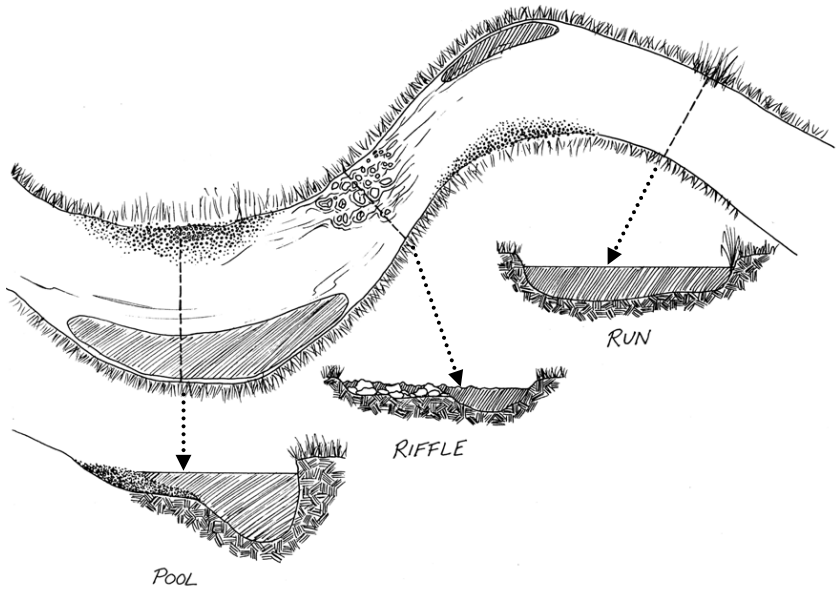

Figure 2.5 Overview of a Pool, Riffle, and Run (USEPA, 1997b)

The distribution in streamflow velocity and stream power throughout the riffle/pool/run sequence impact the geomorphic tasks. The stream bottom of a riffle is at a higher

elevation than the stream areas surrounding it. Consequently, the water flowing in a run from riffle to pool has the highest velocity near the center of the channel just under the surface (i.e., away from the roughness associated with channel boundaries). On reaching a bend, angular momentum forces the highest velocity flow to the outside of the bend and, given enough tractive stress, causes erosion to the bank (cutbanks). Meanwhile on the inside of the bend deposition often occurs because of decreasing flow velocity. Importantly, these and other characteristics of the riffle/pool/run sequence create unique habitats which allow different species to live, reproduce, and feed.

Disruption of Dynamic Equilibrium

Changes caused by (or exacerbated by) hydromodification projects and other human activities can lead to a disruption of the dynamic equilibrium of the stream channel. If, for example, a modification occurs that causes a change in sediment discharge, channel slope, or streamflow, one or more of the other variables will be imbalanced and the channel will usually try to adjust and regain equilibrium by either increasing sediment discharge by scouring the bottom or eroding its banks (degradation) or decreasing sediment discharge by depositing sediment on the bottom (aggradation) (Biedenharn et al., 1997; Watson et al., 1999). In some cases, alterations to a stream channel can result in local or system-wide channel instability (FISRWG, 1998).

General Impacts of Channelization and Channel Modifications

Channelization and channel modifications are undertaken for many purposes including flood control, navigation, drainage improvement, and reduction of channel migration potential. Modifications also occur in association with the installation of culverts and bridges, urbanization of the watershed, and agricultural drainage. These changes may result in several physical and chemical impacts.

Physical Impacts

The most significant physical impact of channelization and channel modifications is the movement or deposition of sediment. Sediment erodes from stream banks and beds, is washed downstream in faster moving water, deposited in areas of slower flows, and transported into new areas of streams or other receiving waters. Critical habitat can be changed when channelization or channel modification projects alter the dynamic equilibrium of a stream and change sediment transport or deposition characteristics. Re-establishing equilibrium may take some time to occur and have long-lasting effects to habitat and water quality conditions.

Channel modification and channelization can lead to increased erosion in some areas of the stream, which produces sediment. Sediment can be dislodged and transported directly from the waterbody's shoreline, bank, or bottom. Sediment being transported by a stream is referred to as the sediment load, which is further classified as the bed load (those particles moving on or near the bed, or bottom of the channel) and the suspended load (those particles moving in the water column). Hydromodification typically results in more uniform channel cross-sections, steeper stream gradients, and reduced average pool depths.

An increase in the sediment load could lead to increased turbidity, which then may cause an increase in stream temperature because the darker sediment particles absorb heat (USEPA, 1997b). Changes in water temperature can influence several abiotic chemical processes, such as dissolved oxygen concentrations, sorption of chemicals onto particles, and volatilization rates. Water temperature influences reaeration rates of oxygen from the atmosphere. Dissolved oxygen concentrations in water are inversely related to temperature; solubility of oxygen decreases with increasing water temperature. In addition, sorption of chemicals to particulate matter and volatilization rates are influenced by changes in water temperature. Sorption often decreases with increasing temperature and volatilization increases with increasing temperature (University of Texas, 1998).

An increased sediment load that contains significant organic matter can increase the sediment oxygen demand (SOD). The SOD is the total of all biological and chemical processes in sediment that consume oxygen (USEPA, 2003a). These processes occur at or just below the sediment-water interface. Most of the SOD at the surface of the sediment is due to the biological decomposition of organic material and the bacterially facilitated nitrification of ammonia, while the SOD several centimeters into the sediment is often dominated by the chemical oxidation of species such as iron, manganese, and sulfide (Walker and Snodgrass, 1986 from USGS, 1997; Wang, 1980). Increases in SOD can lead to lower levels of dissolved oxygen, which can be harmful to aquatic life.

A channel that is deepened or widened can result in slower and/or shallower flow. Reduced stream velocities can result in more sediment deposits to a stream segment. When more sediment is deposited in an area of a stream, critical habitats can be buried, channels may become unstable, and flooding increases. In tidal areas, channel modification activities, such as deepening a channel to allow for larger ships to access a shoreline, may require frequent maintenance to remove accumulating sediment because of changes in flow patterns.

Chemical Impacts

A variety of chemicals can be introduced into surface waters when channelization and channel modification activities alter flow and sediment transport characteristics. Nutrients, metals, toxic organic compounds, pesticides, and organic materials can enter the water in eroding soils along banks and move throughout a stream as flow characteristics change. Changing temperatures and dissolved oxygen levels may lead to alterations in the bioavailability of metals and toxic organics. Complex chemical conditions can significantly change when stream flow and sedimentation characteristics change, resulting in new and/or potentially harmful forms of chemicals affecting instream or benthic organisms.

It is important to remember that many of the physical and chemical changes are interrelated. For a more detailed discussion of the impacts associated with chemical and physical changes to surface waters, see *Restoration of Aquatic Ecosystems* (NRC, 1992). The following discussion provides examples of impacts that may be present as a result of different kinds of channelization. For a more detailed discussion of types of channelization projects and potential impacts, see Watson et al. (1999).

Biological and Habitat Impacts

Pools, riffles, and runs create a mixture of flows and depths and provide a variety of habitats to support fish and invertebrate life (USEPA, 1997b). The shallow, turbulent, and swiftly flowing stretches of riffle water are well oxygenated and have a "patchy distribution of organisms," which means that different types of organisms are naturally found in different parts of the riffle. Pools can also be large or small and shallow or deep and support a wide variety of aquatic species. Sediments can deposit in pools, which can lead to the formation of islands, shoals, or point bars.

Changes in habitat and biological communities following hydromodification of a channel can be highly site-specific and complex. The physical and chemical alterations resulting from channelization impact various habitats and biological communities, including instream algae, fish, macroinvertebrate populations, and bank or floodplain vegetation. Mathias and Moyle (1992) compared unchannelized and channelized sections of the same stream and found a much higher diversity of many organisms, including aquatic invertebrates, fish, and riparian vegetation, in the unchannelized sections of the stream. Adams and Maughan (1986) compared the benthic community in a small headwater stream, prior to and after channelization. They found that the pathways of organic input shifted from materials associated with leaf fall and runoff to materials associated with periphyton production. Accompanying this change was a shift of the assemblage from shredder domination to grazer domination and a decrease in diversity. Biological and habitat impacts caused by channelization can result from increased stream velocity, decreases in pool and riffle habitat complex, decrease in canopy cover, increase in the solar radiation reaching the channel, channel incision, and increases in sediment.

Channelization of a stream may increase velocity due to increased channel slope and decreased friction with the bank and bed material. Changes in the velocity may cause an impact to organisms within the channel. For example, fish may have to expend more energy to stay in swifter currents and their source of food may be swept downstream. Studies have demonstrated that fisheries associated with channelized streams can be far less productive that those of non-channelized streams (Jackson, 1989). Increased rates of erosion as a result of increased velocities downstream of a channelization feature can also create unstable streambanks, which could lead to increased streambank erosion, higher risks of flooding, and ultimately negative impacts to aquatic organisms.

Channelization can result in a more uniform stream channel that is void of the pool and riffle habitat complex or obstructions, such as woody debris inputs. As repeatedly observed, this can result in changes to the biological community. Negishi et al. (2002) observed a decrease in the total density of macroinvertebrates in the middle of a channelized stream and a decrease in taxon richness in the middle and edge of a channelized stream. An overall reduction in habitat heterogeneity is likely responsible for the reduction in species diversity and the increased abundance of those species favored by the altered flows that is typically observed (Allan, 1995). On medium-sized, unregulated rivers, Benke (2001) found that habitat-specific invertebrate biomass was highest on snags, followed by the main channel and then the floodplain. It was concluded that invertebrate productivity from these habitats has likely been significantly diminished as a result of snag removal, channelization, and floodplain drainage (Benke, 2001).

The survival of the Gulf Coast walleye (*Stizostedion vitreum*) relies on the availability of appropriate spawning habitat, such as large woody debris, that locally reduce current velocity. Channelization and the removal of structures have been identified as activities of concern that could threaten the survival of the species (VanderKooy and Peterson, 1998). In one experiment, an assessment of water quality using environmental indices, such as macroinvertebrate communities, found that channelization and deforestation resulted in a completely different and less varied biocommunity (Bis et al., 2000). A lower persistence of the macroinvertebrate assemblage in the channelized stream was attributed to the lower availability of flow such as backwaters and inundated habitats (Negishi et al., 2002). In a study by Kubecka and Vostradovsky (1995), low fish populations were attributed to channelization of the riverbed.

The channelization of a river can also result in a decrease in canopy cover and an increase in the solar radiation reaching the channel. Bis et al. (2000) found that an increase in incident radiation on a river resulted in increased algal productivity and a significant decrease in scrapers, a macroinvertebrate that feeds on periphyton or algae growing on plant surfaces. Increased water temperatures can also lead to a shift in the algal community to predominately planktonic algal communities, which disrupts the aquatic food chain (Galli, 1991). The combination of increased water temperatures and loss of riparian vegetation falling into the stream (which provides both food and cover) may be responsible for the decrease in macroinvertebrates. Increased solar radiation on a channelized stream can act to decrease productivity by reaching the level of photoinhibition; a decrease in productivity due to excessive amounts of solar radiation. The temperature of the water can also be increased to the extent that it adversely impacts organisms. Elevated temperatures disrupt aquatic organisms that have narrow temperature limits, such as trout, salmon, and many aquatic insects.

Incision of a channel, a common impact of channelization, disconnects the channel from the floodplain by lowering the riverbed relative to the floodplain and decreasing the occurrence of overbank flow. Channel incision or downcutting has rarely been found to directly affect the biotic ecosystem, but indirect changes in habitat conditions are significant. Channel incision decreases habitat heterogeneity and, as a result, biodiversity (Tachet, 1997). An analysis of forest overstory, understory, and herbaceous strata along a channelized and unchannelized stream showed that there was a difference in terms of size-class structure and woody debris quantity (Franklin et al., 2001). Loss of woody vegetation along riparian zones on a channel that is incised because of upstream channelization was attributed to a decrease in over bank flooding and a lowering of the water table as the stream became incised (Steiger et al., 1998). A comparison of a regulated and an unregulated river in Colorado's Green River Basin found a difference in riparian vegetation composition. The regulated river supported banks with wetland species that survive in anaerobic soils and terraces with desert species adapted to xeric soil conditions. The unregulated river supported riparian vegetation that changed along a more gradual environmental continuum from a river channel to a high floodplain (Merritt and Cooper, 2000).

Sediment affects the use of water in many ways. When the rate of erosion changes, transport and deposition of sediment also changes. Excessive quantities of sediment can bury benthic organisms and the habitat of fish and waterfowl. Suspended solids in the water reduce the amount of sunlight available to aquatic plants, cover fish spawning areas and food supplies, fill

rearing pools, reduce beneficial habitat structure in stream channels, smother coral reefs, clog the filtering capacity of filter feeders, and clog and harm the gills of fish. Those fish species that rely on visual means to get food may be restricted by increased turbidity. Sedimentation effects combine to reduce fish, shellfish, coral, and plant populations and decrease the overall productivity of lakes, streams, estuaries, and coastal waters.

Impacts Associated with Specific Hydromodification Actions

Channel Straightening and Deepening

Channels are straightened for a multitude of reasons, such as directing water away from a particular structure or area and reducing local flooding. Channelization that involves straightening of the stream channel increases the slope of the channel, which results in higher discharge velocities. Impacts associated with increased water velocities include more streambank and streambed erosion, higher sediment loads, changes in pools, riffle, and run structure, and increased transport of nutrients and other pollutants (FISRWG, 1998; Simons and Senturk, 1992).

Channelization can also result in alterations to the base level of the stream, including channel downcutting or incision of a section of the stream, which raise the height of the floodplain relative to the riverbed and decrease the frequency of overbank flow. When streams reach flood stage and flow into the floodplain, velocities decrease. The reduction in overbank flow reduces sediment deposition and the sediment storage potential of the floodplain (Wyzga, 2001). A change in the downstream base level of a stream can create an unstable stream system (Biedenharn et al., 1997).

Headcutting is the deepening of a waterway caused by channelization or localized stream-bed mining. Headcutting severely impacts the physical integrity of a stream, as streambanks become unstable and are more prone to eroding and sloughing. Bank failures may result, removing streamside vegetation and introducing significant amounts of sediment into the waterway. As sediments build on the stream bottom, natural substrate is covered and stream depth decreases. Water quality often diminishes as temperatures rise due to less shading by riparian vegetation and increased water surface area with decreased depth. The rapid alteration to stream habitat caused by headcutting is usually detrimental to aquatic wildlife. Various organizations, such as the U.S. Army Corps of Engineers, the Natural Resources Conservation Service (NRCS), and the Missouri Department of Conservation, are involved in projects to reduce headcutting (CSU, n.d.; MDC, 2007; USGS, 2000).

Channel Lining

The sides of channels can be lined with materials such as metal sheeting, concrete, wood, or stone to prevent erosion of a particular section of stream channel or stream bank. The artificially lined areas can reduce the friction between the channel and flowing water, leading to an increase in velocity. The increased velocity and thus the increased erosive potential of the flowing water are not able to erode the artificially lined channel area and can result in augmented erosion downstream as well as increased downstream flooding (Brookes, 1998). Lining the channel also removes aquatic habitat and important substrates that are essential to aquatic life.

Channel Narrowing

Narrowing of a stream channel often occurs when flood control measures such as levees and floodwalls are implemented. By narrowing a stream channel, the water is forced to flow through a more confined area and thus travels at an increased velocity (FISRWG, 1998). The increased velocity in turn increases the stream's erosive potential and ability to transport sediment. This can lead to increased erosion of the streambank and shoreline in downstream locations.

When a channel is made narrower, the water depth increases and the surface area exposed to the solar radiation and ambient temperature decreases, especially in the warmer months. This can cause a decrease in the water temperature. Increased depth may also reduce the surface area of the water in contact with the atmosphere and affect the transfer of oxygen into the water.

In a naturally flowing stream, floods are responsible for such processes as redistributing sediment from the river bottom to form sandbars and point bar deposits. Stream channel modifications to reduce flood damage, such as levees and floodwalls, often narrow the stream width, increasing the velocity of the water and thus its erosive potential. This can lead to increased erosion of the streambank and shoreline in downstream locations (FISRWG, 1998).

Channel Widening

Channel widening is often performed to increase a channel's ability to transport a larger volume of water. The design is often based on volumes of water that occur during flood events. The design of a channel modification project to increase the channel's ability to transport a large volume of water will determine the characteristic of the water flow. The widening of a channel can result in a channel with a capacity to transport water that far exceeds the typical daily discharge. This results in a typical flow that is shallow and wide. As a result of increased contact with the streambed and streambank, there is increased friction and a decreased water velocity. The decrease in velocity causes sediment to settle out of the water column and accumulate within the stream channel. This accumulation of sediment can decrease the capacity of the stream channel. The decreased depth and increased surface area of the water exposed to solar radiation and ambient air temperatures can lead to an increase in water temperature. A change in water temperature can influence dissolved oxygen concentrations as dissolved oxygen solubility decreases with increasing water temperature.

Where tidal flow restrictors cause impoundments, there may be a loss of streamside vegetation, disruption of riparian habitat, changes in the historic plant and animal communities, and decline in sediment quality. Restricted flows can impede the movement of fish or other aquatic life. Flow alteration can reduce the level of tidal flushing and the exchange rate for surface waters within coastal embayments, with resulting impacts on the quality of surface waters and on the rates and paths of sediment transport and deposition.

Culverts and Bridges

The presence of culverts and bridges along a channel can have an impact on the physical and chemical qualities of the water. A culvert can be in the form of an arch over a channel or a pipe that encircles a channel, and it functions to direct flow below a roadway or other land use. A culvert or the supports of a bridge can confine the width of a channel forcing the water to flow in a smaller area and thus at a higher velocity. Impacts associated with a higher flow velocity

include increased erosion. An arch culvert maintains the natural integrity of the stream bottom. In addition, as compared with the natural substrate that can be found using an arch culvert without concrete inverts (floors), a pipe culvert may create less friction with the water flow and result in an increased flow velocity. The chemical and physical changes associated with increased erosion and sediment transport capacity would then result.

The culvert acts as a fixed point with a fixed elevation within the stream channel and as the stream attempts to adjust over time, the culvert remains stationary. Placement of this type of structure disturbs the natural equilibrium of a channel. A culvert sometimes may have beneficial attributes when it acts as a grade control structure, and as such, may serve to prevent upstream migrating incision (headcutting) from moving further up the channel. Depending on the watershed processes, the culvert may act to preserve the natural equilibrium of a channel.

Urbanization

As humans develop watersheds, the proportions of pervious and impervious land within the watershed change (most often increasing impervious areas and decreasing pervious areas). Development also results in reductions in vegetative cover in exchange for increases in houses, buildings, roads, and other non-vegetative cover. The result is a change in the fate of water from rainfall events. Generally, as imperviousness increases and vegetative cover is lost:

- Runoff increases
- Soil percolation decreases
- Evaporation decreases
- Transpiration decreases

Increased volumes of runoff resulting from some types of watershed development can result in hydraulic changes in downstream areas including bank scouring, channel modifications, and flow alterations (Anderson, 1992; Schueler, 1987). The resulting changes to the distribution, amount, and timing of flows caused by flow alterations can affect a wide variety of living resources. As urbanization occurs, changes to the natural hydrology of an area are inevitable. During urbanization, pervious spaces, including vegetated and open forested areas, are converted to land uses that usually have increased areas of impervious surface, resulting in increased runoff volumes and pollutant loadings. Hydrologic and hydraulic changes occur in response to site clearing, grading, and change in landscape. Water that previously infiltrated the ground and was slowly released runs off quickly into stream networks. Development, with corresponding increases in imperviousness, can lead to:

- Increased magnitude and frequency of bankfull and subbankfull floods
- Dimensions of the stream channel that are no longer in equilibrium with its hydrologic regime
- Enlargement of channels
- Highly modified stream channels (from human activity)
- Upstream channel erosion that contributes greater sediment load to the stream
- Reduced dry weather flow to the stream
- Decreased wetland perimeter of the stream
- Degraded in-stream habitat structure

- Reduced large woody debris
- Increased stream crossings and potential fish barriers
- Fragmented riparian forests that are narrower and less diverse
- Decline in water quality
- Increased summer stream temperatures
- Reduced aquatic diversity

The hydraulic changes associated with urbanization have often been addressed with channelization and channel modification as a solution. Evaluating impacts from urbanization on a watershed scale and planning solutions on the same watershed scale can often prevent the transference of upstream problems to downstream locations. There are a variety of management activities that can reduce the impacts associated with urban development. When these urban impacts are reduced, additional hydromodification impacts, such as channelization and channel modification or streambank and shoreline erosion effects, may be reduced. Changes in urban development practices that result in reduced sediment in runoff can enhance reservoir quality and lessen the need for management activities to reduce nonpoint source impacts associated with the operation of dams.[1]

Agricultural Drainage

Some activities, including channelization and channel modification, that take place within a watershed, can lead to unintended adverse effects on watershed hydrology. Even when the intended effect of the watershed activity is to reduce pollution or erosion for an area within a watershed, the impact of the project to the entire watershed's hydrology should be evaluated. Since hydrology is important to the detachment, transport, and delivery of pollutants, better understanding of these effects can lead to reduction of nonpoint source pollution problems (USEPA, 2003b).

One example of an activity that has been shown to provide localized nonpoint source benefits, but can negatively affect the hydrology of a watershed, is an agricultural drainage system. The main purpose of agricultural drainage is to provide a root environment suitable for plant growth, but it can also be used as a means of reducing erosion and improving water quality. Despite the localized positive effects of drainage, when drainage water is poor in quality or contains elevated levels of pollutants, adverse impacts may occur downstream within a watershed. Concentrations of salts, nutrients, and other crop-related chemicals, such as fertilizers and pesticides can damage downstream aquatic ecosystems. Many agricultural drainage systems include drain tiles placed strategically throughout a field to create a network of gravity fed drains. The drain tiles empty into a collection pipe that drains to a waterbody nearby. With the drain system in place and operating, water will leave the affected area quicker and at one or more focused points. Water from the drainage system may erode the banks of unlined surface drains, contribute to flashier runoff events in the receiving water or downstream, and increase the load of sediment in drainage water (USEPA, 2003b).

[1] For additional information on hydrologic problems associated with urbanization and management practices that address urbanization issues, refer to *National Management Measures to Control Nonpoint Source Pollution from Urban Areas* (USEPA, 2005d): http://www.epa.gov/owow/nps/urbanmm/index.html.

Because of these adverse effects, drainage planners should analyze effluents from these systems for nutrients and pesticides to determine possible downstream impacts. Care should also be taken with drainage water so that it does not negatively alter the hydrology of a watershed (FAO, 1997). The degree to which management activities, such as agricultural drainage systems, affect watersheds beyond their intended purpose should be evaluated. In some cases, a thorough assessment and thoughtful discussion with key stakeholders is enough to evaluate the potential impacts of a project on hydrology. However, in many instances, some form of modeling is probably needed to integrate various small and large impacts of watershed activities. For more information on agricultural drainage and management practices related to agricultural drainage, refer to *National Management Measures for the Control of Nonpoint Pollution from Agriculture* (USEPA, 2003b).[2]

Shorelines

A shoreline is defined as the areas between low tide and the highest land affected by storm waves. The shape and position of shorelines are constantly being modified by the processes of erosion and deposition by waves and currents (Tarbuck and Lutgens, 2005). NOAA's Coastal Services Center defines shoreline as "the line of contact between the land and a body of water. On Coast and Geodetic Survey nautical charts and surveys the shoreline approximates the mean high water line" (NOAA, 2006).

The shoreline can be divided into three major areas:

1) *Coast*—the land inland from the base of the sea cliff (produced by the undercutting of bedrock at sea level by wave erosion).
2) *Beach (shore)*—the area between low tide level and dunes, sea cliff, or permanent vegetation. This can be separated into backshore and foreshore.
3) *Offshore*—the area continuously underwater, which can include a wave build platform.

Shoreline Processes

As mentioned above, the shape and position of shorelines are constantly modified by erosion and deposition by waves and currents. Waves are agents of erosion, transportation, and deposition of sediments. Waves can be formed by the following processes (Tulane University, n.d.; University of Alabama, 2006):

- *Wind-generated waves*—formed by shear stress between water and air when the wind speed is higher than about 3 km/hr. Factors that determine the size of waves are wind velocity, wind duration, and fetch (distance the wind blows over a continuous water surface).
- *Displacement of water*—can be caused by activities such as landslides.
- *Displacement of seafloor*—can be caused by faulting and volcanic eruptions.

[2] Available online at: http://www.epa.gov/owow/nps/agmm/index.html.

Wave refraction occurs where wave fronts approach the shore at an angle, but are bent to become more parallel to the shoreline by frictional drag on the bottom. The part of the wave in shallow water slows down because of bottom friction, while the part in the deep water keeps moving at regular speed. Wave refraction causes headland erosion and deposition in bays (Tulane University, n.d.; University of Alabama, 2006).

Nearshore currents occur in the area from the shoreline to beyond the surf zone and consist of (Tulane University, n.d.; University of Alabama, 2006):

- *Longshore currents* move parallel to shore in the same general direction as the approaching waves. They are produced by the movement of oblique waves in the surf zone, and can transport large amounts of sediment by longshore drift.
- *Rip currents* are strong, narrow currents of surface water that flow seaward through the surf into deeper water. The currents develop in areas with lower wave heights (deeper water depths).

Deposition and Erosion

Wave erosion and rivers that open into the ocean or lakes can deposit sediment, transported by longshore currents, developing the following depositional features (Tulane University, n.d.; University of Alabama, 2006):

1) *Beaches*—Any strip of sediment that extends from the low-water line inland to a cliff or zone of permanent vegetation, which is built of material eroded by waves from the headlands, and material brought down by rivers that carry the products of weathering and erosion from the land masses. Beaches are protected from the full force of water waves but are continually modified by wave and current erosion.
2) *Spits*—A narrow ridge or embankment of sediment forming a finger-like projection from the shore into the open ocean. Spits typically develop when the sediment being carried by long-shore drift is deposited where water becomes deeper, such as the mouth of a bay.
3) *Baymouth bars*—Sand bars that form as a result of longshore drift and completely cross a bay, sealing it off from the open ocean.
4) *Tombolo*—A ridge of sand that connects two islands or an island with the mainland, formed as the result of wave refraction around an island.
5) *Tidal inlet*—A break in a spit or baymouth bar, caused by storm erosion, through which tidal currents rush.
6) *Barrier islands*—Low offshore ridges of sediments that parallel the coast and are separated from the mainland by lagoons.

Wave erosion can also wear away land features, causing the following types of features to form (Tulane University, n.d.; University of Alabama, 2006):

1) *Sea cliffs*—formed by storm wave erosion which undercuts higher land, making it susceptible to mass wasting. Sea cliffs can erode very slowly or rapidly, depending on the rock type and wave energy.
2) *Wave-cut terrace or platform*—produced by the retreat of a sea cliff which slopes gently in a seaward direction.

3) *Headlands*—occur due to the seaward projections of shore eroded by wave refraction.

Common Natural and Anthropogenic Causes of Coastal Land Loss

Primary causes of coastal land loss, including both natural and anthropogenic causes, are summarized in Table 2.1 below (USGS, 2004).

Table 2.1 Common Causes of Coastal Land Loss

Agent	Examples
Natural Causes	
Erosion	Waves and currents, storms, landslides
Sediment reduction	Climate change, stream avulsion, source depletion
Submergence	Land subsidence, sea-level rise
Wetland deterioration	Herbivory, freezes, fires, saltwater intrusion
Anthropogenic Causes	
Transportation	Boat wakes, altered water circulation
Coastal construction	Sediment deprivation (bluff retention), coastal structures (jetties, groins, seawalls)
River modification	Control and diversion (dams, levees)
Fluid extraction	Water, oil, gas, sulfur
Climate alteration	Global warming and ocean expansion, increased frequency and intensity of storms
Excavation	Dredging (canals, pipelines, drainage), mineral extraction (sand, shell, heavy mines)
Wetland destruction	Pollutant discharge, traffic, failed reclamation, burning

Shorelines can also experience increased rates of erosion as a result of hydromodification activities. Alterations to the sediment sources for beaches can result in erosion. The sediment supplied to beaches or shorelines can come from a variety of sources including rivers, cliff and rocky foreshores, the seafloor, or windblown dune materials. Beaches and shorelines at the mouth of a river are often replenished by fluvial sediment. When changes within the river system decrease the sediment load carried to the mouth of the river, the result may be decreased sediment supplies to the shoreline or beach. While the design of each hydromodification system determines the impacts that will ensue, streambank and shoreline erosion is a common consequence.

Impacts Associated with Dams

The physical presence and operation of dams can result in changes in water quality and quantity. Some of the water quality impacts include changes in erosion, sedimentation, temperature, dissolved gases, and water chemistry. Examples of biological and habitat impacts, which may result from a combination of physical and chemical changes, include loss of habitat for existing or desirable fish, amphibian, and invertebrate species; changes from cold water to warm water species (or inversely, changes from warm water to cold water species); blockage of fish passage; or loss of spawning or necessary habitat.

The impacts associated with dams occur above (upstream) and below (downstream) the dam. Upstream impacts occur primarily in the impoundment/reservoir created by the presence and operation of the dam. The area and depth of the impoundment will determine the extent and

complexity of the upstream and downstream impacts. For example, small, low-head dams with little impounded areas will exhibit different impacts than large storage dams. Sedimentation and fish passage issues at the smaller, low-head dam contrast with sedimentation, temperature, fish passage, flow regulation, and water quality issues that may be associated with the larger storage dam. The existence of the dam and associated impoundment results in much different water quality interactions than those associated with the preexisting naturally flowing streams or rivers.

Above dams, activities within the watershed can have significant impacts on water quality within impoundments and in releases from dams to downstream areas. Watershed activities, such as agricultural land use, unpaved rural roads, forestry harvesting, or urbanization can lead to changes in runoff water quantity and quality. Agricultural and forestry practices that lead to sediment-laden runoff may result in increased sediment accumulation within an impoundment. Chemicals (e.g., pesticides and nutrients) that are applied on agricultural crops can be carried with sediment in runoff. Increases in urbanization that result in more impervious areas within a watershed often result in dramatic changes in the quantity and timing of runoff flows. These external sources are integrated by the dam and may result in short- and long-term water quality changes within an impoundment and dam releases.

Water quality in reservoirs and releases from dams are closely linked and scrutinized to uses of the water. Often, there are multiple potential users who may have differing quality needs and perceptions. Management of dams includes balancing dam operations, watershed activities, reservoirs, and downstream water and uses. Dortch (1997) provides an excellent assessment on water quality considerations in *Reservoir Management*. Dortch (1997) notes the following about water quality:

- *Temperature* regulates biotic growth rates and life stages and defines fishery habitat (warm, cool, and cold water).
- *Oxygen* sustains aquatic life.
- *Turbidity* affects light transmission and clarity.
- *Nutrient enrichment* is linked to primary productivity (algal growth) and can cause oxygen depletion, poor taste, and odor problems.
- *Organic chemicals and metals* may be toxic and accumulate when bound to sediment that settles in the reservoir.
- *Total dissolved solids* may be problematic for water supplies and other users.
- *Total suspended solids* are a transport mechanism for nutrients and contaminants. Solids may settle in reservoirs and displace water storage volume.
- *pH* regulates many chemical reactions.
- *Dissolved iron, manganese, and sulfide* can accumulate in reservoir hypolimnions that are depleted of oxygen and can cause water quality problems in the reservoir and release water.
- *Pathogens* include bacteria, viruses, and protozoa that can cause public health problems.

Water uses include water supply, flood control, hydropower, navigation, fish and wildlife conservation, and recreation (Dortch, 1997). All of the uses have varying water quality requirements, ranging from almost none for flood control to high quality needs for water supply, fish and wildlife conservation, and recreation.

Dams act as a barrier to the flow of water, as well as to materials being transported by the water. This can impact water quality both in the impoundment/reservoir created by the dam and downstream of the dam. Alteration to the chemical and physical qualities of water held behind a dam is often a function of the retention time of a reservoir or the amount of time the water is retained and not able to flow downstream. Water held in a small basin behind a run-of-river dam may undergo minimal alteration. In contrast, water stored for months or even years behind a large storage dam can undergo drastic changes that impact the downstream environment when released (McCully, 2001). A storage dam that impounds a large reservoir of water for an extended time period will cause more extensive impacts to the physical and chemical characteristics of the water than a smaller dam with little storage capacity.

Several physical changes are possible when dams are introduced into a stream or river, including changes in:

- Instream water velocities
- Timing and duration of flows
- Flow rates
- Sediment transport capacities
- Turbidity
- Temperature
- Dissolved gasses

Similarly, changes to water chemistry are possible as a result of damming rivers and streams, including changes to:

- Nutrients
- Alkalinity and pH
- Metals and other toxic pollutants
- Organic matter

The nature and severity of impacts will depend on the location in the river or stream, in relation to the upstream or downstream side of the dam, the storage time of the impounded water, and the operational practices at the dam. Many of the above impacts are also interrelated. For example, changes in temperature may result in changes in dissolved oxygen levels or changes to pH may result in changes to nutrient dynamics and the solubility of metals.

Water Quality in the Impoundment/Reservoir

As water approaches a dam from upstream, the stream velocity slows down considerably, creating a lake-like environment. The water builds up behind the dam and forms a basin (i.e., impoundment, reservoir) that is deeper than the previous stream flow. The height of the dam and its operational characteristics will determine how much water is stored and the length of storage. The extent of impacted stream area above the dam is influenced by the size of the dam installed, how much water is released, and how often water is released. For example, a small run-of-the river dam constructed to divert water for a millrace will have minimal storage capacity and may only store water for several hours or less. In this case, instream water velocities may decrease,

but with minimal upstream and downstream effects. Thus, the length of upstream channel that is impacted should be relatively small.

In contrast, a large flood control dam and reservoir may have many months of storage and severely alter instream velocities for long distances upstream. Topography surrounding the original stream channel and storage volume will be important parameters determining the length of stream channel affected by the large dam. The volume and frequency of discharges from the dam will also determine how much of the upstream channel is impacted with lower instream velocities as a result of the dam.

Dams act as a physical barrier to the movement of suspended sediments and nutrients downstream (McCully, 2001). When the stream flow behind a dam slows, the sediment carrying capacity of the water decreases and the suspended sediment settles onto the reservoir bottom. Any organic compounds, nutrients, and metals that are absorbed to the sediment also settle and can accumulate on the reservoir bottom.

Turbidity associated with sediment varies, depending on particle sizes of the sediment and the length of time water is held. Longer holding times in the reservoir could result in periodic episodes of high turbidity from upstream storm events that carry sediment rich stormwater, especially if the sediment is predominantly very fine clay particles. Turbidity may also increase as a result of planktonic algal growth in a reservoir.

The increased depth of the water in reservoirs reduces the volume of water exposed to solar radiation and ambient temperatures. Once the flow is controlled by the operation of the dam and the reservoir is mixed primarily by winds, temperature variations can become established within the reservoir. This can cause thermal stratification where, compared to the bottom, surface layers become warmer in the summer and cooler in the winter. In deeper reservoirs, the deepest layers may become nearly constant in temperature throughout the year. Changes in temperature can impact water quality and biological processes in the reservoir, including changes in predominant fish species. Since the density of water is a function of water temperature, thermal stratification creates density gradients within the impoundment. As density gradients become established, exchanges of gases and chemicals between gradients decrease. In a stratified impoundment well aerated surface waters often do not mix with hypolimnetic water and result in poorly oxygenated strata below the surface waters.

Nutrient transport is affected by dams, which can trap the nutrients in the impoundment/reservoir. When nutrients accumulate, the reservoir might become nutrient enriched (i.e., eutrophic). In warmer seasons, concentrated nutrients in waters exposed to light can promote growth of algae and other aquatic plants, which consume nutrients and release oxygen (during photosynthesis) and carbon dioxide (during respiration). When algae and other aquatic plants complete their growth cycles, they die and sink to the bottom of an impoundment. Microbial decomposition of the highly organic dead plant materials may release nutrients back into the water column. Microbial decomposition of the dead plant and algal cells in aerobic conditions consumes oxygen, which can rapidly deplete bottom waters of dissolved oxygen. Under anaerobic conditions, microbial decomposition can produce potentially toxic concentrations of gases, such as hydrogen sulfide.

The operational characteristics of a dam will influence nutrient levels in water releases. For example, water released from the surface of an impoundment may contain seasonally varying forms and levels of nutrients. During periods of algal growth, releases may contain lower levels of dissolved nutrients and higher levels of organic materials (algae) containing nutrients. When algal growth is not occurring, releases may contain higher levels of dissolved nutrients.

Anaerobic (oxygen-depleted) environments, which are typical of deeper waters in reservoirs, can result in several changes to the water chemistry. For example, as by-products of organic matter decomposition in an anaerobic environment, ammonia and hydrogen sulfide concentrations can become elevated (Freeman, 1977; Pozo et al., 1997). Highly acidic (or highly alkaline) waters tend to convert insoluble metal sulfides to soluble forms, which can increase the concentration of toxic metals in reservoir waters (FISRWG, 1998).

Changes in one water quality parameter in a reservoir/impoundment can impact other water quality parameters, causing a cycling of events to occur. For example, increased sedimentation (from internal or external sources) can lead to more organic matter remaining in the reservoir, resulting in more biochemical oxygen demand, potentially lower dissolved oxygen, and other changes to water chemistry, such as pH and metal solubility. Periodic growth and then die-off of aquatic plants and algae creates additional variable cycling of organic matter in the reservoir. The following references may provide additional detail on the complex water quality changes that can occur in impoundments and reservoirs:

- Holdren, C., W. Jones, and J. Taggart. 2001. *Managing Lakes and Reservoirs*. North American Lake Management Society and Terrene Institute, in cooperation with the Office of Water, Assessment and Watershed Protection Division, U.S. Environmental Protection Agency, Madison, WI.
- Thornton, K.W., B.L. Kimmel, and F.E. Payne. 1990. *Reservoir Limnology: Ecological Perspectives*. John Wiley & Sons, Inc., New York.
- U.S. Army Corps of Engineers. N.d. *The WES Handbook on Water Quality Enhancement Techniques for Reservoirs and Tailwaters*. U.S. Army Corps of Engineer Research and Development Center Waterways Experiment Station, Vicksburg, MS.

Water Quality Downstream of a Dam

The physical and chemical changes that occur to the water quality in an impoundment/reservoir have a large impact on the water released downstream of a dam. As previously stated, the presence of a dam can alter water velocities above and below the dam. In smaller dams with little storage capacity, velocities may slow locally and recover to an undisturbed state shortly downstream from the dam. When dams store large volumes of water in a reservoir, the operation of the dam will have a major impact on the downstream velocities and flows. Unless the dam is operated to consistently release water at flows near pre-dam levels, downstream areas will have flows and velocities that are directly related to the volume of water released in a given time period. The downstream flow characteristics will become a function of the operation of the dam, including the timing and duration of releases, the depth of reservoir intakes, and other physical characteristics of the release.

> *On the Columbia River, research found that prior to construction of dams, average water temperatures fluctuated more diurnally with cooler nighttime temperatures as compared with the existing average water temperatures. With the dams in place, cooler weather tends to cool the free flowing river but have little effect on the average temperature of the impounded river (USEPA, 2003c).*

When dams trap sediment upstream, water released from the dam may be starved of sediment and have an increase in erosive capacity. Along with trapping sediment, nutrients may also be trapped above the dam. When the nutrients are trapped and unavailable, sensitive downstream habitats and populations may be affected.

Whether the water is released from the surface or bottom of the reservoir can have a large impact on the characteristics of the water. The impacts of water outflows below a dam are an outcome of the seasonal temperature fluctuations and the outflow positioning. Seasonal temperature profiles in reservoirs are highly variable and dependent upon a complex set of factors including tributary inflow, basin morphometry, drawdown and discharge characteristics, and the degree of stratification (Wetzel, 2001). Compared to natural temperatures, in summer elevated temperatures in surface water releases can increase downstream river temperatures, whereas bottom water releases can be expected to decrease water temperatures. The opposite effect is generally observed in the winter due to changes in the water temperature gradient (USACE, 1999 in Fidler and Oliver, 2001).

Suspended Sediment and Reduced Discharge

Whether the release water originates from the surface or the bottom of the reservoir, the suspended sediment has typically settled out of the water column and thus the water released from behind the dam is usually relatively free from sediment (Simons and Senturk, 1992). This sediment-free water can easily pick up and carry a sediment load and have an increase in erosive capacity. Because of the rock lined channels of bank stabilization and navigation projects that usually occur below these reservoirs, the only place that the clear waters can find the sediments they need is in the streambed or navigation channel. This leads to channel deepening or bed degradation, which in turn lowers water tables and drains floodplain channels and backwaters (Rasmussen, 1999). Streambed and streambanks will continue to erode until an equilibrium suspended sediment load is established. Without sediment from upstream sources, downstream streambanks, streambeds, sandbars, and beaches can erode away more quickly (FISRWG, 1998).

A reduction in the discharge and sediment load generally results in degradation of the channel close to the dam and sedimentation downstream due to the increased supply from the erosion near the dam. Degradation may eventually migrate downstream, but is typically most dramatic the first few years following construction of the dam (Biedenharn et al., 1997). In addition, the physical impact of the discharge will depend, in part, on the channel substrate. A fine silt and sand channel bottom may experience more extensive erosion than a bed rock or cobble substrate.

Lower flow conditions below a dam within a tidally influenced basin can lead to changes in water chemistry. The impact of lower freshwater flow into estuaries was extensively studied in San Francisco Bay. Nichols et al. (1986) provide a detailed history of changes to freshwater inflows to San Francisco Bay. They also provide a summary of the impacts, which include the ecological and water quality effects. A study comparing an unregulated river and a dam regulated river found a significant difference in the water quality chemistry, including an analysis of levels of sodium, potassium, calcium, phosphorus, electrical conductivity, and pH in the middle and lower reaches of the rivers. These differences were attributed to increased tidal influence as a result of lower outflow volumes of fresh water from the dam (Colonnello, 2001). In addition, a decreased discharge from the dam and increased tidal influence can prolong the flushing time or the time it takes water to move through a system. This causes the nutrients and pollutants within the water to remain concentrated in areas below the dam near an estuary.

Biological and Habitat Impacts

The presence of a dam may cause physical and chemical changes to the water quality. These, in turn, can have an impact on the entire biological community including fish, macroinvertebrates, algae, and streamside vegetation. Impacts to the biological community differ upstream and downstream of a dam. Dams may disrupt spawning, increase mortalities from predation, change instream and riparian habitat, and alter plant and benthic communities. Resulting fish populations after dam construction may thrive and become well established, but could be very different than populations prior to installing the dam. For example, upstream of the dam, a fish population may change from a cold-water salmonid fishery to one that is dominated by cool- or warm-water species. A once thriving native trout population may become a largemouth bass (*Micropterus salmoides*) and bluegill (*Lepomis macrochirus*) dominated system. Similarly, downstream conditions may also change. In southern states, streams that once supported catfish and other tolerant warm-water species may now be able to support a trout fishery because of cold-water releases from bottom waters behind a dam. Although the trout fishery may be viewed as positive by some, the displaced native warmwater species may not be perceived as beneficial.

Dams prevent the movement of organisms throughout the river system (Morita and Yamamoto, 2002). Researchers found that fragmenting habitat by damming a river caused the disappearance of a fish species in several upstream locations and further disappearances were predicted (Morita and Yamamoto, 2002). Recently, some individual cases involving movement of invasive, non-native aquatic species note the presence of dams as a positive factor. In these cases, dams have blocked the movement of potentially harmful invasive species.

Flood control and hydropower projects influence a river's hydrograph. For example, in some regions normal river hydrographs featured a rise in water level elevation corresponding to spring

rains. Other geographic areas had stream hydrographs corresponding to snowmelt in the mountains, or fall rainfall. Native species evolved under these scenarios and used such water level rises to trigger spawning movements onto floodplains and in the case of birds, for nesting on islands. Additionally, the stream water level fluctuations were important in providing feeding and resting areas for spring and fall waterfowl migrations. Under managed scenarios for commercial navigation, river water level elevations are raised in the spring and held stable throughout the navigation season, virtually eliminating the triggering mechanisms native species used to reproduce and complete their life cycles. Because of this, many native riverine species often fail to spawn or nest, and are becoming increasingly threatened (Rasmussen, 1999). Additionally, stabilization of periodic flooding has also lead to the loss of ephemeral wetlands and may lead to the accumulation of sediments in nearshore areas, thus negatively affecting fish spawning areas (NRC, 1992).

Dams may lead to increased predation of fish in several ways. A dam may cause populations of fish to concentrate on the upstream and downstream sides, which might lead to the likelihood of increased predation. Changes in the habitat adjacent to a dam can make conditions more suitable to predation. Dams may cause the migration process to be delayed, which also leads to increased predation (Larinier, 2000).

The physical and chemical changes to water released from a dam, including reduced streamflow variability and decreased sediment loads, may also impact benthic communities. Increased water clarity and reduced streamflow variability just below a dam may result in a greater abundance of periphyton or other plants as compared with other locations in the river (Stanford and Ward, 1996). A slowed stream flow velocity with decreased turbulence can also encourage the growth of phytoplankton blooms (Décamps et al., 1988). In contrast, the operation of some hydroelectric dams with large, sudden releases of water may scour the bottom of the downstream channel to the extent that there is a nearly complete removal of the plant communities (Allan, 1995).

Impacts Associated with Dam Removal

Removing a dam affects the flow of water, movement of sediment and chemical constituents, and the overall channel morphology (Academy of Natural Sciences, 2002) on the waterway where the dam was located. The impacts of removing a dam differ for the upstream and downstream sections of a waterway.

Changes in the biological community following the removal of a dam are difficult to generalize, as they are highly site specific and can vary in recovery time from a few months to

The effects of river damming were evaluated in a study comparing a regulated river to an unregulated river in the Green River Basin in Colorado. Prior to installation of the dam in Green River in 1962, Green River and the Yampa River were similar in riparian vegetation and fluvial processes. Comparison of the now regulated Green River and the free-flowing Yampa River found distinctive vegetation differences between the parks that surround the rivers. The channel form of Green River has undergone three stages of morphologic change that have transformed the historically deep river into a shallow braided channel. The Yampa River has remained relatively unchanged. The land surrounding the Green River now consists of marshes with anaerobic soil that supports wetland species and terraces with desert species adapted to xeric soil conditions. The meandering Yampa River has maintained its original surroundings. Its frequently flooded bars and high floodplains provide a wide range of habitats for succession of riparian vegetation (Merritt and Cooper, 2000).

more than a decade. With the removal of a dam, there are changes in the vegetative community surrounding the stream channel and changes in the biological community within the stream itself.

Physical Changes: Upstream Impacts

The removal of a dam allows the water formerly held behind the dam to flow and will likely cause the extent of the impoundment area or reservoir area to decrease. As a dam is removed and the water recedes, sediment is scoured from the bottom and a stream channel returns sometimes to its pre-dam pathway and sometimes to a newly carved channel. As a channel is formed, areas that were formerly beneath the impoundment area become exposed. This can leave large areas of unvegetated and unstable land exposed, which makes these areas likely to undergo erosion and gully development, increasing the sediment load to the stream.

In time, vegetation will stabilize the newly formed stream banks, reducing erosion and allowing sediment transport levels to return to natural levels. The nutrient and metal constituents associated with the sediment will also return to natural levels. As the newly established channel-like flow develops and the stagnant and deep conditions are removed, the natural temperature and oxygen levels will be reestablished.

Physical Changes: Downstream Impacts

Once the physical barrier of the dam is removed, a river can flow unrestricted. As the channel is reformed, the water discharge volume and the stream channel can reach equilibrium. As a result, a more natural stream flow rate is maintained.

With the removal of a dam, the fate of the trapped sediments is of concern because flooding and downstream pollution problems can result. On a short-term time scale, the redistribution of the fine silt and sand sediments that accumulated behind the dam wall may cause an increase in turbidity and water quality problems. In addition, the impact can be greater if the sediments contain toxic pollutants, such as metals or bioaccumulative compounds such as mercury or PCBs. On a short-term time scale, the redistribution of the fine silt and sand sediments increases the turbidity and can damage spawning grounds, water quality, habitat, and food quality (American Rivers, 2002a). Suspended sediment loads can have a negative impact on a biological community and reach lethal levels during dam removal if preventive measures are not implemented (Doyle et al., 2000).

After a dam is removed and the sediment that has been trapped behind the dam is redistributed, natural sediment transport levels return. As a result, the constituents typically sorbed to sediment, including nutrients and metals, are no longer found localized in excess. Normal sediment transport levels typically result in a river bottom with a higher percentage of rocky substrate. Gravel and cobblestones located below the sediment may be exposed or may be transported from upstream locations as the flow rate of the river increases. This unrestricted flow and transport of sediment and gravel may also play a key role in restoring sediments to downstream locations and coastal beaches (USDOI, 1995). The removal of a dam and the return of natural flow rates should also help to restore a river's natural water temperature range and oxygen levels.

Short-term chemical changes to the water quality, including the possibility of supersaturation of nitrogen gas directly following the removal of a dam, can cause aquatic animals to experience

adverse conditions. This can include gas bubble disease, in which nitrogen bubbles form in the blood and tissues and block capillaries by embolism (Colt, 1984; Soderberg, 1995). Adverse effects can be seen when the dissolved nitrogen level reaches 102% and at 105% widespread fish mortalities are possible (Dryden Aqua, 2002). Supersaturation was an issue in the 1992 removal of Little Goose Dam on the Snake River (American Rivers, 2002a). If a reservoir is drawn down slowly, the severity of the impact of supersaturation on aquatic organisms can be lessened (American Rivers, 2002a).

Biological Changes: Upstream Impacts

Following the removal of a dam, a return to the normal temperature range, flow rates, and oxygen levels supports the return of native aquatic vegetation species. Still water impoundments support aquatic vegetation that is free floating or that does not need to be strongly rooted, while free-flowing systems support plants that are rooted strongly enough to resist being uprooted by the water current (WRM, 2000).

As the water recedes and the formerly impounded area becomes exposed, vegetation can begin to colonize the area. Sometimes, the exposed area may be colonized by invasive plant species, which are able to remain for several years and prevent other vegetation from becoming established.

The removal of a dam and the subsequent drawdown of water from the impoundment area can affect the wetlands formerly bordering the impoundment area. As the dam is removed, the water table typically begins to drop. The elevation of the wetlands and the extent of the water table drawdown determine whether the wetland areas dry up and what changes will occur in the wetland species composition. Wetlands that develop alongside the newly carved channel are likely to be different than the wetlands formerly bordering the impoundment area in terms of plant and animal species composition.

The biological changes associated with the removal of a dam can be described in phases, as the waterbody makes the transition from reservoir to river. This includes a pattern of relatively rapid recovery for invertebrates or short-lived taxa, followed by a second phase of slower recovery for fish or longer-lived taxa if the dam removal is not an especially large or disruptive event. Overall, the initial impacts, such as colonization by invasive species, typically determine the ecological recovery that follows (Doyle et al., 2000).

Dam removal can allow for improved fish passage and unrestricted fish movement that provides access to spawning habitat upstream. For coastal rivers, the removal of a dam may enable tidal waters to reach upper portions of the stream that were formerly cut off by the dam, creating a spawning environment preferred by certain fish species. Access to upstream sections is particularly beneficial for some anadromous fish that live most of their lives in saltwater and swim upstream toward freshwater to spawn (Massachusetts River Restore Program, 2002).

A dam can also act as a barrier between upstream and downstream fish populations. If a downstream community of fish is an invasive fish species the dam serves as a physical barrier to separate the invasives from the upstream community (American Rivers, 2002a). Thus, the removal of the dam can negatively impact the ecosystem if it allows for the movement of a

population of an invasive species that was previously prevented from traveling to a section of the stream because of the presence of a dam.

Biological Changes: Downstream Impacts

Downstream of the former dam, wetlands are likely to reappear along side the stream channel where they occurred prior to the construction of the dam (WRM, 2000). Revegetation of river beds and banks typically occurs within one growing season, following removal of a dam (Massachusetts River Restore Program, 2002).

Recolonization of the stream banks by vegetation affects the biological community within the stream by providing shade, reducing water temperatures, and supplying a source of woody debris and organic matter to the stream.

As streamside vegetation begins to recover and suitable habitat is restored, fish begin to return. Changes in flow as a result of dam removal lead to the development of side channels and ponds that provide habitat for fish and wildlife. Increased flow rates also allow for the transport of larger debris, including gravel and logs, which create spawning beds and pool and riffle habitat (River Recovery, 2001). In addition, the rocky substrate environment, which is typically exposed as a result of dam removal, provides habitat for aquatic insects and spawning fish. In the long term, the return to natural stream temperatures, oxygen levels, and flow rates all contribute to the reestablishment of a healthy aquatic and riparian ecosystem.

Chapter 3: Channelization and Channel Modification

Channelization and channel modification describe river and stream channel engineering undertaken for flood control, navigation, drainage improvement, and reduction of channel migration potential. Activities that fall into this category include straightening, widening, deepening, or relocating existing stream channels and clearing or snagging operations. These forms of hydromodification typically result in more uniform channel cross-sections, steeper stream gradients, and reduced average pool depths. Channelization and channel modification also refer to the excavation of borrow pits, canals, underwater mining, or other practices that change the depth, width, or location of waterways, or embayments within waterways.

Channelization and channel modification activities can play a critical role in nonpoint source pollution by increasing the downstream delivery of pollutants and sediment that enter the water. Some channelization and channel modification activities can also cause higher flows, which increase the risk of downstream flooding.

Channelization and channel modification can:

- Disturb stream equilibrium
- Disrupt riffle and pool habitats
- Create changes in stream velocities
- Eliminate the function of floods to control channel-forming properties
- Alter the base level of a stream (streambed elevation)
- Increase erosion and sediment load

Many of these impacts are related. For example, straightening a stream channel can increase stream velocities and destroy downstream pool and riffle habitats. As a result of less structure in the stream to retard velocities, downstream velocities may continue to increase and lead to more frequent and severe erosion.

Management Measure 1: Physical and Chemical Characteristics of Channelized or Modified Surface Waters

Management Measure 1
1) Evaluate the potential effects of proposed channelization and channel modification on the physical and chemical characteristics of surface waters. 2) Plan and design channelization and channel modification to reduce undesirable impacts. 3) Develop an operation and maintenance program for existing modified channels that includes identification and implementation of opportunities to improve physical and chemical characteristics of surface waters in those channels.

This management measure applies to proposed channelization or channel modification projects and is intended to occur concurrently with the implementation of Management Measure 2 (Instream and Riparian Habitat Restoration). The intent of the management measure is for project planners to consider potential changes in surface water characteristics when evaluating proposed channelization or channel modification projects. Also, for existing modified channels, the planning process can include consideration of opportunities to improve the surface water characteristics necessary to support desired fish and wildlife.

The purpose of the management measure is to ensure that the planning process for new hydromodification projects addresses changes to physical and chemical characteristics of surface waters that may occur as a result of proposed work. For existing projects, this management measure can be used to ensure the operation and maintenance program uses any opportunities available to improve the physical and chemical characteristics of the surface waters.

Changes created by channelization and channel modification activities are problematic if they unexpectedly alter environmental parameters to levels outside normal or desired ranges. The physical and chemical characteristics of surface waters that may be influenced by channelization and channel modification include sedimentation, turbidity, salinity, temperature, nutrients, dissolved oxygen, oxygen demand, and contaminants. Changes in natural sediment supplies, reduced freshwater availability, and accelerated delivery of pollutants are examples of the types of changes that can be associated with channelization and channel modification.

Published case studies of existing channelization and channel modification projects describe alterations to physical and chemical characteristics of surface waters (Burch et al., 1984; Petersen, 1990; Reiser et al., 1985; Roy and Messier, 1989; Sandheinrich and Atchison, 1986; Sherwood et al., 1990; Shields et al., 1995). Frequently, the post-project conditions are intolerable to desirable fish and wildlife. The literature also describes instream benefits for fish and wildlife that can result from careful planning of channelization and channel modification

projects (Bowie, 1981; Los Angeles River Watershed, 1973; Sandheinrich and Atchison, 1986; Shields et al., 1990; Swanson et al., 1987; USACE, 1989).

Management Practices for Management Measure 1

Implementation of this management measure should begin during the planning process for new projects. For existing projects, implementation of this management measure can be included as part of a regular operation and maintenance program. The approach is two-pronged and should include:

1. *Planning and evaluation*, with numerical models for some situations, of the types of nonpoint source (NPS) pollution related to instream changes and watershed development.

2. *Operation and maintenance programs that apply* a combination of nonstructural and structural practices to address some types of NPS problems stemming from instream changes or watershed development.

Planning and Evaluation

In planning-level evaluations of proposed hydromodification projects, it is critical to understand that the surface water quality and ecological impact of the proposed project will be driven primarily by the alteration of physical transport processes. In addition, it is critical to realize that the most important environmental consequences of many hydromodification projects will occur over a long-term time scale of years to decades.

> Use models/methodologies as one means to evaluate the effects of proposed channelization and channel modification projects on the physical and chemical characteristics of surface waters. Evaluate these effects as part of watershed plans, land use plans, and new development plans.

The key element in the selection and application of models for the evaluation of the environmental consequences of hydromodification projects is the use of appropriate models to adequately characterize circulation and physical transport processes. Appropriate surface water quality and ecosystem models (e.g., salinity, sediment, cultural eutrophication, oxygen, bacteria, fisheries, etc.) are then selected for linkage with the transport model to evaluate the environmental impact of the proposed hydromodification project. There are several sophisticated two-dimensional (2D) and three-dimensional (3D) time-variable hydrodynamic models available for environmental assessments of hydromodification projects. Two-dimensional depth or laterally averaged hydrodynamic models can be routinely applied to assist with environmental assessments of beneficial and adverse effects on surface water quality by knowledgeable teams of physical scientists and engineers (Hamilton, 1990). Three-dimensional hydrodynamic models are also beginning to be more widely applied for large-scale environmental assessments of aquatic ecosystems (e.g., EPA/USACE-WES Chesapeake Bay 3D hydrodynamic and surface water quality model).

Refer to Chapter 8 for a list of some models available for studying the effects of channelization and channel modification activities (Table 8.1). Chapter 8 also provides examples of channelization and channel modification activities and associated models that can be used in the planning process.

Operation and Maintenance Programs

Several management practices can be implemented to avoid or mitigate the physical and chemical impacts generated by hydromodification projects. Many of these practices have been engineered and used for several decades, not only to mitigate human-induced impacts but also to rehabilitate hydrologic systems degraded by natural processes.

In cases where existing channelization or channel modification projects can be changed to enhance instream or streamside characteristics, several practices can be included as a part of regular operation and maintenance programs. New channelization and channel modification projects that are predicted to cause unavoidable physical or chemical changes in surface waters can also use one or more practices to mitigate the undesirable changes. Some of the types of practices include:

- Grade control structures
- Levees, setback levees, and floodwalls
- Noneroding roadways
- Streambank protection and instream sediment load controls
- Vegetative cover

Grade Control Structures

There are two basic types of grade control structures. The first type can be referred to as a bed control structure because it is designed to provide a hard point in the streambed that is capable of resisting the erosive forces of the degradational zone. The second type can be referred to as a hydraulic control structure because it is designed to function by reducing the energy slope along the degradational zone to the point where the stream is no longer capable of scouring the bed. The distinction between the operating processes of these two types is important whenever grade control structures are considered (Biedenharn and Hubbard, 2001).

Design considerations for siting of grade control structures include determining the type, location, and spacing of structures along the stream, along with the elevation and dimensions of structures. Siting grade control structures can be considered a simple optimization of hydraulics and economics. However, these factors alone are usually not sufficient to define optimum siting conditions. Hydraulic considerations must be integrated with a host of other factors that can vary from site to site to determine the final structure plan. Some of the more important factors to be considered when siting grade control structures are discussed more specifically in the U.S. Army Corps of Engineers' *Design Consideration for Siting Grade Control Structures* (Biedenharn and Hubbard, 2001).

When carefully applied, grade control structures can be highly versatile in establishing human and environmental benefits in stabilized channels. To be successful, application of grade control structures should be guided by analysis of the stream system both upstream and downstream from the area to be reclaimed (CASQA, 2003).

In some cases, grade control structures can be designed to allow fish passage. However, some grade control structures can obstruct fish passage. In many instances, fish passage is a primary consideration and may lead engineers to select several small fish passable structures in lieu of

one or more high drops that would restrict fish passage. In some cases, particularly when drop heights are small, fish are able to migrate upstream past a structure during high flows. In situations where structures are impassable, and where the migration of fish is an important concern, openings, fish ladders, or other passageways must be incorporated into the structure's design (Biedenharn and Hubbard, 2001). Fish passage practices are described in Chapter 7.

A type of grade control structure is a check dam. Refer to Chapter 7 for more information about this practice.

Levees, Setback Levees, and Floodwalls

Levees are embankments or shaped mounds constructed for flood control or hurricane protection (USACE, 1981). Setback levees and floodwalls are longitudinal structures used to reduce flooding and minimize sedimentation problems associated with fluvial systems. These practices can be used to reduce the impacts of channelization and channel modification. A more detailed discussion of levees, setback levees, and floodwalls is available in Chapter 7.

Noneroding Roadways

Disturbances along the streambank that result from activities associated with operation and maintenance of channelization projects can lead to additional nonpoint source pollution impacts to the stream. An example of human-induced activities is erosion associated with roadways. Rural road construction, streamside vehicle operation, and stream crossings usually result in significant soil disturbance and create a high potential for increased erosion processes and sediment transport to adjacent streams and surface waters. Erosion during and after construction of roadways can contribute large amounts of sediment and silt to runoff waters, which can deteriorate water quality and lead to fish kills and other ecological problems (USEPA, 1995b).

Road construction involves activities such as clearing of existing native vegetation along the road right-of-way; excavating and filling the roadbed to the desired grade; installation of culverts and other drainage systems; and installation, compaction, and surfacing of the roadbed.

Although most erosion from roadways occurs during the first few years after construction, significant impacts may result from maintenance operations using heavy equipment, especially when the road is located adjacent to a waterbody. In addition, improper construction and lack of maintenance may increase erosion processes and the risk for road failure. To minimize erosion and prevent sedimentation impacts on nearby waterbodies during construction and operation periods, streamside roadway management needs to combine proper design for site-specific conditions with appropriate maintenance practices. A discussion of how roadways can impact fish habitat and passage is available from EPA's *National Management Measures to Control Nonpoint Source Pollution from Forestry* (USEPA, 2005a).

More information about suggested practices to consider during design, construction, operation and maintenance, and general maintenance of noneroding roadways, is available from EPA's *National Management Measures to Control Nonpoint Source Pollution from Forestry* (USEPA, 2005a). This EPA guidance document also provides some suggested permanent control BMPs that may be used to prevent erosion from roadways. Additional information about noneroding roadways is available in Chapter 7 and the Resources section of this document.

Streambank Protection and Instream Sediment Load Controls

Streambank erosion is a natural process that occurs in fluvial systems. Streambank erosion can also be induced or exaggerated as a result of human activities. There are several factors within a watershed that can contribute to human induced streambank erosion. Accelerated streambank erosion related to human activity can typically be attributed to three major causes including channel modifications, reservoir construction, and land use changes (Henderson, 1986). When possible, streambank erosion problems should be addressed in the context of the entire watershed, using a systems approach that considers and accommodates natural stream processes. Approaches to addressing streambank erosion problems associated with channelization and channel modification activities can involve efforts to identify and address all significant contributing factors in addition to treating the immediate symptom, bank erosion.

In general, the design of streambank protection may involve the use of several techniques and materials. Nonstructural or programmatic management practices for the prevention of streambank failures include:

- Protection of existing vegetation along streambanks
- Careful use or regulation of irrigation near streambanks, such as rerouting of overbank drainage
- Minimization of loads on top of streambanks (such as prevention of building within a defined distance from the streambed)

Several structural practices are used to protect or rehabilitate eroded banks. These practices are usually implemented in combination to provide stability of the stream system, and they can be grouped into direct and indirect methods. Direct methods place protecting material in contact with the bank to shield it from erosion. Indirect methods function by deflecting channel flows away from the bank or by reducing the flow velocities to nonerosive levels (Henderson, 1986; Henderson and Shields, 1984). Indirect bank protection requires less bank grading and tree and snag removal. However, some structural methods like stone toe protection, as discussed below, can be placed with minimal disturbance to existing slope, habitat, and vegetation.

Feasibility of the practices at a site depends on the engineering design of the structure, availability of the protecting material, extent of the bank erosion, and specific site conditions such as the flow velocity, channel depth, inundation characteristics, and geotechnical characteristics of the bank. The use of vegetation alone or in combination with other structural practices, when appropriate, could further reduce the engineering and maintenance efforts.

Vegetation can be considered with respect to site-specific characteristics. When vegetation is combined with low cost building materials or engineered structures, numerous techniques can be created for streambank erosion control. It is important to consider the assets and limitations when planning to use planted vegetation for streambank protection. Advantages of vegetation include the following (Allen and Leech, 1997):

- Reinforces soil (increases bank stability).
- Increases resistance to flow and reduces flow velocities (from exposed stalks), causing the flow to dissipate energy against the plant (rather than the soil).

- Intercepts water.
- Enhances water infiltration.
- Depletes soil water by uptake and transpiration.
- Acts as a buffer against the abrasive effect of transported materials.
- Induces sediment deposition (from close-growing vegetation).
- Reduces costs, in some cases, when compared to most structural methods.
- Improves conditions for fisheries and wildlife.
- Improves water quality.
- Protects cultural/archeological resources.

Limits of vegetation include failure to grow; being subject to undermining; being uprooted by wind, water, and the freezing and thawing of ice; ingestion by wildlife or livestock; and maintenance requirements. Chapter 3 of *Bioengineering for Streambank Erosion Control* discusses plant acquisition, handling, and timing of planting (Allen and Leech, 1997).

Streambanks can be protected or restored either by increasing resistance of the bank to erosion or by decreasing the energy of the water at the point of contact with the bank, for example by deflecting or interrupting flows (Henderson, 1986). Instream sediment can be controlled by using several structural, vegetative, or bioengineered practices, depending on the management objective and the source of sediment. Streambank protection and channel stabilization practices, including various types of revetments, grade control structures, and flow restrictors, have been effective in controlling sediment production caused by streambank erosion. Designs should match the protection capability of the treatment to the erosion potential of each stream zone. For example, riprap may be needed at the toe of a slope to protect it from undercutting combined with tree revetments to deflect flows and provide protection for live stakings that will develop permanent support. The growing body of research indicates management techniques that emulate nature and work with natural stream processes are more successful and economical.

Significant amounts of instream sediment deposition can be prevented by controlling bank erosion processes and streambed degradation. Channel stabilization structures can also be designed to trap sediment and decrease the sediment delivery to desired areas by altering the transport capacity of the stream and creating sediment storage areas. In regulated streams, alteration of the natural streamflow, particularly the damping of peak flows caused by surface water regulation and diversion projects, can increase streambed sediment deposits by impairing the stream's transport capacity and its natural flushing power. Sediment deposits and reduced flow alter the channel morphology and stability, the flow area, the channel alignment and sinuosity, and the riffle and pool sequence. Such alterations have direct impacts on the aquatic habitat and the fish populations in the altered streams (Reiser et al., 1985).

Vegetative Cover

Streambank protection using vegetation is a commonly used practice, particularly in areas of low water velocities. Vegetative cover, also used in combination with structural practices, is often relatively easy to establish and maintain, and is visually attractive (USACE, 1983). Emergent vegetation provides two levels of protection. First, the root system helps hold soil together and increases overall bank stability by forming a binding network. Second, the exposed stalks, stems, branches, and foliage provide resistance to streamflow, causing the flow to lose part of its energy

by deforming the plants rather than by removing the soil particles. Above the waterline, vegetation protects against rainfall impact on the banks and reduces the velocity of the overland flow during storm events.

Vegetative controls are not suitable for all sites, especially those sites with severe erosion due to high flow rates or channel velocities. Refer to the Washington State Department of Transportation's (WSDOT's) *Hydraulics Manual*, Chapter 4[1] for information on calculating flow rates or channel velocities. Stabilization measures should only be implemented after a careful evaluation of the stream and the surrounding area. A knowledgeable fluvial geomorphologist may be helpful with this evaluation. In addition, plant species should be selected with care; native plant species should be used whenever possible. Appropriate species can be determined by consulting horticulturalists and botanists for plant selection assistance. The USDA-Forest Service guide, *A Soil Bioengineering Guide for Streambank and Lakeshore Stabilization*[2] provides a list of plants for soil bioengineering associated systems. The International Erosion Control Association (IECA)[3] publishes a products and services directory listing sources of plant material and professional assistance.

In addition to bank stabilization, vegetation can also offer pollutant filtering capacity. Pollutants and sediment transported by overland flow may be partly removed as a result of a combination of processes including reduction in flow pattern and transport capacity, settling and deposition of particulates, and eventual nutrient uptake by plants.

Summary of Physical and Chemical Practices

All of the following practices can be used to address the effects of channelization and channel modification activities on the physical and chemical characteristics of a waterbody:

- Bank shaping and planting
- Branch packing
- Brush layering
- Brush mattressing
- Bulkheads and seawalls
- Check dams
- Coconut fiber roll
- Dormant post plantings
- Erosion and Sediment Control (ESC) Plans
- Joint plantings
- Levees, setback levees, and floodwalls
- Live cribwalls
- Live fascines
- Live staking
- Noneroding roadways
- Return walls

[1] http://www.wsdot.wa.gov/eesc/design/hydraulics/Manual/Rev3Publications/Chapter%204.pdf
[2] http://www.fs.fed.us/publications/soil-bio-guide
[3] http://ieca.org

- Revetments
- Riprap
- Root wad revetments
- Rosgen's Stream Classification Method
- Setbacks
- Toe protection
- Tree revetments
- Vegetated buffers
- Vegetated gabions
- Vegetated geogrids
- Vegetated reinforced soil slope (VRSS)
- Wing deflectors

Additional information about each of the above practices is available in Chapter 7. The Additional Resources section provides a number of sources for obtaining information about the effectiveness, limitations, and cost estimates for these practices.

Management Measure 2: Instream and Riparian Habitat Restoration

Management Measure 2
1) Evaluate the potential effects of proposed channelization and channel modification on instream and riparian habitat. 2) Plan and design channelization and channel modification to reduce undesirable impacts. 3) Develop an operation and maintenance program for existing modified channels that includes identification and implementation of opportunities to restore instream and riparian habitat in those channels.

Implementation of this management measure is intended to occur concurrently with the implementation of the Management Measure for Physical and Chemical Characteristics of Channelized or Modified Surface Waters (see previous management measure discussion). This management measure pertains to surface waters where channelization and channel modification have altered or have the potential to alter instream and riparian habitat, such that historically present plants, fish, or wildlife are adversely affected. This management measure is intended to apply to any proposed channelization or channel modification project to determine changes in instream and riparian habitat and to existing modified channels to evaluate possible improvements to instream and riparian habitat. The purpose of this management measure is to correct or prevent detrimental changes to instream and riparian habitat from the impacts of channelization and channel modification projects.

Management Practices for Management Measure 2

Implementation of this management measure should begin during the planning process for new projects. For existing projects, implementation of this management measure can be included as part of a regular operation and maintenance program. Ensuring the involvement and participation of all partners is a place to start on any restoration project. Determining the extent of the restoration activity can help identify potential partners and other interested stakeholders. Each stakeholder may bring a certain expertise, historical information and data, and possibly funding to a project. Development of a stream corridor restoration plan can help organize the group, set goals for implementation of management practices, secure funding or other types of support, and facilitate the sharing of ideas and accomplishments within the group and to others in the community. The approach is two-pronged and should include:

1. *Planning and evaluation*, with numerical models for some situations, of the types of NPS pollution related to instream and riparian habitat changes and watershed development.

2. *Operation and maintenance* activities that restore habitat through the application of a combination of nonstructural and structural practices to address some types of NPS problems stemming from instream and riparian habitat changes or watershed development.

Planning and Evaluation

Several tools can be used to evaluate the instream and riparian health of a stream system. These approaches include:

- Biological methods/models
- Temperature restoration practices
- Geomorphic assessment techniques
- Expert judgment and checklists

Biological Methods/Models

To assess the biological impacts of channelization, it is necessary to evaluate both physical and biological attributes of the stream system. Assessment studies should be performed before and after channel modification, with samples being collected upstream from, within, and downstream from the modified reach to allow characterization of baseline conditions. It also may be desirable to identify and sample a reference site within the same ecoregion as part of the rapid bioassessment procedures discussed below.

> Use models/methodologies to evaluate the effects of proposed channelization and channel modification projects on instream and riparian habitat and to determine the effects after such projects are implemented.

There are a number of different methods that can be used to assess the biological impacts of channelization. Rapid Bioassessment Protocols (RBPs) were developed as inexpensive screening tools for determining whether a stream is supporting a designated aquatic life use (Barbour et al., 1999; Plafkin et al., 1989). One component of these protocols is an instream habitat assessment procedure that measures physical characteristics of the stream reach (Barbour and Stribling, 1991). An assessment of instream habitat quality based on 12 instream habitat parameters is performed in comparison to conditions at a "reference" site, which represents the "best attainable" instream habitat in nearby streams similar to the one being studied. The RBP habitat assessment procedure has been used in a number of locations across the United States. A small field crew of one or two persons typically can perform the procedure in approximately 20 minutes per sampling site.

Rapid Bioassessment Protocols (Barbour et al., 1999; Plafkin et al., 1989) were designed to be scientifically valid and cost-effective and to offer rapid return of results and assessments. Protocol III (RBP III) focuses on quantitative sampling of benthic macroinvertebrates in riffle/run habitats or on other submerged, fixed structures (e.g., boulders, logs, bridge abutments, etc.) where such riffles may not be available. The data collected are used to calculate various metrics pertaining to benthic community structure, community balance, and functional feeding groups. The metrics are assigned scores and compared to biological conditions as described by either an ecoregional reference database or reference sites chosen to represent the "best attainable" biological community in similarly sized streams. In conjunction with the instream

habitat quality assessment, an overall assessment of the biological and instream habitat quality at the site is derived. RBP III can be used to determine spatial and temporal differences in the modified stream reach. Application of RBP III requires a crew of two persons; field collections and lab processing require 4 to 7 hours per station and data analysis about 3 to 5 hours, totaling 7 to 12 hours per station. The RBP III has been extensively applied across the United States. More information about biological assessments is available from EPA's Biological Assessment Web site.[4]

Karr et al. (1986) describes an Index of Biological Integrity (IBI), which includes 12 metrics in three major categories of fish assemblage attributes: species composition, trophic composition, and fish abundance and condition. Data are collected at each site and compared to those collected at regional reference sites with relatively unimpacted biological conditions. A numerical rating is assigned to each metric based on its degree of agreement with expectations of biological condition provided by the reference sites. The sum of the metric ratings yields an overall score for the site. Application of the IBI requires a crew of two persons; field collections require 2 to 15 hours per station and data analysis about 1 to 2 hours, totaling 3 to 17 hours per station. The IBI, which was originally developed for Midwestern streams, can be readily adapted for use in other regions. It has been used in several states across the country to assess a wide range of impacts in streams and rivers.

Habitat Evaluation Procedures (HEPs) can be used to document the quality and quantity of available habitat, including aquatic habitat, for selected wildlife species. HEPs provide information for two general types of instream and riparian habitat comparisons:

- The relative value of different areas at the same point in time
- The relative value of the same area at future points in time

By combining the two types of comparisons, the impact of proposed or anticipated land and water use changes on instream and riparian habitat can be quantified (Ashley and Berger, 1997).

Additional information about the assessment methods discussed above, as well as other methods for assessing biological impacts is available in Table 8.2 of Chapter 8.

Temperature Restoration Practices

Channelization and channel modification activities can greatly impact stream temperature. All other factors remaining unchanged, when a channel is narrowed, the water depth increases and the surface area exposed to solar radiation and ambient temperature decreases. This can decrease water temperature. When a channel is widened, the opposite occurs; shallower depths and increased temperatures occur. Temperature may also be increased from increased turbidity because the sediment particles absorb heat. It is important to model how temperature will change in a stream, as a result of channelization and channel modification activities, to determine what other changes and impacts might occur in the stream.

[4] http://www.epa.gov/owow/monitoring/bioassess.html

Stream temperature has been widely studied, and heat transfer is one of the better-understood processes in natural watershed systems. Most available approaches use energy balance formulations based on the physical processes of heat transfer to describe and predict changes in stream temperature.

More information about temperature restoration models and practices is provided in Chapter 8 (Modeling).

Geomorphic Assessment Techniques

Fluvial geomorphology is the study of stream form and function. Geomorphic assessment focuses on qualitative and quantitative observations of stream form. It provides a "moment-in-time" characterization of the existing morphology of the stream. In addition, geomorphic assessment includes a stability component. Stability assessments place the stream in the context of past, present, and anticipated adjustment processes. Geomorphic assessments can be useful in predicting changes that could be created by channelization and channel modification activities.

Stream classification is a technique that is used to show the relationship between streams and their watersheds. There are several techniques for stream classification, all of which have advantages and limitations. Advantages of geomorphic assessment include (adapted from FISRWG, 1998):

- Promotes communication.
- Enables extrapolation of data collected on a few streams to a number of channels over a broader geographical area.
- Helps the restoration practitioner consider the landscape context and determine expected ranges of parameters.
- Enables practitioners to interpret the channel-forming or dominant processes active at the site.
- Uses reference reaches as the desired outcome of restoration.
- Provides an important cross-check to verify if the selected design values are within a reasonable range.

Limitations of geomorphic assessment include (adapted from FISRWG, 1998):

- Determination of bankfull or channel-forming flow depth may be difficult or inaccurate.
- The dynamic condition or the stream is not indicated in stream classification systems.
- River response to a perturbation or restoration action is normally not determined by classifying it alone.
- Biological health is not directly determined.
- Classifying a stream should not be used alone to determine the type, location, and purpose of restoration activities.

Schumm (1960) identified straight, meandering, and braided channels and related both channel pattern and stability to modes of sediment transport. Schumm recognized that stable straight and meandering channels have mostly suspended sediment loads and cohesive bank materials, as opposed to unstable braided streams characterized by mostly bedload sediment transport and

wide sandy channels with noncohesive bank materials. Meandering mixed-load channels are found at an intermediate condition (FISRWG, 1998).

Montgomery and Buffington (1993) proposed a classification system similar to Schumm for alluvial, colluvial, and bedrock streams in the Pacific Northwest. This system addresses channel response to sediment inputs throughout the drainage network. Six classes of alluvial channels were identified—cascade, step-pool, plane-bed, riffle-pool, regime, and braided. The stream types are differentiated based on channel response to sediment inputs. For example, steeper channels maintain their morphology while transporting sediment. Streams with lower gradients make more morphological adjustments with increased sediment loads (FISRWG, 1998).

A conceptual model of channel evolution in response to channelization (CEM-channel evolution model) was developed by Simon and Hupp (1986, 1987), Hupp and Simon (1986, 1991), and Simon (1989a, 1989b). The model identifies six geomorphic stages of channel response and was developed and extensively applied to predict empirical stream channel changes following large-scale channelization projects in western Tennessee. Data required for model application include bed elevation and gradient, channel top-width, and channel length before, during, and after modification. Gauging station data can be used to evaluate changes through time of the stage-discharge relationship and bed-level trends. Riparian vegetation is dated to provide ages of various geomorphic surfaces and thereby to deduce the temporal stability of a reach.

A component of Simon and Hupp's (1986, 1987) channel response model is the identification of specific groups of woody plants associated with each of the six geomorphic channel response stages. Their findings for western Tennessee streams suggest that the site preference or avoidance patterns of selected tree species allow their use as indicators of specific bank conditions. This method might require calibration for specific regions of the United States to account for differences in riparian zone plant communities, but it would allow simple vegetative reconnaissance of an area to be used for a preliminary estimate of stream recovery stage (Simon and Hupp, 1987).

Restoring or maintaining streams to a stable form through natural channel design requires detailed information about surface water hydrology and the interactions between rainfall and overland flow or runoff. The Rosgen classification system, developed by David L. Rosgen, and presented in *Applied River Morphology*, is currently the most comprehensive and widely used quantitative assessment method for geomorphology. It represents a compilation of much of the early work in applied fluvial geomorphology and relies largely on the identification of bankfull field indicators. The bankfull discharge is the flow event that fills a stable alluvial channel up to the elevation of the active floodplain (Rosgen, 1996). Dunne and Leopold (1978) first developed hydraulic geometry relationships for the bankfull stage, also called regional curves. Most river engineers and hydrologists work under the assumption that the bankfull discharge is equivalent to the channel forming or dominant discharge in geomorphic classification and in analog and empirical design methods. The bankfull discharge is the only discharge that can be easily identified in the field using physical indicators; therefore it is one of the most commonly used in natural channel design. Additional information about Rosgen is available in Chapter 7.

Moment-in-time stream classifications provide insights into the existing form of the stream and can help to define design parameters and understand potential modifications in reference to existing conditions. Stream classification offers a way to categorize streams based on channel morphology. The older classification systems were largely qualitative descriptions of stream features and landforms and were difficult to apply universally. In 1994, Rosgen published *A Classification of Natural Rivers*. Because of its relative simplicity and usefulness in stream restoration, the Rosgen classification system has become popular among hydrologists, engineers, geomorphologists, and biologists working to restore the biological function and stability of degraded streams. The classification consists of 41 major stream types for which stream channel stability and stream bank erosion potential can be assessed. From the assessment, structures for in-stream and stream bank restoration or modification can be selected. When planning stream restoration projects, it is important for the planning team to use a multidisciplinary approach that includes consideration of hydraulics, hydrology, water quality, geomorphological processes, and biological interactions to develop and implement a successful restoration. Chapter 7 provides additional detailed information on stream classification practices.

In site selection, geomorphic assessments can determine if a site is unstable and in need of some form of restoration activity. During design, geomorphic assessments can be used in combination with hydrologic, hydraulic, and/or sediment transport analyses to define design elements such as channel slope and hydraulic geometry.

Sediment transport analysis in rivers and streams is used to approximate the amount of sediment being moved by flow event scenarios and to determine where it will be deposited. Modeling the sediment transport capacity of a channel and its predicted sediment deposition patterns are important for assessing existing and proposed channel design projects to estimate potential project impacts. Sediment transport analysis is also useful for determining restoration opportunities in existing channelization and channel modification projects. Sediment transport analysis is often coupled with stable channel analyses methods to refine channel geometries to estimate optimal scour and deposition characteristics (Schulte et al., 2000). A good source of technical information on sediment transport analysis can be found in *River Engineering for Highway Encroachments* (FHWA, 2001).

Sediment transport analysis has been used in many projects, including:

- Channel design projects (Schulte et al., 2000)
- Stream restoration design (Copeland et al., 2001; Shields et al., 2003)
- Flood control projects (USACE, 1994)
- Highway projects that include stream crossings (FHWA, 2001)

In the design of new channelization projects and analysis of existing projects, channels are typically evaluated using channel stability methods and then the analysis is refined using sediment transport models. Sediment transport analysis is used to refine geometry so that scour and deposition are minimized. It is also used to determine the optimum grade control structure elevation and placement and to find the excavation depths in depositional zones to minimize operational costs for maintaining the channel geometry (Schulte et al., 2000).

The methods and techniques used to accomplish a geomorphic assessment should be project-specific and conducted by personnel trained in applied fluvial geomorphology. Geomorphic assessment of streams has evolved rapidly over the past 10–15 years. Initial methodologies tended to be tailored for localized applications and required extensive data collection and validation. Rosgen's methodology provides a more universal approach to stream classification that represents trade-offs between data collection needs and ease of application for many different stream types. The challenge to this type of modeling and assessment has always been to balance the complexity and need for extensive data collection with ease of use and reliability of the results. The key is that the geomorphic assessment must provide a fundamental understanding of the linkage between river form and process. The assessment should provide insight into where the stream has been, is now, and in what direction it is moving. It should also place the project reach in the context of broader system wide adjustment processes. Geomorphic assessment can be used to select sites for restoration and develop designs.

Expert Judgment and Checklists

Approaches using expert judgment and checklists developed based on experience acquired in previous projects and case studies may be very helpful in integrating environmental goals into project development. The USACE used this concept of incorporating environmental goals into project design (Shields and Schaefer, 1990) in the development of a computer-based system for the environmental design of waterways (ENDOW). The ENDOW system is composed of three modules: a streambank protection module, a flood control channel module, and a streamside levee module. The three modules require the definition of the pertinent environmental goals to be considered in the identification of design features. Depending on the environmental goals selected for each module, ENDOW will display a list of comments or cautions about anticipated impacts and other precautions to be taken into account in the design.

Another example of using expert judgment is the Proper Functioning Condition (PFC) technique. PFC was developed by the Bureau of Land Management (BLM) to rapidly assess whether a stream riparian area is functioning properly in terms of hydrology, landform/soils, channel characteristics, and vegetation. The assessment is performed by an interdisciplinary team and involves completing a checklist evaluating 17 factors concerning hydrology, vegetation, and erosional/depositional characteristics. The PFC field technique is not quantitative, but with adequate training, results are reproducible to a high degree (FISRWG, 1998).

Operation and Maintenance Activities

Implementation practices for instream and riparian habitat restoration in planned or existing modified channels are consistent with those management practices for physical and chemical characteristics of channelized or modified surface waters. To prevent future impacts to instream or riparian habitat or to solve current problems caused by channelization or channel modification projects, include one or more of the following practices to mitigate the undesirable changes:

- Bank shaping and planting
- Branch packing
- Brush layering
- Brush mattressing
- Bulkheads and seawalls

- Check dams
- Coconut fiber roll
- Dormant post plantings
- Erosion and Sediment Control (ESC) Plans
- Establish and protect stream buffers
- Joint plantings
- Levees, setback levees, and floodwalls
- Live cribwalls
- Live fascines
- Live staking
- Marsh creation and restoration
- Noneroding roadways
- Return walls
- Revetments
- Riparian improvements
- Riprap
- Root wad revetments
- Rosgen's Stream Classification Method
- Setbacks
- Toe protection
- Tree revetments
- Vegetated buffers
- Vegetated gabions
- Vegetated geogrids
- Vegetated reinforced soil slope (VRSS)
- Wing deflectors

Additional information about each of the above practices is available in Chapter 7. The Additional Resources section provides a number of sources for obtaining information about the effectiveness, limitations, and cost estimates for these practices.

Operation and maintenance programs should weigh the benefits of including practices such as those for mitigating any current or future impairments to instream or riparian habitat. Additional information about these practices can be found in Chapter 7. Also, Fischenich and Allen (2000) provide a comprehensive summary of practices that can be evaluated for use in operation and maintenance programs.

Chapter 4: Dams

Dams are a common form of hydromodification. The National Research Council estimated that there were more than 2.5 million dams in the United States in 1992 (NRC, 1992). These dams range in size from berms across small streams that create farm ponds to large concrete structures across major rivers for hydropower and flood control. The USACE estimates (of these 2.5 million dams in the United States) about 79,000 are large enough to be included in the National Inventory of Dams (USACE, n.d.b.).[1]

Dams generally were built to store and provide water for mechanical power generation (e.g., waterwheels to mill grain), industrial cooling, hydroelectric power generation, agricultural irrigation, municipal water supplies for human consumption, and impoundment-based recreation (e.g., boating and sport fishing). Dams are also used for flood control and to maintain channel depths for barge transportation.

Dams can be associated with a number of effects, including changes to hydrology, water quality, habitat, and river morphology. Lakes and reservoirs integrate many processes that take place in their contributing watersheds, including processes that contribute energy (heat), sediment, nutrients, and toxic substances. Human activities, such as agricultural and urban land use, contribute to contaminant and sediment loads to reservoirs. The presence and operation of dams can determine the fate of these pollutants in a reservoir or impoundment and potentially downstream as water is released from the dam. For example, the presence of a dam may lead to sediment accumulation in a reservoir. However, there are management practices that can mitigate this integrative effect of a reservoir. One example is selective withdrawals, which are an operational technique that can be used by some dam operators to provide water quality and temperatures necessary to sustain downstream fish populations.

When dams are built, depending on size and design, they may alter the river system structure, causing it to change from a river (flowing) to lake (static) and back to a river (flowing) system.

[1] With the National Dam Inspection Act (P.L. 92-367) of 1972, Congress authorized the U.S. Army Corps of Engineers (USACE) to inventory U.S. dams. The Water Resources Development Act of 1986 (P.L 99-662) authorized USACE to maintain and periodically publish an updated National Inventory of Dams (NID).

Dams with large storage capacities will, by design, retain water longer than those with little storage. This can change system flow patterns, which can affect water quality and habitat upstream and downstream of the dam. Most effects from dams are observed downstream. Table 4.1 provides a description of several common types of dams.

Table 4.1 Types of Dams (FEMA, 2003)

Type of Dam	Description
Ambursen dam	A buttress dam in which the upstream part is a relatively thin, flat slab usually made of reinforced concrete
Arch dam	A concrete, masonry, or timber dam with the alignment curved upstream so as to transmit the major part of the water load to the abutments
Buttress dam	A dam consisting of a watertight part supported at intervals on the downstream side by a series of buttresses
Crib dam	A gravity dam built up of boxes, crossed timbers, or gabions, filled with earth or rock
Diversion dam	A dam built to divert water from a waterway or stream into a different watercourse
Double curvature arch dam	An arch dam that is curved both vertically and horizontally
Earth dam	An embankment dam in which more than 50% of the total volume is formed of compacted earth layers that are generally smaller than 3-inch size
Embankment dam	Any dam constructed of excavated natural materials, such as both earthfill and rockfill dams, or of industrial waste materials, such as a tailings dam
Gravity dam	A dam constructed of concrete and/or masonry, which relies on its weight and internal strength for stability
Hollow gravity dam	A dam constructed of concrete and/or masonry on the outside but having a hollow interior and relying on its weight for stability
Hydraulic fill dam	An earth dam constructed of materials, often dredged, which are conveyed and placed by suspension in flowing water
Industrial waste dam	An embankment dam, usually built in stages, to create storage for the disposal of waste products from an industrial process
Masonry dam	Any dam constructed mainly of stone, brick, or concrete blocks pointed with mortar
Mine tailings dam (or tailings dam)	An industrial waste dam in which the waste materials come from mining operations or mineral processing
Multiple arch dam	A buttress dam comprised of a series of arches for the upstream face
Overflow dam	A dam designed to be overtopped
Regulating dam (or afterbay dam)	A dam impounding a reservoir from which water is released to regulate the flow downstream
Rock-fill dam	An embankment dam in which more than 50% of the total volume is comprised of compacted or dumped cobbles, boulders, rock fragments, or quarried rock generally larger than 3-inch size
Roller compacted concrete dam	A concrete gravity dam constructed by the use of a dry mix concrete transported by conventional construction equipment and compacted by rolling, usually with vibratory rollers
Rubble dam	A stone masonry dam in which the stones are unshaped or uncoursed
Saddle dam (or dike)	A subsidiary dam of any type constructed across a saddle or low point on the perimeter of a reservoir

Siting, construction, operation, maintenance, and removal of dams can lead to nonpoint source (NPS) effects. For example, siting of dams can result in inundation of wetlands, riparian areas, and fastland in areas upstream of the dam. During construction or maintenance, erosion and soil loss occurs. Proper siting and design help prevent erosion prone areas from being developed. For dams actively controlled by human operators, dam operation and the amount of water released can affect downstream areas when flood waters necessary to deliver sediment are restricted, or when controlled releases from dams change the timing, quantity, or quality of downstream flow. While removal of dams can lead to physical and biological impacts, such as temporary increased turbidity from redistribution of sediment previously stored behind the dam or displacement of warm-water species that prefer lake-like conditions, dam removal has many biological and habitat benefits, such as allowing for easier fish movement and a return of natural stream temperatures and dissolved oxygen. Sometimes, however, dams limit passage of undesirable invasive species. Therefore, a comprehensive evaluation of the benefits and limitations resulting from the presence of a dam should be completed when evaluating operation and maintenance procedures, as well as options for removal. A more detailed discussion of water quality, biological, habitat, physical, and chemical changes from dam removal is provided in Chapter 2.

One opportunity to evaluate and address the NPS impacts of some larger dams that are used for hydropower occurs during the licensing/relicensing process. The Federal Power Act (FPA) requires all nonfederal hydropower projects located on navigable waters to be licensed. The FPA (16 U.S.C. 791-828c) was originally enacted as the Federal Water Power Act in 1920 and was made part of the FPA in 1935. The Federal Energy Regulatory Commission (FERC) is the independent regulatory agency within the Department of Energy that has exclusive authority, under the FPA, to license such projects. The hydropower dam relicensing process offers an opportunity to assess the balance between natural resources and the generation of electricity and to address some areas that are determined to be problematic. Stakeholders, including dam owners and operators, local governments, environmental groups, and the public, often have different interests to be balanced. Through the FPA and the relicensing process, these varied interests can be evaluated and a balanced outcome can be derived. In conjunction with FPA licensing requirements, states and authorized tribes certify that discharges (including those that originate from dams) meet water quality standards under section 401 of the Clean Water Act (CWA).

The FPA also requires relicensing to be conducted in light of recent laws and regulations that are in effect at the time of renewal. As regulations related to hydropower dams change, it is possible that many dams that were previously licensed and are up for relicensing may no longer be in compliance with current regulatory standards. For example, many dams were built prior to the CWA, which includes regulatory requirements for protecting and maintaining designated uses (such as protecting desired aquatic life or maintaining bacterial water quality that is protective of human health for all recreational activities). Other regulatory requirements that may be evaluated during relicensing include protections for wetlands, aquatic habitat, and endangered species.[2]

[2] Additional information about FERC and hydropower licensing/relicensing is available at http://www.ferc.gov.

Management Measure 3: Erosion and Sediment Control for the Construction of New Dams and Maintenance of Existing Dams

Management Measure 3
1) Reduce erosion and, to the extent practicable, retain sediment onsite during and after construction. 2) Prior to land disturbance, prepare and implement an approved erosion and sediment control plan or similar administrative document that contains erosion and sediment control provisions.

The purpose of this management measure is to prevent sediment from entering surface waters during the construction or maintenance of dams. This management measure emphasizes the importance of minimizing sediment loss to surface waters during both dam construction and maintenance. It is essential that proper erosion and sediment control practices be used to protect surface water quality because of the high potential for sediment loss directly to surface waters. Sediment and erosion control practices can be borrowed from other applications, such as urban development and construction activities.

Two broad performance goals constitute this management measure: minimizing erosion and maximizing the retention of sediment onsite. These performance goals allow for site-specific flexibility in specifying practices appropriate for local conditions. Regular inspections of a dam are valuable opportunities for dam owners to identify erosion problems and implement sediment controls to protect the integrity of the dam. Since the number of new dam construction projects is relatively small compared to the number of existing dams, operation and maintenance activities offer significantly more opportunities to prevent NPS problems associated with erosion and sediment control.

Dam owners are encouraged to establish a program of regular safety inspection of the dam's infrastructure and dam maintenance. Safety inspection of a dam is a program of regular visual inspection using simple equipment and techniques. These inspections are often an economical means of ensuring the long-term safety and survival of a dam structure. By regularly monitoring the condition and performance of the dam and its surroundings, adequate warning of potentially unsafe conditions will enable timely maintenance. Being able to recognize the signs of potential problems and failure, as well as what to do and whom to contact, is vital. Partial or total failure of a dam may cause extensive damage to downstream areas, including loss of life, property damage, and impacts to wetlands, riparian areas, stream channels, and other ecologically important lands, for which the owner may be held liable. There are also potentially expensive repair costs and lost income that may result from failures or poorly maintained dam structures.

The primary areas of dam structural failure are:

- Loss of clay soils used in berms and other earthen structures
- Seepage and leakage at the base or along pipes
- Erosion, including wave action, stock damage and spillways
- Cracking and movement of structural components
- Defects in associated structures
- Vegetation, including catchment protection and weed control

Operation and maintenance should be applied to small, as well as large dams. Many owners of small dams, like those on farm ponds, should regularly inspect their dams for maintenance needs. Local NRCS staff can provide technical assistance to small dam owners for operation and maintenance activities.[3]

Regular operation and maintenance efforts can lead to some dams being in need of repairs and/or upgrades. Designs for repairs and upgrades can involve replacing reinforced concrete risers and impact basins, replacing rusted out corrugated metal pipe principal spillways, raising the top of the dams, widening the auxiliary spillways, and removing sediment from the flood pools. Examples of project costs for these types of maintenance activities reported in Ohio have ranged from $175,000 on a small dam to $775,000 on the largest dam (Brate, 2004).

At the state and local levels, this measure can be incorporated into existing erosion and sediment control (ESC) programs. This measure can also be effectively implemented as part of safety inspection requirements. Erosion and sediment control is also intended to be part of a comprehensive land use or watershed management program.

Management Practices for Management Measure 3

The management measure can be implemented by applying one or more management practices appropriate to the source, location, and climate. The practices described below can be applied successfully to implement the management measure for erosion and sediment control for construction of new dams and maintenance of existing dams.

Erosion Control Practices

Successful control of erosion and sedimentation from construction and maintenance activities can involve a system of management practices that targets each stage of the erosion process. The most efficient approach involves minimizing the potential sources of sediment from the onset. This means limiting the extent and duration of land disturbance to the minimum needed, and protecting surfaces once they are exposed. The second stage of the management practice system involves controlling the amount of runoff and its ability to carry sediment by diverting incoming flows and impeding internally generated flows. The third stage involves retaining sediment that is picked up on the project site through the use of sediment-capturing devices. On most sites

[3] Contact your local USDA Service Center (http://offices.sc.egov.usda.gov/locator/app) to access NRCS in your community.

successful erosion and sedimentation control requires a combination of structural and vegetative practices. All of these stages are better performed using advanced planning and good scheduling.

The timing of land disturbing activities and installation of erosion control measures must be coordinated to minimize water quality impacts. For large scale activities, the management practice system is typically installed in reverse order, starting with sediment capturing devices, followed by key runoff control measures and runoff conveyances, and then land clearing activities. Often, construction or maintenance activities that generate significant off-site sediment have failed to sequence activities in the proper order.

Erosion controls reduce the amount of sediment lost during dam construction and prevent sediment from entering surface waters. Erosion control is based on (1) minimizing the area and time of land disturbance and (2) quickly stabilizing disturbed soils to prevent erosion.

The effectiveness of erosion control practices can vary based on land slope, the size of the disturbed area, rainfall frequency and intensity, wind conditions, soil type, use of heavy machinery, length of time soils are exposed and unprotected, and other factors. In general, a system of erosion and sediment control practices can more effectively reduce offsite sediment transport than a single practice. Numerous nonstructural measures such as protecting natural or newly planted vegetation, minimizing the disturbance of vegetation on steep slopes and other highly erodible areas, maximizing the distance eroded material must travel before reaching the drainage system, and locating roads away from sensitive areas may be used to reduce erosion.

The following practices have proven to be useful in controlling erosion and can be incorporated into ESC plans and used during dam construction as appropriate. These practices can be used during and after construction and throughout ongoing maintenance activities.

- Bank shaping and planting
- Branch packing
- Brush layering
- Brush mattressing
- Bulkheads and seawalls
- Check dams
- Coconut fiber roll
- Construct runoff intercepts
- Construction management
- Dormant post plantings
- Erosion and sediment control (ESC) plans
- Erosion control blankets
- Joint planting
- Live cribwalls
- Live fascines
- Live staking
- Locate potential land disturbing activities away from critical areas
- Mulching

- Noneroding roadways
- Phase construction
- Preserve onsite vegetation
- Retaining walls
- Revegetate
- Revetment
- Riparian improvements
- Riprap
- Rootwad revetments
- Scheduling projects
- Sediment fences
- Seeding
- Site fingerprinting
- Sodding
- Soil protection
- Surface roughening
- Training—erosion and sediment control
- Tree armoring, fencing, and retaining walls or tree walls
- Tree revetments
- Vegetated buffers
- Vegetated filter strips
- Vegetated gabions
- Vegetated geogrids
- Vegetated reinforced soil slope (VRSS)
- Wildflower cover
- Wind erosions controls

A more detailed discussion of each of the above practices is provided in Chapter 7.

Runoff Control

To prevent the entry of sediment used during construction into surface waters, these precautionary steps should be followed:

- Identify areas with steep slopes, unstable soils, inadequate vegetation density, insufficient drainage, or other conditions that give rise to a high erosion potential.
- Identify measures to reduce runoff from such areas if disturbance of these areas cannot be avoided (Hynson et al., 1985).

Runoff diversions are structures that channel upslope runoff away from erosion source areas, divert sediment-laden runoff to appropriate traps or stable outlets, or capture runoff before it leaves the site, diverting it to locations where it can be used or released without erosion or flood damage. Diversions can be either temporary or permanent in nature.

Runoff control measures, mechanical sediment control measures, grassed filter strips, mulching, and/or sediment basins could be used to control runoff from the construction site. Scheduling

construction during drier seasons, exposing areas for only the time needed for completion of specific activities, and avoiding stream fording also help to reduce the amount of runoff created during construction.

The largest surface water pollution problem during construction is suspended sediment resulting from aggregate processing, excavation, and concrete work. Preventing the entry of these materials above and/or below a dam is always the preferable alternative because runoff due to these types of construction activities can add more sediment to a reservoir, harm aquatic life above and below the dam, or affect habitat in streams below a dam. Filtration and gravitational settling during detention are the main processes used to remove sediment from construction site runoff. Methods used to control runoff and associated sedimentation from construction sites include:

- Check dams
- Constructing runoff intercepts
- Locate potential land disturbing activities away from critical areas
- Preserve onsite vegetation
- Retaining walls
- Sediment basins/rock dams
- Sediment fences
- Sediment traps
- Vegetated buffers
- Vegetated filter strips

A more detailed discussion of each of the above practices is provided in Chapter 7.

Erosion and Sediment Control (ESC) Plans

ESC plans can be used to control erosion and sediment and incorporate such control in planning. Some states call for specific requirements to be included in state ESC plans. Table 4.2 provides examples of several state ESC plan requirements. Additional detail about ESC plans, including general objectives, and management techniques for ensure proper administration of plans, is available in Chapter 7.

Table 4.2 Examples of Erosion and Sediment Control Plan Requirements for Select States

Location	General Requirements for ESC Plan
Delaware	ESC plans required for sites over 5,000 ft^2. Temporary or permanent stabilization must occur within 14 days of disturbance.
Florida	ESC plans required on all sites that need a runoff management permit.
Georgia	ESC plan required for all land-disturbing activities.
Indiana	ESC plan required for sites over 5 acres.
Maine	ESC plans required for sites adjacent to a wetland or waterbody. Stabilization must occur at completion or if no construction activity is to occur for 7 days. If temporary stabilization is used, permanent stabilization must be implemented within 30 days.
Maryland	ESC plans required for sites over 5,000 ft^2 or 100 yd^3.
Michigan	ESC plans required for sites over 1 acre or within 500 ft of a waterbody. Permanent stabilization must occur within 15 days of final grading. Temporary stabilization is required within 30 days if construction ceases.

Location	General Requirements for ESC Plan
Minnesota	ESC plans required for land development over 1 acre.
New Jersey	ESC plans required for sites over 5,000 ft^2.
North Carolina	ESC plans required for sites over 1 acre. Controls must retain sediment on-site. Stabilization must occur within 30 days of completion of any phase of development.
Ohio	ESC plans required for sites over 5 acres. Permanent stabilization must occur within 7 days of final grading or when there is no construction activity for 45 days.
Oklahoma	ESC plans required for sites over 5 acres.
Pennsylvania	ESC plans required for all sites, but the state reviews only plans for sites over 25 acres. Permanent stabilization must occur as soon as possible after final grading. Temporary stabilization is required within 70 days if construction ceases for more than 30 days. Permanent stabilization is required if the site will be inactive for more than 1 year.
South Carolina	ESC plans required for all sites unless specifically exempted. Perimeter controls must be installed. Temporary or permanent stabilization is required for topsoil stockpiles and all other areas within 7 days of disturbance.
Virginia	For areas within the jurisdiction of the Chesapeake Bay Preservation Act, no more land is to be disturbed than necessary for the project. Indigenous vegetation must be preserved to the greatest extent possible.
Washington	ESC provisions are incorporated into the state runoff management plan.
Wisconsin	ESC plans required for all sites over 4,000 ft^3. Temporary or permanent stabilization is required within 7 days.

(Adapted from Environmental Law Institute, 1998; USEPA, 1993)

Management Measure 4: Chemical and Pollutant Control at Dams

Management Measure 4
1) Limit application, generation, and migration of toxic substances. 2) Ensure the proper storage and disposal of toxic materials. 3) Apply nutrients at rates necessary to establish and maintain vegetation without causing significant nutrient runoff to surface waters.

This management measure is intended to be applied to the construction of new dams, as well as to construction activities associated with the maintenance of dams. This management measure addresses fuel and chemical spills associated with dam construction and operation and maintenance activities, as well as concrete washout and related construction activities. The purpose of this management measure is to prevent downstream contamination from pollutants associated with dam construction and maintenance activities.

Although suspended sediment is the major pollutant generated at a construction site, other pollutants that may be present around dams (especially during construction and operation and maintenance activities) include:

- Petroleum products—fuels and lubricants, specifically gasoline, diesel oil, kerosene, lubricating oils, grease, and asphalt
- Pesticides—insecticides, herbicides, fungicides, and rodenticides
- Fertilizers
- Construction chemicals—acids, soil additives, and concrete-curing compounds
- Wastewater—aggregate wash water, herbicide wash water, concrete-curing water, core-drilling wastewater, or clean-up water from concrete mixers
- Solid wastes—paper, wood, metal, rubber, plastic, and roofing materials
- Garbage
- Sanitary wastes
- Cement
- Lime

This management measure is important because most erosion and sediment control practices are ineffective at retaining soluble NPS pollutants on a construction site. Many of the NPS pollutants, other than suspended sediment, generated at a construction site are carried offsite in solution or attached to clay particles in runoff. Some metals (e.g., manganese, iron, and nickel) attach to larger sediment particles and usually can be retained onsite. Other metals (e.g., copper, cobalt, and chromium) attach to fine clay particles and have greater potential to be carried offsite. Insoluble pollutants (e.g., oils, petrochemicals, and asphalt) form a surface film on runoff water and can be easily washed away (USEPA, 1973; USEPA, 2002b; USEPA, 2005d). Factors that influence the pollution potential of construction chemicals include:

- The nature of the construction and maintenance activity
- The physical characteristics of the construction site
- The characteristics of the receiving water

Dam construction sites are particularly sensitive areas and have the potential to severely impact surface waters with runoff containing construction chemical pollutants. Because dams are located on rivers or streams, pollutants generated at these construction sites have a much shorter distance to travel before entering surface waters. Therefore, chemicals and other NPS pollutants generated at a dam construction site should be controlled.

Management Practices for Management Measure 4

The management measure generally will be implemented by applying one or more management practices appropriate to the source, location, and climate. The practices described below can be applied successfully to implement the control of chemicals and pollutants at dams. This includes dam construction as well as routine maintenance. Practices for controlling chemicals and pollutants include the following:

- Equipment runoff control
- Fuel and maintenance staging areas
- Locate potential land disturbing activities away from critical areas
- Pesticide and fertilizer management
- Pollutant runoff control
- Spill prevention and control program

A more detailed discussion of each of the above practices is provided in Chapter 7.

Management Measure 5: Protection of Surface Water Quality and Instream and Riparian Habitat

Management Measure 5
Develop and implement a program to manage the operation of dams that includes an assessment of: 1) Surface water quality and instream and riparian habitat and potential for improvement. 2) Significant nonpoint source pollution problems that result from excessive surface water withdrawals.

This management measure is intended to be applied to dam operation, maintenance, and removal activities that result in the loss of desirable surface water quality, and of desirable instream and riparian habitat.

The purpose of the management measure is to protect the quality of surface waters and aquatic habitat (including riparian habitat) in the portion of rivers and streams that are impacted by dams. Operation, maintenance, and dam removal activities can be assessed to determine opportunities for potential improvements in water quality and aquatic habitat. These activities, as well as actions within the watershed, that contribute NPS pollutants to an impoundment should be collectively and periodically evaluated to help identify opportunities for cost-effective change.

The recommended overall programmatic approach is to evaluate a set of practices that can be applied individually or in combination to protect and improve surface water quality and aquatic habitat in reservoirs, as well as in areas downstream of dams. Then, a program can be implemented using the most cost-effective operation, maintenance, and removal activities to protect and improve surface water quality and aquatic and riparian habitat.

The individual application of any particular technique, such as aeration, change in operational procedure, restoration of an aquatic or riparian habitat, or implementation of a watershed protection best management practice (BMP), will, by itself, probably not improve water quality to an acceptable level within the reservoir impoundment or in tailwaters flowing through downstream areas. The individual practices discussed in this portion of the guidance may have to be implemented in some combination in order to improve water quality in the impoundment or in tailwaters to acceptable levels.

Selection of the management measure for the protection of surface water and instream and riparian habitat was based on:

- The availability and demonstrated effectiveness of practices to improve water quality in impoundments and in tailwaters of dams.

- The level of improvement in water quality of impoundments and tailwaters that can be measured from implementation of engineering practices, operational procedures, watershed protection approaches, or aquatic or riparian habitat improvements.

Successful implementation of the management measure should generally involve the following categories of practices undertaken individually or in combination to improve water quality and aquatic and riparian habitat in reservoir impoundments and in tailwaters:

- Artificial destratification and hypolimnetic aeration of reservoirs with deep withdrawal points that do not have multilevel outlets to improve dissolved oxygen (DO) levels in the impoundment and to decrease levels of other types of NPS pollutants, such as manganese, iron, hydrogen sulfide, methane, ammonia, and phosphorus in reservoir releases.

- Aeration of reservoir releases, through turbine venting, injection of air into turbine releases, installation of reregulation weirs, use of selective withdrawal structures, or modification of other turbine start-up or pulsing procedures.

- Providing both minimum flows to enhance the establishment of desirable instream habitat and scouring flows as necessary to maintain instream habitat.

- Establishing adequate fish passage or alternative spawning ground and instream habitat for fish species.

- Improving watershed protection by installing and maintaining BMPs in the drainage area above the dam to remove phosphorus, suspended sediment, and organic matter and otherwise improve the quality of surface waters flowing into the impoundment.

- Removing dams, which are unsafe, unwanted, or obsolete, after careful consideration of alternatives.

Since the presence and operation of a dam have the potential to cause impacts, periodic assessments of reservoir water quality, watershed activities, and operational practices may provide valuable information for evaluating management strategies. The types and severity of the impacts can serve as an indicator of the frequency and magnitude of the assessments. There are a variety of assessment tools that are available to assist decision-makers in the evaluation of impacts associated with dams. Watershed-related impacts and management activities can be evaluated with a variety of models. EPA supports several models that may be useful for watershed assessments, such as BASINS.[4]

[4] More information about EPA-supported watershed assessment tools can be found at http://www.epa.gov/waterscience/wqm.

Reservoir water quality can also be assessed with various models. Table 8-1 in this document provides a list of models that may be used to assess reservoir water quality. Also presented in Table 8-1 are models that could be used to evaluate downstream impacts of dams.[5]

Management Practices for Management Measure 5

The management measure generally can be implemented by applying one or more management practices appropriate to the source, location, and climate. Management practices that can be used to achieve the management measure include practices to improve water quality, restore or maintain aquatic and riparian habitat, and maintain fish passage, as well as possible removal of dams. The subsection on dam removal includes planning and evaluation considerations, descriptions of the removal process, permitting requests, sediment removal techniques, descriptions of changes associated with dam removal, and a discussion of potential biological impacts.

Practices for Improving Water Quality

Management practices for improving water quality associated with the operation and maintenance of dams can be categorized as:

- Watershed Protection Practices—activities to reduce NPS pollution that take place within the watershed surrounding a dam. Reduced NPS pollutant inputs, such as sediment or nutrients, can have a significant, positive effect on water quality within a reservoir and often in reservoir releases, as well.

- Practices for Aeration of Reservoir Water—aeration activities within the reservoir. The primary goal for aerating a large portion of reservoir water is to increase oxygen levels throughout the reservoir. Other water quality factors may also improve, including levels of dissolved metals and nutrients, destratification of the water column, and improved oxygen levels in releases.

- Practices for Aeration of Reservoir Releases — a variety of aeration techniques for improving water quality, specifically dissolved oxygen levels, are presented.

Management practices to protect surface water quality and instream and riparian habitat are discussed in the following subsections:

- Improving Water Quality
  - Watershed Protection
  - Aeration of Reservoir Water
  - Aeration of Reservoir Releases
- Improving Aquatic Habitat
- Maintaining Fish Passage
- Dam Removal

Improving water quality in impoundments and tailwaters often requires consideration of the interaction of several different factors. For example, achievement of desired DO levels at specific projects may require evaluation of several different technologies and management activities. The U.S. Army Corps of Engineers created a computer-modeling program, AERATE, that performs calculations to

[5] The USACE Environmental Laboratory develops and supports several models, such as QUAL2E, Bathtub, and CE-QUAL-RI that can be found at http://el.erdc.usace.army.mil/products.cfm?Topic=none.

evaluate several direct (e.g., active aeration technologies) and indirect (e.g., activities such as watershed management to reduce nitrogen and phosphorous runoff, which result in improved DO) reservoir aeration techniques. The program considers the following aeration techniques: improving water quality in the reservoir, modifying the withdrawal outlet location (and thereby changing which water is withdrawn and released from the reservoir), treating the release water to eliminate the poor quality as the flow passes through the outlet structure, and treating the release water in the tail water area (Wilhelms and Yates, 1995).

Watershed Protection Practices

Many NPS pollution problems in reservoirs and dam tailwaters frequently result from sources in the contributing watershed (e.g., sediment, nutrients, metals, and toxics). Management of pollution sources from a watershed has been found to be a cost-effective solution for improving reservoir and dam tailwater water quality (TVA, 1988). Watershed protection practices can be effective in producing long-term water quality benefits and lack the high operation and maintenance costs associated with structural controls.

> Additional information about watershed protection, specifically developing and implementing watershed plans, is available from EPA's draft *Handbook for Developing Watershed Plans to Restore and Protect Our Waters*. The handbook is available at http://www.epa.gov/nps.

Watershed protection is a technique that provides long-term water quality benefits, and many states and local communities have adopted this practice. Numerous state and local governments have already legislated and implemented detailed watershed planning programs that are consistent with this management measure. For example, Oregon, New Jersey, Delaware, and Florida have passed legislation that requires county and municipal governments to adopt comprehensive plans, including requirements to direct future development away from sensitive areas. Many municipalities and regions have adopted land use and growth controls, including the towns of Amherst and Norwood and the Cape Cod region of Massachusetts; Narragansett, Rhode Island; King County, Washington; and many others.

Watershed protection management practices fall under the following four categories:

- Encourage drainage protection—includes descriptions and applications of zoning techniques that can be used to limit development density or redirect density to less environmentally sensitive areas.
- Establish and protect stream buffers—describes important steps for protecting or establishing riparian buffer zones to enhance water quality and pollutant removal.
- Identify and address NPS contributions—involves identifying potential upstream sources of nonpoint source pollution, as well as providing solutions to minimize those impacts.
- Identify and preserve critical areas—entails identifying properties that if preserved or enhanced could maintain or improve water quality and reduce the impacts of urban runoff, as well as, preserving environmentally significant areas (includes land acquisition, easements, and development restrictions of various types).

Refer to Chapter 7 for additional information about each of the above practices.

Reservoir Aeration Practices

Systems that have been developed and tested for reservoir aeration rely on atmospheric air, compressed air, or liquid oxygen to increase DO concentrations in reservoir waters. Mixing of reservoir water to destratify warmer, oxygen rich, epilimnion and cooler, oxygen poor, hypolimnion waters can be used. However, this practice has not been used at large hydropower reservoirs because of the associated cost in deep, large volume reservoirs. Refer to Chapter 7 for additional information about reservoir aeration practices.

Practices to Improve Oxygen Levels in Tailwaters

Aeration of water as it passes through the dam or through the portion of the waterway immediately downstream from the dam is another approach to improving DO in water releases from dams. The systems in this category rely on agitation and turbulence to mix the reservoir releases with atmospheric air. One approach involves the increased use of spillways, which release surface water to prevent it from overtopping the dam. An alternative approach is to install barriers called weirs in the downstream areas. Weirs are designed to allow water to overtop them, which can increase DO through surface agitation and increased surface area contact. Some of these downstream systems create supersaturation of dissolved gases and may require additional modifications to prevent supersaturation, which may be harmful to aquatic organisms.

The quality of reservoir releases can be improved through adjustments in the operational procedures at dams. These include scheduling of releases or of the duration of shutoff periods, instituting procedures for the maintenance of minimum flows, making seasonal adjustments in the pool levels or in the timing and variation of the rate of drawdown, selecting the turbine unit that most increases DO (often increasing the DO levels by 1 mg/L), and operating more units simultaneously (often increasing DO levels by about 2 mg/L). The magnitude and duration of reservoir releases also should be evaluated to determine impacts to the salinity regime in coastal waters, which could be substantially altered from historical patterns.

Two factors should be considered when evaluating the suitability of hydraulic structures such as spillways and weirs for their application in raising the DO concentration in waterways:

- Most of the measurements of DO increases associated with hydraulic structures have been collected at low-head facilities. The effectiveness of these devices may be limited as the level of discharge increases (Wilhelms, 1988).

- The hydraulic functioning of these types of structures should be carefully considered since undesirable flow conditions may occur in some instances (Wilhelms, 1988).

Practices that improve oxygen levels in tailwaters include:

- Gated conduits
- Labyrinth weirs
- Modifying operational procedures
- Reregulation weirs
- Selective withdrawal

- Spillway modifications
- Turbine operation
- Turbine venting
- Water conveyances

Additional information about each of these practices is available in Chapter 7.

Practices to Restore or Maintain Aquatic and Riparian Habitat

Several options are available for the restoration or maintenance of aquatic and riparian habitat in the area of a reservoir impoundment or in portions of the waterway downstream from a dam. One set of practices is designed to augment existing flows that result from normal operation of the dam. These include operation of the facility to produce flushing flows, minimum flows, or turbine pulsing. Another approach to producing minimum flows is to install small turbines that operate continuously. Installation of reregulation weirs in the waterway downstream from the dam can also achieve minimum flows. Finally, riparian improvements are discussed for their importance and effectiveness in restoring or maintaining aquatic and riparian habitat in portions of the waterway affected by the location and operation of a dam.

A 2004 report from the National Academies' National Research Council (NRC, 2004) illustrates the importance of maintaining instream flows and critical wildlife habitat in streams where dams are present and notes that areas along Nebraska's Platte River are properly designated as "critical habitats" for the river's endangered whooping crane and threatened piping plover. A series of dams and reservoirs have been constructed in the river basin for flood control and to provide water for farm irrigation, power generation, recreation, and municipal use. The alterations to the river and surrounding land caused by this extensive water-control system, however, resulted in habitat changes that were at odds with the protection of the listed species.

Conflicts over the protection of federally listed species and water management in the Platte River Basin have existed for more than 25 years. In recent years, the Fish and Wildlife Service of the U.S. Department of the Interior issued a series of biological opinions indicating that new water depletions would have to be balanced by mitigation measures, and a lawsuit forced the designation of "critical habitat" for the piping plover. These and other controversies prompted the Department of the Interior and the Governance Committee of the Platte River Endangered Species Partnership to request that the National Research Council examine whether the current designations of "critical habitat" for the whooping crane and piping plover are supported by existing science. The National Research Council was also asked to assess whether current habitat conditions are affecting the survival of listed species or limiting their chances of recovery, and to examine the scientific basis for the department's instream-flow recommendations, habitat-suitability guidelines, and other decisions. The report concludes that in most instances habitat conditions are indeed affecting the likelihood of species survival and recovery.

Additional information about the following practices to restore or maintain aquatic and riparian habitat are available in Chapter 7:

- Constructed spawning beds
- Flow augmentation

- Riparian improvements
- Spillway modifications

Practices to Maintain Fish Passage

Migrating fish populations may be unable to travel up or downstream because of the presence of a dam or suffer losses when passing through the turbines of hydroelectric dams at facilities that have not been equipped with special design features to accommodate fish passage. The effect of dams and hydraulic structures on migrating fish has been studied since the early 1950s in an effort to develop systems or identify operating conditions that would minimize mortality rates. Selecting a device or management strategy for optimal fish passage in a stream or river with a dam requires careful analysis of a variety of factors, such as species, type and operational strategy of the dam, and the physical characteristics of the river system.

Larinier (2000) reports that devices such as fish ladders and bypass channels can help fish travel past dams, but may result in increased mortality due to the hardship and stress involved with passing through these structures. In addition, the fish passage structures have to be placed in a suitable entrance location, have a flow that is attractive to the species of concern, be continually maintained, and possess the hydraulic conditions necessary for the target species (Larinier, 2000). With all of these requirements, the success of a fish ladder or similar device is often uncertain. Passage through the hydraulic turbines of a hydropower dam can cause increased stress as a result of changes in velocity or pressure and the possibility of electric shocks from the turbines and can lead to increased mortality (Larinier, 2000).

The safe passage of fish either upstream or downstream through a dam requires a balance between operation of the facility for its intended uses and implementation of practices that will ensure safe passage of fish. The United States Congress' Office of Technology Assessment (OTA) report on fish passage technologies at hydropower facilities provides an excellent overview of fish passage technologies and discusses some of the economic considerations associated with the safe passage of fish (OTA, 1995).

The U.S. Fish and Wildlife Service and its partners have created a database that makes information about barriers to fish passage in the United States available to policy makers and the public. The database, known as the Fish Passage Decision Support System (FPDSS),[6] is part of the U.S. Fish and Wildlife Service's National Fish Passage Program.[7]

Available fish-protection systems for hydropower facilities fall into one of four categories based on their mode of action (Stone and Webster, 1986): behavioral barriers, physical barriers, collection systems, and diversion systems. These are discussed in separate sections below, along with additional practices that have been successfully used to maintain fish passage: spill and water budgets, fish ladders, fish lifts, advanced hydroelectric turbines, transference of fish runs, and constructed spawning beds.

[6] https://ecos.fws.gov/fpdss/index.do
[7] http://www.fws.gov/fisheries/fwma/fishpassage

Upstream fish passage systems have been constructed at approximately 10 percent of the FERC licensed hydropower plants. Upstream fish passage systems such as fish ladders and lifts are considered adequately developed for anadromous species such as salmon, American shad (*Alosa sapidissima*), alewives (*Alosa pseudoharengus*), and blueback herring (*Alosa aestivalis*). Fish passage systems for riverine fish have not been specifically designed, although some of these species will use fish passage systems designed for anadromous species (OTA, 1995).

Practices include:

- Advanced hydroelectric turbines
- Behavioral barriers
- Collection systems
- Fish ladders
- Fish lifts
- Physical barriers
- Spill and water budgets
- Transference of fish runs

Additional information about the above practices is available in Chapter 7.

Removal of Dams

The removal of dams has become an accepted practice for dam owners to deal with unsafe, unwanted, or obsolete dams. Dam removal may be necessary as dams deteriorate, sediments accumulate behind dams in reservoirs, human needs shift, and economics dictate (NRC, 1992). Dams serve a variety of important social and environmental purposes (e.g., water supply, flood control, power generation, wildlife habitat, and recreation). As a result, dam removal is often infrequent.

Dam Removal Resource

American Rivers is a nonprofit organization focusing on the health of U.S. river systems, fish, and wildlife. American Rivers' website hosts a variety of information related to hydromodification, including past and recent estimates of dam removals in the United States. http://www.americanrivers.org

Migratory fish passage throughout United States rivers and streams is obstructed by over 2 million dams and many other barriers such as blocked, collapsed, and perched culverts. The National Oceanic and Atmospheric Administration (NOAA) is expanding its community-based approach to restoring fish habitat through the recently developed Open Rivers Initiative (ORI).[8] Administered by NOAA Fisheries Service Office of Habitat Conservation, ORI is designed to help communities correct fish passage problems by focusing financial and technical resources on the removal of obsolete dams and other blockages. ORI strives to restore vital habitat for migrating fish like salmon, striped bass, sturgeon, and shad, as well as improve community safety and stimulate economic revitalization of riverfront communities. Through its more broadly focused Community-based Restoration Program (CRP), NOAA Fisheries Service has opened over 700 miles of stream habitat with financial and technical assistance provided to fish passage

[8] http://www.nmfs.noaa.gov/habitat/restoration/ORI

projects. Examples of successfully completed CRP projects that fit the Open Rivers Initiative model include:

- Culvert removal in the John Smith Creek (Mendocino County, CA)
- Mt. Scott Creek dam removal (Happy Valley, OR)
- Wyomissing Creek dam removal (Reading, PA)
- Town Brook dam removal and fish ladder (Plymouth, MA)
- Sennebec dam removal (Union, ME)

There are many things to consider when removing a dam, one of which is the function(s) of the dam and the status of that function (active vs. inactive). As discussed above, dams are used for various purposes, including water supply, hydroelectric power, recreation, and flood control benefits. When proposals are made to remove a dam with one or more of these active functions, the way in which these functions and benefits will be replaced or mitigated must be addressed (FOR, 1999). An example of this process can be seen with the Jackson Street Dam, located on Bear Creek in Medford, Oregon. The dam diverted water from the creek into the irrigation canals of Rogue River Valley Irrigation District (RRVID). Since the dam created a partial barrier to migratory fish, a loss of stream habitat, and an algae-filled impoundment near the city park, a consensus was reached that removing the dam was the most cost-efficient means of eliminating the problem. However, since the dam was currently providing irrigation diversion, another cost-efficient diversion had to be devised for RRVID. The decision was made to replace the old dam with a less damaging diversion structure. The new structure is approximately one-fourth the height of the Jackson Street Dam (about 3 feet) and is located 1,200 feet upstream. The new structure is also removed at the end of the irrigation season, which coincides with the time of the year when most upstream migration occurs. When the new structure is in place during the irrigation season, it allows fish to migrate (by well-designed fish ladders and screens), and it was designed so that little water will back up behind it. It is also equipped with fish screens to keep fish out of the irrigation canal (FOE et al., 1999).

It is also important to consider the cost of removing a dam, and who will pay for the removal. Removal costs can vary from tens of thousands of dollars to hundreds of millions of dollars, depending on the size and location of the dam. Who pays for dam removal can be a complex issue. Removal in the past has often been financed by the dam owner; local, state, and federal government; and in some cases agreements where multiple stakeholders cover the costs (American Rivers, n.d.a.). A guide to selected funding sources (*Paying for Dam Removal: A Guide to Selected Funding Sources)*[9] is available from American Rivers.

> Dam owners are responsible to keep the dam safe. When a dam begins to fail or breach, a decision must be made as to whether to keep or repair the structure. When a dam generates no revenue, the long-term costs of liability insurance, dam and impoundment maintenance, and operation weigh heavily on the side of dam removal. On average, dam removal costs 3–5 times less than repair.
>
> Source: Delaware Riverkeeper, n.d.

[9] http://www.americanrivers.org/site/DocServer/pdr-color.pdf?docID=727

In the case of the Jackson Street Dam, the most cost-effective alternative to solving the problems associated with the dam was to remove it. However, since it was currently functioning, an alternative means to provide that function was needed. In some instances, it is not more beneficial to remove the dam if it is functioning. For example, USACE expressed concern over the costs of air pollution created by fuel-burning power plants needed to replace the lost power from dams in the debate over the removal of the Snake River dams (Lee, 1999). There was much controversy over whether it was more cost-efficient to remove the dams, especially due to the functions the dams provided. USACE found that replacing the dams would be costly, both monetarily and ecologically. The estimated costs to replace the lower Snake hydropower were between $180 million to $380 million a year for 100 years (Lee, 1999). In addition, the cost of the resulting increase in pollution due to natural gas or coal replacement plants was very high, yet an actual amount was not determined.

Evaluations made by the USACE found that the costs associated with removing the Snake River dams greatly exceeded the costs of maintaining, improving, and keeping them (Associated Press, 2002). Therefore, the dams along the Snake River remain and have been repaired. USACE plans to pursue technical and operational changes at the Snake River dams to improve fish survival, in addition to barging or trucking juvenile salmon around the dams (Associated Press and the Herald Staff, 2002).

The entire decision-making process is a delicate balance that involves many stakeholders. One important step in this process is to decide if the ecological benefits of removing the dam outweigh the benefits of maintaining the dam.

When deciding whether to remove a dam, interested parties should collect as much information as possible about the potential removal project. American Rivers has published a fact sheet (*Data Collection: Researching Dams and Rivers Prior to Removal*),[10] which contains a variety of sources to help begin researching the particular dam that might be removed and the river on which it is located (American Rivers, n.d.b.).

American Rivers and Trout Unlimited have published a guide to help decide whether to remove a dam or not, *Exploring Dam Removal: A Decision-Making Guide* (American Rivers and Trout Unlimited, 2002).[11]

Repercussions of Unsafe Dams (American Rivers, 1999)

Unsafe dams may result in:

1. Loss of life from surging flows if a dam fails
2. Destruction of property
3. Harm to the downstream river environment (e.g., erosion)
4. Release of toxic sediments (e.g., dioxins, PCBs)
5. Risk to users of the river (i.e., users may not be able to avoid life threatening hazards if in close approximation to a failing dam)
6. Jeopardizing delivery of critical services to communities (e.g., power generation, flood control)

The decision-making process related to dam removal is often complex with inputs from stakeholders with opposing desired outcomes. Additional resources related to dam removal are available in the Resources chapter.

[10] http://www.americanrivers.org/site/DocServer/Reseaching_a_Dam_Data_Collection.pdf?docID=981
[11] http://www.americanrivers.org/site/DocServer/Exploring_Dam_Removal-A_Decision-Making_Guide.pdf?docID=3641

Chapter 5: Streambank and Shoreline Erosion

Figure 5.1 Shoreline Erosion: Before and After Photos (SEAS, 2007)

Streambanks and shorelines naturally erode. Water flowing along (parallel to) streambanks dislodges sediment and other materials that constitute the streambank. Similarly, water flowing perpendicular to shorelines, due to waves or tides, transports sediment and other materials away from the shoreline. Anthropogenic influences change the natural erosion processes, often increasing erosion locally and sedimentation downstream, along adjacent shorelines, or offshore. Many human activities change the hydraulic characteristics of stream flows or transfer energy to adjacent shorelines and contribute to increased streambank and shoreline erosion, for example:

- *Urbanization* that leads to changes in imperviousness creates changes in the hydraulics of water during wet weather events. Increased imperviousness can result in flashier runoff events that are shorter in duration with greater flow rates and more erosive force.
- *Agricultural practices*, such as drainage ditches, can change the characteristics of subsurface water flows into receiving streams. These changes result in less subsurface water storage and often increase stream flows during and after storms.
- *Livestock grazing* may reduce vegetative cover, which can result in more erosion on uplands and increased sediment and other pollutant loads in streams. Livestock that are allowed direct access to streams can significantly increase streambank erosion and destroy important riparian habitat.
- *Roads* built in rural areas, such as forest and recreational roads, alter the natural landscape and can destroy riparian habitat. If not properly installed and maintained, these types of roads erode and supply increased sediment and pollutants to adjacent streams. Additionally, roads may increase imperviousness, which leads to flashier runoff events. Stream crossings associated with rural roads can block fish passage, trap debris during storms, and lead to increased streambank erosion in nearby areas.
- *Marinas* can alter local wave and tidal flow patterns, resulting in transference of wave and tidal energy to adjacent shorelines.
- *Channelization or channel straightening* sometimes results in an increase in the slope of a channel, which causes an increase in stream flow velocities. Channel modifications to reduce flood damage, such as levees and floodwalls, often narrow the stream width, increasing the velocity of the water and thus its erosive potential. In addition, newly

constructed banks are generally more prone to erosion than "seasoned" banks and are more likely to require bank stabilization.

- *Dams* alter the flow of water, sediment, organic matter, and nutrients, resulting in both direct physical and indirect biological effects. The impact of a dam on a stream corridor can vary, depending on the purposes of the dam and its size in relation to stream flow. Varying discharges released from a hydropower dam can be a significant factor increasing streambank erosion. When dams are a barrier to the flow of sediment and organic materials, the decreased suspended sediment load in release waters may lead to scouring of downstream streambeds and streambanks.

In summary, these anthropogenic factors can affect the state of equilibrium in streams or along shorelines. The typical chain of events that follows the disturbance to a stream corridor or shoreline can be described as changes in:

- Hydrology
- Stream hydraulics
- Morphology
- Factors such as sediment transport and storage
- Alterations to the biological community
- Impervious cover

Management Measure 6: Eroding Streambanks and Shorelines

Management Measure 6
1) Where streambank or shoreline erosion is a nonpoint source (NPS) pollution problem, streambanks and shorelines should be stabilized. Vegetative methods are strongly preferred unless structural methods are more effective, considering the severity of stream flow discharge, wave and wind erosion, and offshore bathymetry, and the potential adverse impact on other streambanks, shorelines, and offshore areas. 2) Protect streambank and shoreline features with the potential to reduce NPS pollution. 3) Protect streambanks and shorelines from erosion due to uses of either the shorelands or adjacent surface waters.

Typically, several streambank and shoreline stabilization techniques may be used to effectively control erosion wherever it is a source of nonpoint pollution. Often a combination of techniques may be necessary to effectively control conditions that are causing the increased erosion. Techniques involving marsh creation and vegetative bank stabilization ("soil bioengineering") will usually be effective at sites with limited exposure to strong currents or wind-generated waves. In cases with increased erosional forces, an integrated approach that employs the use of structural systems in combination with soil bioengineering techniques can be utilized. The use of harder, more structural approaches, including beach nourishment and coastal or riparian structures, may need to be considered in areas facing severe water velocities or wave energy. In addition to controlling the sources of sediment contributed to surface waters, which are causing nonpoint source (NPS) pollution, these techniques can halt the destruction of wetlands and riparian areas located along the shoreline. Once affected streambanks and shorelines are protected, they can serve as a filter for surface water runoff from upland areas, or as a temporary sink for nutrients, contaminants, or sediment already present as NPS pollution in surface waters.

Stabilization practices involving vegetation or engineering structures should be properly designed and installed. These techniques should be applied only when there will be no adverse effects to aquatic or riparian habitat, or to the stability of adjacent shorelines. In addition to activities that are applied directly to an eroding streambank or shoreline, there may be opportunities to promote institutional measures that establish minimum setback requirements or a buffer zone to reduce concentrated flows and promote infiltration of surface water runoff in areas adjacent to the shoreline.

Stream-friendly Project Tips

Before Construction
Involve your neighbors to increase project success
Get the necessary permits
Flag and avoid disturbing wetlands
Preserve existing native trees and shrubs
Cut trees and shrubs rather than ripping them out of the ground (many may resprout)
Make a plan to replant disturbed areas and use native plants
Install sediment-control practices (e.g., coffer dams)

During Construction
Stockpile fertile topsoil for later use for plants
Use hand equipment rather than heavy equipment
If using heavy equipment, use wide-tracks or rubberized tires
Work from the streambank, preferably on the higher, non-wetland side
Avoid instream work except as authorized by your local fishery and wildlife authority
Stay 100 feet away from water when refueling or adding oil
Avoid using wood treated with creosote or copper compounds

After Construction
Keep out people and livestock during plant establishment
Check project after high flows
Water plants during *droughts*
Control grass until trees and shrubs overtop grass, usually two to three years

Source: SWCD. No date. *Protecting Streambanks from Erosion: Tips for Small Acreages in Oregon*. Washington County Soil and Water Conservation District and the Small Acreage Steering Committee, Oregon Association of Conservation Districts. http://www.or.nrcs.usda.gov/news/factsheets/fs4.pdf. Accessed June 2003.

Initially project planners can consider whether a complete removal or reversal of the causative effects is possible. For example, when evaluating restoration sites affected by upstream armoring and urbanization, rather than adding armoring to the downstream site that is eroding, the planning team may consider whether changes to operations up stream can be made. Next, activities to improve existing erosion damage may be examined. The alteration of operation approaches in combination with management and restoration efforts can reduce future impacts. Similarly, removal of channelization structures may allow for a greater recovery of the integrity of a stream corridor. If feasible, the objective of a restoration design should be to eliminate or moderate disruptive influences to allow for equilibrium (NRC, 1992). If this is not possible, restoration may have limited effectiveness in the long term or may require a closer look at an entire watershed to determine alternate restoration activities. See Chapter 6 for additional information on watershed planning and restoration information.

A glossary of stream restoration terms is available from U.S. Army Corps of Engineers' Ecosystem Management and Restoration Research Program at http://el.erdc.usace.army.mil/elpubs/pdf/sr01.pdf.

This management measure was selected for the following reasons:

- Many anthropogenic activities can destabilize streambanks and shorelines, resulting in erosion that contributes significant amounts of NPS pollution in surface waters.
- The loss of coastal land and streambanks due to shoreline and streambank erosion results in reduction of riparian areas and wetlands that have NPS pollution abatement potential.
- A variety of activities related to use of shorelands or adjacent surface waters can result in erosion of land along coastal bays or estuaries and loss of land along rivers and streams.

Preservation and protection of shorelines and streambanks can be accomplished through many approaches, but preference in this guidance is for vegetative practices, such as soil bioengineering and marsh creation, where their use is appropriate.

Management Practices for Management Measure 6

The management measure generally will be implemented by applying one or more management practices appropriate to the source, location, and climate. A variety of vegetative and structural practices are presented and are examples of activities that can be used as a single practice or in combination with other practices to achieve the desired project goals. An example of a source of information is the USACE publication *Stream Management* (Fischenich and Allen, 2000), which provides a good summary of vegetative and structural practices as well as a comprehensive review of processes related to stream and streambank erosion. The document also presents a thorough overview of planning activities for approaching streambank erosion issues.

The types of practices that can be used to accomplish the elements of Management Measure 6, including the following groups of practices:

- Vegetative practices
- Structural practices
- Integrated systems
- Planning and regulatory approaches

Vegetative Practices

Vegetative practices have a long history of use in Europe for streambank and shoreline protection and for slope stabilization. Prior to the 1980s, they have been practiced in the United States only to a limited extent, primarily because other engineering options, such as the use of riprap, have been more commonly accepted practices (Allen and Klimas, 1986). The use of vegetative streambank and shoreline stabilization practices have become more common in the United States over the past several decades as their implementation has shown to be physically and ecologically successful. Economically, less costly alternatives of stabilization, such as vegetative practices, are being pursued as alternatives to engineering structures for controlling erosion of streambanks and shorelines.

Vegetative practices, sometimes referred to as soil bioengineering, refer to the installation of plant materials as a main structural component in controlling problems of land instability where

erosion and sedimentation are occurring (USDA-NRCS, 1992). Vegetative practices can be defined as, "the use of live and dead plant materials, in combination with natural and synthetic support materials, for slope stabilization, erosion reduction, and vegetative establishment" (FISRWG, 1998).

Basic principles of soil bioengineering include the following (USDA-NRCS, 1992):

- Fit the soil bioengineering system to the site
  - Topography and exposure (e.g., note the degree of slope, presence of moisture)
  - Geology and soils (e.g., determine soil depth and type)
  - Hydrology (e.g., calculate peak flows in the project area)
- Retain existing vegetation whenever possible
- Limit removal of vegetation
- Stockpile and protect topsoil
- Protect areas exposed during construction
- Divert, drain, or store excess water

Additionally, vegetative approaches have the advantage of providing food, cover, and instream and riparian habitat for fish and wildlife and result in a more aesthetically appealing environment than traditional engineering approaches (Allen and Klimas, 1986). Many planners of vegetative practices try to utilize native plants and materials that can be obtained from local stands of species. These plants are already well adapted to the climate and soil conditions of the area and thus have an increased chance of becoming established and surviving. The use of locally available plants also cuts the costs of a restoration project (Gray and Sotir, 1996). Vegetative systems that use locally available plants have the added advantage of blending in with natural vegetation over time.

Additional benefits of using bioengineering methods include (USEPA, 2003c):

- Designed to be low maintenance or maintenance-free in the long run
- Enhance habitat not only by providing food and cover sources, but by serving as a temperature control for aquatic and terrestrial animals
- If successful, can stabilize slopes effectively in a short period of time (e.g., one growing season)
- Self-repairing after establishment
- Filter overland runoff, increase infiltration, and attenuate flood peaks

The limitations of vegetative practices include the need for skilled laborers and the difficulty of locating plant materials, particularly during the dormant season, which is the optimal time for installation. To properly establish a soil bioengineering planting, orientation, on-site training, and careful supervision of the labor crews are required. Another limitation, which is avoidable, is that projects that promote the growth of thick vegetation may increase roughness values or increase friction and raise floodwater elevations. This should be taken into consideration during the planning stages of a project and prevented.

Additional information about soil bioengineering principles is available from the *Engineering Field Handbook, Chapter 18* (USDA-NRCS, 1992).[1] Local agencies, such as the USDA Natural Resources Conservation Service (NRCS) and the Cooperative Extension Service, can be useful sources of information on appropriate native plant species to consider in bioengineering projects.

The USDA Forest Service has published *A Soil Bioengineering Guide for Streambank and Lakeshore Stabilization*,[2] which provides information on how to successfully plan and implement a soil bioengineering project, including the application of soil bioengineering techniques. The guide also provides specific tips for using soil bioengineering techniques successfully.

Specific vegetative practices include (USDA-NRCS, 1992):

- Branch packing
- Brush layering
- Brush mattressing
- Coconut fiber roll
- Dormant post plantings
- Live fascines
- Live staking
- Marsh creation and restoration
- Tree revetments
- Vegetated buffers

Refer to Chapter 7 for additional information about the above practices. The Additional Resources section provides a number of sources for obtaining information about the effectiveness, limitations, and cost estimates for these practices.

Structural Approaches

Soil bioengineering alone is not suitable in all instances. When considering an approach to streambank or shoreline stabilization, it is important to take several factors into account. For example, it is inappropriate to stabilize slopes with vegetative systems in areas that would not support plant growth, such as those areas with soils that are toxic to plants, areas of high water velocity, or where there is significant wave action (Gray and Sotir, 1996). Shores subject to wave erosion will usually require structures or beach nourishment to dampen wave or stream flow energy.

Properly designed and constructed shoreline and streambank erosion control structures are used in areas where higher water velocity or wave energy make vegetative stabilization and marsh creation ineffective. In addition to careful consideration of the engineering design, the proper planning for a shoreline or streambank protection project will include a thorough evaluation of

[1] The soil bioengineering chapter of the handbook is available at http://www.info.usda.gov/CED/ftp/CED/EFH-Ch18.pdf.
[2] Available at http://www.fs.fed.us/publications/soil-bio-guide.

the physical processes causing the erosion. To complete the analysis of physical factors, the following steps are suggested (Hobbs et al., 1981):

- Determine the limits of the shoreline reach
- Determine the rates and patterns of erosion and accretion and the active processes of erosion within the reach
- Determine, within the reach of the sites of erosion-induced sediment supply, the volumes of that sediment supply available for redistribution within the reach, as well as the volumes of that sediment supply lost from the reach
- Determine the direction of sediment transport and, if possible, estimation of the magnitude of the gross and net sediment transport rates
- Estimate factors such as ground-water seepage or surface water runoff that contribute to erosion

Some of the most widely accepted alternative engineering practices for streambank or shoreline erosion control are described below. These practices will have varying levels of effectiveness depending on the strength of waves, tides, streamflow, or currents at the project site. They will also have varying degrees of suitability at different sites and may have varying types of secondary impacts. One important impact that must always be considered is secondary effects, such as the transfer of wave or streamflow energy, which can cause erosion elsewhere, either offshore or alongshore. Finding a satisfactory balance between these three factors (effectiveness, suitability, and secondary impacts) is often the key to a successful streambank or shoreline erosion control project.

Examples of structural approaches include:

- Beach nourishment
- Breakwaters
- Bulkheads and seawalls
- Check dams
- Groins
- Levees, setback levees, and floodwalls
- Return walls
- Revetment
- Riprap
- Toe protection
- Wing deflectors

Refer to Chapter 7 for additional information about the above practices. The Additional Resources section provides a number of sources for obtaining information about the effectiveness, limitations, and cost estimates for these practices.

Integrated Systems

The use of structural systems alone may raise concern because these systems lack vegetation, which can be effective at stabilizing soils in most conditions. Additionally, vegetated systems

can help to restore damaged habitat along shorelines and streambanks. Integrated systems, which combine structural systems and vegetation, can be very effective in many settings where vegetation adds support and habitat to structural systems. An example of an integrated system is the use of stones for toe protection (structural) and soil bioengineering techniques (vegetative) for the upper banks of a waterway. Integrated slope protection designs that employ the traditional structural methods and the soil bioengineering techniques have proven to be more cost effective than either method independently. Where construction methods are labor-intensive and labor costs are reasonable, the combination of methods may be especially cost effective (Gray and Sotir, 1996).

Integrated systems include:

- Bank shaping and planting
- Joint planting
- Live cribwalls
- Riparian improvements
- Root wad revetments
- Vegetated gabions
- Vegetated geogrids
- Vegetated reinforced soil slope (VRSS)

Refer to Chapter 7 for additional information regarding the above practices. The Additional Resources section provides a number of sources for obtaining information about the effectiveness, limitations, and cost estimates for these practices.

Planning and Regulatory Approaches

In addition to the vegetative, structural, and integrated practices discussed above, another group of practices that can be used to protect streambanks and shorelines includes planning and regulatory approaches. The variety of planning activities include practices in waters adjacent to eroding streambanks and shorelines (e.g., evaluating the erosion potential) and on land areas adjacent to eroding streambanks and shorelines (e.g., watershed planning processes). There are also a variety of local policy and regulatory activities that can be used to protect sensitive or eroding streambanks and shorelines ranging from setback requirements and vegetated buffer minimum widths to requirements for erosion and sediment control plans for various types of construction activities. The following are examples (with complete descriptions located in Chapter 7) of planning and regulatory protection activities that could be used to protect vulnerable streambanks or shorelines:

- Erosion and sediment control plans
- Establishment and protection of stream buffers
- Rosgen's stream classification method
- Setbacks
- Shoreline sensitivity assessment

Chapter 6: Guiding Principles

Many of the management measures and practices recommended by EPA to reduce the nonpoint source (NPS) pollutant impacts associated with hydromodification activities stress the need to incorporate planning as a tool. States, local governments, or community groups should begin the planning process early when trying to determine how to address a particular NPS issue associated with a new or existing hydromodification project. The planning process should bring key stakeholders together so that a variety of options can be explored to adequately define the problem and potential solutions. Once the issues are identified according to the various perspectives, project goals can be established to solve one or more environmental problems.

One important part of the planning process is the identification of the goals of the different stakeholders. Once these goals, which are sometimes different for the different groups of stakeholders, are identified and defined, the planning team can strive to achieve a balance among the needs of the various stakeholders. Often restoration compromises can be made to meet differing goals of the stakeholders to achieve a balance of the needs of the different groups. For example, changes in hydroelectric dam operation may be possible to produce minimum base flows downstream from the dam to support a variety of aquatic habitats, while still providing energy in a profitable manner. In addition, solutions that only allow for complete removal of the dam and restoration to preexisting stream conditions may not be possible because of other changes in the watershed (e.g., urbanization, other hydromodification projects, or the need for affordable and environmentally friendly electricity). A compromise solution that enables the dam to continue to operate while minimizing environmental impacts and to enhance critical downstream habitats that support a desirable fish population may be the best solution.

Part of the planning process and achievement of balance when evaluating techniques for restoring areas impacted by NPS pollution associated with hydromodification activities can be termed “creating opportunities.” For example, an opportunity may be found by working with stakeholders such as local homeowners who are concerned about the unsightly algae present in a community reservoir. Reducing runoff containing an abundant supply of nitrogen and phosphorous pollutants from lawns surrounding the reservoir may lead to reductions in the algal bloom. Changes in land use that result in increasing the permeability of land adjacent to a channelized stream can reduce the overall volume and velocity of water in the stream. As flooding conditions are reduced, “hard” structures like bulkheads can be replaced with softer, vegetative solutions along the stream channel. The combination of reduced scouring flows associated with the greater stream velocities and vegetated channel banks can lead to improved instream ecological conditions. There are many other possible opportunities waiting to be found and implemented when projects are evaluated at the watershed level.

Project planning and analysis are essential parts of success when trying to reduce the impact of NPS pollution from new or existing hydromodification activities. One example of a planning process is explained in the EPA document *Ecological Restoration: A Tool to Manage Stream Quality* (USEPA, 1995a). This document outlines the key steps in the ecological restoration decision framework as:

- Identification of impaired or threatened watersheds

- Inventory of the watershed
- Identification of the restoration goals
- Selection of candidate restoration techniques
- Implementation of selected restoration techniques
- Monitoring

Other EPA guidance documents offer similar approaches to the restoration planning process, including *Community-Based Environmental Protection: A Resource Book for Protecting Ecosystems and Communities* (USEPA, 1997a). Both guidance documents offer a variety of case studies to provide readers with examples of the frameworks as they are applied to real-world situations. EPA's *Draft Handbook for Developing Watershed Plans to Restore and Protect Our Waters* (USEPA, 2005c) also provides useful planning information related to watershed plans.

The Natural Resources Conservation Service (NRCS) is also a source of information for planning. NRCS provides assistance through their Watershed Protection and Flood Prevention Program, whose purpose is to assist federal, state, local agencies, local government sponsors, tribal governments, and program participants to protect and restore watersheds from damage caused by erosion, floodwater, and sediment; to conserve and develop water and land resources; and to solve natural resource and related economic problems on a watershed basis. The program provides technical and financial assistance to local people or project sponsors, builds partnerships, and requires local and state funding contribution.[1]

NRCS uses locally-led conservation programs, which are an extension of the agency's traditional assistance to individual farmers and ranchers, for planning and installing conservation practices for soil erosion control, water management, and other purposes. Through this effort, local people, generally with the leadership of conservation districts along with NRCS technical assistance, will assess their natural resource conditions and needs, set goals, identify ways to solve resource problems, utilize a broad array of programs to implement solutions, and measure their success.

When planning any new development activities or restoration of already developed or impacted activities, it is important to account for the guiding principles:

- Using a watershed approach
- Smart growth principles
- Project design principles
- Monitoring and maintenance of structures

Each of these principles is discussed in more detail below.

[1] Additional information about this program, as well as contact information is available at http://www.nrcs.usda.gov/programs/watershed.

Using a Watershed Approach

EPA recommends the use of a watershed approach as the key framework for dealing with problems caused by runoff and other sources that impair surface waters (USEPA, 1998). The watershed protection approach is a comprehensive planning process that considers all natural resources in the watershed, as well as social, cultural, and economic factors. Using a watershed approach, multiple stakeholders integrate regional and locally-led activities with local, state, tribal, and federal environmental management programs. EPA works with federal agencies, states, tribes, local communities, and non-governmental sectors to make a watershed approach the key coordinating framework of planning, restoration, and protection efforts to achieve "clean and safe" water and healthy aquatic habitat.

The watershed approach framework can be applied to address impacts caused by hydromodification activities throughout a watershed. Additionally, the watershed approach can help to identify and address problems within a watershed that increase NPS pollution associated with hydromodification activities.

Major elements of successful watershed approaches include:

- Focusing on hydrologically-defined areas—watersheds and aquifers have hydrologic features that converge to a common point of flow; watersheds range in size from very large (e.g., the Mississippi River Basin) to a drainage basin for a small creek.

- Using an integrated set of tools and programs (regulatory and voluntary, federal/state/tribal/local and non-governmental sectors) to address the myriad problems facing the Nation's water resources, including NPS and point source pollution, habitat degradation, invasive species, and air deposition of pollutants (e.g., mercury and nutrients).

- Involving all parties that have a stake or interest in developing collaborative solutions to a watershed's water resource problems.

- Using an iterative planning or adaptive management process of assessment and setting environmental, water quality, and habitat goals (e.g., water quality standards).

- Planning, implementation, and monitoring to ensure that plans and implementation actions are revised to reflect new data.

- Breaking down barriers between plan development and implementation to enhance prospects for success.

A key attribute of the watershed approach is that it can be applied with equal success to large- and small-scale watersheds. Federal agencies, states, interstate commissions, and tribes usually apply the approach on larger scales, such as in watersheds greater than 100 square miles in size.

However, local agencies and urban communities can apply the approach to watersheds as small as several acres in size.

Although specifics may vary from large scale to small scale, the basic goals of the watershed approach remain the same—protecting, maintaining, and restoring water resources, based on the geomorphology, ecology, and other natural characteristics of the waterbody. Local runoff management program officials must be especially conscious of watershed scale when planning and implementing specific management practices. For example, programmatic practices, such as stream protection ordinances and public education campaigns, are usually applied community wide. Consequently, the results benefit many small watersheds. In contrast, structural practices, such as vegetative approaches, usually provide direct benefits to a single stream. Regional structural management practices such as headland breakwater systems for larger watersheds can be used, but they do not protect smaller contributing streams. Given limited resources, program officials must often analyze cost and benefits and choose between large- and small-scale practices. Often, a combination of nonstructural and structural practices implemented across the watershed and at regional and local levels is the most cost effective approach.

An example of the watershed approach being used for hydromodification activities is the South Myrtle Creek Ditch Project. South Myrtle Creek, which flows into the South Umpqua River in Oregon, was historically populated with cutthroat trout (*Oncorhynchus clarki*) and coho salmon (*Oncorhynchus kisutch*). However, since the early 20th century, diversion structures, used primarily to provide water for irrigating agricultural crops, have blocked the passage of fish through creek waters (USEPA, 2002c). One example of the diversion structures was a diversion dam with a concrete apron, which was installed in a portion of South Myrtle Creek to raise the water level in an impoundment to provide irrigation water for adjacent and downstream landowners. During the summer, water levels in the creek would elevate 14 feet above natural levels and were diverted into a 2.5 mile irrigation ditch. Ultimately, hydromodification of this stream caused flow modifications and high stream temperatures, which degraded water quality for the native trout and salmon populations.

9 Elements of Watershed Planning

EPA has identified a minimum of nine elements that are critical for achieving improvements in water quality. EPA requires that these nine elements be addressed for section 319-funded watershed plans and strongly recommends that they be included in all other watershed plans that are intended to remediate water quality impairments. Additional information is available from FY 2004 Guidelines for the Award of Section 319 Nonpoint Source Grants to States and Territories *at* http://www.epa.gov/owow/nps/cwact.html. *The nine elements are listed below:*

a. Identification of causes of impairment and pollutant sources or groups of similar sources that need to be controlled to achieve needed load reductions, and any other goals identified in the watershed plan. Sources that need to be controlled should be identified at the significant subcategory level along with estimates of the extent to which they are present in the watershed (e.g., X linear miles of eroded streambank needing remediation).

b. An estimate of the load reductions expected from management measures.

c. A description of the nonpoint source management measures that will need to be implemented to achieve load reductions and a description of the critical areas in which those measures will be needed to implement this plan.

d. Estimate of the amounts of technical and financial assistance needed, associated costs, and/or the sources and authorities that will be relied upon to implement this plan.

e. An information and education component used to enhance public understanding of the project and encourage their early and continued participation in selecting, designing, and implementing the nonpoint source management measures that will be implemented.

f. Schedule for implementing the nonpoint source management measures identified in this plan that is reasonably expeditious.

g. A description of interim measurable milestones for determining whether nonpoint source management measures or other control actions are being implemented.

h. A set of criteria that can be used to determine whether loading reductions are being achieved over time and substantial progress is being made toward attaining water quality standards.

i. A monitoring component to evaluate the effectiveness of the implementation efforts over time, measured against the criteria established under item h immediately above.

In 1998 one of the landowners initiated a project to restore flow and improve water quality in South Myrtle Creek. The project used the guiding principles of the watershed approach to restore the health of the creek.

- *Partnership*. The project was a collaborative effort of landowners, who donated services and supplies. The project received funding and support from government agencies, such as the U.S. Fish and Wildlife Service, the Oregon Water Resources Department, the Oregon Watershed Enhancement Board, the Bureau of Land Management, the Natural Resources Conservation Service, and the Douglas County Watermaster.

- *Geographic focus*. Resource management activities were directed specifically to the creek and the drainage ditch, where flow restoration and improved water quality were desired.

- *Sound management techniques based on strong science and data*. An assessment of South Myrtle Creek identified water quality problems from flow modification and high stream temperatures as the priority problems in the creek. The diversion dam and concrete apron were found to be causing the problems. Landowners, the Water Resources Department, and the Watershed Enhancement Board developed a plan, the goal of which was to restore flow and improve water quality in the creek. The plan was implemented by removing the diversion dam and concrete apron. The irrigation system was switched to a sprinkler type system, which is more efficient than the original ditch irrigation. In addition, the denuded riparian area was revegetated to help lower stream temperatures and new seedlings were protected with fencing to keep away livestock.

With the cooperation of the landowners, the county and state governments, and other interested parties, the South Myrtle Creek Ditch Project was a success. Water temperatures have improved and flows have increased by 2.5 cubic feet per second during the summer. Restoration of the streambed to its historical level has allowed passage of salmon and trout to the 10 miles of stream above the dam (USEPA, 2002c).[2]

Smart Growth

Smart growth practices cover a range of development and conservation strategies that are environmentally sensitive, economically viable, community-oriented, and sustainable. Environmental impacts of development can be reduced with techniques that include compact development, reduced impervious surfaces and improved water detention, safeguarding of environmentally sensitive areas, mixing of land uses (e.g., homes, offices, and shops), transit accessibility, and better pedestrian and bicycle amenities.

Through smart growth approaches that enhance neighborhoods and involve local residents in development decisions, these communities are creating vibrant places to live, work, and play. The high quality of life in these communities makes them economically competitive, creates business opportunities, and improves the local tax base. Smart growth practices have also been shown to help protect water quality by reducing the amount of paved surfaces and allowing natural lands to filter rainwater and runoff before it reaches downstream areas.

Based on the experience of communities around the nation that have used smart growth approaches to create and maintain great neighborhoods, the Smart Growth Network[3] developed a set of ten basic principles:

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[2] Additional information about the project is available at http://www.epa.gov/owow/nps/Section319III/OR.htm.
[3] Smart Growth Network (SGN) is a partnership of government, business, and civic organizations that support smart growth. The SGN Web site, Smart Growth Online (http://www.smartgrowth.org/Default.asp?res=1024), features an extensive array of smart growth-related news, events, information, research, presentations, and publications.

1. Mix land uses
2. Take advantage of compact building design
3. Create a range of housing opportunities and choices
4. Create walkable neighborhoods
5. Foster distinctive, attractive communities with a strong sense of place
6. Preserve open space, farmland, natural beauty, and critical environmental areas
7. Strengthen and direct development towards existing communities
8. Provide a variety of transportation choices
9. Make development decisions predictable, fair, and cost effective
10. Encourage community and stakeholder collaboration in development decisions

EPA offers help to communities through the EPA smart growth program to improve development practices and get the type of development they want. They work with local, state, and national experts to discover and encourage successful, environmentally sensitive development strategies. EPA is engaged in conducting research, publishing reports and other publications,[4] showcasing outstanding communities, working with communities through grants[5] and technical assistance (Smart Growth Implementation Assistance Program),[6] and bringing together diverse interests to encourage better growth and development.[7]

Low Impact Development

Low Impact Development (LID) is an innovative stormwater management approach. The goal of LID is to mimic a site's predevelopment hydrology by using design techniques that infiltrate, filter, store, evaporate, and detain runoff close to its source (Low Impact Development Center, Inc., n.d.).

LID is based on the paradigm that stormwater management should not be viewed as stormwater disposal and that numerous opportunities exist within the developed landscape to control stormwater runoff close to the source. These principles include (NRDC, n.d.):

- Integrate stormwater management early in site planning activities
- Use natural hydrologic functions as the integrating framework
- Focus on prevention rather than mitigation
- Emphasize simple, low-tech, and low cost methods
- Manage as close to the source as possible
- Distribute small-scale practices throughout the landscape
- Rely on natural features and processes
- Create a multifunctional landscape

[4] http://www.epa.gov/piedpage/publications.htm
[5] http://www.epa.gov/piedpage/grants/index.htm
[6] http://www.epa.gov/piedpage/sgia.htm
[7] Links to technical assistance, tools, partnerships and grants and other funding are at "Making Smart Growth Happen" at http://www.epa.gov/piedpage/sg_implementation.htm.

The use of LID practices offers both economic and environmental benefits. LID measures result in less disturbance of the development area and conservation of natural features, and they can be less cost intensive than traditional stormwater control mechanisms. Cost savings for control mechanisms are not only for construction, but also for long-term maintenance and life cycle cost considerations (USEPA, 2000).

Ten common LID practices are the following (NRDC, n.d.):

- Impervious surface reduction and disconnection
- Permeable pavers
- Pollution prevention and good housekeeping
- Rain barrels and cisterns
- Rain gardens and bioretention
- Roof leader disconnection
- Rooftop gardens
- Sidewalk storage
- Soil amendments
- Tree preservation
- Vegetated swales, buffers, and strips

Project Design Considerations

General Design Factors

When designing any type of restoration project, it is important to consider the watershed as a whole as well as the specific site where restoration will occur. A watershed survey, or visual assessment, evaluates an entire watershed and can be used to help identify and verify pollutants, sources, and causes of impairments that lead to changes in streambank erosion. Additional monitoring of chemical, physical, and biological conditions may be necessary to determine if water quality is actually being affected by observed pollutants and sources. Watershed surveys can provide an accurate picture of what is occurring in the watershed. EPA's *Volunteer Stream Monitoring: A Methods Manual*[8] provides a watershed survey visual assessment form that may be used. In addition to EPA's method, a variety of visual assessment protocols have been developed by states and agencies. Designers of watershed restoration plans should look for assessment protocols that are already being used in their state or local area (USEPA, 2005c). Another general resource for planning and implementing restoration projects associated with hydromodification activities is EPA's *National Management Measures to Protect and Restore Wetlands* (USEPA, 2005b).

Photographs may also be a powerful tool that can be incorporated into watershed surveys. Photos serve as a visual reference for the site and provide before and after pictures that may be used to analyze restoration or remediation activities. In addition to taking individual photographs, aerial photographs may also provide important before and after information and can be obtained from

[8] http://www.epa.gov/owow/monitoring/volunteer/stream/vms32.html

USGS (Earth Science Information Center), USDA (Consolidated Farm Service Agencies, Aerial Photography Field Office), and other agencies (USEPA, 2005c). Refer to EPA's draft *Handbook for Developing Watershed Plans to Restore and Protect Our Waters* (USEPA, 2005c) for more information about watershed assessments.

Assessment

Tools to analyze channels on a site-by-site basis may include geomorphic assessments such as the methodology developed by Rosgen. Geomorphic assessments help to determine river and stream characteristics such as channel dimensions, reach slope, and channel enlargement and stability. This information about stream physical characteristics might help the restoration team to understand current stream conditions and may be evaluated over time to describe degradation or improvements in the stream. Geomorphic assessment may also be useful for predicting future stream conditions, which can help in selecting suitable restoration or protection approaches (USEPA, 2005c).

The Rosgen geomorphic assessment approach groups streams into different geomorphic classes, based on a set of criteria that include entrenchment ratio, width/depth ratio, sinuosity, channel slope, and channel materials. Assessment methodologies, such as Rosgen's Stream Classification System, can help identify streams at different levels of impairment, determine the types of hydrologic and physical factors affecting stream morphologic conditions, and choose appropriate management measures to implement if needed.[9] Another common geomorphic assessment method is the Modified Wolman Pebble Count (Harrelson et al., 1994), which characterizes the texture (particle size) in the stream or riverbeds of flowing surface waters. It can be used alone or with Rosgen-type assessments. The composition of the streambed can provide information about the characteristics of the stream, including effects of flooding, sedimentation, and other physical impacts on a stream (USEPA, 2005c). Other assessment methods may be available from state agencies or environmental organizations.

The physical conditions of a site can provide important information about factors affecting overall stream integrity, such as agricultural activities and urban development. Runoff from cropland and feedlots can carry sediment into streams, clog existing habitat, and change geomorphological characteristics. An understanding of stream physical conditions can facilitate identification of sources and pollutants and allow for designing and implementing more effective restoration and protection strategies. Physical characterization should also extend beyond the streambanks or shore and include a look at conditions in riparian areas (USEPA, 2005c).

Before choosing a practice to restore an area impacted by hydromodification activities, it is also important to determine what biological endpoints are desired and to consider other environmental or water quality goals. Biological endpoints may include metrics such as the number of fish surviving, number of offspring produced, impairment of reproductive capability, or morbidity. Biological endpoints can be used to evaluate the effectiveness of treatment schemes and can serve as a design parameter during restoration planning. Water quality goals, such as increasing low dissolved oxygen levels, reducing nitrogen or phosphorous pollutant

[9] More information about the Rosgen Stream Classification System is available at http://www.epa.gov/watertrain/stream_class/index.htm.

levels, or decreasing turbidity, are also important to consider when planning restoration. For example, if turbidity is a major problem in the waterbody, planners will want to choose a method of restoration that prevents erosion, is efficient at trapping sediment before it enters the waterbody, or one that will help sediment to settle in desired locations of the stream or river. Looking at endpoints and goals before designing the method of restoration can help planners and stakeholders achieve the desired results.

Engineering Considerations

When choosing from the various alternatives of engineering practices for addressing impacts associated with hydromodification, such as protecting and restoring eroding streambanks and shorelines, the following factors should be taken into consideration:

- Foundation conditions
- Level of exposure to erosive forces
- Availability of materials
- Initial and annual costs
- Past performance

Foundation conditions may have a significant influence on the selection of the specific practice or combination of practices to be used for restoring areas impacted by hydromodification, including shoreline or streambank stabilization. Foundation characteristics at the site must be compatible with the structure that is to be installed for erosion control. A structure such as a bulkhead, which must penetrate through the existing substrate for stability, will generally not be suitable for shorelines with a rocky bottom. Where foundation conditions are poor or where little penetration is possible, a gravity-type structure such as a stone revetment may be preferable. However, all vertical protective structures (revetments, seawalls, and bulkheads) built on sites with soft or unconsolidated bottom materials can experience scouring as incoming waves are reflected off the structures. In the absence of additional toe protection in these circumstances, the level of scouring and erosion of bottom sediments at the base of the structure may be severe enough to contribute to structural failure at some point in the lifetime of the installation.

Along streambanks, the erosive force of the current during periods of high streamflow will influence the selection of bank stabilization techniques and details of the design. For shorelines, the levels of wave exposure at the site will also generally influence the selection of shoreline stabilization techniques and details of the design. In areas of severe levels of exposure to erosive forces, such as strong wave action or currents, light structures such as vegetative techniques, timber cribbing, or light riprap revetment may not provide adequate protection. The effects of winter ice along the shoreline or streambank may also need to be considered in the selection and design of erosion control projects.

The availability of materials is another key factor influencing the selection of suitable techniques for protecting and restoring areas affected by hydromodification activities. For a vegetative approach, availability of plant materials of sufficient quantity and quality is an important design consideration. A particular type of bulkhead, seawall, or revetment may not be economically feasible if materials are not readily available near the construction site. Installation methods may also preclude the use of specific structures in certain situations. For instance, the installation of

bulkhead pilings in coastal areas near wetlands may not always be permissible due to disruptive impacts in locating pile-driving equipment at the project site.

Costs should also be included in the decision making process for implementing hydromodification practices. The total cost of a project should be viewed as including both the initial costs (materials, labor, and planning) and the annual costs of operation and maintenance. To the extent possible, practices should be compared by their total costs. Although a particular practice may be cheaper initially, it could have operation and maintenance costs that make it more expensive in the long run. For example, in some parts of the country, the initial costs of timber bulkheads may be less than the cost of stone revetments. However, stone structures typically require less maintenance and have a longer life than timber structures. Other types of structures whose installation costs are similar may actually have a wide difference in overall cost when annual maintenance and the anticipated lifetime of the structure are considered (USACE, 1984). Environmental benefits, such as creation of habitat, should also be factored into cost evaluations.

An example of a valuable resource that provides specific cost information for practices to protect or reduce streambank and shoreline erosion is your local USDA Service Center, which makes available services provided by the NRCS.[10]

The engineering designers should also evaluate similar existing projects and practice designs to determine how well they performed compared to design specifications. An important consideration for determining past performance is to compare the physical, water quality, and biological endpoints specified in the design with the corresponding endpoints that were observed in the monitoring results. For example, if an operation and maintenance program for an urban channelization project incorporates establishment of vegetative cover along many of the low energy areas of an urban stream, the long-term performance of the vegetative cover can be evaluated with metrics such as:

- Percent of riparian area with erosion problems
- Number of recreationally important fish species present
- Annual operation and maintenance costs
- Changes in important water quality parameter values (e.g., dissolved oxygen, turbidity)

Incorporating Monitoring and Maintenance of Structures

Generally, the monitoring program will help to determine how well the project is performing with respect to the design goals and the extent of any maintenance activities needed (NRC, 1992). The project monitoring plan should be an integral part of the overall design and will be an important consideration for developing long-term project costs and resource needs. Once the project's goals are established, performance indicators are then matched to the goals to create the

[10] A list of USDA Service Centers is available at http://offices.sc.egov.usda.gov/locator/app. A list of regional and state NRCS offices is available at http://www.nrcs.usda.gov/about/organization/regions.html#state.

monitoring program (NRC, 1992). The monitoring program should also be appropriate to the scope of the project (NRC, 1992) by including considerations such as:

- The area covered by the monitoring compared to the area of the overall project—both should be similar.
- The frequency and intensity of sampling to provide reliable assessments of the performance indicators.
- The cost and resources required for monitoring should reflect the overall cost and resources of the project.
- The performance indicators provide information to enable effective assessments of the project goals and decision-making for project maintenance activities.

Each project will have unique goals and corresponding monitoring needs. Chapter 3 of The National Research Council's document *Restoration of Aquatic Ecosystems* (NRC, 1992) provides detailed advice on considerations for planning a monitoring program for restoration activities such as those associated with hydromodification activities. Some additional monitoring considerations can be found in the USDA Forest Service document *A Soil Bioengineering Guide for Streambank and Lakeshore Stabilization* (USDA-FS, 2002):

- Keeping track of where plants were harvested—is there a correlation between growth rate of certain cuttings and the "mother" plants?
- Is the installation functioning as designed?
- Which areas are maturing more rapidly than others?
- Are seeds sprouting in the newly formed beds?
- Which plants have invaded the site through natural succession?
- What has sprouted in the second season?
- Which areas are experiencing difficulty and why?
- Is the bank stabilizing or washing away and why?
- Is something occurring that is unexpected?
- Which techniques are succeeding?
- Are any of the structures failing?

USDA NRCS' *The Practical Streambank Bioengineering Guide*[11] (Bentrup and Hoag, 1998) provides an example monitoring form. The monitoring sheet is also available in Appendix C of *A Soil Bioengineering Guide for Streambank and Lakeshore Stabilization* (USDA-FS, 2002).[12]

During the first few years after installation, maintenance is necessary until vegetation becomes established and the bank stabilizes. Structures may shift or you may notice something that was left undone. Once vegetation is established, projects should become self-sustaining and require little or no maintenance. Be sure the site is managed to give the treatment every chance to be effective over a long period of time (USDA-FS, 2002).

[11] http://www.engr.colostate.edu/~bbledsoe/CE413/idpmcpustguid.pdf
[12] http://www.fs.fed.us/publications/soil-bio-guide/guide/appendices.pdf

Common maintenance tasks include (USDA-FS, 2002; Bentrup and Hoag, 1998):

- Remove debris and weeds that may shade and compete with cuttings
- Secure stakes, wire, twine, etc.
- Control weeds
- Repair weakened or damaged structures (including fences)
- Replant and reseed as necessary (it is not uncommon for a flood to occur days after installation)

Planting success varies from project to project. Bentrup and Hoag (1998) provide the following potential growth success rates:

Pole Plantings	*70-100%*
Live Fascines	*20-50%*
Brush Layering	*10-70%*
Post Plantings	*50-70%*

It is beneficial to inspect the project every other week for the first 2 months after installation, once a month for the next 6 months, and then every other month for 2 years, at least. One should also inspect the project after heavy precipitation, flooding, snowmelt, drought, or any extraordinary occurrence. Assess damage from flooding, wildlife, grazing, boat wakes, trampling, drought, and high precipitation (USDA-FS, 2002). Additional information about monitoring is available from USDA NRCS' *The Practical Streambank Bioengineering Guide* (Bentrup and Hoag, 1998).

Plan and design all streambank, shoreline, and navigation structures so that they do not transfer erosion energy or otherwise cause visible loss of surrounding streambanks or shorelines.

Maintenance varies with the structural type. For stone revetments, the replacement of stones that have been dislodged is necessary; timber bulkheads need to be backfilled if there has been a loss of upland material, and broken sheet pile should be replaced as necessary. Gabion baskets should be inspected for corrosion failure of the wire, usually caused either by improper handling during construction or by abrasion from the stones inside the baskets. Baskets should be replaced as necessary since waves will rapidly empty failed baskets.

Steel, timber, and aluminum bulkheads should be inspected for sheet pile failure due to active earth pressure or debris impact and for loss of backfill. For all structural types not contiguous to other structures, lengthening of flanking walls may be necessary every few years. Through periodic monitoring and required maintenance, a substantially greater percentage of coastal structures will perform effectively over their design life. Since streambank or shoreline protection projects can transfer energy from one area to another, which causes increased erosion in the adjacent area, the possible effects of erosion control measures on adjacent properties should be routinely monitored.

Chapter 7: Practices for Implementing Management Measures

Many of the operation and maintenance solutions presented in Chapter 3 (Channelization and Channel Modification) are also practices that can be used to stabilize streambanks and shorelines as presented in Chapter 5 (Streambank and Shoreline Erosion). For example, a stream channel that has been hardened with vertical concrete walls to prevent local flooding and limit the stream to its existing channel (to protect property built along the stream channel), may benefit from operation and maintenance practices that use opportunities to replace the concrete walls with appropriate vegetative or combined vegetative and non-vegetative structures along the streambank when possible. These same practices may be applicable to stabilize downstream streambanks that are eroding and creating a nonpoint source (NPS) pollution problem because of the upstream development and hardened streambanks.

The following practices apply to one or more management measures. The descriptions and illustrations presented in this chapter are intended to provide a starting point for stakeholders and decision-makers for selecting possible practices to address NPS pollution problems associated with hydromodification activities. Table 7.1 provides a cross-reference of the practices with possible applications for the various hydromodification management measure components (e.g., instream and riparian restoration corresponds to the second component of Management Measures 1 and 2 described in detail in Chapter 3). Users of the information provided in the following table and descriptions evaluate the attributes of the possible practices with site-specific conditions in mind.

Table 7.1 Practices for Hydromodification Management Measures

	Channelization		Dams								Streambanks				Shorelines			
	Physical & chemical	Instream/riparian restoration	Erosion control	Runoff control	Chemical/pollutant control	Watershed protection	Aerate reservoir water	Improve tailwater oxygen	Restore/maintain habitat	Maintain fish passage	Vegetative	Structural	Integrated	Planning & regulatory	Vegetative	Structural	Integrated	Planning & regulatory
Practices	MM1	MM2	MM3		MM4	MM5					MM6							
Advanced Hydroelectric Turbines (7-7)										●								
Bank Shaping and Planting (7-9)	●	●	●										●				●	
Beach Nourishment (7-10)												●				●		
Behavioral Barriers (7-12)										●								
Branch Packing (7-14)	●	●	●								●							
Breakwaters (7-15)																●		
Brush Layering (7-17)	●	●	●								●							
Brush Mattressing (7-19)	●	●	●								●							
Bulkheads and Seawalls (7-21)	●	●	●									●				●		
Check Dams (7-22)	●	●	●	●								●						
Coconut Fiber Roll (7-23)	●	●	●								●							
Collection Systems (7-25)										●								
Construct Runoff Intercepts (7-26)			●	●														
Constructed Spawning Beds (7-27)									●									
Construction Management (7-28)			●															
Dormant Post Plantings (7-29)	●	●	●								●				●			

	Channelization		Dams								Streambanks				Shorelines			
	Physical & chemical	Instream/riparian restoration	Erosion control	Runoff control	Chemical/pollutant control	Watershed protection	Aerate reservoir water	Improve tailwater oxygen	Restore/maintain habitat	Maintain fish passage	Vegetative	Structural	Integrated	Planning & regulatory	Vegetative	Structural	Integrated	Planning & regulatory
Encourage Drainage Protection (7-30)						●												
Equipment Runoff Control (7-31)					●													
Erosion and Sediment Control (ESC) Plans (7-32)	●	●	●											●				●
Erosion Control Blankets (7-35)			●															
Establish and Protect Stream Buffers (7-37)		●				●								●				
Fish Ladders(7-38)										●								
Fish Lifts (7-40)										●								
Flow Augmentation (7-41)									●									
Fuel and Maintenance Staging Areas (7-43)					●													
Gated Conduits (7-44)								●										
Groins (7-45)																●		
Identify and Address NPS Contributions (7-46)						●												
Identify and Preserve Critical Areas (7-48)						●												
Joint Planting (7-50)	●	●	●										●					
Labyrinth Weir (7-51)								●										
Levees, Setback Levees, and Floodwalls (7-52)	●	●										●				●		

	Channelization		Dams								Streambanks				Shorelines			
	Physical & chemical	Instream/riparian restoration	Erosion control	Runoff control	Chemical/pollutant control	Watershed protection	Aerate reservoir water	Improve tailwater oxygen	Restore/maintain habitat	Maintain fish passage	Vegetative	Structural	Integrated	Planning & regulatory	Vegetative	Structural	Integrated	Planning & regulatory
Live Cribwalls (7-54)	●	●	●										●					
Live Fascines (7-56)	●	●	●								●							
Live Staking (7-58)	●	●	●								●							
Locate Potential Land Disturbing Activities Away from Critical Areas (7-60)			●	●	●													
Marsh Creation and Restoration (7-61)		●									●				●			
Modifying Operational Procedures (7-62)								●										
Mulching (7-63)			●															
Noneroding Roadways (7-64)	●	●	●															
Pesticide and Fertilizer Management (7-67)					●													
Phase Construction (7-69)			●															
Physical Barriers (7-70)										●								
Pollutant Runoff Control (7-72)					●													
Preserve Onsite Vegetation (7-73)			●	●														
Reregulation Weir (7-74)								●										
Reservoir Aeration (7-75)							●											
Retaining Walls (7-77)			●	●														
Return Walls (7-78)	●	●										●				●		
Revegetate (7-79)			●															

	Channelization		Dams								Streambanks				Shorelines			
	Physical & chemical	Instream/riparian restoration	Erosion control	Runoff control	Chemical/pollutant control	Watershed protection	Aerate reservoir water	Improve tailwater oxygen	Restore/maintain habitat	Maintain fish passage	Vegetative	Structural	Integrated	Planning & regulatory	Vegetative	Structural	Integrated	Planning & regulatory
Revetment (7-80)	●	●	●									●				●		
Riparian Improvements (7-82)		●	●						●				●				●	
Riprap (7-83)	●	●	●									●				●		
Root Wad Revetments (7-84)	●	●	●										●					
Rosgen's Stream Classification Method (7-86)	●	●												●				
Scheduling Projects (7-88)			●															
Sediment Basins/Rock Dams (7-89)				●														
Sediment Fences (7-91)			●	●														
Sediment Traps (7-92)				●														
Seeding (7-93)			●															
Selective Withdrawal (7-94)								●										
Setbacks (7-95)	●	●												●				●
Shoreline Sensitivity Assessment (7-97)																		●
Site Fingerprinting (7-99)			●															
Sodding (7-100)			●															
Soil Protection (7-101)			●															
Spill and Water Budgets (7-102)										●								
Spill Prevention and Control Program (7-103)					●													
Spillway Modifications (7-104)								●	●									
Surface Roughening (7-105)			●															

	Channelization		Dams								Streambanks				Shorelines			
	Physical & chemical	Instream/riparian restoration	Erosion control	Runoff control	Chemical/pollutant control	Watershed protection	Aerate reservoir water	Improve tailwater oxygen	Restore/maintain habitat	Maintain fish passage	Vegetative	Structural	Integrated	Planning & regulatory	Vegetative	Structural	Integrated	Planning & regulatory
Toe Protection (7-106)	●	●										●				●		
Training—ESC (7-107)			●															
Transference of Fish Runs (7-108)										●								
Tree Armoring, Fencing, and Retaining Walls or Tree Wells (7-109)			●															
Tree Revetments (7-110)	●	●	●								●				●			
Turbine Operation (7-112)								●										
Turbine Venting (7-113)								●										
Vegetated Buffers (7-114)	●	●	●	●							●				●			
Vegetated Filter Strips (7-115)			●	●														
Vegetated Gabions (7-116)	●	●	●										●				●	
Vegetated Geogrids (7-118)	●	●	●										●				●	
Vegetated Reinforced Soil Slope (VRSS) (7-120)	●	●	●										●				●	
Water Conveyances (7-121)								●										
Wildflower Cover (7-122)			●															
Wind Erosion Controls (7-123)			●															
Wing Deflectors (7-124)	●	●										●				●		

Advanced Hydroelectric Turbines

Channelization
- ☐ Physical & chemical
- ☐ Instream/riparian restoration

Dams
- ☐ Erosion control
- ☐ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☑ Maintain fish passage

Erosion
- ☐ Streambanks ☐ Shorelines
  - ☐ Vegetative
  - ☐ Structural
  - ☐ Integrated
  - ☐ Planning & regulatory

Hydroelectric turbines can be designed to reduce impacts to juvenile fish passing through the turbine as it operates. Most research on advanced hydroelectric turbines is being carried out by power producers in the Columbia River basin (U.S. Army Corps of Engineers (USACE) and public utility districts) who are looking to improve the survival of hydroelectric turbine-passed juvenile fish by modifying the operation and design of turbines. Development of low impact turbines is also being pursued on a national scale by the U.S. Department of Energy (DOE) (Cada, 2001).

In the last few years, field studies have shown that improvements in the design of turbines have increased the survival of juvenile fish. Researchers continue to examine the causes and extent of injuries from turbine systems, as well as the significance of indirect mortality and the effects of turbine passage on adult fish. Overall, improvements in turbine design and operation, and new field, laboratory, and modeling techniques to assess turbine-passage survival, are contributing towards improving downstream fish passage at hydroelectric power plants (Cada, 2001).

The redesign of conventional turbines for fish passage has focused on strategies to reduce obstructions and to narrow the gaps between moveable elements of the turbine that are thought to injure fish. The effects of changes in the number, size, orientation, or shape of the blades that make up the runner (the rotating element of a turbine which converts hydraulic energy into mechanical energy) are being investigated (Cada, 2001).

The USACE has put considerable resources into improving turbine passage survival. The USACE Turbine Passage Survival Program (TSP) was developed to investigate means to improve the survival of juvenile salmon as they pass through turbines located at Columbia and Snake River dams. The TSP is organized along three functional elements that are integrated to achieve the objectives (Cada, 2001):[1]

- Biological studies of turbine passage at field sites
- Hydraulic model investigations
- Engineering studies of the biological studies, hydraulic components, and optimization of turbine operations

DOE supports development of low impact turbines under the Advanced Hydropower Turbine System (AHTS) Program. The AHTS program explores innovative concepts for turbine design that will have environmental benefits and maintain efficient electrical generation. The AHTS program awarded contracts for conceptual designs of advanced turbines to different firms/companies. Early in the development of conceptual designs, it became clear that there were

[1] Additional information about USACE efforts with advanced hydroelectric turbines is available at http://hydropower.inel.gov/turbines/pdfs/amfishsoc-fall2001.pdf.

significant gaps in the knowledge of fish responses to physical stresses (injury mechanisms) experienced during turbine passage. Consequently, the AHTS program expanded its activities to include studies to develop biological criteria for turbines (Cada, 2001).[2]

[2] Additional information about DOE efforts with advanced hydroelectric turbines is available at http://hydropower.inel.gov/turbines/pdfs/amfishsoc-fall2001.pdf.

Bank Shaping and Planting

Channelization
- ☑ Physical & chemical
- ☑ Instream/riparian restoration

Dams
- ☑ Erosion control
- ☐ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☑ Streambanks ☑ Shorelines
  - ☐ Vegetative
  - ☐ Structural
  - ☑ Integrated
  - ☐ Planning & regulatory

Bank shaping and planting involve regrading a streambank to establish a stable slope angle, placing topsoil and other material needed for plant growth on the streambank, and selecting and installing appropriate plant species on the streambank. This design is most successful on streambanks where moderate erosion and channel migration are anticipated. Reinforcement at the toe of the bank is often required, particularly where flow velocities exceed the tolerance range for plantings and where erosion occurs below base flows. To determine the appropriate slope angle, slope stability analyses that take into account streambank materials, groundwater fluctuations, and bank loading conditions are recommended (FISRWG, 1998).

Additional Resources

- FISRWG. 1998. *Stream Corridor Restoration: Principles, Processes, and Practices*. Federal Interagency Stream Restoration Working Group. http://www.nrcs.usda.gov/technical/stream_restoration/PDFFILES/APPENDIX.pdf.

- Mississippi State University, Center for Sustainable Design. 1999. *Water Related Best Management Practices in the Landscape: Bank Shaping and Vegetating.* Created for United States Department of Agriculture, Natural Resource Conservation Service, Watershed Science Institute. http://www.abe.msstate.edu/csd/NRCS-BMPs/pdf/streams/bank/bankshaping.pdf.

Beach Nourishment

Channelization
- ☐ Physical & chemical
- ☐ Instream/riparian restoration

Dams
- ☐ Erosion control
- ☐ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☑ Streambanks ☑ Shorelines
  - ☐ Vegetative
  - ☑ Structural
  - ☐ Integrated
  - ☐ Planning & regulatory

The creation or nourishment of existing beaches provides protection to the eroding area and can also provide a riparian habitat function, particularly when portions of the finished project are planted with beach or dune grasses (Woodhouse, 1978). Beach nourishment (Figures 7.1 through 7.4) requires a readily available source of suitable fill material that can be effectively transported to the erosion site for reconstruction of the beach (Hobson, 1977). Dredging or pumping from offshore deposits is the method most frequently used to obtain fill material for beach nourishment. A second possibility is the mining of suitable sand from inland areas and overland hauling and dumping by trucks. To restore an eroded beach and stabilize it at the restored position, fill is placed directly along the eroded sector (USACE, 1984). In most cases, plans must be made to periodically obtain and place additional fill on the nourished beach to replace sand that is carried offshore into the zone of breaking waves or alongshore in littoral drift (Houston, 1991; Pilkey, 1992).

One important task that should not be overlooked in the planning process for beach nourishment projects is the proper identification and assessment of the ecological and hydrodynamic effects of obtaining fill material from nearby submerged coastal areas. Removal of substantial amounts of bottom sediments in coastal areas can disrupt populations of fish, shellfish, and benthic organisms (Atlantic States Marine Fisheries Commission, 2002). Grain size analysis should be performed on sand from both the borrow area and the beach area to be nourished. Analysis of grain size should include both size and size distribution, and fill material should match both of these parameters (Stauble, 2005). Fill materials should also be analyzed for the presence of contaminants, and contaminated sediment should not be used (CA Department of Boating and Waterways and State Coastal Conservancy, 2002). Turbidity levels in the overlying waters can also be raised to undesirable levels (EUCC, 1999). Certain

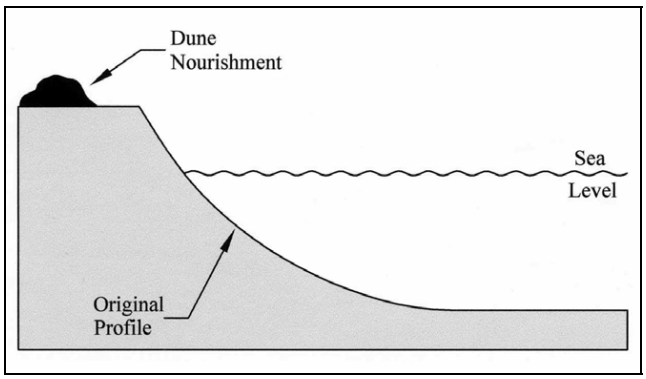

Figure 7.1 Dune Nourishment (CA Dept. of Boating and Waterways and State Coastal Conservancy, 2002)

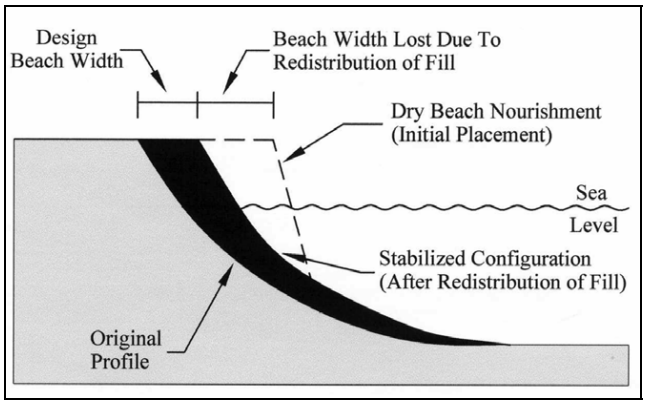

Figure 7.2 Dry Beach Nourishment (CA Dept. of Boating and Waterways and State Coastal Conservancy, 2002)

areas may have seasonal restrictions on obtaining fill from nearby submerged areas (TRB, 2001). Timing of nourishment activities is frequently a critical factor since the recreational demand for beach use frequently coincides with the best months for completing the beach nourishment. These may also be the worst months from the standpoint of impacts to aquatic life and the beach community such as turtles seeking nesting sites.

Design criteria should include proper methods for stabilizing the newly created beach and provisions for long-term monitoring of the project to document the stability of the newly created beach and the recovery of the riparian habitat and wildlife in the area.

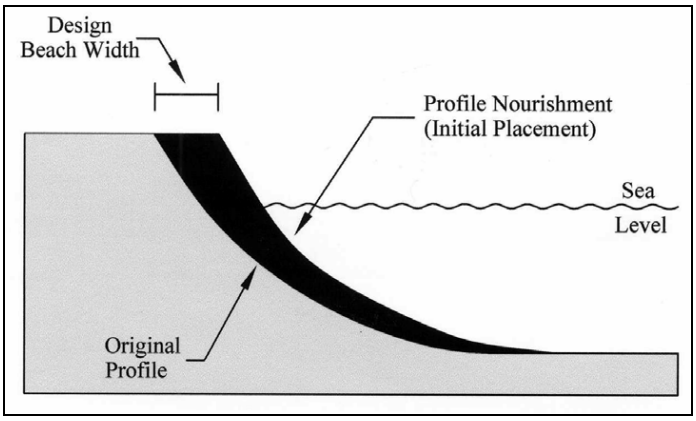

Figure 7.3 Profile Nourishment (CA Dept. of Boating and Waterways and State Coastal Conservancy, 2002)

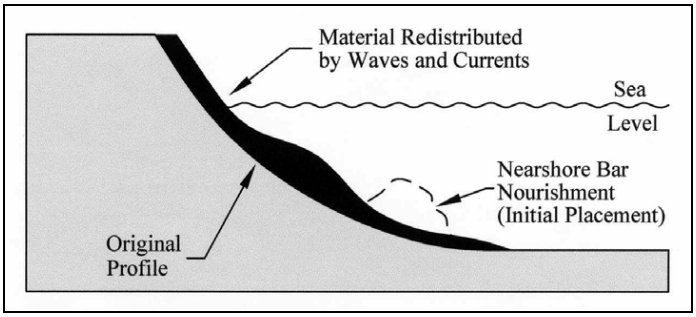

Figure 7.4 Nearshore Bar Nourishment (CA Dept. of Boating and Waterways and State Coastal Conservancy, 2002)

Additional Resources

- Barber, D. No date. *Beach Nourishment Basics.* http://www.brynmawr.edu/geology/geomorph/beachnourishmentinfo.html.
- NOAA. No date. *Beach Nourishment: A Guide for Local Government Officials.* U.S. Department of Commerce, NOAA Coastal Services Center. http://www.csc.noaa.gov/beachnourishment.
- Scottish National Heritage. No date. *A Guide to Managing Coastal Erosion in Beach/Dune Systems: Beach Nourishment.* http://www.snh.org.uk/publications/on-line/heritagemanagement/erosion/appendix_1.7.shtml.

Behavioral Barriers

Channelization
- ☐ Physical & chemical
- ☐ Instream/riparian restoration

Dams
- ☐ Erosion control
- ☐ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☑ Maintain fish passage

Erosion
- ☐ Streambanks ☐ Shorelines
  - ☐ Vegetative
  - ☐ Structural
  - ☐ Integrated
  - ☐ Planning & regulatory

Behavioral barriers use fish responses to external stimuli to keep fish away from intakes or to attract them to a bypass. Since fish behavior is notably variable both within and among species, behavioral barriers cannot be expected to prevent all fish from entering hydropower intakes. Environmental conditions such as high turbidity levels can obscure some behavioral barriers, such as lighting systems and curtains. Competing behaviors such as feeding or predator avoidance can also be a factor influencing the effectiveness of behavioral barriers at a particular time.

Electric screens, bubble and chain curtains, light, sound, and water jets have been evaluated in laboratory or field studies and show mixed results. Despite numerous studies, very few permanent applications of behavioral barriers have been realized (EPRI, 1999). Some authors suggest using behavioral barriers in combination with physical barriers (Mueller et al., 1999).

Electrical screens keep fish away from structures and guide them into bypass areas for removal. Fish seem to respond to the electrical stimulus best when water velocities are low. Tests of an electrical guidance system at the Chandler Canal diversion (Yakima River, Washington) showed efficiency ranging from 70 to 84 percent for velocities of less than 1 ft/sec. Efficiencies decreased to less than 50 percent when water velocities were higher than 2 ft/sec (Pugh et al., 1971). Success of electrical screens may be specific to species and fish size. An electrical field strength suitable to deter small fish may result in injury or death to large fish, since total fish body voltage is directly proportional to fish body length (Stone and Webster, 1986). Electrical screens require constant maintenance of electrodes and associated underwater hardware to maintain effectiveness. Surface water quality can affect the life and performance of electrodes.

Bubble and chain curtains are created by pumping air through a diffuser to create a continuous, dense curtain of bubbles, which can cause an avoidance response. Many factors affect fish response to the curtains, including temperature, turbidity, light, and water velocity. Bubbler systems should be constructed from corrosion-resistant materials and be installed with adequate positioning of the diffuser away from areas where siltation might clog the air ducts. Hanging chains provide a physical, visible obstacle that fish avoid. They are species-specific and lifestage-specific. Efficiency of hanging chains is affected by such variables as velocity, instream flow, turbidity, and illumination levels. Debris can limit their performance. In particular, buildup of debris can deflect chains into a nonuniform pattern and disrupt hydraulic flow patterns.

Strobe lights repel fish by producing an avoidance response. A strobe light system at Saunders Generating Station in Ontario, Canada was found to be 67 to 92 percent effective at repelling or diverting eels (EPRI, 1999). Turbidity levels can affect strobe light efficiency. The intensity and duration of the flash can also affect the response of the fish; for instance, an increase in flash duration has been associated with less avoidance. Strobe lights have the potential for far-field

fish attraction, since they can appear to fish as a constant light source due to light attenuation over a long distance (Stone and Webster, 1986). Strobe lights at Hiram M. Chittenden Locks in Seattle, Washington were examined to determine how fish respond, depending on strobe light distance. Vertical avoidance was 90 to 100 percent when lights were 0.5 meters away, 45 percent when 2.5 meters away, and 19 percent when 4.5 to 6.5 meters away (EPRI, 1999).

Mercury lights have successfully attracted fish to passage systems and repelled them from dams. Studies suggest their effectiveness is species-specific; alewives (*Alosa pseudoharengus*) were attracted to mercury light, whereas coho salmon (*Oncorhynchus kisutch*) and rainbow trout (*Oncorhynchus mykiss*) displayed no attraction to the light (Stone and Webster, 1986). In a test on the Susquehanna River (Maryland, Pennsylvania, and New York), mercury lights attracted gizzard shad (OTA, 1995). Although results have been mixed, low overall cost of the systems has led to continued research on their effectiveness (Duke Engineering & Services, Inc., 2000).

Underwater sound, broadcast at different frequencies and amplitudes, has been effective in attracting fish away from dams or repelling fish from dangers around dams, although the results of field tests are not consistent. Fish have been attracted, repelled, or guided by the sound. A study prepared for DOE showed that low-frequency, high particle motion was effective at invoking flight and avoidance responses in salmonids (Mueller et al., 1998). These finding agree with Knudsen et al. (1994), who found that low frequencies are efficient for evoking awareness reactions and avoidance responses in juvenile Atlantic salmon. Not all fish possess the ability to perceive sound or localized acoustical sources (Harris and Van Bergeijk, 1962). Fish also frequently seem to become habituated to the sound source.

Poppers are pneumatic sound generators that create a high-energy acoustic output to repel fish. Poppers have effectively repelled warm-water fish from water intakes. Laboratory and field studies in California indicate avoidance by several freshwater species such as alewives (*Alosa pseudoharengus*), perch, and smelt. Salmonids do not seem to be effectively repelled (Stone and Webster, 1986). Operation and maintenance considerations include frequent replacement of "O" rings, air entrainment in water inlets, and vibration of structures associated with the inlets.

Water jet curtains create hydraulic conditions that repel fish. Effectiveness is influenced by the angle at which water is jetted. Although effectiveness averages 75 percent (Stone and Webster, 1986), not enough is known to determine what variables affect performance of water jet curtains. Important operation and maintenance concerns would be clogging of the jet nozzles by debris or rust and the acceptable range of stream flow conditions, which contribute to effective results.

Hybrid barriers or combinations of different barriers can enhance the effectiveness of individual behavioral barriers. Laboratory studies showed a chain net barrier combined with strobe lights to be up to 90 percent effective at repelling some species and sizes of fish. Tests of combining rope-net and chain-rope barriers have shown good results. Barriers with horizontal and vertical components in the water column are more effective than those with vertical components alone. Barriers with a large diameter are more effective than those with a small diameter, and thicker barriers are more effective than thinner barriers. Effectiveness of hanging chains was increased when used in combination with strobe lights. Effectiveness also increased when strobe lights were added to air bubble curtains and poppers (Stone and Webster, 1986).

Branch Packing

Channelization
- ☑ Physical & chemical
- ☑ Instream/riparian restoration

Dams
- ☑ Erosion control
- ☐ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☑ Streambanks ☐ Shorelines
  - ☑ Vegetative
  - ☐ Structural
  - ☐ Integrated
  - ☐ Planning & regulatory

Branch packing consists of alternating layers of live branch cuttings and compacted backfill to repair small, localized slumps and holes in slopes (Figure 7.5). Live branch cuttings may range from 0.5 to 2 inches in diameter. They should be long enough to touch undisturbed soil at the back of the trench and extend slightly outward from the rebuilt slope face. Wooden stakes should be 5 to 8 feet long, depending on the depth of the slump or hole being repaired. Stakes should also be made from poles that are
3 to 4 inches in diameter or 2 by 4 feet lumber. Live posts can be substituted. As plant tops begin to grow, the branch packing system becomes more effective in retarding runoff and reducing surface erosion. Trapped sediment refills the localized slumps or holes, while roots spread throughout the backfill and surrounding earth to form a unified mass. Branch packing is not effective in slump areas greater than 4 feet deep or 5 feet wide (USDA-NRCS, 1992). Installation guidelines are available from the USDA-FS Soil Bioengineering Guide (USDA-FS, 2002) and the USDA Natural Resources Conservation Service's (NRCS's) *Engineering Field Handbook, Chapter 18* (USDA-NRCS, 1992).

Additional Resources

- FISRWG. 1998. *Stream Corridor Restoration: Principles, Processes, and Practices*. Federal Interagency Stream Restoration Working Group. http://www.nrcs.usda.gov/technical/stream_restoration/PDFFILES/APPENDIX.pdf.

- ISU. 2006. *How to Control Streambank Erosion: Branchpacking.* Iowa State University. http://www.ctre.iastate.edu/erosion/manuals/streambank/branchpacking.pdf.

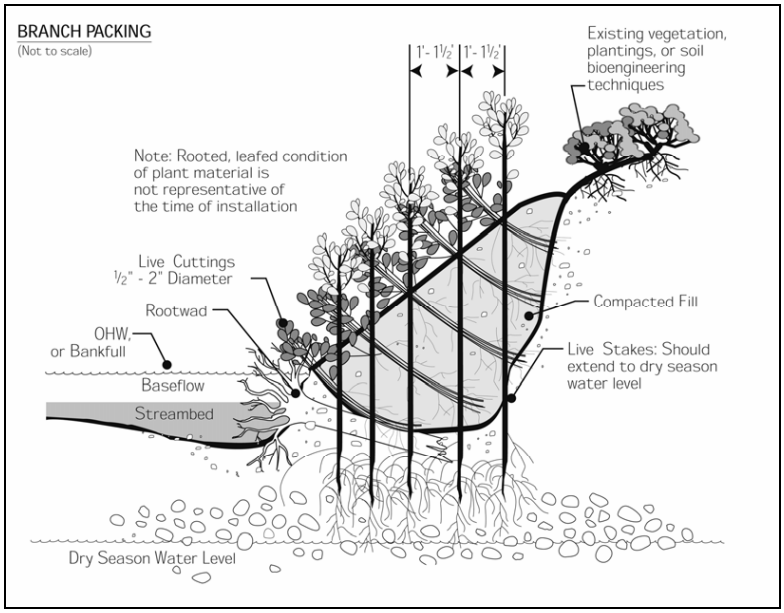

Figure 7.5 Branch Packing (USDA-FS, 2002)

Breakwaters

Channelization
- ☐ Physical & chemical
- ☐ Instream/riparian restoration

Dams
- ☐ Erosion control
- ☐ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☐ Streambanks ☑ Shorelines
  - ☐ Vegetative
  - ☑ Structural
  - ☐ Integrated
  - ☐ Planning & regulatory

Breakwaters are wave energy barriers designed to protect the land or nearshore area behind them from the direct assault of waves. Breakwaters have traditionally been used only for harbor protection and navigational purposes; in recent years, however, designs of shore-parallel segmented breakwaters have been used for shore protection purposes (Fulford, 1985; Hardaway and Gunn, 1989; Hardaway and Gunn, 1991; USACE, 1990). Segmented breakwaters can be used to provide protection over longer sections of shoreline than is generally affordable through the use of bulkheads or revetments. Wave energy is able to pass through the breakwater gaps, allowing for the maintenance of some level of longshore sediment transport, as well as mixing and flushing of the sheltered waters behind the structures. The cost per foot of shore for the installation of segmented offshore breakwaters is generally competitive with the costs of stone revetments and bulkheads (Hardaway et al., 1991).

Figure 7.6 provides a view of breakwaters off the coast of Pennsylvania and Figure 7.7 illustrates single and multiple breakwaters.

Figure 7.6 Breakwaters – View of Presque Isle, Pennsylvania (USACE, 2003)

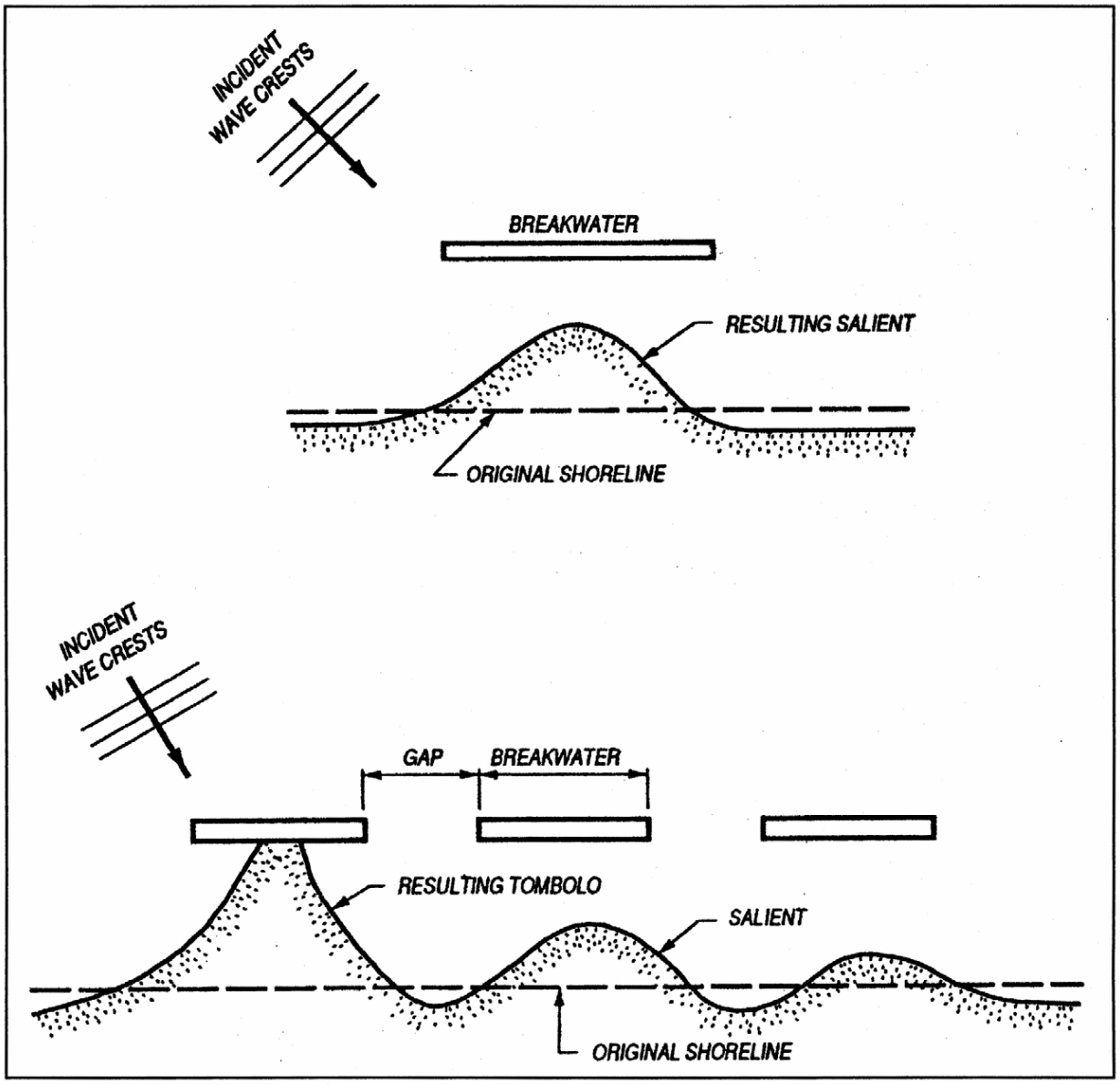

Figure 7.7 Single and Multiple Breakwaters (USACE, 2003)

Additional Resource

- USACE. No date. *Breakwaters.* http://www.usna.edu/NAOE/courses/en420/bonnette/breakwater_design.html.

Brush Layering

Channelization
- ☑ Physical & chemical
- ☑ Instream/riparian restoration

Dams
- ☑ Erosion control
- ☐ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☑ Streambanks ☐ Shorelines
  - ☑ Vegetative
  - ☐ Structural
  - ☐ Integrated
  - ☐ Planning & regulatory

Brush layering consists of placing live branch cuttings interspersed between layers of soil on cut slopes or fill slopes (Figures 7.8 and 7.9). These systems are recommended on slopes up to 2:1 in steepness and not to exceed 15 feet in vertical height. Branch cuttings, which are placed in a crisscross or overlapping pattern, should be long enough to reach the back of the bench and still protrude from the bank (growing tips facing the outside of the slope). The portions of the brush that protrude from the slope face assist in retarding runoff and reducing surface erosion. Backfill is then placed on the branches and compacted.

Brush layering can be used to stabilize a slope against shallow sliding or mass wasting, as well as to provide erosion protection. Brush layers can stabilize and reinforce the outside edge or face of drained earthen buttresses placed against cut slopes or embankment fills. Brush layering works better on fill slopes than cut slopes, because much longer stems can be used in fill (Mississippi State University, 1999). It is most applicable for areas subjected to cut or fill operations or areas that are highly disturbed and/or eroded (ECY, 2007)

Brush layering is somewhat similar to live fascine systems because both involve the cutting and placement of live branch cuttings on slopes. The two techniques differ principally in the orientation of the branches and the depth to which they are placed in the slope. In brush layering, the cuttings are oriented more or less perpendicular to the slope contour. In live fascine systems, the cuttings are oriented more or less parallel to the slope contour. The perpendicular orientation is more effective from the point of view of earth reinforcement and mass stability of the slope (USDA-NRCS, 1992). Thus, brush layering is more effective than live fascines in terms of earth reinforcement and mass stability (Mississippi State University, 1999). When used on a fill slope, brush layering is similar to vegetated geogrids, except the technique does not use geotextile fabric (USDA-FS, 2002).

Brush layering can disrupt native soils. Therefore, installation should be completed in phases and no more area should be excavated than is necessary (ECY, 2007).

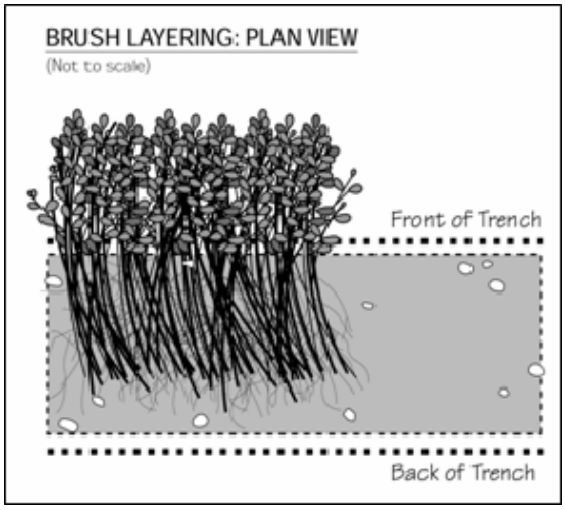

Figure 7.8 Brush Layering: Plan View (USDA-FS, 2002)

Additional Resources

- Mississippi State University, Center for Sustainable Design. 1999. *Water Related Best Management Practices in the Landscape: Brush Layering.* Created for United States Department of Agriculture, Natural Resource Conservation Service, Watershed Science Institute. http://www.abe.msstate.edu/csd/NRCS-BMPs/pdf/streams/bank/brushlayer.pdf.

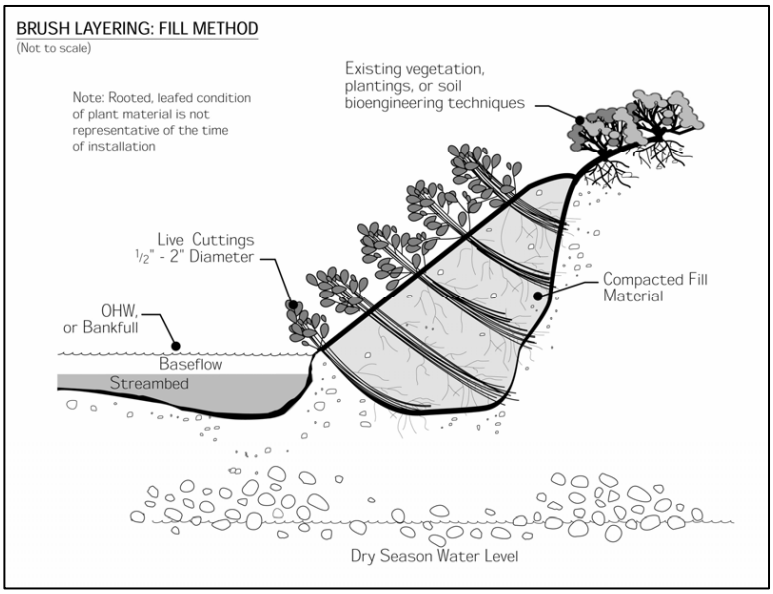

Figure 7.9 Brush Layering: Fill Method (USDA-FS, 2002)

- Myers, R.D. 1993. *Slope Stabilization and Erosion Control Using Vegetation: A Manual of Practice for Coastal Property Owners: Brush Layering.* Shorelands and Coastal Zone Management Program, Washington Department of Ecology. Olympia, WA. Publication 93-30. http://www.ecy.wa.gov/programs/sea/pubs/93-30/brush.html.

- Walter, J., D. Hughes, and N.J. Moore. 2005. *Streambank Revegetation and Protection: A Guide for Alaska. Revegetation Techniques: Brush/Hedge – Brush Layering.* Revised Edition. Alaska Department of Fish and Game, Division of Sport Fish. http://www.sf.adfg.state.ak.us/SARR/restoration/techniques/hedgebrush.cfm.

Brush Mattressing

Channelization
- ☑ Physical & chemical
- ☑ Instream/riparian restoration

Dams
- ☑ Erosion control
- ☐ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☑ Streambanks ☐ Shorelines
  - ☑ Vegetative
  - ☐ Structural
  - ☐ Integrated
  - ☐ Planning & regulatory

Brush mattressing is commonly used in Europe for streambank protection (Figure 7.10). It involves digging a slight depression on the bank and creating a mat or mattress from woven wire or single strands of wire and live, freshly cut branches from sprouting trees or shrubs. Branches approximately 1 inch in diameter are normally cut 6 to 9 feet long (the height of the bank to be covered) and laid in criss-cross layers with the butts in alternating directions to create a uniform mattress with few voids. The mattress is then covered with wire secured with wooden stakes 2.5 to 4 feet long. It is then covered with soil and watered repeatedly to fill voids with soil and facilitate sprouting; however, some branches should be left partially exposed on the surface. The structure may require protection from undercutting by placement of stones or burial of the lower edge. Brush mattresses are generally resistant to waves and currents and provide protection from the digging out of plants by animals. Disadvantages include possible burial with sediment in some situations and difficulty in making later plantings through the mattress.

Installation guidelines are available from the USDA-FS Soil Bioengineering Guide (USDA-FS, 2002). Under the Ecosystem Management and Restoration Research Program (EMRRP), the USACE has presented research on brush mattresses in a technical note (*Brush Mattresses for Streambank Erosion Control*).[3]

Additional Resources

- Allen, H.H. and C. Fischenich. 2001. *Brush Mattresses for Streambank Erosion Control.* U.S. Army Corps of Engineers, Ecosystem Management and Restoration Research Program. http://el.erdc.usace.army.mil/elpubs/pdf/sr23.pdf.

- FISRWG. 1998. *Stream Corridor Restoration: Principles, Processes, and Practices*. Federal Interagency Stream Restoration Working Group. http://www.nrcs.usda.gov/technical/stream_restoration/PDFFILES/APPENDIX.pdf.

- ISU. 2006. *How to Control Streambank Erosion*: *Brushmattress.* Iowa State University. http://www.ctre.iastate.edu/erosion/manuals/streambank/brushmattress.pdf.

- Mississippi State University, Center for Sustainable Design. 1999. *Water Related Best Management Practices in the Landscape: Brush Mattress.* Created for United States Department of Agriculture, Natural Resource Conservation Service, Watershed Science Institute. http://www.abe.msstate.edu/csd/NRCS-BMPs/pdf/streams/bank/brushmattress.pdf.

[3] http://el.erdc.usace.army.mil/elpubs/pdf/sr23.pdf

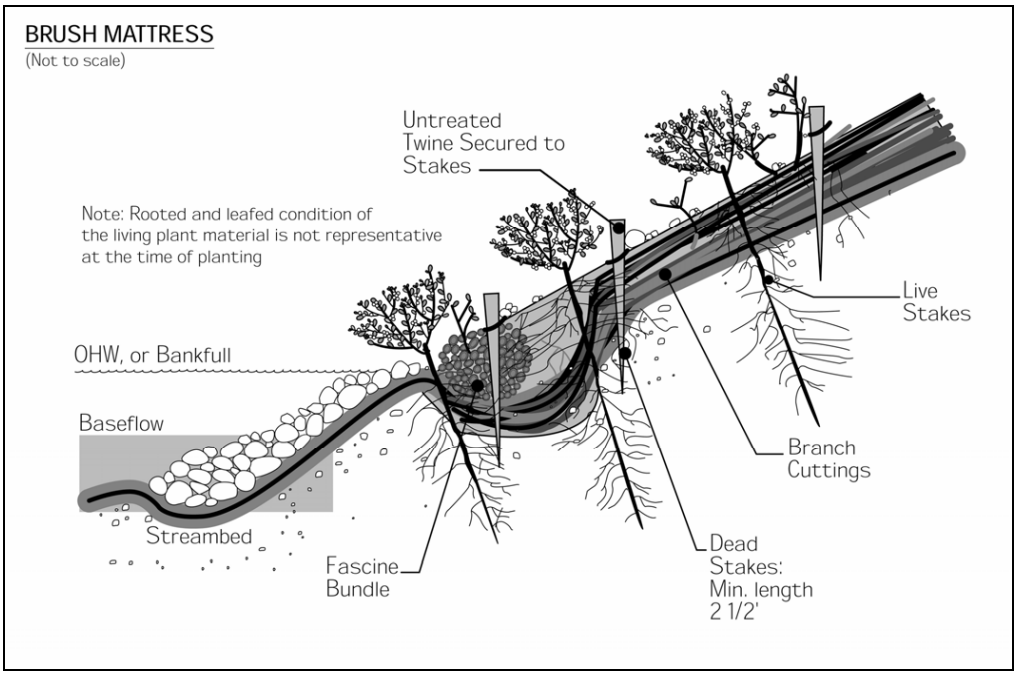

Figure 7.10 Brush Mattress (USDA-FS, 2002)

Bulkheads and Seawalls

Channelization
- ☑ Physical & chemical
- ☑ Instream/riparian restoration

Dams
- ☑ Erosion control
- ☐ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☑ Streambanks ☑ Shorelines
  - ☐ Vegetative
  - ☑ Structural
  - ☐ Integrated
  - ☐ Planning & regulatory

Bulkheads (Figure 7.11) are primarily soil-retaining structures designed to also resist wave attack. Seawalls are principally structures designed to resist wave attack, but they also may retain some soil (USACE, 1984). Both bulkheads and seawalls may be built of many materials, including steel, timber, or aluminum sheet pile, gabions, or rubble-mound structures. Although bulkheads and seawalls protect the upland area against further erosion and land loss, they often create a local problem. Downward forces of water, produced by waves striking the wall, can produce a transfer of wave energy and rapidly remove sand from the wall (Pilkey and Wright, 1988). A stone apron is often necessary to prevent scouring and undermining. With vertical protective structures built from treated wood, there are also concerns about the leaching of chemicals used in the wood preservatives. Chromated copper arsenate (CCA), the most popular chemical used for treating the wood used in docks, pilings, and bulkheads, contains elements of chromium, copper, and arsenic that are toxic above trace levels (CSWRCB, 2005; Kahler et al., 2000).

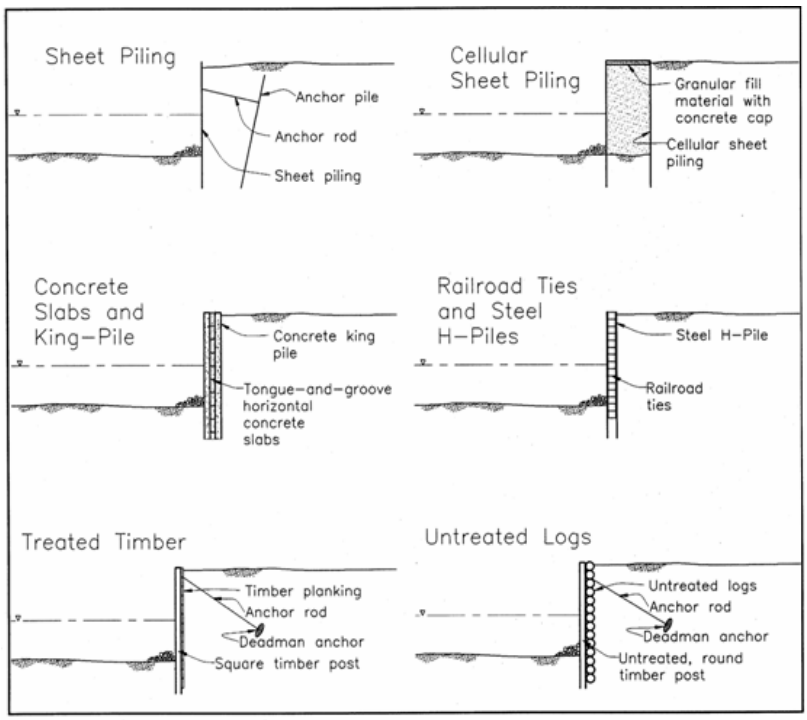

Figure 7.11 Typical Bulkhead Types (USACE, 2003)

Additional Resources

- Scottish National Heritage. No date. *A Guide to Managing Coastal Erosion in Beach/Dune Systems: Seawalls.* http://www.snh.org.uk/publications/on-line/heritagemanagement/erosion/appendix_1.12.shtml.
- USACE. No date. *Bulkheads and Seawalls.* http://www.usna.edu/NAOE/courses/en420/bonnette/Seawall_Design.html.

Check Dams

Channelization
- ☑ Physical & chemical
- ☑ Instream/riparian restoration

Dams
- ☑ Erosion control
- ☑ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☑ Streambanks ☐ Shorelines
  - ☐ Vegetative
  - ☑ Structural
  - ☐ Integrated
  - ☐ Planning & regulatory

Check dams, a type of grade control structure, are small dams constructed across an influent, intermittent stream, or drainageway to reduce channel erosion by restricting flow velocity. They can serve as emergency or temporary measures in small eroding channels that will be filled or permanently stabilized at a later date. Check dams can be installed in eroding gullies as permanent measures that fill up with sediment over time. In permanent usage, when the impounded area is filled, a relatively level surface or delta is formed over which water flows at a noneroding gradient. The water then cascades over the dam through a spillway onto a hardened apron. A series of check dams may be constructed along a stream channel of comparatively steep slope or gradient to create a channel consisting of a succession of gentle slopes with cascades in between.

Check dams can be nonporous (constructed from concrete, sheet steel, or wet masonry) or porous (using available materials such as straw bales, rock, brush, wire netting, boards, and posts). Porous dams release part of the flow through the structure, decreasing the head of flow over the spillway and the dynamic and hydrostatic forces against the dam. Nonporous dams are durable, permanent, and more expensive, while porous dams are simpler, more economical to construct, and temporary. Maintenance of check dams is important, especially the areas to the sides of the dam. Regular inspections, particularly after high flow events, should be performed to observe and repair erosion at the sides of the check dams. Excessive erosion could dislodge the check dam, create additional channel erosion, and add more sediment to the streambed.

Additional Resources

- CASQA. 2003. *California Stormwater BMP Construction Handbook*: *Check Dams.* California Stormwater Quality Association, Sacramento, CA. http://www.cabmphandbooks.com/Documents/Construction/SE-4.pdf.
- ISU. 2006. *Iowa Construction Site Erosion Control Manual: Check Dam.* Iowa State University. http://www.ctre.iastate.edu/erosion/manuals/construction/3.3_check_dam.pdf.
- Mississippi State University, Center for Sustainable Design. 1999. *Water Related Best Management Practices in the Landscape: Check Dam.* Created for United States Department of Agriculture, Natural Resource Conservation Service, Watershed Science Institute. http://www.abe.msstate.edu/csd/NRCS-BMPs/pdf/water/erosion/checkdam.pdf.
- SMRC. No date. *Stream Restoration: Grade Control Practices.* The Stormwater Manager's Resource Center. http://www.stormwatercenter.net/Assorted%20Fact%20Sheets/Restoration/grade_control.htm.
- Tennessee Department of Environment and Conservation. 2002. *Erosion and Sediment Control Handbook: Check Dams*. Tennessee Department of Environment and Conservation, Nashville, TN. http://state.tn.us/environment/wpc/sed_ero_controlhandbook/cd.pdf.

Coconut Fiber Roll

Channelization
- ☑ Physical & chemical
- ☑ Instream/riparian restoration

Dams
- ☑ Erosion control
- ☐ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☑ Streambanks ☐ Shorelines
  - ☑ Vegetative
  - ☐ Structural
  - ☐ Integrated
  - ☐ Planning & regulatory

The coconut fiber roll technique consists of cylindrical structures composed of coconut husk fibers held together with twine woven from coconut material (Figures 7.12 and 7.13). The fiber rolls are typically manufactured in 12-inch diameters and lengths of 20 feet, which serves to protect slopes from erosion, trap sediment, and as a result, encourage plant growth within the fiber roll. The system is typically installed near the toe of the streambank with dormant cuttings and rooted plants inserted into holes cut into the fiber rolls. Once installed, the system provides a good substrate for promoting plant growth and is appropriate where short-term moderate toe stabilization is needed. Installation of this design requires minimal site disturbance and is ideal for sites that are especially sensitive to disturbance. A limitation of this system is that it cannot withstand high velocities or large ice buildup, and it can be fairly expensive to construct. Coconut fiber rolls have an effective life of 6 to 10 years. In some locations, similar and abundant locally available materials, such as corn stalks, are being used instead of coconut materials (FISRWG, 1998).

Installation guidelines are available from the USDA-FS Soil Bioengineering Guide (USDA-FS, 2002). Under EMRRP, the USACE has presented research on coconut rolls in a technical note (*Coir Geotextile Roll and Wetland Plants for Streambank Erosion Control*), which is available at http://el.erdc.usace.army.mil/elpubs/pdf/sr04.pdf.

Figure 7.12 Coconut Fiber Roll (Montgomery Watson, 2001)

Additional Resources

- CASQA. 2003. *California Stormwater BMP Construction Handbook: Fiber Rolls.* California Stormwater Quality Association, Sacramento, CA. http://www.cabmphandbooks.com/Documents/Construction/SE-5.pdf.
- FISRWG. 1998. *Stream Corridor Restoration: Principles, Processes, and Practices*. Federal Interagency Stream Restoration Working Group. http://www.nrcs.usda.gov/technical/stream_restoration/PDFFILES/APPENDIX.pdf.
- ISU. 2006. *How to Control Streambank Erosion: Coconut Fiber Rolls.* Iowa State University. http://www.ctre.iastate.edu/erosion/manuals/streambank/coconut_fiber.pdf.

- Mississippi State University, Center for Sustainable Design. 1999. *Water Related Best Management Practices in the Landscape: Coconut Fiber Roll.* Created for United States Department of Agriculture, Natural Resource Conservation Service, Watershed Science Institute. http://www.abe.msstate.edu/csd/NRCS-BMPs/pdf/streams/bank/coconutfiberroll.pdf.

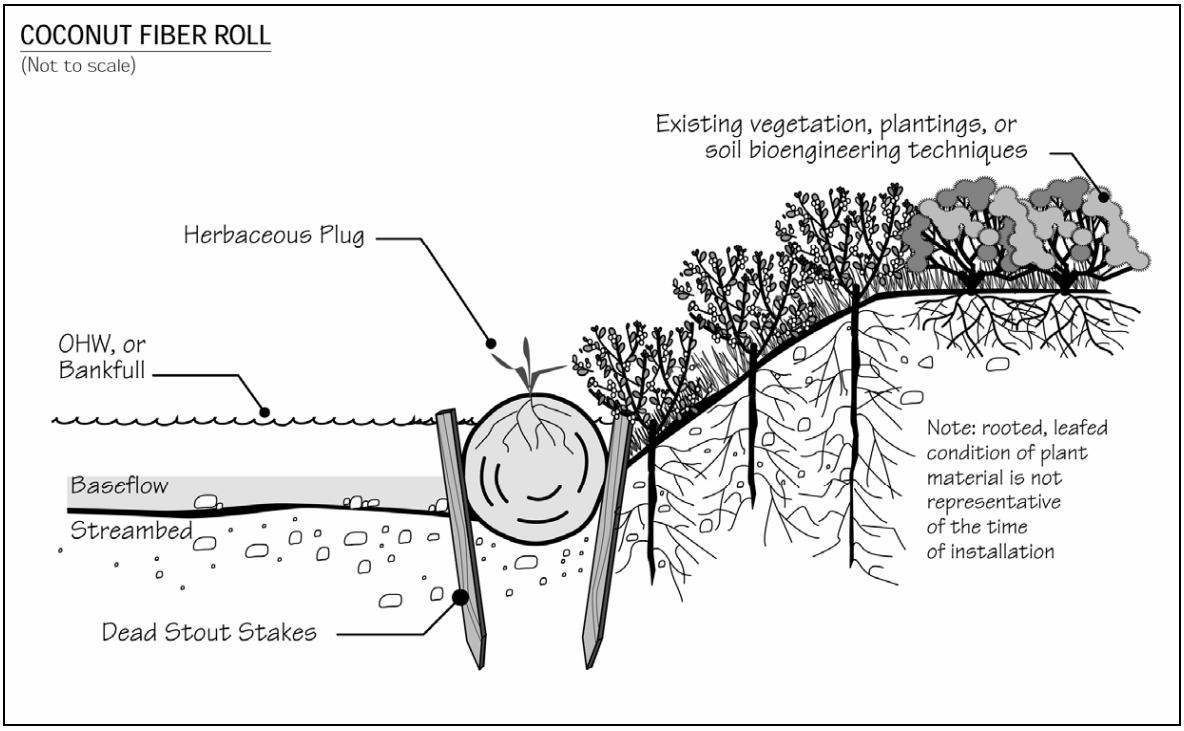

Figure 7.13 Coconut Fiber Roll (USDA-FS, 2002)

Collection Systems

Channelization
- ☐ Physical & chemical
- ☐ Instream/riparian restoration

Dams
- ☐ Erosion control
- ☐ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☑ Maintain fish passage

Erosion
- ☐ Streambanks ☐ Shorelines
  - ☐ Vegetative
  - ☐ Structural
  - ☐ Integrated
  - ☐ Planning & regulatory

Collection systems involve capture of fish by screening and/or netting followed with transport by truck or barge to a downstream location. Since the late 1970s, the USACE has successfully implemented a program that takes juvenile salmon from the uppermost dams in the Columbia River system (Pacific Northwest) and transports them by barge or truck to below the last dam. The program improves the travel time of fish through the river system, reduces most of the exposure to reservoir predators, and eliminates the mortality associated with passing through a series of turbines (van der Borg and Ferguson, 1989). Survivability rates for the collected fish are in excess of 95 percent, as opposed to survival rates of about 60 percent when the fish remain in the river system and pass through the dams (Dodge, 1989). However, the collection efficiency can range from 70 percent to as low as 30 percent. At the McNary Dam on the Columbia River, spill budgets are also implemented to improve overall passage (discussed in greater detail below) when the collection rate achieves less than 70 percent efficiency (Dodge, 1989).

Additional Resource

- Chelan County Public Utility District. No date. *Juvenile Fish Bypass*. http://www.chelanpud.org/juvenile-fish-passage.html.

Construct Runoff Intercepts

Channelization
- ☐ Physical & chemical
- ☐ Instream/riparian restoration

Dams
- ☑ Erosion control
- ☑ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☐ Streambanks ☐ Shorelines
  - ☐ Vegetative
  - ☐ Structural
  - ☐ Integrated
  - ☐ Planning & regulatory

Benches, terraces, or ditches break up a slope by providing areas of low slope in the reverse direction. This keeps water from proceeding down the slope at increasing volume and velocity. Instead, the flow is directed to a suitable outlet or protected drainage system. The frequency of benches, terraces, or ditches will depend on the erodibility of the soils, steepness and length of the slope, and rock outcrops. This practice can be used if there is a potential for erosion along the slope.

Earth dikes, perimeter dikes or swales, or diversions can intercept and convey runoff from above disturbed areas to undisturbed areas or drainage systems. An earth dike is a temporary berm or ridge of compacted soil that channels water to a desired location. A perimeter dike/swale or diversion is a swale with a supporting ridge on the lower side that is constructed from the soil excavated from the adjoining swale (Delaware DNREC, 2003). These practices can intercept flow from denuded areas or newly seeded areas and keep clean runoff away from disturbed areas. The structures can be stabilized within 14 days of installation. A pipe slope drain, also known as a pipe drop structure, is a temporary pipe placed from the top of a slope to the bottom of the slope to convey concentrated runoff down the slope without causing erosion (Delaware DNREC, 2003).

Additional Resources

- CASQA. 2003. *California Stormwater BMP Construction Handbook*: *Earth Dikes and Drainage Swales.* California Stormwater Quality Association, Sacramento, CA. http://www.cabmphandbooks.com/Documents/Construction/EC-9.pdf.

- Fifield, J. 2000. *Design and Implementation of Runoff Control Structures: Diversion Dikes and Swales.* http://www.forester.net/ec_0001_design.html#diversion.

- Lake Superior/Duluth Streams. 2005. *Grassed Swales.* http://www.duluthstreams.org/stormwater/toolkit/swales.html.

Constructed Spawning Beds

Channelization
- ☐ Physical & chemical
- ☐ Instream/riparian restoration

Dams
- ☐ Erosion control
- ☐ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☑ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☐ Streambanks ☐ Shorelines
  - ☐ Vegetative
  - ☐ Structural
  - ☐ Integrated
  - ☐ Planning & regulatory

When a dam adversely affects the aquatic habitat of an anadromous fish species, one option may be to construct replacement spawning beds. Additional facilities such as electric barriers, fish ladders, or bypass channels would be required to channel the fish to these spawning beds.

Merz et al., (2004) tested whether spawning bed enhancement increases survival and growth of Chinook salmon (*Oncorhynchus tshawytscha*) embryos in a regulated stream with a gravel deficit. The authors also examined a dozen physical parameters correlated with spawning sites (e.g., stream velocity, average turbidity, distance from the dam) and how they predicted survival and growth of Chinook salmon and steelhead (*Oncorhynchus mykiss*). The results suggest that spawning bed enhancement can improve embryo survival in degraded habitat. Measuring observed physical parameters before and after spawning bed manipulation can also accurately predict benefits. The National Oceanic and Atmospheric Administration's (NOAA's) S*tatus Review of Chinook Salmon from Washington, Idaho, Oregon, and California* (1998) states that artificial spawning beds for ocean-type Chinook salmon operated near three different dams was discontinued because of high pre-spawning mortality in adult fish and poor egg survival in the spawning beds. Success of constructed spawning beds in increasing survival and development of fish varies and often depends on the site.

Construction Management

Channelization
- ☐ Physical & chemical
- ☐ Instream/riparian restoration

Dams
- ☑ Erosion control
- ☐ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☐ Streambanks ☐ Shorelines
  - ☐ Vegetative
  - ☐ Structural
  - ☐ Integrated
  - ☐ Planning & regulatory

Construction areas can be managed properly to control erosion by stabilizing entrances and proper traffic routing. A construction entrance is a pad of gravel or rock over filter cloth located where traffic enters and leaves a construction site. As construction vehicles drive over the gravel, mud and sediment are collected from the vehicles' wheels. To maximize effectiveness, the rock pad should be at least 50 feet long and 10 to 12 feet wide. The gravel should be 1- to 2-inch aggregate 6 inches deep laid over a layer of filter fabric. Maintenance might include pressure washing the gravel to remove accumulated sediment and adding more rock to maintain thickness. Runoff from this entrance should be treated before exiting the site. This practice can be combined with a designated truck wash-down station to ensure sediment is not transported off-site.

Where possible, construction traffic should be directed to avoid existing or newly planted vegetation. Instead, it should be directed over areas that must be disturbed for other construction activity. This practice reduces the net total area that is cleared and susceptible to erosion.

Additional Resources

- CASQA. 2003. *California Stormwater BMP Construction Handbook*: *Stabilized Construction Entrance/Exit.* California Stormwater Quality Association, Sacramento, CA. http://www.cabmphandbooks.com/Documents/Construction/TR-1.pdf.

- ISU. 2006. *Iowa Construction Site Erosion Control Manual: Stabilized Construction Entrance.* Iowa State University. http://www.ctre.iastate.edu/erosion/manuals/construction/3.14_stabilized_entrance.pdf.

Dormant Post Plantings

Channelization
- ☑ Physical & chemical
- ☑ Instream/riparian restoration

Dams
- ☑ Erosion control
- ☐ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☑ Streambanks ☑ Shorelines
  - ☑ Vegetative
  - ☐ Structural
  - ☐ Integrated
  - ☐ Planning & regulatory

Dormant post plantings include planting of either cottonwood, willow, poplar, or other sprouting species embedded vertically into streambanks to increase channel roughness, reduce flow velocities near the slope face, and trap sediment (Figure 7.14). Dormant posts are made up of large cuttings installed in streambanks in square or triangular patterns. Live posts should be 7 to 20 feet long and 3 to 5 inches in diameter. This method is effective for quickly establishing riparian vegetation particularly in arid regions. By decreasing near bank flow velocities, this design causes sediment deposition and reduces streambank erosion. This design is more resistant to erosion than live staking or similar designs that use smaller cuttings. Success of this design is most likely on streambanks that are not gravel dominated and where ice build up is not common. The exclusion of certain herbivores aids in the success of this design. This method should be combined with other soil bioengineering techniques to achieve a comprehensive streambank restoration design (FISRWG, 1998). Installation guidelines are available from the USDA-FS Soil Bioengineering Guide (USDA-FS, 2002).

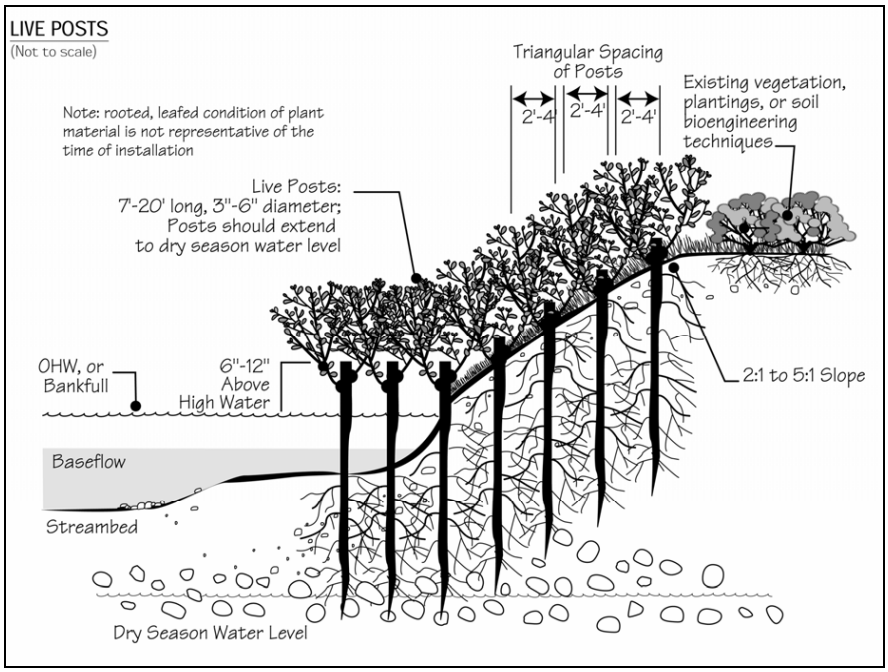

Figure 7.14 Live Posts (USDA-FS, 2002)

Additional Resources

- FISRWG. 1998. *Stream Corridor Restoration: Principles, Processes, and Practices*. Federal Interagency Stream Restoration Working Group. http://www.nrcs.usda.gov/technical/stream_restoration/PDFFILES/APPENDIX.pdf.
- ISU. 2006. *How to Control Streambank Erosion: Dormant Post Plantings.* Iowa State University. http://www.ctre.iastate.edu/erosion/manuals/streambank/dormant_post.pdf.

Encourage Drainage Protection

Channelization
- ☐ Physical & chemical
- ☐ Instream/riparian restoration

Dams
- ☐ Erosion control
- ☐ Runoff control
- ☐ Chemical/pollutant control
- ☑ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☐ Streambanks ☐ Shorelines
  - ☐ Vegetative
  - ☐ Structural
  - ☐ Integrated
  - ☐ Planning & regulatory

A complete understanding of watershed protection should include the implementation of practices that guide future development and land use activities. This will not only help to identify existing sources of NPS pollution but also to prevent future impairments that may impact dam construction or operations and reservoir management. Watershed protection practices can include zoning for natural resource protection. Several zoning techniques are:

- Use cluster zoning and planned unit development
- Consider resource protection zones
- Practice performance-based zoning
- Establish overlay zones
- Establish bonus or incentive zoning
- Consider large lot zoning
- Practice agricultural protection zoning
- Use watershed-based zoning
- Delineate urban growth boundaries

More details about these techniques and case studies can be found in *Protecting Wetlands: Tools for Local Governments in the Chesapeake Bay Region* (Chesapeake Bay Program, 1997).

Equipment Runoff Control

Channelization
- ☐ Physical & chemical
- ☐ Instream/riparian restoration

Dams
- ☐ Erosion control
- ☐ Runoff control
- ☑ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☐ Streambanks ☐ Shorelines
  - ☐ Vegetative
  - ☐ Structural
  - ☐ Integrated
  - ☐ Planning & regulatory

During construction and maintenance activities at dams, equipment and machinery can be a potential source of pollution to the surface and ground water. Thinners or solvents should not be discharged into sanitary or storm sewer systems or into surface water systems, when cleaning machinery. Use alternative methods for cleaning larger equipment parts, such as high-pressure, high-temperature water washes or steam cleaning. Equipment-washing detergents can be used and wash water appropriately discharged. Small parts should be cleaned with degreasing solvents that can be reused or recycled. Washout from concrete trucks should never be dumped directly into surface waters or into a drainage leading to surface waters but can be disposed of into:

- A designated area that will later be backfilled
- An area where the concrete wash can harden, can be broken up, and can then be appropriately disposed
- A location not subject to surface water runoff and more than 50 feet away from a receiving water

Erosion and Sediment Control (ESC) Plans

Channelization
- ☑ Physical & chemical
- ☑ Instream/riparian restoration

Dams
- ☑ Erosion control
- ☐ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☑ Streambanks ☑ Shorelines
  - ☐ Vegetative
  - ☐ Structural
  - ☐ Integrated
  - ☑ Planning & regulatory

ESC plans are important for controlling the adverse impacts of dam construction. ESC plans ensure that provisions for control measures are incorporated into the site planning stage of development. ESC plans also provide for prevention of erosion and sediment problems and accountability if a problem occurs (MDEP, 1990). In many municipalities, ESC plans are required under ordinances enacted to protect water resources. These plans describe the activities construction and maintenance personnel will use to reduce soil erosion and contain and treat runoff that is carrying eroded sediments. ESC plans typically include descriptions and locations of soil stabilization practices, perimeter controls, and runoff treatment facilities that will be installed and maintained before and during construction activities. In addition to special area considerations, the full ESC plan review inventory should include:

- Topographic and vicinity maps
- Site development plan
- Construction schedule
- Erosion and sedimentation control plan drawings
- Detailed drawings and specifications for practices
- Design calculations
- Vegetation plan
- Detailed drawings and specifications for control or management practices

Some erosion and soil loss is unavoidable during land-disturbing activities. Although proper siting and design help prevent areas prone to erosion from being developed, construction activities invariably produce conditions where erosion can occur. To reduce the adverse impacts associated with construction activities at dams, the construction management measure suggests a system of nonstructural and structural ESCs for incorporation into an ESC plan.

Nonstructural controls address erosion control by decreasing erosion potential, whereas structural controls are both preventive and mitigative because they control erosion and sediment movement. Brown and Caraco (1997) identified several general objectives that should be addressed in an effective ESC plan:

- *Minimize clearing and grading* – clearing and grading should occur only where absolutely necessary to build and provide access to structures and infrastructure. Clearing should be done immediately before construction, rather than leaving soils exposed for months or years (SQI, 2000).
- *Protect waterways and stabilize drainage ways* – all natural waterways within a development site should be clearly identified before construction activities begin. Clearing should generally be prohibited in or adjacent to waterways. Sediment control

practices such as check dams might be needed to stabilize drainage ways and retain sediment on-site.

- *Phase construction to limit soil exposure* – construction phasing is a process where only a portion of the site is disturbed at any one time to complete the required building in that phase. Other portions of the site are not cleared and graded until exposed soils from the earlier phase have been stabilized and the construction nearly completed.
- *Stabilize exposed soils immediately* – seeding or other stabilization practices should occur as soon as possible after grading. In colder climates, a mulch cover is needed to stabilize the soil during the winter months when grass does not grow or grows poorly.
- *Protect steep slopes and cuts* - wherever possible, clearing and grading of existing steep slopes should be completely avoided. If clearing cannot be avoided, practices should be implemented to prevent runoff from flowing down slopes.
- *Install perimeter controls to filter sediments* – perimeter controls are used to retain sediment-laden runoff or filter it before it exits the site. The two most common perimeter control options are silt fences and earthen dikes or diversions.
- *Employ advanced sediment-settling controls* – traditional sediment basins are limited in their ability to trap sediments because fine-grained particles tend to remain suspended and the design of the basin themselves is often simplistic. Sediment basins can be designed to improve trapping efficiency through the use of perforated risers; better internal geometry; the installation of baffles, skimmers, and other outlet devices; gentler side slopes; and multiple-cell construction.

ESC plans ensure that provisions for control measures that are incorporated into the site planning stage of development help to reduce the incidence of erosion and sediment problems, and improve accountability if a problem occurs. An effective plan for runoff management on construction sites controls erosion, retains sediments on-site to the extent practicable, and reduces the adverse effects of runoff. Climate, topography, soils, drainage patterns, and vegetation affect how erosion and sediment should be controlled on a site (Washington State Department of Ecology, 1989).

ESC plans should be flexible to account for unexpected events that occur after the plans have been approved, including:

- Discrepancies between planned and as-built grades
- Weather conditions
- Altered drainage
- Unforeseen construction requirements

Changes to an ESC plan should be made based on regular inspections that identify whether the ESC practices were appropriate or properly installed or maintained. Inspecting an ESC practice after storm events shows whether the practice was installed or maintained properly. Such inspections also show whether a practice requires cleanout, repair, reinforcement, or replacement with a more appropriate practice. Inspecting after storms is the best way to ensure that ESC practices remain in place and effective at all times during construction activities.

Because funding for ESC programs is not always dedicated, budgetary and staffing constraints may thwart effective program implementation. Brown and Caraco (1997) recommend several management techniques to ensure that ESC programs are properly administered:

- Local leadership committed to the ESC program
- Redeployment of existing staff from the office to the field or training room
- Cross-training of local review and inspection staff
- Submission of erosion prevention elements for early planning reviews.
- Prioritization of inspections based on erosion risk
- Requirement of designers to certify the initial installation of ESC practices
- Investment in contractor certification and private inspector programs
- Use of public-sector construction projects to demonstrate effective ESC controls
- Enlistment of the talents of developers and engineering consultants in the ESC program
- Revision and update of the local ESC manual

An allowance item that acts as an additional "insurance policy" for complying with the erosion and sediment control plan can be added to bid or contract documents (Deering, 2000a). This allowance covers costs to repair storm damage to ESC measures as specified in the ESC plan. This allowance does not cover storm damage to property that is not related to the ESC plan, because this would be covered under traditional liability insurance. Damage caused by severe and continuous rain events, windblown objects, fallen trees or limbs, or high-velocity, short-term rain events on steep slopes and existing grades would be covered by the allowance, as would deterioration from exposure to the elements or excessive maintenance for silt removal. The contractor is responsible for being in compliance with the ESC plan by properly implementing and maintaining all specified measures and structures. The allowance does not cover damage to practices caused by improper installation or maintenance.

Additional Resources

- ISU. 2006. *Iowa Construction Site Erosion Control Manual: Infiltration Basin and Trench.* Iowa State University. http://www.ctre.iastate.edu/erosion/manuals/construction/4.1_infiltration.pdf.

- Milwaukee River Basin Partnership. 2003. *Detention & Infiltration Basins.* http://clean-water.uwex.edu/plan/drbasins.htm.

- Tennessee Department of Environment and Conservation. 2002. *Erosion and Sediment Control Handbook: Vegetative Practices*. Tennessee Department of Environment and Conservation, Nashville, TN. http://state.tn.us/environment/wpc/sed_ero_controlhandbook/2.%20Vegetative%20Practices.pdf.

Erosion Control Blankets

Channelization
- ☐ Physical & chemical
- ☐ Instream/riparian restoration

Dams
- ☑ Erosion control
- ☐ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☐ Streambanks ☐ Shorelines
  - ☐ Vegetative
  - ☐ Structural
  - ☐ Integrated
  - ☐ Planning & regulatory

Turf reinforcement mats (TRMs) combine vegetative growth and synthetic materials to form a high-strength mat that helps prevent soil erosion in drainage areas and on steep slopes (Figure 7.15) (USEPA, 1999). TRMs enhance vegetation's natural ability to protect soil from erosion. They are composed of interwoven layers of nondegradable geosynthetic materials (e.g., nylon, polypropylene) stitched together to form a three-dimensional matrix. They are thick and porous enough to allow for soil filling and retention. In addition to providing scour protection, the mesh netting of TRMs is designed to enhance vegetative root and stem development. By protecting the soil from scouring forces and enhancing vegetative growth, TRMs can raise the threshold of natural vegetation to withstand higher hydraulic forces on stabilization slopes, streambanks, and channels. In addition to reducing flow velocities, natural vegetation removes particulates through sedimentation and soil infiltration and improves site aesthetics. In general, TRMs should not be used for the following:

- To prevent deep-seated slope failure due to causes other than surficial erosion
- If anticipated hydraulic conditions are beyond the limits of TRMs and natural vegetation
- Directly beneath drop outlets to dissipate impact force (can be used beyond impact zone)
- Where wave height might exceed 1 foot (can protect areas upslope of wave impact zone)

The performance of a TRM-lined conveyance system depends on the duration of the runoff event. For short-term events, TRMs are typically effective at flow velocities of up to 15 feet per second and shear stresses of up to 8 lb/ft^2. However, specific high-performance TRMs may be effective under more severe hydraulic conditions. Practitioners should check with manufacturers for specifications and performance limits of different products. Factors influencing the cost of TRMs include the type of material required, site conditions (e.g., underlying soils, slope steepness), and installation-specific factors (e.g., local construction costs). TRMs typically cost considerably less than concrete and riprap solutions.

Figure 7.15 Erosion Control Blanket (Conwed Fibers, n.d.)

Additional Resources

- Barr Engineering Company. 2001. *Minnesota Urban Small Sites BMP Manual: Stormwater Best Management Practices for Cold Climates. Soil Erosion Control: Mulches, Blankets and Mats.* Prepared for the Metropolitan Council by Barr Engineering Company, St. Paul, MN. http://www.metrocouncil.org/Environment/Watershed/BMP/CH3_RPPSoilMulch.pdf.

- CASQA. 2003. *California Stormwater BMP Construction Handbook: Geotextiles and Mats.* California Stormwater Quality Association, Sacramento, CA. http://www.cabmphandbooks.com/Documents/Construction/EC-7.pdf.

- California Department of Transportation. 1999. *Soil Stabilization Using Erosion Control Blankets.* Construction Storm Water Pollution Prevention Bulletin. Vol. 3, No. 8. California Department of Transportation, Division of Environmental Analysis, Sacramento, CA. http://www.dot.ca.gov/hq/env/stormwater/publicat/const/Aug_1999.pdf.

- Matthews, M. 1998. *What are RECPs? Soil Stabilization Using Erosion Control Blankets*. Erosion Control Technology Council, St. Paul, MN. http://www.ectc.org/what.html.

- North American Green. 2004. *Green Views: Turn Reinforcement Mats as an Alternative to Rock Riprap*. North American Green, Evansville, IN. http://www.nagreen.com/resources/literature/GV_AltToRockRiprap.pdf.

- Tennessee Department of Environment and Conservation. 2002. *Erosion and Sediment Control Handbook: Vegetative Practices: Erosion Control Blanket/Matting*. Tennessee Department of Environment and Conservation, Nashville, TN. http://state.tn.us/environment/wpc/sed_ero_controlhandbook/2.%20Vegetative%20Practices.pdf.

Establish and Protect Stream Buffers

Channelization
- ☐ Physical & chemical
- ☑ Instream/riparian restoration

Dams
- ☐ Erosion control
- ☐ Runoff control
- ☐ Chemical/pollutant control
- ☑ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☑ Streambanks ☐ Shorelines
  - ☐ Vegetative
  - ☐ Structural
  - ☐ Integrated
  - ☑ Planning & regulatory

Riparian buffers and wetlands can provide long-term pollutant removal capabilities without the comparatively high costs usually associated with constructing and maintaining structural controls. Conservation or preservation of these areas is important to water quality protection. Land acquisition programs help to preserve areas considered critical to maintaining surface water quality. Adequate buffer strips along streambanks provide protection for stream ecosystems, help stabilize the stream, and can prevent streambank erosion (Holler, 1989). Buffer strips can also protect and maintain near-stream vegetation that attenuates the release of sediment into stream channels. Levels of suspended solids have been shown to increase at a slower rate in stream channel sections with well-developed riparian vegetation (Holler, 1989).

Stream buffers should be protected and preserved as a conservation area because these areas provide many important functions and benefits, including:

- Providing a "right-of-way" for lateral movement
- Conveying floodwaters
- Protecting streambanks from erosion
- Treating runoff and reducing drainage problems from adjacent areas
- Providing nesting areas and other wildlife habitat functions
- Mitigating stream warming
- Protecting wetlands
- Providing recreational opportunities and aesthetic benefits
- Increasing adjacent property values

Specific stream buffer practices could include:

- Establishing a stream buffer ordinance
- Developing vegetative and use strategies within management zones
- Establishing provisions for stream buffer crossings
- Integration of structural runoff management practices where appropriate
- Developing stream buffer education and awareness programs

More information on establishing and protecting stream buffers is available from EPA's *National Management Measures to Control Nonpoint Source Pollution from Urban Areas*,[4] a document for use by state, local, and tribal managers in the implementation of nonpoint source pollution management programs. It contains a variety of practices and management activities for reducing pollution of surface and ground water from urban areas (USEPA, 2005d).

[4] http://www.epa.gov/owow/nps/urbanmm/index.html

Fish Ladders

Channelization
- ☐ Physical & chemical
- ☐ Instream/riparian restoration

Dams
- ☐ Erosion control
- ☐ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☑ Maintain fish passage

Erosion
- ☐ Streambanks ☐ Shorelines
  - ☐ Vegetative
  - ☐ Structural
  - ☐ Integrated
  - ☐ Planning & regulatory

Fish ladders have been a commonly used structure to enable the safe upstream and downstream passage of mature fish (see Figure 7.16). There are four basic designs: pool-weir, Denil, vertical slot, and steeppass.

Pool-weir fish ladders are one of the oldest and most commonly designed fish passage structures, which consists of stepped pools and weirs that allow fish to pass from pool to pool over the weirs that separate each. Pool-weir fish ladders are normally used on slopes of about 10-degrees. Some pool-weir fish ladders can be modified to increase the possible number of fish that are passed by including submerged orifices that allow fish to pass the fish ladder without cresting the weirs.

Pool-weir fish ladders will pass many different species of fish if they are designed correctly for the environment in which they are employed. OTA (1995) provides details on design and operation of various forms of fish ladders.

Figure 7.16 Fish Ladder at Feather River Hatchery, Oroville Dam, CA (Feather River, n.d.)

Denil fish ladders are elongated rectangular channels that use internal baffles to dissipate flow energy and allow fish passage. They are widely used in the eastern United States due to their ability to pass a wide range of species (from salmonids to riverine) over a wider range of flows than pool-weir ladders. Denil ladders can be used on slopes from 10 to 25 degrees although 10 to 15 degrees is optimal. Most Denil fish ladders are 2–4 feet wide and 4–8 feet deep. This fish ladder design allows fish to pass at a preferred depth instead of through a jumping action. Denil ladders do not have resting areas and therefore fish must either be able to pass the ladder in one burst or resting pools must be provided between sections. Resting pools should be provided every 16 to 50 feet depending upon the species being passed. The high flow rates and turbulence

associated with Denil fish ladders reduces the demand for attraction flow, which is commonly added to insure good attraction over varying flow rates.

Vertical slot fish ladders are elongated rectangular channels that use regularly spaced baffles to create steps and resting pools. The vertically oriented slots in the baffles allow fish to pass through the ladder at a preferred depth. Unlike Denil fishways, vertical slot fishways provide a resting area behind each baffle allowing fish to pass in a "burst-rest" manner instead of one sustained motion. The channel created by the baffles is off-center making the baffles on one side of the ladder wider than the opposing side. Eddies that form behind longer baffles allow fish to rest and end the need for resting areas. Although vertical slot ladders are usually operated at slopes of about 10 degrees, they can be operated over a larger variety of flows. The vertical slots create a water jet that is regulated by the pool on the downstream side of it. This creates a uniform, level flow throughout the ladder.

The steeppass fish ladder, often referred to as the "Alaska steeppass," is a modified Denil fish ladder most commonly used in remote areas for the passage of salmonids. Steeppass fish ladders are usually constructed of lightweight materials such as aluminum and can operate on slopes up to 33 percent. The construction materials and design allow this type of fish ladder to be deployed as a single unit to remote areas. The baffles used in steeppass ladders are more aggressively designed, which allow the ladder to more effectively control water flow. The steeppass ladder is not without its limitations. Due to their narrow design, steeppass ladders are more susceptible to clogging due to debris and changes in flow upstream or downstream of the ladder.

Although fish ladders can be extremely efficient at passing fish, small changes in design have been shown to significantly improve their functionality. A good example of this is the John Day Dam located on the Columbia River. The original design focused on the passage of salmonids and therefore only passed about 17 percent of the American shad (*Alosa sapidissima*) using the ladder. Research indicated that simple design changes could allow for the passage of riverine species such as American shad. By changing the placement of the weirs within the fish ladder, the fish ladder was able to pass 94 percent of the salmonids, and American shad passage increased to 74 percent (Monk et al., 1989).

According to the USACE, Portland District (1997), the success rate for adults negotiating fish ladders at dams in the Columbia River Basin is about 95 percent. The U.S. Fish and Wildlife Agency designs fishways assuming a 90 percent efficiency rate. Few studies document actual efficiency of fish ladders, but it is recognized that not all fishways are equally effective (for various reasons, such as predation or physical damage to passing fish). Some fishways installed in the last 20 years are less effective than newer ones (when federal licenses began to include fish passage requirements). Maine Department of Marine Resources (DMR) estimates efficiency between 75 and 90 percent (Presumpscot River Plan Steering Committee, 2002).

Additional Resource

- Michigan DNR. No date. *What is a fish ladder?* Michigan Department of Natural Resources, Lansing, MI. http://www.michigan.gov/dnr/0,1607,7-153-10364_19092-46291--,00.html.

Fish Lifts

Channelization
- ☐ Physical & chemical
- ☐ Instream/riparian restoration

Dams
- ☐ Erosion control
- ☐ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☑ Maintain fish passage

Erosion
- ☐ Streambanks ☐ Shorelines
  - ☐ Vegetative
  - ☐ Structural
  - ☐ Integrated
  - ☐ Planning & regulatory

Fish lifts describe both fish elevators and locks, which are used to capture fish at the downstream side of a structure and then move them above the structure. Like fish ladders, these systems require sufficient attraction flow to move fish into the lift area. Lift systems can be advantageous because they are not species or flow specific. They can also be employed at structures too tall for fish ladders and to pass species with reduced swimming ability.

Lift systems have the potential to move large numbers of fish if they are operated efficiently. These systems can be automated to allow operation much like fish ladders. Fish lift systems do require additional operation and maintenance costs and are subject to mechanical failures not associated with fish ladders.

Most lift systems require either an active or passive bypass system to move fish far enough upstream to avoid entrainment in the flow through the dam. Passive bypass systems may include constructed waterways or pipes that discharge passed fish sufficiently up-steam of the structure. Active bypass systems include trucking and pumping operations that discharge the fish safely upstream of the structure. Active bypass systems, especially pumping systems, have come under scrutiny for fish behavior and health reasons. During the pumping process, fish may be subject to descaling and/or death due to overcrowding. After release, the fish may have orientation problems and therefore be subject to higher rates of predation mortality. Due to these concerns the United States Fish and Wildlife service has generally opposed the use of fish pumps (OTA, 1995).

Flow Augmentation

Channelization
- ☐ Physical & chemical
- ☐ Instream/riparian restoration

Dams
- ☐ Erosion control
- ☐ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☑ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☐ Streambanks ☐ Shorelines
  - ☐ Vegetative
  - ☐ Structural
  - ☐ Integrated
  - ☐ Planning & regulatory

Operational procedures such as flow regulation, flood releases, or fluctuating flow releases all have the potential for detrimental impacts on downstream aquatic and riparian habitat. When evaluating solutions associated with degraded aquatic and riparian habitat, stakeholders must balance operational procedures to address the needs of downstream aquatic and riparian habitat with the requirements of dam operation. There are often legal and jurisdictional requirements for an operational procedure at a particular dam that should also be considered (USDOI, 1988).

A flushing flow is a high-magnitude, short-duration release for the purpose of maintaining channel capacity and the quality of instream habitat by scouring the accumulation of fine-grained sediments from the streambed. Availability of suitable instream habitat is a key factor limiting spawning success. Flushing flows wash away the sediments without removing the gravel. Flushing flows also prevent the encroachment of riparian vegetation.

However, it is important to keep in mind that flushing flows are not recommended in all cases. Flushing flows of a large magnitude may cause flooding in the old floodplain or depletion of gravel below a dam. Flushing flows are more efficient and predictable for small, shallow, high-velocity mountain streams unaltered by dams, diversions, or intensive land use. Routine maintenance generally requires a combination of practices including high flows coupled with sediment dams or channel dredging, rather than simply relying on flushing or scouring flows (Nelson et al., 1988).

Several options exist for creating minimum flows in the tailwaters below dams. The selection of any particular technique as the most cost-effective is site-specific and depends on several factors including adequate performance to achieve the desired instream and riparian habitat characteristic, compatibility with other requirements for operation of the hydropower facility, availability of materials, and cost.

Sluicing is the practice of releasing water through the sluice gate rather than through the turbines. For portions of the waterway immediately below the dam, the steady release of water by sluicing provides minimum flows with the least amount of water expenditure. At some facilities, this practice may dictate that modifications be made to the existing sluice outlets to maintain continuous low releases. Continuous low-level sluice releases at Eufala Lake and Fort Gibson Lake (Oklahoma) provided minimum flows needed to sustain downstream fish populations. The sluicing also had the benefit of improving DO levels in tailwaters downstream of these two dams such that fish mortalities, which had been experienced in the tailwaters below these two dams prior to initiating this practice, no longer occurred (USDOE, 1991).

Turbine pulsing is a practice involving the release of water through the turbines at regular intervals to improve minimum flows. In the absence of turbine pulsing, water is released from large hydropower dams only when the turbines are operating, which is typically when the demand for power is high.

A study undertaken at the Douglas Dam (French Broad River, Tennessee) suggests some of the site-specific factors that should be considered when evaluating the advantages of practices such as turbine pulsing, sluicing, or other alternatives for providing minimum flows and improving dissolved oxygen (DO) levels in reservoir releases. Two options for maintaining minimum flows (turbine pulsing and sluicing), and two aeration alternatives (operation of surface water pumps and diffusers) were evaluated for their effectiveness, advantages, and disadvantages in providing minimum flows and aeration of reservoir releases. Computer modeling indicated that either turbine pulsing or sluicing could improve DO concentrations in releases by levels ranging from 0.7 to 1.5 mg/L. This is slightly below the level of improvement that might be expected from operation of a diffuser system for aeration. A trade-off can also be expected at this facility between water saved by frequent short-release pulses and the higher maintenance costs due to operating turbines on and off frequently (Hauser et al., 1989). Hauser et al. (1989) found that schemes of turbine pulsing ranging from 15-minute intervals to 60-minute intervals every 2 to 6 hours were found to provide fairly stable flow regimes after the first 3 to 8 miles downstream at several Tennessee Valley Authority (TVA) projects. However, at points farther downstream, less overall flow would be produced by sluicing than by pulsing. Turbine pulsing may also cause waters to rise rapidly, which could endanger people wading or swimming in the tailwaters downstream of the dam (TVA, 1990).

Fuel and Maintenance Staging Areas

Proper maintenance of equipment and installation of proper stream crossings will further reduce pollution of water by these sources. Vehicles need to be inspected for leaks. To prevent runoff, fuel and maintain vehicles on site only in a bermed area or over a drip pan. Fuel tanks should be protected and have containment systems. Stream crossings can be minimized through proper planning of access roads. This will help to keep potential sources of pollution away from direct contact with surface waters.

Channelization
- ☐ Physical & chemical
- ☐ Instream/riparian restoration

Dams
- ☐ Erosion control
- ☐ Runoff control
- ☑ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☐ Streambanks ☐ Shorelines
  - ☐ Vegetative
  - ☐ Structural
  - ☐ Integrated
  - ☐ Planning & regulatory

Gated Conduits

Gated conduits are hydraulic structures that divert the flow of water under the dam. They are designed to create turbulent mixing to enhance oxygen transfer. Gates are used to control the cross-sectional area of flow. Gated conduits have been extensively analyzed for their performance and effectiveness (Wilhelms and Smith, 1981), although the available data are mostly from high-head projects (Wilhelms, 1988). An example of the effectiveness found that gated conduit structures were able to achieve 90 percent aeration and a minimum DO standard of 5 mg/L (Wilhelms and Smith, 1981).

Channelization
- ☐ Physical & chemical
- ☐ Instream/riparian restoration

Dams
- ☐ Erosion control
- ☐ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☑ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☐ Streambanks ☐ Shorelines
  - ☐ Vegetative
  - ☐ Structural
  - ☐ Integrated
  - ☐ Planning & regulatory

Groins

Channelization
- ☐ Physical & chemical
- ☐ Instream/riparian restoration

Dams
- ☐ Erosion control
- ☐ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☐ Streambanks ☑ Shorelines
  - ☐ Vegetative
  - ☑ Structural
  - ☐ Integrated
  - ☐ Planning & regulatory

Groins are structures that are built perpendicular to the shore and extend into the water. Examples of possible planform shapes for groins are illustrated in Figure 7.17. They are generally constructed in series, referred to as a groin field, along the entire length of shore to be protected. Groins trap sand in littoral drift and halt its longshore movement along beaches. The sand trapped by each groin acts as a protective barrier that waves can attack and erode without damaging previously unprotected upland areas. Unless the groin field is artificially filled with sand from other sources, sand is trapped in each groin by interrupting the natural supply of sand moving along the shore in the natural littoral drift. This frequently results in an inadequate natural supply of sand to replace the sand carried away from beaches located farther along the shore in the direction of the littoral drift. If "downdrift" beaches are kept starved of sand for long periods of time, severe beach erosion in unprotected areas can result. As with bulkheads and revetments, the most durable materials for construction of groins are timber and stone. Less expensive techniques for building groins use sand- or concrete-filled bags or tires. It must be recognized that the use of lower-cost materials in the construction of bulkheads, revetments, or groins frequently results in less durability and reduced project life. Figure 7.18 illustrates transition from a groin field to a natural shoreline.

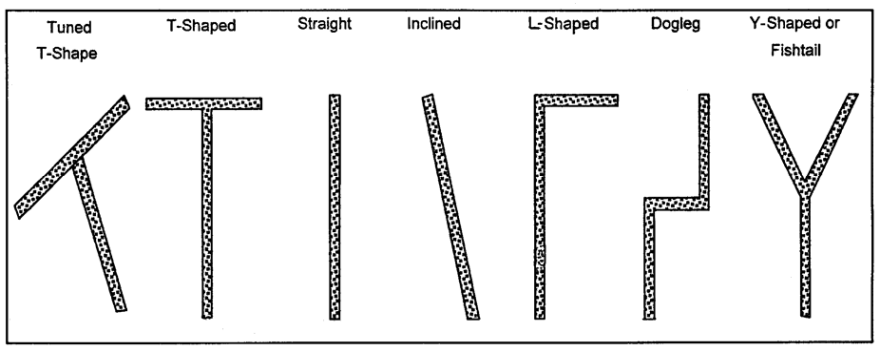

Figure 7.17 Possible Planform Shapes for Groins (USACE, 2003)

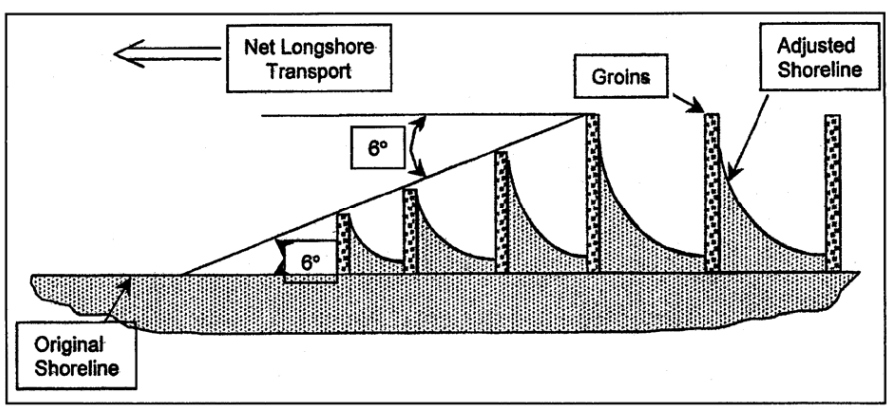

Figure 7.18 Transition from Groin Field to Natural Shoreline (USACE, 2003)

Additional Resource

- USACE. No date. *Groins.* U.S. Army Corps of Engineers, Coastal & Hydraulics Laboratory. http://chl.erdc.usace.army.mil/chl.aspx?p=s&a=ARTICLES!188.

Identify and Address NPS Contributions

Channelization
- ☐ Physical & chemical
- ☐ Instream/riparian restoration

Dams
- ☐ Erosion control
- ☐ Runoff control
- ☐ Chemical/pollutant control
- ☑ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☐ Streambanks ☐ Shorelines
  - ☐ Vegetative
  - ☐ Structural
  - ☐ Integrated
  - ☐ Planning & regulatory

Another watershed protection practice involves the evaluation of the total NPS pollution contributions in the watershed. NPS contributions can stem from different land use activities upstream from a dam. For example, the analysis and interpretation of stereoscopic color infrared aerial photographs can be used to find and map specific areas of concern where a high probability of NPS pollution exists from septic tank systems, animal wastes, soil erosion, and other similar types of NPS pollution (TVA, 1988). Other remote sensing techniques, such as analysis of satellite imagery, can be used to map areas of concern within a watershed. Historically, TVA has used analysis of aerial photography images to survey about 25 percent of the Tennessee Valley to identify sources of nonpoint pollution in a period of less than 5 years at a cost of a few cents per acre (TVA, 1988). Modern geographic information systems (GIS) enable watershed planners and modelers to rapidly assess large watersheds in a cost-effective manner.

The development of Total Maximum Daily Loads (TMDLs) in watersheds with impaired waterbodies is a way to identify all sources of pollution. TMDLs are planning documents that provide load allocations, for both point and nonpoint sources, and identify potential contributions of pollutants to an impaired waterbody. TMDLs often include the involvement of stakeholders throughout the watershed, in not only the development, but also with implementation of specific activities within the watershed. TMDL documents can provide a plan for addressing pollution sources throughout a watershed.

Different practices can be used to control NPS pollution once sources have been identified. These practices may include the following:

Soil Erosion Control

Soil erosion has been determined to be the major source of suspended solids, nutrients, organic wastes, pesticides, and sediment that combined form the most problematic form of NPS pollution (TVA, 1988). Soil erosion and runoff controls have been addressed throughout earlier management measures in this document.

Mine Reclamation

Abandoned mines may have the potential to contribute significant sediment, metals, acidified water, and other pollutants to reservoirs (TVA, 1988). Old mines need to be located and reclaimed to reduce NPS pollutants emanating from them. Revegetation is a cost-effective method of reclaiming denuded strip-mined lands, and agencies such as the Natural Resource Conservation Service (NRCS) can provide technical insight for revegetation practices.

Animal Waste Control

A major contributor to reservoir pollution in some watersheds is waste from animal confinement facilities. TVA (1988) estimated that in the Tennessee Valley, farms produced about six times the organic wastes of the population of the valley. EPA also has available the *National Management Measures to Control Nonpoint Source Pollution from Agriculture*,[5] which is a technical guidance and reference document for use by state, local, and tribal managers in the implementation of NPS pollution management programs. It contains information on a variety of practices and management strategies for reducing pollution of surface and ground water from agriculture (USEPA, 2003b).

Correcting Failing Septic Systems

The objective of this practice is to protect waterbodies from pollutants discharged by onsite sewage disposal systems (OSDS). They should be sited, designed, and installed so that impacts to waterbodies will be reduced to the extent practicable. Factors such as soil type, soil depth, depth to water table, rate of sea level rise, and topography should be considered. The installation of OSDS should be prevented in areas where soil absorption systems will not provide adequate treatment of effluents containing solids, phosphorus, pathogens, nitrogen, and nonconventional pollution prior to entry into surface waters and ground water. Setbacks, separation distances, and maintenance requirements should be established.

Failing septic tank or OSDS are another source of NPS pollution in reservoirs. TVA has found septic tank failures to be a problem in some of its reservoirs and has identified them through an aerial survey (TVA, 1988). Additional guidance on OSDS is available from EPA's *Onsite Wastewater Treatment Systems Manual* (EPA 625-R-00-008), which is available through EPA's National Service Center for Environmental Publications.[6]

Land Use Planning

Land use plans that establish guidelines for permissible uses of land within a watershed serve as a guide for reservoir management programs addressing NPS pollution (TVA, 1988). Watershed land use plans identify suitable uses for land surrounding a reservoir, establish sites for economic development and natural resource management activities, and facilitate improved land management (TVA, 1988). Land use plans must be flexible documents that account for the needs of the landowners, state and local land use goals, the characteristics of the land and its ability to support various uses, and the control of NPS pollution (TVA, 1988).

Comprehensive planning is an effective nonstructural tool to control NPS pollution. Where possible, growth should be directed toward areas where it can be sustained with minimal impact on the environment (Meeks, 1990). Poorly planned growth and development have the potential to degrade and destroy natural drainage systems and surface waters (Mantell et al., 1990). Proper planning and zoning decisions allow water quality managers to direct development and land disturbance away from areas that drain to sensitive waters. Land use designations and zoning laws can also be used to protect environmentally sensitive areas such as riparian corridors and wetlands.

[5] http://www.epa.gov/owow/nps/pubs.html
[6] http://www.epa.gov/ncepihom

Identify and Preserve Critical Areas

Channelization
- ☐ Physical & chemical
- ☐ Instream/riparian restoration

Dams
- ☐ Erosion control
- ☐ Runoff control
- ☐ Chemical/pollutant control
- ☑ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☐ Streambanks ☐ Shorelines
  - ☐ Vegetative
  - ☐ Structural
  - ☐ Integrated
  - ☐ Planning & regulatory

Protection of sensitive areas and areas that provide water quality benefits (e.g., natural wetlands and riparian areas) is integral to maintaining or minimizing the impacts of development on receiving waters and associated habitat. Without a comprehensive planning approach that includes the use of riparian buffers, open space, bioretention, and structural controls to maintain the predevelopment hydrologic characteristics of the site, significant water quality and habitat impacts are likely. The experience of various communities has shown that the use of structural controls in the absence of adequate local land use planning and zoning often does not adequately protect water quality and might even cause detrimental effects, such as increased temperature.

An initial step for incorporating targeted land conservation into a runoff management program is to identify critical conservation areas on a watershed map and superimpose this information on a tax map. Owners of potential conservation lands could include a mix of individuals, corporations or other business entities, homeowner associations, government agencies, and land trusts.

Land conservation includes more than simply preserving land in its current state. It also means that an individual or organization should take responsibility for restoration of areas of the property that are contributing to runoff problems or have been adversely affected by runoff. Stewardship activities for land conservation might include:

- Resource monitoring
- General maintenance
- Control of exotic species
- Installation of structural runoff management practices and maintenance

There are several options for landowners who would like to retain ownership of the parcel but relinquish stewardship and conservation management to another organization. These nonexclusive management options, discussed below, include establishing conservation easements, leases, deed restrictions, covenants, or transfer of development rights (TDRs).

Conservation Easements

A conservation easement is a legal agreement that transfers specific rights concerning the use of land by sale or donation to a government agency (municipal, county, or state), a qualified nonprofit organization (e.g., land trust or conservancy), or other legal entity without transferring title of the land (Cwikiel, 1996).

Leases

Even though government agencies, land trusts, and other nonprofit organizations would prefer that conservation lands be acquired by donation or that conservation easements be placed on the property, some lands hold so much value as conservation areas that leasing is worth the expense and effort. Leasing a property allows the agency, trust, or organization to actively manage the land for conservation.

Deed Restrictions

Restrictions can be included in deeds for the purpose of constraining use of the land. In theory, deed restrictions are designed to perform functions similar to those of conservation easements. In practice, however, deed restrictions have proven to be much weaker substitutes because unlike conservation easements, deed restrictions do not necessarily designate or convey oversight responsibilities to a particular agency or organization to enforce protection and maintenance provisions. Also, deed restrictions can be relatively easy to modify or vacate through litigation. Modifying or nullifying an easement is difficult, especially if tax benefits have already been realized. For these reasons, conservation easements are generally preferred over deed restrictions.

Covenants

A covenant is similar to a deed restriction in that it restricts activities on a property, but it is in the form of a contract between the landowner and another party. The term *mutual covenants* is used to describe a situation where one or more nearby or adjacent landowners are contracted and covered by the same restrictions.

Transfer of Development Rights (TDRs)

The concept of TDRs as a watershed protection tool is based on the premise that ownership of land includes a “bundle” of property rights. One of these rights is the right to develop the property to its “highest and best use.” Although this right can be restricted by zoning building codes, environmental constraints, and other types of restrictions, the basic right to develop remains. A TDR system creates an opportunity for property owners to transfer development potential or density at one property, called a sending area to another property, called a receiving area. In the context of watershed planning objectives, TDR programs can be an effective way to transfer development potential from sensitive subwatersheds to subwatersheds that can better deal with increased imperviousness.

Joint Planting

Channelization
- ☑ Physical & chemical
- ☑ Instream/riparian restoration

Dams
- ☑ Erosion control
- ☐ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☑ Streambanks ☐ Shorelines
  - ☐ Vegetative
  - ☐ Structural
  - ☑ Integrated
  - ☐ Planning & regulatory

Joint planting (or vegetated riprap) involves tamping live cuttings of rootable plant material into soil between the joints or open spaces in rocks that have previously been placed on a slope (Figure 7.19). Alternatively, the cuttings can be tamped into place at the same time that rock is being placed on the slope face. Joint planting is useful where rock riprap is required or already in place. It is successful 30 to 50 percent of the time, with first year irrigation improving survival rates. Live cuttings must have side branches removed and bark intact. They should range from 0.5 to 1.5 inches in diameter and be long enough to extend well into the soil, reaching into the dry season water level. Installation guidelines are available from the USDA-FS Soil Bioengineering Guide (USDA-FS, 2002) and the USDA NRCS *Engineering Field Handbook, Chapter 18* (USDA-NRCS, 1992).

Additional Resources

- FISRWG. 1998. *Stream Corridor Restoration: Principles, Processes, and Practices*. Federal Interagency Stream Restoration Working Group. http://www.nrcs.usda.gov/technical/stream_restoration/PDFFILES/APPENDIX.pdf.

- ISU. 2006. *How to Control Streambank Erosion: Joint Planting.* Iowa State University. http://www.ctre.iastate.edu/erosion/manuals/streambank/joint_planting.pdf.

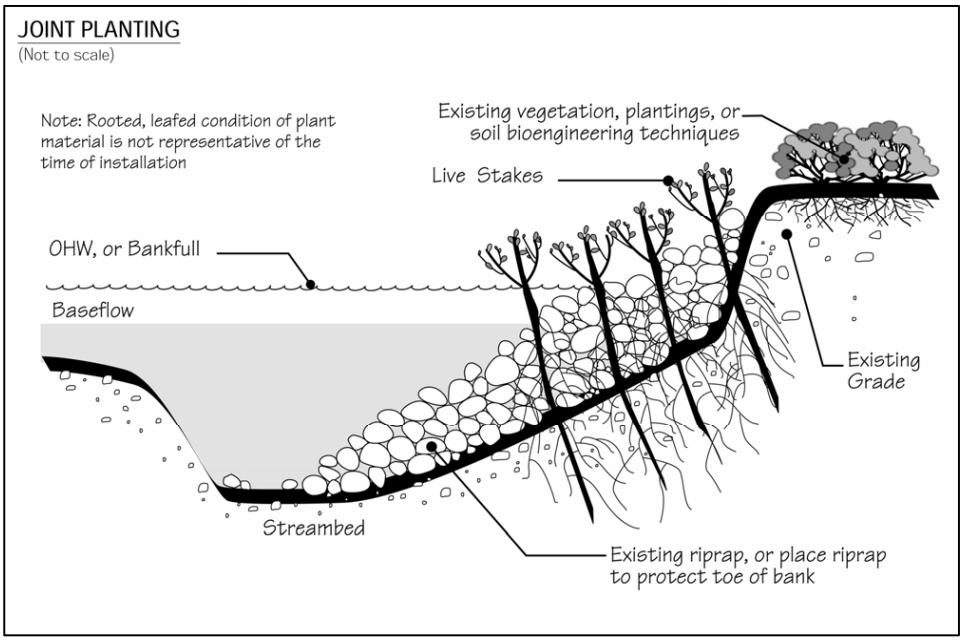

Figure 7.19 Joint Planting (USDA-FS, 2002)

Labyrinth Weir

Labyrinth weirs have extended crest length and are usually W-shaped. These weirs spread the flow out to prevent dangerous undertows in the plunge pool. A labyrinth weir at South Holston Dam (Tennessee) was constructed for the dual purpose of providing minimum flows and improving DO in reservoir releases. The weir aerates to up to 60 percent of the oxygen deficit. For instance, projected performance at the end of the summer is an increase in the DO from 3 mg/L to 7 mg/L (or an increase of 4 mg/L) (Hauser, 1992). Actual increases in the DO will depend on the temperature and the level of DO in the incoming water.

Channelization
- ☐ Physical & chemical
- ☐ Instream/riparian restoration

Dams
- ☐ Erosion control
- ☐ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☑ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☐ Streambanks ☐ Shorelines
  - ☐ Vegetative
  - ☐ Structural
  - ☐ Integrated
  - ☐ Planning & regulatory

Levees, Setback Levees, and Floodwalls

Channelization
- ☑ Physical & chemical
- ☑ Instream/riparian restoration

Dams
- ☐ Erosion control
- ☐ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☑ Streambanks ☑ Shorelines
  - ☐ Vegetative
  - ☑ Structural
  - ☐ Integrated
  - ☐ Planning & regulatory

Many valuable techniques can be used, when applied correctly, to protect, operate, and maintain levees (Hynson et al., 1985). Evaluation of site-specific conditions and the use of best professional judgment are the best methods for selecting the proper levee protection and operation and maintenance plan. According to Hynson and others (1985), maintenance activities generally consist of vegetation management, burrowing animal control, upkeep of recreational areas, and levee repairs.

Care must be taken during construction to prevent disturbing the natural channel vegetation, cross section, or bottom slope. No immediate instream effects from sedimentation are usually caused by implementing this type of modification. The potential for long-term channel adjustments can be evaluated using methods outlined in *Channel Stability Assessment for Flood Control Projects* (USACE, 1994).

Methods to control vegetation include mowing, grazing, burning, and using chemicals. Selection of a vegetation control method should consider the existing and surrounding vegetation, desired instream and riparian habitat types and values, timing of controls to avoid critical periods, selection of livestock grazing periods, and timing of prescribed burns to be consistent with historical fire patterns. Additionally, a balance between the vegetation management practices for instream and riparian habitat and engineering considerations should be maintained to avoid structural compromise. Animal control methods are most effective when used as a part of an integrated pest management program and might include instream and riparian habitat manipulation or biological controls. Recreational area management includes upkeep of planted areas, disposal of solid waste, and repairing of facilities (Hynson et al., 1985).

The prevention of floods by dams and levees can eliminate or diminish essential ecological functions. Dams, levees and channel training structures have dramatically altered or eliminated the frequency, duration, magnitude, and timing of periodic high flows. These projects significantly reduce the likelihood of floodplain inundation, block the transfer of organic matter and nutrients between river and floodplain, block plant succession, eliminate fish access to spawning areas, and rob rivers of the erosive power to restore and create a diversity of habitats (Environmental Defense, 2002). Levees have had several impacts on the Snake River in Wyoming. Anthony (1998) found habitat losses, including changes in vegetation (including losses of cottonwood and riparian habitats from 1956) and changes in channel and floodplain complexity from a braided to a single channel pattern.

Siting of levees and floodwalls should be addressed prior to design and implementation of these types of projects. Proper siting of such structures can avoid several types of problems. First, construction activities should not disturb the physical integrity of adjacent riparian areas and/or

wetlands. Second, by setting back the structures (offsetting them from the streambank), the relationship between the channel and adjacent riparian areas can be preserved. Proper siting and alignment of proposed structures can be established based on hydraulic calculations, historical flood data, and geotechnical analysis of riverbank stability.

Additional Resource

- LSU AgCenter. 1999. *Floodwalls*. Louisiana State University Agricultural Center, Louisiana Cooperative Extension Service. http://www.louisianafloods.org/NR/rdonlyres/7A01F7C8-703B-47D1-BCCD-63CD0A57721F/2995/pub2745Floodwall6.pdf.

Live Cribwalls

Channelization
- ☑ Physical & chemical
- ☑ Instream/riparian restoration

Dams
- ☑ Erosion control
- ☐ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☑ Streambanks ☐ Shorelines
  - ☐ Vegetative
  - ☐ Structural
  - ☑ Integrated
  - ☐ Planning & regulatory

A live cribwall is used to rebuild a bank in a nearly vertical setting. It consists of a hollow, box-like interlocking arrangement of untreated log or timber members (Figure 7.20). The structure is filled with suitable backfill material and layers of live branch cuttings, which root inside the crib structure and extend into the slope. Logs or untreated timbers should range from 4 to 6 inches in diameter. Lengths will vary with the size of the crib structure. Fill rock should be 6 inches in diameter. Live branch cuttings should be 0.5 to 2.5 inches in diameter and long enough to reach the back of the wooden crib structure. Once the live cuttings root and become established, the subsequent vegetation gradually takes over the structural functions of the wood members. Live cribwalls are appropriate where space is limited and at the base of a slope where a low wall may be required to stabilize the toe of the slope and to reduce its steepness. They are also appropriate above and below the water level where stable streambeds exist. They are not designed for or intended to resist large, lateral earth stress. Installation guidelines are available from the USDA-FS Soil Bioengineering Guide (USDA-FS, 2002) and the USDA NRCS *Engineering Field Handbook, Chapter 18* (USDA-NRCS, 1992).

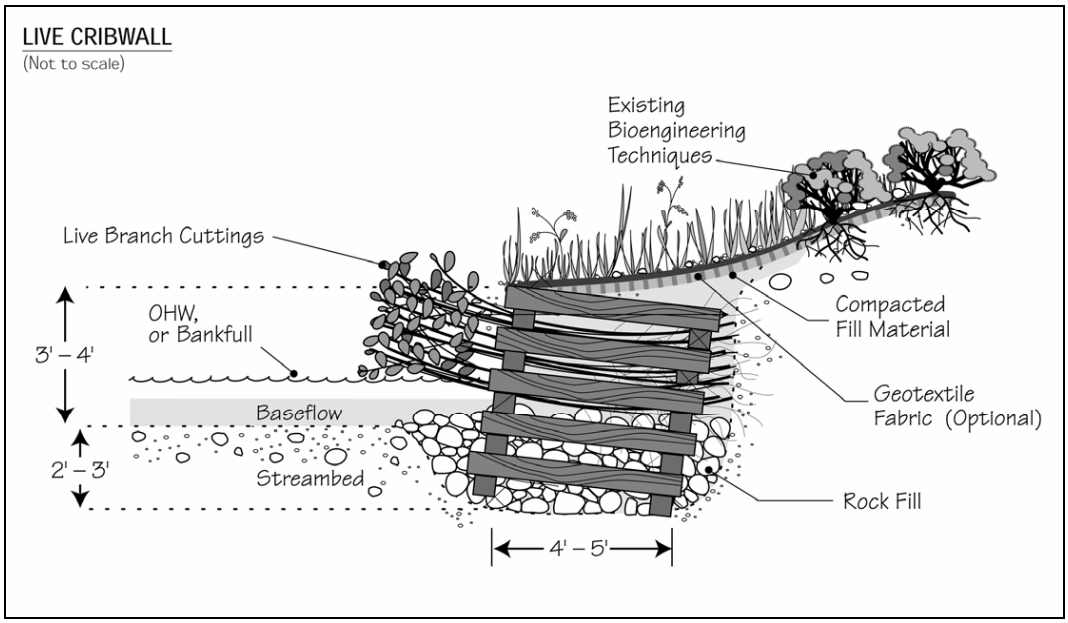

Figure 7.20 Live Cribwall (USDA-FS, 2002)

Additional Resources

- FISRWG. 1998. *Stream Corridor Restoration: Principles, Processes, and Practices*. Federal Interagency Stream Restoration Working Group. http://www.nrcs.usda.gov/technical/stream_restoration/PDFFILES/APPENDIX.pdf.

- ISU. 2006. *How to Control Streambank Erosion: Live Cribwall.* Iowa State University. http://www.ctre.iastate.edu/erosion/manuals/streambank/live_cribwall.pdf.

- Mississippi State University, Center for Sustainable Design. 1999. *Water Related Best Management Practices in the Landscape: Live Cribwall.* Created for United States Department of Agriculture, Natural Resource Conservation Service, Watershed Science Institute. http://www.abe.msstate.edu/csd/NRCS-BMPs/pdf/streams/bank/livecribwall.pdf.

- Ohio DNR. No date. *Ohio Stream Management Guide: Live Cribwalls.* Ohio Department of Natural Resources. http://www.ohiodnr.com/water/pubs/fs_st/stfs17.htm.

Live Fascines

Channelization
- ☑ Physical & chemical
- ☑ Instream/riparian restoration

Dams
- ☑ Erosion control
- ☐ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☑ Streambanks ☐ Shorelines
  - ☑ Vegetative
  - ☐ Structural
  - ☐ Integrated
  - ☐ Planning & regulatory

Live fascines are long bundles of branch cuttings bound together in a cylindrical structure (Figure 7.21). They are suited to steep, rocky slopes, where digging is difficult (USDA-NRCS, 1992). When cut from appropriate species (e.g., young willows or shrub dogwoods) that root easily and have long straight branches, and when properly installed, they immediately begin to stabilize slopes. The cuttings (0.5 to 1.5 inches in diameter) form live fascine bundles that vary in length from 5 to 10 feet or longer, depending on site conditions and handling limitations. Completed bundles should be 6 to 8 inches in diameter. The goal is for natural recruitment to follow once slopes are secured. Live fascines should be placed in shallow contour trenches on dry slopes and at an angle on wet slopes to reduce erosion and shallow face sliding. Live fascines should be applied above ordinary high-water mark or bankfull level except on very small drainage area sites. In arid climates, they should be used between the high and low water marks on the bank. This system, installed by a trained crew, does not cause much site disturbance.

Installation guidelines are available from the USDA-FS Soil Bioengineering Guide (USDA-FS, 2002) and the USDA NRCS *Engineering Field Handbook, Chapter 18* (USDA-NRCS, 1992). Under their Ecosystem Management and Restoration Research Program (EMRRP), the U.S. Army Corps of Engineers presents research on live fascines in a technical note (*Live and Inert Fascine Streambank Erosion Control*).[7]

Additional Resources

- Massachusetts DEP. 2006. *Massachusetts Nonpoint Source Pollution Management Manual: Live Fascines.* Massachusetts Department of Environmental Protection, Boston, MA. http://projects.geosyntec.com/NPSManual/Fact%20Sheets/Live%20Fascines.pdf.

- Greene County Soil & Water Conservation District. No date. *Construction Specification VS-01: Live Fascines.* http://www.gcswcd.com/stream/library/pdfdocs/vs-01.pdf.

- ISU. 2006. *How to Control Streambank Erosion: Live Fascine.* Iowa State University. http://www.ctre.iastate.edu/erosion/manuals/streambank/live_fascine.pdf.

- Mississippi State University, Center for Sustainable Design. 1999. *Water Related Best Management Practices in the Landscape: Live Fascine.* Created for United States Department of Agriculture, Natural Resource Conservation Service, Watershed Science Institute. http://abe.msstate.edu/csd/NRCS-BMPs/pdf/streams/bank/livefacine.pdf.

[7] http://el.erdc.usace.army.mil/elpubs/pdf/sr31.pdf

- Ohio DNR. No date. *Ohio Stream Management Guide: Live Fascines*. Ohio Department of Natural Resources. http://www.ohiodnr.com/water/pubs/fs_st/stfs14.pdf.

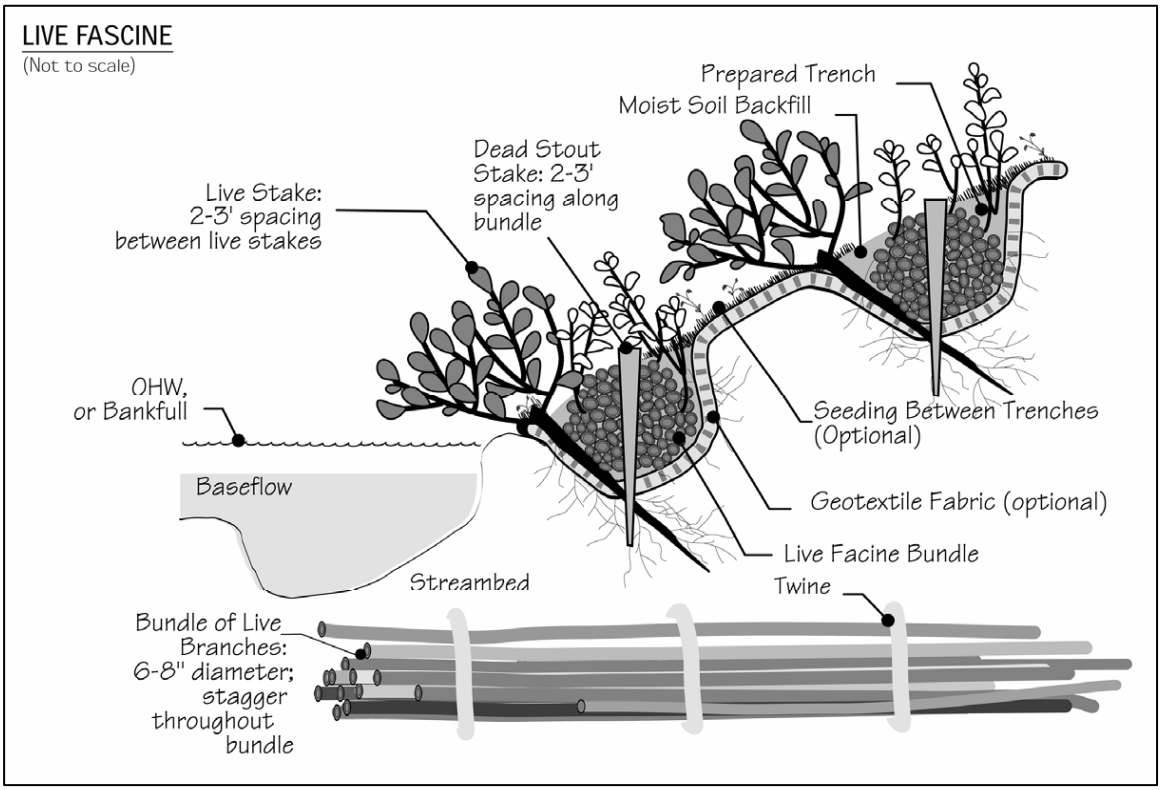

Note: OHW (Ordinary High Water) is the mark along a streambank where the waters are common and usual. This mark is generally recognized by the difference in the character of the vegetation above and below the mark or the absence of vegetation below the mark (USDA-FS, 2002).

Figure 7.21 Live Fascine (USDA-FS, 2002)

Live Staking

Channelization
- ☑ Physical & chemical
- ☑ Instream/riparian restoration

Dams
- ☑ Erosion control
- ☐ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☑ Streambanks ☐ Shorelines
  - ☑ Vegetative
  - ☐ Structural
  - ☐ Integrated
  - ☐ Planning & regulatory

Live staking (Figure 7.22) is appropriate for relatively uncomplicated site conditions when construction time is limited. It can also be used to stabilize intervening areas between other soil bioengineering techniques (USDA-NRCS, 1992). Live staking involves the insertion and tamping of live, rootable vegetative cuttings into the ground. If correctly prepared and placed, the live stake will root and grow. A system of stakes creates a living root mat that stabilizes the soil by reinforcing and binding soil particles together and by extracting excess soil moisture. Stakes are generally 1 to 2 inches in diameter and 2 to 3 feet long. Specific site requirements and available cutting source will determine size. Vegetation selected should be able to withstand the degree of anticipated inundation, provide year round protection, have the capacity to become well established under sometimes adverse soil conditions, and have root, stem, and branch systems capable of resisting erosive flows. Most willow species are ideal for live staking because they root rapidly and begin to dry out a slope soon after installation. Sycamore and cottonwood are also species commonly used for live staking. This is an appropriate technique for repair of small earth slips and slumps that are frequently wet. Installation guidelines are available from the USDA-FS Soil Bioengineering Guide (USDA-FS, 2002) and the USDA NRCS *Engineering Field Handbook, Chapter 18* (USDA-NRCS, 1992).

Additional Resources

- ISU. 2006. *How to Control Streambank Erosion: Live Stakes.* Iowa State University. http://www.ctre.iastate.edu/erosion/manuals/streambank/live_stakes.pdf.

- Myers, R.D. 1993. *Slope Stabilization and Erosion Control Using Vegetation: A Manual of Practice for Coastal Property Owners. Live Staking.* Shorelands and Coastal Zone Management Program, Washington Department of Ecology. Olympia. Publication 93-30. http://www.ecy.wa.gov/programs/sea/pubs/93-30/livestaking.html.

- Walter, J., D. Hughes, and N.J. Moore. 2005. *Streambank Revegetation and Protection: A Guide for Alaska. Revegetation Techniques: Live Staking.* Revised Edition. Alaska Department of Fish and Game, Division of Sport Fish. http://www.sf.adfg.state.ak.us/SARR/restoration/techniques/livestake.cfm.

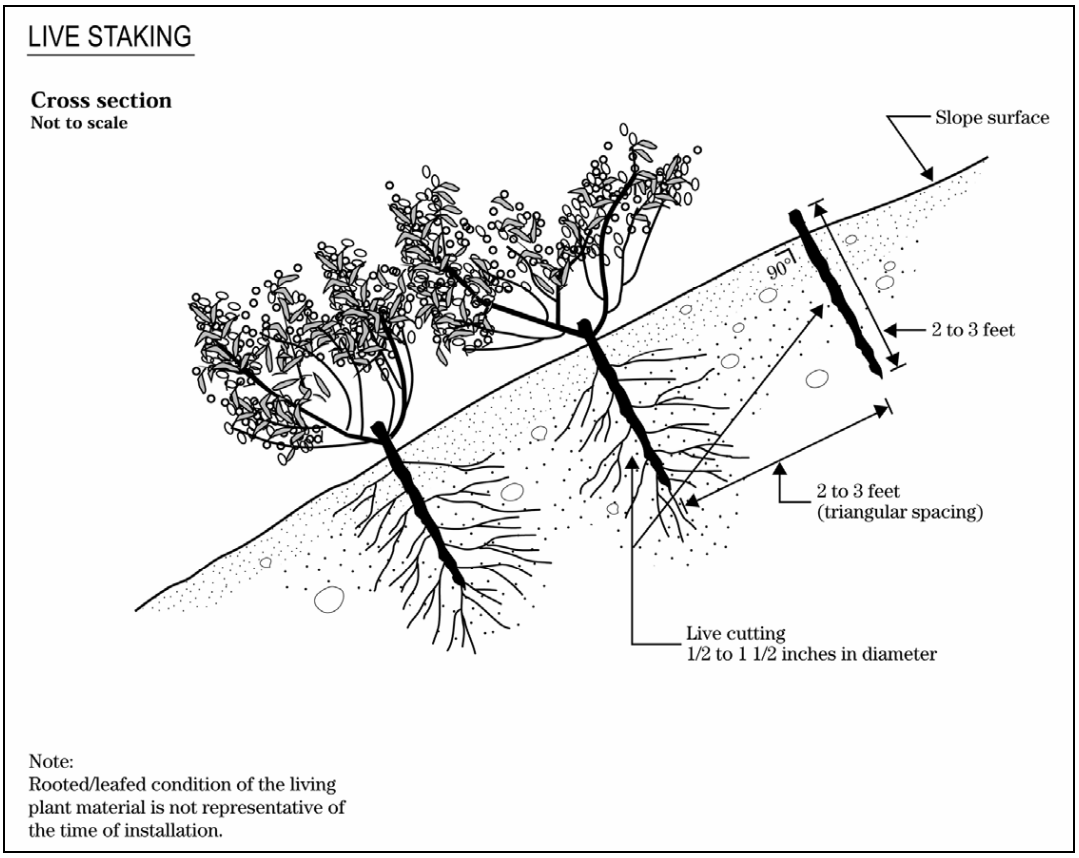

Figure 7.22 Live Staking (USDA-NRCS, 1992)

Locate Potential Land Disturbing Activities Away from Critical Areas

Material stockpiles, borrow areas, access roads, and other land-disturbing activities can often be located away from critical areas such as steep slopes, highly erodible soils, and areas that drain directly into sensitive waterbodies.

Channelization
- ☐ Physical & chemical
- ☐ Instream/riparian restoration

Dams
- ☑ Erosion control
- ☑ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☐ Streambanks ☐ Shorelines
  - ☐ Vegetative
  - ☐ Structural
  - ☐ Integrated
  - ☐ Planning & regulatory

Marsh Creation and Restoration

Channelization
- ☐ Physical & chemical
- ☑ Instream/riparian restoration

Dams
- ☐ Erosion control
- ☐ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☑ Streambanks ☑ Shorelines
  - ☑ Vegetative
  - ☐ Structural
  - ☐ Integrated
  - ☐ Planning & regulatory

Marsh creation and restoration is a useful vegetative technique that can address problems with erosion of shorelines. Marsh plants perform two functions in controlling shore erosion (Knutson, 1988). First, their exposed stems form a flexible mass that dissipates wave energy. As wave energy is diminished, the offshore transport and longshore transport of sediment are reduced. Ideally, dense stands of marsh vegetation can create a depositional environment, causing accretion of sediments along the intertidal zone rather than continued shore erosion. Second, marsh plants form a dense mat of roots, which can add stability to the shoreline sediments. The basic approach for marsh creation is to plant a shoreline area in the vicinity of the tide line with appropriate marsh grass species. Suitable fill material may be placed in the intertidal zone to create a wetlands planting terrace of sufficient width (at least 18 to 25 feet) if such a terrace does not already exist at the project site. For shoreline sites that are highly sheltered from the effects of wind, waves, or boat wakes, the fill material is usually stabilized with small structures, similar to groins, which extend out into the water from the land. For shorelines with higher levels of wave energy, the newly planted marsh can be protected with an offshore installation of stone that is built either in a continuous configuration or in a series of breakwaters.

Additional Resource

- Maryland Department of the Environment. 2006. *Shore Erosion Control Guidelines: Marsh Creation*. http://www.mde.state.md.us/assets/document/wetlandswaterways/Shoreerosion.pdf.

Modifying Operational Procedures

Channelization
- ☐ Physical & chemical
- ☐ Instream/riparian restoration

Dams
- ☐ Erosion control
- ☐ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☑ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☐ Streambanks ☐ Shorelines
  - ☐ Vegetative
  - ☐ Structural
  - ☐ Integrated
  - ☐ Planning & regulatory

A useful tool for evaluating the effects of operational procedures on the quality of tailwaters is computer modeling. For instance, computer models can describe the vertical withdrawal zone that would be expected under different scenarios of turbine operation (Smith et al., 1987). Zimmerman and Dortch (1989) modeled release operations for a series of dams on a Georgia river and found that procedures that were maintaining cool temperatures in summer were causing undesirable decreases in DO and increases in dissolved iron in autumn. The suggested solution was a seasonal release plan that is flexible, depending on variations in the in-pool water quality and predicted local weather conditions. Care should be taken with this sort of approach to accommodate the needs of both the fishery resource and reservoir recreationalists, particularly in late summer.

Modeling has also been undertaken for a variety of TVA and USACE facilities to evaluate the downstream impacts on DO and temperature that would result from changes in several operational procedures, including (Hauser et al., 1990a; Hauser et al., 1990b; Higgins and Kim, 1982; Nestler et al., 1986):

- Maintenance of minimum flows
- Timing and duration of shutoff periods
- Seasonal adjustments to the pool levels
- Timing and variation of the rate of drawdown

Mulching

Channelization
- ☐ Physical & chemical
- ☐ Instream/riparian restoration

Dams
- ☑ Erosion control
- ☐ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☐ Streambanks ☐ Shorelines
  - ☐ Vegetative
  - ☐ Structural
  - ☐ Integrated
  - ☐ Planning & regulatory

Newly established vegetation does not have as extensive a root system as existing vegetation and therefore is more prone to erosion, especially on steep slopes. Additional stabilization should be considered during the early stages of seeding. This extra stabilization can be accomplished using mulches or mulch mats, which are applied to disturbed soil surfaces and can protect the area while vegetation becomes established.

Mulches and mulch mats include tacked straw, wood chips, and jute netting and are often covered by blankets or netting. Mulching alone should be used only for temporary protection of the soil surface or when permanent seeding is not feasible. The useful life of mulch varies with the material used and the amount of precipitation, but, generally, is approximately 2 to 6 months. Mulching and/or sodding may be necessary as slopes become moderate to steep, as soils become more erosive, and as areas become more sensitive. During the times of the year when vegetation cannot be established, mulch can be applied to moderate slopes and soils that are not highly erodible. On steep slopes or highly erodible soils, mulching may need to be reapplied if washed away.

Additional Resources

- Barr Engineering Company. 2001. *Minnesota Urban Small Sites BMP Manual: Stormwater Best Management Practices for Cold Climates. Soil Erosion Control: Mulches, Blankets and Mats.* Prepared for the Metropolitan Council by Barr Engineering Company, St. Paul, MN. http://www.metrocouncil.org/Environment/Watershed/BMP/CH3_RPPSoilMulch.pdf.

- CASQA. 2004. *California Stormwater BMP Construction Handbook*: *Hydraulic Mulch.* California Stormwater Quality Association, Sacramento, CA. http://www.cabmphandbooks.com/Documents/Construction/EC-3.pdf.

- ISU. 2006. *Iowa Construction Site Erosion Control Manual: Mulching.* Iowa State University. http://www.ctre.iastate.edu/erosion/manuals/construction/2.3_mulching.pdf.

Noneroding Roadways

Channelization
- ☑ Physical & chemical
- ☑ Instream/riparian restoration

Dams
- ☑ Erosion control
- ☐ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☐ Streambanks ☐ Shorelines
  - ☐ Vegetative
  - ☐ Structural
  - ☐ Integrated
  - ☐ Planning & regulatory

General Road Construction Considerations

Road design and construction activities that are tailored to topography and soils and take into consideration the overall drainage pattern in the watershed where the road is being constructed can prevent road-related water quality problems. Lack of adequate consideration of watershed and site characteristics, road system design, and construction techniques appropriate to the site can result in mass soil movements, extensive surface erosion, and severe sedimentation in nearby waterbodies. The effect that a road network has on stream networks largely depends on the extent to which the networks are interconnected. Road networks can be hydrologically connected to stream networks where road surface runoff is delivered directly to stream channels (at stream crossings or via ditches or gullies that direct flow off the road into a stream) and where road cuts transform subsurface flow into surface flow (in road ditches or on road surfaces that deliver sediment and water to streams much more quickly than without a road present). The combined effects of these drainage network connections are increased sedimentation and peak flows that are higher and arrive more quickly after storms. This can lead to increased instream erosion and stream channel changes, especially in small watersheds (USEPA, 2005a).

Site characteristics should be considered during construction planning. On-site verification of information from topographic maps, soil maps, and aerial photos can ensure that locations where roads are to be cut into slopes or built on steep slopes or where skid trails, landings, and equipment maintenance areas are to be located are appropriate to the use. If an on-site visit indicates that construction changes can reduce the risk of erosion, the project manager can make these changes prior to construction, and in some cases as the project progresses (USEPA, 2005a).

Road drainage features tailored to the site prevent water from pooling or collecting on road surfaces. This prevents saturation of the road surface, which can lead to rutting, road slumping, and channel washout. Many roads associated with channelization projects are temporary or seasonal-use roads, and their construction should not involve the high level of disturbance generated by construction of permanent, high-standard roads. However, these types of roads still need to be constructed and maintained to prevent erosion and sedimentation (USEPA, 2005a).

Erosion control practices need to be applied while a road is being constructed, when soils are most susceptible to erosion, to minimize soil loss to waterbodies. Since sedimentation from roads often does not occur incrementally and continuously, but in pulses during large rainstorms, it is important that road, drainage structure, and stream crossing design take into consideration a sufficiently large design storm that has a good chance of occurring during the life of the project. Such a storm might be the 10-year, 25-year, 50-year, or even 100-year, 12- to 24-hour return period storm. Sedimentation cannot be completely prevented during or after road construction,

but the process is exacerbated if the road construction and design are inappropriate for the site conditions or if the road drainage or stream crossing structures are insufficient (USEPA, 2005a).

When constructing a new road, it is useful to consider road surface shape and composition, slope stabilization, and wetlands. A more detailed discussion of these topics is provided below. More information about potential impacts to fish habitat and passage are provided in EPA's *National Management Measures to Control Nonpoint Source Pollution from Forestry*.[8]

Road Shape and Composition

The shape of a road is an important runoff control component. Road drainage and runoff control are obtained by shaping the road surface to be insloping, outsloping, or crowned. Insloping roads can be effective where soils are highly erodible and directing runoff directly to the fill slope would be detrimental. Outsloped roads tend to dissipate runoff more than insloped roads, which concentrate runoff at cross drain locations, and are useful where erosion of backfill or ditch soil might be a problem. Crowned roads are suited to two lane roads and to steep single-lane roads that have frequent cross drains or ditches and ditch relief culverts (USEPA, 2005a). These road surface shapes are illustrated in Figure 7.23. Maintain one of these shapes to ensure good drainage. Crowns, inslopes, and outslopes will quickly lose effectiveness if not maintained frequently, due to ruts created by traffic when the road surface is damp or wet (USEPA, 2005a).

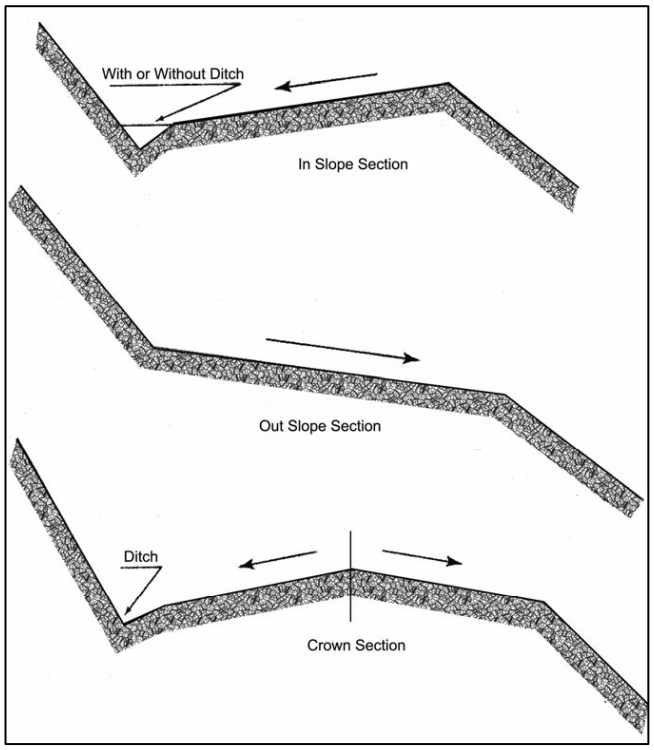

Figure 7.23 Types of Road Surface Shapes (USEPA, 2005a)

Road surface composition can effectively control erosion from road surfaces and slopes. It is important to choose a surface that is suitable to the topography, soils, and intended use. Surface protection of the roadbed and cut-and-fill slopes with a suitable material can minimize soil losses during storms, reduce frost heave erosion production, restrain downslope movement of soil slumps, and minimize erosion from softened roadbeds (USEPA, 2005a).

Slope Stabilization

Road cuts and fills can be a large source of sediment when constructing a rural road. Stabilizing back slopes and fill slopes as they are constructed is important in minimizing erosion from these areas. Combined with gravel or other surfacing, establishing grass or another form of slope stabilization can significantly reduce soil loss from road construction. If constructing on an unstable slope is necessary, consider consulting with an engineering geologist or geotechnical

[8] Available online at http://www.epa.gov/owow/nps/forestrymgmt.

engineer for recommended construction methods and to develop plans for the road segment. Unstable slopes that threaten water quality should be considered unsuitable for road building.

Planting grass on cut-and-fill slopes of new roads can effectively reduce erosion, and placing forest floor litter or brush barriers on downslopes in combination with establishing grass is also effective for reducing downslope sediment transport. Grass-covered fill is generally more effective than mulched fill in reducing soil erosion from newly constructed roads because of the roots that hold the soil in place, which are lacking with other cover. Because grass needs some time to establish itself, a combination of straw mulch with netting to hold it in place can be used to cover a seeded area and effectively reduce erosion while grass is growing. The mulch and netting provide immediate erosion control and promote grass growth (USEPA, 2005a).

Wetland Road Considerations

Sedimentation is a concern when considering road construction through wetlands. It is better to avoid putting a road through a wetland when an alternative route exists. If no alternative exists, make sure to implement best management practices (BMPs) suggested by the state. Road construction or maintenance for certain farming, forestry, or mining activities might be exempt under Clean Water Act (CWA) section 404. However, to qualify for the exemption, the roads must be constructed and maintained following application of specific BMPs designed to protect the aquatic environment (USEPA, 2005a).

Pesticide and Fertilizer Management

Channelization
- ☐ Physical & chemical
- ☐ Instream/riparian restoration

Dams
- ☐ Erosion control
- ☐ Runoff control
- ☑ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☐ Streambanks ☐ Shorelines
  - ☐ Vegetative
  - ☐ Structural
  - ☐ Integrated
  - ☐ Planning & regulatory

Chemicals used in dam management include pesticides (insecticides, herbicides, and fungicides) and fertilizers. Since pesticides can be toxic, they have to be mixed, transported, loaded, and applied correctly and their containers disposed properly to prevent potential nonpoint source pollution. Since fertilizers can also be toxic or can damage the ecosystem, it is important that they be handled and applied properly, according to label instructions.

Even though a limited number of applications might be made at a specific dam site, consider that throughout a watershed many sites could receive applications of fertilizers and pesticides, which can accumulate in soils and in waterbodies. Application techniques also partly determine the potential risk to the aquatic environment from infrequent applications of pesticides and fertilizers. These chemicals can directly enter surface waters through five major pathways—direct application, drift, mobilization in ephemeral streams, overland flow, and leaching. Direct application is the most important source of increased chemical concentrations and is also one of the most easily controlled.

Some more specific implementation practices for pesticide maintenance include:

- Apply pesticides during favorable atmospheric conditions. Do not apply pesticides when wind conditions increase the likelihood of significant drift. It is also best to avoid pesticide application when temperatures are high or relative humidity is low because these conditions influence the rate of evaporation and enhance losses of volatile pesticides.
- Ensure that pesticide users abide by the current pesticide label, which might specify whether users be trained and certified in the proper use of the pesticide; allowable use rates; safe handling, storage, and disposal requirements; and whether the pesticide may be used under the provisions of an approved State Pesticide Management Plan.
- Locate mixing and loading areas, and clean all mixing and loading equipment thoroughly after each use, where pesticide residues will not enter streams or other waterbodies.
- Dispose of pesticide wastes and containers according to state and federal laws.
- Consider the use of pesticides as only one part of an overall program to control pest problems. Integrated Pest Management (IPM) strategies have been developed to control pests without total reliance on chemical pesticides.
- Base selection of pesticide on site factors and pesticide characteristics. These factors include vegetation height, target pest, adsorption (attachment) to soil organic matter, persistence or half-life, toxicity, and type of formulation.
- Check all equipment carefully, particularly for leaking hoses and connections and plugged or worn nozzles. Calibrate spray equipment periodically to achieve uniform pesticide distribution and rate.

- Always use pesticides in accordance with label instructions, and adhere to all federal and state policies and regulations governing pesticide use.

Specific implementation practices for fertilizer maintenance include:

- Apply slow-release fertilizers when possible. This practice reduces potential nutrient leaching to ground water, and it increase the availability of nutrients for plant uptake.
- Apply fertilizer during favorable atmospheric conditions. Do not apply fertilizer when wind conditions increase the likelihood of significant drift.
- Apply fertilizers during maximum plant uptake periods to minimize leaching.
- Base fertilizer type and application rate on soil and/or foliar analysis.

Phase Construction

Channelization
- ☐ Physical & chemical
- ☐ Instream/riparian restoration

Dams
- ☑ Erosion control
- ☐ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☐ Streambanks ☐ Shorelines
  - ☐ Vegetative
  - ☐ Structural
  - ☐ Integrated
  - ☐ Planning & regulatory

Construction site phasing involves disturbing only small portions of a site at a time to prevent erosion from dormant parts (CWP, 1997c). Grading activities and construction are completed and soils are effectively stabilized on one part of the site before grading and construction commence at another. This is different from the more traditional practice of construction site sequencing, in which construction occurs at only one part of the site at a time but site grading and other site-disturbing activities typically occur all at once, leaving portions of the disturbed site vulnerable to erosion. To be effective, construction site phasing must be incorporated into the overall site plan early. Elements to consider when phasing construction activities include (CWP, 1997c):

- Managing runoff separately in each phase
- Determining whether water and sewer connections and extensions can be accommodated
- Determining the fate of already completed downhill phases
- Providing separate construction and residential accesses to prevent conflicts between residents living in completed stages of the site and construction equipment working on later stages

A comparison of sediment loss from a typical development and from a comparable phased project showed a 42 percent reduction in sediment export in the phased project (CWP, 1997c). Phasing can also provide protection from complete enforcement and shutdown of the entire project. If a contractor is in noncompliance in one phase or zone of a site, that will be the only zone affected by enforcement. This approach can help to minimize liability exposure and protect the contractor financially (Deering, 2000b).

Physical Barriers

Channelization
- ☐ Physical & chemical
- ☐ Instream/riparian restoration

Dams
- ☐ Erosion control
- ☐ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☑ Maintain fish passage

Erosion
- ☐ Streambanks ☐ Shorelines
  - ☐ Vegetative
  - ☐ Structural
  - ☐ Integrated
  - ☐ Planning & regulatory

Physical barriers are diversion systems that lead or force fish to bypasses that transport them above or below the dam (FAO, 2001). Physical diversion structures deployed at dams include angled screens, drum screens, inclined plane screens, louvers, and traveling screens. The success and effectiveness of physical barriers has been found to be specific to individual hydropower facilities (Mattice, 1990).

Angled screens are used to guide fish to a bypass by guiding them through the channel at some angle to the flow. Coarse-mesh angled screens have been shown to be highly effective with numerous warm- and cold-water species at adult life stages. Fine-mesh angled screens have been shown in laboratory studies to be highly effective in diverting larval and juvenile fish to a bypass with resultant high survival. Performance of angled screens can vary by species, stream velocity, fish length, screen mesh size, screen type, and temperature (Stone and Webster, 1986). Clogging from debris and fouling organisms is a maintenance problem associated with angled screens.

Angled rotary drum screens oriented perpendicular to the flow direction have been used extensively to lead fish to a bypass. Angled rotary drum screens tend not to experience the major operational and maintenance clogging problems of stationary screens, such as angled vertical screens. Maintenance of angled rotary drum screens typically consists of routine inspection, cleaning, lubrication, and periodic replacement of the screen mesh (Stone and Webster, 1986).

An inclined plane screen is used to divert fish upward in the water column into a bypass. Once concentrated, the fish are transported to a release point below the dam. An inclined plane pressure screen at the T.W. Sullivan Hydroelectric Project (Willamette Falls, Oregon) is located in the penstock of one unit. The design is effective in diverting fish, with a high survival rate. However, this device has been linked to injuries in some species of migrating fish, and it has not been accepted for routine use (Stone and Webster, 1986).

Louvers consist of an array of evenly spaced, vertical slats aligned across a channel at an angle leading to a bypass. The turbulence they create is sensed and avoided by the fish (Stone and Webster, 1986). Louver systems rely on a fish's instincts to use senses other than sight to move around obstacles. Once the louver is sensed, the fish tend to reverse their head first downstream orientation (to head upstream, tail to the louver) and move laterally along it until they reach the bypass (OTA, 1995).

Submerged traveling screens are used to divert downstream migrating fish out of turbine intakes to adjoining gatewell structures, where the fish are concentrated for release downstream. This device has been tested extensively at hydropower facilities on the Snake and Columbia Rivers. Because of their complexity, submerged traveling screens must be continually maintained. The

screens must be serviced seasonally, depending on the debris load, and trash racks and bypass orifices must be kept free of debris (Stone and Webster, 1986).

Physical barrier fish diversion systems have been found to work best when specifically designed to the structure and fish being passed. Small differences in design, such as the spacing or depth of the louvers, can mean the difference in success and failure. A successful louver system has been installed at the Holyoke Hydroelectric Power Station, on the Connecticut River. This partial depth louver system was installed in the intake channel at the power plant and successfully passed 86 percent of the juvenile clupeids and 97 percent of the Atlantic salmon (*Salmo salar*) smolts (Marmulla, 2001). Another partial depth louver system on the same river has experienced less successful results. The system installed at the Vernon Dam on the Connecticut River is successfully passing about 50 percent of the Atlantic salmon smolts (OTA, 1995).

Pollutant Runoff Control

Store, cover, and isolate construction materials, refuse, garbage, sewage, debris, oil and other petroleum products, mineral salts, industrial chemicals, and topsoil to prevent runoff of pollutants and contamination of ground water.

Channelization
- ☐ Physical & chemical
- ☐ Instream/riparian restoration

Dams
- ☐ Erosion control
- ☐ Runoff control
- ☑ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☐ Streambanks ☐ Shorelines
  - ☐ Vegetative
  - ☐ Structural
  - ☐ Integrated
  - ☐ Planning & regulatory

Preserve Onsite Vegetation

Preserving onsite vegetation retains soil and limits runoff of water, sediment, and pollutants. The destruction of existing onsite vegetation can be minimized by initially surveying the site to plan access routes, locations of equipment storage areas, and the location and alignment of the dam. Construction workers can be encouraged to limit activities to designated areas only. Reducing the disturbance of vegetation also reduces the need for revegetation after construction is completed, including the required fertilization, replanting, and grading that are associated with revegetation. Additionally, as much natural vegetation as possible should be left next to the waterbody where construction is occurring. This vegetation provides a buffer to reduce the NPS pollution effects of runoff originating from areas associated with the construction activities.

Channelization
- ☐ Physical & chemical
- ☐ Instream/riparian restoration

Dams
- ☑ Erosion control
- ☑ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☐ Streambanks ☐ Shorelines
  - ☐ Vegetative
  - ☐ Structural
  - ☐ Integrated
  - ☐ Planning & regulatory

Additional Resource

- CASQA. 2004. *California Stormwater BMP Construction Handbook*: *Preservation of Existing Vegetation.* California Stormwater Quality Association, Sacramento, CA. http://www.cabmphandbooks.com/Documents/Construction/EC-2.pdf.

Reregulation Weir

Channelization
- ☐ Physical & chemical
- ☐ Instream/riparian restoration

Dams
- ☐ Erosion control
- ☐ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☑ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☐ Streambanks ☐ Shorelines
  - ☐ Vegetative
  - ☐ Structural
  - ☐ Integrated
  - ☐ Planning & regulatory

Reregulation weirs have been constructed from stone, wood, and aggregate. In addition to increasing the levels of DO in the tailwaters, reregulation weirs result in a more constant rate of flow farther downstream during periods when turbines are not in operation. A reregulation weir constructed downstream of the Canyon Dam (Guadalupe River, Texas) increased DO levels in waters leaving the turbine from 3.3 mg/L to 6.7 mg/L (EPRI, 1990).

The USACE Waterways Experiment Station (Wilhelms, 1988) has compared the effectiveness with which various hydraulic structures accomplished the reaeration of reservoir releases. The study concluded that, whenever operationally feasible, more discharge should be passed over weirs to improve DO concentrations in releases. Results indicated that overflow weirs aerate releases more effectively than low-sill spillways (Wilhelms, 1988).

Reservoir Aeration

Channelization
- ☐ Physical & chemical
- ☐ Instream/riparian restoration

Dams
- ☐ Erosion control
- ☐ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☑ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☐ Streambanks ☐ Shorelines
  - ☐ Vegetative
  - ☐ Structural
  - ☐ Integrated
  - ☐ Planning & regulatory

Some techniques for reservoir aeration include:

- Air injection systems
- Diffused air systems
- Oxygen injection systems
- U-tube design

Air injection systems mix water from different strata in the impoundment by using air or pure oxygen injected into a pumping system. Air injection systems are categorized as partial air lift systems and full air lift systems. In the partial air lift system, compressed air is injected at the bottom of the unit; then the air and water are separated at depth and the air is vented to the surface. In the full air lift system, compressed air is injected at the bottom of the unit (as in the partial air lift system), but the air-water mixture rises to the surface. The full air lift design has a higher efficiency than the partial-air lift and has a lesser tendency to elevate dissolved nitrogen levels (Thornton et al., 1990).

Diffused air systems provide effective transfer of oxygen to water by forcing compressed air through small pores in diffuser systems to form bubbles. One diffuser system test in the Delaware River near Philadelphia, Pennsylvania in 1969–1970 demonstrated the efficiency of this practice. Coarse-bubble diffusers were deployed at depths ranging from 13 to 38 feet. Depending on the depth of deployment, the oxygen transfer efficiency varied from 1 to 12 percent. When compared with other systems discussed below, this efficiency rate is rather low. But the results of this test determined that river aeration was more economical than advanced wastewater treatment as a strategy for improving the levels of DO in the river (EPRI, 1990). Another type of oxygen injection system, which pumps gaseous oxygen into the hypolimnion through diffusers, has effectively improved DO levels in the reservoir behind the Richard B. Russell Dam (Savannah River, on the Georgia-South Carolina border). The system is operated 1 mile upstream of the dam, with occasional supplemental injection of oxygen at the dam face when DO levels are especially low. The system has successfully maintained DO levels above 6 mg/L in the releases, with an average oxygen transfer efficiency of 75 percent (EPRI, 1990; Gallagher and Mauldin, 1987).

The diffused air system has been found to be a cost-effective method to raise low DO levels within a reservoir (Henderson and Shields, 1984). However, the costs of air diffuser operation may be high for deep reservoirs because of hydraulic pressures that must be overcome. Destratification that results from deployment of an air diffuser system may also mix nutrient-rich waters located deep in the impoundment into layers located closer to the surface, increasing the potential for stimulation of algal populations. Barbiero et al. (1996), in a study on the effects of artificial circulation on a small northeastern impoundment, found that artificial circulation ultimately had no effect on the magnitude of summer phytoplankton populations. However, the authors note that intermittent mixing events tend to promote increased transport of phosphorus

into the epilimnion. While this had no effect on phytoplankton populations in the studied lake, it demonstrates the potential of artificial circulation to impact water quality and the need for careful evaluation of potential impacts.

Oxygen injection systems use pure oxygen to increase levels of dissolved oxygen in reservoirs. One type of design, termed side stream pumping, carries water from the impoundment onto the shore and through a piping system into which pure oxygen is injected. After passing through this system, the water is returned to the impoundment (EPRI, 1990).

The U-tube design, in which water from deep in the impoundment is pumped to the surface layer, provides a means to aerate reservoir waters. Oxygen transfer is increased as a mixture of water and oxygen gas is subjected to greater hydrostatic pressure. Water moves down the U-tube and pressure increases as a function of depth, dissolving the oxygen gas into the water. The oxygenated water then travels back up through the system and is released to the waterway (Jones and Stokes, 2004). The inducement of artificial circulation through aeration of the impoundment may also provide the opportunity for a "two-story" fishery, reduce internal phosphorus loading, and eliminate problems with iron and manganese in drinking water (Thornton et al., 1990).

If the principal objective is to improve DO levels only in the reservoir releases and not throughout the entire impoundment, then aeration can be applied selectively to discrete layers of water immediately surrounding the intakes or as water passes through release structures such as hydroelectric turbines. Localized mixing is a practice to improve releases from thermally stratified reservoirs by destratifying the reservoir in the immediate vicinity of the outlet structure. This practice differs from the practice of artificial destratification, where mixing is designed to destratify all or most of the reservoir volume (Holland, 1984). Localized mixing is provided by forcing a jet of high-quality surface water downward into the hypolimnion. Pumps used to create the jet generally fall into two categories, axial flow propellers and direct drive mixers (Price, 1989). Axial flow pumps usually have a large-diameter propeller (6 to 15 feet) that produces a high-discharge, low-velocity jet. Direct drive mixers have small propellers (1 to 2 feet) that rotate at high speeds and produce a high-velocity jet. The axial flow pumps are suitable for shallow reservoirs because they can force large quantities of water down to shallow depths. The high-momentum jets produced by direct drive mixers are necessary to penetrate deeper reservoirs (Price, 1989).

Additional Resource

- Thornton, K.W., B.L. Kimmel, and F.E. Payne. 1990. *Reservoir Limnology: Ecological Perspectives*. John Wiley & Sons, Inc., New York.

Retaining Walls

Channelization
- ☐ Physical & chemical
- ☐ Instream/riparian restoration

Dams
- ☑ Erosion control
- ☑ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☐ Streambanks ☐ Shorelines
  - ☐ Vegetative
  - ☐ Structural
  - ☐ Integrated
  - ☐ Planning & regulatory

Retaining walls are used in areas where soils are unstable, where slopes are steeper than the angle of repose, and where the horizontal distance is limited. They help stabilize slopes and can decrease the steepness of a slope. If the steepness of a slope is reduced, the runoff velocity is decreased and, therefore, the erosion potential is decreased.

According to the *Iowa Construction Site Erosion Control Manual*, a variety of materials can be used for construction of retaining walls, including concrete masonry, concrete cribbing, steel piling, gabions, precast stone, rock riprap, reinforced earth, stone drywall, and treated wood timbers. Costs vary by the material selected for construction. When designing a retaining wall, the following factors should be taken into account: drainage, bearing value of the soil, wall thickness, stress, foundation design, and wall height.

Additional Resources

- ISU. 2006. *Iowa Construction Site Erosion Control Manual: Retaining Wall.* Iowa State University. http://www.ctre.iastate.edu/erosion/manuals/construction/3.13_retaining_wall.pdf.

- Leposky, R.E. 2004. *Retaining Walls: What You See and What You Don't.* http://www.forester.net/ecm_0401_retaining.html.

Return Walls

Whenever shorelines or streambanks are "hardened" through the installation of bulkheads, seawalls, or revetments, the design process must include consideration that waves and currents can continue to dislodge the substrate at both ends of the structure, resulting in very concentrated erosion and rapid loss of fastland. This process is called flanking. To prevent flanking, return walls should be provided at either end of a vertical protective structure and should extend landward for a horizontal distance consistent with the local erosion rate and the design life of the structure.

Channelization
- ☑ Physical & chemical
- ☑ Instream/riparian restoration

Dams
- ☐ Erosion control
- ☐ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☑ Streambanks ☑ Shorelines
  - ☐ Vegetative
  - ☑ Structural
  - ☐ Integrated
  - ☐ Planning & regulatory

Additional Resource

- USACE. 1985. *Coastal Engineering Technical Note: Determining Lengths of Return Walls*. U.S. Army Engineer Waterways Experiment Station. http://chl.erdc.usace.army.mil/library/publications/chetn/pdf/cetn-iii-25.pdf.

Revegetate

Channelization
- ☐ Physical & chemical
- ☐ Instream/riparian restoration

Dams
- ☑ Erosion control
- ☐ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☐ Streambanks ☐ Shorelines
  - ☐ Vegetative
  - ☐ Structural
  - ☐ Integrated
  - ☐ Planning & regulatory

Revegetation of construction sites during and after construction is the most effective way to permanently control erosion (Hynson et al., 1985). To select the right plants for your bioengineering project, note what native plant communities grow in the area. Avoid planting noxious or invasive grasses, such as reed canary grass or ryegrass. Remove invasive plants such as yellow starthistle, English ivy, deadly nightshade, field morning glory, scotch broom, cheatgrass, and purple loosestrife. Use more of the same native plants in the bioengineering design, as these plants are most likely adapted to conditions to the area.

Plants like willow, red osier dogwood, alder, ash, and cottonwood can be well suited for bioengineering. They establish easily, grow quickly, and have thick root systems. Cuttings are available from native plant nurseries. They may also be collected next to the project site, if the area is well vegetated (Oregon Association of Conservation Districts, 2004).

Ecological and vegetational areas vary throughout the country. Therefore, other plant materials may be more suitable for a project. Contact local cooperative extension services for more plant information.[9]

Additional Resources

- Barr Engineering Company. 2001. *Minnesota Urban Small Sites BMP Manual: Stormwater Best Management Practices for Cold Climates. Soil Erosion Control: Vegetative Methods.* Prepared for the Metropolitan Council by Barr Engineering Company, St. Paul, MN. http://www.metrocouncil.org/environment/Watershed/BMP/CH3_RPPSoilVeget.pdf.

- Ohio DNR. No date. *Ohio Stream Management Guide: Restoring Streambanks with Vegetation.* Ohio Department of Natural Resources. http://www.ohiodnr.com/water/pubs/fs_st/stfs07.htm.

[9] http://www.csrees.usda.gov/qlinks/partners/state_partners.html

Revetment

Channelization
- ☑ Physical & chemical
- ☑ Instream/riparian restoration

Dams
- ☑ Erosion control
- ☐ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☑ Streambanks ☑ Shorelines
  - ☐ Vegetative
  - ☑ Structural
  - ☐ Integrated
  - ☐ Planning & regulatory

A revetment (Figure 7.24) is a type of vertical protective structure used for shoreline protection. One revetment design contains several layers of randomly shaped and randomly placed stones, protected with several layers of selected armor units or quarry stone. The armor units in the cover layer should be placed in an orderly manner to obtain good wedging and interlocking between individual stones. The cover layer may also be constructed of specially shaped concrete units (USACE, 1984). Sometimes gabions (stone-filled wire baskets) or interlocking blocks of precast concrete are used in the construction of revetments. In addition to the surface layer of armor stone, gabions, or rigid blocks, successful revetment designs also include an underlying layer composed of either geotextile filter fabric and gravel or a crushed stone filter and bedding layer. This lower layer functions to redistribute hydrostatic uplift pressure caused by wave action in the foundation substrate. Precast cellular blocks, with openings to provide drainage and to allow vegetation to grow through the blocks, can be used in the construction of revetments to stabilize banks. Vegetation roots add additional strength to the bank. In situations where erosion can occur under the blocks, fabric filters can be used to prevent the erosion. Technical assistance should be obtained to properly match the filter and soil characteristics. Typically blocks are hand placed when mechanical access to the bank is limited or costs need to be minimized. Cellular block revetments have the additional benefit of being flexible to conform to minor changes in the bank shape (USACE, 1983).

Additional Resource

- Ohio DNR. No date. *Ohio Stream Management Guide: Riprap Revetments.* Ohio Department of Natural Resources. http://www.ohiodnr.com/water/pubs/fs_st/stfs16.pdf.

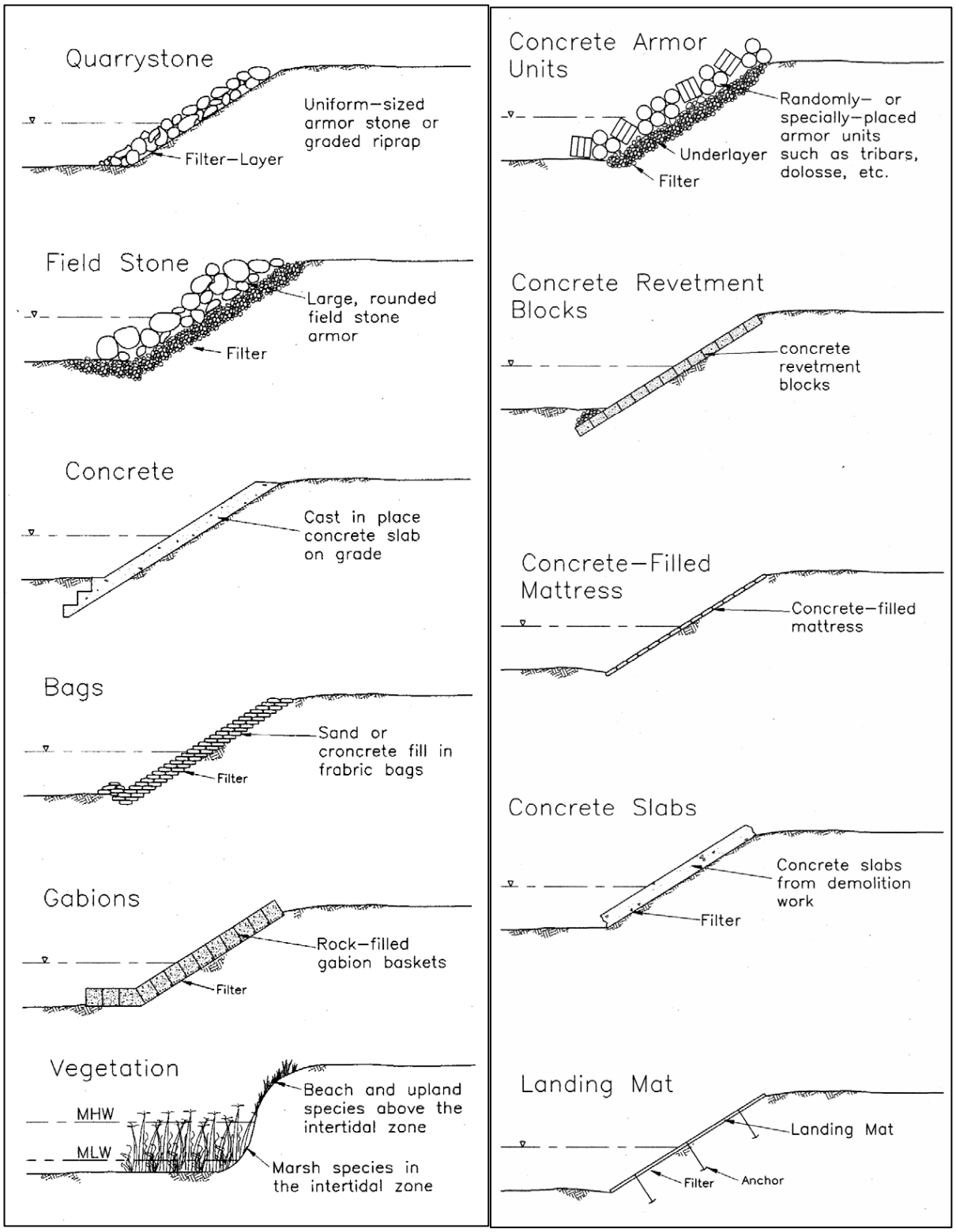

Figure 7.24 Revetment Alternatives (USACE, 2003)

Riparian Improvements

Channelization
- ☑ Physical & chemical
- ☑ Instream/riparian restoration

Dams
- ☑ Erosion control
- ☐ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☑ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☑ Streambanks ☑ Shorelines
  - ☐ Vegetative
  - ☐ Structural
  - ☑ Integrated
  - ☐ Planning & regulatory

Riparian improvements are another strategy that can be used to restore or maintain aquatic and riparian habitat around reservoir impoundments or along the waterways downstream from dams. In fact, Johnson and LaBounty (1988) found that riparian improvements were more effective, in some cases, than flow augmentation for protection of instream habitat. In the Salmon River (Idaho), a variety of instream and riparian habitat improvements have been recommended to improve the indigenous stocks of Chinook salmon (*Oncorhynchus tshawytscha*). These improvements include reducing sediment loading in the watershed, improving riparian vegetation, eliminating barriers to fish migration (see sections discussing this practice below), and providing greater instream and riparian habitat diversity (Andrews, 1988).

Maintaining and improving riparian areas upstream of a dam may also be an important consideration for reducing flow-related impacts to dams. Riparian areas along brooks and smaller streams are sometimes altered in a manner that impairs their ability to detain and absorb floodwater and stormwater (e.g., removal of forest cover or increased imperviousness). The cumulative impact of the riparian changes results in the smaller streams discharging increased volumes and velocities of water, which then result in more severe downstream flooding and increased storm damage and/or maintenance to existing structures (such as dams). These downstream impacts may occur even though main stem floodplains and riparian areas are safeguarded and remain close to their natural condition (Cohen, 1997).

Riprap

Channelization
- ☑ Physical & chemical
- ☑ Instream/riparian restoration

Dams
- ☑ Erosion control
- ☐ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☑ Streambanks ☑ Shorelines
  - ☐ Vegetative
  - ☑ Structural
  - ☐ Integrated
  - ☐ Planning & regulatory

Riprap is a layer of appropriately sized stones designed to protect and stabilize areas subject to erosion, slopes subject to seepage, or areas with poor soil structure. Riprap extends from the toe of the slope to a height needed for long term durability (Figure 7.25).

Riprap can be used where vegetation cannot be established or in combination with vegetative approaches. This method is suitable where stream flow velocity is high or where there is a threat to life or property. This method can be expensive, particularly if materials are not locally available. This method should be combined with soil bioengineering techniques, particularly revegetation efforts, to achieve a comprehensive streambank restoration design (FISRWG, 1998).

Additional Resources

- FISRWG. 1998. *Stream Corridor Restoration: Principles, Processes, and Practices*. Federal Interagency Stream Restoration Working Group. http://www.nrcs.usda.gov/technical/stream_restoration/PDFFILES/APPENDIX.pdf.

- ISU. 2006. *Iowa Construction Site Erosion Control Manual: Riprap.* Iowa State University. http://www.ctre.iastate.edu/erosion/manuals/construction/3.15_riprap.pdf.

- Tennessee Department of Environment and Conservation. 2002. *Erosion and Sediment Control Handbook: Riprap*. Tennessee Department of Environment and Conservation, Nashville, TN. http://state.tn.us/environment/wpc/sed_ero_controlhandbook/rr.pdf.

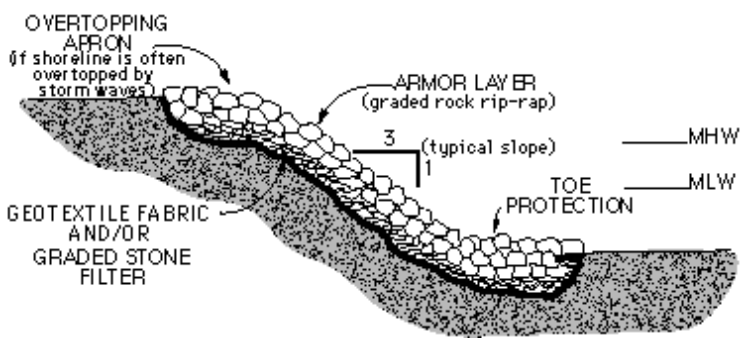

Proper riprap placement (MHW=mean high water, MLW=mean low water).

Figure 7.25 Riprap Diagram (http://www.extension.umn.edu/distribution/naturalresources/components/DD6946g.html)

Root Wad Revetments

Channelization
- ☑ Physical & chemical
- ☑ Instream/riparian restoration

Dams
- ☑ Erosion control
- ☐ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☑ Streambanks ☐ Shorelines
  - ☐ Vegetative
  - ☐ Structural
  - ☑ Integrated
  - ☐ Planning & regulatory

Root wads armor a bank by keeping faster moving currents away from the bank (Figures 7.26 and 7.27). They are most useful for low energy streams that meander and have out-of-bank flow conditions. Root wads should be used in combination with other soil bioengineering techniques to stabilize a bank and ensure plant establishment on the upper portions of the streambank. Stabilizing the bank will reduce streambank erosion, trap sediment, and improve habitat diversity. There are a number of ways to install root wads. The trunk can be driven into the bank, laid in a deep trench, or installed as part of a log and boulder revetment. Use tree wads that have brushy top and durable wood, such as Douglas fir, oak, hard maple, juniper, spruce, cedar, red pine, white pine, larch, or beech. Ponderosa pine and aspen are too inflexible, and alder decomposes rapidly.

With the added support of a log and boulder revetment, root wads can stabilize banks of high-energy streams. Root wad span should be approximately 5 feet with numerous root protrusions. The trunk should be at least 8 to 12 feet long. Boulders should be as large as possible, but at least one and a half times the log's diameter. They should also have an irregular surface. Logs are to be used as footers or revetments and should be over 16 inches in diameter.

When logs and root wads are well anchored, this design will tolerate high boundary shear stress. However, local scour and erosion is possible. Varying with climate and tree species used, the decomposition of the logs and rootwads will limit the life span of this design. If colonization of streambank vegetation does not take place, replacement may be required. The project site must be accessible to heavy equipment. Locating materials may be difficult in some locations and this method can be expensive (FISRWG, 1998).

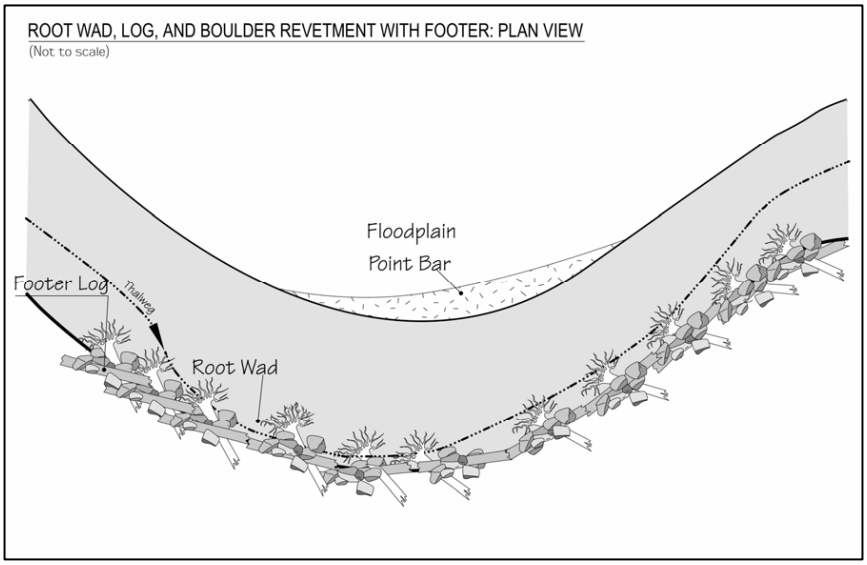

Figure 7.26 Root Wad, Log, and Boulder Revetment with Footer: Plan View (USDA-FS, 2002)

Installation guidelines are available from the USDA-FS Soil Bioengineering Guide (USDA-FS, 2002). Under EMRRP, the USACE has presented research on rootwad composites in a technical note (*Rootwad Composites for Streambank Erosion Control and Fish Habitat Enhancement*).[10]

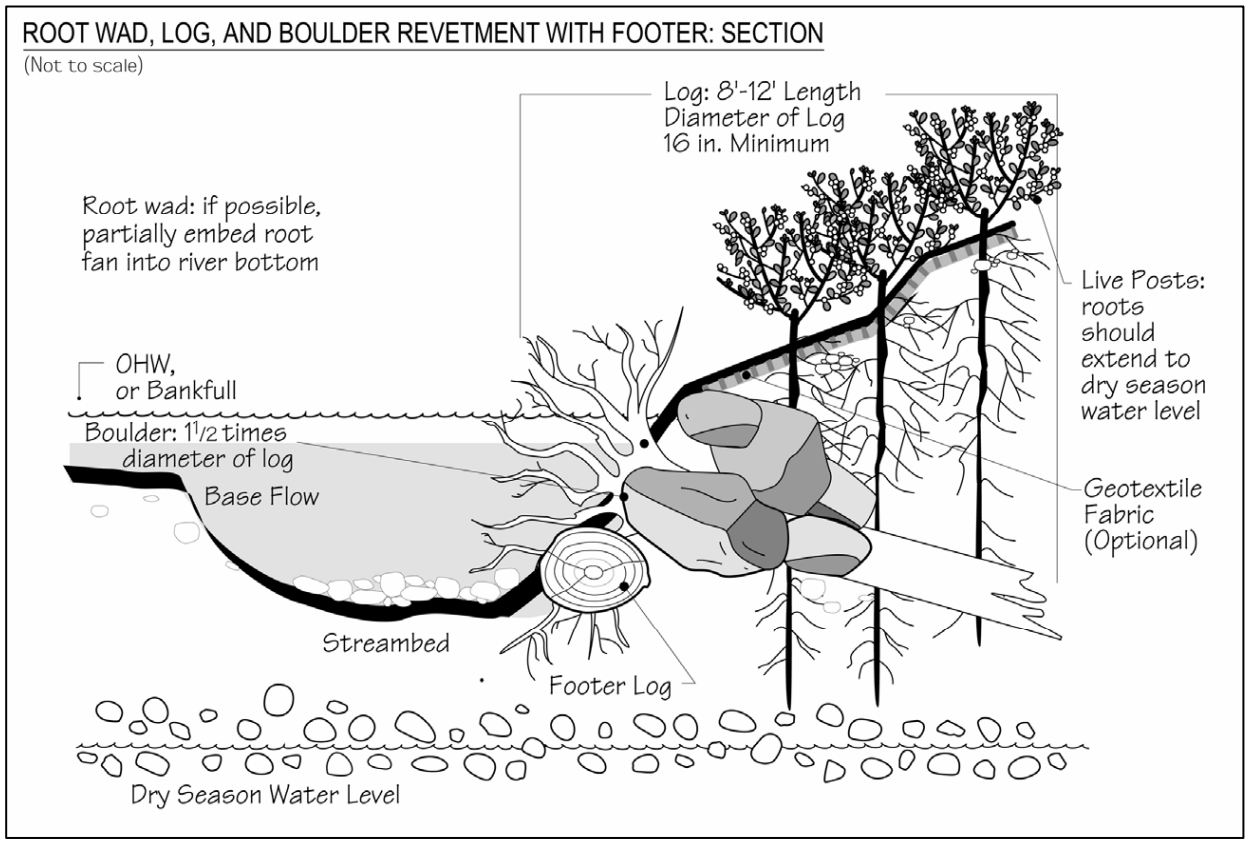

Figure 7.27 Rootwad, Log, and Boulder Revetment with Footer: Section (USDA-FS, 2002)

Additional Resources

- FISRWG. 1998. *Stream Corridor Restoration: Principles, Processes, and Practices*. Federal Interagency Stream Restoration Working Group. http://www.nrcs.usda.gov/technical/stream_restoration/PDFFILES/APPENDIX.pdf.

- Harmon, W.A. and R. Smith. 2000. *Using Root Wads and Rock Vanes for Streambank Stabilization.* River Course Fact Sheet Number 4. North Carolina Cooperative Extension Service. http://www.bae.ncsu.edu/programs/extension/wqg/sri/rv-crs-4.pdf.

- Walter, J., D. Hughes, and N.J. Moore. 2005. *Streambank Revegetation and Protection: A Guide for Alaska. Revegetation Techniques: Root Wads.* Revised Edition. Alaska Department of Fish and Game, Division of Sport Fish. http://www.sf.adfg.state.ak.us/SARR/restoration/techniques/rootwad.cfm.

[10] http://el.erdc.usace.army.mil/elpubs/pdf/sr21.pdf

Rosgen's Stream Classification Method

Channelization
- ☑ Physical & chemical
- ☑ Instream/riparian restoration

Dams
- ☐ Erosion control
- ☐ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☑ Streambanks ☐ Shorelines
  - ☐ Vegetative
  - ☐ Structural
  - ☐ Integrated
  - ☑ Planning & regulatory

Rosgen's stream channel stability method provides a sequence of steps for the field practitioner to use in reaching final conclusions and making recommendations for management, stream design, or restoration. The field practitioner uses field-measured variables to assess:

- Stream state or channel condition variables
- Vertical stability (degradation/aggradation)
- Lateral stability
- Channel patterns
- Stream profile and bed features
- Channel dimension factor
- Channel scour/deposition (with competence calculations of field verified critical dimensionless shear stress and change in bed and bar material size distribution)
- Stability ratings adjusted by stream type
- Dimensionless ratio sediment rating curves by stream type and stability ratings
- Selection of position in stream type evolutionary scenario as quantified by morphological variables by stream type to determine state and potential of stream reach.

The stability assessment is conducted on a reference reach and a departure analysis is performed when compared to an unstable reach of the same stream type. Changes in the variables controlling river channel form, primarily streamflow, sediment regime, riparian vegetation, and direct physical modifications can cause stream channel instability. Separating the differences between anthropogenic versus geologic processes in channel adjustment is a key to prevention, mitigation, and restoration of disturbed systems.

Rosgen (1996) has also created a river inventory hierarchy involving four levels that would allow a stream assessment to be conducted at various levels, ranging from broad qualitative descriptions to detailed quantitative descriptions. The idea is to provide documented measurements, coupled with consistent, quantitative indices of stability, to make the approach to stream assessments less subjective and more consistent and reproducible. Level I and Level II are used to do the initial stratification of a reach by valley and stream type. Level III is used to predict stability. Level IV is used for validation, and requires the greatest amount of detail over a longer time period. For example, vertical stability and bank erosion can be estimated at Level III. But, in a Level IV assessment, permanent cross-sections are revisited over time to verify shifts in bed elevation and measure actual erosion that occurred.

The four hierarchal levels, and the measurements and determinations they include, are shown below along with their objectives.

Level I—Geomorphic characterization: Used to describe generalized fluvial features using remote sensing and existing inventories of geology, landform evolution, valley morphology, depositional history and associated river slopes, relief and patterns utilized for generalized categories of major stream types, and associated interpretations.

Level II—Morphological description: To delineate homogeneous stream types that describe specific slopes, channel materials, dimensions and patterns from reference reach measurements and provide a more detailed level of interpretation than Level I. Includes measurements such as sinuosity, width/depth ration, slope, entrenchment ratio, and channel patterns and material.

Level III—Stream "state" or condition: The "state" of streams further describes existing conditions that influence the response of channels to imposed change and provide specific information for prediction methodologies (such as stream bank erosion calculations). Provides for very detailed descriptions and associated interpretation and predictions. Includes such measurements and/or characterizations of vegetation, deposition, debris, meander patterns, channel stability index, and flow regime.

Level IV—Reach specific studies (validation level): Provides reach-specific information on channel processes. Used to evaluate prediction methodologies; to provide sediment, hydraulic and biological information related to specific stream types; and to evaluate effectiveness of mitigation and impact assessments for activities by stream type. Involves direct measurements of sediment transport, bank erosion rates, aggradation/degradation, hydraulics, and biological data.

Rosgen's stream classification methodologies can assist in stream restoration design by:

- Enabling more precise estimates of quantitative hydraulic relationships associated with specific stream and valley morphologies.
- Establishing guidelines for selecting stable stream types for a range of dimensions, patterns, and profiles that are in balance with the river's valley slope, valley confinement, depositional materials, streamflow, and sediment regime of the watershed.
- Providing a method for extrapolating hydraulic parameters and developing empirical relationships for use in the resistance equations and hydraulic geometry equations needed for restoration design.
- Developing a series of meander geometry relationships that are uniquely related to stream types and their bankfull dimensions.
- Identifying the stable characteristics for a given stream type by comparing the stable form to its unstable or disequilibrium condition.

Refer to *Applied River Morphology* (Rosgen, 1996) for more information on this stream classification system and potential applications.

Scheduling Projects

Often clearing and grading for a project can be scheduled during the time of year that the erosion potential of the site is relatively low. In many parts of the country, there is a certain period of the year when erosion potential is relatively low and construction scheduling could be very effective. For example, in the Pacific region if construction can be completed during the 6-month dry season (e.g., May 1 to October 31), temporary erosion and sediment controls might not be needed. In some parts of the country erosion potential is very high during certain parts of the year, such as the spring thaw in northern and high-elevation areas. During that time of year, snowmelt generates a constant runoff that can erode soil. In addition, construction vehicles can easily turn the soft, wet ground into mud, which is more easily washed off-site. Therefore, in the north, limitations could be placed on clearing and grading during the spring thaw (Goldman et al., 1986).

Channelization
- ☐ Physical & chemical
- ☐ Instream/riparian restoration

Dams
- ☑ Erosion control
- ☐ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☐ Streambanks ☐ Shorelines
  - ☐ Vegetative
  - ☐ Structural
  - ☐ Integrated
  - ☐ Planning & regulatory

Additional Resource

- CASQA. 2004. *California Stormwater BMP Construction Handbook: Scheduling.* California Stormwater Quality Association, Sacramento, CA. http://www.cabmphandbooks.com/Documents/Construction/EC-1.pdf.

Sediment Basins/Rock Dams

Channelization
- ☐ Physical & chemical
- ☐ Instream/riparian restoration

Dams
- ☐ Erosion control
- ☑ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☐ Streambanks ☐ Shorelines
  - ☐ Vegetative
  - ☐ Structural
  - ☐ Integrated
  - ☐ Planning & regulatory

An earthen or rock embankment that is located to capture sediment from runoff and retain it on the construction site.

Sediment basins, also known as silt basins, are engineered impoundment structures that allow sediment to settle out of the urban runoff. They are installed prior to full-scale grading and remain in place until the disturbed portions of the drainage area are fully stabilized. They are generally located at the low point of sites, away from construction traffic, where they will be able to trap sediment-laden runoff. Basin dewatering is achieved either through a single riser and drainage hole leading to a suitable outlet on the downstream side of the embankment or through the gravel of the rock dam. In both cases, water is released at a substantially slower rate than would be possible without the control structure.

The following are general specifications for sediment basin design criteria as presented in Schueler (1997):

- Provide 1,800 to 3,600 ft^3 of storage per contributing acre (a number of states, including Maryland, Pennsylvania, Georgia, and Delaware, recently increased the storage requirement to 3,600 ft^3 or more [CWP, 1997b]).
- Surface area equivalent to 1 percent of drainage area (optional, seldom required).
- Riser with spillway capacity of 0.2 ft^3/s/ac of drainage area (peak discharge for 2-year storm with 1-foot freeboard).
- Length-to-width ratio of 2 or greater.
- Basin side slopes no steeper than 2:1 (h:v).
- Safety fencing, perforated riser, dewatering (optional, seldom required).

Sediment basins can be classified as either temporary or permanent structures, depending on the length of service of the structure. If they are designed to function for less than 36 months, they are classified as temporary; otherwise, they are considered permanent. Temporary sediment basins can also be converted into permanent runoff management ponds. When sediment basins are designed as permanent structures, they must meet all standards for wet ponds. It is important to note that even the best-designed sediment basin seldom exceeds 60 to 75 percent total suspended solids (TSS) removal, which should be considered when selecting a sediment control practice.

Basins are most commonly used at the outlets of diversions, channels, slope drains, or other runoff conveyances that discharge sediment-laden water.

Additional Resources

- CASQA. 2003. *California Stormwater BMP Construction Handbook*: *Sediment Basin.* California Stormwater Quality Association, Sacramento, CA. http://www.cabmphandbooks.com/Documents/Construction/SE-2.pdf.

- ISU. 2006. *Iowa Construction Site Erosion Control Manual: Sediment Basin.* Iowa State University. http://www.ctre.iastate.edu/erosion/manuals/construction/3.17_sediment_basin.pdf.

- Michigan Department of Environmental Quality. 1992. *SESC Training Manual*: *Sedimentation Basin*. Michigan Department of Environmental Quality, Lansing, MI. http://www.deq.state.mi.us/documents/deq-swq-nps-sb.pdf.

- Tennessee Department of Environment and Conservation. 2002. *Erosion and Sediment Control Handbook: Sediment Basin*. Tennessee Department of Environment and Conservation, Nashville, TN. http://state.tn.us/environment/wpc/sed_ero_controlhandbook/sb.pdf.

Sediment Fences

Channelization
- ☐ Physical & chemical
- ☐ Instream/riparian restoration

Dams
- ☑ Erosion control
- ☑ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☐ Streambanks ☐ Shorelines
  - ☐ Vegetative
  - ☐ Structural
  - ☐ Integrated
  - ☐ Planning & regulatory

Silt fence, also known as filter fabric fence, is available in several mesh sizes from many manufacturers. Sediment is filtered out as runoff flows through the fabric. Such fences should be used only where there is sheet flow (no concentrated flow), and the maximum drainage area to the fence should be 0.5 acre or less per 100 feet of fence. To ensure sheet flow, a gravel collar or level spreader can be used upslope of the fence. Many types of fabrics are available commercially. The characteristics that determine a fence's effectiveness include filtration efficiency, permeability, tensile strength, tear strength, ultraviolet resistance, pH effects, and creep resistance. The longevity of silt fences depends heavily on proper installation and maintenance, however they typically last 6 to 12 months. CWP (1997d) identified several conditions that increase the effectiveness of silt fences:

- The length of the slope does not exceed 50 feet for slopes of 5 to 10 percent, 25 feet for slopes of 10 to 20 percent, or 15 feet for slopes greater than 20 percent.
- The silt fence is aligned parallel to the slope contours.
- Edges of the silt fence are curved uphill, which does not allow flow to bypass the fence.
- The contributing length to the fence is less than 100 feet.
- The fence has reinforcement if receiving concentrated flow.
- The fence was installed above an outlet pipe or weir.
- The fence is down slope of the exposed area and alignment considers construction traffic.
- Sediment is not allowed to accumulate behind the fence (increases capacity and decreases breach potential).
- Alignment of the silt fence mirrors the property line or limits of disturbance.

Additional Resources

➢ CASQA. 2003. *California Stormwater BMP Construction Handbook: Straw Bale Barrier.* California Stormwater Quality Association, Sacramento, CA. http://www.cabmphandbooks.com/Documents/Construction/SE-9.pdf.

➢ ISU. 2006. *Iowa Construction Site Erosion Control Manual: Sediment Barrier.* Iowa State University. http://www.ctre.iastate.edu/erosion/manuals/construction/3.16_sediment_barrier.pdf.

➢ Missouri Department of Natural Resources. 2006. *Protecting Water Quality, A Construction Site Water Quality Field Guide: Sediment Fence*. Missouri Department of Natural Resources. http://www.dnr.mo.gov/env/wpp/field-guide/fg05_06_sedimentcontrol.pdf.

➢ Tennessee Department of Environment and Conservation. 2002. *Erosion and Sediment Control Handbook: Silt Fence*. Tennessee Department of Environment and Conservation, Nashville, TN. http://state.tn.us/environment/wpc/sed_ero_controlhandbook/sf.pdf.

Sediment Traps

Sediment traps are small impoundments that allow sediment to settle out of runoff water. They are typically installed in a drainage way or other point of discharge from a disturbed area. Temporary diversions can be used to direct runoff to the sediment trap. Sediment traps are ideal for sites 1 acre and smaller and should not be used for areas greater than 5 acres. They typically have a useful life of approximately 18 to 24 months. A sediment trap should be designed to maximize surface area for infiltration and sediment settling. This design increases the effectiveness of the trap and decreases the likeliness of backup during and after periods of high runoff intensity. The approximate storage capacity of each trap should be at least 1,800 ft^3/acre of disturbed land draining into the trap (Smolen et al., 1988).

Channelization
- ☐ Physical & chemical
- ☐ Instream/riparian restoration

Dams
- ☐ Erosion control
- ☑ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☐ Streambanks ☐ Shorelines
  - ☐ Vegetative
  - ☐ Structural
  - ☐ Integrated
  - ☐ Planning & regulatory

Additional Resources

- British Columbia Ministry of Agriculture, Food and Fisheries. 2004. *Constructed Ditch Fact Sheet: Sediment Traps.* No. 9. http://www.agf.gov.bc.ca/resmgmt/publist/600Series/641310-1.pdf.

- CASQA. 2003. *California Stormwater BMP Construction Handbook*: *Sediment Traps.* California Stormwater Quality Association, Sacramento, CA. http://www.cabmphandbooks.com/Documents/Construction/SE-3.pdf.

- Tennessee Department of Environment and Conservation. 2002. *Erosion and Sediment Control Handbook: Sediment Trap*. Tennessee Department of Environment and Conservation, Nashville, TN. http://www.state.tn.us/environment/wpc/sed_ero_controlhandbook/st.pdf.

Seeding

Channelization
- ☐ Physical & chemical
- ☐ Instream/riparian restoration

Dams
- ☑ Erosion control
- ☐ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☐ Streambanks ☐ Shorelines
  - ☐ Vegetative
  - ☐ Structural
  - ☐ Integrated
  - ☐ Planning & regulatory

Seeding establishes a vegetative cover on disturbed areas and is very effective in controlling soil erosion once a dense vegetative cover has been established. Seeding establishes permanent erosion control in a relatively short amount of time and has been shown to decrease solids load by 99 percent (CWP, 1997a). The three most common seeding methods are (1) broadcast seeding, in which seeds are scattered on the soil surface; (2) hydroseeding, in which seeds are sprayed on the surface of the soil with a slurry of water; and (3) drill seeding, in which a tractordrawn implement injects seeds into the soil surface. Broadcast seeding is most appropriate for small areas and for augmenting sparse and patchy grass covers. Hydroseeding is often used for large areas (in excess of 5,000 square feet) and is typically combined with tackifiers, fertilizers, and fiber mulch. Drill seeding is expensive and is cost-effective only on sites greater than 2 acres. For best results, bare soils should be seeded or otherwise stabilized within 15 calendar days after final grading. Denuded areas that are inactive and will be exposed to rain for 15 days or more can also be temporarily stabilized, usually by planting seeds and establishing vegetation during favorable seasons in areas where vegetation can be established. In very flat, nonsensitive areas with favorable soils, stabilization may involve simply seeding and fertilizing. The Soil Quality Institute (SQI, 2000) recommends that soils that have been compacted by grading should be broken up or tilled before vegetating.

To establish a vegetative cover, it is important to use seeds from adapted plant species and varieties that have a high germination capacity. Supplying essential plant nutrients, testing the soil for toxic materials, and applying an adequate amount of lime and fertilizer can overcome many unfavorable soil conditions and establish adequate vegetative cover. Specific information about seeds, various species, establishment techniques, and maintenance can be obtained from *Erosion Control & Conservation Plantings on Noncropland* (Landschoot, 1997) or a local Cooperative State Research, Education, and Extension Service[11] or Natural Resources Conservation Service[12] office.

Additional Resources

- CASQA. 2003. *California Stormwater BMP Construction Handbook: Hydroseeding.* California Stormwater Quality Association, Sacramento, CA. http://www.cabmphandbooks.com/Documents/Construction/EC-4.pdf.

- Wisconsin Department of Natural Resources. 2003. *Seeding for Construction Site Erosion Control.* Wisconsin Department of Natural Resources, Madison, WI. http://dnr.wi.gov/org/water/wm/nps/pdf/stormwater/techstds/erosion/Seeding%20For%20Construction%20Site%20Erosion%20Control%20_1059.pdf.

[11] http://www.csrees.usda.gov
[12] http://www.nrcs.usda.gov

Selective Withdrawal

Channelization
- ☐ Physical & chemical
- ☐ Instream/riparian restoration

Dams
- ☐ Erosion control
- ☐ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☑ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☐ Streambanks ☐ Shorelines
  - ☐ Vegetative
  - ☐ Structural
  - ☐ Integrated
  - ☐ Planning & regulatory

Temperature control in reservoir releases depends on the volume of water storage in the reservoir, the timing of the release relative to storage time, and the level from which the water is withdrawn. Dams capable of selectively releasing waters of different temperatures can provide cooler or warmer water temperatures downstream at times that are critical for other instream resources, such as during periods of fish spawning and development of fry (Fontane et al., 1981; Hansen and Crumrine, 1991). Stratified reservoirs are operated to meet downstream temperature objectives such as to enhance a cold-water or warm-water fishery or to maintain preproject stream temperature conditions. Release temperature may also be important for irrigation (Fontane et al., 1981).

Multilevel intake devices in storage reservoirs allow selective withdrawal of water based on temperature and DO levels. These devices minimize the withdrawal of surface water high in blue-green algae, or of deep water enriched in iron and manganese. Care should be taken in the design of these systems not to position the multilevel intakes too far apart because this will increase the difficulty with which withdrawals can be controlled, making the discharge of poor-quality hypolimnetic water more likely (Howington, 1990; Johnson and LaBounty, 1988; Smith et al., 1987).

Setbacks

Channelization
- ☑ Physical & chemical
- ☑ Instream/riparian restoration

Dams
- ☐ Erosion control
- ☐ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☑ Streambanks ☑ Shorelines
  - ☐ Vegetative
  - ☐ Structural
  - ☐ Integrated
  - ☑ Planning & regulatory

Where setbacks have been implemented to reduce the hazard of coastal land loss, they have also included requirements for the relocation of existing structures located within the designated setback area. Setbacks can also include restrictions on uses of waterfront areas that are not related to the construction of new buildings (Davis, 1987). Upland drainage from development should be directed away from bluffs and banks so as to avoid accelerating slope erosion.

In most cases, states have used the local unit of government to administer the program on either a mandatory or voluntary basis. This allows local government to retain control of its land use activities and to exceed the minimum state requirements if this is deemed desirable (NRC, 1990).

Technical standards for defining and delineating setbacks also vary from state to state. One approach is to establish setback requirements for any "high hazard area" eroding at greater than 1 foot per year. Another approach is to establish setback requirements along all erodible shores because even a small amount of erosion can threaten homes constructed too close to the streambank or shoreline. Several states have general setback requirements that, while not based on erosion hazards, have the effect of limiting construction near the streambank or shoreline.

The basis for variations in setback regulations between states seems to be based on several factors, including (NRC, 1990):

- The language of the law being enacted
- The geomorphology of the coast
- The result of discretionary decisions
- The years of protection afforded by the setback
- Other variables decided at the local level of government

From the perspective of controlling NPS pollution resulting from erosion of shorelines and streambanks, the use of setbacks has the immediate benefit of discouraging concentrated flows and other impacts of storm water runoff from new development in areas close to the streambank or shoreline. In particular, the concentration of storm water runoff can aggravate the erosion of shorelines and streambanks, leading to the formation of gullies, which are not easily repaired. Therefore, drainage of storm water from developed areas and development activities located along the shoreline should be directed inland to avoid accelerating slope erosion.

The most significant NPS benefits are provided by setbacks that not only include restrictions on new construction along the shore but also contain additional provisions aimed at preserving and protecting coastal features such as beaches, wetlands, and riparian forests. This approach

promotes the natural infiltration of surface water runoff before it passes over the edge of the bank or bluff and flows directly into the coastal waterbody. Setbacks also help protect zones of naturally occurring vegetation growing along the shore. As discussed in the section on "bioengineering practices," the presence of undisturbed shoreline vegetation itself can help to control erosion by removing excess water from the bank and by anchoring the individual soil particles of the substrate.

Almost all states and territories with setback regulations have modified their original programs to improve effectiveness or correct unforeseen problems (NRC, 1990). Experiences have shown that procedures for updating or modifying the setback width need to be included in the regulations. For instance, application of a typical 30-year setback standard in an area whose rate of erosion is 2 feet per year results in the designation of a setback width of 60 feet. This width may not be sufficient to protect the beaches, wetlands, or riparian forests whose presence improves the ability of the streambank or shoreline to respond to severe wave and flood conditions, or to high levels of surface water runoff during extreme precipitation events. A setback standard based on the landward edge of streambank or shoreline vegetation is one alternative that has been considered (NRC, 1990; Davis, 1987).

From the standpoint of NPS pollution control, an approach that designates streambanks, shorelines, wetlands, beaches, or riparian forests as a special protective feature, allows no development on the feature, and measures the setback from the landward side of the feature is recommended (NRC, 1990). In some cases, provisions for soil bioengineering, marsh creation, beach nourishment, or engineering structures may also be appropriate since the special protective features within the designated setbacks can continue to be threatened by uncontrolled erosion of the shoreline or streambank. Finally, setback regulations should recognize that some special features of the streambank or shoreline will change position. For instance, beaches and wetlands can be expected to migrate landward if water levels continue to rise. Alternatives for managing these situations include flexible criteria for designating setbacks, vigorous maintenance of beaches and other special features within the setback area, and frequent monitoring of the rate of streambank or shoreline erosion and corresponding adjustment of the setback area.

Shoreline Sensitivity Assessment

Channelization
- ☐ Physical & chemical
- ☐ Instream/riparian restoration

Dams
- ☐ Erosion control
- ☐ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☐ Streambanks ☑ Shorelines
  - ☐ Vegetative
  - ☐ Structural
  - ☐ Integrated
  - ☑ Planning & regulatory

Currently there are no complete, universal assessment methodologies that apply to all shorelines and assess erosion vulnerabilities in various types of lakes, reservoirs, estuaries, and coasts. The methods presented by NOAA and the U.S. Geological Survey (USGS) were originally developed for other purposes and are being applied for other shoreline assessments:

- Environmental Sensitivity Mapping
- USGS Coastal Classification (Coastal & Marine Geology Program)
- Coastal Vulnerability Index (CVI) (focus is on SLR—the "erosion" factor may be the only relevant factor in CVI)

Environmental Sensitivity Mapping

The Environmental Sensitivity Index (ESI) was originally created for NOAA to prioritize areas for environmental cleanup (mainly oil-spills), to assist spill-response coordinators in evaluating the potential impact of oil along a shoreline, and to facilitate the allocation of resources during and after a spill.

ESI maps are comprised of three general types of information (NOAA, 1997):

- Shoreline Classification—ranked according to a scale relating to sensitivity, natural persistence of oil, and ease of cleanup.
- Biological Resources—including oil-sensitive animals and rare plants as well as habitats that are used by oil-sensitive species or are themselves sensitive to oil spills, such as submersed aquatic vegetation and coral reefs.
- Human-Use Resources—specific areas that have added sensitivity and value because of their use, such as beaches, parks and marine sanctuaries, water intakes, and archaeological sites.

The standardized ESI shoreline guideline rankings include estuarine, lacustrine, riverine, and palustrine habitats (NOAA, 1997). The classification scheme is based on an understanding of the physical and biological character of the shoreline environment, not just the substrate type and grain size. Relationships among physical processes, substrate type, and associated biota produce specific geomorphic/ecologic shoreline types, sediment transport patterns, and predictable patterns in oil behavior and biological impact. The concepts relating natural factors to the relative sensitivity of coastline, mostly developed in the estuarine setting, were slightly modified for lakes and rivers. The sensitivity ranking is controlled by the following factors:

- Relative exposure to wave and tidal energy
- Shoreline slope

- Substrate type (grain size, mobility, penetration and/or burial, and trafficability)
- Biological productivity and sensitivity

ESI maps have proven to have a long-term use, and they are excellent tools for studying shoreline change and its effects on the distribution and concentration of plants and animals living near the coast. Environmental sensitivity mapping is still evolving, and NOAA researchers are working with federal, state, and private industry partners to improve the ESI mapping system to extend beyond spill response.

USGS Coastal Classification (Coastal & Marine Geology Program)

The objective of the Coastal Classification Map is to determine the hazard vulnerability of an area. The coastal geomorphic classification scheme utilizes morphology and human modifications of the coast as the primary basis for hazard assessment. It emphasizes physical factors that influence erosion, overwash of sandy beaches and barrier islands, and landward sediment transport during storms along and across those features (USGS, 2004).

USGS National Assessment of Coastal Vulnerability to Sea-Level Rise

The USGS Coastal and Marine Geology Program's National Assessment, seeks to determine the relative risks due to future sea-level rise for the U.S. Atlantic, Pacific, and Gulf of Mexico coasts USGS, 2002). Through the use of a CVI, the relative risk that physical changes will occur as sea-level rises is quantified based on the following criteria: tidal range, wave height, coastal slope, shoreline change, geomorphology, and historical rate of relative sea-level rise. This approach combines a coastal system's susceptibility to change with its natural ability to adapt to changing environmental conditions, and yields a relative measure of the system's natural vulnerability to the effects of sea-level rise.

In 2001, USGS in partnership with the National Park Service (NPS) Geologic Resources Division, began conducting hazard assessments and creating map products to assist the NPS in managing vulnerable coastal resources. One of the most important and practical issues in coastal geology is determining the physical response of coastal environments to water-level changes.

Additional Resources

- NOAA. 1997. *Environmental Sensitivity Index Guidelines (Version 3)* Chapter 2. Seattle, WA. http://response.restoration.noaa.gov/book_shelf/876_chapter2.pdf.

- USGS. 2002. *Vulnerability of US National Parks to Sea-Level Rise and Coastal Change*. U.S. Geological Survey. http://pubs.usgs.gov/fs/fs095-02/fs095-02.html.

- USGS. 2004. *Coastal Classification Mapping Project*. U.S. Geological Survey, Coastal & Marine Geology Program. http://coastal.er.usgs.gov/coastal-classification/class.html.

Site Fingerprinting

Channelization
- ☐ Physical & chemical
- ☐ Instream/riparian restoration

Dams
- ☑ Erosion control
- ☐ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☐ Streambanks ☐ Shorelines
  - ☐ Vegetative
  - ☐ Structural
  - ☐ Integrated
  - ☐ Planning & regulatory

Often areas of a construction site are unnecessarily cleared. The total amount of disturbed area can be reduced with site fingerprinting, which involves placing development in the most environmentally sound locations on the site and minimizing the size of disturbed area. With site fingerprinting, only those areas essential for completing construction activities are cleared. The remaining area is left undisturbed.

Fingerprinting places development away from environmentally sensitive areas (wetlands, steep slopes, etc.), areas for future open space and restoration, areas where trees are to be saved, and temporary and permanent vegetative buffer zones.

The proposed limits of land disturbance can be physically marked off to ensure that only the land area required for buildings, roads, and other infrastructure is cleared. Existing vegetation, especially vegetation on steep slopes, can be avoided.

Sodding

Channelization
- ☐ Physical & chemical
- ☐ Instream/riparian restoration

Dams
- ☑ Erosion control
- ☐ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☐ Streambanks ☐ Shorelines
  - ☐ Vegetative
  - ☐ Structural
  - ☐ Integrated
  - ☐ Planning & regulatory

Sodding permanently stabilizes an area with a thick vegetative cover. Sodding provides immediate stabilization of an area and can be used in critical areas or where establishing permanent vegetation by seeding and mulching would be difficult. Sodding is also a preferred option when there is high erosion potential during the period of vegetative establishment from seeding. According to the Soil Quality Institute (SQI, 2000), soils that have been compacted by grading should be broken up or tilled before placing sod.

Additional Resources

- Barr Engineering Company. 2001. *Minnesota Urban Small Sites BMP Manual: Stormwater Best Management Practices for Cold Climates. Soil Erosion Control: Vegetative Methods.* Prepared for the Metropolitan Council by Barr Engineering Company, St. Paul, MN. http://www.metrocouncil.org/environment/Watershed/BMP/CH3_RPPSoilVeget.pdf.

- ISU. 2006. *Iowa Construction Site Erosion Control Manual: Sodding.* Iowa State University. http://www.ctre.iastate.edu/erosion/manuals/construction/2.6_sodding.pdf.

Soil Protection

Unprotected stockpiles are very prone to erosion, and they must be protected. Small stockpiles can be covered with a tarp to prevent erosion. Large stockpiles can be stabilized by erosion blankets, seeding, or mulching.

Because of the high organic content of topsoil, it is not recommended for use as fill material or under pavement. After a site is cleared, the topsoil is typically removed. Since topsoil is essential to establish new vegetation, it should be stockpiled and then reapplied to the site for revegetation, if appropriate. Although topsoil salvaged from the existing site can often be used, it must meet certain standards, and topsoil might need to be imported onto the site if the existing topsoil is not adequate for establishing new vegetation.

Channelization
- ☐ Physical & chemical
- ☐ Instream/riparian restoration

Dams
- ☑ Erosion control
- ☐ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☐ Streambanks ☐ Shorelines
  - ☐ Vegetative
  - ☐ Structural
  - ☐ Integrated
  - ☐ Planning & regulatory

Spill and Water Budgets

Channelization
- ☐ Physical & chemical
- ☐ Instream/riparian restoration

Dams
- ☐ Erosion control
- ☐ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☑ Maintain fish passage

Erosion
- ☐ Streambanks ☐ Shorelines
  - ☐ Vegetative
  - ☐ Structural
  - ☐ Integrated
  - ☐ Planning & regulatory

Although often used together, spill and water budgets are independent methods of facilitating downstream fish migration. Spill budgets provide alternative methods for fish passage that are less dangerous than passage through turbines. Spillways are used to allow fish to leave the reservoir by passing over the dam rather than through the turbines. The spillways must be designed to ensure that hydraulic conditions do not induce injury to the passing fish from scraping and abrasion, turbulence, rapid pressure changes, or supersaturation of dissolved gases in water passing through plunge pools (Stone and Webster, 1986).

In the Columbia River basin (Pacific Northwest), the USACE provides spill on a limited basis to pass fish around specific dams to improve survival rates. At key dams, spill is used in special operations to protect hatchery releases or provide better passage conditions until bypass systems are fully developed or, in some cases, improved (van der Borg and Ferguson, 1989). The cost of this alternative depends on the volume of water lost for power production (Mattice, 1990). Analyses of this practice, using a USACE model called FISHPASS, historically has shown that application of spill budgets in the Columbia River basin is consistently the most costly and least efficient method of improving overall downstream migration efficiency (Dodge, 1989).

In 1995 the National Marine Fisheries Service (NMFS) released a draft biological opinion to save Columbia River Basin salmon. The opinion was issued after concluding that current operations of the hydropower system were jeopardizing Columbia Basin salmon. The opinion addresses safer passage for young fish through the dams and modification to a number of hydropower operations and facilities. It calls for using as much water as possible during fish-passage season to improve flow for fish moving through the system. Specifically the draft called for spilling water over dams to increase passage of juvenile salmon via non-turbine routes to at least 80 percent. The USACE now runs the Juvenile Fish Transportation Program in cooperation with NMFS (NOAA, 1995; USACE, 2002b).

Water budgets increase flows through dams during the out-migration of anadromous fish species. They are used to speed smolt migration through reservoirs and dams. Water normally released from the impoundment during the winter period to generate power is instead released in May or June, when it can be sold only as secondary energy. This concept has been used in some regions of the United States, although quantification of the overall benefits is lacking (Dodge, 1989).

The volume of a typical water budget is generally not adequate to sustain minimum desirable flows for fish passage during the entire migration period. The Columbia Basin Fish and Wildlife Authority has proposed replacement of the water budget on the Columbia River system with a minimum flow requirement to prevent problems of inadequate water volume in discharge during low-flow years (Muckleston, 1990).

Spill Prevention and Control Program

Channelization
- ☐ Physical & chemical
- ☐ Instream/riparian restoration

Dams
- ☐ Erosion control
- ☐ Runoff control
- ☑ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☐ Streambanks ☐ Shorelines
  - ☐ Vegetative
  - ☐ Structural
  - ☐ Integrated
  - ☐ Planning & regulatory

Spill procedure information can be posted, and persons trained in spill handling should be onsite or on call at all times. Materials for cleaning up spills can be kept onsite and easily available. Spills should be cleaned up immediately and the contaminated material properly disposed.

In general, a spill prevention, control, and countermeasure (SPCC) plan can include guidance to site personnel on:

- Proper notification when a spill occurs
- Site responsibility with respect to addressing the cleanup of a spill
- Stopping the source of a spill
- Cleaning up a spill
- Proper disposal of materials contaminated by the spill
- Location of spill response equipment programs
- Training program for designated on-site personnel

A periodic spill "fire drill" can be conducted to help train personnel on proper responses to spill events and to keep response actions fresh in the minds of personnel. It is important to maintain an adequate spill and cleaning kit, which could include the following:

- Detergent or soap, hand cleaner, and water
- Activated charcoal, adsorptive clay, vermiculite, kitty litter, sawdust, or other adsorptive materials
- Lime or bleach to neutralize pesticides or other spills in emergency situations
- Tools such as a shovel, broom, and dustpan and containers for disposal
- Proper protective clothing

Spillway Modifications

Channelization
- ☐ Physical & chemical
- ☐ Instream/riparian restoration

Dams
- ☐ Erosion control
- ☐ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☑ Improve tailwater oxygen
- ☑ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☐ Streambanks ☐ Shorelines
  - ☐ Vegetative
  - ☐ Structural
  - ☐ Integrated
  - ☐ Planning & regulatory

Spill at hydroelectric dams is routinely required during periods of high runoff when the river discharge exceeds what can be passed through the powerhouse turbines. In some cases, spill has been associated with gas supersaturation problems. The USACE has proposed several practices for solving the gas supersaturation problem. These include (1) passing more headwater storage through turbines, installing new fish bypass structures, and installing additional power units to reduce the need for spill; (2) incorporating "flip-lip" deflectors in spillway-stilling basins, transferring power generation to high-dissolved-gas-producing dams, and altering spill patterns at individual dams to minimize nitrogen mass entrainment; and (3) collecting and transporting juvenile salmonids around affected river reaches. Only a few of these practices have been implemented (Tanovan, 1987). As more attention is being paid to maintaining minimum flows in rivers for fish passage and spawning, mangers are balancing the need for spills with the potential impacts of gas supersaturation (Anderson, 2004; Anderson, 1995; DeHart, 2003; USFWS, 2001; Van Holmes and Anderson, 2004). For example, the U.S. Fish and Wildlife Service has routinely monitored gas supersaturation in reaches below Bonneville Dam (Columbia River, Oregon) to protect migrating salmon, many of which are endangered species (USFWS, 2001).

Surface Roughening

Roughening is the scarifying of a bare sloped soil surface with horizontal grooves or benches running across the slope. Roughening aids the establishment of vegetative cover, improves water infiltration, and decreases runoff velocity.

Additional Resource

- Tennessee Department of Environment and Conservation. 2002. *Erosion and Sediment Control Handbook: Surface Roughening*. Tennessee Department of Environment and Conservation, Nashville, TN. http://www.state.tn.us/environment/wpc/sed_ero_controlhandbook/sr.pdf.

Channelization
- ☐ Physical & chemical
- ☐ Instream/riparian restoration

Dams
- ☑ Erosion control
- ☐ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☐ Streambanks ☐ Shorelines
  - ☐ Vegetative
  - ☐ Structural
  - ☐ Integrated
  - ☐ Planning & regulatory

Toe Protection

A number of qualitative advantages are to be gained by providing toe protection for vertical bulkheads. Toe protection usually takes the form of a stone apron installed at the base of the vertical structure to reduce wave reflection and scour of bottom sediments during storms. The installation of rubble toe protection should include filter cloth and perhaps a bedding of small stone to reduce the possibility of rupture of the filter cloth. Ideally, the rubble should extend to an elevation such that waves will break on the rubble during storms.

Channelization
- ☑ Physical & chemical
- ☑ Instream/riparian restoration

Dams
- ☐ Erosion control
- ☐ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☑ Streambanks ☑ Shorelines
  - ☐ Vegetative
  - ☑ Structural
  - ☐ Integrated
  - ☐ Planning & regulatory

Additional Resources

- Massachusetts DEP. 2006. *Massachusetts Nonpoint Source Pollution Management Manual: Stone Toe Protection.* Massachusetts Department of Environmental Protection, Boston, MA. http://projects.geosyntec.com/NPSManual/Fact%20Sheets/Stone%20Toe%20Protection.pdf.

- Wisconsin Department of Natural Resources. 2006. *Vegetated Armoring Erosion Control Methods.* http://dnr.wi.gov/org/water/fhp/waterway/erosioncontrol-vegetated.html.

Training—ESC

Channelization
- ☐ Physical & chemical
- ☐ Instream/riparian restoration

Dams
- ☑ Erosion control
- ☐ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☐ Streambanks ☐ Shorelines
  - ☐ Vegetative
  - ☐ Structural
  - ☐ Integrated
  - ☐ Planning & regulatory

Provide education and training opportunities for designers, developers, and contractors. One of the most important factors determining whether ESCs will be properly installed and maintained on a construction site is the knowledge and experience of the contractor and onsite personnel. Many communities require certification for key on-site employees who are responsible for implementing the ESC plan. Certification can be accomplished through municipally sponsored training courses; more informally, municipalities can hold mandatory preconstruction or prewintering meetings and conduct regular and final inspection visits to transfer information to contractors (Brown and Caraco, 1997). Information that can be covered in training courses and meetings includes the importance of ESC for water quality protection; developing and implementing ESC plans; the importance of proper installation, regular inspection, and diligent maintenance of ESC practices; and record keeping for inspections and maintenance activities.

Transference of Fish Runs

Channelization
- ☐ Physical & chemical
- ☐ Instream/riparian restoration

Dams
- ☐ Erosion control
- ☐ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☑ Maintain fish passage

Erosion
- ☐ Streambanks ☐ Shorelines
  - ☐ Vegetative
  - ☐ Structural
  - ☐ Integrated
  - ☐ Planning & regulatory

Transference of fish runs involves inducing anadromous fish species to use different spawning grounds in the vicinity of an impoundment. To implement this practice, the nature and extent of the spawning grounds that were lost due to the blockage in the river need to be assessed, and suitable alternative spawning grounds need to be identified. The feasibility of successfully collecting the fish and transporting them to alternative tributaries also needs to be carefully determined.

One strategy for mitigating the impacts of diversions on fisheries is the use of ephemeral streams as conveyance channels for all or a portion of the diverted water. If flow releases are controlled and uninterrupted, a perennial stream is created, along with new instream and riparian habitat. However, the biota that had been adapted to preexisting conditions in the ephemeral stream will probably be eliminated.

Tree Armoring, Fencing, and Retaining Walls or Tree Wells

Tree armoring protects tree trunks and natural vegetation from being damaged by construction equipment. Fencing can also protect tree trunks, but it should be placed at the tree's drip line so that construction equipment is kept away from the tree. A tree's drip line is the minimum area around the tree in which the tree's root system should not be disturbed by cut, fill, or soil compaction caused by heavy equipment. When cutting or filling must be done near a tree, a retaining wall or tree well can be used to minimize the cutting of the tree's roots or the quantity of fill placed over the tree's roots. It is recommended that cutting or filling be done only when absolutely necessary. Fill placement over the tree root flare or within the dripline will eventually kill the tree.

Channelization
- ☐ Physical & chemical
- ☐ Instream/riparian restoration

Dams
- ☑ Erosion control
- ☐ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☐ Streambanks ☐ Shorelines
  - ☐ Vegetative
  - ☐ Structural
  - ☐ Integrated
  - ☐ Planning & regulatory

Tree Revetments

Channelization
- ☑ Physical & chemical
- ☑ Instream/riparian restoration

Dams
- ☑ Erosion control
- ☐ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☑ Streambanks ☑ Shorelines
  - ☑ Vegetative
  - ☐ Structural
  - ☐ Integrated
  - ☐ Planning & regulatory

Tree revetments consist of a row of interconnected trees anchored to the toe of the streambank or to the upper streambank (Figures 7.28 and 7.29). This serves to reduce flow velocities along eroding streambanks, trap sediment, and provide a substrate for plant establishment and erosion control. This design relies on the installation of an adequate anchoring system and is best suited for streambank heights under 12 feet and bankfull velocities under 6 feet per second. In addition, this structure should occupy no more than 15 percent of the channel at bankfull. Toe protection is needed to accompany this design if scour is anticipated and upper bank soil bioengineering techniques are recommended to ensure streamside regeneration. This design allows for the use of local materials if they are readily available. Decay resistant species are recommended for the logs to extend the life of the structure and thus the ability of vegetation to become established. Due to decomposition, these structures have a limited life and might require periodic replacement. It is considered beneficial that decomposition of the logs over time allows the streambank to return to a natural state with protection provided by mature streambank vegetation. There is a potential for the logs to dislodge, and these structures should not be located upstream of bridges or other structures sensitive to damage. Tree revetments are susceptible to damage by ice (FISRWG, 1998). Installation guidelines are available from the USDA-FS Soil Bioengineering Guide (USDA-FS, 2002).

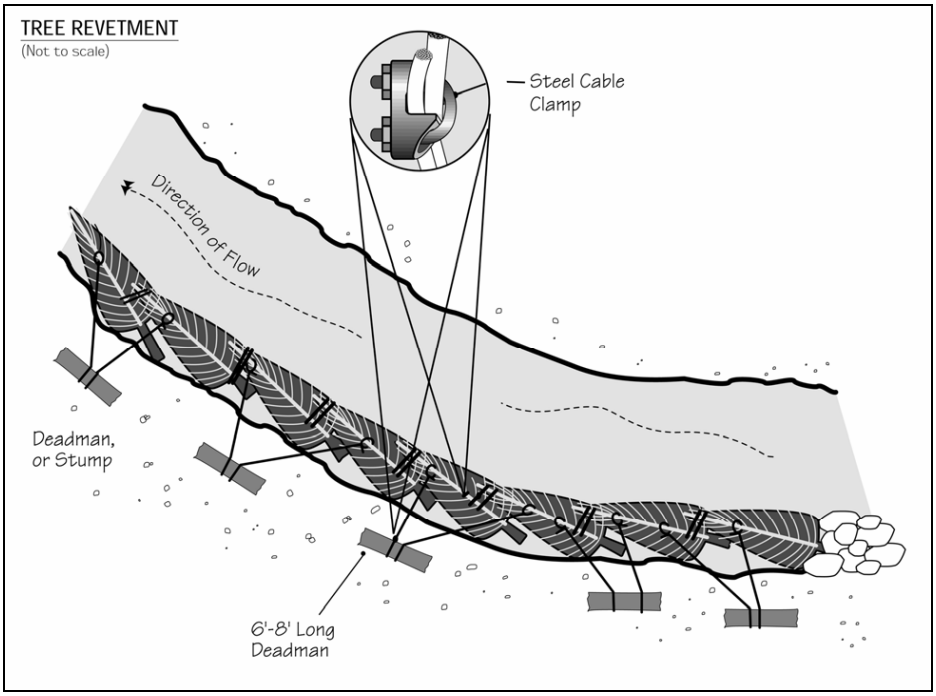

Figure 7.28 Tree Revetment (USDA-FS, 2002)

Additional Resources

- Alaska Department of Fish and Game. 2005. *Spruce Tree Revetment.* http://www.sf.adfg.state.ak.us/sarr/restoration/techniques/images/csbs_strevet.pdf.

- FISRWG. 1998. *Stream Corridor Restoration: Principles, Processes, and Practices*. Federal Interagency Stream Restoration Working Group. http://www.nrcs.usda.gov/technical/stream_restoration/PDFFILES/APPENDIX.pdf.

- Goard, D. 2006. *Riparian Forest Best Management Practices: Tree Revetments.* Kansas State University, Manhattan, KS. http://www.oznet.ksu.edu/library/forst2/MF2750.pdf.

- Gough, S. 2004. *Tree Revetments for Streambank Revitalization.* Missouri Department of Conservation, Fisheries Division, Jefferson City, MO. http://mdc.mo.gov/fish/streams/revetmen/.

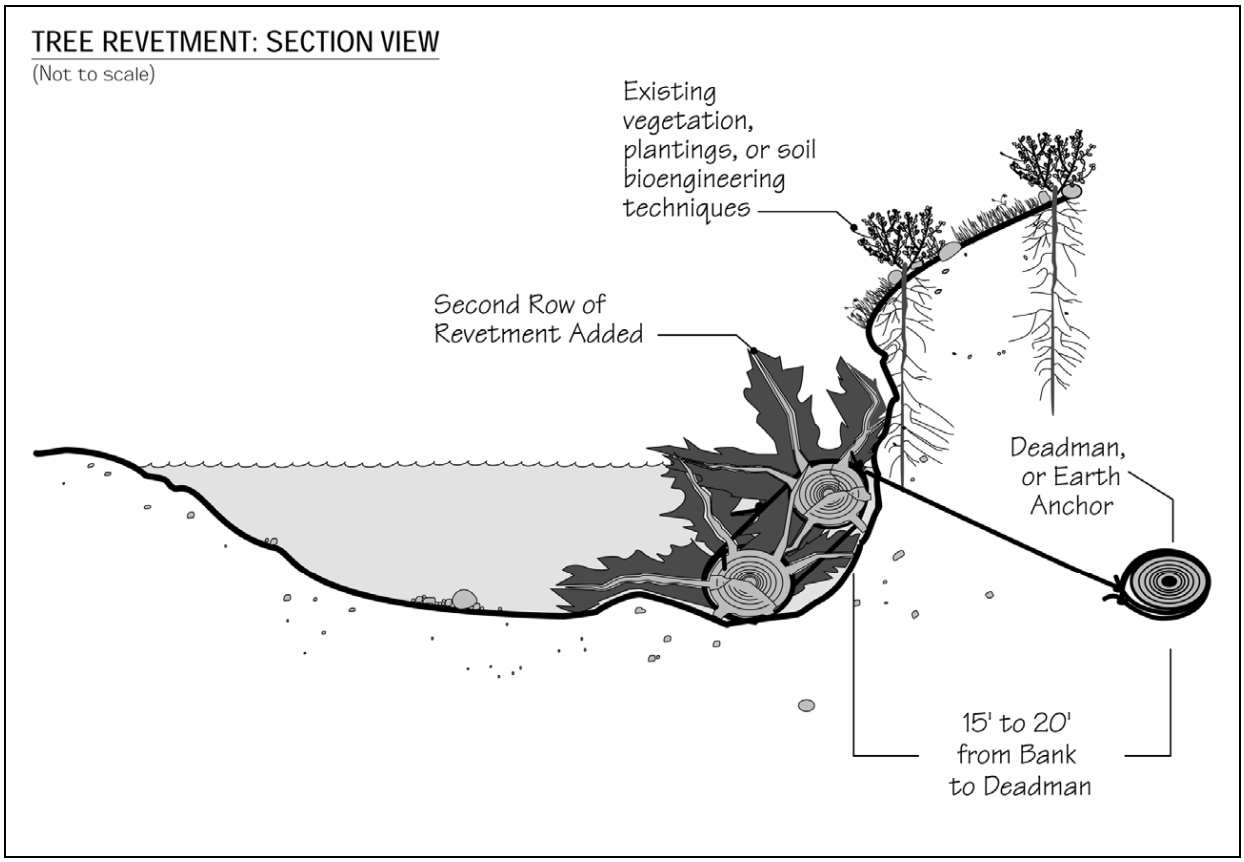

Figure 7.29 Tree Revetment: Section View (USDA-FS, 2002)

Turbine Operation

Implementation of changes in the turbine start-up procedures can also enlarge the zone of withdrawal to include more of the epilimnetic waters in the downstream releases. Monitoring of the releases at the Walter F. George lock and dam (Chattahoochee River, Georgia), showed levels of DO declined sharply at the start-up of hydropower production. The severity and duration of the DO drop were found to be reduced by starting up all the generator units within a minute of each other (Findley and Day, 1987).

Channelization
- ☐ Physical & chemical
- ☐ Instream/riparian restoration

Dams
- ☐ Erosion control
- ☐ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☑ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☐ Streambanks ☐ Shorelines
  - ☐ Vegetative
  - ☐ Structural
  - ☐ Integrated
  - ☐ Planning & regulatory

Turbine Venting

Channelization
- ☐ Physical & chemical
- ☐ Instream/riparian restoration

Dams
- ☐ Erosion control
- ☐ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☑ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☐ Streambanks ☐ Shorelines
  - ☐ Vegetative
  - ☐ Structural
  - ☐ Integrated
  - ☐ Planning & regulatory

Turbine venting is the practice of injecting air into water as it passes through a turbine. If vents are provided inside the turbine chamber, the turbine will aspirate air from the atmosphere and mix it with water passing through the turbine as part of its normal operation. In early designs, the turbine was vented through existing openings, such as the draft tube opening or the vacuum breaker valve in the turbine assembly. Air forced by compressors into the draft tube opening enriched reservoir waters with little detectable DO to concentrations of 3 to 4 mg/L. Overriding the automatic closure of the vacuum breaker valve (at high turbine discharges) increased DO by only 2 mg/L (Harshbarger, 1987).

Turbine venting uses the low-pressure region just below the turbine wheel to aspirate air into the discharges (Wilhelms, 1984). Autoventing turbines are constructed with hub baffles, or deflector plates placed on the turbine hub upstream of the vent holes to enhance the low-pressure zone in the vicinity of the vent and thereby increase the amount of air aspirated through the venting system. Turbine efficiency relates to the amount of energy output from a turbine per unit of water passing through the turbine. Efficiency decreases as less power is produced for the same volume of water. In systems where the water is aerated before passing through the turbine, part of the water volume is displaced by the air, thus leading to decreased efficiency. Hub baffles have also been added to autoventing turbines at the Norris Dam (Clinch River, Tennessee) to further improve the DO levels in the turbine releases (Jones and March, 1991).

Developments in autoventing turbine technology show that it may be possible to aspirate air with no resulting decrease in turbine efficiency. In one test of an autoventing turbine at the Norris Dam, the turbine efficiency increased by 1.8 percent (March et al., 1991; Waldrop, 1992). Technologies like autoventing turbines are very site-specific and outcomes will vary considerably.

Vegetated Buffers

Channelization
- ☑ Physical & chemical
- ☑ Instream/riparian restoration

Dams
- ☑ Erosion control
- ☑ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☑ Streambanks ☑ Shorelines
  - ☑ Vegetative
  - ☐ Structural
  - ☐ Integrated
  - ☐ Planning & regulatory

Like filter strips, vegetated buffers provide a physical separation between a construction site and a waterbody. The difference between a filter strip and a vegetated buffer area is that a filter strip is an engineered device, whereas a buffer is a naturally occurring filter system. Vegetated buffers remove nutrients and other pollutants from runoff, trap sediments, and shade the waterbody to optimize light and temperature conditions for aquatic plants and animals (Welsch, n.d.). Preservation of vegetation for a buffer can be planned before any site-disturbing activities begin so as to minimize the impact of construction activities on existing vegetation. Trees can be clearly marked at the dripline to preserve them and to protect them from ground disturbances around the base of the tree.

Proper maintenance of buffer vegetation is important. Maintenance requirements depend on the plant species chosen, soil types, and climatic conditions. Maintenance activities typically include fertilizing, liming, irrigating, pruning, controlling weeds and pests, and repairing protective markers (e.g., fluorescent fences and flags).

Additional Resources

- CASQA. 2003. *California Stormwater BMP Construction Handbook: Vegetated Buffer Strips.* California Stormwater Quality Association, Sacramento, CA. http://www.cabmphandbooks.com/Documents/Development/TC-31.pdf.

- Ohio DNR. No date. *Ohio Stream Management Guide: Forested Buffer Strips.* Ohio Department of Natural Resources. http://www.ohiodnr.com/water/pubs/fs_st/stfs13.htm.

- River Alliance of Wisconsin. No date. *Benefits of Vegetated Buffers.* River Alliance of Wisconsin, Madison, WI. http://www.wisconsinrivers.org/documents/policy/Fact%20Sheet%20-%20Benefits%20of%20Vegetated%20Buffers.pdf.

- Tennessee Department of Environment and Conservation. 2002. *Erosion and Sediment Control Handbook: Vegetative Practices*. Tennessee Department of Environment and Conservation, Nashville, TN. http://state.tn.us/environment/wpc/sed_ero_controlhandbook/2.%20Vegetative%20Practices.pdf.

Vegetated Filter Strips

Channelization
- ☐ Physical & chemical
- ☐ Instream/riparian restoration

Dams
- ☑ Erosion control
- ☑ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☐ Streambanks ☐ Shorelines
  - ☐ Vegetative
  - ☐ Structural
  - ☐ Integrated
  - ☐ Planning & regulatory

Vegetated filter strips are low-gradient vegetated areas that filter overland sheet flow. Runoff must be evenly distributed across the filter strip. Channelized flows decrease the effectiveness of filter strips. Level spreading devices are often used to distribute the runoff evenly across the strip (Dillaha et al., 1989).

Vegetated filter strips should have relatively low slopes and adequate length to provide optimal sediment control and should be planted with erosion-resistant plant species. The main factors that influence the removal efficiency are the vegetation type, soil infiltration rate, and flow depth and travel time. These factors are dependent on the contributing drainage area, slope of strip, degree and type of vegetative cover, and strip length. Maintenance requirements for vegetated filter strips include sediment removal and inspections to ensure that dense, vigorous vegetation is established and concentrated flows do not occur. For more information on vegetated filter strips, refer to EPA's *National Management Measures to Protect and Restore Wetlands and Riparian Areas for the Abatement of Nonpoint Source Pollution* (USEPA, 2005b).

Additional Resources

- ISU. 2006. *Iowa Construction Site Erosion Control Manual: Vegetative Filter Strip.* Iowa State University. http://www.ctre.iastate.edu/erosion/manuals/construction/2.8_veg_filter_strip.pdf.

- Leeds, R., L.C. Brown, M.R. Sulc, and L. VanLieshout. No date. *Vegetative Filter Strips: Application, Installation and Maintenance*. The Ohio State University, Food, Agriculture and Biological Engineering, Columbus, OH. http://ohioline.osu.edu/aex-fact/0467.html.

- USDA. 2003. *Grass Filter Strips.* U.S. Department of Agriculture, Natural Resources Conservation Service. http://www.oh.nrcs.usda.gov/programs/Lake_Erie_Buffer/filter_strips.html.

Vegetated Gabions

Channelization
- ☑ Physical & chemical
- ☑ Instream/riparian restoration

Dams
- ☑ Erosion control
- ☐ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☑ Streambanks ☑ Shorelines
  - ☐ Vegetative
  - ☐ Structural
  - ☑ Integrated
  - ☐ Planning & regulatory

Vegetated gabions (Figure 7.30) start with wire-mesh, rectangular baskets filled with small to medium rock and soil. The baskets are then laced together to form a structural toe or sidewall. Live branches (0.5 to 1 inch in diameter) are then placed on each consecutive layer between the rock filled baskets to take root, join together the structure, and bind it to the slope. This method is effective for protecting steep slopes where scouring or undercutting is occurring. However, this method is not appropriate in streams with heavy bed load or where severe ice damage occurs. This method provides moderate structural support and should be placed at the base of a slope to stabilize the slope and reduce slope steepness. A stable foundation is required for the installation of these structures. When the rock size needed is not locally available, this design is effective because smaller rocks can be used. A limiting factor of this method is that it is expensive to install and to replace. These structures are relatively expensive to construct and frequently require costly repairs. This method should be combined with other soil bioengineering techniques, particularly revegetation efforts, to achieve a comprehensive streambank restoration design (FISRWG, 1998). There is often opposition to these structures based on their inability to blend in with natural settings and their general lack of aesthetically pleasing qualities (Gore, 1985).

Installation guidelines are available from the USDA NRCS *Engineering Field Handbook, Chapter 18* (USDA-NRCS, 1992). Under EMRRP, the USACE has presented research on vegetated gabions in a technical note (*Gabions for Streambank Erosion Control*).[13]

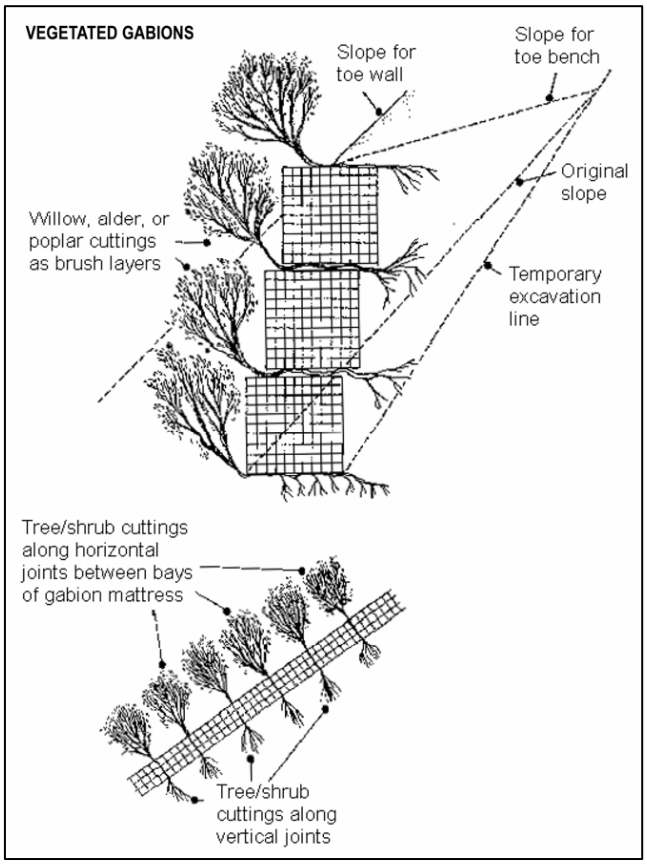

Figure 7.30 Vegetated Gabion (Allen and Leech, 1997)

[13] http://el.erdc.usace.army.mil/elpubs/pdf/sr22.pdf

Additional Resources

- FISRWG. 1998. *Stream Corridor Restoration: Principles, Processes, and Practices*. Federal Interagency Stream Restoration Working Group. http://www.nrcs.usda.gov/technical/stream_restoration/PDFFILES/APPENDIX.pdf.

- ISU. 2006. *Iowa Construction Site Erosion Control Manual: Gabion.* Iowa State University. http://www.ctre.iastate.edu/erosion/manuals/construction/3.8_gabion.pdf.

- Mississippi State University, Center for Sustainable Design. 1999. *Water Related Best Management Practices in the Landscape: Vegetated Rock Gabions/Gabions.* Created for United States Department of Agriculture, Natural Resource Conservation Service, Watershed Science Institute. http://www.abe.msstate.edu/csd/NRCS-BMPs/pdf/streams/bank/veg_rockgabions.pdf.

- MMG Civil Engineering Systems, Ltd. 2001. *Vegetated Gabions*. MMG Civil Engineering Systems, Ltd., St. Germans, Kings Lynn, Norfolk, England. http://www.verdantsolutions.ltd.uk/acrobat/vegsod.pdf.

- Ohio DNR. No date. *Ohio Stream Management Guide: Gabion Revetments.* Ohio Department of Natural Resources. http://www.ohiodnr.com/water/pubs/fs_st/stfs15.htm.

- Tennessee Department of Environment and Conservation. 2002. *Erosion and Sediment Control Handbook: Gabion*. Tennessee Department of Environment and Conservation, Nashville, TN. http://state.tn.us/environment/wpc/sed_ero_controlhandbook/ga.pdf.

Vegetated Geogrids

Channelization
- ☑ Physical & chemical
- ☑ Instream/riparian restoration

Dams
- ☑ Erosion control
- ☐ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☑ Streambanks ☑ Shorelines
  - ☐ Vegetative
  - ☐ Structural
  - ☑ Integrated
  - ☐ Planning & regulatory

Vegetated geogrids consist of layers of live branch cuttings and compacted soil with natural or synthetic geotextile materials wrapped around each soil layer (Figure 7.31). This serves to rebuild and vegetate eroded streambanks, particularly on outside bends where erosion can be a problem. This system is designed to capture sediment providing a substrate for plant establishment and if properly designed and installed, these systems help to quickly establish riparian vegetation. Its benefits are similar to those of brush layering (e.g., dries excessively wet sites, reinforces soil as roots develop, which adds significant resistance to sliding or shear displacement). Due to the strength of this design and the higher initial tolerance to flow velocity, these systems can be installed on a 1:1 or steeper streambank or lakeshore. Limitations of this design include the complexity involved with constructing this system and the fairly high expense (FISRWG, 1998). When constructing this type of system, use live branch cuttings that are brushy and root readily. Also use cuttings that are 0.5 to 2 inches in diameter and 4 to 6 feet long. This type of system requires biodegradable erosion control fabric. Installation guidelines are available from the USDA-FS Soil Bioengineering Guide (USDA-FS, 2002).

Additional Resources

- FISRWG. 1998. *Stream Corridor Restoration: Principles, Processes, and Practices*. Federal Interagency Stream Restoration Working Group. http://www.nrcs.usda.gov/technical/stream_restoration/PDFFILES/APPENDIX.pdf.

- Massachusetts DEP. 2006. *Massachusetts Nonpoint Source Pollution Management Manual: Vegetated Geogrids.* Massachusetts Department of Environmental Protection, Boston, MA. http://projects.geosyntec.com/NPSManual/Fact%20Sheets/Vegetated%20Geogrids.pdf.

- ISU. 2006. *How to Control Streambank Erosion: Vegetated Geogrids.* Iowa State University. http://www.ctre.iastate.edu/erosion/manuals/streambank/vegetated_geogrids.pdf.

- Mississippi State University, Center for Sustainable Design. 1999. *Water Related Best Management Practices in the Landscape: Vegetated Geogrids.* Created for United States Department of Agriculture, Natural Resource Conservation Service, Watershed Science Institute. http://www.abe.msstate.edu/csd/NRCS-BMPs/pdf/streams/bank/vegegeogrids.pdf.

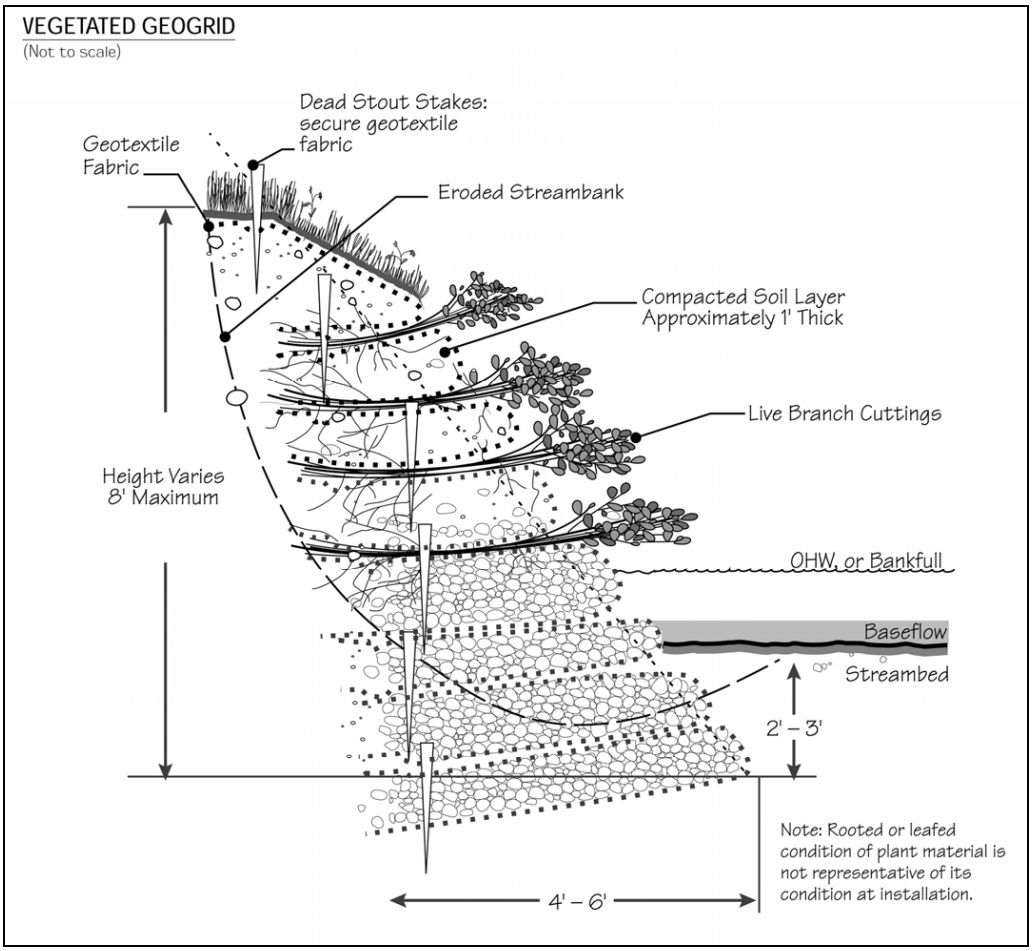

Figure 7.31 Vegetated Geogrid (USDA-FS, 2002)

Vegetated Reinforced Soil Slope (VRSS)

Channelization
- ☑ Physical & chemical
- ☑ Instream/riparian restoration

Dams
- ☑ Erosion control
- ☐ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☑ Streambanks ☑ Shorelines
  - ☐ Vegetative
  - ☐ Structural
  - ☑ Integrated
  - ☐ Planning & regulatory

The vegetated reinforced soil slope (VRSS) soil system (Figures 7.32 and 7.33) is an earthen structure constructed from living, rootable, live-cut, woody plant material branches, bare root, tubling or container plant stock, along with rock, geosynthetics, geogrids, and/or geocomposites. The VRSS system is useful for immediately repairing or preventing deeper failures, providing a structurally sound system with soil reinforcement, drainage, and erosion control (typically on steepened slope sites with limited space). Living cut branches and plants grow and perform additional soil reinforcement via the roots and surface protection via the top growth (Sotir and Fischenich, 2003).

Live vegetation is typically installed from just above baseflow elevation and up the face of the reconstructed streambank, acting to protect the bank through immediate soil reinforcement and confinement, drainage, and, in the toe area, with rock. The system extends below the depth of scour, typically with rock, which improves infiltration and supports the riparian zone. Internal systems (e.g., rock, live cut branches) can be configured to act as drains that redirect or collect internal bank seepage and transport water to the stream via a rock toe (Sotir and Fischenich, 2003).

Figure 7.32 VRSS Structure After Construction
(Sotir and Fischenich, 2003)

Figure 7.33 Established VRSS Structure (Sotir and Fischenich, 2003)

Plants may be selected to provide color, texture, and other attributes to add a natural landscape appearance. Examples of plants include dogwood, willow, hybiscus, and *Viburnum* spp. Check with your local NRCS office to make sure these are appropriate for the location. If a compound channel cross section is desirable near or just below the baseflow elevation, a step-back terrace may be incorporated to offer an enhanced riparian zone where emergent aquatic plants may invade over time. Although the total mass uptake may be small, they assimilate contaminants within the water column. Aquatic wetland plants that may be installed adjacent to the stream include blueflag, monkey flower, and pickerelweed. Again, check with your local NRCS office to ensure these are appropriate. VRSS systems can be constructed on slopes ranging from 1V on 2H (1:2) to 1:0.5. When constructed in step or terrace fashion, they improve pollutant control by intercepting sediment and attached pollutants during overbank flows (Sotir and Fischenich, 2003). Additional information about VRSS systems is available from USACE's *Vegetated Reinforced Soil Slope Streambank Erosion Control.*[14]

[14] http://el.erdc.usace.army.mil/elpubs/pdf/sr30.pdf

Water Conveyances

Channelization
- ☐ Physical & chemical
- ☐ Instream/riparian restoration

Dams
- ☐ Erosion control
- ☐ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☑ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☐ Streambanks ☐ Shorelines
  - ☐ Vegetative
  - ☐ Structural
  - ☐ Integrated
  - ☐ Planning & regulatory

These are the open or closed channel, conduit, or drop structure used to convey water from a reservoir. The USACE has studied the performance of spillways and overflow weirs at its facilities to determine the importance of these structures in improving DO levels. For example, data have been analyzed for the test spill done in 1999 at Canyon Ferry Dam in Montana, which found that allowing a portion of the releases to go over the spillways resulted in a significant increase in DO in the river downstream of the dam. Initially the use of spillways appeared to be a viable solution to the problem of low dissolved oxygen in the river below the dam. However, there was a problem with nitrogen supersaturation.

The operation of some types of hydraulic structures has been linked to problems of the supersaturation. An unexpected fish kill occurred in spring 1978 due to supersaturation of nitrogen gas in the Lake of the Ozarks (Missouri) within 5 miles of Truman Dam, caused by water plunging over the spillway and entraining air. The vertical drop between the spillway crest and the tailwaters was only 5 feet. The maximum total gas saturation was 143 percent, which is well above desired saturation levels. In this case, the spillway was modified by cutting a notch to prevent water from plunging directly into the stilling basin (ASCE, 1986).

Wildflower Cover

Channelization
- ☐ Physical & chemical
- ☐ Instream/riparian restoration

Dams
- ☑ Erosion control
- ☐ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☐ Streambanks ☐ Shorelines
  - ☐ Vegetative
  - ☐ Structural
  - ☐ Integrated
  - ☐ Planning & regulatory

Because of the hardy, drought-resistant nature of wildflowers, they may be more beneficial as an erosion control practice than turf grass. Though not as dense as turfgrass, wildflower thatches and associated grasses are expected to be as effective in erosion control and contaminant absorption. An additional benefit of wildflower thatches is that they provide habitat for wildlife, including insects and small mammals. Because thatches of wildflowers do not need fertilizers, pesticides, or herbicides and watering is minimal, implementation of this practice may result in cost savings.

A wildflower stand requires several years to become established, but maintenance requirements are minimal once established. Prices vary greatly, from less than $15 (Stock Seed Farms, n.d.) to $40 (Albright Seed Company, 2002) a pound, for wildflower seed mixes. The amount of wildflower seeds applied depends on the desired coverage of wildflowers. However, Stock Seed Farms recommends that one pound of seed can cover 3,500 ft^2 (Stock Seed Farms, n.d.). Keep in mind that species selection should focus on those wildflowers and grasses native to the given area or appropriate to the site.

Wind Erosion Controls

Wind erosion controls limit the movement of dust from disturbed soil surfaces and include many different practices. Wind barriers block air currents and are effective in controlling soil blowing. Many different materials can be used as wind barriers, including solid board fences, snow fences, and bales of hay. Sprinkling moistens the soil surface with water and must be repeated as needed to be effective for preventing wind erosion (Delaware DNREC, 2003); however, applications must be monitored to prevent excessive runoff and erosion.

Channelization
- ☐ Physical & chemical
- ☐ Instream/riparian restoration

Dams
- ☑ Erosion control
- ☐ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☐ Streambanks ☐ Shorelines
  - ☐ Vegetative
  - ☐ Structural
  - ☐ Integrated
  - ☐ Planning & regulatory

Wing Deflectors

Channelization
- ☑ Physical & chemical
- ☑ Instream/riparian restoration

Dams
- ☐ Erosion control
- ☐ Runoff control
- ☐ Chemical/pollutant control
- ☐ Watershed protection
- ☐ Aerate reservoir water
- ☐ Improve tailwater oxygen
- ☐ Restore/maintain habitat
- ☐ Maintain fish passage

Erosion
- ☑ Streambanks ☑ Shorelines
  - ☐ Vegetative
  - ☑ Structural
  - ☐ Integrated
  - ☐ Planning & regulatory

Wing deflectors are structures that protrude from either streambank but do not extend entirely across a channel. The structures are designed to deflect flows away from the bank, and create scour pools by constricting the channel and accelerating flow. The structures can be installed in series on alternative streambanks to produce a meandering thalweg and stream diversity. The most common design is a rock and rock-filled log crib deflector structure. The design bases the size of the structure on anticipated scour. These structures need to be installed far enough downstream from riffle areas to avoid backwater effects that could drown out or damage the riffle. This design should be employed in streams with low physical habitat diversity, particularly channels that lack pool habitats. Construction on a sand bed stream may be susceptible to failure and should be constructed with the use a filter layer or geotextile fabric beneath the wing deflector structure (FISRWG, 1998).

Additional Resources

- FISRWG. 1998. *Stream Corridor Restoration: Principles, Processes, and Practices*. Federal Interagency Stream Restoration Working Group. http://www.nrcs.usda.gov/technical/stream_restoration/PDFFILES/APPENDIX.pdf.

- Massachusetts DEP. 2006. *Massachusetts Nonpoint Source Pollution Management Manual: Wing Deflectors.* Massachusetts Department of Environmental Protection, Boston, MA. http://projects.geosyntec.com/NPSManual/Fact%20Sheets/Wing%20Deflectors.pdf.

- Mississippi State University, Center for Sustainable Design. 1999. *Water Related Best Management Practices in the Landscape: Single Wing Deflector.* Created for United States Department of Agriculture, Natural Resource Conservation Service, Watershed Science Institute. http://www.abe.msstate.edu/csd/NRCS-BMPs/pdf/streams/bank/singlewing.pdf.

- Mississippi State University, Center for Sustainable Design. 1999. *Water Related Best Management Practices in the Landscape: Double Wing Deflector.* Created for United States Department of Agriculture, Natural Resource Conservation Service, Watershed Science Institute. http://abe.msstate.edu/csd/NRCS-BMPs/pdf/streams/bank/doublewing.pdf.

- Ohio DNR. No date. *Ohio Stream Management Guide: Deflectors.* Ohio Department of Natural Resources. http://www.ohiodnr.com/water/pubs/fs_st/stfs19.pdf.

- SMRC. No date. *Stream Restoration: Flow Deflection/Concentration Practices.* The Stormwater Manager's Resource Center. http://www.stormwatercenter.net/Assorted%20Fact%20Sheets/Restoration/flow_deflection.htm.

Chapter 8: Modeling Information

Physical and chemical effects of hydraulic and hydrologic changes to streams, rivers, or other surface water systems can often be estimated with models and past experience (expert judgment). Several different models are available that can simulate many of the complex physical, chemical, and biological interactions that occur when hydraulic changes are imposed on surface water systems. Additionally, models can sometimes be used to determine a combination of practices to mitigate the unavoidable effects that occur even when a project is properly planned. Models, however, cannot be used independently of expert judgment gained through past experience. When properly applied models are used in conjunction with expert judgment, the effects of hydromodification activities (both potential and existing projects) can be evaluated and many undesirable effects prevented or eliminated. Models combined with expert judgment can also be used to evaluate existing hydromodification activities as part of operation and maintenance programs to identify possible opportunities to reduce or eliminate water quality impacts.

In the U.S. Army Corps of Engineers' (USACE's) report, *Review of Watershed Water Quality Models*[1] (Deliman et al., 1999), the authors compare and evaluate existing hydrologic and watershed water quality models, make recommendations for base model(s) for predicting nonpoint source (NPS) pollution, and identify areas for model improvement. The authors review commonly used and well validated models used in urban or nonurban settings. Users of the models can use the report to obtain basic model information and to review how well the models simulate NPS pollution and where the authors think improvements could be made. This information might be useful to readers who are trying to select the best model for analyzing how to reduce NPS pollution in their watersheds (Deliman et al., 1999).

Tables 8.1 and 8.2 below provided example of models and assessment approaches that could be used to determine the effects of hydromodification activities.

[1] http://el.erdc.usace.army.mil/elpubs/pdf/trw99-1.pdf

Available Models and Assessment Approaches

Table 8.1 lists some of the models available for studying the effects of channelization and channel modification activities, as well as models to analyze watershed runoff and to assess BMPs and low impact development to reduce impacts (of hydromodification activities.) The table also provides a quick description of each model and the dimension in which it models, as well as source and contact information.

Table 8.1 Models Applicable to Hydromodification Activities

Model	Dimension	Description	Model Resources
Channelization and Channel Modification Models			
BRANCH	1	The Branch-Network Dynamic Flow Model is used to simulate steady state flow in a single open channel reach or throughout a system of branches connected in a dendritic or looped pattern. The model is typically applied to assess flow and transport in upland rivers where flows are highly regulated or backwater effects are evident, or in coastal networks of open channels where flow and transport are governed by the interaction of freshwater inflows, tidal action, and meteorological conditions. (Last updated: 1997)	http://water.usgs.gov/cgi-bin/man_wrdapp?branch
CE-QUAL-RIV1	1	CE-QUAL-RIV1 is a one-dimensional (cross-sectionally averaged) hydrodynamic and water quality model, meaning that the model resolves longitudinal variations in hydraulic and quality characteristics and is applicable where lateral and vertical variations are small. CE-QUAL-RIV1 consists of two parts, a hydrodynamic code (RIV1H) and a water quality code (RIV1Q). The hydrodynamic code is applied first to predict water transport and its results are written to a file, which is then read by the quality model. It can be used to predict one-dimensional hydraulic and water quality variations in streams and rivers with highly unsteady flows, although it can also be used for prediction under steady flow conditions.	http://www.wes.army.mil/el/elmodels/riv1info.html

Model	Dimension	Description	Model Resources
CE-QUAL-W2	2	CE-QUAL-W2 is a two-dimensional, laterally averaged, finite difference hydrodynamic and water quality model for rivers, reservoirs, and estuaries. Because the model assumes lateral homogeneity, it is best suited for relatively long and narrow waterbodies exhibiting longitudinal and vertical water quality gradients. Branched networks can be modeled. The model accommodates variable grid spacing (segment lengths and layer thicknesses) so that greater resolution in the grid can be specified where needed.	http://smig.usgs.gov/cgi-bin/SMIC/model_home_pages/model_home?selection=cequalw2 http://www.ce.pdx.edu/w2
CH3D-SED	1, 2, or 3	The CH3D numerical modeling system can be used to investigate sedimentation on bendways, crossings, and distributaries. Applications address dredging, channel evolution, and channel training structure evaluations.	http://chl.erdc.usace.army.mil/chl.aspx?p=s&a=Software;22
EFDC	1, 2, or 3	The Environmental Fluid Dynamics Code is a single source, three-dimensional, finite-difference modeling system having hydrodynamic, water quality-eutrophication, sediment transport and toxic contaminant transport components linked together.	John Hamrick developed this at the Virginia Institute of Marine Science 1990-1991. Dr. John Hamrick, Tetra Tech, Inc. 10306 Eaton Place, Suite 340 Fairfax, VA 22030
EFM	1	Ecosystem Functions Model (EFM) is a planning tool that analyzes ecosystem response to changes in flow regime. EFM allows environmental planners, biologists, and engineers to determine whether proposed alternatives (e.g., reservoir operations, levee alignments) would maintain, enhance, or diminish ecosystem health. Project teams can use EFM software to visualize existing ecologic conditions, highlight promising restoration sites, and assess and rank alternatives according to the relative enhancement (or decline) of ecosystem aspects. The hydraulic modeling portion of the EFM process is performed by existing independent software, such as HEC-RAS.	http://el.erdc.usace.army.mil/elpubs/pdf/smartnote04-4.pdf

Model	Dimension	Description	Model Resources
FESWMS-2DH	2	FESWMS-2DH is a finite element surface water modeling system for two-dimensional flow in a horizontal plane. The model can simulate steady and unsteady surface water flow and is useful for simulating two-dimensional flow where complicated hydraulic conditions exist (e.g., highway crossings of streams and flood rivers). It can also be applied to many types of steady or unsteady flow problems. (Last updated: 1995)	http://water.usgs.gov/cgi-bin/man_wrdapp?feswms-2dh
HEC-6	1	HEC-6 is a one-dimensional, moveable boundary, open channel flow numeric model designed to simulate and predict changes in river profiles resulting from scour and deposition over moderate time periods, typically years. Latest revision occurred in 1993.	http://www.hec.usace.army.mil/software/legacysoftware/hec6/hec6.htm
HEC-HMS	1	The HEC-HMS model is designed to simulate the precipitation-runoff processes of dendritic watershed systems. It is applicable in a wide range of geographic areas for solving the widest possible range of problems, including large river basin water supply and flood hydrology, and small urban or natural watershed runoff. Hydrographs produced by the program are used directly or in conjunction with other software for studies of water availability, urban drainage, flow forecasting, future urbanization impact, reservoir spillway design, flood damage reduction, floodplain regulation, and systems operation.	http://www.hec.usace.army.mil/software/hec-hms/index.html http://el.erdc.usace.army.mil/elpubs/pdf/smartnote04-3.pdf

Model	Dimension	Description	Model Resources
HEC-RAS	1	HEC-RAS is an integrated system of software, designed for interactive use in a multi-tasking, multi-user network environment. The system is comprised of a graphical interface (GUI), separate hydraulic analysis components, data storage and management capabilities, graphics and reporting facilities. The model performs one-dimensional steady flow, unsteady flow, and sediment transport calculations. The key element is that all three components will use a common geometric data representation and common geometric and hydraulic computation routines. In addition to the three hydraulic analysis components, the system contains several hydraulic design features that can be invoked once basic water surface profiles are computed. The HEC-RAS modeling system was developed as a part of the Hydrologic Engineering Center's "Next Generation" (NexGen) of hydrologic engineering software. The NexGen project encompasses several aspects of hydrologic engineering, including: rainfall-runoff analysis; river hydraulics; reservoir system simulation; flood damage analysis; and real-time river forecasting for reservoir operations.	http://www.hec.usace.army.mil/software/hec-ras
HIVEL2D	1, 2	HIVEL2D is a free-surface, depth averaged model designed specifically to simulate flow in typical high-velocity channels.	http://chl.erdc.usace.army.mil/CHL.aspx?p=s&a=Software;6
RiverWare™	1	RiverWare™ is a reservoir and river modeling software decision support tool. With RiverWare™, users can model the topology, physical processes and operating policies of river and reservoir systems, and make better decisions about how to operate these systems by understanding and evaluating the trade-offs among the various management objectives. Water management professionals can improve their management of river and reservoir systems by using the software. The Bureau of Reclamation, the Tennessee Valley Authority, and the USACE sponsor ongoing RiverWare™ research and development.	http://cadswes.colorado.edu/riverware

Model	Dimension	Description	Model Resources
SAM	1	The model calculates the width, depth, slope and n-values for stable channels in alluvial material. SAM can be used to evaluate erosion, entrainment, transportation, and deposition in alluvial streams. Channel stability can be evaluated, and the evaluation used to determine the cost of maintaining a constructed project. The model is currently being improved and enhanced at WES.	http://chl.erdc.usace.army.mil/CHL.aspx?p=s&a=Software;2
SIAM	N/A	SIAM is a model designed to simulate the movement of sediment through a drainage network from source to outlet. It allows for evaluation of numerous sediment management alternatives relatively quickly. The model provides an intermediate level of analysis more quantitative than a conventional geomorphic evaluation, but less specific than a numerical, mobile-boundary simulation. SIAM is to be incorporated into a future release of HEC-RAS.	http://www.usbr.gov/pmts/sediment/model/srhsiam/index.html http://www.wes.army.mil/rsm/pubs/pdfs/RSM-2-WS04.pdf
SMS (RMA2 and RMA4)	1, 2	The Surface-Water Modeling System is a generalized numerical modeling system for open-channel flows, sedimentation, and constituent transport.	http://chl.erdc.usace.army.mil/CHL.aspx?p=s&a=Software;4
TABS-MD (RMA2, RMA4, RMA10, SED2D)	1, 2, or 3	The multi-dimensional numerical modeling system is a collection of generalized computer programs and utility codes, designed for studying multidimensional hydrodynamics in rivers, reservoirs, bays, and estuaries. The models can be applied to study project impacts of flows, sedimentation, constituent transport, and salinity.	http://chl.erdc.usace.army.mil/CHL.aspx?p=s&a=Software;10
WASP	1, 2, or 3	Water Quality Analysis Simulation Program. Framework for modeling contaminant fate and transport in surface waters. The WASP framework can be used to model biochemical oxygen demand and dissolved oxygen dynamics, nutrients and eutrophication, bacterial contamination, and organic chemical and heavy metal contamination.	http://www.epa.gov/athens/wwqtsc/html/wasp.html

Model	Dimension	Description	Model Resources
Models to Analyze Watershed Runoff and Assess Practices to Reduce Impacts of Hydromodification			
BMP Decision Support System (BMP-DSS)	1	BMP-DSS is a decision-making tool for placement of BMPs/LID practices at strategic locations in urban watersheds based on integrated data collection and hydrologic/hydraulic/water quality modeling. The system uses GIS technology, integrates BMP processes simulation models, and applies system optimization techniques for BMP placement and selection. The system also provides interfaces for BMP placement, BMP attribute data input, and decision optimization management. The system includes a stand-alone BMP simulation and evaluation module, which complements both research and regulatory nonpoint source control assessment efforts and allows flexibility in examining various BMP design alternatives.	Developed by the EPA and Prince George's County Department of Environmental Resources. Contact Dr. Mow-Soung Cheng at 301-883-5836 for more information.
HSPF	1	Hydrological Simulation Program——FORTRAN (HSPF) is a comprehensive package for simulation of watershed hydrology and water quality for both conventional and toxic organic pollutants. HSPF incorporates watershed-scale ARM and NPS models into a basin-scale analysis framework that includes fate and transport in one dimensional stream channels. It is the only comprehensive model of watershed hydrology and water quality that allows the integrated simulation of land and soil contaminant runoff processes with In-stream hydraulic and sediment-chemical interactions. The result of this simulation is a time history of the runoff flow rate, sediment load, and nutrient and pesticide concentrations, along with a time history of water quantity and quality at any point in a watershed. HSPF simulates three sediment types (sand, silt, and clay) in addition to a single organic chemical and transformation products of that chemical.	http://www.epa.gov/ceampubl/swater/hspf/index.htm

Model	Dimension	Description	Model Resources
LSPC	1	LSPC is the Loading Simulation Program in C++, a watershed modeling system that includes streamlined Hydrologic Simulation Program Fortran (HSPF) algorithms for simulating hydrology, sediment, and general water quality on land as well as a simplified stream transport model. LSPC is derived from the Mining Data Analysis System (MDAS), which was developed by EPA Region 3 and has been widely used for mining applications and TMDLs. A key data management feature of this system is that it uses a Microsoft Access database to manage model data and weather text files for driving the simulation. The system also contains a module to assist in TMDL calculation and source allocations. For each model run, it automatically generates comprehensive text-file output by subwatershed for all land-layers, reaches, and simulated modules, which can be expressed on hourly or daily intervals. Output from LSPC has been linked to other model applications such as EFDC, WASP, and CE-QUAL-W2.	http://www.epa.gov/ATHENS/wwqtsc/html/lspc.html
Program for Predicting Polluting Particle Passage through Pits, Puddles, and Ponds—Urban Catchment Model (P8–UCM)	1	P8–UCM is a model for predicting the generation and transport of stormwater pollutants in urban watersheds. Continuous water balance and mass balance calculations are performed on a user-defined system consisting of watersheds, devices (runoff storage/treatment areas, BMPs), particle classes, and water quality components. Simulations are driven by continuous hourly rainfall and daily air temperature time series data. The model simulates pollutant transport and removal in a variety of treatment devices (BMPs).	http://wwwalker.net/p8

Model	Dimension	Description	Model Resources
Storm Water Management Model (SWMM)	1	SWMM is a dynamic rainfall-runoff simulation model used for single event or long-term (continuous) simulation of runoff quantity and quality from primarily urban areas. The runoff component of SWMM operates on a collection of subcatchment areas that receive precipitation and generate runoff and pollutant loads. The routing portion of SWMM transports this runoff through a system of pipes, channels, storage/treatment devices, pumps, and regulators. SWMM tracks the quantity and quality of runoff generated within each subcatchment, and the flow rate, flow depth, and quality of water in each pipe and channel during a simulation period comprised of multiple time steps.	http://www.epa.gov/ednnrmrl/models/swmm/index.htm

Table 8.2 lists some of the available assessment models and approaches for assessing the biological impacts of channelization. The table also provides a quick description of the model or approach, as well as sources of additional information.

Table 8.2 Assessment Models and Approaches

Model or Assessment Approach	Description	Model Resources
Assessment Models		
AQUATOX	A freshwater ecosystem simulation model designed to predict the fate of various pollutants such as nutrients and organic toxicants and their effects on the ecosystem, including fish, invertebrates, and aquatic plants (including periphyton).	http://epa.gov/waterscience/models/aquatox
Cornell Mixing Zone Expert System (CORMIX)	A water quality modeling and decision support system designed for environmental impact assessment of mixing zones resulting from wastewater discharge from point sources. The system emphasizes the role of boundary interaction to predict plume geometry and dilution in relation to regulatory mixing zone requirements.	http://www.epa.gov/waterscience/models/cormix.html
HEC-HMS, Hydrologic Modeling System	A system designed to simulate the precipitation-runoff processes of dendritic watershed systems. In addition to unit hydrograph and hydrologic routing options, capabilities include a linear quasi-distributed runoff transform (ModClark) for use with gridded precipitation, continuous simulation with either a one-layer or more complex five-layer soil moisture method, and a versatile parameter estimation option.	http://www.hec.usace.army.mil/software/hec-hms/index.html
HEC-RAS, River Analysis System	The HEC-RAS system is used to calculate water surface profiles for both steady and unsteady gradually varied flow. The system can handle a full network of channels, a dendritic system, or a single river reach.	http://www.hec.usace.army.mil/software/hec-ras/hecras-hecras.html http://www.wsi.nrcs.usda.gov/products/W2Q/H&H/Tools_Models/Ras.html

Model or Assessment Approach	Description	Model Resources
Physical Habitat Simulation Model (PHABSIM)	A set of computer programs designed to predict the microhabitat (depth, velocities, channel indices) conditions in rivers at different flow levels and the relative suitability of those conditions for different life stages of aquatic life. (Serves as the key microhabitat simulation component of IFIM.)	http://www.fort.usgs.gov/Products/Software/PHABSIM
Riverine Community Habitat Assessment and Restoration Concept (RCHARC)	A simulation approach using computer models to compare hydraulic conditions and microhabitats of a reference reach to alternative study reach(es).	Nestler, J., T. Schneider, and D. Latka. 1993. RCHARC: A new method for physical habitat analysis. *Engineering Hydrology*, 294-99.
RiverWare™	RiverWare™ is a reservoir and river modeling software decision support tool. With RiverWare™, users can model the topology, physical processes, and operating policies of river and reservoir systems, and make better decisions about how to operate these systems by understanding and evaluating the trade-offs among the various management objectives. Water management professionals can improve their management of river and reservoir systems by using the software. The Bureau of Reclamation, the Tennessee Valley Authority, and the Army Corps of Engineers sponsor ongoing RiverWare™ research and development.	http://cadswes.colorado.edu/riverware
Salmonid Population Model (SALMOD)	A computer model that simulates the dynamics (spawning, growth, movement, and mortality) of freshwater salmonid populations, both anadromous and resident, under various habitat quality and capacities.	http://www.fort.usgs.gov/Products/Software/SALMOD
Assessment Approaches		
A Procedure to Estimate the Response of Aquatic Systems to Changes in Phosphorus and Nitrogen Inputs	A simple tool to estimate the responsiveness of a waterbody to changes in the loading of phosphorus and nitrogen using a dichotomous key that classifies it according to key characteristics.	ftp://ftp.wcc.nrcs.usda.gov/downloads/wqam/aqusens.pdf

Model or Assessment Approach	Description	Model Resources
EPA Volunteer Stream Monitoring Methods	A series of methods geared for volunteer monitoring programs offering simple to advanced techniques for monitoring macroinvertebrates, habitat, water quality, and physical conditions.	http://www.epa.gov/owow/monitoring/volunteer/stream
Habitat Evaluation Procedures/Habitat Suitability Index (HEP/HSI)	HEP is an evaluation method that determines the suitability of available habitat for select aquatic and terrestrial wildlife species and measures the impact of proposed land or water use changes on that habitat. HSI is a measure of habitat suitability.	http://policy.fws.gov/870fw1.html http://www.fort.usgs.gov/Products/Software/HEP http://www.fort.usgs.gov/Products/Software/HSI
Index of Biological Integrity (IBI)	An aquatic ecosystem health index using measures of total native fish species composition, indicator species composition, pollutant intolerant and tolerant species composition, and fish condition.	http://www.epa.gov/owow/wetlands/wqual/bio_fact/fact5.html
Indicators of Hydrologic Alteration (IHA)	A method for assessing the degree of hydrologic alteration attributable to human impacts within an ecosystem. The method takes daily stream flow values and calculates indices relating to the five components of flow regime critical for ecological processes: magnitude, frequency, duration, timing, and rate of change of hydrologic conditions.	http://www.nature.org/initiatives/freshwater/conservationtools/art17004.html
Instream Flow Incremental Methodology (IFIM)	A river network analysis that incorporates fish habitat, recreational opportunity, and woody vegetation responses to alternative water management schemes. Information is presented as a time series of flow and habitat at select points within the network.	http://www.fort.usgs.gov/Products/Software/IFIM
Invertebrate Community Index (ICI)	An invertebrate community health index using ten structural and compositional invertebrate community metrics including number of mayfly, caddisfly, and dipteran taxa.	http://www.epa.state.oh.us/dsw/bioassess/BioCriteriaProtAqLife.html

Model or Assessment Approach	Description	Model Resources
(Modified) Index of Well-Being (IWB)	The IWB is a fish community health index using measures of fish species abundance and diversity estimates. The *modified* index of well being factors out 13 pollutant tolerant species of fish from certain calculations to prevent false high readings on polluted streams which have large populations of pollutant tolerant fish.	http://www.epa.state.oh.us/dsw/bioassess/BioCriteriaProtAqLife.html
Rapid Bioassessment Protocols (RBP)	A set of protocols that offer cost-effective techniques of varying complexity to characterize the biological integrity of streams and rivers using the collection and analysis of biological, physical, and chemical data. It focuses on periphyton, benthic macroinvertebrates, and fish assemblages, and on assessing the quality of the physical habitat.	http://www.epa.gov/owow/monitoring/rbp
Rapid Channel Assessment (RCA)	A reference stream/integrated ranking approach to evaluate the physical condition of a stream channel based on channel geometry, percent channel-bank scour, sediment size distribution and embeddedness, large wood debris, and thalweg profiles.	CWP. 1998. *Rapid Watershed Planning Handbook: A Comprehensive Guide for Managing Urbanizing Watersheds*. Center for Watershed Protection, Ellicott City, MD. For a copy contact: The Center for Watershed Protection, 8391 Main Street Ellicott City, MD 21043, email: center@cwp.org.
Rapid Stream Assessment Technique (RSAT)	A reference stream/integrated ranking approach to evaluate steam health based on chemical stability, channel scouring/sediment deposition, physical instream habitat, water quality, riparian habitat, and biological indicators.	CWP. 1998. *Rapid Watershed Planning Handbook: A Comprehensive Guide for Managing Urbanizing Watersheds*. Center for Watershed Protection, Ellicott City, MD. For a copy contact: The Center for Watershed Protection, 8391 Main Street Ellicott City, MD 21043, email: center@cwp.org. http://www.stormwatercenter.net
Rosgen's Stream Classification Method	A classification method that uses morphological stream characteristics to organize streams into relatively homogeneous stream types to predict stream behavior and to apply interpretive information.	Reference: Rosgen, D. 1996. *Applied River Morphology*. Wildland Hydrology, Pagosa Springs, CO. For a copy contact: Wildland Hydrology Books, 1481 Stevens Lake Road, Pagosa Springs, CO 81147.

Model or Assessment Approach	Description	Model Resources
Stream Network/Stream Segment Temperature Models (SNTEMP/SSTEMP)	Developed to help predict the consequences of stream manipulation on water temperatures, these computer models simulate mean daily water temperatures for streams and rivers from data describing the stream's geometry, meteorology, and hydrology. SNTEMP is for a stream network with multiple tributaries for multiple time periods. SSTEMP is a scaled down version suitable for single (to a few) reaches and single (to a few) time periods.	http://www.fort.usgs.gov/Products/Software/SNTEMP
Stream Visual Assessment Protocol (SVAP)	A simple procedure to evaluate the condition of a stream based on visual characteristics. It also identifies opportunities to enhance biological value and conveys information on how streams function.	ftp://ftp.wcc.nrcs.usda.gov/downloads/wqam/svapfnl.pdf
Systems Impact Assessment Model (SIAM)	An integrated set of models used to aid the evaluation of water management alternatives, it address significant interrelationships among selected physical (temperature, microhabitat), chemical (dissolved oxygen, water temperature), and biological variables (young-of-year Chinook salmon production), and stream flow. Developed for the Klamath River in northern California.	http://www.fort.usgs.gov/Products/Software/SIAM
Time-Series Library (TSLIB)	A set of DOS-based computer programs to create monthly or daily habitat time-series and habitat-duration curves using the habitat-discharge relationship produced by PHABSIM. (Can serve as the hydraulic component of IFIM).	http://www.fort.usgs.gov/Products/Software/TSLIB
TR-20, Computer Program for Project Formulation Hydrology	A physically based watershed scale runoff event model that computes direct runoff and develops hydrographs resulting from any synthetic or natural rainstorm. Developed hydrographs are routed through stream and valley reaches as well as through reservoirs.	http://www.wsi.nrcs.usda.gov/products/W2Q/H&H/Tools_Models/WinTR20.html
TR-55, Urban Hydrology for Small Watersheds	Simplified procedures to calculate storm runoff volume, peak rate of discharge, hydrographs, and storage volumes required for floodwater reservoirs.	http://www.info.usda.gov/CED/ftp/CED/tr55.pdf

Examples of Channel Modification Activities and Associated Models/Practices

Modeling for Impoundments

A low-complexity option for modeling impoundments is to use simple models like the Bathtub model to simulate the waterbody. Compared to more complex multi-dimensional models, which use multiple computational cells to estimate volumetric and contaminant fluxes between the cells, Bathtub-type models typically use a single cell. This single cell, while a simplification of the system, may be appropriate if the system is fully mixed in both the horizontal and vertical dimensions. This approach can also be economically developed using spreadsheets (such as Excel) to calculate the results. However, a Bathtub-type model has limited utility if the water body is stratified or if results are required at more than one location in the system.

Another example of a modeling tool that has the ability to simulate impoundments is CE-QUAL-W2, a two-dimensional hydrodynamic water quality model. CE-QUAL-W2 provides results for either a horizontal or cross-sectional, two-dimensional plane. Because the model assumes a vertically or horizontally-mixed environment, it is best suited for relatively long and narrow water bodies (rivers, lakes, reservoirs, and estuaries) that exhibit longitudinal or vertical water quality stratification. The water quality portion of CE-QUAL-W2 includes the major processes of eutrophication kinetics and a single algal compartment. The bottom sediment compartment stores settled particles, releases nutrients to the water column, and exerts sediment oxygen demand based on user-supplied fluxes; a full sediment diagenesis (i.e., the process of chemical and physical change in deposited sediment during its conversion to rock) model is under development.

The Environmental Fluid Dynamics Code (EFDC) is a general-purpose modeling package for simulating one- or multi-dimensional flow, transport, and bio-geochemical processes in surface water systems including rivers, lakes, estuaries, reservoirs, wetlands, and coastal regions. The EFDC model was originally developed by Hamrick in 1992 at the Virginia Institute of Marine Science for estuarine and coastal applications and is considered public domain software. This model is now EPA-supported as a component of EPA Region 2's PRVI BASINS software system and EPA's TMDL Toolbox,[2] and has been used extensively to support TMDL development throughout the country. In addition to hydrodynamic, salinity, and temperature transport simulation capabilities, EFDC is capable of simulating cohesive and non-cohesive sediment transport, near field and far field discharge dilution from multiple sources, eutrophication processes, the transport and fate of toxic contaminants in the water and sediment phases, and the transport and fate of various life stages of finfish and shellfish.

Modeling for Estuary Tidal Flow Restrictions

Artificial hydraulic structures have the ability to alter natural flow patterns (hydrodynamic) in an estuary, which may modify erosion patterns, salinity regimes, and the fate and transport of pollutants. Some examples of artificial hydraulic structures include culverts, bridges, tide gates,

[2] http://www.epa.gov/athens/wwqtsc/html/efdc.html

and weir structures. Installation or removal of these structures may cause a significant change in local hydrodynamics, and tools may be used to estimate the impacts prior to the modification.

The EFDC model, as described above, allows modelers to evaluate the impacts of hydraulic structures, such as culverts, bridges, tide gates, and weirs. Due to the flexibility of EFDC, each of these structures can also be conceptually represented in a variety of ways. For example, the weir equation can be applied to locations in the modeling grid to estimate water surface-dependent flow through one or more grid cells. This enables a modeler to evaluate the effect of placement of structures that modify surface flow patterns (such as a weir). Structures such as piers and impermeable barriers (e.g. jetties, breakwaters) can also be simulated using this code.

Another modeling tool that can address estuary tidal flow restrictions is the Finite Element Surface Water Modeling System (FESWMS) model. This modeling code was developed by the Federal Highway Administration (FHA) and is distributed by the U.S Geological Survey (USGS). FESWMS is a hydrodynamic modeling code that simulates two-dimensional, depth-integrated, steady or unsteady surface-water flows. It supports both super and subcritical flow analysis, and area wetting and drying. FESWMS is also suited for modeling regions involving flow control structures, such as are encountered at the intersection of roadways and waterways. Specifically, the FESWMS model allows the user to include weirs, culverts, drop inlets, and bridge piers into a standard two-dimensional finite element model. FESWMS does not have three-dimensional capabilities.

Modeling for Estuary Flow Regime Alterations

A number of structures or processes can alter the flow regime of a system. Flow contributions to an estuary can be altered by upstream rediversions or basin transfers, dams and dam releases, or other channel modifications. For example, when freshwater flows patterns are altered by the presence and operation of a dam, EFDC can be used to model the impact to downstream estuaries. EFDC can provide modelers with a time series representation of flow that is withdrawn from a simulated reservoir/dam system. Coupling the time series flow projections with hydrodynamic analysis of the receiving esturay enables modelers to determine potential impacts of altered flow patterms and to evaluate various spill options for the dam operation. Structures within the estuary that may alter the flow patterns include marinas, piers, jetties, and other similar type structures. Flow regime alterations due to these structures can be simulated using the same modeling tools described in the Flow Restrictions section above. Flow restrictions are the cause of most changes in the flow regime, so the simulation of the causes of restriction using a process-based modeling tool produces the desired flow alterations. Therefore, EFDC and FESWMS can be utilized in the same manner to obtain flow regime results.

Temperature Restoration Practices

Several computer models that predict instream water temperature are currently available. These models vary in the complexity of detail with which site characteristics, including meteorology, hydrology, stream geometry, and riparian vegetation, are described. The U.S. Fish and Wildlife Service developed an instream surface water temperature model (Theurer et al., 1984) to predict mean daily temperature and diurnal fluctuations in surface water temperatures throughout a stream system. The model, Stream Network Temperature Model (SNTEMP), can be applied to any size watershed or river system. This predictive model uses either historical or synthetic

hydrological, meteorological, and stream geometry characteristics to describe the ambient conditions. The purpose of the model is to predict the longitudinal temperature and its temporal variations. The instream surface water temperature model has been used satisfactorily to evaluate the impacts of riparian vegetation, reservoir releases, and stream withdrawal and returns on surface water temperature. In the Upper Colorado River Basin, the model was used to study the impact of temperature on endangered species (Theurer et al., 1982). It also has been used in smaller ungauged watersheds to study the impacts of riparian vegetation on salmonid habitat.[3]

The Stream Segment Temperature Model (SSTEMP) is a much-scaled down version of the SNTEMP model developed by the USGS Biological Resource Division. Unlike the large network model (SNTEMP), this program only handles single stream segments for a single time period (e.g., month, week, day) for any given "run." Initially designed as a training tool, SSTEMP may be used satisfactorily for a variety of simple cases that one might face on a day-to-day basis. It is especially useful to perform sensitivity and uncertainty analysis. The model predicts minimum 24-hour temperatures, mean 24-hour temperatures, and maximum 24-hour stream temperatures for a given day, as well as a variety of intermediate values. The SSTEMP model identifies current stream and/or watershed characteristics that control stream temperatures. The model also quantifies the maximum loading capacity of the stream to meet water quality standards for temperature. This model is important for estimating the effect of changing controls or factors (such as riparian grazing, stream channel alteration, and reduced streamflow) on stream temperature. The model can also be used to help identify possible implementation activities to improve stream temperature by targeting those factors causing impairment to the stream. Good input data and an awareness of the model's assumptions are critical to obtaining reliable predictions. SSTEMP may be used to evaluate alternative reservoir release proposals, analyze the effects of changing riparian shade or the physical features of a stream, and examine the effects of different withdrawals and returns on instream temperature.[4]

Selecting Appropriate Models

Although a wide range of adequate hydrodynamic and surface water quality models are available, the central issue in selecting appropriate models for evaluating hydromodification projects is the appropriate match of the financial and geographical scale of the proposed project with the cost required to perform a credible technical evaluation of the projected environmental impact. It is highly unlikely, for example, that a proposal for a relatively small stream channel modification project, such as installing culverts in a stream segment, would be expected or required to contain a state-of-the-art hydrodynamic and surface water quality analysis that requires one or more person-years of effort. In such projects, a simplified, desktop approach (e.g., HEC-RAS Model) requiring less time and money would most likely be sufficient (USACE, 2002a). In contrast, substantial technical assessment of the long-term environmental impacts would be expected for channelization proposed as part of construction of a major harbor facility or as part of a system of navigation and flood control locks and dams. The assessment should

[3] For more information or to download SNTEMP, see the U.S. Geological Survey Web site: http://www.fort.usgs.gov/Products/Software/SNTEMP.
[4] More information about the model is available on the U.S. Geological Survey Web site: http://www.mesc.usgs.gov/products/software/default.asp (navigate to Stream Network Temperature Model and Stream Segment Temperature Model).

incorporate the use of detailed 2D or 3D hydrodynamic models coupled with sediment transport and surface water quality models.

In general, six criteria can be used to review available models for potential application in a given hydromodification project:

1. Time and resources available for model application
2. Ease of application
3. Availability of documentation
4. Applicability of modeled processes and constituents to project objectives and concerns
5. Hydrodynamic modeling capabilities
6. Demonstrated applicability to size and type of project

The Center for Exposure Assessment Modeling (CEAM),[5] EPA Environmental Research Laboratory, Athens, Georgia, provides continual support for several hydrodynamic and surface water quality models, such as HSCTM2D, HSPF, PRZM3, and SED3D. Another source of information and technical support is the Waterways Experiment Station, USACE, Vicksburg, Mississippi.[6] Although a number of available models are in the public domain, costs associated with setting up and operating these models may exceed the project's available resources. For a simple to moderately difficult application, the approximate level of effort varies, but could range from 1 to 12 person-months.

Several factors need to be considered in the application of mathematical models to predict impacts from hydromodification projects including:

- Variations and uncertainties in the accuracy of these models when they are applied to the short- and long-term response of natural systems.
- Availability of relevant information (data collection) to derive the simulations and validate the modeling results.

The cost of a given modeling project depends on a number of factors. Questions need to be asked prior to the start of a modeling project to determine the purpose and future use of the model, and/or its results. For example, the modeler needs to know if the model results are to be used deterministically (the model assumes there is only one possible result that is known for each alternative course or action), or if the model is to be used for a heuristic (involving or serving as an aid to learning, discovery, or problem-solving by experimental and especially trial-and-error methods) scoping exercise to identify data gaps in a system. In a deterministic study, the results are traditionally compared to observed data in an effort regarded as calibration and validation. The model must therefore be rigorous enough to represent the system accurately. The complexity of the system under study is also a consideration that must be made prior to the project. The complexity of the system generally correlates well with the level of complexity of the model required to simulate it. Likewise, the more complex the model is, the more intensive it is to develop and run, and the more costly the modeling project is.

[5] http://www.epa.gov/ceampubl
[6] http://www.erdc.usace.army.mil

A number of approaches are available to model a given system, and the discussion above only highlights a few of the modeling tools currently available. The cost to set up a model for a given system varies tremendously, based not only on the modeling code selected, but also on what the modeler decides to simulate. For example, a modeler may aim to obtain flow results for an estuary using a given model. In reality, surface winds in that estuary may or may not be influencing the flow regime. If observed wind data is available from a weather station nearby, the modeler may choose to incorporate these data into the model to better represent that influence. The modeler may also choose not to incorporate these data, or the data may not be available. Although the modeler is utilizing the same modeling code, the decision regarding whether or not to simulate the wind conditions is not only a question regarding the model's purpose, but also what the development of this model will cost.

Modeling tools can range from simple spreadsheet tools using "back of the envelope" type calculations, to complex processed based models that must be run on high performance computing systems. As discussed previously, the tool selected for a given modeling project needs to be chosen with a number of questions in mind. As a result, each system can be modeled in a number of different ways with a number of different modeling codes. Therefore, the range in cost for even a single estuary or impoundment may range tenfold depending on the model's purpose. Typically, the cost of developing a model may range from a few thousand dollars for a simple spreadsheet model, to in excess of one million dollars for a more robust modeling system.

Chapter 9: Dam Removal Requirements, Process, and Techniques

Chapter 2 provided a discussion of specific impacts from dams, water quality above and below the dam, suspended sediment and recharge issues, and biological and habitat impacts. Chapter 4 then provided a discussion of types of dams, Federal Energy Regulatory Commission (FERC) requirements, management measures and practices that can be used to mitigate for some of the effects of dams, and information to consider when contemplating removing a dam. Chapter 9 focuses on what occurs after the decision has been made to remove a dam. This chapter provides a more detailed discussion on some permitting requirements for removing dams, the dam removal process, and sediment removal techniques to consider when removing a dam.

Requirements for Removing Dams

Removing a dam may require evaluations and permits from state, federal, and local authorities. These requirements are typically to ensure that the removal is done is a manner that is safe and minimizes short and long term impacts to the river and floodplain. States and local governments have different requirements. The following federal requirements may apply to dam removal:

- Rivers and Harbors Act Permit
- FERC License Surrender or Non-power License Approval
- National Environmental Policy Act (NEPA) Review
- Federal Consultations (Endangered Species Act Section 7 Consultation, Magnuson-Stevenson Act Consultation, National Historic Preservation Act Compliance)
- State Certifications (Water Quality Certification, Coastal Zone Management Act Certification)

The following state requirements might apply to dam removal:

- Clean Water Act (CWA) Section 404 Dredge and Fill Permit
- Waterway Development Permits
- Dam Safety Permits
- State Environmental Policy Act Review
- Historic Preservation Review
- Resetting the Floodplain
- State Certifications

Demolition and building permits may also be required for dam removal. Individual state and local governments may have additional requirements as well.

Tips for a Successful Permitting Process (American Rivers, 2002b)

Dam removal is relatively new and the permitting process can be difficult. Most state and federal agencies are not yet practiced at moving dam removal through the permitting process. The relevant permitting requirements were designed for more destructive activities, and dam removal does not easily fit into the requirements. Tips to help make the process smoother include:

Schedule Time

- *Expect dam removal projects to take longer than construction efforts.*
- *Schedule more lead-time into the permitting process to avoid delays and frustrations.*

Establish a Relationship with the Permitting Agencies

- *Hold a pre-application meeting with key agency staff once your project is well thought out.*
- *Do not attempt to circumvent the process and stick with the permitting timeline.*
- *Do not provide inconsistent information.*
- *A single point of contact for the group applying for the permit will help avoid confusion and maintain communication.*

Providing Information about the Proposed Project

- *Create clear and simple descriptions and drawings (to scale) of the proposed project.*
- *Be sure to identify complicating conditions, schedules, seasonal constraints, etc.*
- *Provide and discuss alternatives, but make it clear why the chosen approach should be used.*
- *Assume the reviewers know nothing about your project.*

Dam Removal Process

The complexity of the removal process of a dam is specific to each particular case of removal. There are two major components of the removal process: the stakeholders involved in the decision-making process of removing the dam and the actual physical removal of the dam itself. The authorities that govern dams are numerous, yet overlapping. These entities include: USACE, Bureau of Reclamation, FERC, and other federal agencies; interest groups; and state and local governments. There are also various state programs that have been created to keep dams safe and environmentally friendly, as well as to help owners finance dam removal. A study by the Aspen Institute (2002) provides a list of priority issues to consider when dam removal may be a possibility. Among the considerations listed are dam and public safety, economics, environmental concerns, risk, social values and community interests, scientific information, and stakeholder participation. This report suggests that success of dam removal is dependent upon a thorough analysis of these competing factors and input from all interested parties (Aspen Institute, 2002). Often, the dam owner makes the decision to remove a dam, deciding that the costs of continuing operation and maintenance are greater than the cost of removing the dam. However, state dam safety offices can order for a dam to be removed if there are safety concerns; FERC can order removal of dams under their jurisdiction for environmental and safety reasons (American Rivers, n.d.a.).

State governments have authority over the dams in their jurisdiction. Other state and local government agencies dealing with issues such as water quality, water rights, and fish and wildlife protection can also play a role in overseeing dams within their jurisdiction if they so choose

(FOE et al., 1999). Certain states have implemented stringent rules for dams that are and are not regulated by FERC or USACE. For example, the state of Wisconsin has a Dam Safety Inspection Program that requires dams to be inspected every 10 years by the Wisconsin Department of Natural Resources (WDNR) (Doyle et al., 2000). Any dam that fails to meet safety requirements set by WDNR must be repaired or removed. The state of Pennsylvania has implemented a law that was written under the order of the Pennsylvania Fish and Boat Commission that states that any newly constructed or existing dam that requires a state permit for construction or modification must also include provisions for fish passage (Doyle et al., 2000).

Some states have programs that aid dam owners in the process of removing their structures. The Pennsylvania Department of Environmental Protection (DEP) has adopted procedures to make it easier and less expensive for dam owners to remove unsafe, unused, or unwanted dams. In this process, owners of dams on third order or larger streams are contacted and asked if they are interested in removing their dams. If they are, then all the landowners affected by the removal are contacted, and a public meeting is held if interest warrants one. After public comments, an engineering design is created, followed by an environmental assessment, then sediment and erosion control (ESC) plans are established, and finally approval is sought by the USACE. This program was used in the removal of seven dams on Conestoga River and also in the removal of the Williamsburg Station Dam on the Juniata River. This approval process takes between 12 and 18 weeks (FOE et al., 1999). However, the physical decommissioning and removing of a dam can still be a lengthy and diversified process.

Sediment Removal Techniques

Large dams can trap thousands to millions of cubic yards of sediment over time, eliminating the flood control or storage capacity of the dam. Removal or control of sediment behind a dam can represent a large portion of the cost and planning effort of a dam removal project. There are several methods available to project planners and dam owners that target different pollution concerns and budgetary limitations (International Rivers Network, 2003). The options in terms of sediment removal range from complete removal and relocation of all accumulated material from the inundated regions; removing sediment only from the anticipated channel of the river, or allowing the river to erode a new channel through the sediment (Wunderlich et al., 1994).

If the sediment is basically clean and the main concern is turbidity and clogging downstream streambed spawning areas, gradual incremental drawdowns of the reservoir behind the dam allow the sediment to be transported downstream in smaller portions and avoids the release one large, lethal volume of sediment. If contaminated sediment is the main concern, dredging is an option that can be used. While the use of silt curtains can minimize turbidity during dredging, silt curtains do not contain dissolved substances such as metals, which can pose a threat to downstream ecosystems (EMC2, 2001). Another option for contaminated sediments is to stabilize the sediment in place within the stream. This can be accomplished by leaving a portion of the dam in place to hold back an area of sediment that is of concern. The strategic placement of boulders can also contain the sediment from moving downstream.

For more information on issues associated with dam removal, see the Additional Resources section of this document.

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Zimmerman, M.J., and M. S. Dortch. 1989. Modelling water quality of a reregulated stream below a hydropower dam. *Regulated Rivers: Research and Management* 4:235-247.

Additional Resources

The following are additional resources that may be used to obtain supplementary information for topics presented in this document.

Background on Streams, Restoration, and Hydrology

The following are basic references regarding stream ecology, restoration, and hydrology:

Allan, J.D. 1995. *Stream Ecology—Structure and Function of Running Waters*. Chapman and Hall, New York.

Brookes, A. and F.D. Shields, eds. 1999. *River Channel Restoration: Guiding Principles for Sustainable Projects*. John Wiley and Sons, Chichester, U.K.

Cooke, G.D., E.B. Welch, S.A. Peterson, and P.R. Newroth. 1993. *Restoration and Management of Lakes and Reservoirs*. 2nd ed. Lewis Publishers, Boca Raton, FL.

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Ponce, V.M. 1989. *Engineering Hydrology: Principles and Practices*. Prentice-Hall, Englewood Cliffs, New Jersey.

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Detailed Information for Practices to Achieve Management Measures

Additional information about practices, their effectiveness, limitations, and cost estimates are available from a number of sources, including:

Allen, H.H. and J.R. Leech. 1997. *Bioengineering for Streambank Erosion Control: Report 1 Guidelines*. U.S. Army Corps of Engineers, Environmental Impact Research Program, Technical Report EL-97-8. http://el.erdc.usace.army.mil/elpubs/pdf/trel97-8.pdf.

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Center for Watershed Protection (CWP). 2007. *The Stormwater Manager's Resource Center*. http://www.stormwatercenter.net.

Federal Interagency Stream Restoration Working Group (FISRWG). 1998. *Stream Corridor Restoration: Principles, Processes, and Practices*. http://www.nrcs.usda.gov/technical/stream_restoration.

Fischenich, J. C. and H. Allen. 2000. *Stream Management*. ERDC/EL SR-W-00-1, U.S. Army Engineer Research and Development Center, Vicksburg, MS. http://el.erdc.usace.army.mil/elpubs/pdf/srw00-1/srw00-1.pdf. Accessed October 2004.

Knutson, P.L., and M.R. Inskeep. 1982. *Shore Erosion Control with Salt Marsh Vegetation*. Coastal Engineering Technical Aid No. 82-3. U.S. Army Corps of Engineers Coastal Engineering Research Center, Vicksburg, MS.

National Association of Home Builders (NAHB). 1995. *Storm Water Runoff & Nonpoint Source Pollution Control Guide for Builders and Developers*. National Association of Home Builders, Washington, DC. http://www.nahbrc.org.

Oregon Association of Conservation Districts. 1999. *Protecting Streambanks from Erosion: Tips for Small Acreages in Oregon*. http://www.or.nrcs.usda.gov/news/factsheets/fs4.pdf.

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U.S. Environmental Protection Agency (USEPA). 2002. *Development Document for Proposed Effluent Guidelines and Standards for the Construction and Development Category*. EPA-821-R-02-007. http://www.epa.gov/waterscience/guide/construction/devdoc.htm.

U.S. Environmental Protection Agency (USEPA). 2007. *National Menu of Stormwater Best Management Practices*. http://cfpub.epa.gov/npdes/stormwater/menuofbmps/menu.cfm.

Additional information about hydromodification, soil bioengineering, and restoration is available from the following:

- *Ann Riley, Urban Stream Restoration: A Video Tour of Ecological Restoration Techniques* (http://www.noltemedia.com/nm/urbanstream): This video, which can be ordered online, is a documentary tour of six urban stream restoration sites. It provides background information on funding, community involvement, and the history and principles of restoration. The demonstration includes examples of stream restoration in very urbanized areas, re-creating stream shapes and meanders, creek daylighting, soil bioengineering, and ecological flood control projects. Ann Riley, a nationally known hydrologist, stream restoration professional, and executive director of the Waterways Restoration Institute in Berkley, California, leads the tour.

- *California Forest Stewardship Program*. Bioengineering to Control Streambank Erosion (http://ceres.ca.gov/foreststeward/html/bioengineering.html): This fact sheet discusses various bioengineering techniques applicable to California streams.

- *Lower American River Corridor River Management Plan* (http://www.safca.com): The plan provides information on aquatic habitat management goals, including restoration to improve aquatic habitat impaired by low flows from channel modification of the Lower American River.

- *Natural Resources Conservation Service, Watershed Technology Electronic Catalog* (http://www.wcc.nrcs.usda.gov/wtec/wtec.html): This online catalog is a source of technical guidance on a variety of restoration techniques and management practices, to provide direction for watershed managers and restoration practitioners. The site is focused on providing images and conceptual diagrams.

- *North Delta Improvements Project* (http://ndelta.water.ca.gov/index.html): The North Delta Improvements Project (NDIP), which is under the California Department of Water Resources, presents unique opportunities for synergy in achieving flood control and ecosystem restoration goals.

- *Ohio Department of Natural Resources*. Stream Management Guide Fact Sheets (http://www.dnr.state.oh.us/water/pubs/fs_st/streamfs.htm): This is a compilation of fact sheets offering technical guidance for streambank and instream practices, general stream management, and stream processes.

- *Sacramento River Riparian Habitat Program* (http://www.sacramentoriver.ca.gov): The Sacramento River Riparian Habitat Program is working to ensure that riparian habitat management along the river addresses the dynamics of the riparian ecosystem and the reality of the local agricultural economy.

- Schueler, T. 1987. *Controlling Urban Runoff: A Practical Manual for Planning and Designing Urban BMPs*. Metropolitan Washington Council of Governments, Washington, DC.

- *South Delta Improvements Program* (http://baydeltaoffice.water.ca.gov/sdb/sdip/index_sdip.cfm): The purpose of the South Delta Improvements Program (SDIP) is to incrementally maximize diversion capability into Clifton Court Forebay, while providing an adequate water supply for diverters within the South Delta Water Agency and reducing the effects of State Water Project exports on both aquatic resources and direct losses of fish in the South Delta.

- *South Sacramento County Streams Project* (http://www.spk.usace.army.mil): South Sacramento County Streams Project provides flood damage reduction to the urban areas of the Morrison Creek and Beach Stone Lake drainage basins in the southern area of Sacramento, as well as around the Sacramento Regional Waste Water Treatment Plant. The project will fund stream restoration in southern Sacramento County.

- *USDA Natural Resources Conservation Service, Stream Visual Assessment Protocol* (http://www.nrcs.usda.gov/technical/ECS/aquatic/svapfnl.pdf): This document outlines methods for field conservationists and landowners to evaluate stream ecological conditions.

- *Washington State Department of Transportation, Soil Bioengineering Web site* (http://www.wsdot.wa.gov/eesc/design/roadside/sb.htm): This is a comprehensive Web site, with information on cost, specifications for project design, funding, and case studies.

- *WATERSHEDSS:Water, Soil and Hydro-Environmental Decision Support System* (http://www.water.ncsu.edu/watershedss): The "Educational Component" of this Web site contains fact sheets with information on a variety of techniques for management practices, including soil bioengineering and structural streambank stabilization.

Resources for Dams

Thornton, K.W., B.L. Kimmel, and F.E. Payne, eds. 1990. *Reservoir Limnology: Ecological Perspectives*. John Wiley and Sons, Inc., New York, NY.

U.S. Army Corps of Engineers. No date. *The WES Handbook on Water Quality Enhancement Techniques for Reservoirs and Tailwaters*. U.S. Army Engineer Research and Development Center Waterways Experiment Station, Vicksburg, MS.

Web sites for dam removal include the following:

- American Rivers' Rivers Unplugged Program: http://www.americanrivers.org/site/PageServer?pagename=AMR_content_1270
- Association of State Dam Safety Officials: http://www.damsafety.org
- Friends of the Earth's River Restoration: http://www.foe.org/camps/reg/nw/river/index.html
- International River Network's River Revival Program: http://www.irn.org/revival/decom
- Massachusetts Department of Fisheries, Wildlife, and Environmental Law Enforcement River Restore Program: http://www.mass.gov/dfwele/river/programs/riverrestore/riverrestore.htm
- National Performance of Dams Program Stanford University: http://www.stanford.edu/group/strgeo/researchcenters.html
- New Hampshire Department of Environmental Services: http://www.des.state.nh.us/dam.htm
- Pennsylvania Department of Environmental Protection, Division of Dam Safety, Dam Safety Program: http://www.dep.state.pa.us/dep/deputate/watermgt/we/damprogram/Main.htm
- Pennsylvania Fish & Boat Commission: http://www.fish.state.pa.us
- River Recovery—Restoring Rivers through Dam Decommissioning: http://www.recovery.bcit.ca/index.html
- United States Society on Dams: http://www.ussdams.org
- Wisconsin Department of Natural Resources: http://www.dnr.state.wi.us/org/water/wm/dsfm/dams/removal.html

Additional information about dam removal is available from the following resources:

- ASCE. 1997. *Guidelines for the Retirement of Hydroelectric Facilities*. American Society of Civil Engineers.
- Bednarek, A.T. 2001. Undamming rivers: A review of the ecological impacts of dam removal. *Environmental Management* 27(6):803-814.
- Bioscience. 2002. Dam removal and river restoration: Linking scientific, socioeconomic, and legal perspectives. Summer (special issue).
- Born, S.M., et al. 1998. Socioeconomic and institutional dimensions of dam removals: The Wisconsin experience. *Environmental Management* 22(3):359-370.

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- Heinz Center. 2002. *Dam Removal: Science and Decision Making*. Available at: http://www.heinzctr.org/Programs/SOCW/dam_removal.htm.
- International Rivers Network: http://www.irn.org/pubs/wrr.
- Niemi, G.J., et al. 1990. Overview of case studies on recovery of aquatic systems from disturbance. *Environmental Management* 14(5):571-587.
- United States Society on Dams Publications: http://www.ussdams.org/pubs.html.
- University of Wisconsin-Madison/Extension. 1996. *The Removal of Small Dams: An Institutional Analysis of the Wisconsin Experience*. Extension Report 96-1, May. Department of Urban and Regional Planning.
- Wisconsin Department of Natural Resources Projects: http://www.dnr.state.wi.us/org/gmu/sidebar/iem/lowerwis/index.htm#baraboo or http://www.dnr.state.wi.us/org/gmu/lowerwis/baraboo.htm; http://www.dnr.state.wi.us/org/gmu/sidebar/iem/milw/index.htm; http://www.dnr.state.wi.us/org/gmu/sidebar/iem/superior/index.htm; http://www.dnr.state.wi.us/org/gmu/sidebar/iem/sheboygan/index.htm

Noneroding Roadways

The following sources may be used to obtain additional information on noneroding roadways:

- *Controlling Nonpoint Source Runoff Pollution from Roads, Highways, and Bridges* http://www.epa.gov/owow/nps/roads.html
- *Erosion, Sediment, and Runoff Control for Roads and Highways* http://www.epa.gov/owow/nps/education/runoff.html
- *Gravel Roads: Maintenance and Design Manual*—the purpose of the manual is to provide clear and helpful information for doing a better job of maintaining gravel roads. The manual is designed for the benefit of elected officials, mangers, and grader operators who are responsible for designing and maintaining gravel roads. http://www.epa.gov/owow/nps/gravelroads
- *Low-Volume Roads Engineering Best Management Practices Field Guide* http://zietlow.com/manual/gk1/web.doc
- *Massachusetts Unpaved Roads BMP Manual* http://berkshireplanning.org/4/download/dirt_roads.pdf
- *Planning Considerations for Roads, Highways, and Bridges* http://www.epa.gov/owow/nps/education/planroad.html
- *Pollution Control Programs for Roads, Highways, and Bridges* http://www.epa.gov/owow/nps/education/control.html
- *Recommended Practices Manual: A Guideline for Maintenance and Service of Unpaved Roads* http://www.epa.gov/owow/nps/unpavedroads.html
- The "Road Maintenance Video Set" is a five-part video series developed for USDA Forest Service equipment operators that focuses on environmentally sensitive ways of maintaining low volume roads. http://www.epa.gov/owow/nps/maint_videoset.html

Additional Information

Barbour, M.T., J. Gerritsen, B.D. Snyder, and J.B. Stribling. 1999. *Rapid Bioassessment Protocols for Use in Streams and Wadeable Rivers: Periphyton, Benthic Macroinvertebrates and Fish*, Second Edition. EPA 841-B-99-002. U.S. Environmental Protection Agency; Office of Water; Washington, D.C. http://www.epa.gov/owow/monitoring/rbp/ Accessed July 2007.

International Commission on Large Dams
http://www.icold-cigb.org

International Rivers Network
http://www.irn.org

U.S. Army Corps of Engineers, Engineer Research and Development Center
http://www.erdc.usace.army.mil

U.S. Department of Agriculture, Farm Service Agency
http://www.fsa.usda.gov/pas

U.S. Department of Agriculture, Natural Resources Conservation Service
http://www.nrcs.usda.gov

U.S. Department of the Interior, Bureau of Reclamation
http://www.usbr.gov

U.S. Department of the Interior, National Park Service
http://www.nps.gov

U.S. Department of the Interior, U.S. Fish and Wildlife Service
http://www.fws.gov

U.S. Department of the Interior, U.S. Geological Survey
http://www.usgs.gov

USEPA. 1994. *A State and Local Government Guide to Environmental Program Funding Alternatives*. EPA 841-K-94-001. http://www.epa.gov/owow/nps/MMGI/funding.html

USEPA. 1994. *A Tribal Guide to the Section 319(h) Nonpoint Source Grant Program*. EPA 841-S-94-003.

USEPA. 1994. *Section 319 Success Stories: Volume I*. EPA 841-S-94-004.
http://www.epa.gov/owow/nps/Success319

USEPA. *Catalog of Federal Funding Sources for Watershed Protection*
http://cfpub.epa.gov/fedfund

USEPA. 1997. *Section 319 Success Stories: Volume II—Highlights of State and Tribal Nonpoint Source Programs*. EPA 841-R-97-001.
http://www.epa.gov/owow/nps/Section319II

USEPA. 2002. *Section 319 Success Stories: Volume III*.
http://www.epa.gov/owow/nps/Section319III

USEPA Clean Lakes Program
http://www.epa.gov/owow/lakes/cllkspgm.html

USEPA Environmental Finance Information Network (EFIN)
http://www.epa.gov/efinpage/efin.htm

USEPA Nonpoint Source Pollution Control Program Homepage
http://www.epa.gov/OWOW/NPS

USEPA Surf Your Watershed
http://www.epa.gov/surf

USEPA Watershed Academy
http://www.epa.gov/owow/watershed/wacademy

Watershedss, (Water, Soil, and HydroEnvironmental Decision Support System)—North Carolina State University
http://www.water.ncsu.edu/watershedss

Appendix A
U.S. Environmental Protection Agency Contacts

This appendix provides wetlands contacts, nonpoint source regional contacts, and Clean Water State Revolving Fund Contacts.

U.S. Environmental Protection Agency Contacts

EPA is grouped into 10 Regions. For questions about a particular state, contact the appropriate EPA Regional Coordinator listed below.

EPA Region	Wetland Contact	Nonpoint Source Regional Coordinators	Clean Water State Revolving Fund Regional Coordinators
Region 1: CT, MA, ME, NH, RI, VT http://www.epa.gov/region01/	U.S. EPA-Region 1 Wetlands Protection Unit One Congress Street Boston, MA 02114-2023 http://www.epa.gov/region01/topics/ecosystems/wetlands.html	U.S. EPA-Region 1 Nonpoint Source Coordinator One Congress Street, Boston, MA 02114-2023 http://www.epa.gov/region01/topics/water/npsources.html	U.S. EPA-Region 1 SRF Program Contact One Congress Street Boston, MA 02114-2023 http://www.epa.gov/ne/cwsrf/index.html
Region 2: NJ, NY, PR, VI http://www.epa.gov/Region2	U.S. EPA-Region 2 Water Programs Branch Wetlands Section 290 Broadway New York, NY 10007-1866 http://www.epa.gov/region02/water/wetlands/	U.S. EPA-Region 2 Water Programs Branch Nonpoint Source Coordinator 290 Broadway New York, NY 10007-1866 http://www.epa.gov/region02/water/npspage.htm	U.S. EPA-Region 2 Water Programs Branch SRF Program Contact 290 Broadway New York, NY 10007-1866 http://www.epa.gov/Region2/water/wpb/staterev.htm
Region 3: DC, DE, MD, PA, VA, WV http://www.epa.gov/region03	U.S. EPA-Region 3 Wetlands Protection Section 1650 Arch Street (3WP12) Philadelphia, PA 19103 http://www.epa.gov/reg3esd1/hydricsoils/index.htm	U.S. EPA-Region 3 Nonpoint Source Coordinator 1650 Arch Street (3WP12) Philadelphia, PA 19103 http://www.epa.gov/reg3wapd/nps/	U.S. EPA-Region 3 Construction Grants Branch SRF Program Contact 1650 Arch Street (3WP12) Philadelphia, PA 19103 http://www.epa.gov/reg3wapd/srf/index.htm
Region 4: AL, FL, GA, KY, MS, NC, SC, TN http://www.epa.gov/region4/	U.S. EPA-Region 4 Wetlands Section 61 Forsyth Street, SW Atlanta, GA 30303 http://www.epa.gov/region4/water/wetlands/	U.S. EPA-Region 4 Nonpoint Source Coordinator 61 Forsyth Street, SW Atlanta, GA 30303 http://www.epa.gov/region4/water/nps/	U.S. EPA-Region 4 Surface Water Permits & Facilities SRF Program Contact 61 Forsyth St. Atlanta GA, 30303 http://www.epa.gov/Region4/water/gtas/grantprograms.html
Region 5: IL, IN, MI, MN, OH, WI http://www.epa.gov/region5/	U.S. EPA-Region 5 Watersheds and Wetlands Water Division (W-15J) 77 West Jackson Blvd. Chicago, IL 60604 http://www.epa.gov/region5/water/wshednps/topic_wetlands.htm	U.S. EPA-Region 5 Nonpoint Source Coordinator Water Division (W-15J) 77 West Jackson Blvd. Chicago, IL 60604 http://www.epa.gov/region5/water/wshednps/topic_nps.htm	U.S. EPA-Region 5 SRF Program Contact Water Division (W-15J) 77 West Jackson Blvd. Chicago, IL 60604 http://www.epa.gov/region5/business/fs-cwsrf.htm

EPA Region	Wetland Contact	Nonpoint Source Regional Coordinators	Clean Water State Revolving Fund Regional Coordinators
Region 6: AR, LA, NM, OK, TX http://www.epa.gov/region6	U.S. EPA-Region 6 Marine and Wetlands Section 1445 Ross Ave., Suite 1200 Dallas, TX 75202 http://www.epa.gov/region6/water/ecopro/index.htm	U.S. EPA-Region 6 Nonpoint Source Coordinator 1445 Ross Ave., Suite 1200 Dallas, TX 75202 http://www.epa.gov/region6/water/ecopro/watershd/nonpoint/	U.S. EPA-Region 6 SRF Program Contact 1445 Ross Ave., Suite 1200 Dallas, TX 75202 http://www.epa.gov/Arkansas/6en/xp/enxp2c4.htm
Region 7: IA, KS, MO, NE http://www.epa.gov/region7	U.S. EPA-Region 7 Wetlands Protection Section (ENRV) 901 N. 5th St. Kansas City, KS 66101 http://www.epa.gov/region7/wetlands/index.htm	U.S. EPA-Region 7 Nonpoint Source Coordinator 901 N. 5th St. Kansas City, KS 66101	U.S. EPA-Region 7 SRF Program Contact 901 N. 5th St. Kansas City, KS 66101 http://www.epa.gov/Region7/water/srf.htm
Region 8: CO, MT, ND, SD, UT, WY http://www.epa.gov/region8	U.S. EPA-Region 8 Wetlands Program 999 18th Street, Suite 500 Denver, CO 80202-2405 http://www.epa.gov/region8/water/wetlands/wetlands.html	U.S. EPA-Region 8 Nonpoint Source Coordinator 999 18th Street, Suite 300 Denver, CO 80202-2405 http://www.epa.gov/region8/water/nps/contacts.html	U.S. EPA-Region 8 SRF Program Contact 999 18th Street, Suite 300 Denver, CO 80202-2405
Region 9: AZ, CA, HI, NV, Pacific Islands http://www.epa.gov/region9/	U.S. EPA-Region 9 Water Division, Wetlands 75 Hawthorne Street San Francisco, CA 94105 http://www.epa.gov/region09/water/wetlands/index.html	U.S. EPA-Region 9 Nonpoint Source Coordinator 75 Hawthorne Street San Francisco, CA 94105 http://www.epa.gov/region09/water/nonpoint/index.html	U.S. EPA-Region 9 Construction Grants Branch SRF Program Contact 75 Hawthorne Street San Francisco, CA 94105 http://www.epa.gov/region9/funding/
Region 10: AK, ID, OR, WA http://www.epa.gov/region10/	U.S. EPA-Region 10 Wetlands Section 1200 Sixth Ave. Seattle, WA 98101 http://yosemite.epa.gov/R10/ECOCOMM.NSF/webpage/Wetlands	U.S. EPA-Region 10 Nonpoint Source Coordinator 1200 Sixth Ave. Seattle, WA 98101	U.S. EPA-Region 10 Ecosystems & Communities SRF Program Contact 1200 Sixth Ave. Seattle, WA 98101 http://yosemite.epa.gov/r10/ecocomm.nsf/webpage/Clean+Water+State+Revolving+Fund+in+Region+10
General Program Information	U.S. EPA Wetlands Division (4502F) Mail Code RC-4100T 1200 Pennsylvania Ave., NW Washington, DC 20460 http://www.epa.gov/owow/wetlands/	U.S. EPA Nonpoint Source Control Branch (4503-T) Ariel Rios Bldg. 1200 Pennsylvania Ave., NW Washington, DC 20460 http://www.epa.gov/owow/nps	U.S. EPA The Clean Water State Revolving Fund Branch (4204M) 1201 Constitution Ave., NW Washington, DC 20004 http://www.epa.gov/owm/cwfinance/cwsrf/index.htm

Center for Watershed Protection Announcement

Center Releases Latest Manual in the Urban Subwatershed Restoration Manual Series:
Urban Stormwater Retrofit Practices

Ellicott City, MD - Until now, **no definitive guidance has been available** on the art and science of urban retrofitting. The Center for Watershed Protection's new manual reflects **over two decades** of Center experience in retrofitting more than 25 urban watersheds across the country.

As a country, we have degraded many of our small urban watersheds. Nearly 80% of them were developed without effective stormwater practices. The key to restoring these watersheds lies in the practice of **stormwater retrofitting**, which involves subwatershed detective work, storm drain forensics and imaginative design.

This manual outlines the basics of retrofits, describes the 13 unique locations where they can be found, and presents rapid methods to find, design and deliver retrofits to meet a wide range of subwatershed objectives.

The concepts of retrofitting are illustrated in more than 75 figures, 150 photos, 60 tables and nine appendices. The manual contains

- updated costs for retrofit practices,
- updated pollutant removal data for stormwater treatment options,
- a design point method to estimate individual retrofit removal rates, and
- practical tips to support the design, permitting and construction of retrofit projects.

In short, the manual provides **all** the resources needed to develop an effective local retrofit program. This 400+ page guidance is available as a free download on the Center website**.** A **hard copy of this manual will soon be made available**. As part of this mailing list, you will be notified as soon as the hard copy becomes available.

Download Manual 3: Urban Stormwater Retrofit Practices

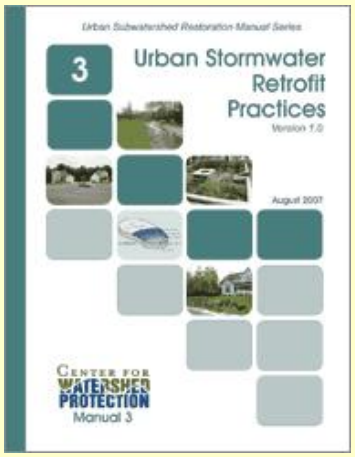

Links

Center website
Center USRM Series Store

For more info:
Center for Watershed Protection
center@cwp.org
410-461-8323

County of Riverside

Santa Margarita Watershed

Municipal Separate Storm Sewer System

FY 2008-2009

Progress Report

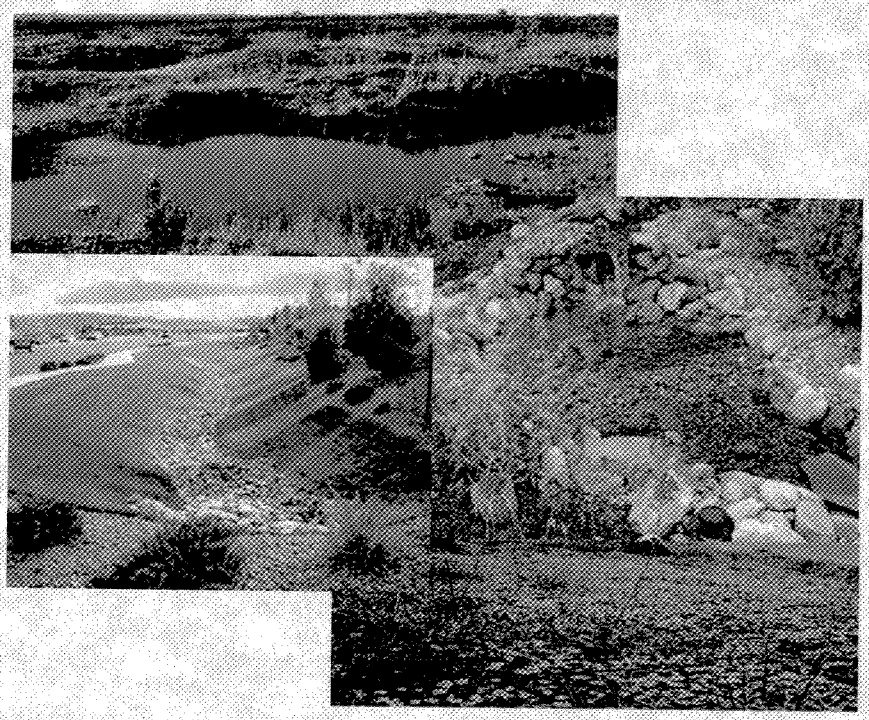

NPDES Permit #: CAS108766

San Diego Regional Water Quality Control Board Order #: R-9-2004-001

Bill Luna
County Executive Officer

Jay E. Orr
Assistant County Executive Officer

Executive Office, County of Riverside

County of Riverside Certification Statement

I Certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based upon my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Gary M. Christmas
Signature

Gary Christmas, Chief Deputy County Executive Officer

September 30, 2009
Date

Robert T. Andersen Administrative Center
4080 Lemon Street • 4th Floor • Riverside, California 92501 • (951) 955-1100 • Fax (951) 955-1105

SANTA MARGARITA WATERSHED NPDES MUNICIPAL STORMWATER PERMIT

(NPDES No. CAS0108766)

ANNUAL REPORTING FORMS

FOR

CITY/COUNTY/DISTRICT FISCAL YEAR 2008 - 2009

I. Executive Summary
1. Development Planning
2. Construction
3. Municipal
4. Industrial/Commercial
5. Residential
6. Education
7. Illicit Discharge Detection and Elimination
8. Public Participation
9. Fiscal Analysis Component
10. Non-Storm Water Discharges
11. Receiving Water Limitations
12. Additional Urban Runoff Data
13. Proposed Revisions

BOARD ORDER NO. R9-2004-001
CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN DIEGO REGION

Executive Summary

The County of Riverside (County), the Riverside County Flood Control and Water Conservation District (District), Coachella Valley Water District (CVWD) and the twenty-six cities of Riverside County including Banning, Beaumont, Blythe, Calimesa, Canyon Lake, Cathedral City, Coachella, Corona, Desert Hot Springs, Hemet, Indian Wells, Indio, La Quinta, Lake Elsinore, Menifee, Moreno Valley, Murrieta, Norco, Palm Desert, Palm Springs, Perris ,Rancho Mirage, Riverside, San Jacinto, Temecula and Wildomar (Cities) are regulated pursuant to the Federal Clean Water Act and the California Water Code through the following National Pollution Discharge Elimination System (NPDES) and Municipal Separate Storm Sewer System (MS4) permits:

- Whitewater River Basin, NPDES Permit No. CAS6177002 and California Regional Water Quality Control Board, Colorado River Region, Board Order R7-2008-001
- Santa Ana River Watershed, NPDES Permit No. CAS601833 and California Regional Water Quality Control Board, Santa Ana River Region, Board Order R8-2002-0011 (pending renewal)
- Santa Margarita River Watershed, NPDES Permit No. CAS0108766 and California Regional Water Quality Control Board, San Diego Region, Board Order R9-2004-001 (pending renewal)

The District serves as the principle permittee within the three watersheds described above, with the unincorporated County areas, Cities (depending on geography) and CVWD (Whitewater River Basin only) designated as the co-permittees. Collectively the permittees are required as part of the NPDES and MS4 permit process to adopt, develop and implement adaptable stormwater management programs to protect surface water quality and to report annually on their progress with respect to specific compliance activities.

Demographics

Population

The County was incorporated in 1893 out of parts of San Diego and San Bernardino Counties in Southern California. It is bordered by San Bernardino County (North), La Paz County, Arizona (East), Orange County (West) and Imperial and San Diego Counties (South). As of Jan 2009 the California Department of Finance estimates the population of Riverside County at 2,107,653 making it the fourth largest County of the fifty-eight counties in the State. This accounts for an increase of 29,052 residents since 2008. The County provides governmental services to 5.5% of the State's population.

City/County Population Estimates with Annual Percent Change
January 1, 2008 and 2009
(California Department of Finance, 2008/2009 Population Estimates)

State/County/City	Total Population 1/1/2008	Total Population 1/1/2009	Percent Change
California	37,883,992	38,292,687	1.1
Riverside County	2,078,601	2,107,653	1.4
Banning	28,148	28,457	1.1
Beaumont	31,317	32,403	3.5
Blythe	21,627	21,329	-1.4
Calimesa	7,423	7,498	1.0
Canyon Lake	10,994	11,128	1.2
Cathedral City	51,972	52,447	0.9
Coachella	40,317	41,000	1.7
Corona	146,698	148,597	1.3
Desert Hot Springs	25,939	26,552	2.4
Hemet	73,205	74,361	1.6
Indian Wells	5,000	5,093	1.9
Indio	80,962	82,230	1.6
Lake Elsinore	49,556	50,267	1.4
La Quinta	42,743	43,778	2.4
Menifee	0	67,705	0.0
Moreno Valley	182,945	186,301	1.8
Murrieta	99,576	100,714	1.1
Norco	27,143	27,160	0.1
Palm Desert	50,686	51,509	1.6
Palm Springs	47,019	47,601	1.2
Perris	53,340	54,323	1.8
Rancho Mirage	16,975	17,180	1.2
Riverside	296,191	300,430	1.4
San Jacinto	35,491	36,477	2.8
Temecula	99,873	102,604	2.7
Wildomar	0	31,321	0.0
Unincorporated County	553,461	459,188	-17.0

Land Area

As well as having the fourth largest population the County of Riverside has the forth largest land mass in the State encompassing 7295.6 square miles. The region is made up of 90 percent arid and semi arid desert rural lands with 10 percent comprising urban and suburban inland valleys and mountains. Less than 25 percent of the population lives in the rural portions of the County in comparison to 75 percent living in the western urban/suburban interface.

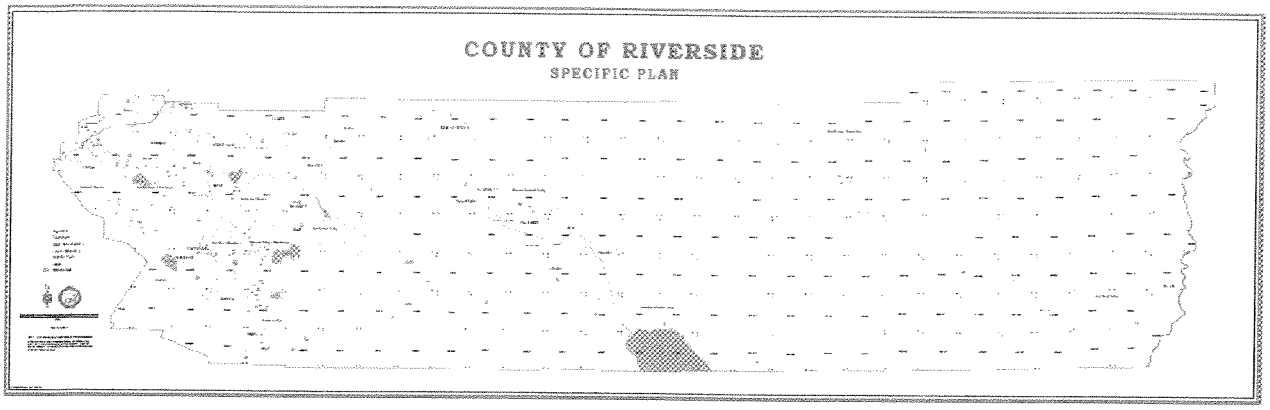

Land Use

Historically the primary land use for the region has been farming. The Coachella Valley is known for having one of the longest growing seasons in the world. Agricultural products cultivated in the Coachella Valley include fruits and vegetables. Because of the mild winter climate the Coachella Valley is in a state of transition with the demand for affordable housing and mild winters. The Coachella Valley is the annual winter destination for "snow-birds" (retired individuals who temporarily migrate to the desert to escape the harsh winters in the Midwest and Northeast.

The Central portion of Riverside County has been historically known as the "Agri-Empire" where potatoes and other vegetable crops were grown. It is also home to numerous dairy farms. The Temecula Valley has had a long tradition in citrus and avocados. However, most recently it has become known for its vineyards that produce world renowned wines.

In Western Riverside County expansive citrus groves once flourished and in 1895, due to the amazingly sweet naval orange crop, Riverside was the richest city per capita in the nation and referred to as the "Orange Empire". Almost one hundred years later only a few groves remain.

The urban/suburban interface of Western Riverside County has been transformed into a warehousing and transportation hub intersected by rail and interstate transportation corridors and linking the ports of San Diego, Long Beach and Los Angeles to heartland USA and destinations east.

Salton Sea

The Salton Sea is the largest lake in California. It is jointly contained in Riverside and Imperial Counties. The 320 square mile inland sea was formed in 1905 when an irrigation canal that brought water from the Colorado River to the valley was breached and overwhelmed by high water levels caused from heavy rains in the upper Colorado River watershed. For almost two years the entire flow of the Colorado River dumped into the "Salton Sink" filling it with water. Today's Salton Sea is slowly evaporating which is causing environmental and ecological concerns. The Salton Sea provides an

ecosystem for hundreds of species birds and other wildlife and is a crucial link to the Pacific Flyway and an integral part of the Colorado River delta.

Western Riverside County Multiple Species Habitat Conservation Plan

The Western Riverside County Multiple Species Habitat Conservation Plan (MSHCP) was adopted June 2003, and is a comprehensive multi-jurisdictional Habitat Conservation Plan (HCP) that focuses on conservation of species and their associated habitats in Western Riverside County. This plan was the first of several efforts in Southern California with the overall goal of maintaining biological and ecological diversity within a rapidly growing and urbanizing region. The MSHCP allows Riverside County and its cities to control local land use decisions and maintain a strong economic climate in the region while addressing the requirements of the state and federal endangered species acts. The HCP is one of the largest plans ever attempted in the nation and covers multiple species and habitats within a diverse landscaped that includes urban cents to undeveloped foothills and forests, all under multiple jurisdictions. It extends across many bioregion including the Santa Ana mountains, Riverside lowlands, San Jacinto foothills, San Jacinto mountains, Agua Tibia mountains, San Bernardino mountains and desert transition areas. The HCP provides for coordinated conservation areas that preserve biological diversity and maintain the regions quality of life.

The Western Riverside County MSHCP serves as a HCP pursuant to Section 10(a)(1)(b) of the federal Endangered Species Act of 1973 (FESA) and the Natural Communities Conservation Plan Act of 2001 (NCCP). The MSHCP authorizes participating jurisdictions "Take" of plant and wildlife species identified within the planning area. The United States Fish and Wildlife Service (USFWS) and the California Department of Fish and Game (CDFG) have the authority to regulate the Take of threatened, endangered, and rare species. In coordination with local land use authority these wildlife agencies review public and private development to ensure that Take is managed and coordinated in accordance with the MSHCP area.

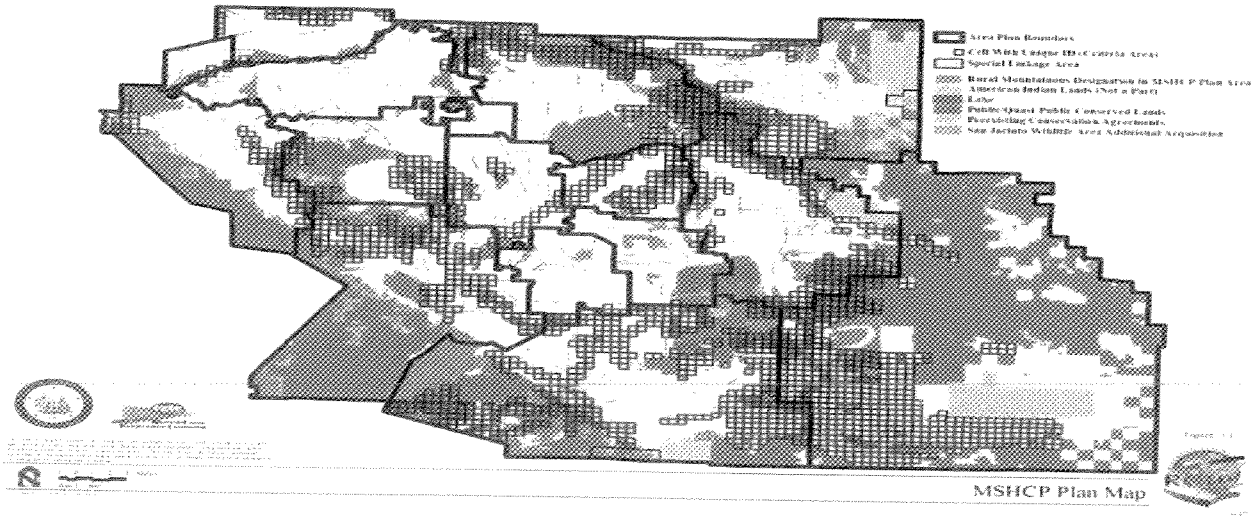

Coachella Valley Multiple Species Habitat Conservation Plan

The diverse desert landscape of the Coachella Valley provides habitat for dozens of plan and animal species, some found nowhere else in the world. Until the recent economic decline the Coachella Valley was one of the fastest growing regions in the State. The Coachella Valley Multiple Species Habitat Conservation Plan (CVMSHCP) provides a regional vision for balanced growth to meet the requirements of federal and state endangered species laws, while promoting enhanced opportunities for recreation, tourism and job growth. The CVMSHCP aims to conserve over 240,00 acres of open space and protect twenty-seven plant and animal species. The CVMSHCP not only safeguards the desert's natural heritage for future generations, it allows for timely construction of roads and other infrastructure that is vital to improving quality of life in the Coachella Valley.

The Coachella Valley Association of Governments (CVAG) serves as the lead agency for regional plan review and final consideration for new development as it relates to CVMSHCP. Participants include Riverside County, Cathedral City, Coachella, Desert Ht Springs, Indian Wells, Indio, La Quinta, Palm Desert, Palm Springs, Rancho Mirage, as well as the Coachella Valley Water District and the Imperial Irrigation District. The benefits of the CVMSHCP include:

- Preservation of Coachella Valley's native desert wildlife;
- Creates a system of open space, trails and reserves;
- Safeguards significant habitat linkages and wildlife corridors that enable animals to move safely and unobstructed from one habitat to another;
- Assures critical transportation corridors including freeways, currently planned road projects and interchanges can be constructed without delays resulting from endangered species conflicts;
- Offers certainty for new development and the business community making the Coachella Valley a more attractive place for businesses to relocate or expand;
- Ensures the continuation of the Fringe-Toed Lizard permit and provides long term conservation for this endangered species;
- Approximately 60,000 acres (twenty-five percent of the land) has already been acquired for the CVMSHCP.

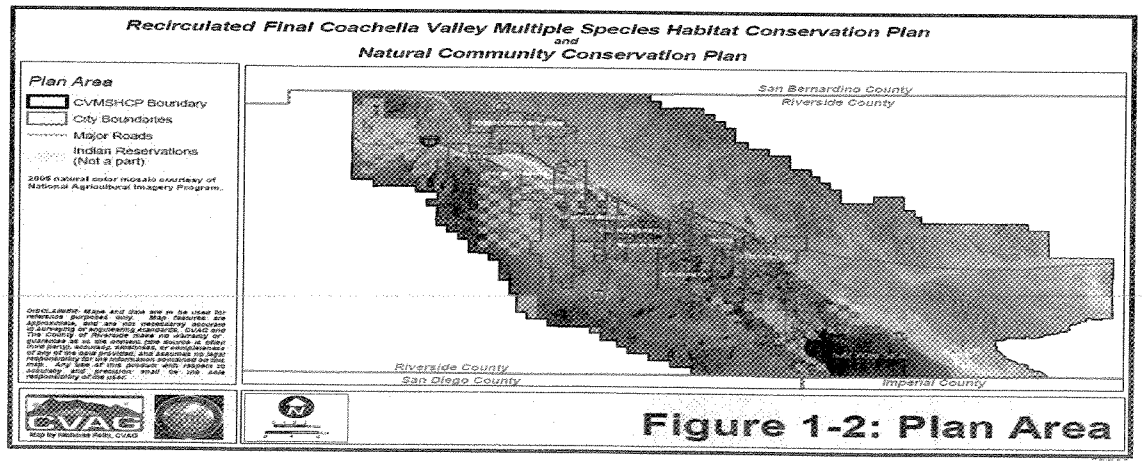

Figure 1-2: Plan Area

The combined efforts of the Western Riverside County MSHCP and the CVMSHCP will effectively preserve one third of the total land area within Riverside County which equates to 2,360 square miles of pristine meadows, forests and desert lands.

Weather, Precipitation and Drought

Riverside County continues to suffer moderate to severe drought conditions in all three watersheds. In fact those who ascribed to the global warming theory contend that the Southwestern United States is in the midst of a 10 year drought with no indication of it subsiding. The 2008-2009 storm seasons for most parts of western Riverside County was 65% of normal at 6.67 inches of rainfall. Palm Springs and the Coachella Valley experienced 97% of normal and recorded 5.07 inches of rainfall.

March-October 2008 was the driest such 8-month period on record for California and Nevada. As October came to a close, the California Department of Water Resources (www.water.ca.gov/drought) called the drought of the past two years, "the most significant water crisis in California's history." The drought was also arguably the biggest factor in the wildfires that made this year's "the worst fire season in California's history," according to Governor Schwarzenegger and CalFire. Water supply problems in the months ahead were expected. As noted by the North County Times, the amount of water being stored in California reservoirs was at its lowest point in 14 years, underscoring the severity of a worsening drought that could prompt providers to order rationing in San Diego and Riverside counties as early as January 2009. According to news reports (San Francisco Chronicle), California announced that it planned to cut water deliveries to their second-lowest level ever in 2009, raising the prospect of rationing for cities and less planting by farmers. The Department of Water Resources projected that it would deliver just 15 percent of the amount that local water agencies throughout California request every year. The reservoirs that are most crucial to the state's water delivery system were at their lowest levels since 1977, after two years of dry weather and court-ordered restrictions on water pumping out of the Sacramento-San Joaquin Delta.

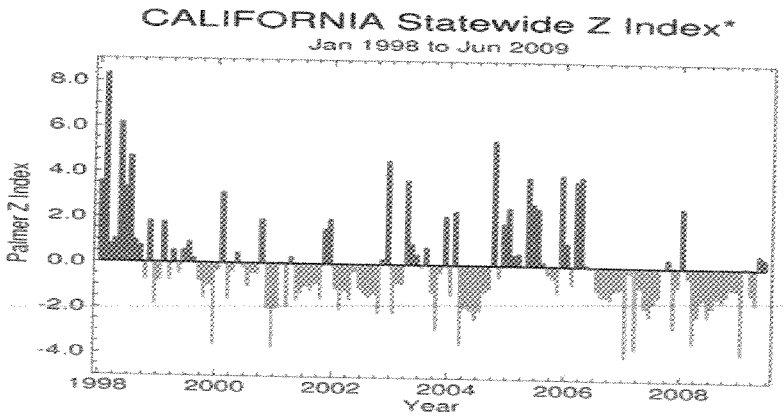

National Climatic Data Center / NESDIS / NOAA

*Palmer Z Index
Short-Term Drought

Dry Spell
Wet Spell

Economic Condition and Outlook

The economic condition and outlook for Riverside County is sobering at best. Unemployment for July 2009 is approaching 15%. Foreclosures, realignment of property taxes, non-existent new development, a faltering State budget and a sluggish economy have caused declines in all areas of local government.

ANNUAL LABOR FORCE AND EMPLOYMENT AVERAGES
County of Riverside

Civilian Year	Labor Force	Employment	Unemployment Number	Unemployment Percent
1992	576,400	507,600	68,800	11.9
1993	582,600	511,600	71,000	12.2
1994	597,400	534,000	63,400	10.6
1995	607,400	549,900	57,500	9.5
1996	614,500	563,100	51,400	8.4
1997	638,200	589,600	48,600	7.6
1998	659,900	615,900	44,000	6.7
1999	691,500	653,600	37,900	5.5
2000	680,700	644,200	36,500	5.4
2001	711,100	672,000	39,100	5.5
2002	750,400	701,800	48,600	6.5
2003	781,700	730,700	51,100	6.5
2004	820,900	771,600	49,300	6.0
2005	857,300	811,000	46,300	5.4
2006	890,100	845,300	44,800	5.0
2007	911,500	856,500	55,000	6.0
2008	918,800	839,900	79,000	8.6

2009 Monthly Labor Force and Employment Data **
County of Riverside

Month	Labor Force	Employment	Number	Percent
January	927,100	813,800	113,400	12.2
February	927,100	809,100	118,000	12.7
March	931,500	807,700	123,800	13.3
April	923,600	804,600	119,100	12.9
May	916,100	794,300	121,900	13.3
June	922,000	792,700	129,400	14.0
July*	925,400	789,100	136,400	14.7
August				
September				
October				
November				
December				

* Preliminary data
** Labor force data for all geographic areas now reflect the March 2008 benchmark and Census 2000 population controls at the state level.

Website: http://www.labormarketinfo.edd.ca.gov
Data Source: State of California Employment Development Department

The recession is over a year old and appears to have bottomed out. The Riverside County Assessor released the following table of assessed property value. The County-wide reduction is 10.5 %

RIVERSIDE COUNTY ASSESSOR
ASSESSED VALUE FOR CITIES
2009/2010

CITY	TOTAL 2009/2010 LOCAL ROLL	LESS NON-REIMBURSED EXEMPTIONS	NET TANGIBLE VALUE	LESS HOMEOWNER'S EXEMPTIONS	2009/2010 NET TAXABLE VALUE	2008/2009 NET TAXABLE VALUE	ASSESSED VALUE CHANGE	PERCENTAGE CHANGE
BANNING	1,892,855,441	29,069,121	1,863,786,320	42,552,776	1,821,233,544	2,085,234,266	(264,000,722)	-12.66%
BEAUMONT	3,032,750,635	37,704,383	2,995,046,252	37,690,561	2,957,355,691	3,433,163,322	(475,807,631)	-13.86%
BLYTHE	712,140,706	59,760,131	652,380,575	11,347,105	641,033,470	649,031,089	(7,997,619)	-1.23%
CALIMESA	626,851,566	20,851,019	606,000,547	12,414,596	593,585,951	674,799,992	(81,214,041)	-12.04%
CANYON LAKE	1,388,362,533	5,375,714	1,382,986,819	18,215,400	1,364,771,419	1,653,519,724	(288,748,305)	-17.46%
CATHEDRAL CITY	3,969,635,768	112,964,044	3,856,671,724	50,164,380	3,806,507,344	4,336,410,655	(529,903,311)	-12.22%
COACHELLA	1,812,837,329	124,593,687	1,688,243,642	19,943,566	1,668,300,076	1,969,816,859	(301,516,783)	-15.31%
CORONA	16,531,078,963	251,764,260	16,279,314,703	151,399,913	16,127,914,790	17,538,887,024	(1,410,972,234)	-8.04%
DESERT HOT SPRINGS	1,394,489,500	40,301,206	1,354,188,294	20,501,815	1,333,686,479	2,031,451,328	(697,764,849)	-34.35%
HEMET	4,663,340,424	87,827,026	4,575,513,398	86,714,458	4,488,798,940	5,387,762,136	(898,963,196)	-16.69%
INDIAN WELLS	4,928,767,802	41,681,052	4,887,086,750	10,182,200	4,876,904,550	5,056,071,924	(179,167,374)	-3.54%
INDIO	6,701,613,437	102,207,066	6,599,406,371	64,956,134	6,534,450,237	7,367,866,013	(833,415,776)	-11.31%
LA QUINTA	11,863,938,782	56,588,290	11,807,350,492	54,164,600	11,753,185,892	12,416,034,763	(662,848,871)	-5.34%
LAKE ELSINORE	4,101,193,647	40,181,207	4,061,012,440	42,153,790	4,018,858,650	4,885,098,504	(866,239,854)	-17.73%
MENIFEE	6,177,757,060	77,990,175	6,099,766,885	106,946,302	5,992,820,583	0	5,992,820,583	-
MORENO VALLEY	11,235,023,117	225,491,493	11,009,531,624	154,005,955	10,855,525,669	13,374,228,662	(2,518,702,993)	-18.83%
MURRIETA	10,112,353,803	108,567,661	10,003,786,142	117,769,454	9,886,016,688	11,689,213,209	(1,803,196,521)	-15.43%
NORCO	2,629,466,998	46,534,604	2,582,932,394	30,150,400	2,552,781,994	2,883,035,076	(330,253,082)	-11.46%
PALM DESERT	13,475,475,941	141,241,966	13,334,233,975	76,082,588	13,258,151,387	13,753,561,325	(495,409,938)	-3.60%
PALM SPRINGS	9,793,147,879	138,925,681	9,654,222,198	66,544,249	9,587,677,949	10,108,391,005	(520,713,056)	-5.15%
PERRIS	4,082,350,354	31,636,986	4,050,713,368	43,445,652	4,007,267,716	4,967,960,323	(960,692,607)	-19.34%
RANCHO MIRAGE	8,300,121,942	232,254,754	8,067,867,188	32,711,561	8,035,155,627	8,071,182,949	(36,027,322)	-0.45%
RIVERSIDE	23,942,491,969	939,822,636	23,002,669,333	266,165,526	22,736,503,807	24,598,583,377	(1,862,079,570)	-7.57%
SAN JACINTO	2,397,602,820	44,017,401	2,353,585,419	39,052,238	2,314,533,181	3,158,772,345	(844,239,164)	-26.73%
TEMECULA	12,003,546,129	112,285,694	11,891,260,435	115,782,800	11,775,477,635	13,320,998,304	(1,545,520,669)	-11.60%
WILDOMAR	2,498,809,180	60,180,421	2,438,628,759	35,529,624	2,403,099,135	0	2,403,099,135	-
CITY TOTALS	170,268,003,725	3,169,817,678	167,098,186,047	1,706,587,643	165,391,598,404	175,411,074,174	(10,019,475,770)	-5.71%

Data suggest that property tax revenue through FY 2011/2012 will not meet the current growth projections (represented by the dashed line in the graph below) used to estimate revenue as part of the county's long-range budget plan. The bold line represents a negative assessed value growth for FY2009/2010.

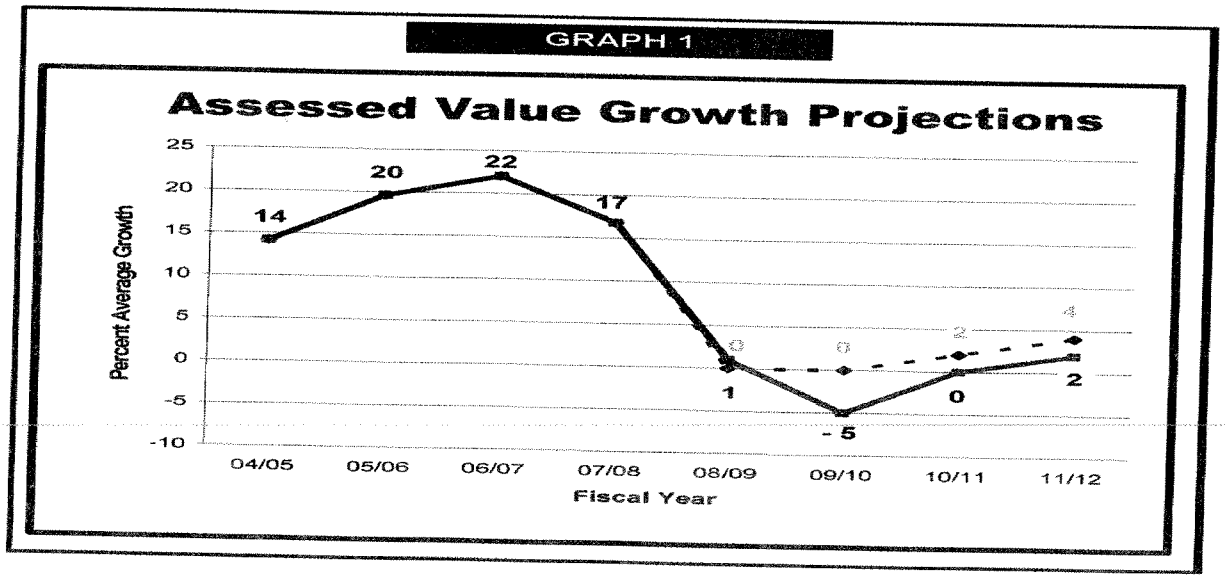

Local economist have stated that Riverside-San Bernardino region is poised to remain for the next year among the nation's weakest local economies, with unemployment soaring to as high as 16 percent and home values dipping to 65 percent below their 2006 peaks. Economists also concede that the real estate implosion in Southwest Riverside County was almost certainly a factor in the 11 percent decline in local retail sales in 2008 compared with 2007.

They predicted a recovery may begin to form in 2010. All agreed that real estate development should and probably will remain important for the region, and that its eventual recovery will probably play a role in a broader economic recovery. Ditto for the distribution and warehousing industries, which funnel imported goods from the Los Angeles, San Diego, and Long Beach port complex, the nation's largest. The downside is that wages are middling in those industries, and lower among the strip malls that dot the region, according to state figures.

Foreclosures

A report released by RealtyTrac in April of 2009 announced that the Riverside County region had the fourth highest foreclosure rate in the nation. Lenders sent default notices to 16,906 homeowners in Riverside County in the first quarter of 2009 a 12% increase from the same period in 2008. Other reports have warned that adjustable-rate loans taken out in the last three years will begin to reset next year through 2012, likely resulting in a second wave of foreclosures. As of August 2009 Riverside County has the second highest foreclosure rate in the State. Currently, 1 in 74 households in Riverside County are going into default.

Riverside County Budget Crisis for 2009-2010

Calling the budget process for 2009-2010 a challenge is an understatement. An overnight reduction of $130 million for general fund purposes (from a base of $750 million in FY 2008/2009) makes for difficult choices and requires a restructuring of government over the next several years. The State of California in an attempt to balance their own budget has taken steps to cut allocations in several program areas and raid local Prop 42 revenue. These additional losses in funds (approximately $45 million) will reduce the services that the County currently provides. Any unfunded mandates passed down to the local level will be vigorously challenged as resources are not available for frivolous program enhancements that are not proven to protect water quality or the environment.

County Governmental Structure

Board of Supervisors

The Riverside County Board of Supervisors is the governing body of the County, certain special districts, and the housing authority. The Board enacts ordinances, and resolutions, adopts the annual budget , approves contracts, appropriates funds, determines land use zoning for the unincorporated area of the county. In addition, the Board appoints certain County officers and members of various boards and

commissions. There are five supervisorial districts based upon an equal distribution of population.

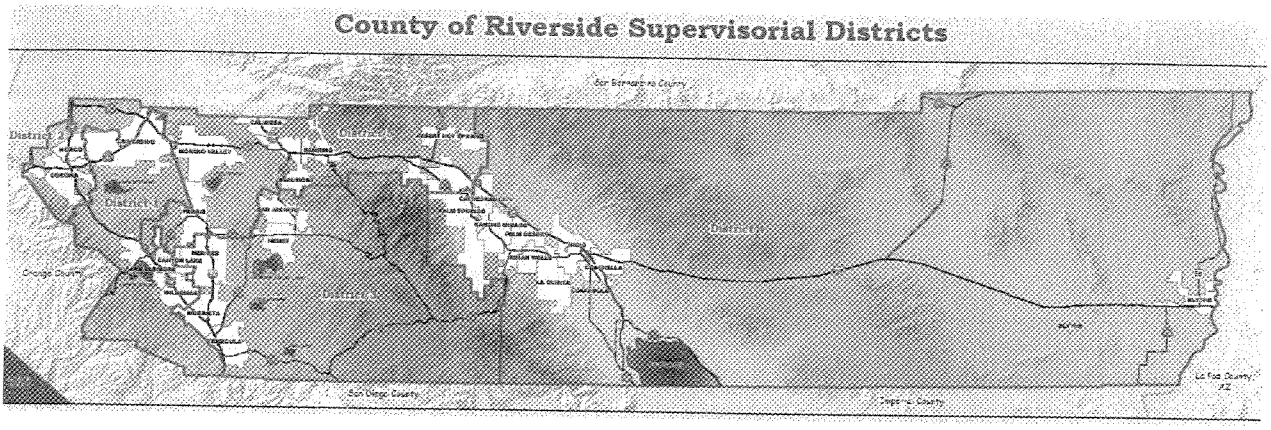

- The First District includes portions of Riverside and Lake Elsinore and the City of Wildomar;
- The Second District includes portions of Riverside, and the cities of Corona and Norco;
- The Third District includes the Cities of Canyon Lake, Hemet, Murrieta, San Jacinto, Temecula and portions of Menifee and Lake Elsinore;
- The Fourth District includes the cities Blythe, Cathedral City, Coachella, Indian Wells , Indio, La Quinta, Rancho Mirages and a portion of Palm Springs
- The Fifth District includes the cities of Banning Beaumont Calimesa, Desert Hot Springs, Moreno Valle and portions of Palm Springs and Menifee.

Executive Office

The County Executive Officer and his staff provide for management and administrative oversight for County activities including long range planning, budget, internal and inter-governmental affairs. The Executive Office coordinates all National Pollution Discharge Elimination System (NPDES) and Municipal Separate Storm Sewer System (MS4) activities with County departments to ensure consistency and regulatory compliance with all applicable laws and regulations.

Capital Improvement Projects

To ensure that all municipal construction projects have adequate funding and that all environmental requirements including CEQA, NPDES/stormwater and air quality criteria is considered the County Executive Office formed the Capital Improvement Project Oversite and Review Committee. The makeup of the committee includes representatives from the Executive Office with finance, NPDES and construction expertise, Director of Economic Development Agency and management staff, County Information Technology staff. All proposed projects must have adequate funding, be reviewed for various project requirements and approved prior to commencement of work.

Economic Development Agency

The Riverside County Economic Development Agency (EDA) includes various divisions made up of Community Development (Aviation, County Service Areas, and Housing) Economic Development and Redevelopment, Work Force Development, Life Style & Leisure (County Fair and National Date Festival) and Facilities Management including Capital Improvement Projects (CIP). The inclusion of Facilities Management Department within the Economic Development Agency was due to the fact that CIPs are managed from the conceptual idea, environmental study, project design, construction, and then maintained by Facilities Management. Economic and Redevelopment projects go through the same process as CIP. To save costs the building and construction functionality of EDA and Facilities Management was merged.

Leadership in Energy and Environmental Design (LEED™) Certification

The LEED™ "green building rating is a nationally accepted benchmark for the design, construction and operation of green buildings. LEED™ gives building owners and operators the tools they need to have and immediate and measurable impact on their buildings' performance in five key areas:

- Sustainable site development
- Water conservation
- Energy efficiency
- Materials selection, and
- Indoor air quality
-

The County of Riverside EDA is on the cutting edge as it has incorporated LEED™ criteria into CIP.

County Service Area 152 (CSA 152)

The Economic Development Agency assumed control of County Service Area's (CSAs) in July of 2002.CSAs are an alternative method of providing governmental services by the County within unincorporated areas to provide extended services such as sheriff protection, fire protection, local park maintenance services, water and sewer services, ambulance services, streetlight energy services, landscape services and street sweeping.

CSA 152 was designated as the mechanism to provide limited maintenance for MS4 and NPDES issues within the service area.

Transportation Land Management Agency

The Riverside County Transportation Land Management Agency (TLMA) is made up of the following departments: Transportation, Building & Safety, Code Enforcement, Planning, Environmental Programs, Administrative Services which includes Geographic Information System (GIS) and database management.

New Development construction has come to a complete standstill as builders and developers reacted to an unexpected severe drop-off in buying. The spiraling decline in permit activity has caused the county to take steps to reduce the number of inspectors and engineers that perform plan review and field work. This exodus of qualified staff through early retirement and layoffs has cause a loss of institutional knowledge and experience.

- ***Building and Safety Department-*** To augment the Compliance Assistance Program (CAP) program the County took steps in December of 2007 to establish a business registration and licensing ordinance. Ordinance 857, Section 13 provides for water quality inspections and enforcement of the MS4 permit requirements. Over 10,000 establishments have been registered within the unincorporated portion of the County. For those businesses that meet the criteria for a water quality inspection an additional inspection fee is charged. The CAP will continue to be utilized by the cities until such time the water quality inspections program is integrated through an MOU or each city independently establishes their own water quality inspection program. This is a revenue neutral program and the fee only and covers the cost of registration and the time required to perform the water quality inspections. Building and Safety is also responsible for inspections of new residential and commercial development for sediment and erosion control measures. Referrals are made to the Regional Board for observed non-compliance issues associated with the Statewide General Construction Permit.
- ***Code Enforcement Department-*** The Code Enforcement Department is the investigatory unit that does follow-up investigations on land use complaints. This includes illegal connections and illicit discharges (IC/ID) investigations. The Code Enforcement Department has taken a more proactive approach to community policing and outreach by implementing a community improvement planning process in the economically underserved communities throughout the County. The community improvement plan is used to address conditions that otherwise lead to blighted conditions. "The Posting" a monthly newsletter provides success stories throughout the area.
- ***Planning Department-*** The Planning Department is the entry portal for private residential and commercial development review for the unincorporated county areas. A checklist is utilized to ensure that projects conform to the MS4 permit requirements. Projects that meet specified criteria are subject to the submission of a Water Quality Management Plan (WQMP) which is synonymous with the Standard Urban Stormwater Mitigation Plan (SUSMP). The WQMP is reviewed by the Riverside County Flood Control and Water Conservation District for substantial conformity. The WQMP is required to address post construction best management practices (BMPs), long term maintenance and monitoring.
- ***Environmental Programs Department-*** The Environmental Programs Department (EPD) is responsible for overseeing program implementation of the regional habitat conservation plans including the Expedited Review Process (ERP) for the Western Riverside County MSHCP.

- ***ERP-*** Property owners who intend to construct a single family residence on an existing legal parcel will be required to go through the ERP if their property is located within a criteria cell as identified in the MSHCP. The ERP will determine the appropriate location of a building footprint and access roads. Habitat assessments for plants and /or animal species may also be required. The ERP does not prevent construction, but the result of the ERP may require that structures and access road be located on the least sensitive portion of the property.

- ***Administrative Services (GIS and data management)-*** The Administrative Services Department provides support to the other departments within the TLMA structure including GIS and data management functions.
- ***Transportation Department-*** The County Transportation Department provides design specifications, construction and monitoring and maintenance of publicly owned roads, right of way and some MS4 facilities. One of the tools utilized by the Transportation Department to ensure compliance of the MS4 facilities is through the formation of Landscape and Lighting Maintenance Districts (LLMDs). Each LLMD is responsible for ensuring that MS4 facilities and structural BMPs in their right of way are routinely cleaned and maintained. The LLMD also provides for street sweeping in some areas. Another function of the Transportation Department is the mapping of MS4 facilities that are owned and operated by the department. GIS mapping is a fluid process and continues to grow as new areas in the county are developed.

Community Health Agency

The Community Health Agency is the umbrella agency for the Department of Environmental Health. The Department of Environmental Health (DEH) provides support to the MS4 program through the CAP for those cities that do not have an industrial solid/liquid waste inspection program. A survey form is used by DEH staff to supplement the inspection efforts of businesses that handle hazardous materials, generate hazardous waste, store fuel in underground storage tanks and retail food establishments. The surveys are then provided to the cities to follow-up on any MS4 compliance issues. The DEH also responds to hazardous materials emergency spills and large sewage discharges (greater than 1000 gallons) that have the potential of entering the MS4. The DEH also performs complaint investigations for some IC/ID. The DEH also is part of the District Attorney's Environmental Crimes Task Force where some misdemeanor and felony environmental crimes investigations are handled.

DEH acts as the Local Enforcement Agency (LEA) for solid waste issues. As part of the franchise trash haulers agreement some jurisdictions in the unincorporated portions of the county require mandatory trash pickup and street sweeping.

On-Site Wastewater Disposal System (OSWDS) or septic system construction is managed through plan check activities. OSWDS moratoriums and prohibitions in coordination with the Santa Ana RWQCB have been instituted in various locations within the watershed.

Special Districts

Regional Parks and Open Space District

The Riverside County Regional Park and Open-Space District was created by the electorate in November 1990 by a 64% vote and formed on January 29, 1991. The District is an independent agency governed by the Board of Supervisors, which sits as the District Board of Directors. The Park District presently employs approximately 100 staff who bring to their jobs a high degree of dedication to the public and a wide variety of skills and abilities.

At the present time, the district manages and operates more than 44,000 acres which includes forty parks, reserves, historic or archaeological sites and ninety miles of regional trails. The staff includes professionals in the fields of accounting and finance, biology, building and grounds maintenance, carpentry and construction, ecology, as well as environmental restoration.

Additional fields include historic preservation, interpretation, landscape architecture, museum and curatorial management, park planning, personnel administration, recreation, security, trails planning and construction, weddings and special events, wildlife habitat management, and a host of other disciplines.

Waste Resources Management Department

The mission of the Riverside County Waste Management Department is to provide for the protection of the general public health and welfare by efficient management of Riverside County's solid waste system through:

- provision of facilities and programs which meet or exceed all applicable local, State, Federal and land use regulations;
- utilization of up-to-date technological improvements;
- development and maintenance of a system that is balanced economically, socially and politically; and,
- economically feasible recovery of waste materials.

The Waste Management Department currently operates 6 landfills; an additional privately owned and operated landfill is located in Western Riverside County. In addition to the landfills there are 8 privately owned and operated transfer stations.

Recycling and Specialty Programs

Household Hazardous Waste (HHW)-Residential Program

The County of Riverside established the Household Hazardous Waste Program in October 1988 with the formation of a mobile community HHW collection program. This HHW program has evolved and is comprised of a combination of three permanent HHW collection centers, two Antifreeze, Battery, Oil and Paint (latex only) ABOP collection centers and temporary collection events at 16 locations throughout the County.

Conditionally Exempt Small Quantity Generator (CESQG) -Business Program

As an enhancement to the HHW program and to encourage small businesses to properly handle their hazardous waste the County provides the CESQG program as an affordable and legal solution for the proper disposal of hazardous waste. The program is on an appointment only basis and a hazardous waste disposal contractor comes to the business to ensure proper labeling and documentation is provided.

Universal and e-Waste

Universal Wastes are hazardous wastes that are generated by several sectors of society, rather than a single industry or type of business. Universal Wastes contain harmful chemicals, which, if put in the trash may harm people or the environment. E-waste include:

- ***Common Batteries*** - AA, AAA, C & D Cell and button batteries (e.g. hearing aid and watch batteries). Automotive type batteries are not Universal Waste. When they become waste, they are regulated under a different law.
- ***Fluorescent Tubes, Bulbs and Other Mercury Containing Lamps*** - Fluorescent light tubes and bulbs, Hi Intensity discharge (HID), metal halide, sodium and neon bulbs.
- ***Electronic Devices*** - Televisions, computer monitors computers, printers, VCR's, cell phones, telephones, radios, and microwave ovens.
- ***Mercury-Containing Devices*** - Thermostats, switches, thermometers, dental amalgam, pressure and vacuum gauges, novelty items, counterweights and dampers, and medical devices known as dilators.
- ***Non-Empty Aerosol Cans that Contain Hazardous Materials***. (Labeled Toxic, Flammable, or Corrosive)

Riverside County's Backyard Composting Program:

This program has been developed to aid the residents of Riverside County in composting their organic material, so that we can all recycle more and discard less.

Composting harnesses the natural process of decomposition by turning organic matter (such as fruit and vegetable wastes, grass clippings, leaves, and some animal manure's) into a useful product for your landscape or garden. Composting can also improve hard, depleted soils, so that flowers, vegetables, and fruit trees can thrive in a nutrient-rich environment. Composting also improves the soil by boosting its fertility, its moisture-holding capabilities, and its texture.

Composted material is actually rather expensive to buy. But anyone with a little extra room in a garden, a little extra time, and a good source of compostable materials can produce good, high quality compost in as little as 4 weeks - absolutely free! By composting, you return the earth's nutrients back to the soil, where your plants absorb them, thereby becoming healthier. Healthy plants are far more resistant to diseases and pests. Instead of throwing away your organic waste, compost them! You will cut down your trash collection service, and you will be prolonging the life of Riverside County's rapidly depleting landfill space!

Sharps

Hypodermic needles, lances, and other sharp material associated with medical treatment can be collected in sharps containers and brought to the HHW collection centers for proper disposal. Sharps containers can be obtained from your HHW collection center or local pharmacy.

Construction Activities

The Waste Management Department's construction and industrial activities include maintenance of county operated landfills and stabilization of closed landfills. This includes the requirement to prevent and mitigate stormwater or other discharges including sediment, solid waste and liquids from entering an MS4 system.

Flood Control and Water Conservation District (District)

The Control and Water Conservation District (District) operates and maintains major flood control facilities such as dams, flood basins, levees, open channels and major underground storm drains. In most cases, the District does not maintain storm drain inlets or pipes less than 36 inches in diameter. These smaller facilities are typically maintained by City or County Transportation Department crews. The engineering design of all projects constructed by the District is performed under the direct supervision of, one of the District's two design teams. They are responsible for coordinating all activities involved in moving projects forward from the conceptual planning phase to the actual start of construction

The construction section administers all District construction contracts and inspects the construction of all flood control projects to be accepted for operation and maintenance by the District.

In addition, as part of the plan review process for private development and CIPs within the county, the District's planning section review and make recommendations on WQMP submittals.

Local Ordinances

The County of Riverside has enacted the following ordinances to address stormwater issues and related activities. The text for each of the ordinances can be found at http://www.clerkoftheboard.co.riverside.ca.us/ords.htm

ORDINANCE 348
Land Use Ordinance of Riverside County
Amended through Ordinance No. 348.4574

ORDINANCE 427
Regulating Land Application of Manure
Amended through Ordinance No. 427.3

ORDINANCE 492
Regulating Food Establishments and Food Facilities
Amended through 492.9 and Incorporating by Reference Ordinance 725

ORDINANCE 541
Related to the Removal of Rubbish
Amended through Ordinance 541.5

ORDINANCE 615
Relating to Establishments where Hazardous Waste is Generated, Stored, Handled, Disposed, Treated or Recycled
Amended through Ordinance 615.3

ORDINANCE 617
Regulating Underground Storage Tank Systems containing Hazardous Substances
Amended through Ordinance 617.4

ORDINANCE 650
Regulating the Discharge of Sewage in the Unincorporated Areas of Riverside County
Amended through Ordinance 650.5 and Incorporating Ordinance No. 725

ORDINANCE 657
Regulating the Collection, Transfer, and Removal of Solid Waste
Amended through 657.6

ORDINANCE 689
Prohibiting the Unlawful Dumping of Trash
Amended through 689.1

ORDINANCE 725
Establishing Procedures and Penalties for Violations of Riverside County Ordinances and Providing for Reasonable Costs Related to Enforcement
Amended through 725.12 and Incorporating by Reference Ordinance 640.

ORDINANCE 745
Providing for the Comprehensive Collection and Disposal of Solid Waste in Specified Unincorporated Areas of Riverside County
Amended through Ordinance 745.2

ORDINANCE 754
Establishing Stormwater/Urban Runoff Management and Controls
Amended through Ordinance 754.2

ORDINANCE 772
Declaring as a Fire Hazard Abandoned or Neglected Orchards, Groves or Vineyards, and Ancillary weeds and Debris and Providing for their Abatement

ORDINANCE 812
Prohibiting the Land Application of Class B Sewage and Sludge
Amended through Ordinance 812.1 and Incorporating by Reference Ordinance 725

ORDINANCE 830
Regulating the Land Application of Class A Sewage Sludge For Agricultural Activities
Amended through Ordinance 830.1 and Incorporating by Reference Ordinance 725.

ORDINANCE 843
Regulating the Discharge of Waste into the Public Sewer System for the Highgrove Community

ORDINANCE 856
Establishing a Septic Tank Prohibition for Specified Areas of Quail Valley
Requiring the Connection of Existing Septic systems to Sewer

ORDINANCE 857
Regarding the Establishment of a Business Registration and Licensing Program

ORDINANCE 859
Establishing Water-efficient Landscape Requirements
Amended through Ordinance 859.1

ORDINANCE 871
Prohibiting the Installation of Specified Septic Systems in Cherry Valley

ORGANIZATIONAL CHART

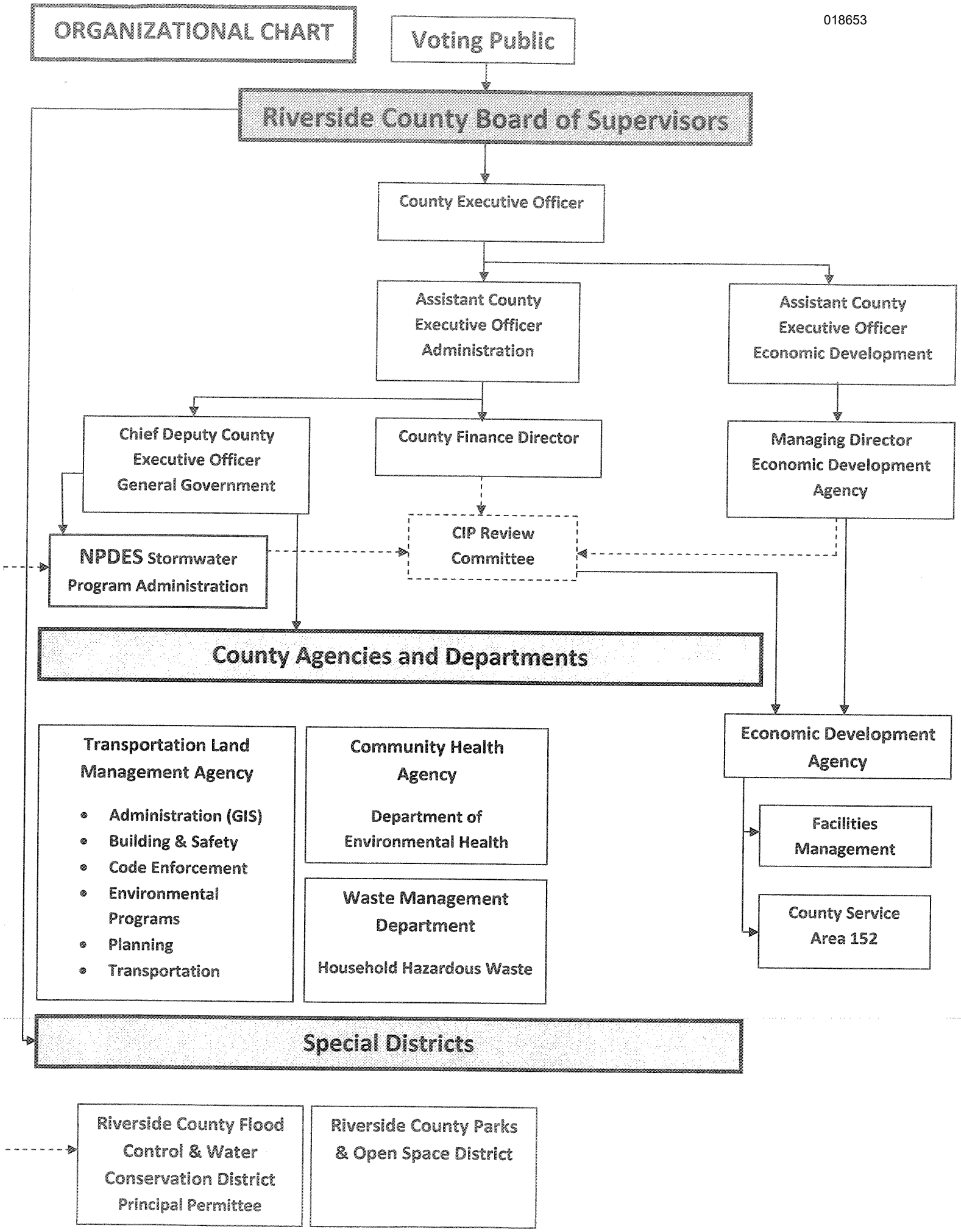

1. DEVELOPMENT PLANNING
(SECTION F of ORDER NO. R9-2004-001)

1) **Description of any amendments to the General Plan or the development project approval process:** None

1) **Number of grading permits issued:** 388 within the Santa Margarita Watershed

2) **Number of developments conditioned to meet SUSMP(WQMP) requirements:** See Flood Control Report for projects conditioned and reviewed for SUSMP (WQMP) by the District. Three municipal CIPs were conditions with SUSUMP/WQMP requirements

3) **Attach one example of a development project that was conditioned to meet SUSMP (WQMP) requirements and a description of the required BMPs:** See Flood Control District Report

4) **Description of any updates to the environmental review process:** None, the 2003 General Plan is still in effect.

5) **Description and number of training efforts conducted during the reporting period (for staff, developers, contractors, etc.), including the number of staff trained.**

a) **Training:**

Training	Training Description	Training Dates	Number of Attendees
WQMP	WQMP Training	11/3/08	19
	WQMP Training	5/4/09	11
	WQMP Training	6/8/09	2
		Total	**0**

b) **Summarize the educational and outreach activities the Development Planning Component has conducted over the past year:** [i.e., focused brochures, posters - see Education form (Section I)] Educational Outreach is provided through Riverside County FC&WCD. Kiosks are setup at all TLMA in-take counters where NPDES stormwater information is available. Each Development Project conditioned for approval is required to obtain copies of public education materials, sign an affidavit stating that they will provide stormwater related materials to all property owners. In addition the County and RCFC&WCD keep the general public and the development community informed of all training and educational opportunities through the District website and informational bulletins.

1. DEVELOPMENT PLANNING
(SECTION F of ORDER NO. R9-2004-001)

6) **An assessment of program effectiveness based on the measurable goals established in the Permittee's Individual SWMP:**

   a. Training continues to be a priority with changing technology and increased emphasis on hydromodification and low impact development (LID) as they relate to SUSMP (WQMP) requirements.

   b. Projects that meet the regulatory threshold are conditioned for SUSMP/WQMP

7) **Additional Comments/Information:**

Describe the major accomplishments of the Development Planning Component over the past year. (General Plan or ordinance revisions, procedure/approval process changes, SUSMP guidance material): The Economy has continued to stall, which has effectively curtailed most development over the last 18 months as can be seen by the significant drop off in the number of grading permits issued. Availability of diminishing water resources caused by drought conditions will continue to have an impact on future development for the region. For those projects that have moved through the development process and into the construction phase, emphasis has been on incorporated drought tolerant landscape and water efficient micro-irrigation techniques including the use of smart irrigation controllers. Where recycled water is available infrastructure is being added to accommodate common area landscape.

Summarize new activities or improvements to be implemented next year as a result of your self assessment of the Development Planning Component:

Post construction BMPs installed by developer continue to be inspected by Building and Safety –Environmental Compliance Inspection staff to ensure that they are working as designed and are providing adequate protection of the MS4.

Planned Projects for FY 2009/2010

Facilities Management

1. Southwest Law and Justice Center (Parking Lot Expansion)

WDID #: 9-33C352808

Processing Date: 7/31/2008

WQMP completed: Yes

Project Manager: Nahid Selbe

Comments: Project funded, design phase completed and moving forward to bid award.

Date Project Completed: unknown, to be determined

1. DEVELOPMENT PLANNING
(SECTION F of ORDER NO. R9-2004-001)

2. Glen Oaks Fire Station (On Hold) (Facilities Management)

WDID #:

Processing Date:

WQMP completed: Yes

Project Manager: Dane Winkelman

Comments: Land acquisition completed-, project put on hold pending funding

Date Project Completed: unknown, funding not obtained

3. Lake Riverside Fire Station (On Hold)

WDID #: Pending

Processing Date: Pending

WQMP Completed: No

Project Manager: Real Estate – Burt Presnell

Comments: Land acquisition not yet completed. Further geotechnical study underway.

Date Project Completed: unknown, pending further study

2. CONSTRUCTION
(SECTION G of ORDER NO. R9-2004-001)

1) **Number of inspections conducted:** 508

2) **Number and type of enforcement actions related to construction sites:**

Enforcement and Compliance Responses	Private Projects	Public Projects
Non-monetary Penalties	0	0
Stop Work Authority	28	0
Fines	0	0
Financial Security	0	0
Permit/Certificate of Occupancy Denial	0	0
Referral to SDRWQCB	49	0
Total	**77**	**0**

3) **Description of modifications made to the construction and grading approval process:** The Building and Safety Department construction and grading approval process has not been significantly modified since our last annual report was filed. Standard NPDES Construction Notes are still required to be included on the County approved grading plans for projects with more than one acre of disturbance. Projects with less than one acre of disturbance are still required to install erosion and sediment controls, but not to the same extent as those projects involving more than one acre. The Department still ensures that proof of the filing of a NOI is provided when necessary and that the site WDID is noted.

4) **Description and number of training efforts conducted during the reporting.**

a) **Training:**

Training	Training Description	Training Dates	Number of Attendees
Grading 101 and BMPS	Grading- BMP- 101 class	3/18/09	10
Construction NPDES	Classroom Training	9/4/08	8
Construction NPDES	Classroom Training	10/9/08	8
In Field NPDES training	(one on one) NPDES Field training	10/9/08	8
BIA Construction NPDES	Board Chambers Class Training	1/15/09	30
Flood Control Provided Construction Training	Classroom Training	9/29/08 9/30/08 5/27/09	33 59 24
		Total	**180**

2. CONSTRUCTION
(SECTION G of ORDER NO. R9-2004-001)

b) **Summarize any additional education and outreach activities conducted for project applicants, contractors, developers, property owners, and/or responsible parties in support of the Construction Component:**

Building and Safety: During NPDES construction inspections, staff spent a substantial amount of time meeting with developers, owners. Etc., discussing the educational material that is available for the development of the site specific SWPPPs ad the installation and continued maintenance of site erosion and sediment control measures. In addition our inspection staff spent and additional six, nine hour days training one on one on construction aspects and NPDES related materials with our consultant. Educational materials such as brochures and posters are freely distributed for use and reference by to interested parties to assist with compliance of NPDES rules and regulations. Pre-storm season site inspections are conducted on all single family residential, commercial and tract construction sites in September of each year. In addition the Building and Safety Department spends time with small builders and owner-builders to insure that they understand what BMPs are and give them ample opportunity to meet compliance requirements. This storm season was third year in a row where pre-season storm inspections were conducted. 1176 conducted in 2008. In August 2008 County staff assisted in leading over 200 developers in the area with NPDES training at the Pechanga Indian Resort.

Transportation: The Transportation Department encourages and supports all appropriate staff to attend NPDES Training. In addition to NPDES Construction training, five (5) employees attended training in NPDES Municipal, NPDES Water Quality Management Plan and NPDES Vegetation Management.

EDA/Facilities Management: All construction management staff has received NPDES training in construction management to ensure that municipal construction projects are in compliance with NPDES rules and regulations.

Regional Parks and Open Space District: Planning staff responsible for oversight of municipal construction activities have received the required NPDES training.

5) **An assessment of program effectiveness based on the measurable goals established in the Permittee's Individual SWMP:**

Building and Safety Department: 508construction related NPDES inspections were completed on 157 project sites within the upper portion of the Santa Margarita Watershed. The table below provides the distribution of sites greater than 1 acre that were inspected during the 2008-2009 Storm Season.

Project Type	# of Projects
Single Family Residential > 1 acre	123
Commercial	8
Tracts	27

2. CONSTRUCTION
(SECTION G of ORDER NO. R9-2004-001)

Transportation Department: two (2) construction projects were completed in the Santa Margarita region.

Project Description	Status	Priority	# of Inspections	NOI Submitted	NOT Submitted
Scott Rd Widening	Completed	Medium	11	Oct 2008	Sep 2009
*Winchester Rd (SR79-Thompson Rd to Whisper Rd)	Completed	Low	2	Feb 2008	Aug 2008

* Note: The Winchester Road Project (State Route 79) was under the jurisdiction of the Caltrans NPDES Permit.

The NPDES Construction Inspection Program requires that High priority projects be inspected once every two weeks. Medium priority projects are required to be inspected once each month, and Low priority projects are required to be inspected once during the wet season (October 1st thought May 31st).

6) **Additional Comments/Information:**

- A Decision was made by the Building and Safety Department to utilize County staff to conduct NPDES construction inspection instead of consultant services. Currently there are four fulltime Environmental Compliance Inspectors, two Senior Environmental Compliance Inspectors and one Principle Environmental Compliance Inspector.

- For the 2009-2010 storm season all construction sites will be required to have a storm season meeting prior to grading activities commencing.

- The Transportation Department utilized consultant services, URS Corporation, to conduct NPDES Construction and Municipal Inspections for FY 08/09.

Other Comments

For FY 09/10, URS will continue to assist the Transportation Department with Construction and Municipal Inspections for public road construction activities.

3. MUNICIPAL
(SECTION H.1 of ORDER NO. R9-2004-001)

1) **Number of inspections conducted at existing municipal facilities:** There are currently no EDA-Facilities Management /county owned facilities within the Santa Margarita Watershed that have post construction BMPs as required by a WQMP. Current county owned municipal construction was completed prior to the WQMP requirement. Future projects will require WQMPs and inspection schedules for post construction BMPs. The Department of Environmental Health conducted CAP hazardous materials and UST inspections of county facilities including fleet services and transportation maintenance countywide. Also, Transportation conducts facility inspection though a consultant at all road maintenance yards throughout the County.

2) **Number and type of enforcement actions related to municipal sites:**

Enforcement and Compliance Responses	Number
Education and Information	
Verbal warning	
Written warning	
Other:	
Total	**0**

3) **Number of catch basins and inlets that were inspected and the number that were cleaned:**

Transportation Department	Number Inspected	Number Cleaned
Catch Basins and Inlets	149	149

3. MUNICIPAL
(SECTION H.1 of ORDER NO. R9-2004-001), CONT.

4) **Assessment of the amount and type of debris removed from catch basins, streets, and open channels, including an identification of problem areas that generate the most pollutants:**

Facility	Type of Debris	Amount (tons)	Problem Areas that Generate Most Pollutants
Catch Basin Cleaning Program	Vegetative Litter	5.42	
	Anthropogenic Litter	7.95	
	Sediment	10.62	
	Other man-made debris		
Total		**23.99**	**tons (wet weight)**
Street Sweeping Program	Vegetative Litter	179.02	
	Anthropogenic Litter	59.67	
	Sediment	954.82	
	Other man-made debris		
Total		**1,193.51**	**tons (wet weight)**
Roadside Litter Removal Program	Vegetative Litter		
	Anthropogenic Litter	11.15	
	Sediment		
	Other man-made debris		
Total		**11.15**	**tons (wet weight)**
Code Enforcement Clean Up Program	Vegetative Litter	469.19	
Total		**469.19**	**tons (wet weight)**
	TOTAL	**1696.84**	**tons (wet weight)**

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3. MUNICIPAL
(SECTION H.1 of ORDER NO. R9-2004-001), CONT.

5) **Assessment of effectiveness of BMPs that have been implemented for municipal facilities and activities:**

BMP Code	Description	Used	Notes
SC-10	Non-Stormwater Discharges	☐ Yes ☐ No	N/A
SC-11	Spill Prevention, Control and Clean-up	☒ Yes ☐ No	Transportation, Fleet Services, Waste Mgmt
SC-20	Vehicle and Equipment Fueling	☒ Yes ☐ No	Transportation, Fleet Services, Waste Mgmt
SC-21	Vehicle and Equipment Cleaning	☒ Yes ☐ No	Transportation, Fleet Services, Waste Mgmt
SC-22	Vehicle and Equipment Repair	☒ Yes ☐ No	Transportation, Fleet Services, Waste Mgmt
SC-30	Outdoor Loading/Unloading of Materials	☒ Yes ☐ No	Purchasing
SC-31	Outdoor Liquid Container Storage	☒ Yes ☐ No	Transportation, Fleet Services, Waste Mgmt
SC-32	Outdoor Equipment Maintenance	☒ Yes ☐ No	Transportation, Fleet Services, Waste Mgmt
SC-33	Outdoor Storage of Raw Materials	☒ Yes ☐ No	Transportation
SC-34	Waste Handling and Disposal	☒ Yes ☐ No	Transportation, Fleet Services, Waste Mgmt
SC-35	Safe Alternative Products	☒ Yes ☐ No	Purchasing
SC-40	Contaminated or Erodible Areas	☐ Yes ☐ No	N/A
SC-41	Building and Grounds Maintenance	☒ Yes ☐ No	EDA-Facilities
SC-42	Building Repair and Construction	☒ Yes ☐ No	EDA-Facilities
SC-43	Parking/Storage Area Maintenance	☒ Yes ☐ No	EDA-Facilities
SC-44	Drainage System Maintenance	☒ Yes ☐ No	EDA-Facilities
SC-60	Housekeeping Practices	☒ Yes ☐ No	EDA-Facilities
SC-61	Safe Alternative Products	☒ Yes ☐ No	EDA-Facilities
SC-70	Road and Street Maintenance	☒ Yes ☐ No	Transportation
SC-71	Plaza and Sidewalk Cleaning	☒ Yes ☐ No	EDA-Facilities
SC-72	Fountain and Pool Maintenance	☐ Yes ☐ No	N/A
SC-73	Landscape Maintenance	☒ Yes ☐ No	County Policy H28
SC-74	Drainage System Maintenance	☒ Yes ☐ No	EDA-Facilities
SC-75	Waste Handling and Disposal	☒ Yes ☐ No	Transportation, Fleet Services, Waste Mgmt
SC-76	Water and Sewer Utility Maintenance	☐ Yes ☐ No	N/A

Assessment of the effectiveness of BMPs that have been implemented for municipal facilities and activities.

Applicable departments have facility pollution prevention plans that include BMPs that are managed by each site.

018662

3. MUNICIPAL
(SECTION H.1 of ORDER NO. R9-2004-001), CONT.

6) **Description and number of training efforts conducted over the last year (for municipal facility operators and/or inspectors).**

a) **Training:**

Training	Training Description	Training Dates	Number of Attendees
Municipal	Municipal Training	11/6/08	10
	Municipal Training	11/18/08	4
	Municipal Training	5/5/09	9
	Municipal Training	5/26/09	14
		Total	**37**

b) **Summarize the internal and external education and outreach activities the Municipal Component has conducted over the past year:** Staff attended the municipal training provided by Flood Control.

7) **An assessment of program effectiveness based on the measurable goals established in the Permittee's Individual SWMP:**

Storm drain inspections and cleaning were conducted during the dry season for FY 08/09 in Santa Margarita Region as required by the MS4 Permit.

The Catch Basin Cleaning & Inspection Crew documented all inspections and cleanings. The Catch Basin Cleaning & Inspection Crew removed approximately 23.99 tons of litter of which 7.95 tons were anthropogenic littler, 5.42 tons were vegetative litter and 10.62 were sediment littler. Dump tickets were collected to verify projected weight of debris removed from storm drains.

In addition, each district Road Maintenance Supervisor and Assistant Supervisor visually inspects pipes and various storm drains such as catch basins, inlets, outlets, culverts, swales and channels frequently. Special attention is paid to the storm drains located within traditional or known problem areas.

8) **Additional Comments/Information:**

Describe the major accomplishments of the Municipal Component over the past year:
The Transportation Department hired a consultant to update the Stormwater Prevention Pollution Plans for all municipal facilities in the Department. Best Management Practices (BMPs) were implemented.

3. MUNICIPAL
(SECTION H.1 of ORDER NO. R9-2004-001), CONT.

Summarize new activities or improvements to be implemented next year as a result of your self assessment of the Municipal Component:

Yearly assessments will continue to be conducted by the Transportation staff and the consultant (URS) for our Municipal Sites. Additionally, staff will continue to update the database that was developed to capture data for catch basin inspections and cleaning.

Transportation Department: Continue education and training for all appropriate staff to insure that appropriate BMPs are used at all municipal facilities.

EDA/Facilities: Continue education and training for all appropriate staff to insure that appropriate BMPs are used at all municipal facilities.

Parks and Open Space District: Continue education and training for all appropriate staff to insure that appropriate BMPs are used at all municipal facilities.

Other comments

4. INDUSTRIAL/COMMERCIAL
(SECTION H.2 of ORDER NO. R9-2004-001), CONT.

1) **Number of inspections conducted:**

Category	Number of Inspections By Building & Safety	Number of CAP Inspections By Environmental Health*
Industrial Facilities	**28**	**77**
High Priority Facilities	14	18
Medium Priority Facilities	9	55
Low Priority Facilities	5	4
Commercial Facilities	**577**	**328**
High Priority Facilities	91	55
Medium Priority Facilities	181	58
Low Priority Facilities	305	216
Total	**605**	**406**

*This is a transition year. In future years CAP inspections by Environmental Health will only be done in the cities that lack an inspection programs.

2) **Number and type of enforcement actions taken:**

Enforcement and Compliance Responses	Industrial	Commercial
Non-Monetary Penalties	8	11
Fines		
Bonding Requirements		
Permit Denial		
Referral to SDRWQCB	0	3
Total	**0**	**3**

4. INDUSTRIAL/COMMERCIAL
(SECTION H.2 of ORDER NO. R9-2004-001), CONT.

3) **Description and number of training efforts conducted over the last year (for industrial/commercial facility operators and/or inspectors).**

a. **Training:**

Training	Training Description	Training Dates	Number of Attendees
Special/Detailed Training-Building + Safety Staff	Inspection training specifically for Industrial/ Commercial NPDES Inspections	8/7/08	8
Special/Detailed Training-Building + Safety Staff	Inspection training specifically for Industrial/ Commercial NPDES Inspections	8/13/08	8
Special/Detailed Training-Building + Safety Staff	Inspection training specifically for Industrial/ Commercial NPDES Inspections	8/20/09	8
EPA Teleconference	NPDES Industrial Permit	11/5/09	2
CASQA Conference	Stormwater Related Issues Presnetation on Commercial NPDES Inspections	9/22/09	1
Environmental Health CAP Training (DES & HAZMAT)	Annual Refresher Training	6/2/09	72
		Total	**97**

4) **An assessment of program effectiveness based on the measurable goals established in the Permittee's Individual SWMP:** The County of Riverside Industrial/Commercial NPDES Inspection Program is approximately one year old. We have completed 605 NPDES Industrial and Commercial inspections.. At every inspection education and outreach is performed with educational information left for businesses. The CAP program is in transition, the county area is inspected by Building and & Safety Environmental Compliance Inspectors. The cities still rely on the CAP program provided by Environmental Health to meet their compliance inspection requirement if they don't already have a stand-alone program in place.

5) **Additional Comments/Information:**

Describe the major accomplishments of the Industrial Component over the past year: The major accomplishment for the combined Industrial/Commercial Component this past year

4. INDUSTRIAL/COMMERCIAL
(SECTION H.2 of ORDER NO. R9-2004-001), CONT.

was the continued registration of approximately 12,000 businesses located in the unincorporated area of Riverside County. Environmental Health Department conducted Industrial/Commercial NPDES inspections in incorporated areas, and Building and Safety conducted 605 inspections in un-incorporated areas.

Summarize the internal and external education and outreach activities the Industrial Component has conducted over the past year: The combined Industrial/Commercial internal, external educational and outreach activities centered around the training and readying of Environmental Compliance staff for beginning the Industrial/Commercial NPDES Inspections. Environmental Complianc inspectors have undergone over 40 hours of hands on and in class room training on NPDES Industrial and Commercial requirments, and how to's for performing these inspections.

Summarize the internal and external education and outreach activities the Commercial Component has conducted over the past year: We plan on continuing with initial site inspections until all businesses have been evaluated.

Summarize new activities or improvements to be implemented next year as a result of your self assessment of the Industrial Component: Due to the fiscal crisis and reduction in workforce it will be a struggle to maintain the level of service provided in the previous years.

Summarize new activities or improvements to be implemented next year as a result of your self assessment of the Commerical Component: The transition from a survey program that was based upon the Department of Environmental Health inspection to a more comprehensive and focused NPDES/stormwater specific inspection program by the Department of Building and Safety should increase awareness of the program to the regulated businesses throughout the unincorporated portions of the county.

Other comments

5. RESIDENTIAL
(SECTION H.3 of ORDER NO. R9-2004-001)

1) **A description of residential areas that were focused on during the past year:**

Flood Control District: The flood Control District provides various opportunities for public education throughout the year as well as follow-ups on complaints that are located within their right of way. See Flood Control and Water Conservation District Report

Code Enforcement: Community Improvement Programs, Community Cleanup activities, Code complaint investigations and enforcement actions,

Waste Management Department: Household hazardous waste community collection program for disposal of household generated hazardous waste such as paint, pesticides, batteries, solvents, universal waste, used oil, coolant, and other hazardous materials.

2) **Number and type of enforcement actions taken:**

Enforcement and Compliance Responses	Public Projects
Education and information	See Flood Control Report
Verbal Warning	
Written Warning	
Notice of Non-Compliance (illegal grading activities)	327
Administrative Compliance Order	
Misdemeanor	
Infraction	
Citation	
Referral to SDRWQCB	
Total	**0**

3) **An assessment of program effectiveness based on the measurable goals established in the Permittee's Individual SWMP:** The Countywide Household Hazardous Waste Collection Program has achieve significant success in diverting hazardous materials from being illegally dumped and ending up in the local landfills and providing easy access to the public with three regional HHW collection centers and opportunities at selected locations for mobile collection events in rural communities. This program has significantly reduced the amount of illegal dumping of household hazardous waste.

RESIDENTIAL
(SECTION H.3), CONT.

The Code Enforcement Department continues to be successful with their community policing program and use of the community improvement planning efforts. These programs help reduce illegal disposal and blight, and provide the public a sense of community and an opportunity to get involved. Significant volumes of trash and debris have been collected through the efforts of community cleanup days. See totals in Section 3.

4) **Additional Comments/Information:**

Describe the major accomplishments of the Residential Component over the past year:
Although outside of the Santa Margarita Watershed, a new full service HHW facility was constructed in the City of Palm Springs. Residents from throughout the county have access to all County Waste Management HHW sites.

Summarize the internal and external education and outreach activities the Residential Component has conducted over the past year: See Flood Control District Report for community educational activities.

Summarize new activities or improvements to be implemented next year as a result of your self assessment of the Residential Component: Continue community oriented code enforcement activities that focus on reducing blight and illegal dumping on vacant land. See newsletter in attachments section

Educational information and written notice of violation and other enforcement tools will be utilized to insure residents are in compliance with stormwater and landscape ordinances.

Other comments None.

6. EDUCATION
(SECTION I of ORDER NO. R9-2004-001)

1) **Description of education efforts conducted by the Permittee (not collectively with other Permittees) during the previous year:**

Audience	Measures
Permittee Departments and Personnel	Number of Permittee employees trained for: ***See Flood Control Report for additional detail.*** • Construction Inspection: 64 • Industrial/Commercial Inspection: 605 • Municipal Facilities and Activities: 0 • Development Planning: 0
Construction Site Owners and Developers	Outreach events conducted: ***See Flood Control Report***
Industrial/Commercial Owners and Operators	Industrial/Commercial outreach events conducted: ***See Flood Control Report***
Residential Community, General Public, Other Public Agencies and Students	Number of Media Impressions in: ***See Flood Control Report*** • Newspaper: • Mailings: • Radio/TV: • Billboards: • Other: • Materials: Number of classroom presentations: Public Education events conducted:

2) **Assessment of overall program effectiveness based on the measurable goals established in the Permittee's Individual SWMP:** ***See Flood Control Report for details***

3) **Additional Comments/Information:**

Describe the major accomplishments of the Education Component over the past year:
See Flood Control Report

6. EDUCATION
(SECTION I of ORDER NO. R9-2004-001)

Summarize new activities or improvements to be implemented next year as a result of your self assessment of the Education Component: County departments' partner with the Riverside County Flood Control and Water Conservation District on all educational opportunities and share cost and time at community events with their "Only Rain in the Drain" campaign.

Other comments

7. ILLICIT DISCHARGE DETECTION AND ELIMINATION
(SECTION J of ORDER NO. R9-2004-001)

1) **Number of illicit discharges, connections and spills reported and/or identified during the reporting period:**

   a) **Illicit Discharges (ID):** 33 illegal dumping which involved hazardous materials, tires, green waste, construction debris and household waste.
   b) **Illicit Connections (IC):** 18 pool discharges and filter cleaning directed toward storm drain.
   c) **Spills (S):**

As IC\IDs are identified follow-up investigations are initiated and as appropriate progressive enforcement action is taken to ensure abatement of conditions. In difficult cases and need for additional regulatory authority RWQCB staff and other regulatory agencies are notified for assistance.

2) **Number of illicit discharges or connections investigated during the reporting period and the outcome of the investigations:** See 1above .

Type	Category	Substance	Outcome of Investigation
ID	Residential	Oil/Grease	
ID	Residential	Oil/Grease	
ID	Residential	Oil/Grease	
ID	Residential	Oil/Grease	
ID	Residential	Oil/Grease	
ID	Residential	Oil/Grease	

3) **Number and types of enforcement actions taken for illicit discharges or connections during the reporting period:**

Enforcement and Compliance Responses	Private Facilities	Public Facilities
Non-monetary penalties (cleanup and abatement)	51	
Stop work authority (illegal grading)	327	
Fines		
Financial Security		
Permit/Business License Denial		
Total	**378**	**0**

7. ILLICIT DISCHARGE DETECTION AND ELIMINATION
(SECTION J of ORDER NO. R9-2004-001), CONT.

4) **Number of times your agency's hotline was called during the reporting period, as compared to previous reporting periods.**

	Number of Calls	
	2007-08	**2008-09**
Water Pollution Hotline	See Flood Control Report	See Flood Control Report

5) **Number and location of dry weather monitoring sites that were monitored during the reporting period:**

Number of Site(s): See Flood Control Report

Location(s): See Flood Control Report

7. ILLICIT DISCHARGE DETECTION AND ELIMINATION
(SECTION J of ORDER NO. R9-2004-001), CONT.

6) **Summary of Illicit Discharge Monitoring Program results, including: 1) All inspection, field screening, and analytical monitoring results; 2) All follow-up and elimination activities; and 3) Any proposed changes to station locations and/or sampling frequencies:** The Riverside County Flood Control & Water Conservation District provides this function, See their report

Date	Location	Monitoring Results	Follow-up and Elimination Activities	Proposed Changes
				No Changes Comment(s):
				No Changes Comment(s):
				No Changes Comment(s):
				No Changes Comment(s):
				No Changes Comment(s):
				No Changes Comment(s):
				No Changes Comment(s):
				No Changes Comment(s):
				No Changes Comment(s):
				No Changes Comment(s):

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7. ILLICIT DISCHARGE DETECTION AND ELIMINATION
(SECTION J of ORDER NO. R9-2004-001), CONT.

7) **An assessment of overall program effectiveness based on the measurable goals established in the Permittee's Individual SWMP:** See Flood Control Report

8) **Additional Comments/Information:**

Describe the major accomplishments of the Illicit Discharge Detection and Elimination Component over the past year: See Flood Control Report

Summarize the internal and external education and outreach activities the Illicit Discharge Detection and Elimination Component has conducted over the past year:
See Flood Control Report

Summarize new activities or improvements to be implemented next year as a result of your self assessment of the Illicit Discharge Detection and Elimination Component:

Other comments

8. PUBLIC PARTICIPATION

1) **A description of efforts to include the public urban runoff management programs during the reporting period (i.e., river clean-ups, volunteer monitoring, Permittee council meetings related to the SWMP, etc.):** The County participates in various organizations, committees and workshops to ensure coordination and countywide consistency. (CASQA, SA/SMR TAC, Management Steering Committee (City Managers) Capitol Improvement Project Review Committee, Departmental Water Quality Management Committee, IRWMP process (three regions). Various departments participate on community cleanup days throughout the county.

2) **Additional Comments/Information:**

Assessment of overall program effectivenss based on the measurable goals established in the Permittee's Individual SWMP: Participation by departments is expected by management.

Code Enforcement Cleanup crews accounted for 469.19 tons of litter removal as part of the community cleanup efforts in Supervisorial District 1 and 3.

Describe the major accomplishments of the Public Participation Component over the past year: See Flood Control Report

Summarize the internal and external education and outreach activities the Public Participation Component has conducted over the past year: See the Flood Control Report

Summarize new activities or improvements to be implemented next year as a result of your self assessment of the Public Participation Component: No planned additional activities.

Other comments

9. FISCAL ANALYSIS COMPONENT

Fiscal Analysis Component - each Permittee shall include an annual fiscal analysis, for each fiscal year covered by Order No. R9-2004-001, in its Individual Annual Report. This analysis shall evaluate the expenditures (such as capital, operation and maintenance, education, and administrative expenditures) necessary to accomplish the activities of the Permittee's Individual SWMP. The analysis shall include the following:

1) **A report of the previous reporting period's budget and a budget for the upcoming reporting period. To the extent possible, the budgets should be broken down by the following programs:**

Program Element	Fiscal Year 2007-2008		Fiscal Year 2008-2009	
	Capital Expenditures	O&M/Admin Expenditure	Capital Expenditures	O&M/Admin Expenditure
Program Management		853,000		785,000
Annual Fee for MS4 NPDES Permit		40,00		40,000
Implementation Agreement Shared Cost		190,000		150,000
Construction Inspections		485,000		485,000
Development Planning		30,000		30,000
Industrial and Commercial Inspections		175,000		175,000
Illicit Connections & Illegal Discharges Program		1,610,000		1,625,000
Municipal Facilities and Activities		180,000		180,000
Catch Basin Cleaning		796,272		430,513
Public Education & Outreach		N/A		N/A
Monitoring Program		685,000		685,000
Other: GIS Roadside Litter Removal CSA 152/Street Sweeping		347,729 1,625,000 681,753		620,530 1,351,238 789,614
Total	**$**	**7,698,754 ***	**$ 0**	**7,346,894***

The annual budget for 07/08 reflected an 8% reduction in general fund dollars. The annual County Budget for 09/10 will reflect a 10% cut across all general fund departments with an

9. FISCAL ANALYSIS COMPONENT

(CONT.)

additional 7-10% reduction proposed for FY10/11. This will put the general funding available to NPDES/Stormwater activities back to FY 04/05 levels. With the inclusion of 26 mandatory furlough days, layoffs, and early retirement; less general fund dollars, time and staff will be available to accomplish the same workload. * Direct cost only, this does not include ancillary costs in combination with related program activities, which is estimated at between $17-$18 million. The estimated immediate loss in revenue due to property tax reassessments and State of California take backs for FY09/10 is $150 million.

2) **A description of the source(s) of funds that were utilized during the previous fiscal year and the source(s) of funds proposed to meet the necessary expenditures for the subsequent year, including legal restrictions on the use of such funds.**

Source of Funds	Capital Expenditures	Percent of Program Funding	Restrictions on Use (if applicable)
General fund (TLMA, EDA, Facilities Management, Environmental Health, Executive Office (EO), Parks District)		33% (supplemented by EO General Fund budget) 67% from Departmental General Fund budgets)	NPDES fund designations within budget units. Catch basin cleanouts, MS4 mapping, roadside litter removal, IC/ID inspections
GAS Tax, FEMA		<1%	Storm related damage to MS4 within Transportation Dept jurisdictional control
Assessments		100%	Street sweeping
Contract obligations (Waste Hauler Street Sweeping)		100%	Street sweeping
Business Licensing/Industrial Commercial NPDES inspection (fee neutrality)		50% 50% general fund support	Industrial/Commercial NPDES inspections (inspection fee-hourly rate) regulated business community only
Developer Fees (developer cost) * 50% reduction for FY 09/10		100%	Project Specific inspections for erosion and sediment control
WQMP Review (developer cost)		100%	Project Specific

9. FISCAL ANALYSIS COMPONENT

(CONT.)

3) Additional Comments/Information:

Overall, the direct and indirect cost for program implementation of NPDES related activities are in the range of $17,000,000-18,000,000 countywide. Program costs continue to increase while revenues and taxes are decreasing. Each watershed requires additional quantification of activities, tracking and need for funding with no additional projected income foreseen. In this period of economic recession, general fund dollars are diminishing with a projected 20% decrease anticipated in the County's general fund for the next 3 years. It is imperative that the County continues to closely monitor and contain program costs and work with the three Regional Boards to ensure economic considerations are taken into account when planning any new program requirements.

10. NON-STORM WATER DISCHARGES

Permittees shall report on any discharge category listed in Requirement B.2 of Order No. R9-2004-001 that was identified as a source of pollutants during the reporting period. For each identified category, the Permittee shall report whether it elected to prohibit the discharge or to require BMPs to reduce pollutants in the discharge to the MEP. If the discharge is not prohibited, the BMPs that will be implemented, or required to be implemented, shall be described in each Permittee's Individual SWMP Annual Report.

Category	Prohibited	BMP to be Implemented
Diverted stream flows	☐ Yes ☐ No	Not Applicable
Rising ground waters	☐ Yes ☐ No	Not Applicable
Uncontaminated ground water infiltration [as defined at 40 CFR 35.2005(20)] to MS4s	☐ Yes ☐ No	Not Applicable
Uncontaminated pumped ground water	☐ Yes ☐ No	Not Applicable
Foundation drains	☐ Yes ☐ No	Not Applicable
Springs	☐ Yes ☐ No	Not Applicable
Water from crawl space pumps	☐ Yes ☐ No	Not Applicable
Footing drains	☐ Yes ☐ No	Not Applicable
Air conditioning condensation	☐ Yes ☐ No	Not Applicable
Flows from riparian habitats and wetlands	☐ Yes ☐ No	Not Applicable
Water line flushing	☐ Yes ☐ No	Not Applicable
Landscape irrigation	☒ Yes ☐ No	Ordinance 859.1
Discharges from potable water sources not subject to NPDES Permit No. CAG679001, other than water main breaks	☐ Yes ☐ No	Not Applicable
Irrigation water	☐ Yes ☐ No	Not Applicable
Lawn watering	☒ Yes ☐ No	Ordinance 859.1
Individual residential car washing	☐ Yes ☐ No	Not Applicable
Non-emergency fire fighting flows	☐ Yes ☐ No	Not Applicable
Dechlorinated swimming pool discharges	☐ Yes ☐ No	Educational materials, progressive enforcement for illegal discharges of pool water (chlorinated or algae laden)

1) **Additional Comments/Information:** Landscape Ordinance 859.1 in effect as of 4/25/20

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11. RECEIVING WATER LIMITATIONS

This section includes the report required pursuant to Requirement C.2.a. of Order No. R9-2004-001, if applicable.

Requirement C.2.a. states:

"Upon a determination by either a Permittee or the SDRWQCB that MS4 discharges are causing or contributing to an exceedance of an applicable water quality standard, the Permittee shall promptly notify and thereafter submit a report to the SDRWQCB that describes BMPs that are currently being implemented and additional BMPs that will be implemented to prevent or reduce any pollutants that are causing or contributing to the exceedance of water quality standards. The report may be incorporated in the SWMP Annual Report unless the SDRWQCB directs an earlier submittal. The report shall include an implementation schedule. The SDRWQCB may require modifications to the report;"

See Flood control and Water Conservation Report.

The County relies on the Flood Control and Water Conservation District to conduct water quality monitoring. The District advises the permittees of any pollutants of concern that have been identified and corrective actions are taken through a cost share agreement. This process is evolving and requires additional work. Flood Control staff have transitioned out of the program and new staff are being trained. In addition, a sub contractor is being brought on to perform a revised monitoring program that will enhance monitoring and enforcement for IC/ID which ultimately will be more protective of water quality.

12. ADDITIONAL URBAN RUNOFF DATA

This section is a summary of all urban runoff related data not included in the annual monitoring report (e.g., special investigations).

See Flood Control Report for monitoring and data analysis.

13. PROPOSED REVISIONS

This section includes proposed revisions to the Individual SWMP, including areas in need of improvement based on the assessment of effectiveness of each program component.

1) The cities of Wildomar and Menifee will be reporting their respective jurisdictional areas in future reports. The City of Menifee has approximately 60,000 residents that live in a 50 square miles area of which less than 5% is in the Santa Margarita watershed. The City of Wildomar has approximately 23,000 residents in a 24 square mile area with approximately 60 % in the Santa Margarita watershed. All MS4 infrastructure managed by the TLMA in these two jurisdictions has been transferred. All plan check and new development review is the responsibility of the cities.

2) GIS mapping continues to evolve as data sets become more refined. Improved mapping and data management capabilities will increase effectiveness for BMP cataloging and long term operation & maintenance.

3) Consistency of MS4 permits between Regional Boards (Santa Ana, San Diego and Colorado) that take into consideration inland valley arid and semi-arid conditions of the region (not coastal issues) would be less confusing and provide for programmatic uniformity and help with the County's attempt to comply with the ever increasing regulatory burden.

4) Due to budget issues cost containment must be taken into consideration for continued program implementation. The voting public will not tolerate increases in fees and/or taxes to support increased non-science based program initiatives.

Supporting Documentation

SUPPORTING DOCUMENTATION

TRANSPORTATION DEPARTMENT

BUILDING & SAFETY DEPARTMENT

PLANNING DEPARTMENT

CODE ENFORCEMENT DEPARTMENT

DEPARTMENT OF ENVIRONMENTAL HEALTH

WASTE MANAGEMENT DEPARTMENT-HOUSEHOLD HAZARDOUS WASTE

AGRICULTURE

LANDSCAPE ORDIANCE 859.2

MEETINGS (Examples)

TRANING LOGS

TRANSPORTATION DEPARTMENT

SANTA MARGARITA ATTACHMENT A

(TRANSPORTATION DEPARTMENT)

BACKGROUND

The Transportation Department's NPDES activities for Fiscal Year (FY) 08/09 included the Roadside Litter Removal Program, Catch Basin Inspection & Cleaning Program, Code Enforcement Clean up Program, and the enhancement to the integrated approach in the continued development of the MS4 map.

The Roadside Litter Removal Program has a crew of seven (7) employees that provides roadside clean up efforts. The funding for this Program is provided by each of the five Supervisorial Districts within the County. The crew collects roadside litter from ten (10) linear miles of designated roadways in each of the five Supervisorial Districts. Ten (10) linear miles are cleaned on a rotating basis, allowing for problems areas to be re-addressed every ten (10) weeks. Cumulatively, this program cleans approximately 60 linear miles quarterly. This effort has proven successful in reducing the amount of debris and anthropogenic litter entering the storm drains, nearby streams and waterbodies within the different watersheds. Roughly, 33.75 road miles were cleaned in the Santa Margarita watershed, and approximately 11.15 tons of anthropogenic litter was removed under this program for FY 08/09.

The Catch Basin Inspection & Cleaning Program has a crew of five (5) employees. The funding for this Program is provided by the County Executive Office. This Program performs inspection and maintenance on all storm drainage facilities maintained by the County of Riverside. The crew inspects and maintains catch basins, inlets, outlets, culverts, channels, swales and detention/retention basins to ensure maximum storm water diversion from rights-of-way, while simultaneously maintaining the National Pollutant Discharge Elimination System standards. For FY 08/09, approximately 7.95 tons of anthropogenic litter, 5.42 tons of vegetative litter, and 10.62 tons of sediment litter were removed from the Santa Margarita watershed under this Program.

The Code Enforcement Clean up Program has three crews totaling seventeen (17) employee positions. The funding for this Program is provided by Code Enforcement Department. The crew carries out wide-ranging clean ups. The Santa Margarita watershed falls within Supervisorial District 1 and 3. For FY 08/09, the approximate tonnage of litter removed from each Supervisorial District is summarized in the following table:

Supervisorial District	Tons of Litter Removed
District 1	230.17
District 3	239.02
Total	**469.19**

ROAD REPAIR AND STREET SWEEPING

For FY 08/09, the Transportation Department received a total of 1292 complaint calls countywide for general road repair and maintenance, of which a total of 106 complaints were within the Santa Margarita Region involving the following issues:

Type of Complaint	Number of Complaints
a. Flooding-road shoulder, ditch damage	0
b. Ditches gutter, culvert drains, clean out	3
c. Drainage low spots, ponding floods	1
d. Mud gravel, dirt, rock, snow, swept/cleared	6
e. Trash, debris, object removed or cleared	10
f. Trees, palm fronds and branches	11
g. Weed, grass, brushes and tumbleweeds	8
h. Graffiti	0
i. Potholes or large holes	14
j. Improvements, grading paving & resurfacing	52
k. Road sidewalk, curb gutter damage & repair	1
Total	**106**

Currently, all streets in County Service Area (CSA) 152 are swept. New development projects within the County (with curb and gutter) are required to annex into CSA 152 in order to receive street sweeping services. These services are contracted out and roadways are swept at least once a month, and in some cases more frequently. Whenever possible, the Department has increased the frequency of street sweeping to twice a month. During FY 08/09, a total of 14,376 curb miles were swept. In comparison to last fiscal year, FY 07/08, a total of 13,398 curb miles were swept, which represents a 7.30% increase.

The amount of debris removed from street sweeping activities decreased this year. For last FY 07/08, approximately 1,548 tons of debris were removed from streets, in comparison to this FY 08/09, approximately 1,193 tons of debris were removed. It represents 22.93% decrease in amount of debris removed. In general, for FY08/09 less anthropogenic, vegetative and sediment littler were removed from street sweeping activities.

FISCAL EXPENDITURES FOR FY 08/09

Expenditures for NPDES activities include Municipal Inspections, MS4 Mapping, Catch Basin Inspection, Monitoring & Cleaning Program and Code Enforcement Clean Up Program & Roadside Litter Removal Program. Future costs are expected to increase as the program expands. The following table summarizes the NPDES program expenditures funded by the County General Funds and other related activities and fund sources:

Program/Activity	Funding Source	FY 08/09 Expenditures
Overlay, Sealing	Gas Tax	$3,482,891
Storm Damage	Gas Tax, FEMA	$11,044
Municipal Inspections	General Funds	$13,652
MS4 Mapping	General Funds	$347,729
Catch Basin Inspection, Monitoring & Cleaning Program	General Funds	$430,513
Street Sweeping CSA 152	County Assessment Area 152	$556,448
Street Sweeping (Non-CSA 152)	Waste Haulers (ISS Sweeping)	$161,790
	Environmental Health (Burrtec Waste Industries, Inc.)	$71,376
Code Enforcement Clean Up Program & Roadside Litter Removal Program	Code Enforcement, General Funds	$1,625,000

TRAINING

The Transportation Department is very supportive of NPDES training. A total of sixty-eight (68) Transportation staff attended NPDES training offered by Flood Control during FY 08/09. In addition, one (1) employee attended the California Stormwater Quality Association (CASQA) Annual Conference.

ILLICIT CONNECTION/ILLEGAL DISCHARGE (IC/ID)

The Riverside County Transportation Department, as part of its normal duties, conducts routine maintenance of the storm drain facilities. The Highway Operations Division provides the County with coverage concerning illegal connections or illegal discharges within the storm drain systems such as inlets, outlets, culverts, swales and channels which ultimately make their way to facilities owned by Riverside County Flood Control District. The Transportation Department District Road Maintenance Supervisors and Assistant Supervisors visually inspect the storm drain infrastructure on a regular basis as part of their daily routine. They look for evidence of illegal discharge or illicit

connections. They pay close attention to facilities located within areas of concern, or areas that historically have had issues. This could involve areas where illegal dumping has occurred or other maintenance issues need to be addressed, which would require additional follow-up. These issues could necessitate additional assistance from the County illegal dumping cleanup programs and/or Code Enforcement investigation.

The Transportation Department Permit Engineer also sends a letter to property owners that encroach upon County right-of-way with illegal connections or other obstructions, and if needed is reported to Code Enforcement. The Permit Engineer is responsible for reviewing encroachment applications along County road right-of-way. If the illegal connection is not remedied in a timely manner, it is removed by the County and billed to the owner of the property.

In summary, for FY 08/09, Code Enforcement supervised the following three (3) types of illicit discharges, connections and spills:

a. There were 327 cases of illegal grading or grading without permit in which 88 are currently opened and 239 are closed. They were discharge of soil and sediments.

b. There were 33 cases of illegal dumping in which 5 are currently opened and 28 are closed. They were a variety of materials from hazmat, tires, green waste, construction debris, and household waste.

c. There were 18 NPDES investigations in which 4 are currently opened and 14 are closed. The NPDES violations were for illegal pool water discharges and the cleaning of pool filters into gutters.

MAINTENANCE STORMWATER POLLUTION PREVENTION BULLETIN

Issue 2 - August 2009

Handling and Storage of Liquid Wastes

Improper storage and handling of liquid wastes can allow oils and greases, heavy metals, nutrients, toxic substances and other pollutants to enter stormwater runoff. Help prevent the discharge of pollutants by:

» Reducing and tracking waste generation, storage and disposal;

» Properly handling and storing wastes; and

» Preventing run-on to and runoff from storage areas.

By implementing the following Best Management Practices (BMPs), you can help prevent pollution.

Managing Waste Generation

» Reduce waste generated by minimizing the amount of material stored onsite; using the most efficient method and equipment for the job; and considering the use of the most non-toxic material.

» Establish a material tracking system to increase awareness about materials usage and waste generation.

» Recycle materials whenever possible.

General Liquid Storage Practices

» Prevent waste materials from directly contacting stormwater. Cover storage areas with a permanent roof and always cover containers with secured, spill-proof lids.

» Place storage containers on secondary containment pallets.

» Prevent stormwater run-on from entering the waste storage area by enclosing the area or building a berm around it.

» Use drip pans or absorbent materials whenever oil or grease containers are emptied.

» Check storage containers weekly for leaks and spills and to ensure that lids are properly secured.

» Inspect, repair, and replace faulty pumps, valves, lines, seals, or hoses regularly to minimize the potential of releases and spills.

» Replace any containers that are leaking, corroded, or otherwise deteriorating.

» Sweep and clean the storage area regularly. Do not hose down the area.

» Dispose of rinse and wash water from cleaning waste containers into a sanitary sewer if allowed by the local sewer authority.

» Take special care when loading and unloading liquid wastes to minimize drips and spills.

» Do not mix wastes! Mixing wastes may cause chemical reactions, make recycling impossible, and complicate disposal.

Good Housekeeping

» Use all of a product before disposing of the container.

» Keep the waste storage area clean at all times by sweeping and cleaning up spills immediately.

» Stencil storm drains on the facility's property with a prohibitive message regarding waste disposal (e.g. "Only Rain Down the Storm Drain").

Liquid Hazardous Wastes

» Examples of liquid hazardous wastes include wastes generated from the use of petroleum products, wood preservatives, concrete curing compounds, asphalt products, pesticides, paints, and solvents.

» Hazardous wastes must be stored in sealed containers constructed of a suitable material in compliance with fire and hazardous waste codes and labeled with the waste being stored and the date of accumulation.

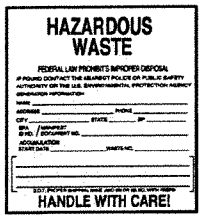

» Store hazardous waste only in the designated on-site hazardous waste storage area.

» Place all hazardous waste containers in secondary containment.

» Provide sufficient separation between stored containers to allow for spill cleanup and emergency response access.

» The hazardous waste storage area should be roofed and curbed or diked to provide a spill containment volume equal to 10% of the combined volume of all containers or 110% of the capacity of the largest container, whichever is greater.

» The hazardous waste storage area should be impervious to the stored substances (if spilled) for a minimum contact time of 72 hours.

» The hazardous waste storage area should be maintained free of accumulated rainwater and spills. In the event of spills or leaks, accumulated rainwater and spilled substances should be placed into drums and handled as a hazardous waste unless laboratory analytical testing determines it to be non-hazardous.

» Ensure that hazardous waste is collected, removed, and disposed by licensed and permitted hazardous waste transporters and disposal facilities utilizing properly completed Uniform Hazardous Waste Manifests.

If you have any doubt about proper handling and storage of a waste ask your District Supervisor.

Remember, pollution prevention begins with you.

MAINTENANCE STORMWATER POLLUTION PREVENTION BULLETIN

Issue 3 - September 2009

Handling and Storage of Solid Wastes

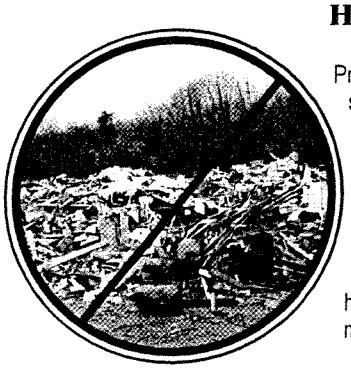

Properly implemented solid waste management practices help prevent and reduce stormwater pollutants such as sediment, paper, plastics, green waste, oils and greases, and metals such as lead, copper, zinc, etc. Solid waste management practices include:

» Providing designated waste storage areas and containers

» Properly maintaining designated waste storage areas and containers; and

» Arranging for regular disposal

Posting of waste disposal guidance charts in multiple locations may be helpful. Such a chart lists a waste's hazardous nature (toxic, corrosive, ignitable, reactive), prohibitions on its disposal, and the recommended disposal method (recycle, sanitary sewer, landfill, etc.).

Implement the following Best Management Practices (BMPs) to help prevent the release of pollutants to stormwater.

General BMPs for Solid Waste Storage

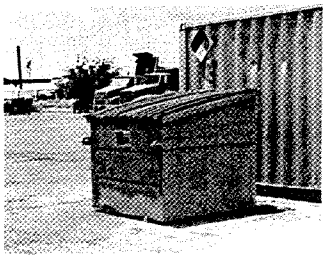

» Provide adequate solid waste containers for waste generated.

» Arrange for regular waste collection; increase waste collection frequency or number of dumpsters, if necessary.

» Locate solid waste storage areas at least 50 feet from storm drains and watercourses and away from areas prone to flooding or ponding.

» Cover solid waste containers, dumpsters and trash receptacles at all times to prevent wind-blown debris.

» Regularly inspect solid waste containers for damage to prevent waste from escaping through holes or cracks in the container.

» All waste piles should be covered (e.g., tarp)

» Prevent stormwater run-on from contacting stored solid waste by installing and maintaining berms, dikes or other diversion structures or by elevating the waste off the ground.

» Ensure that only appropriate solid wastes are added to a solid waste container—hazardous wastes must not be placed in regular trash dumpster.

» Inspect and sweep/clean the solid waste storage area regularly, but do not hose down the area to a storm drain.

» Do not hose out dumpsters or other waste containers; leave dumpster cleaning to the trash hauling contractor.

Green Waste BMPs

» Do not dispose collected green waste into waterways or storm-water drainage systems.

» Securely cover green waste not stored in watertight dumpsters with tarps to protect against wind and rain.

» Salvage or recycle useful vegetation debris. For example, cut trees and shrubs can be converted into wood chips and used as mulch.

Controlling Litter

» Post "No Littering" signs and enforce compliance.

» Provide sufficient covered litter receptacles in appropriate locations.

» Empty litter receptacles frequently to prevent overflow and windblown litter.

Solid Hazardous Wastes

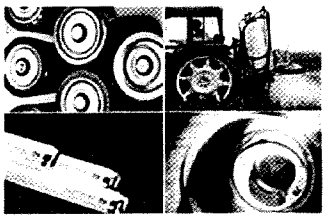

» Examples of solid hazardous wastes include soil, absorbents, and rags containing petroleum-based substances (oil, diesel, gasoline etc.); fluorescent light bulbs; lithium or lead-containing batteries; cathode ray tubes found in televisions and computer monitors; and mercury-containing devices such as thermostats, thermometers, electric switches, and relays.

» Do not mix wastes! Segregate solid hazardous waste from solid non-hazardous waste.

» Ensure that adequate solid hazardous waste storage is available,conveniently located, and away from storm drains, watercourses, and moving vehicles.

» Store solid hazardous waste only in a designated solid hazardous waste storage area. Do not allow potentially hazardous wastes to accumulate directly on the ground.

» Solid hazardous wastes must be stored in sealed containers constructed of a suitable material in compliance with fire and hazardous waste codes and labeled with the waste being stored and the date of accumulation.

» Ensure that solid hazardous waste is collected, removed, and disposed by licensed and permitted hazardous waste transporters and disposal facilities utilizing properly completed Uniform Hazardous Waste Manifests.

If you have any doubt about proper handling and storage of a waste ask your District Supervisor.

Remember, pollution prevention begins with you!

MAINTENANCE
STORM WATER POLLUTION PREVENTION BULLETIN

Issue 1 - July 2009

Spill Prevention, Control and Cleanup

Spills and leaks are one of the largest contributors of stormwater pollutants. Help prevent the discharge of pollutants to drainage systems and surface waters by reducing the chance for spills, stopping the source of spills, containing and cleaning up spills, and properly disposing of spilled materials. By implementing the following Best Management Practices (BMPs), you can help prevent the discharge of pollutants into the environment.

Spill Prevention and Control

» Keep storage areas clean, well organized, and equipped with ample cleanup supplies.

» Sweep storage areas monthly if it is paved - do not hose down the area to a storm drain.

» Check tanks daily for leaks and spills.

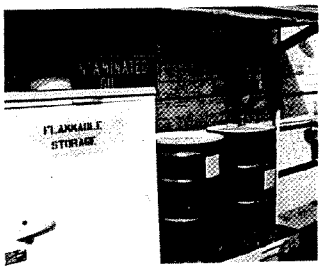

» Store and contain liquid materials in such a way that the contents of a ruptured tank or container will not discharge, flow, or be washed into the storm drainage system, surface waters, or groundwater.

» Place drip pans or absorbent materials beneath all mounted taps, and at all potential drip and spill locations during filling of and dispensing from tanks. Properly dispose of all collected liquids and soiled absorbent materials immediately. Do not leave full drip pans or other open containers lying around.

» Oil filters disposed in trashcans or dumpsters can leak oil and pollute stormwater. Place oil filters in a funnel over a waste oil-recycling drum to drain excess oil before disposal or recycling.

» Store cracked batteries in a covered, non-leaking secondary container. If a battery is dropped, treat it as if it is cracked and place in a containment area until certain it is not leaking.

» Regularly inspect onsite vehicles and equipment for leaks and repair them immediately.

» Repair or replace perimeter controls, containment structures, covers, and liners as needed to maintain their proper function.

Cleanup

Minor Spills

Minor spills typically involve small quantities of oil, gas, paint, etc. which can be controlled by the first responder at the discovery of the spill. If you are the first to detect the spill:

» Contain the spread of the spill.

» Clean the contaminated area by using absorbent materials rather than hosing it down or burying the spill.

» Promptly and properly dispose of contaminated materials.

Semi-Significant Spills

Semi-significant spills can be controlled by the first responder with the assistance of other personnel and may require all other activities to be temporarily discontinued. To control and clean up this type of spill:

» Contain the spread of the spill.

» Notify your supervisor.

» If the spill occurs on a paved surface, immediately contain it by encircling it with absorbent materials. Use "dry" methods such as absorbent materials, cat litter and/or rags for clean up.

» If the spill occurs in an unpaved area, immediately contain it by constructing an earthen dike. Dig up and properly dispose of the contaminated soil.

» If the spill occurs during a rain event, contain and block storm drains (if any) and then cover the spill with a tarp or other material to prevent runoff contamination.

Significant/Hazardous Spills

For significant or hazardous spills that cannot be controlled by properly trained personnel in

the immediate vicinity, take the following steps:

» Notify the local emergency response (911) and your District Road Maintenance Supervisor.

» If necessary, the District Road Maintenance Supervisor will notify the County Fire Department and/or the County Department of Environmental Health (HazMat).

» Notification must be made by telephone immediately (within 24 hours of discovery) and followed up with a written report.

» The services of a spills contractor or a Haz-Mat team should be obtained immediately. Road maintenance staff should not attempt to clean up the spill until appropriate and qualified personnel have arrived on site.

» Other agencies may also need to be notified. Speak to your District Road Maintenance Supervisor for guidance.

Remember, pollution prevention begins with you.

BUILDING & SAFETY DEPARTMENT

BUSINESS REGISTRATION AND LICENSING PROGRAM

In November 2006, the Riverside County Board of Supervisors approved Ordinance No. 857 creating a Business Registration and Licensing Program. The ordinance requires that businesses within the unincorporated area of Riverside County obtain a business license. The ordinance includes information regarding the contents of the application form, license issuance protocol, description of license fee, license inspections, water quality inspections and enforcement, and business license enforcement procedures.

The ordinance requires all businesses to register; however, some businesses are exempt from paying fees. Fee exemptions will be granted for various agricultural activities, certain residential businesses, places of worship, specific non-profit, and any business exempt by virtue of constitutional law.

Business license fees will not exceed the reasonable cost of providing an inventory of county businesses and the required registration information. No business license fee charged under the provisions of this ordinance shall be construed as a business license tax.

A business registration form designed to ascertain pertinent information regarding the businesses will be mailed to every known business within unincorporated area of Riverside County. In addition, businesses have the ability to access the County of Riverside's website for an on-line registration and payment system. For more information regarding business registration requirements, please contact the Business Registration and License Program Office at 951-955-1400. or on the website: www.rctlma.org.buslic

FEE EXEMPTIONS

Pursuant to Ordinance No. 857, some businesses are exempt from paying fees; however, they must register within 60 days of being notified by the County in order to maintain their exempt status. Exemptions apply to the following:

Residential Facility: Apartments, rooming houses, residential care homes, and family day care homes.

Church, Temple or Places of Worship: Churches, temples or other places of worship, for worship, religious education, or the social affairs of the religious group. **NOTE:** This exemption shall not apply to other activities, including, but not limited to, day schools, social service programs or Church-owned or operated business enterprises.

Home Occupations: Home occupations that are not subject to compliance with water quality restrictions. If your business affects water quality, it will not be exempt from the registration fee.

Agriculture: Agricultural pursuits consisting of the growing of crops, raising of livestock, and dairying, the purchase and storage of substances, materials, supplies, animal feeds and produce, and the marketing of farm products. **NOTE:** A business license shall be required in connection with any of the following: 1) retail nurseries, 2) retail greenhouses; and 3) wholesaling, processing, storage or manufacturing use which involves the collection of products of multiple farms or ranches .

Federal or State Law: Any businesses that are legally recognized as exempt by the U. S. Constitution or applicable statutes, or by the State of California.

Non-Profit Organizations: Any non-profit organizations that are legally recognized as tax exempt pursuant to the provisions of 26 U.S.C. Section 501 (c)(3).

RIVERSIDE COUNTY BUSINESS REGISTRATION AND LICENSING PROGRAM

4080 Lemon St.
P.O. Box 1208
Riverside, Ca 92503
www.rctlma.org/buslic
(951) 955-1400

018696

Frequently Asked Questions?

WHAT IS THE PURPOSE OF THE BUSINESS REGISTRATION AND LICENSING PROGRAM?

This program provides a comprehensive inventory of businesses in unincorporated area of Riverside County, enhances public safety and helps achieve compliance with federal, state and local water quality regulations.

HOW DOES THE BUSINESS REGISTRATION PROGRAM BENEFIT BUSINESS OWNERS AND THE GENERAL PUBLIC?

There are a two major benefits to the business community and general public from the business registration program:

Public Safety

The program gives county law enforcement and fire personnel a better understanding of the business community and its processes and alerts them to potential hazards, making them more effective responding to protect residents and property. .

Water Quality

The business registration program requires that specific business types be identified, prioritized and inspected for storm water management requirements. It will ensure that those businesses have implemented best management practices to prevent illicit discharges into the storm water system that could ultimately harm water quality.

HOW MUCH WILL THE BUSINESS LICENSE COST?

License fees charged pursuant to this ordinance are as follows:

License fee (first year):	**$45**
Annual renewal fee:	**$30**
Change of name/ location:	**$30**
Duplicate license:	**$30**

WHO IS REQUIRED TO HAVE A LICENSE?

Every person conducting business as defined in Riverside County Ordinance 857 in unincorporated areas of Riverside County must obtain a business license. A separate license must be obtained for each physical location. Any person who does not obtain the required license is subject to the procedures and penalties set forth in the ordinance.

WHAT IF I OPERATE A MOBILE BUSINESS?

A business license is required for the following mobile businesses: mobile automobile or other motor vehicle washing; pest control services; mobile carpet; drape or furniture cleaning; concrete mixing or cutting; masonry; painting and coating; landscaping; pool and fountain cleaning; and portable toilet servicing.

WHAT IF MY BUSINESS ALSO CONDUCTS BUSINESS IN ANOTHER CITY OR COUNTY?

You might need a separate business license to conduct business in any city or county. Most California cities and counties have a business license ordinance. Each jurisdiction, however, has it's own filing fee and requirements. Check with the appropriate jurisdiction for its' fees.

HOW LONG IS THIS LICENSE GOOD FOR?

Your license is current for one calendar year from the effective date of license issuance. Renewal fees are due 30 days prior to the expiration date on the license.

DO STATE LICENSED CONTRACTORS NEED A BUSINESS LICENSE?

Any person licensed as a contractor by the State Contractors Board must obtain a business license if they are physically located within the unincorporated areas of the County.

DO I NEED A LICENSE IF I WORK OUT OF MY HOME?

Yes, home-based businesses also require registration. Most home occupations are exempt from paying registration fees. The fee exemption shall not apply to those home occupations that are subject to comply with water quality requirements. Please refer to the brochure's fee exemption section or go to our website at: www.rctlma.org/buslic.

IF I AM A NONPROFIT BUSINESS, DO I HAVE TO REGISTER?

You are required to register, but are exempt from paying fees if your organization is legally recognized as tax exempt pursuant to the provisions of Internal Revenue Code Section 501 (C) (3) and your exemption is filed within 60 days of notification of the County's registration requirement.

DO I NEED A LICENSE FOR GROWING OR PRODUCING AGRICULTURAL PRODUCTS?

Yes, all agricultural businesses must register; however, some agricultural activities may be exempt from fees. Refer to the fee exemption section on this brochure or go to www.rctlma.org/buslic.

WHAT IS THE APPLICATION PROCEDURE?

The process to obtain a business license takes only a few minutes and may be completed by mail or on the web based registration system. Using the internet, go to the county business registration website at: www.rctlma.org/buslic where you will find online instructions, a registration application and convenient payment system.

IF I AM EXEMPT FROM FEES, DO I STILL HAVE TO REGISTER?

Yes. Business that are exempt from paying fees still must register within 60 days of notification.

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018698

County of Riverside
Environmental Compliance Division
NPDES Construction Inspection Form

Tract/Plot/APN No: 963-070-026
Date: 11/6/08 ECI: C. Santiago P. Broesdime.
Grading Permit No: 200 638 90-07-02-2008 by Facilities only
Thomas Bros: 929 B-2 & B-3
WDID Number: 933C351153
Weather Condition: Sunny
Size/Site (Acres Disturbed): East of Briggs Rd. 9.5 Acres
Contact Person: John Murillo
Owner/Applicant: French Valley Business Center
Phone Number: 951 970 7566
Address:
Email: John@KeetonConstruction.com
Process Date: 11-6-08

Site Priority Level	Revised Priority Level	Inactive	Active
☐ Low ☑ Medium ☐ High	☐ Low ☐ Medium ☑ High	☐	☑

Yes	No	
		1 Storm Water Pollution Prevention Plan:
☐	☑	A) Current SWPPP document on job site?
		2. Best Management Practices:
☐	☑	A) Erosion Control BMPs installed, maintained and effective?
☐	☑	B) Sediment Control BMPs installed, maintained and effective?
☐	☑	C) Wind Erosion Control BMPs installed, maintained and effective?
☑	☐	D) Tracking Control BMPs installed, maintained and effective?
☐	☑	E) Non-Stormwater Management BMPs installed, maintained and effective?
☐	☑	F) Waste management and materials pollution control BMPs installed, maintained and effective?
		3. Non-Stormwater Discharges:
☐	☑	A) Is the site free from evidence of non-storm water discharges?
☐	☑	B) Is the site free from the potential to create a non-storm water discharge?
☐	☑	C) Is there an effective combination of BMPs installed?

Enforcement: Facilities Contact George 955 4875

In Compliance	Non-Compliance	Gross Non-Compliance
☐	☐	☑

☐ Verbal ☐ Written ☑ NOV ☐ Stop Work Order ☐ RWQCB Notified

**This inspection is based solely upon the observations made by the inspector at the time of the inspection.*

Comments: No swppp on site. No Grading Permit. Conditional grading permit from Facilities. Only one rumble strip at entrance. No BMPs installed throughout. Blue stream. Ben Weil complaint. Must obtain grading Permit. Implement swppp, & effective combo of BMPs.

Follow Up Date: 11/13/08

**See back for additional comments.*

R.M.

Date: 11/13/08 Action: NOV.

018699

Department of Building and Safety

COUNTY OF RIVERSIDE

TO: Dist.

ADDRESS: Date 11-13-08

CORRECTION NOTICE

Permit No. PP 17666

NOV - MUST OBTAIN A GRADING PERMIT FROM COUNTY OF RIVERSIDE + NOI FOR WDID # + COMPLIANCE FOR NPDES. INSTALL BMPS TO KEEP ALL SEDIMENT ON SITE

PHIL C BROESAMLE
Inspector

DO NOT REMOVE FROM JOBSITE

284-205 (rev. 1/83) DISTRIBUTION: WHITE-Job, CANARY-Inspector, PINK-Office

Attachment A: 2008-2009 Storm Season Final Statistics SM

Legal Description	Regional Water Quality Control Board Responsible	End of Storm Season Percent Compliance	Number of Verifications Conducted	Date Last Verification Processed
APN 156-340-024 SFR				
APN 384-080-013 SFR		STOP WORK ORDER	2	12/10/2008
APN 384-080-015 SFR		STOP WORK ORDER	1	9/4/2008
APN 384-080-016 SFR		STOP WORK ORDER	1	9/4/2008
APN 470-330-025 SFR	SM	IC	4	3/26/2009
APN 470-340-023 SFR	SM	NC	5	3/26/2009
APN 571-130-039 SFR	SM	NC	1	9/11/2009
APN 571-630-010 SFR	SM	NC	3	4/9/2009
APN 640-040-005 SFR	SM	IC	3	4/14/2009
APN 904-560-010 SFR	SM	NC	3	4/8/2009
APN 915-080-028 SFR	SM	NC	4	1/26/2009
APN 915-110-027 SFR	SM	IC	3	4/15/2009
APN 915-110-041 SFR	SM	NC	1	3/10/2009
APN 915-110-045 SFR	SM	NC	3	5/14/2009
APN 915-210-050 SFR	SM	IC	2	1/20/2009
APN 915-220-051 SFR	SM	IC	2	11/3/2008
APN 915-230-053 SFR	SM	STOP WORK ORDER	2	10/20/2008
APN 915-240-036 SFR	SM	NC	2	10/7/2008
APN 915-240-054 SFR		NC	3	11/25/2008
APN 915-370-075 SFR	SM	IC	2	12/10/008
APN 915-400-020 SFR	SM	NC	3	12/19/2008
APN 915-550-017 SFR	SM	STOP WORK ORDER	2	10/24/2009
APN 915-550-034 SFR	SM	NC	3	1/20/2009
APN 915-550-042 SFR	SM	IC	2	10/20/2008
APN 915-560-017 SFR	SM	STOP WORK ORDER	2	10/20/2009
APN 915-560-026 SFR	SM	NC	1	9/9/2008
APN 915-560-033 SFR	SM	STOP WORK ORDER	3	10/20/2008
APN 915-560-034 SFR	SM	STOP WORK ORDER	3	10/20/2008
APN 915-750-007 SFR	SM	STOP WORK ORDER	3	4/14/2009
APN 915-750-030 SFR	SM	IC	3	1/28/2009
APN 915-750-038 SFR	SM	STOP WORK ORDER	3	10/20/2009
APN 915-750-039 SFR	SM	NC	3	1/21/2009
APN 918-020-022 SFR	SM	NC	4	4/7/2009
APN 927-150-024 SFR	SM	NC	4	5/28/2009
APN 927-220-004 SFR	SM	STOP WORK ORDER	2	10/20/2009
APN 927-220-005 SFR	SM	STOP WORK ORDER	2	10/20/2009
APN 927-250-008 SFR	SM	NC	1	11/5/2008
APN 927-510-025 SFR	SM	IC	2	12/5/2008

APN 928-170-040 SFR	SM	Closed	1	9/24/2008
APN 928-210-003 SFR	SM	NC	3	3/30/2009
APN 928-210-005 SFR	SM	STOP WORK ORDER	3	4/13/2009
APN 928-220-011 SFR	SM	STOP WORK ORDER	4	4/13/2009
APN 928-220-012 SFR	SM	STOP WORK ORDER	4	4/13/2009
APN 928-220-024 SFR	SM	STOP WORK ORDER	4	4/13/2009
APN 928-220-025 SFR	SM	STOP WORK ORDER	4	4/13/2000
APN 928-220-026 SFR	SM	STOP WORK ORDER	4	4/13/2009
APN 928-220-029 SFR	SM	STOP WORK ORDER	2	4/13/2009
APN 928-220-030 SFR	SM	STOP WORK ORDER	4	4/13/2009
APN 928-230-015 SFR	SM	STOP WORK ORDER	4	4/13/2009
APN 928-230-016 SFR	SM	STOP WORK ORDER	4	4/13/2009
APN 928-230-021 SFR	SM	NC	3	3/30/2009
APN 928-240-025 SFR	SM	NC	3	3/30/2009
APN 928-260-030 SFR	SM	IC	3	4/14/2009
APN 928-280-018 SFR	SM	NC	1	9/28/2009
APN 928-310-007 SFR	SM	STOP WORK ORDER	4	3/11/2009
APN 928-350-030 SFR	SM	IC	1	9/24/2008
APN 929-020-012 SFR	SM	STOP WORK ORDER	5	2/23/2009
APN 929-020-014 SFR	SM	IC	3	4/14/2009
APN 929-110-020 SFR	SM	Closed	2	3/17/2009
APN 929-190-022 SFR	SM	IC	3	2/23/2009
APN 929-290-002 SFR	SM	NC	3	12/18/2008
APN 929-350-005 SFR	SM	IC	4	5/13/2009
APN 929-360-004 SFR	SM	IC	2	12/10/2008
APN 930-060-002 SFR	SM	IC	3	1/6/2009
APN 930-150-002 SFR	SM	NC	3	12/31/2008
APN 931-020-004 SFR	SM	NC	2	1/16/2009
APN 931-040-014 SFR	SM	Closed	1	9/29/2008
APN 931-050-011 SFR	SM	NC	3	4/8/2009
APN 931-070-012 SFR	SM	NC	3	4/8/2009
APN 931-070-013 SFR	SM	Closed	1	12/08/0/
APN 931-170-007 SFR	SM	IC	3	2/23/2009
APN 931-220-009 SFR	SM	IC	3	5/13/2009
APN 931-380-019 SFR	SM	Closed	1	9/19/2008
APN 932-020-019 SFR	SM	Closed	1	11/25/2008
APN 932-020-024 SFR	SM	IC	3	1/28/2009
APN 932-030-018 SFR	SM	NC	6	4/14/2009
APN 932-260-065 SFR	SM	NC	3	4/8/2009
APN 932-280-037 SFR	SM	Closed	1	9/25/2008
APN 932-310-002 SFR	SM	NC	2	1/22/2009
APN 932-310-007 SFR	SM	IC	2	12/1/2008
APN 932-320-045 SFR	SM	NC	3	12/22/2008
APN 932-340-004 SFR	SM	NC	3	4/8/2009
APN 932-340-013 SFR		STOP WORK ORDER		
APN 932-350-003 SFR	SM	STOP WORK ORDER	1	10/31/2008
APN 932-350-005 SFR	SM	IC	2	1/16/2009
APN 932-350-025 SFR	SM	IC	2	10/31/2008
APN 932-370-034 SFR	SM	NC	2	10/28/2008
APN 932-370-036 SFR	SM	IC	2	2/4/2009
APN 932-370-037 SFR	SM	IC	2	3/10/2009
APN 932-370-046 SFR	SM	NC	3	4/8/2009

APN 932-370-048 SFR	SM	NC	3	2/9/2009
APN 934-030-007 SFR	SM	NC	4	4/14/2009
APN 934-180-008 SFR	SM	IC	3	12/30/2008
APN 935-130-005 SFR	SM	IC	3	5/13/2009
APN 935-180-015 SFR	SM	IC	4	5/28/2009
APN 935-190-007 SFR	SM	IC	3	4/7/2009
APN 935-200-012 SFR	SM	Closed	1	11/12/2008
APN 935-220-019 SFR	SM	STOP WORK ORDER	1	3/5/2009
APN 935-400-008 SFR	SM	Closed	1	9/24/2008
APN 936-150-015 SFR	SM	Closed	1	9/15/2009
APN 937-070-021 SFR	SM	IC	2	5/14/2009
APN 937-160-004 SFR	SM	Closed	1	9/15/2009
APN 938-150-004 SFR	SM	IC	3	1/27/2009
APN 939-110-013 SFR	SM	IC	2	4/7/2009
APN 940-040-005 SFR	SM	NC	3	1/27/2009
APN 940-070-004 SFR	SM	IC	3	4/7/2009
APN 940-070-020 SFR	SM	NC	3	5/28/2009
APN 940-160-003 SFR	SM	IC	7	5/13/2009
APN 941-030-008 SFR	SM	IC	3	4/15/2009
APN 941-060-010 SFR	SM	IC	3	5/28/2009
APN 941-070-007 SFR	SM	IC	2	12/3/2008
APN 942-060-010 SFR	SM	IC	2	1/28/2009
APN 942-110-005 SFR	SM	IC	2	12/9/2008
APN 942-250-026 SFR	SM	Closed	1	9/16/2008
APN 943-090-023 SFR	SM	NC	3	4/20/2009
APN 951-040-008 SFR	SM	IC	1	12/17/2008
APN 951-090-025 SFR	SM	NC	3	2/10/2009
APN 951-750-013 SFR	SM	NC	2	10/20/2008
PM 30017 / PP 17680	SM	IC	2	12/4/2008
PM 32159-PP 17680	SM	Expired	1	10/4/2008
PM 33691	SM	Closed	2	1/15/2009
PP 17680	SM	STOP WORK ORDER	3	1/21/2009
PP 18891	SM	IC	1	11/5/2008
PP 22254	SM	IC	2	2/3/2009
PP 22461	SM	Closed	2	1/27/2009
PP 31219	SM	NC	2	3/17/2009
TR 22948	SM	IC	1	10/14/2008
TR 25994	SM	NC	1	11/5/2008
TR 27603	SM	Expired	1	11/12/2008
TR 28298	SM	IC	5	4/2/2009
TR 28695-1	SM	IC	2	12/10/2008
TR 28695-2	SM	IC	3	3/20/2009
TR 29114	SM	IC	5	2/9/2009
TR 29214	SM	IC	5	2/6/2009
TR 29962	SM	Closed	1	10/14/2008
TR 30069-1	SM	NC	8	5/12/2009
TR 30155	SM	STOP WORK ORDER	7	5/12/2009
TR 30297	SM	IC	3	2/4/2009
TR 30347	SM	IC	3	1/7/2009
TR 30791	SM	IC	3	4/2/2009
TR 30885	SM	NC	8	5/13/2009
TR 30939	SM	Closed	4	4/17/2009

TR 31118	SM	IC	4	4/2/2009
TR 31330	SM	IC	3	3/17/2009
TR 31353	SM	NC	6	5/12/2009
TR 31662	SM	Closed	4	4/6/2009
TR 31674	SM	NC	3	12/30/2008
TR 32049	SM	IC	8	5/8/2009
TR 32171	SM	IC	3	4/2/2009
TR 32185	SM	IC	5	5/8/2009
TR 32982	SM	Expired	1	11/5/2008
TR 34324	SM	NC	4	3/26/2009
TR 35200	SM	IC	3	3/17/2009

Attachment B: 2008-09 Storm Season – Sites Where Enforcement Acti

LEGAL	RWQCB	% COMPLIANCE IMPROVEMENT	VERIFICATION NO.
		STOP WORK ORDERS	
APN 384-080-013 SF	SM	STOP WORK ORDER	2
APN 384-080-015 SF	SM	STOP WORK ORDER	1
APN 384-080-016 SF	SM	STOP WORK ORDER	1
APN 915-230-053 SF	SM	STOP WORK ORDER	2
APN 915-550-017 SF	SM	STOP WORK ORDER	2
APN 915-560-017 SF	SM	STOP WORK ORDER	2
APN 915-560-033 SF	SM	STOP WORK ORDER	3
APN 915-560-034 SF	SM	STOP WORK ORDER	3
APN 915-750-007 SF	SM	STOP WORK ORDER	3
APN 915-750-038 SF	SM	STOP WORK ORDER	3
APN 927-220-004 SF	SM	STOP WORK ORDER	2
APN 927-220-005 SF	SM	STOP WORK ORDER	2
APN 928-210-005 SF	SM	STOP WORK ORDER	3
APN 928-220-011 SF	SM	STOP WORK ORDER	4
APN 928-220-012 SF	SM	STOP WORK ORDER	4
APN 928-220-024 SF	SM	STOP WORK ORDER	4
APN 928-220-025 SF	SM	STOP WORK ORDER	4
APN 928-220-026 SF	SM	STOP WORK ORDER	4
APN 928-220-029 SF	SM	STOP WORK ORDER	2
APN 928-220-030 SF	SM	STOP WORK ORDER	4
APN 928-230-015 SF	SM	STOP WORK ORDER	4
APN 928-230-016 SF	SM	STOP WORK ORDER	4
APN 928-310-007 SF	SM	STOP WORK ORDER	4
APN 929-020-012 SF	SM	STOP WORK ORDER	5
APN 932-340-013 SFR		STOP WORK ORDER	
APN 932-350-003 SF	SM	STOP WORK ORDER	1
APN 935-220-019 SF	SM	STOP WORK ORDER	1
PP 17680	SM	STOP WORK ORDER	3
TR 30155	SM	STOP WORK ORDER	7

on Was Taken SM

DATE STOP WORK ORDER WAS ISSUED	COMMENT REGARDING ACTION TAKEN
12/10/2008	Still in Effect
9/4/2008	Still in Effect
9/4/2008	Still in Effect
10/20/2008	Still in Effect
10/24/2009	Still in Effect
10/20/2009	Still in Effect
10/20/2008	Still in Effect
10/20/2008	Still in Effect
4/14/2009	Still in Effect
10/20/2009	Still in Effect
10/20/2009	Still in Effect
10/20/2009	Still in Effect
4/13/2009	Still in Effect
4/13/2009	Still in Effect
4/13/2009	Still in Effect
4/13/2009	Still in Effect
4/13/2000	Still in Effect
4/13/2009	Still in Effect
4/13/2009	Still in Effect
4/13/2009	Still in Effect
4/13/2009	Still in Effect
4/13/2009	Still in Effect
3/11/2009	Still in Effect
2/23/2009	Still in Effect
	Still in Effect
10/31/2008	Still in Effect
3/5/2009	Still in Effect
1/21/2009	Still in Effect
5/12/2009	Still in Effect

Case No.	Hearing Date	Item #	Planner	Super. Dist.	Area Plan	Watershed	Decision	D.U.s
PP23285	06/11/08	5.5	A. Krizek	3	Southwest	Santa Marga	A	
TR29010	06/11/08	5.6	J. Horn	3	Riverside E	Santa Marga	A	32
PM35108	07/23/08	5.5	A. Krizek	3	Southwest	Santa Marga	A	2
PM35070	07/23/08	5.1	M. Straite	1	Southwest	Santa Marga	A	4
PM33093	08/06/08	5.3	A. Krizek	3	Southwest	Santa Marga	A	2
PM34498	08/11/08	4.1	J. Equina	3	Riverside E	Santa Marga	A	2
PM34562	08/20/08	5.3	A. Krizek	3	Southwest	Santa Marga	A	4
PM35241	09/22/08	4.7	A. Krizek	3	Southwest	Santa Marga	A	4
PM35983	10/06/08	3.5	R. Brady	3	Harvest Vall	Santa Marga	A	2
PM34828	10/20/08	4.3	A. Krizek	3	Southwest	Santa Marga	A	2
PM35139	10/20/08	4.1	J. Horn	3	Riverside E	Santa Marga	A	3
PP20375	01/12/09	4.2	A. Krizek	3	thwest Area	Santa Marga	A	
PP23017	01/26/09	5.1	A. Krizek	3	thwest Area	Santa Marga	N	
PM35118	02/04/09	5.5	A. Krizek	3	Southwest	Santa Marga	A	4
CUP03551	02/04/09	5.6	A. Krizek	3	Southwest	Santa Marga	A	
PM35829	02/04/09	5.7	A. Krizek	2	Southwest	Santa Marga	A	2
PM33459A2	02/18/09	5.3	J. Horn	3	Riverside E	Santa Marga	A	0
TR33423M1	03/04/09	4.1	A. Krizek	3	Southwest	Santa Marga	A	0
PM35656	03/04/09	7.1	A. Krizek	3	Southwest	Santa Marga	A	4
PM32981M1	04/15/09	4.2	L.Sheldon	3	Southwest	Santa Marga	A	
PM34343	04/15/09	5.5	L.Sheldon	3	Southwest	Santa Marga	A	2
TR32896	05/13/09	5.6	J.Horn	3	REMAP	Santa Marga	A	7
PUP00892	06/24/09	8.6	A.RUSH	1	Mead Valley	Santa Margarita		
PM30038	06/24/09	8.4	J.Horn	3	REMAP	Santa Margarita		4
PM35279	06/29/09	4.2	J.Horn	3	REMAP	Santa Margarita		4
PP22217	06/29/09	4.1	L. Sheldon	3	RANCHO C	Santa Margarita		

Total Cases	26
Total DU	84
Total Bldg Area	4,168

Illegal Grading Closed FY0809

Case #	Case Name	Location	CITY	Case Closed
CV034351	GRADING WITHOUT PERMIT	APN #917-290-001 □1 Parcel W. of 44735 Sage Rd, Temecula □Contact: LAURENCE RENEE *(NEW)		1/26/2009
CV044781	GRADING WITHOUT PERMIT	382390031 □34824 Stoneman Ave.		9/22/2008
CV044909	GRADING WITHOUT PERMIT	362240008		9/2/2008
CV050254	GRADING WITHOUT PERMIT	382140011		9/22/2008
CV050494	GRADING WITHOUT PERMIT	380290026	WILDOMAR	9/19/2008
CV050495	GRADING WITHOUT PERMIT	380290015	WILDOMAR	9/22/2008
CV051204	GRADING WITHOUT PERMIT	368200035 □:ADDR 20980 PALOMAR ST LAKE ELSINORE CA		7/16/2008
CV051205	GRADING WITHOUT PERMIT	368030053 □:ADDR 34980 MISSION TR LAKE ELSINORE CA		7/31/2008
CV051286	GRADING WITHOUT PERMIT	367310010	WILDOMAR	2/23/2009
CV051288	GRADING WITHOUT PERMIT	376350014	WILDOMAR	7/22/2008
CV051289	GRADING WITHOUT PERMIT	376350003	WILDOMAR	7/22/2008
CV051511	GRADING WITHOUT PERMIT	382120055 □34647 Borchard Rd., Lake Elsinore		9/22/2008
CV053131		367160006		8/6/2008
CV053131		367160006		10/16/2008
CV053154	GRADING WITHOUT PERMIT	583100010	AGUANGA	3/4/2009
CV053862	GRADING WITHOUT PERMIT	362120053 □ □RP: ROBERT STURGIS @ 951-244-9885 (HM) @ 951-203-7824 (CELL) □ □	MENIFEE	9/19/2008
CV054056	GRADING WITHOUT PERMIT	384120007 □ □RP: BILL @ 909-519-1234 □		2/27/2009
CV054247	grading without a permit	366240082 □rp-anonymous	WILDOMAR	7/21/2008
CV054247	grading without a permit	366240082 □rp-anonymous	WILDOMAR	10/6/2008
CV054512	GWP	376160023, 376160024, 376160025, 376160026 □RPTY Bill Greenly 21645 Indiana, Wildomar Home(951)678-5538 Cell (951)757-2316		7/7/2008

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Illegal Grading Closed FY0809

Case #	Case Name	Location	CITY	Case Closed
CV054778	GRADING WITHOUT PERMIT	918260009 □RP: TOM WILHELM @ 760-742-0642 □		12/23/2008
CV054779	GRADING WITHOUT PERMIT	918260011 □RP: TOM WILHELM @ 760-742-0642 □		1/13/2009
CV054781	GRADING WITHOUT PERMIT	918260013 □RP: TOM WILHELM @ 760-742-0642	Temecula	12/23/2008
CV055350	Grading w/o Permit	376150010 □RPTY - Martha Gonzales (951)674-8118	LAKE ELSINORE	2/23/2009
CV055653	Grading without a Permit	367480007 □Ruth Turner (951)674-2885	WILDOMAR	12/1/2008
CV055709	GRADING WITHOUT PERMIT	571110024 ADDRESS: 1 Parcel east of 47855 Rawhide Rd., Aguanga, CA 92536 □RP: Marie Goetz @ 951-767-9427		1/7/2009
CV056593	GRADING WITHOUT PERMIT	APN: 917-130-005 □RP: JOHN HUELSON @ 951-302-1381	TEMECULA	8/27/2008
CV056640	GRADING WITHOUT PERMIT	569330008		3/24/2009
CV060365	GRADING WITHOUT PERMIT	915-240-060 □RP: Suzanne 951-302-6191		1/13/2009
CV060516	Grading without permit	382170024 □between 20679 Grand Ave. & Alameda Del Monte, Wildomar		9/22/2008
CV060641	GRADING WITHOUT PERMIT	915-640-011 □RP: Carol Schmuhl @ 951-767-1061 760-891-7965 (work)	TEMECULA	1/21/2009
CV060916	Grading w/o Permit	380070011		9/19/2008
CV061071	GRADING WITHOUT PERMIT	932200026 □ADDR: A PARCEL ON VIA VOLCANO (TENAJA ROAD), NORTH OF AVOCADO MESA □RP: CHARLES WIDEEN		2/23/2009
CV061098	GRADING WITHOUT PERMIT	569-330-011 □Address: One Parcel East of 43220 Falcon □RP: Michael Ray Horn (951) 265-9637 hm. (909) 322-8643 wk.		1/15/2009
CV062451	CONST W/O PERMIT	579-260-024 □RP: Gordon Lea @ 591 763-0161	ANZA	10/30/2008
CV062555	GRADING WITHOUT PERMIT	943-250-019 □RP: LINDA @ 951-699-3629	TEMECULA	4/30/2009
CV062752	Grading w/o permit	368170050		7/25/2008
CV062883	Grading Without a Permit	927-120-013 □RP: Barry Wilson - Building & Safety	TEMECULA	1/12/2009

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Illegal Grading Closed FY0809

Case #	Case Name	Location	CITY	Case Closed
CV062922	Grading w/o permit	368060005		7/25/2008
CV063239	GRADING WITHOUT PERMIT	915-550-028 □ADDR: 1 Parcel East of 40055 Green Oaks Dr., Temecula □RP: Tressa @ 949-631-5444 ext 205 until 3:30pm		7/15/2008
CV063751	Grading Without Permit	952170005		2/27/2009
CV063879	Grading Without Permit	APN: 951-110-010 □RP: Anonymous	TEMECULA	4/16/2009
CV064027	Occupied Recreation Vehicles	915480001 □RP: John @ 767-2423 (home)/526-3741 (cell)	HEMET	12/2/2008
CV064097	Grading w/o Permit	928280001	MURRIETA	2/20/2009
CV064213	GRADING WITHOUT PERMIT	917170001		2/6/2009
CV064587	Grading Without Permit	583280012		3/4/2009
CV064676	Grading w/o permit	932050020		4/3/2009
CV064726	Grading Without Permit	APN: 915-270-021, Temecula. SW corner, intersection of Exaely Rd & Rope Rd □RP: Susan @ 760 891-7922		1/21/2009
CV064743	Grading Without Permit	941200017 □RP: Officer discovery - Mark Slocum	TEMECULA	4/27/2009
CV064937	GRADING WITHOUT PERMIT	APN: 362-440-023 □ADDR: 32200 Geary, Menifee	MENIFEE	2/23/2009
CV065399	GRADING WITHOUT PERMIT	APN: 952-320-018 □ADDR: 42145 CALLE BARBONA, TEMECULA	TEMECULA	4/8/2009
CV065496	Grading w/o permit	939080016	TEMECULA	8/13/2008
CV066644	Grading without a permit	271210002		2/27/2009
CV066788	GRADING WITHOUT PERMIT	951-090-025	TEMECULA	7/30/2008
CV066954	GRADING WITHOUT PERMIT	APN: 952-060-022	TEMECULA	1/14/2009
CV067072	GWP	178230018		6/22/2009
CV067487	GRADING WITHOUT PERMIT	581060001		3/2/2009
CV067583	GRADING WITHOUT PERMIT	915330021		1/12/2009
CV067776	GRADING WITHOUT PERMIT	580360020	AGUANGA	4/6/2009
CV070185	GRADING WITHOUT PERMIT	943110018	TEMECULA	2/3/2009
CV070585	Grading w/out permit	963100008	WINCHESTER	12/4/2008
CV070786	GRADING WITHOUT PERMIT	915080028	TEMECULA	1/29/2009
CV070824	GRADING WITHOUT PERMIT	583260051		3/30/2009
CV070861	Grading without Permit	927540036		1/9/2009
CV070864	Grading without a Permit	583120018	AGUANGA	1/7/2009
CV070938	Grading without Permit	915220023	TEMECULA	1/16/2009
CV0710098	Grading Without Permit	915220018	TEMECULA	10/9/2008
CV0710130	GRADING WITHOUT PERMIT	915560028	temecula	2/9/2009

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Illegal Grading Closed FY0809

Case #	Case Name	Location	CITY	Case Closed
CV0710144	GRADING WITHOUT PERMIT	936040020		8/6/2008
CV0710177	GRADING WITHOUT PERMIT	583190031	AGUANGA	1/12/2009
CV0710205	GRADING WITHOUT PERMIT	951270014	Temecula	7/23/2008
CV0710213	GRADING WITHOUT PERMIT	939110029		1/16/2009
CV0710217	GRADING WITHOUT PERMIT	386172011	LAKE ELSINORE	7/11/2008
CV0710326	GRADING WITHOUT PERMIT	942080029	TEMECULA	5/27/2009
CV0710370	Grading without permits.	917310030		6/24/2009
CV0710377	GRADING WITHOUT PERMIT	366230011	WILDOMAR	11/4/2008
CV071230	Grading without permit	965250015	TEMECULA	1/29/2009
CV071941	Grading without a permit	581160011	AGUANGA	3/2/2009
CV072261	Grading without a permit	941120013	Temecula,	3/19/2009
CV072347	Grading without permits.	361051011		1/23/2009
CV072494	Grading without permits	952090003		1/29/2009
CV072694	Grading without permits.	918270057	TEMECULA	4/23/2009
CV073322	GRADING WITHOUT PERMIT	932200012	MURRIETA	3/12/2009
CV073564	GRADING WITHOUT A PERMIT	940-240-005 GRADING WITHOUT A PERMIT	TEMECULA	11/18/2008
CV073587	GRADING WITHOUT PERMIT	917110017	TEMECULA	1/16/2009
CV073588	Grading without a Permit	915440006	TEMECULA	12/30/2008
CV074056	Grading without permits	467030022	WINCHESTER	8/14/2008
CV074553	GRADING WITHOUT PERMIT	927550017	TEMECULA	6/24/2009
CV074619	Grading Without Permit	466160013	WINCHESTER	1/21/2009
CV074920	Grading without a permit	927620017 □1 Parcel S. of 38685 De Portola Rd.		10/28/2008
CV075984	Grading Without Permit	915560007		2/24/2009
CV076012	Grading without permits	964110013	WINCHESTER	3/12/2009
CV076146	GRADING WITHOUT PERMIT	928180007		11/18/2008
CV076232	Grading Without Permit	964110010		4/1/2009
CV076333	Grading / Stockpiling	526220011		11/20/2008
CV076355	Grading without Permit.	942250035	TEMECULA	3/5/2009
CV077322	Grading Without Permit	917260081		2/4/2009
CV077407	Grading w/out Permits	345100021		11/20/2008
CV078308	Grading without permits	941120014	Temcula	12/15/2008
CV078354	Grading without premits	951130014	TEMECULA	7/15/2008
CV078532	Grading Without Permit	584250021	ANZA	10/6/2008
CV078828	Grading Without Permit	927280007		3/26/2009
CV078828	Grading Without Permit	927280007		8/11/2008
CV079004	Grading without permits	583260069		4/16/2009
CV079105	Grading Without Permit	924120027	TEMECULA	6/4/2009
CV079656	GRADING WITHOUT PERMIT	366260001	WILDOMAR	7/23/2008

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Illegal Grading Closed FY0809

Case #	Case Name	Location	CITY	Case Closed
CV079657	GRADING WITHOUT PERMIT	366230008	WILDOMAR	7/29/2008
CV0800034	Grading without permit	927280011		7/7/2008
CV0800108	GRADING WITHOUT PERMIT	951270003	TEMECULA	2/9/2009
CV0800280	GRADING WITHOUT PERMIT	581210017	AGUANGA	3/31/2009
CV0800596	Grading Without Permit	927500031	TEMECULA	4/13/2009
CV0800645	Grading Without Permit	571270063	AGUANGA	3/16/2009
CV0800699	Grading Without Permit	571150061	HEMET	3/16/2009
CV0800709	Grading without permits	384160005	MENIFEE	10/28/2008
CV0800752	Grading Without Permit	915050008	TEMECULA	4/28/2009
CV0800921	GRADING WITHOUT PERMIT	931170007		12/15/2008
CV0801087	Grading Without Permit	927440007		1/28/2009
CV0801152	Grading Without Permit	915630002	TEMECULA	3/27/2009
CV0801160	Grading Without Permit	581100012		3/31/2009
CV0801161	Grading Without Permit	581120006	AGUANGA	3/30/2009
CV0801186	Grading Without Permit	927280040		8/5/2008
CV0801249	Grading Without Permit	941300009	TEMECULA	2/9/2009
CV0801724	GRADING WITHOUT PERMIT	576030019	ANZA	9/11/2008
CV0801915	GRADING WITHOUT PERMIT	932060034		10/15/2008
CV0801948	GRADING WITHOUT PERMIT	927370020	TEMECULA	7/25/2008
CV0802045	GRADING WITHOUT PERMIT	367270008		6/29/2009
CV0802270	Grading without a Permit	583250008		11/26/2008
CV0802496	GRADING WITHOUT PERMIT	571280018 Address: Parcel SE of 38155 Reed Valley Rd., Aguanga, CA		4/29/2009
CV0802529	GRADING WITHOUT PERMIT	942180001 Address: Parcel East of 39815 Jeremiah Road, Temecula, CA		7/7/2008
CV0802651	Grading without permits	943240006		7/18/2008
CV0802697	Grading Without Permit	917260050	TEMECULA	7/18/2008
CV0803204	GRADING WITHOUT PERMIT	929270011		6/18/2009
CV0803381	Grading Without Permit	579270039	Anza	4/14/2009
CV0803611	GRADING WITHOUT PERMIT	915720020		5/27/2009
CV0803705	Grading Without Permit	927320081		4/2/2009
CV0804117	GRADING WITHOUT PERMIT	943230001	TEMECULA	7/7/2008
CV0804383	GRADING WITHOUT PERMIT	915720030		5/27/2009
CV0804402	GRADING WITHOUT PERMIT	927660003	TEMECULA	5/5/2009
CV0805031	GRADING WITHOUT PERMIT	940020007		10/15/2008
CV0805224	Grading Without Permit	915710013	TEMECULA	3/27/2009
CV0805335	GRADING WITHOUT PERMIT	943170017	TEMECULA	7/22/2008

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Illegal Grading Closed FY0809

Case #	Case Name	Location	CITY	Case Closed
CV0805386	GRADING WITHOUT PERMIT	575250007	ANZA	4/7/2009
CV0805752	GRADING WITHOUT PERMIT	932120010		11/10/2008
CV0805752	GRADING WITHOUT PERMIT	932120010		7/1/2008
CV0805787	GRADING WITHOUT PERMIT	927530018	TEMECULA	9/29/2008
CV0805787	GRADING WITHOUT PERMIT	927530018	TEMECULA	7/2/2008
CV0805942	GRADING WITHOUT PERMIT	931240004	MURRIETA	7/9/2008
CV0805942	GRADING WITHOUT PERMIT	931240004	MURRIETA	2/23/2009
CV0806189	GRADING WITHOUT PERMIT	380120012	WILDOMAR	7/17/2008
CV0806189	GRADING WITHOUT PERMIT	380120012	WILDOMAR	6/17/2009
CV0806190	GRADING WITHOUT PERMIT	380120013		7/17/2008
CV0806190	GRADING WITHOUT PERMIT	380120013		6/17/2009
CV0806315	Grading Without Permit	917260046	TEMECULA	5/5/2009
CV0806315	Grading Without Permit	917260046	TEMECULA	7/22/2008
CV0806408	Grading Without Permit	924150015	TEMECULA	4/30/2009
CV0806408	Grading Without Permit	924150015	TEMECULA	7/24/2008
CV0806594	GRADING WITHOUT PERMIT	932330060		7/30/2008
CV0806594	GRADING WITHOUT PERMIT	932330060		8/6/2008
CV0807066	NPDES/ PM-10	1 lot S. of 48335 Painted Canyon Rd., Cahuilla Hills		4/21/2009
CV0807066	NPDES/ PM-10	1 lot S. of 48335 Painted Canyon Rd., Cahuilla Hills		8/18/2008
CV0807088	NPDS/ PM-10	1 lot W of 71670 Jaguar Way, Cahuilla Hills		3/17/2009
CV0807088	NPDS/ PM-10	1 lot W of 71670 Jaguar Way, Cahuilla Hills		8/18/2008
CV0807180	GRADING WITHOUT PERMIT	575280011 □Address: Parcel South of 59792 Hop Patch Spring Rd., Mountain Center, CA		8/20/2008
CV0807180	GRADING WITHOUT PERMIT	575280011 □Address: Parcel South of 59792 Hop Patch Spring Rd., Mountain Center, CA		9/3/2008
CV0807738	CONSTRUCTION WITHOUT PERI	376361005	WILDOMAR	9/8/2008
CV0807738	CONSTRUCTION WITHOUT PERI	376361005	WILDOMAR	5/13/2009
CV0807745	STOCKPILING SOIL	382200012	WILDOMAR	9/8/2008
CV0807745	STOCKPILING SOIL	382200012	WILDOMAR	11/17/2008
CV0807810	GWP	583280007	AGUANGA	9/10/2008
CV0807810	GWP	583280007	AGUANGA	12/9/2008
CV0807862	GWP	575280001 □1 Par. S/o of 59783 Hop Patch Springs Rd., Mountain Center		9/11/2008
CV0807862	GWP	575280001 □1 Par. S/o of 59783 Hop Patch Springs Rd., Mountain Center		10/28/2008
CV0807960	Grading Without Permit	915120042	TEMECULA	1/27/2009
CV0807960	Grading Without Permit	915120042	TEMECULA	9/16/2008

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Illegal Grading Closed FY0809

Case #	Case Name	Location	CITY	Case Closed
CV0808368	GWP	951-080-018	TEMECULA	10/1/2008
CV0808369	GWP	951-080-024	TEMECULA	10/1/2008
CV0808480	GWP	966040008	TEMECULA	10/2/2008
CV0808480	GWP	966040008	TEMECULA	5/7/2009
CV0808508	GRADING WITHOUT PERMIT	367300001	WILDOMAR	10/3/2008
CV0808508	GRADING WITHOUT PERMIT	367300001	WILDOMAR	6/25/2009
CV0808529	GRADING WITHOUT PERMIT (ST	383105023	LAKE ELSINORE	10/3/2008
CV0808768	GRADING WITHOUT PERMIT	928260030		11/10/2008
CV0808768	GRADING WITHOUT PERMIT	928260030		10/16/2008
CV0808860	Grading without Permit	349-240-048		12/11/2008
CV0808985	Grading without Permit	927330014	TEMECULA	2/26/2009
CV0809500	Gradin without permit	579140033	ANZA	11/6/2008
CV0809500	Gradin without permit	579140033	ANZA	12/29/2008
CV0809732	Grading without Permit	927340016	TEMECULA	11/17/2008
CV0809732	Grading without Permit	927340016	TEMECULA	6/24/2009
CV0810048	Grading W/O Permit	963040003	MURRIETA	11/25/2008
CV0810048	Grading W/O Permit	963040003	MURRIETA	12/12/2008
CV0810074	Grading without permit	APN: 928-280-018 □	murrieta	12/1/2008
CV0810254	GRADING WITHOUT A PERMIT	3 P/S OF 21491 SALTER ROAD PERRIS, CA		12/4/2008
CV0810627	GRADING W/O PERMIT	927360027	TEMECULA	12/16/2008
CV0810627	GRADING W/O PERMIT	927360027	TEMECULA	6/17/2009
CV0810732	GRADING WITHOUT PERMIT	469100006	HEMET	12/18/2008
CV0810732	GRADING WITHOUT PERMIT	469100006	HEMET	6/26/2009
CV0810753	GRADING WITHOUT PERMIT	927360027	Temecula	12/19/2008
CV0810753	GRADING WITHOUT PERMIT	927360027	Temecula	2/26/2009
CV0810921	GRADING WITHOUT PERMIT	915220023	TEMECULA	12/30/2008
CV0810921	GRADING WITHOUT PERMIT	915220023	TEMECULA	3/12/2009
CV0810930	GRADING WITHOUT PERMIT	915550016	TEMECULA	12/30/2008
CV0810930	GRADING WITHOUT PERMIT	915550016	TEMECULA	3/11/2009
CV0810936	GRADING WITHOUT PERMIT	915560017	TEMECULA	12/30/2008
CV0810936	GRADING WITHOUT PERMIT	915560017	TEMECULA	2/5/2009
CV0900124	GRADING WITHOUT PERMIT	951140057 □Address: SW corner of Rancho California and Anza, Temecula		1/9/2009
CV0900124	GRADING WITHOUT PERMIT	951140057 □Address: SW corner of Rancho California and Anza, Temecula		3/23/2009
CV0900250	GRADING WITHOUT PERMIT	571500001	Hemet	1/13/2009

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Illegal Grading Closed FY0809

Case #	Case Name	Location	CITY	Case Closed
CV0900250	GRADING WITHOUT PERMIT	571500001	Hemet	3/16/2009
CV0900293	GRADING WITHOUT PERMIT	941310004	TEMECULA	1/14/2009
CV0900293	GRADING WITHOUT PERMIT	941310004	TEMECULA	6/24/2009
CV0900300	GRADING W/O PERMIT	576610010	AGUANGA	1/14/2009
CV0900300	GRADING W/O PERMIT	576610010	AGUANGA	2/5/2009
CV0900463	GRADING WITHOUT PERMIT	362240025	WILDOMAR	1/21/2009
CV0900463	GRADING WITHOUT PERMIT	362240025	WILDOMAR	6/25/2009
CV0900467	GRADING WITHOUT PERMIT	362240026	WILDOMAR	1/21/2009
CV0900467	GRADING WITHOUT PERMIT	362240026	WILDOMAR	6/26/2009
CV0901105	GRADING WITHOUT PERMIT	380050019	WILDOMAR	2/17/2009
CV0901105	GRADING WITHOUT PERMIT	380050019	WILDOMAR	3/12/2009
CV0901255	GRADING WITHOUT PERMIT	951120024	TEMECULA	2/23/2009
CV0901255	GRADING WITHOUT PERMIT	951120024	TEMECULA	4/23/2009
CV0901298	GRADING WITHOUT PERMIT	927660002	TEMECULA	2/24/2009
CV0901298	GRADING WITHOUT PERMIT	927660002	TEMECULA	5/5/2009
CV0901308	GRADING WITHOUT PERMIT	927680002	TEMECULA	2/25/2009
CV0901308	GRADING WITHOUT PERMIT	927680002	TEMECULA	3/9/2009
CV0901504	GRADING WITHOUT PERMIT	584250030	Aguanga	3/3/2009
CV0901504	GRADING WITHOUT PERMIT	584250030	Aguanga	3/19/2009
CV0901589	GRADING WITHOUT PERMIT	571580005	AGUANGA	3/6/2009
CV0901589	GRADING WITHOUT PERMIT	571580005	AGUANGA	3/16/2009
CV0901704	GRADING WITHOUT PERMIT	571600004	AGUANGA	3/11/2009
CV0901704	GRADING WITHOUT PERMIT	571600004	AGUANGA	3/24/2009
CV0901914	GRADING WITHOUT PERMIT	584190015	AGUANGA	3/18/2009
CV0901914	GRADING WITHOUT PERMIT	584190015	AGUANGA	3/24/2009
CV0903044	Grading without permits		TEMECULA	4/29/2009
CV0903222	GRADING WITHOUT PERMIT	928220030 LEGAL ADDRESS PER LMS IS 37020 VIA VISTA GRANDE, MURRIETA		5/7/2009
CV0903222	GRADING WITHOUT PERMIT	928220030 LEGAL ADDRESS PER LMS IS 37020 VIA VISTA GRANDE, MURRIETA		6/22/2009
CV0903542	UNAPPROVED GRADING/CLEAR	470450011 □ADDRESS: PARCEL EAST OF 37370 HORSEMAN DR. TEMECULA		5/15/2009
CV0903542	UNAPPROVED GRADING/CLEAR	470450011 □ADDRESS: PARCEL EAST OF 37370 HORSEMAN DR. TEMECULA		5/20/2009
CV0903823	Grading Without Permit	924180020		5/28/2009
			Total	239

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Illegal Grading Open FY0809

Case #	Case Opened	CASE NAME	Location	Case Status	CITY
CV0807002	8/14/2008	Grading without permits		Open	TEMECULA
CV0810935	12/30/2008	GRADING WITHOUT PERMIT	915550057	Open	Temecula
CV0900940	2/4/2009	GRADING WITHOUT PERMIT	901060007	Closed	LAKE ELSINORE
CV0901308	2/25/2009	GRADING WITHOUT PERMIT	927680002	Closed	TEMECULA
CV0806408	7/24/2008	Grading Without Permit	924150015	Closed	TEMECULA
CV0806315	7/22/2008	Grading Without Permit	917260046	Closed	TEMECULA
CV0807962	9/16/2008	GRADING WITHOUT PERMIT	936280018	Open	TEMECULA
CV0806189	7/17/2008	GRADING WITHOUT PERMIT	380120012	Closed	WILDOMAR
CV0807745	9/8/2008	STOCKPILING SOIL	382200012	Closed	WILDOMAR
CV0807172	8/20/2008	GRADING WITHOUT PERMIT	917260050	Open	TEMECULA
CV0807517	9/2/2008	Grading Without Permit	901-020-022	Open	
CV0810921	12/30/2008	GRADING WITHOUT PERMIT	915220023	Closed	TEMECULA
CV0805770	7/1/2008	GRADING WITHOUT PERMIT		Closed	WILDOMAR
CV0807960	9/16/2008	Grading Without Permit	915120042	Closed	TEMECULA
CV0805942	7/9/2008	GRADING WITHOUT PERMIT	931240004	Closed	MURRIETA
CV0900250	1/13/2009	GRADING WITHOUT PERMIT	571500001	Closed	Hemet
CV0805752	7/1/2008	GRADING WITHOUT PERMIT	932120010	Closed	
CV0810732	12/18/2008	GRADING WITHOUT PERMIT	469100006	Closed	HEMET
CV0809732	11/17/2008	Grading without Permit	927340016	Closed	TEMECULA
CV0805787	7/2/2008	GRADING WITHOUT PERMIT	927530018	Closed	TEMECULA
CV0808985	10/23/2008	Grading without Permit	927330014	Closed	TEMECULA
CV0807801	9/10/2008	GWP	9172600051 ADDR: 4600 ANZA RD., TEMECULA	Open	
CV0809250	10/31/2008	Surface Mining	Par. N/o 29990 TECHNOLOGY DR, MURRIETA, CA. 92563	Closed	
CV0806430	7/25/2008	GRADING WITHOUT PERMIT	571040013 Address: Parcel South East of 44630 Skaggs Road, Hemet, CA	Open	
CV0806594	7/30/2008	GRADING WITHOUT PERMIT	932330060	Closed	
CV0900124	1/9/2009	GRADING WITHOUT PERMIT	951140057 Address: SW corner of Rancho California and Anza, Temecula	Closed	
CV0806657	8/1/2008	GRADING WITHOUT PERMIT		Closed	MURRIETA
CV0810927	12/30/2008	GRADING WITHOUT PERMIT	917260042	Open	TEMECULA
CV0900168	1/12/2009	Grading without Permit	915750014	Open	
CV0807738	9/8/2008	CONSTRUCTION WITHOUT PERMIT	376361005	Closed	WILDOMAR
CV0808768	10/16/2008	GRADING WITHOUT PERMIT	928260030	Closed	
CV0807365	8/27/2008	Grading without permits/NPDES	917260051	Open	TEMECULA

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Illegal Grading Open FY0809

Case #	Case Opened	CASE NAME	Location	Case Status	CITY
CV0808502	10/3/2008	CWP	579440008	Open	ANZA
CV0807810	9/10/2008	GWP	583280007	Closed	AGUANGA
CV0807862	9/11/2008	GWP	575280001 □1 Par. S/o of 59783 Hop Patch Springs Rd., Mountain Center	Closed	
CV0900463	1/21/2009	GRADING WITHOUT PERMIT	362240025	Closed	WILDOMAR
CV0901105	2/17/2009	GRADING WITHOUT PERMIT	380050019	Closed	WILDOMAR
CV0808508	10/3/2008	GRADING WITHOUT PERMIT	367300001	Closed	WILDOMAR
CV0810753	12/19/2008	GRADING WITHOUT PERMIT	927360027	Closed	Temecula
CV0810919	12/30/2008	GRADING WITHOUT PERMIT	915550042	Open	TEMECULA, CA
CV0808368	10/1/2008	GWP	951-080-018	Closed	TEMECULA
CV0808369	10/1/2008	GWP	951-080-024	Closed	TEMECULA
CV0808480	10/2/2008	GWP	966040008	Closed	TEMECULA
CV0810931	12/30/2008	GRADING WITHOUT PERMIT	915550068	Open	TEMECULA, CA
CV0810074	12/1/2008	Grading without permit	APN: 928-280-018 □	Closed	murrieta
CV0810910	12/30/2008	GWP-EXPIRED PERMIT	915550045	Open	TEMECULA
CV0901451	3/2/2009	GRADING W/O PERMIT	941190036	Open	TEMECULA
CV0810817	12/24/2008	Grading Without Permit	928220027	Open	
CV0809500	11/6/2008	Gradin without permit	579140033	Closed	ANZA
CV0901589	3/6/2009	GRADING WITHOUT PERMIT	571580005	Closed	AGUANGA
CV0901704	3/11/2009	GRADING WITHOUT PERMIT	571600004	Closed	AGUANGA
CV0810048	11/25/2008	Grading W/O Permit	963040003	Closed	MURRIETA
CV0810251	12/4/2008	Grading without Permit	941100002	Open	TEMECULA
CV0810940	12/30/2008	GRADING WITHOUT PERMIT	915220016	Open	TEMECULA, CA
CV0810765	12/19/2008	GWP	NEW APN# 927490025	Open	
CV0900293	1/14/2009	GRADING WITHOUT PERMIT	941310004	Closed	TEMECULA
CV0903220	5/7/2009	GRADING WITHOUT PERMIT	928230016 LEGAL ADDRESS PER LMS IS 38155 VIA VISTA GRANDE, MURRIETA	Open	
CV0903222	5/7/2009	GRADING WITHOUT PERMIT	928220030 LEGAL ADDRESS PER LMS IS 37020 VIA VISTA GRANDE, MURRIETA	Closed	
CV0903224	5/7/2009	GRADING WITHOUT PERMIT	928220029 LEGAL ADDRESS PER LMS IS 37120 VIA VISTA GRANDE, MURRIETA	Open	
CV0810926	12/30/2008	GRADING WITHOUT PERMIT	964120013	Open	TEMECULA
CV0810627	12/16/2008	GRADING W/O PERMIT	927360027	Closed	TEMECULA
CV0810941	12/30/2008	GRADING WITHOUT PERMIT	941020001	Open	TEMECULA
CV0901874	3/17/2009	GRADING WITHOUT PERMIT	929230004	Open	MURRIETA
CV0810936	12/30/2008	GRADING WITHOUT PERMIT	915560017	Closed	TEMECULA
CV0810767	12/19/2008	Grading Without Permit	927490024	Open	

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Illegal Grading Open FY0809

Case #	Case Opened	CASE NAME	Location	Case Status	CITY
CV0810930	12/30/2008	GRADING WITHOUT PERMIT	915550016	Closed	TEMECULA
CV0810938	12/30/2008	GRADING WITHOUT PERMIT	941310012	Open	TEMECULA, CA
CV0900467	1/21/2009	GRADING WITHOUT PERMIT	362240026	Closed	WILDOMAR
CV0900300	1/14/2009	GRADING W/O PERMIT	576610010	Closed	AGUANGA
CV0901373	2/27/2009	Grading Without Permit	584250029	Open	Aguanga
CV0901255	2/23/2009	GRADING WITHOUT PERMIT	951120024	Closed	TEMECULA
CV0901298	2/24/2009	GRADING WITHOUT PERMIT	927660002	Closed	TEMECULA
CV0903285	5/7/2009	GRADING WITHOUT PERMIT	928220012	Open	
CV0901504	3/3/2009	GRADING WITHOUT PERMIT	584250030	Closed	Aguanga
CV0901424	2/27/2009	GRADING WITHOUT PERMIT	380290008	Open	WILDOMAR
CV0903044	4/29/2009	Grading without permits		Closed	TEMECULA
CV0903552	5/15/2009	GRADING WITHOUT PERMIT	38240005	Closed	LAKE ELSINORE
CV0901914	3/18/2009	GRADING WITHOUT PERMIT	584190015	Closed	AGUANGA
CV0904190	6/10/2009	GRADING WITHOUT PERMIT	932060031	Open	MURRIETA
CV0902270	3/31/2009	UNAPPROVED GRADING	581110010	Open	AGUANGA
CV0903811	5/28/2009	Grading Without Permit	927210018	Open	TEMECULA
CV0902917	4/27/2009	GRADING WITHOUT PERMIT	928190018	Open	MURRIETA
CV0903221	5/7/2009	GRADING WITHOUT PERMIT	928230015 LEGAL ADDRESS PER LMS IS 38175 VIA VISTA GRANDE, MURRIETA	Open	
CV0903223	5/7/2009	GRADING WITHOUT PERMIT	928220024 LEGAL ADDRESS PER LMS IS 37195 VIA VISTA GRANDE, MURRIETA	Open	
CV0903225	5/7/2009	GRADING WITHOUT PERMIT	928220025 LEGAL ADDRESS PER LMS IS 37720 VIA VISTA GRANDE, MURRIETA	Open	
CV0903226	5/7/2009	GRADING WITHOUT PERMIT	928220026 LEGAL ADDRESS PER LMS IS 37980 VIA VISTA GRANDE, MURRIETA	Open	
CV0903284	5/7/2009	GRADING WITHOUT PERMIT	928220011	Open	
CV0903823	5/28/2009	Grading Without Permit	924180020	Closed	

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Illegal Dumping Closed FY0708

Case #	CASE NAME	Location	CITY	Date Closed
SE055748	Illegal Dumping		TEMECULA	2/10/2009
SE060783	Illegal Dumping	951160009	TEMECULA	2/11/2009
SE060827	Illegal Dumping	APN # 469-230-009 West of 30920 Charlene Way, Diamond Valley		2/11/2009
SE060898	Illegal Dumping	Owl Valley Rd. & Quarter Valley Rd. Sage		2/11/2009
SE063191	Illegal Dumping	6th St & C St Valle Vista		2/10/2009
SE066628	Illegal Dumping	North of SH 79 & East of Anza		2/10/2009
SE067132	Illegal Dumping	Mira & Scott Menifee		2/11/2009
SE0800425	Illegal Dumping	Cahuilla and Ave 66		9/11/2008
SE0800457	Illegal Dumping	Sage X/of Cactus		7/22/2008
SE0800478	Illegal Dumping	963321031	MURRIETA	9/12/2008
SE0800591	Illegal Dumping	Sage Rd x/of Cactus Valley road		9/22/2008
SE0800661	Illegal Dumping	2nd and Cahuilla		8/8/2008
SE0800731	Illegal Dumping	2nd and Coahuilla		9/15/2008
SE0800731	Illegal Dumping	2nd and Coahuilla		8/27/2008
SE0800807	Illegal Dumping	3rd/Coahuilla		9/23/2008
SE0800807	Illegal Dumping	3rd/Coahuilla		9/24/2008
SE0900022	Illegal Dumping	2nd & Coahuilla		1/9/2009
SE0900022	Illegal Dumping	2nd & Coahuilla		1/20/2009
SE0900112	Illegal Dumping	24831 Clinton Keith	WILDOMAR	5/14/2009
SE0900112	Illegal Dumping	24831 Clinton Keith	WILDOMAR	2/3/2009
SE0900113	ILLEGAL DUMPING	30040 COMMERCE CT. AND MURRIETA HOT SPRINGS/POUROY		2/4/2009
SE0900113	ILLEGAL DUMPING	30040 COMMERCE CT. AND MURRIETA HOT SPRINGS/POUROY		4/24/2009
SE0900118	Illegal Dumping	Coahuilla St & 2nd	mecca	2/11/2009
SE0900118	Illegal Dumping	Coahuilla St & 2nd	mecca	2/5/2009
SE0900227	ILLEGAL DUMPING	WINCHESTER/BOREL		3/17/2009
SE0900227	ILLEGAL DUMPING	WINCHESTER/BOREL		4/24/2009
SE0900276	ILLEGAL DUMPING	2ND/COAHUILLA		3/31/2009
SE0900276	ILLEGAL DUMPING	2ND/COAHUILLA		4/8/2009
				Total 28

018719

Illegal Dumping Open FY0809

Case #	Case Opened	Case Type	Location	Current Status	CITY
SE0800850	10/10/2008	Illegal Dumping	Cactus Valley & Sage	Open	
SE0900201	3/6/2009	ILLEGAL DUMPING	CHRISTMAS TREE LANE/SANTA ROSA MINES RD	Open	
SE0900430	5/29/2009	Illegal Dumping	Ave 62 & Van Buren	Open	
SE0900368	5/5/2009	Illegal Dumping	Mountain & Menifee	Open	
SE0900471	6/18/2009	Illegal Dumping	Walden Rd x/of Murrieta	Open	

018721

NPDES Closed FY0809

Case #	Location	CITY	Closed Dated
CV034155	940030002 □ADDR 27695 RANCHO CALIFORNIA RD TEMECULA CA :Contact: MANNING BRUCE/"LOURDES"		2/23/2009
CV034155	940030002 □ADDR 27695 RANCHO CALIFORNIA RD TEMECULA CA :Contact: MANNING BRUCE/"LOURDES"		2/23/2009
SE055927	Vuelta Grande Rd. & Carancho Rd. De Luz Creek		2/10/2009
SE055927	Vuelta Grande Rd. & Carancho Rd. De Luz Creek		2/10/2009
SE060090	Avenida De La Bandlaro APN # 924-180-009		2/11/2009
SE060090	Avenida De La Bandlaro APN # 924-180-009		2/11/2009
SE061735	Murrieta Rd. & Corson Ave. Menifee		2/11/2009
SE061735	Murrieta Rd. & Corson Ave. Menifee		2/11/2009
SE064741		WILDOMAR	2/10/2009
SE064741		WILDOMAR	2/10/2009
SE0800728	1 Parcel W. of 35100 Calle Nopal		8/27/2008
SE0800728	1 Parcel W. of 35100 Calle Nopal		10/27/2008
SE0800728	1 Parcel W. of 35100 Calle Nopal		8/27/2008
SE0800728	1 Parcel W. of 35100 Calle Nopal		10/27/2008

018722

NPDES Open FY0809

Case #	Date Opened	CASE NAME	Location	Case Status	CITY
SE0800728	8/27/2008	NPDES/grading without permits	1 Parcel W. of 35100 Calle Nopal	Closed	
SE0800728	8/27/2008	NPDES/grading without permits	1 Parcel W. of 35100 Calle Nopal	Closed	
SE0900286	4/3/2009	NPDES VIOLATION	38300 Via Majorca, Murrieta	Open	
SE0900286	4/3/2009	NPDES VIOLATION	38300 Via Majorca, Murrieta	Open	

018723

PLANNING DEPARTMENT

| Project Address | City | Zip | Tract/Lot Or Assessor Parcel No. | Acreage | Project Type | Project Description | Existing Land Use | No of Units | Project Priority | Water Source | WCID No (Contract) | Applicant Phone No. | Applicant Email | Applicant Address | Contact Name | City | Zip | Phone Number (24 hours) | Name (24 hours) | Phone Number | Email | Tract | Lot | Block | Section | Township | Range | Base | Comments | Single Family | Multi Family | Date Received | Approved Building Permit | Date Issued | Permit Number | Status | Date | Permit Expires | Comments | Inspector | Date | Time | Inspection Type | Inspection Status | Inspector | Comments |
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CODE ENFORCEMENT DEPARTMENT

CODE ENFORCEMENT
Illegal Dumping Closed FY0809

Case #	CASE NAME	Location	CITY	Date Closed	WATERSHED
SE063191	Illegal Dumping	6th St & C St Valle Vista		2/10/2009	SA
SE055748	Illegal Dumping		TEMECULA	2/10/2009	SMR
SE060783	Illegal Dumping	951160009	TEMECULA	2/11/2009	SMR
SE060827	Illegal Dumping	APN # 469-230-009 West of 30920 Charlene Way, Diamond Valley		2/11/2009	SMR
SE060898	Illegal Dumping	Owl Valley Rd. & Quarter Valley Rd. Sage		2/11/2009	SMR
SE066628	Illegal Dumping	North of SH 79 & East of Anza		2/10/2009	SMR
SE067132	Illegal Dumping	Mira & Scott Menifee		2/11/2009	SMR
SE0800457	Illegal Dumping	Sage X/of Cactus		7/22/2008	SMR
SE0800478	Illegal Dumping	963321031	MURRIETA	9/12/2008	SMR
SE0800591	Illegal Dumping	Sage Rd x/of Cactus Valley road		9/22/2008	SMR
SE0900112	Illegal Dumping	24831 Clinton Keith	WILDOMAR	5/14/2009	SMR
SE0900112	Illegal Dumping	24831 Clinton Keith	WILDOMAR	2/3/2009	SMR
SE0900113	ILLEGAL DUMPING	30040 COMMERCE CT. AND MURRIETA HOT SPRINGS/POUROY		2/4/2009	SMR
SE0900113	ILLEGAL DUMPING	30040 COMMERCE CT. AND MURRIETA HOT SPRINGS/POUROY		4/24/2009	SMR
SE0900227	ILLEGAL DUMPING	WINCHESTER/BOREL		3/17/2009	SMR
SE0900227	ILLEGAL DUMPING	WINCHESTER/BOREL		4/24/2009	SMR
SE0800425	Illegal Dumping	Cahuilla and Ave 66		9/11/2008	W
SE0800661	Illegal Dumping	2nd and Cahuilla		8/8/2008	W
SE0800731	Illegal Dumping	2nd and Coahuilla		9/15/2008	W
SE0800731	Illegal Dumping	2nd and Coahuilla		8/27/2008	W
SE0800807	Illegal Dumping	3rd/Coahuilla		9/23/2008	W
SE0800807	Illegal Dumping	3rd/Coahuilla		9/24/2008	W
SE0900022	Illegal Dumping	2nd & Coahuilla		1/9/2009	W
SE0900022	Illegal Dumping	2nd & Coahuilla		1/20/2009	W
SE0900118	Illegal Dumping	Coahuilla St & 2nd	mecca	2/11/2009	W
SE0900118	Illegal Dumping	Coahuilla St & 2nd	mecca	2/5/2009	W
SE0900276	ILLEGAL DUMPING	2ND/COAHUILLA		3/31/2009	W
SE0900276	ILLEGAL DUMPING	2ND/COAHUILLA		4/8/2009	W
				Total 28	

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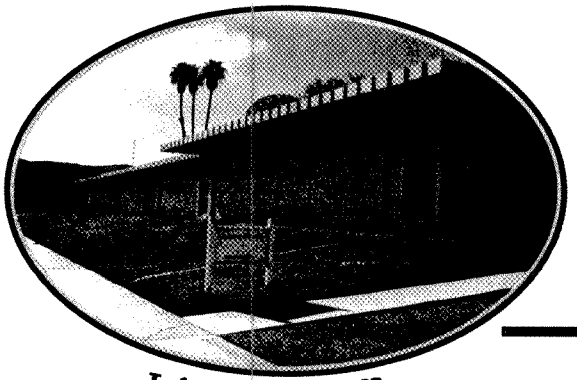

Lake Elsinore Office

Home Gardens Office

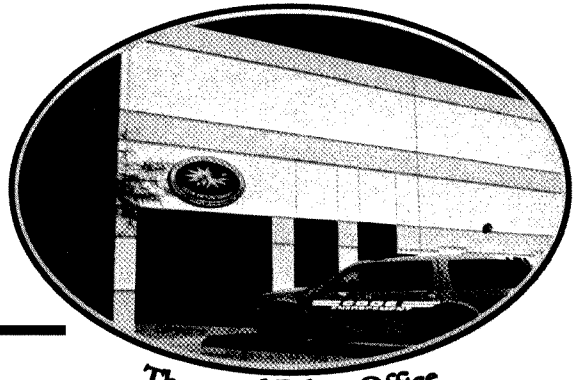

Thousand Palms Office

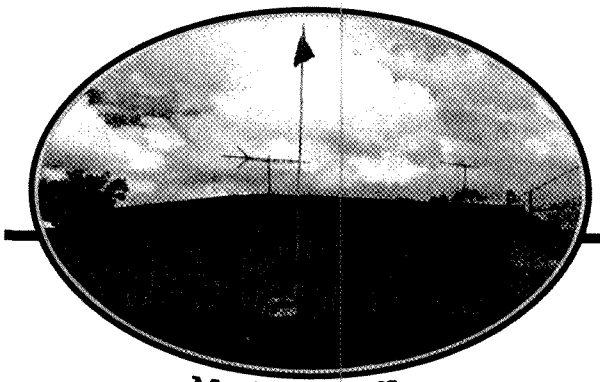

Mead Valley Office

COUNTY OF RIVERSIDE
CODE ENFORCEMENT
TRANSPORTATION & LAND MANAGEMENT AGENCY

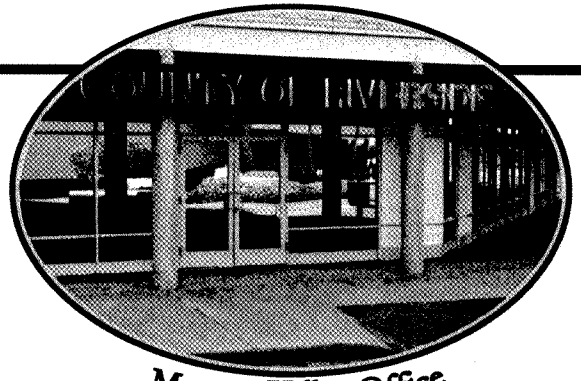

Moreno Valley Office

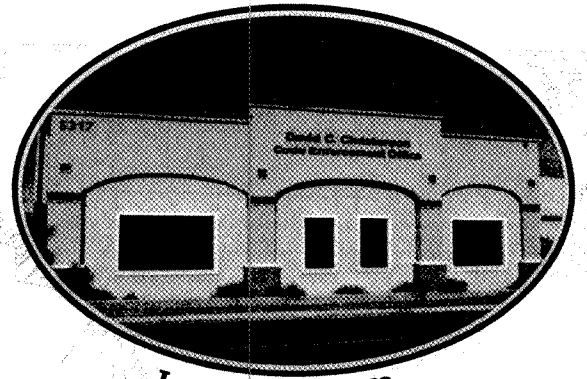

Jurupa Valley Office

2008 Annual Report

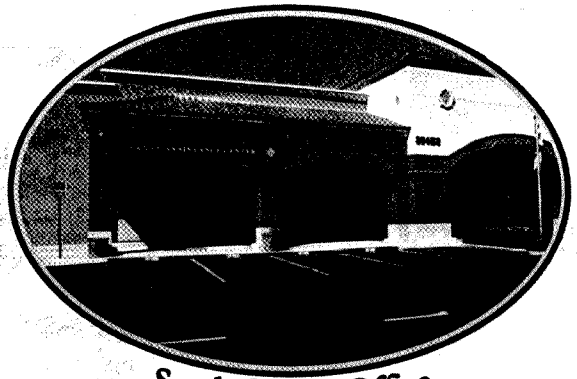

South County Office

County of Riverside
Code Enforcement Department

018735

County of Riverside
Board of Supervisors

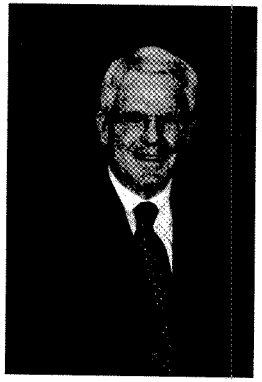

Bob Buster
District 1

John F. Tavaglione
District 2

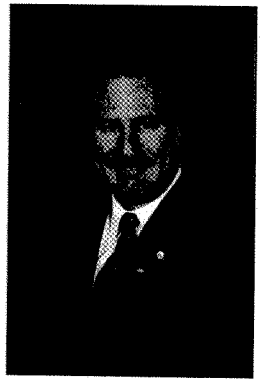

Jeff Stone
District 3

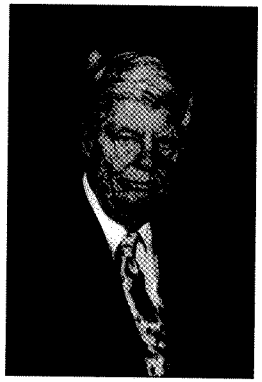

Roy Wilson
District 4

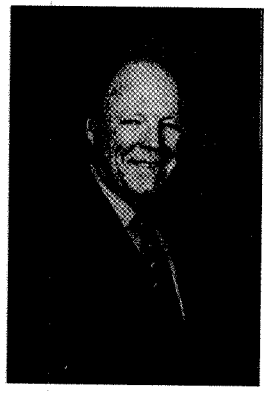

Marion Ashley
District 5

The Code Enforcement Department would like to thank the Board of Supervisors whose forward thinking has given us the support we need to make such a positive impact for the residents and businesses of Riverside County.

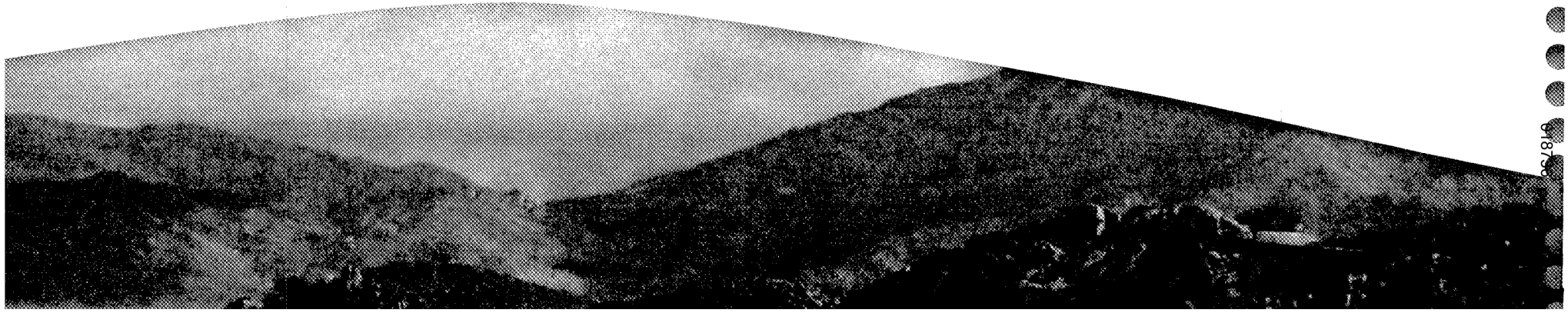

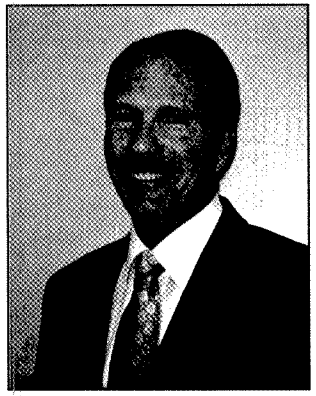

January 2009

To the Residents of Riverside County:

This past year has been filled with challenging opportunities. After accepting the position of Code Enforcement Director in September, I quickly developed an understanding of why this department has long been recognized for its problem-solving skills. In the last two years, Code Enforcement has been re-engineered to become the flagship code enforcement agency statewide. Our vision is to develop, establish, and maintain "sustainable healthy neighborhoods." By partnering with our neighborhood communities, and engaging them in developing and using their own assets and skills, we not only get to the bottom of their fundamental code issues, but the potential for long-term sustainability is greatly enhanced. As the Director, I am committed to providing training and resources necessary to give our officers and staff all the tools and skills they will need to be effective in their chosen professions. I look forward to the challenges that lie ahead of us in the coming years as we continue moving forward to make a positive difference in the communities we serve.

John Boyd

John Boyd, Director
Code Enforcement Department
County of Riverside

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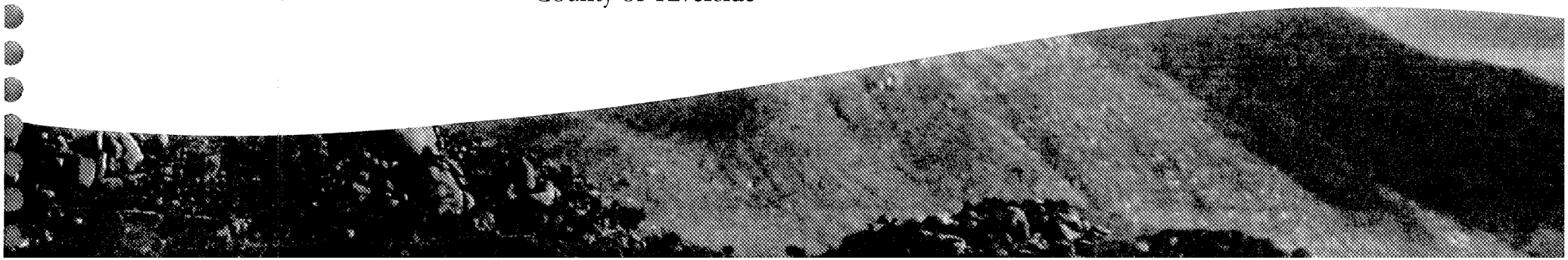

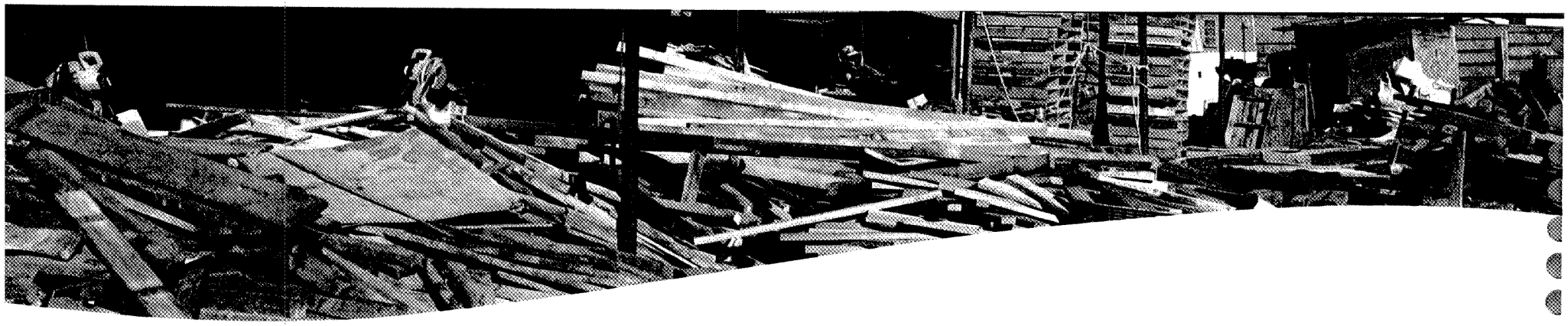

Code Enforcement Department Management Team

Greg Flannery
Division Manager

Tracey Towner
Division Manager

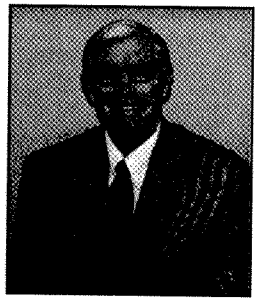

Steve Bloomquist
Division Manager

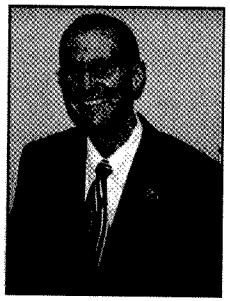

Jim Monroe
Division Manager

Ward Komers
Administrative Manager

Vision Statement

Our vision is to develop, establish, and maintain sustainable healthy neighborhoods.

Mission Statement

Our mission is to enhance public safety and the quality of life in partnership with communities through fair enforcement of laws and codes.

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Our Organization

150 Budgeted Positions
136 Filled Positions
101 Field Staff

Our Budget

FY08/09 $21,251,168
Serving over 554,571 residents

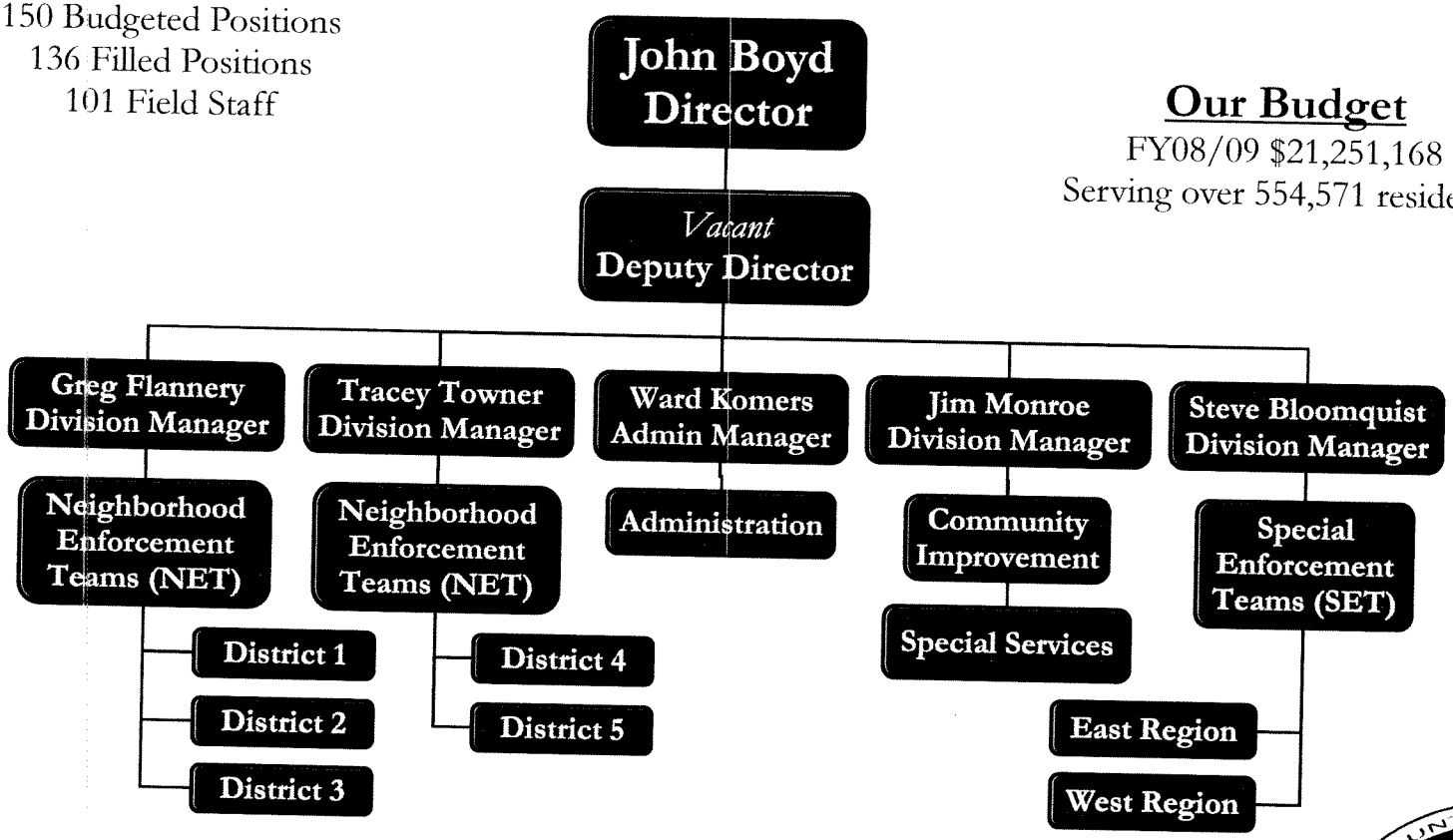

COUNTY OF RIVERSIDE
CODE ENFORCEMENT
TRANSPORTATION & LAND MANAGEMENT AGENCY

018739

Highlights of 2008

- The Foreclosure Task Force, consisting of over 12 members from our department, was created to tackle code issues associated with the growing trend of abandoned and distressed homes. **This represents over 10% of our field staff dedicated to this issue in the last quarter of 2008.**

- **8,840 property inspections** have been conducted of the 12,663 homes in some stage of foreclosure targeted by the task force, which also identified **795 additional code violations** being addressed by our department.

- **34,750** copies of The Posting, our monthly Code Enforcement newsletter, were distributed in 2008.

- Generated **$2.8 million** in revenue and additional funding from land use/parking enforcement, vehicle abatement, grants, and other sources.

- Over **26,847** hits were registered on the Code Enforcement website at **http://www.rctlma.org/ce**.

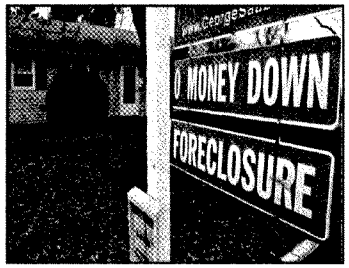

The Board of Supervisors passed Ordinances 880 & 881, effective May 13, 2008, which affects residential properties in the unincorporated areas of Riverside County. These properties, left unmaintained, have led to a decline in property value, pose a danger to children as attractive nuisances, provide opportunities for secretive criminal conduct including gang and drug related crimes, squatters, and real estate fraud. On June 27, 2008, previous Code Enforcement Director Jay E. Orr made the decision to host a forum for members of the financial and real estate communities so that they could come together and engage in open dialogue about these ordinances and the concerns of the county. The purpose of the meeting was to provide information about the registration and enforcement requirements of the ordinances. The forum also provided an opportunity for the public to ask questions and provide input on implementation concerns. Nearly 100 representatives from leading financial, real estate, and title companies participated in this meeting. Code Enforcement Director John Boyd opened the forum with introductions of the management team, followed by a presentation by Code Enforcement outlining a realistic perspective of the problem. Lisa Traczyk, Deputy County Counsel, walked the audience through the key components of the ordinances. Questions and comments from the participants lasted almost an hour, and several commented on their appreciation for the event.

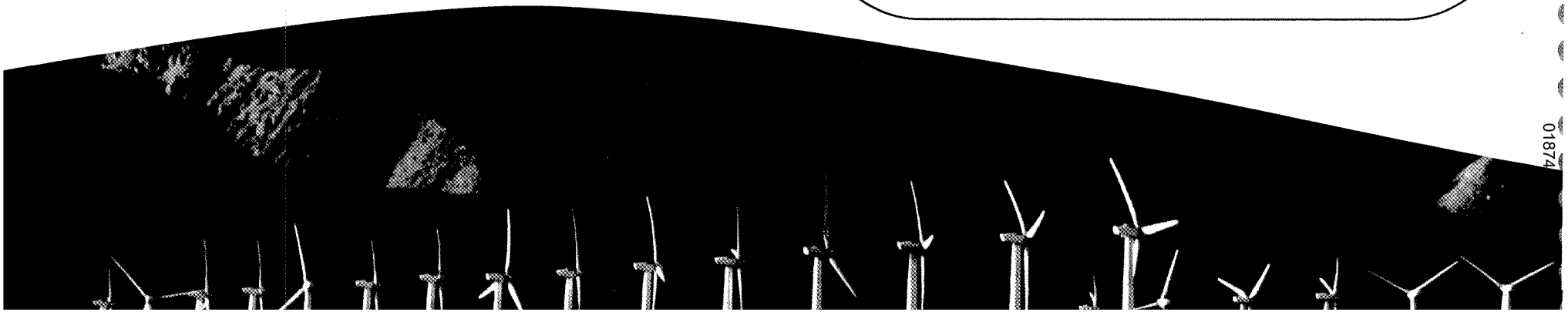

Highlights of 2008 Continued...

- The **Thousand Palms** Code Enforcement office was opened in April of 2008, and the **Home Gardens** Code Enforcement office was opened in June of 2008.

- **10,941 new Code Enforcement cases** were investigated in **2008**. This is in addition to the 8,840 property inspections that have been conducted by the Foreclosure Task Force.

- **26,686 inspections** were conducted by Code Enforcement staff in 2008.

- **1,699 administrative citations** and **8,289 parking citations** were issued in 2008.

- **150 public hearings** regarding administrative abatements were held by the Board of Supervisors in 2008.

- The Code Enforcement Department sponsored over **1,135 media spots,** educating the public concerning a variety of code enforcement issues.

The Department continues to grow as offices were opened in Thousand Palms and Home Gardens. This demonstrates that Riverside County Code Enforcement grows side-by-side with the community. It also shows that officers and staff are working hard to form alliances with the communities, working together to improve the quality of life in Riverside County.

The beginning of the second quarter of 2008 marked a new phase for Riverside County Code Enforcement. This phase began with a radio campaign to introduce the Department and the various ways we can be of assistance to the community. These commercial spots gave examples of numerous violations and invited the community to call in and get informed on how to come into compliance. During the month of May, Code Enforcement officers made history, as they became guests of the 30-minute local show "Despierta Nuestro Valle" ("Wake Up Our Valley") on the Univision channel in the desert communities of District 4. They touched upon the history of Code Enforcement, types of violations, how to comply, and where the Department is going.

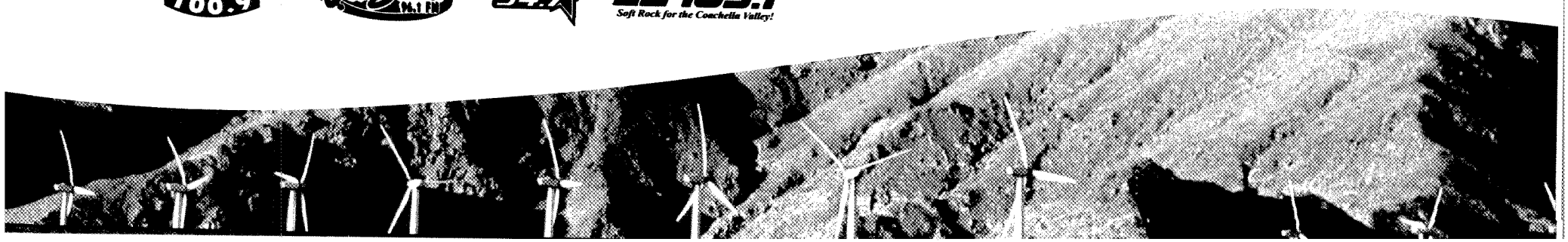

Highlights of 2008

- We held **34 community cleanup events** in 2008.
- These cleanup events collected over **1,106 tons of trash** and serviced well over **2,000 participants**.
- The Trash Task Force collected over **2,383 tons of trash** from our roadsides in 2008.
- Our **compliance rate for accumulated rubbish cases** has increased from 68% in 2007 to **77% in 2008**. Because the process for these cases has been streamlined, we are operating more efficiently; we experienced a **50% increase in opened cases** and a **70% increase in closed cases** for accumulated rubbish in 2008.
- In conjunction with our Community Impact Plans, we held over **10 community resource fairs** and **15 code enforcement workshops** to better inform the community members on ways they can "violation proof" their properties.

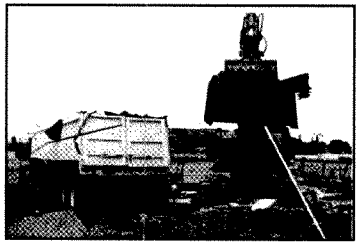

The Riverside County Board of Supervisors recently amended the ordinance (Ord. 541.5) that regulates the removal of rubbish, including green waste. This ordinance was amended to protect the health and welfare of residents from possible fire hazards and other safety concerns by expediting the process in which trash can be removed from vacant parcels.

Although Notices of Violation are still required, the time frames have been significantly reduced to gain compliance. This ordinance will allow county officials the ability to move quickly in abating these violations.

This improved process has increased the number of accumulated rubbish cases the Code Enforcement Department opened in 2008 to 2,198, which is 737 more than in 2007.

The fact that we can move expeditiously on this issue has led to increased compliance. We have been able to resolve 1,696 of accumulated rubbish cases in 2008, which is an increase of 703 cases over 2007.

018742

Highlights of 2008 Continued...

- **622 criminal citations** were issued for **illegal vending (51% increase over 2007)** and **228 criminal citations** were issued for **illegal dumping** in 2008.

- We implemented the "Safe Parks Now" program, which has identified and **inspected 349 units in 25 illegal or non-permitted mobile home parks,** addressing dangerous health and safety conditions affecting the residents of these parks.

- We continue to provide Code Enforcement services to the newly incorporated cities of Wildomar and Menifee.

- **$242,783** in grant funds were utilized by our Community Improvement Program to help owners clean and improve their properties, thereby enhancing their community.

- We cleaned up the largest trash pile in the history of the County. See page 9 for more information.

- We hosted our First Annual Neighborhood Conference. See page 11 for more information.

- We received the Challenge Award from the California Association of Counties (CSAC) for our Community Impact Plans. See page 13 for more information.

In the recent months, Code Enforcement officers have been working with mobile home park owners and residents in addressing immediate health and safety concerns. During this time, the Department launched the "Safe Parks Now" program to address quality of life issues within mobile home parks in the Coachella Valley. In order to address the health and safety issues found within these parks, a task force was formed between state and county agencies, including Code Enforcement, Housing & Community Development, Catholic Charities, Economic Development Agency, Housing Authority, and the California Rural Legal Assistance.

To date, this group of park inspectors has conducted inspections of 25 illegal and unpermitted mobile home parks. The outcome of the inspections has been very positive since the team identified and addressed numerous life-threatening conditions, such as exposed, energized wires and uncovered cesspools. The diligent efforts of the task force has resulted in the elimination of various types of health and safety hazards. These actions mean that the residents, including many children, are no longer being subjected to ongoing health risks. During the inspections, property owners are also being educated concerning their options and presented with programs available from county agencies that may assist them in bringing their properties into compliance.

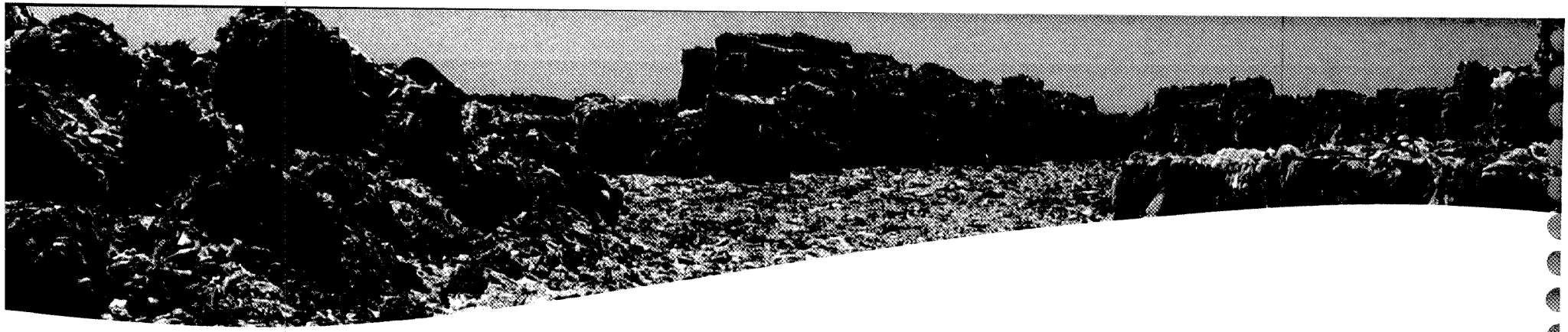

Code Enforcement and the California Integrated Waste Management Board Team Up to Clean One of the Largest Trash Heaps in County History

Code Enforcement routinely investigates illegal and unpermitted businesses and complaints regarding accumulated rubbish. However, this investigation, spearheaded by Senior Officer George Gianos, very rapidly escalated into an abatement action that far exceeded the scope of any trash cleanup undertaken by the Department. Senior Officer Gianos described his first encounter with this enormous trash heap this way: "We investigated the matter and discovered stockpiles of bundled trash covering an area of about seven acres. **Some of the bundles were stockpiled over 20 feet high!** The bundles consisted of household trash, soft goods, and plastics. The site contained no active fire prevention apparatus or measures for rodent control." The property owner, doing business as Mission Fiber, was immediately notified of the violations by Senior Officer Gianos, who also brought County Counsel into the mix to begin processing a court case for injunctive relief. Pam Walls, Assistant County Counsel, delivered a powerfully persuasive argument in favor of shutting the business down and cleaning the site immediately. Due to the overwhelming evidence of potential harm to the public, a judge agreed with Ms. Walls and ordered Mission Fiber to cease operation and remove the offending rubbish from the property. Senior Officer Gianos then began the arduous task of enforcing the court order and ensuring the cleanup of the property. "Unfortunately, the business owner was reluctant to comply," said Senior Officer Gianos. "The business owner's idea of compliance was to remove the rubbish at a slow pace, spanning several months to two other counties." Several attempts by the owners to remove the rubbish failed and were met with stiff legal opposition from other counties. It was beginning to look like Code Enforcement was going to have to move forward in contracting for the abatement of this monumental nuisance. A preliminary job walk was conducted, which established the amount of trash to be removed at about 12,000 tons, making this the largest trash removal project ever undertaken by county Code Enforcement.

018744

Senior Officer George Gianos receives a special proclamation from the Board of Supervisors, recognizing his resourcefulness in making this cleanup a success.

Bids came in ranging from several hundred thousand to over a million dollars to abate this mountain of trash. Knowing that the exorbitant amount of this abatement project could seriously jeopardize the future of Code Enforcement's abatement program, Senior Officer Gianos began looking for alternative funding sources. He knew that the Department had worked with the California Integrated Waste Management Board (CIWMB) on other enforcement programs in the past and were currently partnering with the CIWMB on the Waste Tire Enforcement Grant Program. Senior Officer Gianos felt this would be the perfect agency to pitch this cleanup project to. "I forwarded my case report, photos, and a cover letter requesting help to the CIWMB," said Senior Officer Gianos. "They promptly responded by sending their investigators and a state approved contractor to the site. We all walked the site, and I pointed out the hazardous conditions to the state officials. I was very pleased when I received word that the CIWMB had decided that the site fit the criteria for a state assisted cleanup. My case report was forwarded to the CIWMB review committee in Sacramento. **After testifying in front of the committee, our request was approved, and an award of $950,000 was budgeted toward the abatement.**" The state wasted no time in mobilizing equipment at the dump site. For about 12 days during the month of November, over 20 truckers hauled over 500 loads of rubbish to a landfill in Arizona. A CIWMB representative remained on site until the project was completed. Thanks to the innovative thinking by Senior Officer George Gianos, and the much appreciated assistance from the CIWMB, **this property is now in compliance, and the potential health and safety threat to the nearby city of Blythe has been avoided.**

Riverside County Code Enforcement Department's First Annual Neighborhood Conference is a Huge Success

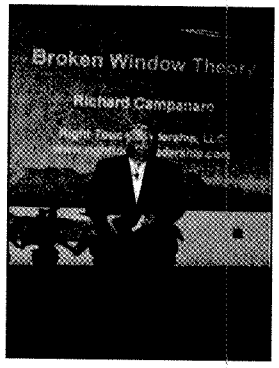

Keynote speaker Richard Campanaro's presentation on the "Broken Windows Theory" received rave reviews.

Our neighborhoods start with our families. As such, all were welcome at the Neighborhood Conference.

What the Community is Saying...

"...helped to educate me on the simplicity of empowering residents to effect change.

Excellent presentation with lots of ideas to share with my community.

Very well organized; please come back next year. I will tell my neighbors to come.

Code Enforcement did a great job... lots of good information."

Service FIRST

- **F**ocused on Compliance
- **I**nvestigate and Document
- **R**esponsive to the Community
- **S**ense of Appropriate Urgency
- **T**eamwork and Collaboration

COUNTY OF RIVERSIDE
CODE ENFORCEMENT
TRANSPORTATION & LAND MANAGEMENT AGENCY

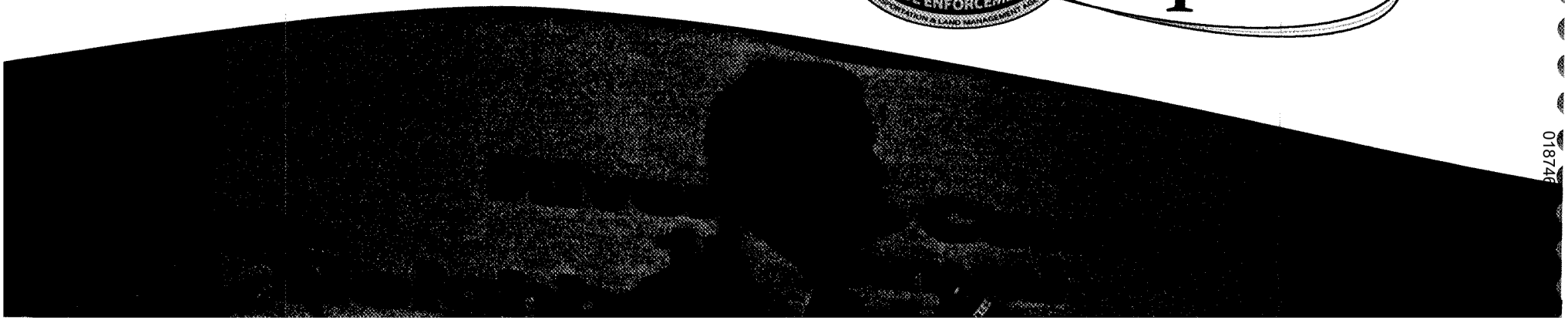

018746

Partnering with Communities for Sustainable Neighborhoods

On Saturday, October 25, 2008, Riverside County Code Enforcement hosted its First Annual Neighborhood Conference at the beautiful UC Riverside Palm Desert campus. "Community Partnerships for Sustainable Neighborhoods" was the theme of the conference. The Following workshops were held for community members: Asset Based Community Development, Foreclosures, Making Meetings Work, Lush and Efficient Landscaping, Living with Diversity in Your Community, and 12 Steps of Emergency Preparedness.

Numerous public and private organizations provided information to the participants throughout the day. Richard Campanaro, the keynote speaker for the conference, presented the "Broken Windows Theory" as well as strategies for transforming your life and your community. When surveyed, the majority of the participants stated that this presentation was powerful and the highlight of the conference.

In addition to our innovative community impact plans, this conference is another method for our department to establish and maintain a beneficial relationship with the communities in which we serve. We will continue to work with these community stakeholders to educate and empower residents to improve the quality of life in their neighborhoods and to establish sustainable and healthy communities, while making the best use of all our resources.

Due to the success of this first Neighborhood Conference, plans are already underway for next year's event, which will include more information and strategies to assist residents and further our efforts in providing our valuable services throughout the unincorporated communities of Riverside County.

Our Second Annual Neighborhood Conference is being planned for Fall of 2009

COMMUNITY IMPACT PLANS

Winner of the Prestigious California State Association of Counties 2008 Challenge Award

CSAC

changing COMMUNITIES

making an IMPACT

producing RESULTS

A comprehensive five point strategy...

Ongoing Assessment

Utilizing assessments, surveys, and input from stakeholders we will develop a plan to address the true needs of the community.

Community Involvement

Build relationships of trust and understanding with community stakeholders to maximize resources and benefit the community.

Education/Outreach

Education of our mission, purpose, methods, and outreach of community services offered to ensure that we are all working together and using all available resources.

Cleanup

Utilize existing cleanup programs and special projects to make an impact in the community.

Enforcement

Conduct a phased enforcement program customized to the unique needs and resources included within the Community Impact Plan.

018748

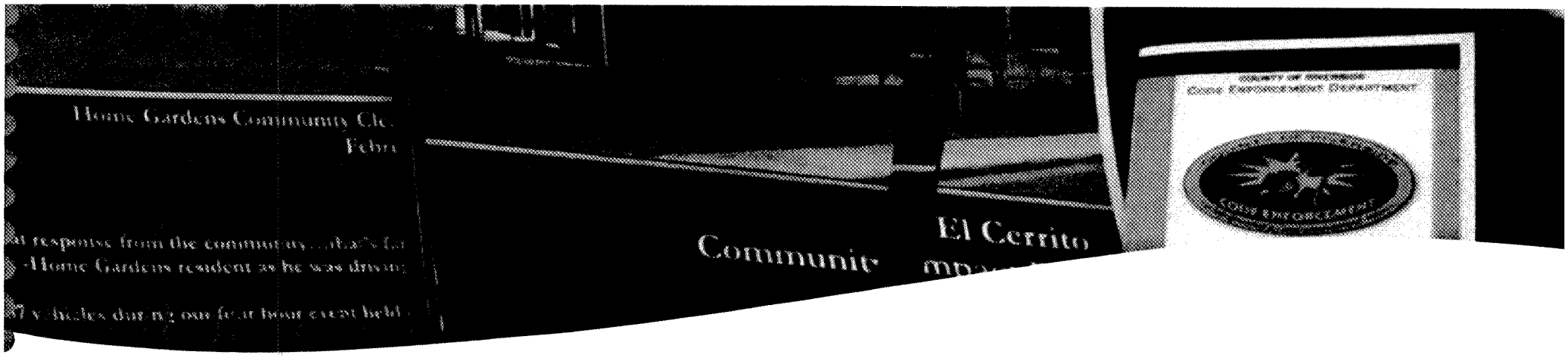

Revolutionizing Code Enforcement

The concept of our community impact plans is revolutionizing how Code Enforcement interacts with the communities we serve. Using the best concepts from community policing and other community improvement programs, we are developing comprehensive five-point community impact plans.

We are no longer waiting for issues to become problems and complaints to be filed. We are taking a more proactive approach by maximizing our resources to prevent problems and to address them before they become major issues.

This process all started when the Department tackled the unique challenges of the community of Mecca. Code Enforcement took a fresh look at how we could partner with the community and identified numerous ways we could assist the community in improving their quality of life. Partnering with local churches, we started a progressive outreach campaign. A total of 920 people attended one of our five community meetings. Following a targeted enforcement period, dramatic changes were seen in Mecca. We experienced an unprecedented rate of voluntary compliance from property owners desiring to make improvements without the need for enforcement action.

Utilizing the successful model we developed in Mecca, our department has expanded this program to communities throughout the county. Our goal is to have a community impact plan directing our activities in each community we serve.

Eager to share this effective program with other jurisdictions, we submitted our community impact plan process to the California State Association of Counties, and we were awarded one of ten Challenge Awards for this fresh and innovative approach to addressing issues affecting the health and well-being of the communities we serve.

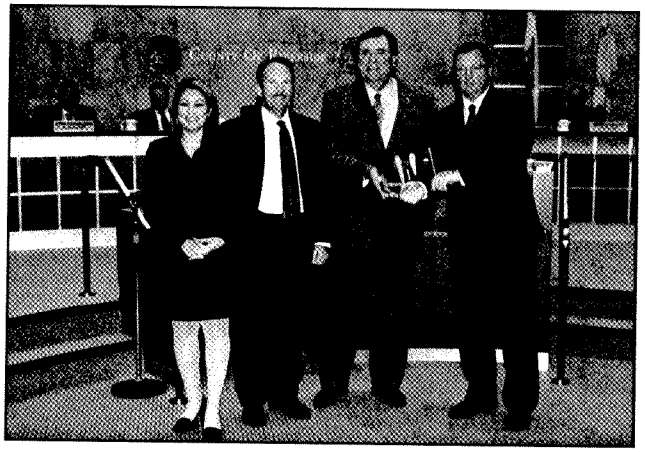

Susana Orozco, John Boyd, Paul McIntosh and Jay Orr at the presentation of one of ten 2008 CSAC Challenge Awards recognized statewide by the California State Association of Counties.

018749

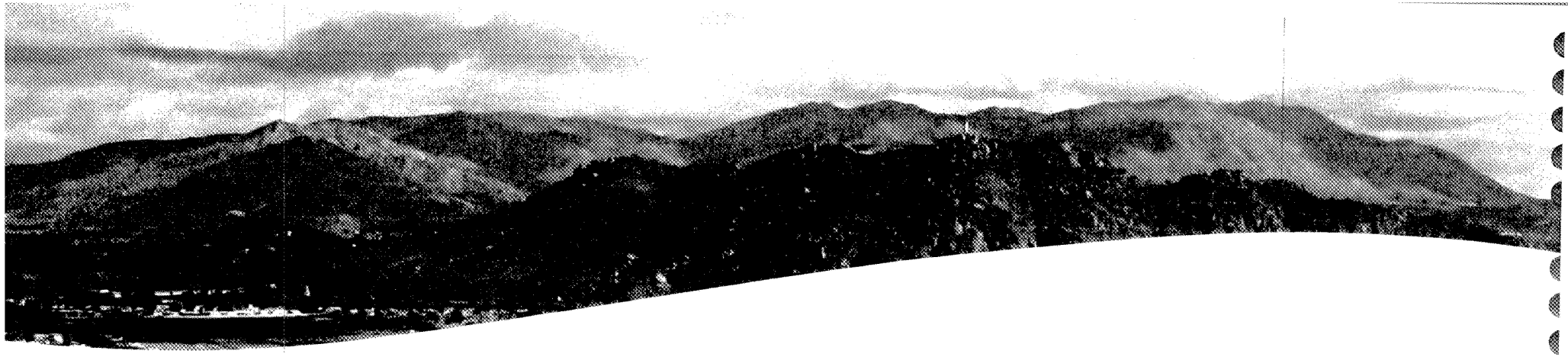

Administrative Services

Meeting long-term needs...

The Administrative Services Unit is tasked with providing the Department with a variety of support related services. Some of which include the following:

- Initial and recurrent training
- Create, review, and update policies and procedures
- Administer the State Waste Tire Enforcement Grant
- Special projects
- Review cases for cost recovery
- Administer the Abandoned Residential Property Registration Program
- Purchasing support
- Publications
- Providing administrative support to the Director
- Administer the Abandoned Vehicle Abatement (AVA) Service Authority
- Prepare for and represent the Department at weekly public nuisance abatement and statement of expense hearings before the Board of Supervisors

Training Update

During the past year, Code Enforcement staff attended a wide variety of training classes geared to improving their overall job knowledge and officer safety. This, in turn, has improved our capacity to provide exceptional service to the public. **For the year 2008, the training program coordinated over 290 training classes and 7,100 hours of training to department staff, a 50% increase over 2007.**

018750

Abandoned Vehicle Abatement Service Authority

The Riverside County Abandoned Vehicle Abatement (AVA) Service Authority was established to receive monies from the state, which are derived from a one dollar service fee per vehicle registered in this county pursuant to the California Vehicle Code. The AVA Service Authority's administrator, under the guidance of the Board approved Abandoned Vehicle Abatement Plan, disburses these funds to its member jurisdictions based on area and population data as well as vehicle abatement activity. Funds are used to reimburse member cities and the county for the abatement of abandoned, wrecked, dismantled, or inoperable vehicles from private and public property.

Since its inception in 1993, the Riverside County Abandoned Vehicle Abatement Service Authority has disbursed $14,335,725 to reimburse cities and the unincorporated Riverside County for the removal of 117,363 junk vehicles. In this same period, the unincorporated county has received $4,713,529, or 33% of the total allocation of AVA funding and has effected the removal of 30,971 junk vehicles, or 26% of all vehicles abated countywide.

Recent changes in legislation under Senate Bill 106 provides for the extension of the service fee in increments of up to ten years. The current sunset date of the Authority is 2014.

Waste Tire Enforcement Grant

The Waste Tire Enforcement Grant is a state program designed to track the movement of used and waste tires throughout the State of California. The key component of the program is on-site inspections. More than two hundred inspections of waste tire generators, haulers, and end-use facilities were conducted in 2008. These inspections are critical in ensuring that used and waste tires are properly accounted for as required by the California Integrated Waste Management Board (CIWMB). To date, over 50 Notices of Violation have been issued and more than 20 locations have come into compliance with state requirements. Five violators that failed to comply were referred to the State for further enforcement action.

In addition to enforcement, education plays a vital part in the program. Several training sessions benefited the tire haulers in Riverside County, who were trained on the proper way of documenting and manifesting waste tires.

018751

Community Improvement

Caring for the community...

The Community Improvement Program is a community based outreach effort intended to help residents enhance their neighborhoods and come into compliance with the laws we enforce.

It is the goal of the Community Improvement Program to provide visual improvement throughout Riverside County while instilling community pride.

Community Improvement Programs:

- Beautification Program (CDBG Grant)
- Clean Money (Giving Youth Groups Fundraising opportunities by cleaning the community)
- Voluntary Compliance Programs (CDBG Grant)
- Monthly publishing of "The Posting"
- Media Campaign
- Code Enforcement Web Site
- Neighborhood Conference
- Code Enforcement Resource Fairs
- Community Cleanup Events
- Code Enforcement Workshops
- Trash Task Force
- Thermal United Kids Program (CDBG Grant)

Your donations have helped make a difference!

We would like to thank all of the businesses, organizations, and individuals who have donated so much of their time and resources in making our events so successful and allowing us to empower residents in improving their communities.

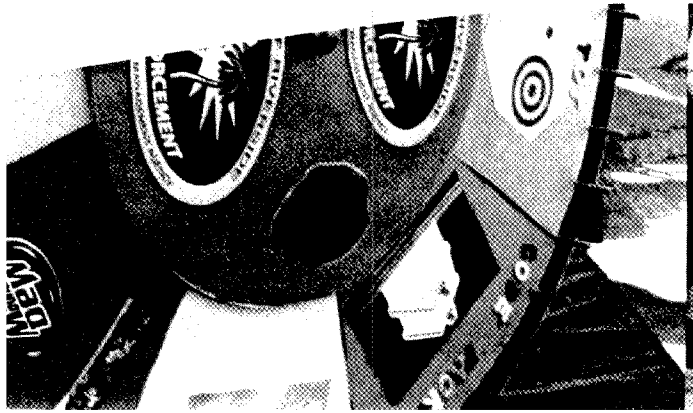

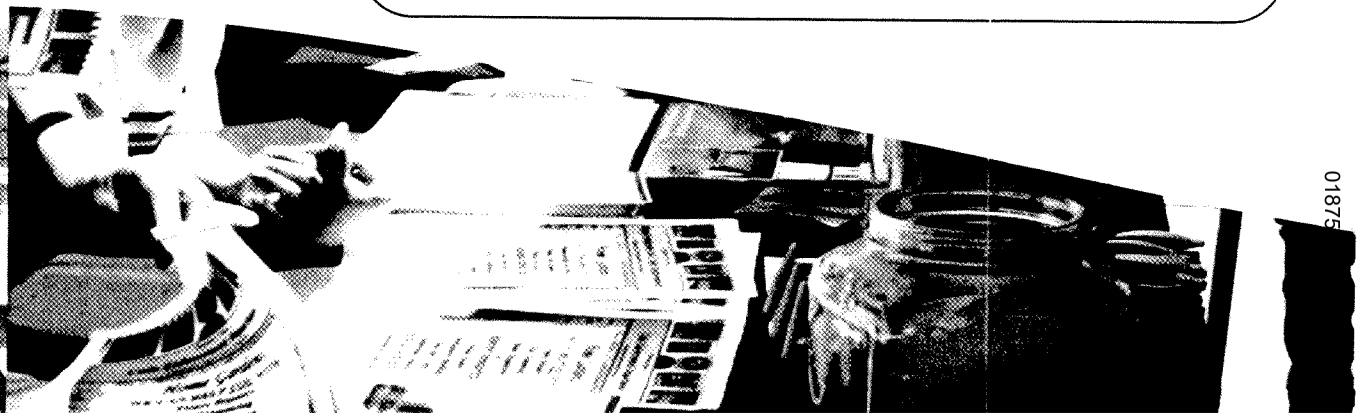

01875

Code Enforcement Assisting the Community in Cleaning Up

This year, Riverside County Code Enforcement applied for and received funds to help homeowners living in the communities of Ripley, Mesa Verde, Thermal, Oasis, Mecca, Good Hope, Home Gardens, Bell Town, Rubidoux, and Mead Valley. These funds were awarded to the Code Enforcement Department through the Federal Community Development Block Grant (CDBG) program. The department administers these funds through the Voluntary Public Nuisance Abatement Program (VPNAP).

This vital program allows Code Enforcement to provide assistance to struggling property owners for the removal of substandard structures, weeds/vegetation, trash, excessive outside storage, inoperable vehicles, as well as unoccupied mobile homes. In certain communities such as Mecca, Home Gardens, and Rubidoux, residents may be eligible for property beautification assistance. This program allows the department to select qualified applicants, who will receive services from an authorized contractor for fencing installation and repairs, residential landscaping, and residential exterior painting – all free of charge to the resident.

To be eligible, the applicant must reside within one of the above-mentioned communities and be in need of financial assistance to clean up their property. Funds may be used to correct code violations if applicable, and assistance through the VPNAP is a one-time grant, which is funded on a first come, first served basis.

County Celebrates 10,000 Tons of Roadside Trash Removed

In March, the Riverside County Board of Supervisors recognized County departments and private industries for their hard work and efforts in the removal of over 10,000 tons of trash in Riverside County in 2007. This is equivalent to over five miles of dumpsters. That amount would line the highway from downtown Riverside to San Bernardino County.

T.O.M. and Fifth District Legislative Assistant Jaime Hurtado

Riverside County Code Enforcement started the cleanup campaign in 2006. It is a collaborative effort between County departments and private agencies. At the March 25, 2008 Board meeting, Supervisors Marion Ashley and John Tavaglione and previous Code Enforcement Director Jay Orr presented the Recognition Awards to department heads and independent business owners. Certificates of appreciation were also given to 227 staff members from those agencies.

Thank you to the trashcan mascot, who made a surprise appearance, as pictured above with Fifth District Legislative Assistant Jaime Hurtado. In 2008, the Trash Task Force collected over 2,383 tons of material from our roadsides.

Neighborhood Enforcement Teams (NET)

The Neighborhood Enforcement Teams (NET) utilize a planned comprehensive approach to resolving issues within the communities we serve. NET focuses on "traditional" code enforcement issues including:

- Accumulated Rubbish
- Inoperable or Abandoned Vehicles
- Excessive Animals
- Prohibited Fencing Materials
- Substandard/Hazardous Structures
- Uncovered Excavations and Unsecured Pools
- Substandard Mobile Home and/or Recreational Vehicles
- Occupied Recreational Vehicles/Travel Trailers
- Unpermitted Second Dwellings
- Illegal Mobile Home Parks
- Zoning Violations
- Junkyards (Excessive Outside Storage)
- Land Use Violations
- Unpermitted Occupancy
- Grading without Permits
- Construction without Permits
- Mobile Home Install without Permits
- Parking Violations
- NPDES-Storm Water Management
- Abandoned and Distressed Properties
- Noise Complaints
- Unpermitted Businesses

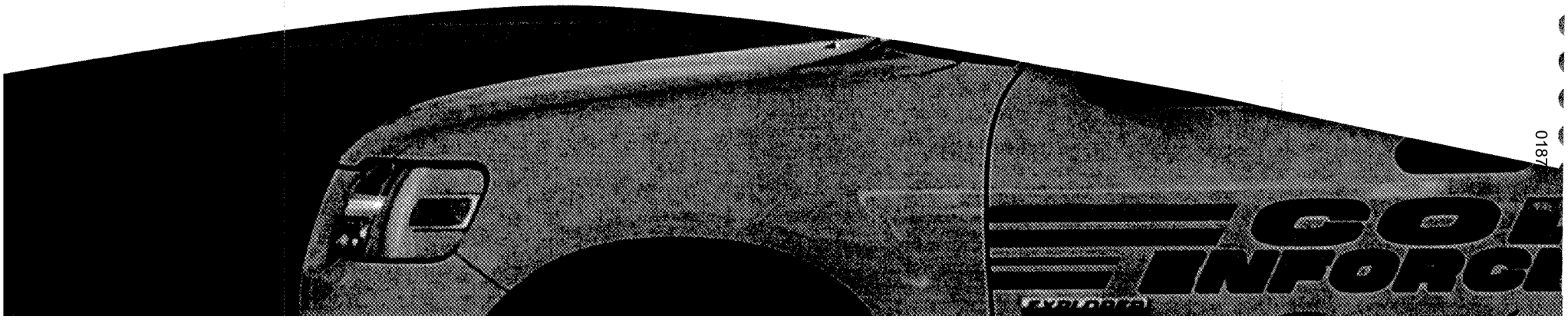

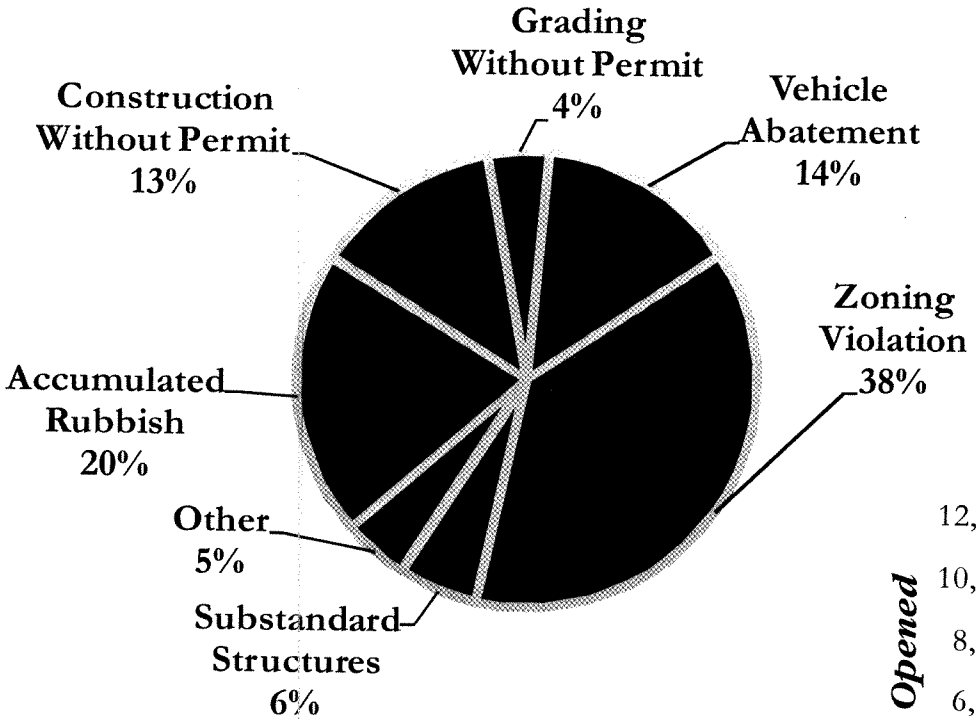

Our Goal Is Compliance...

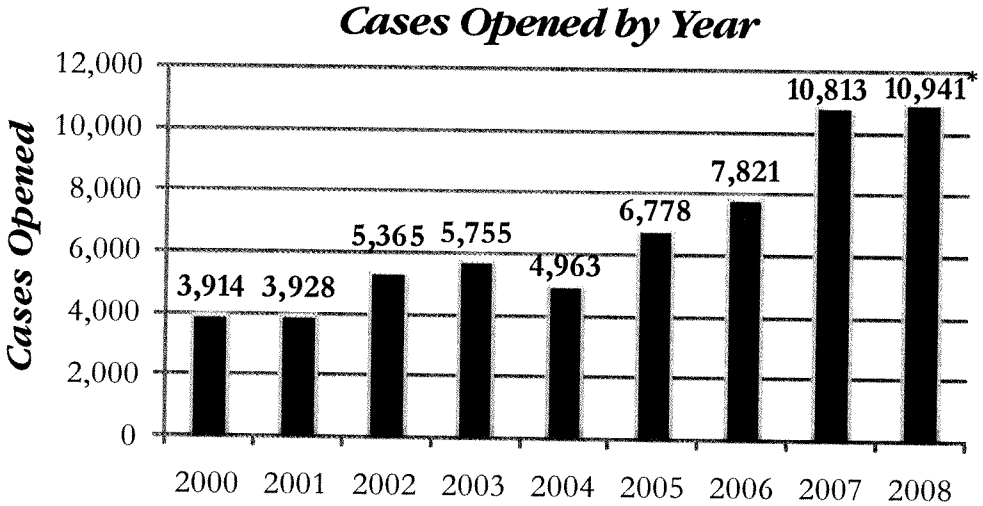

*This number does not include the 8,840 property inspections conducted by the Foreclosure Task Force.

In 2008, 10,941 new Code Enforcement cases were opened based on complaints or officer observed violations.

At any given time, we have over 8,000 cases under investigation.

This year we resolved 9,934 cases through investigation, compliance, or abatement.

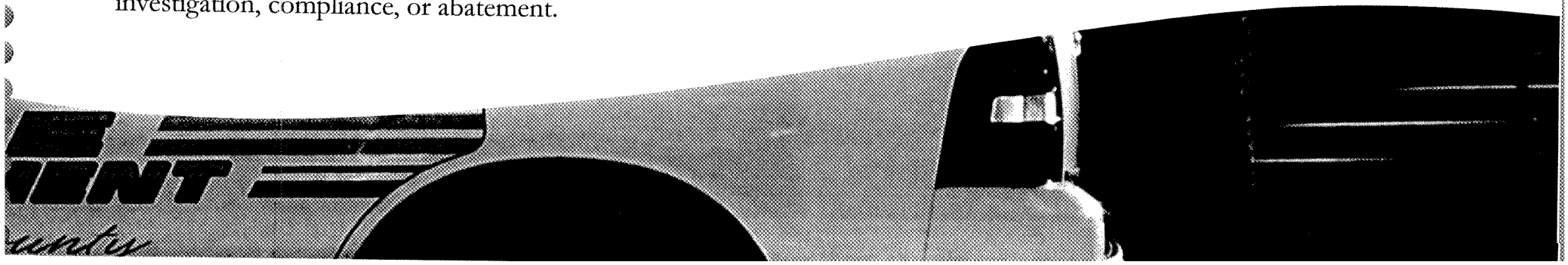

First District

Proudly serving the communities of:

- Lake Elsinore
- Alberhill
- Gavilan Hills
- Horsethief Canyon
- La Sierra
- Lakeland Village
- Mead Valley
- Lake Mathews
- Temescal Valley
- Woodcrest
- Glen Ivy
- Glen Valley
- Sedco Hills
- Wildomar

Giving our best to make a difference...

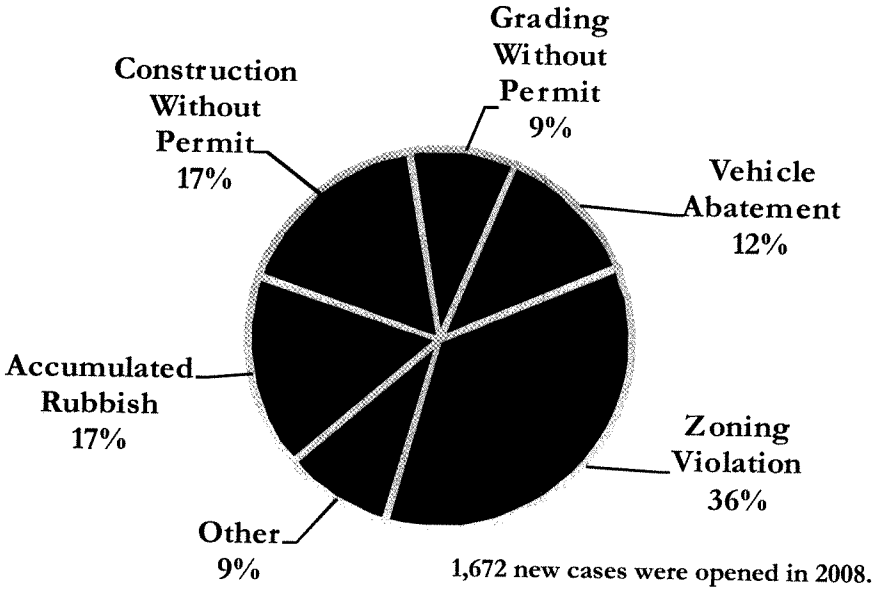

1,672 new cases were opened in 2008.

This is what the community is saying...

"I really appreciate the Block Grant funding to help clean up my property, and you have been awesome to work with. Thank you so much for everything!

-Keri Mittan – Mead Valley Resident

I just wanted to THANK YOU again for all your help. It would have taken me months to do what you guys did in a couple days. I owe each of you big time."

-Brian Shomo, RCHCA

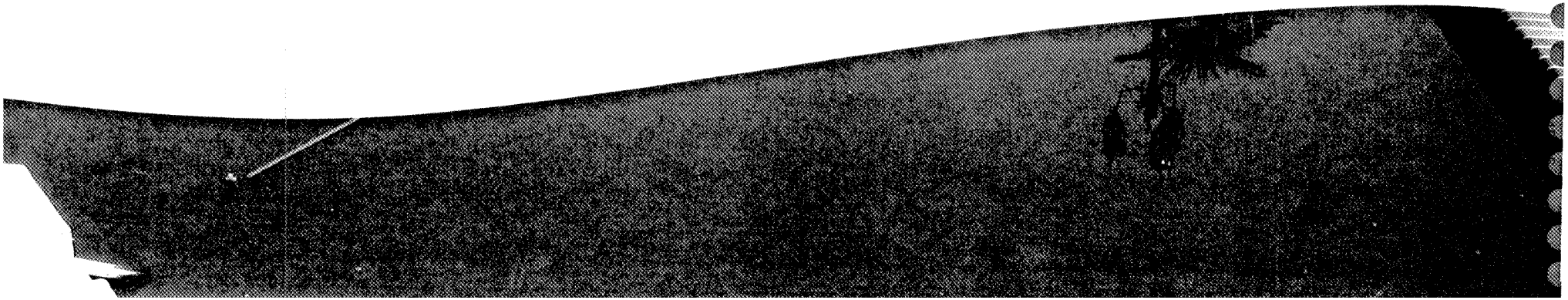

Lake Elsinore/Mead Valley Office

Distinguished Accomplishments...

Safer Neighborhoods

Lake Elsinore staff inspected an alleged illegal business that had multiple code enforcement violations and posed a potential fire hazard. Staff found an area of the property next to a grassy hillside used to store 5,000 wood pallets, as well as a large shed with multiple electrical cords. Upon completion of the inspection, the business owner received a notice of the violation and a stop work order, which remained in effect until the proper permits could be obtained. Within 35 days, all 5,000 pallets had been removed and the large shed taken down. The property had been cleaned of all material related to the business and no further actions were needed. Code Enforcement's quick and decisive action eliminated violations that could have led to a devastating fire.

Preserving Residential Tranquility

Staff investigated a cabinet manufacturing shop located on Santa Rosa Mine Road in Perris. Officers discovered an illegally operating cabinet shop with multiple workers and a large permitted covered horse arena that stored all the materials. A citation was issued at the time of the inspection. At the 30-day follow-up inspection, the violation remained. Code Enforcement sent the case to County Counsel for a civil injunction to shut down the illegal land use. A hearing at Riverside Superior Court resulted in an agreement with the property owners to stop the illegal activity and bring the property into compliance. Subsequently, Code Enforcement staff conducted a follow-up site inspection and observed the business was no longer in operation and the property was clean and clear of all materials, bringing peace to the residential community.

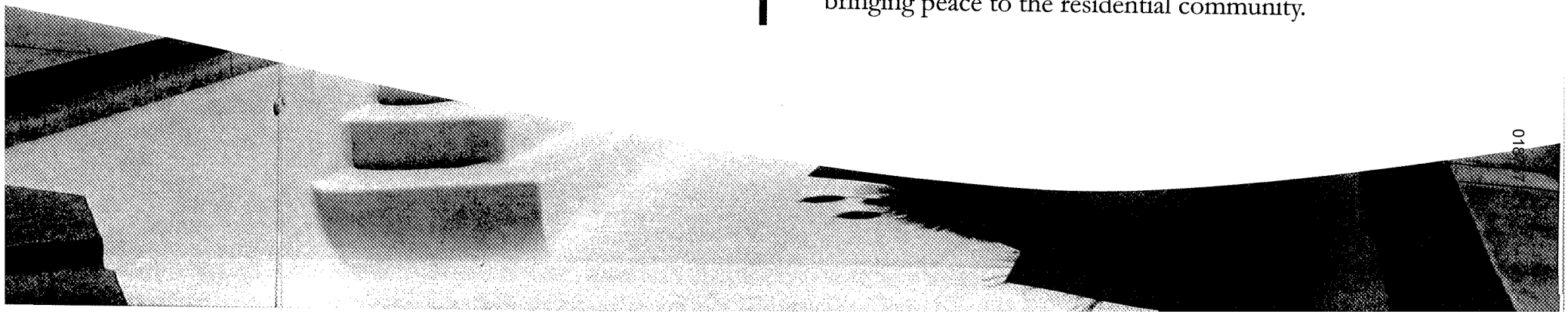

Second District

Proudly serving the communities of:

- Belltown
- Coronita
- Crestmore
- Eastvale
- El Cerrito
- Glen Avon
- Home Gardens
- Indian Hills
- Jurupa Valley
- Mira Loma
- Pedley
- Rubidoux
- Sunnyslope

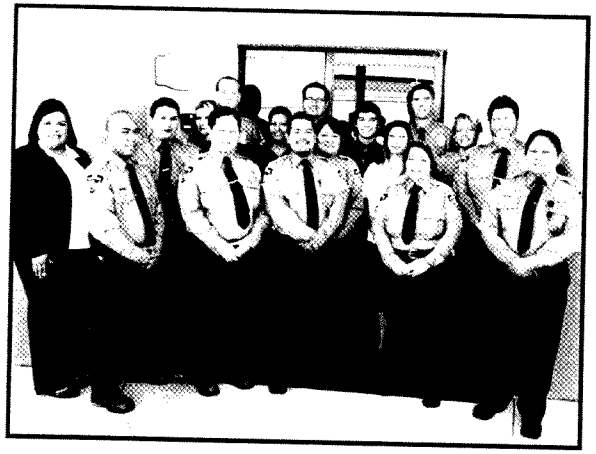

Working the issues that matter...

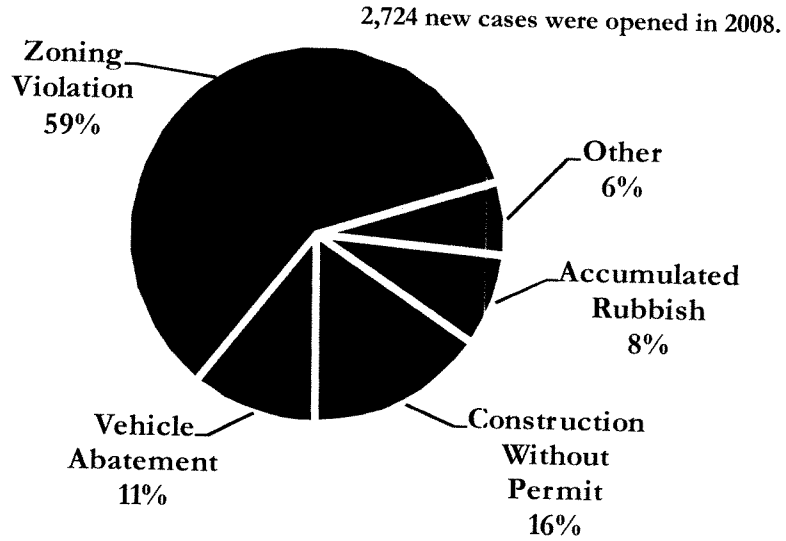

This is what the community is saying...

"**This is exactly what the community needed. What a good thing.**

-Leticia Carmona, El Cerrito Resident

Just want you to know I think you are doing a heck of a good job.

-Linda Prokus, Indian Hills Resident

Thank you, thank you, thank you! You are doing a great job.

-Ed Cleveland, Glen Avon Resident"

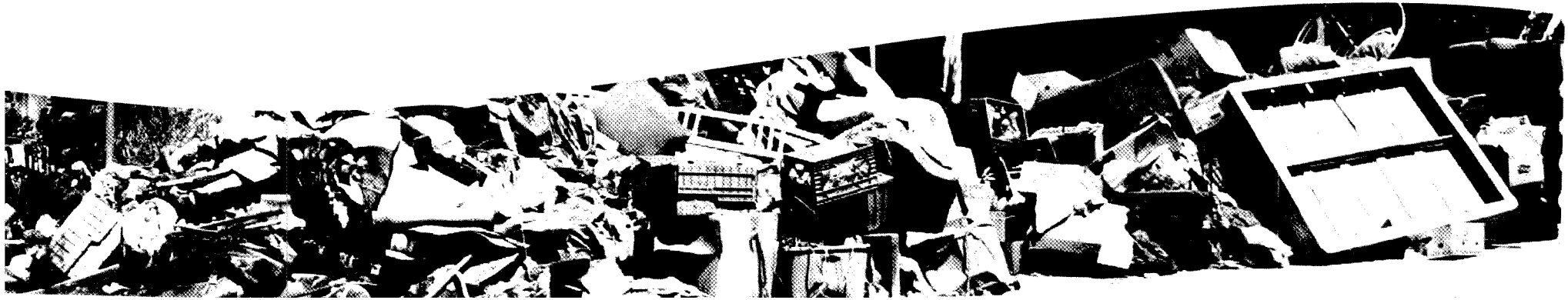

Jurupa Valley/Home Gardens Office

Solving Problems...

Permanent Compliance

For some time, staff has investigated a property on Felspar Avenue for junk, illegally occupied recreational vehicles, and substandard structures that fostered other illegal activity in the area. The property changed ownership this year through a trustee sales and the new owner quickly discovered the deteriorating conditions. He contacted his local Code Enforcement office and asked for help. Seeing a great opportunity, the Jurupa office partnered with the Riverside County Sheriff's Department to utilize this property as a temporary training facility to increase law enforcement presence in the neighborhood, thus reducing crime. Then Code Enforcement worked with the Riverside County Economic Development Agency to obtain a demolition grant to clean the entire property, bringing closure to a stubborn problem.

Productive Commercial Enforcement

Officers investigated a 28th Street property for an unpermitted concrete business, which included the storage of concrete mixing trucks. The illegal business was creating a public nuisance, as many neighbors complained about excessive noise and dust. To exacerbate an already volatile situation, the property had been illegally graded in such a manner causing drainage and runoff to adversely impact neighboring properties. Soon into the investigation, when it became apparent that the business owner was not going to comply with the officer's directive to cease the business activity, the Department filed a civil injunction in Riverside Superior Court. During the court proceedings, the judge found in favor of the County and ordered the business to vacate the property. As a result, concrete trucks no longer travel through this residential area, that has since returned to a normal, quiet neighborhood.

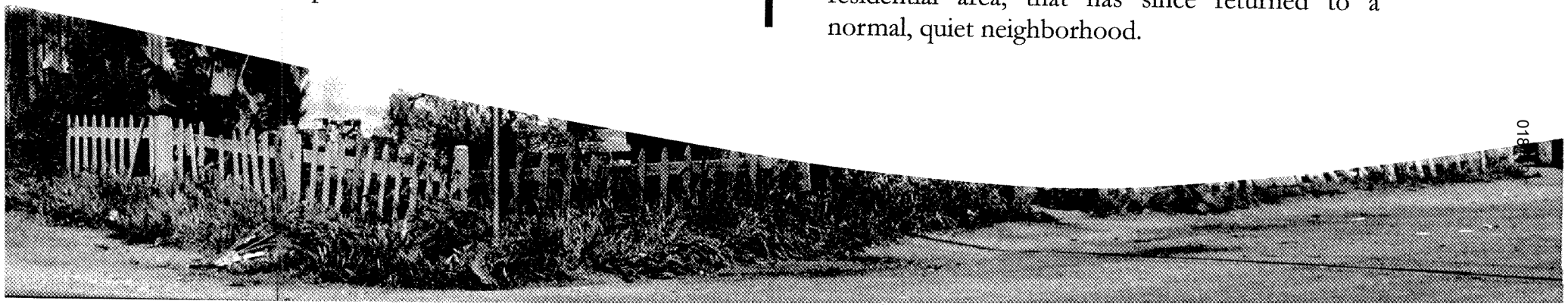

Third District

Proudly serving the communities of:

- Aguanga
- Anza
- Cottonwood Canyon
- French Valley
- Garner Valley
- Green Acres
- Homeland
- Idyllwild
- Lake Riverside
- Lake Skinner
- Menifee
- Mountain Center
- Murrieta Hot Springs
- Pine Cove
- Pine Meadow
- Pinyon Pines
- Poppet Flats
- Quail Valley
- Rancho California
- Soboba Hot Springs
- Sun City
- Vail Lake
- Valle Vista
- Winchester

Putting the community first...

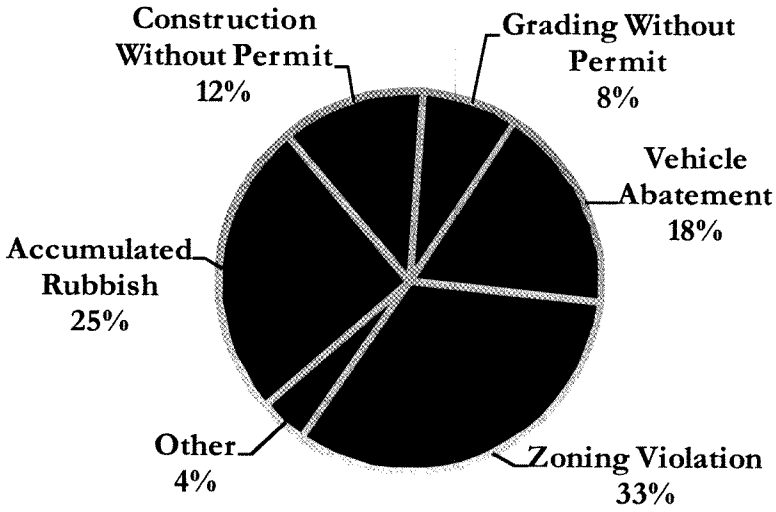

2,534 new cases were opened in 2008.

This is what the community is saying...

"We appreciate your hard work and dedication to us. Your hard work has brought many visible changes to our community, as well as our way of life.

-Earl McGee, Executive Director Quail Valley Crime Watch

This is the best I have seen Idyllwild look in a long time. Code Enforcement over the past year has made a difference. I truly mean it!"

-Jerry Holldber, General Manager of the Pine Cove Water District

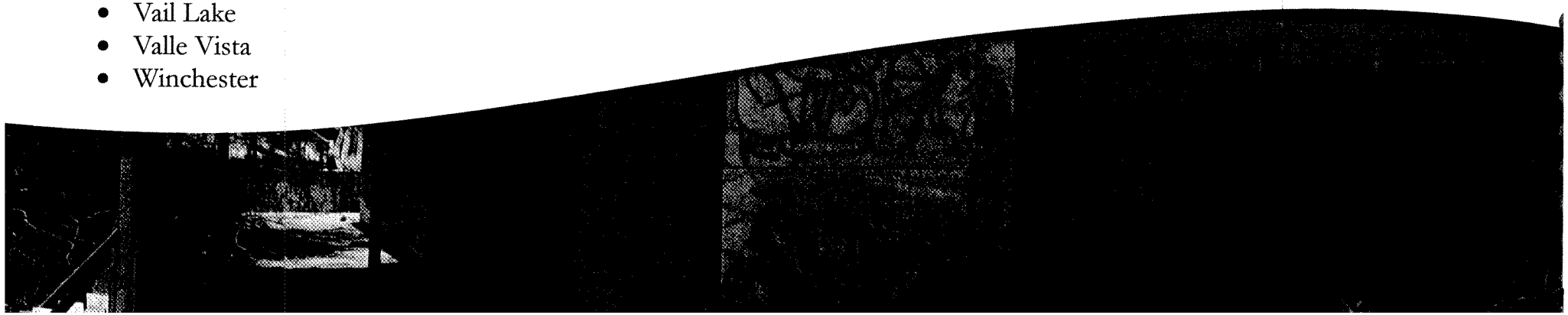

Murrieta/South County Office

Getting the Job Done...

Improving Living Conditions

During the summer of 2008, Murrieta staff focused enforcement efforts on a mobile home park in Quail Valley that had become a source of problems for the community and a safe haven for criminal activity. The mobile home park had several code violations, including substandard and unpermitted mobile homes, non-operational vehicles, accumulated rubbish, and other conditions that violated its permit to operate. Since normal enforcement activity was not inducing compliance, staff pursued a revocation of the Conditional Use Permit. As time drew closer for the revocation hearing, the property owner began to rapidly comply with our corrective actions. The park is no longer a safe haven for criminal activity, demonstrating that addressing these code issues can have a beneficial impact on the quality of life.

Partnerships Are Making a Difference

The apartments on Marine Drive in Hemet have had a long-standing problem with trash and illegal dumping from its residents. Under new management, occupants had been directed to clean their properties and remove excessive storage in order to remain a resident of this neighborhood. Instead of complying with management's directives, many residents moved out and left behind garbage, furniture, and rubbish. Code Enforcement Department staff, in partnership with the Sheriff's Hemet Station, conducted a cleanup on June 11, 2008. The Sheriff's Department and Code Enforcement worked throughout the day, loading and unloading truckloads of furniture and garbage into trash bins provided by the local trash hauler. This cleanup demonstrated that county staff cares about the communities in which they serve.

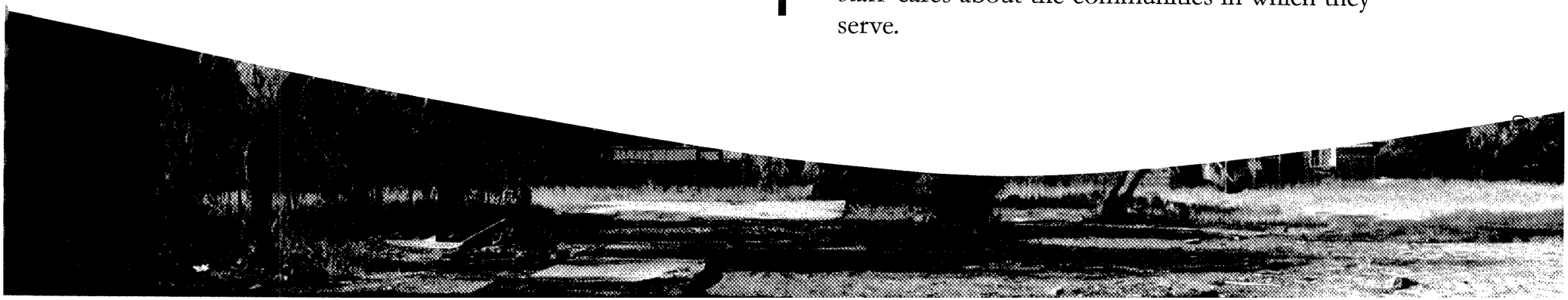

Fourth District

Proudly serving the communities of:

- Bermuda Dunes
- Ciriaco Summit
- Desert Center
- Eagle Mountain
- Indio Hills
- Mecca
- Mesa Verde
- North Shore
- Oasis
- Ripley
- Sky Valley
- Thermal
- Thousand Palms
- Valerie Jean
- Vista Santa Rosa

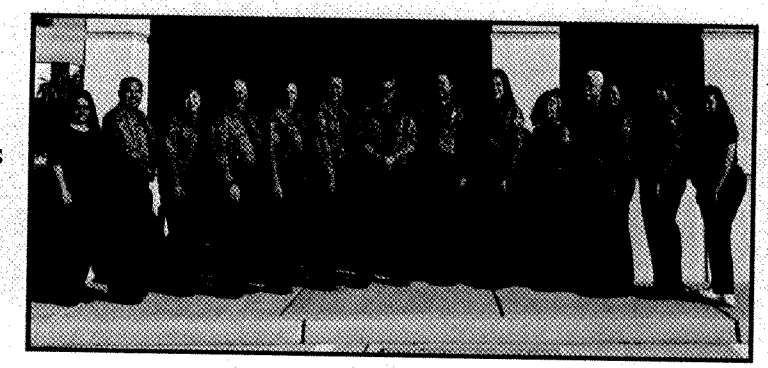

Building partnerships for success...

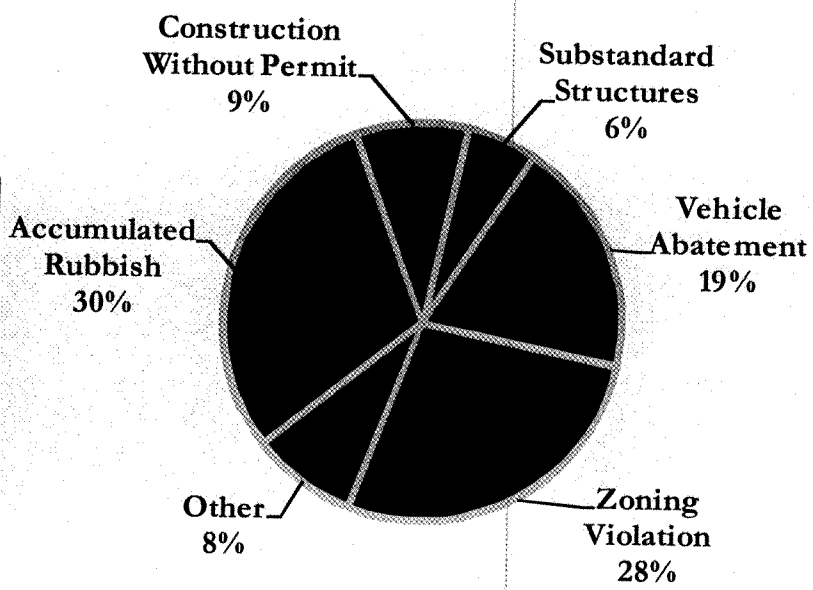

1,810 new cases were opened in 2008.

This is what the community is saying...

"**My family really appreciates what Code has done for Mecca.** – *Mecca Resident*

We greatly appreciate what you do for us in helping us clean up our community. Thanks! – *Julie Casserly, Sky Valley Community Council*

We are so excited that we are finally having a cleanup. We have needed a cleanup for over five years. Thank you very much.

– *Rigoberto Perez, Ripley Community Council*"

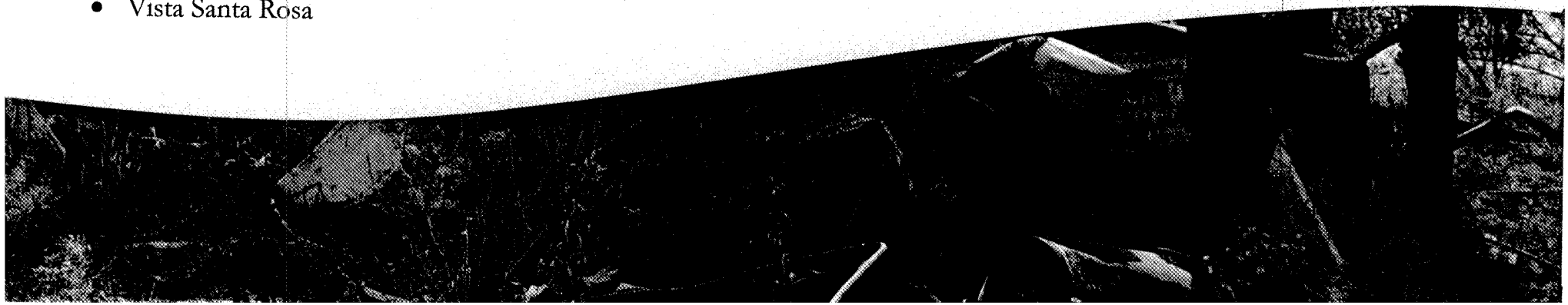

Thousand Palms/East County Office

Making a Difference...

Tackling Chronic Problems

The Thousand Palms office received numerous complaints about the condition of several properties located on East Vernon Avenue in Blythe. These properties have had intermittent code violations over the years. Upon inspection, officers found dilapidated residences containing rubbish, abandoned vehicles, and three substandard cottages. They also discovered a fire damaged duplex that was being used by transients who were conducting criminal activity. Working with the property owners, rehabilitation permits were issued for the substandard dwellings, and all the rubbish was removed. A number of vehicles were also removed through the Department's "Junk Your Clunker" program. One property owner was reluctant to comply, and a seizure warrant was obtained. In the end, all of the properties were cleaned up, making a significant visual difference in the community.

Restoring Our Natural Habitats

Staff discovered several vacant properties on Wallace Road in Thermal that contained a massive accumulation of illegally dumped rubbish and debris, including over 100 waste tires. The dumping was so expansive that a satellite GPS system was utilized to determine the approximate location and quantity of trash. Over 120,000 square feet of trash was observed, and in some areas, the rubbish piles exceeded five feet in height! Through the diligent efforts of Code Enforcement staff, one owner came forward and voluntarily cleaned his property. The remaining trash and debris was removed by a contractor hired by the County. Scorching summer heat and an active beehive did not deter the Department from completing the task of removing the remaining rubbish piles. Eventually, all of the parcels were completely cleaned, eliminating an extremely blighted condition and restoring a portion of our beautiful desert habitat to its original pristine condition.

Fifth District

Proudly serving the communities of:

- Cabazon
- Cherry Valley
- Desert Hot Springs
- Eden Hot Springs
- Garnet
- Gilman Hot Springs
- Good Hope
- Highgrove
- Juniper Flats
- Lakeview
- Meadowbrook
- North Palm Springs
- Nuevo
- Painted Hills
- Reche Canyon
- Romoland
- Twin Pines
- Whitewater
- Windy Point

Providing excellence in customer service...

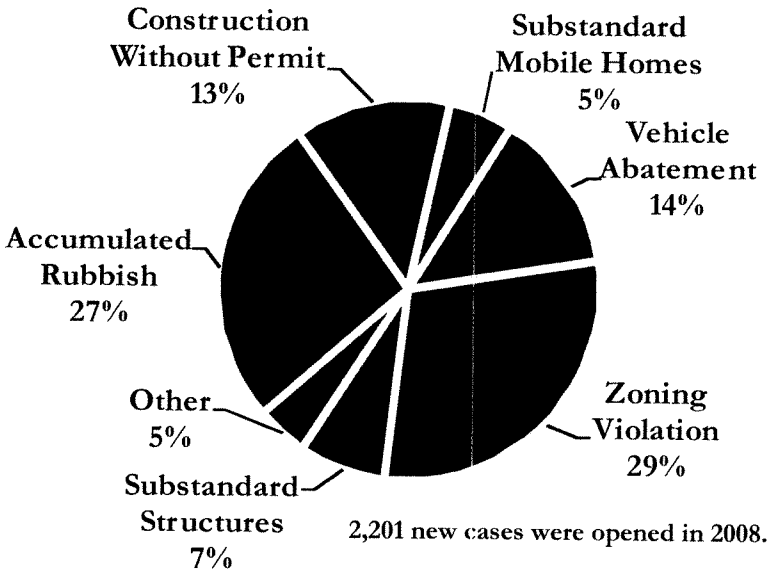

2,201 new cases were opened in 2008.

This is what the community is saying...

"Your department and Supervisor Marion Ashley's office have done great things for our small communities of Nuevo, Lakeview, and Juniper Flats". Thank you Code Enforcement! *- Mr. John Linch*

I appreciate the cleanup and increasing higher standards. *-Henry Mussenden*

It's time people clean up the trash; we cannot even ride our horses without risk. Thank you Department of Code Enforcement. *-Jim & Kim Kresin*"

Moreno Valley/Banning Office

Significant Achievements...

Persistence is Rewarded with Compliance

Officers inspected a property on Prospect Avenue in Highgrove for multiple code violations. The property, located on a heavily traveled street, contained six substandard structures with defects ranging from general dilapidation and hazardous electrical wiring to open and attractive nuisance. Several discussions with the property owner about abating the substandard structures did not produce the desired result. Officers persisted in their efforts to rid the neighborhood of this eyesore and prepared the case for an administrative abatement hearing before the Board of Supervisors. Once the owner was convinced that Code Enforcement was not backing down, they proceeded to completely demolish all six structures and remove all of the construction debris and trash. This case of voluntary compliance not only abated dangerous housing conditions, it also serves as a reminder to other property owners of the importance of keeping their residences up to code.

Contracting with Desert Hot Springs

With the support of Supervisor Ashley, staff from Code Enforcement were contracted in 2008 to work closely with the City of Desert Hot Springs to help address issues identified within the city. Officer James Pike worked primarily on violations involving businesses and health and safety issues. Working to gain compliance, staff educated the residents and businesses and worked with them to improve the safety and quality of life in the city. A total of 24 citations were issued to non-compliant property owners. In addition to these routine issues, the Department also addressed other problems, including the illegal dumping of medical waste, unsafe living conditions of homeless camps, and dilapidated structures. All of the objectives set forth for this contact were met, and the County is proud we were able to assist the City of Desert Hot Springs in improving the quality of life for their residents.

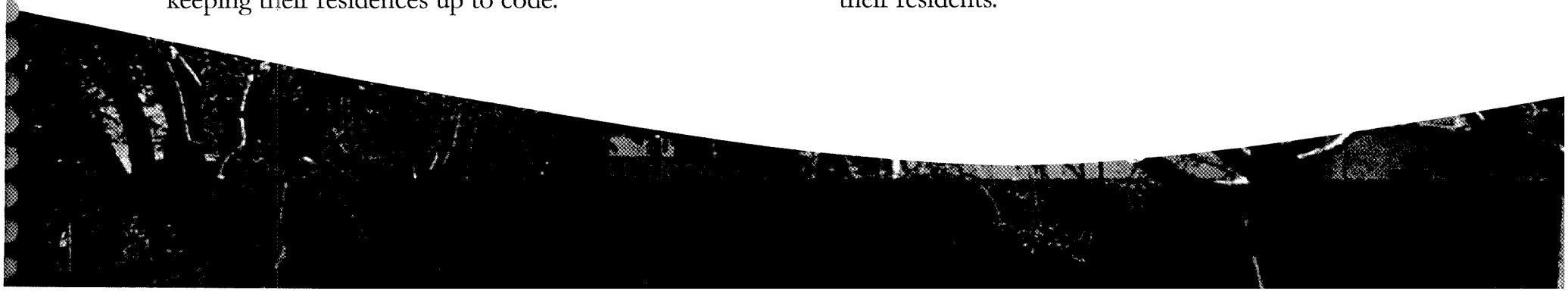

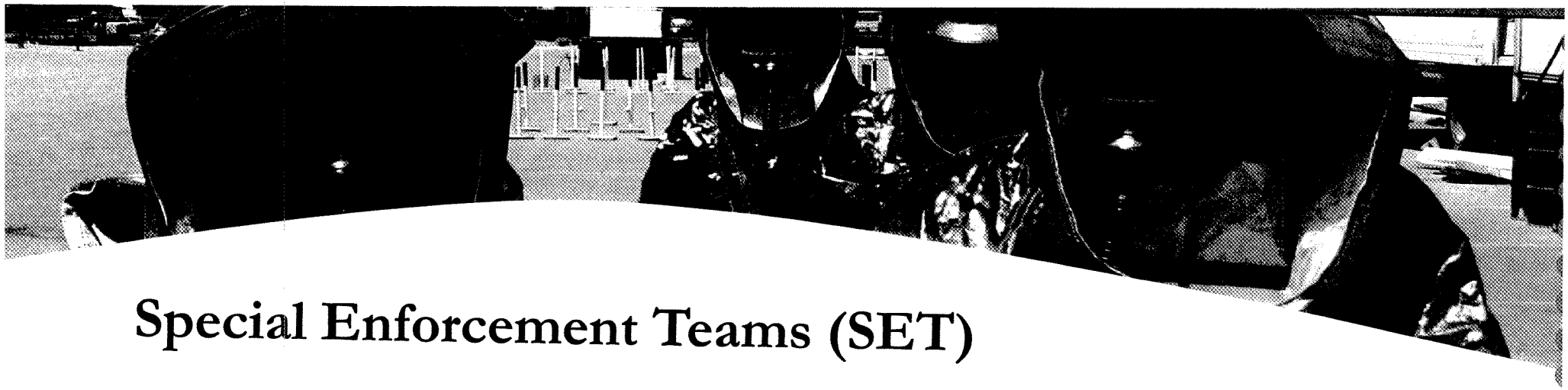

Special Enforcement Teams (SET)

Making things happen...

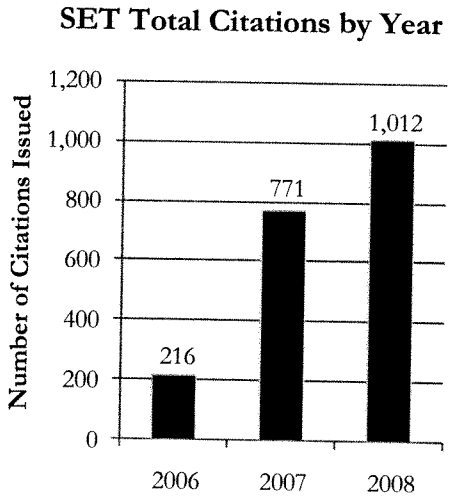

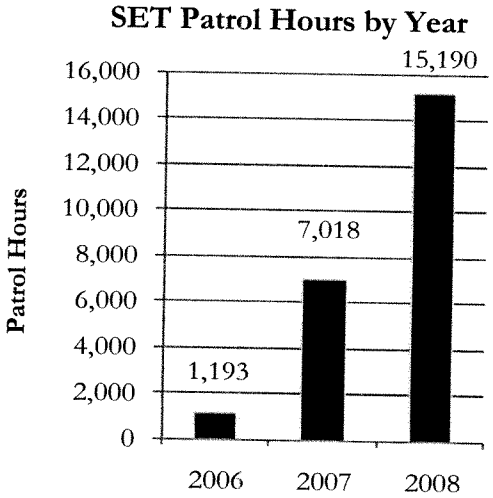

It is the goal of the Special Enforcement Team (SET) to provide support to the district offices in resolving specific issues identified and affecting the communities.

SET activities have increased dramatically during its expansion beginning in 2007 resulting in 2008 being the first year this program was fully staffed and operational.

SET working closely with the Sheriff's Department and the District Attorney's Office, investigate and submit for prosecution of criminal activity in the following areas:

- Illegal Dumping
- Illegal Vending
- Unpermitted Swap Meets/Fiestas
- Excessive Noise/Off-Highway Vehicle Enforcement

018766

Roadside and Illegal Vending

In response to very loud and consistent public outcry, the Special Enforcement Team coordinated enforcement efforts through a coalition of federal, state, and local enforcement agencies including Riverside County District Attorney's office, Riverside County Environmental Health (Illegal Food Program), Riverside County Sheriff's Department, and Riverside County Animal Control, as well as agents from the California Franchise Tax Board, California Department of Food & Agriculture (Milk and Dairy), Brand Inspector and representatives from the Recording Industry & Artist Association (RIAA) and luxury item industry (counterfeit clothing, jewelry, and other accessory clothing items).

The goal was to pursue vertical prosecution through comprehensive enforcement programs, addressing violations ranging from illegal home kitchens/restaurants, illegal fiestas, roadside taco stands, and roadside food vendors. These illegal activities pose a threat to public health by operating unpermitted facilities and include the "underground economy" aspect of each of these crimes. *(Continued in next column.)*

Through various direct and undercover enforcement actions, the coalition experienced unprecedented success as measured by a decrease in the number of calls for service and a noticeable reduction in the number of unpermitted vendors.

Carver Tract Project

In February of 2008, in an effort to curtail individuals drinking liquor and using illegal drugs behind the Coachella Valley Rescue Mission located in Indio, Code Enforcement SET officers and deputies formulated a plan to clean up the area by removing trash and old furniture from behind the mission. Code Enforcement established an account with Waste Management and rented a flatbed truck to remove the trash. Deputies provided security and contacted persons loitering at the location. A number of individuals contacted were found to be in violation of Health and Safety codes, Penal codes, county ordinances, and were either arrested or issued citations.

During the enforcement action, SET officers issued citations for various violations. Both agencies continue to host cleanup operations, removing trash and old furniture left in the area.

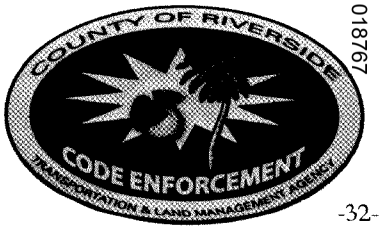

018767

2008 Statistics

NET Statistics by District						
District	1st	2nd	3rd	4th	5th	Totals
Opened Cases	1,672	2,724	2,534	1,810	2,201	10,941
Inspections[1]	5,120	6,310	5,991	4,823	4,442	26,686
Parking Citations	853	5,996	1,098	80	262	8,289
Administrative Citations	353	700	193	146	307	1,699
Abatement Hearings	38	8	26	13	20	105
Expense Hearings	20	2	8	4	11	45

[1] These are inspections conducted by field staff for standard code enforcement cases. 2008 is the first year we began tracking this information. This does not include the 8,840 property inspections conducted by the Foreclosure Task Force.

Community Improvement Statistics by District						
District	1st	2nd	3rd	4th	5th	Totals
Cleanup Events	3	4	6	12	9	34
Tonnage from Events	124	167	168	400	247	1,106
Tonnage Trash Task Force	643	470	278	188[1]	804	2,383

[1] Not all tonnage information was available for Fourth District.

District Information

SET Statistics by District						
District	1st	2nd	3rd	4th	5th	Totals
Dumping						
Infractions	9	6	3	69	4	91
Misdemeanors	21	21	52	26	30	150
Felonies	0	0	0	1	0	1
Vending						
Infractions	113	253	55	88	76	585
Misdemeanors	2	18	3	2	2	27
Felonies	1	0	7	2	0	10
Other						
Infractions	5	5	5	79	9	103
Misdemeanors	2	23	6	5	8	44
Felonies	0	1	0	0	0	1
Totals	153	327	131	272	129	1,012

Countywide Activity Levels	2006	2007	2008
Cases Opened	7,817	10,813	**10,941**
Inspections[1]	N/A	N/A	26,686
Public Hearings	30	82	**150**
Administrative Citations	1,252	2,041	1,699
Parking Citations	2,898	12,276	8,289
Vehicles Abated[2]	1,035	938	**3,000**
Accumulated Rubbish Cases Opened	N/A	1,461	**2,198**
Accumulated Rubbish Cases Resolved	N/A	993	**1,696**
Cleanup Events Material Collected (Tons)	740	1,256	1,106
Number of Cleanup Events	24	39	34
Code Enforcement Resource Fairs[3]	N/A	N/A	10
Code Enforcement Workshops[3]	N/A	N/A	15
Trash Task Force Material Collected (Tons)	N/A	9,425	2,383
Criminal Citations Issued			
Illegal Dumping	113	220	**242**
Illegal Vending	27	412	**622**
All Other Criminal Violations	76	139	**148**
SET Patrol Hours[4]	1,193	7,018	**15,190**

[1] These are inspections conducted by field staff for standard code enforcement cases. 2008 is the first year we began tracking this information. This does not include the 8,840 property inspections conducted by the Foreclosure Task Force.

[2] 2008 was the first year we instituted a comprehensive case auditing process to accurately match the state's AVA reporting requirements.

[3] This information was not recorded for previous years.

[4] Patrol hours increased dramatically during SET's expansion beginning in 2007 resulting in 2008 being the first year this program was fully staffed.

Countywide Information

Acknowledgements:

It is difficult to articulate the value of the services we perform. Although we point to our traditional workload indicators, we invite you to review our monthly newsletter, *The Posting*, and see just how our job makes an impact every day in the communities throughout Riverside County.

We wish to thank the county departments who worked closely with us in serving the residents of Riverside County.

We cannot be as successful as we are without the help and partnerships of so many dedicated community members who truly help us make a difference.

Thank You

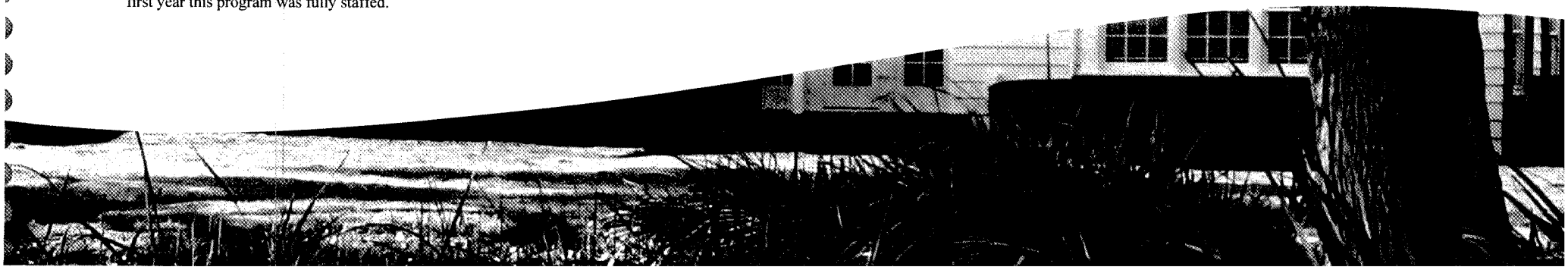

COUNTY OF RIVERSIDE

CODE ENFORCEMENT DEPARTMENT

ADMINISTRATIVE OFFICES
4080 LEMON STREET, 12TH FLOOR
RIVERSIDE, CALIFORNIA 92501
(951) 955-2004 ▪ FAX (951) 955-8680

FIRST DISTRICT
LAKE ELSINORE/MEAD VALLEY OFFICE
117 SOUTH LANGSTAFF STREET
LAKE ELSINORE, CALIFORNIA 92530
(951) 245-3186

SECOND DISTRICT
JURUPA VALLEY/HOME GARDENS OFFICE
5317 MISSION BOULEVARD
RIVERSIDE, CALIFORNIA 92509
(951) 275-8739

THIRD DISTRICT
MURRIETA SOUTH COUNTY OFFICE
39493 LOS ALAMOS ROAD, SUITE A
MURRIETA, CALIFORNIA 92563
(951) 600-6140

FOURTH DISTRICT
THOUSAND PALMS EAST COUNTY OFFICE
31-290 PLANTATION DRIVE
THOUSAND PALMS, CALIFORNIA 92276
(760) 343-4150

FIFTH DISTRICT
MORENO VALLEY/BANNING OFFICE
24318 HEMLOCK AVENUE, SUITE C-1
MORENO VALLEY, CALIFORNIA 92557
(951) 485-5840

018770

Riverside County Code Enforcement

August 2008
Volume 2, Issue 8

The Posting

A TLMA Code Enforcement Monthly Newsletter

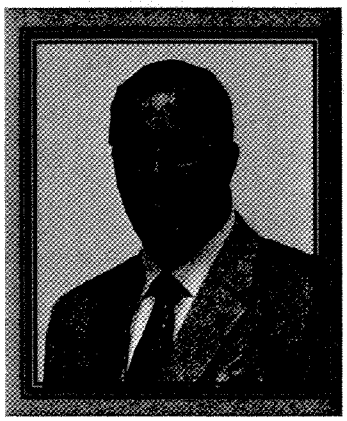

Director Jay E. Orr

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Tire Collection Event Mead Valley 4
Home Gardens Clean-up 5
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Nuevo Community Clean-up & Tire Collection Event

Community residents lined up as early as 6:30 a.m. to unload household trash that had been illegally dumped along Ramona Expressway and in the open fields of the Juniper Flats, Nuevo and Lakeview communities. Code Enforcement staff were eager to assist residents in the removal of unwanted tires and waste. Not only were these residents provided with an opportunity to dispose of their waste but thanks to Community Improvement Specialist, Sue Rush, local residents were educated on new County ordinances, Household Hazardous Waste & Tire collection events and property maintenance. Code Enforcement Officer Jennifer Morris assisted with traffic control and bin monitoring to ensure that hazardous waste was not disposed of at this event. Waste Management Inc. donated and delivered 19 bins for this event. Clean ups such as these, provide an opportunity for residents to come into compliance.

Chaka Osborne-5

There were 311 tires removed from all three communities combined!

"Your Department and Supervisor Marion Ashley's office has done great things for our small communities of Nuevo, Lakeview, and Juniper Flats". Thank you Code Enforcement!- Mr. John Linch

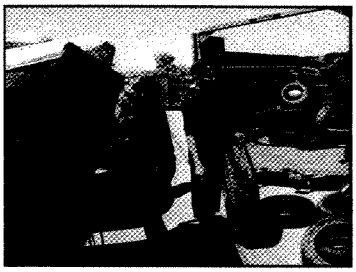

CIS Grace Escobar counts tires & inspects vehicles for hazardous waste.

19 bins; 55.20 tons of waste removed from Nuevo, Lakeview and Juniper Flats.

From Trash to Gardens

In Code Enforcement, we strive to achieve voluntary compliance. In working with Community Improvement Programs and Impact Plans, we offer all available resources to help bring property owners into compliance. In most cases we are able to bring everything to a happy ending. For example, on the morning of May 6, using Dakeno Demolitions, we were able to bring the property seen in these photos into compliance.

BEFORE

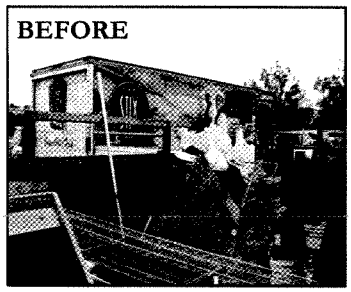

Even though the property owner was hesitant at first about the abatement, in the end, the property owner admitted that this was the best thing they could have done. In fact, upon a follow-up visit, we found the property owner planting a garden and enjoying the clean space.

Ken King-2

AFTER

Riverside County Code Enforcement

September 2008
Volume 2, Issue 9

The Posting

A TLMA Code Enforcement Monthly Newsletter

Mission Statement: "To enhance public safety and the quality of life in partnership with communities through fair enforcement of laws and codes."

Director Jay E. Orr

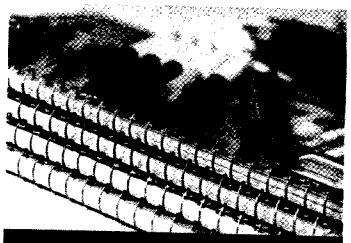

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Neighborhood Conference	Last page

Watch Where You Park

Riverside County Ordinance 413, which regulates parking, was enacted in order to "further community preservation and protection of the health, safety, and welfare of its citizens, property values, and aesthetic qualities." With this ordinance, Riverside County Code Enforcement is regulating and enforcing street parking restrictions and prohibitions for certain vehicles within the unincorporated areas of the county. Code Enforcement officers enforce a variety of parking regulations including the parking of commercial vehicles in residential districts.

Ordinance 413 generally prohibits the parking of any commercial vehicle in excess of 10,000 pounds of gross vehicle weight on a residential street. Certain exceptions to this regulation apply, such as commercial vehicles engaged in the pick up or delivery of goods, wares, or merchandise.

The parking of commercial trailers or semi-trailers on residential streets is prohibited regardless of weight. Code Enforcement Supervisor Mickey Parmele commented, "This is a problem because of the very large number of commercial truckers we have. Lots of them get in late and just take their trucks home." Consequently, most commercial drivers find out about this regulation the hard way. The penalties for this violation are high and you can receive additional citations every 24-hour period (see chart below). Commercial vehicles should be parked in commercially zoned areas or in a lawfully permitted vehicle storage yard. Signs are strategically posted at the entry points into the county and along major streets and thoroughfares alerting drivers to the commercial vehicle parking restrictions in residential areas. So why not save yourself time and money and just "Park it right and forget the cite!"

Grace Escobar

1st Violation	$ 250.00
2nd Violation	$ 500.00
3rd Violation	$ 750.00

CODE ENFORCEMENT ADMINISTRATION
4080 Lemon Street,
12th Floor
Riverside, CA 92501
Phone: 951-955-2004
Fax: 951-955-8680

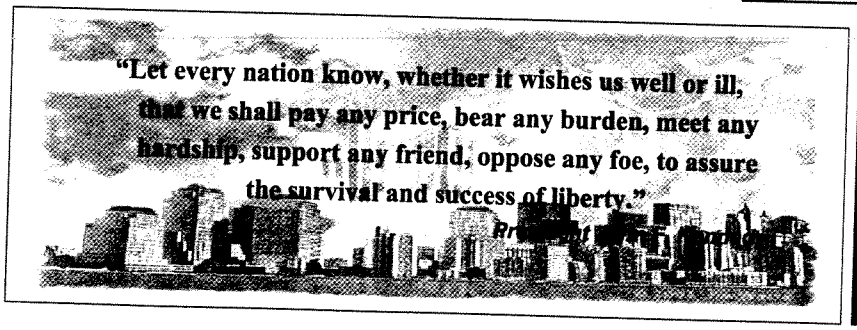

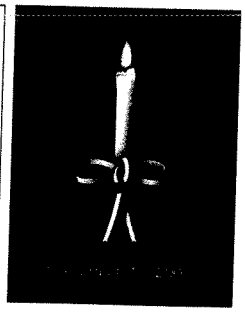

Riverside County
Code Enforcement

October
Volume 2, Issue 10

The Posting

A TLMA Code Enforcement Monthly Newsletter

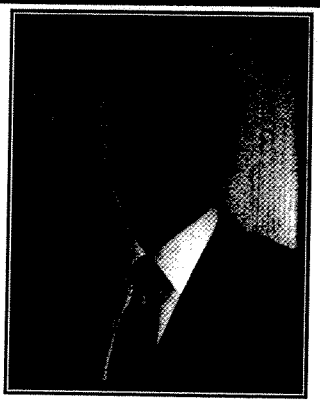

Director John Boyd

Mission Statement: "To enhance public safety and the quality of life in partnership with communities through fair enforcement of laws and codes."

Message From Our New Director

Last month we celebrated the promotion of our former Director, Jay Orr, to his new post as Assistant County Executive Officer under County Executive Officer Bill Luna. In the last two years Code Enforcement has been reengineered to become the flagship Code Enforcement agency statewide. As the new Director, I am now responsible to carry on the programs established under Jay and will strive to continue to make this department one recognized for its problem-solving skills.

I worked in developing the Community Oriented Policing model used by the Riverside Sheriff's Department, so I understand the importance of identifying and analyzing community problems and engaging the community in developing solutions. Our vision is to develop, establish, and maintain "sustainable healthy neighborhoods." By engaging the community in enhancing and using their own assets and skills, the potential for long-term sustainability is great.

As the Director, I am committed to providing training and resources necessary to give the officers and staff all the tools and skills they will need to be effective in their chosen professions. I look forward to the challenges that lie ahead of us as we continue moving forward to make a positive difference in the communities we serve.

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Vacant Mobile Hides Suspects 3

Great Fall Cleanup 4

Good, Bad, & Ugly 5

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Calendar 7

CODE ENFORCEMENT ADMINISTRATION
4080 Lemon Street,
12th Floor
Riverside, CA 92501
Phone: 951-955-2004

Code Enforcement to Host FREE Conference

On the 25th of October, a groundbreaking event will take place that you absolutely do not want to miss. On that day, at the beautiful Palm Desert campus of the University of California, the Code Enforcement Department will be hosting the first ever Riverside County Neighborhood Conference.

This half day gathering will be filled with exciting workshops and speakers who will prove to be not only informative, but challenging and engaging as well. Please view the last page for Workshop titles and other vital information.

This is a great opportunity for you, as a community leader or supporter, to receive creative ideas that you can take back and invest in your neighborhood. Networking and the sharing of ideas with other community members will be encouraged throughout the day. All participants will come together in the afternoon to hear nationally recognized keynote speaker Richard Campanero, who will be delivering a motivationally thought-provoking presentation on the "Broken Window Theory."

For the little ones who attend, there will be separate activities geared specifically for children ages 6-12. A free continental breakfast and delicious box lunch will be provided to all participants. To round out the conference, several vendors will be on hand all day to talk to you about the services and products they offer, designed to help in the growth of sustainable neighborhoods.

Van pools are being coordinated to assist those coming to the conference from distant communities. For those driving to the event, you will be pleased to know that parking is abundant and FREE, thanks to the hospitality of our friends at the Palm Desert UCR campus.

We look forward to seeing you at the conference, as we continue to make positive strides toward forming "Community Partnerships for Sustainable Neighborhoods."

James Monroe,
Administration

Riverside County Code Enforcement

THE POSTING

December 2008

Volume 2, Issue 12

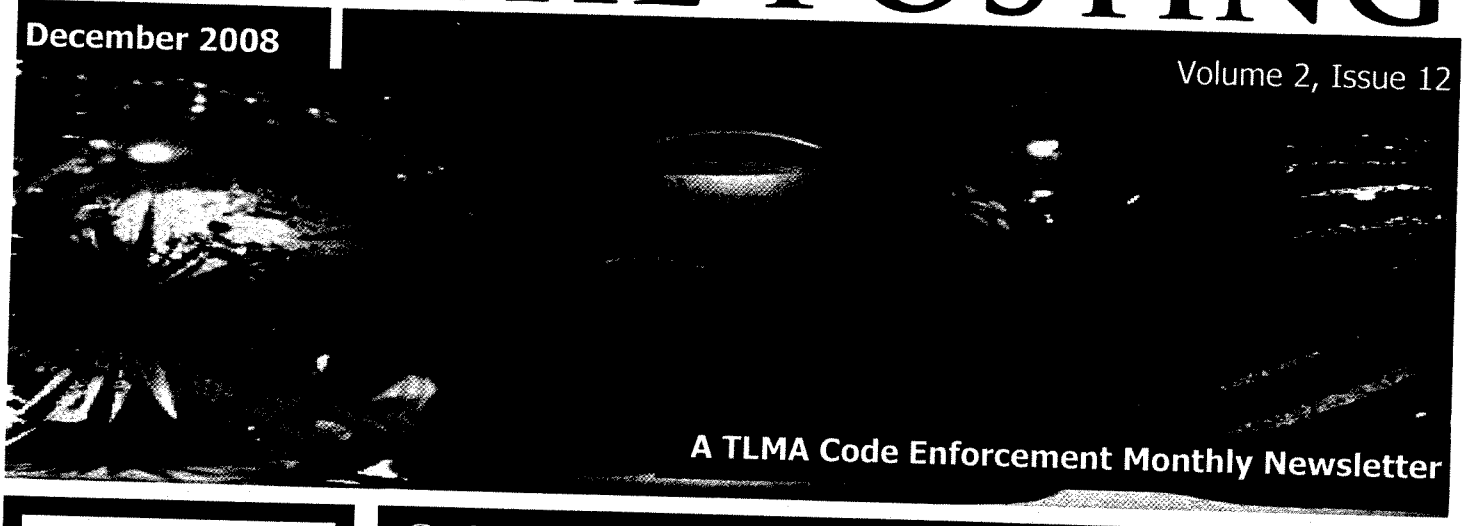

A TLMA Code Enforcement Monthly Newsletter

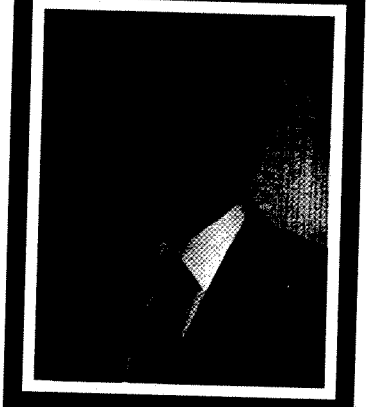

Director John Boyd

"To enhance public safety and the quality of life in partnership with communities through fair enforcement of laws and codes."

4080 Lemon Street
12th Floor,
Riverside, CA 92501
Phone: 951-955-2004
www.rctlma.org

Code Enforcement and the State Team Up to Clean One of the Largest Trash Heaps in County History *District 4*

Code Enforcement routinely investigates illegal and unpermitted businesses and complaints regarding accumulated rubbish; however, this investigation, spearheaded by Senior Officer George Gianos, very rapidly escalated into an abatement action that far exceeded the scope of any trash cleanup undertaken by the Department.

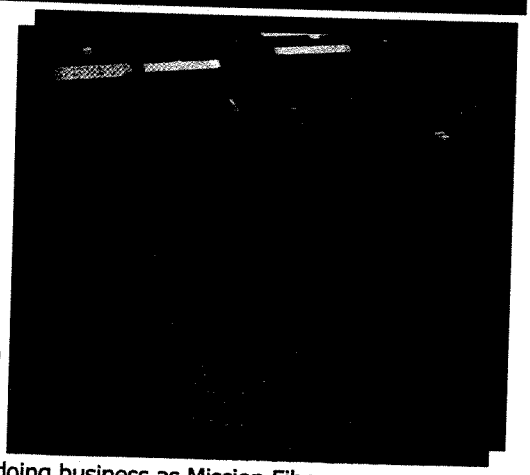

Officer Gianos described his first encounter with this enormous trash heap this way: "We investigated the matter and discovered stockpiles of bundled trash covering an area of about seven acres. Some of the bundles were stockpiled over 20 feet high! The trash bundles consisted of household trash, soft goods, and plastics. The site contained no active fire prevention apparatus or measures for rodent control." The property owner, doing business as Mission Fiber, was immediately notified of the violations by Officer Gianos, who also brought County Counsel into the mix to begin processing a court case for injunctive relief. Assistant County Counsel Pam Walls delivered a powerfully persuasive argument in favor of shutting the business down and cleaning the site immediately.

Due to the overwhelming evidence of potential harm to the public, the judge agreed with Ms. Walls and ordered Mission Fiber to cease operation and remove the offending rubbish from the property. Officer Gianos then began the arduous task of enforcing the court order and ensuring the cleanup of the property. "Unfortunately, the business owner was reluctant to comply," said Officer Gianos. The business owner's idea of compliance was to remove the rubbish at a slow pace to two other counties, spanning several months.

(continued on page 2)

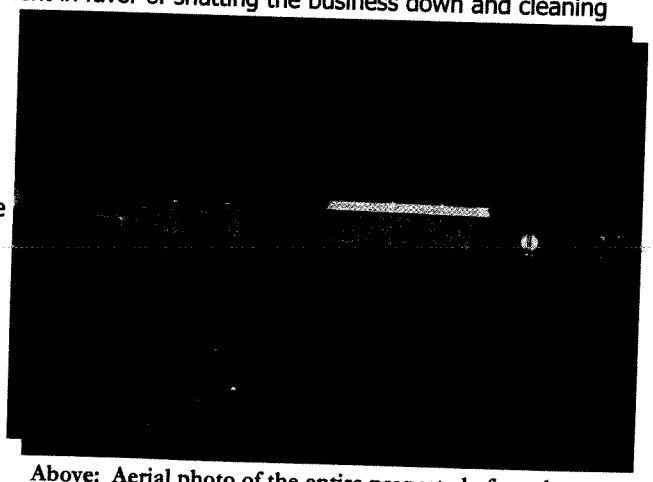

Above: Aerial photo of the entire property before cleanup
Below: The same property after the cleanup

Riverside County Code Enforcement

THE POSTING

January 2009

Volume 3, Issue 1

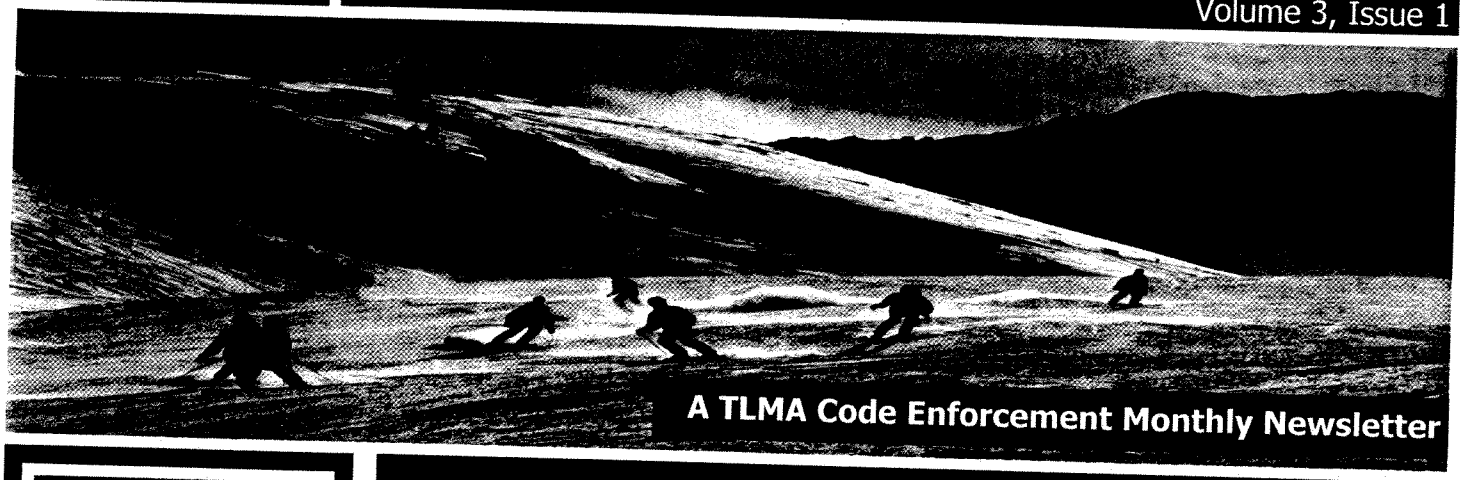

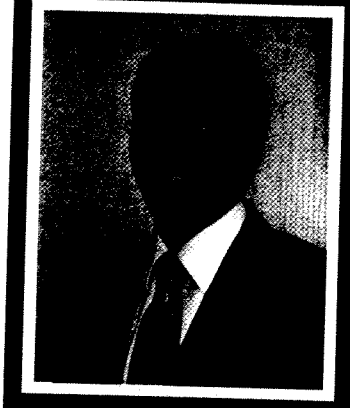

Director John Boyd

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4080 Lemon Street
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Phone: 951-955-2004
www.rctlma.org

Bee Careful *District 1*

Code Enforcement officers are trained to constantly keep their eyes open and their ears tuned in to what is going on around them, because they never know what they may encounter while conducting a routine property investigation. Officer Brett Farlow was conducting an inspection in the unincorporated area of Murrieta when he encountered a swarm of Africanized bees that had taken up residency in a boat stored on the property. "Even though I responded immediately to the impending threat, the bees keyed in on our movement from over 50 yards away and attacked the property owner and myself, stinging us repeatedly," stated Officer Farlow. With prior Animal Services training, Officer Farlow knew the best strategy was to run away from the hive. "We ran over a quarter of a mile before the bees gave up chase," Officer Farlow recounted. Furthermore, Cal Fire was called and responded to the scene due to the extreme behavior exhibited by the bees. Cal Fire donned protective gear with bee screens and displaced the hive with foam. While on site, paramedics provided first aid to Officer Farlow and the property owner. Other than a real painful experience, neither sting victim sustained any serious injuries that required further medical assistance.

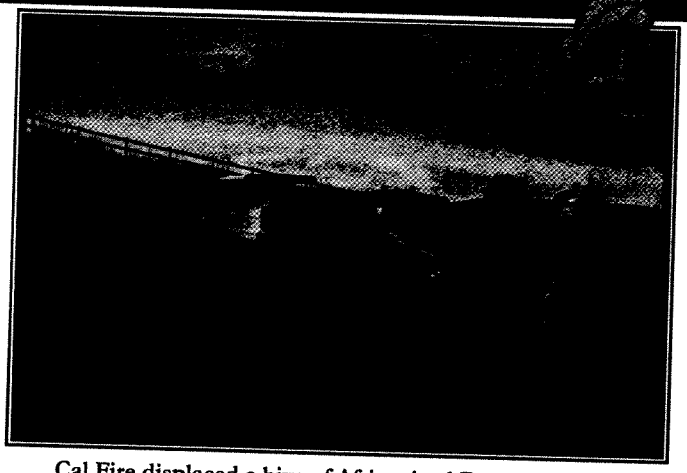

Cal Fire displaced a hive of Africanized Bees with foam

WHAT TO DO IF YOU ARE STUNG:

- Pull or scrape stings from skin as soon as possible. Most venom is released within one minute.
- Wash stung areas with soap and water like any other wound to prevent infection.
- Apply ice to relieve pain and swelling.
- Seek medical attention if breathing is difficult, if stung many times, or if allergic to bee stings.

Riverside County Code Enforcement

THE POSTING

February 2009

Volume 3, Issue 2

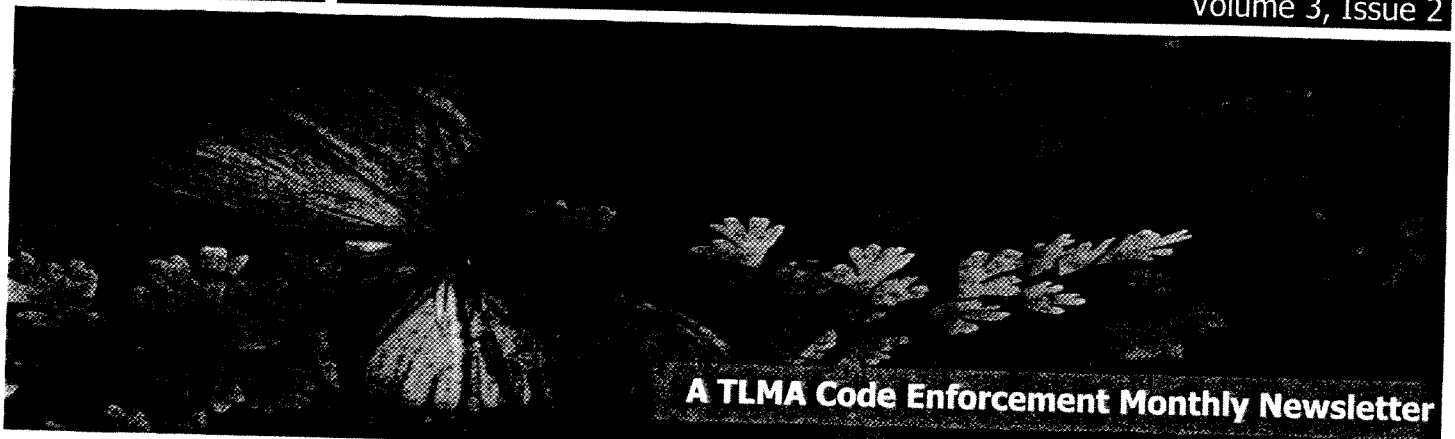

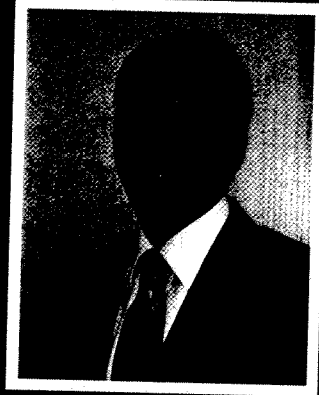

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Revolutionizing Code Enforcement

In the face of increased foreclosed and abandoned homes, blight and the subsequent health and safety issues have become more prevalent and an adversary for Code Enforcement. Violations such as abandoned vehicles, trash and debris, dilapidated buildings, dry vegetation on vacant properties, and illegal signs bring blight to unincorporated communities. To manage the influx of issues facing the County of Riverside our department developed the model for Community Impact Plans, a five-point strategy that uses the best concepts from Community Policing and Improvement Programs. The concept of our Community Impact Plans is revolutionizing how Code Enforcement interacts with the communities we serve.

The Community Impact Plans encompass the characteristics of each community and take into account the history, demographics, zoning, and media outlets to ensure community involvement and a sense of pride for the residents as their wants and needs are considered. The plans consist of assessment and research, community involvement, education and outreach, clean-ups and pro-active enforcement.

Utilizing the successful model we developed in one of our communities, our department has expanded this program to communities throughout the county. We are taking a more proactive approach by maximizing our resources to prevent problems and to address them before they become major issues. Our goal is to have a community impact plan directing our activities in each community.

Eager to share this effective program with other jurisdictions, we submitted our community impact plan process to the California State Association of Counties, and we were awarded one of ten Challenge Awards for this fresh and innovative approach to addressing issues affecting the health and well-being of the communities we serve. Feedback from residents is positive, common code violations have been significantly reduced, and internal management of the department has improved. In addition, the Code Enforcement Department is perceived as playing an active role in solving neighborhood problems.

CSAC
CALIFORNIA COUNTIES CHALLENGE AWARD
2008 WINNER

Susana Orozco, John Boyd, Paul McIntosh, and Jay Orr at the presentation of the 2008 CSAC Challenge Awards.

Riverside County Code Enforcement

THE POSTING

March 2009

Volume 3, Issue 3

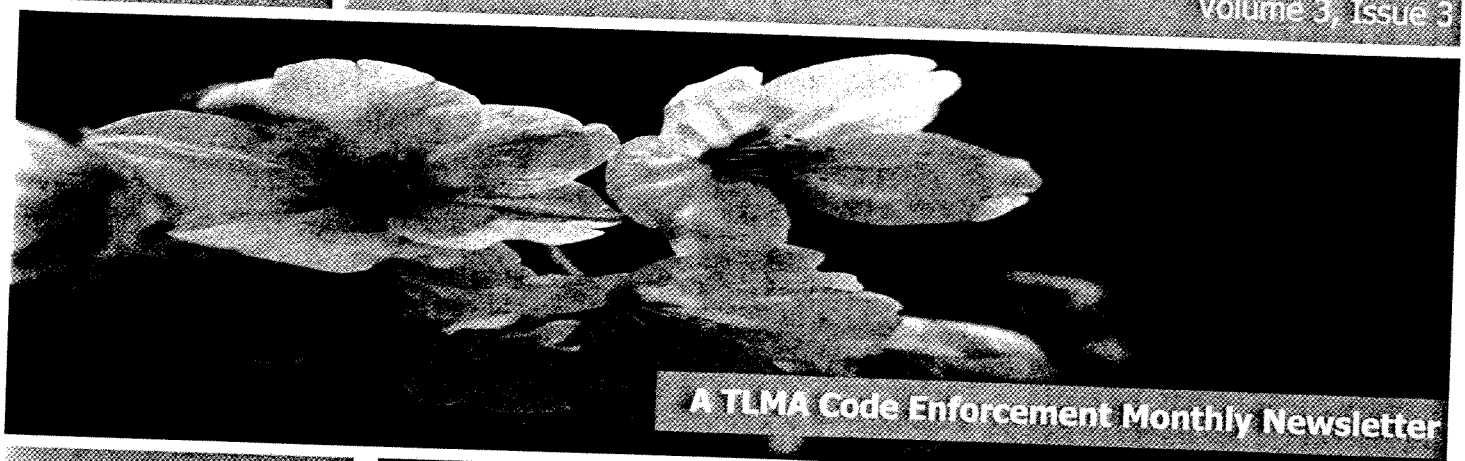

A TLMA Code Enforcement Monthly Newsletter

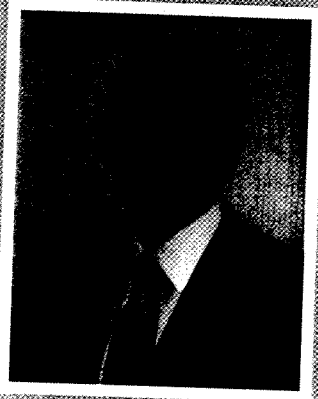

Director John Boyd

Mission Statement:

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Code Enforcement Administration

[illegible] Lemon Street
[illegible] Floor
[illegible]side, CA 92501
[illegible] 951.955-[illegible]
[illegible]tlma.org/[illegible]

Earlier this year, the Special Enforcement Team (SET) received a telephone call from a District Five constituent regarding a single wide mobile home that had been dumped on the side of Cherry Valley Boulevard, east of the I-10 freeway. SET officers responded and contacted the property owner where the unit was located. During their investigation, officers determined that the property owner was not responsible nor had they agreed to the dumping of the mobile home on their property. SET officers then contacted several neighbors around the dump location in an effort to generate any investigative leads. Unfortunately, no leads developed and the property owner was in no financial position to remove the unit. This ugly pink mobile home was not going anywhere, anytime soon. Or so the officers thought.

SET contacted Community Improvement, inquiring about resources that could be offered to the victim. Community Improvement identified that the location was not in a CDBG area and therefore not eligible for grant funds. Susan Rush, from the Community Improvement team, made one phone call and Riverside County's own Transportation Department (once again) came to the rescue. With their big tractors, they hauled away the junked out mobile home. Special thanks to everyone involved for your team effort and persistence in getting this mobile removed!

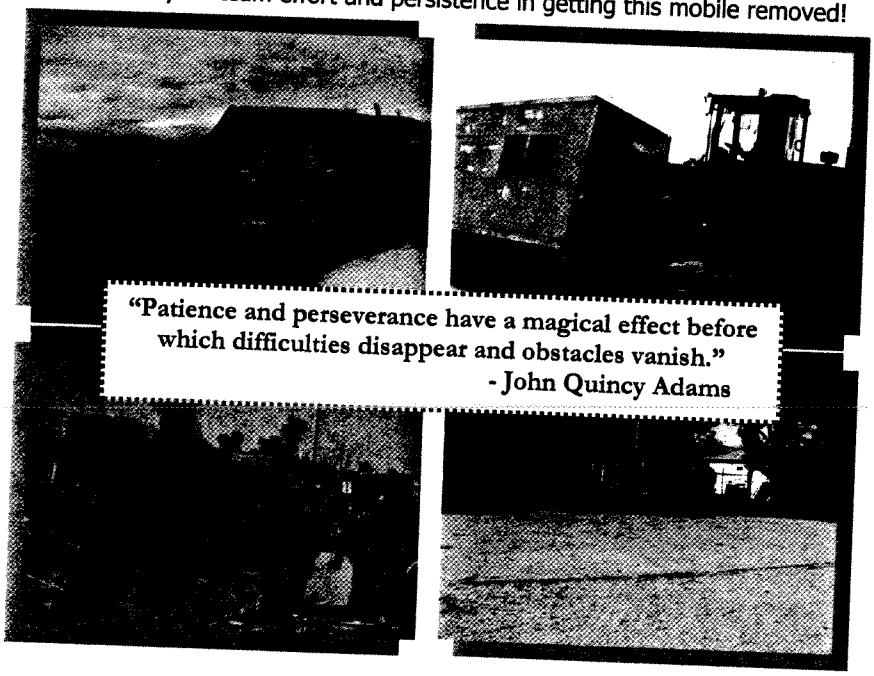

"Patience and perseverance have a magical effect before which difficulties disappear and obstacles vanish."
- John Quincy Adams

Riverside County Code Enforcement

THE POSTING

April 2009

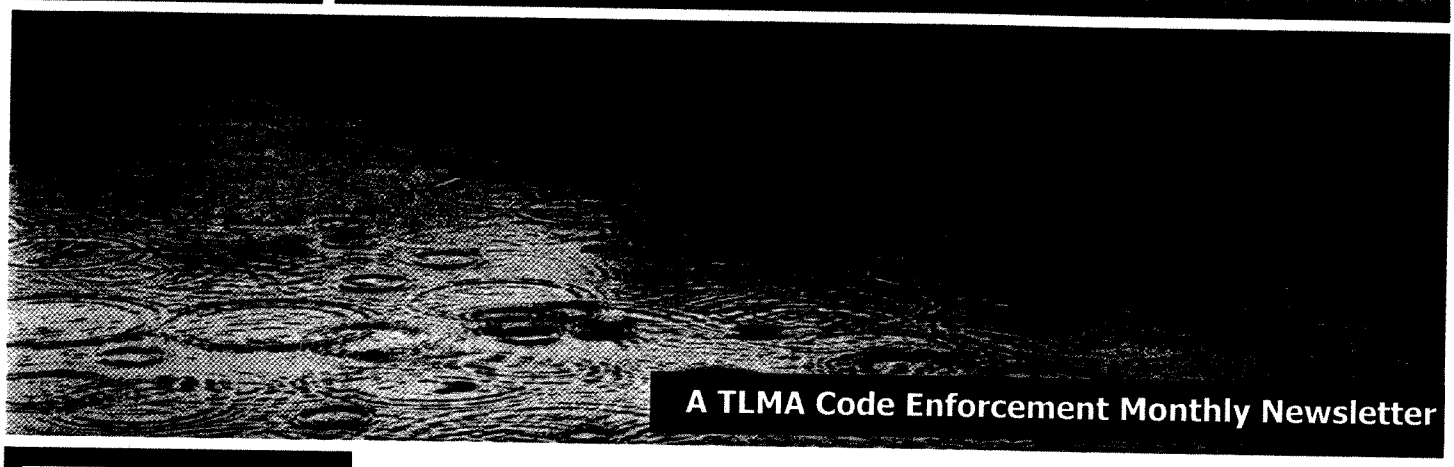

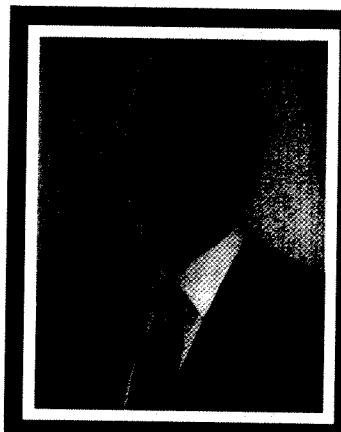

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Indio Hills Receives a Much Needed Facelift *District 4*

You could see it all from Dillon Road. The entire property was visible from the major roadway through the area, and the citizens of Indio Hills had a constant reminder that their area had problems. Since there was no perimeter fencing, the neighborhood was able to see over twenty (20) inoperable, dismantled vehicles, including trucks, a sweeper, motor homes, and boats. The owner, who had been renting the house to relatives, had recently moved back to the property.

Code Enforcement Officer Jacqueline Fogh began a vehicle abatement case to cause the owner to take the necessary action to remove, repair, or properly store the inoperable vehicles on the property. Soon after notifying the owner of a county code ordinance violation, the property owner either removed or garaged the offending vehicles; but the property owner did not stop there. The excess outside storage was also removed, and all the operable vehicles were arranged neatly on the property.

The area now looks so much better thanks to the owner who took responsibility for the property – with a friendly reminder from the Code Enforcement Department.

Over 20 inoperable vehicles were scattered around the property

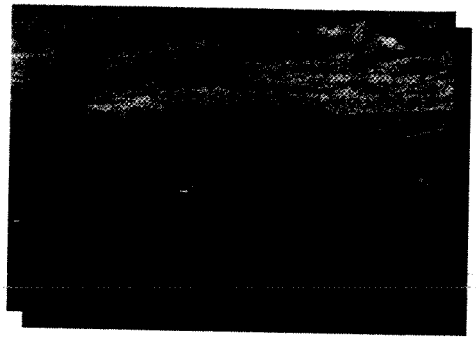

The vehicles were either removed or stored properly

Good Neighbor Tip:
Park your car(s) in designated areas on the street or in your driveway or garage.

Riverside County Code Enforcement

THE POSTING

May 2009

Volume 3, Issue 5

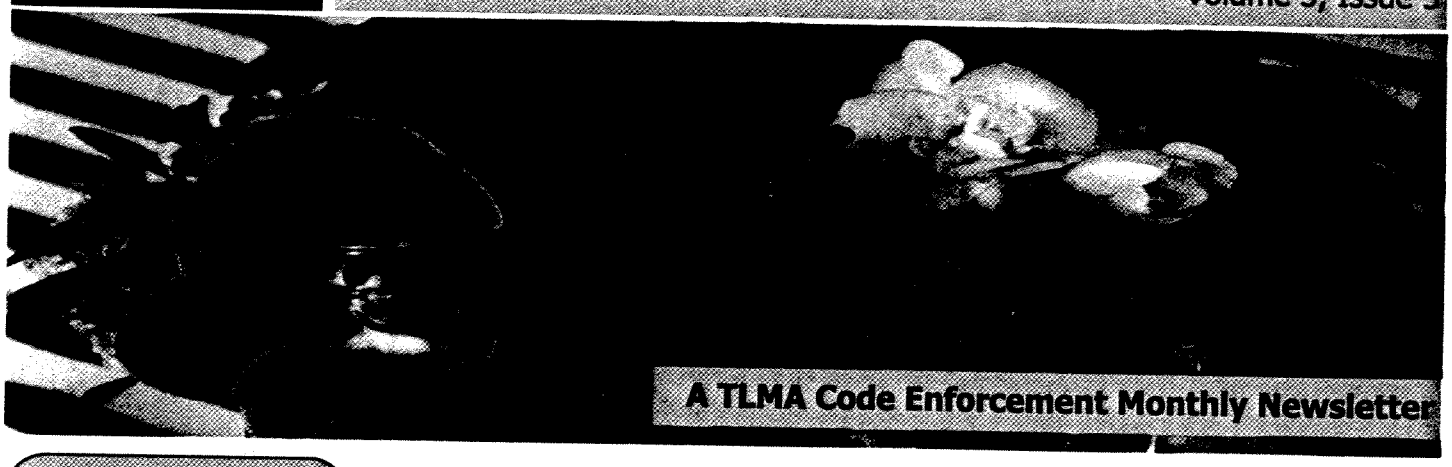

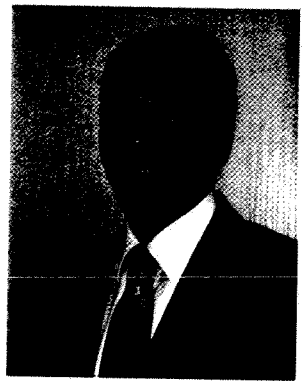

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Elderly Resident Removed from Unsanitary Conditions by Caring Family *District 5*

Code Enforcement officers are subjected to all sorts of code violations on a daily basis. Oftentimes, property owners and family members become emotional as the officers attempt to communicate the hazards and safety concerns they witness on a property. Code Enforcement Officers Anthony Green, James Pike, and Lanee Padilla were contacted by Animal Services to assist with a multi-agency cleanup of a property in Cabazon.

During the initial inspection of the property, it was discovered that the elderly resident was living in very unsanitary conditions. In addition to the intrinsic conditions associated with the keeping of over 20 cats and dogs, several electrical hazards were also documented on the property.

A high level of courtesy, compassion, and customer service was exercised by the Code Enforcement Department, Animal Services, and the Sheriff's Department in order to avoid any additional stress being placed on the property owner or her family members. During the inspection, the owner was voluntarily removed from the residence by relatives and taken to an assisted care facility.

Although these types of cases can be emotionally draining, the gratitude expressed by the family members and neighbors make it all worthwhile.

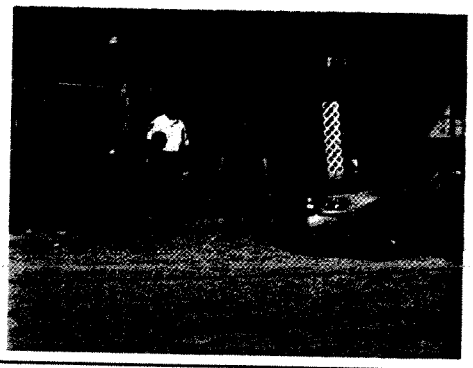

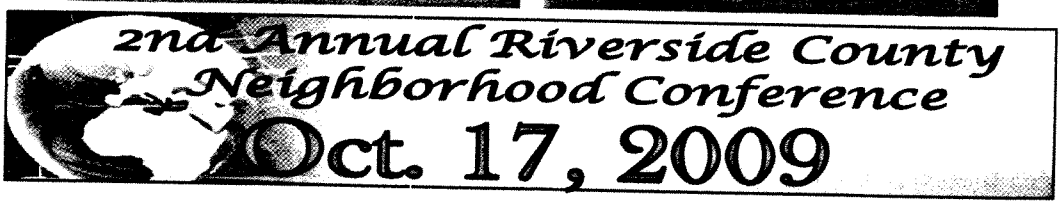

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Riverside County Code Enforcement

THE POSTING

June 2009
Volume 3, Issue 6

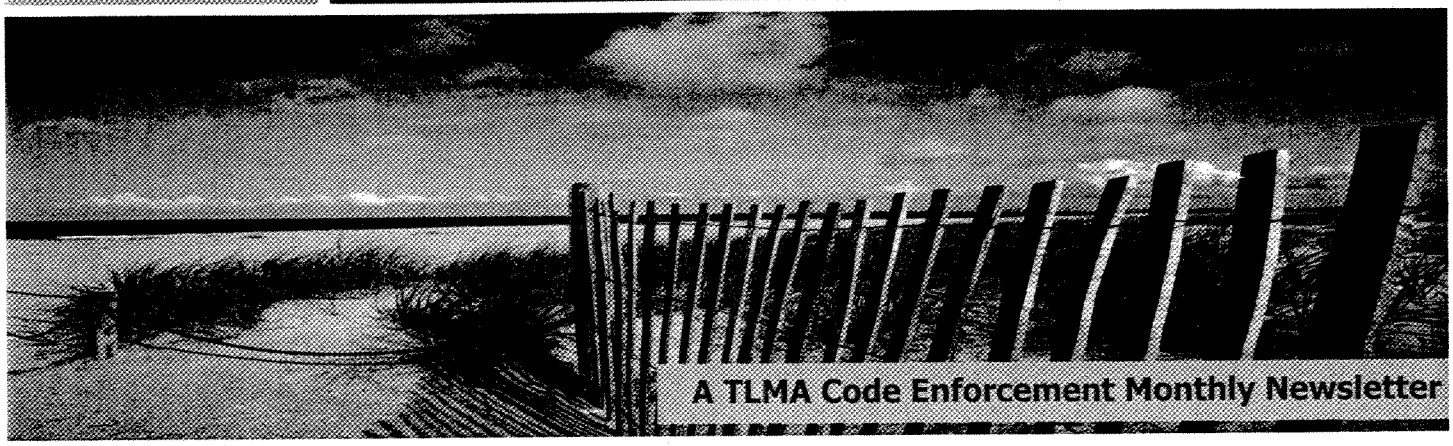

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Fire Damage Leads to Voluntary Compliance *District 2*

The Riverside County Code Enforcement Department received a report from the California Department of Forestry regarding a structure fire on Grant Street in the community of Home Gardens. Senior Officer Marcella Villanueva and Officer Diana Parra inspected the location.

Officers Villanueva and Parra found the structure had sustained major fire damage. While inspecting the property, the officers also discovered that the structure's garage had been illegally converted into living space and contained a large L-shaped unpermitted addition. The garage and addition had been divided into three separate units, and it was unknown if the utilities to the unpermitted units were correctly installed, which could have proved hazardous to the previous occupants. The main structure was deemed substandard and a notice was posted. A Notice of Violation was issued for the unpermitted additions and garage conversion.

Officer Parra contacted the individual representing the property owner and gave the representative direction on how to come into compliance. The property owner decided to remove the structure from the property and obtained a demolition permit. Code Enforcement maintained contact with the representative and demolition contractor, and within weeks, the structure was removed from the property. Currently there are plans for a new single family residence to be built at this location.

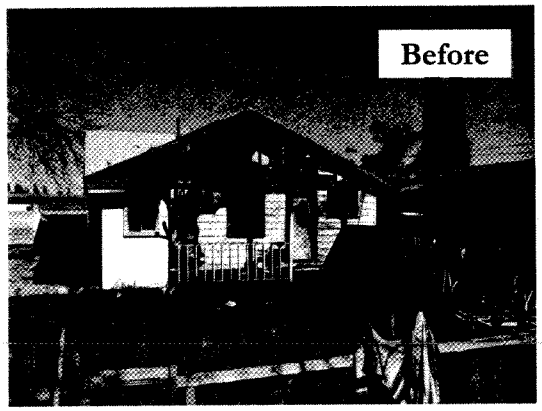

2nd Annual Riverside County Neighborhood Conference

Save the Date **Oct. 17, 2009** Save the Date

DEPARTMENT OF ENVIRONMENTAL HEALTH

Murrieta

PR0033621	1st Class Collision Murrieta	41729 Eastman Dr	Murrieta	1/15/09
PR0023695	A-1 Murrieta Auto Repair	26622 Jefferson Ave #	Murrieta	1/15/09
PR0023726	Affordable Automotive Repair	41604 Date St Ste.D	Murrieta	5/28/09
PR0019702	Airmech Inc	37552 Winchester Rd	Murrieta	7/30/08
PR0038081	Albertson's #6609	28047 Scott Rd	Murrieta	3/12/09
PR0033141	Albertson's #6734	39224 Winchester Rd	Murrieta	2/23/09
PR0032786	Alta Dry Cleaners	40365 Murrieta Hot Sp	Murrieta	1/13/09
PR0023293	Alta Dry Cleaners	40365 Murrieta Hot Sp	Murrieta	8/19/08
PR0019732	Auto Techniques	41340 Pear St #15	Murrieta	1/22/09
PR0040172	Autobahn Automotive	26871 Hobie Cir #B-1	Murrieta	1/22/09
PR0034046	AutoZone #5566	40950 California Oaks	Murrieta	7/25/08
PR0023402	Baliani Automotive	26450 Jefferson Ave #	Murrieta	1/27/09
PR0021213	Big O Tires	40420 California Oaks	Murrieta	8/8/08
PR0031137	Black's Auto Repair	25760 Washington Av	Murrieta	4/20/09
PR0033838	Brunswick California Oaks Bowl	40440 California Oaks	Murrieta	7/31/08
PR0031558	Caliber Collision Centers	41416 Pear St	Murrieta	4/29/09
PR0029662	California Auto Centers	26860 Jefferson Ave #	Murrieta	4/29/09
PR0023067	California Oaks Carwash/Quick Lu	40933 California Oaks	Murrieta	7/2/08
PR0031104	California Oaks Shell	40981 California Oaks	Murrieta	2/3/09
PR0028363	Calvary Chapel Conference Cente	39405 Murrieta Hot Sp	Murrieta	3/17/09
PR0032421	Cameron Welding Supply	41341 Date St	Murrieta	5/28/09
PR0032979	Capri Cleaners	40119 Murrieta Hot Sp	Murrieta	1/12/09
PR0033784	Carl's Jr #1105	40980 California Oaks	Murrieta	8/7/08
PR0033596	Carriage Motors, Inc	26825 Auto Mall Pkwy	Murrieta	2/25/09
PR0040805	Carrier Sales & Distribution, LLC	41710 Reagan Wy	Murrieta	6/1/09
PR0034066	Chevron Station #21-0409	39440 Murrieta Hot Sp	Murrieta	5/5/09
PR0028096	Chevron Stations Inc. #1484/2012	40500 California Oaks	Murrieta	4/2/09
PR0033788	Chuck E Cheese #414	25110 Hancock Ave	Murrieta	3/5/09
PR0020242	Classic Cleaners-OOB OOB	40605 California Oaks	Murrieta	8/19/08
PR0032532	Convenience Retailers LLC-OOB	41010 California Oaks	Murrieta	1/13/09
PR0022157	CVS Pharmacy #9628	25080 Hancock Ave	Murrieta	3/5/09
PR0025974	Excaliber Fuels #5	40648 California Oaks	Murrieta	11/26/08
PR0029929	Excaliber Fuels #5	40648 California Oaks	Murrieta	1/8/09
PR0022448	Express Tire - Murrieta	40615 California Oaks	Murrieta	8/8/08
PR0022360	EZ Lube #115	40430 California Oaks	Murrieta	7/31/08
PR0028199	Faith Quality Auto Body, Inc.	41130 Nick Ln	Murrieta	4/28/09

PR0028213	Gentle Dry Cleaners	25060 Hancock Ave #	Murrieta	3/5/09
PR0023425	High Tech Auto	26450 Jefferson Ave #	Murrieta	1/27/09
PR0030701	Home Depot #668	25100 Madison Ave	Murrieta	5/27/09
PR0028205	Hot Springs Cleaners	40469 Murrieta Hot Sp	Murrieta	1/13/09
PR0028292	International Immunology Corp	25549 Adams Ave	Murrieta	1/8/09
PR0028280	James Allen Collision Center II	41109 Sandalwood Ci	Murrieta	3/16/09
PR0032329	Johnson Machinery Rentals	41105 Raintree Ct	Murrieta	2/2/09
PR0029972	Kip Incorporated	25740 Washington Av	Murrieta	4/20/09
PR0034035	Kragen Auto Parts #1430	40951 California Oaks	Murrieta	7/25/08
PR0026296	Madison Shell #68569	25336 Madison Ave	Murrieta	12/8/08
PR0023721	Murrieta 76	39460 Murrieta Hot Sp	Murrieta	10/14/08
PR0033911	Murrieta Hot Springs Shell	40452 Murrieta Hot Sp	Murrieta	5/19/09
PR0033504	Murrieta Volkswagon	41300 Date St	Murrieta	2/25/09
PR0033099	MVUSD Transportation Facility	41870 Mc Alby Ct	Murrieta	6/1/09
PR0030564	Pro-Tec	41376 Pear St	Murrieta	1/22/09
PR0040564	Pure Chiropractic	25136 Hancock Ave S	Murrieta	3/5/09
PR0026685	Ralphs Grocery Company #118	23801 Washington Av	Murrieta	11/13/08
PR0032430	RCP Block & Brick	25725 Jefferson Ave	Murrieta	1/28/09
PR0033725	RK Sport Inc	26900 Jefferson Ave #	Murrieta	2/2/09
PR0023777	S & T Saab Volvo Specialist	26622 Jefferson #105	Murrieta	1/15/09
PR0039847	Scott-Murrieta Service Station LP	33070 Antelope Rd	Murrieta	5/27/09
PR0033974	Seven Eleven #33484	28015 Scott Rd	Murrieta	3/12/09
PR0034493	Seven-Eleven #33552	40210 Murrieta Hot Sp	Murrieta	2/26/09
PR0033282	Southern California Gas Co	25620 Jefferson St	Murrieta	5/6/09
PR0031701	Spectrum Cleaners III	40964 California Oaks	Murrieta	7/25/08
PR0032328	Star Trac Strength Inc	41180 Raintree Ct	Murrieta	2/2/09
PR0030853	Stater Bros. Market #139	25050 Hancock Ave	Murrieta	3/5/09
PR0035161	Superior Ready Mix Concrete	26165 Adams Ave	Murrieta	5/28/09
PR0023270	Target Store #1283	41040 California Oaks	Murrieta	8/14/08
PR0042282	Temecula Auto Body & Paint	41196 Nick Ln	Murrieta	4/28/09
PR0033837	The Movie Experience	41090 California Oaks	Murrieta	8/7/08
PR0030708	USA Station #68168	39055 Winchester Rd	Murrieta	3/23/09
PR0028243	Verizon/Murrieta CO	24961 Washington Av	Murrieta	6/3/09
PR0026705	Vons Fuel Center #2660	29910 Murrieta Hot Sp	Murrieta	10/20/08
PR0023401	Worldwide Autoworks	26450 Jefferson #105	Murrieta	1/27/09

Total Site Visits for Murrieta - 71

Temecula

PR0022876	A 1 Auto	28696 Via Montezuma	Temecula	2/19/09
PR0038911	Above All Auto Body, Inc	27516 Commerce Cer	Temecula	10/14/08
PR0023459	Adobe Plaza Cleaners	27625 Jefferson Ave #	Temecula	10/2/08
PR0031317	Airgas West Inc	41735 Rider Wy	Temecula	5/19/09
PR0030854	Albertson's #6706	30530 Rancho Californ	Temecula	9/10/08
PR0022434	APD Technologies, Inc-OOB OOE	42066 Avenida Alvara	Temecula	3/12/09
PR0026102	Arco #5928/Prestige Stations-OOI	27691 Ynez Rd	Temecula	7/22/08
PR0022407	Arco #6305/Prestige Stations #63	40212 Winchester Rd	Temecula	8/13/08
PR0023786	Arrow Engines	43162 Blackdeer Loop	Temecula	7/21/08
PR0024170	Ask Terry Automotive	28733 Via Montezuma	Temecula	11/3/08
PR0021879	Auto Care Experts, Inc	42295 Avenida Alvara	Temecula	7/7/08
PR0019731	Auto Doctor- Thompson Magnetic	42255 Baldaray Cir St	Temecula	7/16/08
PR0022741	Auto World Service Center	27495 Commerce Cer	Temecula	7/29/08
PR0019831	Autocenter Autobody Of Temecula	28710 Las Haciendas	Temecula	7/31/08
PR0038764	Automedics	42103 Rio Nedo # 103	Temecula	8/26/08
PR0023869	AutoZone #5936	40345 Winchester Rd	Temecula	2/24/09
PR0035040	BJ's Restaurant & Brewhouse	26500 Ynez Rd	Temecula	4/21/09
PR0024384	Bostik Findley Inc	27460 Bostik Ct	Temecula	7/28/08
PR0034540	Burger King	30534 Rancho Californ	Temecula	3/5/09
PR0025149	California Highway Patrol	27685 Commerce Cer	Temecula	9/26/08
PR0034501	Carl's Jr #1023	30660 Rancho Californ	Temecula	1/20/09
PR0028062	Cemex Construction Materials Pa	29065 Front St	Temecula	11/26/08
PR0040669	Central Service Station LP	44239 Margarita Rd	Temecula	6/3/09
PR0019862	Chase Auto Repair	27516 Commerce Cer	Temecula	8/19/08
PR0019862	Chase Auto Repair	27516 Commerce Cer	Temecula	3/3/09
PR0019813	Chevron Jefferson Street	27560 Jefferson Ave	Temecula	11/26/08
PR0025921	Chevron SS #1492/201596	40635 Winchester Rd	Temecula	12/23/08
PR0026094	Chevron SS #1838/204029	31669 Hwy 79	Temecula	12/29/08
PR0034030	Chick-fil-A-OOB OOB	40531 Margarita Rd	Temecula	2/25/09
PR0034322	Chipotle Mexican Grill	40573 Margarita Rd #	Temecula	2/25/09
PR0023435	Continental Cleaners	33175 S Hwy 79 Ste.D	Temecula	7/23/08
PR0024107	Creative Touch Interiors	43085 Business Park I	Temecula	9/23/08
PR0019840	Creekside Gas And Food Mart	29115 Front St	Temecula	2/17/09
PR0038709	Cycle Shack	32839 Temecula Pkwy	Temecula	3/24/09

PR0023669	DCH Acura of Temecula	26705 Ynez Rd	Temecula	1/21/09
PR0020212	DCH Chrysler Jeep Temecula-OC	26799 Ynez Rd	Temecula	1/21/09
PR0020216	DCH Honda of Temecula	26755 Ynez Rd	Temecula	1/21/09
PR0019852	Del Rio Enterprise	42181 Avenida Alvara	Temecula	8/19/08
PR0034619	Denny's	28915 Rancho Califor	Temecula	2/19/09
PR0019856	Dial Automotive	43175 Blackdeer Lp	Temecula	7/7/08
PR0023732	Discount Auto Service	41680 Enterprise Cir S	Temecula	11/3/08
PR0022079	Dutch Dry Cleaners	27461 Jefferson Ave	Temecula	3/18/09
PR0019873	EMWD Temecula Valley Regional	42565 Avenida Alvara	Temecula	8/12/08
PR0020138	Enterprise Automotive	28696 Via Montezuma	Temecula	4/13/09
PR0040329	Express Tire	44092 Margarita Rd	Temecula	2/5/09
PR0022537	Express Tire - Temecula	29095 Front St	Temecula	9/17/08
PR0020040	ExxonMobil Oil Corporation #1019	44520 Bedford Ct	Temecula	4/20/09
PR0020037	ExxonMobil Oil Corporation #1084	29500 Rancho Califor	Temecula	2/19/09
PR0023276	ExxonMobil Oil Corporation #1913	33165 Hwy 79	Temecula	9/25/08
PR0037891	EZ Lube #85	30625 Temecula Pkwy	Temecula	7/31/08
PR0039626	Food 4 Less #319	26419 Ynez Rd	Temecula	3/17/09
PR0021464	Fourth Street Automotive	41935 4th St	Temecula	9/24/08
PR0030867	Frazee Paint & Wallcovering	27355 Jefferson Ave S	Temecula	3/18/09
PR0023264	Front St. Service Station LP	44987 Front St	Temecula	10/22/08
PR0034671	Gilmore Liquid Air Co	42217 Rio Nedo #B10	Temecula	4/21/09
PR0022275	Gold Prospectors Assoc of Americ	43445 Business Park I	Temecula	11/3/08
PR0019913	Graphics Unlimited Lithography-O	43171 Business Park I	Temecula	7/23/08
PR0022288	Grizzle & Hunter Plastics LLC	27957 Diaz Rd	Temecula	9/24/08
PR0024108	HD Supply White Cap Constructio	28065 Diaz Rd	Temecula	8/25/08
PR0023239	Home Depot #1028	32020 Hwy 79	Temecula	7/30/08
PR0034257	Jack in the Box #0048-OOB OOB	27410 Jefferson Ave	Temecula	3/9/09
PR0020193	Jiffy Lube #1878	30690 Rancho Califor	Temecula	5/27/09
PR0023608	Johnson Matthey	27449 Colt Ct	Temecula	8/25/08
PR0023642	Label Productions of California	43135 Blackdeer Loop	Temecula	7/24/08
PR0020010	Lewis Cleaners	29760 Rancho Califor	Temecula	3/12/09
PR0032287	Line-X of Temecula Valley	28069 Diaz Rd #F	Temecula	9/24/08
PR0023109	Long Machine, Inc.	27450 Colt Ct	Temecula	11/3/08
PR0022042	M A C Products Inc	43214 Blackdeer Loop	Temecula	7/30/08
PR0021219	Magic Cleaners	41925 Motor Car Pkwy	Temecula	5/20/09
PR0019855	Magnecomp Corp.	26201 Ynez Rd #103	Temecula	4/21/09
PR0025299	McMillan Farm Management	35350 Rancho Califor	Temecula	12/18/08

PR0022429	Minuteman Press	27452 Jefferson Ave	Temecula	5/20/09
PR0021438	Molding International Engineering	42136 Avenida Alvara	Temecula	7/24/08
PR0021182	Murrieta Valley RV Service	27882 Del Rio Rd	Temecula	9/17/08
PR0020020	My Tech Automotive-OOB OOB	42346 Rio Nedo St #G	Temecula	1/21/09
PR0020020	My Tech Automotive-OOB OOB	42346 Rio Nedo St #G	Temecula	10/6/08
PR0020058	National Process Industries Inc	42250 Baldaray Cir	Temecula	10/1/08
PR0020073	Old Town Tire & Service	28700 Front St	Temecula	9/17/08
PR0026445	Palomar Village Shell	42197 Margarita Rd	Temecula	10/15/08
PR0034397	Panda Express #834	32195 S Hwy 79 Ste.C	Temecula	4/14/09
PR0019727	Pauley Equipment Company	28374 Felix Valdez Av	Temecula	7/29/08
PR0028402	Pedley Propane	42046 Rio Nedo St	Temecula	5/20/09
PR0028417	Polycraft Inc	42075 Avenida Alvara	Temecula	7/8/08
PR0022907	Pro Auto Collision	42011 E Avenida Alva	Temecula	7/9/08
PR0023589	Quality 1 Auto Service	27512 W Enterprise C	Temecula	11/13/08
PR0038269	Rainbow Service Station	30535 Temecula Pkw	Temecula	8/20/08
PR0023320	Ramona Tire And Service Center	31955 Via Rio Temec	Temecula	3/19/09
PR0020136	Rancho Car Wash	27378 Jefferson Ave	Temecula	10/7/08
PR0037535	Rancho Cleaners	27477 Ynez Rd	Temecula	7/9/08
PR0022110	Rancho Ford Lincoln Mercury	26895 Ynez Rd	Temecula	3/18/09
PR0026135	Rancho Shell #68623	29750 Rancho Califor	Temecula	1/5/09
PR0029748	RCWD Ace Bowen Pump Station	29025 Via Santa Rosa	Temecula	6/10/09
PR0039301	RCWD Calle Breve PS		Temecula	6/10/09
PR0029752	RCWD Carancho Pump Station	43695 El Calamar Rd	Temecula	6/10/09
PR0028481	RCWD De Portola Pump Station	40110 Cordova Dr	Temecula	6/10/09
PR0034159	RCWD Doherty Pump Station	43250 Elm St	Temecula	6/9/09
PR0029743	RCWD East Bluff Pump Station	42500 Block of Busine	Temecula	6/9/09
PR0028461	RCWD RC Pump Station #2 Well	31690 Rancho Califor	Temecula	6/9/09
PR0034158	RCWD VDC	37100 Block De Portol	Temecula	6/10/09
PR0028445	RCWD Well #108	40000 Block Margarita	Temecula	6/9/09
PR0028444	RCWD Well #309	26585 Madison Ave	Temecula	6/9/09
PR0022312	Redhawk Shell #68622	44260 Redhawk Pkwy	Temecula	2/4/09
PR0020154	Roadside Automotive & Tire Road	42346 Rio Nedo St # A	Temecula	4/13/09
PR0038913	S & P Automotive	42103 Rio Nedo # 105	Temecula	9/12/08
PR0023387	Saturn Of Temecula-OOB OOB	27430 Ynez Rd	Temecula	2/25/09
PR0024198	Sears Auto Center #2658	40680 Winchester Rd	Temecula	11/12/08
PR0023070	Sears Roebuck & Company #110	40710 Winchester Rd	Temecula	11/12/08
PR0040629	Shahin Shaath	27691 Ynez Rd	Temecula	5/4/09

PR0020219	SKS, Inc	41981 Avenida Alvara	Temecula	6/9/09
PR0020187	Solid State Stamping Inc	43350 Business Park I	Temecula	10/1/08
PR0019832	South Bay Cable Corp	42033 Rio Nedo St	Temecula	10/6/08
PR0036840	Stater Bros. Market #138 (Red Ha	31813 Temecula Pkwy	Temecula	7/10/08
PR0021686	Superior Auto Repair	28733 Via Montezuma	Temecula	7/22/08
PR0021761	T.V.S. Complete Auto Care	28822 Front St #107	Temecula	11/18/08
PR0035842	Taco Bell #19515	41005 Winchester Rd	Temecula	1/20/09
PR0022068	Target Stores #359	29676 Rancho Californ	Temecula	4/1/09
PR0038902	Techstar Automotive-OOB OOB	43094 Via Dos Picos #	Temecula	9/11/08
PR0037602	Temecula 76	28903 Rancho Californ	Temecula	8/15/08
PR0033197	Temecula Auto Repair & Radiator	43191 Rancho Wy	Temecula	2/3/09
PR0020215	Temecula Car Wash	29766 Rancho Californ	Temecula	3/11/09
PR0023619	Temecula Motorcycle Service	41860 Enterprise Cir S	Temecula	11/12/08
PR0020045	Temecula Print	40610 County Center I	Temecula	11/13/08
PR0023208	Temecula Quick Lube	29764 Rancho Californ	Temecula	8/27/08
PR0039110	Temecula Valley Paint	27641 Commerce Cer	Temecula	10/7/08
PR0026058	Temecula Valley School District	40516 Roripaugh Rd	Temecula	11/26/08
PR0034323	Temeku Cinema	26463 Ynez Rd	Temecula	3/4/09
PR0022798	Temeku Hills Golf Club	41687 Temeku Dr	Temecula	3/11/09
PR0034278	The Movie Experience	27531 Ynez Rd	Temecula	3/4/09
PR0019959	The Tranny Shop, Inc.	42346 Rio Nedo St #I	Temecula	10/6/08
PR0022922	Thompson's Discount Tire Center	28007 Jefferson Ave S	Temecula	10/9/08
PR0024041	Toyota of Temecula Valley	41892 Motor Car Pkwy	Temecula	2/4/09
PR0020244	Toyota Of Temecula Valley	26631 Ynez Rd	Temecula	2/4/09
PR0038675	Transmission Plus	28733 Via Montezuma	Temecula	4/14/09
PR0038910	Ultra Motorcycles-OOB OOB	42180 Sarah Wy	Temecula	9/9/08
PR0031426	Vail Lake Resort	40940 Hwy 79	Temecula	7/7/08
PR0022684	Vail Ranch Cleaners	31821 Hwy 79 #B5	Temecula	4/14/09
PR0028247	Verizon/Rancho California CO	41963 Moreno Rd	Temecula	9/29/08
PR0032079	Verizon/Redhawk CO	32505 Hwy 79	Temecula	9/29/08
PR0037090	Ynez Shell Food Mart/Car Wash	26680 Ynez Rd	Temecula	10/16/08

Total Site Visits for Temecula - 139

Wildomar

PR0038549	Arco AM/PM	36228 Hidden Springs	Wildomar	7/30/08
PR0037751	Arco AM/PM	33986 Orange St	Wildomar	3/11/09
PR0039863	Bundy Canyon Turf Supply	21400 Bundy Canyon	Wildomar	12/1/08

PR0022471	FCP, Inc	23100 Baxter Rd	Wildomar	8/20/08
PR0036117	HBPARKCO Contruction, Inc	33861 Mission Trail	Wildomar	2/25/09
PR0038869	Marc Cohen Trucking, Inc	31705 Central Ave #B	Wildomar	8/12/08
PR0019568	Round Up Liquor & Deli	20651 Palomar St	Wildomar	10/30/08
PR0035662	Seven Eleven #33595	32060 Clinton Keith R(	Wildomar	10/20/08
PR0023473	USA Station #68238	23905 Catt Rd	Wildomar	12/19/08

Total Site Visits for Wildomar - 9

TOTAL SITE VISITS: 219

Murrieta

PR0038920	Aliberto's Mexican Food	25312 Madison Ave Ste #102	Murrieta	9/23/08
PR0005098	ALTA MURRIETA ELEMENTARY SCHOOL	39475 WHITEWOOD RD	MURRIETA	11/6/08
PR0005263	ANDY'S CAFE	40469 MURRIETA HOT SPRINGS RD	MURRIETA	9/8/08
PR0008985	ANTELOPE HILLS ELEMENTARY	36105 E MURRIETA OAKS Ave	MURRIETA	10/30/08
PR0038294	Anthony's Lounge & Restorante	24630 Washington Ave #100	Murrieta	9/24/08
PR0038210	Applebee's Neighborhood Grill & Bar	24872 Madison Ave	Murrieta	1/15/09
PR0035931	AROMAS COFFEE AND FLORAL CO	29950 HUNTER RD 103	Murrieta	8/6/08
PR0004941	AVAXAT ELEMENTARY SCHOOL	24300 LAS BRISAS Rd	MURRIETA	10/30/08
PR0039759	Baja Grill	40663 Murrieta Hot Springs Rd	Murrieta	2/18/09
PR0008470	BELLA VISTA MIDDLE SCHOOL	31650 BROWNING ST	MURRIETA	12/2/08
PR0036899	Board'z Grill	39509 Los Alamos Rd D	Murrieta	8/6/08
PR0039096	Booster Juice	24635 Madison Ave	Murrieta	11/6/08
PR0007099	BUCHANAN ELEMENTARY	40121 TORREY PINES RD	MURRIETA	11/6/08
PR0009407	CARL'S JR.	28023 SCOTT RD	MURRIETA	9/10/08
PR0039593	Catch of the Day Seafood Grill	40365 Murrieta Hot Springs Rd Ste #C-14	Murrieta	1/13/09
PR0008306	CHINA PANDA	39252 WINCHESTER RD 121	MURRIETA	10/29/08
PR0007186	CHUY'S MESQUITE BROILER	25401 MADISON AVE	MURRIETA	1/15/09
PR0006906	COLE CANYON ELEMENTARY SCHOOL	23750 VIA ALISOL	MURRIETA	9/17/08
PR0039395	Cookie's Cafe	25030 Hamcock Ave Ste #104	Murrieta	1/12/09
PR0005368	DEL TACO #249	40465 ALTA MURRIETA DR	MURRIETA	8/11/08
PR0042451	Dick's Sporting Goods	40404 Murrieta Hot Springs Rd	Murrieta	5/26/09
PR0005097	E. HALE CURRAN ELEMENTARY SCHOOL	40855 CHACO CANYON RD	MURRIETA	9/17/08
PR0039450	E1-X / Mini Melts Dist	26692 Pierce Cir Ste #B	Murrieta	1/13/09
PR0006836	FRENCH VALLEY CAFE	37552 WINCHESTER RD	MURRIETA	9/8/08
PR0038837	Fresh and Easy	39530 Murrieta Hot Springs Rd	Murrieta	9/9/08
PR0003813	GOLDEN PHOENIX--OOB	25100 HANCOCK AVE 105	MURRIETA	1/12/09
PR0036179	Hole In One Donuts & Bagels	40119 Murrieta Hot Springs Rd	Murrieta	8/19/08
PR0005231	HONEYCUTT FARMS	40477 MURRIETA HOT SPRINGS RD	MURRIETA	8/12/08
PR0006460	HOT WOK CHINESE FOOD	40469 MURRIETA HOT SPRINGS RD	MURRIETA	8/12/08
PR0040078	Jack in the Box	33080 Antelope Rd	Murrieta	2/10/09
PR0037948	Juice It Up	27890 Clinton Keith Rd #G	Murrieta	7/2/08
PR0038029	KR's Chicken & Ribs	41539 Kalmia St #120	Murrieta	10/30/08
PR0038029	KR's Chicken & Ribs	41539 Kalmia St #120	Murrieta	8/4/08
PR0010409	LE PETIT CAFE	26499 JEFFERSON AVE #F	MURRIETA	10/30/08
PR0018253	Lisa J Mails Elementary School	35185 Briggs	Murrieta	11/12/08
PR0039802	Little Caesars Pizza #5955	39209 Winchester Rd Ste #103	Murrieta	1/29/09
PR0008007	MONTE VISTA ELEMENTARY SCHOOL	37420 VIA MIRA MOSA	MURRIETA	11/6/08
PR0039567	Murrieta Home Brew Emporium	38750 Sky Canyon Dr	Murrieta	12/23/08
PR0037713	Murrieta Pizza Factory--OOB	40477 Murrieta Hot Springs Rd # D3	Murrieta	9/22/08
PR0005940	MURRIETA VALLEY HIGH SCHOOL	24105 WASHINGTON AVE	MURRIETA	9/17/08
PR0005940	MURRIETA VALLEY HIGH SCHOOL	24105 WASHINGTON AVE	MURRIETA	12/3/08

PR0008932	OAK MEADOWS ELEMENTARY SCHOOL	28600 POINSETTIA ST	MURRIETA	10/30/08
PR0039917	Office Depot #2371	24500 Village Walk	Murrieta	1/23/09
PR0003746	PEONY CHINESE CUISINE	39525 LOS ALAMOS RD	MURRIETA	9/10/08
PR0040382	Pho Tho Vietnamese Restaurant	40250 Murrieta Hot Springs Rd Ste #101	Murrieta	3/17/09
PR0005099	RAIL RANCH ELEMENTARY SCHOOL	25030 VIA SANTEE Rd	MURRIETA	11/6/08
PR0039349	Rubio's Murrieta Store	40436 Murrieta Hot Springs Rd	Murrieta	11/18/08
PR0004880	SCGA MEMBERS' CLUB AT RANCHO CALIFORNIA	39500 ROBERT TRENT JONES PKWAY	MURRIETA	10/21/08
PR0039801	Scott-Murrieta Service Station LP	33070 Antelope Rd	Murrieta	1/20/09
PR0037351	SGC Sushi Japanese Restaurant	40461 Murrieta Hot Springs Rd Ste J-2	Murrieta	8/12/08
PR0006155	SHIVELA MIDDLE SCHOOL	24515 LINCOLN AVE	MURRIETA	12/3/08
PR0004907	SIDELINES SPORTS BAR & GRILL	24910 WASHINGTON AVE	MURRIETA	11/6/08
PR0004907	SIDELINES SPORTS BAR & GRILL	24910 WASHINGTON AVE	MURRIETA	6/9/09
PR0005297	SIZZLER	40489 MURRIETA HOT SPRINGS RD	MURRIETA	9/8/08
PR0038244	Smokin Joe's Pizza Deli	38365 Innovation Ct	Murrieta	9/23/08
PR0038401	Subway	31460 Murrieta Hot Springs	Murrieta	10/16/08
PR0008392	SWEET LAYERS CAKES & PASTRIES	29992 HUNTER RD 103	MURRIETA	9/10/08
PR0037917	T K's Donuts & Ice Cream	41539 Kalmia St #107	Murrieta	7/2/08
PR0009123	TACO BELL #22691	39056 WINCHESTER RD	MURRIETA	8/5/08
PR0003022	TACO BELL #5081	39557 LOS ALAMOS RD	MURRIETA	8/12/08
PR0039494	Taco's Durango	41539 Kalmia St #105	Murrieta	1/21/09
PR0007458	THAI ORCHID RESTAURANT	25359 MADISON AVE F101	MURRIETA	11/18/08
PR0035693	The Mill	24690 Washington ST	Murrieta	11/12/08
PR0006827	THOMPSON MIDDLE SCHOOL	42400 NIGHTHAWK WAY	MURRIETA	9/24/08
PR0006622	TOVASHAL ELEMENTARY SCHOOL	23801 SAINT RAPHAEL DR	MURRIETA	10/30/08
PR0039054	Truly Madly Sweetly	41539 Kalmia Ste #102	Murrieta	10/29/08
PR0040796	Unique Pizza & Subs	25383 Madison Ave	Murrieta	4/8/09
PR0008008	VISTA MURRIETA HIGH SCHOOL	28251 CLINTON KEITH RD	MURRIETA	10/30/08
PR0006973	WAL-MART #2952	41200 MURRIETA HOT SPRINGS RD	MURRIETA	7/31/08
PR0008521	WARM SPRINGS MIDDLE SCHOOL	39245 CALLE DE FORTUNA	MURRIETA	11/6/08
PR0039925	White Lime Yogurt	39540 Murrieta Hot Springs Rd	Murrieta	1/28/09
PR0039496	Xtreme Frozen Yogurt	27890 Clinton Keith Rd Ste #C	Murrieta	12/2/08

Total Site Visits for Murrieta - 72

Temecula

PR0038170	5th Ave Dog House	41958 Fifth St	Temecula	9/23/08
PR0040047	Abbott Vascular Coffee Bar	41888 Motorcar Pkwy	Temecula	3/18/09
PR0006641	ABBY REINKE ELEMENTARY SCHOOL	43799 SUNNY MEADOWS DR	TEMECULA	9/9/08
PR0009803	AIYARA THAI CUISINE	41533 MARGARITA RD	TEMECULA	1/15/09
PR0008461	ALAMOS ELEMENTARY SCHOOL	38200 PACIFIC PARK DR	TEMECULA	12/2/08
PR0037420	America's Wholesale Ice Cream--OOB	26111 Ynez Rd #B-2	Temecula	8/13/08
PR0005113	ARBY'S	27702 JEFFERSON AVE	TEMECULA	1/14/09
PR0041041	Arco Am/Pm	27691 Ynez Rd	Temecula	5/7/09
PR0009924	BASKIN ROBBINS--OOB	31891 RANCHO CALIFORNIA RD 300	TEMECULA	7/9/08

PR0009739	BJ'S RESTAURANT	26500 YNEZ RD	TEMECULA	10/30/08
PR0038295	Bob's Big Boy	27313 Jefferson Ave	Temecula	7/28/08
PR0006844	BURGER KING	40520 WINCHESTER RD	TEMECULA	10/28/08
PR0037985	California Tea & Coffee Brewery	40315 Winchester Rd #A	Temecula	7/25/08
PR0039873	Chevron Extra Mile Station	28900 Rancho California	Temecula	1/7/09
PR0003876	CHEVRON FOOD MART	40635 WINCHESTER RD	TEMECULA	10/29/08
PR0003819	CHILIS GRILL & BAR	27645 YNEZ RD	TEMECULA	2/3/09
PR0008546	CHIPOTLE MEXICAN GRILL	40573 MARGARITA RD E	TEMECULA	10/29/08
PR0039845	Chronic Tacos	27523 Ynez Rd	Temecula	4/21/09
PR0008988	CROWNE HILL ELEMENTARY SCHOOL	33535 OLD KENT RD	TEMECULA	10/2/08
PR0037683	Daly's Frozen--OOB	28480 Old Town Front St D	Temecula	7/2/08
PR0004452	DEL TACO #395	27445 JEFFERSON AVE	TEMECULA	1/14/09
PR0009095	DEL TACO #763	30607 HWY 79 S	TEMECULA	7/11/08
PR0006832	DEL TACO #835	40375 WINCHESTER RD	TEMECULA	10/22/08
PR0003353	DENNY'S #1947--OOB	28915 RANCHO CALIFORNIA RD	TEMECULA	1/13/09
PR0004958	EL POLLO LOCO #3337	27375 JEFFERSON AVE	TEMECULA	1/13/09
PR0009263	EL TORITO RESTAURANT	40517 MARGARITA RD	TEMECULA	10/29/08
PR0007981	ERLE STANLEY GARDNER MIDDLE SCHOOL	45125 VIA DEL CORONADO	TEMECULA	12/4/08
PR0040336	ET's Lounge	27423 Jefferson Ave	Temecula	5/15/09
PR0040335	Filipinoy Asian Market	31141 Temecula Pkwy Ste #4	Temecula	3/17/09
PR0005982	FISH HOUSE VERA CRUZ	26700 YNEZ RD	TEMECULA	10/30/08
PR0039364	Fresh & Easy	44060 Margarita Rd	Temecula	1/29/09
PR0037918	Giant New York Pizza Co--OOB	27371 Jefferson Ave #S	Temecula	8/12/08
PR0040076	Goldilocks Bakery and Restaurant	27480 YNEZ Rd STE #O-1	Temecula	3/18/09
PR0040302	Great Harvest Bread Co	31795 Rancho California Rd	Temecula	3/16/09
PR0008455	GREAT OAKS HIGH SCHOOL-SNACK BAR-200	32555 DEER HOLLOW WAY	TEMECULA	11/20/08
PR0006599	HELEN HUNT JACKSON ELEMENTARY SCHOOL	32400 CAMINO SAN DIMAS	TEMECULA	11/20/08
PR0004613	JACK IN THE BOX #48--OOB	27410 JEFFERSON AVE	TEMECULA	11/18/08
PR0006600	JAMES L. DAY MIDDLE SCHOOL	40775 CAMINO CAMPOS VERDE	TEMECULA	9/30/08
PR0038147	Juice It Up! Village Walk	39848 Winchester Rd #8	Temecula	8/6/08
PR0004774	LA CASITA NUEVA	27645 JEFFERSON AVE	TEMECULA	10/30/08
PR0039803	Little Caesars Pizza #5956	44066 Margarita Rd Ste # 4	Temecula	2/2/09
PR0040692	Lucille's Smokehouse BBQ	40748 Winchester Rd	Temecula	5/12/09
PR0003340	MAD MADELINES	28495 FRONT ST	TEMECULA	10/22/08
PR0040512	Mangoz Ultimate Frozen Yogurt	40573 Margarita Rd #B	Temecula	4/8/09
PR0004940	MARGARITA MIDDLE SCHOOL	30600 MARGARITA RD	TEMECULA	12/2/08
PR0038283	Mariscos El Cuete	32459 Temecula Pkwy # D-107	Temecula	9/15/08
PR0004646	MCDONALD'S	28100 Jefferson Ave	TEMECULA	11/13/08
PR0036852	Meritage At Callaway	32720 Rancho California Rd	Temecula	7/1/08
PR0039100	Mr Shish Restaurant	28120 Jefferson Ave Ste #A101	Temecula	1/14/09
PR0010311	MR YOU EXPRESS	31795 RANCHO CALIFORNIA RD 100	TEMECULA	7/9/08
PR0005274	NICHOLAS VALLEY ELEMENTARY SCHOOL	39600 N GENERAL KEARNY Rd	TEMECULA	12/2/08

PR0038558	Noodles Of The World	32965 Temecula Parkway	Temecula	11/4/08
PR0040841	Noodles Of The World	30590 Rancho California Rd Ste C303	Temecula	4/29/09
PR0038206	Oak Mountain Winery	36522 Via Verde	Temecula	12/4/08
PR0040389	P F Chang's China Bistro	40762 Winchester Rd #400	Temecula	4/6/09
PR0006303	PALOMA ELEMENTARY SCHOOL	42940 VIA RAMI	TEMECULA	10/2/08
PR0039592	Pami Kabob House	41257 Margarita Rd Ste #B101	Temecula	1/30/09
PR0041437	Papa Paul's Restaurant	27470 Commerce Center Dr	Temecula	5/7/09
PR0036982	Papa Paul's Restaurant--OOB	27535 Jefferson Ave	Temecula	9/30/08
PR0006451	PAUBA VALLEY ELEMENTARY	33215 REGINA DR	TEMECULA	9/9/08
PR0038827	Pizza Fusion	40695 Winchester Rd Ste #C1	Temecula	11/18/08
PR0004752	RANCHO ELEMENTARY SCHOOL	31530 LA SERENA WAY	TEMECULA	10/2/08
PR0042480	Rancho Fruit Market	28670 Old Town Front St	Temecula	5/29/09
PR0005482	RED HAWK ELEMENTARY SCHOOL	32045 CAMINO SAN JOSE	TEMECULA	11/20/08
PR0042402	Ruby Tuesday 6201	41785 Nicole Ln	Temecula	5/29/09
PR0006947	SAIGON NOODLE HOUSE	27523 JEFFERSON AVE	TEMECULA	11/7/08
PR0005051	SERRANO'S FRESCO GRILL	27315 JEFFERSON AVE	TEMECULA	11/4/08
PR0039862	Shakey's Pizza Parlor	26479 Ynez Rd Ste #C	Temecula	1/9/09
PR0039442	South Coast Winery- Snack Bar	34843 Rancho California Rd	Temecula	12/4/08
PR0004938	SPARKMAN ELEMENTARY SCHOOL	32225 PIO PICO Rd	TEMECULA	9/9/08
PR0038150	Starbucks Coffee #14486	39848 Winchester Rd	Temecula	8/6/08
PR0004571	SUSHI HOUSE ONE +	27725 JEFFERSON AVE -104	TEMECULA	11/7/08
PR0042625	Sweet Lumpy's BBQ	41915 3rd St	Temecula	6/26/09
PR0006712	T.G.I. FRIDAY'S	40830 WINCHESTER RD	TEMECULA	11/4/08
PR0005657	TACO BELL #19515	41005 WINCHESTER RD	TEMECULA	10/29/08
PR0039913	Tacos El Gordo	27590 Jefferson Ave	Temecula	2/11/09
PR0040196	Taqueria Los Campeones	41925 Motorcar Pkwy	Temecula	2/25/09
PR0039552	Tastee Tacos	43049 Margarita Rd Ste #A103	Temecula	12/4/08
PR0005100	TEMECULA ELEMENTARY SCHOOL	41951 MORAGA RD	TEMECULA	9/30/08
PR0038721	Temecula Luiseno Elementary	45754 N Wolf Creek Dr	Temecula	12/4/08
PR0004324	TEMECULA MIDDLE SCHOOL	42075 MEADOWS PKWY	TEMECULA	10/2/08
PR0038973	Temecula Valley Elks #2801	28061 Diaz	Temecula	10/2/08
PR0004647	TEMECULA VALLEY HIGH SCHOOL	31555 RANCHO VISTA RD	TEMECULA	10/7/08
PR0005109	TEMECULA VALLEY HS CAMPUS SNACK BAR	31350 RANCHO VISTA RD	TEMECULA	10/7/08
PR0038928	The Blue Peacock	27536 Ynez Rd	Temecula	11/10/08
PR0008089	THE FORGE	42170 SARAH WAY B	TEMECULA	11/12/08
PR0042166	The Gambling Cowboy Chophouse &	42072 Fifth St #303	Temecula	5/22/09
PR0038044	The Melting Pot	39738 Winchester Rd	Temecula	8/7/08
PR0038492	The Public House	41971 Main St	Temecula	9/23/08
PR0005283	THE SWEET BEAN	30590 RANCHO CALIFORNIA RD	TEMECULA	7/9/08
PR0009441	TOBIN ELEMENTARY SCHOOL	45200 MORGAN HILL DR	TEMECULA	9/9/08
PR0004325	VAIL ELEMENTARY SCHOOL	29915 MIRA LOMA DR	TEMECULA	10/7/08
PR0006410	VAIL RANCH MIDDLE SCHOOL	33340 CAMINO PIEDRA ROJO	TEMECULA	9/9/08

PR0042400	Vesuvio Brick Fired Pizza	27371 Jefferson Ave Ste #S	Temecula	5/21/09
PR0004803	VINCE'S SPAGHETTI EXPRESS	28145 JEFFERSON	TEMECULA	11/13/08
PR0005658	VINTAGE HILLS ELEMENTARY SCHOOL	42240 CAMINO ROMO	TEMECULA	10/7/08
PR0039145	Virginia Barbeque	30571 Temecula Pkwy Ste #C	Temecula	11/4/08
PR0010329	WENDI DONUTS	31867 RANCHO CALIFORNIA RD	TEMECULA	7/9/08
PR0042407	Whimsical Yogurt & Gelato	40756 Winchester Rd	Temecula	5/29/09
PR0042403	White Lime	30630 Rancho California Rd Ste #503	Temecula	6/29/09
PR0040724	Williams Sonoma #795	40764 Winchester Rd Ste #560	Temecula	4/9/09
PR0007606	WILSON CREEK WINERY	35960 RANCHO CALIFORNIA RD	TEMECULA	11/4/08
PR0039329	Wilson Creek Winery Restaurant	35960 Rancho California Rd	Temecula	11/4/08
PR0040666	Yard House	40770 Winchester Rd Ste #750	Temecula	4/9/09
PR0039903	Yogurt Island	32240 Temecula Pkwy Ste #B106	Temecula	2/4/09
PR0042465	Yogurt Point	29073 Overland Dr Ste #J	Temecula	5/29/09
PR0037977	Zarka Cigar Lounge	28120 Jefferson Ave Ste# B202	Temecula	7/2/08

Total Site Visits for Temecula - 107

WILDOMAR

PR0006301	BROWN MIDDLE SCHOOL	21861 GRAND AVE	WILDOMAR	10/27/08
PR0040457	Checkerboard Deli	36068 Hidden Springs Ste #B	Wildomar	4/7/09
PR0039673	Denny's #7830	23857 Clinton Keith Rd	Wildomar	1/21/09
PR0038509	La Cresta Mexican Grill	23865 Clinton Keith Rd #2	Wildomar	9/30/08
PR0038514	Panda Express	23861 Clinton Keith Rd Ste 1	Wildomar	9/30/08
PR0009047	RONALD REAGAN ELEMENTARY SCHOOL	35445 PORRAS RD	WILDOMAR	10/27/08
PR0004333	WILDOMAR ELEMENTARY SCHOOL	21575 PALOMAR ST	WILDOMAR	10/27/08
PR0009379	WILLIAM COLLIER ELEMENTARY SCHOOL	20150 MAYHALL DR	WILDOMAR	10/29/08

Total Site Visits for WILDOMAR - 8

TOTAL SITE VISITS: 187

WASTE MANAGEMENT DEPARTMENT-
HOUSEHOLD HAZARDOUS WASTE

PRESS RELEASE

RIVERSIDE COUNTY
WASTE MANAGEMENT DEPARTMENT

Diane Christensen
Program Administrator
(951) 486-3282

September 28, 2009

Riverside County Regional Permanent Household Hazardous Waste Collection Facility Opens in Palm Springs

A new hazardous waste facility will open July 11 in Palm Springs. The facility will replace the previous facility on Alejo Road, which closed permanently June 27.

The new facility on 1100 Vella Road, across from Demuth Park, will accept drop-offs starting 7 a.m. This new site will be open to the public on Saturdays from 7 a.m. to noon through September. Operational hours from October through May are from 9 a.m. to 2 p.m. The hazardous waste facility will close on holidays or due to inclement weather.

Most residential hazardous waste will be accepted at the new location, including electronic waste. Hazardous waste collection is a free service provided to Riverside County residents. State law requires the safe disposal of used motor oil, flammable liquids, paint, antifreeze, household and automotive batteries, pesticides, cleaning products, fluorescent lamps and properly packaged and labeled sharps such as needles syringes or lancets. Televisions, computers, VCRs and telephones are also accepted. Flammable liquids are accepted, but containers, such as gasoline cans, will not be returned.

The new facility is a partnership between the county Waste Management Department and the City of Palm Springs. While the facility is available for the safe disposal of hazardous waste, residents are encouraged to use up their hazardous products whenever possible to help keep down the costs of the free service.

Residents are limited to transporting no more than five gallons or 50 pounds of hazardous waste per trip, but multiple trips are allowed. The facility will not accept appliances, explosives, radioactive waste, ammunition, asbestos, compressed gas cylinders over 40 pounds, and infectious or medical waste other than sharps. Waste is not accepted from business or non-profits.

For more information or questions, call (951) 486-3200 or (800) 304-2226

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Riverside County Waste Management Department
Household Hazardous Waste Collection Program
FY 2008/2009 Activities in
Santa Margarita Watershed

Location	Service Dates	Number of Service Days in FY 2008/2009	Contractor Cost	Total Vehicles	Batteries (Auto) (lbs) 45#/unit	Nicad/ Lithium Batteries (lbs)	Waste Oil (lbs) 8.5 lb/gal	Anti-Freeze (lbs) 8.5 lb/gal	Latex Paint (lbs) 10 lb/gal	Oil Filters (lbs)	Alkaline Batteries (lbs)	Mercury (lbs)	Propane (lbs)	Paint Related (lbs)	Fluor. Tubes (lbs) 0.2 lbs/linear foot	Flam. Solid/Liq (lbs)	Reuse (lbs)	Poison (lbs)	Acid (lbs)	Base (lbs)	Oxidizer (lbs)	Other (lbs)	Aerosols (lbs)	Asbestos (lbs)	Sharps (lbs)	CRTs (lbs)	Misc E-waste (lbs)	Total Pounds Shipped
Murrieta ABOP HHW Collection Facility																												
	All non-holiday Saturdays	44	$ 37,029	1,927	9,810	221	25,160	3,528	51,655	1,264	797	0	0	657	0	511	0	0	0	0	0	1,200	0	0	0	0	0	94,803
Temporary HHW Collection Facility (THHWCF) Events																												
Aguanga	10/18/2008	1	$ 750	11	69	0	850	34	0	0	15	0	180	694	4	167	0	0	0	0	0	0	18	0	0	60	20	2,111
Aguanga	5/30/2009	1	$ 900	12	255	0	425	0	250	4	10	0	6	0	11	0	0	72	18	0	8	0	26	0	7	26	520	1,638
Subtotal		2	$ 1,650	23	324	0	1,275	34	250	4	25	0	186	694	15	167	0	72	18	0	8	0	44	0	7	86	540	3,749
Anza	9/27/2008	1	$ 5,336	67	407	0	2,635	128	1,200	85	31	0	190	862	0	1,854	20	471	361	130	12	659	133	0	53	40	20	9,291
Anza	12/20/2008	1	$ 1,650	24	90	0	850	0	500	14	7	0	0	340	0	551	0	213	9	0	0	0	11	0	0	780	160	3,525
Anza	3/28/2009	1	$ 4,575	62	642	16	2,848	0	700	41	70	0	226	773	23	904	2	215	9	46	9	33	88	0	0	0	280	6,925
Subtotal		3	$ 11,561	153	1,139	16	6,333	128	2,400	140	108	0	416	1,975	23	3,309	22	899	379	176	21	692	232	0	53	820	460	19,741
Pinyon Pines	11/15/2008	1	$ 1,725	28	759	27	638	26	650	38	38	0	5	201	11	0	0	136	0	0	0	309	16	0	0	1,420	600	4,874
Pinyon Pines	5/16/2009	1	$ 2,025	30	203	10	680	255	400	31	16	0	27	473	16	220	0	285	0	0	0	16	28	0	15	360	200	3,235
Subtotal		2	$ 3,750	58	962	37	1,318	281	1,050	69	54	0	32	674	27	220	0	421	0	0	0	325	44	0	15	1,780	800	8,109
Temecula	9/13/2008	1	$ 26,519	382	2,233	90	1,488	340	5,250	15	430	5	1,751	3,173	162	3,462	0	547	136	326	18	36	486	0	114	6,680	4,100	30,842
Temecula	1/31/2009	1	$ 34,875	495	1,448	194	1,488	425	9,000	55	645	6	775	3,338	203	4,447	2	583	245	224	51	185	800	0	166	6,460	4,560	35,300
Temecula	5/9/2009	1	$ 18,750	261	923	56	1,275	340	3,700	13	256	6	159	2,170	49	2,577	0	191	113	268	18	106	351	0	132	1,760	1,900	16,363
Subtotal		3	$ 80,144	1,138	4,604	340	4,250	1,105	17,950	83	1,331	17	2,685	8,681	414	10,486	2	1,321	494	818	87	327	1,637	0	412	14,900	10,560	82,504
TOTAL THHWCF		10	97,105	1,372	7,029	393	13,176	1,548	21,650	296	1,518	17	3,319	12,024	479	14,182	24	2,713	891	994	116	1,344	1,957	0	487	17,586	12,360	114,103
TOTAL AMOUNTS FROM ALL HHW FACILITY TYPES IN SANTA MARGARITA WATERSHED																												
		54	$ 134,134	3,299	16,839	614	38,336	5,076	73,305	1,560	2,315	17	3,319	12,681	479	14,693	24	2,713	891	994	116	2,544	1,957	0	487	17,586	12,360	208,906

Household Hazardous Waste Schedule

ALL SITES ARE OPEN FROM 9:00 am to 2:00 pm
CLOSED: During Inclement Weather or other Hazardous Conditions
Facilities are closed on Holiday Weekends unless otherwise scheduled
Maximum Chemical Load: 5 gallons or 50 lbs. (per trip)
July - December 2008

Date	Location
07/05/08	HOLIDAY CLOSURE
07/12/08	Lake Elsinore
07/12/08	Pedley
07/19/08	Pedley
07/26/08	Pedley
08/02/08	Lake Elsinore
08/02/08	Pedley
08/09/08	Pedley
08/16/08	Pedley
08/23/08	Pedley
08/30/08	HOLIDAY CLOSURE
09/06/08	Lake Elsinore
09/06/08	Pedley
09/06/08	Riverside
09/13/08	Pedley
09/13/08	Temecula
09/19/08	Corona
09/20/08	Corona
09/20/08	Pedley
09/27/08	Anza
09/27/08	La Quinta
09/27/08	Pedley

Date	Location
10/04/08	Agua Mansa
10/04/08	Lake Elsinore
10/04/08	Norco
10/04/08	Oasis
10/10/08	Moreno Valley
10/11/08	Moreno Valley
10/11/08	Agua Mansa
10/18/08	Agua Mansa
10/18/08	Aguanga
10/18/08	Blythe
10/24/08	Palm Springs
10/25/08	Palm Springs
10/25/08	Agua Mansa
10/31/08	Cathedral City
11/01/08	Cathedral city
11/01/08	Agua Mansa
11/01/08	Lake Elsinore
11/08/08	Agua Mansa
11/15/08	Agua Mansa
11/15/08	Banning
11/15/08	Pinyon Pines
11/21/08	Hemet
11/22/08	Hemet

Date	Location
11/22/08	Agua Mansa
11/29/08	HOLIDAY CLOSURE
12/5/08	Corona
12/6/08	Corona
12/6/08	Agua Mansa
12/13/08	Agua Mansa
12/13/08	Indio
12/20/08	Agua Mansa
12/20/08	Anza
12/27/08	HOLIDAY CLOSURE

Holiday Closure Dates

July 5, 2008
August 30, 2008
November 29, 2008
December 27, 2008

Changing Oil Too Often?

Review your owner's manual for manufacturer's suggested oil change frequency!

RECYCLE USED OIL

RECYCLE USED OIL FILTERS

Zero Waste - You Make It Happen!

Funded by a Grant from the California Integrated Waste Management Board.

Additional Hazardous Waste Services Available in the following Cities:

Indian Wells
760-346-2489 x227

Palm Springs
Rancho Mirage
1-800-449-7587

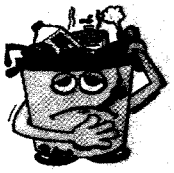

Household Hazardous Waste Collection Program
July thru December 2008
What is Household Hazardous Waste?
All The Items Listed Below And More!

Household Hazardous Waste Collection Sites will take ALL Household Hazardous Waste

Before transporting waste to the collection event or facility, please use this checklist to make sure you have done the following:

- ☐ Have I used up every product to the fullest extent possible?
- ☐ Have I offered good, usable products I can't use to my neighbor, family or friends?
- ☐ Have I kept the amount of chemical waste to less than 5 gallons or 50 pounds for transportation? (State Law maximum transportation limitation.)
- ☐ Are any of the containers leaking? (If they are, place them in a container or material that will not allow the leak to spread and place securely in the vehicle for safe transport.)
- ☐ Is the waste in its original container or is it properly labeled as to the contents? (The contents of the container must be the same as stated on the label. If not, cover up the label and write the name of its content.)
- ☐ Are the items placed in a sturdy container, such as cardboard or wooden box, for transporting? (Wrap glass bottles in newspaper to prevent breakage.) Containers with flammable liquid will not be returned.
- ☐ Is the box placed in the trunk of your car or in the bed of your pickup truck and secured to prevent movement? (Keep items away from passengers.)

Follow directions once you reach the event site. You will be asked to turn off your motor and stay in your vehicle. The site staff will unload the material from your vehicle.

THIS EVENT IS FOR RESIDENTIAL USE ONLY. PHOTO DOCUMENTATION WILL BE MADE OF EXCESSIVE OR SUSPECTED NON-RESIDENTIAL LOADS COMING TO EVENT.

The following waste CANNOT be accepted at ANY Riverside County HHW collection facility:
Ammunition, Appliances, Asbestos or other Remediation Waste, Compressed Gas Cylinders greater than 40 pounds Explosives, Infectious or Medical Waste other than Home-Generated Sharps, Radioactive Waste, Non-Residentially Generated Waste, Waste Generated Outside of Riverside County.

If you have any of the above wastes please call (951) 486-3200 for assistance.

ACCEPTABLE MATERIALS

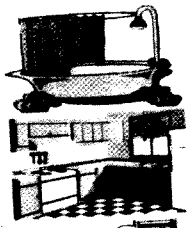

BATHROOM
*Chlorine Bleach
*Nail Polish Remover
*Deodorizer/Air Freshener
*Shoe Dye
*Disinfectant
*Toilet, Tub & Tile Cleaner
*Mercury Devices
*Hair Dye

KITCHEN
*Aerosol Cans
*Floor Care Products
*Aluminum Cleaner
*Furniture Polish
*Ammonia
*Oven Cleaner
*Drain Opener
*Microwave Oven

WORKSHOP & HOBBY
*Caulking
*Paint Stripper
*Wood Preservative
*Gun Cleaner
*Paint Thinner/Turpentine
*Glue
*Fiberglass & Epoxy Resins
*Photo Chemicals
*Roof Coating
*Paint Latex/Oil Based
*Varnish
*Hobby Chemicals

GARDENING
*Fertilizer
*Slug and Snail Poison
*Fungicide
*Weed Killer/Herbicides
*Insecticides/Pesticides
*Rodent Bait/Poison
*Aerosol Insecticides
*BBQ Propane Tanks

GARAGE
*Antifreeze
*Engine Degreaser
*Transmission & Brake Fluid
*Auto Batteries
*Gas, Diesel Fuel
*Fluorescent Tubes/Bulbs
*Carburetor Cleaner
*Motor Oil
*Old TV's & Computers
*Chrome Polish
*Oil Filters
*Rodent Poison

MISCELLANEOUS
*Artist's Paints
*Kerosene/Lamp Oil
*Rug Cleaner
*Camp Propane Tanks
*Lighter Fluid
*Sharps/Needles
*All Batteries
*Moth Balls/Flakes
*Spot Remover w/Solvent
*Flea Powder
*Pool/Spa Chemicals
*Electronic Devices

Household Hazardous Waste Information (800) 304-2226 or www.rivcowm.org

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Household Hazardous Waste Collection Locations

Permanent Sites
(All Hazardous Waste Types)

Agua Mansa Area (HHW)
FACILITY OPENS - October 4, 2008
Agua Mansa HHW Facility
1780 Agua Mansa Rd. (92509)
TB 866 E4 (cross Market St.)
Open Non Holiday Saturdays.
9:00 AM to 2:00 PM

Lake Elsinore Area (HHW)
City Maintenance Facility
521 N. Langstaff St. (92530)
TB 866 E4 (cross Sumner)
Open 1st Saturday each month except
January, September, and December
9:00 AM to 2:00 PM

Pedley Area (HHW)
FACILITY CLOSURE - end of September 2008
County Road Yard
6851 Van Buren Blvd.(92503)
TB 684 E6 (at Clay St.)
NON-Holiday Saturdays.
9:00 AM to 2:00 PM

Palm Desert Area (HHW)
(Open to Palm Desert Residents ONLY)
41-800 Corporate Way (92260)
Behind Post Office on Hovley Lane
TB 818 H5 (between Portola & Cook)
NON-Holiday Saturdays.
9:00 AM to 1:00 PM
(760) 340-2113

Temporary Event Locations
(See Schedule for Dates &Times)

Aguanga Area
Cottonwood Fire Station
44222 Sage Rd. (92536)
TB 981 J4 (cross North of Hwy 79)

Anza Area
Anza Transfer Station
40329 Terwilliger Rd. (92539)
TB 965 E3 (cross South Of Hwy 371)

Banning Area
Repplier Park
789 N. San Gorgonio Ave. (92220)
TB 722 B2 (cross Wilson St.)

Blythe Area
County Administration Center
260 N. Broadway St. (92225)
TB 5491 E6 (cross Murphy St.)

Cathedral City Area
Vacant lot near City Hall
East of City Hall on Buddy Rogers Ave.
TB 787 E7 (cross Van Fleet & Buddy Rogers)

Corona Area
City Corporate Yard
760 Corporation Yard Way (92880)
TB 743 C4 (cross Cota St.)

Hemet Area
County Road Yard
595 N. Juanita St. (92543)
TB 811 A6 (cross Oakland Ave.)

Indio Area
Date Festival Fairgrounds
46-350 Arabia St. (Gate #6) (92201)
TB 5470 F2 (cross Dr. Carreon Blvd.)

La Quinta Area
Parking Lot next to Fritz Burns Park
South Side of Ave. 52 (92253)
TB 849 F7 (cross Desert Club Dr.)

Moreno Valley Area
City Maintenance Facility
15670 Perris Blvd. (92251)
TB 747 G2 (cross N. of Iris Ave.)

Norco Area
Norco Community Center
3900 Acacia Ave. (92860)
TB 713 E3 (cross Taft at Hamner Ave.)

Oasis Area
Oasis Landfill
84-505 84th Avenue (92274)
TB 5772 H3 (cross Hwy 86)

Palm Springs Area
Fire Department Training Center
3000 E. Alejo Rd. (92262)
TB 786 H1 (cross Civic Dr.)

Pinyon Pines Area
Pinon Flats Transfer Station
TB 907 H7 See Page 906 (cross South End of Pinon Flats Road)

Riverside Area
City Corporate Yard
8095 Lincoln Ave. (92504)
TB 715 D5 (cross St. Lawrence St.)

Temecula Area
City Public Works Parking Lot
43200 Business Park Dr. (92590)
TB 958 G6 (across from City Hall)

All sites will accommodate multiple trips if storage capacity allows
COLLECTION SITES MAY BE CLOSED DURING INCLEMENT WEATHER

TB = Thomas Bros. Guide

ABOP Centers

Antifreeze, Batteries, Oil (and Filters), and Paint (Latex) ONLY
Collection Center
SATURDAY 9:00 am to 2:00 pm (see details for each)
LIMIT: 5 gallons or 50 lbs. (per trip)
CLOSED: During inclement weather and hazardous conditions.

RECYCLE USED OIL

HOLIDAY CLOSURE DATES:
07/05/08, 08/30/08, 11/29/08, 12/27/08

RECYCLE USED OIL FILTERS

Accepting: Cooking Oil

Murrieta Area
County Road Yard
25315 Jefferson Ave. (92562)
TB 928 C6 (cross Murrieta Hot Springs Rd.)
NON-Holiday Saturdays
9:00 AM to 2:00 PM.

Palm Springs Area
Fire Department Training Center
3000 E. Alejo Rd. (92262)
TB 786 H1 (cross Civic Dr.)
NON-Holiday Saturdays. Oct - May 9:00 AM to 2:00 PM
NON-Holiday Saturdays. Jun - Sept 7:00 AM to 12:00 PM

Proper Disposal of Medication and Sharps

Most medications are not considered hazardous waste and can be disposed of in regular trash.
Remove personal information from containers before disposal.

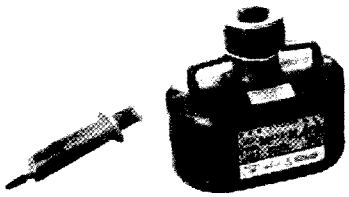

Liquid.....Empty liquid medication onto absorbent paper towels or rags and throw IN TRASH.

Pill.....Crush pills, mix with coffee grounds or kitty litter, and dispose of mixture IN TRASH.

Inhaler.....Empty container, expel propellant, and toss empty cylinder IN TRASH.

Sharps/Needles.....Must be placed in a secure approved sharps container and brought to a Household Hazardous Waste collection for disposal. FREE Approved containers are available while supply lasts. If a container is not available, put sharps in rigid plastic jug (bleach bottle), tighten lid, secure with tape, and place label "SHARPS/NEEDLES".
ALWAYS BRING SHARPS TO HHW PERMANENT FACILITY OR TEMPORARY EVENT.

Small Business Hazardous & Universal Waste

Conditional Exempt Small Quantity Generator (CESQG) **1-800-952-5566**

What is a CESQG? Businesses that generate up to 27 gallons or 220 lbs. of hazardous waste, or 2.2 lbs of extremely hazardous waste per month are called CESQG's. These businesses are required to use a licensed hazardous waste hauler to manifest and transport their waste. The most common CESQG's are painters, print shops, auto shops, builders, churches, schools, non-profit groups and property managers.

What is the CESQG Program? This Program is a hazardous waste pick-up disposal service for eligible businesses/non-profit organizations in the County of Riverside. This Program provides small quantity generators with a legal and affordable way to dispose of their waste with all legal documentation provided as part of the service.

How do I get service? To arrange an appointment for the **CESQG** Program, call **1-800-952-5566.**
A disposal fee will be charged based on the type and amount of waste picked-up.

Storm Water Pollution Prevention - ONLY RAIN DOWN THE STORM DRAIN

What is the #1 reason water bodies such as creeks, rivers, and lakes get dirty? It's from pollutants that flow into storm drains then make their way to your favorite water recreational facility. The storm drain system is designed to prevent flooding and is not connected to a treatment facility.

Call **1-800-506-2555** to report storm drain disposal or obtain more information.
You can also email us at **flood.fcndes@co.riverside.ca.us** or visit **www.floodcontrol.co.riverside.ca.us**

Recycle. It's in your hands.

bottlesandcans.com

Permanent Household Hazardous Waste Collection Facilities

Limit: 5 gallons or 50 lbs of chemical waste (per trip)

CLOSED on Holiday weekends and during inclement weather

Agua Mansa
1780 Agua Mansa Rd.
Riverside, CA 92509
Open: Saturdays
9:00 AM to 2:00 PM

Lake Elsinore
521 N. Langstaff St.
Lake Elsinore, CA 92530
Open: First Saturday of the month (except January & December)
9:00 AM to 2:00 PM

Palm Desert
(Palm Desert Residents only)
41800 Corporate Way
Palm Desert, CA 92260
Open: Saturdays -
9:00 AM to 1:00 PM
(760) 340-2113

Palm Springs Opening Late April
1100 Vella Road
Palm Springs, CA 92264
Open: Saturdays
Oct - May 9:00 AM to 2:00 PM
Jun - Sept 7:00 AM to 12:00 PM

Antifreeze, Batteries, Oil *(and filters)*, and Paint *(Latex)* ONLY Collection Centers

Limit: 5 gallons or 50 lbs of chemical waste (per trip)

CLOSED on Holiday weekends and during inclement weather

Cathedral City Area
Edom Hill Transfer Station
70-100 Edom Hill Rd.
Cathedral City, CA 92235
Open: Non-Holiday Saturdays
8:00 AM to 4:30 PM
(760) 340-2113

Coachella Valley Area
Coachella Valley Transfer Station
87-011A Landfill Road
Coachella Valley, CA 92236
Open: Mon-Friday, 8:00 AM to 5:00 PM, and Saturday 8:00 AM to Noon
(760) 863-4094

Murrieta Area
County Road Yard
25315 Jefferson Ave.
Murrieta, CA 92562
Open: NON-Holiday Saturdays
9:00 AM to 2:00 PM

Palm Springs Area
Fire Department Training Center
3000 E. Alejo Rd.
Palm Springs, CA 92262
Open: NON-Holiday Saturdays
Oct - May: 9:00 AM to 2:00 PM
Jun - Sept: 7:00 AM to 12:00 PM

Proper Disposal of Medication and Sharps

- Most medications are not considered hazardous waste and can be disposed of in regular trash.
- No Drugs Down the Drain. Do not flush unused medications down the toilet.
- Remove personal information from containers before disposal.
- Sharps and needles should be taken to a household hazardous waste facility or event.

LIQUID & PILLS Empty medication into coffee grounds or kitty litter and dispose with regular TRASH.

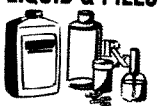

INHALER Empty container by expelling propellant and dispose of cylinder in regular TRASH.

SHARPS/ NEEDLES **Always bring Sharps to a HHW Facility or Temporary Collection** Sharps must be placed and secured in an approved sharps disposal container and brought to a Household Hazardous Waste collection for disposal. FREE Approved containers are available at HHW events - while supply lasts.

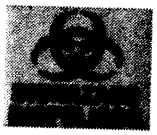

Make your own container from a non-food rigid plastic sealable jug. For instructions and FREE Biohazard Labels: 951-486-3200 or http://www.rivcowm.org/hhw/medications.html
Contact your Local City Hall for additional Sharps collection programs.

For more information:
(951) 486-3200 or http://www.rivcowm.org/hhw/medications.html

Riverside County Backyard Composting Program

Free Workshop Schedule

Saturdays 10:00 am

Date	*Area*	*Location*
April 25	Palm Desert	San Nicholas Garden
May 9	Riverside	Landscapes So Cal Style Garden
May 30	Idyllwild	Town Hall
June 20	Jurupa	Jurupa Cultural Center
June 27	Hemet	Hemet Public Library
July 11	Wildomar	Mission Trail Library
July 18	Banning	Banning Community Center
July 25	Temecula	Grace Mellman Community Ctr.
August 8	Perris	Perris Public Library
August 15	Norco	Norco Public Library
September 19	Hemet	Hemet Public Library
October 17	Jurupa	Jurupa Cultural Center
October 24	Palm Springs	Mizell Senior Center
October 31	Temecula	Grace Mellman Community Ctr.
November 7	Riverside	Landscapes So Cal Style Garden
November 21	Cathedral City	Cathedral City Public Library

Low Cost Compost Bins

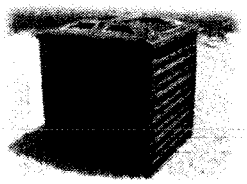

Volunteers needed to become Master Composters
Training Class to begin in August 2009

For more information:
(951) 486-3200 *or*
http://www.rivcowm.org/composting/compost_in_rc.html

What Is Household Hazardous Waste?

Many products used in our home contain hazardous materials. Your home and garage may seem safe, but look again. To know whether or not a product is hazardous, check the label. **Unwanted products labeled Corrosive, Flammable, or Toxic warn of potential hazards** if the chemical product is misused, spilled or disposed of improperly. Typical products found throughout the house that may be hazardous are as follows:

Last year, more than 21,000 residents have properly disposed of over 1,965,000 pounds of Household Hazardous Waste. Thank you for participating in this valuable Riverside County Program.

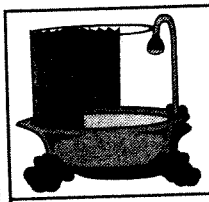

BATHROOM

- Chlorine Bleach
- Deodorizer/ Air Freshener
- Disinfectant
- Nail Polish Remover
- Shoe Dye
- Mercury Thermometer
- Toilet, Tub & Tile Cleaner

GARDENING

- Fertilizer
- Fungicide
- Insecticides
- Pesticides
- Moss Killer
- Slug And Snail Poison
- Weed Killer/Herbicides

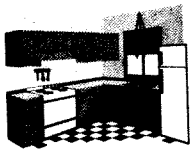

KITCHEN

- Microwave Oven
- Aerosol Cans
- Aluminum Cleaner
- Ammonia
- Drain Opener
- Floor Care Products
- Furniture Polish
- Oven Cleaner
- Rodent Poison

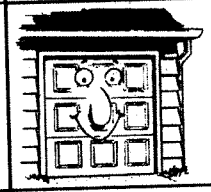

GARAGE

- Antifreeze
- Auto Batteries
- Transmission & Brake Fluid
- Carburetor Cleaner
- Chrome Polish
- Gas, Diesel Fuel
- Engine Degreaser
- Motor Oil
- Oil Filters

WORKSHOP

- Fiberglass & Epoxy Resins
- Glue
- Gun Cleaner
- Paint Latex/Oil Based
- Paint Stripper
- Paint Thinner/ Turpentine
- Photo Chemicals
- Varnish
- Wood Preservative
- Caulking
- Fluorescent Lamps

MISCELLANEOUS

- Artists' Paints
- Flea Powder
- All Batteries
- Kerosene/Lamp Oil
- Lighter Fluid
- Moth Balls/ Flakes
- Pool/Spa Chemicals
- Rug Cleaner
- Spot Remover w/Solvent
- Cell Phones
- TV's
- Computers
- Mercury Devices
- Consumer Electronics
- Sharps-Needles
- BBQ Propane Tanks

UNIVERSAL WASTES (a category of Household Hazardous Waste)

- Aerosol Cans (non-empty label toxic or flammable)
- Batteries (AA, AAA, C & D cell) all single use.
- Cell phone
- Computer
- Computer Monitor (up to 3)
- Dental amalgam
- Fluorescent Bulbs
- Fluorescent Tubes
- Microwave oven
- Printer
- Radio
- Telephone
- Thermometer
- Thermostat
- TV's and VCR's (up to 3)

RESTRICTIONS:

- County of Riverside residents only
- No explosives/ammunition
- No radioactive materials
- No tires
- No business or non-profit organization waste
- No appliances
- No medical waste
- No 30 or 55-gallon drums

CAUTION:

- You may bring up to **5 gallons** or **50 lbs.** of a chemical hazardous waste maximum per car/per trip.
- Container shall be marked and secured to prevent leaks. Do not mix waste products.
- Containers holding gasoline will not be returned.

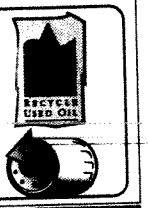

HOUSEHOLD HAZARDOUS WASTE 24 Hour HOTLINE 1-800-304-2226
Current Schedule or Subscribe for automatic updates:
http://www.rivcowm.org/hhw/hhw_schedule.html
Riverside County Waste Management Department (951) 486-3200

This insert has been funded through a cooperative effort from Riverside County Waste Management Department, the cities and County of Riverside Storm Water/Clean Water Protection Program, the California Department of Conservation, and the California Integrated Waste Management Board. Zero Waste - You Make It Happen!

05231008M915.2

Household Hazardous Waste

or HHW, are unwanted materials that are flammable, reactive, poisonous, or corrosive. These items are banned from the landfill and must be disposed of at an HHW Collection Facility or event.

Common Acceptable Items include:

- Batteries
- Fluorescent Bulbs
- Electronic Devices
- Mercury-Containing Devices
- Sharps
- Paints and Thinners
- Cleaners
- Solvents
- Pesticides
- Yard Chemicals
- Automotive Fluids
- Small & BBQ Propane Tanks
- Swimming Pool Chemicals
- Hobby Chemicals

Items which CANNOT be accepted include:

- Ammunition
- Asbestos or Remediation Waste
- Compressed Gas Cylinders Greater Than 40 Pounds
- Explosives
- Infectious or Medical Waste, except Sharps
- Radioactive Waste
- Business Waste
- Waste Generated Outside of Riverside County.

Material must be secured from tipping, abeled and sealed during transport. State aw limits the amount of waste to 5 gallons or 50 pounds per visit.

The Riverside County Waste Management Department Mission Statement

To provide for the protection of the general public health and welfare by efficient management of Riverside County's solid waste system through:

- Provision of facilities and programs which meet or exceed all applicable local, State, Federal and land use regulations;
- Utilization of up-to-date technological improvements;
- Development and maintenance of a system that is balanced economically, socially and politically; and
- Economically feasible recovery of waste materials.

For more program information, visit www.rivcowm.org or call 1-800-304-2226

RECYCLE
USED OIL FILTERS

Zero Waste - You Make It Happen!

This publication was funded by a grant from the California Integrated Waste Management Board.

What to do with Household Hazardous Waste *in Riverside County*

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Riverside County
Waste Management Department

Permanent HHW Facilities

Lake Elsinore City Maintenance Facility
521 N. Langstaff Street, near Sumner
pen 1st Sat. of the month, except in Dec. & Jan.
From 9:00 AM to 2:00 PM

Pedley Area - County Road Yard
6851 Van Buren Boulevard, near Clay Street
Open NON-holiday Sat's, from 9 AM to 2 PM

Beaumont Area *(Open in 2008)*
Lamb Canyon Landfill
16411 Lamb Canyon Road
Open NON-holiday Sat's, from 9 AM to 2 PM

Palm Springs Area *(Open in 2008)*
Wastewater Treatment Plant
4575 E. Mesquite Ave.
Open NON-holiday Sat's,
October - May from 9 AM to 2 PM
June - September from 7 AM to 12Noon

Riverside Area *(Open in 2008)*
East of Robert A. Nelson Transfer Station
1830 Agua Mansa Rd.
Open NON-holiday Sat's, from 9 AM to 2 PM

Temporary HHW Sites are set up

throughout the County and throughout the year. For locations, dates, and times, please call 1-800-304-2226 or visit www.rivcowm.org.

ABOP Locations, (or those that take ONLY Antifreeze, Batteries, Oil, and Paint)

Murrieta Area - County Road Yard
25315 Jefferson Avenue
Open NON-Holiday Sat's, from 9 AM - 2 PM

Palm Springs Area - Fire Dept. Training Area
3000 E. Alejo Road
Open NON-holiday Sat's,
October - May from 9 AM to 2 PM
June - September from 7 AM to 12 Noon

Recycle Park at Lamb Canyon Landfill

Recycle Park is designed to divert usable and recyclable materials from the waste stream, while also providing a location for disposing of Household Hazardous Waste and other items banned from the landfill. Though it is currently in the construction phase, once completed, it will feature:

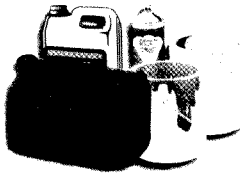

Household Hazardous Waste Collection:
providing a new permanent facility for the area.

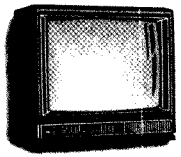

Consumer Electronics Drop-Off:
of unwanted televisions, computer, and other electronic devices.

Tire Drop Off:
from cars, passenger trucks, and RVs

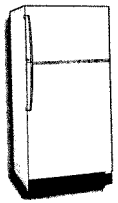

Appliance Recycling:
for major appliances, including items with Freon.

Reuse Exchange Store:
where visitors can purchase used items.

Trash Disposal Pad:
which is an area where visitors can safely unload unusable refuse away from heavy equipment.

018805

printed on recycled paper

REGISTERED HAZARDOUS WASTE TRANSPORTERS SERVING RIVERSIDE COUNTY

***ADVANCED CLEANUP TECHNOLOGIES, INC.**
18414 S. Santa Fe Ave.
Rancho Dominguez, CA 90221
(800) 334-2284 (310) 763-1423 actihmu340@aol.com

EPA ID# CAD983620402
Full service hazardous waste bulk and tanker trucks. Available 24 hours emergency response.

***ADVANCED CLEANUP TECHNOLOGIES, INC.**
12345 South La Cadena Drive
Colton, CA 92324
(800) 334-2284 (909) 423-0438 jenniferf@acticolton

EPA ID# CAD983620402
Full service hazardous waste bulk and tanker trucks. Available 24 hours emergency response.

ADVANCE ENVIRONMENTAL SERVICES, INC.
7 Amato
Mission Viejo, CA 92692
(800) 850-8680 (949) 454-2546

EPA ID# CAR000149070
Full service hazardous waste bulk and tanker trucks. Available 24 hours emergency response
Clarifier waste

ADVANCED ENVIRONMENTAL TECHNICAL SERVICE (ATES)
570 E La Cadena, Suite 2J 107 S. Motor Ave.
Riverside CA 92501 Azusa CA 91702
(951) 782-8375 (818)334-5117 (800) 572-2964

EPA ID# NJD080631369
Unknown spill clean-up. Transports bulk or containerized waste. Available 24hrs. Clarifier waste.

AMBERWICK CORP.
2304 W. 16th Street
Long Beach CA 90813
(562) 901-2350 (800) 300-9990

EPA ID# CAL000827879
Transports bulk or containerized waste. No radioactive or explosive wastes.

[redacted]

***ASBURY ENVIRONMENTAL SERVICES**
2100 N. Alameda Street
Compton, CA 90222
(800) 974-4495 (310) 886-3400

EPA ID# CAD 028277036
Full service hazardous waste bulk and tanker trucks. Available 24 hours emergency response.

AUTOMOTIVE ENVIRONMENTAL SERVICES
2081 Bay Road,
East Palo Alto CA 94303
(650) 325-2666 (888) 242-8592

EPA ID# CAD981694664
Waste Antifreeze, use oil filters, and miscellaneous haz. waste. Clarifier waste.

BENCO SALES, INC.
123 Stout Dr
Crossvield, TN 38555
(931) 484-9578

EPA ID# CAD084455757
Transports known containerized hazardous waste.

*** CONSOLIDATED WASTE INDUSTRIES**
10680 Silicon Avenue
Montclair, CA 91763
(800) 788-2167 (909) 625-6645

EPA ID# CAD983668583
Unknown spill cleanup; transports bulk or containerized waste; Available 24hrs. Clarifier waste

Note: The above facilities were included on this list by request only. Therefore, this section is to be used for a reference and is not intended as a complete list of hazardous waste transporters.

*** 24 hour Haz Mat Response**

REGISTERED HAZARDOUS WASTE TRANSPORTERS SERVING RIVERSIDE COUNTY (cont)

CROSBY & OVERTON, INC.
1610 West 17th Street
Long Beach, CA 90813
(562) 432-5445 (800) 827-6729)

EPA ID# CAD028409019
Unknown spill cleanup; transports bulk or containerized waste.

DALTON TRUCKING INC.
13560 Whittram Ave.
Fontana, CA 92335
(909) 823-0663 (800) 333-2400

EPA ID# CAD076078666
Transports bulk and containerized wastes; available 24 hrs.

***ECOLOGY CONTROL INDUSTRIES**
20846 Normandi
Torrance, CA 90502
(800) 321-5479 (310) 320-2555

EPA ID# CAD982030173
Unknown spill cleanup; transports bulk or containerized waste; available 24 hrs.

ECOLOGY CONTROL INDUSTRIES
10680 Silicon Ave
Montclair, CA 91763
(909) 355-5601 (909) 625-6645

EPA ID# CAD982030173
Unknown spill cleanup; transports bulk or containerized waste; available 24 hrs

EVERGREEN ENVIRONMENTAL MANAGEMENT
2355 Main Street, Suite 230
Irvine CA 92614
(949) 757-7770 (800) 972-5284

EPA ID# CAL000219066
Vacuum truck service; spill clean-up; transports containerized wastes; available 24 hours. Clarifier waste.

FILTER RECYCLING SERVICES, INC.
180 W. Monte Ave.
PO Box 449
Rialto, CA 92376
(800) 698-4377 (909)873-4141

EPA ID# CAD982444481
TSDF; Transporter of various waste; Emergency Response; Drop off and pickup service; Recycles various waste.

FRS ENVIRONMENTAL
1414 East 6th St.
Corona, CA 92879
(951) 898-1888

EPA ID# CAL000224539
General transportation of various waste. Drop off and pickup service, recycles water based parts washing solutions

HAZARDOUS TECHNOLOGIES
2744 Pomona Blvd.
Pomona, CA 91768
(909) 595-5991

EPA ID# CAD009661844
Wastes transported: various types of hazardous waste.

INDUSTRIAL WASTE UTILIZATION, INC.
5601 State Street
Montclair, CA 91763
(909) 984-9984

EPA ID# CAD980585293
Vacuum truck service; transports liquids & solids in bulk or containers; treatment units available. Clarifier waste.

INTELLIGENT RECYCLING SOLUTIONS
81-194 Red Bluff Road
Indio, CA 92201
(760) 342-0680 www.waste-hauler.com

EPA ID #CAL000161242
Specialize in household hazardous waste and small business hazardous waste. Registered waste tire hauler.

Note: The above facilities were included on this list by request only. Therefore, this section is to be used for a reference and is not intended as a complete list of hazardous waste transporters.

*** 24 hour Haz Mat Response**

REGISTERED HAZARDOUS WASTE TRANSPORTERS SERVING RIVERSIDE COUNTY (cont)

INTERSTATE PUMPING COMPANY
4023 Bayberry
Chino Hills, CA 91709
(909) 393-4696

EPA ID# CAD982462871
Vacuum truck service; transports bulk solids; spill cleanup; available 24 hrs. Clarifier waste.

ISLAND ENVIRONMENTAL SERVICES, INC.
3359 W. Pomona Blvd.
Pomona, CA 91768
(800) 400-4347, (626) 855-1200

EPA ID# CAR000053405
Vacuum truck service; transports liquids &solids in bulk or containers.

***CLEAN HARBORS**
5295 S. Garvey Road
Westmorland, CA 92281
760) 344-9400

EPA ID# SCD987574647
Disposal of known containerized wastes; vacuum truck service; **TSDF;** unknown spill cleanup; avail. 24 hours.

***CLEAN HARBORS**
5756 Alba Street
Los Angeles, CA 90058
(909) 933-3604, (800) 366-0506

EPA ID# CAD050806850
Disposal of known containerized wastes; vacuum truck service; unknown spill cleanup; avail. 24 hours. Clarifier waste.

STARLITE RECLAMATION
229 N. Laurel Ave.
Ontario, CA 91762
(909) 933-3604, (909) 694-7227 24 hr pager

EPA ID# CAL000063809
Wastes transported: Waste oil and all hazardous waste types
Clarifier waste.

*** UNITED PUMPING SERVICE**
14000 East Valley Blvd.
City of Industry, CA 91746
(626) 961-9326

EPA ID# CAD072953771
Unknown spill cleanup; transports bulk or containerized waste; Available 24hr. Clarifier waste.

Small Business Waste

Conditional Exempt Small Quantity Generator (CESQG) **1-800-952-5566**

What is a CESQG? Businesses that generate up to 27 gallons or 220 lbs. of hazardous waste, or 2.2 lbs of extremely hazardous waste per month are called CESQG's. These businesses are required to use a licensed hazardous waste hauler to manifest and transport their waste. The most common CESQG's are painters, print shops, auto shops, builders, churches, schools, non-profit groups and property managers.

What is the CESQG Program? This program is an "At the Business" hazardous waste pick-up disposal service for eligible businesses/ non-profit organizations in the County of Riverside. This program provides small quantity generators with a legal and affordable way to dispose of their waste with all legal documentation provided as part of the service.

How do I get service? To arrange an appointment for the **CESQG** Program, call 1 (800) 952-5566. A disposal fee will be charged based on the type and amount of waste picked-up. **Business waste will NOT be accepted at HHW events or facilities.**

Note: The above facilities were included on this list by request only. Therefore, this section is to be used for a reference and is not intended as a complete list of hazardous waste transporters.

*** 24 hour Haz Mat Response**

UNIVERSAL WASTE
MAIL-BACK RECYCLING SERVICES

Onyx Environmental Services
https://www.onyxes.com/OnyxPak/index.jsp

Proper recycling is easy with OnyxPak. When you have lamps, ballasts, batteries, mercury devices or computer monitors to dispose of simply order an OnyxPak. OnyxPak makes it easy to recycle small quantities and to comply with today's changing regulations. Our prepaid packaging allows you to conveniently manage lighting and electronic waste. One price includes everything you need - packaging, freight, insurance, liability protection and certificates of recycling.
We stock a variety of fiber drums, boxes and pails that will meet your needs. Simply fill, seal and return via the prepaid shipping label. Your boxes, drums or pails will be delivered to one of four fully permitted Onyx facilities, where your waste will be recycled to the highest standards in the industry. That's compliance with confidence!

Benefits of OnyxPak

Low cost compliance. Price includes packaging, return shipping and recycling.

Minimize the need to sort, count and store lighting and electronic waste.

Easy process for recycling your lamps and ballasts. Simply go to our ordering page or call toll-free (800) 556-5267.

Access to recycling expertise. Customer service representatives are standing by, ready to assist you.

Receive confirmation that your lighting and electronic waste was recycled. Onyx will send you a certificate of recycling.

For larger or bulk quantities, we offer competitive pricing, containers and documentation for sorting, storing and shipping your lighting and electronic wastes. When it comes time to recycle, we'll even arrange for transportation.
Contact us today to request a bulk quote.

Lighting Resources, Inc.
http://www.lightingresourcesinc.com/hs_services.html

Corporate Offices
805 E. Francis Street
Ontario, CA 91761

DID YOU KNOW ?

COMPOUNDS & SOLUTIONS
COMPUTER RECYCLING
ACCEPTABLE MATERIALS LIST
PRODUCT SALES & MORE
PRE-PAID RETURN PROGRAM
MERCURY SPILL KITS
NEWS ARCHIVES
CONTACT AERC
MERCURY LINKS & ARTICLES
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EPA

WHY RECYCLE

- Mercury is a toxic metal that is hazardous to both the environment and human health.
- An ounce of mercury contaminates a lake for centuries.
- 100 fluorescent lamps contain approximately 4 grams of mercury.
- Ballasts contain polychlorinated biphenyls (PCB's) which is a hazardous waste.
- Batteries contain heavy metals and corrosive components.
- Computer monitors contain toxic lead in the glass and circuits.

UNIVERSAL WASTE RULE (UWR)

The EPA issued the UWR in 1995 to reduce the amount of hazardous waste items entering municipal solid waste. It encourages recycling and proper disposal of certain wastes. Regulatory and administrative burdens for managing wastes were also streamlined. Numerous states have moved forward with the inclusion of electronic scrap (e-scrap) into the UWR. In addition, numerous states have banned monitors from landfills.

AERC PRE-PAID RETURN PROGRAM

AERC offers a comprehensive recycling service for commercial, institutional, municipal, and governmental waste generators.

1. Order Your Recycle Kit Order your kit by going to the RecycleKits website or by calling your AERC representative. You will need to know what quantities of the specific material you will be recycling. Prepayment includes recycling fees, container and FedEx freight. Certificates of Recycling and Process available upon request. AERC offers a comprehensive recycling service for commercial, institutional, municipal, and government waste generators.

2. Shipping Guidelines Put the material you're recycling into the designed container and follow the packaging instructions. Complete the enclosed labels and affix the prepaid shipping labels to the container.

FedEx Ground will not accept any package with the a PPRP label that has been changed, altered or tampered with in any way.

Give this package to the FedEx Ground driver during a routine delivery. Do not call FedEx Ground for a pickup if you are already set up for daily pick-ups. If you are not set-up for daily pick-ups you will need to call FedEx Ground as (888)777-6040 to schedule a pick-up.

3. AERC Recycles Your Waste AERC recycles your waste at one of its four fully permitted facilities. After your waste has been processed, a Certificate of Recycling or Process can be provided upon request.

ADVANTAGES OF AERC'S PPRP PROGRAM

- One price includes everything you need.
- Convenience for small quantity generators with storage limitations.
- Reduces the chances of facility contamination by minimizing volumes of waste on-site.
- Allows each facility to purchase recycling services based on its individual

Regional Sales Manager: Robert Hewitt
(760) 929-8718, (949) 400-3350, Fax (760) 929-8728

Earth Protection Services
http://www.earthpro.com/

Corporate Headquarters:
10 S. 48th Ave., Suite #4
Phoenix, AZ 85043
Phone: 800-414-0443 - Fax: 602-353-9285
Mailing Address: P.O. Box 23820
Phoenix, AZ 85063-3820
Send E-mail to EPSI earthpro@fiberpipe.net

See website for complete information on EPSI Pak mail back services.

Bethlehem Apparatus
http://www.bethlehemlamprecycling.com/

Mercury Waste Solutions, Inc.
http://www.lamptracker.com/new/LampTracker.pdf

Air Cycle Corporation
http://www.lamprecycling.com/pdf/EasyPak.pdf
Air Cycle Corporation
2000 S. 25th Avenue, Suite C
Broadview, IL 60155
Tel: (800) 909-9709
Fax: (708) 344-7875

Toxco
http://www.biggreenbox.com/StoreFront.bok
http://www.toxco.com/

The Riverside County Waste Management Department has added electronics recycling collections to their current residential Household Hazardous Waste Events. For more information go to www.rivcowm.org or call (800) 304-2226.

The California Integrated Waste Management Board maintains a list of certified recyclers http://www.ciwmb.ca.gov/Electronics/Collection/

Goodwill - Magnolia Center	(951) 688-0035	Riverside
Goodwill - La Sierra	(951) 684-1160	Riverside
Goodwill - Cathedral City	(760) 202-1544	Cathedral City

Riverside County landfills will accept residential TV, monitors, CRT's, and other consumer electronic devices for recycling. Residents may bring in up to 2 CRT type devices per trip. A minimum fee of $8.00 will be charged for loads up to 800 lbs. or $31.91 per ton prorated for heavier loads (new fees effective 7/1/06). Electronic waste from businesses is not accepted at the landfills at this time. Please contact the handlers on the following list.

Large Quantity CRT Handlers

Computer Recyclers of America	(760) 599-9131
Chase Electronics, Inc.	(610) 449-8160
Edom Hill Transfer Station	(760) 251-3649
Electronics Partners Corp.	(415) 541-5346
Envirocycle	(909) 519-3276
E-Recycling of So. Cal.	(562) 634-8372
Gold N' West	(951) 340-1501
Goodwill Industries	(323) 223-1211
Industrial Recycling Services	(951) 301-5252
Nxtcycle	(602) 442-7900
SoCal Computer Recycling, Inc.	(310) 978-2790
U. S. Dept of Justice, UNICOR	(330) 424-7448 x1313
UPS	(678) 746-7021
Waste Management, Inc.	(951) 280-5430

If you would like to be added to our listing, please contact jmorelan@co.riverside.ca.us. These lists are provided as a public service and are not an endorsement of these companies or their services. The Department is not responsible for any errors or omissions on these listings.

018813

County Fire Stations within the Santa Margarita Watershed

9-Feb-09

	Fire Station	Address	City	State	Zipcode	Comments
Lower Watershed						
	Temecula Sta 12	28330 Mercedes St	Temecula	CA	92590	Contract City of Temecula
	Wildomar Sta 61	32637 Grunwell St	Wildomar	CA	92595	
	Rancho California Sta 73	27415 Enterprise Circle West	Temecula	CA	92590	Contract City of Temecula
	Bear Creek Sta 75	38900 Clinton Keith Rd	Murrieta	CA	92562	
	French Valley Sta 83	37500 Sky Canyon Dr	Murrieta	CA	92563	Contract City of Temecula
	Parkview Sta 84	30650 Pauba Rd	Temecula	CA	92592	Contract City of Temecula
	Wolf Creek Sta 92	32211 Wolf Creek Dr	Temecula	CA	92592	Contract City of Temecula
Upper Watershed						
	Anza Sta 29	6560 Highway 371	Anza	CA	92539	
	Pinyon Sta 30	70080 Highway 74-103	Anza	CA	92539	
	Cottonwood Sta 52	44222 Sage Rd	Aguanga	CA	92536	
	Garner Valley Sta 53	59200 Morris Ranch Rd	Mountain Center	CA	92561	
	Lake Riverside Sta 77	41610 Lakeshore Blvd	Aguanga	CA	92536	
	Glen Oaks Sta 96*	37700 Glen Oaks Rd	Temecula	CA	92593	

* Temporary site

AGRICULTURE

University of California
COOPERATIVE EXTENSION

Riverside County

Current Research and Education using Multi-disciplinary Approaches to Solving Complex Issues, 2007-08 update

Environmental Horticulture Effort Saves Billions of Gallons of Water in Desert

Using temporary weather stations, Advisor Mike Henry and CE Specialist, Rick Snyder teamed with the Coachella Valley Water District in an eight year study to determine local reference evapotranspiration (ETo) in urban sites in the Coachella Valley, California. Findings showed potential water savings of 2.5 billion gallons annually.

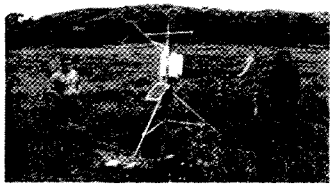

Temporary weather station with temperature, humidity, radiation and wind speed sensors provided data that could be used to calculate ETo which was then compared with the ETo for the Valley from the State CIMIS station in Indio, CA (# 200)).

Agricultural Economics: New Crop Studies Show Opportunity for Sustainability and Viability of Agriculture in Southern California

Current cost studies analysed by Eta Takele show the benefits and challenges of producing and investing in crops such as Dates, Mandarins and Blueberries.

The Coachella Valley, the Date Production Area in the US

Rapid population growth and the high cost of production resulting from resource diversion of water and land from agriculture to urban development has led many growers to consider high value, small scale production in southern California. For detail information of the studies, please go to the following websites and access the publications.

http://coststudies.ucdavis.edu
http://groups.ucanr.org/farmgt/

Subtropical Horticulture Program

Citrus leafminer (CLM) continues to be an insect pest on all varieties of citrus trees in Riverside County. A variety of natural predators appear to be gradually controlling the CLM populations. Allowing biological control to take effect is highly recommended at this time. Working in conjunction with UCR Entomology, Dr. Peggy Mauk and SRA Tom Shea are supplying CLM infested leaves from field work and more predators are being successfully reared for release. For mature trees and any citrus tree over four years old, no pesticide application is suggested. See UC ANR publication – Pest Notes #74137, August 2007, for more CLM information – available online.

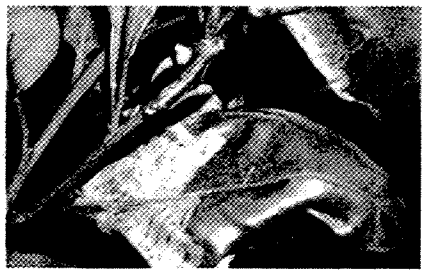

The serpentine (snake –like) mines of citrus leafminer on a citrus leaf.

Vegetable Crops

Vegetable crops advisor, Jose Aguiar in 2006 took a sabbatical leave in Sinaloa, Mexico to study bell pepper production. He found various technologies that can be applicable in the Coachella Valley including green house, Maya Sombra and open field production. Along with UC specialists and advisors, Jose is now evaluating the benefits of these techniques.

Bell peppers being grown in shade house in the Oasis area of the Coachella Valley.

State Water Quality Grant Uses BMP's To Improve San Jacinto Watershed

Best Management practices for Citrus, Grain, Vegetable crops and urban turfgrass are being developed and extended to farmers and residential clientele in the watershed to improve the water quality of Canyon Lake and Lake Elsinore in western Riverside County. Mike Henry, Darren Haver, Eta Takele, Nyles Peterson and CE Specialist, Milt McGiffen work with Dr. Laoshang Wu, CE Water Specialist (P.I.) and the State Water Quality Control Board on this project.

Project researchers install field instrumentation to measure runoff from potato field in Riverside County.

Nutrition, Family and Consumer Sciences

Advisor Chutima Ganthavorn and EFNEP/FSNEP program staff, Fatima Afana, Gustavo Rimada, Liz Armijo, Myriam Acevedo and Sharon Southworth, teamed with local agency partners and schools to make a change in food behaviors of parents and children from low-income families. During FY 2006-2007 Riverside County EFNEP helped 576 low income families and 1,142 youth to improve their nutrition, physical activity and health, while Riverside County FSNEP helped 313 food stamp families and 1,702 youth to improve their knowledge in money management and nutrition.

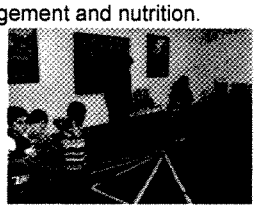

Promoting MyPyramid and physical activity in youth from grandparents raising grandchildren families

Head Start parents learning to use a cooking thermometer.

University of California
COOPERATIVE EXTENSION

Riverside County

Current Research and Education using Multi-disciplinary Approaches to Solving Complex Issues cont'd, 2007-08 update

Master Gardener Program Teams With FSNEP & 4-H on TWIGS Project

In Riverside County, Master Gardeners, FSNEP and 4-H are teaming up to support school gardens. Elementary school youth learn about gardening and nutrition from the TWIGS (Team with Intergenerational Support) curriculum. Master Gardeners and 4-H program rep, Jeanne Lothridge, are helping with direct teaching, gardening and making supplemental posters for TWIGS.

Master Gardener, Pauline Pedigo introducing her pet desert turtle during a break from TWIGS lesson at school garden in Riverside, CA.

Viticulture Program

The viticulture program addresses critical needs and issues that affect wine grape and table grape production in Riverside, San Bernardino and San Diego counties. Advisor Carmen Gispert is currently working on new table grape selections and the efficacy of novel insecticide materials for the control of vine mealybug.

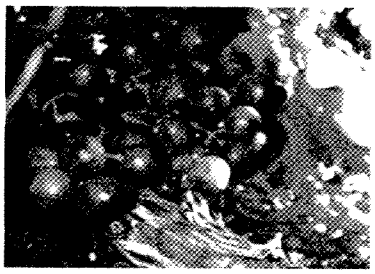

Vine mealybug on grapes in the Temecula Valley of Riverside County.

A collaborative effort among the University of California, the California Department of Food and Agriculture has successfully maintained low populations of the glassy-winged sharpshooter in the Coachella and Temecula Valleys, reducing the potential of the spread of Pierce's disease, a lethal malady on grapes.

Poultry Science

Advisor Doug Kuney currently serves on County Poultry Committees. The committee's mission is to help resolve and prevent nuisance related complaints from neighboring communities near poultry farms. Doug assists the committee by providing information about management practices that have been proven to mitigate nuisance related complaints. In addition, he works with the poultry industry to adopt those management practices.

Main Office:
21150 Box Springs Road, Suite 202, Moreno Valley, CA 92557.
Tel . (951) 683-6491

Indio Office:
82-675 Highway 111, Room 118, Indio, CA 92201.
Tel. (760)863-8293

Palo Verde Office:
290 N. Broadway, Blythe, CA 92225.
Tel. (760) 921-5060

University of California, County of Riverside and U.S. Department of Agriculture Cooperating

Serving Riverside County residents in delivering research and educational programs in: Agriculture, Nutrition, Youth Development, and Natural Resources since 1917

Etaferahu Takele
County Director
Tel. 951-683-6491 Ext. 243
Fax 951-788-2615
E-mail: ettakele@ucdavis.edu

There is a wealth of consumer resources for homeowners to learn more about smart pesticide use as well as alternatives to pesticides. While a larger list is available at here are some of the more authoritative resources:

California Department of Pesticide Regulation:

California Stormwater Quality Association:

California Structural Pest Control Board:

Centers for Disease Control:

National Pest Management Association – Quality Pro:

National Pest Management Association – QualityPro Green:

University of California Integrated Pest Management Program:

US Environmental Protection Agency:

What is IPM:

apply .org

Printed on recycled paper

apply .org

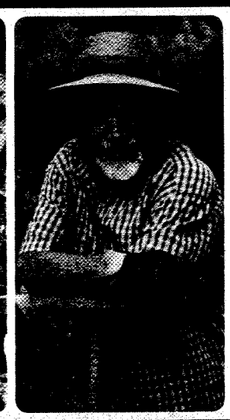

Smart tips for homeowners about the proper use, storage and disposal of outdoor consumer pesticide products, including insecticides. If you use these products, please apply them responsibly to protect our water and environment.

URBAN PYRETHROID

Pyrethroids (pronounced *"pī-rē-throids"*) are ingredients found in many commonly used consumer home and garden insecticides for treating a wide variety of pests, including problems with mosquitoes, caterpillars, ants, spiders, garden worms, wasps, cockroaches, aphids and other insect infestations.

The Urban Pyrethroid Stewardship is a pesticide industry alliance that is promoting *"Apply Responsibly"*— a campaign to inform Californians in urban areas about environmentally responsible ways to handle, store and dispose of a wide range of home and garden pesticide products, including insecticides containing pyrethroids in order to help protect California's waters.

If you use insecticides in your garden or outside your house, please remember to apply them responsibly to protect our water and environment. *"Apply Responsibly"* also provides resources for consumers who may want to consider limiting pesticide use through integrated pest management and prevention efforts.

Protecting Our Water

Water is an essential natural resource that every Californian should help safeguard.

Many urban creeks in California receive water from residential areas. Chemicals used around the home, including home and garden pesticides, can move from where they are applied and run off through the storm drain system into these creeks.

By following a few simple rules for handling and disposal of chemicals, you can play an important role in helping prevent this type of runoff and in preserving California's water quality and environment.

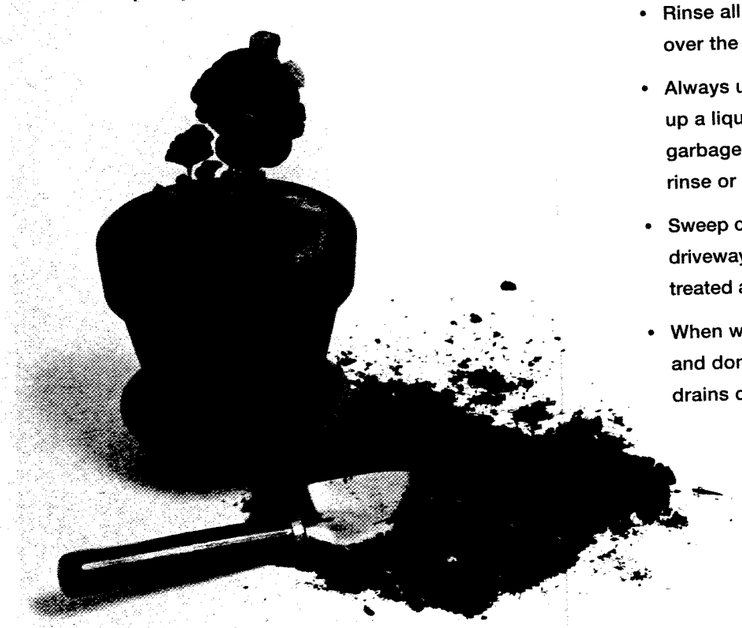

Tips for the Lawn & Garden

Gardeners who choose to use pesticides to control insects in their yards should adhere to the following guidelines:

- Always read the entire label first and follow the directions
- Reduce pest infestations by eliminating what often attracts them or creates ideal breeding conditions – standing water, pet droppings, tree prunings or fallen fruit
- Remove thatch buildup in lawns to ensure water soaks deeply into the lawn and prevents runoff
- Mix and use only the amount you need
- Avoid applying a spray or dust on a windy day
- Rinse all pesticide application equipment only over the treated area
- Always use dry sawdust or kitty litter to soak up a liquid spill and then sweep it into a plastic garbage bag for disposal; don't use water to rinse or clean up a liquid spill
- Sweep or blow granules that fall on porches, driveways and sidewalks back onto the treated area
- When watering treated areas, don't overwater and don't allow water runoff into gutters, in-lawn drains or storm drains

Tips for Around the House

Homeowners who apply pesticides around the outside of their homes should follow a number of important guidelines:

- Always read the entire label first and follow the directions
- Limit the likelihood of pest infestations near the house by keeping wood piles, groundcover and shrubs away from the outside surfaces of your house
- Avoid applying a spray or dust on a windy day
- Only apply pesticides to the target problem areas
- If a product is labeled for "spot" and "cracks and crevices" you should only treat those areas
- Don't treat entire driveways, patios, sidewalks or similar outdoor surfaces
- Always use dry sawdust or kitty litter to soak up a liquid spill and then sweep it into a plastic garbage bag for disposal; don't use water to rinse or clean up a liquid spill
- If you hire a professional pest control company, be sure the operator is licensed and certified according to state law and local ordinances. Have a conversation with them to understand what, if any, pesticides they will apply around your home. Tell them about any do-it-yourself products that you may be using as sometimes they can interfere with products the professional may use. Finally, be sure to ask about steps that you can take to help keep pests from entering your home such as sealing cracks and crevices or fixing leaks

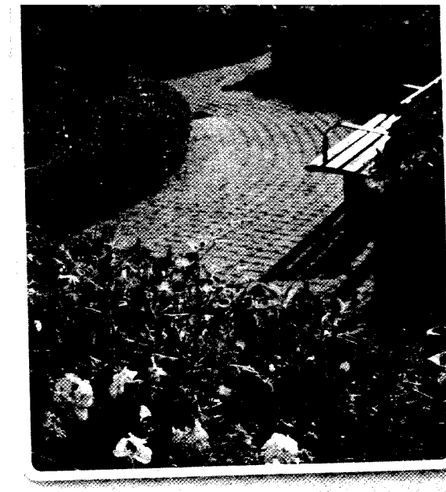

Storage & Disposal

- Dispose of unused pesticides according to the instructions on the product label
- Never pour any leftover pesticides down the sink, toilet, sewer or storm drain
- Don't stockpile pesticides. Buy only enough for one season
- If you only need to treat a small area, consider ready-to-use pesticides rather than products you have to mix yourself
- Always store pesticides in their original containers
- Ensure containers are securely closed
- Store in a safe place away from children
- Do not reuse an empty pesticide container
- Remember that an empty pesticide container contains residue and should also be handled carefully and according to the label

LANDSCAPE ORDIANCE 859.2

018820

202

ORIG APPROVED COUNTY COUNSEL
Y. KARIN L. WATTS-BAZAN 9/18/09
DATE

SUBMITTAL TO THE BOARD OF SUPERVISORS
COUNTY OF RIVERSIDE, STATE OF CALIFORNIA

FROM: TLMA - Planning

SUBMITTAL DATE:
September 3, 2009

SUBJECT: Amendment to Ordinance No. 859 The Water Efficient Landscape Requirements

RECOMMENDED MOTION: That the Board of Supervisors introduce Ordinance No. 859.2 on September 15, 2009 and adopt Ordinance No. 859.2 on September 29, 2009.

BACKGROUND: Court rulings on endangered species, a growing crisis involving a long-term pumping solution for the Bay Delta, and drought conditions continue to impact the way the State of California uses water. On December 19, 2006 the County adopted Ordinance No. 859 which established water-efficient landscape requirements for all discretionary permits and/or approvals.

On September 28, 2006, the State adopted AB1881 which revised the Water Conservation in Landscaping Act. AB1881 gave local land use jurisdictions until January 1, 2010 to adopt an ordinance "as effective" as the State's Model Ordinance or the State's Model Ordinance would prevail. On February 8, 2008, the California Department of Water Resources (DWR) promulgated the first of several model water efficient landscape ordinances that began to define the State requirements for water efficient landscaping.

CONTINUED ON ATTACHED PAGE

Damian Meins, Assistant Planning Director for
Ron Goldman
Planning Director

FINANCIAL DATA				
	Current F.Y. Total Cost:	$ 0	In Current Year Budget:	N/A
	Current F.Y. Net County Cost:	$ 0	Budget Adjustment:	N/A
	Annual Net County Cost:	$ 0	For Fiscal Year:	N/A

SOURCE OF FUNDS: N/A

Positions To Be Deleted Per A-30 ☐
Requires 4/5 Vote ☐

C.E.O. RECOMMENDATION:

APPROVE
BY Tina Grande

County Executive Office Signature

Dep't Recomm.: ☒ Policy ☐ Consent
Per Exec. Ofc.: ☒ Policy ☐ Consent

Prev. Agn. Ref.: | District: 1-5 | Agenda Number: 3.45

During the Spring of 2009, the Riverside County Water Task Force developed and subsequently released a Local Model Landscape Water Use Efficiency Ordinance (Local Model Ordinance). This ordinance was modeled after the County's Ordinance No. 859 and incorporated the required elements of the State's Model Ordinance. The Local Model Ordinance was tailored to meet the unique relationships and needs of the Riverside County region.

On June 8, 2009, the WRCOG Executive Committee endorsed the Local Model Ordinance and encouraged its member jurisdictions to adopt it or utilize it in creating their respective local ordinances. Staff has incorporated the Local Model Ordinance into Ordinance No. 859.2 (Attachment A) and its accompanying provisions of resolution (Attachment B).

Key, new features of Ordinance No. 859.2 include:

1. Its applicability to landscapes equal to or greater than 2,500 square feet which require a discretionary permit or approval
2. A reduction in maximum water demand from 80% to 70% of the referenced evapotranspiration rate
3. Greater specificity concerning the design requirements of landscape plans
4. An expanded landscape documentation package including a:
    a. soils management plan, and a
    b. grading plan
5. A requirement that surface area of water features be incorporated into the water budget calculations
6. Added emphasis on recycled water
7. Special provisions for cemeteries, areas irrigated with recycled water, parks, sports fields, and other high traffic turf areas

Key features of Resolution 2009-289 include:

1. Reliance on local water purveyors, as the direct and immediate supplier of water, to enforce landscape water use efficiency standards with respect to existing customers
2. A request to local water purveyors to identify programs that enhance and encourage landscape water use efficiency (e.g. tiered water rate structure, allocation-based conservation water pricing structure, etc.)

On September 29, 2009, staff will bring the aforementioned ordinance and resolution to the Board for approval along with a revised Board Policy H-25 that addresses the County's Water Efficient Landscape Policy for County Facilities.

ATTACHMENT A

ORDINANCE NO. 859.2

AN ORDINANCE OF THE COUNTY OF RIVERSIDE

AMENDING ORDINANCE NO. 859 THE WATER EFFICIENT

LANDSCAPE REQUIREMENTS

The Board of Supervisors of the County of Riverside ordains as follows:

Section 1. Ordinance No. 859 is hereby amended in its entirety to read as follows:

Section 1. **SHORT TITLE**. This Ordinance shall be known as the Water Efficient Landscape Requirements Ordinance.

Section 2. **INTENT**. It is the intent of the Board of Supervisors in adopting this Ordinance to:

A. Establish provisions for water management practices and water waste prevention;

B. Establish a structure for planning, designing, installing, maintaining, and managing water efficient landscapes in new and rehabilitated projects;

C. To reduce the water demands from landscapes without a decline in landscape quality or quantity;

D. To retain flexibility and encourage creativity through appropriate design;

E. To assure the attainment of water efficient landscape goals by requiring that landscapes not exceed a maximum water demand of seventy percent (70%) of its reference evapotranspiration (ETo) or any lower percentage as may be required by state legislation, whichever is stricter;

F. To eliminate water waste from overspray and/or runoff;

G. To achieve water conservation by raising the public awareness of the need to conserve water through education and motivation to embrace an effective water demand management program; and

H. To implement the requirements of the California Water Conservation in Landscaping Act 2006 and the California Code of Regulations Title 23, Division 2, Chapter 2.7.

Section 3. **DEFINITIONS.** The terms used in this Ordinance shall have the meaning set forth below:

a. "backfilling means to refill an excavation, usually with excavated material.

b. "backflow prevention device" means a safety device used to prevent pollution or contamination of the water supply due to the reverse flow of water from the irrigation system.

c. "check valve" or "anti-drain valve" means a valve located under a sprinkler head or other location in the irrigation system to hold water in the system to prevent drainage from the sprinkler heads when the system is off.

d. "established landscape" means the point at which plants in the landscape have developed a significant root growth into the site. Typically, most plants are established after one or two years of growth.

e. "estimated annual water use" or "EAWU" means estimated total water use per year as calculated by the formula contained in Section 5.B.12.n.

f. "hydrozone" means a portion of the landscaped area having plants with similar water needs. A hydrozone may be irrigated or non-irrigated.

g. "invasive species" are non-indigenous species (e.g. plants or animals) that adversely affect the habitats they invade economically, environmentally, or ecologically. Lists of invasive species are included within the Western

Riverside County Multiple Species Habitat Conservation Plan and the Coachella Valley Multiple Species Habitat Conservation Plan. Said lists are hereby incorporated by reference.

h. "landscape architect" means a person who holds a license to practice landscape architecture in the State of California.

i. "landscaped area" or "LA" means all of the planting areas, turf areas, and water features in a landscape design plan subject to the Maximum Applied Water Allowance (MAWA) calculation. The landscape area does not include footprints of buildings, or structures, sidewalks, driveways, parking lots, decks, patios, gravel or stone walks, other pervious or impervious hardscapes, and other non-irrigated areas designated for non-development (e.g., open space and existing native vegetation).

j. "local water purveyor" means any entity, including a public agency or private water company that provides retail water service to customers in the unincorporated area of Riverside County.

k. "low volume irrigation" means the application of irrigation water at low pressure through a system of tubing or lateral lines and low volume emitters such as drip, to apply small volumes of water slowly at or near the root zone of plants.

l. "Maximum Applied Water Allowance" or "MAWA" means the upper limit of annual applied water allowed for the established landscaped area.

m. "overhead sprinkler irrigation systems" means systems that deliver water through the air (e.g. pop ups, impulse sprinklers, spray heads and rotors, etc.).

n. "reference evapotranspiration" or "ETo" means a standard measurement of environmental parameters which affect the water use of plants. ETo is given in inches per day, month, or year. Reference evapotranspiration is used as the basis of determining the Maximum Applied Water Allowances

so that regional differences in climate can be accommodated. Reference evapotranspiration numbers shall be taken from the most current EvapoTranspiration Zones Map developed by the California Department of Water Resources. For geographic areas not covered by the EvapoTranspiration Zones Map, data from nearby areas shall be used.

o. "rehabilitated landscapes" means any re-landscaping of a project that requires a discretionary permit.

p. "special landscape area" means an area of the landscape dedicated to edible plants, areas irrigated with recycled water, and publicly accessible areas dedicated to active play such as parks, sports fields, golf courses, where turf provides a playing field or where turf is needed for high traffic activities.

q. "temporarily irrigated" means irrigation for the purposes of establishing plants, or irrigation which will not continue after plant establishment. Temporary irrigation is for a period of six months or less.

r. "water-intensive landscaping" means a landscape with a WUCOLS plant factor of 0.7 or greater.

s. "WUCOLS" means the publication entitled "Water Use Classification of Landscape Species" by the University of California Cooperative Extension (1999 or most current version).

<u>Section 4.</u> APPLICABILITY.

A. The water-efficient landscape requirements contained in this Ordinance shall be applicable to all new and rehabilitated landscapes associated with residential uses (including single family and multi-family units/projects) with a total landscape area equal to or greater than 2,500 square feet which require a discretionary permit and/or approval and all new and rehabilitated landscapes

associated with commercial or industrial uses which require a discretionary permit and/or approval.

B. In the event Covenants, Conditions and Restrictions are required for any permit subject to this Ordinance, a condition shall be incorporated into any project approval prohibiting the use of water-intensive landscaping and requiring the use of low water use landscaping pursuant to the provisions of this Ordinance in connection with common area/open space landscaping. Additionally, such a condition shall also require the Covenants, Conditions and Restrictions to incorporate provisions concerning landscape irrigation system management and maintenance. This Ordinance shall not be construed as requiring landscaping of common areas or open space that is intended to remain natural. Covenants, Conditions and Restrictions shall not prohibit use of low-water use plants or the replacement of turf with less water intensive plant species.

C. Recognizing the special landscape needs of cemeteries, new and rehabilitated landscapes within a cemetery are subject only to the provisions set forth in Sections 6.A.and 6.B. of this Ordinance.

D. The following uses and/or projects are exempt from the provisions of this Ordinance:

1. Registered local, state or federal historical sites;
2. Ecological restoration projects that do not require a permanent irrigation system and have an establishment period of less than 5 years;
3. Mined land reclamation projects that do not require a permanent irrigation system; and
4. Botanical gardens and arboretums open to the public.

Section 5. **LANDSCAPE DOCUMENTATION REQUIREMENTS.** An applicant proposing any new or rehabilitated landscape for a project subject to the requirements of Section 4 of this Ordinance shall prepare and submit to the Planning Director documentation including the following: 1. project information; 2. a planting plan; 3. an irrigation design plan; 4. a soil management plan; and 5. a grading design plan. The "Riverside County Guide to California Friendly Landscaping" (Landscaping Guide) as may be periodically amended by the Planning Director is hereby incorporated by reference to assist in designing, constructing and maintaining a water efficient landscape and efficient irrigation system.

It is recommended that an applicant proposing any new or rehabilitated landscape that is designated for recycled water use consult with the appropriate local water purveyor early in the development review process to ensure that future recycled water facilities meet the projected demand and that the aforementioned plans when submitted comply with the applicable standards, approvals and implementation requirements of this Ordinance, the local water purveyor and any applicable maintenance entity.

Water systems for common open space areas shall use non-potable water if approved facilities are made available by the local water purveyor. Provisions for a non-potable water system shall be provided within the irrigation design plan. Water systems designed to utilize non-potable water shall be designed to meet all applicable standards of the applicable Regional Water Quality Control Board and the Riverside County Health Department.

A. **PROJECT INFORMATION.**

1. date;
2. name of applicant and contact information;
3. name of project owner and contact information;
4. project address including parcel and lot numbers;
5. total landscape area in square feet;
6. project type (e.g. new or rehabilitated, and residential, commercial, or industrial);

7. water supply (e.g. potable, well, recycled; use of recycled water is encouraged);

8. applicant's signature and date with statement, "I agree to comply with the requirements of Ordinance No. 859 and submit a complete Landscape Documentation Package."

B. **PLANTING PLAN REQUIREMENTS.**

1. Plant types shall be grouped together in regards to their water, soil, sun and shade requirements and in relationship to the buildings. Plants with different water needs shall be irrigated separately. Plants with the following classifications shall be grouped accordingly: high and moderate, moderate and low, low and very low. Deviation from these groupings shall be not be permitted.

2. Trees for shade shall be provided for residential, commercial and industrial buildings, parking lots and open space areas. These trees can be deciduous or evergreen and are to be incorporated to provide natural cooling opportunities for the purpose of energy and water conservation.

3. Plants shall be placed in a manner considerate of solar orientation to maximize summer shade and winter solar gain.

4. Plant selection for projects in high fire hazard areas shall address fire safety and prevention. A defensible space or zone around a building or structure is required pursuant to Public Resources Code Section 4291 and Ordinance No. 695. Fire-prone plant materials and highly flammable mulches shall be avoided.

5. Invasive species of plants shall be avoided especially near parks, buffers, greenbelts, water bodies, conservation areas/reserves and other open space areas because of their potential to cause harm to environmentally sensitive areas.

6. All exposed surfaces of non-turf areas within the developed landscape area shall be mulched with a minimum three inch (3") layer of material, except in areas with groundcover planted from flats where mulch depth shall be one and one half inches (1 ½").
7. Stabilizing mulching products shall be used on slopes.
8. Turf areas shall be used in response to functional needs and in compliance with the water budget.
9. Decorative water features shall use re-circulating water systems.
10. Where available, recycled water shall be used as the source for irrigation and decorative water features.
11. Planting plans shall identify and site the following:
    a. new and existing trees, shrubs, ground covers, and turf areas within the proposed landscaped area;
    b. a planting legend indicating all plant species by botanical name and common name, spacing, and quantities of each type of plant by container size;
    c. designation of hydrozones;
    d. area, in square feet, devoted to landscaping and a breakdown of the total area by landscape hydrozones;
    e. property lines, streets, and street names;
    f. building locations, driveways, sidewalks, retaining walls, and other hardscape features;
    g. appropriate scale and north arrow;
    h. any special landscape areas;
    i. type of mulch and application depth;
    j. type and surface area of water features;
    k. type and installation details of any applicable stormwater best management practices;

l. planting specifications and details, including the recommendations from the soils analysis, if applicable;

m. maximum Applied Water Allowance (MAWA):

i. Planting plans shall be prepared using the following Water Budget Formula:

MAWA (in gallons) = (ETo)(0.62)[0.7 x LA+0.3 x SLA]

where

ETo is reference evapotranspiration

SLA is the amount of special landscape area in square feet

LA is total landscape area (including the SLA) in square feet; and

ii. For the purposes of determining the MAWA, average irrigation efficiency is assumed to be 0.71. Irrigation systems shall be designed, maintained, and managed to meet or exceed an average irrigation efficiency of 0.71.

n. Estimated Annual Water Use (EAWU):

i. EAWU for a given hydrozone is calculated as follows:

EAWU (in gallons) = (ETo)(0.62)[((PF x HA)/IE) + SLA]

where

ETo is reference evapotranspiration

PF is Plant Factor

HA is hydrozone area in square feet

IE is irrigation efficiency (minimum 0.71)

SLA is the amount of special landscape area in square feet;

ii. Landscaping plans shall provide EAWU (in the same units as the MAWA) for each valve circuit in the irrigation hydrozone. The sum of all EAWU calculations shall not exceed the MAWA for the project;

iii. The plant factor used shall be from WUCOLS. The plant factor for low water use plants range from 0 to 0.3, for moderate water use plants range from 0.4 to 0.6, and for high water use plants range from 0.7 to 1.0.

iv. The plant factor calculation is based on the proportions of the respective plant water uses and their plant factor, or the factor of the higher water using plant used.

v. The surface area of a water feature shall be included in the high water use hydrozone area of the water budget calculation and temporarily irrigated areas in the low water use hydrozone.

12. Planting plans and Irrigation plans (Section 5.C.) shall be drawn at the same size and scale.

13. The Planting plan shall be prepared by a Landscape Architect licensed by the State of California.

C. **IRRIGATION DESIGN PLAN REQUIREMENTS.**

1. Irrigation systems shall be designed, maintained, and managed to meet or exceed an average irrigation efficiency of 0.71.
2. All irrigation systems shall be designed to prevent runoff, over-spray, lowhead drainage and other similar conditions where water flows off-site on to adjacent property, non-irrigated areas, walk, roadways, or structures. Irrigation systems shall be designed, constructed, managed, and maintained to achieve as high an overall efficiency as possible. The irrigation system shall be designed to ensure that the dynamic pressure at each emission device is within the manufacturer's recommended pressure range for optimal performance.
3. Landscaped areas shall be provided with a smart irrigation controller which automatically adjusts the frequency and/or duration of irrigation events in response to changing weather conditions unless the use of the property would otherwise prohibit use of a timer. The planting areas shall be grouped in relation to moisture control zones based on similarity of water requirements (i.e., turf separate from shrub and groundcover, full sun exposure areas separate from shade areas, top of slope separate from toe of slope). Additional water conservation technology may be require, where necessary, at the discretion of the Planning Director.
4. Water systems for common open space areas shall use non-potable water, if approved facilities are made available by the water purveyor. Provisions for the conversion to a non-potable water system shall be provided within the landscape plan. Water systems designed to utilize non-potable water shall be designed to meet all

applicable standards of the California Regional Water Quality Control Board and the Riverside County Health Department.

5. Separate valves shall be provided for separate water use planting areas, so that plants with similar water needs are irrigated by the same irrigation valve. All installations shall rely on highly efficient state of the art irrigation systems to eliminate runoff and maximize irrigation efficiency as required by the Landscaping Guide.

6. Static water pressure, dynamic or operating pressure and flow reading of the water supply shall be measured. These pressure and flow measurements shall be conducted at the design stage. If the measurements are not available at the design stage, the measurements shall be conducted at the installation.

7. The capacity of the irrigation system shall not exceed:

   a. the capacity required for peak water demand based on water budget calculations;

   b. meter capacity; or

   c. backflow preventer type and device capacity.

8. Sprinkler heads and other emission devices shall have matched precipitation rates, unless otherwise directed by the manufacturer.

9. In mulched planting areas, the use of low volume irrigation is required to maximize water infiltration into the root zone.

10. Non-turf areas on slopes greater than 25% shall be irrigated with drip irrigation or other low volume irrigation technology.

11. Long-narrow, or irregularly shaped areas including turf less than eight (8) feet in width in any direction shall be irrigated with subsurface irrigation or low-volume irrigation technology.

12. Overhead irrigation shall not be permitted within 24 inches of any non-permeable surface. There are no restrictions on the irrigation system type if the landscape area is adjacent to permeable surfacing and no overspray and runoff occurs.

13. Overhead irrigation shall be limited to the hours of 8 p.m. to 9 a.m.

14. All irrigation systems shall be equipped with the following:

    a. A smart irrigation controller as defined in Section 5.C.4. of this Ordinance;

    b. A rain sensing device to prevent irrigation during rainy weather;

    c. Anti-drain check valves installed at strategic points to minimize or prevent low-head drainage;

    d. A manual shut-off valve shall be required as close as possible to the point of connection of the water supply, to minimize water loss in case of an emergency or routine repair;

    e. A pressure regulator when the static water pressure is above or below the recommended operating pressure of the irrigation system;

    f. Backflow prevention devices; and

    g. Riser protection components for all risers in high traffic areas.

15. Dedicated landscape meters shall be required for all projects greater than 2,500 square feet except single-family residences.

16. Irrigation design plans shall identity and site the following:

    a. Hydrozones:

        i. Each hydrozone shall be designated by number, letter or other designation.

in gallons per month and gallons per year, for the established landscape; and

l. Irrigation design plans shall contain the following statement, "I agree to comply with the criteria of Ordinance No. 859 and to apply the criteria for the efficient use of water in the irrigation design plan."

17. For each valve, two irrigation schedules shall be prepared, one for the initial establishment period of six months and one for the established landscape, which incorporate the specific water needs of the plants and turf throughout the calendar year.

18. Irrigation design plans and planting plans (Section 5.B.) shall be drawn at the same size and scale.

D. **SOIL MANAGEMENT PLAN REQUIREMENTS.**

1. After mass grading, the project applicant shall:

a. perform a preliminary site inspection;

b. determine the appropriate level of soil sampling and sampling method needed to obtain representative soil sample(s);

c. conduct a soil probe test to determine if the soil in the landscape area has sufficient depth to support the intended plants; and

d. obtain appropriate soil sample(s).

2. The project applicant shall submit soil sample(s) to a laboratory for analysis and recommendation. The soil analysis may include:

a. soil texture;

b. infiltration rate determined by laboratory test or soil texture infiltration rate tables;

c. pH;

d. total soluble salts;

e. sodium; and

f. recommendations.

3. The project applicant shall prepare documentation describing the following:

a. soil type;

b. identification of limiting soil characteristics;

c. identification of planned soil management actions to remediate limiting soil characteristics; and

d. submit the soil analysis report and documentation verifying implementation of soil analysis report recommendations to the County pursuant to the requirements of Section 7.C.

E. **GRADING DESIGN PLAN REQUIREMENTS.**

1. The landscape documentation submitted shall also include rough/precise grade elevations prepared for the project by a licensed civil engineer.

Section 6. **LANDSCAPE IRRIGATION AND MAINTENANCE.** This section shall apply to all projects subject to the provisions of this Ordinance as set forth in Section 4.

A. Two irrigation schedules shall be prepared, one for the initial establishment period of six months and one for the established landscape, which incorporate the specific water needs of the plants and turf throughout the calendar year. The irrigation schedule shall take into account the particular characteristics of the soil; shall be continuously available on site to those responsible for the landscape maintenance; and shall contain specifics as to optimum run time and frequency of watering, and irrigation hours per day. The schedule currently in effect shall be posted at the controller.

B. A regular maintenance schedule and Certificate of Completion shall be submitted to the Planning Director, property owner, and water purveyor. A regular maintenance schedule shall include, but not be limited to, routine inspection, adjustments, and repair of the irrigation system and its components; aerating and dethatching turf areas; replenishing mulch; fertilizing; pruning; weeding in all landscape areas and removing any obstruction to irrigation devices. Repair of all irrigation equipment shall be done with the originally installed components or equivalent.

C. All model homes that are landscaped shall use signs and written information to demonstrate the principles of water efficient landscapes described in this Ordinance.

D. Information shall be provided to owners of new, single family residential homes regarding the design, installation, management, and maintenance of water efficient landscapes.

Section 7. COMPLIANCE/PLAN SUBMITTAL PROCESS. Prior to issuance of a building permit for the project, the project applicant shall:

A. Submit all landscape documents for review and approval by the Planning Director. The planting plan, irrigation design plan, and soils management plan shall be reviewed by an independent licensed landscape architect to ensure that all components of the plans adhere to the requirements of this Ordinance. The licensed landscape architect shall sign the plans verifying that the plans comply with this Ordinance. Any plans submitted without the signature of a licensed landscape architect shall not be accepted for review.

B. Prior to issuance of a certificate of occupancy or final inspection for the project, a regular maintenance schedule and a Certificate of Completion shall be submitted to the Planning Director certifying that

the landscaping has been completed in accordance with the approved planting, irrigation design, soil management, and grading design plans for the project. The Certificate of Completion shall be signed by a licensed landscape architect and shall indicate:

1. Date;
2. Project information:
   a. Project name;
   b. Project applicant name, telephone and mailing address;
   c. Project address and location; and
   d. Property owner name and mailing address;
3. Prior to backfilling, evidence that the party responsible for irrigation installation conducted a preliminary field inspection of the irrigation system (evidence of field inspection shall be attached);
4. The landscaping has been installed in conformance with the approved planting and irrigation design plans;
5. Irrigation audit report performed by a certified irrigation auditor after project installation (audit report shall be attached);
6. The smart irrigation controller has been set according to the irrigation schedule;
7. The irrigation system has been adjusted to maximize irrigation efficiency and eliminate overspray and runoff; and
8. A copy of the approved landscape documentation (Section 5), the irrigation schedule (Section 6.A.) and the maintenance schedule (Section 6.B.) has been given to the property owner and local water purveyor.
9. Verification that the maintenance schedule has been provided to the Planning Director.

C. At a minimum, all landscape irrigation audits shall comply with the "Irrigation Association Certified Landscape Irrigation Auditor Training Manual" (2004 or most current) and shall be conducted by a certified landscape irrigation auditor.

D. The Planning Director or his/her designee shall have the right to enter upon the project site at any time before, during and after installation of the landscaping, to conduct inspections for the purpose of enforcing this Ordinance.

Section 2. The provisions of this Ordinance shall not take effect until thirty (30) days after its adoption.

BOARD OF SUPERVISORS OF THE COUNTY
OF RIVERSIDE, STATE OF CALIFORNIA

By: _____
Chairman, Board of Supervisors

ATTEST:
CLERK OF THE BOARD

By: _____
Deputy

(SEAL)

APPROVED AS TO FORM
September 3, 2009

By: Karin Watts-Bazan
KARIN WATTS-BAZAN
Deputy County Counsel

KWB:mdk
08/20/09
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Board of Supervisors **Attachment B** **County of Riverside**

RESOLUTION NO. 2009-289
COORDINATION WITH WATER PURVEYORS CONCERNING LANDSCAPE WATER EFFICIENCY PROGRAMS

WHEREAS, the State of California has enacted the Water Conservation in Landscaping Act (Landscaping Act);

WHEREAS, Assembly Bill 1881 amends said Landscaping Act to require the Department of Water Resources to update the State's model water efficient landscape ordinance in accordance with certain specified requirements;

WHEREAS, the Department of Water Resources has updated the State's model efficient landscape ordinance;

WHEREAS, said Landscaping Act mandates local agencies to, no later than January 1, 2010, adopt the State's model ordinance or a water efficient landscape ordinance that is at least as effective in conserving water as the updated model ordinance;

WHEREAS, the Board of Supervisors on September 29, 2009 adopted a comprehensive amendment to Ordinance No. 859 (Riverside County's ordinance establishing water efficient landscape requirements) in order to comply with Assembly Bill 1881;

WHEREAS, the State's model water efficient landscape ordinance includes provisions regarding the efficiency and analysis of landscape irrigation water use and it is the purpose of this Resolution to provide an equivalent mechanism;

WHEREAS, Ordinance No. 859, in combination with the requirements of Board Policy H-25 and the provisions of this Resolution, is at least as effective in conserving water as the State's updated model ordinance.

FORM APPROVED COUNTY COUNSEL
KARIN WATTS-BAZAZ 8/27/09
DATE

BE IT RESOLVED, DETERMINED, AND ORDERED by the Board of Supervisors of the County of Riverside, State of California, in regular session assembled on September 29, 2009, as follows:

1. The County of Riverside shall rely on local water purveyors, as the direct and immediate supplier of water, to enforce landscape water use efficiency standards with respect to existing customers.
2. The Board of Supervisors hereby requests local water purveyors to identify programs that enhance and encourage landscape water use efficiency such as:
   a. a tiered water rate structure, or
   b. an allocation-based conservation water pricing structure, or
   c. a rate structure at least as effective as the aforementioned options, or
   d. establishment of a program to administer/perform irrigation audits and/or irrigation surveys to insure the landscape areas of its customers meet the maximum applied water allowance, or
   e. the imposition of penalties, including fines for water waste.

The Board of Supervisors hereby directs the Planning Director, or his designee, to transmit a copy of this Resolution to all water purveyors providing service to customers with the unincorporated area of Riverside County

MEETINGS

(Examples)

RIVERSIDE COUNTY STORMWATER MANAGEMENT PROGRAM
MANAGEMENT STEERING COMMITTEE
SANTA ANA/SANTA MARGARITA REGIONS

MEETING MINUTES
for
May 21, 2009

Attendees:

Jason Uhley	RCFC&WCD
Linda Garcia	RCFC&WCD
Alex Gann	Riverside County Executive Office
Joe Aklufi	City of Beaumont
Kishen Prathivadi	City of Beaumont
Randy Anstine	City of Calimesa
Habib Motlagh	City of Canyon Lake
Rudy Fandel	City of Corona
Tom Koper	City of Corona
Bill Woolsey	City of Murrieta
Andy Okoro	City of Norco
Habib Motlagh	City of Perris/Canyon Lake
Barry McClellan	City of San Jacinto
Ron Grider	City of Wildomar

1. ***Welcome and Self Introductions – Jason Uhley, RCFC&WCD***

Jason Uhley welcomed everyone to the meeting and initiated self introductions of attendees. Jason noted that this meeting was the 4th and final meeting of the fiscal year.

2. ***Review May 21, 2009 Agenda and Approval of April 16, 2009 Meeting Minutes – Jason Uhley, RCFC&WCD***

Handouts Provided

- Agenda for May 21, 2009
- Minutes for April 16, 2009
- General Construction Permit Update (From Best, Best and Krieger and CASQA)

Jason added Riverside County Issued a draft ACL to agenda item 3.

Minutes were approved.

3. ***Santa Ana/Santa Margarita Program Status - Jason Uhley, RCFC&WCD***

- **General Construction Permit** – (Last page of agenda handout). Existing Permit has been in effect since 1999. There is a revised draft out for review. The State Board would like to have the Permit adopted by October 2009. Jason explained that the new Permit has erroneous provisions in that there is a lot more monitoring required. It will require staffs who conduct inspections for public works projects or preparing stormwater pollution prevention plans for public works projects to go through a formal training program and obtain certification. The Stormwater Pollution Prevention Plan will be a much more dynamic document that will need to

be continuously updated, in which there are associated costs. There are also additional BMP requirements; because this is a draft Permit, things can change. More importantly, Jason added that there is no grandfathering clause for projects that will be in construction at the time the Permit is adopted, which means that Permittees may want to include in any specifications for any projects they expect to be active across the period of the Permit renewal, language that will require contractors to comply with the new draft Permit. It was asked if this applied to all agencies. Jason explained that the General Construction Permit applies to any construction project that disturbs more than 1 acre and applies to all agencies. Updates and additional information will be provided to the NPDES TAC representatives. Please see handout provided at meeting for more detailed General Construction Permit information.

As of the May 21st MSC Meeting, the draft Santa Ana NPDES MS4 Permit had not yet been released.

- **Permit Renewal Status**
  1. **North Orange County MS4 Permit** – There is an adoption hearing scheduled for May 22, 2009. The one item left for discussion on the North Orange County Permit deals with what types of BMPs will be required for new developments whether they are public or private. The issue is whether or not the Permit will mandate that all new projects infiltrate or reuse stormwater on site. Currently there is no requirement to infiltrate. The Counties of Orange, San Bernardino and Riverside, along with the BIA are expected to attend the adoption hearing and will be recommending that filtration BMPs be identified as part of the allowable BMPs to be used as part of a development project. It is likely that what is adopted for Orange County will be modeled for the Riverside County MS4 Permit in the Santa Ana Region.

  2. **South Orange County MS4 Permit** – This Permit is issued by the San Diego Regional Board. It is expected that this Permit will be the template for the Santa Margarita Region MS4 Permit for Riverside County. A meeting is set for May 26, 2009 with Board staff to discuss the LID provisions. As this Permit forms, updates will be provided. The most important issue with this Permit is that it would require a prohibition of excess irrigation runoff. San Diego County is working diligently to get the language of the Permit revised.

  3. **Riverside County Issued a draft ACL** – Last week the County of Riverside received a draft Administrative Civil Liability (ACL) fine from the San Diego Regional Board for 1.2 million dollars. The fine alleged that the County did not have a public works WQMP process. Jason discussed details of the two projects (1 in Santa Ana watershed and 1 which went across the watershed boundary) in which the draft ACL evolved. This raises the point for those Cities that are across that boundary, in that they need to be very careful in making sure that they know where their projects are relative to their Permit areas.

4. ***TMDL Development – Jason Uhley, RCFC&WCD***

- **Lake Elsinore and Canyon Lake Nutrient TMDL** – Jason advised City Managers and representatives to make sure that their staff is attending the meetings for the TMDLs. The next meeting is set for August 3rd at 2 p.m. There was discussion on issues with Lake Elsinore. Jason stated that Permittees have been out of compliance in regards to the measures of the target parameters. The Task Force will need to reevaluate how success at the lake is being determined. This will be a very expensive long term effort and will take a couple of years to get around to.

- **Middle Santa Ana River Watershed Bacteria Indicator TMDL** - No updates.

- **Santa Ana Region Draft 303 (d) List** – No updates.

5. ***New Agenda Items/Schedule Next MSC Meetings - Jason Uhley, RCFC&WCD***

- **Schedule Next MSC Meeting** – The next meeting was set for October 15th. Subsequently, the draft Riverside County MS4 Permit was released and the meeting was rescheduled to August 20th.

NEXT MEETING IS SET FOR
August 20, 2009
AT
RIVESIDE COUNTY EXECUTIVE OFFICE, FIFTH FLOOR, ROOM C
4080 Lemon Street, Riverside, CA 92501

Visit the StormWater/Clean Water Protection Program website at:
http://rcflood.org/NPDES/
The site contains a variety of useful stormwater program information including links to other stormwater management programs and related web sites.

P8/126352

Water Quality Management Committee

Meeting Agenda
July 21, 2008
10:00-11:00
Riverside County Executive Office-Conference Room A

1. **Self Introductions**

2. **Notice of Violation-Santa Ana Audit of 2006**
   a. **Next steps**
      - **FPPPs for Parks District**

3. **Notice of Violation-San Diego Audit of 2007 & follow-up 2008**
   a. **Next steps**
      - **EDA and FM**

4. **Department updates and discussion points**
   a. ***Environmental Health***
   b. ***Building and Safety***
   c. ***Transportation Department***
   d. ***Planning Department***
   e. ***Code Enforcement***
   f. ***Facilities Management***
   g. ***EDA/RDA***
   h. ***Parks and Open Space District***

5. **Flood Control and Water Conservation District Updates**

6. **Training**

7. **IRWM Progress (Prop 50, Prop 84, Prop 1E)**
   a. Anza-$50,000 Capacity Building Grant

8. **IC/ ID complaints**

9. **Non-agenda items and round table discussion.**

10. **Next meeting date <u>September 15, 2008</u>**

Water Quality Management Committee

Meeting Agenda
April 20, 2009
10:00-11:00
Riverside County Executive Office-Conference Room A

1. **Self Introductions**

2. **Department updates and discussion points**
   - ***a. Environmental Health Jeff Lojeski***
   - ***b. Building and Safety-Chandra Santiago***
   - ***c. Transportation Department-Glen Higa***
   - ***d. Planning Department-Kristi Lovelady***
   - ***e. Code Enforcement-Hector Viray***
   - ***f. Facilities Management-Claudia Steiding***
   - ***g. EDA/RDA-Lance Nolan***
   - ***h. Parks and Open Space District-Marc Brewer***

3. **Flood Control and Water Conservation District Updates-Jason Uhley**
   - a. Monthly Report
     - ROWD-Santa Margarita River MS4 Permit
     - Permit negotiations Santa Ana River MS4 Permit
     - c. SWMP / WQMP-Whitewater River MS4 Permit
     - Ventura County and Orange County Santa Ana MS4Permit and ramifications to Riverside County
       - CASQA Newsletter
   - b. TMDLs

4. **Training**
   Spring Training through Flood Control now available

5. **IC/ ID complaints**
   - a. Grey Squirrel (Rancho Glen Oaks)-Status Report from Code Enforcement

6. **Non-agenda items and round table discussion.**

7. **Next meeting dates <u>May 18, 2009.</u>**

Riverside County Flood Control & Water Cons
NPDES Stormwater Quality Tra

Home Courses Locations Presentations Need Help? Register

Storm Water Quality Training

Annual training is required by our National Pollutant Discharge Elimination System (NPDES) Permits to ensure that water quality is protected. Not attending training may result in non-compliance for your municipality and possible fines for your programs. Click on the "Need He link if you have questions on which class if any is right for you."

Riverside County's Flood Control & Water Conservation District provides the following **NO FEE TRAINING**:

- Construction Training
- Industrial/Commercial Training
- WQMP Training
- Municipal Training

This website is designed to provide multiple ways of determining which class is right for you. Each path will take you to the same webpage that will allow you to register for yourself and/or for multiple people.

Login:
For those who've already registered.

Email:

Password:

Submit

Note: All of the login accounts are res every training period. Please register fc training season to login.

Please note that we are going **GREEN**! Unlike the previous trainings, NPDES training classe now be virtually ***paperless***. All presentation materials and handouts will be posted on this we Copies of the presentation materials will ***not*** be available at the training. Attendees are encou to print in advance any presentation materials they want to have in class. All presentation ma will be posted on-line at this site after the training for attendees to reference or download.

Please let us know in advance if you need public education materials. Click here to view our form.

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CASQA California Stormwater Quality Association™
Dedicated to the Advancement of Stormwater Quality Management, Science and Regulation

Week of April 13, 2009

In this Update:

1. May 15 CASQA General Membership meeting and webcast focus is stormwater harvesting and reuse
2. 5th Annual CASQA Conference – Exhibitor space and General registration now available
3. Upcoming CASQA Committee / Subcommittee meetings / conference calls
4. Position openings / Opportunities
5. City of Stockton survey of Phase I Stormwater Rates

1. **May 15 CASQA General Membership meeting / webcast to focus on stormwater harvesting and reuse** – The 2nd quarterly meeting / webcast of the year will focus on a very timely issue and one that affects water supply and stormwater quality agencies. We have put together an agenda covering stormwater permit issues, California's water balance and water supply, examples of regional agencies' efforts to harvest precipitation, a discussion of regulatory barriers and solutions to using stormwater, and case studies showcasing the use of different source water, treatment systems, and re-uses. Click **here** for the agenda. Click **here** to register to attend the meeting or watch the webcast.
   - Friday, May 15 (3rd Friday) – General Membership meeting and webcast (2nd quarterly) at the Waterfront Hotel in Jack London Square, Oakland.

2. **5th Annual CASQA Conference–Exhibitor space and General registration now available**– The 2009 CASQA Stormwater Conference will be held November 2-4, 2009 at sunny Mission Bay in San Diego! The theme for this year's Conference is: "Stormwater Management: Challenges and Solutions." The CASQA 2009 Conference will again offer a full program of training workshops, presentations, and exhibits for holders of municipal, industrial, and construction NPDES stormwater permits. Click **here** for registration and other information.

   The 2009 CASQA Conference is the premier event for addressing municipal, industrial, and construction stormwater issues. CASQA prides itself on offering its members timely information on critical stormwater issues from the most influential and experienced leaders in the field. CASQA's work products, including past Conferences, the Program Effectiveness Assessment manual, and our various Stormwater BMP Handbooks have received national recognition. CASQA's committee members have been influential in promulgation of state and federal regulations, statewide NPDES Permits, and formulating strategies to assist local governments, businesses, and contractors in addressing many critical policy issues vexing the state. The 2009 Conference will present our latest updates and the latest information regarding critical stormwater issues including:

   - Regulations, Permits, and Policies
   - Sustainable Development
   - True Source Control
   - Stormwater Treatment
   - Pollutants of Concern
   - Modifying Public Behavior
   - Program Assessment
   - Scientific Advances

If you only attend one stormwater conference this year, this is the one!

The 2009 Conference will be held at the Hilton San Diego Resort & Spa located at 1775 East Mission Bay Drive, San Diego, CA 92109. Click here for map and transportation information. The conference hotel is located just six miles from the San Diego International Airport and right on San Diego's famous Mission Bay. The Hilton San Diego Resort & Spa is centrally located near the world famous San Diego Zoo, Balboa Park, Historic Old Town, and the Gaslamp Quarter, host to world class shopping and fine dining.

3. **Upcoming CASQA Committee / Subcommittee meetings / conference calls**
   - Tuesday, April 14: 3:30 – Policy & Permitting Subcommittee call (Richard Boon)
   - Wednesday, April 15; 2:30 – Phase II Subcommittee call (Kelye McKinney)
   - Thursday, April 16; 8:30 – Watershed Management & Impaired Waterbodies Subcommittee call (Rich Watson)

   - Tuesday, April 21; 8:00 – Membership Committee call (Scott Taylor)

4. **Position openings / Opportunities**
   - City of Santa Rosa; 2 Associate Civil Engineer positions (see attached)

5. **City of Stockton survey of Phase I Stormwater Rates**
   The City of Stockton implemented its current Stormwater Rate (service fee) in 1991 and has not had an increase since the Rate was established. In order to prepare for a Rate study, the City is conducting a survey of Phase I communities around California and is asking for information from communities that have Stormwater Rates in place. The following information is being requested:

   Name of community
   Population
   Current Stormwater Rate
   Year Rate was last increased
   CPI or annual increase
   Was there a Prop 218 vote? If so, was it successful?

   Please send the information to: Courtney D. Vasquez, Stormwater Program Manager, City of Stockton Municipal Utilities Department
   Courtney.vasquez@ci.stockton.ca.us

Review of Draft South Orange County MS4 Permit

Key Management Issues

April 16, 2009

StormWater

Background

South Orange County MS4 Permit:

- February 2008 adoption hearing–
  - USEPA Region IX staff did not endorse adoption
  - RWQCB staff directed to revise
  - No consultation with OC Permittees
- Model for Santa Margarita Region MS4 Permit

StormWater

Non-Stormwater Runoff

- Dry weather discharges:
  - Are not "storm water"
  - Maximum Extent Practicable (MEP) standard not applicable
- Mandates prohibition of non-stormwater discharges:
  - Landscape irrigation
  - Irrigation water
  - Lawn watering
- Establishes numeric effluent limits for non-stormwater based on:
  - Basin Plan Objectives
  - California Toxics Rule
  - USEPA criteria

StormWater

MS4 Stormwater Discharges

- Establishes Municipal Action Levels (MALs)
  - Numerical discharge limits
  - Based on nationwide MS4 monitoring
- Exceedance of MALs presumes failure to comply with MEP (i.e., violation)
- No exceedance of MALs does not presume MEP is met

StormWater

MS4 Stormwater Discharges
(continued)

- MS4 facilities will be subject to hydromodification requirements
- MS4 discharges must comply at all times irrespective of source and manner of discharge
- Asserts that trash is a serious threat to beneficial uses

StormWater

Permittee Compliance Programs

- Mandates Treatment Control BMP databases
- Annually
  - Inspect 100% of Permittee and "high priority" privately-owned Treatment Control BMPs
  - Verify that @ least 90% of WQMPs are implemented
  - Inspect and remove accumulated waste from all MS4 facilities
  - Develop and update Watershed Water Quality Work Plan

StormWater

Permittee Programs
(continued)

- Develop and implement Hydromodification Management Plan
- Expand HOA oversight and enforcement programs
- Must develop long-term funding/business plan for compliance program

StormWater

New Development Requirements

- Redefines Priority Development Project to include commercial and industrial projects >1 acre (versus 100,000 sq ft impervious)

StormWater

New Development
(continued)

WQMPs for Priority Development Projects

- Specific Low Impact Development BMPs must be incorporated
- Irrigation runoff must be eliminated
- Landscaping with native or low water species required
- Effective Impervious Area (EIA) limited to 5% of project area pending development of Permittee programs

StormWater cleanWater

New Development
(continued)

WQMPs for Priority Development Projects

- Comply with Permittee-developed hydromodification requirements
- Reviews of WQMPs must include assessment of:
  - Techniques to infiltrate, filter, store, evaporate, or detain runoff
  - Potential collection of storm water for reuse onsite or offsite
  - Alternatives to conventional stormwater conveyance and management

StormWater cleanWater

Existing Development

Mandates retrofit of existing development with Source Control and Treatment Control BMPs including LID in accordance with Standard Stormwater Mitigation Plan* (SSMP) requirements

**Not Standard Urban Stormwater Mitigation Plan (SUSMP). The word "urban" has been struck throughout the Tentative Draft.*

StormWater cleanWater

Construction

Ordinances must include the following sanctions for non-compliance:

- Non-monetary penalties
- Fines
- Bonding requirements
- Permit/occupancy denials

StormWater cleanWater

Monitoring & Special Studies

- Each CoPermittee required to conduct non-storm numeric effluent monitoring
- Urban stream toxicity study
- Trash and litter impairment investigation
- Inventory and evaluate MS4 facilities as pollutant source
  - Identify source controls
  - Evaluate feasibility of retrofit

StormWater

MS4 Permit Adoption Process

- Draft Orange County MS4 Permit released March 13 and workshop held April 3
- Deadline for written comments April 24
- MS4 adoption hearing scheduled for June 10

StormWater

Summary

- Asserts Permit not an "Unfunded State Mandate"
- Standards of compliance based on numeric standards
- Expansion of New Development requirements
- Requirements for retrofit
- Expansion of monitoring/special studies

  If applied in SMR, would result in significant increase in compliance costs

StormWater

Please plan to join us for a one day conference

Storm Water Issues: Changes, Challenges, and Solutions

Plus Other Construction Water Handling Solutions

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Friday, May 15, 2009

9:00 am to 3:00 pm

Rain for Rent
6400 Fischer Road
Riverside, CA

- Panel discussions

Public Sector Panelists
Chandra Santiago, Riverside County Environmental Compliance Division
Michael Roth, Santa Ana Regional Water Quality Board
Dan Ilkay, San Bernardino County Stormwater Program

Private Sector Panelist
Allison Mackenzie, E.S. Babcock & Sons Inc
Joe Zucker, Hall & Foreman Inc
Joel Woolf, Rain for Rent
Clayton Miller, BIA of Southern California

- Vendor displays

Construction water-related products and solutions

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3404 State Road
Bakersfield, CA 93308

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Sign In Log
Water Quality Management Meeting
July 21, 2008

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WQMC
Sign In. Sheet Oct 2008

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Dec 15, 2008

Sign In WQMC

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County of Riverside Water Quality Management Committee
County Executive Office
4080 Lemon Street, 4th Floor, Conference Room A, Riverside, California 92501

Monday, January 26, 2009
10:00 a.m.

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Sign In Log
Water Quality Management Meeting
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ALBERT MARTINEZ	RCFC	951.955.2901	amart@rcflood.org

018863

Sign In Sheet

Mar 2009

Water Quality Management Meeting.

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Water Quality Management Meeting
April 20, 2009
Sign In Log

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Kristi Lovelady	Co. Planning	955-0781	Klovelad@ rctlma.org

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WATER QUALITY MANAGEMENT MEETING
May 18, 2009

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Alex Gann	EO	5-1110	

018866

Sign In Log
Water Quality Management Meeting
June 15, 2009

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Jason Kirkley	EC	51273	

`CIP TEAM AGENDA
Executive Office, Conference Room D
October 27, 2008 3:30 pm
(BOS Date 11/04/08)

1. Call to Order

2. Forms 11

103 FM (Sheriff) – Progress Report Regarding the Hub Jail Facility Construction Project

104 FM – Hemet Family Care Center (architectural and engineering services agreement)- ***Project will generate over 5000 sq ft of impervious surface and therefore a WQMP to address hydromodification and LID requirements shall be implemented. SWPPP during construction will necessitate BMPs to MEP standard. Post construction BMPs will be sized in accordance with the WQMP. Post construction BMPs shall have an O & M plan in place at time of building acceptance.***

123 FM – Desert Hot Springs Family Care Center (Schematic Design) ***Project will generate over 5000 sq ft of impervious surface and therefore a WQMP to address hydromodification and LID requirements shall be implemented. SWPPP during construction will necessitate BMPs to MEP standard. Post construction BMPs will be sized in accordance with the WQMP. Post construction BMPs shall have an O & M plan in place at time of building acceptance.***

134c EDA – Consent to the Purchase of Real Property by the RDA known as APNs: 727-161-018, 019, 020, 021, 024 and 727-165-040, Desert Communities Project Area, 4th District

139FM – Blythe Fleet Services Fueling Station and Car Wash (Schematic Design) ***Project will generate over 5000 sq ft of impervious surface and therefore a WQMP to address hydromodification and LID requirements shall be implemented. SWPPP during construction will necessitate BMPs to MEP standard. Post construction BMPs will be sized in accordance with the WQMP. Post construction BMPs shall have an O & M plan in place at time of building acceptance.***

Because this project will have above ground fuel storage tanks (ASTs) a Spill Prevention and Countermeasures Control Plan (SPCC) will be required. This plan must be approved by the Riverside County Department of Environmental Health prior to the operation of the AST.

CIP TEAM AGENDA
Executive Office, Conference Room D
November 10, 2008 3:30 pm
(BOS Date 11/18/08)

1. Call to Order

2. Forms 11

   205 FM (Probation) – Lease Agreement – Probation Department, Moreno Valley

   215 FIRE – Approve the Agreement for Consultant Services for the Riverside County Fire Department Strategic Plan

   224 FM (CHA) – Blythe Animal Shelter (Schematic Design)

   230 FM (RCRMC) – Riverside County Regional Medical Center Spine Clinic Remodel (Advertise for Bids)

   265 FM – County Administrative Center 7th Floor Renovation (Architectural Agreement)

   266 FM – Job Order Contract #002 – Approve Contract and Total Funding

   267 FM – North Shore Yacht Club Rehabilitation (Architectural Agreement)

3. Items for Discussion

4. Open Agenda

5. Next Meeting Date

CIP TEAM AGENDA
Executive Office, Conference Room D
December 1, 2008 3:30 pm
(BOS Date 12/9/08)

1. Call to Order

2. Forms 11

   402 FM (Courts) – Riverside Federal Court Grand Jury Remodel (advertise for bids)

   404 FM (DA) – Indio District Attorney and Public Defender Renovation Project Phase I

   405 FM (Sheriff) – Progress Report Regarding the Hub Jail Facility Construction Project

   406 FM (Public Defender) – Indio Public Defender – County Administrative Center Annex – Phase 2 (architectural services agreement)

   412 FM – Resolution No. 2008-406, Notice of Intention to Convey Real Property to the Riverside County Habitat Conservation Agency

   413 FM – Desert Hot Springs Family Care Center – Approval of Plans and Specifications for Street Improvements

   431 FM – Resolution No. 2008-499, Notice of Intention to Purchase Real Property in the City of Riverside, CA

   464 FM – License Agreement – Atrium Café, Riverside

3. Items for Discussion

4. Open Agenda

5. Next Meeting Date

CIP TEAM AGENDA
Executive Office, Conference Room B
February 2, 2009 - 3:30 pm
(BOS Date 2/10/09)

1. Call to Order

2. Forms 11

   307 FM – Perris Fueling Station and Car Wash – Notice of Completion (for information only)

   314 RDA – (Sheriff) Thermal Sheriff's Station and Aviation Facility Architectural and Engineering Services Agreement

   322 RCIT – In-Principle approval to authorize the Department of Facilities Management, Real Estate Division, to locate office space and negotiate a lease agreement for Riverside County Information Technology

3. Items for Discussion

4. Open Agenda

5. Next Meeting Date

   - Tuesday, February 17 at 9:00 am

CIP TEAM AGENDA
Executive Office, Conference Room B
March 16, 2009 – 3:30 p.m.
(BOS Date 3/24/09)

1. Call to Order

2. Forms 11

   806 PSEC Project Executive Steering Committee – PSEC Detail Design and Contract Amendments

   822 RDA – Jurupa Valley Aquatic Center - Findings and Approval of the Plans and Specifications

   823 RDA – Proposed Romoland/Homeland Community and Childcare Center and Park Project – Findings and Approval of the Plans and Specifications

   826 FM (Courts) – Riverside Federal Court Grand Jury Remodel (construction agreement)

3. Items for Discussion

4. Open Agenda

5. Next Meeting Date

   - Monday, March 23

CIP TEAM AGENDA
Executive Office, Conference Room B
April 6, 2009 – 3:30 p.m.
(BOS Date 4/14/09)

1. Call to Order

2. Forms 11

   203 FM (Fire) – Adopt Mitigated Negative Declaration, Mitigation Monitoring and Reporting Plan, and Addendum No. 1 for the Cajalco Fire Station and Improvements to Western Municipal Water District's Operation Center Project ("the Project").

   206 FM (Fire) – Glen Oaks Fire Station (Mitigated Negative Declaration)

   255 FM – Riverside Centre Roof Replacement (contractor agreement)

   256 FM (Sheriff) – Ben Clark Training Center Fire Drill Grounds Infrastructure Project Phase 1 and Phase II

   269 FM (Fire) – Glen Oaks Fire Station (advertise for bids)

3. Items for Discussion

4. Open Agenda

5. Next Meeting Date

   - Monday, April 13

CIP TEAM AGENDA
Executive Office, Conference Room B
April 27, 2009 – 3:30 p.m.
(BOS Date 5/5/09)

1. Call to Order

2. Forms 11

   503 Ben Clark Training Center Larry Parrish Parkway Extension – Phase 1A and 1B (advertise for bids)

   519 FIRE – Sole Source Purchase of Software Applications from Northrop Grumman Corporation

3. Items for Discussion

4. Open Agenda

5. Next Meeting Date

   - Monday, May 4

CIP TEAM AGENDA
Executive Office, Conference Room B
May 5, 2009 – 8:30 a.m.
(BOS Date 5/12/09)

1. Call to Order

2. Forms 11

✓ 601 EDA – ADA Paving Improvements at Riverside County Fairgrounds < >5000 SqFt) WQMP –

612 FM – Professional Service Agreement for Legal Services (French Valley Business Center) litigation – funding

✓ 613 FM – Southwest Justice Center Parking Lot Expansion (advertise for bids) WQMP

615 Sheriff-Coroner – Approval of Budget Adjustments to Purchase Security Cameras for the Sheriff's Criminal Justice Building

617 Housing Authority – Award of Consulting Services Agreement with Escalante Architects for Dr. Clair S. Johnson Apartments

✓ 631C EDA – Rancho Ramona Park Rehabilitation Project < need stormwater >

✓ 638 FM – Indio Volunteer Clinic (architectural and engineering services) WQMP

641 EDA – Bermuda Dunes Community Service Center

3. Items for Discussion

4. Open Agenda

5. Next Meeting Date

- Monday, May 11

CIP TEAM AGENDA
Executive Office, Conference Room B
June 1, 2009 – 3:30 pm
(BOS Date 6/9/09)

1. Call to Order

2. Forms 11

   903 PARKS – Gilman Historic Ranch and Wagon Museum Site Improvement Project - Notice of Completion – District V

   906 FM – Re-Route Downtown Voice and Data – Phase I (engineering service agreement)

   918 RCIT – Approval of the Agreement with Verizon Business Network Services Inc., on Behalf of Verizon Select Services Inc., to Provide Cabling Equipment and Installation Services for the Downtown Law Building

   919 AEFD – Resolution No. 2009-159, Authorization to Purchase Real Property Interests in the City of Banning, CA (Larry Smith Correctional Facility Project Expansion No. 3)

   922 AEFD – Resolution No. 2009-142, Authorization to Purchase Real Property Interests in the City of Banning, CA (Larry Smith Correctional Facility Expansion No. 3)

   931 FM/RCRMC – Riverside County Regional Medical Center Emergency Department / Trauma Expansion (architectural and engineering services agreement)

3. Items for Discussion

4. Open Agenda

5. Next Meeting Date

   - Monday, June 8 - 3:30 pm

CIP TEAM AGENDA
Executive Office, Conference Room B
June 22, 2009 – 3:30 pm
(BOS Date 6/30/09)

1. Call to Order

2. Forms 11

320	EDA	First Amendment – Personal Service Agreement for Legal Services
322	EDA *(FYI)*	Resolution No. 2009-222, Notice of Intention to Purchase, Public Safety Enterprise Communications Project Site, Clinton Keith
323	EO	Amendment to Capital Improvement Program (CIP) Policy B-22
343	EDA	Resolution No. 2009-053, Authorization to Purchase Real Property for the Public Safety Enterprise Communications Project, Morongo Site
347	FM	Probation Department Security/Safety Enhancements - Ratification of Actions and Notice of Completion of Riverside Juvenile Hall Security Lighting Project
366	EDA/ RCRMC	Riverside County Regional Medical Center Energy Update Project
374	EDA (FYI)	Mesa Verde Community and Childcare Center Project
376	IT	Approval of the Agreement with Verizon Business Network Services Inc., on behalf of Verizon Selection Services, Inc., to Provide Cabling Equipment and Installation Services for the Downtown Law Building

3. Items for Discussion

   - CIP Policy

4. Open Agenda

5. Next Meeting Date

   - Monday, July 6 3:30 pm

TRANING LOGS

PLEASE SIGN IN

NPDES STORMWATER QUALITY TRAINING FOR
Construction Training
Riverside County Flood Control & Water Conservation District

Meeting of: Monday, September 29 - 08:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
1	Kris	Harper	City of Banning	Public Utilities		
2	Joe	Arias	City of Banning	Public Utilities		
3	Roger	Ohms	City of Banning	Public Utilities		
4	Mike	Steen	City of Banning	Public Utilities		
5	Jason	Smith	City of Banning	Public Utilities		
6	Erick	Shackelford	City of Riverside	Public Utilities - Water Field	(951) 351-6350	
7	lewis	barry	Riverside County	Building & Safety	(951) 955-1800	BARRY LEWIS
8	Douglass	Gardenias	Riverside County	Transportation Department	(951) 955-1095	
9	James	Wilson	Riverside County	Transportation Department	(951) 955-1095	
10	Jeffrey	Kukulka	Riverside County	Waste Management	909 288 6410	
11	Brian	Hawkinson	Riverside County	Waste Management		
12	Mark	Hunt	Riverside County	Waste Management		
13	Rob	Istik	Riverside County	Waste Management		
14	Scott	Kraak	Riverside County	Waste Management		
15	Nguyen	Jessica	Riverside County	Waste Management		Jessica nguyen
16	Joe	Schupp	Riverside County	Waste Management		
17	Evangelina	Zapien	Riverside County	Waste Management		
18	RYAN	RIGHETTI	Riverside County	TRANSPORTATION	(951) 659-2603	
19	Rick	Fite	Riverside County	TRANSPORTATION	(951) 659-2603	
20	Morgan	Newlin	City of Hemet	Public Works Engineering	(951) 765-3855	

018878

NPDES STORMWATER QUALITY TRAINING FOR
Construction Training
Riverside County Flood Control & Water Conservation District

Meeting of: Monday, September 29 - 08:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
21	Daniel	Valenzuela	City of La Quinta	Public Works	(760) 777-7096	
22	Randy	Olgren	City of Riverside	PU Electric Field	(951) 351-6351	
23	Rick	Skelton	City of Riverside	PU Electric Field	(951) 351-6351	
24	Rusty	Clarke	City of Riverside	PU Electric Field	(951) 351-6351	
25	Roger	Wagner	City of Riverside	PU Electric Field	(951) 351-6351	
26	Greg	Yates	City of Riverside	PU Electric Field	(951) 351-6351	
27	Bill	Crumley	City of Riverside	PU Electric Field	(951) 351-6351	
28	Dave	McLellan	City of Riverside	PU Electric Field	(951) 351-6351	
29	Bruce	Taylor	City of Riverside	PU Electric Field	(951) 351-6351	
30	Casey	Whitney	City of Riverside	PU Electric Field	(951) 351-6351	
31	Dale	Underwood	City of Riverside	PU Electric Field	(951) 351-6351	
32	Matt	Field	City of Banning	Public Utilities		
33	Michael	Colantuono	City of Banning	Public Utilities		
34	Mario	Elizondo	City of Banning	Public Utilities		
35	michael	ramek	Riverside County	Building & Safety	(951) 955-1800	
36	ted	gascoigne	Riverside County	Building & Safety	(951) 955-1800	
37	rendell	klaarenbeek	Riverside County	Building & Safety	(951) 955-1800	
38	Shea	Anti	Riverside County	Waste Management		
39	Tim	Evans	Riverside County	Waste Management		
40	Donald	Gerber	Riverside County	Waste Management		

018879

NPDES STORMWATER QUALITY TRAINING FOR
Construction Training
Riverside County Flood Control & Water Conservation District

Meeting of: Monday, September 29 - 08:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
41	Christopher	Green	Riverside County	Waste Management		
42	Jason	Woods	City of Banning	Public Utilities		
43	Gregory	Oliver	City of Riverside	Public Utilities - Water Field	(951) 351-6350	
44	william	peppas	Riverside County	Building & Safety	(951) 955-1800	
45	richard	sharp	Riverside County	Building & Safety	(951) 955-1800	
46	Kenneth	McGregor	City of Riverside	Public Utilities - Water Field	(951) 351-6350	
47	Michael	Baggett	City of Riverside	Public Utilities - Water Field	(951) 351-6350	
48	Al	orozco	City of Riverside	Public Utilities - Water Field	(951) 351-6350	
49	gary	Kirby	City of Riverside	Public Utilities - Water Field	(951) 351-6350	
50	Randall	Marrs	Riverside County	Waste Management	951 640 5840	
51	Todd	Shibata	Riverside County	Waste Management	462 1 6	
52	[illegible]	[illegible]				
53	CHRIS	GREEN				
54	[illegible]	[illegible]	City of Banning	Utilities		
55	ERICK	SHACKELFORD	City of Riv.	utilities		
56	Rodney	Koenig	Riverside C.	waste Management	951-544-7210	
57	[illegible]	Sharp	County of Riverside			
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PLEASE SIGN IN

NPDES STORMWATER QUALITY TRAINING FOR
WQMP Training
Riverside County Flood Control & Water Conservation District

Meeting of: Monday, November 3 - 08:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
1	David	Cooper	Other	Consultant; Bureau Veritas	(858) 735-1352	
2	Guy	Pegan	City of Moreno Valley	Public Works	(951) 413-3115	
3	Josh	Frohman	City of Moreno Valley	Public Works	(951) 413-3251	
4	Timothy	Kearns	Riverside County	Facilities Management	(951) 955-9467	
5	Andres	Alfaro	Riverside County	Facilities Management	(951) 823-2724	
6	Arthur	Miller	Riverside County	Facilities Management		
7	Jim	Rossman	Riverside County	Facilities Management	(951) 901-5091	
8	Donald	Delgadillo	RCFC & WCD	Flood Control	(951) 955-4683	
9	Daisy	Barreto	RCFC & WCD	Plan Check	(951) 955-1269	
10	Jianhong	Xiong	Other	Consultant for RCFC & WCD	(858) 451-6100	
11	Lori	Wolfe	RCFC & WCD	Plan Check	(714) 402-9645	
12	Komy	Ghods	RCFC & WCD	Design	(951) 955-1326	
13	Mark	Westover	City of Moreno Valley	Public Works	(951) 413-3114	
14	DEEPAK	SOLANKI	City of Moreno Valley	CAPITAL PROJECTS DIVISION	(909) 268-7639	
15	Anabella	Hedman	Other	Consultant for RCFC & WCD	(858) 869-4851	
16	Monte	Bowers	Other	Consultant for RCFC & WCD	(858) 451-6100	
17	Marc	Crispin	Riverside County	Facilities Management	(951) 955-0167	

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NPDES STORMWATER QUALITY TRAINING FOR
WQMP Training
Riverside County Flood Control & Water Conservation District

Meeting of: Monday, November 3 - 08:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
18	Larry	Gonzales	City of Moreno Valley	Public Works	(951) 413-3130	
19	Marge	Lazarus	City of Moreno Valley	Public Works	(951) 413-3130	
20	Sergio	Pena	Riverside County	Facilities Management	(951) 955-2809	
21	kyle	gallup	RCFC & WCD	design	(951) 955-8627	
22	Mike	Wong	RCFC & WCD	Design	(951) 955-1205	
23	Amy	McNeill	RCFC & WCD	Design	(951) 955-1268	Amy McNeill
24	JERRAD	JACKSON	MORENO VALLEY		951 413-3171	
25	VIKKI	KUNTZ	COUNTY/FRIV.	DESIGN & CONST	951 955 0161	
26	~~KOR~~ STEVE	KORN	" "	" "	951.955.2549	
27	Lance	Noland	County of Riverside	EDA	955-9698	
28	JOHN	ALFRED	COUNTY OF RIVERSIDE	FACILITIES MGMT.	951-955-4844	
29	~~LORI~~	~~WOLFE~~				
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NPDES STORMWATER QUALITY TRAINING FOR
Municipal Training
Riverside County Flood Control & Water Conservation District

Meeting of: Tuesday, November 4 - 08:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
35	Terry	Anderson	Riverside County	Facilities Management	(951) 782-2449	
36	Ross	Rither	Riverside County	Facilities Management	(951) 358-5483	
37	Gilbert	Montanez	Riverside County	Facilities Management	(951) 955-4806	
38	Kevin	Short	Riverside County	Facilities Management	(951) 955-4115	
39	Arthur	Fong	Riverside County	Facilities Management	(951) 955-2500	
40	Stuart	Sheldon	City of Moreno Valley	Public Works	(951) 413-3483	
41	Tony	Silvas	City of Moreno Valley	Public Works Special Districts	(951) 616-7299	
42	Dave	Carrico	City of San Jacinto	Public Works	(951) 654-4041	
43	Joe	Vilchis	City of San Jacinto	Public Works	(951) 654-4041	
44	Frank	Zaldivar	City of San Jacinto	Public Works	(951) 654-4041	
45	Gilbert	Gonzales	City of San Jacinto	Public Works	(951) 654-4041	
46	Alfonso	Zubia	City of San Jacinto	Public Works	(951) 654-4041	
47	John	Holmes	City of San Jacinto	Public Works	(951) 654-4041	
48	Ann	Iaali	Riverside County	RCFC&WCD NPDES	955-1248	
49						
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NPDES STORMWATER QUALITY TRAINING FOR
Municipal Training
Coachella Valley Water District

Meeting of: Tuesday, November 18 - 08:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
1	Brandon	Garcia	Riverside County	Transportation Department	(951) 955-1095	
2	Donald	Raymond	Riverside County	Transportation Department	(951) 955-1095	Don Raymond
3	Alana	Townsend	City of Palm Desert	Public Works	(760) 346-0611	Alana Townsend
4	James	Breihan	City of Palm Springs	Aviation	(760) 318-3823	
5	Edward	Graff	City of Palm Springs	Aviation	(760) 318-3824	
6	Cora	Salas	City of Palm Desert	Public Works	(760) 346-0611	
7	Scott	Hamilton	City of La Quinta	Public Works		
8	Demetrio	Pecina	City of La Quinta	Public Works		
9	Ed	Houston	CVWD	Safety/Human Resources	(760) 398-2651	
10	Javier	Miranda	CVWD	Trades & Support	(760) 398-2651	Rene Luna for Javier Miranda
11	Javier	Loredo	CVWD	Trades & Support	(760) 398-2651	
12	Rick	Adamson	CVWD	Trades & Support	(760) 398-2651	
13	Juan	Hernandez	City of Palm Desert	Parks	(760) 346-0611	
14	Valerie	Wagner	City of Palm Springs	Street Maintenance	(760) 322-8364	Valerie Wagner
15	Larry	Naranjo	Riverside County	Facilities Management	(760) 921-5042	
16	George	Herrera	City of Palm Springs	Street Maintenance	(760) 322-8364	
17	Adam	Servin	Riverside County	Facilities Management	(760) 863-8704	

018884

18	Andy	Luna	Riverside County	Facilities Management	(760) 393-3253	
19	Jay	Mirpour	Whitewater Regional Board	Stormwater	(760) 776-8981	
20	Erich	Konrad	City of Palm Springs	Fleet Operations	7603238	
21	David	Flint	City of Palm Desert	Building Maintenance	(760) 346-0611	
22	Cyril	Snake	City of Palm Desert	Building Maintenance	(760) 346-0611	
23	Marco	Zamudio	City of Palm Desert	Public Works	(760) 346-0611	
24	Joe	Rojas	City of Palm Desert	Public Works	(760) 346-0611	
25	James	Lindsey	City of La Quinta	Public Works	(760) 777-7052	
26	Adolfo	Cabrera	City of La Quinta	Public Works		
27	Tim	Batten	City of La Quinta	Public Works		
28	Raphael	Alvarado	City of La Quinta	Public Works		
29	Agustin	Arellano	City of La Quinta	Public Works		
30	Steven	Rakestraw	City of Palm Springs	Fleet Operations	(760) 323-8168	
31	Jesus	Padilla	City of Palm Desert	Public Works	(760) 346-0611	
32	Frank	Duran	City of Palm Desert	Public Works	(760) 346-0611	
33	Ernesto	Teran	City of Palm Desert	Parks	(760) 346-0611	
34	Daniel	Lopez	City of Palm Desert	Public Works	(760) 346-0611	
35	Ruben	Castaneda	City of La Quinta	Public Works		
36	James	Staight	City of La Quinta	Public Works		
37	Beto	Gonzales	City of La Quinta	Public Works		
38	Alex	Martinez	City of La Quinta	Public Works		

39	Pablo	Rivera	City of Indian Wells	Public Works	(760) 776-0237	
40	Ryan	Bowen	City of Indian Wells	Public Works	(760) 776-0237	
41	Francisco	Torres	City of Palm Desert	Public Works	(760) 346-0611	
42	Jaime	Macias	City of Palm Springs	Fleet Operations	760 323-8168	
43	Freddy	Rios	City of Palm Desert	Public Works	(760) 346-0611	
44	Brian	Petree	City of Norco	Parks, Recreation and Community Services		
45	John	Carmona	Whitewater Regional Board	NPDES Unit	(760) 340-4521	
46	THOMAS	TVEIT	CITY OF COACHELLA	BLDG DEPT	760 398 3002	
47	ROBERT	RUEDA	CITY OF COACHELLA	PUBLIC WORKS	760 398 5744	
48	Gabriel	Pérez	City of Coachella	Community Development	760 398-3102	
49	Gabriel	Papp	" " "	" "	" " "	
50	PAVEL	HORN	CATHEDRAL CITY	ENG. DEPT.	760 770-0320	
51	Ramon	Villalobos	City of INDIO	Equipment Operator	760-347-1058	
52	Margarito	Bautista	City of Coachella	PUBLIC WORKS - streets	760/398-4202	
53	JESSE	Nunez	City of Coachella	Public work - streets	(760) 398-1202	
54	ALEX	ALARCON	City of COACHELLA	CODE ENFORCEMENT	760 398-4978	
55	GEORGE	INSUEZ	City OF COACHELLA	PUBLIC WORKS	760) 398-5744	
56	OSCAR	RODAS	CITY OF CATHEDRAL CITY	ENGINEERING	(760) 770-0327	
57	Sergio	Samaniego	City of Palm Desert	Public works	(760) 346-0611	
58	[illegible]	Jimenez	C.V.W.D.	INSPECTOR	760) 832-2906	
59	Jim	Kreizinger	C.V.W.D.	INSPECTOR	760 4859437	

018886

NPDES STORMWATER QUALITY TRAINING FOR
Construction Training
Riverside County Flood Control & Water Conservation District

Meeting of: Tuesday, September 30 - 13:00 - 17:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
18	Jeremy	Seward	Riverside County	Transportation Department	(951) 955-1095	
19	Hoang	Nguyen	City of Moreno Valley	Public Works	(951) 413-3216	
20	Chris	Sunde	City of Perris	Engineering	(951) 943-6504	
21	STEVEN	HOWARD	City of Riverside	PUBLIC WORKS	(951) 712-3904	Steve Howard
22	James	Caddel	City of Riverside	PUBLIC WORKS	(951) 329-7703	
23	Jean	Voshall	City of Temecula	Public Works	(951) 302-4144	
24	Tom	Cole	City of Temecula	Public Works	(951) 302-4144	
25	JUVENTINO	GARCIA	City of Riverside	PUBLIC WORKS	(951) 826-5599	
26	Tom	Mckay	Riverside County	transportation	(951) 313-2154	
27	Mac	McCall	City of Hemet	Public Works Engineering	(951) 765-2360	
28	Douglas	Norfolk	City of Norco	Eng.	(951) 545-7894	
29	Mervyn	Manalo	Riverside County	EDA	(951) 955-3408	
30	Melvyn "Matt"	Sayre	Riverside County	Transportation Department	(951) 955-1095	
31	Salvador	Lopez	Riverside County	Transportation Department	(951) 955-1095	Salvador Lopez #17
32	Lisa	Elder	Riverside County	Transportation Department	(951) 955-1095	
33	Julie	Meyer	Riverside County	Transportation Department	(951) 955-1095	Julie Meyer
34	Sean	Motlagh	Other	City of Perris, City of San Jacinto	(951) 943-6504	

018887

PLEASE SIGN IN

NPDES STORMWATER QUALITY TRAINING FOR
Construction Training
Riverside County Flood Control & Water Conservation District

Meeting of: Tuesday, September 30 - 13:00 - 17:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
1	Marianne	Parker	City of Temecula	Public Works	909-703-8354	Marianne L Parker
2	William	Taylor	City of Temecula	Public Works	(951) 302-4144	
3	Rodney	Koenig	Riverside County	Waste Management		
4	RYAN	RIGHETTI	Riverside County	TRANSPORTATION	(951) 659-2603	
5	Monica	Telles	Riverside County	EDA	(760) 863-2541	
6	Der	Xiong	Riverside County	EDA	(951) 955-3421	
7	Jim	Ayres	Riverside County	Economic Development Agency	(760) 863-2552	
8	Anna	Rodriguez	Riverside County	Economic Development Agency	(760) 863-2537	
9	Leah	Rodriguez	Riverside County	Economic Development Agency	(760) 863-2534	
10	Joaquin	Tijerina	Riverside County	Economic Development Agency	(760) 863-2529	
11	Larry	Bennett	Riverside County	Transportation Department	(951) 955-1095	
12	Henry	Gutierrez	Riverside County	Transportation Department	(951) 955-1095	
13	Zuri	Lowe	Riverside County	Transportation Department	(951) 955-1095	
14	Byron	Moreno	Riverside County	Transportation Department	(951) 955-1095	
15	Jeff	Gullett	Riverside County	Transportation Department	(951) 955-1095	
16	William E.	Anderson	Riverside County	Transportation Department	(951) 955-1095	
17	Monty	Smith	Riverside County	Transportation Department	(951) 955-1095	

018888

NPDES STORMWATER QUALITY TRAINING FOR
WQMP Training
Riverside County Flood Control & Water Conservation District

Meeting of: Monday, November 3 - 13:00 - 17:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
36	ANN	JAALI	RCFC&WCD	NPDES	955 1245	[illegible]
37	JAY	MARBOUR	RWQCB-7	NPDES	760	776-8981
38	John	Carman	" "	"	"	"
39	Daisy	Barrera	RCFC&WCD	Plan Check	955-1269	Daisy Barrera
40	Robert	Vasquez	RCFC&WCD	Design II		[illegible]
41	HOANG	NGUYEN	CITY OF MORENO VALL	NPDES	951-413-3216	Hoang Nguyen
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NPDES STORMWATER QUALITY TRAINING FOR
WQMP Training
Riverside County Flood Control & Water Conservation District

Meeting of: Monday, November 3 - 13:00 - 17:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
18	Quang	Nguyen	City of Moreno Valley	Public Works	(951) 413-3130	
19	Michael	Cairns	RCFC & WCD	Plan Check	(858) 866-0128	
20	Dennis	Downs	Riverside County	Facilities Management	(951) 955-0391	
21	Sean	Motlagh	Other	City of Perris, City of San Jacinto	(951) 943-6504	
22	Bob	Moehling	City of Murrieta	Engineering	(951) 304-2489	
23	Tim	Taylor	City of Hemet	Engineering	(951) 765-3889	
24	John	Kerenyi	City of Moreno Valley	Public Works Transportation Engineering	(951) 413-3199	
25	Henry	Ngo	City of Moreno Valley	Public Works	(951) 413-3130	
26	Ewina	Lau	City of Riverside	Parks, Recreation, & Community Services Department	(951) 826-2012	
27	Bill	Woolsey	City of Murrieta	Engineering	(951) 461-6073	Bill Woolsey
28	John	Hogard	City of Moreno Valley	Public Works	(951) 413-3130	
29	Alfredo	Del Toro	Riverside County	Facilities Management	(951) 955-8324	
30	Frank	Gonzales	Riverside County	Facilities Management	(951) 955-8467	
31	Jason	Plotkin	Riverside County	Facilities Management		
32	Nahid	Selbe	Riverside County	Facilities Management	(951) 955-4728	Nahid N. Selbe
33	Dane	Winkelman	Riverside County	Facilities Management	(951) 955-0394	
34	Rizaldy	Baluyot	Riverside County	Facilities Management	(951) 955-4889	
35	Randy	McDaniel	City of Riverside	Park Planning	(951) 826-2006	

018890

PLEASE SIGN IN

NPDES STORMWATER QUALITY TRAINING FOR
WQMP Training
Riverside County Flood Control & Water Conservation District

Meeting of: Monday, November 3 - 13:00 - 17:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
1	Christopher	Wiberg	City of Moreno Valley	Public Works	(951) 413-3130	
2	Edward	Perez	RCFC & WCD	Plan Check	(714) 750-7275	
3	Bruce	Norris	Riverside County	Facilities Management	(951) 955-0353	
4	Dawn	Torres	Riverside County	Facilities Management	(951) 955-4880	
5	Rita	Medellin	Riverside County	Facilities Management	(951) 955-0395	
6	Jeremy	Mueller	Riverside County	Facilities Management	(951) 955-4845	
7	Kent	Wegelin	City of Moreno Valley	Public Works	(951) 413-3497	
8	Arman	BULAONG Bualong	City of Perris	Engineering	(951) 943-6504	
9	Chris	Sunde	City of Perris	Engineering	(951) 943-6504	
10	John	Carmona	Whitewater Regional Board	NPDES Unit		
11	Ken	Horsley	RCFC & WCD	Planning	(858) 866-0128	
12	Lombardo	Detrinidad	RCFC & WCD	Planning	(619) 866-0128	
13	Rachel	McLure	City of Riverside	Parks, Recreation, & Community Services Department	(951) 826-2028	
14	Derek	Petersen	RCFC & WCD	Planning	(619) 920-6430	
15	Jeff	Fulton	RCFC & WCD	Plan Check	(760) 603-6091	
16	Nancy	Cano	Riverside County	Facilities Management	(951) 955-0392	
17	Rebecca	Tsagris	Riverside County	Facilities Management	(951) 955-8764	

018891

NPDES STORMWATER QUALITY TRAINING FOR
Construction Training
Riverside County Flood Control & Water Conservation District

Meeting of: Monday, September 29 - 13:00 - 17:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
45	Joanna	Dorham	City of Moreno Valley	Public Works	(951) 413-3192	
46	Chuck	Thurman	City of Banning	Public Utilities	951-922-3268	Chuck Thurman
47	Rick	Diaz	City of Banning	Public Utilities	9512324934	
48	Tim	McLaughlin	City of Banning	Public Utilities	951 922 3260	
49	Cameron	Hawley	City of Banning	Public Utilities	951849-1506	
50	Ryan	Frisby	City of Banning	Public Utilities	(951)314-1650	
51	Marques	Crews	Riverside County	Waste Management	(951)486-3269	
52	Noah	Rau	Riverside County	Waste Management	951-486-3260	Noah Rau
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NPDES STORMWATER QUALITY TRAINING FOR
Construction Training
Riverside County Flood Control & Water Conservation District

Meeting of: Monday, September 29 - 13:00 - 17:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
23	Art	Fuentes	Riverside County	Waste Management	951-486-3274	
24	Kaniz	Quazi	Riverside County	Waste Management		
25	Manuel	Ruiz	Riverside County	Waste Management		
26	Samuel	Theodora	City of Canyon Lake	Special Enforcement	(951) 244-2955	
27	Daniel	Cuthbertson	City of Norco	Public Works	(951) 545-7872	
28	Ann	Iaali	RCFC & WCD	NPDES, Regulatory Division	(951) 955-1248	
29	nohemi	johnston	Riverside County	TLMA/Code Enforcement	(951) 955-8802	
30	Oscar	Rodas	City of Catherdal City	Engineering	(760) 770-0327	
31	Terry	Huemer	City of Perris	Engineering	(951) 943-6504	
32	marco	diaz	Riverside County	TLMA/Code Enforcement	(951) 955-8802	
33	Jon	Salazar	City of Temecula	Public Works	(951) 694-6411	
34	Mayra	De La Torre	City of Temecula	Public Works	(951) 694-6411	
35	Kendra	Hannah-Meistrell	City of Temecula	Public Works	(951) 694-6411	
36	Steve	Beswick	City of Temecula	Public Works	(951) 694-6411	
37	Mike	Hudson	City of Temecula	Public Works	(951) 694-6411	
38	Steve	Charette	City of Temecula	Public Works	(951) 694-6411	
39	John	Shelton	Riverside County	Transportation Department	(951) 955-1095	
40	Chad	Davies	Riverside County	Economic Development Agency-Aviation Division	(951) 955-9417	
41	Kelley	Donovan	Riverside County	Transportation Department	(951) 955-1095	
42	Randy	White	Riverside County	Transportation Department	(951) 955-1095	
43	Eddie	Godinez	City of Moreno Valley	Public Works	(951) 413-3127	
44	Alex	Ramirez	City of Moreno Valley	Public Works	(951) 413-3123	

018893

PLEASE SIGN IN

NPDES STORMWATER QUALITY TRAINING FOR
Construction Training
Riverside County Flood Control & Water Conservation District

Meeting of: Monday, September 29 - 13:00 - 17:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
1	Chuck	Peebles	City of San Jacinto	Engineering	(951) 654-3592	
2	Tamrat	Seyoum	City of Riverside	Water Department	(951) 826-5672	
3	Annie	Bostre-Le	City of Temecula	Public Works	(951) 694-6411	
4	Robert	Bohan	City of Canyon Lake	Special Enforcement	(951) 244-2955	
5	John	Bivens	City of Canyon Lake	Special Enforcement	(951) 244-2955	
6	Richard	Rupert	City of Canyon Lake	Special Enforcement	(951) 244-2955	
7	Lance	Noland	Riverside County	Econo0mic Development Agency	(951) 955-9698	
8	Linda	Nixon	City of Hemet	Public Works Engineering	(951) 765-3880	
9	Kent	Wegelin	City of Moreno Valley	Public Works	(951) 413-3497	
10	Jay	PEEBLES Hutchinson	City of San Jacinto	Engineering	(951) 654-3592	
11	Leo	Ferrando	City of Riverside	Water Department	(951) 826-5694	
12	Eric	Escobar	City of Riverside	Water Department	(951) 826-2253	
13	Arman	Bualong BULAONG	City of Perris	Engineering	(951) 943-6504	
14	Pavel	Horn	City of Catherdal City	Engineering	(760) 770-0329	
15	Ismael	Pando	City of Hemet	Public Works Engineering	(951) 765-2361	
16	David	McBride	City of Temecula	Public Works	(951) 694-6411	
17	Dan	York	City of Temecula	Public Works	(951) 694-6411	
18	Jeramy	Jackson	City of Moreno Valley	Public Works	(951) 413-3474	
19	Steve	Grewe	Riverside County	Transportation Department	(951) 955-1095	
20	Robert	Morris	Riverside County	Transportation Department	(951) 955-1095	
21	John C.	Wilson	Riverside County	Transportation Department	(951) 955-1095	
22	mark	mandel	Riverside County	TLMA/Code Enforcement	(951) 955-8802	

018894

NPDES STORMWATER QUALITY TRAINING FOR
Construction Training
Riverside County Flood Control & Water Conservation District

Meeting of: Tuesday, September 30 - 13:00 - 17:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
52	Travis	Taylor	Riverside County	Waste Management	951-486-3273	
53	Justin	Brown	Riverside County	Waste Management	951-246-3278	
54	Michael	Ray	Riverside County	Waste Management	9512471761	M.I. Ray
55	Donald	Chase	Riverside County	Waste Management		Donald Chase
56	George	Solorio	Riverside County	Waste Management	951-318-1994	George Solorio
57	Jim	Mikkelson	Riverside County	Waste Management	951-580-0324	Donald Chase 951 323-1155
58	Mario	Ramirez	Riverside County	Waste Management	9519456-3270	
59	Panda	Workman	Riverside County	Waste Management	951-486-3276	Panda
60	Juan	Yepez	Riverside County	Waste Management	951-486-3276	Juan Yepez
61	Tom	M Ray	" "	TRANS.	951-658-5234	Tom M Ray
62	Nancy	Beltran	City of Hemet	Engineering Dept.	951-765-3877	
63	MAC	McCall	City of Hemet	ENGINEERING DEPT	951-847-5737	Mac McCall
64	Daniel	Nicholson	Riverside Co	TRANS	951-955-1793	
65	Rick	Fite	Riverside Co	Dist. Tel. Maint. Sup.	9511659-2603	Rick Fite
66	~~[illegible]~~	~~[illegible]~~				
67	Henry	Gutierrez	Riverside Co	Equipt operator II	909.872-4019	Henry M Gutierrez
68						

018895

NPDES STORMWATER QUALITY TRAINING FOR
Construction Training
Riverside County Flood Control & Water Conservation District

Meeting of: Tuesday, September 30 - 08:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
35	Jeffrey	Karalun	City of Riverside	Public Utilities - Water Field	(951) 351-6350	
36	William	Cates	City of Riverside	Public Utilities - Water Field	(951) 351-6350	
37	Victor	Velasquez	City of Riverside	Public Utilities - Water Field	(951) 351-6339	
38	Steven	Horn	Riverside County	Facilities Management	(951) 955-2549	
39	Dario	Samonte	RCFC & WCD	Construction Inspection	(909) 560-0199	Dario Sam
40	Jeff	Lewellen	Riverside County	Transportation Department	(951) 955-1095	
41	Richard "Rick"	Ott	Riverside County	Transportation Department	(951) 955-1095	Richard Ott
42	Stewart	Noble	City of Riverside	Water Department	(951) 538-6970	
43	Roger	Florez	Riverside County	Transportation Department	(951) 955-1095	Roger Flo
44	Tracy	Bravo	Riverside County	Transportation Department	(951) 955-1095	
45	Rene	Guzman	Riverside County	Transportation Department	(951) 955-1095	
46	Joseph	Bohne	Riverside County	Transportation Department	(951) 955-1095	
47	Mike	Lynch	City of Banning	Engineering/Public Works	(951) 922-3130	
48	David	Matier	City of Banning	Engineering/Public Works	(951) 922-3130	
49	carol	lucero	Riverside County	TLMA/Code Enforcement	(951) 955-8802	Carol Lucero
50	donna	payne	Riverside County	TLMA/Code Enforcement	(951) 955-8802	D Payne
51	patricia	silva	Riverside County	TLMA/Code Enforcement	(951) 955-8802	

018896

NPDES STORMWATER QUALITY TRAINING FOR
Construction Training
Riverside County Flood Control & Water Conservation District

Meeting of: Tuesday, September 30 - 08:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
18	Todd	Jorgenson	City of Riverside	Water Department	(951) 233-6381	
19	Claudia	Steiding	Riverside County	Facilities Management	(951) 955-8174	
20	Vikki	Kuntz	Riverside County	Facilities Management	(951) 955-0166	
21	David	Hatch	City of Riverside	PUBLIC WORKS	(951) 288-3632	
22	JACK	PALOMAREZ	City of Riverside	PUBLIC WORKS	(951) 712-4972	
23	FRED	CERDA	City of Riverside	PUBLIC WORKS	(951) 712-4966	
24	Mike	Luna	RCFC & WCD	Construction Inspection	(909) 908-0978	
25	Will	Becerra	City of Temecula	Public Works	(951) 694-6411	
26	John	Pourkazemi	City of Temecula	Public Works	(951) 694-6411	
27	Andy	Lindsay	City of Riverside	Public Utilities - Water Field	(951) 351-6368	
28	Chris	Joranco	City of Riverside	Public Utilities - Water Field	(951) 351-6350	
29	William	Ryan	City of Riverside	Public Utilities - Water Field	(951) 351-6350	
30	Richard	Ryno	City of Riverside	Public Utilities - Water Field	(951) 351-6350	
31	Robert	Lucas	City of Riverside	Public Utilities - Water Field	(951) 351-6350	
32	Jim	Grady	City of Riverside	Public Utilities - Water Field	(951) 351-6350	
33	Gene	Lewis	RCFC & WCD	Construction administration	(951) 850-6917	
34	Miguel	Perez	City of Riverside	Public Utilities - Water Field	(951) 351-6350	

018897

PLEASE SIGN IN

NPDES STORMWATER QUALITY TRAINING FOR
Construction Training
Riverside County Flood Control & Water Conservation District

Meeting of: Tuesday, September 30 - 08:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
1	BRENT	MYTINGER	RCFC & WCD	Inspection	(909) 560-1142	
2	Jeremy	Stroschein	Riverside County	Transportation Department		
3	Ray	Dunn	RCFC & WCD	Construction Inspection	(951) 955-1315	
4	Jesus	Pizano	Riverside County	Transportation Department	(951) 955-1095	
5	Barry	Temple	RCFC & WCD	Construction Inspection	(951) 955-1315	
6	Gabriel	Novello	City of Banning	Engineering/Public Works	(951) 922-3130	
7	Bill	Russell	City of Banning	Engineering/Public Works	(951) 922-3130	
8	Waren	Woodstock	City of Banning	Engineering/Public Works	(951) 922-3130	
9	Guero	Cervantes	City of Perris	Engineering Department	(951) 943-6504	
10	Greg	Butler	City of Temecula	Public Works	(951) 694-6411	
11	Avlin	Odviar	City of Temecula	Public Works	(951) 694-6411	
12	Tony	Colarossi	City of La Quinta	Public Works	(760) 777-7089	
13	Michael	Davis	Riverside County	Transportation Department	(951) 955-1095	
14	Tim	Fagg	RCFC & WCD	Construction Inspection	(951) 955-1236	
15	Charles	McBride	City of Riverside	Water Department	(951) 538-6972	
16	Michael	Morrison	Riverside County	Transportation Department	(951) 955-1095	
17	Habib	Hariri	City of Riverside	Water Department	(951) 826-5304	

018898

NPDES STORMWATER QUALITY TRAINING FOR
Industrial/Commercial Training
Coachella Valley Water District

Meeting of: Tuesday, November 18 - 13:00 - 17:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
1	Hart	Ponder	City of Palm Desert	Code Enforcement	(760) 346-0611	
2	Pedro	Rodriguez	City of Palm Desert	Code Enforcement	(760) 346-0611	Pedro Rodriguez
3	Shawn	Kilpatrick	City of Palm Desert	Code Enforcement	(760) 346-0611	Shawn M Kilpatrick
4	Johnny	Terfehr	City of Palm Desert	Code Enforcement	(760) 346-0611	
5	Michael	Adkins	City of Palm Desert	Code Enforcement	(760) 346-0611	Michael P Adkins
6	Sara	Toyoda	City of Indio	Public Works	(760) 391-4149	Sara Toyoda
7	Leland	Bishop	City of Indio	Public Works	760-391-4067	Leland Bishop
8	John	Carmona	Whitewater Regional Board	NPDES Unit	7603404521	John Carmona
9	Brett	Daniels	City of Coachella	Environmental Programs Director	(760) 398-3002	
10	Bob	French	City of Calimesa	Public Workds	(909) 795-9801	Bob French
11	Mike	McCabe	City of Calimesa	Public Works	(909) 795-9801	Mike McCabe
12	Butch	Scheffer	City of Calimesa	Public Works	(909) 795-9801	B Scheffer
13	BOB	OKREN	City of Palm Springs	COMPLIANCE	(760) 343-6505	R Okren
14	TRAVIS	JOHNSON	CITY OF COACHELLA	FLEET	760 272-6909	TRAVIS JOHNSON
15	JOHN	BROWN	City of Coachell	Building + Safety	760-398-3002	John Brown
16	[illegible]	INFUEZ	City of Coachella	Public Works	(760) 398-5744	[illegible]
17						

018899

NPDES STORMWATER QUALITY TRAINING FOR
Construction Training
Riverside County Flood Control & Water Conservation District

Meeting of: Tuesday, September 30 - 13:00 - 17:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
35	Xavier	Jacobo	City of Riverside	Water Department	(951) 538-3461	
36	Jim	Henke	City of Riverside	Water Department	(951) 538-3451	
37	Cesar	Gutierrez	Riverside County	Transportation Department	(951) 955-1095	
38	angela	frazier	Riverside County	TLMA/Code Enforcement	(951) 955-8802	
39	Bill	McAteer	City of Temecula	Public Works	(951) 694-6411	
40	Amer	Attar	City of Temecula	Public Works	(951) 694-6411	
41	Laura	Bragg	City of Temecula	Public Works	(951) 694-6411	
42	David	Maus	Riverside County	Transportation Department	(951) 955-1095	
43	Kevin	Gillette	Riverside County	Transportation Department	(951) 955-1095	
44	Thomas	Shipley	Riverside County	Transportation Department	(951) 955-1095	
45	Yolanda	Macalalad	City of Corona	Public Works	(951) 279-3748	
46	Danny	Astorga	City of Moreno Valley	Public Works	(951) 413-3119	
47	Gabriel	Gonzalez	City of Moreno Valley	Public Works	(951) 413-3252	
48	Mosallam	Almasri	City of Moreno Valley	Public Works	(951) 413-3113	
49	Preston "Jerry"	Lytle	Riverside County	Transportation Department	(951) 955-1095	
50	Koran	Manka	Riverside County	Transportation Department	(951) 955-1095	
51	Harvey	McCoy	Riverside County	Transportation/Operations	(951) 658-5234	

018900

NPDES STORMWATER QUALITY TRAINING FOR
Construction Training
Riverside County Flood Control & Water Conservation District

Meeting of: Tuesday, September 30 - 08:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
52	jamison	cole	Riverside County	TLMA/Code Enforcement	(951) 955-8802	
53	Bob	French	City of Calimesa	Public Workds	(909) 795-9801	
54	jeannie	chambelain	Riverside County	TLMA/Code Enforcement	(951) 955-8802	
55	roy	ryder	Riverside County	TLMA/Code Enforcement	(951) 955-8802	
56	Mike	McCabe	City of Calimesa	Public Works	(909) 795-9801	
57	Luis	Tapia	City of Riverside	Water Department	(951) 538-3456	
58	Gary	Moss	Riverside County	Transportation Department	(951) 955-1095	
59	Jay	Oldham	City of Temecula	Public Works	(951) 694-6411	
60	Henry	Olivo	RCFC & WCD	Construction Administration	(951) 955-1288	
61	Gary	Lundberg	RCFC	Inspection	9095601147	
62	Byron	Moreno	Trans Dept			
63	Mayra	De La Torre	City of Temecula	Public Works	951)6946411	
64						
65						
66						
67						
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018901

NPDES STORMWATER QUALITY TRAINING FOR
Municipal Training
Murrieta City Hall

Meeting of: Thursday, November 6 - 08:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
18	Matt	Wicks	City of San Jacinto	Public Works	(951) 654-4041	
19	Kenny	Rodger	City of San Jacinto	Public Works	(951) 654-4041	
20	Kevin	Carranza	City of San Jacinto	Public Works	(951) 654-4041	
21	Victor	Vasquez	City of San Jacinto	Public Works	(951) 654-4041	
22	Paul	Swancott	City of Murrieta	Planning	(951) 304-2489	
23	Cory	Hammond	City of Murrieta	Public Works	(951) 304-2489	
24	Lanker	Figueroa	City of Murrieta	Public Works	(951) 304-2489	
25	Mike	Brooks	City of Murrieta	Public Works	(951) 304-2489	
26	Sarah	Russell	City of Murrieta	Public Works	(951) 304-2489	
27	David	Hendry	City of Murrieta	Public Works	(951) 304-2489	
28	Ken	Jones	City of Murrieta	Engineering	(951) 304-2489	
29	Mike	Almodovar	City of Murrieta	Public Works	(951) 304-2489	
30	Daniel	Scroggins	City of Murrieta	Public Works	(951) 304-2489	
31	Aaron	Rintamaki	City of Murrieta	Planning	(951) 304-2489	
32	Israel	Reyes	City of Murrieta	Community Services	(951) 461-6124	
33	Jose	Munoz	City of Murrieta	Community Services	(951) 461-6124	
34	Juan	Del Val	City of Murrieta	Community Services	(951) 461-6124	

018902

PLEASE SIGN IN

NPDES STORMWATER QUALITY TRAINING FOR
Municipal Training
Murrieta City Hall

Meeting of: Thursday, November 6 - 08:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
1	Brad	Buron	City of Temecula	Public Works	(951) 694-6411	
2	Mark	Levis	City of Temecula	Public Works	(951) 694-6411	
3	Jim	Smith	City of Temecula	Public Works	(951) 694-6411	
4	David	Davis	City of Temecula	Public Works	(951) 694-6411	
5	Mario	Munoz	City of Temecula	Community Services	(951) 694-6480	
6	John	Maisey	City of Temecula	Public Works	(951) 694-6480	
7	George	DeLaRosa	City of Temecula	Community Services	(951) 694-6480	
8	Jose	Diaz	City of Temecula	Community Services	(951) 694-6480	
9	Matt	Wiechec	City of Temecula	Community Services	(951) 694-6480	
10	Richard	Serven	City of Temecula	Community Services	(951) 694-6480	
11	David	Thurman	City of Temecula	Community Services	(951) 694-6480	
12	Dino	Camberos	City of Temecula	Community Services	(951) 694-6480	
13	Steve	Sterling	City of Temecula	Community Services	(951) 694-6480	
14	Richard	Shea	City of Temecula	Community Services	(951) 694-6480	
15	Karl	Nordgren	City of Temecula	Community Services	(951) 694-6480	
16	Kevin	Harrington	City of Temecula	Community Services	(951) 694-6480	
17	Tim	Stockton	City of San Jacinto	Public Works	(951) 654-4041	

018903

NPDES STORMWATER QUALITY TRAINING FOR
Municipal Training
Murrieta City Hall

Meeting of: Thursday, November 6 - 08:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
52	Juan	Jaime	City of Temecula	Public Works	(951) 694-6411	
53	Ryan	Castillo	City of Temecula	Public Works	(951) 694-6411	
54	Perry	Ludwig	City of Temecula	Public Works	(951) 694-6411	
55	Gus	Gonzalez	City of Temecula	Public Works	(951) 694-6411	
56	John	Ward	City of Temecula	Public Works	(951) 694-6411	
57	Bradley	Moore	Riverside County	Facilities Management	(951) 696-3441	
58	Danny	Astorga	City of San Jacinto	Public Works	(951) 654-4041	
59	Alex	Garcia	City of San Jacinto	Public Works	(951) 654-4041	
60	Mark	Halman	City of San Jacinto	Public Works	(951) 654-4041	
61	JEREMY	JACKSON	CITY OF MOVAL	CAND DEV	913-3474	
62	Matt	Nicks	City of San Jac.	Public Works		
63	DINO	CAMBEROS	Temecula	TCSD		
64	RON	STUART	MURRIETA	CSD	9514616124	
65	BOB	KAST	"	"	"	
66	RICK	THOMPSON	"	"	"	
67	JOSE	ALFARO	EXCEL LANDSCAPE	SUPERVISOR	9517359650	
68	PHIL	ESNAYRA	CITY OF MURRIETA	C.S.D	951-532-7513	

018904

NPDES STORMWATER QUALITY TRAINING FOR
Municipal Training
Murrieta City Hall

Meeting of: Thursday, November 6 - 08:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
35	Larry	Gross	City of Murrieta	Community Services	(951) 461-6124	
36	Mike	Bigay	City of Murrieta	Community Services	(951) 461-6124	
37	Hoang	Nguyen	City of Moreno Valley	Public Works	(951) 413-3216	
38	Manuel	Moran	Riverside County	Facilities Management	(950) 600-6240	
39	Rodney	Tidwell	City of Temecula	Public Works	(951) 694-6411	
40	Bruce	Wedeking	City of Temecula	Community Services	(951) 694-6480	
41	Aldo	Licitra	City of Temecula	Public Works	(951) 694-6411	
42	Danny	Marks	City of Murrieta	Community Services	(951) 461-6124	
43	Mark	Bolschweiler	City of Murrieta	Public Works	(951) 304-2489	
44	Mike	Burris	City of Murrieta	Public Works	(951) 304-2489	
45	Lucas	Haynes	City of Murrieta	Public Works	(951) 304-2489	
46	Robert	Edmonds	City of Murrieta	Public Works	(951) 304-2489	
47	Nick	Vaughn	City of Murrieta	Public Works	(951) 304-2489	
48	Alberto	Aspe	City of Murrieta	Community Services	(951) 461-6124	
49	Chris	Payne	City of Temecula	Public Works	(951) 694-6411	
50	Flint	Norman	City of Temecula	Public Works	(951) 694-6411	
51	Larry	Romine	City of Temecula	Public Works	(951) 694-6411	

018905

PLEASE SIGN IN

NPDES STORMWATER QUALITY TRAINING FOR
Industrial/Commercial Training
Riverside County Flood Control & Water Conservation District

Meeting of: Tuesday, November 4 - 13:00 - 17:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
1	Joe	Mullen	City of San Jacinto	Public Works	(951) 654-4041	
2	Jeff	Potts	City of Corona	Public Works	951-736-2446	
3	Dennis	Hurford	City of Norco	Building and Safety	(951) 270-5689	
4	Jeramy	Jackson	City of Moreno Valley	Public Works	(951) 413-3474	
5	Lori	Askew	City of Norco	Engineering	(951) 270-5678	
6	Sheldon	Zell	City of Norco	Fire Department	(951) 737-8097	
7	Mark	Solano	City of Corona	Department of Water & Power	(951) 279-3558	
8	Rudy	Fandel	City of Corona	Department of Water & Power	(951) 736-2476	
9	Craig	Leyland	City of San Jacinto	Public Works	(951) 654-4041	
10	Ralph	Durrett	City of San Jacinto	Public Works	(951) 654-4041	Ralph Durrett
11	HOANG	NGUYEN	CITY OF MORENO VAL	"	951 413-3216	
12	ANN	JAFLI	County of Riverside	RCFC &WCD - NPDES	9557248	
13						
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018906

NPDES STORMWATER QUALITY TRAINING FOR
Municipal Training
Murrieta City Hall

Meeting of: Thursday, November 6 - 08:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
69	Venita	Anderson	Code Enforcement	PD	4616332	Venita Anderson
70	Gene	Dickson	Code Enfo MPD.	PD	4616334	[illegible]
71	George	Nelson	Code Enforcement	PD	461-6338	[illegible]
72	Linda	Mejia	Code Enf.	PD	461-6337	[illegible]
73	Paul	Swanott	City Murrieta	Planning	461-6063	Paul Swanott
74	MIKE	BROOKS	MURRIETA	PW MAINT.	461-6401	[illegible]
75	JASON	JONES	"	CODE ENF.	461-6331	[illegible]
76	James	Smith	Temecula	Public works	303-3164	[illegible]
77	Bill	Woolsey	Murrieta	ENG	461-6073	Bill Woolsey
78	Rich	Shea	Temecula	C.S.		[illegible]
79						
80						

018907

PLEASE SIGN IN

NPDES STORMWATER QUALITY TRAINING FOR
Municipal Training
Riverside County Flood Control & Water Conservation District

Meeting of: Tuesday, November 4 - 08:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
1	Daniel	Monto	City of Moreno Valley	Public Works	(951) 413-3485	
2	Renee	Power	City of Norco	Animal control Dept ~~Parks, Recreation and Community Services~~	737 8972	
3	Lance	Noland	Riverside County	Econo0mic Development Agency	(951) 955-9698	
4	mike	blanco	City of Norco	Public Works	951-270-5207	
5	Keith	Price	City of Norco	Parks, Recreation and Community Services	(951) 545-7891	
6	Bob	March	City of Norco	Parks, Recreation and Community Services	(951) 545-7892	
7	Michelle	Anglin	City of Norco	Parks, Recreation and Community Services	951. 545. 7883	
8	Brandie	Potter	City of Norco	Parks, Recreation and Community Services	[illegible]	
9	Roger	Jackson	City of San Jacinto	Public Works	(951) 654-4041	Roger Jackson
10	Jim	Cash	City of San Jacinto	Public Works	(951) 654-4041	Tim Cash
11	Ray	Sanchez	City of San Jacinto	Public Works	(951) 654-4041	
12	Ben	Haskell	City of San Jacinto	Public Works	(951) 654-4041	
13	Chris	Wyrick	City of Norco	Parks, Recreation and Community Services	951 545 7850	
14	Henk	Koke	City of Norco	Parks, Recreation and Community Services	951-545-7814	
15	Jeff	Woodley	City of Banning	Engineering/Public Works	(951) 922-3286	Jeff Woodley
16	Ramiro	Garcia	City of Banning	Engineering/Public Works	(951) 922-3286	Ramiro Garcia
17	Carlos	Navarro	City of Banning	Engineering/Public Works	951-922 3241	Carlos Navarro

018908

NPDES STORMWATER QUALITY TRAINING FOR
Municipal Training
Riverside County Flood Control & Water Conservation District

Meeting of: Tuesday, November 4 - 08:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
18	Quang	Nguyen	City of Moreno Valley	Public Works	(951) 413-3159	
19	Terrence	Piorkowski	City of Norco	Public Works	(951) 270-5607	
20	derek	lacombe	City of Norco	Public Works	951 - 270 - 5601	
21	nate	salazar	City of Norco	Public Works		
22	ryan	McIntyre	City of Norco	Public Works		
23	Lyndon	Lorance	City of Norco	Public Works		
24	Zachary	Foster	City of Moreno Valley	Public Works	(951) 203-4997	
25	Ann	iaali	RCFC & WCD	NPDES, Regulatory Division		
26	Miguel	Mariscal	City of Banning	Parks/Street Maintenance Division	(951) 922-3320	
27	Steven	Horn	Riverside County	Facilities Management	(951) 955-2549	
28	Randy	West	City of Temecula	Public Works	(951) 694-6411	
29	Robert	Florez	City of Moreno Valley	Special Districts	(951) 413-3471	
30	Bill	Shesgreen	City of Banning	Parks/Street Maintenace Division	(951) 922-3286	
31	Pete	Schlensker	City of Banning	Engineering/Public Works	(951) 922-3286	
32	Steve	Parker	City of Banning	Engineering/Public Works	951-922-3572	
33	Daniel	Cover	City of Moreno Valley	Public Works/ Special districts	(951) 413-3503	
34	Robert	Johnson	Riverside County	Facilities Management	(951) 782-2458	

018909

18	Andy	Luna	Riverside County	Facilities Management	(760) 393-3253	
19	Jay	Mirpour	Whitewater Regional Board	Stormwater	(760) 776-8981	
20	Erich	Konrad	City of Palm Springs	Fleet Operations	760 323 8168	
21	David	Flint	City of Palm Desert	Building Maintenance	(760) 346-0611	
22	Cyril	Snake	City of Palm Desert	Building Maintenance	(760) 346-0611	
23	Marco	Zamudio	City of Palm Desert	Public Works	(760) 346-0611	
24	Joe	Rojas	City of Palm Desert	Public Works	(760) 346-0611	
25	James	Lindsey	City of La Quinta	Public Works	(760) 777-7052	
26	Adolfo	Cabrera	City of La Quinta	Public Works		
27	Tim	Batten	City of La Quinta	Public Works		
28	Raphael	Alvarado	City of La Quinta	Public Works		
29	Agustin	Arellano	City of La Quinta	Public Works		
30	Steven	Rakestraw	City of Palm Springs	Fleet Operations	(760) 323-8168	
31	Jesus	Padilla	City of Palm Desert	Public Works	(760) 346-0611	
32	Frank	Duran	City of Palm Desert	Public Works	(760) 346-0611	
33	Ernesto	Tecan	City of Palm Desert	Parks	(760) 346-0611	
34	David	Lara	City of Palm Desert	Public Works	(760) 346-0611	
35	Dario	Gutierrez	City of La Quinta	Public Works		
36	Jorge	Sandoval	City of La Quinta	Public Works		
37	Delia	Gonzalez	City of La Quinta	Public Works		
38	Jose	Gutierrez	City of La Quinta	Public Works		

NPDES STORMWATER QUALITY TRAINING FOR
WQMP Training
Riverside County Flood Control & Water Conservation District

Meeting of: Monday, November 3 - 08:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
18	Larry	Gonzales	City of Moreno Valley	Public Works	(951) 413-3130	
19	Marge	Lazarus	City of Moreno Valley	Public Works	(951) 413-3130	
20	Sergio	Pena	Riverside County	Facilities Management	(951) 955-2899	
21	kyle	gallup	RCFC & WCD	design	(951) 955-8627	
22	Mike	Wong	RCFC & WCD	Design	(951) 955-1205	
23	Amy	McNeill	RCFC & WCD	Design	(951) 955-1268	Amy McNeill
24	JERAMY	JACKSON	MORENO VALLEY		951 413-3171	
25	VIKKI	KUNTZ	COUNTY/RIV.	DESIGN & CONST	951 955 0161	
26	~~[illegible]~~ STEVE	HORN	" "	" "	951.955.2599	
27	Lance	Noland	County of Riverside	EDA	955-9698	
28	JOHN	ALFRED	COUNTY OF RIVERSIDE	FACILITIES MGMT.	951-955-4844	
29	~~[illegible]~~	~~[illegible]~~				
30						
31						
32						
33						
34						

018911

MAPS

NPDES Progress Map

As of 12/31/2008

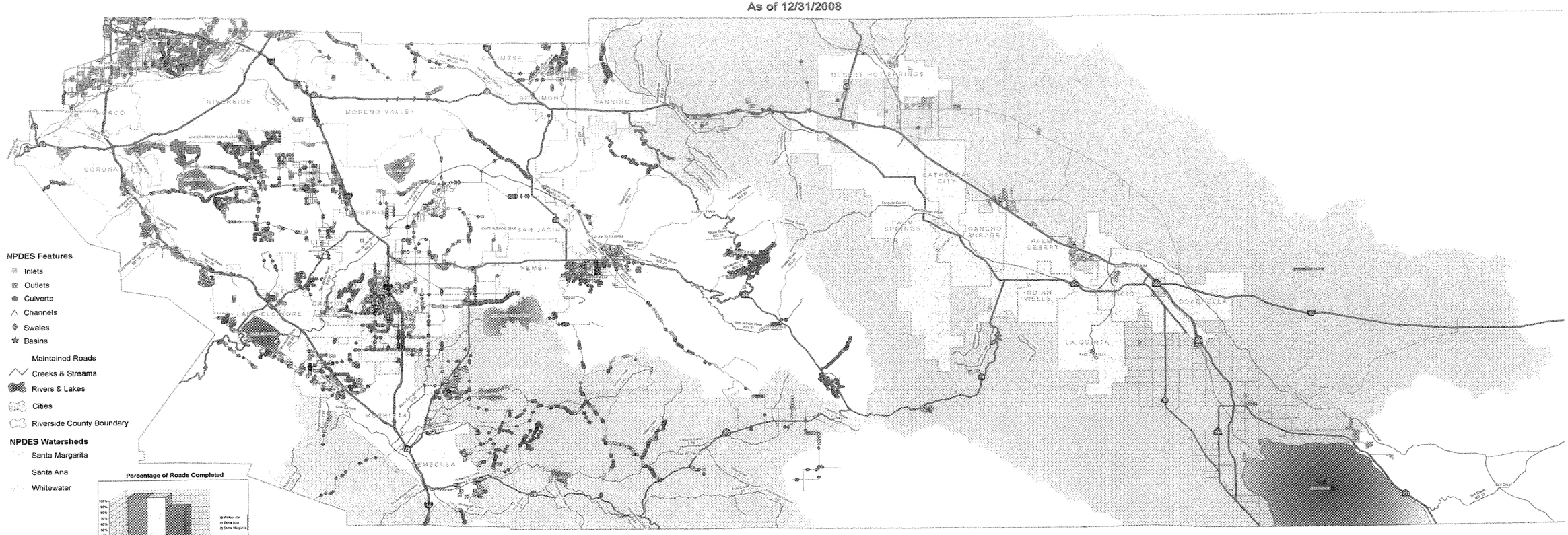

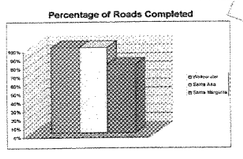

** Data Collected by John Morris and Larry Cecil*
As of 12/31/2008

Watershed	Basin Points	Basins	Channel Points	Channels	Swale Points	Swales	Culvert Points	Culverts	Inlet Points	Outlet Points	Control Points	Total Maintained Roads	Road Completed	% Completed
Santa Margarita	22	2	16	7	22	11	792	376	988	-	64	253.99	253.99	* *Less than 100.0%
Santa Ana	18	2	183	79	390	136	2686	1227	4206	580	111	1,358.46	1,358.46	100.0%
Whitewater	0	0	0	0	3	1	139	42	242	9	2	557.12	557.12	100.0%
Total	**40**	**4**	**199**	**86**	**415**	**148**	**3617**	**1645**	**5436**	**589**	**177**			

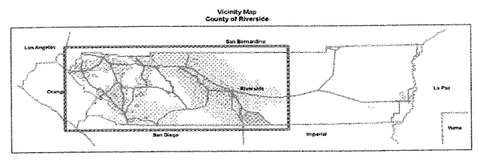

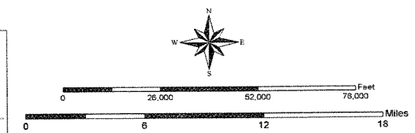

Disclaimer. Maps and data are to be used for reference purposes only. Map features are approximate, and are not necessarily accurate to surveying or engineering standards. The County of Riverside makes no warranty or guarantee as to the content (the source is often third party), accuracy, timeliness, or completeness of any of the data provided, and assumes no legal responsibility for the information contained on this map. Any use of this product with respect to accuracy and precision shall be the sole responsibility of the user.

Map Created by Adriana Soares, Riverside County, Transportation Department/GIS - December 10, 2008
U:\Projects\NPDES\Progress_Maps\Whitewater_12\1009.mxd

Example of an Inlet

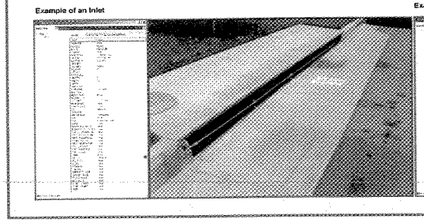

Example of an Outlet

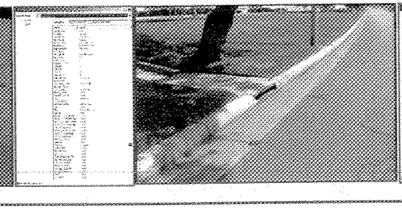

Example of a Culvert

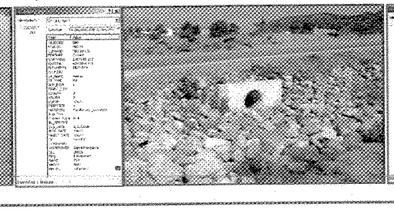

Example of a Channel

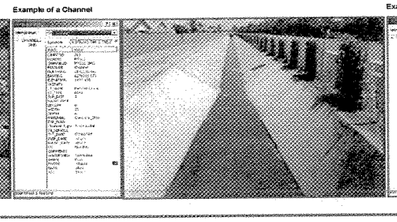

Example of a Swale

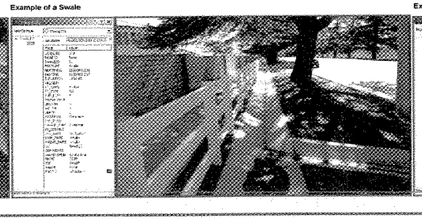

Example of a Basin

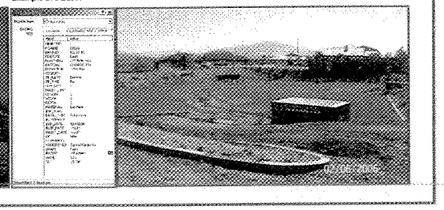

Western Riverside County Habitat Conservation Summary

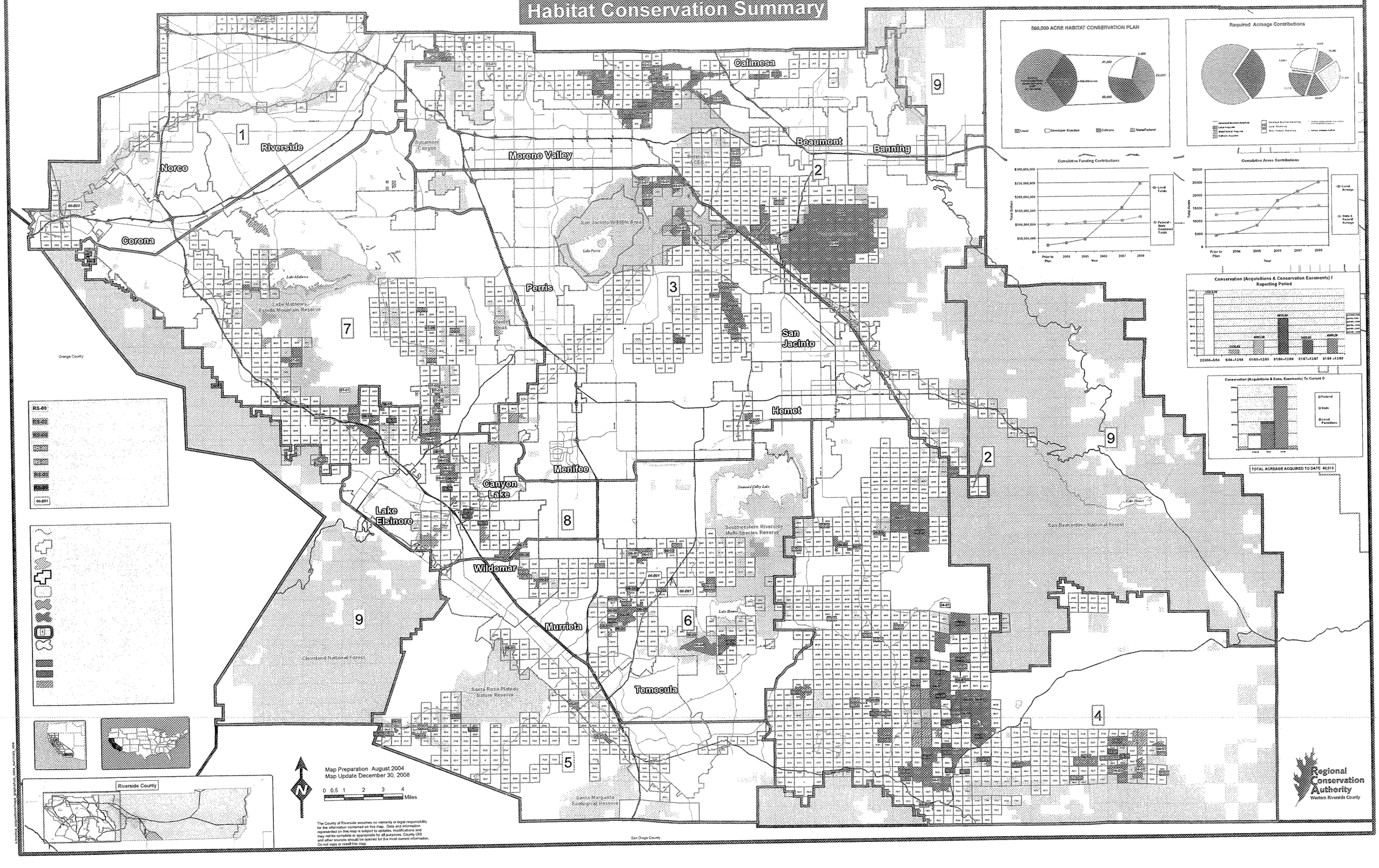

500,000 ACRE HABITAT CONSERVATION PLAN

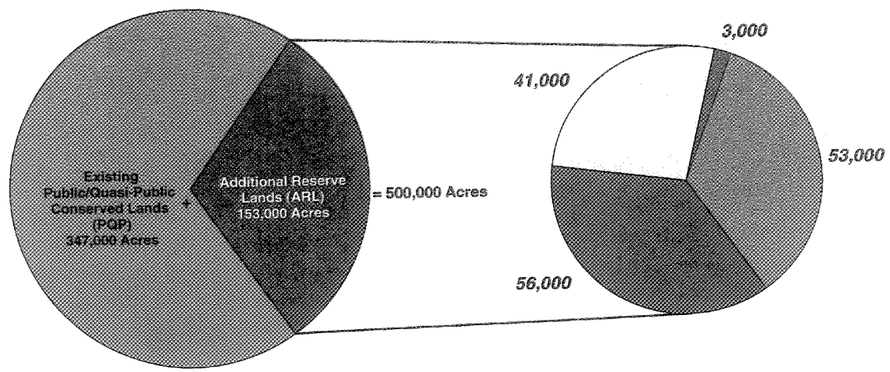

Required Acreage Contributions

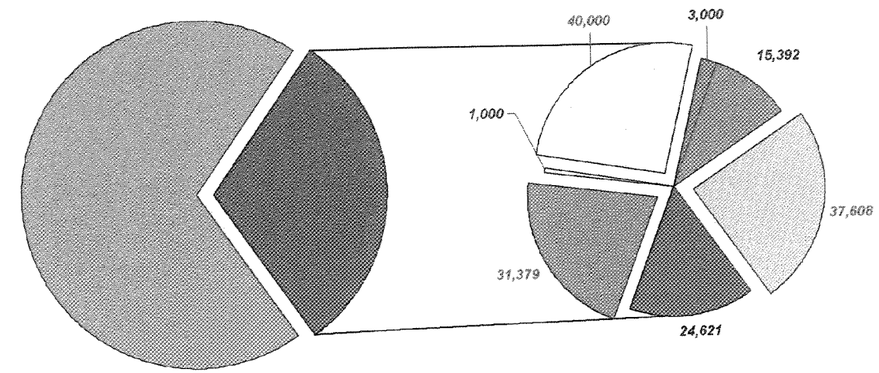

Developer Exaction Acquired
Local Acquired
State/Federal Acquired
Caltrans Acquired
Developer Exaction Remaining
Local Remaining
State / Federal Remaining
*** Numbers in Red Indicate Acres Needed to Fulfill MSHCP Obligations.
* Caltrans Obligation Fulfilled

Cumulative Funding Contributions

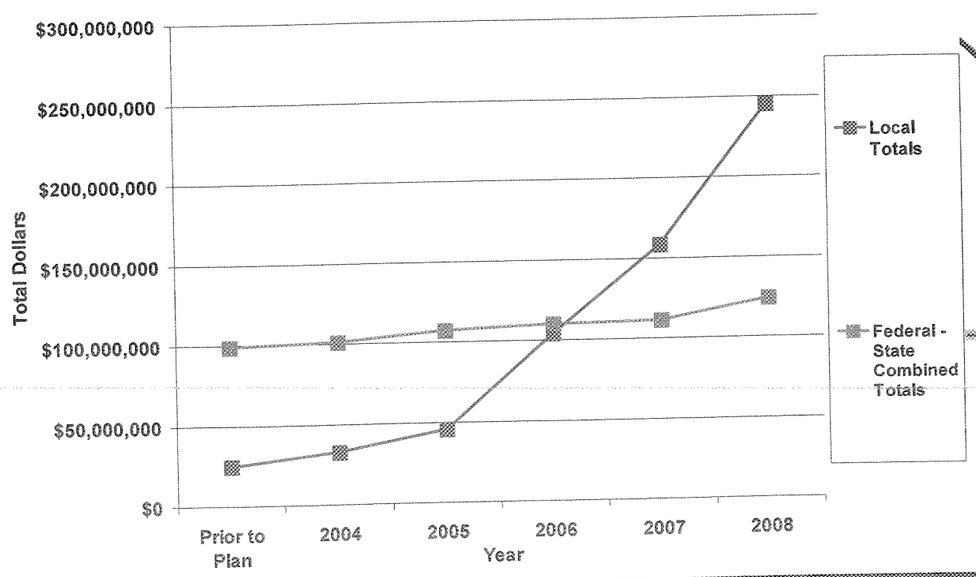

Cumulative Acres Contributions

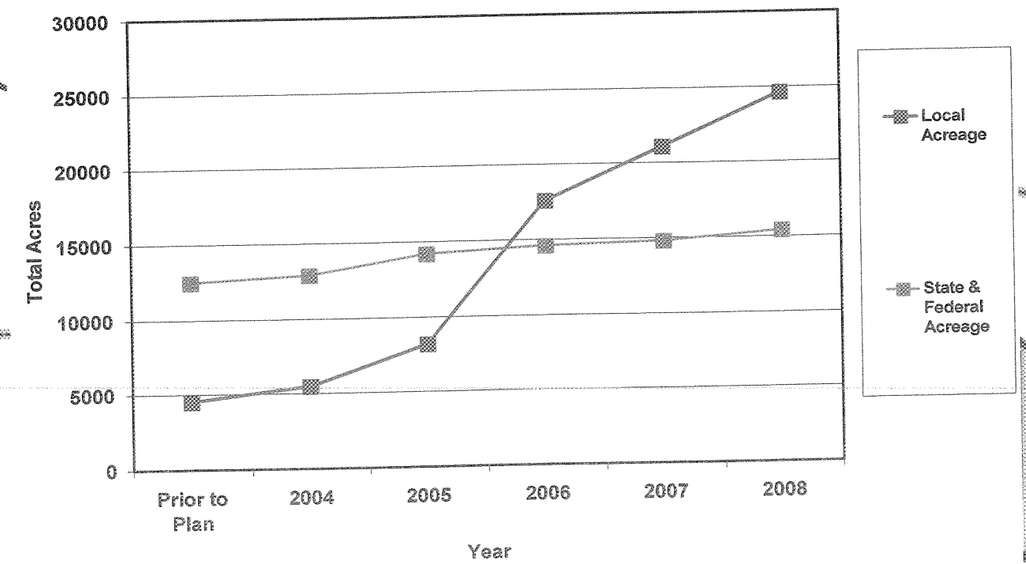

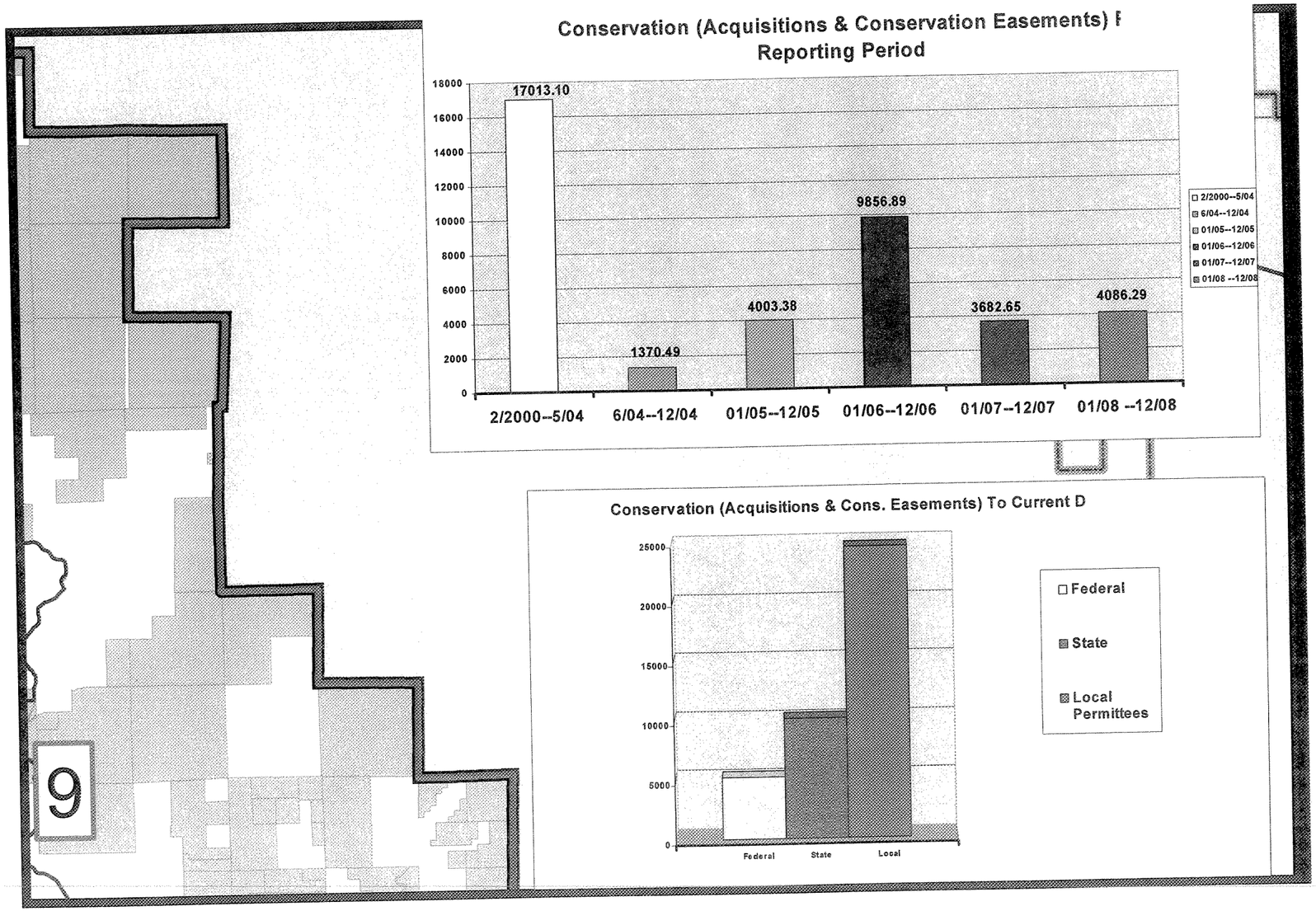
Conservation (Acquisitions & Conservation Easements) F
Reporting Period
18000
16000
14000
12000
10000
8000
6000
4000
2000
0
17013.10
1370.49
4003.38
9856.89
3682.65
4086.29
2/2000--5/04
6/04--12/04
01/05--12/05
01/06--12/06
01/07--12/07
01/08 --12/08
Conservation (Acquisitions & Cons. Easements) To Current D
25000
20000
15000
10000
5000
0
Federal
State
Local
Federal
State
Local Permittees
9

Riverside County Flood Control and Water Conservation District and County of Riverside Municipal Separate Storm Sewer System (MS4) Inspection Report

Background

PG Environmental, LLC, a USEPA Region IX contractor, with assistance from the California Regional Water Quality Control Board, San Diego Bay Region (Regional Water Board), conducted inspections of the Riverside County Flood Control and Water Conservation District (hereafter, District) and County of Riverside (hereafter, County) Municipal Separate Storm Sewer System (MS4) programs on September 20, 2007 and January 15 through 17, 2008. Mr. Wesley Ganter and Mr. Max Kuker of PG Environmental, LLC led the inspections and were assisted by Regional Water Board staff. Discharges from the District's and the County's MS4 are regulated by Regional Water Board Order No. R9-2004-001 (NPDES Permit No. CAS0108766) issued July 14, 2004. The purpose of the inspections was to determine the Permittees' compliance with requirements contained within Regional Water Board Order No. R9-2004-001 (hereafter, Order), and to assess the Permittees' current implementation status with respect to their Drainage Area Management Plan (DAMP). The initial September 20, 2007 inspection identified discrepancies between the Order requirements and the District and County MS4 program implementation. The intent of the January 2008 inspections was to further investigate and substantiate the previously noted discrepancies.

The District serves as the principal permittee for the Riverside County MS4 permittee group and the District and the County jointly implement several of the individual MS4 program elements. The previously referenced Order is the second MS4 permit issued to these permittees. While the District and the County also hold MS4 permits issued by the Santa Ana and Colorado River Regional Water Boards, this inspection primarily focused on activities occurring within the Santa Margarita River watershed and within the jurisdictional boundaries of the San Diego Regional Water Board. However, where indicated in this inspection report, Development Planning inspection activities also occurred in the Santa Ana Region during which the inspection team evaluated the permittees compliance with respect to Santa Ana Regional Water Board Order No. R8-2002-001. These activities occurred with the full knowledge and support of the Santa Ana Regional Board.

The inspections focused specifically on two sections of the Order: Provision F. Development Planning and the implementation of Standard Urban Storm Water Mitigation Plan (SUSMP) requirements; and Provision L. Part II. Monitoring Program. The inspections did not evaluate or assess compliance with the following provisions of the Order: G. Construction, H. Existing Development, I. Education, J. Illicit Discharge Detection and Elimination Program; and K. Watershed-Based Activities. As such, the inspections were not intended to be a comprehensive evaluation of all components and requirements associated with the entire MS4 program.

The inspections consisted of interviews of District and County staff. Interviews occurred at the Riverside County Executive Office located at 4080 Lemon Street in downtown Riverside and at

the District's offices located at 1995 Market Street, Riverside, CA. The primary MS4 Program representatives were Mr. Mike Shetler and Mr. Alex Gann, Riverside County Executive Office, and Mr. Jason Uhley, Senior Civil Engineer, Riverside County Flood Control and Water Conservation District. These individuals were supported by other District and County staff that have responsibilities for program implementation and also by URS Corporation representatives, a consultant to the Riverside County permittee group. A list of all inspection attendees is attached to this report.

The County of Riverside was represented by five separate organizational entities during the course of the inspections as follows: the Executive Office, Economic Development Agency (EDA), Transportation Department, Facilities Management Department, and the Regional Park & Open-Space District.

The inspection schedule was as follows:

September 20, 2007	**January 15-17, 2008**
Riverside County Flood Control and Water Conservation District and County of Riverside	***Riverside County Flood Control and Water Conservation District and County of Riverside***
9:00 AM – Opening meeting at the Riverside County Executive offices	**January 15th** Review of District's Monitoring Program
9:30 AM – Interview regarding Development Planning and the implementation of SUSMP requirements	**January 16th** (AM) – Review of private development (PM) – Review of public development
1:30 PM – Office visit to discuss Monitoring	**January 17th** Two teams with office and field activities
4:00 PM – Closing Conference	**Team 1** – Review of public Capital Improvement Projects (CIP) SUSMP applicability and field visits **Team 2** – Review of private development SUSMP applicability, development, and maintenance

Findings

Section F. Development Planning

Note: The permittee internally refers to the SUSMP program and required documents as Water Quality Management Plans (WQMPs). Hereafter, these terms are used interchangeably.

The organizational structure for the WQMP process is divided between private and public development sectors. The District solely leads and implements the WQMP process for all private development. District staff review incoming development plans, converse with the development community, and condition and approve submitted WQMPs. In terms of public development, the County has four separate organizational entities which are granted with building authority and therefore have WQMP obligations. These organizations include: EDA, Transportation Department, Facilities Management Department, and the Regional Park & Open-Space District. At the time of the initial inspection in September 2007, County representatives stated that District staff did not have any involvement or participation in the review of WQMPs for public development. During the course of the January 2008 inspection, County representatives stated that opportunities to involve District staff in WQMP reviews for public projects was being discussed but formal arrangements for shared services had yet to be determined or implemented. As such, while staff from the County's Executive Office provide guidance, each organizational entity was fully responsible for implementation of the County's WQMP program.

The inspection team visited a number of private WQMP projects in various stages of development to generally observe BMP selection, placement, operation, and maintenance. The WQMP project sites that were visited included: (1) Arco Gas Station (ID No. PA05-0127) and (2) Southern California Edison staging area (ID No. PA05-0036).

On-site inspection activities for public development projects focused primarily on the project sponsorship, design, and development activities of the EDA, the Transportation Department, and Facilities Management Department. The Regional Park & Open-Space District was not evaluated in depth as it was stated that the other three county entities frequently implement development projects on their behalf.

Summary Finding for Section F. Development Planning

With two exceptions (listed below as Findings 4 and 5), there were no adverse findings identified regarding the District's implementation of the Section F. Development Planning requirements for the private development community. District staff appeared well trained and knowledgeable with the implementation of the County's WQMP program and the use of post-construction BMPs and adequate procedures were in place to ensure identification of WQMP-applicable projects. Deficiencies were not identified at the private development sites visited during the inspection. Findings 4 and 5 address deficiencies identified with the appropriate identification of Pollutants of Concern (POCs) and application of effective BMPs and the use of an effective program to ensure ongoing maintenance of post-construction BMPs at commercial and industrial locations.

In contrast, while the County Transportation Department was implementing the WQMP program, the EDA and Facilities Management Department had yet to establish a WQMP program and were not identifying or conditioning WQMP-applicable projects. These entities appeared to be in their infancy of developing and implementing a WQMP program that would comply with, or meet the intent of, the Section F. Development Planning requirements. Regional Board Order No. R9-2004.001 Requirement F.2.(b) requires the District and County "Within 365 days of adoption of this Order, each Permittee shall develop, adopt, and implement a SUSMP to reduce pollutants to the MEP and to maintain or reduce downstream erosion and protect stream habitat from all Priority Development Projects." This required a SUSMP program to be developed, adopted, and implemented no later than July 15, 2005. As demonstrated during the inspection and substantiated in Findings 1, 2, and 3, the County was not in compliance with this provision. Furthermore, it is problematic that worthwhile and significant county-sponsored efforts to develop a Policy on Sustainable Development and construct a Leadership in Energy and Environmental Design (LEED) building would progress without reference to or incorporate the County's WQMP program (see Findings 2 and 3 below). The following significant deficiencies were identified with the County's implementation of the WQMP program for public projects.

1. Failure to Adopt and Implement a SUSMP. Regional Water Board Order No. R9-2004-001, Requirement F.2.b. requires the County to "develop, adopt, and implement a SUSMP to reduce pollutants to the MEP [maximum extent practicable] and to maintain or reduce downstream erosion and protect stream habitat from all Priority Development Projects." Pursuant to this requirement, the County has developed the Riverside County Water Quality Management Plan for Urban Runoff dated July 24, 2006 (hereafter, Riverside WQMP Manual). Internally, however, the County EDA and Facilities Management Department have not formally adopted or adequately implemented the Riverside WQMP Manual. Based on questioning by the inspectors, the County EDA and Facilities Management Department staff displayed partial knowledge of the MS4 permit requirements and were not knowledgeable or aware of the Riverside WQMP Manual itself. During the course of the inspection, copies of both documents were provided to County EDA staff for compliance assistance purposes. As a result, the County EDA and Facilities Management Department have not formally adopted or adequately implemented a SUSMP to reduce pollutants to the MEP and to maintain or reduce downstream erosion and protect stream habitat from all Priority Development Projects.

2. Failure to Develop a Process by which SUSMP Requirements will be Implemented. Regional Water Board Order No. R9-2004-001, Requirement F.2.b.(6), Implementation Process, requires the County to "develop a process by which SUSMP requirements will be implemented." Because the County EDA and Facilities Management Department had not implemented the Riverside WQMP Manual and associated procedures, these entities did not have a structured program in place for Capital Improvement Projects (CIPs) to: (1) identify all Priority Development Projects for applicability of the SUSMP requirements (see Finding 3), (2) require the development of Project-Specific WQMPs, (3) review Project-Specific WQMPs for compliance with the SUSMP requirements, or (4) ensure adequate long-term maintenance of constructed WQMP Best Management Practices (BMPs) (see Finding 5). During the inspection, both Facilities Management Department and EDA staff acknowledged that they did not have a structured WQMP program but stated that they were willing and eager to develop and implement

the SUSMP requirements. Facilities Management Department staff indicated that they were currently re-writing contracting specifications and would include WQMP requirements in future versions.

The Facilities Management Department Contract General Conditions dated March 2006 (hereafter, Contract General Conditions), states that the "contractor shall keep informed of, and comply with, all federal, state, and county laws, ordinances, rules, and regulations applicable to the Work." However, the language in the Contract General Conditions does not clearly specify that a project must be built in accordance with the Project-Specific WQMP. Furthermore, the Contract General Conditions do not reference or require the use of the Riverside WQMP Manual, a document which is intended to guide the development of an adequate Project-Specific WQMP. As a result, the County does not have an adequate mechanism to ensure that the SUSMP requirements will be implemented. This appeared substantiated by recent design and construction activities that have occurred without reference to, or incorporation of, a project-specific WQMP.

Additionally, County representatives stated that the County Board of Supervisors is currently in the process of establishing the County's policy on sustainable building. The draft Sustainable Building Policy document sets a minimum performance target to reuse and clean water onsite. Furthermore, the document states that "green building design will help to reduce operating costs associated with…storm water management." Despite the draft policy's effort to address the topic of storm water management, it does not establish minimum performance targets which are aligned with the WQMP requirements of Regional Water Board Order No. R9-2004-001. It is strongly recommended that the County leverage its policy on sustainable building to better integrate its land-use practices with its water quality goals and obligations. During the course of the inspection, County staff expressed that they were willing and eager to incorporate the WQMP program into the County's contract language and would explore opportunities to incorporate WQMP provisions into the policy on sustainable building. The County must develop a process by which SUSMP requirements will be implemented.

3. Failure to Identify WQMP-Applicable Projects. Regional Water Board Order No. R9-2004-001, Provision F.2.b, requires that each Permittee "review and ensure that all Priority Development Projects meet SUSMP requirements." Requirement F.2.b. of the Order defines Priority Development Projects as: "(a) all new development projects, and (b) those redevelopment projects that create, add or replace at least 5,000 square feet of impervious surfaces on an already developed site, that are listed under the project categories or locations in Requirement F.2.b.(1)."

The EDA and Facilities Management Department did not have a structured program to ensure that their County-sponsored CIPs are reviewed by a trained person or entity for WQMP applicability or to ensure the development, adequacy, or implementation of a Project-Specific WQMP. As stated by EDA and Facilities Management Department personnel, as of January 15, 2008 neither of these entities had developed a Project-Specific WQMP for a completed CIP. The Facilities Management Department had been actively approving CIPs during the current permit term and following the compliance date of July 15, 2005, without a structured WQMP program in place. For example, the proposed Southwest Justice Center (SWJC) Parking Lot Expansion is proposed to be located at 30755 Auld Road in unincorporated Murrieta, CA. The Facilities

Management Department Capital Project Status Report dated January 2008 (hereafter, Facilities CIP List), states that the project will include the addition of 390 parking spaces and that a contract agreement was being prepared (see attached Exhibit 1). Although this project qualifies as a Priority Development Project under F.2.b.(1)(b) and F.2.b.(1)(g) of the Order, the Facilities CIP List indicates that a contract agreement could be finalized without incorporating the SUSMP requirements for the project. As a result, the Facilities Management Department had not ensured that all Priority Development Projects meet SUSMP requirements.

Due to the limited availability of completed projects identified as Priority Development Projects by the County, the inspection team visited project sites in both the Santa Margarita River and Santa Ana River[1] watersheds. Activities conducted within the Santa Ana River watershed are regulated by Santa Ana Regional Water Board Order No. R8-2002-0011. Section VIII.B.1. of that Order requires that the WQMP address management of Urban Runoff quality from non-residential developments where the land area of the project site is 5,000 square feet or more. The WQMP requirements of Order No. R8-2002-0011, Section VIII.B.1., would apply to a number of CIP sites identified and visited during the inspections that did not adhere to these WQMP requirements. Examples include:

Rubidoux Fleet Services Facility – This $14 million dollar project was constructed under the administration of the EDA at the intersection of Crestmore Road and Mission Boulevard in unincorporated Rubidoux, CA. The project consists of a five acre municipal facility which provides vehicle maintenance, parking for 175 vehicles, and 5,000 square feet of office space. The project design was completed in December 2005 and construction was completed in July 2007. The facility was visited during the inspection and County representatives confirmed the project was designed and completed without a WQMP and associated post-construction BMPs. Information regarding the project (as well as others in the area) are available at http://district2.co.riverside.ca.us/opencms/districthappenings.html.

Woodcrest Community Library – This library was also constructed under the administration of the EDA at 17024 Van Buren Boulevard in unincorporated Riverside, CA. Groundbreaking ceremonies for the library occurred on November 2, 2006 and the project was opened to the public on November 10, 2007. The library consists of a 10,000 square foot LEED (Leadership in Energy and Environmental Design) certified building. Although the Woodcrest Library project implemented a number of post-construction BMPs, it is located on an approximate 2 acre project site and was not constructed in accordance with the aforementioned WQMP requirements or the associated Riverside WQMP Manual procedures. Information regarding the project is available at http://appsweb.co.riverside.ca.us/news/process?action=viewPressRelease&id=1769.

Although not visited during the inspections, the WQMP requirements of Order No. R8-2002-0011, Section VIII.B.1., would appear to apply to a number of additional CIPs which are currently being designed and/or constructed under the administration of the Facilities Management Department as follows: (1) the County Mental Health Department's Riverside Safe Haven located at 2800 Hulen Place in Riverside, CA; and (2) the County Community Health Agency's Administrative Building expansion. The County must apply the WQMP requirements

[1] Inspection activities in the Santa Ana River watershed were granted pre-inspection authorization by the Santa Ana Regional Water Board.

and associated Riverside WQMP Manual procedures to the categories of development identified in Order No. R8-2002-0011, Section VIII.B.1.

Due to the likelihood that additional CIPs qualify as a Priority Development Project, the County must review all current and proposed CIPs within both the Santa Margarita and Santa Ana River watersheds for WQMP applicability and develop a list of these projects including all data necessary to determine whether the CIPs qualify as a Priority Development Project, including but not limited to: land use, land area for development, area of impervious surface created or replaced, number of dwelling units, proximity to an ESA(s), and all other data relating to the Priority Development Project Categories specified in Requirement F.2.b.(1) of Order No. R9-2004-001 and Requirement VIII.B.1.b of Order No. R8-2002-0011. As a component of the list, the County shall make an initial Priority Development Project Category determination regarding the need for a WQMP and supporting rationale. The resulting list must be submitted to both the San Diego and Santa Ana Regional Water Boards.

4. Implementation of a Process to Ensure BMPs are Effective at Removing or Treating the Pollutants of Concern Associated with the Project. Regional Water Board Order No. R9-2004-001, Requirement F.2.b.(2)(d) requires that WQMP BMPs "be effective at removing or treating the pollutants of concern associated with the project." The County did not have an adequate procedure for requiring the application of BMPs which are effective at removing or treating the POCs associated with Capital Improvement Projects and Private Development. The County's procedure only required the review of plans for appropriate BMPs when the CIP's receiving waters are CWA Section 303(d) listed waters for the identified POCs. Regional Water Board Order No. R9-2004-001, Requirement F.2.b.(5), Pollutants or Conditions of Concern, states that "the procedure shall address, at a minimum: (1) Receiving water quality (including pollutants for which receiving waters are listed as impaired under CWA section 303(d); (2) Land use type of the development project and pollutants associated with that land use type; (3) Pollutants expected to be present on site; (4) Changes in storm water discharge flow rates, velocities, durations, and volumes resulting from the development project; and (5) Sensitivity of receiving waters to changes in storm water discharge flow rates, velocities, durations, and volumes."

Due to the lack of an adequate procedure for requiring the application of appropriate BMPs for identified POCs, it appeared that project proponents (i.e., developers or consultants retained by the county) could propose any BMP or suite of BMPs listed in the County's WQMP Manual irregardless of the BMPs applicability to items 1 through 5 above. This is turn could lead to the deployment of permanent post-construction BMPs that are ineffective at removing or treating the suite of POCs associated with a project. The following project exemplifies this problem.

<u>Site: Clinton Keith Road Widening from George Avenue to Copper Craft Drive located in un-incorporated Murrieta, CA 92562</u>

Regional Water Board Order No. R9-2004-001, Requirement F.2.b.(2)(d) requires that WQMP BMPs "be effective at removing or treating the pollutants of concern associated with the project." Pursuant to this requirement, the Riverside WQMP Manual, Section 4.5.3 Treatment Control BMPs, states that "for identified Pollutants of Concern (POCs) that are causing

impairments in receiving waters, the Project-Specific WQMP shall incorporate one or more Treatment Control BMPs of at least *medium* efficiency [emphasis added]." The Transportation Department hired URS Corporation to prepare a WQMP for this project. The Project-Specific WQMP dated May 11, 2007, Section III. Pollutants of Concern, identifies both Murrieta Creek and the Santa Margarita River as receiving waters for this CIP. The Final 2006 CWA Section 303(d) List of Water Quality Limited Segments identifies the entire length of Murrieta Creek (12 miles) as impaired for the following: iron and manganese (metals), and nitrogen and phosphorus (nutrients); and the upper portion of the Santa Margarita River (18 miles) as impaired for phosphorus. The Project-Specific WQMP selected Fossil Filter Inserts (County Standard No. 300A) to be installed on all catch basins throughout the project extent, even though the BMPs have an unknown (U) removal efficiency for the POCs identified in the Final 2006 CWA Section 303(d) List of Water Quality Limited Segments (metals and nutrients), (see attached Exhibit 2).

The Department of Transportation also hired Bureau Veritas North America, Inc. (BVNA) to conduct a third party review of the Project-Specific WQMP. BVNA's technical review memorandum dated, June 15, 2007, identifies this deficiency as it states "Catch Basin Filter Inserts are not an appropriate BMP for this project because…they do not treat the primary pollutants of concern (those generated by the site and also found in the receiving waters) to a medium/high removal efficiency level. Select a more appropriate BMP that RCTD [Riverside County Transportation District] approves and that provide the required treatment." Additional documentation and/or revisions to the WQMP were not available during the inspection and therefore it was not determined if the Project-Specific WQMP had been revised accordingly. However, it should also be noted that construction activities had not yet commenced on the project.

The selection of BMPs which are protective of POC levels will be vitally important as TMDLs continue to be adopted and implemented in the permittee's jurisdiction. Furthermore, the selection of WQMP BMPs which are effective for the identified POCs is more likely to result in measurable and tangible water quality improvement. The County must select WQMP BMPs which are effective at removing or treating the pollutants of concern associated with the project. Additionally, for identified POCs that are causing impairments in receiving waters, the County must ensure that the Project-Specific WQMP incorporates one or more Treatment Control BMPs of at least *medium* efficiency.

5. Failure to Implement a Process to Ensure Ongoing Maintenance: Regional Board Order No. R9-2004-001, Requirement F.2.b.(6), Implementation Process, requires the County to "develop a process by which SUSMP requirements will be implemented." Furthermore, Requirement F.2.b.(2)(j), BMP Requirements, requires that BMPs shall: "Include proof of mechanism, to be provided by the project proponent or Permittee, which shall ensure the ongoing long-term BMP maintenance." The County did not have a mechanism in place to add those new private development projects without Conditions, Covenants, and Restrictions (CC&Rs), such as restaurants, to the its inventory of BMPs. The County's current process appeared adequate for residential developments but did not appear to be effective for commercial or industrial developments. As a result, the County did not provide an adequate mechanism to ensure that all BMPs are maintained as required. Further, the County was not tracking the ongoing maintenance of BMPs. Specifically, required maintenance, maintenance history, inspection

results, and physical characteristics were not tracked. To ensure compliance with the requirements presented above, the County needs to develop and implement a system to more effectively track deployment, ownership, and maintenance of WQMP BMPs associated with commercial and industrial developments to ensure adequate long-term maintenance of the BMPs.

Section L. Monitoring and Reporting Program

The District has entered into interlocal agreements with the copermittees to implement the Monitoring and Reporting Program (MRP) as required by Order R9-2004-001. The MRP is organized as follows:

MRP Section I. Purpose. The MRP is intended to meet the following goals:

1. Assess compliance with Order R9-2004-001:
2. Measure and improve the effectiveness of the SWMPs;
3. Assess the chemical, physical, and biological impacts of receiving waters resulting from urban runoff;
4. Characterize urban runoff discharges;
5. Identify sources of pollutants;
6. Prioritize drainage and sub-drainage areas that need management actions;
7. Detect and eliminate illicit discharges and illicit connections to the MS4; and
8. Assess the overall health of the receiving waters.

MRP Section II. Monitoring Program. The Monitoring Program consists of the following elements:

- A. Receiving Waters Monitoring
  - A.I Core Monitoring[2]
    - 1. Mass Loadings
    - 2. Water Column Toxicity Testing
    - 3. Bioassessment
    - 4. Follow-up Actions Based on Triad Approach
    - 5. Tributary Monitoring
  - A.II Regional Monitoring
  - A.III Special Studies
- B. Illicit Discharge Monitoring
- C. Monitoring Provisions

MRP Section III. Reporting Program. The Reporting Program consists of the following elements:

- A. SWMP Reporting Requirements
  - 1. Individual Annual Report
  - 2. Watershed Annual Report
- B. Receiving Waters Monitoring Reporting Requirements
  - 1. Monitoring Program Annual Report
- C. Certified Perjury Statement

[2] The Mass Loadings, Water Column Toxicity Testing, and Bioassessment monitoring components of the Core Monitoring section are collectively referred to as the triad approach.

The inspection activities conducted in September 2007 and January 2008 focused primarily on the Districts implementation of the Section II. Monitoring Program and Section III.B Monitoring Program Annual Report requirements. The inspection included interviews with District personnel and their consultants and a review of the District's 2006 - 2007 Monitoring Annual Report submitted pursuant to Section III.B.1. With the exception of an overall finding relating to the purpose and goals of the monitoring program, which is presented last, the remainder of this report is organized to follow the MRP outline presented above.

MRP Section II.A.I.1 Core Monitoring.

The District has established the following four triad monitoring stations for wet and dry weather monitoring:

Triad Stations:
Temecula Creek below Pala Road – Station No. 777 (Lower Temecula Creek)
Lower Murrieta Creek @ USGS Weir – Station No. 778
Cole Creek – Station No. 188
Adobe Creek – Station No. 848

The District stated that Cole Creek is used as a wet weather reference station while Adobe Creek serves as a dry weather reference station.

The following findings were identified with respect to the District's implementation of triad monitoring.

6. Failure to Collect Wet Weather Mass Loading Samples. Monitoring and Reporting Program No. R9-2004-001, Section II.A.1(b), requires the Permittees to monitor the first storm event of each monitoring year that produces sufficient flow to collect a composite sample, and a minimum of two additional storm events during each monitoring year at each triad station (i.e., a total of three storm events are required to be sampled). During monitoring year 2006 - 2007, the District failed to obtain the required number of wet weather mass loading samples at all triad stations. Specifically, no wet weather samples were collected at the Cole Creek wet weather reference station, one wet weather sample was collected at the Lower Murrieta Creek station, and one wet weather sample was collected at the Temecula Creek station. [These samples were improperly collected – see Finding 9 below.] A summary of the District's mass loading sampling is provided as Exhibit 3. The exhibit was compiled based on the District's Field Data Sheets for the 2006 – 2007 reporting period that were obtained during the January 2008 inspection.

It should be noted that based on Table G-10 of the District's 2006 – 2007 Annual Monitoring Report and a review of Field Data Sheets, the Mass Loading sites were only visited during three wet weather events during the monitoring year. These dates included December 16, 2006, February 22, 2007, and April 20, 2007. The lone wet weather sample was obtained during the April 20, 2007 event. Precipitation data provided in Table G-8 of the 2006 – 2007 Monitoring Annual Report indicates that at least 8 precipitation events of greater than 0.1 inch occurred during the reporting period.

Additionally, the District only conducted one site visit to the Cole Creek triad monitoring station during the monitoring year. During this single visit it was determined that flow in the waterway was insufficient to obtain a composite sample. For the storm event on April 20, 2007 (when the other Mass Loading stations were sampled), District representatives stated that the Cole Creek site was not visited because the District assumed that the site would not have flowing water.

7. Failure to Monitor First Storm Event. Monitoring and Reporting Program No. R9-2004-001, Section II.A.1(b), requires the Permittees to monitor the first storm event of each monitoring year (July 1 through June 30) that produces sufficient flow to collect a composite sample, and a minimum of two additional storm events during each monitoring year at each triad station. The District is using the Riverside County Consolidated Monitoring Program for Water Quality Monitoring dated September 2007 (hereafter, Consolidated Monitoring protocol) as its procedure manual for the monitoring programs. The Consolidated Monitoring protocol defines a measurable storm event in accordance with an EPA classified storm event as follows: greater than 0.1 inch of accumulated precipitation preceded by 72 hours of dry weather. Furthermore, the Consolidated Monitoring protocol amends the 72 hour mark to include storms within that time frame that produce flow, given the first storm may not produce sufficient flow to collect a sample.

Based on available precipitation and USGS stream flow data, it appears the District failed to obtain the required samples during the first storm event that produced sufficient flow in monitoring year 2006 - 2007. A detailed review of the Lower Murrieta Creek monitoring station (Station No. 778) was conducted to be representative of the failure to obtain samples as follows:

Based on precipitation dated provided in Table G-8 of the 2006 - 2007 Monitoring Annual Report, the first measurable storm event in monitoring year 2006 - 2007 at the Murrieta Creek weather station was recorded as 0.59 inches on September 6, 2006. The District did not complete a site visit during this event and District staff cited their Consolidated Monitoring protocol amendment regarding insufficient flow for sample collection during the first storm event. Data obtained from the USGS gaging station on Murrieta Creek (USGS Station No. 11043000), which is 600 feet downstream of the sample location, substantiated the lack of flow as the recorded flow measurement was less than 0.10 cubic feet per second (cfs). The second measurable storm event in the Murrieta Creek watershed was recorded as 0.13 inches on October 14, 2006, but based on USGS flow records also did not result in sufficient flow to obtain samples. The first measurable storm event of monitoring year 2006 - 2007 that resulted in sufficient flow to obtain a sample at the District's Murrieta Creek weather station was recorded as 0.29 inches on December 10, 2006. A flow of 30 cubic feet per second (cfs) was recorded at USGS Station No. 11043000 on December 10, 2006, however the District did not complete a site visit nor did they obtain samples during this event. As stated in the 2006 – 2007 Monitoring Annual Report, "During storm events, sampling is conducted at the USGS Gage House, upstream of the USGS weir due to safety." [Additionally, the District did not complete site visits or obtain any samples from either the Cole Creek or Lower Temecula triad monitoring stations during this event.]

Based on a review of USGS streamflow data for the Murrieta Creek watershed, it appears that five instances of measurable flow occurred between September 6, 2006 and April 21, 2007 that

resulted in sufficient flow for obtaining wet weather samples in the Murrieta Creek. In these instances, the streamflow equaled or exceeded the stream flow present during the April 20, 2007 sampling event. A complete assessment of streamflow present within Murrieta Creek is attached to this report as Exhibit 4.

Based on the above information, the District appears to have an inadequate process for the identification and mobilization of sampling efforts to obtain monitoring data. The District heavily relies upon guidelines that use both the Quantitative Precipitation Statement (QPS) of forecasted precipitation events and antecedent moisture condition (AMC) within the watershed to identify opportunities to collect wet weather samples. The District stated that sample mobilization does not occur unless the QPS predicts a storm greater than 0.5 inches. It should be noted that use of 0.5 inches as a qualifying event contradicts the District's own procedures as presented in Section 3.A of the Consolidated Monitoring protocol. It appeared that this process may allow measurable storms to occur without being sampled (or at least field verified). Additionally, the QPS tracking does not begin until mid October which is after the onset of the wet season. The District representative stated that storms are tracked prior to the initiation of the QPS in October, but that mobilization does not commonly occur due to the fact that QPS predictions are often unreliable.

It appears that the District is challenged in obtaining samples from the triad stations due to problems with the mobilization process. For instance, the District does not appear to be timing site visitation with an expected time of actual flow. This is evident in the February 22, 2007 site visit to the Murrieta Creek monitoring station for obtaining wet weather sampling of an anticipated storm event. According to the Field Data Sheet (Exhibit 5), the site visit was conducted prior to the time of sufficient flow (as documented at the USGS gaging station, see Exhibit 4). The Consolidated Monitoring protocol references USEPA's storm classification and sample collection procedures (i.e., USEPA Stormwater Sampling Guidance Document 833-8-92-001 (July 1992)) specifying that composite samples should be taken during the first 3 hours of the storm or for the entire duration of the storm (if the event is less than 3 hours long). However, based on a review of Field Data sheets and USGS flow data, it appears that there is a disconnect between the timing of the site visits compared to the expected time that the wet weather flow would actually reach the monitoring station. The District should evaluate this procedure in light of other sampling requirements and commitments and make recommendations to the Regional Water Board regarding possible remedies.

8. Failure to Provide Written Explanation for Lack of Sampling. Monitoring and Reporting Program No. R9-2004-001, Section II.A.1(c), requires that "in the event that the required number of storm events are not sampled during one monitoring year at any given station, the Permittees shall submit, with the subsequent Annual Report, a written explanation for a lack of sampling data, including streamflow data from the nearest USGS gaging station." The 2006 - 2007 Monitoring Annual Report did not include a written explanation for the lack of mass loading sampling data at the triad stations, nor did the District provide streamflow data from the USGS gaging station or any other type of flow monitoring data that indicated that streamflows were not sufficient to collect the required samples.

District staff stated during the inspection that the watershed received very little rainfall during the reporting period which resulted in the failure to collect the required number of samples. Because the required number of storm events were not sampled during monitoring year 2006 - 2007 at all triad stations, the District must submit a written explanation for the lack of sampling data, including streamflow data from the nearest USGS gaging stations, to explain why the District did not monitor the required number of storm events.

9. Failure to Adhere to Required Monitoring Provisions. Monitoring and Reporting Program No. R9-2004-001, Section II.A.1(f), requires that "mass loading sampling and analysis protocols shall be consistent with 40 CFR 122.21(g)(7)(ii) and with the EPA Storm Water Sampling Guidance Document (EPA 833-B-92-001). Storm water samples shall be flow-weighted composites, collected during the first 3 hours of flow, or for the duration of the storm if it is less than 3 hours." The mass loading samples collected by the District at the triad stations do not conform with the referenced guidance documents as the District did not collect flow-weighted composite samples, and also did not adequately document whether the samples were collected during the first 3 hours of flow or for the duration of the storm when it is less than 3 hours. The District did not obtain composite samples from the triad stations during the sampling events conducted in monitoring year 2006 - 2007 as required by Section II.A.1(f) of the MRP. The District's Field Data Sheets indicate that the mass loading samples collected during the monitoring year at the triad stations were obtained as grab samples instead of the required composite samples. These samples include wet weather sampling events on April 20, 2007 at the Temecula Creek and Lower Murrieta Creek monitoring stations. This departure from the established Consolidated Monitoring protocols and Order requirements was not disclosed within the 2006 - 2007 Monitoring Annual Report. The reliance on grab samples was only identified after reviewing Field Data Sheets and questioning by the inspectors. The District must collect storm water samples which are flow-weighted composites, collected during the first 3 hours of flow, or for the duration of the storm if it is less than 3 hours.

10. Failure to Monitor First Storm Event for Full EPA Priority Pollutant List. MRP No. R9-2004-001, Section II.A.1(h), requires that at the triad stations, the first storm of every sampling year be analyzed for the full EPA priority pollutant list as defined in 40 CFR 122, Appendix D. The District's 2006 - 2007 Monitoring Annual Report states in Section G-6.1.1 that "During the first storm event of the reporting period, samples collected at the Triad stations were analyzed for the complete list of priority pollutants (40 CFR 122, Appendix D)." A review of the actual monitoring results reported in the District's Monitoring Annual Report revealed that the full list of priority pollutants was not actually completed as the samples collected on April 20, 2007 were not analyzed for bacteria and nutrients. 40 CFR 122, Appendix D, Table IV (Conventional and Non-conventional Pollutants Required To Be Tested by Existing Dischargers if Expected to be Present) lists bacteria and nutrients to be sampled if expected to be present in the receiving water.

It is reasonable to believe that nutrients and bacteria are present in the receiving waters of Cole Creek, Temecula Creek, Lower Murrieta Creek, and Adobe Creek based upon the following:

(1) There are CWA Section 303(d) impairments in the Santa Margarita River watershed for nutrients. Specifically, the Final 2006 CWA Section 303(d) List of Water Quality Limited

Segments identifies the entire length of Murrieta Creek (12 miles) as impaired for nitrogen and phosphorus (nutrients); and the upper portion of the Santa Margarita River (18 miles) as impaired for phosphorus; and

(2) The Water Quality Control Plan for the San Diego Basin, dated September 8, 1994 (hereafter, Basin Plan) specifies Water Quality Objectives (WQO) for fecal coliform. Fecal coliform is listed in Table G-27 of the District's 2006-2007 Monitoring Annual Report (Summary of Constituents of Concern) as detected above the WQO at Temecula Creek during one dry weather event and detected above the WQO at all tributaries during wet weather.

(3) The District collected samples for both nutrients and bacteria during their April 20, 2007 wet weather sampling at their tributary stations. Fecal coliform bacteria and nutrients were found to exceed the WQO in 7 of 8 bacteria samples and 10 of 10 nutrient samples, respectively.

(4) The District sampled for bacteria and nutrients during the October 17, 2006 and May 10, 2007 dry weather sampling events at both the Murrieta and Temecula Creek stations.

For these reasons, it is unclear why the District would fail to monitor for bacteria and nutrient during the single wet weather sampling event of the monitoring season. Pursuant to MRP No. R9-2004-001, Section II.A.1(h), the District must ensure that during the first storm event of the reporting period, samples collected at the Triad stations are analyzed for the complete list of priority pollutants (40 CFR 122, Appendix D).

Pages G-45 through G-63 of the District's 2006 – 2007 Monitoring Annual Report is attached to this report as Exhibit 7.

11. Failure to Conduct Follow-up Analysis and Actions Based on Triad Approach.
Monitoring and Reporting Program No. R9-2004-001, Section II.A.I.4, establishes a matrix of required follow-up actions based on the results of the triad monitoring. As presented in section G-6.4.3 of the 2006 – 2007 Monitoring Annual Report, the District states that "During the 2004-2005 and 2005-2006 reporting periods, toxicity to Hyalella was observed in 1 of 3 and 3 of 4 stormwater collections respectively, for both Temecula and Murrieta Creeks." During the course of the September 2007 and January 2008 inspections, the District stated that they examined the results and internally determined with their consultants that the results were not valid because the WET test species were coated with microorganisms that they believed to be the cause of the observed toxicity. It was stated that for this reason the District did not initiate a TIE in either 2005 or 2006 as is required by the permit. During the 2006 – 2007 reporting period, toxicity was again observed for Hyalella, however this time the District's consultant determined that, while present, the microorganisms were likely not the cause of the identified toxicity. The District subsequently initiated the required TIE procedure, which identified pyretheroids as the toxicant. The District conducted the TIE in May and June of 2007 and received the final results on July 7, 2007. Pursuant to Monitoring and Reporting Program No. R9-2004-001, Section II.A.4 Table 2, the District should have initiated a TIE following the evidence of toxicity in the previous monitoring years.

Furthermore, Monitoring and Reporting Program No. R9-2004-001, Section II.A.4(b) requires a Toxicity Reduction Evaluation (TRE) be conducted immediately upon the completion of a Toxicity Identification Evaluation (TIE) that identifies a pollutant(s) associated with urban runoff as a cause of any identified toxicity. The District did not initiate a TRE immediately upon completion of the TIE. As of the September 20, 2007 inspection, the District had yet to initiate the TRE process. During the January 2008 inspection, the District stated that a TRE had been initiated but they did not intend on submitting the TRE until submittal of their 2007-2008 Monitoring Annual Report which is due on or before October 31, 2008. SectionII.A.4(b) requires that once the source of toxicity and appropriate BMPs are identified that the permittee submit the TRE to the Regional Water Board for review. As such, the District is strongly encouraged to submit the TRE report and associated program changes to the Regional Water Board for review immediately upon its completion.

MRP Section II.A.I.5. Tributary Monitoring

12. Failure to Analyze for Constituents of Concern and Collect Dry Weather Tributary Samples. Monitoring and Reporting Program R9-2004-001, Section A.I.5.a) Tributary Monitoring, states the permittees "shall collect a grab sample from the first storm event of each monitoring year, a minimum of one additional storm event, and two dry weather events during each monitoring year at the following four tributary stations to help identify sources of pollutants." This requirement equates to the collection of two wet weather and two dry weather samples. The District has identified the following four tributary stations:

Warm Springs Creek – Station No. 397
Lateral A of Santa Gertudis Creek – Temecula – Station No. 774
Long Canyon – Station No. 780
Redhawk Channel downstream of Overland Drive – Station No. 768

Monitoring and Reporting Program R9-2004-001, Section A.I.5(c) states "tributary samples shall be analyzed for the constituents of concern…" Table G-2 of the District's 2006 – 2007 Monitoring Annual Report identifies the Constituents of Concern. Page G-4 of the 2006 – 2007 Monitoring Annual Report states "Per the MRP, monitoring of the tributary stations consists of collection of grab samples during the first storm event, an additional storm event and two dry weather events. The samples will be analyzed for the Constituents of Concern listed in Table G-2." Section G-6.1.2 Core Monitoring – Tributary Stations (page G-47) states "Four dry weather and two wet weather sampling events were monitored at the Tributary stations during the 2006-2007 reporting period. Wet weather samples were analyzed for the Constituents of Concern in Table G-2. Dry weather samples were collected and analyzed as described in the Illicit Connection/Illicit Discharge (IC/ID) discussion in Section 7.3.5." This procedure of analyzing dry weather samples per the IC/ID field screening procedure is a departure from the MRP requirements and the District's own procedures. Both dry and wet weather samples should have been analyzed for the Constituents of Concern.

This departure appears to be due, in part, to the fact that the District has elected to use their four tributary stations as their illicit discharge stations. Based on a review of Field Data Sheets, it appears that field crews were either unaware, or became confused, regarding the need to collect a

complete suite of parameters listed in Table G-2 during the dry weather events. Instead, the field crews appeared to have only collected the field screening data conducted as a component of the IC/ID program. Nonetheless, the District did not collect the full suite of parameters listed in Table G-4 during the dry weather sampling events.

Additionally, as displayed in Table G-12: Detected Results, the District collected only one dry weather sample at the Santa Gertudis Creek station and no dry weather samples at the Warm Springs Creek. As reported in Table G-31 of the 2006 – 2007 Monitoring Annual report, the Long Canyon, Santa Gertudis Creek, and Warm Springs Creek stations were only visited on September 14, 2006 and March 20, 2007. Additional efforts to collect the dry weather samples were not performed and therefore it does not appear that the District took all reasonable steps to acquire the required samples.

Further, the District did not collect bacteria samples during the first wet weather event on December 16, 2006 at the Long Canyon, Redhawk Channel, Santa Gertudis Creek, and Warm Springs Creek tributary stations. Bacteria samples were not collected during the September 14, 2006 sampling event at Long Canyon, Santa Gertudis Creek, and Warm Springs stations. During the course of the January 2007 inspection, the District stated that bacteria sampling has been difficult due to an inability to meet holding times at the contract laboratory. As a result, many of the collected bacteria samples have not been analyzed or reported.

It should be noted that the District did not proactively identify the above deficiencies and departures from the MRP requirements and their own Consolidate Monitoring protocols. Rather, the District states in Section G-6.1.2 Core Monitoring – Tributary Stations (page G-47) that "Four dry weather and two wet weather sampling events were monitored at the Tributary stations during the 2006-2007 reporting period." This statement is proven to be false.

Pages G-45 through G-63 of the District's 2006 – 2007 Monitoring Annual Report is attached to this report as Exhibit 7.

MRP Section II.B. Illicit Discharge Monitoring

13. Effectiveness of Illicit Discharge Monitoring Locations. Monitoring and Reporting Program No. R9-2004-001, Section II.B.1(a), Illicit Discharge Monitoring, requires that "stations shall be accessible points in the MS4 (i.e., outfalls, manholes or open channels) located downstream of potential sources of illicit discharges (i.e., commercial, industrial, and residential areas). Permittees shall use the MS4 map, developed pursuant to section J.2 of Order No. R9-2004-001, to help locate dry weather monitoring stations and to determine the number necessary to adequately represent the entire MS4."

As previously stated, the District selected the four tributary sites as their illicit discharge monitoring sites. These sites are located within the receiving streams and/or within open channel systems that routinely contain standing or ponded water throughout much of the year. As a result, the usefulness of these locations in identifying unauthorized dry weather discharges to the MS4 and eliminating their respective source(s) was questionable. The District should consider

selecting new or additional dry weather monitoring stations at appropriate points in the MS4, the number of which are adequate to represent the entire MS4 under dry weather conditions.

MRP Section II.C. Monitoring Provisions

14. Failure to Adhere to Monitoring Provisions. Monitoring and Reporting Program No. R9-2004-001, Section C requires that all monitoring shall meet established federal and state regulations that govern record keeping and sample collection, analysis, and reporting. Specifically, Monitoring and Reporting Program No. R9-2004-001, Section II.C.(c), requires that records of monitoring information include: (1) the date, exact place, and time of sampling or measurements; (2) the individual(s) who performed the sampling or measurements; (3) the date(s) analyses were performed; (4) the individual(s) who performed the analysis; (5) the analytical techniques or methods used; and (6) the results of such analyses.

A review of the Districts Field Data Sheets was performed during the January 2007 inspection. The review indicated that the records of sampling events are not fully completed on a regular basis and critical information from the Field Data Sheets is missing. Missing data includes names of samplers, required signature of lead sampler, select field measurements, and critical information such as why grab samples were collected in lieu of composite samples. An example of the missing data is attached to this report as Exhibit 8.

As an example of where important information was left out of the Monitoring Annual Report, the District did not mention or explain within the 2006 - 2007 Monitoring Annual Report the reason for absence of dissolved oxygen (DO) readings for the dry weather sample collected on May 10, 2007. Upon questioning, the District representatives stated that the DO readings were not taken due to a broken meter. This was not recorded on the Field Data Sheets.

The District needs to ensure that its recordkeeping and sample collection, analysis, and reporting procedures adhere to the federal and state regulations presented in Monitoring and Reporting Program No. R9-2004-001, Section C.

MRP Section I. Purpose

15. Summary Finding Regarding Purpose and Goals of the Monitoring Program. Monitoring and Reporting Program No. R9-2004-001, Section I., states that one of the goals of the MRP is to "measure and improve the effectiveness of the SWMPs [Storm Water Management Plans]." Based on the inspections, it is unclear how the District is using its monitoring programs to measure the effectiveness of the BMPs it has implemented and to accordingly identify modifications and improvements needed to its SWMP (or DAMP as it is referred to by the permittee). This statement is based on the findings presented above which are summarized below:

- The District did not monitor the required number of wet and dry weather events nor did they appear to take all reasonable steps to attempt to comply with the monitoring requirements;
- The District did not appear to take all reasonable steps to attempt to monitor the first storm event;

- Samples collected at the Mass Loading stations were not analyzed for the complete list of EPA priority pollutants during the first wet weather storm event of monitoring year 2006/2007;
- The District did not monitor the required number of dry weather events at the tributary stations nor did they appear to take all reasonable steps to attempt to comply with the monitoring requirements.
- Tributary station sample analyses were not conducted in accordance with MRP requirements or the Districts own procedures;
- The number and location of illicit discharge monitoring stations did not appear to be effective or sufficient to represent the MS4 and detect illicit discharges that may occur throughout the system; and
- As stated by District personnel, the sampling program and efforts are purposely structured so as to meet the minimum requirements contained within the MRP;
- The District failed to proactively identify known departures from their established sampling protocols and the permit requirements within their 2006 – 2007 Monitoring Annual Report. Several of these issues were only identified after record reviews conducted on-site by the inspection team.

Furthermore, as presented in Section A.I of the MRP, the triad and tributary Core Monitoring requirements are intended to generate water quality data that will build upon existing data to begin answering the following management questions:

- Are conditions in receiving waters protective, or likely to be protective, of beneficial uses?
- What is the extent and magnitude of the current or potential receiving water problems?
- What is the relative urban runoff contribution to the receiving water problem(s)?
- What are the sources of urban runoff that contribute to receiving water problems(s)?
- Are conditions in receiving waters getting better or worse?

Clearly, the task of generating sufficient data to answer these important management questions is not a trivial exercise. Based on the current design and implementation status of the Districts monitoring program, the ability of the District to begin answering the management questions at the end of the current Order term appeared questionable. In part, the District acknowledges this assessment as stated in Section G-6.4.6 of the Monitoring Annul Report.

Section III.B.1(d) of the MRP requires the permittees to submit a fourth-year Monitoring Report that shall include:

- A discussion of any long-term trends that can be detected from existing data (from all previous permit terms).
- Recommendations for future monitoring based on the results of previous efforts and the progress towards answering the management questions listed in Section II.A of the MRP and achieving the goals listed in Section I of the MRP.
- Recommended modifications to Individual or Watershed SWMPs to address identified source of pollutants in urban runoff.

As such, the District is encouraged to thoroughly evaluate the stated purpose, extent, existing data, and procedures of its monitoring program to ensure that the upcoming fourth-year Monitoring Report meets the objectives of the requirements.

California Regional Water Quality Control Board

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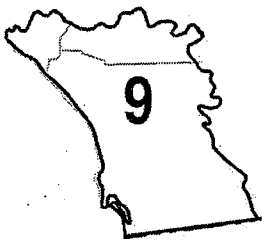

GENERAL WASTE DISCHARGE REQUIREMENTS
FOR DISCHARGES
FROM GROUNDWATER EXTRACTION AND SIMILAR DISCHARGES
TO SURFACE WATERS WITHIN THE SAN DIEGO REGION
EXCEPT FOR SAN DIEGO BAY (WDR)

ORDER NO. R9-2008-0002
NPDES NO. CAG919002

A Discharger, as described in the following table that has complied with the requirements for coverage under this General "Waste Discharge Requirements" (WDR), is subject to waste discharge requirements, once permit coverage is effective, as set forth in this WDR.

Dischargers	Any person with discharges from ground water extraction activities to surface waters within the San Diego Region, except for San Diego Bay that do not cause, have the reasonable potential to cause, or contribute to an instream excursion above any applicable State or federal water quality objectives/criteria or cause acute or chronic toxicity in the receiving water.

This WDR was adopted by the Regional Board on:	March 12, 2008
This WDR shall become effective on:	March 12, 2008
This WDR shall expire on:	March 12, 2013
The U.S. Environmental Protection Agency and the California Regional Water Quality Control Board, San Diego Region have classified these discharges as minor discharges.	

IT IS HEREBY ORDERED that Order No. 2001-96 is rescinded upon the effective date of this WDR except for enforcement purposes, as specified elsewhere in this Order, and, in order to meet the provisions contained in Division 7 of the California Water Code and regulations adopted therein, and the provisions of the federal Clean Water Act, and regulations and guidelines adopted therein, Dischargers shall comply with the requirements in this WDR.

I, John H. Robertus, Executive Officer, do hereby certify the following is a full, true, and correct copy of an Order adopted by the California Regional Water Quality Control Board, San Diego Region on March 12, 2008.

for John H. Robertus, Executive Officer

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I. DISCHARGE INFORMATION

A. Groundwater Extraction

Existing and proposed discharges of groundwater extraction waste to surface waters within the San Diego Region from construction groundwater extraction, foundation groundwater extraction and groundwater extraction related to groundwater remediation cleanup projects (collectively groundwater extraction):

1. Result from similar operations (all involve extraction and discharge of groundwater);
2. Are the same type of wastes (all are groundwater containing or potentially containing petroleum hydrocarbons, solvents, or other pollutants);
3. Require similar effluent limitations for the protection of the beneficial uses of similar receiving waters;
4. Require similar monitoring; and
5. Are more appropriately regulated under a general permit rather than individual permits.

II. PERMIT INFORMATION

A. Application

To obtain coverage under this WDR a Discharger must submit the following to the California Regional Water Quality Control Board, San Diego Region (Regional Board):

1. A Notice of Intent (NOI), including the following information:
   a. Owner and Operator name;
   b. Owner and Operator address;
   c. Owner and Operator telephone number;
   d. Site name
   e. Site address
   f. Type of discharges;
   g. Name of receiving waterbody and conveyance(s);
2. An initial sampling and monitoring report;
3. A project map(s) that shows the essential features of the groundwater extraction system within the Regional Board boundary, and the corresponding surface water or storm drain to which water will be discharged; and
4. Payment of the application fee, equal to the first annual fee, made payable to "SWRCB."

The NOI form is included within this WDR package as Attachment B.

The WDR NOI, including, map(s), the application fee, and other attachments, must be submitted to the following address:

CRWQCB – San Diego Region
9174 Sky Park Court, Suite 100
San Diego, CA 92123

Attn: Groundwater Extraction to San Diego Region
Core Regulatory Unit
NOTICE OF INTENT

B. Coverage

Permit coverage will be effective when all of the following have occurred:

1. The Discharger has submitted a complete NOI application (including initial sampling and monitoring report), as determined by the Regional Board; and
2. The Regional Board issues the Discharger's a Notice of Enrollment, which includes the discharge flow limit, any additional or increase in monitoring due to specific circumstances of the discharge, and any other additional requirements.
3. Current dischargers enrolled in Order No. 2001-96 shall re-enroll no later than 365 days after adoption of this WDR, each discharger currently enrolled in Order No. 2001-96 shall continue to comply with Order No. 2001-96 until obtaining permit coverage under this WDR.

C. Eligibility Criteria

This WDR is intended to cover all discharges of groundwater extraction wastes to surface waters within the San Diego Region Except San Diego Bay, from groundwater extraction due to construction and other groundwater extraction activities regardless of volume, including discharges less than 100,000 gallons per day. Dischargers must meet the following criteria to be subject to waste discharge requirements by this WDR:

1. The discharge of extracted groundwater due to groundwater extraction activities is discharged to surface waters within San Diego Region except San Diego Bay;

2. Pollutant concentrations in the discharge comply with the Discharge Specifications of this WDR.

This WDR does <u>not</u> cover:

STORM WATER - Storm water runoff due to construction activities. These activities may be covered under the statewide general NPDES permit for storm water discharges associated with construction activities (CAS000002), the statewide general NPDES permit for storm water runoff associated with small linear underground/overhead construction projects (CAS000005), and/or Clean Water Act (CWA) Section 401 Water Quality Certifications.

SANITARY SEWER - Discharges to a sanitary sewer. These discharges do not need coverage under the NPDES Program. Contact the agency controlling the sanitary sewer for approval prior to discharging to its conveyance system.

UTILITY VAULTS - Discharges from utility vaults and underground structures. These activities may be covered under the statewide general NPDES permit for discharges from utility vaults and underground structures to surface water Order No. 2006-0008-DWQ (CAG990002).

HYDROSTATIC/ POTABLE WATER – Discharges from drinking water well development. These discharges are covered under Order No. R9-2002-0020 (CAG679001).

D. Discharge to a Municipal Separate Storm Sewer System (MS4)

Prior to discharging into an MS4, the Discharger shall demonstrate alternatives to discharging extracted groundwater waste into an MS4 and why it is technically or economically infeasible to implement these alternatives.

Without prior approval from the appropriate local agency with jurisdiction over the MS4, the discharger shall not discharge extracted groundwater waste under this WDR into an MS4.

Local agencies responsible for operating the MS4s may not passively receive and discharge pollutants from third parties. By providing free and open access to an MS4 that conveys discharges to waters of the U.S., the MS4 operator essentially accepts responsibility for discharges into the MS4 that it does not prohibit or control. These discharges may cause or contribute to a condition of contamination or a violation of water quality standards.

Therefore, at least 30 days prior to initiating an extracted groundwater discharge to an MS4, the Discharger shall notify and receive authorization from the appropriate local agency with jurisdiction over the MS4. This requirement encourages communication between Dischargers enrolled under this WDR and local agencies responsible for MS4s in an effort to reduce misunderstandings and concerns over the types of discharges covered by this WDR.

E. Termination of Discharges

Dischargers shall submit a written request referred to as a "Notice of Termination (NOT)" to this Regional Board when coverage under this WDR is no longer required. The NOT letter constitutes a notice that the owner (and his/her agent) of the site has ceased the discharge of ground water associated with the groundwater extraction activities at the site under this WDR.

The NOT should include "Notice of Termination (NOT)" in the subject line, the Waste Discharge Identification Number (WDID) assigned to the project by the Regional Board when enrolled in the WDR, the name and address of the owner, and be signed and dated by the owner in accordance with the signatory requirements of the WDR. The Discharger shall continue to comply with the

requirements of the WDR until the Regional Board approves the NOT. Submittal of a NOT letter does not guarantee termination. Approval of the NOT does not relieve the Discharger's responsibility for paying any applicable outstanding invoices of annual fees as a result of enrollment under this WDR, nor does it relieve the Discharger from enforcement from existing violations.

F. Re-Enrollment of Renewed Permit

Dischargers enrolled under previous General Permit Order No. 2001-96 that plan on continuing their discharge, must re-enroll by submitting an NOI to obtain coverage under this WDR. Re-enrollees shall re-enroll no later than 365 days after the date of adoption of this WDR to achieve compliance with the new effluent limitations and criteria established by this WDR.

G. Transferring Ownership

Enrollment under the WDR for a specific project is not transferable. In the event of any change in ownership of land or waste discharge facilities presently owned by the enrolled Discharger, the Discharger must notify the new succeeding owner of the existence of this WDR by letter 120 days prior to property transfer, a copy of which must be immediately forwarded to the Regional Board office. Additionally, the Discharger must submit a NOT to the Regional Board. The new succeeding owner must submit a new NOI in application of enrollment under this WDR.

III. Findings

The Regional Board finds:

A. Background

This WDR supersedes Order No. 2001-96. The NPDES No. CAG919002 remains the same. Dischargers enrolled under previous Order No. 2001-96 must obtain coverage under this new WDR to continue their discharge subject to waste discharge requirements in this WDR.

B. Discharge Subject to Waste Discharge Requirements

To be subject to waste discharge requirements in this WDR for continued and future discharge to waters of the United States, Dischargers must submit an NOI and obtain coverage in order to be regulated under this WDR as provided in 40 CFR section 122.28 (b)(2).

C. Discharge Description

Existing and proposed discharges of groundwater extraction waste to surface waters within the San Diego Region except San Diego Bay from construction groundwater extraction, foundation groundwater extraction and groundwater extraction related to groundwater remediation (collectively referred to as Groundwater Extraction).

D. Legal Authorities

These waste discharge requirements are issued pursuant to Sections 13263 and 13377 of the California Water Code (CWC). The Regional Board shall prescribe requirements as to the nature of any proposed discharge and shall issue waste discharge requirements which apply and ensure compliance with all applicable provisions of the Federal Water Pollution Control Act, also referred as the Clean Water Act (CWA).

These waste discharge requirements issued by the Regional Board shall also serve as an NPDES permit for point source discharges from groundwater extraction waste to surface waters within the San Diego Region except San Diego Bay.

States may request authority to issue general NPDES permits pursuant to 40 CFR section 122.28. On June 8, 1989, the California State Water Resources Control Board (State Board) submitted an application to USEPA requesting revisions to its NPDES Program in accordance with 40 CFR sections 122.28, 123.62, and 403.10. The application included a request to add general permit authority to its approved NPDES Program. On September 22, 1989, USEPA, Region 9, approved the State Board's request and granted authorization for the State of California to issue general NPDES permits.

E. Background and Rationale for Requirements

The Regional Board developed the requirements in this WDR based on information submitted as part of the applications for several like agencies, individuals, and entities, through monitoring and reporting programs, and through special studies. Attachments A through F, which contain background information and rationale for WDR requirements, are hereby incorporated into this WDR and constitute part of the Findings for this WDR.

F. California Environmental Quality Act (CEQA)

This action to adopt a NPDES permit is exempt from the provisions of CEQA (Public Resources Code section 21100, et seq.) in accordance with CWC section 13389.

G. Technology-Based Effluent Limitations (TBELs)

Permits shall include applicable TBELs and standards. (40 CFR § 122.44(a)). This WDR does not include numeric-TBELs because USEPA has not promulgated effluent limitation guidelines for groundwater extraction.

H. Water Quality-Based Effluent Limitations (WQBELs)

Permits shall include WQBELs to attain and maintain applicable numeric and narrative water quality criteria to protect the beneficial uses of the receiving water. (40 CFR § 122.44(d)). Where numeric water quality criteria have not been established, WQBELs may be established using USEPA CWA section 304(a)criteria guidance, proposed State criteria or a State policy interpreting

narrative criteria supplemented with other relevant information, or an indicator parameter. (40 CFR § 122.44(d)).

I. Water Quality Control Plan

The Regional Board's Water Quality Control Plan for the San Diego Basin (hereinafter Basin Plan) designates beneficial uses, establishes water quality objectives, and contains implementation programs and policies to achieve those objectives for all waters addressed through the Basin Plan. The Basin Plan was adopted by the Regional Board on September 8, 1994, and was subsequently approved by the State Board on December 13, 1994. Subsequent revisions to the Basin Plan have also been adopted by the Regional Board and the State Board.

In addition, State Board Resolution No. 88-63 establishes state policy that all waters, with certain exceptions, should be considered suitable or potentially suitable for municipal and domestic supplies. Requirements of this WDR specifically implement the applicable provisions of the Basin Plan and State Board policy.

J. National Toxics Rule (NTR) and California Toxics Rule (CTR)

The USEPA adopted the NTR on December 22, 1992, which was amended on May 4, 1995, and November 9, 1999. The CTR was adopted by USEPA on May 18, 2000, and amended on February 13, 2001. These rules include water quality criteria for priority pollutants and are applicable to these discharges.

K. State Implementation Policy

On March 2, 2000, the State Board adopted the Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California (State Implementation Policy or SIP). The SIP became effective on April 28, 2000, with respect to the priority pollutant criteria promulgated for California by USEPA through the NTR and to the priority pollutant objectives established by the Regional Boards in their Basin Plans, with the exception of the provision on alternate test procedures for individual discharges that have been approved by the USEPA Regional Administrator. The alternate test procedures provision became effective on May 22, 2000. The SIP became effective on May 18, 2000. The SIP includes procedures for determining the need for WQBELs and for calculating WQBELs. The SIP also requires Dischargers to submit sufficient data to make the determination, and if necessary to calculate the WQBELs. The State Board adopted amendments to the SIP on February 24, 2005, that became effective on July 13, 2005. The SIP establishes implementation provisions for priority pollutant criteria and objectives, and provisions for chronic toxicity control. Requirements of this WDR implement the SIP.

L. Compliance Schedules and Interim Requirements

Current dischargers enrolled in Order No. 2001-96 shall re-enroll no later than 365 days after adoption of this WDR, each discharger currently enrolled in Order

No. 2001-96 shall continue to comply with Order No. 2001-96 until obtaining permit coverage under this WDR.

M. Antidegradation Policy

Section 131.12 of 40 CFR requires that State water quality standards include an antidegradation policy consistent with the federal policy. The State Board established California's antidegradation policy in State Board Resolution No. 68-16. Resolution No. 68-16 incorporates the federal antidegradation policy where the federal policy applies under federal law. Resolution No. 68-16 requires that existing quality of waters be maintained unless degradation is justified based on specific findings. The Regional Boards' Basin Plans implement, and incorporate by reference, both the State and federal antidegradation policies. As discussed in detail in the Fact Sheet, the permitted discharges are consistent with the antidegradation provision of 40 CFR section 131.12 and State Board Resolution No. 68-16.

N. Anti-Backsliding Requirements

Sections 402(o)(2) and 303(d)(4) of the CWA and federal regulations of 40 CFR section 122.44(l) prohibit backsliding in NPDES permits. These anti-backsliding provisions require effluent limitations in a reissued permit to be as stringent as those in the previous permit, with some exceptions where limitations may be relaxed. All effluent limitations in this WDR are at least as stringent as the effluent limitations in the previous Order.

O. Monitoring and Reporting

Section 122.48 of 40 CFR requires that all NPDES permits specify requirements for recording and reporting monitoring results. Sections 13267 and 13383 of the CWC authorize the Regional Boards to require technical and monitoring reports. The Monitoring and Reporting Program (MRP) establishes monitoring and reporting requirements to implement federal and State requirements. This MRP is provided in Attachment E.

P. Standard and Special Provisions

Standard Provisions, which in accordance with 40 CFR sections 122.41 and 122.42 apply to all NPDES discharges and must be included in every NPDES permit, are provided in Attachment D. The Regional Board has also included in this WDR special provisions applicable to the enrolled Dischargers. A rationale for the special provisions contained in this WDR is provided in the attached Fact Sheet (Attachment F).

Q. Notification of Interested Parties

The Regional Board has notified the Dischargers, interested agencies and persons of its intent to prescribe WDRs for these discharges, and has provided them with an opportunity to submit their written comments and recommendations. Notification details are provided in the Fact Sheet (Attachment F) of this WDR.

R. Consideration of Public Comment

The Regional Board, in a public meeting, heard and considered all comments pertaining to the discharges. Details of the Public Hearing are provided in the Fact Sheet of this WDR.

S. Alaska Rule

On March 30, 2000, USEPA revised its regulation that specifies when new and revised State and Tribal water quality standards (WQS) become effective for CWA purposes (40 CFR section 131.21, 65 FR 24641, April 27, 2000). Under the revised regulation (also known as the Alaska rule), USEPA must approve new and revised standards submitted to USEPA after May 30, 2000, before being used for CWA purposes. The final rule also provides that standards already in effect and submitted to USEPA by May 30, 2000, may be used for CWA purposes, whether or not approved by USEPA.

T. Ocean Plan

In order to protect the beneficial uses of receiving waters from excessive concentrations of pollutants as a result of groundwater extraction waste discharges, this Order does not provide for a mixing zone or a zone of initial dilution except when the discharge is to the surf zone. This Order allows initial dilution of 3 in a surf zone.

IV. Discharge Prohibitions

A. The discharge of wastewater at a location, or in a manner different from that described in the Findings, NOI, or Notice of Enrollment letter from the Regional Board is prohibited.

B. The discharge of wastewater shall not create or cause conditions of nuisance or pollution.

C. The discharge shall not cause, have a reasonable potential to cause, or contribute to an in-stream excursion above any applicable criterion promulgated by USEPA pursuant to section 303 of the CWA, or water quality objective adopted by the State or Regional Boards.

D. The discharge of waste to areas designated by the State Board as being of special (ASBS) biological significance is prohibited. Discharges shall be located a sufficient distance from such designated areas to assure maintenance of natural water quality conditions in these areas.

E. The discharge of groundwater extraction wastes from a specific site in excess of the flowrate specified in the Notice of Enrollment from the Regional Board is prohibited, unless the enrollee obtains a revised discharge Notice of Enrollment authorizing an increased flowrate.

F. The addition of pollutants to extracted groundwater to be discharged to surface waters within the San Diego Region except San Diego Bay is prohibited. The

only exception to this prohibition is that chemicals may be added to extracted groundwater to control biofouling in treatment systems, provided that extracted groundwater discharged meets the effluent limitations for such chemicals established by this WDR and in the discharge Notice of Enrollment issued by the Regional Board.

G. The discharge of groundwater extraction wastes to surface waters within the San Diego Region except San Diego Bay is prohibited unless an NOI has been submitted, and the Regional Board has provided the Discharger with a written Notice of Enrollment identifying the discharge subject to waste discharge requirements.

H. The discharge of groundwater extraction wastes from a groundwater remediation operation after the date groundwater has been remediated to the satisfaction of the Regional Board is prohibited.

I. Compliance with Discharge Prohibitions contained in the Basin Plan is also required as a condition of this WDR.

J. Discharges of wastes in a manner, or to a location which have not been specifically regulated by waste discharge requirements of this WDR are prohibited.

K. The discharge of any radiological, chemical, or biological warfare agent, or high level radiological waste is prohibited.

L. The dumping or deposition, from shore, of oil, garbage, trash, or other solid municipal, industrial, or agricultural waste directly into waters subject to tidal action or adjacent to waters subject to tidal action in any manner which may permit it to be washed into waters subject to tidal action is prohibited.

M. The dumping or deposition of chemical agents or explosives into waters subject to tidal action is prohibited.

V. Effluent Limitations and Discharge Specifications

A. Effluent Limitations

Summary of Water Quality-Based Effluent Limitations
Discharge Point
Summary of Water Quality-based Effluent Limitations Table

1. DISCHARGES TO BAYS AND HARBORS

The discharge of groundwater extraction waste to Mission Bay, Oceanside Harbor, Del Mar Boat Basin, or Dana Point Harbor shall not contain pollutants in excess of the following effluent limitations:

General / Inorganic / Biological

Parameter	Units	Effluent Limitations				
		AMEL	AWEL	MDEL	Instantaneous Maximum	6-Month Median
Settleable Solids	ml/L	1.0 [OP]	1.5 [OP]	-	3.0 [OP]	-
Total Suspended Solids	mg/L	30 [AB]	-	-	50 [AB]	-
Hydrogen Sulfide	µg/L	2 [AB]	-	4 [AB]	10 [AB]	-
Total Residual Chlorine	µg/L	-	-	8 [OP]	60 [OP]	2 [OP]
Acute Toxicity	Tua			0.3 [OP]		
Chronic Toxicity	Tuc			1.0 [OP]		
Total Coliform	MPN/ 100 ml				1000.0 [AB]	
Fecal Coliform	MPN/ 100 ml				200.0 [AB]	
pH	Units	Within limit of 6.0 to 9.0 at all times [OP]				

Parameter	Units	Effluent Limitations				
		AMEL	AWEL	MDEL	Instantaneous Minimum	6-Month Median
Dissolved Oxygen (DO)	mg/L				> 5.0 [AB]	

Petroleum

Parameter	Units	Effluent Limitations				
		AMEL	AWEL	MDEL	Instantaneous Maximum	6-Month Median
MTBE	µg/L				5 [DHS]	
Benzene	µg/L	-	-	-	5 [AB]	-
Ethylbenzene	µg/L	-	-	-	5 [AB]	-
Toluene	µg/L	-	-	-	5 [AB]	-
Xylene	µg/L	-	-	-	5 [AB]	-
Total Petroleum Hydrocarbons	mg/L	-	-	-	0.5 [AB]	-

Metals

Parameter	Units	Effluent Limitations			
		AMEL	MDEL	Instantaneous Maximum	6-Month Median
Tributyltin (TBT)	µg/L	0.0014 [OP]			

Organics

Parameter	Units	Effluent Limitations			
		AMEL	MDEL	Instantaneous Maximum	6-Month Median
Phenolic Compounds (non-chlorinated)	µg/L	-	120 [OP]	300 [OP]	30 [OP]
Chlorinated Phenolics	µg/L	0.025 [CTR]	0.049 [CTR]	10 [OP]	1 [OP]
1,1,2,2-tetrachlorethane (PCA)	µg/L	2.3 [OP]	-	-	-
1,1,1-trichloroethane (TCA)	µg/L	5.4E5 [OP]	-	-	-
1,1,2-trichloroethane (TCA)	µg/L	9.4 [OP]	-	-	-
1,2-dichloroethane	µg/L	28 [OP]	-	-	-
Tetrachloroethylene (PCE)	µg/L	2.0 [OP]	-	-	-
Trichloroethylene (TCE)	µg/L	27 [OP]	-	-	-
Vinyl chloride	µg/L	36 [OP]	-	-	-
Carbon tetrachloride	µg/L	0.90 [OP]	-	-	-
Base/Neutral Organic Compounds	µg/L			10 [AB]	

Parameter	Units	Effluent Limitations			
		AMEL	MDEL	Instantaneous Maximum	6-Month Median
Ammonia (as N)	µg/L		2400 [OP]	6000 [OP]	600 [OP]
Endosulfan	ng/L	-	18 [OP]	27 [OP]	9 [OP]
HCH	ng/L	-	8 [OP]	12 [OP]	4 [OP]
Dichloromethane	µg/L	450 [OP]	-	5 [AB]	-
Halomethanes	µg/L	-	-	5 [AB]	-
PAHs	ng/L	8.8 [OP]	-	-	-
TCDD Equivalents	pg/L	0.0039 [OP]	-	-	-

Parameter	Units	Effluent Limitations			
		AMEL	MDEL	Instantaneous Maximum	6-Month Median
Turbidity	µg/L	75 [OP]	2.2 [CTR]	225	-

Parameter	Units	Effluent Limitations			
		AMEL	AWEL	Instantaneous Minimum	6-Month Median
Turbidity	NTU	75 [OP]	100 [OP]	225 [OP]	-
Turbidity	NTU	Shall not exceed the turbidity of the receiving water. [AB]			
126 Priority Pollutants from "Inland Surface Waters"					

2. DISCHARGES TO LAGOONS/ESTUARIES

The discharge of groundwater extraction waste discharges to saline lagoons (only Buena Vista Lagoon is fresh water) and estuaries of the region shall not contain pollutants in excess of the following effluent limitations:

Includes limits to the Bays and Harbors Limitations

Parameter	Units	Effluent Limitations			
		AMEL	MDEL	Instantaneous Maximum	6-Month Median
Total Nitrogen	mg/L	-	-	2.0 [AB]	1.0 [AB]
Total Phosphorus	mg/L	-	-	.0.2 [AB]	0.1 [AB]
pH	Units	Within limit of 7.0 to 8.5 at all times [AB]			
All Parameters and Effluent Limitations from "Bays and Harbors"					

3. DISCHARGES TO THE SURF ZONE

The discharge of groundwater extraction waste to the surf zone (3:1 dilution factor) shall not contain pollutants in excess of the following effluent limitations:

Discharges to the Surf Zone Calculation

The formula used to calculate effluent limits for consituents discharged to the surf zone is from Table B in the Ocean Plan except for Toxicity and Radioactivity.

$Ce=Co+Dm(Co-Cs)$

Ce = the effluent concentration limit, ug/L
Co = the concentration (water quality objective) to be met at the completion of initial dilution, ug/L
Dm = minimum probable initial dilution expressed as parts seawater per part wastewater

Dm = 3 from findings from the 2001-96 Order.
Cs = background seawater concentration (see Table C), ug/L

Table C BACKGROUND SEAWATER CONCENTRATIONS (Cs) Waste Consitituent	Cs (ug/L)
Arsenic	3
Copper	2
Mercury	0.0005
Silver	0.16
Zinc	8
For all other Table B parameters	0

DISCHARGES TO THE SURF ZONE

(3:1 DILUTION FACTOR) [AB]

Parameter	Units	Effluent Limitations			
		AMEL	MDEL	Instantaneous Maximum	6-Month Median
TCR	µg/L		32 [OP]	240 [OP]	8 [OP]
Ammonia (as Nitrogen)	µg/L		9600 [OP]	24,000 [OP]	2400 [OP]
Arsenic	µg/L		119 [OP]	311 [OP]	23 [OP]
Cadmium	µg/L		16 [OP]	40 [OP]	4 [OP]
Chromium (hexavalent)	µg/L		32 [OP]	80 [OP]	8 [OP]
Copper	µg/L		42 [OP]	114 [OP]	6 [OP]
Lead	µg/L		32 [OP]	80 [OP]	8 [OP]
Mercury	µg/L		0.64 [OP]	1.60 [OP]	0.16 [OP]
Nickel	µg/L		80 [OP]	200 [OP]	20 [OP]
Silver	µg/L		10.7 [OP]	27.5 [OP]	2.32 [OP]
Zinc	µg/L		296 [OP]	776 [OP]	56 [OP]
Cyanide	µg/L		16 [OP]	40 [OP]	4 [OP]
Phenolic Compounds (Non-chlorinated)	µg/L		480 [OP]	1200 [OP]	120 [OP]
1,1,2,2-tetrachloroethane	µg/L		9.2 [OP]		
Tributyltin (TBT)	µg/L		0.0056 [OP]		
1,1,-trichoroethane	µg/L		2,160,000 [OP]		

Parameter	Units	Effluent Limitations			
		AMEL	MDEL	Instantaneous Maximum	6-Month Median
1,1,2-trichloroethane	µg/L		37.6 OP		
Carbon tetrachloride	µg/L		3.6 OP		
PCBs	µg/L		0.000076 OP		
Tetrachloroethylene	µg/L		8 OP		
Trichloroethylene	µg/L		108 OP		
Vinyl chloride	µg/L		144 OP		
Selenium	µg/L		240 OP	600 OP	60 OP
Endosulfan	µg/L		0.072 OP	0.108 OP	0.036 OP
Endrin	µg/L		0.016 OP	0.024 OP	0.008 OP
HCH	µg/L		0.032 OP	0.048 OP	0.016 OP
Acrolein	µg/L	880 OP			
Antimony	µg/L	4800 OP			
bis(2-chloroethoxy) methane	µg/L	17.6 OP			
bis(2-chloroisopropyl) ether	µg/L	4800 OP			
Chlorobenzene	µg/L	2280 OP			
di-n-butyl phthalate	µg/L	14,000 OP			
Dichlorobenzenes	µg/L	20,400 OP			
1,1-dichloroethylene	µg/L	3.6 OP			
Diethyl phthalate	µg/L	132,000 OP			
Dimethyl phthalate	µg/L	3,280,000 OP			
4,6-dinitro-2-methylphenol	µg/L	880 OP			
2,4-dinitrophenol	µg/L	16 OP			
Ethylbenzene	µg/L	16,400 OP			
Fluoranthene	µg/L	60 OP			
Hexachlorocyclopentadiene	µg/L	232 OP			

Parameter	Units	Effluent Limitations			
		AMEL	MDEL	Instantaneous Maximum	6-Month Median
Nitrobenzene	µg/L	19.6 OP			
Thallium	µg/L	8 OP			
Acrylonitrile	µg/L	0.4 OP			
Aldrin	µg/L	0.000088 OP			
Benzene	µg/L	23.6 OP			
Benzidine	µg/L	0.000276 OP			
Beryllium	µg/L	0.132 OP			
Bis(2-chloroethyl) ether	µg/L	0.18 OP			
Bis(2-ethylhexyl) phthalate	µg/L	14 OP			
Chlordane	µg/L	0.000092 OP			
Chloroform	µg/L	520 OP			
DDT	µg/L	0.00068 OP			
3,3-dichlorobenzidine	µg/L	0.0324 OP			
1,2-dichloroethane	µg/L	112 OP			
Dichloromethane	µg/L	1,800 OP			
1,3-dichloropropene	µg/L	35.6 OP			
Dieldrin	µg/L	0.00016 OP			
2,4-dinitrotoluene	µg/L	10.4 OP			
1,2-diphenylhydrazine	µg/L	0.64 OP			
Halomethanes	µg/L	520 OP			
Heptachlor	µg/L	0.0002 OP			
Hexachlorobenzene	µg/L	0.00084 OP			
Hexachlorobutadine	µg/L	56 OP			
Hexachloroethane	µg/L	10 OP			

Parameter	Units	Effluent Limitations			
		AMEL	MDEL	Instantaneous Maximum	6-Month Median
N-nitrosodimethylamine	µg/L	29.2 [OP]			
N-nitrosodiphenylamine	µg/L	10 [OP]			
PAHs	µg/L	0.0352 [OP]			
TCDD equivalents	µg/L	1.56E-08 [OP]			
Toxaphene	µg/L	0.00084 [OP]			
2,4,6-trichlorophenol	µg/L	1.16 [OP]			

Parameter	Units	Effluent Limitations			
		AMEL	AWEL	Instantaneous Maximum	MDEL
Settleable Solids	ml/L	1 [OP]	1.5 [OP]	3 [OP]	
Suspended Solids		75% [OP] *			
		*Suspended Solids AMEL is 75% removal unless the average monthly influent is 80 mg/L or less, then the effluent limit shall be 60 mg/L. [OP]			
pH		Within limit of 6.0 and 9.0 at all times. [OP]			
Toluene		340,000 [OP]			
Xylene				5 [AB]	
Total Petroleum Hydrocarbons				500 [AB]	
Aute Toxicity	TUa				0.3 [OP]
Chronic Toxicity	TUc				1 [OP]
Turbidity	NTU	75 [OP]	100 [OP]	225 [OP]	

Parameter	Units	Effluent Limitations			
		AMEL	AWEL	Instantaneous Maximum	Shellfish Harvesting
Total Coliform	MPN/100 mL	1,000 [OP]		10,000 [OP]	
Total Coliform	MPN/100 mL			1,000 [OP] *	
		*Total coliform density shall not exceed 1,000 per 100 mL when the ratio of fecal/total coliform exceeds 0.1 [OP]			
Total Coliform					70 [OP] **

Parameter	Units	Effluent Limitations			
		AMEL	AWEL	Instantaneous Maximum	Shellfish Harvesting
Total Coliform					230 [OP] **
		**The median total coliform density shall not exceed 70 per 100 mL, and not more than 10 percent of the samples shall exceed 230 per 100 mL. [OP]			
Fecal Coliform	MPN/100 mL	200 [OP]		400 [OP]	
Enterococcus	MPN/100 mL	35 [OP]		104 [OP]	

Parameter	Units	Effluent Limitations				
		AMEL	AWEL	MDEL	Instantaneous Minimum	6-Month Median
Dissolved Oxygen (DO)	mg/L				5.0 [AB]	

[OP] Basis – Ocean Plan 2005
[AB] Basis – Anti-Backsliding, values from the previous permit
[DHS] Basis – Department of Health Services
[CTR] Basis – California Toxics Rule/ State Implementation Plan 2005

4. DISCHARGES TO INLAND SURFACE WATERS

The discharge of groundwater extraction waste to inland surface waters (including Buena Vista Lagoon) shall not contain pollutants in excess of the following effluent limitations:

GENERAL CONSTITUENTS

Constituent	Unit	AMEL	Daily Maximum	Instantaneous Maximum	Basis
Settleable Solids	ml/L	0.1	---	0.2	AB
Total Suspended Solids	mg/L	30	---	50	
Percent Sodium	%	---	---	60	AB
Total Nitrogen	mg/L	1.0		2.0	"
Total Phosphorus	mg/L	0.1		0.2	"
Methylene Blue Active Substances	mg/L	---	---	0.5	"
Turbidity	NTU	Shall not exceed the ambient turbidity of the surface water at any time.			"
Fluoride	mg/L	---	---	1.0	"
Hydrogen Sulfide	µg/L	2	4	10	AB
Total Residual Chlorine (TRC)	µg/L	2	8	10	AB
pH	Units	Within the limits of 6.5 and 8.5 at all times.			AB
Acute Toxicity	TUa	---	---	0.59	AB
Chronic Toxicity	TUc	---	1	---	AB

Constituent	Unit	AMEL	Daily Maximum	Instantaneous Maximum	Basis
Dissolved Oxygen	mg/L	Shall not be less than 5.0 at any time in waters with designated warm fresh-water habitat beneficial uses or less than 6.0 in waters with cold fresh water habitat beneficial uses.			AB
Total Coliform	MPN/100mL	---	---	1000	"
Fecal Coliform	MPN/100mL	---	---	200	"

VOLATILES, METALS, PRIORITY POLLUTANTS:

Beneficial Use:	Municipal/Potable Supply			Non-municipal/Non-potable		
		Instantaneous			Instantaneous	
Constituent	Unit	Maximum	Basis	Unit	Maximum	Basis
Dibromochloropropane	µg/L	0.2	DOHS	µg/L	0.2	AB
Ethylene Dibromide	µg/L	0.02	DOHS	µg/L	0.02	AB
Xylene	µg/L	5	AB	µg/L	5	AB
Chlorinated Phenolics	µg/L	1	DOHS	µg/L	10	AB
Remaining Base/Neutral Compounds	µg/L	10	AB	µg/L	10	AB
Total Petroleum Hydrocarbons	mg/L	0.5	"	mg/L	0.5	AB
Iron**	mg/L	0.3	"	mg/L	0.3	AB
Manganese	mg/L	0.05	"	mg/L	0.05	AB
MTBE	µg/L	5	DOHS			
126 Priority Pollutants (Including metals)	40 CFR 131.38 - Water Quality Standards; Establishment of Numeric Criteria for Priority Toxic Pollutants for the State of California.					See Below

126 Priority Pollutants - 40 CFR 131.38 - Water Quality Standards; Establishment of Numeric Criteria for Priority Toxic Pollutants for the State of California.

The effluent limits for eight priority pollutants will be developed on a case-by-case basis because the freshwater criteria are based on site-specific water quality data.

Seven metals are dependent on water hardness, Cadmium, Copper, Chromium (III), Lead, Nickel, Silver, and Zinc [See Table 1 to 40 CFR 131.38(b)(2)], and the "Conversion Factors" for Cadmium and Lead are also water hardness dependent. [See Table 3 of 40 CFR 131.38(b)(2)]

In order to calculate the effluent limits for these seven metals the following equations from 40 CFR 131.38(b)(2) will be needed:

Cd CFa=1.136672-((LN(hardness))*0.041838)
Cd CFc = 1.101672-((LN(hardness))*0.041838)
Pb CFa&c = 1.46203-((LN(hardness))*0.145712)
Criterion=WER*CFx*(exp(mA*LN(hardness)+bA

Pentachlorophenol is dependent on the pH value. [See Footnote "f" to Table in 40 CFR 131.38(b)(1)]

To calculate the effluent limit for Pentachlorophenol use this equation:
CMC = exp(1.005(pH)−4.869). CCC = exp(1.005(pH)−5.134)

The remainder of the criteria is not water quality dependent and the effluent limits can be calculated. However, not all the effluent limits will apply to all sites because of the Beneficial use designation for "Municipal" may not apply to all sites.

Effluent Limits for Human Health Municipal and Non-Municipal

		Human Health			
		MUN		NON-MUN	
		AMEL (µg/L)	MDEL (µg/L)	AMEL (µg/L)	MDEL (µg/L)
A					
1	Antimony	14	28	4300	8600
2	Arsenic				
3	Beryllium				
4	Cadmium				
5a	Chromium (III)				
5b	Chromium (IV)				
6	Copper	1300	2600		
7	Lead				
8	Mercury	0.05	0.1	0.051	0.1
9	Nickel				
10	Selenium				
11	Silver				
12	Thallium				
13	Zinc	700	1400	220000	440000
14	Cyanide	7000000	14000000		
15	Asbestos	1.3E-08	2.6E-08	1.4E-08	2.8E-08
16	2,3,7,8-TCDD (Dioxin)	320	640	780	1600
17	Acrolein	0.059	0.12	0.66	1.3
18	Acrylonitrile	1.2	2.4	71	140
19	Benzene	4.3	8.6	360	720
20	Bromoform	0.25	0.5	4.4	8.8
21	Carbon Tetrachloride	680	1400	21000	42000
22	Chlorobenzene	0.41	0.82	34	68
23	Chlorodibromomethane				

		Human Health			
		MUN		NON-MUN	
		AMEL (µg/L)	MDEL (µg/L)	AMEL (µg/L)	MDEL (µg/L)
24	Chloroethane				
25	2-Chloroethylvinyl Ether				
26	Chloroform				
27	Dichlorobromomethane	0.56	1.1	46	92
28	1,1-Dichloroethane				
29	1,2-Dichloroethane	0.38	0.76	99	200
30	1,1-Dichloroethylene	0.057	0.11	3.2	6.4
31	1,2-Dichloropropane	0.52	1	39	78
32	1,3-Dichloropropylene	10	20	1700	3400
33	Ethylbenzene	3100	6200	29000	58000
34	Methyl Bromide	48	96	4000	8000
35	Methyl Chloride				
36	Methylene Chloride	4.7	9.4	1600	3200
37	1,1,2,2-Tetrachloroethane	0.17	0.34	11	22
38	Tetrachloroethylene	0.8	1.6	8.9	18
39	Toluene	6800	14000	200000	400000
40	1,2-Trans-Dichloroethylene	700	1400	140000	280000
41	1,1,1-Trichloroethane				
42	1,1,2-Trichloroethane	0.6	1.2	40	80
43	Trichloroethylene	2.7	5.4	81	160
44	Vinyl Chloride	2	4	530	1100
45	2-Chlorophenol	120	240	400	800
46	2,4-Dichlorophenol	93	190	790	1600
47	2,4-Dimethylphenol	540	1100	2300	4600
48	2-Methyl-4,6-Dinitrophenol	13	27	770	1500
49	2,4-Dinitrophenol	70	140	14000	28000
50	2-Nitrophenol				
51	4-Nitrophenol				
52	3-Methyl-4-Chlorophenol				
53	Pentachlorophenol	0.28	0.56	8.2	16
54	Phenol	21000	42000	4500000	9000000
55	2,4,6-Trichlorophenol	2.1	4.2	6.5	13
56	Acenaphthene	1200	2400	2700	5400

		Human Health			
		MUN		NON-MUN	
		AMEL	MDEL	AMEL	MDEL
		(µg/L)	(µg/L)	(µg/L)	(µg/L)
57	Acenaphthylene				
58	Anthracene	9600	19000	110000	220000
59	Benzidine	0.00012	0.00024	0.00054	0.0011
60	Benzo(a)Anthracene	0.0044	0.0088	0.049	0.098
61	Benzo(a)Pyrene	0.0044	0.0088	0.049	0.098
62	Benzo(b)Fluoranthene	0.0044	0.0088	0.049	0.098
63	Benzo(ghi)Perylene				
64	Benzo(k)Fluoranthene	0.0044	0.0088	0.049	0.098
65	Bis(2-Chloroethoxy)Methane				
66	Bis(2-Chloroethyl)Ether	0.031	0.062	1.4	2.8
67	Bis(2-Chloroisopropyl)Ether	1400	2800	170000	340000
68	Bis(2-Ethylhexyl)Phthalate	1.8	3.6	5.9	12
69	4-Bromophenyl Phenyl Ether				
70	Butylbenzyl Phthalate	3000	6000	5200	10000
71	2-Chloronaphthalene	1700	3400	4300	8600
72	4-Chlorophenyl Phenyl Ether				
73	Chrysene	0.0044	0.0088	0.049	0.098
74	Dibenzo(a,h)Anthracene	0.0044	0.0088	0.049	0.098
75	1,2 Dichlorobenzene	2700	5400	17000	34000
76	1,3 Dichlorobenzene	400	800	2600	5200
77	1,4 Dichlorobenzene	400	800	2600	5200
78	3,3'-Dichlorobenzidine	0.04	0.08	0.077	0.15
79	Diethyl Phthalate	23000	46000	120000	240000
80	Dimethyl Phthalate	310000	630000	2900000	5800000
81	Di-n-Butyl Phthalate	2700	5400	12000	24000
82	2,4-Dinitrotoluene	0.11	0.22	9.1	18
83	2,6-Dinitrotoluene				
84	Di-nOctyl Phthalate				
85	1,2-Diphenylhydrazine	0.04	0.08	0.54	1.1
86	Fluoranthene	300	600	370	740
87	Fluorene	1300	2600	14000	28000
88	Hexachlorobenzene	0.00075	0.0015	0.00077	0.0015
89	Hexachlorobutadiene	0.44	0.88	50	100

		Human Health			
		MUN		NON-MUN	
		AMEL (µg/L)	MDEL (µg/L)	AMEL (µg/L)	MDEL (µg/L)
90	Hexachlorocyclopentadiene	240	480	17000	34000
91	Hexachloroethane	1.9	3.8	8.9	18
92	Inden(1,2,3-cd) Pyrene	0.0044	0.0088	0.049	0.098
93	Isophorone	8.4	17	600	1200
94	Naphthalene				
95	Nitrobenzene	17	34	1900	3800
96	N-Nitrosodimethylamine	0.00059	0.0012	8.1	16
97	N-Nitrosodi-n-Propylamine	0.005	0.01	1.4	2.8
98	N-Nitrosodiphenylamine	5	10	16	32
99	Phenanthrene				
100	Pyrene	960	1900	11000	22000
101	1,2,4-Trichlorobenzene				
102	Aldrin	0.00013	0.00026	0.00014	0.00028
103	alpha-BHC	0.0039	0.0078	0.013	0.026
104	beta-BHC	0.014	0.028	0.046	0.092
105	gamma-BHC	0.019	0.038	0.063	0.13
106	delta-BHC				
107	Chlordane	0.00057	0.0011	0.00059	0.0012
108	4,4'-DDT	0.00059	0.0012	0.00059	0.0012
109	4,4'-DDE	0.00059	0.0012	0.00059	0.0012
110	4,4'-DDD	0.00083	0.0017	0.00084	0.0017
111	Dieldrin	0.00014	0.00028	0.00014	0.00028
112	alpha-Endosulfan	110	220	240	480
113	beta-Endosulfan	110	220	240	480
114	Endosulfan Sulfate	110	220	240	480
115	Endrin	0.76	1.5	0.81	1.6
116	Endrin Aldehyde	0.76	1.5	0.81	1.6
117	Heptachlor	0.00021	0.00042	0.00021	0.00042
118	Heptachlor Epoxide	0.0001	0.0002	0.00011	0.00022
119	Polychlorinated biphenyls (PCBs)	0.00017	0.00034	0.00017	0.00034
120	"				
121	"				

		Human Health			
		MUN		NON-MUN	
		AMEL (µg/L)	MDEL (µg/L)	AMEL (µg/L)	MDEL (µg/L)
122	"				
123	"				
124	"				
125	"				
126	Toxaphene	0.00073	0.0015	0.00075	0.0015

Effluent Limits for Freshwater and Saltwater

		Freshwater		Saltwater	
		MDEL (µg/L)	AMEL (µg/L)	MDEL (µg/L)	AMEL (µg/L)
A					
1	Antimony				
2	Arsenic	250	120	59	29
3	Beryllium				
4	Cadmium	*	*	16	8
5a	Chromium (III)	*	*		
5b	Chromium (IV)	16	8.1	83	41
6	Copper	*	*	5.8	2.9
7	Lead	*	*	14	7
8	Mercury				
9	Nickel	*	*	14	6.8
10	Selenium	8.2	4.1	120	58
11	Silver	*	*	2.2	1.1
12	Thallium				
13	Zinc	*	*	95	47
14	Cyanide	8.5	4.2	1	0.5
15	Asbestos				
16	2,3,7,8-TCDD (Dioxin)				
17	Acrolein				
18	Acrylonitrile				
19	Benzene				
20	Bromoform				
21	Carbon Tetrachloride				

		Freshwater		Saltwater	
		MDEL (µg/L)	AMEL (µg/L)	MDEL (µg/L)	AMEL (µg/L)
22	Chlorobenzene				
23	Chlorodibromomethane				
24	Chloroethane				
25	2-Chloroethylvinyl Ether				
26	Chloroform				
27	Dichlorobromomethane				
28	1,1-Dichloroethane				
29	1,2-Dichloroethane				
30	1,1-Dichloroethylene				
31	1,2-Dichloropropane				
32	1,3-Dichloropropylene				
33	Ethylbenzene				
34	Methyl Bromide				
35	Methyl Chloride				
36	Methylene Chloride				
37	1,1,2,2-Tetrachloroethane				
38	Tetrachloroethylene				
39	Toluene				
40	1,2-Trans-Dichloroethylene				
41	1,1,1-Trichloroethane				
42	1,1,2-Trichloroethane				
43	Trichloroethylene				
44	Vinyl Chloride				
45	2-Chlorophenol				
46	2,4-Dichlorophenol				
47	2,4-Dimethylphenol				
48	2-Methyl-4,6-Dinitrophenol				
49	2,4-Dinitrophenol				
50	2-Nitrophenol				
51	4-Nitrophenol				
52	3-Methyl-4-Chlorophenol				
53	Pentachlorophenol	**	**	13	6.5
54	Phenol				
55	2,4,6-Trichlorophenol				

		Freshwater		Saltwater	
		MDEL (µg/L)	AMEL (µg/L)	MDEL (µg/L)	AMEL (µg/L)
56	Acenaphthene				
57	Acenaphthylene				
58	Anthracene				
59	Benzidine				
60	Benzo(a)Anthracene				
61	Benzo(a)Pyrene				
62	Benzo(b)Fluoranthene				
63	Benzo(ghi)Perylene				
64	Benzo(k)Fluoranthene				
65	Bis(2-Chloroethoxy)Methane				
66	Bis(2-Chloroethyl)Ether				
67	Bis(2-Chloroisopropyl)Ether				
68	Bis(2-Ethylhexyl)Phthalate				
69	4-Bromophenyl Phenyl Ether				
70	Butylbenzyl Phthalate				
71	2-Chloronaphthalene				
72	4-Chlorophenyl Phenyl Ether				
73	Chrysene				
74	Dibenzo(a,h)Anthracene				
75	1,2 Dichlorobenzene				
76	1,3 Dichlorobenzene				
77	1,4 Dichlorobenzene				
78	3,3'-Dichlorobenzidine				
79	Diethyl Phthalate				
80	Dimethyl Phthalate				
81	Di-n-Butyl Phthalate				
82	2,4-Dinitrotoluene				
83	2,6-Dinitrotoluene				
84	Di-nOctyl Phthalate				
85	1,2-Diphenylhydrazine				
86	Fluoranthene				
87	Fluorene				
88	Hexachlorobenzene				
89	Hexachlorobutadiene				

		Freshwater		Saltwater	
		MDEL (µg/L)	AMEL (µg/L)	MDEL (µg/L)	AMEL (µg/L)
90	Hexachlorocyclopentadiene				
91	Hexachloroethane				
92	Inden(1,2,3-cd) Pyrene				
93	Isophorone				
94	Naphthalene				
95	Nitrobenzene				
96	N-Nitrosodimethylamine				
97	N-Nitrosodi-n-Propylamine				
98	N-Nitrosodiphenylamine				
99	Phenanthrene				
100	Pyrene				
101	1,2,4-Trichlorobenzene				
102	Aldrin	3	1.5	1.3	0.65
103	alpha-BHC				
104	beta-BHC				
105	gamma-BHC	0.95	0.47	0.16	0.08
106	delta-BHC				
107	Chlordane	0.007	0.0035	0.0066	0.0033
108	4,4'-DDT	0.0016	0.00082	0.0016	0.00082
109	4,4'-DDE				
110	4,4'-DDD				
111	Dieldrin	0.092	0.046	0.0031	0.0016
112	alpha-Endosulfan	0.092	0.046	0.014	0.0071
113	beta-Endosulfan	0.092	0.046	0.014	0.0071
114	Endosulfan Sulfate				
115	Endrin	0.059	0.029	0.0038	0.0019
116	Endrin Aldehyde				
117	Heptachlor	0.0062	0.0031	0.0059	0.0029
118	Heptachlor Epoxide	0.0062	0.0031	0.0059	0.0029
119	Polychlorinated biphenyls (PCBs)	0.023	0.011	0.049	0.025
120	"				
121	"				
122	"				

		Freshwater		Saltwater	
		MDEL (µg/L)	AMEL (µg/L)	MDEL (µg/L)	AMEL (µg/L)
123	"				
124	"				
125	"				
126	Toxaphene	0.00033	0.00016	0.00033	0.00016

* Use equations from 40 CFR 131.38(b)(2)
** Use equations from 40 CFR 131.38(b)(1) footnote "f"

Mass Limits

All permit limitations, standards or prohibitions shall be expressed in terms of mass except for pH, or other pollutants which cannot appropriately be expressed by mass or under certain circumstances including "when applicable standards and limitations are expressed in terms of other units of measurement." (40 CFR § 122.45(f)(1)). Therefore, all concentration limits stated above except for Settleable Solids, Acute Toxicity, Chronic Toxicity, Total Coliform, Fecal Coliform, pH, and Dissolved Oxygen shall also have a mass limit based on its concentration limit times the discharge flow limit in the Notice of Enrollment expressed in pounds per day (lbs/d) as shown in the equations below:

Concentration Limit * Flow Limit * Conversion Factor = Mass Limit
(mg/l) * (MGD) * 8.34 [lb*L/(Million Gallons*mg)] = lbs/day
(µg/l) * (MGD) * 0.00834 [lb*L/(Million Gallons*µg)] = lbs/day
(mg/l) * (gpd) * 0.00000834 [lb*L/(Gallons*mg)] = lbs/day
(µg/l) * (gpd) * 0.00000000834 [lb*L/(Million Gallons*µg)] = lbs/day

5. Interim Effluent Limitations (Not Applicable)

6. Land Discharge Specifications (Not Applicable)

7. Reclamation Specifications (Not Applicable)

B. Land Discharge Specifications (Not Applicable)

C. Reclamation Specifications (Not Applicable)

VI. Receiving Water Limitations

A. Surface Water Limitations

Receiving water limitations are based on water quality objectives contained in the Basin Plan and are a required part of this WDR. The discharge of groundwater extraction waste from any site shall not, separately or jointly with any other discharge, cause violations of the following water quality objectives. These

limitations apply unless more stringent provisions exist in either the Basin Plan, or an applicable State plan. The more stringent limitation shall apply.

1. Bacterial Characteristics

   a. Water-Contact Standards
   Within a zone bounded by the shoreline and a distance of 1,000 feet from the shoreline or the 30-foot depth contour, whichever is further from the shoreline, and in areas outside this zone used for water-contact sports, as determined by the Regional Board, the following bacterial objectives shall be maintained throughout the water column:

   (1) Samples of water from each sampling station shall have a density of total coliform organisms less than 1,000 per 100 ml (10 per ml); provided that not more than 20 percent of the samples at any sampling station, in any 30-day period, may exceed 1,000 per 100 ml (10 per ml), and provided further that no single sample when verified by a repeat sample taken within 48 hours shall exceed 10,000 per 100 ml (100 per ml).

   (2) The fecal coliform density based on a minimum of not less than five samples for any 30-day period shall not exceed a geometric mean of 200 per 100 ml nor shall more than 10 percent of the total samples during any 60-day period exceed 400 per 100 ml.

   b. Shellfish Harvesting Standards
   At all areas where shellfish may be harvested for human consumption, as determined by the Regional Board, the following bacterial objectives shall be maintained throughout the water column:

   The median total coliform density shall not exceed 70 per 100 ml, and not more than 10 percent of the samples shall exceed 230 per 100 ml.

2. Physical Characteristics
   a. Floating particulates and grease and oil shall not be visible.
   b. The discharge of waste shall not cause aesthetically undesirable discoloration of the surface waters.
   c. Natural light shall not be significantly reduced.
   The rate of deposition of solids and the characteristics of inert solids in the sediments shall not be changed such that benthic communities are degraded.

3. Chemical Characteristics
   a. The dissolved oxygen concentration shall not at any time be depressed more than 10 percent from that which occurs naturally, as a result of the discharge of oxygen demanding waste materials.
   b. The pH shall not be changed at any time more than 0.2 units from that which occurs naturally.

c. The dissolved sulfide concentration of waters in and near sediments shall not be significantly increased above that present under natural conditions.
d. The concentration of substances set forth in the Discharge Specifications in marine sediments shall not be increased to levels which would degrade indigenous biota.
e. The concentration of organic materials in the sediments shall not be increased to levels which would degrade marine life.
f. Nutrient materials shall not cause objectionable aquatic growth or degrade indigenous biota.

4. Biological Characteristics
   a. Marine communities, including vertebrate, invertebrate, and plant species, shall not be degraded.
   b. The natural taste, odor, and color of fish, shellfish, or other aquatic resources used for human consumption shall not be altered.
   c. The concentration of organic materials in fish, shellfish or other aquatic resources used for human consumption shall not bioaccumulate to levels that are harmful to human health.

5. Radioactivity
   Discharge of radioactive waste shall not degrade marine life.

6. Toxic Materials Limitations for Marine Waters (Surf Zone) Ocean Plan, 2005

OBJECTIVES FOR PROTECTION OF MARINE AQUATIC LIFE

Chemical	Units of Measurement	6-Month Median	Daily Maximum	Instantaneous Maximum
Arsenic	µg/L	8	32	80
Cadmium	µg/L	1	4	10
Chromium (Hexavalent)	µg/L	2	8	20
Copper	µg/L	3	12	30
Lead	µg/L	2	8	20
Mercury	µg/L	0.04	0.16	0.4
Nickel	µg/L	5	20	50
Selenium	µg/L	15	60	150
Silver	µg/L	0.7	2.8	7
Zinc	µg/L	20	80	200
Cyanide	µg/L	1	4	10
Total Chlorine Residual	µg/L	2	8	60
Ammonia (as nitrogen)	µg/L	600	2400	6000
Chronic Toxicity	TUc		1	
Phenolic Compounds (Non-chlorinated)	µg/L	30	120	300
Chlorinated Phenolics	µg/L	1	4	10
Endosulfan	ng/L	9	18	27
Endrin	ng/L	2	4	6

Chemical	Units of Measurement	6-Month Median	Daily Maximum	Instantaneous Maximum
HCH	ng/L	4	8	12
Radioactivity	Not to exceed limits specified in Title 17, Chapter 15, Subchapter 4, Group 3, Article 3, Section 30269 of the California Code of Regulations.			

OBJECTIVES FOR PROTECTION OF HUMAN HEALTH -- NONCARCINOGENS

Chemical	Units of Measurement	30-day Averages
Acrolein	µg/L	220
Antimony	mg/L	1.2
bis(2-chloroethoxy) methane	µg/L	4.4
bis(2-chloroisopropyl) ether	mg/L	1.2
Chlorobenzene	µg/L	570
Chromium (III)	mg/L	190
Di-n-butyl phthalate	mg/L	3.5
Dichlorobenzenes	mg/L	5.1
1,1-dichloroethylene	mg/L	7.1
Diethyl phthalate	mg/L	33
Dimethyl phthalate	mg/L	820
4,6-dinitro-2-methylphenol	µg/L	220
2,4-dinitrophenol	µg/L	4.0
Ethylbenzene	mg/L	4.1
Fluoranthene	µg/L	15
Hexachlorocyclopentadiene	µg/L	58
Isophorone	mg/L	150
Nitrobenzene	µg/L	4.9
Thallium	µg/L	14
Toluene	mg/L	85
1,1,2,2-tetrachloroethane	mg/L	1.2
Tributyltin	ng/L	1.4
1,1,1-trichloroethane	mg/L	540
1,1,2-trichloroethane	mg/L	43

OBJECTIVES FOR PROTECTION OF HUMAN HEALTH -- CARCINOGENS

Chemical	Units of Measurement	30-day Average
Acrylonitrile	µg/L	0.1
Aldrin	ng/L	0.022
Benzene	µg/L	5.9
Benzidine	ng/L	0.069
Beryllium	ng/L	33
bis(2-chloroethyl) ether	µg/L	0.045
bis(2-ethylhexyl) phthalate	µg/L	3.5
Carbon tetrachloride	µg/L	0.9
Chlordane	ng/L	0.023
Chloroform	mg/L	0.13
DDT	ng/L	0.17

Chemical	Units of Measurement	30-day Average
1,4-dichlorobenzene	µg/L	18
3,3-dichlorobenzidine	ng/L	8.1
1,2-dichloroethane	mg/L	0.13
Dichloromethane	mg/L	0.45
1,3-dichloropropene	µg/L	8.9
Dieldrin	ng/L	0.04
2,4-dinitrotoluene	µg/L	2.6
1,2-diphenylhydrazine	µg/L	0.16
Halomethanes	mg/L	0.13
Heptachlor	ng/L	0.72
Hexachlorobenzene	ng/L	0.21
Hexachlorobutadiene	µg/L	14
Hexachloroethane	µg/L	2.5
N-nitrosodimethylamine	µg/L	7.3
N-nitrosodiphenylamine	µg/L	2.5
PAHs	ng/L	8.8
PCBs	ng/L	0.019
TCDD equivalents	pg/L	0.0039
Tetrachloroethylene	µg/L	99
Toxaphene	ng/L	0.21
Trichloroethylene	µg/L	27
2,4,6-trichlorophenol	µg/L	0.29
Vinyl chloride	µg/L	36

7. Toxic Materials Limitations and Objectives for Inland Surface Waters (Fresh)

(a) Discharges of extracted groundwater shall not cause violations of surface water quality objectives presented by hydrographic subunit and subarea in Table 3-2 of the Comprehensive Water Quality Control Plan Report, San Diego Basin (9), as amended.

(b) Discharges of extracted groundwater shall not cause violations of the following objectives in inland surface waters:

1. No individual pesticide or combination of pesticides shall be present in concentrations that adversely affect beneficial uses. There shall be no increase in pesticide concentrations found in bottom sediments or aquatic life.

2. For the protection of public health and aquatic species, waters designated for use as domestic or municipal supply (MUN) shall not contain concentrations of toxics in excess of the maximum contaminant levels for contaminants set forth in the California Code of Regulations, Title 22, as amended, or water quality objectives listed in 40 CFR 131.38 (Attachment D), for the protection of aquatic species and protection of human health, whichever concentration for a specific chemical is less. Current maximum

contaminant levels for the protection of human health from the ingestion of water are as follows:

	Constituent	Title22 Maximum Contaminant Level (mg/L)
a. Inorganic	Aluminum	1
	Arsenic	0.05
	Barium	1
	Cadmium	0.01
	Chromium	0.05
	Lead	0.05
	Mercury	0.002
	Nitrate	45
	Selenium	0.01
	Silver	0.05

	Constituent	Title22 Maximum Contaminant Level (mg/L)
b. Organic	Atrazine	0.003
	Bentazon	0.018
	Benzene	0.001
	Carbon Tetrachloride	0.0005
	2,4-D	0.1
	Dibromochloropropane	0.0002
	1,4-Dichlorobenzene	0.005
	1,2-Dichloroethane	0.0005
	1,1-Dichloroethylene	0.006
	1,3-Dichloropropene	0.0005
	Endrin	0.0002
	Ethyl Benzene	0.68
	Ethylene Dibromide	0.00002
	Lindane	0.004
	Methoxychlor	0.1
	Molinate	0.02
	Monochlorobenzene	0.03
	Simazine	0.01
	1,1,2,2-Tetrachloroethane	0.001
	Tetrachloroethylene	0.005
	Thiobencarb	0.07
	Toxaphene	0.005
	2,4,5-TP Silvex	0.01
	1,1,1-Trichloroethane	0.2
	1,1,2-Trichloroethane	0.032
	Trichloroethylene	0.005
	Vinyl Chloride	0.0005
	Xylenes (Single or sum of isomers)	1.75

8. Mineral Objectives for Inland Surface Waters (fresh):

Hydrographic Unit	**Objective (mg/L)**			
	TDS	**Chloride**	**Sulfate**	**Boron**
San Juan Unit				
1.10	1000	400	500	0.75
1.20,1.30,1.40,1.50	500	250	250	0.75
Santa Margarita Unit				
2.20,2.40,2.50,2.60	500	250	250	0.75
2.70,2.80,2.90,2.10,2.30	750	300	300	0.75
San Luis Rey Unit				
3.10,3.20,3.30	500	250	250	0.75
Carlsbad Unit				
4.10,4.40				
4.20,4.30,4.50,4.60	500	250	250	0.75
San Dieguito Unit				
5.10,5.20,5.30,5.40, 5.50	500	250	250	0.75
Penasquitos Unit				
6.10,6.20,6.40	500	250	250	0.75
6.30,6.50	---	---	---	---
San Diego Unit				
7.10	1000	400	500	1.0
7.11	1500	400	500	1.0
7.12c/d,	1000/1500	400	500	1.0
7.20,7.30,7.40	300	50	65	1.0
Coronado Unit				
10.10	NA	NA	NA	NA
Sweetwater River Unit				
9.10	1500	500	500	0.75
9.20,9.30	500	250	250	0.75
Otay Unit				
10.20	1000	400	500	0.75
10.30	500	250	250	0.75
Tijuana Unit				
11.11	2100	NA	NA	NA
11.20,11.30,11.40,11.50				
11.60,11.70,11.80	500	250	250	1.0

9. Waters designated for use as agricultural supply (AGR) shall not contain concentrations of chemical constituents in amounts that adversely affect such beneficial use.

10. Radioactivity: Discharges of radioactive waste shall not degrade marine life.

B. Groundwater Limitations (Not Applicable)

VII. Provisions

A. Standard Provisions

1. The Discharger shall comply with all Standard Provisions included in Attachment D of this WDR.

2. Regional Board Standard Provisions. The Discharger shall comply with the following provisions:

   a. The Discharger shall comply with all requirements and conditions of this WDR. Any permit non-compliance constitutes a violation of the CWA and/or of the CWC and is grounds for enforcement action, permit termination, revocation and reissuance, or modification, or for denial of an application for permit renewal, modification, or reissuance.

   b. The Discharger shall comply with all applicable federal, state, and local laws and regulations for handling, transport, treatment, or disposal of waste or the discharge of waste to waters of the state in a manner which causes or threatens to cause a condition of pollution, contamination or nuisance as those terms are defined in CWC 13050.

   c. The Porter-Cologne Water Quality Control Act provides for civil and criminal penalties comparable to, and in some cases greater than, those provided for under the CWA.

   d. Any noncompliance with this WDR is a violation of the CWC and/or the CWA and is grounds for denial of an application for Order renewal or modification.

   e. No discharge of waste into waters of the state, whether or not the discharge is made pursuant to WDRs, shall create a vested right to continue the discharge. All discharges of waste into waters of the state are privileges, not rights.

   f. For the purposes of this WDR, the term "permittee" used in parts of 40 CFR incorporated into this WDR by reference and/or applicable to this WDR shall have the same meaning as the term "Discharger" used elsewhere in this WDR.

g. This WDR expires on March 12, 2013, after which, the terms and conditions of this permit are automatically continued pending issuance of a new WDR, provided that all requirements of USEPA's NPDES regulations at 40 CFR 122.6 and the State's regulations at CCR Title 23, Section 2235.4 regarding the continuation of expired Orders and waste discharge requirements are met.

h. Except as provided for in 40 CFR 122.7, no information or documents submitted in accordance with or in application for this permit will be considered confidential, and all such information and documents shall be available for review by the public at the office of the Regional Water Board.

i. A copy of this WDR shall be maintained on-site at the Facility, and shall be available to Regional Water Board, State Water Board, and EPA personnel and/or their authorized representatives at all times.

j. The Discharger shall comply with any interim limitations established by addendum, enforcement action, or revised waste discharge requirements that have been or may be adopted by the Regional Water Board.

k. Failure to comply with provisions or requirements of this WDR, or violation of other applicable laws or regulations governing discharges from this facility, may subject the Discharger to administrative or civil liabilities, criminal penalties, and/or other enforcement remedies to ensure compliance. Additionally, certain violations may subject the Discharger to civil or criminal enforcement from appropriate local, state, or federal law enforcement entities.

l. In the event the Discharger does not comply or will be unable to comply for any reason, with any prohibition, effluent limitation, discharge specification, or receiving water limitation of this WDR, the Discharger shall notify the Regional Water Board by telephone (858) 467-2952 within 24 hours of having knowledge of such noncompliance, and shall confirm this notification in writing within five days, unless the Regional Water Board waives confirmation. The written notification shall state the nature, time, duration, and cause of noncompliance, and shall describe the measures being taken to remedy the current noncompliance and prevent recurrence including, where applicable, a schedule of implementation. Other noncompliance requires written notification as above at the time of the normal monitoring report.

m. The Discharger is required to retain records, including all monitoring information and copies of all reports required by this WDR, for five years unless directed otherwise by the Regional Board.

n. This WDR may be modified, revoked and reissued, or terminated for cause due to promulgation of amended regulations, receipt of USEPA

guidance concerning regulated activities, judicial decision, or in accordance with 40 Code of Federal Regulations (CFR) 122.62, 122.63, 122.64, and 124.5.

o. Dischargers enrolled in this WDR planning to discharge extracted groundwater waste after the expiration date of March 12, 2013 may be subject to new prohibitions or requirements based on the re-issuance of this WDR after March 12, 2013.

p. The enrollee shall take all reasonable steps to minimize or correct any adverse impact on the environment resulting from noncompliance with this WDR and the Notice of Enrollment from the Regional Board, including such accelerated or additional monitoring as may be necessary to determine the nature, and effect of the noncomplying discharge.

q. This WDR or the Notice of Enrollment from the Regional Board, may be modified, revoked and reissued, or terminated for cause including, but not limited to, the following:

(1) Violation of any terms or conditions of this WDR or the Notice of Enrollment from the Regional Board;

(2) Obtaining enrollment in this WDR, or a Notice of Enrollment from the Regional Board, by misrepresentation or failure to disclose fully all relevant facts;

(3) A change in any condition that requires either a temporary or permanent reduction or elimination of the discharge subject to waste discharge requirements; or

(4) A finding that monitoring "indicator" pollutants listed in this WDR do not ensure compliance with water quality criteria or objectives for the pollutants expected to be represented by the "indicator" pollutants.

r. The filing of a request by the enrollee for modification, revocation and reissuance, or termination of this WDR or an associated discharge Notice of Enrollment from the Regional Board, or a notification of planned change in or anticipated noncompliance with this WDR or discharge Notice of Enrollment does not stay any condition of this WDR or the Notice of Enrollment from the Regional Board.

s. Notwithstanding Provision 2.e above, if any applicable toxic effluent standard or prohibition (including any schedule of compliance specified in such effluent standard or prohibition) is promulgated under Section 307(a) of the CWA for a toxic pollutant and that standard or prohibition is more stringent than any limitation on the pollutant in this WDR, the Regional Board may institute proceedings under these regulations to modify or revoke and reissue this WDR to conform to the toxic effluent standard or prohibition.

t. In addition to any other grounds specified herein, this WDR or a Notice of Enrollment from the Regional Board shall be modified or revoked at any time if, on the basis of any data, the Regional Board determines that continued discharges may cause unreasonable degradation of the aquatic environment.

u. The Regional Board or the Director of the USEPA may require any person requesting enrollment under this WDR or subject to waste discharge requirements under this WDR to apply for and obtain an individual NPDES permit. Cases where an individual NPDES permit may be required include but are not limited to those described in 40 CFR 122.28 (b)(3)(i) and (b)(3)(ii), and where the volume of a discharge exceeds 10 million gallons per year, or the duration of a discharge exceeds 3 years.

v. It shall not be a defense for the enrollee in an enforcement action that effluent limitation violations are a result of analytical variability rendering the results inaccurate. The validity of the testing results, whether or not the enrollee has monitored or sampled more frequently than required by this WDR, shall not be a defense to an enforcement action.

w. A copy of this WDR, and the Notice of Enrollment from the Regional Board shall be posted at a prominent location at or near the enrollee's facility, and shall be available to operating personnel at all times.

x. The enrollee shall take all reasonable steps to minimize or prevent any discharge in violation of this WDR which has a reasonable likelihood of adversely affecting human health or the environment.

y. For the purposes of this WDR, the term permit, general permit, and order, shall have the same meaning as the term WDR used elsewhere in this WDR.

z. For the purpose of this WDR, the term Discharger and enrollee shall have the same meaning as the term discharger used elsewhere in this WDR.

B. Monitoring and Reporting Program Requirements

The Discharger shall comply with the MRP, and future revisions thereto, in Attachment E of this WDR.

C. Special Provisions

1. Reopener Provisions (Not Applicable)

2. Special Studies, Technical Reports and Additional Monitoring Requirements (Not Applicable)

3. Best Management Practices and Pollution Prevention Plan (Not Applicable)

4. Compliance Schedules (Not Applicable)

5. Construction, Operation and Maintenance Specifications (Not Applicable)

6. Special Provisions for Municipal Facilities (POTWs Only) (Not Applicable)

7. Other Special Provisions

   The Dischargers shall dispose of solids removed from liquid wastes in a manner that is consistent with Title 27 of the CCR and approved by the Regional Board.

8. Order No. R9-2008-0002 may be modified by the Regional Board and EPA to enable the discharger to participate in comprehensive regional monitoring activities conducted in the Southern California Bight during the term of this permit. The intent of regional monitoring activities is to maximize the efforts of all monitoring partners using a more cost-effective monitoring design and to best utilize the pooled scientific resources of the region. During these coordinated sampling efforts, the discharger's sampling and analytical effort may be reallocated to provide a regional assessment of the impact of the discharge of municipal wastewater to the Southern California Bight. Anticipated modifications to the monitoring program will be coordinated so as to provide a more comprehensive picture of the ecological and statistical significance of monitoring results and to determine cumulative impacts of various pollution sources. If predictable relationships among the biological, water quality and effluent monitoring variables can be demonstrated, it may be appropriate to decrease the discharger's sampling effort. Conversely, the monitoring program may be intensified if it appears that the objectives cannot be achieved through the discharger's existing monitoring program. These changes will improve the overall effectiveness of monitoring in the Southern California Bight. Minor changes may be made without further public notice.

VIII. Compliance Determination

Compliance with the effluent limitations contained in Section IV of this WDR will be determined as specified below:

A. Average Monthly Effluent Limitation (AMEL)

If the average of daily discharges over a calendar month exceeds the AMEL for a given parameter, an alleged violation will be flagged and the Discharger will be considered out of compliance for each day of that month for that parameter (e.g., resulting in 31 days of non-compliance in a 31-day month). The average of daily discharges over the calendar month that exceeds the AMEL for a parameter will be considered out of compliance for that month only. If only a single sample is taken during the calendar month and the analytical result for that sample exceeds the AMEL, the Discharger will be considered out of compliance for that calendar month. For any one calendar month during which no sample (daily discharge) is taken, no compliance determination can be made for that calendar month.

B. Average Weekly Effluent Limitation (AWEL)

If the average of daily discharges over a calendar week exceeds the AWEL for a given parameter, an alleged violation will be flagged and the Discharger will be considered out of compliance for each day of that week for that parameter, resulting in seven days of non-compliance. The average of daily discharges over the calendar week that exceeds the AWEL for a parameter will be considered out of compliance for that week only. If only a single sample is taken during the calendar week and the analytical result for that sample exceeds the AWEL, the Discharger will be considered out of compliance for that calendar week. For any one calendar week during which no sample (daily discharge) is taken, no compliance determination can be made for that calendar week.

C. Maximum Daily Effluent Limitation (MDEL)

If a daily discharge exceeds the MDEL for a given parameter, an alleged violation will be flagged and the Discharger will be considered out of compliance for that parameter for that one day only within the reporting period. For any one day during which no sample is taken, no compliance determination can be made for that day.

D. Instantaneous Minimum Effluent Limitation

If the analytical result of a single grab sample is lower than the instantaneous minimum effluent limitation for a parameter, a violation will be flagged and the Discharger will be considered out of compliance for that parameter for that single sample. Non-compliance for each sample will be considered separately (e.g., the results of two grab samples taken within a calendar day that both are lower than the instantaneous minimum effluent limitation would result in two instances of non-compliance with the instantaneous minimum effluent limitation).

E. Instantaneous Maximum Effluent Limitation

If the analytical result of a single grab sample is higher than the instantaneous maximum effluent limitation for a parameter, a violation will be flagged and the Discharger will be considered out of compliance for that parameter for that single sample. Non-compliance for each sample will be considered separately

(e.g., the results of two grab samples taken within a calendar day that both exceed the instantaneous maximum effluent limitation would result in two instances of non-compliance with the instantaneous maximum effluent limitation).

F. Six-Month Median Effluent Limitation

The Discharger shall determine the six-month median effluent value (SMEV) for a given parameter by calculating the statistical median of all daily effluent values (DEVs) for each parameter within each six-month calendar period (January-June and July-December). The SMEV determination for a given six-month calendar period shall not include DEVs from any other six-month calendar period. If only a single DEV is obtained for a parameter during a six-month calendar period, that DEV shall be considered the SMEV for that parameter for that given six-month calendar period. The SMEV shall be attributed to each day of the six-month calendar period for determination of compliance with the six-month median effluent limitation (SMEL) for a given parameter for each day of that given six-month calendar period, resulting in approximately 180 days of non-compliance depending on the number of days in the six-month calendar period. If the SMEV exceeds the six-month median, the Discharger will be considered out of compliance for each day for the six-month period. The SMEV cannot be determined for any six month calendar period during which no DEV is obtained.

Attachment A – Definitions

Arithmetic Mean (μ), also called the average: the sum of measured values divided by the number of samples. For ambient water concentrations, the arithmetic mean is calculated as follows:

Arithmetic mean = $\mu = \Sigma x / n$ where: Σx is the sum of the measured ambient water concentrations, and n is the number of samples.

Average Monthly Effluent Limitation (AMEL): the highest allowable average of daily discharges over a calendar month, calculated as the sum of all daily discharges measured during a calendar month divided by the number of daily discharges measured during that month.

Average Weekly Effluent Limitation (AWEL): the highest allowable average of daily discharges over a calendar week (Sunday through Saturday), calculated as the sum of all daily discharges measured during a calendar week divided by the number of daily discharges measured during that week.

Bioaccumulative Pollutants: those substances taken up by an organism from its surrounding medium through gill membranes, epithelial tissue, or from food and subsequently concentrated and retained in the body of the organism.

Carcinogenic Pollutants: substances that are known to cause cancer in living organisms.

Coefficient of Variation (*CV*): a measure of the data variability and is calculated as the estimated standard deviation divided by the arithmetic mean of the observed values.

Cone of Depression: A depression in the water table that develops around a pumped well.

Cone of Influence: The depression, roughly conical in shape, produced in a water table by the pumping of water from a well.

Contamination Site: A site that is currently under investigation or cleanup for any medium (air, soil, water), or is provided oversight by any local, state, or federal environmental regulatory agency, such as the County of San Diego, Air Pollution Control District, and Department of Toxics Substance Control, or the quality of surface water or groundwater at a site has been altered by wastes to a degree which unreasonably affects either the waters for beneficial uses or facilities which serve these beneficial uses.

Daily Discharge: Daily Discharge is defined as either: (1) the total mass of the constituent discharged over the calendar day (12 a.m. through 11:59 p.m.) or any 24-hour period that reasonably represents a calendar day for purposes of sampling (as specified in the permit), for a constituent with limitations expressed in units of mass or;

(2) the unweighted arithmetic mean measurement of the constituent over the day for a constituent with limitations expressed in other units of measurement (e.g., concentration).

The daily discharge may be determined by the analytical results of a composite sample taken over the course of one day (a calendar day, or other 24-hour period defined as a day), or by the arithmetic mean of analytical results from one or more grab samples taken over the course of the day.

For composite sampling, if one day is defined as a 24-hour period other than a calendar day, the analytical result for the 24-hour period will be considered as the result for the calendar day in which the 24-hour period ends.

Detected, but Not Quantified (DNQ): those sample results less than the Reporting Level (RL), but greater than or equal to the laboratory's Method Detection Limit (MDL).

Dilution Credit: the amount of dilution granted to a Discharger in the calculation of a water quality-based effluent limitation, based on the allowance of a specified mixing zone. It is calculated from the dilution ratio, or determined through conducting a mixing zone study, or modeling of the discharge and receiving water.

Effluent Concentration Allowance (ECA): a value derived from the water quality criterion/objective, dilution credit, and ambient background concentration that is used, in conjunction with the coefficient of variation for the effluent monitoring data, to calculate a long-term average (LTA) discharge concentration. The ECA has the same meaning as waste load allocation (WLA) as used in USEPA guidance (Technical Support Document For Water Quality-based Toxics Control, March 1991, second printing, EPA/505/2-90-001).

Enclosed Bays: indentations along the coast that enclose an area of oceanic water within distinct headlands or harbor works. Enclosed bays include all bays where the narrowest distance between the headlands or outermost harbor works is less than 75 percent of the greatest dimension of the enclosed portion of the bay. Enclosed bays include, but are not limited to, Humboldt Bay, Bodega Harbor, Tomales Bay, Drake's Estero, San Francisco Bay, Morro Bay, Los Angeles-Long Beach Harbor, Upper and Lower Newport Bay, Mission Bay, and San Diego Bay. Enclosed bays do not include inland surface waters or ocean waters.

Notice of Enrollment: A notice from the Regional Board to the discharger that the NOI application has been accepted and the project is enrolled in this WDR. The Notice of Enrollment will specify the discharge flow limit, any additional or increase in monitoring due to specific circumstances of the discharge, or other requirements.

Estimated Chemical Concentration: the estimated chemical concentration that results from the confirmed detection of the substance by the analytical method below the Minimum Level value.

Estuaries: waters, including coastal lagoons, located at the mouths of streams that serve as areas of mixing for fresh and ocean waters. Coastal lagoons and mouths of streams that are temporarily separated from the ocean by sandbars shall be considered estuaries. Estuarine waters shall be considered to extend from a bay or the open ocean to a point upstream where there is no significant mixing of fresh water and seawater. Estuarine waters include~~d~~, but are not limited to, the Sacramento-San Joaquin Delta, as defined in Water Code section 12220, Suisun Bay, Carquinez Strait downstream to the Carquinez Bridge, and appropriate areas of the Smith, Mad, Eel, Noyo, Russian, Klamath, San Diego, and Otay rivers. Estuaries do not include inland surface waters or ocean waters.

Inland Surface Waters: all surface waters of the State that do not include the ocean, enclosed bays, or estuaries. Inland surface water consist of freshwater and do not have any measurable salinity.

Instantaneous Maximum Effluent Limitation: the highest allowable value for any single grab sample or aliquot (i.e., each grab sample or aliquot is independently compared to the instantaneous maximum limitation).

Instantaneous Minimum Effluent Limitation: the lowest allowable value for any single grab sample or aliquot (i.e., each grab sample or aliquot is independently compared to the instantaneous minimum limitation).

Maximum Daily Effluent Limitation (MDEL): the highest allowable daily discharge of a pollutant, over a calendar day (or 24-hour period). For pollutants with limitations expressed in units of mass, the daily discharge is calculated as the total mass of the pollutant discharged over the day. For pollutants with limitations expressed in other units of measurement, the daily discharge is calculated as the arithmetic mean measurement of the pollutant over the day.

Median: the middle measurement in a set of data. The median of a set of data is found by first arranging the measurements in order of magnitude (either increasing or decreasing order). If the number of measurements (n) is odd, then the median = $X_{(n+1)/2}$. If n is even, then the median = $(X_{n/2} + X_{(n/2)+1})/2$ (i.e., the midpoint between the $n/2$ and $n/2+1$).

Method Detection Limit (MDL): the minimum concentration of a substance that can be measured and reported with 99 percent confidence that the analyte concentration is greater than zero, as defined in title 40 of the Code of Federal Regulations, Part 136, Attachment B, revised as of July 3, 1999.

Minimum Level (ML): the concentration at which the entire analytical system must give a recognizable signal and acceptable calibration point. The ML is the concentration in a sample that is equivalent to the concentration of the lowest calibration standard analyzed by a specific analytical procedure, assuming that all the method specified sample weights, volumes, and processing steps have been followed.

Mixing Zone: a limited volume of receiving water that is allocated for mixing with a wastewater discharge where water quality criteria can be exceeded without causing adverse effects to the overall water body.

Not Detected (ND): those sample results less than the laboratory's MDL.

Notice of Intent (NOI): A form completed and signed by a Discharger notifying the Regional Board that the Discharger is applying for enrollment under the terms and conditions of the WDR and will comply with the WDR for a groundwater extraction activity at a specific site.

Notice of Termination (NOT): A letter completed and signed by a Discharger notifying the Regional Board that the Discharger no longer wishes to discharge under the WDR. Submission of a NOT constitutes notice that the owner (and his/her agent) of the site identified on the letter has ceased discharge groundwater associated with groundwater extraction activities at the site under this WDR.

Ocean Waters: the territorial marine waters of the State as defined by California law to the extent these waters are outside of enclosed bays, estuaries, and coastal lagoons. Discharges to ocean waters are regulated in accordance with the State Board's California Ocean Plan.

Permanent groundwater extraction activities: Groundwater extraction operations for structures which 1) are not designed or constructed to withstand hydrostatic pressure or do not preclude infiltration of groundwater, and 2) require removal of groundwater to prevent water infiltration to the structure(s).

Persistent pollutants: substances for which degradation or decomposition in the environment is nonexistent or very slow.

Radius of Influence: The radial distance from the center of a wellbore to the point where there is no lowering of the water table or potentiometric surface (the edge of the cone of depression).

Reporting Level (RL): the ML (and its associated analytical method) chosen by the Discharger for reporting and compliance determination from the MLs included in this WDR. The MLs included in this WDR correspond to approved analytical methods for reporting a sample result that are selected by the Regional Board either from Appendix 4 of the SIP in accordance with section 2.4.2 of the SIP, or established in accordance with section 2.4.3 of the SIP. The ML is based on the proper application of method-based analytical procedures for sample preparation and the absence of any matrix interferences. Other factors may be applied to the ML depending on the specific sample preparation steps employed. For example, the treatment typically applied in cases where there are matrix-effects is to dilute the sample or sample aliquot by a factor of ten. In such cases, this additional factor must be applied to the ML in the computation of the RL.

Satellite Collection System: the portion, if any, of a sanitary sewer system owned or operated by a different public agency than the agency that owns and operates the wastewater treatment facility that a sanitary sewer system is tributary to.

Six-Month Median Effluent Limitation: the highest allowable median of all daily discharges, based on 24-hour flow-weighted composite samples, for any 180-day period.

Source of Drinking Water: any water designated as municipal or domestic supply (MUN) in a Regional Board Basin Plan.

Standard Deviation (σ): a measure of variability that is calculated as follows:

$$\sigma = (\sum[(x - \mu)^2]/(n - 1))^{0.5}$$

where:

x is the observed value;

μ is the arithmetic mean of the observed values; and

n is the number of samples.

Temporary Discharge: Discharge of extracted groundwater waste from groundwater cleanup with a projected cleanup date and subsurface excavation that requires groundwater extraction that is not a permanent groundwater extraction activity.

Discharges of groundwater for the purpose of protecting subterranean structures from groundwater infiltration are not considered groundwater cleanup projects, whether or not such discharges cleanup or remove pollutants from the groundwater. These activities may be covered under the statewide general NPDES permit for discharges from utility vaults and underground structures to surface water (CAG990002).

Toxicity Reduction Evaluation (TRE): a study conducted in a step-wise process designed to identify the causative agents of effluent or ambient toxicity, isolate the sources of toxicity, evaluate the effectiveness of toxicity control options, and then confirm the reduction in toxicity. The first steps of the TRE consist of the collection of data relevant to the toxicity, including additional toxicity testing, and an evaluation of facility operations and maintenance practices, and best management practices. A Toxicity Identification Evaluation (TIE) may be required as part of the TRE, if appropriate. (A TIE is a set of procedures to identify the specific chemical[s] responsible for toxicity. These procedures are performed in three phases [characterization, identification, and confirmation] using aquatic organism toxicity tests.)

Waters of the United States or waters of the U.S.: (40 e-CFR 122.2, March 20, 2007) (a) All waters which are currently used, were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide; (b) All interstate waters, including interstate "wetlands;" (c) All other waters such as intrastate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, "wetlands," sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds the use, degradation, or destruction of which would affect or could affect interstate or foreign commerce including any such waters:

(1) Which are or could be used by interstate or foreign travelers for recreational or other purposes; (2) From which fish or shellfish are or could be taken and sold in interstate or foreign commerce; or (3) Which are used or could be used for industrial purposes by industries in interstate commerce; (d) All impoundments of waters otherwise defined as waters of the United States under this definition; (e) Tributaries of waters identified in paragraphs (a) through (d) of this definition; (f) The territorial sea; and (g) "Wetlands" adjacent to waters (other than waters that are themselves wetlands) identified in paragraphs (a) through (f) of this definition. Waste treatment systems, including treatment ponds or lagoons designed to meet the requirements of CWA (other than cooling ponds as defined in 40 CFR 423.11(m) which also meet the criteria of this definition) are not waters of the United States. This exclusion applies only to manmade bodies of water which neither were originally created in waters of the United States (such as disposal area in wetlands) nor resulted from the impoundment of waters of the United States. Waters of the United States do not include prior converted cropland. Notwithstanding the determination of an area's status as prior converted cropland by any other federal agency, for the purposes of the Clean Water Act, the final authority regarding Clean Water Act jurisdiction remains with EPA.

Attachment B1 – Notice of Intent Form

NOTICE OF INTENT

TO DISCHARGE GROUNDWATER EXTRACTION WASTE TO SURFACE WATERS WITHIN THE SAN DIEGO REGION

EXCEPT FOR SAN DIEGO BAY

SUBJECT TO GENERAL WASTE DISCHARGE REQUIREMENTS IN ORDER NO. R9-2008-0002 (NPDES NO. CAG919002)

GENERAL WASTE DISCHARGE REQUIREMENTS FOR DISCHARGES FROM GROUNDWATER EXTRACTION AND SIMILAR WASTE DISCHARGES TO SURFACE WATERS WITHIN THE SAN DIEGO REGION EXCEPT FOR SAN DIEGO BAY (WDR)

Attach Form 200 (completed and signed) and additional sheets as necessary to provide complete information requested in this Notice of Intent (NOI).

I. STIPULATION OF APPLICABILITY AND CERTIFICATION

☐ I have determined that the groundwater extracted waste discharge will be to navigable waters of the United States within the San Diego Region and that any violation of effluent limits will be subject to Mandatory Minimum Penalties under California Water Code section 13385(h) and (i).

☐ I have determined that this discharge is eligible for enrollment in this General "Waste Discharge Requirements" (WDR) because the discharge will comply with the Discharge Specifications of this WDR.

☐ I have read this WDR Order No. R9-2008-0002 and hereby certify that:

1. I understand the requirements of Order No. R9-2008-0002.
2. The enclosed information describing my proposed groundwater extraction waste discharge is accurate and describes a discharge that meets the requirements of Order No. R9-2008-0002, which is the applicable general groundwater extraction waste discharge permit.
3. I will comply with all terms, conditions, and requirements of WDR Order No. R9-2008-0002.

I. STIPULATION OF APPLICABILITY AND CERTIFICATION

I certify under penalty of law that this document, Form 200, and all attachments were prepared under my direction or supervision in accordance with a system designed to ensure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those directly responsible for gathering the information, the information submitted is true, accurate, and complete to the best of my knowledge and belief. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment. In addition, I certify that the provisions of the permit, including the criteria for eligibility will be complied with.

A. Printed Name:	
B. Signature*:	C. Date:
D. Title:	

*The appropriate person must sign the application form.
Acceptable signatures are:
1. for a corporation, a principal executive officer of at least the level of senior vice-president;
2. for a partnership or individual (sole proprietorship), a general partner or the proprietor;
3. for a governmental or public agency, either a principal executive officer or ranking elected/appointed official.

II. ITEMS REQUIRED FOR DETERMINING ELIGIBILITY

☐ A. Identify and discuss technical and economic feasibility of alternative disposal options.

☐ B. If discharging to an MS4, obtain authorization from the appropriate municipality and submit proof.

☐ C. Submit scale appropriate vicinity map(s).

☐ D. Submit a completed and signed Form 200 (*Application/Report of Waste Discharge, General Information for Waste Discharge Requirements or NPDES Permit*).

III. NOTICE OF INTENT STATUS

A. Is this a renewal of an expiring WDR? 1. ☐ No 2.☐ Yes, Order No.: _____

IV. GROUNDWATER EXTRACTION INFORMATION

A. Nature of Groundwater Extraction Activity:
1. ☐ Subsurface Excavation
   a.☐ Foundation b. ☐ Tunneling c.☐ Construction d.☐ Footing e.☐ Other _____
2. ☐ Remediation Project
3. ☐ Other _____

B. ☐ This project is associated with a project that requires Regional Board license, permit, or oversight?
Explain: Construction storm water, 401 Certifications, WDR, UST or cleanup project, etc.

C. Duration and Start Date
1. Proposed Start Date of Groundwater Extraction Discharge: _____

2. Estimated Duration of Groundwater Extraction Discharge: _____

D. 1.☐ Describe the historical use of the land within the cone/radius of influence.

2. ☐ Identify all known contamination sites and ground water plumes within half mile of each groundwater extraction point to be used in the project.
Attach a source of contamination description and list of constituents.
Attach site assessment (If one has been done)

E. For each discharge point identify the location of discharge according to the following: (show in vicinity map)
1. ☐ Storm Drain, ☐ Attach proof of authorization from the appropriate municipality for the discharge into the storm drain or conveyance used to convey the discharge.
2. ☐ Directly into surface water, ☐ submerged or ☐ on the surface

3. Salinity of the Tributary at the discharge point _____

F. Will treatment be required to meet the Discharge Specifications of this WDR?
1.☐ Yes 2.☐ No
If Yes, attach the following:
a. ☐ A report certifying the adequacy of each component of the treatment facilities or other type of contingency plan. The report shall also certify that:
(1) ☐ all treatment facility startup and operation instruction manuals are adequate and available to operating personnel,
(2) ☐ adequate treatment facility maintenance and testing (if treatment facilities are on "standby") schedules are included in the treatment facility operations manual,
(3) ☐ treatment facilities and appurtenances can be fully operational, as designed, within 24 hours, and
(4) ☐ influent and effluent sampling locations or ports are located in areas where samples representative of the waste stream to be monitored can be obtained.
b. ☐ The design engineer shall affix his/her signature and engineering license number to this certification report.

IV. GROUNDWATER EXTRACTION INFORMATION

G. Additional Attachments
1. ☐ Describe best management practices (bmp) and contingency plan.
2. ☐ Provide the results of the analysis of the groundwater to be extracted for all of those constituents, as determined by the sampling requirement criteria described in this WDR, for the proposed receiving water type.

V. RECEIVING WATER INFORMATION

A. Name of receiving water(s): (San Diego River, Rainbow Creek, Pacific Ocean, etc.)

B. Describe the types of receiving waters affected: (bay, creek, river, etc.)

C. Receiving water flows seasonally 1.☐ Yes 2.☐ No

D. More than one discharge point is proposed?

1.☐ Yes 2.☐ No If Yes, how many? _____

And distance between points _____
Include in Vicinity Map

3. Location of Discharge Points: (attach)
Example: Outfall 001 (Latitude and Longitude)

E. Proposed Flow (MGD or gpd) of the discharge:
1. Maximum Discharge: _____
2. Average Daily Flowrate: _____
3. Basis for flow rate estimates (if necessary attach):

F. Hydrologic Subarea Number(s) at the point of discharge:

VI. APPLICATION FEE

The initial fee and annual fee are based upon the type of pollutants to be discharged or potentially discharged.

Make checks payable to "SWRCB" and include the project's name in the "memo" field.

☐ **Category 3 Lowest Threat to Water Quality**
The discharge will not require any treatment.
Current fee is $1,000 plus $185 surcharge = $1,185

☐ **Category 2 Moderate Threat to Water Quality**
The discharge will be from a well that has a contaminated site within the radius of influence.
Current fee is $2,900 plus $537 surcharge = $3,437

☐ **Category 1 Highest Threat to Water Quality**
The discharge will require treatment to meet effluent limitations.
Current fee is $4,800 plus $888 surcharge = $5,688

VII. ANTIDEGREDATION POLICIES

A. ☐ Statement of compliance with 40 CFR 131.12 and State Water Resources Control Board Resolution No. 68-16 (attach) (collectively antidegredation policies)

40 CFR 131.12 Antidegradation policy.
(a) The State shall develop and adopt a statewide antidegradation policy and identify the methods for implementing such policy pursuant to this subpart. The antidegradation policy and implementation methods shall, at a minimum, be consistent with the following:
(1) Existing instream water uses and the level of water quality necessary to protect the existing uses shall be maintained and protected.
(2) Where the quality of the waters exceed levels necessary to support propagation of fish, shellfish, and wildlife and recreation in and on the water, that quality shall be maintained and protected unless the State finds, after full satisfaction of the intergovernmental coordination and public participation provisions of the State's continuing planning process, that allowing lower water quality is necessary to accommodate important economic or social development in the area in which the waters are located. In allowing such degradation or lower water quality, the State shall assure water quality adequate to protect existing uses fully. Further, the State shall assure that there shall be achieved the highest statutory and regulatory requirements for all new and existing point sources and all cost-effective and reasonable best management practices for nonpoint source control.
(3) Where high quality waters constitute an outstanding National resource, such as waters of National and State parks and wildlife refuges, and waters of exceptional recreational or ecological significance, that water quality shall be maintained and protected.
(4) In those cases where potential water quality impairment associated with a thermal discharge is involved, the antidegradation policy and implementing method shall be consistent with section 316 of the Act.

RESOLUTION NO, 68-16
STATEMENT OF POLICY WITH RESPECT TO MAINTAINING HIGH QUALITY OF WATERS IN CALIFORNIA
WHEREAS the California Legislature has declared that it is the policy of the State that the granting of permits and licenses for unappropriated water and the disposal of wastes into the waters of the State shall be so regulated as to achieve highest water quality consistent with maximum benefit to the people of the State and shall be controlled so as to promote the peace, health, safety and welfare of the people of the State; and
WHEREAS water quality control policies have been and are being adopted for waters of the State; and
WHEREAS the quality of some waters of the State is higher than that established by the adopted policies and it is the intent and purpose of this Board that such higher quality shall be maintained to the maximum extent possible consistent with the declaration of the Legislature;

NOW, THEREFORE, BE IT RESOLVED:
1. Whenever the existing quality of water is better than the quality established in policies as of the date on which such policies become effective, such existing high quality will be maintained until it has been demonstrated to the State that any change will be consistent with maximum benefit to the people of the State, will not unreasonably affect present and anticipated beneficial use of such water and will not result in water quality less than that prescribed in the policies.
2. Any activity which produces or may produce a waste or increased volume or concentration of waste and which discharges or proposes to discharge to existing high quality waters will be required to meet waste discharge requirements which will result in the best practicable treatment or control of the discharge necessary to assure that (a) a pollution or nuisance will not occur, and (b) the highest water quality consistent with maximum benefit to the people of the State will be maintained.
3. In implementing this policy, the Secretary of the Interior will be kept advised and will be provided with such information as he will need to discharge his responsibilities under the Federal Water Pollution Control Act.

BE IT FURTHER RESOLVED that a copy of this resolution be forwarded to the Secretary of the Interior as part of California's water quality control policy submission.
CERTIFICATION
The undersigned, Executive Officer of the State Water Resources Control Board, does hereby certify that the foregoing is a full, true, and correct copy of a resolution duly and regularly adopted at a meeting of the State Water Resources Control Board held on October 24, 1968.
Dated: October 28, 1968
Kerry W. Mulligan, Executive Officer
State Water Resources Control Board

VIII. CALIFORNIA CONSTITUTION COMPLIANCE

A. ☐ Discuss the potential uses of the extracted groundwaters, efforts made to ensure use to the fullest extent possible and compliance with Article 10, Section 2 of the California Constitution (attach)

CALIFORNIA CONSTITUTION
ARTICLE 10 WATER
SEC. 2. It is hereby declared that because of the conditions prevailing in this State the general welfare requires that the water resources of the State be put to beneficial use to the fullest extent of which they are capable, and that the waste or unreasonable use or unreasonable method of use of water be prevented, and that the conservation of such waters is to be exercised with a view to the reasonable and beneficial use thereof in the interest of the people and for the public welfare. The right to water or to the use or flow of water in or from any natural stream or water course in this State is and shall be limited to such water as shall be reasonably required for the beneficial use to be served, and such right does not and shall not extend to the waste or unreasonable use or unreasonable method of use or unreasonable method of diversion of water. Riparian rights in a stream or water course attach to, but to no more than so much of the flow thereof as may be required or used consistently with this section, for the purposes for which such lands are, or may be made adaptable, in view of such reasonable and beneficial uses; provided, however, that nothing herein contained shall be construed as depriving any riparian owner of the reasonable use of water of the stream to which the owner's land is riparian under reasonable methods of diversion and use, or as depriving any appropriator of water to which the appropriator is lawfully entitled.

This section shall be self-executing, and the Legislature may also enact laws in the furtherance of the policy in this section contained.

Submit the NOI, first annual fee, map, and other attachments to the following address:

CRWQCB – San Diego Region
9174 Sky Park Court, Suite 100
San Diego, CA 92123

Attn: Groundwater Extraction to San Diego Region
Core Regulatory Unit
NOTICE OF INTENT

IX. STATE USE ONLY

WDID:	Staff Initials:	Status: ☐ Complete ☐ Incomplete ☐ Withdrawn ☐ Pending Additional Information
Date NOI Received:	Check #:	
Date NOI Processed:	Fee Amount Received: $	
CIWQS Place # :	CIWQS Reg. Meas. # :	
Comments:		

Attachment B2 – Priority Toxic Pollutants
Source: [65 FR 31711, May 18, 2000, as amended at 66 FR 9961, Feb. 13, 2001; 68 FR 62747, Nov. 6, 2003]

Table in Paragraph (b)(1) of 40 CFR 131.38 —126 PRIORITY POLLUTANTS
Numeric criteria for priority toxic pollutants for the State of California

A		B Freshwater		C Saltwater		D Human Health (10^{-6} risk for carcinogens) For consumption of:	
# Compound	CAS Number	Criterion Maximum Conc. [c] B1	Criterion Continuous Conc. [d] B2	Criterion Maximum Conc. [d] C1	Criterion Continuous Conc. [d] C2	Water & Organisms (µg/L) D1	Organisms Only (µg/L) D2
1. Antimony	7440360					14 a,s	4300 a,t
2. Arsenic [b]	7440382	340 i,m,w	150 i,m,w	69 i,m	36 i,m		
3. Beryllium	7440417					n	n
4. Cadmium [b]	7440439	4.3 e,i,m,w,x	2.2 e,i,m,w	42 i,m	9.3 i,m	n	n
5a. Chromium (III)	16065831	550 e,i,m,o	180 e,i,m,o			n	n
5b. Chromium (VI) [b]	18540299	16 i,m,w	11 i,m,w	1100 i,m	50 i,m	n	n
6. Copper [b]	7440508	13 e,i,m,w,x	9.0 e,i,m,w	4.8 i,m	3.1 i,m	1300	
7. Lead [b]	7439921	65 e,i,m	2.5 e,i,m	210 i,m	8.1 i,m	n	n
8. Mercury [b]	7439976	[Reserved]	[Reserved]	[Reserved]	[Reserved]	0.050 a	0.051 a
9. Nickel [b]	7440020	470 e,i,m,w	52 e,i,m,w	74 i,m	8.2 i,m	610 a	4600 a
10. Selenium [b]	7782492	[Reserved] p	5.0 q	290 i,m	71 i,m	n	n
11. Silver [b]	7440224	3.4 e,i,m		1.9 i,m			
12. Thallium	7440280					1.7 a,s	6.3 a,t
13. Zinc [b]	7440666	120 e,i,m,w,x	120 e,i,m,w	90 i,m	81 i,m		
14. Cyanide [b]	57125	22 o	5.2 o	1 r	1 r	700 a	220,000 a,j
15. Asbestos	1332214					7,000,000 fibers/L k,s	
16. 2,3,7,8-TCDD (Dioxin)	1746016					0.000000013 c	0.000000014 c
17. Acrolein	107028					320 s	780 t
18. Acrylonitrile	107131					0.059 a,c,s	0.66 a,c,t
19. Benzene	71432					1.2 a,c	71 a,c
20. Bromoform	75252					4.3 a,c	360 a,c
21. Carbon Tetrachloride	56235					0.25 a,c,s	4.4 a,c,t
22. Chlorobenzene	108907					680 a,s	21,000 a,j,t
23. Chlorodibromomethane	124481					0.401 a,c	34 a,c
24. Chloroethane	75003						
25. 2-Chloroethylvinyl Ether	110758						

Table in Paragraph (b)(1) of 40 CFR 131.38 —126 PRIORITY POLLUTANTS

Numeric criteria for priority toxic pollutants for the State of California

A		B Freshwater		C Saltwater		D Human Health (10^{-6} risk for carcinogens) For consumption of:	
# Compound	CAS Number	Criterion Maximum Conc. [d] B1	Criterion Continuous Conc. [d] B2	Criterion Maximum Conc. [d] C1	Criterion Continuous Conc. [d] C2	Water & Organisms (µg/L) D1	Organisms Only (µg/L) D2
26. Chloroform	67663					[Reserved]	[Reserved]
27. Dichlorobromomethane	75274					0.56 a,c	46 a,c
28. 1,1-Dichloroethane	75343						
29. 1,2-Dichloroethane	107062					0.38 a,c,s	99 a,c,t
30. 1,1-Dichloroethylene	75354					0.057 a,c,s	3.2 a,c,t
31. 1,2-Dichloropropane	78875					0.52 a	39 a
32. 1,3-Dichloropropylene	542756					10 a,s	1,700 a,t
33. Ethylbenzene	100414					3,100 a,s	29,000 a,t
34. Methyl Bromide	74839					48 a	4,000 a
35. Methyl Chloride	74873					n	n
36. Methylene Chloride	75092					4.7 a,c	1,600 a,c
37. 1,1,2,2-Tetrachloroethane	79345					0.17 a,c,s	11 a,c,t
38. Tetrachloroethylene	127184					0.8 c,s	8.85 c,t
39. Toluene	108883					6,800 a	200,000 a
40. 1,2-Trans-Dichloroethylene	156605					700 a	140,000 a
41. 1,1,1-Trichloroethane	71556					n	n
42. 1,1,2-Trichloroethane	79005					0.60 a,c,s	42 a,c,t
43. Trichloroethylene	79016					2.7 c,s	81 c,t
44. Vinyl Chloride	75014					2 c,s	525 c,t
45. 2-Chlorophenol	95578					120 a	400 a
46. 2,4-Dichlorophenol	120832					93 a,s	790 a,t
47. 2,4-Dimethylphenol	105679					540 a	2,300 a
48. 2-Methyl-4,6-Dinitrophenol	534521					13.4 s	765 t
49. 2,4-Dinitrophenol	51285					70 a,s	14,000 a,t
50. 2-Nitrophenol	88755						
51. 4-Nitrophenol	100027						
52. 3-Methyl-4-Chlorophenol	59507						
53. Pentachlorophenol	87865	19 f,w	15 f,w	13	7.9	0.28 a,c	8.2 a,c,j
54. Phenol	108952					21,000 a	4,600,000 a,j,t
55. 2,4,6-Trichlorophenol	88062					2.1 a,c	6.5 a,c
56. Acenaphthene	83329					1,200 a	2,700 a
57. Acenaphthylene	208968						
58. Anthracene	120127					9,600 a	110,000 a

Table in Paragraph (b)(1) of 40 CFR 131.38 —126 PRIORITY POLLUTANTS

Numeric criteria for priority toxic pollutants for the State of California

A		B Freshwater		C Saltwater		D Human Health (10^{-6} risk for carcinogens) For consumption of:	
# Compound	CAS Number	Criterion Maximum Conc. [d] B1	Criterion Continuous Conc. [d] B2	Criterion Maximum Conc. [d] C1	Criterion Continuous Conc. [d] C2	Water & Organisms (µg/L) D1	Organisms Only (µg/L) D2
59. Benzidine	92875					0.00012 a,c,s	0.00054 a,c,t
60. Benzo(a)Anthracene	56553					0.0044 a,c	0.049 a,c
61. Benzo(a)Pyrene	50328					0.0044 a,c	0.049 a,c
62. Benzo(b)Fluoranthene	205992					0.0044 a,c	0.049 a,c
63. Benzo(ghi)Perylene	191242						
64. Benzo(k)Fluoranthene	207089					0.0044 a,c	0.049 a,c
65. Bis(2-Chloroethoxy)Methane	111911						
66. Bis(2-Chloroethyl)Ether	111444					0.031 a,c,s	1.4 a,c,t
67. Bis(2-Chloroisopropyl)Ether	39638329					1,400 a	170,000 a,t
68. Bis(2-Ethylhexyl)Phthalate	117817					1.8 a,c,s	5.9 a,c,t
69. 4-Bromophenyl Phenyl Ether	101553						
70. Butylbenzyl Phthalate	85687					3,000 a	5,200 a
71. 2-Chloronaphthalene	91587					1,700 a	4,300 a
72. 4-Chlorophenyl Phenyl Ether	7005723						
73. Chrysene	218019					0.0044 a,c	0.049 a,c
74. Dibenzo(a,h)Anthracene	53703					0.0044 a,c	0.049 a,c
75. 1,2 Dichlorobenzene	95501					2,700 a	17,000 a
76. 1,3 Dichlorobenzene	541731					400	2,600
77. 1,4 Dichlorobenzene	106467					400	2,600
78. 3,3'-Dichlorobenzidine	91941					0.04 a,c,s	0.077 a,c,t
79. Diethyl Phthalate	84662					23,000 a,s	120,000 a,t
80. Dimethyl Phthalate	131113					313,000 s	2,900,000 t
81. Di-n-Butyl Phthalate	84742					2,700 a,s	12,000 a,t
82. 2,4-Dinitrotoluene	121142					0.11 c,s	9.1 c,t
83. 2,6-Dinitrotoluene	606202						
84 Di-n-Octyl Phthalate	117840						
85. 1,2-Diphenylhydrazine	122667					0.040 a,c,s	0.54 a,c,t
86. Fluoranthene	206440					300 a	370 a
87. Fluorene	86737					1,300 a	14,000 a
88. Hexachlorobenzene	118741					0.00075 a,c	0.00077 a,c
89. Hexachlorobutadiene	87683					0.44 a,c,s	50 a,c,t
90. Hexachlorocyclopentadiene	77474					240 a,s	17,000 a,j,t
91. Hexachloroethane	67721					1.9 a,c,s	8.9 a,c,t

Table in Paragraph (b)(1) of 40 CFR 131.38 —126 PRIORITY POLLUTANTS

Numeric criteria for priority toxic pollutants for the State of California

A		B Freshwater		C Saltwater		D Human Health (10^{-6} risk for carcinogens) For consumption of:	
# Compound	CAS Number	Criterion Maximum Conc. [a] B1	Criterion Continuous Conc. [a] B2	Criterion Maximum Conc. [a] C1	Criterion Continuous Conc. [a] C2	Water & Organisms (µg/L) D1	Organisms Only (µg/L) D2
92. Indeno(1,2,3-cd) Pyrene	193395					0.0044 a,c	0.049 a,c
93. Isophorone	78591					8.4 c,s	600 c,t
94. Naphthalene	91203						
95. Nitrobenzene	98953					17 a,s	1,900 a,j,t
96. N-Nitrosodimethylamine	62759					0.00069 a,c,s	8.1 a,c,t
97. N-Nitrosodi-n-Propylamine	621647					0.005 a	1.4 a
98. N-Nitrosodiphenylamine	86306					5.0 a,c,s	16 a,c,t
99. Phenanthrene	85018						
100. Pyrene	129000					960 a	11,000 a
101. 1,2,4-Trichlorobenzene	120821						
102. Aldrin	309002	3 g		1.3 g		0.00013 a,c	0.00014 a,c
103. alpha-BHC	319846					0.0039 a,c	0.013 a,c
104. beta-BHC	319857					0.014 a,c	0.046 a,c
105. gamma-BHC	58899	0.95 w		0.16 g		0.019 c	0.063 c
106. delta-BHC	319868						
107. Chlordane	57749	2.4 g	0.0043 g	0.09 g	0.004 g	0.00057 a,c	0.00059 a,c
108. 4,4'-DDT	50293	1.1 g	0.001 g	0.13 g	0.001 g	0.00059 a,c	0.00059 a,c
109. 4,4'-DDE	72559					0.00059 a,c	0.00059 a,c
110. 4,4'-DDD	72548					0.00083 a,c	0.00084 a,c
111. Dieldrin	60571	0.24 w	0.056 w	0.71 g	0.0019 g	0.00014 a,c	0.00014 a,c
112. alpha-Endosulfan	959988	0.22 g	0.056 g	0.034 g	0.0087 g	110 a	240 a
113. beta-Endosulfan	33213659	0.22 g	0.056 g	0.034 g	0.0087 g	110 a	240 a
114. Endosulfan Sulfate	1031078					110 a	240 a
115. Endrin	72208	0.086 w	0.036 w	0.037 g	0.0023 g	0.76 a	0.81 a,j
116. Endrin Aldehyde	7421934					0.76 a	0.81 a,j
117. Heptachlor	76448	0.52 g	0.0038 g	0.053 g	0.0036 g	0.00021 a,c	0.00021 a,c
118. Heptachlor Epoxide	1024573	0.52 g	0.0038 g	0.053 g	0.0036 g	0.00010 a,c	0.00011 a,c
119-125. Polychlorinated biphenyls (PCBs)			0.014 u		0.03 u	0.00017 c,v	0.00017 c,v
126. Toxaphene	8001352	0.73	0.0002	0.21	0.0002	0.00073 a,c	0.00075 a,c
Total Number of Criteria [h]		22	21	22	20	92	90

Footnotes to
Table in paragraph(b)(1) of 40 CFR 131.38 —126 PRIORITY POLLUTANTS:

a. Criteria revised to reflect the Agency q1* or RfD, as contained in the Integrated Risk Information System (IRIS) as of October 1, 1996. The fish tissue bioconcentration factor (BCF) from the 1980 documents was retained in each case.

b. Criteria apply to California waters except for those waters subject to objectives in Tables III–2A and III–2B of the San Francisco Regional Water Quality Control Board's (SFRWQCB) 1986 Basin Plan that were adopted by the SFRWQCB and the State Water Resources Control Board, approved by EPA, and which continue to apply. For copper and nickel, criteria apply to California waters except for waters south of Dumbarton Bridge in San Francisco Bay that are subject to the objectives in the SFRWQCB's Basin Plan as amended by SFRWQCB Resolution R2–2002–0061, dated May 22, 2002, and approved by the State Water Resources Control Board. EPA approved the aquatic life site-specific objectives on January 21, 2003. The copper and nickel aquatic life site-specific objectives contained in the amended Basin Plan apply instead.

c. Criteria are based on carcinogenicity of 10 (-6) risk.

d. Criteria Maximum Concentration (CMC) equals the highest concentration of a pollutant to which aquatic life can be exposed for a short period of time without deleterious effects. Criteria Continuous Concentration (CCC) equals the highest concentration of a pollutant to which aquatic life can be exposed for an extended period of time (4 days) without deleterious effects. ug/L equals micrograms per liter.

e. Freshwater aquatic life criteria for metals are expressed as a function of total hardness (mg/L) in the water body. The equations are provided in matrix at paragraph (b)(2) of this section. Values displayed above in the matrix correspond to a total hardness of 100 mg/l.

f. Freshwater aquatic life criteria for pentachlorophenol are expressed as a function of pH, and are calculated as follows: Values displayed above in the matrix correspond to a pH of 7.8. CMC = exp(1.005(pH)−4.869). CCC = exp(1.005(pH)−5.134).

g. This criterion is based on 304(a) aquatic life criterion issued in 1980, and was issued in one of the following documents: Aldrin/Dieldrin (EPA 440/5–80–019), Chlordane (EPA 440/5–80–027), DDT (EPA 440/5–80–038), Endosulfan (EPA 440/5–80–046), Endrin (EPA 440/5–80–047), Heptachlor (440/5–80–052), Hexachlorocyclohexane (EPA 440/5–80–054), Silver (EPA 440/5–80–071). The Minimum Data Requirements and derivation procedures were different in the 1980 Guidelines than in the 1985 Guidelines. For example, a "CMC" derived using the 1980 Guidelines was derived to be used as an instantaneous maximum. If assessment is to be done using an averaging period, the values given should be divided by 2 to obtain a value that is more comparable to a CMC derived using the 1985 Guidelines.

h. These totals simply sum the criteria in each column. For aquatic life, there are 23 priority toxic pollutants with some type of freshwater or saltwater, acute or chronic criteria. For human health, there are 92 priority toxic pollutants with either "water + organism" or "organism only" criteria. Note that these totals count chromium as one pollutant even though EPA has developed criteria based on two valence states. In the matrix, EPA has assigned numbers 5a and 5b to the criteria for chromium to reflect the fact that the list of 126 priority pollutants includes only a single listing for chromium.

i. Criteria for these metals are expressed as a function of the water-effect ratio, WER, as defined in paragraph (c) of this section. CMC = column B1 or C1 value×WER; CCC = column B2 or C2 value×WER.

j. No criterion for protection of human health from consumption of aquatic organisms (excluding water) was presented in the 1980 criteria document or in the 1986 Quality Criteria for Water. Nevertheless, sufficient information was presented in the 1980 document to allow a calculation of a criterion, even though the results of such a calculation were not shown in the document.

k. The CWA 304(a) criterion for asbestos is the MCL.

l. [Reserved]

m. These freshwater and saltwater criteria for metals are expressed in terms of the dissolved fraction of the metal in the water column. Criterion values were calculated by using EPA's Clean Water Act 304(a) guidance values (described in the total recoverable fraction) and then applying the conversion factors in §131.36(b)(1) and (2).

n. EPA is not promulgating human health criteria for these contaminants. However, permit authorities should address these contaminants in NPDES permit actions using the State's existing narrative criteria for toxics.

o. These criteria were promulgated for specific waters in California in the National Toxics Rule ("NTR"), at §131.36. The specific waters to which the NTR criteria apply include: Waters of the State defined as bays or estuaries and waters of the State defined as inland, i.e., all surface waters of the State not ocean waters. These waters specifically include the San Francisco Bay upstream to and including Suisun Bay and the Sacramento-San Joaquin Delta. This section does not apply instead of the NTR for this criterion.

p. A criterion of 20 ug/l was promulgated for specific waters in California in the NTR and was promulgated in the total recoverable form. The specific waters to which the NTR criterion applies include: Waters of the San Francisco Bay upstream to and including Suisun Bay and the Sacramento-San Joaquin Delta; and waters of Salt Slough, Mud Slough (north) and the San Joaquin River, Sack Dam to the mouth of the Merced River. This section does not apply instead of the NTR for this criterion. The State of California adopted and EPA approved a site specific criterion for the San Joaquin River, mouth of Merced to Vernalis; therefore, this section does not apply to these waters.

q. This criterion is expressed in the total recoverable form. This criterion was promulgated for specific waters in California in the NTR and was promulgated in the total recoverable form. The specific waters to which the NTR criterion applies include: Waters of the San Francisco Bay upstream to and including Suisun Bay and the Sacramento-San Joaquin Delta; and waters of Salt Slough, Mud Slough (north) and the San Joaquin River, Sack Dam to Vernalis. This criterion does not apply instead of the NTR for these waters. This criterion applies to additional waters of the United States in the State of California pursuant to 40 CFR 131.38(c). The State of California adopted and EPA approved a site-specific criterion for the Grassland Water District, San Luis National Wildlife Refuge, and the Los Banos State Wildlife Refuge; therefore, this criterion does not apply to these waters.

r. These criteria were promulgated for specific waters in California in the NTR. The specific waters to which the NTR criteria apply include: Waters of the State defined as bays or estuaries including the San Francisco Bay upstream to and including Suisun Bay and the Sacramento-San Joaquin Delta. This section does not apply instead of the NTR for these criteria.

s. These criteria were promulgated for specific waters in California in the NTR. The specific waters to which the NTR criteria apply include: Waters of the Sacramento-San Joaquin Delta and waters of the State defined as inland (i.e., all surface waters of the State not bays or estuaries or ocean) that include a MUN use designation. This section does not apply instead of the NTR for these criteria.

t. These criteria were promulgated for specific waters in California in the NTR. The specific waters to which the NTR criteria apply include: Waters of the State defined as bays and estuaries including San Francisco Bay upstream to and including Suisun Bay and the Sacramento-San Joaquin Delta; and waters of the State defined as inland (i.e., all surface waters of the State not bays or estuaries or ocean) without a MUN use designation. This section does not apply instead of the NTR for these criteria.

u. PCBs are a class of chemicals which include aroclors 1242, 1254, 1221, 1232, 1248, 1260, and 1016, CAS numbers 53469219, 11097691, 11104282, 11141165, 12672296, 11096825, and 12674112, respectively. The aquatic life criteria apply to the sum of this set of seven aroclors.

v. This criterion applies to total PCBs, e.g., the sum of all congener or isomer or homolog or aroclor analyses.

w. This criterion has been recalculated pursuant to the 1995 Updates: Water Quality Criteria Documents for the Protection of Aquatic Life in Ambient Water, Office of Water, EPA–820-B–96–001, September 1996. See also Great Lakes Water Quality Initiative Criteria Documents for the Protection of Aquatic Life in Ambient Water, Office of Water, EPA–80–B–95–004, March 1995.

x. The State of California has adopted and EPA has approved site specific criteria for the Sacramento River (and tributaries) above Hamilton City; therefore, these criteria do not apply to these waters.

40 CFR 131.38 Editorial Note: At 66 FR 9961, Feb. 13, 2001, §131.38 was amended in the table to paragraph (b)(1) under the column heading for "B Freshwater" by revising the column headings for "Criterion Maximum Concentration" and "Criterion Continuous Concentration"; under the column heading for "C Saltwater" by revising the column headings for "Criterion Maximum Concentration" and "Criterion Continuous Concentration"; and by revising entries "23." and "67.", effective Feb. 13, 2001. However, this is a photographed table and the amendments could not be incorporated into the text. For the convenience of the user, the amended text is set forth as follows:

1) § 131.38 Establishment of Numeric Criteria for priority toxic pollutants for the State of California.

(b)(1) * * *

A		B Freshwater		C Saltwater		D Human Health (10^{-6} risk for carcinogens) For consumption of:	
# Compound	CAS number	Criterion maximum conc. (µg/L)[d] B1	Criterion continous conc. (µg/L)[d] B2	Criterion maximum conc. (µg/L)[d] C1	Criterion continious conc. (µg/L)[d] C2	Water & organisms (µg/L) D1	Organisms only (µg/L) D2
*	*	*	*	*	*	*	
23. Chlorodibromomethane	124481					[a,c]0.41	[a,c]34
*	*	*	*	*	*	*	
67. Bis(2-Chloroisopropyl)Ether	108601					[a]1,400	[a,t]170,000
*	*	*	*	*	*	*	

Attachment C – (Not applicable)

Attachment D – Standard Provisions

I. Standard Provisions – Permit Compliance

A. Duty to Comply

1. The Discharger must comply with all of the conditions of this WDR. Any noncompliance constitutes a violation of the Clean Water Act (CWA) and the California Water Code (CWC) and is grounds for enforcement action, for permit termination, revocation and reissuance, or denial of a permit renewal application [40 CFR §122.41(a)].

2. The Discharger shall comply with effluent standards or prohibitions established under section 307(a) of the CWA for toxic pollutants and with standards for sewage sludge use or disposal established under section 405(d) of the CWA within the time provided in the regulations that establish these standards or prohibitions, even if this WDR has not been modified to incorporate the requirement [40 CFR §122.41(a)(1)].

B. Need to Halt or Reduce Activity Not a Defense

It shall not be a defense for a Discharger in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this WDR [*40 CFR §122.41(c)*].

C. Duty to Mitigate

The Discharger shall take all reasonable steps to minimize or prevent any discharge or sludge use or disposal in violation of this WDR that has a reasonable likelihood of adversely affecting human health or the environment [*40 CFR §122.41(d)*].

D. Proper Operation and Maintenance

The Discharger shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the Discharger to achieve compliance with the conditions of this WDR. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures. This provision requires the operation of backup or auxiliary facilities or similar systems that are installed by a Discharger only when necessary to achieve compliance with the conditions of this WDR [*40 CFR §122.41(e)*].

E. Property Rights

1. This WDR does not convey any property rights of any sort or any exclusive privileges [40 CFR §122.41(g)].

2. The issuance of this WDR does not authorize any injury to persons or property or invasion of other private rights, or any infringement of State or local law or regulations [40 CFR §122.5(c)].

F. Inspection and Entry

The Discharger shall allow the Regional Water Quality Control Board (Regional Board), California State Water Resources Control Board (State Board), United States Environmental Protection Agency (USEPA), and/or their authorized representatives (including an authorized contractor acting as their representative), upon the presentation of credentials and other documents, as may be required by law, to [*40 CFR §122.41(i)*] [*CWC 13383(c)*]:

1. Enter upon the Discharger's premises where a regulated facility or activity is located or conducted, or where records are kept under the conditions of this WDR [40 CFR §122.41(i)(1)];

2. Have access to and copy, at reasonable times, any records that must be kept under the conditions of this WDR [40 CFR §122.41(i)(2)];

3. Inspect and photograph, at reasonable times, any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this WDR [40 CFR §122.41(i)(3)];

4. Sample or monitor, at reasonable times, for the purposes of assuring WDR compliance or as otherwise authorized by the CWA or the CWC, any substances or parameters at any location [40 CFR §122.41(i)(4)].

G. Bypass

1. Definitions

   a. "Bypass" means the intentional diversion of waste streams from any portion of a treatment facility [40 CFR §122.41(m)(1)(i)].

   b. "Severe property damage" means substantial physical damage to property, damage to the treatment facilities, which causes them to become inoperable, or substantial and permanent loss of natural resources that can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production [40 CFR §122.41(m)(1)(ii)].

2. Bypass not exceeding limitations – The Discharger may allow any bypass to occur which does not cause exceedances of effluent limitations, but only if it is for essential maintenance to assure efficient operation. These bypasses are not subject to the provisions listed in Standard Provisions – Permit Compliance I.G.3 and I.G.5 below [40 CFR §122.41(m)(2)].

3. Prohibition of bypass – Bypass is prohibited, and the Regional Board may take enforcement action against a Discharger for bypass, unless [40 CFR §122.41(m)(4)(i)]:

   a. Bypass was unavoidable to prevent loss of life, personal injury, or severe property damage [40 CFR §122.41(m)(4)(A)];

   b. There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate back-up equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass that occurred during normal periods of equipment downtime or preventive maintenance [40 CFR §122.41(m)(4)(B)]; and

   c. The Discharger submitted notice to the Regional Board as required under Standard Provision – Permit Compliance I.G.5 below [40 CFR §122.41(m)(4)(C)].

4. The Regional Board may approve an anticipated bypass, after considering its adverse effects, if the Regional Board determines that it will meet the three conditions listed in Standard Provisions – Permit Compliance I.G.3 above [40 CFR §122.41(m)(4)(ii)].

5. Notice

   a. Anticipated bypass. If the Discharger knows in advance of the need for a bypass, it shall submit a notice, if possible at least 10 days before the date of the bypass [40 CFR §122.41(m)(3)(i)].

   b. Unanticipated bypass. The Discharger shall submit notice of an unanticipated bypass as required in Standard Provisions - Reporting V.E below [40 CFR §122.41(m)(3)(ii)].

H. Upset

Upset means an exceptional incident in which there is unintentional and temporary noncompliance with technology based permit effluent limitations because of factors beyond the reasonable control of the Discharger. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation [*40 CFR §122.41(n)(1)*].

1. Effect of an upset. An upset constitutes an affirmative defense to an action brought for noncompliance with such technology based permit effluent limitations if the requirements of paragraph H.2 of this section are met. No determination made during administrative review of claims that noncompliance was caused by upset, and before an action for

noncompliance, is final administrative action subject to judicial review [40 CFR §122.41(n)(2)].

2. Conditions necessary for a demonstration of upset. A Discharger who wishes to establish the affirmative defense of upset shall demonstrate, through properly signed, contemporaneous operating logs or other relevant evidence that [40 CFR §122.41(n)(3)]:

   a. An upset occurred and that the Discharger can identify the cause(s) of the upset [40 CFR §122.41(n)(3)(i)];

   b. The permitted facility was, at the time, being properly operated [40 CFR §122.41(n)(3)(i)];

   c. The Discharger submitted notice of the upset as required in Standard Provisions – Reporting V.E.2.b [40 CFR §122.41(n)(3)(iii)]; and

   d. The Discharger complied with any remedial measures required under Standard Provisions – Permit Compliance I.C above [40 CFR §122.41(n)(3)(iv)].

3. Burden of proof. In any enforcement proceeding, the Discharger seeking to establish the occurrence of an upset has the burden of proof [40 CFR §122.41(n)(4)].

II. Standard Provisions – Permit Action

A. General

This WDR may be modified, revoked and reissued, or terminated for cause. The filing of a request by the Discharger for modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance does not stay any WDR condition [*40 CFR §122.41(f)*].

If any toxic effluent standard or prohibition (including any schedule of compliance specified in such effluent standard or prohibition) is promulgated under section 307(a) of the CWA for a toxic pollutant which is present in the discharge, and that standard or prohibition is more stringent than any limitation on the pollutant in this WDR, this WDR shall be modified or revoked and reissued to conform to the toxic effluent standard or prohibition and the Discharger so notified.

B. Duty to Reapply

If the Discharger wishes to continue an activity regulated by this WDR after the expiration date of this WDR, the Discharger must apply for and obtain a new permit [*40 CFR §122.41(b)*] or submit a new NOI for re-enrollment.

C. Transfers

This Order is not transferable to any person because the Regional Board is required to modify or revoke and reissue this Order to change the name of the Discharger and incorporate such other requirements as may be necessary under the CWA and the CWC [*40 CFR §122.41(l)(3)*] [*40 CFR §122.61*]. A new owner or operator shall submit an NOI application to enroll in this WDR and the previous owner or operator shall submit a NOT.

D. Severability

The provisions of this WDR are severable and if any provisions of this WDR or the application of any provisions of this WDR to any circumstance is held invalid, the applications of such provision to other circumstances and the remainder of this WDR shall not be affected thereby.

E. Pollution, Contamination, or Nuisance [CWC §13050]

Neither the treatment nor the discharge shall create a condition of pollution, contamination or nuisance.

III. Standard Provisions – Monitoring

A. Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity [40 CFR §122.41(j)(1)].

B. Monitoring results must be conducted according to test procedures under 40 CFR section 136 or, in the case of sludge use or disposal, approved under 40 CFR section 136 unless otherwise specified in 40 CFR section 503 unless other test procedures have been specified in this WDR [40 CFR §122.41(j)(4)] [40 CFR §122.44(i)(1)(iv)].

IV. Standard Provisions – Records

A. Except for records of monitoring information required by this WDR related to the Discharger's sewage sludge use and disposal activities, which shall be retained for a period of at least five years (or longer as required by 40 CFR section 503), the Discharger shall retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this WDR, and records of all data used to complete the application for this WDR, for a period of at least three (3) years from the date of the sample, measurement, report or application. This period may be extended by request of the Regional Board Executive Officer at any time [40 CFR §122.41(j)(2)].

B. Records of monitoring information shall include:

1. The date, exact place, and time of sampling or measurements [40 CFR §122.41(j)(3)(i)];

2. The individual(s) who performed the sampling or measurements [40 CFR §122.41(j)(3)(ii)];

3. The date(s) analyses were performed [40 CFR §122.41(j)(3)(iii)];

4. The individual(s) who performed the analyses [40 CFR §122.41(j)(3)(iv)];

5. The analytical techniques or methods used [40 CFR §122.41(j)(3)(v)]; and

6. The results of such analyses [40 CFR §122.41(j)(3)(vi)].

C. Claims of confidentiality for the following information will be denied [40 CFR §122.7(b)]:

1. The name and address of any permit applicant or Discharger [40 CFR §122.7(b)(1)]; and

2. Permit applications and attachments, permits and effluent data [40 CFR §122.7(b)(2)].

V. Standard Provisions – Reporting

A. Duty to Provide Information

The Discharger shall furnish to the Regional Board, State Board, or USEPA within a reasonable time, any information which the Regional Board, State Board, or USEPA may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this WDR or to determine compliance with this WDR. Upon request, the Discharger shall also furnish to the Regional Board, State Board, or USEPA copies of records required to be kept by this WDR [*40 CFR §122.41(h)*] [*CWC 13267*].

B. Signatory and Certification Requirements

1. All applications, reports, or information submitted to the Regional Board, State Board, and/or USEPA shall be signed and certified in accordance with paragraph (B.2) and (B.3) of this provision [40 CFR §122.41(k)].

2. All permit applications shall be signed as follows:

a. For a corporation: By a responsible corporate officer. For the purpose of this section, a responsible corporate officer means: (i) A president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy or decision making functions for the corporation, or (ii) the manager of one or more manufacturing, production, or operating facilities, provided the manager is authorized to make management decisions which govern the operation of the regulated facility including having the explicit or implicit duty of making major capital investment recommendations, and initiating and directing other comprehensive measures to assure long term environmental compliance with environmental laws and regulations; the manager can ensure that the necessary systems are established or actions taken to gather complete and accurate information for permit application requirements; and where authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures [40 CFR §122.22(a)(1)];

b. For a partnership or sole proprietorship: by a general partner or the proprietor, respectively [40 CFR §122.22(a)(2)]; or

c. For a municipality, State, federal, or other public agency: by either a principal executive officer or ranking elected official. For purposes of this provision, a principal executive officer of a federal agency includes: (i) the chief executive officer of the agency, or (ii) a senior executive officer having responsibility for the overall operations of a principal geographic unit of the agency (e.g., Regional Administrators of USEPA) [40 CFR §122.22(a)(3)].

3. All reports required by this WDR and other information requested by the Regional Board, State Board, or USEPA shall be signed by a person described in paragraph (B.2) of this provision, or by a duly authorized representative of that person. A person is a duly authorized representative only if:

a. The authorization is made in writing by a person described in paragraph (B.2) of this provision [40 CFR §122.22(b)(1)];

b. The authorization specified either an individual or a position having responsibility for the overall operation of the regulated facility or activity such as the position of plant manager, operator of a well or a well field, superintendent, position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters for the company (a duly authorized representative may thus be either a named individual or any individual occupying a named position) [40 CFR §122.22(b)(2)]; and

c. The written authorization is submitted to the Regional Board, State Board, or USEPA [40 CFR §122.22(b)(3)].

4. If an authorization under paragraph (B.3) of this provision is no longer accurate because a different individual or position has responsibility for the overall operation of the facility, a new authorization satisfying the requirements of paragraph (B.3) of this provision must be submitted to the Regional Board, State Board or USEPA prior to or together with any reports, information, or applications, to be signed by an authorized representative [40 CFR §122.22(c)].

5. Any person signing a document under paragraph (B.2) or (B.3) of this provision shall make the following certification:

   "I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations" [*40 CFR §122.22(d)*].

C. Monitoring Reports

1. Monitoring results shall be reported at the intervals specified in the MRP in this WDR [40 CFR §122.41(l)(4)].

2. Monitoring results must be reported on a Self-Monitoring Report (SMR) form or forms provided or specified by the Regional Board or State Board for reporting results of monitoring of sludge use or disposal practices [40 CFR §122.41(l)(4)(i)].

3. If the Discharger monitors any pollutant more frequently than required by this WDR using test procedures approved under 40 CFR section 136 or, in the case of sludge use or disposal, approved under 40 CFR section 136 unless otherwise specified in 40 CFR section 503, or as specified in this WDR, the results of this monitoring shall be included in the calculation and reporting of the data submitted in the SMR or sludge reporting form specified by the Regional Board [40 CFR §122.41(l)(4)(ii)].

4. Calculations for all limitations, which require averaging of measurements, shall utilize an arithmetic mean unless otherwise specified in this WDR [40 CFR §122.41(l)(4)(iii)].

D. Compliance Schedules

Reports of compliance or noncompliance with, or any progress reports on, interim and final requirements contained in any compliance schedule of this WDR, shall be submitted no later than 14 days following each schedule date [*40 CFR §122.41(l)(5)*].

E. Twenty-Four Hour Reporting

1. The Discharger shall report any noncompliance that may endanger health or the environment. Any information shall be provided orally within 24 hours from the time the Discharger becomes aware of the circumstances. A written submission shall also be provided within five (5) days of the time the Discharger becomes aware of the circumstances. The written submission shall contain a description of the noncompliance and its cause; the period of noncompliance, including exact dates and times, and if the noncompliance has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance [40 CFR §122.41(l)(6)(i)].

2. The following shall be included as information that must be reported within 24 hours under this paragraph [40 CFR §122.41(l)(6)(ii)]:

   a. Any unanticipated bypass that exceeds any effluent limitation in this WDR [40 CFR §122.41(l)(6)(ii)(A)].

   b. Any upset that exceeds any effluent limitation in this WDR [40 CFR §122.41(l)(6)(ii)(B)].

   c. Violation of a maximum daily discharge limitation for any of the pollutants listed in this WDR to be reported within 24 hours [40 CFR §122.41(l)(6)(ii)(C)].

3. The Regional Board may waive the above-required written report under this provision on a case-by-case basis if an oral report has been received within 24 hours [40 CFR §122.41(l)(6)(iii)].

F. Planned Changes

The Discharger shall give notice to the Regional Board as soon as possible of any planned physical alterations or additions to the permitted facility. Notice is required under this provision only when [*40 CFR §122.41(l)(1)*]:

1. The alteration or addition to a permitted facility may meet one of the criteria for determining whether a facility is a new source in 40 CFR §122.29(b) [40 CFR §122.41(l)(1)(i)]; or

2. The alteration or addition could significantly change the nature or increase the quantity of pollutants discharged. This notification applies to pollutants which

are subject neither to effluent limitations in this WDR nor to notification requirements under 40 CFR section 122.42(a)(1) (see Additional Provisions—Notification Levels VII.A.1) [40 CFR §122.41(l)(1)(ii)]; or

3. The alteration or addition results in a significant change in the Discharger's sludge use or disposal practices, and such alteration, addition, or change may justify the application of permit conditions that are different from or absent in the existing permit, including notification of additional use or disposal sites not reported during the permit application process or not reported pursuant to an approved land application plan [40 CFR §122.41(l)(1)(iii)].

G. Anticipated Noncompliance

The Discharger shall give advance notice to the Regional Board or State Board of any planned changes in the permitted facility or activity that may result in noncompliance with the requirements of this WDR [*40 CFR §122.41(l)(2)]*.

H. Other Noncompliance

The Discharger shall report all instances of noncompliance not reported under Standard Provisions – Reporting E.3, E.4, and E.5 at the time monitoring reports are submitted. The reports shall contain the information listed in Standard Provision – Reporting V.E [*40 CFR §122.41(l)(7)*].

I. Discharge Monitoring Quality Assurance (DMQA) Program [STATE WATER BOARD/USEPA 106 MOA]

The Discharger shall conduct appropriate analyses on any sample provided by USEPA as part of the DMQA program. The results of such analyses shall be submitted to USEPA's DMQA manager.

J. Other Information

When the Discharger becomes aware that it failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application or in any report to the Regional Board, State Board, or USEPA, the Discharger shall promptly submit such facts or information [*40 CFR §122.41(l)(8)*].

VI. Standard Provisions – Enforcement

A. The CWA provides that any person who violates section 301, 302, 306, 307, 308, 318 or 405 of the Act, or any permit condition or limitation implementing any such sections in a permit issued under section 402, or any requirement imposed in a pretreatment program approved under sections 402(a)(3) or 402(b)(8) of the Act, is subject to a civil penalty not to exceed $25,000 per day for each violation. The CWA provides that any person who negligently violates sections 301, 302, 306, 307, 308, 318, or 405 of the Act, or any condition or limitation implementing any of such sections in a permit issued under section 402 of the Act, or any requirement imposed in a pretreatment program approved

under section 402(a)(3) or 402(b)(8) of the Act, is subject to criminal penalties of $2,500 to $25,000 per day of violation, or imprisonment of not more than one (1) year, or both. In the case of a second or subsequent conviction for a negligent violation, a person shall be subject to criminal penalties of not more than $50,000 per day of violation, or by imprisonment of not more than two (2) years, or both. Any person who knowingly violates such sections, or such conditions or limitations is subject to criminal penalties of $5,000 to $50,000 per day of violation, or imprisonment for not more than three (3) years, or both. In the case of a second or subsequent conviction for a knowing violation, a person shall be subject to criminal penalties of not more than $100,000 per day of violation, or imprisonment of not more than six (6) years, or both. Any person who knowingly violates section 301, 302, 303, 306, 307, 308, 318 or 405 of the Act, or any permit condition or limitation implementing any of such sections in a permit issued under section 402 of the Act, and who knows at that time that he thereby places another person in imminent danger of death or serious bodily injury, shall, upon conviction, be subject to a fine of not more than $250,000 or imprisonment of not more than 15 years, or both. In the case of a second or subsequent conviction for a knowing endangerment violation, a person shall be subject to a fine of not more than $500,000 or by imprisonment of not more than 30 years, or both. An organization, as defined in section 309(c)(3)(B)(iii) of the CWA, shall, upon conviction of violating the imminent danger provision, be subject to a fine of not more than $1,000,000 and can be fined up to $2,000,000 for second or subsequent convictions [40 CFR §122.41(a)(2)] [CWC 13385 and 13387].

B. Any person may be assessed an administrative penalty by the Regional Board for violating CWA section 301, 302, 306, 307, 308, 318 or 405, or any permit condition or limitation implementing any of such sections in a permit issued under CWA section 402. Administrative penalties for Class I violations are not to exceed $10,000 per violation, with the maximum amount of any Class I penalty assessed not to exceed $25,000. Penalties for Class II violations are not to exceed $10,000 per day for each day, during which the violation continues, with the maximum amount of any Class II penalty not to exceed $125,000 [40 CFR §122.41(a)(3)].

C. The CWA provides that any person who falsifies, tampers with, or knowingly renders inaccurate any monitoring device or method required to be maintained under this permit shall, upon conviction, be punished by a fine of not more than $10,000, or by imprisonment for not more than two years, or both. If a conviction of a person is for a violation committed after a first conviction of such person under this paragraph, punishment is a fine of not more than $20,000 per day of violation, or by imprisonment of not more than four years, or both [40 CFR §122.41(j)(5)].

D. The CWA provides that any person who knowingly makes any false statement, representation, or certification in any record or other document submitted or required to be maintained under this WDR, including monitoring reports or reports of compliance or noncompliance shall, upon conviction, be punished by

a fine of not more than $10,000 per violation, or by imprisonment for not more than six months per violation, or by both [40 CFR §122.41(k)(2)].

VII. Additional Provisions – Notification Levels

A. Non-Municipal Facilities

Dischargers of existing manufacturing, commercial, mining, and silvicultural wastes shall notify the Regional Board as soon as they know or have reason to believe [*40 CFR §122.42(a)*]:

1. That any activity has occurred or will occur that would result in the discharge, on a routine or frequent basis, of any toxic pollutant that is not limited in this WDR, if that discharge will exceed the highest of the following "notification levels" [40 CFR §122.42(a)(1)]:

    a. 100 micrograms per liter (µg/L) [40 CFR §122.42(a)(1)(i)];

    b. 200 µg/L for acrolein and acrylonitrile; 500 µg/L for 2,4-dinitrophenol and 2-methyl-4,6-dinitrophenol; and 1 milligram per liter (mg/L) for antimony [40 CFR §122.42(a)(1)(ii)];

    c. Five (5) times the maximum concentration value reported for that pollutant in the Report of Waste Discharge [40 CFR §122.42(a)(1)(iii)]; or

    d. The level established by the Regional Board in accordance with 40 CFR section 122.44(f) [40 CFR §122.42(a)(1)(iv)].

2. That any activity has occurred or will occur that would result in the discharge, on a non-routine or infrequent basis, of any toxic pollutant that is not limited in this WDR, if that discharge will exceed the highest of the following "notification levels" [40 CFR §122.42(a)(2)]:

    a. 500 micrograms per liter (µg/L) [40 CFR §122.42(a)(2)(i)];

    b. 1 milligram per liter (mg/L) for antimony [40 CFR §122.42(a)(2)(ii)];

    c. Ten (10) times the maximum concentration value reported for that pollutant in the Report of Waste Discharge [40 CFR §122.42(a)(2)(iii)]; or

    d. The level established by the Regional Board in accordance with 40 CFR §122.44(f) [40 CFR §122.42(a)(2)(iv)].

B. Publicly-Owned Treatment Works (POTWs) (Not Applicable)

Attachment E – Monitoring and Reporting Program (MRP)

Title 40 of the Code of Federal Regulations (CFR) section 122.48 requires that all National Pollutant Discharge Elimination System (NPDES) permits specify monitoring and reporting requirements. California Water Code sections 13267 and 13383 also authorize the California Regional Water Quality Control Board (Regional Board) to require technical and monitoring reports. This MRP establishes monitoring and reporting requirements, which implement the federal and California regulations.

I. General Monitoring Provisions

A. Samples and measurements taken as required herein shall be representative of the volume and nature of the monitored discharge. All samples shall be taken at the monitoring location identified in the representative sampling and analysis program. Another waste stream, body of water, or substance shall not dilute the monitored discharge. Monitoring points shall not be changed without notification to and the approval of the appropriate Regional Board.

B. Monitoring must be conducted according to USEPA test procedures approved under 40 CFR section 136, Guidelines Establishing Test Procedures for the Analysis of Pollutants Under the Clean Water Act as amended, unless other test procedures are specified in this WDR and/or by the appropriate Regional Board.

C. If the Discharger monitors any pollutant more frequently than required by this WDR using test procedures approved under 40 CFR section 136, or as specified in this WDR or by the appropriate Regional Board, the results of the monitoring shall be included in the calculation and reporting of the data submitted in the Discharger's Annual Report. The increased frequency of monitoring shall also be reported.

D. Calculations for all limitations, which require averaging of measurements, shall utilize an arithmetic mean unless otherwise specified in this WDR.

E. All analyses shall be performed in a laboratory certified to perform such analyses by the California Department of Health Services or a laboratory approved by the appropriate Regional Board.

F. All monitoring instruments and devices used by the Discharger to fulfill the monitoring program shall be properly maintained and calibrated to ensure accuracy. All flow measurement devices shall be calibrated at least once per year to ensure accuracy of the devices.

G. Order No. R9-2008-0002 may be modified by the Regional Board and EPA to enable the discharger to participate in comprehensive regional monitoring activities conducted in the Southern California Bight during the term of this permit. The intent of regional monitoring activities is to maximize the efforts of all monitoring partners using a more cost-effective monitoring design and to best utilize the pooled scientific resources of the region. During these coordinated sampling efforts, the discharger's sampling and analytical effort may be reallocated to provide a regional assessment of the impact of the discharge of municipal wastewater to the

Southern California Bight. Anticipated modifications to the monitoring program will be coordinated so as to provide a more comprehensive picture of the ecological and statistical significance of monitoring results and to determine cumulative impacts of various pollution sources. If predictable relationships among the biological, water quality and effluent monitoring variables can be demonstrated, it may be appropriate to decrease the discharger's sampling effort. Conversely, the monitoring program may be intensified if it appears that the objectives cannot be achieved through the discharger's existing monitoring program. These changes will improve the overall effectiveness of monitoring in the Southern California Bight. Minor changes may be made without further public notice.

II. Monitoring Locations

A. Dischargers enrolling for the first time under this WDR shall develop a representative sampling and analysis program to be used as case studies to represent the typical types of discharges occurring within their service areas. This study, to be submitted as the first annual report, will include the monitoring locations and rationale for choosing those locations.

B. Re-enrollees must submit a new case study defining monitoring locations and rationale for these locations, if there are new types of discharges.

III. Influent Monitoring Requirements (Not Applicable)

IV. Effluent Monitoring Requirements

A. Dischargers who are enrolling for the first time under this WDR shall develop a representative sampling and analysis program based on the discharge anticipated from the extracted groundwater activity as compared to the Effluent Limitations and Discharge Specifications established in this Permit to ensure the discharge will not violate Regional Board Discharge Prohibitions.

B. The Regional Board may increase monitoring requirements on a case-by-case basis. Additional monitoring for individual discharges may be required, where necessary, to show that during the term of the discharge, applicable water quality objectives will be maintained.

C. For certain metals, the hardness of the receiving water is required to calculate the effluent limit, therefore the Discharger shall measure the hardness of the receiving water at the same frequency as metals analysis.

D. Treatment System Status
The daily status (e.g., onsite, in operation/on standby, etc.) of any treatment systems used to achieve compliance with this WDR or the Notice of Enrollment from the Regional Board shall be reported monthly.

E. GROUNDWATER DISCHARGE MONITORING

1. For discharges associated with gasoline or diesel underground or above ground storage tanks (Remediation Projects) (as determined by the Regional Board), the discharge monitoring shall be conducted as listed below. For remediation of groundwaters containing individual solvents (e.g. trichloroethylene, tetrachloroethane, etc.) not associated with fuel products, or other substances with effluent concentration limitations in Order No. R9-2008-0002 , the monitoring requirements may be modified in the Notice of Enrollment to include a sampling frequency of once every two weeks for the individual compound(s) present in lieu of benzene, ethylbenzene, toluene, and xylene (collectively BTEX) monitoring requirements, provided that BTEX are not present, and the results reported monthly:

(a) Constituent	Units	Sample Type	Analysis Frequency	Reporting Frequency
Flowrate	gpd	NA	daily	monthly
Total Nitrogen	mg/L	grab	quarterly	quarterly
	lb/d	"	"	"
Total Phosphorus	mg/L	"	"	"
	lb/d	"	"	"
Settleable Solids	ml/L	"	"	"
	lb/d	"	"	"
Total Suspended Solids	mg/L	"	quarterly	quarterly
	lb/d	"	"	"

(b) Constituent	Units	Sample Type	Analysis Frequency	Reporting Frequency
Hydrogen Sulfide	µg/L	grab	semiannually	semiannually
	lb/d	"	"	"
Total Residual Chloride (TRC)	µg/L	"	daily if chlorinating	monthly
	lb/d	"		"
pH	Units	"	monthly	monthly
Benzene	µg/L	"	every 2 weeks	monthly
	lb/d	"		"
Ethylbenzene	µg/L	"	"	"
	lb/d	"	"	"
Toluene	µg/L	"	"	"
	lb/d	"	"	"
Xylene	µg/L	"	"	"
	lb/d	"	"	"
MTBE	µg/L	"	"	"

Constituent	Units	Sample Type	Analysis Frequency	Reporting Frequency
Total Petroleum Hydrocarbons	µg/L	grab	monthly	monthly
	lb/d	"	"	"
Tributyltin	µg/L	"	semiannually	semiannually
	lb/d	"	"	"
Arsenic	µg/L	"	"	"
	lb/d	"	"	"
Cadmium	µg/L	"	"	"
	lb/d	"	"	"
Chromium (hexavalent)	µg/L	"	"	"
	lb/d	"	"	"
Copper CTR	µg/L	"	"	"
	lb/d	"	"	"
Lead	µg/L	"	quarterly	quarterly
	lb/d	"	"	"
Mercury	µg/L	"	semiannually	semiannually
	lb/d	"	"	"
Nickel	µg/L	"	"	"
	lb/d	"	"	"
Silver	µg/L	"	"	"
	lb/d	"	"	"
Zinc	µg/L	"	"	"
	lb/d	"	"	"
Cyanide	µg/L	"	"	"
	lb/d	"	"	"
Phenolic Compounds (non-chlorinated)	µg/L	"	"	"
	lb/d	"	"	"

(c) Constituent	Units	Sample Type	Analysis Frequency	Reporting Frequency
Chlorinated Phenolics	µg/L	grab	semiannually	semiannually
	lb/d	"	"	"
Acute Toxicity	TUa	"	quarterly	quarterly
Chronic Toxicity	TUc	"	"	"
1,1,2,2-Tetrachloroethane (PCA)	µg/L	"	semiannually	semiannually
1,1,1-Trichloroethane (TCA)	mg/L	"	"	"
1,1,2-Trichloroethane (TCA)	mg/L	"	"	"
1,2-Dichloroethane	µg/L	"	"	"
Tetrachloroethylene (PCE)	µg/L	"	"	"

Constituent	Units	Sample Type	Analysis Frequency	Reporting Frequency
Trichloroethylene (TCE)	µg/L	"	"	"
Vinyl Chloride[6]	µg/L	"	"	"
Carbon Tetrachloride	µg/L	"	"	"
Base/Neutrals	µg/L	"	"	"
	lb/d	"	"	"
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2. For discharges which are not associated with gasoline or diesel underground or above ground storage tanks (as determined by the Regional Board), discharge monitoring shall be conducted as follows:

(d) Constituent	Units	Sample Type	Analysis Frequency	Reporting Frequency
Flowrate	gpd	na	daily	quarterly
Total Nitrogen	mg/L	grab	quarterly	quarterly
Total Phosphorus	mg/L	"	"	"
Settleable Solids	ml/L	"	"	"
	lb/d	"	"	"
Total Suspended Solids	mg/L	"	"	"
	lb/d	"	"	"
Hydrogen Sulfide	mg/L	"	semiannually	semiannually
	lb/d	"	"	"
Total Residual Chlorine (TRC)	µg/L	"	daily if chlorinating	monthly
	lb/d	"		"
pH	Units	"	monthly	quarterly

(e) Constituent	Units	Sample Type	Analysis Frequency	Reporting Frequency
Total Petroleum Hydrocarbons	µg/L	grab	quarterly	quarterly
	lb/d	"	"	"
MTBE	µg/L	"	"	"
Tributyltin	µg/L	"	semiannually	semiannually
	lb/d	"	"	"
Arsenic	µg/L	"	"	"
	lb/d	"	"	"
Cadmium	µg/L	"	"	"
	lb/d	"	"	"
Chromium (hexavalent)	µg/L	"	"	"
	lb/d	"	"	"
Copper	µg/L	"	"	"
	lb/d	"	"	"

Constituent	Units	Sample Type	Analysis Frequency	Reporting Frequency
Lead	µg/L	"	"	"
	lb/d	"	"	"
Mercury	µg/L	"	"	"
	lb/d	"	"	"
Nickel	µg/L	"	"	"
	lb/d	"	"	"
Silver	µg/L	"	"	"
	lb/d	"	"	"
Zinc	µg/L	"	"	"
	lb/d	"	"	"
Cyanide	µg/L	"	"	"
	lb/d	"	"	"
Phenolic Compounds	µg/L	"	"	"
(non-chlorinated)	lb/d	"	"	"
Chlorinated Phenolics	µg/L	"	"	"
	lb/d	"	"	"
Acute Toxicity	TUa	"	quarterly	quarterly
Chronic Toxicity	TUc	"	"	"
Base/Neutrals	µg/L	"	semiannually	semiannually
	lb/d	"	"	"
126 Priority Pollutants – Attachment B2 (Excluding Above Marked Pollutants)		"	"	"

3. For long term discharges (greater than 6 months) in RURAL AREAS (as determined by the Regional Board), discharge monitoring shall be conducted as follows:

(f) Constituent	Units	Sample Type	Analysis Frequency	Reporting Frequency
Flowrate	gpd	na	daily	monthly
Total Nitrogen	mg/L	grab	quarterly	quarterly
Total Phosphorus	mg/L	"	"	"
	lb/d	"	"	"
Settleable Solids	ml/L	"	"	"
	lb/d	"	"	"
Total Suspended Solids	mg/L	"	"	"
Hydrogen Sulfide	µg/L	"	"	"
Total Petroleum Hydrocarbons	µg/L	"	"	"
Total Residual Chlorine	µg/L	"	daily if	monthly
(TRC)	lb/d	"	chlorinating	"
pH	Units	"	monthly	quarterly
MTBE	µg/L	"	quarterly	quarterly
Acute Toxicity	TUa	"	semiannually	semiannually
Chronic Toxicity	TUc	"	"	"
Base/Neutrals	µg/L	"	"	"
126 Priority Pollutants – Attachment B2	"		"	"

4. For short term (duration of 6 months or less at a particular groundwater extraction site) discharges in RURAL AREAS, monitoring shall be conducted as follows:

(g) Constituent	Units	Sample Type	Analysis Frequency	Reporting Frequency
Flowrate	gpd	na	daily	monthly
Total Nitrogen	mg/L	grab	every two weeks	monthly
Total Phosphorus	mg/L	"	"	"
	lb/d	"	"	"
Settleable Solids	ml/L	"	"	"
	lb/d	"	"	"
Total Suspended Solids	mg/L	"	"	"
Hydrogen Sulfide	µg/L	"	"	"
Total Petroleum Hydrocarbons	µg/L	"	every two weeks	monthly
Total Residual Chlorine	µg/L	"	daily if	"
(TRC)	lb/d	"	chlorinating	"
pH	Units	"	monthly	quarterly
MTBE	µg/L	"	quarterly	"
			Analysis	**Reporting**

(h) Constituent	Units	Sample Type	Frequency	Frequency
Acute Toxicity	TUa	grab	semiannually	semiannually
Chronic Toxicity[5]	TUc	"	"	"
Base/Neutrals[7]	µg/L	"	"	"
126 Priority Pollutants – Attachment B2		"	"	"

5. For short term (duration of 6 months or less at a particular groundwater extraction site) discharges in URBAN AREAS, discharge monitoring shall be conducted as follows:

(i) Constituent	Units	Sample Type	Analysis Frequency	Reporting Frequency
Flowrate	gpd	NA	daily	monthly
Total Nitrogen	mg/L	grab	every other week	"
Total Phosphorus	mg/L	"	"	"
Settleable Solids	ml/L	"	"	"
	lb/d	"	"	"
Total Suspended	mg/L	"	"	"
Solids	lb/d	"	"	"
Hydrogen Sulfide	mg/L	"	"	"
	lb/d	"	"	"
Total Residual	µg/L	"	daily if	"
Chlorine (TRC)	lb/d	"	chlorinating	"
pH	Units	"	every other week	"
Total Petroleum	µg/L	"	"	"
Hydrocarbons	lb/d	"	"	"
MTBE	µg/L	"	"	"
Tributyltin	µg/L	"	semiannually	semiannually
	lb/d	"	"	"
Arsenic	µg/L	"	"	"
	lb/d	"	"	"
Cadmium	µg/L	"	"	"
	lb/d	"	"	"
Chromium	µg/L	"	"	"
(hexavalent)	lb/d	"	"	"
Copper	µg/L	"	"	"
	lb/d	"	"	"
Lead	µg/L	"	"	"
	lb/d	"	"	"
Mercury	µg/L	"	"	"
	lb/d	"	"	"
Nickel	µg/L	grab	"	"
	lb/d	"	"	"

(j) Constituent	Units	Sample Type	Analysis Frequency	Reporting Frequency
Silver	µg/L	"	semiannually	semiannually
	lb/d	"	"	"
Zinc	µg/L	"	"	"
	lb/d	"	"	"
Cyanide	µg/L	"	"	"
	lb/d	"	"	"
Phenolic Compounds	µg/L	"	"	"
(non-chlorinated)	lb/d	"	"	"
Chlorinated Phenolics	µg/L	"	"	"
	lb/d	"	"	"
Chronic Toxicity	TUc	"	quarterly	quarterly
Base/Neutrals	µg/L	"	"	"
	lb/d	"	"	"
126 Priority Pollutants – Attachment B2 (Excluding Above Marked Pollutants)	"		semiannually	semiannually

6. For discharges associated with Sewer System Replacement, or Wastewater Treatment Plant Construction or Expansion Projects, in addition to monitoring for those Constituents listed in Monitoring Provision E, discharge monitoring shall be conducted for the following:

Constituent	Units	Sample Type	Minimum Frequency Of Analysis	Reporting Frequency
Total Coliform	MPN100/ml	grab	weekly	Monthly
Fecal Coliform	"	"	"	"
Dissolved Oxygen	mg/L	"	"	"
126 Priority Pollutants – Attachment B2	---	"	semiannually	Semiannually

E. RECEIVING WATER MONITORING

The discharger shall obtain a monthly upstream sample of the receiving water if the discharge is to a river or stream; or from an area unaffected by the discharge for other receiving waters, and analyze the sample for turbidity and report the results monthly. The turbidity of the receiving water is necessary to determine compliance of the effluent turbidity. The discharger shall also submit a monthly report discussing any turbidity plumes created by the discharge including a description (e.g., color, extent, duration, etc.) of any turbidity plumes.

For discharges to surf zones, in lieu of obtaining turbidity samples in unaffected areas, the discharger shall submit a monthly report describing (e.g., color, extent, duration, etc.) any turbidity plumes caused by the discharge.

The Regional Board may increase receiving water monitoring requirements on a case-by-case basis. Additional receiving water monitoring for individual discharges may be required, where necessary, to show that during the term of the discharge, applicable surface water quality objectives will be maintained.

For certain metals, the hardness of the receiving water is required to calculate the effluent limit, therefore the discharger shall measure the hardness of the receiving water at the same frequency as metals analysis.

F. ANNUAL SUMMARY OF MONITORING DATA

A summary of monitoring data for the previous year shall be submitted to the Regional Board previous to March 1st of each year. The report shall contain both tabular and graphical summaries of the previous year's data. If the duration of the discharge is six months or less, an annual summary is not required.

G. REPORT OF DISCHARGE TERMINATION

Within thirty days of the termination of the discharge, the discharger shall submit a letter to the Regional Board specifying the date the groundwater extraction waste discharge was terminated.

H. REPORTING FREQUENCY

Monitoring reports shall be submitted to the Regional Board in accordance with the following schedule:

REPORTING FREQUENCY	REPORT PERIOD	REPORT DUE
Monthly	January, February March, April, May June, July, August September, October November, December	By the 30th day of the following month*.

* The monthly report for January is due no later than February 28th

Quarterly	January - March	April 30
	April - June	July 30
	July - September	October 30
	October - December	January 30
Semiannually	January - June	July 30
	July - December	January 30
Annual	January - December	March 1

Laboratories analyzing monitoring samples shall be certified by the Department of Health Services, in accordance with the provision of Water Code Section 13176, and must include quality assurance/quality control data with their reports.

The results of such analysis shall be reported in the annual report. Grab samples shall be collected at the applicable point of discharge (either at the storm drain or the receiving water). If a Discharger monitors the above constituents more frequently than required by this WDR, then the results of such monitoring shall be included in the calculation and reporting of the data submitted in the annual report. Separate annual reports are required for each region.

I. The Discharger shall retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this WDR, and records of all data used to complete the application for this WDR, for a period of at least five years from the date of the sample, measurement, report, or application. This period may be extended by request of this Regional Board. These records shall include:

1. The date, place, and time of site inspections, sampling, visual observation, and/or measurement;
2. The individual(s) who performed the site inspections, sampling, visual observations, and/or measurements;
3. The dimension, size and/or volume of vault;
4. Flow measurements (if required) and duration of discharge;
5. The estimated volume of discharge;
6. The date and time of analyses;
7. The laboratory, staff, or wholesaler who performed the analyses; and
8. Analytical results.

J. Toxicity Reduction Evaluation (TRE)

The enrollee shall develop a Toxicity Reduction Evaluation (TRE) workplan. The workplan shall be subject to the approval of the Regional Board and shall be modified as directed by the Regional Board. Enrollees shall submit the TRE workplan to the Regional Board upon request of the Regional Board. The TRE

workplan shall be developed no later than six months after adoption of this WDR in accordance with the following manuals:

1. Generalized Methodology for Conducting Industrial Toxicity Reduction Evaluations (EPA/600/2-88/070).

2. Toxicity Identification Evaluation (TIE), Phase I (EPA/600/6-91/005F).

3. Methods for Aquatic Toxicity Identification Evaluations, Phase II (EPA/600/R-92/080).

4. Methods for Aquatic Toxicity Identification Evaluations, Phase III (EPA/600/R-92/081).

K. If toxicity-testing results show a violation of any acute toxicity limitation identified in Discharge Specifications of this WDR, the enrollee shall:

1. Take all reasonable measures necessary to immediately minimize toxicity; and

2. Increase the frequency of the toxicity test(s), which showed a violation, to at least two times per month until the results of at least two consecutive toxicity tests do not show violations.

L. If the Regional Board determines that toxicity testing shows consistent violation of any acute toxicity limitation identified in Discharge Specifications of this WDR, the enrollee shall conduct a TRE that includes all reasonable steps to identify the source of toxicity. Once the source of toxicity is identified, the enrollee shall take all reasonable steps to reduce the toxicity to meet the toxicity limitations identified in Discharge Specifications of this WDR.

M. Within 14 days of completion of the TRE, the enrollee shall submit the results of the TRE, including a summary of the findings, data generated, a list of corrective actions necessary to achieve consistent compliance with all the toxicity limitations of this WDR and to prevent recurrence of violations of those limitations, and a time schedule for implementation of such corrective actions. The corrective actions and time schedule shall be modified at the direction of the Regional Board.

V. Whole Effluent Toxicity Testing Requirements

Whole effluent toxicity (WET) tests measure the aggregate toxic effect of a mixture of pollutants that may be present in a waste stream and provides information on potential toxic impacts to receiving waters from the discharge of wastes. WET tests measure the degree of response of exposed aquatic test organisms to an effluent. The WET approach provides a means of assessing compliance with the narrative toxicity water quality objective for aquatic life protection of the Basin Plan while implementing numeric criteria for toxicity.

There are two types of WET tests: acute and chronic. An acute toxicity test is conducted over a short time period and measures mortality. A chronic toxicity test is conducted over a longer period of time and may measure mortality, reproduction, and development.

This order requires that a Toxicity Reduction Evaluation (TRE) be conducted if a discharge causes or contributes to chronic toxicity in a receiving water body. This WDR requires the Discharger to periodically monitor the toxicity of its discharge and to develop a TRE Workplan if the toxicity effluent limitations are exceeded.

VI. Land Discharge Monitoring Requirements (Not Applicable)

VII. Reclamation Monitoring Requirements (Not Applicable)

VIII. Receiving Water Monitoring Requirements – SURFACE WATER AND GROUNDWATER (Not Applicable)

IX. Other Monitoring Requirements (Not Applicable)

X. Reporting Requirements

A. General Monitoring and Reporting Requirements

All reports submitted in response to this WDR shall comply with signatory requirements set forth in the Standard Provisions.

B. Self Monitoring Reports (SMRs) to State and Regional Board

1. At any time during the term of this permit, the State or Regional Board may notify the Discharger to electronically submit Self-Monitoring Reports (SMRs) using the State Board's California Integrated Water Quality System (CIWQS) Program Web site (http://www.waterboards.ca.gov/ciwqs/index.html). Until such notification is given, the Discharger shall submit hard copy SMRs. The CIWQS Web site will provide additional directions for SMR submittal in the event there will be service interruption for electronic submittal.

2. The Discharger shall submit annual monitoring results to the Regional Board by the 20th day of March for the preceding calendar year. The Discharger shall report in the SMR the results for all monitoring specified in this MRP. The Discharger shall submit annual SMRs including the results of all required monitoring using USEPA-approved test methods or other test methods specified in this WDR. If the Discharger monitors any pollutant more frequently than required by this WDR, the results of this monitoring shall be included in the calculations and reporting of the data submitted in the SMR.

3. The Discharger shall submit SMRs in accordance with the following requirements:

   a. The Discharger shall arrange all reported data in a tabular format. The data shall be summarized to clearly illustrate whether the facility is operating in compliance with interim and/or final effluent limitations. The Discharger is not required to duplicate the submittal of data that are entered in a tabular format within CIWQS. When electronic submittal of data is required and CIWQS does not provide for entry into a tabular format within the system, the Discharger shall electronically submit the data in a tabular format as an attachment.

   b. The Discharger shall attach a cover letter to the SMR. The information contained in the cover letter shall clearly identify violations of this WDR; discuss corrective actions taken or planned; and the proposed time schedule for corrective actions. Identified violations must include a description of the requirement that was violated and a description of the violation.

   c. SMRs must be submitted to the appropriate Regional Board, signed and certified as required by the Standard Provisions (Attachment D).

C. Discharge Monitoring Reports (DMRs) to EPA

When requested by USEPA, the Discharger shall also complete and submit Discharge Monitoring Reports to USEPA. The submittal date shall be specified in the request.

D. OTHER REPORTS (NOT APPLICABLE)

Attachment F – Fact Sheet

As described in section III of this WDR, this Fact Sheet includes the legal requirements and technical rationale that serve as the basis for the requirements of this WDR.

I. Permit Information

A. INTRODUCTION

This Order establishes a WDR regulating the discharge of groundwater extraction waste discharges to surface waters in the San Diego Region except San Diego Bay from all construction groundwater extraction, and similar waste discharges.

B. BACKGROUND

In 1972, the Federal Water Pollution Control Act, currently referred to as the Federal Clean Water Act (CWA), was amended to provide that the discharge of pollutants to waters of the United States from any point source is prohibited, unless the discharge is in compliance with a National Pollutant Discharge Elimination System (NPDES) permit. The federal regulations allow authorized states to issue either general permits or individual permits to regulate discharges of pollutants to waters of the United States. On January 28, 1991, the California Regional Water Quality Control Board, San Diego Region (Regional Board) issued a General Waste Discharge Requirement for Groundwater Remediation and Dewatering Wastes Discharges to Surface Waters within the San Diego Region except for San Diego Bay (Order No. 91-10). The permit was reissued two more times on June 13, 1996 (Order No. 96-41) and October 10, 2001 (Order No. 2001-96).

In accordance with Title 40, Code of Federal Regulations (CFR), the Regional Board must meet general program requirements prior to the re-issuance and adoption of a general NPDES permit. General program requirements include preparing a draft WDR, public noticing, allowing a public comment period, and conducting a public hearing. To meet these requirements, the Regional Board prepared a draft WDR. The tentative WDR was made available to interested parties and posted on the Regional Board's website on February 5, 2008 for comments. A public hearing to receive testimony from interested parties was scheduled for March 12, 2008. A public hearing notice was posted in the San Diego Union-Tribune, The Riverside Press-Enterprise, and The Orange County Register, major newspapers in the San Diego Region, on February 8, 2008. The public written comment period ended March 5, 2008 and the public oral comment period ended March 12, 2008 at the Regional Board meeting.

C. GENERAL CRITERIA

Extracted groundwater may contain pollutants which may be found in groundwaters as a result of decomposition of organic materials (e.g., hydrogen

sulfide), leaking underground storage tanks and fuel lines, surface spills, sewage, past use of liquid waste impoundments, or the potential presence of nutrients (phosphorus and nitrogen compounds).

The San Diego Regional Water Quality Control Board (hereinafter Regional Board) is aware that petroleum pollutant plumes exist in groundwaters in areas subject to construction groundwater extraction. In addition to construction groundwater extraction discharges, groundwater remediation projects required by cleanup and abatement orders issued by the Regional Board may require the discharge of treated groundwater. In addition to petroleum products and solvents, groundwaters may contain elevated concentrations of other pollutants that could degrade surface waters. These other pollutants may include metals, nutrients (nitrogen and phosphorus), hydrogen sulfide, solids, and other inorganic and organic compounds.

Existing and proposed discharges of groundwater extraction waste from construction groundwater extraction, foundation groundwater extraction, and groundwater cleanup projects:

a) Result from similar operations (all involve extraction and discharge of groundwater);

b) Are the same type of waste (all are groundwater);

c) Require similar effluent limitations for the protection of the beneficial uses of the receiving waters;

d) Require similar monitoring; and

e) Are more appropriately regulated under a general permit rather than individual permits.

Order No. 2001-96, applied to all groundwater extraction waste discharges of greater than 100,000 gpd. For purposes of renewing NPDES permit No. 2001-96 (Tentative Order No. R9-2008-0002), historical monitoring data has been reviewed. Based on the data review results, lack of complaints of adverse impacts to water quality and/or beneficial uses of the receiving waters, and lack of documentation of adverse impacts to water quality and/or beneficial uses of the receiving waters, discharges of groundwater to all receiving waters within the region except discharges to San Diego Bay less than 100,000 gallons per day and where no known contamination exists, probably will not have an adverse effect on the receiving water/environment.

This WDR does <u>not</u> cover:

STORM WATER - Storm water runoff due to construction activities. These activities may be covered under the statewide general NPDES permit for storm water discharges associated with construction activities (CAS000002), the

statewide general NPDES permit for Storm Water Runoff Associated With Small Linear Underground/Overhead Construction Projects (CAS000005), and/or Clean Water Act (CWA) Section 401 Water Quality Certifications.

SANITARY SEWER - Discharges to a sanitary sewer. These discharges do not need coverage under the NPDES Program, although the agency controlling the sanitary sewer must approve discharges to its conveyance system.

UTILITY VAULTS - Discharges from utility vaults and underground structures. These activities may be covered under the statewide general NPDES permit for discharges from utility vaults and underground structures to surface water Order No. 2006-0008-DWQ (CAG990002).

HYDROSTATIC/ POTABLE WATER – Discharges from drinking water well development. These discharges are covered in Order No. R9-2002-0020 (CAG679001).

Notification Requirements

The purpose of this WDR is to facilitate regulation of discharges from groundwater extraction activities. To obtain coverage under this WDR, the Discharger must submit a Notice of Intent (NOI), a project map(s), an initial Monitoring Report, and first annual fee. Signing the certification on the NOI signifies that the Discharger intends to comply with the provisions and requirements of this WDR. AN NOI must be signed to be valid.

D. DISCHARGE TO A MUNICIPAL SEPARATE STORM SEWER SYSTEM (MS4)

Prior to discharging into an MS4, the Discharger shall demonstrate alternatives to discharging extracted groundwater waste into an MS4 and why it is technically or economically infeasible to implement these alternatives.

Without prior approval from the appropriate local agency with jurisdiction over the MS4, the discharger shall not discharge extracted groundwater waste under this WDR into an MS4.

Local agencies responsible for operating the MS4s may not passively receive and discharge pollutants from third parties. By providing free and open access to an MS4 that conveys discharges to waters of the U.S., the MS4 operator essentially accepts responsibility for discharges into the MS4 that it does not prohibit or control. These discharges may cause or contribute to a condition of contamination or a violation of water quality standards.

Therefore, at least 30 days prior to initiating an extracted groundwater discharge to an MS4, the Discharger shall notify and receive authorization from the appropriate local agency with jurisdiction over the MS4. This requirement encourages communication between Dischargers enrolled under this WDR and

local agencies responsible for MS4s in an effort to reduce misunderstandings and concerns over the types of discharges covered by this WDR.

E. DISCHARGE DESCRIPTION

Groundwaters in some urban areas are known to be contaminated with petroleum products and solvents due to underground storage tank leaks and pipeline leaks. Discharges of groundwater to receiving waters within the region will be required to comply with the effluent limitations contained in this Order and protect the beneficial uses of the receiving waters.

Regional Board staff expects that a number of the groundwater project proponents will propose discharges to surface waters which will require National Pollutant Discharge Elimination System (NPDES) permits.

Any discharge of untreated groundwater to a surface water may cause or contribute to excursions above narrative water quality objectives contained in the Ocean Plan and/or Basin Plan as a result of the potential discharge of petroleum related compounds, solvents, and metals.

Enrollees under this WDR that are in close proximity of the ocean, a bay, harbor, lagoon or estuary, may encounter saline groundwater, in which case the use of EPA Method 1638, and EPA Method 1640 (Clean Technologies) would be appropriate for the analysis of metals in saline samples.

FACILITY DESCRIPTIONS - TREATMENT FACILITIES AND OUTFALLS

This general NPDES permit contains effluent limitations which may require the application of 'best available treatment economically achievable' for the removal of petroleum products and organic compounds from each groundwater project proponent's discharge. The general NPDES permit will require each Enrollee to certify the adequacy of each component of treatment facilities or a contingency plan prior to initiating a discharge. Each Enrollee's certification report shall contain a requirement-by-requirement analysis, based on accepted engineering practice, of how the contingency plan or process and physical design of the facilities will ensure compliance with this Order.

Groundwater may be discharged to a variety of receiving waters, storm drains, or other conveyance systems tributary to receiving waters within the region. Because outfalls are not designed to achieve maximum initial dilution and dispersion of discharges, initial dilution factors for discharges to inland surface waters, bays, estuaries, and lagoons are conservatively assumed to equal zero.

An initial dilution factor of three is assumed for discharges to the surf zone. The initial dilution factor is based on a preliminary dilution model submitted by Professor Gerhard H. Jirka, School of Civil and Environmental Engineering, Cornell University, for a dewatering project for the international treatment facility ocean outfall near Tijuana. This particular model assumes that:

a) Mixing of the dewatering discharge is primarily controlled by wave-induced turbulence and longshore conditions;

b) 0.55 meter wave height with a 15 second period occurring with a 95 percent exceedance probability;

c) A longshore velocity of 5 to 10 centimeters per second; and

d) A near-shore beach slope of 3 percent.

The model results in an initial dilution ratio of six. Since the model does not represent topographic and wave conditions throughout the region, the initial dilution factor for discharges to surf zones was halved.

F. DESCRIPTION OF WASTEWATER AND BIOSOLIDS TREATMENT OR CONTROLS (NOT APPLICABLE)

G. DISCHARGE POINTS AND RECEIVING WATERS

Under the WDR, there may be multiple discharge points. Additional information regarding the receiving waters can be found in the completed NOI which describes the discharge and identifies the points of discharge.

The Comprehensive Water Quality Control Plan Report, San Diego Basin (9), (Basin Plan) was adopted by this Regional Board on September 8, 1994, and subsequently approved by the State Water Resource Control Board (hereinafter SWRCB) on December 13, 1994. Subsequent revisions to the Basin Plan have also been adopted by the Regional Board and approved by the SWRCB. The Basin Plan designates beneficial uses, narrative and numerical water quality objectives, and prohibitions which are applicable to the groundwater extraction waste discharges regulated under this Order.

The Basin Plan identifies the following beneficial uses of the surface waters in the San Diego Region to be protected (not all surface waters have all of the beneficial uses listed below):

- Municipal and domestic supply;
- Agricultural supply;
- Industrial service supply;
- Industrial process supply;
- Groundwater recharge;
- Freshwater replenishment;
- Navigation;
- Hydropower generation;

- Contact water recreation;
- Non-contact water recreation;
- Commercial and sport fishing;
- Warm freshwater habitat;
- Cold freshwater habitat;
- Preservation of Biological Habitats of Special Significance;
- Inland saline water habitat;
- Wildlife habitat;
- Rare, threatened, or endangered species;
- Marine habitat;
- Migration of aquatic organisms;
- Spawning, reproduction, and/or early development;
- Shellfish harvesting;
- Estuarine habitat; and
- Aquaculture

In order to protect these beneficial uses, the Basin Plan establishes water quality objectives (for bacterial, physical, chemical, and biological characteristics, and for radioactivity), general requirements for management of waste discharge to the bays/harbors, quality requirements for waste discharges (effluent water quality requirements), discharge prohibitions, and general provisions.

The SWRCB adopted a revised Water Quality Control Plan for Ocean Waters of California (Ocean Plan) on April 21, 2005. The Ocean Plan identifies the following beneficial uses of state ocean waters to be protected:

- Industrial water supply;
- Navigation;
- Aesthetic enjoyment;
- Water contact recreation;
- Non-contact water recreation;
- Fish migration;
- Mariculture;
- Marine habitat;
- Preservation and enhancement of areas of special biological significance;
- Preservation and enhancement of rare and endangered species;
- Fish spawning;
- Shellfish harvesting
- Ocean commercial and sport fishing;

The Ocean Plan establishes water quality objectives (for bacterial, physical, chemical, and biological characteristics, and for radioactivity), general requirements for management of waste discharge to the ocean, quality requirements for waste discharges (effluent water quality requirements), discharge prohibitions, and general provisions.

Beneficial uses of the bays and estuaries in the San Diego Region are similar to those of the Ocean Waters of the State. In order to protect the beneficial uses of the bays and estuaries, discharge specifications and receiving water quality limitations for some parameters, derived from the Ocean Plan, have been included in this Order for discharges to bays and estuaries (when open to the ocean and consisting of marine waters). If a lagoon or estuary is not open to the Pacific Ocean and consists of fresh water, discharges shall comply with the requirements established in this Order for discharges to inland surface waters.

This region has continuous and ephemeral rivers and streams, bays, estuaries, lagoons, and approximately 85 miles of coastline. No receiving waters covered under the terms and conditions of this Order have been designated an outstanding national resource water by the SWRCB. However, Heisler Park Ecological Reserve, located in coastal waters near the City of Laguna Beach, the San Diego-La Jolla Ecological Reserve, and the San Diego Marine Life Refuge, located in coastal waters near La Jolla, a community of the City of San Diego, have been designated an Area of Special Biological Significance (ASBS) by the SWRCB. The Water Quality Control Plan for Ocean Waters of California (Ocean Plan) contains the following prohibitions applicable to ASBSs:

"Waste shall not be discharged to areas designated as being of special biological significance. Discharges shall be located a sufficient distance from such designated areas to assure maintenance of natural water quality conditions in these areas."

Order No. R9-2008-0002 prohibits the discharge of extraction waste to the above ASBSs

H. SUMMARY OF EXISTING REQUIREMENTS AND SELF-MONITORING REPORT DATA

Order No. 2001-96, which this WDR replaces, requires the Discharger not to exceed the Effluent Limitations for a number of constituents, and to monitor and report the concentration and mass of the constituents in their discharge. Significant changes occurred in the Effluent Limitation requirements for some constituents. Effluent Limitations under Order No. 2001-96 were developed using the CTR, while the SIP was used for this WDR.

I. Compliance Summary (Not Applicable)

J. Planned Changes (Not Applicable)

II. Applicable Plans, Policies, and Regulations

The requirements contained in this WDR are based on the requirements and authorities described in this section.

A. Legal Authorities

This WDR is issued pursuant to CWA section 402 and implementing regulations adopted by the USEPA and Chapter 5.5, Division 7 of the California Water Code (CWC). It shall serve as an NPDES permit for point source discharges from groundwater extraction waste discharges to surface waters. This WDR also serves as Waste Discharge Requirements (WDRs) pursuant to Article 4, Chapter 4 of the CWC for discharges that are not subject to regulation under CWA section 402.

States may request authority to issue general NPDES permits pursuant to 40 CFR section 122.28. On June 8, 1989, the State Board submitted an application to the USEPA requesting revisions to its NPDES Program in accordance with 40 CFR 122.28, 123.62, and 403.10. The application included a request to add general permit authority to its approved NPDES Program. On September 22, 1989, the USEPA, Region 9, approved the State Board's request and granted authorization for the State to issue general NPDES permits.

B. California Environmental Quality Act (CEQA)

This action to adopt a NPDES permit is exempt from the provisions of CEQA (Public Resources Code section 21100, et seq.) in accordance with CWC section 13389 for the following reasons: 1) A Discharger cannot obtain coverage under this WDR if pollutants in the discharge, cause, contribute, or have the reasonable potential to cause or contribute to a water quality standards violation; 2) The permit requires Dischargers to monitor and report the discharge to ensure the Dischargers will not cause a violation; and 3) The Regional Board's granting of the exceptions does not have the potential for causing significant adverse environmental effects. See California Code of Regulations, Title 14, section 15061(b)(3).

C. State and Federal Regulations, Policies, and Plans

1. **Water Quality Control Plan**
   On September 8, 1994, the Regional Board adopted a Water Quality Control Plan for the San Diego Region (hereinafter Basin Plan), that designates beneficial uses, establishes water quality objectives, and contains implementation programs and policies to achieve those objectives for all waters addressed through the plan. In addition, State Board Resolution No. 88-63 requires that, with certain exceptions, the Regional Board assigns the municipal and domestic supply use to water bodies that do not have beneficial uses listed in the Basin Plans.

2. **National Toxics Rule (NTR) and California Toxics Rule (CTR)**
   USEPA adopted the NTR on December 22, 1992, which was amended on May 4, 1995, and November 9, 1999, and the CTR on May 18, 2000, which was amended on February 13, 2001. These rules include water quality criteria for priority pollutants and are applicable to this discharge.

3. **State Implementation Policy (SIP)**
On March 2, 2000, the State Board adopted the SIP, which became effective on April 28, 2000, with respect to the priority pollutant criteria promulgated for California by the USEPA through the NTR and to the priority pollutant objectives established by the Regional Boards in their basin plans, with the exception of the provision on alternate test procedures for individual discharges that have been approved by USEPA Regional Administrator. The alternate test procedures provision was effective on May 22, 2000. The SIP became effective on May 18, 2000, with respect to the priority pollutant criteria promulgated by the USEPA through the CTR. The State Board adopted amendments to the SIP on February 24, 2005, that became effective on July 13, 2005. The SIP includes procedures for determining the need for and calculating Water Quality-Based Effluent Limitations (WQBELs), and requires Dischargers to submit data sufficient to do so. The State Board adopted amendments to the SIP on February 24, 2005, that became effective on July 13, 2005. The SIP establishes implementation provisions for priority pollutant criteria and objectives and provisions for chronic toxicity control. Requirements of this WDR implement the SIP.

4. **Antidegradation Policy**
Section 131.12 of 40 CFR requires that State water quality standards include an antidegradation policy consistent with the federal policy. The State Board established California's antidegradation policy in State Board Resolution No. 68-16, which incorporates the requirements of the federal antidegradation policy where applicable. Resolution No. 68-16 requires that existing water quality be maintained unless degradation is justified based on specific findings. As discussed in detail in this Fact Sheet, the permitted discharge shall be consistent with the antidegradation provision of 40 CFR section 131.12 and State Board Resolution No. 68-16.

5. **Anti-Backsliding Requirements**
Sections 402(o)(2) and 303(d)(4) of the CWA and 40 CFR section 122.44(l) prohibit backsliding in NPDES permits. These anti-backsliding provisions require that effluent limitations in a reissued permit must be as stringent as those in the previous permit, with some exceptions in which limitations may be relaxed. All effluent limitations in the WDR are at least as stringent as the effluent limitations in the previous Order unless specified.

6. **Monitoring and Reporting Requirements**
Section 122.48 of 40 CFR requires that all NPDES permits specify requirements for recording and reporting monitoring results. Sections 13267 and 13383 of the CWC authorize the Regional Boards to require technical and monitoring reports. The MRP establishes monitoring and reporting requirements to implement Federal and State requirements. This MRP is provided in Attachment E.

D. Impaired Water Bodies on CWA 303(d) List

The federal Clean Water Act requires States to identify and make a list of surface water bodies that are polluted. These water bodies, referred to in law as "water quality limited segments," do not meet water quality standards even after discharges of wastes from point sources have been treated by the minimum required levels of pollution control technology. Wastewater treatment plants, a city's storm drain system, or a boat yard, are a few examples of point sources that discharge wastes to surface waters. States are required to compile the water bodies into a list, referred to as the "Clean Water Act Section 303(d) List of Water Quality Limited Segments" (303(d) List). States must also prioritize the water bodies on the list and develop action plans, called total maximum daily loads (TMDLs) to improve the water quality.

The State Board updated the 2004-2006 303(d) List for California on October 25, 2006, and EPA approved it on November 30, 2006.

There are approximately 100 impaired water bodies on the 303(d) List in the San Diego Region. Most TMDLs for water bodies within the San Diego Region are under development or have not been started. However, four TMDLs for the San Diego Region need only State Board approval to be complete, and three are already complete. Of the three completed TMDLs, two impact the water quality of San Diego Bay and the third impacts the water quality of Rainbow Creek.

E. Other Plans, Polices and Regulations

Ocean Plan
The State Board adopted the Water Quality Control Plan for Ocean Waters of California (Ocean Plan) in 2005, it was approved by USEPA, and became effective on February 14, 2006. The Ocean Plan identifies the following beneficial uses of state ocean waters to be protected:

a. Industrial water supply;
b. Navigation;
c. Aesthetic enjoyment;
d. Water contact recreation;
e. Non-contact water recreation;
f. Ocean commercial and sport fishing;
g. Mariculture;
h. Preservation and enhancement of Areas of Special Biological Significance;
i. Preservation and enhancement of rare and endangered species;
j. Marine habitat;
k. Fish migration;
l. Fish spawning; and
m. Shellfish harvesting.

In order to protect the above beneficial uses, the Ocean Plan establishes water quality objectives (for bacteriological, physical, chemical, and biological characteristics, and for radioactivity), general requirements for management of waste discharged to the ocean, quality requirements for waste discharges (effluent quality requirements), discharge prohibitions, and general provisions.

Limits derived from the Ocean Plan have been included in this WDR to protect beneficial uses of enclosed bays and estuaries because their beneficial uses are similar to those of the ocean waters of the State.

F. BASIS FOR WASTE DISCHARGE REQUIREMENTS

Section 402 of the federal Clean Water Act (CWA) gives the U.S. EPA the authority to issue NPDES permits for discharges into navigable waters and to prescribe conditions for such permits necessary to carry out the provisions of the CWA. In California, EPA has delegated this authority to the State of California.

The discharge of extracted groundwater threatens to cause or contribute to excursions above narrative water quality objectives as a result of the discharge of petroleum related compounds, metals, and organics. On May 26, 1989, the U.S. EPA enacted revisions to 40 CFR 122 (NPDES regulations). When a proposed discharged of a compound or chemical threatens to cause or contribute to an excursion above a State narrative water quality standard and a numeric water quality standard for the specific chemical has not been established, the NPDES revisions require the Regional Board to:

a) Establish an effluent limitation using a proposed State water quality objective or standard or an explicit State policy or regulation interpreting its narrative water quality objective which will protect and maintain water quality and designated beneficial uses of the receiving water;

b) Establish effluent limitations on a case-by-case basis, using EPA's water quality criteria published under 307(a) of the Federal Clean Water Act; or

c) Establish effluent limitations on an indicator parameter for the pollutants of concern (State Board memorandum dated November 3, 1989).

Groundwater pollutant plumes are often complex mixtures of hundreds of petroleum related compounds (e.g. gasoline contains over 200 chemical compounds) which makes complete chemical analyses very expensive and sometimes impracticable or impossible due to sample matrix interferences, constituent masking, or the lack of standard analytical techniques. Since water quality criteria for many of the petroleum hydrocarbon compounds have not been proposed or established by the State or EPA, the permit will require monitoring groundwater discharged using "indicator constituents" for the detection and evaluation of complex mixtures of petroleum related compounds such as gasoline and solvents. The indicator constituents used for evaluating compliance with the narrative water quality criteria in the permit for discharges of gasoline related products are benzene, ethylbenzene, toluene, xylene, and total petroleum

hydrocarbons, since it is believed that fuels have been adequately studied to justify limiting the analysis to these compounds.

On June 8, 1989, the SWRCB submitted an application to the U.S. EPA requesting revisions to its NPDES program in accordance with 40 CFR 123.62 and 403.10. The application included a request to add general permit authority to its approved NPDES program. States may request authority to issue general permits pursuant to 40 CFR 122.28. On September 22, 1989, the EPA, Region IX, approved the SWRCB's request and granted authorization for the State's issuance of general NPDES permits.

40 CFR 122.28 provides for the issuance of general permits to regulate discharges of waste which result from similar operations, are the same type of waste, require the same effluent limitations, require similar monitoring, and are more appropriately regulated under a general permit rather than individual permits.

In order to protect the beneficial uses of groundwaters and receiving waters in the region as a result of escalating numbers of groundwater extraction waste discharges, new permanent groundwater extraction waste discharges will be considered for enrollment on a case-by-case basis. The regulation of discharges from new permanent groundwater extraction operations to receiving waters will reduce the waste of groundwater as intended by Article X of the California Constitution and Section 275 of the California Water Code, and may reduce the potential number of new permanent discharges as intended by the federal Clean Water Act (Section 101(a)(1)) and the Water Quality Control Policy for Enclosed Bays and Estuaries of California.

The practice of permanent groundwater extraction for the purpose of protecting underground parking or other structures and the subsequent discharge of the groundwaters, without using the groundwaters to the "fullest extent to which they are capable, "as required by the California Constitution, is an unreasonable use of such waters, if the waters have designated beneficial uses. Article X, Section 2, of the California Constitution requires that "water resources of the State be put to beneficial use to the fullest extent of which they are capable and that the waste or unreasonable use or unreasonable method of use of water be prevented, and that the conservation of such waters is to be exercised with a view to the reasonable and beneficial use thereof in the interest of the people and for the public welfare." Water Code Section 275 states, "The department and board shall take all appropriate proceedings or actions before executive, legislative, or judicial agencies to prevent waste, unreasonable use, unreasonable method of use, or unreasonable method of diversion of water in this state."

On March 2, 2000, the SWRCB, in Resolution No. 2000-15, adopted a Policy for Implementation of Toxic Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California (Policy). The Policy implements the provisions promulgated by the U.S. Environmental Protection Agency (U.S. EPA) in the California Toxics Rule (CTR). Criteria for 126 priority pollutants are established by the CTR.

U.S. EPA promulgated this rule to fill a gap in California water quality standards that was created in 1994 when a State court overturned the State's water quality control plans containing water quality criteria for priority toxic pollutants. The Federal criteria are legally applicable in the State of California for inland surface waters, enclosed bays and estuaries for all purposes and programs under the Clean Water Act.

The Policy was effective on April 28, 2000, with respect to the priority pollutant criteria promulgated for California by the U.S. EPA through the National Toxics Rule (NTR) and to the priority pollutant objectives established by Regional Boards in their water quality control plans (basin plans).

The U.S. EPA promulgated the final California Toxic Rule (CTR) on May 18, 2000, as required by Section 303(c)(2)(B) of the federal Clean Water Act. The CTR regulations, codified in 40 CFR 131.38, establish numeric criteria for water quality standards for priority toxic pollutants for the State of California.

The Policy establishes:

a) implementation provisions for priority pollutant criteria promulgated by the U.S. EPA through the National Toxic Rule (NTR) and the CTR, and for priority pollutant objectives established in the Basin Plan;

b) monitoring requirements for 2,3,7,8-TCDD (tetrachlorodibenzo-p-dioxin) equivalents; and

c) Chronic toxicity control provisions.

Pursuant to Section 5.3 of the Policy, the Regional Board may, after compliance with the California Environmental Quality Act (CEQA), allow short-term or seasonal exceptions from meeting the priority pollutant criteria/objectives if determined to be necessary to implement control measures either:

a) For resource or pest management (i.e., vector or weed control, pest eradication, or fishery management) conducted by public entities to fulfill statutory requirements, including, but not limited for, those in the California Fish and Game, Food and Agriculture, Health and Safety, and Harbors and Navigation codes; or

b) Regarding drinking water conducted to fulfill statutory requirements under the federal Safe Drinking Water Act or the California Health and Safety Code. Such categorical exceptions may also be granted for draining municipal storm water conveyances for cleaning or maintenance, or for draining water treatment facilities for cleaning or maintenance.

Section 5.3 of the Policy states that, where site-specific conditions in individual water bodies or watersheds differ sufficiently from statewide conditions and those differences cannot be addressed through other provisions of this policy the SWRCB

may, in compliance with the California Environmental Quality Act (CEQA), subsequent to a public hearing, and with the concurrence of the U.S. Environmental Protection Agency, grant an exception to meeting a priority pollutant criterion/objective or any other provision of this Policy where the State Board determines:

a) The exception will not compromise protection of enclosed bay, estuarine, and inland surface waters for beneficial uses; and

b) The public interest will be served.

Section 402(a)(1) of the Clean Water Act authorizes the issuance of best available technology effluent limitations in NPDES permits using best professional judgement. Using best professional judgement, best available technology economically achievable for the removal of volatile and semi-volatile organic compounds, and analytical practical quantitation levels is the basis for effluent limitations, for these compounds, in the Discharge Specifications of the Order. Thus, best available technology economically achievable for the removal of organic compounds is the basis for effluent limitations for xylene and other volatile hydrocarbons, and base/neutral compounds (not included in 40 CFR 131.38).

Water Quality Based Effluent Discharge Specifications (limits) were established for this groundwater extraction waste discharge permit, using 40 CFR 131.38 (Water Quality Standards; Establishment of Numeric Criteria for Priority Toxic Pollutants for the State of California), and the State's Implementation Policy. Water Quality Based Effluent Discharge Limits do not apply to discharges of extracted groundwater to the surf zone.

In general, there are two accepted technologies in use for the removal of synthetic organic compounds from water: aeration and adsorption. Removal efficiencies of volatile organic compounds through aeration processes can be estimated based on each compound's Henry's Law Coefficient (increasing coefficients indicate increasing volatility). Benzene is relatively soluble in water when compared to other fuel constituents and solvents. Any compound which has a Henry's Law coefficient greater than that of benzene will theoretically volatilize faster than benzene (assuming molecular or chemical interactions are nonexistent or minimized). Most of the compounds associated with fuel products and solvents commonly found in contaminated groundwater have Henry's Law Coefficients greater than that of benzene and will be efficiently removed through aeration if benzene is removed. The general consensus in the literature is that a 99 percent removal efficiency of volatile compounds with similar concentrations may be achieved through aeration processes. Based on best professional judgement, if benzene is removed from groundwater to levels approaching detection limits (practical quantitation level), other volatile organic compounds of concern (e.g., tetrachloroethylene, trichloroethylene, carbon tetrachloride, etc.) will be removed from the discharged groundwater as well.

Organic compounds which are not removed from groundwaters through aeration processes may be removed through adsorption processes (e.g., granular activated carbon). When properly designed and operated, most granular activated carbon systems can lower the concentration of synthetic organic contaminants to below detection limits.

In general, most synthetic organic contaminants can be removed from groundwaters using the aeration of adsorption processes or a combination thereof. Establishing effluent limitations in the practical quantitation limit range (1 to 5 □g/L) and monitoring requirements for BTEX as indicators of fuels, 40 CFR 136 listed volatile compounds as indicators of solvents, and base/neutral compounds as indicators of diesel product, will, based on best professional judgement, ensure that compounds of concern are not discharged in levels which will cause excursions from narrative water quality criteria or objectives.

On January 1, 1998, Senate Bill (SB) 521 was passed. SB521 adds language, applicable to leaking underground storage tanks, to the Health & Safety Code as follows: "Section 25299.37.1. No closure letter pursuant to this chapter shall be issued unless the soil or groundwater, or both, where applicable, at the site have been tested for Methyl Tertiary Butyl Ether (MTBE) and the results of that testing are known to the Regional Board." Subsequently, on February 20, 1998, the San Diego Regional Board, Site Mitigation & Cleanup Unit, issued written notification to interested parties of Mandatory MTBE Sampling For Underground Storage Tank (UST) Site Closures-Senate Bill (SB) 521. The February 20, 1998, notification specifies that "For ground water impacted sites or soil sites that may threaten ground water, both soil and ground water sampling and analysis for MTBE will be required."

The Porter-Cologne Water Quality Control Act (January 1, 2000), Section 13272.1 and Section 13285, address discharges of MTBE. The California Department of Health Services (DHS) last update (March 9, 2000) of California's Maximum Contaminant Levels (MCLs) for MTBE states the following:

As established by the DHS, the primary MCL is 13 µg/L for MTBE and the secondary MCL is 5 µg/L.

The Order requires that groundwater discharged to bays and estuaries must not contain pollutants in excess of applicable receiving water quality objectives contained in 40 CFR 131.38 (Water Quality Standards; Establishment of Numeric Criteria for Priority Toxic Pollutants for the State of California), or effluent limitations based on achievable concentrations using best available technology (BAT), whichever results in a lower effluent concentration. Effluent limitations based on BAT are equal to or less than the practical quantitation level. Since the assumed initial dilution factor for the discharge is zero, a discharge could not cause an excursion from numeric receiving water quality objectives for Tables 1 and 2 (Groundwater Extraction Discharges to Bays and Harbors, and Groundwater Extraction Waste Discharges to Lagoons/Estuaries), if the discharge is in compliance with the effluent limitations contained in the Order. Likewise,

discharges to the surf zone cannot cause excursions from water quality objectives based on the preceding, and assuming that the dilution factor will always be greater than three.

For discharges to inland surface waters, effluent limitations are based on the EPA water quality criteria for the protection of aquatic species, the EPA water quality criteria for the protection of human health, effluent concentrations achievable using best available technology, 40 CFR 131.38 (Water Quality Standards; Establishment of Numeric Criteria for Priority Toxic Pollutants for the State of California), or, in the cases where the receiving water is designated potable or municipal supply waters, maximum contaminant levels for municipal waters established by the California Department of Health Services. Since the assumed initial dilution factor for the discharge is zero and a mixing zone is not allowed, a discharge could not cause an excursion from numeric receiving water quality objectives if the discharge is in compliance with the effluent limitations contained in the Order.

No evidence that groundwaters in the region contain biocides, dioxins, or radiation has been found to date. However, discharges of pesticides in detectable concentrations to inland surface waters are prohibited by the Comprehensive Water Quality Control Plan Report, San Diego Basin (9) (Basin Plan), and by the Order.

In the adoption of waste discharge requirements and effluent limitations to protect the beneficial uses of waters of the State, Section 1300 et seq., of the California Water Code, authorizes the use of relevant water quality objectives or other criteria in the absence of numerical effluent concentration limitations in the Bays and Estuaries Policy.

Compliance with effluent limitations shall be determined as follows (pursuant to 40 CFR – 131.38):

a) Dischargers shall be deemed out of compliance with an effluent limitation if the concentration of the priority pollutant in the monitoring sample is greater than the effluent limitation and greater than or equal to the reported Minimum Level (ML).

b) Dischargers shall be required to conduct a Pollutant Minimization Program (PMP) when there is evidence (e.g., sample results reported as "Detected, but Not Quantified" (DNQ) when the effluent limitation is less than the Method Detection Limit (MDL), sample results from analytical methods more sensitive than those methods included in the permit, presence of whole effluent toxicity, health advisories for fish consumption, results of benthic or aquatic organism tissue sampling) that the priority pollutant is present in the effluent above an effluent limitation and either:

   1) A sample result is reported as DNQ and the effluent limitation is less than the reported ML; or

2) A sample result is reported as Non-Detect (ND) and the effluent limitation is less than the MDL.

When determining compliance with an Average Monthly Effluent Limitation (AMEL) and more than one sample result is available in a month, the discharger shall compute the arithmetic mean unless the data set contains one or more reported determinations of DNQ or ND. In those cases, the discharger shall compute the median in place of the arithmetic mean in accordance with the following procedure:

a) The data set shall be ranked from low to high, reported ND determinations lowest, DNQ determinations next, followed by quantified values (if any). The order of the individual ND or DNQ determinations is unimportant.

b) The median value of the data set shall be determined. If the data set has an odd number of data points, then the median is the middle value. If the data set has an even number of data points, then the median is the average of the two values around the middle unless one or both of the points are ND or DNQ, in which case the median value shall be the lower of the two data points where DNQ is lower than a value and ND is lower than DNQ.

If a sample result, or the arithmetic mean or median of multiple sample results, is below the reported ML, and there is evidence that the priority pollutant is present in the effluent above an effluent limitation and the discharger conducts a PMP, the discharger shall not be deemed out of compliance.

III. Rationale For Effluent Limitations and Discharge Specifications

The CWA requires point source dischargers to control the amount of conventional, non-conventional, and toxic pollutants that are discharged into the waters of the United States. The control of pollutants discharged is established through effluent limitations and other requirements in NPDES permits. Effluent limitations are based on the following principles:

A. 40 CFR section 122.44(a) requires that permits include applicable technology-based limitations and standards;

B. 40 CFR section 122.44(d) requires that permits include water quality-based effluent limitations to attain and maintain applicable numeric and narrative water quality criteria to protect the beneficial uses of the receiving water. Where numeric water quality criteria have not been established, three options exist to protect water quality: 1) 40 CFR section 122.44(d) specifies that WQBELs may be established using USEPA criteria guidance under CWA section 304(a); 2) proposed state criteria or a state policy interpreting narrative criteria supplemented with other relevant information may be used; or 3) an indicator parameter may be established;

C. Any discharge of untreated groundwater to surface water in the San Diego Reigon threatens to cause or contribute to excursions above narrative water quality objectives contained in the Basin Plan as a result of the potential discharge of petroleum related compounds, solvents, and metals.

On May 26, 1989, USEPA enacted revisions to NPDES program regulations (40 CFR 122). When a proposed discharge of a compound or chemical threatens to cause or contribute to an excursion above a State narrative water quality standard and a numeric water quality standard for the specific chemical has not been established, the NPDES program regulations require the Regional Board to do the following: 1) Establish effluent limitations using a proposed State water quality objective or standard, or an explicit State policy or regulation interpreting its narrative water quality objective which will protect and maintain water quality and designated beneficial uses of the receiving water; 2) Establish effluent limitations on a case-by-case basis, using USEPA's water quality criteria published under CWA section 307(a); or 3) Establish effluent limitations on an indicator parameter for the pollutants of concern; and

D. 40 CFR section 122.44(l) requires that when a permit is renewed or reissued, effluent limitations must be at least as stringent as the effluent limitations in the previous permit. Since this permit is a renewal of a previous permit, anti-backsliding is applicable and the following pollutants are included:

Settleable Solids
Total Suspended Solids
Hydrogen Sulfide
Total Residual Chlorine
pH
Benzene
Ethylbenzene
Toluene
Xylene
Total Petroleum Hydrocarbons
Arsenic
Cadmium
Chromium (hexavalent)
Copper
Lead
Mercury
Nickel
Silver
Zinc
Cyanide
Phenolic Compounds (non-chlorinated)
Chlorinated Phenolics
1,1,2,2-tetrachlorethane (PCA)
1,1,1-trichloroethane (TCA)
1,1,2-trichloroethane (TCA)
1,2-dichloroethane
Tetrachloroethylene (PCE)
Trichloroethylene (TCE)
Vinyl chloride
Carbon tetrachloride
Base/Neutral Organic Compounds
Acute Toxicity
Chronic Toxicity
Tributyltin (TBT)
Total Coliform
Fecal Coliform
Dissolved Oxygen (DO)

E. Methyl Tertiary-Butyl Ether (MTBE), is a chemical compound that is manufactured by the chemical reaction of methanol and isobutylene.

MTBE is produced in very large quantities (over 200,000 barrels per day in the U.S. in 1999) and is almost exclusively used as a fuel additive in motor gasoline. It is one of a group of chemicals commonly known as "oxygenates" because they raise the oxygen content of gasoline. At room temperature, MTBE is a volatile, flammable and colorless liquid that dissolves rather easily in water.

Because MTBE dissolves easily in water and does not "cling" to soil very well, it migrates faster and farther in the ground than other gasoline components, thus making it more likely to migrate to groundwater extraction wells. MTBE does not degrade (breakdown) easily and is difficult and costly to remove from groundwater.

On January 1, 1998, Senate Bill (SB) 521 was passed. SB521 adds language to the Health & Safety Code which is applicable to leaking underground storage tanks as follows: "Section 25299.37.1. No closure letter pursuant to this chapter shall be issued unless the soil or groundwater, or both, where applicable, at the site have been tested for Methyl Tertiary Butyl Ether (MTBE) and the results of that testing are known to the Regional Board." Subsequently, on February 20, 1998, the Regional Board, Site Mitigation & Cleanup Unit, issued written notification to interested parties of Mandatory MTBE Sampling For Underground Storage Tank (UST) Site Closures-Senate Bill (SB) 521. The February 20, 1998, notification specifies that "For ground water impacted sites or soil sites that may threaten ground water, both soil and ground water sampling and analysis for MTBE will be required."

Sections 13272.1 and Section 13285 of the CWC address discharges of MTBE. The California Department of Health Services (DHS) adopted limits for Maximum Contaminant Levels for MTBE. The Primary MCL of 13 µg/L was adopted by DHS on May 17, 2000. The Secondary MCL (for taste and odor not health affects) of 5 µg/L was adopted on January 7, 1999. The UST program uses the more conservative secondary MCL of 5 µg/L.

F. Discharge Prohibitions

Discharges under this WDR are required to be nontoxic. Toxicity is the adverse response of organisms to chemicals or physical agents. This prohibition is based on the Basin Plan, which require that all waters be maintained free of toxic substances in concentrations that are lethal or produce other detrimental responses in aquatic organisms. Detrimental responses include, but are not limited to, decreased growth rate and decreased reproductive success of resident or indicator species. The Basin Plan also requires waters to be free of toxic substances in concentrations that produce detrimental physiological responses in human, plant, or animal life. This objective applies regardless of whether

the toxicity is caused by a single substance or the interactive effect of multiple substances.

Mass emission rate limitations will be determined using the discharge flowrate and effluent concentration limitations specified in this WDR; therefore, the daily maximum discharge flowrate limitation for each discharge will be specified in the discharge Notice of Enrollment from the Regional Board. The discharge flowrate will be designated as the maximum discharge flowrate and the Discharger shall be prohibited from discharging in excess of the maximum discharge flowrate.

1. The discharge of groundwater to surface waters is prohibited unless authorized, exempted, or issued an individual NPDES permit by the Regional Board.

2. The discharge of wastes to areas designated by the SWRCB, and recommended by the Regional Board, as areas of special biological significance is prohibited. Discharges shall be located a sufficient distance from such designated areas to assure maintenance of natural water quality conditions in these areas.

3. The discharge of groundwater extraction waste to surface waters from permanent groundwater extraction operations in basins with designated beneficial uses of industrial, agricultural, or municipal and domestic supply are prohibited unless such extracted groundwater (not used beneficially) is used beneficially (Application Requirements, Section F.17, and F.18). If the Enrollee of such extracted groundwater wishes to discharge to surface waters, it shall be the responsibility of the Enrollee to obtain an individual NPDES Permit for the discharge.

4. The discharge of groundwater extraction waste to enclosed bays, harbors, lagoons, and estuaries, or tributaries thereto, is prohibited unless the Enrollee demonstrates to the satisfaction of the Regional Board that alternative disposal sites (e.g., surf zone) are not practicable as required in Application Requirements, Sections F.17, and F.18.

5. The discharge of groundwater extraction waste to any surface water from a groundwater extraction project after the date of completion of construction of structures requiring groundwater extraction, or from a groundwater remediation operation after the date the groundwater has been remediated to the satisfaction of the Regional Board, is prohibited.

6. The discharge of groundwater in excess of the flowrate specified in each Enrollee's Notice of Enrollment is prohibited unless the

Enrollee obtains a revised discharge Notice of Enrollment authorizing an increased flowrate.

7. No individual pesticide or combination of pesticides shall be present in the water column, sediments, or biota at concentration(s) that adversely affect beneficial uses. Pesticides shall not be present at levels which will bioaccumulate in aquatic organisms to levels which are harmful to human health, wildlife or aquatic organisms.

   Water designated for use as domestic or municipal supply (MUN) (drinking water) shall not contain concentrations of pesticides in excess of the maximum contaminant levels specified in California Code of Regulations, Title 22, Table 64444-A of Section 64444 (Organic Chemicals). (See Basin Plan Chapter 3-13).

8. Compliance with the waste discharge prohibitions contained in the Basin Plan is a condition of this Order.

9. The discharge of groundwater extraction waste to a storm water conveyance system without notifying and receiving authorization from the agency having jurisdiction over the storm water conveyance system is prohibited.

10. The discharge of wastes tributary or directly to areas designated as being of special biological significance by the SWRCB is prohibited. Discharges shall be located a sufficient distance from such designated areas to assure maintenance of natural water quality conditions in these areas.

G. Technology-Based Effluent Limitations (TBELs)

1. Scope and Authority

The CWA requires that TBELs be established based on several levels of controls:

Best Practicable Treatment Control Technology (BPT) represents the average of the best performance by plants within an industrial category or subcategory. The BPT standards apply to toxic, conventional, and nonconventional pollutants.

Best Available Technology Economically Achievable (BAT) represents the best existing performance of treatment technologies that are economically achievable within an industrial point source category. The BAT standards apply to toxic and nonconventional pollutants.

Best Conventional Pollutant Control Technology (BCT) represents the control from existing industrial point sources of conventional pollutants including BOD, TSS, fecal coliform, pH, and oil and grease. The BCT standard is established after considering the "cost reasonableness" of the relationship between the cost of attaining a reduction in effluent discharge and the benefits that would result, and also the cost effectiveness of additional industrial treatment beyond BPT.

New Source Performance Standards (NSPS) represent the best available demonstrated control technology standards. The intent of NSPS guidelines is to set limitations that represent state-of-the-art treatment technology for new sources.

The CWA requires USEPA to develop Effluent Limitations, Guidelines and Standards (ELGs) representing application of BPT, BAT, BCT, and NSPS. Section 402(a)(1) of the CWA and 40 CFR section 125.3 of the NPDES regulations authorize the use of Best Professional Judgment (BPJ) to derive technology-based effluent limitations on a case-by-case basis where ELGs are not available for certain industrial categories and/or pollutants of concern. Where BPJ is used, the permit writer must consider specific factors outlined in 40 CFR section 125.3.

2. Applicable Technology-Based Effluent Limitations

The USEPA has not developed numeric Technology-Based effluent limitations for pollutants in discharges from groundwater extraction.

H. Water Quality-Based Effluent Limitations (WQBELs)

1. Scope and Authority

As specified in 40 CFR section 122.44(d)(1)(i), permits are required to include WQBELs for pollutants (including toxicity) that are or may be discharged at levels that cause, have reasonable potential to cause, or contribute to an excursion above any state water quality standard. The process for determining reasonable potential and calculating WQBELs when necessary is intended to protect the designated uses of the receiving water as specified in the Basin Plan, achieve applicable water quality objectives and criteria contained in state plans and policies, and meet water quality criteria in the CTR and NTR.

2. Applicable Beneficial Uses and Water Quality Criteria and Objectives

The designated beneficial uses of surface waters throughout the State may include municipal, domestic, industrial, and agricultural supply; water contact and non-contact recreation; navigation; groundwater recharge and freshwater replenishment; hydropower generation; wildlife habitat; cold

freshwater and warm freshwater habitat; fish migration and fish spawning; marine habitat; estuarine habitat; shellfish harvesting; ocean commercial and sport fishing; areas of special biological significance; and preservation of rare and endangered species. To the extent that the Basin Plan designates additional or different beneficial uses, the Basin Plan shall apply.

3. Determining the Need for WQBELs

All applicable provisions of sections 301 and 402 of the CWA must be met for NPDES permits for discharges to surface waters. These provisions require controls of pollutant discharges that utilize BAT and BCT to reduce pollutant and any more stringent controls necessary to meet water quality standards.

As specified in the SIP, the Regional Board shall conduct an analysis for each priority pollutant with applicable criterion or objective to determine if a water quality-based effluent limitation is required.

Data are unavailable to conduct an analysis because a WDR as a General Permit, does not require a Report of Waste Discharge. Therefore, the discharger shall conduct an initial sample based on flow to determine the requirements.

Reasonable Potential Analysis (RPA)

In order to determine what to sample for and what frequency, an initial set of data is required.

If the discharger proposes to discharge less than 100,000 gallons per day, then the discharger shall initially conduct Monitoring Program A (sample for the entire constituents listed in III.D. and MTBE).

However it the discharger proposes to discharge 100,000 gallons per day or more, then the discharger shall initially conduct Monitoring Program B (sample the entire constituents listed in III.D., MTBE, and all 126 priority pollutants).

Based on the initial monitoring program if the discharge does not require treatment to meet the discharge specifications of this WDR, then the discharger will only need to conduct Monitoring Program A (if discharging less than 100,000 gallons per day) or Monitoring Program B (if discharging 100,000 gallons per day or more) once per year. This will provide data to identify reasonable potential for future effluent limits.

If the discharge will require treatment prior to discharge, then in addition to the once per year monitoring required listed above, the discharger will also monitor for all the constituents listed in the discharge specification with

effluent limits at the frequency required in the Monitoring and Reporting Program stated in Attachment E because of the reasonable potential of exceeding the effluent limits in the discharge specifications of this WDR.

If there are any contaminated sites within the radius of influence of the groundwater extraction activities, then the constituent of concern will be monitored at the frequency required in the Monitoring and Reporting Program stated in Attachment E because of the reasonable potential of exceeding the effluent limits in the discharge specifications of this WDR. If the constituent of concern is not listed in the Monitoring and Reporting Program stated in Attachment E then a monitoring and reporting frequency will be stated in the Notice of Enrollment.

Table summarizing effluent limits and monitoring

DISCHARGE	EFFLUENT LIMITS	MONITORING PROGRAM
< 100,000		• Program A Annual
>= 100,000		• Program B Annual
Treatment	Yes	• Monitoring and Reporting Program in Attachment E
Contaminated Site in Radius of Influence		• Monitor and Report constituent(s) of concern as stated in the Notice of Enrollment

4. WQBEL Calculations

The Average Monthly Effluent and Maximum Daily Effluent WQBELs were calculated using a statistical approach with the following considerations and assumptions:

No dilution credit is considered for the discharge. Therefore, the discharge must comply with the Water Quality Objective at the point of discharge.

The WQBEL based on the CTR were implemented using the procedure list in the SIP. The procedure is listed below with copper as the example.

CTR/SIP calculations - Copper Example:

Criteria for Priority Toxic Pollutant in the State of California is described in the CTR table listed in 40 CFR 131.38.

§ 131.38 40 CFR Ch. I (7–1–00 Edition)

A		B Freshwater		C Saltwater		D Human Health (10^{-6} risk for carcinogens) For consumption of:	
# Compound	CAS Number	Criterion Maximum Conc. [d] B1	Criterion Continuous Conc. [d] B2	Criterion Maximum Conc. [d] C1	Criterion Continuous Conc. [d] C2	Water & Organisms (µg/L) D1	Organisms Only (µg/L) D2
1. Antimony	7440360					14 a,e	4300 a,i
2. Arsenic [b]	7440382	340 i,m,w	150 i,m,w	69 i,m	36 i,m		
3. Beryllium	7440417					n	n
4. Cadmium [b]	7440439	4.3 e,i,m,w,x	2.2 e,i,m,w	42 i,m	9.3 i,m	n	n
5a. Chromium (III)	16065831	550 e,i,m,o	180 e,i,m,o			n	n
5b. Chromium (VI) [b]	18540299	16 i,m,w	11 i,m,w	1100 i,m	50 i,m	n	n
6. Copper [b]	7440508	13 e,i,m,w,x	9.0 e,i,m,w	4.8 i,m	3.1 i,m	1300	

Saltwater criterion maximum concentration (CMC) = 4.8 µg/L
Saltwater criterion continuous concentration (CCC) = 3.1 µg/L

These criteria are expressed in terms of the dissolved fraction of the metal in the water column. [See footnote "m" to Table in paragraph (b)(1) of 40 CFR 131.38]

40 CFR 122.45(c) requires that this WDR include effluent limitations as a total recoverable concentration.

The SIP requires that if it is necessary to express a dissolved metal or selenium value as total recoverable and a site-specific translator has not yet been developed, the Regional Board shall use the applicable conversion factor from 40 CFR 131.38.

The term "Conversion Factor" (CF) represents the recommended conversion factor for converting a metal criterion expressed as the total recoverable fraction in the water column to a criterion expressed as the dissolved fraction in the water column [See note to Table 2 of Paragraph (b)(2) to 40 CFR 131.38]

Total recoverable concentration * CF = Dissolved concentration criterion

or

Total recoverable concentration = Dissolved concentration criterion / CF

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(iv) Table 2 to paragraph (b)(2) of this section:

Metal	Conversion factor (CF) for freshwater acute criteria	CF for freshwater chronic criteria	CF for saltwater acute criteria	CF* for saltwater chronic criteria
Antimony	(d)	(d)	(d)	(d)
Arsenic	1.000	1.000	1.000	1.000
Beryllium	(d)	(d)	(d)	(d)
Cadmium	[b] 0.944	[b] 0.909	0.994	0.994
Chromium (III)	0.316	0.860	(d)	(d)
Chromium (VI)	0.982	0.962	0.993	0.993
Copper	0.960	0.960	0.83	0.83

CF for copper = 0.83

Total recoverable concentrations for copper:
4.8 µg/L dissolved (CMC) / 0.83 (CF) = 5.8 µg/L total recoveralbe for CMC
3.1 µg/L dissolved (CCC) / 0.83 (CF) = 3.7 µg/L total recoveralbe for CCC

Effluent variability multiplier and Coefficient of Variation (CV)
For each concentration based on an aquatic life criterion, the long-term average (LTA) is calculated by multiplying the concentration with a factor that adjusts for effluent variability. The multiplier can be found in Table 1 of the SIP. Since this is a WDR without existing data points, the number of effluent data points is less than ten; the CV shall be set equal to 0.6 per the SIP.

Table 1. Effluent Concentration Allowance (ECA) Multipliers for Calculating Long-Term Averages (LTAs)

Coefficient Of Variation (CV)	Acute Multiplier	Chronic Multiplier
	99th Percentile Occurrence Probability	99th Percentile Occurrence Probability
0.1	0.797	0.891
0.2	0.643	0.797
0.3	0.527	0.715
0.4	0.440	0.643
0.5	0.373	0.581
0.6	0.321	0.527

Therefore, from Table 1 of the SIP, the effluent variability multiplier will be as follows:
Acute Multiplier = 0.321
Chronic Multiplier = 0.527

The long-term average (LTA) is calculated by multiplying the total recoverable concentrations for copper with the acute and chronic multipliers:

LTA acute = 5.8 µg/L * 0.321 = 1.9 µg/L
LTA chronic = 3.7 µg/L * 0.527 = 2.0 µg/L

The MDEL and AMEL will be based on the most limiting of the acute and chronic LTA, in the case for copper it will be LTA acute of 1.9 µg/L.

Water quality-based effluent limits are calculated by multiplying the most limiting LTA with a factor (multiplier) that adjusts for the averaging periods and exceedance frequencies of the criteria and the effluent limitations. The multiplier can be found in Table 2 of the SIP. Since this is a WDR without existing data points, the CV will be set equal to 0.6 and since sampling frequency is four times a month or less, n shall be set equal to 4 per SIP (n=4).

Table 2. Long-Term Average (LTA) Multipliers for Calculating Effluent Limitations

Coefficient of Variation	MDEL Multiplier	AMEL Multiplier			MDEL/AMEL Multiplier		
	99th Percentile Occurrence Probability	95th Percentile Occurrence Probability			MDEL = 99th Percentile AMEL = 95th Percentile Occurrence Probability		
(CV)		n = 4	n = 8	n = 30	n = 4	n = 8	n = 30
0.1	1.25	1.08	1.06	1.03	1.16	1.18	1.22
0.2	1.55	1.17	1.12	1.06	1.33	1.39	1.46
0.3	1.90	1.26	1.18	1.09	1.50	1.60	1.74
0.4	2.27	1.36	1.25	1.12	1.67	1.82	2.02
0.5	2.68	1.45	1.31	1.16	1.84	2.04	2.32
0.6	3.11	1.55	1.38	1.19	2.01	2.25	2.62

Therefore, from Table 2 of the SIP, the LTA multipliers will be as follows:
MDEL Multiplier = 3.11
AMEL Multiplier = 1.55

The MDEL and AMEL limits are calculated by multiplying the LTA with an LTA multiplier for each limit:
Maximum Daily Effluent Limit (MDEL) = 1.9 µg/L * 3.11 = 5.8 µg/L
Average Monthly Effluent Limit (AMEL) = 1.9 µg/L * 1.55 = 2.9 µg/L

I. Whole Effluent Toxicity (WET)

Whole effluent toxicity (WET) tests measure the aggregate toxic effect of a mixture of pollutants that may be present in a waste stream and provides information on potential toxic impacts to receiving waters from the

discharge of wastes. WET tests measure the degree of response of exposed aquatic test organisms to an effluent. The WET approach provides a means of assessing compliance with the narrative toxicity water quality objective for aquatic life protection of the Basin Plan while implementing numeric criteria for toxicity. There are two types of WET tests: acute and chronic. An acute toxicity test is conducted over a short time period and measures mortality. A chronic toxicity test is conducted over a longer period of time and may measure mortality, reproduction, and development.

The SIP requires that a Toxicity Reduction Evaluation (TRE) be conducted if a discharge causes or contributes to chronic toxicity in a receiving water body. This WDR requires the Discharger to periodically monitor the toxicity of its discharge and to develop a TRE Workplan if the toxicity effluent limitations are exceeded.

J. Anti-Backsliding Effluent Limitations

Sections 402(o)(2) and 303(d)(4) of the CWA and 40 CFR section 122.44(l) prohibit backsliding in NPDES permits. The following limits designated with AB in the Final Effluent Limitations table below have the same limit as the previous permit.

K. Final Effluent Limitations

Summary of Water Quality-Based Effluent Limitations
Discharge Point
Summary of Water Quality-based Effluent Limitations Table

Mass Limits
All permit limitations, standards or prohibitions shall be expressed in terms of mass except for pH, or other pollutants which cannot appropriately be expressed by mass or under certain circumstances including "when applicable standards and limitations are expressed in terms of other units of measurement." (40 CFR § 122.45(f)(1)). Therefore, all concentration limits stated above except for Settleable Solids, Acute Toxicity, Chronic Toxicity, Total Coliform, Fecal Coliform, pH, and Dissolved Oxygen shall also have a mass limit based on its concentration limit times the discharge flow limit in the Notice of Enrollment expressed in pounds per day (lbs/d) as shown in the equations below:

Concentration Limit * Flow Limit * Conversion Factor = Mass Limit
(mg/l) * (MGD) * 8.34 [lb*L/(Million Gallons*mg)] = lbs/day
(µg/l) * (MGD) * 0.00834 [lb*L/(Million Gallons*µg)] = lbs/day
(mg/l) * (gpd) * 0.00000834 [lb*L/(Gallons*mg)] = lbs/day
(µg/l) * (gpd) * 0.00000000834 [lb*L/(Million Gallons*µg)] = lbs/day

B. DISCHARGE SPECIFICATIONS

1. DISCHARGES TO BAYS AND HARBORS

The discharge of groundwater extraction waste to Mission Bay, Oceanside Harbor, Del Mar Boat Basin, or Dana Point Harbor shall not contain pollutants in excess of the following effluent limitations:

General / Inorganic / Biological

Parameter	Units	Effluent Limitations				
		AMEL	AWEL	MDEL	Instantaneous Maximum	6-Month Median
Settleable Solids	ml/L	1.0 [OP]	1.5 [OP]	-	3.0 [OP]	-
Total Suspended Solids	mg/L	30 [AB]	-	-	50 [AB]	-
Hydrogen Sulfide	µg/L	2 [AB]	-	4 [AB]	10 [AB]	-
Total Residual Chlorine	µg/L	-	-	8 [OP]	60 [OP]	2 [OP]
Acute Toxicity	Tua			0.3 [OP]		
Chronic Toxicity	Tuc			1.0 [OP]		
Total Coliform	MPN/ 100 ml				1000.0 [AB]	
Fecal Coliform	MPN/ 100 ml				200.0 [AB]	
pH	Units	Within limit of 6.0 to 9.0 at all times [OP]				

Parameter	Units	Effluent Limitations				
		AMEL	AWEL	MDEL	Instantaneous Minimum	6-Month Median
Dissolved Oxygen (DO)	mg/L				> 5.0 [AB]	

Petroleum

Parameter	Units	Effluent Limitations				
		AMEL	AWEL	MDEL	Instantaneous Maximum	6-Month Median
MTBE	µg/L				5 [DHS]	
Benzene	µg/L	-	-	-	5 [AB]	-
Ethylbenzene	µg/L	-	-	-	5 [AB]	-
Toluene	µg/L	-	-	-	5 [AB]	-
Xylene	µg/L	-	-	-	5 [AB]	-

Parameter	Units	Effluent Limitations				
		AMEL	AWEL	MDEL	Instantaneous Maximum	6-Month Median
Total Petroleum Hydrocarbons	mg/L	-	-	-	0.5 [AB]	-

Metals

Parameter	Units	Effluent Limitations			
		AMEL	MDEL	Instantaneous Maximum	6-Month Median
Tributyltin (TBT)	µg/L	0.0014 [OP]			

Organics

Parameter	Units	Effluent Limitations			
		AMEL	MDEL	Instantaneous Maximum	6-Month Median
Phenolic Compounds (non-chlorinated)	µg/L	-	120 [OP]	300 [OP]	30 [OP]
Chlorinated Phenolics	µg/L	0.025 [CTR]	0.049 [CTR]	10 [OP]	1 [OP]
1,1,2,2-tetrachlorethane (PCA)	µg/L	2.3 [OP]	-	-	-
1,1,1-trichloroethane (TCA)	µg/L	5.4E5 [OP]	-	-	-
1,1,2-trichloroethane (TCA)	µg/L	9.4 [OP]	-	-	-
1,2-dichloroethane	µg/L	28 [OP]	-	-	-
Tetrachloroethylene (PCE)	µg/L	2.0 [OP]	-	-	-
Trichloroethylene (TCE)	µg/L	27 [OP]	-	-	-
Vinyl chloride	µg/L	36 [OP]	-	-	-
Carbon tetrachloride	µg/L	0.90 [OP]	-	-	-
Base/Neutral Organic Compounds	µg/L			10 [AB]	

Parameter	Units	Effluent Limitations			
		AMEL	MDEL	Instantaneous Maximum	6-Month Median
Ammonia (as N)	µg/L		2400 [OP]	6000 [OP]	600 [OP]

Parameter	Units	Effluent Limitations			
		AMEL	MDEL	Instantaneous Maximum	6-Month Median
Endosulfan	ng/L	-	18 [OP]	27 [OP]	9 [OP]
HCH	ng/L	-	8 [OP]	12 [OP]	4 [OP]
Dichloromethane	µg/L	450 [OP]	-	5 [AB]	-
Halomethanes	µg/L	-	-	5 [AB]	-
PAHs	ng/L	8.8 [OP]	-	-	-
TCDD Equivalents	pg/L	0.0039 [OP]	-	-	-
Turbidity	µg/L	75 [OP]	2.2 [CTR]	225	-

Parameter	Units	Effluent Limitations			
		AMEL	AWEL	Instantaneous Minimum	6-Month Median
Turbidity	NTU	75 [OP]	100 [OP]	225 [OP]	-
Turbidity	NTU	Shall not exceed the turbidity of the receiving water. [AB]			
126 Priority Pollutants from "Inland Surface Waters"					

2. DISCHARGES TO LAGOONS/ESTUARIES

The discharge of groundwater extraction waste discharges to saline lagoons (only Buena Vista Lagoon is fresh water) and estuaries of the region shall not contain pollutants in excess of the following effluent limitations:

Includes limits to the Bays and Harbors Limitations

Parameter	Units	Effluent Limitations			
		AMEL	MDEL	Instantaneous Maximum	6-Month Median
Total Nitrogen	mg/L	-	-	2.0 [AB]	1.0 [AB]
Total Phosphorus	mg/L	-	-	.0.2 [AB]	0.1 [AB]
pH	Units	Within limit of 7.0 to 8.5 at all times [AB]			
All Parameters and Effluent Limitations from "Bays and Harbors"					

3. DISCHARGES TO THE SURF ZONE

The discharge of groundwater extraction waste to the surf zone (3:1 dilution factor) shall not contain pollutants in excess of the following effluent limitations:

Discharges to the Surf Zone Calculation

The formula used to calculate effluent limits for consituents discharged to the surf zone is from Table B in the Ocean Plan except for Toxicity and Radioactivity.

Ce=Co+Dm(Co-Cs)

Ce = the effluent concentration limit, ug/L
Co = the concentration (water quality objective) to be met at the completion of initial dilution, ug/L
Dm = minimum probable initial dilution expressed as parts seawater per part wastewater Dm = 3 from findings from the 2001-96 Order.
Cs = background seawater concentration (see Table C), ug/L

Table C
BACKGROUND SEAWATER CONCENTRATIONS (Cs)

Waste Consitituent	Cs (ug/L)
Arsenic	3
Copper	2
Mercury	0.0005
Silver	0.16
Zinc	8
For all other Table B parameters	0

DISCHARGES TO THE SURF ZONE

(3:1 DILUTION FACTOR) [AB]

Parameter	Units	Effluent Limitations			
		AMEL	MDEL	Instantaneous Maximum	6-Month Median
TCR	µg/L		32 [OP]	240 [OP]	8 [OP]
Ammonia (as Nitrogen)	µg/L		9600 [OP]	24,000 [OP]	2400 [OP]
Arsenic	µg/L		119 [OP]	311 [OP]	23 [OP]
Cadmium	µg/L		16 [OP]	40 [OP]	4 [OP]
Chromium (hexavalent)	µg/L		32 [OP]	80 [OP]	8 [OP]
Copper	µg/L		42 [OP]	114 [OP]	6 [OP]
Lead	µg/L		32 [OP]	80 [OP]	8 [OP]

Parameter	Units	Effluent Limitations			
		AMEL	MDEL	Instantaneous Maximum	6-Month Median
Mercury	µg/L		0.64 OP	1.60 OP	0.16 OP
Nickel	µg/L		80 OP	200 OP	20 OP
Silver	µg/L		10.7 OP	27.5 OP	2.32 OP
Zinc	µg/L		296 OP	776 OP	56 OP
Cyanide	µg/L		16 OP	40 OP	4 OP
Phenolic Compounds (Non-chlorinated)	µg/L		480 OP	1200 OP	120 OP
1,1,2,2-tetrachloroethane	µg/L		9.2 OP		
Tributyltin (TBT)	µg/L		0.0056 OP		
1,1,-trichoroethane	µg/L		2,160,000 OP		
1,1,2-trichloroethane	µg/L		37.6 OP		
Carbon tetrachloride	µg/L		3.6 OP		
PCBs	µg/L		0.000076 OP		
Tetrachloroethylene	µg/L		8 OP		
Trichloroethylene	µg/L		108 OP		
Vinyl chloride	µg/L		144 OP		
Selenium	µg/L		240 OP	600 OP	60 OP
Endosulfan	µg/L		0.072 OP	0.108 OP	0.036 OP
Endrin	µg/L		0.016 OP	0.024 OP	0.008 OP
HCH	µg/L		0.032 OP	0.048 OP	0.016 OP
Acrolein	µg/L	880 OP			
Antimony	µg/L	4800 OP			
bis(2-chloroethoxy) methane	µg/L	17.6 OP			
bis(2-chloroisopropyl) ether	µg/L	4800 OP			
Chlorobenzene	µg/L	2280 OP			
di-n-butyl phthalate	µg/L	14,000 OP			

Parameter	Units	Effluent Limitations			
		AMEL	MDEL	Instantaneous Maximum	6-Month Median
Dichlorobenzenes	µg/L	20,400 OP			
1,1-dichloroethylene	µg/L	3.6 OP			
Diethyl phthalate	µg/L	132,000 OP			
Dimethyl phthalate	µg/L	3,280,000 OP			
4,6-dinitro-2-methylphenol	µg/L	880 OP			
2,4-dinitrophenol	µg/L	16 OP			
Ethylbenzene	µg/L	16,400 OP			
Fluoranthene	µg/L	60 OP			
Hexachlorocyclopentadiene	µg/L	232 OP			
Nitrobenzene	µg/L	19.6 OP			
Thallium	µg/L	8 OP			
Acrylonitrile	µg/L	0.4 OP			
Aldrin	µg/L	0.000088 OP			
Benzene	µg/L	23.6 OP			
Benzidine	µg/L	0.000276 OP			
Beryllium	µg/L	0.132 OP			
Bis(2-chloroethyl) ether	µg/L	0.18 OP			
Bis(2-ethylhexyl) phthalate	µg/L	14 OP			
Chlordane	µg/L	0.000092 OP			
Chloroform	µg/L	520 OP			
DDT	µg/L	0.00068 OP			
3,3-dichlorobenzidine	µg/L	0.0324 OP			
1,2-dichloroethane	µg/L	112 OP			
Dichloromethane	µg/L	1,800 OP			
1,3-dichloropropene	µg/L	35.6 OP			

Parameter	Units	Effluent Limitations			
		AMEL	MDEL	Instantaneous Maximum	6-Month Median
Dieldrin	µg/L	0.00016 OP			
2,4-dinitrotoluene	µg/L	10.4 OP			
1,2-diphenylhydrazine	µg/L	0.64 OP			
Halomethanes	µg/L	520 OP			
Heptachlor	µg/L	0.0002 OP			
Hexachlorobenzene	µg/L	0.00084 OP			
Hexachlorobutadine	µg/L	56 OP			
Hexachloroethane	µg/L	10 OP			
N-nitrosodimethylamine	µg/L	29.2 OP			
N-nitrosodiphenylamine	µg/L	10 OP			
PAHs	µg/L	0.0352 OP			
TCDD equivalents	µg/L	1.56E-08 OP			
Toxaphene	µg/L	0.00084 OP			
2,4,6-trichlorophenol	µg/L	1.16 OP			

Parameter	Units	Effluent Limitations			
		AMEL	AWEL	Instantaneous Maximum	MDEL
Settleable Solids	ml/L	1 OP	1.5 OP	3 OP	
Suspended Solids		75% OP *			
		*Suspended Solids AMEL is 75% removal unless the average monthly influent is 80 mg/L or less, then the effluent limit shall be 60 mg/L. OP			
pH		Within limit of 6.0 and 9.0 at all times. OP			
Toluene		340,000 OP			
Xylene				5 AB	
Total Petroleum Hydrocarbons				500 AB	
Aute Toxicity	TUa				0.3 OP

Parameter	Units	Effluent Limitations			
		AMEL	AWEL	Instantaneous Maximum	MDEL
Chronic Toxicity	TUc				1 [OP]
Turbidity	NTU	75 [OP]	100 [OP]	225 [OP]	

Parameter	Units	Effluent Limitations			
		AMEL	AWEL	Instantaneous Maximum	Shellfish Harvesting
Total Coliform	MPN/ 100 mL	1,000 [OP]		10,000 [OP]	
Total Coliform	MPN/ 100 mL			1,000 [OP] *	
		*Total coliform density shall not exceed 1,000 per 100 mL when the ratio of fecal/total coliform exceeds 0.1 [OP]			
Total Coliform					70 [OP] **
Total Coliform					230 [OP] **
		**The median total coliform density shall not exceed 70 per 100 mL, and not more than 10 percent of the samples shall exceed 230 per 100 mL. [OP]			
Fecal Coliform	MPN/ 100 mL	200 [OP]		400 [OP]	
Enterococcus	MPN/ 100 mL	35 [OP]		104 [OP]	

Parameter	Units	Effluent Limitations				
		AMEL	AWEL	MDEL	Instantaneous Minimum	6-Month Median
Dissolved Oxygen (DO)	mg/L				5.0 [AB]	

[OP] Basis – Ocean Plan 2005
[AB] Basis – Anti-Backsliding, values from the previous permit
[DHS] Basis – Department of Health Services
[CTR] Basis – California Toxics Rule/ State Implementation Plan 2005

4. DISCHARGES TO INLAND SURFACE WATERS

The discharge of groundwater extraction waste to inland surface waters (including Buena Vista Lagoon) shall not contain pollutants in excess of the following effluent limitations:

GENERAL CONSTITUENTS

Constituent	Unit	AMEL	Daily Maximum	Instantaneous Maximum	Basis
Settleable Solids	ml/L	0.1	---	0.2	AB
Total Suspended Solids	mg/L	30	---	50	
Percent Sodium	%	---	---	60	AB
Total Nitrogen	mg/L	1.0		2.0	"
Total Phosphorus	mg/L	0.1		0.2	"
Methylene Blue Active Substances	mg/L	---	---	0.5	"
Turbidity	NTU	Shall not exceed the ambient turbidity of the surface water at any time.			"
Fluoride	mg/L	---	---	1.0	"
Hydrogen Sulfide	µg/L	2	4	10	AB
Total Residual Chlorine (TRC)	µg/L	2	8	10	AB
pH	Units	Within the limits of 6.5 and 8.5 at all times.			AB
Acute Toxicity	TUa	---	---	0.59	AB
Chronic Toxicity	TUc	---	1	---	AB
Dissolved Oxygen	mg/L	Shall not be less than 5.0 at any time in waters with designated warm fresh-water habitat beneficial uses or less than 6.0 in waters with cold fresh water habitat beneficial uses.			AB
Total Coliform	MPN/100mL	---	---	1000	"
Fecal Coliform	MPN/100mL	---	---	200	"

VOLATILES, METALS, PRIORITY POLLUTANTS:

Beneficial Use:	Municipal/Potable Supply			Non-municipal/Non-potable		
		Instantaneous			Instantaneous	
Constituent	Unit	Maximum	Basis	Unit	Maximum	Basis
Dibromochloropropane	µg/L	0.2	DOHS	µg/L	0.2	AB
Ethylene Dibromide	µg/L	0.02	DOHS	µg/L	0.02	AB
Xylene	µg/L	5	AB	µg/L	5	AB
Chlorinated Phenolics	µg/L	1	DOHS	µg/L	10	AB
Remaining Base/Neutral Compounds	µg/L	10	AB	µg/L	10	AB
Total Petroleum Hydrocarbons	mg/L	0.5	"	mg/L	0.5	AB
Iron	mg/L	0.3	"	mg/L	0.3	AB
Manganese	mg/L	0.05	"	mg/L	0.05	AB
MTBE	µg/L	5	DOHS			
126 Priority Pollutants (Including metals)	40 CFR 131.38 - Water Quality Standards; Establishment of Numeric Criteria for Priority Toxic Pollutants for the State of California.					See Below

126 Priority Pollutants - 40 CFR 131.38 - Water Quality Standards; Establishment of Numeric Criteria for Priority Toxic Pollutants for the State of California.

The effluent limits for eight priority pollutants will be developed on a case-by-case basis because the freshwater criteria are based on site-specific water quality data.

Seven metals are dependent on water hardness, Cadmium, Copper, Chromium (III), Lead, Nickel, Silver, and Zinc [See Table 1 to 40 CFR 131.38(b)(2)], and the "Conversion Factors" for Cadmium and Lead are also water hardness dependent. [See Table 3 of 40 CFR 131.38(b)(2)]

In order to calculate the effluent limits for these seven metals the following equations from 40 CFR 131.38(b)(2) will be needed:

Cd CFa=1.136672-((LN(hardness))*0.041838)
Cd CFc = 1.101672-((LN(hardness))*0.041838)
Pb CFa&c = 1.46203-((LN(hardness))*0.145712)
Criterion=WER*CFx*(exp(mA*LN(hardness)+bA

Pentachlorophenol is dependent on the pH value. [See Footnote "f" to Table in 40 CFR 131.38(b)(1)]

To calculate the effluent limit for Pentachlorophenol use this equation:
CMC = exp(1.005(pH)−4.869). CCC = exp(1.005(pH)−5.134)

The remainder of the criteria is not water quality dependent and the effluent limits can be calculated. However, not all the effluent limits will apply to all sites because of the Beneficial use designation for "Municipal" may not apply to all sites.

These priority pollutant effluent limits were calculated the same way as the effluent limits for the bays and harbors.

Effluent Limitations calculated from CTR and SIP

Effluent Limits for Human Health Municipal and Non-Municipal

		Human Health			
		MUN		NON-MUN	
		AMEL (µg/L)	MDEL (µg/L)	AMEL (µg/L)	MDEL (µg/L)
A					
1	Antimony	14	28	4300	8600
2	Arsenic				
3	Beryllium				
4	Cadmium				
5a	Chromium (III)				

		Human Health			
		MUN		NON-MUN	
		AMEL (µg/L)	MDEL (µg/L)	AMEL (µg/L)	MDEL (µg/L)
5b	Chromium (IV)				
6	Copper	1300	2600		
7	Lead				
8	Mercury	0.05	0.1	0.051	0.1
9	Nickel				
10	Selenium				
11	Silver				
12	Thallium				
13	Zinc	700	1400	220000	440000
14	Cyanide	7000000	14000000		
15	Asbestos	1.3E-08	2.6E-08	1.4E-08	2.8E-08
16	2,3,7,8-TCDD (Dioxin)	320	640	780	1600
17	Acrolein	0.059	0.12	0.66	1.3
18	Acrylonitrile	1.2	2.4	71	140
19	Benzene	4.3	8.6	360	720
20	Bromoform	0.25	0.5	4.4	8.8
21	Carbon Tetrachloride	680	1400	21000	42000
22	Chlorobenzene	0.41	0.82	34	68
23	Chlorodibromomethane				
24	Chloroethane				
25	2-Chloroethylvinyl Ether				
26	Chloroform				
27	Dichlorobromomethane	0.56	1.1	46	92
28	1,1-Dichloroethane				
29	1,2-Dichloroethane	0.38	0.76	99	200
30	1,1-Dichloroethylene	0.057	0.11	3.2	6.4
31	1,2-Dichloropropane	0.52	1	39	78
32	1,3-Dichloropropylene	10	20	1700	3400
33	Ethylbenzene	3100	6200	29000	58000
34	Methyl Bromide	48	96	4000	8000
35	Methyl Chloride				
36	Methylene Chloride	4.7	9.4	1600	3200
37	1,1,2,2-Tetrachloroethane	0.17	0.34	11	22

		Human Health			
		MUN		NON-MUN	
		AMEL (µg/L)	MDEL (µg/L)	AMEL (µg/L)	MDEL (µg/L)
38	Tetrachloroethylene	0.8	1.6	8.9	18
39	Toluene	6800	14000	200000	400000
40	1,2-Trans-Dichloroethylene	700	1400	140000	280000
41	1,1,1-Trichloroethane				
42	1,1,2-Trichloroethane	0.6	1.2	40	80
43	Trichloroethylene	2.7	5.4	81	160
44	Vinyl Chloride	2	4	530	1100
45	2-Chlorophenol	120	240	400	800
46	2,4-Dichlorophenol	93	190	790	1600
47	2,4-Dimethylphenol	540	1100	2300	4600
48	2-Methyl-4,6-Dinitrophenol	13	27	770	1500
49	2,4-Dinitrophenol	70	140	14000	28000
50	2-Nitrophenol				
51	4-Nitrophenol				
52	3-Methyl-4-Chlorophenol				
53	Pentachlorophenol	0.28	0.56	8.2	16
54	Phenol	21000	42000	4500000	9000000
55	2,4,6-Trichlorophenol	2.1	4.2	6.5	13
56	Acenaphthene	1200	2400	2700	5400
57	Acenaphthylene				
58	Anthracene	9600	19000	110000	220000
59	Benzidine	0.00012	0.00024	0.00054	0.0011
60	Benzo(a)Anthracene	0.0044	0.0088	0.049	0.098
61	Benzo(a)Pyrene	0.0044	0.0088	0.049	0.098
62	Benzo(b)Fluoranthene	0.0044	0.0088	0.049	0.098
63	Benzo(ghi)Perylene				
64	Benzo(k)Fluoranthene	0.0044	0.0088	0.049	0.098
65	Bis(2-Chloroethoxy)Methane				
66	Bis(2-Chloroethyl)Ether	0.031	0.062	1.4	2.8
67	Bis(2-Chloroisopropyl)Ether	1400	2800	170000	340000
68	Bis(2-Ethylhexyl)Phthalate	1.8	3.6	5.9	12
69	4-Bromophenyl Phenyl Ether				
70	Butylbenzyl Phthalate	3000	6000	5200	10000

		Human Health			
		MUN		NON-MUN	
		AMEL (µg/L)	MDEL (µg/L)	AMEL (µg/L)	MDEL (µg/L)
71	2-Chloronaphthalene	1700	3400	4300	8600
72	4-Chlorophenyl Phenyl Ether				
73	Chrysene	0.0044	0.0088	0.049	0.098
74	Dibenzo(a,h)Anthracene	0.0044	0.0088	0.049	0.098
75	1,2 Dichlorobenzene	2700	5400	17000	34000
76	1,3 Dichlorobenzene	400	800	2600	5200
77	1,4 Dichlorobenzene	400	800	2600	5200
78	3,3'-Dichlorobenzidine	0.04	0.08	0.077	0.15
79	Diethyl Phthalate	23000	46000	120000	240000
80	Dimethyl Phthalate	310000	630000	2900000	5800000
81	Di-n-Butyl Phthalate	2700	5400	12000	24000
82	2,4-Dinitrotoluene	0.11	0.22	9.1	18
83	2,6-Dinitrotoluene				
84	Di-nOctyl Phthalate				
85	1,2-Diphenylhydrazine	0.04	0.08	0.54	1.1
86	Fluoranthene	300	600	370	740
87	Fluorene	1300	2600	14000	28000
88	Hexachlorobenzene	0.00075	0.0015	0.00077	0.0015
89	Hexachlorobutadiene	0.44	0.88	50	100
90	Hexachlorocyclopentadiene	240	480	17000	34000
91	Hexachloroethane	1.9	3.8	8.9	18
92	Inden(1,2,3-cd) Pyrene	0.0044	0.0088	0.049	0.098
93	Isophorone	8.4	17	600	1200
94	Naphthalene				
95	Nitrobenzene	17	34	1900	3800
96	N-Nitrosodimethylamine	0.00059	0.0012	8.1	16
97	N-Nitrosodi-n-Propylamine	0.005	0.01	1.4	2.8
98	N-Nitrosodiphenylamine	5	10	16	32
99	Phenanthrene				
100	Pyrene	960	1900	11000	22000
101	1,2,4-Trichlorobenzene				
102	Aldrin	0.00013	0.00026	0.00014	0.00028
103	alpha-BHC	0.0039	0.0078	0.013	0.026

		Human Health			
		MUN		NON-MUN	
		AMEL (µg/L)	MDEL (µg/L)	AMEL (µg/L)	MDEL (µg/L)
104	beta-BHC	0.014	0.028	0.046	0.092
105	gamma-BHC	0.019	0.038	0.063	0.13
106	delta-BHC				
107	Chlordane	0.00057	0.0011	0.00059	0.0012
108	4,4'-DDT	0.00059	0.0012	0.00059	0.0012
109	4,4'-DDE	0.00059	0.0012	0.00059	0.0012
110	4,4'-DDD	0.00083	0.0017	0.00084	0.0017
111	Dieldrin	0.00014	0.00028	0.00014	0.00028
112	alpha-Endosulfan	110	220	240	480
113	beta-Endosulfan	110	220	240	480
114	Endosulfan Sulfate	110	220	240	480
115	Endrin	0.76	1.5	0.81	1.6
116	Endrin Aldehyde	0.76	1.5	0.81	1.6
117	Heptachlor	0.00021	0.00042	0.00021	0.00042
118	Heptachlor Epoxide	0.0001	0.0002	0.00011	0.00022
119	Polychlorinated biphenyls (PCBs)	0.00017	0.00034	0.00017	0.00034
120	"				
121	"				
122	"				
123	"				
124	"				
125	"				
126	Toxaphene	0.00073	0.0015	0.00075	0.0015

Effluent Limits for Freshwater and Saltwater

		Freshwater		Saltwater	
		MDEL (µg/L)	AMEL (µg/L)	MDEL (µg/L)	AMEL (µg/L)
A					
1	Antimony				
2	Arsenic	250	120	59	29
3	Beryllium				
4	Cadmium	*	*	16	8
5a	Chromium (III)	*	*		
5b	Chromium (IV)	16	8.1	83	41
6	Copper	*	*	5.8	2.9
7	Lead	*	*	14	7
8	Mercury				
9	Nickel	*	*	14	6.8
10	Selenium	8.2	4.1	120	58
11	Silver	*	*	2.2	1.1
12	Thallium				
13	Zinc	*	*	95	47
14	Cyanide	8.5	4.2	1	0.5
15	Asbestos				
16	2,3,7,8-TCDD (Dioxin)				
17	Acrolein				
18	Acrylonitrile				
19	Benzene				
20	Bromoform				
21	Carbon Tetrachloride				
22	Chlorobenzene				
23	Chlorodibromomethane				
24	Chloroethane				
25	2-Chloroethylvinyl Ether				
26	Chloroform				
27	Dichlorobromomethane				
28	1,1-Dichloroethane				
29	1,2-Dichloroethane				
30	1,1-Dichloroethylene				

		Freshwater		Saltwater	
		MDEL (µg/L)	AMEL (µg/L)	MDEL (µg/L)	AMEL (µg/L)
31	1,2-Dichloropropane				
32	1,3-Dichloropropylene				
33	Ethylbenzene				
34	Methyl Bromide				
35	Methyl Chloride				
36	Methylene Chloride				
37	1,1,2,2-Tetrachloroethane				
38	Tetrachloroethylene				
39	Toluene				
40	1,2-Trans-Dichloroethylene				
41	1,1,1-Trichloroethane				
42	1,1,2-Trichloroethane				
43	Trichloroethylene				
44	Vinyl Chloride				
45	2-Chlorophenol				
46	2,4-Dichlorophenol				
47	2,4-Dimethylphenol				
48	2-Methyl-4,6-Dinitrophenol				
49	2,4-Dinitrophenol				
50	2-Nitrophenol				
51	4-Nitrophenol				
52	3-Methyl-4-Chlorophenol				
53	Pentachlorophenol	**	**	13	6.5
54	Phenol				
55	2,4,6-Trichlorophenol				
56	Acenaphthene				
57	Acenaphthylene				
58	Anthracene				
59	Benzidine				
60	Benzo(a)Anthracene				
61	Benzo(a)Pyrene				
62	Benzo(b)Fluoranthene				
63	Benzo(ghi)Perylene				
64	Benzo(k)Fluoranthene				

		Freshwater		Saltwater	
		MDEL (µg/L)	AMEL (µg/L)	MDEL (µg/L)	AMEL (µg/L)
65	Bis(2-Chloroethoxy)Methane				
66	Bis(2-Chloroethyl)Ether				
67	Bis(2-Chloroisopropyl)Ether				
68	Bis(2-Ethylhexyl)Phthalate				
69	4-Bromophenyl Phenyl Ether				
70	Butylbenzyl Phthalate				
71	2-Chloronaphthalene				
72	4-Chlorophenyl Phenyl Ether				
73	Chrysene				
74	Dibenzo(a,h)Anthracene				
75	1,2 Dichlorobenzene				
76	1,3 Dichlorobenzene				
77	1,4 Dichlorobenzene				
78	3,3'-Dichlorobenzidine				
79	Diethyl Phthalate				
80	Dimethyl Phthalate				
81	Di-n-Butyl Phthalate				
82	2,4-Dinitrotoluene				
83	2,6-Dinitrotoluene				
84	Di-nOctyl Phthalate				
85	1,2-Diphenylhydrazine				
86	Fluoranthene				
87	Fluorene				
88	Hexachlorobenzene				
89	Hexachlorobutadiene				
90	Hexachlorocyclopentadiene				
91	Hexachloroethane				
92	Inden(1,2,3-cd) Pyrene				
93	Isophorone				
94	Naphthalene				
95	Nitrobenzene				
96	N-Nitrosodimethylamine				
97	N-Nitrosodi-n-Propylamine				
98	N-Nitrosodiphenylamine				

		Freshwater		Saltwater	
		MDEL (µg/L)	AMEL (µg/L)	MDEL (µg/L)	AMEL (µg/L)
99	Phenanthrene				
100	Pyrene				
101	1,2,4-Trichlorobenzene				
102	Aldrin	3	1.5	1.3	0.65
103	alpha-BHC				
104	beta-BHC				
105	gamma-BHC	0.95	0.47	0.16	0.08
106	delta-BHC				
107	Chlordane	0.007	0.0035	0.0066	0.0033
108	4,4'-DDT	0.0016	0.00082	0.0016	0.00082
109	4,4'-DDE				
110	4,4'-DDD				
111	Dieldrin	0.092	0.046	0.0031	0.0016
112	alpha-Endosulfan	0.092	0.046	0.014	0.0071
113	beta-Endosulfan	0.092	0.046	0.014	0.0071
114	Endosulfan Sulfate				
115	Endrin	0.059	0.029	0.0038	0.0019
116	Endrin Aldehyde				
117	Heptachlor	0.0062	0.0031	0.0059	0.0029
118	Heptachlor Epoxide	0.0062	0.0031	0.0059	0.0029
119	Polychlorinated biphenyls (PCBs)	0.023	0.011	0.049	0.025
120	"				
121	"				
122	"				
123	"				
124	"				
125	"				
126	Toxaphene	0.00033	0.00016	0.00033	0.00016

* Use equations from 40 CFR 131.38(b)(2)
** Use equations from 40 CFR 131.38(b)(1) footnote "f"

5. Groundwater extraction waste discharged to surface waters must be essentially free of:

   a. Material that is floatable or will become floatable upon discharge.

   b. Settleable material or substances that form sediments which degrade[23] benthic communities or other aquatic life.

   c. Substances which will accumulate to toxic levels in aquatic sediments or biota.

   d. Substances that significantly[24] decrease the natural light to benthic communities and other aquatic life.

   e. Materials that result in aesthetically undesirable discoloration of surface waters.

6. Groundwater extraction waste discharged to surface waters shall not cause natural water quality conditions to be altered in areas designated as being of special biological significance or areas that existing marine laboratories use as a source of seawater.

7. Groundwater extraction waste discharged to surface waters shall be discharged in such a manner as to provide maximum protection to aquatic environments.

8. Groundwater extraction waste that contains pathogenic organisms or viruses shall be discharged a sufficient distance from shellfishing and water-contact sports areas to maintain applicable bacterial standards without disinfection. Where conditions are such that an adequate distance cannot be attained, reliable disinfection in conjunction with a reasonable separation of the discharge point from the area must be provided. Disinfection procedures that do not increase effluent toxicity and that constitute the least environmental and human hazard shall be used.

9. The Enrollee shall comply with all items of the " 40 CFR Standard Provisions References" that are part of this Order (Attachment B).

IV. Rationale for Receiving Water Limitations

A. Surface Water

Receiving Water Limitations are based upon water quality objectives contained in the Basin Plan. The discharge of groundwater extraction waste from any site shall not, separately or jointly with any other discharge, cause violations of the following water quality objectives in the surface waters of the San Diego Region.

1. Bacterial Characteristics

a. Water-Contact Standards

Within a zone bounded by the shoreline and a distance of 1,000 feet from the shoreline or the 30-foot depth contour, whichever is further from the shoreline, and in areas outside this zone used for water-contact sports, as determined by the Regional Board, the following bacterial objectives shall be maintained throughout the water column:

(1) Samples of water from each sampling station shall have a density of total coliform organisms less than 1,000 per 100 ml (10 per ml); provided that not more than 20 percent of the samples at any sampling station, in any 30-day period, may exceed 1,000 per 100 ml (10 per ml), and provided further that no single sample when verified by a repeat sample taken within 48 hours shall exceed 10,000 per 100 ml (100 per ml).

(2) The fecal coliform density based on a minimum of not less than five samples for any 30-day period shall not exceed a geometric mean of 200 per 100 ml nor shall more than 10 percent of the total samples during any 60-day period exceed 400 per 100 ml.

b. Shellfish Harvesting Standards

At all areas where shellfish may be harvested for human consumption, as determined by the Regional Board, the following bacterial objectives shall be maintained throughout the water column:

1) The median total coliform density shall not exceed 70 per 100 ml; and

2) Not more than 10 percent of the samples shall exceed 230 per 100 ml.

2. Physical Characteristics

a. Floating particulates and grease and oil shall not be visible.

b. The discharge of waste shall not cause aesthetically undesirable discoloration of the surface waters.

c. Natural light shall not be significantly reduced.

d. The rate of deposition of solids and the characteristics of inert solids in the sediments shall not be changed such that benthic communities are degraded.

3. Chemical Characteristics

a. The dissolved oxygen concentration shall not at any time be depressed more than 10 percent from that which occurs naturally, as a result of the discharge of oxygen demanding waste materials.

b. The pH shall not be changed at any time more than 0.2 units from that which occurs naturally.

c. The dissolved sulfide concentration of waters in and near sediments shall not be significantly increased above that present under natural conditions.
d. The concentration of substances set forth in the Discharge Specifications in marine sediments shall not be increased to levels which would degrade indigenous biota.
e. The concentration of organic materials in the sediments shall not be increased to levels which would degrade marine life.
f. Nutrient materials shall not cause objectionable aquatic growth or degrade indigenous biota.

4. Biological Characteristics

a. Marine communities, including vertebrate, invertebrate, and plant species, shall not be degraded.
b. The natural taste, odor, and color of fish, shellfish, or other aquatic resources used for human consumption shall not be altered.
c. The concentration of organic materials in fish, shellfish or other aquatic resources used for human consumption shall not bioaccumulate to levels that are harmful to human health.

5. Radioactivity

Discharge of radioactive waste shall not degrade marine life.

6. Toxic Materials Limitations

Since there is no dilution, toxic materials limits are the same as the effluent limits.

V. Rationale for Monitoring and Reporting Requirements

Section 122.48 of 40 CFR requires all NPDES permits to specify recording and reporting of monitoring results. Sections 13267 and 13383 of the CWC authorize the Regional Board to require technical and monitoring reports. The MRP, Attachment E of this WDR, establishes monitoring and reporting requirements to implement federal and state requirements. The following provides the rationale for the monitoring and reporting requirements contained in the MRP for this permit.

A. Influent Monitoring (Not applicable)

B. Effluent Monitoring

In reviewing the monitoring reports, the State Board found that although Dischargers were reporting Total Petroleum Hydorcarbons (TPH), a distinction between diesel and gasoline was not always made. Results for TPH should be reported as total TPH, TPH diesel (TPH-d), and TPH gasoline (TPH-g). Also, for detections of TPH-g, the amount of benzene, ethylbenzene, toluene, and xylene

should be reported. Benzene, ethylbenzene, and toluene are priority pollutants. (40 CFR § 131).

C. Whole Effluent Toxicity (WET) Testing Requirements

A WET Limit is required if a discharge causes, has a reasonable potential to cause, or contributes to an exceedance of applicable water quality standards, including numeric and narrative. Since these types of discharges are prohibited under this WDR, WET limits are not applicable.

D. Receiving Water Monitoring

States are required to adopt numeric criteria where they are necessary to protect designated uses. (CWA §§ 303(a) – 303(c)). The Regional Board adopted numeric criteria in the Basin Plan. The Basin Plan is a regulatory reference for meeting the State and Federal requirements for water quality control. (40 CFR 131.20). State Board Resolution 68-16, the Antidegradation Policy, does not allow changes in water quality less than that prescribed in Water Quality Control Plans (Basin Plans). The Basin Plan states that; "The numerical and narrative water quality objectives define the least stringent standards that the Regional Water Board will apply to regional waters in order to protect the beneficial uses." This WDR contains Receiving Water Limitations based on the Basin Plan numerical and narrative water quality objectives for Biostimulatory Substances, Chemical Constituents, Color, Dissolved Oxygen, Floating Material, Oil and Grease, pH, Pesticides, Radioactivity, Salinity, Sediment, Settleable Material, Suspended Material, Tastes and Odors, Temperature, Toxicity and Turbidity.

Section 13267 of the California Water Code states, in part,

> (a) A regional board, in establishing … waste discharge requirements … may investigate the quality of any waters of the state within its region" and "(b) (1) In conducting an investigation … the regional board may require that any person who … discharges … waste … that could affect the quality of waters within its region shall furnish, under penalty of perjury, technical or monitoring program reports which the regional board requires. The burden, including costs, of these reports shall bear a reasonable relationship to the need for the report and the benefits to be obtained from the reports.

The attached Monitoring and Reporting Program is issued pursuant to CWC section 13267. The groundwater extraction waste discharge monitoring and reporting program required by this WDR and the attached Monitoring and Reporting Program are necessary to determine compliance with these waste discharge requirements. The Discharger is responsible for the discharges of waste at the facility subject to this WDR.

E. Other Monitoring Requirements (Not Applicable)

VI. Rationale for Provisions

A. Standard Provisions

Standard Provisions, which in accordance with 40 CFR sections 122.41and 122.42, apply to all NPDES discharges and must be included in every NPDES permit, are provided in Attachment D.

B. Special Provisions

1. Reopener Provisions (Not Applicable)

2. Special Studies and Additional Monitoring Requirements (Not Applicable)

3. Best Management Practices and Pollution Prevention Plan (Not Applicable)

4. Compliance Schedules (Not Applicable)

5. Construction, Operation, and Maintenance Specifications (Not Applicable)

6. Special Provisions for Municipal Facilities (POTWs Only) (Not Applicable)

7. Other Special Provisions

The Dischargers shall dispose of solids removed from liquid wastes in a manner that is consistent with Title 27 of the CCR and approved by the Regional Board.

VII. Public Participation

In considering the re-issuance and adoption of this WDR the Regional Board has developed a draft WDR. The Regional Board encouraged public participation in the WDR adoption process.

A. Notification of Interested Parties

The Regional Board notified interested agencies and persons of its intent to prescribe waste discharge requirements in this WDR and provided them with an opportunity to submit their written comments and recommendations. Notification was posted on the Regional Board's webpage on February 5, 2008, and published in the San Diego Union Tribune, The Riverside Press-Enterprise, and The Orange County Register newspapers on February 8, 2008. On March 12, 2008, the Regional Board sent out notification through the Regional Board Agenda by an electronic mail list.

B. Written Comments

Interested persons were invited to submit written comments concerning the tentative WDR. Comments were to be submitted in person, by fax, email, or mail to the Executive Officer at the Regional Board at the address on the cover page of this Permit.

To be fully addressed and considered by the Regional Board, written comments must have been received at the Regional Board office by 5 p.m. on March 5, 2008.

C. Public Hearing

The Regional Board held a public hearing on the tentative WDR during its regular meeting on the following date and at the following location:

Date: **March 12, 2008**
Location: **California Regional Water Quality Control Board**
San Diego Region
Regional Board Meeting Room
9174 Sky Park Court, Suite 100
San Diego, California 92123

Interested persons were invited to attend. At the public hearing, the Regional Board heard testimony pertinent to the discharge and WDR.

D. Information and Copying

WDR-related documents, tentative effluent limitations and special provisions, comments received, and other information are on file and may be inspected at the address above at any time between 8:30 a.m. and 4:45 p.m., Monday through Friday. A partial list of these items are on the Regional Board's web site at: www.waterboards.ca.gov/sandiego

Copying of documents may be arranged through the Regional Board by calling (858) 467-2952.

E. Register of Interested Persons

Any person interested in being placed on the mailing list for information regarding the WDR was invited to contact the Regional Board, reference this WDR, and provide a name, address, and telephone number.

F. Additional Information

Requests for additional information or questions regarding this WDR may be directed to Vicente Rodriguez at (858) 627-3940 or at: VRodriguez@waterboards.ca.gov

This WDR will expire on March 12, 2012. Enrollees covered under this WDR at the time of expiration will be required to re-enroll under the reissued permit.

CITY OF LOS ANGELES

SANITATION
DEPARTMENT OF
PUBLIC WORKS

WATERSHED PROTECTION DIVISION
DEPARTMENT OF PUBLIC WORKS
BUREAU OF SANITATION
CITY OF LOS ANGELES

City of Los Angeles

Selected CB Inserts and Opening Screen Covers for Citywide Implementation

WATERSHED
PROTECTION
CITY OF LOS ANGELES

City of Los Angeles
Selected CB Inserts and Opening Screen Covers for Citywide Implementation

The intent of this paper is to present the selected structural devices that the City will deploy to meet the compliance milestones of the Trash TMDL. The City has tested over the past 4 years several inserts and opening screen covers and concluded that the vertical insert and the flow activated opening screen covers are the best suited for implementation within the City to achieve compliance with the Trash TMDL.

BMP Evolution

Catch Basin Inserts

The City has explored several configurations of catch basin inserts in order to select one that met the regulatory requirements and had minimal impact on the existing storm drain system. Figure 1 below shows the evolution of CB inserts that the City has investigated over the course of the last 4 years.

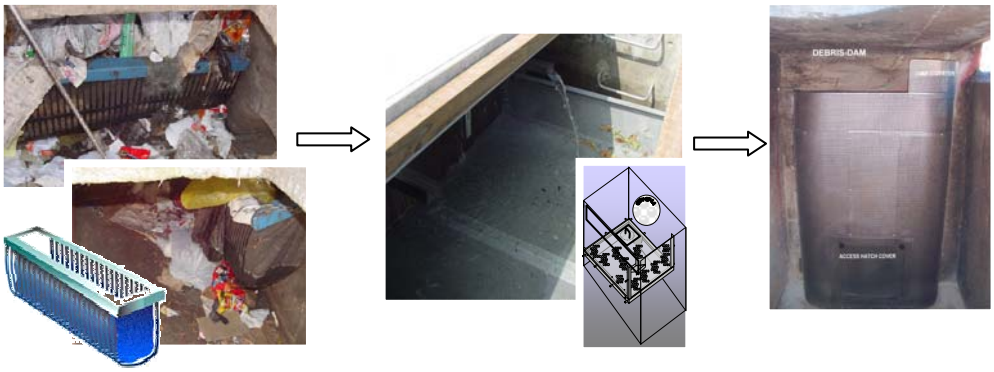

a) hanging basket b) horizontal c) vertical

Figure 1. Evolution of catch basin inserts in the City of LA

As can be seen, the City has examined three distinct configurations of inserts. The hanging basket type was examined in pilot installations with discouraging results. The demise of the basket insert is its limited volume for trash capture and the associated tedious maintenance requirements. The City did not proceed with extensive installations of this insert but opted to proceed with that of the horizontal and vertical insert that are described below.

The horizontal insert was considered because it addressed the City's concern for trash capture and maintenance. The inserts are manufactured from hot dipped galvanized steel screen sheets with 5 millimeter (0.197 inch) diameter circular openings. Inserts installed in curb opening catch basins encompass the entire width and approximately 85% of the entire length of the basin. An overflow is provided to alleviate hydraulic conditions from major rain events to ensure public safety. Those installed in grated inlets fit the entire opening. The City has installed several hundred of these inserts in the high trash areas and this is the type of insert used for the pilot study (Attachment D). The pilot study concluded with recommendations to consider for future catch basin insert installations. Those recommendations were: maximize the trash capture area; minimize the flooding potential; optimize insert screen material openings; and ease of maintenance.

The vertical catch basin insert is the insert that the City is deploying in the high trash areas. This insert addresses all the recommendations made by the pilot study. The vertical insert maximizes the trash capture area by leaving most of the original catch basin containment volume intact. The absence of the horizontal screen floor has added several benefits: a.) it lessened the time of maintenance of the insert and catch basin; b.) it minimized flooding potential; and c.) it allowed for the vertical section of the insert to be larger in height. **The City will continue to deploy vertical inserts since their performance exceeds that of the horizontal insert evaluated in the pilot study.**

Catch Basin Opening Screen Covers

The City has explored several configurations of catch basin opening screen covers in order to select one that helps meet the regulatory requirements and has minimal impact on the existing storm drain system. Figure 2 below shows the evolution of CB opening screen covers that the City has investigated its use.

a) fixed b) magnetic c) flow activated

Figure 2. Evolution of catch basin opening screen covers in the City of LA

As can be seen, the City has examined three distinct configurations of catch basin opening covers. The fixed type catch basin opening cover was examined only for limited installations. This type of insert was primarily installed for security reasons around the Convention Center during the 2000 Democratic Convention. The demise of the fixed catch basin opening screen covers is the placement on the face of the curb and the ponding of flow during rain events. The placement on the curb face has led to destruction of these covers by the large wheel lug nuts found on commercial vehicles (i.e., buses, delivery vehicles). The City did not proceed with extensive installations of this opening screen cover but opted to proceed with that of the magnetic and flow activated opening screen covers described below.

The magnetic opening screen cover was considered because it addressed the City's concern for ponding during rain events. The opening screen covers were manufactured from hot dipped galvanized steel screen sheets with diamond shape openings (1 inch by 0.75 inch). The magnetic opening screen covers fit the entire catch basin curb opening. The City has installed several hundred of these inserts in the high trash areas and this is the type of insert used for the pilot study (Attachment E). The pilot study concluded with recommendations to be considered for future catch basin opening screen cover installations. Those recommendations were: maximize the amount of trash kept on the streets; minimize flooding potential; prevent large trash from entering the catch basin; and ease of maintenance.

The flow activated opening screen cover is the cover that addresses all the recommendations from the pilot study. The City is deploying that type of cover throughout the City. The flow activated opening screen cover maximizes the amount of trash kept on the street and minimizes flooding by allowing the City to set the trigger at which the screen would swing open. Additionally, the flow activated opening screen cover has circular perforations of only 0.75 inches, much smaller than those of the magnetic cover used in the pilot study. It has a dual locking mechanism that addresses the concern of large trash binding the cover in the open position. Installations of the flow activated opening screen covers is being recessed

from the curb face (4 inches) to address the concern of large commercial vehicles destroying it and ensure it durability. **The City will continue to deploy flow activated opening screen covers since their performance exceeds that of the magnetic type.**

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Statewide Investigation of the Role of Pyrethroid Pesticides in Sediment Toxicity in California's Urban Waterways

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A statewide investigation of urban creek sediment toxicity was conducted in California in recognition of increased incidences of toxicity linked to pyrethroid pesticides. The goals were to examine the spatial occurrence and magnitude of sediment toxicity in California urban creeks, and to examine the role of pyrethroids in toxic urban creek sediment samples. After a preliminary screening of 90 sites, 30 creeks were sampled in eight geographical regions. Sediment toxicity was assessed using 10 day bioassays with the resident amphipod *Hyalella azteca*. Bioassays were conducted at two test temperatures of 23 °C and at 15 °C to provide evidence of the cause of toxicity, and to more accurately reflect ambient environmental temperatures. Twenty-five of 30 samples were toxic when tested at 23 °C, and all 30 samples were toxic when tested at 15 °C. The magnitude of toxicity increased in samples tested at 15 °C suggesting the influence of pyrethroids, which are more toxic at colder temperatures. Pyrethroids were present in all sediment samples and were the only compounds detected at concentrations toxic to *H. azteca*. Bifenthrin was the pyrethroid of greatest toxicological concern, occurring in all 30 samples at concentrations up to 219 ng/g. Pyrethroid contamination of urban creeks was most severe in the Los Angeles, Central Valley, and San Diego regions, respectively. However, pyrethroids were also linked to urban creek aquatic toxicity in all regions sampled, including the less urbanized areas of the North Coast and Lake Tahoe.

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Introduction

Pyrethroid pesticides have become the dominant urban insecticides used in California (*1*). Pyrethroids are applied in all 58 counties of the State with over 345 000 kg reported used for landscape maintenance, structural pest control, and public health pest control in 2005 (*2*). Approximately 60% of the reported urban-related pyrethroid pesticide use occurs in the four Southern California counties of Riverside, Los Angeles, Orange, and San Diego. The widespread usage of pyrethroid pesticides and dominance in urban environments is of concern particularly because pyrethroids are highly toxic to fish and aquatic invertebrates (*3*).

Several earlier studies identified sediment toxicity associated with pyrethroid pesticides in urban creeks of the Eastern San Francisco Bay and Sacramento areas (*4, 5*). In the Sacramento area creeks, pyrethroids were present at concentrations greater than amphipod acute toxicity values (*6*) in 95% of the toxic samples. Although a number of pyrethroids were observed in these sediments, bifenthrin contributed the most to the observed toxicity. The highest concentrations of pyrethroids were observed in the sediments near the stormwater outfalls and decreased going downstream. Understanding the role of pyrethroids in urban creek sediment toxicity has become an important issue for statewide stormwater pollution regulation and prevention activities.

The U.S. Environmental Protection Agency (EPA) promulgated the municipal stormwater program under the Clean Water Act (CWA) to address stormwater runoff. The program is currently administered through National Pollutant Discharge Elimination System (NPDES) permits, and in California NPDES permits are issued by the State Water Resources Control Board. To satisfy NPDES requirements, municipalities are required to develop stormwater management plans that outline the pollution prevention control activities to reduce discharge of pollutants, protect water and sediment quality, and satisfy requirements of the CWA. As stormwater management plans are being developed and implemented throughout California, it is not known whether toxicity associated with pyrethroid pesticide contamination is isolated to particular regions or of statewide concern. This is an important question because unnecessary monitoring impacts urban stormwater programs by diverting resources from other potential water and sediment quality problems.

Despite the lack of monitoring of pyrethroids in California's urban waterways, there is extensive evidence of pyrethroid contamination in agricultural waterways (*6*−*14*). These data, in addition to the limited urban data, prompted the Department of Pesticide Regulation, who regulates pesticide sales and use in California, to initiate a reevaluation of more than 600 products containing pyrethroid pesticides in 2006. The registration reevaluation process includes a critical review of all available data and, in some cases, special focused studies, to address significant data gaps, and make determinations on registration. Statewide pyrethroid data for urban-dominated waterways presents a large data gap in California.

Goals of the study were 2-fold. First, to screen urban creeks throughout the State and examine the statewide occurrence of pyrethroids in California's urban waterways. Second, to determine the role of pyrethroid pesticides in toxic urban creek sediments.

Materials and Methods

Site Reconnaissance and Sediment Screening. Ninety sites were sampled on 63 urban waterways statewide during late

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FIGURE 1. Map of California with regions and sampling sites shown.

Summer and Fall 2006 as part of a preproject site reconnaissance phase. A three-replicate 10 day *Hyalella azteca* screening toxicity test was conducted on samples to assess the potential for sediment toxicity and follow up testing. The three-replicate sediment assay was used only for screening sediment samples, and differed from the standard eight-replicate sediment toxicity test only by the number of replicates. The standard eight-replicate toxicity assay is outlined later in the toxicity testing methods section. Most screening samples were collected prior to any rainfall after the summer months. Approximately $^1/_3$ of these samples had caused significant toxicity.

The screening data, although not reported, were used to identify 40 sampling sites for the 23 °C and 15 °C toxicity testing. These samples included 24 of the sites screened during reconnaissance phase, of which 20 were identified as toxic using the screening assay, and 16 new sites. The new sites were added because some regions of the state were not well represented (primarily the Central Coast and San Diego) and most regions of the State were not screened after rainfall due to insufficient rainfall, sampling logistics, and project time frame constraints. Thirty-one of the 40 samples were toxic in the 23 °C test, with approximately 25% resulting in zero percent survival. Thirty-seven of the 40 samples were toxic in the 15 °C test, with approximately $^1/_3$ resulting in 0% survival. The toxicity testing results are presented in Table 3 of the Supporting Information.

Thirty of the 40 sites were selected as the focus for this study, from which all sediments would be included in the chemical analyses, and four would be further investigated using TIEs and reported in a separate manuscript. The primary criteria for selecting sites to include or exclude from the core 30-site list was having a representative statewide spatial distribution. Sites that were excluded were typically close to each other within the same region.

Statewide Site Selection. Thirty urban creek sites were sampled from eight of nine regions of California (Figure 1). Site selection criteria included areas dominated by residential urban land use, perennial creek flow, natural habitat (named waterways) of ecological importance, presence of sediment depositional zones, the presence of stormwater outfalls, and evidence of toxicity from the screening studies. The number of sampling sites in a region was reflective of pyrethroid pesticide use, urban residential land use, and availability of sites meeting the site selection criteria. Sampling sites were not identified in the Colorado River region due to the lack of permanent creek flows and dominance of agriculture in certain parts of this region. Also, sampling sites were not identified in the southern part (south of Stockton) of the Central Valley because urban stormwater runoff is primarily routed to dry wells and not natural named creeks. Sampling site location information is available in Table 1 of the Supporting Information.

The existing data, while limited, suggest that pyrethroids are persistent in the sediment (*15*), hydrophobic, and rapidly adsorb to sediments in aquatic environments (*16*), so it is not surprising pyrethroids have been reported as most concentrated in the sediments near the point of discharge to a waterway (*4*). Therefore, only creek reaches located within or immediately downstream of urban areas were selected. Sampling site locations targeted those areas of sediment deposition within an identified 50 m of urban stormwater outfalls. Sampling reaches that could be influenced by agricultural practices were avoided.

Sediment Sampling Procedures. Sampling was conducted after significant rainfall had occurred in each watershed (≥1.3 cm) since the beginning of the water year on July 1. All sediment samples were collected during January through March 2007. Exceptions include samples collected from the Lake Tahoe region in October 2006, and samples from the North Coast and Central Valley, which were collected in November 2006.

Sediment samples for toxicity testing and chemical analyses were collected by skimming the upper 2 cm of sediment from depositional zones using precleaned Teflon polycarbonate or stainless steel scoops. Sediments were placed into precleaned 2 L glass jars and transported to the laboratory on ice. Approximately 4 L of sediment were collected from each site. Sediments were homogenized on a roller apparatus (Wheaton Instruments, Millville, NJ), and aliquots of sediment were held at 4 °C (sediment toxicity testing samples) or −20 °C (analytical chemical samples), prior to analyses.

Toxicity Testing. Sediment toxicity was assessed using the 10 day survival toxicity test with *H. azteca* (*17*), an amphipod species that occurs in California waterways. Eight replicate test containers, each containing 10 7−14-day old amphipods, were used for the test. Laboratory control sediment consisted of a formulated sediment prepared in accordance with Anderson et al. (*18*),. Testing was done in 250 mL beakers containing 50 mL of sediment and 200 mL of overlying water. Tests were conducted using the standard test temperature of 23 °C, in addition to the temperature of 15 °C, to reflect fall and winter creek temperatures. The overlying water was renewed twice daily, and 1.0 mL of YCT (yeast, cerophyll, trout chow; Aquatic Biosystems, Fort Collins, CO) was added daily to each test container. About half of the samples required aeration, due to low dissolved oxygen. After a 10 day exposure, surviving amphipods were recovered and their number recorded.

Analytical Chemistry. Sediment chemical analytes included eight pyrethroids, 30 organochlorine pesticides (OCs) or their degradation products, and the pyrethroid synergist piperonyl-butoxide (PBO). OCs include highly persistent legacy compounds such as chlordanes and DDT that may co-occur with pyrethroids, and their measurement may help resolve relationships between contaminants and toxicity. PBO is commonly used in pesticide formulations with pyrethroids to potentiate their toxicity, and its measurement may help resolve relationships between pyrethroids and magnitude of toxicological effect. All sediment samples were extracted twice

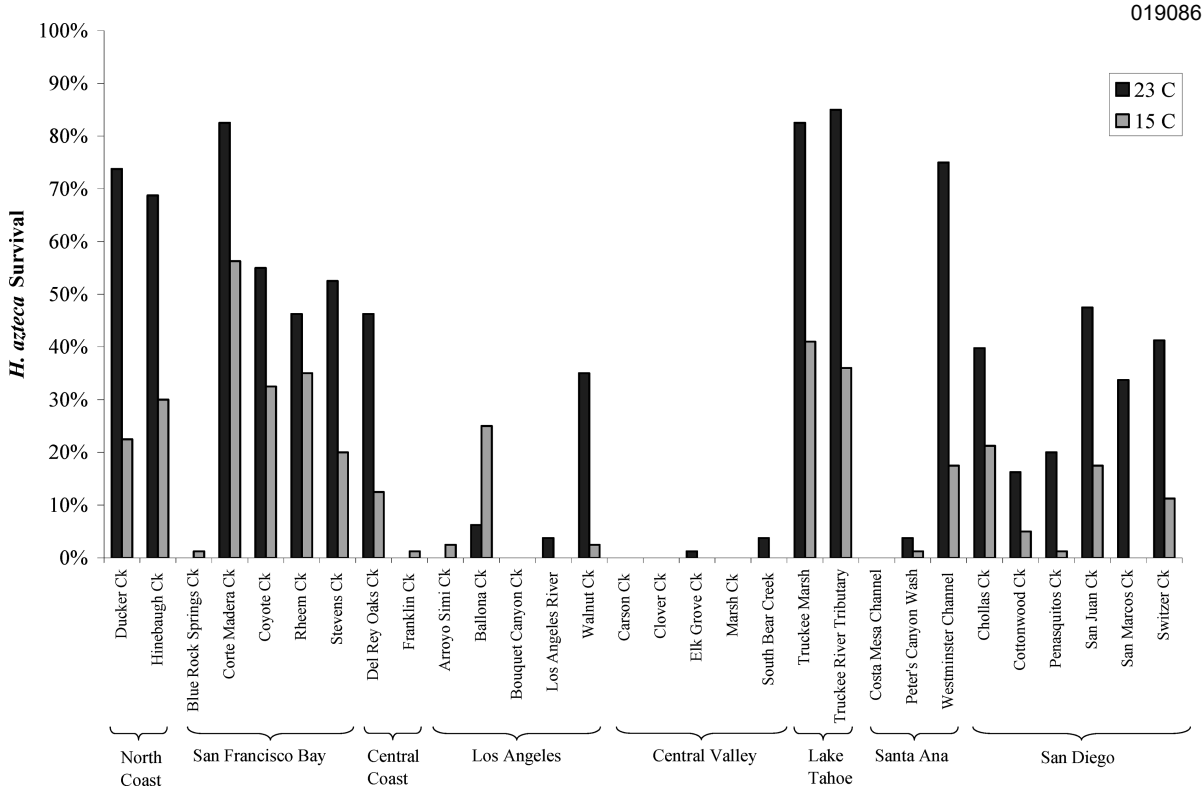

FIGURE 2. ***H. azteca*** **percent survival from sediment toxicity tests conducted at 23C and 15C with sediments from each urban creek.**

using method 3545A modified pressurized fluid extraction (*19*). In addition, two organophosphate pesticides (OPs; diazinon and chlorpyrifos) were also analyzed in interstitial water samples following procedures recommended by Sullivan and Goh (*20*). While these OPs are phased out for residential use, they are commonly found in urban creeks, and their measurement aids in identification of chemicals associated with toxicity. Further, both diazinon and chlorpyrifos are highly toxic to invertebrates, relatively water soluble, and have been observed in toxic concentrations exceeding amphipod toxicity values in interstitial water samples collected from agricultural waterways in California (*9*). See Table 5 in the Supporting Information for a more detailed outline of the chemistry methods. Metals were not measured in sediment samples.

Hardness, alkalinity, conductivity, pH, and ammonia were measured at the beginning and end of each test. Temperature and dissolved oxygen were monitored daily. Ammonia did not exceed any established toxicity values for *H. azteca* (*21*). Total organic carbon and grain size were measured in each sediment sample using method 9060A (*19*) on an elemental analyzer by Applied Marine Sciences in League City, TX.

Data Analyses. Toxicity testing data were analyzed by comparing sample results to laboratory controls with separate variance *t* tests ($\alpha = 0.05$). A sample from a site was deemed toxic if there was significant response difference ($p < 0.05$) from laboratory control response, and if the sample survival percentage was at least twenty percentage points below the control survival percentage.

Results and Discussion

Sediment Toxicity Testing. Twenty-five of the thirty samples were toxic at the 23 °C test temperature and all thirty were toxic at the 15 °C test temperature (Figure 2). An overall increase in the magnitude of toxicity was observed in samples tested at 15 °C, with the exception of the Ballona Creek site, which was more toxic at 23 °C than 15 °C (see discussion below). Of the five samples that became toxic with the cold exposure, two were samples from the Lahontan region (Truckee River swale and the Truckee Marsh), and one sample each was from the North Coast, northern San Francisco Bay, and Santa Ana regions. Sites with the lowest *H. azteca* survival were observed in the Central Valley, Los Angeles, and San Diego regions (Figure 2).

Chemistry. Organochlorine pesticides were detected in 23 of the 30 samples. However, none were reported above concentrations associated with toxicity to *H. azteca*, (see Table 4 in the Supporting Information). Diazinon was observed in interstitial water below the toxicity threshold for *H. azteca* (LC50 = 6.51 ug/L (*22*),), but above the reporting limit in Franklin Creek and the Truckee River swale at 0.120 ug/L and 0.277 ug/L, respectively. Chlorpyrifos was observed in samples (Franklin Creek, Costa Mesa Channel, and Chollas Creek) above the detection limit (0.050 ug/L) but below the reporting limit (0.100 ug/L). The *H. azteca* LC50 for chlorpyrifos is 0.086 ug/L (*22*), so it is possible that we did not detect slightly toxic concentrations of chlorpyrifos.

Seven of eight pyrethroid analytes were detected in this study, but deltamethrin and esfenvalerate were observed infrequently. Fenpropathrin was not detected in any samples. PBO was detected in five samples (Franklin Creek, Bouquet Canyon Creek, Walnut Creek, South Bear Creek, and Switzer Creek) at concentrations ranging from 1.5 to 48.7 ng/g. Amweg et al. (2005) reports that sediments spiked with permethrin became more toxic with as little as 12.5 ng/g PBO in sediment. See Table 2 in the Supporting Information for pyrethroid pesticide and PBO analytical chemistry results. Quality assurance results for all analytes were within acceptable ranges and available upon request.

Bifenthrin was observed in all thirty urban creek samples with concentrations ranging from 2.19 to 219 ng/g dry weight. These results are comparable to earlier studies in the Eastern San Francisco Bay, and Sacramento areas (*4, 5*). As reported previously, the highest concentrations of bifenthrin continue to be observed in the Central Valley region, with the maximum concentration of bifenthrin measured in the current study

(219 ng/g) from Clover Creek in Redding. Although this concentration is only about half the maximum concentration recorded from earlier work in the Sacramento area (430 ng/g from Curry Creek), these data show high concentrations occurring in a part of the northern Central Valley region where ambient pesticide and sediment toxicity monitoring has not been conducted. The second highest concentration of bifenthrin from the current study was observed in the Los Angeles region (173 ng/g) followed by the remaining Central Valley samples (65.1−114 ng/g), and Cottonwood Creek (69.1 ng/g) and Penasquitos Creek (56.8 ng/g) in the San Diego region.

Permethrin was the second most commonly observed pyrethroid, occurring in 26 of 30 samples. Cyfluthrin was measured in 16 samples. The five Central Valley samples had the highest concentrations of cyfluthrin with South Bear Creek in Stockton having the highest concentration of 127 ng/g dry weight. Cypermethrin was measured in 10 samples collected from the Central Valley, Los Angeles, and San Diego regions. Maximum concentration of 102 ng/g dry weight was observed in Cottonwood Creek in San Diego. Lambda-cyhalothrin was also measured in 10 samples with observations occurring in every region except the North Coast and Lake Tahoe regions.

The widespread occurrence of pyrethroids in urban creek sediments suggests a need for increased monitoring for aquatic life impacts due to pyrethroids in urban creek habitats statewide.

Role of Pyrethroids in Sediment Toxicity. Pyrethroid concentrations were converted to toxic units (TUs) to better understand the relative toxicities of each pyrethroid to *H. azteca*. Pyrethroid TUs were calculated by dividing the organic carbon normalized concentration of pyrethroid in the sediment by the organic carbon normalized pyrethroid *H. azteca* LC50 reported from earlier studies (*6, 23*). Pyrethroid TUs were calculated using LC50 data derived at the standard test temperature of 23 °C. Therefore, the TU approach will tend to under-predict observed toxicity at 15 °C due to the enhanced toxicity of pyrethroids at the lower temperature.

There is a clear relationship between total pyrethroid TUs and *H. azteca* toxicity both in tests conducted at 23 °C and 15 °C (Figure 3). For example, nearly all samples tested at 23 °C with greater than 0.5 TUs displayed significant toxicity. Sediments from 26 sample sites contained at least 0.5 TU of pyrethroids, indicating these pesticides likely play a major role in sediment toxicity in these urban creeks.

Toxicity of samples tested at 15 °C may provide a more ecologically relevant indicator of pyrethroid toxicity, particularly during winter months. All of the urban creeks demonstrated significant toxicity when tested at 15 °C. This observation is not surprising, since pyrethroids occurred in all samples, and pyrethroids have been shown to be more toxic at colder temperatures (*24*), largely due to the slower metabolism at lower temperatures (*25*). The overall increase in the magnitude of toxicity observed in samples tested at 15 °C provide further evidence of the role of pyrethroids (Figure 3). Most of the urban creeks assessed as part of the current study have winter temperatures well below the lowest tested temperature of 15 °C. In fact, the Truckee Marsh in the Lake Tahoe region has typical winter temperatures of 4 °C. Typical urban waterway temperatures in the Sacramento area are closer to 10 °C.

The occurrence of pyrethroids at toxicologically significant concentrations to *H. azteca* is of particular concern since this species is also a resident in many California urban habitats. Weston et al. (*4*), studied pyrethroid occurrence, toxicity patterns, and resident *H. azteca* abundance in a Sacramento area urban watershed. The abundance of resident *H. azteca* was inversely correlated with pyrethroids TUs. In the current study the toxicity observed in the Truckee

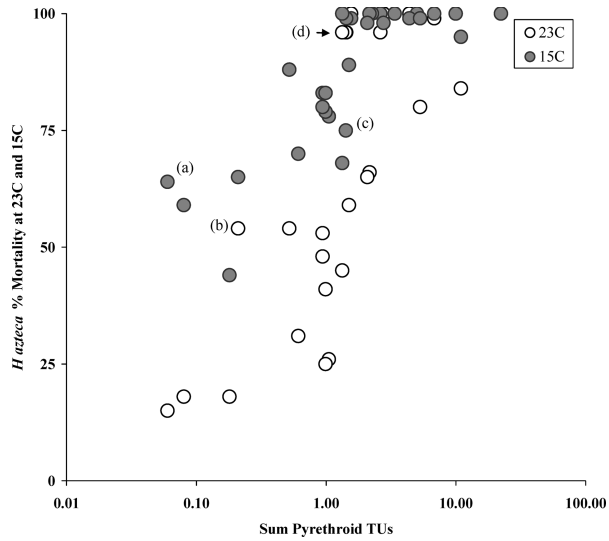

FIGURE 3. Relationship between the sum of pyrethroid TUs in California urban creek sediments and the toxicity to *H. azteca* in 10 day laboratory sediment toxicity tests conducted at 23C and 15C. Pyrethroid TUs are based on *H. azteca* 10 day sediment toxicity tests conducted at 23C, and are calculated using organic carbon (oc) normalized pyrethroid pesticide concentrations. The points designated as a, b, c, and d are discussed in the text.

Marsh is also of particular concern because earlier data indicate the occurrence of resident *H. azteca* in the Truckee Marsh (*26*). Studies conducted in the Santa Maria and Salinas Rivers have also documented declines in amphipods and other macroinvertebrates at sites demonstrating sediment toxicity due to pyrethroids and other pesticides (*7−9, 13*).

Results of *H. azteca* toxicity tests and pyrethroid TU analyses suggest a major role of pyrethroids in sediment toxicity in California's urban creeks. However, the potential role in explaining toxicity at three sites was less evident. The sample from the Truckee Marsh in the Lake Tahoe region had caused significant *H. azteca* mortality when tested at 15 °C at only 0.08 TU of pyrethroids (Figure 3, point a). Similarly, the Rheem Creek sample, from eastern San Francisco Bay, had significant *H. azteca* toxicity at 23 °C with less than 0.5 TU of pyrethroids (Figure 3, point b). Both sample results suggest the possibility that other unanalyzed substances may also be linked to the toxicity at these sites. Ballona Creek, in the Los Angeles region, was the other site where the role of pyrethroids was less clear since this site was the only site to be more toxic at 23 °C than 15 °C (Figure 3, points c and d). Since there are greater than 1.4 TUs of pyrethroids in the Ballona Creek sediments it would be expected to have an increase in the magnitude of toxicity at the colder temperature, since pyrethroids are more toxic at colder temperatures. However, it is not possible to determine if unanalyzed substances could be linked to or affecting any of the observed toxicity.

The organic carbon content and grain size (percent fines) of sediments influences pyrethroid bioavailability and toxicity. Organic carbon content ranged from 0.62% (Arroyo Simi Creek in Los Angeles) to 32.89% (Truckee Marsh in Lahontan). The relationship between organic carbon content and bioavailability of hydrophobic organic compounds is well established. Recent studies have shown that organic carbon quality also affects chemical bioavailability and thus, toxicity (*27−29*). While there was very high TOC in the Truckee Marsh sediment (~33%), this was mainly comprised of intact reeds and leaves, a carbon source that is likely less effective at binding hydrophobic chemicals than more humified plant

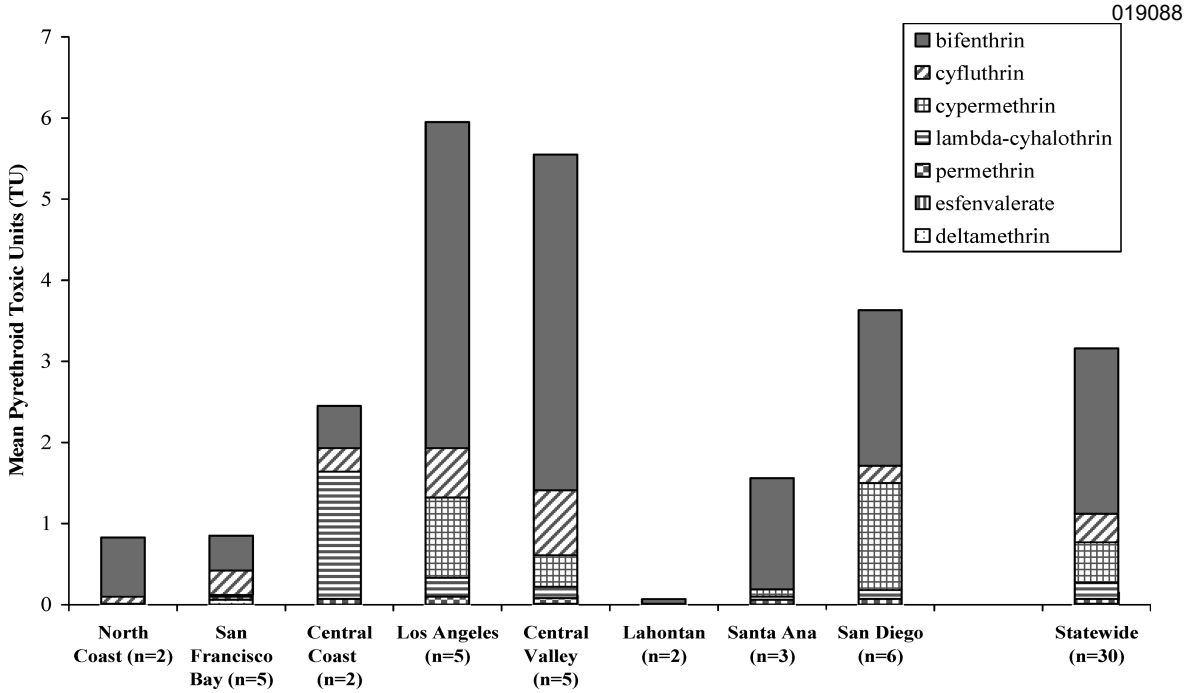

FIGURE 4. Comparison of mean pyrethroid pesticide TUs in urban creek sediments in regions of California and Statewide, and the contribution of the various pyrethroids to the total TUs. Pyrethroid TUs are calculated using organic carbon normalized (oc) pyrethroid pesticide concentration data to compare the concentrations of pyrethroids that would be sufficient to cause 50% mortality to *H. azteca* in 10 day sediment toxicity tests. Calculation of TUs is based on *H. azteca* 10 day sediment toxicity tests conducted at 23C.

materials (*28*). Therefore, the oc-normalized TUs calculated for the Truckee Marsh sediment would likely underestimate its potential for toxicity. Although the analyte list was relatively complete, other contaminants (e.g., metals) could have played a role in the toxicity occurrences. However, test organism mortality due to sediment metals would likely have been increased with an increase in temperature, opposite of that which occurs with pyrethroids.

Grain size ranged from 1.8% (Costa Mesa Channel) fines less than 0.0625 to 97.5% (Truckee Marsh). Pyrethroid pesticide occurrences in sediment were not limited to sampling sites with high percent fines. However, the sampling sites with the highest percent fines generally contained higher concentrations of pyrethroids, with the exception of the Lahontan region sites. Pyrethroid linked toxicity was also observed in sampling sites with the lowest percent fines (e.g., 1.84% in Costa Mesa channel at both test temperatures). Average and median percent fines were 52 and 57% for the thirty statewide urban creeks, respectively.

Statewide Significance of Pyrethroids in Urban Waterways. When the pyrethroid TUs are partitioned among regions and individual pyrethroid analytes (Figure 4), it is apparent that the level of pyrethroid contamination and toxicity varies regionally, ranging from less than 1.0 TU to over 5.0 TUs. Statewide, the mean level of pyrethroid contamination is approximately 3 TUs. The most contaminated regions sampled were the Los Angeles, Central Valley, and San Diego regions, whereas the regions with the least amount of pyrethroid contamination were the North Coast, San Francisco Bay, and Lahontan regions. The San Francisco Bay region, while less contaminated by pyrethroids than the statewide average, was dominated by a prevalence of coarse-grained sediments in the regional creek samples. The fate of pyrethroids in streams dominated by coarse grained sediment has not been studied. However, coarse grained sediments do not present a suitable matrix for the sampling and analysis of sediment-bound organic contaminants, such as pyrethroids. Other factors (e.g., usage patterns, management practices, land use) could also be associated with regional differences in pyrethroid contamination, which, an analysis of is beyond the scope of the current screening investigation.

When the individual pyrethroid TUs are partitioned, it is also apparent that bifenthrin accounts for approximately 67% of the mean observed pyrethroid toxicity statewide. This finding is consistent with the earlier studies in the Sacramento and Eastern San Francisco Bay urban creeks (*5*). However, bifenthrin is not the only contributor to pyrethroid linked toxicity, cyfluthrin and cypermethrin, also played large roles in the pyrethroid linked toxicity on a statewide basis. Ng et al. (*30*), reported the occurrence of cypermethrin in sediment samples collected from three agricultural and urban mixed land use streams in the Central Coast region, and noted that the occurrence of cypermethrin as being more typical of the agricultural rather than the urban stream reaches in the sites surveyed. Cypermethrin was not detected in urban creek samples from the Central Coast in the current study. However, cypermethrin occurred in $^{1}/3$ of the samples collected statewide from the current study, in other regions and watersheds without agricultural influence. This finding is not surprising as both cyfluthrin and cypermethrin are used extensively in commercial structural pesticide applications in California, explaining one possible reason they were observed in the urban creek samples.

Budd et al. (*31*), also surveyed pyrethroid occurrence in a mixed land use watershed, in the San Diego Creek/Newport Bay area of the Santa Ana region. Similar to the current study, bifenthrin was the most commonly observed pyrethroid in sediment samples. However, fenpropathrin, a pyrethroid pesticide registered only for use in agriculture and nurseries, was the second most commonly observed pyrethroid. These findings are not surprising because the sampling areas were in close proximity to several commercial nurseries. Fenpropathrin was not detected at any sites in the current study, probably because it is not used much in California. In addition, fenpropathrin has not been identified as being a

contributor to aquatic toxicity observations in any earlier urban-dominated creek studies.

This study documented the occurrence of pyrethroids in urban creek sediments of California. Thirty urban creeks were sampled from eight regions of California, including the State's largest urban areas (e.g., Los Angeles, San Diego, San Francisco Bay) and in less urbanized but also ecologically important environments elsewhere in California (e.g., South Lake Tahoe, North Coast). Sampling sites were targeted in close proximity to urban residential stormwater outfalls to provide a screening level assessment of pyrethroid occurrence and toxicity. These data were intended to provide water quality and pesticide regulators, and stormwater managers, the potential statewide significance of pyrethroid pesticides in urban creeks of the State of California. Pyrethroid pesticides were observed in sufficient concentrations in every region to explain the observed toxicity to *H. azteca*. Bifenthrin accounted for 67% of the statewide urban creek pyrethroid TU's observed. Cypermethrin, cyfluthrin, and lambda-cyhalothrin were also important contributors to the pyrethroid toxicity in urban waterways of California.

Acknowledgments

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Supporting Information Available

Sampling locations (Table 1), analytical results for physical properties, pyrethroid pesticides, and piperonyl butoxide (PBO) in sediment samples (Table 2), toxicity testing results for 10 day *H. azteca* sediment toxicity tests (Table 3), analytical results for organochlorine pesticides in sediment samples (Table 4), and analytical methods information (Table 5). This material is available free of charge via the Internet at http://pubs.acs.org.

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ES801346G

STATE OF CALIFORNIA

STATE WATER RESOURCES CONTROL BOARD

ORDER WQ 2009-0008

In the Matter of the Petition of

COUNTY OF LOS ANGELES AND LOS ANGELES COUNTY FLOOD CONTROL DISTRICT

Waste Discharge Requirements Order No. R4-2006-0074
Issued by the
California Regional Water Quality Control Board,
Los Angeles Region

SWRCB/OCC FILE A-1780

BY THE BOARD:

In 2001, the Los Angeles Regional Water Quality Control Board (Los Angeles Water Board) adopted Waste Discharge Requirements Order No. 01-182 (the permit), a national pollutant discharge elimination system (NPDES) municipal storm water permit. The permit authorizes storm water discharges from municipalities throughout the County of Los Angeles.[1] In 2002, the Los Angeles Water Board established a total maximum daily load (TMDL) for bacteria at Santa Monica Bay beaches during dry weather (the TMDL). The TMDL includes a waste load allocation for municipal storm water discharges. On September 14, 2006, the Los Angeles Water Board modified the permit by adopting Waste Discharge Requirements Order No. R4-2006-0074 (the Permit modification). The Los Angeles Water Board crafted the Permit modification to implement the summer dry weather waste load allocations in the TMDL.

On October 16, 2006, the County of Los Angeles and the Los Angeles County Flood Control District (Petitioners) filed a petition with the State Water Resources Control Board (State Water Board), challenging the Permit modification. The Petitioners asked that the petition be placed in abeyance. Two years later, in September 2008, the Petitioners activated

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[1] The City of Long Beach is subject to a separate municipal storm water permit. (Los Angeles Water Board Order 99-060 [NPDES No. CAS004002].)

the petition. In this Order, the State Water Board concludes that the Los Angeles Water Board's implementation of the TMDL through the Permit modification was appropriate and proper.[2]

I. BACKGROUND

A. Regulatory Background

The Petitioners contend the Los Angeles Water Board improperly translated the provisions of an existing TMDL into a municipal storm water permit. In this section, we provide a brief overview of relevant portions of the regulatory frameworks for TMDLs and for storm water regulation.

1. TMDLs

In State Water Board Order WQ 2001-06 (*Tosco*), this Board provided a detailed background of TMDLs. As we explained in the *Tosco* order, water quality standards provide the foundation for identifying impaired waters that require a TMDL. Clean Water Act section 303(c) requires the states to adopt water quality standards that protect the public health or welfare, enhance the quality of water, and serve the purposes of the Clean Water Act. Water quality standards consist of the beneficial uses of a water body and the criteria to protect those uses. For waters subject to the Clean Water Act, California's water quality standards are typically found in regional water quality control plans (basin plans) and in statewide plans.

Clean Water Act section 303(d) requires states to identify waters of the United States for which technology-based effluent limitations are not stringent enough to implement water quality standards. We refer to those waters that are not attaining water quality standards as impaired waters, and identify the impaired waters on the state's 303(d) list of water quality limited segments.

For the pollutants causing impairment of waters of the United States, Clean Water Act section 303(d) requires states to establish TMDLs. "A TMDL defines the specified maximum amount of a pollutant which can be discharged or 'loaded' into [impaired waters] from all combined sources."[3] A TMDL is the sum of the individual wasteload allocations assigned to point sources, load allocations for nonpoint sources, and other elements designed to achieve

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[2] To the extent Petitioners raised issues not discussed in this order, such issues are hereby dismissed as not substantial or appropriate for review by the State Water Board. (See *People v. Barry* (1987) 194 Cal.App.3d 158, 175-177; *Johnson v. State Water Resources Control Board* (2004) 123 Cal.App.4th 1107; Cal. Code Regs., tit. 23, § 2052, subd. (a)(1).)

[3] *Dioxin/Organochlorine Center v. Clarke* (9th Cir. 1995) 57 F.3d 1517, 1520.

water quality standards.[4] Regional water quality control boards typically adopt TMDLs as part of each region's basin plan[5] and therefore include programs for implementation.[6] In essence, TMDLs serve as a backstop provision of the Clean Water Act designed to implement water quality standards when other provisions have failed to achieve water quality standards.

TMDLs are not self-executing, but instead, rely upon further orders or actions to adjust pollutant restrictions on individual dischargers.[7] Federal regulations state that water quality based effluent limitations in NPDES permits must be consistent with the assumptions and requirements of the wasteload allocations in the TMDL, if the TMDL has been approved by the United States Environmental Protection Agency (U.S. EPA).[8]

The State Water Board estimates that statewide over 580 TMDLs will be needed for the current impaired waters list of 2,238 pollutant/water body combinations. Over 115 TMDLs are currently under development.

2. Municipal Storm Water Regulation

This Board has discussed the regulatory requirements for municipal storm water discharges in prior orders.[9] Section 402(p) of the Clean Water Act prohibits the discharge of pollutants from specified municipal separate storm sewer systems (MS4s) to waters of the United States except as authorized by an NPDES permit. Section 402(p) contains two substantive standards applicable to municipal storm water permits: MS4 permits (1) "shall include a requirement to effectively prohibit non-stormwater discharges into the storm sewers;"[10] and (2) "shall require controls to reduce the discharge of pollutants to the maximum extent practicable, including management practices, control techniques and system, design and engineering methods, and such other provisions as the Administrator or the State determines appropriate for the control of such pollutants."[11]

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[4] 40 C.F.R. § 130.3(i).

[5] See 40 C.F.R. §§ 130.6(c)(1) & 130.7.

[6] Wat. Code, §§ 13050, subd. (j), & 13242.

[7] *City of Arcadia v. EPA* (N.D.Cal. 2003) 265 F.Supp.2d 1142, 1144-1145; see also, e.g., State Water Board Resolution 2002-0149, ¶ 9 (approving Santa Monica Beaches Dry Weather Bacteria TMDL and noting that numeric targets and wasteload allocations are not directly enforceable and will need to be translated into individual permit requirements during a subsequent permitting action).

[8] 40 C.F.R. § 122.44(d)(1)(vii)(B).

[9] See, e.g., State Water Board Orders WQ 91-03 (*Communities for a Better Environment*), WQ 96-13 (*Save San Francisco Bay Ass'n*), WQ 2000-11 (*Cities of Bellflower et al.*), and WQ 2001-15 (*BIA*).

[10] 33 U.S.C., § 1342(p)(3)(B)(ii).

[11] *Id.*, § 1342(p)(3)(B)(iii).

U.S. EPA promulgated regulations establishing minimum requirements for all MS4 permits. The regulations generally focus on requirements that MS4s implement programs to reduce the amount of pollutants found in storm water discharges to the maximum extent practicable. The regulations also require the MS4's program to include an element to detect and remove illicit discharges and improper disposal into the storm sewer.[12] U.S. EPA added the illicit discharge program requirement with the stated intent of implementing the Clean Water Act provision requiring permits to "effectively prohibit non-storm water discharges."[13] Neither the Clean Water Act nor the federal storm water regulations define "non-storm water." "Illicit discharge" is defined as any discharge to an MS4 "not composed entirely of storm water."[14] Thus, "illicit discharge" is the most nearly applicable definition of "non-storm water" found in federal law and is often used interchangeably with that term.

B. Procedural Background

In 1998, the State Water Board added 44 Santa Monica Bay beaches to its 303(d) list due to bacteria impairments. As required by the Clean Water Act, the Los Angeles Water Board adopted a TMDL entitled *Dry Weather TMDL for Bacteria at Santa Monica Bay Beaches* (the TMDL) on January 24, 2002. The State Water Board approved the TMDL on September 19, 2002. The California Office of Administrative Law and U.S. EPA subsequently approved the TMDL, and the TMDL became effective on July 15, 2003.

The Los Angeles Water Board established the TMDL to protect swimmers and other recreational users of Santa Monica Bay beaches when there are dry weather conditions and the beaches are most heavily used. Dry weather is defined in the TMDL to mean those days with less than 0.1 inches of rain and days at least three days after a day with 0.1 inches of rain or more. The TMDL recognizes that, under certain conditions, even undeveloped watersheds may have exceedances of bacteria water quality standards. As a result, the TMDL differentiates between summer dry weather (April 1 to October 31) and winter dry weather (November 1 to March 31). In summer dry weather, a reference beach in an undeveloped watershed had no exceedances of bacteria water quality standards. The resulting summer dry weather wasteload allocations in the TMDL are, therefore, zero days of exceedance of the bacteria water quality standards at a particular beach. In winter dry weather, the reference

[12] 40 C.F.R. § 122.26(d)(2)(iv)(B).

[13] National Pollutant Discharge Elimination System Permit Application Regulations for Storm Water Discharges; Final Rule (hereafter Phase I preamble), 55 Fed. Reg. 47990, 47995 (Nov. 16, 1990).

[14] 40 C.F.R. § 122.26(b)(2). The definition of "illicit discharge" does provide exceptions for discharges pursuant to a separate NPDES permit and for discharges resulting from fire fighting activities. (*Ibid.*)

beach had three exceedances of the bacteria water quality standards. The resulting winter dry weather wasteload allocations allowed no more than three days of exceedance of the bacteria water quality standards at a particular beach.[15]

The TMDL includes wasteload allocations for municipal storm water discharges. Recognizing the different challenges associated with achieving the summer and winter dry weather wasteload allocations, as well as the higher summertime use of the beaches, the Los Angeles Water Board's implementation plan for the TMDL established a shorter schedule for achieving the summer dry weather wasteload allocations. The basin plan amendment establishing the TMDL included an implementation plan with a final compliance date of July 15, 2006 for summer dry weather. The final date for winter dry weather is July 15, 2009. By those dates, the TMDL's implementation plan anticipated there were to be no more discharges from MS4s that cause or contribute to exceedances of bacteria water quality standards on summer dry weather days.

The TMDL applies to Santa Monica Bay beaches along 55 miles of coastline, from Leo Carillo State Beach in the north to Outer Cabrillo beach in the south. Together, the beaches host an average of 55 million visitors per year, who add approximately $1.7 billion dollars to the local economy.

In May 2006, the Los Angeles Water Board's staff provided notice of its proposal to reopen and modify the permit in order to establish permit requirements consistent with the TMDL and its implementation plan. The proposed modification would make the TMDL's wasteload allocations enforceable, and be consistent with U.S. EPA's regulation requiring that effluent limitations in NPDES permits be consistent with the assumptions and requirements of the wasteload allocations in the TMDL.[16] The Los Angeles Water Board solicited and received two rounds of comments on the proposed permit revisions, held a public workshop to solicit oral and written comments, and issued two sets of responses to comments. During the comment period, the Los Angeles Water Board received many comment letters, including letters of support from Governor Schwarzenegger and other public officials. On September 14, 2006, the Los Angeles Water Board held a public hearing and adopted a permit modification that included requirements to implement the TMDL's summer dry weather wasteload allocations.

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[15] Relying on antidegradation principles, the TMDL established winter dry weather wasteload allocations of zero, one, two, or three days of bacteria exceedances based on a particular beach's historical water quality.

[16] 40 C.F.R. §122.44(d)(1)(vii)(B).

The modification prohibits discharges that cause or contribute to exceedances of bacteria water quality standards at Santa Monica Bay beaches on summer dry weather days. The Permit modification added Part 2.5 to the Receiving Water Limitations. Part 2.5 states:

> During Summer Dry Weather there shall be no discharges of bacteria from MS4s into the Santa Monica Bay that cause or contribute to exceedances in the Wave Wash, of the applicable bacteria objectives. The applicable bacteria objectives include both the single sample and geometric mean bacteria objectives set to protect the Water Contact Recreation (REC-1) beneficial use, as set forth in the Basin Plan.

The Permit modification also added a discharge prohibition. Discharge Prohibition 1.B states: "Discharges of Summer Dry Weather flows from MS4s into Santa Monica Bay that cause or contribute to exceedances of the bacteria Receiving Water Limitations in Part 2.5 below are prohibited." Neither the discharge prohibition nor the receiving water limitations includes an iterative process towards compliance.

Petitioners submitted a timely joint petition to the State Water Board on October 16, 2006. Pursuant to State Water Board regulations,[17] the petition was held in abeyance for nearly two years before Petitioners activated it on September 18, 2008. On that date, Petitioners also submitted a supplemental statement of points and authorities, which the State Water Board hereby adds to the administrative record. Petitioners, the Los Angeles Water Board, and a group of three environmental organizations sought leave to make additional submissions and to add evidence to the administrative record.[18] Those requests are hereby denied.[19]

II. ISSUES AND FINDINGS

Contention: The discharge prohibition and receiving water limitations added by the Permit modification are ambiguous and should be clarified.

Finding: The contested provisions are sufficiently clear and were properly adopted. We conclude that no changes are necessary and reject this contention. Petitioners claim that the discharge prohibition and receiving water limitations added by the Permit modification could be construed to prohibit storm water discharges containing bacteria, despite the Los Angeles Water Board's stated intention to limit those provisions to non-storm

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[17] See Cal. Code Regs., tit. 23, § 2050.5, subd. (d).

[18] The filings include Petitioners' request to file a reply pleading, and various requests for administrative notice and to submit additional evidence.

[19] See Cal. Code Regs., tit. 23, §§ 2050.5, subd. (a), & 2050.6.

water discharges. In Petitioners' view, the words "non-storm water" should be added to Part 2.5 of the permit's receiving water limitations to match that intent and to clarify that Part 2.5 does not apply to storm water discharges.

Part 2.5 of the permit reads: "During Summer Dry Weather there shall be no discharges of bacteria from MS4s into the Santa Monica Bay that cause or contribute to [bacteria] exceedances…." The permit defines dry weather as "days with less than 0.1 inch of rainfall and occurring more than three days after a rain day."[20] "Summer Dry Weather" is a dry weather day occurring from April 1 to October 31 of each year.[21]

Petitioners' proposed revision to Part 2.5 would read: "During Summer Dry Weather there shall be no *non-storm water* discharges of bacteria from MS4s . . . ." (Italics added.) They argue that, without the change, Part 2.5 may apply to "storm water" because that term is defined in federal regulations to include "surface run-off and drainage." Petitioners imply that the federal reference to "surface run-off and drainage" includes run-off and drainage discharges that occur during dry weather periods of the summer.

We decline to accept Petitioners' proposed language, including their similar proposal for Discharge Prohibition 1.B, because the language chosen by the Los Angeles Water Board is clear and appropriate. The challenged permit provisions do not apply to storm water flows. U.S. EPA has previously rejected the notion that "storm water," as defined at 40 Code of Federal Regulations section 122.26(b)(13), includes dry weather flows. In U.S. EPA's preamble to the storm water regulations, U.S. EPA rejected an attempt to define storm water to include categories of discharges "not in any way related to precipitation events."[22] The Los Angeles Water Board's permit language follows U.S. EPA's approach. The new Permit provisions specifically regulate dry weather discharges, which are defined to exclude discharges occurring during or immediately following a reportable precipitation event. Any discharges during such dry weather days would not be precipitation-related. No liability will attach under these provisions for discharges during, or as the result of, a rainfall event exceeding 0.1 inches.

In any event, Petitioners' proposed language deviates from that of the underlying wasteload allocation. That wasteload allocation defines "dry weather" and "summer dry weather" with language identical to that used in the challenged provisions.[23] The discharges

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[20] Permit, Part 5, Definitions.

[21] *Ibid*.

[22] 55 Fed. Reg. 47990, 47995.

[23] See Basin Plan, Tables 7-4.1, 7-4.2a.

regulated by the wasteload allocation are not qualified by the modifier "non-storm water," or any other term. Because 40 Code of Federal Regulations section 122.44(d)(1)(vii) requires effluent limitations to be consistent with the assumptions and requirements of the underlying wasteload allocation, we refuse to unnecessarily add language that, if anything, could cause confusion and threaten compliance with U.S. EPA's regulation.

Contention: The receiving water limitations and discharge prohibition are numeric effluent limitations and, therefore, do not follow the accepted approach for controlling municipal storm water discharges.

Finding: The contested provisions are appropriate and proper. The summer dry weather discharges, as defined by the Permit and the TMDL, are more appropriately regarded as non-storm water discharges, which the Clean Water Act requires to be effectively prohibited.

Petitioners liken the challenged provisions to numeric effluent limitations, and then cite various state and federal sources to argue that using numeric effluent limitations to implement a TMDL in a storm water permit is inappropriate. Petitioners point to State Water Board Order WQ 2001-15 (*BIA*), where we stated that, for municipal storm water permits, "we will generally not require 'strict compliance' with water quality standards through numeric effluent limitations," and instead "we will continue to follow an iterative approach, which seeks compliance over time" with water quality standards.[24] They also point to a U.S. EPA guidance document entitled *Establishing Total Maximum Daily Load (TMDL) Wasteload Allocations (WLAs) for Storm Water Sources and NPDES Permit Requirements Based on Those WLAs* (the U.S. EPA guidance document).[25] Petitioners cite a provision therein that reads, "because storm water discharges are due to storm events that are highly variable in frequency and duration and are not easily characterized, only in rare cases will it be feasible or appropriate to establish numeric limits for municipal and small construction discharges."[26]

The references relied upon by Petitioners are inapposite, and do not support invalidating the Los Angeles Water Board's requirements. Instead, the Petitioners' references are directed at the regulation of storm water discharges. The Permit modification is limited to non-storm water discharges which occur during summer dry weather. The U.S. EPA guidance document is limited to wasteload allocations "for storm water discharges" and permit limitations

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[24] *BIA*, *supra*, at p. 8.

[25] U.S. EPA, *Establishing Total Maximum Daily Load (TMDL) Wasteload Allocations (WLAs) for Storm Water Sources and NPDES Permit Requirements Based on Those WLAs*, Memorandum from U.S. EPA Director, Office of Wetlands, Oceans and Watersheds Robert H. Wayland, III and Director, Office of Wastewater Management James Hanlon to Water Division Directors, Regions 1-10, Nov. 22, 2002 (hereafter U.S. EPA guidance document).

[26] *Id.*, at p. 4.

and conditions "based on the [wasteload allocations] for storm water discharges."[27] Furthermore, the Clean Water Act and the federal storm water regulations assign different performance requirements for storm water and non-storm water discharges. These distinctions in the guidance document, the Clean Water Act, and the storm water regulations make it clear that a regulatory approach for storm water - such as the iterative approach we have previously endorsed - is not necessarily appropriate for non-storm water.

We instead look to directly relevant authorities. Federal law requires municipal storm water permit limitations to be consistent with applicable wasteload allocations.[28] The Clean Water Act requires MS4 permit requirements to effectively prohibit non-storm water discharges.[29] Similarly, California law requires NPDES permits to apply "any more stringent effluent standards or limitations necessary to implement water quality control plans...."[30]

The basin plan established a compliance deadline of July 15, 2006, for achieving final compliance with the summer dry weather wasteload allocations for bacteria. The TMDL, which is a component of the Los Angeles Water Board's basin plan, assigns a wasteload allocation to certain "local agencies that are permittees or co-permittees on a municipal storm water permit."[31] The basin plan further establishes that these agencies are responsible for complying with the summer dry weather wasteload allocation. The summer dry weather wasteload allocation prohibits the exceedance of bacteria water quality objectives on summer dry weather days at specified locations.[32] The Permit modification is consistent with the wasteload allocation and other basin plan provisions.

The Permit modification is also consistent with the federal framework for non-storm water discharges. 40 Code of Federal Regulations section 122.26(d)(2)(iv)(B), which implements the Clean Water Act's requirement for the effective prohibition of non-storm water discharges, requires municipal storm water permittees to detect and remove all categories of non-storm water discharges to the MS4, or to require the non-storm water discharger to obtain a separate NPDES permit. While MS4 permits generally contain exceptions for some non-storm water discharges, these exceptions do not extend to non-storm water discharges identified as a

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[27] U.S. EPA guidance document, *supra*, at p. 1.

[28] 40 C.F.R. § 122.44(d)(1)(vii)(B).

[29] 33 U.S.C. § 1342(p)(3)(B)(ii).

[30] Wat. Code, § 13377.

[31] Basin Plan, Table 7-4.1, fn. 3.

[32] *Id.*, Table 7-4.1.

source of pollutants.[33] In adopting the TMDL, the Los Angeles Water Board identified summer dry weather discharges as a source of water quality exceedances for bacteria. Prohibiting summer dry weather bacteria exceedances caused or contributed to by MS4s is therefore consistent with the federal framework for non-storm water discharges.

Moreover, the references Petitioners' rely upon to challenge the prohibitions and receiving water limitations as strict, numeric effluent limitations are not relevant to this petition. The contested provisions are receiving water limitations, not numeric effluent limitations. The contested provisions do not impose a numeric limitation measured at a point source outfall. Instead, compliance with the limitations is measured in the receiving water, and more specifically, at the "wave wash" for the individual beaches. The TMDL defines the wave wash "as the point at which the storm drain or creek empties and the effluent from the storm drain initially mixes with the receiving ocean water."[34] The provisions are directed at the quality of the receiving water, as affected by the discharge. They do not establish numeric effluent limitations for the discharge to the receiving water.[35],[36]

While the issue before us only concerns permit requirements to implement summer dry weather wasteload allocations and therefore non-storm water discharges, the result would not necessarily be different for municipal *storm water* discharges subject to a TMDL. TMDLs, which take significant resources to develop and finalize, are devised with specific implementation plans and compliance dates designed to bring impaired waters into compliance with water quality standards. It is our intent that federally mandated TMDLs be given substantive effect. Doing so can improve the efficacy of California's NPDES storm water permits. This is not to say that a wasteload allocation will result in numeric effluent limitations for municipal storm water discharges. But, when an approved TMDL is in place, the water boards will give substantive effect to the TMDL and allow it to become much more than an academic exercise. Whether a future municipal storm water permit requirement appropriately implements a storm water wasteload allocation will need to be decided based on the regional

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[33] See 40 C.F.R. § 122.26(d)(2)(iv)(B)(1). The exempted categories include, but are not limited to, water line flushing, rising ground waters, landscape irrigation, and street wash water.

[34] Basin Plan, Table 7-4.1, fn. 1.

[35] See, e.g., *BIA*, *supra*; State Water Board Order WQ 99-05 (*Environmental Health Coalition*). Those Orders endorsed receiving water limitations modified by an iterative process. The absence of an accompanying iterative process does not convert receiving water limitations into numeric effluent limitations.

[36] For the purposes of state enforcement under the Porter-Cologne Act's mandatory minimum penalties law, California distinguishes numeric restrictions on discharged effluent from receiving water limitations. (Wat. Code, § 13385.1, subd. (c).)

water quality control board's findings supporting either the numeric or non-numeric effluent limitations contained in the permit.

III. ORDER

IT IS HEREBY ORDERED THAT the petition of the County of Los Angeles and Los Angeles County Flood Control District is denied.

CERTIFICATION

The undersigned, Clerk to the Board, does hereby certify that the foregoing is a full, true, and correct copy of an order duly and regularly adopted at a meeting of the State Water Resources Control Board held on August 4, 2009.

AYE: Chairman Charles R. Hoppin
Vice Chair Frances Spivy-Weber
Board Member Arthur G. Baggett, Jr.
Board Member Tam M. Doduc

NAY: None

ABSENT: None

ABSTAIN: None

Jeanine Townsend

Jeanine Townsend
Clerk to the Board

California Regional Water Quality Control Board
San Diego Region

Waste Discharge Requirements for Discharges of Runoff from the Municipal Separate Storm Sewer Systems (MS4s) Draining the Watershed of the County of Orange, The Incorporated Cities of Orange County, and The Orange County Flood Control District Within the San Diego Region

Order No. R9-2009-0002
NPDES NO. CAS0108740

December 16, 2009

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Documents also are available at: http://www.waterboards.ca.gov/sandiego

WASTE DISCHARGE REQUIREMENTS FOR DISCHARGES OF RUNOFF FROM THE MUNICIPAL SEPARATE STORM SEWER SYSTEMS (MS4s) DRAINING THE WATERSHED OF THE COUNTY OF ORANGE, THE INCORPORATED CITIES OF ORANGE COUNTY, AND THE ORANGE COUNTY FLOOD CONTROL DISTRICT WITHIN THE SAN DIEGO REGION

Adopted by the
California Regional Water Quality Control Board
San Diego Region
on December 16, 2009

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LINDA S. ADAMS, Agency Secretary, California Environmental Protection Agency

California Regional Water Quality Control Board
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Eric Anderson	Irrigated Agriculture
Wayne Rayfield	Water Quality
Grant Destache	Industrial Water Use
George Loveland	Water Supply
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This permit was prepared under the direction of

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The California Regional Water Quality Control Board, San Diego Region (hereinafter Regional Board), finds that:

A. BASIS FOR THE ORDER

1. This Order is based on the federal Clean Water Act (CWA), the Porter-Cologne Water Quality Control Act (Division 7 of the Water Code, commencing with Section 13000), applicable State and federal regulations, all applicable provisions of statewide Water Quality Control Plans and Policies adopted by the State Water Resources Control Board (State Board), the Water Quality Control Plan for the San Diego Basin adopted by the Regional Board, the California Toxics Rule, and the California Toxics Rule Implementation Plan.

2. This Order reissues National Pollutant Discharge Elimination System (NPDES) Permit No. CAS0108740, which was first adopted by the Regional Board on July 16, 1990 (Order No. 90-38), and then reissued on August 8, 1996 (Order No. 96-03) and February 13, 2002 (Order No. R9-2002-01). On August 21, 2006, in accordance with Order No. R9-2002-01, the County of Orange, as the Principal Copermittee, submitted a Report of Waste Discharge (ROWD) for reissuance of the municipal separate storm sewer system (MS4) Permit.

3. This Order is consistent with the following precedential Orders adopted by the State Water Resources Control Board (State Board) addressing MS4 NPDES Permits: Order 99-05, Order WQ-2000-11, Order WQ 2001-15, Order WQO 2002-0014, and Order WQ-2009-0008 (*SWRCB/OCC FILE A-1780).*

4. The Fact Sheet / Technical Report for the Order No. R9-2009-0002, NPDES No. CAS0108740, Waste Discharge Requirements for Discharges of Runoff from the Municipal Separate Storm Sewer Systems (MS4s) Draining the Watersheds of the County of Orange, the Incorporated Cities of Orange County, and the Orange County Flood Control District Within the San Diego Region includes cited regulatory and legal references and additional explanatory information and data in support of the requirements of this Permit. This information, including any supplements thereto, and any response to comments on the Tentative Orders, is hereby incorporated by reference into these findings.

B. REGULATED PARTIES

1. Each of the persons in Table 1 below, hereinafter called Copermittees or dischargers, owns or operates an MS4, through which it discharges runoff into waters of the United States within the San Diego Region. These MS4s fall into one or more of the following categories: (1) a medium or large MS4 that services a population of greater than 100,000 or 250,000 respectively; or (2) a small MS4 that is “interrelated” to a medium or large MS4; or (3) an MS4 which contributes to a

violation of a water quality standard; or (4) an MS4 which is a significant contributor of pollutants to waters of the United States (waters of the U.S).

Table 1. Municipal Copermittees

1. City of Aliso Viejo	8. City of Mission Viejo
2. City of Dana Point	9. City of Rancho Santa Margarita
3. City of Laguna Beach	10. City of San Clemente
4. City of Laguna Hills	11. City of San Juan Capistrano
5. City of Laguna Niguel	12. County of Orange
6. City of Laguna Woods	13. Orange County Flood Control District
7. City of Lake Forest	

C. DISCHARGE CHARACTERISTICS

1. Runoff discharged from an MS4 contains waste, as defined in the California Water Code (CWC), and pollutants that adversely affect the quality of the waters of the State. The discharge of runoff from an MS4 is a “discharge of pollutants from a point source” into waters of the U.S. as defined in the CWA.

2. MS4 storm water and non-storm water discharges are likely to contain pollutants that cause or threaten to cause a violation of water quality standards, as outlined in the Regional Board’s Water Quality Control Plan for the San Diego Basin (Basin Plan). Storm water and non-storm water discharges from the MS4 are subject to the conditions and requirements established in the San Diego Basin Plan for point source discharges. These surface water quality standards must be complied with at all times, irrespective of the source and manner of discharge.

3. The most common categories of pollutants in runoff include total suspended solids, sediment, pathogens (e.g., bacteria, viruses, protozoa); heavy metals (e.g., copper, lead, zinc and cadmium); petroleum products and polynuclear aromatic hydrocarbons; synthetic organics (e.g., pesticides, herbicides, and PCBs); nutrients (e.g., nitrogen and phosphorus fertilizers); oxygen-demanding substances (decaying vegetation, animal waste); detergents; and trash.

4. The discharge of pollutants and/or increased flows from MS4s may cause or threaten to cause the concentration of pollutants to exceed applicable receiving water quality objectives and/or impair or threaten to impair designated beneficial uses resulting in a condition of pollution (i.e., unreasonable impairment of water quality for designated beneficial uses), contamination, or nuisance.

5. Pollutants in runoff can threaten and adversely affect human health. Human illnesses have been clearly linked to recreating near storm drains flowing to coastal waters. Also, runoff pollutants in receiving waters can bioaccumulate in the tissues of invertebrates and fish, which may be eventually consumed by humans.

6. Runoff discharges from MS4s often contain pollutants that cause toxicity to aquatic organisms (i.e., adverse responses of organisms to chemicals or physical agents ranging from mortality to physiological responses such as impaired reproduction or growth anomalies). Toxic pollutants impact the overall quality of aquatic systems and beneficial uses of receiving waters.

7. The Copermittees discharge runoff into lakes, drinking water reservoirs, rivers, streams, creeks, bays, estuaries, coastal lagoons, the Pacific Ocean, and tributaries thereto within one of the eleven hydrologic units (San Juan Hydrologic Unit) comprising the San Diego Region as shown in Tables 2a and 2b. Some of the receiving water bodies have been designated as impaired by the Regional Board and the United States Environmental Protection Agency (USEPA) in 2006 pursuant to CWA section 303(d). Also shown in the Tables are the watershed management areas (WMAs) as defined in the Regional Board report, Watershed Management Approach, January 2002.

Table 2a. Common Watersheds and CWA Section 303(d) Impaired Waters

Regional Board Watershed Management Area (WMA)	**Hydrologic Area (HA) or Hydrologic Subarea (HSA) of the San Juan Hydrologic Unit**	**Major Receiving Water Bodies**	**303(d) Pollutant(s)/stressor or Water Quality Effect[1]**
Laguna Coastal Streams	Laguna HA, excluding Aliso HSA and Dana Point HSA	Laguna Canyon Creek, Pacific Ocean	Bacterial indicators Sediment toxicity
Aliso Creek	Aliso HSA	Aliso Creek, English Canyon, Pacific Ocean	Toxicity Phosphorus Bacterial indicators Benzo[b]fluoranthene Dieldrin Sediment Toxicity
Dana Point Coastal Streams	Dana Point HSA	Dana Point Harbor, Salt Creek, Pacific Ocean	Bacterial indicators
San Juan Creek	Mission Viejo HA	San Juan Creek, Trabuco Creek, Oso Creek, Canada Gobernadora, Bell Canyon, Verdugo Canyon, Pacific Ocean	Bacterial indicators DDE Chloride Sulfates Total dissolved solids

[1] The listed 303(d) pollutant(s) do not necessarily reflect impairment of the entire corresponding WMA or all corresponding major surface water bodies. The specific impaired portions of each WMA are listed in the State Water Resources Control Board's 2006 Section 303(d) List of Water Quality Limited Segments.

Table 2a. Common Watersheds and CWA Section 303(d) Impaired Waters

Regional Board Watershed Management Area (WMA)	**Hydrologic Area (HA) or Hydrologic Subarea (HSA) of the San Juan Hydrologic Unit**	**Major Receiving Water Bodies**	**303(d) Pollutant(s)/stressor or Water Quality Effect[1]**
San Clemente Coastal Streams	San Clemente HA	Prima Deshecha, Segunda Deshecha, Pacific Ocean	Bacterial indicators Phosphorus Turbidity
San Mateo Creek	San Mateo HA	San Mateo Creek, Christianitos Creek, Pacific Ocean	

Table 2b. Common Watersheds and Municipalities

Municipality	**Laguna Coastal Streams**	**Aliso Creek**	**Dana Point Coastal Streams**	**San Juan Creek**	**San Clemente Coastal Streams**	**San Mateo Creek**
Aliso Viejo	☑	☑				
Dana Point			☑	☑		
Laguna Beach	☑	☑				
Laguna Hills *		☑		☑		
Laguna Niguel		☑	☑	☑		
Laguna Woods *		☑				
Lake Forest *		☑				
Mission Viejo		☑		☑		
Rancho Santa Margarita				☑		
San Clemente					☑	☑
San Juan Capistrano				☑		
County of Orange *	☑	☑	☑	☑	☑	☑
Orange County Flood Control District *	☑	☑	☑	☑	☑	
* Municipality also includes areas within watersheds of the Santa Ana Regional Board that are outside the scope of this Order						

8. Trash is a persistent pollutant which can enter receiving waters from the MS4 resulting in accumulation and transport in receiving waters over time. Trash poses a serious threat to the Beneficial Uses of the receiving waters, including, but not limited to, human health, rare and endangered species, navigation and human recreation.

9. The Copermittees' water quality monitoring data submitted to date documents persistent violations of Basin Plan water quality objectives for various runoff-related pollutants (fecal coliform bacteria, total suspended solids, turbidity, metals, etc.) at

various watershed monitoring stations. Persistent toxicity has also been observed at some watershed monitoring stations. In addition, bioassessment data indicates that the majority of urbanized receiving waters have Poor to Very Poor Index of Biotic Integrity ratings. In sum, the above findings indicate that runoff discharges are causing or contributing to water quality impairments, and are a leading cause of such impairments in Orange County.

10. When natural vegetated pervious ground cover is converted to impervious surfaces such as paved highways, streets, rooftops, and parking lots, the natural absorption and infiltration abilities of the land are lost. Therefore, runoff leaving a developed area is significantly greater in runoff volume, velocity, and peak flow rate than pre-development runoff from the same area. Runoff durations can also increase as a result of flood control and other efforts to control peak flow rates. Increased volume, velocity, rate, and duration of runoff, and decreased natural clean sediment loads, greatly accelerate the erosion of downstream natural channels. Significant declines in the biological integrity and physical habitat of streams and other receiving waters have been found to occur with as little as a 3-5 percent conversion from natural to impervious surfaces. The increased runoff characteristics from new development must be controlled to protect against increased erosion of channel beds and banks, sediment pollutant generation, or other impacts to beneficial uses and stream habitat due to increased erosive force.

11. Development creates new pollution sources as human population density increases and brings with it proportionately higher levels of car emissions, car maintenance wastes, municipal sewage, pesticides, household hazardous wastes, pet wastes, trash, etc. which can either be washed or directly dumped into the MS4. As a result, the runoff leaving the developed urban area is significantly greater in pollutant load than the pre-development runoff from the same area. These increased pollutant loads must be controlled to protect downstream receiving water quality.

12. Development and urbanization especially threaten environmentally sensitive areas (ESAs), such as water bodies designated as supporting a RARE beneficial use (supporting rare, threatened or endangered species) and CWA 303(d)-impaired water bodies. Such areas have a much lower capacity to withstand pollutant shocks than might be acceptable in other areas. In essence, development that is ordinarily insignificant in its impact on the environment may become significant in a particularly sensitive environment. Therefore, additional control to reduce storm water pollutants from new and existing development may be necessary for areas adjacent to or discharging directly to an ESA.

13. Although dependent on several factors, the risks typically associated with properly managed infiltration of runoff (especially from residential land use areas) are not significant. The risks associated with infiltration can be managed by many techniques, including (1) designing landscape drainage features that promote infiltration of runoff, but do not “inject” runoff (injection bypasses the natural processes of filtering and transformation that occur in the soil); (2) taking reasonable

steps to prevent the illegal disposal of wastes; (3) protecting footings and foundations; (4) ensuring that each drainage feature is adequately maintained in perpetuity; and (5) pretreatment.

14. Non-storm water (dry weather) discharge from the MS4 is not considered a storm water (wet weather) discharge and therefore is not subject to regulation under the Maximum Extent Practicable (MEP) standard from CWA 402(p)(3)(B)(iii), which is explicitly for "Municipal … *Stormwater Discharges* (emphasis added)" from the MS4. Non-storm water discharges, per CWA 402(p)(3)(B)(ii), are to be effectively prohibited. Such dry weather non-storm water discharges have been shown to contribute significant levels of pollutants and flow in arid, developed Southern California watersheds and are to be effectively prohibited under the Clean Water Act.

15. Non-storm water discharges to the MS4 granted an influent exception [i.e., which are exempt from the effective prohibition requirement set forth in CWA section 402(p)(3)(B)(ii)] under 40 CFR 122. 26 are included within this Order. Any exempted discharges identified by Copermittees as a source of pollutants are subsequently required to be *addressed* (emphasis added) as illicit discharges through prohibition and incorporation into existing IC/ID programs. The Copermittees have identified landscape irrigation, irrigation water and lawn water, previously exempted discharges, as a source of pollutants and conveyance of pollutants to waters of the United States.

D. RUNOFF MANAGEMENT PROGRAMS

1. General

a. This Order specifies requirements necessary for the Copermittees to reduce the discharge of pollutants in storm water runoff to the maximum extent practicable (MEP). However, since MEP is a dynamic performance standard, which evolves over time as runoff management knowledge increases, the Copermittees' runoff management programs must continually be assessed and modified to incorporate improved programs, control measures, best management practices (BMPs), etc. in order to achieve the evolving MEP standard. Absent evidence to the contrary, this continual assessment, revision, and improvement of runoff management program implementation is expected to ultimately achieve compliance with water quality standards in the Region.

b. The Copermittees have generally been implementing the jurisdictional runoff management programs required pursuant to Order No. 2002-01 since February 13, 2003. Prior to that, the Copermittees were regulated by Order No. 96-03 since August 8, 1996. Runoff discharges, however, continue to cause or contribute to violations of water quality standards as evidenced by the Copermittees monitoring results.

c. This Order contains new or modified requirements that are necessary to improve Copermittees' efforts to reduce the discharge of pollutants in storm water runoff to the MEP and achieve water quality standards. Some of the new or modified requirements, such as the revised Watershed Runoff Management Program section, are designed to specifically address high priority water quality problems. Other new or modified requirements address program deficiencies that have been noted during audits, report reviews, and other Regional Board compliance assessment activities.

d. Updated Jurisdictional Runoff Management Plans (JRMPs) and Watershed Runoff Management Plans (WRMPs), which describe the Copermittees' runoff management programs in their entirety, are needed to guide the Copermittees' runoff management efforts and aid the Copermittees in tracking runoff management program implementation. It is practicable for the Copermittees to update the JRMPs and WRMPs within one year, since significant efforts to develop these programs have already occurred.

e. Pollutants can be effectively reduced in storm water runoff by the application of a combination of pollution prevention, source control, and treatment control BMPs. Pollution prevention is the reduction or elimination of pollutant generation at its source and is the best "first line of defense." Source control BMPs (both structural and non-structural) minimize the contact between pollutants and flows (e.g., rerouting run-on around pollutant sources or keeping pollutants on-site and out of receiving waters). Treatment control BMPs remove pollutants that have been mobilized by wet-weather or dry-weather flows.

f. Runoff needs to be addressed during the three major phases of urban development (planning, construction, and use) in order to reduce the discharge of pollutants from storm water to the MEP, effectively prohibit non-storm water discharges and protect receiving waters. Development which is not guided by water quality planning policies and principles can unnecessarily result in increased pollutant load discharges, flow rates, and flow durations which can negatively impact receiving water beneficial uses. Construction sites without adequate BMP implementation result in sediment runoff rates which greatly exceed natural erosion rates of undisturbed lands, causing siltation and impairment of receiving waters. Existing development generates substantial pollutant loads which are discharged in runoff to receiving waters.

g. Annual reporting requirements included in this Order are necessary to meet federal requirements and to evaluate the effectiveness and compliance of the Copermittees' programs.

h. This Order establishes Storm Water Action Levels (SALs) for selected pollutants based on USEPA Rain Zone 6 (arid southwest) Phase I MS4 monitoring data for pollutants in storm water. The SALs were computed as the 90th percentile of the data set, utilizing the statistical based population approach, one of three

approaches recommended by the California Water Board's Storm Water Panel in its report, 'The Feasibility of Numerical Effluent Limits Applicable to Discharges of Storm Water Associated with Municipal, Industrial and Construction Activities (June 2006). SALs are identified in Section D of this Order. Copermittees shall implement a timely, comprehensive, cost-effective storm water pollution control program to reduce the discharge of pollutants in storm water from the permitted areas so as not to exceed the SALs. Exceedance of SALs may indicate inadequacy of programmatic measures and BMPs required in this Order.

2. **Development Planning**

a. The Standard Storm Water Mitigation Plan (SSMP) requirements contained in this Order are consistent with Order WQ-2000-11 adopted by the State Water Resources Control Board (State Board) on October 5, 2000. In the precedential order, the State Board found that the design standards, which essentially require that runoff generated by 85 percent of storm events from specific development categories be infiltrated or treated, reflect the MEP standard. The order also found that the SSMP requirements are appropriately applied to the majority of the Priority Development Project categories contained in Section D.1 of this Order. The State Board also gave Regional Water Quality Control Boards the needed discretion to include additional categories and locations, such as retail gasoline outlets (RGOs), in SSMPs.

b. Controlling runoff pollution by using a combination of onsite source control and site design BMPs augmented with treatment control BMPs before the runoff enters the MS4 is important for the following reasons: (1) Many end-of-pipe BMPs (such as diversion to the sanitary sewer) are typically ineffective during significant storm events. Whereas, onsite source control BMPs can be applied during all runoff conditions; (2) End-of-pipe BMPs are often incapable of capturing and treating the wide range of pollutants which can be generated on a sub-watershed scale; (3) End-of-pipe BMPs are more effective when used as polishing BMPs, rather than the sole BMP to be implemented; (4) End-of-pipe BMPs do not protect the quality or beneficial uses of receiving waters between the pollutant source and the BMP; and (5) Offsite end-of-pipe BMPs do not aid in the effort to educate the public regarding sources of pollution and their prevention.

c. Use of Low-Impact Development (LID) site design BMPs at new development, redevelopment and retrofit projects can be an effective means for minimizing the impact of storm water runoff discharges from the development projects on receiving waters. LID is a site design strategy with a goal of maintaining or replicating the pre-development hydrologic regime through the use of design techniques. LID site design BMPs help preserve and restore the natural hydrologic cycle of the site, allowing for filtration and infiltration which can greatly reduce the volume, peak flow rate, velocity, and pollutant loads of storm water runoff. Current runoff management, knowledge, practices and technology have

resulted in the use of LID BMPs as an acceptable means of meeting the storm water MEP standard.

d. Retail Gasoline Outlets (RGOs) are significant sources of pollutants in storm water runoff. RGOs are points of convergence for motor vehicles for automotive related services such as repair, refueling, tire inflation, and radiator fill-up and consequently produce significantly higher loadings of hydrocarbons and trace metals (including copper and zinc) than other developed areas.

e. Industrial sites are significant sources of pollutants in runoff. Pollutant concentrations and loads in runoff from industrial sites are similar or exceed pollutant concentrations and loads in runoff from other land uses, such as commercial or residential land uses. As with other land uses, LID site design, source control, and treatment control BMPs are needed at industrial sites in order to meet the MEP standard. These BMPs are necessary where the industrial site is larger than 10,000 square feet. The 10,000 square feet threshold is appropriate, since it is consistent with requirements in other Phase I NPDES storm water regulations throughout California.

f. If not properly designed or maintained, certain BMPs implemented or required by municipalities for runoff management may create a habitat for vectors (e.g. mosquitoes and rodents). Proper BMP design and maintenance to avoid standing water, however, can prevent the creation of vector habitat. Nuisances and public health impacts resulting from vector breeding can be prevented with close collaboration and cooperative effort between municipalities, the Orange County Vector Control District, and the California Department of Public Health during the development and implementation of runoff management programs.

g. The increased volume, velocity, frequency and discharge duration of storm water runoff from developed areas has the potential to greatly accelerate downstream erosion, impair stream habitat in natural drainages, and negatively impact beneficial uses. Development and urbanization increase pollutant loads in storm water runoff and the volume of storm water runoff. Impervious surfaces can neither absorb water nor remove pollutants and thus lose the purification and infiltration provided by natural vegetated soil. Hydromodification measures for discharges to hardened channels are needed for the future restoration of the hardened channels to their natural state, thereby restoring the chemical, physical, and biological integrity and Beneficial Uses of local receiving waters.

3. **Construction and Existing Development**

a. In accordance with federal NPDES regulations and to ensure the most effective oversight of industrial and construction site discharges, discharges of runoff from industrial and construction sites are subject to dual (State and local) storm water regulation. Under this dual system, each Copermittee is responsible for enforcing its local permits, plans, and ordinances, and the Regional Board is

responsible for enforcing the General Construction Activities Storm Water Permit, State Board Order 99-08 DWQ, NPDES No. CAS000002 (General Construction Permit) and the General Industrial Activities Storm Water Permit, State Board Order 97-03 DWQ, NPDES No. CAS000001 (General Industrial Permit) and any reissuance of these permits. NPDES municipal regulations require that municipalities develop and implement measures to address runoff from industrial and construction activities. Those measures may require the implementation of additional BMPs than are required under the statewide general permits for activities subject to both State and local regulation.

b. Identification of sources of pollutants in runoff (such as municipal areas and activities, industrial and commercial sites/sources, construction sites, and residential areas), development and implementation of BMPs to address those sources, and updating ordinances and approval processes are necessary for the Copermittees to ensure that discharges of pollutants from its MS4 in storm water are reduced to the MEP and that non-storm water discharges are not occurring. Inspections and other compliance verification methods are needed to ensure minimum BMPs are implemented. Inspections are especially important at high risk areas for pollutant discharges.

c. Historic and current development makes use of natural drainage patterns and features as conveyances for runoff. Urban streams used in this manner are part of the municipalities MS4 regardless of whether they are natural, anthropogenic, or partially modified features. In these cases, the urban stream is both an MS4 and receiving water.

d. As operators of the MS4s, the Copermittees cannot passively receive and discharge pollutants from third parties. By providing free and open access to an MS4 that conveys discharges to waters of the U.S., the operator essentially accepts responsibility for discharges into the MS4 that it does not prohibit or control. These discharges may cause or contribute to a condition of contamination or a violation of water quality standards.

e. Waste and pollutants which are deposited and accumulate in MS4 drainage structures will be discharged from these structures to waters of the U.S. unless they are removed. These discharges may cause or contribute to, or threaten to cause or contribute to, a condition of pollution in receiving waters. For this reason, pollutant discharges from storm water into MS4s must be reduced using a combination of management measures, including source control, and an effective MS4 maintenance program must be implemented by each Copermittee.

f. Enforcement of local runoff related ordinances, permits, and plans is an essential component of every runoff management program and is specifically required in the federal storm water regulations and this Order. Each Copermittee is individually responsible for adoption and enforcement of ordinances and/or policies, implementation of identified control measures/BMPs needed to prevent

or reduce pollutants in storm water runoff, and for the allocation of funds for the capital, operation and maintenance, administrative, and enforcement expenditures necessary to implement and enforce such control measures/BMPs under its jurisdiction. Education is an important aspect of every effective runoff management program and the basis for changes in behavior at a societal level. Education of municipal planning, inspection, and maintenance department staffs is especially critical to ensure that in-house staffs understand how their activities impact water quality, how to accomplish their jobs while protecting water quality, and their specific roles and responsibilities for compliance with this Order. Public education, designed to target various urban land users and other audiences, is also essential to inform the public of how individual actions affect receiving water quality and how adverse effects can be minimized.

g. Public participation during the development of runoff management programs is necessary to ensure that all stakeholder interests and a variety of creative solutions are considered.

h. Retrofitting existing development with storm water treatment controls, including LID, is necessary to address storm water discharges from existing development that may cause or contribute to a condition of pollution or a violation of water quality standards. Although SSMP BMPs are required for redevelopment, the current rate of redevelopment will not address water quality problems in a timely manner. Cooperation with private landowners is necessary to effectively identify, implement and maintain retrofit projects for the preservation, restoration, and enhancement of water quality.

4. **Watershed Runoff Management**

a. Since runoff within a watershed can flow from and through multiple land uses and political jurisdictions, watershed-based runoff management can greatly enhance the protection of receiving waters. Such management provides a means to focus on the most important water quality problems in each watershed. By focusing on the most important water quality problems, watershed efforts can maximize protection of beneficial use in an efficient manner. Effective watershed-based runoff management actively reduces pollutant discharges and abates pollutant sources causing or contributing to watershed water quality problems. Watershed-based runoff management that does not actively reduce pollutant discharges and abate pollutant sources causing or contributing to watershed water quality problems can necessitate implementation of the iterative process outlined in section A.3 of the Tentative Order. Watershed management of runoff does not require Copermittees to expend resources outside of their jurisdictions. Watershed management requires the Copermittees within a watershed to develop a watershed-based management strategy, which can then be implemented on a jurisdictional basis.

b. Some runoff issues, such as general education and training, can be effectively addressed on a regional basis. Regional approaches to runoff management can improve program consistency and promote sharing of resources, which can result in implementation of more efficient programs.

c. It is important for the Copermittees to coordinate their water quality protection and land use planning activities to achieve the greatest protection of receiving water bodies. Copermittee coordination with other watershed stakeholders, especially the State of California Department of Transportation, the United States Department of Defense, and water and sewer districts, is also important.

E. STATUTE AND REGULATORY CONSIDERATIONS

1. The Receiving Water Limitations (RWL) language specified in this Order is consistent with language recommended by the USEPA and established in State Board Water Quality Order 99-05, *Own Motion Review of the Petition of Environmental Health Coalition to Review Waste Discharge Requirements Order No. 96-03, NPDES Permit No. CAS0108740*, adopted by the State Board on June 17, 1999. The RWL in this Order require compliance with water quality standards, which for storm water discharges is to be achieved through an iterative approach requiring the implementation of improved and better-tailored BMPs over time. Compliance with receiving water limits based on applicable water quality standards is necessary to ensure that MS4 discharges will not cause or contribute to violations of water quality standards and the creation of conditions of pollution.

2. The Water Quality Control Plan for the San Diego Basin (Basin Plan), identifies the following beneficial uses for surface waters in Orange County: Municipal and Domestic Supply (MUN)[2], Agricultural Supply (AGR), Industrial Process Supply (PROC), Industrial Service Supply (IND), Ground Water Recharge (GWR), Contact Water Recreation (REC1), Non-contact Water Recreation (REC2), Warm Freshwater Habitat (WARM), Cold Freshwater Habitat (COLD), Wildlife Habitat (WILD), Rare, Threatened, or Endangered Species (RARE), Freshwater Replenishment (FRSH), Hydropower Generation (POW), and Preservation of Biological Habitats of Special Significance (BIOL). The following additional beneficial uses are identified for coastal waters of Orange County: Navigation (NAV), Commercial and Sport Fishing (COMM), Estuarine Habitat (EST), Marine Habitat (MAR), Aquaculture (AQUA), Migration of Aquatic Organisms (MIGR), Spawning, Reproduction, and/or Early Development (SPWN), and Shellfish Harvesting (SHELL).

3. This Order is in conformance with State Board Resolution No. 68-16, *Statement of Policy with Respect to Maintaining High Quality Waters in California*, and the federal Antidegradation Policy described in 40 CFR 131.12.

[2] Subject to exceptions under the "Sources of Drinking Waters" Policy (Resolution No. 89-33)

4. Section 6217(g) of the Coastal Zone Act Reauthorization Amendments of 1990 (CZARA) requires coastal states with approved coastal zone management programs to address non-point pollution impacting or threatening coastal water quality. CZARA addresses five sources of non-point pollution: agriculture, silviculture, urban, marinas, and hydromodification. This NPDES permit addresses the management measures required for the urban category, with the exception of septic systems. The adoption and implementation of this NPDES permit relieves the Copermittee from developing a non-point source plan, for the urban category, under CZARA. The Regional Board addresses septic systems through the administration of other programs.

5. Section 303(d)(1)(A) of the CWA requires that "Each state must identify those waters within its boundaries for which the effluent limitations…are not stringent enough to implement any water quality standard (WQS) applicable to such waters." The CWA also requires states to establish a priority ranking of impaired water bodies known as Water Quality Limited Segments and to establish Total Maximum Daily Loads (TMDLs) for such waters. This priority list of impaired water bodies is called the Section 303(d) List. The current Section 303(d) List was approved by the State Board on October 25, 2006. On June 28, 2007 the 2006 303(d) list for California was given final approval by the United States Environmental Protection Agency (USEPA).

6. This Order does not constitute an unfunded local government mandate subject to subvention under Article XIIIB, Section (6) of the California Constitution for several reasons, including, but not limited to, the following. First, this Order implements federally mandated requirements under federal Clean Water Act section 402. (33 U.S.C. § 1342(p)(3)(B).) Second, the local agency Copermittees' obligations under this Order are similar to, and in many respects less stringent than, the obligations of non-governmental and new dischargers who are issued NPDES permits for storm water and non-storm water discharges. Third, the local agency Copermittees have the authority to levy service charges, fees, or assessments sufficient to pay for compliance with this Order. Fourth, the Copermittees have requested permit coverage in lieu of compliance with the complete prohibition against the discharge of pollutants contained in federal Clean Water Act section 301, subdivision (a) (33 U.S.C. § 1311(a)) and in lieu of numeric restrictions on their storm water discharges. Fifth, the local agencies' responsibility for preventing discharges of waste that can create conditions of pollution or nuisance from conveyances that are within their ownership or control under State law predates the enactment of Article XIIIB, Section (6) of the California Constitution. Likewise, the provisions of this Order to implement total maximum daily loads (TMDLs) are federal mandates. The federal Clean Water Act requires TMDLs to be developed for water bodies that do not meet federal water quality standards. (33 U.S.C. sec. 1313(d).) Once the U.S. Environmental Protection Agency or a state develops a TMDL, federal law requires that permits must contain effluent limitations consistent with the assumptions of any applicable wasteload allocation. (40 C.F.R. sec. 122.44(d)(1)(vii)(B).)

7. Runoff treatment and/or mitigation must occur prior to the discharge of runoff into receiving waters. Treatment BMPs must not be constructed in waters of the U.S. or State unless the runoff flows are sufficiently pretreated to protect the values and functions of the water body. Federal regulations at 40 CFR 131.10(a) state that in no case shall a state adopt waste transport or waste assimilation as a designated use for any waters of the U.S. Authorizing the construction of an runoff treatment facility within a water of the U.S., or using the water body itself as a treatment system or for conveyance to a treatment system, would be tantamount to accepting waste assimilation as an appropriate use for that water body. Furthermore, the construction, operation, and maintenance of a pollution control facility in a water body can negatively impact the physical, chemical, and biological integrity, as well as the beneficial uses, of the water body. Without federal authorization (e.g., pursuant to Clean Water Act Section 404), waters of the U.S. may not be converted into, or used as, waste treatment or conveyance facilities. Similarly, waste discharge requirements pursuant to California Water Code Section 13260 are required for the conversion or use of waters of the State as waste treatment or conveyance facilities. Diversion from waters of the U.S./State to treatment facilities and subsequent return to waters of the U.S. is allowable, provided that the effluent complies with applicable NPDES requirements.

8. The issuance of waste discharge requirements and an NPDES permit for the discharge of runoff from MS4s to waters of the U.S. is exempt from the requirement for preparation of environmental documents under the California Environmental Quality Act (CEQA) (Public Resources Code, Division 13, Chapter 3, section 21000 et seq.) in accordance with the CWC section 13389.

9. Multiple water bodies in Orange County have been identified as impaired and placed on the 303(d) list. In 2004, Bacteria Impaired Waters TMDL Project II included six bacteria impaired shorelines in Dana Point Harbor and San Diego Bay: Baby Beach in Dana Point Harbor and Shelter Island Shoreline Park, B Street, G Street Pier, Tidelands Park, and Chula Vista Marina in San Diego Bay. Since then, only Baby Beach in Dana Point Harbor and Shelter Island Shoreline Park in San Diego Bay can be confirmed as still impaired by indicator bacteria. On June 11, 2008 the Regional Board adopted a Basin Plan amendment to incorporate *Bacteria Impaired Waters TMDL Project II for San Diego Bay and Dana Point Harbor Shorelines*. On June 16, 2009, the State Board approved the Basin Plan amendment. This action meets requirements of section 303(d) of the Clean Water Act (CWA). The Basin Plan amendment process is authorized under section 13240 of the Water Code. The State's Office of Administrative Law (OAL) approved the TMDLs on September 15, 2009. The effective date of the TMDLs is the date of OAL approval. USEPA approved the TMDLs on October 26, 2009.

10. Storm water discharges from developed and developing areas in Orange County are significant sources of certain pollutants that cause, may be causing, threatening to cause or contributing to water quality impairment in the waters of Orange County.

Furthermore, as delineated in the CWA section 303(d) list in Table 3, the Regional Board has found that there is a reasonable potential that municipal storm water and non-storm water discharges from MS4s cause or may cause or contribute to an excursion above water quality standards for the following pollutants: Indicator Bacteria, Phosphorous, Toxicity and Turbidity. In accordance with CWA section 303(d), the Regional Board is required to establish Total Maximum Daily Loads (TMDLs) for these pollutants to these waters to eliminate impairment and attain water quality standards. Therefore, certain early pollutant control actions and further pollutant impact assessments by the Copermittees are warranted and required pursuant to this Order.

Table 3. 2006 Section 303(d) Listed Waterbodies in So. Orange County

Waterbody	**Pollutant**
Aliso Creek	Indicator Bacteria, Phosphorus, Toxicity
Aliso Creek Mouth	Indicator Bacteria
Dana Point Harbor	Indicator Bacteria
English Canyon Creek	Benzo[b]fluoranthene, Dieldrin, Sediment Toxicity
Laguna Canyon Channel	Sediment Toxicity
Oso Creek (at Mission Viejo Golf Course)	Chloride, Sulfates, Total Dissolved Solids
Pacific Ocean Shoreline, Aliso HSA	Indicator Bacteria
Pacific Ocean Shoreline, Dana Point HSA	Indicator Bacteria
Pacific Ocean Shoreline, Laguna Beach HSA	Indicator Bacteria
Pacific Ocean Shoreline, Lower San Juan HSA	Indicator Bacteria
Pacific Ocean Shoreline, San Clemente HA	Indicator Bacteria
Pacific Ocean Shoreline, San Joaquin Hills HSA	Indicator Bacteria
Prima Deshecha Creek	Phosphorus, Turbidity
San Juan Creek	DDE, Indicator Bacteria
San Juan Creek (mouth)	Indicator Bacteria
Segunda Deshecha Creek	Phosphorus, Turbidity

11. This Order incorporates only those MS4 Waste Load Allocations (WLAs) developed in TMDLs that have been adopted by the Regional Water Board and have been approved by the State Board, Office of Administrative Law and U.S. EPA. Approved TMDL WLAs are to be addressed using water quality-based effluent limitations (WQBELs) calculated as numeric limitations (either in the receiving waters and/or at the point of MS4 discharge) and/or as BMPs. In most cases, the numeric limitation must be achieved to ensure the adequacy of the BMP program. Waste load

allocations for storm water and non-storm water discharges have been included within this Order only if the TMDL has received all necessary approvals. This Order establishes WQBELs and conditions consistent with the requirements and assumptions of the WLAs in the TMDLs as required by 40 CFR 122.44(d)(1)(vii)(B).

A TMDL is the total amount of a particular pollutant that a water body can receive and still meet Water Quality Standards (WQSs), which are comprised of Water Quality Objectives (WQOs), Beneficial Uses and the States Policy on Maintaining High Quality Waters[3]. The WQOs serve as the primary basis for protecting the associated Beneficial Use. The Numeric Target of a TMDL interprets and applies the numeric and/or narrative WQOs of the WQSs as the basis for the WLAs. This Order addresses TMDLs through Water Quality Based Effluent Limitations (WQBELs) that must be consistent with the assumptions and requirements of the WLA[4]. Federal guidance[5] states that when adequate information exists, storm water permits are to incorporate numeric water quality based effluent limitations. In most cases, the numeric target(s) of a TMDL are a component of the WQBELs. When the numeric target is based on one or more numeric WQOs, the numeric WQOs and underlying assumptions and requirements will be used in the WQBELs as numeric effluent limitations by the end of the TMDL compliance schedule, unless additional information is required. When the numeric target interprets one or more narrative WQOs, the numeric target may assess the efficacy and progress of the BMPs in meeting the WLAs and restoring the Beneficial Uses by the end of the TMDL compliance schedule.

This Order fulfills a component of the TMDL Implementation Plan adopted by this Regional Board on June 11, 2008 for indicator bacteria in Baby Beach by establishing WQBELs expressed as both BMPs to achieve the WLAs and as numeric limitations[6] for the City of Dana Point and the County of Orange. The establishment of WQBELs expressed as BMPs should be sufficient to achieve the WLA specified in the TMDL. The Waste Load Allocations (WLAs) and Numeric Targets are the necessary metrics to ensure that the BMPs achieve appropriate concentrations of bacterial indicators in the receiving waters.

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[3] State Water Resources Control Board, Resolution No. 68-16
[4] 40 CFR 122.44(d)(1)(vii)(B)
[5] USEPA, *Interim Permitting Approach for Water Quality-Based Effluent Limitations in Storm Water Permits,* 61 FR 43761, August 26, 1996
[6] The Waste Load Allocations are defined in Resolution No. R9-2008-0027, A Resolution to Adopt an Amendment to the *Water Quality Control Plan for the San Diego Basin (9)* to Incorporate Total Maximum Daily Loads for Indicator Bacteria, Baby Beach in Dana Point Harbor and Shelter Island Shoreline Park in San Diego Bay.

12. This Order requires each Copermittee to effectively prohibit all types of unauthorized discharges of non-storm water into its MS4. However, historically pollutants have been identified as present in dry weather non-storm water discharges from the MS4s through 303(d) listings, monitoring conducted by the Copermittees under Order No. R9-2002-0001, and there are others expected to be present in dry weather non-storm water discharges because of the nature of these discharges. This Order includes action levels for pollutants in non-storm water, dry weather, discharges from the MS4 designed to ensure that the requirement to effectively prohibit all types of unauthorized discharges of non-storm water in the MS4 is being complied with. Action levels in the Order are based upon numeric or narrative water quality objectives and criteria as defined in the Basin Plan, the Water Quality Control Plan for Ocean Waters of California (Ocean Plan), and the State Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California (State Implementation Policy or SIP). An exceedance of an action level requires specified responsive action by the Copermittees. This Order describes what actions the Copermittees must take when an exceedance of an action level is observed. Exceedances of non-storm water action levels do not alone constitute a violation of this Order but could indicate non-compliance with the requirement to effectively prohibit all types of unauthorized non-storm water discharges into the MS4 or other prohibitions established in this Order. Failure to undertake required source investigation and elimination action following an exceedance of 2a non-storm water action level (NAL or action level) is a violation of this Order. The Regional Board recognizes that use of action levels will not necessarily result in detection of all unauthorized sources of non-storm water discharges because there may be some discharges in which pollutants do not exceed established action levels. However, establishing NALs at levels appropriate to protect water quality standards is expected to lead to the identification of significant sources of pollutants in dry weather non-storm water discharges.

13. In addition to federal regulations cited in the Fact Sheet / Technical Report for the Order NO. R9-2009-0002, monitoring and reporting required under Order No. R9-2009-0002 is required pursuant to authority under CWC section 13383.

F. PUBLIC PROCESS

1. The Regional Board has notified the Copermittees, all known interested parties, and the public of its intent to consider adoption of an Order prescribing waste discharge requirements that would serve to renew an NPDES permit for the existing discharge of runoff.

2. The Regional Board has held public hearings on April 11, 2007, February 13, 2008, July 1, 2009, and November 18, 2009 and heard and considered all comments pertaining to the terms and conditions of this Order.

IT IS HEREBY ORDERED that the Copermittees, in order to meet the provisions contained in Division 7 of the California Water Code (CWC) and regulations adopted thereunder, and the provisions of the Clean Water Act (CWA) and regulations adopted thereunder, must each comply with the following:

A. PROHIBITIONS AND RECEIVING WATER LIMITATIONS

1. Discharges into and from municipal separate storm sewer systems (MS4s) in a manner causing, or threatening to cause, a condition of pollution, contamination, or nuisance (as defined in CWC section 13050), in waters of the state are prohibited.

2. Storm water discharges from MS4s containing pollutants which have not been reduced to the maximum extent practicable (MEP) are prohibited.[7]

3. Discharges from MS4s that cause or contribute to the violation of water quality standards (designated beneficial uses, water quality objectives developed to protect beneficial uses, and the State policy with respect to maintaining high quality waters) are prohibited.

a. Each Copermittee must comply with section A.3 and section A.4 as it applies to Prohibition 5 in Attachment A of this Order through timely implementation of control measures and other actions to reduce pollutants in storm water discharges in accordance with this Order, including any modifications. If exceedance(s) of water quality standards persist notwithstanding implementation of this Order, the Copermittee must assure compliance with section A.3 and section A.4 as it applies to Prohibition 5 in Attachment A of this Order by complying with the following procedure:

(1) Upon a determination by either the Copermittee or the Regional Board that storm water MS4 discharges are causing or contributing to an exceedance of an applicable water quality standard, the Copermittee must notify the Regional Board within 30 days and thereafter submit a report to the Regional Board that describes best management practices (BMPs) that are currently being implemented and additional BMPs that will be implemented to prevent or reduce any pollutants that are causing or contributing to the exceedance of water quality standards. The report may be incorporated in the Annual Report unless the Regional Board directs an earlier submittal. The report must include an implementation schedule. The Regional Board may require modifications to the report;

[7] This prohibition does not apply to MS4 discharges which receive subsequent treatment to reduce pollutants to the MEP prior to entering receiving waters (e.g., low flow diversions to the sanitary sewer).

(2) Submit any modifications to the report required by the Regional Board within 30 days of notification;

(3) Within 30 days following approval of the report described above by the Regional Board, the Copermittee must revise its Jurisdictional Runoff Management Program and monitoring program to incorporate the approved modified BMPs that have been and will be implemented, the implementation schedule, and any additional monitoring required; and

(4) Implement the revised Jurisdictional Runoff Management Program and monitoring program in accordance with the approved schedule.

b. The Copermittee must repeat the procedure set forth above to comply with the receiving water limitations for continuing or recurring exceedances of the same water quality standard(s) unless directed to do otherwise by the Regional Board Executive Officer.

c. Nothing in section A.3 must prevent the Regional Board from enforcing any provision of this Order while the Copermittee prepares and implements the above report.

4. In addition to the above prohibitions, discharges from MS4s are subject to all Basin Plan prohibitions cited in Attachment A to this Order.

B. NON-STORM WATER DISCHARGES

1. Each Copermittee must effectively prohibit all types of non-storm water discharges into its MS4 unless such discharges are either authorized by a separate National Pollutant Discharge Elimination System (NPDES) permit; or not prohibited in accordance with sections B.2 and B.3 below.

2. The following categories of non-storm water discharges are not prohibited unless a Copermittee or the Regional Board identifies the discharge category as a source of pollutants to waters of the U.S. Where the Copermittee(s) have identified a category as a source of pollutants, the category shall be addressed as an illicit discharge and prohibited through ordinance, order or similar means. The Regional Board may identify categories of discharge that either requires prohibition or other controls. For such a discharge category, the Copermittee, under direction of the Regional Board, must either prohibit the discharge category or develop and implement appropriate control measures to prevent the discharge of pollutants to the MS4 and report to the Regional Board pursuant to Section K.1 and K.3 of this Order.

a. Diverted stream flows;
b. Rising ground waters;
c. Uncontaminated ground water infiltration [as defined at 40 CFR 35.2005(20)] to

MS4s;

d. Uncontaminated pumped ground water[8];
e. Foundation drains[8];
f. Springs;
g. Water from crawl space pumps[8];
h. Footing drains[8];
i. Air conditioning condensation;
j. Flows from riparian habitats and wetlands;
k. Water line flushing[9,10];
l. Discharges from potable water sources not subject to NPDES Permit No. CAG679001, other than water main breaks;
m. Individual residential car washing; and
n. Dechlorinated swimming pool discharges[11].

3. Emergency fire fighting flows (i.e., flows necessary for the protection of life or property) do not require BMPs and need not be prohibited. As part of the Jurisdictional Runoff Management Plan (JRMP), each Copermittee must develop and implement a program to address pollutants from non-emergency fire fighting flows (i.e., flows from controlled or practice blazes and maintenance activities) identified by the Copermittee to be significant sources of pollutants to waters of the United States.

a. Building fire suppression system maintenance discharges (e.g. sprinkler line flushing) contain waste. Therefore, such discharges are to be prohibited by the Copermittees as illicit discharges through ordinance, order, or similar means.

4. Each Copermittee must examine all dry weather effluent analytical monitoring results collected in accordance with section F.4 of this Order and Receiving Waters and MS4 Discharge Monitoring and Reporting Program No. R9-2009-0002 to identify water quality problems which may be the result of any non-prohibited discharge category(ies) identified above in section B.2. Follow-up investigations must be conducted as necessary to identify and control, pursuant to section B.2, any non-prohibited discharge category(ies) listed above.

[8] Requires enrollment under Order R9-2008-002. Discharges into the MS4 require authorization from the owner and operator of the MS4 system.
[9] This exemption does not include fire suppression sprinkler system maintenance and testing discharges. Those discharges may be regulated under Section B.3.
[10] Requires enrollment under Order R9-2002-0020.
[11] Including saline swimming pool discharges directly to a saline water body.

C. NON-STORM WATER DRY WEATHER ACTION LEVELS

1. Each Copermittee, beginning no later than May 1, 2011, shall implement the non-storm water dry weather action level (NAL) monitoring as described in Attachment E of this Order.

2. In response to an exceedance of an NAL, each Copermittee must investigate and identify the source of the exceedance in a timely manner. However, if any Copermittee identifies exceedances of NALs that prevent them from adequately conducting source investigations in a timely manner, then the Copermittees may submit a prioritization plan and timeline that identifies the timeframe and planned actions to investigate and report their findings on all of the exceedances. Following the source investigation and identification, the Copermittees must submit an action report dependant on the source of the pollutant exceedance as follows:

a. If the Copermittee identifies the source of the exceedance as natural (non-anthropogenically influenced) in origin and in conveyance into the MS4; then the Copermittee shall report their findings and documentation of their source investigation to the Regional Board within fourteen days of the source identification.

b. If the Copermittee identifies the source of the exceedance as an illicit discharge or connection, then the Copermittees must eliminate the discharge to their MS4 and report the findings, including any enforcement action(s) taken, and documentation of the source investigation to the Regional Board within fourteen days of the source identification. If the Copermittee is unable to eliminate the source of discharge within fourteen days, then the Copermittee must submit, as part of their action report, their plan and timeframe to eliminate the source of the exceedance. Those dischargers seeking to continue such a discharge must become subject to a separate NPDES permit prior to continuing any such discharge.

c. If the Copermittee identifies the source of the exceedance as an exempted category of non-storm water discharge, then the Copermittees must determine if this is an isolated circumstance or if the category of discharges must be addressed through the prevention or prohibition of that category of discharge as an illicit discharge. The Copermittee must submit their findings in including a description of the steps taken to address the discharge and the category of discharge, to the Regional Board for review with the next subsequent annual report. Such description shall include relevant updates to or new ordinances, orders, or other legal means of addressing the category of discharge. The Copermittees must also submit a summary of their findings with the Report of Waste Discharge.

d. If the Copermittee identifies the source of the exceedance as a non-storm water discharge in violation or potential violation of an existing separate NPDES permit

(e.g. the groundwater dewatering permit), then the Copermittee must report, within three business days, the findings to the Regional Board including all pertinent information regarding the discharger and discharge characteristics.

e. If the Copermittee is unable to identify the source of the exceedance after taking and documenting reasonable steps to do so, then the Copermittee must identify the pollutant as a high priority pollutant of concern in the tributary subwatershed, perform additional focused sampling and update their programs within a year to reflect this priority. The Copermittee's annual report shall include these updates to their programs including, where applicable, updates to their watershed workplans (Section G.2), retrofitting consideration (Section F.3.d) and program effectiveness work plans (Section J.4).

f. The Copermittees or any interested party, may evaluate existing NALs and propose revised NALs for future Board consideration.

3. An exceedance of an NAL does not alone constitute a violation of the provisions of this Order, but an exceedance of an NAL may indicate lack of compliance with the requirement that Copermittees effectively prohibit all types of unauthorized non-storm water discharges into the MS4 or other prohibitions set forth in Sections A and B of this Order. Failure to timely implement required actions specified in this Order following an exceedance of an NAL constitutes a violation of this Order. However, neither compliance with NALs nor compliance with required actions following observed exceedances, excuses any non-compliance with the requirement to effectively prohibit all types of unauthorized non-storm water discharges into the MS4s or any non-compliance with the prohibitions in Sections A and B of this Order. NALs provide an assessment of the effectiveness of the prohibition of non-storm water discharges and of the appropriateness of exempted non-storm water discharges. During any annual reporting period in which one or more exceedances of NALs have been documented the Copermittee must submit with their next scheduled annual report, a report describing whether and how the observed exceedances did or did not result in a discharge form the MS4 that caused, or threatened to cause or contribute to a condition of pollution, contamination, or nuisance in the receiving waters.

4. Monitoring of effluent will occur at the end-of-pipe prior to discharge into the receiving waters, with a focus on Major Outfalls, as defined in 40 CFR 122.26(B 5-6) and Attachment E of this Order. The Copermittees must develop their monitoring plans to sample a representative percentage of major outfalls and identified stations within each hydrologic subarea. At a minimum, outfalls that exceed any NALs once during any year must be monitored in the subsequent year. Any station that does not exceed an NAL for 3 years may be replaced with a different station.

5. Each Copermittee shall monitor for the non-storm water dry weather action levels, which are incorporated into this Order as follows:

a. Action levels for discharges to inland surface waters:

Table 4.a.1: General Constituents

Parameter	Units	AMAL	MDAL	Instantaneous Maximum	Basis
Fecal Coliform	MPN/ 100 ml	200[A] 400[B]	-		BPO
Enterococci	MPN/ 100 ml	33	-	104[C]	BPO/OP
Turbidity	NTU	-	20		BPO
pH	Units	Within limit of 6.5 to 8.5 at all times			BPO
Dissolved Oxygen	mg/L	Not less than 5.0 in WARM waters and not less than 6.0 in COLD waters			BPO
Total Nitrogen	mg/L	-	1.0	See MDEL	BPO
Total Phosphorus	mg/L	-	0.1	See MDEL	BPO
Methylene Blue Active Substances	mg/L	-	0.5	See MDEL	BPO

A – Based on a minimum of not less than five samples for any 30-day period
B – No more than 10 percent of total samples may exceed 400 per 100 ml during any 30 day period
C – This Value has been set to Ocean Plan Criteria for Designated Beach Areas
BPO – Basin Plan Objective OP – Ocean Plan
MDAL – Maximum Daily Action Level AMAL – Average Monthly Action Level

Table 4.a.2: Priority Pollutants

		Freshwater (CTR)		Saltwater (CTR)	
Parameter	Units	MDAL	AMAL	MDAL	AMAL
Cadmium	ug/L	*	*	16	8
Copper	ug/L	*	*	5.8	2.9
Chromium III	ug/L	*	*	-	-
Chromium VI (hexavalent)	ug/L	16	8.1	83	41
Lead	ug/L	*	*	14	2.9
Nickel	ug/L	*	*	14	6.8
Silver	ug/L	*	*	2.2	1.1
Zinc	ug/L	*	*	95	47

CTR – California Toxic Rule
* - Action Levels developed on a case-by-case basis (see below)

The NALs for Cadmium, Copper, Chromium (III), Lead, Nickel, Silver and Zinc will be developed on a case-by-case basis because the freshwater criteria are based on site-specific water quality data (receiving water hardness). For these priority pollutants, the following equations (40 CFR 131.38.b.2) will be required:

Cadmium (Total Recoverable) = exp(0.7852[ln(hardness)] -2.715)
Chromium III (Total Recoverable) = exp(0.8190[ln(hardness)] + .6848)
Copper (Total Recoverable) = exp(0.8545[ln(hardness)] - 1.702)
Lead (Total Recoverable) = exp(1.273[ln(hardness)] - 4.705)

Nickel (Total Recoverable) = exp(.8460[ln(hardness)] + 0.0584)
Silver (Total Recoverable) = exp(1.72[ln(hardness)] - 6.52)
Zinc (Total Recoverable) = exp(0.8473[ln(hardness)] + 0.884)

b. Action levels for discharges to bays, harbors and lagoons/estuaries:

Table 4.b: General Constituents

Parameter	Units	AMAL	MDAL	Instantaneous Maximum	Basis
Total Coliform	MPN/100 ml	1,000	-	10,000	BPO
Fecal Coliform	MPN/100 ml	200[A] ,400[B]	-		BPO
Enterococci	MPN/100 ml	35	-	104[C]	BPO
Turbidity	NTU	75	-	225	OP
pH	Units	Within limit of 6.0 to 9.0 at all times			OP
Priority Pollutants	ug/L	See limitations in Table 4.a.2			

A – Based on a minimum of not less than five samples for any 30-day period
B – No more than 10 percent of total samples may exceed 400 per 100 ml during any 30 day period
C – Designated Beach Areas
OP – California Ocean Plan 2005 BPO – Basin Plan Objective
MDAL – Maximum Daily Action Level AMAL – Average Monthly Action Level

c. Action levels for discharges to the surf zone:

Table 4.c: General Constituents

Parameter	Units	AMAL	MDAL	Instantaneous Maximum	Basis
Total Coliform	MPN/100 ml	1,000	-	10,000 1,000[A]	OP
Fecal Coliform	MPN/100 ml	200[B]	-	400	OP
Enterococci	MPN/100 ml	35	-	104[C]	OP

A – Total coliform density shall not exceed 1,000 per 100 ml when the ratio of fecal/total coliform exceeds 0.1
B – During any 30 day period
C – Designated Beach Areas
OP – California Ocean Plan 2005

D. STORM WATER ACTION LEVELS

1. Beginning Year 3 after Order adoption date, a running average of twenty percent or greater of exceedances of any discharge of storm water from the MS4 to waters of the United States that exceed the Storm Water Action Levels (SALs) for the pollutants listed in Table 5 (below) will require each Copermittee to affirmatively augment and implement all necessary storm water controls and measures to reduce the discharge of the associated class of pollutants(s) to the MEP standard. The Copermittees must utilize the exceedance information when adjusting and executing annual work plans, as required by this Order. Copermittees shall take the magnitude, frequency, and number of constituents exceeding the SAL(s), in addition to receiving water quality data and other information, into consideration when reacting to SAL exceedances in an iterative manner. Failure to appropriately consider and react to SAL exceedances in an iterative manner creates a presumption that the Copermittee(s) have not complied with the MEP standard.

Table 5. Storm Water Action Levels

Pollutant	Action Level
Turbidity (NTU)	126
Nitrate & Nitrite total (mg/L)	2.6
P total (mg/L)	1.46
Cd total (µg/L)	3.0
Cu total (µg/L)	127
Pb total (µg/L)	250
Ni total (µg/L)	54
Zn total (µg/L)	976

2. The end-of-pipe assessment points for the determination of SAL compliance are all major outfalls, as defined in 40 CFR 122.26(b)(5) and (b)(6). The Copermittees must develop their monitoring plans to sample a representative percent of the major outfalls within each hydrologic subarea. At a minimum, outfalls that exceed SALs must be monitored in the subsequent year. Any station that does not exceed an SAL for 3 years may be replaced with a different station. SAL samples must be 24 hour time weighted composites.

3. The absence of SAL exceedances does not relieve the Copermittees from implementing all other required elements of this Permit.

4. This Permit does not regulate natural sources and conveyances of constituents listed in Table 5. To be relieved of the requirements to prioritize pollutant/watershed combinations for BMP updates and to continue monitoring a station, the Copermittee must demonstrate that the likely and expected cause of the SAL exceedance is not anthropogenic in nature.

5. The SALs will be reviewed and updated at the end of every permit cycle. The data collected pursuant to D.2 above can be used to create SALs based upon local data.

It is the goal of the SALs, through the iterative and MEP process, to have outfall storm water discharges meet all applicable water quality standards.

E. LEGAL AUTHORITY

1. Each Copermittee must establish, maintain, and enforce adequate legal authority to control pollutant discharges into and from its MS4 through ordinance, statute, permit, contract or similar means. Nothing herein shall authorize a Co-Permittee or other discharger regulated under the terms of this order to divert, store or otherwise impound water if such action is reasonably anticipated to harm downstream water right holders in the exercise of their water rights. This legal authority must, at a minimum, authorize the Copermittee to:

- **a.** Control the contribution of pollutants in discharges of runoff associated with industrial and construction activity to its MS4 and control the quality of runoff from industrial and construction sites. This requirement applies both to industrial and construction sites which have coverage under the statewide general industrial or construction storm water permits, as well as to those sites which do not. Grading ordinances must be updated and enforced as necessary to comply with this Order;
- **b.** Prohibit all identified illicit discharges not otherwise allowed pursuant to section B.2;
- **c.** Prohibit and eliminate illicit connections to the MS4;
- **d.** Control the discharge of spills, dumping, or disposal of materials other than storm water to its MS4;
- **e.** Require compliance with conditions in Copermittee ordinances, permits, contracts or orders (i.e., hold dischargers to its MS4 accountable for their contributions of pollutants and flows);
- **f.** Utilize enforcement mechanisms to require compliance with Copermittee storm water ordinances, permits, contracts, or orders;
- **g.** Control the contribution of pollutants from one portion of the shared MS4 to another portion of the MS4 through interagency agreements among Copermittees. Control of the contribution of pollutants from one portion of the shared MS4 to another portion of the MS4 through interagency agreements with other owners of the MS4 such as the State of California Department of Transportation, the United States Department of Defense, or Native American Tribes is encouraged;
- **h.** Carry out all inspections, surveillance, and monitoring necessary to determine compliance and noncompliance with local ordinances and permits and with this Order, including the prohibition on illicit discharges to the MS4. This means the Copermittee must have authority to enter, monitor, inspect, take measurements, review and copy records, and require regular reports from industrial facilities discharging into its MS4, including construction sites;
- **i.** Require the use of BMPs to prevent or reduce the discharge of pollutants into MS4s from storm water to the MEP; and

j. Require documentation on the effectiveness of BMPs implemented to reduce the discharge of storm water pollutants to the MS4 to the MEP.

2. Each Copermittee must submit within 365 days of adoption of this Order, a statement certified by its chief legal counsel that the Copermittee has taken the necessary steps to obtain and maintain full legal authority to implement and enforce each of the requirements contained in 40 CFR 122.26(d)(2)(i)(A-F) and this Order except for the updated requirements for low impact development and hydromodification in section F.1. Each Copermittee must submit as part of its updated SSMP, a statement certified by its chief legal counsel that the Copermittee has taken the necessary steps to obtain and maintain full legal authority to implement and enforce the low impact development and hydromodification requirements in section F.1. These statements must include:

a. Identification of all departments within the jurisdiction that conduct runoff related activities, and their roles and responsibilities under this Order. Include an up to date organizational chart specifying these departments and key personnel.
b. Citation of runoff related ordinances and the reasons they are enforceable;
c. Identification of the local administrative and legal procedures available to mandate compliance with runoff related ordinances and therefore with the conditions of this Order;
d. A description of how runoff related ordinances are implemented and appealed; and
e. Description of whether the municipality can issue administrative orders and injunctions or if it must go through the court system for enforcement actions.

F. JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM (JRMP)

Each Copermittee must implement all requirements of section F of this Order no later than 365 days after adoption of the Order, unless otherwise specified in this Order. Prior to 365 days after adoption of the Order, each Copermittee must at a minimum implement its Jurisdictional RMP document, as the document was developed and amended to comply with the requirements of Order No. R9-2002-001.
Each Copermittee must develop and implement an updated JRMP for its jurisdiction. Each updated JRMP must meet the requirements of section F of this Order, reduce the discharge of storm water pollutants from the MS4 to the MEP, and prevent runoff discharges from the MS4 from causing or contributing to a violation of water quality standards.

1. DEVELOPMENT PLANNING COMPONENT

Each Copermittee must implement a program which meets the requirements of this section and (1) reduces Development Project discharges of storm water pollutants from the MS4 to the MEP; (2) prevents Development Project discharges from the MS4 from causing or contributing to a violation of water quality standards; (3) prevents illicit discharges into the MS4; and (4) manages increases in runoff discharge rates and durations from Development Projects that are likely to cause increased erosion of stream beds and banks, silt pollutant generation, or other impacts to beneficial uses and stream habitat due to increased erosive force.

a. GENERAL PLAN

Each Copermittee must revise as needed its General Plan or equivalent plan (e.g., Comprehensive, Master, or Community Plan) for the purpose of providing effective water quality and watershed protection principles and policies that direct land-use decisions and require implementation of consistent water quality protection measures for all development and redevelopment projects.

b. ENVIRONMENTAL REVIEW PROCESS

Each Copermittee must revise as needed its current environmental review processes to accurately evaluate water quality impacts and cumulative impacts and identify appropriate measures to avoid, minimize and mitigate those impacts for all Development Projects.

c. APPROVAL PROCESS CRITERIA AND REQUIREMENTS FOR ALL DEVELOPMENT PROJECTS

For all proposed Development Projects, each Copermittee during the planning process, and prior to project approval and issuance of local permits, must prescribe the necessary requirements so that Development Project discharges of storm water pollutants from the MS4 will be reduced to the MEP, will not cause or

contribute to a violation of water quality standards, and will comply with Copermittee's ordinances, permits, plans, and requirements, and with this Order. Performance Criteria: Discharges from each approved development project must be subject to the following management measures:

(1) Source control BMPs that reduce storm water pollutants of concern in runoff, including prevention of illicit discharges into the MS4; prevention of irrigation runoff; storm drain system stenciling or signage; properly designed outdoor material storage areas; properly designed outdoor work areas; and properly designed trash storage areas;

(2) The following LID BMPs listed below shall be implemented at all Development Projects where applicable and feasible.

(a) Conserve natural areas, including existing trees, other vegetation, and soils.
(b) Construct streets, sidewalks, or parking lot aisles to the minimum widths necessary, provided that public safety is not compromised.
(c) Minimize the impervious footprint of the project.
(d) Minimize soil compaction to landscaped areas.
(e) Minimize disturbances to natural drainages (e.g., natural swales, topographic depressions, etc.)
(f) Disconnect impervious surfaces through distributed pervious areas.

(3) Buffer zones for natural water bodies, where feasible. Where buffer zones are infeasible, require project proponent to implement other buffers such as trees, access restrictions, etc;

(4) Measures necessary so that grading or other construction activities meet the provisions specified in section F.2 of this Order; and

(5) Submittal of proof of a mechanism under which ongoing long-term maintenance of all structural post-construction BMPs will be conducted.

(6) Infiltration and Groundwater Protection

To protect groundwater quality, each Copermittee must apply restrictions to the use of treatment control BMPs that are designed to primarily function as centralized infiltration devices (such as large infiltration trenches and infiltration basins). Such restrictions must be designed so that the use of such infiltration treatment control BMPs must not cause or contribute to an exceedance of groundwater quality objectives. At a minimum, each treatment control BMP designed to primarily function as a centralized infiltration device must meet the restrictions below, unless it is demonstrated that a restriction is not necessary to protect groundwater quality. The Copermittees may collectively or individually develop alternative restrictions on the use of

treatment control BMPs which are designed to primarily function as centralized infiltration devices. Alternative restrictions developed by the Copermittees can partially or wholly replace the restrictions listed below. The restrictions are not intended to be applied to small infiltration systems dispersed throughout a development project.

(a) Runoff must undergo pretreatment such as sedimentation or filtration prior to infiltration;

(b) All dry weather flows containing significant pollutant loads must be diverted from infiltration devices and treated through other BMPs;

(c) Pollution prevention and source control BMPs must be implemented at a level appropriate to protect groundwater quality at sites where infiltration treatment control BMPs are to be used;

(d) Infiltration treatment control BMPs must be adequately maintained so that they remove storm water pollutants to the MEP;

(e) The vertical distance from the base of any infiltration treatment control BMP to the seasonal high groundwater mark must be at least 10 feet. Where groundwater basins do not support beneficial uses, this vertical distance criteria may be reduced, provided groundwater quality is maintained;

(f) The soil through which infiltration is to occur must have physical and chemical characteristics (such as appropriate cation exchange capacity, organic content, clay content, and infiltration rate) which are adequate for proper infiltration durations and treatment of runoff for the protection of groundwater beneficial uses;

(g) Infiltration treatment control BMPs must not be used for areas of industrial or light industrial activity; areas subject to high vehicular traffic (25,000 or greater average daily traffic on main roadway or 15,000 or more average daily traffic on any intersecting roadway); automotive repair shops; car washes; fleet storage areas (bus, truck, etc.); nurseries; and other high threat to water quality land uses and activities as designated by each Copermittee unless first treated or filtered to remove pollutants prior to infiltration and a comprehensive site-specific evaluation has been conducted; and

(h) Infiltration treatment control BMPs must be located a minimum of 100 feet horizontally from any water supply wells.

(7) Where feasible, landscaping with native or low water species shall be preferred in areas that drain to the MS4 or to waters of the United States.

d. STANDARD STORM WATER MITIGATION PLANS (SSMPS) – APPROVAL PROCESS CRITERIA AND REQUIREMENTS FOR PRIORITY DEVELOPMENT PROJECTS

Within two years of adoption of this Order, the Copermittees must submit an updated model SSMP, to the Regional Board's Executive Officer for a 30 day public review and comment period. The Regional Board's Executive Officer has the discretion to determine the necessity of a public hearing. Within 180 days of determination that the Model SSMP is in compliance with this Permit's provisions, each Copermittee must update their own local SSMP, and amended ordinances consistent with the model SSMP, and shall submit both (local SSMP and amended ordinances) to the Regional Board. The model SSMP must meet the requirements of section F.1.d of this Order to (1) reduce Priority Development Project discharges of storm water pollutants from the MS4 to the MEP, and (2) prevent Priority Development Project runoff discharges from the MS4 from causing or contributing to a violation of water quality standards.[12]

(1) Definition of Priority Development Project (PDP):

Priority Development Projects are:

(a) All new Development Projects that fall under the project categories or locations listed in section F.1.d.(2), and

(b) Those redevelopment projects that create, add, or replace at least 5,000 square feet of impervious surfaces on an already developed site and the existing development and/or the redevelopment project falls under the project categories or locations listed in section F.1.d.(2). Where redevelopment results in an increase of less than fifty percent of the impervious surfaces of a previously existing development, and the existing development was not subject to SSMP requirements, the numeric sizing criteria discussed in section F.1.d.(6) applies only to the addition or replacement, and not to the entire development. Where redevelopment results in an increase of more than fifty percent of the impervious surfaces of a previously existing development, the numeric sizing criteria applies to

[12] Updated SSMP and hydromodification requirements must apply to all priority projects or phases of priority projects which have not yet begun grading or construction activities at the time any updated SSMP or hydromodification requirement commences. If lawful prior approval of a project exists, whereby application of an updated SSMP or hydromodification requirement to the project is illegal, the updated SSMP or hydromodification requirement need not apply to the project. Updated Development Planning requirements set forth in Sections F.1. (a) through (h) of this Order must apply to all projects or phases of projects, unless, at the time any updated Development Planning requirement commences, the projects or project phases meet any one of the following conditions: (i) the project or phase has begun grading or construction activities; or (ii) a Copermittee determines that lawful prior approval rights for a project or project phase exist, whereby application of the Updated Development Planning requirement to the project is legally infeasible. Where feasible, the Permittees must utilize the SSMP and hydromodification update periods to ensure that projects undergoing approval processes include application of the updated SSMP and hydromodification requirements in their plans.

the entire development.

(c) One acre threshold: In addition to the Priority Development Project Categories identified in section F.1.d.(2), Priority Development Projects must also include all other pollutant-generating Development Projects that result in the disturbance of one acre or more of land within three years of adoption of this Order.[13] As an alternative to this one-acre threshold, the Copermittees may collectively identify a different threshold, provided the Copermittees' threshold is at least as inclusive of Development Projects as the one-acre threshold.

(2) Priority Development Project Categories

Where a new Development Project feature, such as a parking lot, falls into a Priority Development Project Category, the entire project footprint is subject to SSMP requirements.

(a) New development projects that create 10,000 square feet or more of impervious surfaces (collectively over the entire project site) including commercial, industrial, residential, mixed-use, and public projects. This category includes development projects on public or private land which fall under the planning and building authority of the Copermittees.

(b) Automotive repair shops. This category is defined as a facility that is categorized in any one of the following Standard Industrial Classification (SIC) codes: 5013, 5014, 5541, 7532-7534, or 7536-7539.

(c) Restaurants. This category is defined as a facility that sells prepared foods and drinks for consumption, including stationary lunch counters and refreshment stands selling prepared foods and drinks for immediate consumption (SIC code 5812), where the land area for development is greater than 5,000 square feet. Restaurants where land development is less than 5,000 square feet must meet all SSMP requirements except for structural treatment BMP and numeric sizing criteria requirement F.1.d.(6) and hydromodification requirement F.1.h.

(d) All hillside development greater than 5,000 square feet. This category is defined as any development which creates 5,000 square feet of impervious surface which is located in an area with known erosive soil conditions, where the development will grade on any natural slope that is twenty-five percent or greater.

(e) Environmentally Sensitive Areas (ESAs). All development located within or directly adjacent to or discharging directly to an ESA (where discharges

[13] Pollutant generating Development Projects are those projects that generate pollutants at levels greater than natural background levels.

from the development or redevelopment will enter receiving waters within the ESA), which either creates 2,500 square feet of impervious surface on a proposed project site or increases the area of imperviousness of a proposed project site to 10 percent or more of its naturally occurring condition. "Directly adjacent" means situated within 200 feet of the ESA. "Discharging directly to" means outflow from a drainage conveyance system that is composed entirely of flows from the subject development or redevelopment site, and not commingled with flows from adjacent lands.

(f) Parking lots 5,000 square feet or more or with 15 or more parking spaces and potentially exposed to runoff. Parking lot is defined as a land area or facility for the temporary parking or storage of motor vehicles used personally, for business, or for commerce.

(g) Street, roads, highways, and freeways. This category includes any paved surface that is 5,000 square feet or greater used for the transportation of automobiles, trucks, motorcycles, and other vehicles.

(h) Retail Gasoline Outlets (RGOs). This category includes RGOs that meet the following criteria: (a) 5,000 square feet or more or (b) a projected Average Daily Traffic (ADT) of 100 or more vehicles per day.

(3) Pollutants of Concern

As part of its local SSMP, each Copermittee must implement an updated procedure for identifying pollutants of concern for each Priority Development Project. The procedure must address, at a minimum: (1) Receiving water quality (including pollutants for which receiving waters are listed as impaired under CWA section 303(d)); (2) Land-use type of the Development Project and pollutants associated with that land use type; and (3) Pollutants expected to be present on site.

(4) Low Impact Development BMP Requirements

Each Copermittee must require each Priority Development Project to implement LID BMPs which will collectively minimize directly connected impervious areas, limit loss of existing infiltration capacity, and protect areas that provide important water quality benefits necessary to maintain riparian and aquatic biota, and/or are particularly susceptible to erosion and sediment loss.

(a) The following LID BMPs must be implemented:

(i) Each Copermittee must require LID BMPs or make a finding of infeasibility for each Priority Development Project in accordance with the LID waiver program in Section F.1.d.(8);

(ii) Each Copermittee must incorporate formalized consideration, such as thorough checklists, ordinances, and/or other means, of LID BMPs into the plan review process for Priority Development Projects;

(iii) The review of each Priority Development Project must include an assessment of potential collection of storm water for on-site or off-site reuse opportunities;

(iv) The review of each Priority Development Project must include an assessment of techniques to infiltrate, filter, store, evaporate, or retain runoff close to the source of runoff; and

(v) Within 2 years after adoption of this Order, each Copermittee must review its local codes, policies, and ordinances and identify barriers therein to implementation of LID BMPs. Following the identification of these barriers to LID implementation, where feasible, the Copermittee must take, by the end of the permit cycle, appropriate actions to remove such barriers.

(b) The following LID BMPs must be implemented at all Priority Development Projects where technically feasible as required below:

(i) Maintain or restore natural storage reservoirs and drainage corridors (including depressions, areas of permeable soils, swales, and ephemeral and intermittent streams.

(ii) Projects with landscaped or other pervious areas must, where feasible, drain runoff from impervious areas (rooftops, parking lots, sidewalks, walkways, patios, etc) into pervious areas prior to discharge to the MS4. The amount of runoff from impervious areas that is to drain to pervious areas shall not exceed the total capacity of the project's pervious areas to infiltrate or treat runoff, taking into consideration the pervious areas' geologic and soil conditions, slope, and other pertinent factors.

(iii) Projects with landscaped or other pervious areas must, where feasible, properly design and construct the pervious areas to effectively receive and infiltrate or treat runoff from impervious areas, prior to discharge to the MS4. Soil compaction for these areas shall be minimized. The amount of the impervious areas that are to drain to pervious areas must be based upon the total size, soil conditions, slope, and other pertinent factors.

(iv) Projects with low traffic areas and appropriate soil conditions must construct walkways, trails, overflow parking lots, alleys, or other low-traffic areas with permeable surfaces, such as pervious concrete, porous asphalt, unit pavers, and granular materials.

(c) To protect ground water resources any infiltration LID BMPs must comply with Section F.1.(c)(6).

(d) LID BMPs sizing criteria:

(i) LID BMPs shall be sized and designed to ensure onsite retention without runoff, of the volume of runoff produced from a 24-hour 85th percentile storm event, as determined from the County of Orange's 85th Percentile Precipitation Map[14] ("design capture volume");

(ii) If onsite retention LID BMPs are technically infeasible per section F.1.d.(7)(b), LID biofiltration BMPs may treat any volume that is not retained onsite by the LID BMPs. The LID biofiltration BMPs must be designed for an appropriate surface loading rate to prevent erosion, scour and channeling within the BMP. Due to the flow through design of biofiltration BMPs, the total volume of the BMP, including pore spaces and prefilter detention volume, must be sized to hold at least 0.75 times the design storm volume that is not retained onsite by LID retention BMPs;

(iii) If it is shown to be technically infeasible to treat the remaining volume up to and including the design capture volume using LID BMPs (retention or biofiltration), the project must implement conventional treatment control BMPs in accordance with Section F.1.d.(6) below and must participate in the LID waiver program in Section F.1.d.(7).

(e) All LID BMPs shall be designed and implemented with measures to avoid the creation of nuisance or pollution associated with vectors, such as mosquitoes, rodents, and flies.

(5) Source Control BMP Requirements

Each Copermittee must require each Priority Development Project to implement source control BMPs. The source control BMPs to be required must:

(a) Prevent illicit discharges into the MS4;
(b) Minimize storm water pollutants of concern in runoff;
(c) Eliminate irrigation runoff;
(d) Include storm drain system stenciling or signage;
(e) Include properly designed outdoor material storage areas;
(f) Include properly designed outdoor work areas;
(g) Include properly designed trash storage areas;
(h) Include water quality requirements applicable to individual priority project categories.

[14] The isopluvial map is available from the County of Orange. The map can also be found as Figure A-1 Exhibit 7.II in the Model WQMP (September 2003), page 5 of 57 at http://www.ocwatersheds.com/documents/2003_DAMP_Exhibit_7_II_Model_WQMP_Attachments.pdf

(6) Treatment Control BMP Requirements[15]

Each Copermittee must require each Priority Development Project to implement treatment control BMPs that meet the following requirements:

(a) All treatment control BMPs for a single Priority Development Project must collectively be sized to comply with the following numeric sizing criteria:

(i) Volume-based treatment control BMPs must be designed to mitigate (infiltrate, filter, or treat) the volume of runoff produced from a 24-hour 85th percentile storm event, as determined from the County of Orange's 85th Percentile Precipitation Isopluvial Map[16]; or

(ii) Flow-based treatment control BMPs must be designed to mitigate (infiltrate, filter, or treat) either: a) the maximum flow rate of runoff produced from a rainfall intensity of 0.2 inch of rainfall per hour, for each hour of a storm event; or b) the maximum flow rate of runoff produced by the 85th percentile hourly rainfall intensity (for each hour of a storm event), as determined from the local historical rainfall record, multiplied by a factor of two.

(b) Treatment control BMPs for all Priority Development Projects must mitigate (treat through infiltration, settling, filtration or other unit processes) the required volume or flow of runoff from all developed portions of the project, including landscaped areas.

(c) All treatment control BMPs must be located so as to remove pollutants from runoff prior to its discharge to any waters of the U.S. Multiple Priority Development Projects may use shared treatment control BMPs as long as construction of any shared treatment control BMP is completed prior to the use or occupation of any Priority Development Project from which the treatment control BMP will receive runoff.

(d) All treatment control BMPs for Priority Development Projects must, at a minimum:

(i) Be ranked with high or medium pollutant removal efficiency for the project's most significant pollutants of concern, as the pollutant removal efficiencies are identified in the Copermittees' Model

[15] This section only applies to those PDPs not implementing LID capable of meeting the design storm criteria for the entire site and meeting technical infeasibility eligibility. Low-Impact Development (LID) and other site design BMPs that are correctly designed to effectively remove pollutants from runoff are considered treatment control BMPs.

[16] The isopluvial map is available from the County of Orange. The map can also be found as Figure A-1 Exhibit 7.II in the Model WQMP (September 2003), page 105 of 157 at http://www.ocwatersheds.com/StormWater/PDFs/2003_DAMP/2003_DAMP_Section_7_New_Development_Significant_Redevelopment.pdf.

SSMP. Treatment control BMPs with a low removal efficiency ranking must only be approved by a Copermittee when a feasibility analysis has been conducted which exhibits that implementation of treatment control BMPs with high or medium removal efficiency rankings are infeasible for a Priority Development Project or portion of a Priority Development Project.

(ii) Be correctly sized and designed so as to remove storm water pollutants to the MEP.

(e) Target removal of pollutants of concern from runoff.

(f) Be implemented close to pollutant sources, and prior to discharging into waters of the U.S.

(g) Not be constructed within a waters of the U.S. or waters of the State.

(h) Include proof of a mechanism under which ongoing long-term maintenance will be conducted to ensure proper maintenance for the life of the project. The mechanisms may be provided by the project proponent or Copermittee.

(i) Be designed and implemented with measures to avoid the creation of nuisance or pollution associated with vectors, such as mosquitoes, rodents, and flies.

(7) Low Impact Development (LID) BMP Waiver Program

The Copermittees must develop, collectively or individually, a LID waiver program for incorporation into local SSMPs, which would allow a Priority Development Project to substitute implementation of all or a portion of required LID BMPs in section F.1.d(4) with implementation of treatment control BMPs and a mitigation project, payment into an in-lieu funding program, and/or watershed equivalent BMP(s) consistent with Section F.1.d.(11). The Copermittees shall submit the LID waiver program as part of their updated model SSMP. At a minimum, the program must meet the requirements below:

(a) Prior to implementation, the LID waiver program must clearly exhibit that it will not allow PDPs to result in a net impact (after consideration of any mitigation and in-lieu payments) from pollutant loadings over and above the impact caused by projects meeting LID requirements;

(b) For each PDP participating, a technical feasibility analysis must be included demonstrating that it is technically infeasible to implement LID BMPs that comply with the requirements of Section F.1.(d)(4). The

Copermittee(s) must develop criteria for the technical feasibility analysis including a cost benefit analysis, examination of LID BMPs considered and alternatives chosen. Each PDP participating must demonstrate that LID BMPs were implemented as much as feasible given the site's unique conditions. Analysis must be made of the pollutant loading for each project participating in the LID substitution program. The estimated impacts from not implementing the required LID BMPs in section F.1.d.(4) must be fully mitigated. Technical infeasibility may result from conditions including, but not limited to:

(i) Locations that cannot meet the infiltration and groundwater protection requirements in section F.1.c.(6). Where infiltration is technically infeasible, the project must still examine the feasibility of other onsite retention LID BMPs;
(ii) Smart growth and infill or redevelopment locations where the density and/or nature of the project would create significant difficulty for compliance with the onsite volume retention requirements; and
(iii) Other site, geologic, soil or implementation constraints identified in the Copermittees updated local SSMP document.

(c) The LID waiver program must include mechanisms to verify that each Priority Development Project participating in the program is in compliance with all applicable SSMP requirements;

(d) The LID waiver program must develop and implement a review process verifying that the BMPs to be implemented meet the designated design criteria. The review process must also verify that each Priority Development Project participating in the program is in compliance with all applicable SSMP requirements.

(e) The LID waiver program must include performance standards for treatment control BMPs specified in compliance with section F.1.(d)(6).

(f) Each PDP that participates in the LID waiver program must mitigate for the pollutant loads expected to be discharged due to not implementing the LID BMPs in section F.1.d.(4). Mitigation projects must be implemented within the same hydrologic subarea as the PDP. Mitigation projects outside of the hydrologic subarea but within the same hydrologic unit may be approved provided that the project proponent demonstrates that mitigation projects within the same hydrologic subarea are infeasible and that the mitigation project will address similar beneficial use impacts as expected from the PDPs pollutant load types and amount. Offsite mitigation projects may include green streets projects, existing development retrofit projects, retrofit incentive programs, regional BMPs and stream restoration. Project applicants seeking to utilize these

alternative compliance provisions may propose other offsite mitigation projects, which the Copermittees may approve if they meet the requirements of this subpart.

(g) A Copermittee may choose to implement a pollutant credit system as part of the LID waiver program provided that such a credit system clearly exhibits that it will not allow PDPs to result in a net impact from pollutant loadings over and above the impact caused by projects meeting LID requirements. Any credit system that a Copermittee chooses to implement must be submitted to the Executive Officer for review and approval as part of the waiver program.

(h) The LID waiver program shall include a storm water mitigation fund developed by the Copermittee(s) to be used for water quality improvement projects which may serve in lieu of the PDP's required mitigation in section F.1.d.(8)(e). The LID waiver program's storm water mitigation fund shall, at a minimum, identify;

(i) The entity or entities that will manage the storm water mitigation fund (i.e., assume full responsibility);
(ii) The range and types of acceptable projects for which storm water mitigation funds may be expended;
(iii) The entity or entities that will assume full responsibility for each water quality improvement project, including its successful completion; and
(iv) How the dollar amount of storm water mitigation fund contributions will be determined. In-lieu payments must be proportional to the additional pollutant load discharged by not fully implementing LID.

(i) Each Copermittee must notify the Regional Board in their annual report of each PDP choosing to participate in the LID waiver program. The annual report must include the following information:

(i) Name of the developer of the participating PDP;
(ii) Site location;
(iii) Reason for LID waiver including technical feasibility analysis;
(iv) Description of BMPs implemented;
(v) Total amount deposited, if any, into the storm water mitigation fund described in section F.1.d.(8)(f);
(vi) Water quality improvement project(s) proposed to be funded; and
(vii) Timeframe for implementation of water quality improvement projects.

(8) <u>Site Design and Treatment Control BMP Design Standards</u>

As part of its local SSMP, each Copermittee must develop and require Priority

Development Projects to implement sitting, design, and maintenance criteria for each site design and treatment control BMP listed in its local SSMP to determine feasibility and applicability and so that implemented site design and treatment control BMPs are constructed correctly and are effective at pollutant removal, runoff control, and vector minimization. LID techniques, such as soil amendments, must be incorporated into the criteria for appropriate treatment control BMPs. Development of BMP design worksheets which can be used by project proponents is encouraged.

(9) Implementation Process

As part of its local SSMP, each Copermittee must implement a process to verify compliance with SSMP requirements. The process must identify at what point in the planning process Priority Development Projects will be required to meet SSMP requirements and at a minimum, the Priority Development Project must implement the required post-construction BMPs prior to occupancy and/or the intended use of any portion of that project. The process must also include identification of the roles and responsibilities of various municipal departments in implementing the SSMP requirements, as well as any other measures necessary for the implementation of SSMP requirements.

(10) Treatment BMP Review

(a) The Copermittees must review and update the BMPs that are listed in their local SSMPs as options for treatment control during the third year of implementation of this Order. At a minimum, the update must include removal of obsolete or ineffective BMPs and addition of LID BMPs that can be used for treatment, such as bioretention cells, bioretention swales, etc. The update must also add appropriate LID BMPs to any tables or discussions in the local SSMPs addressing pollutant removal efficiencies of treatment control BMPs. In addition, the update must include review and revision where necessary of treatment control BMP pollutant removal efficiencies.

(b) The update must incorporate findings from BMP effectiveness studies conducted by the Copermittees for projects funded wholly or in part by the State Board or Regional Board.

(c) Each Copermittee must implement a mechanism for annually incorporating findings from local treatment BMP effectiveness studies (e.g., ones conducted by, or on-behalf of, public agencies in Orange County) into SSMP project reviews and permitting

(11) Where a development project, greater than 100 acres in total project size or smaller than 100 acres in size yet part of a larger common plan of

development that is over 100 acres, has been prepared using watershed and/or sub-watershed based water quality, hydrologic, and fluvial geomorphologic planning principles that implement regional LID BMPs in accordance with the sizing and location criteria of this Order and acceptable to the Regional Board, such standards shall govern review of projects with respect to Section F.1 of this Order and shall be deemed to satisfy this Order's requirements for LID site design, buffer zone, infiltration and groundwater protection standards, source control, treatment control, and hydromodification control standards. Regional BMPs must clearly exhibit that they will not result in a net impact from pollutant loadings over and above the impact caused by capture and retention of the design storm. Regional BMPs may be used provided that the BMPs capture and retain the volume of runoff produced from the 24-hour 85th percentile storm event as defined in section F.1.d.(6)(a)(i) and that such controls are located upstream of receiving waters. Any volume that is not retained by the LID BMPs, up to the design capture volume, must be treated using LID biofiltration. Where regional LID implementation has been shown to be technically infeasible (per section F.1.d.7.b) any volume up to and including the design capture volume, not retained by LID BMPs, nor treated by LID biofiltration, must be treated using conventional treatment control BMPs in accordance with Section F.1.d.(6) and participation in the LID waiver program in Section F.1.d.(7).

e. BMP CONSTRUCTION VERIFICATION

Prior to occupancy and/or intended use of any portion of the Priority Development Project subject to SSMP requirements, each Copermittee must inspect the constructed site design, source control, and treatment control BMPs to verify that they have been constructed and are operating in compliance with all specifications, plans, permits, ordinances, and this Order.

f. BMP MAINTENANCE TRACKING

(1) Each Copermittee must develop and maintain a watershed-based database to track and inventory all approved post-construction BMPs and BMP maintenance within its jurisdiction since July 2001. LID BMPs implemented on a lot by lot basis at a single family residential home, such as rainbarrels, are not required to be tracked or inventoried. At a minimum, the database must include information on BMP type, location, watershed, date of construction, party responsible for maintenance, maintenance certifications or verifications, inspections, inspection findings, and corrective actions, including whether the site was referred to the Vector Control District.

(2) Each Copermittee must establish a mechanism not only to track post-construction BMPs, but also to ensure that appropriate easements and ownerships are properly recorded in public records and the information is

conveyed to all appropriate parties when there is a change in project or site ownership.

(3) Each Copermittee must verify that approved post-construction BMPs are operating effectively and have been adequately maintained by implementing the following measures:

(a) An annual inventory of all approved BMPs within the Copermittee's jurisdiction. LID BMPs implemented on a lot by lot basis at a single family residential home, such as rainbarrels, are not required to be tracked or inventoried. The inventory must also include all BMPs approved for Priority Development Projects since July 2001;

(b) The designation of high priority BMPs. High-priority designation must include consideration of BMP size, recommended maintenance frequency, likelihood of operational and maintenance issues, location, receiving water quality, and other pertinent factors;

(c) Verify implementation, operation, and maintenance of BMPs by inspection, self-certification, surveys, or other equally effective approaches with the following conditions:

(i) The implementation, operation, and maintenance of at least 90 percent of approved and inventoried final project public and private SSMPs (a.k.a. WQMPs) must be verified annually. All post-construction BMPs shall be verified within every four year period;
(ii) Operation and maintenance verifications must be required prior to each rainy season;
(iii) All (100 percent) projects with BMPs that are high priority must be inspected by the Copermittee annually prior to each rainy season;
(iv) All (100 percent) public agency projects with BMPs must be inspected by the Copermittee annually;
(v) At least 50 percent of projects with drainage insert treatment control BMPs must be inspected by the Copermittee annually;
(vi) Appropriate follow-up measures (including re-inspections, enforcement, maintenance, etc.) must be conducted to ensure the treatment BMPs continue to reduce storm water pollutants as originally designed;
(vii) All inspections must verify effective operation and maintenance of the treatment control BMPs, as well as compliance with all ordinances, permits, and this Order; and

(viii) Inspections must note observations of vector conditions, such as mosquitoes. Where conditions are identified as contributing to mosquito production, the Copermittee must notify the Orange County Vector Control District.

g. ENFORCEMENT OF DEVELOPMENT SITES

Each Copermittee must enforce its storm water ordinance for all Development Projects and at all development sites as necessary to maintain compliance with this Order. Copermittee ordinances or other regulatory mechanisms must include appropriate sanctions to achieve compliance. Sanctions must include the following or their equivalent: Non-monetary penalties, fines, bonding requirements, and/or permit or occupancy denials for non-compliance.

h. HYDROMODIFICATION – LIMITATIONS ON INCREASES OF RUNOFF DISCHARGE RATES AND DURATIONS[17]

Each Copermittee shall collaborate with the other Copermittees to develop and implement a Hydromodification Management Plan (HMP) to manage increases in runoff discharge rates and durations from all Priority Development Projects. The HMP shall be incorporated into the local SSMP and implemented by each Copermittee so that estimated post-project runoff discharge rates and durations shall not exceed pre-development discharge rates and durations. Where the proposed project is located on an already developed site, the pre-project discharge rate and duration shall be that of the pre-developed, naturally occurring condition. The HMP shall be submitted to the Executive Officer within 2 years of permit adoption. The HMP will be made available for public review and comment and the Executive Officer will determine the need for a public hearing.

(1) The HMP must:

(a) Identify a method for assessing susceptibility of channel segments which receive runoff discharges from Priority Development Projects. The geomorphic stability within the channel shall be assessed. A performance standard shall be created that ensures that the geomorphic stability within the channel not be compromised as a result of receiving runoff discharges from Priority Development Projects.

(b) Utilize continuous simulation of the entire rainfall record (or other analytical method proposed by the Copermittees and deemed acceptable

[17] Updated SSMP and hydromodification requirements shall apply to all priority projects or phases of priority projects which have not yet begun grading or construction activities at the time any updates SSMP or hydromodification requirement commences. If a Copermittee determines that lawful prior approval of a project exists, whereby application of an updated SSMP or hydromodification requirement to the project is legally infeasible, the updated SSMP or hydromodification requirement need not apply to the project. The Copermittees shall utilize the SSMP and hydromodification update periods to ensure that projects undergoing approval processes include application of the updated SSMP and hydromodification requirements in their plans.

by the Regional Board) to identify a range of runoff flows[18] for which priority Development Project post-project runoff flow rates and durations shall not exceed pre-development (naturally occurring) runoff flow rates and durations by more than 10 percent, where the increased flow rates and durations will result in increased potential for erosion or other significant adverse impacts to beneficial uses. In addition, the identified range of runoff flow rates and durations must compensate for the loss of sediment supply due to the development. The lower boundary of the range of runoff flows identified shall correspond with the critical channel flow that produces the critical shear stress that initiates channel bed movement or that erodes the toe of channel banks. The identified range of runoff flows may be different for specific watersheds, channels, or channel reaches. In the case of an artificially hardened (concrete lined, rip rap, etc.) channel, the lower boundary of the range of runoff flows identified shall correspond with the critical channel flow that produces the critical shear stress that initiates channel bed movement or that erodes the toe of channel banks of a comparable soft-bottomed channel.

(c) Require Priority Development Projects to implement hydrologic control measures so that Priority Development Projects' post-project runoff flow rates and durations (1) do not exceed pre-project (naturally occurring) runoff flow rates and durations by more than 10 percent for the range of runoff flows identified under section F.1.h.(1)(b), where the increased flow rates and durations will result in increased potential for erosion or other significant adverse impacts to beneficial uses; (2) do not result in channel conditions which do not meet the channel standard developed under section F.1.h.(1)(a) for channel segments downstream of Priority Development Project discharge points; and (3) compensate for the loss of sediment supply due to development.

(d) Include other performance criteria (numeric or otherwise) for Priority Development Projects as necessary to prevent runoff from the projects from increasing and/or continuing unnatural rates of erosion of channel beds and banks, silt pollutants generation, or other impacts to beneficial uses and stream habitat due to increased erosive force.

(e) Include a review of pertinent literature.

(f) Identify areas within the San Juan Hydrologic Unit where historic hydromodification has resulted in a negative impact to benthic macroinvertebrate and benthic periphyton by identifying areas with low or very low Index of Biotic Integrity (IBI) scores.

[18] The identified range of runoff flows to be controlled should be expressed in terms of peak flow rates of rainfall events, such as "10% of the pre-development 2-year runoff event up to the pre-project 10-year runoff event."

(g) Include a protocol to evaluate potential hydrograph change impacts to downstream watercourses from Priority Development Projects. This protocol must include the use of the IBI score as a metric for assessing impacts and improvements to downstream watercourses.

(h) Include a description of how the Copermittees will incorporate the HMP requirements into their local approval processes.

(i) Include criteria on selection and design of management practices and measures (such as detention, retention, and infiltration) to control flow rates and durations and address potential hydromodification impacts.

(j) Include technical information supporting any standards and criteria proposed.

(k) Include a description of inspections and maintenance to be conducted for management practices and measures to control flow rates and durations and address potential hydromodification impacts.

(l) Include a description of pre- and post-project monitoring and other program evaluation, including IBI score, to be conducted to assess the effectiveness of implementation of the HMP.

(m) Include mechanisms for assessing and addressing cumulative impacts within a watershed on channel morphology.

(n) Include information on evaluation of channel form and condition, including slope, discharge, vegetation, underlying geology, and other information, as appropriate.

(2) In addition to the hydrologic control measures that must be implemented per section F.1.h.(1)(c), the HMP must include a suite of management measures to be used on Priority Development Projects to protect and restore downstream beneficial uses and prevent or further prevent adverse physical changes to downstream channels. The measures must be based on a prioritized consideration of the following elements in this order:

(a) Hydrologic control measures;
(b) On-site management controls;
(c) Regional controls located upstream of receiving waters; and
(d) In-stream controls.

Where stream channels are adjacent to, or are to be modified as part of a Priority Development Project, management measures must include buffer zones and setbacks. Under no circumstances will in-stream controls include the use of non-naturally occurring hardscape materials such as concrete,

riprap, gabions, etc. The suite of management measures shall also include stream restoration as a viable option to achieve the channel standard in section F.1.h.(1)(a).

(3) Each individual Copermittee has the discretion to not require Section F.1.h. at Priority Development Projects where the project:

(a) Discharges storm water runoff into underground storm drains discharging directly to bays or the ocean; or
(b) Discharges storm water runoff into conveyance channels whose bed and bank are concrete lined all the way from the point of discharge to ocean waters, enclosed bays, estuaries, or water storage reservoirs and lakes.

(4) HMP Reporting and Implementation

(a) Within 2 years of adoption of the Order, the Copermittees shall submit to the Regional Board a draft HMP that has been reviewed by the public, including the analysis that identifies the appropriate limiting range of flow rates per section F.1.h.(1)(b).

(b) Within 180 days of receiving Regional Board comments on the draft HMP, the Copermittees shall submit a final HMP that addressed the Regional Board's comments.

(c) Within 90 days of receiving a finding of adequacy from the Executive Officer, each Copermittee shall incorporate and implement the HMP for all Priority Development Projects.

(d) Prior to approval of the HMP by the Regional Board, the early implementation measures likely to be included in the HMP shall be encouraged by the Copermittees.

(5) <u>Interim Hydromodification Criteria</u>

Within one year of adoption of this Order, each Copermittee must ensure that all Priority Development Projects are implementing the following criteria by comparing the pre-development (naturally occurring) and post-project flow rates and durations using a continuous simulation hydrologic model such as US EPA's Hydrograph Simulation Program-Fortran (HSPF):

(a) For flow rates from 10 percent of the 2-year storm event to the 5 year storm event, the post-project peak flows shall not exceed pre-development (naturally occurring) peak flows.

(b) For flow rates from the 5 year storm event to the 10 year storm event the post-project peak flows may exceed pre-development (naturally

occurring) flows by up to 10 percent for a 1-year frequency interval.

The interim hydromodification criteria do not apply to Priority Development Projects where the project discharges (1) storm water runoff into underground storm drains discharging directly to bays or the ocean, or (2) storm water runoff into conveyance channels whose bed and bank are concrete lined all the way from the point of discharge to ocean waters, enclosed bays, estuaries, or water storage reservoirs and lakes.

Within one year of adoption of this Order, each Copermittee must submit a signed, certification statement to the Regional Board verifying implementation of the interim hydromodification criteria.

(6) No part of section F.1.h shall alleviate the Copermittees responsibilities for implementing Low Impact Development BMPs as required under section F.1.d.(4).

i. TRAINING AND EDUCATION

(1) Municipal Departments and Personnel Education

Municipal Development Planning: Each Copermittee must implement an education program so that its planning and development review staffs and contractors (and Planning Boards and Elected Officials, if applicable) have an understanding of:

(a) Federal, State, and local water quality laws and regulations applicable to Development Projects;

(b) The connection between land use decisions and short and long-term water quality impacts (i.e., impacts from land development and urbanization); and

(c) Methods of minimizing impacts to receiving water quality resulting from development, including:

(i) Storm water management plan development and review;
(ii) Local sensitive water bodies, including 303(d)-impairments and ESAs;
(iii) Methods to control downstream erosion impacts;
(iv) Identification of pollutants of concern;
(v) Site design BMP techniques;
(vi) Source control BMPs;
(vii) Selection of the most effective treatment control BMPs for the pollutants of concern; and
(viii) Public heath concerns related to storm water management infrastructure.

(2) Project Applicants, Developers, Contractors, Property Owners, and other Responsible Parties

(a) Each Copermittee must implement a New Development / Redevelopment education program using all media as appropriate to:

(i) Measurably increase the knowledge of the target communities regarding MS4s, impacts of runoff on receiving waters, and potential BMP solutions for the target audience; and
(ii) To measurably change the behavior of target communities and thereby reduce pollutant releases to MS4s and the environment.

(b) Each Copermittee must educate each target community on the following topics where appropriate:

(i) The importance of educating all construction workers in the field about storm water issues and BMPs though formal or informal training;
(ii) Federal, State, and local water quality laws and regulations applicable to new development and redevelopment activities;
(iii) Site design, source control, pollution prevention, and treatment BMPs;
(iv) General runoff concepts; and
(v) Other topics of local importance, including local water quality conditions, impaired waterbodies and environmentally sensitive areas.

2. CONSTRUCTION COMPONENT

Each Copermittee must implement a construction program which meets the requirements of this section, prevents illicit discharges into the MS4, implements and maintains structural and non-structural BMPs to reduce pollutants in storm water runoff from construction sites to the MS4, reduces construction site discharges of storm water pollutants from the MS4 to the MEP, and prevents construction site discharges from the MS4 from causing or contributing to a violation of water quality standards.

a. ORDINANCE UPDATE

Within 365 days of adoption of this Order, each Copermittee must review and update its grading ordinances and other ordinances as necessary to achieve full compliance with this Order, including requirements for the implementation of all designated BMPs and other measures.

b. SOURCE IDENTIFICATION

Each Copermittee must maintain an updated watershed based inventory of all construction sites within its jurisdiction. The use of an automated database system, such as Geographical Information Systems (GIS) is required.

c. Site Planning and Project Approval Process

Each Copermittee must incorporate consideration of potential water quality impacts prior to approval and issuance of construction and grading permits.

(1) Each construction and grading permit must require proposed construction sites to implement designated BMPs and other measures so that illicit discharges into the MS4 are prevented and storm water pollutants discharged from the site will be reduced to the maximum extent practicable and will not cause or contribute to a violation of water quality standards.

(2) Prior to permit issuance, the project proponent's runoff management plan (or equivalent construction BMP plan) must be required to comply, and reviewed to verify compliance, with the local grading ordinance, other applicable local ordinances, and this Order.

(3) Prior to permit issuance, each Copermittee must verify that project proponents subject to California's statewide General NPDES Permit for Storm Water Discharges Associated With Construction Activities, (hereinafter General Construction Permit), have existing coverage under the General Construction Permit.

d. BMP Implementation

(1) Designate BMPs: Each Copermittee must designate a minimum set of BMPs and other measures to be implemented at all construction sites. The designated minimum set of BMPs must include:

(a) Management Measures:

(i) Pollution prevention, where appropriate;
(ii) Development and implementation of a site-specific runoff management plan;
(iii) Minimization of areas that are cleared and graded to only the portion of the site that is necessary for construction;
(iv) Minimization of exposure time of disturbed soil areas;
(v) Minimization of grading during the wet season and correlation of grading with seasonal dry weather periods to the extent feasible;
(vi) Limitation of grading to a maximum disturbed area as determined by each Copermittee before either temporary or permanent erosion controls are implemented to prevent storm water pollution. The Copermittee has the option of temporarily increasing the size of

disturbed soil areas by a set amount beyond the maximum, if the individual site is in compliance with applicable storm water regulations and the site has adequate control practices implemented to prevent storm water pollution;

(vii) Temporary stabilization and reseeding of disturbed soil areas as rapidly as feasible;
(viii) Wind erosion controls;
(ix) Tracking controls;
(x) Non-stormwater management measures to prevent illicit discharges and control storm water pollution sources;
(xi) Waste management measures;
(xii) Preservation of natural hydrologic features where feasible;
(xiii) Preservation of riparian buffers and corridors where feasible;
(xiv) Evaluation and maintenance of all BMPs, until removed; and
(xv) Retention, reduction, and proper management of all storm water pollutant discharges on site to the MEP standard.

(b) Erosion and Sediment Controls:

(i) Erosion prevention. Erosion prevention is to be used as the most important measure for keeping sediment on site during construction;
(ii) Sediment controls. Sediment controls are to be used as a supplement to erosion prevention for keeping sediment on-site during construction;
(iii) Slope stabilization must be used on all active slopes during rain events regardless of the season and on all inactive slopes during the rainy season and during rain events in the dry season; and
(iv) Permanent revegetation or landscaping as early as feasible.

(c) Designate enhanced BMPs[19] for 303(d) impairments and ESAs: Each Copermittee must implement, or require implementation of, enhanced measures to address the exceptional threat to water quality posed by all construction sites tributary to CWA section 303(d) water body segments impaired for sediment or turbidity. Each Copermittee must also implement, or require implementation of, enhanced, site-specific measures for construction sites within or adjacent to or discharging directly to coastal lagoons, the ocean, or other receiving waters within environmentally sensitive areas (as defined in Attachment C of this Order).

(i) Active Sediment Treatment (AST): Each Copermittee must require implementation of advanced treatment for sediment at construction

[19] Enhanced BMPs are control actions specifically targeted to the pollutant or condition of concern and of higher quality and effectiveness than the minimum control measures otherwise required. Enhanced in this Order means better, not simply more, BMPs.

sites (or portions thereof) that are determined by the Copermittee to be an exceptional threat to water quality. In evaluating the threat to water quality, the following factors must be considered by the Copermittee:

[a] Soil erosion potential or soil type;
[b] The site's slopes;
[c] Project size and type;
[d] Sensitivity of receiving water bodies;
[e] Proximity to receiving water bodies;
[f] Non-storm water discharges;
[g] Ineffectiveness of other BMPs;
[h] Proximity and sensitivity of aquatic threatened and endangered species of concern;
[i] Known effects of AST chemicals; and
[j] Any other relevant factors.

(d) Implement BMPs: Each Copermittee must implement, or require the implementation of, the designated minimum BMPs and any additional measures necessary to comply with this Order at each construction site within its jurisdiction year round. BMP implementation requirements, however, can vary based on wet and dry seasons. Dry season BMP implementation must plan for and address unseasonal rain events that may occur during the dry season (May 1 through September 30).

e. INSPECTION OF CONSTRUCTION SITES

Each Copermittee must conduct construction site inspections for compliance with its ordinances (grading, storm water, etc.), permits (construction, grading, etc.), and this Order. Priorities for inspecting sites must consider the nature and size of the construction activity, topography, and the characteristics of soils and receiving water quality.

(1) During the wet season, each Copermittee must inspect at least biweekly (every two weeks), all construction sites within its jurisdiction meeting any of the following criteria:

(a) All sites 30 acres or more in size with rough grading or active slopes occurring during the wet season;

(b) All sites one acre or more, and tributary to a CWA section 303(d) water body segment impaired for sediment or within or directly adjacent to, or discharging directly to, the ocean or a receiving water within an ESA; and

(c) Other sites determined by the Copermittees or the Regional Board as a significant threat to water quality. In evaluating threat to water quality, the following factors must be considered: (1) soil erosion potential; (2) site

slope; (3) project size and type; (4) sensitivity of receiving water bodies; (5) proximity to receiving water bodies; (6) non-storm water discharges; (7) past record of non-compliance by the operators of the construction site; and (8) any other relevant factors.

(2) During the wet season, each Copermittee must inspect at least monthly, all construction sites with one acre or more of soil disturbance not meeting the criteria specified above in section F.2.e.(1).

(3) During the wet season, each Copermittee must inspect construction sites less than one acre in size as needed to ensure compliance with its ordinances and this Order.

(4) Each Copermittee must inspect all construction sites as needed during the dry season. Sites meeting the criteria in section F.2.e.(1) must be inspected at least once in August or September each year.

(5) Re-inspections: Based upon site inspection findings, each Copermittee must implement all follow-up actions (i.e., re-inspection, enforcement) necessary to comply with this Order. Reinspection frequencies must be determined by each Copermittee based upon the severity of deficiencies, the nature of the construction activity, and the characteristics of soils and receiving water quality.

(6) Inspections of construction sites must include, but not be limited to:

(a) Check for coverage under the General Construction Permit (Notice of Intent (NOI) and/or Waste Discharge Identification No.) during initial inspections;
(b) Assessment of compliance with Copermittee ordinances and permits related to runoff, including the implementation and maintenance of designated minimum BMPs;
(c) Assessment of BMP effectiveness;
(d) Visual observations for non-storm water discharges, potential illicit connections, and potential discharge of pollutants in storm water runoff;
(e) Education and outreach on storm water pollution prevention, as needed; and
(f) Creation of a written or electronic inspection report.

(7) The Copermittees must track the number of inspections for each inventoried construction site throughout the reporting period to verify that each site is inspected at the minimum frequencies required.

f. ENFORCEMENT OF CONSTRUCTION SITES

(1) Each Copermittee must develop and implement an escalating enforcement

process that achieves prompt corrective actions at construction sites for violations of the Copermittee's water quality protection permit requirements and ordinances. This enforcement process must include authorizing the Copermittee's construction site inspectors to take immediate enforcement actions when appropriate and necessary. The enforcement process must include appropriate sanctions such as stop work orders, non-monetary penalties, fines, bonding requirements, and/or permit denials for non-compliance.

(2) Each Copermittee must be able to respond to complaints received from third-parties and to ensure the Regional Board that corrective actions have been implemented.

g. REPORTING OF NON-COMPLIANT SITES

(1) In addition to the notification requirements in Attachment B, each Copermittee must notify the Regional Board when the Copermittee issues a stop work order or other high level enforcement to a construction site in its jurisdiction as a result of storm water violations.

(2) Each Copermittee shall annually notify the Regional Board, prior to the commencement of the wet season, of all construction sites with alleged violations. Information may be provided as part of the JRMP annual report if submitted prior to the rainy season. Information provided shall include, but not be limited to, the following:

(a) WDID number if enrolled under the General Construction Permit
(b) Site Location, including address
(c) Current violations or suspected violations

h. TRAINING AND EDUCATION

(1) Municipal Staff and Contractors: Requirements for municipal staff and contractors are described in the Municipal Component section of this Order.

(2) Construction Site Owner / Operator Responsibilities:

As early in the planning and development process as possible and all through the permitting and construction process, each Copermittee must implement a program to educate project applicants, developers, contractors, property owners, and other responsible parties. The education program must provide an understanding of the topics listed below, as appropriate for the audience being educated.

(a) The importance of educating all construction workers in the field about storm water issues and BMPs though formal or informal training;

(b) Federal, State, and local water quality laws and regulations applicable to construction and grading activities;
(c) Site design, source control, pollution prevention, and treatment BMPs;
(d) General runoff concepts; and
(e) Other topics of local importance, including local water quality conditions, impaired waterbodies and environmentally sensitive areas.

3. EXISTING DEVELOPMENT COMPONENT

a. MUNICIPAL

Each Copermittee must implement a municipal program which meets the requirements of this section, prevents illicit discharges into the MS4, reduces municipal discharges of storm water pollutants from the MS4 to the MEP, and prevents municipal discharges from the MS4 from causing or contributing to a violation of water quality standards.

(1) Source Identification / Inventory

Each Copermittee must maintain an updated watershed-based inventory of municipal areas and activities. The inventory must include the name, address (if applicable), and a description of the area/activity; which pollutants are potentially generated by the area/activity; whether the area/activity is adjacent to an ESA; and identification of whether the area/activity is tributary to a CWA section 303(d) water body segment and generates pollutants for which the water body segment is impaired. The use of an automated database system, such as Geographical Information Systems (GIS) is required when applicable.

(2) General BMP Implementation

(a) Pollution Prevention: Each Copermittee must implement pollution prevention methods in its municipal program and must require their use by appropriate municipal departments, personnel, and contractors, where appropriate.

(b) Designate Minimum BMPs: Each Copermittee must designate a minimum set of BMPs for all municipal areas and activities. The designated minimum BMPs for municipal areas and activities must be area or activity specific as appropriate. BMPs must be designated for special events that are expected to generate significant trash and litter.

(c) Designate BMPs for ESAs and 303(d) Impairments: Each Copermittee must designate enhanced measures for municipal areas and activities tributary to CWA section 303(d) impaired water body segments when an area or activity generates pollutants for which the water body segment is

impaired. Each Copermittee must also designate additional controls for municipal areas and activities within or directly adjacent to or discharging directly to coastal lagoons, the ocean, or other receiving waters within environmentally sensitive areas (as defined in Attachment C of this Order).

(d) Implement BMPs: Each Copermittee must implement, or require the implementation of, the designated minimum and enhanced BMPs and any additional measures necessary based on its inventory to comply with this Order for each municipal area or activity within its jurisdiction.

(3) BMP Implementation for Management of Pesticides, Herbicides, and Fertilizers

Each Copermittee must implement BMPs to reduce the contribution of storm water pollutants associated with the application, storage, and disposal of pesticides, herbicides and fertilizers from municipal areas and activities to MS4s and receiving waters. Such BMPs must include, at a minimum:

(a) Educational activities, permits, certifications and other measures for municipal applicators and distributors;
(b) Integrated Pest Management (IPM) measures that rely on non-chemical solutions;
(c) The use of native vegetation;
(d) Schedules for irrigation and chemical application; and
(e) The collection and proper disposal of unused pesticides, herbicides, and fertilizers.

(4) BMP implementation for Flood Control Structures

(a) Each Copermittee must implement procedures to assure that flood management projects assess the impacts on the water quality of receiving water bodies.
(b) Each Copermittee must include water quality protection measures, where feasible, when retrofitting existing flood control structural devices.
(c) Each Copermittee must evaluate its existing flood control devices, identify devices causing or contributing to a condition of pollution, identify measures to reduce or eliminate the structure's effect on pollution, and evaluate the feasibility of retrofitting the structural flood control device. The inventory and evaluation must be completed by and submitted to the Regional Board in the 2nd year JRMP Annual Report.

(5) BMP Implementation for Sweeping of Municipal Areas

Where municipal area sweeping is implemented as an MS4 BMP for municipal roads, streets, highways, and parking facilities, each Copermittee must design and implement the program based on the following criteria:

(a) Optimize pickup of trash and debris based on land uses, trash collection schedules, seasonal factors (e.g., special events, tourism, etc.) and inspections of municipal areas/activities.

(6) Operation and Maintenance of Municipal Separate Storm Sewer System (MS4) and Structural Controls

(a) Treatment Controls: Each Copermittee must implement a schedule of inspection and maintenance activities to verify proper operation of all municipal structural treatment controls designed to reduce storm water pollutant discharges to or from its MS4s and related drainage structures.

(b) MS4 and Facilities: Each Copermittee must implement a schedule of maintenance activities for the MS4 and MS4 facilities (catch basins, storm drain inlets, open channels, etc). The maintenance activities must, at a minimum, include:

(i) Inspection and removal of accumulated waste at least once a year between May 1 and September 30 of each year for all MS4 facilities;
(ii) Additional cleaning as necessary between October 1 and April 30 of each year for facilities that receive or collect high volumes of trash and debris;
(iii) Following two years of inspections, any MS4 facility that requires inspection and cleaning less than annually may be inspected as needed, but not less that every other year;
(iv) Open channels must be cleaned of observed anthropogenic litter in a timely manner;
(v) Record keeping of the maintenance and cleaning activities including the overall quantity of waste removed;
(vi) Proper disposal of waste removed pursuant to applicable laws; and
(vii) Measures to eliminate waste discharges during MS4 maintenance and cleaning activities.

(7) Infiltration From Sanitary Sewer to MS4/Provide Preventive Maintenance of Both

(a) Each Copermittee must implement controls and measures to prevent and eliminate infiltration of seepage from municipal sanitary sewers to MS4s through thorough, routine preventive maintenance of the MS4. Each Copermittee that operates both a municipal sanitary sewer system and a MS4 must implement controls and measures to prevent and eliminate infiltration of seepage from the municipal sanitary sewers to the MS4s that must include overall sanitary sewer and MS4 surveys and thorough, routine preventive maintenance of both.

(b) Each Copermittee must implement controls to limit infiltration of seepage from municipal sanitary sewers to municipal separate storm sewer systems where necessary. Such controls must include:

(i) Adequate plan checking for construction and new development,
(ii) Incident response training for municipal employees that identify sanitary sewer spills;
(iii) Code enforcement inspections;
(iv) MS4 maintenance and inspections;
(v) Interagency coordination with sewer agencies; and
(vi) Proper education of municipal staff and contractors conducting field operations on the MS4 or municipal sanitary sewer (if applicable).

(8) Inspection of Municipal Areas and Activities

(a) At a minimum, each Copermittee must inspect the following high priority municipal areas and activities annually:

(i) Roads, Streets, Highways, and Parking Facilities;
(ii) Flood Management Projects and Flood Control Devices;
(iii) Areas and activities tributary to a CWA section 303(d) impaired water body segment, where an area or activity generates pollutants for which the water body segment is impaired.
(iv) Areas and activities within or adjacent to or discharging directly to coastal lagoons, the ocean, or other receiving waters within environmentally sensitive areas (as defined in Attachment C of this Order);
(v) Municipal Facilities:
[a] Active or closed municipal landfills;
[b] Publicly owned treatment works (including water and wastewater treatment plants) and sanitary sewage collection systems;
[c] Solid waste transfer facilities;
[d] Land application sites;
[e] Corporate yards including maintenance and storage yards for materials, waste, equipment and vehicles; and
[f] Household hazardous waste collection facilities.
(vi) Municipal airfields;
(vii) Parks and recreation facilities;
(viii) Special event venues following special events (festivals, sporting events, etc.);
(ix) Power washing; and
(x) Other municipal areas and activities that the Copermittee determines may contribute a significant pollutant load to the MS4.

(b) Other municipal areas and activities must be inspected as needed and in response to water quality data, valid public complaints, and findings from

municipal or contract staff.

(c) Based upon site inspection findings, each Copermittee must implement all follow-up actions necessary to comply with this Order.

(9) Enforcement of Municipal Areas and Activities

Each Copermittee must enforce its storm water ordinance for all municipal areas and activities as necessary to maintain compliance with this Order.

(10) Training and Education

Each Copermittee must ensure that all municipal personnel and contractors that have responsibilities for selecting, implementing, and evaluating BMPs for municipal areas and activities are adequately trained and educated to perform such tasks.

(a) Municipal Departments and Personnel Education

(i) Municipal Construction Activities: Each Copermittee must implement an education program that includes annual training prior to the rainy season so that its construction, building, code enforcement, and grading review staffs, inspectors, and other responsible construction staff have, at a minimum, an understanding of the following topics, as appropriate for the target audience:

[a] Federal, State, and local water quality laws and regulations applicable to construction and grading activities;
[b] The connection between construction activities and water quality impacts (i.e., impacts from land development and urbanization and impacts from construction material such as sediment);
[c] Proper implementation of erosion and sediment control and other BMPs to minimize the impacts to receiving water quality resulting from construction activities;
[d] The Copermittee's inspection, plan review, and enforcement policies and procedures to verify consistent application;
[e] Current advancements in BMP technologies;
[f] SSMP Requirements including treatment options, site design, source control, and applicable tracking mechanisms; and
[g] Other topics of local importance, including local water quality conditions, impaired water bodies, environmentally sensitive areas, and public health and disease vector issues associated with runoff.

(ii) Municipal Industrial/Commercial Activities: Each Copermittee must train staff responsible for conducting storm water compliance inspections and enforcement of industrial and commercial facilities at

least once a year. Training must cover inspection and enforcement procedures, BMP implementation, and review of monitoring data

(iii) Municipal Other Activities: Each Copermittee must implement an education program so that municipal personnel and contractors performing activities which generate pollutants have an understanding of the activity specific BMPs for each activity to be performed.

b. COMMERCIAL / INDUSTRIAL

Each Copermittee must implement a commercial / industrial program that meets the requirements of this section, prevents illicit discharges into the MS4, reduces commercial / industrial discharges of storm water pollutants from the MS4 to the MEP, and prevents commercial / industrial discharges from the MS4 from causing or contributing to a violation of water quality standards.

(1) Source Identification

(a) Each Copermittee must maintain an updated watershed-based inventory of all industrial and commercial sites/sources within its jurisdiction (regardless of ownership) that could contribute a significant pollutant load to the MS4. The inventory must include the following minimum information for each industrial and commercial site/source: name; address; pollutants potentially generated by the site/source; and identification of whether the site/source is tributary to a Clean Water Act section 303(d) water body segment and generates pollutants for which the water body segment is impaired; and a narrative description including SIC codes which best reflects the principal products or services provided by each facility.

At a minimum, the following sites/sources must be included in the inventory:

(i) Commercial Sites/Sources:

[a] Automobile repair, maintenance, fueling, or cleaning;
[b] Airplane repair, maintenance, fueling, or cleaning;
[c] Boat repair, maintenance, fueling, or cleaning;
[d] Equipment repair, maintenance, fueling, or cleaning;
[e] Automobile and other vehicle body repair or painting;
[f] Mobile automobile or other vehicle washing;
[g] Automobile (or other vehicle) parking lots and storage facilities;
[h] Retail or wholesale fueling;
[i] Pest control services;
[j] Eating or drinking establishments, including food markets;

[k] Mobile carpet, drape or furniture cleaning;
[l] Cement mixing or cutting;
[m] Masonry;
[n] Painting and coating;
[o] Botanical or zoological gardens and exhibits;
[p] Landscaping;
[q] Nurseries and greenhouses;
[r] Golf courses, parks and other recreational areas/facilities;
[s] Cemeteries;
[t] Pool and fountain cleaning;
[u] Marinas;
[v] Portable sanitary services;
[w] Building material retailers and storage;
[x] Animal facilities;
[y] Mobile pet services;
[z] Power washing services; and
[aa] Other sites and sources with a history of un-authorized discharges to the MS4.

(ii) Industrial Sites/Sources:

[a] Industrial Facilities, as defined at 40 CFR § 122.26(b)(14), including those subject to the General Industrial Permit or other individual NPDES permit;
[b] Operating and closed landfills;
[c] Facilities subject to SARA Title III; and
[d] Hazardous waste treatment, disposal, storage and recovery facilities.

(iii) ESAs and 303(d) Listed Waterbodies: All other commercial or industrial sites/sources tributary to a CWA Section 303(d) impaired water body segment, where the site/source generates pollutants for which the water body segment is impaired. All other commercial or industrial sites/sources within or directly adjacent to or discharging directly to coastal lagoons, the ocean, or other receiving waters within environmentally sensitive areas (as defined in Attachment C of this Order).

(iv) All other commercial or industrial sites/sources that the Copermittee determines may contribute a significant pollutant load to the MS4.

(2) <u>General BMP Implementation</u>

(a) Pollution Prevention: Each Copermittee must require the use of pollution prevention methods by industrial and commercial sites/sources.

(b) Designate / Update Minimum BMPs: Each Copermittee must designate a minimum set of BMPs for all industrial and commercial sites/sources. Where BMPs have already been designated, each Copermittee must review its existing BMPs for adequacy. The designated minimum BMPs must be specific to facility types and pollutant-generating activities, as appropriate.

(c) Designate Enhanced BMPs for ESAs and 303(d) Impairments: Each Copermittee must designate enhanced measures for industrial and commercial sites/sources tributary to CWA section 303(d) impaired water body segments (where a site/source generates pollutants for which the water body segment is impaired). Each Copermittee must also designate additional controls for industrial and commercial sites/sources within or directly adjacent to or discharging directly to coastal lagoons, the ocean, or other receiving waters within environmentally sensitive areas (as defined in Attachment C of this Order).

(d) Implement BMPs: Each Copermittee must implement, or require the implementation of, the designated minimum and enhanced BMPs and any additional measures necessary based on inspections, incident responses, and water quality data to comply with this Order at each industrial and commercial site/source within its jurisdiction.

(3) <u>BMP Implementation for Mobile Businesses</u>

(a) Each Copermittee must develop and implement a program to reduce the discharge of storm water pollutants from mobile businesses to the MEP and to prohibit non-storm water discharges pursuant to Section B of this Order. Each Copermittee must keep as part of their commercial source inventory a listing of mobile businesses known to operate within its jurisdiction. The program must include:

(i) Development and implementation of minimum standards and BMPs to be required for each of the various types of mobile businesses;
(ii) Development and implementation of an enforcement strategy which specifically addresses the unique characteristics of mobile businesses;
(iii) Notification of those mobile businesses known to operate within the Copermittee's jurisdiction of the minimum standards and BMP requirements and local ordinances;
(iv) Development and implementation of an outreach and education strategy; and
(v) Inspection of mobile businesses as needed to implement the program.

(b) If they choose to, the Copermittees may cooperate in developing and implementing their programs for mobile businesses, including sharing of mobile business inventories, BMP requirements, enforcement action

information, and education.

(4) Inspection of Industrial and Commercial Sites/Sources

Each Copermittee must conduct industrial and commercial site inspections for compliance with its ordinances, permits, and this Order.

(a) Inspection Procedures: Inspections must include but not be limited to:

(i) Review of BMP implementation plans, if the site uses or is required to use such a plan;

(ii) Review of facility monitoring data, if the site monitors its runoff;

(iii) Check for coverage under the General Industrial Permit (Notice of Intent (NOI) and/or Waste Discharge Identification Number), if applicable;

(iv) Assessment of compliance with Copermittee ordinances and permits related to runoff;

(v) Assessment of BMP implementation, maintenance and effectiveness;

(vi) Visual observations for non-storm water discharges, potential illicit connections, and potential discharge of pollutants in storm water runoff; and

(vii) Education and training on storm water pollution prevention, as conditions warrant.

(b) Each Copermittee shall annually notify the Regional Board, prior to the commencement of the wet season, of all Industrial Sites and Industrial Facilities subject to the General Industrial Permit or other individual NPDES permit with alleged violations. Information may be provided as part of the JRMP annual report if submitted prior to the rainy season. Information provided shall include, but not be limited to, the following:

(i) WDID number if enrolled under the General Industrial Permit;
(ii) Site Location, including address;
(iii) Current violations or suspected violations; and
(iv) Past Violation history.

(c) Frequencies: At a minimum, 20 percent of the sites inventoried as required in section F.3.b.(1) above (excluding mobile sources and food facilities) must be inspected each year. Mobile businesses must be

inspected pursuant to the enforcement strategy developed pursuant to section F.3.b.(3). Other inspection frequencies must be based upon findings of the Copermittee's existing program and the following factors:

(i) Type of activity (SIC code);
(ii) Materials used at the facility;
(iii) Wastes generated;
(iv) Pollutant discharge potential;
(v) Non-storm water discharges;
(vi) Size of facility;
(vii) Proximity to receiving water bodies;
(viii) Sensitivity of receiving water bodies;
(ix) Whether the facility is subject to the General Industrial Permit or an individual NPDES permit;
(x) Whether the facility has filed a No Exposure Certification/Notice of Non-Applicability;
(xi) Facility design;
(xii) Total area of the site, area of the site where industrial or commercial activities occur, and area of the site exposed to rainfall and runoff;
(xiii) The facility's compliance history; and
(xiv) Any other relevant factors.

(d) Food Facilities: Each food facility must be inspected annually for compliance with the Copermittee's water quality ordinances and this Order. Each inspection of a food facility must, at a minimum, address the following concerns:

(i) Trash storage and disposal;
(ii) Grease storage and disposal;
(iii) Washwater discharges to the MS4 (e.g., from floor mats, driveways, sidewalks, etc.);
(iv) Identification of outdoor sewer and MS4 connections; and
(v) Education of property managers when grease and/or trash facilities are shared by multiple facilities.

(e) Third-Party Inspections: Each Copermittee may develop and implement a third party inspection program for verifying industrial and commercial site/source compliance with its ordinances, permits, and this Order. To the extent that third party inspections are conducted to fulfill the requirements of this Order, the Copermittee will be responsible for conducting and documenting quality assurance and quality control of the third-party inspections.

(i) Each inspection conducted by a third-party must, at a minimum, result in the following:

[a] Photo documentation of potential storm water violations identified during the third party inspection;
[b] Reporting to the Copermittee of identified significant potential violations, including imminent or observed illegal discharges, within 24 hours of the third party inspection;
[c] Reporting to the Copermittee of all inspection findings within one week of the inspection being conducted; and
[d] Copermittee follow-up and/or enforcement actions for identified potential storm water violations within two business days of the inspection or potential violation report receipt.

(f) Based upon site inspection findings, each Copermittee must implement all follow-up actions and enforcement necessary to comply with this Order.

(g) To the extent that the Regional Board has conducted an inspection of an industrial site during a particular year, the requirement for the responsible Copermittee to inspect this facility during the same year will be satisfied.

(h) The Copermittees must track the number of inspections for the inventoried industrial and commercial sites/sources throughout the reporting period to verify that the sites/sources are inspected at the minimum frequencies listed in this Order.

(5) Enforcement of Industrial and Commercial Sites/Sources

Each Copermittee must enforce its storm water ordinance for all industrial and commercial sites/sources as necessary to maintain compliance with this Order. Copermittee ordinances or other regulatory mechanisms must include appropriate sanctions to achieve compliance. Sanctions must include the following or their equivalent: Non-monetary penalties, fines, bonding requirements, and/or permit denials for non-compliance.

(6) Training and Education for Owners and Operators of Commercial and Industrial Activities

(a) Each Copermittee must implement an education program using all media as appropriate to (1) measurably increase the knowledge of owners and operators of commercial and industrial activities regarding MS4s, impacts of runoff on receiving waters, and potential BMP solutions for the target audience; and (2) to measurably change the behavior of target communities and thereby reduce storm water pollutant releases and eliminate prohibited non-storm water discharges to MS4s and the environment. At a minimum, the education program must meet the requirements of this section and address the following issues:

(i) Laws, regulations, permits, & requirements;

(ii) Best management practices;
(iii) General runoff concepts; and

(iv) Other topics, including public reporting mechanisms, water conservation, low-impact development techniques.

(b) BMP Notification: At least twice during the five-year period of this Order, each Copermittee must notify the owner/operator of each inventoried industrial and commercial site/source of the BMP requirements applicable to the site/source.

C. RESIDENTIAL

Each Copermittee must implement a residential program which meets the requirements of this section, prevents illicit discharges into the MS4, reduces residential discharges of storm water pollutants from the MS4 to the MEP, and prevents residential discharges from the MS4 from causing or contributing to a violation of water quality standards.

(1) Threat to Water Quality Prioritization

Each Copermittee must identify residential areas and activities that pose a high threat to water quality. At a minimum, these must include:

(a) Automobile repair, maintenance, washing, and parking;
(b) Home and garden care activities and product use (pesticides, herbicides, and fertilizers);
(c) Disposal of trash, pet waste, green waste, and household hazardous waste (e.g., paints, cleaning products);
(d) Any other residential source that the Copermittee determines may contribute a significant pollutant load to the MS4;
(e) Any residential areas tributary to a CWA section 303(d) impaired water body, where the residence generates pollutants for which the water body is impaired; and
(f) Any residential areas within or directly adjacent to or discharging directly to a coastal lagoon, the ocean, or other receiving waters within an environmentally sensitive area (as defined in Attachment C of this Order).

(2) BMP Implementation

(a) Pollution Prevention: Each Copermittee must actively encourage the use of pollution prevention methods by residents.

(b) Designate BMPs: Each Copermittee must designate minimum BMPs for high-threat-to-water quality residential areas and activities. The designated minimum BMPs for high-threat-to-water quality residential

areas and activities must be area or activity specific.

(c) Hazardous Waste BMPs: Each Copermittee must facilitate the proper management and disposal of used oil, toxic materials, and other household hazardous wastes. Such facilitation must include educational activities, public information activities, and establishment of collection sites operated by the Copermittee or a private entity. Curbside collection of household hazardous wastes is encouraged.

(d) Implement BMPs: Each Copermittee must implement, or require implementation of, the designated minimum BMPs and any additional measures necessary to comply with Sections A and B of this Order.

(e) Each Copermittee must implement, or require implementation of, BMPs for residential areas and activities that have not been designated a high threat to water quality, as necessary.

(3) Enforcement of Residential Areas and Activities

Each Copermittee must enforce its storm water ordinance for all residential areas and activities as necessary to maintain compliance with this Order.

(4) Evaluation of Oversight of Residential Areas and Activities

Each Copermittee must annually review the effectiveness of efforts to reduce residential discharges of storm water pollutants from the MS4 and eliminate illicit residential discharges into the MS4. The evaluation must consider findings from monitoring data, municipal employee comments, inspections, complaints, and other appropriate sources.

(5) Common Interest Areas (CIA) / Home Owner Association (HOA) Areas

Each Copermittee must implement measures specifically to ensure that runoff within common interest developments, including areas managed by associations, meets the objectives of this section and Order.

(a) BMP Implementation: Each Copermittee must implement management measures based on a review of pertinent factors, including:

(i) Current maintenance duties and procedures used by CIA/HOA maintenance associations within its jurisdiction;
(ii) Whether streets and storm drains are publicly or privately owned within the CIA/HOA;
(iii) Whether the CIA/HOA area has been identified as a high priority residential area;
(iv) Proximity to 303(d)-listed waterbodies, the ocean, environmentally

sensitive areas;
(v) Evaluation of water quality monitoring data;
(vi) Evaluation of existing illegal discharge/illicit connection activities;
(vii) Other activities conducted or authorized by the HOA that may pose a significant risk to inland or coastal receiving waters.

(b) Legal Authority and Enforcement: Within one year of adoption of this Order, each Copermittee must review its Municipal Code to determine the most appropriate method to implement and enforce runoff management measures within CIA/HOA areas.

(6) Residential Education Program

(a) Each Copermittee must implement a Residential Education Program using all media as appropriate to (1) measurably increase the knowledge regarding MS4s, impacts of runoff on receiving waters, and potential BMP solutions for the target audience; and (2) to measurably change the behavior of target communities and thereby reduce storm water and eliminate prohibited non-storm water pollutant releases to MS4s and the environment.

(b) Copermittee educational programs must emphasize underserved target audiences, residents and managers of CIA/HOA areas, high-risk behaviors, and "allowable" behaviors and discharges. At a minimum, the education program must meet the requirements of this section and address the following issues:

(i) Laws, regulations, permits, and requirements;
(ii) Best management practices;
(iii) General runoff concepts;
(iv) Existing water quality, including local water quality conditions, impaired waterbodies and environmentally sensitive areas; and
(v) Other topics, including public reporting mechanisms, water conservation, low-impact development techniques, and public health and disease vector issues associated with runoff.

d. Retrofitting Existing Development

Each Copermittee must develop and implement a retrofitting program which meets the requirements of this section. The goals of the existing development retrofitting program are to reduce impacts from hydromodification, promote LID, support riparian and aquatic habitat restoration, reduce the discharges of storm water pollutants from the MS4 to the MEP, and prevent discharges from the MS4 from causing or contributing to a violation of water quality standards. Where feasible, at the discretion of the Copermittee, the existing development retrofitting program may be coordinated with flood control projects and infrastructure

improvement programs.

(1) Source Identification

The Copermittee must identify and inventory existing developments (i.e. municipal, industrial, commercial, residential) as candidates for retrofitting. Potential retrofitting candidates must include but are not limited to:

(a) Development that contributes pollutants of concern to a TMDL or a ESA;
(b) Receiving waters channelized or otherwise hardened;
(c) Development tributary to receiving waters that are channelized or otherwise hardened;
(d) Developments tributary to receiving waters that are significantly eroded;
(e) Developments tributary to an ASBS or SWQPA; and
(f) Development that causes hydraulic constriction.

(2) Each Copermittee shall evaluate and rank the inventoried existing developments to prioritize retrofitting. Criteria for evaluation must include but is not limited to:

(a) Feasibility;
(b) Cost effectiveness;
(c) Pollutant removal effectiveness;
(d) Impervious area potentially treated;
(e) Maintenance requirements;
(f) Landowner cooperation;
(g) Neighborhood acceptance;
(h) Aesthetic qualities; and
(i) Efficacy at addressing concern.

(3) Each Copermittee must consider the results of the evaluation in prioritizing work plans for the following year. Highly feasible projects expected to benefit water quality should be given a high priority to implement source control and treatment control BMPs. Where feasible, the retrofit projects should be designed in accordance with the SSMP requirements within sections F.1.d.(3) through F.1.d.(8). In addition, the Copermittee shall encourage retrofit projects to implement where feasible the Hydromodification requirements in Section F.1.h.

(4) When requiring retrofitting on existing development, the Copermittees will cooperate with private landowners to encourage retrofitting projects. The Copermittee may consider the following practices in cooperating and encouraging private landowners to retrofit their existing development:

(a) Demonstration retrofit projects;
(b) Retrofits on public land and easements;

(c) Education and outreach;
(d) Subsidies for retrofit projects;
(e) Requiring retrofit projects as mitigation or ordinance compliance;
(f) Public and private partnerships; and
(g) Fees for existing discharges to the MS4.

(5) The completed retrofit BMPs shall be tracked and inspected in accordance with section F.1.f.

(6) Where constraints on retrofitting preclude effective BMP deployment on existing developments at locations critical to protect receiving waters, a Copermittee may propose a regional mitigation project to improve water quality. Such regional projects may include but are not limited to:

(a) Regional water quality treatment BMPs;
(b) Urban creek or wetlands restoration and preservation;
(c) Daylighting and restoring underground creeks;
(d) Localized rainfall storage and reuse to the extent such projects are fully protective of downstream water rights;
(e) Hydromodification project; and
(f) Removal of invasive plant species.

(7) A retrofit project or regional mitigation project may qualify as a Watershed Water Quality Activity provided it meets the requirements in section G. Watershed Runoff Management Program.

4. ILLICIT DISCHARGE DETECTION AND ELIMINATION

Each Copermittee must implement a program which meets the requirements of this section to actively detect and eliminate illicit discharges and disposal into the MS4. The program must address all types of illicit discharges and connections excluding those non-storm water discharges not prohibited by the Copermittee in accordance with section B of this Order.

a. PREVENT AND DETECT ILLICIT DISCHARGES AND CONNECTIONS

Each Copermittee must implement measures to prevent and detect illicit discharges to the MS4.

(1) Legal Authority: Each Copermittee must retain legal authority to prevent and eliminate illicit discharges and connections to the MS4.

(2) Inspections: Each Copermittee must include use of appropriate municipal personnel and contractors to assist in identifying illicit discharges and connections during their daily activities.

(a) Inspections for illegal discharges and connections must be conducted during routine maintenance of all MS4 facilities.

(b) Municipal staff and contractors conducting non-MS4 field operations must be trained to report suspected illegal discharges and connections to proper municipal staff.

b. MAINTAIN MS4 MAP

Each Copermittee must maintain an updated map of its entire MS4 and the corresponding drainage areas within its jurisdiction. The use of GIS is required. The accuracy of the MS4 map must be confirmed during dry weather field screening and analytical monitoring and must be updated at least annually. The GIS layers of the MS4 map must be submitted with the updated Jurisdictional Runoff Management Plan within 365 days after adoption of this Order.

c. FACILITATE PUBLIC REPORTING OF ILLICIT DISCHARGES AND CONNECTIONS - PUBLIC HOTLINE

Each Copermittee must promote, publicize and facilitate public reporting of illicit discharges or water quality impacts associated with discharges into or from MS4s. Each Copermittee must facilitate public reporting through development and operation of a public hotline. Public hotlines can be Copermittee-specific or shared by Copermittees. All storm water hotlines must be capable of receiving reports in both English and Spanish 24 hours per day and seven days per week.

d. DRY WEATHER FIELD SCREENING AND ANALYTICAL MONITORING

Each Copermittee must conduct dry weather field screening and analytical monitoring of MS4 outfalls and other portions of its MS4 within its jurisdiction to detect illicit discharges and connections in accordance with Receiving Waters and MS4 Discharge Monitoring and Reporting Program No. R9-2009-0002 in Attachment E of this Order.

e. INVESTIGATION / INSPECTION AND FOLLOW-UP

Each Copermittee must implement procedures to investigate and inspect portions of the MS4 that, based on the results of field screening, analytical monitoring, or other appropriate information, indicate a reasonable potential of containing illicit discharges, illicit connections, or other sources of pollutants in non-storm water.

(1) Develop response criteria for data: Each Copermittee must develop, update, and use numeric criteria action levels (or other actions level criteria where appropriate) to determine when follow-up investigations will be performed in response to water quality monitoring. The criteria must include required

non-storm water action levels (see Section C) and a consideration of 303(d)-listed waterbodies and environmentally sensitive areas (ESAs) as defined in Attachment C.

(2) Respond to data: Each Copermittee must investigate portions of the MS4 for which water quality data or conditions indicates a potential illegal discharge or connection.

(a) Obvious illicit discharges (i.e. color, odor, or significant exceedances of action levels) must be investigated immediately.

(b) Field screen data: Within two business days of receiving dry weather field screening results that exceed action levels, the Copermittees must either initiate an investigation to identify the source of the discharge or document the rationale for why the discharge does not pose a threat to water quality and does not need further investigation. This documentation shall be included in the Annual Report.

(c) Analytical data: Within five business days of receiving analytical laboratory results that exceed action levels, the Copermittees must either initiate an investigation to identify the source of the discharge or document the rationale for why the discharge does not pose a threat to water quality and does not need further investigation. This documentation shall be included in the Annual Report.

(3) Respond to notifications: Each Copermittee must respond to and resolve each reported incident (e.g., public hotline, staff notification, etc.) in a timely manner. Criteria may be developed to assess the validity of, and prioritize the response to, each report.

f. Elimination Of Illicit Discharges And Connections

Each Copermittee must take immediate action to initiate steps necessary to eliminate all detected illicit discharges, illicit discharge sources, and illicit connections after detection. Elimination measures may include an escalating series of enforcement actions for those illicit discharges that are not a serious threat to public health or the environment. Illicit discharges that pose a serious threat to the public's health or the environment must be eliminated immediately.

g. Enforce Ordinances

Each Copermittee must implement and enforce its ordinances, orders, or other legal authority to prevent illicit discharges and connections to its MS4 and to eliminate detected illicit discharges and connections to it's MS4.

h. Prevent And Respond To Sewage Spills (Including From Private Laterals And Failing Septic Systems) And Other Spills

(1) Each Copermittee must implement management measures and procedures to prevent, respond to, contain and clean up all sewage (see below) and other spills that may discharge into its MS4 from any source (including private laterals and failing septic systems). Copermittees must coordinate with spill response teams to prevent entry of spills into the MS4 and contamination of surface water, ground water and soil. Each Copermittee must coordinate spill prevention, containment and response activities throughout all appropriate departments, programs and agencies so that maximum water quality protection is available at all times.

(2) Each Copermittee must develop and implement a mechanism whereby it is notified of all sewage spills from private laterals and failing septic systems into its MS4. Each Copermittee must implement management measures and procedures to prevent, respond to, and coordinate a response to contain and clean up sewage from any such notification.

i. Education And Training

Each Copermittee must implement educational activities, public information activities, and other appropriate activities to facilitate the proper management and disposal of used oil and toxic materials.

5. PUBLIC PARTICIPATION COMPONENT

Each Copermittee must incorporate a mechanism for public participation in the updating, development, and implementation of the Jurisdictional Runoff Management Program.

G. WATERSHED RUNOFF MANAGEMENT PROGRAM

1. Lead Watershed Copermittee Identification

Watershed Copermittees shall identify the Lead Watershed Copermittee for their Watershed Management Area (WMA). The Lead Watershed Copermittees shall serve as liaisons between the Permittees and Regional Board, where appropriate.

2. Watershed Water Quality Workplan (Watershed Workplan)

The Watershed Workplan shall describe the Permittees' development and implementation of a collective watershed strategy to assess and prioritize the water quality problems within the watershed's receiving waters, identify and model sources of the highest priority water quality problem(s), develop a watershed-wide BMP implementation strategy to abate highest priority water quality problems, and a monitoring strategy to evaluate BMP effectiveness and changing water quality prioritization in the WMA.

The work plan shall, at a minimum:

a. Characterize the receiving water quality in the WMA. Characterization shall include use of regularly collected water quality data, reports, monitoring and analysis generated in accordance with the requirements of the Receiving Waters Monitoring and Reporting Program, as well as applicable information available from other public and private organizations.

b. Identify the highest priority water quality problem(s), in terms of constituents by location, in the WMA's receiving waters. Identified water quality problem(s) shall, at a minimum, give consideration to; TMDLs, receiving waters listed on the CWA section 303(d) list, waters with persistent violations of water quality standards, toxicity, or impacts to beneficial uses, and other pertinent conditions.

c. Identify the sources of the highest water quality problem(s) within the WMA. Efforts to determine such sources shall include, but not be limited to: use of information from the construction, industrial/commercial, municipal, and residential source identification programs required within the Jurisdictional Runoff Program (JRMP) of this Order; specific actions to model pollutant transport to receiving waters for the sake of identifying the source(s) point(s) of origin; water quality monitoring data collected as part of the Receiving Water Monitoring and Reporting Program required by this Order, and additional focused water quality monitoring to identify specific sources within the watershed.

d. Develop a watershed BMP implementation strategy to attain receiving water quality objectives in the identified highest priority water quality problem(s). The BMP implementation strategy shall include a schedule for implementation of the BMP projects to abate specific receiving water quality problems. BMPs not

contributing to measured pollutant reductions or improvements to water quality must be removed and replaced with alternative BMPs. Identified watershed water quality problems may be the result of jurisdictional discharges that will need to be addressed with BMPs applied in a specific jurisdiction in order to generate a benefit to the watershed.

e. Develop a strategy to model and monitor improvements in receiving water quality directly resulting from implementation of the BMPs described in the Watershed Workplan. The modeling and monitoring strategy shall generate the necessary data to report on the measured pollutant reduction that results from proper BMP implementation. Monitoring shall, at a minimum, be conducted in the receiving water to demonstrate reduction in pollutant concentrations and progression towards attainment of receiving water quality objectives.

f. Establish a schedule for development and implementation of the Watershed strategy outlined in the Workplan. The schedule shall, at a minimum, include forecasted dates of planned actions to address Provisions E.2(a) through E.2(e) and dates for watershed review meetings through the remaining portion of this Permit cycle. Annual watershed workplan review meetings must be open to the public and appropriately publically noticed such that interested parties may come and provide comments on the watershed program.

3. **Watershed Workplan Implementation –** Watershed Copermittee's shall begin implementing the Watershed Workplan within 60-days of acceptance by the Regional Board Executive Officer. If within 30 days of submittal, the Regional Board has not taken an action, the Workplan shall be deemed acceptable.

4. **Copermittee Collaboration** – Watershed Copermittees shall collaborate to develop and implement the Watershed Workplan. Watershed Copermittee collaboration shall include frequent regularly scheduled meetings.

5. **Public Participation –** Watershed Copermittees shall implement a watershed-specific public participation mechanism within each watershed. A required component of the watershed-specific public participation shall be a minimum 30-day public review of the Watershed Workplan prior to submittal for acceptance by the Regional Board Execuive Officer. Opportunity for the public to review and comment on the Watershed Workplan must occur before the workplan is implemented.

6. **Watershed Workplan Review and Updates –** Watershed Copermittees shall review and update the Watershed Workplan annually to identify needed changes to the prioritized water quality problem(s) listed in the workplan. All updates to the Watershed Workplan shall be presented during an Annual Watershed Review Meeting. Annual Watershed Review Meetings shall occur once every calendar year and be conducted by the Watershed Copermittees. Annual Watershed Review Meetings shall be open to the public and adequately noticed. Individual Watershed Copermittees shall also review and modify their jurisdictional programs and JRMP

Annual Reports, as necessary, so that they are consistent with the updated Watershed Workplan.

7. Aliso Creek Watershed Runoff Management Plan (WRMP) Provisions

The following provisions apply to the Aliso Creek WRMP. Requirements in this subsection must supersede requirements prescribed by the Regional Board on October 18, 2005.[20]

a. Each Copermittee within the Aliso Creek Watershed must implement the monitoring and reporting program described in *Aliso Creek 13325 Directive, Revised Monitoring Program Design – Integration with NPDES Program*, December 2004 (Revised Aliso Creek Program).

b. Each Copermittee must provide annual reports by March 1 of each year beginning in 2011 for the preceding annual period of January through December. The annual reports must contain the following information:

(1) Water quality data and assessment from the Revised Aliso Creek Program. Each municipality must implement the monitoring and reporting program described in the Revised Aliso Creek Program. All information submitted in the report must conform to a SWAMP-Compatible Quality Assurance Project Plan[21]. The report must contain an assessment of compliance with applicable water quality standards for each monitoring station. The report must include data in tabular and graphical form, and electronic data must be submitted to the Regional Board.

(2) Program Assessment. A description and assessment of each municipality's program implemented within the high-priority storm drain locations (as identified Revised Aliso Creek Program) to reduce discharges of indicator fecal bacteria/pathogens. Monitoring alone is not sufficient to assess progress of the municipal programs. Municipalities must demonstrate each year that their programs are effective and resulting in a reduction of bacteria sources.

(i) For structural and nonstructural management practices implemented, the assessment must contain a description of the

[20] On October 12, 2005, the Regional Board accepted proposed changes to the bacteria monitoring program that had been conducted since spring 2001 pursuant to an Investigative Order from the Regional Board's executive officer. The October 18, 2005, letter from the Regional Board's executive officer revised the Investigative Order and instituted the new monitoring and reporting requirements.

[21] The State Water Resource Control Board (State Board) has prepared an electronic template for Quality Assurance Project Plans (QAPP) to assist in QAPP development, to provide a common format that will allow for review to be expedited, and to provide information on Surface Water Ambient Monitoring (SWAMP) consistency. Additional information and the template are available on-line at http://www.waterboards.ca.gov/swamp/qapp.html.

practice, capital and maintenance costs, expectations for effectiveness, date implemented, and any observed results.

(ii) For structural and nonstructural management practices evaluated, the assessment must contain a description of the practice(s), conclusions from the evaluation, and whether and when the practice is planned for implementation by the municipality or group of municipalities.

(3) Status Reports. Updates on high-priority storm drain areas. Status reports must be provided by each municipality that discuss the causes of impairment and subsequent management activities implemented within the reporting period in the high priority areas and the planned activities for the next reporting period.

(4) Certification Statement. The technical reports submitted to the Regional Board must include the following certification statement signed by either the principal executive officer, ranking elected official, or duly authorized representative of that person:

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person(s) directly responsible for gathering the information, the information is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

c. The annual reports must be submitted until the Regional Board determines they are no longer warranted. If requested by a municipality, the monitoring program may be modified or reduced by the Regional Board. The monitoring program and annual reporting may be modified in response to adopted TMDLs and additional Clean Water Act 303(d) listings for impairment.

d. Municipalities must continue meeting on a quarterly basis to discuss efforts to reduce bacteria in the Aliso Creek watershed.

H. FISCAL ANALYSIS

1. Secure Resources: Each Copermittee must secure the resources necessary to meet all requirements of this Order.

2. Annual Analysis: Each Copermittee must conduct an annual fiscal analysis of the necessary capital and operation and maintenance expenditures necessary to accomplish the activities of the programs required by this Order. The analysis must include estimated expenditures for the reporting period, the preceding period, and the next reporting period.

- **a.** Each analysis must include a description of the source of funds that are proposed to meet the necessary expenditures, including legal restrictions on the use of such funds.
- **b.** Each analysis must include a narrative description of circumstances resulting in a 25 percent or greater annual change for any budget line items.

3. Annual Reporting: Each Copermittee must submit its annual fiscal analysis with the annual JRMP report.

I. TOTAL MAXIMUM DAILY LOADS

The waste load allocations (WLAs) of fully approved and adopted TMDLs are incorporated as Water Quality Based Effluent Limitations on a pollutant by pollutant, watershed by watershed basis. Early TMDL requirements, including monitoring, may be required and inserted into this Order pursuant to Finding E.10

1. Baby Beach Bacterial Indicator TMDL Water Quality Based Effluent Limitations

a. The Copermittees in the Baby Beach watershed shall implement BMPs capable of achieving the interim and final Bacterial Indicator Waste Load Allocations (WLAs) in discharges to Baby Beach as described in Table 6.

Table 6: TMDL Waste Load Reduction Milestones

Action	Date
Meet 50% wasteload reductions	3 years after effective date for dry weather
	7 years after effective date for wet weather
Meet 100% wasteload reductions	5 years after effective date for dry weather
	10 years after effective date for wet weather

b. The Copermittees shall conduct necessary monitoring, as described in Attachment A to Resolution No. R9-2008-0027, and submit annual progress reports as part of their yearly reports.

c. The following WLAs (Table 7) are to be met in Baby Beach receiving water by the end of the year 2019 for wet weather and 2014 for dry weather:

Table 7: Final Bacterial Indicator Waste Load Allocations for Baby Beach

	Waste Load Allocation	
Bacterial Indicator	Dry Weather (Billion MPN / Day)	Wet Weather (Billion MPN / 30 Days)
Total Coliform	0.86	3,254
Fecal Coliform	0.17	112
Enterococcus	0.03	114

MPN: Most Probable Number

d. The Copermittees must meet the following Numeric Targets (Table 8) in Baby Beach receiving waters in order to meet the underlying assumptions of the TMDL. The Numeric Targets are to be met once 100 percent of the WLA reductions have been achieved (see Table 7 above).

Table 8: Final Bacterial Indicator Numeric Targets for Baby Beach

Bacterial Indicator	30-day geo mean (MPN / 100mL)	Single Sample Max (MPN / 100mL)
	Dry Weather only	Dry and Wet Weather
Total Coliform	1,000	10,000
Fecal Coliform	200	400
Enterococcus	35	104

MPN: Most Probable Number

J. PROGRAM EFFECTIVENESS ASSESSMENT AND REPORTING

1. Jurisdictional Program Effectiveness Assessments

a. OBJECTIVES OF EFFECTIVENESS ASSESSMENTS

Beginning with the Annual Report due in 2011, each Copermittee must annually assess the effectiveness of its Jurisdictional Runoff Management Program (JRMP) implementation at meeting the following objectives:

(1) Objective for 303(d) Waterbodies: Reduce storm water pollutant loadings.

(a) Each Copermittee must establish annual assessment measures or methods specifically for reducing discharges of storm water pollutants from its MS4 into each downstream 303(d)-listed water body for which that waterbody is impaired. Assessment measures must be developed for each of the six outcome levels described by CASQA.[22]
(b) Each Copermittee must annually conduct each established assessment measure or method and evaluate the outcome. Each outcome must then be used to assess the effectiveness of implemented management measures toward reducing MS4 discharges of the specific pollutants causing or contributing to conditions of impairment.
(c) The assessment measures must target both water quality outcomes and the results of municipal enforcement activities.

(2) Objective for Environmentally-Sensitive Areas: Prevent storm water MS4 discharges from causing or contributing to conditions of pollution, nuisance, or contamination.

(a) Each Copermittee must establish annual measures or methods specifically for assessing the effectiveness of its management measures for protecting downstream ESAs from adverse effects caused by discharges from its MS4. Assessment measures must be developed for each of the six outcome levels described by CASQA.
(b) Each Copermittee must annually implement each established assessment measure or method and evaluate the outcome. Each outcome must be used to assess the effectiveness of implemented management measures toward reducing MS4 discharges of the specific pollutants causing or contributing to conditions of impairment.
(c) The assessment measures must target both water quality outcomes and the results of municipal enforcement activities.

(3) Objectives for major program component outcomes: Determined by Each

[22] Effectiveness assessment outcome levels as defined by CASQA are defined in Attachment C of this Order. See "*Municipal Stormwater Program Effectiveness Assessment Guidance"* (CASQA, May 2007) for guidance for assessing program activities at the various outcome levels.

Copermittee.

(a) Each Copermittee must annually develop objectives for each program component in Section F and the overall JRMP. The objectives must be established as appropriate in response to program implementation and evaluation of water quality and management practices.
(b) Assessment approaches for program implementation must include a mix of specific activities, general program components, and water quality data.
(c) The assessment measures must target both water quality outcomes and the results of municipal enforcement activities.

(4) Objectives for actions taken to protect receiving water limitations in accordance with this Order.

(a) Each Copermittee must develop and implement an effectiveness assessment strategy for each measure conducted in response to a determination to implement the "iterative" approach to prevent or reduce any storm water pollutants that are causing or contributing to the exceedance of water quality standards as outlined in this Order

b. ASSESSMENT REVIEW

(1) Based on the results of the effectiveness assessments, each Copermittee must annually review its jurisdictional activities and BMPs to identify modifications and improvements needed to maximize JRMP effectiveness, as necessary to achieve compliance with this Order.

(2) Each Copermittee must develop and annually conduct an Integrated Assessment[23] of each effectiveness assessment objective above (Section J.1.a) and the overall JRMP using a combination of outcomes as appropriate to the objectives.[24]

2. Program Modifications

a. Each Copermittee must develop and implement a plan and schedule to address program modifications and improvements identified during annual effectiveness assessments.

b. Jurisdictional activities/BMPs that are ineffective or less effective than other comparable jurisdictional activities/BMPs must be replaced or improved upon by implementation of more effective jurisdictional activities/BMPs. Where monitoring data exhibits persistent water quality problems that are caused or

[23] Integrated assessment is defined in Attachment C. It is the process of evaluating whether program implementation is resulting in the protection or improvement of water quality. Integrated assessment combines assessments of program implementation and water quality.
[24] Not all program components need be addressed at each of the six outcome levels.

contributed to by MS4 discharges, jurisdictional activities or BMPs applicable to the water quality problems must be modified and improved to correct the water quality problems.

3. Effectiveness Assessment and Program Response Reporting

a. Each Copermittee must include a description and summary of its annual and long-term effectiveness assessments within each Annual Report. Beginning with the Annual Report due in 2011, the Program Effectiveness reporting must include:

(1) 303(d) waterbodies: A description and results of the annual assessment measures or methods specifically for reducing discharges of storm water pollutants from its MS4 into each 303(d)-listed waterbody;
(2) ESAs: A description and results of the annual assessment measures or methods specifically for managing discharges of pollutants from its MS4 into each downstream ESA;
(3) Other Program Components: A description of the objectives and corresponding assessment measures and results used to evaluate the effectiveness of each general program component. The results must include findings from both program implementation and water quality assessment where applicable;
(4) Receiving water protection: A description and results of the annual assessment measures or methods employed specifically for actions taken to protect receiving water limitations in accordance with Section A.3 of this Order;
(5) A description of the steps taken to use dry-weather and wet-weather monitoring data to assess the effectiveness of the programs for 303(d) impairments, ESAs, and general program components;
(6) A description of activities conducted in response to investigations of illicit discharge and illicit connection activities, including how each investigation was resolved and the pollutant(s) involved;
(7) Responses to effectiveness assessments: A description of each program modification, made in response to the results of effectiveness assessments conducted pursuant to Section J.1.a, and the basis for determining (pursuant to Section J.2.b.) that each modified activity and/or BMP represents an improvement with respect to reducing the discharge of storm water pollutants from the MS4.
(8) A description of the steps that will be taken to improve the Copermittee's ability to assess program effectiveness using measurable targeted outcomes, assessment measures, assessment methods, and outcome levels 1-6. Include a time schedule for when improvement will occur; and

(9) A description of the steps that will be taken to identify aspects of the Copermittee's Jurisdictional Runoff Management Program that will be changed based on the results of the effectiveness assessment.

4. Work Plan

Each Copermittee must develop a work plan to address their high priority water quality problems in an iterative manner over the life of the permit. The goal of the work plan is to demonstrate a responsive and adaptive approach for the judicious and effective use of available resources to attack the highest priority problems. The work plan shall include, at a minimum, the following:

- **a.** The problems and priorities identified during the assessment;
- **b.** A list of priority pollutants and known or suspected sources;
- **c.** A brief description of the strategy employed to reduce, eliminate or mitigate the negative impacts;
- **d.** A description and schedule for new and/or modified BMPs. The schedule is to include dates for significant milestones;
- **e.** A description of how the selected activities will address an identified high priority problem. This will include a description of the expected effectiveness and benefits of the new and/or modified BMPs;
- **f.** A description of implementation effectiveness metrics;
- **g.** A description of how efficacy results will be used to modify priorities and implementation; and
- **h.** A review of past activities implemented, progress in meeting water quality standards, and planned program adjustments.

The Copermittee shall submit the work plan to the Regional Board within 365 days of adoption of the Order. Annual updates are also required and shall be included with the annual JRMP report. The Regional Board will assess the work plan for compliance with the specific and overall requirements of the Order. To increase effectiveness and efficiencies, Copermittees may combine their implementation efforts and work plans within a hydrologic area or sub area. Each Copermittee, however, maintains individual responsibility for developing and implementing an acceptable work plan.

K. REPORTING

The Copermittees may propose alternate reporting criteria and schedules, as part of their updated JRMP, for the Executive Officer's acceptance. The Copermittees shall submit the updated JRMP within 365 days after adoption of this Order.

1. Runoff Management Plans

a. JURISDICTIONAL RUNOFF MANAGEMENT PLANS

(1) Copermittees: The written account of the overall program to be conducted by each Copermittee to meet the jurisdictional requirements of section F of this Order is referred to as the Jurisdictional Runoff Management Plan (JRMP). Each Copermittee must revise and update its existing JRMP so that it describes all activities the Copermittee will undertake to implement the requirements of this Order. Each Copermittee must submit its updated and revised JRMP to the Regional Board 365 days after adoption of this Order.

(2) At a minimum, each Copermittee's JRMP must be updated and revised to demonstrate compliance with each applicable section of this Order.

b. WATERSHED WORKPLANS

(1) Copermittees: The written account of the program conducted by each watershed group of Copermittees is referred to as the Watershed Workplan. Copermittees within each watershed shall be responsible for updating and revising each Watershed Workplan. Each Watershed Workplan shall be updated and revised to describe any changes in water quality problems or priorities in the WMAs, and any necessary change to actions Copermittees will take to implement jurisdictional or watershed BMPs to address those identified.

(2) Lead Watershed Copermittee: Each Lead Watershed Permittee shall be responsible for coordinating the production of the Watershed Workplan, as well as coordinating Annual Watershed Review Meetings and public participation/public noticing in accordance with the requirements of this Order. The Lead Watershed Permittee shall submit the Watershed Workplan to the Principal.

(3) Principal Copermittee: The Principal Permittee shall assemble and submit the Watershed Workplan to the Regional Board no later than 365 days after adoption of this Order, and shall be prepared to implement the workplan within 60 days of the Regional Board Executive Officer deeming the workplan acceptable.

(4) Each Watershed Workplan shall, at a minimum, include:

(a) Identification of the Lead Watershed Permittee for the watershed.
(b) An updated watershed map.
(c) Identification and description of all applicable water quality data, reports, analyses, and other information to be used to assess receiving water quality.
(d) Assessment and analysis of the watershed's water quality data, reports, analyses, and other information, used during identification and prioritization of the watershed's water quality problems.
(e) A prioritized list of water quality problems within the WMA including rationale explaining the method/logic used to determine prioritization.
(f) Identification of the likely sources, pollutant discharges, and/or other factors causing the high priority water quality problems within the WMA.
(g) A description of the strategy to be used to guide Copermittee implementation of BMPs either jurisdictionally or on a watershed-wide basis to abate the highest water quality problems
(h) A list of criteria used to evaluate BMP effectiveness and how it was applied.
(i) A GIS map of BMPs implemented and BMPs scheduled for implementation.
(j) A description of the public participation mechanisms to be used and the parties anticipated to be involved during the development and implementation of the Watershed Workplan.
(k) A description of Copermittee collaboration to accomplish development of the Watershed Workplan, including a schedule for Watershed meetings.
(l) A description of how TMDLs and 303(d)-listed water bodies were considered during prioritization of watershed water quality problems
(m) A description of the strategy to model and monitor improvement in receiving water quality directly resulting from implementation of the BMPs described in the Watershed Workplan.
(n) A scheduled annual Watershed Workplan Review Meeting once every calendar year. This meeting shall be open to the public.

2. Other Required Reports and Plans

a. SSMP UPDATES

(1) Copermittees must submit their updated model SSMP in accordance with the applicable requirements of section F.1 with the JRMP <u>two years after adoption</u> of this Order.
(2) Within 180 days of determination that the Model SSMP is in compliance with this Permit's provisions, each Copermittee must update their own local SSMP, and amended ordinances consistent with the model SSMP, and shall submit both (local SSMP and amended ordinances) to the Regional Board.
(3) For SSMP-related requirements of Section F.1 with subsequent

implementation due dates, updated SSMPs must be submitted with the JRMP annual report covering the applicable reporting period.

b. REPORT OF WASTE DISCHARGE

The Principal Copermittee must submit to the Regional Board, no later than 210 days in advance of the expiration date of this Order, a Report of Waste Discharge (ROWD) as an application for issuance of new waste discharge requirements. The fourth annual report for this Order may serve as the ROWD, provided it contains the minimum information below.

At a minimum, the ROWD must include the following: (1) Proposed changes to the Copermittees' runoff management programs; (2) Proposed changes to monitoring programs; (3) Justification for proposed changes; (4) Name and mailing addresses of the Copermittees; (5) Names and titles of primary contacts of the Copermittees; and (6) Any other information necessary for the reissuance of this Order.

3. Annual Reports

a. JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM (JRMP) ANNUAL REPORTS

(1) Copermittees: Each Copermittee must generate individual JRMP Annual Reports which cover implementation of its jurisdictional activities during the past annual reporting period. Each Annual Report must verify and document compliance with this Order as directed in this section. Each Copermittee must retain records through 2015, available for review, that document compliance with each requirement of this Order. Each Copermittee must submit to the Principal Copermittee its individual JRMP Annual Report by the date specified by the Principal Copermittee. The reporting period for these annual reports must be the previous fiscal year. For example, the report submitted September 30, 2010 must cover the reporting period July 1, 2009 to June 30, 2010.

(2) Principal Copermittee: The Principal Copermittee is responsible for collecting and assembling each Copermittee's individual JRMP Annual Report. The Principal Copermittee must submit Unified JRMP Annual Reports to the Regional Board by September 30 of each year, beginning on September 30, 2011. The Unified JRMP Annual Report must contain the 13 individual JRMP Annual Reports.

(3) Each JRMP Annual Report must contain, at a minimum, the following information:

(a) Information required to be reported annually in Section H (Fiscal Analysis) of this Order;

(b) Information required to be reported annually in Section J (Program Effectiveness) of this Order;
(c) The completed Reporting Checklist found in Attachment D, and
(d) Information for each program component by watershed as described in the following Table 9:

Table 9. Annual Reporting Requirements

Program Component	Reporting Requirement
New Development	1. Updated relevant sections of the General Plan and environmental review process and a description of planned updates within the next annual reporting period, if applicable
	2. Revisions to the local SSMP, including where applicable: (a) Identification and summary of where the SSMP fails to meet the requirements of this Order; (b) Updated procedures for identifying pollutants of concern for each Priority Development Project; (c) Updated treatment BMP ranking matrix; and (d) Updated site design and treatment control BMP design standards;
	3. Verification that site design, source control, and treatment BMPs were required on all applicable Priority Development Projects;
	4. Description of the application of LID and site design BMPs in the planning and approval process;
	5. Description of projects subject to the local waiver provision for numeric sizing of treatment control BMP requirements;
	6. Description and summary of the LID site design BMP substitution program, if applicable;
	7. Description and summary of the process to verify compliance with SSMP requirements;
	8. Updates to the BMPs that are listed in the local SSMP as options for treatment control;
	9. Description of the treatment control maintenance tracking process and verification that the requirements of this Order were met during the reporting period; (a) Updated watershed-based database of approved treatment control BMPs and treatment control BMP maintenance within its jurisdiction, including updates to the list of high-priority treatment BMPs;
	10. Description of the process for identifying and evaluating hydrologic conditions of concern and requiring a suite of management measures within all Priority Development Projects to protect downstream beneficial uses and prevent adverse physical changes to downstream stream channels;
	11. Description of enforcement activities applicable to the new development and redevelopment component and a summary of the effectiveness of those activities;

Program Component	Reporting Requirement
Construction	1. Updated relevant ordinances and description of planned ordinance updates within the next annual reporting period, if applicable;
	2. A description of procedures used for identifying priorities for inspecting sites and enforcing control measures which consider the nature of the construction activity, topography, and the characteristics of soils and receiving water quality;
	3. Designated minimum and enhanced BMPs;
	4. Summary of the inspection program, including the following information: (a) Number and date of inspections conducted at each facility, including the facility address; (b) Number of facilities lacking adequate BMPs; (c) The BMP violations identified during the inspection by facility; (d) Number, date, and types of enforcement actions by facility; (e) Narrative description of inspection findings and follow-up activities for each facility;
Municipal	1. Updated source inventory;
	2. Changes to the designated municipal BMPs;
	3. Descriptions of procedures to assure that flood management projects assess the impacts on the water quality of receiving water bodies;
	4. Summary and assessment of BMPs implemented at retrofitted flood control structures, including: (a) List of projects with BMP retrofits; and (b) List and description of structures retrofitted without BMPs;
	5. Description and assessment of the municipal structural treatment control operations and maintenance activities, including: (a) Number of inspections and types of facilities; and (b) Summary of findings;
	6. Description of the municipal areas/facilities operations and maintenance activities, including: (a) Number and types of facilities maintained; (b) Amount of material removed and how that material was disposed; and (c) List of facilities planned for bi-annual inspections and the justification;
	7. Description of the municipal areas/programs inspection activities, including: (a) Number and date of inspections conducted at each facility; (b) Number of facilities lacking adequate BMPs; (c) The BMP violations identified during the inspection by facility; (d) Number, date and types of enforcement actions by facility; (e) Narrative description of inspection findings and follow-up activities for each facility;

Program Component	Reporting Requirement
	8. Description of activities implemented to address sewage infiltration into the MS4;
Commercial / Industrial	1. Annual inventory of commercial / industrial sources;
	2. Summary of the inspection program, including the following information: (a) Number and date of inspections conducted at each facility including the facility address; (b) Number of facilities lacking adequate BMPs; (c) The BMP violations identified during the inspection by facility; (d) Number, date, and types of enforcement actions by facility; (e) Narrative description of inspection findings and follow-up activities for each facility;
	3. Changes to designated minimum and enhanced BMPs;
	4. A list of industrial sites, including each name, address, and SIC code, that the Copermittee suspects may require coverage under the General Industrial Permit, but has not submitted an NOI;
Residential	1. Updated minimum BMPs required for residential areas and activities;
	2. Quantification and summary of applicable runoff and storm water enforcement actions within residential areas and activities;
	3. Description of efforts to manage runoff and storm water pollution in common interest areas;
Illicit Discharge Detection and Elimination	1. Changes to the legal authority to implement Illicit Discharge Detection and Elimination activities;
	2. Changes to the established investigation procedures;
	3. Public reporting mechanisms, including phone numbers and web pages;
	4. All data and assessments from the Dry Weather Effluent Analytical Monitoring activities;
	5. Response criteria developed for water quality data and notifications;
	6. Summaries of illicit discharges (including spills and water quality data events) and how each significant case was resolved;
	7. A description of instances when field screening and analytical data exceeded action levels, but for which no investigation was conducted;
	8. A description of enforcement actions taken in response to investigations of illicit discharges and a description of the effectiveness of those enforcement measures;
	9. A description of controls to prevent infiltration of seepage from municipal sanitary sewers to municipal separate storm sewer systems;
Work Plan	Priorities, strategy, implementation schedule and effectiveness evaluation;

(4) Each JRMP Annual Report must also include the following information

regarding non-storm water discharges (see Section B.2. of this Order):

(a) Identification of non-storm water discharge categories identified as a source of pollutants to waters of the U.S;
(b) A description of ordinances, orders, or similar means to prohibit non-storm water discharge categories identified under section B.2 above ;
(c) Identification of any control measures to be required and implemented for non-storm water discharge categories identified as needing said controls by the Regional Board; and
(d) A description of a program to address pollutants from non-emergency fire fighting flows identified by the Copermittee to be significant sources of pollutants.

4. Interim Reporting Requirements

For the July 2009-June 2010 reporting period, the Jurisdictional RMP must be submitted on January 31, 2011. Each Jurisdictional RMP Annual Report submitted for this reporting period must, at a minimum, include comprehensive descriptions of all activities conducted to fully implement the Copermittees' Jurisdictional RMP documents, as those documents were developed to comply with the requirements of Order No. 2002-01. The Principal Copermittee must submit these documents in a unified manner, consistent with the unified reporting requirements of Order No. 2002-01.

5. Universal Reporting Requirements

All submittals must include an executive summary, introduction, conclusion, recommendations, and signed certified statement. Each Copermittee must submit a signed certified statement covering its responsibilities for each applicable submittal. The Principal Copermittee must submit a signed certified statement covering its responsibilities for each applicable submittal and the sections of the submittals for which it is responsible.

L. MODIFICATION OF PROGRAMS

Modifications of Jurisdictional Runoff Management Programs and/or Watershed Runoff Management Programs may be initiated by the Executive Officer of the Regional Board or by the Copermittees. Requests by Copermittees must be made to the Executive Officer, and must be submitted during the annual review process. Requests for modifications should be incorporated, as appropriate, into the Annual Reports or other deliverables required or allowed under this Order.

1. Minor Modifications: Minor modifications to Jurisdictional Runoff Management Programs, and/or Watershed Runoff Management Programs, may be accepted by the Executive Officer where the Executive Officer finds the proposed modification complies with all discharge prohibitions, receiving water limitations, and other requirements of this Order.

2. Modifications Requiring an Amendment to this Order: Proposed modifications that are not minor require amendment of this Order in accordance with this Order's rules, policies, and procedures.

M. PRINCIPAL COPERMITTEE RESPONSIBILITIES

Within 180 days of adoption of this Order, the Copermittees must designate the Principal Copermittee and notify the Regional Board of the name of the Principal Copermittee. The Principal Copermittee must, at a minimum:

1. Serve as liaison between the Copermittees and the Regional Board on general permit issues, and when necessary and appropriate, represent the Copermittees before the Regional Board.
2. Coordinate permit activities among the Copermittees and facilitate collaboration on the development and implementation of programs required under this Order.
3. Integrate individual Copermittee documents and reports into single unified documents and reports for submittal to the Regional Board as required under this Order.
4. Produce and submit documents and reports as required by section K of this Order and Receiving Waters and MS4 Discharge Monitoring and Reporting Program No. R9-2009-0002 in Attachment E of this Order.

N. RECEIVING WATERS AND MS4 DISCHARGE MONITORING AND REPORTING PROGRAM

Pursuant to CWC section 13267, the Copermittees must comply with all the requirements contained in Receiving Waters and MS4 Discharge Monitoring and Reporting Program No. R9-2009-0002 in Attachment E of this Order.

O. STANDARD PROVISIONS, REPORTING REQUIREMENTS, AND NOTIFICATIONS

1. Each Copermittee must comply with Standard Provisions, Reporting Requirements, and Notifications contained in Attachment B of this Order. This includes 24 hour/5 day reporting requirements for any instance of non-compliance with this Order as described in section 5.e of Attachment B.

2. All plans, reports and subsequent amendments submitted in compliance with this Order must be implemented immediately (or as otherwise specified). All submittals by Copermittees must be adequate to implement the requirements of this Order.

I, David W. Gibson, Executive Officer, do hereby certify the foregoing is a full, true, and correct copy of an Order adopted by the California Regional Water Quality Control Board, San Diego Region, on December 16, 2009.

David W. Gibson
Executive Officer

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN DIEGO REGION

FACT SHEET / TECHNICAL REPORT

FOR

ORDER NO. R9-2009-0002
NPDES NO. CAS0108740

WASTE DISCHARGE REQUIREMENTS

FOR

DISCHARGES OF RUNOFF FROM
THE MUNICIPAL SEPARATE STORM SEWER SYSTEMS (MS4s)
DRAINING THE WATERSHEDS OF THE
COUNTY OF ORANGE,
THE INCORPORATED CITIES OF ORANGE COUNTY,
AND THE ORANGE COUNTY FLOOD CONTROL DISTRICT
WITHIN THE SAN DIEGO REGION

December 16, 2009

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LIST OF ACRONYMS AND ABBREVIATIONS

ADT - Average Daily Traffic
ASBS - Area of Special Biological Significance
AST – Active Sediment Treatment
BAT - Best Available Technology
BIA - Building Industry Association of San Diego County
BMP - Best Management Practice
Basin Plan - Water Quality Control Plan for the San Diego Basin
BU – Beneficial Uses
CASQA - California Stormwater Quality Association
CCC - California Coastal Commission
CDFG - California Department of Fish and Game
CEQA - California Environmental Quality Act
CFR - Code of Federal Regulations
Copermittees - County of Orange, the 11 incorporated cities within the County of Orange in the San Diego Region, and the Orange County Flood Control District
CWA - Clean Water Act
CWC - California Water Code
CZARA - Coastal Zone Act Reauthorization Amendments of 1990
DAMP – Drainage Area Management Plan
ESAs - Environmentally Sensitive Areas
FR - Federal Register
GIS - Geographic Information System
HMP – Hydromodification Management Plan
IBI – Index of Biotic Integrity
IC/ID - Illicit Connections and Illicit Discharges
JRMP - Jurisdictional Runoff Management Plan
LARWQCB – California Regional Water Quality Control Board, Los Angeles Region
LID – Low Impact Development
MEP - Maximum Extent Practicable
MRP - Receiving Waters Monitoring and Reporting Program
MS4 - Municipal Separate Storm Sewer System
NOI - Notice of Intent
NPDES - National Pollutant Discharge Elimination System
NRDC - Natural Resources Defense Council
NURP - Nationwide Urban Runoff Program
OCVCD – Orange County Vector Control District
Regional Board – California Regional Water Quality Control Board, San Diego Region
RGOs - Retail Gasoline Outlets
ROWD - Orange County Copermittees' Report of Waste Discharge (application for NPDES reissuance)
RWLs - Receiving Water Limitations
SAL - Storm Water Action Level
SIC - Standard Industrial Classification Code
SSMP - Standard Storm Water Mitigation Plan
State Board - State Water Resources Control Board
SWMP - Storm Water Management Plan
SWPPP - Storm Water Pollution Prevention Plan
SWQPA - State Water Quality Protected Area
TAC - State Water Resources Control Board Urban Runoff Technical Advisory Committee
TIE - Toxicity Identification Evaluation
TMDL - Total Maximum Daily Load
USEPA - United States Environmental Protection Agency

USACE – United States Army Corps of Engineers
WDRs - Waste Discharge Requirements
WLA - Waste Load Allocation
WQC - Water Quality Criteria
WQBEL - Water Quality Based Effluent Limitations
WQMP – Water Quality Management Plan
WSPA - Western States Petroleum Association
WRMP - Watershed Runoff Management Plan

I. FACT SHEET FORMAT

This Fact Sheet briefly sets forth the principle facts and the significant factual, legal, methodological, and policy questions that the California Regional Water Quality Control Board, San Diego Region (Regional Board) considered in preparing Order No. R9-2009-0002. In accordance with the Code of Federal Regulations (CFR) title 40 parts 124.8 and 124.56, this Fact Sheet includes, but is not limited to, the following information:

A. Contact information
B. Public process and notification procedures
C. Background information
D. Permitting approach
E. Economic issues
F. Legal authority
G. Findings
H. Directives

Tentative Order No. R9-2008-0001 was distributed for review on February 9, 2007. A public hearing was subsequently held on April 11, 2007 in the City of Mission Viejo to receive oral comments from interested persons, and the Regional Board accepted written comments on the Tentative Order until April 25, 2007. Following review of the comments, a Revised Tentative Order was distributed on July 6, 2007 with a Response to Comments document (RTC 1). A second set of written comments were received on the revisions until August 23, 2007. Following review of the second round of written comments, the Regional Board further revised specific sections of the Order and distributed a second Response to Comments document (RTC 2). Tentative Order No. R9-2008-0001 was submitted to the Board for adoption on February 13, 2008. Upon review and comment, the Board chose not to adopt Tentative Order No. R9-2008-0001 and sent the Order back to staff with comments for changes. Tentative Order No. R9-2009-0002 was distributed for review on March 13, 2009. Written comments received on the tentative Order prior to June 19, 2009 were provided to Regional Board members for a public hearing regarding the Tentative Order held on July 1, 2009. On August 12, 2009, the sixth version of the Tentative Order was distributed for review. On November 18, 2009 an adoption hearing was held on the Tentative Order. The Regional Board directed staff to make specific changes and bring the Tentative Order back for consideration.

The Regional Board's files applicable to the issuance of Order No. R9-2009-0002 are incorporated into the administrative record in support of the findings and requirements of Order No. R9-2009-0002.

II. CONTACT INFORMATION

Regional Board

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The Order and other related documents can be downloaded from the Regional Board website at http://www.waterboards.ca.gov/sandiego/programs/oc_stormwater.html.

All documents referenced in this Fact Sheet and in Order No. R9-2009-0002 are available for public review at the Regional Board office, located at the address listed above. Public records are available for inspection during regular business hours, from 8:00 am to 5:00 pm Monday through Friday. To schedule an appointment to inspect public records, contact Sylvia Wellnitz at 858-637-5593 or DiAnne Broussard at 858-492-1763.

Copermittees

County of Orange	City of Laguna Woods
Orange County Flood Control District	City of Lake Forest
City of Aliso Viejo	City of Mission Viejo
City of Dana Point	City of Rancho Santa Margarita
City of Laguna Beach	City of San Clemente
City of Laguna Hills	City of San Juan Capistrano
City of Laguna Niguel	

III. PUBLIC PROCESS AND NOTIFICATION PROCEDURES

The Regional Board followed the schedule listed below for the preparation of Order No. R9-2009-0002:

A. In April 2006 and July 2006, the Northern Watershed Unit of the Regional Board met with the Copermittees to discuss the Report of Waste Discharge (ROWD) and potential changes to the permit based on the annual reports and the tentative permit for San Diego County.
B. On August 18, 2006, the Regional Board received the ROWD for the permit renewal.
C. On October 20, 2006 the Regional Board provided written comments on the ROWD to the Copermittees.
D. On November 15, 2006, the Regional Board received the 2005-06 annual reports from the Copermittees for the existing permit.
E. On January 11, 2007, the Regional Board notified all known interested parties that an electronic email listserv had been established to provide information and notices on the reissuance of the municipal storm water NPDES permit for southern Orange County.
F. On February 9, 2007, the Regional Board released the tentative Order and notified interested parties of a planned workshop. Written comments were accepted until April 25, 2007.
G. A public workshop was held on March 12, 2007.
H. A public hearing of the tentative Order was conducted on April 11, 2007.
I. A revised tentative Order was released on July 6, 2007. Written comments were accepted until August 23, 2007.
J. A second revised tentative Order was released on December 12, 2007.
K. A public hearing was conducted on February 13, 2008. The Regional Board chose not to adopt the tentative Order, and sent it back to staff for revision.
L. On March 13, 2009 the Regional Board released a fourth version of the revised tentative Order and notified interested parties of a planned workshop.
M. On April 03, 2009 and May 06, 2009 the Regional Board held public workshops.
N. A public hearing of the tentative Order was held on July 01, 2009.
O. On August 12, 2009 the Regional Board released an additional version of the revised tentative Order for public review. Written comments were accepted until September 28, 2009.
P. An adoption hearing of the tentative Order was conducted on November 18, 2009. The Regional Board chose not to adopt the tentative Order and directed staff to make specific changes.

IV. BACKGROUND

Tentative Order No. R9-2009-0002 is the fourth iteration of the storm water permit for the municipal separate storm sewer systems (MS4s) in the Orange County portion of the San Diego region. The first permit was adopted in 1990, and the permit was reissued in 1996 and 2002.

Municipal Storm Water Permits are required by the Federal Clean Water Act 1987 Amendments. The federal Clean Water Act (CWA) was amended in 1987 to address storm water runoff from municipal and industrial dischargers. One requirement of the amendment was that many municipalities throughout the United States were obligated for the first time to obtain National Pollutant Discharge Elimination System (NPDES) permits for discharges of storm water runoff from their MS4s. In response to the CWA amendment (and the pending federal NPDES regulations which would implement the amendment), the Regional Board issued a municipal storm water permit, Order No. 90-38, in July 1990 to the Copermittees for their MS4 discharges.[1]

The First and Second Term Permits, Order Nos. 90-38 and 96-03, provided maximum flexibility. Order No. 90-38 contained the "essentials" of the 1990 regulations, but the requirements were written in very broad, generic terms. This was done in order to provide the maximum amount of flexibility to the Copermittees in implementing the new requirements (flexibility was, in fact, the stated reason for issuing the permit in advance of the final regulations). This lack of specificity was reflected in the Drainage Area Management Plan (DAMP) implemented under this First Term Permit in 1993 and renewed under the Second Term Permit in 1996. From staff's perspective however, this same lack of specificity, combined with the lack of funding and political will, also provided the Copermittees with ample reasons to take few substantive steps towards permit compliance. The situation was exacerbated by the Regional Board's own lack of storm water resources.

By 2000 the Regional Board and Copermittees recognized the importance of an improved storm water program. Although renewed in 1996 as Order No. 96-03, the 1993 DAMP implemented by the Copermittees was not significantly updated until 2000. The 2000 DAMP submitted to the Regional Board for the Third-Term Permit renewal was improved over the earlier DAMP. Regional Board staff concluded, however, that it reflected only the basic requirements of the 1990 Federal Regulations and in most cases did not represent significant improvement over the 1993 DAMP. Continued implementation of the DAMP without amendment would not have adequately addressed the impacts to receiving waters resulting from the discharge of storm water runoff and would not have achieved the maximum extent practicable standard (MEP) as defined in the Order.

[1] The 1990 permit was issued to the County of Orange, the Orange County Flood Control District, and six incorporated cities. Additional municipalities have been added to the MS4 NPDES permit as they have incorporated.

In order to provide the Copermittees with the minimum requirements to meet the MEP standard for storm water of the Regional Board, a more detailed Order was adopted (Order No. R9-2002-01) that emphasized the strong jurisdictional level programs developed by the Copermittees during the First and Second Term Permits as well as the watershed-level approach embodied in the proposed DAMP.

The Third-Term Permit introduced specific requirements. The regulatory approach incorporated into Order No. R9-2002-01 was a significant departure from the regulatory approach of the First and Second-Term Permits. Where Order Nos. 90-38 and 96-03 included broad, nonspecific requirements in order to provide the Copermittees with the maximum amount of flexibility in developing their programs, Order No. R9-2002-01 used detailed, specific requirements which outlined the minimum level of implementation required for the Copermittees' programs. The shift in permitting approaches resulted from the Regional Board's conclusion that the lack of specificity in earlier Orders resulted in frequently unenforceable permit requirements, which in turn allowed some Copermittees to only make limited progress in implementing their programs.

The Third-Term Permit followed the San Diego County permit template. The shift in regulatory approaches for MS4 permits was first manifested in the 2001 MS4 permit to the owners and operators of San Diego County MS4s (Order No. R9-2001-01). The Third-Term Orange County Permit included similar requirements as the 2001 San Diego County Permit. Both the San Diego and Orange County Permits were appealed to the State Water Resources Control Board (State Board).[2] Minor modifications of each were made by the State Board, but the vast majority of the requirements were upheld. The San Diego County permit was also challenged in the Superior Court of the State of California and the Court of Appeal, Fourth Appellate District. Further litigation on the Orange County permit was held pending the precedential decisions on the San Diego Permit. The San Diego Permit was largely upheld in the Superior and Appellate Courts. The State of California Supreme Court declined to hear a final appeal from the Building Industry Association in March 2005. Thus, the Third-Term Orange County permit requirements remained as slightly modified by the State Board.

[2] Seven petitions were filed with the State Board over the Third-Term Orange County Permit. Six were placed in abeyance. Three of the petitioners sought stays. One stay request was dismissed and one was withdrawn. The active petition and stays were addressed by the State Board in Order No. WQO 2002-0014. That Order stayed provision F.5.f regarding sewage spills and modified Finding No. 26 regarding chronic toxicity.

The Third-Term Permit was adopted following substantial public participation. Public participation was extensive during the adoption process of the Third-Term Permit. The draft permit was released for public review and comment on July 2, 2001, and revised in response to comments and State Board Order WQ 2001-15 on the petition to review the San Diego Municipal Storm Water Permit. Because the proposed requirements for Orange County were similar to those that had recently been adopted and contested in San Diego County, much of the public participation dialogue echoed the discussions held during the San Diego renewal. Approximately 684 comments were received and responded to during two public workshops and a written comment period on the Tentative Order for the Third-Term Orange County permit. Following the extensive public participation process, the Regional Board adopted Order No. R9-2002-01 on February 13, 2002.

Storm water programs have improved under the Third-Term Permit. Since adoption of Order No. R9-2002-01, the Copermittees' storm water programs have expanded dramatically. Audits of the Copermittees' programs and reviews of annual reports exhibit that the Copermittees' jurisdictional programs are largely in compliance with the Order. Some of the efforts currently being conducted on a regular basis by the Copermittees that were not conducted on a widespread basis prior to adoption of Order No. R9-2002-01, include: construction site storm water inspections, industrial and commercial facility storm water inspections, municipal facility storm water inspections, management of storm water quality from new development, development of BMP requirements for existing development, interdepartmental coordination, comprehensive water quality monitoring, and assessment of storm water program effectiveness.

Significant challenges remain. When viewed relative to the magnitude of the storm water runoff problem, enormous challenges remain, particularly regarding the management of storm water runoff on a watershed scale. Today, storm and non-storm water discharges from the MS4 continue to be the leading cause of water quality impairment in the San Diego Region.[3] The Copermittees' monitoring data exhibits persistent exceedances of water quality objectives in most watersheds.[4] Many watersheds also have conditions that are frequently toxic to aquatic life. Bioassessment data from the watersheds further reflects these conditions, finding that macroinvertebrate communities in creeks have widespread Poor to Very Poor Index of Biotic Integrity ratings. Finally, the now too familiar "health advisory" or "beach closure" signs, which often result from high levels of bacteria in storm and non-storm water, exhibit the continued threat to public health by such discharges.

[3] The potential sources of impairments are identified on the CWA section 303(d) list of impaired water bodies for the San Diego Region.
[4] Data is provided in annual reports to the Regional Board. A summary of data collected during the third-term permit is provided in the Copermittees' application for permit reissuance. That summary is available on-line at: http://www.ocwatersheds.com/StormWater/documents_ROWD.asp

V. PERMITTING APPROACH (PROGRAM INTEGRATION, FLEXIBILITY, AND DETAIL)

The Order contains an increased emphasis on storm water discharge management on a watershed basis. This shift towards increased watershed management is consistent with planning efforts conducted by the Regional Board regarding reissuance of the San Diego Permit (Order No. R9-2007-0001), and it is also consistent with the Copermittees' most recent Report of Waste Discharge (ROWD).[5] This shift reflects recognition of the maturity of the storm water programs since they began implementing the Third-Term Permit. Addressing storm water discharge management on a watershed basis is only possible if effective jurisdictional programs have been established, and maintaining effective jurisdictional programs is crucial to the success of watershed-focused management.

There are several reasons for this shift in emphasis. First, the Copermittees are generally doing an effective job at implementing their jurisdictional programs; while on the other hand, an emphasis on watersheds is necessary to shift the focus of the Copermittees from program development and implementation to water quality results. After over 15 years of Copermittee program implementation, it is critical that the Copermittees link their efforts with positive impacts on water quality. Addressing storm water on a watershed scale focuses on water quality results by emphasizing the receiving waters within the watershed. The conditions of the receiving waters drive management actions, which in turn focus on the water quality problems in each watershed.

Focusing on watershed implementation does not mean that the Copermittees must expend funds outside of their jurisdictions. Rather, the Copermittees within each watershed are expected to collaborate to develop a watershed strategy to address the high priority water quality problems within each watershed. They have the option of implementing the strategy in the manner they find to be most effective. Each Copermittee can implement the strategy individually within its jurisdiction, or the Copermittees can group together to implement the strategy throughout the watershed.

While the Order includes a new emphasis on addressing storm water discharges on a watershed basis, the Order includes recognition of the importance of continued program implementation on jurisdictional and countywide levels. The Order also acknowledges that jurisdictional, watershed, and countywide efforts are not always mutually exclusive. For this reason, an attempt has been made to allow for the Copermittees' jurisdictional, watershed, and countywide programs to integrate.

[5] The Report of Waste Discharge (ROWD) was submitted to the Regional Board on August 18, 2006 by the Principal Permittee (County of Orange) on behalf of all Copermittees.

In the Order, the watershed requirements serve as the mechanism for this program integration. Since jurisdictional and countywide activities can also serve watershed purposes, such activities can be integrated into the Copermittees' watershed programs, provided the activities meet certain criteria. In this manner, the Copermittees' activities do not always need to distinguish between jurisdictional, watershed, and countywide levels of implementation. Instead, they can be integrated on multiple levels.

Such opportunities for program integration inherently provide flexibility to the Copermittees in implementing their programs. Program integration can be expanded or minimized as the Copermittees see fit. For example, there is flexibility provided in determining the activities to be integrated and implemented in the watershed programs – watershed-based efforts, countywide efforts, enhanced jurisdictional efforts, or a mixture of the three. Significant flexibility is also provided throughout other portions of the Order.

Copermittees can choose the best management practices (BMPs) to be implemented, or required to be implemented, for development, construction, and existing development areas. Flexibility to determine which industrial or commercial sites are to be inspected is also provided to the Copermittees. Educational approaches are also to be determined by the Copermittees under the Order. Implementation of certain efforts on a countywide basis is largely optional for the Copermittees as well. Significant leeway is also provided to the Copermittees in using methods to assess the effectiveness of their various runoff management programs. This flexibility is further extended to the monitoring program requirements, which allow the Copermittees to develop monitoring approaches to several aspects of the monitoring program.

The challenge in drafting the Order is to provide the flexibility described above while ensuring that the Order is still enforceable. To achieve this, the Order frequently prescribes minimum measurable outcomes, while providing the Copermittees with flexibility in the approaches they use to meet those outcomes. Enforceability has been found to be a critical aspect of the Order. For example, the watershed requirements of Order No. R9-2002-01 were some of the Order's most flexible requirements. This lack of specificity in the watershed requirements resulted in inefficient watershed compliance efforts. This situation reflects a common outcome of flexible permit language. Such language can be unclear and unenforceable, and it can lead to implementation of inadequate programs.

To avoid these types of situations, a balance between flexibility and enforceability has been crafted into the Order. Minimum measurable outcomes are utilized to ensure the Order is enforceable, while the Copermittees are provided flexibility in deciding how they will implement their programs to meet the minimum measurable outcomes.

GENERAL CRITERIA

Non-storm water discharges may contain pollutants which result from various activities that occur within areas draining into the MS4. This includes, but is not limited to, illicit discharges and connections, exempted categories of discharge not a source of pollutants (40 CFR 122.26(d)), and discharges into the MS4 covered under a separate NPDES permit. As such, existing and proposed discharges of non-storm water from MS4s:

a) Result from similar activities through the MS4 system;
b) Are the same type of water;
c) Require similar effluent limitations for the protection of the Beneficial Uses of the receiving waters;
d) Require similar monitoring;
e) Are under the control of the owner and operator of the MS4 system; and
f) Are more appropriately regulated under a general permit than individual permits.

VI. ECONOMIC ISSUES

Economic discussions of storm and non-storm water management programs tend to focus on the significant costs incurred by municipalities in developing and implementing the programs. However, when considering the cost of implementing the programs, it is also important to consider the alternative costs incurred by not fully implementing the programs, as well as the benefits which result from program implementation. For instance, unhealthful coastal water quality conditions negatively affect residents, tourists, and related portions of the Orange County economy.[6]

[6] Orange County 2006 Community Indicators Project. 2006. Sponsored by the County of Orange, the Orange County Business Council, and the Children and Families Commission of Orange County. Available on-line at www.oc.ca.gov/ceocommunity.asp

It is very difficult to ascertain the true cost of implementation of the Copermittees' management programs because of inconsistencies in reporting by the Copermittees. Reported costs of compliance for the same program element can vary widely from city to city, often by a very wide margin that is not easily explained.[7] Despite these problems, efforts have been made to identify management program costs, which can be helpful in understanding the costs of program implementation. The Orange County Municipalities plan to prepare a common fiscal reporting strategy to better define the expenditure and budget line items included in annual reports.[8]

Estimates of Phase I Storm Water Program Costs.

The United States Environmental Protection Agency (USEPA), the California Regional Water Quality Control Boards, and the State Board have attempted to evaluate the costs of implementing municipal storm water programs. The assessments demonstrate that true costs are difficult to ascertain and reported costs vary widely. Nonetheless, they provide a useful context for considering the costs of requirements within Tentative Order No. R9-2008-0001. In addition, reported fiscal analyses tend to neglect the costs incurred to municipalities when storm water runoff is not effectively managed. Such costs result from pollution, contamination, nuisance, and damage to ecosystems, property, and human health.

In 1999 USEPA reported on multiple studies it conducted to determine the cost of management programs. A study of Phase II municipalities determined that the annual cost of the Phase II program was expected to be $9.16 per household. USEPA also studied 35 Phase I municipalities, finding costs to be $9.08 per household annually, similar to those anticipated for Phase II municipalities.[9] The USEPA cost estimate for Phase I municipalities is valuable because it considers municipalities in Orange County.
A study on program cost was also conducted by the California Regional Water Quality Control Board, Los Angeles Region (LARWQCB), where program costs reported in the municipalities' annual reports were assessed. The LARWQCB estimated that average per household cost to implement the MS4 program in Los Angeles County was $12.50.[10] Since the Los Angeles County permit is very similar to Order No. R9-2002-01, this estimate is also useful in assessing general program costs in Orange County.

[7] LARWQCB, 2003. Review and Analysis of Budget Data Submitted by the Permittees for Fiscal Years 2000-2003. P. 2.
[8] Orange County Storm Water Copermittees. 2006. Report of Waste Discharge (San Diego Region)
[9] Federal Register / Vol. 64, No. 235 / Wednesday, December 8, 1999 / Rules and Regulations. P. 68791-68792.
[10] LARWQCB, 2003. Review and Analysis of Budget Data Submitted by the Permittees for Fiscal Years 2000-2003. P. 2.

The State Board also recently commissioned a study by the California State University, Sacramento to assess costs of the Phase I MS4 program. This study includes an assessment of costs incurred by Phase I MS4s throughout the State to implement their programs. Annual cost per household in the study ranged from $18-46, with the City of Encinitas in San Diego County representing the upper end of the range.[11] Although no Orange County municipalities were assessed, the cost of the City of Encinitas' program may be somewhat representative of the upper range of Orange County MS4 programs. Encinitas shares similarities with southern Orange County, including the similarity of the San Diego MS4 permit to the Orange County MS4 permit, the city's coastal location, and its reliance on tourism. However, the City's program cost can be considered as the high end of the spectrum for management program costs because the City has a consent decree with environmental groups regarding its program, and City of Encinitas has received recognition for implementing a superior program.

It is important to note that reported program costs are not all attributable to compliance with MS4 permits. Many program components, and their associated costs, existed before any MS4 permits were ever issued. For example, street sweeping and trash collection costs cannot be solely or even principally attributable to MS4 permit compliance, since these practices have long been implemented by municipalities. Therefore, true program cost resulting from MS4 permit requirements is some fraction of reported costs. The California State University, Sacramento study found that only 38 percent of program costs are new costs fully attributable to MS4 permits. The remainder of the program costs were either pre-existing or resulted from enhancement of pre-existing programs.[12] In 2000, the County of Orange found that even lesser amounts of program costs are solely attributable to MS4 permit compliance, reporting that the amount attributable to implement the Drainage Area Management Plan (DAMP), was less than 20 percent of the total budget. The remaining 80 percent was attributable to pre-existing programs.[13]

Estimating Costs of Reissued Storm Water Permits

The vast majority of costs that will be incurred as a result of implementing Order No. R9-2009-0002 are not new. Storm water management programs have been in place in Orange County for over 15 years. Any increase in cost to the Copermittees will be incremental in nature. Moreover, since Order No. R9-2009-0002 "fine tunes" the requirements of Order No. R9-2002-01, these cost increases are expected to be modest.

[11] State Water Board, 2005. NPDES Stormwater Cost Survey. P. ii.
[12] Ibid. P. 58.
[13] County of Orange, 2000. A NPDES Annual Progress Report. P. 60. More current data from the County of Orange is not used in this discussion because the County of Orange no longer reports such information.

The anticipated costs of program changes are difficult to estimate because of the flexibility inherent within the Permit and the recognition that program modifications will vary among the municipalities in response to the specific needs of the local and watershed programs. In other words, the Permit is intended to allow each Permittee to de-emphasize some program components and strengthen others based on the experience of the jurisdictional programs.

The changes in Order No. R9-2009-0002 reflect the iterative process of BMP implementation and the necessarily adaptive nature of storm water management that is expected by the USEPA. In 1996, USEPA recognized that changes to MS4 programs would occur during the reapplication period based on new information on the relative magnitude of a problem, new data on water quality impacts of the storm water discharges, and experience gained under the prior permit.[14] Some program changes have been proposed by the Copermittees in the permit reapplication package, and others have been included because the Regional Board considers those measures necessary and feasible to protect water quality from the effects of MS4 discharges.

Other Economic Considerations.

Economic considerations of management programs cannot be limited only to program costs. Evaluation of programs requires information on the implementation costs and information on the benefits derived from environmental protection and improvement.[15] Attention is often focused on program costs, but the programs must also be viewed in terms of their value to the public.

For example, household willingness to pay for improvements in fresh water quality for fishing and boating has been estimated by USEPA to be $158-210.[16] This estimate can be considered conservative, since it does not include important considerations such as marine waters benefits, wildlife benefits, or flood control benefits. The California State University, Sacramento study corroborates USEPA's estimates, reporting annual household willingness to pay for statewide clean water to be $180.[17] When viewed in comparison to household costs of existing management programs, household willingness to pay estimates exhibit that per household costs incurred by Copermittees to implement their management programs remain reasonable.

[14] Federal Register / Vol. 61, No. 155 / Friday, August 9, 1996 / Rules and Regulations. Interpretive policy memorandum on reapplication requirements for MS4s.
[15] Ribaudo M.O. and D. Heelerstein. 1992, *Estimating Water Quality Benefits: Theoretical and Methodological Issues.* U.S. Department of Agriculture. Technical Bulletin No. 1808.
[16] Federal Register / Vol. 64, No. 235 / Wednesday, December 8, 1999 / Rules and Regulations. P. 68793.
[17] State Board, 2005. NPDES Stormwater Cost Survey. P. iv.

The effect of storm and non-storm water discharges on receiving waters can also influence the value of real estate in southern Orange County. For instance, recent marketing of new developments in the region prominently features access or proximity to the ocean.[18] This demonstrates the added value of healthy aquatic environments to property values. The real estate industry recognizes that home buyers are willing to pay for access to clean water environments. The ability to market water-based recreational activities is dependent on healthy water quality conditions.

Municipalities and business groups in Orange County recognize the value of programs to prevent and treat storm water pollution in Orange County. For instance, both coastal and inland Orange County cities positively promote their access to the Pacific Ocean as a valuable quality of life feature.[19] In addition, the South Orange County Regional Chamber of Commerce's legislative policy for infrastructure includes the support of programs and solutions for non-point source storm water runoff. This demonstrates that the business community realizes the negative economic effects that result from polluted storm water.

Another important way to consider management program costs is to consider implementation in terms of costs incurred by not improving the programs. Storm and non-storm water discharges from MS4s in southern California has been found to cause illness in people bathing near storm drains.[20] A study of south Huntington Beach and north Newport Beach (both located in northern Orange County) found that an illness rate of about 0.8 percent among bathers at those beaches resulted in about $3 million annually in health-related expenses.[21] Extrapolation of such numbers to the wide range of beaches of Orange County could result in huge public expenses.

[18] Examples include the "Marblehead Coastal" project in San Clemente (http://www.marbleheadonthecoast.com), the "Pacifica San Juan" project in San Juan Capistrano (http://pacificasanjuan.com), and "The Strand at Headlands" in Dana Point (http://strandoc.com).
[19] For a coastal city, see Laguna Beach Overview at http://www.lagunabeachcity.net/about/overview. For an inland city, see the Lake Forest 2005 Economic Profile at http://www.thearbor.info/pdf/2005%20Economic%20Profile.pdf.
[20] Haile, R.W., et al, 1996. An Epidemiological Study of Possible Adverse Health Effects of Swimming in Santa Monica Bay. Santa Monica Bay Restoration Project.
[21] Dwight, R.H., et al., 2005. Estimating the Economic Burden From Illnesses Associated With Recreational Coastal Water Pollution – A Case Study in Orange County, California. Journal of Enviro. Management Vol.76. No.2 p.95-103. Also reported in: Los Angeles Times, May 2, 2005. Here's What Ocean Germs Cost You: A UC Irvine Study Tallies the Cost of Treatment and Lost Wages for Beachgoers Who Get Sick.

Storm and non-storm water MS4 discharges, and their impact on receiving waters also affect tourism. In past years, Orange County was featured in the national press for its water quality problems. Such news is likely to have a negative impact on tourism, since polluted beaches are generally not attractive to tourists. According to the Orange County Community Indicators Project, the County's visitors spent an average of $107.70 per day in 2004.[22] The experience of Huntington Beach provides an example of the potential economic impact of poor water quality. Approximately eight miles of Huntington Beach were closed for two months in the middle of summer of 1999, severely impacting beach visitation. When considered with the number of visitors and their average expenditure, the negative effects to the local economy are obvious.

Coastal tourism is an important industry in Orange County and is dependent upon effective management of storm water pollution and the prevention of non-storm water pollution. The following examples reflect that relationship.

> DANA POINT: In response to a Grand Jury finding (1999-2000 Rainy Season's First Flush Hits the Harbors of Orange County), the city of Dana Point notes the interrelationship between the clean coastal water and the economic health of the city. Dana Point reports receiving $5.2 million in transit occupancy tax funds in FY 1999-2000 "due in large part because of proximity to the beach. Without clean beaches, Dana Point risks losing its major revenue source."[23] More recently, the City budget report estimates that transit occupancy taxes comprise 35 percent of general fund revenues for the 2006 fiscal year.
>
> LAGUNA BEACH: Tourism is one of the primary components of the Laguna Beach economy, and the beach is one of the main tourist attractions in the city. In 1999, hotel/motel bed tax revenue was approximately $3 million, representing 13 percent of the City's general fund revenue.[24] In 2006, the City expects transit occupancy taxes to represent about 11 percent of general fund revenue.[25] The proportional decrease is due to an increase in property taxes, which is also affected in part by the quality of coastal waters. The City Council recognizes the value of the beaches to tourists, and the local population and has funded several low-flow non-storm water diversion systems in an attempt to prevent beach pollution and beach closures.

[22] Orange County 2006 Community Indicators Project. 2006. Sponsored by the County of Orange, the Orange County Business Council, and the Children and Families Commission of Orange County. Available on-line at www.oc.ca.gov/ceocommunity.asp
[23] Orange County Grand Jury. 1999-2000 Rainy Season's First Flush Hits the Harbors of Orange County.
[24] Laguna Beach at a Glance. May 2000. Prepared by Moore Iacofano Goltsman, Inc.
[25] City of Laguna Beach, adopted budget 2006-2007. Available on-line at: http://www.lagunabeachcity.net/government/reference/budget07

DOHENY STATE BEACH: In 1997, the U.S. Army Corps of Engineers (USACE) prepared an economic analysis as part of the San Juan Creek and Aliso Creek Watershed Study. Recreational value for Doheny State Beach, based on annual visitation of 670,545 people in 1995, was calculated at $2,850,000. Furthermore, the USACE notes that lifeguards reported that beach attendance falls dramatically when there are unhealthy conditions in the ocean. In 1999, the USACE prepared an updated economic study as part of the Feasibility Phase of the San Juan Creek Watershed Management Study. The 1999 study reports that average beach attendance from 1996 to 1998 increased to 918,735. The USACE places a recreation value per visitor at $5.76, which implies the annual recreational value of Doheny State Beach for 1996 to 1998 was $5,291,914.

ALISO BEACH: In 1997, the USACE prepared an economic analysis as part of the San Juan Creek and Aliso Creek Watershed Study. Recreational value for Aliso Beach, based on annual visitation of 3,477,369 people in 1995, was calculated at $14,779,000. In the 1999 Draft Feasibility Report for the Aliso Creek Watershed Management Study, the USACE noted that the average beach attendance from 1996 to 1998 decreased to 1,148,374. The recreation value per visitor was calculated at $4.50 and the average annual impact from water quality-related beach closures at Aliso Beach Park was estimated to be $468,392. This number is comparable to an economic analysis conducted as part of the Aliso Creek Watershed 205(j) study that estimated the annual average recreational value impact of beach closures at Aliso Beach Park to be $468,400.

Finally, it is important to consider the benefits of management programs in conjunction with their costs. A recent study conducted by the University of Southern California and University of California, Los Angeles assessed the costs and benefits of implementing various approaches for achieving compliance with the MS4 permits in the Los Angeles Region. The study found that non-structural systems would cost $2.8 billion but provide $5.6 billion in benefit. If structural systems were determined to be needed, the study found that total costs would be $5.7 to $7.4 billion, while benefits could reach $18 billion.[26] Costs are anticipated to be borne over many years – probably ten years at least. As can be seen, the benefits of the programs are expected to considerably exceed their costs. Such findings are corroborated by USEPA, which found that the benefits of implementation of its Phase II storm water rule would also outweigh the costs.[27]
Additional discussion of economic issues can be found at section 3 of the Fact Sheet/Technical Report for Regional Board Order No. R9-2002-01, available at:

http://www.waterboards.ca.gov/sandiego/programs/oc_stormwater.html.

[26] LARWQCB, 2004. Alternative Approaches to Stormwater Control.
[27] Federal Register / Vol. 64, No. 235 / Wednesday, December 8, 1999 / Rules and Regulations. P. 68791.

VII. LEGAL AUTHORITY

The following statutes, regulations, and Water Quality Control Plans provide the basis for the requirements of Order No. R9-2009-0002: Clean Water Act (CWA), California Water Code (CWC), 40 CFR Parts 122, 123, 124 (National Pollutant Discharge Elimination System Permit Application Regulations for Storm Water Discharges, Final Rule), Part II of 40 CFR Parts 9, 122, 123, and 124 (National Pollutant Discharge Elimination System – Regulations for Revision of the Water Pollution Control Program Addressing Storm Water Discharges; Final Rule), Water Quality Control Plan – Ocean Waters of California (California Ocean Plan), Water Quality Control Plan for the San Diego Basin (Basin Plan), 40 CFR 131 Water Quality Standards; Establishment of Numeric Criteria for Priority Toxic Pollutants for the State of California; Rule (California Toxics Rule), and the California Toxics Rule Implementation Plan.

The legal authority citations below generally apply to directives in Order No. R9-2009-0002, and provide the Regional Board with ample underlying authority to require each of the directives of Order No. R9-2009-0002. Legal authority citations are also provided with each permit section discussion in section IX of this Fact Sheet/Technical Report.

CWA 402(p)(3)(B)(ii) – The CWA requires in section 402(p)(3)(B)(ii) that permits for discharges from municipal storm sewers "shall include a requirement to effectively prohibit non-storm water discharges into the storm sewers."

CWA 402(p)(3)(B)(iii) – The CWA requires in section 402(p)(3)(B)(iii) that permits for discharges from municipal storm sewers "shall require controls to reduce the discharge of pollutants to the maximum extent practicable, including management practices, control techniques and system, design and engineering methods, and such other provisions as the Administrator or the State determines appropriate for the control of such pollutants."

40 CFR 122.26(d)(2)(i)(B,C,E, and F) – Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B,C,E, and F) provide that each Copermittee's permit application "shall consist of: (i) Adequate legal authority. A demonstration that the applicant can operate pursuant to legal authority established by statute, ordinance or series of contracts which authorizes or enables the applicant at a minimum to: […] (B) Prohibit through ordinance, order or similar means, illicit discharges to the municipal separate storm sewer; (C) Control through ordinance, order or similar means the discharge to a municipal separate storm sewer of spills, dumping or disposal of materials other than storm water; […] (E) Require compliance with condition in ordinances, permits, contracts or orders; and (F) Carry out all inspection, surveillance and monitoring procedures necessary to determine compliance and noncompliance with permit conditions including the prohibition on illicit discharges to the municipal separate storm sewer."

40 CFR 122.26(d)(2)(iv) – Federal NPDES regulation 40 CFR 122.26(d)(2)(iv) provides that the Copermittee shall develop and implement a proposed management program which "shall include a comprehensive planning process which involves public participation and where necessary intergovernmental coordination, to reduce the discharge of pollutants to the maximum extent practicable using management practices, control techniques and system, design and engineering methods, and such other provisions which are appropriate. The program shall also include a description of staff and equipment available to implement the program. […] Proposed programs may impose controls on a system wide basis, a watershed basis, a jurisdiction basis, or on individual outfalls. […] Proposed management programs shall describe priorities for implementing controls."

40 CFR 122.26(d)(2)(iv)(A - D) – Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(A - D) require municipalities to implement controls to reduce pollutants in storm water runoff from new development and significant redevelopment, construction, and commercial, residential, industrial, and municipal land uses or activities. Prevention of illicit discharges is also required.

CWC 13377 – CWC section 13377 provides that "Notwithstanding any other provision of this division, the State Board or the regional boards shall, as required or authorized by the CWA, as amended, issue waste discharge requirements and dredged or fill material permits which apply and ensure compliance with all applicable provisions of the act and acts amendatory thereof or supplementary, thereto, together with anymore stringent effluent standards or limitation necessary to implement water quality control plans, or for the protection of beneficial uses, or to prevent nuisance."

Order No. R9-2009-0002 is an essential mechanism for achieving the water quality objectives that have been established for protecting the beneficial uses of the water resources in the San Diego Regional Board's portion of Orange County. Federal NPDES regulation 40 CFR 122.44(d)(1) requires MS4 permits to include any requirements necessary to "achieve water quality standards established under CWA section 303, including State narrative criteria for water quality." The term "water quality standards" in this context refers to a water body's beneficial uses and the water quality objectives necessary to protect those beneficial uses as established in the Basin Plan and antidegradation policies.

VIII. FINDINGS

The findings of the Order have been modified to reduce repetition in their discussions and address new requirements. Each finding of the Order is provided and discussed below. Additional discussion relative to the findings can be found in section IX of the Fact Sheet, which provides discussions of the Order's directives.

A. Basis For the Order

Finding A.1. This Order is based on the federal Clean Water Act (CWA), the Porter-Cologne Water Quality Control Act (Division 7 of the Water Code, commencing with Section 13000), applicable state and federal regulations, all applicable provisions of statewide Water Quality Control Plans and Policies adopted by the State Water Resources Control Board (State Board), the Water Quality Control Plan for the San Diego Basin adopted by the Regional Board, the California Toxics Rule, and the California Toxics Rule Implementation Plan.

Discussion of Finding A.1. In 1987, Congress established CWA Amendments to create requirements for storm water discharges under the NPDES program, which provides for permit systems to regulate the discharge of pollutants. Under the Porter-Cologne Water Quality Control Act, the State Board and the nine Regional Water Quality Control Boards have primary responsibility for the coordination and control of water quality, including the authority to implement the CWA. Porter-Cologne (section 13240) directs the Regional Water Quality Control Boards to set water quality objectives via adoption of Basin Plans that conform to all State policies for water quality control.

As a means for achieving those water quality objectives, Porter-Cologne (section 13243) further authorizes the Regional Water Quality Control Boards to establish waste discharge requirements (WDRs) to prohibit waste discharges in certain conditions or areas. Since 1990, the San Diego Regional Board has issued area-wide MS4 NPDES permits. The Order will renew Order No. R9-2002-01 to comply with the CWA and attain water quality objectives in the Basin Plan by limiting the contributions of pollutants conveyed by storm water and by including numeric action levels for dry weather non-storm water discharges designed to ensure that the Copermittees comply with the requirement to effectively prohibit all types of unauthorized non-storm water discharges into their MS4. Further discussions of the legal authority associated with the prohibitions and directives of the Order are provided in section VII this document.

Finding A.2. This Order renews National Pollutant Discharge Elimination System (NPDES) Permit No. CAS0108740, which was first issued on July 16, 1990 (Order No. 90-38), and then renewed on August 8, 1996 (Order No. 96-03) and February 13, 2002 (Order No. R9-2002-01). On August 21, 2006, in accordance with Order No. R9-2002-01, the County of Orange, as the Principal Permittee, submitted a Report of Waste Discharge (ROWD) for renewal of the MS4 Permit.

Discussion of Finding A.2. This Order renews National Pollutant Discharge Elimination System (NPDES) Permit No. CAS0108740, which was first issued on July 16, 1990 (Order No. 90-38), and then renewed on August 8, 1996 (Order No. 96-03) and February 13, 2002 (Order No. R9-2002-01). On August 21, 2006, in accordance with Order No. R9-2002-01, the County of Orange, as the Principal Permittee, submitted a Report of Waste Discharge (ROWD) for renewal of the MS4 Permit. Supporting information discussing the topic of this finding can be found in section V of this document.

Finding A.3. This Order is consistent with the following precedential Orders adopted by the State Water Resources Control Board (State Board) addressing municipal storm water NPDES Permits: Order 99-05, Order WQ-2000-11, Order WQ 2001-15, Order WQO 2002-0014, and Order WQ-2009-0008 (*SWRCB/OCC FILE A-1780)*.

Discussion of Finding A.3. In recent years the State Board has considered several appeals of MS4 permits issued by the Regional Boards. In Order 99-05, the State Board established language for Receiving Water Limitation Language for MS4 permits. In Order No. WQ-2000-11, the State Board addressed design standards for Standard Urban Storm Water Mitigation Plan (SUSMP) requirements. Order WQ 2001-15 addressed Petitions of the San Diego County MS4 Permit issued by the Regional Board in 2001 (Order No. R9-2001-01). Order WQO 2002-0014 addresses Petitions of the Orange County MS4 Permit issued by the Regional Board in 2002 (Order No. R9-2002-01).

B. Regulated Parties

Finding B.1. Each of the persons in Table 1 of the Order, hereinafter called Copermittees or dischargers, owns or operates a municipal separate storm sewer system (MS4), through which it discharges storm water and non-storm water into waters of the United States within the San Diego Region. These MS4s fall into one or more of the following categories: (1) a medium or large MS4 that services a population of greater than 100,000 or 250,000 respectively; or (2) a small MS4 that is "interrelated" to a medium or large MS4; or (3) an MS4 which contributes to a violation of a water quality standard; or (4) an MS4 which is a significant contributor of pollutants to waters of the United States.

Discussion of Finding B.1. Section 402 of the CWA prohibits the discharge of any pollutant to waters of the United States from a point source, unless that discharge is authorized by a NPDES permit. Though storm water and non-storm water may come from a diffuse source, it is discharged through MS4s, which are point sources under the CWA. Federal NPDES regulation 40 CFR 122.26(a) (iii) and (iv) provide that discharges from MS4s, which service medium or large populations greater than 100,000 or 250,000 respectively, shall be required to obtain a NPDES permit. Federal NPDES regulation 40 CFR 122.26(a)(v) also provides that a NPDES permit is required for "A [storm water] discharge which the Director, or in states with approved NPDES programs, either the Director or the USEPA Regional Administrator, determines to contribute to a violation of a water quality standard or is a significant contributor of pollutants to waters of the United States." Such sources are then designated into the program.

Other small MS4s, such as those serving universities and military installations, also exist within the watersheds of Orange County in the San Diego Region. While these MS4s are not subject to this Order, they are subject to the Phase II NPDES storm water regulations. Over time, these MS4s will be designated for coverage under the State Board's statewide general storm water permit for small MS4s.

C. Discharge Characteristics

Finding C.1. Runoff discharged from an MS4 contains waste, as defined in the California Water Code (CWC), and pollutants that adversely affect the quality of the waters of the State. The discharge of runoff from an MS4 is a "discharge of pollutants from a point source" into waters of the U.S. as defined in the CWA.

Discussion of Finding C.1. Section 13050(d) of the CWC defines "waste" as "sewage and any and all other waste substances, liquid, solid, gaseous, or radioactive, associated with human habitation, or of human or animal origin, or from any producing, manufacturing, or processing operation, including waste placed within containers of whatever nature prior to, and for purposes of, disposal." 40 CFR 122.2 defines "point source" as "any discernable, confined, and discrete conveyance, including but not limited to, any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, landfill leachate collection system, vessel or other floating craft from which pollutants are or may be discharged. This term does not include return flows from irrigated agriculture or agricultural storm water runoff." 40 CFR 122.2 defines "discharge of a pollutant" as "Any addition of any pollutant or combination of pollutants to waters of the U.S. from any point source." Also, the justification for control of pollution into waters of the state can be found at CWC section 13260(a)(1). State Board Order WQ 2001-15 verifies that discharges from the MS4 contain waste.[28]

The term urban runoff has been removed throughout Tentative Order R9-2009-0002 and replaced with storm water (wet weather) or non-storm water (dry weather) runoff. This clarification is necessary to prevent the misunderstanding that regulation under this permit is subject only to urbanized areas. The term "urban runoff" is not defined in the Code of Federal Regulations or Federal Register in the regulation of phase 1 MS4 discharges.

The discharge of runoff from an MS4 is a "discharge of pollutants from a point source" into waters of the U.S. as defined in the Clean Water Act (CWA). The Permit defines runoff as all flows in a storm water conveyance system (MS4 defined below) and consists of the following components:

(1) storm water (wet weather flows) and
(2) non-storm water discharges (dry weather flows).

The Permit defines an MS4 as a conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, or storm drains):

[28] State Board, 2001. Order WQ 2001-15. In the Matter of Petitions of Building Industry Association of San Diego County and Western States Petroleum Association: For Review of Waster Discharge Requirements Order No. 2001-01 for Urban Runoff from San Diego County [NPDES No. CAS0108758] Issued by the Regional Board.

(i) Owned or operated by a State, city, town, borough, county, parish, district, association, or other public body (created by or pursuant to State law) having jurisdiction over disposal of sewage, industrial wastes, storm water, or other wastes, including special districts under State law such as a sewer district, flood control district or drainage district, or similar entity, or an Indian tribe or an authorized Indian tribal organization, or designated and approved management agency under section 208 of the CWA that discharges to waters of the United States;

(ii) Designated or used for collecting or conveying storm water;

(iii) Which is not a combined sewer;

(iv) Which is not part of the Publicly Owned Treatment Works (POTW) as defined at 40 CFR 122.26.

Permit finding D.3.c. includes natural streams that convey runoff as part of the MS4. The presence of an MS4 system is not limited to areas considered to be "urban" in nature. Though the term urban is often referred to specifically as pertaining to cities, runoff means all flows in a storm water conveyance system, regardless of the location of the conveyance system. A conveyance system owned or operated by a State, city, town, borough, county, parish, district, association, or other public body (created by or pursuant to State law), may be located in a setting (e.g. unincorporated area, low density residential) that is not considered by the public to be "urban" in nature. These areas are contributing pollutants to the MS4 system that must be addressed. The term runoff applies to all flows in an MS4 system, no matter where the MS4 may be located in regards to incorporated or unincorporated property.

The Code of Federal Regulations (CFR) at 40 CFR 122.26 requires that large and medium MS4s obtain a permit for all discharges from their systems. Appendix I to 40 CFR 122 designates Orange County as having a large and medium MS4 requiring a permit. The regulations do not differentiate discharges from urban or rural MS4 systems. Rather, the regulations require the permit for all discharges from their systems. In the Final Rule establishing the Phase 1 storm water regulations, the USEPA clarified that all discharges are subject to a permit. On page 48041 of the Final Rule, the USEPA states:

> "EPA recognizes that some of the counties addressed by today's rule have, in addition to areas with high unincorporated urbanized populations, areas that are essentially rural or uninhabited and may not be the subject of planned development. While permits issued for these municipal systems ***will cover*** *(emphasis added) municipal systems discharges in unincorporated portions of the county* (emphasis added), it is the intent of EPA that management plans

> and other components of the programs focus on the urbanized and developing areas of the county."

So, while the Permit covers all MS4 discharges regardless if that discharge is in an urban or unincorporated area; the Copermittees management program should focus on urbanized areas. Due to the Permit's requirements, the Copermittees management programs will naturally focus on urbanized areas. Urbanized areas have more industry, construction, pollution and MS4s that require more inspection, maintenance, monitoring, enforcement and complaint follow-up.

USEPA further clarified on page 48041 that all MS4 discharges require permit coverage when addressing highway MS4 systems:

> "[The regulations] will result in discharges from separate storm sewer systems serving State highways and other highways through storm sewers … in unincorporated portions of specified unincorporated portions of specified counties being included as part of the large or medium municipal separate storm sewer systems, since all municipal separate storm sewers within the boundaries of these political entities are included."

In their summary on page 48043, the USEPA states:

> "The definition [of MS4] provides that all systems within a geographical area including highways and flood controls will be covered, thereby avoiding fragmented and ill-coordinated programs;"

Neither the State Board's storm water permit for Caltrans (Order No. 99-06-DWQ) nor the Los Angeles Regional Board's draft MS4 permit for Ventura County include the term "urban runoff" in a significant regulatory capacity. The Caltrans permit has one reference to "urban runoff" where the term is used interchangeably with "storm water." The draft Ventura permit uses the term "urban runoff" when referring to titles of reference documents, previously adopted management plans and municipal ordinances that may contain the phrase.

Understandably, the Copermittees have expressed concern regarding the regulation of pollutants from natural, undeveloped areas that enter the MS4 in an unincorporated area. The MS4 collection could change a natural sheet flow discharge to a concentrated point discharge. The MS4 does not provide natural infiltration or other pollutant remediation that these flows would receive in an otherwise natural drainage system. The MS4 may concentrate these natural pollutants and flows. In some cases, the MS4 may ultimately discharge the elevated concentrations of natural pollutants and flow rates to waters of the US far from the natural pollutant and flow source, causing a condition of pollution or a violation of water quality standards.

Finding C.2. MS4 storm water and non-storm water discharges are likely to contain pollutants that cause or threaten to cause a violation of surface water quality standards, as outlined in the Regional Board's Water Quality Control Plan for the San Diego Basin (Basin Plan). Storm water and non-storm water discharges from the MS4 are subject to the conditions and requirements established in the San Diego Basin Plan for point source discharges. These water quality standards must be complied with at all times, irrespective of the source and manner of discharge.

Discussion of Finding C.2. This finding is a clarification regarding the potential for discharges of storm water and non-storm water to impact the Beneficial Uses as described in the Basin Plan. As such these point source discharges require Waste Discharge Requirements (WDRs) to ensure that water quality standards are met. Furthermore, since point source discharges require WDRs, the discharges are subject to the prohibitions, conditions and requirements of the Basin Plan.

In addition, municipal discharges have been split into storm water and non-storm water discharges to represent the differing regulations applicable to storm water and non-storm water, though both types of discharges are likely to contain pollutants.

Finding C.3. The most common categories of pollutants in runoff include total suspended solids, sediment (due to anthropogenic activities); pathogens (e.g., bacteria, viruses, protozoa); heavy metals (e.g., copper, lead, zinc and cadmium); petroleum products and polynuclear aromatic hydrocarbons; synthetic organics (e.g., pesticides, herbicides, and PCBs); nutrients (e.g., nitrogen and phosphorus fertilizers); oxygen-demanding substances (decaying vegetation, animal waste); detergents; and trash.

Discussion of Finding C.3. The National Urban Runoff Program (NURP) study showed that heavy metals, organics, coliform bacteria, nutrients, oxygen demanding substances (e.g., decaying vegetation), and total suspended solids are found at relatively high levels in storm water and non-storm water discharges.[29] It also found that MS4 discharges draining residential, commercial, and light industrial areas contain significant loadings of total suspended solids and other pollutants. The Basin Plan goes on to identify runoff pollutants to include lawn and garden chemicals, household and automotive care products dumped or drained on streets, and sediment that erodes from construction sites.[30] In addition, the State Board Urban Runoff Technical Advisory Committee (TAC) finds that urban runoff pollutants include sediments, nutrients, oxygen-demanding substances, heavy metals, petroleum hydrocarbons, pathogenic bacteria, viruses, and pesticides.[31] Runoff that flows over streets, parking lots, construction sites, and industrial, commercial, residential, and municipal areas carries these untreated pollutants through storm drain networks directly to the receiving waters of the San Diego Region.

Finding C.4. The discharge of pollutants and/or increased flows from MS4s may cause or threaten to cause the concentration of pollutants to exceed applicable receiving water quality objectives and impair or threaten to impair designated beneficial uses resulting in a condition of pollution (i.e., unreasonable impairment of water quality for designated beneficial uses), contamination, or nuisance.

Discussion of Finding C.4. The 1992, 1994, and 1996 National Water Quality Inventory Reports to Congress prepared by USEPA showed a trend of impairment in the nation's waters from contaminated storm and non-storm water runoff.[32] The 1998 National Water Quality Inventory Report showed that runoff discharges affect 11 percent of rivers, 12 percent of lakes, and 28 percent of estuaries. The report states that ocean shoreline impairment due to runoff increased from 55 percent in 1996 to 63 percent in 1998. The report notes that runoff discharges are the leading source of pollution and the main factor in the degradation of surface water quality in California's coastal waters, rivers, and streams. Furthermore, the NURP study found that pollutant levels from illicit non-storm water discharges were high enough to significantly degrade receiving water quality, and threaten aquatic life, wildlife, and human health.[33]

[29] Ibid.
[30] Regional Board, 1994. Water Quality Control Plan, San Diego Basin, Region 9. San Diego.
[31] State Board, 1994. Urban Runoff Technical Advisory Committee Report and Recommendations. Nonpoint Source Management Program.
[32] USEPA, 2000. Quality of Our Nation's Waters: Summary of the National Water Quality Inventory 1998 Report to Congress – USEPA 841-S-00-001; Water Quality Conditions in the United States: Profile from the 1998 National Water Quality Inventory Report to Congress – USEPA 841-F-00-006.
[33] USEPA, 1993. Results of the Nationwide Urban Runoff Program, Volume 1 – Final Report.

In addition, the Region's CWA section 303(d) list, which identifies water bodies with impaired beneficial uses within the region, also indicates that the impacts of storm water and non-storm water runoff on receiving waters are significant. Many of the impaired water bodies on the 303(d) list are impaired by constituents that have been found at high levels within storm water and non-storm water runoff by the County of Orange storm water monitoring program.[34] Examples of constituents frequently responsible for beneficial use impairment include indicator fecal bacteria, heavy metals, and sediment; these constituents have been found at high levels in runoff both regionally and nationwide.[35,36] In addition, impairments may be caused by synergistic effects of multiple contaminants or by pollutants not currently monitored by storm water programs[37].

Finding C.5. Pollutants in runoff can threaten and adversely affect human health. Human illnesses have been clearly linked to recreating near storm drains flowing to coastal waters. Also, runoff pollutants in receiving waters can bioaccumulate in the tissues of invertebrates and fish, which may be eventually consumed by humans.

[34] County of Orange, 2006. Orange County Municipal Copermittees 2005-2006 Annual Storm Water Program Report, Section 11.
[35] Ibid.
[36] USEPA, 1983. Results of the Nationwide Urban Runoff Program, Volume 1 – Final Report.
[37] County of Orange, 2006. Orange County Municipal Copermittees 2005-2006 Annual Storm Water Program Report, Section 11.

Discussion of Finding C.5. A landmark study, conducted by the Santa Monica Bay Restoration Project, found that there was an increased occurrence of illness in people that swam in proximity to a flowing storm drain.[38] A study of south Huntington Beach and north Newport Beach (both located in northern Orange County) found that an illness rate of about 0.8 percent among bathers at those beaches resulted in about $3 million annually in health-related expenses.[39] Furthermore, runoff pollutants in receiving waters can bioaccumulate in the tissues of invertebrates and fish, which may eventually be consumed by humans. Pollutants such as heavy metals and pesticides, which are commonly found in MS4 runoff, have been found to bioaccumulate and biomagnify in long-lived organisms at the higher trophic levels.[40] Since many aquatic species are utilized for human consumption, toxic substances accumulated in species' tissues can pose a significant threat to public health. USEPA supports this finding when it states, "As runoff flows over areas altered by development, it picks up harmful sediment and chemicals such as oil and grease, pesticides, heavy metals, and nutrients (e.g., nitrogen and phosphorus). These pollutants often become suspended in runoff and are carried to receiving waters, such and lakes, ponds, and streams. Once deposited, these pollutants can enter the food chain through small aquatic life, eventually entering the tissues of fish and humans."[41]

Finding C.6. Runoff discharges from MS4s often contain pollutants that cause toxicity to aquatic organisms (i.e., adverse responses of organisms to chemicals or physical agents ranging from mortality to physiological responses such as impaired reproduction or growth anomalies). Toxic pollutants impact the overall quality of aquatic systems and beneficial uses of receiving waters.

[38] Haile, R.W., et al., 1996. An Epidemiological Study of Possible Adverse Health Effects of Swimming in Santa Monica Bay. Santa Monica Bay Restoration Project.
[39] Dwight, R.H., et al., 2005. Estimating the Economic Burden From Illnesses Associated With Recreational Coastal Water Pollution – A Case Study in Orange County, California. Journal of Enviro. Management Vol.76. No.2 p.95-103. Also reported in: Los Angeles Times, May 2, 2005. Here's What Ocean Germs Cost You: A UC Irvine Study Tallies the Cost of Treatment and Lost Wages for Beachgoers Who Get Sick.
[40] Abel, P.D, 1996. Water Pollution Biology.
[41] USEPA, 2000. Storm Water Phase II Compliance Assistance Guide. Washington D.C. EPA 833-R-00-002.

Discussion of Finding C.6. The Copermittees' monitoring data exhibits frequent toxic conditions in runoff during storm events and dry weather. Toxicity is observed in both fresh and marine receiving waters, but varies significantly within and among sites and over time. However, according to the County of Orange, toxicity in both dry and wet weather appears concentrated along the coast. This supports the conclusion that toxicity is associated with anthropogenic activities and is caused by pollutants that flow downstream and become concentrated near the bottom of developed watersheds. Physical channel modification and hydromodification are also greatest near the coast and likely contribute to findings of toxicity. The cause of toxicity may vary between locations, dates, and indicator organisms. The actual cause may be influenced by various factors such as development, runoff management, habitat modification, hydromodification, and native aquatic environment. Toxicity identification evaluations (TIEs) have failed to confirm initial findings of toxicity. Follow-up studies by the County of Orange implicate both pollutants and physical stream habitat degradation (e.g. channel modification and hydromodification) as factors related to toxicity findings.[42]

Finding C.7. The Copermittees discharge runoff into lakes, drinking water reservoirs, rivers, streams, creeks, bays, estuaries, coastal lagoons, the Pacific Ocean, and tributaries thereto within one of the eleven hydrologic units (San Juan Hydrologic Unit) comprising the San Diego Region as shown in Tables 2a and 2b. Some of the receiving water bodies have been designated as impaired by the Regional Board and the United States Environmental Protection Agency (USEPA) in 2006 pursuant to CWA section 303(d). Also shown in the Tables are the watershed management areas (WMAs) as defined in the Regional Board report, Watershed Management Approach, January 2002.

Discussion of Finding C.7. This finding identifies the Copermittees responsible for MS4 discharges in each watershed management area. The list is identical to Order No. R9-2002-0001. The CWA Section 303(d) List of Impaired Waters, 2006 Update has been approved by the Regional Board, State Board, and USEPA.[43] This 303(d) list identifies waters that do not meet water quality standards after applying certain required technology-based effluent limits ("impaired" water bodies). As part of this listing process, states are required to prioritize waters/watersheds for future development of Total Maximum Daily Loads (TMDLs). The listed 303(d) pollutant(s) of concern do not necessarily reflect impairment of the entire corresponding WMA or all corresponding major surface water bodies. The specific impaired portions of each WMA are listed in the State Board's 2006 Section 303(d) List of Water Quality Limited Segments.

[42] County of Orange, 2006. Orange County Municipal Copermittees 2005-2006 Annual Storm Water Program Report, Section 11.
[43] The approved 2006 Clean Water Act Section 303(d) List of Water Quality Limited Segments is on-line at: http://www.waterboards.ca.gov/tmdl/303d_lists2006.html

Finding C.8. Trash is a persistent pollutant which can enter receiving waters from the MS4 resulting in accumulation and transport in receiving waters over time. Trash poses a serious threat to the Beneficial Uses of the receiving waters, including, but not limited to, human health, rare and endangered species, navigation and human recreation.

Discussion of Finding C.8. The Copermittees to date have documented high volumes of trash coming from the MS4 system and in receiving waters.[44]

The Basin Plan specifies the following narrative Water Quality Objective (WQO) for Floating Material:

> *"Waters shall not contain floating material, including solids, liquids, foams, and scum in concentrations which cause nuisance or adversely affect beneficial uses."*

The Basin Plan specifies the following narrative WQO for Suspended and Settleable Solids: Material:

> *"Waters shall not contain suspended and settleable solids in concentrations of solids that cause nuisance or adversely affect beneficial uses."*

Additionally, high density urban areas in Southern California have been shown to be responsible for up to 60 percent of the trash that enters receiving waters from the MS4.[45] The retrofitting of existing MS4 systems, such as catch basins, in targeted high trash areas can result in significant reductions in the amount of trash entering receiving waters from the MS4.

Trash, as litter in both solid and liquid form, is consistently found on and adjacent to roadways. A California Department of Transportation Litter Management Pilot Study found that of roadway trash, plastics and Styrofoam accounted for 33 percent of trash by weight, and 43 percent by volume. Further, the study found that approximately 80 percent of the litter associated with roadways was floatable, indicating that, without capture, this litter would enter Waters of the State after a storm event, resulting in the impairment of Beneficial Uses.[46] The study, however, relied upon a mesh capture size of 0.25 inches (6.35 millimeters). This size is too large to effectively capture plastic pre-production pellets (aka "nurdles"), which are roughly 3 mm in size, and likely underestimated the total contribution of plastics. Plastics, including pre-production pellets, have been found to be the dominant pollutant on beaches in the County of Orange.[47] Furthermore, pre-production plastic pellets, which are small enough to be easily digested, have been found to carry persistent organic pollutants, including PCBs

[44] Aliso Creek Watershed 27th, 28th, 29th and 30th Quarterly Progress Reports. 2007-2008.
[45] The City of Los Angeles Meets Trash TMDLs Compliance with CB Inserts and Opening Covers. August 06, 2008.
[46] California Department of Transportation District 7 Litter Management Pilot Study. June 26, 2000.
[47] Moore, S.L., Gregorio, D., Carreon, M., Weisberg, S.B. and M. K. Leecaster. 1998. Composition and Distribution of Beach Debris in Orange County, California. *Marine Pollution Bulletin*. Vol. 42

and DDT.[48]

Finding C.9. The Copermittees' water quality monitoring data submitted to date documents persistent violations of Basin Plan water quality objectives for various runoff-related pollutants (fecal coliform bacteria, total suspended solids, turbidity, metals, etc.) at various watershed monitoring stations. Persistent toxicity has also been observed at some watershed monitoring stations. In addition, bioassessment data indicates that the majority of urbanized receiving waters have Poor to Very Poor Index of Biotic Integrity ratings. In sum, the above findings indicate that runoff discharges are causing or contributing to water quality impairments, and are a leading cause of such impairments in Orange County.

Discussion of Finding C.9. The Copermittees have produced data that demonstrates water quality objectives are frequently not met during dry and wet weather. The 2006 Report of Waste Discharge and the 2005-06 Annual Reports document that receiving water monitoring stations often fail to meet water quality objectives established in the Basin Plan. Similar conclusions are found in monitoring reported to the Regional Board pursuant to Investigative Orders issued between 2001 and 2006 for Aliso Creek, Salt Creek[49], Prima Deshecha[50], and North Creek at Doheny Beach[51]. Monitoring reported to the State Board pursuant to funding grant agreements also demonstrates that discharges from MS4s routinely exceed water quality objectives. [52,53, 54, 55, 56].

[48] Rios, L.M., Moore, C. and Patrick R. Jones. 2007. Persistent organic pollutants carried by synthetic polymers in the ocean environment. *Marine Pollution Bulletin.* Vol. 54.
[49] An Investigative Order was issued on March 6, 2003 to the City of Dana Point for water quality conditions of Salt Creek near Monarch Beach.
[50] An Investigative Order was issued on July 3, 2002 to the City of San Clemente and the County of Orange for water quality conditions of Prima Deshecha Canada (including Poche Beach).
[51] Investigative Order No. R9-2006-0039 was issued on April 4, 2006 to the City of Dana Point and Quantum Ozone, Inc. for an assessment of water quality conditions at North Creek, Doheny Beach.
[52] City of Dana Point. 2005. *Final Report for the Del Obispo Storm Drain Project*. Prepared for the State Water Resources Control Board Agreement No. 02-216-550-0.
[53] City of Dana Point. 2004. *Final Report For The Alipaz Storm Drain Treatment And Low Flow Diversion Project" by the City of Dana Point.* Prepared for State Water Resources Control Board Agreement Number: 01-068-550-0.
[54] James Volz. 2005. *Final Report for Poche Beach Urban Runoff Ultraviolet Light Bacteria Disinfection Project*. Prepared by the County of Orange for State Water Resources Control Board Agreement No. 01-236-550-1.
[55] Max Anderson. 2005. Final Report: Aliso Beach Clean Beach Initiatives, J01P28 Interim Water Quality Improvement Package Plant Best Management Practices. Prepared by the County of Orange for State Water Resources Control Board Agreement No. 01-227-550-0.
[56] City of Laguna Niguel and CH2MHILL. 2004. *Final Report: Wetland Capture and Treatment (WetCAT) Network.* Prepared for State Water Resources Control Board Agreement No. 01-122-259-0.

Water quality in receiving waters downstream of MS4 discharges fail to meet Ocean Plan standards[57], California Toxics Rule standards[58], and Basin Plan objectives. Data submitted in the MS4 Annual Reports indicate that at various times chemical, bacteria, pesticide, and metal concentrations may exceed water quality objectives in marine and fresh water receiving waters in both wet and dry weather conditions. Although wet weather MS4 effluent data is not generally reported, dry-weather non-storm water MS4 effluent data demonstrates that the effluent contains concentrations of pollutants that would exceed receiving water quality objectives.

In most of these watersheds, there are no other significant NPDES permits discharging to the creeks. For instance, there are no live-stream discharges of treated waste water in south Orange County. The few NPDES permits in the watersheds are mainly for recycled water which only discharges occasionally during the rainy season. Because the water quality monitoring indicates exceedances of water quality standards and MS4 discharges are the main source of pollutants in the watersheds, it can be inferred that the MS4 discharges are causing or contributing to water quality impairments, and are a leading cause of such impairments in Orange County.

Finding C.10. When natural vegetated pervious ground cover is converted to impervious surfaces such as paved highways, streets, rooftops, and parking lots, the natural absorption and infiltration abilities of the land are lost. Therefore, runoff leaving a developed area is significantly greater in runoff volume, velocity, and peak flow rate than pre-development runoff from the same area. Runoff durations can also increase as a result of flood control and other efforts to control peak flow rates. Increased volume, velocity, rate, and duration of runoff greatly accelerate the erosion of downstream natural channels. Significant declines in the biological integrity and physical habitat of streams and other receiving waters have been found to occur with as little as a 3-5 percent conversion from natural to impervious surfaces. The increased runoff characteristics from new development must be controlled to protect against increased erosion of channel beds and banks, sediment pollutant generation, or other impacts to beneficial uses and stream habitat due to increased erosive force.

Finding C.11. Development creates new pollution sources as human population density increases and brings with it proportionately higher levels of car emissions, car maintenance wastes, municipal sewage, pesticides, household hazardous wastes, pet wastes, trash, etc. which can either be washed or directly dumped into the MS4. As a result, the runoff leaving the developed area is significantly greater in pollutant load than the pre-development runoff from the same area. These increased pollutant loads must be controlled to protect downstream receiving water quality.

[57] The Basin Plan incorporates terms and conditions of the State Board's *Water Quality Control Plan for Ocean Waters of California* (Ocean Plan) as a water quality objective for Ocean Waters in the San Diego Region.
[58] The California Toxics Rule criteria promulgated by the USEPA are directly applicable water quality standards for certain priority toxic pollutants in inland surface waters and enclosed bays and estuaries in California.

Discussion of Findings C.10 and C.11.
The Natural Resources Defense Council (NRDC) 1999 Report, "*Stormwater Strategies, Community Responses to Runoff Pollution*" identifies two main causes of the storm water pollution problem in developed areas. Both causes are directly related to development:

1. Increased volume and velocity of surface runoff. There are three types of human-made impervious covers that increase the volume and velocity of runoff: (i) rooftop, (ii) transportation imperviousness, and (iii) non-porous (impervious) surfaces. As these impervious surfaces increase, infiltration will decrease, forcing more water to run off the surface, picking up speed and pollutants.

2. The concentration of pollutants in the runoff. Certain industrial, commercial, residential and construction activities are large contributors of pollutant concentrations in storm water runoff. As human population density increases, it brings with it proportionately higher levels of car emissions, car maintenance wastes, municipal sewage, pesticides, household hazardous wastes, pet wastes, trash, etc.

As a result of these two causes, runoff leaving developed areas is significantly greater in volume, velocity, and pollutant load than pre-development runoff from the same area.

By accommodating the traditional approach to storm water management, development has also altered the flow regime (rate, magnitude, frequency, timing, and flashiness of runoff) that supports aquatic and riparian habitats. These hydrologic changes are driven by the loss of water storage capacity in the watersheds,[59] and exacerbated by physical alterations of the stream channel network.[60] This relationship between development and stream channel integrity has been documented nationally and in southern California.

[59] Konrad, Christopher P. and Derek K. Booth, 2005. *Hydrologic Changes in Urban Streams and Their Ecological Significance.* American Fisheries Society Symposium Vol.47 pp.157-177.
[60] Poff. N.L. et al. 1997. The Natural Flow Regime: A paradigm for river conservation and restoration. Bioscience Vol. 47, No. 11, pp.769-784.

Hydrologic changes from development also directly and indirectly adversely affect wetlands. Natural wetlands support many beneficial uses and provide important water-quality related ecological services, including pollutant removal, flood attenuation, and groundwater recharge.[61] The Center for Watershed Protection recently provided USEPA with a synthesis of more than 100 scientific studies on the direct and indirect impacts of development, particularly urbanization, on wetlands and the role wetlands play in watershed quality. The report found that the three changes from land development with the most potential to impact wetlands include: Increased storm water runoff; decreased groundwater recharge; and flow constriction.[62] Each of these changes can often be avoided or minimized by implementing LID and hydromodification BMPs.

When Order No. R9-2002-01 was adopted, studies had shown that the level of imperviousness in an area strongly correlates with the quality of nearby receiving waters.[63] One comprehensive study, which looked at numerous areas, variables, and methods, revealed that stream degradation occurs at levels of imperviousness as low as 10 – 20 percent.[64] Stream degradation is a decline in the biological integrity and physical habitat conditions that are necessary to support natural biological diversity. For instance, few urban streams can support diverse benthic communities with imperviousness greater than or equal to 25 percent.[65] To provide some perspective, a medium density, single-family home area can be from 25 percent to 60 percent impervious (variation due to street and parking design).[66]

More recently, a report on the effects of impervious in southern California streams found that local ephemeral and intermittent streams are more sensitive to such effects than streams in other parts of the country. This study, by the Southern California Coastal Water Research Program, estimated a threshold of response at a two to three percent change in percent of impervious cover in a watershed. [67] This threshold is lower than the previously reported estimates by the USEPA that were cited in the Fact Sheet for Order No. R9-2002-01.

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[61] Wright, Tiffany, et al. 2006. "Direct and Indirect Impacts of Urbanization on Wetland Quality." Prepared by the Center for Watershed Protection. Available at: http://www.cwp.org. 81p.
[62] Ibid p.26
[63] USEPA, 1999. Part II. 40 CFR Parts 9, 122, 123, and 124. National Pollutant Discharge Elimination System – Regulations for Revision of the Water Pollution Control Program Addressing Storm Water Discharges; Final Rule. Federal Register.
[64] Ibid.
[65] Ibid.
[66] Schueler, T.R., 1994. The Importance of Imperviousness. Watershed Protection Techniques. As cited in 64 Fed. Reg. 68725.
[67] Coleman, Derrick, et al. 2005. *Effect of Increases in Peak Flows and Imperviousness on the Morphology of Southern California Streams.* Technical Report No. 450 of the Southern California Coastal Water Research Project.

To demonstrate the principle of increased volume and velocity of runoff from urbanization, Figure 1 shows the flow rate of an urban vs. a natural stream. What the figure demonstrates is that urban stream flows have greater peaks and volumes, as well as shorter retention times than natural stream flows. The greater peak flows and volumes result in stream degradation through increased erosion of stream banks and damage to aquatic habitat. The shorter retention times result in less time for sediments and other pollutants to settle before being carried out to the ocean. This sediment, and the associated pollutants it carries, can be a significant cause of water quality degradation.

Figure 1. Flow Rate of Urban and Natural Streams[68]

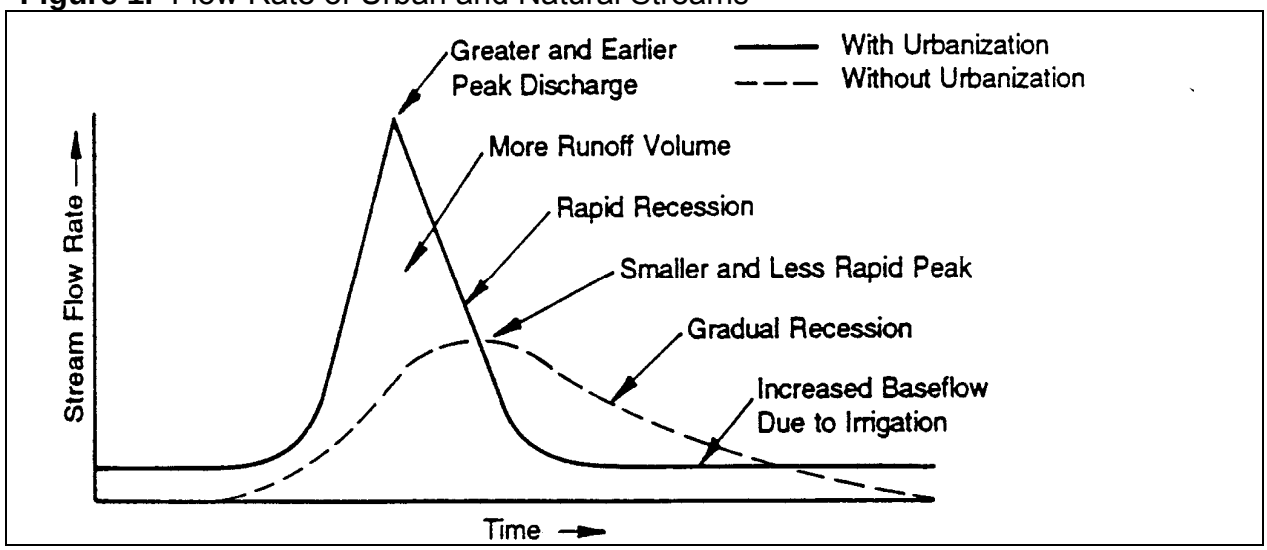

Increased volume and velocity of runoff adversely impacts receiving waters and their beneficial uses in many ways. According to the Urban Runoff TAC report,[69] increases in population density and imperviousness result in changes to stream hydrology including:

1. Increased peak discharges compared to pre-development levels;
2. Increased volume of storm water runoff with each storm compared to pre-development levels;
3. Decreased travel time to reach receiving water; increased frequency and severity of floods;
4. Reduced stream flow during prolonged periods of dry weather due to reduced levels of infiltration;
5. Increased runoff velocity during storms due to a combination of effects of higher discharge peaks, rapid time of concentration, and smoother hydraulic surfaces from channelization; and

[68] Adapted from Schueler, T.R., 1987. Controlling Urban Runoff: A Practical Manual for Planning and Designing Urban BMPs. Metropolitan Washington Council of Governments.
[69] State Board, 1994. Urban Runoff Technical Advisory Committee Report and Recommendations. Nonpoint Source Management Program.

6. Decreased infiltration and diminished ground water recharge.

Even though the rainfall depths in arid watersheds are lower, watershed development can greatly increase peak discharge rates during rare flood events.[70] A study conducted in arid watersheds around Riverside, CA showed that, over two decades, impervious cover increased from 9 percent to 22 percent, which resulted in an increase of more than 100 percent in the peak flow rate for the two-year storm event. The study also showed that the average annual storm water runoff volume had increased by 115 percent to 130 percent over the same time span.[71]

Prior hydromodification studies in California have shown that the increase in impervious cover, and thus change in runoff volume, velocity, rate, and duration, results in a shift in the range of storms that produce geomorphically significant flows within receiving waters (see above discussion). Additionally, studies in California have determined that ninety percent of the geomorphic "work" done within channels receiving flows from developed areas now occurs from flows below the 10 year peak flow event.[72]

This increased volume, velocity, rate, and duration of runoff greatly accelerates the erosion of the beds and banks within downstream receiving waters. Additionally, storm water flows which runoff directly from impervious surfaces into the MS4 and thus receiving waters prevent the associated runoff of natural sediments which would occur in pre-project conditions. This combined alteration of the physical condition of storm water runoff results in accelerated downstream erosion of receiving water bed and banks. The excessive erosion of stream beds and banks releases pollutants found in soils into receiving waters, degrades macroinvertebrate habitat (see D.2.c), eliminates spawning habitat, reduces associated wetland and riparian habitat, and threatens existing infrastructure adjacent to receiving waters. Bank sloughing within creeks and streams increases the pollutant loading to those receiving waters, particularly for turbidity and phosphorous.[73] In arid environments, accelerated channel erosion has been shown to have synergistic impacts within watersheds. Increased channel erosion within Las Vegas wash has resulted in the loss of over 1,000 acres of wetland and riparian habitat, released additional pollutants into downstream receiving waters, and eliminated in-stream habitat and water quality conditions required for existing threatened and endangered species.[74]

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[70] Schueler and Holland, 2000. Storm Water Strategies for Arid and Semi-Arid Watersheds (Article 66). The Practice of Watershed Protection. P. 695-706.
[71] Ibid.
[72] Santa Clara Valley Hydromodification Management Plan. April 21, 2005.
[73] Sekely, A.C., Mulla, D.J. and D.W. Bauer. 2002. Streambank slumping and its contribution to the phosphorus and suspended sediment loads of the Blue Earth River, Minnesota. *Journal of Soil and Water Conservation.* September 2002 vol. 57 no. 5 243-250.
[74] Tuttle, P.L.. and E..L.. Orsak. 2002. Las Vegas Wash Water Quality and Implications to Fish and Wildlife. U.S.

Regarding the impact of development on storm water runoff pollutant loads, the Regional Board's Basin Plan states:

> *Nonpoint source pollution is primarily the result of man's uses of land such as urbanization, roads and highways, vehicles, agriculture, construction, industry, mineral extraction, physical habitat alteration (dredging/filling), hydromodification (diversion, impoundment, channelization), silviculture (logging), and other activities which disturb land.*[75] *As a result, when rain falls on and drains through urban freeways, industries, construction sites, and neighborhoods it picks up a multitude of pollutants. The pollutants can be dissolved in the runoff and quickly transported by gravity flow through a vast network of concrete channels and underground pipes referred to as storm water conveyance systems. Such systems ultimately discharge the polluted runoff, without treatment, into the nation's creeks, rivers, estuaries, bays, and oceans.*[76]

According to the Center for Watershed Protection, urbanization strongly shapes the quality of both surface and ground water in arid and semi-arid regions of the southwest. Since rain events are so rare, pollutants have more time to build up on impervious surfaces compared to humid regions. Therefore, the pollutant concentrations of storm water runoff from arid watersheds tends to be higher than that of humid watersheds.[77] The effect of antecedent rainfall events is demonstrated in a recent report from the California Department of Transportation (Caltrans) that found the concept of a seasonal first flush is applicable to the southern California climate.[78]

Finding C.12. Development and urbanization especially threaten environmentally sensitive areas (ESAs), such as water bodies designated as supporting a RARE beneficial use (supporting rare, threatened or endangered species) and CWA 303(d)-impaired water bodies. Such areas have a much lower capacity to withstand pollutant shocks than might be acceptable in other areas. In essence, development that is ordinarily insignificant in its impact on the environment may become significant in a particularly sensitive environment. Therefore, additional control to reduce storm water pollutants from new and existing development may be necessary for areas adjacent to or discharging directly to an ESA.

Fish and Wildlife Service.

[75] Regional Board, 1994. Water Quality Control Plan for the San Diego Basin. P. 4-66.

[76] Ibid. P. 4-69 - 4-70.

[77] Schueler and Holland, 2000. Storm Water Strategies for Arid and Semi-Arid Watersheds (Article 66). The Practice of Watershed Protection. P. 695-706.

[78] Stenstrom, Michael and Masoud Kayhanian, 2005. *First Flush Phenomenon Characterization.* Prepared for Caltrans. Report No. CTSW-RT-05-73-02.6 Study jointly performed by UCLA and UCD. Most of the data presented was collected from three highly urbanized highway sites in west Los Angeles. Much effort went into developing a quantitative way of defining the mass first flush. Other aspects include: variability of water quality during storm events, litter characteristics, correlation among constituents, first flush of organics and particle size distribution, new methods for measuring oil and grease, and grab and composite sampling strategies. The report is available on-line at: http://www.dot.ca.gov/hq/env/stormwater/special/newsetup/

Discussion of Finding C.12. ESAs are defined in the Order as "Areas that include but are not limited to all CWA Section 303(d) impaired water bodies; areas designated as Areas of Special Biological Significance by the Basin Plan ; water bodies designated with the RARE beneficial use by the Basin Plan; areas designated as preserves or their equivalent under the Natural Communities Conservation Program within the Cities and County of Orange; and any other equivalent environmentally sensitive areas which have been identified by the Copermittees."

Areas that meet this definition are inherently sensitive habitats containing unique, rare, threatened, or endangered species, or are not achieving their designated beneficial uses. As discussed above, runoff is known to contain a wide range of pollutants and has demonstrated toxicity to plants and animals. Therefore, it is necessary to apply additional storm water controls for developments within, adjacent to, or directly discharging to ESAs. This need for additional storm water controls is addressed within each component of the Order. USEPA supports the requirement for additional storm water controls, stating "For construction sites that discharge to receiving waters that do not support their designated use or other waters of special concern, additional construction site controls are probably warranted and should be strongly considered."[79] Further support for requiring additional controls to reduce pollutants in storm water discharges to ESAs can be found in *Mitigation of Storm Water Impacts From New Developments in Environmentally Sensitive Areas*, a technical report written by the LARWQCB.[80]

ESAs within the area subject to this Order are expected to be substantially similar to the previous Order. Additions may be necessary once the South County Natural Community Conservation Plan/Habitat Conservation Plan (NCCP/HCP) is formally adopted. Other modifications may reflect updated descriptions or findings of threatened or endangered aquatic species.

Finding C.13. Although dependent on several factors, the risks typically associated with properly managed infiltration of runoff (especially from residential land use areas) are not significant. The risks associated with infiltration can be managed by many techniques, including (1) designing landscape drainage features that promote infiltration of runoff, but do not "inject" runoff (injection bypasses the natural processes of filtering and transformation that occur in the soil); (2) taking reasonable steps to prevent the illegal disposal of wastes; (3) protecting footings and foundations; (4) ensuring that each drainage feature is adequately maintained in perpetuity; and (5) pretreatment.

[79] USEPA, 1992. Guidance Manual for the Preparation of Part II of the NPDES Permit Applications for Discharges from Municipal Separate Storm Sewer Systems. Washington D.C. EPA/833-B-92-002.
[80] LARWQCB, 2001. Mitigation of Storm Water Impacts From New Developments In Environmentally Sensitive Areas.

Discussion of Finding C.13. Infiltration is an effective means for managing runoff. However, measures must be taken to protect groundwater quality when infiltration of runoff is implemented. USEPA supports runoff infiltration and provides guidance for protection of groundwater: "With a reasonable degree of site-specific design considerations to compensate for soil characteristics, infiltration may be very effective in controlling both urban runoff quality and quantity problems. This strategy encourages infiltration of urban runoff to replace the natural infiltration capacity lost through urbanization and to use the natural filtering and sorption capacity of soils to remove pollutants; however, the potential for some types of urban runoff to contaminate groundwater through infiltration requires some restrictions."[81] The restrictions placed on runoff infiltration in this Order are based on recommendations provided by the USEPA Risk Reduction Engineering Laboratory. The State Board found in Order WQ 2000-11 on the appeal of the LARWQCB's Standard Urban Storm Water Mitigation Plan (SUSMP) requirements that the guidance provided in the above referenced document by the USEPA Risk Reduction Engineering Laboratory is sufficient for the protection of groundwater quality from runoff infiltration. To further protect groundwater quality, the Order also includes guidance from the LARWQCB,[82] the State of Washington,[83] and the State of Maryland.[84] Subsequently, the California Storm Water Quality Association (CASQA) has produced technical guidance for post-construction treatment BMPs to protect ground water quality[85].

Finding C.14. Non-storm water (dry weather) discharge from the MS4 is not considered a storm water (wet weather) discharge and therefore is not subject to regulation under the Maximum Extent Practicable (MEP) standard from CWA 402(p)(3)(B)(iii), which is explicitly for "Municipal … *Stormwater Discharges* (emphasis added)" from the MS4. Non-storm water discharges, per CWA 402(p)(3)(B)(ii), are to be effectively prohibited. Such dry weather non-storm water discharges have been shown to contribute significant levels of pollutants and flow in arid, developed Southern California watersheds and are not to be effectively prohibited under the Clean Water Act.

Discussion of Finding C.14.

<u>Permitting Framework</u>
The Clean Water Act (CWA) employs the strategy of prohibiting the discharge of any pollutant from a point source into waters of the United States unless the discharger of the pollutant(s) obtains a NPDES permit pursuant to Section 402 of the Clean Water

[81] USEPA, 1994. Potential Groundwater Contamination from Intentional and Nonintentional Stormwater Infiltration. EPA 600 SR-94 051.
[82] LARWQCB, 2000. Standard Urban Storm Water Mitigation Plan for Los Angeles County and Cities in Los Angeles County.
[83] Washington State Department of Ecology, 1999. Draft Stormwater Management in Washington State. Volume V – Runoff Treatment BMPs. Pub. No. 99-15.
[84] Maryland Department of the Environment, 1999. 2000 Maryland Stormwater Design Manual. Volume I.
[85] CASQA. The New Development and Redevelopment Handbook, 2003. Available on-line at http://www.cabmphandbooks.org/Development.asp

Act. The discharge of storm water and/or non-storm water from an MS4 system is considered a discharge from a point source. As discussed below, however, the Clean Water Act regulates storm water and non-storm water discharges under different standards.

In 1987 the CWA was amended to include provisions that specifically concerned NPDES permitting requirements for storm water discharges from MS4 systems. Section 402(p) of the CWA regulates the discharge of storm water from a point source, the municipal separate storm sewers. Such discharges of storm water are subject to the maximum extent practicable (MEP) storm water standard and the related iterative process. The MEP standard for storm water discharges reflects Congress' recognition that the variability of flow and intensity of storm events render difficult strict compliance with water quality standards by MS4s. However, this standard was not considered applicable to non-storm water discharges, which under 402(p) are required to be effectively prohibited from entering the MS4. Clearly, if non-storm water discharges must be effectively prohibited from entering the MS4, the very next requirement (402(p)(3)(B)(iii)) requiring discharges from the MS4 be reduced to the MEP intends that the discharge of pollutants be limited to storm water. Unless exempt or authorized under a separate NPDES permit, non-storm water discharges are not authorized to enter the MS4 in the first instance and are considered to be illicit discharges.

The Federal Register further clarifies that such discharges through an MS4 are not authorized under the CWA (55 Fed. Reg. 47995):

> "Today's rule defines the term "illicit discharge" to describe any discharge through a municipal separate storm sewer system that is not composed entirely of storm water and that is not covered by an NPDES permit. Such illicit discharges are not authorized under the Clean Water Act. Section 402(p(3)(B) requires that permits for discharges from municipal separate storm sewers require the municipality to "effectively prohibit" non-storm water discharges from the municipal separate storm sewer…Ultimately, such non-storm water discharges through a municipal separate storm sewer must either be removed from the system or become subject to an NPDES permit."

The federal regulations (40 Code of Federal Regulations (CFR) 122.26(d)(vi)(2)(B)) require that the municipal separate storm sewer discharger prohibit "through ordinance, order or similar means, illicit discharges to the municipal separate storm sewer." As owners and operators of the MS4, Copermittees cannot passively receive discharges from third parties (Federal Register 68766) and thus are responsible for the discharge of any non-storm water from their MS4.

The State Water Board's recent precedential order (Order WQ-2009-0008) affirming a Los Angeles County MS4 permit modification, consistent with USEPA's prior interpretations, recognizes that "[n]either the Clean Water Act nor the federal storm water regulations define 'non-storm water.' 'Illicit discharge' is defined as any discharge to an MS4 'not composed entirely of storm water.'[fn]. Thus, 'illicit

discharge' is the most nearly applicable definition of 'non-storm water' found in federal law and is often used interchangeably with that term."[86]

Storm Water and Non-storm Water Definitions

By definition non-storm water is not precipitation related. 40 CFR 122.26(b)(13) states that: "Storm water means storm water runoff, snowmelt runoff, and surface runoff and drainage." While "surface runoff and drainage" is not defined in federal law, it is related to precipitation events such as rain and/or snowmelt (see 55 Fed Reg 47995-96). The Federal Register (55, page 47995) includes an entire section on the definition of storm water and non-storm water. The term "surface runoff and drainage" does not include all incidental flows in the MS4 system, but consists of flows relating to precipitation events as clarified by the Federal Register, USEPA's documents and permitting, and other Regional Board Orders.

The Federal Register (55 Fed Reg 47995-47996) provides clarification on the distinction between storm water and non-storm water discharges, including their regulation:

> "In response to the comments which requested EPA to define the term storm water broadly to include a number of classes of discharges **which are not in any way related to precipitation events, EPA believes that this rulemaking is not an appropriate forum for addressing the appropriate regulation of such non-storm water discharges**, even though some classes of non-storm water discharges may typically contain only minimal amounts of pollutants. Congress did not intend that the term storm water be used to describe any discharge that has a de minimis amount of pollutants, not did it intend for section 402(p) to be used to provide a moratorium from permitting other non-storm water discharges."

As recently recognized by the State Water Board in a precedential decision upholding an MS4 permit modification adopted by the Los Angeles Regional Water Board, "U.S. EPA has previously rejected the notion that 'storm water,' as defined at 40 Code of Federal Regulations section 122.26(b)(13), includes dry weather flows. In U.S. EPA's preamble to the storm water regulations, U.S. EPA rejected an attempt to define storm water to include categories of discharges 'not in any way related to precipitation events.'[fn]."[87] Thus, USEPA has made it clear that it deems discharges unrelated to precipitation events to be non-storm water discharges. 40 CFR 122.26(d)(iv)(B) itself provides specific examples of non-storm water discharges:

> "…the following category of non-storm water discharges or flows shall only be addressed where such discharges are identified by the municipality as sources of pollutants to the United States: water line flushing, landscape irrigation,

[86] State Water Board Order WQ-2009-0008 (*In the Matter of the Petition of County of Los Angeles and Los Angeles County Flood Control District*, adopted August 4, 2009), p. 4.
[87] State Water Board Order WQ-2009-0008 (*In the Matter of the Petition of County of Los Angeles and Los Angeles County Flood Control District*, adopted August 4, 2009), p. 7.

> diverted stream flows, rising ground waters, uncontaminated groundwater infiltration (as defined at 40 CFR 35.2005(20) to separate storm sewers, uncontaminated pumped groundwater,…"

USEPA also removed street wash waters from the definition of storm water, as USEPA specifically identified this discharge as being non-storm water (55 Fed. Reg. page 47996). Additionally, section 1.2.2.2. of USEPA's Multi-Sector General Permit for Industrial Activities (MSGP-2000) considers fire hydrant flushings, irrigation drainage, landscape watering, and foundation or footing drains to be non-storm water discharges. USEPA's September 1999 Storm Water Management Fact Sheet for Non-Storm Water Discharges to Storm Sewers states that non-storm water discharges can include discharges of process water, air conditioning condensate, non-contact cooling water, vehicle wash water, or sanitary wastes.

While these types of non-storm water discharges (or illicit discharges) may be regulated under storm water permits because as a practical matter they can enter and be discharged from the MS4 systems, they are not regulated as storm water discharges under the Clean Water Act because they are unrelated to precipitation events. As indicated above, the State Water Resources Control Board recent discussion of this issue supports the conclusion that non-storm water discharges are unrelated to precipitation events. In its Order affirming amendments to the Los Angeles County MS4 permit to implement a TMDL to control bacteria in dry weather flows, the State Water Board rejected petitioners County of Los Angeles and the Los Angeles County Flood Control District implied assertion that the definition of "storm water" contained in the federal regulations (defined as "surface run-off and drainage") includes the run-off and drainage from non-storm events. The State Water Board notes that the challenged permit provisions do not apply to storm water flows in that they apply only during dry weather conditions as defined in the permit. In upholding the challenged order, the State Water Board notes that the Los Angeles Water Board's permit language followed USEPA's approach, referring to USEPA's rejection of attempts to define storm water to include categories of discharges "not in any way related to precipitation events."[88]

Lastly, the Regional Board and State Board have issued multiple permits for non-storm water discharges, including, but not limited to, R9-2008-0002 (extracted groundwater), R9-2002-0020 (hydrostatic discharge) and 2006-008 DWQ (utility vaults), pursuant to section 402 of the CWA.

<u>Permitting Non-storm Water Discharges</u>
The U.S. EPA's approach (and the Regional Board's under its approved program) for non-storm water discharges from MS4s is to regulate these discharges under the existing 402 NPDES framework (Fed Reg 47995 and 48037 see below) for discharges

[88] State Water Board Order WQ-2009-0008 (*In the Matter of the Petition of County of Los Angeles and Los Angeles County Flood Control District*, adopted August 4, 2009), p. 7 (quoting 55 Fed. Reg. 47990. 47995).

to surface waters. The NPDES program (40 CFR 122.44(d)) utilizes discharge prohibitions and effluent limitations as regulatory mechanisms to regulate non-storm water discharges, including the use of technology and water quality-based effluent limitations. Non-numerical effluent limitations, such as BMPs for non-storm water discharges may only be authorized where numerical effluent limits are infeasible or where the practices are reasonably necessary to achieve effluent limitations and standards or to carry out the purposes and intent of the CWA (40 CFR 122.44(k) see below).

The Federal Register (55, page 48037) provides clarification that non-storm water discharges from the MS4 are to be regulated under section 402, not 402(p):

> "Conveyances which continue to accept other "non-storm water" discharges (e.g. discharges without an NPDES permit) with the exceptions noted above (*exempted discharges that are not a source of pollutants*) do not meet the definition of municipal separate storm sewer and are not subject to 402(p)(3)(B) of the CWA unless such discharges are issued separate NPDES permits. Instead, conveyances which continue to accept non-storm water discharges which have not been issued separate NPDES permits are subject to sections 301 and 402 of the CWA."

This regulatory approach is consistent with the approach recently upheld by the State Water Board in a precedential order adopted on August 4, 2009. In this Order, the State Water Board rejected a challenge to amendments to the Los Angeles County MS4 permit that require compliance with receiving water limitations and discharge prohibitions for dry weather, non-storm water discharges. Petitioners there argued that the receiving water limits and discharge prohibitions for dry weather dischargers were inappropriate and that the Los Angeles Water Board should instead have regulated the discharges with the maximum extent practicable standard, through an iterative process. The State Water Board concludes that dry weather discharges, as defined in the permit and in the underlying TMDL, "are more appropriately regarded as non-storm water discharges, which the Clean Water Act requires to be effectively prohibited."[89]

As stated above, for NPDES permits under 402 of the CWA, the Code of Federal Regulations (122.44(k)) clarify that a discharger may utilize BMPs to control or abate the discharge of pollutants when:

> "(1) Authorized under section 304(e) of the CWA for the control of toxic pollutants and hazardous substances from ancillary industrial activities;
> (2) Authorized under section 402(p) of the CWA for the control of storm water discharges;
> (3) Numeric limits are infeasible; or
> (4) The practices are reasonably necessary to achieve effluent limitations and standards or to carry out the purposes and intent of the CWA."

[89] State Water Board Order WQ-2009-0008 (*In the Matter of the Petition of County of Los Angeles and Los Angeles County Flood Control District*, adopted August 4, 2009), p. 8

For the last 19 years, Southern Orange County NPDES permits for discharges of storm water have regulated non-storm water discharges from the MS4. These permits required Copermittees (dischargers) to prohibit non-storm water discharges into (thus through and from) their MS4 systems, implement a program to prevent illicit discharges, and monitor to identify illicit discharges and exempted discharges that are a source of pollution. These measures are considered Best Management Practices (BMPs), are required to be included in NPDES permits issued under Section 402(p) of the CWA, and are considered by USEPA to be an interim approach to permitting non-storm water discharges from the MS4 in accordance with section 402 of the CWA and CFR 122.44(k).

As explained in the discussion of Finding C.15., below, the Copermittees' reliance on BMPs for the past 19 years has not resulted in compliance with applicable water quality standards. The Regional Board has evaluated (in accordance with 40 CFR 122.44(d)(1)) past and existing controls (BMPs), non-storm water effluent monitoring results, the sensitivity of the species in receiving waters (e.g. endangered species), and the potential for effluent dilution, and has determined that existing BMPs to control pollutants in storm water discharges are not sufficient to protect water quality standards in receiving waters and the existing requirement that Copermittees effectively prohibit all types of unauthorized non-storm water discharges into the MS4 historically results in the discharge of pollutants to the receiving waters. Thus, numeric action levels for non-storm water, dry weather, discharges from the MS4 and required actions following observed exceedances of numeric action levels have been established. For further discussion regarding the development of action levels please see Finding E.12 and discussion.

Dry weather action levels are applicable to non-storm water discharges of effluent from the MS4 system. Non-storm water effluent discharges from the MS4 are those which occur during dry weather conditions. These action levels are not applied to storm water discharges, as defined within the Order. Storm water discharges regulated by the Order are required to meet the MEP standard and related iterative process and have separate action levels.

Dry weather action levels are applicable to non-storm water discharges from the MS4 system into receiving waters. Non-storm water discharges are already required to be prohibited unless specifically exempted or covered under a separate NPDES permit. Dry weather action levels apply to non-storm water discharges of effluent from a point source into receiving waters. The MS4 is not a receiving water. Should a discharger wish to discharge a non-exempt category to the MS4 system, such discharges require a separate NPDES permit pursuant to sections 402 and 301 of the CWA. It is also infeasible to monitor and sample every discharge into the MS4, as such discharges are diffuse by nature and may vary spatially and temporally.

Finding C.15. Non-storm water discharges to the MS4 granted an influent exception (i.e., which are exempt from the effective prohibition requirement set forth in CWA section 402(p)(3)(B)(ii)) under 40 CFR 122. 26 are included within this Order. Any exempted discharges identified by Copermittees as a source of pollutants are subsequently required to be *addressed* (emphasis added) as illicit discharges through prohibition and incorporation into existing IC/ID programs. The Copermittees have identified landscape irrigation, irrigation water and lawn water, previously exempted discharges, as a source of pollutants and conveyance of pollutants to waters of the United States.

Discussion of Finding C.15. The Federal Register (55, page 48037) and 40 CFR 122.26(d)(iv)(B) clarify that certain components and categories of non-storm water discharges into the MS4 are not required to be prohibited. The Code of Federal Regulations requires the discharger have:

> "…a program, including inspections, to implement through ordinance, orders or similar means to prevent illicit discharges to the municipal separate storm sewer system; this program shall address all types of illicit discharges, however, the following category of non-storm water discharges or flows shall only be addressed where such discharges are identified by the municipality as sources of pollutants to the United States: water line flushing, landscape irrigation, diverted stream flows, rising ground waters, uncontaminated groundwater infiltration (as defined at 40 CFR 35.2005(20) to separate storm sewers, uncontaminated pumped groundwater,…"

As such, the identification of any of these categories as a source of pollutants requires them to be addressed as illicit discharges, which are not authorized under the CWA, and are required to be "effectively prohibited" as illicit discharges via ordinance, order or similar means. The prohibition of previously exempted discharges of non-storm water to waters of the United States from entering, and necessarily being discharged from an MS4, conforms with CWA requirements for standards and enforcement for effluent limitations to necessary to meet water quality standards (33 U.S.C. 1311(b)(1)(C)).

To date the Copermittees have identified overspray and drainage from potable and reclaimed water landscape irrigation as a substantial source and conveyance mechanism for pollutants into waters of the United States. Irrigation runoff into the MS4, as identified by the Copermittees, is a source of pollutants to waters of the United States, and is required to be *addressed* (emphasis added) as an illicit discharge per 40 CFR 122.26(d)(2)(iv)(B)(1) by prohibition through implementing and enforcing an ordinance, order or similar means. The Copermittees have identified irrigation water as a source of pollutants and conveyance of pollutants to waters of the United States, when applied improperly in excess and thereafter entering the MS4, in the following documents:

- Per requirements of 401 Water Quality Certification 02C-055, the County of Orange conducted a **Drainage Area Reconnaissance and Urban Runoff**

Characterization study. From the reconnaissance and characterization, the County of Orange determined that:

> "…*water quality results provided two important findings*." First, "*analytical data strongly indicates that irrigation overspray and drainage constitutes a very substantial source and conveyance mechanism for fecal indicator bacteria into Aliso Creek, and suggests that reduction measures for this source of urban runoff could provide meaningful reduction in bacteria loading to the stream*."

- Aliso Creek, currently 303(d) listed as impaired for Indicator Bacteria, is included in the Bacteria Project I TMDL adopted by the Regional Board on December 12, 2007. Secondly, reclaimed water high in electrical conductivity and Nitrate was indicated as:

  > "…*the source water at three of the excessive runoff locations (P1,P2,J01). These dissolved nitrogen concentration and flow rates create relatively high nitrogen loadings, which have the potential to contribute to undesirable levels of periphytic algal growth in Aliso Creek.*"

- On November 15, 2007 the **Unified Annual Progress Report Program Effectiveness Assessment** for the 2006-2007 reporting period was submitted by the Copermittees. Within the report, the Copermittees demonstrate that a "*wide range of constituents exceeded the tolerance interval bounds*", including orthophosphate. Tolerance interval bounds are pollutant levels set by the Copermittees that represent when a problem may be occurring. These tolerance levels sometimes equate with Basin Plan Objectives (BPOs) and California Toxic Rules (CTR) and USEPA Criteria. The report states that "*high levels of orthophosphate concentration are most likely the result of fertilizer runoff or reclaimed water runoff*". Aliso Creek is currently 303(d) listed as impaired for phosphorous.

- On November 15, 2007 the **Watershed Action Plan Annual Report**(s) for the 2006-2007 reporting period was submitted by the County of Orange, Orange County Flood Control District and Copermittees within the San Juan Creek, Laguna Coastal Streams, Aliso Creek, and Dana Point Coastal Streams Watersheds. San Juan Creek, Laguna Coastal Streams, Aliso Creek and Dana Point Coastal Streams are all currently 303(d) listed as impaired for Indicator Bacteria within their watersheds and/or in the Pacific Ocean at the discharge points of their watersheds. These locations are included in the Bacteria Project I TMDL adopted by the Regional Board on December 12, 2007. The Copermittees, within their Watershed Action Strategy Table for Fecal Indicator Bacteria

  > "*Support programs to reduce or eliminate the discharge of anthropogenic dry weather nuisance flow throughout the […] watershed. Dry weather flow is the transport medium for bacteria and other 303(d) constituents of*

concern". Additionally, they state that "*conditions in the MS4 contribute to high seasonal bacteria propagation in-pipe during warm weather. Landscape irrigation is a major contributor to dry weather flow, both as surface runoff due to over-irrigation and overspray onto pavements; and as subsurface seepage that finds its way into the MS4*."

- In 2006, the State Water Quality Control Board (State Board) allocated Grant funding to the **SmartTimer/Edgescape Evaluation Program (SEEP)**. Project partners include the following Copermittees: the Cities of Aliso Viejo, Dana Point, Laguna Beach, Laguna Hills, Laguna Nigel, Laguna Woods, Lake Forest, Mission Viejo, Rancho Santa Margarita and San Juan Capistrano. Also included in the study were the Metropolitan Water District of Southern California, the Department of Agriculture and ten south Orange County water districts. The project targets irrigation runoff by retrofitting existing development and documenting the conservation and runoff improvements. The Grant Application states that:

  "*Irrigation runoff contributes flow & pollutant loads to creeks and beaches that are 303(d) listed for bacteria indicators.*"

  Furthermore, the grant application states:

  "*Regional program managers agree that the reduction and/or elimination of irrigation-related urban flows and associated pollutant loads may be key to successful attainment of water quality and beneficial use goals as outlined in the San Diego Basin Plan and Bacteria TMDL over the long term.*"

  This is reinforced in the project descriptions and objectives:

  "*Elevated dry-weather storm drain flows, composed primarily in the South Orange County Region of landscape irrigation water wasted as runoff, carry pollutants that impair recreational use and aquatic habitats all along Southern California's urbanized coastline. Storm drain systems carry the wasted water, along with landscape derived pollutants such as bacteria, nutrients and pesticides, to local creeks and the ocean. Given the local Mediterranean climate, excessive perennial dry season stream flows are an unnatural hydrologic pattern, causing species shifts in local riparian communities and warm, unseasonal contaminated freshwater plumes in the near-shore marine environment*".

  The basis of this grant project, conducted by the Copermittees and additional water use partners, is that over-irrigation (landscape irrigation, irrigation water and lawn watering) into the MS4 is a source and conveyance of pollutants. In addition, they indicate that this alteration of natural flows is impacting the Beneficial Uses of Waters of the State and U.S.

D. Runoff Management Programs

Finding D.1.a. This Order specifies requirements necessary for the Copermittees to reduce the discharge of pollutants in storm water runoff to the maximum extent practicable (MEP). However, since MEP is a dynamic performance standard, which evolves over time as runoff management knowledge increases, the Copermittees' runoff management programs must continually be assessed and modified to incorporate improved programs, control measures, best management practices (BMPs), etc. in order to achieve the evolving MEP standard. Absent evidence to the contrary, this continual assessment, revision, and improvement of runoff management program implementation is expected to ultimately achieve compliance with water quality standards in the Region.

Discussion of Finding D.1.a. Under CWA section 402(p), municipalities are required to reduce the discharge of storm water pollutants from their MS4s to the maximum extent practicable (MEP). MEP is the critical technology-based performance standard that municipalities must attain. The MEP standard is an ever-evolving, flexible, and advancing concept, which considers technical and economic feasibility. As knowledge about controlling storm water runoff continues to evolve, so does that which constitutes MEP. Reducing the discharge of storm water pollutants to the MEP requires Copermittees to assess each program component and revise activities, control measures, best management practices (BMPs), and measurable goals, as necessary to meet MEP.

To achieve the MEP standard, municipalities must employ whatever BMPs are technically feasible (i.e., are likely to be effective) and are not cost prohibitive. The major emphasis is on technical feasibility. Reducing storm water pollutants to the MEP means choosing effective BMPs, and rejecting applicable BMPs only where other effective BMPs will serve the same purpose, or the BMPs would not be technically feasible, or the cost would be prohibitive. In selecting BMPs to achieve the MEP standard, the following factors may be useful to consider:

1. Effectiveness: Will the BMPs address a pollutant (or pollutant source) of concern?
2. Regulatory Compliance: Is the BMP in compliance with storm water regulations as well as other environmental regulations?
3. Public Acceptance: Does the BMP have public support?
4. Cost: Will the cost of implementing the BMP have a reasonable relationship to he pollution control benefits to be achieved?
5. Technical Feasibility: Is the BMP technically feasible considering soils, geography, water resources, etc?

If a municipality reviews a lengthy menu of BMPs and chooses to select only a few of the least expensive BMPs, it is likely that MEP has not been met. On the other hand, if a municipal discharger employs all applicable BMPs except those where it can show that they are not technically feasible in the locality, or whose cost is prohibitive, it would have met the standard. Where a choice may be made between two BMPs that should provide generally comparable effectiveness, the discharger may choose the least expensive alternative and exclude the more expensive BMP. However, it would not be acceptable either to reject all BMPs that would address a pollutant source, or to pick a BMP based solely on cost, which would be clearly less effective. In selecting BMPs the municipality must make a serious attempt to comply and practical solutions may not be easily dismissed. In any case, the burden is on the municipal discharger to show compliance with its permit. After selecting BMPs, it is the responsibility of the discharger to ensure that all BMPs are implemented.[90]

A definition of MEP is not provided in either the federal statute or in the federal regulations. The final determination regarding whether a municipality has reduced storm water pollutants to the MEP can only be made by the Regional Board or the State Board, and not by the municipal discharger. While the Regional Board or the State Board ultimately define MEP, it is the responsibility of the Copermittees to initially propose actions that implement BMPs to reduce storm water pollution to the MEP. In other words, the Copermittees' runoff management programs to be developed under the Order are the Copermittees' proposals of MEP. Their total collective and individual activities conducted pursuant to their runoff management programs become their proposal for MEP as it applies both to their overall effort, as well as to specific activities. The Order provides a minimum framework to guide the Copermittees in meeting the MEP standard for storm water.

It is the Regional Board's responsibility to evaluate the proposed programs and specific BMPs to determine what constitutes MEP, using the above guidance and the court's 1994 decision in NRDC v. California Department of Transportation, Federal District Court, Central District of California. The federal court stated that a Copermittee must evaluate and implement BMPs except where (1) other effective BMPs will achieve greater or substantially similar pollution control benefits; (2) the BMP is not technically feasible; or (3) the cost of BMP implementation greatly outweighs the pollution control benefits. In the absence of a proposal acceptable to the Regional Board, the Regional Board will define MEP by requiring implementation of additional measures by the Copermittees.

[90] State Water Resources Control Board, 1993. Memo Entitled Definition of Maximum Extent Practicable.

The Copermittees' continual evolution in meeting the MEP standard is expected to achieve compliance with water quality standards. USEPA has consistently supported this expectation. In its Interim Permitting Approach for Water Quality-Based Effluent Limitations (WQBELs) in Storm Water Permits, USEPA states "the interim permitting approach uses best management practices (BMPs) in first-round storm water permits, and expanded or better-tailored BMPs in subsequent permits, where necessary, to provide for attainment of water quality standards."[91] USEPA reiterated its position in 1999, when it stated regarding the Phase II municipal storm water regulations that "successive iterations of the mix of BMPs and measurable goals will be driven by the objective of assuring maintenance of water quality standards" and "EPA anticipates that a permit for a regulated small MS4 operator implementing BMPs to satisfy the six minimum control measures will be sufficiently stringent to protect water quality, including water quality standards […]."[92]

The requirements of the Order are expected to achieve compliance with receiving water quality standards. The approach to be used is the continual assessment, revision, and improvement of Copermittee best management practice implementation. This approach is consistent with the Clean Water Act and State Board guidance. In Defenders of Wildlife v. Browner (1999, 197 F. 3d 1035), the United States Court of Appeals for the Ninth Circuit states: "Under 33 U.S.C. section 1342 (p)(3)(B)(iii), the EPA's choice to include either management practices or numeric limitations in the permits was within its discretion." In addition, the approach is consistent with State Board Order WQ 99-05, which outlines an iterative approach for achieving compliance with water quality standards.

Finding D.1.b. The Copermittees have generally been implementing the jurisdictional runoff management programs required pursuant to Order No. R9-2002-01 since February 13, 2003. Prior to that, the Copermittees were regulated by Order No. 96-03 since August 8, 1996. Runoff discharges, however, continue to cause or contribute to violations of water quality standards as evidenced by the Copermittees monitoring results.[93]

[91] Federal Register / Vol. 61, No. 166 / August 26, 1996 / P. 43761.
[92] Federal Register / Vol. 64, No. 235 / Wednesday, December 8, 1999 / Rules and Regulations. P. 68753-68754.
[93] Orange County Storm Water Program, 2006. Unified Annual Progress Report, Program Effectiveness Assessment (San Diego Region).

Discussion of Finding D.1.b. In response to Order No. R9-2002-01, the Copermittees have improved their runoff management programs. For instance, comprehensive runoff management plans have been developed. In order to implement the plans, the Copermittees have, among other things, developed BMP requirements, improved inter- and intra-governmental coordination, improved training programs, improved illicit discharge detection procedures, and improved their monitoring efforts. Although the programmatic improvements have led to better implementation of BMPs, the Copermittees' monitoring data demonstrate that additional or revised BMPs are necessary to prevent discharges from MS4s from causing and contributing to violations of water quality standards. A discussion of data collected by the Copermittees is included in the discussion for Finding C.9.

Finding D.1.c. This Order contains new or modified requirements that are necessary to improve Copermittees' efforts to reduce the discharge of storm water pollutants in runoff to the MEP and achieve water quality standards. Some of the new or modified requirements, such as the revised Watershed Runoff Management Program section, are designed to specifically address these high priority water quality problems. Other new or modified requirements address program deficiencies that have been noted during audits, report reviews, and other Regional Board compliance assessment activities.

Discussion of Finding D.1.c. The Copermittees are required to update and expand their runoff management programs on jurisdictional and watershed levels in order to improve their efforts to reduce the contribution of storm water pollutants in runoff to the MEP and meet water quality standards. Changes to Order No. R9-2002-01's requirements have been made to help ensure these two standards are achieved by the Copermittees.

The Orders' jurisdictional requirements have changed based on findings by the Regional Board during typical compliance assurance activities or receipt of complaints.[94] The Regional Board performed full jurisdictional program audits of 8 of the 13 Copermittees during the Order No. R9-2002-01 permit term. Where the audits found common implementation problems, requirements have been altered to better ensure compliance. In addition, the Regional Board conducted detailed reviews of every jurisdictional annual report submitted by the Copermittees. Updates to the Copermittees' programs are also based on recommendations found in the Copermittees' ROWD.[95] In many instances, the Copermittees and the Regional Board have identified similar issues that merit program modifications.

[94] Audit reports, report reviews, and inspection reports are available for review at the Regional Board office.
[95] All significant changes made to the Order's requirements are described and explained in detail in Fact Sheet section X.

To better focus on attainment of water quality standards, the Order's watershed requirements have been improved. The conditions of the receiving waters now drive management actions, which in turn focus diminishing resources on the highest priority water quality problems within the receiving waters in each watershed. Improvements to watershed requirements were also made to facilitate a mutually clear understanding of the requirements between the Regional Board and Copermittees.

Finding D.1.d. Updated Jurisdictional Runoff Management Plans (JRMPs) and Watershed Runoff Management Plans (WRMPs), which describe the Copermittees' runoff management programs in their entirety, are needed to guide the Copermittees' runoff management efforts and aid the Copermittees in tracking runoff management program implementation. It is practicable for the Copermittees to update the JRMPs and WRMPs within one year, since significant efforts to develop these programs have already occurred.

Discussion of Finding D.1.d. Development of runoff management plans is a crucial runoff management measure and should be considered a BMP. The plans help organize and focus the Copermittees' programs and guide their implementation. In its statewide assessment report to USEPA Region IX and the State Board, Tetra Tech, Inc. concluded that the lack of a master storm water planning document must be considered a serious program deficiency[96]. When submitted to the Regional Board, the plans provide useful correspondence between the Copermittees and the Regional Board. The Plans also become available for review by the public, and thus facilitate public participation in runoff management decisions. Finally, while development and submittal of runoff management plans are not necessary to ensure compliance of the Copermittees' runoff management programs with the Order, the Regional Board is provided with a means to track Copermittee implementation.

The focus of the Order is on development and implementation of storm water programs which meet MEP, rather than creation of Copermittee plans which exhibit MEP. While the Order does not rely upon the plans to ensure MEP and other standards are achieved, the plans still serve a useful purpose. As stated above, the plans serve to organize the Copermittees' efforts to address runoff. As a practical matter, any program of the size required by the Order should be documented in writing. This serves to guide implementation of the program by the numerous individuals responsible for program implementation.

[96] Tetra Tech, Inc. 2006. *Assessment Report on Tetra Tech's Support of California's MS4 Stormwater Program.* Produced for USEPA Region IX and the California State and Regional Water Quality Control Boards.

Runoff management plans are not necessary for ensuring compliance with the Order because the Order itself contains sufficient detailed requirements to ensure that compliance with discharge prohibitions, receiving water limitations, and the narrative standard of MEP for storm water are achieved. Implementation by the Copermittees of programs in compliance with the Order's requirements, prohibitions, and receiving water limitations is the pertinent compliance standard to be used under the Order, as opposed to assessing compliance by reviewing the Copermittees' implementation of their plans alone. The Regional Board ensures compliance with the Order by reviewing annual reports, conducting inspections, performing audits, and through other general program oversight.

Runoff management plans are particularly important and useful for municipalities when program implementation is spread across several departments and/or when municipalities experience staff turnover.[97] Each Copermittee relies on multiple employees or contractors for program implementation, but the spread of responsibility varies among Copermittees.[98] Written jurisdictional plans ensure appropriate coordination within each municipality.

Copermittees' runoff management plans are simply descriptions of their runoff management programs required under the Order. These plans serve as procedural correspondence which guides program implementation and aids the Copermittees and Regional Board in tracking implementation of the programs. In this manner, the plans are not functional equivalents of the Order. For these reasons, the Copermittees' runoff management plans need not be an enforceable part of the Order.

The Copermittees' plans and programs can be updated within one year because much of their plans and programs are already in existence. In fact, many parts of their plans and programs have been in place for 15 years. Moreover, the adoption of Order No. R9-2002-01 required a larger scale reorganization of the Copermittees' programs than Tentative Order No. R9-2009-0002, but also allowed one year for program updates. The Copermittees were generally able to meet the time schedule required under Order No. R9-2002-01.

Finding D.1.e. Pollutants can be effectively reduced in storm water runoff by the application of a combination of pollution prevention, source control, and treatment control BMPs. Pollution prevention is the reduction or elimination of pollutant generation at its source and is the best "first line of defense". Source control BMPs (both structural and non-structural) minimize the contact between pollutants and flows (e.g., rerouting run-on around pollutant sources or keeping pollutants on-site and out of receiving waters). Treatment control BMPs remove pollutants that have been mobilized by wet-weather or dry-weather flows.

[97] Tetra Tech, Inc. 2005. Program Evaluation Report. Orange County Storm Water Program: Cities of Laguna Beach, Laguna Hills, Lake Forest, and Rancho Santa Margarita.
[98] Responsible departments and employees are described in the 2005-06 Annual Reports for the MS4 programs.

Discussion of Finding D.1.e. The State Board finds in its Order No. WQ 98-01 that BMPs are effective in reducing pollutants in storm water runoff, stating that "implementation of BMPs [is] generally the most appropriate form of effluent limitations when designed to satisfy technology requirements, including reduction of pollutants to the maximum extent practicable." A State Board TAC further supports this finding by recommending "that nonpoint source pollution control can be accomplished most effectively by giving priority to [BMPs] in the following order:

1. Pollution Prevention – implementation of practices that use or promote pollution free alternatives;
2. Source Control – implementation of control measures that focus on preventing or minimizing urban runoff from contacting pollution sources;
3. Treatment Control – implementation of practices that require treatment of polluted runoff either onsite or offsite."[99]

Pollution prevention, the reduction or elimination of pollutant generation at its source, is an essential aspect of BMP implementation. Fewer pollutants are available to be washed from developed areas when the generation of pollutants by activities is limited. Thus, pollutant loads in storm water discharges are reduced from these areas. In addition, there is no need to control or treat pollutants that are never generated.[100] Furthermore, pollution prevention BMPs are generally more cost effective than removal of pollutants by treatment facilities or cleanup of contaminated media.[101,102]

In the Pollution Prevention Act of 1990, Congress established a national policy that emphasizes pollution prevention over control and treatment. CWC section 13263.3(a) also supports pollution prevention, stating "The Legislature finds and declares that pollution prevention should be the first step in a hierarchy for reducing pollution and managing wastes, and to achieve environmental stewardship for society. The Legislature also finds and declares that pollution prevention is necessary to support the federal goal of zero discharge of pollutants into navigable waters." Finally, the Basin Plan also supports this finding by stating "To eliminate pollutants in storm water, one can either clean it up by removing pollutants or prevent it from becoming polluted in the first place. Because of the overwhelming volume of storm water and the enormous costs associated with pollutant removal, pollution prevention is the only approach that makes sense."[103]

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[99] State Board, 1994. Urban Runoff Technical Advisory Committee Report and Recommendations. Nonpoint Source Management Program.
[100] Orange County Storm Water Copermittees. 2006. Report of Waste Discharge (San Diego Region).
[101] Devinny, J.S. et al. 2004. *Alternative Approaches to Stormwater Quality Control.* Prepared for the Los Angeles Regional Water Quality Control Board. Found as Appendix H to *NPDES Stormwater Cost Survey.* Prepared for the California State Water Resources Control Board by the Office of Water Programs California State University, Sacramento. Available on-line at: http://www.owp.csus.edu/research/npdes/
[102] Schueler, T.R.., 2000. Center for Watershed Protection. Assessing the Potential for Urban Watershed Restoration, Article 142.
[103] Regional Board, 1994. Water Quality Control Plan, San Diego Basin, Region 9.

USEPA also supports the utilization of a combination of BMPs to address pollutants in runoff. For example, USEPA has found there has been success in addressing illicit discharge related problems through BMP initiatives like storm drain stenciling and recycling programs, including household hazardous waste special collection days.[104] Structural BMP performance data has also been compiled and summarized by USEPA.[105]

The summary provides the performance ranges of various types of structural BMPs for removing suspended solids, nutrients, pathogens, and metals from storm water flows. These pollutants are generally a concern in storm water in the San Diego Region and Orange County.[106] For suspended solids, the least effective structural BMP type was found to remove 30-65 percent of the pollutant load, while the most effective was found to remove 65-100 percent of the pollutant load. For nutrients, the least effective structural BMP type was found to remove 15-45 percent of the pollutant load, while the most effective was found to remove 65-100 percent of the pollutant load. For pathogens, the least effective structural BMP type was found to remove <30 percent of the pollutant load, while the most effective was found to remove 65-100 percent of the pollutant load. For metals, the least effective structural BMP type was found to remove 15-45 percent of the pollutant load, while the most effective was found to remove 65-100 percent of the pollutant load.

Several studies conducted in the last few years have measured the effectiveness of treatment BMPs in southern Orange County. Studies have been conducted on both dry weather and wet weather flows. Each demonstrates that treatment control BMPs can, to varying degrees, remove pollutants from runoff, but that pollution prevention and source control BMPs are necessary to reduce storm water pollutant discharges to the point of supporting water quality objectives in the receiving waters. A partial list of such studies includes:

1. "Assessment of Best Management Practice (BMP) Effectiveness" by the Southern California Coastal Water Research Project (SCCWRP).[107] This project assesses the effectiveness of BMPs in southern California for improving water quality related to toxicity.

2. "Final Report for the Del Obispo Storm Drain Project" by the City of Dana Point.[108] This report assesses the implementation of a solids removal unit and low-flow diversion project.

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[104] USEPA, 1999. 40 CFR Parts 9, 122, 123, and 124 National Pollutant Discharge Elimination System-Regulations for Revision of the Water Pollution Control Program Addressing Storm Water Discharges. 64 FR 68728.
[105] USEPA, 1999. Preliminary Data Summary of Urban Storm Water Best Management Practices. EPA 821-R-99-012.
[106] Orange County Stormwater Program, Appendix E1 BMP Effectiveness and Applicability for Orange County (updated June 2005).
[107] Jeffrey S. Brown and Steven M. Bay 2005. *Assessment of Best Management Practice (BMP) Effectiveness.* SCCWRP Technical Report 461.
[108] City of Dana Point. 2005. *Final Report for the Del Obispo Storm Drain Project*. Prepared for the State Water Resources Control Board Agreement No. 02-216-550-0.

3. "Final Report for the Alipaz Storm Drain Treatment and Low Flow Diversion Project" by the City of Dana Point.[109] This report assesses the implementation of a solids removal unit and low-flow diversion project.

4. "Final Report for Poche Beach Urban Runoff Ultraviolet Light Bacteria Disinfection Project" by the County of Orange.[110] This report assesses the implementation of an ultraviolet system within a box culvert.

5. Final Report for J01P28 Interim Water Quality Improvement Package Plant Best Management Practices.[111] This report assesses the implementation of an ultraviolet treatment system at an inland waters storm drain outfall.

6. "Final Report for Wetland Capture and Treatment (WetCAT) Network" by the City of Laguna Niguel.[112] This report assesses the implementation of constructed wetlands.

Results of these recent studies demonstrate that treatment at the MS4 outfalls for pollutants that have already been discharged *into* the MS4 is generally unlikely to reduce pollutant concentrations to levels that would support water quality objectives. It also demonstrates that non-storm water discharges are occurring into the MS4 that are illicit discharges, exempted discharges that are a source of pollutants and/or discharges under a separate NPDES permit that are in violation of that permit.

It is important to note that the Clean Water Act and NPDES federal regulations clearly require control of discharges into the MS4. Section 402(p)(3)(B)(ii) of the Clean Water Act states that MS4 permits must "prohibit non-storm water discharges into the storm sewers." 40 CFR 122.26(d)(2)(iv)(B) requires Copermittees to "detect and remove […] illicit discharges and improper disposal into the storm sewer." See Finding C.14 and Discussion.

[109] City of Dana Point. 2004. *Final Report For The Alipaz Storm Drain Treatment And Low Flow Diversion Project" by the City of Dana Point.* Prepared for State Water Resources Control Board Agreement Number: 01-068-550-0.
[110] Volz, James. 2005. *Final Report for Poche Beach Urban Runoff Ultraviolet Light Bacteria Disinfection Project*. Prepared by the County of Orange for State Water Resources Control Board Agreement No. 01-236-550-1.
[111] Anderson, Max. 2005. Final Report: Aliso Beach Clean Beach Initiatives, J01P28 Interim Water Quality Improvement Package Plant Best Management Practices. Prepared by the County of Orange for State Water Resources Control Board Agreement No. 01-227-550-0.
[112] City of Laguna Niguel and CH2MHILL. 2004. *Final Report: Wetland Capture and Treatment (WetCAT) Network.* Prepared for State Water Resources Control Board Agreement No. 01-122-259-0.

The Order's approach to regulating discharges into and from the MS4 is in accordance with State Board Order WQ 2001-15. In that order, the State Board reviewed the San Diego County permit (Order No. 2001-01) requirements and made one change to one prohibition.[113] The Order upheld all other requirements of the current permit. Order No. R9-2009-0002 incorporates the one change made by the State Board, and continues the approach of Order No. 2001-01 (the basis for the current permit), as it was upheld by the State Board in Order WQ 2001-15. State Board Order WQ 2001-15 supports such requirements, stating: "It is important to emphasize that dischargers into MS4s continue to be required to implement a full range of BMPs, including source control."

The Court of Appeals, Fourth Appellate District, found that the current permit's approach to regulation of discharges into the MS4 was appropriate. Since the Tentative Order utilizes the same approach, the court decision supports the Tentative Order's requirements.

Finding D.1.f. Runoff needs to be addressed during the three major phases of urban development (planning, construction, and use) in order to reduce the discharge of storm water pollutants to the MEP, effectively prohibit non-storm water discharges and protect receiving waters. Development which is not guided by water quality planning policies and principles can unnecessarily result in increased pollutant load discharges, flow rates, and flow durations which can impact receiving water beneficial uses. Construction sites without adequate BMP implementation result in sediment runoff rates which greatly exceed natural erosion rates of undisturbed lands, causing siltation and impairment of receiving waters. Existing development generates substantial pollutant loads which are discharged in runoff to receiving waters.

Discussion of Finding D.1.f. MS4 permits are issued to municipalities because of their land use authority. The ultimate responsibility for the pollutant discharges, increased runoff, and inevitable long-term water quality degradation that results from development lies with local governments. This responsibility is based on the fact that it is the local governments that have authorized the development (i.e., conversion of natural pervious ground cover to impervious surfaces) and the land uses that generate the pollutants and runoff. Furthermore, the MS4 through which the pollutants and increased flows are conveyed, and ultimately discharged into natural receiving waters, are owned and operated by the same local governments. In summary, the Copermittees under the Order are responsible for discharges into and out of their MS4s because (1) they own and operate the MS4; and (2) they have the legal authority that authorizes the very development and land uses with generate the pollutants and increased flows in the first place.

[113] The State Board removed the prohibition of discharges *into* the MS4 that cause or contribute to exceedances of water quality objectives. The revision allows for treatment of storm water flows once the pollutants have entered the MS4. It does not affect the effective prohibition on certain dry-weather flows into the MS4 that is required by the Clean Water Act.

For example, since grading cannot commence prior to the issuance of a local grading permit, the Copermittees have a built-in mechanism to ensure that all grading activities are protective of receiving water quality. The Copermittee has the authority to withhold issuance of the grading permit until the project proponent has demonstrated to the satisfaction of the Copermittee that the project will not violate their ordinances or cause the Copermittee to be in violation of its MS4 permit. Since the Copermittee will ultimately be held responsible for any discharges from the grading project by the Regional Board, the Copermittee will want to use its own permitting authority to ensure that whatever measures the Copermittee deems necessary to protect discharges into its MS4 are in fact taken by the project proponent.

The Order holds the local government accountable for this direct link between its land use decisions and water quality degradation. The Order recognizes that each of the three major stages in the development process (development planning, construction, and the use or operational stage) are controlled by and must be authorized by the local government. Accordingly, this permit requires the local government to implement, or require others to implement, appropriate best management practices to reduce storm water pollutant discharges and increased flow during each of the three stages of development.

Including plans for BMP implementation during the design phase of new development and redevelopment offers the most cost effective strategy to reduce storm water runoff pollutant loads to surface waters.[114] The Phase II regulations for small municipalities reflect the necessity of addressing runoff during the early planning phase. Due to the greater water quality concerns generally experienced by larger municipalities, Phase II requirements for small municipalities are also applicable to larger municipalities such as the Copermittees. The Phase II regulations direct municipalities to develop, implement, and enforce a program to address storm water runoff from new development and redevelopment projects that disturb greater than or equal to one acre, including projects less than one acre that are part of a larger common plan of development or sale. The program must ensure that controls are in place that would prevent or minimize water quality impacts. This includes developing and implementing strategies which include a combination of structural and/or non-structural BMPs appropriate to the locality. The program must also ensure the adequate long-term operation and maintenance of BMPs.[115] USEPA expands on the Phase II regulations for urban development when it recommends that Copermittees:

[114] USEPA, 2000. Storm Water Phase II Compliance Assistance Guide. EPA 833-R-00-002.
[115] USEPA, 1999. 40 CFR Parts 9, 122, 123, and 124 National Pollutant Discharge Elimination System-Regulations for Revision of the Water Pollution Control Program Addressing Storm Water Discharges; Final Rule. 64 FR 68845.

> "Adopt a planning process that identifies the municipality's program goals (e.g., minimize water quality impacts resulting from post-construction runoff from new development and redevelopment), implementation strategies (e.g., adopt a combination of structural and/or non-structural BMPs), operation and maintenance policies and procedures, and enforcement procedures. In developing your program, you should consider assessing existing ordinances, policies, programs and studies that address storm water runoff quality."

Management of storm water runoff during the construction phase is also essential. USEPA explains in the preamble to the Phase II regulations that storm water discharges generated during construction activities can cause an array of physical, chemical, and biological water quality impacts. Specifically, the biological, chemical and physical integrity of the waters may become severely compromised due to runoff from construction sites. Fine sediment from construction sites can adversely affect aquatic ecosystems by reducing light penetration, impeding sight-feeding, smothering benthic organisms, abrading gills and other sensitive structures, reducing habitat by clogging interstitial spaces within the streambed, and reducing intergravel dissolved oxygen by reducing the permeability of the bed material. Water quality impairment also results, in part, because a number of pollutants are preferentially absorbed onto mineral or organic particles found in fine sediment. The interconnected process of erosion (detachment of the soil particles), sediment transport, and delivery is the primary pathway for introducing key pollutants, such as nutrients, metals, and organic compounds into aquatic systems.[116]

Finally, storm water and non-storm water runoff from existing development must be addressed. The Copermittees' monitoring data exhibits that significant water quality problems exist in receiving waters which receive runoff from areas with extensive existing development, such as Aliso Creek. Source identification, BMP requirements, inspections, and enforcement are all important measures which can be implemented to address runoff from existing development. USEPA supports inspections and enforcement by municipalities when it states "Effective inspection and enforcement requires […] penalties to deter infractions and intervention by the municipal authority to correct violations. Enforcement mechanisms […] also must be described."[117]

Finding D.1.g. Annual reporting requirements included in this Order are necessary to meet federal requirements and to evaluate the effectiveness and compliance of the Copermittees' programs.

Discussion of Finding D.1.g. The annual reporting requirements are consistent with federal NPDES regulation 40 CFR 122.41, which states:

[116] Ibid., 64 FR 68728.
[117] USEPA, 1992. Guidance Manual for the Preparation of Part II of the NPDES Permit Applications for Discharges from Municipal Separate Storm Sewer Systems. EPA 833-B-92-002.

> "The operator of a large or medium municipal separate storm sewer system of a municipal separate storm sewer system that has been designated by the Director under section 122.26(a)(1)(v) of this part must submit an annual report by the anniversary of the date of the issuance of the permit for such a system. The report shall include: (1) The status of implementing the components of the storm water management program that are established as permit conditions; (2) Proposed changes to the storm water management program that are established as permit condition, Such proposed changes shall be consistent with § 122.26(d)(2)iii) of this part; (3) Revisions, if necessary, to the assessment of controls and the fiscal analysis reported in the permit application under § 122.26(d)(2)iv) and (d)(2)(v) of this part; (4) A summary of data, including monitoring data, that is accumulated throughout the reporting year; (5) Annual expenditures and budget for year following each annual report; (6) A summary describing the number and nature of enforcement actions, inspections, and public education programs; and (7) Identification of water quality improvements or degradation."

CWC section 13267 provides that "the regional board may require that any person who has discharged […] shall furnish, under penalty of perjury, technical or monitoring reports which the regional board requires."

The Regional Board must assess the reports to ensure that the Copermittees' programs are adequate to assess and address water quality. The reporting requirements can also be useful tools for the Copermittees to review, update, or revise their programs. Areas or issues which have received insufficient efforts can also be identified and improved.

Finding D.1.h. This Order establishes Storm Water Action Levels (SALs) for selected pollutants based on USEPA Rain Zone 6 (arid southwest) Phase I MS4 monitoring data for pollutants in storm water. The SALs were computed as the 90th percentile of the data set, utilizing the statistical based population approach, one of three approaches recommended by the California Water Board's Storm Water Panel in its report, 'The Feasibility of Numerical Effluent Limits Applicable to Discharges of Storm Water Associated with Municipal, Industrial and Construction Activities (June 2006). SALs are identified in Section D of this Order. Copermittees shall implement a timely, comprehensive, cost-effective storm water pollution control program to reduce the discharge of pollutants in storm water from the permitted areas so as not to exceed the SALs. SALs express an integration of the adequacy/inadequacy of programmatic measures and BMPs required in this Order.

Discussion of Finding D.1.h. Section 402(p) of the CWA states MS4 permits for storm water shall require controls to reduce the discharge of pollutants to the maximum extent practicable, including management practices, control techniques and system, design and engineering methods, and such other provisions as the

Administrator or the State determines appropriate for the control of such pollutants. This includes requiring numeric effluent limitations for storm water.

SALs are not numeric effluent limitations, which is reflected in language which clarifies an excursion above a SAL does not create a presumption that MEP is not being met. Instead, a SAL exceedance is to be used by the Copermittee as an indication that the MS4 storm water discharge point is a definitive "bad actor," and the result from the monitoring needs to be considered as part of the iterative process for reducing pollutants in storm water to the MEP.

The CWA defines effluent limitations as:
“Any restriction imposed by the Director on quantities, discharge rates, and concentrations of pollutants which are “discharged” from “point sources” into “waters of the United States”…” A SAL is not a restriction on a quantity, rate or concentration, but is a level at which actions that further reduce pollutants from that discharge point need to be evaluated in order to reduce storm water pollutants to the MEP. Thus, SALs are not effluent limitations as defined by the CWC or CWA.

The approach of using "action levels" is consistent with recommendations made by USEPA in their Interim Permitting Approach for Water Quality-Based Effluent Limitations in Storm Water Permits, dated August 26, 1996:
"Under the Clean Water Act(CWA) and NPDES regulations, permitting authorities may employ a variety of conditions and limitations in storm water permits, including best management practices, performance objectives, narrative conditions, monitoring triggers, action levels (e.g., monitoring benchmarks, toxicity reduction evaluation action levels), etc., as the necessary water-quality based limitations, where numeric water quality based effluent limitations are determined to be unnecessary or infeasible". As such, these action levels are not considered numeric water quality-based effluent limitations.

It should be noted that a purpose of monitoring, required under this and previous Orders, is to aid in the evaluation of implemented programs and BMPs in reducing pollutants in storm water discharges to the MEP. The tentative Monitoring and Reporting Program states:

This Receiving Waters and Runoff Monitoring and Reporting Program is intended to meet the following goals:

2. Measure and improve the effectiveness of the Permittees’ runoff management programs;
3. Assess the chemical, physical, and biological impacts to receiving waters resulting from runoff discharges;
4. Characterize runoff discharges;
5. Identify sources of specific pollutants;
6. Prioritize drainage and sub-drainage areas that need management actions; and

9. Provide information to implement required BMP improvements.

For the past 4 permit cycles (19 years), Copermittees have utilized non-numerical limitations (BMPs) to control and abate the discharge of any pollutants in storm water discharges to the MEP. Copermittees have been accorded 19 years to research, develop, and deploy BMPs that are capable of reducing storm water discharges from the MS4 to levels represented in SALs. Storm Water Action Levels are set at such a level that any exceedance of a SAL will clearly indicate BMPs being implemented are insufficient to protect the Beneficial Uses of waters of the State. Copermittee shall utilize the exceedance information as a high priority consideration when adjusting and executing annual work plans, as required by this Permit. Failure to appropriately consider and react to SAL exceedances in an iterative manner creates a presumption that the Copermittee(s) have not complied to the MEP.

SALs have been developed utilizing Phase I storm water effluent data (updated February 2008, http://rpitt.eng.ua.edu/Research/ms4/mainms4.shtml) from the arid west region (USEPA Rain Zone 6). USEPA Rainfall Zone 6, which includes MS4 effluent data from Orange, San Diego, Los Angeles and Ventura County. While the County of Orange has a large monitoring data set, Regional Board staff have concluded that there is a lack of effluent monitoring from major outfalls that are representative of conditions throughout the Region. The approach taken to derive SALs is a straightforward percentile approach, with the SAL being set as the 90th percentile of the dataset for each constituent. This approach is consistent with the 2006 State Board Panel Report:

> "The statistically based population approach would once again rely on the average distribution of measured water quality values developed from many water quality samples taken for many events at many locations. In this case, however, the Action Level would be defined by the central tendency and variance estimates from the population data. For example, the Action Level could be set as two standard deviations above the mean, i.e. if measured concentrations are consistently higher than two standard deviations above the mean, an Action Level would be triggered. Other population based measures of central tendency could be used (i.e. geomean, median, etc.) or estimates of variance (i.e. prediction intervals, etc.). Regardless of which population based estimators are used (or percentile from above), the idea would be to identify the [statistically derived] point at which managers feel concentrations are significantly beyond the norm."

SALs are a measurable criteria which quantifies the performance of BMPs for a particular watershed or subwatershed that discharges storm water MS4 effluent from that particular discharge point. Thus, Copermittees can utilize SAL results to determine the effectiveness BMPs on the effluent from a particular area of the MS4.

SALs represent the lowest 10 percent of pollutant reduction for USEPA Rain Zone 6 MS4 Phase I programs discharging to waters of the United States. For the past 4

permit cycles (19 years), Copermittees have utilized non-numerical limitations (BMPs) to control and abate the discharge of any pollutants in storm water discharges to the MEP. Copermittees have been accorded 19 years to research, develop, and deploy BMPs that are capable of reducing storm water discharges from the MS4 to levels represented in SALs. Storm Water Action Levels are set at such a level that any exceedance of a SAL will indicate to the Copermittee(s) that the discharge is within the lowest 10% of monitored outfalls. Therefore, an exceedance of a SAL warrants priority consideration within the Copermittee iterative process.

Finding D.2.a. The Standard Storm Water Mitigation Plan (SSMP) requirements contained in this Order are consistent with Order WQ-2000-11 adopted by the State Water Resources Control Board (State Board) on October 5, 2000. In the precedential order, the State Board found that the design standards, which essentially require that runoff generated by 85 percent of storm events from specific development categories be infiltrated or treated, reflect the MEP standard. The order also found that the SSMP requirements are appropriately applied to the majority of the Priority Development Project categories contained in Section D.1 of this Order. The State Board also gave Regional Water Quality Control Boards the needed discretion to include additional categories and locations, such as retail gasoline outlets (RGOs), in SSMPs.

Discussion of Finding D.2.a. The post-construction requirements and design standards contained in the SSMP section of Order No. R9-2009-0002 constitute MEP consistent with State Board guidance, court decisions, and Regional Board requirements. The State Board and Regional Boards have made several recent decisions in regards to inclusion of SSMP requirements in MS4 permits. In a precedential decision, State Board WQ Order No. 2000-11, the State Board found that the SSMP provisions constitute MEP for addressing storm water pollutant discharges resulting from Priority Development Projects. The provisions of the SSMP section of the Order are also consistent with those previously issued by the Regional Board for Orange County (Order No. R9-2002-0001) and San Diego County (Order Nos. R9-2001-01 and R9-2007-0001), as well as requirements in the Los Angeles County MS4 permit (Order No. R4-2001-182). In State Board Order WQ 2001-15, the State Board reaffirmed that SSMP requirements constitute MEP. Moreover, the SSMP requirements of the San Diego County MS4 permit (Order No. R9-2001-01) were upheld when the California State Supreme Court declined to hear the matter on appeal.

Finding D.2.b. Controlling runoff pollution by using a combination of onsite source control and site design BMPs augmented with treatment control BMPs before the runoff enters the MS4 is important for the following reasons: (1) Many end-of-pipe BMPs (such as diversion to the sanitary sewer) are typically ineffective during significant storm events. Whereas, onsite source control BMPs can be applied during all runoff conditions; (2) End-of-pipe BMPs are often incapable of capturing and treating the wide range of pollutants which can be generated on a sub-watershed scale; (3) End-of-pipe BMPs are more effective when used as polishing BMPs, rather than the sole BMP to be implemented; (4) End-of-pipe BMPs do not protect the quality or beneficial uses of receiving waters between the pollutant source and the BMP; and (5) Offsite end-of-pipe BMPs do not aid in the effort to educate the public regarding sources of pollution and their prevention.

Discussion of Finding D.2.b. Many end-of-pipe BMPs are designed for low flow conditions because their end-of-pipe location prevents them from being designed for large storm events. This results in the end-of-pipe BMPs being overwhelmed, bypassed, or ineffective during larger storm events more frequently than onsite BMPs designed for larger storms. BMPs are also frequently most effective for a particular type of pollutant (such as sediment). Such BMPs may be appropriate for small sites with a limited suite of pollutants generated; however, end-of-pipe BMPs must typically be able to address a wide range of pollutants generated by a sub-watershed, limiting their effectiveness and/or increasing costs. Moreover, the location of some end-of-pipe BMPs allow for untreated pollutants to be discharged to and degrade receiving waters prior to their reaching the BMPs. This fails to protect receiving waters, which is the purpose of BMP implementation. In addition, opportunities to educate the public regarding runoff pollution can be lost when end-of-pipe BMPs are located away from pollutant sources and out of sight. Onsite BMPs can lead to a better public understanding of runoff issues since their presence can provide a visible and/or tangible lesson in pollution prevention.

Finding D.2.c. Use of Low-Impact Development (LID) site design BMPs at new development, redevelopment and retrofit projects can be an effective means for minimizing the impact of storm water runoff discharges from the development projects on receiving waters. LID is a site design strategy with a goal of maintaining or replicating the pre-development hydrologic regime through the use of design techniques. LID site design BMPs help preserve and restore the natural hydrologic cycle of the site, allowing for filtration and infiltration which can greatly reduce the volume, peak flow rate, velocity, and pollutant loads of storm water runoff. Current runoff management, knowledge, practices and technology have resulted in the use of LID BMPs as an acceptable means of meeting the storm water MEP standard.

Discussion of Finding D.2.c. The Clean Water Act (CWA) is the cornerstone of surface water quality protection in the United States. (The Act does not deal directly with ground water nor with water quantity issues.) The statute employs a variety of regulatory and nonregulatory tools to sharply reduce direct pollutant discharges into

waterways, and manage polluted runoff. These tools are employed to achieve the broader goal of restoring and maintaining the chemical, physical, and biological integrity of the nation's waters so that they can support the protection and propagation of fish, shellfish, wildlife and recreation in and on the water.

Increasing the volume, velocity, frequency and discharge duration of storm water runoff from developed areas will eventually greatly accelerate downstream erosion, impair stream habitat in natural drainages, and negatively impact beneficial uses. Development and urbanization increase pollutant loads and volume while simultaneously increasing impervious area. Impervious surfaces can neither absorb water nor remove pollutants and thus lose the purification and infiltration provided by naturally vegetated soil. Furthermore, impervious surfaces tend to concentrate pollutants on the top of the surface that are then washed off into the MS4 and waters of the State in a concentrated manner. The use of Low-Impact Development (LID) site design BMPs can be an effective means of minimizing the impact of runoff discharges on receiving waters. By reducing water pollution, reducing runoff and increasing groundwater recharge, LID helps to improve the quality of receiving surface waters, stabilize the flow rates of receiving waters (preventing downstream hydromodification), reduce downstream flooding and protect and enhance water supply sources. Current runoff management, knowledge, practice and technology has resulted in the use of LID BMPs as an acceptable means of meeting the MEP standard for storm water treatment.

Current municipal codes may oppose or hinder the design, use and implementation of specific elements of LID. These codes include, but are not limited to, emergency services access requirements, building landscape ordinances, building height limits and parking space requirements. It is essential for Copermittees to work with other responsible agencies and/or update codes that have the potential to impact the use of LID.

The Local Government Commission, a non-profit organization working to build livable communities, developed a set of principles known as the *Ahwahnee Water Principles for Resource-Efficient Land Use*[118] that provide the opportunity to reduce costs and improve the reliability and quality of our water resources. Implementation of LID incorporates several of the Ahwahnee principles such as:

> 1. "Community Design should be compact, mixed use, walkable and transit-oriented so that urban runoff pollutants are minimized and the open lands that absorb water are preserved to the maximum extent possible."
> 3. "Water holding areas such as creek beds, recessed athletic fields, ponds, cisterns, and other features that serve to recharge groundwater, reduce runoff, improve water quality and decrease flooding should be incorporated into the urban landscape."

[118] Local Government Commission, "The Ahwahnee Water Principles – A Blueprint for Regional Sustainability", http://water.lgc.org/Members/tony/docs/lgc_water_guide.pdf

4. "All aspects of landscaping from the selection of plants to soil preparation and the installation of irrigation systems should be designed to reduce water demand, retain runoff, decrease flooding, and recharge groundwater."
5. "Permeable surfaces should be used for hardscape. Impervious surfaces such as driveways, streets, and parking lots should be minimized so that land is available to absorb storm water, reduce polluted urban runoff, recharge groundwater and reduce flooding."

The use of LID site design BMPs helps reduce the amount of impervious area associated with development and allows storm water to infiltrate into the soil. Natural vegetation and soil filters storm water runoff and reduces the volume and pollutant loads of storm water. Studies have revealed that the level of imperviousness resulting from development and urbanization is strongly correlated with the water quality impairment of nearby receiving waters.[119] In many cases, the impacts on receiving waters due to changes in hydrology can be more significant than those attributable to the contaminants found in storm water discharges.[120] These impacts include stream bank erosion (increased sediment load and subsequent deposition), benthic habitat degradation, and decreased diversity of macroinvertebrates. Although conventional BMPs do reduce storm water pollutant loads, they may not effectively control adverse effects from changes in the discharge hydrologic conditions.[121]

The Order includes requirements for developments to include site design BMPs that mimic or replicate the natural hydrologic cycle. Open space designs which maximize pervious surfaces and retention of "natural" drainages have been found to reduce both the costs of development and pollutant export.[122] Moreover, USEPA finds including plans for a "natural" site design and BMP implementation during the design phase of new development and redevelopment offers the most cost effective strategy to reduce storm water pollutant loads to surface waters.[123] In addition, a recent U.S. Department of Housing and Urban Development guidance document on low-impact development notes that the use of LID-based storm water management design allows land to be developed, but in a cost-effective manner that helps mitigate potential environmental impacts.[124]

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[119] USEPA, 1999. 40 CFR Parts 9, 122, 123, and 124 National Pollutant Discharge Elimination System – Regulations for Revision of the Water Pollution Control Program Addressing Storm Water Discharges; Final Rule.
[120] Ibid.
[121] USEPA, 2000. Low-Impact Development: A literature review. EPA-841-B-00-005. 35p.
[122] Center for Watershed Protection, 2000. "The Benefits of Better Site Design in Residential Subdivisions." Watershed Protection Techniques. Vol. 3. No. 2.
[123] USEPA, 1999. 40 CFR Parts 9, 122, 123, and 124 National Pollutant Discharge Elimination System – Regulations for Revision of the Water Pollution Control Program Addressing Storm Water Discharges; Final Rule.
[124] U.S. Department of Housing and Urban Development, Office of Policy Development and Research, 2003. "The Practice of Low Impact Development." Prepared by: NAHB Research Center, Inc. Upper Marlboro, Maryland. Contract No. H-21314CA. 131p.

Finding D.2.d. Retail Gasoline Outlets (RGOs) are significant sources of pollutants in storm water runoff. RGOs are points of convergence for motor vehicles for automotive related services such as repair, refueling, tire inflation, and radiator fill-up and consequently produce significantly higher loadings of hydrocarbons and trace metals (including copper and zinc) than other developed areas.

Discussion of Finding D.2.d. RGOs are included in the Order as a Priority Development Project category because RGOs produce significantly greater loadings of hydrocarbons and trace metals (including copper and zinc) than other developed areas. To meet the storm water MEP standard, source control and structural treatment BMPs are needed at RGOs that meet the following criteria: (a) 5,000 square feet or more or (b) an ADT of 100 or more vehicles per day. These are appropriate thresholds since vehicular development size and volume of traffic are good indicators of potential impacts of storm water runoff from RGOs on receiving waters.

This finding has been added to satisfy State Board WQ Order No. 2000-11's requirements for including RGOs as a Priority Development Category. Order No. 2000-11 acknowledged that a threshold (size, average daily traffic, etc.) appropriate to trigger SSMP requirements should be developed for RGOs and that specific findings regarding RGOs should be included in MS4 permits to justify the requirement.[125] Additional detail to support the inclusion of RGOs can be found in the Fact Sheet discussion of Section D.1.d.2.j.

Finding D.2.e. Industrial sites are significant sources of pollutants in runoff. Pollutant concentrations and loads in runoff from industrial sites are similar or exceed pollutant concentrations and loads in runoff from other land uses, such as commercial or residential land uses. As with other land uses, LID site design, source control, and treatment control BMPs are needed at industrial sites in order to meet the MEP standard. These BMPs are necessary where the industrial site is larger than 10,000 square feet. The 10,000 square feet threshold is appropriate, since it is consistent with requirements in other Phase I NPDES storm water regulations throughout California.

[125] State Board, 2000. Order WQ 2000-11. In the Matter of the Petitions of The Cities Of Bellflower, Et Al., The City Of Arcadia, And Western States Petroleum Association Review of January 26, 2000 Action of the Regional Board And Actions and Failures to Act by both the California Regional Water Quality Control Board, Los Angeles Region and Its Executive Officer Pursuant to Order No. 96-054, Permit for Municipal Storm Water and Urban Run-Off Discharges Within Los Angeles County [NPDES NO. CAS614001] SWRCB/OCC FILES A-1280, A-1280(a) and A-1280(b)

Discussion of Finding D.2.e. Industrial sites can be a significant source of pollutants in storm water runoff. In an extensive review of storm water literature, the LARWQCB found widespread support for the finding that "industrial and commercial activities can also be considered hot spots as sources of pollutants." It also found that "industrial and commercial areas were likely to be the most significant pollutant source areas" of heavy metals.[126] Likewise, storm water runoff from heavy industry in the Santa Clara Valley has been found to be extremely toxic.[127] These findings are corroborated by USEPA, which states in the preamble to the 1990 Phase I NPDES storm water regulations that "Because storm water from industrial facilities may be a major contributor of pollutants to municipal separate storm sewer systems, municipalities are obligated to develop controls for storm water discharges associated with industrial activity through their system in their storm water management program." Since heavy industrial sites can be a significant source of pollutants in runoff in a manner similar to other SSMP project categories such as commercial development or automotive repair shops, it is appropriate to include heavy industrial sites as a SSMP category in the Order.

The Phase I NPDES storm water regulations require the Copermittees to "control through ordinance, permit, contract, order, or similar means, the contribution of pollutants to the municipal storm sewer by storm water discharges associated with industrial activity and the quality of storm water discharged from sites of industrial activity" (40 CFR 122.26(d)(2)(i)). In addition, it has been established that the MEP standard for the control of storm water runoff from new development projects includes incorporation of the SSMP requirements. Since the Copermittees must both control storm water pollutants from industrial sites and meet the storm water MEP standard for new development, it is appropriate to apply the SSMP requirements to heavy industrial sites.

The State Board's Order WQ 2000-11 indicates that it is appropriate to apply SSMP requirements to categories of development where evidence shows the category of development can be a significant source of pollutants. As evidenced above, heavy industrial sites can be a significant source of pollutants. Therefore, the Order includes heavy industrial sites as a SSMP Priority Development Project category.

[126] Los Angeles Regional Water Quality Control Board. 2001.
[127] Schueler and Holland, 2000. Storm Water Strategies for Arid and Semi-Arid Watersheds (Article 66). The Practice of Watershed Protection.

Finding D.2.f. If not properly designed or maintained, certain BMPs implemented or required by municipalities for runoff management may create a habitat for vectors (e.g. mosquitoes and rodents). However, proper BMP design and maintenance to avoid standing water can prevent the creation of vector habitat. Nuisances and public health impacts resulting from vector breeding can be prevented with close collaboration and cooperative effort between municipalities, the Orange County Vector Control District, and the California Department of Public Health during the development and implementation of runoff management programs.

Discussion of Finding D.2.f. The implementation of certain structural BMPs or other runoff treatment systems can result in significant vector problems in the form of increased breeding or harborage habitat for mosquitoes, rodents or other potentially disease transmitting organisms. The implementation of BMPs that retain water may provide breeding habitat for a variety of mosquito species, some of which have the potential to transmit diseases such as Western Equine Encephalitis, St. Louis Encephalomyelitis, and malaria. Recent BMP implementation studies by Caltrans[128] in District 7 and District 11 have demonstrated mosquito breeding associated with some types of BMPs. The Caltrans BMP Retrofit Pilot study cited lack of maintenance and improper design as factors contributing to mosquito production. However, a Watershed Protection Techniques article describes management techniques for selecting, designing, and maintaining structural treatment BMPs to minimize mosquito production.[129] State and local runoff management programs that include structural BMPs with the potential to retain water have been implemented in Florida and the Chesapeake Bay region without resulting in significant public health threats from mosquitoes or other vectors.[130]

Finding D.2.g. The increased volume, velocity, frequency and discharge duration of storm water runoff from developed areas has the potential to greatly accelerate downstream erosion, impair stream habitat in natural drainages, and negatively impact beneficial uses. Development and urbanization increase pollutant loads in storm water runoff and the volume of storm water runoff. Impervious surfaces can neither absorb water nor remove pollutants and thus lose the purification and infiltration provided by natural vegetated soil. Hydromodification measures for discharges to hardened channels allow for the future restoration of the hardened channels to their natural state, thereby restoring the chemical, physical, and biological integrity and Beneficial Uses of local receiving waters.

[128] Caltrans, 2000. BMP Retrofit Pilot Studies: A Preliminary Assessment of Vector Production.
[129] Watershed Protection Techniques, 1995. Mosquitoes in Constructed Wetlands: A Management Bugaboo? 1(4):203-207.
[130] Shaver, E. and R. Baldwin , 1995. Sand Filter Design for Water Quality Treatment in Herricks, E., Ed. Stormwater Runoff and Receiving Systems: Impact, Monitoring, and Assessment, CRC Lewis Publishers, New York, NY.

Discussion of Finding D.2.g. Increasing the volume, velocity, frequency and discharge duration of storm water runoff from developed areas will eventually greatly accelerate downstream erosion, impair stream habitat in natural drainages, and negatively impact beneficial uses. Development and urbanization increase pollutant loads and volume while simultaneously increasing impervious area. Impervious surfaces can neither absorb water nor remove pollutants and thus lose the purification and infiltration provided by naturally vegetated soil.

Historic hydromodification impacts, such as concrete lining and channelization, have impacted the natural physical habitat of urban streams resulting in low Index of Biotic Integrity (IBI) scores. The Copermittee's 2006-2007 monitoring indicated decreased IBI scores in the developed watersheds. In the absence of water chemistry and toxicity impacts, these low scores were attributed to be a result of poor physical habitat conditions.[131]

Hydromodification impacts result in poor physical habitat conditions through streambed scour, erosion, vegetation displacement, sediment deposition, channelization and channel modifications. Increased sediment loads from hydromodification causes other impacts to physical habitats including increased turbidity which then may cause increased temperatures. In addition, an increased sediment load may have an increased biological content thereby increasing the sediment oxygen demand and lowering the dissolved oxygen available for aquatic life.[132]

The objective of the CWA is "to restore and maintain the chemical, *physical,* and biological integrity of the Nation's waters (emphasis added)." Stream restoration by removing concrete and other unnatural materials is a major step toward achieving that objective. The success of future stream restoration and stabilization is, however, dependent on preventing and reducing physical impacts from activities upstream. Therefore, hydromodification management measures are necessary upstream of modified (e.g. concrete, rip rap, etc.) channels in addition to non-modified channels.

Please see discussion of Findings C.10 and C.11.

[131] Orange County Copermittees, November 15, 2007. 2006-2007 Unified Annual Progress Report Program Effectiveness Assessment (San Diego Region).
[132] USEPA, National Management Measures to Control Nonpoint Source Pollution from Hydromodification, EPA 841-B-07-002, July 2007.

Finding D.3.a. In accordance with federal NPDES regulations and to ensure the most effective oversight of industrial and construction site discharges, discharges of runoff from industrial and construction sites are subject to dual (state and local) storm water regulation. Under this dual system, each Copermittee is responsible for enforcing its local permits, plans, and ordinances, and the Regional Board is responsible for enforcing the General Construction Activities Storm Water Permit, State Board Order 99-08 DWQ, NPDES No. CAS000002 (General Construction Permit) and the General Industrial Activities Storm Water Permit, State Board Order 97-03 DWQ, NPDES No. CAS000001 (General Industrial Permit). NPDES municipal regulations require that municipalities develop and implement measures to address runoff from industrial and construction activities. Those measures may require the implementation of additional BMPs than are required under the statewide general permits for activities subject to both state and local regulation.

Discussion of Finding D.3.a. USEPA finds the control of pollutant discharges from industry and construction so important to receiving water quality that it has established a double system of regulation over industrial and construction sites. This double system of regulation consists of two parallel regulatory systems with the same common objective: to keep pollutants from industrial and construction sites out of the MS4. In this double system of regulation for runoff from industrial and construction sites, local governments must enforce their legal authorities (i.e., local ordinances and permits) while the Regional Board must enforce its legal authority (i.e., statewide general industrial and construction storm water permits). These two regulatory systems are designed to complement and support each other. Municipalities are not required to enforce Regional Board and State Board permits; however, they are required to enforce their ordinances and permits. The Federal regulations are clear that municipalities have responsibility to prevent non-storm water and address storm water runoff from industrial and construction sites which enters their MS4s.

Municipalities have this responsibility because they have the authority to issue land use and development permits. Since municipalities are the lead permitting authority for industrial land use and construction activities, they are also the lead for enforcement regarding runoff discharges from these sites. For sites where the municipality is the lead permitting authority, the Regional Board will work with the municipality and provide support where needed. The Regional Board will assist municipalities in enforcement against non-compliant sites after the municipality has exhibited a good faith effort to bring the site into compliance.

According to USEPA, the storm water regulations envision that NPDES permitting authorities and municipal operators will cooperate to develop programs to monitor and control pollutants in storm water discharges from industrial facilities.[133] USEPA discusses the "dual regulation" of construction sites in its Storm Water Phase II Compliance Assistance Guide, which states "Even though all construction sites that disturb more than one acre are covered nationally by an NPDES storm water permit, the construction site runoff control minimum measure […] is needed to induce more localized site regulation and enforcement efforts, and to enable operators […] to more effectively control construction site discharges into their MS4s."[134] While the Storm Water Phase II Compliance Assistance Guide applies to small municipalities, it is applicable to the Copermittees, because they are similar in size and have the potential to discharge similar pollutant types as Phase II municipalities.

Finding D.3.b. Identification of sources of pollutants in runoff (such as municipal areas and activities, industrial and commercial sites/sources, construction sites, and residential areas), development and implementation of BMPs to address those sources, and updating ordinances and approval processes are necessary for the Copermittees to ensure that discharges of pollutants from its MS4 in storm water are reduced to the MEP and that non-storm water discharges are not occurring. Inspections and other compliance verification methods are needed to ensure minimum BMPs are implemented. Inspections are especially important at high risk areas for pollutant discharges.

Discussion of Finding D.3.b. Source identification is necessary to characterize the nature and extent of pollutants in discharges and to develop appropriate BMPs. It is the first step in a targeted approach to runoff management. Source identification helps identify the location of potential sources of pollutants in runoff. Pollutants found to be present in receiving waters can then be traced to the sites which frequently generate such pollutants. In this manner source inventories can help to target inspections, monitoring, and potential enforcement. This allows for limited inspection, monitoring, and enforcement time to be most effective. USEPA supports source identification as a concept when it recommends construction, municipal, and industrial source identification in guidance and the federal regulations.[135,136]

[133] USEPA, 1992. Guidance Manual for the Preparation of Part II of the NPDES Permit Applications for Discharges from Municipal Separate Storm Sewer Systems. EPA 833-B-92-002.
[134] USEPA, 2000. Storm Water Phase II Compliance Assistance Guide. EPA 833-R-00-002.
[135] USEPA, 1992. Guidance Manual for the Preparation of Part II of the NPDES Permit Applications for Discharges from Municipal Separate Storm Sewer Systems. EPA 833-B-92-002.
[136] 40 CFR 122.26(d)(2)(ii)

The development of BMPs for identified sources will help ensure that appropriate, consistent controls are implemented at all types of development and areas. Copermittees must reduce the discharge of pollutants in storm water runoff to the maximum extent practicable. To achieve this level of pollutant reduction, BMPs must be implemented. Designation of minimum BMPs helps ensure that appropriate BMPs are implemented for various sources. These minimum BMPs also serve as guidance as to the level of water quality protection required. USEPA requires development and implementation of BMPs for construction, municipal, commercial, industrial, and residential sources at 40 CFR 122.26(d)(2)(iv)(A-D).

Updating ordinances and approval processes is necessary in order for the Copermittees to control discharges to their MS4s. USEPA supports updating ordinances and approval processes when it states "A crucial requirement of the NPDES storm water regulation is that a municipality must demonstrate that it has adequate legal authority to control the contribution of pollutants in storm water discharged to its MS4. […] In order to have an effective municipal storm water management program, a municipality must have adequate legal authority to control the contribution of pollutants to the MS4. […] 'Control,' in this context, means not only to require disclosure of information, but also to limit, discourage, or terminate a storm water discharge to the MS4."[137]

Inspections provide a necessary means for the Copermittees to evaluate compliance of pollutant sources with their municipal ordinances and minimum BMP requirements. USEPA supports inspections when it recommends inspections of construction, municipal, and industrial sources.[138] Inspection of high risk sources are especially important because of the ability of frequent inspections to help ensure compliance, thereby reducing the risk associated with such sources. USEPA suggests that inspections can improve compliance when it states "Effective inspection and enforcement requires […] penalties to deter infractions and intervention by the municipal authority to correct violations."[139]

Finding D.3.c. Historic and current development makes use of natural drainage patterns and features as conveyances for runoff. Urban streams used in this manner are part of the municipalities MS4 regardless of whether they are natural, anthropogenic, or partially modified features. In these cases, the urban stream is both an MS4 and receiving water.

[137] USEPA, 1992. Guidance Manual for the Preparation of Part II of the NPDES Permit Applications for Discharges from Municipal Separate Storm Sewer Systems. EPA 833-B-92-002.
[138] Ibid.
[139] USEPA, 1992. Guidance Manual for the Preparation of Part II of the NPDES Permit Applications for Discharges from Municipal Separate Storm Sewer Systems. EPA 833-B-92-002.

Discussion of Finding D.3.c. An MS4 is defined in the federal regulations as a conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, or storm drains), owned or operated by a Copermittee, and designed or used for collecting or conveying runoff.[140] Natural drainage patterns and urban streams are frequently used by municipalities to collect and convey runoff away from development within their jurisdiction. Therefore, the Regional Board considers natural drainages that are used for conveyances of runoff, regardless of whether or not they've been altered by the municipality, as both part of the MS4s and as receiving waters. To clarify, an unaltered natural drainage, which receives runoff from a point source (channeled by a Copermittee to drain an area within their jurisdiction), which then conveys the runoff to an altered natural drainage or a man-made MS4, is both an MS4 and a receiving water.[141]

Finding D.3.d. As operators of the MS4s, the Copermittees cannot passively receive and discharge pollutants from third parties. By providing free and open access to an MS4 that conveys discharges to waters of the U.S., the operator essentially accepts responsibility for discharges into the MS4 that it does not prohibit or control. These discharges may cause or contribute to a condition of contamination or a violation of water quality standards.

[140] USEPA, 2000. EPA Administered Permit Programs: The National Pollutant Discharge Elimination System. Code of Federal Regulations, Vol. 40, Part 122.
[141] Regional Board, 2001. Response in Opposition to Petitions for Review of California Regional Water Quality Control Board San Diego Region Order No. 2001-01 – NPDES Permit No. CAS0108758 (San Diego Municipal Storm Water Permit).

Discussion of Finding D.3.d. CWA section 402(p) requires operators of MS4s to prohibit non-storm water discharges into their MS4s. This is necessary because pollutants which enter the MS4 generally are conveyed through the MS4 to be eventually discharged into receiving waters. If a municipality does not prohibit non-storm water discharges, it is providing the pathway (its MS4) which enables pollutants to reach receiving waters. Since the municipality's storm water management service can result in pollutant discharges to receiving waters, the municipality must accept responsibility for the water quality consequences resulting from this service. Furthermore, third party discharges can cause a municipality to be out of compliance with its permit. Since pollutants from third parties which enter the MS4 will eventually be discharged from the MS4 to receiving waters, the third party discharges can result in a situation of municipality non-compliance if the discharges lead to an exceedance of water quality standards. For these reasons, each Copermittee must prohibit and/or control discharges from third parties to its MS4. USEPA supports this concept when it states "the operators of regulated small MS4s cannot passively receive and discharge pollutants from third parties" and "the operator of a small MS4 that does not prohibit and/or control discharges into its system essentially accepts 'title' for those discharges. At a minimum, by providing free and open access to the MS4s that convey discharges to the waters of the United States, the municipal storm sewer system enables water quality impairment by third parties."[142]

Finding D.3.e. Waste and pollutants which are deposited and accumulate in MS4 drainage structures will be discharged from these structures to waters of the U.S. unless they are removed. These discharges may cause or contribute to, or threaten to cause or contribute to, a condition of pollution in receiving waters. For this reason, pollutant discharges from storm water into MS4s must be reduced using a combination of management measures, including source control, and an effective MS4 maintenance program must be implemented by each Copermittee.

Discussion of Finding D.3.e. When rain falls and drains freeways, industries, construction sites, and neighborhoods, it picks up a multitude of pollutants. Gravity flow transports the pollutants to the MS4. Illicit discharges and connections also can contribute a significant amount of pollutants to MS4s. MS4s are commonly designed to convey their contents as quickly as possible. Due to the resulting typically high flow rates within the concrete conveyance systems of MS4s, pollutants which enter or are deposited in the MS4 and not removed are generally flushed unimpeded through the MS4 to waters of the United States. Since treatment generally does not occur within the MS4, in such cases reduction of storm water pollutants to the MEP must occur prior to discharges entering the MS4.

[142] Federal Register / Vol. 64, No. 235 / Wednesday, December 8, 1999 / Rules and Regulations. P. 68765-68766.

The importance of this concept is supported by the tons of wastes/pollutants that have been removed from the Copermittees' MS4s as reported in their ROWD.[143] Moreover, these pollutants will be discharged into receiving waters unless an effective MS4 and structural treatment BMP maintenance program is implemented by the Copermittees. The requirement for Copermittees to conduct a MS4 maintenance program is specifically directed in both the Phase I and Phase II storm water regulations. Regarding MS4 cleaning, USEPA states "The removal of sediment, decaying debris, and highly polluted water from catch basins has aesthetic and water quality benefits, including reducing foul odors, reducing suspended solids, and reducing the load of oxygen-demanding substances that reach receiving waters."[144] It goes on to say, "Catch basin cleaning is an efficient and cost-effective method for preventing the transport of sediment and pollutants to receiving water bodies." USEPA also finds that "Lack of maintenance often limits the effectiveness of storm water structural controls such as detention/retention basins and infiltration devices. […] The proposed program should provide for maintenance logs and identify specific maintenance activities for each class of control, such as removing sediment from retention ponds every five years, cleaning catch basins annually, and removing litter from channels twice a year."[145]

Finding D.3.f. Enforcement of local runoff related ordinances, permits, and plans is an essential component of every runoff management program and is specifically required in the federal storm water regulations and this Order. Each Copermittee is individually responsible for adoption and enforcement of ordinances and/or policies, implementation of identified control measures/BMPs needed to prevent or reduce pollutants in storm water runoff, and for the allocation of funds for the capital, operation and maintenance, administrative, and enforcement expenditures necessary to implement and enforce such control measures/BMPs under its jurisdiction. Education is an important aspect of every effective runoff management program and the basis for changes in behavior at a societal level. Education of municipal planning, inspection, and maintenance department staffs is especially critical to ensure that in-house staffs understand how their activities impact water quality, how to accomplish their jobs while protecting water quality, and their specific roles and responsibilities for compliance with this Order. Public education, designed to target various urban land users and other audiences, is also essential to inform the public of how individual actions affect receiving water quality and how adverse effects can be minimized.

[143] Orange County Storm Water Copermittees. 2006. Report of Waste Discharge (San Diego Region).
[144] USEPA, 1999. Storm Water O&M Fact Sheet, Catch Basin Cleaning. EPA 832-F-99-011.
[145] USEPA, 1992. Guidance Manual for the Preparation of Part II of the NPDES Permit Applications for Discharges from Municipal Separate Storm Sewer Systems. EPA 833-B-92-002.

Discussion of Finding D.3.f. The Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(A – D) are clear in placing responsibility on municipalities for control of runoff from third party activities and land uses to their MS4.[146] In order for municipalities to assume this responsibility, they must implement ordinances, permits, and plans addressing runoff from third parties. Assessments for compliance with their ordinances, permits, and plans are essential for a municipality to ensure that third parties are not causing the municipality to be in violation of its municipal storm water permit. When conditions of non-compliance are determined, enforcement is necessary to ensure that violations of municipality ordinances and permits are corrected. When the Copermittees determine a violation of its storm water ordinance, it must pursue correction of the violation. Without enforcement, third parties do not have incentive to correct violations. USEPA supports enforcement by municipalities when it states "Effective inspection and enforcement requires […] penalties to deter infractions and intervention by the municipal authority to correct violations. Enforcement mechanisms […] also must be described."[147]

Education is a critical BMP and an important aspect of runoff management programs. USEPA finds that "An informed and knowledgeable community is critical to the success of a storm water management program since it helps ensure the following: Greater support for the program as the public gains a greater understanding of the reasons why it is necessary and important, [and] greater compliance with the program as the public becomes aware of the personal responsibilities expected of them and others in the community, including the individual actions they can take to protect or improve the quality of area waters."[148]

Regarding target audiences, USEPA also states "The public education program should use a mix of appropriate local strategies to address the viewpoints and concerns of a variety of audiences and communities, including minority and disadvantaged communities, as well as children."

Finding D.3.g. Public participation during the development of runoff management programs is necessary to ensure that all stakeholder interests and a variety of creative solutions are considered.

Discussion of Finding D.3.g.
This finding is supported by the Phase II Storm Water Regulations, which state "early and frequent public involvement can shorten implementation schedules and broaden public support for a program." USEPA goes on to explain, "Public participation is likely to ensure a more successful storm water program by providing valuable expertise and a conduit to other programs and governments."[149]

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[146] USEPA, 2000. EPA Administered Permit Programs: The National Pollutant Discharge Elimination System. Code of Federal Regulations, Vol. 40, Part 122.
[147] USEPA, 1992. Guidance Manual for the Preparation of Part II of the NPDES Permit Applications for Discharges from Municipal Separate Storm Sewer Systems. EPA/833-B-92-002.
[148] USEPA, 2000. Storm Water Phase II Compliance Assistance Guide. EPA 833-R-00-002.
[149] Federal Register / Vol. 64, No. 235 / Wednesday, December 8, 1999 / Rules and Regulations. P. 68755.

Finding D.3.h. Retrofitting existing development with storm water treatment controls including LID, is necessary to address storm water discharges from existing development that may cause or contribute to a condition of pollution or a violation of water quality standards. Although SSMP BMPs are required for redevelopment, the current rate of redevelopment will not address water quality problems in a timely manner. Cooperation with private landowners is necessary to effectively identify, implement and maintain retrofit projects for the preservation, restoration, and enhancement of water quality.

Discussion of Finding D.3.h. Existing BMPs are not sufficient to protect the Beneficial Uses of receiving waters from storm water MS4 discharges, as evidenced by 303(d) listings and exceedances of Water Quality Objectives from the Copermittees monitoring reports. Implementing more advanced BMPs, including the retrofitting of existing development with LID, is part of the iterative process. Based on the current rate of redevelopment compared to existing BMPs, the use of LID only on new and redevelopment will not adequately address current water quality problems, including downstream hydromodification. Retrofitting existing development is practicable for a municipality through a systematic evaluation, prioritization and implementation plan focused on impaired water bodies, pollutants of concern, areas of downstream hydromodification, feasibility and effective communication and cooperation with private property owners.

Finding D.4.a. Since runoff within a watershed can flow from and through multiple land uses and political jurisdictions, watershed-based runoff management can greatly enhance the protection of receiving waters. Such management provides a means to focus on the most important water quality problems in each watershed. By focusing on the most important water quality problems, watershed efforts can maximize protection of beneficial use in an efficient manner. Effective watershed-based runoff management actively reduces pollutant discharges and abates pollutant sources causing or contributing to watershed water quality problems. Watershed-based runoff management that does not actively reduce pollutant discharges and abate pollutant sources causing or contributing to watershed water quality problems can necessitate implementation of the iterative process outlined in section A.3 of the Tentative Order. Watershed management of runoff does not require Copermittees to expend resources outside of their jurisdictions. Watershed management requires the Copermittees within a watershed to develop a watershed-based management strategy, which can then be implemented on a jurisdictional basis.

Discussion of Finding D.4.a. In recent years, addressing water quality issues from a watershed perspective has increasingly gained attention. Regarding watershed-based permitting, the USEPA *Watershed-Based NPDES Permitting Policy Statement* issued on Jan. 7, 2004 states the following:

> USEPA continues to support a holistic watershed approach to water quality management. The process for developing and issuing NPDES permits on a watershed basis is an important tool in water quality management. USEPA believes that developing and issuing NPDES permits on a watershed basis can benefit all watershed stakeholders, from the NPDES permitting authority to local community members. A watershed-based approach to point source permitting under the NPDES program may serve as one innovative tool for achieving new efficiencies and environmental results. USEPA believes that watershed-based permitting can:
>
> - Lead to more environmentally effective results;
> - Emphasize measuring the effectiveness of targeted actions on improvements in water quality;
> - Provide greater opportunities for trading and other market based approaches;
> - Reduce the cost of improving the quality of the nation's waters;
> - Foster more effective implementation of watershed plans, including total maximum daily loads (TMDLs); and
> - Realize other ancillary benefits beyond those that have been achieved under the CWA (e.g., facilitate program integration including integration of clean water act and safe drinking water act programs).
>
> Watershed-based permitting is a process that ultimately produces NPDES permits that are issued to point sources on a geographic or watershed basis. In establishing point source controls in a watershed-based permit, the permitting authority may focus on watershed goals, and consider multiple pollutant sources and stressors, including the level of nonpoint source control that is practicable. In general, there are numerous permitting mechanisms that may be used to develop and issue permits within a watershed approach.

This USEPA guidance is in line with State Board and Regional Board watershed management goals. For example, the State Board's TAC recommends watershed-based water quality protection, stating "Municipal permits should have watershed specific components." The TAC further recommends that "All NPDES permits and Waste Discharge Requirements should be considered for reissuance on a watershed basis."

In addition, the Basin Plan states that "public agencies and private organizations concerned with water resources have come to recognize that a comprehensive evaluation of pollutant contributions on a watershed scale is the only way to realistically assess cumulative impacts and formulate workable strategies to truly protect our water resources. Both water pollution and habitat degradation problems can best be solved by following a basin-wide approach."

In light of USEPA's policy statement and the State Board's and Regional Board's watershed management goals, the Regional Board seeks to expand watershed management in the regulation of runoff from the MS4. Watershed-based MS4 permits can provide for more effective receiving water quality protection by focusing on specific water quality problems. The entire watershed for the receiving water can be assessed, allowing for critical areas and practices to be targeted for corrective actions. Known sources of pollutants of concern can be investigated for potential water quality impacts. Problem areas can then be addressed, leading to eventual improvements in receiving water quality. Management of runoff on a watershed basis allows for specific water quality problems to be targeted so that efforts result in maximized water quality improvements.[150]

Finding D.4.b. Some runoff issues, such as general education and training, can be effectively addressed on a regional basis. Regional approaches to runoff management can improve program consistency and promote sharing of resources, which can result in implementation of more efficient programs.

Discussion of Finding D.4.b. Copermittees in Orange County participate in several runoff-related activities whose scope extends beyond the area subject to this Order. These include countywide activities (e.g., portions of Orange County fall under the jurisdiction of the Santa Ana Regional Board), southern California, and statewide activities. Copermittees' participation in these regional activities is generally directed at improving management capability, preventing redundancy and taking advantage of economies of scale. For instance, Copermittees seek to develop consistency between watershed and/or jurisdictional programs (e.g., through standards development), and to collaborate on certain program activities such as education, training, and monitoring. The Copermittees report agreeing that jurisdictional, watershed, and regional programs cannot be effectively developed and implemented in isolation. In addition, the Copermittees, through WRMP implementation efforts, have learned that many watershed activities can be more effectively implemented (e.g., achieve more water quality benefits) at the regional level due to economies of scale and agree watershed protection should be increasingly emphasized as a focal point of Copermittee efforts under the re-issued Permit.[151]

Finding D.4.c. It is important for the Copermittees to coordinate their water quality protection and land use planning activities to achieve the greatest protection of receiving water bodies. Copermittee coordination with other watershed stakeholders, especially Caltrans, the Department of Defense, and water and sewer districts, is also important.

[150] Regional Board, 2004. San Diego County Municipal Storm Water Permit Reissuance Analysis Summary. P. 1.

[151] Orange County Storm Water Copermittees. 2006. Report of Waste Discharge (San Diego Region).

Discussion of Finding D.4.c. Conventional planning and zoning can be limited in their ability to protect the environmental quality of creeks, rivers, and other waterbodies. Watershed-based planning is often ignored, despite the fact that receiving waters unite land by collecting runoff from throughout the watershed. Since watersheds unite land, they can be used as an effective basis for planning. Watershed-based planning enables local and regional areas to realize economic, social, and other benefits associated with growth, while conserving the resources needed to sustain such growth, including water quality.

This type of planning can involve four steps: (1) Identify the watersheds shared by the participating jurisdictions; (2) Identify, assess, and prioritize the natural, social, and other resources in the watersheds; (3) Prioritize areas for growth, protection, and conservation, based on prioritized resources; and (4) Develop plans and regulations to guide growth and protect resources. Local governments have started with simple, yet effective, steps toward watershed planning, such as adopting a watershed-based planning approach, articulating the basic strategy in their General Plans, and beginning to pursue the basic strategy in collaboration with neighboring local governments who share the watersheds. Examples of new mechanisms created to facilitate watershed-based planning and zoning include the San Francisquito Creek Watershed Coordinated Resource Management Process and the Santa Clara Basin Watershed Management Initiative.[152]

[152] Bay Area Stormwater Management Agencies Association., 1999. Start at the Source. Forbes Custom Publishing. Available on-line at: http://www.scvurppp-w2k.com/basmaa_satsm.htm

E. Statute and Regulatory Considerations

Finding E.1. The Receiving Water Limitations (RWL) language specified in this Order is consistent with language recommended by the USEPA and established in State Board Water Quality Order 99-05, *Own Motion Review of the Petition of Environmental Health Coalition to Review Waste Discharge Requirements Order No. 96-03, NPDES Permit No. CAS0108740*, adopted by the State Board on June 17, 1999. The RWL in this Order require compliance with water quality standards, which for storm water discharges is to be achieved through an iterative approach requiring the implementation of improved and better-tailored BMPs over time. Compliance with receiving water limitations based on applicable water quality standards is necessary to ensure that MS4 discharges will not cause or contribute to violations of water quality standards and the creation of conditions of pollution.

Discussion of Finding E.1. The RWLs in the Order require storm water compliance with water quality standards through an iterative approach for implementing improved and better-tailored BMPs over time. The iterative BMP process requires the implementation of increasingly stringent BMPs until receiving water standards are achieved. This is necessary because implementation of BMPs alone cannot ensure attainment of receiving water quality standards. For example, a BMP that is effective in one situation may not be applicable in another. An iterative process of BMP development, implementation, and assessment is needed to promote consistent compliance with receiving water quality objectives. If assessment of a given BMP confirms that the BMP is ineffective, the iterative process should be restarted, with redevelopment of a new BMP that is anticipated to result in compliance with receiving water quality objectives.

The issue of whether storm water discharges from MS4s must meet water quality standards has been intensely debated in past years. The argument arises because CWA section 402(p) fails to clearly state that municipal dischargers of storm water must meet water quality standards. On the issue of industrial discharges of storm water, the statute clearly indicates that industrial dischargers must meet both (1) the technology-based standard of “best available technology economically achievable (BAT)” and (2) applicable water quality standards. On the issue of municipal discharges however, the statute states that municipal dischargers must meet (1) the technology-based standard of MEP” and (2) “such other provisions that the Administrator or the State determines appropriate for the control of such pollutants.” The statute fails, however, to specifically state that municipal dischargers must meet water quality standards.

As a result, the municipal storm water dischargers have argued that they do not have to meet water quality standards; and that they only are required to meet MEP for storm water. Environmental interest groups maintain that not only do MS4 discharges have to meet water quality standards, but that MS4 permits must also comply with numeric effluent limitations for the purpose of meeting water quality standards. On the issue of water quality standards, USEPA, the State Board, and the Regional Board have consistently maintained that MS4s must indeed comply with water quality standards. On the issue of whether water quality standards must be met by numeric effluent limitations, USEPA, the State Board (in Orders WQ 91-03 and WQ 91-04), and the Regional Board have maintained that MS4 permits can contain narrative requirements for the implementation of BMPs in place of numeric effluent limitations for storm water discharges.[153]

In addition to relying on USEPA's legal opinion concluding that MS4s must meet MEP for storm water and water quality standards, the State Board also relied on the CWA's explicit authority for States to require "such other provisions that the Administrator or the State determines appropriate for the control of such pollutants" in addition to the technology-based standard of MEP for storm water discharges. To further support its conclusions that MS4 permit dischargers must meet water quality standards, the State Board relied on provisions of the CWC that specify that all waste discharge requirements must implement applicable Basin Plans and take into consideration the appropriate water quality objectives for the protection of beneficial uses.

The State Board first formally concluded that permits for MS4s must contain effluent limitations based on water quality standards in its Order WQ 91-03. In that Order, the State Board also concluded that it was appropriate for Regional Boards to achieve this result by requiring best management practices, rather than by inserting numeric effluent limitations into MS4 permits. Later, in Order WQ 98-01, the State Board prescribed specific precedent setting Receiving Water Limitations language to be included in all future MS4 permits. This language specifically requires that MS4 dischargers meet water quality standards and allows for the use of narrative BMPs (increasing in stringency and implemented in an iterative process) as the mechanism by which water quality standards can be met for storm water discharges.

In Order WQ 99-05, the State Board modified its receiving water limitations language in Order WQ 98-01 to meet specific objections by USEPA (the modifications resulted in stricter compliance with water quality standards). State Board Order WQ 99-05 states:

[153] For the most recent assessment, see Storm Water Panel Recommendations to the California State Water Resources Control Board, 2006. *The Feasibility of Numeric Effluent Limits Applicable to Discharges of Storm Water Associated with Municipal, Industrial, and Construction Activities.*

> "In Order WQ 98-01, the State Board ordered that certain receiving water limitation language be included in future municipal storm water permits. Following inclusion of that language in permits issued by the San Francisco Bay and San Diego Regional Boards for Vallejo and Riverside respectively, the USEPA objected to the permits. The USEPA objection was based on the receiving water limitation language. The USEPA has now issued those permits itself and has included receiving water limitation language it deems appropriate.
>
> In light of USEPA's objection to the receiving water limitation language in Order WQ 98-01 and its adoption of alternative language, the State Board is revising its instructions regarding receiving water limitation language for municipal storm water permits. It is hereby ordered that Order WQ 98-01 will be amended to remove the receiving water limitation language contained therein and to substitute the USEPA language. Based on the reasons stated here, and as a precedent decision, the following receiving water limitation language shall be included in future municipal storm water permits."

In the 1999 case involving MS4 permits issued by USEPA to several Arizona cities (*Defenders of Wildlife v. Browner*, 1999, 197 F. 3d 1035), the United States Court of Appeals for the Ninth Circuit upheld USEPA's requirement for MS4 dischargers to meet water quality standards, but it did so on the basis of USEPA's discretion rather than on the basis of strict compliance with the Clean Water Act. In other words, while holding that the Clean Water Act does not require all MS4 discharges to comply strictly with state water quality standards, the Court also held that USEPA has the authority to determine that ensuring strict compliance with state water quality standards is necessary to control pollutants. On the question of whether MS4 permits must contain numeric effluent limitations, the court upheld USEPA's use of iterative BMPs in place of numeric effluent limitations for storm water discharges.

On October 14, 1999, the State Board issued a legal opinion on the federal appellate decision and provided advice to the Regional Boards on how to proceed in the future. In the memorandum, the State Board concludes that the recent Ninth Circuit opinion upholds the discretion of USEPA and the State to (continue to) issue storm water permits to MS4s that require compliance with water quality standards through iterative BMPs. Moreover, the memorandum states that "[…] because most MS4 discharges enter impaired water bodies, there is a real need for permits to include stringent requirements to protect those water bodies. As TMDLs are developed, it is likely that MS4s will have to participate in pollutant load reductions, and the MS4 permits are the most effective vehicles for those reductions." In summary, the State Board found that the Regional Boards should continue to include the RWL established in State Board Order WQ 99-05 in all future permits.

The issue of the RWLs language was also central to BIA's (and others') appeal of Order No. 2001-01 (San Diego MS4 permit), which was used as a template for Order No. R9-2002-01. BIA contended that the storm water MEP standard was a ceiling on what could be required of the Copermittees in implementing their runoff management programs, and that Order No. 2001-01's receiving water limitations requirements exceeded that ceiling. In other words, BIA argued that the Copermittees could not be required to comply with receiving water limitations if they necessitated efforts which went beyond the MEP standard. Again, the courts upheld the Regional Board's discretion to require compliance with water quality standards in municipal storm water permits, without limitation. The Court of Appeal, Fourth Appellate District found that the Regional Board has "the authority to include a permit provision requiring compliance with water quality standards."[154] On further appeal by BIA, the California State Supreme Court declined to hear the matter.

While implementation of the iterative BMP process is a means to achieve compliance with water quality objectives for storm water MS4 discharges, it does not shield the discharger from enforcement actions for continued non-compliance with water quality standards. Consistent with USEPA guidance,[155] regardless of whether or not an iterative process is being implemented, discharges that cause or contribute to a violation of water quality standards are in violation of Order No. R9-2008-0001.

Finding E.2. The Water Quality Control Plan for the San Diego Basin (Basin Plan), identifies the following beneficial uses for surface waters in Orange County: Municipal and Domestic Supply (MUN)[156], Agricultural Supply (AGR), Industrial Process Supply (PROC), Industrial Service Supply (IND), Ground Water Recharge (GWR), Contact Water Recreation (REC1) Non-contact Water Recreation (REC2), Warm Freshwater Habitat (WARM), Cold Freshwater Habitat (COLD), Wildlife Habitat (WILD), Rare, Threatened, or Endangered Species (RARE), Freshwater Replenishment (FRSH), Hydropower Generation (POW), and Preservation of Biological Habitats of Special Significance (BIOL). The following additional beneficial uses are identified for coastal waters of Orange County: Navigation (NAV), Commercial and Sport Fishing (COMM), Estuarine Habitat (EST), Marine Habitat (MAR), Aquaculture (AQUA), Migration of Aquatic Organisms (MIGR), Spawning, Reproduction, and/or Early Development (SPWN), and Shellfish Harvesting (SHELL).

[154] Building Industry Association et al., v. State Water Resources Control Board, et al. 2004.
[155] USEPA, 1998. Jan. 21, 1998 correspondence, "State Board/OCC File A-1041 for Orange County," from Alexis Strauss to Walt Petit, and March 17, 1998 correspondence from Alexis Strauss to Walt Petit.
[156] Subject to exceptions under the "Sources of Drinking Waters" Policy (Resolution No. 89-33)

Discussion of Finding E.2. The southern portion of Orange County is within the San Diego Region. The Orange County portion of the San Diego Region falls within and comprises the majority of the San Juan Hydrologic Unit. Major streams within the Orange County watersheds include San Juan Creek, Trabuco Creek, and San Mateo Creek. Other surface water bodies include Aliso Creek, Prima Deshecha Canada, Segunda Deshecha Canada, Oso Creek, Salt Creek, Laguna Canyon Channel, Canada Gobernadora, and Bell Canyon. Several small canyon streams drain directly to the Ocean. Major inland waterbodies include Oso Reservoir, El Toro Reservoir, and Sulphur Creek Reservoir.

The Orange County watersheds include unincorporated portions of Orange County, the Cities of Aliso Viejo, Dana Point, Laguna Beach, Laguna Hills, Laguna Niguel, Laguna Woods, Lake Forest, Mission Viejo, Rancho Santa Margarita, San Clemente, and San Juan Capistrano. The uppermost portions of the San Mateo, San Juan, Trabuco, and Aliso Creek watersheds are within the Cleveland National Forests.

Approximately 500,000 people reside within the permitted area. This estimate is based on the 2000 census, which does not represent exact numbers because three municipalities (County of Orange and the Cities of Laguna Hills and Lake Forest) lie within both the San Diego Region and the Santa Ana Region. In addition, new developments have increased the housing stock of the area since the 2000 census. This includes the master planned developments of Ladera Ranch in the San Juan Creek watershed and Talega in the San Clemente Coastal and San Mateo Creek watersheds.

Finding E.3. This Order is in conformance with State Board Resolution No. 68-16, *Statement of Policy with Respect to Maintaining High Quality Waters in California*, and the federal Antidegradation Policy described in 40 CFR 131.12.

Discussion of Finding E.3. Runoff management programs are required to be designed to reduce pollutants in storm water MS4 discharges to the maximum extent practicable and achieve compliance with water quality standards. Therefore, implementation of runoff management programs, which satisfy the requirements of Order No. R9-2009-0002, will prevent violations of receiving water quality standards. The Basin Plan states that "Water quality objectives must […] conform to US EPA regulations covering antidegradation (40 CFR 131.12) and State Board Resolution 68-16, Statement of Policy with Respect to Maintaining High Quality of Waters in California." As a result, when water quality standards are met, USEPA and State Board antidegradation policy requirements are also met.

Finding E.4. Section 6217(g) of the Coastal Zone Act Reauthorization Amendments of 1990 (CZARA) requires coastal states with approved coastal zone management programs to address non-point pollution impacting or threatening coastal water quality. CZARA addresses five sources of non-point pollution: agriculture, silviculture, urban, marinas, and hydromodification. This NPDES permit addresses the management measures required for the urban category, with the exception of septic systems. The adoption and implementation of this NPDES permit relieves the Permittee from developing a non-point source plan, for the urban category, under CZARA. The Regional Board addresses septic systems through the administration of other programs.

Discussion of Finding E.4. Coastal states are required to develop programs to protect coastal waters from nonpoint source pollution, as mandated by the federal CZARA. CZARA Section 6217 identifies polluted runoff as a significant factor in coastal water degradation, and requires implementation of management measures and enforceable policies to restore and protect coastal waters. In lieu of developing a separate NPS program for the coastal zone, California's NPS Pollution Control Program was updated in 2000 to address the requirements of both the CWA section 319 and the CZARA section 6217 on a statewide basis. The California Coastal Commission (CCC), the State Board, and the nine Regional Water Quality Control Boards are the lead State agencies for upgrading the program, although 20 other State agencies also participate. Pursuant to the CZARA (6217(g) Guidance Document the development of runoff management programs pursuant to this NPDES permit fulfills the need for coastal cities to develop an runoff non-point source plan identified in the State's Non-point Source Program Strategy and Implementation Plan.[157]

Finding E.5. Section 303(d)(1)(A) of the CWA requires that "Each state shall identify those waters within its boundaries for which the effluent limitations…are not stringent enough to implement any water quality standard (WQS) applicable to such waters." The CWA also requires states to establish a priority ranking of impaired waterbodies known as Water Quality Limited Segments and to establish Total Maximum Daily Loads (TMDLs) for such waters. This priority list of impaired waterbodies is called the Section 303(d) List. The current Section 303(d) List was approved by the State Board on February 4, 2003 and on July 25, 2003 by USEPA. The List was recently updated by the State Board on October 25, 2006. On June 28, 2007 the 2006 303(d) list for California was given final approval by the United States Environmental Protection Agency (USEPA).

[157] State Board/CCC, 2000. Nonpoint Source Program Strategy and Implementation Plan, 1998-2013 (PROSIP).

Discussion of Finding E.5. Section 303(d) of the federal CWA (CWA, 33 USC 1250, et seq., at 1313(d)), requires States to identify waters that do not meet water quality standards after applying certain required technology-based effluent limits ("impaired" water bodies). States are required to compile this information in a list and submit the list to USEPA for review and approval. This list is known as the Section 303(d) list of impaired waters. As part of this listing process, States are required to prioritize waters/watersheds for future development of TMDLs. The State Board and Regional Boards have ongoing efforts to monitor and assess water quality, to prepare the Section 303(d) list, to prioritize waters/watersheds for TMDL development and to subsequently develop TMDLs. TMDLs developed and adopted by the Regional Board are incorporated into the Basin Plan via a Basin Plan Amendment as authorized under section 13240 of the California Water Code. The 2006 California 303(d) List identifies impaired receiving water bodies and their watersheds within the State of California. Storm water and non-storm water runoff that is discharged from the Copermittees' MS4s is a leading cause of receiving water quality impairment in the San Diego Region.[158] TMDLs Project I and II for bacteria are considered priority development TMDLs due to impacts to REC 1 benefits due to impairment of waters for human contact recreation.

Finding E.6. This Order does not constitute an unfunded local government mandate subject to subvention under Article XIIIB, Section (6) of the California Constitution for several reasons, including, but not limited to, the following. First, this Order implements federally mandated requirements under federal Clean Water Act section 402. (33 U.S.C. § 1342(p)(3)(B).) Second, the local agency Copermittees' obligations under this Order are similar to, and in many respects less stringent than, the obligations of non-governmental and new dischargers who are issued NPDES permits for storm water and non-storm water discharges. Third, the local agency Copermittees have the authority to levy service charges, fees, or assessments sufficient to pay for compliance with this Order. Fourth, the Copermittees have requested permit coverage in lieu of compliance with the complete prohibition against the discharge of pollutants contained in federal Clean Water Act section 301, subdivision (a) (33 U.S.C. § 1311(a)) and in lieu of numeric restrictions on their storm water discharges. Fifth, the local agencies' responsibility for preventing discharges of waste that can create conditions of pollution or nuisance from conveyances that are within their ownership or control under State law predates the enactment of Article XIIIB, Section (6) of the California Constitution. Likewise, the provisions of this Order to implement total maximum daily loads (TMDLs) are federal mandates. The federal Clean Water Act requires TMDLs to be developed for water bodies that do not meet federal water quality standards. (33 U.S.C. sec. 1313(d).) Once the U.S. Environmental Protection Agency or a state develops a TMDL, federal law requires that permits must contain effluent limitations consistent with the assumptions of any applicable wasteload allocation. (40 C.F.R. sec. 122.44(d)(1)(vii)(B).)

[158] The approved 2006 Clean Water Act Section 303(d) List of Water Quality Limited Segments is on-line at: http://www.waterboards.ca.gov/tmdl/303d_lists2006.html.

Discussion of Finding E.6. This Order does not constitute an unfunded local government mandate subject to subvention under Article XIIIB, Section (6) of the California Constitution for several reasons, including, but not limited to, the following. First, this Order implements federally mandated requirements under federal Clean Water Act section 402, subdivision (p)(3)(B). (33 U.S.C. § 1342(p)(3)(B).) This includes federal requirements to effectively prohibit non-storm water discharges, to reduce the discharge of pollutants in storm water to the maximum extent practicable, and to include such other provisions as the Administrator or the State determines appropriate for the control of such pollutants. Federal cases have held these provisions require the development of permits and permit provisions on a case-by-case basis to satisfy federal requirements. (Natural Resources Defense Council, Inc. v. U.S. E.P.A. (9th Cir. 1992) 966 F.2d 1292, 1308, fn. 17.)

The authority exercised under this Order is not reserved state authority under the Clean Water Act's savings clause (cf. Burbank v. State Water Resources Control Bd. (2005) 35 Cal.4th 613, 627-628 [relying on 33 U.S.C. § 1370, which allows a state to develop requirements which are not "less stringent" than federal requirements]), but instead, is part of a federal mandate to develop pollutant reduction requirements for municipal separate storm sewer systems. To this extent, it is entirely federal authority that forms the legal basis to establish the permit provisions. (See, City of Rancho Cucamonga v. Regional Water Quality Control Bd.-Santa Ana Region (2006) 135 Cal.App.4th 1377, 1389; Building Industry Ass'n of San Diego County v. State Water Resources Control Bd. (2004) 124 Cal.App.4th 866, 882-883.)

Second, the local agency Copermittees' obligations under this Order are similar to, and in many respects less stringent than, the obligations of non-governmental dischargers who are issued NPDES permits for storm water discharges. With a few inapplicable exceptions, the Clean Water Act regulates the discharge of pollutants from point sources (33 U.S.C. § 1342) and the Porter-Cologne regulates the discharge of waste (Wat. Code, § 13263), both without regard to the source of the pollutant or waste. As a result, the "costs incurred by local agencies" to protect water quality reflect an overarching regulatory scheme that places similar requirements on governmental and nongovernmental dischargers. (See County of Los Angeles v. State of California (1987) 43 Cal.3d 46, 57-58 [finding comprehensive workers compensation scheme did not create a cost for local agencies that was subject to state subvention].)

The Clean Water Act and the Porter-Cologne Water Quality Control Act largely regulate storm water with an even hand, but to the extent there is any relaxation of this even-handed regulation, it is in favor of the local agencies. Except for municipal separate storm sewer systems, the Clean Water Act requires point source dischargers, including discharges of storm water associated with industrial or construction activity, to comply strictly with water quality standards. (33 U.S.C. § 1311(b)(1)(C), Defenders of Wildlife v. Browner (1999) 191 F.3d 1159, 1164-1165 [noting that industrial storm water discharges must strictly comply with water quality standards].) As discussed in prior State Water Resources Control Board decisions, this Order does not require strict compliance with water quality standards. (SWRCB Order No. WQ 2001-15, p. 7.) The Order, therefore, regulates the discharge of waste in municipal storm water more leniently than the discharge of waste from non-governmental sources.

Third, the local agency Copermittees have the authority to levy service charges, fees, or assessments sufficient to pay for compliance with this Order. The fact sheet demonstrates that numerous activities contribute to the pollutant loading in the municipal separate storm sewer system. Local agencies can levy service charges, fees, or assessments on these activities, independent of real property ownership. (See, e.g., Apartment Ass'n of Los Angeles County, Inc. v. City of Los Angeles (2001) 24 Cal.4th 830, 842 [upholding inspection fees associated with renting property].) The ability of a local agency to defray the cost of a program without raising taxes indicates that a program does not entail a cost subject to subvention. (County of Fresno v. State of California (1991) 53 Cal.3d 482, 487-488.)

Fourth, the Copermittees have requested permit coverage in lieu of compliance with the complete prohibition against the discharge of pollutants contained in federal Clean Water Act section 301, subdivision (a) (33 U.S.C. § 1311(a)) and in lieu of numeric restrictions on their storm water discharges. To the extent, the local agencies have voluntarily availed themselves of the permit, the program is not a state mandate. (Accord County of San Diego v. State of California (1997) 15 Cal.4th 68, 107-108.) Likewise, the Copermittees have voluntarily sought a program-based municipal storm water permit in lieu of a numeric limitations approach on their storm water discharge. (See City of Abilene v. U.S. E.P.A. (5th Cir. 2003) 325 F.3d 657, 662-663 [noting that municipalities can choose between a management permit or a permit with numeric limitations].) The local agencies' voluntary decision to file a report of waste discharge proposing a program-based permit is a voluntary decision not subject to subvention. (See Environmental Defense Center v. USEPA (9th Cir. 2003) 344 F.3d 832, 845-848.)

Fifth, the local agencies' responsibility for preventing discharges of waste that can create conditions of pollution or nuisance from conveyances that are within their ownership or control under state law predates the enactment of Article XIIIB, Section (6) of the California Constitution.

Finding E. 7. Runoff treatment and/or mitigation must occur prior to the discharge of runoff into receiving waters. Treatment BMPs must not be constructed in waters of the U.S. or State unless the runoff flows are sufficiently pretreated to protect the values and functions of the water body. Federal regulations at 40 CFR 131.10(a) state that in no case shall a state adopt waste transport or waste assimilation as a designated use for any waters of the U.S. Authorizing the construction of an runoff treatment facility within a water of the U.S., or using the water body itself as a treatment system or for conveyance to a treatment system, would be tantamount to accepting waste assimilation as an appropriate use for that water body. Furthermore, the construction, operation, and maintenance of a pollution control facility in a water body can negatively impact the physical, chemical, and biological integrity, as well as the beneficial uses, of the water body. Without federal authorization (e.g., pursuant to Clean Water Act Section 404), waters of the U.S. may not be converted into, or used as, waste treatment or conveyance facilities. Similarly, waste discharge requirements pursuant to California Water Code Section 13260 are required for the conversion or use of waters of the State as waste treatment or conveyance facilities. Diversion from waters of the U.S./State to treatment facilities and subsequent return to waters of the U.S. is allowable, provided that the effluent complies with applicable NPDES requirements.

Discussion of Finding E.7. Runoff treatment and/or mitigation in accordance with any of the requirements in the Order must occur prior to the discharge of storm water into receiving waters. Allowing storm water polluted runoff to enter receiving waters prior to treatment to the MEP will result in degradation of the water body and potential exceedances of water quality standards, from the discharge point to the point of dissipation, infiltration, or treatment. Furthermore, the construction, operation, and maintenance of a pollution control facility in a water body can negatively impact the physical, chemical, and biological integrity, as well as the beneficial uses, of the water body. This requirement is supported by federal regulation 40 CFR 131.10(a) and USEPA guidance. According to USEPA,[159] "To the extent possible, municipalities should avoid locating structural controls in natural wetlands. Before considering siting of controls in a natural wetland, the municipality should demonstrate that it is not possible or practicable to construct them in sites that do not contain natural wetlands… Practices should be used that settle solids, regulate flow, and remove contaminants prior to discharging storm water into a wetland."

Additional Federal guidance discusses the implementation of wetlands to treat municipal storm water discharges (USEPA, 2000. *Guiding Principles for Constructed Treatment Wetlands: Providing for Water Quality and Wildlife Habitat*). It states:

[159] USEPA, 1992. Guidance Manual for the Preparation of Part II of the NPDES Permit Applications for Discharges from Municipal Separate Storm Sewer Systems. EPA 833-B-92-002.

> *"..treatment wetlands should not be constructed in a waters of the U.S. unless you can sufficiently pretreat the stormwater flows to protect the values and functions of the waters of the U.S. Because storm water is an unpredictable effluent source and can contain high levels of toxic substances, nutrients, and pathogens, we strongly encourage that you construct the treatment wetland in uplands and use best management practices in these projects."*[160]

Consistent with USEPA guidance, the conversion or use of waters of the U.S./State into runoff treatment facilities or conveyance facilities for untreated storm water discharges must be appropriately reviewed by both Federal and State resource agencies. Such projects may be subject to federal permitting pursuant to Clean Water Act Section 404 if discharges of dredged or fill material is involved.

The placement of hydromodification controls within waters of the U.S./State may also be subject to federal and/or state permitting, but would not necessarily be considered a pollutant treatment BMP. Provided the grade control structures are designed to re-establish a natural channel gradient and correct excessive changes to the sediment transport regime caused by urbanization, rather than to create a series of artificial hydrological impoundments for the purpose of treating pollution, this type of project is not considered an in-stream treatment BMP.

Finding E. 8. The issuance of waste discharge requirements and an NPDES permit for the discharge of runoff from MS4s to waters of the U.S. is exempt from the requirement for preparation of environmental documents under the California Environmental Quality Act (CEQA) (Public Resources Code, Division 13, Chapter 3, section 21000 et seq.) in accordance with the CWC section 13389.

Discussion of Finding E. 8. CWC Section 13389 exempts the adoption of waste discharge requirements (such as NPDES permits) from CEQA requirements: "Neither the State Board nor the regional boards shall be required to comply with the provisions of Chapter 3 (commencing with section 21100) of Division 13 of the Public Resources Code prior to the adoption of any waste discharge requirement, except requirements for new sources as defined in the Federal Water Pollution Control Act or acts amendatory thereof or supplementary thereto."

[160] USEPA, 2000. Guiding Principles for Constructed Treatment Wetlands: Providing for Water Quality and Wildlife Habitat, (EPA 843-B-00-003).

This CEQA exemption was challenged during BIA's (and others') appeal of Order No. 2001-01. BIA contended that the CEQA exemption did not apply to permit requirements where the Regional Board utilized its discretion to craft permit requirements which were more prescriptive than required by federal law. The Court of Appeal, Fourth Appellate District disagreed with this argument, stating "we also reject Building Industry's argument to the extent it contends the statutory CEQA exemption in Water Code section 13389 is inapplicable to a particular NPDES permit provision that is discretionary, rather than mandatory, under the CWA."[161] On further appeal by BIA, the California State Supreme Court declined to hear the matter.

In a recent decision, the Court of Appeal of the State of California, Second Appellate District, upheld the CEQA exemption for municipal storm water NPDES permits (County of Los Angeles, et al. v. California State Water Resources Control Board, et al.).[162]

Finding E.9. Multiple water bodies in Orange County have been identified as impaired and placed on the 303(d) list. In 2004, Bacteria Impaired Waters TMDL Project II included six bacteria impaired shorelines in Dana Point Harbor and San Diego Bay: Baby Beach in Dana Point Harbor and Shelter Island Shoreline Park, B Street, G Street Pier, Tidelands Park, and Chula Vista Marina in San Diego Bay. Since then, only Baby Beach in Dana Point Harbor and Shelter Island Shoreline Park in San Diego Bay can be confirmed as still impaired by indicator bacteria. On June 11, 2008 the Regional Board adopted a Basin Plan amendment to incorporate *Bacteria Impaired Waters TMDL Project II for San Diego Bay and Dana Point Harbor Shorelines*. On June 16, 2009, the State Board approved the Basin Plan amendment. This action meets requirements of section 303(d) of the Clean Water Act (CWA). The Basin Plan amendment process is authorized under section 13240 of the Water Code. The State's Office of Administrative Law (OAL) approved the TMDLs on September 15, 2009. The effective date of the TMDLs is the date of OAL approval. USEPA approved the TMDLs on October 26, 2009.

Finding E.10. Storm water discharges from developed and developing areas in Orange County are significant sources of certain pollutants that cause, may be causing, threatening to cause or contributing to water quality impairment in the waters of Orange County. Furthermore, as delineated in the CWA section 303(d) list in Table 3, the Regional Board has found that there is a reasonable potential that municipal storm water and non-storm water discharges from MS4s cause or may cause or contribute to an excursion above water quality standards for the following pollutants: Indicator Bacteria, Phosphorous, Toxicity and Turbidity. In accordance with CWA section 303(d), the Regional Board is required to establish Total Maximum Daily Loads (TMDLs) for these pollutants to these waters to eliminate impairment and attain water quality standards. Therefore, certain early pollutant control actions and further pollutant impact assessments by the Copermittees are warranted and required

[161] Building Industry Association et al., v. State Water Resources Control Board, et al. 2004.
[162] Los Angeles County Super. Ct. No. BS080792. Partial publication dated November 6, 2006.

pursuant to this Order.

Finding E.11. This Order incorporates only those MS4 Waste Load Allocations (WLAs) developed in TMDLs that have been adopted by the Regional Water Board and have been approved by the State Board, Office of Administrative Law and U.S. EPA. Approved TMDL WLAs are to be addressed using water quality-based effluent limitations (WQBELs) calculated as numeric limitations (either in the receiving waters and/or at the point of MS4 discharge) and/or as BMPs. In most cases, the numeric limitation must be achieved to ensure the adequacy of the BMP program. Waste load allocations for storm water and non-storm water discharges have been included within this Order only if the TMDL has received all necessary approvals. This Order establishes WQBELs and conditions consistent with the requirements and assumptions of the WLAs in the TMDLs as required by 40 CFR 122.44(d)(1)(vii)(B).

A TMDL is the total amount of a particular pollutant that a water body can receive and still meet Water Quality Standards (WQSs), which are comprised of Water Quality Objectives (WQOs), Beneficial Uses and the States Policy on Maintaining High Quality Waters[163]. The WQOs serve as the primary basis for protecting the associated Beneficial Use. The Numeric Target of a TMDL interprets and applies the numeric and/or narrative WQOs of the WQSs as the basis for the WLAs. This Order addresses TMDLs through Water Quality Based Effluent Limitations (WQBELs) that must be consistent with the assumptions and requirements of the WLA[164]. Federal guidance[165] states that when adequate information exists, storm water permits are to incorporate numeric water quality based effluent limitations. In most cases, the numeric target(s) of a TMDL are a component of the WQBELs. When the numeric target is based on one or more numeric WQOs, the numeric WQOs and underlying assumptions and requirements will be used in the WQBELs as numeric effluent limitations by the end of the TMDL compliance schedule, unless additional information is required. When the numeric target interprets one or more narrative WQOs, the numeric target may assess the efficacy and progress of the BMPs in meeting the WLAs and restoring the Beneficial Uses by the end of the TMDL compliance schedule.

This Order fulfills a component of the TMDL Implementation Plan adopted by this Regional Board on June 11, 2008 for indicator bacteria in Baby Beach by establishing WQBELs expressed as both BMPs to achieve the WLAs and as numeric limitations[166] for the City of Dana Point and the County of Orange. The establishment of WQBELs expressed as BMPs should be sufficient to achieve the WLA specified in the TMDL. The Waste Load Allocations (WLAs) and Numeric Targets are the necessary metrics to ensure that the BMPs achieve appropriate concentrations of bacterial indicators in

[163] State Water Resources Control Board, Resolution No. 68-16
[164] 40 CFR 122.44(d)(1)(vii)(B)
[165] USEPA, *Interim Permitting Approach for Water Quality-Based Effluent Limitations in Storm Water Permits,* 61 FR 43761, August 26, 1996
[166] The Waste Load Allocations are defined in Resolution No. R9-2008-0027, A Resolution to Adopt an Amendment to the *Water Quality Control Plan for the San Diego Basin (9)* to Incorporate Total Maximum Daily Loads for Indicator Bacteria, Baby Beach in Dana Point Harbor and Shelter Island Shoreline Park in San Diego Bay.

the receiving waters.

Discussion of Finding E.9, E.10, E.11. Section 303(d)(1)(A) of the Clean Water Act (CWA) requires that:

> "*Each state must identify those waters within its boundaries for which the effluent limitations…are not stringent enough to implement any water quality standard (WQS) applicable to such waters.*"

The CWA also requires states to establish a priority ranking of impaired waterbodies known as Water Quality Limited Segments and to establish Total Maximum Daily Loads (TMDLs) for such waters. This priority list of impaired waterbodies is called the Section 303(d) List. The current Section 303(d) List was approved by the State Water Resources Control Board (State Board) on October 25, 2006. On June 28, 2007 the 2006 303(d) list for California was given final approval by the United States Environmental Protection Agency (USEPA). Every two years the State of California is required by CWA section 303(d) and 40 CFR(130.7) to develop and submit to the USEPA for approval an updated 303(d) list of impaired waterbodies. The Regional Board is currently undergoing the required 2 year (2008) update for submittal to the State Board.

Multiple water bodies in Orange County have been identified as impaired and placed on the Section 303(d) list. The Regional Board has 78 current 303(d) listings for which TMDLs must be prioritized and subsequently developed. The 303(d) listing of a waterbody and subsequent TMDL development is required when regulations under current permits, such as Technology Based Effluent Limitations (TBELS), are not stringent enough to meet Water Quality Standards and protect the Beneficial Uses of Waters of the State. In 2004, the *Bacteria Impaired Waters TMDL Project II* addressed six bacteria impaired shorelines including Baby Beach in Dana Point Harbor. On June 11, 2008 the Regional Board adopted a Basin Plan amendment to incorporate *TMDLs for Indicator Bacteria, Baby Beach in Dana Point Harbor and Shelter Island Shoreline Park in San Diego Bay*. On June 16, 2009, the State Board approved the Basin Plan amendment The *TMDLs for Indicator Bacteria, Baby Beach in Dana Point Harbor and Shelter Island Shoreline Park in San Diego Bay* are pending approval by the State Office of Administrative Law (OAL) and USEPA.

Storm water discharges from developed and developing areas in Orange County are a significant source of certain pollutants that cause, may be causing, threatening to cause or contributing to water quality impairment in the waters of Orange County. Furthermore, the CWA section 303(d) list indicates that there is a reasonable potential that municipal storm water and dry weather discharges from MS4s cause or may cause or contribute to an excursion above water quality standards for the following pollutants: Indicator Bacteria, Phosphorous, Toxicity and Turbidity. In accordance with CWA section 303(d), the Regional Board is required to establish TMDLs for these pollutants in these waters to eliminate impairment and attain water quality standards. Per 40 CFR(130.7), WLAs are required for all point sources, including storm water and

non-storm water discharges from MS4s. Therefore, focused pollutant control actions and further pollutant impact assessments by the Copermittees are warranted and required pursuant to this Order.

MS4 Permits address only those TMDL WLAs that have been adopted by the Regional Board and have been approved by the State Board, OAL and USEPA. WLAs are portions of a receiving water's loading capacity that is allocated to one of its existing or future point sources of pollution. The TMDL WLAs in MS4 Permits can be addressed using water quality-based numeric effluent limitations (WQBELs) calculated at end-of-pipe. WQBELs must be consistent with the assumptions and requirements of the WLAs.[167]

Assessment of compliance with WLAs is to be assessed at the point of discharge to the receiving water and within the receiving water. TMDL WLAs evaluated end-of-pipe will be assessed using WQBELs. Determination of compliance may also be assessed within the receiving waters to evaluate WLA reductions, program effectiveness and to assess overall water quality. As Numeric Targets serve to establish WLAs, they are part of the underlying assumptions of the WLA and can serve as points of compliance.

Finding E.12. This Order requires each Copermittee to effectively prohibit all types of unauthorized discharges of non-storm water into its MS4. However, historically pollutants have been identified as present in dry weather non-storm water discharges from the MS4s through 303(d) listings, monitoring conducted by the Copermittees under Order No. R9-2002-0001, and there are others expected to be present in dry weather non-storm water discharges because of the nature of these discharges. This Order includes action levels for pollutants in non-storm water, dry weather, discharges from the MS4 designed to ensure that the requirement to effectively prohibit all types of unauthorized discharges of non-storm water in the MS4 is being complied with. Action levels in the Order are based upon numeric or narrative water quality objectives and criteria as outlined in the Basin Plan, Water Quality Control Plan for Ocean Waters of California (Ocean Plan), and State Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California (State Implementation Policy or SIP). An exceedance of an action level requires specified responsive action by the Copermittees. This Order describes what actions the Copermittees must take when an exceedance of an action level is observed. Exceedances of non-storm water action levels do not alone constitute a violation of this Order but could indicate non-compliance with the requirement to effectively prohibit all types of unauthorized non-storm water discharges into the MS4 or other prohibitions established in this Order. Failure to undertake required source investigation and elimination action following an exceedance of a non-storm water action level (NAL or action level) is a violation of this Order. The Regional Board recognizes that use of action levels will not necessarily result in detection of all unauthorized sources of non-storm water discharges because there may be some

[167] Per 40 CFR 122.44(d)(1)(vii)(B)

discharges in which pollutants do not exceed established action levels. However, establishing NALs at levels appropriate to protect water quality standards is expected to lead to the identification of significant sources of pollutants in dry weather non-storm water discharges.

Discussion of Finding E.12. This Order includes the existing requirement that Copermittees effectively prohibit all types of unauthorized non-storm water discharges in the MS4s. It also includes the following prohibition set forth in the Basin Plan: "The discharge of waste to waters of the state in a manner causing, or threatening to cause a condition of pollution, contamination or nuisance as defined in California Water Code section 13050 is prohibited." (Prohibition A.1.) As discussed in the Order's Findings on discharge characteristics, e.g., C.2.,C.4., C.6., C.7., C.9., C.14., and C.15., the Copermittees' reliance on BMPs for the past 19 years has not resulted in compliance with applicable water quality standards or compliance with the requirement to effectively prohibit all types of unauthorized discharges of non-storm water in the MS4. The Regional Board has evaluated (in accordance with 40 CFR 122.44(d)(1)) past and existing control (BMPs), non-storm water effluent monitoring results, the sensitivity of the species in receiving waters (e.g. endangered species), and the potential for effluent dilution and has determined that existing BMPs to control pollutants in storm water discharges are not sufficient to protect water quality standards in receiving waters and the existing requirement that Copermittees effectively prohibit all types of unauthorized non-storm water discharges into the MS4 historically results in the discharge of pollutants to the receiving waters.

Therefore it is appropriate to establish dry weather non-storm water action levels based upon established water quality standards to measure pollutants levels in the discharge of dry weather non-storm water that could indicate non-compliance with the requirement to effectively prohibit al types of unauthorized non-storm water discharges into the MS4 and/or that these discharges are causing, or threatening to cause, a condition of pollution, contamination or nuisance in the receiving waters. NALs are not numeric effluent limitations. While not alone a violation of this Order, an exceedance of an NAL requires the Copermittees to initiate a series of source investigation and elimination actions to address the exceedance. Results from the NAL monitoring are to be used in developing the Copermittees annual work plans. Failure to undertake required source investigation and elimination action following an exceedance of an NAL is a violation of this Order. Please see further discussion in the directives section C of the fact sheet.

A purpose of monitoring, required under this and previous Orders, as stated in the Monitoring and Reporting Program is to "detect and eliminate illicit discharges and illicit connections to the MS4" and to answer the following core management questions:

1. Are conditions in receiving waters protective, or likely to be protective, of beneficial uses?

2. What is the extent and magnitude of the current or potential receiving water problems?
3. What is the relative MS4 discharge contribution to the receiving water problem(s)?
4. What are the sources of MS4 discharge that contribute to receiving water problem(s)?
5. Are conditions in receiving waters getting better or worse?

For the past 4 permit cycles (19 years), Copermittees have utilized their IC/ID program to identify and eliminate non-storm water discharges that are sources of pollutants to the MS4. The Copermittees are also subject to the requirement to effectively prohibit all types of unauthorized discharges of non-storm water into the MS4s. Historically, discharges of unauthorized non-storm water do occur, resulting in the discharge of pollutants to the receiving water. NALs have been included in this Order to ensure that the Copermittees comply with the requirement to effectively prohibit all types of unauthorized non-storm water discharges that are a source of pollutants in the receiving waters.

F. Public Process

Finding F.1. The Regional Board has notified the Copermittees, all known interested parties, and the public of its intent to consider adoption of an Order prescribing waste discharge requirements that would serve to renew an NPDES permit for the existing discharge of runoff.

Discussion of Finding F.1. Public notification of development of a draft permit is required under Federal regulation 40 CFR 124.10(a)(1)(ii). This regulation states "(a) Scope. (1) The Director shall give public notice that the following actions have occurred: (ii) A draft permit has been prepared under Sec. 124.6(d)." Public notifications "shall allow at least 30 days for public comment," as required under Federal regulation 40 CFR 124.10(b)(1).

Finding F.2. The Regional Board has held public hearings on April 11, 2007, February 13, 2008, July 1, 2009, and November 18, 2009 and heard and considered all comments pertaining to the terms and conditions of this Order.

Discussion of Finding F.2. Public hearings are required under CWC Section 13378, which states "Waste discharge requirements and dredged or fill material permits shall be adopted only after notice and any necessary hearing." Federal regulation 40 CFR 124.12(a)(1) also requires public hearings for draft permits, stating "The Director shall hold a public hearing whenever he or she finds, on the basis or requests, a significant degree of public interest in a draft permit(s)." Regarding public notice of a public hearing, Federal regulation 40 CFR 124.10(b)(2) states that "Public notice of a public hearing shall be given at least 30 days before the hearing."

IX. DIRECTIVES

This section discusses significant changes which have been made to the requirements of the Order from the requirements which were previously included in Order No. R9-2002-0001. For each section of the Order than has been changed there is a discussion which describes the change that was made and provides the rationale for the change. In addition, comments on the Copermittees' ROWD recommendations, as they pertain to each changed requirement of the Order, are provided.

Requirements of the Order that are not discussed in this section have not been significantly changed from those requirements previously included in Order No. 2002-0001. For such requirements, discussions and rationale for the requirements can be found in section VII of the Fact Sheet/Technical Report for Regional Board Order No. R9-2002-0001, dated February 13, 2002. Section VII also provides additional background information for those requirements that have undergone significant change which are described in detail in this report. The Fact Sheet/Technical Report is available for download at:

http://www.waterboards.ca.gov/sandiego/programs/oc_stormwater.html

Legal authority citations are provided for each major section of the Tentative Order. These citations apply to all applicable requirements within the section for which they are provided.

A. Prohibitions and Receiving Water Limitations

The following legal authority applies to section A:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: The Regional Board Water Quality Control Plan for the San Diego Basin (Basin Plan) contains the following waste discharge prohibition: "The discharge of waste to waters of the state in a manner causing, or threatening to cause a condition of pollution, contamination, or nuisance as defined in California Water Code Section 13050, is prohibited."

California Water Code section 13050(l) states "(1) 'Pollution' means an alteration of the quality of waters of the state by waste to a degree which unreasonably affects either of the following: (A) The water for beneficial uses. (B) Facilities which serve beneficial uses. (2) 'Pollution' may include "contamination."

California Water Code section 13050(k) states "'Contamination' means an impairment of the quality of waters of the state by waste to a degree which creates a hazard to public health through poisoning or through the spread of disease. 'Contamination' includes any equivalent effect resulting from the disposal of waste, whether or not waters of the state are affected."

California Water Code section 13050(m) states "'Nuisance' means anything which meets all of the following requirements: (1) Is injurious to health, or is indecent or offensive to the senses, or an obstruction to the free use of property, so as to interfere with the comfortable enjoyment of life or property. (2) Affects at the same time an entire community or neighborhood, or any considerable number of persons, although the extent of the annoyance or damage inflicted upon individuals may be unequal. (3) Occurs during, or as a result of, the treatment or disposal of wastes."

California Water Code section 13241 requires each regional board to "establish such water quality objectives in water quality control plans as in its judgment will ensure the reasonable protection of beneficial uses and the prevention of nuisance […]."

California Water Code Section 13243 provides that "A regional board, in a water quality control plan or in waste discharge requirements, may specify certain conditions or areas where the discharge of waste, or certain types of waste, will not be permitted."

California Water Code Section 13263(a) provides that waste discharge requirements prescribed by the Regional Board implement the Basin Plan.

Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(A - D) require municipalities to implement controls to reduce pollutants in storm water runoff from commercial, residential, industrial, and construction land uses or activities.

Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(A - D) require municipalities to have legal authority to control various discharges to their MS4.

Federal NPDES regulation 40 CFR 122.44(d)(1) requires municipal storm water permits to include any requirements necessary to "[a]cheive water quality standards established under section 303 of the CWA, including State narrative criteria for water quality."

Federal NPDES regulation 40 CFR 122.44(d)(1)(i) requires NPDES permits to include limitations to "control all pollutants or pollutant parameters (either conventional, nonconventional, or toxic pollutants) which the Director determines are or may be discharged at a level which will cause, have reasonable potential to cause, or contribute to an excursion above any State water quality standard, including State narrative criteria for water quality."

Section A of the Order combines two previously distinct requirement sections – Prohibitions and RWLs. These sections have been combined into one section for organization purposes and to reduce redundancy, since both sections address the same issue. These changes have no net effect on the implementation and enforcement of the Order.

Section A.3 describes the “iterative process.” The Copermittees must reduce the discharge of storm water pollutants to the MEP and ensure that their MS4 discharges do not cause or contribute to violations of water quality standards. If the Copermittees have reduced storm water pollutant discharges to the MEP, but their discharges are still causing or contributing to violations of water quality standards, the Order provides a clear and detailed process for the Copermittees to follow. This process is often referred to as the "iterative process" and can be found at section A.3. The language of section A.3 is prescribed by the State Board and is included in MS4 permits statewide. Section A.3 essentially requires additional BMPs to be implemented until MS4 storm water discharges no longer cause or contribute to a violation of water quality standards.

The State Policy with respect to maintaining high quality waters has been added to clarify that discharges from the MS4 that cause or contribute to a violation of the Policy for high quality waters is prohibited.

B. Non-Storm Water Discharges

The following legal authority applies to section B:

Broad Legal Authority: CWA sections 402, 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F), 40 CFR 122.26(d)(2)(iv) and 40 CFR 122.44.

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B) requires MS4 operators "to detect and remove (or require the discharger to the municipal separate storm sewer to obtain a separate NPDES permit for) illicit discharges and improper disposal into the storm sewer."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B)(1) provides that the Copermittees shall prevent all types of illicit discharges into the MS4 except for certain non-storm water discharges.

Section B of the Order has been reworded to simplify and clarify the requirements for addressing non-storm water discharges that are not prohibited. This rewording has no net effect on the implementation and enforcement of the Order.

Section B.2 has been modified by the removal of landscape irrigation, irrigation water and lawn watering from the list of non-storm water discharges that are not prohibited, i.e. landscape irrigation, irrigation water and lawn watering discharges into and from the MS4 are now prohibited. Saline swimming pool discharges have been added as a footnote to the list provided the discharge is directly to a saline water body (see Finding C.14 and Discussion). Language has been added to the section to clarify differences in the federal regulations under 40 CFR 122.26(d)(iv)(B) and for the authority of the Director (Regional Board) in regards to exempted discharges.

The following exemptions have been removed from Section B, per identification as a source and conveyance of pollutants to waters of the United States when discharged from the MS4: landscape irrigation, irrigation water and lawn watering. Therefore, these illicit discharges must be addressed per 40 CFR 122.26(B). These previously exempted discharges have been identified by Permittees as a source of pollutants and conveyance of pollutants to waters of the United States in the following:

The County of Orange conducted, per requirements of 401 Water Quality Certification 02C-055, a Drainage Area Reconnaissance and Urban Runoff Characterization study. From the reconnaissance and characterization, the County of Orange determined that "water quality results provided two important findings". First, "analytical data strongly indicates that irrigation overspray and drainage constitutes a very substantial source and conveyance mechanism for fecal indicator bacteria into Aliso Creek, and suggests that reduction measures for this source of urban runoff could provide meaningful reduction in bacteria loading to the stream". Aliso Creek, currently 303(d) listed as impaired for Indicator Bacteria, is included in the Bacteria Project I TMDL adopted by the San Diego Regional Board on December 12, 2007. Secondly, reclaimed water high in electrical conductivity and Nitrate was indicated as "the source water at three of the excessive runoff locations (P1,P2,J01P02). These dissolved nitrogen concentration and flow rates create relatively high nitrogen loadings, which have the potential to contribute to undesirable levels of periphytic algal growth in Aliso Creek".

The County of Orange, Cities of Orange County and Orange County Flood Control District on November 15, 2007 submitted their Unified Annual Progress Report for the 2006-2007 reporting period. Within the report, the Copermittees demonstrate that a "wide range of constituents exceeded the tolerance interval bounds", including orthophosphate. "These high levels of orthophosphate concentration are most likely the result of fertilizer runoff or reclaimed water runoff". Aliso Creek is currently 303(d) listed as impaired for phosphorous.

The County of Orange, Orange County Flood Control District and Permittees within the San Juan Creek, Laguna Coastal Streams, Aliso Creek, and Dana Point Coastal Streams Watersheds on November 15, 2007 submitted their Watershed Action Plan Annual Reports for the 2006-2007 reporting period. San Juan Creek, Laguna Coastal Streams, Aliso Creek and Dana Point Coastal Streams are all currently 303(d) listed as impaired for Indicator Bacteria within the watershed and/or Pacific Ocean at the discharge point of the watershed. These locations are included in the Bacteria Project I TMDL adopted by the San Diego Regional Board on December 12, 2007. The Copermittees, within their Watershed Action Strategy Table for Fecal Indicator Bacteria "Support programs to reduce or eliminate the discharge of anthropogenic dry weather nuisance flow throughout the […] watershed. Dry weather flow is the transport medium for bacteria and other 303(d) constituents of concern". Additionally, they state that "conditions in the MS4 contribute to high seasonal bacteria propagation in-pipe during warm weather. Landscape irrigation is a major contributor to dry weather flow, both as surface runoff due to over-irrigation and overspray onto pavements; and as subsurface seepage that finds its way into the MS4".

In 2006, the State Water Quality Control Board allocated Grant funding to the Smarttimer/Edgescape Evaluation Program (SEEP). Project partners include the cities of Aliso Viejo, Dana Point, Laguna Beach, Laguna Hills, Laguna Nigel, Laguna Woods, Lake Forest, Mission Viejo, Rancho Santa Margarita and San Juan Capistrano as well as the Metropolitan Water District of Southern California, the Department of Agriculture and ten south Orange County water districts. The project targets irrigation runoff by retrofitting existing development and documenting the conservation and runoff improvements. The Grant Application states that "Irrigation runoff contributes flow & pollutant loads to creeks and beaches that are 303(d) listed for bacteria indicators". Furthermore, the grant application states that "Regional program managers agree that the reduction and/or elimination of irrigation-related urban flows and associated pollutant loads may be key to successful attainment of water quality and beneficial use goals as outlined in the San Diego Basin Plan and Bacteria TMDL over the long term". This is reinforced in the project descriptions and objectives: "Elevated dry-weather storm drain flows, composed primarily in the South Orange County Region of landscape irrigation water wasted as runoff, carry pollutants that impair recreational use and aquatic habitats all along Southern California's urbanized coastline. Storm drain systems carry the wasted water, along with landscape derived pollutants such as bacteria, nutrients and pesticides, to local creeks and the ocean. Given the local Mediterranean climate, excessive perennial dry season stream flows are an unnatural hydrologic pattern, causing species shifts in local riparian communities and warm, unseasonal contaminated freshwater plumes in the near-shore marine environment". The basis of this grant project, conducted by the Permittees and additional water use partners, is that over-irrigation (landscape irrigation, irrigation water and lawn watering) into the MS4 is a source and conveyance of pollutants. In addition, they indicate that the alteration of natural flows is impacting the Beneficial Uses of waters of the State.

Section B.3 has been clarified by the recognition of building fire suppression system maintenance (e.g. fire sprinklers) as an illicit discharge. The Regional Board has found that such discharges contain waste, and as such the Regional Board is requiring these discharges be addressed as illicit discharges by the Copermittees. This is consistent with the Federal Regulations (55 Fed Reg 48037). Thus, the discharges are to be prohibited via ordinance, order or similar means and incorporated as part of the Copermittees IC/ID program.

C. Non Storm Water Dry Weather Action Levels

The following legal authority applies to Section C:

Broad Legal Authority: CWA section 402, 402(p)(3)(B)(ii), CWC §13377. 40 CFR 122.26(d)(2)(i)(B, C, E, and F), and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority:
The Clean Water Act section 402(p)(3)(B)(ii) provides that MS4 permits "shall include a requirement to effectively prohibit non-storm water discharges into the storm sewers."

Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(B) provides that the proposed management program "shall be based on a description of a program including a schedule, to detect and remove (or require the discharger to the municipal storm sewer to obtain a separate NPDES permit for) illicit discharges and improper disposal into the storm sewer."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B)(1) provides that the Copermittee include in its proposed management program "a program, including inspections, to implement and enforce an ordinance, orders or similar means to prevent illicit discharges to the municipal storm sewer system; this program description shall address all types of illicit discharges, however the [listed exempt] category of non-storm water discharges or flows shall be addressed where such discharges are identified by the municipality as sources of pollutants to waters of the United States."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B)(2) provides that the Copermittee include in its proposed management program "a description of procedures to conduct on-going field screening activities during the life of the permit, including areas or locations that will be evaluated by such field screens."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B)(3) provides that the Copermittee include in its proposed management program "procedures to be followed to investigate portions of the separate storm sewer system that, based on the results of the field scree, or other appropriate information, indicate a reasonable potential of containing illicit discharges or other sources of non-storm water."

Section C establishes non-storm water dry weather action levels (see also Finding C.14, Finding E.12, and the Discussion for those sections).

Non-exempted, non-storm water discharges are to be effectively prohibited from entering the MS4 or become subject to another NPDES permit (see Federal Register, Vol. 55, No. 222, pg. 47995). Conveyances which continue to accept non-exempt, non-storm water discharges do not meet the definition of MS4 and are not subject to

section 402(p)(3)(B) of the CWA unless the discharges are issued separate NPDES permits. Instead, conveyances that continue to accept non-exempt, non-storm water discharges that do not have a separate NPDES permit are subject to sections 301 and 402 of the CWA (see Federal Register, Vol. 55, No. 222, pg. 48037).

The Order requires the sampling of a representative percentage of major outfalls and other identified stations within each hydrologic subarea. While it is important to assess all major outfall discharges from the MS4 into receiving waters, to date the Copermittees have implemented a dry-weather monitoring program that has identified major outfalls that are representative of each hydrologic subarea and have randomly sampled other major outfalls. Thus, it is expected that the Copermittees will utilize past dry weather monitoring in the selection and annual sampling of a representative percentage of major outfalls in accordance with the requirements under Section C.4.

Background and Rationale for Requirements

The Regional Board developed the requirements for dry weather, non-storm water action levels based upon an evaluation of existing controls, monitoring and reporting programs (effluent and receiving water), special studies, and based upon Findings C.1 C.3, C.4, C.6, C.7 and C.14.

Water Quality Control Plan

Section 303(C) of the Clean Water Act requires the state to establish Water Quality Standards (WQS). WQS define the water quality goals of a waterbody, or part thereof, by designating their use or uses to be made of the water and by setting criteria necessary to protect those uses.

The Regional Board's Water Quality Control Plan for the San Diego Basin (Basin Plan) designates beneficial uses, establishes water quality objectives, and contains implementation programs and policies to achieve those objectives for all waters addressed through the Basin Plan. The Basin Plan was adopted by the Regional Board on September 8, 1994, and was subsequently approved by the State Board on December 13, 1994. Subsequent revisions to the Basin Plan have also been adopted by the Regional Board and State Board.

State Board Resolution No. 88-63 establishes state policy that all waters, with certain exceptions, should be considered suitable or potentially suitable for municipal and domestic supplies. Requirements of this Order do not include effluent limitations reflecting municipal and domestic supply use as all waters within the County of Orange under this Order are specifically exempted from municipal and domestic supply as a Beneficial Use.

The State Board adopted the Water Quality Control Plan for Ocean Waters of California (Ocean Plan) in 2005, it was approved by USEPA, and became effective on February 14, 2006. The Ocean Plan establishes Water Quality Objectives, general requirements for management of waste discharged to the ocean, effluent quality

requirements, discharge provisions, and general provisions. Limitations derived from the Ocean Plan have been included in this Order as action levels to protect the Beneficial Uses of enclosed bays and estuaries because their Beneficial Uses are similar

National Toxics Rule (NTR) and California Toxics Rule (CTR)
The USEPA adopted the NTR on December 22, 1992, which was amended on May 4, 1995, and November 9, 1999. The CTR was adopted by USEPA on May 18, 2000, and amended on February 13, 2001. These rules include water quality criteria for priority pollutants and are applicable to non-storm water discharges from the MS4. Criteria for 126 priority pollutants are established by the CTR. USEPA promulgated this rule to fill a gap in California water quality standards that was created in 1994 when a California court overturned the State's water quality control plans containing criteria for priority toxic pollutants. The federal criteria are legally applicable in the State of California for inland surface waters, enclosed bays and estuaries for all purposes and programs under the CWA.

Antidegradation Policy
Section 131.12 of 40 CFR requires that the State water quality standards include an antidegradation policy consistent with the federal policy. The State Board established California's antidegradation policy in State Board Resolution No. 68-16. Resolution No. 68-16 incorporates the federal antidegradation policy where the federal policy applies under federal law. Resolution No. 68-16 requires that existing quality of waters be maintained unless degradation is justified based on specific findings. The Regional Boards' Basin Plans implement, and incorporate by reference, both the State and federal antidegradation policies. Permitted non-storm water discharges from the MS4 are consistent with the antidegradation provision of 40 CFR section 131.12 and State Board Resolution No. 68-16.

Monitoring and Reporting
40 CFR Section 122.48 requires that all NPDES permits specify requirements for recording and reporting monitoring results. Sections 13267 and 13383 of CWC authorize the Regional Boards to require technical and monitoring reports. The Monitoring and Reporting Program establishes monitoring and reporting requirements to implement state and federal regulations. The Monitoring and Reporting Program can be found as Attachment E of the Order.

Dilution or Mixing Zones
In order to protect the Beneficial Uses of receiving waters from pollutants as a result of non-storm water MS4 discharges, this Order does not provide for a mixing zone or a zone of initial dilution except when the discharge is to the surf zone.

The San Diego Region has predominately intermittent and ephemeral rivers and streams (Inland Surface Waters) which vary in flow volume and duration at spatial and temporal scales. Therefore, it is assumed that any non-storm water discharge from

the MS4 into the receiving water is likely to be of a quantity and duration that does not allow for dilution or mixing. For ephemeral systems, non-storm water discharges from the MS4 are likely to be the only surface flows present within the receiving water during the dry season.

MS4 discharge points to bays, estuaries and lagoons are not designed to achieve maximum initial dilution and dispersion of non-storm water discharges. Thus, initial dilution factors for non-storm water discharges from the MS4 into bays, estuaries, and lagoons are conservatively assumed to equal zero.

It is appropriate to base numeric action levels for dry weather non-storm water discharges on these considerations.

California Ocean Plan

A discharge to a surf zone occurs when the non-storm water discharge point from the MS4 discharges:

a) Directly into the ocean in a wave induced area subject to long-shore conditions; or
b) Across a primarily sandy substrate beach and subsequently directly into a wave induced area subject to long-shore conditions;

Establishment of Action Levels

Action levels in the Order are based upon numeric or narrative water quality objectives and criteria as defined in the Basin Plan, the Water Quality Control Plan for Ocean Waters of California (Ocean Plan), and the State Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California (State Implementation Policy or SIP). The Regional Board recognizes that use of action levels will not necessarily result in detection of all unauthorized sources of non-storm water discharges because there may be some discharges in which pollutants do not exceed established action levels.

In June of 2006, the California Water Board's Blue Ribbon Storm Water Panel released its report titled 'The Feasibility of Numerical Effluent Limits Applicable to Discharges of Storm Water Associated with Municipal, Industrial and Construction Activities.' The report only examined numerical limits as applied to storm water and not non-storm water. In the recommendations, the Blue Ribbon panel proposed storm water action levels which are computed using statistical based population approaches. For example, Section D of the Permit uses a recommended statistical approach to develop storm water action levels. The Blue Ribbon panel did not examine the efficacy of action levels or recommendations for development of action levels for non-storm water discharges.

For discharges to inland surface waters, action levels are based on the EPA water quality criteria for the protection of aquatic species, the EPA water quality criteria for the protection of human health, water quality criteria and objectives in the applicable

State plans, effluent concentration available using best available technology, and 40 CFR 131.38. Since the assumed initial dilution factor for the discharge is zero and a mixing zone is not allowed, a non-storm water discharge from the MS4 could not cause an excursion from numeric receiving water quality objectives if the discharge is in compliance with the action levels contained in the Order. Likewise, discharges in compliance with action levels to the surf zone cannot cause excursions from water quality objectives.

Dry weather monitoring of non-storm water MS4 effluent conducted under the previous Order (R9-2002-001), which relies on BMPs as controls to protect water quality standards, has identified pollutants that are found in non-storm water discharges. Monitoring of pH, Dissolved Oxygen, Phosphorus, Nitrate, Turbidity and Methylene Blue Active Substances (MBAS) in non-storm water MS4 discharges has shown that the effluent exceeds state water quality criteria. It is appropriate to establish numeric action levels for these pollutants to ensure that the Copermittees are complying with the requirement to effectively prohibit all types of unauthorized non-storm water discharges into the MS4s.

Water Quality Limited Segments on the current 303(d) list (2006) within the jurisdiction of this Order have been identified due to exceedances of Sulfate, Chloride and Total Dissolved Solids criteria from a source which is currently unknown (see Table 2a). These pollutants are not monitored for under the current non-storm water MS4 effluent monitoring program. While this Order does not establish a numeric action level for these constituents at this time, this Order now requires non-storm water MS4 discharge monitoring to include monitoring for Sulfates, Chlorides and Total Dissolved Solids.

Priority pollutants analyzed included Cadmium, Copper, Chromium, Lead, Nickel, Silver and Zinc. These priority pollutants are likely to be present in non-storm water MS4 discharges (see Finding C.3) and dissolved metal effluent monitoring is available from the previous Order. The most stringent applicable water quality criteria have been identified for these seven metals and, excluding Chromium (VI), and all are dependent on receiving water hardness. The conversion factors for Cadmium and Lead are also water hardness dependent (40 CFR 131.38(b)(2)). These levels are established as the action levels for these constituents.

While effluent monitoring is available from the previous Order, the monitoring was done for dissolved concentrations and lacked a measurement of receiving water hardness. Due to the multiple point source discharges of non-storm water from the MS4, a discharge may enter a receiving water whose hardness will vary temporally. In addition, hardness may vary spatially within and among receiving waters.

However, other information is available to determine the appropriateness of an action level. Existing effluent monitoring concentrations absent of receiving water data, no dilution credit or mixing zone allowance, current 303(d) listings of receiving waters for

other pollutants, receiving water monitoring data, and the classification of waters as critical habitat for endangered and species of concern, provide evidence that NALs are appropriate for these priority pollutants at this time in order to ensure that the Copermittees comply with the requirement to effectively prohibit all types of unauthorized non-storm water discharges into the MS4s.

Existing effluent data (see attachment F), absent receiving water hardness, provides evidence that it is appropriate to include NALs based on a conservative hardness level. Absent receiving water hardness, all analyzed metals, are discharged at concentrations which may be in exceedance of CTR criteria depending on receiving water hardness. Chromium effluent data that is available is in the form of total Chromium. However, per the SIP, Chromium criteria are for Chromium III and Chromium VI. Therefore, the total Chromium measurement is inadequate, but can be used as an estimate of Chromium III and VI concentrations.

As discussed, inland surface waters, enclosed bays, and estuaries have conservatively been allotted a mixing zone and dilution credit of zero. As such, any discharge of these priority pollutants is likely to impact the receiving water, regardless of the quantity or rate of discharge.

As discussed in Finding C.7 and discussion, multiple receiving waters within the County of Orange are 303(d) listed for a number of pollutants, including toxicity. The 303(d) listing of a waterbody as impaired provides evidence that the receiving water(s) are already experiencing negative impacts. These water quality limited segments are more susceptible to degradation from the synergistic addition of more pollutants, even from upstream discharges. It is therefore appropriate to include numeric action levels designed to ensure that the Copermittees are complying with the requirement to effectively prohibit all types of unauthorized discharges of non-storm water into the MS4s.

Copermittees have monitored the receiving waters for MS4 discharges pursuant to requirements under Order R9-2002-0002. Dry weather receiving water data indicates poor conditions within waters receiving non-storm water MS4 discharges. Urban stream bioassessment conducted under the Order (2002-2008) has documented all non-reference sites as consistently having poor or very poor Index of Biotic Integrity (IBI) scores, in part due to receiving water toxicity[168].

Receiving waters within the jurisdiction of this Order are classified as critical habitat, including being designated with the RARE beneficial use, for endangered, threatened and species of concern including, but not limited to, *O. mykiss irideus*, *E. newberryil, A. marmorata pallida* and *G. orcutti.*

[168] 2006-07 and 2007-08 Unified Annual Progress Reports.

The Regional Board evaluated discharges to the surf zone, per the California Ocean Plan, Appendix VI and in accordance with 40 CFR 122.44(d). Indicator bacteria, pH, turbidity (NTU), and metals were analyzed for the purpose of determining the levels of these constituents in non-storm water discharges from the MS4.

The Regional Board has determined that there is not sufficient information at this time to develop action levels for pH, turbidity and metals. While non-storm water MS4 effluent data is available, the data collected is for discharges to inland surface waters, enclosed bays and estuaries. Preliminary receiving water data and limited non-storm water MS4 discharge data collected under the Ambient Coastal Receiving Water Monitoring indicates some exceedances of criteria for metals in the discharge, and toxicity in receiving waters[169]. However, the Regional Board believes the level of data available is insufficient, and is requiring additional monitoring of pH, turbidity and metals in non-storm water MS4 discharges to ocean waters (discharges to the surf zone).

Water Quality Limited Segments on the current 303(d) list (2006) for the Pacific Ocean shoreline within the jurisdiction of this Order have been identified due to exceedances of Indicator Bacteria criteria whose known source includes non-storm water discharges from the MS4. These 303(d) listed segments support extensive REC-1 beneficial uses and are located within State Marine Reserves and Conservation Areas. The listing of receiving waters as 303(d) listed for bacteria supports the inclusion of action levels to ensure that the Copermittees are complying with the requirement to effectively prohibit all types of unauthorized non-storm water discharges into the MS4. In addition, no dilution credit or mixing zone allowance is included in developing numeric action levels for the discharge of a pollutant to waters which are 303(d) listed as impaired for that pollutant.

Dry Weather Non-Storm Water Action Levels Calculations for Discharges to Inland Surface Waters, Enclosed Bays, and Estuaries

On the basis of the foregoing discussion, the NALs were calculated with the following considerations and assumptions:

> No dilution credit is considered for the discharge. Therefore, the discharge must comply with the Water Quality Objective at the point of discharge.
>
> For NALs based on CTR, implementation was done using the procedure list as outlined in the SIP (see below example).

NAL CTR/SIP Calculation – Zinc Example:

Criteria for Priority Toxic Pollutants in the State of California is described in the CTR

[169] 2007-08 Unified Annual Progress Report.

table listed in 40 CFR 131.38.

A		B Freshwater		C Saltwater		D Human Health (10^{-6} risk for carcinogens) For consumption of:	
# Compound	CAS Number	Criterion Maximum Conc. [d] B1	Criterion Continuous Conc. [d] B2	Criterion Maximum Conc. [d] C1	Criterion Continuous Conc. [d] C2	Water & Organisms (µg/L) D1	Organisms Only (µg/L) D2
1. Antimony	7440360					14 a,s	4300 a,t
2. Arsenic [b]	7440382	340 i,m,w	150 i,m,w	69 i,m	36 i,m		
3. Beryllium	7440417					n	n
4. Cadmium [b]	7440439	4.3 e,i,m,w,x	2.2 e,i,m,w	42 i,m	9.3 i,m	n	n
5a. Chromium (III)	16065831	550 e,i,m,o	180 e,i,m,o			n	n
5b. Chromium (VI) [b]	18540299	16 i,m,w	11 i,m,w	1100 i,m	50 i,m	n	n
6. Copper [b]	7440508	13 e,i,m,w,x	9.0 e,i,m,w	4.8 i,m	3.1 i,m	1300	
7. Lead [b]	7439921	65 e,i,m	2.5 e,i,m	210 i,m	8.1 i,m	n	n
8. Mercury [b]	7439976	[Reserved]	[Reserved]	[Reserved]	[Reserved]	0.050 a	0.051 a
9. Nickel [b]	7440020	470 e,i,m,w	52 e,i,m,w	74 i,m	8.2 i,m	610 a	4600 a
10. Selenium [b]	7782492	[Reserved] p	5.0 q	290 i,m	71 i,m	n	n
11. Silver [b]	7440224	3.4 e,i,m		1.9 i,m			
12. Thallium	7440280					1.7 a,s	6.3 a,t
13. Zinc [b]	7440666	120 e,i,m,w,x	120 e,i,m,w	90 i,m	81 i,m		

Saltwater criterion maximum concentration (CMC) = 90 ug/L
Saltwater criterion continuous concentration (CCC) = 81 ug/L

These criteria are expressed in terms of the dissolved fraction of the metal in the water column. [See footnote “m” to Table in paragraph (b)(1) of 40 CFR 131.38].

40 CFR 122.45(c) requires that this Order include effluent limitations as total recoverable concentration; therefore it is appropriate to include action levels also as total recoverable concentration.

The SIP requires that if it is necessary to express a dissolved metal value as a total recoverable and a site-specific translator has not yet been developed, the Regional Board shall use the applicable conversion factor from 40 CFR 131.38.

The term “Conversion Factor” (CF) represents the recommended conversion factor for converting a metal criterion expressed as the total recoverable fraction in the water column to a criterion expressed as the dissolved fraction in the water column.

Total recoverable concentration * CF = Dissolved concentration criterion

or

Total recoverable concentration = Dissolved concentration criterion/ CF

§ 131.38 40 CFR Ch. I (7–1–08 Edition)

Metal	Conversion factor (CF) for freshwater acute criteria	CF for freshwater chronic criteria	CF for saltwater acute criteria	CF[a] for saltwater chronic criteria
Silver	0.85	([d])	0.85	([d])
Thallium	([d])	([d])	([d])	([d])
Zinc	0.978	0.986	0.946	0.946

CF for Zinc = .946, so the total recoverable concentrations for zinc:
90 ug/L dissolved (CMC)/ 0.946 (CF) = 95 ug/L total recoverable CMC
81 ug/L dissolved (CCC) / 0.946 (CF) = 86 ug/L total recoverable CCC

Effluent Variability multiplier and Coefficient of Variation (CV)
For each concentration based on an aquatic life criterion, the long-term average (LTA) is calculated by multiplying the concentration with a factor that adjusts for effluent variability. The multiplier can be found in Table 1 of the SIP. Since this Order does not have existing data to properly conduct a variability analysis in accordance with the SIP, the CV has been set equal to 0.6 per SIP requirements. The current effluent data is limited due to the small number of representative outfalls sampled, the lack of outfalls discharging to representative waterbodies within the Region, and the targeted nature of the sampling design.

Based upon a CV of 0.6, Table 1 of the SIP requires an effluent variability as follows:
Acute Multiplier = 0.321
Chronic Multiplier = 0.527

The long-term average (LTA) is calculated by multiplying the total recoverable concentrations for zinc with the acute and chronic multipliers:
LTA Acute = 95 ug/L * 0.321 = 30.5
LTA Chronic = 86 ug/L * 0.527 = 45.3
The MDAL and AMAL will be based on the most limiting of the acute and chronic LTA, in the case for copper the most limiting LTA is the acute of 30.5 ug/L

NALs are calculated by multiplying the most limiting LTA with a multiplier that adjusts for the averaging periods and exceedance frequencies of the criteria and the effluent limitations. The multiplier can be found in Table 2 of the SIP. Since this Order has insufficient data, the CV has been set to 0.6 and since sampling frequency is four times a month or less, n has been set equal to 4 per the SIP.

Table 2. Long-Term Average (LTA) Multipliers for Calculating Effluent Limitations

Coefficient of Variation	MDEL Multiplier	AMEL Multiplier			MDEL/AMEL Multiplier		
	99th Percentile Occurrence Probability	95th Percentile Occurrence Probability			MDEL = 99th Percentile AMEL = 95th Percentile Occurrence Probability		
(CV)		n = 4	n = 8	n = 30	n = 4	n = 8	n = 30
0.1	1.25	1.08	1.06	1.03	1.16	1.18	1.22
0.2	1.55	1.17	1.12	1.06	1.33	1.39	1.46
0.3	1.90	1.26	1.18	1.09	1.50	1.60	1.74
0.4	2.27	1.36	1.25	1.12	1.67	1.82	2.02
0.5	2.68	1.45	1.31	1.16	1.84	2.04	2.32
0.6	3.11	1.55	1.38	1.19	2.01	2.25	2.62

Therefore, from Table 2 of the SIP, the LTA multipliers will be as follows:
MDAL Multiplier = 3.11
AMAL Multiplier = 1.55

The MDAL and AMAL limits are calculated by multiplying the LTA with an LTA multiplier for each limit:
MDAL = 30.5 ug/L * 3.11 = 95 ug/L
AMAL = 30.5 ug/L * 1.55 = 47 ug/L

Dry Weather Non-Storm Water Action Levels Calculations for Discharges to the Surf Zone
Based on the foregoing discussion, the Average Monthly and Maximum Daily NALs were calculated with the following considerations and assumptions:

No dilution credit is considered for the discharge. Therefore, the discharge must comply with the Water Quality Objective at the point of discharge.

Whole Effluent Toxicity (WET) Testing Requirements
A WET limit is required if a discharge causes, has a reasonable potential to cause, or contributes to an exceedance of applicable water quality standards, including numeric and narrative. Since these types of discharges are prohibited under this Order, WET limits are not applicable.

Discussion of AMALs, MDALs and Instantaneous Maximums
Where practical, action levels in this Order have been expressed as both AMALs and MDALs. Certain action levels may not practicably be expressed as AMALs and MDALs due to specific BPO language, sampling requirements and/or a lack of Criteria. Based upon the likely sampling frequency of the Copermittees, the frequency of sampling will occur such that grab samples are taken once per sampling day. This single sample would then be subject to MDALs and Instantaneous Maximum levels. In this case, the more conservative action level would apply. In addition, it is expected that some effluent monitoring will occur less than or equal to once per month. In this scenario, the MDAL, AMAL and Instantaneous Maximum levels would need to be met based upon one sample, unless sampling did not occur. For some BPOs, AMALs have been excluded and only MDALs/Instantaneous Maximums set to prevent redundancy in action levels.

Compliance with Action levels (Priority Pollutants)
Compliance with action levels shall be determined as follows:

Dischargers shall be deemed out of compliance with this Order if the Copermittee failed to take the prescribed action in response to a concentration of the priority pollutant in the monitoring sample that is greater than the action level and greater than or equal to the reported Minimum Level (exceedance of an action level). Regardlss of the Copermittee's actions in response to an exceedance, they are still subject to the prohibitions found in Section A and B of the Order.

When determining to take an action in response to the AMALs and more than one sample result is available in a month, the discharger shall compute the arithmetic mean unless the data set contains one or more reported determinations of DNQ or ND. In those cases, the discharger shall compute the median in place of the arithmetic mean in accordance with the following procedure:

(1) The data set shall be ranked from low to high, reported ND determinations lowest, DNQ determinations next, followed by quantified values (if any). The order of the individual ND or DNQ determinations is unimportant.

(2) The median value of the data set shall be determined. If the data set has an odd number of data points then the median is the middle value. If the data set has an even number of data points, then the median is the average of the two values around the middle unless one or both of those points are ND or DNQ, in which case the median value shall be the lower of the two data points where DNQ is lower than a value and ND is lower than DNQ.

D. Storm Water Action Levels

Section D has been added to establish storm water action levels (see also Finding D.1.h and Discussion).

Introduction
In response to comments at the initial public workshop, meetings with the principle Permittees, and comments from the July 01, 2009 Regional Board meeting, SAL concentrations, standards and constituents have been updated, Order language has been clarified and additions to the monitoring requirements have been made.

SAL Concentration/Standards Updates
SAL pollutant levels have been updated and now come from a regional subset of nationwide Phase I MS4 data. Regional Board staff have chosen to update SALs by using USEPA Climate Zone 6 (arid west) data when computing SALs. Utilizing data from USEPA Climate Zone 6 is expected to produce SALs which closely reflect the environmental conditions experienced in Orange County. The localized subset of data includes sampling events from multiple Southern California locations including Orange, San Diego, Riverside, Los Angeles and San Bernardino Counties. The dataset includes samples taken from highly built-out impervious areas and from storm events representative of Southern California conditions.

Additionally, utilization of regional data is appropriate due to the addition of data into the nationwide Phase I MS4 monitoring dataset in February 2008. This additional data increased the number of USEPA Climate Zone 6 samples to more than 400, and included additional monitoring events within Southern California (see Figure 2).

Figure 2. Sample Sizes Used to Calculate Storm Water Action Levels

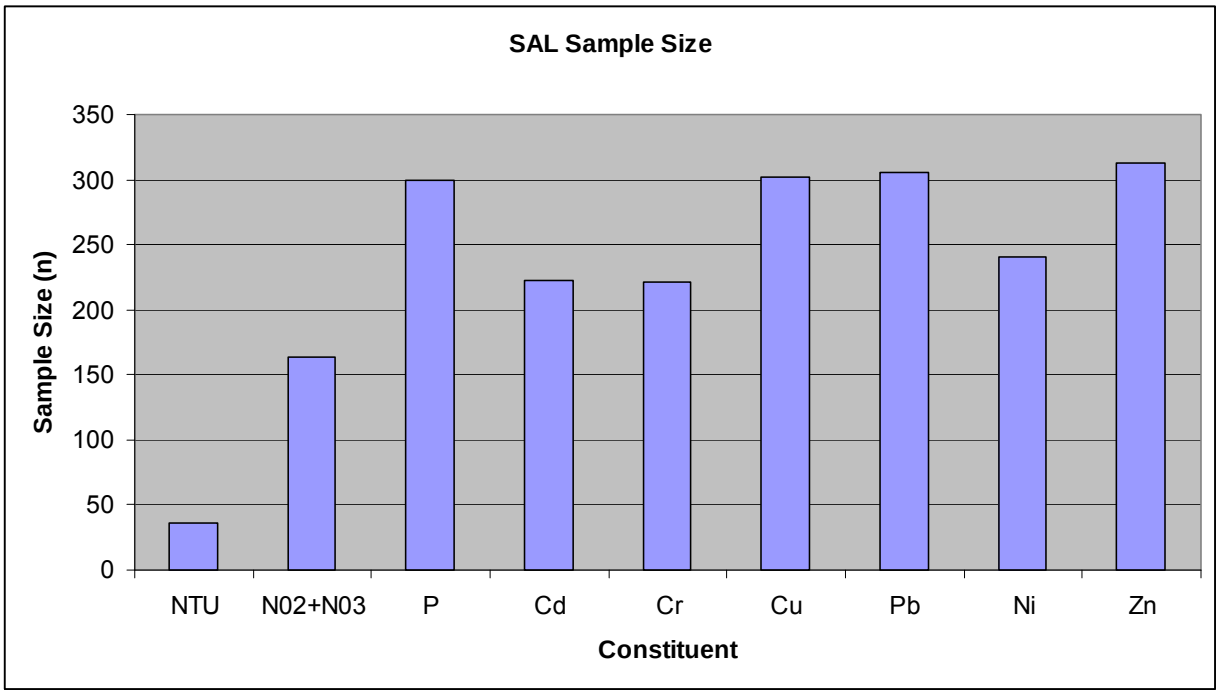

Additional changes have been made by staff to update SALs to reflect the water quality standards in the San Diego Regional Water Quality Control Board Basin Plan, the California Toxic Rule and USEPA Water Quality Criteria. Since it is the goal of the SALs, through the iterative and MEP process, to have outfall storm water discharges meet all applicable water quality objectives, the list of constituents to be tested and protocol for testing has been updated to provide a reference point to evaluate the iterative MEP process. As such, Kjedahl Nitrogen (TKN) and Total Suspended Solids (TSS) have been removed from the SAL table. There currently are no appropriate criteria for TKN or TSS, and alternate constituents are available which do have BPOs for comparative purposes. Instead, Nitrate/Nitrite and Turbidity, which have BPOs of 1.0 mg/L and 20 NTUs respectively, are included with associated SALs.

Metals included in SALs include Cadmium, Chromium, Nickel, Zinc, Lead and Copper. In receiving water quality monitoring collected by the Copermittees to date, these metals have been detected and shown to contribute to toxicity at mass loading stations within Southern Orange County.

Monitoring Updates

SAL language has been updated to require the measurement of hardness and to provide more specificity in the assessment of samples with SALs for total metal concentrations. While USEPA Climate Region 6 data includes a large sample size for concentrations of total metals, the impact the concentration will have on receiving waters will vary with receiving water hardness. Since it is the goal of the SALs,

through the iterative and MEP process, to have MS4 storm water discharges meet all applicable water quality objectives, the hardness of the receiving water should be used when assessing the total metal concentration of a sample. Thus, when an exceedance of a SAL concentration is detected for a metal the Copermittee must determine if that exceedance is above the existing applicable water quality limitation based upon the hardness of the receiving water. The water quality limitations Permittees must use to assess total metal SAL exceedances are the California Toxic Rule (CTR) and USEPA National Recommended Water Quality Criteria for Freshwater Aquatic Life 1 hour maximum concentrations. The 1 hour maximum concentration is to be used for comparison since it is expected to most replicate the impacts to waters of the State from the first flush following a precipitation event.

E. Legal Authority

The following legal authority applies to section E:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.26(d)(2)(i)(A) provides that the Copermittees shall develop and implement legal authority to "Control through ordinance, order or similar means, the contribution of pollutants to the municipal storm sewer by storm water discharges associated with industrial activity and the quality of storm water discharged from sites of industrial activity."

Federal NPDES regulation 40 CFR 122.26(d)(2)(i)(D) provides that the Copermittees shall develop and implement legal authority to "Control through interagency agreements among coapplicants the contribution of pollutants from one portion of the municipal system to another portion of the municipal system."

Illicit discharge is defined under Federal NPDES regulation 40 CFR 122.26(b)(2) as "any discharge to a municipal separate storm sewer system that is not composed entirely of storm water except discharges pursuant to a NPDES permit (other than the NPDES permit for discharges from the municipal separate storm sewer) and discharges resulting from fire fighting activities."

Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(A - D) require municipalities to implement controls to reduce pollutants in storm water runoff from commercial, residential, industrial, and construction land uses or activities.

Federal NPDES regulation 40 CFR 122.26(d)(1)(ii) requires from the Copermittee "A description of existing legal authority to control discharges to the municipal separate storm sewer system."

Section E.1.b Prohibit all identified illicit discharges not otherwise allowed pursuant to section B.2 including but not limited to:

(1) Sewage;
(2) Discharges of wash water resulting from the hosing or cleaning of gas stations, auto repair garages, or other types of automotive services facilities;
(3) Discharges resulting from the cleaning, repair, or maintenance of any type of equipment, machinery, or facility including motor vehicles, cement-related equipment, and port-a-potty servicing, etc.;
(4) Discharges of wash water from mobile operations such as mobile automobile washing, steam cleaning, power washing, and carpet cleaning, etc.;

(5) Discharges of wash water from the cleaning or hosing of impervious surfaces in municipal, industrial, commercial, and residential areas including parking lots, streets, sidewalks, driveways, patios, plazas, work yards and outdoor eating or drinking areas, etc.;
(6) Discharges of runoff from material storage areas containing chemicals, fuels, grease, oil, or other hazardous materials;
(7) Discharges of pool or fountain water containing chlorine, biocides, toxic amounts of salt, or other chemicals; discharges of pool or fountain filter backwash water;
(8) Discharges of sediment, pet waste, vegetation clippings, or other landscape or construction-related wastes; and

Duplicative language has been removed from this section.

Section E.1.j has been added to the Order to ensure that BMPs implemented by third parties are effective. Since the Copermittees cannot passively receive and discharge pollutants from third parties, the Copermittees must ensure discharges of storm water pollutants to the MS4 are reduced to the MEP. In order to achieve this, the Copermittees must be able to ensure that effective BMPs are being implemented by requiring the third parties to document BMP effectiveness. Regarding the Copermittees' ability to require documentation and reporting from third parties, USEPA states "municipalities should provide documentation of their authority to enter, sample, inspect, review, and copy records, etc., as well as demonstrate their authority to require regular reports."[170]

[170] USEPA, 1992. Guidance Manual for the Preparation of Part 2 of the NPDES Permit Applications for Discharges from Municipal Separate Storm Sewer Systems. EPA 833-B-92-002.

F. Jurisdictional Runoff Management Program

F.1. Development Planning

The following legal authority applies to section F.1:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWA section 402(a), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F), 40 CFR 131.12, and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A)(2) provides that Copermittees develop and implement a management program which is to include "A description of planning procedures including a comprehensive master plan to develop, implement and enforce controls to reduce the discharge of pollutants from municipal separate storm sewers which receive discharges from areas of new development and significant redevelopment. Such plans shall address controls to reduce pollutants in discharges from municipal separate storm sewers after construction is completed."

Federal NPDES regulation 40 CFR 122.44(d)(1) requires municipal storm water permits to include any requirements necessary to "[a]cheive water quality standards established under section 303 of the CWA, including State narrative criteria for water quality."

Sections F.1.a and F.1.b (General Plan and Environmental Review Process) require the Copermittees to update and revise their General Plan (or equivalent plan) and environmental review processes to ensure water quality and watershed protection principles are included. The Copermittees are required to detail any changes to the General Plan or environmental review process in their Jurisdictional Runoff Management Program Annual Reports.

The change made to these sections requires updating the General Plan and Environmental Review Process on an as-needed basis, is supported by information provided in the Copermittees' Report of Waste Discharge (ROWD) and Annual Reports. Each Copermittee has either updated, is in the process of updating, or has assessed its General Plan to ensure the General Plans include the required principles and are in compliance with Order No. R9-2002-0001. The ROWD also states that although all the Copermittees have reviewed their environmental review processes, a number of Copermittees want the overall planning approval process to more effectively ensure that water quality protection is considered in the earliest phases of project consideration.

Section F.1.a has been modified to include redevelopment projects in the General Plan. This change requires Copermittees to update their General Plan to include water quality and watershed protection for all new development and redevelopment projects.

Section F.1.c (Approval Process Criteria and Requirements) requires that all development projects (regardless of size) implement BMPs to reduce storm water pollutant discharges to the MEP. Source control and site design BMP requirements were not clearly described in this section of Order No. R9-2002-0001. Additional detail has been added to this section to better describe the source control and site design BMPs needed for implementation. This additional detail is consistent with the requirements of the SSMP, known in Orange County as the Water Quality Management Plan (WQMP). However, only source control and site design BMPs that apply to all types of development projects are required (i.e., properly designed trash storage areas).

The requirements are consistent with Order No. R9-2002-0001, section F.1.b.1. However, some elements are not contained in the current or proposed DAMP[171] (e.g., buffer zones). One exception is that Order No. R9-2002-0001's requirement that applicants must provide evidence of coverage under the General Industrial Permit has been removed, since industrial tenants for a development project are usually not known during the planning stage.

The section has been modified to reflect the prohibition of over-irrigation runoff to the MS4, as well as LID requirements. Additionally, this section requires the use of native and/or low water use plants for landscaping, where feasible.

Sections F.1.d and F.1.d.(1) (Standard Storm Water Mitigation Plans) require the Copermittees to review and update their local SSMPs (also known in Orange County as Water Quality Management Plans – WQMPs) for compliance with the Order. The sections also require all Priority Development Projects falling under certain categories to meet SSMP requirements. The update is necessary to ensure that the Copermittees' local SSMPs are consistent with the changes that have been made to the Order's SSMP requirements. The requirement for the development/adoption of a Model SSMP has been removed since a model was completed and adopted in 2003.

The SSMP section of the Order has been reformatted for clarity. There are also some significant changes. Changes have been made in response to experience gained by the Orange County Storm Water program, USEPA program evaluations, recent BMP development and effectiveness studies, recent reports on the magnitude of problems caused by hydromodification, and reviews of annual reports and the ROWD submitted by the Copermittees.

[171] Orange County Storm Water Copermittees. *Drainage Area Management Plan (DAMP) 2007.* July 21, 2006. The 2007 DAMP was submitted to the Regional Board with the Report of Waste Discharge as part of the application for NPDES Permit reissuance.

In addition, the Order requires that a one-acre threshold be phased in over three years for the priority development category. This threshold was selected to be consistent with the Phase II NPDES regulations for small municipalities. The one-acre determination applies to the amount of ground area disturbed, not the total size of the parcel or project. Each Copermittee may also lower this threshold if desired.

Section F.1.d.(2) (Priority Development Project Categories) includes several changes to improve, simplify, and clarify the Priority Development Project categories.

The most significant change is that where a new Development Project feature, such as a parking lot, falls into a Priority Development Project Category, the entire project footprint is subject to SSMP requirements. This criterion was not included in Order No. R9-2002-0001. It is included, however, in the Model San Diego SSMP that was approved by the Regional Board in 2002. It is included in this Order because existing development inspections by Orange County municipalities show that facilities included in the Priority Development Project Categories routinely pose threats to water quality. This permit requirement will improve water quality and program efficiency by preventing future problems associated with partly treated storm water runoff from redevelopment sites. This approach to improving storm water runoff from existing developments is practicable because municipalities have a better ability to regulate new developments than existing developments.

Industrial sites and retail gasoline outlets have been added to the priority development categories. This heavy industrial category was not included in Order No. R9-2002-0001 because industrial NPDES requirements already establish storm water criteria. This category is included in the Order to be consistent with Phase II rules and to close loopholes. A discussion of retail gasoline outlets is below.

The criterion for commercial developments has been lowered to one acre from 100,000 square feet (2.3 acres). It is modified in order to be consistent with USEPA Phase II guidance, and to reflect the findings from Permittees that smaller commercial developments pose high threats to storm water discharges.

Housing and restaurant criteria have been clarified. The two housing development categories are now combined into one category that includes 10 or more housing units. In addition, requirements which specifically apply to restaurants have been combined in this section. The section has been modified to clarify that restaurants with less than 5,000 square feet of development are subject to SSMP requirements, except for the treatment control BMP and hydromodification control requirements. This is consistent with Order No. R9-2002-0001's approach for applying SSMP requirements to restaurants.

Section F.1.d.(2)(j) includes Retail Gasoline Outlets (RGOs) as a Priority Development Project category because RGOs are points of confluence for motor vehicles for automotive related services such as repair, refueling, tire inflation, and radiator fill-up. RGOs consequently produce significantly greater pollutant loadings of hydrocarbons and trace metals (including copper and zinc) than other developed areas. To meet the storm water MEP standard, source control and structural treatment BMPs are needed at RGOs that meet the following criteria: (a) 5,000 square feet or more of developed area, or (b) a projected average daily traffic of 100 or more vehicles per day. These are appropriate thresholds since development size and volume of traffic are good indicators of potential impacts of runoff from RGOs on receiving waters. RGOs were proposed, but not included in Order No. R9-2002-0001 pending guidance from the State Board in its review of the San Diego MS4 Permit, Order No. 2001-0001.

In State Board WQ Order No. 2000-11, the State Board removed RGOs as a SSMP category because the State Board found that RGOs were already heavily regulated and limited in their ability to construct infiltration devices or perform treatment. Order No. 2000-11 also acknowledged that a threshold (size, average daily traffic, etc.) appropriate to trigger SSMP requirements should be developed, and that specific findings regarding RGOs should be included in MS4 permits to justify the requirement.[172] The State Board also removed the RGO category from the San Diego County MS4 permit (Order No. 2001-01) because the Regional Board did not specifically address the issues raised in WQ Order No. 2000-11.

As discussed further below, the LARWQCB and the Regional Board have adequately addressed these issues. RGOs have been included as a SSMP category in the Los Angeles County MS4 permit (Order No. R4-01-182), the statewide general Phase II MS4 permit (WQ Order No. 2003-0005-DWQ), and the Regional Board Southern Riverside County MS4 permit (Order No. R9-2004-001). The State Board also addressed the inclusion of RGOs through the appeals of MS4 permits issued by the Los Angeles and San Francisco Bay Area Regional Boards. The State Board held a workshop addressing RGOs and identified RGOs as significant sources of pollutants. The State Board then dismissed the petitions for removal of RGOs from the SSMP requirements in the Los Angeles and San Francisco Bay Area MS4 permits.

Inexpensive and effective structural treatment BMPs which reduce storm water pollutants and control peak flow rates and velocities are available for use at RGOs. Studies have shown that some catch basin inserts can remove hydrocarbons and heavy metals, which are typical pollutants of concern at RGOs. Sand or media filters have also been found to be effective and available for use at RGOs. Site design measures to control flow include cisterns, small weirs, baffles, and redirecting roof runoff to pervious areas.

[172] State Board, 2000. Order WQ 2000-11.

No evidence has been provided to indicate that use of these structural BMPs at RGOs will pose a safety risk. In fact, filter BMPs have been installed at RGOs in some municipalities without apparent adverse safety effects. In addition, similar BMPs such as oil/water separators have been used for years by RGOs without safety problems.

Threshold - Studies indicate that runoff from RGOs contains similar pollutants to runoff from commercial parking lots. In precedential WQ Order 2000-11, the State Board determined that parking lots with a size threshold of 5,000 square feet or more is an appropriate SUSMP category. Based in part on the similarity of pollutants, the 5,000 square feet size threshold was also included for RGOs in the Order. In addition, other municipalities currently use similar size thresholds for RGOs when requiring design standards to mitigate storm water runoff. To provide additional flexibility for the Copermittees, another threshold of 100 or more motor vehicles ADT has been added to the Order. This threshold is based on requirements used in Washington and Oregon for what are considered “high use” sites. This is an appropriate threshold since vehicular traffic is a good indicator of the amount of pollutants generated at a site.

The Regional Board followed the State Board’s direction regarding RGOs by including the above discussion in this Fact Sheet, as well as a specific finding that justifies the regulation of runoff from RGOs that meet certain criteria. Considering all of the supporting documentation discussed above, it is appropriate to include RGOs as a Priority Development Project category.

Additional detailed supporting information can be found in the 2001 technical report titled *Retail Gasoline Outlets: New Development Design Standards for Mitigation of Storm Water Impacts* by the LARWQCB and the Regional Board.

Section F.1.d.(3) (Pollutants of Concern) requires Copermittees to update their procedures for identifying pollutants of concern for each Priority Development Project. This is important to do periodically because of changing water quality conditions and designations of impairments or areas of concern. Furthermore Copermittees continually learn more about pollutant-generating activities as they conduct inspections and investigations, and that information must be incorporated into the SSMP process.

Section F.1.d.(4) This Section has been modified to clarify some elements of low impact development. This section requires Copermittees to require or implement site design BMPs at Priority Development Projects in order to reduce the amount of polluted storm water runoff from those sites. The primary approach in site design BMPs is to limit the permanent loss of existing infiltration capacity because loss of infiltration is a major contributor to wet weather pollution discharges. General means to accomplish that goal include retaining natural infiltration areas of a site and limiting the amount of impervious surfaces. The Order does not require a specific or relative amount of pervious surfaces be added to a project. The Order seeks to retain on-site capture of the 85th percentile storm.

The site design BMP options listed in these sections are consistent with the site design BMPs currently required by the Copermittees in the Model WQMP. In the ROWD, the Copermittees propose to improve the process of selecting site design BMPs. Specifically, they propose to develop recommendations for incorporating low-impact design (LID) techniques and site design BMPs. However, the Model WQMP employs an open-ended approach to requirements for site design BMPs, requiring implementation of site design BMPs "where applicable and feasible" and "where appropriate." Unfortunately, this approach has proven to be ineffective in integrating site design BMPs in project designs. Audits conducted in 2005 of four Copermittees found that municipalities need to work with project applicants to improve the quality of site design BMPs.[173] As a result, the Order establishes two sets of site design BMP criteria.

First, section F.1.d.(4)(b) of the Order directs the Copermittees to require, rather than consider, new development projects to employ certain classes of site design BMPs. The required site design BMPs take advantage of features that are incorporated into the Priority Development Project, such as landscaping or walkways. It also requires that projects seek to maintain natural water drainage features rather than instinctively convey water in buried pipes and engineered ditches that eliminate natural water quality treatment functions. These types of site design BMPs are both effective and achievable. These requirements are consistent with the guidelines of Order No. R9-2002-0001 and both the 2003 and 2007 DAMPs.[174]

Next, section F.1.d.(4)(d) of the Order requires that LID BMPs be sized and designed to ensure onsite retention without runoff, of the volume of runoff produced from a 24-hour 85th percentile storm event. This is consistent with other municipal stormwater NPDES permits recently adopted by the Los Angeles and Santa Ana Regional Boards. In those permits, the stakeholders were involved in drafting the numerical performance criteria. The requirement for a numerical BMP design standard is well established for treatment control BMPs and is required in permits throughout the nation such as in Pennsylvania, West Virginia, Georgia, and Washington D.C. Since the 85th percentile storm event has previously been used as the numeric design standard for treatment control BMPs; the same size storm event can be applied as the numeric design standard for LID BMPs. According to information provided by the County of Orange, the 24 hour, 85th percentile rainfall is between 0.7 to 0.8 inches of rain for the majority of the area covered by this permit.

[173] Tetra Tech, Inc. 2005. Program Evaluation Report. Orange County Storm Water Program: Cities of Laguna Beach, Laguna Hills, Lake Forest, and Rancho Santa Margarita.
[174] The 2003 and 2007 DAMPs include preserving natural drainage features as a recommended site design BMP requirement that was to be reviewed and used where applicable and feasible. The DAMPs note this as a way to mimic a site's natural hydrologic regime.

The retention of natural drainage features, such as ephemeral streams, wetlands, and depressions, can be particularly important because small tributaries are essential to the maintenance of the chemical, biological, and physical integrity of larger waterbodies.[175] The loss and modification of such natural water resources to accommodate post-development storm water management leads to direct and indirect adverse effects on water quality that are felt both on the project site and off the site within the watershed.[176,177,178] Effects to aquatic beneficial uses from altered drainage features can occur downstream and upstream. The length of upstream or downstream effect of channel modifications is dependant on the specific structure type and channel slope.[179] For instance, road culverts can act as partial barriers to upstream distribution of native aquatic macroinvertebrates in urban streams, while bridges can provide adequate passage.[180] As a result of the adverse effects to water quality and beneficial uses, the State of California nonpoint source pollution program management measures for urban areas includes limiting the destruction of natural drainage features and natural conveyance areas. [181]

Through its process of conditioning development projects under the CWA section 401 Water Quality Certification program, the Regional Board finds that the level of site design BMP implementation in the Order is feasible for all projects. This site design BMP requirement will help ensure that site design BMPs are implemented for new development projects. Site design BMPs are a critical component of storm water runoff management at new development projects, since the BMPs provide multiple benefits including preservation of hydrologic conditions, reduction of pollutant discharges, cost effectiveness, and green space.

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[175] Aquatic scientists comment letter (April 10, 2003) on the Advanced Notice of Proposed Rulemaking (ANPRM) on the Clean Water Act Regulatory Definition of "Waters of the United States." (Docket ID No. OW-2002-0050). This letter is a synthesis of scientific information regarding ephemeral, intermittent, and headwater streams. It was written to USEPA by 85 leading aquatic scientists.

[176] Wright, Tiffany, et al. 2006. *Direct and Indirect Impacts of Urbanization on Wetland Quality.* Prepared by the Center for Watershed Protection for the USEPA Office of Wetlands, Oceans, an Watersheds. 81p. Available on-line at http://www.cwp.org

[177] Konrad, Christopher P. and Derek K. Booth, 2005. *Hydrologic Changes in Urban Streams and Their Ecological Significance.* American Fisheries Society Symposium. Vol. 45 pp.157-177.

[178] Coleman, Derrick, et al. 2005. *Effect of Increases in Peak Flows and Imperviousness on the Morphology of Southern California Streams*. Technical Report No. 450 of the Southern California Coastal Water Research Project.

[179] Fischenich, J.C. 2001. "*Impacts of stabilization measures*," EMRRP Technical Notes Collection (ERDC TNEMRRP- SR-32), U.S. Army Engineer Research and Development Center, Vicksburg, MS. http://www.wes.army.mil/el/emrrp

[180] Blakely, Tanya J., et al. 2006. *Barriers To The Recovery Of Aquatic Insect Communities In Urban Streams* Freshwater Biology Vol. 51(9), 1634–1645.

[181] California Nonpoint Source Encyclopedia, Management Measure 3.1.b. Runoff from Developing Areas, Site Development and Management Measure 3.3.a. Runoff from Existing Development, Existing Development.

The site design BMP options listed do not need to be costly.[182] Some design options, such as concave vegetated surfaces or routing rooftop or walkway runoff to landscaped areas, are cost neutral.[183] Other site design BMPs, such as minimizing parking stall widths or use of efficient irrigation devices, are oftentimes already required. In addition, use of site design BMPs reduces storm water runoff quantity, allowing for treatment control BMPs and other storm water infrastructure on site to be smaller, therefore savings costs for both developers and municipalities.[184,185]

Because of the potential economic and environmental benefits of using low-impact development site design, the U.S. Department of Housing and Urban Development, Office of Policy Development and Research, developed "*The Practice of Low Impact Development (LID)*" to assist the housing industry during the land development process. [186] This document focuses specifically on technologies that affect both the cost impacts and environmental issues associated with land development. Much of the report focuses on storm water management because low-impact development storm water management systems can save capital costs for developers and maintenance costs for municipalities.[187] The executive summary of the HUD report notes:

> *This approach to land development, called Low Impact Development (LID), uses various land planning and design practices and technologies to simultaneously conserve and protect natural resource systems and reduce infrastructure costs. LID still allows land to be developed, but in a cost-effective manner that helps mitigate potential environmental impacts. LID is best suited for new, suburban development.*

Developers can use site and structure designs that reduce building footprints, decrease the amount of paved infrastructure, and provide for dispersed drainage and infiltration of runoff from impervious surfaces to reduce the effective impervious surface.[188] The concept of effective impervious surface is important, because when runoff from these surfaces is directed to pervious areas rather to an impervious drainage system (i.e., curbs, gutters, street surfaces, storm drain pipes), it can infiltrate, evaporate, or be taken up by vegetation, thereby reducing the total volume of storm water runoff leaving a site.

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[182] USEPA, 2000. Low-Impact Development: A literature review. EPA-841-B-00-005. 35p.
[183] Bay Area Stormwater Management Agencies Association., 1999. Start at the Source. Forbes Custom Publishing. Available on-line at: http://www.scvurppp-w2k.com/basmaa_satsm.htm. pp. 149.
[184] National Association of Home Builders Research Center. *Builders Guide to Low Impact Development.* Available on-line at http://www.toolbase.org
[185] National Association of Home Builders Research Center. *Municipal Guide to Low Impact Development.* Available on-line at http://www.toolbase.org
[186] U.S. Department of Housing and Urban Development, Office of Policy Development and Research, 2003. *The Practice of Low Impact Development."* Prepared by: NAHB Research Center, Inc. Upper Marlboro, Maryland. Contract No. H-21314CA.
[187] Ibid. Executive Summary, p.x.
[188] Bay Area Stormwater Management Agencies Association. 2003. *Using Site Design Techniques to Meet Development Standards for Stormwater Quality*. Available on-line at: http://www.basmaa.org/

The Order continues to provide the Copermittees with flexibility in implementing site design BMP requirements by providing a LID BMP waiver program.

Section F.1.d.(5) (Source Control BMP Requirements) requires that Priority Development Projects implement minimum source control BMPs. This section has been added to provide more detail and clarify the Order's requirements for source control BMPs. The minimum source control BMPs listed in the section are consistent with the Model WQMP.

Section F.1.d.(6) (Treatment Control BMP Requirements) is consistent with Order No. R9-2002-0001, with two exceptions. First, the Order limits the selections of methods used to determine the appropriate volume of storm water runoff to be treated. The modification ensures that priority development project proponents utilize the most accurate information to determine the volume or flow of runoff which must be treated. Using detailed local rainfall data, the County of Orange has developed the 85th Percentile Precipitation Isopluvial Map, which exhibits the size of the 85th percentile storm event throughout Orange County.[189] Since this map uses detailed local rainfall data, it is more accurate for calculating the 85th percentile storm event than other methods which were included in Order No. R9-2002-0001. The other methods found in Order No. R9-2002-0001 were included as options to be used in the event that detailed accurate rainfall data did not exist for various locations within Orange County. The development of the 85th Percentile Precipitation Isopluvial Map makes these other less accurate methods superfluous. Therefore, these other methods for calculating the 85th percentile storm event have been removed from the current Order.

Second, the Order requires that treatment control BMPs selected for implementation at Priority Development Projects have a removal efficiency rating that is higher than the "low removal efficiency," as presented in the Model SSMP/WQMP. The requirement allows exceptions for those projects that, with a feasibility analysis, can justify the use of a treatment control BMP with a low removal efficiency for a Priority Development Project. This requirement is needed because to date, the Copermittees have generally approved low removal efficiency treatment control BMPs without justification or evidence that use of higher efficiency treatment BMPs was considered and found to be infeasible. Specifically, it has been found during audits of the Copermittees' SSMP programs that many SSMP reports do not adequately describe the selection of treatment control BMPs.[190] Moreover, USEPA's contractor Tetra Tech, Inc. recommends that "project proponents should begin with the treatment control that is most effective at removing the pollutants of concern […] and provide justification if that treatment control BMP is not selected."[191]

[189] The isopluvial map can be found as Exhibit 7.II in the Model WQMP.
[190] Tetra Tech, Inc. 2005. Program Evaluation Report. Orange County Storm Water Program: Cities of Laguna Beach, Laguna Hills, Lake Forest, and Rancho Santa Margarita.
[191] Tetra Tech, Inc., 2005. Program Evaluation Report –San Diego Standard Urban Storm Water Mitigation Plan (SUSMP) Evaluation. P. 5.

In the ROWD, the Copermittees acknowledge the need for further attention to the selection and implementation of effective treatment BMPs. They propose to revise the model WQMP table of BMP effectiveness. The requirement is needed to provide clarification that selection of low efficiency treatment control BMPs over high efficiency BMPs without justification does not meet permit requirements and is not in compliance with the storm water MEP standard.

In addition, treatment control BMPs must be designed and implemented with measures to avoid the creation of nuisance or pollution associated with vectors, such as mosquitoes, rodents, and flies. Related guidelines are identified in guidance from CASQA.[192] Additional considerations are outlined in publications from the California Department of Health Services and University of California Division of Agriculture and Natural Resources.[193]

Section F.1.d.(7). (Low-Impact Design BMP Waiver Program) allows Copermittees to develop a LID BMP waiver program, under which projects where it is technically infeasible to implement the required LID BMPs could substitute with treatment control BMPs and a mitigation project, payment into an in-lieu funding program, and/or watershed equivalent BMPs. Some sites may be technically infeasible to implement the required LID BMPs due to the site constraints. For this reason, the Regional Board has added to the Order a requirement for the Copermittees to develop such a program. The program would provide the opportunity for development projects to avoid partial or full LID BMP implementation in exchange for implementation of treatment control BMPs and mitigation. The program would maintain equal water quality benefits as properly implemented LID BMPs when partial LID BMPs are coupled with a mitigation project or in-lieu funding.

The Order includes specific minimum requirements so that the program will achieve similar water quality benefits. Any program which allows development projects to forgo LID BMP implementation must include provisions which will achieve similar water quality benefits. To ensure that this is the case for the LID BMP waiver program, minimum provisions for the program have been added to the Order

[192] For example, see the California Stormwater BMP Handbook guidelines for Extended Detention Basins (TC-22) at http://www.cabmphandbooks.org.
[193] Marco Metzger. "Managing Mosquitoes in Stormwater Treatment Devices." University of California Division of Agriculture and Natural Resources Publication No. 8125. Available at http://anrcatalog.ucdavis.edu.

Section F.1.d.(8). (BMP Design Standards) addresses a need for the Copermittees to develop and apply consistent criteria for the design and maintenance of structural treatment BMPs. Correct BMP design is critical to ensure that BMPs are effective and perform as intended. Without design criteria, there is no assurance that this will occur, since there is no standard for design or review. As an example, Ventura County has developed a BMP manual that includes standard design procedure forms for BMPs. Ventura County's *Technical Guidance Manual for Storm Water Quality Control Measures* is available at http://www.vcstormwater.org/ publications.htm."[194] California Stormwater Quality Association (CASQA) also confirms the necessity of design criteria when it includes such criteria in its New Development and Redevelopment BMP Handbook.[195] This issue is noted in the ROWD, and the Copermittees propose to develop standard design checklist/plans/details for selected source control and treatment BMPs.

Section F.1.d.(9). (Implementation process) requires the Copermittee to implement a process to verify compliance with SSMP requirements. As part of the SSMP, requires identification at what point in the planning process that projects must meet SUSMP requirements and what are roles/responsibilities of municipal departments. The intent of this requirement is to provide consistency in the application of the SSMPs between the Copermittees. This requirement was included in previous Order No. R9-2002-0001.

Section F.1.d.(10) (Annual Review of Treatment BMPs) requires Copermittees to keep their SSMPs up to date with BMP effectiveness studies for low-impact design and treatment control BMPs. The ROWD includes commitments to develop a library of BMP performance reports and to revise the model WQMP table for the latest information on BMPs. This requirement will ensure that two important types of information be included in those efforts: Site design BMPs and treatment BMPs that are assessed as part of contracts with the State Board and Regional Board. The later types of projects include those funded with Clean Beach Initiative grants and other grants. Projects funded with such state grants must include effectiveness assessments using a quality assurance plan. As a result, such studies generally provide reliable sources of local data and should be included in local SSMPs.

[194] Ibid.
[195] California Stormwater Quality Association, 2003. Stormwater Best Management Practice Handbook – New Development and Redevelopment.

Sections F.1.e and F.1.f. (BMP Verification and Treatment BMP Maintenance Tracking) are included in the Order to improve the effectiveness of the BMP requirements. They are included in response to findings from the Audits[196] and recommendations from USEPA.[197] The Copermittees recognize a need to improve the verification of post-construction BMPs. The 2007 DAMP proposes to verify 90 percent of WQMPs (including structural and non-structural BMPs) by inspection, self-certifications, surveys or other means. The Regional Board finds that 90 percent is a reasonable annual target, but considers inspections to be essential to achieve optimal results. Therefore, the Order requires high priority sites to be inspected annually, and allows other measures to be used for lower priority treatment control BMPs.

Section F.1.h. (Hydromodification) expands and clarifies current requirements for control of MS4 discharges to limit hydromodification effects caused by changes in runoff resulting from development and urbanization. The requirements are based on findings and recommendations of the Orange County Storm Water Program, the Stormwater Monitoring Coalition (SMC),[198,199] and the Storm Water Panel on Numeric Effluent Limits (Numeric Effluent Panel).[200] Added specificity is needed due to the current lack of a clear standard for controlling hydromodification resulting from development. More specific requirements are also warranted because hydromodification is increasingly recognized as a major factor affecting water quality and beneficial uses, and the Copermittees have proposed only vague and voluntary modifications to the Model WQMP. The Order is intended to ensure the intent of the proposed modifications is incorporated into each Copermittees' SSMP.

[196] The 2005 audits performed by Tetra Tech, Inc. found that cities are not tracking post-construction BMPs. The final audit report recommended (Section 2.1.2) that each city should develop a system to verify implementation and track post-construction BMPs to ensure that they are adequately maintained.
[197] Federal Register / Vol. 64, No. 235 / Wednesday, December 8, 1999 / Rules and Regulations. P. 68845. USEPA recommends such practices in the Phase II storm water regulations, promoting "inspections during construction to verify BMPs are built as designed."
[198] Coleman, Derrick, et al. 2005. *Effect of Increases in Peak Flows and Imperviousness on the Morphology of Southern California Streams.* Technical Report No. 450 of the Southern California Coastal Water Research Project.
[199] Stein, Eric and Susan Zaleski. 2005. Managing Runoff to Protect Natural Streams: The Latest Developments on Investigation and Management of Hydromodification in California. Proceedings of a special technical workshop co-sponsored by California Stormwater Quality Association (CASQA), Stormwater Monitoring Coalition (SMC), and University of Southern California Sea Grant (USC Sea Grant). Technical Report No. 475 of the Southern California Coastal Water Research Project.
[200] Storm Water Panel Recommendations to the California State Water Resources Control Board. 2006. The Feasibility of Numeric Effluent Limits Applicable to Discharges of Storm Water Associated with Municipal, Industrial, and Construction Activities.

Hydromodification is the change in a watershed's runoff characteristics resulting from development, together with associated morphological changes to channels receiving the runoff. As the total area of impervious surfaces increases, infiltration of rainfall decreases, causing more water to run off the surface and at a higher velocity. Runoff from developed areas can produce erosive flows in channels under rainfall conditions which were not previously problematic. Moreover, runoff from developed areas increases the duration of time that channels are exposed to erosive flows. The increase in the volume of runoff and the length of time that erosive flows occur ultimately intensify sediment transport, causing changes in sediment transport characteristics and the hydraulic geometry (width, depth, and slope) of channels.[201]

These types of changes have been documented in southern California. It has been reported that researchers studying flood frequencies in Riverside County have found that increases in watershed imperviousness of only 9-22 percent can result in increases in peak flow rates for the two-year storm event of up to 100 percent.[202] Such changes in runoff have significant impacts on channel morphology. It has recently been found that ephemeral/intermittent channels in southern California appear to be more sensitive to changes in imperviousness than channels in other areas. Morphology of small channels in southern California was found to change with only 2-3 percent watershed imperviousness, as opposed to 7-10 percent watershed imperviousness in other parts of the nation.[203]

Effects of hydromodification are evident in southern Orange County and recognized by the Copermittees. Analyses of bioassessment data, for example, indicate that physical changes to stream channels caused by hydromodification are likely responsible, in part, for the low bioassessment scores in urbanized settings.[204] It is important to recognize that the physical changes are a direct result of MS4 discharges, but that two separate mechanisms are involved. First, is a change in the flow regime caused by the increase in impervious surfaces and loss of natural conveyance systems. Discharges to receiving waters from the MS4 outfalls do not mimic the natural discharges from former tributaries to that receiving water, and the change results in erosion. Second, the physical stream habitat in many places has been severely modified in order to efficiently convey those increased storm water discharges to the ocean. Where streams are hardened and/or buried to convey storm water, they cannot provide adequate water quality and other necessary conditions to support beneficial uses. Both of these issues are addressed in the Order.

[201] Santa Clara Valley Urban Runoff Pollution Prevention Program, 2005. Hydromodification Management Plan. P. 1-1.
[202] Schueler and Holland, 2000. Storm Water Strategies for Arid and Semi-Arid Watersheds (Article 66). The Practice of Watershed Protection.
[203] Coleman, et. al., 2005. Effect of Increases in Peak Flows and Imperviousness on the Morphology of Southern California Streams. P. iv.
[204] See Chapter 11 of the ROWD and the 2005-06 Unified Annual Report for the analyses.

The Copermittees' recognize the need to improve management of hydromodification. The ROWD proposes to revise the Model WQMP to incorporate additional information from ongoing hydromodification studies conducted by the SMC. The Order allows the Copermittees to adopt criteria consistent with future SMC findings in the development of their Hydromodification Management Plan (see below).

Section F.1.h. requires the Copermittees to submit a Hydromodification Management Plan (HMP) within two years of permit adoption. This is consistent with other Southern California MS4 permits and in direct response to comments from the USEPA on Tentative Order R9-2008-001.

Section F.1.h (1) describes several elements that must be included in the HMP. For example, the HMP must identify a method for assessing susceptibility of channel segments which receive runoff discharges from Priority Development Projects, and include a channel standard to ensure that the stability of the channel is not compromised as a result of discharges from the Priority Development Projects. The HMP must also identify a range of flows where Priority Development Projects could cause hydromodification effects and subsequent stream instability.

Additionally, the HMP must require Priority Development Projects to implement hydrologic control measures (such as LID or detention basins) to prevent hydromodification and resultant degradation of stream conditions downstream of project sites. To compare post-project flow rates and durations to pre-project flow rates and durations, the HMP must specify that the pre-developed (naturally occurring) flow rates and durations shall be used when assessing pre-project conditions, so that the naturally occurring hydrology is eventually restored.

In cases where a stream has been armored with concrete, rip rap, or other man-made materials, the HMP shall require the assessment of a comparable soft-bottom channel as the channel standard, as opposed to using the characteristics of the hardened channel as the channel standard. This is to ensure that hydromodification management measures are already in place should any portion of the hardened channel be returned to its natural state, thereby restoring the physical integrity of the creek and its Beneficial Uses. For this reason, the waiver provision for hydromodification management measures for projects discharging into hardened channels was deleted from the Tentative Order. The remaining exception is for projects that discharge storm water runoff into underground storm drains discharging directly into bays or the ocean and for projects discharging to waters where the entire channel bed and banks have been concrete lined all the way to ocean receiving waters.

The HMP must also include metrics for assessing impacts to downstream watercourses from Priority Development Projects, as well as assessing improvements to these watercourses. One metric that must be included is the Index of Biotic Integrity (IBI) score for benthic macroinvertebrates. This is because historic hydromodification

impacts, such as concrete lining and channelization, have impacted the natural physical habitat of urban streams resulting in low IBI scores. The Copermittee's 2006-2007 monitoring indicated decreased IBI scores in the urbanized watersheds. In the absence of water chemistry and toxicity impacts, these low scores were attributed to be a result of poor physical habitat conditions.[205] Therefore, the IBI score will be a useful metric in terms of assessing both impacts to streams from Priority Development Projects and improvements due to implementation of management measures.

In addition to the hydrologic control measures that must be included in the HMP to prevent or minimize hydromodification effects from Priority Development Projects, the HMP must also include additional measures to be used on Priority Development Projects based on a prioritized consideration of the following elements in this order: 1) site-design hydrologic control measures, 2) on-site management measures, 3) the use of regional controls upstream of receiving waters, and lastly, 4) in-stream controls (not to include reinforcement with non-naturally occurring materials). The suite of management measures must also include stream restoration as a viable option to achieve the channel standard and subsequently restore Beneficial Uses.

Section F.1.h (5) describes interim hydromodification criteria that must be implemented by the Copermittees within one year of adoption of the Tentative Order and concurrent to development of the local HMP. The values chosen for the interim criteria are those currently being implemented by Copermittees in the San Diego area.

Finally, the requirements included in section F.1.h do not supersede the requirements for LID presented in section F.1.d. (4). In certain situations, the requirements to incorporate LID will satisfy the requirements for hydromodification management. For example, detention basins are a common BMP used to manage high flow rates but behave hydrologically different than distributed systems used in LID. Using LID is a viable option for both accomplishing hydromodification management and pollutant load reductions.

F.2. Construction

The following legal authority applies to section F.2:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv).

[205] Orange County Copermittees, November 15, 2007. 2006-2007 Unified Annual Progress Report Program Effectiveness Assessment (San Diego Region).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(D) provides that the proposed management program include "A description of a program to implement and maintain structural and non-structural best management practices to reduce pollutants in storm water runoff from construction sites to the municipal storm sewer system."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(D)(1) provides that the proposed management program include "A description of procedures for site planning which incorporate consideration of potential water quality impacts."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(D)(2) provides that the proposed management program include "A description of requirements for nonstructural and structural best management practices."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(D)(3) provides that the proposed management program include "A description of procedures for identifying priorities for inspecting sites and enforcing control measures which consider the nature of the construction activity, topography, and the characteristics of soils and receiving water quality."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(D)(4) provides that the proposed management program include "A description of appropriate educational and training measures for construction site operators."

Federal NPDES regulation 40 CFR 122.26(d)(2)(i)(A) provides that each Copermittee must demonstrate that it can control "through ordinance, permit, contract, order or similar means, the contribution of pollutants to the municipal storm sewer by storm water discharges associated with industrial activity and the quality of storm water discharged from site of industrial activity."

Federal NPDES regulation 40 CFR 122.26(b)(14) provides that "The following categories of facilities are considered to be engaging in 'industrial activity' for the purposes of this subsection: […] (x) Construction activity including cleaning, grading and excavation activities […]."

Federal NPDES regulation 40 CFR 122.44(d)(1)(i) requires NPDES permits to include limitations to "control all pollutants or pollutant parameters (either conventional, nonconventional, or toxic pollutants) which the Director determines are or may be discharged at a level which will cause, have reasonable potential to cause, or contribute to an excursion above any State water quality standard, including State narrative criteria for water quality."

Section F.2 has additions to ensure the protection of threatened and endangered species and requires the consideration of potential impacts from the use of Active Treatment Systems. These requirements were added to ensure additional protection of the Beneficial Uses of waters of the State.

Section F.2.a. (Ordinance Update) requires each Copermittee to review and update its grading and storm water ordinances as necessary to comply with the MS4 permit. By updating the grading and storm water ordinances, the Copermittees will have the necessary legal authority to require construction sites to implement effective BMPs that will reduce pollutant discharges to the maximum extent practicable. The Order allows the Copermittees 365 days to review and update their ordinances. The 365 days should be adequate to allow for the relatively minor changes that might be needed since their ordinances were last updated under Order No. R9-2002-0001.

Section F.2.b. (Source Identification) requires the Copermittees to develop and update a watershed based inventory of all construction sites regardless of size or ownership. This section has been modified to require the inventory be updated regularly, rather than annually. More frequent updates will ensure the Copermittees have a more accurate inventory of construction sites within their jurisdiction. A regularly updated inventory of active construction sites will assist the Copermittees in ensuring that all sites are inspected per Order requirements. The Order does not specify the frequency of updates, and instead relies on each Copermittee to develop updates appropriate to local construction activity. The 2007 DAMP proposes that the inventory be updated "at a minimum" prior to the start of the rainy season. Such a minimum standard may not be appropriate for each Copermittee. Failure to maintain a useful inventory would be a violation of the Order.

Section F.2.c. (Site Planning and Project Approval Process) requires Copermittees to incorporate consideration of potential water quality impacts prior to approval and issuance of construction and grading permits. The Copermittees[206] and our program evaluations in 2005[207] recommend that storm water requirements need to be better incorporated into the pre-construction process.

[206] Orange County Storm Water Copermittees. 2006. Report of Waste Discharge (San Diego Region), Section 7, New Development.
[207] Tetra Tech, Inc. 2005. Program Evaluation Report. Orange County Storm Water Program: Cities of Laguna Beach, Laguna Hills, Lake Forest, and Rancho Santa Margarita.

This section now requires the Copermittees to review project proponents' runoff management plans for compliance with local regulations, policies, and procedures. USEPA recommends that it is often easier and more effective to incorporate storm water quality controls during the site plan review process or earlier.[208] In the Phase I storm water regulations, USEPA states that a primary control technique is good site planning.[209] USEPA goes on to say that the most efficient controls result when a comprehensive storm water management system is in place.[210] To determine if a construction site is in compliance with construction and grading ordinances and permits, USEPA states that the "MS4 operator should review the site plans submitted by the construction site operator before ground is broken."[211] Site plan review aids in compliance and enforcement efforts since it alerts the "MS4 operator early in the process to the planned use or non-use of proper BMPs and provides a way to track new construction activities."[212] During audits of Orange County Copermittee storm water programs, it was found that site plan and SWPPP review were inadequate and inconsistent.[213]

Section F.2.d. (BMP Implementation) includes modifications to the requirements for each Copermittee to designate and ensure implementation of a set of minimum BMPs at construction sites. These modifications are based on Regional Board findings and experience during implementation of Order No. R9-2002-0001.

[208] USEPA, 1992. Guidance 833-8-92-002. Section 6.3.2.1.
[209] Federal Register / Vol. 55, No. 222 / Friday, November 16, 1990 / Rules and Regulations. P. 48034.
[210] Ibid.
[211] USEPA, 2000. Guidance 833-R-00-002. Section 4.6.2.4, P. 4-30.
[212] Ibid., P. 4-31.
[213] Tetra Tech, Inc. 2005. Program Evaluation Report. Orange County Storm Water Program: Cities of Laguna Beach, Laguna Hills, Lake Forest, and Rancho Santa Margarita.

Unlike Order No. R9-2002-0001, this Order does not require the Copermittee to designate a set of minimum BMPs for high, medium, and low threat to water quality construction sites. This change was made in recognition of most Copermittees' application of one consistent set of BMPs throughout their jurisdictions. The Copermittees also desire to move toward a risk-based approach to BMP requirements.[214] As a result, the Order requires a minimum set of BMPs to be designated for all sites and that enhanced BMPs, including advanced treatment systems, be designated for sites upstream of 303(d) impairments and ESAs. Advanced treatment has been effectively implemented extensively in the other states and in the Central Valley Region of California.[215] In addition, the Regional Board's inspectors have observed advanced treatment being effectively implemented at large sites greater than 100 acres and at small, less than 5 acre, in-fill sites. Advanced treatment is often necessary for Copermittees to ensure that discharges from construction sites are not causing or contributing to a violation of water quality standards. For example, the Basin Plan lists the water quality objective for turbidity as 20 NTU for all hydrologic areas and subareas except for the Coronado HA (10.10) and the Tijuana Valley (11.10). For certain construction sites with large slopes and exposed areas, the only technology that is likely to meet 20 NTU is advanced treatment combined with erosion and sediment controls. To ensure the MEP standard and water quality standards are met, the requirement for implementation of advanced treatment at high threat construction sites has been added to the Order, while still providing sufficient flexibility for each Copermittee's unique program.

[214] Orange County Storm Water Copermittees. 2006. Report of Waste Discharge (San Diego Region), Section 8, Construction
[215] SWRCB, 2004. Conference on Advanced Treatment at Construction Sites.

The Order does not include seasonal restrictions on grading. Seasonal restrictions on grading for storm water are difficult to implement due to the conflict between seasonal grading restrictions, endangered birds' breeding seasons and the seasonal passage of endangered salmonids; therefore the seasonal grading restrictions have not been included with the other BMPs in the Order. Found in southern California, the Least Bell's Vireo and the Coastal California Gnatcatcher are listed as federally endangered and threatened, respectively.[216] Permits issued by the California Department of Fish and Game (CDFG) restrict grading during these birds' breeding seasons, which is from April 10 to August 31 for the Least Bell's Vireo[217] and from February 15 to August 31 for the Coastal California Gnatcatcher.[218] Ideally storm water restrictions on grading would be during the wet season from October 1 through April 30.[219] Combined, these restrictions would limit construction grading to be during the month of September, which is infeasible. Section D.2.d of the Order still requires project proponents to minimize grading during the wet season and coincide grading with seasonal dry weather periods to the extent feasible.

Section F.2.e. (Inspections) establishes criteria for inspections based on risk factors including size, season, and location of the construction site. Modifications have been made to requirements of Order No. R9-2002-0001 based on the experience of the Copermittees and Regional Board construction programs.

The Order requires sites in active grading during the wet season that are over 30 acres be inspected every two weeks, rather than sites over 50 acres being inspected weekly. In south Orange County approximately 15 percent (34 sites) of construction sites over one acre are larger than 30 acres, whereas about 9 percent (21 sites) of sites are over 50 acres.[220] This may result in a net decrease of inspections of large sites, although more sites will be covered. The reduction in inspection frequency for sites greater than 50 acres is justified because the sites have generally improved their erosion and sediment control measures since adoption of Order No. R9-2002-0001. Biweekly inspections of these sites in the future should be sufficient to ensure compliance with local regulations.

[216] State of California, Department of Fish and Game, 2005. State and Federally Listed Endangered and Threatened Animals of California.
[217] United States Department of the Interior, Fish and Wildlife Service, 2001. Least Bell's Vireo Survey Guidelines.
[218] United States Department of the Interior, Fish and Wildlife Service, 1997. Coastal California Gnatcatcher (*Polioptila californica californica)* Presence/Absence Survey Guidelines.
[219] Regional Board, 2001. Order No. 2001-01, San Diego County MS4 Permit. Directive F.2.g.(2).
[220] Based on the State Board's database of sites covered by the Construction Storm Water General NPDES Permit, Order No. 99-08-DWQ. That general permit requires sites disturbing over one acre to file for coverage, so it provides a good basis for assessment.

The Order lowers the size of construction sites adjacent to or discharging directly to ESAs that receive scrutiny. Order No. R9-2002-0001 requires such sites five acres and more to be inspected weekly during the wet season. This Order requires such sites one acre and above to be inspected every two weeks during the wet season and once during August or September. The lower size threshold is consistent with Phase II storm water permits.

The Order omits Order No. R9-2002-0001's provision allowing a Copermittee to decrease the inspection frequency for high priority sites if the Copermittee certifies in writing to the Regional Board that they have recorded the site's Waste Discharge Identification Number, reviewed the site's Storm Water Pollution Prevention Plan (SWPPP), assured the site's SWPPP is in compliance, and assured the SWPPP is properly implemented at the site. Under Order No. R9-2002-0001, the Regional Board never received from any of the Copermittees a certification to decrease the inspection frequency at high priority sites. Since the certification process was never used, the language has been deleted from the Order.

This section also requires the Copermittees to track the number of inspections for each inventoried construction site. This requirement has been added to ensure that the Copermittees can demonstrate that construction sites are inspected at the minimum frequencies.

Section F.2.g.2 includes an additional requirement for notification to the Regional Board regarding construction sites has been added to this section. Copermittees are required to annually notify the Regional Board of construction sites that have suspected violations. This was added to enhance Regional Board and Permittee communication and coordination in regulating construction sites.

F.3 Existing Development

F.3.a. Municipal

The following legal authority applies to section D.3.a:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A)(1) provides that the proposed management program include "A description of maintenance activities and a maintenance schedule for structural controls to reduce pollutants (including floatables) in discharges from municipal separate storm sewers."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A)(3) provides that the proposed management program include "A description for operating and maintaining public streets, roads and highways and procedures for reducing the impact on receiving waters of discharges from municipal storm sewer systems, including pollutants discharged as a result of de-icing activities."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A)(4) provides that the proposed management program include "A description of procedures to assure that flood management projects assess the impacts on the water quality of receiving water bodies and that existing structural flood control devices have been evaluated to determine if retrofitting the device to provide additional pollutant removal from storm water is feasible."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A)(5) provides that the proposed management program include "A description of a program to monitor pollutants in runoff from operating or closed municipal landfills or other treatment, storage or disposal facilities for municipal waste, which shall identify priorities and procedures for inspections and establishing and implementing control measures for such discharges."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A)(6) provides that the proposed management program include "A description of a program to reduce to the maximum extent practicable, pollutants in discharges from municipal separate storm sewers associated with the application of pesticides, herbicides, and fertilizer which will include, as appropriate, controls such as educational activities, permits, certifications, and other measures for commercial applicators and distributors, and controls for application in public right-of-ways and at municipal facilities."

Federal NPDES regulation 40 CFR 122.44(d)(1)(i) requires NPDES permits to include limitations to "control all pollutants or pollutant parameters (either conventional, nonconventional, or toxic pollutants) which the Director determines are or may be discharged at a level which will cause, have reasonable potential to cause, or contribute to an excursion above any State water quality standard, including State narrative criteria for water quality."

Section F.3.a.2. (General BMP Implementation) requires the Copermittees to designate minimum BMPs for general municipal areas and activities, regardless of their threat to water quality. The requirement that different types of BMPs be designated for different threats to water quality categories of municipal areas and activities has been removed from the Order. This was done to help simplify and clarify the Order's requirements. BMPs required to be implemented at a site can now be based on the sources or activities present at the site. This is closer to the approach taken by the Copermittees in their JRMPs. Threat to water quality is used to determine inspection frequencies in section F.3.a.(7).

Section F.3.a.3, F.3.a.4, and F.3.a.5. (Specific BMP Implementation Categories) establishes requirements for specific categories of activities and areas. These are selected based on the CWA and findings of the Permittees in annual reports and ROWD that identify these activities as warranting special attention.

Pesticides, Herbicides, and Fertilizers. 40 CFR 122.26(d)(2)(iv)(A)(6) requires a description of a storm water program for pesticides, herbicides, and fertilizers. In addition, water quality data demonstrates widespread presence of such pollutants in receiving waters and MS4 discharges. In response to similar requirements of Order No. R9-2002-0001, the Copermittees have developed a specific model Integrated Pest Management, Pesticides, and Fertilizer guidelines.

Flood Control Structures. In order to more closely meet the intent of the federal regulations and guidance, the requirement has been modified. 40 CFR 122.26(d)(2)(iv)(A)(4) requires "A description of procedures to assure that flood management projects assess the impacts on the water quality of receiving water bodies and that existing structural flood control devices have been evaluated to determine if retrofitting the device to provide additional pollutant removal from storm water is feasible." Retrofitting flood control devices can reduce storm water pollutants and improve water quality. Copermittees have conducted many flood control retrofit projects, many of which have been partially funded with State grant awards.

USEPA expands on the federal provision with the following information: "Storm water management devices and structures that focus solely on water quantity are usually not designed to remove pollutants, and may sometimes harm aquatic habitat and aesthetic values" (1992). As flood control structures and other elements of the MS4 age and retrofitting becomes necessary, opportunities for water quality improvements arise.

Conveyance systems which take water quality consideration into account (such as grassed swales, vegetated detention ponds, etc.) can often cost less to construct than traditional concrete systems. Evaluation of the applicability of such systems during retrofitting must occur to ensure that pollutants in storm water runoff are reduced to the maximum extent practicable. USEPA supports utilizing BMPs for pollution reduction in flood management projects, stating that "The proposed management program must demonstrate that flood management projects take into account the effects on the water quality of receiving water bodies. […] Opportunities for pollutant reduction should be considered".[221]

[221] USEPA, 1992. Guidance Manual for the Preparation of Part II of the NPDES Permit Applications for Discharges from Municipal Separate Storm Sewer Systems. Washington D.C. EPA/833-B-92-002.

Existing Copermittee projects include two types of retrofits. The first type involves adding an engineered device to an existing structure in order to treat or divert runoff. Examples include catch basin inlet filters/screens, ultraviolet disinfection facilities, hydrodynamic separators, and diversions to the sanitary sewer. The second type involves re-installing pervious or natural treatment features to facilities. Examples include removing concrete portions of conveyances to create pervious conveyances; and creating treatment wetlands within flood detention facilities. The later type of retrofit is preferred by the Regional Board. They are likely more sustainable over the long-term because they may require less rigorous operation and maintenance than the former. They may also provide the additional benefit of providing significant or incidental opportunities for beneficial uses (e.g., recreation, wildlife, water supply).[222,223]

Sweeping of Municipal Areas. Sweeping municipal areas would likely be done in the absence of the Order. However, in certain cases it is an important component of a jurisdictional runoff management program. The Order contains requirements to ensure that the use of street sweeping is optimized for runoff applications if it is to be used and reported as a BMP. The criteria in the Order are taken from industry guidance as reported by the Permittees in the Aliso Creek watershed.[224]

Section F.3.a.(6). (Operation and Maintenance of MS4 and Structural Controls) requires the Copermittees to inspect and remove waste from their MS4s prior to the rainy season.

Maintenance is critical to the successful implementation of every storm water runoff management program. USEPA finds that "Lack of maintenance often limits the effectiveness of storm water structural controls such as detention/retention basins and infiltration devices. […] The proposed program should provide for maintenance logs and identify specific maintenance activities for each class of control, such as removing sediment from retention ponds every five years, cleaning catch basins annually, and removing litter from channels twice a year.

[222] Burton, Carmen et al. 2005. Assessing Water Source and Channel Type as Factors Affecting Benthic Macroinvertebrate and Periphyton Assemblages in the Highly Urbanized Santa Ana River Basin, California. American Fisheries Society Symposium. Vol.47 pp.239-262.
[223] Stromberg, Juliet C. 2001. Restoration of Riparian Vegetation in the South-Western United States: the importance of flow regimes and fluvial dynamism. Journal of Arid Environments. Vol49, pp.17-34.
[224] See 20th and 21st quarterly reports for the Aliso Creek watershed bacteria investigation, prepared by the Orange County Copermittees within the Aliso Creek watershed.

If maintenance activities are scheduled infrequently, inspections must be scheduled to ensure that the control is operating adequately. In cases where scheduled maintenance is not appropriate, maintenance should be based on inspections of the control structure or frequency of storm events. If maintenance depends on the results of inspections or if it occurs infrequently, the applicant must provide an inspection schedule. The applicant should also identify the municipal department(s) responsible for the maintenance program".[225] The MS4 maintenance requirements are based on the above USEPA recommendations. This maintenance will help ensure that structural controls are in adequate condition to be effective year round, but especially at the beginning of and throughout the rainy season.

Two requirements have been added to the Order that were not within Order No. 2002-0001. Subsection (3) allows a decreased inspection frequency for facilities that are routinely clean, and Subsection (4) requires trash to be removed from channels in a timely manner. Typically, Copermittees have reported annual or semi-annual creek cleanups as significant BMPs. The large volumes of trash reported to be removed during these events demonstrates the significant amount of trash that accumulates in the channels. In addition, storm water runoff is a leading contributor to the accumulation of trash and debris along the beaches of Orange County.[226] In order to reduce the effect of the trash, the Order requires that trash be removed more frequently.

Section F.3.a.(7). (Sewage Infiltration) requires the Copermittees to implement controls and measures to prevent and eliminate sewage infiltration or seepage from municipal sanitary sewers to MS4s through thorough, routine preventive maintenance of the MS4. This requirement is in Order No. R9-2002-0001 in the section on Illicit Discharge Detection and Elimination (section F.5.i).

Sections F.3.a.(8) and F.3.a.(9). (Inspections and Enforcement) establishes a minimum set of municipal areas and activities for oversight and inspection by the Copermittees and requires that Copermittees properly enforce runoff requirements at municipal areas and activities.

[225] USEPA, 1992. Guidance Manual for the Preparation of Part II of the NPDES Permit Applications for Discharges from Municipal Separate Storm Sewer Systems. Washington D.C. EPA/833-B-92-002.
[226] Moore, S.L., D. Gregorio, M. Carreon, S B. Weisberg, and M. K. Leecaster. 2001. *Composition and distribution of beach debris in Orange County, California*. Marine Pollution Bulletin 42(3): 241-245..

F.3.b. Industrial and Commercial
The following legal authority applies to section F.3.b:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(C) provides that the proposed management program include "A description of a program to monitor and control pollutants in storm water discharges to municipal systems from municipal landfills, hazardous waste treatment, disposal and recovery facilities, industrial facilities that are subject to section 313 of title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA), and industrial facilities that the municipal permit applicant determines are contributing a substantial pollutant loading to the municipal storm sewer system."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(C)(1) provides that the Copermittee must "identify priorities and procedures for inspections and establishing and implementing control measures for such discharges."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(C)(2) provides that the proposed management program shall "Describe a monitoring program for storm water discharges associated with the industrial facilities identified in paragraph (d)(2)(iv)(C) of this section, to be implemented during the term of the permit, including the submission of quantitative data on the following constituents: any pollutants limited in effluent guidelines subcategories, where applicable; any pollutant listed in an existing NPDES permit for a facility; oil and grease, COD, pH, BOD5 , TSS, total phosphorus, total Kjeldhal nitrogen, nitrate plus nitrite nitrogen, and any information on discharges required under 40 CFR 122.21(g)(7)(iii) and (iv)."

Federal NPDES regulation 40 CFR 122.26(d)(2)(ii) provides that the Copermittee "Provide an inventory, organized by watershed of the name and address, and a description (such as Standard Industrial Classification [SIC] codes) which best reflects the principal products or services provided by each facility which may discharge, to the municipal separate storm sewer, storm water associated with industrial activity."

Federal NPDES regulation 40 CFR 122.44(d)(1)(i) requires NPDES permits to include limitations to "control all pollutants or pollutant parameters (either conventional, nonconventional, or toxic pollutants) which the Director determines are or may be discharged at a level which will cause, have reasonable potential to cause, or contribute to an excursion above any State water quality standard, including State narrative criteria for water quality."

Federal NPDES regulation 40 CFR 122.26(d)(2)(i)(A) provides that each Copermittee must demonstrate that it can control "through ordinance, permit, contract, order or similar means, the contribution of pollutants to the municipal storm sewer by storm water discharges associated with industrial activity and the quality of storm water discharged from site of industrial activity."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A) provides that the Copermittee develop a proposed management program which includes "A description of structural and source control measures to reduce pollutants from runoff from commercial and residential areas that are discharged from the municipal storm sewer system that are to be implemented during the life of the permit, accompanied with an estimate of the expected reduction of pollutant loads and a proposed schedule for implementing such controls."

Section F.3.b. (Industrial and Commercial) requires the Copermittees to implement an industrial and commercial program to reduce pollutants in storm water runoff from all industrial and commercial sites/sources. The industrial and commercial sections of Order No. 2002-0001 have been combined into one section in this Order. This change will streamline and simplify the Order, without negatively impacting water quality. This change is not unprecedented because industrial and commercial facilities are commonly addressed together. For example, the Southern Riverside County MS4 Permit[227] combined industrial and commercial programs into one section. In addition, in their Annual Reports and ROWD,[228] the Copermittees jointly address industrial and commercial components. USEPA contractor Tetra Tech also evaluated and reported on the industrial and commercial programs jointly during their program evaluations.[229]

Section F.3.b.(1)(a) (Source Identification) requires that building material retailers and storage, animal facilities, and power washing services be included in the Copermittees' inventory of commercial sites/sources. These activities have been identified annual MS4 program reports and quarterly Aliso Creek watershed reports as potentially significant sources of pollutants. This is not a significant change because Order No. R9-2002-0001 requires that any commercial site or source determined by a Copermittee to contribute a significant pollutant load to the MS4 be added to its inventory of commercial sites. Furthermore, the commercial BMP fact sheets developed by the Copermittees generally address the types of activities occurring at these facilities and practices.

[227] Regional Board, 2004. Order No. R9-2004-001; Riverside County MS4 Permit. Section H.2; P. 24.
[228] Orange County Storm Water Copermittees. 2006. Report of Waste Discharge (San Diego Region). Section 9.
[229] Tetra Tech, Inc., 2005. Program Evaluation Reports Orange County Storm Water Programs: Cities of Laguna Beach, Laguna Hills, Lake Forest, and Rancho Santa Margarita.

The Order has revised requirements for identifying industrial sites/sources. The revised requirements are identical to those found in the Southern Riverside County MS4 permit.[230] USEPA requires the same identification: "Measures to reduce pollutants in storm water discharges to municipal separate storm sewers from municipal landfills, hazardous waste treatment, disposal and recovery facilities, industrial facilities that are subject to section 313 of title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA)."[231] USEPA "also requires the municipal storm sewer permittee to describe a program to address industrial dischargers that are covered under the municipal storm sewer permit."[232] In order to more closely follow USEPA's guidance, this Order also includes operating and closed landfills, and hazardous waste treatment, disposal, storage and recovery facilities.

Section F.3.b.3. (Mobile Businesses) requires each Copermittee to develop and implement a program to reduce the discharge of storm water pollutants from mobile businesses to the MEP and to prevent the discharge of non-storm water. Mobile businesses are service industries that travel to the customer to perform the service rather than the customer traveling to the business to receive the service. Examples of mobile businesses are power washing, mobile vehicle washers, carpet cleaners, port-a-potty servicing, pool and fountain cleaning, mobile pet groomers, and landscapers. These mobile services produce waste streams that could potentially impact water quality if appropriate BMPs are not implemented.

Order No. R9-2002-0001 also requires BMP implementation for certain mobile businesses (e.g., mobile vehicle washing and mobile carpet cleaning). These storm water requirements of Order No. R9-2009-0002 are not significantly different from the existing requirements. The Order specifies mobile businesses must prevent non storm water dry weather flows from entering the MS4 (see C.1.b) for special attention based on reports from the Copermittees that mobile businesses have been difficult to control with existing programs.

Mobile businesses present a unique difficulty in storm water regulation. Due to the transient nature of the business, the regular, effective practice of unannounced inspections is difficult to implement. Also, tracking these mobile businesses is difficult because they are often not permitted or licensed and their services cross Copermittee jurisdictions. Mobile businesses that operate within a municipality may be based in another municipality or even outside the Region. The Order takes into account the difficulties in regulating mobile businesses.

Because BMPs have been developed already, but communication with mobile businesses may be difficult, the Order provides broad flexibility to the Copermittees for developing a targeted program within the Commercial portion of each JRMP.

[230] Regional Board, 2004. Order No. R9-2004-001; Riverside County MS4 Permit. Section H.2.b)(2); P. 25.
[231] Federal Register / Vol. 55, No. 222 / Friday, November 16, 1990 / Rules and Regulations. P. 48056.
[232] Ibid.

Section F.3.b.4. (Inspections) includes requirements for inspections of industrial and commercial sites/sources. The Order is similar to the Southern Riverside County MS4 permit[233] in requiring that inspections check for coverage under the General Industrial Permit; assessment of compliance with Copermittee ordinances and permits related to storm water and non-storm water runoff; assessment of BMP implementation, maintenance, and effectiveness; visual observations for non-storm water discharges, potential illicit connections, and potential discharge of pollutants in storm water runoff; and education and outreach on storm water pollution prevention. The Order also requires that inspections include review of BMP implementation plans if the site uses or is required to use such a plan, and the review of facility monitoring data if the site monitors its runoff. Order No. 2002-0001 did not contain requirements for inspection procedures.

Changes in the Order's requirements for inspection procedures mimic USEPA's guidance: "Site inspections should include (1) an evaluation of the pollution prevention plan and any other pertinent documents, and (2) an onsite visual inspection of the facility to evaluate the potential for discharges of contaminated storm water from the site and to assess the effectiveness of the pollution prevention plan."[234] In 1999, USEPA "recognized visual inspection as a baseline BMP for over 10 years," and "visual inspections are an effective way to identify a variety of problems. Correcting these problems can improve the water quality of the receiving water."[235] Most, if not all, of the Order's procedures are being conducted by the Copermittees that follow the Model Existing Development Program of the DAMP.

With the exception of restaurants, the Order allows Copermittees to establish inspection frequencies, as long as at least 20 percent of the sites are inspected annually. Restaurants are now required to be inspected annually. Inspection frequencies in the Order have been modified from Order No. R9-2002-0001. Order No. R9-2002-0001 specifies frequencies for inspecting industrial sites based on threat to water quality and requires high priority commercial sites to be inspected as needed. Copermittees have been inspecting industrial sites according to Order No. R9-2002-0001. The Copermittees have been inspecting restaurants annually as part of the County Health Department inspections. For other commercial sites, the Copermittees have been focusing annual activities on certain commercial sectors, such as automobiles, with the goal of inspecting every high priority site at least once during the permit term. This change is not considered significant because it should allow the Copermittees to continue existing programs.

[233] Regional Board, 2004. Order No. R9-2004-001; Riverside County MS4 Permit. Section H.2.d)(3);
[234] USEPA, 1992. Guidance 833-8-92-002, section 6.3.3.4 "Inspection and Monitoring".
[235] USEPA, 1999. 832-F-99-046, "Storm Water Management Fact Sheet – Visual Inspection".

Reports from the Aliso Creek watershed Copermittees demonstrate that as-needed inspections for restaurants means at least annually. Restaurants have been found to present many threats to water quality and standard educational efforts are not effective because restaurants are subject to frequent management changes. For these reasons, the Order requires restaurants to be inspected annually.

An additional notification to the Regional Board regarding industrial sites has been added. Copermittees are required to annually notify the Regional Board of industrial sites that have suspected violations. This was added to enhance Regional Board and Permittee communication and coordination in regulating industrial sites.

Section F.3.b.(6). (Training and Education) requires training and education measures generally consistent with the existing storm water programs. One distinction is that the Order requires each Copermittee to notify the owner/operator of each inventoried industrial and commercial site/source of the BMP requirements applicable to the site/source. This requirement is necessary to ensure that the owners and operators of commercial sites stay informed of appropriate BMPs. This is especially important because sites may be inspected as little as once every five years.

Section F.3.c. (Residential Component)
The following legal authority applies to section F.3.c:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A) provides that the Copermittee develop a proposed management program which includes “A description of structural and source control measures to reduce pollutants from runoff from commercial and residential areas that are discharged from the municipal storm sewer system that are to be implemented during the life of the permit, accompanied with an estimate of the expected reduction of pollutant loads and a proposed schedule for implementing such controls.”

Federal NPDES regulation 40 CFR 122.44(d)(1)(i) requires NPDES permits to include limitations to “control all pollutants or pollutant parameters (either conventional, nonconventional, or toxic pollutants) which the Director determines are or may be discharged at a level which will cause, have reasonable potential to cause, or contribute to an excursion above any State water quality standard, including State narrative criteria for water quality.”

Section F.3.c (Residential Component) moves the common interest areas / homeowners' association component and the requirement for proper management of used oil, toxic materials, and other household hazardous wastes to the residential section of the Order, since these requirements generally apply to residential areas. These changes improve the organization of the Order and have no net effect on its implementation and enforcement. Other requirements for prioritization, BMP implementation, and enforcement are consistent with Order No. R9-2002-01.

Section F.3.d. (Retrofitting Existing Development)

Legal Authority: The legal authority for retrofitting existing development is the same legal authority as that identified for municipal, industrial, commercial and residential development sections (See fact sheet discussion on those sections, F.3.a – c). In particular, CWA sections 402(p)(3)(B)(ii-iii), and CWC section 13377 give the Regional Board the legal authority to require retrofitting of existing development.

A section has been added to require the retrofit of existing development (see Finding D.3.i and Discussion). This section contains specific requirements for the retrofit process. Retrofitting existing development is a widespread practice across the United States. Successful retrofitting programs have been implemented in such diverse locations as Seattle, Washington[236]; Portland Oregon[237], Santa Monica, California[238]; Kansas City, Kansas[239]; and Montgomery County, MD[240]. When appropriately applied as the draft Tentative Order, retrofitting existing development meets the maximum extent practicable standard.

Existing BMPs are not sufficient, as evidenced by 303(d) listings and exceedances of Water Quality Objectives from the Copermittees monitoring reports. More advanced BMPs, including the retrofitting of existing development with LID, are part of the iterative process. Previous permits limited the requirement of treatment control BMPs to new development and redevelopment. Based on the current rate of redevelopment compared to existing BMPs, the use of LID only on new and redevelopment will not adequately address current water quality problems, including downstream hydromodification. Retrofitting existing development is practicable for a municipality through a systematic evaluation, prioritization and implementation plan focused on impaired water bodies, pollutants of concern, areas of downstream hydromodification, feasibility and effective communication and cooperation with private property owners.

[236] SEA Street, http://www.seattle.gov/dpd/Planning/CityDesign/What_We_Do/Outreach/Folio/DPDS_008014.asp
[237] Clean River Rewards, http://www.portlandonline.com/BES/index.cfm?c=edeef
[238] City of Santa Monica, Urban Runoff program, http://www.smgov.net/Departments/OSE/categories/content.aspx?id=4007
[239] 10,000 Rain Gardens, http://www.rainkc.com/
[240] Rainscapes, http://www.montgomerycountymd.gov/Content/DEP/Rainscapes/home.html

F.4. Illicit Discharge Detection and Elimination

The following legal authority applies to section F.4:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(B) provides that the proposed management program "shall be based on a description of a program, including a schedule, to detect and remove (or require the discharger to the municipal storm sewer to obtain a separate NPDES permit for) illicit discharges and improper disposal into the storm sewer."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B)(1) provides that the Copermittee include in its proposed management program "a program, including inspections, to implement and enforce an ordinance, orders or similar means to prevent illicit discharges to the municipal storm sewer system."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B)(2) provides that the Copermittee include in its proposed management program "a description of procedures to conduct on-going field screening activities during the life of the permit, including areas or locations that will be evaluated by such field screens."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B)(3) provides that the Copermittee include in its proposed management program "procedures to be followed to investigate portions of the separate storm sewer system that, based on the results of the field screen, or other appropriate information, indicate a reasonable potential of containing illicit discharges or other sources of non-storm water."

Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(B)(4) provides that the Copermittee include in its proposed management program "a description of procedures to prevent, contain, and respond to spills that may discharge into the municipal separate storm sewer."

Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(B)(5) provides that the Copermittee include in its proposed management program "a description of a program to promote, publicize, and facilitate public reporting of the presence of illicit discharges or water quality impacts associated with discharges from municipal separate storm sewers."

Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(B)(6) provides that the Copermittee include in its proposed management program "a description of educational activities, public information activities, and other appropriate activities to facilitate the proper management and disposal of used oil and toxic materials."

Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(B)(7) provides that the Copermittee include in its proposed management program "a description of controls to limit infiltration of seepage from municipal sanitary sewers to municipal separate storm sewer systems where necessary."

Section F.4.a-b. (Prevent and Detect Illicit Discharges) requires the Copermittees to implement a program to actively seek and eliminate illicit connections and discharges (IC/ID). Additional wording has been added to this section to clarify and ensure that all appropriate (i.e., field personnel) municipal personnel are utilized in the program to observe and report these illicit discharges and connections. requirement has been added requiring submittal of the GIS layers of the MS4 map within 365 days of Order adoption.

Section F.4.e (Investigations) requires the Copermittees to conduct follow up investigations and inspect portions of the MS4 for illicit discharges and connections, based on dry weather effluent analytical monitoring results. The section also requires the Copermittees to establish criteria for triggering follow up investigations. Additional language has been added to this section to clarify the minimum level of effort and timeframes for follow up investigations when dry weather limitations are exceeded. Timely investigation and follow up of exceedances is necessary to identify sources of illicit discharges, especially since many of the discharges are transitory. The requirements for a 48-hour minimum response time when action levels are exceeded and for immediate response to obvious illicit discharges is necessary to ensure timely response by the Copermittees.

The Copermittees currently use action levels to facilitate the determination of when source investigation studies are warranted based on data from the dry-weather monitoring program. One set of criteria is based on regional averages of constituent concentrations that were developed based on randomly selected storm drains. Another set of criteria is based on trends at a particular station. These are reasonable criteria if decision-makers are properly trained and action levels set by the County are in compliance with dry weather non-storm water action levels as required in Section C. The ability of the local managers to interpret dry-weather monitoring data collected by the County has greatly improved in the last two years, and continued training is required in section F.4.i.

Section F.4.h. (Spill Response) requires each Copermittee to implement measures to prevent and respond to spills into its MS4. These requirements are similar to Order No. R9-2002-0001 and based on federal regulations at 40 CFR 122.26(d)(2)(iv)(B)(4). Those federal NPDES regulations clearly require that owners and operators of MS4s have procedures to prevent, contain, and respond to spills that may discharge into the municipal separate storm sewer.

The Tentative Order includes sewage and non-sewage spills in the requirement for spill prevention and response. Federal regulations clearly define sewage as an illicit discharge that must be addressed by municipalities (see Phase II Final Rule, p.68758). Sewage is an illicit discharge to the MS4 that threatens public health. As such, the Copermittees must implement measures to prevent sewage from entering the MS4 system and must respond to illicit discharges that have entered the system. This section has been revised to clarify that management measures and procedures must be implemented to prevent, respond to, and cleanup spills.

This same requirement was adopted by the Regional Board in Order No, 2002-0001, but was subsequently stayed by the State Board in Order WQO 2002-0014. The City of Mission Viejo challenged the requirement to prevent and respond to sewage spills on the grounds that since the sanitary sewer systems in the City are operated by three water districts already regulated by a NPDES permit from the Regional Board, this requirement would cause delayed spill responses as the City and agencies try to determine jurisdiction and responsibilities. The State Board found that the costs of this requirement did not constitute harm, but agreed that harm could ensue from potential response delay and confusion. Although the entire permit requirement was stayed, neither the State Board, nor the Petitioner discussed spills other than sewage.

Subsequently, the Copermittees and the local sewer agencies have developed mature relationships and implemented procedures for spill response and sewage spill response.[241]. As a result, the concerns expressed by the State Water Board are no longer warranted. The Model Sewage Spill Response Procedure is outlined in the Copermittees' Proposed 2007 Drainage Area Management Plan (DAMP). According to the 2007 DAMP, regardless of where the spill originates, if the spill has entered or may enter the storm drain system, the Copermittees respond to assist with the cleanup and remediation of the area.

Only three Permittees (Laguna Beach, San Clemente, and San Juan Capistrano) own or operate their own sewage collection systems, yet all Copermittees implement the programs for spill response. For the Copermittees that do not own or operate sewage systems, the Regional Board expects that they will continue to respond appropriately to reported or identified spills to the MS4 system.

[241] Sections 10.2.4 and 10.2.5 in the 2007 DAMP.

Section F.3.a.7 of the Tentative Order includes requirements for measures that must be taken to prevent sewage spills. Examples of measures being implemented by Copermittees include inspections of fats, oils, and grease management at restaurants. Other preventative measures can be implemented during routine planning efforts for new development and redevelopment projects. Similarly, building permit inspections should be used to verify the integrity of the sanitary and storm sewer infrastructure and ensure that cross-connections between the two are avoided.

G. Watershed Runoff Management Programs

The following legal authority applies to section G:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.26(a)(3)(ii) states: "The Director may […] issue distinct permits for appropriate categories of discharges […] including, but not limited to […] all discharges within a system that discharge to the same watershed […]"

Federal NPDES regulations 40 CFR 122.26(a)(3)(v) states: "Permits for all or a portion of all discharges from large or medium municipal separate storm sewer systems that are issued on a system-wide, jurisdiction-wide, watershed, or other basis may specify different conditions relating to different discharges covered by the permit, including different management programs for different drainage areas [watersheds] which contribute storm water to the system."

Federal NPDES regulation 40 CFR 122.26(a)(5) states: "The Director may issue permits for municipal separate storm sewers that are designated under paragraph (a)91)(v) of this section on a system-wide basis, a jurisdiction-wide basis, watershed basis, or other appropriate basis."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv) states: "Proposed programs may impose controls on a system-wide basis, a watershed basis, a jurisdiction basis, or on individual outfalls."

Section G. (Watershed Runoff Management Program) requires Copermittees to continue implementation of their watershed runoff management programs (WRMPs), however the implementation approach has changed. Order No. R9-2002-01 required watershed RMPs to include a collaborative strategy to abate the sources and reduce the discharges causing high priority water quality problems. This strategy was to guide Watershed Copermittee's selection and implementation of Watershed Activities, so that the activities selected and implemented would remove that pollutant contribution responsible for the identified high priority water quality problem. Outcomes of these requirements were not able to demonstrate improvements to water quality.

Revised language in Order R9-2009-002 attempts to focus watershed copermittee's efforts and resources on addressing the highest water quality problems in the watershed by focusing attention on the health of the receiving water body and the most efficient use of the Watershed Copermittee's time and resources. Order R9-2009-002 requires the Watershed Copermittee's to follow a workplan approach towards assessing receiving water body conditions, prioritizing the Watershed Management Area's (WMAs) highest priority water quality problems, implementing effective BMPs, and measuring water quality improvement in the receiving water.

G1. (Lead Watershed Copermittee Identification) requires the watershed copermittee's to identify a Lead Watershed Copermittee for their WMA.

This requirement is the same to that found in Order 2002-01.

G.2 a-f. (Watershed Workplan) requires the Watershed Copermittees to develop and implement a collective watershed strategy to assess and prioritize the water quality problems within the watershed's receiving waters, identify and model sources of the highest priority water quality problem(s), develop a watershed-wide BMP implementation strategy to abate highest priority water quality problems, and a monitoring strategy to evaluate BMP effectiveness and changing water quality prioritization in the WMA. Development of a workplan rather than watershed activities will allow the Copermittees flexibility to iteratively modify their watershed strategy over the course of future planning years as priorities change.

G.3. Watershed Workplan Implementation – Watershed Copermittee's shall begin implementing the Watershed Workplan within 30-days of approval by the Regional Board Executive Officer. Since the Copermittees are already familiar with the watershed program requirements implementing the watershed workplan within 30-days of approval by the Regional Board Executive Officer is reasonable.

G.4. Copermittee Collaboration – Watershed Copermittees shall collaborate to develop and implement the Watershed Workplan. Watershed Copermittee collaboration shall include frequent regularly scheduled meetings.

This requirement is the same to that found in Order 2002-01.

G.5. Public Participation – Watershed Copermittees shall implement a watershed-specific public participation mechanism within each watershed. A required component of the watershed-specific public participation shall be a minimum 30-day public review of the Watershed Workplan. Opportunity for the public to review and comment on the Watershed Workplan must occur before the workplan is implemented.

This requirement is similar to that found in Order 2002-01.

G.6. Watershed Workplan Review and Updates – Watershed Copermittees shall

review and update the Watershed Workplan annually to identify need changes to the prioritized water quality problem(s) listed in the workplan. All updates to the Watershed Workplan shall be presented during an Annual Watershed Review Meeting. Annual Watershed Review Meetings shall be conducted by the Watershed Copermittees, open to the public and adequately noticed, and occur once every calendar year. Individual Watershed Copermittees shall also review and modify their jurisdictional programs and JRMP Annual Reports, as necessary, so that they are consistent with the updated Watershed Workplan.

This section requires the copermittee's to review and update their workplan each year to incorporate changing priorities and evolving watershed strategies. This requirement is meant to take the place of Order No. 2002-01 requirement to submit Watershed Annual Reports.

G.7. Aliso Creek Watershed RMP Provisions. This requirement is the same to that found in Order 2002-01.

H. Fiscal Analysis

The following legal authority applies to section H:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.26(d)(2)(vi) provides that "[The Copermittee must submit] for each fiscal year to be covered by the permit, a fiscal analysis of the necessary capital and operation and maintenance expenditures necessary to accomplish the activities of the programs under paragraphs (d)(2)(iii) and (iv) of this section. Such analysis shall include a description of the source of funds that are proposed to meet the necessary expenditures, including legal restrictions on the use of such funds."

Section H has been expanded in order to develop more useful and meaningful fiscal reporting. The Copermittees have identified a need to assess the current fiscal reporting process and have proposed to prepare a fiscal reporting strategy to better define the expenditure and budget line items included in the fiscal reports.[242] The Regional Board agrees that the process should be improved. A revamped fiscal reporting strategy will provide the Regional Board and the Copermittees with better capability to manage performance of the programs.

The Copermittees' effort is expected to provide standardization of reporting so that figures between Copermittees are comparable, which is one of many types of information which can be used by the Regional Board to better understand Copermittee program implementation. Standardization and comparison of fiscal analysis reporting is supported by the State Board funded NPDES Stormwater Cost Survey, which finds that "standards for reporting costs and stormwater activities are needed to allow accurate cost comparisons to be made between stormwater activities."[243] This document also provides guidance regarding categorization of expenditures for tracking and reporting.

The Order establishes criterion for when Copermittees must add narrative evaluations to the tables. This will address some of the variability in reporting and will provide the public and Regional Board with improved understanding of how resources are shifted in response to annual assessments. This will also help ensure that projected annual costs adequately reflect planned program modifications described in the annual reports.

[242] Orange County Storm Water Copermittees. 2006. Report of Waste Discharge (San Diego Region), section 2.3.4.
[243] Currier, et al., 2005. *NPDES Storm Water Cost Survey Final Report*. Prepared for California State Water Resources Control Board by Office of Water Programs, California State University, Sacramento. P. 63.

The Regional Board has chosen not to require a description of fiscal benefits realized from implementation of the storm water protection program. This is a recommendation from the National Association of Flood and Stormwater Management Agencies.[244] For instance, the current fiscal assessment does not address city-wide fiscal benefits of protection (e.g., public health, tourism, property values, economic activity, beneficial uses, etc.), even though many costs currently reported to the Regional Board are for related activities. This type of assessment may help Copermittees improve the allocation of resources and it may help the Copermittees secure adequate funding for the program. Finally, it will provide a clearer picture of the storm water and non-storm water runoff program to the public and Regional Board. However, qualitative assessments could be overly subjective and most Copermittees likely lack the ability to provide accurate quantitative assessments. The Regional Board encourages Copermittees to consider means for conducting assessments of fiscal benefits derived from the programs. Such assessments could be conducted on a regional scale similar to studies of program costs conducted by the State Water Board[245] or community indicators by the Community Indicators Project.[246]

Currently, each Orange County municipality's annual report includes a table based on a template developed by the principal Copermittee. The template was meant to facilitate reporting consistency among the 13 Copermittees. The annual report table contains estimates of spending during the reported period and estimates of the next year's spending. The tables separate capital costs from operations and maintenance costs and are arranged by program element. In addition to the tables, each municipality reports on the sources of the funds, (e.g., general fund, special fee, grants, etc.) to demonstrate that resources have been secured. There is very heavy reliance on general funds.

Review of the fiscal analysis tables included in the annual reports has not been as straightforward as expected, and the value of the information is moderate. Generally, questions regarding the financial reporting process of individual Permittees have been adequately resolved during meetings to discuss the annual reports. Based on those meetings, the Regional Board staff has found that cities do not use consistent methods to fill in the tables because they use different accounting and budgeting processes, and certain stormwater program expenditures are not easily categorized into the table formats. Furthermore, stormwater permit-related activities involve several departments, which makes it difficult for the storm water manager to gather and decipher actual costs.

[244] National Association of Flood and Stormwater Management Agencies. 2006. *Guidance for Municipal Stormwater Funding.* Prepared under a grant provided by the USEPA.
[245] State Water Board, 2005. NPDES Stormwater Cost Survey.
[246] Orange County 2006 Community Indicators Project. 2006. Sponsored by the County of Orange, the Orange County Business Council, and the Children and Families Commission of Orange County. Available on-line at www.oc.ca.gov/ceocommunity.asp

These issues also make it difficult for the Copermittees to accurately compartmentalize expenditures within the format. The Copermittees are aware of the reporting discrepancies and have planned to modify the reporting template and guidelines. As a result, the current financial reporting provides estimates at best and cannot be reliably used to compare program implementation among most municipalities.

I. Total Maximum Daily Loads

This section has been added to address any TMDLs that are adopted by the Regional Board. See Finding E.10 and Discussion.

J. Program Effectiveness Component

The following legal authority applies to section J:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.26(d)(2)(v) provides that the Copermittees must include "Estimated reductions in loadings of pollutants from discharges of municipal storm sewer constituents from municipal storm sewer systems expected as the result of the municipal storm water quality management program. The assessment shall also identify known impacts of storm water controls on ground water." Under Federal NPDES regulation 40 CFR 122.42(c) applicants must provide annual reports on the progress of their storm water management programs.

Section J.1 (jurisdictional program effectiveness assessments) of the Order requires the Copermittees to assess the effectiveness of the implementation of their jurisdictional programs and activities. The section requires that the effectiveness strategy of the programs be designed around four classes of objectives and that the results are used to direct program modifications. The section does not specify the assessments to be conducted, but does require that assessment measures conform to the guidance developed by the California Storm Water Quality Association (CASQA). The Orange County Storm Water Program is supportive of the CASQA effort, and use of CASQA assessment techniques is consistent with the methodology proposed in the ROWD.[247] [248]

The section is also consistent with the plan of the Copermittees to improve the efficacy of the assessment process.[249] The Copermittees currently report a series of metrics for spatial and temporal assessments across the County. The Program Effectiveness requirements of the Order provide the Copermittees with the framework for improving their standard assessment metrics.

[247] The structure of planned program effectiveness is proposed in section 1.2.2 of the 2007 ROWD. The ROWD then identifies current and potential assessment outcome levels within each major program chapter (e.g., new development, construction, etc.).
[248] CASQA 2007. Municipal Stormwater Program Effectiveness Assessment Guidance.
[249] Orange County Storm Water Copermittees. 2006. Report of Waste Discharge (San Diego Region), section 3.3.2.

The Order provides focus to the assessment methodology by requiring that impaired waterbodies and environmentally-sensitive areas are specifically addressed. In this way, the high priority water quality issues will receive a high level of attention, consistent with USEPA and CASQA guidance for prioritization. The Order provides flexibility to establish the actual metrics for each assessment outcome level. The Order also provides the Copermittees flexibility to develop objectives for the general program components based on the CASQA guidance, as is proposed in the ROWD and DAMP.

In addition, Section J.1 requires that an effectiveness assessment strategy is developed and implemented in response to actions taken by a Copermittee to comply with Section A.3 (Prohibitions and Receiving Water Limitations) of the Order. Section A.3 outlines the procedure for addressing instances when jurisdictional programs implement control actions in response to determinations that discharges from the MS4 are causing or contributing to violations of water quality standards.

This section includes a requirement for the Copermittees to develop and implement a workplan identifying and addressing the highest priority issues in the watershed. The workplan requirement in the JRMP section has been added to ensure Copermittees are allocating resources and effort to address priority problems and pollutants identified in the watershed analysis. This section has been added to ensure Copermittees use the annual watershed water quality assessment to asses, adjust and tailor their JRMP programs.

Section J.2 (program modification) of the Order requires the Copermittees to improve jurisdictional activities or BMPs when they are found to be ineffective or when water quality impairments are continuing. This requirement fulfills the purpose of conducting effectiveness assessments – to improve and refine the Copermittees' programs. The requirement is consistent with USEPA's Phase II regulations, which state: "If the permittee determines that its original combination of BMPs are not adequate to achieve the objectives of the municipal program, the MS4 should revise its program to implement BMPs that are adequate […]."[250]

Section J.3 (reporting) of the Order describes the information required to be submitted in jurisdictional annual reports pertaining to program effectiveness assessments, review, and response. The reporting will demonstrate whether Copermittees have appropriately responded to the effectiveness assessments.

[250] Federal Register / Vol. 64, No. 235 / Wednesday, December 8, 1999 / Rules and Regulations. P. 68762.

K. Reporting

The following legal authority applies to section K:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.42(c) requires that "The operator of a large or medium municipal separate storm sewer system or a municipal separate storm sewer system that has been designated by the director under § 122.26(a)(1)(v) of this part must submit an annual report by the anniversary of the date of the issuance of the permit for such system. The report shall include: (1) The status of implementing the components of the storm water management program that are established as permit conditions; (2) Proposed changes to the storm water management program that are established as permit condition. Such proposed changes shall be consistent with § 122.26(d)(2)(iii) of this part; (3) Revisions, if necessary, to the assessment of controls and the fiscal analysis reported in the permit application under § 122.26(d)(2)(iv) and (d)(2)(v) of this part; (4) A summary of data, including monitoring data, that is accumulated throughout the reporting year; (5) Annual expenditures and budget for year following each annual report; (6) A summary describing the number and nature of enforcement actions, inspections, and public education programs; (7) Identification of water quality improvements or degradation."

California Water Code section 13267 provides that "the Regional Board may require than any person who has discharged […] shall furnish, under penalty of perjury, technical or monitoring reports which the regional board requires."

Section K.1 (Jurisdictional Runoff Management Plans and Watershed Workplans) outlines the process and due dates for submitting plans. The information to be included in the Jurisdictional and Watershed plans must be sufficient to demonstrate the capacity to implement the requirements of Section G and Section J, respectively, of the Order.

Two general modifications from Order No. R9-2002-0001 result in reduced reporting effort by the Copermittees. First, in many cases, the requirements of the Order should not necessitate a complete rewrite of the plans, as was basically done in 2003. Only sections of the Order which are new or have been significantly changed should warrant rewriting of plans' sections. Second, the WRMP annual reporting is no longer due in January. Annual reporting will occur during a watershed review meeting conducted some time during the calendar year. The Regional Board plans to work with the Copermittees and provide guidance regarding where JRMPs must be updated in accordance with the Order. This will help ensure that rewriting, reporting, and review efforts are minimized.

The reporting requirements include two significant additions. The first addition is a summary reporting checklist which has been added to the reporting requirements. The checklist has been added to ensure that Copermittees evaluate and demonstrate compliance with all requirements in the Order.
Section K.2 (Other Required Reports) include requirements for information to be included in the SSMP update and the Report of Waste Discharge for the next permit reissuance. The Order requires submittal of a ROWD prior to the expiration of the Order. The section identifies the minimum information to be included in the ROWD, based on USEPA's May 17, 1996 guidance "Interpretive Policy Memorandum on Reapplication Requirements for Municipal Separate Storm Sewer Systems."

Section K.3 (Annual Reports) outlines the process and roles of the Copermittees for developing and submitting the JRMP annual report. Information to be included in the annual reports is described in Section K.3.a.3. The due dates have been changed. The JRMP is due approximately six weeks earlier than under Order No. R9-2002-0001. This change is necessary because the existing timelines prevented efficient response by the Copermittees to comments from the Regional Board and the Copermittees' own review. However, the Copermittees may propose alternate reporting criteria and schedules, as part of their updated JRMP, for the Executive Officer's acceptance.

Each Copermittee is required to maintain records demonstrating that Permit activity requirements have been met, which allows the Regional Board to confirm compliance as needed, such as via inspections, program audits, or requests for information per California Water Code Sections 13225 and 13267.

Reporting requirements in the Order focus on results and responses to the effectiveness assessments conducted by the Copermittees. This will allow the Regional Board to determine how appropriately municipalities adapt and tailor their programs to findings from activities and monitoring results. Assessment of progress toward meeting the objectives is possible because the data collected by the Copermittees under Order No. R9-2002-0001 can be used to establish baseline conditions. Compared to activity-based reporting, this will greatly enhance the ability of the Regional Board, Copermittees, and the public to determine whether the programs are successful.

The Order reduces the amount of program activity-based reporting from Order No. R9-2002-0001. Under the CASQA assessment model, activity-based reporting includes primarily outcomes that document compliance with permit requirements (Level 1 outcomes), rather than being indicators of the impact of activity implementation.[251] This approach is consistent with guidance from the USEPA, which notes that annual reports should highlight program effectiveness as well as describing activities.[252] This emphasis is also consistent with recommendations from the National Academy of Public Administration in its report to USEPA on Evaluating Environmental Progress, which suggest that reviewing activities data provides limited value when evaluating the effectiveness of programs and resulting environmental conditions.[253]

The Order maintains some reporting requirements for certain activity-based outcomes. These are mostly focused on activities that establish or revise municipal processes related to storm water runoff and management. The processes required by the Order are especially important in situations where sustaining water quality improvements may require activities that extend beyond the five-year period of the NPDES permit.

In addition, the Order maintains many activity-based reporting requirements related to enforcement of local requirements, with an emphasis on the results from such activities. This is intended to facilitate review of the contributions that inspection and enforcement activities have made toward meeting the goals of the Order. Reporting of these types of activities is supported by recommendations from the National Academy of Public Administration in its report to the USEPA: *Evaluating Environmental Progress: How EPA and the States Can Improve the Quality of Enforcement and Compliance Information* (June 2001).[254] Other activity-based reporting has been reduced to selected items based on consideration of program priorities.

Another source of prioritization for activity-based reporting is the *Storm Water Panel Recommendations to the California State Water Resources Control Board The Feasibility of Numeric Effluent Limits Applicable to Discharges of Storm Water Associated with Municipal, Industrial and Construction Activities* (June 19, 2006). In particular, the panel highlighted needs to improve the design, maintenance, and inspections of best management practices.

[251] Level 1 outcomes under the CASQA guidance include documentation that required activities have been implemented.
[252] USEPA 2007. *MS4 Program Evaluation Guidance.* USEPA Office of Wastewater Management EPA-833-R-07-003. January 2007 field test version.
[253] National Academy of Public Adminstration 2001. Evaluating Environmental Progress: How EPA and the States Can Improve the Quality of Enforcement and Compliance Information (June 2001). http://www.napawash.org
[254] The National Academy of Public Administration report is available on-line at http://www.napawash.org

L. Modification of Programs

The following legal authority applies to section L:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv).

Section L of the Order provides a process for the Copermittees to modify their runoff management programs. This process will be useful so that the Copermittees can continue to refine and improve their programs based on the findings of their annual program effectiveness assessments. The process allows for minor modifications to the Copermittees' programs where the Copermittees can exhibit that the modifications meet or exceed existing legal requirements under the Order. Such a process avoids lengthy and time consuming formal approvals of proposed modifications before the Regional Board, while still ensuring compliance with applicable legal standards and the Order. The process included in the Order is based on a process utilized by the San Francisco Bay Area Regional Water Quality Control Board in their MS4 permit for Alameda County.[255]

[255] San Francisco Bay Area Regional Water Quality Control Board, 2003. Order No. R2-2003-0021. P. 45.

M. Principal Permittee Responsibilities

The following legal authority applies to section M:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.26(a)(3)(iii)(C) provides that "A regional authority may be responsible for submitting a permit application."

Federal NPDES regulation 40 CFR 122.26(d)(2)(i)(D) provides that "[The Copermittee must demonstrate that it can control] through interagency agreements among coapplicants the contribution of pollutants from one portion of the municipal system to another portion of the municipal system."

No significant changes were made to this section.

N. Receiving Waters Monitoring and Reporting

The following legal authority applies to section N:

Broad Legal Authority: CWA sections 402, 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Copermittees must conduct a comprehensive monitoring program as required under Federal NPDES regulations 40 CFR 122.26(d)(2)(iii) and 122.44.

See section T of this Fact Sheet/Technical Report for a discussion of changes to the Receiving Waters Monitoring and Reporting Program.

O. Standard Provisions, Reporting Requirements, And Notifications

The following legal authority applies to section O:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Standard provisions, reporting requirements, and notifications are consistent to all NPDES permits and are generally found in Federal NPDES regulation 40 CFR 122.41.

Section L.2 of the Order has been changed to remove the statement that all plans and reports submitted in compliance with the Order are an enforceable part of the Order. This statement has been removed because it is unnecessary. The Order itself contains sufficient detailed requirements to ensure that compliance with discharge prohibitions, receiving water limitations, non-storm water action levels and the narrative standard of MEP for storm water are achieved. Implementation by the Copermittees of programs in compliance with the Order's requirements, prohibitions, and receiving water limitations is the pertinent compliance standard to be used under the Order, as opposed to assessing compliance by reviewing the Copermittees' implementation of their plans alone.

Rather than being substantive components of the Order itself, the Copermittees' management plans are simply descriptions of their runoff management programs required under the Order. These plans serve as procedural correspondence which guides program implementation and aids the Copermittees and Regional Board in tracking implementation of the programs. In this manner, the plans are not functional equivalents of the Order. For these reasons, the Copermittees' runoff management plans need not be an enforceable part of the Order.

P. Attachment A – Basin Plan Prohibitions

The following legal authority applies to Attachment A:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: California Water Code Section 13243 provides that "A regional board, in a water quality control plan or in waste discharge requirements, may specify certain conditions or areas where the discharge of waste, or certain types of waste, will not be permitted."

California Water Code Section 13263(a) provides that waste discharge requirements prescribed by the SDRWQCB implement the Basin Plan.

No significant changes were made to this attachment.

Q. Attachment B – Standard Provisions

The following legal authority applies to Attachment B:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Standard provisions, reporting requirements, and notifications are consistent to all NPDES permits and are generally found in Federal NPDES regulation 40 CFR 122.41.

Attachment B includes Standard Provisions which have been developed by the State Board. These Standard Provisions ensure that NPDES permits are consistent and compatible with USEPA's federal regulations. Some Standard Provisions sections specific to publicly owned sewage treatment works are not included in Attachment B.

R. Attachment C – Definitions

The following legal authority applies to Attachment C:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv).

Attachment C contains definitions for terms found in the Order. In addition, definitions for terms previously defined in Order No. R9-2002-0001 Attachment D, but which are not found in the current Order, have been deleted.

An additional section which includes acronyms and abbreviations has been added. This is to ensure clarity and prevent confusion of terms. Definitions have been added for new terms used in the permit to provide a clear understanding of their meaning and use.

S. Attachment D – Summary of Submittals

The following legal authority applies to Attachment D:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, 13383, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv) and 122.44(i).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.42(c) requires that "The operator of a large or medium municipal separate storm sewer system or a municipal separate storm sewer system that has been designated by the director under § 122.26(a)(1)(v) of this part must submit an annual report by the anniversary of the date of the issuance of the permit for such system. The report shall include: (1) The status of implementing the components of the storm water management program that are established as permit conditions; (2) Proposed changes to the storm water management program that are established as permit condition. Such proposed changes shall be consistent with § 122.26(d)(2)(iii) of this part; (3) Revisions, if necessary, to the assessment of controls and the fiscal analysis reported in the permit application under § 122.26(d)(2)(iv) and (d)(2)(v) of this part; (4) A summary of data, including monitoring data, that is accumulated throughout the reporting year; (5) Annual expenditures and budget for year following each annual report; (6) A summary describing the number and nature of enforcement actions, inspections, and public education programs; (7) Identification of water quality improvements or degradation."

California Water Code section 13267 provides that "the regional board may require than any person who has discharged […] shall furnish, under penalty of perjury, technical or monitoring reports which the regional board requires."

Attachment D to the Order provides a table summary of scheduled submittals required by the Order. Unscheduled submittals are no longer added to the table, since there is no proper due date for such submittals. A task summary has not been created for the Order, since the previous task summary was found to be redundant, repeating information found in the submittal summary and elsewhere in the Order.

A Jurisdictional Runoff Management Program (JRMP) Annual Report Checklist has been added to the reporting requirements. This addition is to determine and ensure that all requirements of the permit are being met. A Jurisdictional Runoff Management Program (JRMP) Annual Report Checklist has been added to the reporting requirements. This addition is to determine and ensure that all requirements of the permit are being met.

T. Attachment E - Receiving Waters and MS4 Discharge Monitoring and Reporting Program

The following legal authority applies to the Receiving Waters and MS4 Discharge Monitoring and Reporting Program:

Broad Legal Authority: CWA sections 402, 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv), 122.44 and 122.45.

Specific Legal Authority: Copermittees must conduct a comprehensive monitoring program as required under Federal NPDES regulations 40 CFR 122.26(d)(2)(iii).

Federal NPDES regulation 40 CFR 122.42(c) requires that "The operator of a large or medium municipal separate storm sewer system or a municipal separate storm sewer system that has been designated by the director under § 122.26(a)(1)(v) of this part must submit an annual report by the anniversary of the date of the issuance of the permit for such system. The report shall include: (1) The status of implementing the components of the storm water management program that are established as permit conditions; (2) Proposed changes to the storm water management program that are established as permit condition. Such proposed changes shall be consistent with § 122.26(d)(2)(iii) of this part; (3) Revisions, if necessary, to the assessment of controls and the fiscal analysis reported in the permit application under § 122.26(d)(2)(iv) and (d)(2)(v) of this part; (4) A summary of data, including monitoring data, that is accumulated throughout the reporting year; (5) Annual expenditures and budget for year following each annual report; (6) A summary describing the number and nature of enforcement actions, inspections, and public education programs; (7) Identification of water quality improvements or degradation."

California Water Code section 13267 provides that "the regional board may require than any person who has discharged […] shall furnish, under penalty of perjury, technical or monitoring reports which the regional board requires."

1. Purpose

According to USEPA, the benefits of sampling data include, but are not limited to:

1. Providing a means for evaluating the environmental risk of storm water discharges by identifying types and amounts of pollutants present;
2. Determining the relative potential for storm water discharges to contribute to water quality impacts or water quality standard violations;
3. Identifying potential sources of pollutants; and

4. Eliminating or controlling identified sources more specifically through permit conditions.[256]

Equally important, monitoring programs are an essential link in the improvement of storm water management efforts. Data collected from monitoring programs can be assessed to determine the effectiveness of management programs and practices, which is vital for the success of the iterative approach used to meet the MEP standard for storm water. Specifically, when data indicates that a particular BMP or program component is not effective, improved efforts can be selected and implemented. Also, when water quality data indicate that water quality standards or objectives are being exceeded, particular pollutants, sources, and drainage areas can be identified and targeted for specific management efforts.

Considering the benefits described above, the Receiving Waters Monitoring and Reporting Program (MRP) has been designed to determine impacts to receiving water quality and beneficial uses from storm water runoff and to use the results to refine the Copermittees' storm water runoff management programs for the reduction of storm water pollutant loadings to the MEP. For non-storm water discharges, monitoring has been designed for the identification of prohibited illicit discharges and to determine appropriate actions to take in response to dry weather non-storm water action levels. Additionally, the results from dry weather non-storm water monitoring can be used to evaluate exempted non-storm water discharges as a source or conveyance of pollutants. The primary goals of the MRP include:

1. Assess compliance with Order No. R9-2009-0002;
2. Measure and improve the effectiveness of the Copermittees' runoff management programs;
3. Assess the chemical, physical, and biological impacts of receiving waters from MS4 discharges;
4. Characterize storm water runoff discharges;
5. Identify sources of specific pollutants;
6. Prioritize drainage and sub-drainage areas that need management actions;
7. Detect and eliminate illicit discharges and illicit connections to the MS4;
8. Assess the overall health of receiving waters; and
9. Provide information to implement required BMP improvements

[256] USEPA, 1992. NPDES Storm Water Sampling Guidance Document. EPA/833-B-92-001.

Each of the components of the MRP is necessary to meet the objectives listed above. In addition, the MRP has been designed in accordance with the guidance provided by the Southern California Stormwater Monitoring Coalition's Model Monitoring Technical Committee in its August 2004 "Model Monitoring Program for Municipal Separate Storm Sewer Systems in Southern California." This guidance document was developed in response to Senate Bill 72 (Kuehl), which addressed the standardization of sampling and analysis protocols in municipal stormwater monitoring programs. The technical committee which developed the guidance included representatives from Southern California Regional Water Quality Control Boards (including San Diego), municipal storm water Permittees (including the County of Orange), Heal the Bay, and the Southern California Coastal Water Research Project.

As its title suggests, the guidance essentially developed a model municipal storm water monitoring program for use in Southern California. The model program is structured around five fundamental management questions, outlined below. The MRP is designed as an iterative step towards ensuring that the Copermittees' monitoring program can fully answer each of the five management questions.

1. Are conditions in receiving waters protective, or likely to be protective, of beneficial uses?
2. What is the extent and magnitude of the current or potential receiving water problems?
3. What is the relative storm water runoff contribution to the receiving water problem(s)?
4. What are the sources of storm water runoff that contribute to receiving water problem(s)?
5. Are conditions in receiving waters getting better or worse?

The justifications for each component of the monitoring program are discussed below.

2. Monitoring Program

Mass Loading Station Monitoring

The intent of current mass loading monitoring as conducted by the Copermittees is to use water chemistry data from storm events and dry weather flows to calculate pollutant loads and to assess water quality with respect to applicable acute and chronic toxicity criteria from the California Toxics Rule (CTR).[257]

[257] Orange County Storm Water Permittees. 2006. Report of Waste Discharge, section C-11.3.2.

Section II.A.1 of the MRP requires mass loading and toxicity monitoring at monitoring stations located at the bottom of major watersheds within Orange County. The mass loading monitoring will provide data representing event mean concentrations of pollutants, total pollutant loadings, and toxicity conditions from specific drainage areas. Mass loading monitoring stations are recommended by the Model Monitoring Technical Committee in order to answer management questions 1, 2, and 5.[258] The stations are also expected to contribute towards meeting MRP goals 1, 2, 3, 4, 6, and 8. The locations of the mass loading monitoring stations are not changed from Order No. R9-2002-0001. However, the frequency of monitoring has been changed, and some revisions to the constituents have been made.

The frequency of mass loading monitoring in Order No. 2009-0002 has been modified to include two wet and two dry weather events. Currently three wet events have been targeted (though usually two or less have been sampled). This modification is not expected to affect long-term trend analyses for storm events since the monitoring to date has been sporadic.[259] Dry weather monitoring is necessary because dry-weather flows in these watersheds are now perennial and changes have been made to the Order for non-storm water discharges. The addition of dry weather monitoring provides a more comprehensive temporal view of the watershed, which will improve the Copermittees' ability to understand the dynamics of annual pollutant loading.

In addition, the required constituents include some revisions to Order No. R9-2002-0001. The changes are made to be compatible with the federal NPDES regulations and in response to data collected during the current permit term. The changes include:

1. All events must now include Biological Oxygen Demand, 5-day Chemical Oxygen Demand, Total Organic Carbon, Dissolved Organic Carbon. These are specifically identified in 40 CFR 122.26(d)(2)(iii)(B), but were omitted from Order No. R9-2002-01.

2. Carbamate and Pyrethroid pesticides must initially be monitored in Prima Deshecha and Segunda Deshecha watersheds. If carbamate and/or pyrethroid pesticides are found to correlate with observed acute or chronic toxicity, then sampling and analysis for that pesticide must be added to all stations displaying toxicity. The Copermittees suggest adding these pesticides to Prima and Segunda Deshecha watersheds in an attempt to find a cause for observed persistent toxicity at those stations.[260] If these pesticides are found in these watersheds, then they will likely be present in the other developed watersheds of the Region.

[258] Model Monitoring Technical Committee, 2004. Model Monitoring Program for Municipal Separate Storm Sewer Systems in Southern California. Chapter 5.
[259] Mass loading monitoring has been hampered by technical difficulties. For instance, only four of six stations were operational during the 2004-05 season, and only three stations were operational during 2002-04 season.
[260] Orange County Storm Water Permittees. 2006. Report of Waste Discharge, section C-11.4.1.

3. Impaired water body pollutants. Specific pollutants have been added in response to the U.S. Environmental Protection Agency approval of California's 2004-2006 Section 303(d) Water Quality Limited Waters List. Monitoring for these pollutants is specific to the watershed in which the impairment is located.

4. Dimethoate monitoring has been eliminated because data collected to date has not observed any significant levels at the mass emissions stations.

5. A requirement to collect a grab sample for total petroleum hydrocarbons whenever a sheen is observed has been added at the suggestion of the County of Orange.

Bioassessment

Section II.A.2 of the MRP requires the Copermittees to conduct bioassessment monitoring. Bioassessment monitoring is a cost-effective tool that measures the effects of water quality over time.[261] It is an important indicator of stream health and impacts from storm water and non-storm water runoff. It can detect impacts that chemical and toxicity monitoring cannot. USEPA encourages permitting authorities to consider requiring biological monitoring methods to fully characterize the nature and extent of impacts from runoff.[262] Therefore, the Regional Board commonly requires bioassessment monitoring in MS4 and other types of discharge permits.

Bioassessment is the direct measurement of the biological condition, physical condition, and attainment of beneficial uses of receiving waters (typically using benthic macroinvertebrates, periphyton, and fish). Bioassessment monitoring integrates the effects of both water chemistry and physical habitat impacts (e.g., sedimentation or erosion) of various discharges on the biological community native to the receiving waters. Moreover, bioassessment is a direct measurement of the impact of cumulative, sub-lethal doses of pollutants that may be below reasonable water chemistry detection limits, but that still have biological affects.

[261] California Department of Fish and Game, 2002. California Regional Water Quality Control Board, San Diego Region 2002 Biological Assessment Report: Results of May 2001 Reference Site Study and Preliminary Index of Biotic Integrity.
[262] USEPA, 1999. Rapid Bioassessment Protocols for Use in Wadeable Streams and Rivers. EPA 841-B-99-002. P. 2-5.

Because bioassessment focuses on communities of living organisms as integrators of cumulative impacts resulting from water quality or habitat degradation, it defines the ecological risks resulting from storm water and non-storm water MS4 runoff. Bioassessment not only identifies that an impact has occurred, but also measures the effect of the impact and tracks recovery when control or restoration measures have been taken. These features make bioassessment a powerful tool to assess compliance, evaluate the effectiveness of BMPs, and to track both short and long-term trends (MRP goals 1,2,3, and 8). Bioassessment can also help answer management questions 1, 2, and 5.

The Order also identifies the most current established protocol to be used in identifying bioassessment reference stations. The protocol referenced in the Order is specified because it provides a qualitative and repeatable method for identifying reference sites. Moreover, the protocol is well established, since it has been peer reviewed and published.

The Order includes four modifications to the bioassessment monitoring required under Order 2002-0001. These changes include:

1. Bioassessment monitoring must utilize the targeted riffle composite approach, which is consistent with the State Board's Surface Water Ambient Monitoring Program (SWAMP) Quality Assurance Management Plan (QAMP), as amended. Through SWAMP, various bioassessment methods were evaluated and it was found that the targeted riffle composite approach was a particularly efficient method, providing accurate data in a cost efficient manner.

2. Bioassessment monitoring to include assessment of periphyton (algae). Advantages of bioassessment using periphyton include: (1) they have rapid reproduction rates and very short life cycles, making them valuable indicators of short-term impacts; (2) as primary producers, they are most directly affected by physical and chemical factors; (3) sampling is easy and inexpensive; and (4) algal assemblages are sensitive to some pollutants which may not visibly affect other aquatic assemblages.[263] Future bioassessment must use algal IBI scores, when developed.

[263] USEPA, 1999. Rapid Bioassessment Protocols for Use in Wadeable Streams and Rivers. EPA 841-B-99-002. P. 3-3.

3. One of the two required annual monitoring events has been eliminated for streams exhibiting perennial flows. The Copermittees suggest this approach in response to analyses that indicate that the physical habitat conditions are better correlated than aquatic chemistry data with IBI scores.[264] The Copermittees analyses indicate that although biological communities are different in the Fall and Spring, both seasonal communities indicate the same common relationships to spatial biological patterns and potential variables that explain the differences. For instance, downstream urbanized locations which exhibit perennial flows display lower IBI scores than reference sites regardless of the season, even if the biological community at a downstream site differs between the Fall and Spring.

4. The number of bioassessment stations has been reduced from 12 to six. This will allow resources to be available to implement the Stormwater Monitoring Coalition's program for Regional Monitoring of Southern California's Coastal Watersheds (Section II.D.3). The Regional Monitoring program calls for six sites to be sampled each year and includes each of the basic elements within the Copermittees' bioassessment monitoring program. Although the amount of toxicity tests are reduced, wetland status analyses will also be analyzed. The Regional Monitoring program is discussed in Section II.D.3 below.

Follow-up Analyses and Actions

Section II.A.3 of the MRP requires the Copermittees to use the results of the chemistry, toxicity, and bioassessment monitoring to determine if impacts from MS4 discharges are occurring and when follow-up actions are necessary. The triad approach allows a wide range of measurements to be combined to more efficiently identify pollutants, their sources, and appropriate follow-up actions. Results from the three types of monitoring shall be assessed to evaluate the extent and causes of pollution in receiving waters and to prioritize management actions to eliminate or reduce the sources. The framework provided is to be used to determine conclusions from the data and appropriate follow-up actions. The framework is proposed by the Copermittees and derived from the Model Monitoring Program for Municipal Separate Storm Sewer Systems in Southern California.[265] These follow-up actions are expected to primarily help answer management questions 2 and 4, as well as address MRP goals 2, 4, 5, 6 and 7.

[264] Orange County Storm Water Copermittees. 2006. Report of Waste Discharge (San Diego Region), section 11 and 2005-06 Annual Report section 11.3
[265] Model Monitoring Technical Committee, 2004. Model Monitoring Program for Municipal Separate Storm Sewer Systems in Southern California. P. 5-61.

When, based on the framework in Table 2 of the M&R Program, data indicates the presence of toxic pollutants in runoff, the Copermittees are required to conduct a Toxicity Identification Evaluation (TIE). A TIE is a set of procedures used to identify the specific chemical(s) responsible for toxicity to aquatic organisms. When discharges are toxic to a test organism, a TIE must be conducted to confirm potential constituents of concern and rule out others, therefore allowing Copermittees to determine and prioritize appropriate management actions. If a sample is toxic to more than one species, it is necessary to determine the toxicant(s) affecting each species. If the type and source of pollutants can be identified based on the data alone and an analysis of potential sources in the drainage area, a TIE is not necessary.

When a TIE identifies a pollutant associated with MS4 discharge as a cause of toxicity, it is then necessary to conduct follow-up actions to identify the causative agents of toxicity, isolate the sources of toxicity, evaluate the effectiveness of toxicity control options, and then confirm the reduction in toxicity. Follow-up actions should analyze all potential source(s) causing toxicity, potential BMPs to eliminate or reduce the pollutants causing toxicity, and suggested monitoring to demonstrate that toxicity has been removed.

Ambient Coastal Receiving Waters Monitoring

The Copermittees have been implementing a phased Ambient Coastal Monitoring Program that initially involved monitoring chemistry and aquatic toxicity of dry and storm water discharges to ecologically sensitive areas along the coastline. Later, aerial photographs of storm water plumes were taken to estimate the spatial extent of the impact of storm water runoff. The results were used to identify storm drains for source and toxicity identification studies, including sampling of storm water plumes.

Section II.A.4 of the MRP allows the Copermittees to continue the existing program, while requiring that the special studies be consistent with the MRP goals and that stations be located within Areas of Special Biological Significance.

Coastal Storm Drain Monitoring

Section II.A.5 of the MRP has been extensively modified and changed to a Regional Monitoring Program.

Section II.A.5.a. Coastal storm drain monitoring has been replaced with a Regional Bacteria Monitoring section. Coastal storm drain monitoring is critical because one of the primary impacts to coastal receiving waters is the loss of recreational beneficial uses resulting from high levels of bacteria in storm water and non-storm water MS4 runoff. The regional monitoring program is expected to help answer management questions 1, 2, 3, 4 and 5, as well as address MRP goals 1, 2, 3, 4, 5, 6, 7, and 8.

The changes to the coastal storm drain monitoring program have been made in response to the Copermittees' request. The Copermittees recommend participation in the regional program to save cost, prevent redundancy, improve notification times and provide more effort toward intensive investigations of problematic storm drains.[266] This section has been modified to allow the Copermittees to participate in the development and subsequent regional bacteria monitoring program upon review and approval from the Executive Officer. An adaptive approach is consistent with the Model Monitoring Technical Committee's recommendations.

High Priority Inland Aquatic Habitats

Section II.A.6 of the MRP has been removed.

Wet Weather MS4 Runoff Discharge Monitoring

Section II.B of the MRP requires the Copermittees to develop and implement a program to monitor and characterize pollutant discharges from MS4 outfalls. Currently the Copermittees do not monitor the discharge of storm water from the MS4 outfalls. As a result, a substantial amount of information regarding the quality of MS4 effluent is unknown. The collection of wet-weather data will enable the Copermittees to assess the effectiveness of existing storm water BMP measures. This data can be used to more effectively target storm water management program efforts. The MRP also requires compliance with Section D of the Order for Storm Water Action Levels.

The monitoring of outfalls is expected to be used to identify storm drains that are discharging pollutants in concentrations that may pose a threat to receiving waters. Source investigations are expected to be conducted as a response to the data.

The MRP provides the Copermittees great flexibility in assigning stations for wet-weather monitoring. Copermittees are to choose the number and frequency of monitoring stations, thus determining the overall cost of their program.

The monitoring requirements also include a requirement to measure receiving water hardness when comparing storm water MS4 discharge data to Storm Water Action Levels for priority pollutants (e.g. metals). The effect of these constituents upon receiving waters will vary depending upon the hardness of receiving waters.

[266] Ibid

Section II.B.2 requires the Copermittees to develop and implement a program to identify sources of discharges of pollutants causing the high priority water quality problems within each watershed. This requirement should be easily met because of the foundation already developed by the Copermittees in response to Order No. R9-2002-0001. To some extent, the Copermittees do conduct follow-up monitoring in response to dry-weather outfall data. The ROWD and 2007 DAMP describe some guidance that is provided by the County to the Copermittees, and it is expected that the Copermittees will develop follow-up monitoring programs for storm water discharges. The ROWD does recommend that additional training be provided for the municipalities with respect to interpreting and using the data collected by the County. In addition, many of the Copermittees have developed procedures and experience in conducting follow-up investigations in response to the bacteria investigations in the Aliso Creek watershed.[267]

Identification of sources causing high priority water quality problems is a central purpose of storm water runoff management programs. Monitoring which enables the Copermittees to identify sources of water quality problems aids the Copermittees in focusing their management efforts, improving their programs and choosing additional and/or better BMPs. In turn, the Copermittees' programs can abate identified sources, which will improve the quality of storm water runoff discharges and receiving waters. This monitoring is needed to address management question 4. Moreover, in its review of the San Diego County Copermittees' monitoring proposal, Tetra Tech, Inc. finds that "after some years of assessment monitoring, it is time to look more systematically at determining the relative urban contributions and the sources of urban runoff that contribute to identified receiving water problems."[268]

Non-storm Water Dry Weather Action Levels

Section II.C of the MRP describes the monitoring to be conducted by the Copermittees to determine compliance with dry weather, non-storm water action levels.

Section II.B.3 has been changed by removal of the Dry Weather Field Screening and Analytical Monitoring and subsequent replacement with section II.C for Dry Weather Non-Storm Water Action Level Monitoring. This change is required to assess compliance with action levels for non-storm water discharges from the MS4 into receiving waters. The required sampling frequency has been changed to allow Copermittees to sample a representative number of discharge points and the sampling methodology has been changed to grab sampling. This is expected to allow Copermittees to maintain a cost-neutral dry weather monitoring program that is similar to their existing IC/ID monitoring program.

[267] Copermittees in the Aliso Creek watershed include the County of Orange and the Cities of Aliso Viejo, Laguna Beach, Laguna Hills, Laguna Niguel, Laguna Woods, Lake Forest, and Mission Viejo.
[268] Tetra Tech Inc., 2006. Review of San Diego County MS4 Monitoring Program.

Special Studies

Section II.D.1 of the MRP absorbs the bacteria monitoring and reporting program currently in place in the Aliso Creek watershed.[269] This monitoring effort has been required by the Regional Board pursuant to authorities provided under California Water Code sections 13225 and 13267. The monitoring and reporting is focused solely on the MS4s in the Aliso Creek watershed and has effectively been integrated already into the Copermittees' programs. Inclusion of it into the MRP is done for organizational purposes and will have no other net effect.

Section II.D.3 includes a requirement to participate in the program for Regional Monitoring of Southern California's Coastal Watersheds developed by the Stormwater Monitoring Coalition. That program calls for the sampling of six locations within the Permit area each year. All sampling will be SWAMP comparable. Sampling includes water chemistry, aquatic toxicity (*Ceriodaphnia dubia*), physical habitat, benthic macroinvertebrates, wetland status (based on California Rapid Assessment Method protocols), and periphyton.

Section II.D.4 includes a requirement that the Copermittees conduct a sediment toxicity special study. This study has been added to the Monitoring and Reporting requirements to assess the quality of urban stream sediments and possible contamination due to runoff from the MS4. Toxicity tests focusing on aqueous toxicity may not account for the full toxicity of receiving waters if constituents, such as heavy metals or pesticides, are bound to sediments. Southern California studies have shown that stream sediments can exhibit significant levels of toxic metals and pesticides.[270,271]

Section II.D.5 includes a requirement that the Copermittees conduct a Trash and Litter Impairment Investigation (see Finding C.8 and Discussion).

Monitoring Provisions

Section II.E of the MRP includes monitoring provisions which are standard requirements for all municipal storm water permits.

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[269] On October 12, 2005, the Regional Board accepted the revised Aliso Creek watershed bacteria monitoring plan proposal from the MS4 Permittees. The Regional Board concluded that the scope of the current bacteria monitoring in the watershed was no longer warranted and that the proposed changes would constitute an effective interim program until adoption of a Total Maximum Daily Load, requiring a bacteria reduction and assessment program for the watershed. In addition, the Regional Board recognized that as a result of reduced monitoring costs, the municipalities expect to direct additional resources toward implementation of management practices to reduce indicator bacteria and pathogens.

[270] Holmes, R.W., Anderson, B.S., Phillips, B.M., Hunt, J.W., Crane, D.B., Mekebri, A. and V. Connor. 2008. Statewide Investigation of the Role of Pyrethroid Pesticides in Sediment Toxicity in California's Urban Waterways. *Environmental Science Technology* 42: 7003-7009..

[271] Crane, D.B. and C. Younghans-Haug. 1992. Oxadiazon residue concentrations in sediment, fish, and shellfish from a combined residential/agricultural area in Southern California. *Bulletin of Environmental Contamination and Toxicology.* Volume 48, no. 4.

2. Reporting Program

Section III of the MRP discusses submittal of the Jurisdictional Runoff Management Program Annual Reports and the Receiving Waters Monitoring Annual Reports. In effect, a description of the monitoring program will be submitted with the Jurisdictional RMPs, and the monitoring data and assessment will be submitted one month later. The MRP continues the reporting approach utilized under the requirements of Order No. R9-2002-0001, where Lead Permittees for each watershed submit their annual reports to the Principal Permittee to be unified into one document.

The reporting requirements for the Aliso Creek watershed are also specified in this section. These reporting requirements are identical to the current reporting required by the Regional Board for the bacteria investigation. They are specified in this section because the requirements are more specific than reporting required for other watershed RMPs.

U. Attachment F - Source Data

Attachment F contains data utilized for the development of Storm Water Action Levels and Non-storm Water Action Levels.

019389
UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
1315 East-West Highway
Silver Spring, Maryland 20910

THE DIRECTOR

Ms. Debbie Edwards
Director, Office of Pesticide Programs
U.S. Environmental Protection Agency
One Potomac Yard
2777 S. Crystal Drive
Arlington, Virginia 22202

APR 20 2009

Dear Ms. Edwards:

Enclosed is the National Oceanic Atmospheric Administration (NOAA) National Marine Fisheries Service's (NMFS) final biological opinion (Opinion), issued under the authority of section 7(a)(2) of the Endangered Species Act (ESA), on the effects of the U.S. Environmental Protection Agency's (EPA) proposed registration of pesticide products containing the active ingredients carbaryl, carbofuran, and methomyl on endangered species, threatened species, and critical habitat that has been designated for those species. This Opinion assesses the effects of all pesticides containing carbaryl, carbofuran, or methomyl on 28 listed Pacific salmonids.

After considering the status of the listed resources, the environmental baseline, and the direct, indirect, and cumulative effects of EPA's proposed action on listed species, NMFS concludes that pesticide products containing carbaryl and carbofuran are likely to jeopardize the continuing existence of 22 listed Pacific salmonids as described in the attached Opinion. NMFS also concluded that the effects of carbaryl and carbofuran are likely to destroy or adversely modify designated habitat for 20 of 26 listed salmonids. NMFS has not designated critical habitat for two listed salmonids. NMFS determinations for no jeopardy and no adverse modification of critical habitat apply to Ozette Lake sockeye salmon, Snake River sockeye salmon, Northern California steelhead, Columbia River chum salmon, Hood Canal summer-run chum salmon, and Oregon Coast coho salmon. We further conclude that pesticide products containing methomyl are likely to jeopardize 18 listed Pacific salmonids and likely to destroy or adversely modify critical habitat for 16 of 26 salmonids with designated critical habitat. NMFS determinations for no jeopardy and no adverse modification of designated critical habitat apply to California Coastal Chinook salmon, Snake River fall-run Chinook salmon, Snake River spring/summer-run Chinook salmon, Ozette Lake sockeye salmon, Snake River sockeye salmon, Northern California steelhead, Columbia River chum salmon, Hood Canal summer-run chum salmon, Oregon Coast coho salmon, and Snake River steelhead. As NMFS has not designated critical habitat for the Lower Columbia River coho salmon or Puget Sound steelhead, the action area contains no designated critical habitat for these species. Thus, the Opinion presents no further critical habitat analysis for the Lower Columbia River coho salmon and Puget Sound steelhead.

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THE ASSISTANT ADMINISTRATOR
FOR FISHERIES

As required by section 7 of the ESA, NMFS provides an incidental take statement with the Opinion. The incidental take statement describes reasonable and prudent measures NMFS considers necessary or appropriate to minimize incidental take associated with this action. The incidental take statement also sets forth nondiscretionary terms and conditions, including reporting requirements that EPA and any person who performs the action must comply with to carry out the reasonable and prudent measures. Incidental take from actions by EPA and the applicants that meets these terms and conditions will be exempt from the ESA section 9 prohibitions for take.

This Opinion assesses effects to listed Pacific salmonids pursuant to the ESA. It does not address EPA's obligation under the Magnuson-Stevens Fishery Conservation and Management Act to consult on effects to essential fish habitat (EFH) for salmonids and other federally-managed species. Please contact Mr. Tom Bigford or Ms. Susan-Marie Stedman in NMFS' Office of Habitat Conservation at 301-713-4300 regarding the EFH consultation process.

If you have questions regarding this Opinion please contact me or Ms. Angela Somma, Chief of our Endangered Species Division at (301) 713-1401.

Sincerely,

for James H. Lecky
Director
Office of Protected Resources

Enclosure

National Marine Fisheries Service
Endangered Species Act Section 7 Consultation
Biological Opinion
Environmental Protection Agency Registration of
Pesticides Containing Carbaryl, Carbofuran, and Methomyl

Photo Credit: Desmond Maynard NMFS

Photo Credit: Tom Maurer USFWS

April 20, 2009

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National Marine Fisheries Service
Endangered Species Act Section 7 Consultation
Biological Opinion

Agency:	United States Environmental Protection Agency
Activities Considered:	Authorization of pesticide products containing the a.i.s carbaryl, carbofuran, and methomyl, and their formulations in the United States and its affiliated territories
Consultation Conducted by:	Endangered Species Division of the Office of Protected Resources, National Marine Fisheries Service
Approved by:	Helen M. Stickle for James H. Lecky
Date:	April 20, 2009

Section 7(a)(2) of the Endangered Species Act of 1973, as amended (ESA; 16 U.S.C. §1531 *et seq.*) requires each federal agency to insure that any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of critical habitat of such species. When a federal agency's action "may affect" a protected species, that agency is required to consult formally with the National Marine Fisheries Service (NMFS) or the U.S. Fish and Wildlife Service (USFWS), depending upon the endangered species, threatened species, or designated critical habitat that may be affected by the action (50 CFR §402.14(a)). Federal agencies are exempt from this general requirement if they have concluded that an action "may affect but is not likely to adversely affect"

endangered species, threatened species or designated critical habitat (50 CFR §420.14(b)).

The United States (U.S.) Environmental Protection Agency (EPA) initiated consultation with NMFS on its proposal to authorize use, pursuant to the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), 7 U.S.C. 136 *et seq.*, of pesticide products containing the a.i.s (a.i.s) of carbaryl, and methomyl on April 1, 2003, and of carbofuran on December 1, 2004. EPA authorization of pesticide uses are categorized as FIFRA sections 3 (new product registrations), 4 (reregistrations and special review), 18 (emergency use), or 24(c) [Special Local Needs (SLN)]. At that time, EPA determined that uses of pesticide products containing these ingredients "may affect" most of the 26 Evolutionarily Significant Units (ESUs) of Pacific salmonids listed as endangered or threatened and designated critical habitat for the ESUs. This document represents NMFS' biological opinion (Opinion) on the impacts of EPA's authorization of pesticide products containing the above-mentioned a.i.s on the listed ESUs, plus on two newly listed salmonids. This is a partial consultation because pursuant to the court's order, EPA sought consultation on only this group of listed species under NMFS' jurisdiction. However, even though the court's order did not address the two more recently listed salmonids, NMFS analyzed the impacts of EPA's action to them because they belong to the same taxon. NMFS analysis requires consideration of the same information. Consultation with NMFS will be completed when EPA makes effect determinations on all remaining species and consults with NMFS as necessary.

This Opinion is prepared in accordance with section 7(a)(2) of the ESA and implementing regulations at 50 CFR §402. However, consistent with the decision in Gifford Pinchot Task Force v. USFWS, 378 F.3d 1059 (9th Cir. 2004), we did not apply the regulatory definition of "destruction or adverse modification of critical habitat" at 50 CFR §402.02. Instead, we relied on the statutory provisions of the ESA to complete our analysis of the effects of the action on designated critical habitat.

This Opinion is based on NMFS' review of the package of information the EPA submitted with its 2003 and 2004 requests for formal consultation on the proposed authorization of the above a.i.s. It also includes our review of recovery plans for listed Pacific salmonids, past and current research and population dynamics modeling efforts, monitoring reports from prior research, Opinions on similar research, published and unpublished scientific information on the biology and ecology of threatened and endangered salmonids in the action area, and other sources of information gathered and evaluated during the consultation on the proposed authorization of a.i.s for carbaryl, carbofuran, and methomyl. NMFS also considered information and comments provided by EPA and by the registrants identified as applicants by EPA.

Background

On January 30, 2001, the Washington Toxics Coalition, Northwest Coalition for Alternatives to Pesticides, Pacific Coast Federation of Fishermen's Associations, and Institute for Fisheries Resources filed a lawsuit against EPA in the U.S. District Court for the Western District of Washington, Civ. No. 01-132. This lawsuit alleged that EPA violated section 7(a)(2) of the ESA by failing to consult on the effects to 26 ESUs of listed Pacific salmonids of its continuing approval of 54 pesticide a.i.s.

On July 2, 2002, the court ruled that EPA had violated ESA section 7(a)(2) and ordered EPA to initiate interagency consultation and make determinations regarding effects to the salmonids on all 54 a.i.s by December 2004.

In December 2002, EPA and the USFWS and NMFS (referred to as the Services) began interagency discussions for streamlining EPA's court ordered consultations.

On January 24, 2003, EPA and the Services published an Advance Notice of Proposed Rulemaking seeking public comment on improving the process by which EPA and the Services work together to protect listed species and critical habitat (68 FR 3785).

Between May and December 2003, EPA and the Services reviewed EPA's ecological risk assessment methodology and earlier drafts of EPA's "Overview of the Ecological Risk Assessment Process in the Office of Pesticide Programs, U.S. Environmental Protection Agency (Overview Document)". EPA and the Services also developed counterpart regulations to streamline the consultation process.

On January 22, 2004, the court enjoined application of pesticides within 20 (for ground) and 100 (for aerial) feet (ft) of streams supporting salmon. Washington Toxics Coalition v. EPA, 357 F.Supp. 2d 1266 (W.D. Wash. 2004). The court imposed several additional restrictions on pesticide use in specific settings.

On January 23, 2004, EPA finalized its Overview Document which specified EPA's conduct of ecological risk assessment on pesticide registrations.

On January 26, 2004, the Services approved EPA's procedures and methods for conducting ecological risk assessments and approved interagency counterpart regulations for EPA's pesticide registration program.

On January 30, 2004, the Services published in the Federal Register (69 FR 4465) proposed joint counterpart regulations for consultation under the ESA for regulatory actions under the FIFRA, codified at 50 C.F.R. Part 402 Subpart D.

On August 5, 2004, the Services promulgated final joint counterpart regulations for EPA's ESA-related actions taken pursuant to FIFRA. These regulations and the Alternative Conservation Agreement (ACA) under the regulations allowed EPA to conduct independent analyses of potential impacts of pesticide registration on listed species and their designated critical habitats. The ACA outlined procedures to ensure EPA's risk assessment approach will produce effect determinations that reliably assess the effects of pesticides on listed species and designated critical habitat. Additionally, EPA and the Services agreed to meet annually, or more frequently as may be deemed appropriate. The intention of these meetings was to identify new research and other

activities that may improve EPA's current approach for assessing the potential ecological risks posed by use of a pesticide to listed species or designated critical habitat.

On September 23, 2004, the Washington Toxics Coalition and others challenged the counterpart regulations in the U.S. District Court for the Western District of Washington, Civ. No. 04-1998, alleging that the regulations were not authorized by the ESA and that the Services had not complied with the Administrative Procedure Act and the National Environmental Policy Act (NEPA) in promulgating these counterpart regulations.

In January 2006, EPA and the Services developed a draft joint interagency research agenda to address several critical areas of scientific and procedural uncertainties in EPA's current effects determination process. The jointly developed document identified eight areas of risk assessment and research uncertainties.

On August 24, 2006, the court determined the Services did not implement NEPA procedures properly during their promulgation of the joint counterpart regulations for EPA actions under FIFRA. Additionally, the court determined that the "not likely to adversely affect" and emergency consultation provisions of the counterpart regulations were arbitrary and capricious and contrary to the substantive requirements of ESA section 7(a)(2). The court determined that EPA may conduct its own formal consultation with the Services' involvement. Washington Toxics Coalition v. Department of the Interior, 457 F.Supp. 2d 1158 (W.D.Wash. 2006).

On November 5, 2007, the Northwest Coalition for Alternatives to Pesticides and others filed a legal complaint in the U.S. District Court for the Western District of Washington, Civ. No. 07-1791, against NMFS for its unreasonable delay in completing the section 7 consultations for EPA's registration of 54 pesticide a.i.s.

On July 30, 2008, NMFS and the plaintiffs entered into a settlement agreement with the Northwest Coalition for Alternatives to Pesticides. NMFS agreed to complete consultation within four years on 37 a.i.s. (EPA had concluded that 17 of the 54 a.i.s at

issue in the first litigation would not affect any listed salmonid species or any of their designated critical habitat, and so did not initiate consultation on those a.i.s.)

On November 18, 2008, NMFS issued its first Opinion for three organophosphates: chlorpyrifos, diazinon, and malathion. This second consultation evaluates three carbamate insecticides: carbaryl, carbofuran, and methomyl. EPA consultations on pesticide products currently focus on their effects to listed Pacific salmonids. EPA consultations remain incomplete until all protected species under NMFS' jurisdiction are covered.

Consultation History

On April 1, 2003, the EPA sent a letter to NMFS' Office of Protected Resources (OPR) requesting section 7 consultation for the registration of the a.i. carbaryl and detailing its effects determinations on 26 ESUs of Pacific salmonids listed at that time. In that same letter, EPA's Office of Pesticide Programs (OPP) determined that the use of carbaryl will have "no effect" for 4 ESUs, "may affect but is not likely to adversely affect" 2 ESUs, and "may affect" 20 ESUs of listed salmonids. EPA's "no effect" determinations for carbaryl applied to Northern California steelhead, SONCC coho salmon, Hood Canal Summer-run chum salmon, and Ozette Lake sockeye salmon.

On April 1, 2003, the EPA sent a letter to NMFS' OPR requesting section 7 consultation for the registration of the a.i. methomyl and detailing its effects determinations on 26 ESUs of Pacific salmonids listed at that time. In that same letter, the EPA's OPP determined that the use of methomyl will have "no effect" for 2 ESUs, and "may affect" 24 ESUs of listed salmonids. EPA's "no effect" determinations for methomyl applied to the Northern California steelhead and California Coastal Chinook salmon ESUs.

On December 1, 2004, the EPA sent a letter to NMFS' OPR requesting section 7 consultation for the registration of the a.i. carbofuran and detailing its effects determinations on 26 ESUs of Pacific salmonids listed at that time. In that same letter, EPA's OPP determined that the use of carbofuran will have "no effect" for 3 ESUs; "may

affect but is not likely to adversely affect" 18 ESUs, and "may affect" 3 ESUs of listed salmonids. EPA's "no effect" determinations applied to the California Coastal Chinook salmon, Central California coho salmon, and Northern California steelhead.

On June 28, 2005, NMFS listed the Lower Columbia River coho salmon ESU as endangered. Given this recent listing, EPA's 2003 and 2004 effects determinations for carbaryl, carbofuran, and methomyl on listed Pacific salmonids lack an effects determination for the Lower Columbia River coho salmon.

On May 22, 2007, NMFS listed the Puget Sound Steelhead Distinct Population Segment (DPS) as threatened. Given this recent listing, EPA's 2003 and 2004 effects determinations for carbaryl, carbofuran, and methomyl on listed Pacific salmonids lack an effects determination for the Puget Sound steelhead.

On December 10-12, 2007, EPA and the Services met and discussed approaches for moving forward with ESA consultations and pesticide registrations. The agencies agreed to develop methodologies for filling existing data gaps. In the interim, the Services will develop approaches within their Opinions to address these gaps. The agencies identified communication and coordination mechanisms to address technical and policy issues and procedures for conflict resolution.

On February 11, 2008, NMFS listed the Oregon Coast coho salmon ESU as threatened. EPA's 2003 and 2004 initiation packages for carbaryl, carbofuran, and methomyl provided an effects determination for the Oregon Coast coho salmon ESU. This ESU was previously listed in 1998 and its ESA status was in-flux until 2008.

On August 20, 2008, NMFS met with EPA and requested EPA to identify applicants for this and subsequent pesticide consultations. NMFS also requested information on EPA's cancellation of carbofuran and of existing stocks of carbofuran.

On August 29, 2008, NMFS met with EPA and the applicants for chlorpyrifos, diazinon, and malathion. At that meeting, NMFS asked EPA to identify applicants for this and subsequent pesticide consultations.

On September 16, 2008, NMFS requested EPA to confirm the status of EPA's cancellation of carbofuran and for existing stocks of that same compound during a conference call.

On September 17, 2008, NMFS requested EPA approval of Confidential Business Information (CBI) clearance for certain staff members in accordance with FIFRA regulations and access to EPA's incident database so NMFS staff may evaluate CBI materials from the applicants and incident reports for the a.i.s under consultation. EPA conveyed to NMFS that no access to the incident database would be authorized and the reports will be sent directly from EPA to NMFS.

On September 23, 2008, NMFS staff received notification of CBI clearance from EPA.

On September 26, 2008, NMFS sent correspondence to EPA informing it of the roles of the action agency and applicants during formal consultation. NMFS also requested incident reports and label information for subsequent pesticide consultations from EPA. The specified timeline for NMFS' receipt of incident report and label information for carbaryl, carbofuran, and methomyl was November 3, 2008.

On October 3, 2008, NMFS received post-2002 incident reports for carbaryl, carbofuran, and methomyl from EPA.

On November 5, 2008, NMFS sent an e-mail to EPA requesting it to identify applicants for upcoming pesticide consultations and label and incident report information for carbaryl, carbofuran, and methomyl. NMFS also requested information regarding whether final cancellation of carbofuran or any if its uses had occurred.

On November 13, 2008, EPA provided an interim e-mail response to NMFS' November 5, 2008 query. EPA stated that it was developing a process to identify applicants for carbaryl, carbofuran, and methomyl. No applicants were identified in EPA's response. EPA also stated that incident data for carbaryl, carbofuran, and methomyl were sent via FedEx to NMFS on October 2, 2008, which we received. Finally, EPA confirmed that no final cancellations for carbofuran have occurred subsequent to the Scientific Advisory Panel (SAP) meeting required for action relative to the Notice of Intent to cancel this compound. The SAP meeting occurred on February 5, 2008.

On December 1, 2008, NMFS repeated its request to EPA to identify applicants for carbaryl, carbofuran, and methomyl via e-mail. NMFS also requested EPA to provide technical staff contact information for these same chemicals so NMFS staff may request information from them during this consultation.

On December 15, 2008, EPA informed NMFS via e-mail that it would send letters to the technical registrants of carbaryl, carbofuran, and methomyl. EPA also stated that it would inform the parties that they may submit information relative to the consultation directly to NMFS with a copy to EPA. EPA also offered to include additional information requested by NMFS pertinent to the consultation into that same letter.

On December 16, 2008, NMFS and EPA discussed each agency's notification strategy of prospective applicants for this consultation. As the action agency, EPA indicated it would identify and contact prospective applicants. EPA limited applicant status to those technical registrants who have all information pertinent to the consultation.

On December 18, 2008, EPA sent formal correspondence to four technical registrants. EPA's letter requested confirmation on their desire to have applicant status and for parties to submit data not already provided with EPA's consultations that may inform the outcome of the consultation. That information includes any toxicity data, field studies or mesocosm studies not part of the consultation package, or EPA's Interim Registration Eligibility Decision (IRED) or Registration Eligibility Decision (RED) documents for the

pesticide a.i.; and current labels for end use products or if available, a master label that includes all use instructions for all products containing the a.i.s. These data would be submitted to NMFS and EPA.

On December 19, 2008, EPA identified technical staff contact information and four applicants to NMFS for this consultation via formal correspondence. In that same letter, EPA referred NMFS to the IRED and RED documents for any changes to the three subject a.i.s since consultation was initiated in 2003 and 2004.

On that same date, NMFS received electronic copies of EPA letters sent to the applicants. EPA identified the following applicants: Bayer CropScience LP, Drexel Chemical Company, E.I., duPont de Nemours and Company (DuPont), and FMC Corporation.

On January 5, 2009, NMFS requested clarification on EPA's registration action for carbofuran via e-mail. Questions pertained to the six carbofuran uses that have not been proposed for voluntary cancellation; the duration of the cancellation process for these same six uses as well as for 22 crop uses proposed for voluntary cancellation; and whether other current or pending registrations for carbofuran (FIFRA sections 3, 4, 18, or 24 (c)) are anticipated.

On January 7, 2009, EPA notified NMFS via email that it was conducting an internal policy review and would provide a full response to NMFS' query on carbofuran as soon as possible.

On January 8 and 9, 2009, EPA and NMFS exchanged e-mails scheduling a meeting at the end of January with identified applicants for this consultation.

On January 9, 2009, NMFS provided EPA with an electronic draft of the Description of the Proposed Action and associated Appendix for this consultation. NMFS requested EPA comments on these documents by January 23, 2009.

On January 21, 2009, the agencies agreed to meet with the applicants on January 30, 2009, at OPP Headquarters in Crystal City, Virginia.

On January 22, 2009, NMFS requested the following information from EPA: the bibliography for the carbofuran IRED (August 3, 2006), the report study cited as Table 16 within the carbofuran IRED; and the methomyl study cited in the Science Chapter – Master Record Identification Number (MRID) #00131255.

On that same date, DuPont informed NMFS that it would submit information to NMFS and EPA to support the consultation for methomyl.

On that same date, EPA informed NMFS that it would provide comments to NMFS on the draft Description of the Proposed Action by January 30, 2009.

On January 23, 2009, EPA instructed DuPont to send any data in support of the methomyl consultation to both EPA and NMFS.

On January 26, 2009, NMFS received data on methomyl from DuPont. The package included a cover letter, analysis of risk to methomyl to listed Pacific salmonids; copies of four studies, including three toxicity tests with formulated material and an environmental fate study (dissipation of methomyl in a simulated pond); and copies of methomyl product labels held by DuPont.

On that same date, NMFS also received confidential information on sales of Lannate (DuPont methomyl product) in Washington and Oregon from 2004-2006.

On January 27, 2009, NMFS asked EPA via e-mail to identify agenda topics and a list of participants/applicants for the January 30, 2009, meeting. EPA provided the requested information on that same date.

On January 29, 2009, NMFS received information from Bayer CropScience, the registrant for carbaryl. The information included a summary of Section 3 label restrictions, a "master label table", and copies of current 24(c) and Section 3 labels.

On January 30, 2009, NMFS met with EPA, Bayer CropScience, DuPont, and FMC Corporation. At this meeting, NMFS explained the consultation procedure and timelines for this consultation. The applicants also presented information to NMFS and EPA on these a.i.s. DuPont presented the risk of methomyl on endangered salmonids. FMC presented the U.S. registration status and use in the Pacific Northwest for carbofuran. Bayer CropScience presented use pattern summaries for carbaryl. This venue facilitated a question-answer session between the applicants and the agencies.

On that same date, NMFS received electronic files of applicant presentation materials on carbaryl, carbofuran, and methomyl. EPA also provided NMFS with a PDF file of the Environmental Fate and Effects Division's (EFED) RED Science Chapter for methomyl.

On February 2, 2009, NMFS received carbofuran data from FMC Corporation. Materials included the status on furadan registration and use in the relevant Pacific Northwest, the proposed federal label for furadan, current special local needs label for potato use in Oregon and spinach grown for seed use in Washington, and the Federal Register notice for proposed voluntary cancellation of most uses.

On that same date, NMFS queried FMC Corporation via e-mail regarding when EPA's response on the proposed federal label for furadan is expected. NMFS also requested information whether the proposed permitted uses for foliar application of furadan on cotton would apply in California, Idaho, Oregon, and Washington.

On February 3, 2009, NMFS received comments from EPA on the draft Description of the Proposed Action relevant to carbofuran and methomyl. EPA disagreed with FMC's statement that use of carbofuran has been discontinued on field corn in the Pacific Northwest. According to EPA, carbofuran use is specified on federal labels and is used

in California, Idaho, Oregon, and Washington. Carbofuran is also used on sunflowers grown in these states. EPA feedback for methomyl pertained to the SLN in California and the status of some section 24(c) actions. EPA provided no response regarding carbaryl.

On that same date, NMFS requested clarification on registered carbofuran uses and EPA's verification of NMFS' draft Description of the Proposed Action for this ingredient.

On February 5, 2009, NMFS received the two early life stage studies for fish (MRID 131255 and 126862) from EPA. On that same date, FMC Corporation responded to NMFS' questions regarding uses of furadan raised in it February 2, 2009, e-mail.

On February 9, 2009, EPA provided responses via e-mail regarding questions posed in NMFS' February 3, 2009, e-mail, on carbaryl. EPA provided no comments on NMFS' Description of the Proposed Action for carbaryl and no response towards NMFS' questions on carbofuran.

On February 11, 2009, NMFS received a study on carbaryl from Bayer CropScience.

On February 13, 2009, NMFS contacted EPA by phone and requested EPA comments on the draft Description of the Proposed Action.

On that same date, NMFS received a copy of a position paper on key issues related to carbaryl use, ecotoxicology, and aquatic exposure from Bayer CropScience. Bayer Crop Science also sent this document to EPA.

On February 20, 2009, EPA e-mailed NMFS information on carbaryl use patterns for Idaho, Oregon, and Washington. NMFS previously requested this information for the draft Description of the Proposed Action.

On February 20, 2009, EPA e-mailed NMFS information on carbaryl use patterns for Idaho, Oregon, and Washington.

On March 5, 2009, NMFS received an extension from the court for this consultation from March 31, 2009, to April 20, 2009.

On March 12, 2009, NMFS requested clarification from EPA on the carbaryl use data provided in its February 20, 2009, e-mail. NMFS also requested EPA forward cancellation notices for carbaryl for several crop uses once they are available.

On March 13, 2009, NMFS met with and provided EPA a list of questions pertaining to past, ongoing, and future pesticide consultations with EPA.

On March 17, 2009, NMFS e-mailed EPA instructions to access a pdf copy of the draft Opinion from NMFS' ftp site. NMFS also FedExed a pdf copy of the draft Opinion to EPA on that same day. Although this draft did not include Reasonable and Prudent Alternatives (RPAs), NMFS conveyed to EPA that RPAs will be provided on the following day.

On that same date, EPA downloaded the draft Opinion file from NMFS' ftp site and requested NMFS provide word version files for future draft Opinions.

On March 18, 2009, NMFS provided EPA instructions to access a pdf copy of the draft Opinion, including RPAs from NMFS' ftp site. NMFS also FedExed a word file of a full draft Opinion, including RPAs and a separate RPA file to EPA. On this same day, EPA responded to NMFS' query of SLN use of carbaryl in Washington State. EPA's e-mail further stated that Bayer CropScience does not support carbaryl use for adult mosquito treatments although carbaryl is registered for use on a number of sites where it could kill mosquitoes.

On that same date, EPA e-mailed NMFS information on the voluntary cancellation of carbofuran. NMFS replied to EPA's message and reminded EPA of NMFS questions raised in a February 3, 2009, e-mail regarding uses of carbofuran.

On March 24, 2009, EPA notified NMFS via e-mail of receipt of the cd containing the word versions of a complete draft Opinion and separate RPA document.

On March 30, 2009, EPA and NMFS confirmed their availability to meet with the three identified applicants for this consultation on April 7, 2009.

On April 7, 2009, EPA, NMFS, and the applicants met at EPA's office in Crystal City, VA. NMFS presented its assessment and conclusions on the draft Opinion. The applicants provided a combined presentation on their general and specific comments on NMFS' draft Opinion. Afterwards, all parties discussed potential Reasonable and Prudent Alternatives (RPAs) as NMFS concluded that EPA's proposed action will likely result in jeopardy of listed species and adverse modification of critical habitat for listed Pacific salmonids under NMFS' jurisdiction.

On that same date, NMFS and EPA discussed RPAs for this consultation and for NMFS' November 18, 2008, Opinion for chlorpyrifos, diazinon, and malathion.

On April 9, 2009, NMFS received copies of the three presentations made by the applicants at the April 7, 2009, meeting.

On April 10, 2009, NMFS received written comments from EPA on the March 18, 2009 draft Opinion for carbaryl, carbofuran, and methomyl. On that same date, NMFS received comments on the draft Opinion from Bayer CropScience on carbaryl and from DuPont on methomyl.

On April 15, 2009, NMFS received additional comments from Bayer CropScience on the draft Opinion.

On April 18, 2009, NMFS received additional comments from Bayer CropScience on the draft Opinion.

Description of the Proposed Action

The Federal Action

The proposed action encompasses EPA's registration of the uses (as described by product labels) of all pesticides containing carbaryl, carbofuran, and methomyl. The purpose of the proposed action is to provide tools for pest control that do not cause unreasonable adverse effects to the environment throughout the U.S. and its affiliated territories. Pursuant to FIFRA, before a pesticide product may be sold or distributed in the U.S. it must be exempted or registered with a label identifying approved uses by EPA's OPP. Once registered, a pesticide may not legally be used unless the use is consistent with directions on its approved label (http:www.epa.gov/pesticides/regulating/registering/index.htm). EPA authorization of pesticide uses are categorized as FIFRA sections 3 (new product registrations), 4 (re-registrations and special review), 18 (emergency use), or 24(c) SLN.

EPA's pesticide registration process involves an examination of the ingredients of a pesticide, the site or crop on which it will be used, the amount, frequency and timing of its use, and its storage and disposal practices. Pesticide ingredients may include active and other ingredients, adjuvants, and surfactants (described in greater detail below). The EPA evaluates the pesticide to ensure that it will not have unreasonable adverse effects on humans, the environment, and non-target species. An unreasonable adverse effect on the environment is defined in FIFRA as, "(1) any unreasonable risk to man or the environment, taking into account the economic, social, and environmental costs and benefits of the use of the pesticide, or (2) a human dietary risk from residues that result from a use of a pesticide in or on any food inconsistent with the standard under section 408 of the Federal Food, Drug, and Cosmetic Act (FFDCA) (21 U.S.C. §346a)." 7 U.S.C. 136(b).

After registering a pesticide, EPA retains discretionary involvement and control over such registration. EPA must periodically review the registration to ensure compliance with FIFRA and other federal laws (7 U.S.C. §136d). A pesticide registration can be cancelled whenever "a pesticide or its labeling or other material… does not comply with the provisions of FIFRA or, when used in accordance with widespread and commonly recognized practice, generally causes unreasonable adverse effects on the environment."

On December 12, 2007, EPA, NMFS, and FWS agreed that the federal action for EPA's FIFRA registration actions will be defined as the "authorization for use or uses described in labeling of a pesticide product containing a particular pesticide ingredient." In order to ensure that EPA's action will not jeopardize listed species or destroy or adversely modify critical habitat, NMFS' analysis necessarily encompasses the impacts to Pacific salmonid ESUs/DPSs of all uses authorized by EPA, regardless of whether those uses have historically occurred.

Pesticide Labels. For this consultation, EPA's proposed action encompasses all approved product labels containing carbaryl, carbofuran, or methomyl; their degradates, metabolites, and formulations, including other ingredients within the formulations; adjuvants; tank mixtures; and their individual and collective interactions when applied in agricultural, urban, and residential landscapes throughout the U.S. and its territories. These activities comprise the stressors of the action (Figure 1). The three biological evaluations (BEs) indicate that carbaryl, carbofuran, and methomyl are labeled for a variety of uses including applications to residential areas and crop lands (EPA 2003; EPA 2003; EPA 2004). Modifications have been made or are planned for new product labels containing carbaryl, carbofuran, and methomyl as a result of reregistration activities that have occurred since the release of the BEs.

The Food Quality Protection Act (FQPA) of 1996 required EPA to complete an assessment of the cumulative effects on human health resulting from exposure to multiple chemicals that have a common mechanism of toxicity. In 2001, EPA identified the *N*-methyl carbamate (NMC) pesticides as a group which shares a common mechanism of

toxicity. This group includes carbaryl, carbofuran, methomyl, and seven other cholinesterase-inhibiting pesticides. (http://www.epa.gov/pesticides/cumulative/carbamate_risk_mgmt.htm). EPA published a preliminary Cumulative Risk Assessment for NMC pesticides in 2005 and revised the risk assessment in 2007 (EPA 2007). Concurrent with completing the revised assessments, EPA completed tolerance reassessments and REDs for the NMC pesticides (EPA 1998; EPA 2006; EPA 2007; EPA 2008). EPA has identified measures to address cumulative risk of NMC pesticides (http://www.epa.gov/pesticides/cumulative/carbamate_risk_mgmt.htm). Some of the risk reduction measures for carbaryl, carbofuran, and methomyl follow:

Carbaryl – EPA intends to evaluate the revised worker assessment, which may require an amendment to the RED. EPA continues to respond to petitions requesting that carbaryl be cancelled and its tolerances revoked.

Carbofuran – EPA is pursuing cancellation of all carbofuran uses in the U.S. EPA has received a request from the carbofuran registrant, FMC Corporation, for voluntary cancellation of 22 crop uses of this pesticide. FMC Corporation has six uses not proposed for voluntary cancellation that EPA indicates still present risk concerns and are subject to future regulatory action by EPA. In July 2008, EPA initiated action to revoke existing carbofuran tolerances (residue limits in food) due to unacceptable dietary risks, especially to children, from consuming food or water alone or from a combination of food and water with carbofuran residues. Following resolution of the tolerance revocations, EPA plans to proceed with cancellation of remaining carbofuran uses due to unreasonable ecological and worker risks (Federal Register / Vol. 73, No. 245 / December 19, 2008 /77690-77693). In March 2008, EPA announced an order for the cancellation of some registrations and termination of certain uses, voluntarily requested by the registrant (Federal Register/Vol. 74, No. 51/ March 18, 2009/11551-11553).

Methomyl – The intent of registrants for voluntary cancellation of methomyl use on strawberry and grapes were incorporated in the *N*-methyl carbamate revised cumulative

risk assessment. With these and other mitigation measures for these individual pesticides, EPA concluded that the cumulative risks to humans associated with the *N*-methyl carbamates are below EPA's regulatory level of concern (http://www.epa.gov/pesticides/cumulative/carbamate_risk_mgmt.htm). The FQPA does not address cumulative risk of pesticides to aquatic resources.

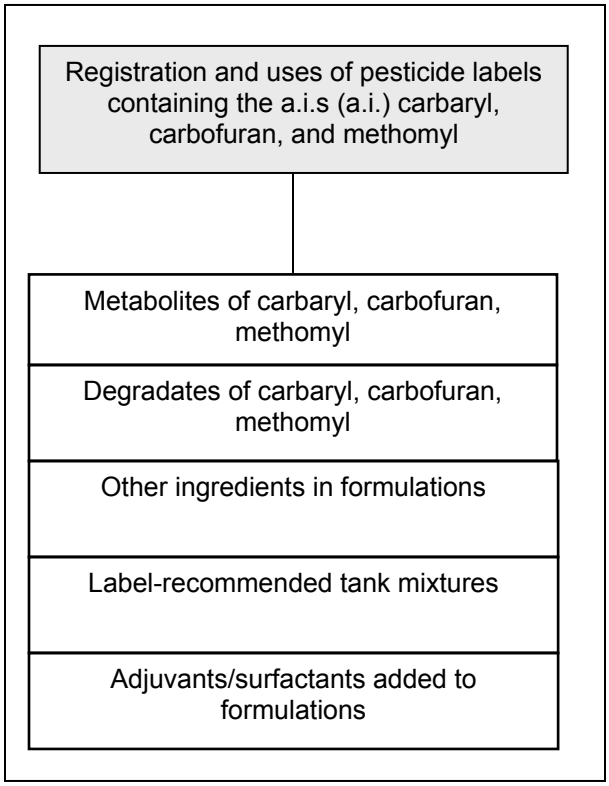

Figure 1. Stressors of the Action

Mode of Action of Carbamate Insecticides. NMC insecticides are neurotoxicants, affecting the central and peripheral nervous systems of animals. Similar to other carbamate and organophosphate (OP) insecticides, these a.i.s inhibit the enzyme acetylcholinesterase (AChE) found in brain and muscle tissue of invertebrates and vertebrates. Thus, NMCs belong to a class of insecticides known as AChE inhibitors. Inhibition of AChE results in a build-up of the neurotransmitter, acetylcholine, which can lead to continued stimulation. Normally, acetylcholine is broken down rapidly in the nerve synapse by AChE. Chemical neurotransmission and communication are impaired when acetycholine is not quickly degraded in animals, which ultimately may result in a number of adverse responses from physiological and behavioral modification to death.

NMFS batched the consultations on carbaryl, carbofuran, and methomyl into one Opinion because these compounds have the same mechanism of action, *i.e.*, they target the same site of action in the exact same way. However, NMFS evaluated the effects of each a.i. independently. Additionally, cumulative exposure to the three a.i.s is expected given they have overlapping uses and detections in surface water samples.

Active and Other Ingredients. Carbaryl, carbofuran, and methomyl are the a.i.s that kill or otherwise affect targeted organisms (listed on the label). However, pesticide products that contain these a.i.s also contain inert ingredients. Inert ingredients are ingredients which EPA defines as not "pesticidally" active. EPA also refers to inert ingredients as "other ingredients". The specific identification of the compounds that make up the inert fraction of a pesticide is not required on the label. However, this does not necessarily imply that inert ingredients are non-toxic, non-flammable, or otherwise non-reactive. EPA authorizes the use of chemical adjuvants to make pesticide products more efficacious. An adjuvant aides the operation or improves the effectiveness of a pesticide. Examples include wetting agents, spreaders, emulsifiers, dispersing agents, solvents, solubilizers, stickers, and surfactants. A surfactant is a substance that reduces surface tension of a system, allowing oil-based and water-based substances to mix more readily. A common group of non-ionic surfactants is the alkylphenol polyethoxylates (APEs), which may be used in pesticides or pesticide tank mixes, and also are used in many common household products. Nonylphenol (NP), one of the APEs, has been linked to endocrine-disrupting effects in aquatic animals.

Formulations. Pesticide products come in a variety of solid and liquid formulations. Examples of formulation types include dusts, dry flowables, emulsifiable concentrates, granulars, solutions, soluble powders, ultra-low volume concentrates, water-soluble bags, and powders. The formulation type can have implications for product efficacy and exposure to humans and other non-target organisms.

Tank Mix. A tank mix is a combination by the user of two or more pesticide formulations as well as any adjuvants or surfactants added to the same tank prior to application.

Typically, formulations are combined to reduce the number of spray operations or to obtain better pest control than if the individual products were applied alone. The compatibility section of a label may advise on tank mixes known to be incompatible or provide specific mixing instructions for use with compatible mixes. Labels may also recommend specific tank mixes. Pursuant to FIFRA, EPA has the discretion to prohibit tank mixtures. Applicators are permitted to include any combination of pesticides in a tank mix as long as each pesticide in the mixture is permitted for use on the application site and the label does not explicitly prohibit the mix.

Pesticide Registration. The Pesticide Registration Improvement Act (PRIA) of 2003 became effective on March 23, 2004. The PRIA directed EPA to complete REDs for pesticides with food uses/tolerances by August 3, 2006, and to complete REDs for all remaining non-food pesticides by October 3, 2008. The goal of the reregistration program is to mitigate risks associated with the use of older pesticides while preserving their benefits. Pesticides that meet today's scientific and regulatory standards may be declared "eligible" for reregistration. The results of EPA's reviews are summarized in RED documents. EPA issued REDs for carbaryl and methomyl in 2007 and 1998, respectively. The IRED for carbofuran was issued in August 2006. EPA considered the registration eligibility determination for carbofuran complete upon issuance of the cumulative assessment for the NMC pesticides in 2007 (http://www.epa.gov/pesticides/reregistration/REDs/carbofuran_red.pdf). Accordingly, EPA treated the carbofuran IRED as its RED. The REDs for all three a.i.s include various mitigation measures, including the cancellation of all registered uses of carbofuran due to ecological and occupational risks. These mitigation components were considered part of the proposed action.

Duration of the Proposed Action. EPA's goal for reassessing currently registered pesticide a.i.s is every 15 years. Given EPA's timeframe for pesticide registration reviews, NMFS' evaluation of the proposed action is also 15 years.

Interrelated and Interdependent Activities. No interrelated and interdependent activities are associated with the proposed action.

Registration Information of Pesticide A.i.s under Consultation. As discussed above, the proposed action encompasses EPA's registration of the uses (as described by product labels) of all pesticides containing carbaryl, carbofuran, or methomyl. However, EPA did not provide copies of all product labels containing these a.i.s. The following descriptions represent information acquired from review of a sample of current product labels as well as information conveyed in the BEs, EPA REDs, and other documents.

Carbaryl

Carbaryl, also known by the trade name *Sevin*, is an NMC insecticide which was first registered in 1959 for use on cotton. In 2001, EPA identified the NMC insecticides as a group which shares a common mechanism of toxicity. Therefore, EPA was required to consider the cumulative effects on human health resulting from exposure to this group of chemicals when considering whether to establish, modify, or revoke a tolerance for pesticide residues in food, in accordance with the FQPA (EPA 2008).

Several regulatory documents concerning carbaryl were issued after EPA's BE of the analysis of risk of carbaryl to threatened and endangered salmonids (EPA 2003). An IRED for carbaryl that addressed the potential human health and ecological risks was signed on June 30, 2003. EPA amended the IRED on October 22, 2004, to incorporate clarifications and corrections, updated the residential risk assessment to reflect the voluntary cancellation of the liquid broadcast use of carbaryl on residential turf to address post-application risk to toddlers identified in the 2003 IRED, and addressed issues regarding labeling of carbaryl formulations for mitigating potential hazards to bees. In addition, mitigation measures required in the 2004 amended IRED included cancellation of certain uses and application methods, reduction of application rates, application prohibitions, personal protective equipment (PPE) and engineering control (EC) requirements, and extension of restricted-entry intervals (REIs) for post-application exposure (EPA 2008).

EPA also issued generic and product-specific data call-ins (DCIs) for carbaryl in March 2005. The carbaryl generic DCI required several studies for the a.i. carbaryl, including additional toxicology, worker exposure monitoring, and environmental fate data. The product DCI required acute toxicity and product chemistry data for all pesticide products containing carbaryl. In response to the 2005 DCIs, many carbaryl registrants chose to voluntarily cancel their carbaryl products. Approximately 80% of all of carbaryl end-use products registered at the time of the 2003 IRED have since been cancelled through this process or other voluntary cancellations (EPA 2008).

On September 26, 2007, EPA published a revised NMC cumulative risk assessment (EPA 2007), which concluded that the cumulative risks associated with the NMC pesticides meet the safety standard set forth in the FFDCA. Concurrently, on September 26, 2007, the RED for carbaryl was completed. The 2007 RED presents EPA's revised carbaryl human health risk assessment under FQPA and EPA's final tolerance reassessment decision for carbaryl. EPA amended the carbaryl RED in August of 2008. The amendment updated the 2007 RED to reflect the Revised Occupational Exposure and Risk Assessment, dated July 9, 2007 (EPA 2008).

The National Pesticide Information Retrieval System (NPIRS) website (http://ppis.ceris.purdue.edu/htbin/epachem.com) suggests that there are currently 24 registrants with active registrations of 87 pesticide products containing carbaryl. "Carbaryl is nationally registered for over 115 uses in agriculture, professional turf management, ornamental production, and residential settings (EPA 2007). Carbaryl is also registered for use as a mosquito adulticide. (http://www.umass.edu/fruitadvisor/NEAPMG/145-149.pdf)(EPA 2007)."

Several product labels indicate carbaryl is commonly formulated with other a.i.s. For example, there are active registrations of carbaryl products that also contain copper sulfate, rotenone, malathion, captan, metaldehyde, and bifenthrin (NPIRS website). According to EPA's BE, 26 carbaryl products are registered to individual states under

SLN provisions in Section 24(c) of FIFRA (EPA 2003). Section 24(c) registrations include control of shrimp in oyster beds in two tideland areas (Willapa Bay and Grays Harbor) in Washington and, in California, insecticidal use on fruits and nuts, prickly pear cactus, ornamental plants, and non-food crops. Idaho and Oregon do not have any 24(c) registrations for carbaryl (EPA 2003).

Usage Information.

The insecticide carbaryl is used in agriculture to control pests on terrestrial food crops including fruit and nut trees, many types of fruit and vegetables, and grain crops; cut flowers; nursery and ornamentals; turf, including production facilities; greenhouses; golf courses; and in oyster beds. Carbaryl is also registered for use on residential sites (*e.g.*, annuals, perennials, shrubs) by professional pest control operators and by homeowners on gardens, ornamentals, and turfgrass (EPA 2008). EPA estimated over 1.4 million pounds (lbs) of carbaryl are applied each year on agricultural crops and over 200,000 lbs are applied annually for turf, landscape, and horticultural uses in the U.S. (EPA 2008).

The California Department of Pesticide Regulation (CDPR) indicated approximately 150,000 – 250,000 lbs of carbaryl were applied annually in California between 2002 and 2006 based on agricultural and other "reportable uses" (CDPR 2007). The 1999 Oregon Legislature authorized development of the Oregon Pesticide Use Reporting System (PURS). In 2006, information on household pesticide use was collected through a pesticide use survey. The first full year of collecting non-household pesticide use in PURS was 2007. Over 37,000 lbs of carbaryl were reported as applied in Oregon in 2007 (ODA 2008). Approximately 189,600 lbs of carbaryl are used annually for agriculture in Washington State (WSDA 2004). Similar data on pesticide use were not found for Idaho.

Examples of Registered Uses.

Agricultural Uses. Carbaryl is used on a myriad of crops. Examples of crops currently proposed for continued carbaryl use and which are grown in areas with Pacific salmon and steelhead include cranberries, cucumbers, beans, eggplant, grapefruit, grapes, hay, lemons, lettuce, nectarines, olives, onions, oranges, parsley, peaches, peanuts, pears,

pecans, peppers, pistachios, plums, potatoes, prunes, pumpkins, rice, sod, spinach, squash, strawberries, sugar beets, sunflowers, sweet corn, sweet potatoes, tangelos, tangerines, tomatoes, walnuts, watermelons, wheat (EPA 2008). Carbaryl is also used to thin fruit in orchards to enhance fruit size and enhance repeat bloom.

Non-agricultural Uses. Carbaryl is used extensively by homeowners, particularly for lawn care (EPA 2008). Examples of non-agricultural use sites include home and commercial lawns, flower beds around buildings, recreation areas, golf courses, sod farms, parks, rights-of-way, hedgerows, Christmas tree plantations, oyster beds, rural shelter belts, and applications to control ticks, grasshoppers, and adult mosquitoes (EPA 2007). Carbaryl is also used for pet care (pet collars, powders and dip, in kennels, and on pet sleeping quarters).

Examples of Registered Formulation Types. Carbaryl products are manufactured as granular, liquid, wettable powder, and dust formulations. All dry flowable (water dispersible granule) products have been voluntarily cancelled. The use of dust formulation in agriculture and backpack sprayers are not supported by Bayer CropScience, the carbaryl technical registrant, who is amending its carbaryl registrations to delete these uses (EPA 2008).

Methods and Rates of Application.

Methods. Groundboom, airblast, and aerial applications are typical for agricultural uses of carbaryl. Other applications can also be made using handheld equipment, such as low pressure hand wand sprayers, turf guns, and various ready-to-use products. Applications by aerosol cans, hand, spoon, shaker can, and front- and back-mounted spreaders are prohibited (EPA 2008).

Application Rates. The maximum single application rate allowed on the labels for agricultural uses in California, Idaho, Oregon, and Washington is 12 lb carbaryl/acre (Table 1). Many agricultural uses allow repeated application of carbaryl at intervals of 7-14 days. Application intervals are not specified for some uses (*e.g.*, flower beds, home

use on fruits, and vegetables). Additionally, some uses do not specify the maximum number of applications (*e.g.*, prickly pear, ticks, and grasshoppers).

Table 1. Registered uses and application rates for carbaryl in California, Idaho, Oregon, and Washington (EPA 2007)

Use Site	Application			
	Maximum Single Application Rate (lb a.i./acre)	Maximum Number of Applications	Minimum Application Interval (days)	Maximum per year (lb a.i./acre)
Home Lawn	9.1	2	7	Not specified
Fire ants	7.4	2	7	Not specified
Flower beds around buildings	8	4	None	6
Lawns, recreation areas, golf courses, sod farms, commercial lawns	8	2	7	8
Parks	8	1	-	8
Citrus	12	1	-	12
Citrus	7.5	8	14	20
Olives	7.5	2	14	Not specified
Almonds, chestnuts, pecans, filberts, walnuts, pistachio	5	4	7	15
Flowers, shrubs	4.3	3	7	Not specified
Apricot, cherries, nectarines, peaches, plums, prunes	4 (5 dormant)	3 + 1 dormant	15	9 + 5 dormant spray
Apple, pear, crabapple, oriental pear, loquat	3	8	14	Not specified
Sweet corn	2	8	3	Not specified
Caneberries, blueberries, grapes, strawberries	2	5	7	Not specified
Tomatoes, peppers, eggplant	2	7	7	8
Peanuts	2	5	7	8
Broccoli, cauliflower, cabbage, kohlrabi, Chinese cabbage, collards, kale, mustard greens, brussel sprouts, hanover salad	2	4	6	7
Sweet potato	2	8	7	8
Field corn, pop corn	2	4	14	8
Leaf lettuce, head lettuce, dandelion, endive, parsley, spinach, swiss chard	2	5	7	6
Celery, garden beets, carrots, horseradish, parsnip, rutabaga, potato, salsify, root turnip, radish	2	6	7	Not specified
Prickly pear	2	As needed	7	6
Rice	1.5	2	7	4
Fresh beans, dry beans, fresh peas, dry peas, cowpeas, fresh southern peas, soybeans	1.5	4	7	6
Sugar beets, pasture, grass for seed	1.5	2	14	3
Alfalfa, birdsfoot trefoil, clover	1.5	1/cutting	None	Not specified
Rangeland	1	1	-	1
Cucumber, melon, pumpkin, squash, roses, other herbaceous	1	6	7	Not specified

Use Site	Application			
	Maximum Single Application Rate (lb a.i./acre)	Maximum Number of Applications	Minimum Application Interval (days)	Maximum per year (lb a.i./acre)
plants, woody plants				
CRP acreage, set-aside acreage, rights-of-way, hedgerows, ditch banks, roadsides, wasteland	1	2	14	3
Non-urban forests, tree plantations, Christmas trees, parks, rangeland trees, rural shelter belts	1	2	7	Not specified
adult mosquitoes[10]	1	*	*	Not specified
Ticks	2	As needed	None	Not specified
Grasshoppers	1.5	As needed	None	Not specified
flax	1.5	2	14	Not specified
Home fruits and vegetables	1.95	6	None	12.1
Proso millet, wheat	1.5	2	14	Not specified
lentils	1.5	4	7	Not specified
Oyster beds	8	Not specified	None	Not specified
Sunflower	1.5	2	7	Not specified
Tobacco	2	4	7	Not specified

*Number of applications and interval as specified for use site (pastures, rangeland, forests and wastelands, etc.).

Metabolites and Degradates.

The major metabolite of carbaryl degradation by both abiotic and microbially mediated processes is 1-naphthol. This degradate represented up to 67% of the applied carbaryl in degradation studies. It is also formed in the environment by degradation of naphthalene and other polyaromatic hydrocarbon compounds. EPA reports that only limited information on the environmental transport and fate of 1-naphthol is available and indicates this compound is less persistent and less mobile than the parent carbaryl (EPA 2003).

Carbofuran

Carbofuran is a NMC systemic pesticide first registered in the U.S. in 1969. The BE for carbofuran indicates it is registered as a restricted use broad spectrum insecticide, nematicide, and miticide for use on a wide variety of agricultural and non-agricultural crops (EPA 2004). Carbofuran is classified as a restricted use pesticide and is formulated into flowable, wettable powder, and granular forms. Through an agreement between EPA and the technical registrant in 1991, granular carbofuran has been limited to the sale

of 2,500 lbs of a.i. per year in the U.S. since 1994, for use only on certain crops. Today granular carbofuran is limited to use on spinach grown for seed, pine seedlings, bananas (in Hawaii only), and cucurbits only (EPA 2006).

In the late 1990s, the technical registrant made a number of changes to labels in order to reduce human health (drinking water) and ecological risks of concern. These included reducing application rates and numbers of applications for alfalfa, cotton, corn, potatoes, soybeans,sugarcane, and sunflowers. Numbers of applications were also restricted on some soils to reduce groundwater concentrations (EPA 2006).

Several regulatory documents concerning carbofuran were issued after EPA's BE of the analysis of risk of carbofuran to threatened and endangered salmonids (EPA 2004). An IRED for carbofuran was published in August 2006. As previously indicated, EPA concluded the NMC cumulative risk assessment in September 2007. All tolerance reassessment and REDs for individual NMC pesticides were considered complete. The carbofuran IRED, therefore is considered a completed RED.

The carbofuran IRED (EPA 2006), and draft Notice of Intent to Cancel Carbofuran (January 2008) indicate EPA proposes cancellation of all uses of carbofuran, due to ecological, occupational, and human dietary risks of concern from some crops. Economic benefits are low to moderate for all of these uses, and do not outweigh the risks (EPA 2006). There are several uses for which residues do not pose dietary risks of concern *and* which have moderate benefits to growers [artichokes, chile peppers in the Southwestern U.S., cucurbits (granular formulation only), spinach grown for seed, sunflowers, and pine seedlings in the Southeastern U.S.]. For these uses, EPA is allowing a four-year phase-out in order to allow time for new alternatives to become available to growers (EPA 2006).

Although EPA determined that all uses of carbofuran are ineligible for reregistration, use of carbofuran will continue for an undetermined period of time. EPA has initiated cancellation procedures for product uses of low economic benefits. The remaining uses

are subject to a four year phase-out. However, final cancellation of all carbofuran uses may take several years and the decision to cancel carbofuran registrations could be subject to legal challenges. Additionally, EPA indicated that FMC wishes to retain registrations for six uses: corn, potatoes, pumpkins, sunflowers, pine seedlings, and spinach grown for seed (Jones 2009). FMC also proposed to phase out use of artichokes over two years. EPA plans to consider FMC's proposal for the continued registration of carbofuran at a future date.

The IRED indicated there are currently one technical, two manufacturing-use, and six end-use products registered under Section 3 of FIFRA. There are also 77 active SLN registrations under Section 24(c) of FIFRA (EPA 2006). The NPIRS website suggests one registrant holds nine active registrations of pesticide products containing carbofuran (EPA registration numbers: 279-2712, 279-2862, 279-2874, 279-2876, 279-2922, 279-3023, 279-3038, 279-3060, and 279-3310). Many carbofuran uses and products were recently canceled through voluntary requests of the product registrant. Under the conditions of the cancelation order, existing stocks of these carbofuran products may be sold or used until they are depleted, opr until the effective date for the revocation of the associated tolerances (Federal Register/Vol. 74, No. 51/ March 18, 2009/11551-11553).

Usage Information

Nearly one million lbs a.i. are applied annually from the application of liquid carbofuran formulations (EPA 2006). The major use of liquid formulations of carbofuran is on corn, alfalfa, and potatoes. Under the existing terms and conditions of the registration, sale of the granular formulation is limited to 2,500 lbs a.i. per year, and use is limited to pine seedlings, cucurbits, bananas (in Hawaii only), and spinach grown for seed (EPA 2006). Carbofuran use has decreased significantly in California over the last decade. CDPR indicates agricultural uses of carbofuran exceeded 200,000 lbs in 1996 and use declined each preceding year with approximately 23,000 lbs of carbofuran applied in California in 2006 (CDPR 2007). Multiyear use statistics for describing temporal trends of carbofuran were unavailable for Idaho, Oregon, and Washington. It is anticipated that use of

carbofuran will decrease across the action area as cancellation orders are implemented and existing stocks are depleted.

Examples of Registered Uses.

Food Crops. Alfalfa, artichoke, banana, barley, coffee, corn (field, pop, and sweet), cotton, cucurbits (cucumber, melons, and squash), grapes, oats, pepper, plantain, potato, sorghum, soybean, sugar beet, sugarcane, sunflower, and wheat (EPA 2006).

Non-food uses. Agricultural fallow land, cotton, ornamental and/or shade trees, ornamental herbaceous plants, ornamental non-flowering plants, ornamental woody shrubs and vines, pine, spinach grown for seed, and tobacco (EPA 2006).

Examples of Registered Formulation Types.

Carbofuran is formulated into flowable, wettable powder, and granular forms. The flowable formulation constitutes the vast majority of the carbofuran currently used (EPA 2004).

Examples of Approved Methods and Rates of Application.

Equipment. Carbofuran is applied by aerial equipment, chemigation systems, groundboom sprayers, airblast sprayers, tractor-drawn spreaders, push-type granular spreaders, and handheld equipment (EPA 2006).

Method and Rate. Carbofuran can be applied as a foliar or soil treatment. Maximum single and seasonal application rates range from 0.002 to 10 lbs a.i./acre, depending on the application scenario (EPA 2006).

Table 2. Registered uses and application rates for carbofuran in California, Idaho, Oregon, and Washington (EPA 2004)

Use Site	Application			
	Maximum Single Application Rate (lb a.i./acre)	Maximum Number of Applications	Minimum Application Interval (days)	Maximum per year (lb a.i./acre)
Flowable Carbofuran – Section 3 registrations				
Alfalfa, corn, cotton	1	1	-	1
Ornamentals	0.06	Not specified	Not specified	0.06
Pine seedlings	0.05	1	-	Prepare slurry: Add 0.05 lbs a.i., 0.5 gallons water, and 2.0 lbs clay; Slurry sufficient to treat roots of 150 to 200 seedlings.
Potatoes	1	2	Not specified	2
Small grains, soybeans	0.25	2	Not specified	0.5
Sugarcane	0.75	2	Not specified	1.5
Sunflowers	1.4	1	-	1.4
Tobacco	6	Not specified	Not specified	6
Granular Carbofuran – Section 3 registrations				
Bananas	0.006	2	Not specified	0.012
Pine seedlings	0.002	Not specified	Not specified	0.002
Rice[1]	0.5	1	-	0.5
California- Flowable Carbofuran- Section 24C				
Artichokes	1	2	Not specified	2
Grapes	10	1	-	10
Ornamentals	10	Not specified	Not specified	10
Idaho- Flowable Carbofuran- Section 24C				
Potatoes	3	2	Not specified	6
Sugar beets	2	1	-	2
Oregon- Flowable Carbofuran- Section 24C				
Potatoes	3	2	Not specified	6
Nursery stock	10	Not specified	Not specified	10
Sugar beets	2	1	-	2
Oregon- Granular Carbofuran- Section 24C				
Watermelons	1	Not specified	Not specified	1
Washington- Flowable Carbofuran- Section 24C				
Potatoes	3	2	Not specified	6
Washington- Granular Carbofuran- Section 24C				
Spinach (grown for seed)	1	1	-	1

[1]The section 3 registration for rice was discontinued in 1997. Additional use of carbofuran on rice since that time has been from existing stock or in connection with emergency exemption requests (EPA 2004a).

Timing. Carbofuran is a contact insecticide applied at planting or post-planting (EPA 2006). The timing is variable among crops.

Metabolites and Degradates. The major transformation product of carbofuran in water and aerobic aquatic metabolism is the hydrolysis product, carbofuran 7-phenol (EPA 2006). It also appears as the transformation endpoint prior to conversion to CO_2 and is shorter lived in water than the parent. Other major expected environmental transformation products in soils that have potential to reach the aquatic environment are 3-hydroxycarbofuran and 3-ketocarbofuran, which typically occur in small amounts (*i.e.*, < 5.0 % of applied) and are relatively short lived as compared to the parent (EPA 2006).

Methomyl

Methomyl was first registered for use in the U.S. in 1968. Methomyl is currently registered for use on a wide variety of sites including field, vegetable, and orchard crops; turf (sod farms only); livestock quarters; commercial premises; and refuse containers (EPA 2007). All methomyl products, except the 1% bait formulations, are classified as restricted use pesticides (EPA 2007). A Registration Standard issued in April 1989 required additional testing, modified tolerances. It also required label modifications related to applicator safety, re-entry intervals, and environmental hazards (EPA 2007). Additional label modifications were required with the publication of the methomyl RED in 1998 (EPA 1998).

EPA's BE of the analysis of risks of methomyl to threatened and endangered salmonids indicated there were 10 end-use products registered under Section 3 of FIFRA (EPA 2003). The NPIRS website suggests that there are currently six registrants with active registrations for nine products containing methomyl (EPA registration numbers: 270-255, 352-342, 352-361, 352-366, 352-384, 2724-274, 7319-6, 53871-3, 5742-2). Eighteen additional methomyl products are registered to individual states under SLN provisions in Section 24(c) of FIFRA (EPA 2003). California has seven SLN for use to control insects on ornamentals, beans, soybeans, radishes, sweet potatoes, Chinese broccoli, broccoli raab, and pumpkins (EPA 2003). Idaho, Oregon, and Washington do not have any SLNs for methomyl (EPA 2003). Methomyl also was previously registered as a molluscicide to control snails and slugs and as a fungicide for control of blights, rots,

mildews and other fungal diseases. Those uses, as well as uses on ornamentals and in greenhouses, have been cancelled (EPA 2003).

Usage Information

The BE indicated EPA has no recent national data on the amount of methomyl applied annually (EPA 2003). According to the 1998 RED, an estimated 2.5 to 3.5 million lbs of methomyl a.i. were applied annually in the U.S. between 1987 and 1995. CDPR indicates approximately 262 – 554 thousand lbs of methomyl were applied annually in California between 2000 and 2006 based on agricultural and other "reportable uses" (CDPR 2007). Over 42,000 lbs of methomyl were applied in Oregon in 2007 (ODA 2008). Similar data on pesticide use were not found for Idaho and Washington.

Examples of Registered Uses

Agriculture. Methomyl is used for a variety of agricultural uses including alfalfa, anise, asparagus, barley, beans (succulent and dry), beets, Bermuda grass (pasture), blueberries, broccoli, broccoli raab, Brussels sprouts, cabbage, carrot, cauliflower, celery, chicory, Chinese broccoli, Chinese cabbage, collards (fresh market), corn (sweet), corn (field and popcorn), corn (seed), cotton, cucumber, eggplant, endive, garlic, horseradish, leafy green vegetables, lentils, lettuce (head and leaf), lupine, melons, mint, nonbearing nursery stock (field grown), oats, onions (dry and green), peas, peppers, potato, pumpkin, radishes, rye, sorghum, soybeans, spinach, sugar beet, summer squash, sweet potato, tomatillo, tomato, turf (sod farms only), wheat, and orchards including apple, avocado, grapes, grapefruit, lemon, nectarines, oranges, peaches, pomegranates, tangelo, and tangerine (EPA 2007).

Non-agriculture. Methomyl has several non-crop uses that are outside uses involving scatter bait or bait station formulations including the following use sites: bakeries, beverage plants, broiler houses, canneries, commercial dumpsters which are enclosed, commercial use sites (unspecified), commissaries, dairies, dumpsters, fast food establishments, feedlots, food processing establishments, hog houses, kennel, livestock barns, meat processing establishments, poultry houses, poultry processing establishments, restaurants, supermarkets, stables, and warehouses (EPA 2007).

Examples of Registered Formulations and Types.

End-use formulations of methomyl include soluble concentrate, wettable powder, granular, pelleted/tableted, and water soluble packaged. Products registered as fly baits also contain (Z)-9-tricosene (0.04 to 0.26% a.i.) as an a.i.; labels note that these products contain a sex attractant and feeding synergist (EPA 2003).

Examples of Approved Methods and Rates of Application.

Application Equipment. Methomyl can be applied by aircraft; bait box; brush; cup; duster; glove; granule applicator; ground; high volume ground sprayer; low volume ground sprayer; package applicator; scoop; shaker can; shaker jar; sprayer; and ultra low volume sprayer (EPA 1998).

Application Rates. The maximum single application rate allowed on the labels for agricultural uses in California, Idaho, Oregon, and Washington is 0.9 lb a.i./acre. Many agricultural uses allow repeated application of methomyl at relatively short intervals (1-5 days). For example, the application interval for methomyl for sweet corn is one day and methomyl can be applied 28 times within a single crop of sweet corn. Additionally, several crops of sweet corn may be grown per year in some locations within the action area (EPA 2007). The maximum seasonal labeled application rates (indicated on the label as maximum application rates per crop) for agricultural uses range from 0.9 lb a.i./acre/crop [*i.e.*, Bermuda grass (pasture), avocado, lentils, beans (interplanted with trees), sorghum, and soybeans (interplanted with trees)] to 7.2 lbs a.i./acre/crop [*i.e.*, cabbage, lettuce (head), cauliflower, broccoli raab, celery, and Chinese cabbage]. Several methomyl crops can be grown more than one time per year (*i.e.,* they have multiple crop cycles). Therefore, for those methomyl uses that have more than one crop cycle per year, the maximum allowable yearly application rate will be higher than the maximum seasonal application rate. For perennial crops (*e.g.*, alfalfa), the number of cuttings per year was used to determine the number of crop cycles per year. Based on the labeled application rates and information from EPA's OPP Benefits and Economic Analysis Division (BEAD) on the number of times each crop for which methomyl is registered for use can be grown in California, the maximum yearly application rates for

methomyl are 32.4 lb a.i./acre/year (alfalfa) and 21.6 lb a.i./acre/year (broccoli raab, cabbage, and Chinese cabbage) for agricultural crops; 5.4 lb a.i./acre/year (peaches) for orchards; and 0.22 lb a.i./acre/application for nonagricultural uses (no maximum application/acre/year is provided on the nonagricultural use labels). All orchard and most agricultural uses involve foliar application. The only granular agricultural/orchard use is for corn which also has a foliar use (EPA 2007).

All non-agricultural outside uses for methomyl in California, Idaho, Oregon, and Washington are limited to scatter baits and bait stations around agricultural (*e.g.*, animal premises) and commercial structures and commercial dumpsters, where children or animals are not likely to contact the pesticide. The scatter bait can also be mixed with water to form a paste which can be brushed onto walls, window sills, and support beams. The maximum application rate for the scatter bait use is 0.22 lb a.i./acre (0.0025 lb a.i./500 ft^2). However, it is unlikely that applications would involve a full acre as the outside use of the scatter bait is limited to areas around structures and dumpsters. No minimum application interval or maximum application rate per year is provided on the scatter bait labels (EPA 2007).

Table 3. Examples of registered uses and application rates for methomyl in California, Idaho, Oregon, and Washington (EPA 2007).

Use Site	Application			
	Maximum Single Application Rate (lb a.i./acre)	Maximum Number of Applications	Minimum Application Interval (days)	Maximum per year (lb a.i./acre)
Commercial dumpsters; poultry houses; unspecified commercial sites; outside commercial uses: feedlots, dairies, stables, broiler houses, hog houses, livestock barns, meat processing establishments, poultry processing establishments, beverage plants, canneries, food processing establishments, kennels, dumpsters, restaurants, supermarkets, commissaries, and bakeries.	0.22	Not specified	1-3	Not specified
Alfalfa	0.9	10 x 9 crops	5	32.4
Asparagus	0.9	5	7	4.5
Avocado	0.9	2	5	0.9
Barley	0.45	4	5	1.8
Beans	0.9	10	5	4.5
Broccoli	0.9	10 x 3 crops	5	21.6
Cabbage	0.9	15 x 3 crops	2	21.6
Corn	0.45	28 x 3 crops	1	18.9
Lettuce	0.9	8 x 2 crops	2	14.4

Use Site	Application			
	Maximum Single Application Rate (lb a.i./acre)	Maximum Number of Applications	Minimum Application Interval (days)	Maximum per year (lb a.i./acre)
Onions	0.9	8 x 3 crops	5	16.2
Spinach	0.9	8 x 3 crops	5	10.8
Turf	0.9	4 x 2 crops	5	7.2

Timing. The timing of application is dependent on use, but may occur throughout the year. In most cases multiple applications are allowed to maintain pest control. Applications occur on fruit crops during the bloom, petal fall, pre-bloom, and leaf stages and when pest pressure is highest on a "When Needed" basis. On corn, application may occur during the whorl/foliar stages. With other crops, application is during the foliar or leaf stages of the crop (EPA 1998).

Metabolites and Degradates

Several degradates and metabolites have been identified for methomyl. The major degradate in most metabolism studies was CO^2. Another degradate, S-methyl-N-hydroxythioacetamidate, which is highly mobile, appears primarily as a product of alkaline hydrolysis. In an aquatic metabolism study, methomyl degraded with estimated half-lives of four to five days. After seven days, acetonitrile comprised a maximum of 17% and acetamide up to 14% of the amount of methomyl applied. After 102 days, volatilized acetonitrile totaled up to 27% of the applied and CO_2 up to 46% of the applied material (EPA 2003).

Species Addressed in the BEs

EPA's BEs considered the effects of carbaryl, carbofuran, and methomyl to 26 species of listed Pacific salmonids and their designated critical habitat. EPA determined that carbaryl, carbofuran, and methomyl may affect most of these species. Exceptions follow:

EPA concluded that the registration of carbaryl products would have no effect on Northern California steelhead, SONCCal coho, Hood Canal summer-run chum, and Ozette Lake sockeye. EPA also concluded that the registration of carbaryl products

would not likely adversely affect California Coastal Chinook and Puget Sound Chinook salmon.

EPA concluded that the registration of carbofuran products would have no effect on Northern California Steelhead, Central California Coast coho, and California Coastal Chinook salmon. EPA also concluded that the registration of carbofuran products would not likely adversely affect Central Valley Spring-run Chinook salmon, Lower Columbia River Chinook salmon, Puget Sound Chinook salmon, Sacramento River winter-run Chinook salmon, Upper Willamette River Chinook salmon, Columbia River chum, Hood Canal summer-run chum, Oregon Coast coho, SONCC coho, Ozette Lake sockeye, Snake River sockeye, Central California Coast steelhead, California Central Valley steelhead, Lower Columbia River steelhead, Snake River steelhead, South-Central California steelhead, Southern California steelhead, and Upper Willamette River steelhead.

EPA concluded that the registration of methomyl products would have no effect on Northern California steelhead and California Coastal Chinook salmon.

Although EPA has determined that its action in registering pesticides containing the three a.i.s is not likely to adversely affect certain ESUs/DPSs and will have no effect on others, EPA initiated formal consultation on its action because EPA concluded that its action may adversely affect other listed ESUs/DPSs. When an action agency concludes that its action will not affect any listed species or critical habitat, then no section 7 consultation is necessary (USFWS and NMFS 1998). If NMFS concurs with a federal agency that its action is not likely to adversely affect any listed species or critical habitat, then formal consultation is not required. Since formal consultation was triggered, NMFS evaluated the federal action and its impacts to all listed Pacific, anadromous salmonids and their designated critical habitat. In this Opinion, NMFS will analyze the impacts to all ESUs/DPSs of Pacific salmonids present in the action area, including those salmonid species identified by EPA as being unaffected or not likely to be adversely affected including two species of salmonid listed after EPA provided its BEs.

Approach to this Assessment

Overview of NMFS' Assessment Framework

NMFS uses a series of steps to assess the effects of federal actions on endangered and threatened species and designated critical habitat. The first step of our analysis identifies those physical, chemical, or biotic aspects of proposed actions that are likely to have individual, interactive, or cumulative direct and indirect effects on the environment (we use the term "potential stressors" for these aspects of an action). As part of this step, we identify the spatial extent of any potential stressors and recognize that the spatial extent of those stressors may change with time. The spatial extent of these stressors is the "action area" for a consultation.

The second step of our analyses identifies the listed resources (endangered and threatened species and designated critical habitat) that are likely to occur in the same space and at the same time as these potential stressors. If we conclude that such co-occurrence is likely, we then try to estimate the nature of co-occurrence (these represent our *Exposure Analyses*). In this step of our analysis, we try to identify the number, age (or life stage), gender, and life history of the individuals that are likely to be exposed to an action's effects and the populations or subpopulations those individuals represent.

Once we identify which listed resources are likely to be exposed to potential stressors associated with an action and the nature of that exposure, in the third step of our analysis we examine the scientific and commercial data available to determine whether and how those listed resources are likely to respond given their exposure (these represent our *Response Analyses*). We integrate the exposure and response analyses to assess the risk to listed individuals and their habitat from the stressors of the action (these represent our *Risk Characterization*). NMFS' analysis is ultimately a qualitative assessment that draws on a variety of quantitative and qualitative tools and measures to address risk to listed resources.

In the final steps of our analyses, we establish the risks posed to listed species and to designated critical habitat. Our jeopardy determinations for listed species must be based on an action's effects on the continued existence of threatened or endangered species as those "species" have been listed, which can include true biological species, subspecies, or distinct population segments of vertebrate species. Because the continued existence of listed species depends on the fate of the populations that comprise them, the viability (that is, the probability of extinction or probability of persistence) of listed species depends on the viability of the populations that comprise the species. Similarly, the continued existence of populations are determined by the fate of the individuals that comprise them; populations grow or decline as the individuals that comprise the population live, die, grow, mature, migrate, and reproduce (or fail to do so).

The structure of our risk analyses reflects the relationships between listed species, the populations that comprise each species, and the individuals that comprise each population. Our risk analyses begin by identifying the probable risks actions pose to listed individuals that are likely to be exposed to an action's effects. Our analyses then integrates those individual-level effects to identify consequences to the populations those individuals represent. Our analyses conclude by determining the consequences of those population-level risks to the species those populations comprise.

We evaluate risks to listed individuals by measuring the individual's "fitness" defined as changes in an individual's growth, survival, annual reproductive success, or lifetime reproductive success. In particular, we examine the scientific and commercial data available to determine if an individual's probable response to an action's effect on the environment (which we identify in our *Response Analyses*) are likely to have consequences for the individual's fitness.

Reductions in abundance, reproduction rates, or growth rates (or increased variance in one or more of these rates) of the populations those individuals represent is a *necessary* condition for reductions in a population's viability, which is itself a *necessary* condition for reductions in a species' viability. On the other hand, when listed plants or animals

exposed to an action's effects are *not* expected to experience reductions in fitness, we would not expect that action to have adverse consequences on the viability of the population those individuals represent or the species those populations comprise (Mills and Beatty 1979; Stearns 1982; Anderson, Phillips et al. 2006). If we conclude that listed species are *not* likely to experience reductions in their fitness, we would conclude our assessment because an action that is not likely to affect the fitness of individuals is not likely to jeopardize the continued existence of listed species.

If, however, we conclude that listed plants or animals are likely to experience reductions in their fitness, our assessment determines if those fitness reductions are likely to be sufficient to reduce the viability of the populations those individuals represent (measured using changes in the populations' abundance, reproduction, spatial structure and connectivity, growth rates, or variance in these measures to make inferences about the population's extinction risks). In this step of our analyses, we use the population's base condition (established in the *Status of Listed Resources* and *Environmental Baseline* sections of this Opinion) as our point of reference. Finally, our assessment determines if changes in population viability are likely to be sufficient to reduce the viability of the species those populations comprise.

Critical habitat analysis focuses on reductions in the quality or quantity of PCEs. The stressors of the action for this Opinion are chemicals and PCEs potentially affected are salmonid prey availability and degradation of water quality in freshwater spawning sites, freshwater rearing sites, freshwater migration corridors, estuarine areas, and nearshore marine areas. Endpoints evaluated for the prey PCE include prey survival, prey growth, prey drift, prey reproduction, abundance of prey, health of invertebrate aquatic communities, and recovery of aquatic communities following pesticide exposure. Degradation of water quality was evaluated by considering the information available on the presence of constituents known to adversely affect aquatic organisms (*e.g.,* toxic chemicals, nutrients, sediments), whole effluent test or toxicity indicator evaluations, and/or instances of waterbodies not meeting local, state, or federal water quality criteria.

Evidence Available for the Consultation

We search, compile and use a variety of resources to conduct our analyses including:

- EPA's BEs, REDs, IREDS, other documents developed by EPA
- Peer-reviewed literature
- Gray literature
- Books
- Available pesticide labels
- Any correspondence (with EPA or others)
- Available monitoring data and other local, county, and state information
- Pesticide registrant generated data
- Online toxicity databases (PAN, EXTOXNET, ECOTOX, USGS, NPIC)
- Pesticide exposure models run by NMFS
- Population models run by NMFS
- Information and data provided by the registrants identified as applicants
- Comments on the draft Opinion from EPA and any applicants
- Incident reports

Collectively, this information provided the basis for our determination as to whether and to what degree listed resources under our jurisdiction are likely to be exposed to EPA's action and whether and to what degree the EPA can ensure that its authorization of pesticides is not likely to jeopardize the continued existence of threatened and endangered species or is not likely to result in the destruction or adverse modification of designated critical habitat.

Application of Approach in this Consultation

The EPA proposes to authorize the use of over 100 pesticide formulations (pesticide products) containing the a.i.s carbaryl, carbofuran, and methomyl through its authority to register pesticides under FIFRA. Registration by EPA authorizes the use of these formulations in the U.S. and its territories, documented by EPA's approval of registrant-derived pesticide labels. Pursuant to the court's 2002 order in Washington Toxics Coalition v. EPA, EPA initiated consultation on registration of carbaryl, carbofuran, and methomyl for 26 listed ESUs of Pacific salmonids. Since EPA initiated consultation, NMFS has listed one additional Pacific coho ESU and one additional Pacific steelhead DPS. This Opinion represents NMFS' evaluation of whether EPA's authorization of

these labels satisfies EPA's obligations to listed salmonids pursuant to section 7(a)(2) of the ESA.

The NMFS evaluates whether endangered species, threatened species, and designated critical habitat are likely to be exposed to the direct and indirect effects of the proposed action. If those listed resources are not likely to be exposed to these activities, we would conclude that EPA's action is not likely to jeopardize the continued existence of threatened species, endangered species, or result in the destruction or adverse modification of designated critical habitat under NMFS' jurisdiction. If, however, listed individuals are likely to be exposed to these actions and individual fitness is reduced, then we evaluate the potential for population-level consequences.

A Viable Salmonid Population (VSP) is an independent population of any Pacific salmonid that has a negligible risk of extinction due to threats from demographic variation, local environmental variation, and genetic diversity changes over a 100-year time frame (McElhaney, Ruckleshaus et al. 2000). The independent population is the fundamental unit of evaluation in determining the risk of extinction of salmon in an ESU. Attributes or metrics associated with a VSP include the abundance, productivity, spatial structure, and genetic diversity of the population. Abundance is defined as the size of the population and can be expressed in a number of ways, *e.g.,* the number of spawning adults, the number of adults surviving to recruit to fisheries, or the number of emigrating smolts. Abundance is a vital measure, as smaller populations run a greater risk of extinction. The second VSP measure is productivity, generally defined as the growth rate of a population. This Opinion discusses productivity in terms of lambda (λ). Appendix 1 contains a more detailed explanation of λ in the context of our population models. The spatial structure of a population is inherently dependant on the quantity and quality of available habitat. A limited spatial structure can hamper the ability of the ESU to respond to evolutionary pressures. Genetic variability within the ESU gives the species the ability to respond to short-term stochastic events, as well as to evolve to a changing environment in the long-term. These VSP parameters provide an indication of the population's capacity to adapt to various environmental conditions and ability to be self-

sustaining in the natural environment (McElhaney, Ruckleshaus et al. 2000; McElhaney, Chilcote et al. 2007).

In determining the effect of an action to populations, we first address whether individual fitness level consequences are likely and whether those consequences affect populations. We evaluate whether identified VSP parameters of populations such as abundance and productivity are reduced by individual fitness effects. If populations are likely to be adversely affected by reductions in VSP parameters, we analyze the potential effects to the species as a whole. In parallel, if designated critical habitats are likely to be exposed and PCEs are adversely affected, then we evaluate the potential for reductions in the conservation value of the habitats. We devise risk hypotheses based on identified PCEs that are potentially affected by the stressors of the action. If the best available data indicate that PCE-specific risk hypotheses are supported, then we discuss whether critical habitat will remain functional to serve the intended conservation role for the species in the *Conclusion* section.

General conceptual framework for assessing risk of EPA's pesticide actions to listed resources.

We evaluate the risk to listed species and designated critical habitat in the *Effects of the Proposed Action* section by applying an ecological risk assessment framework that organizes the available information in three phases: problem formulation, analysis, and risk characterization (EPA 1998; McElhaney, Ruckleshaus et al. 2000). We adapted the EPA framework to address ESA-specific considerations (Figure 2). The framework follows a process for organizing, evaluating, and synthesizing the available information on listed resources and the stressors of the action. Below, we briefly describe each phase in the *Effects of the Proposed Action* section.

Problem Formulation

The first phase of the framework is problem formulation. In this phase, we generate conceptual models from our initial evaluation of the relationships between stressors of the action (pesticides and identified chemical stressors and potential receptors (listed species, habitat). We represent these relationships in conceptual models presented as diagrams

and written risk hypotheses (EPA 1998). Conceptual model diagrams are constructed to illustrate potential pesticide exposure pathways and associated listed resources' responses. An example of a conceptual model is presented in Figure 3 for Pacific salmonids. In it, we illustrate where the pesticides generally reside in the environment following application, how pesticides may co-occur with listed species and their habitats, and how the individuals/habitat may respond upon exposure to them. In the case of Pacific salmonids, we ascribe exposure and response to specific life stages of individuals and then assess individual fitness endpoints sensitive to the action's stressors.

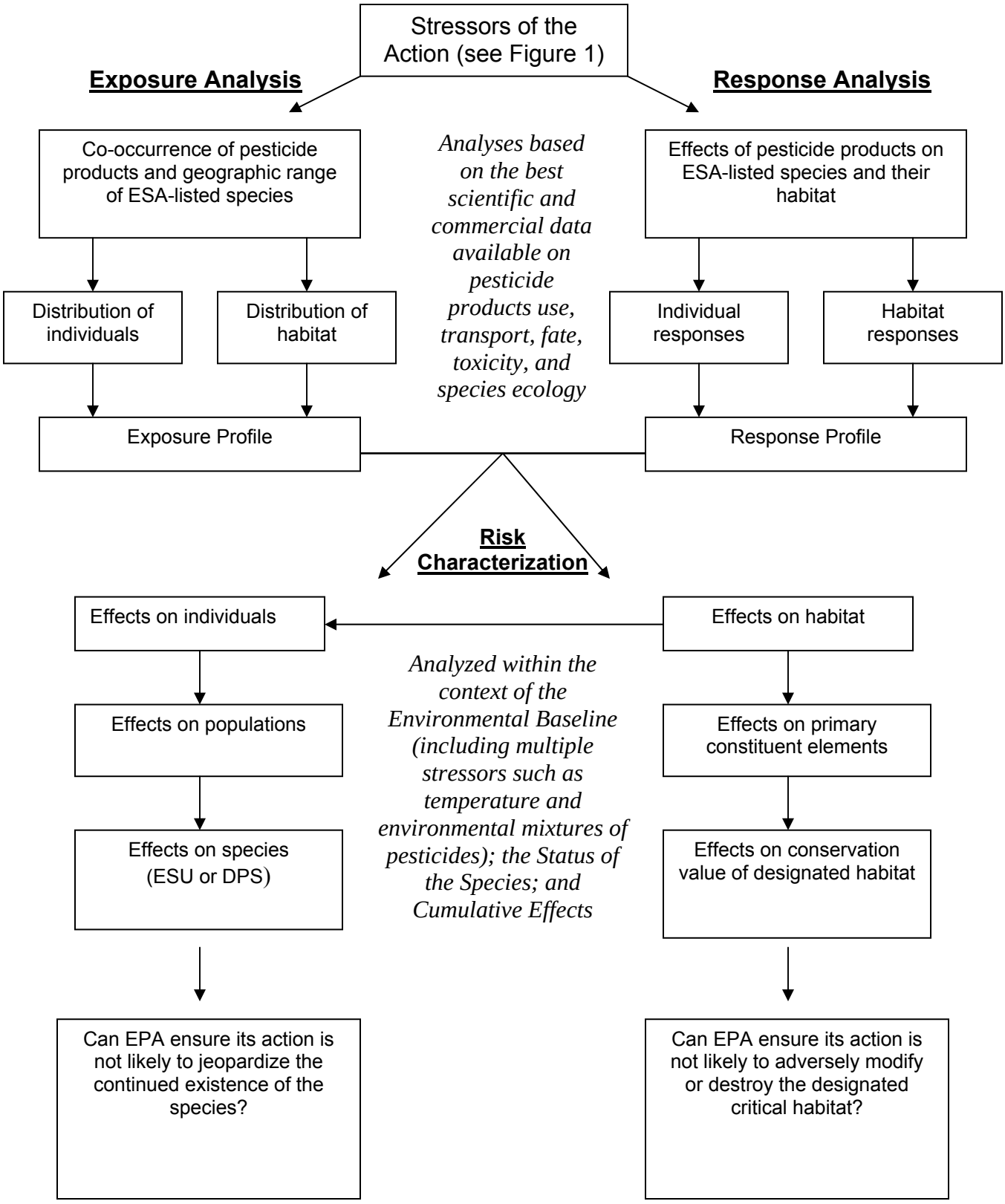

Figure 2. Conceptual framework for assessing risks of EPA's action to listed resources

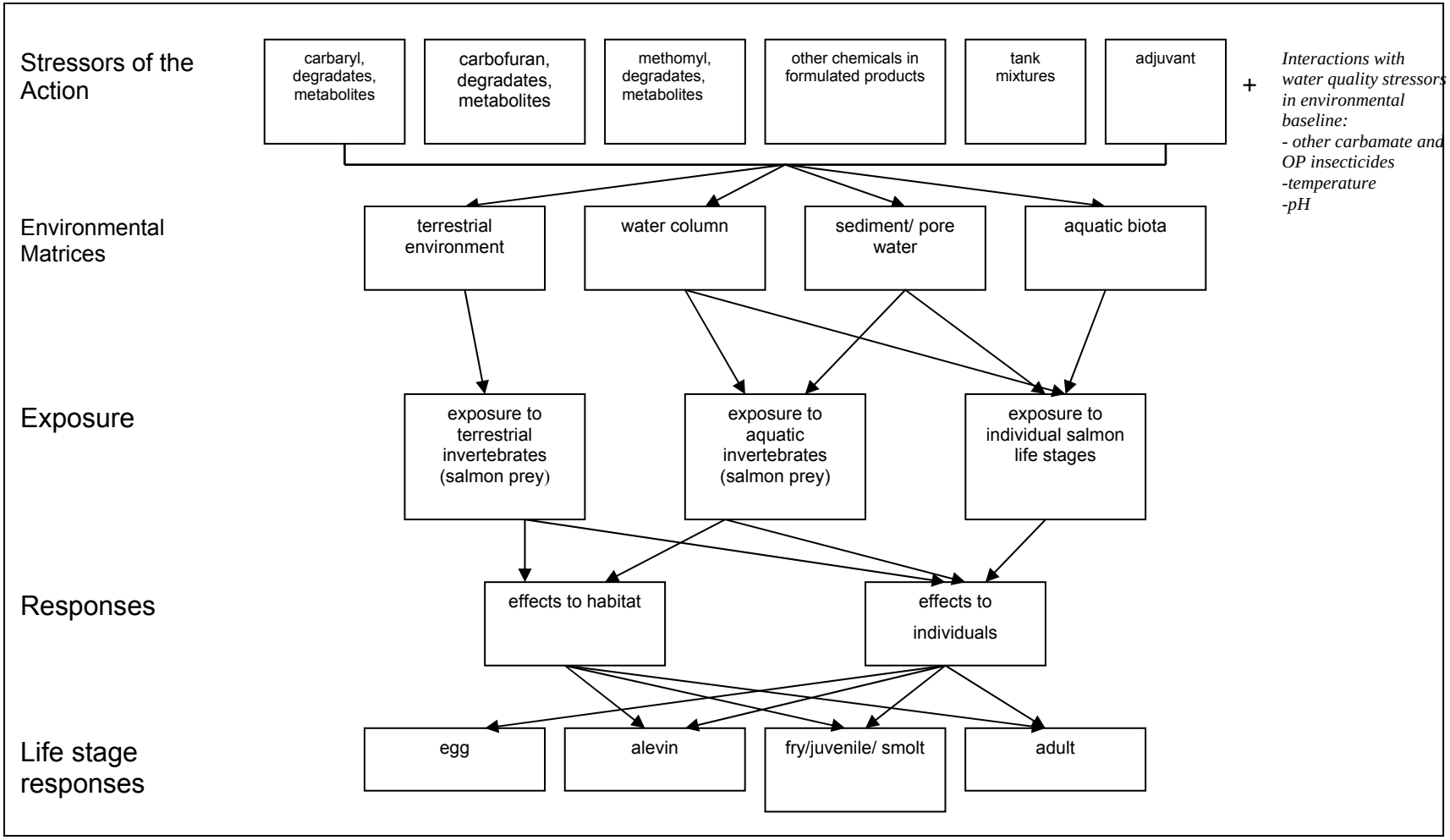

Figure 3. Exposure pathways to carbaryl, carbofuran, and methomyl and general responses of listed Pacific salmonids and habitat.

Species Risk Hypotheses

We construct risk hypotheses by identifying biological requirements or assessment endpoints (Table 4) for listed resources in the action area. We designate assessment endpoints as those biological properties of species and their habitat essential for successful completion of a species life cycle. We integrate the listed resources information with what is known about the stressors of the action, including their physical properties, use, presence in aquatic habitats, and their toxicity. We then evaluate how listed salmonids and their habitat are potentially affected by the stressors of the action and integrate this information with exposure information to develop risk hypotheses. Below are the risk hypotheses (written as affirmative statements) we evaluate in the *Effects of the Proposed Action* section:

1. Exposure to carbaryl, carbofuran, and methomyl is sufficient to:
    a. Kill salmonids from direct, acute exposure;
    b. Reduce salmonid survival through impacts to growth;
    c. Reduce salmonid growth through impacts on the availability and quantity of salmonid prey;
    d. Impair swimming which leads to reduced growth (via reductions in feeding), delayed and interrupted migration patterns, survival (via reduced predator avoidance), and reproduction (reduced spawning success); and
    e. Reduce olfactory-mediated behaviors resulting in consequences to survival, migration, and reproduction.
2. Exposure to mixtures of carbaryl, carbofuran, and methomyl can act in combination to increase adverse effects to salmonids and salmonid habitat.
3. Exposure to other stressors of the action including degradates, adjuvants, tank mixtures, and other active and other ingredients in pesticide products containing carbaryl, carbofuran, and methomyl cause adverse effects to salmonids and their habitat.
4. Exposure to other pesticides present in the action area can act in combination with carbaryl, carbofuran, and methomyl to increase effects to salmonids and their habitat.
5. Exposure to elevated temperatures can enhance the toxicity of the stressors of the action.

We discuss an example of one risk hypothesis to show the relationship between assessment endpoints and measures with species responses. In risk hypothesis 1 (d), aquatic exposure to carbaryl, carbofuran, and methomyl can impair a salmonid's nervous

system and consequently affect swimming ability of fish. Behavioral modifications, such as changes in swimming performance, are regularly considered in NMFS' Opinions. Swimming performance therefore is an assessment endpoint. Measurable changes in swimming speed are the assessment measure used to evaluate this endpoint. Reductions in swimming performance could also affect other assessment endpoints such as migration and predator avoidance. We may or may not have empirical data that address these endpoints, resulting in a recognized data gap. This uncertainty would be identified during the problem formulation phase, and discussed in the risk characterization phase.

Critical Habitat Risk Hypotheses:

To determine potential effects to designated critical habitat, NMFS evaluates the effects of the action by first looking at the effects on PCEs of critical habitat. Effects to PCEs include changes to the functional condition of salmonid habitat caused by the action in the action area. Properly functioning salmonid PCEs are important to the conservation of the ESU/DPS. The stressors of the action for this Opinion are chemicals. As such, the key PCEs that are potentially affected are salmonid prey availability and degradation of water quality in freshwater spawning sites, freshwater rearing sites, freshwater migration corridors, estuarine areas, and nearshore marine areas. We developed two risk hypotheses based on these PCEs:

1. Exposure to the stressors of the action is sufficient to reduce abundance of aquatic prey items of salmonids; and
2. Exposure to the stressors of the action is sufficient to degrade water quality in designated critical habitat.

These hypotheses are evaluated using the best scientific and commercial data available presented in the *Response* section. Examples of assessment endpoints evaluated include prey survival, prey growth, prey drift, prey reproduction, abundance of prey, health of invertebrate aquatic communities, recovery of aquatic communities following pesticide exposure, etc. If the available evidence supports the risk hypotheses, then NMFS evaluates whether the potential reductions in PCEs are localized or widespread. The potential reduction of PCEs affect on the conservation value of designated critical

habitats is then assessed. This portion of the analysis is conducted in the *Integration and Synthesis* section.

Below we discuss an example of one risk hypothesis to show the relationship between assessment endpoints and measures with species responses. In risk hypothesis 1 (d), aquatic exposure to carbaryl, carbofuran, and methomyl can impair a salmonid's nervous system and consequently affect swimming ability of fish. Behavioral modifications, such as changes in swimming performance, are regularly considered in NMFS' Opinions. Swimming performance therefore is an assessment endpoint. Measurable changes in swimming speed are the assessment measure used to evaluate this endpoint. Reductions in swimming performance could also affect other assessment endpoints such as migration and predator avoidance. We may or may not have empirical data that address these endpoints, resulting in a recognized data gap. This uncertainty would be identified during the problem formulation phase, and discussed in the risk characterization phase.

In the problem formulation phase, we also identify the toxic mode and mechanism of action of chemical stressors, particularly for the pesticide a.i.s. This information helps us understand what an organism's physiological consequences may be following exposure. It also helps us evaluate whether mixture toxicity occurs because we identify other pesticides that share similar modes of action and the likelihood for co-occurrence in listed species habitats. A similar mode of action with other pesticides is a key determinant of the likelihood of mixture toxicity. With vertebrates (fish and mammals) and invertebrates, the three a.i.s share a common mode and mechanism of action, acetylcholinesterase inhibition. Given this information, a range of potential adverse responses are possible (Figure 4). We then search, compile, and review the available toxicity information to ascertain which physiological systems are known to be affected and to what degree.

Figure 4. Physiological systems potentially affected by acetylcholinesterase inhibition

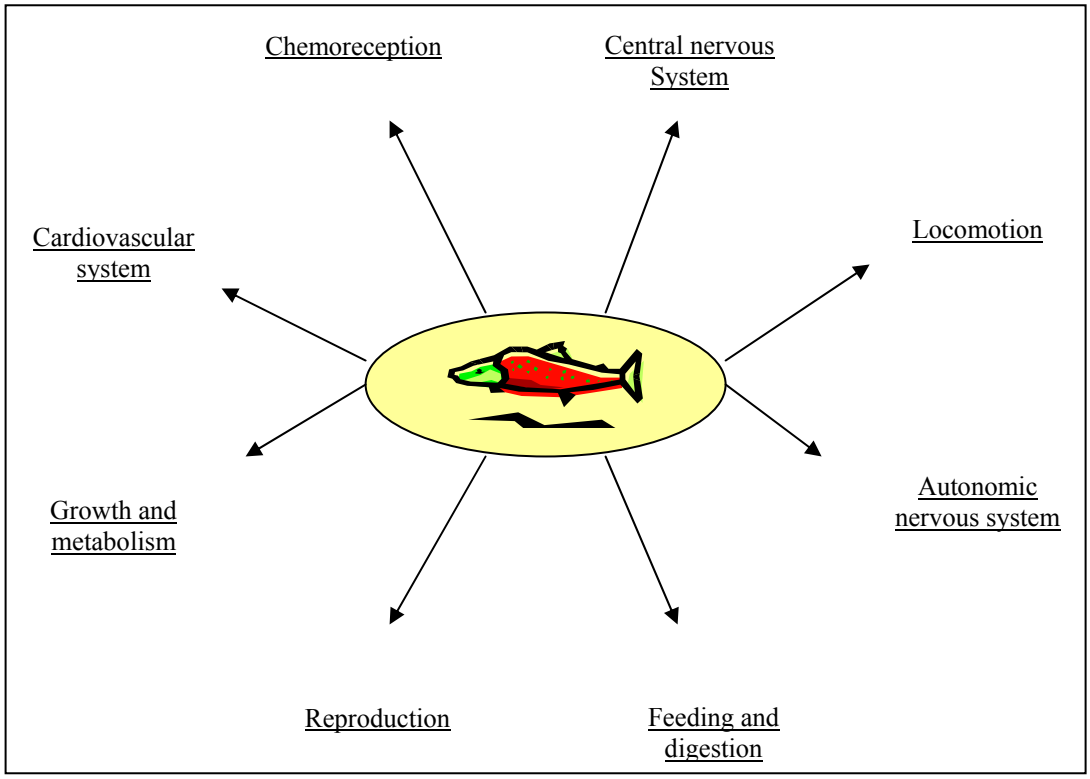

In Table 4, assessment endpoints and assessment measures are identified for particular life stages. We focused on the following physiological systems identified in Figure 4: chemoreception, locomotion, feeding, reproduction, and growth. We did not locate any information on the remaining systems in Figure 4. Thus, they were not specifically addressed in our analysis.

We assess the likelihood of these fitness level consequences occurring from exposure to the action. In the exposure analysis (Figure 2), we select exposure estimates for our listed resources derived from reviewing the available exposure data. Depending on the chemicals being evaluated, data may or may not be available for all endpoints and measures, and available data may vary in reliability. Thus, we use a weight-of-evidence approach in this Opinion.

The problem formulation phase as articulated in EPA's 1998 Guidelines for Conducting Ecological Risk Assessment concludes with the development of an analysis plan. In this Opinion, the *Approach to the Assessment* section is the general analysis plan. This section identifies how exposure will be assessed and which assessment endpoints will be evaluated. Therefore, the *Approach to the Assessment* is a road map for evaluating the effects of EPA's registration actions with carbaryl, carbofuran, and methomyl.

Table 4. Examples of salmonid lifestage assessment endpoints and measures

Salmonid Life Stage	Assessment Endpoint (individual fitness)	Assessment Measure (measures of changes in individual fitness)
Egg* * Is the egg permeable to pesticides (measured by pesticide concentrations in eggs)?	Development Survival	size, hatching success, morphological deformities viability (percent survival)
Alevin (yolk-sac fry)	Respiration Swimming: predator avoidance site fidelity Yolk-sac utilization: growth rate size at first feeding Development Survival	gas exchange, respiration rate swimming speed, orientation, burst speed predator avoidance assays rate of absorption, growth weight and length weight and length morphology, histology LC50 (dose-response slope). Percent dead at a given concentration
Fry, Juvenile, Smolt	First exogenous feeding (fry)– post yolk-sac absorption Survival Growth Feeding Swimming: predator avoidance behavior migration use of shelter Olfaction: kin recognition predator avoidance imprinting feeding Smoltification (smolt) Development	time to first feeding, starvation LC50 (dose-response slope). Percent dead at a given concentration weight, length stomach contents, weight, length, starvation, prey capture rates swimming speed, orientation, burst swimming speed predator avoidance assays swimming rate, downstream migration fish monitoring, bioassays electro-olfactogram measurements, behavioral assays behavioral assays behavioral assays behavioral assays Na/K ATPase activity, sea water challenge tests length, weight, malformations
Returning adult	Survival Feeding Swimming: predator avoidance migration spawning feeding Sexual development Olfaction: Predator avoidance Homing Spawning	LC50 (dose-response slope). Percent dead at a given concentration stomach contents behavioral assays numbers of adult returns, behavioral assays numbers of eggs fertilized stomach contents histological assessment of ovaries/testis electro-olfactogram measurements, measurements of intersex behavioral assays behavioral assays behavioral assays

Risk Characterization

We follow the framework presented in Figure 2 to conduct the analysis and risk characterization phases. First we conduct exposure and response analyses to estimate/determine the type, likelihood, magnitude, and frequency of adverse responses resulting from predicted exposure based on the best available information. We evaluate species information and pesticide information to determine when, where, and at what concentrations listed salmonids and their habitat may be exposed. We then correlate those exposure estimates with probable response based on available toxicity data. Once we have conducted the analysis phase, we move to the risk characterization phase (Figure 2**)**.

In the risk characterization phase, we revisit the risk hypotheses and apply tools to address whether any individual fitness consequences assessed in the analysis phase would be expected to impact populations and ultimately species. One of the tools we employ is individual-based population models predicated on a juvenile salmonids' probability of survival in its first year of life. We also assess interactions between the stressors of the action and stressors in the *Environmental Baseline* (Figure 2). Some pesticides' toxicity profiles are influenced by environmental parameters such as pH and temperature. Temperature can affect pesticide metabolism in fish and is seasonally elevated in many salmonid supporting watersheds. As described earlier in this section we translate expected effects to identified PCEs by evaluating the available information to support risk hypotheses. If we expect PCEs to be reduced we discuss whether the expected reductions translate to reductions in the conservation value of designated critical habitat.

To conclude consultation, cumulative effects are described and the extent to which species and habitat are affected is documented. Cumulative effects as defined in 50 CFR §404.2 include the effects of future, state, tribal, local, or private actions that are reasonably certain to occur in the action area of this Opinion. Integrating the *Effects of the Proposed Action*, the *Status of Listed Resources*, and the *Environmental Baseline*, NMFS determines whether EPA's pesticide registration action jeopardizes the continued

existence of the species. NMFS also determines whether the action results in the destruction or adverse modification of designated critical habitat.

Other Considerations

In this Opinion, we evaluated lines of evidence constructed as species-specific risk hypotheses to ensure relevant endpoints were addressed. Ultimately, our analysis weighs each line of evidence by evaluating the best commercial and scientific data available that pertain to a given risk hypothesis. Overall, the analysis is a qualitative approach that uses some quantitative tools to provide examples of potential risks to listed salmonids and their habitat. Multiple methods and tools currently exist for addressing contaminant-induced risk to the environment. Hazard-based assessments, probabilistic risk assessment techniques, combinations of the two, and deterministic approaches such as screening level assessments have been applied to questions of risk related to human health and the environment.

In recent pesticide risk assessments, probabilistic techniques have been used to evaluate the probability of exceeding a "toxic" threshold for aquatic organisms by combining pesticide monitoring data with species sensitivity distributions (Geisy, Solomon et al. 1999; Giddings 2009). There is utility in information generated by probabilistic approaches if supported by robust data. We compared the species sensitivity distributions presented in Giddings 2009 with the probability distributions of salmonid prey acute lethality values that we developed to highlight differences in outcomes. The assessment with carbaryl did not address many of the species-specific risk hypotheses. We found no other probabilistic assessments that addressed risk to salmonids affected by short-term sublethal exposures, mixtures, or affects on growth from reduced feeding ability and reduced abundances of prey.

NMFS considered the use of probabilistic risk assessment techniques for addressing risk at population and species (ESU and DPS) scales for the stressors of the action. However, we encountered significant limitations in available data that suggested the information was not sufficient to define exposure and/or response probabilities necessary to determine

the probability of risk. In the *Risk Characterization* section, the distribution of the sensitivity of salmonid prey items was used to determine selection of a survival toxicity value used in population modeling exercises. Probabilistic techniques were not otherwise utilized in the Opinion due to issues with data collection, paucity of data, non-normal distributions of data, and quality assurance and quality control. For example, it was not deemed appropriate to pair the salmonid prey responses with exposure probabilities based on monitoring results given the limitations of that data set discussed in the *Effects of the Proposed Action*. To evaluate population consequences associated with potential lethality from pesticide exposure in salmon, NMFS selected the lowest reported salmonid LC50 from the available information to ensure risk was not underestimated. When we consider the data limitations coupled with the inherent complexity of EPA's proposed action (Figure 1) in California, Idaho, Oregon, and Washington, we find that probabilistic assessments at population and species scales introduce an unquantifiable amount of uncertainty that undermines confidence in derived risk estimates. These same studies do not factor the status of the existing health and baseline conditions of the environment into their assessment. At this time, the best available data do not support such an analysis and conclusions from such an analysis would be highly speculative.

Action Area

The action area is defined as all areas to be affected directly or indirectly by the federal action and not merely the immediate area involved in the action (50 CFR §402.02). Given EPA's nationwide authorization of these pesticides, the action area would encompass the entire U.S. and its territories. These same geographic areas would include all listed species and designated critical habitat under NMFS jurisdiction.

In this instance, as a result of the 2002 order in Washington Toxics Coalition v. EPA, EPA initiated consultation on its authorization of 37 pesticide a.i.s and their effects on listed Pacific salmonids under NMFS' jurisdiction and associated designated critical habitat in the states of California, Idaho, Oregon, and Washington. Consequently, for purposes of this Opinion, the action area consists of the entire range and most life history stages of listed salmon and steelhead and their designated critical habitat in California,

Idaho, Oregon, and Washington. The action area encompasses all freshwater, estuarine, marsh, swamps, nearshore, and offshore marine surface waters of California, Oregon, and Washington. The action area also includes all freshwater surface waters in Idaho (Figure 5).

Carbaryl, carbofuran, and methomyl are the second set of three insecticides identified in the consultation schedule established in the settlement agreement and are analyzed in this Opinion. NMFS' analysis focuses only on the effects of EPA's action on listed Pacific salmonids in the above-mentioned states. It includes the effects of these pesticides on the recently listed Lower Columbia River coho salmon, Puget Sound steelhead, and Oregon Coast coho salmon. The Lower Columbia River coho salmon was listed as endangered in 2005. The Puget Sound steelhead and the Oregon Coast coho salmon were listed as threatened in 2007 and 2008, respectively.

EPA's consultation with NMFS remains incomplete until it analyzes the effects of its authorization of pesticide product labels with carbaryl, carbofuran, and methomyl for all remaining threatened and endangered species under NMFS' jurisdiction. EPA must ensure its action does not jeopardize the continued existence or result in the destruction or adverse modification of critical habitat for other listed species and designated critical habitat under NMFS' jurisdiction throughout the U.S. and its territories.

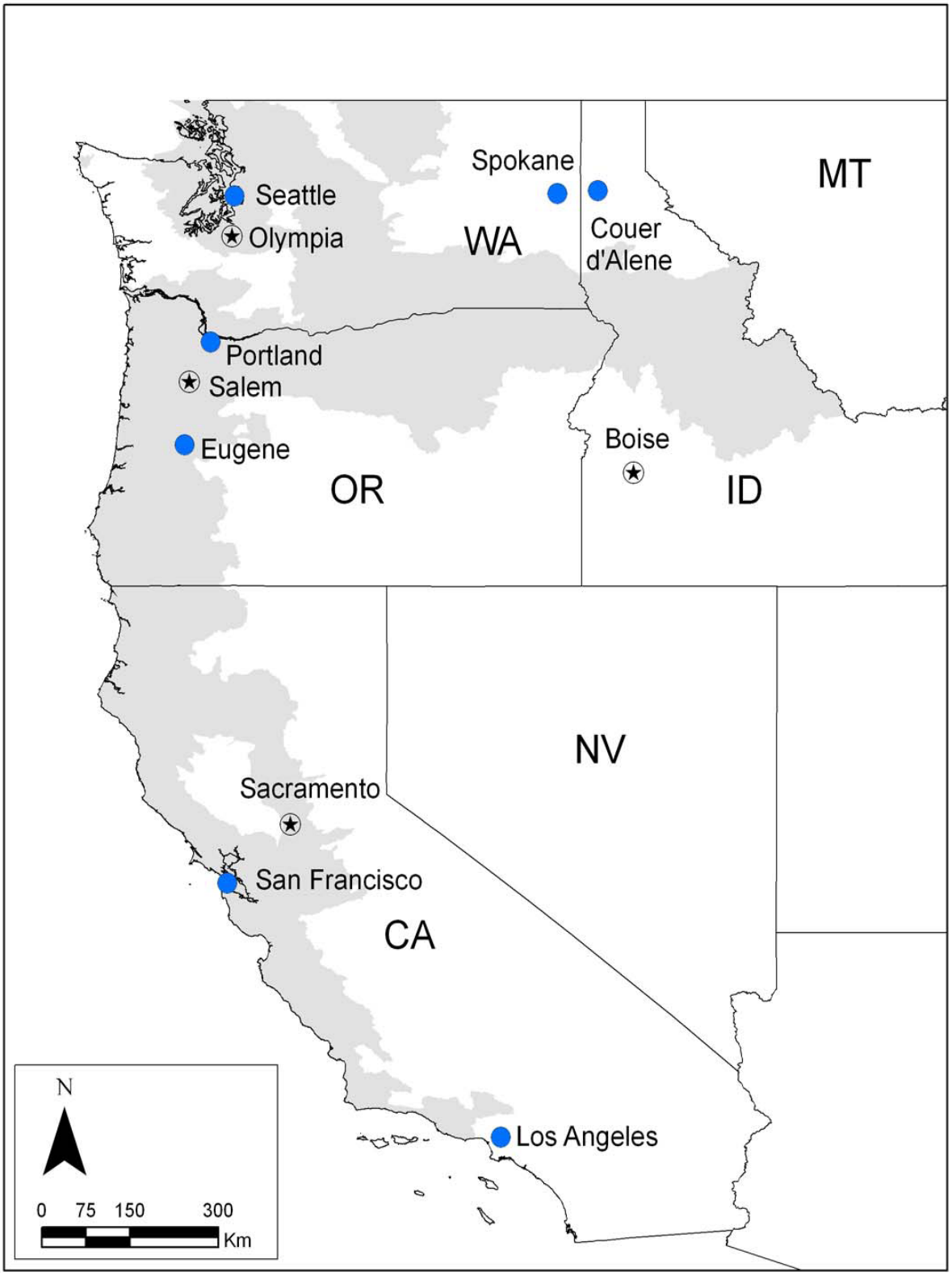

Figure 5. Map showing extent of inland action area with the range of all ESU and DPS boundaries for ESA listed salmonids highlighted in gray.

Status of Listed Resources

NMFS has determined that the following species and critical habitat designations may occur in this action area for EPA's registration of carbaryl, carbofuran, and methomyl - containing products (Table 5). More detailed information on the status of these species and critical habitat are found in a number of published documents including recent recovery plans, status reviews, stock assessment reports, and technical memorandums. Many are available on the Internet at http://www.nmfs.noaa.go/pr/species/.

Table 5. Listed Species and Critical Habitat (denoted by asterisk) in the Action Area

Common Name (Distinct Population Segment or Evolutionarily Significant Unit)	*Scientific Name*	*Status*
Chinook salmon (California Coastal*)	*Oncorhynchus tshawytscha*	Threatened
Chinook salmon (Central Valley Spring-run*)		Threatened
Chinook salmon (Lower Columbia River*)		Threatened
Chinook salmon (Upper Columbia River Spring-run*)		Endangered
Chinook salmon (Puget Sound*)		Threatened
Chinook salmon (Sacramento River Winter-run*)		Endangered
Chinook salmon (Snake River Fall-run*)		Threatened
Chinook salmon (Snake River Spring/Summer-run*)		Threatened
Chinook salmon (Upper Willamette River*)		Threatened
Chum salmon (Columbia River*)	*Oncorhynchus keta*	Threatened
Chum salmon (Hood Canal Summer-run*)		Threatened
Coho salmon (Central California Coast*)	*Oncorhynchus kisutch*	Endangered
Coho salmon (Lower Columbia River)		Threatened
Coho salmon (Southern Oregon & Northern California Coast*)		Threatened
Coho salmon (Oregon Coast*)		Threatened
Sockeye salmon (Ozette Lake*)	*Oncorhynchus nerka*	Threatened
Sockeye salmon (Snake River*)		Endangered
Steelhead (Central California Coast*)	*Oncorhynchus mykiss*	Threatened
Steelhead (California Central Valley*)		Threatened
Steelhead (Lower Columbia River*)		Threatened
Steelhead (Middle Columbia River*)		Threatened
Steelhead (Northern California*)		Threatened
Steelhead (Puget Sound)		Threatened
Steelhead (Snake River*)		Threatened
Steelhead (South-Central California Coast*)		Threatened
Steelhead (Southern California*)		Threatened
Steelhead (Upper Columbia River*)		Threatened
Steelhead (Upper Willamette River*)		Threatened

The following brief narratives summarize the biology and ecology of threatened and endangered species in the action area that are relevant to the effects analysis in this

Opinion. Summaries of the status and trends [including (VSP) information] of each species are presented to provide a foundation for the analysis.

One of the important factors defining a viable population is the population's long- and short-term tendency to increase in abundance. In our status reviews of each listed salmonid species, we calculated the median annual population growth rate (denoted as lambda, λ) from available time series of abundance for individual populations. The lambda for each population is calculated using the rate at which four year running sums of available abundance estimates changes through time. Several publications provide a detailed description of the calculation of lambda (McClure, Holmes et al. 2003; Good, Waples et al. 2005). The lambda values for salmonid VSPs presented in these papers are summarized in Appendix 2. Unfortunately, reliable time series of abundance estimates are not available for most Pacific salmon and steelhead populations. In those cases, we made general inferences of long-term change based on what is known of historical and past abundances from snapshot surveys, surveys of a population segments, harvest by commercial and recreational fisheries, and professional judgment. We then compare these to similar information of current populations.

Below, each species narrative is followed by a description of its critical habitat with particular emphasis on any essential features of the habitat that may be exposed to the proposed action, and may warrant special attention.

Chinook Salmon

Description of the Species

Chinook salmon are the largest of the Pacific salmon and historically ranged from the Ventura River in California to Point Hope, Alaska in North America, and in northeastern Asia from Hokkaido, Japan to the Anadyr River in Russia (Healey 1991). In addition, Chinook salmon have been reported in the Canadian Beaufort Sea (McPhail and Lindsey 1970). We discuss the distribution, life history, diversity (when applicable), status, and critical habitat of the nine species of endangered and threatened Chinook salmon separately.

Of the Pacific salmon species, Chinook salmon exhibit one of the most diverse and complex life history strategies. Chinook salmon are generally described as one of two races, within which there is substantial variation. One form, the "stream-type" resides in freshwater for a year or more following emergence from gravel nests. Another form, the "ocean-type" migrates to the ocean within their first year. The ocean-type typifies populations north of 56ºN (Healey 1991). Within each race, there is often variation in age at seaward migration, age of maturity, timing of spawning migrations, male precocity, and female fecundity.

Status and Trends

Over the past few decades, the size and distribution of Chinook salmon populations have declined because of natural phenomena and human activity. Geographic features, such as waterfalls, pose natural barriers to salmon migrating to spawning habitat. Flooding can eliminate salmon runs and significantly alter large regions of salmon habitat. However, these threats are not considered as serious as several anthropogenic threats. Of the various natural phenomena that affect most populations of Pacific salmon, changes in ocean productivity are generally considered most important. Natural variations in freshwater and marine environments have substantial effects on the abundance of salmon populations.

Salmon along the U.S. west coast are prey for a variety of predators, including marine mammals, birds, sharks, and other fishes. In general, Chinook salmon are prey for pelagic fishes, birds, and marine mammals, including harbor seals, sea lions, and killer whales. Chinook salmon are also exposed to high rates of natural predation, during freshwater rearing and migration stages, as well as during ocean migration. There have been recent concerns that the increasing size of tern, seal, and sea lion populations in the Pacific Northwest may have reduced the survival of some salmon ESUs. Human activities include the operation of hydropower systems, over-harvest, hatcheries, and habitat degradation including poor water quality from chemical contamination.

Chinook salmon are dependent on the quantity and quality of aquatic habitats. Juvenile salmonids rely on a variety of non-main channel habitats that are critical to rearing. All listed salmonids use shallow, low flow habitats at some point in their life cycle. Examples of off-channel habitat include alcoves, channel edge sloughs, overflow channels, backwaters, terrace tributaries, off-channel dredge ponds, and braids (Anderson 1999; Swift III 1979). Chinook salmon, like the other salmon NMFS has listed, have declined under the combined effects of overharvests in fisheries; competition from fish raised in hatcheries and native and non-native exotic species; dams that block their migrations and alter river hydrology; gravel mining that impedes their migration and alters the hydrogeomorphology of the rivers and streams that support juveniles; water diversions that deplete water levels in rivers and streams; destruction or degradation of riparian habitat that increase water temperatures in rivers and streams sufficient to reduce the survival of juvenile Chinook salmon; and land use practices (logging, agriculture, urbanization) that destroy or alter wetland and riparian ecosystems. These activities and features introduce sediment, nutrients, biocides, metals, and other pollutants into surface and ground water and degrade water quality in the freshwater, estuarine, and coastal ecosystems throughout the Pacific Northwest.

Salmonids along the west coast of the U.S. share common threats. Therefore, anthropogenic threats for all species and stocks are summarized here (see (NMFS 2005) for a review). Population declines have resulted from several human-mediated causes. However, the greatest negative influence has been the establishment of waterway obstructions such as dams, power plants, and sluiceways for hydropower, agriculture, flood control, and water storage. These structures have blocked salmon migration to spawning habitat or resulted in direct mortality and have eliminated entire salmon runs. Presently, many of these structures have been re-engineered, renovated, or removed to allow for surviving runs to access former habitat. However, success has been limited. Remaining freshwater habitats are threatened from development along waterways as well as sedimentation, pollution run-off, habitat modification, and erosion. These factors can directly cause mortality, affect salmonid health, or modify spawning habitat so as to

reduce reproductive success. Immature salmonids remain in freshwater systems and may be exposed to these modifications for years. These conditions reduce juvenile survival.

Salmonids are also a popular commercial resource and have faced significant pressure from fishing. Although currently protected, illegal oceanic driftnet gear is suspected of hindering salmon survival and recovery. Despite the protection of weaker salmonid stocks from fishing, exploitation of more populous stocks may actually harm weaker stocks. Hatchery-reared salmon have been and are still being introduced to bolster stocks. However, the broader effects of this action are unknown.

California Coastal Chinook Salmon

Distribution

California Coastal (CC) Chinook salmon includes all naturally-spawned coastal Chinook salmon spawning from Redwood Creek south through the Russian River as shown in (Figure 6).

CC Chinook salmon are a fall-run, ocean-type fish. Although a spring-run (river-type) component existed historically, it is now considered extinct (Bjorkstedt, Spence et al. 2005). Table 6 identifies populations within the CC Chinook salmon ESU, their abundances, and hatchery input.

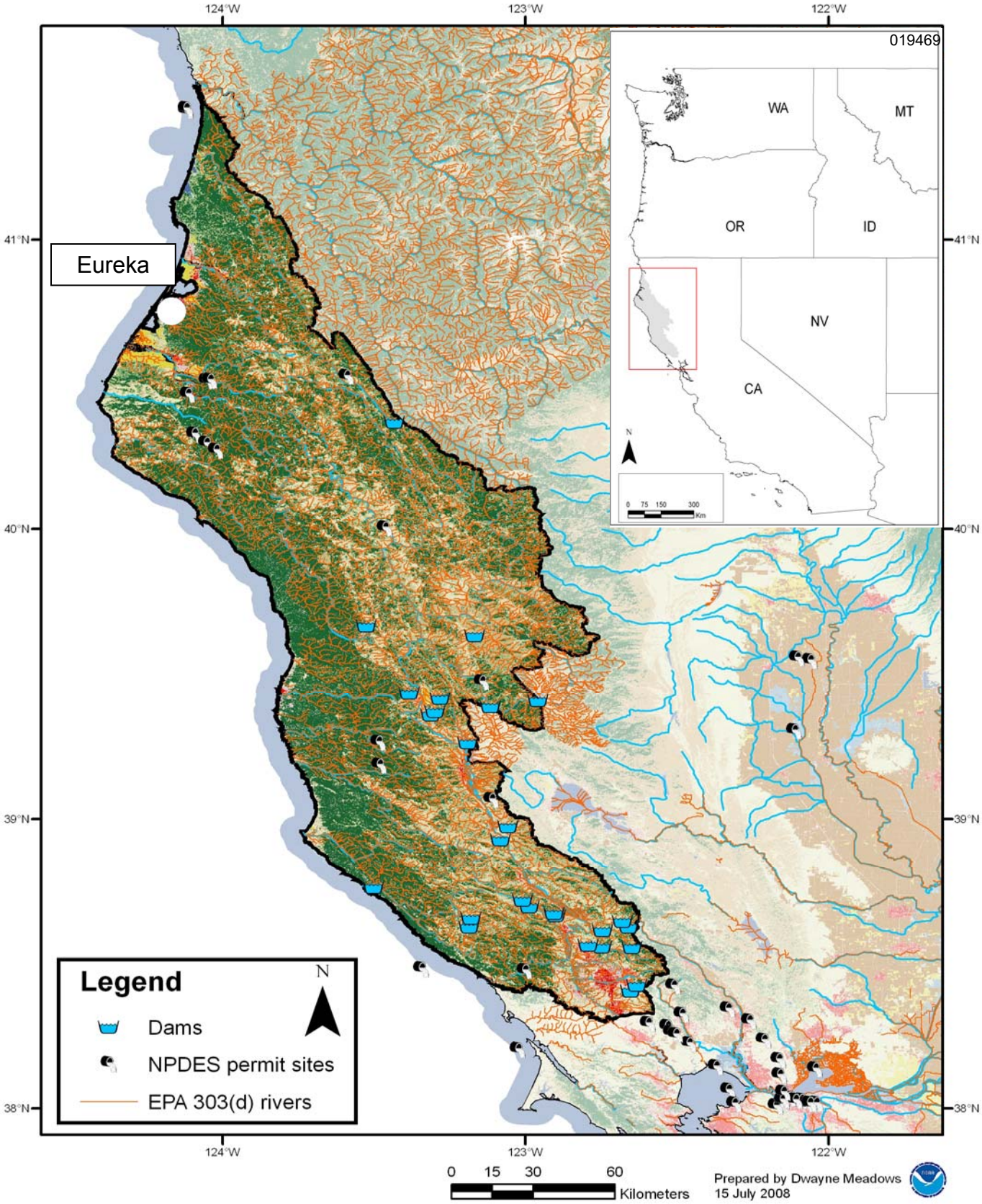

Figure 6. CC Chinook salmon distribution. Land Cover Class Legend in Figure 7.

Figure 7. Legend for the Land Cover Class categories found in species distribution maps. Land cover is based on the 2001 National Land Cover Data and classifications. http://www.mrlc.gov/index.php.

Table 6. CC Chinook salmon--preliminary population structure, abundances, and hatchery contributions (Good, Waples et al. 2005).

Population	Historical Abundance	Most Recent Spawner Abundance	Hatchery Abundance Contributions
Eel River (includes * tributaries below)	17,000-55,000	156-2,730	~30%
Mainstem Eel River*	13,000	Inc. in Eel River	Unknown
Van Duzen River*	2,500	Inc. in Eel River	Unknown
Middle Fork Eel River*	13,000	Inc. in Eel River	Unknown
South Fork Eel River*	27,000	Inc. in Eel River	Unknown
North Fork Eel River*	Unknown	Inc. in Eel River	Unknown
Upper Eel River*	Unknown	Inc. in Eel River	Unknown
Redwood Creek	1,000-5,000	Unknown	0
Mad River	1,000-5,000	19-103	Unknown
Bear River	100	Unknown	0
Mattole River	1,000-5,000	Unknown	Unknown
Russian River	50-500	200,000	~0%
Humbolt Bay tributaries	40	120	40 (33%)
Tenmile to Gualala coastal effluents	Unknown	Unknown	0
Small Humboldt County rivers	1,500	Unknown	0
Rivers north of Mattole River	600	Unknown	0
Noyo River	50	Unknown	0
Total	**20,750-72,550**	**200,175 (min)**	

Status and Trends

CC Chinook salmon were listed as threatened on September 16, 1999 (64 FR 50393). Their classification was reaffirmed following a status review on June 28, 2005 (70 FR 37160). The outcome was based on the combined effect of dams that prevent individuals from reaching spawning habitat, logging, agricultural activities, urbanization, and water withdrawals in the river drainages that support CC Chinook salmon. Historical estimates of escapement, based on professional opinion and evaluation of habitat conditions, suggest abundance was roughly 73,000 in the early 1960s with the majority of fish spawning in the Eel River [see CDFG 1965 *in* (Good, Waples et al. 2005)]. The species exists as small populations with highly variable cohort sizes and discussion is underway to split Eel River salmon into as many as five separate populations (see Table 3). The Russian River probably contains some natural production. However, the origin of those fish is unclear as a number of introductions of hatchery fish occurred over the last century. The Eel River contains a substantial fraction of the remaining Chinook salmon spawning habitat for this species.

Since the original listing and status review, little new data are available or suitable for analyzing trends or estimating changes in the Eel River population's growth rate (Good, Waples et al. 2005). Historical and current abundance information indicates that independent populations of Chinook salmon are depressed in many of those basins where they have been monitored.

Critical Habitat

Critical habitat was designated for this species on September 2, 2005 (70 FR 52630). The critical habitat designation for this ESU identifies PCEs that include sites necessary to support one or more Chinook salmon life stages. Specific sites include freshwater spawning sites, freshwater rearing sites, freshwater migration corridors, nearshore marine habitat, and estuarine areas. The physical or biological features that characterize these sites include water quality and quantity, natural cover, forage, adequate passage conditions, and floodplain connectivity. Critical habitat in this ESU consists of limited quantity and quality summer and winter rearing habitat, as well as marginal spawning habitat. Compared to historical conditions, there are fewer pools, limited cover, and reduced habitat complexity. The limited instream cover that does exist is provided mainly by large cobble and overhanging vegetation. Instream large woody debris, needed for foraging sites, cover, and velocity refuges is especially lacking in most of the streams throughout the basin. NMFS has determined that these degraded habitat conditions are, in part, the result of many human-induced factors affecting critical habitat. They include dam construction, agricultural and mining activities, urbanization, stream channelization, water diversion, and logging.

Central Valley Spring-Run Chinook Salmon

Distribution

The Central Valley spring-run (CV) Chinook salmon includes all naturally spawned populations of spring-run Chinook salmon in the Sacramento River and its tributaries in California (Figure 8).

Table 7 identifies populations within the CV spring-run Chinook salmon ESU, their abundances, and hatchery input.

Table 7. CV Chinook salmon--preliminary population structure, abundances, and hatchery contributions (Good, Waples et al. 2005).

Population	Historical Abundance	Most Recent Spawner Abundance	Hatchery Abundance Contributions
Butte Creek Spring-run Chinook		67-4,513	Unknown
Deer Creek Spring-run Chinook		243-1,076	Unknown
Mill Creek Spring-run Chinook		203-491	Unknown
Total	**~700,000 for all populations**	**513-6,080**	Unknown

Life History

CV Chinook salmon enter the Sacramento River from March to July and spawn from late August through early October, with a peak in September. Spring-run fish in the Sacramento River exhibit an ocean-type life history, emigrating as fry and sub-yearlings. Chinook salmon require cool freshwater while they mature over the summer. This species tends to take advantage of high flows. Adult upstream migration may be blocked by temperatures above 21ºC (McCullough 1999). Temperatures below 21ºC can stress fish by increasing their susceptibility to disease (Berman 1990) and elevating their metabolism (Brett 1979).

Status and Trends

CV Chinook salmon were listed as threatened on September 16, 1999 (64 FR 50393). This classification was retained following a status review on June 28, 2005 (70 FR 37160). The species was listed because dams isolated individuals from most of their historic spawning habitat and the remaining habitat is degraded. Historically, spring-run Chinook salmon were predominant throughout the CV. This species occupied the upper and middle reaches (1,000 to 6,000 ft) of the San Joaquin, American, Yuba, Feather, Sacramento, McCloud and Pit Rivers. Smaller populations occurred in most tributaries with sufficient habitat for over-summering adults (Stone 1874; Rutter 1904; Clarke 1929).

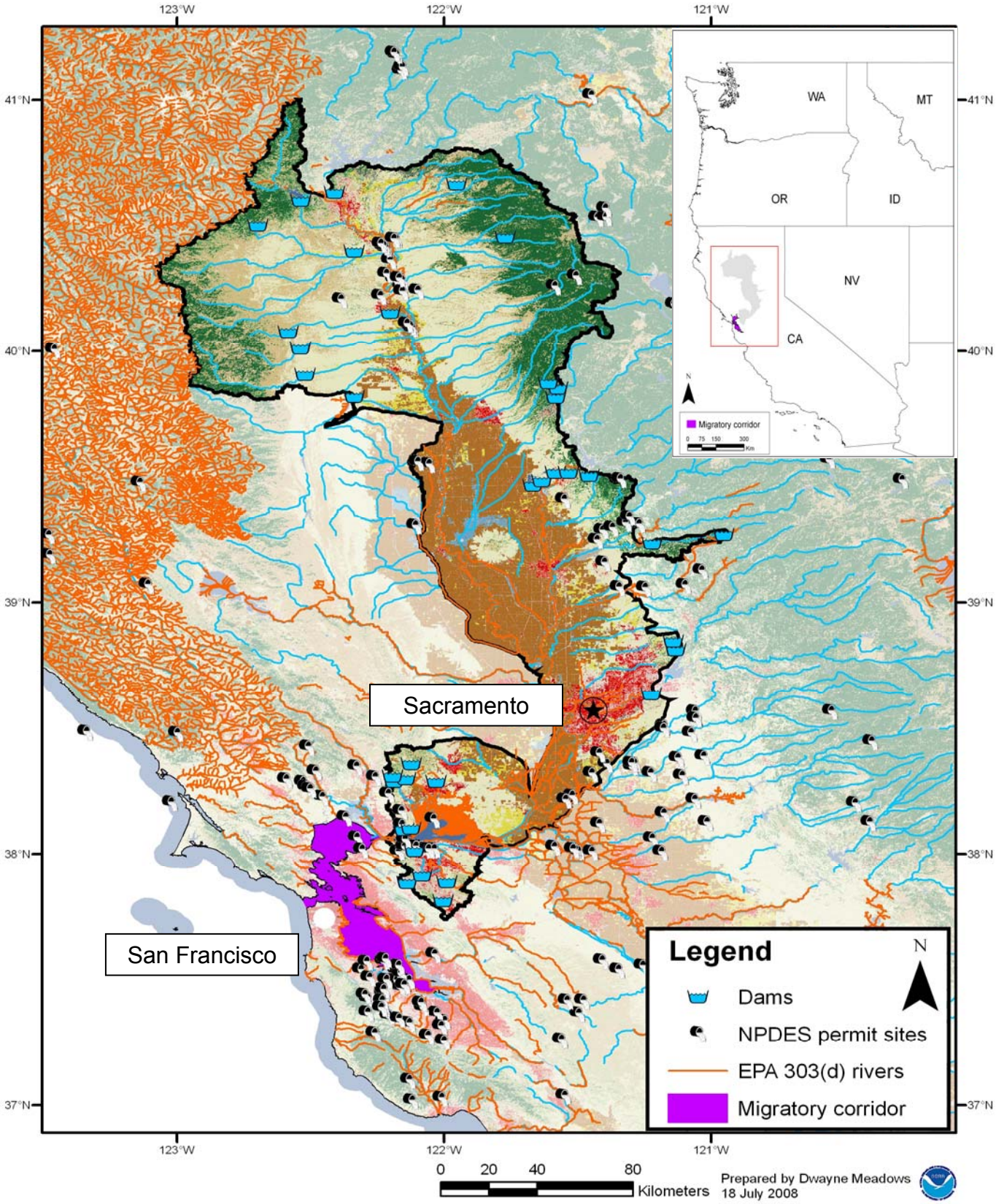

Figure 8. CV Chinook salmon distribution. Land Cover Class Legend in Figure 7.

The CV drainage as a whole is estimated to have supported spring-run Chinook salmon runs as large as 700,000 fish between the late 1880s and the 1940s (Brown, Moyle et al. 1994). Before construction of Friant Dam, nearly 50,000 adults were counted in the San Joaquin River alone (Fry 1961). Following the completion of Friant Dam, the native population from the San Joaquin River and its tributaries (*i.e.*, the Stanislaus and Mokelumne Rivers) was extirpated. Spring-run Chinook salmon no longer exist in the American River due to the operation of Folsom Dam. Naturally spawning populations of CV Chinook salmon currently are restricted to accessible reaches of the upper Sacramento River, Antelope Creek, Battle Creek, Beegum Creek, Big Chico Creek, Butte Creek, Clear Creek, Deer Creek, Feather River, Mill Creek, and Yuba River (CDFG 1998). Since 1969, the CV Chinook salmon ESU (excluding Feather River fish) has displayed broad fluctuations in abundance ranging from 25,890 in 1982 to 1,403 in 1993 (CDFG unpublished data).

The average abundance for the ESU was 12,499 for the period of 1969 to 1979, 12,981 for the period of 1980 to 1990, and 6,542 for the period of 1991 to 2001. In 2003 and 2004, total run size for the ESU was 8,775 and 9,872 adults, respectively. These averages are well above the 1991 to 2001 average.

Evaluating the ESU as a whole, however, masks significant changes that are occurring among populations that comprise the ESU. For example, the mainstem Sacramento River population has undergone a significant decline while the abundance of many tributary populations increased. Average abundance of Sacramento River mainstem spring-run Chinook salmon recently declined from a high of 12,107 for the period 1980 to 1990, to a low of 609 for the period 1991 to 2001 (Good, Waples et al. 2005). Meanwhile, the average abundance of Sacramento River tributary populations increased from a low of 1,227 to a high of 5,925 over the same periods.

According to Good et al. (2005), abundance time series data for Mill, Deer, and Butte creeks spring-run Chinook salmon (updated through 2001) confirm that population increases in the tributary populations seen in the 1990s have continued. During this

period, habitat improvements included the removal of several small dams and increases in summer flows in the watersheds, a reduced ocean fisheries, and a favorable terrestrial and marine climate. All three spring-run Chinook populations in the Sacramento River tributaries have long-and short-term lambdas >1, indicating population growth. However, population sizes are relatively small compared to fall-run Chinook salmon populations, and there have been some extreme fluctuations in population size, which is often indicative of an impending collapse in small populations. Additionally, Feather River hatchery and Feather River spring-run Chinook salmon are not closely related to the Mill, Deer, and Butte creek spring-run Chinook salmon populations. This group represents a distinct genetic legacy. Although protective measures and critical habitat restoration likely have contributed to recent increases in spring-run Chinook salmon abundance, the ESU is still below levels observed from the 1960s through 1990. Threats from hatchery production (*i.e.*, competition for food between naturally spawned and hatchery fish, and run hybridization and homogenization), climatic variation, reduced stream flow, high water temperatures, predation, and large scale unscreened water diversions persist.

Critical Habitat

Critical habitat was designated for this species on September 2, 2005 (70 FR 52630). The critical habitat designation for this ESU identifies PCEs that include sites necessary to support one or more Chinook salmon life stages. Specific sites include freshwater spawning sites, freshwater rearing sites, freshwater migration corridors, nearshore marine habitat, and estuarine areas. The physical or biological features that characterize these sites include water quality and quantity, natural cover, forage, adequate passage conditions, and floodplain connectivity. Factors contributing to the downward trends in this ESU include: loss of most historical spawning habitat, reduced access to spawning/rearing habitat behind impassable dams, climatic variation, water management activities, hybridization with fall-run Chinook salmon, predation, and harvest. Additional factors include the degradation and modification of remaining rearing and migration habitats in the natal stream, the Sacramento River, and the Sacramento delta. The natal tributaries have many small hydropower dams and water diversions that in some years

have greatly reduced or eliminated in-stream flows during spring-run migration periods. Problems in the migration corridor include unscreened or inadequately screened water diversions, predation by nonnative species, and excessively high water temperatures. Collectively, these factors have impacted spring-run Chinook salmon critical habitat and population numbers (CDFG 1998). Several actions have been taken to improve and increase the PCEs of critical habitat for spring-run Chinook salmon, including improved management of CV water (*e.g.*, through use of CALFED EWA and CV Project Improvement Act (b)(2) water accounts), implementing new and improved screen and ladder designs at major water diversions along the mainstem Sacramento River and tributaries, removal of several small dams on important spring-run Chinook salmon spawning streams, and changes in ocean and inland fishing regulations to minimize harvest.

Lower Columbia River Chinook Salmon

Distribution

Lower Columbia River (LCR) Chinook salmon includes all naturally-spawned populations of Chinook salmon from the Columbia River and its tributaries from its mouth at the Pacific Ocean upstream to a transitional point between Oregon and Washington, east of the Hood River and the White Salmon River (Figure 7). Naturally spawned populations also occur along the Willamette River to Willamette Falls, Oregon, exclusive of spring-run Chinook salmon in the Clackamas River (Table 5). The Cowlitz, Kalama, Lewis, White Salmon, and Klickitat Rivers are the major river systems on the Washington side, and the lower Willamette and Sandy Rivers are foremost on the Oregon side. The eastern boundary for this species occurs at Celilo Falls, which corresponds to the edge of the drier Columbia Basin Ecosystem. Historically, Celilo Falls may have been a barrier to salmon migration at certain times of the year. Table 8 identifies populations within the LCR Chinook salmon ESU, their abundances, and hatchery input

Table 8. LCR Chinook salmon - preliminary population structure, abundances, and hatchery contributions (Good, Waples et al. 2005).

Population	Historical Abundance	Most Recent Spawner Abundance	Hatchery Abundance Contributions
Youngs Bay	Unknown	Unknown	Unknown
Grays River	2,477	99	38%
Big Creek	Unknown	Unknown	Unknown
Elochoman River	Unknown	676	68%
Clatskanie River	Unknown	Unknown	Unknown
Mill, Abernathy, and German Creeks	Unknown	734	47%
Scappoose Creek	Unknown	Unknown	Unknown
Coweeman River	Unknown	274	0%
Lower Cowlitz River	4,971	1,562	62%
Upper Cowlitz River (fall run)	Unknown	5,682	Unknown
Toutle River (fall run)	53,956	Unknown	Unknown
Kalama River (fall run)	25,392	2,931	67%
Salmon Creek and Lewis River	47,591	256	0%
Clackamas River	Unknown	40	Unknown
Washougal River	7,518	3,254	58%
Sandy River (fall run)	Unknown	183	Unknown
Columbia Gorge-lower tributaries	Unknown	Unknown	Unknown
Columbia Gorge-upper tributaries	Unknown	Unknown	Unknown
Hood River (fall run)	Unknown	18	Unknown
Big White Salmon River	Unknown	334	21%
Sandy River (late fall run)	Unknown	504	3%
Lewis River-North Fork	Unknown	7,841	13%
Upper Cowlitz River (spring run)	Unknown	Unknown	Unknown
Cispus River	Unknown	1,787	Unknown
Tilton River	Unknown	Unknown	Unknown
Toutle River (spring run)	2,901	Unknown	Unknown
Kalama River (spring run)	4,178	98	Unknown
Lewis River	Unknown	347	Unknown
Sandy River (spring run)	Unknown	Unknown	Unknown
Big White Salmon River (spring run)	Unknown	Unknown	Unknown
Hood River (spring run)	Unknown	51	Unknown
Total	**148,984 (min)**	**26,273 (min)**	

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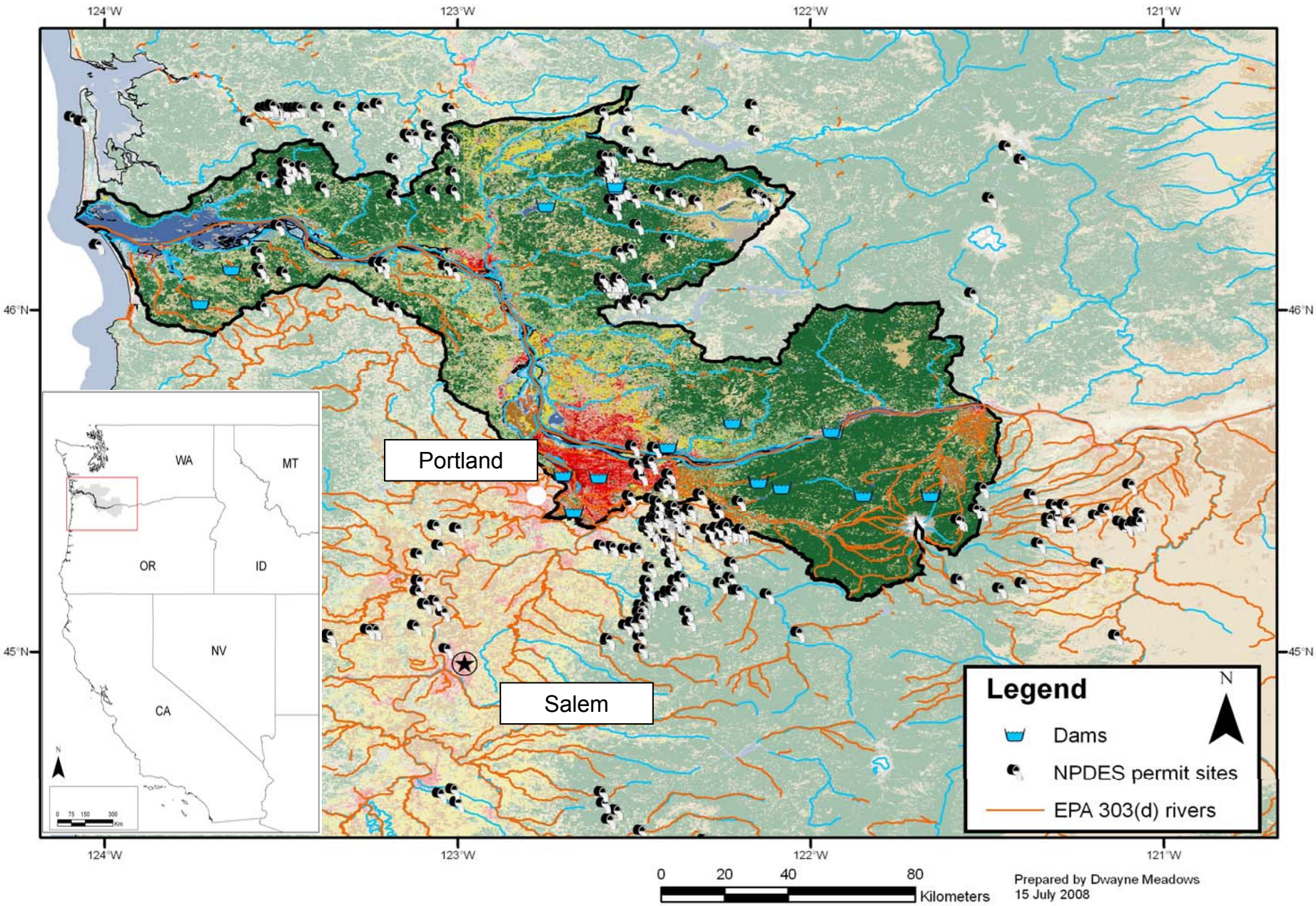

Figure 9. LCR Chinook salmon distribution. Land Cover Class Legend in Figure 7.

Life History

LCR Chinook salmon display three life history types including early fall runs, late fall runs, and spring-runs. Spring and fall runs have been designated as part of a LCR Chinook salmon ESU. The predominant life history type for this species is the fall-run. Fall Chinook salmon enter freshwater typically in August through October to spawn in large river mainstems. The juvenile life history stage emigrates from freshwater as sub-yearling (ocean-type). Spring Chinook salmon enter freshwater in March through June to spawn in upstream tributaries and generally emigrate from freshwater as yearlings (stream-type).

Status and Trends

LCR Chinook salmon were originally listed as threatened on March 24, 1999 (64 FR 14308). This status was reaffirmed on June 28, 2005 (70 FR 37160). Historical records of Chinook salmon abundance are sparse. However, cannery records suggest a peak run of 4.6 million fish [43 million lbs see (Lichatowich 1999)] in 1883. Although fall-run Chinook salmon occur throughout much of their historical range, they remain vulnerable to large-scale hatchery production, relatively high harvest, and extensive habitat degradation. The Lewis River late fall Chinook salmon population is the healthiest and has a reasonable probability of being self-sustaining. Abundances largely declined during 1998 to 2000. Trend indicators for most populations are negative, especially if hatchery fish are assumed to have a reproductive success equivalent to that of natural-origin fish.

New data acquired for the Good et al. (2005) report includes spawner abundance estimates through 2001, new estimates of the fraction of hatchery spawners, and harvest estimates. In addition, estimates of historical abundance have been provided by the Washington Department of Fish and Wildlife (WDFW). The Willamette/Lower Columbia River Technical Review Team (W/LCRTRT) has estimated that 8-10 historic populations have been extirpated, most of them spring-run populations. Almost all of the spring-run Chinook of LCR Chinook are at very high risk of extinction. Near loss of that

important life history type remains an important concern. Although some natural production currently occurs in 20 or so populations, only one exceeds 1,000 spawners. Most LCR Chinook salmon populations have not seen increases in recent years as pronounced as those that have occurred in many other geographic areas.

According to Good et al. (2005), the majority of populations for which data are available have a long-term trend of <1; indicating the population is in decline. Currently, the spatial structures of populations in the Coastal and Cascade Fall Run major population groups (MPGs) are similar to their respective historical conditions. The genetic diversity of the Coastal, Cascade, and Gorge Fall Run MPGs (*i.e.*, all except the Late Fall Run Chinook salmon MPG) has been eroded by large hatchery influences and periodically by low effective population sizes. Hatchery programs for spring Chinook salmon are preserving the genetic legacy from populations that were extirpated from blocked areas. High hatchery production also poses genetic and ecological risks to natural populations and masks their performance.

Critical Habitat

Critical habitat was designated for this species on September 2, 2005 (70 FR 52630). Designated critical habitat includes all Columbia River estuarine areas and river reaches proceeding upstream to the confluence with the Hood Rivers as well as specific stream reaches in a number of tributary subbasins. The critical habitat designation for this ESU identifies PCEs that include sites necessary to support one or more Chinook salmon life stages. Specific sites include freshwater spawning sites, freshwater rearing sites, freshwater migration corridors, nearshore marine habitat, and estuarine areas. The physical or biological features that characterize these sites include water quality and quantity, natural cover, forage, adequate passage conditions, and floodplain connectivity.

Of 52 subbasins reviewed in NMFS' assessment of critical habitat for the LCR Chinook salmon ESU, 13 subbasins were rated as having a medium conservation value, four were rated as low, and the remaining subbasins (35), were rated as having a high conservation value to LCR Chinook salmon. Factors contributing to the downward trends in this ESU

are hydromorphological changes resulting from hydropower development, loss of tidal marsh and swamp habitat, and degraded freshwater and marine habitat from industrial harbor and port development, and urban development. Limiting factors identified for this species include: (1) Habitat degradation and loss due to extensive hydropower development projects, urbanization, logging, and agriculture on Chinook spawning and rearing habitat in the LCR, (2) reduced access to spawning/rearing habitat in tributaries, (3) hatchery impacts, (4) loss of habitat diversity and channel stability in tributaries, (5) excessive fine sediment in spawning gravels, (6) elevated water temperature in tributaries, (7) harvest impacts, and (8) poor water quality.

Upper Columbia River Spring-run Chinook Salmon

Distribution

Endangered Upper Columbia River (UCR) spring-run Chinook salmon includes stream-type Chinook salmon that inhabit tributaries upstream from the Yakima River to Chief Joseph Dam (Figure 10). The UCR spring-run Chinook salmon is composed of three major population groups (MPGs): the Wenatchee River population, the Entiat River population, and the Methow River population. These same populations currently spawn in only three river basins above Rock Island Dam: the Wenatchee, Entiat, and Methow Rivers. Several hatchery populations are also listed including those from the Chiwawa, Methow, Twisp, Chewuch, and White rivers, and Nason Creek (Table 9). Table 9 identifies populations within the UCR Chinook salmon ESU, their abundances, and hatchery input.

Table 9. UCR Chinook salmon - preliminary population structure, abundances, and hatchery contributions (Good, Waples et al. 2005).

Population	Historical Abundance	Most Recent Spawner Abundance	Hatchery Abundance Contributions
Methow River	~2,100	79-9,904	59%
Twisp River	Unknown	10-369	54%
Chewuch River	Unknown	6-1,105	41%
Lost/Early River	Unknown	3-164	54%
Entiat River	~380	53-444	42%
Wenatchee River	~2,400	119-4,446	42%
Chiwawa River	Unknown	34-1,046	47%
Nason Creek	Unknown	8-374	39%
Upper Wenatchee River	Unknown	0-215	66%
White River	Unknown	1-104	8%
Little Wenatchee River	Unknown	3-74	21%
Total	**~4,880 (min)**		

Life History

UCR spring Chinook salmon begin returning from the ocean in the early spring. They enter the upper Columbia tributaries from April through July, with the run into the Columbia River peaking in mid-May. After migration, UCR spring Chinook salmon hold in freshwater tributaries until spawning occurs in the late summer, peaking in mid- to late August. Juvenile spring Chinook salmon spend a year in freshwater before emigrating to salt water in the spring of their second year.

Status and Trends

UCR spring-run Chinook salmon were listed as endangered on March 24, 1999 (64 FR 14308). This listing was reaffirmed on June 28, 2005 (70 FR 37160) based on a reduction of UCR spring-run Chinook salmon to small populations in three watersheds. Based on redd count data series, spawning escapements for the Wenatchee, Entiat, and Methow rivers have declined an average of 5.6%, 4.8%, and 6.3% per year, respectively, since 1958.

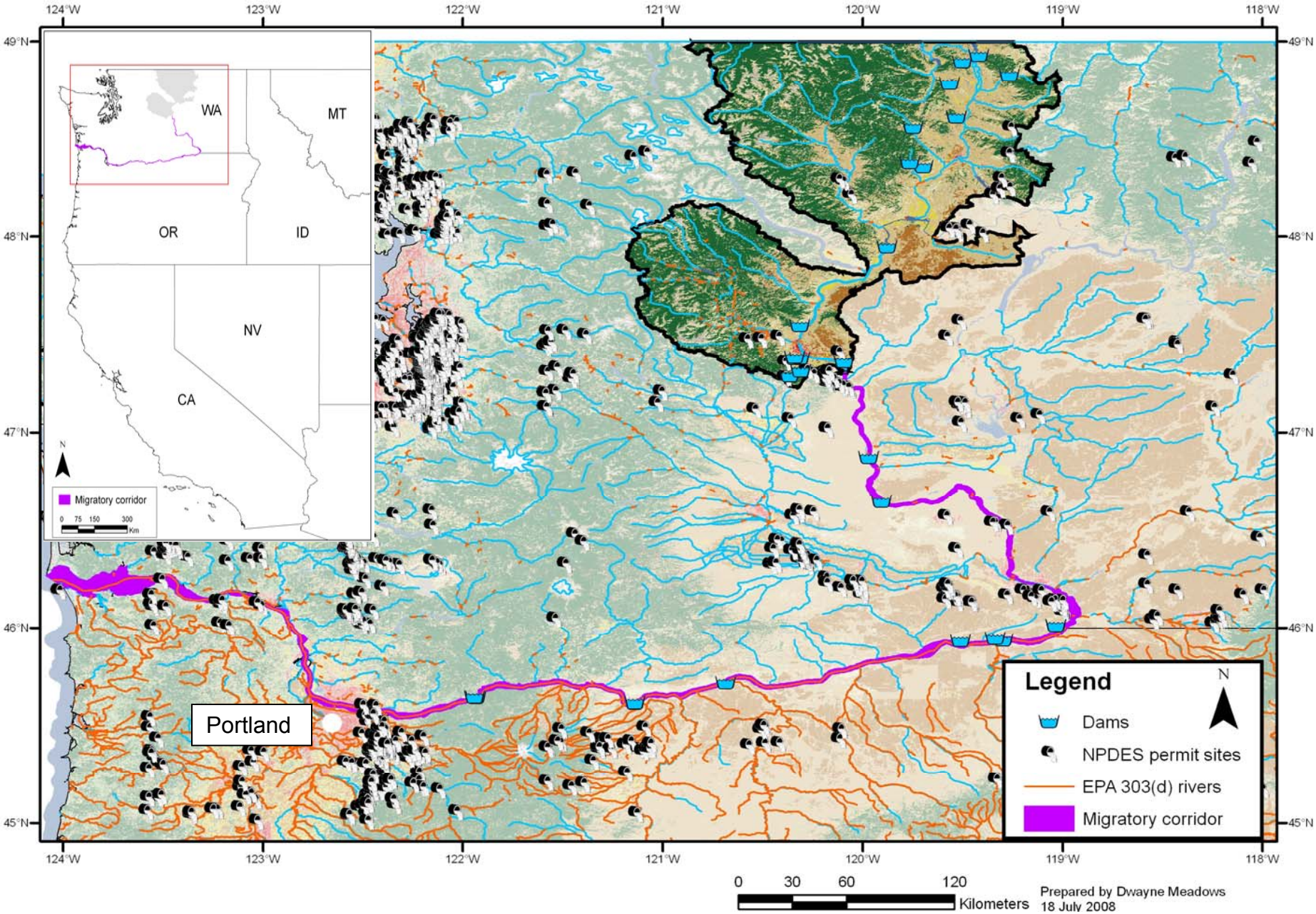

Figure 10. UCR Spring-run Chinook salmon distribution. Land Cover Class Legend in Figure 7.

In the most recent five-year geometric mean (1997 to 2001), spawning escapements were 273 for the Wenatchee population, 65 for the Entiat population, and 282 for the Methow population. These numbers represent only 8% to 15% of the minimum abundance thresholds. However, escapement increased substantially in 2000 and 2001 in all three river systems. Based on 1980-2004 returns, the average annual population growth rate, lambda, for this ESU is estimated at 0.93 (meaning the population is not replacing itself) (Fisher and Hinrichsen 2006). Assuming that population growth rates were to continue at 1980-2004 levels, UCR spring-run Chinook salmon populations are projected to have very high probabilities of decline within 50 years. Population viability analyses for this species suggest that these Chinook salmon face a significant risk of extinction: a 75 to 100% probability of extinction within 100 years (given return rates for 1980 to present). Finally, the Interior Columbia Basin Technical Recovery Team (ICBTRT) characterizes the diversity risk to all UCR spring Chinook populations as "high". The high risk is a result of reduced genetic diversity from homogenization of populations that occurred under the Grand Coulee Fish Maintenance Project in 1939-1943. Straying hatchery fish, and a low proportion of natural-origin fish in some broodstocks and a high proportion of hatchery fish on the spawning grounds have also contributed to the high genetic diversity risk.

Critical Habitat

Critical habitat was designated for this species on September 2, 2005 (70 FR 52630). Designated critical habitat includes all Columbia River estuarine areas and river reaches proceeding upstream to Chief Joseph Dam and several tributary subbasins. The critical habitat designation for this ESU also identifies PCEs that include sites necessary to support one or more Chinook salmon life stages. Specific sites include freshwater spawning sites, freshwater rearing sites, freshwater migration corridors, nearshore marine habitat, and estuarine areas. The physical or biological features that characterize these sites include water quality and quantity, natural cover, forage, adequate passage conditions, and floodplain connectivity. The UCR spring-run Chinook salmon ESU has 31 watersheds within its range. Five watersheds received a medium rating and 26

received a high rating of conservation value to the ESU. The Columbia River rearing/migration corridor downstream of the spawning range was rated as a high conservation value. Factors contributing to the downward trends in this ESU include: (1) Mainstem Columbia River hydropower system mortality, (2) tributary riparian degradation and loss of in-river wood, (3) altered tributary floodplain and channel morphology, (4) reduced tributary stream flow and impaired passage, (5) harvest impacts, and (6) degraded water quality.

Puget Sound Chinook Salmon

Distribution

The boundaries of the Puget Sound ESU correspond generally with the boundaries of the Puget Lowland Ecoregion (Figure 11). The Puget Lowland Ecoregion begins in Washington at approximately the Dungeness River near the eastern end of the Strait of Juan de Fuca and extends through Puget Sound to the British Columbia border and up to the Cascade foothills. The Puget Sound ESU includes all runs of Chinook salmon in the Puget Sound region from the North Fork Nooksack River to the Elwha River on the Olympic Peninsula. This ESU is comprised of 31 historical populations. Of these, 22 populations are believed to be extant. Thirty-six hatchery populations were included as part of the ESU and five were considered essential for recovery and listed. They include spring Chinook salmon from Kendall Creek, the North Fork Stillaguamish River, White River, and Dungeness River, and fall run fish from the Elwha River (Table 10). Table 10 identifies populations within the Puget Sound Chinook salmon ESU, their abundances, and hatchery input.

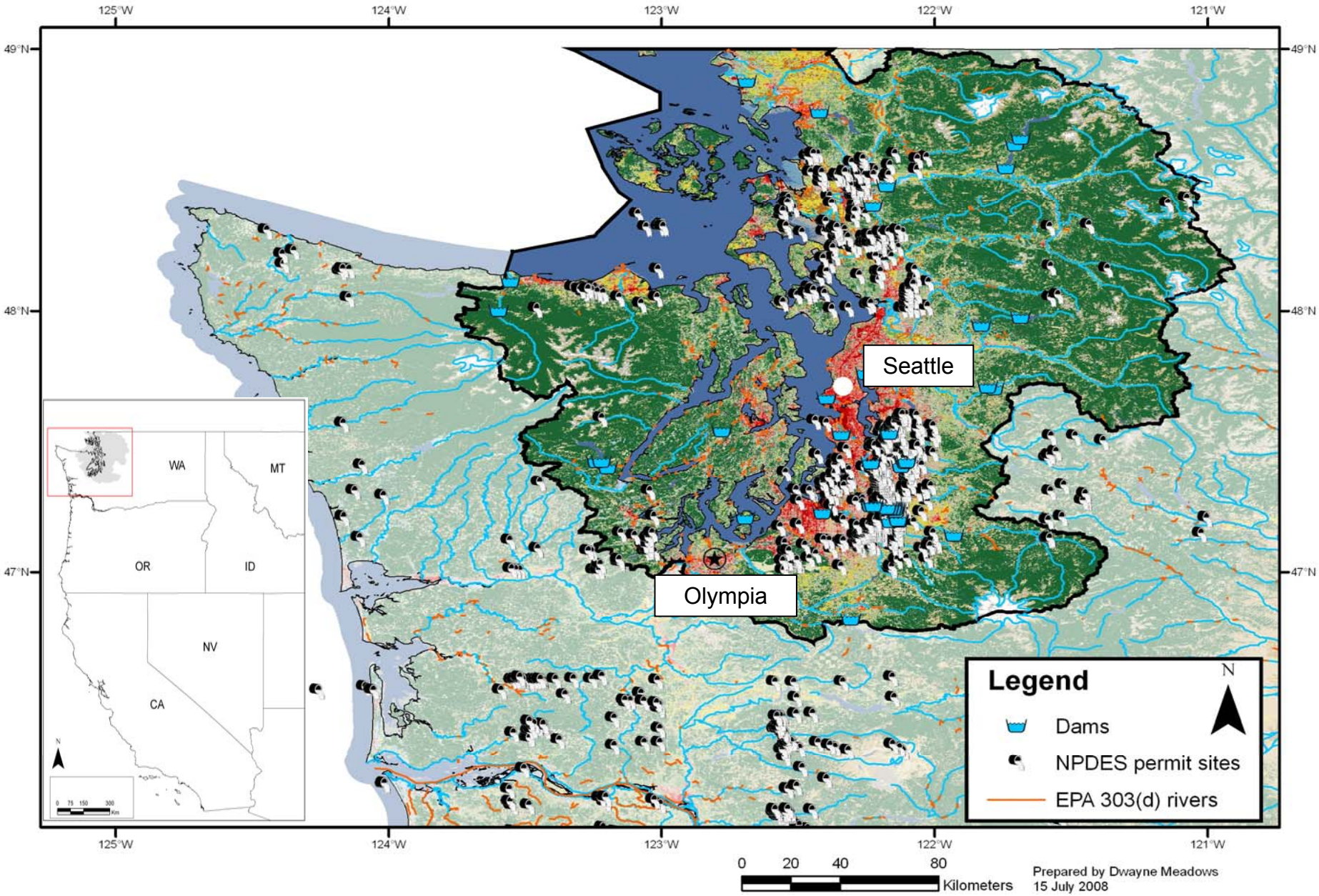

Figure 11. Puget Sound Chinook distribution. Land Cover Class Legend in Figure 7..

Table 10. Puget Sound Chinook salmon - preliminary population structure, abundances, and hatchery contributions (Good, Waples et al. 2005).

Population	Historical Abundance	Most Recent Spawner Abundance	Hatchery Abundance Contributions
Nooksack-North Fork	26,000	1,538	91%
Nooksack-South Fork	13,000	338	40%
Lower Skagit	22,000	2,527	0.2%
Upper Skagit	35,000	9,489	2%
Upper Cascade	1,700	274	0.3%
Lower Sauk	7,800	601	0%
Upper Sauk	4,200	324	0%
Suiattle	830	365	0%
Stillaguamish-North Fork	24,000	1,154	40%
Stillaguamish-South Fork	20,000	270	Unknown
Skykomish	51,000	4,262	40%
Snoqualmie	33,000	2,067	16%
North Lake Washington	Unknown	331	Unknown
Cedar	Unknown	327	Unknown
Green	Unknown	8,884	83%
White	Unknown	844	Unknown
Puyallup	33,000	1,653	Unknown
Nisqually	18,000	1,195	Unknown
Skokomish	Unknown	1,392	Unknown
Dosewallips	4,700	48	Unknown
Duckabush	Unknown	43	Unknown
Hamma Hamma	Unknown	196	Unknown
Mid Hood Canal	Unknown	311	Unknown
Dungeness	8,100	222	Unknown
Elwha	Unknown	688	Unknown
Total	**~690,000**	**39,343**	

Life History

Chinook salmon in this area generally have an "ocean-type" life history. Puget Sound populations exhibit both the early-returning and late-returning Chinook salmon spawners described by Healey (1997). However, within these two generalized behavioral forms, substantial variation occurs in juvenile behavior and residence time in fresh water and estuarine environments. Hayman et al. (1996) described three juvenile life histories for Chinook salmon with varying freshwater and estuarine residency times in the Skagit River system in northern Puget Sound. Chinook salmon use the nearshore area of Puget Sound during all seasons of the year and can be found long distances from their natal river systems (Brennan, Higgins et al. 2004).

Status and Trends

Puget Sound Chinook salmon were listed as threatened in 1999 (64 FR 14308). This status was re-affirmed on June 28, 2005 (70 FR 37160). This ESU has lost 15 spawning aggregations that were either demographically independent historical populations or major components of the life history diversity of the remaining 22 existing independent historical populations identified (Good, Waples et al. 2005). Nine of the 15 extinct spawning aggregations were early-run type Chinook salmon (Good, Waples et al. 2005). The disproportionate loss of early-run life history diversity represents a significant loss of the evolutionary legacy of the historical ESU.

The estimated total run size of Chinook salmon in Puget Sound in the early 1990s was 240,000 fish, representing a loss of nearly 450,000 fish from historic numbers. During a recent five-year period, the geometric mean of natural spawners in populations of Puget Sound Chinook salmon ranged from 222 to just over 9,489 fish. Most populations had natural spawners numbering in the hundreds (median recent natural escapement is 766). Of the six populations with greater than 1,000 natural spawners, only two have a low fraction of hatchery fish. Estimates of the historical equilibrium abundance, based on pre-European settlement habitat conditions, range from 1,700 to 51,000 potential Puget Sound Chinook salmon spawners per population. The historical estimates of spawner capacity are several orders of magnitude higher than spawner abundances currently observed throughout the ESU (Good, Waples et al. 2005).

Long-term trends in abundance and median population growth rates for naturally spawning populations of Puget Sound Chinook salmon indicate that approximately half of the populations are declining and the other half are increasing in abundance over the length of available time series. Eight of 22 populations are declining over the short-term, compared to 11 or 12 populations that have long-term declines (Good, Waples et al. 2005). Widespread declines and extirpations of spring- and summer-run Puget Sound Chinook salmon populations represent a significant reduction in the life history diversity of this ESU (Meyers, Kope et al. 1998). The median overall populations of long-term trend in abundance is 1, indicating that most populations are just replacing themselves.

Populations with the greatest long-term population growth rate are the North Fork Nooksack and White rivers.

Regarding spatial structure, the populations (22) presumed to be extinct are mostly early returning fish. Most of these are in the mid- to southern Puget Sound or Hood Canal and the Strait of Juan de Fuca. The ESU populations with the greatest estimated fractions of hatchery fish tend to be in the mid-to southern Puget Sound, Hood Canal, and the Strait of Juan de Fuca. Finally, all but one of the nine extinct Chinook salmon stocks is an early run population (or component of a population).

Critical Habitat

Critical habitat was designated for this species on September 2, 2005 (70 FR 52630). The critical habitat designation for this ESU identifies PCEs that include sites necessary to support one or more Chinook salmon life stages. Specific sites include freshwater spawning sites, freshwater rearing sites, freshwater migration corridors, nearshore marine habitat, and estuarine areas. The physical or biological features that characterize these sites include water quality and quantity, natural cover, forage, adequate passage conditions, and floodplain connectivity.

Of 49 subbasins (5th field Hydrological Units) reviewed in NMFS' assessment of critical habitat for the Puget Sound ESUs, nine subbasins were rated as having a medium conservation value, 12 were rated as low, and the remaining subbasins (40), where the bulk of Federal lands occur in this ESU, were rated as having a high conservation value to Puget Sound Chinook salmon. Factors contributing to the downward trends in this ESU are hydromorphological changes (such as diking, revetments, loss of secondary channels in floodplains, widespread blockages of streams, and changes in peak flows), degraded freshwater and marine habitat affected by agricultural activities and urbanization, and upper river tributaries widely affected by poor forest practices, and lower tributaries. Hydroelectric development and flood control also impact Puget Sound Chinook salmon in several basins. Changes in habitat quantity, availability, diversity,

flow, temperature, sediment load, water quality, and channel stability are common limiting factors in areas of critical habitat.

Sacramento River Winter-Run Chinook Salmon

Distribution

Sacramento River winter-run Chinook salmon consists of a single spawning population that enters the Sacramento River and its tributaries in California from November to June and spawns from late April to mid-August, with a peak from May to June (Figure 12). Sacramento River winter Chinook salmon historically occupied cold, headwater streams, such as the upper reaches of the Little Sacramento, McCloud, and lower Pit Rivers.

Life History

Winter-run fish spawn mainly in May and June in the upper mainstem of the Sacramento River. Winter-run fish have characteristics of both stream- and ocean-type races. They enter the river and migrate far upstream. Spawning is delayed for some time after river entry. Young winter-run Chinook salmon, however migrate to sea in November and December, after only four to seven months of river life (Burgner 1991).

Status and Trends

Sacramento River winter-run Chinook salmon were listed as endangered on January 4, 1994 (59 FR 440), and were reaffirmed as endangered on June 28, 2005 (70 FR 37160). This was based on restricted access from dams to a small fraction of salmon historic spawning habitat and the degraded conditions of remaining habitat. Sacramento River winter-run Chinook salmon consist of a single self-sustaining population which is entirely dependent upon the provision of suitably cool water from Shasta Reservoir during periods of spawning, incubation, and rearing.

Construction of Shasta Dams in the 1940s eliminated access to historic spawning habitat for winter-run Chinook salmon in the basin. Winter-run Chinook salmon were not expected to survive this habitat alteration (Moffett 1949). However, cold water releases from Shasta Dam have created conditions suitable for winter Chinook salmon for roughly

60 miles downstream from the dam. As a result the ESU has been reduced to a single spawning population confined to the mainstem Sacramento River below Keswick Dam. Some adult winter-run Chinook salmon were recently observed in Battle Creek, a tributary to the upper Sacramento River.

Quantitative estimates of run-size are not available for the period before 1996, the completion of Red Bluff Diversion Dam. However, winter-runs may have been as large as 200,000 fish based upon commercial fishery records from the 1870s (Brown, Moyle et al. 1994).

The CDFG estimated spawning escapement of Sacramento River winter-run Chinook salmon at 61,300 (60,000 mainstem, 1,000 Battle Creek, and 300 in Mill Creek) in the early 1960s. During the first three years of operation of the county facility at the Red Bluff Diversion Dam (1967 to 1969), the spawning run of winter-run Chinook salmon averaged 86,500 fish. From 1967 through the mid-1990s, the population declined at an average rate of 18% per year, or roughly 50% per generation. The population reached critically low levels during the drought of 1987 to 1992. The three-year average run size for the period of 1989 to 1991 was 388 fish.

Based on the Red Bluff Diversion Dam counts, the population has been growing rapidly since the 1990s. Mean run size from 1995-2000 has been 2,191, but have ranged from 364 to 65,683 (Good, Waples et al. 2005). Most recent estimates indicate that the short-term trend is 0.26, and the population growth rate is less than one.

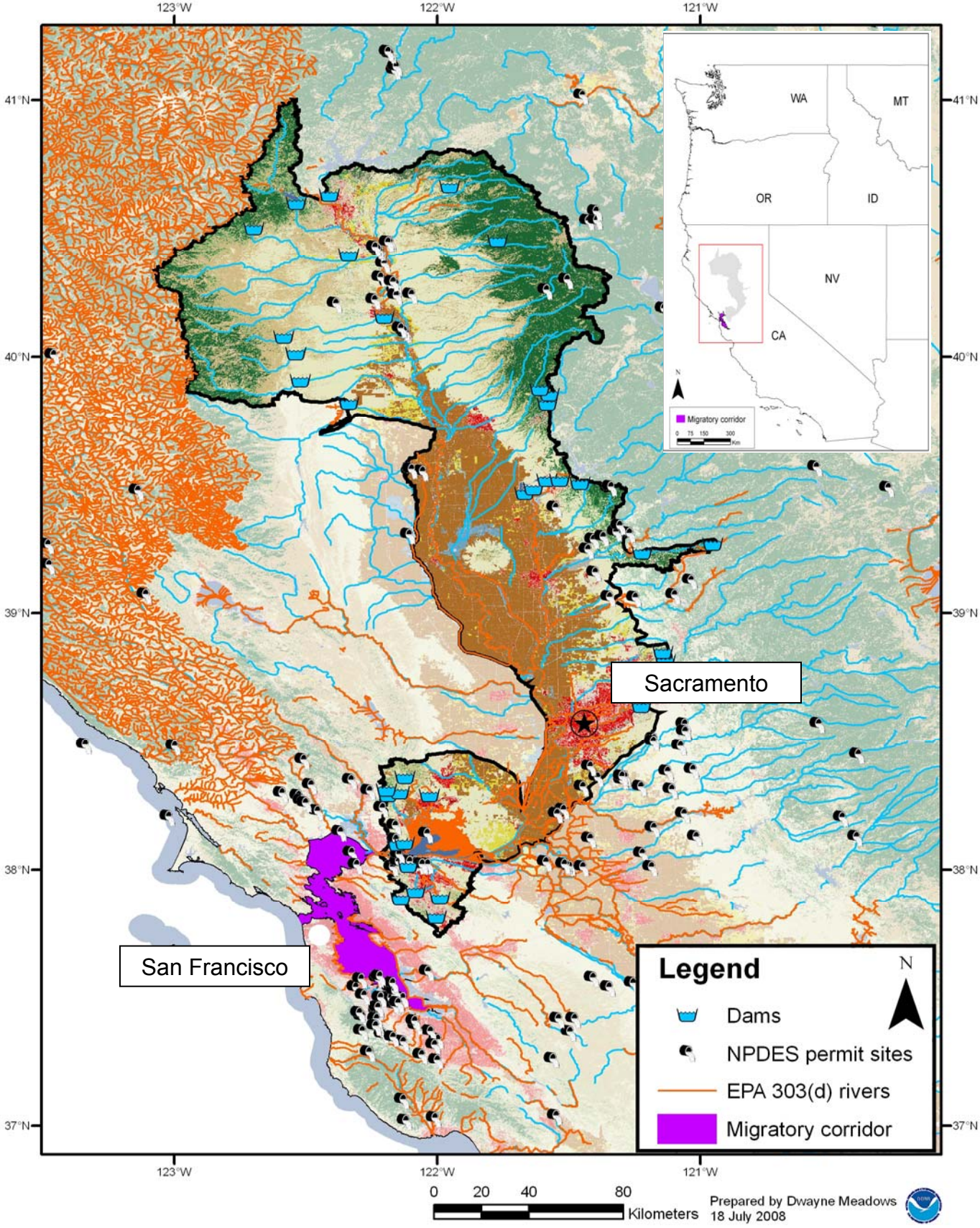

Figure 12. Sacramento River Winter-run Chinook salmon distribution. Land Cover Class Legend in Figure 7.

Critical Habitat

Critical habitat was designated for this species on June 16, 1993 (58 FR 33212). The following areas consist of the water, waterway bottom, and adjacent riparian zones: the Sacramento River from Keswick Dam, Shasta County (river mile 302) to Chipps Island (river mile 0) at the westward margin of the Sacramento-San Joaquin Delta, and other specified estuarine waters. Factors contributing to the downward trends in this ESU include: (1) Reduced access to spawning/rearing habitat, (2) possible loss of genetic integrity through population bottlenecks, (3) inadequately screened diversions, (4) predation at artificial structures and by nonnative species, (5) pollution from Iron Mountain Mine and other sources, (6) adverse flow conditions, (7) high summer water temperatures, (8) degraded water quality, (9) unsustainable harvest rates, (10) passage problems at various structures, and (11) vulnerability to drought (Good, Waples et al. 2005).

Snake River Fall-Run Chinook Salmon

Distribution

Historically, the primary fall-run Chinook salmon spawning areas occurred on the upper mainstem Snake River (SR) (Connor, Sneva et al. 2005). A series of SR mainstem dams blocks access to the upper SR, which significantly reduced spawning and rearing habitat for SR fall-run Chinook salmon (Figure 13).

The present range of spawning and rearing habitat for naturally-spawned SR fall-run Chinook salmon is limited to the SR below Hells Canyon Dam and the lower reaches of the Clearwater River. SR fall-run Chinook salmon spawn above Lower Granite Dam in the mainstem SR and in the lower reaches of the larger tributaries.

As a consequence of lost access to historic spawning and rearing sites in the Upper SR, fall-run Chinook salmon now reside in waters that are generally cooler than the majority

of historic spawning areas. Additionally, alteration of the Lower SR by hydroelectric dams has created a series of low-velocity pools in the SR that did not exist historically.

Life History

Prior to alteration of the SR basin by dams, fall Chinook salmon exhibited a largely ocean-type life history, where they migrated downstream and reared in the mainstem SR during their first year. Today, fall Chinook salmon in the SR Basin exhibit one of two life histories: ocean-type and reservoir-type (Connor, Sneva et al. 2005). The reservoir-type life history is one where juveniles overwinter in the pools created by the dams, prior to migrating out of the SR. The reservoir-type life history is likely a response to early development in cooler temperatures which prevents juveniles from reaching suitable size to migrate out of the SR.

Adult SR fall-run Chinook salmon enter the Columbia River in July and August. Spawning occurs from October through November. Juveniles emerge from gravels in March and April of the following year, moving downstream from natal spawning and early rearing areas from June through early fall.

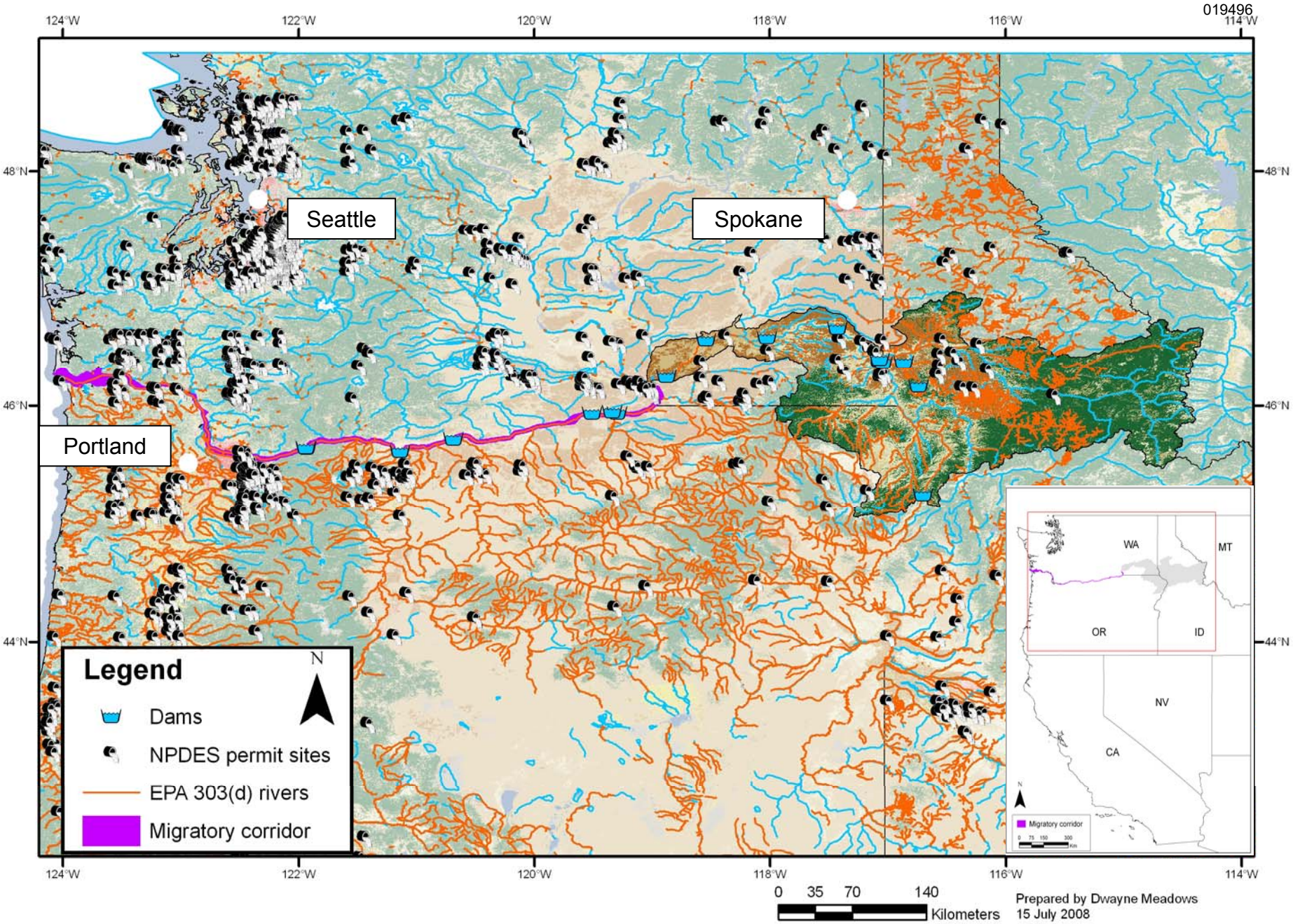

Figure 13. SR fall-run Chinook salmon distribution. Land Cover Class Legend in Figure 7..

Status and Trends

SR fall-run Chinook salmon were originally listed as threatened in 1992 (57 FR 14653). Their classification was reaffirmed following a status review on June 28, 2005 (70 FR 37160). Estimated annual returns for the period 1938 to 1949 was 72,000 fish. By the 1950s, numbers had declined to an annual average of 29,000 fish (Bjornn and Horner 1980). Numbers of SR fall-run Chinook salmon continued to decline during the 1960s and 1970s as approximately 80% of their historic habitat was eliminated or severely degraded by the construction of the Hells Canyon complex (1958 to 1967) and the lower SR dams (1961 to 1975). Counts of natural-origin adult SR fall-run Chinook salmon at Lower Granite Dam were 1,000 fish in 1975, and ranged from 78 to 905 fish (with an average of 489 fish) over the ensuing 25-year period (Good, Waples et al. 2005). Numbers of natural-origin SR fall-run Chinook salmon have increased over the last few years, with estimates at Lower Granite Dam of 2,652 fish in 2001, 2,095 fish in 2002, and 3,895 fish in 2003.

SR fall-run Chinook salmon have exhibited an upward trend in returns over Lower Granite Dam since the mid-1990s. Returns classified as natural-origin exceeded 2,600 fish in 2001, compared to a 1997-2001 geometric mean natural-origin count of 871. Long- and short-term trends in natural returns are positive. Harvest impacts on SR fall-run Chinook salmon declined after listing and have remained relatively constant in recent years. There have been major reductions in fisheries impacting this stock. Mainstem conditions for subyearling Chinook salmon migrants from the SR have generally improved since the early 1990s. The hatchery component, derived from outside the basin, has decreased as a percentage of the run at Lower Granite Dam from the 1998/99 status reviews (five year average of 26.2%) to 2001 (8%). This reflects an increase in the Lyons Ferry component, systematic removal of marked hatchery fish at the Lower Granite trap, and modifications to the Umatilla supplementation program to increase homing of fall Chinook release groups.

Overall abundance for SR fall-run Chinook salmon is relatively low, but has been increasing in the last decade (Good, Waples et al. 2005). The 1997 to 2001 geometric mean natural-origin count over Lower Granite Dam approximate 35% of the proposed delisting abundance criteria of 2,500 natural spawners averaged over 8 years. The recent abundance is approaching the delisting criteria. However, hatchery fish are faring better than wild fish.

Regarding productivity [population growth rate (lambda)], the long-term trend in total returns is >1; indicating the population size is growing. Although total abundance has dropped sharply in the past two years, it still remains at levels higher than previous decades. Productivity is likely sustained largely by a system of small artificial rearing facilities in the Lower SR Basin. The growth trend for natural-origin fish is close to 1, and could either be higher or lower, depending on the number of hatchery fish that spawn naturally.

The historic spatial structure has been reduced to one single remnant population. The ESU occupies a relatively small amount of marginal habitat, with the vast majority of historic habitat inaccessible. Genetic diversity is likely reduced from historic levels. Hatcheries affect ESU genetics due to three major components: natural-origin fish (which may be progeny of hatchery fish), returns of SR fall-run fish from the Lyons Ferry Hatchery program, and strays from hatchery programs outside the SR. Nevertheless, the SR fall-run Chinook salmon remains genetically distinct from similar fish in other basins. Phenotypic characteristics have shifted in apparent response to environmental changes from hydroelectric dams (Connor, Sneva et al. 2005).

The ICBTRT has defined only one extant population for the SR fall-run Chinook salmon, the lower SR mainstem population. This population occupies the SR from its confluence with the Columbia River to Hells Canyon Dam, and the lower reaches of the Clearwater, Imnaha, Grande Rhonde, Salmon, and Tucannonh Rivers (ICBTRT 2003).

Critical Habitat

Critical habitat for these salmon was designated on December 28, 1993 (58 FR 68543). This critical habitat encompasses the waters, waterway bottoms, and adjacent riparian zones of specified lakes and river reaches in the Columbia River that are or were accessible to listed SR fall-run salmon (except reaches above impassable natural falls, and Dworshak and Hells Canyon Dams). Adjacent riparian zones are defined as those areas within a horizontal distance of 300 ft from the normal line of high water of a stream channel or from the shoreline of a standing body of water. Designated critical habitat includes the Columbia River from a straight line connecting the west end of the Clatsop jetty (Oregon side) and the west end of the Peacock jetty (Washington side), all river reaches from the estuary upstream to the confluence of the SR, and all SR reaches upstream to Hells Canyon Dam. Critical habitat also includes several river reaches presently or historically accessible to SR fall-run Chinook salmon. Limiting factors identified for SR fall-run Chinook salmon include: (1) Mainstem lower Snake and Columbia hydrosystem mortality, (2) degraded water quality, (3) reduced spawning and rearing habitat due to mainstem lower SR hydropower system, (4) harvest impacts, (5) impaired stream flows, barriers to fish passage in tributaries, excessive sediment, and (6) altered floodplain and channel morphology (NMFS 2005). The above activities and features also introduce sediment, nutrients, biocides, metals, and other pollutants into surface and ground water and degrade water quality in the freshwater, estuarine, and coastal ecosystems throughout the Pacific Northwest.

Snake River Spring/Summer-Run Chinook Salmon

Distribution

SR spring/summer-run Chinook salmon are primarily limited to the Salmon, Grande Ronde, Imnaha, and Tucannon Rivers in the SR basin (Figure 14). The SR basin drains portions of southeastern Washington, northeastern Oregon, and north/central Idaho. Environmental conditions are generally drier and warmer in these areas than in areas occupied by other Chinook salmon species. The ICBTRT has identified 32 populations in five MPGs (Upper Salmon River, South Fork Salmon River, Middle Fork , Salmon

River, Grande Ronde/Imnaha, Lower Snake Mainstem Tributaries) for this species. Historic populations above Hells Canyon Dam are considered extinct (ICBTRT 2003). This ESU includes production areas that are characterized by spring-timed returns, summer-timed returns, and combinations from the two adult timing patterns. Historically, the Salmon River system may have supported more than 40% of the total run of spring and summer Chinook salmon to the Columbia system (Fulton 1968).

Some or all of the fish returning to several of the hatchery programs are also listed, including those returning to the Tucannon River, Imnaha River, and Grande Ronde River hatcheries, and to the Sawtooth, Pahsimeroi, and McCall hatcheries on the Salmon River. The Salmon River system contains a range of habitats used by spring/summer Chinook. The South Fork and Middle Fork Salmon Rivers currently support the bulk of natural production in the drainage. Returns into the upper Salmon River tributaries have reestablished following the opening of passage around Sunbeam Dam on the mainstem Salmon River downstream of Stanley, Idaho. The dam was impassable to anadromous fish from 1910 until the 1930s. Table 11 identifies populations within the SR spring/summer Chinook salmon ESU, their abundances, and hatchery input.

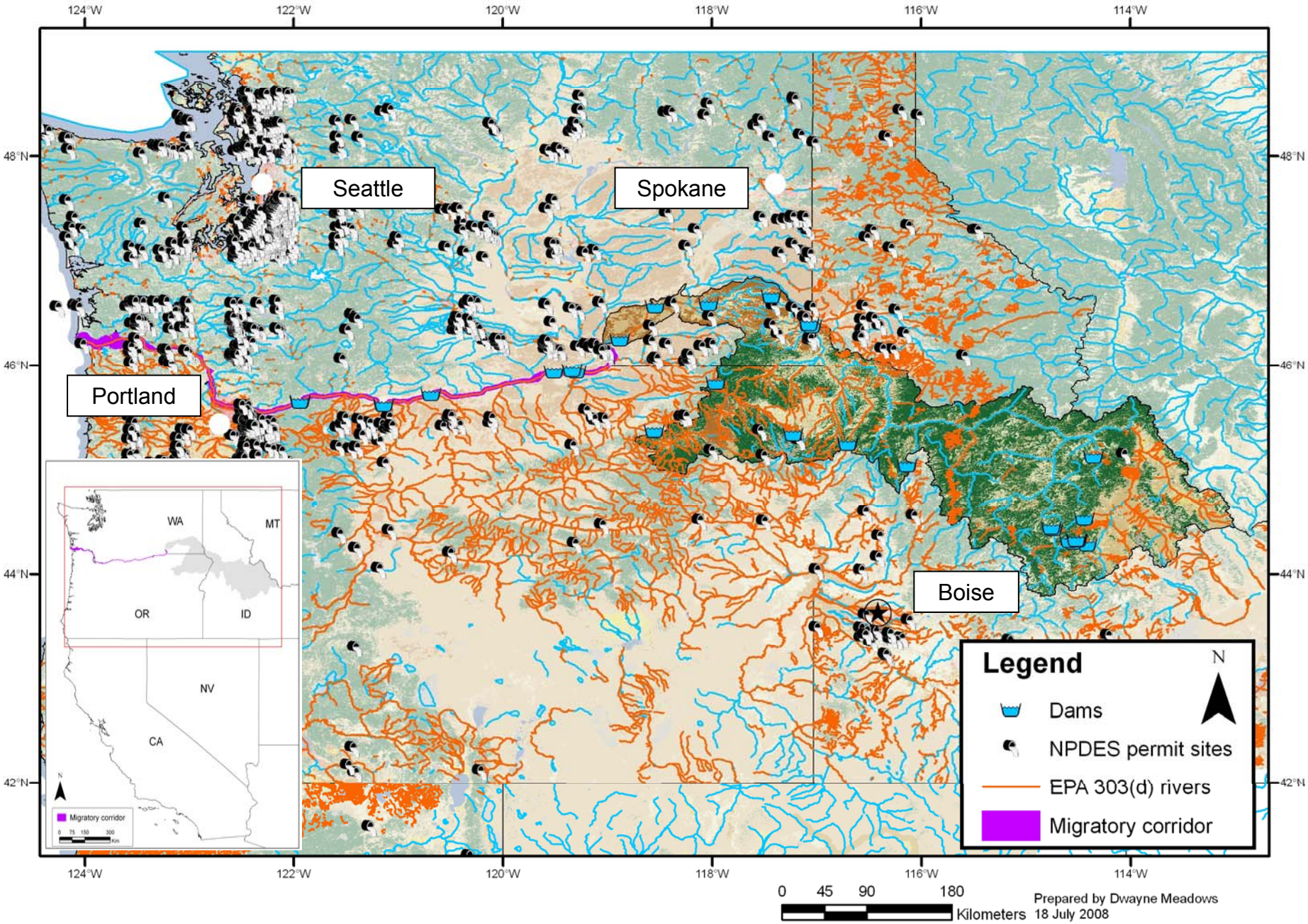

Figure 14. SR Spring/Summer-run Chinook salmon distribution. Land Cover Class Legend in Figure 7.

Table 11. SR Spring/Summer Chinook salmon populations, abundances, and hatchery contributions (Good, Waples et al. 2005). Note: rpm denotes redds per mile.

Current Populations	Historical Abundance	Most Recent Spawner Abundance	Hatchery Abundance Contributions
Tucannon River	Unknown	128-1,012	76%
Wenaha River	Unknown	67-586	64%
Wallowa River	Unknown	0-29 redds	5%
Lostine River	Unknown	9-131 redds	5%
Minam River	Unknown	96-573	5%
Catherine Creek	Unknown	13-262	56%
Upper Grande Ronde River	Unknown	3-336	58%
South Fork Salmon River	Unknown	277-679 redds	9%
Secesh River	Unknown	38-444 redds	4%
Johnson Creek	Unknown	49-444 redds	0%
Big Creek spring run	Unknown	21-296	0%
Big Creek summer run	Unknown	2-58 redds	Unknown
Loon Creek	Unknown	6-255 redds	0%
Marsh Creek	Unknown	0-164	0%
Bear Valley/Elk Creek	Unknown	72-712	0%
North Fork Salmon River	Unknown	2-19 redds	Unknown
Lemhi River	Unknown	35-216 redds	0%
Pahsimeroi River	Unknown	72-1,097	Unknown
East Fork Salmon spring run	Unknown	0.27 rpm	Unknown
East Fork Salmon summer run	Unknown	1.22 rpm	0%
Yankee Fork spring run	Unknown	0	Unknown
Yankee Fork summer run	Unknown	1-18 redds	0%
Valley Creek spring run	Unknown	2-28 redds	0%
Valley Creek summer run	Unknown	2.14 rpm	Unknown
Upper Salmon spring run	Unknown	25-357 redds	Unknown
Upper Salmon summer run	Unknown	0.24 rpm	Unknown
Alturas Lake Creek	Unknown	0-18 redds	Unknown
Imnaha River	Unknown	194-3,041 redds	62%
Big Sheep Creek	Unknown	0.25 redds	97%
Lick Creek	Unknown	0-29 redds	59%
Total	**~1.5 million**	**~9,700**	

Life History

SR spring/summer-run Chinook salmon exhibit a stream-type life history. Eggs are deposited in late summer and early fall, incubate over the following winter, and hatch in late winter and early spring of the following year. Juvenile fish mature in fresh water for one year before they migrate to the ocean in the spring of their second year of life. Depending on the tributary and the specific habitat conditions, juveniles may migrate extensively from natal reaches into alternative summer-rearing or overwintering areas. SR spring/summer-run Chinook salmon return from the ocean to spawn primarily as four

and five-year old fish, after two to three years in the ocean. A small fraction of the fish return as three year-old "jacks", heavily predominated by males.

Status and Trends

SR spring/summer-run Chinook salmon were originally listed as threatened on April 22, 1992 (57 FR 14653). Their classification was reaffirmed following a review on June 28, 2005 (70 FR 37160). Although direct estimates of historical annual SR spring/summer Chinook salmon returns are not available, returns may have declined by as much as 97% between the late 1800s and 2000. According to Matthews and Waples (1997), total annual SR spring/summer Chinook salmon production may have exceeded 1.5 million adult fish in the late 1800s. Total (natural plus hatchery origin) returns fell to roughly 100,000 spawners by the late 1960s (Fulton 1968) and were below 10,000 by 1980. Between 1981 and 2000, total returns fluctuated between extremes of 1,800 and 44,000 fish. The 2001 and 2002 total returns increased to over 185,000 and 97,184 adults, respectively. The 1997 to 2001 geometric mean total return for the summer run component at Lower Granite Dam was slightly more than 6,000 fish, compared to the geometric mean of 3,076 fish for the years 1987 to 1996. The 2002 to 2006 geometric mean of the combined Chinook salmon runs at Lower Granite Dam was over 18,000 fish. However, over 80% of the 2001 return and over 60% of the 2002 return originated in hatcheries (Good, Waples et al. 2005). Good et al. (2005) reported that risks to individual populations within the ESU may be greater than the extinction risk for the entire ESU due to low levels of annual abundance and the extensive production areas within the SR basin. Year-to-year abundance has high variability and is most pronounced in natural-origin fish. Although the average abundance in the most recent decade is more abundant than the previous decade, there is no obvious long-term trend. Additionally, hatchery fish are faring better than wild fish, which comprise roughly 40% of the total returns in the past decade. Overall, most populations are far below their respective interim recovery targets.

Regarding population growth rate (lambda), long-term trends are <1; indicating the population size is shrinking. However, recent trends, buoyed by last 5 years, are

approaching 1. Nevertheless, many spawning aggregates have been extirpated, which has increased the spatial separation of some populations. Populations are widely distributed in a diversity of habitats although roughly one-half of historic habitats are inaccessible. There is no evidence of wide-scale genetic introgression by hatchery populations. The high variability in life history traits indicates sufficient genetic variability within the DPS to maintain distinct subpopulations adapted to local environments. Despite the recent increases in total spring/summer-run Chinook salmon returns to the basin, natural-origin abundance and productivity remain below their targets. SR spring/summer Chinook salmon remains likely to become endangered (Good, Waples et al. 2005).

Critical Habitat

Critical habitat for these salmon was designated on October 25, 1999 (64 FR 57399). This critical habitat encompasses the waters, waterway bottoms, and adjacent riparian zones of specified lakes and river reaches in the Columbia River that are or were accessible to listed SR salmon (except reaches above impassable natural falls, and Dworshak and Hells Canyon Dams). Adjacent riparian zones are defined as those areas within a horizontal distance of 300 ft from the normal line of high water of a stream channel or from the shoreline of a standing body of water. Designated critical habitat includes the Columbia River from a straight line connecting the west end of the Clatsop jetty (Oregon side) and the west end of the Peacock jetty (Washington side). Critical habitat also includes all river reaches from the estuary upstream to the confluence of the SR, and all SR reaches upstream to Hells Canyon Dam; the Palouse River from its confluence with the SR upstream to Palouse Falls, the Clearwater River from its confluence with the SR upstream to its confluence with Lolo Creek; the North Fork Clearwater River from its confluence with the Clearwater river upstream to Dworshak Dam.

Limiting factors identified for this species include: (1) Hydrosystem mortality, (2) reduced stream flow, (3) altered channel morphology and floodplain, (4) excessive fine sediment, and (5) degraded water quality (Myers, Kope et al. 1998). The above activities and features also introduce sediment, nutrients, biocides, metals, and other pollutants into

surface and ground water and degrade water quality in the freshwater, estuarine, and coastal ecosystems throughout the Pacific Northwest.

Upper Willamette River Chinook Salmon

Distribution

Upper Willamette River (UWR) Chinook salmon occupy the Willamette River and tributaries upstream of Willamette Falls (Figure 15). In the past, this ESU included sizable numbers of spawning salmon in the Santiam River, the middle fork of the Willamette River, and the McKenzie River, as well as smaller numbers in the Molalla River, Calapooia River, and Albiqua Creek. Historically, access above Willamette Falls was restricted to the spring when flows were high. In autumn, low flows prevented fish from ascending past the falls. The UWR Chinook salmon are one of the most genetically distinct Chinook salmon groups in the Columbia River Basin. Fall-run Chinook salmon spawn in the Upper Willamette but are not considered part of the species because they are not native. None of the hatchery populations in the Willamette River were listed although five spring-run hatchery stocks were included in the species' listing. UWR Chinook salmon migrate far north and are caught incidentally in ocean fisheries, particularly off southeast Alaska and northern Canada, and in spring season fisheries in the mainstem Columbia and Willamette Rivers. Table 12 identifies populations within the UWR Chinook salmon ESU, their abundances, and hatchery input

Table 12. UWR Chinook salmon populations, abundances, and hatchery contributions (Good, Waples et al. 2005). Note: rpm denotes redds per mile

Current Populations	Historical Abundance	Most Recent Spawner Abundance	Hatchery Abundance Contributions
Clackamas River	Unknown	2,910	64%
Molalla River	Unknown	52 redds	>93%
North Santiam River	Unknown	~ 7.1 rpm	>95%
South Santiam River	Unknown	982 redds	>84%
Calapooia River	Unknown	16 redds	100%
McKenzie River	Unknown	~2,470	26%
Middle Fork Willamette River	Unknown	235 redds	>39%
Upper Fork Willamette River	Unknown	Unknown	Unknown
Total	**>70,000**	**~9,700**	Mostly hatchery

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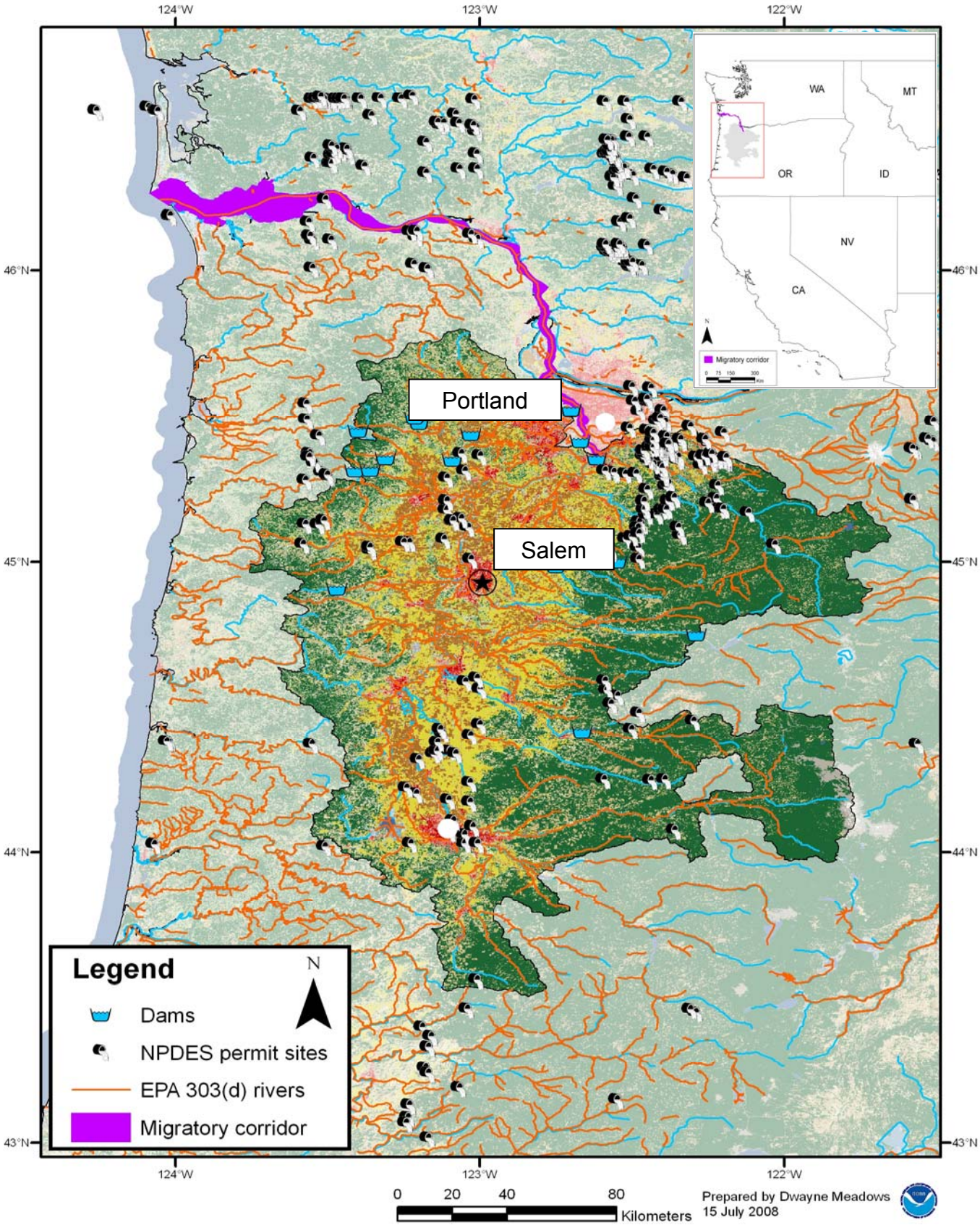

Figure 15. UWR Chinook salmon distribution. Land Cover Class Legend in Figure 7.

Life History

UWR Chinook salmon exhibit an earlier time of entry into the Columbia River and estuary than other spring Chinook salmon ESUs (Meyers, Kope et al. 1998). Although juveniles from interior spring Chinook salmon populations reach the mainstem migration corridor as yearling, some juvenile Chinook salmon in the lower Willamette River are subyearlings (Friesen, Vile et al. 2004).

Status and Trends

UWR Chinook salmon were listed as threatened on March 24, 1999 (64 FR 14308), and reaffirmed as threatened on June 28, 2005 (70 FR 37160). The total abundance of adult spring-run Chinook salmon (hatchery-origin + natural-origin fish) passing Willamette Falls has remained relatively steady over the past 50 years (ranging from approximately 20,000 to 70,000 fish). However, it is an order of magnitude below the peak abundance levels observed in the 1920s (approximately 300,000 adults). Until recent years, interpretation of abundance levels has been confounded by a high but uncertain fraction of hatchery-produced fish.

Most natural spring Chinook salmon populations is likely extirpated or nearly so. Only one remaining naturally reproducing population is identified in this ESU: the spring Chinook salmon in the McKenzie River. Unfortunately, recent short-term declines in abundance suggest that this population may not be self-sustaining (Meyers, Kope et al. 1998; Good, Waples et al. 2005). Most of the natural-origin populations in this ESU have very low current abundances (less than a few hundred fish) and many largely have been replaced by hatchery production. Long- and short-term trends for population growth rate are approximately 1 or are negative, depending on the metric examined (*i.e.*, long-term trend [regression of log-transformed spawner abundance] or lambda [median population growth rate]). Although the population increased substantially in 2000-2003, it was probably due to increased survival in the ocean. Future survival rates in the ocean are unpredictable, and the likelihood of long-term sustainability for this population has

not been determined. Although the number of adult spring-run Chinook salmon crossing Willamette Falls is in the same range (about 20,000 to 70,000 adults) it has been for the last 50 years, a large fraction of these are hatchery produced. Of concern is that a majority of the spawning habitat and approximately 30 to 40% of total historical habitat are no longer accessible because of dams (Good, Waples et al. 2005).

Critical Habitat

Critical habitat was designated for this species on September 2, 2005 (70 FR 52630). Designated critical habitat includes all Columbia River estuarine areas and river reaches proceeding upstream to the confluence with the Willamette River as well as specific stream reaches in a number of subbasins. The critical habitat designation for this ESU also identifies PCEs that include sites necessary to support one or more Chinook salmon life stages. Specific sites include freshwater spawning and rearing sites, freshwater migration corridors. The physical or biological features that characterize these sites include water quality and quantity, natural cover, forage, adequate passage conditions, and floodplain connectivity. Of 65 subbasins reviewed in NMFS' assessment of critical habitat for the UWR Chinook salmon ESU, 19 subbasins were rated as having a medium conservation value, 19 were rated as low, and the remaining subbasins (27), were rated as having a high conservation value to UWR Chinook salmon. Federal lands were generally rated as having high conservation value to the species' spawning and rearing. Factors contributing to the downward trends in this ESU include: (1) Reduced access to spawning/rearing habitat in tributaries, (2) hatchery impacts, (3) altered water quality and temperature in tributaries, (4) altered stream flow in tributaries, and (5) lost/degraded floodplain connectivity and lowland stream habitat.

Chum Salmon

Description of the Species

Chum salmon has the widest natural geographic and spawning distribution of any Pacific salmonid because its range extends farther along the shores of the Arctic Ocean than other salmonids. Chum salmon have been documented to spawn from Korea and the Japanese island of Honshu, east around the rim of the North Pacific Ocean to Monterey

Bay, California. Historically, chum salmon were distributed throughout the coastal regions of western Canada and the U.S. Presently, major spawning populations are found only as far south as Tillamook Bay on the northern Oregon coast. We discuss the distribution, life history diversity, status, and critical habitat of the two species of threatened chum salmon separately.

Chum salmon are semelparous, spawn primarily in freshwater, and exhibit obligatory anadromy (there are no recorded landlocked or naturalized freshwater populations). Chum salmon spend two to five years in feeding areas in the northeast Pacific Ocean, which is a greater proportion of their life history than other Pacific salmonids. Chum salmon distribute throughout the North Pacific Ocean and Bering Sea. North American chum salmon (as opposed to chum salmon originating in Asia) rarely occur west of 175° E longitude.

North American chum salmon migrate north along the coast in a narrow coastal band that broadens in southeastern Alaska. However, some data suggest that Puget Sound chum, including Hood Canal summer run chum, may not make extended migrations into northern British Columbian and Alaskan waters. Instead, they may travel directly offshore into the north Pacific Ocean.

Chum salmon, like pink salmon, usually spawn in the lower reaches of rivers, with redds usually dug in the mainstem or in side channels of rivers from just above tidal influence to nearly 100 km from the sea. Juveniles outmigrate to seawater almost immediately after emerging from the gravel that covers their redds (Salo 1991). The immature salmon distribute themselves widely over the North Pacific Ocean. The maturing adults return to the home streams at various ages, usually at two through five years, and at some cases up to seven years (Bigler 1985). This ocean-type migratory behavior contrasts with the stream-type behavior of some other species in the genus *Oncorhynchus* (*e.g.*, coastal cutthroat trout, steelhead, coho salmon, and most types of Chinook and sockeye salmon), which usually migrate to sea at a larger size, after months or years of freshwater rearing. This means that survival and growth in juvenile chum salmon depend less on freshwater

conditions (unlike stream-type salmonids which depend heavily on freshwater habitats) than on favorable estuarine conditions. Another behavioral difference between chum salmon and species that rear extensively in freshwater is that chum salmon form schools. Presumably, this behavior reduces predation (Pitcher 1986), especially if fish movements are synchronized to swamp predators (Miller and Brannon 1982).

The duration of estuarine residence for chum salmon juveniles are known for only a few estuaries. Observed residence times range from 4 to 32 days; with a period of about 24 days being the most common (Johnson, Grant et al. 1997). Juvenile salmonids rely on a variety of non-main channel habitats that are critical to rearing. All listed salmonids use shallow, low flow habitats at some point in their life cycle. Examples of off-channel habitat include alcoves, channel edge sloughs, overflow channels, backwaters, terrace tributaries, off-channel dredge ponds, and braids (Anderson 1999; Swift III 1979).

Status and Trends

Chum salmon have been threatened by overharvests in commercial and recreational fisheries, adult and juvenile mortalities associated with hydropower systems, habitat degradation from forestry and urban expansion, and shifts in climatic conditions that changed patterns and intensity of precipitation.

Chum salmon, like the other salmon NMFS has listed, have declined under the combined effects of overharvests in fisheries; competition from fish raised in hatcheries and native and non-native exotic species; dams that block their migrations and alter river hydrology; gravel mining that impedes their migration and alters the dynamics of the rivers and streams that support juveniles; water diversions that deplete water levels in rivers and streams; destruction or degradation of riparian habitat that increase water temperatures in rivers and streams sufficient to reduce the survival of juvenile chum salmon; and land use practices (logging, agriculture, urbanization) that destroy or alter wetland and riparian ecosystems. The above activities and features also introduce sediment, nutrients, biocides, metals, and other pollutants into surface and ground water and degrade water

quality in the freshwater, estuarine, and coastal ecosystems throughout the Pacific Northwest.

Columbia River Chum Salmon

Distribution

Columbia River chum salmon includes all natural-origin chum salmon in the Columbia River and its tributaries in Oregon and Washington. The species consists of three populations: Grays River, Hardy, and Hamilton Creek in Washington State (Figure 16).

This ESU also includes three artificial hatchery programs. There were 16 historical populations in three MPGs in Oregon and Washington between the mouth of the Columbia River and the Cascade crest. Significant spawning now occurs for two of the historical populations. About 88% of the historical populations are extirpated. Table 10 identifies populations within the Columbia River Chum salmon ESU, their abundances, and hatchery input.

Table 13. Columbia River Chum salmon populations, abundances, and hatchery contributions (Good, Waples et al. 2005).

Current Populations	Historical Abundance	Most Recent Spawner Abundance	Hatchery Abundance Contributions
Youngs Bay	Unknown	0	0
Grays River	7,511	331-704	Unknown
Big Creek	Unknown	0	0
Elochoman River	Unknown	0	0
Clatskanie River	Unknown	0	0
Mill, Abernathy, and German Creeks	Unknown	0	0
Scappoose Creek	Unknown	0	0
Cowlitz River	141,582	0	0
Kalama River	9,953	0	0
Lewis River	89,671	0	0
Salmon Creek	Unknown	0	0
Clackamus River	Unknown	0	0
Sandy River	Unknown	0	0
Washougal River	15,140	0	0
Lower gorge tributaries	>3,141	425	0
Upper gorge tributaries	>8,912	0	0
Total	**>283,421**	**756-1,129**	

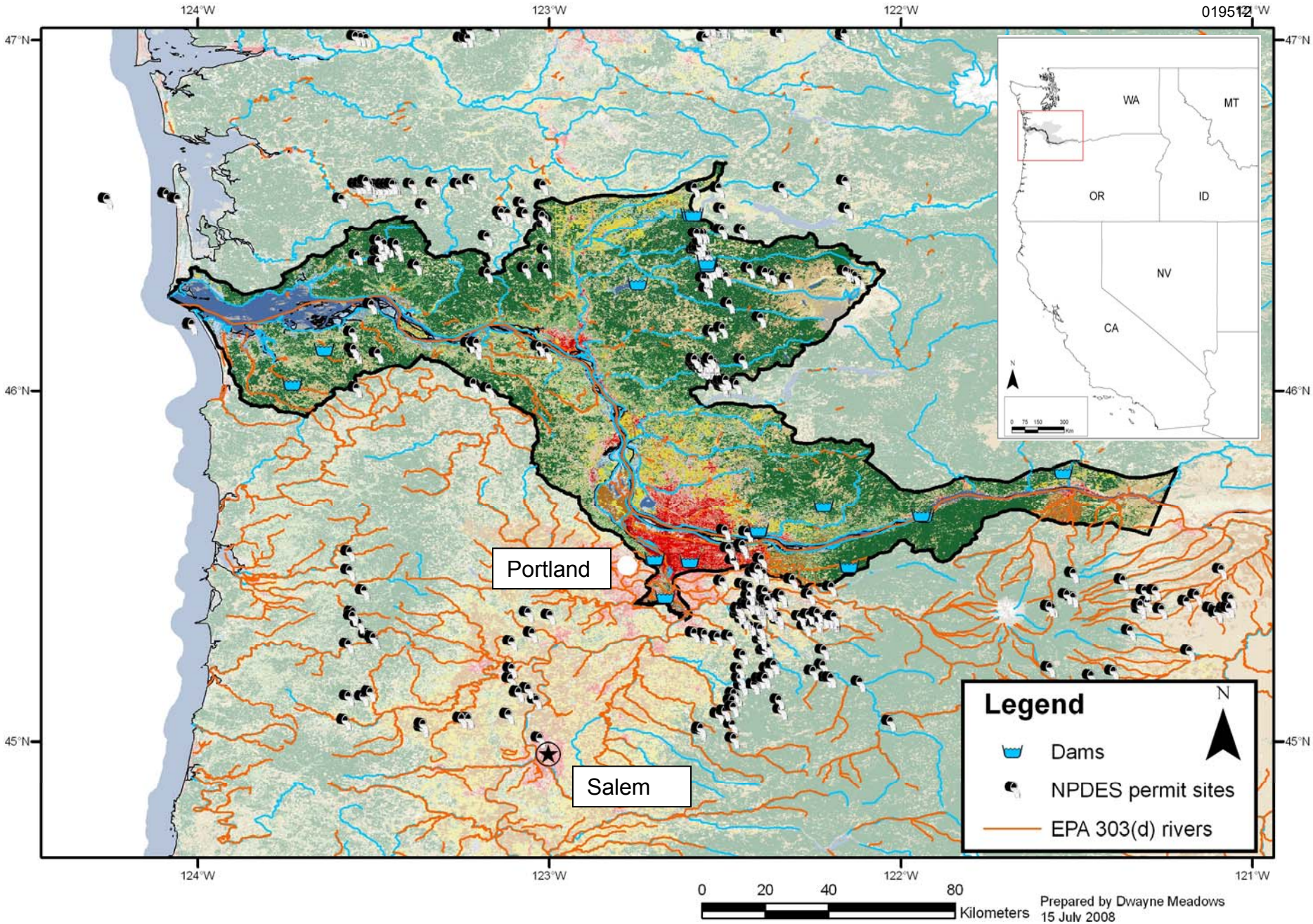

Figure 16. Columbia River Chum salmon distribution. Land Cover Class Legend in Figure 7.

Life History

Chum salmon return to the Columbia River in late fall (mid-October to December). They primarily spawn in the lower reaches of rivers, digging redds along the edges of the mainstem and in tributaries or side channels. Some spawning sites are located in areas where geothermally-warmed groundwater or mainstem flow upwells through the gravel. Chum salmon fry emigrate from March through May shortly after emergence in contrast to other salmonids (*e.g.*, steelhead, coho salmon, and most Chinook salmon), which usually migrate to sea at a larger size after months or years of freshwater rearing. Juvenile chum salmon reside in estuaries to feed before beginning a long-distance oceanic migration. Chum salmon may choose either the upper or lower estuaries depending on the relative productivity of each. The timing of entry of juvenile chum salmon into sea water is commonly correlated with the warming of the nearshore waters and the accompanying plankton blooms (Burgner 1991). The movement offshore generally coincides with the decline of inshore prey resources and is normally at the time when the fish has grown to a size that allows them to feed upon neritic organisms and and avoid predators (Burgner 1991).

Although most juvenile chum salmon migrate rapidly from freshwater to shallow nearshore marine habitats after emergence from gravel beds, some may remain up to a year in fresh water in large northern rivers. The period of estuarine residence appears to be a critical life history phase and may play a major role in determining the size of the subsequent adult run back to freshwater.

Status and Trends

Columbia River chum salmon were listed as threatened on March 25, 1999, and their threatened status was reaffirmed on June 28, 2005 (71 FR 37160). Chum salmon in the Columbia River once numbered in the hundreds of thousands of adults and were reported in almost every river in the LCR basin. However, by the 1950s most runs disappeared (Rich 1942; Marr 1943; Fulton 1968). The total number of chum salmon returning to the Columbia River in the last 50 years has averaged a few thousand per year, with returns

limited to a very restricted portion of the historical range. Significant spawning occurs in only two of the 16 historical populations. Nearly 88% of the historical populations are extirpated. The two remaining populations are the Grays River and the Lower Gorge (Good, Waples et al. 2005). Chum salmon appear to be extirpated from the Oregon portion of this ESU. In 2000, the Oregon Department of Fish and Wildlife (ODFW) conducted surveys to determine the abundance and distribution of chum salmon in the Columbia River. Of 30 sites surveyed, only one chum salmon was observed.

Historically, the Columbia River chum salmon supported a large commercial fishery in the first half of this century which landed more than 500,000 fish per year as recently as 1942. Commercial catches declined beginning in the mid-1950s, and in later years rarely exceeded 2,000 per year. During the 1980s and 1990s, the combined abundance of natural spawners for the Lower Gorge, Washougal, and Grays River populations was below 4,000 adults. In 2002, however, the abundance of natural spawners exhibited a substantial increase at several locations (estimate of natural spawners is approximately 20,000 adults). The cause of this dramatic increase in abundance is unknown. Estimates of abundance and trends are available only for the Grays River and Lower Gorge populations. The 10-year trend was negative for the Grays River population and just over 1.0 for the Lower Gorge. The Upper Gorge population, and all four of the populations on the Oregon side of the river in the Coastal MPG, are extirpated or nearly so (McElhaney, Chilcote et al. 2007). However, long- and short-term productivity trends for populations are at or below replacement. Regarding spatial structure, few Columbia River chum salmon have been observed in tributaries between The Dalles and Bonneville dams. Surveys of the White Salmon River in 2002 found one male and one female carcass and the latter had not spawned (Ehlke and Keller 2003). Chum salmon were not observed in any of the upper gorge tributaries, including the White Salmon River, during the 2003 and 2004 spawning ground surveys. Finally, most Columbia River chum populations have been functionally extirpated or are presently at very low abundance levels. The loss of off-channel habitat and the extirpation of approximately 17 historical populations increase this species' vulnerability to environmental variability and

catastrophic events. Overall, the populations that remain have low abundance, limited distribution, and poor connectivity (Good, Waples et al. 2005).

Critical Habitat

Critical habitat was originally designated for this species on February 16, 2000 (65 FR 7764) and was re-designated on September 2, 2005 (70 FR 52630). The critical habitat designation for this ESU identifies PCEs that include sites necessary to support one or more chum salmon life stages. Columbia River chum salmon have PCEs of: (1) Freshwater spawning, (2) freshwater rearing, (3) freshwater migration, (4) estuarine areas free of obstruction, (5) nearshore marine areas free of obstructions, and (6) offshore marine areas with good water quality. The physical or biological features that characterize these sites include water quality and quantity, natural cover, forage, adequate passage conditions, and floodplain connectivity.

Of 21 subbasins reviewed in NMFS' assessment of critical habitat for the Columbia River chum salmon ESU, three subbasins were rated as having a medium conservation value, no subbasins were rated as low, and the majority of subbasins (18), were rated as having a high conservation value to Columbia River chum salmon. Washington's federal lands were rated as having high conservation value to the species. The major factors limiting recovery for Columbia River chum salmon are altered channel form and stability in tributaries, excessive sediment in tributary spawning gravels, altered stream flow in tributaries and the mainstem Columbia River, loss of some tributary habitat types, and harassment of spawners in the tributaries and mainstem. The above activities and features also introduce sediment, nutrients, biocides, metals, and other pollutants into surface and ground water and degrade water quality in the freshwater, estuarine, and coastal ecosystems throughout the Pacific Northwest.

Hood Canal Summer-Run Chum Salmon

Distribution

This ESU includes all naturally spawned populations of summer-run chum salmon in Hood Canal and its tributaries as well as populations in Olympic Peninsula rivers

between Hood Canal and Dungeness Bay, Washington (64 FR 14508, Figure 17). Eight artificial propagation programs are considered as part of the ESU: the Quilcene National Fish Hatchery, Hamma Hamma Fish Hatchery, Lilliwaup Creek Fish Hatchery, Union River/Tahuya, Big Beef Creek Fish Hatchery, Salmon Creek Fish Hatchery, Chimacum Creek Fish Hatchery, and the Jimmycomelately Creek Fish Hatchery summer-run chum hatchery programs. NMFS determined that these artificially propagated stocks are no more divergent relative to the local natural population(s) than what would be expected between closely related natural populations within the species. Table 14 identifies populations within the Hood Canal summer-run Chum salmon ESU, their abundances, and hatchery input.

Table 14. Hood Canal summer-run Chum salmon populations, abundances, and hatchery contributions (Good, Waples et al. 2005).

Current Populations	Historical Abundance	Most Recent Spawner Abundance	Hatchery Abundance Contributions
Jimmycomelately Creek	Unknown	~60	Unknown
Salmon/Snow creeks	Unknown	~2,200	0-69%
Big/Little Quilcene rivers	Unknown	~4,240	5-51%
Lilliwaup Creek	Unknown	~164	Unknown
Hamma Hamma River	Unknown	~758	Unknown
Duckabush River	Unknown	Unknown	Unknown
Dosewallips River	Unknown	~900	Unknown
Union River	Unknown	~690	Unknown
Chimacum Creek	Unknown	0	100
Big Beef Creek	Unknown	0	100
Dewetto Creek	Unknown	0	Unknown
Total	**Unknown**	**~9,012**	

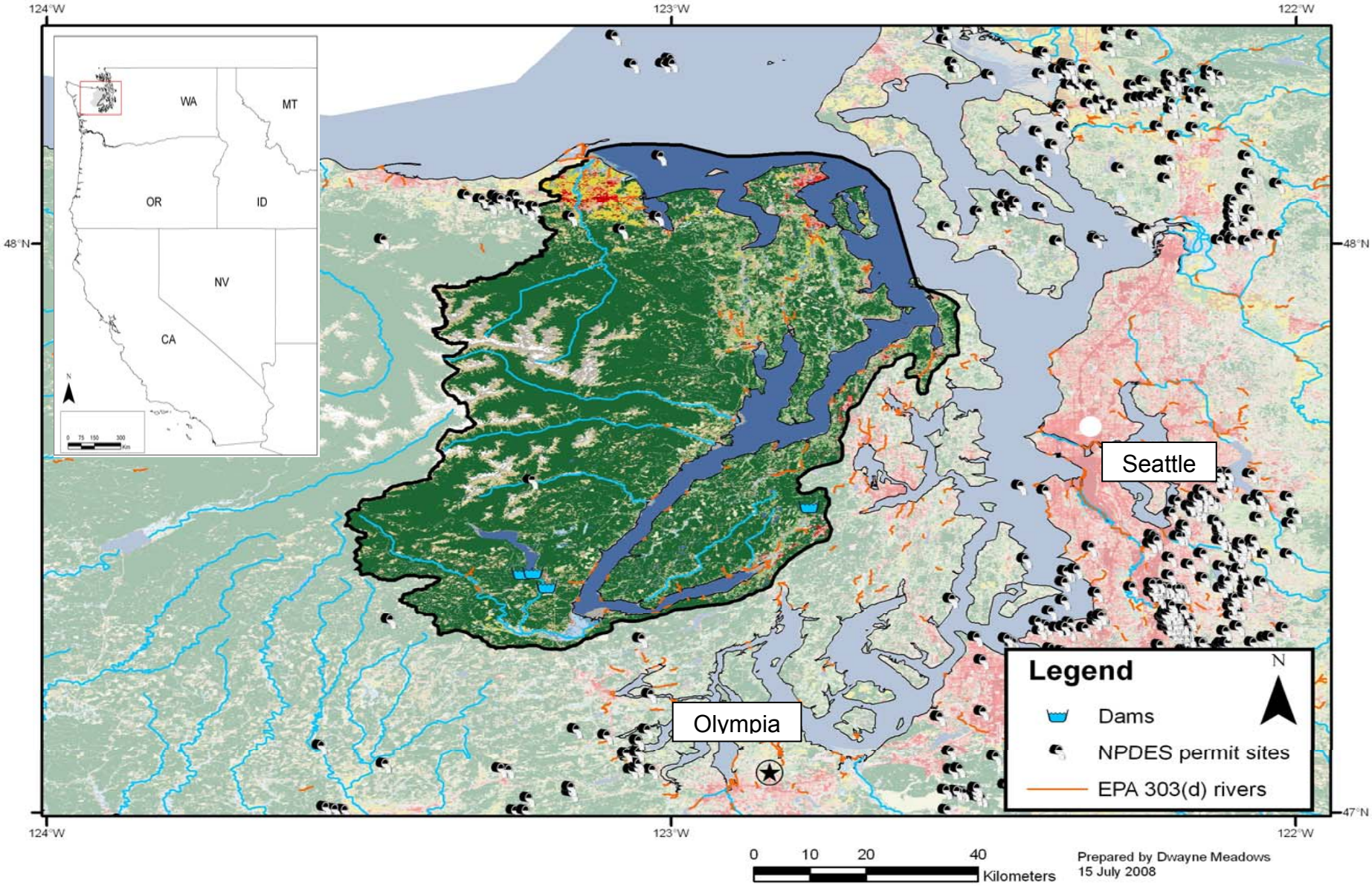

Figure 17. Hood Canal Summer-run Chum salmon distribution. Land Cover Class Legend in Figure 7.

Life History

The Hood Canal summer-run Chum salmon are defined in the Salmon and Steelhead Stock Inventory (WDF, WDW et al. 1993) as fish that spawn from mid-September to mid-October. However, summer chum have been known to enter natal rivers in late August. Fall-run chum salmon are defined as fish that spawn from November through December or January. Run-timing data for as early as 1913 indicated temporal separation between summer and fall chum salmon in Hood Canal (Johnson, Grant et al. 1997). Hood Canal summer Chum salmon are genetically distinct from healthy populations of Hood Canal fall Chum salmon originating within this area. Hood Canal summer Chum salmon return to natal rivers to spawn during the August through early October period. The fall Chum salmon spawn between November and December, when streams are higher and water temperature is lower.

The time to hatching varies among populations and among individuals within a population (Salo 1991). Fry tend to emerge when they had their best chances of surviving in streams and estuaries (Koski 1975). A variety of factors may influence the time to hatching, emergence from the gravel, or both. They include dissolved oxygen, gravel size, salinity, nutritional conditions, behaviour of alevins in the gravel and incubation temperature [reviewed in (Bakkala 1970; Schroder, Koski et al. 1974; Schroder 1977; Salo 1991)]. The average residence time in estuaries for Hood canal chum salmon is 23 days. Fry in Hood Canal have not been observed to display daily tidal migrations (Bax 1983). Fry movement is associated with prey availability. Summer-run chum salmon migrate up the Hood Canal and into the main body of Puget Sound. Fish may emerge from streams over an extended period or juveniles may also remain in Quilcene Bay for several weeks.

Status and Trends

Hood Canal summer-run Chum salmon were listed as threatened on March 25, 1999, and reaffirmed as threatened on June 28, 2005 (70 FR 37160). Adult returns for some populations in the Hood Canal summer-run Chum salmon species showed modest

improvements in 2000, with upward trends continuing in 2001 and 2002. The recent five-year mean abundance is variable among populations in the species, ranging from one fish to nearly 4,500 fish. Hood Canal summer-run chum salmon are the focus of an extensive rebuilding program developed and implemented since 1992 by the state and tribal co-managers. Two populations (the combined Quilcene and Union River populations) are above the conservation thresholds established by the rebuilding plan. However, most populations remain depressed. Estimates of the fraction of naturally spawning hatchery fish exceed 60% for some populations. This indicates that reintroduction programs are supplementing the numbers of total fish spawning naturally in streams. Long-term trends in productivity are above replacement for only the Quilcene and Union River populations. Buoyed by recent increases, seven populations are exhibiting short-term productivity trends above replacement.

Of an estimated 16 historical populations in the ESU, seven populations are believed to have been extirpated or nearly extirpated. Most of these extirpations have occurred in populations on the eastern side of Hood Canal, generating additional concern for ESU spatial structure. The widespread loss of estuary and lower floodplain habitat was noted by the BRT as a continuing threat to ESU spatial structure and connectivity. There is some concern that the Quilcene hatchery stock is exhibiting high rates of straying, and may represent a risk to historical population structure and diversity. However, with the extirpation of many local populations, much of this historical structure has been lost, and the use of Quilcene hatchery fish may represent one of a few remaining options for Hood Canal summer-run Chum salmon conservation.

Of the eight programs releasing summer chum salmon that are considered to be part of this ESU, six of the programs are supplementation programs implemented to preserve and increase the abundance of native populations in their natal watersheds. NMFS' assessment of the effects of artificial propagation on ESU extinction risk concluded that these hatchery programs collectively do not substantially reduce the extinction risk of the ESU. The hatchery programs are reducing risks to ESU abundance by increasing total ESU abundance as well as the number of naturally spawning summer-run chum salmon.

Several of the programs have likely prevented further population extirpations in the ESU. The contribution of ESU hatchery programs to the productivity of the ESU in-total is uncertain. The hatchery programs are benefiting ESU spatial structure by increasing the spawning area utilized in several watersheds and by increasing the geographic range of the ESU through reintroductions. These programs also provide benefits to ESU diversity. By bolstering total population sizes, the hatchery programs have likely stemmed adverse genetic effects for populations at critically low levels. Additionally, measures have been implemented to maintain current genetic diversity, including the use of native broodstock and the termination of the programs after 12 years of operation to guard against long-term domestication effects. Collectively, artificial propagation programs in the ESU presently provide a slight beneficial effect to ESU abundance, spatial structure, and diversity. However, artificial propagation programs also provide uncertain effects to ESU productivity.

Critical Habitat

Critical habitat for this species was designated on September 2, 2005 (70 FR 52630). Hood Canal summer-run chum salmon have PCEs of: (1) Freshwater spawning, (2) freshwater rearing, (3) freshwater migration, (4) estuarine areas free of obstruction, (5) nearshore marine areas free of obstructions, and (6) offshore marine areas with good water quality. The physical or biological features that characterize these sites include water quality and quantity, natural cover, forage, adequate passage conditions, and floodplain connectivity.

Of 17 subbasins reviewed in NMFS' assessment of critical habitat for the Hood Canal chum salmon ESU, 14 subbasins were rated as having a high conservation value, while only three were rated as having a medium value to the conservation. Limiting factors identified for this species include: (1) Degraded floodplain and mainstem river channel structure, (2) degraded estuarine water quality conditions and loss of estuarine habitat, (3) riparian area degradation and loss of in-river wood in mainstem, (4) excessive sediment in spawning gravels, and (5) reduced stream flow in migration areas. These conditions also introduce sediment, nutrients, biocides, metals, and other pollutants into surface and

ground water and degrade water quality in the freshwater, estuarine, and coastal ecosystems throughout the Pacific Northwest.

Coho Salmon

Description of the Species

Coho salmon occur naturally in most major river basins around the North Pacific Ocean from central California to northern Japan (Laufle, Pauley et al. 1986). We discuss the distribution, life history diversity, status, and critical habitat of the four endangered and threatened coho species separately.

After entering the ocean, immature coho salmon initially remain in nearshore waters close to the parent stream. Most coho salmon adults are three-year-olds, having spent approximately 18 months rearing in freshwater and 18 months in salt water. Most coho salmon enter rivers between September and February. However, entry is influenced by discharge and other factors. In many systems, coho salmon and other Pacific salmon are unable to enter the rivers until sufficiently strong flows open passages and provide sufficient depth. Wild female coho salmon return to spawn almost exclusively at age three. Coho salmon spawn from November to January, and occasionally into February and March. Spawning occurs in a few third-order streams. Most spawning activity occurs in fourth- and fifth-order streams. Spawning generally occurs in tributaries with gradients of 3% or less.

Eggs incubate for about 35 to 50 days, and start emerging from the gravel within two to three weeks after hatching. Following emergence, fry move to shallow areas near the stream banks. As fry grow, they disperse upstream and downstream to establish and defend territories. Juvenile rearing usually occurs in tributaries with gradients of 3% or less, although they may move to streams with gradients of 4 to 5%. Juvenile coho salmon are often found in small streams less than five ft wide, and may migrate considerable distances to rear in lakes and off-channel ponds. During the summer, fry prefer pools featuring adequate cover such as large woody debris, undercut banks, and

overhanging vegetation. Overwintering tends to occur in larger pools and backwater areas.

North American coho salmon will migrate north along the coast in a narrow coastal band that broadens in southeastern Alaska. During this migration, juvenile coho salmon tend to occur in both coastal and offshore waters. During spring and summer, coho salmon will forage in waters between 46ºN, the Gulf of Alaska, and along Alaska's Aleutian Islands.

Status and Trends

Coho salmon survive only in aquatic ecosystems and depend on the quantity and quality of those aquatic systems. Coho salmon, like the other salmon NMFS has listed, have declined under the combined effects of overharvests in fisheries; competition from fish raised in hatcheries and native and non-native exotic species; dams that block their migrations and alter river hydrology; gravel mining that impedes their migration and alters the dynamics of the rivers and streams that support juveniles; water diversions that deplete water levels in rivers and streams; destruction or degradation of riparian habitat that increase water temperatures in rivers and streams sufficient to reduce the survival of juvenile chum salmon; and land use practices (logging, agriculture, urbanization) that destroy wetland and riparian ecosystems. The above activities and features introduce sediment, nutrients, biocides, metals, and other pollutants into surface and ground water and degrade water quality in the freshwater, estuarine, and coastal ecosystems throughout the Pacific Northwest.

Central California Coast Coho Salmon

Distribution

The CCC coho salmon ESU extends from Punta Gorda in northern California south to and including the San Lorenzo River in central California (Weitkamp, Wainwright et al. 1995). Table 15 identifies populations within the CCC Coho salmon ESU, their abundances, and hatchery input (Figure 18).

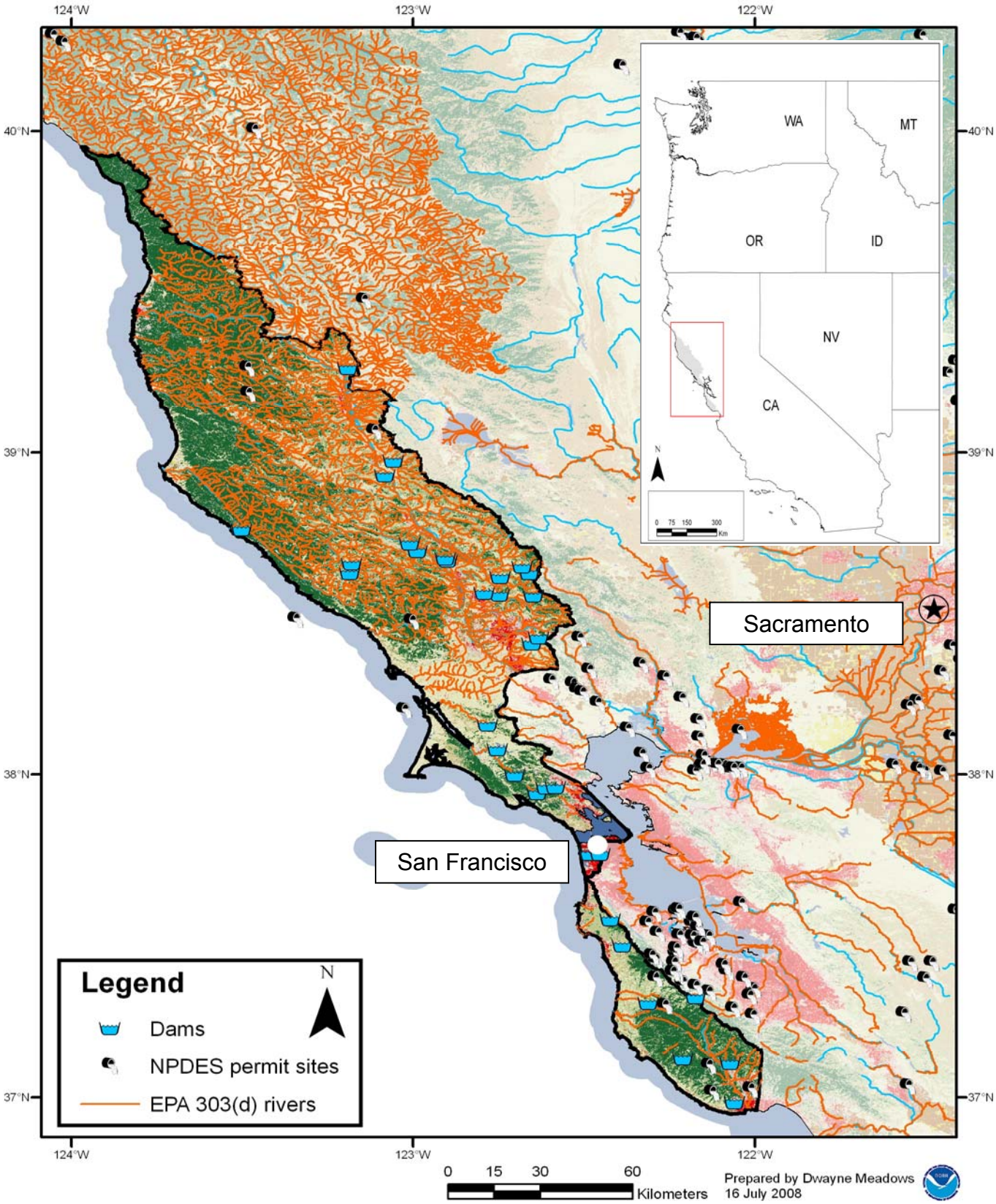

Figure 18. CCC Coho salmon distribution. Land Cover Class Legend in Figure 7.

Table 15. CCC Coho salmon populations, abundances, and hatchery contributions (Good, Waples et al. 2005).

River/Region	Historical Escapement (1963)	1987-1991 Escapement Abundance	Hatchery Abundance Contributions
Ten Mile River	6,000	160	Unknown
Noyo River	6,000	3,740	Unknown
Big River	6,000	280	Unknown
Navarro River	7,000	300	Unknown
Garcia River	2,000	500 (1984-1985)	Unknown
Other Mendacino County rivers	10,000	470	Unknown
Gualala River	4,000	200	Unknown
Russian River	5,000	255	Unknown
Other Sonoma County rivers	1,000	180	Unknown
Marin County	5,000	435	Unknown
San Mateo County	1,000	Unknown	Unknown
Santa Cruz County	1,500	50 (1984-1985)	Unknown
San Lorenzo River	1,600	Unknown	Unknown
Total	**200,000-500,000**	**6,570 (min)**	

Life History

Both run and spawn timing of coho salmon in this region are very late (both peaking in January), with little time spent in freshwater between river entry and spawning. This compressed adult freshwater residency appears to coincide with the single, brief peak of river flow characteristic of this area.

Status and Trends

The CCC coho salmon ESU was originally listed as threatened under the ESA on October 31, 1996 (61 FR 56138) and later revised to endangered status on June 28, 2005 (70 FR 37160). The ESU includes all naturally spawned populations of coho salmon from Punta Gorda in northern California south to and including the San Lorenzo River in central California, as well as populations in tributaries to San Francisco Bay, excluding the Sacramento-San Joaquin River system. The ESU also includes four artificial propagation programs: the Don Clausen Fish Hatchery Captive Broodstock Program, Scott Creek/King Fisher Flats Conservation Program, Scott Creek Captive Broodstock Program, and the Noyo River Fish Station egg-take Program coho hatchery programs.

Information on the abundance and productivity trends for the naturally spawning component of the CCC coho salmon ESU is extremely limited. There are no long-term time series of spawner abundance for individual river systems. Analyses of juvenile coho presence-absence information, juvenile density surveys, and irregular adult counts for the South Fork Noyo River indicate low abundance and long-term downward trends for the naturally spawning populations throughout the ESU. Improved ocean conditions coupled with favorable stream flows and harvest restrictions have contributed to increased returns in 2001 in streams in the northern portion of the ESU, as indicated by an increase in the observed presence of fish in historically occupied streams. Data are lacking for many river basins in the southern two thirds of the ESU where naturally spawning populations are considered at the greatest risk. The extirpation or near extirpation of natural coho salmon populations in several major river basins, and across most of the southern historical range of the ESU, represents a significant risk to ESU spatial structure and diversity. Artificial propagation of coho salmon within the CCC ESU has declined since the ESU was listed in 1996 though it continues at the Noyo River and Scott Creek facilities, and two captive broodstock populations have recently been established. Genetic diversity risk associated with out-of-basin transfers appears to be minimal. However, diversity risk from domestication selection and low effective population sizes in the remaining hatchery programs remains a concern. An out-of-ESU artificial propagation program for coho was operated at the Don Clausen hatchery on the Russian River through the mid-1990s. However, the program was terminated in 1996. Termination of this program was considered by the Biological Review Team (BRT) as a positive development for naturally produced coho salmon in this ESU.

CCC coho salmon populations continue to be depressed relative to historical numbers. Strong indications show that breeding groups have been lost from a significant percentage of streams in their historical range. A number of coho salmon populations in the southern portion of the range appear to be either extinct or nearly so. They include those in Gualala, Garcia, and Russian rivers, as well as smaller coastal streams in and south of San Francisco Bay (Good, Waples et al. 2005). For the naturally spawning component of the ESU, the BRT found very high risk (of extinction) for the abundance,

productivity, and spatial structure VSP parameters and comparatively moderate risk with respect to the diversity VSP parameter. The lack of direct estimates of the performance of the naturally spawned populations in this ESU, and the associated uncertainty this generates, was of specific concern to the BRT, as the naturally spawned component of the CCC coho salmon ESU was "in danger of extinction".

Critical Habitat

Critical habitat for the CCC coho salmon ESU was designated on May 5, 1999 (64 FR 24049). Designated critical habitat encompasses accessible reaches of all rivers (including estuarine areas and tributaries) between Punta Gorda and the San Lorenzo River (inclusive) in California. Critical habitat for this species also includes two streams entering San Francisco Bay: Arroyo Corte Madera Del Presidio and Corte Madera Creek.

Lower Columbia River Coho Salmon

Distribution

LCR coho salmon include all naturally spawned populations of coho salmon in the Columbia River and its tributaries in Oregon and Washington, from the mouth of the Columbia up to and including the Big White Salmon and Hood Rivers, and includes the Willamette River to Willamette Falls, Oregon (Figure 19). This ESU also includes 25 artificial propagation programs: the Grays River, Sea Resources Hatchery, Peterson Coho Project, Big Creek Hatchery, Astoria High School Coho Program, Warrenton High School Coho Program, Elochoman Type-S Coho Program, Elochoman Type-N Coho Program, Cathlamet High School FFA Type-N Coho Program, Cowlitz Type-N Coho Program in the Upper and Lower Cowlitz Rivers, Cowlitz Game and Anglers Coho Program, Friends of the Cowlitz Coho Program, North Fork Toutle River Hatchery, Kalama River Type-N Coho Program, Kalama River Type-S Coho Program, Washougal Hatchery Type-N Coho Program, Lewis River Type-N Coho Program, Lewis River Type-S Coho Program, Fish First Wild Coho Program, Fish First Type-N Coho Program, Syverson Project Type-N Coho Program, Eagle Creek National Fish Hatchery, Sandy Hatchery, and the Bonneville/Cascade/Oxbow complex coho hatchery programs.

Table 16 identifies populations within the LCR Coho salmon ESU, their abundances, and hatchery input.

Table 16. LCR Coho salmon populations, abundances, and hatchery contributions (Good, Waples et al. 2005).

River/Region	Historical Abundance	2002 Spawner Abundance	Hatchery Abundance Contributions
Youngs Bay and Big Creek	Unknown	4,473	91%
Grays River	Unknown	Unknown	Unknown
Elochoman River	Unknown	Unknown	Unknown
Clatskanie River	Unknown	229	60%
Mill, Germany, and Abernathy creeks	Unknown	Unknown	Unknown
Scappoose Rivers	Unknown	458	0%
Cispus River	Unknown	Unknown	Unknown
Tilton River	Unknown	Unknown	Unknown
Upper Cowlitz River	Unknown	Unknown	Unknown
Lower Cowlitz River	Unknown	Unknown	Unknown
North Fork Toutle River	Unknown	Unknown	Unknown
South Fork Toutle River	Unknown	Unknown	Unknown
Coweeman River	Unknown	Unknown	Unknown
Kalama River	Unknown	Unknown	Unknown
North Fork Lewis River	Unknown	Unknown	Unknown
East Fork Lewis River	Unknown	Unknown	Unknown
Upper Clackamas River	Unknown	1,001	12%
Lower Clackamas River	Unknown	2,402	78%
Salmon Creek	Unknown	Unknown	Unknown
Upper Sandy River	Unknown	310	0%
Lower Sandy River	Unknown	271	97%
Washougal River	Unknown	Unknown	Unknown
LCR gorge tributaries	Unknown	Unknown	Unknown
White Salmon	Unknown	Unknown	Unknown
Upper Columbia River gorge tributaries	Unknown	1,317	>65%
Hood River	Unknown	Unknown	Unknown
Total	**Unknown**	**10,461 (min)**	

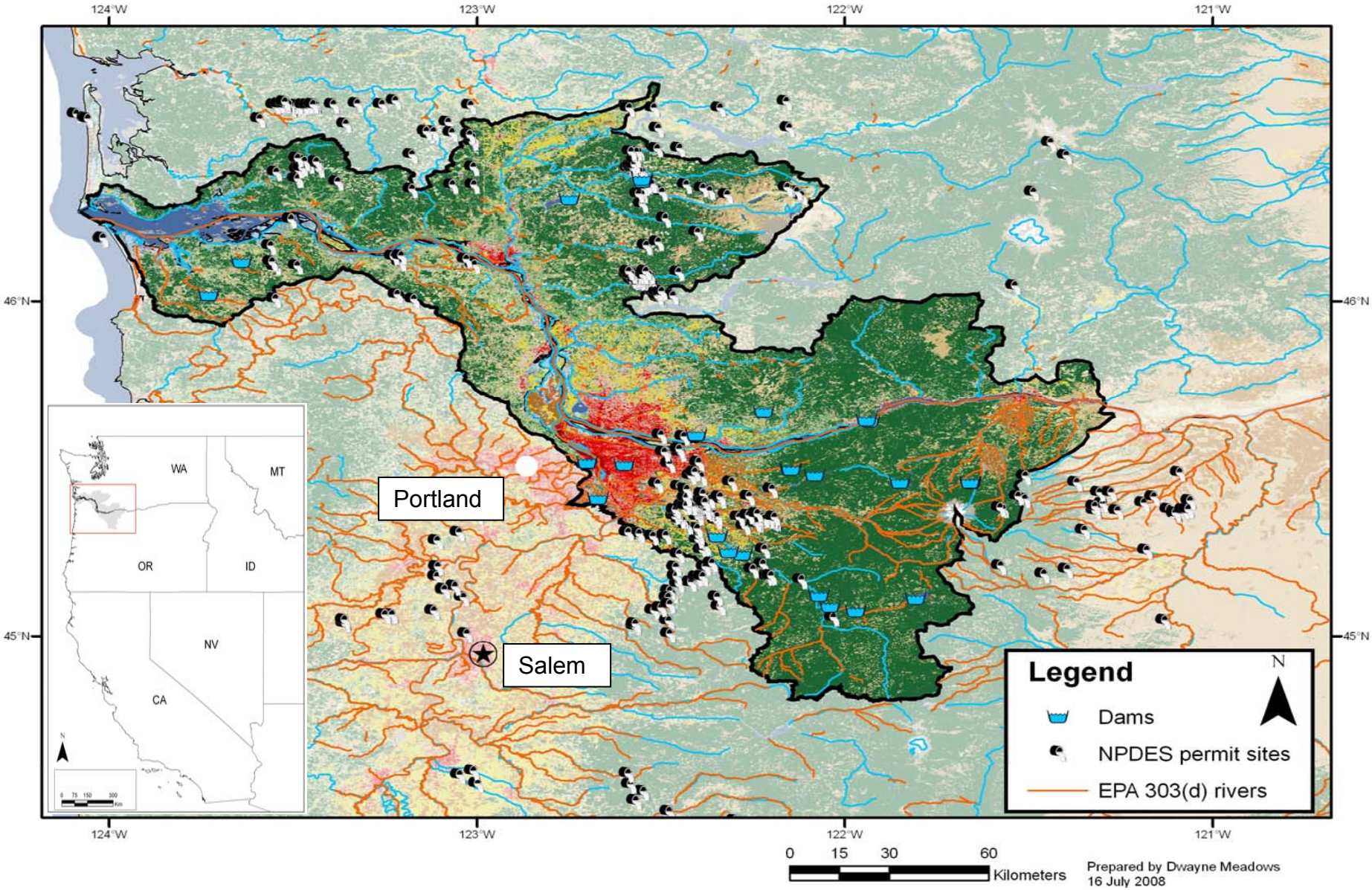

Figure 19 . LCR coho salmon distribution. Land Cover Class Legend in Figure 7.

Life History

Although run time variation is inherent to coho salmon life history, the ESU includes two distinct runs: early returning (Type S) and late returning (Type N). Type S coho salmon generally migrate south of the Columbia once they reach the ocean, returning to freshwater in mid-August and to the spawning tributaries in early September. Spawning peaks from mid-October to early November. Type N coho salmon have a northern distribution in the ocean, return to the Columbia River from late September through December and enter the tributaries from October through January. Most Type N spawning occurs from November through January. However some spawning occurs in February and as late as March (LCFRB 2004). Almost all LCR ESU coho salmon females and most males spawn at three years of age.

Status and Trends

LCR coho salmon were listed as endangered on June 28, 2005 (70 FR 37160). The vast majority (over 90%) of the historic population in the LCR coho salmon ESU appear to be either extirpated or nearly so. The two populations with any significant natural production (Sandy and Clackamas) are at appreciable risk because of low abundance, declining trends, and failure to respond after a dramatic reduction in harvest. Most of the other populations are believed to have very little, if any, natural production.

The Sandy population had a recent mean abundance of 342 spawners and a very low fraction of hatchery-origin spawners. Trends in the Sandy are similar to the Clackamas. The long-term trends and growth rate estimates over the period 1977 to 2001 have been slightly positive and the short-term trends have been slightly negative. Other populations in this ESU are dominated by hatchery production. There is very little, if any, natural production in Oregon beyond the Clackamas and Sandy rivers. The Washington side of the ESU is also dominated by hatchery production. There are no populations with appreciable natural production. The most serious threat facing this ESU is the scarcity of naturally-produced spawners, with attendant risks associated with small population, loss of diversity, and fragmentation and isolation of the remaining naturally-produced fish. In

the only two populations with significant natural production (Sandy and Clackamas), short- and long-term trends are negative and productivity (as gauged by pre-harvest recruits) is down sharply from recent (1980s) levels.

The Federal Columbia River Power System Opinion (FCRPS) (2008) describes this ESU as consisting of three MPGs. Each is comprised of three to 14 populations. In many cases, populations have low abundance and natural runs have been extensively replaced by hatchery production. Abundance estimates are available for only five populations and trend estimates for only two. Time series are not available for Washington coho populations. The 100-year risk of extinction was derived qualitatively, based on risk categories and criteria identified by the W/LCTRT in 2004. Most of the population of LCR had high or very high extinction risk probabilities. Spatial structure has been substantially reduced by the loss of access to the upper portions of some basins from tributary hydro development (*i.e.*, Condit Dam on the Big White Salmon River and Powerdale Dam on the Hood River). Finally, the diversity of populations in all three MPGs has been eroded by large hatchery influences and periodically, low effective population sizes. Nevertheless, the genetic legacy of the Lewis and Cowlitz River coho salmon populations is preserved in ongoing hatchery programs.

Critical Habitat

NMFS has not designated critical habitat for LCR coho salmon.

SONCC *Coho Salmon*

Distribution

SONCC coho salmon consists of all naturally spawning populations of coho salmon that reside below long-term, naturally impassible barriers in streams between Punta Gorda, California and Cape Blanco, Oregon (Figure 20).

This ESU also includes three artificial propagation programs: the Cole Rivers Hatchery (ODFW stock #52), Trinity River Hatchery, and Iron Gate Hatchery coho hatchery

programs. The three major river systems supporting Southern Oregon / Northern Coastal California coast coho are the Rogue, Klamath (including the Trinity), and Eel rivers.

Life History

SONCC coho salmon enter rivers in September or October. River entry is much later south of the Klamath River Basin, occurring in November and December, in basins south of the Klamath River to the Mattole River, California. River entry occurs from mid-Decmeber to mid-February in rivers farther south. Because coho salmon enter rivers late and spawn late south of the Mattole River, they spend much less time in the river prior to spawning. Coho salmon adults spawn at age three, spending just over a year in freshwater and a year and a half in the ocean.

Status and Trends

SONCC coho salmon were listed as threatened on May 7, 1997 (62 FR 24588). This species retained its original classification when its status was reviewed on June 28, 2005 (70 FR 37160). The status of coho salmon coast wide, including the SONCC coho salmon ESU, was formally assessed in 1995 (Weitkamp, Wainwright et al. 1995). Two subsequent status review updates have been published by NMFS. One review update addressed all West Coast coho salmon ESUs (Busby, Wainwright et al. 1996). The second update specifically addressed the Oregon Coast and SONCC coho salmon ESUs (Gustafson, Wainwright et al. 1997). In the 1997 status update, estimates of natural population abundance were based on very limited information. New data on presence/absence in northern California streams that historically supported coho salmon were even more disturbing than earlier results. Data indicated that a smaller percentage of streams contained coho salmon compared to the percentage presence in an earlier study. However, it was unclear whether these new data represented actual trends in local extinctions, or were biased by sampling effort.

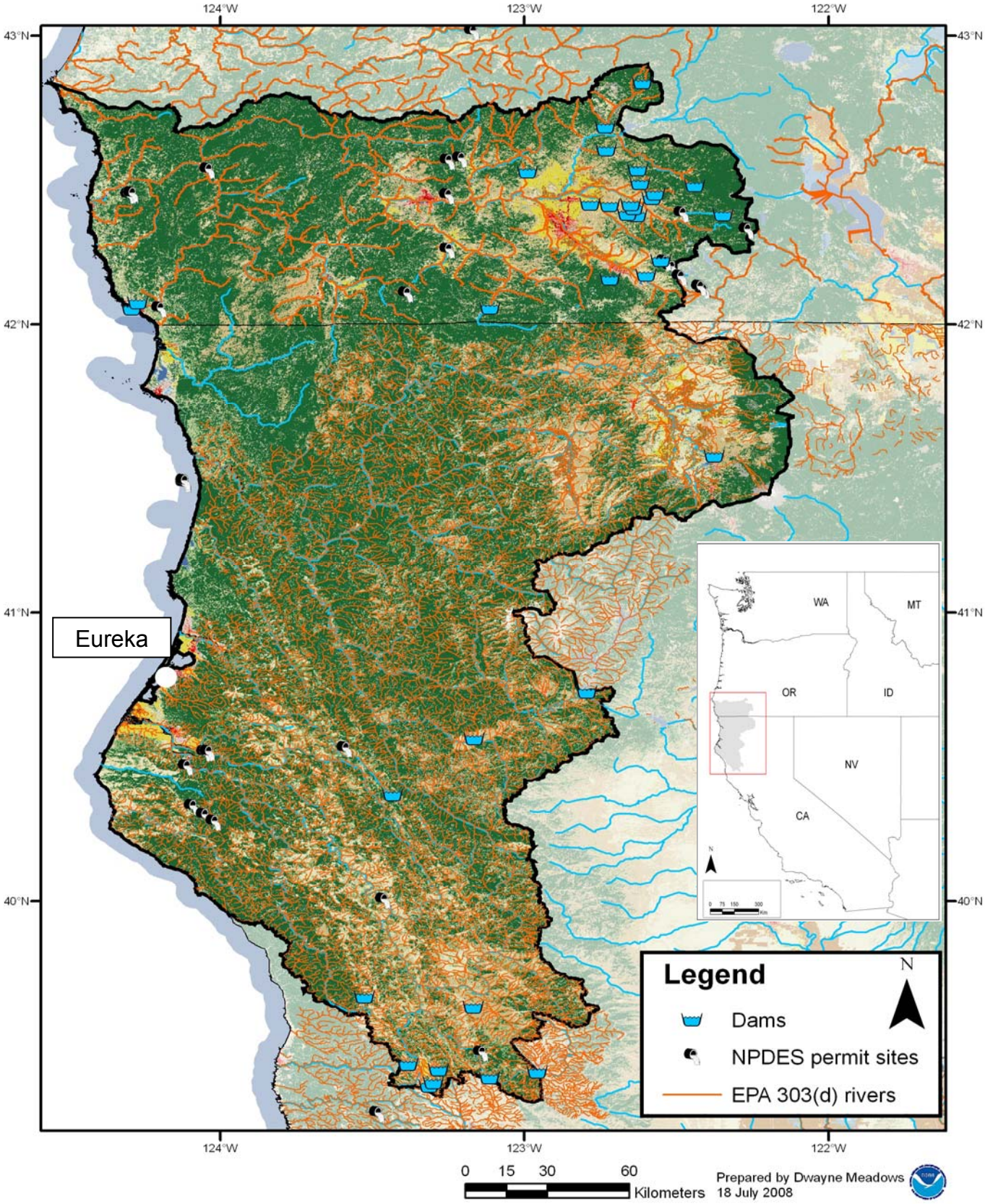

Figure 20. SONCC coho salmon distribution. Legend for Land Cover Class in Figure 7.

Data on population abundance and trends are limited for the California portion of this ESU. No regular estimates of natural spawner escapement are available. Historical point estimates of coho salmon abundance for the early 1960s and mid-1980s suggest that statewide coho spawning escapement in the 1940s ranged between 200,000 and 500,000 fish. Numbers declined to about 100,000 fish by the mid-1960s with about 43% originating from this ESU. Brown et al. (1994) estimated that the California portion of this ESU was represented by about 7,000 wild and naturalized coho salmon (Good, Waples et al. 2005). In the Klamath River, the estimated escapement has dropped from approximately 15,400 in the mid-1960s to about 3,000 in the mid-1980s, and more recently to about 2,000 (Good, Waples et al. 2005). The second largest producing river in this ESU, the Eel River, dropped from 14,000, to 4,000 to about 2,000 during the same period. Historical estimates are considered "best guesses" made using a combination of limited catch statistics, hatchery records, and the personal observations of biologists and managers.

Most recently, Williams et al. (2006) described the structure of historic populations of SONCC coho salmon. They described three categories of populations: functionally independent populations, potentially independent populations, and dependent populations. Functionally independent populations are populations capable of existing in isolation with a minimal risk of extinction. Potentially independent populations are similar but rely on some interchange with adjacent populations to maintain a low probability of extinction. Dependent populations have a high risk of extinction in isolation over a 100-year timeframe and rely on exchange of individuals from adjacent populations to maintain themselves.

Critical Habitat

Critical habitat was designated for the SONCC coho salmon on November 25, 1997, and re-designated on May 5, 1999. Species critical habitat encompasses all accessible river reaches between Cape Blanco, Oregon, and Punta Gorda, California and consists of the water, substrate, and river reaches (including off-channel habitats) in specified areas. Accessible reaches are those within the historical range of the ESU that can still be

occupied by any life stage of coho salmon. Of 155 historical streams for which data are available, 63% likely still support coho salmon. Limiting factors identified for this species include: (1) Loss of channel complexity, connectivity and sinuosity, (2) loss of floodplain and estuarine habitats, (3) loss of riparian habitats and large in-river wood, (4) reduced streamflow, (5) poor water quality, temperature and excessive sedimentation, and (6) unscreened diversions and fish passage structures.

Oregon Coast Coho Salmon

Distribution

The Oregon Coast (OC) coho salmon ESU includes all naturally spawned populations of coho salmon in Oregon coastal streams south of the Columbia River and north of Cape Blanco (63 FR 42587; August 10, 1998; Figure 21). One hatchery stock, the Cow Creek (ODFW stock # 37) hatchery coho, is considered part of the ESU. Table 17 identifies populations within the OC coho salmon ESU, their abundances, and hatchery input.

Table 17. Oregon Coast Coho salmon populations, abundances, and hatchery contributions (Good, Waples et al. 2005).

Basin	Historical Abundance	Recent Spawner Abundance	Hatchery Abundance Contributions
Necanicum	Unknown	1,889	35-40%
Nehalem	Unknown	18,741	40-75%
Tillamook	Unknown	3,949	30-35%
Nestucca	Unknown	3,846	~5%
Siletz	Unknown	2,295	~50%
Yaquima	Unknown	3,665	~25%
Alsea	Unknown	3,621	~40%
Siuslaw	Unknown	16,213	~40%
Umpqua	Unknown	24,351	<10%
Coos	Unknown	20,136	<5%
Coquille	Unknown	8,847	<5%
Total	**924,000**	**107,553**	

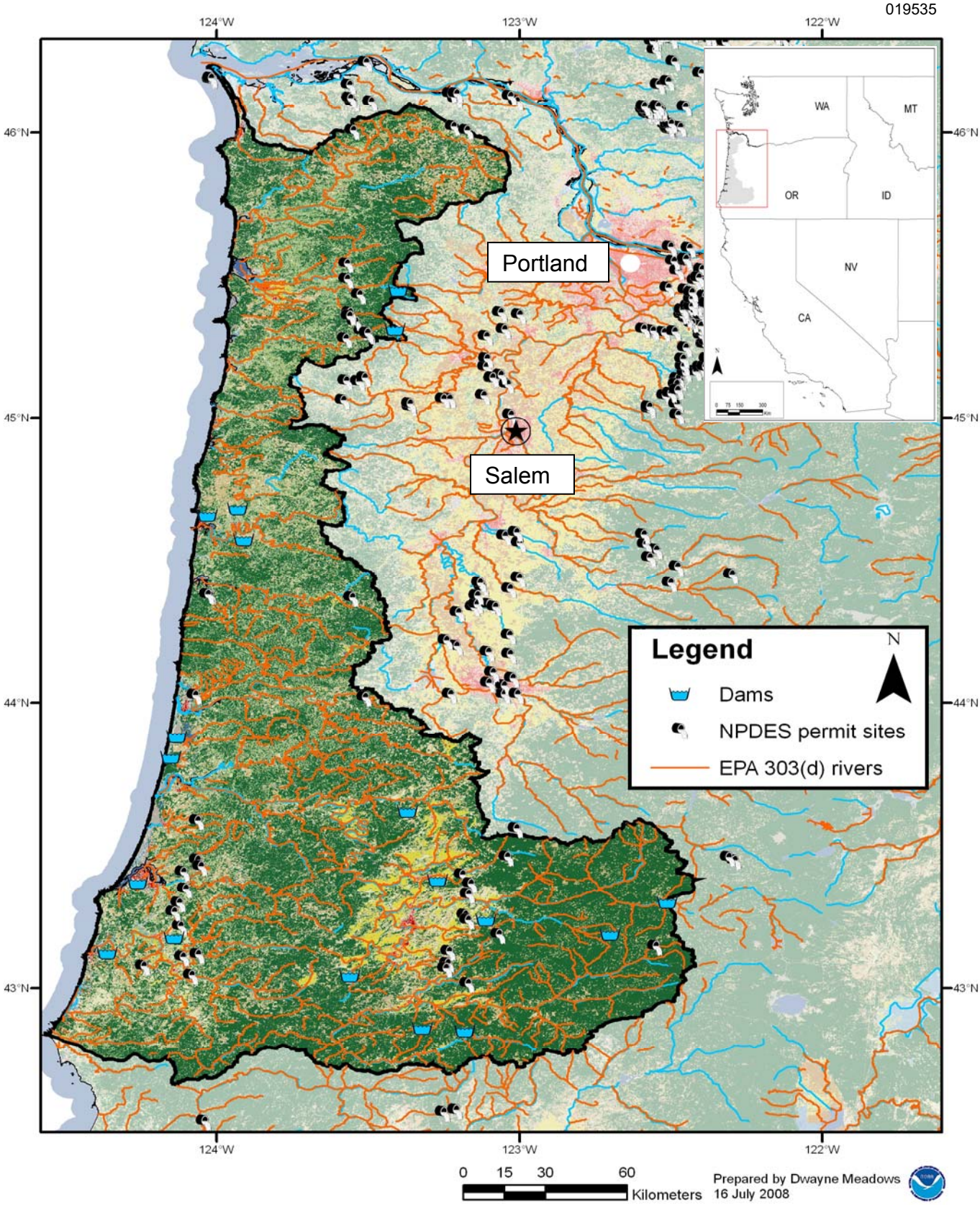

Figure 21. Oregon Coast Coho salmon distribution. Land Cover Class Legend in Figure 7.

Status and Trends

The OC coho salmon ESU was listed as a threatened species on February 11, 2008 (73 FR 7816). The most recent NMFS status review for the OC coho salmon ESU was conducted by the BRT in 2003, which assessed data through 2002. The abundance and productivity of OC coho salmon since the previous status review (Gustafson, Wainwright et al. 1997) represented some of the best and worst years on record. Yearly adult returns for this ESU were in excess of 160,000 natural spawners in 2001 and 2002, far exceeding the abundance observed for the past several decades. These encouraging increases in spawner abundance in 2000–2002 were preceded, however, by three consecutive brood years (the 1994–1996 brood years returning in 1997–1999, respectively) exhibiting recruitment failure. Recruitment failure is when a given year class of natural spawners fails to replace itself when its offspring return to the spawning grounds three years later. These three years of recruitment failure were the only such instances observed thus far in the entire 55-year abundance time series for OC coho salmon (although comprehensive population-level survey data have only been available since 1980). The encouraging 2000–2002 increases in natural spawner abundance occurred in many populations in the northern portion of the ESU, which were the most depressed at the time of the last review (Gustafson, Wainwright et al. 1997). Although encouraged by the increase in spawner abundance in 2000–2002, the BRT noted that the long-term trends in ESU productivity were still negative due to the low abundances observed during the 1990s (73 FR 7816). Since the BRT convened, the total abundance of natural spawners in the OC coho salmon ESU has declined each year (*i.e.*, 2003-2006). The abundance of total natural spawners in 2006 (111,025 spawners) was approximately 43% of the recent peak abundance in 2002 (255,372 spawners). In 2003, ESU-level productivity (evaluated in terms of the number of spawning recruits resulting from spawners three years earlier) was above replacement, and in 2004, productivity was approximately at replacement level. However, productivity was below replacement in 2005 and 2006, and dropped to the lowest level since 1991 in 2006.

Preliminary spawner survey data for 2007 (the average peak number of spawners per mile observed during random coho spawning surveys in 41 streams) suggest that the 2007-2008 return of Oregon Coast coho salmon is either: (1) much reduced from abundance levels in 2006, or (2) exhibiting delayed run timing from previous years. As of December 13, 2007, the average peak number of spawners per mile was below 2006 levels in 38 of 41 surveyed streams (ODFW 2007 *in* 73 FR 7816). It is possible that the timing of peak spawner abundance is delayed relative to previous years, and that increased spawner abundance in late December and January 2008 will compensate for the low levels observed thus far.

The recent five year geometric mean abundance (2002-2006) of approximately 152, 960 total natural spawners remains well above that of a decade ago (approximately 52,845 from 1992-1996). However, the decline in productivity from 2003 to 2006, despite generally favorable marine survival conditions and low harvest rates, is of concern. (73 FR 7816). The long-term trends in productivity in this ESU remain strongly negative.

Critical Habitat

Critical habitat was proposed for Oregon Coast coho salmon on December 14, 2004 (69 FR 74578). The final designation of critical habitat is included in the final rule published on February 11, 2008 (73 FR 7816). Approximately 6,568 stream miles (10,570 km) and 15 square miles (38.8 sq km) of lake habitat are designated critical habitat. Refer to the final rule for a detailed description of the watersheds included in the critical habitat, and a map for each subbasin.

Sockeye Salmon

Description of the Species

Sockeye salmon occur in the North Pacific and Arctic oceans and associated freshwater systems. This species ranges south as far as the Klamath River in California and northern Hokkaido in Japan, to as far north as far as Bathurst Inlet in the Canadian Arctic and the Anadyr River in Siberia. We discuss the distribution, life history diversity, status, and critical habitat of the two endangered and threatened sockeye species separately.

The species exhibits riverine and lake life history strategies, the latter of which may be either freshwater resident forms or anadromous forms. The vast majority of sockeye salmon spawn in outlet streams of lakes or in the lakes themselves. These "lake-type" sockeye use the lake environment for rearing for up to three years and then migrate to sea, returning to their natal lake to spawn after one to four years at sea. Some sockeye spawn in rivers, however, without lake habitat for juvenile rearing. Offspring of these riverine spawners tend to use the lower velocity sections of rivers as the juvenile rearing environment for one to two years, or may migrate to sea in their first year.

Certain populations of *O. nerka* become resident in the lake environment over long periods of time and are called kokanee or little redfish (Burgner 1991). Kokanee and sockeye often co-occur in many interior lakes, where access to the sea is possible but energetically costly. On the other hand, coastal lakes where the migration to sea is relatively short and energetic costs are minimal, rarely support kokanee populations.

Spawning generally occurs in late summer and autumn, but the precise time can vary greatly among populations. Males often arrive earlier than females on the spawning grounds, and will persist longer during the spawning period. Average fecundity ranges from about 2,000 to 2,400 eggs per female to 5,000 eggs, depending upon the population and average age of the female. Fecundity in kokanee is much lower and may range from about 300 to less than 2,000 eggs.

Incubation is a function of water temperatures, but generally lasts between 100 and roughly 200 days (Burgner 1991). After emergence, fry move rapidly downstream or upstream along the banks to the lake rearing area. Fry emerging from lakeshore or island spawning grounds may simply move along the shoreline of the lake (Burgner 1991). Juvenile salmonids rely on a variety of non-main channel habitats that are critical to rearing. All listed salmonids use shallow, low flow habitats at some point in their life cycle. Examples of off-channel habitat include alcoves, channel edge sloughs, overflow

channels, backwaters, terrace tributaries, off-channel dredge ponds, and braids (Anderson 1999; Swift III 1979).

Sockeye salmon survive only in aquatic ecosystems and depend on the quantity and quality of those aquatic systems. Sockeye salmon, like the other salmon NMFS has listed, have declined under the combined effects of overharvests in fisheries; competition from fish raised in hatcheries and native and non-native exotic species; dams that block their migrations and alter river hydrology; gravel mining that impedes their migration and alters the hydrogeomorphology of the rivers and streams that support juveniles; water diversions that deplete water levels in rivers and streams; destruction or degradation of riparian habitat that increase water temperatures in rivers and streams sufficient to reduce the survival of juvenile chum salmon; and land use practices (logging, agriculture, urbanization) that destroy wetland and riparian ecosystems. These activities and features introduce sediment, nutrients, biocides, metals, and other pollutants into surface and ground water and degrade water quality in the freshwater, estuarine, and coastal ecosystems throughout the Pacific Northwest.

Ozette Lake Sockeye Salmon

Distribution

This ESU includes all naturally spawned populations of sockeye salmon in Ozette Lake, Ozette River, Coal Creek, and other tributaries flowing into Ozette Lake, Washington. This ESU is composed of one historical population, with substantial substructuring of individuals into multiple spawning aggregations (Figure 22). The primary spawning aggregations occur in two beach locations – Allen's and Olsen's beaches, and in two tributaries Umbrella Creek and Big River (both tributary-spawning groups were initiated through a hatchery introduction program).

Sockeye salmon stock reared at the Makah Tribe's Umbrella Creek Hatchery were considered part of the ESU, but were not considered essential for recovery of the ESU. NMFS determined that it is presently not necessary to consider the progeny of intentional hatchery-wild or wild-wild crosses produced through the Makah Tribal hatchery program

as listed under the ESA (March 25, 1999, 64 FR 14528). However, once the hatchery fish return and spawn in the wild, their progeny are considered listed.

Life History

The sockeye salmon life history is one of the most complex of any Pacific salmon species because of its variable freshwater residency (one to three years in freshwater), and because the species has several different forms: fish that go to the ocean and back, fish that remain in freshwater, and fish that do both.

Adult Ozette Lake sockeye salmon enter Ozette Lake through the Ozette River from April to early August. Adults remain in the lake for an extended period of time (return April – August; spawn late October-February) before spawning on beaches or in the tributaries. Sockeye salmon spawn primarily in lakeshore upwelling areas in Ozette Lake (at Allen's Bay and Olsen's Beach). Minor spawning may occur below Ozette Lake in the Ozette River or in Coal Creek, a tributary of the Ozette River. Sockeye salmon do not presently spawn in tributary streams to Ozette Lake. However, they may have spawned there historically. Eggs and alevins remain in gravel redds until the fish emerge as fry in spring. Fry then migrate immediately to the limnetic zone in Ozette Lake, where the fish rear. After one year of rearing, in late spring, Ozette Lake sockeye salmon emigrate seaward as one + smolts. The majority of Ozette Lake sockeye salmon return to spawn as four year old adult fish, having spent one winter in fresh water and two winters at sea (NMFS 2005b). As prespawning mortality is unknown, it is unclear what escapement levels to the spawning aggregations may be.

In Ozette Lake, naturally high water temperatures and low summer flows in the Ozette River may affect migration by altering timing of the runs (La Riviere 1991). Declines in abundance have been attributed to a combination of introduced species, predation, loss of tributary populations, decline in quality of beach spawning habitat, temporarily unfavorable ocean conditions, habitat degradation, and excessive historical harvests (Jacobs, Larson et al. 1996)

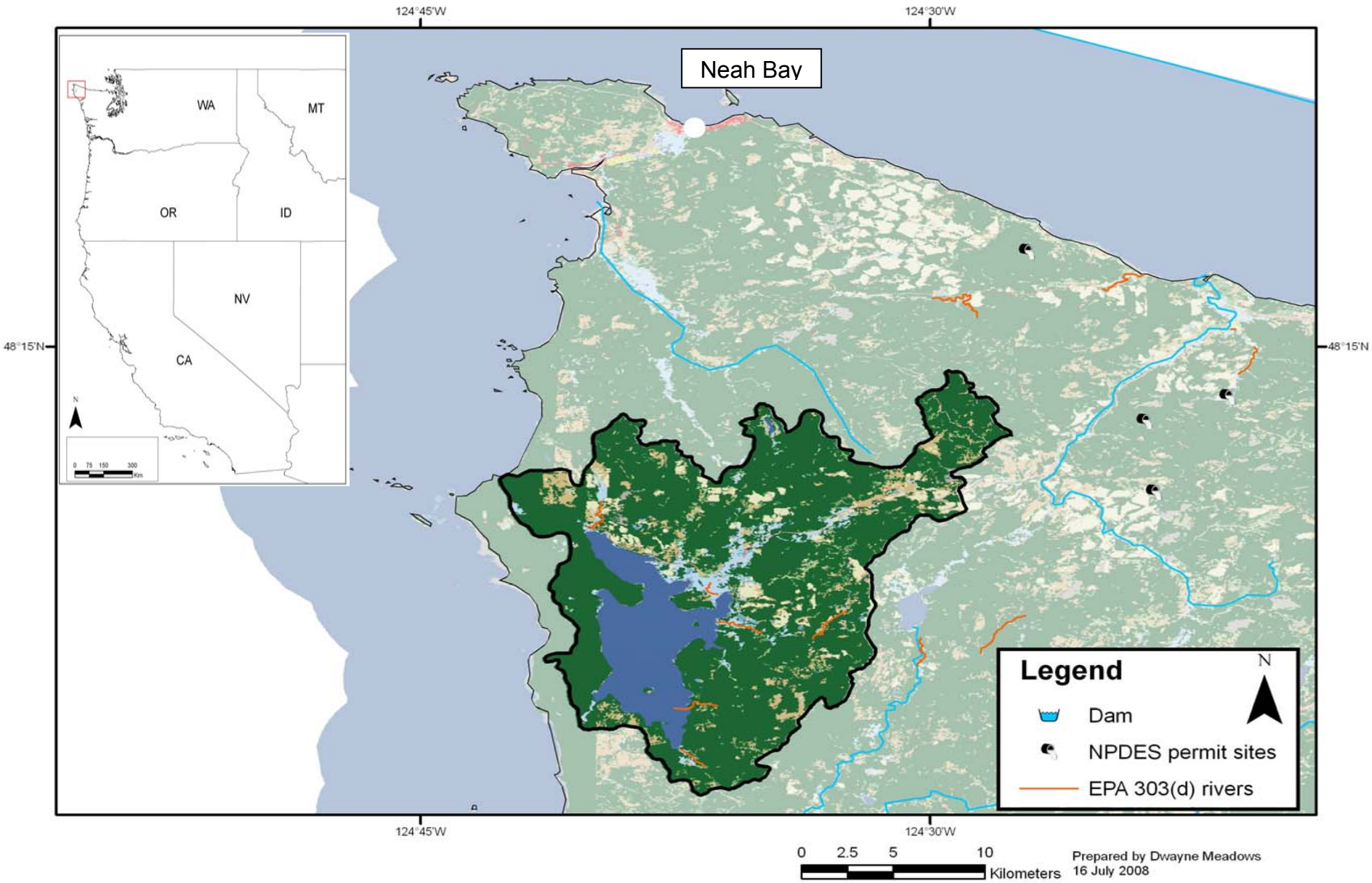

Figure 22. Ozette Lake Sockeye salmon distribution. Land Cover Class Legend in Figure 7.

Status and Trends

The Ozette Lake sockeye salmon ESU was originally listed as a threatened species in 1999 (64 FR 14528). This classification was retained following a species status review on June 28, 2005 (70 FR 37160).

The historical abundance of Ozette Lake sockeye salmon is poorly documented, but may have been as high as 50,000 individuals (Blum 1988). Nevertheless, the overall abundance of naturally–produced Ozette Lake sockeye salmon is believed to have declined substantially from historical levels. In the first study of lake escapement of Ozette Lake sockeye salmon (Kemmerich 1945), the run size entering the lake was estimated at a level of several thousand fish. These counts appear to be roughly double the current mean lake abundance, considering that they were likely conducted upstream from fisheries in or near to the Ozette River. Makah Fisheries Management (2000) concluded that there appears to be a substantial decline in the Tribal catch of Ozette Lake sockeye salmon beginning in the 1950s and a similar decline in the run size since the 1920s weir counts reported by Kemmerich (1945).

An updated NMFS analysis of total annual Ozette Lake sockeye salmon abundance (based on adult run size data presented in Jacobs et al. (1996)) indicates a trend in abundance averaging minus 2% per year over the period 1977 through 1998. The current tributary-based hatchery program was planned and initiated in response to the declining population trend identified for the Ozette Lake sockeye salmon population. The updated analysis also indicated that the most recent ten year (1989-98) trend for the population is plus 2% per year, improving from the minus 9.9% annual trend reported in Gustafson et al. (1999).

Data from the early 1900s indicate the spawning population was as large as 10,000 to 20,000 fish in large run years. Recent information on abundance of Ozette Lake sockeye salmon ESU comes from visual counts at a weir across the lake outlet. Therefore, the counts represent total run size. The estimates of total run size were revised upward after

the 1997 status review due to resampling of data using new video counting technology. The Makah Fisheries biologists estimate that previous counts of adult sockeye salmon returning to the lake were underestimates, and they have attempted to correct run-size estimates based on their assessments of human error and variations in interannual run timing (Makah Fisheries Management 2000) *in* (Good, Waples et al. 2005).

The most recent (1996-2003) run-size estimates range from a low of 1,609 in 1997 to a high of 5,075 in 2003, averaging approximately 3,600 sockeye per year (Hard, Jones et al. 1992; Haggerty, Ritchie et al. 2007). For return years 2000 to 2003, the four-year average abundance estimate was slightly over 4,600 sockeye (Haggerty, Ritchie et al. 2007). Because run-size estimates before 1998 are likely to be even more unreliable than recent counts, and new counting technology has resulted in an increase in estimated run sizes, no statistical estimation of trends is reported. The current trends in abundance are unknown for the beach spawning aggregations. Although overall abundance appears to have declined from historical levels, whether this resulted in fewer spawning aggregations, lower abundances at each aggregation, or both, is unknown (Good, Waples et al. 2005). It is estimated that between 35,500 and 121,000 spawners could be normally carried after full recovery (Hard, Jones et al. 1992).

There has been no harvest of Ozette Lake sockeye salmon for the past four brood cycle years (since 1982). Prior to that time, ceremonial and subsistence harvests by the Makah Tribe were low, ranging from 0 to 84 fish per year. Harvest has not been an important mortality factor for the population in over 35 years. In addition, due to the early river entry timing of returning Ozette Lake sockeye salmon (beginning in late April, with the peak returns prior to late-May to mid-June), the fish are not intercepted in Canadian and U.S. marine area fisheries directed at Fraser River sockeye salmon. There are currently no known marine area harvest impacts on Ozette Lake sockeye salmon.

According to Good et al. (2005) it appears that overall abundance is low for this population, which represents an entire ESU, and may be substantially below historical levels. The number of returning adults in the last few years has increased. However, a

substantial (but uncertain) fraction of these appear to be of hatchery origin. This condition leads to uncertainty regarding growth rate and productivity of the natural component of the ESU. Genetic integrity may have been compromised due to the artificial supplementation that has occurred in this population. Approximately one million sockeye have been released into the Ozette watershed from the late 1930s to present (Kemmerich 1945; Boomer 1995; Good, Waples et al. 2005).

Critical Habitat

On September 2, 2005, NMFS designated critical habitat for the Ozette Lake sockeye salmon ESU (70 FR 52630), and encompasses areas within the Hoh/Quillayute subbasin. Refer to the final rule for additional information on the watersheds within this subbasin, including a map of the area. Limiting factors for this species include siltation of beach-spawning habitat and logging.

Snake River Sockeye Salmon

Distribution

The SR sockeye salmon ESU includes all anadromous and residual sockeye from the SR basin Idaho, as well as artificially propagated sockeye salmon from the Redfish Lake Captive Broodstock Program (Figure 23).

Life History

SR sockeye salmon are unique compared to other sockeye salmon populations. Sockeye salmon returning to Redfish Lake in Idaho's Stanley Basin travel a greater distance from the sea (approximately 900 miles) to a higher elevation (6,500 ft) than any other sockeye salmon population and are the southern-most population of sockeye salmon in the world (Bjornn, Craddock et al. 1968). Stanley Basin sockeye salmon are separated by 700 or more river miles from two other extant upper Columbia River populations in the Wenatchee River and Okanogan River drainages. These latter populations return to lakes at substantially lower elevations (Wenatchee at 1,870 ft, Okanagon at 912 ft) and occupy different ecoregions.

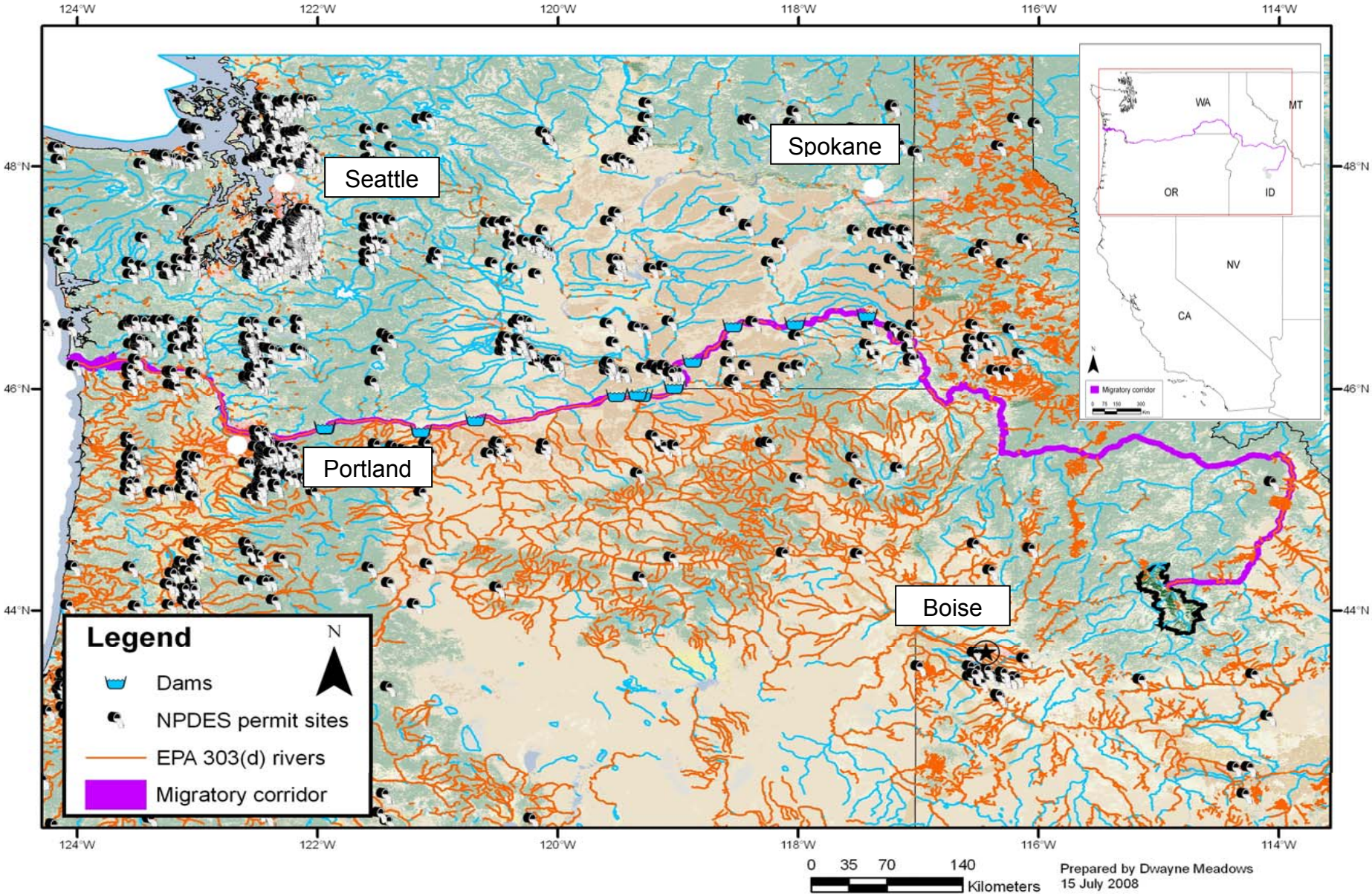

Figure 23. SR Sockeye Salmon distribution. Land Cover Class Legend in Figure 7.

Status and Trends

SR sockeye salmon were originally listed as endangered in 1991. Their classification was retained following a status review on June 28, 2005 (70 FR 37160). The only extant sockeye salmon population in the SR basin at the time of listing was that in Redfish Lake, in the Stanley Basin (upper Salmon River drainage) of Idaho. Other lakes in the SR basin historically supported sockeye salmon populations, including Wallowa Lake (Grande Ronde River drainage, Oregon), Payette Lake (Payette River drainage, Idaho) and Warm Lake (South Fork Salmon River drainage, Idaho) (Gustafson, Wainwright et al. 1997). These populations are now considered extinct. Although kokanee, a resident form of *O. nerka*, occur in numerous lakes in the SR basin, resident *O. nerka* were not considered part of the species at the time of listing in 1991. Subsequent to the 1991 listing, a residual form of sockeye residing in Redfish Lake was identified. The residuals are non-anadromous. They complete their entire life cycle in freshwater, but spawn at the same time and in the same location as anadromous sockeye salmon. In 1993, NMFS determined that residual sockeye salmon in Redfish Lake were part of the SR sockeye salmon. Also, artificially propagated sockeye salmon from the Redfish Lake Captive Propagation program are considered part of this species (June 28, 2005, 70 FR 37160).

NMFS has determined that this artificially propagated stock is genetically no more than moderately divergent from the natural population (Good, Waples et al. 2005). Five lakes in the Stanley Basin historically contained sockeye salmon: Alturas, Pettit, Redfish, Stanley and Yellowbelly (Bjornn, Craddock et al. 1968). It is generally believed that adults were prevented from returning to the Sawtooth Valley from 1910 to 1934 by Sunbeam Dam. Sunbeam Dam was constructed on the Salmon River approximately 20 miles downstream of Redfish Lake. Whether or not Sunbeam Dam was a complete barrier to adult migration remains unknown. It has been hypothesized that some passage occurred while the dam was in place, allowing the Stanley Basin population or populations to persist (Bjornn, Craddock et al. 1968; Matthews and Waples 1991).

Adult returns to Redfish Lake during the period 1954 through 1966 ranged from 11 to 4,361 fish (Bjornn, Craddock et al. 1968). Sockeye salmon in Alturas Lake were extirpated in the early 1900s as a result of irrigation diversions, although residual sockeye may still exist in the lake (Chapman and Witty 1993). From 1955 to 1965, the Idaho Department of Fish and Game eradicated sockeye salmon from Pettit, Stanley, and Yellowbelly lakes, and built permanent structures on each of the lake outlets that prevented re-entry of anadromous sockeye salmon (Chapman and Witty 1993). In 1985, 1986, and 1987, 11, 29, and 16 sockeye, respectively, were counted at the Redfish Lake weir (Good, Waples et al. 2005). Only 18 natural origin sockeye salmon have returned to the Stanley Basin since 1987. The first adult returns from the captive brood stock program returned to the Stanley Basin in 1999. From 1999 through 2005, a total of 345 captive brood program adults that had migrated to the ocean returned to the Stanley Basin.

Recent annual abundances of natural origin sockeye salmon in the Stanley Basin have been extremely low. No natural origin anadromous adults have returned since 1998 and the abundance of residual sockeye salmon in Redfish Lake is unknown. This species is entirely supported by adults produced through the captive propagation program at the present time. Current smolt-to-adult survival of sockeye originating from the Stanley Basin lakes is rarely greater than 0.3% (Hebdon, Kline et al. 2004). Based on current abundance and productivity information, the SR sockeye salmon ESU does not meet the ESU-level viability criteria (non-negligible risk of extinction over a 100-year time period).

Critical Habitat

Critical habitat for these salmon was designated on December 28, 1993 (58 FR 68543). Designated habitats encompasses the waters, waterway bottoms, and adjacent riparian zones of specified lakes and river reaches in the Columbia River that are or were accessible to listed SR salmon (except reaches above impassable natural falls, and Dworshak and Hells Canyon Dams). Adjacent riparian zones are defined as those areas within a horizontal distance of 300 ft from the normal line of high water of a stream

channel or from the shoreline of a standing body of water. Designated critical habitat areas include the Columbia River from a straight line connecting the west end of the Clatsop jetty (Oregon side) and the west end of the Peacock jetty (Washington side), all river reaches from the estuary upstream to the confluence of the SR, and all SR reaches upstream to the confluence of the Salmon River; all Salmon River reaches to Alturas Lake Creek; Stanley, Redfish, yellow Belly, Pettit, and Alturas Lakes (including their inlet and outlet creeks); Alturas Lake Creek and that portion of Valley Creek between Stanley Lake Creek; and the Salmon River. Limiting factors identified for SR sockeye include: (1) Reduced tributary stream flow, (2) impaired tributary passage and blocks to migration, (3) degraded water quality; and (4) mainstem Columbia River hydropower system mortality.

Steelhead

Description of the Species

Steelhead are native to Pacific Coast streams extending from Alaska south to northwestern Mexico (Moyle 1976; Gustafson, Wainwright et al. 1997; Good, Waples et al. 2005). We discuss the distribution, life history diversity, status, and critical habitat of the 11 endangered and threatened steelhead species separately.

Steelhead can be divided into two basic run-types: the stream-maturing type, or summer steelhead and the ocean-maturing type, or winter steelhead. The stream-maturing type or summer steelhead enters fresh water in a sexually immature condition. It requires several months in freshwater to mature and spawn. The ocean-maturing type or winter steelhead enters freshwater with well-developed gonads and spawns shortly after river entry. Variations in migration timing exist between populations. Some river basins have both summer and winter steelhead, while others only have one run-type.

Summer steelhead enter freshwater between May and October in the Pacific Northwest (Nickelsen, Nicholas et al. 1992; Busby, Wainwright et al. 1996). They require cool, deep holding pools during summer and fall, prior to spawning (Nickelsen, Nicholas et al. 1992). They migrate inland toward spawning areas, overwinter in the larger rivers,

resume migration in early spring to natal streams, and then spawn (Meehan and Bjornn 1991; Nickelsen, Nicholas et al. 1992) in January and February (Barnhart 1986). Winter steelhead enter freshwater between November and April in the Pacific Northwest (Nickelsen, Nicholas et al. 1992; Busby, Wainwright et al. 1996), migrate to spawning areas, and then spawn, generally in April and May (Barnhart 1986). Some adults, however, do not enter some coastal streams until spring, just before spawning (Meehan and Bjornn 1991).

There is a high degree of overlap in spawn timing between populations regardless of run type (Busby, Wainwright et al. 1996). Difficult field conditions at that time of year and the remoteness of spawning grounds contribute to the relative lack of specific information on steelhead spawning. Unlike Pacific salmon, steelhead are iteroparous, or capable of spawning more than once before death (Busby, Wainwright et al. 1996), although steelhead rarely spawn more than twice before dying; most that do so are females (Nickelsen, Nicholas et al. 1992). Iteroparity is more common among southern steelhead populations than northern populations (Busby, Wainwright et al. 1996).

After two to three weeks, in late spring, and following yolk sac absorption, alevins emerge from the gravel and begin actively feeding. After emerging from the gravel, fry usually inhabit shallow water along banks of perennial streams. Fry occupy stream margins (Nickelsen, Nicholas et al. 1992). Summer rearing takes place primarily in the faster parts of pools, although young-of-the-year are abundant in glides and riffles. Winter rearing occurs more uniformly at lower densities across a wide range of fast and slow habitat types. Some older juveniles move downstream to rear in larger tributaries and mainstem rivers (Nickelsen, Nicholas et al. 1992).

Juvenile steelhead migrate little during their first summer and occupy a range of habitats featuring moderate to high water velocity and variable depths (Bisson, Sullivan et al. 1988). Juvenile steelhead feed on a wide variety of aquatic and terrestrial insects (Chapman and Bjornn 1969), and older juveniles sometimes prey on emerging fry. Steelhead hold territories close to the substratum where flows are lower and sometimes

counter to the main stream; from these, they can make forays up into surface currents to take drifting food (Kalleberg 1958). Juveniles rear in freshwater from one to four years, then smolt and migrate to the ocean in March and April (Barnhart 1986). Winter steelhead juveniles generally smolt after two years in freshwater (Busby, Wainwright et al. 1996). Juvenile steelhead tend to migrate directly offshore during their first summer from whatever point they enter the ocean rather than migrating along the coastal belt as salmon do. During the fall and winter, juveniles move southward and eastward (Hartt and Dell 1986) *op. cit.* (Nickelsen, Nicholas et al. 1992). Steelhead typically reside in marine waters for two or three years prior to returning to their natal stream to spawn as four or five year olds. Juvenile salmonids rely on a variety of non-main channel habitats that are critical to rearing. All listed salmonids use shallow, low flow habitats at some point in their life cycle. Examples of off-channel habitat include alcoves, channel edge sloughs, overflow channels, backwaters, terrace tributaries, off-channel dredge ponds, and braids (Anderson 1999; Swift III 1979).

Status and Trends

Steelhead, like the other salmon discussed previously, survive only in aquatic ecosystems and, therefore, depend on the quantity and quality of those aquatic systems. Steelhead, like the other salmon NMFS has listed, have declined under the combined effects of overharvests in fisheries; competition from fish raised in hatcheries and native and non-native exotic species; dams that block their migrations and alter river hydrology; gravel mining that impedes their migration and alters the hydrogeomorphology of the rivers and streams that support juveniles; water diversions that deplete water levels in rivers and streams; destruction or degradation of riparian habitat that increase water temperatures in rivers and streams sufficient to reduce the survival of juvenile chum salmon; and land use practices (logging, agriculture, urbanization) that destroy wetland and riparian ecosystems. These same activities and features introduce sediment, nutrients, biocides, metals, and other pollutants into surface and ground water and degrade water quality in the freshwater, estuarine, and coastal ecosystems throughout the Pacific Northwest.

Central California Coast Steelhead

Distribution

The Central California Coast (CCC) steelhead DPS includes all naturally spawned anadromous *O. mykiss* (steelhead) populations below natural and manmade impassable barriers in California streams from the Russian River (inclusive) to Aptos Creek (inclusive), and the drainages of San Francisco, San Pablo, and Suisun Bays eastward to Chipps Island at the confluence of the Sacramento and San Joaquin Rivers (Figure 24). Tributary streams to Suisun Marsh including Suisun Creek, Green Valley Creek, and an unnamed tributary to Cordelia Slough (commonly referred to as Red Top Creek), excluding the Sacramento-San Joaquin River Basin, as well as two artificial propagation programs: the Don Clausen Fish Hatchery, and Kingfisher Flat Hatchery/ Scott Creek (Monterey Bay Salmon and Trout Project) steelhead hatchery programs. Table 18 identifies populations within the CCC Steelhead salmon ESU, their abundances, and hatchery input.

Table 18. CCC Steelhead salmon populations, abundances, and hatchery contributions (Good, Waples et al. 2005).

Basin	Historical Abundance	Most Recent Spawner Abundance	Hatchery Abundance Contributions
Russian River	65,000 (1970)	1,750-7,000 (1994)	Unknown
Lagunitas	Unknown	400-500 (1990s)	Unknown
San Gregorio	1,000 (1973)	Unknown	Unknown
Waddell Creek	481	150 (1994)	Unknown
Scott Creek	Unknown	<100 (1991)	Unknown
San Vicente Creek	150 (1982)	50 (1994)	Unknown
San Lorenzo River	20,000	<150 (1994)	Unknown
Soquel Creek	500-800 (1982)	<100 (1991)	Unknown
Aptos Creek	200 (1982)	50-75 (1994)	Unknown
Total	**94,000**	**2,400-8,125**	

Life History

Only winter steelhead are found in this DPS and those to the south. Migration and spawn timing are similar to adjacent steelhead populations. There is little other life history information for steelhead in this DPS.

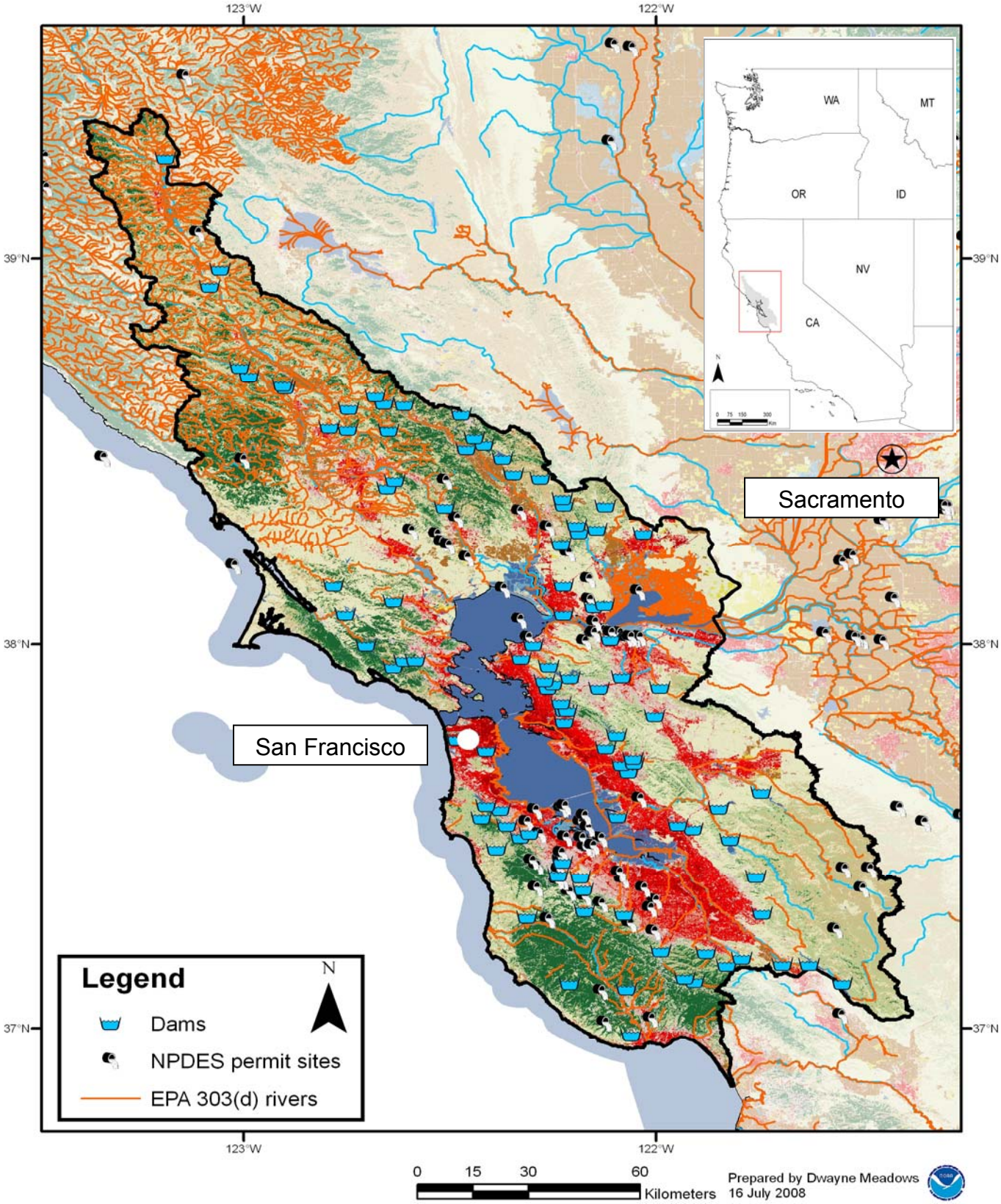

Figure 24. CCC steelhead. Land Cover Class Legend in Figure 7.

Status and Trends

The CCC steelhead DPS was listed as a threatened species on August 18, 1997(62 FR 43937). Its threatened status was reaffirmed on January 5, 2006 (71 FR 834). Busby et al. (1996) reported one estimate of historical (pre-1960s) abundance. Shapovalov and Taft (1954) described an average of about 500 adults in Waddell Creek (Santa Cruz County) for the 1930s and early 1940s. Johnson (1964) estimated a run size of 20,000 steelhead in the San Lorenzo River before 1965. The CDFG (1965) estimated an average run size of 94,000 steelhead for the entire DPS, for the period 1959–1963. The analysis by CDFG (1965) was compromised for many basins, as the data did not exist for the full 5-year analytical period. The authors of CDFG (1965) state that "estimates given here which are based on little or no data should be used only in outlining the major and critical factors of the resource."

Recent data for the Russian and San Lorenzo rivers (Reavis 1991; CDFG 1994; Shumann 1994) suggested that these basins had populations smaller than 15% of their size 30 years earlier. These two basins were thought to have originally contained the two largest steelhead populations in the CCC steelhead ESU.

A status review update in 1997 (Gustafson, Wainwright et al. 1997) concluded that slight increases in abundance occurred in the three years following the status review. However, the analyses on which these conclusions were based had various problems. They include the inability to distinguish hatchery and wild fish, unjustified expansion factors, and variance in sampling efficiency on the San Lorenzo River. Presence-absence data indicated that most (82%) sampled streams (a subset of all historical steelhead streams) had extant populations of juvenile *O. mykiss* (Adams 2000; Good, Waples et al. 2005).

The majority (69%) of BRT votes were for "likely to become endangered," and another 25% were for "in danger of extinction". Abundance and productivity were of relatively high concern (as a contributing factor to risk of extinction), and spatial structure was also of concern. Predation by pinnipeds at river mouths and during the ocean phase was noted

as a recent development posing significant risk. There were no time-series data for the CCC steelhead DPS. A variety of evidence suggested the ESU's largest run (the Russian River winter steelhead run) has been, and continues to be, reduced in size. Concern was also expressed about populations in the southern part of the DPS's range—notably those in Santa Cruz County and the South Bay area (Good, Waples et al. 2005).

Critical Habitat

Critical habitat was designated for the CCC steelhead DPS on September 2, 2005 (70 FR 52488), and includes areas within the following hydrologic units: Russian River, Bodega, Marin Coastal, San Mateo, Bay Bridges, Santa Clara, San Pablo, Big Basin. Refer to the final rule for a more detailed description of critical habitat, including a map for each hydrologic unit.

California Central Valley Steelhead

Distribution

California CV steelhead occupy the Sacramento and San Joaquin Rivers and its tributaries (Figure 25).

Life History

California CV steelhead are considered winter steelhead by the CDFG, although "three distinct runs," including summer steelhead, may have occurred there as recently as 1947(CDFG 1995; McEwan and Jackson 1996). Steelhead within this DPS have the longest freshwater migration of any population of winter steelhead. There is essentially a single continuous run of steelhead in the upper Sacramento River. River entry ranges from July through May, with peaks in September and February. Spawning begins in late December and can extend into April (McEwan and Jackson 1996).

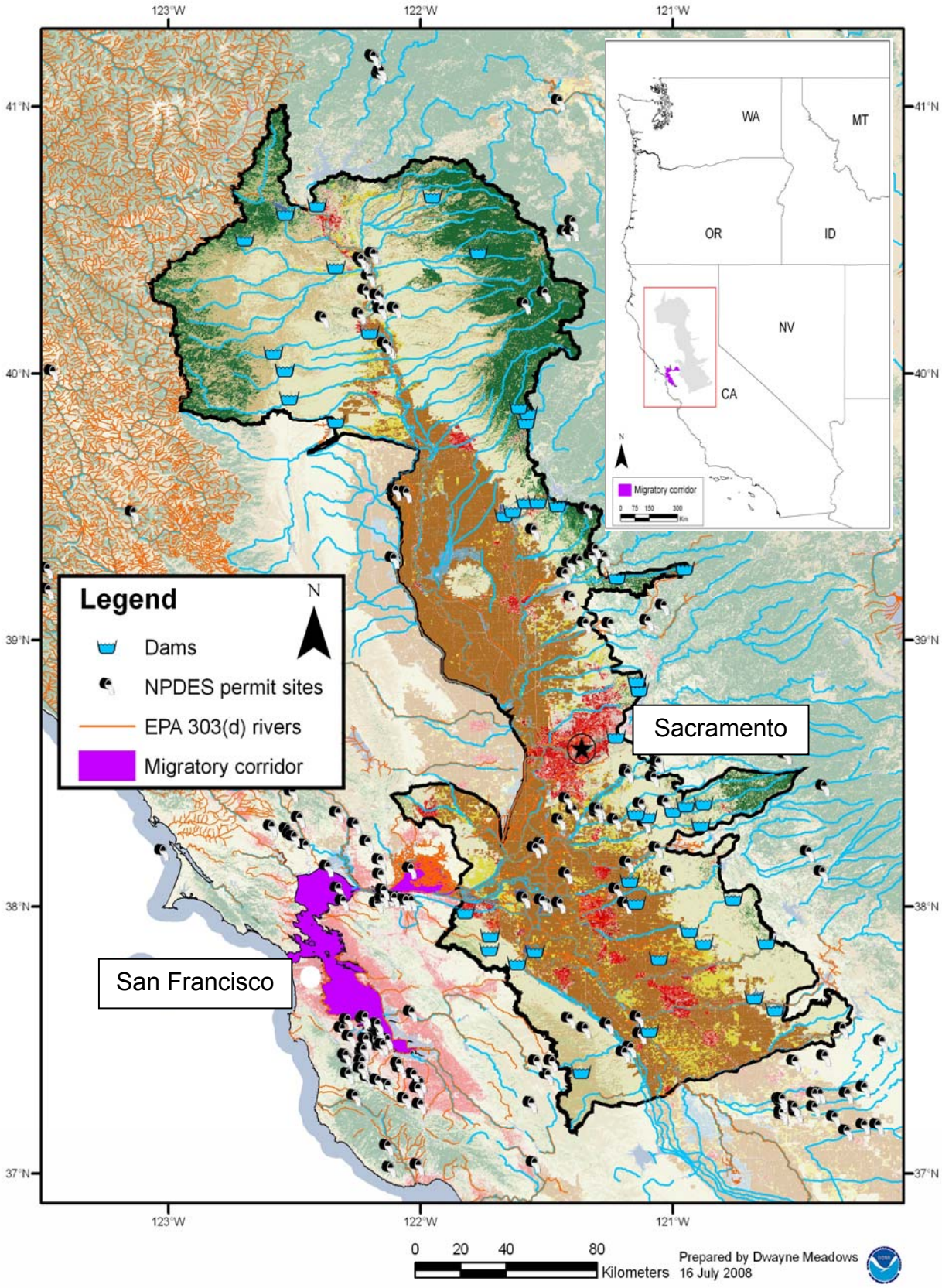

Figure 25. California CV steelhead distribution. Land Cover Class Legend in Figure 7.

Status and Trends

California CV steelhead were listed as threatened on March 19, 1998. Their classification was retained following a status review on January 5, 2006 (71 FR 834). This DPS consists of steelhead populations in the Sacramento and San Joaquin River (inclusive of and downstream of the Merced River) basins in California's CV. Steelhead historically were well distributed throughout the Sacramento and San Joaquin Rivers (Busby, Wainwright et al. 1996). Steelhead were found from the upper Sacramento and Pit River systems (now inaccessible due to Shasta and Keswick Dams), south to the Kings and possibly the Kern River systems (now inaccessible due to extensive alteration from water diversion projects), and in both east- and west-side Sacramento River tributaries (Yoshiyama, Gerstung et al. 1996). The present distribution has been greatly reduced (McEwan and Jackson 1996). The California Advisory Committee on Salmon and Steelhead (1988) reported a reduction of steelhead habitat from 6,000 miles historically to 300 miles today. Historically, steelhead probably ascended Clear Creek past the French Gulch area, but access to the upper basin was blocked by Whiskeytown Dam in 1964 (Yoshiyama, Gerstung et al. 1996). Steelhead also occurred in the upper drainages of the Feather, American, Yuba, and Stanislaus Rivers which are now inaccessible (McEwan and Jackson 1996; Yoshiyama, Gerstung et al. 1996).

Historic CV steelhead run size is difficult to estimate given limited data, but may have approached one to two million adults annually (McEwan 2001). By the early 1960s, the steelhead run size had declined to about 40,000 adults (McEwan 2001). Over the past 30 years, the naturally spawned steelhead populations in the upper Sacramento River have declined substantially. Hallock et al. (1961) estimated an average of 20,540 adult steelhead in the Sacramento River, upstream of the Feather River, through the 1960s. Steelhead counts at Red Bluff Diversion Dam declined from an average of 11,187 for the period of 1967 to 1977, to an average of approximately 2,000 through the early 1990s, with an estimated total annual run size for the entire Sacramento-San Joaquin system, based on Red Bluff Diversion Dam counts, to be no more than 10,000 adults (McEwan

and Jackson 1996; McEwan 2001). Steelhead escapement surveys at Red Bluff Diversion Dam ended in 1993 due to changes in dam operations.

The only consistent data available on steelhead numbers in the San Joaquin River basin come from CDFG mid-water trawling samples collected on the lower San Joaquin River at Mossdale. These data indicate a decline in steelhead numbers in the early 1990s, which have remained low through 2002 (CDFG 2003). In 2004, a total of 12 steelhead smolts were collected at Mossdale (CDFG unpublished data).

Existing wild steelhead stocks in the CV are mostly confined to the upper Sacramento River and its tributaries, including Antelope, Deer, and Mill Creeks and the Yuba River. Populations may exist in Big Chico and Butte Creeks. A few wild steelhead are produced in the American and Feather Rivers (McEwan and Jackson 1996).

Snorkel surveys from 1999 to 2002 indicate that steelhead are present in Clear Creek (J. Newton, FWS, pers. comm. 2002, as reported *in* Good et al. (2005). Because of the large resident *O. mykiss* population in Clear Creek, steelhead spawner abundance has not been estimated.

Until recently, steelhead were thought to be extirpated from the San Joaquin River system. Recent monitoring has detected small self-sustaining populations of steelhead in the Stanislaus, Mokelumne, Calaveras, and other streams previously thought to be void of steelhead (McEwan 2001). On the Stanislaus River, steelhead smolts have been captured in rotary screw traps at Caswell State Park and Oakdale each year since 1995 (Demko and Cramer 2000). It is possible that naturally spawning populations exist in many other streams. However, these populations are undetected due to lack of monitoring programs (IEPSPWT 1999).

The majority (66%) of BRT votes was for “in danger of extinction,” and the remainder was for “likely to become endangered”. Abundance, productivity, and spatial structure were of highest concern. Diversity considerations were of significant concern. The BRT

was concerned with what little new information was available and indicated that the monotonic decline in total abundance and in the proportion of wild fish in the California CV steelhead ESU was continuing.

Critical Habitat

Critical habitat was designated for this species on September 2, 2005. The critical habitat designation for this DPS identifies PCEs that include sites necessary to support one or more life stages of steelhead. Specific sites include: (1) Freshwater spawning, (2) freshwater rearing, (3) freshwater migration, (4) estuarine areas free of obstruction, (5) nearshore marine areas free of obstructions, and (6) offshore marine areas with good water quality. The physical or biological features that characterize these sites include water quality and quantity, natural cover, and adequate forage.

Lower Columbia River Steelhead

Distribution

LCR steelhead DPS includes 23 historical anadromous populations in four MPGs. This DPS includes naturally-produced steelhead returning to Columbia River tributaries on the Washington side between the Cowlitz and Wind rivers in Washington and on the Oregon side between the Willamette and Hood rivers, inclusive (Figure 26). In the Willamette River, the upstream boundary of this species is at Willamette Falls. This species includes both winter and summer steelhead. Two hatchery populations are included in this species, the Cowlitz Trout Hatchery winter-run stock and the Clackamas River stock. However, neither hatchery population was listed as threatened.
Table 19 identifies populations within the LCR Steelhead salmon DPS, their abundances, and hatchery input.

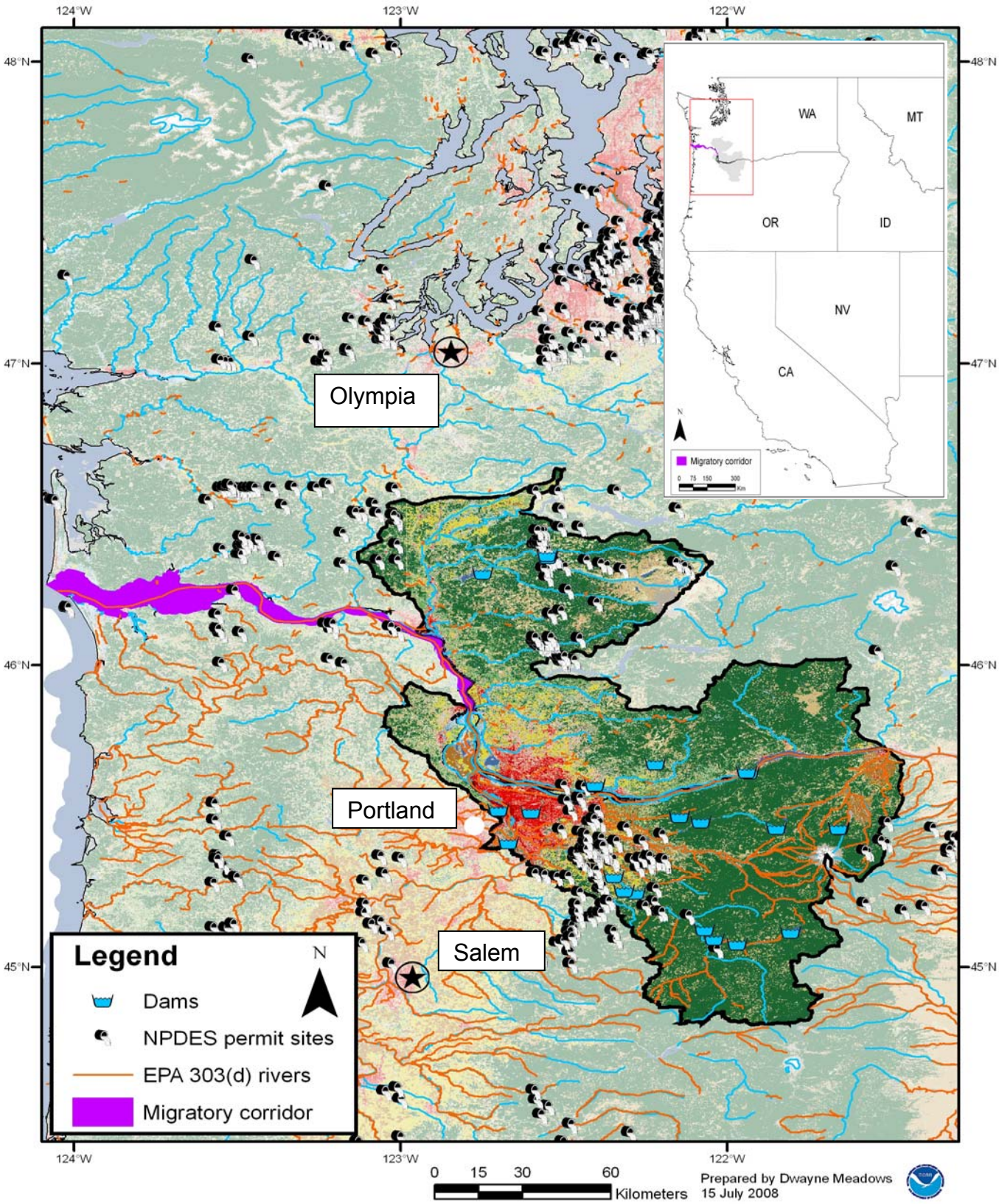

Figure 26. Lower Columbia River Steelhead distribution. Land Cover Class Legend in Figure 7.

Table 19. LCR Steelhead salmon populations, abundances, and hatchery contributions (Good, Waples et al. 2005).

Population	Historical Abundance	Most Recent Spawner Abundance	Hatchery Abundance Contributions
Cispus River	Unknown	Unknown	Unknown
Tilton River	Unknown	2,787	~73%
Upper Cowlitz River	Unknown	Unknown	Unknown
Lower Cowlitz River	1,672	Unknown	Unknown
Coweeman River	2,243	466	~50%
South Fork Toutle River	2,627	504	~2%
North Fork Toutle River	3,770	196	0%
Kalama River-winter run	554	726	0%
Kalama River-summer run	3,165	474	~32%
North Fork Lewis River-winter run	713	Unknown	Unknown
North Fork Lewis River-summer run	Unknown	Unknown	Unknown
East Fork Lewis River-winter run	3,131	Unknown	Unknown
East Fork Lewis River-summer run	422	434	~25%
Salmon Creek	Unknown	Unknown	Unknown
Washougal River-winter run	2,497	323	0%
Washougal River-summer run	1,419	264	~8%
Clackamas River	Unknown	560	41%
Sandy River	Unknown	977	42%
Lower Columbia gorge tributaries	793	Unknown	Unknown
Upper Columbia gorge tributaries	243	Unknown	Unknown
Hood River-winter run	Unknown	756	~52%
Hood River-summer run	Unknown	931	~83%
Wind River	2,288	472	~5%
Total	**25,537 (min)**	**9,870 (min)**	

Life History

Summer steelhead return to freshwater from May to November, entering the Columbia River in a sexually immature condition and requiring several months in freshwater before spawning. Winter steelhead enter freshwater from November to April. They are close to sexual maturation and spawn shortly after arrival in their natal stream. Where both races spawn in the same stream, summer steelhead tend to spawn at higher elevations than the winter forms. Juveniles rear in freshwater (stream-type life history).

Status and Trends

LCR steelhead were listed as threatened on March 19, 1998 (63 FR 13347), and reaffirmed as threatened on January 5, 2006 (71 FR 834). The 1998 status review noted that this ESU is characterized by populations at low abundance relative to historical levels, significant population declines since the mid-1980s, and widespread occurrence of

hatchery fish in naturally-spawning steelhead populations. During this review NMFS was unable to identify any natural populations that would be considered at low risk.

All populations declined from 1980 to 2000, with sharp declines beginning in 1995. Historical counts in some of the larger tributaries (Cowlitz, Kalama, and Sandy Rivers) suggest the population probably exceeded 20,000 fish. During the 1990s, fish abundance dropped to 1,000 to 2,000 fish. Recent abundance estimates of natural-origin spawners range from completely extirpated for some populations above impassable barriers to over 700 for the Kalama and Sandy winter-run populations. A number of the populations have a substantial fraction of hatchery-origin spawners in spawning areas. These populations are hypothesized to be sustained largely by hatchery production. Exceptions are the Kalama, the Toutle, and East Fork Lewis winter-run populations. These populations have relatively low recent mean abundance estimates with the largest being the Kalama (geometric mean of 728 spawners).

According to Good et al. (2005), most populations are at relatively low abundance. Those with adequate data for modeling are estimated to have a relatively high extinction probability. Some populations, particularly summer run, have shown higher return in the last two to three years. Many of the long-and short-term trends in abundance of individual populations are negative, some severely so. The trend in natural spawners is <1; indicating the population is not replacing itself and in decline. Spatial structure has been substantially reduced by the loss of access to the upper portions of some basins due to tributary hydro development. Finally, a number of the populations have a substantial fraction of hatchery-origin spawners. Exceptions are the Kalama, North and South Fork Toutle, and East Fork Lewis winter-run populations, which have few hatchery fish spawning in natural spawning areas.

Over 73% of the BRT votes for this species fell in the “likely to become endangered” category. There were small minorities falling in the “danger of extinction” and “not likely to become endangered” categories. The BRT found moderate risks in all VSP

categories, with mean risk matrix scores ranging from moderately low for spatial structure to moderately high for abundance and productivity (population growth rate).

Critical Habitat

Critical habitat was designated for this species on September 2, 2005 (70 FR 52488). The critical habitat designation for this DPS identifies PCEs that include sites necessary to support one or more steelhead life stages. Specific sites include: (1) Freshwater spawning, (2) freshwater rearing, (3) freshwater migration, (4) estuarine areas free of obstruction, (5) nearshore marine areas free of obstructions, and (6) offshore marine areas with good water quality. The physical or biological features that characterize these sites include water quality and quantity, natural cover, forage, adequate passage conditions, and floodplain connectivity.

Of 47 subbasins reviewed in NMFS' assessment of critical habitat for the LCR steelhead, 34 subbasins were rated as having a high conservation value. Eleven subbasins were rated as having a medium value and two were rated as having a low value to the conservation of the DPS. Limiting factors identified for LCR steelhead include: (1) Degraded floodplain and steam channel structure and function, (2) reduced access to spawning/rearing habitat, (3) altered streamflow in tributaries, (4) excessive sediment and elevated water temperatures in tributaries, and (5) hatchery impacts (NMFS 2005b). The above conditions also introduce sediment, nutrients, biocides, metals, and other pollutants into surface and ground water and degrade water quality in the freshwater, estuarine, and coastal ecosystems throughout the Pacific Northwest.

Middle Columbia River Steelhead

Distribution

Middle Columbia River (MCR) steelhead DPS includes anadromous populations in Oregon and Washington subbasins upstream of the Hood and Wind River systems to and including the Yakima River (Figure 27). There are four MPGs with 17 populations in this DPS. Steelhead from the SR Basin (described elsewhere) are excluded. This

species includes the only populations of inland winter steelhead in the U.S., in the Klickitat River and Fifteenmile Creek (Busby, Wainwright et al. 1996).

Two hatchery populations are considered part of this species, the Deschutes River stock and the Umatilla River stock. Listing for neither of these stocks was considered warranted. MCR steelhead occupy the intermontane region which includes some of the driest areas of the Pacific Northwest, generally receiving less than 15.7 inches of rainfall annually. Vegetation is of the shrub-steppe province, reflecting the dry climate and harsh temperature extremes. Because of this habitat, occupied by the species, factors contributing to the decline include agricultural practices, especially grazing, and water diversions and withdrawals. In addition, hydropower development has impacted the species by preventing these steelhead from migrating to habitat above dams, and by killing some of them when they try to migrate through the Columbia River hydroelectric system. Table 20 identifies populations within the MCR Steelhead salmon DPS, their abundances, and hatchery input.

Table 20. MCR Steelhead salmon populations, abundances, and hatchery contributions (Good, Waples et al. 2005).

Population	Historical Abundance	Most Recent Spawner Abundance	Hatchery Abundance Contributions
Klickitat River	Unknown	97-261 reds	Unknown
Yakima River	Unknown	1,058-4,061	97%
Fifteenmile Creek	Unknown	2.87 rpm	100%
Deschutes River	Unknown	10,026-21,457	38%
John Day upper main stream	Unknown	926-4,168	96%
John Day lower main stream	Unknown	1.4 rpm	0%
John Day upper north fork	Unknown	2.57 rpm	0%
John Day lower north fork	Unknown	.52 rpm	0%
John Day middle fork	Unknown	3.7 rpm	0%
John Day south fork	Unknown	2.52 rpm	0%
Umatilla River	Unknown	1,480-5,157	60%
Touchet River	Unknown	273-527	84%
Total	Unknown		

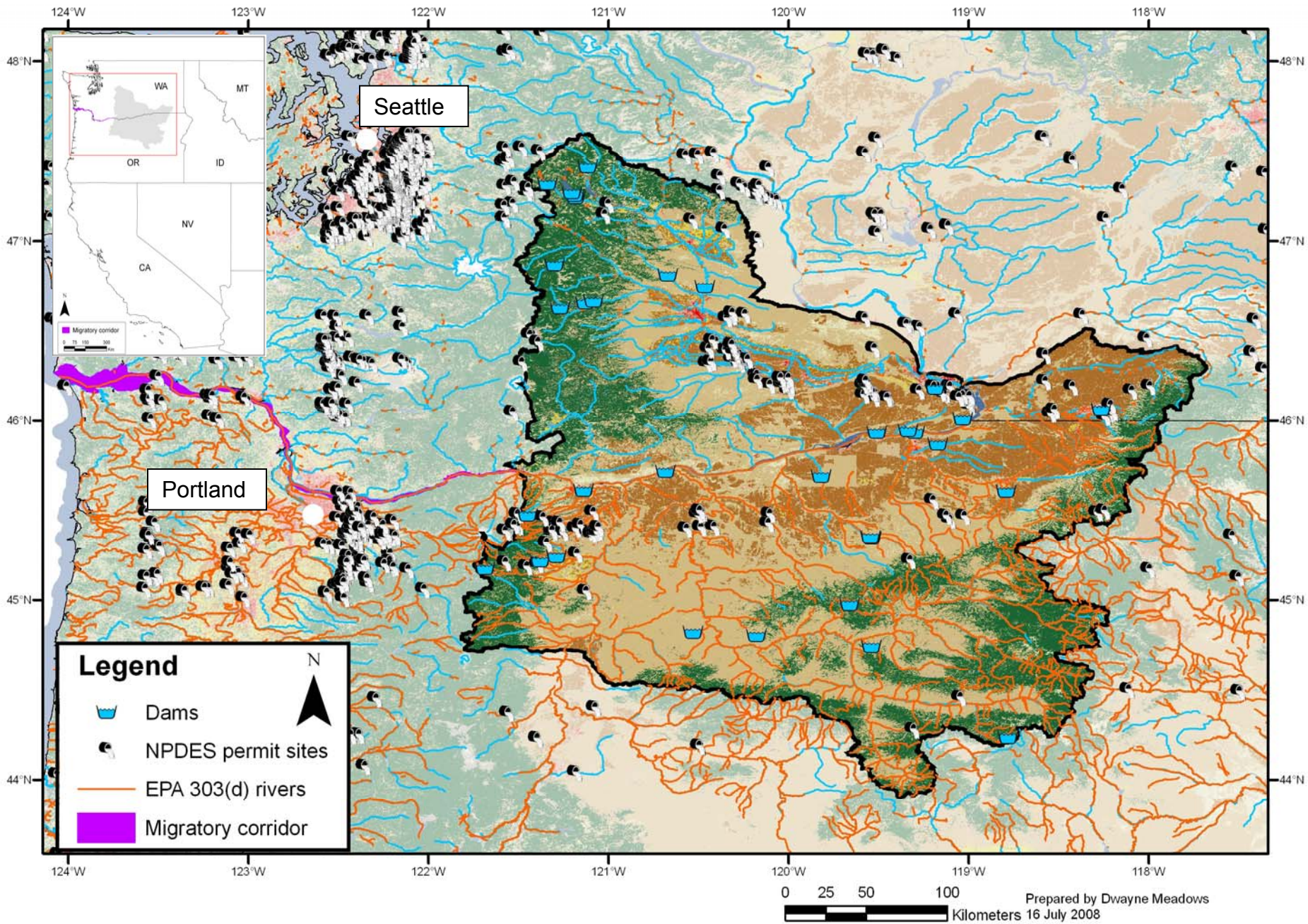

Figure 27. MCR Steelhead distribution. Land Cover Class Legend in Figure 7.

Life History

Most MCR steelhead smolt at two years and spend one to two years in saltwater prior to re-entering freshwater. Here they may remain up to a year prior to spawning (Howell, Jones et al. 1985). Within this ESU, the Klickitat River is unusual as it produces both summer and winter steelhead. The summer steelhead are dominated by age two ocean steelhead. Most other rivers in this region produce about equal numbers of both age one and two ocean steelhead.

Status and Trends

MCR steelhead were listed as threatened in 1999 (64 FR 14517), and their status was reaffirmed on January 5, 2006 (71 FR 834). The ICBTRT (2003) identified 15 populations in four MPGs (Cascades Eastern Slopes Tributaries, John Day River, the Walla Walla and Umatilla Rivers, and the Yakima River) and one unaffiliated independent population (Rock Creek) in this species. There are two extinct populations in the Cascades Eastern Slope MPG: the White Salmon River and Deschutes Crooked River above the Pelton/Round Butte Dam complex.

Seven hatchery steelhead programs are considered part of the MCR steelhead species. These programs propagate steelhead in three of 16 populations and improve kelt survival in one population. No artificial programs produce the winter-run life history in the Klickitat River and Fifteenmile Creek populations. All of the MCR steelhead hatchery programs are designed to produce fish for harvest. However, two hatchery programs are also implemented to augment the naturally spawning populations in the basins where the fish are released. The NMFS assessment of the effects of artificial propagation on MCR steelhead extinction risk concluded that these hatchery programs collectively do not substantially reduce the extinction risk. Artificial propagation increases total species abundance, principally in the Umatilla and Deschutes Rivers. The kelt reconditioning efforts in the Yakima River do not augment natural abundance and benefit the survival of the natural populations. The Touchet River Hatchery program has only recently been established, and its contribution to species viability is uncertain. The hatchery programs affect a small proportion of the species. Collectively, artificial propagation programs

provide a slight beneficial effect to species abundance and have neutral or uncertain effects on species productivity, spatial structure, and diversity.

The precise pre-1960 abundance of this species is unknown. However, historic run estimates for the Yakima River imply that annual species abundance may have exceeded 300,000 returning adults (Busby, Wainwright et al. 1996). MCR steelhead run estimates between 1982 and 2004 were calculated by subtracting adult counts for Lower Granite and Priest Rapids Dams from those at Bonneville Dam. The five year average (geometric mean) return of natural MCR steelhead for 1997 to 2001 was up from previous years' basin estimates. Returns to the Yakima River, the Deschutes River, and sections of the John Day River system were substantially higher compared to 1992 to 1997 (Good, Waples et al. 2005). Yakima River returns are still substantially below interim target levels of 8,900 (the current five year average is 1,747 fish) and estimated historical return levels, with the majority of spawning occurring in one tributary, Satus Creek (Berg 2001). The recent five year geometric mean return of the natural-origin component of the Deschutes River run exceeded interim target levels (Good, Waples et al. 2005). Recent five year geometric mean annual returns to the John Day River basin are generally below the corresponding mean returns reported in previous status reviews. However, each major production area in the John Day system has shown upward trends since the 1999 return year (Good, Waples et al. 2005). The Touchet and Umatilla are below their interim abundance targets of 900 and 2,300, respectively. The five year average for these basins is 298 and 1,492 fish, respectively (Good, Waples et al. 2005).

As per the FCRPS (2008), during the most recent 10-year period (for which trends in abundance could be estimated), trends were positive for approximately half of the populations and negative for the remainder. On average, when only natural production is considered, most of the MCR steelhead populations have replaced themselves. The ICBTRT characterizes the diversity risk to all but one MCR steelhead population as "low" to "moderate". The Upper Yakima is rated as having "high" diversity risk because of introgression with resident *O. mykiss* and the loss of presmolt migration pathways.

Critical Habitat

Critical habitat was designated for this species on September 2, 2005 (70 FR 52488). The critical habitat designation for this DPS identifies PCEs that include sites necessary to support one or more life stages of steelhead. MCR steelhead have PCEs of: (1) freshwater spawning, (2) freshwater rearing, (3) freshwater migration, (4) estuarine areas free of obstruction, (5) nearshore marine areas free of obstructions, and (6) offshore marine areas with good water quality. The physical or biological features that characterize these sites include water quality and quantity, natural cover, forage, and adequate passage conditions. Although pristine habitat conditions are still present in some wilderness, roadless, and undeveloped areas, habitat complexity has been greatly reduced in many areas of designated critical habitat for MCR steelhead. Limiting factors identified for MCR steelhead include: (1) Hydropower system mortality; (2) reduced stream flow; (3) impaired passage; (4) excessive sediment; (5) degraded water quality; and (6) altered channel morphology and floodplain.

Northern California Steelhead

Distribution

Northern California steelhead includes steelhead in CC river basins from Redwood Creek south to the Gualala River, inclusive (Figure 28). Table 21 identifies populations within the Northern California Steelhead salmon ESU, their abundances, and hatchery input.

Table 21. Northern California Steelhead salmon populations, abundances, and hatchery contributions (Good, Waples et al. 2005).

River	Historical Abundance	Most Recent Spawner Abundance	Hatchery Abundance Contributions
Redwood Creek	10,000	Unknown	Unknown
Mad River	6,000	162-384	Unknown
Eel River	82,000	3,127-21,903	Unknown
Mattole River	12,000	Unknown	Unknown
Ten Mile River	9,000	Unknown	Unknown
Noyo River	8,000	Unknown	Unknown
Big River	12,000	Unknown	Unknown
Navarro River	16,000	Unknown	Unknown
Garcia River	4,000	Unknown	Unknown
Gualala River	16,000	Unknown	Unknown
Other Humboldt County streams	3,000	Unknown	Unknown
Other Mendocino County streams	20,000	Unknown	Unknown
Total	**198,000**	**Unknown**	

Life History

Steelhead within this DPS include winter and summer steelhead. Half-pounder juveniles occur in the Mad and Eel Rivers. Half-pounders are immature steelhead that returns to freshwater after only two to four months in the ocean, and generally overwinter in freshwater. These juveniles then outmigrate in the following spring.

Status and Trends

NC steelhead were listed as threatened on June 7, 2000 (65 FR 36074). They retained that classification following a status review on January 5, 2006 (71 FR 834). Long-term data sets are limited for this NC steelhead. Before 1960, estimates of abundance specific to this DPS were available from dam counts in the upper Eel River (Cape Horn Dam–annual avg. no. adults was 4,400 in the 1930s), the South Fork Eel River (Benbow Dam–annual avg. no. adults was 19,000 in the 1940s), and the Mad River (Sweasey Dam–annual avg. no. adults was 3,800 in the 1940s). Estimates of steelhead spawning populations for many rivers in this DPS totaled 198,000 by the mid-1960s.

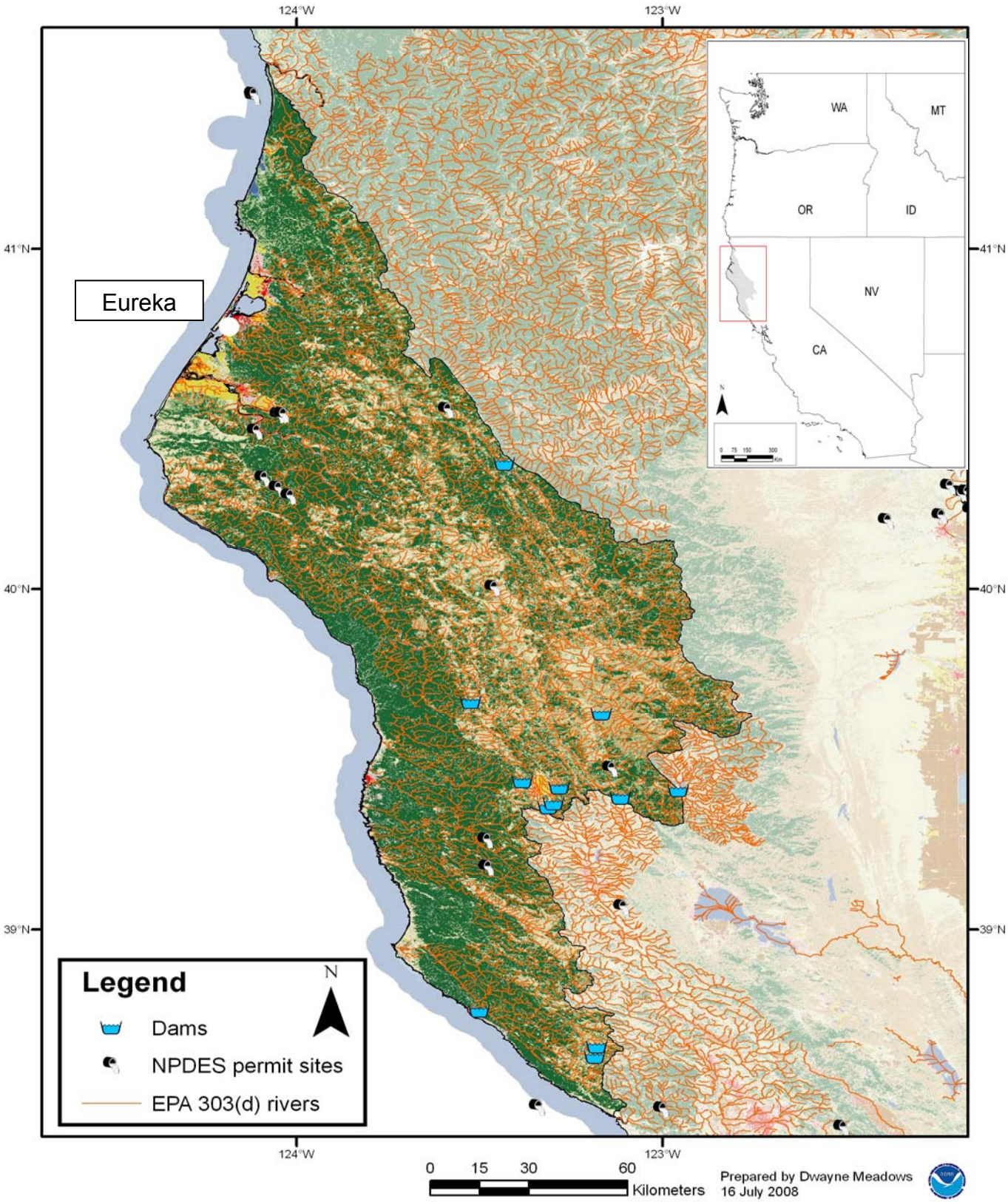

Figure 28. Northern California Steelhead distribution. Land Cover Class Legend in Figure 7.

During the first status review on this population, adult escapement trends could be computed on seven populations. Five of the seven populations exhibited declines while two exhibited increases with a range of almost 6% annual decline to a 3.5% increase. At the time little information was available on the actual contribution of hatchery fish to natural spawning, and on present total run sizes for the DPS (Busby, Wainwright et al. 1996).

More recent time series data are from snorkel counts conducted on summer-run steelhead in the Middle Fork Eel River. An estimate of lambda over the interval 1966 to 2002 was made and a random-walk with drift model fitted using Bayesian assumptions. Good et al. (2005) estimated lambda at 0.98 with a 95% confidence interval of 0.93 and 1.04. The result is an overall downward trend in both the long- and short- term. Juvenile data were also recently examined. Both upward and downward trends were apparent (Good, Waples et al. 2005). The majority (74%) of BRT votes were for "likely to become endangered," with the remaining votes split equally between "in danger of extinction" and "not warranted".

Critical Habitat

Critical habitat was designated for NC steelhead on September 2, 2005 (70 FR 52488). The critical habitat designation for this DPS identifies PCEs that include sites necessary to support one or more life stages of steelhead. Specific sites include: (1) freshwater spawning, (2) freshwater rearing, (3) freshwater migration, (4) estuarine areas free of obstruction, (5) nearshore marine areas free of obstructions, and (6) offshore marine areas with good water quality. The physical or biological features that characterize these sites include water quality and quantity, natural cover, and adequate forage.

Puget Sound Steelhead

Distribution

Puget Sound steelhead occupy river basins of the Strait of Juan de Fuca, Puget Sound, and Hood Canal, Washington. Included are river basins as far west as the Elwha River and as far north as the Nooksack River (Figure 29). Puget Sound's fjord-like structure

may affect steelhead migration patterns. For example, some populations of coho and Chinook salmon, at least historically, remained within Puget Sound and did not migrate to the Pacific Ocean. Even when Puget Sound steelhead migrate to the high seas, they may spend considerable time as juveniles or adults in the protected marine environment of Puget Sound. This is a feature not readily accessible to steelhead from other areas of the Pacific Northwest. The species is primarily composed of winter steelhead but includes several stocks of summer steelhead, usually in subbasins of large river systems and above seasonal hydrologic barriers.

Life History

Life history attributes of Puget Sound steelhead (migration and spawn timing, smolt age, ocean age, and total age at first spawning) appear similar to those of other west coast steelhead. Ocean age for Puget Sound summer steelhead varies among populations.

Status and Trends

Puget Sound steelhead were listed as a threatened species on May 11, 2007 (72 FR 26722). Run size for this DPS, was calculated in the early 1980s at about 100,000 winter-run fish and 20,000 summer-run fish. It is unclear what portion were hatchery fish. However, a combined estimate with coastal steelhead suggested that roughly 70% of steelhead in ocean runs were of hatchery origin. The percentage in escapement to spawning grounds would be substantially lower due to differential harvest and hatchery rack returns. By the 1990s, total run size for four major stocks exceeded 45,000, roughly half of which was natural escapement.

Nehlsen et al. (1991) identified nine Puget Sound steelhead stocks at some degree of risk or concern. The WDFW et al. (1993) estimated that 31 of 53 stocks were of native origin and predominantly natural production. The WDFW assessment of the status of these 31 stocks was 11 healthy, three depressed, one critical, and 16 of unknown status. Their assessment of the status of the remaining (not native/natural) stocks was three healthy, 11 depressed, and eight of unknown status.

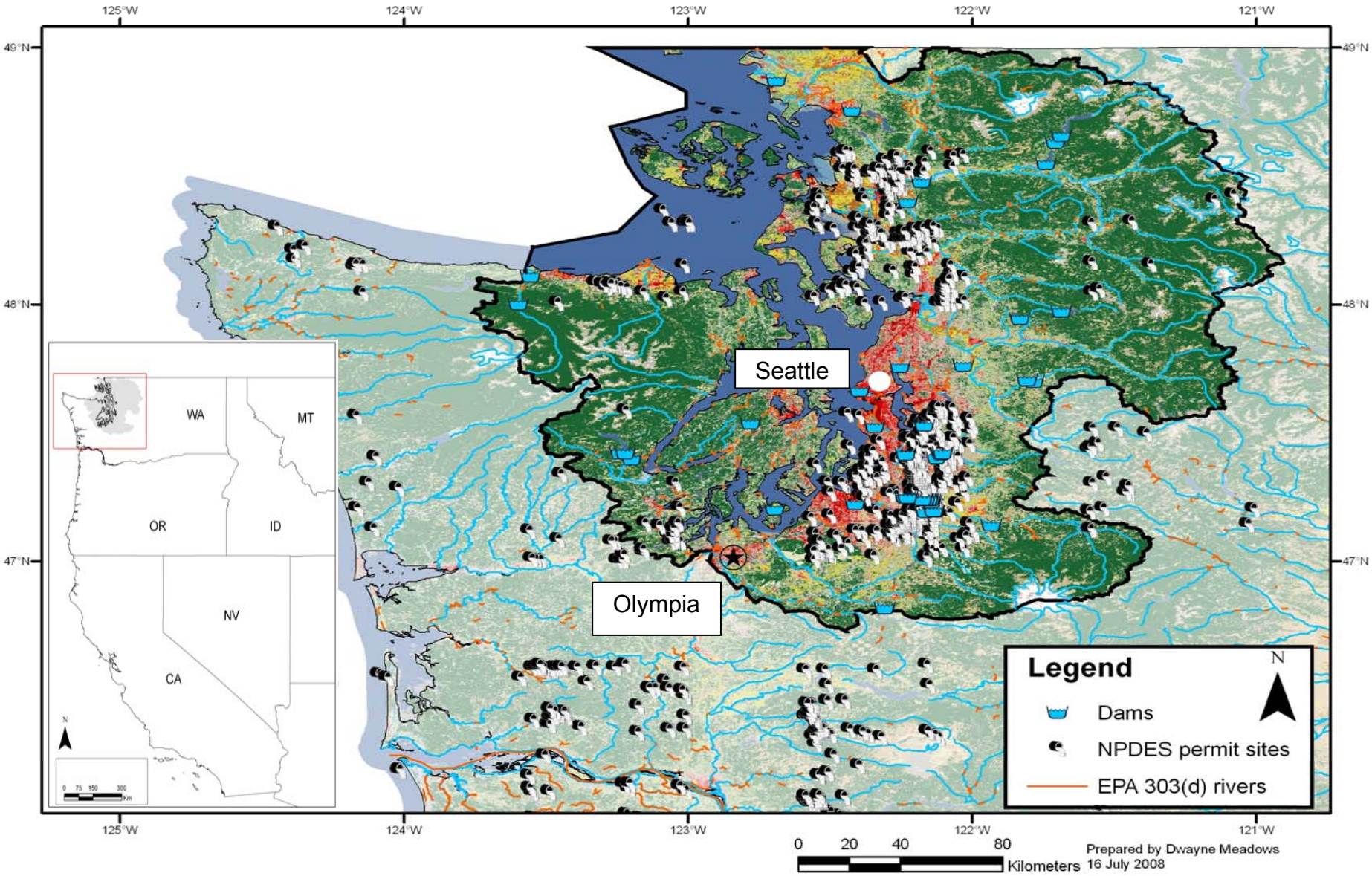

Figure 29. Puget Sound steelhead distribution. Land Cover Class Legend in Figure 7.

Of the 21 populations in the Puget Sound ESU reviewed by Busby et al. (1996), 17 had declining and four had increasing trends, with a range from 18% annual decline (Lake Washington winter-run steelhead) to 7% annual increase (Skykomish River winter-run steelhead). Eleven of these trends (nine negative, two positive) were significantly different from zero. These trends were for the late-run naturally produced component of winter-run steelhead populations. No adult trend data were available for summer-run steelhead. Most of these trends were based on relatively short data series. The Skagit and Snohomish River winter-run populations have been approximately three to five times larger than the other populations in the DPS, with average annual spawning of approximately 5,000 and 3,000 total adult spawners, respectively. These two basins exhibited modest overall upward trends at the time of the Busby et al. (1996) report. Busby et al. (1996) estimated five-year average natural escapements for streams with adequate data range from less than 100 to 7,200, with corresponding total run sizes of 550 to 19,800.

Critical Habitat

Critical habitat is not currently designated for Puget Sound steelhead. However, factors for essential habitat are under evaluation to designate future critical habitat.

Snake River Steelhead

Distribution

SR Basin steelhead is an inland species that occupies the SR basin of Idaho, northeast Oregon, and southeast Washington. The SR Basin steelhead species includes all naturally spawned populations of steelhead (and their progeny) in streams in the SR Basin of Idaho, northeast Oregon, and southeast Washington SR Basin steelhead do not include resident forms of *O. mykiss* (rainbow trout) co-occurring with these steelhead. The historic spawning range of this species included the Salmon, Pahsimeroi, Lemhi, Selway, Clearwater, Wallowa, Grande Ronde, Imnaha, and Tucannon Rivers.

Managers classify up-river summer steelhead runs into two groups based on ocean age and adult size upon return to the Columbia River. A-run steelhead are predominately

age-one-ocean fish. B-run steelhead are larger, predominated by age-two-ocean fish. A-run populations are found in the tributaries to the lower Clearwater River, the upper Salmon River and its tributaries, the lower Salmon River and its tributaries, the Grand Ronde River, Imnaha River, and possibly the SR's mainstem tributaries below Hells Canyon Dam. B-run steelhead occupy four major subbasins. They include two on the Clearwater River (Lochsa and Selway) and two on the Salmon River (Middle Fork and South Fork Salmon); areas not occupied by A-run steelhead. Some natural B-run steelhead are also produced in parts of the mainstem Clearwater and its major tributaries. There are alternative escapement objectives of 10,000 (Columbia River Fisheries Management Plan) and 31,400 (Idaho) for B-run steelhead. B-run steelhead represent at least one-third and as much as three-fifths of the production capacity of the DPS. Table 22 identifies populations within the SR Basin Steelhead salmon ESU, their abundances, and hatchery input.

Table 22. SR Basin Steelhead salmon populations, abundances, and hatchery contributions (Good, Waples et al. 2005). Note: rpm denotes redds per mile.

River	Historical Abundance	Most Recent Spawner Abundance	Hatchery Abundance Contributions
Tucannon River	3,000	257-628	26%
Lower Granite run	Unknown	70,721-259,145	86%
Snake A run	Unknown	50,974-25,950	85%
Snake B run	Unknown	9,736-33,195	89%
Asotin Creek	Unknown	0-543 redds	Unknown
Upper Grande Ronde River	15,000	1.54 rpm	23%
Joseph Creek	Unknown	1,077-2,385	0%
Imnaha River	4,000	3.7 rpm	20%
Camp Creek	Unknown	55-307	0%
Total	**22,000 (min)**	**?**	

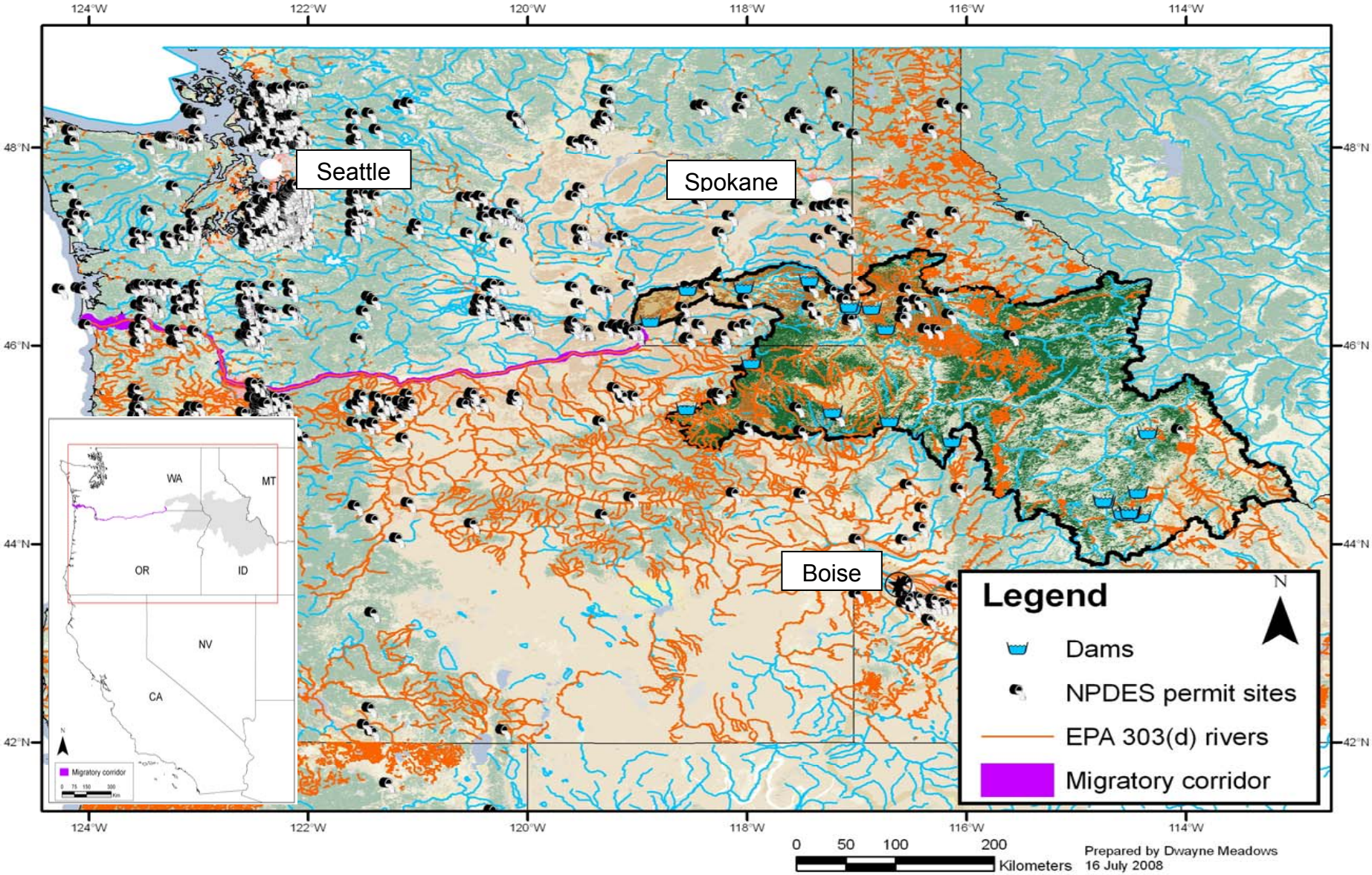

Figure 30. SR Basin Steelhead distribution. Land Cover Class Legend in Figure 7.

Life History

SR Basin steelhead occupy habitat that is considerably warmer and drier (on an annual basis) than other steelhead DPSs. SR Basin steelhead are generally classified as summer run, based on their adult run timing pattern. Sexually immature adult SR Basin summer steelheads enter the Columbia River from late June to October. SR Basin steelhead returns consist of A-run fish that spend one year in the ocean, and larger B-run fish that spend two years at sea. Adults typically migrate upriver until they reach tributaries from 1,000 to 2,000 m above sea level where they spawn between March and May of the following year. Unlike other anadromous members of the *Oncorhynchus* genus, some adult steelhead survive spawning, return to the sea, and later return to spawn a second time. After hatching, juvenile SR Basin steelhead typically spend two to three years in fresh water before they smolt and migrate to the ocean.

Status and Trends

SR Basin steelhead were listed as threatened in 1997 (62 FR 43937). Their classification status was reaffirmed following a status review on January 5, 2006 (71 FR 834). The ICBTRT (2003) identified 23 populations in the following six MPGs: Clearwater River, Grande Ronde River, Hells Canyon, Imnaha River, Lower SR, and Salmon River. SR Basin steelhead remain spatially well distributed in each of the six major geographic areas in the SR basin (Good, Waples et al. 2005). Environmental conditions are generally drier and warmer in these areas than in areas occupied by other steelhead species in the Pacific Northwest. SR Basin steelhead were blocked from portions of the upper SR beginning in the late 1800s and culminating with the construction of Hells Canyon Dam in the 1960s. The SR Basin steelhead "B run" population-levels remain particularly depressed. The ICBTRT has not completed a viability assessment for SR Basin steelhead.

Limited information on adult spawning escapement for specific tributary production areas for SR Basin steelhead made a quantitative assessment of viability difficult. Annual return estimates are limited to counts of the aggregate return over Lower Granite Dam,

and spawner estimates for the Tucannon, Grande Ronde, and Imnaha Rivers. The 2001 return over Lower Granite Dam was substantially higher relative to the low levels seen in the 1990s; the recent five-year mean abundance (14,768 natural returns) was approximately 28% of the interim recovery target level. The 10-year average for natural-origin steelhead passing Lower Granite Dam between 1996 and 2005 is 28,303 adults. Parr densities in natural production areas, which are another indicator of population status, have been substantially below estimated capacity for several decades. The SR supports approximately 63% of the total natural-origin production of steelhead in the Columbia River Basin. The current condition of SR Basin steelhead (Good, Waples et al. 2005) is summarized below:

There is uncertainty for wild populations given limited data for adult spawners in individual populations. Dam counts are currently 28% of interim recovery target for the SR Basin (52,000 natural spawners). Only the Joseph Creek population exceeds the interim recovery target. Regarding population growth rate, there are mixed long- and short-term trends in abundance and productivity. Regarding spatial structure, the SR Basin steelhead are well distributed with populations remaining in six major areas. However, the core area for B-run steelhead, once located in the North Fork of the Clearwater River, is now inaccessible to steelhead. Finally, genetic diversity is affected by the displacement of natural fish by hatchery fish (declining proportion of natural-origin spawners). Homogenization of hatchery stocks occurs within basins, and some stocks exhibit high stray rates.

Critical Habitat

Critical habitat was designated for this species on September 2, 2005 (70 FR 52488). The critical habitat designation for this ESU identifies PCEs that include sites necessary to support one or more steelhead life stages. Specific sites include: (1) Freshwater spawning, (2) freshwater rearing, (3) freshwater migration, (4) estuarine areas free of obstruction, (5) nearshore marine areas free of obstructions, and (6) offshore marine areas with good water quality.

Of the 291 fifth order streams reviewed in this DPS, 220 were rated as high, 44 were rated as medium, and 27 were rated as low conservation value. The physical or biological features that characterize these sites include water quality and quantity, natural cover, and adequate forage. Limiting factors identified for SR Basin salmonids include: (1) Hydrosystem mortality, (2) reduced stream flow, (3) altered channel morphology and floodplain, (4) excessive sediment, (5) degraded water quality, (6) harvest impacts, and (7) hatchery impacts (Myers, Kope et al. 1998).

South-Central California Coast Steelhead

Distribution

The South-Central California Coast (S-CCC) steelhead DPS includes all naturally spawned populations of steelhead (and their progeny) in streams from the Pajaro River (inclusive) to, but not including the Santa Maria River, California (Figure 31).

Life History

Only winter steelhead are found in this DPS. Migration and spawn timing are similar to adjacent steelhead populations. There is little other life history information for steelhead in this DPS.

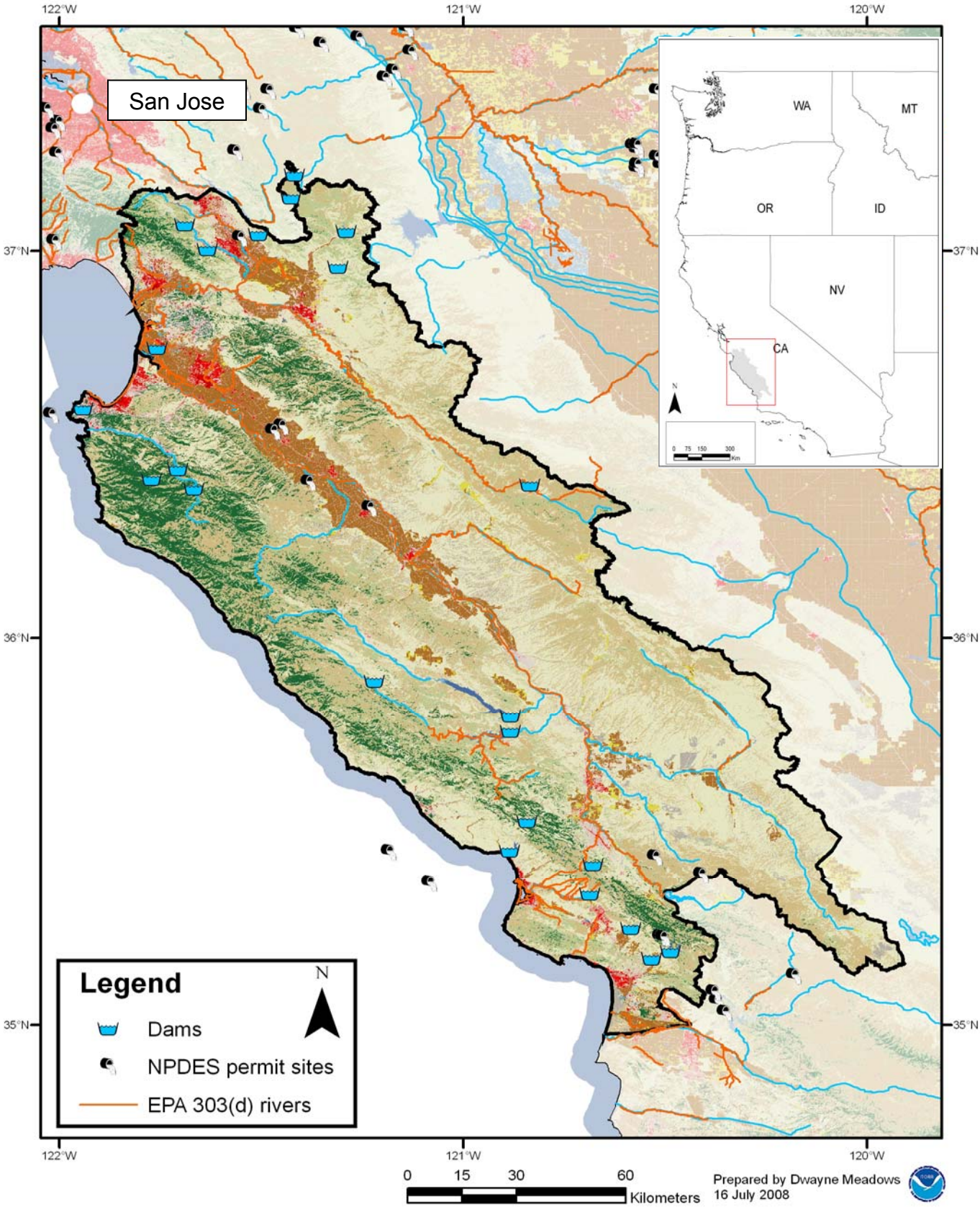

Figure 31. S-CCC steelhead distribution. Land Cover Class Legend in Figure 7.

Status and Trends

S-CCC steelhead were listed as threatened in 1997. Their classification was retained following a status review on January 5, 2006 (71 FR 834). Historical data on the S-C CC steelhead DPS are limited. In the mid-1960s, the CDFG estimated the adult population at about 18,000. We know of no recent estimates of the total DPS. However, five river systems, the Pajaro, Salinas, Carmel, Little Sur, and Big Sur, indicate that runs are currently less than 500 adults. Past estimates for these basins were almost 5,000 fish. Carmel River time series data indicate that the population declined by about 22% per year between 1963 and 1993 (Good, Waples et al. 2005). From 1991 the population increased from one adult, to 775 adults at San Clemente Dam. Good et al. (2005) thought that this recent increase seemed too great to attribute simply to improved reproduction and survival of the local steelhead population. Other possibilities were considered including that the substantial immigration or transplantation occurred, or that resident trout production increased as a result of improved environmental conditions within the basin. Nevertheless, the majority (68%) of BRT votes were for "likely to become endangered," and another 25% were for "in danger of extinction".

Critical Habitat

Critical habitat was designated for this species on September 2, 2005 (70 FR 52488). The critical habitat designation for this DPS identifies PCEs that include sites necessary to support one or more steelhead life stages. Specific sites include: (1) freshwater spawning, (2) freshwater rearing, (3) freshwater migration, (4) estuarine areas free of obstruction, (5) nearshore marine areas free of obstructions, and (6) offshore marine areas with good water quality. The physical or biological features that characterize these sites include water quality and quantity, natural cover, and adequate forage.

Southern California Steelhead

Distribution

Southern California (SC) steelhead occupy rivers from the Santa Maria River to the U.S. –Mexico border (Figure 32).

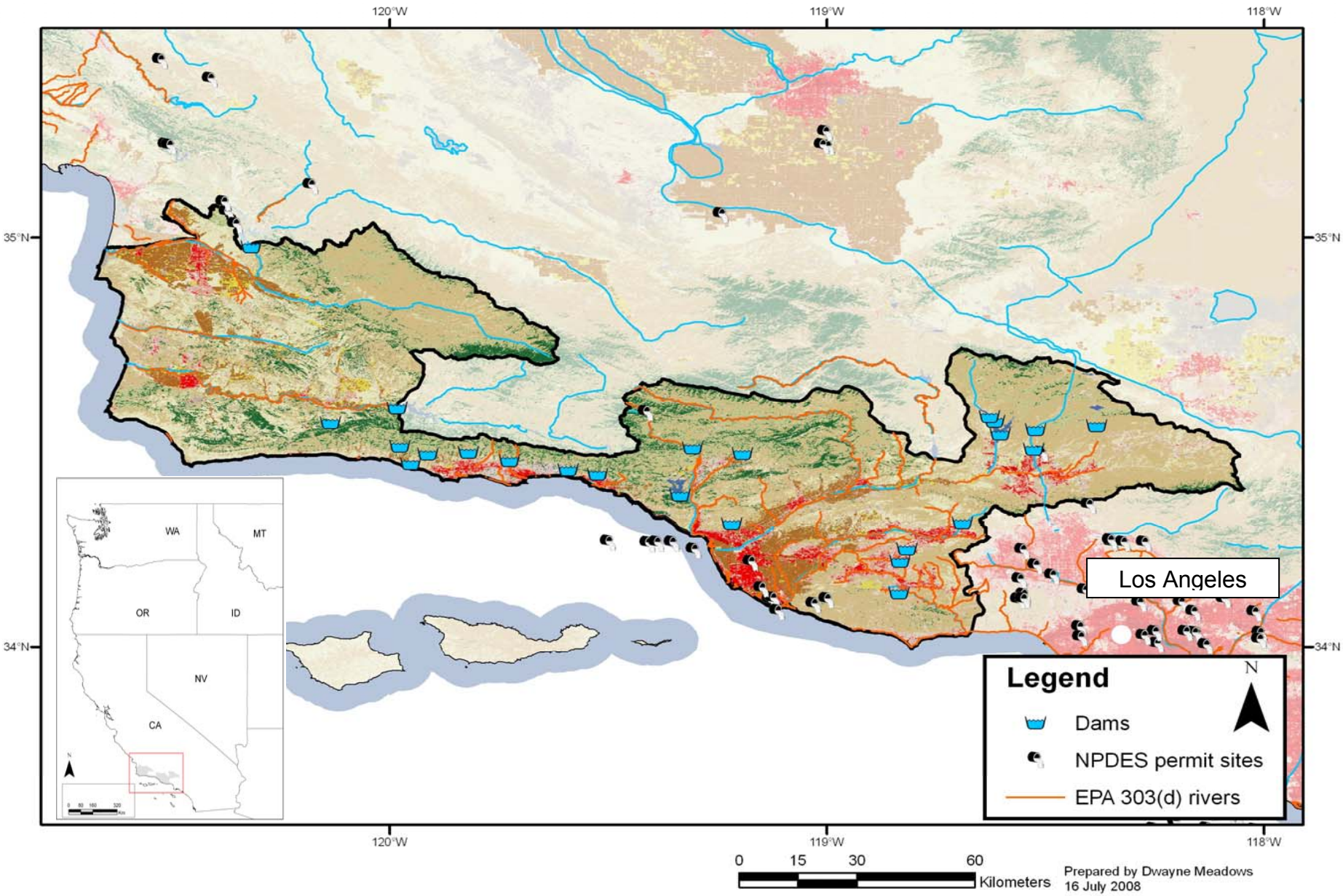

Figure 32. Southern California steelhead distribution. Land Cover Class Legend in Figure 7.

Table 23 identifies populations within the Southern California Steelhead salmon ESU, their abundances, and hatchery input.

Table 23. Southern California Steelhead salmon populations, abundances, and hatchery contributions (Good, Waples et al. 2005).

River	Historical Abundance	Most Recent Spawner Abundance	Hatchery Abundance Contributions
Santa Ynez River	12,995-30,000	Unknown	Unknown
Ventura River	4,000-6,000	Unknown	Unknown
Matilija River	2,000-2,500	Unknown	Unknown
Creek River	Unknown	Unknown	Unknown
Santa Clara River	7,000-9,000	Unknown	Unknown
Total	**32,000-46,000**	**<500**	

Life History

Migration and life history patterns of SC steelhead are dependent on rainfall and streamflow (Moore 1980). Steelhead within this DPS can withstand higher temperatures than populations to the north. The relatively warm and productive waters of the Ventura River have resulted in more rapid growth of juvenile steelhead than occurs in more northerly populations (Moore 1980). There is little life history information for steelhead in this DPS.

Status and Trends

SC steelhead were listed as endangered in 1997 (62 FR 43937). Their classification was retained following a status review on January 5, 2006 (71 FR 834). In many watersheds throughout Southern California, dams isolate steelhead from historical spawning and rearing habitats. Dams also alter the hydrology of the basin (*e.g.*, Twitchell Reservoir within the Santa Maria River watershed, Bradbury Dam within the Santa Ynez River watershed, Matilija and Casitas dams within the Ventura River watershed, Rindge Dam within the Malibu Creek watershed). Based on combined estimates for the Santa Ynez, Ventura, and Santa Clara rivers, and Malibu Creek, an estimated 32,000 to 46,000 adult steelhead occupied this DPS. In contrast, less than 500 adults are estimated to occupy the same four waterways presently. The last estimated run size for steelhead in the Ventura River, which has its headwaters in Los Padres National Forest, is 200 adults (Busby, Wainwright et al. 1996). The majority (81%) of the BRT votes were for "in danger of

extinction," with the remaining 19% of votes for "likely to become endangered. This was based on extremely strong concern for abundance, productivity, and spatial concern (as per the risk matrix); diversity was also of concern. The BRT also expressed concern about the lack of data on the SC steelhead DPS, including uncertainty on the metapopulation dynamics in the southern part of the DPS's range and the fish's nearly complete extirpation from the southern part of the range.

Critical Habitat

Critical habitat was designated for this species on September 2, 2005. The designation identifies PCEs that include sites necessary to support one or more steelhead life stages. These sites contain the physical or biological features essential for the species conservation. Specific sites include freshwater spawning sites, freshwater rearing sites, freshwater migration corridors, and estuarine areas. The physical or biological features that characterize these sites include water quantity, depth, and velocity, shelter, cover, living space and passage conditions.

Upper Columbia River Steelhead

Distribution

UCR steelhead occupy the Columbia River Basin upstream from the Yakima River, Washington, to the border between the U.S. and Canada (Figure 33). This area includes the Wenatchee, Entiat, and Okanogan Rivers. All UCR steelhead are summer steelhead. Steelhead primarily use streams of this region that drain the northern Cascade Mountains of Washington State. This species includes hatchery populations of summer steelhead from the Wells Hatchery because it probably retains the genetic resources of steelhead populations that once occurred above the Grand Coulee Dam. This species does not include the Skamania Hatchery stock because of its non-native genetic heritage.

Abundance estimates of returning naturally produced UCR steelhead have been based on extrapolations from mainstem dam counts and associated sampling information (*e.g.*, hatchery/wild fraction, age composition). The natural component of the annual steelhead run over Priest Rapids Dam increased from an average of 1,040 (1992-1996),

representing about 10% of the total adult count, to 2,200 (1997-2001), representing about 17% of the adult count during this period of time (ICBTRT 2003). Table 24 identifies populations within the UCR Steelhead salmon DPS, their abundances, and hatchery input.

Table 24. UCR Steelhead salmon populations, abundances, and hatchery contributions (Good, Waples et al. 2005).

Population	Historical Abundance	Most Recent Spawner Abundance	Hatchery Abundance Contributions
Wenatchee/Entiat rivers	Unknown	1,899-8,036	71%
Methow/Okanogan rivers	Unknown	1,879-12,801	91%
Total	**Unknown**	**3,778-20,837**	

Life History

The life history patterns of UCR steelhead are complex. Adults return to the Columbia River in the late summer and early fall. Most migrate relatively quickly up the mainstem to their natal tributaries. A portion of the returning run overwinters in the mainstem reservoirs, passing over the upper-mid-Columbia dams in April and May of the following year. Spawning occurs in the late spring of the calendar year following entry into the river. Juvenile steelhead spend one to seven years rearing in freshwater before migrating to sea. Smolt outmigrations are predominantly age-two and age-three juveniles. Most adult steelhead return after one or two years at sea, starting the cycle again.

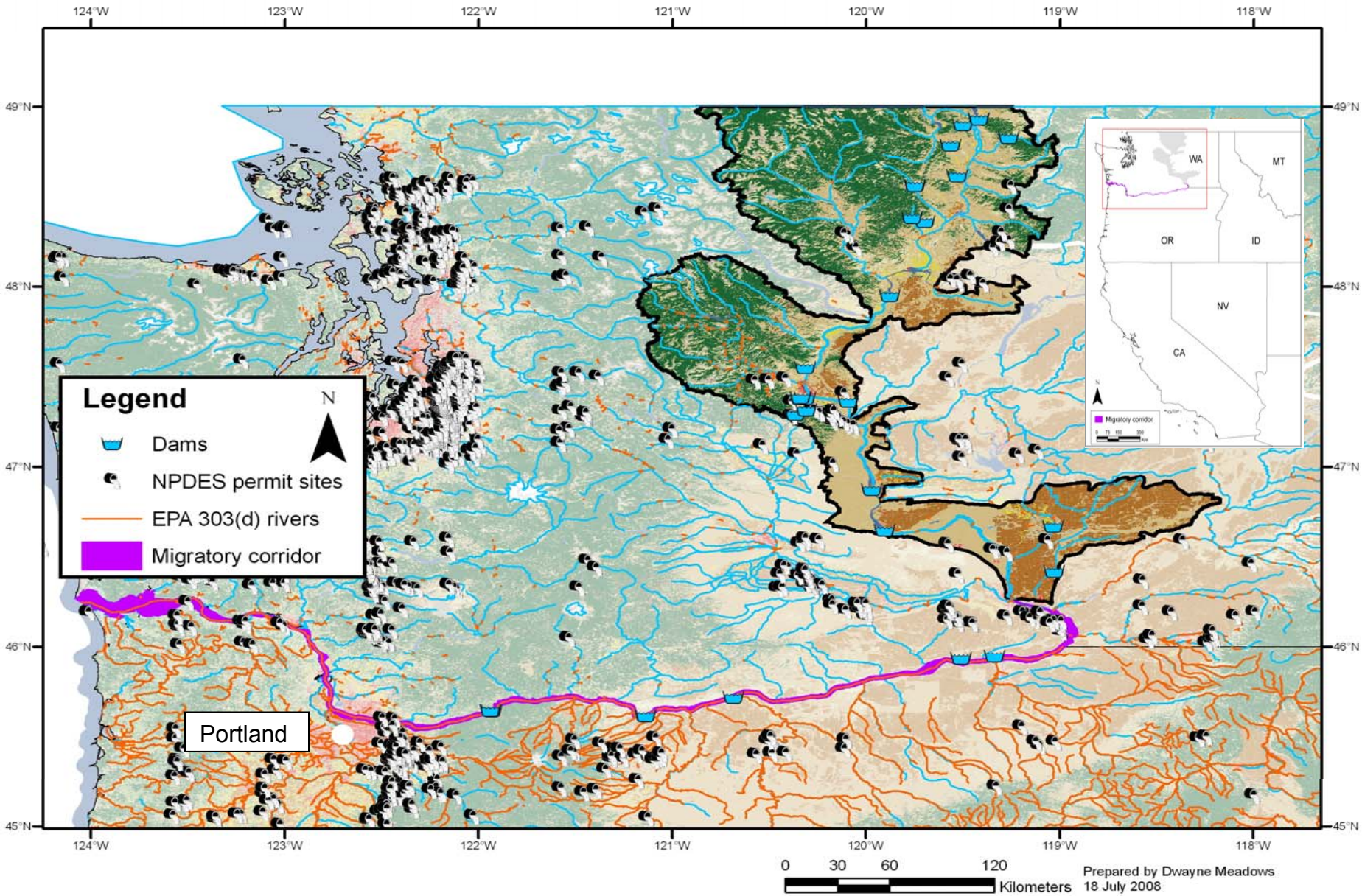

Figure 33. UCR Steelhead distribution. Land Cover Class Legend in Figure 7.

Returns of both hatchery and naturally produced steelhead to the UCR have increased in recent years. The average 1997 to 2001 return counted through the Priest Rapids fish ladder was approximately 12,900 fish. The average for the previous five years (1992 to 1996) was 7,800 fish. Abundance estimates of returning naturally produced UCR steelhead have been based on extrapolations from mainstem dam counts and associated sampling information (*e.g.*, hatchery/wild fraction, age composition). The natural component of the annual steelhead run over Priest Rapids Dam increased from an average of 1,040 (1992-1996), representing about 10% of the total adult count, to 2,200 (1997-2001), representing about 17% of the adult count during this period of time (ICBTRT 2003).

In terms of natural production, recent population abundances for both the Wenatchee and Entiat aggregate population and the Methow population remain well below the minimum abundance thresholds developed for these populations (ICBTRT 2005). A five-year geometric mean (1997 to 2001) of approximately 900 naturally produced steelhead returned to the Wenatchee and Entiat rivers (combined). Although this is well below the minimum abundance thresholds, it represents an improvement over the past (an increasing trend of 3.4% per year). However, the average percentage of natural fish for the recent five-year period dropped from 35% to 29%, compared to the previous status review. For the Methow population, the five-year geometric mean of natural returns over Wells Dam was 358. Although this is well below the minimum abundance thresholds, it is an improvement over the recent past (an increasing trend of 5.9% per year). In addition, the 2001 return (1,380 naturally produced spawners) was the highest single annual return in the 25-year data series. However, the average percentage of wild origin spawners dropped from 19% for the period prior to the 1998 status review to 9% for the 1997 to 2001 returns.

Regarding the population growth rate of natural production, on average, over the last 20 full brood year returns (1980/81 through 1999/2000 brood years), including adult returns through 2004-2005, UCR steelhead populations have not replaced themselves. The ICBTRT has characterized the spatial structure risk to UCR steelhead populations as

"low" for the Wenatchee and Methow, "moderate" for the Entiat, and "high" for the Okanogan. Overall adult returns are dominated by hatchery fish, and detailed information is lacking on the productivity of the natural population. All UCR steelhead populations have reduced genetic diversity from homogenization of populations that occurred during the Grand Coulee Fish Maintenance project from 1939-1943, from 1960, and 1981 (Chapman, Hillman et al. 1994).

Critical Habitat

Critical habitat was designated for this species on September 2, 2005 (70 FR 52488). The critical habitat designation for this DPS identifies PCEs that include sites necessary to support one or more steelhead life stages. They include all Columbia River estuarine areas and river reaches upstream to Chief Joseph Dam and several tributary subbasins. Specific sites include freshwater spawning and rearing sites, freshwater migration corridors, estuarine areas free of obstruction, and offshore marine areas. The physical or biological features that characterize these sites include water quality and quantity, natural cover, forage, and adequate passage conditions.

The UCR steelhead DPS has 42 watersheds within its range. Three watersheds received a low rating, eight received a medium rating, and 31 rated a high conservation value to the DPS. In addition, the Columbia River rearing/migration corridor downstream of the spawning range was rated as a high conservation value. Limiting factors identified for the UCR steelhead include: (1) Mainstem Columbia River hydropower system mortality, (2) reduced tributary streamflow, (3) tributary riparian degradation and loss of in-river wood, (4) altered tributary floodplain and channel morphology, and (5) excessive fine sediment and degraded tributary water quality. The above activities and features also introduce sediment, nutrients, biocides, metals, and other pollutants into surface and ground water and degrade water quality in the freshwater, estuarine, and coastal ecosystems throughout the Pacific Northwest.

Upper Willamette River Steelhead

Distribution

UWR steelhead occupy the Willamette River and its tributaries upstream of Willamette Falls (Figure 34). This is a late-migrating winter group that enters freshwater in March and April (Howell, Jones et al. 1985). Only the late run was included in the listing of this species, which is the largest remaining population in the Santiam River system. Table 25 identifies populations within the UWR Steelhead salmon ESU, their abundances, and hatchery input.

Table 25. UWR Steelhead salmon populations, abundances, and hatchery contributions (Good, Waples et al. 2005). Note: rpm denotes redds per mile.

Population	Historical Abundance	Most Recent Spawner Abundance	Hatchery Abundance Contributions
Mollala Rivers	Unknown	0.972 rpm	Unknown
North Santiam River	Unknown	0.963 rpm	Unknown
South Santiam River	Unknown	0.917 rpm	Unknown
Calapooia River	Unknown	1.053 rpm	Unknown
Total	**Unknown**	**5,819**	

Life History

Winter steelhead enter the Willamette River beginning in January and February. They do not ascend to their spawning areas until late March or April (Dimick and Merryfield 1945). Spawning occurs from April to June 1st and redd counts are conducted in May. The smolt migration past Willamette Falls also begins in early April and extends through early June (Howell, Jones et al. 1985) Migration peaks in early- to mid-May. Steelhead smolts generally migrate away from the shoreline and enter the Columbia via Multnomah Channel rather than the mouth of the Willamette. Most spend two years in the ocean before re-entering fresh water to span (Busby, Wainwright et al. 1996). Steelhead in the UWR DPS generally spawn once or twice. A few fish may spawn three times based on patterns found in the LCR steelhead DPS. Repeat spawners are predominantly female and generally account for less than 10% of the total run size (Busby, Wainwright et al. 1996).

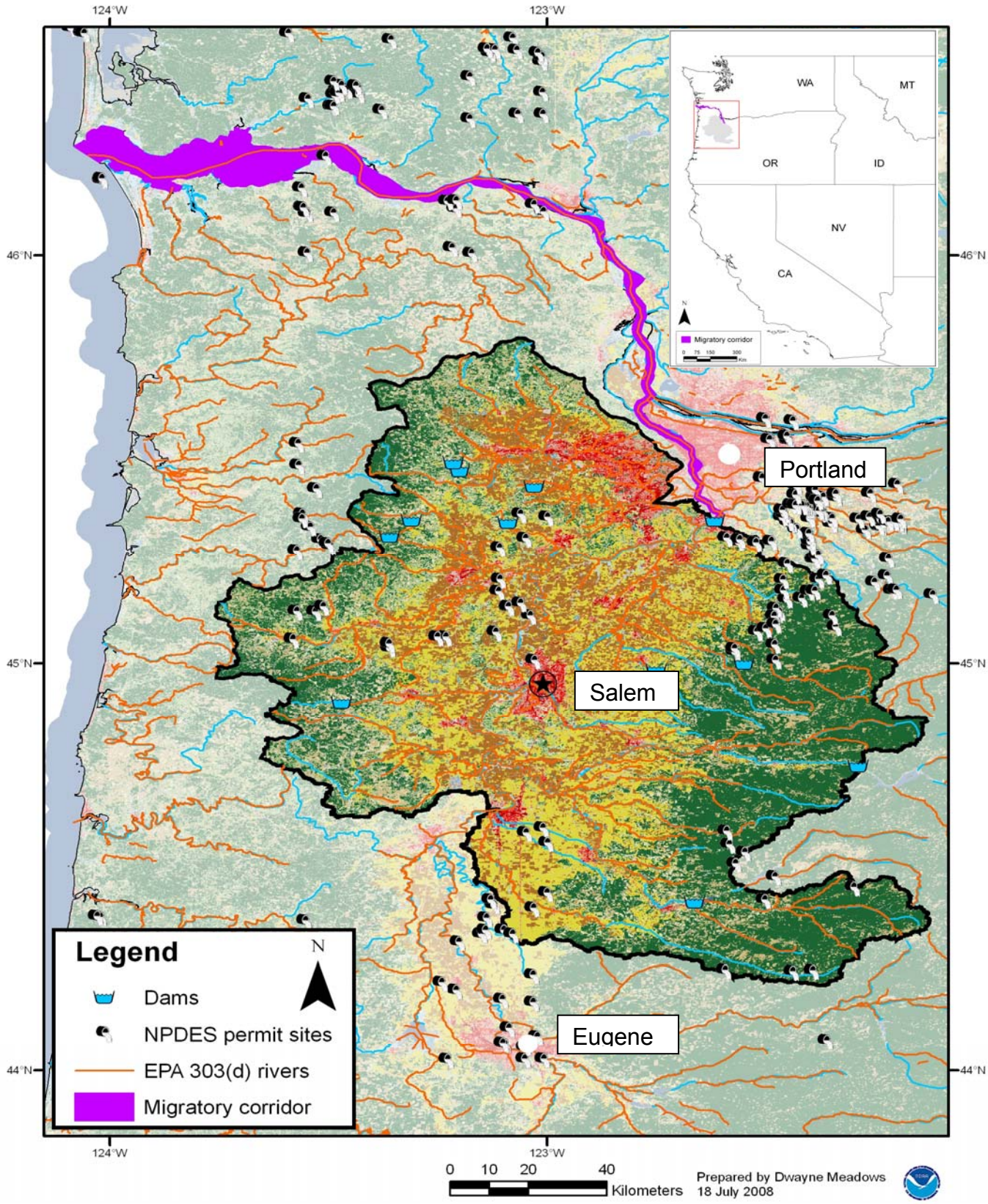

Figure 34. UWR Steelhead distribution. Land Cover Class Legend in Figure 7.

Status and Trends

UWR steelhead were listed as threatened in 1999 (64 FR 14517). Their classification was retained following a status review on January 5, 2006 (71 FR 834). A major threat to Willamette River steelhead results from artificial production practices. Fishways built at Willamette Falls in 1885 have allowed Skamania-stock summer steelhead and early-migrating winter steelhead of Big Creek stock to enter the range of UWR steelhead. The population of summer steelhead is almost entirely maintained by hatchery salmon, although natural-origin, Big Creek-stock winter steelhead occur in the basin (Howell, Jones et al. 1985). In recent years, releases of winter steelhead are primarily of native stock from the Santiam River system.

Steelhead in this DPS are depressed from historical levels, but to a much lesser extent than are spring Chinook in the Willamette basin (McElhaney, Chilcote et al. 2007). All of the historical populations remain extant and moderate numbers of wild steelhead are produced each year. The population growth rate data indicate long-term trends are <1; short-term trends are 1 or higher (McElhaney, Chilcote et al. 2007). Spatial structure for the North and South Santiam populations has been substantially reduced by the loss of access to the upper North Santiam basin and the Quartzville Creek watershed in the South Santiam subbasin due to construction of the dams owned and operated by the U.S. Army Corps of Engineers without passage facilities (McElhaney, Chilcote et al. 2007). Additionally, the spatial structure in the Molalla subbasin has been reduced significantly by habitat degradation and in the Calapooia by habitat degradation and passage barriers. Finally, the diversity of some populations have been eroded by small population size, the loss of access to historical habitat, legacy effects of past winter-run hatchery releases, and the ongoing release of summer steelhead (McElhaney, Chilcote et al. 2007).

Critical Habitat

Critical habitat was designated for this species on September 2, 2005 (70 FR 52488). It includes all Columbia River estuarine areas and river reaches proceeding upstream to the confluence with the Willamette River as well as specific steam reaches in the following subbasins: Upper Willamette, North Santiam, South Santiam, Middle Willamette,

Molalla/Pudding, Yamhill, Tualatin, and Lower Willamette (NMFS 2005b). The critical habitat designation for this DPS identifies PCEs that include sites necessary to support one or more steelhead life stages. Specific sites include: (1) Freshwater spawning, (2) freshwater rearing, (3) freshwater migration, (4) estuarine areas free of obstruction, (5) nearshore marine areas free of obstructions, and (6) offshore marine areas with good water quality. The physical or biological features that characterize these sites include water quality and quantity, natural cover, forage, adequate passage conditions, and floodplain connectivity. Anthropogenic land uses introduce sediment, nutrients, biocides, metals, and other pollutants into surface and ground water and degrade water quality in the freshwater, estuarine, and coastal ecosystems throughout the Pacific Northwest. These human impacts affect the essential feature requirements for this DPS.

Of 43 subbasins reviewed in NMFS' assessment of critical habitat for the UWR steelhead, 20 subbasins were rated as having a high conservation value, while six were rated as having a medium value and 17 were rated as having a low value to the conservation of the DPS.

Environmental Baseline

By regulation, environmental baselines for Opinions include the past and present impacts of all state, federal or private actions and other human activities in the action area, the anticipated impacts of all proposed federal projects in the action area that have already undergone formal or early section 7 consultation, and the impact of state or private actions which are contemporaneous with the consultation in process (50 CFR §402.02). The environmental baseline for this Opinion includes a general description of the natural and anthropogenic factors influencing the current status of listed Pacific salmonids and the environment within the action area.

Our summary of the environmental baseline complements the information provided in the *Status of Listed Resources* section of this Opinion, and provides the background necessary to understand information presented in the *Effects of the Action*, and *Cumulative Effects* sections of this Opinion. We then evaluate these consequences in combination with the environmental baseline to determine the likelihood of jeopardy or adverse modification of designated critical habitat.

The proposed action under consultation is geographically focused on the aquatic ecosystems in the states of California, Idaho, Oregon, and Washington. Accordingly, the environmental baseline for this consultation focuses on the general status and trends of the aquatic ecosystems in these four states and the consequences of that status for listed resources under NMFS' jurisdiction. We describe the overall principal natural phenomena affecting all listed Pacific salmonids under NMFS jurisdiction in the action area.

We further describe anthropogenic factors through the predominant land and water uses within a region, as land use patterns vary by region. Background information on pesticides in the aquatic environment is also provided. This context illustrates how the physical and chemical health of regional waters and the impact of human activities have contributed to the current status of listed resources in the action area.

Natural Mortality Factors

Available data indicate high natural mortality rates for salmonids, especially in the open ocean/marine environment. According to Bradford (1997), salmonid mortality rates range from 90 to 99%, depending on the species, the size at ocean entry, and the length of time spent in the ocean. Predation, inter- and intraspecific competition, food availability, smolt quality and health, and physical ocean conditions likely influence the survival of salmon in the marine environment (Bradford 1997; Brodeur, Fisher et al. 2004). In freshwater rearing habitats, the natural mortality rate averages about 70% for all salmonid species (Bradford 1997). Past studies in the Pacific Northwest suggest that the average freshwater survival rate (from egg to smolt) is 2 to 3% throughout the region (Marshall and Britton 1990; Bradford 1997). A number of suspected causes contributing to natural mortality include parasites and/or disease, predation, water temperature, low water flow, wildland fire, and oceanographic features and climatic variability.

Parasites and/or Disease

Most young fish are highly susceptible to disease during the first two months of life. The cumulative mortality in young animals can reach 90 to 95%. Although fish disease organisms occur naturally in the water, native fish have co-evolved with them. Fish can carry these diseases at less than lethal levels (Kier Associates 1991; Walker and Foott 1993; Foott, Harmon et al. 2003). However, disease outbreaks may occur when water quality is diminished and fish are stressed from crowding and diminished flows (Spence, Lomnicky et al. 1996; Guillen 2003). Young coho salmon or other salmonid species may become stressed and lose their resistance in higher temperatures (Spence, Lomnicky et al. 1996). Consequently, diseased fish become more susceptible to predation and are less able to perform essential functions, such as feeding, swimming, and defending territories (McCullough 1999). Examples of parasites and disease for salmonids include whirling disease, infectious hematopoietic necrosis (IHN), sea-lice (*Lepeophtheirus salmonis*), *Henneguya salminicola*, *Ichthyopthirius multifiliis* or Ich, and Columnaris *(Flavobacterium columnare*).

Whirling disease is a parasitic infection caused by the microscopic parasite *Myxobolus cerebrali*. Infected fish continually swim in circular motions and eventually expire from exhaustion. The disease occurs in the wild and in hatcheries and results in losses to fry and fingerling salmonids, especially rainbow trout. The disease is transmitted by infected fish and fish parts and birds.

IHN is a viral disease in many wild and farmed salmonid stocks in the Pacific Northwest. This disease affects rainbow/steelhead trout, cutthroat trout (*Salmo clarki*), brown trout (*Salmo trutta*), Atlantic salmon (*Salmo salar*), and Pacific salmon including Chinook, sockeye, chum, and coho. The virus is triggered by low water temperatures and is shed in the feces, urine, sexual fluids, and external mucus of salmonids. Transmission is mainly from fish to fish, primarily by direct contact and through the water.

Sea lice also cause deadly infestations of wild and farm-grown salmon. *Henneguya salminicola*, a protozoan parasite, is commonly found in the flesh of salmonids. The fish responds by walling off the parasitic infection into a number of cysts that contain milky fluid. This fluid is an accumulation of a large number of parasites. Fish with the longest freshwater residence time as juveniles have the most noticeable infection. The order of prevalence for infection is coho followed by sockeye, Chinook, chum, and pink salmon.

Additionally, ich (a protozoan) and Columnaris (a bacterium) are two common fish diseases that were implicated in the massive kill of adult salmon in the Lower Klamath River in September 2002 (CDFG 2003; Guillen 2003).

Predation

Salmonids are exposed to high rates of natural predation, during freshwater rearing and migration stages, as well as during ocean migration. Salmon along the U.S. west coast are prey for marine mammals, birds, sharks, and other fishes. Concentrations of juvenile salmon in the coastal zone experience high rates of predation. In the Pacific Northwest, the increasing size of tern, seal, and sea lion populations may have reduced the survival of some salmon ESUs.

Marine Mammal Predation

Marine mammals are known to attack and eat salmonids. Harbor seals (*Phoca vitulina*), California sea lions (*Zalophus californianus*), and killer whales (*Orcinus orca*) prey on juvenile or adult salmon. Killer whales have a strong preference for Chinook salmon (up to 78% of identified prey) during late spring to fall (Hard, Jones et al. 1992; Hanson, Baird et al. 2005; Ford and Ellis 2006). Generally, harbor seals do not feed on salmonids as frequently as California sea lions (Pearcy 1997). California sea lions from the Ballard Locks in Seattle, Washington have been estimated to consume about 40% of the steelhead runs since 1985/1986 (Gustafson, Wainwright et al. 1997). In the Columbia River, salmonids may contribute substantially to sea lion diet at specific times and locations (Pearcy 1997). Spring Chinook salmon and steelhead are subject to pinniped predation when they return to the estuary as adults (NMFS 2006). Adult Chinook salmon in the Columbia River immediately downstream of Bonneville Dam have also experienced increased predation by California sea lions. In recent years, sea lion predation of adult LCR winter steelhead in the Bonneville tailrace has increased. This prompted ongoing actions to reduce predation effects. They include the exclusion, hazing, and in some cases, lethal take of marine mammals near Bonneville Dam (FCRPS 2008).

NOAA Fisheries has granted permits to the states of Idaho, Oregon, and Washington for the lethal removal of individual California sea lions that prey on adult spring-run Chinook salmon in the tail race of Bonneville Dam under section 120 of the Marine Mammal Protection Act (NMFS 2006). This action may increase the survival of adult Chinook salmon and steelhead. The Humane Society of the U.S. unsuccessfully challenged the issuance of these permits. The case is now on appeal.

Avian Predation

Large numbers of fry and juveniles are eaten by birds such as mergansers (*Mergus* spp.), common murre (*Uria aalage*), gulls (*Larus* spp.), and belted kingfishers (*Megaceryle alcyon*). Avian predators of adult salmonids include bald eagles (*Haliaeetus leucocephalus*) and osprey (*Pandion haliaetus*) (Pearcy 1997). Caspian terns (*Sterna*

caspia) and cormorants (*Phalacrocorax* spp.) also take significant numbers of juvenile or adult salmon. Stream-type juveniles, especially yearling smolts from spring-run populations, are vulnerable to bird predation in the estuary. This vulnerability is due to salmonid use of the deeper, less turbid water over the channel, which is located near habitat preferred by piscivorous birds (Binelli, Ricciardi et al. 2005). Recent research shows that subyearlings from the LCR Chinook salmon ESU are also subject to tern predation. This may be due to the long estuarine residence time of the LCR Chinook salmon (Ryan, Carper et al. 2006). Caspian terns and cormorants may be responsible for the mortality of up to 6% of the outmigrating stream-type juveniles in the Columbia River basin (Roby, Collis et al. 2006; Collis 2007).

Antolos *et al.* (2005) quantified predation on juvenile salmonids by Caspian terns nesting on Crescent Island in the mid-Columbia reach. Between 1,000 and 1,300 adult terns were associated with the colony during 2000 and 2001, respectively. These birds consumed about 465,000 juvenile salmonids in the first and approximately 679,000 salmonids in the second year. However, caspian tern predation in the estuary was reduced from a total of 13,790,000 smolts to 8,201,000 smolts after relocation of the colony from Rice to East Sand Island in 1999. Based on PIT-tag recoveries at the colony, these were primarily steelhead for Upper Columbia River stocks. Less than 0.1% of the inriver migrating yearling Chinook salmon from the Snake River and less than 1% of the yearling Chinook salmon from the Upper Columbia were consumed. PIT-tagged coho smolts (originating above Bonnevile Dam) were second only to steelhead in predation rates at the East Sand Island colony in 2007 (Roby, Colis et al. 2008). There are few quantitative data on avian predation rates on Snake River sockeye salmon. Based on the above, avian predators are assumed to have a minimal effect on the long-term survival of Pacific salmon (FCRPS 2008).

Fish Predation

Pikeminnows (*Ptychocheilus oregonensis*) are significant predators of yearling juvenile migrants (Friesen and Ward 1999). Chinook salmon were 29% of the prey of northern pikeminnows in lower Columbia reservoirs, 49% in the lower Snake River, and 64%

downstream of Bonneville Dam. Sockeye smolts comprise a very small fraction of the overall number of migrating smolts (Ferguson 2006) in any given year. The significance of fish predation on juvenile chum is unknown. There is little direct evidence that piscivorous fish in the Columbia River consume juvenile sockeye salmon. Nevertheless, predation of juvenile sockeye likely occurs. The ongoing Northern Pikeminnow Management Program (NPMP) has reduced predation-related juvenile salmonid mortality since 1990. Benefits of recent northern pikeminnow management activities to chum salmon are unknown. However, it may be comparable to those for other salmon species with a subyearling juvenile life history (Friesen and Ward 1999).

The primary fish predators in estuaries are probably adult salmonids or juvenile salmonids which emigrate at older and larger sizes than others. They include cutthroat trout (*O. clarki*) or steelhead smolts preying on chum or pink salmon smolts. Outside estuaries, many large fish population reside just offshore and may consume large numbers of smolts. These fishes include Pacific hake (*Merluccius productus*), Pacific mackerel (*Scomber japonicus*), lingcod (*Ophiodon elongates*), spiny dogfish (*Squalus acanthias*), various rock fish, and lamprey (Beamish, Thomson et al. 1992; Pearcy 1992; Beamish and Neville 1995).

Wildland Fire

Wildland fires that are allowed to burn naturally in riparian or upland areas may benefit or harm aquatic species, depending on the degree of departure from natural fire regimes. Although most fires are small in size, large size fires increase the chances of adverse effects on aquatic species. Large fires that burn near the shores of streams and rivers can have biologically significant short-term effects. They include increased water temperatures, ash, nutrients, pH, sediment, toxic chemicals, and large woody debris (Buchwalter, Sandahl et al. 2004; Rinne 2004). Nevertheless, fire is also one of the dominant habitat-forming processes in mountain streams (Bisson, Rieman et al. 2003). As a result, many large fires burning near streams can result in fish kills with the survivors actively moving downstream to avoid poor water quality conditions (Greswell 1999; Rinne 2004). The patchy, mosaic pattern burned by fires provides a refuge for

those fish and invertebrates that leave a burning area or simply spares some fish that were in a different location at the time of the fire (USFS 2000). Small fires or fires that burn entirely in upland areas also cause ash to enter rivers and increase smoke in the atmosphere, contributing to ammonia concentrations in rivers as the smoke adsorbs into the water (Greswell 1999).

The presence of ash also has indirect effects on aquatic species depending on the amount of ash entry into the water. All ESA-listed fishes rely on macroinvertebrates as a food source for at least a portion of their life histories. When small amounts of ash enter the water, there are usually no noticeable changes to the macroinvertebrate community or the water quality (Bowman and Minshall 2000). When significant amounts of ash are deposited into rivers, the macroinvertebrate community density and composition may be moderately to drastically reduced for a full year with long-term effects lasting 10 years or more (Buchwalter, Jenkins et al. 2003), (Minshall, Royer et al. 2001; Buchwalter, Sandahl et al. 2004). Larger fires can also indirectly affect fish by altering water quality. Ash and smoke contribute to elevated ammonium, nitrate, phosphorous, potassium, and pH, which can remain elevated for up to four months after forest fires (Buchwalter, Jenkins et al. 2003).

Many species have evolved in the presence of regular fires and have developed population-level mechanisms to withstand even the most intense fires (Greswell 1999). These same species have come to rely on fire's disturbance to provide habitat heterogeneity. In the past century, the human population has increased dramatically, resulting in urban sprawl and the development of formerly remote locations. This condition has increased the urban/wildland interface. As a result, the threat of fires to personal property and people has increased, including the demand for protection of their safety and belongings. We expect listed fish species will be exposed to an increasing number of fires and fire fighting techniques over time. Currently, federal, state, and local resource agencies lack long-term monitoring data on the effects of wildland fire on listed Pacific salmonids and their habitats. Thus, we are unable to quantify the overall effects of wildland fire on the long-term survival of listed Pacific salmonids at this time.

Oceanographic Features and Climatic Variability

Oceanographic features of the action area may influence prey availability and habitat for Pacific salmonids. The action area includes important spawning and rearing grounds and physical and biological features essential to the conservation of listed Pacific salmonids - *i.e.*, water quality, prey, and passage conditions. Ocean conditions and climatic variability may affect salmonids in the action area.

The primary effects of the ocean on salmon productivity involve growth and survival of salmon. All salmon growth is completed in the ocean. According to Welch (1996), fish growth will not reach its maximum potential if food density (food available divided by ocean volume) is insufficient to provide the maximum daily ration. If this critical level of food is not exceeded, then the potential for the ocean to limit salmon growth exists.

The decline in salmon survival in Oregon and Washington since 1977 may be caused by poorly understood processes in the marine (as opposed to freshwater) environment (Welch 1996). Current findings also indicate that the primary control on salmon distribution is temperature. However, the upper thermal limit varies throughout the year (Welch 1996).

Naturally occurring climatic patterns, such as the Pacific Decadal Oscillation and the El Niño and La Niña events, are major causes of changing marine productivity. Recent studies have shown that long-term changes in climate affect oceanic structure and produce abrupt differences in salmon marine survival and returns (Mantua, Hare et al. 1997; Hare, Mantua et al. 1999). A major regime shift in the subarctic and California Current ecosystems during the late 1970s may have been a factor in reducing ocean survival of salmon in the Pacific Northwest and in increasing the marine survival in Alaska (Hare, Mantua et al. 1999). Fluctuations in mortality of salmon in the freshwater and marine environment have been shown to be almost equally significant sources of annual recruitment variability (Bradford 1997). These events and changes in ocean temperature may also influence salmonid abundance in the action area. In years when ocean conditions are cooler than usual, the majority of sockeye salmon returning to the

Fraser River do so via this route. However, when warmer conditions prevail, migration patterns shift to the north through the Johnstone Strait (Groot and Quinn 1987).

Climate Change

Anthropogenic climate change, caused by factors such as the continuing build-up of human-produced atmospheric carbon dioxide, is predicted to have major environmental impacts along the west coast of North America during the 21st century and beyond (IPCC 2001; CIG 2004). Warming trends continue in both water and air temperatures. Projections of the consequences of climate change include disruption of annual cycles of rain and snow, alteration of prevailing patterns of winds and ocean currents, and increases in sea levels (Glick 2005; Snover, Mote et al. 2005). Oceanographic models project a weakening of the thermohaline circulation resulting in a reduction of heat transport into high latitudes of Europe, an increase in the mass of the Antarctic ice sheet, and a decrease in the Greenland ice sheet (IPCC 2001). These changes, coupled with increased acidification of ocean waters, are expected to have substantial effects on marine productivity and food webs, including populations of salmon and other salmonid prey (Hard, Jones et al. 1992).

Climate change poses significant hazards to the survival and recovery of salmonids along the west coast. Changes in water temperature can alter migration timing, reduce growth, reduce the supply of available oxygen in the water, reduce insect availability as prey, and increase the susceptibility of fish to toxicants, parasites, and disease (Fresh, Casillas et al. 2005; NMFS 2007). Earlier spring runoff and lower summer flows make it difficult for returning adult salmon to negotiate obstacles (NMFS 2007). Excessively high levels of winter flooding can scour eggs from their nests in the stream beds and increase mortalities among overwintering juvenile salmon. The predicted increased winter flooding, decreased summer and fall stream flows, and elevated warm season temperatures in the streams and estuaries may further degrade conditions for salmon that are already stressed from habitat degradation. Although the impacts of global climate change are less clear in the ocean environment, early modeling efforts suggest that increased temperatures will likely increase ocean stratification. This stratification

coincides with relatively poor ocean habitat for most Pacific Northwest salmon populations (IPCC 2001; CIG 2004).

We expect changing weather and oceanographic conditions may affect prey availability, temperature and water flow in habitat conditions, and growth for all 28 ESUs. Consequently, we expect the long-term survival and reproductive success for listed salmonids to be greatly affected by global climate change.

Anthropogenic Mortality Factors

In this section we address anthropogenic threats in the geographic regions across the action area. Among the threats discussed are the "four Hs": hatcheries, harvest, hydropower, and habitat. Prior to discussion of each geographic region, three major issues are highlighted: pesticide contamination, elevated water temperature, and loss of habitat/habitat connectivity. These three factors are the most relevant to the current analysis. To address these issues, we provide information on pesticide detections in the aquatic environment and highlight their background levels from past and ongoing anthropogenic activities. This information is pertinent to EPA's proposed registration of carbaryl, carbofuran, and methomyl in the U.S. and its territories. As water temperature plays such a strong role in salmonid distribution, we also provide a general discussion of anthropogenic temperature changes. Finally, we discuss the health of riparian systems and floodplain connectivity, as this habitat is vital to salmonid survival.

Baseline Pesticide Detections in Aquatic Environments

In the environmental baseline, we address pesticide detections reported as part of the U.S. Geological Survey (USGS) National Water-Quality Assessment Program's (NAWQA) national assessment (Gilliom, Barbash et al. 2006). We chose this approach for *Environmental Baseline* as the NAWQA studies present the same level of analysis for each area. Further, given the lack of reporting standards, we are unable to present a comprehensive basin-specific analysis of detections from other sources.

In the exposure section of the *Effects of the Proposed Action* we also present more recent unpublished data on the chemicals and degradates addressed in this Opinion from the NAWQA program and state databases maintained by California and Washington. As far as NMFS was able to ascertain, neither Oregon nor Idaho maintain publically available state-wide water quality databases. The California and Washington databases include some data from the NAWQA, but mostly the data are from more localized studies. Overall, data from those databases are relatively consistent in regards to pesticides addressed in this Opinion, with carbaryl generally being the most frequently quantifiable parent compound. Carbaryl and carbofuran were measured in concentrations ranging from 0.0001-33.5 μg/L. Methomyl generally was measured at slightly lower concentrations, ranging from 0.004-5.4 μg/L. Methomyl is also detected less frequently in some monitoring datasets, as it dissipates rapidly in aquatic systems, and non-targeted monitoring does not necessarily coincide with applications. Both 1-napthol (methomyl degradate) and 3-hydroxycarbofuran (carbofuran degradate) were detected in slightly lower concentrations, ranging from 0.0007-0.64 μg/L, than any of the parent compounds.

According to Gilliom *et al.*(2006), the distributions of the most prevalent pesticides in streams and ground water correlate with land use patterns and associated present or past pesticide use. When pesticides are released into the environment, they frequently end up as contaminants in aquatic environments. Depending on their physical properties some are rapidly transformed via chemical, photochemical, and biologically mediated reactions into other compounds, known as degradates. These degradates may become as prevalent as the parent pesticides depending on their rate of formation and their relative persistence.

National Water-Quality Assessment Program.

From 1992-2001, the USGS sampled water from 186 stream sites within 51 study units; bed-sediment samples from 1,052 stream sites, and fish from 700 stream sites across the continental U.S. Concentrations of pesticides were detected in streams and groundwater within most areas sampled with substantial agricultural or urban land uses. NAWQA results further detected at least one pesticide or degradate more than 90% of the time in water, in more than 80% in fish samples, and greater than 50% of bed-sediment samples

from streams in watersheds with agricultural, urban, and mixed land use (Gilliom, Barbash et al. 2006).

About 40 pesticide compounds accounted for most detections in water, fish, or bed sediment. Twenty-four pesticides and one degradate were each detected in more than 10% of streams in agricultural, urban, or mixed land use settings. These 25 pesticide compounds include 11 herbicides used most heavily in agriculture during the study period (plus the atrazine degradate, deethylatrazine); 7 herbicides used extensively for non-agricultural purposes; and 6 insecticides used in both agricultural and urban settings. Three of those insecticides were chlorpyrifos, diazinon, and malathion. Thirteen organochlorine pesticide compounds, including historically used parent pesticides and their degradates and by-products, were each found in more than 10% of fish or bed-sediment samples from streams draining watersheds with either agricultural, urban, or mixed land use (Gilliom, Barbash et al. 2006).

Additionally, more frequent detections and higher concentrations of insecticides occur in sampled urban streams (Gilliom, Barbash et al. 2006). Diazinon, chlorpyrifos, carbaryl, and malathion nationally ranked 2nd, 4th, 8th, and 15th among pesticides in frequencies of outdoor applications for home- and garden use in 1992 (Whitmore, Kelly et al. 1992). These same insecticides accounted for the most insecticide detections in urban streams. Diazinon and carbaryl were the most frequently detected and were found at frequencies and levels comparable to those for the common herbicides. Historically used insecticides were also found most frequently in fish and bed sediment from urban streams. The highest detection frequencies were for chlordane compounds, dichloro-diphenyl-trichloroethane (DDT) compounds, and dieldrin. Urban streams also had the highest concentrations of total chlordane and dieldrin in both sediment and fish tissue. Chlordane and aldrin were widely used for termite control until the mid-to-late 1980s. Their agricultural uses were restricted during the 1970s.

Chlorpyrifos and diazinon were commonly used in agricultural and urban areas from 1992-2001 and prior to the sampling period. About 13 million lbs of chlorpyrifos and

about 1 million lbs of diazinon were applied for agricultural use. Non-agricultural uses of chlorpyrifos and diazinon totaled about 5 million and 4 million lbs per year in 2001, respectively (Gilliom, Barbash et al. 2006). For both insecticides, concentrations in most urban streams were higher than in most agricultural streams, and were similar to those found in agricultural areas with the greatest intensities of use. Diazinon and chlorpyrifos were detected about 75% and 30% of the time in urban streams, respectively (Gilliom, Barbash et al. 2006). NMFS (2008) determined that current use of chlorpyrifos, diazinon, and malathion is likely to jeopardize the continued existence of 27 listed salmonid ESUs. NMFS provided EPA with reasonable and prudent alternatives (RPAs), including buffers and vegetative strips, to reduce pesticide exposure to listed salmon. Until the EPA implements the RPAs, we must assume current exposure will continue.

Another dimension of pesticides and their degradates in the aquatic environment is their simultaneous occurrence as mixtures (Gilliom, Barbash et al. 2006). Mixtures result from the use of different pesticides for multiple purposes within a watershed or groundwater recharge area. Pesticides generally occur more often in natural waterbodies as mixtures than as individual compounds. Mixtures of pesticides were detected more often in streams than in ground water and at relatively similar frequencies in streams draining areas of agricultural, urban, and mixed land use. More than 90% of the time, water from streams in these developed land use settings had detections of two or more pesticides or degradates. About 70% and 20% of the time, streams had five or more and ten or more pesticides or degradates, respectively (Gilliom, Barbash et al. 2006). Fish experiencing coincident exposure to multiple pesticides may also experience additive and synergistic effects. If the effects on a biological endpoint from concurrent exposure to multiple pesticides can be predicted by adding the potency of the pesticides involved, the effects are said to be additive. If, however, the response to a mixture lead to a greater than expected effect on the endpoint, and the pesticides within the mixture enhance the toxicity of one another, the effects are characterized as synergistic. These effects are of particular concern when the pesticides share a mode of action. Carbaryl, carbofuran, and methomyl are all AChE inhibitors. In California, there are 61 pesticides that inhibit AChE approved for use (CDPR 2007). According to CDPR, the amount of these

chemicals used has decreased (Table 26). However, some AChE a.i.s – such as bensulide and naled – are increasing in use (CDPR 2007). While the trend indicates decreased reliance on these products, we note that their current use remains significant.

Table 26. Use figures for AChE inhibiting pesticides in California (CDPR 2007)

	1996	2006
lbs a.i. applied	15,473,843	6,857,530
Acres treated (agriculture use only)	11,720,058	5,729,958

Mixtures of organochlorine pesticide compounds were also common in fish-tissue samples from most streams. About 90% of fish samples collected from urban steams contained two or more pesticide compounds and 33% contained 10 or more pesticides. Similarly, 75% of fish samples from streams draining watersheds with agricultural and mixed land use contained 2 or more pesticide compounds and 10% had 10 or more compounds (Gilliom, Barbash et al. 2006).

NAWQA analysis of all detections indicates that more than 6,000 unique mixtures of 5 pesticides were detected in agricultural streams (Gilliom, Barbash et al. 2006). The number of unique mixtures varied with land use. Mixtures of the most often detected individual pesticides include the herbicides atrazine (and its degradate deethylatrazine), metolachlor, simazine, and prometon. Each herbicide occurred in more than 30% of all mixtures found in agricultural and urban uses in streams. Also present in more than 30% of the mixtures were cyanazine, alachlor, metribuzin, and trifluralin in agricultural streams. Dacthal and the insecticides diazinon, chlorpyrifos, carbaryl, and malathion were also present in urban streams. Carbaryl occurred in at least 50% of urban streams. In 15% of urban streams carbaryl concentration was over 0.1µg/L (Gilliom, Barbash et al. 2006). Insecticides are typical constituents in environmental mixtures and are commonly found in both agriculatural and urban streams.

The numbers of unique mixtures of organochlorine pesticide compounds found in whole-fish tissue samples were greater in urban streams than in streams from agricultural or mixed land use watersheds. About 1,400 unique 5-compound mixtures were found in

fish from urban steams compared to fewer than 800 unique 5-compound mixtures detected in fish from agricultural and mixed land use steams. The relative contributions of most organochlorine compounds to mixtures in fish were about the same for urban and agricultural streams.

More than half of all agricultural streams sampled and more than three-quarters of all urban streams had concentrations of pesticides in water that exceeded one or more benchmarks for aquatic life. Aquatic life criteria are EPA water-quality guidelines for protection of aquatic life. Exceedance of an aquatic life benchmark level indicates a strong probability that aquatic species are being adversely affected. However, aquatic species may also be affected at levels below criteria. Finally, organochlorine pesticides that were discontinued 15 to 30 years ago still exceeded benchmarks for aquatic life and fish-eating wildlife in bed sediment or fish-tissue samples from many streams.

National Pollutant Discharge Elimination System

Pollution originating from a discrete location such as a pipe discharge or wastewater treatment outfall is known as a point source. Point sources of pollution require a National Pollutant Discharge Elimination System (NPDES) permit. These permits are issued for aquaculture, concentrated animal feeding operations, industrial wastewater treatment plants, biosolids (sewer/sludge), pre-treatment and stormwater overflows. The EPA administers the NPDES permit program and states certify that NPDES permit holders comply with state water quality standards. Nonpoint source discharges do not originate from discrete points; thus, nonpoint sources are difficult to identify, quantify, and are not regulated. Examples of nonpoint source pollution include, but are not limited to, urban runoff from impervious surfaces, areas of fertilizer and pesticide application, and manure.

According to EPA's database of NPDES permits, about 243 NPDES permits are co-located with listed Pacific salmonids in California. Collectively, the total number of EPA-recorded NPDES permits in Idaho, Oregon, and Washington, that are co-located with listed Pacific salmonids is 1,978. See ESU Figures in the *Status of Listed Resources* section for NPDES permits co-located within listed salmonid ESUs within the states of

California, Idaho, Oregon, and Washington.

On November 27, 2006, EPA issued a final rule which exempted pesticides from the NPDES permit process, provided that application was approved under FIFRA. The NPDES permits, then, do not include any point source application of pesticides to waterways in accordance with FIFRA labels. This rule was vacated by the courts on January 7, 2009 (National Cotton Council v. EPA, 553 F.3d 927 (6th Cir. 2009)).

Baseline Water Temperature- Clean Water Act

Elevated temperature is considered a water pollutant in most states with approved Water Quality Standards under the federal Clean Water Act (CWA) of 1972. As per the CWA, states periodically prepare a list of all surface waters in the state for which beneficial uses - such as drinking, recreation, aquatic habitat, and industrial use – are impaired by pollutants. These are water quality limited estuaries, lakes, and streams that do not meet state surface water quality standards, and are not expected to improve within the next two years. This process is in accordance with section 303(d) of the CWA. There are five categories a waterway can be classified under as per section 303(d):

- Category 1: Meets tested water quality standards;
- Category 2: Some evidence of a water quality problem, action not yet required;
- Category 3: Insufficient data;
- Category 4: Polluted waterway with solution being implemented; and
- Category 5: Polluted waterway, action is required

Water bodies listed under Category 5 are those that are considered impaired or threatened by pollution. The "303(d) list" is generally considered synonymous with the Category 5 waters, and will be treated as such within this Opinion.

Each state has separate and different 303(d) listing criteria and processes. Generally a water body is listed separately for each standard it exceeds, so it may appear on the list more than once. If a water body is not on the 303(d) list, it is not necessarily contaminant-free; rather it may not have been tested. Therefore, the 303(d) list is a minimum list for the each state regarding polluted water bodies by parameter.

After states develop their lists of impaired waters, they are required to prioritize and submit their lists to EPA for review and approval. States are expected to identify high priority waters targeted for Total Maximum Daily Load (TMDL) development within two years of the 303(d) listing process. A TMDL includes a plan for reducing contaminant loading and is required for all impaired waterways. Each state also establishes a priority ranking for the development of TMDLs for such waters, considering the severity of the pollution and the uses to be made of such waters.

Federal non-priority water quality standards have been established for carbaryl and carbofuran, but not for methomyl. The California 303(d) list includes a 49 mile section of the Colusa Basin Drain that exceeds carbofuran standards (Category 5). Several areas in Washington and Oregon have been listed under Category 2 for carbaryl and carbofuran. They include: Willapa Bay, WA (carbaryl, 18 separate listings); Grays Harbor County Drainage Ditch #1, WA (carbaryl); Pacific County Drainage Ditch #1, WA (carbaryl); North River, WA (carbaryl); Palix River, WA (carbaryl); Johnson Creek, OR (carbaryl & carbofuran, 23.7 river miles); Beaverton Creek, OR (carbaryl, 9.8 river miles); Tualatin River, OR (carbaryl, 44.7 river miles); and Mill Creek, OR (carbofuran, 25.7 river miles). In addition to specific compounds, water bodies are listed as impaired due to "pesticides" as a general category. We did not consider these waterways as there was no way to tell what compounds were present.

Temperature is significant for the health of aquatic life. Water temperatures affect the distribution, health, and survival of native cold-blooded salmonids in the Pacific Northwest. These fish will experience adverse health effects when exposed to temperatures outside their optimal range. For listed Pacific salmonids, water temperature tolerance varies between species and life stages. Optimal temperatures for rearing salmonids range from 10ºC and 16ºC. In general, the increased exposure to stressful water temperatures and the reduction of suitable habitat caused by drought conditions reduce the abundance of salmon. Warm temperatures can reduce fecundity, increase egg survival, retard growth of fry and smolts, reduce rearing densities, increase susceptibility

to disease, decrease the ability of young salmon and trout to compete with other species for food, and to avoid predation (Spence, Lomnicky et al. 1996; McCullough 1999). Migrating adult salmonids and upstream migration can be delayed by excessively warm stream temperatures. Excessive stream temperatures may also negatively affect incubating and rearing salmonids (Gregory and Bisson 1997).

Sublethal temperatures (above 24ºC) could be detrimental to salmon by increasing susceptibility to disease (Colgrove and Wood 1966) or elevating metabolic demand (Brett 1995). Substantial research demonstrates that many fish diseases become more virulent at temperatures over 15.6ºC (McCullough 1999). Due to the sensitivity of salmonids to temperature, states have established lower temperature thresholds for salmonid habitat as part of their water quality standards. A water body is listed for temperature on the 303(d) list if the 7-day average of the daily maximum temperatures (7-DADMax) exceeds the temperature threshold (Table 27).

Table 27. Washington State water temperature thresholds for salmonid habitat. These temperatures are representative of limits set by California, Idaho, and Oregon (WSDE 2006).

Category	Highest 7-DADMax
Salmon and Trout Spawning	13°C (55.4°F)
Core Summer Salmonid Habitat	16°C (60.8°F)
Salmonid Spawning, Rearing, and Migration	17.5°C (63.5°F)
Salmonid Rearing and Migration Only	17.5°C (63.5°F)

Water bodies that are not designated salmonid habitat are also listed if they have a one-day maximum over a given background temperature. Using publicly available GIS layers, we determined the number of km on the 303(d) list for exceeding temperature thresholds within the boundaries of each ESU (Table 28). Because the 303(d) list is limited to the subset of rivers tested, the chart values should be regarded aslower-end estimates.

While some ESU ranges do not contain any 303(d) rivers listed for temperature, others show considerable overlap. These comparisons demonstrate the relative significance of elevated temperature among ESUs. Increased water temperature may result in

wastewater discharge, decreased water flow, minimal shading by riparian areas, and climatic variation.

Table 28. Number of kilometers of river, stream and estuaries included in state 303(d) lists due to temperature that are located within each salmonid ESU. Data was taken from the most recent GIS layers available from state water quality assessments reports*

Species	ESU	California	Oregon	Washington	Idaho	Total
Chinook Salmon	California Coastal	39.3	–	–	–	39.3
	Central Valley Spring - Run	0.0	–	–	–	0.0
	Lower Columbia River	–	56.6	229.8	–	286.4
	Upper Columbia River Spring - Run	–	–	254.6	–	254.6
	Puget Sound	–	–	705.0	–	705.0
	Sacramento River Winter - Run	0.0	–	–	–	0.0
	Snake River Fall - Run	–	610.1	246.6	400.2	1,256.9
	Snake River Spring / Summer - Run	–	809.3	243.2	543.8	1,596.3
	Upper Williamette River	–	2,468.0	–	–	2,468.0
Chum Salmon	Columbia River	–	56.6	225.0	–	281.6
	Hood Canal Summer - Run	–	–	90.1	–	90.1
Coho Salmon	Central California Coast	39.3	–	–	–	39.3
	Lower Columbia River	–	291.9	233.5	–	525.4
	Southern Oregon and Northern California Coast	1,416.2	1,833.0	–	–	3,249.2
	Oregon Coast	–	3,715.8	–	–	3,715.8
Sockeye Salmon	Ozette Lake	–	–	4.8	–	4.8
	Snake River	–	–	–	0.0	0.0
Steelhead	Central California Coast	0.0	–	–	–	0.0
	California Central Valley	0.0	–	–	–	0.0
	Lower Columbia River	–	201.2	169.3	–	370.5
	Middle Columbia River	–	3,518.5	386.2	–	3,904.7
	Northern California	39.3	–	–	–	39.3
	Puget Sound	–	–	704.9	–	704.9
	Snake River	–	990.7	246.6	737.6	1,974.9
	South-Central California Coast	0.0	–	–	–	0.0
	Southern California	0.0	–	–	–	0.0
	Upper Columbia River	–	–	282.3	–	282.3
	Upper Williamette River	–	1,668.0	–	–	1,668.0

*CA 2006, Oregon 2004/2006, Washington 2004, and Idaho 1998. (California EPA TMDL Program 2007b, Oregon Department of Environmental Quality 2007, Washington State Department of Ecology 2005, Idaho Department of Environmental Quality 2001).

Baseline Habitat Condition

Riparian zones are the areas of land adjacent to rivers and streams. These systems serve as the interface between the aquatic and terrestrial environments. Riparian vegetation is

characterized by emergent aquatic plants and species that thrive on close proximity to water, such as willows. This vegetation maintains a healthy river system by reducing erosion, stabilizing main channels, and providing shade. Leaf litter that enters the river becomes an important source of nutrients for invertebrates (Bisson and Bilby 2001). Riparian zones are also the major source of large woody debris (LWD). When trees fall and enter the water, they become an important part of the ecosystem. The LWD alters the flow, creating the pools of slower moving water preferred by salmon (Bilby, Fransen et al. 2001). While not necessary for pool formation, LWD is associated with around 80% of pools in northern California, Washington, and the Idaho pan-handle (Bilby and Bisson 2001).

Bilby and Bisson (2001) discuss several studies that associate increased LWD with increased pools, and both pools and LWD with salmonid productivity. Their review also includes documented decreases in salmonid productivity following the removal of LWD. Other benefits of LWD include deeper pools, increased sediment retention, and channel stabilization.

Floodplains are relatively flat areas adjacent to larger streams and rivers. They allow for the lateral movement of the main channel and provide storage for floodwaters during periods of high flow. Water stored in the floodplain is later released during periods of low flow. This process ensures adequate flows for salmonids during the summer months, and reduces the possibility of high-energy flood events destroying salmonid redds (Smith 2005).

Periodic flooding of these areas creates habitat used by salmonids. Storms also wash sediment and LWD into the main stem river, often resulting in blockages. These blockages may force the water to take an alternate path and result in the formation of side channels and sloughs (Benda, Miller et al. 2001). Side channels and sloughs are important spawning and rearing habitat for salmonids. The degree to which these off-channel habitats are linked to the main channel via surface water connections is referred

to as connectivity (PNERC 2002). As river height increases with heavier flows, more side channels form and connectivity increases.

Healthy riparian habitat and floodplain connectivity are vital for supporting a salmonid population. Once the area has been disturbed, it can take decades to recover (Smith 2005). Consequently, most land use practices cause some degree of impairment. Development leads to construction of levees and dikes, which isolate the mainstem river from the floodplain. Agricultural development and grazing in riparian areas also significantly change the landscape. Riparian areas managed for logging, or logged in the past, are often impaired by a change in species composition. Most areas in the northwest were historically dominated by conifers. Logging results in recruitment of deciduous trees, decreasing the quality of LWD in the rivers. Deciduous trees have smaller diameters than conifers; they decompose faster and are more likely to be displaced (Smith 2005).

Without a properly functioning riparian zone, salmonids contend with a number of limiting factors. They face reductions in quantity and quality of both off-channel and pool habitats. Also, when seasonal flows are not moderated, both higher and lower flow conditions exist. Higher flows can displace fish and destroy redds, while lower flows cut off access to parts of their habitat. Finally, decreased vegetation limits the available shade and cover, exposing individuals to higher temperatures and increased predation.

Geographic Regions

For a more fine scale analysis, we divided the action area into geographic regions: the Southwest Coast Region (California) and the Pacific Northwest Region (Idaho, Oregon, and Washington). The Pacific Northwest Region was further subdivided according to ecoregions or other natural features important to NMFS trust resources. Use of these geographic regions is consistent with previous NMFS consultations conducted at the national level (NMFS 2007). We summarize the principal anthropogenic factors occurring in the environment that influence the current status of listed species within each region. Table 29 provides a breakdown of these regions and includes the USGS

subregions and accounting units for each region. It also provides a list of ESUs found in each accounting unit, as indicated by Federal Register listing notices.

Southwest Coast Region

The basins in this section occur in the State of California and the southern parts of the State of Oregon. Table 30 and Table 31 show land area in km² for each ESU /DPS located in the Southwest Coast Region.

Table 29. USGS Subregions and accounting units within the Northwest and Southwest Regions, along with ESUs present within the area (Seaber, Kapinos et al. 1987).

Region	USGS Subregion	Accounting Unit	State	HUC no.	ESU
Pacific Northwest: Columbia River Basin	Upper Columbia River Basin	—	WA	170200	Upper Columbia Spring-run Chinook; Upper Columbia Steelhead; Middle Columbia Steelhead
	Yakima River Basin	—	WA	170300	Middle Columbia Steelhead
	Lower Snake River Basin	Lower Snake River Basin	ID, OR, WA	170601	Snake River Steelhead; Snake River Spring/Summer-run Chinook; Snake River Fall-run Chinook; Snake River Sockeye
		Salmon River Basin	ID	170602	Snake River Steelhead; Snake River Spring/Summer - Run Chinook; Snake River Fall - Run Chinook; Snake River Sockeye
		Clearwater River Basin	ID, WA	170603	Snake River Steelhead; Snake River Fall - Run Chinook
	Middle Columbia River Basin	Middle Columbia River Basin	OR, WA	170701	Middle Columbia Steelhead; Lower Columbia Chinook; Columbia Chum; Lower Columbia Coho
		John Day River Basin	OR	170702	Middle Columbia Steelhead
		Deschutes River Basin	OR	170703	Middle Columbia Steelhead
	Lower Columbia River Basin	—	OR, WA	170800	Lower Columbia Chinook; Columbia Chum; Lower Columbia Steelhead; Lower Columbia Coho

Region	USGS Subregion	Accounting Unit	State	HUC no.	ESU
	Willamette River Basin	—	OR	170900	Upper Willamette Chinook; Upper Willamette Steelhead; Lower Columbia Chinook; Lower Columbia Steelhead; Lower Columbia Coho
Pacific Northwest: Coastal Drainages	Oregon-Washington Coastal Basin	Washington Coastal	WA	171001	Ozette Lake Sockeye
		Northern Oregon Coastal	OR	171002	Oregon Coast Coho
		Southern Oregon Coastal	OR	171003	Oregon Coast Coho; Southern Oregon and Northern California Coast Coho
Pacific Northwest: Puget Sound	Puget Sound	—	WA	171100	Puget Sound Chinook; Hood Canal Summer - Run Chum; Puget Sound Steelhead
Southwest Coast	Klamath-Northern California Coastal	Northern California Coastal	CA	180101	Southern Oregon and Northern California Coast Coho; California Coastal Chinook; Northern California Steelhead; Central California Coast Steelhead; Central California Coast Coho
		Klamath River Basin	CA, OR	180102	Southern Oregon and Northern California Coast Coho
	Sacramento River Basin	Lower Sacramento River Basin	CA	180201	Central Valley Spring-run Chinook; California Central Valley Steelhead; Sacramento River Winter-run Chinook
	San Joaquin River Basin	—	CA	180400	California Central Valley Steelhead
	San Francisco Bay	—	CA	180500	Central California Coast Steelhead; Southern Oregon and Northern California Coast Coho; Central California Coast Coho; Sacramento River Winter-run Chinook

Region	USGS Subregion	Accounting Unit	State	HUC no.	ESU
	Central California Coastal	—	CA	180600	Central California Coast Steelhead; Southern Oregon and Northern California Coast Coho; South-Central California Coast Steelhead; Southern California Steelhead; Central California Coast Coho; Sacramento River Winter-run Chinook
	Southern California Coastal	Ventura-San Gabriel Coastal	CA	180701	Southern California Steelhead
		Laguna-San Diego Coastal	CA	180703	Southern California Steelhead

Table 30. Area of land use categories within the range Chinook and Coho Salmon ESUs in km². Land cover image data were taken from Multi-Resolution Land Characteristics (MRLC) Consortium, a consortium of nine federal agencies (USGS, EPA, USFS, NOAA, NASA, BLM, NPS, NRCS, and USFWS) (National Land Cover Data 2001). Land cover class definitions are available at: http://www.mrlc.gov/nlcd_definitions.php

Landcover Type code		Chinook Salmon			Coho Salmon	
		CA Coastal	Central Valley	Sacramento River	Central CA Coast	So. Oregon and No. CA
Open Water	11	128	346	0	157	197
Perennial Snow/Ice	12	0	0	12	0	11
Developed, Open Space	21	826	1,150	16	629	1,384
Developed, Low Intensity	22	137	578	313	171	225
Developed, Medium Intensity	23	95	567	0	138	92
Developed, High Intensity	24	10	135	313	30	23
Barren Land	31	70	158	40	23	261
Deciduous Forest	41	850	664	7	208	1,057
Evergreen Forest	42	10,700	3,761	1	4,752	28,080
Mixed Forest	43	1,554	479	51	922	2,426
Shrub/Scrub	52	3,801	3,203	0	1,620	8,864
Herbaceous	71	2,114	6,317	12	1,646	2,708
Hay/Pasture	81	183	769	11	6	736
Cultivated Crops	82	212	5,110	0	233	454
Woody Wetlands	90	42	191	0	25	130
Emergent Herbaceous Wetlands	95	18	553	18	13	50
TOTAL (inc. open water)		20,740	23,982	792	10,572	46,697
TOTAL (w/o open water)		20,612	23,636	792	10,415	46,499

Table 31. Area of Land Use Categories within the Range of Steelhead Trout DPSs (km²). Land cover image data were taken from Multi-Resolution Land Characteristics (MRLC) Consortium, a consortium of nine federal agencies (USGS, EPA, USFS, NOAA, NASA, BLM, NPS, NRCS, and USFWS) (National Land Cover Data 2001). Land cover class definitions are available at: http://www.mrlc.gov/nlcd_definitions.php

Landcover Type	code	Steelhead				
		Central CA Coast	CA Central Valley	Northern CA	South-Central CA Coast	Southern CA
Open Water	11	1,406	409	106	127	86
Perennial Snow/Ice	12	0	0	0	0	0
Developed, Open Space	21	1,224	1,431	610	1,019	685
Developed, Low Intensity	22	876	693	50	247	364
Developed, Medium Intensity	23	1,223	744	32	168	262
Developed, High Intensity	24	327	181	3	23	12
Barren Land	31	26	202	63	303	62
Deciduous Forest	41	179	751	763	1	0
Evergreen Forest	42	2,506	3,990	9,790	1,721	835
Mixed Forest	43	2,086	598	1,159	1,925	897
Shrub/Scrub	52	2,253	3,745	2,878	4,952	4,370
Herbacous	71	3,588	9,435	1,478	6,194	1,516
Hay/Pasture	81	36	1,671	179	203	141
Cultivated Crops	82	486	9,054	14	1,297	653
Woody Wetlands	90	36	248	32	93	35
Emergent Herbacous Wetlands	95	392	450	17	73	35
TOTAL (inc. open water)		16,645	33,601	17,173	18,345	9,954
TOTAL (w/o open water)		15,240	33,193	17,067	18,218	9,868

Select watersheds described herein characterize the past, present, and future human activities and their impacts on the area. The Southwest Coast region encompasses all Pacific Coast rivers south of Cape Blanco, Oregon through southern California. NMFS has identified the Cape Blanco area as an ESU/DPS biogeographic boundary for Chinook and coho salmon, and steelhead based on strong genetic, life history, ecological and habitat differences north and south of this landmark. Major rivers contained in this

grouping of watersheds are the Sacramento, San Joaquin, Salinas, Klamath, Russian, Santa Ana, and Santa Margarita Rivers (Table 32).

Table 32. Select rivers in the southwest coast region (Carter and Resh 2005).

Watershed	Approx Length (mi)	Basin Size (mi^2)	Physiographic Provinces*	Mean Annual Precipitation (in)	Mean Discharge (cfs)	No. Fish Species (native)	No. Endangered Species
Rogue River	211	5,154	CS, PB	38	10,065	23 (14)	11
Klamath River	287	15,679	PB, B/R, CS	33	17,693	48 (30)	41
Eel River	200	3,651	PB	52	7,416	25 (15)	12
Russian River	110	1,439	PB	41	2,331	41 (20)	43
Sacramento River	400	27,850	PB, CS, B/R	35	23,202	69 (29)	>50 T & E spp.
San Joaquin River	348	83,409	PB, CS	49	4,662	63	>50 T & E spp.
Salinas River	179	4,241	PB	14	448	36 (16)	42 T & E spp.
Santa Ana River	110	2,438	PB	13	60	45 (9)	54
Santa Margarita River	27	1,896	LC, PB	49.5	42	17 (6)	52

* Physiographic Provinces: PB = Pacific Border, CS = Cascades-Sierra Nevada Range, B/R = Basin & Range.

Land Use

Forest and vacant land are the dominant land uses in the northern basins. Grass, shrubland, and urban uses are the dominant land uses in the southern basins (Table 33). Overall, the most developed watersheds are the Santa Ana, Russian, and Santa Margarita rivers. The Santa Ana watershed encompasses portions of San Bernardino, Los Angeles, Riverside, and Orange counties. About 50% of the coastal subbasin in the Santa Ana watershed is dominated by urban land uses and the population density is about 1,500 people per square mile. When steep and undevelopable lands are excluded from this area, the population density in the watershed is about 3,000 people per square mile. However, the most densely populated portion of the basin is near the City of Santa Ana. Here, the population density reaches 20,000 people per square mile (Burton, Izbicki et al. 1998; Belitz, Hamlin et al. 2004). The basin is home to nearly 5 million people. However, this population is projected to increase two-fold in the next 50 years (Burton, Izbicki et al. 1998; Belitz, Hamlin et al. 2004).

Table 33. Land uses and population density in several southwest coast watersheds (Carter and Resh 2005).

Watershed	Land Use Categories (Percent)				Density (people/mi^2)
	Agriculture	Forest	Urban	Other	
Rogue River	6	83	<1	9 grass & shrub	32
Klamath River	6	66	<1	24 grass, shrub, wetland	5
Eel River	2	65	<1	31 grass & shrub	9
Russian River	14	50	3	31 (23 grassland)	162
Sacramento River	15	49	2	30 grass & shrub	61
San Joaquin River	30	27	2	36 grass & shrub	76
Salinas River	13	17	1	65 (49 grassland)	26
Santa Ana River	11	57	32	---	865
Santa Margarita River	12	11	3	71 grass & shrub	135

As a watershed becomes urbanized, population increases and changes occur in stream habitat, water chemistry, and the biota (plants and animals) that live there. The most obvious effect of urbanization is the loss of natural vegetation which results in an increase in impervious cover and dramatic changes to the natural hydrology of urban streams. Urbanization generally results in land clearing, soil compaction, modification and/or loss of riparian buffers, and modifications to natural drainage features (Richter 2002). The increased impervious cover in urban areas leads to increased volumes of runoff, increased peak flows and flow duration, and greater stream velocity during storm events.

Runoff from urban areas also contains all the chemical pollutants from automobile traffic and roads as well as those from industrial sources and residential use. Urban runoff is also typically warmer than receiving waters and can significantly increase temperatures in small urban streams. Warm stream water is detrimental to native aquatic life resident fish and the rearing and spawning needs of anadromous fish. Wastewater treatment plants replace septic systems, resulting in point dischages of nutrients and other contaminants not removed in the processing. Additionally, some cities have combined sewer/stormwater overflows (CSOs) and older systems may discharge untreated sewage following heavy rainstorms. Wastewater treatment plant outfalls often discharge directly into the rivers containing salmonids. These urban nonpoint and point source discharges

affect the water quality and quantity in basin surface waters.

In many basins, agriculture is the major water user and the major source of water pollution to surface waters. In 1990, nearly 95% of the water diverted from the San Joaquin River was diverted for agriculture. Additionally, 1.5% of the water was diverted for livestock (Carter and Resh 2005). The amount and extent of water withdrawals or diversions for agriculture impact streams and their inhabitants via reduced water flow/velocity and dissolved oxygen levels. For example, adequate water flow is required for migrating salmon along freshwater, estuarine, and marine environments in order to complete their life cycle. Low flow events may delay salmonid migration or lengthen fish presence in a particular water body until favorable flow conditions permit fish migration along the migratory corridor or into the open ocean.

Water diversions may also increase nutrient load, sediments (from bank erosion), and temperature. Flow management and climate changes have decreased the delivery of suspended particulate matter and fine sediment to the estuary. The conditions of the habitat (shade, woody debris, overhanging vegetation) whereby salmonids are constrained by low flows also may make them more or less vulnerable to predation, elevated temperatures, crowding, and disease. Water flow effects on salmonids may seriously impact adult migration and water quality conditions for spawning and rearing salmonids. High temperature may also result from the loss of vegetation along streams that used to shade the water and from new land uses (buildings and pavement) whereby rainfall picks up heat before it runs off into the stream.

Currently, California has over 500 water bodies on its 303(d) list (Wu 2000). The 2006 list includes 779 stream segments, rivers, lakes, and estuaries and 12 pollutant categories (CEPA 2007). Pollutants represented on the list include pesticides, metals, sediments, nutrients or low dissolved oxygen, temperature, bacteria and pathogens, and trash or debris. There are 2,237 water body/pollutant listings; a water body is listed separately for each pollutant detected (CEPA 2007). The 2006 303(d) list identifies water bodies listed due to the presence of specific pollutants, including carbofuran and elevated temperature

(Table 34). See species ESU/DPS maps for NPDES permits and 303(d) waters co-located within listed salmonid ESUs/DPSs in California.

Table 34. California's 2006 Section 303(d) List of Water Quality Limited Segments: segments listed for exceeding temperature and carbofuran limits (CEPA 2007).

Pollutant	Estuary Acres Affected	River / Stream Miles Affected	# Water Bodies
Temperature	-	16,907.2	41
Carbofuran	-	49	1

Estuary systems of the region are consistently exposed to anthropogenic pressures stemming from high human density sources. For example, the largest west coast estuary is the San Francisco Estuary. This water body provides drinking water to 23 million people, irrigates 4.5 million acres of farmland, and drains roughly 40% of California's land area. As a result of high use, many environmental measures of the San Francisco Estuary are poor. Water quality suffers from high phosphorus and nitrogen loads, primarily from agricultural, sewage, and storm water runoff. Water clarity is also compromised. Sediments from urban runoff and historical activities contain high levels of contaminants. They include pesticides,polychlorinated biphenyls (PCBs), nickel, selenium, cadmium, , mercury, copper, and silver. Specific pesticides include pyrethroids, malathion, carbaryl, and diazinon. Other pollutants include DDT and polynuclear aromatic hydrocarbons (PAHs).

Other wastes are also discharged into San Francisco Bay. Approximately 150 industries discharge wastewater into the bay. Discharge of hot water from power plants and industrial sources may elevate temperatures and negatively affect aquatic life. Additionally, about 60 sewage treatment plants discharge treated effluent into the bay and elevate nutrient loads. However, since 1993, many of the point sources of pollution have been greatly reduced. Pollution from oil spills also occur due to refineries in the bay area. As these stressors persist in the marine environment, the estuary system will likely carry loads for future years, even with strict regulation. Gold mining has also reduced estuary depths in much of the region, causing drastic changes to habitat.

Large urban centers are foci for contaminants. Contaminant levels in surface waters near San Francisco, Oakland, and San Jose are highest. These areas are also where water clarity is at its worst. Some of the most persistent contaminants (PCBs, dioxins, DDT, etc.) are bioaccumulated by aquatic biota and can biomagnify in the food chain. Fish tissues contain high levels of PCB and mercury. Concentrations of PCB were 10 times above human health guidelines for consumption. Birds, some of which are endangered (clapper rail and least tern), have also concentrated these toxins.

Santa Ana Basin: NAWQA assessment

The Santa Ana watershed is the most heavily populated study site out of more than 50 assessment sites studied across the nation by the NAWQA Program. According to Belitz *et al.* (2004), treated wastewater effluent is the primary source of baseflow to the Santa Ana River. Secondary sources that influence peak river flows include stormwater runoff from urban, agricultural, and undeveloped lands (Belitz, Hamlin et al. 2004). Stormwater and agricultural runoff frequently contain pesticides, fertilizers, sediments, nutrients, pathogenic bacteria, and other chemical pollutants to waterways and degrade water quality. The above inputs have resulted in elevated concentrations of nitrates and pesticides in surface waters of the basin. Nitrates and pesticides were more frequently detected here than in other national NAWQA sites (Belitz, Hamlin et al. 2004).

Additionally, Belitz *et al.* (2004) found that pesticides and volatile organic compounds (VOCs) were frequently detected in surface and ground water in the Santa Ana Basin. Of the 103 pesticides and degradates routinely analyzed for in surface and ground water, 58 were detected. Pesticides included diuron, diazinon, carbaryl, chlorpyrifos, lindane, malathion, and chlorothalonil. Carbaryl was detected in 42% of urban samples, though it generally did not exceed the standard for protection of aquatic life (Belitz *et al.* 2004). Carbofuran was also detected, but did not exceed any water quality standards. Methomyl was tested for but not detected. Of the 85 VOCs routinely analyzed for, 49 were detected. VOCs included methyl *tert*-butyl ether (MTBE), chloroform, and trichloroethylene (TCE). Organochlorine compounds were also detected in bed sediment and fish tissue. Organochlorine concentrations were also higher at urban sites than at

undeveloped sites in the Santa Ana Basin. Organochlorine compounds include DDT and its breakdown product diphenyl dicloroethylene (DDE), and chlordane. Other contaminants detected at high levels included trace elements such as lead, zinc, and arsenic. According to Belitz *et al.* (2004), the biological community in the basin is heavily altered as a result from these pollutants.

San Joaquin-Tulare Basin: NAWQA assessment

A study was conducted by the USGS in the mid-1990s on water quality within the San Joaquin-Tulare basins. USGS detected 49 of the 83 pesticides it tested for in the mainstem and three subbasins. Pesticides were detected in all but one of the 143 samples. The most common detections were of the herbicides simazine, dacthal, metolachlor, and EPTC (Eptam), and the insecticides diazinon and chlorpyrifos. Twenty-two pesticides were detected in 20% of the samples (Dubrovsky, Kratzer et al. 1998). Carbaryl and methomyl were detected in all three subbasins, despite land use differences. Carbaryl was detected in roughly 20% of samples from each subbasin, while methomyl detections ranged from 5% to 25%. Further, most samples contained mixtures of between 7 and 22 pesticides. Criteria for the protection of aquatic life were exceeded in 37% of samples of streams (Dubrovsky, Kratzer et al. 1998). Only seven pesticides exceeded their criteria: diuron, trifluralin, azinphos-methyl, carbaryl, chlorpyrifos, diazinon, and malathion. Forty percent of these exceedances were attributed solely to diazinon. However, criteria do not exist yet for over half of the detected compounds (Dubrovsky et al.1998).

Organochlorine insecticides in bed sediment and tissues of fish or clams were also detected. They include DDT and toxaphene. Levels at some sites were among the highest in the nation. Concentrations of trace elements in bed sediment generally were higher than concentrations found in other NAWQA study units (Dubrovsky, Kratzer et al. 1998).

Sacramento River Basin: NAWQA analysis

Another study conducted by the USGS from 1996-1998 within the Sacramento River Basin detected up to 24 out of 47 pesticides in surface waters (Domagalski 2000). Pesticides included thiobencarb, carbofuran, molinate, simazine, metolachlor, dacthal, chlorpyrifos, carbaryl, and diazinon. Land use differences between sites are reflected in pesticide detections. Carbofuran was detected in 100% of samples from the agricultural site, but only 6.7% of urban samples (Domagalski 2000). Carbaryl, however, was detected in 100% of urban samples and 42.9% of agricultural samples. Some pesticides were detected at concentrations higher than criteria for the protection of aquatic life in the smaller streams, but were diluted to safer levels in the mainstem river. Intensive agricultural activities also impact water chemistry. In the Salinas River and in areas with intense agriculture use, water hardness, alkalinity, nutrients, and conductivity are also high.

Habitat Modification

The Central Valley area, including San Francisco Bay and the Sacramento and San Joaquin River Basins, has been drastically changed by development. Salmonid habitat has been reduced to 300 miles from historic estimates of 6,000 miles (CDFG 1993). In the San Joaquin Basin alone, the historic floodplain covered 1.5 million acres with 2 million acres of riparian vegetation (CDFG 1993). Roughly 5% of the Sacramento River Basin's riparian forests remain. Impacts of development include loss of LWD, increased bank erosion and bed scour, changes in sediment loadings, elevated stream temperature, and decreased base flow. Thus, lower quantity and quality of LWD and modified hydrology reduce and degrade salmonid rearing habitat.

The Klamath Basin in Northern California has been heavily modified as well. Water diversions have reduced spring flows to 10% of historical rates in the Shasta River, and dams block access to 22% of historical salmonid habitat. The Scott and Trinity Rivers have similar histories. Agricultural development has reduced riparian cover and diverted water for irrigation (NRC 2003). Riparian habitat has decreased due to extensive logging

and grazing. Dams and water diversions are also common. These physical changes resulted in water temperatures too high to sustain salmonid populations. The Salmon River, however, is comparatively pristine; some reaches are designated as Wild and Scenic Rivers. The main cause of riparian loss in the Salmon River basin is likely wild fires – the effects of which have been exacerbated by salvage logging (NRC 2003).

Mining

Famous for the gold rush of the mid-1800s, California has a long history of mining. Extraction methods such as suction dredging, hydraulic mining, strip mining may cause water pollution problems. In 2004, California ranked top in the nation for non-fuel mineral production with 8.23% of total production (NMA 2007). Today, gold, silver, and iron ore comprise only 1% of the production value. Primary minerals include construction sand, gravel, cement, boron, and crushed stone. California is the only state to produce boron, rare-earth metals, and asbestos (NMA 2007).

California contains some 1,500 abandoned mines. Roughly 1% of these mines are suspected of discharging metal-rich waters into the basins. The Iron Metal Mine in the Sacramento Basin releases more than 1,100 lbs of copper and more than 770 lbs of zinc to the Keswick Reservoir below Shasta Dam. The Iron Metal Mine also released elevated levels of lead (Cain et al. 2000 in Carter and Resh 2005). Metal contamination reduces the biological productivity within a basin. Metal contamination can result in fish kills at high levels or sublethal effects at low levels. Sublethal effects include a reduction in feeding, overall activity levels, and growth. The Sacramento Basin and the San Francisco Bay watershed are two of the most heavily impacted basins within the state from mining activities. The basin drains some of the most productive mineral deposits in the region. Methylmercury contamination within San Francisco Bay, the result of 19th century mining practices using mercury to amalgamate gold in the Sierra Nevada Mountains, remains a persistent problem today. Based on sediment cores, pre-mining concentrations were about five times lower than concentrations detected within San Francisco Bay today (Conaway, Squire et al. 2003).

Hydromodification Projects

Several of the rivers within the area have been modified by dams, water diversions, drainage systems for agriculture and drinking water, and some of the most drastic channelization projects in the nation (see species distribution maps). In all, there are about 1,400 dams within the State of California, more than 5,000 miles of levees, and more than 140 aqueducts (Mount 1995). In general, the southern basins have a warmer and drier climate and the more northern, coastal-influenced basins are cooler and wetter. About 75% of the runoff occurs in basins in the northern half of California, while 80% of the water demand is in the southern half. Two water diversion projects meet these demands—the federal Central Valley Project (CVP) and the California State Water Project (CSWP). The CVP is one of the world's largest water storage and transport systems. The CVP has more than 20 reservoirs and delivers about 7 million acre-ft per year to southern California. The CSWP has 20 major reservoirs and holds nearly 6 million acre-ft of water. The CSWP delivers about 3 million acre-ft of water for human use. Together, both diversions irrigate about 4 million acres of farmland and deliver drinking water to roughly 22 million residents.

Both the Sacramento and San Joaquin rivers are heavily modified, each with hundreds of dams. The Rogue, Russian, and Santa Ana rivers each have more than 50 dams, and the Eel, Salinas, and the Klamath Rivers have between 14 and 24 dams each. The Santa Margarita is considered one of the last free flowing rivers in coastal southern California. Nine dams occur in this watershed. All major tributaries of the San Joaquin River are impounded at least once and most have multiple dams or diversions. The Stanislaus River, a tributary of the San Joaquin River, has over 40 dams. As a result, the hydrograph of the San Joaquin River is seriously altered from its natural state. Alteration of the temperature and sediment transport regimes had profound influences on the biological community within the basin. These modifications generally result in a reduction of suitable habitat for native species and frequent increases in suitable habitat for nonnative species. The Friant Dam on the San Joaquin River is attributed with the extirpation of spring-run Chinook salmon within the basin. A run of the spring-run Chinook salmon once produced about 300,000 to 500,000 fish (Carter and Resh 2005).

Artificial Propagation

Anadromous fish hatcheries have existed in California since establishment of the McCloud River hatchery in 1872. There are nine state hatcheries: the Iron Gate (Klamath River), Mad River, Trinity (Trinity River), Feather (Feather River), Warm Springs (Russian River), Nimbus (American River), Mokelumne (Mokulumne River), and Merced (Merced River). The California Department of Fish and Game (CDFG) also manages artificial production programs on the Noyo and Eel rivers. The Coleman National Fish Hatchery, located on Battle Creek in the upper Sacramento River, is a federal hatchery operated by the USFWS. The USFWS also operates an artificial propagation program for Sacramento River winter run Chinook.

Of these, the Feather River, Nimbus, Mokelumne, and Merced River facilities comprise the Central Valley Hatcheries. Over the last ten years, the Central Valley Hatcheries have released over 30 million young salmon. State and the federal (Coleman hatchery) hatcheries work together to meet overall goals. State hatcheries are expected to release 18.6 million smolts in 2008 and Coleman is aiming for more than 12 million. There has been no significant change in hatchery practices over the year that would adversely affect the current year class of fish. A new program marking 25% of the 32 million Sacramento Fall-run Chinook smolts may provide data on hatchery fish contributions to the fisheries in the near future.

Commercial and Recreational Fishing

The region is home to many commercial fisheries. The largest in terms of total landings in 2006 were northern anchovy, Pacific sardine, Chinook salmon, sablefish, Dover sole, Pacific whiting, squid, red sea urchin, and Dungeness crab (CDFG 2007). Red abalone is also harvested. The commercial landings report does not include information on bycatch of listed salmonids (CDFG 2007). The first salmon cannery established along the west coast was located in the Sacramento River watershed in 1864. However, this cannery only operated for about two years because the sediment from hydraulic mining decimated the salmon runs in the basin (NRC 1996).

Alien Species

Plants and animals that are introduced into habitats in which they do not naturally occur are called non-native species. They are also known as non-indigenous, exotic, introduced, or invasive species, and have been known to affect ecosystems. Non-native species are introduced through infested stock for aquaculture and fishery enhancement, through ballast water discharge and from the pet and recreational fishing industries (http://biology.usgs.gov/s+t/noframe/x191.htm.). The Aquatic Nuisance Species (ANS) Task Force suggests that it is inevitable that cultured species will eventually escape confinement and enter U.S. waterways. Non-native species were cited as a contributing cause in the extinction of 27 species and 13 subspecies of North American fishes over the past 100 years (Miller, Williams et al. 1989). Wilcove, Rothstein et al. (1998) note that 25% of ESA listed fish are threatened by alien species. By competing with native species for food and habitat as well as preying on them, non-native species can reduce or eliminate populations of native species.

Surveys performed by CDFG state that at least 607 alien species are found in California coastal waterways (Foss *et al.* 2007). The majority of these species are representatives of four phyla: annelids (33%), arthropods (22%), chordates (13%), and mollusks (10%). Non-native chordate species are primarily fish and tunicates which inhabit fresh and brackish water habitats such as the Sacramento-San Joaquin Delta (Foss, Ode et al. 2007). The California Aquatic Invasive Species Management Plan (CAISMP) includes goals and strategies for reducing the introduction rate of new invasive species as well as removing those with established populations.

Atmospheric deposition

In 2002, chlopyrifos, diazinon, trifluralin, and other pesticides were detected in air samples collected from Sacramento, California (Majewski and Baston 2002).

Pesticide Reduction Programs

There are several measures in place in California that may reduce the levels of pesticides found in the aquatic environment beyond FIFRA label requirements. Monitoring of

water resources is handled by California Environmental Protection Agency's Regional Water Boards. Each Regional Board makes water quality decisions for its region including setting standands and determining waste discharge requirements. The Central Valley Regional Water Quality Control Board (CVRWQCB) addresses issues in the Sacramento and San Joaquin River Basins. These river basins are characterized by crop land, specifically orchards, which historically rely heavily on organophosphates for pest control.

In 2003, the CVRWQCB adopted the Irrigated Lands Waiver Program (ILWP). Participation was required for all growers with irrigated lands that discharge waste which may degrade water quality. However, the ILWP allowed growers to select one of three methods for regulatory coverage (Markle, Kalman et al. 2005). These options included: 1) join a Coalition Group approved by the CVRWQCB, 2) file for an Individual Discharger Conditional Waiver, and 3) comply with zero discharge regulation (Markle, Kalman et al. 2005). Many growers opted to join a Coalition as the other options were more costly. Coalition Groups were charged with completing two reports – a Watershed Evaluation Report and a Monitoring and Reporting Plan. The Watershed Evaluation Report had to include information on crop patterns and pesticide/nutrient use, as well as mitigation measures that would prevent orchard run-off from impairing water quality. Similar programs are in development in other agricultural areas of California.

As a part of the Waiver program, the Central Valley Coalitions undertook monitoring of "agriculture dominated waterways". Some of the monitored waterways are small agricultural streams and sloughs that carry farm drainage to larger waterways. The coalition was also required to develop a management plan to address exceedance of State water quality standards. Currently, the Coalitions monitor toxcity to test organisms, stream parameters (*e.g.*, flow, temperature, etc.), nutrient levels, and pesticides used in the region, including diazinon and chlorpyrifos. Sampling diazinon exceedances within the Sacramento and Feather Rivers resulted in the development of a TMDL. The Coalitions were charged with developing and implementing management and monitoring plans to address the TMDL and reduce diazinon run-off.

The Coalition for Urban/Rural Environmental Stewardship (CURES) is a non-profit organization that was founded in 1997 to support educational efforts for agricultural and urban communities focusing on the proper and judicious use of pest control products. CURES educates growers on methods to decrease diazinon surface water contamination in the Sacramento River Basin. The organization has developed best-practice literature for pesticide use in both urban and agricultural settings (www.curesworks.org). CURES also works with California's Watershed Coalitions to standardize their Watershed Evaluation Reports and to keep the Coalitions informed. The organization has worked with local organizations, such as the California Dried Plum Board and the Almond Board of California, to address concerns about diazinon, pyrethroids, and sulfur. The CURES site discusses alternatives to oprganophosphate dormant spray applications. It lists pyrethroids and carbaryl as alternatives, but cautions that these compounds may impact non-target organisms. For example, carbaryl is highly toxic to honeybees, so bees must be removed from the area prior to application

In 2006, CDPR put limitations on dormant spay application of most insecticides in orchards, in part to adequately protect aquatic life in the Central Valley region. While the legislation was prompted by organophosphate use, limitations also apply to pyrethroids and carbamates.

The CDPR publishes voluntary interim measures for mitigating the potential impacts of pesticide useage to listed species. These measures are available online as county bulletins (http://www.cdpr.ca.gov/docs/endspec/colist.htm). Measures that apply to carbaryl, carbofuran, and methomyl use in salmonid habitat are:

- Do not use in currently occupied habitat
- Provide a 20 ft minimum strip of vegetation (on which pesticides should not be applied) along rivers, creeks, streams, wetlands, vernal pools and stock ponds, or on the downhill side of fields where runoff could occur. Prepare land around fields to contain runoff by proper leveling, etc. Contain as much water "on-site" as possible. The planting of legumes, or other cover crops for several rows adjacent to off-target water sites is recommended. Mix pesticides in areas not prone to runoff such as concrete mixing/loading pads, disked soil in flat terrain or graveled mix pads, or use a suitable method to contain spills and/or rinsate. Properly empty and triple-rinse pesticide

containers at time of use.

- Conduct irrigations efficiently to prevent excessive loss of irrigation waters through runoff. Schedule irrigations and pesticide applications to maximize the interval of time between the pesticide application and the first subsequent irrigation. Allow at least 24 hours between application of pesticides listed in this bulletin and any irrigation that results in surface runoff into natural waters. Time applications to allow sprays to dry prior to rain or sprinkler irrigations. Do not make aerial applications while irrigation water is on the field unless surface runoff is contained for 72 hours following the application.
- For sprayable or dust formulations: when the air is calm or moving away from habitat, commence applications on the side nearest the habitat and proceed away from the habitat. When air currents are moving toward habitat, do not make applications within 200 yards by air or 40 yards by ground upwind from occupied habitat. The county agricultural commissioner may reduce or waive buffer zones following a site inspection, if there is an adequate hedgerow, windbreak, riparian corridor or other physical barrier that substantially reduces the probability of drift.

Pacific Northwest Region

This region encompasses Idaho, Oregon, and Washington and includes parts of Nevada, Montana, Wyoming, and British Columbia. In this section we discuss three major areas that support salmonid populations within the action area. They include the Columbia River Basin and its tributaries, the Puget Sound Region, and the coastal drainages north of the Columbia River. Table 35, Table 36, and Table 37 show the types and areas of land use within each salmonid ESU/DPS.

Table 35. Area of land use categories within Chinook Salmon ESUs in km². Land cover image data were taken from Multi-Resolution Land Characteristics (MRLC) Consortium, a consortium of nine federal agencies (USGS, EPA, USFS, NOAA, NASA, BLM, NPS, NRCS, and USFWS) (NLCD 2001). Land cover class definitions are available at: http://www.mrlc.gov/nlcd_definitions.php

Landcover Type code		Chinook Salmon					
		Lower Columbia River	Upper Columbia River Spring Run	Puget Sound	Snake River Fall Run	Snake River Spring/ Summer Run	Upper Willamette River
Open Water	11	641	188	6,172	6,172	253	124
Perennial Snow/Ice	12	12	16	313	313	40	7
Developed, Open Space	21	649	203	1,601	1,601	328	632
Developed, Low Intensity	22	517	218	1,694	1,694	113	722
Developed, Medium Intensity	23	290	55	668	668	30	322
Developed, High Intensity	24	118	11	266	266	2	112
Barren Land	31	287	360	1,042	1,042	500	220
Deciduous Forest	41	551	21	999	999	10	248
Evergreen Forest	42	6,497	8,138	14,443	14,443	27,701	9,531
Mixed Forest	43	927	7	2,526	2,526	4	1,130
Shrub/Scrub	52	1,598	6,100	2,415	2,415	13,618	1,940
Herbaceous	71	520	1,737	957	957	11,053	801
Hay/Pasture	81	547	327	1,188	1,188	456	3,617
Cultivated Crops	82	278	636	258	258	3,860	2,355
Woody Wetlands	90	377	92	648	648	96	431
Emergent Herbaceous Wetlands	95	223	59	492	492	92	78
TOTAL (inc. open water)		14,031	18,168	35,683	35,683	58,157	22,269
TOTAL (w/o open water)		13,390	17,981	29,511	29,511	57,904	22,146

Table 36. Area of land use categories within chum and coho ESUs in km². Land cover image data were taken from Multi-Resolution Land Characteristics (MRLC) Consortium, a consortium of nine federal agencies (USGS, EPA, USFS, NOAA, NASA, BLM, NPS, NRCS, and USFWS) (NLCD 2001). Land cover class definitions are available at: http://www.mrlc.gov/nlcd_definitions.php

Landcover Type	code	Chum Salmon		Coho Salmon	
		Columbia River	Hood Canal Summer Run	Lower Columbia River	Oregon Coast
Open Water	11	655	704	675	200
Perennial Snow/Ice	12	1	51	12	0
Developed, Open Space	21	605	134	708	1,107
Developed, Low Intensity	22	463	77	563	163
Developed, Medium Intensity	23	258	20	305	49
Developed, High Intensity	24	110	6	124	20
Barren Land	31	247	166	290	467
Deciduous Forest	41	548	97	575	418
Evergreen Forest	42	4,294	2,477	8,487	14,943
Mixed Forest	43	892	200	999	4,126
Shrub/Scrub	52	1,353	299	1,982	3,134
Herbaceous	71	526	133	600	1,478
Hay/Pasture	81	533	64	680	860
Cultivated Crops	82	213	2	348	64
Woody Wetlands	90	363	61	386	263
Emergent Herbaceous Wetlands	95	222	56	225	226
TOTAL (inc. open water)		11,284	4,548	16,959	27,520
TOTAL (w/o open water)		10,628	3,843	16,284	27,320

Table 37. Area of land use categories within sockeye ESUs and steelhead DPSs in km². Land cover image data were taken from Multi-Resolution Land Characteristics (MRLC) Consortium, a consortium of nine federal agencies (USGS, EPA, USFS, NOAA, NASA, BLM, NPS, NRCS, and USFWS) (NLCD 2001). Land cover class definitions are available at: http://www.mrlc.gov/nlcd_definitions.php

Landcover Type code		Sockeye Salmon		Steelhead					
		Ozette Lake	Snake River	Lower Columbia River	Middle Columbia River	Puget Sound	Snake River	Upper Columbia River	Upper Willamette River
Open Water	11	30	19	250	575	6,172	285	359	62
Perennial Snow/Ice	12	0	18	12	13	313	42	16	0
Developed, Open Space	21	1	3	518	1,276	1,601	515	343	382
Developed, Low Intensity	22	0	2	506	627	1,694	144	294	513
Developed, Medium Intensity	23	0	0	287	192	668	40	80	231
Developed, High Intensity	24	0	0	116	25	266	3	13	75
Barren Land	31	2	9	174	183	1,042	504	361	77
Deciduous Forest	41	3	0	382	54	999	35	25	171
Evergreen Forest	42	158	755	7,023	18,347	14,443	39,556	8,223	4,133
Mixed Forest	43	3	0	611	41	2,526	17	7	791
Shrub/Scrub	52	14	185	1,589	32,089	2,415	15,644	9,351	994
Herbaceous	71	8	269	398	2,752	957	12,361	1,823	519
Hay/Pasture	81	0	12	605	863	1,188	463	448	2,529
Cultivated Crops	82	0	1	322	11,908	258	6,227	3,236	1,844
Woody Wetlands	90	8	16	244	217	648	116	109	292
Emergent Herbaceous Wetlands	95	1	34	93	291	492	111	81	43
TOTAL (inc. open water)		228	1,323	13,128	69,453	35,683	76,061	24,771	12,655
TOTAL (w/o open water)		199	1,304	12,878	68,878	29,511	75,777	24,411	12,593

Columbia River Basin

The most notable basin within the region is the Columbia River. The Columbia River is the largest river in the Pacific Northwest and the fourth largest river in terms of average discharge in the U.S. The Columbia River drains over 258,000 square miles, and is the sixth largest in terms of drainage area. Major tributaries include the Snake, Willamette, Salmon, Flathead, and Yakima rivers. Smaller rivers include the Owyhee, Grande Ronde, Clearwater, Spokane, Methow, Cowlitz, and the John Day Rivers (see Table 38 for a description of select Columbia River tributaries). The Snake River is the largest tributary at more than 1,000 miles long. The headwaters of the Snake River originate in Yellowstone National Park, Wyoming. The second largest tributary is the Willamette River in Oregon (Kammerer 1990; Hinck, Schmitt et al. 2004). The Willamette River is also the 19th largest river in the nation in terms of average annual discharge (Kammerer 1990). The basins drain portions of the Rocky Mountains, Bitteroot Range, and the Cascade Range.

Table 38. Select tributaries of the Columbia River (Carter and Resh 2005)

Watershed	Approx Length (mi)	Basin Size (mi^2)	Physiographic Provinces*	Mean Annual Precipitation (in)	Mean Discharge (cfs)	No. Fish Species (native)	No. Endangered Species
Snake/Salmon rivers	870	108,495	CU, NR, MR, B/R	14	55,267	39 (19)	5 fish (4 T, 1 E), 6 (1 T, 5 E) snails, 1 plant (T)
Yakima River	214	6,139	CS, CU	7	3,602	50	2 fish (T)
Willamette River	143	11,478	CS, PB	60	32,384	61 (~31)	5 fish (4 T, 1 E),

* Physiographic Provinces: CU = Columbia-Snake River Plateaus, NR = Northern Rocky Mountains, MR = Middle Rocky Mountains, B/R = Basin & Range, CS = Cascade-Sierra Mountains, PB = Pacific Border

The Columbia river and estuary were once home to more than 200 distinct runs of Pacific salmon and steelhead with unique adaptations to local environments within a tributary (Stanford, Hauer et al. 2005). Salmonids within the basin include Chinook salmon, chum salmon, coho salmon, sockeye salmon, steelhead, redband trout, bull trout, and cutthroat trout.

Land Use

More than 50% of the U.S. portion of the Columbia River Basin is in federal ownership (most of which occurs in high desert and mountain areas). Approximately 39% is in private land ownership (most of which occurs in river valleys and plateaus). The remaining 11% is divided among the tribes, state, and local governments (Hinck, Schmitt et al. 2004). See Table 39 for a summary of land uses and population densities in several subbasins within the Columbia River watershed (data from (Stanford, Hauer et al. 2005).

Table 39. Land use and population density in select tributaries of the Columbia River (Stanford, Hauer et al. 2005).

Watershed	Land Use Categories (Percent)				Density (people/mi^2)
	Agriculture	Forest	Urban	Other	
Snake/Salmon rivers	30	10-15	1	54 scrub/rangeland/barren	39
Yakima River	16	36	1	47 shrub	80
Willamette River	19	68	5	--	171

The interior Columbia Basin has been altered substantially by humans causing dramatic changes and declines in native fish populations. In general, the basin supports a variety of mixed uses. Predominant human uses include logging, agriculture, ranching, hydroelectric power generation, mining, fishing, a variety of recreational activities, and urban uses. The decline of salmon runs in the Columbia River is attributed to loss of habitat, blocked migratory corridors, altered river flows, pollution, overharvest, and competition from hatchery fish. In the Yakima River, 72 stream and river segments are listed as impaired by the Washington Department of Ecology (DOE) and 83% exceed temperature standards. In the Willamette River, riparian vegetation was greatly reduced by land conversion. By 1990, only 37% of the riparian area within 120 m was forested, 30% was agricultural fields, and 16% was urban or suburban lands. In the Yakima River, non-native grasses and other plants are commonly found along the lower reaches of the river (Stanford, Hauer et al. 2005).

Agriculture and Ranching

Agriculture, ranching, and related services in the Pacific Northwest employ more than nine times the national average [19% of the households within the basin (NRC 2004)].

Ranching practices have led to increased soil erosion and sediment loads within adjacent tributaries. The worst of these effects may have occurred in the late 1800s and early 1900s from deliberate burning to increase grass production (NRC 2004). Several measures are currently in place to reduce the impacts of grazing. Measures include restricted grazing in degraded areas, reduced grazing allotments, and lowered stocking rates. Today, the agricultural industry impacts water quality within the basin. Agriculture is second only to the large-scale influences of hydromodification projects regarding power generation and irrigation. Water quality impacts from agricultural activities include alteration of the natural temperature regime, insecticide and herbicide contamination, and increased suspended sediments.

Roughly 6% of the annual flow from the Columbia River is diverted for the irrigation of 7.3 million acres of croplands within the basin. The vast majority of these agricultural lands are located along the lower Columbia River, the Willamette, Yakima, Hood, and Snake rivers, and the Columbia Plateau (Hinck, Schmitt et al. 2004).

Agriculture and ranching increased steadily within the Columbia River basin from the mid- to late-1800s. By the early 1900s, agricultural opportunities began increasing at a much more rapid pace with the creation of more irrigation canals and the passage of the Reclamation Act of 1902 (NRC 2004). Today, agriculture represents the largest water user within the basin (>90%).

The USGS has a number of fixed water quality sampling sites throughout various tributaries of the Columbia River. Many of the water quality sampling sites have been in place for decades. Water volumes, crop rotation patterns, croptype, and basin location are some of the variables that influence the distribution and frequency of pesticides within a tributary. Detection frequencies for a particular pesticide can vary widely. One study conducted by the USGS between May 1999 and January 2000 in the surface waters of Yakima Basin detected 25 pesticide compounds (Ebbert and Embry 2002). Atrazine was the most widely detected herbicide and azinphos-methyl was the most widely detected insecticide. Other detected compounds include simazine, terbacil, trifluralin;

deethylatrazine, carbaryl, diazinon, malathion, and DDE. In addition to current use-chemicals legacy chemicals continue to pose a serious problem to water quality and fish communities despite their ban in the 1970s and 1980s (Hinck, Schmitt et al. 2004).

Fish and macroinvertebrate communities exhibit an almost linear decline in condition as the level of agriculture intensity increases within a basin (Cuffney, Meador et al. 1997; Fuhrer, Morace et al. 2004). A study conducted in the late 1990s examined 11 species of fish, including anadromous and resident fish collected throughout the basin, for a suite of 132 contaminants. They included 51 semi-volatile chemicals, 26 pesticides, 18 metals, 7 PCBs, 20 dioxins, and 10 furans. Sampled fish tissues revealed PCBs, metals, chlorinated dioxins and furans (products of wood pulp bleaching operations), and other contaminants.

Yakima River Basin: NAWQA analysis

The Yakima River Basin is one of the most agriculturally productive areas in the U.S. (Fuhrer, Morace et al. 2004). Croplands within the Yakima Basin account for about 16% of the total basin area of which 77% is irrigated. The extensive irrigation-water delivery and drainage system in the Yakima River Basin greatly controls water quality conditions and aquatic health in agricultural streams, drains, and the Yakima River (Fuhrer, Morace et al. 2004). From 1999 to 2000, the USGS conducted a NAWQA study in the Yakima River Basin. Fuhrer *et al.* (2004) reported that nitrate and orthophosphate were the dominant forms of nitrogen and phosphorus found in the Yakima River and its agricultural tributaries. Arsenic, a known human carcinogen, was also detected in agricultural drains at elevated concentrations during the nonirrigation season when ground water is the primary source of streamflow.

The USGS also detected 76 pesticide compounds in the Yakima River Basin. They include 38 herbicides (including metribuzin), 17 insecticides (such as carbaryl, diazinon, and malathion), 15 breakdown products, and 6 others. Ninety-one percent of the samples collected from the small agricultural watersheds contained at least two pesticides or pesticide breakdown products. Carbaryl was detected in 29% of tributary samples and

17% of mainstem Yakima River samples at a screening level of 21 nanograms/liter (Fuhrer *et al.* 2004). Carbofuran was screened for, but not detected. The assessment did not screen for methomyl. The median and maximum number of chemicals in a mixture was 8 and 26, respectively (Fuhrer, Morace et al. 2004). The herbicide 2,4-D, occurred most often in the mixtures, along with azinphos-methyl, the most heavily applied pesticide, and atrazine, one of the most aquatic mobile pesticides (Fuhrer, Morace et al. 2004). However, the most frequently detected pesticides in the Yakima River Basin are total DDTs ,(DDT and its breakdown products, dichloro-diphenyl-dichloroethylene (DDE), dichloro-diphenyl-dichloroethane (DDD)), and dieldrin (Johnson and Newman 1983; Joy 2002; Fuhrer, Morace et al. 2004). Nevertheless, concentrations of total DDT in water have decreased since 1991. These reductions are attributed to erosion-controlling best management practices (BMPs).

Williamette Basin: NAWQA analysis

From 1991 to 1995, the USGS also sampled surface waters in the Willamette Basin, Oregon. Wentz *et al.* (1998) reported that, of the 86 tested for, 50 pesticides and pesticide degradates were detected in streams. Ten of the pesticides exceeded criteria established by the EPA for the protection of freshwater aquatic life from chronic toxicity. Carbaryl exceeded protective criteria in 17 of its 46 detections, while carbofuran exceeded limits in three of 51 detections (Wentz *et al.* 1998). Atrazine, simazine, metolachlor, deethylatrazine, diuron, and diazinon were detected in more than one-half of stream samples. Methomyl was tested for but not detected. Forty-nine pesticides were detected in streams draining predominantly agricultural land. About 25 pesticides were detected in streams draining mostly urban areas. The highest pesticide concentrations generally occurred in streams draining predominately agricultural land.

Snake River Basin: NAWQA assessment

The USGS conducted a water quality study from 1992-1995 in the upper Snake River basin, Idaho and Wyoming (Clark, Maret et al. 1998). In basin wide stream sampling in May and June 1994, Eptam [EPTC] (used on potatoes, beans, and sugar beets), atrazine and its breakdown product desethylatrazine (used on corn), metolachlor (used on potatoes

and beans), and alachlor (used on beans and corn) were the most commonly detected pesticides. These same compounds accounted for 75% of all detections. Seventeen different pesticides were detected downstream from American Falls Reservoir. Carbaryl and carbofuran were each detected in only 1% of samples; methomyl was screened for but not detected (Clark, Maret et al. 1998).

Hood River Basin

The Hood River Basin ranks fourth in the state of Oregon in total agricultural pesticide usage (Jenkins, Jepson et al. 2004). The land in Hood River basin is used to grow five crops: alfalfa, apples, cherries, grapes, and pears. About 61 a.i.s, totaling 1.1 million lbs, are applied annually to roughly 21,000 acres. Of the top nine, three are carbamates and three are organophosphate insecticides (Table 40). These compounds will have a similar mode of action, though different toxicities, as carbaryl, carbofuran, and methomyl.

Table 40. Amount of most common a.i.s applied to crops in Hood River Basin 1990-1996 (Jenkins et al. 2004).

Active Ingredient	Class	Lbs applied
Oil	-	624,392
Lime Sulfur	-	121,703
Mancozeb	Carbamate	86,872
Sulfur	-	60,552
Ziram	Carbamate	45,965
Azinphos-methyl	Organo-phosphate	22,294
Metam-Sodium	Carbamate	17,114
Phosmet	Organo-phosphate	15,919
Chlorpyrifos	Organo-phosphate	14,833

The Hood River basin contains approximately 400 miles of perennial stream channel, of which an estimated 100 miles is accessible to anadromous fish. These channels are important rearing and spawning habitat for salmonids, making pesticide drift a major concern for the area.

Central Columbia Plateau: NAWQA Assessment

The USGS sampled 31 surface-water sites representing agricultural land use, with different crops, irrigation methods, and other agricultural practices for pesticides in Idaho and Washington from 1992-1995 (Williamson, Munn et al. 1998). Pesticides were

detected in samples from all sites, except for the Palouse River at Laird Park (a headwaters site in a forested area). Many pesticides were detected in surface water at very low concentrations. Concentrations of six pesticides exceeded freshwater-chronic criteria for the protection of aquatic life in one or more surface-water samples. They include the herbicide triallate and five insecticides (azinphos-methyl, chlorpyrifos, diazinon, *gamma*-HCH, and parathion). Carbaryl and carbofuran were detected in 6% and 5% of samples, respectively. Methomyl was screened for, but not detected in any samples (Williamson *et al.* 1998).

Detections at four sites were high, ranging from 12 to 45 pesticides. The two sites with the highest detection frequencies are in the Quincy-Pasco subunit, where irrigation and high chemical use combine to increase transport of pesticides to surface waters. Pesticide detection frequencies at sites in the dryland farming (non-irrigated) areas of the North-Central and Palouse subunits are below the national median for NAWQA sites. All four of the sites had at least one pesticide concentration that exceeded a water-quality standard or guideline.

Concentrations of organochlorine pesticides and PCBs are higher than the national median (50th percentile) at seven of 11 sites; four sites were in the upper 25% of all NAWQA sites. Although most of these compounds have been banned, they still persist in the environment. Elevated concentrations were observed in dryland farming areas as well as in irrigated areas.

Urban and Industrial Development

The largest urban area in the basin is the greater Portland metropolitan area, located at the mouth of the Willamette River. Portland's population exceeds 500,000 (Hinck, Schmitt et al. 2004). Although the basin's land cover is about 8% of the U.S. total land mass, its human population is one-third the national average (about 1.2% of the U.S. population) (Hinck, Schmitt et al. 2004).

Discharges from sewage treatment plants, paper manufacturing, and chemical and metal

production represent the top three permitted sources of contaminants within the lower basin according to discharge volumes and concentrations (Rosetta and Borys 1996). Rosetta and Borys (1996) review of 1993 data indicate that 52% of the point source waste water discharge volume is from sewage treatment plants, 39% from paper and allied products, 5% from chemical and allied products, and 3% from primary metals. However, the paper and allied products industry are the primary sources of the suspended sediment load (71%). Additionally, 26% comes from sewage treatment plants and 1% is from the chemical and allied products industry. Nonpoint source discharges (urban stormwater runoff) account for significant pollutant loading to the lower basin, including most organics and over half of the metals. Although rural nonpoint sources contributions were not calculated, Rosetta and Borys (1996) surmised that in some areas and for some contaminants, rural areas may contribute a large portion of the load. This is particularly true for pesticide contamination in the upper river basin where agriculture is the predominant land use.

Water quality has been reduced by phosphorus loads and decreased water clarity, primarily along the lower and middle sections of the Columbia River Estuary. Although sediment quality is generally very good, benthic indices have not been established within the estuary. Fish tissue contaminant loads (PCBs, DDT, DDD, DDE, and mercury) are high and present a persistent and long lasting effect on estuary biology. Health advisories have been recently issued for people eating fish in the area that contain high levels of dioxins, PCBs, and pesticides.

Habitat Modification

Basin wide, critical ecological connectivity (mainstem to tributaries and riparian floodplains) has been disconnected by dams and associated activities such as floodplain deforestation and urbanization. Dams have flooded historical spawning and rearing habitat with the creation of massive water storage reservoirs. More than 55% of the Columbia River Basin that was accessible to salmon and steelhead before 1939 has been blocked by large dams (NWPPC 1986). Construction of the Grand Coulee Dam blocked 1,000 miles (1,609 km) of habitat from migrating salmon and steelhead (Wydoski and

Whitney 1979). Similarly, over one third (2,000 km) of coho salmon habitat is no longer accessible (Good, Waples et al. 2005). The mainstem habitats of the lower Columbia and Willamette rivers have been reduced primarily to a single channel. As a result, floodplain area is reduced, off-channel habitat features have been eliminated or disconnected from the main channel, and the amount of LWD in the mainstem has been reduced. Remaining areas are affected by flow fluctuations associated with reservoir management for power generation, flood control, and irrigation. Overbank flow events, important to habitat diversity, have become rare as a result of controlling peak flows and associated revetments. Portions of the basin are also subject to impacts from cattle grazing and irrigation withdrawals. Consequently, estuary dynamics have changed substantially.

Stream habitat degradation in Columbia Central Plateau is relatively high (Williamson, Munn et al. 1998). In the most recent NAWQA survey, a total of 16 sites were evaluated - all of which showed signs of degradation (Williamson, Munn et al. 1998). Streams in this area have an average of 20% canopy cover and 70% bank erosion. These factors have severely affected the quality of habitat available to salmonids. The Palouse subunit of the Lower Snake River exceeds temperature levels for the protection of aquatic life (Williamson, Munn et al. 1998).

Habitat loss has fragmented habitat and human density increase has created additional loads of pollutants and contaminants within the Columbia River Estuary (Anderson, Dugger et al. 2007). About 77% of swamps, 57% of marshes, and over 20% of tree cover have been lost to development and industry. Twenty four threatened and endangered species occur in the estuary, some of which are recovering and others (*i.e.*, Chinook salmon) are not.

The Willamette Basin Valley has been dramatically changed by modern settlement. The complexity of the mainstem river and extent of riparian forest have both been reduced by 80% (PNERC 2002). About 75% of what was formerly prairie and 60% of what was wetland has been converted to agricultural purposes. These actions, combined with urban development, extensive (96 miles) bank stabilization, and in-river and near-shore gravel

mining, have resulted in a loss of floodplain connectivity and off-channel habitat (PNERC 2002).

Habitat Restoration

Since 2000, land management practices included improving access by replacing culverts and fish habitat restoration activities at Federal Energy Regulatory Commission (FERC)-licensed dams. Habitat restoration in the upper (reducing excess sediment loads) and lower Grays River watersheds may benefit the Grays River chum salmon population as it has a subyearling juvenile life history type and rears in such habitats. Short-term daily flow fluctuations at Bonneville Dam sometimes create a barrier (*i.e.*, entrapment on shallow sand flats) for fry moving into the mainstem rearing and migration corridor. Some chum fry have been stranded on shallow water flats on Pierce Island from daily flow fluctuations. Coho salmon are likely to be affected by flow and sediment delivery changes in the Columbia River plume. Steelhead may be affected by flow and sediment delivery changes in the plume (Casillas 1999).

In 2006, NOAA Fisheries completed consultation on issuance of a 50-year incidental take permit to the State of Washington for its Washington State Forest Practices Habitat Conservation Plan (HCP). The HCP is expected to improve habitat conditions on state forest lands within the action area. Improvements include removing barriers to migration, restoring hydrologic processes, increasing the number of large trees in riparian zones, improving stream bank integrity, and reducing fine sediment inputs (FCRPS 2008).

Mining

Most of the mining in the basin is focused on minerals such as phosphate, limestone, dolomite, perlite, or metals such as gold, silver, copper, iron, and zinc. Mining in the region is conducted in a variety of methods and places within the basin. Alluvial or glacial deposits are often mined for gold or aggregate. Ores are often excavated from the hard bedrocks of the Idaho batholiths. Eleven percent of the nation's output of gold has come from mining operations in Washington, Montana, and Idaho. More than half of the

nation's silver output has come from a few select silver deposits.

Many of the streams and river reaches in the basin are impaired from mining. Several abandoned and former mining sites are also designated as superfund cleanup areas (Stanford, Hauer et al. 2005; Anderson, Dugger et al. 2007). According to the U.S. Bureau of Mines, there are about 14,000 inactive or abandoned mines within the Columbia River Basin. Of these, nearly 200 pose a potential hazard to the environment (Quigley, Arbelbide et al. 1997 in Hincke et al. 2004). Contaminants detected in the water include lead and other trace metals.

Hydromodification Projects

More than 400 dams exist in the basin, ranging from mega dams that store large amounts of water to small diversion dams for irrigation. Every major tributary of the Columbia River except the Salmon River is totally or partially regulated by dams and diversions. More than 150 dams are major hydroelectric projects. Of these, 18 dams are located on the mainstem Columbia River and its major tributary, the Snake River. The FCRPS encompasses the operations of 14 major dams and reservoirs on the Columbia and Snake rivers. These dams and reservoirs operate as a coordinated system. The Corps operates 9 of 10 major federal projects on the Columbia and Snake rivers, and the Dworshak, Libby and Albeni Falls dams. The BOR operates the Grand Coulee and Hungry Horse dams. These federal projects are a major source of power in the region. These same projects provide flood control, navigation, recreation, fish and wildlife, municipal and industrial water supply, and irrigation benefits.

BOR has operated irrigation projects within the basin since 1904. The irrigation system delivers water to about 2.9 million acres of agricultural lands. About 1.1 million acres of land are irrigated using water delivered by two structures, the Columbia River Project (Grand Coulee Dam) and the Yakima Project. The Grand Coulee Dam delivers water for the irrigation of over 670,000 acres of croplands and the Yakima Project delivers water to nearly 500,000 acres of croplands (Bouldin, Farris et al. 2007).

The Bonneville Power Administration (BPA), an agency of the U.S. Department of Energy, wholesales electric power produced at 31 federal dams (67% of its production) and non-hydropower facilities in the Columbia-Snake Basin. The BPA sells about half the electric power consumed in the Pacific Northwest. The federal dams were developed over a 37-year period starting in 1938 with Bonneville Dam and Grand Coulee in 1941, and ending with construction of Libby Dam in 1973 and Lower Granite Dam in 1975.

Development of the Pacific Northwest regional hydroelectric power system, dating to the early 20th century, has had profound effects on the ecosystems of the Columbia River Basin (ISG 1996). These effects have been especially adverse to the survival of anadromous salmonids. The construction of the FCRPS modified migratory habitat of adult and juvenile salmonids. In many cases, the FCRPS presented a complete barrier to habitat access for salmonids. Approximately 80% of historical spawning and rearing habitat of Snake River fall-run Chinook salmon is now inaccessible due to dams. The Snake River spring/summer run has been limited to the Salmon, Grande Ronde, Imnaha, and Tuscanon rivers. Damming has cut off access to the majority of Snake River Chinook salmon spawning habitat. The Sunbeam Dam on the Salmon River is believed to have limited the range of Snake River sockeye salmon as well.

Both upstream and downstream migrating fish are impeded by the dams. Additionally, a substantial number of juvenile salmonids are killed and injured during downstream migrations. Physical injury and direct mortality occurs as juveniles pass through turbines, bypasses, and spillways. Indirect effects of passage through all routes may include disorientation, stress, delays in passage, exposure to high concentrations of dissolved gases, warm water, and increased predation. Non-federal hydropower facilities on Columbia River tributaries have also partially or completely blocked higher elevation spawning.

Qualitatively, several hydromodification projects have improved the productivity of naturally produced Snake River fall Chinook salmon. Improvements include flow augmentation to enhance water flows through the lower Snake and Columbia Rivers

(USBR 1998 *in* (FCRPS 2008); providing stable outflows at Hells Canyon Dam during the fall Chinook salmon spawning season and maintaining these flows as minimums throughout the incubation period to enhance survival of incubating fall-run Chinook salmon; and reduced summer temperatures and enhanced summer flow in the lower Snake River (see (Corps, BPA et al. 2007), Appendix 1 *in* (FCRPS 2008)). Providing suitable water temperatures for over-summer rearing within the Snake River reservoirs allows the expression of productive "yearling" life history strategy that was previously unavailable to Snake River fall-run Chinook salmon.

The mainstem FCRPS corridor has also improved safe passage through the hydrosystem for juvenile steelhead and yearling Chinook salmon with the construction and operation of surface bypass routes at Lower Granite, Ice Harbor, and Bonneville dams and other configuration improvements (Corps, BPA et al. 2007).

For salmon, with a stream-type juvenile life history, projects that have protected or restored riparian areas and breached or lowered dikes and levees in the tidally influenced zone of the estuary have improved the function of the juvenile migration corridor. The FCRPS action agencies recently implemented 18 estuary habitat projects that removed passage barriers. These activities provide fish access to good quality habitat.

The Corps et al. (2007) estimated that hydropower configuration and operational improvements implemented from 2000 to 2006 have resulted in an 11.3% increase in survival for yearling juvenile LCR Chinook salmon from populations that pass Bonneville Dam. Improvements during this period included the installation of a corner collector at Powerhouse II (PH2) and the partial installation of minimum gap runners at Powerhouse 1 (PH1) and of structures that improve fish guidance efficiency at PH2. Spill operations have been improved and PH2 is used as the first priority powerhouse for power production because bypass survival is higher than at PH1. Additionally, drawing water towards PH2 moves fish toward the corner collector. The bypass system screen was removed from PH1 because tests showed that turbine survival was higher than through the bypass system at that location.

Artificial Propagation

There are several artificial propagation programs for salmon production within the Columbia River Basin. These programs were instituted under federal law to lessen the effects of lost natural salmon production within the basin from the dams. The hatcheries are operated by federal, state, and tribal managers. For more than 100 years, hatcheries in the Pacific Northwest have been used to produce fish for harvest and replace natural production lost to dam construction. Hatcheries have only minimally been used to protect and rebuild naturally produced salmonid population (*e.g.*, Redfish Lake sockeye salmon). In 1987, 95% of the coho salmon, 70% of the spring Chinook salmon, 80% of the summer Chinook salmon, 50% of the fall-run Chinook salmon, and 70% of the steelhead returning to the Columbia River Basin originated in hatcheries (CBFWA 1990). More recent estimates suggest that almost half of the total number of smolts produced in the basin come from hatcheries (Beechie, Liermann et al. 2005).

The impact of artificial propagation on the total production of Pacific salmon and steelhead has been extensive (Hard, Jones et al. 1992). Hatchery practices, among other factors, are a contributing factor to the 90% reduction in natural coho salmon runs in the lower Columbia River over the past 30 years (Flagg, Waknitz et al. 1995). Past hatchery and stocking practices have resulted in the transplantation of salmon and steelhead from non-native basins. The impacts of these hatchery practices are largely unknown. Adverse effects of these practices likely included: loss of genetic variability within and among populations (Busack 1990; Riggs 1990; Hard, Jones et al. 1992; Reisenbichler 1997), disease transfer, increased competition for food, habitat, or mates, increased predation, altered migration, and the displacement of natural fish (Steward and Bjornn 1990; Hard, Jones et al. 1992; Fresh 1997). Species with extended freshwater residence may face higher risk of domestication, predation, or altered migration than species that spend only a brief time in freshwater (Hard, Jones et al. 1992). Nonetheless, artificial propagation may also contribute to the conservation of listed salmon and steelhead. However, it is unclear whether or how much artificial propagation during the recovery process will compromise the distinctiveness of natural populations (Hard, Jones et al. 1992).

The States of Oregon and Wasington and other fisheries co-managers are engaged in a substantial review of hatchery management practices through the Hatchery Scientific Review Group (HSRG). The HSRG was established and funded by Congress to provide an independent review of current hatchery program in the Columbia River Basin. The HSRG has completed its work on LCR populations and provided its recommendations. A general conclusion is that the current production programs are inconsistent with practices that reduce impacts on naturally-spawning populations, and will have to be modified to reduce adverse effects on key natural populations identified in the Interim Recovery Plan. The adverse effects are caused by hatchery-origin adults spawning with natural-origin fish or competing with natural-origin fish for spawning sites (FCRPS 2008). Oregon and Washington initiated a comprehensive program of hatchery and associated harvest reforms (WDFW 2005; ODFW 2007). The program is designed to achieve HSRG objectives related to controlling the number of hatchery-origin fish on the spawning grounds and in the hatchery broodstock.

Coho salmon hatchery programs in the lower Columbia have been tasked to compensate for impacts of fisheries. However, hatchery programs in the LCR have not operated specifically to conserve LCR coho salmon. These programs threaten the viability of natural populations. The long-term domestication of hatchery fish has eroded the fitness of these fish in the wild and has reduced the productivity of wild stocks where significant numbers of hatchery fish spawn with wild fish. Large numbers of hatchery fish have also contributed to more intensive mixed stock fisheries. These programs largely overexploited wild populations weakened by habitat degradation. Most LCR coho salmon populations have been heavily influenced by hatchery production over the years.

Commercial, Recreational, and Subsistence Fishing

Archeological records indicate that indigenous people caught salmon in the Columbia River more than 7,000 years ago. One of the most well known tribal fishing sites within the basin was located near Celilo Falls, an area in the lower river that has been occupied by Dalles Dam since 1957. Salmon fishing increased with better fishing methods and

preservation techniques, such as drying and smoking. Salmon harvest substantially increased in the mid-1800s with canning techniques. Harvest techniques also changed over time, from early use of hand-held spears and dip nets, to riverboats using seines and gill-nets. Harvest techniques eventually transitioned to large ocean-going vessels with trolling gear and nets and the harvest of Columbia River salmon and steelhead from California to Alaska (Beechie, Liermann et al. 2005).

During the mid-1800s, an estimated 10 to 16 million adult salmon of all species entered the Columbia River each year. Large annual harvests of returning adult salmon during the late 1800s ranging from 20 million to 40 million lbs of salmon and steelhead significantly reduced population productivity (Beechie, Liermann et al. 2005). The largest known harvest of Chinook salmon occurred in 1883 when Columbia River canneries processed 43 million lbs of salmon (Lichatowich 1999). Commercial landings declined steadily from the 1920s to a low in 1993. At that time, just over one million lbs of Chinook salmon were harvested (Beechie, Liermann et al. 2005).

Harvested and spawning adults reached 2.8 million in the early 2000s, of which almost half are hatchery produced (Beechie, Liermann et al. 2005). Most of the fish caught in the river are steelhead and spring/summer Chinook salmon. Ocean harvest consists largely of coho and fall Chinook salmon. Most ocean catches are made north of Cape Falcon, Oregon. Over the past five years, the number of spring and fall salmon commercially harvested in tribal fisheries has averaged between 25,000 and 110,000 fish (Beechie, Liermann et al. 2005). Recreational catch in both ocean and in-river fisheries varies from 140,000 to 150,000 individuals (Beechie, Liermann et al. 2005).

Non-Indian fisheries in the lower Columbia River are limited to a harvest rate of 1%. Treaty Indian fisheries are limited to a harvest rate of 5 to 7%, depending on the run size of upriver Snake River sockeye stocks. Actual harvest rates over the last 10 years have ranged from 0 to 0.9%, and 2.8 to 6.1%, respectively (see TAC 2008, Table 15 *in* FCRPS (2008).

Columbia River chum salmon are not caught incidentally in tribal fisheries above Bonneville Dam. However, Columbia River chum salmon are incidentally caught occasionally in non-Indian fall season fisheries below Bonneville Dam. There are no fisheries in the Columbia River that target hatchery or natural-origin chum salmon. The species' later fall return timing make them vulnerable to relatively little potential harvest in fisheries that target Chinook salmon and coho salmon. Columbia River chum salmon rarely take the sport gear used to target other species. Incidental catch of chum amounts to a few tens of fish per year (TAC 2008). The harvest rate of Columbia River chum salmon in proposed state fisheries in the lower river is estimated to be 1.6% per year and is less than 5%.

LCR coho salmon are harvested in the ocean and in the Columbia River and tributary freshwater fisheries of Oregon and Washington. Incidental take of coho salmon prior to the 1990s fluctuated from approximately 60 to 90%. However, this number has been reduced since its listing to 15 to 25% (LCFRB 2004). The exploitation of hatchery coho salmon has remained approximately 50% through the use of selective fisheries.

LCR steelhead are harvested in Columbia River and tributary freshwater fisheries of Oregon and Washington. Fishery impacts of LCR steelhead have been limited to less than 10% since implementation of mark-selective fisheries during the 1980s. Recent harvest rates on UCR steelhead in non-Treaty and treaty Indian fisheries ranged from 1% to 2%, and 4.1% to 12.4%, respectively (FCRPS 2008).

Alien Species

Many non-native species have been introduced to the Columbia River Basin since the 1880s. At least 81 invasive species have currently been identified, composing one-fifth of all species in some areas. New non-native species are discovered in the basin regularly; a new aquatic invertebrate is discovered approximately every 5 months (Sytsma, Cordell et al. 2004). It is clear that the introduction of non-native species has changed the environment, though whether these changes will impact salmonid populations is uncertain (Sytsma, Cordell et al. 2004).

Puget Sound Region

Puget Sound is the second largest estuary in the U.S. It has about 1,330 miles of shoreline and extends from the mouth of the Strait of Juan de Fuca east. Puget Sound includes the San Juan Islands and south to Olympia, and is fed by more than 10,000 rivers and streams.

Puget Sound is generally divided into four major geographic marine basins: Hood Canal, South Sound, Whidbey Basin, and the Main Basin. The Main Basin has been further subdivided into two subbasins: Admiralty Inlet and Central Basin. About 43% of the Puget Sound's tideland is located in the Whidbey Island Basin. This reflects the large influence of the Skagit River, which is the largest river in the Puget Sound system and whose sediments are responsible for the extensive mudflats and tidelands of Skagit Bay.

Habitat types that occur within the nearshore environment include eelgrass meadows, kelp forest, mud flats, tidal marshes, sub-estuaries (tidally influenced portions of river and stream mouths), sand spits, beaches and backshore, banks and bluffs, and marine riparian vegetation. These habitats provide critical functions such as primary food production and support habitat for invertebrates, fish, birds, and other wildlife.

Major rivers draining to Puget Sound from the Cascade Mountains include the Skagit, Snohomish, Nooksack, Puyallup, and Green rivers, as well as the Lake Washington/Cedar River watershed. Major rivers from the Olympic Mountains include the Hamma Hamma, the Duckabush, the Quilcene, and the Skokomish rivers. Numerous other smaller rivers drain to the Sound, many of which are significant salmonid production areas despite their small size.

The Puget Sound basin is home to more than 200 fish and 140 mammalian species. Salmonids within the region include coho, Chinook, sockeye, chum, and pink salmon, kokanee, steelhead, rainbow, cutthroat, and bull trout (Wydoski and Whitney 1979; Kruckeberg 1991). Important commercial fishes include the five Pacific salmon and several rockfish species. A number of introduced species occur within the region,

including brown and brook trout, Atlantic salmon, bass, tunicates (sea squirts), and a saltmarsh grass (*Spartina* spp.). Estimates suggest that over 90 species have been intentionally or accidentally introduced in the region (Ruckelshaus and McClure 2007). At present, over 40 species in the region are listed as threatened and endangered under the ESA.

Puget Sound is unique among the nation's estuaries as it is a deep fjord-like structure that contains many urban areas within its drainage basin (Collier, O'Neill et al. 2006). Because of the several sills that limit entry of oceanic water into Puget Sound, it is relatively poorly flushed compared to other urbanized estuaries of North America. Thus, toxic chemicals that enter Puget Sound have longer residence times within the system. This entrainment of toxics can result in biota exposure to increased levels of contaminant for a given input, compared to other large estuaries. This hydrologic isolation puts the Puget Sound ecosystem at higher risk from other types of populations that enter the system, such as nutrients and pathogens.

Because Puget Sound is a deep, almost oceanic habitat, the tendency of a number of species to migrate outside of Puget Sound is limited relative to similar species in other large urban estuaries. This high degree of residency for many marine species, combined with the poor flushing of Puget Sound, results in a more protracted exposure to contaminants. The combination of hydrologic and biological isolation makes the Puget Sound ecosystem highly susceptible to inputs of toxic chemicals compared to other major estuarine ecosystems (Collier, O'Neill et al. 2006).

An indication of this sensitivity occurs in Pacific herring, one of Puget Sound's keystone forage fish species (Collier, O'Neill et al. 2006). These fish spend almost all of their lives in pelagic waters and feed at the lower end of the food chain. Pacific herring should be among the least contaminated of fish species. However, monitoring has shown that herring from the main basins of Puget Sound have higher body burdens of persistent chemicals (*e.g.*, PCBs) compared to herring from the severely contaminated Baltic Sea. Thus, the pelagic food web of Puget Sound appears to be more seriously contaminated

than previously anticipated.

Chinook salmon that are resident in Puget Sound (a result of hatchery practices and natural migration patterns) are several times more contaminated with persistent bioaccumulative contaminants than other salmon populations along the West Coast (Collier, O'Neill et al. 2006). Because of associated human health concerns, fish consumption guidelines for Puget Sound salmon are under review by the Washington State Department of Health.

Extremely high levels of chemical contaminants are also found in Puget Sound's top predators, including harbor seals and ESA-listed southern resident killer whales (Collier, O'Neill et al. 2006). In addition to carrying elevated loads of toxic chemicals in their tissues, Puget Sound's biota also show a wide range of adverse health outcomes associated with exposure to chemical contaminants. They include widespread cancer and reproductive impairment in bottom fish, increased susceptibility to disease in juvenile salmon, acute die-offs of adult salmon returning to spawn in urban watersheds, and egg and larval mortality in a variety of fish. Given current regional projections for population growth and coastal development, the loadings of chemical contaminants into Puget Sound will increase dramatically in future years.

Land Use

The Puget Sound Lowland contains the most densely populated area of Washington. The regional population in 2003 was an estimated 3.8 million people, with 86% residing in King, Pierce, and Snohomish counties (Snohomish, Cedar-Sammamish Basin, Green-Duwamish, and Puyallup River watersheds). The area is expected to attract 4 to 6 million new human residents in the next 20 years (Ruckelshaus and McClure 2007). The Snohomish River watershed, one of the fastest growing watersheds in the region, increased about 16% in the same period.

Land use in the Puget Sound lowland is composed of agricultural areas (including forests for timber production), urban areas (industrial and residential use), and rural areas (low

density residential with some agricultural activity). Pesticides are regularly applied to agricultural and non-agricultural lands and are found virtually in every land use area. Pesticides and other contaminants drain into ditches in agricultural areas and eventually to stream systems. Roads bring surface water runoff to stream systems from industrial, residential, and landscaped areas in the urban environment. Pesticides are also typically found in the right-of-ways of infrastructure that connect the major landscape types. Right-of-ways are associated with roads, railways, utility lines, and pipelines.

In the 1930s, all of western Washington contained about 15.5 million acres of "harvestable" forestland. By 2004, the total acreage was nearly half that originally surveyed (PSAT 2007). Forest cover in Puget Sound alone was about 5.4 million acres in the early 1990s. About a decade later, the region had lost another 200,000 acres of forest cover with some watersheds losing more than half the total forested acreage. The most intensive loss of forest cover occurred in the Urban Growth Boundary, which encompasses specific parts of the Puget Lowland. In this area, forest cover declined by 11% between 1991 and 1999 (Ruckelshaus and McClure 2007). Projected land cover changes indicate that trends are likely to continue over the next several decades with population changes (Ruckelshaus and McClure 2007). Coniferous forests are also projected to decline at an alarming rate as urban uses increase.

According to the 2001 State of the Sound report (PSAT 2007), impervious surfaces covered 3.3% of the region, with 7.3% of lowland areas (below 1,000 ft elevation) covered by impervious surfaces. From 1991 to 2001, the amount of impervious surfaces increased 10.4% region wide. Consequently, changes in rainfall delivery to streams alter stream flow regimes. Peak flows are increased and subsequent base flows are decreased and alter in-stream habitat. Stream channels are widened and deepened and riparian vegetation is typically removed which can cause increases in water temperature and will reduce the amounts of woody debris and organic matter to the stream system.

Pollutants carried into streams from urban runoff include pesticides, heavy metals, PCBs, polybrominated diphenyl ethers (PBDEs) compounds, PAHs, nutrients (phosphorus and

nitrogen), and sediment (Table 41). Other ions generally elevated in urban streams include calcium, sodium, potassium, magnesium, and chloride ions where sodium chloride is used as the principal road deicing salt (Paul and Meyer 2001). The combined effect of increased concentrations of ions in streams is the elevated conductivity observed in most urban streams.

Table 41. Examples of Water Quality Contaminants in Residential and Urban Areas

Contaminant groups	Select constituents	Select example(s)	Source and Use Information
Fertilizers	Nutrients	Phosphorus Nitrogen	lawns, golf courses, urban landscaping
Heavy Metals	Pb, Zn, Cr, Cu, Cd, Ni, Hg, Mg	Cu	brake pad dust, highway and parking lot runoff, rooftops
Pesticides including- Insecticides (I) Herbicides (H) Fungicides (F) Wood Treatment chemicals (WT) Legacy Pesticides (LP) Other ingredients in pesticide formulations (OI)	Organophosphates (I) Carbamates (I) Organochlorines (I) Pyrethroids (I) Triazines (H) Chloroacetanilides (H) Chlorophenoxy acids (H) Triazoles (F) Copper containing fungicides (F) Organochlorines (LP) Surfactants/adjuvants (OI)	Chlorpyrifos (I) Diazinon (I) Carbaryl (I) Atrazine (H) Esfenvalerate (I) Creosote (WT) DDT (LP) Copper sulfate (F) Metalaxyl (F) Nonylphenol (OI)	golf courses, right of ways, lawn and plant care products, pilings, bulkheads, fences
Pharmaceuticals and personal care products	Natural and synthetic hormones soaps and detergents	Ethinyl estradiol Nonylphenol	hospitals, dental facilities, residences, municipal and industrial waste water discharges
Polyaromatic hydrocarbons (PAHs)	Tricyclic PAHs	Phenanthrene	fossil fuel combustion, oil and gasoline leaks, highway runoff, creosote-treated wood
Industrial chemicals	PCBs PBDEs Dioxins	Penta-PBDE	utility infrastructure, flame retardants, electronic equipment

Many other metals have been found in elevated concentrations in urban stream sediments including arsenic, iron, boron, cobalt, silver, strontium, rubidium, antimony, scandium, molybdenum, lithium, and tin (Wheeler, Angermeier et al. 2005). The concentration, storage, and transport of metals in urban streams are connected to particulate organic matter content and sediment characteristics. Organic matter has a high binding capacity for metals and both bed and suspended sediments with high organic matter content frequently exhibit 50-7,500 times higher concentrations of zinc, lead, chromium, copper, mercury, and cadmium than sediments with lower organic matter content.

Although urban areas occupy only 2% of the Pacific Northwest land base, the impacts of urbanization on aquatic ecosystems are severe and long lasting (Spence, Lomnicky et al. 1996). O'Neill *et al.* (2006) found that Chinook salmon returning to Puget Sound had significantly higher concentrations of PCBs and PBDEs compared to other Pacific coast salmon populations. Furthermore, Chinook salmon that resided in Puget Sound in the winter rather than migrate to the Pacific Ocean (residents) had the highest concentrations of persistent organic pollutants (POPs), followed by Puget Sound fish populations believed to be more ocean-reared. Fall Chinook salmon from Puget Sound have a more localized marine distribution in Puget Sound and the Georgia Basin than other populations of Chinook salmon from the west coast of North America. This ESU is more contaminated with PCBs (2 to 6 times) and PBDEs (5 to 17 times). O'Neill *et al.* (2006) concluded that regional body burdens of contaminants in Pacific salmon, and Chinook salmon in particular, could contribute to the higher levels of contaminants in federally-listed endangered southern resident killer whales.

Endocrine disrupting compounds (EDCs) are chemicals that mimic natural hormones, inhibit the action of hormones and/or alter normal regulatory functions of the immune, nervous and endocrine systems and can be discharged with treated effluent (King County 2002d). Endocrine disruption has been attributed to DDT and other organochlorine pesticides, dioxins, PAHs, alkylphenolic compounds, phthalate plasticizers, naturally occurring compounds, synthetic hormones and metals. Natural mammalian hormones such as 17β-estradiol, are also classified as endocrine disruptors. Both natural and synthetic mammalian hormones are excreted through the urine and are known to be present in wastewater discharges.

Jobling *et al.* (1995) reported that ten chemicals known to occur in sewage effluent interacted with the fish estrogen receptor by reducing binding of 17β-estradiol to its receptor, stimulating transcriptional activity of the estrogen receptor or inhibiting transcription activity. Binding of the ten chemicals with the fish endocrine receptor indicates that the chemicals could be endocrine disruptors and forms the basis of concern

about WWTP effluent and fish endocrine disruption.

Fish communities are impacted by urbanization (Wheeler, Angermeier et al. 2005). Urban stream fish communities have lower overall abundance, diversity, taxa richness and are dominated by pollution tolerant species. Lead content in fish tissue is higher in urban areas. Furthermore, the proximity of urban streams to humans increases the risk of non-native species introduction and establishment. Thirty-nine non-native species were collected in Puget Sound during the 1998 Puget Sound Expedition Rapid Assessment Survey (Brennan, Higgins et al. 2004). Lake Washington, located within a highly urban area, has 15 non-native species identified (Ajawani 1956).

PAH compounds also have distinct and specific effects on fish at early life history stages (Incardona, Collier et al. 2004). PAHs tend to adsorb to organic or inorganic matter in sediments, where they can be trapped in long-term reservoirs (Johnson, Collier et al. 2002). Only a portion of sediment-adsorbed PAHs are readily bioavailable to marine organisms, but there is substantial uptake of these compounds by resident benthic fish through the diet, through exposure to contaminated water in the benthic boundary layer, and through direct contact with sediment. Benthic invertebrate prey are a particularly important source of PAH exposure for marine fishes, as PAHs are bioaccumulated in many invertebrate species (Varanasi, Stein et al. 1989; Varanasi, Stein et al. 1992; Meador, Stein et al. 1995).

PAHs and their metabolites in invertebrate prey can be passed on to consuming fish species, PAHs are metabolized extensively in vertebrates, including fishes (Johnson, Collier et al. 2002). Although PAHs do not bioaccumulate in vertebrate tissues, PAHs cause a variety of deleterious effects in exposed animals. Some PAHs are known to be immunotoxic and to have adverse effects on reproduction and development. Studies show that PAHs exhibit many of the same toxic effects in fish as they do in mammals (Johnson, Collier et al. 2002).

Habitat Modification

Much of the region's estuarine wetlands have been heavily modified, primarily from agricultural land conversion and urban development (NRC 1996). Although most estuarine wetland losses result from conversions to agricultural land by ditching, draining, or diking, these wetlands also experience increasing effects from industrial and urban causes. By 1980, an estimated 27,180 acres of intertidal or shore wetlands had been lost at 11 deltas in Puget Sound (Bortleson, Chrzastowski et al. 1980). Tidal wetlands in Puget Sound amount to roughly 18% of their historical extent (Collins and Sheikh 2005). Coastal marshes close to seaports and population centers have been especially vulnerable to conversion with losses of 50-90%. By 1980, an estimated 27,180 acres of intertidal or shore wetlands had been lost at eleven deltas in Puget Sound (Bortleson, Chrzastowski et al. 1980). More recently, tidal wetlands in Puget Sound amount to about 17-19% of their historical extent (Collins and Sheikh 2005). Coastal marshes close to seaports and population centers have been especially vulnerable to conversion with losses of 50-90% common for individual estuaries. Salmon use freshwater and estuarine wetlands for physiological transition to and from saltwater and rearing habitat. The land conversions and losses of Pacific Northwest wetlands constitute a major impact. Salmon use marine nearshore areas for rearing and migration, with juveniles using shallow shoreline habitats (Brennan, Higgins et al. 2004).

About 800 miles of Puget Sound's shorelines are hardened or dredged (PSAT 2004; Ruckelshaus and McClure 2007). The area most intensely modified is the urban corridor (eastern shores of Puget Sound from Mukilteo to Tacoma). Here, nearly 80% of the shoreline has been altered, mostly from shoreline armoring associated with the Burlington Northern Railroad tracks (Ruckelshaus and McClure 2007). Levee development within the rivers and their deltas has isolated significant portions of former floodplain habitat that was historically used by salmon and trout during rising flood waters.

Urbanization has caused direct loss of riparian vegetation and soils and significantly altered hydrologic and erosion rates. Watershed development and associated

urbanization throughout the Puget Sound, Hood Canal, and Strait of Juan de Fuca regions have increased sedimentation, raised water temperatures, decreased LWD recruitment, decreased gravel recruitment, reduced river pools and spawning areas, and dredged and filled estuarine rearing areas (Bishop and Morgan 1996 in (NMFS 2008)). Large areas of the lower rivers have been channelized and diked for flood control and to protect agricultural, industrial, and residential development.

The NMFS' 2005 Report to Congress on implementation of the Pacific Coastal Salmon Recovery Fund listed habitat-related factors as the leading limits to Puget Sound Chinook Salmon and Hood-Canal Summer Run Chum recovery (PCSRF 2006). Similarly, the principal factor for decline of Puget Sound steelhead is the destruction, modification, and curtailment of its habitat and range. Barriers to fish passage and adverse effects on water quality and quantity resulting from dams, the loss of wetland and riparian habitats, and agricultural and urban development activities have contributed and continue to contribute to the loss and degradation of steelhead habitats in Puget Sound (NMFS 2008).

Industrial Development

More than 100 years of industrial pollution and urban development have affected water quality and sediments in Puget Sound. Many different kinds of activities and substances release contamination into Puget Sound and the contributing waters. According to the State of the Sound Report (PSAT 2007) in 2004, more than 1,400 fresh and marine waters in the region were listed as “impaired.” Almost two-thirds of these water bodies were listed as impaired due to contaminants, such as toxics, pathogens, and low dissolved oxygen or high temperatures, and less than one-third had established cleanup plans. More than 5,000 acres of submerged lands (primarily in urban areas; 1% of the study area) are contaminated with high levels of toxic substances, including polybrominated diphenyl ethers (PBDEs; flame retardants), and roughly one-third (180,000 acres) of submerged lands within Puget Sound are considered moderately contaminated. In 2005 the Puget Sound Action Team (PSAT) identified the primary pollutants of concern in Puget Sound and their sources listed below in Table 42.

Table 42. Pollutants of Concern in Puget Sound (PSAT 2005)

Pollutant	Sources
Heavy Metals: Pb, Hg, Cu, and others	vehicles, batteries, paints, dyes, stormwater runoff, spills, pipes.
Organic Compounds: Polycyclic aromatic hydrocarbons (PAHs)	Burning of petroleum, coal, oil spills, leaking underground fuel tanks, creosote, asphalt.
Polychlorinated biphenyls (PCBs)	Solvents electrical coolants and lubricants, pesticides, herbicides, treated wood.
Dioxins, Furans	Byproducts of industrial processes.
Dichloro-diphenyl-trichloroethane (DDTs)	Chlorinated pesticides.
Phthalates	Plastic materials, soaps, and other personal care products. Many of these compounds are in wastewater from sewage treatment plants.
Polybrominated diphenyl ethers (PBDEs)	PBDEs are added to a wide range of textiles and plastics as a flame retardant. They easily leach from these materials and have been found throughout the environment and in human breast milk.

Puget Sound Basin: NAWQA analysis

The USGS sampled waters in the Puget Sound Basin between 1996 and 1998. (Ebbert, Embrey et al. 2000) reported that 26 of 47 analyzed pesticides were detected. A total of 74 manmade organic chemicals were detected in streams and rivers, with different mixtures of chemicals linked to agricultural and urban settings. NAWQA results reported that the herbicides atrazine, prometon, simazine and tebuthiuron were the most frequently detected herbicides in surface and ground water (Bortleson and Ebbert 2000). Herbicides were the most common type of pesticide found in an agricultural stream (Fishtrap Creek) and the only type of pesticide found in shallow ground water underlying agricultural land (Bortleson and Ebbert 2000). The most commonly detected VOC in the agricultural land use study area was associated with the application of fumigants to soils prior to planting (Bortleson and Ebbert 2000). One or more fumigant-related compound (1,2-dichloropropane, 1,2,2-trichloropropane, and 1,2,3-trichloropropane) were detected in over half of the samples. Insecticides, in addition to herbicides, were detected frequently in urban streams (Bortleson and Ebbert 2000). Sampled urban streams showed the highest detection rate for the three insecticides: carbaryl, diazinon, and malathion. Carbaryl was detected at over 60% of urban sample sites (Ebbert, Embrey et al. 2000). The insecticide diazinon was also frequently detected in urban streams at

concentrations that exceeded EPA guidelines for protecting aquatic life (Bortleson and Ebbert 2000). Insecticides screened for included both carbofuran and methomyl. Carbofuran was detected, while methomyl was not. No insecticides were found in shallow ground water below urban residential land (Bortleson and Ebbert 2000).

Habitat Restoration

Positive changes in water quality in the region are evident. One of the most notable improvements was the elimination of sewage effluent to Lake Washington in the mid-1960s. This significantly reduced problems within the lake from phosphorus pollution and triggered a concomitant reduction in cyanobacteria (Ruckelshaus and McClure 2007). Even so, as the population and industry has risen in the region a number of new and legacy pollutants are of concern.

Mining

Mining has a long history in Washington. In 2004, the state was ranked 13th nationally in total nonfuel mineral production value and 17th in coal production (Palmisano, Ellis et al. 1993; NMA 2007). Metal mining for all metals (zinc, copper, lead, silver, and gold) peaked between 1940 and 1970 (Palmisano, Ellis et al. 1993). Today, construction sand and gravel, Portland cement, and crushed stone are the predominant materials mined. Where sand and gravel is mined from riverbeds (gravel bars and floodplains) it may result in changes in channel elevations and patterns, instream sediment loads, and seriously alter instream habitat. In some cases, instream or floodplain mining has resulted in large scale river avulsions. The effect of mining in a stream or reach depends upon the rate of harvest and the natural rate of replenishment, as well as flood and precipitation conditions during or after the mining operations.

Artificial Propagation

The artificial propagation of late-returning Chinook salmon is widespread throughout Puget Sound (Good, Waples et al. 2005). Summer/fall Chinook salmon transfers between watersheds within and outside the region have been commonplace throughout this century. Therefore, the purity of naturally spawning stocks varies from river to river. Nearly 2 billion Chinook salmon have been released into Puget Sound tributaries since

the 1950s. The vast majority of these have been derived from local late-returning adults.

Returns to hatcheries have accounted for 57% of the total spawning escapement. However, the hatchery contribution to spawner escapement is probably much higher than that due to hatchery-derived strays on the spawning grounds. The genetic similarity between Green River late-returning Chinook salmon and several other late-returning Chinook salmon in Puget Sound suggests that there may have been a significant and lasting effect from some hatchery transplants (Marshall, Smith et al. 1995).

Overall, the use of Green River stock throughout much of the extensive hatchery network in this ESU may reduce the genetic diversity and fitness of naturally spawning populations (Good, Waples et al. 2005).

Hydromodification Projects

More than 20 dams occur within the region's rivers and overlap with the distribution of salmonids. A number of basins contain water withdrawal projects or small impoundments that can impede migrating salmon. The resultant impact of these and land use changes (forest cover loss and impervious surface increases) has been a significant modification in the seasonal flow patterns of area rivers and streams, and the volume and quality of water delivered to Puget Sound waters. Several rivers have been hydromodified by other means including levees and revetments, bank hardening for erosion control, and agriculture uses. Since the first dike on the Skagit River delta was built in 1863 for agricultural development (Ruckelshaus and McClure 2007), other basins like the Snohomish River are diked and have active drainage systems to drain water after high flows that top the dikes. Dams were also built on the Cedar, Nisqually, White, Elwha, Skokomish, Skagit, and several other rivers in the early 1900s to supply urban areas with water, prevent downstream flooding, allow for floodplain activities (like agriculture or development), and to power local timber mills (Ruckelshaus and McClure 2007).

Over the next few years, however, a highly publicized and long discussed dam removal

project is expected to begin in the Elwha River. The removal of two dams in the Elwha River, a short but formerly very productive salmon river, is expected to open up more than 70 miles of high quality salmon habitat (Wunderlich, Winter et al. 1994; Ruckelshaus and McClure 2007). Estimates suggest that nearly 400,000 salmon could begin using the basin within 30 years after the dams are removed (PSAT 2007).

In 1990, only one-third of the water withdrawn in the Pacific Northwest was returned to the streams and lakes (NRC 1996). Water that returns to a stream from an agricultural irrigation is often substantially degraded. Problems associated with return flows include increased water temperature, which can alter patterns of adult and smolt migration; increased toxicant concentrations associated with pesticides and fertilizers; increased salinity; increased pathogen populations; decreased dissolved oxygen concentration; and increased sedimentation (NRC 1996). Water-level fluctuations and flow alterations due to water storage and withdrawal can affect substrate availability and quality, temperature, and other habitat requirements of salmon. Indirect effects include reduction of food sources; loss of spawning, rearing, and adult habitat; increased susceptibility of juveniles to predation; delay in adult spawning migration; increased egg and alevin mortalities; stranding of fry; and delays in downstream migration of smolts (NRC 1996).

Commercial and Recreational Fishing

Most of the commercial landings in the region are groundfish, Dungeness crab, shrimp, and salmon. Many of the same species are sought by Tribal fisheries and by charter and recreational anglers. Nets and trolling are used in commercial and Tribal fisheries. Recreational anglers typically use hook and line, and may fish from boat, river bank, or docks. Entanglement of marine mammals in fishing gear is not uncommon and can lead to mortality or serious injury.

Pesticides are used in commercial oyster-producing areas in Willapa Bay and Grays Harbor. Currently, under a statewide SLN or Section 24 (c) registration, carbaryl can be applied to aerially applied to intertidal areas when exposed at low tide. Pesticide use is intended to control ghost shrimp (*Neotrypaea californiensis)* and mud shrimp *(Upogebia*

pugettensis). An NPDES permit is required for application, and although the registration allows application anywhere in the state, these locations are the only ones covered under active permits. There has been some discussion of phasing out carbaryl use and replacing it with alternative pesticides.

Harvest impacts on Puget Sound Chinook salmon populations average 75% in the earliest five years of data availability and have dropped to an average of 44% in the most recent five-year period (Good, Waples et al. 2005). Populations in Puget Sound have not experienced the strong increases in numbers seen in the late 1990s in many other ESUs. Although more populations have increased than decreased since the last BRT assessment, after adjusting for changes in harvest rates, trends in productivity are less favorable. Most populations are relatively small, and recent abundance within the ESU is only a small fraction of estimated historic run size.

Atmospheric deposition

Pesticides were detected in wet deposition (rain) (Capel, Ma et al. 1998), and snow samples from Mount Rainier National Park, Washington (Hageman, Simonich et al. 2006). Three of the four most frequently detected pesticides were found in the Mount Rainier snow (dacthal, chlorpyrifos, and endosulfan).

Oregon-Washington-Northern California Coastal Drainages

This region encompasses drainages originating in the Klamath Mountains, the Oregon Coast Mountains, and the Olympic Mountains. More than 15 watersheds drain the region's steep slopes including the Umpqua, Alsea, Yaquina, Nehalem, Chehalis, Quillayute, Queets, and Hoh rivers. Numerous other small to moderately sized streams dot the coastline. Many of the basins in this region are relatively small. The Umpqua River drains a basin of 4,685 square miles and is slightly over 110 miles long. The Nehalem River drains a basin of 855 square miles and is almost 120 miles long. However, systems here represent some of the most biologically diverse basins in the Pacific Northwest (Kagan, Hak et al. 1999; Belitz, Hamlin et al. 2004; Carter and Resh 2005).

Land Use

The rugged topography of the western Olympic Peninsula and the Oregon Coastal Range has limited the development of dense population centers. For instance, the Nehalem River and the Umpqua River basins consist of less than 1% urban land uses. Most basins in this region have long been exploited for timber production, and are still dominated by forest lands. In Washington State, roughly 90% of the coastal region is forested (Palmisano, Ellis et al. 1993). Roughly 80% of the Oregon Coastal Range is forested as well (Gregory 2000). Approximately 92% of the Nehalem River basin is forested, with only 4% considered agricultural (Belitz, Hamlin et al. 2004). Similarly, in the Umpqua River basin, about 86% is forested land, 5% agriculture, and 0.5% is considered urban lands. Roughly half the basin is under federal management (Carter and Resh 2005).

Habitat Modification

While much of the coastal region is forested, it has still been impacted by land use practices. Less than 3% of the Oregon coastal forest is old growth conifers (Gregory 2000). The lack of mature conifers indicates high levels of habitat modification. As such, overall salmonid habitat quality is poor, though it varies by watershed. The amount of remaining high quality habitat ranges from 0% in the Sixes to 74% in the Siltcoos (ODFW 2005). Approximately 14% of freshwater winter habitat available to juvenile coho is of high quality. Much of the winter habitat is unsuitable due to high temperatures. For example, 77% of coho salmon habitat in the Umpqua basin exceeds temperature standards.

Reduction in stream complexity is the most significant limiting factor in the Oregon coastal region. An analysis of the Oregon coastal range determined the primary and secondary lifecycle bottlenecks for the 21 populations of coastal coho salmon (Nicholas, McIntosh et al. 2005). Nicholas et al. (2005) determined that stream complexity is either the primary (13) or secondary (7) bottleneck for every population. Stream complexity has been reduced through past practices such as splash damming, removing riparian vegetation, removing LWD, diking tidelands, filling floodplains, and channelizing rivers.

Habitat loss through wetland fills is also a significant factor. Table 43 summarizes the change in area of tidal wetlands for several Oregon estuaries (Good 2000).

Table 43. Change in total area (acres^2) of tidal wetlands (tidal marshes and swamps) due to filling and diking between 1870 and 1970 (Good 2000).

Estuary	Diked or Filled Tidal Wetland	Percent of 1870 Habitat Lost
Necanicum	15	10
Nehalem	1,571	75
Tillamook	3,274	79
Netarts	16	7
Sand Lake	9	2
Nestucca	2,160	91
Salmon	313	57
Siletz	401	59
Yaquina	1,493	71
Alsea	665	59
Siuslaw	1,256	63
Umpqua	1,218	50
Coos Bay	3,360	66
Coquille	4,600	94
Rogue	30	41
Chetco	5	56
Total	20,386	72%

The only listed salmonid population in coastal Washington is the Ozette Lake Sockeye. The range of this ESU is small, including only one lake (31 km^2) and 71 km of stream. Like the Oregon Coastal drainages, the Ozette Lake area has been heavily managed for logging. Logging resulted in road building and the removal of LWD, which affected the nearshore ecosystem (NMFS 2008). LWD along the shore offered both shelter from predators and a barrier to encroaching vegetation (NMFS 2008). Aerial photograph analysis shows near-shore vegetation has increased significantly over the past 50 years (Ritchie 2005). Further, there is strong evidence that water levels in Ozette Lake have dropped between 1.5 and 3.3 ft from historic levels (Herrera 2005 in (NMFS 2008)). The impact of this water level drop is unknown. Possible effects include increased desiccation of sockeye redds and loss of spawning habitat. Loss of LWD has also

contributed to an increase in silt deposition, which impairs the quality and quantity of spawning habitat.

Very little is known about the relative health of the Ozette Lake tributaries and their impact on the sockeye salmon population.

Mining

Oregon is ranked 35th nationally in total nonfuel mineral production value in 2004. In that same year, Washington was ranked 13th nationally in total nonfuel mineral production value and 17th in coal production (Palmisano, Ellis et al. 1993; NMA 2007). Metal mining for all metals (*e.g.*, zinc, copper, lead, silver, and gold) peaked in Washington between 1940 and 1970 (Palmisano, Ellis et al. 1993). Today, construction sand, gravel, Portland cement, and crushed stone are the predominant materials mined in both Oregon and Washington. Where sand and gravel is mined from riverbeds (gravel bars and floodplains) changes in channel elevations and patterns, instream sediment loads, may result and alter instream habitat. In some cases, instream or floodplain mining has resulted in large scale river avulsions. The effect of mining in a stream or reach depends upon the rate of harvest and the natural rate of replenishment. Additionally, the severity of the effects is influenced by flood and precipitation conditions during or after the mining operations.

Hydromodification Projects

Compared to other areas in the greater Northwest Region, the coastal region has fewer dams and several rivers remain free flowing (*e.g.*, Clearwater River). The Umpqua River is fragmented by 64 dams, the fewest number of dams on any large river basin in Oregon (Carter and Resh 2005). According to Palmisano *et al.* (1993) dams in the coastal streams of Washington permanently block only about 30 miles of salmon habitat. In the past, temporary splash dams were constructed throughout the region to transport logs out of mountainous reaches. The general practice involved building a temporary dam in the creek adjacent to the area being logged, and filling the pond with logs. When the dam broke the floodwater would carry the logs to downstream reaches where they could be

rafted and moved to market or downstream mills. Thousands of splash dams were constructed across the Northwest in the late 1800s and early 1900s. While the dams typically only temporarily blocked salmon habitat, in some cases dams remained long enough to wipe out entire salmon runs. The effects of the channel scouring and loss of channel complexity resulted in the long-term loss of salmon habitat (NRC 1996).

Commercial and Recreational Fishing

Most commercial landings in the region are groundfish, Dungeness crab, shrimp, and salmon. Many of the same species are sought by Tribal fisheries, as well as by charter, and recreational anglers. Nets and trolling are used in commercial and Tribal fisheries. Recreational anglers typically use hook and line and may fish from boat, river bank, or docks.

Atmospheric deposition

Pesticides and other chemicals may be transported through the air and later deposited on land and into waterways. For example, orthophosphate insecticides were detected in two Oregon streams, Hood River and Mill Creek (tributaries of the Columbia River). Detection occurred following periods of chemical applications on orchard crops, and may be related to atmospheric drift, mixing operations, or other aspects of pesticide use.

Environmental Protection Programs

When using carbaryl, carbofuran, and methomyl, growers must adhere to the court-ordered injunctive relief, requiring buffers of 20 yards for ground application and 100 yards for any aerial application. These measures are mandatory in all four states, pending completion of consultation.

California and Oregon both have Pesticide Use Reporting System (PURS) legislation. California PURS requires all agricultural uses of registered pesticides be reported. In this case "agricultural" use includes applications to parks, golf courses, and most livestock uses. Oregon requires reporting if application is part of a business, for a government agency, or in a public place. However, the Governor of Oregon has suggested suspending the PURS program for 2009 – 2011 due to budget shortages. A final decision

will be made during the summer. If suspension occurs, PURS will resume for the 2012 growing season.

Washington State has a Surface Water Monitoring Program that looks at pesticide concentrations in some salmonid bearing streams and rivers. The program was initiated in 2003 and now monitors four areas. Three of these were chosen due to high overlap with agriculture: the Skagit-Samish watershed, the Lower Yakima Watershed, and the Wenatchee and Entiat watersheds. The final area, in the Cedar-Sammamish watershed, is an urban location, intended to look at runoff in a non-agriculture setting. It was chosen due to detection of pesticides coincident with pre-spawning mortality in Coho salmon. The Surface Water Monitoring program is relatively new and will continue to add watersheds and testing for additional pesticides over time.

Washington State also has a voluntary program that assists growers in addressing water rights issues within a watershed. Several watersheds have elected to participate, forming Comprehensive Irrigation District Management Plans (CIDMPs). The CIDMP is a collaborative process between government and landowners and growers; the parties determine how they will ensure growers get the necessary volume of water while also guarding water quality. This structure allows for greater flexibility in implementing mitigation measures to comply with both the CWA and the ESA.

Oregon has also implemented a voluntary program. The Pesticide Stewardship Partnerships (PSP) program began in 1999 through the Oregon Department of Environmental Quality. Like the CIDMP program, the goal is to involve growers and other stakeholders in water quality management at a local level. Effectiveness monitoring is used to provide feedback on the success of mitigation measures. As of 2006, there were six pilot PSPs planned or in place. Early results from the first PSPs in the Columbia Gorge Hood River and in Mill Creek demonstrate reductions in chlorpyrifos and diazinon levels and detection frequencies. DEQ's pilot programs suggest that PSPs can help reduce contamination of surface waters.

Oregon is in the process of developing a Pesticide Management Plan for Water Quality Protection, as required under FIFRA. This plan describes how government agencies and stakeholders will collaboratively reduce pesticides in Oregon water supplies. The PSP program is a component of this Plan, and will provide information on the effectiveness of mitigation measures.

The Columbia Gorge Fruit Growers Association is a non-profit organization dedicated to the needs of growers in the mid-Columbia area. The association brings together over 440 growers and 20 shippers of fruit from Oregon and Washington. It has issued a BMP handbook for OPs, including information on alternative methods of pest control. However, their website does not mention carbamate pesticides. The mid-Columbia area is of particular concern, as many orchards are in close proximity to streams.

Idaho State Department of Agriculture has published a BMP guide for pesticide use. The BMPs include eight "core" voluntary measures that will prevent pesticides from leaching into soil and groundwater. These measures include applying pest-specific controls, being aware of the depth to ground water, and developing an Irrigation Water Management Plan.

Integration of the Environmental Baseline on Listed Resources

Collectively, the components of the environmental baseline for the action area include sources of natural mortality as well as influences from natural oceanographic and climatic features in the action area. Climatic variability may affect the growth, reproductive success, and survival of listed Pacific salmonids in the action area. Temperature and water level changes may lead to: (1) Reduced summer and fall stream flow, leading to loss of spawning habitat and difficulty reaching spawning beds; (2) increased winter flooding and disturbance of eggs; (3) changes in peak stream flow timing affecting juvenile migration; and (4) rising water temperature may exceed the upper temperature limit for salmonids at 64ºF (18ºC) (JISAO 2007). Additional indirect impacts include changes in the distribution and abundance of the prey and the distribution and abundance

of competitors or predators for salmonids. These conditions will influence the population structure and abundance for all listed Pacific salmonids.

The baseline also includes human activities resulting in disturbance, injury, or mortality of individual salmon. These activities include hydropower, hatcheries, harvest, and habitat degradation, including poor water quality and reduced availability of spawning and rearing habitat for all 28 ESUs/DPSs. As such, these activities degrade salmonid habitat, including all designated critical habitat and their PCEs. While each area is affected by a unique combination of stressors, the two major impacts to listed Pacific salmonid critical habitat are habitat loss and decreased prey abundance. Although habitat restoration and hydropower modification measures are ongoing, the long-term beneficial effects of these actions on Pacific salmonids, although anticipated, remain to be realized. Thus, we are unable to quantify these potential beneficial effects at this time.

Listed Pacific salmonids and designated critical habitat may be affected by the proposed registration of carbaryl, carbofuran, and methomyl in California, Idaho, Oregon, and Washington. These salmonids are and have been exposed to the components of the environmental baseline for decades. The activities discussed above have some level of effect on all 28 ESUs/DPSs in the proposed action area. They have also eroded the quality and quantity of salmonid habitat – including designated critical habitat. We expect the combined consequences of those effects, including impaired water quality, temperature, and reduced prey abundance, may increase the vulnerability and susceptibility of overall fish health to disease, predation, and competition for available suitable habitat and prey items. The continued trend of anthropogenic impairment of water quality and quantity on Pacific salmonids and their habitats may further compound the declining status and trends of listed salmonids, unless measures are implemented to reverse this trend.

Effects of the Proposed Action

The analysis includes three primary components: exposure, response, and risk characterization. We analyze exposure and response, and integrate the two in the risk characterization phase where we address support for risk hypotheses. These risk hypotheses are predicted on effects to salmonids and designated critical habitats' PCEs. The combined analysis evaluated effects to listed Pacific salmonids and their designated critical habitat (see *Approach to the Assessment).*

Exposure Analysis

In this section, we identify and evaluate exposure information from the stressors of the action (Figure 1). We begin by presenting a general discussion of the physical and chemical properties of carbaryl, carbofuran, and methomyl that influence the distribution and persistence of action stressors in the environment and exposure of listed species and designated critical habitat (structures shown in Figure 36). Next we present general life history information of Pacific salmon and steelhead and evaluate the likely co-occurrence of action stressors with the listed Pacific salmonids. We then summarize exposure estimates presented in the three BEs and present other sources of information, including other modeling estimates and monitoring data to further characterize exposure to listed species and designated critical habitat. Finally, we conclude with a summary of expected ranges of exposure and the uncertainty contained in the exposure analysis. Because the ESA section 7 consultation process is intended to ensure that the agency action is not likely to jeopardize listed species or destroy or adversely modify critical habitat, NMFS considers a variety of exposure scenarios in addition to those presented in EPA's BEs. These scenarios provide exposure estimates for the range of habitats utilized by listed salmonids.

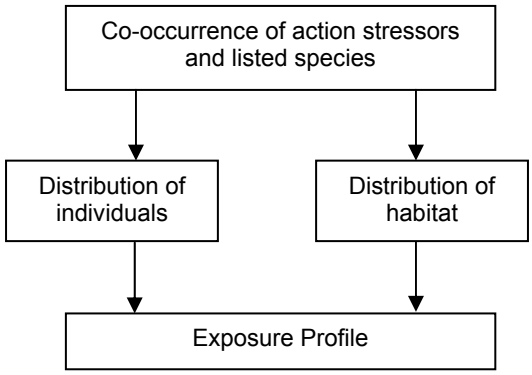

Figure 35. Exposure analysis

Summary of Chemical Fate of A.I.s

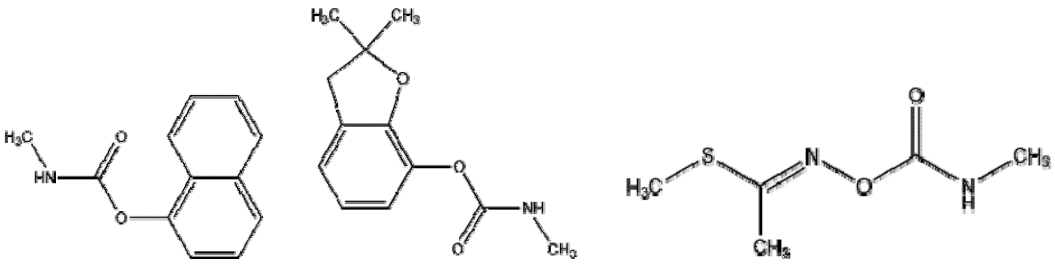

Carbaryl Carbofuran Methomyl

Figure 36. Chemical structures of carbaryl, carbofuran, and methomyl.

Carbaryl

"Carbaryl is a widely used pesticide that is commonly detected in the environment from its application in agricultural and non-agricultural settings (EPA 2003)." Carbaryl is primarily applied to terrestrial habitats, although a 24(c) registration in Washington State allows for application to commercial oyster beds to control native ghost shrimp and mud shrimp. Carbaryl can contaminate surface waters via runoff, erosion, leaching, and spray drift from application at terrestrial sites, or direct application to aquatic habitats. Carbaryl and its primary degradate, 1-naphthol, are fairly mobile and slightly persistent in the environment. Although they are not likely to persist or accumulate under most conditions, they may do so under acidic conditions with limited microbial activity.

Carbaryl dissipates in the environment by abiotic and microbially mediated degradation. The environmental fate characteristics for carbaryl are listed below (Table 44).

Table 44. Environmental fate characteristics of carbaryl (EPA 2003).

Parameter	Value
Water solubility	32 mg/L at 20 deg C
Vapor pressure	1.36 10^{-7} torrs
Henry's law constant	1.28 x 10^{-8} atm m^3 /mol
Octanol/Water partition	K_{ow} = 229
Hydrolysis ($t_{1/2}$) pH 5, pH 7, and pH 9	Stable, 12 days, 3.2 hours
Aqueous photolysis ($t_{½}$)	21 days
Soil photolysis($t_{½}$)	assumed stable
Aerobic soil metabolism ($t_{½}$)	4 days - sandy loam soil
Anaerobic soil metabolism ($t_{½}$)	72 days
Aerobic aquatic metabolism ($t_{½}$)	4.9 days
Anaerobic aquatic metabolism ($t_{½}$)	72 days
K_{oc}	177- 249 ml/g

Fish are most likely to be exposed to carbaryl through direct uptake of the chemical from the water column and across the gills, although other routes of exposure may also be important. Potential exposure routes for aquatic organisms include direct uptake from the water column or pore water of sediment, incidental ingestion of the chemical in sediment, or ingestion of the chemical in food items. EPA asserts that "carbaryl is not expected to bioaccumulate" and reports a bioacculation factor of 45 (EPA 2003). Other sources suggest accumulation of carbaryl can occur in fish, invertebrates, algae and plants. Residue levels in fish can be 140 fold greater than the concentration of carbaryl in water (http://pmep.cce.cornell.edu/profiles/extoxnet/carbaryl-dicrotophos/carbaryl-ext.html#14). In general, due to its rapid metabolism and rapid degradation, carbaryl should not pose a significant bioaccumulation risk in alkaline waters. However, under conditions below neutrality accumulation of carbaryl may be significant (http://pmep.cce.cornell.edu/profiles/extoxnet/carbaryl-dicrotophos/carbaryl-ext.html#14).

EPA reports the major degradation products of carbaryl are CO_2 and 1-naphthol, which is further degraded to CO_2 (EPA 2003). Carbaryl is stable to hydrolysis in acidic conditions but hydrolyzes in neutral environments. Hydrolysis rates increase with increasing alkalinity. Carbaryl is degraded by photolysis in water with a half-life of 21 days (d).

Under aerobic conditions, it degrades rapidly by microbial metabolism in soil and aquatic environments. Metabolism is much slower in anaerobic environments, with half-lives on the order of 2 to 3 months. Carbaryl is mobile in the environment. Sorption onto soils is positively correlated with increasing soil organic content. Because of its low octanol/water partition coefficient (K_{ow} values range from 65 to 229), carbaryl is not expected to significantly bioaccumulate (EPA 2003).

The major metabolite of carbaryl degradation by both abiotic and microbially mediated processes is 1-naphthol. This degradate represented up to 67% of the applied carbaryl in degradation studies. It is also formed in the environment by degradation of naphthalene and other PAH compounds. Data suggest 1-naphthol "is less persistent and less mobile than parent carbaryl (EPA 2003).

In a field dissipation study, carbaryl was applied on 3- to 8- ft tall pine trees in an Oregon forest. Maximum measured concentrations were 264 mg/kg on foliage at 2 d post-treatment, 28.7 mg/kg in leaf litter after 92 days, 0.16 mg/kg in the upper 15 cm of litter-covered soil at 62 d, and 1.14 mg/kg in the upper 15 cm of exposed soil at 2 d. Carbaryl was detected in the leaf litter up to 365 d after treatment and in litter-covered soil up to 302 d after treatment. Half-lives were 21 d on foliage, 75 d in leaf litter, and 65 days in soil. Carbaryl was detected at <0.003 mg/L in water and <0.003 mg/kg in sediment from a pond and stream located approximately 50 ft from the treated area (EPA 2003).

Carbofuran

Carbofuran is an *N*-methyl carbamate and is used as a broad spectrum insecticide and nematicide. Carbofuran can contaminate surface waters via runoff, erosion, leaching, and spray drift from application at upland sites.

Potential exposure routes for aquatic organisms include direct uptake of the chemical from the water column or pore water of sediment, incidental ingestion of the chemical in sediment, or ingestion of the chemical in food items. Considering that carbofuran has

high water solubility, low K_{ow}, and a relatively low bioconcentration factor (2-12), fish are most likely to be exposed to carbofuran through direct uptake from the water column (Table 45). Exposure via the food chain, pore water, and sediment pathways are also possible but are less likely to be relevant for most life stages of fish (EPA 2004).

Table 45. Environmental fate characteristics of carbofuran (EPA 2004).

Parameter	Value
Water solubility	700 mg/L
Vapor pressure	6×10^{-7} torrs
Henry's law constant	No data
Octanol/Water partition	$K_{ow} = 0.03$
Hydrolysis ($t_{1/2}$) pH 6, pH 7, pH 7, & pH 9	Stable, 28 days, 3 days, and 0.8-15 hrs
Aqueous photolysis ($t_{½}$)	6 days
Soil photolysis ($t_{½}$)	78 days
Aerobic soil metabolism ($t_{½}$)	321 days
Anaerobic soil metabolism ($t_{½}$)	624 days
Aerobic aquatic metabolism ($t_{½}$)	No data
Anaerobic aquatic metabolism ($t_{½}$)	No data
K_{oc}	9 to 62 ml/g

Carbofuran is highly mobile and can leach to ground water in many soils or reach surface waters via runoff. The median K_{oc} of carbofuran is 30 and the Freundlich coefficient (K_f) ranges from 0.10 to 30.3 (EPA 2004). Major factors influencing the fate and persistence of carbofuran are water and soil pH. Carbofuran is very mobile and persistent in acidic environments, but dissipates more rapidly in pHs that are basic. Carbofuran is stable to hydrolysis at pHs < 6, but becomes increasingly susceptible to hydrolysis as the pH increases, hydrolyzing rapidly in alkaline aquatic environments (EPA 2004). A study evaluating its persistence in natural surface waters found it took 3 weeks to degrade by 50% (Sharom, Miles et al. 1980). Carbofuran phenol (7-phenol) was the only degradate detected in hydrolysis studies (EPA 2004). The rate of carbofuran degradation in soils is also pH dependent. In an acidic soil (pH 5.7), carbofuran dissipated with a half-life of 321 d, but when the soil was limed to a pH of 7.7, the half-life dropped to 149 d. The major identified degradate was 3-keto carbofuran, which peaked at 12% of the amount applied after 181 d. The other degradation products formed during photolysis, soil, and aquatic metabolism studies are 3-hydroxycarbofuran, 3-hydroxy-7-phenol, and 3-keto-7-phenol (EPA 2004).

In an aqueous photolysis study carbofuran photodegraded in neutral water (buffered [pH 7] solution) at 25ºC with a half-life of 6 d. In a soil photolysis study, carbofuran photodegraded with a half-life of 78 d on a sandy loam soil. Carbofuran is moderately persistent to microbial degradation, with half-lives on the order of a year. Near-surface photolysis is significant under laboratory conditions in aqueous solution, with a half-life on the order of days (EPA 2004).

Methomyl

Methomyl is a broad spectrum insecticide approved for a variety of terrestrial use sites. Use in aquatic habitats is not permitted. EPA characterized methomyl as moderately persistent and highly mobile suggesting methomyl may contaminate surface waters through runoff, erosion, leaching, and spray drift from application at upland sites (EPA 2003).

Potential exposure routes for fish and other aquatic organisms include direct uptake of the chemical from the water column or pore water of sediment, incidental ingestion of the chemical in sediment, or ingestion of the chemical in food items. Methomyl bioaccumulation has not been studied in fish, although it is expected to be relatively low given low octanol/water partition coefficients (K_{ow} ranges from 1.29 to 1.33, Table 46).

Methomyl degradation occurs through metabolism and photolysis. Site-specific factors affecting the persistence of methomyl include aerobicity, organic matter and soil moisture content, exposure to sunlight, and pH. Climate, crop management, soil type and other site-specific factors also influence leaching and runoff.

Table 46. Environmental fate characteristics of methomyl (EPA 2003).

Parameter	Value
Water solubility	58,000 mg/L
Vapor pressure	$1x10^{-5}$ torrs
Henry's law constant	$1.8x10^{-10}$ atm-m^3/mol
Octanol/Water partition[1]	K_{ow} =1.29 – 1.33
Hydrolysis ($t_{1/2}$) pH 5, pH 7, & pH 9	Stable, stable, & 30 days
Aqueous photolysis ($t_{½}$)	1 day
Soil photolysis ($t_{½}$)	36 days
Aerobic soil metabolism ($t_{½}$)	11 to 45 days
Anaerobic soil metabolism ($t_{½}$)	No data
Aerobic aquatic metabolism ($t_{½}$)	3.5-4.5 days[1]
Anaerobic aquatic metabolism ($t_{½}$)	<7 to 14 days
K_{oc}	24 ml/g

1Reported in (EPA 2007)

Methomyl photolysis occurs relatively quickly in water but slowly in soils. It is moderately stable to aerobic soil metabolism but degrades more rapidly under anaerobic conditions. While methomyl becomes more susceptible to hydrolysis as the pH increases above neutral, this is not expected to be a major route of dissipation under most circumstances. Laboratory studies show that methomyl does not readily adsorb to soil and has the potential to be very mobile. Dissipation from the soil surface occurs by a combination of chemical breakdown and movement. Field studies show that the varying dissipation rates for methomyl were related primarily to differences in soil moisture content, which may affect the microbial activity, and rainfall/irrigation, which could influence leaching (EPA 2003).

Several degradates of methomyl have been identified. CO_2 is a major degradate of methomyl. Methomyl oxime, is a minor degradation product in soil and water that degrades rapidly and has negligible toxicity (DuPont 2009). Another degradate, S-methyl-N-hydroxythioacetamidate, which is highly mobile, appears to be primarily a product of alkaline hydrolysis. In an aquatic metabolism study, methomyl degraded with estimated half-lives of 4-5 d. After 7 d, acetonitrile comprised a maximum of 17% and acetamide up to 14% of the amount of methomyl applied. After 102 d, volatilized acetonitrile totaled up to 27% of the parent methomyl applied and CO_2 up to 46% of the applied material (EPA 2003).

Habitats Occupied by Listed Salmonids

Listed salmonids occupy habitats that range from shallow, low flow freshwaters to open reaches of the Pacific Ocean. All listed Pacific salmonid species use freshwater, estuarine, and marine habitats. The temporal and spatial use of habitats by salmonids depends on the species and the individuals' life history and life stage (Table 47). Many migrate hundreds or thousands of miles during their lifetime, increasing the likelihood that they will come in contact with aquatic habitats contaminated with pesticides. Given that all listed Pacific salmonid ESUs/DPSs use watersheds where the use of carbaryl, carbofuran, and methomyl products is authorized, and these compounds are frequently detected in watersheds where they are used (Gilliom, Barbash et al. 2006) we expect all listed Pacific salmonid ESUs/DPSs will continue to be exposed to these compounds and other stressors of the action.

Table 47. General life histories of Pacific salmonids.

Species	General Life History Descriptions		
(number of listed ESUs or DPSs)	Spawning Migration	Spawning Habitat	Juvenile Rearing and Migration
Chinook (9)	Mature adults (usually four to five years old) enter rivers (spring through fall, depending on run). Adults migrate and spawn in river reaches extending from above the tidewater to as far as 1,200 miles from the sea. Chinook salmon migrate and spawn in four distinct runs (spring, fall, summer, and winter). Chinook salmon are semelparous (can spawn only once).	Generally spawn in the middle and upper reaches of main stem rivers and larger tributary streams.	The alevin life stage primarily resides just below the gravel surface until they approach or reach the fry stage. Immediately after leaving the gravel, fry swim-up and distribute to habitats that provide refuge from fast currents and predators. Juveniles exhibit two general life history types: Ocean-type fish migrate to sea in their first year, usually within six months of hatching. Ocean-type juveniles may rear in the estuary for extended periods. Stream-type fish migrate to the sea in the spring of their second year.

Species (number of listed ESUs or DPSs)	General Life History Descriptions		
	Spawning Migration	Spawning Habitat	Juvenile Rearing and Migration
Coho (4)	Mature adults (usually two to four years old) enter the rivers in the fall. The timing varies depending on location and other variables. Coho salmon are semelparous (can spawn only once).	Spawn throughout smaller coastal tributaries, usually penetrating to the upper reaches to spawn. Spawning takes place from October to March.	Following emergence, fry move to shallow areas near stream banks. As fry grow they distribute up and downstream and establish territories in small streams, lakes, and off-channel ponds. Here they rear for 12-18 months. In the spring of their second year juveniles rapidly migrate to sea. Initially, they remain in nearshore waters of the estuary close to the natal stream following downstream migration.
Chum (2)	Mature adults (usually three to four years old) enter rivers as early as July, with arrival on the spawning grounds occurring from September to January. Chum salmon are semelparous (can spawn only once).	Generally spawn from just above tidewater in the lower reaches of mainstem rivers, tributary stream, or side channels to 100 km upstream.	The alevin life stage primarily resides just below the gravel surface until they approach or reach the fry stage. Immediately after leaving the gravel, swim-up fry migrate downstream to estuarine areas. They reside in estuaries near the shoreline for one or more weeks before migrating for extended distances, usually in a narrow band along the Pacific Ocean's coast.
Sockeye (2)	Mature adults (usually four to five years old) begin entering rivers from May to October. Sockeye are semelparous (can spawn only once).	Spawn along lakeshores where springs occur and in outlet or inlet streams to lakes.	The alevin life stage primarily resides just below the gravel surface until they approach or reach the fry stage. Immediately after leaving the gravel, swim-up fry migrate to nursery lakes or intermediate feeding areas along the banks of rivers. Populations that migrate directly to nursery lakes typically occupy shallow beach areas of the lake's littoral zone; a few cm in depth. As they grow larger they disperse into deeper habitats. Juveniles usually reside in the lakes for one to three years before migrating to off shore habitats in the ocean. Some are residual, and complete their entire lifecycle in freshwater.

General life histories of Pacific salmonids (continued)			
(number of listed ESUs)	Spawning Migration	Spawning Habitat	Juvenile Rearing and Migration
Steelhead (11)	Mature adults (three to five years old) may enter rivers any month of the year, and spawn in late winter or spring. Migration in the Columbia River system extends up to 900 miles from the ocean in the Snake River. Steelhead are iteroparous (can spawn more than once).	Usually spawn in fine gravel in a riffle above a pool.	The alevin life stage primarily resides just below the gravel surface until they approach or reach the fry stage. Immediately after leaving the gravel, swim-up fry usually inhabit shallow water along banks of stream or aquatic habitats on streams margins. Steelhead rear in a wide variety of freshwater habitats, generally for two to three years, but up to six or seven years is possible. They smolt and migrate to sea in the spring.

Modeling: Estimates of Exposure to Carbaryl, Carbofuran, and Methomyl

Exposure estimates for non-crop pesticide applications

EPA's BEs indicate that pesticides containing carbaryl, carbofuran, and methomyl are registered for over 100 use sites (EPA 2003; EPA 2003; EPA 2004). As previously indicated, many of the uses identified in the BEs have since been modified, or are scheduled to be phased out or cancelled. The BEs provided relatively few estimates of exposure given the number and variety of uses authorized (Table 48). All modeled exposure estimates assumed pesticide use in agricultural crops. No estimates were provided for other uses of carbaryl, carbofuran, or methomyl.

Table 48. Examples of registered uses of carbaryl, carbofuran, methomyl and the exposure method used by EPA in BEs.

a.i.	Examples of Registered Use	Exposure Characterization in BE
Carbaryl	Crops: cranberries, cucumbers, beans, eggplant, grapefruit, grapes, hay, lemons, lettuce, nectarines, olives, onions, oranges, parsley, peaches, peanuts, pears, pecans, peppers, pistachios, plums, potatoes, prunes, pumpkins, rice, sod, spinach, squash, strawberries, sugar beets, sunflowers, sweet corn, sweet potatoes, tangelos, tangerines, tomatoes, walnuts, watermelons, and wheat.	PRZM-EXAMS 9 crops
	Targeted pests: adult mosquitoes, ticks, fleas, fire ants, and grasshoppers.	No estimates provided
	Other use sites: home and commercial lawns, flower beds, around buildings, recreation areas, golf courses, sod farms, parks, rights-of-way, hedgerows, Christmas tree plantations, oyster beds, and rural shelter belts.	No estimates provided
Carbofuran	Crops: All uses will be cancelled. Examples of current uses include Alfalfa, artichoke, banana, barley, coffee, field corn, sweet corn, pop corn, cotton, cucumber, melons, squash, grapes, oats, pepper, plantain, potato, sorghum, soybean, sugar beet, sugarcane, sunflower, wheat, cotton, spinach grown for seed, and tobacco.	PRZM-EXAMS Estimates for 5 crops
	Other use sites: All uses will be cancelled. Examples of current uses include agricultural fallow land, ornamental and/or shade trees, ornamental herbaceous plants, ornamental non-flowering plants, pine, ornamental woody shrubs, and vines.	No estimates provided
Methomyl	Crops: alfalfa, anise, asparagus, barley, beans (succulent and dry), beets, Bermuda grass (pasture), blueberries, broccoli, broccoli raab, brussels sprouts, cabbage, carrot, cauliflower, celery, chicory, Chinese broccoli, Chinese cabbage, collards (fresh market), corn, cotton, cucumber, eggplant, endive, garlic, horseradish, leafy green vegetables, lentils, lettuce (head and leaf), lupine, melons, mint, oats, onions (dry and green), peas, peppers, potato, pumpkin, radishes, rye, sorghum, soybeans, spinach, strawberry, sugar beet, summer squash, sweet potato, tomatillo, tomato, wheat, and orchards including apple, avocado, grapes, grapefruit, lemon, nectarines, oranges, peaches, pomegranates, tangelo, and tangerine.	PRZM-EXAMS Estimates for 4 crops
	Other use sites: sod farms, bakeries, beverage plants, broiler houses, canneries, commercial dumpsters which are enclosed, commercial use sites (unspecified), commissaries, dairies, dumpsters, fast food establishments, feedlots, food processing establishments, hog houses, kennels, livestock barns, meat processing establishments, poultry houses, poultry processing establishments, restaurants, supermarkets, stables, and warehouses.	No estimates provided

Exposure estimates for crop applications

The BEs provide estimated environmental concentrations (EECs) for carbaryl, carbofuran, and methomyl in surface water (Table 49). EECs were generated using the PRZM-EXAMS model and used to estimate exposure of the three a.i.s to listed salmonids and their prey (EPA 2004). PRZM-EXAMS generates pesticide concentrations for a generic "farm pond". The pond is assumed to represent all aquatic habitats including rivers, streams, off-channel habitats, estuaries, and near shore ocean environments. EPA indicated that the PRZM-EXAMS scenarios provide "worst-case" estimates of salmonid exposure and it "believes that the EECs from the farm pond model do represent first order streams, such as those in headwaters areas" used by listed salmon (EPA 2003; EPA 2003; EPA 2004). However, listed salmonids use aquatic habitats with physical characteristics that would be expected to yield higher pesticide concentrations than would be predicted with the "farm pond" based model. Juvenile salmonids rely upon a variety of off-channel habitats that are critical to rearing. All listed salmonids use shallow, low flow habitats at some point in their life cycle (Table 47). Below we discuss the utility of the EECs for the current consultation. NMFS presents information that indicates the EECs do not represent worst-case environmental concentrations that listed Pacific salmonids may be exposed to. Finally, NMFS provides additional modeling estimates to evaluate potential exposure in vulnerable off-channel habitats used by salmonids.

Table 49. PRZM-EXAMS exposure estimates from EPA's BEs.

Scenario: crop, state	Application: rate (lbs a.i./A)/ method/ number of applications	Acute EEC (μg/L)	Chronic EEC 60-d average (μg/L)[1]
Carbaryl			
Sweet corn, OH	2/aerial/8; 3.4/aerial/2	53; 46	19; 13
Field corn, OH	2/aerial/4; 1/aerial/2	47; 13	14; 4
Apples, PA	2/aerial/5; 1.2/spray blast/2	31; 12	7; 2
Sugar Beets, MN	1.5/aerial/2; 1.5/aerial/1	23; 7	6; 2
Citrus, FL	5/aerial/4; 3.4/aerial/2	153; 100	41; 23
Peaches, CA	7/aerial/2; 3.5/air blast/1	57; 14	12; 3
Citrus, CA	5/aerial/4; 3.4/aerial/2	20; 7	11; 2
Tomatoes, CA	2/aerial/4; 0.66/air blast/1	17; 2	7; 1
Apples, OR	2/aerial/5; 1.2/aerial/2	19; 3	6; 1
Blackberries, OR	2/aerial/5; 1.9/air blast/1	12; 8	6; 3
Snap beans, OR	1.5/aerial/4; 0.8/ground/1	10; 1.2	1; 0.3
Carbofuran			
Alfalfa, CA	1/foliar/1	6	3.0
Alfalfa, PA	1/foliar/1	7.9	4.1
Cotton, MS	1/in-furrow/1	11	5.5
Grapes, CA	10/soil surface/1	5.5	2.7
Potatoes, ME	1/not reported/2	26	14
Artichokes, CA	2/ground/1	35	19
Cotton, CA	1/in-furrow/1	0.8	0.4
Potatoes, ID	2/foliar/1; 3/in-furrow/1; 6/chemigation/1	6.2; 0.2; 10.4	4.0; 0.1; 6.2
Methomyl			
Lettuce	0.9/aerial/10; 0.225/aerial/15	88; 30	81; 26
Sweet corn	0.45/aerial/16	60	54
Peaches	1.8/aerial/3	99	85
Cotton	0.6/aerial/3	55	47

[1]The chronic values reported for methomyl are 56-day average concentrations rather than 60-day average concentrations.

Utility of EECs for consultation

As described in the *Approach to the Assessment* section, our exposure analysis begins at the organism (individual) level of biological organization. We consider the number, age (or life stage), gender, and life histories of the individuals likely to be exposed. This scale of assessment is essential as adverse effects to individuals may result in population-level consequences, particularly for populations of extremely low abundance. Characterization of impacts to individuals provides necessary information to assess potential impacts to populations, and ultimately to the species. To assess risk to individuals, we must consider the highest concentrations to which any individuals of the population may be exposed. Several lines of evidence discussed below suggest that

EECs in the BEs may underestimate exposure of some listed organisms and designated critical habitat.

Although EPA characterized these exposure estimates as "worst case" in the BEs, it has also acknowledged that measured concentrations in the environment sometimes exceed PRZM-EXAMs EECs (EPA 2007). EPA has subsequently clarified that rather than providing worst case estimates, PRZM-EXAMS estimates are protective for the vast majority of applications and aquatic habitats (EPA 2007). NMFS agrees that the model is designed to produce estimates of exposure that are protective for a large number of aquatic habitats.

Recent formal consultation and reviews of EPA informal consultations by the Services found that concentrations measured in surface water sometimes exceed peak concentrations predicted with PRZM/EXAMS modeling (NMFS 2007; NMFS 2008; USFWS 2008). Concentrations of carbaryl, carbofuran, and methomyl were generally less than concentrations predicted in the BEs using PRZM-EXAMs although there were examples where measured concentrations in surface water exceeded these estimates (*e.g.,* (Hurlburt 1986; Creekman and Hurlburt 1987; Tufts 1989; Tufts 1990; Beyers, Farmer et al. 1995). These findings demonstrate that the EECs generated using PRZM-EXAMS can underestimate peak concentrations that actually occur in some aquatic habitats, and therefore, peak exposure experienced by some individuals of listed species may be underestimated.

Exposure values derived by EPA using PRZM-EXAMS may underestimate or overestimate salmonid exposure to carbaryl, carbofuran, and methomyl. Two assumptions are discussed below that show salmonids may be exposed to higher concentrations than predicted with PRZM-EXAMS modeling:

Assumption 1: Model outputs are 90th percentile time-weighted averages. It is important to recognize that the model predicts concentrations based on site-specific assumptions (*e.g.,* rainfall) and that environmental concentrations provided for the

estimate do not represent the highest aquatic concentrations predicted given the assumptions. Rather, the exposure estimates provided in the BEs are time-weighted average concentrations for one day (*i.e.,* peak), 21 d, and 60 d. Although EPA refers to the 1 d-averages as peak concentrations, they do not represent the maximum concentration predicted. Rather, they represent the average concentration over a 24-hour (h) period. Additionally, the concentrations reported represent the 90th percentile of the estimates derived using PRZM-EXAMS (Lin 1998). Although NMFS agrees this is a relatively protective approach for evaluating exposure in most aquatic habitats, it does not represent the possible "worst case" exposure.

Assumption 2: Model inputs used the highest use rates and greatest number of applications. NMFS compiled information on the maximum use rates permitted (single and seasonal), number of applications allowed, and minimum application intervals required through EPA product labeling (Tables 1-3).

Several of the PRZM-EXAMS scenarios did not match up well with current use restrictions and did not account for maximum permitted application rates. For example, PRZM-EXAMS scenarios for carbaryl evaluated a maximum single application rate of 3.5 lb a.i./acre versus higher single application rates authorized by EPA for oyster beds, home lawn, golf course, and sod farms (8-9.1 lb a.i./acre), nut trees (5 lbs a.i./acre), and citrus (7.5 – 12 lbs a.i./acre). Some of the simulations included multiple applications that exceed single application rates. For example, there were simulations for 4 applications of 5 lbs a.i./acre in citrus and 2 applications of 7 lbs a.i./acre in peaches. However, these scenarios do not cover the maximum rate of carbaryl allowed per applications (12 lbs a.i./acre in California citrus) or annually (24 lbs a.i./acre/year in apple, pear, crabapple, and others). The maximum single application rate for methomyl is 0.9 lbs a.i./acre. One scenario assumed 3 applications of 1.8 lbs a.i./acre (California peaches). This scenario may overestimate aquatic concentrations for single applications at comparable use sites. However, considering multiple applications, the maximum application rate of methomyl evaluated in the BE was 9 lbs a.i./acre (lettuce) versus allowable application rates of 10-

32 lbs a.i./acre/year for alfalfa, broccoli, cabbage, corn, lettuce, onions, and spinach (EPA 2007).

Few crop scenarios were assessed relative to the number of approved uses. The BEs provided pesticide exposure estimates from uses in relatively few crops considering the number of registered uses of carbofuran, carbaryl, and methomyl. For example, estimates of carbaryl exposure were provided for nine agricultural crops. An evaluation of currently registered uses of a single carbaryl product label (Sevin brand XLR plus carbaryl insecticide) revealed the product can be applied to more than 75 agricultural crops in California alone (CDPR 2009). Similarly, the product Furadan 4-F Insecticide - Nematicide (carbofuran) can be applied to more than 20 use sites in California while exposure estimates evaluated only 5 agricultural crops. Finally, DuPont Lannate SP Insecticides (methomyl) is authorized for use on more than 80 agricultural crops in California while the BE provided exposure estimates for only 4 crops for all methomyl products. NMFS also reviewed aquatic exposure estimates developed by EPA to assess the risk of carbaryl and methomyl to the red legged frog (EPA 2007). Although these estimates were specific to registered uses in California only, they represent a more thorough evaluation of uses than was provided in the BEs. Estimates for agricultural crops were relatively comparable to estimates in the BEs with most scenarios predicting concentrations of carbaryl and methomyl within an order of magnitude (10-100 µg/L). Exposure estimates associated with carbaryl use in rice (2,579 µg/L) were a notable exception and this use was not evaluated in the BE. The acute EECs for carbaryl ranged from 6 – 167 µg/L for other crops assessed versus 1-153 µg/L in the BE. Acute EECs for methomyl ranged from 3 – 183 µg/L versus 30-99 µg/L in the BE.

Crop scenarios are likely not representative of the entire action area. The regional scale that the modeled scenarios are intended to represent is unclear. Many of the scenarios were conducted for states outside the distribution of listed salmonids. The methomyl BE did not provide information on geographic locations simulated (*e.g.,* county, state, region, etc.). The assumed rainfall and other site-specific input assumptions can have large impacts on predicted exposure. For example, the carbofuran

BE provides a peak EEC of 5.5 μg/L in water following an application rate of 10 lbs a.i./acre. Yet three simulations conducted at a 10-fold lower application rate produced greater estimates of exposure due to differences in site-specific assumptions (Table 49). NMFS also questions whether input assumptions were adequate to represent the range in variability among sites throughout the action area. Site-specific meteorological and soil conditions vary greatly throughout the four states where listed salmonids are distributed and crops are grown. The BEs did not indicate site-specific input assumptions of each scenario nor did they put these assumptions into perspective with regard to the range of conditions throughout the four states. This makes it difficult to determine the representativeness of scenario estimates for the complete range of crop uses.

Crop scenarios do not consider application of more than one pesticide. The pesticide labels NMFS reviewed had few restrictions regarding the co-application (*i.e.,* tank mixture applications) or sequential applications of other pesticide products containing different a.i.s. Also, there were few restrictions for those pesticides containing ingredients that share a common mode of action (*e.g.*, cholinesterase-inhibiting insecticides). For example, we saw no restrictions that would prevent either co-application or sequential application of products containing carbofuran, carbaryl, and methomyl. Examples of fish kill incidents discussed in the *Risk Characterization* section of the Opinion indicate combinations of cholinesterase-inhibiting insecticides are sometimes applied on the same day or over a short interval, increasing the likelihood of salmonid exposure to chemical mixtures that may have additive or synergistic effects. Some labels encourage the use of more than one product. The Sevin Brand XLR Plus Carbaryl Insecticide (EPA registration No. 264-333) advises that 8 applications of carbaryl at 3 d intervals "may not provide adequate levels of protection under conditions of rapid growth or severe pest pressure. The use of an alternative product should be considered in conjunction with this product." Multiple applications of pesticides increase the likelihood of cumulative exposure. We considered cumulative exposure based on generated 60 d time-weighted average concentrations to simulate situations where pesticide products containing the three a.i.s were applied at separate times during the growing season (Table 49). To address potential variability between sites, we generated

exposure values for a few labeled uses using the GENEEC model, which is intended to provide screening estimates over large geographic regions (Table 50)[1]. The input parameters used were consistent with recent EPA model inputs (EPA 2006; EPA 2007; EPA 2007).

Table 50. GENEEC estimated concentrations of carbaryl, carbofuran, and methomyl in surface water adjacent to sweet corn, potatoes, sweet corn, potatoes, and citrus.

Chemical use	Rate	No.*	Interval	Buffer	EEC (μg/L)				
Foliar/ ground application	lbs/ acre		days	ft	24-h avg	4-d avg	21-d avg	60-d avg	90-d avg
Sweet Corn									
Carbaryl	2	8	3	0	397	390	348	272	229
Carbofuran	0.5	2	7	0	56	56	55	54	53
Methomyl	0.45 0.225	14 28	1 1	25 25	307 288	276 259	163 153	72 68	49 46
Potatoes									
Carbaryl	2	3	7	0	175	172	153	120	101
Carbofuran	1	2	5	0	112	112	111	108	106
Methomyl	0.9	5	5	25	212	191	113	50	34
Citrus									
Carbaryl	12	1	-	0	485	476	424	332	280
Carbofuran	-	-	-	-	-	-	-	-	-
Methomyl	0.9	3	5	25	133	120	71	31	21

*Number of applications
-Not applicable

The EECs for EPA's effect determinations were derived primarily using the PRZM-EXAMS model. This model predicts runoff to a "farm pond" based on application specifications (rate and method), properties of the a.i. (solubility, soil adsorption coefficient, soil metabolisms rate, etc.,), assumed meteorological conditions (amount of rainfall), and other site-specific assumptions [soil type, slope, etc. (EPA 2004)]. The farm pond scenario is likely a poor surrogate of certain habitats used by salmonids.

In particular, listed salmonids rely extensively upon a variety of off-channel habitats that would be expected to yield higher pesticide concentrations than would be predicted with the "farm pond" based PRZM/EXAMS model. Examples of off-channel habitats include

[1] EPA characterizes GENEEC as a tier-1 screening model (EPA 2004c). GENEEC is a meta-model of the PRZM-EXAMS model that incorporates assumptions that are intended to model exposure estimates on a site vulnerable to runoff. The size of the treated area and aquatic habitat (farm pond) are the same as described for PRZM-EXAMS.

alcoves, channel edge sloughs, overflow channels, backwaters, terrace tributaries, off-channel dredge ponds, off-channel ponds, and braids (Swift III 1979; Anderson 1999). Diverse, abundant communities of invertebrates (many of which are salmonid prey items) also populate these habitats and, in part, are responsible for juvenile salmonids reliance on off-channel habitats. Juvenile coho salmon, stream-type Chinook salmon, and steelhead use off-channel habitats for extended durations (several months). Although these habitats typically vary in surface area, volume, and flow, they are frequently shallow, low to no-flow systems protected from a river's or a stream's primary flow. Thus, rearing and migrating juvenile salmonids use these habitats extensively (Beechie T. and Bolton 1999, Beechie T. J. et al. 2005, Caffrey 1996, Henning 2006, Montgomery 1999, Morley S. A. et al. 2005, Opperman and Merenlender 2004, Roni 2002).

Small streams and some off-channel habitats represent examples of habitats used by salmonids that can have a lower capacity to dilute pesticide inputs than the farm pond. The PRZM-EXAM estimates assume that a 10-hectare (approximately 25 acres) drainage area is treated and the aquatic habitat is assumed to be static (no inflow or outflow). Pesticide treatment areas of 10-hectares and larger occur frequently in agricultural crops, particularly under pest eradication programs. Additionally, aquatic habitats used by salmon vary in volume and recharge rates and consequently have different dilution capacities to spray drift and runoff events. The assumed drainage area to water volume ratio (100,000 m^2:20,000 m^3) is easily exceeded for small water bodies. For example, a one acre pond with an average depth of 1 m would exceed this ratio for treated drainage areas of approximately five acres in size and larger. The assumed aquatic habitat and size of the treated area for the PRZM-EXAMS scenarios suggest that exposure is underestimated for listed salmonids that utilize relatively small aquatic habitats with low dilution capacities.

NMFS estimates of potential exposure in shallow water habitats used by salmonids

Direct over-spray

To estimate potential exposure of salmon to pesticides in off-channel and other shallow-water habitats we first determined the initial average concentrations that will result from a direct overspray of shallow surface water. NMFS is unaware of any circumstances where EPA has authorized direct application of methomyl to aquatic habitats. However, both carbaryl and carbofuran may be applied to aquatic habitats. For example, carbaryl is registered for use in rice crops to control tadpole shrimp and other rice pests. The resulting concentrations in surface water are a function of the amount applied and the volume of the water body when pesticides are applied directly to aquatic habitats (Table 51). Carbaryl can be applied twice in rice at a rate of 1.5 lbs a.i./acre. A single application at that rate would result in an average initial carbaryl concentration of 1,682 μg/L in 10 cm of water. Similarly, EPA estimated aquatic concentrations of 2,579 μg/L associated with 2 applications of carbaryl at 1.5 lbs a.i./acre in a recent assessment for the red legged frog (EPA 2007). Specimen labels for carbaryl do not place any restrictions on rice paddy discharges, yet they warn "discharge from rice fields may kill aquatic and estuarine invertebrates (EPA Reg. No. 264-333 and 264-349)." Although the section 3 registration for rice was canceled in 1997, the BE indicates carbofuran may still be applied in rice from use of existing stock or in connection with emergency exemption requests. The BE indicates it is applied to rice fields prior to flooding at a rate of 0.5 lbs a.i./acre. Assuming this rate in 10 cm of water results in an average initial average concentration of 561 μg/L.

Carbaryl is registered for use at a rate of 2 lbs a.i./acre in cranberries. Five applications can be made at 7 d intervals. The label for Sevin brand XLR Plus warns that the "use in cranberries may kill shrimp and crabs. Do not use in areas where these are important resources (EPA Reg. No. 264-333)." However, there are no restrictions regarding applications to standing water, or label requirements to ensure bog water does not contaminate other surface waters. A single application of 2 lbs a.i./acre to water 10 cm of water results in an initial average concentrations of 2,242 μg/L.

Carbaryl can also be applied at 8 lbs a.i./acre in estuarine areas in Washington state to kill ghost shrimp and mud shrimp in commercial oyster beds. Application of 8 lbs of carbaryl to a static water body of 10 cm deep would result in an initial average concentration of approximately 9 mg/L (8,968 μg/L). This estimate does not consider tidal influences. The 24(c) label for the use of carbaryl on oyster beds does not specify when applications are to be made with relation to incoming or outgoing tides. The label does specify applicators must obtain an NPDES permit for this use. A current NPDES permit specifies that applications to these tidal areas are made when the beds are uncovered by the outgoing tide. Peak concentrations in the water column are expected as the treated area is re-flooded by the incoming tide. These concentrations are expected to decrease as the volume of water over the treated area increases. The area contaminated by the carbaryl application will increase beyond the treatment site, and water column concentrations will simultaneously decrease due to transport and dilution from the incoming tide. This use is discussed in more detail in the *Risk Characterization* portion of the Opinion (see *Field studies in ESA-listed salmonid habitat*).

Table 51. Average initial concentration of any a.i. in surface water resulting from a direct overspray of aquatic habitat.

Application Rate	Water Depth	A.i. Concentration in Surface Water
(lbs a.i. / acre)	(meters)	(μg/L)
0.25	2	14
0.5	2	28
1	2	56
3	2	168
10	2	560
0.25	1	28
0.5	1	56
1	1	112
3	1	336
10	1	1121
0.25	0.5	56
0.5	0.5	112
1	0.5	224
3	0.5	673
10	0.5	2242
0.25	0.3	93
0.5	0.3	187
1	0.3	374
3	0.3	1121
10	0.3	3736

Application Rate	Water Depth	A.i. Concentration in Surface Water
(lbs a.i. / acre)	(meters)	(μg/L)
0.25	0.1	280
0.5	0.1	560
1	0.1	1121
3	0.1	3363
10	0.1	11208

Pesticide drift

We also provide estimated pesticide concentrations in shallow off-channel habitats associated with drift from terrestrial applications of pesticides (Table 52). These estimates were derived using the AgDrift model and estimate downwind deposition from pesticide drift (Teske 2001). Additional deposition from runoff was not considered. The drift estimates derived represent mean projected drift. Although AgDrift adequately predicts drift, its field validations studies and other research show drift is highly variable and influenced by site-specific conditions and application equipment (Bird, Perry et al. 2002). No-spray buffer zones (or setbacks) may significantly reduce pesticide exposure to salmonids by reducing runoff and drift inputs.

The methomyl RED requires label statements for methomyl products that specify not to "apply by ground equipment within 25 ft, or by air within 100 ft of lakes, reservoirs, rivers, estuaries, commercial fish ponds and natural, permanent streams, marshes or natural, permanent ponds. Increase the buffer zone to 450 ft from the above aquatic areas when ultra low volume application is made (EPA 1998)." This label requirement appears to address many, but not all aquatic habitats used by listed salmonids. For example, labels specify buffers to natural and permanent streams, marshes, and ponds but there is no mention of important intermittent aquatic habitats or manmade watercourses such as floodplain restoration sites and irrigation systems that either contain listed species or drain to such habitats.

Specific buffer zones that correspond to current label requirements for carbaryl, carbofuran, and methomyl were assessed (Table 52). No buffers to aquatic habitats are required by EPA for carbaryl or carbofuran products. However, we did consider interim "voluntary" buffers recommended by CDPR to protect federally listed endangered species (http://www.cdpr.ca.gov/docs/endspec/prescint.htm). Our simulations assumed the off-channel

habitat had a downwind width of 10 m. Pesticide concentrations were predicted for habitats that ranged in depths from 0.1 to 2 m. These dimensions were assumed based on research of salmonid use of off-channel habitats (Beechie et al. 2005, Henning 2006, Montgomery 1999, Morley S. A. et al. 2005, Roni 2002). Average initial concentration estimates derived from the simulations ranged from 0.2-447 μg/L for each lb of a.i. applied. These simulations indicate that applications of several lbs a.i. per acre adjacent to some off-channel habitats could result in aquatic concentrations exceeding 1 mg/L, a value that would result in substantial toxicity to aquatic life, including deaths of exposed salmonids.

Maximum rates of carbaryl permitted for most vegetable crops range from 1-2 lbs a.i./acre. Several tree crops allow much higher application rates (3-8 lbs a.i./acre), with a maximum single application rate of 12 lbs a.i./acre approved for use in California on citrus crops. Carbaryl may be applied by ground boom, chemigation, spray blast, and aerial spray applications. Considering application rates, methods, and no requirements for buffers to aquatic habitat, the estimated initial concentrations of carbaryl in surface waters range from 3 μg/L to 7 mg/L in the modeled habitats. Voluntary buffers recommended by CDPR for protection of federally listed fish would considerably reduce the deposition. For example, drift from aerial applications with the 600 ft buffer to a 10 m wide stream are predicted to be approximately equivalent to 2-6% of the applied rate versus drift equivalent to 30-39% of the applied rate with no buffer. Additionally, drift from ground application with the 120 ft buffer predict drift equivalent to 0.3 – 2% of the applied rate versus 7-23% of the applied rate predicted with no buffer.

Current carbofuran labels reviewed by NMFS specify application rates of 1 lb a.i./acre or less for most crops. Carbofuran can be applied by both ground and aerial methods. Simulations assuming no aquatic buffers at these rates provide estimates of initial average carbofuran concentrations from the low μg/L range to several hundred μg/L. The carbofuran BE indicates several 24(c) uses have previously allowed application of carbofuran at rates as high as 10 lbs a.i./acre. Simulations indicate that application rates in this range, with no buffer restrictions, would result in initial surface water concentrations of 2 μg/L to over 4,000 μg/L.

The maximum single application rate for methomyl is 0.9 lbs a.i./acre. Considering label-required buffer zones, simulations at the maximum labeled application rate predict initial average concentrations of 1-57 μg/L for ground applications and 4-84 μg/L for aerial applications. Incorporating voluntary buffers listed by CDPR predict concentrations ranging from 0.2 – 58 μg/L.

Table 52. Average initial pesticide concentration in 10 m wide off-channel habitat per lb of pesticide applied based on AgDrift simulations.

Depth of aquatic habitat (meters)	Buffer to Aquatic Habitat (ft)	Average Initial Concentration in Surface Water (μg/L)
Aerial Applications, EPA default (ASAE fine-medium droplet size distribution)		
2	0[1]	17
1	0[1]	34
0.5	0[1]	67
0.1	0[1]	333
2	100[2]	5
1	100[2]	9
0.5	100[2]	19
0.1	100[2]	93
2	600[3]	1
1	600[3]	2
0.5	600[3]	4
0.1	600[3]	18
Aerial Applications, (ASAE very fine – fine droplet distribution)		
2	0[1]	22
1	0[1]	45
0.5	0[1]	89
0.1	0[1]	447
2	450[2]	4
1	450[2]	8
0.5	450[2]	16
0.1	450[2]	79
2	600[3]	3
1	600[3]	6
0.5	600[3]	13
0.1	600[3]	64
Air Blast Applications, Dormant Spray		
2	0[1]	11
1	0[1]	21
0.5	0[1]	43
0.1	0[1]	214
2	25[2]	3
1	25[2]	6
0.5	25[2]	12
0.1	25[2]	62
2	120[3]	0.3
1	120[3]	1

Depth of aquatic habitat (meters)	Buffer to Aquatic Habitat (ft)	Average Initial Concentration in Surface Water (μg/L)
0.5	120[3]	1
0.1	120[3]	6
Ground Application, Low Boom, ASAE very fine-fine distribution, 50th percentile		
2	0[1]	4
1	0[1]	8
0.5	0[1]	15
0.1	0[1]	76
2	25[2]	1
1	25[2]	1
0.5	25[2]	2
0.1	25[2]	11
2	120[3]	0.2
1	120[3]	0.4
0.5	120[3]	1
0.1	120[3]	4
Ground Application, High Boom, ASAE very fine-fine distribution, 50th percentile		
2	0[1]	13
1	0[1]	26
0.5	0[1]	52
0.1	0[1]	261
2	25[2]	3
1	25[2]	6
0.5	25[2]	13
0.1	25[2]	64
2	120[3]	1
1	120[3]	2
0.5	120[3]	3
0.1	120[3]	17

[1]Carbaryl and carbofuran labels do not require buffers to aquatic habitats.
[2]Buffer to aquatic habitats specified on current methomyl product labels, as required by the 1998 methomyl RED.
[3]Voluntary "interim bulletin" measures developed by California Department of Pesticide Regulation to protect threatened and endangered species.

Monitoring Data: Measured Concentrations of Carbaryl, Carbofuran, Methomyl, 1-Napthol and 3-Hydroxyfuran

Data Described in USEPA's Biological Evaluations

The BE for carbofuran (EPA 2004) summarized national scale surface water monitoring data available from the USGS NAWQA program and also provided state level summaries based on NAWQA and CDPR data. It should be noted that some USGS data are also reported in the CDPR database. National scale NAWQA data (1991-2001) were presented by land use category, and included information on reporting limits (0.02 μg/L), frequency of detections, and

maximum concentrations. Maximum concentrations reported for the various land categories were: agricultural land (7 μg/L), mixed land use (0.678 μg/L), urban land use (0.034 μg/L), and undeveloped land use (0.034 μg/L). An additional table summarizing NAWQA data (1984-2004) by state (California, Idaho, Oregon, and Washington) reported a maximum concentration of 32.2 μg/L. This concentration occurred in surface water sampled from Zollner Creek, near Mt. Angel, Oregon on April 17, 2002, and was also the maximum residue found in the database on a national scale. CDPR data (1990-2003) were presented by county. Zollner Creek is a tributary to the Willamette River and within the distribution of threatened Upper Willamette River Chinook salmon and Upper Willamette River steelhead. The maximum concentration measured in California was 5.5 μg/L, in Imperial County. Date and specific location were not provided.

The BEs for carbaryl (EPA 2003) and methomyl (EPA 2003) provided less detailed information about monitoring data on a national basis. The BE for carbaryl provided a national maximum reported concentration of 5.5 μg/L, and noted that carbaryl was the second most commonly detected insecticide in the NAWQA database. It also noted there were more frequent detections and higher concentrations in urban streams than in streams draining agricultural or mixed land use areas. The BE for methomyl reported that few national level monitoring data were available, and reported data located in EPA's STORET database. The highest reported concentration nationally was 1 μg/L (in Texas).

Table 53. National Maximum Concentrations of Carbaryl, Carbofuran, and Methomyl as Reported in EPA BEs (EPA 2003a, EPA 2003b, and EPA 2004)

Pesticide	Maximum Concentration (μg/L)	Data Source	Years Reported
Carbaryl	5.5	USGS NAWQA	1991-1998
Carbofuran	32.2	USGS NAWQA	1984-2004
Methomyl	1.0	EPA STORET	Not Reported
1-Napthol	Not Reported		

USGS NAWQA Data for California, Idaho, Oregon, and Washington

We obtained updated data from the USGS NAWQA database to evaluate the occurrence of carbofuran, carbaryl, methomyl, and 1-napthol (a degradate of carbaryl) in surface waters

monitored in California, Idaho, Oregon, and Washington. The database query resulted in approximately 5,000 samples in which one or more of the compounds was an analyte Approximately 350 unique sampling locations were represented. Available data covered a range of 15 years, from 1992-2007. Land uses associated with the sampling stations included agriculture, forest, rangeland, urban, and mixed use. Some stations occurred only once in the data set, others appeared multiple times across a span of years. The frequency of detection is a combination of the actual occurrence of pesticides in the water and the sampling intensity. Values reported are for a filtered water sample (0.7 micron glass fiber filter), representing the dissolved phase. Chemicals transported primarily in the particulate phase would be underreported in this data set. No sediment or tissue data were available from USGS for these compounds. Because the USGS monitoring program does not generally coordinate sampling efforts with specific pesticide applications or runoff events, detected concentrations are likely to be lower than actual peak concentrations that occur.

Summary information for quantifiable concentrations of carbaryl, carbofuran, methomyl, and 1-napthol is reported below (Table 54). Non-detects in this data set are reported as less than ("<") the laboratory reporting level (LRL) for that sample. Summary statistics were calculated on samples not designated as ("<"). The LRL ranges reported were estimated based on "<"-qualified data. Many of the concentrations that could be quantified were designated as "E," meaning the concentrations were estimated. These data are included in the summary statistics. Quantifiable concentrations ranged from 0.0001 – 33.5 μg/L for carbaryl, 0.0015 – 32.2 μg/L for carbofuran, 0.0039 – 0.8222 μg/L for methomyl, and 0.0007 – 1.6 μg/L for 1-napthol.

Table 54. Summary of Occurrences of Carbaryl, Carbofuran, Methomyl, and 1-Napthol in USGS NAWQA Database (1992-2007) for California, Idaho, Oregon, and Washington

Statistic	Carbaryl	Carbofuran	Methomyl	1-Napthol
Samples	4938	4545	1297	1256
Percent Detections	30%	8.5%	2.3%	8.5%
LRL range (μg/L)	0.0005-5.2	0.002-0.150	0.0044-1.22	0.007-0.09
Minimum concentration (μg/L)	0.0001	0.0015	0.0039	0.0007
Maximum concentration (μg/L)	33.5	32.2	0.8222	1.6
Arithmetic mean concentration (μg/L)	0.0943	0.3846	0.1171	0.0258
Standard deviation (μg/L)	1.11	2.13	0.19	0.15
Median concentration	0.0314	0.0318	0.0440	0.0072

Monitoring Data from California Department of Pesticide Regulation

We evaluated monitoring data available from the CDPR, which maintains a public database of pesticide monitoring data for surface waters in California (CDPR 2008). Data were available for carbaryl, carbofuran, methomyl and 3-hydroxycarborfuran (a degradate of carbofuran), but not 1-napthol. Data in the database (http://www.cdpr.ca.gov/docs/emon/surfwtr/surfdata.htm) are from multiple sources, including monitoring conducted by CDPR, USGS (data from the NAWQA program as well as other studies), state, city, and county water resource agencies; and some non-governmental or inter-governmental groups such as Deltakeeper. The CDPR requires a formal QA/QC protocol for data submitted or does a separate QA/QC review, thus only data subject to appropriate QA/QC procedures are included in the surface water database. Unlike the USGS NAWQA data set, the CDPR database may contain whole water samples as well as filtered samples. If whole water concentrations are reported for compounds that sorb significantly to the particulate phase, concentrations would appear higher than in a filtered sample, which represents only the dissolved phase. The majority of the studies, which are described in metadata available from CDPR, are not targeted at correlating water concentrations with specific application practices, with the exception of some studies evaluating rice pesticides.

Summary information for carbaryl, carbofuran, methomyl, and 3-hydroxycarbofuran is reported below (Table 55). No monitoring for 1-napthol was reported in the database. The database, last updated in June 2008, consists of approximately 270,000 data records. Each record reports a specific sampling site, date, and analyte. The number of records associated with a particular compound is indicative of monitoring intensity rather than actual occurrence in surface waters. In this database, detections below the LOQ are reported as 0 μg/L. Summary statistics were calculated on samples with values above the LOQ.

Carbaryl (5,265 records) and carbofuran (5,864 records) were the subject of greater monitoring intensity than either methomyl (1,982 records) or 3-hydroxycarbofuran (1,149 records). Quantifiable amounts of methomyl appeared in 11.0% of the samples. Carbaryl (3.6%) and carbofuran (5.9%) were quantifiable less often, and 3-hydroxycarbofuran (0.3%) was only rarely quantifiable. Quantifiable concentrations ranged from 0.0030 – 8.4 μg/L for carbaryl, 0.0066 –

5.2 µg/L for carbofuran, 0.0150 – 5.4 µg/L for methomyl, and 0.0600 – 0.1800 µg/L for 3-hydroxycarbofuran.

Table 55. Summary of Occurrences of Carbofuran, Carbaryl, Methomyl, and 3-Hydroxycarbofuran in CDPR Database (1991-2006)

Statistic	Carbaryl	Carbofuran	Methomyl	3-Hydroxycarbofuran
Samples in data set	5265	5864	1982	1149
Quantifiable samples	191	347	218	3
% of quantifications in data set	3.6%	5.9%	11.0%	0.3%
LOQ range (µg/L)	0.003-1.0	0.002	0.002-1.0	0.0058-0.69
Minimum concentration (µg/L)	0.0030	0.0066	0.0150	0.0600
Maximum concentration (µg/L)	8.4	5.2	5.4	0.18
Arithmetic mean concentration (µg/L)	0.3733	0.3197	0.2984	0.1367
Standard deviation (µg/L)	0.8999	0.5521	0.5223	0.0666
Median concentration	0.1200	0.1100	0.1550	0.1700

Monitoring Data from Washington State

Data from ~30 pesticide monitoring studies conducted in the state of Washington are included in Department of Ecology Environmental Information Management (EIM) database (http://www.ecy.wa.gov/eim/). Data in the database are from multiple sources, including state agencies, and may contain whole water samples as well as filtered samples. If whole water concentrations are reported for compounds that sorb significantly to the particulate phase, concentrations would appear higher than in a filtered sample, which represents only the dissolved phase. The EIM requires a formal QA/QC protocol for data submitted or does a separate QA/QC review, thus only data subject to appropriate QA/QC procedures are included. Some of the studies contained in this database are targeted with respect to specific pesticide uses, while others are more generalized water quality surveys. Results from a database query on carbaryl, carbofuran, methomyl, 1-napthol, and 3-hydroxycarbofuran, conducted by NMFS, are provided below (Table 56).

Included in the EIM database are monitoring efforts conducted jointly by the Washington Departments of Agriculture and of Ecology in some salmon-bearing streams. Final reports for 2003-2007 seasons are publically available on their website (http://agr.wa.gov/PestFert/natresources/SWM/default.htm). A separate summary of data from those investigations is provided below (Table 57). Water samples are not filtered, and thus concentrations reported include pesticides in both dissolved and particulate phases, although the

sampling protocol specifies an attempt to avoid collection of excessive particulates (Johnson and Cowles 2003). Whole water concentrations for compounds that sorb significantly to the particulate phase will appear higher than those for a filtered sample, which represents only the dissolved phase.

The procedure for reporting in the EIM database includes reporting non-detects as the reporting limit for that particular sample, and adding a "U" data qualifier. The reporting limit was not specified in the data accessed by NMFS, thus LOQ ranges (Table 56) were estimated based on "U"-qualified data. Summary statistics were calculated on samples with values above the LOQ (*i.e.,* not qualified with a "U").

Summary information for carbaryl, carbofuran, methomyl, 1-napthol, and 3-hydroxycarbofuran based on all data in the database is reported below (Table 56). Sampling intensity was approximately the same for the three parent compounds considered in this Opinion (~1,400 samples each), with slightly fewer sampling events for the degradates. Based on the method of reporting in the database, we cannot determine how many samples may have contained detection of any of the compounds that were below LOQs. Carbaryl appeared most often in the samples (8.5%), followed by carbofuran (4.0%), and methomyl (3.5%). The degradates were detected slightly less often when they were analytes, with 1-napthol quantifiable in 1.8% of the samples, and 3-hydroxycarbofuran quantifiable in 3.3%. Quantifiable concentrations ranged from 0.002 – 10.0 μg/L for carbaryl, 0.01 – 2.3 μg/L for carbofuran, 0.0150 – 0.17 μg/L for methomyl, 0.01-0.64 for 1-napthol, and 0.05 – 0.42 μg/L for 3-hydroxycarbofuran.

Table 56. Summary of Occurrences of Carbofuran, Carbaryl, Methomyl, 1-Napthol and 3-Hydroxycarbofuran in Surface Water - Washington EIM Database (1988-2007)

Statistic	Carbaryl	Carbofuran	Methomyl	1-Napthol	3-Hydroxy carbofuran
Samples in data set	1477	1410	1402	1173	1396
Quantifiable samples	126	57	49	23	46
% of quantifications in data set	8.5%	4.0%	3.5%	2.0%	3.3%
LOQ range (μg/L)	0.002-25.0	0.01-25.0	0.01-5.0	0.01-5.0	0.01-10.0
Minimum concentration (μg/L)	0.01	0.028	0.02	0.01	0.10
Maximum concentration (μg/L)	10.0	0.16	0.17	0.64	0.15
Arithmetic mean concentration (μg/L)	0.30	0.09	0.04	0.13	0.12
Standard deviation (μg/L)	1.40	0.07	0.05	0.19	0.04
Median concentration	0.03	0.08	0.02	0.08	0.12

Summary information for carbaryl, carbofuran, methomyl, 1-napthol, and 3-hydroxycarbofuran based on the recent studies (2003-2007) conducted by Washington Departments of Agriculture and Ecology are presented below (Table 57). All sampling was done in streams that contain listed Pacific salmonids. These data are a subset of the data listed in Table 56. Sampling intensity was approximately the same for the three parent compounds considered in this Opinion (~1,200 samples each), with slightly fewer sampling events for the degradates. Based on the method of reporting in the database, we cannot determine how many samples may have contained detection of any of the compounds that were below LOQs. Carbaryl appeared most often in the samples (4.3%), followed by 1-napthol (1.0%), and methomyl (0.7%). Carbofuran and 3-hydroxycarbofuran appeared less often (0.2% and 0.2% respectively). Quantifiable concentrations ranged from 0.01 – 10.0 μg/L for carbaryl, 0.028 – 0.16 μg/L for carbofuran, 0.015 – 0.17 μg/L for methomyl, 0.01 – 0.641 for 1-napthol, and 0.095 – 0.15 μg/L for 3-hydroxycarbofuran.

Table 57. Summary of Occurrences of Carbofuran, Carbaryl, Methomyl, 1-Napthol and 3-Hydroxycarbofuran in recent studies by Washington Department of Ecology (2003-2007)

Statistic	Carbaryl	Carbofuran	Methomyl	1-Napthol	3-Hydroxy carbofuran
Samples in data set	1,223	1,208	1,207	1,003	102
Quantifiable samples	52	3	9	10	2
% of quantifications in data set	4.3%	0.2%	0.7%	1.0%	0.2%
LOQ range (μg/L)	0.01-0.25	0.01-0.25	0.01-0.25	0.03-0.25	0.02-0.25
Minimum concentration (μg/L)	0.0100	0.0280	0.015	0.01	0.0950
Maximum concentration (μg/L)	10.0	0.16	0.17	0.641	0.15
Arithmetic mean concentration (μg/L)	0.30	0.09	0.043	0.1338	0.12
Standard deviation (μg/L)	1.40	0.07	0.050	0.189	0.04
Median concentration	0.03	0.08	0.019	0.078	0.12

Three studies in the EIM database reported sediment concentrations. One was conducted to determine the concentrations of carbaryl and 1-napthol in the sediment of Willapa Bay, and two were sediment toxicity assessments. The sediment toxicity assessments, which provided the reported values (Table 58) for carbofuran, methomyl, and 3-hydoxycarbofuran as well as some data on carbaryl and 1-napthol, had an LOQ of 100 μg/kg. The LOQs for the Willapa Bay analysis were lower, ranging from 22-37 μg/kg. Neither of the sediment toxicity studies reported detectable concentration of any of the chemicals. In the Willapa Bay study, both carbaryl (range 29-3,400 μg/kg) and 1-napthol (range 34-280 μg/kg) were detected. These data represent a very

small subset of potentially contaminated sediments, and the negative results should not necessarily be interpreted to mean that these chemicals are not in the sediment.

Table 58. Summary of Occurrences of Carbofuran, Carbaryl, Methomyl, 1-Napthol and 3-Hydroxycarbofuran in Sediments in Washington EIM Database (1988-2007)

Statistic	Carbaryl	Carbofuran	Methomyl	1-Napthol	3-Hydroxy carbofuran
Samples in data set	26	26	26	69	26
Quantifiable samples	17	0	0	9	0
% of quantifications in data set	65.32%	0%	0%	13.0%	0%
LOQ range (□g/kg)	22-160	100	100	22-58	100
Minimum concentration (□g/kg)	29	NA	NA	34	NA
Maximum concentration (□g/kg)	3,400	NA	NA	280	NA
Arithmetic mean concentration (□g/kg)	762	NA	NA	122	NA
Standard deviation (□g/kg)	1,166	NA	NA	75	NA
Median concentration (□g/kg)	200	NA	NA	120	NA

Summary of National and State Monitoring Databases

Overall, data from the three sets of monitoring data examined by NMFS are relatively consistent, with carbaryl generally being the most frequently quantifiable parent compound. No state monitoring data were available from Oregon or Idaho. Carbaryl and carbofuran were measured in concentrations ranging from 0.0001-33.5 µg/L. Methomyl generally was measured at slightly lower concentrations, ranging from 0.004-5.4 µg/L. Both 1-napthol and 3-hydroxycarbofuran were detected in slightly lower concentrations, ranging from 0.0007-0.64 µg/L, than any of the parent compounds. Water concentrations based on these monitoring data, as anticipated, were generally lower than those based on modeling estimates.

Targeted Monitoring Studies

Numerous studies have been conducted in coordination with applications of carbaryl in Washington State to control burrowing shrimp in commercial oyster beds. Several investigators have documented water column concentrations exceeding several mg/L, with a peak detection of 27,800 µg/L (27.8 mg/L) in one estuary. Those monitoring studies are discussed in greater detail in the *Risk Characterization* portion of the Opinion.

The BEs for carbofuran (EPA 2004) and methomyl (EPA 2003) report some targeted studies evaluating pesticide concentrations in field runoff and receiving water bodies. The carbofuran BE reports concentrations of 16-28 µg/L of carbofuran in runoff from treated rice fields 26 d

after flooding (Nicosia, Carr et al. 1991) as cited in (EPA 2004)). Concentrations declined to ≤5 μg/L by 37 d after flooding. The discussion does not describe when or how the carbofuran was applied prior to flooding. Other studies described merely note that carbofuran does move into surface water, and that concentrations decline over time. Ground water monitoring data for carbofuran reported in the BE included concentrations of up 4.3 μg/L in wells on Long Island, NY 20 years after use was prohibited, and a maximum reported concentration of 176 μg/L in Suffolk County, NY.

The methomyl BE reports data from monitoring studies for specific crops that appear to have been designed to approximate PRZM-EXAMS scenarios. These studies evaluated application rates ranging from 0.3 – 1.35 lb ai/acre on crops such as cantaloupe, sweet corn, apples, lettuce, and tomatoes. All of the studies included multiple applications (from 5 to 29) and short re-application intervals (1-5 d). Some studies measured concentrations in field runoff (96-1,320 μg/L), and all measured concentrations in various receiving waterbodies (4.6 – 175 μg/L).

Carbaryl is one of the pesticides used by the U.S. Department of Agriculture's Animal and Plant Health Inspection Service (APHIS) to control grasshopper infestations. Research was conducted to evaluate the effects of rangeland aerial applications of a carbaryl formulation known as Sevin-4-Oil (Beyers, Farmer et al. 1995). Fixed-wing aircraft were used to apply the carbaryl to rangeland on both sides of the Little Missouri River. Pesticide applicators were instructed to observe a 152 m no-spray buffer around the Little Missouri River. Carbaryl was applied at a rate of 0.5 lbs a.i./acre in 1991 and 0.4 lbs per acre in 1993. Surface water concentrations were monitored during a drought and non-drought year. During the study, discharge in the river ranged from 0.026 to 0.057 m^3/s in 1991 and 37.7 to 49.8 m^3/s in 1993. Concentrations of carbaryl in the river were monitored for 3 d following application (Table 59). Maximum values in surface water were measured on the day of application and peaked at 85.1 and 12.6 μg/L in 1991 and 1993. Concentrations declined but were detectable when the study was terminated 96 h post treatment. Peak values were approximately 7 fold during the drought year when flows were low, demonstrating the influence of dilution capacity on receiving water concentrations. These values represent concentrations that might be observed in similar habitats used by listed

salmonids. The 85.1 µg/L represents one of the higher values observed in the monitoring data despite the low use rate (0.5 lbs a.i./acre) and no-spray buffer of almost 500 ft.

Table 59. Mean concentration (µg/L) of carbaryl in the Little Missouri River following rangeland application of Sevin-4-Oil

	Hours after application						
	1	**2**	**4**	**8**	**12**	**24**	**96**
1991	85.1	-	12.3	3.08	5.30	10.3	0.100
1993	12.0	12.6	3.84	4.01	-	4.51	5.14

-No Data

The CDPR database contained data from several studies conducted by CDPR in the 1990s evaluating concentrations of rice chemicals in the Colusa Basin Drain, Butte Slough, and the Sacramento River (referenced in their metadata as studies 17, 30, 34, and 40). Carbofuran, along with molinate, malathion, methyl parathion, and thiobencarb, was one of the analytes in all years. Some years, analytes also included other pesticides such as 2,4-D, triclopyr, and propanil (Norberg-King, Durhan et al. 1991). Sampling was conducted in March-July. Carbofuran was quantifiable in 100% of the samples for which it was an analyte. Concentrations across all years ranged from 0.087 – 2.97 µg/L (Table 60). Another study located in open literature, conducted in 1991-1992 (Crepeau and Kuivila 2000), measured peak concentrations in the Colusa River Basin of 0.6-1.1 µg/L. This study also measured concentrations in the Sacramento River at Sacramento and the Sacramento River at Rio Vista. Carbofuran concentrations in the river were typically an order of magnitude lower than the concentrations in the Colusa Basin Drain. The CDPR studies included acute biotoxicity studies (test organism not specified in metadata) and generally found no significant toxicity. However, a study on water from the Colusa Basin Drain using *Ceriodaphnia dubia* as the test organism in a Toxicity Indicator Evaluation (TIE) procedure found that an extract of Colusa Basin Drain water caused toxicity in laboratory tests (Norberg-King, Durhan et al. 1991) The procedure indicated that carbofuran and methyl parathion accounted for the toxicity of the sample, although other chemicals such as molinate and thiobencarb were present as well. The concentrations observed in surface water monitoring are, as expected; much lower than those predicted for the flooded rice paddies themselves. It should be noted that California requires rice growers to obtain discharge permits or get conditional waivers before discharging water from treated rice fields. Obtaining the permits or waivers typically requires holding periods following pesticide applications, which helps reduce

pesticide concentrations in the discharge. Those conditions are not a requirement of the federal label.

Table 60. Carbofuran Concentrations in CDPR Studies of Rice Effluents (1995-1998)

Statistic	All years	1995	1996	1997	1998
Samples in data set	97	22	29	25	21
Quantifiable samples	97	22	29	25	21
% of quantifications in data set	100%	100%	100%	100%	100%
LOQ range (μg/L)	0.1-0.35	0.05-0.35	0.05-0.35	0.05-0.35	0.05-0.35
Minimum concentration (μg/L)	0.0872	0.1240	0.1620	0.1400	0.0872
Maximum concentration (μg/L)	2.97	0.7000	2.97	0.6600	1.35
Arithmetic mean concentration (μg/L)	0.5661	0.3907	0.8995	0.3998	0.4800
Standard deviation (μg/L)	0.5098	0.1465	0.7862	0.1472	0.3276
Median concentration	0.4125	0.3700	0.6100	0.4080	0.3800

Based on these studies, other targeted monitoring studies described in EPA BEs, and open literature evaluated for the Opinion rendered on chlorpyrifos, diazinon, and malathion (NMFS 2008), and the general state of knowledge regarding field runoff from pesticide applications, we anticipate the following:

- edge-of-field runoff concentrations will be higher than concentrations measured in waterbodies with substantial diluting volume,
- low-flow or runoff-dominated systems may contain the highest concentrations (approaching or exceeding modeled concentrations), and
- measured concentrations are likely to be lower than peak runoff concentrations, as sampling may not coincide with initial application and/or runoff events.

Monitoring data considerations

Surface water monitoring can provide useful information regarding real-time exposure and the occurrence of environmental mixtures. A primary consideration in evaluating monitoring data is whether the study design is sufficient to address exposure in a qualitative, quantitative, or probabilistic manner. The available monitoring studies were conducted under a variety of protocols and for varying purposes. None of the datasets discussed above were designed to capture peak concentrations of exposure for salmon, or define exposure distributions.

Of the monitoring programs discussed, only the studies conducted by the Washington State DOE were designed to evaluate exposure to listed Pacific salmonid habitats in several Washington State watersheds. This sampling program was intended to evaluate pesticide occurrence in some salmonid-bearing streams during the pesticide application seasons (Johnson and Cowles 2003).

Sample sites for this study are best characterized as integration sites selected based on the presence of the listed Yakima salmonid population (one of 17 independent populations that comprise the Middle Columbia River steelhead DPS) and high diversity and intensity of agriculture. The study design included sampling during the pesticide application season but did not target specific applications of pesticides nor did it target salmonid habitats that would be expected to produce the highest concentrations of pesticides (*e.g.,* shallow off-channel habitat in close proximity to pesticide application sites). Sampling was generally conducted on a weekly basis, so it is likely peak concentrations associated with drift and runoff events were not captured. Sampling stations included both agricultural- and urban-dominated watersheds, and some storm events are captured in the sampling. Sampling favored the detection of multiple pesticides, rather than peak concentrations in some habitats used by Middle Columbia River steelhead.

Other available monitoring data are also applicable to assessing exposure in listed salmon, but to varying degrees. Common aspects that limit the utility of the available monitoring data as accurate depictions of exposure within listed salmonid habitats include: 1) protocols were not designed to capture peak concentrations or durations of exposure in habitats occupied by listed species; 2) limited utility as a surrogate for other non-sampled surface waters; 3) lack of representativeness of current and future pesticide uses and conditions; and 4) lack of information on actual pesticide use to correlate with observed surface water concentrations.

Protocols not designed to capture peak exposure. The NAWQA monitoring studies contain the largest data set evaluated. However, these studies were designed to evaluate trends in water quality and were not designed to characterize exposure of pesticides to listed salmonids (Hirsch 1988). The NAWQA design does not result in an unbiased representation of surface waters. For example, some agricultural activities and related pesticide uses that may be very important in a particular region may not be represented in the locations sampled. Sampling from the NAWQA studies and other studies reviewed was typically not conducted in coordination with specific applications of carbaryl, carbofuran, and methomyl. Similarly, sampling was not designed with consideration to salmon distribution or to target the salmonid habitats most likely to contain the greatest concentrations of pesticides. Given the relatively rapid dissipation of these pesticides in

flowing water habitats, it is not surprising that pesticide concentrations from these datasets were generally much lower than predicted by modeling efforts.

Limited applicability to other locations. Pesticide runoff and drift are influenced by a variety of site-specific variables such as meteorological conditions, soil type, slope, and physical barriers to runoff and drift. Additionally, surface water variables such as volume, flow, and pH influence both initial concentrations and persistence of pesticides in aquatic habitats. Finally, cropping patterns and pesticide use have high spatial variability. Given these and other site-specific factors, caution should be used when extrapolating monitoring data to other sites.

Representativeness of current and future uses. Pesticide use varies annually depending on regulatory changes, market forces, cropping patterns, and pest pressure. The use of cholinesterase inhibiting insecticides has declined in California over recent decades. However, pesticide use patterns change annually and may result in either increases or decreases in use of pesticide products for specific uses. There is considerable uncertainty regarding the representativeness of monitoring conditions to forecast future use of products containing the three a.i.s.

Lack of information on actual use to correlate with observed concentrations. A common constraint in the monitoring data was lack of information on actual use of pesticides containing the three a.i.s. For example, the ability to relate surface water monitoring data to the proposed action was severely hampered because information on application rates, setbacks/buffers, and applications methods associated with the monitoring were generally not reported. In most cases, the temporal and spatial aspect of pesticide use relative to sampling was not reported, further limiting the utility of the information.

Exposure to Other Action Stressors

Stressors of the action also include the metabolites and degradates of the a.i.s, other active and inert ingredients included in their product formulations, and tank mixtures and adjuvants authorized on their product labels. Below we summarize information presented in the BEs and provide additional information to characterize exposure to these stressors.

Metabolites and degradates of carbaryl, carbofuran, and methomyl

Available monitoring data for some metabolites and degrades of the three a.i.s in surface water are presented above. The BE indicates that degradation studies show 1-naphthol is found at up to 67% of the applied carbaryl. It is also formed in the environment by degradation of naphthalene and other polyaromatic hydrocarbon compounds. EPA suggests that salmonid exposure to 1-naphthol is expected, particularly in alkaline waters, but indicates exposure to aquatic organisms cannot be calculated due to lack of environmental fate and transport data for this degradate.

The major transformation product of carbofuran in water is 7-phenol (EPA 2004). The BE indicates other transformation products have the potential to reach the aquatic environment, including 3-hydroxycarbofuran and 3-ketocarbofuran, and that these typically occur in small amounts and are relatively short lived as compared to the parent. The major degradate in a soil metabolism study was 3-ketocarbofuran, which peaked at 12% of the amount applied after 181 days.

Several transformation products were also identified in the methomyl BE (EPA 2003). CO_2 was identified as the major degradate in most metabolism studies. S-methyl-N-hydroxythioacetamidate was identified as a highly mobile product of alkaline hydrolysis. In an aquatic metabolism study, after 7 d, acetonitrile comprised a maximum of 17% and acetamide up to 14% of the amount of methomyl applied. After 102 d, volatilized acetonitrile totaled up to 27% of the applied methomyl.

The BEs recognized that listed salmonids are likely exposed to several metabolites and degradates of the a.i.s. However, estimates quantifying exposure to these transformation products were not provided and remain a considerable source of uncertainty.

Other ingredients in formulated products

Registered pesticide products containing carbaryl, carbofuran, and methomyl generally include other ingredients such as carriers and surfactants. NMFS searched NPIRS and located several pesticide products that contain multiple a.i.s. NMFS located several labels of currently

registered products that contain more than one a.i. (Table 61). Carbaryl is a common component in several fertilizer products used on turf. It is also commonly formulated with other pesticidal ingredients including rotenone, a botanical extract used to eradicate fish and as an insecticide. Carbaryl is formulated with malathion (another cholinesterase-inhibiting insecticide), bifenthrin (a neurotoxic synthetic pyrethroid) and copper sulfate (registered for use as an insecticide, algicide, and fungicide). Methomyl is formulated with muscalure, a fly attractant used in fly bait formulations. NMFS is not aware of any carbofuran products that contain other a.i.s.

Table 61. Examples of listed a.i.s on pesticide products containing carbaryl and methomyl.

EPA Product Registration Number	A.i.s	Other Ingredients
4-29	Basic cupric sulfate 7%, carbaryl 1.25%, rotenone 0.5%, cube resins other than rotenone 1%	90.25%
4-59	Carbaryl 0.5%, malathion 3%, captan 5.87%	90. 63%
4-122	Carbaryl 0.3%, malathion 6%, captan 11.7%	82%
4-458	Basic cupric sulfate 7%, carbaryl 2%	19%
4-333, 239-2514, 8119-5, 71096-15	Metaldehyde 2%, carbaryl 5%	93%
9198-233, 9198-234, 9198-235	Carbaryl 2.3%, Bifenthrin 0.058%	97.642%
270-255	Methomyl 1%, component of muscalure 0.025%	98.975%
2724-274	Methomyl 1%, component of muscalure 0.049%	98.951%
7319-6	Methomyl 1%, component of muscalure 0.026%	98.974%
53871-3	Methomyl 1%, component of muscalure 0.04%	98.96%

Nonylphenol (NP) and nonylphenol polyethoxylates are inert ingredients that may be part of a pesticide product formulation and are common adjuvant ingredients added during pesticide applications. NP and nonylphenol polyethoxylates are also ingredients in detergents, cosmetics, and other industrial products and are a common wastewater contaminant from industrial and municipal sources. NP has been linked to endocrine disrupting effects in aquatic systems. A national survey of streams found that NP was among the most ubiquitous organic wastewater contaminants in the U.S., detected in more than 50% of the samples tested. The median concentration of NP in streams surveyed was 0.8 μg/L and the maximum concentration detected was 40.0 μg/L (Table 62). Related compounds were also detected at a relatively high frequency (Koplin, Furlong et al. 2002).

Table 62. Detection of nonionic detergent degradates in streams of the U.S. (Koplin, Furlong et al. 2002)

Chemical	Frequency Detected	Maximum (μg/L)	Median (μg/L)
4-nonylphenol	50.6	40	0.8
4-nonylphenol monoethoxylate	45.9	20	1
4-nonylphenol diethoxylate	36.5	9	1
4-octylphenol monoethoxylate	43.5	2	0.2
4-octylphenol diethoxylate	23.5	1	0.1

We are uncertain to what degree NP and NP-ethoxylates may or may not occur in carbaryl, carbofuran, and methomyl product formulations and/or are added prior to application. Inert ingredients are often not specified on product labels. Additionally, NP and NP-ethoxylates represent a very small portion of the more than 4,000 inert ingredients that EPA permits for use in pesticide formulations (EPA 2008). Many of these inerts are known to be hazardous in their own right (*e.g.,* xylene is a neurotoxin and coal tar is a known carcinogen). Several permitted inerts are also registered a.i.s (*e.g.,* copper, zinc, chloropictrin, chlorothalonil). Inerts can be more than 50% of the mass of pesticide products, and millions of lbs of these products are applied to the landscape each year (CDPR 2007). This equates to large contaminant loads of inerts that may adversely affect salmon or their habitat. Uncertainty regarding exposure to these ingredients will be qualitatively incorporated into our analysis.

Tank Mixtures

Several pesticide labels authorize the co-application of other pesticide products and other materials in tank mixes, thereby increasing the likelihood of exposure to multiple chemical stressors. For example, Sevin XLR Plus (EPA Reg. No. 264-333), which contains carbaryl, specifies the product is compatible with a wide range of pesticides. The label indicates that when used as a fruit thinner, Sevin XLR Plus may be mixed with other fruit thinners. Although mixtures with other pesticides products are not specifically recommended on the Furadan LFR label (EPA Reg. No. 279-3310, containing carbofuran), they are not prohibited. Furadan LFR does specifically indicate that the product may be mixed with liquid fertilizer. Lannate SP (EPA Reg. No. 352-342, containing methomyl) also provides instructions for tank mixing with other products and identifies some tank mixes that are not compatible. These ingredients and the other inert ingredients in these products are considered part of the action because they are authorized by EPA's approval of the FIFRA label. Exposure, and consequently risk associated with

potential ingredients in tank mixtures were not addressed in EPA's BEs and remain a significant source of uncertainty.

Environmental Mixtures

As described in the *Approach to the Assessment*, we analyze the status of listed species, in conjuction with the *Environmental Baseline* in evaluating the likelihood that action stressors will reduce the viability of populations of listed salmonids. This involves considering interactions between the stressors of the action and the *Environmental Baseline*. For example, we consider that listed salmonids may be exposed to the wide array of chemical stressors that occur in the various marine, estuarine, and freshwater habitats they occupy throughout their life cycle. Exposure to multiple pesticide ingredients is most likely in freshwater habitats and nearshore environments adjacent to areas where pesticides are used. As of 1997, about 900 a.i.s were registered in the U.S. for use in more than 20,000 different pesticide products (Aspelin and Grube 1999). Typically 10 to 20 new a.i.s are registered each year (Aspelin and Grube 1999). In a typical year in the U.S., pesticides are applied at a rate of approximately five billion lbs of a.i. per year (Kiely, Donaldson et al. 2004). Pesticide contamination in the nation's freshwater habitats is ubiquitous and pesticides usually occur in the environment as mixtures (Gilliom, Barbash et al. 2006). "More than 90% of the time, water from streams with agricultural, urban, or mixed-land-use watersheds had detections of two or more pesticides or degradates, and about 20% of the time they had detections of 10 or more (Gilliom, Barbash et al. 2006)." The likelihood of exposure to multiple pesticides throughout a listed salmonids' lifetime is great considering their migration routes and habitats occupied for spawning and rearing. In a three-year monitoring study conducted by the Washington DOE, pesticide mixtures were found to be common in both urban and agricultural watersheds (Burke, Anderson et al. 2006). An average of three pesticides was found in each sample collected on urban sampling sites with as many as nine pesticides found in a single sample. Agricultural sites averaged three to five pesticides per sample with as many as 14 pesticides being detected in a single sample (Burke, Anderson et al. 2006). Mixtures of chemicals that share a common mode or mechanism of action are of particular concern. Six to 11 million lbs of cholinesterase-inhibiting insecticides are used annually in California (CDPR 2007). One a.i., thiodicarb, degrades into methomyl. Potential

effects of thiodicarb and other pesticide mixtures containing carbaryl, carbofuran, and methomyl were not addressed in the BEs.

Cholinesterase inhibiting insecticides, including carbaryl, diazinon, chlorpyrifos, and malathion are the most frequently detected mixtures in urban streams across the U.S. (Gilliom, Barbash et al. 2006).

Gilliom and others (2006) suggested that assessment of pesticide mixture toxicity to aquatic life is needed given the widespread and common occurrence of pesticide mixtures, particularly in streams, because the total combined toxicity of pesticides in water is often greater than that of any single pesticide compound. Exposure to multiple pesticide ingredients can result in additive and synergistic responses as described below in the *Risk Characterization* section. It is reasonable to conclude that compounds sharing a common mode of action cause additive effects and in some cases synergistic effects. CDPR's most recent pesticide use report indicates 6,857,530 lbs of cholinesterase-inhibiting insecticides were applied in California during 2006. Over 60 cholinesterase-inhibiting a.i.s are currently registered in California (CDPR 2007). Exposure to these compounds and other baseline stressors (*e.g.,* thermal stress) was not a consideration in the BEs. Therefore, risk to listed species may be underestimated.

Exposure Conclusions

Pacific salmon and steelhead use a wide range of freshwater, estuarine, and marine habitats and many migrate hundreds of miles to complete their life cycle. Carbaryl, carbofuran, and methomyl are commonly detected in freshwater habitats within the four western states where listed Pacific salmonids are distributed. Because the proposed action of registration of the three a.i.s for the next 15 years authorizes many of the same uses, these three a.i.s will continue to be present in the action area. Therefore, we expect some individuals within all the listed Pacific salmon and steelhead ESUs/DPSs will be exposed to these chemicals and other stressors of the action. Carbaryl can exceed several mg/L in coastal estuaries based on measured environmental concentrations. Carbaryl and carbofuran concentrations in off-channel habitat can also exceed several mg/L where buffers are lacking. Peak concentrations of methomyl are expected to be significantly lower given label restrictions that require buffers to aquatic habitats and a relatively

low maximum application rate. However, model estimates indicate methomyl can reach concentrations of several hundred μg/L in surface waters given some uses that allow repeated applications at short re-application intervals. Given variable use of these pesticides across the landscape, and variable temporal and spatial distributions of listed salmonids, we expect exposure is also highly variable among individuals and populations of listed salmon. However, defining exposure and distributions of exposure among differing life stages of each independent population is complicated by several factors. Paramount among these is the uncertainty associated with the use of pesticide products containing these a.i.s. More specifically:

- Although the BEs and RED documents provide information on EPA regulatory decisions, they lack a full characterization of label-specific information needed to assess exposure (*e.g.,* application restrictions including application methods, rates, and intervals are lacking for many non-agricultural uses);

- EPA-authorized labels contain language that frequently does not provide clear boundaries on product use (*e.g.,* the maximum number of applications is commonly not specified and labels often instruct applicators to repeat applications "as necessary");

- Product labels authorize the application of chemical mixtures that are not specified or not clearly defined (*e.g.,* the ingredients of pesticide formulations are not fully disclosed, labels recommend tank mixture applications with other pesticides and adjuvants and tank mixtures with other pesticides are permitted unless specifically stated otherwise);

- Defining use of these products is highly uncertain because products are not likely to be used to the full extent permitted on the labels and historical use information is limited and may not reflect future use.

A major limitation of these assessments is that the majority of monitoring data used were not designed to determine exposure to listed salmonids, with the exception of specific studies conducted in Washington. Therefore, caution should be exercised in using these data for that purpose. Additionally, the assessments lack uncertainty analyses of the monitoring and toxicity data used, which limit the confidence in the given estimates (Warren-Hicks and Moore 1998). Given the complexity and scale of this action we are unable to accurately define exposure distributions for the chemical stressors. We assume the highest probability of exposure occurs in freshwater, and nearshore estuarine/marine environments with close proximity to areas where

pesticide products containing carbaryl, carbofuran, and methomyl are applied. We considered several sources of information to define the range of potential exposure to action stressors. EPA provided a number of exposure estimates with maximum concentrations of 153, 35, and 99 μg/L predicted for registered uses of carbaryl, carbofuran, and methomyl, respectively. We generated additional exposure estimates for shallow off-channel habitats with predicted concentrations exceeding 1,000 μg/L for carbaryl and carbofuran, and a peak concentration of 58 μg/L for methomyl. Additionally, we considered monitoring data presented by EPA and from other sources which indicate comparable concentrations of carbaryl, carbofuran, and methomyl have been detected in surface waters within the four states where the listed salmon and steelhead are distributed (85, 32, and 175 μg/L, respectively).

We assume that the exposure estimates provided by EPA in the BEs and additional modeling and monitoring information provided above represent realistic exposure levels for some individuals of the listed species. Further, we assume the distribution within the range of exposures is a function of pesticide use and the duration of time listed salmonids spend in these habitats. All listed Pacific salmon and steelhead occupy habitats that could contain high concentrations of these pesticides at one or more life stages. However, the time spent in these habitats varies among species. Adult salmon and steelhead spend weeks to several months in freshwater habitats during their migration and spawning activities. Immediately after emerging from the gravel substrate and transitioning from alevins to fry, salmonids move to habitats where they can swim freely and forage. At this point in their development most salmon occupy freshwater habitats. Chum salmon are an exception. They immediately migrate downstream following emergence to nearshore environments in estuaries near the mouth of their parent stream. Upon arrival in the estuary the chum salmon fry inhabit nearshore areas at a preferred depth of 1.5-5 m. In Puget Sound, WA, surveys indicate chum salmon fry are distributed extremely close to the shoreline and concentrated in the top 6 inches of water. Therefore, chum salmon fry are less likely to be exposed to high concentrations of pesticides than other salmonids given the duration of time spent in shallow water habitats and the habitat they occupy. They may reside immediately next to the shore in estuaries for as little as one or two weeks before moving offshore or into deeper-water habitats within the nearshore environment. Sockeye salmon fry most frequently distribute to shallow beach areas in the littoral zones of lakes. They initially

occupy shoreline habitats of only a few centimeters in depth before moving further off-shore and taking on a more pelagic existence. Coho salmon, Chinook salmon, and steelhead fry typically select off-channel habitats associated with their natal rivers and streams. These species are most likely to experience higher pesticide exposures given their utilization of shallow freshwater habitats as juveniles for rearing. Coho salmon and steelhead have a greater preference for the shallow habitats and rear in freshwater for more than a year.

Substantial data gaps in EPA's exposure characterization include exposure estimates associated with product uses on many crops and particularly, on non-crop uses. The highest concentrations detected in surface waters were those associated with applications to aquatic habitats. Those types of applications although mentioned, were not evaluated in EPA's BEs. Additionally, exposure estimates for other chemical stressors including other ingredients in pesticide formulations, other pesticide products authorized for co-application, adjuvants, degradates, and metabolites are not available or are non-existent. Although NMFS is unable to comprehensively quantify exposure to these chemical stressors, we are aware that exposure to these stressors is likely. We assume these chemical stressors may pose additional risk to listed Pacific salmonids. However, in order to ensure that EPA's action is not likely to jeopardize listed species or destroy or adversely modify critical habitat, NMFS analyzes exposure based on all stressors that could result from all uses authorized by EPA's action.

Response Analysis

In this section, we identify and evaluate toxicity information from the stressors of the action and organize the information under assessment endpoints (Figure 37). The endpoints target potential effects from the stressors of the action to individual salmonids and their supporting habitats. The assessment endpoints represent biological attributes that, when adversely affected, lead to reduced fitness of individual salmonids or degrade PCEs (*e.g.,* prey abundance and water quality). We constructed a visual conceptual model to guide development of risk hypotheses and assessment endpoints to highlight potential uncertainties uncovered by our analysis of the available information. We begin the response analysis by describing the toxic mode and mechanism of action of carabaryl, carbofuran, and methomyl. Next we summarize the toxicity data presented in the three BEs and organize the information to applicable assessment endpoints

(*e.g.*, survival, growth, etc.). The information provided by EPA addressed aspects of survival, growth and reproduction of aquatic species (freshwater and saltwater), as well as providing some discussion on other information found in the open literature, such as results from some field experiments and experiments that evaluated sublethal effects. NMFS is charged under the ESA to evaluate all direct and indirect effects of an action. We therefore evaluate all aspects of an action that may reduce fitness of individuals or reduce primary constituent elements of designated critical habitat. The evaluation includes information that EPA provided on survival, growth, or reproduction, but also encompasses a broader range of endpoints including behaviors, endocrine disruption, and other physiological alterations. The information we assessed is derived from published, scientific journals and information from government agency reports, theses, books, information and data provided by the registrants identified as applicants, and independent reports. Typically, the most relevant study results are those that directly measure effects to an identified assessment endpoint derived from experiments with salmonids, preferably listed Pacific salmonids or hatchery surrogates, exposed to the stressors of the action.

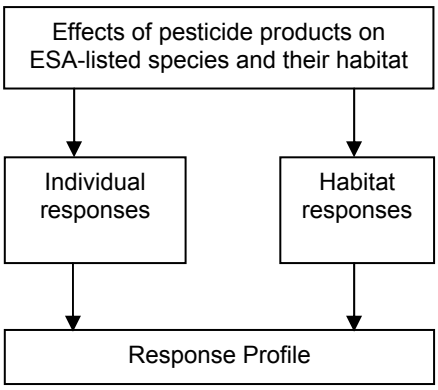

Figure 37. Response analysis

Mode and Mechanism of Action

Carbaryl, carbofuran, and methomyl share a similar mode and mechanism of toxic action and are a part of a group known as *N*-methyl carbamates. All three have similar chemical structures and act as neurotoxicants by impairing nerve cell transmission in vertebrates and invertebrates. They inhibit the enzyme AChE, which is present in cholinergic synapses. The normal function of AChE is to break down (hydrolyze) the neurotransmitter, acetylcholine, thereby serving as an "off-switch" for the electrochemical signal transmissions along nerve cells and neuromuscular junctions. AChE is prevalent in a variety of cell and organ types throughout the body of

vertebrates and invertebrates (Walker and Thompson 1991). Interference of normal nerve transmission by *N*-methyl carbamates may affect a wide array of physiological systems in fish (Figure 4). Organophosphates (OPs) share this mode of action and physiological responses are similar.

The mechanism of action of *N*-methyl carbamates, inhibition of AChE, involves a series of enzyme-mediated reactions. Briefly, in a reversible reaction carbamates bind to AChE, thereby inhibiting AChE's normal activity to hydrolyze the neurotransmitter acetylcholine at nerve synapses. This reaction is similar to organophosphorus insecticides with the main exception being a carbamylation of AChE instead of a phosphorylation. Carbamate inhibition of AChE is "reversible" in cases of sublethal exposure and recovery of *N*-methyl carbamate-inhibited AChE is typically rapid compared to OP-inhibited AChE. The key result of AChE inhibition by carbamate and OP insecticides is accumulation of acetylcholine in a cholinergic synapse. The buildup of acetylcholine causes continuous nerve firing and eventual failure of nerve impulse propagation. A variety of adverse effects to organisms can result ranging from sublethal behavioral effects to death (Mineau 1991).

Incidences of acute poisoning from AChE inhibitors are prevalent for wildlife, particularly for birds and fish (Mineau 1991). The following passage describes the classic signs of AChE-inhibiting insecticide poisonings of fish:

> "Fish initially change normal swimming behavior to rapid darting about with loss of balance. This hyper excitability is accompanied by sharp tremors which shake the entire fish. The pectoral fins are extended stiffly at right angles from the body instead of showing the usual slow back and forth motion normally used to maintain balance. The gill covers open wide, and opercular movements become more rapid. With death the mouth is open and the gill covers are extended. Hemorrhaging appears around the pectoral girdle and base of the fins (Weiss and Botts 1957)."

Numerous reports, peer-reviewed journal articles (Williams and Sova 1966; Holland, Coppage et al. 1967; Coppage and Matthews 1974; Rabeni and Stanley 1975; Haines 1981; Antwi 1985) as well as multiple reviews, text books (Mineau 1991; Smith 1993; Geisy, Solomon et al. 1999), and wildlife poisoning cases document inhibition of AChE activity in exposed invertebrates

(Detra and Collins 1986; Detra and Collins 1991) and vertebrates including salmonids following exposures to carbamates and OPs (Beyers and Sikoski 1994, Eder et al. 2007, Grange 2002, Hoy et al. 1991, Laetz et al. 2009, Li H. X. et al. 2008, Li S. N. and Fan 1996, Liu et al. 2007, Sandahl J. F. et al. 2004, Sandahl J.F. et al. 2005, Scholz et al. 2006, St. Aubin 2004, Tierney et al. 2007, Yi et al. 2006, Zinkl et al. 1987).

One highly relevant study measured inhibition of brain AChE, duration of recovery, survival at 24 h, and tissue concentrations in juvenile rainbow trout (*O. mykiss*) following exposure to carbaryl at 0, 250, 500, 1,000, 2,000, and 4,000 μg/L (Zinkl, Shea et al. 1987). Rainbow trout showed dose-dependent AChE inhibition from 61 to 91 % when exposed to 250 – 4,000 μg/L for 24 h. Most trout that died had 85% or greater inhibition. Trout recovered AChE activity following 24 h in uncontaminated water, indicating that fish recover if given the opportunity following carbamate exposures (Zinkl, Shea et al. 1987). This study showed that carbaryl is acutely toxic to rainbow trout in a matter of hours (incidences of death at 1.5 – 4 h) at concentrations at or above 1,000 μg/L.

pH and toxicity

We located several data sets on toxicity to freshwater fish and aquatic invertebrates exposed to carbaryl and carbofuran at different pHs (Mayer and Ellersieck 1986). Acute toxicity of carbaryl and carbofuran increases as pH increased, based on the available freshwater fish assays (Mayer and Ellersieck 1986). This largely is considered a result of the influence pH has on the creation of hydrolysis products (Mayer and Ellersieck 1986). However, the persistence of carbaryl and carbofuran is reduced as pH increases. As noted in the exposure section, degradation half-lives can vary from hours (in alkaline waters) to weeks (in acidic waters) depending on pH. Within the Pacific Northwest and California pH varies seasonally and typically may range from 6 – 9. For methomyl, pH seems to have less of an influence on hydrolysis rates. Due to the influence of pH on persistence of carbaryl and carbofuran, we evaluated reported toxic effects within the context of pH if provided and discuss pH in relationship to salmonid habitat utilization.

Temperature and toxicity

We found no consistent correlation with temperature and toxicity of the three *N*-methyl carbamates.

Studies with mixtures of AChE inhibiting insecticides

Because the three carbamates share a common mechanism of action, are registered for use and applied in the same watersheds, and have demonstrated additive and synergistic effects in aquatic organisms, we evaluate the response of salmonids and their habitat not just from exposure to single carbamates, but also to common mixtures of *N*-methyl carbamates. We therefore include an analysis of combinations of carbaryl, carbofuran, and methomyl based on additive toxicity observed in recent publications with Chinook and coho salmon (discussed in the *Risk Characterization* section) (Scholz, Truelove et al. 2006; Laetz, Baldwin et al. 2009). Because NMFS identified mixture effects to listed salmonids as a critical data gap in understanding the occurrences of multiple insecticides in salmonid habitats, a number of the experiments described below were conducted by researchers at or associated with NOAA's Northwest Fisheries Science Center.

One of the earliest mixture studies available evaluated bluegill survival following a range of exposure durations (24, 48, 72, or 96 h) to binary combinations of 19 insecticide mixtures (Macek 1975). Carbaryl and several of the OP pesticides were tested. Macek (1975) used the equation AB/(A+B) = X to calculate mixture toxicity; where AB was the number of dead fish from a mixture of pesticides A and B, and A + B was the sum of dead fish from A and B alone. The resulting ratios, X, were designated by the author as less than additive for a ratio of less than 0.5, additive when the ratio fell between 0.5 and 1.5, and synergistic for a ratio of more than 1.5. Carbaryl containing mixtures resulted in additive toxicity for some compounds (DDT, methoxychlor, parathion, methyl parathion) and synergistic toxicity for other compounds (malathion, copper sulfate). Antagonism is when the cumulative toxicity of a mixture is less than additive. In this study, mixtures containing carbaryl were not antagonistic. Differences in classification between additive and synergistic combinations should be interpreted cautiously, as the threshold for synergism was arbitrarily set at 1.5 by the authors. Mixture results with DDT and toxaphene were 1.31 and 1.14, respectively. The binary combination of diazinon and

parathion was classified as synergistic toxicants, (*i.e.,* more fish died than predicted based on an additive response). Validation of chemical concentrations with analytical chemistry was not conducted. Although the lack of raw data makes it difficult to determine exact concentrations tested and the lack of analytical confirmation precludes determination of precise concentrations, the study shows that binary combinations containing carbaryl exhibit greater toxicity than exposure to carbaryl alone. Additionally, the majority of pesticide-containing mixtures tested resulted in either additive or synergistic responses including mixtures containing carbamate and OP insecticides.

Additive toxicity of binary combinations of carbamates and OPs at a cellular level was demonstrated from *in vitro* experiments with Chinook salmon (Scholz, Truelove et al. 2006). Carbaryl and carbofuran, in addition to the oxons of diazinon, chlorpyrifos, and malathion caused additive toxicity as measured by AChE inhibition in salmonid brain tissue (Scholz, Truelove et al. 2006). Further, the joint toxicity of the mixtures could be accurately predicted from each insecticide's toxic potency, simply by adding the two potencies together at a given concentration. Since the experiments were conducted using *in vitro* exposures with the oxon degradates and not with the parent compounds, the authors conducted subsequent experiments to investigate whether additive toxicity as measured by AChE inhibition also occurred when live, juvenile coho salmon were exposed for 96 h to the parent compounds, *i.e., in vivo* exposures.

The results of the second set of experiments were unexpected by the authors (Laetz, Baldwin et al. 2009). Measured AChE inhibition from some of the binary combinations was significantly greater than the expected additive toxicity, *i.e.,* synergistic toxic responses were found (Laetz, Baldwin et al. 2009). As with the *in vitro* study, brain AChE inhibition in juvenile coho salmon (*O. kisutch*) exposed to sublethal concentrations of the carbamates carbaryl and carbofuran, as well as the OPs chlorpyrifos, diazinon, and malathion, was measured (Laetz, Baldwin et al. 2009). Dose-response data for individual chemicals were normalized to their respective EC_{50} concentrations (AChE activity compared to control) and collectively fit to a non-linear regression. The regression line was used to determine whether toxicological responses to binary mixtures were antagonistic, additive, or synergistic. No binary mixtures resulted in antagonism. Additivity and synergism were both observed, with a greater degree of synergism at higher

exposure concentrations. Moreover, certain combinations of OPs were lethal at concentrations that were sublethal in single chemical trials. Concentrations of each insecticide are listed in Table 63. Based on a default assumption of dose-addition, the five pesticides were combined in all possible pairings to yield target levels of AChE inhibitions in the brains of exposed coho salmon.

Table 63. Concentrations (μg/L) of insecticides used in mixture exposures. EC50s were calculated from dose-response data of AChE activity using non-linear regression. Coho salmon exposed to 1.0, 0.4, or 0.1 EC50 treatments had an equipotent amount of each carbamate or OP within the treatment *e.g.,* to attain the 1.0 EC50 treatment for diazinon and chlorpyrifos, 1.0 μg/L of chlorpyrifos (0.5 the EC50) was combined with 72.5 μg/L of diazinon (0.5 of the EC50).

Insecticide	Measured EC50	Concentration of each ingredient in binary combination to achieve treatment level		
		1.0 EC50 units	0.40 EC50 units	0.10 EC50 units
Carbaryl	145.8	72.9	29.2	7.3
Carbofuran	58.4	29.2	11.7	2.9
Chlorpyrifos	2.0	1.0	0.4	0.1
Diazinon	145.0	72.5	29.0	7.3
Malathion	74.5	37.3	14.9	3.7

As determined by the regression, these levels of enzyme inhibition would result from exposure to 0.1, 0.4, and 1.0 EC50 units, respectively. Two thirds (20/30) of pesticide pairs yielded AChE levels that were significantly lower, *i.e.,* indicative of synergism, than would be expected based on additivity *i.e.,* dose-addition (t-test with Bonferroni correction, $p < 0.005$). The number of combinations that were statistically synergistic increased with increasing exposure concentrations. All pairings analyzed at 1.0 EC50 showed synergism in AChE inhibition.

The combination of carbaryl at 79.9 μg/L and carbofuran at 29.2 μg/L to achieve 1.0 EC50 produced synergistic toxicity, however no incidences of coho mortality were observed. At 0.1 and 0.4 EC50 levels with the two carbamates, synergistic toxicity was observed, although the deviation from the predicted additive response was not statistically significant. In binary mixtures containing an OP and a carbamate synergistic toxicity occurred with some of the combinations at 0.1 and 0.4 EC50 treatments. The mechanism for synergistic toxicity in salmonids is unknown.

Additionally, pairings of two OPs produced a greater degree of synergism than mixtures containing one or two carbamates. This was particularly true for mixtures containing malathion coupled with either diazinon or chlorpyrifos. At the highest exposure treatment, 1.0 EC50 (malathion at 37.3, chlorpyrifos at 2, diazinon at 72.5 μg/L), binary combinations produced synergistic toxicity. Many fish species die following high rates of acute brain AChE inhibition, between 70-90% (Fulton and Key 2001).

Coho salmon exposed to combinations of diazinon and malathion (1.0 and 0.4 EC_{50}) as well as chlorpyrifos and malathion (1.0 EC_{50}) all died (Laetz, Baldwin et al. 2009). This result was in contrast to the predicted AChE inhibition from *in vitro* tests with Chinook salmon. Coho exposed to these OP mixtures showed toxic symptoms of inhibition of AChE, including loss of equilibrium, rapid gilling, altered startle response, and increased mucus production before dying. OP combinations were also synergistic at the lowest concentrations tested. Diazinon and chlorpyrifos were synergistic when combined at 7.3 μg/L and 0.1 μg/L, respectively. The pairing of diazinon (7.3 μg/L) with malathion (3.7 μg/L) produced severe (> 90%) AChE inhibition, including classical signs of poisoning as well as death. We expect that juvenile salmonids exposed to these effect concentrations in the environment will respond similarly.

Multiple studies indicate compounds that share a common mode of action frequently result in additive and at times synergistic responses in aquatic organisms (Anderson T. D. and Lydy 2002, Belden et al. 2007, Bocquene et al. 1995, Jin-Clark et al. 2002, Laetz et al. 2009, Lydy and Austin 2005, Macek 1975, Monserrat et al. 2001, Scholz et al. 2006). Unfortunately, we are unable to create a predictive model of synergistic toxicity as dose-response relationships with multiple ratios of pesticides are not available at the present time and the mechanism of synergism remains to be determined. That said, we conducted a mixture analysis with carbaryl, carbofuran, and methomyl based on additive toxicity with the caveat that synergism is likely where circumstances mirror the experimental conditions of this study, *i.e.,* similar exposure durations and pesticide concentrations. This is a reasonable approach based on the current state of the science. We used the mixture work of Laetz, Baldwin et al. (2009) and Scholz, Truelove et al. (2006) to construct mixture dose-response relationships predicated on additivity (see mixture analyses in the *Risk Characterization* section).

Summary of Toxicity Information Presented in the Biological Evaluations

Each BE primarily summarized acute and chronic toxicity data from "standardized toxicity tests" submitted by pesticide registrants during the registration process, tests from government laboratories available in EPA databases, or from published, peer-reviewed scientific publications (books and journals). The assessment endpoints from these tests for an individual organism generally included aspects of survival (death), reproduction, and growth measured in laboratory dose-response experiments (EPA 2004). Survival is measured in both acute and chronic tests. Reproduction and growth are generally measured and reported in the chronic tests. Population-level endpoints and analyses were generally absent in the BEs, other than a few measurements of fish and aquatic invertebrate reproduction. Adverse effects to organisms were not translated into consequences to populations. The BEs also presented some information on multispecies microcosm and mesocosm studies. For this Opinion, NMFS translates effects to individual salmonids into potential population-level consequences as explained in the *Risk Characterization* portion of the *Effects of the Proposed Action* section, and ultimately draws a conclusion on the likely risk to listed salmonids based on exposure and anticipated individual and population-level effects.

Survival of individual fish is typically measured by incidences of death following 96 h exposures (acute test) and incidences of death following 21 d, 30 d, 32 d, and "full life cycle" exposures (chronic tests) to a subset of freshwater and marine fish species reared in laboratories under controlled conditions (temperature, pH, light, salinity, dissolved oxygen, etc.,) (EPA 2004). Lethality of the pesticide is usually reported as the median lethal concentration (LC50), the statistically-derived concentration sufficient to kill 50% of the test population. For aquatic invertebrates it may be reported as an EC50, because death of these organisms may be difficult to detect and immobilization is considered a terminal endpoint. An LC50 is derived from the number of surviving individuals at each concentration tested following a 96 h exposure and is typically estimated by probit or logit analysis and recently by statistical curve fitting techniques. In FIFRA guideline tests, LC50s are typically calculated by probit analysis. If the data are not normally distributed for a probit analysis, than either a moving average or binomial is used, resulting in no slope being reported. Ideally, to maximize the utility of a given LC50 study, a slope, variability around the LC50, and a description of the experimental design- such as

experimental concentrations tested, number of treatments and replicates used, solvent controls, etc.- are needed. The slope of the observed dose-response relationship is particularly useful in interpolating incidences of death at concentrations below or above an estimated LC50. The variability of an LC50 is usually depicted by a confidence interval (95% CI) or standard deviation/error and is illustrative of the degree of confidence associated with a given LC50 estimate *i.e.,* the smaller the range of uncertainty the higher the confidence in the estimate. Without an estimate of variability, it is difficult to infer the precision of the estimate. Furthermore, survival experiments are of most utility when conducted with the most sensitive life stage of the listed species or a representative surrogate. In the case of ESA-listed Pacific salmonids, there are several surrogates that are available for toxicity testing including hatchery reared coho salmon, Chinook salmon, steelhead, and chum salmon, as well as rainbow trout[2]. The available toxicity data include a varitety of salmonids. Unfortunately, slopes, estimates of variability for an LC50, and experimental concentrations frequently are not reported. In our review of the BEs, we did not locate any reported slopes of dose-response curves, although some of this information was presented in some of the corresponding Science Chapters. Consequently, we must err on the side of the species in the face of these uncertainties and select LC50s from the lower range of available salmonid studies. We selected LC50s and associated slopes as input in the population modeling exercises discussed later. We evaluate the likelihood of concentrations that are expected to kill fish and apply qualitative and quantitative methods to infer population-level responses of ESA-listed salmonids within the *Risk Characterization* section (Figure 2).

Growth of individual organisms is an assessment endpoint derived from standard chronic fish and invertebrate toxicity tests summarized in the BEs. It is difficult to translate the significance of impacted growth derived from a guideline study to fish growth in aquatic ecosystems. The health of the fish, availability and abundance of prey items, and the ability of the fish to adequately feed are not assessed in standard chronic fish tests. These are important factors affecting the survival of wild fish. What is generally assessed is size or weight of fish measured

[2] Rainbow trout and steelhead are the same genus species (*Oncorhynchus mykiss*), with the key differentiation that steelhead migrate to the ocean while rainbow trout remain in freshwaters. Rainbow trout are therefore good toxicological surrogates for freshwater life stages of steelhead, but are less useful as surrogates for life stages that use estuarine and ocean environments.

at several times during an experiment. The test fish are usually fed twice daily, *ad libitum, i.e.,* an over abundance of food is available to the fish. Therefore, any reductions in size are a result of fish being affected to such an extent that they are not feeding even when presented with an abundance of food. Subtle changes in feeding behaviors or availability of food would not be detected from these types of experiments. If growth is affected in these experiments, it is highly probable that growth of fish in natural aquatic systems would be severely affected. If effects to growth are likely, we assess salmonid population-level consequences based on reductions in juvenile growth and subsequent reduction in size prior to ocean entry.

Reproduction, at the scale of an individual, can be measured by the number of offspring per female (fecundity), and at the scale of a population by measuring the number of offspring per females in a population over multiple generations. The BEs summarized reproductive endpoints at the individual scale from chronic freshwater fish experiments where hatchability and juvenile and larval survival are measured. NMFS considers many other assessment measures of reproduction, including egg size, spawning success, sperm and egg viability, gonadal development, reproductive behaviors, and hormone levels. These endpoints are not generally measured in standardized toxicity assays used in pesticide registration.

Sometimes qualitative observations of sublethal effects are summarized from 96 h lethality dose-response bioassays in EPA's risk assessments. These observations generally were limited in the BEs for carabaryl, carbofuran, and methomyl, and when noted, pertained to unusual swimming behaviors. None of these behaviors were rigorously measured and therefore are of limited value in assessing the effects of the three insecticides on Pacific salmonids. We do, however note a few of the observations when they pertained to a relevant assessment endpoint, such as impaired swimming. Some BEs presented toxicity information on degradates, metabolites, and formulations. However, toxicity information on other or "inert" ingredients found in pesticide formulations was usually not presented.

Results from multiple species tests, called microcosm and mesocosm studies, were also discussed in the BEs to a varying degree. These types of experiments are likely closer approximations of potential ecosystem-level responses such as interactions among species (predator-prey dynamics), recovery of species, and indirect effects to fish. However, the

interpretation of results is complicated by how well the results represent natural aquatic ecosystems and how well the studies apply to salmonid-specific assessment endpoints and risk hypotheses. These studies typically measured individual responses of aquatic organisms to contaminants in the presence of other species. Some are applicable to questions of trophic effects and invertebrate recovery, as well as providing pesticide fate information. The most useful mesocosm study results for this Opinion are those that directly pertain to identified assessment endpoints and risk hypotheses. We discuss study results in the context of salmonid prey responses, emphasizing survival and recovery of prey taxa as well as shifts from preferred taxa to other taxa if measured. One of the notable limitations of these study types is they do not take represent real world aquatic ecosystems that are degraded from various stressors including contaminants and elevated water temperature..

Results from aquatic field studies were generally not discussed in great detail within the BEs. We discuss field studies that evaluated identified assessment endpoints, particularly those which address salmonid prey responses in systems with ESA-listed salmonids.

Ranges in toxicity values presented in the BEs for each a.i. are summarized in Table 64. Ranges in toxicity values (µg/L) are organized by assessment endpoint and associated assessment measures. The BEs provided toxicity information from EPA's EFED Pesticide Toxicity Database and from the ACQUIRE database.

Table 64. Assessment endpoint toxicity values (μg/L) presented in BEs and REDs for carbaryl, carbofuran, and methomyl

Assessment Endpoint		carbaryl (μg/L)			carbofuran (μg/L)			methomyl (μg/L)		
	Assessment measure	> 95% a.i.	< 95% a.i.	degradate (s)	> 95% a.i.	< 95% a.i.	degradate (s)	> 95% a.i.	< 95% a.i.	degradate (s)
Survival	Freshwater fish LC_{50}	250 – 20,000 n=17	14,000-290,000 n=8	1,400-1,800 n=6	88 – 1,990 n=20	240 – 3,100 n=6	--	480 – 6,800 n=11	300 – 7,700 n=16	462,000 n=1
Survival	Salmonid LC_{50}	250 – 3,000 n=7	1,400 – 4,500 n=4	1,400, 1,600 n=2	164 - 600 n=10	610 n=1	--	560 – 6,800 n=6	1,200 – 3,200 n=7	--
Reproduction or larval survival	NOEC/LOEC	fathead minnows 210/ 680 n=1	--	--	rainbow trout 24.8/ 56.7 n=1 (larval survival[1])	--	--	fathead minnow 57/117 n=1 (larval survival[1])	--	--
Fish growth	NOEC/LOEC	--	--	--	rainbow trout[2] 24.8/ 56.7 n=1	--	--	fathead minnow 76,117/ 142,243 n=2	--	--
Habitat-salmonid prey	invertebrate survival	1.7 - 26 n=5	4.3 - 13.0 n=5	200-2,100 n=5	2.2 – 2,700 n=3	41 n=1	--	8.8 - 920 n=8	7.6 - 720 n=6	--
	invertebrate fecundity/ emergence/ developmental rate	500-1,000 n=1	--	--	--	--	--	0.4-0.8 n=1	--	--
	invertebrate reproduction	1.5-3.3 n=1	--	--	9.8/ 27 n=1	--	--	1.6- 3.1 n=1	--	--

1. Larval survival derived from 28 day fish assays
2. Juvenile growth measured at 60, 75, 90 d exposure
n is the number of studies

Assessment endpoint: Fish survival

Assessment measure: 96 h survival from laboratory bioassays reported as an LC50.

Carbofuran is the most toxic of three insecticides based on fish survival values (LC50s) followed by carbaryl and methomyl, respectively (Table 64). All three carbamates have a range of acute freshwater fish LC50s spanning 1 to 2 orders of magnitude. EPA reported the following ranges of LC50s: carbofuran LC50s ranged from 88-3,100 μg/L; carbaryl LC50s ranged from 250-290,000 μg/L; and methomyl LC50s ranged from 300-7,700 μg/L. Based on these LC50 ranges, EPA classified these insecticides as "highly toxic" to "moderately toxic". Salmonids were well represented in the data set, with 11 results for carbaryl, 11 for carbofuran, and 13 for methomyl. A cumulative frequency distribution of carbaryl LC50s for freshwater fish indicated that Atlantic salmon were the most sensitive of the species tested, and salmonids as a group were much more sensitive than fathead minnow and bluegill sunfish (EPA 2003).

EPA classified the three carbamates as very highly toxic to moderately toxic to estuarine and salt water species depending on the chemical and the fish species tested. Carbofuran LC50s for marine and estuarine fish ranged from 33 μg/L to more than 100 μg/L (n=5), indicating that saltwater/estuarine species were more sensitive to carbofuran than salmonids tested in freshwater. Two LC50s (2,200 and 2,600 μg/L, both sheepshead minnow) were reported for carbaryl and one LC50 (1,160 μg/L, sheepshead minnow) was reported for methomyl. Based on available data presented in EPA documents, it is uncertain whether marine and estuarine species are more sensitive, less sensitive, or equally sensitive to carbaryl and methomyl compared to freshwater fish. No data were presented on salmonids exposed in saline environments.

Assessment endpoint: Reproduction

Assessment measure: Number of offspring, hatchability, number of fish that attained sexual maturity by 136 d, and number of spawns per spawning pair

For carbaryl, one chronic study was listed in the BE (EPA 2003) and briefly discussed in the Science Chapter (EPA 2003), which evaluated a variety of assessment endpoints of fathead minnows including reproductive endpoints (referenced in (EPA 2003) as TOUCAR05 Carlson 1972, although this is an erroneous citation of (Carlson 1971)). Reproductive endpoints measured included number of mature males, number of mature females, number of immature

fish, number of eggs per mature female, number of eggs spawned, and hatchability of eggs (Carlson 1971). Fathead minnows were exposed to five treatments (8, 17, 62, 210, and 680 µg/L [analytically verified]) of carbaryl in a flow through system for nine months; capturing the life cycle of the fathead minnow. Fathead minnows showed reduced number of eggs per female and reduced number of eggs spawned when exposed to 680 µg/L and of the eggs spawned, none hatched (Carlson 1971).

The carbofuran BE (EPA 2004) stated that no full life cycle fish tests were available, and as it did not report any early-life stage test results, presumably none of those were available either, as the only data reported were for a partial life cycle test for rainbow trout (*O. mykiss*). Reported NOAECs were based on growth effects, and no reproductive endpoints were discussed. A definitive reference to the study was not provided in the BE. The carbofuran Science Chapter (EPA 2005) reports on an early life stage test for rainbow trout, referring to it as Acc.# GEOCAR08. We were unable to locate a specific citation for this study in the references but the reported NOAEC (24.8 µg/L) and LOAEC (56.7 µg/L) were the same as the unreferenced study discussed in the BE. However, the Science Chapter stated that larval survival was the most sensitive endpoint of those evaluated, and that scoliosis was observed in the larval fish at carbofuran concentrations ≥56.7 µg/L. The Science Chapter also references a sheepshead minnow (*Cyprinodon varigatus*) early life stage study (MRID 432505-01) that resulted in a NOAEC of 2.6 µg/L and LOAEC of 6.0 µg/L based on reduced embryo hatching. Specific extent of reduced hatching was not reported. No sublethal effects, such as the scoliosis in the rainbow trout, were mentioned in this study or two other studies on sheepshead minnow (MRIDs 408184-01 and 426974-01) that were submitted but did not produce definitive NOAECs or LOAECs.

The Science Chapter for methomyl (EPA 1998) reports a NOAEC (57 µg/L) and LOAEC (117 µg/L) for fathead minnow (*Pimephales promelus*) based on larval survival. Specific reductions in larval survival were not reported. In the Science Chapter for methomyl (EPA 1998), the study is referred to as MRID 00131255 and Driscoll 1982 and appears to reference the same study as Acc. 251424. The same data are reported in the BE (EPA 2003), but without any

citation. We located the data report and confirmed that embryo hatchability was not affected by the dose regime tested: 0, 57, 113, 254, 395, and 972 µg/L (measured concentrations).

Assessment endpoint: Fish growth

Assessment Measure: Growth rate, weight, length, or biomass of second generation as measured in chronic toxicity tests

The carbaryl BE (EPA 2003) did not report any effects on growth for either freshwater or estuarine/marine species, although reduced growth is listed as the affected endpoint in a fathead minnow (*Pimephales promelas*) study referenced in the Science Chapter (EPA 2003). For this study, the NOAEC is given as 210 µg/L and the LOAEC as 680 µg/L However, the fathead minnow study discussed within the reproductive endpoints summary measured growth of fathead minnow larvae (length) at 30 and 60 days (Carlson 1971). Although statistical tests were not used, no differences in growth were apparent between exposed and control fish at the concentrations tested: 8, 17, 62, 210, and 680 µg/L (Carlson 1971).

The carbofuran BE (EPA 2004) reports larval rainbow trout (*O. mykiss*) exposed to 56.7 and 88.7 µg/L carbofuran had significantly reduced lengths and reduced survival at 60, 75, and 90 d compared to unexposed trout in a partial life cycle test. Additionally, trout weight was significantly reduced after 75 d of exposure to 56.7 and 88.7 µg/L. Although, no definitive reference was provided for these data, NMFS obtained the study report to verify study results. Upon review, several additional adverse effects to fry were noted throughout the experiment. At day 20, trout exposed to 57.8 and 88.7 µg/L respired rapidly compared to control fish and were hyperactive at 88.7 µg/L. These effects continued for the remainder of the experiment (~ 70 days). Following 75 d of exposure to carbofuran at 56.7 and 88.7 µg/L, 23 and 35% of the fish, respectively, had curved spines. The Science Chapter (EPA 2005) reports growth was the most sensitive endpoint in two sheepshed minnow studies (*Cyprinodon varigatus*, MRIDs 40818401 and 42697401), but notes that neither of these tests produced a definitive NOAEC or LOAEC.

The methomyl BE (EPA 2003) lists a NOAEC of 76 µg/L and a LOAEC of 142 µg/L based on growth endpoints for fathead minnow (*Pimephales promelas*), a freshwater species. It also lists a NOAEC of 260 µg/L and a LOAEC of 490 µg/L for sheepshead minnow (*Cyprinodon*

varigatus), an estuarine species, but the endpoint affected is described as reproduction and/or growth, so whether or not growth was affected is uncertain. The Science Chapter (EPA 1998) does not describe any data for estuarine/marine species.

Assessment endpoint: Habitat- salmonid prey

Assessment measure: Aquatic invertebrate survival, growth, reproduction from acute and chronic laboratory toxicity tests

The carbaryl BE (EPA 2003) lists a range of acute EC50 values for freshwater aquatic invertebrate survival. Six EC50 values are given for *Daphnia magna*, ranging from 4.3 -13.0 µg/L (mean 7.3 µg/L). Although not specified as such, given the test organism, the fact that they are noted as 48 h tests, and the range of percent a.i., we assume that these are guideline tests conducted by the registrant or an acceptable government lab. EC50s were also given for three species of stoneflies, ranging from 1.7-5.6 µg/L (mean 3.6 µg/L). An EC50 for an amphipod (*Gammarus fasciatus*) of 26 µg/L was also given. There were also EC50 values for a number of estuarine species. There were five EC50 values given for mysid shrimp (*Mysidopsis bahia*), a common guideline test organism, ranging from 5.7-20.2 µg/L (mean 10.3 µg/L. EC50s for various other shrimp species were given, ranging from 1.5-170 µg/L. All of these tests appear to have been conducted on the a.i. An LC50 for blue crab of 320 µg/L was given. The BE also reported a number of EC50/LC50 values for aquatic insects and other invertebrates derived from the USEPA ECOTOX database.

The carbaryl Science Chapter (EPA 2003) used an acute value of 5.1 µg/L (stonefly, *Chlorperla grammatica*) as the survival assessment endpoint for freshwater aquatic invertebrates, and 5.7 µg/L (mysid shrimp) as the survival assessment endpoint for estuarine/marine aquatic invertebrates. The chapter also notes:

> "Studies have indicated that acute exposure to carbaryl impacts predator avoidance mechanisms in invertebrates, reduces overall zooplankton abundance (Hanazato and Yasuno 1989; Havens 1995), and may actually promote phytoplankton growth through reduced predation by zooplankton."

Acute toxicity data for 1-napthol presented in the BE (EPA 2003) listed 48 h EC50s of 700-730 µg/L for *D. magna*, and EC50s of 200-210 µg/L for *M. bahia*. No additional information

regarding acute toxicity of 1-napthol to aquatic invertebrates was provided in the Science Chapter (EPA 2003).

Overall, results presented show that carbaryl and formulations of carbaryl are acutely toxic to a wide array of aquatic invertebrates in the low µg/L range, frequently with EC50s/LC50s of less than 10 µg/L. The degradate, 1-napthol, appears less toxic with respect to comparable invertebrates; acute survival EC50s ranged from 200-730 µg/L. However, no data for the genera more sensitive to the parent carbaryl, such as the stoneflies, caddisflies, or mayflies, are available. Thus the lower end of the toxicity range is not well established.

The carbaryl BE (EPA 2003) lists a NOAEC of 1.5 µg/L and a LOAEC of 3.3 µg/L for *D. magna* based on reproduction and a NOAEC of 500 µg/L and a LOAEC of 1,000 µg/L for the midge fly (*Chironomous riparius*) based on emergence/developmental rate. Specific percentages of inhibition are not noted. The Science Chapter (EPA 2003) does not add any additional detail, but does note:

> "midge larvae are benthic macroinvertebrates and exposure may have been better characterized had it been based on sediment pore water concentrations as opposed to carbaryl concentrations in overlying water"

as a potential explanation for the difference in sensitivity between *D. magna* and *C. riparius*. No data regarding reproductive endpoints were presented for 1-napthol.

The carbofuran BE (EPA 2004) included acute EC50s for the *D. magna* (29-38.6 µg/L) and pink shrimp (*Penaeus duorarum,* 4.6-7.3 µg/L). All tests appear to have been conducted with the a.i. EC50s of 2.2-2.6 µg/L were reported in the Science Chapter (EPA 2005) for the freshwater water flea *Ceriodaphnia dubia*. The Science Chapter also provided toxicity values for the freshwater red crayfish (*Procambarus clarkii,* LC50 2,700 µg/L) and the eastern oyster (*Crassostrea virginica*, EC50s of >1,000->5,000 µg/L). Probit slopes were included in Appendix H of Appendix 1 (EPA 2005) for studies where they were reported or data were available to calculate them. Probit slopes were not available for *D. magna* or *C. dubia*, but were available for the red crayfish (slope 2.91) and the pink shrimp (slope 2.25). Data provided from chronic toxicity tests

included a NOAEC of 9.8 µg/L and a LOAEC of 27 µg/L for the freshwater aquatic invertebrate *D. magna*, and NOAEC of 0.4 µg/L and a LOAEC of 0.98 µg/L for the estuarine invertebrate *M. bahia*. In both cases, the most sensitive endpoints appeared to be survival of the adults and/or growth rather than decreased production of offspring.

The BE (EPA 2004) and Science Chapter (EPA 2005) reference several field studies from the open literature that examined effects on aquatic invertebrates following application of carbofuran either to fields or directly to water. One study (Matthiessen, Shearan et al. 1995) noted complete mortality of caged amphipods (*Gammarus pulex)* in a stream draining a field treated with granular carbofuran at 2.7 lbs a.i./acre. EPA documents reported a pond enclosure study (Wayland 1991) noting decreases in amphipod *(Hyallela azteca)* abundance and biomass and Chironominae larvae biomass at concentrations of 25 µg/L in a pond enclosure study. EPA also reported several studies in which carbofuran applied directly to water caused mortality in aquatic invertebrates at concentrations ranging from 5-25 µg/L (Flickinger et al. 1986, Mullie et al. 1991, Wayland and Boag 1990).

The methomyl BE (EPA 2003) reported acute survival EC50s for the freshwater invertebrates water flea (*D. magna*), amphipod (*Gammarus pseudolimnaeus*), midge (*Chironomous plumosus*) and three genera of stoneflies (*Skwala* sp., *Pteronarcella badia*, and *Isogenus* sp.). Most values appeared to be derived from 48-or 96 h standard laboratory tests. Many of the tests were with a.i. (95-99% a.i.), but others were conducted with a 24% formulation (EPA 2003). The product name was not specified. Information in the BE is noted as having come from the EFED Pesticide Ecotoxicity Database, not the RED Science Chapter. There are some inconsistencies between these two documents regarding which EC50 is associated with the formulation versus the technical a.i. Based on information in the BE, which lists data for a formulation test on all species, the 24% formulation appears to be more toxic than the technical. EC50s for the technical range from 8.8-31.8 µg/L for *D. magna*, and are reported as 920 µg/L for *G. psuedolimnaeus*, 88 µg/L for *C .plumosus,* 34 µg/L for *Skwala* sp, 69 µg/L for *P. badia*, and 343 for *Isogenus* sp. EC50s for the 24% formulation are reported as 7.6 µg/L for *D. magna*, 720 µg/L for *G. psuedolimnaeus*, 32 µg/L for *C. plumosus* 29 µg/L for *Skwala* sp, 60 µg/L for *P. badia*, and 29 for *Isogenus* sp.

Acute EC50s are also reported for several species of estuarine/marine shrimp in both the BE (EPA 2003) and the RED Science Chapter (EPA 1998). Again, there are inconsistencies between the documents, with the same EC50s from formulation tests reported in the BE as 30% a.i. and in the Science Chapter as 24% a.i. Some EC50s were also reported for the a.i. Only one species, grass shrimp (*Palmonetes vulgaris*) appears to have been tested with both the a.i. and the formulation (EPA 2003). In this case, the formulation (EC50 130 µg/L, reported as a 30% a.i.), appears less toxic than the technical (EC50 49 µg/L). Other EC50s listed in the BE were for pink shrimp (*P. duorarum*, 19 µg/L) and mysid shrimp (*M. bahia*, 230 µg/L), both of which appear to be technical a.i. (90-98.4%).

The methomyl BE (EPA 2003) reports NOAECs and LOAECs for reproductive endpoints for two studies conducted on *D. magna*, both with the technical a.i. In one study, with a NOAEC of 0.4 µg/L and a LOAEC of 0.8 µg/L, the number of young per female was reduced. A second resulted in a NOAEC of 1.6 µg/L and a LOAEC of 3.1 µg/L, based on an unspecified reproductive endpoint. The BE also reports a NOAEC of 29 µg/L and a LOAEC of 59 µg/L for the estuarine mysid shrimp, based on "reproduction and/or growth."

The BE and Science Chapter both report on an outdoor microcosom study conducted with methomyl (MRID 437444-02). The Science Chapter, Appendix C (EPA 1998), describes the study design as: "Methomyl was applied to seven treatment groups, at two application rates, at three different application intervals, over a period of 22 days (pg 51)." Specific application rates and intervals were not provided, nor was use of a control specifically mentioned. Zooplankton (Cladocera, Copepodia and Rotifera) abundance and community composition were altered in at least some treatments, and Ephemeroptera abundance decreased in the two highest treatments.

Toxicity of Carbaryl, Carbofuran, and Methomyl Degradates

The BEs briefly addressed the issues of degradates. The carbaryl BE (EPA 2003c) provides acute fish and invertebrate toxicity data the degradate, 1-napthol. The LC50s for three species of fish tested (freshwater (*O. mykiss*, *Lepomis macrochirus*)) and marine/estuarine (*Cyprinodon varigatus*) range from 750 – 1,800 µg/L. LC50s presented for aquatic invertebrates include 700-

730 μg/L for *D. magna* (freshwater organism), 200-210 μg/L for *M. bahia* (estuarine organism) and 2,100 μg/L for *C. virginica* (estuarine organism).

During our open literature review, we located a study that compared acute lethalities between carbaryl and 1-naphthol in two species of fish (Shea and Berry 1983). In goldfish (*Carassius auratus*) and killifish (*Fundulus heteroclitus*), 1-naphtol was significantly more toxic than carbaryl based on 10 d acute lethality tests (Shea and Berry 1983). The degradate 1-naphthol was approximately five times more toxic than carbaryl in goldfish, and in killifish twice as toxic as carbaryl (Shea and Berry 1983). Additionally, fish exposed to 1-naphthol showed neurological trauma including pronounced erratic swimming behaviors and increased opercula beats following exposure to 5 and 10 mg/L after 4 and 24 h exposures, respectively. None of these symptoms were observed in the carbaryl treatments (Shea and Berry 1983).

Other degradates identified in fate studies submitted to EPA included 5-hydroxy-1-napthylmethylcarbamate (aerobic soil metabolism and anaerobic aquatic); 1-naphthyl (hydroxymethyl) carbamate (aerobic soil metabolism and anaerobic aquatic); 1,4-napththoquinones (degradates of 1-napthol); 4-hydroxy-1-napthyl methylcarbamate (anaerobic aquatic); 1,5-naphthalenediol (anaerobic aquatic); and 1,4-naphthalenediol (anaerobic aquatic). No toxicity information was presented for these degradates.

The carbofuran BE (EPA 2005) describes three degradates: 3-hydroxycarbofuran, 3-ketocarbofuran, and carbofuran 7-phenol in the toxicity section, and refers to two additional degradates: 3-hydroxy-7-phenol, and 3-keto-7-phenol in the section on environmental fate and transport. No toxicity data are included, and the document noted that "inclusion of environmental transformation products in the risk analysis of carbofuran would not be expected to result in substantive changes to conclusions drawn using the parent alone (pg 30)" (EPA 2005).

Based on the more detailed fate information in the Science Chapter for the Carbofuran RED (EPA 2005), carbofuran 7-phenol is a hydrolysis product (up to 75% of applied). Carbofuran 7-phenol is expected to be less toxic than parent carbofuran, as the toxic moiety (the carbamylating

radical) has already dissociated (EPA 2005). No toxicity data for this compound are provided in either the BE or the Science Chapter. The degradates 3-hydroxycarbofuran and 3-ketocarbofuran are detected in soil photolysis and aerobic soil metabolism studies. These compounds were each approximately 3-5% of applied (EPA 2004a), and are structurally more similar to the parent carbofuran. The Science Chapter cites an open literature study using Microtox (Kross, et. al., as cited in EPA 2005) noting "3-ketocarbofuran appears as toxic or slightly more toxic than the parent, but 3-hydroxycarbofuran is much less toxic." A second study evaluated (Gupta 1994, as cited in EPA 2005) indicates 3-hydroxycarbofuran is "equally as toxic as the parent." No specific toxicity values were presented. Other degradates mentioned in the fate summary are 3-hydroxycarbofuran phenol (3-hydrocy-7-pheonl) and 3-ketocarbofuran phenol (3-keto-7-phenol), which are less than 5% of applied (EPA 2005).

The methomyl BE notes "a degradate (thiolacetohyroxamic acid 5-methyl ester)… was tested and found to be practically nontoxic to bluegill" (EPA 2003a). This study is also mentioned in the Environmental Risk Assessment for the RED (EPA 1998c). The bluegill LC50 for this degradate is 462,000 μg/L. No other degradate toxicity data were presented. The fate portion of the BE (EPA 2003a) and the Environmental Risk Assessment (EPA 1998c) both reference S-methyl-N-hydroxythioacetamidate as a product of hydrolysis in both water and soil. This may be the same compound expressed under different naming conventions, but no structures were provided to confirm this identification. No toxicity data were presented for acetonitrile or acetamide.

Formulations and other (inert) ingredients found in carbaryl's, carbofuran's, and methomyl's formulations

Assessment endpoint: Fish survival, aquatic invertebrate survival, and primary production

Assessment measure: Aquatic invertebrate survival, growth, and reproduction from acute and chronic laboratory toxicity tests

The carabaryl BE (EPA 2003c) and the carbaryl Science Chapter (EPA 2003b) provide some toxicity data on formulations containing 5-81.5% carbaryl for both aquatic invertebrates and fish. We did not receive information on whether the formulations tested are currently registered. Data for formulations (referred to in the Science Chapter (EPA 2003b) as technical end-product or

TEP) are contained in Appendix D-1. The technical a.i. EC50 for water flea (*D. magna*), based on a single test, is 5.6 µg/L. No 95% confidence interval is given for the test. Data for several formulations with 43.7-81.5% carbaryl are presented. EC50s for the formulations range from 4.3-13.0 µg/L. Data are also available to compare toxicity of the technical grade to formulations (43.7-81.5%) for the estuarine mysid shrimp, *M. bahia*. No 95% confidence intervals are given. Two technical a.i. LC50s were provided in the data, 5.7 µg/L and 6.7 µg/L. Tests with formulations (n=3) resulted in LC50s of 9.3-20.2 µg/L. No chronic tests were described for any formulations.

For carbaryl, acute LC50 formulation data are also given for two species of fish, rainbow trout (*O. mykiss*, 44-81.5 % carbaryl) and bluegill sunfish (*Lepomis macrochirus*, 5-50% carbaryl). No 95% confidence intervals are given. Although other fish data for the technical carbofuran are provided, a same-species comparison of toxicity data is better than evaluating against a range of species, as the various species will exhibit a range of sensitivity. A single a.i. LC50 (1,200 µg/L) is given for rainbow trout. A total of four LC50s are given for formulations, ranging from 1,400-4,500µg/L. Three a.i. LC50s for bluegill are given, ranging from 5,000-14,000 µg/L. The bluegill LC50s (n=4) for formulations range from 9,800-290,000 µg/L. Based on these data, it appears the formulations tested are relatively similar in toxicity to the a.i. on an acute lethality basis (survival endpoint). No chronic tests, which evaluate reproduction and growth, were described for any formulations.

The carbofuran BE (EPA 2004a) lists some formulation toxicity data for aquatic invertebrates, referenced to the EFED Science Chapter and other data referenced to the EPA Acquire Database. In some cases, the formulation data referenced to the Science Chapter provides percent a.i. and in others it contains designations such as “5G” or “50 WP”. In cases where the percent a.i. is reported as a number, we presume the toxicity value has been corrected to percent a.i. It is unclear whether the others have been corrected, whether the data from the Acquire database has been corrected, or the specific products with which the toxicity data are associated.

Toxicity data presented in the carbofuran Science Chapter (EPA 2005) were found in Appendix H of Appendix 1 to the main document, titled Animal Toxicity Tests with DERs. Study data on

formulations were presented for bluegill sunfish (*L. macrochirus*) and rainbow trout (*O. mykiss*). A single test on rainbow trout was conducted using the formulation Furadan 75WP with a reported LC50 of 458 μg/L. LC50s for rainbow trout tested with technical carbofuran ranged from 362-600 μg /L. A number of different formulations (Furadan 4F, Furadan 10G, Furadan 50WP and Furadan 75WP) were tested with bluegill sunfish. LC50s ranged from 240-488 μg carbofuran/L. LC50s for bluegill sunfish tested with technical carbofuran ranged from 88-126 μg a.i/L. Only one formulation test for freshwater invertebrates was reported. *D. magna* exposed to "5G" had a survival EC50 of 41 μg /L. Tests with *D. magna* on technical carbofuran produced survival EC50s of 29-38.6 μg /L. The estuarine fish Atlantic silverside (*Mendia menidia*) was tested in two formulations, Furadan 4F and Furadan 15G. LC50s from these tests were 36 μg a.i./L and 64 μg a.i./L, respectively. A test with technical grade on the same species produced an LC50 of 33 μg a.i./L. (95% CI 27-41 μg a.i./L). The estuarine/marine invertebrate pink shrimp was tested both in a formulation (Furadan 15G) EC50 13.3 μg a.i./L and with technical (EC50s 4.6-7.3 μg a.i./L, n=2). Based on these data, there is no indication that the carbofuran formulations tested are more toxic than the a.i. on survival as an endpoint. No long term studies, such as life cycle studies, with formulations were reported for either fish or invertebrates.

The methomyl BE (EPA 2003a) and Science Chapter for the RED (EPA 1998c) both reported toxicity data for a 24% formulation and a 29% formulation for both fish and aquatic invertebrates. In addition, the BE reported some toxicity data for a 30% formulation. While it is difficult to make a definitive comparison given the structure of the data, the 24% formulation appears more toxic to both fish and invertebrates. Neither the toxicity section of the BE nor the use characterization in the Science Chapter list specific products. Thus, we cannot cross-reference the data to a product or determine if it is a currently registered product.

Identified data gaps and uncertainties of carbofuran's, carbaryl's and methomyl's toxicity information presented in BEs and REDs:

Overall, data provided in the BEs and their Science Chapters were insufficient to allow a thorough evaluation of all identified assessment endpoints and measures considered by NMFS. The Data Evaluation Reviews (DERs) or the original studies may have helped reduce some of

the uncertainties related to experimental design, dose-response slopes, and confidence estimates of the data, but we did not receive summaries of this information from EPA when preparing this Opinion. However, even if the DER data were submitted, other aspects of EPA's assessment endpoints (survival, reproduction, and growth) were not presented. When this missing information is combined with the absence of information presented on other non-assessed endpoints such as AChE inhibition in fish and invertebrates, swimming behaviors, and olfactory-mediated impairments, an incomplete picture emerges on the potential effects of EPA's action to listed salmonid and habitat endpoints.

Toxicity information presented in the BEs (EPA 2003c, EPA 2004a, and EPA 2003a) lacks details NMFS requires for analyses in support of this consultation. More complete information is presented in the Science Chapters for carbaryl (EPA 2003c) and carbofuran (EPA 2005), yet the information was not applied by EPA in its characterization of risk to listed salmonids or salmonid habitats. Specific data gaps identified include the following, although not all gaps apply to all three carbamates.

- Reported LC50s not accompanied by slopes, experimental design (number of treatments and replicates, life stage of organism, concentrations tested), measures of variability such as confidence intervals or standard deviations/errors;
- No analysis of the degree or magnitude of inhibition of acetylcholinesterase by the three carbamates and expected response by listed salmonids or aquatic, salmonid prey communities;
- Summary and discussion of fish sublethal data absent from BEs including effects to swimming and chemoreception;
- Limited or no toxicity data on current formulations,
- Limited or no toxicity data presented for identified surface water degradates of the three carbamates;
- Sensitivity of surrogate lab strains compared to wild, listed fish, particularly comparisons between warm and cold water fish species used in chronic guideline tests;
- No data summarized for mixture toxicity including tank mixtures and environmental mixtures to assessment endpoints;
- No toxicity data presented on "inert" or other ingredients present in formulations containing each of the a.i.s;
- No analysis of influence of environmental factors (pH, temperature) on exposure and toxicity.

Summary of Toxicity Information from Open Literature

To organize the available toxicity information on listed salmonids and habitat, we developed risk hypotheses with associated assessment endpoints as described in the *Approach to the Assessment* section. Recall that assessment endpoints are biological attributes of salmonids and their habitat potentially susceptible to the stressors of the action. In addition to toxicity data presented in the BEs, we also considered information from other sources to evaluate both individual and population-level endpoints. The results of those studies are summarized below under corresponding assessment endpoints. We qualitatively assigned the most significance to study results that were: 1) derived from experiments using salmonids (preferably listed Pacific salmonids or hatchery surrogates); 2) measured an assessment endpoint of concern *e.g.*, survival, growth, behavior, reproduction, abundance etc., identified in a risk hypothesis; 3) resulted from exposure to stressors of the action or relevant chemical surrogates (*i.e.*, other AChE inhibitors); and 4) had no substantial flaws in the experimental design. When a study did not meet these criteria, we highlighted the issue(s) and discussed how the information was used or why the information could not be used.

Assessment endpoint: Swimming

Assessment measures: Burst swimming speed, distance swam, rate of turning, baseline speed, tortuosity of path, acceleration, swimming stamina, and spontaneous swimming activity

Swimming is a critical function for anadromous salmonids that is necessary to complete their life cycle. Impairment of swimming may affect feeding, migrating, predator avoidance, and spawning (Little and Finger 1990). It is the most frequently assessed behavioral response of toxicity investigations with fish (Little and Finger 1990). Swimming activity and swimming capacity of salmonids have been measured following exposures to a variety of AChE-inhibiting insecticides including the carbamates carbaryl and carbofuran and a variety of OP insecticides. Swimming capacity is a measure of orientation to flow as well as the physical capacity to swim against it (Howard 1975; Dodson and Mayfield 1979). Swimming activity includes measurements of frequency and duration of movements, speed and distance traveled, frequency and angle of turns, position in the water column, and form and pattern of swimming. A review paper summarized many of the experimental swimming behavioral studies and concluded that effects to swimming activity generally occur at lower concentrations than effects to swimming

capacity (Little and Finger 1990). Therefore, measurements of swimming activity are usually more sensitive than measurements of swimming capacity. A likely reason is that fishes having impaired swimming to the degree that they cannot orient to flow or maintain position in the water column are moribund (*i.e.,* death is imminent). The authors of the review also concluded that swimming-mediated behaviors are frequently adversely affected at 0.3 – 5.0% of reported fish LC50s[3], and that 75% of reported adverse effects to swimming occurred at concentrations lower than reported LC50s (Little and Finger 1990). Both swimming activity and swimming capacity are adversely affected by AChE-inhibiting insecticides.

We located studies that measured impacts to salmonid swimming behaviors from exposure to carbaryl. Several studies also measured AChE inhibition from OPs and provided correlations between AChE activity and swimming behaviors. We did not locate any studies that tested mixtures of AChE-inhibiting insecticides on swimming behaviors of any aquatic species.

Carbaryl

Experiments with carbaryl have shown that cutthroat trout's (*Oncorhynchus clarki clarki*) swimming abilities are compromised by 6 h exposures to 750 and 1,000 µg/L, resulting in increased susceptibility to predation (Labenia, Baldwin et al. 2007). Cutthroat trout swimming capacity was not significantly affected by carbaryl at 500 µg/L, although muscle AChE activity was 29% relative to unexposed cutthroat. More sensitive swimming activity measurements were not evaluated. At 750 and 1,000 µg/L, AChE activity was 24 and 23% relative to unexposed fish, respectively. A known predator of juvenile cutthroat, lingcod (*Ophiodon elongates*), consumed on average more cutthroat that were exposed to carbaryl compared to those that were not exposed to carbaryl. The experimental design ensured that the predator was exposed to minimal concentrations when carbaryl-exposed fish were transferred in a large experimental chamber along with unexposed cuthroat. In the predation experiment with lingcod, cutthroat were exposed for 2 h to 200, 500, and 1,000 µg/L carbaryl. Results indicated a dose-dependent decrease in the ability of carbaryl-exposed trout to avoid being eaten by the lingcod predator. At

[3] The current hazard quotient-derived threshold for effects to threatened and endangered species used by EPA is 5 % (1/20th) of the lowest fish LC50 reported. If the exposure concentration is less than 5 % of the LC50 a no effect determination is made which likely underestimates risk to listed salmonids based on swimming behaviors.

200 μg/L, an increase in predation was evident, although not statistically significant. At 500 and 1,000 μg/L carbaryl, cutthroat trout were consumed at significantly higher rates than unexposed fish. Cutthroat trout's AChE activity was also reduced in a dose-dependent fashion showing greater reductions with increasing carbaryl concentrations. Six hour exposures significantly reduced AChE activity in brain and muscle, where 50% reductions (IC50) in brain AChE occurred at 213 μg/L carbaryl. The onset of inhibition occurred within 2 hours, at which point AChE activity was near its lowest value. Benchmark concentrations corresponding to 20% inhibition were 32 μg/L in brain and 23 μg/L in muscle tissues. Recovery of AChE activity (to pre-exposure levels) took 42 hours at 500 μg/L carbaryl. We ranked these sets of experiments as highly relevant to understanding the effects of carbaryl on inhibition of AChE and subsequent salmonid swimming behaviors. The test also provided information on lack of predator avoidance behaviors by salmonids.

Catfish (*Mystus vittatus*) showed increased swimming activity following 72 h of exposure to 12,500 μg/L and no mortalities were noted (Arunachalam, Jeyalakshmi et al. 1980). The 72 h LC50 for catfish was 17,000 μg/L, indicating this species of catfish is much less sensitive to acute concentrations of carbaryl than salmonids. Other sublethal endpoints were also affected by carbaryl, including food intake, growth, metabolism, and rate of opercular beats. Catfish increased their rates of opercular beats from 74 per minute exposed to freshwater alone to 124 per minute when exposed to 12,500 μg/L carbaryl, which the authors attributed to acute stress from carbaryl. We ranked this study as relevant because swimming was measured, but the high concentrations used, lack of chemical verification, and lack of compatibility to listed salmonids introduces uncertainty.

Multiple behavioral responses related to swimming were assessed in rainbow trout fry (0.5-1 g) following 96 h exposures to carbaryl at 10, 100, and 1,000 μg/L; nominal concentrations (Little, Archeski et al. 1990). These included swimming capacity (cm/sec), swimming activity (sec), prey strike frequency, daphnids consumed, percent consuming daphnids, and percent survival from predation. All endpoints were significantly affected at 1,000 μg/L carbaryl relative to unexposed fry. At 10, 100, and 1,000 μg/L carbaryl, significantly more rainbow trout were

consumed relative to unexposed fish. By using very young fry, the studies also provide information on a sensitive early lifestage where swimming behaviors are critical to survival (*i.e.,* feeding and predator avoidance). We ranked these studies as highly relevant to a variety of essential swimming-associated behaviors.

One study tested whether schooling of fish in estuarine waters was affected by a single short-term exposure of carbaryl at 100 μg/L (Weis and Weis 1974). Carbaryl impaired schooling of Atlantic silversides (*M. menidia*) by increasing the school area by up to twice that of control groups. Recovery of schooling behavior took three days (Weis and Weis 1974). The authors suggested that increased schooling areas would increase energy expenditures of individual fish and also increase rates of predation. The study lacked analytical verification of exposure concentrations; only one concentration was tested; and the study was conducted with a non-salmonid fish. The study is relevant because it addressed an important swimming behavior (*i.e.,* schooling), which juvenile salmonids use at times, and presented data on time to recovery following an adverse behavioral affect. However, it remains uncertain at which concentrations juvenile salmonids that school would be affected.

Neurological effects on the startle response and ability to avoid predation by juvenile medaka (*Oryzias latipes*) were evaluated following exposures of 2.5, 5.1, 7.0, and 9.4 mg/L carbaryl (Carlson, Bradbury et al. 1998). At 5.1 mg/L and higher, carbaryl increased the time between motor neuron peak and initiation of muscle activity (*i.e.,* swimming response) and at 7.0 mg/L and higher response to stimuli ratios were also higher. Predation trials showed no differences between medaka exposed to carbaryl and unexposed fish. While these concentrations are extremely high compared to concentrations affecting salmonids, the results indicate that neurological-associated swimming behaviors are affected by carbaryl. Given that the 48 h LC50 of juvenile medaka is estimated at 9.4 mg/L and that detectable sublethal neurological effects occurred at 5.1 mg/L, roughly half the LC50, it is uncertain at what concentrations juvenile salmonids neurological endpoints would be affected. We ranked this experiment as relevant as it provided evidence that neurological effects manifest at lower concentrations than 48 h LC50s.

Carbofuran

Carbofuran adversely affected swimming behaviors in goldfish (*C. auratus*) following 24 and 48 h exposures to the lowest concentration tested, 5 μg/L (Bretaud, Saglio et al. 2002). Swimming activity (fish swimming from one zone to another), the least sensitive endpoint, was significantly affected at 500 μg/L carbofuran, while burst swimming, the most sensitive endpoint, was significantly affected at 5 μg/L following 24 h exposure (Bretaud, Saglio et al. 2002). Burst swimming behavior, sheltering, and nipping in goldfish were significantly increased by a 4 h exposure to 1 μg/L carbofuran (Saglio, Trijasse et al. 1996). At 12 h exposures, significant effects were observed at 100 μg/L for sheltering, nipping, and burst swimming. Grouping of goldfish showed non dose-dependent responses as significant effects ($p<0.05$) appeared at 10 μg/L, but were absent at 1 and 100 μg/L (Saglio, Trijasse et al. 1996). We ranked both of these studies as relevant, but due to difficulties inherent in translating the observed behavioral effects in goldfish to salmonids, combined with the lack of analytical verification of concentrations, the study did not receive a highly relevant ranking. The results support that ecologically relevant swimming-related behaviors are impacted at lower concentrations than more coarse measures of swimming such as swimming stamina or swimming capacity.

Methomyl

We were unable to locate any studies that evaluated effects to swimming related behaviors in fish. Although this is a data gap, we assume methomyl does inhibit swimming in the same fashion as the other carbamates because swimming behaviors are typically affected when AChE is sufficiently inhibited (*e.g.* by 30% or more). A review also concluded that swimming-mediated behaviors are frequently adversely affected at 0.3 – 5.0% of reported fish LC50s, and that 75% of reported adverse effects to swimming occurred at concentrations lower than reported LC50s (Little and Finger 1990).

Other AChE-inhibiting insecticides effects on swimming and related behaviors

We also reviewed study results conducted with other carbamate and OP insecticides because both classes of compounds share the same mode of action. Recovery of swimming to pre-exposure levels is much more rapid in carbamate-affected fish compared to OP-affected fish due to the reversible binding of carbamates with AChE (Mineau 1991). In one study with carbaryl and rainbow trout, AChE activity returned to control levels after 24 h in clean water following

24 hr exposure (Zinkl, Shea et al. 1987). In another study with cutthroat trout within 42 h recovery occurred following 6 h exposure(Labenia, Baldwin et al. 2007). In the latter study, cutthroat trout recovered approximately half of their pre-exposure AChE activity within 6 h, following peak AChE inhibition within 2 h. Both of these studies indicate that recovery of AChE activity following exposure to carbamates occurs quickly and is highly dependent on environmental exposure conditions found in aquatic habitats.

We did not locate additional studies with other carbamates, but located multiple studies with OP insecticides. The OPs chlorpyrifos, diazinon, and malathion showed significant and persistent effects to a suite of swimming related behaviors in salmonids at concentrations expected in salmonid habitats; as reviewed in NMFS' November 18, 2008 Opinion on these three OP insecticides (NMFS 2008). Robust evidence of the three OPs showed reductions in swimming speed (Brewer, Little et al. 2001), distance swam (Brewer, Little et al. 2001), acceleration (Tierney, Casselman et al. 2007), food strikes (Sandahl, Baldwin et al. 2005) and significant correlations with AChE activity (Brewer, Little et al. 2001; Sandahl, Baldwin et al. 2005). Additionally, other OPs including fenitrothion, parathion, and methyl parathion, adversely affected a suite of swimming behaviors reviewed by (Little and Finger 1990). One noteworthy study investigated the effects of six pesticides including methyl parathion (OP) and tribufos (OP) on rainbow trout swimming behavior (Little, Archeski et al. 1990). All insecticides adversely affected spontaneous swimming activity, while DEF also reduced swimming capacity in juvenile rainbow trout (Little, Archeski et al. 1990). In bluegill, methyl parathion adversely affected burst swimming behavior at 300 μg/L (Henry and Atchison 1984). Respiratory disruptions, comfort movements, and aggression behaviors in bluegill were all adversely affected by 24 h exposures to methyl parathion at 3.5 μg/L. This suggests that these social behaviors are very sensitive to AChE inhibition (Henry and Atchison 1984).

Two month old juvenile rainbow trout, brook trout, and coho were exposed to malathion (Phillaps Malathion 55%) for 7-10 days depending on species (Post and Leasure 1974). Swimming performance, brain AChE activity, and recovery time were measured following exposure to malathion concentrations of 0, 40, 90, 120 μg/L in brook trout; 0, 55, 112, 175 μg/L in rainbow trout; and 0, 100, 200, 300 μg/L in coho. Additionally, once fish recovered AChE

activity, they were subjected to a second exposure to determine if prior exposure altered susceptibility to malathion. Swimming performance and AChE activity did not differ from values of the initial exposure *i.e.,* a second exposure resulted in no evidence of increased susceptibility. Brook trout were the most sensitive based on AChE inhibition followed by rainbow trout and coho salmon, respectively. AChE inhibition of 25% relative to control fish occurred at 40 μg/L (brook trout), 55 μg/L (rainbow trout), and 100 μg/L (coho). Swimming performance was affected at the lowest concentrations tested in each salmonid species and showed a dose-dependent decrease in swimming performance as malathion concentration increased. The data indicated that AChE inhibition of approximately 20-30% resulted in a 5% or less reduction in swimming performance and as inhibition increased, swimming performance decreased. Note, however, that the swimming test conducted in the study is a coarse measure of swimming capacity. Thus, other non-measured swimming activity endpoints would likely be affected at lower concentrations (Little and Finger 1990; Little, Archeski et al. 1990).

In summary, the information presented on swimming behaviors from AChE-inhibiting insecticides provide a weight of evidence that carbamates (and OPs) adversely affect swimming behaviors which can reduce the fitness of affected salmonids.

Assessment endpoints: Olfaction and olfactory-mediated behaviors: Predator avoidance, prey detection and subsequent growth, imprinting of juvenile fish to natal waters, homing of adults returning from the ocean, and spawning/reproduction

Assessment measures: Olfactory recordings (electro-olfactogram), behavioral measurements such as detection of predator cues and alarm response, adult homing success, AChE activity in olfactory rosettes and bulbs, and avoidance/preference

The olfactory sensory system in salmonids is particularly sensitive to toxic effects of metals and organic contaminants. This is likely a result of the direct contact of olfactory neurons and dissolved contaminants in surface waters. Olfactory-mediated behaviors play an essential role in the successful completion of anadromous salmonid life cycles, and include detecting and avoiding predators, recognizing kin, imprinting and homing in natal waters, and reproducing. It is well established that Pacific salmon lose navigation skills when olfactory function is lost and consequently are unable to return to natal streams (Wisby and Hasler 1954).

We located studies that measured olfactory responses of fish to carbofuran and carbaryl. We found no studies with methomyl. Several studies with other carbamates were found, but most were with thiocarbamates which have a different mode of action than *N*-methyl carbamates, *i.e.,* they do not inhibit acetylcholineterase. We do not discuss or use studies with OPs as surrogates for effect to olfaction in salmonids because AChE inhibition does not appear to be the putative mode of action affecting olfaction, although more empirical data are needed to confirm this. Below we discuss the available literature of carbamate effects on fish olfaction.

The olfactory activity of juvenile cutthroat trout appeared unresponsive to carbaryl following 10 second pulses across the olfactory epithelia, and juveniles showed no preference/avoidance to carbaryl (Labenia, Baldwin et al. 2007). No departures relative to unexposed fish were observed at 5, 50, or 500 μg/L carbaryl from neurophysiological recordings *i.e.,* electro-olfactograms. Additionally, in a behavioral avoidance assay, cutthroat trout did not avoid seawater containing carbaryl at 500 μg/L. These results suggest that cutthroat trout do not actively avoid carbaryl and that short term exposures do not affect olfaction at the concentrations tested. We found no other studies that evaluated other salmonids in estuarine conditions or in freshwaters. We ranked these study results as highly relevant to the effects of carbaryl on salmonid olfaction and an olfactory-mediated behavior, avoidance.

In one set of experiments, coho salmon exposed for 30 minutes to three carbamates (carbofuran, antisapstain IPBC, mancozeb) separately, had reduced olfactory ability as well as disruption of normal AChE activity (Jarrard, Delaney et al. 2004). Carbofuran reduced olfaction by 50% (EC50) at 10.4 μg/L; IPBC reduced olfaction at 1.28 μg/L (EC50); and mancozeb reduced olfaction at 2.05 mg/L (EC50). In addition, carbofuran reduced AChE activity in the olfactory receptor at at 200 μg/L (68%), but none of the treatments (0.1, 10, or 200 μg/L) reduced brain or olfactory bulb AChE activity. This could be a result of the limited exposure duration. The authors concluded that too little information exists to develop a causal relationship between AChE inhibition and olfaction (Jarrard, Delaney et al. 2004). The data do show that carbofuran inhibited both olfaction and AChE activity at 10 and 200 μg/L, respectively. We ranked these study results as highly relevant to carbofuran's effect on salmonid olfaction.

Goldfish showed no avoidance of carbofuran up to a concentration of 10 mg/L, but at the onset of the contaminated flow goldfish showed increased and immediate burst swimming responses relative to unexposed fish (Saglio, Trijasse et al. 1996). In the same study, olfactometric tests were performed to assess the influence of 1, 10, and 100 μg/L carbofuran on a suite of behavioral responses to a food extract (a chironomid–containing solution). Sheltering, grouping, nipping, burst swimming, and attraction behaviors were assessed for ten minutes at 4, 8, and 12 h time points. Significant effects to goldfish behavior in the presence of food stimuli were observed as low as 1 μg/L carbofuran. Sheltering activity increased, while attraction decreased in a dose-dependent manner at 4 h across treatment range (1-100 μg/L) relative to unexposed fish. At 10 and 100 μg/L, goldfish nipped more, relative to controls; which may be representative of increased aggression and stress. The authors concluded that olfactory-mediated behaviors in goldfish were adversely affected by sublethal concentrations of carbofuran. We ranked this study as relevant to the assessment endpoint of olfaction, as ecologically relevant olfactory-mediated behaviors were tested with sublethal concentrations of carbofuran. We note that concentrations were not analytically verified and direct correlation of olfactory-affected goldfish behaviors to salmonid behaviors remains uncertain.

The olfactory ability of male Atlantic salmon to detect a female priming hormone was measured following 5 d exposures to carbofuran (1.1, 2.7, 6.5, 13.9, 22.7 μg/L) (Waring and Moore 1997). The response to the female pheromone prostaglandin F2α, by male olfactory epithelium was reduced at carbofuran concentrations as low as 1.0 μg/L., while the threshold for detection was reduced 10-fold. Furthermore, at 2.7 μg/L carbofuran, male fish completely lost priming ability induced by the female pheromone resulting in no increase in milt or plasma steroids at 2.7 μg/L. These results suggest that Atlantic salmon exposed to these concentrations would have difficulty preparing for spawning due to their impaired priming. Reductions in productivity are possible if male fish miss spawning opportunities. We ranked this study as highly relevant to the effects of carbofuran on olfactory–mediated behaviors such as spawning synchronization.

Mixtures containing carbaryl, carbofuran, and methomyl

We located no experiments that tested mixtures of the three a.i.s, nor did we find mixture studies with other *N*-methyl carbamates. Therefore, the potential for mixture toxicity to olfactory

endpoints of salmonids remains a recognized data gap. Given the differences in olfactory toxicity in salmonids for carbaryl (no observed toxicity) and carbofuran (inhibited olfaction at 10 μg/L) combined with no available information on methomyl's affect on olfaction, no apparent dose-response pattern of toxicity emerges for the three a.i.s.

Assessment endpoints: Toxic effects in salmonids from consuming contaminated prey

Assessment measures: Survival, swimming performance

A current uncertainty is the degree to which secondary poisoning of juvenile salmonids may occur from feeding on contaminated dead and dying drifting insects. Secondary poisoning is a frequent occurrence with OPs and carbamates in bird deaths (Mineau 1991), yet is much less studied in fish. Uptake, metabolism, and accumulation of carbaryl by a salmonid prey item, *Chironomus riparius* (midge), exposed for 24 h indicated significant uptake over the first 8 h, significant metabolism (more than 85-99%) of parent carbaryl to metabolites and low bioconcentration factors (5-10) (Lohner and Fisher 1990). These results suggest that contaminated prey items, such as aquatic invertebrates, do not accumulate significant carbaryl, and what they do accumulate is likely rapidly metabolized. That said, juvenile salmonids could still get a dose of carbaryl from feeding on drifting, contaminated insects that have not had time to metabolize carbaryl. Juvenile brook trout gorged on drifting insects following applications of carbaryl and AChE activity was reduced (15-34%) in the trout (Haines 1981). However, it is not possible to differentiate the contribution to AChE inhibition from the aqueous and dietary routes because concentrations were not measured in the water, prey, or fish. In another study, resident trout feeding on dying and dead drifting invertebrates (from the pyrethroid cypermethrin) caused a range of physiological symptoms in brook trout: loss of self-righting ability and startle response; lethargy; hardening and haemolysis of muscular tissue similar to muscle tetany; and anemic appearance of blood and gills (Davies and Cook 1993). The possibility that the adverse effects in the trout manifested from exposure to the water column instead of from feeding on contaminated prey was ruled out by the authors as measured field concentrations of pesticides did not produce known toxic responses. In a laboratory feeding study with the OP fenitrothion, brook trout (*S. fontinalis*) were fed contaminated pellets (1 or 10 mg/g fenitrothion for four wks) (Wildish and Lister 1973). Growth was reduced in both treatments. AChE inhibition was measured at 2, 12, and 27 d following termination of contaminated diet treatments. Trout had lower AChE activity than unexposed fish at both treatments, and by 27 d following termination,

AChE levels recovered slightly. The treatment concentrations used in this study are very high and indicate that brook trout are not sensitive to diet-induced toxicity of fenitrothion. The experiment did show that AChE inhibition from the diet is possible, yet it is difficult to determine the relative toxicity of carbaryl, carbofuran, and methomyl found in contaminated insects consumed by Pacific salmonids.

Habitat assessment endpoints:

Prey survival, prey drift, nutritional quality of prey, abundance of prey, health of aquatic prey community, and recovery of aquatic communities following N-methyl carbamate exposures

Assessment measures: 24, 48, and 96 h survival of prey items from laboratory bioassays reported as EC/LC50s; sublethal effects to prey items; field studies on community abundance; indices of biological integrity (IBI); community richness; and community diversity.

Death of aquatic invertebrates in laboratory toxicity tests were reported in each of the BEs. Salmonid aquatic and terrestrial prey are highly sensitive to the three carbamate insecticides. Death of individuals and reductions in individual taxa and prey communities have been documented and are expected following applications of *N*-methyl carbamates that achieve effect concentrations-several of which are at the low μg/L levels (Schulz 2004). Complete or partial elimination of aquatic invertebrates from streams contaminated by insecticides has been documented for carbaryl (Muirhead-Thomson 1987) as well as many other insecticides. A review of field studies published from 1982-2003 on insecticide contamination concluded that "about 15 of the 42 studies revealed a clear relationship between quantified, non-experimental exposure and observed effects in situ, on abundance [aquatic invertebrate], drift, community structure, or dynamics" (Schulz 2004). Although the top three insecticides most frequently detected at levels expected to result in toxicity were chlorpyrifos (OP), azinphos-methyl (OP), and endosulfan, the *N*-methyl carbamates carbaryl, carbofuran, oxymyl, and fenobucarb all showed clear or assumed relationships between exposure and effect (Schulz 2004).

Drift, feeding behavior, swimming activity, and growth are sublethal endpoints of aquatic prey negatively affected by exposure to AChE inhibitors (Courtemanch and Gibbs 1980; Haines 1981; Hatakeyama, Shiraishi et al. 1990; Davies and Cook 1993; Beyers, Farmer et al. 1995; Schulz 2004). Drift of aquatic invertebrates is an evolutionary response to aquatic stressors. However, insecticides, particularly carbamates and OPs, can trigger catastrophic drift of salmonid prey

items (Courtemanch and Gibbs 1980; Haines 1981; Hatakeyama, Shiraishi et al. 1990; Davies and Cook 1993; Schulz 2004). Some invertebrates may drift actively to avoid pesticides and settle further downstream, which can provide temporary spikes in available food items for feeding salmonids. Catastrophic drift can also deplete benthic populations resulting in long-term prey reduction that may affect salmonid growth at critical time periods. We located no studies that address this line of reasoning directly with Pacific salmonids. Davies and Cook (1993) did show aquatic invertebrate community changes, mortality of invertebrates, drift of dying and dead invertebrates, and affected trout following spraying of a pyrethroid pesticide, cypermethrin, an invertebrate and fish neurotoxicant (Davies and Cook 1993). Effect concentrations were estimated at 0.1-0.5 μg/L cypermethrin. It is difficult to compare these effect concentrations to carbamate insecticides. However, it is illustrative of how insecticides can damage multiple endpoints of an aquatic community including reducing abundance of prey (Davies and Cook 1993).

Several scientific peer-reviewed publications and EPA documents have reviewed aspects of the available information on multi-organism microcosm, mesocosm, and field test results for the AChE insecticides (Leeuwangh 1994; Barron and Woodburn 1995; Schulz 2004; Van Wijngaarden, Brock et al. 2005). Van Wijngaarden et al. (2005) conducted a literature review that listed ecological threshold values (*e.g.,* $NOEC_{eco}$ and $LOEC_{eco}$) for carbaryl, carbofuran, and bendiocarb (another *N*-methyl carbamate) from model ecosystems or "adequate" field studies. A $NOEC_{eco}$ represented "the highest tested concentration at which no, or hardly any, effects on the structure and functioning of the studied model ecosystem were observed. The $LOEC_{eco}$ is the lowest tested concentration at which significant treatment-related effects occurred" (Van Wijngaarden, Brock et al. 2005). Below we discuss some of this information in relation to effects on salmonid prey. The majority of studies were conducted in littoral systems, *i.e.,* ponds, and other static systems, but one study with carbaryl was conducted in a running water (lotic) system (Courtemanch and Gibbs 1980). Population densities of salmonid prey items (*i.e.*, Ephemeroptera, Diptera, Amphipoda, Cladocera, Copepoda, Isopoda, Ostracada, Trichoptera) decline following exposures to AChE-inhibiting insecticide concentrations, including carbaryl and carbofuran (Van Wijngaarden, Brock et al. 2005). Adverse effects to these groups occurred

at or below "1 toxic unit"-where a toxic unit equals field concentrations normalized by dividing them by the 48 h EC50 of *Daphnia magna* for a given AChE inhibitor.

We did not locate any microcosm, mesocosm, or field experiments that measured responses of aquatic communities that contained salmonids and salmonid prey simultaneously; a recognized data gap. Several studies evaluated aquatic invertebrate responses to *N*-methyl carbamates (carbaryl, carbofuran, and bendiocarb) in static and running water systems. We found no field studies with methomyl. We summarize open literature studies with aquatic invertebrates organized by insecticide in Table 65. We found no studies that addressed effects of methomyl on aquatic invertebrates in the field or from multispecies microcosms or mesocosms.

The available literature from field experiments indicates that populations of aquatic insects and crustaceans are likely the first aquatic organisms damaged by exposures to carbaryl, carbofuran, and methomyl contamination. Benthic community shifts from sensitive mayfly, stonefly and caddisfly taxa, the preferred prey of salmonids, to worms and midges occur in areas with degraded water quality including from contaminants such as pesticides (Cuffney, Meador et al. 1997; Hall, Killen et al. 2006). Reduced salmonid prey availability correlated to OP use in salmonid bearing watersheds (Hall, Killen et al. 2006). We found no studies that evaluated the effects on carbamates and that made correlations to salmonid bearing watersheds. Subsequent effects to salmonid's growth from reduced prey availability and quality remain untested and are a current data gap.

We located a study addressing impacts on fish growth due to prey reduction. Although this study was conducted on chlorpyrifos, an insecticide not considered in this Opinion, we deemed it highly relevant due to the ecological context it provided. The study indicated that native fathead minnows exposed to chlorpyrifos had reduced growth due to reductions in prey item abundance in littoral enclosures (pond compartments) (Brazner and Kline 1990). The experiment tested the hypothesis that, "addition of chlorpyrifos would reduce the abundance of invertebrates and cause diet changes that would result in reduced growth rates." Nominal, chlorpyrifos treatment concentrations of 0.5, 5.0, and 20 μg/L (chemical analysis of water concentrations provided at 0, 12, 24, 96, 384, 768 h) all resulted in statistically significant reductions in growth at 31 days. A

single pulse of chlorpyrifos was introduced into each enclosure at day 0. Invertebrate abundance was determined in each replicate on days -3, 4, 16, and 32. Fathead minnows were sampled from enclosures on days -2, 7, 15, and 31 where fish were weighed, measured, and dissected to determine gut content (dietary items identified). By day 7, significant differences in mean numbers of rotifers, cladocerans, protozoans, chironomids, mean total number of prey being eaten per fish, and mean species richness were greater in fish from the control enclosures than in some of the treatments. By day 15, control minnows were significantly larger than fish from treated levels. These experimental results support the conclusion that reductions in abundance of prey to juvenile fish can result in significant growth effects. It is reasonable to assume that reductions in prey from carbamate insecticides can also result in reduced juvenile salmonid growth and ultimately reduced survival and productivity. The precise levels of prey reduction necessary to cause subsequent reductions in salmonid growth remain a recognized data gap.

Recent declines in aquatic species in the Sacramento-San Joaquin River Delta in California have been attributed in part to toxic pollutants, including pesticides (Werner, Deanovic et al. 2000). Significant mortality or reproductive toxicity in *C. dubia* was detected in water samples collected at 24 sites in the Sacramento-San Joaquin River Delta in California. Ecologically important back sloughs had the largest percentage of toxic samples (14 - 19%). The TIEs identified carbofuran and carbaryl as well as the OPs chlorpyrifos, diazinon, and malathion as the primary toxicants in these samples responsible for the adverse effects (Werner, Deanovic et al. 2000).

Recovery of salmonid prey communities following acute and chronic exposures from carbaryl, carbofuran, and methomyl depends on the organism's sensitivity, life stage, length of life cycle, among other characteristics. Univoltine species will take longer than multivoltine species to recover (Liess and Schulz 1999). Recovery of salmonid prey items such as caddisflies, stoneflies, and mayflies will be slow, considering their long life cycles and infrequent reproduction. Additionally, these species also require clean, cool waters to both recover and maintain self-sustaining populations. In several salmonid-supporting systems these habitats are continually exposed to anthropogenic disturbances, including pesticide contamination, which limits their recovery and can also limit recovery of multivoltine species. For example, urban environments are seasonally affected by stormwater runoff that introduces toxic levels of

contaminants and scours stream bottoms with high flows. Consequently, urban environments do not typically support diverse communities of aquatic invertebrates (Paul and Meyer 2001; Morley and Karr 2002).

Similarly, yet due to a different set of circumstances, watersheds with intensive agriculture land uses show compromised invertebrate communities (Cuffney, Meador et al. 1997). Indices of biological integrity (IBI) and other invertebrate community metrics are useful measures of the health of an aquatic community because cumulative impacts of aquatic stressors are integrated over time. The IBI is also valuable because it converts relative abundance data of a species assemblage into a single index of biological integrity (Allan 1995). Salmonid-inhabited watersheds have been assessed using IBIs and other metrics of aquatic community health.

A study on the condition of Yakima River Basin's aquatic benthic community found that invertebrate taxa richness was directly related to the intensity of agriculture *i.e.,* at higher agriculture intensities taxa richness declined significantly both for invertebrates as well as for fish (Cuffney, Meador et al. 1997). Locations with high levels of impairment were associated with high levels of pesticides and other agricultural activities, which together with habitat degradation were likely responsible for poor aquatic conditions in the Yakima (Cuffney, Meador et al. 1997). Salmonid ESUs and DPSs occur in the Yakima River Basin as well as other watersheds where invertebrate community measurements indicate severely compromised aquatic invertebrate communities such as the Willamette River Basin, Puget Sound Basin, and the Sacramento-San Joaquin River Basin.

Table 65. Study designs and results with freshwater aquatic invertebrates

Chemical	Taxa/species	Assessment measures	Concentrations tested	Exposure duration	Effects	Data source
Carbaryl	multiple n= 25; including predators, herbivores, zooplankton	species richness, biomass, abundance, survival	510 μg/L; single application; simulating direct overspray	13 d	Reduced richness of community (by 15%), predators, zoo plankton; reduced biomass of predators; increased abundance of large herbivores; No effect on zooplankton abundance; elimination of diving beetle larvae, *Daphnia pulex*, *D. ambigua*	(Relyea 2005)
Carbaryl	*C. californica* (stonefly) *C. sp.* (mayfly) *A. sp* (mayfly) *B. americanus* (caddisfly) *P. sp.* (caddisfly) early instar *P. sp.* (caddisfly) late instar *L. unicolor* (caddisfly)	Survival; LC1,LC50	1-30 μg/L 4-100,000 μg/L 10-28 μg/L 5-55 μg/L 5-80 μg/L 5-80 μg/L 5- 80 μg/L	96 h	9.0 (LC1); 17.3 (LC50) μg/L 3.0; 11.1 7.5; 20.4 28.8; 41.2 14.8; 30.3 33.8; 61.0 9.5; 29.0	(Peterson, Jepson et al. 2001)
Carbaryl	Coleopteran (beetles), Diptera (flies), Trichoptera (caddisflies), terrestrial insects, Emphemeroptera (mayflies)	salmonid stomach contents	0.5 lbs/acre, 2 applications, 7 days interval	na	Increased numbers of Diptera in stomach after first spray; increased numbers of Emphemeroptera, Trichoptera, Diptera, and terrestrial insects indicating drift; condition factor of fish increased following applications due to increased feeding; fish AChE inhibited 15-34%fish AChE inhibited 15-34%	(Haines 1981)
Carbaryl	*Chironomus riparius* (midge)	Survival (EC50); Uptake rate; Bioconcentration factors (BCFs)	Multiple concentration ranges at pH 4,6,8; temps 12, 20, 30 °C	24 h	EC50s (61-133 μg/L); Lowest EC50 at 30 °C, pH 4 and 6; Highest EC50s at 10°C, pH 4 and 6. Uptake rates increased with temp. BCFs = 5.36-10.12	(Lohner and Fisher 1990)

Chemical	Taxa/species	Assessment measures	Concentrations tested	Exposure duration	Effects	Data source
Carbaryl	*C. californica* (stonefly) *Cinygma sp.* (mayfly)	Survival (EC50)	17.3, 173, 1730 μg/L 10.2, 102, 204, 408, 1020 μg/L	15 min 30 60 15 min 30 60 96 h recovery period	EC50= na EC50= na EC50 = 1139 95% CI (370-15400) μg/L EC50 = 848 no CI EC50 = 220 no CI EC50 = 165 95% CI (124-232)	(Peterson, Jepson et al. 2001)
carbaryl	Stream invertebrate aquatic community	Aquatic invertebrate drift, survival; presence and abundance of riffle invertebrates; recovery of benthic invertebrates	0.75 lbs/ acre; 1 lb/acre	2, 30, 60, 365 day drift sampling post spray; 1,2, 3, 30, 60 day benthic samples	170-fold increase in drift at 2 d. All invertebrates in drift samples dead at 2 d (Plecoptera, Ephemeroptera Diptera were common), at 30 and 60 d drift below prey-spray levels. Within hrs larger stream inverts found dead (Plecoptera, Trichoptera, Emphemerptera), Tricoptera abandoned their cases; at 30 and 60 d significant population declines of salmonid-prey invertebrates compared to pre-spray levels. Total number of organisms not significantly reduced.	(Courtemanch and Gibbs 1980)
carbaryl	*Xathocnemis zealandica* (damselfly)	Emergence of damselflies, % emerged	1, 10, 100 μg/L (concentrations replenished every 12 days at ½ the nominal treatment level)	67 days	90% reduction in emergence at 100 μg/L no significant differences at 1 and 10 μg/L.	(Hardersen and Wratten 1998)

Chemical	Taxa/species	Assessment measures	Concentrations tested	Exposure duration	Effects	Data source
carbaryl	*Daphnia magna* (daphnids)	Population abundance at different phases; Life stage sensitivity (survival, 48 h LC50)	15 μg/L applied as a single pulse at different population phases (treatments): growing, density peak, stable	1 pulse at day 8 to growing treatment (3 replicates), day 11 to density peak treatment , day 25 stable treatment; 48 h	70% decline in abundance during growth phase, 92.6% decline in peak phase, 34.8 % decline in stable phase , compare to a 61% decline in control population; Survival (48h LC50s)	(Takahashi and Hanazato 2007)
carbaryl	Zooplankton pond community	Abundance of zooplankton species	500 μg/L; 1-3 applications to pond mesocosms; 0.1 mg/L	0 – 3 months	At 500 μg/L sustained reductions in daphnid and copepod populations. No observable reductions in rotifer populations. At 100 μg/L, reductions in daphnid population observed, but not with copepods or rotifers	(Hanazato and Yasuno 1990)
carbaryl formulation (43.3% a.i.)	Bluegill sunfish, multiple aquatic species including phytoplankton, macrophytes, zooplankton, and macroinvertebrates	Abundance and richness of species groups; Fish survival and growth	2, 6, 20, 60, 200 μg/L; applications at weekly intervals for 6 weeks	0 – 12 weeks, with 6 weekly pulses beginning at week 10	no long term reductions in major invertebrate groups were observed; no detectable differences in bluegill survival or growth between control and pesticide treatments, carbaryl half life was 30 min, mean pH of treatment groups in application events ranged from 9.2-10.3; mean temperatures ranged from 17 – 27 ◦C, with the majority between 20-24 ◦C.	Registrant-submitted study (1993)

Chemical	Taxa/species	Assessment measures	Concentrations tested	Exposure duration	Effects	Data source
carbaryl formulation (Sevin-4-Oil)	Aquatic macroinvertebrate community; *Platygobio gracilis* (Flathead chub)	Invertebrate drift; AChE inhibition in resident fish	Aerial application in 1991 and 1993 applied at 0.5 lbs carabaryl/acre and 0.4 lbs/acre, respectively	River water sampled at 1, 2, 4, 8, 12, 24, 48, 96 h; AChE inhibition measured at 24 h; Drift sampled 4 times daily for 4 days	1 h average 85 μg/L and declined to 0.100 μg/L by 96 h in 1991; 2 h average 12 μg/L L and declined to 5.14 μg/L by 96 h in 1993; No detectable differences in AChE inhibition at 24 h, low statistical power (0.82 and 1); Note: AChE is expected to recover by 24 h; Increase in coefficient of variation of drift measure from day 1and 2 post application compared to reference site drift in 1991; Similar increase on day 2 in 1993; drift composed primarily of live mayflies (Emphemeroptera)	(Beyers, Farmer et al. 1995)
carbofuran	*Gammarus pulex* (fw amphipod)	*in situ* survival, feeding rates; laboratory bioassays measured 24 h survival (LC50) and feeding rates	Field study: measured stream concentrations in stormwater runoff following an application of 3 kg a.i./ ha; 27 μg/L stream, 256 μg/L in agricultural field ditch Lab study: Feeding rate- 0.75,1.25,2.25,4.0,7.0, 12.0 μg/L	Field study: 5 day; 2 rain events captured Lab study: Survival- 24-, 48- 96-hr Feeding rate- 7 day exposures	Field study: All amphipod chambers showed reduced feeding rates at time during rain events and all amphipods died in 10 experimental chambers Lab study: Survival- μg/L (95% CI) 24 h LC50 = 21 (14.7-30) 48 h LC50 = 12.5 (5.7-27.5) 96 h LC50 = 9 (5.8-13.9) Feeding rate- >3 μg/L feeding rates reduced to 0	(Matthiessen , Shearan et al. 1995)

Chemical	Taxa/species	Assessment measures	Concentrations tested	Exposure duration	Effects	Data source
carbofuran	1 h average 85 μg/L and declined to 0.100 μg/L by 96 h in 1991; 2 h average 12 μg/L L and declined to 5.14 μg/L by 96 h in 1993; No detectable differences in AChE inhibition at 24 h, low statistical power (0.82 and 1); Note: AChE is expected to recover by 24 h; Increase in coefficient of variation of drift measure from day 1and 2 post application compared to reference site drift in 1991; Similar increase on day 2 in 1993; drift composed primarily of live mayflies (Emphemeroptera)	Taxa abundance and biomass	5 μg/L 25 μg/L Note: pH of 9 in experimental pond reduced persistence of carbofuran by increasing the rate of hydrolysis (Chapman and Cole 1982)	Taxa assessed at 5, 11, 32, 55 days post application	No detectable reductions to abundance or biomass of taxa from 5 μg/L; *H azteca*: 10% reduction in abundance; 6% reduction in biomass Chironominae: 77% dead in 48-72 h dip net samples compared to 0% dead in control and 5 μg/L treatment; biomass reduced by 17% at 55 d; evidence that younger larvae were less sensitive than older larvae; No detectable reductions in remaining taxa	(Wayland 1991)
carbofuran	Aquatic invertebrate community in rice fields: ostracada, copepod, cladocera, mosquito larvae, chironomid larvae	Abundance of ostracada, copepod, cladocera, mosquito larvae, chironomid larvae	0.1 kg carbofuran/ha-applied once 0.3 kg carbofuran/ha applied in two regimes: 3, 52, 85, 97 days; 16, 57, 69 days	variable application intervals and frequencies	Ostracada: timing and magnitude of peak abundances not affected by carbofuran, multiple application regimes of 0.3 k/ha significantly reduced abundance compared to one application of 0.1 kg/ha Copepods: significant reductions at 45 and 57 d at 0.3 kg/ha. Cladoceran: rate of population growth significantly affected from 52 and 85 days at 0.3 kg/ha. Abundance lower at 0.1 kg/ha compared to 0.3 kg/ha. Chironomid larvae: isolated significant differences in abundances were found (P<0.05), but showed no dose-response relationship Mosquito larvae: No change in abundances	(Simpson, Roger et al. 1994)

Chemical	Taxa/species	Assessment measures	Concentrations tested	Exposure duration	Effects	Data source
carbofuran	*Cerodaphnia dubia* (daphnids)	Survival (24 and 48 h LC50s); survival from mixture of carbofuran and methylpararthion (48 h LC50); Mean young per female and percent survival from 7 day chronic assays	Irrigation field-collected water samples (toxicity identification evaluations employed) Mixture toxicity (1:1, 3:1, 1:3 ratios tested) 0.16, 0.33, 0.65, 1.3, 2.6 μg/L	24, 48 hours 7 days	Carbofuran and methyl-parathion putative agents of toxicity in field-collected samples from CA rice drain. Carbofuran acute toxicity: 24 h LC50 3.4 μg/L (95% CI 2.8-4.3; 48 h LC50 2.6 μg/L (95% CI NA); chronic study- NOEC 1.3 μg/L; LOEC at 2.6 μg/L Strict additive toxicity of combinations tested of carbofuran and methyl-parathion.	(Norberg-King, Durhan et al. 1991)
carbofuran	*Chironomus tentans* (midge)	Survival in spiked-sediments, mixed with atrazine, and field-collected runoff	Spiked sediment concentrations: 25, 45, 83, 150 μg/kg; Mixture concentrations: 25, 45, 80 μg/kg carbofuran + 5, 10, 20 mg/kg atrazine; Field collected sediments in runoff: collected sediments in runoff: 186 μg/kg sediment-associated 73 μg/L pore water	10 days	Spiked sediment results: Nominal [carbofuran] LC50 47.9 μg/kg (95% CI 43.9-52.1); Sediment bound LC50 20.9 μg/kg (95% CI 18.4-33.2); Interstitial water LC50 11.8 μg/L (95% CI 10.9-17.1) Mixture results: Additive toxicity present with atrazine + carbofuran, no synergistic or antagonistic toxicity responses. Atrazine affected survival in the low mg/kg range. Field collected sediments in runoff: No chironomids survived exposure, note control survival was low (57%)	(Douglas, McIntosh et al. 1993)
carbofuran	*Chorophium volutator* (estuarine amphipod)	Survival and avoidance behavior in contaminated spiked sediments	2.5, 25, 250 ng/g (dry weight sediment)	48 and 96 h exposures	48 h LC 50 = 73 ng/g (95% CI 0-128); 48 h LC20 = 41 (95% CI 2-82) ng/g; no effect on avoidance behavior of sediment	(Hellou, Leonard et al. 2009)

Chemical	Taxa/species	Assessment measures	Concentrations tested	Exposure duration	Effects	Data source
carbofuran	*Daphnia magna* (daphnid) *Hydra attenuate* (fw jellyfish) *Macrobrachium rosenbergii* (fw shrimp) Aquatic macroinvertebrate community	Survival (acute LC50); macroinvertebrate community structure	Average concentrations detected 5 d post application 0.7 and 0.16 μg/L maximum carbofuran detection 2.1 μg/L	24 , 48, 72, 96 h exposures to field collected water samples	No acute toxicity reported to tested species. Significant reduction of % EPT taxa and increase in community loss indices at treated sites. Mayflies were primary affected species from carbofuran applications	(Castillo, Martinez et al. 2006)
carbofuran	*Ceriodaphnia dubia (daphnid)* *Neomysis mercedi(* mysid*)* *Pimephales promelas (*fathead minnow*)*	Survival (% mortality)	Not reported; conducted toxicity identification evaluations (TIE)	96 h exposures to field collected water samples	3/47 irrigation samples had 100% toxicity to *C. dubia* attributed to carbofuran	(de Vlaming, DiGiorgio et al. 2004)
carbofuran	Wetland invertebrate aquatic community*:* *Daphnia magna,* *Chironomus riparius*	Survival (EC50) Primary productivity	10, 100, 1,000 μg/L water only 48 h test; 10, 100, 1,000 μg/L mixed with soil and added to microcosms	48- hr; 30 day microcosm test	*D. magna* EC50 = 48 μg/L *C. riparius* EC50 = 56 μg/L Populations of *D. magna* were viable at day 1 in 10 and 100 μg/L, it took 4 d for a viable population (*i.e.,* 5 or more live daphnids) to establish at 1000 μg/L . No dead daphnids or chironomids observed at 14 d and 30 d. No effects to microbial community enzyme activity were found.	(Johnson 1986)

Studies with other AChE inhibitors on salmonid prey items:

Robust evidence shows that salmonid prey taxa and communities can be substantially reduced following exposures to the OP insecticides chlorpyrifos, diazinon, and malathion. NMFS reviewed these data and presented its findings in a biological opinion (NMFS 2007d). We use these findings to show the types of aquatic community responses following exposures to AChE inhibiting insecticides. The toxic potency of a pesticide is a function of concentration and duration of exposure, which in turn is a function of a pesticide's physical properties and interactions of the pesticide with environmental variables such as temperature, pH, sunlight, soil micro-organisms, etc. With this in mind, if carbaryl, carbofuran, and methomyl are at concentrations individually (or together in mixtures) expected to reduce salmonid prey communities, we infer a similar magnitude of response (reductions in abundance from death and catastrophic drift) and similar recovery period for those observed in affected aquatic communities treated with OP insecticides.

We note that individual aquatic invertebrates exhibiting adverse sublethal responses from carbamates will likely recover much more quickly than those exposed to OPs (Kallander, Fisher et al. 1997). The midge, *Chironomus tentans*, showed complete recovery of AChE activity in 24 h following two 1 h pulses of carbaryl separated by 24 h. Additionally, two, 1 h pulses of carbamates (carbaryl, carbofuran, aldicarb, propoxur) caused significantly fewer symptoms of intoxication than 2 h of continuous exposure when chironomids were given 2 to6 h of recovery in clean water between doses (Kallander, Fisher et al. 1997). In contrast, sublethal exposures to OPs were equally toxic when exposures are either pulsed or continuous.

Reviews of field, mesocosm, and microcosm studies with the three OPs document reductions in aquatic invertebrate populations and lengthy recovery times for populations of some taxa (Giesy, Solomon et al. 1998; Van Wijngaarden, Brock et al. 2005). A recent study found significant changes to macroinvertebrate assemblages of artificial stream systems following a 6 h exposure to chlorpyrifos at 1.2 μg/L (Colville, Jones et al. 2008). The addition of chlorpyrifos to the artificial streams resulted in a rapid (6 h) change in the macroinvertebrate assemblages of the streams, which persisted for at least 124 d after dosing (Colville, Jones et al. 2008). The chlorpyrifos dissipated from the system within 48 h (Pablo, Krassoi et al. 2008), however the

macroinvertebrate community did not recover rapidly. Several species similar to salmonid prey items were significantly affected.

Zooplankton and insect taxa appeared the most sensitive in studies with diazinon. In particular, the salmonid prey taxa Trichoptera, Diptera, and Cladocera were highly sensitive (Giddings, Hall et al. 2000). Field studies in salmonid habitat also show reductions in salmonid prey abundances. For example, in listed steelhead habitat in the Salinas River, California, abundances of the salmonid prey items including mayfly taxa, daphnids, and an amphipod (*Hyalella azteca*) were significantly reduced downstream of an irrigation return drain compared to upstream (Anderson, Hunt et al. 2003; Anderson, Hunt et al. 2003; Anderson, Phillips et al. 2006). Diazinon and chlorpyrifos were detected above acute toxicity thresholds in surface waters and sediments. Combined toxicity of the two OPs using a toxic unit approach correlated strongly with mortality of daphnids. For *H. azteca*, acute toxicity was attributed to sediment pore-water concentrations of chlorpyrifos (Anderson, Hunt et al. 2003). Other pesticides, including carbaryl, were likely present and responsible for some of the toxicity in the Salinas River,. In a subsequent study on the Salinas River, TIE demonstrated that chlorpyrifos and diazinon were responsible for the observed death of the daphnid *C. dubia* (Hunt, Anderson et al. 2003). These data support the line of evidence that field concentrations of OPs can and do adversely affect aquatic invertebrates in salmonid habitats. It is reasonable to assume that the same situation occurs with carbamates, given the toxicity of the compounds and the similar mode of action.

Adjuvant toxicity

Assessment endpoints: Survival of fish and aquatic prey items, endocrine disruption in fish

Assessment measures: 24, 48, 96 h LC50s, and vitellogenin levels in fish plasma

Although no data were provided in the BEs related to adjuvant toxicity, an abundance of toxicity information is available on the effects of the alkylphenol polyethoxylates, a family of non-ionic surfactants used extensively in combination with pesticides as dispersing agents, detergents, emulsifiers, adjuvants, and solubilizers (Xie, Thrippleton et al. 2005). Two types of alkylphenol polyethoxylates, NP ethoxylates and octylphenol ethoxylates, degrade in aquatic environments to the more persistent, toxic, and bioaccumulative degradates, NP and octylphenol, respectively. We note that the technical registrant of methomyl stated that no nonylphenol ethoxylates are used within methomyl formulations. We did not receive information on the presence or absence

of alkylphenol polyethoxylates in carbaryl- or carbofuran- containing formulations. Adjuvants are frequently mixed with formulations prior to applications, so although they may not be present in the formulations they could still be co-applied. Below we discuss NP's toxicity as an example of potential adjuvant toxicity, as we received no information on adjuvant use or toxicity within the BEs.

We queried EPA's ECOTOX online database and retrieved 707 records of nonylphenol's (NP) acute toxicity to freshwater and saltwater species. The lowest reported LC50 for a salmonid was 130 μg/L for Atlantic salmon. Aquatic invertebrates, particularly crustaceans, were killed at low concentrations of NP, with the lowest reported LC50 = 1 μg/L for *H. azteca*. These data indicate that a wide array of aquatic species are killed by NP at μg/L concentrations. We also queried EPA's ECOTOX database for sublethal toxicity and retrieved 689 records of freshwater and saltwater species tested in chronic experiments. The lowest fish LOEC reported was 0.15 μg/L for fathead minnow reproduction. Numerous fish studies reported LOECs at or below 10 μg/L. Additionally, salmonid prey species are sensitive to sublethal effects of NP at low μg/L concentrations. The amphipod, *Corophium volutator*, grew less and had disrupted sexual differentiation (Brown, Conradi et al. 1999). Multiple studies with fish indicated that NP disrupts fish endocrine systems by mimicking the female hormone 17β-estradiol (Brown and Fairchild 2003; Arsenault, Fairchild et al. 2004; Madsen, Skovbolling et al. 2004; Jardine, MacLatchy et al. 2005; Luo, Ban et al. 2005; McCormick, O'Dea et al. 2005; Segner 2005; Hutchinson, Ankley et al. 2006; Lerner, Bjornsson et al. 2007; Lerner, Bjornsson et al. 2007). NP induced the production of vitellogenin in fish at concentrations ranging from 5-100 μg/L (Hemmer, Bowman et al. 2002; Ishibashi, Hirano et al. 2006; Arukwe and Roe 2008; Schoenfuss, Bartell et al. 2008). Vitellogenin is an egg yolk protein produced by mature females in response to 17-β estradiol, however immature male fish have the capacity to produce vitellogenin if exposed to estrogenic compounds. As such, vitellogenin is a robust biomarker of exposure. A retrospective analysis of an Atlantic salmon population crash suggested the crash was due to NP applied as an adjuvant in a series of pesticide applications in Canada (Fairchild, Swansburg et al. 1999; Brown and Fairchild 2003). Additionally, processes involved in sea water adaptation of salmonid smolts are impaired by NP (Madsen, Skovbolling et al. 2004;

Jardine, MacLatchy et al. 2005; Luo, Ban et al. 2005; McCormick, O'Dea et al. 2005; Lerner, Bjornsson et al. 2007; Lerner, Bjornsson et al. 2007).

These results demonstrate NP is of concern to aquatic life, particularly salmonid endocrine systems involved in reproduction and smoltification. This summary is for one of the more than 4,000 inerts/other ingredients and adjuvants currently registered for use in pesticide formulations and there are likely others with equally deleterious effects. Unfortunately we received minimal information on the constituents found in carbaryl-, carbofuran-, and methomyl-containing formulations. Consequently, the effects that these other ingredients may have on listed salmonids and designated critical habitat remain an uncertainty and are a recognized data gap in EPA's action under this consultation.

Summary of Response Analysis:

We summarize the available toxicity information by assessment endpoint in Table 66. Data and information reviewed for each assessment endpoint was assigned a general qualitative ranking of either "low", "medium", or "high." To achieve a high confidence ranking, the information stemmed from direct measurements of an assessment endpoint, conducted with a listed species or appropriate surrogate, and was from a well-conducted experiment with stressors of the action or relevant chemical surrogates. A medium ranking was assigned if one of these three general criteria was absent and low ranking was assigned if two criteria were absent. Evidence of adverse effects to assessment endpoints for salmonids and their habitat from the three a.i.s was prevalent. However, much less information was available for other ingredients, in part, due to the lack of formulation information provided in the BEs as well as the statutory mandate under FIFRA for toxicity data on the a.i.s to support registration. We did locate a substantial amount of data on one group of adjuvants/surfactants, the NP ethoxylates. However, we received and located minimal information for the majority of tank mixes and other ingredients within formulations.

Table 66. Summary of assessment endpoints and effect concentrations

Assessment Endpoint	Evidence of adverse responses (yes/no)	Concentration range of observed effect or concentrations tested showing absence of effect (µg/L)	Degree of confidence in effects (low, medium, high)
Carbaryl			
Fish:			
-survival (LC50)	yes	250-4,500	high
-growth	no	8,17,62,210, 680	medium
-reproduction	yes	680	medium
-swimming	yes	10-12,500	high
-olfactory-mediated behaviors	no	5, 50, 500	high
Habitat: -prey survival (LC50)	yes	1.5-35[1]	high
Carbofuran			
Fish:			
-survival (LC50)	yes	88-3,100	high
-growth	yes	56.7	medium
-reproduction	yes	6	low
-swimming	yes	5, 100	medium
-olfactory-mediated behaviors	yes	1-200	high
Habitat: -prey survival (LC50)	yes	1.6[2]-2,700	high
Methomyl			
Fish:			
-survival (LC50)	yes	300-7,700	high
-growth	yes	142, 243	medium
-reproduction	no	31-500	low
-swimming	-	-	-
-olfactory-mediated behaviors	-	-	-
Habitat: -prey survival (LC50)	yes	8.8-920	high
Other ingredient:			
Nonylphenol (NP)			
Fish:			
-survival (LC50)	yes	130 - >1,000	high
-reproduction	yes	0.15 - 10	high
-smoltification	yes	5 - 100	medium
-endocrine disruption	yes	5.0 – 100	high
Habitat: -prey survival (LC50)	yes	1- >1,000	high
Additive toxicity of *N*-methyl carbamates	yes	multiple	high
Synergistic toxicity of *N*-methyl carbamates	yes	multiple	high

[1] reported 48 h EC50s of *D. magna* are low and high values of the range (Takahashi and Hanazato 2007)
[2] 48 h survival EC50 of *Chironomus tentans* (Karnak and Collins 1974)

Risk Characterization

In this section we integrate our exposure and response analyses to evaluate the likelihood of adverse effects to individuals, populations, species, and designated critical habitat (Figure 38). We combined the exposure analysis with the response analysis to: 1) determine the likelihood of salmonid and habitat effects occurring from the stressors of the action; 2) evaluate the evidence presented in the exposure and response analyses to support or refute risk hypotheses; 3) translate fitness level consequences of individual salmonids to population-level effects; and 4) translate habitat-associated effects to potential impacts on PCEs of critical habitat. The risk characterization section concludes with a general summary of species responses from population-level effects. We then evaluate the effects to specific ESUs and designated critical habitat in the *Integration and Synthesis* section.

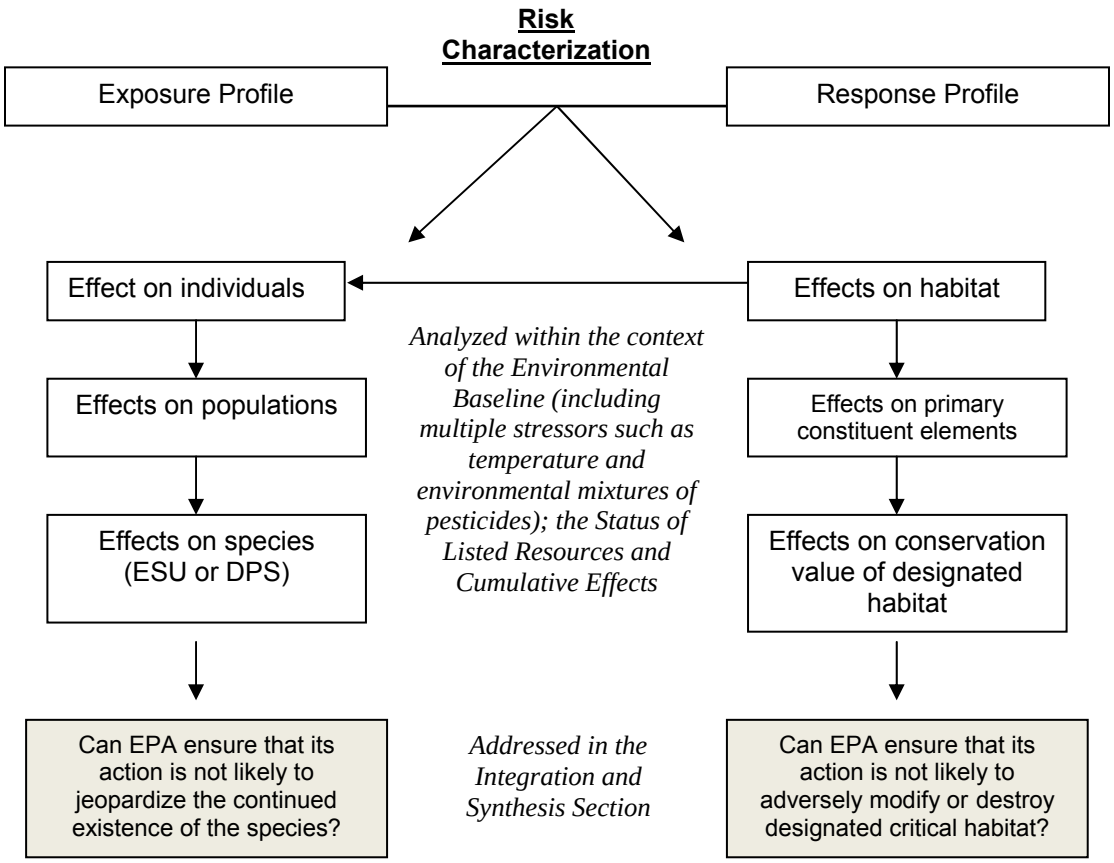

Figure 38. Schematic of the Risk Characterization Phase

Exposure and Response Integration

In Figures 39-41, we show the overlap between exposure estimates for the three carbamates and concentrations that affect assessment endpoints. The figures show the exposure concentration ranges (minimum – maximum values) gleaned from the three predominant sources of exposure data we analyzed: monitoring data; EPA's estimates presented in the BEs that represent crop uses; and NMFS' modeling estimates for off-channel habitats. None of the modeled exposure estimates were derived for non-crop use. This is a major data gap as carbaryl is used extensively in urban and residential areas. The effect concentrations are values taken from the toxicity data reviewed in the *Response Analysis Section*. With respect to the assessment endpoint survival, recall that the effect concentrations are LC50s, thus death of sensitive individuals is not represented by this metric and can occur at concentrations well below LC50s. Additionally, we cannot accurately predict at what concentrations death first occurs because dose-response slope information was generally not provided for most of the acute lethality studies. Although we are unable to determine at what concentration an individual organism might die, we do incorporate survival endpoints from acute 96 h studies using a default slope in a population modeling exercise discussed below. This slope is recommended by EPA when more relevant information is unavailable (EPA 2004). Where overlap occurs between exposure concentrations and effect concentrations NMFS explores the likelihood of adverse effects. If data suggest exposure exceeds adverse effects thresholds, we discuss the likelihood and expected frequency of effects based on species information and results of the exposure and response analyses.

This is a coarse analysis because it does not present temporal aspects of exposure nor does it show the distribution of toxicity values. However, it does allow us to systematically address which assessment endpoints are affected from carbaryl, carbofuran, and methomyl exposure. Where significant uncertainty arises, NMFS highlights the information and discusses its influence on our inferences and conclusions. We discuss the uncertainties related to these endpoints under associated risk hypotheses later in this section.

Carbaryl

Concentration ranges overlap with most of the assessment endpoint ranges indicating that adverse effects are expected in salmonids if exposed for sufficient durations (Figure 39). Prey

survival appears to be the most sensitive endpoint as all three ranges encompass this endpoint and the maximum concentration values far exceed the prey survival range. Swimming is likely impaired at the higher end of the concentration range from monitoring data, at the middle and higher range from EPA estimates, and throughout the range predicted in the off-channel habitat estimates. Concentrations occurring in the off-channel habitats that NMFS modeled will kill juvenile salmonids. Furthermore, given the LC50 values for salmonids following 96 h exposures, we expect that fewer deaths of juveniles will occur in many of the freshwater habitats exposed to carbaryl. Fish reproduction (based on a single fathead minnow study) would be affected by concentrations in the off-channel habitat. We also note minimal data exist on effects to fish growth: only a single study with fathead minnows. We expect that carbaryl will impair swimming of salmonids, kill salmonid prey, and in certain circumstances kill salmonids when exposed for sufficient durations. The effect concentrations shown in the figure do not account for the potential enhanced toxicity of carbaryl to salmonids or their prey items in aquatic habitats where other AChE inhibitors are present. We also note that pH is a major factor in carbaryl's persistence in aquatic habitats. At pHs above 8, carbaryl breaks down fairly rapidly (half-life of 24 h) while at pHs less than 8 carbaryl is much more resistant to hydrolysis (half-life of 1- 30 d for pH of 7.9 – 5.7). The pH of natural surface waters commonly ranges from 7 to 9, thus pH is an important consideration when evaluating toxicity of carbaryl.

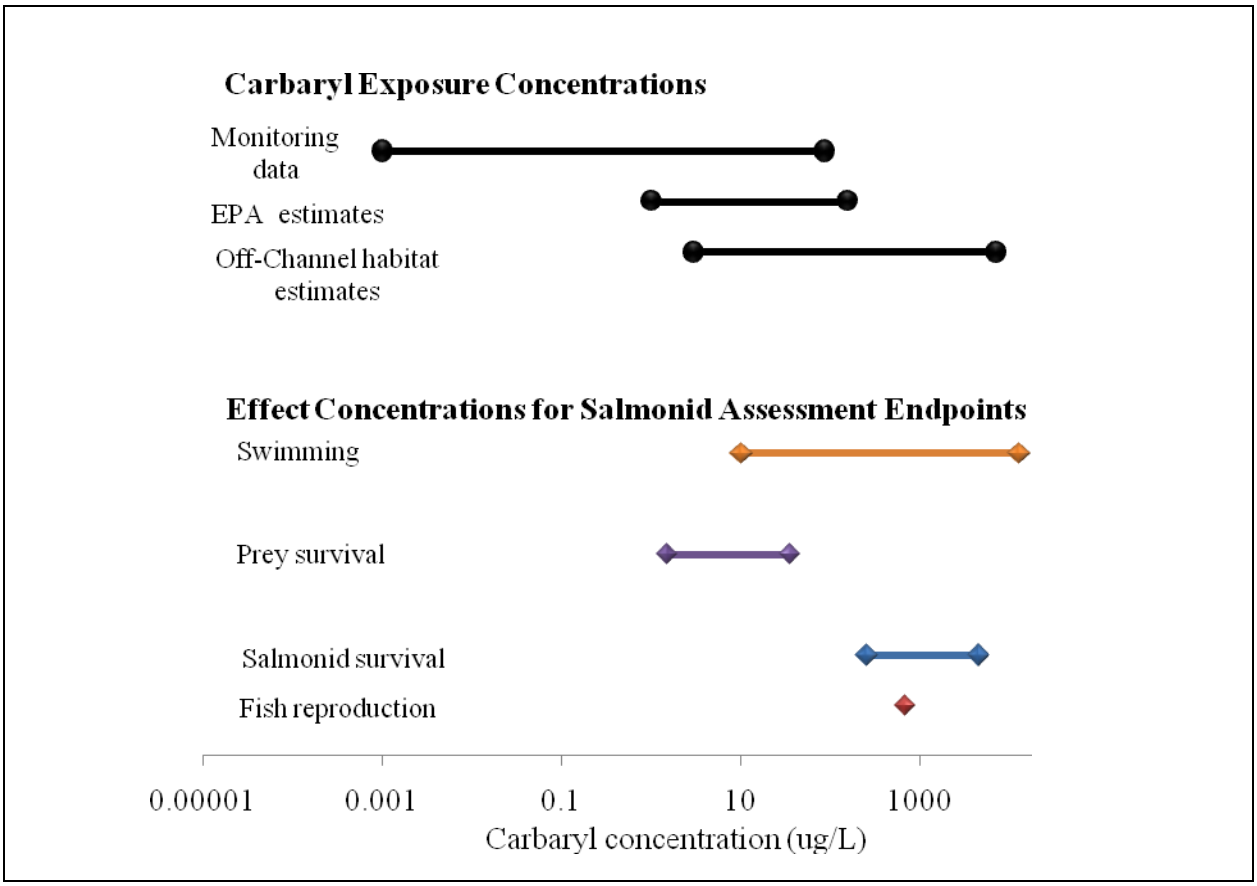

Figure 39. Carbaryl exposure concentrations and salmonid assessment endpoints' effect concentrations in µg/L

Carbofuran

Concentration ranges overlap with most of the assessment endpoint ranges, indicating that adverse effects are expected in salmonids if exposed for a sufficient duration (Figure 40). Salmonid prey items appear just as sensitive to carbofuran as to carbarylalthough significant variation among prey species was observed in reported acute survival EC/LC 50s. Fish reproduction, swimming and salmonid olfactory-mediated behaviors are encompassed or exceeded by all three exposure ranges. The fish growth value (56 µg/L LOEC) was exceeded by the off-channel habitat concentrations. Salmonid survival was the least sensitive response reviewed. As with carbaryl, concentrations of carbofuran occurring in the off-channel habitats that NMFS modeled will kill juvenile salmonids. Furthermore, given the LC50 values for salmonids following 96 h exposures, we expect that fewer deaths of juveniles will occur in many of the freshwater habitats exposed to carbofuran. As with carbaryl, we note that pH is a major

factor in the degree of toxicity of carbofuran. At pHs above 9, carbofuran breaks down fairly rapidly (half-life of 0.8-15 h) while at pH 7 reported half-lives range from 2- 28 d. Therefore, pH is an important consideration when evaluating toxicity of carbofuran in the aquatic environment. We discuss these effects and other considerations in more detail under the risk hypotheses.

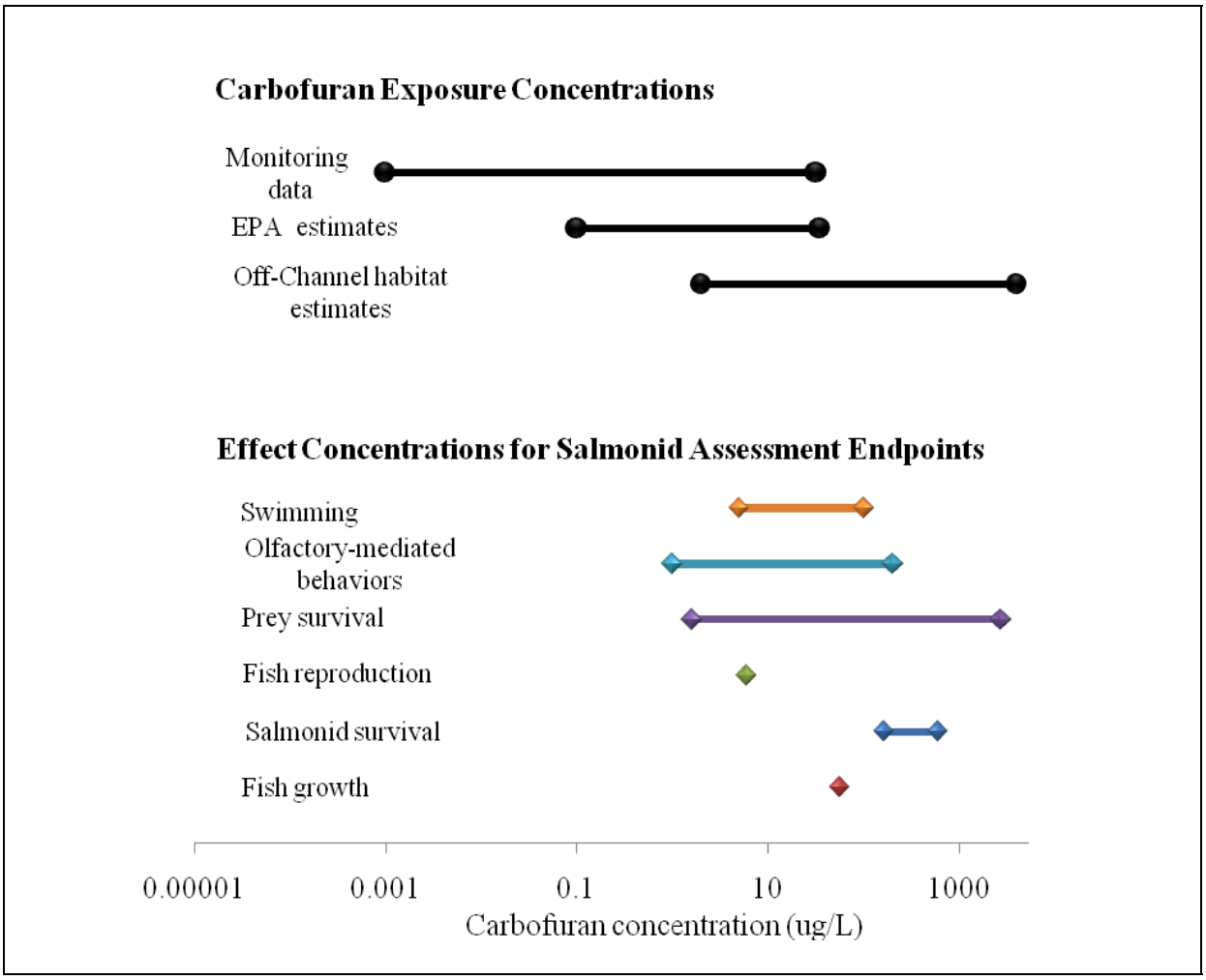

Figure 40. Carbofuran exposure concentrations and salmonid assessment endpoints' effect concentrations in µg/L

Methomyl

We expect a portion of fish to be exposed to upper end concentrations which would overlap with most of the effect thresholds. (Figure 41). As with carbaryl and carbofuran, prey survival was the most sensitive endpoint assessed. More sensitive prey, with EC50s at the lower end of the

distribution, are expected to die based on all three exposure estimate ranges, with the highest rates of mortality based on EPA estimates and NMFS' off-channel habitat estimates. The magnitude of reduction in prey abundance will depend on which taxa are present in the exposed water body and the actual concentrations and exposure durations. If reductions in prey abundance, especially of the smaller organisms, coincide with fry feeding for the first time following yolk sac absorption, starvation is likely. We discuss this in greater detail in the risk hypotheses below. The lower value of the fish reproduction endpoint, 31 µg/L, overlapped with both EPA's and NMFS' off-channel habitat estimates, and the highest value in the monitoring data was greater. A notable data gap is the absence of information on methomyl's toxicity to olfactory-mediated behaviors. Although we found no studies that evaluated swimming, we expect swimming impairment at concentrations less than LC50s because swimming is impaired with other AChE inhibitors and AChE inhibition correlates to impaired swimming (Little and Finger 1990; Little, Archeski et al. 1990).

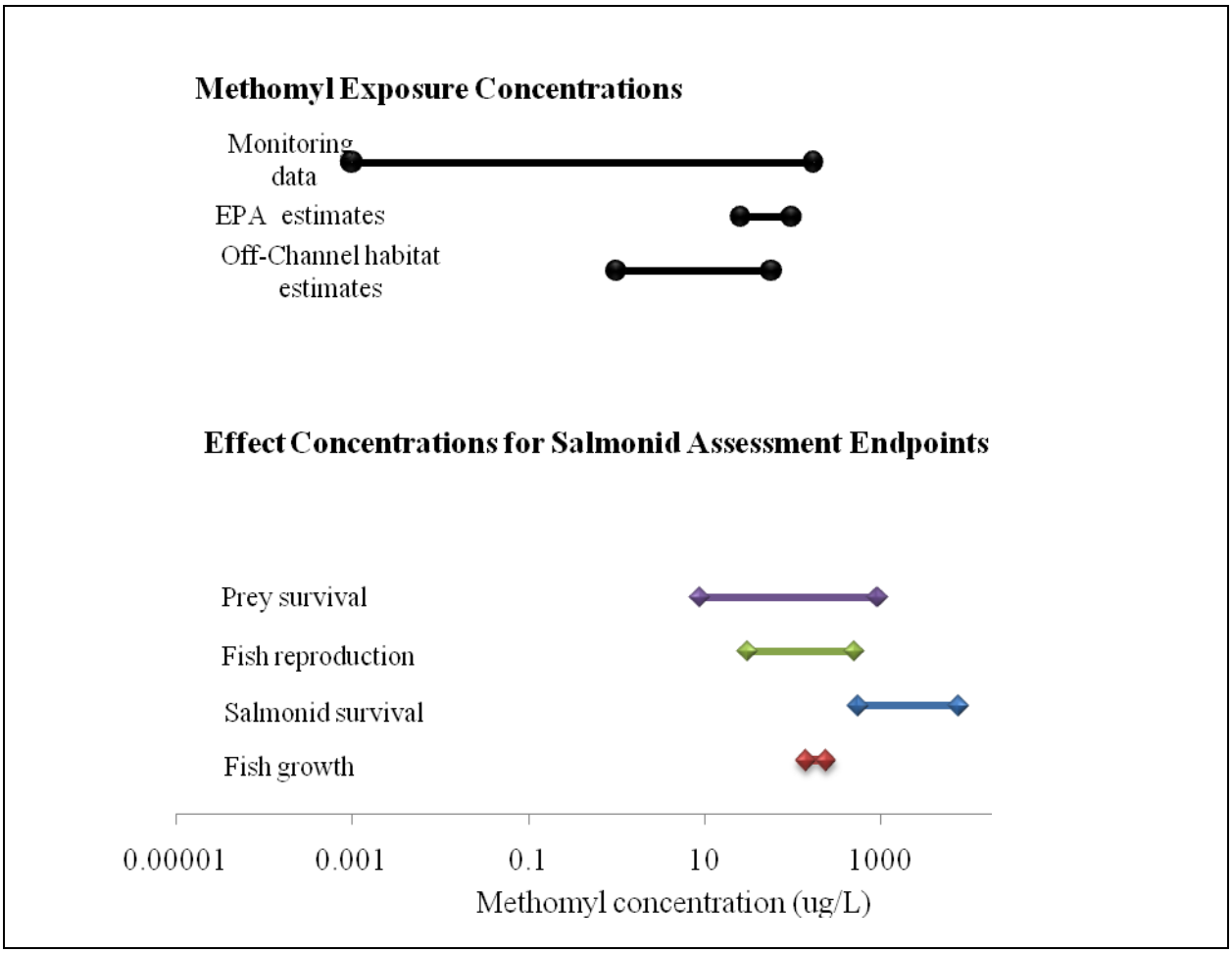

Figure 41. Methomyl exposure concentrations and salmonid assessment endpoints' effect concentrations in µg/L

Relationship of pesticide use to effects in the field

Schulz (2004) reviewed 45 field and *in situ* studies published in peer-reviewed journals (from 1982-2003) that evaluated relationships between insecticide contamination and biological effects in freshwater aquatic ecosystems and included invertebrates and fishes. For each study, the authors classified the relationship of exposure to effect in one of four categories: no relation, assumed relation, likely relation, and clear relation based on the cited authors' judgment of their own results. A relationship was classified as clear only if the exposure was quantified and the effects were linked to exposure temporally and spatially. The review concluded that "about 15 of the 42 studies revealed a clear relationship between quantified, non-experimental exposure and observed effects *in situ*, on abundance [aquatic invertebrate], drift, community structure, or dynamics" (Schulz 2004). Although the top three insecticides most frequently detected at levels

expected to result in toxicity were chlorpyrifos (OP), azinphos-methyl (OP), and endosulfan, the *N*-methyl carbamates carbaryl, carbofuran, oxymyl, and fenobucarb all showed clear, likely or assumed relationships between exposure and effect (Schulz 2004). No studies involving methomyl were evaluated. It should be noted that these studies were not designed to establish effect thresholds and in our review, are not sufficient to define thresholds. However, the data do provide information on concentrations of insecticides known to cause biological and ecological effects under field conditions.

Schulz (2004) noted that for all of the studies "that seem to establish a clear link between exposure and effect, the pesticide concentrations measured in the field were not high enough to support an explanation of the observed effects simply based on [laboratory bioassays] acute toxicity." Some authors have suggested differences in field measured exposure and actual organismal exposure (aquatic, sediment, dietary; environmental variables that affect exposure) as a reason for higher mortalities *in situ* than predicted by laboratory toxicity data. Schulz concluded that on the basis of present knowledge, it cannot be determined whether the measured concentration in the field regularly underestimates the actual exposure or if a general difference between the field and laboratory reactions of aquatic invertebrates is responsible; both are reasonable assertions. The review by Schulz shows a body of evidence that natural aquatic ecosystems can be adversely affected by AChE inhibitors including carbaryl and carbofuran. We expect a similar relationship for methomyl because it shares the same mechanism of action as carbaryl and carbofuran (AChE inhibition) and concentrations that lead to death of aquatic invertbrates are similar to carbaryl and carbofuran.

We reviewed multiple studies that showed direct, adverse effects to salmonid prey species following exposures to *N*-methyl carbamates (Table 67). These included reduction in individual aquatic species, changes in community abundance, richness, and diversity with salmonid prey items.

Table 67. . Examples of published field studies designed to establish a relationship between *N*-methyl carbamate contamination of aquatic habitats and agricultural practices (adapted from Table 2 in Schulz 2004).

Source	Concentration µg/L	Duration	Endpoint	Species	Relationship of exposure and effect
Carbaryl					
Aerial application	0.1-85.1	24	aquatic invertebrate Drift	Various invertebrates	Likely
Carbofuran					
	0.05-26.8	Few hours	mortality	Amphipod (*Gammarus pulex*)	Clear

Field studies in ESA-listed salmonid habitats with other AChE inhibitors

A group of field studies evaluated macroinvertebrate community responses in the orchard-dominated Hood River Basin, Oregon and correlated results with chlorpyrifos and azinphos-methyl use and detections (Grange 2002, St. Aubin 2004, Van der Linde 2005). Hood River Basin contains several listed anadromous salmonids, including lower Columbia River steelhead. The goals of the studies were to determine whether in-stream OPs affected steelhead AChE activity and changed the aquatic macroinvertebrate community. An additional objective addressed how changes in macroinvertebrate community might affect salmonid growth. A suite of reference and orchard-dominated sampling sites within the Hood River Basin were sampled pre and post the two primary application seasons, spring (chlorpyrifos) and summer (azinphos-methyl). Significant differences in macroinvertebrate community assemblages were found between upstream reference sites and downstream agricultural sites (St. Aubin 2004), similar to the results described in a California stream (Hall, Killen et al. 2006). However, no significant differences were found at each individual site, before and after summer spraying (St. Aubin 2004). Therefore, the second Hood River study investigated the spring spray events as well as the summer spray events to determine seasonal effects (Van der Linde 2005). Sharp declines in species abundance between reference sites and downstream sites during the spring-spray period correlated to chlorpyrifos applications and subsequent aquatic detections (one site over an 8 d period showed chlorpyrifos ranging from 0.032 -0.183 µg/L). There were more pollutant tolerant taxa and less intolerant taxa at the agricultural sites (Van der Linde 2005). Collector-gatherer species, many of which are salmonid prey items, declined rapidly at agricultural sites

compared to abundances at the reference sites following applications. Interestingly, reductions in biodiversity in 2001 agricultural sites compared to reference sites was not seen in 2002 (Van der Linde 2005). The authors commented that diversity metrics do not always behave consistently or predictably in response to environmental stress. More than two years of data are likely needed to more sufficiently address community variability at this site.

Two sets of field experiments directly investigated juvenile steelhead (hatchery- reared) AChE activity from caged-fish studies in an agricultural basin in Hood River Basin, OR (Grange 2002; St. Aubin 2004). The studies analyzed water samples for chlorpyrifos, azinphos-methyl, and malathion before, during, and after orchard spray periods. One of the studies also monitored the aquatic invertebrate community's response (discussed later under prey effects) in conjunction with the AChE inhibition (St. Aubin 2004). Steelhead from reference sites had statistically significantly greater AChE activity than steelhead from orchard-dominated areas. The reductions in AChE activity corresponded to the application seasons and detections of chlorpyrifos and azinphos-methyl insecticides.

The data from one study indicated that OP-insecticides inhibited AChE activity in steelhead held in cages in the Hood River Basin and this inhibition correlated to chlorpyrifos and azinphos-methyl detections and to a lesser degree with malathion detections (Grange 2002). None of the pesticides were detected at reference sites and both chlorpyrifos (range in maxima of (0.077-0.196 µg/L) and azinphos-methyl were frequently detected at orchard stream and river sites. AChE activity was inhibited up to 21% in smolts, and 33% in juveniles relative to reference locations. Temperature was a confounding factor as lower temperatures showed lower AChE activity while higher temperatures showed higher AChE activity at reference sites. The authors normalized data to temperature and found a greater number of statistically significant reductions in AChE in steelhead. Study results show that steelhead in these systems exposed to OP insecticides lose AChE activity (up to 33%) which, depending on the percentage of inhibition, can manifest into fitness level consequences (Grange 2002; St. Aubin 2004).

The field studies conducted in Hood River Basin, Oregon show that salmonids' AChE activity was reduced in streams near orchards during chlorpyrifos and azinphos-methyl applications.

Additionally, the macroinvertebrate communities in these systems were compromised to such an extent that there was a reduction in salmonid prey abundance. These findings highlight the importance of characterizing the presence of AChE insecticides, *N*-methyl carbamates and OPs, within aquatic habitats because the compounds share a mode of action and adverse biological responses to mixtures containing multiple AChE insecticides are likely cumulative. These data can serve as a surrogate for expected effects of the aquatic community when concentrations of carbaryl, carbofuran, and methomyl attain effect thresholds.

Field studies in ESA-listed salmonid habitats: Willapa Bay and Grays Harbor Washington

History of Carbaryl use in Washington estuaries

Willapa Bay and Grays Harbor support large commercial oyster-producing areas (approximately 600 acres in Willapa and 200 acres in Grays Harbor) and are located north of the Columbia River along the southwestern coast of Washington. The Pacific oyster (*Crassostrea gigas*), introduced from Japan in the 1920s, is the principal species cultivated in those estuaries (Feldman, Armstrong et al. 2000). Two species of endemic shrimp, ghost shrimp (*Neotrypaea californiensis*) and mud shrimp (*Upogebia pugettensis*), are abundant in the oyster growing areas of these estuaries and create burrows in the sediment that are unfavorable for optimal oyster cultivation. The Washington State oyster industry has used aerial applications of carbaryl to kill the burrowing shrimp in oyster beds since the early 1960s. EPA authorizes the use of carbaryl on oyster beds in Washington through a SLN label, or Section 24(c) (EPA Reg. No. 264-316). Carbaryl is applied directly to intertidal areas when they are exposed at low tide, primarily by helicopter (Dumbauld, Brooks et al. 2001). This use has been controversial and there have been numerous studies dating back several decades that evaluated the ecological impact of carbaryl use in these two estuaries (Feldman, Armstrong et al. 2000). Although the EPA label does not limit applications to Willapa Bay and Grays Harbor, historically these have been the only areas treated with carbaryl. Additionally, Washington State requires applicators to obtain NPDES permits for applications to aquatic habitats.

ESA-Listed Pacific salmonids that occur in Willapa Bay and Grays Harbor

Juvenile and adult Chinook salmon from ESA-listed populations are expected to be present in Willapa Bay and Grays Harbor at the time of carbaryl applications. It is expected that juvenile

Chinook salmon from the Lower Columbia River use these estuaries during the period when carbaryl is applied based on their behaviors (Personal communication Eduardo Casillas NMFS 2/18/2009, Anne Shaffer WDFW 3/04/2009, and Thom Hooper NMFS, 2/12/2009). Specifically, their use of dendritic channels to access inundated mud flats suggests juvenile Chinook salmon will be exposed to peak carbaryl concentrations in the water column and also from feeding on live and dead contaminated prey. Also, recent information (six years of coastline surveys) shows that juvenile Columbia River Chinook salmon "bounce" north along the Washington coastline and south along the Oregon coastline in the nearshore surf zones (Personal communication Eduardo Casillas NMFS 2/18/2009) and have been found occupying nearshore habitats as far North as the Strait of Juan de Fuca (Shaffer, Crain et al. submitted). In one study, juvenile Chinook salmon captured along the coast Washington State were genetically analyzed to determine natal river origins. Of the fish collected for genetic analysis, 45% of juvenile Chinook salmon collected in Crescent Bay, 75% of those in Freshwater Bay, and 60% of those in Pysht Bay were from ESA-listed stocks of the Columbia River (Shaffer, Crain et al. submitted).

DNA analysis revealed that adult salmonids harvested in Willapa Bay in July and August, when carbaryl is typically applied, include several ESA-listed species: Lower Columbia River Chinook salmon, California Coastal Chinook salmon, Puget Sound Chinook salmon, and Snake River Fall-run Chinook salmon (Kassler and Marshall 2004). Given this information we also expect these same species of Chinook salmon will be present in Grays Harbor as Grays Harbor is located just north of Willapa Bay. Further, we expect adults of these stocks may be exposed to carbaryl given that they occupy the estuary during the application periods and oyster plots occur throughout the Bay. It is possible that chum salmon from the Columbia River also occur in the Willipa Bay and Grays Harbor estuaries. However, we are unaware of documentation of their occurrence at those locations, and unlike juvenile Chinook salmon from the Columbia River, juvenile chum have not been found in recent sampling efforts of nearshore surf zones. We therefore conclude that Columbia River ESA-listed chum are unlikely to be present in Willapa Bay or Grays Harbor.

Measured Concentrations in Willapa Bay and Grays Harbor following Carbaryl Applications

Numerous monitoring studies have been conducted in coordination with applications of carbaryl to control burrowing shrimp in commercial oyster beds in Washington State. The results of the studies are quite variable, as are the study designs and objectives. Several investigations have documented water column concentrations exceeding several mg/L (which is substantially higher than the µg/L concentrations observed in freshwater aquatic habitats) following the first flood tide post-application (Hurlburt 1986; Creekman and Hurlburt 1987; Tufts 1989; Tufts 1990). Water column concentrations measured at Willapa Bay in 1984 detected a mean concentration of 10.6 mg/L upon initial flooding of the treated area (Hurlburt 1986). Concentrations were monitored at varying depths for several hours following flooding. The concentrations decreased rapidly but were detectable in the low µg/L range throughout sampling. In 1985 samples were collected along transects from treated areas following the direction of the tide to monitor the dispersal of carbaryl (Creekman and Hurlburt 1987). The data indicate that carbaryl is transported off the treated area by the tide. Average concentrations measured above the treated area ranged from 2.4 – 5.5 mg/L. The highest average concentration (7.9 mg/L) was collected 510 ft from the treated area. Average concentrations at the most distant sampling point (650 ft from initial treated area) were 2.5 mg/L. In 1996, further study evaluated carbaryl movement off the treated spray area (Tufts 1989). Samples were collected along a transect corresponding to the direction of the incoming tide. The peak concentration measured was 27.8 mg/L. Over one treated area, the concentration of carbaryl decreased from 13.2 mg/L to 9.3 mg/L as the water depth increased from 1.5 to 10 inches. The concentration further decreased to 600 µg/L when the water rose to 16 inches. The monitoring indicated concentrations of carbaryl decreased with increasing distances along the transect, but concentrations greater than 1 mg/L were detected in several instances at distances several hundred feet from treated plots. Carbaryl was found in the water column at the detection limit (0.1 mg/L) as far as 1,725 ft from the treated area.

In 1987, surface water monitoring was conducted in Willapa Bay to determine "the dilution pattern of carbaryl washed from sprayed oyster beds, and to determine carbaryl concentrations in shallow pools and streams where marine fish might be found" (Tufts 1990). Carbaryl concentrations in the mg/L range were frequently detected with the incoming tide. Peak concentration for one sample site was 18.8 mg/L upon initial flooding. The concentrations

decreased to 0.2 mg/L when covered by 18 inches of water. Concentrations of carbaryl were variable among sites. For example, at one of the sampling sites carbaryl was not detected until the water was 7 inches deep. A peak concentration of 8 mg/L was detected at this site when the water depth was 11 inches. This sample station was located 300 ft from a treated area. Maximum carbaryl concentrations detected at other sites were 17.4, 7.8, and 4 mg/L with samples collected at depths of 6, 4, and 13 inches from the bottom. Carbaryl's primary toxic degradate, 1-naphthol, was detected at concentrations as high as 1.4 mg/L. Average concentrations of carbaryl detected in tide pools and small streams ranged from 3.6 to 11.2 mg/L. The 11.2 mg/L detection was associated with application of 5 lbs carbaryl/acre. An average concentration of 7.8 mg/L in tide pools and streams was associated with an application rate of 4 lbs carbaryl/acre, approximately half the maximum rate allowed. Similarly, a more recent study found a peak of 820 µg/L in the water column 50 ft from the application site following a typical treatment application at the maximum rate of 8 lbs/acre (n=3) (Weisskopf and Felsot 1998).

Several studies demonstrate that carbaryl dissipates fairly rapidly from over the treatment site due to degradation, metabolism, dilution, and off-site transport (Hurlburt 1986; Creekman and Hurlburt 1987; Tufts 1989; Tufts 1990; Weisskopf and Felsot 1998). In 2006 and 2007, samples collected at the mouth of channels adjacent to treated oyster beds in Willapa Bay had maximum concentrations of 29.1 µg/L after 6 h (high tide), 38 µg/L after 12 h (low tide), and 21.1 µg/L after 24 h (low tide) (Major, Grue et al. 2005).

The NPDES permit for Willapa Bay and Grays Harbor requires annual monitoring of water column concentrations in treated areas. It specifies an acute effluent limit of 3 µg/L and a chronic limit of 0.06 µg/L. However, those data are of highly questionable value because the monitoring plan specifies that monitoring is suspended for the first 48 h following application to assess the acute effluent, and further suspends monitoring for 30 days from the last application to assess the chronic limit. We expect that most of the carbaryl will be degraded and transported to other locations by the time carbaryl monitoring is initiated.

Carbaryl sprayed on mud flats can be transported substantial distances at concentrations that may have ecological impacts. Researchers found that close to 100% of Dungeness crabs were killed

up to 100 m off the carbaryl application area (Doty, Armstrong et al. 1990). Levels decrease to below 1 mg/L when transported more than 200m or more. Washington DOE reports that carbaryl concentrations in the "potential effects threshold range" of 0.1-0.7 µg/L have been detected at locations several miles from oyster beds soon after large areas were treated (Johnson 2001).

Measured Concentrations in Invertebrates

Samples of crustaceans from carbaryl treated areas in 1984 showed high tissue levels (Table 68). A single ghost shrimp and Dungeness crab were analyzed and contained concentrations of 24.9 and 41.9 mg/kg (ppm), respectively (Hurlburt 1986). Analysis of dead shrimp in 1985 following treatment at 7.5 lbs carbaryl/acre revealed average concentrations of approximately 4.5 mg/kg. When left on the treated oyster beds the concentrations declined to approximately 10% of the initial concentration 24 h post-treatment, then remained relatively stable at the 48, 72, and 96 h sampling events. Concentrations in shrimp and annelid worms were investigated following the 1985 applications and associated with different application rates (Tufts 1989). Average concentrations in shrimp ranged from 5.3 to 13.8 mg/kg. The concentration in worms ranged from 57-58.6 mg/kg. The 10 lb application rate is less relevant as the current label restricts applications to 8 lbs a.i./acre. Concentrations in other, more relevant salmonid prey items were apparently not assessed although we assume they may be comparable for other organisms that occupy similar habitat.

Table 68. Carbaryl concentrations in aquatic organisms on treated sites (mg/kg).

Year	Dungeness Crab	Burrowing Shrimp	Annelid Worms
1984	41.9	24.9 (rate not reported)	-
1985	-	4.5 (7.5 lb a.i./acre)	-
1986	-	13.8 (10 lb a.i./acre) 8.7 (7.5 lb a.i./acre) 5.3 (5 lb a.i./acre)	75.5 (5 lb a.i./acre) 57 (7.5 lb a.i./acre) 58.6 (5 lb a.i./acre)

Ecological Effects

There have been concerns that carbaryl applications in Willapa Bay and Grays Harbor may have adverse effects to the commercial Dungeness crab fishery (Feldman, Armstrong et al. 2000). Consequently, Washington Department of Fisheries conducted several surveys to estimate the number of crabs killed (Hurlburt 1986; Creekman and Hurlburt 1987; Tufts 1989; Tufts 1990).

Transect surveys conducted on treatment beds the day following applications indicate large numbers of crabs are killed by the applications (Table 69). Other acute mortalities to non-target organisms were generally not reported. However, transect surveys were conducted during 1986 and 1987 due to concerns over potential impacts to fish given staff observations from the Washington Department of Fisheries reported that fish mortality was "routinely" noted, but not quantitatively assessed following applications of carbaryl (Tufts 1989). Mortalities were characterized as small fish apparently trapped in shallow pools during low tide and directly exposed during carbaryl treatments. The surveys indicate several thousand fish were killed each year from carbaryl applications to approximately 400 acres at rates of ≤ 7.5 lbs a.i./acre (Table 70). Currently, the NPDES permit allow for treatment of up to 600 acres. The current 24 (c) label does not specify acreage restrictions and allows for applications of carbaryl up to 8 lbs a.i./acre.

Table 69. Estimated dungeness crab mortalities resulting from carbaryl applications in Willapa Bay and Grays Harbor, Washington

Year	Maximum Application Rates*	Total Acres Treated**	Dungeness Crab Killed
1984	≤ 10 lbs a.i. / acre	490	38,410
1985	≤ 7.5 lbs a.i./acre	391	59,933
1986	≤ 7.5 lbs a.i./acre	398	16,286
1987	≤ 7.5 lbs a.i./acre	434	44,053

* Current 24(c) label allows for application of up to 8 lbs a.i./acre
** Current NPDES permit allows for a total of 600 hundred acres to be treated in Willapa Bay and Grays Harbor, WA. The Label places no restrictions on acres or geographic restrictions for use of carbaryl on oyster beds in Washington.

Given that the fish that reside in standing water on mud flats are likely to be the most vulnerable to carbaryl exposure, staff from the Washington Department of Fisheries also estimated the available marine fish habitat that existed on exposed mudflats of treated areas. They characterized water that was at least 2 inches in depth, a depth that is adequate for salmon fry, as marine habitat. This habitat comprised substantial portions of the treated areas. In 1986, surveys indicate 135 acres of the 398 of the treated area (approximately 34%) were marine fish habitat (Tufts 1989). In 1987, 67 of the 434 (15%) acres were characterized by Washington Department of Fisheries as marine fish habitat. The current NPDES permit specifies that there be a 200 ft buffer zone for sloughs and channels when carbaryl is applied by helicopter. A 50 ft buffer is required for those aquatic habitats when carbaryl is applied by hand sprayer. AgDrift estimates for aerial application at an application rate of 8 lbs a.i./acre with a 200 ft buffer indicate the

average initial concentration from drift to a body of water that is 2 inches deep (~ 5 cm) and 10 m wide would be 771 µg/L. It seems highly unlikely that helicopter applications would be able to successfully avoid direct overspray of some of the marine fish habitats on the exposed mudflats. Additionally, the 24(C) labels do not contain buffer zone restrictions. A direct overspray of 2 inches of water would result in an average initial concentration of approximately 18 mg/L, a concentration comparable to measured concentrations associated with initial tidal inundation of treated mud flats (see surface water detections above). Acute exposure to these concentrations are expected to kill a portion of exposed salmonids in a matter of hours *i.e.,* 24 h LC50s for carbaryl range from 948-8,000 µg/L, n= 60 (Mayer and Ellersieck 1986), and significantly reduce AChE activity that will lead to myriad sublethal effects such as impaired swimming.

Table 70. Estimated fish mortalities resulting from carbaryl applications in Willapa Bay and Grays Harbor, Washington

Year	Maximum Application Rates*	Total Acres Treated**	Fish Killed
1986	≤ 7.5 lbs a.i./acre	398	14, 954
1987	≤ 7.5 lbs a.i./acre	434	8,041

* Current 24(c) label allows for application of up to 8 lbs a.i./acre
** Current NPDES permit allows for a total of 600 hundred acres to be treated in Willapa Bay and Grays Harbor, WA. The Label places no restrictions on acres or geographic restrictions for use of carbaryl on Oyster beds in Washington.

Salmonids were not reported in the sampling data, which was taken over two seasons. The authors report that the fish kills were extremely variable and unpredictable. The fish mortality reported for transect surveys included only four species in 1986: saddleback gunnel, threespine stickleback, staghorn sculpin, and arrow goby. In 1987, mortalities included English sole, sand sole, kelp greenlings, shiner perch, saddleback gunnels, staghorn sculpin, and arrow goby.

Response of benthic community

Samples were collected in 1985 to assess impacts of carbaryl on the intertidal invertebrate community (Tufts 1990). Treated area showed decreases in numbers of infaunal benthic crustaceans at 15 and 30 d post-treatment while a concurrent increase in crustacean abundance was observed on control plots (Table 71). Abundance of benthic crustaceans was low on both control and treated plots 5 months after application in December. The authors suggest the data may represent a seasonal decline in benthic crustaceans.

Table 71. Total number of benthic crustaceans (tanaids, cumaceans, amphipods, copepods, and ostracods; adapted from Tufts 1990).

Date	Sampling	Control Plot (change from pretreatment)	Treated Plot (change from pretreatment)
June 30	Pretreatment	75	33
July 16	15 days post-treatment	96 (+28%)	2 (-94%)
August 01	30 days post-treatment	136(+181%)	4 (-82%)
December 10	161 days post-treatment	2	6

Field incidents reported in EPA incident database

NMFS reviewed reported incidents of fish deaths from field observations throughout the U.S. because the information reflects real world scenarios of pesticide applications and corresponding death of freshwater fish. We recognize that much of the information is not described in sufficient detail to attribute an incident to a label-permitted use leading to the death of fish, or to make conclusions regarding the frequency of fish kills that may be associated with the use of pesticides. NMFS uses the information as a component to evaluate a line of evidence- whether or not fish kills have been observed from labeled uses of the three pesticide products. EPA categorizes incidents in the database into one of five levels of certainty: highly probable, probable, possible, unlikely, or unrelated. The certainty level indicates the likelihood that a particular pesticide caused the observed effects. EPA uses the following definitions to classify fish kill incidents:

- Highly probable (4): Pesticide was confirmed as the cause through residue analysis or other reliable evidence, or the circumstances of the incident along with knowledge of the pesticides toxicity or history of previous incidents give strong support that this pesticide was the cause.

- Probable (3): Circumstances of the incident and properties of the pesticide indicate that this pesticide was the cause, but confirming evidence is lacking.

- Possible (2): The pesticide possibly could have caused the incident, but there are possible explanations that are at least as plausible. Often used when organisms were exposed to more than one pesticide.
- Unlikely (1): Evidence exists that a stressor other than exposure to this pesticide caused the incident, but that evidence is not conclusive.

- Unrelated (0): Conclusive evidence exists that a stressor other than exposure to the given pesticide caused the incident.

NMFS reviewed several incident reports provided by EPA from OPP's incident database. This database is populated with reports received by EPA from registrants that are defined as reportable under FIFRA 6(a)(2) and includes other information received from registrants and other sources.

Relatively few incidents involving lethality to fish were documented in the database, considering the length of time these products have been registered and their toxicity profiles. EPA provided the following table summarizing known mortality incidents (Table 72). NMFS is uncertain as to how representative this database is of known fish kills and the level of coordination that has occurred with various state and federal agencies that investigate these incidents. The mortality events discussed above for carbaryl applications in Willapa Bay and Grays Harbor were not recorded in the database. Several of the incidents provided by EPA are discussed in more detail below.

Table 72. EPA summary of field incident data with carbaryl, carbofuran, and methomyl; highlighted incidents (*) are discussed.

Carbaryl		Carbofuran		Methomyl	
Incident ID	Certainty	Incident ID	Certainty	Incident ID	Certainty
B0000-246-01*	Probable	I000165-052	Possible	B0000-216-19	Unlikely
B0000-501-92*	Probable	I000599-008*	Probable	B0000-501-36	Unlikely
I000799-003	Possible	I001605-003	Probable	I000108-001*	Probable
I000910-001	Unlikely	I005416-001	Highly Probable[1]		
I007720-020	Probable	I012265-001	Possible		
I015419-644	Possible	I012265-003	Probable		
I018436-001	Possible	I012265-004	Possible		
I013436-001*		I013436-001*	Possible	I013436-001*	Possible

[1]Waterfowl mortality incident in flooded rice

Incident I013436-001: A report of a large fish kill on October 16, 2001, was investigated by the California Department of Fish and Game. The kill involved several thousand fish. Although salmonids were not identified, it occurred in the San Joaquin River, which is used by listed salmonids. EPA characterized this event as "possible" regarding its association with carbaryl, carbofuran, and methomyl. Methomyl was detected in fish gills and several other pesticides

were detected in the water including azinphos-methyl, another cholinesterase inhibitor, and several chlorinated hydrocarbons (chlordane, DDT, dieldrin, methoxychlor, mirex, and others). It is likely that the kill was in part due to mixture toxicity, particularly with the combinations of carbamates and OP insecticides.

Incident I000599-008: A report by the California Department of Fish and Game indicates approximately 3,000 fish, 4,000 crayfish and frogs, 200 birds, and at least 5,000 invertebrates were killed on North Temple Creek in San Joaquin County, California. The adjacent vineyard had been treated with Furadan 4F (carbofuran). Chemical analysis confirmed carbofuran in the gizzards of starling up to 9.8 mg/kg, crayfish collected on site had 0.6 mg/kg, the stomach contents of great egrets, which were primarily crayfish, contained 0.3 mg/kg, and surface water had detections up to 7,800 µg/L. The California Department of Fish and Game concluded that the preponderance of evidence indicated carbofuran was the cause of death. EPA characterized the cause of death as probable.

Incident B0000-246-01: According to a 1975 report by EPA, 22,000 catfish were killed in 7 miles of stream at an agricultural site in Oklahoma. Minimal information on the incident was reported. Chemical analysis was not conducted but EPA classified this association with carbaryl as probable. Other a.i.s were identified as possibly contributing to the kill were toxaphene, methyl parathion, and endrin.

Incident B0000-501-92: EPA concluded that a fish kill in a New Jersey pond was caused by drift of carbaryl following the application of Sevin in 2000. This incident was characterized as probable. No chemical analysis was conducted.

FMC reported several incidents called in to their emergency telephone number in the second quarter of 1992. One incident reported a small number of dead bluegill observed in a drain pond adjacent to corn and tobacco fields. The caller indicated Furadan 15G (carbofuran), Counter (chlorpyrifos), and Temik (aldicarb) had been applied to the crops. Chlorpyrifos is an AChE inhibiting organophosphate insecticide. Aldicarb and carbaryl are both cholinesterase inhibiting *N*-methyl carbamates. Dead fish were observed following heavy rains. No analysis was done on

the fish to determine the cause of death. EPA characterized carbofuran as a "possible" cause of the incident. It seems likely that the three cholinesterase inhibiting insecticides may have resulted in a cumulative exposure that was sufficient to cause the fish kill due to mixture toxicity.

Incident I000108-001: DuPont reported a fish kill in 1992 in southern Georgia that occurred following an application of Lannate LV (methomyl). One hundred and twenty-five fish were found dead in a pond located 50 to 75 yards from a large field of sweet corn. The 200 acre field was treated with Lannate LV five times between June 1 and June 16. Additionally, Lorsban insecticide (chlorpyrifos) was applied four times during the same interval including co-applications of four fertilizer treatments. On the day of the fish kill (June 16), applications of both Lannate and Lorsban were made. Lannate LV was applied at rates of 1.5 pints/acre and Lorsban was applied at a rate of 1 pint/acre. During the first 16 days of June a total of 10.52 inches of rain were received. The State of Georgia took water samples on June 17. Analysis indicated 136 µg/L of methomyl in the pond. Chlorpyrifos concentrations were not reported and it is not known if it was an analyte. Water temperatures were relatively high (reported to be about 90ºF) but dissolved oxygen was reported to be "normal (7.2-10)". DuPont suggested the high temperatures, fertilizers, and suspended solids could be stressful to fish and low oxygen content at night might have played a part in the deaths. The species involved in the incident (carp and bluegill) were warm water fishes. EPA characterized methomyl as a "probable" cause of the fish kill. Given the reported rapid dissipation of methomyl it is likely that the concentrations measured do not represent peak concentrations that occurred in the pond. It seems likely that chlorpyrifos may have also been a contributing factor in this incident.

Mixture Analysis of Carbaryl, Carbofuran, and Methomyl

As noted earlier, pesticides most often occur in the aquatic environment as mixtures. In our review and synthesis of the available exposure and response information, we find the three *N*-methyl carbamates carbaryl, carbofuran, and methomyl share the same mechanism of toxic action (AChE inhibition) and are expected to co-occur in salmonid habitats. Therefore, we employ a simple mixture analysis derived from empirical data with Pacific salmonids to predict potential effects to individual salmonid's AChE activity and their survival from short-term

exposures. The analysis is predicated on the toxic potencies of the three insecticides added together to predict the resulting cumulative effect to AChE activity and mortality.

Mixture toxicity is typically described by three general responses: antagonistic, additive, or synergistic. Antagonism and synergism are where the toxic response is not predicted by the individual potencies of the pesticides found in the mixture. Antagonistic effects of a mixture lead to less than expected toxicity on the organismal endpoint. Mechanistically, the pesticides are likely interacting with one another to reduce the toxic potency of individual pesticides. Synergistic effects of a mixture lead to a greater than expected effect on the organismal endpoint and the pesticides within the mixture enhance the toxicity of one another. The third general type of mixture toxicity and the one most frequently reported is additivity (known also as dose-addition or concentration-addition). This type of response is defined by adding the individual potencies of pesticides together to predict the effect on the biological endpoint. Additivity has been demonstrated for many pesticide classes as well as other organic compounds such as PAHs, PCBs, and dioxins.

Additive toxicity of chemicals that share a mode or mechanism of toxic action is well established in the scientific literature, and as a result has been informing regulatory decisions for more than a decade. In 1996, the National Academy of Sciences recommended a dose-additive approach to assessing risks to human infants and children from pesticide exposure. EPA currently assesses human risk of pesticide mixtures for pesticides that share a common mechanism of toxic action *e.g., N*-methyl carbamates [such as carbaryl, carbofuran, methomyl], organophosphorus insecticides, chloroacetanilide and triazine herbicides, as mandated by FQPA. The analysis EPA conducts is predicated on additive toxicity and applies dose-addition to set tolerance limits of pesticide residues on food. For example, the toxic potencies of the *N*-methyl carbamates are added together to determine pesticide tolerance limits for edible crops. Although additive toxicity is evaluated when determining risk to humans, EPA OPP has yet to apply a similar approach to address cumulative toxicity of pesticides that share a common mode or mechanism of action in the evaluation of terrestrial and aquatic species. That said, the use of dose-addition for mixtures containing acetylcholinesterase-inhibiting pesticides is well established and has been extended to protection of aquatic life (Belden, Gilliom et al. 2007).

Dose-addition assumes the cumulative toxicity of the mixture can be predicted from the sum of the individual toxic potencies of each component of the mixture. Within the past decade, government regulatory bodies started to use dose-addition models to predict toxicity for those chemicals that share a common mode of action. In California, the CVRWQB used dose-addition models (based on the toxic-unit approach) to develop TMDLs for the OP insecticides diazinon and malathion. NMFS Biological Opinions have also recognized the environmental reality of co-occurring pesticides in species' aquatic habitats and applied additive toxicity models to predict potential responses of salmonids (NMFS 2004; NMFS 2005; NMFS 2005; NMFS 2005; NMFS 2008).

In salmon, dose-additive inhibition of brain AChE activity by mixtures of OPs and carbamates was demonstrated *in vitro* (Scholz, Truelove et al. 2006). More recently, it has been found that salmonid responses to OP and carbamate mixtures vary *in vivo*; some interactions were synergistic, rather than just additive (Laetz, Baldwin et al. 2009). We used the dose-addition method to predict responses by applying the modeling exposure estimates and measured concentrations of carbaryl, carbofuran, and methomyl presented in the *Exposure Analysis*. Effects of the three carbamates individually and in combination on AChE inhibition Figure 42 (A) and survival (B), are shown below. Based on additivity, the mixture is expected to be more toxic than the individual carbamates for both endpoints. Due to the steep slopes of the two dose-response curves, and especially the mortality slope, small changes in concentrations elicit large changes in observed toxicity. The exposure values represent concentrations from EPA PRZM-EXAMs 60 d average modeling estimates for surface waters (carbaryl: 4 aerial applications at 5 lbs a.i./acre, citrus in FL; carbofuran: 1 ground application at 2 lbs a.i./acre, artichokes in CA; methomyl: 3 aerial applications at 1.8 lbs a.i./acre, peaches). We recognize that this approach is likely to under-predict toxicity for mixtures that produce synergistic rather than additive responses (Laetz, Baldwin et al. 2009).

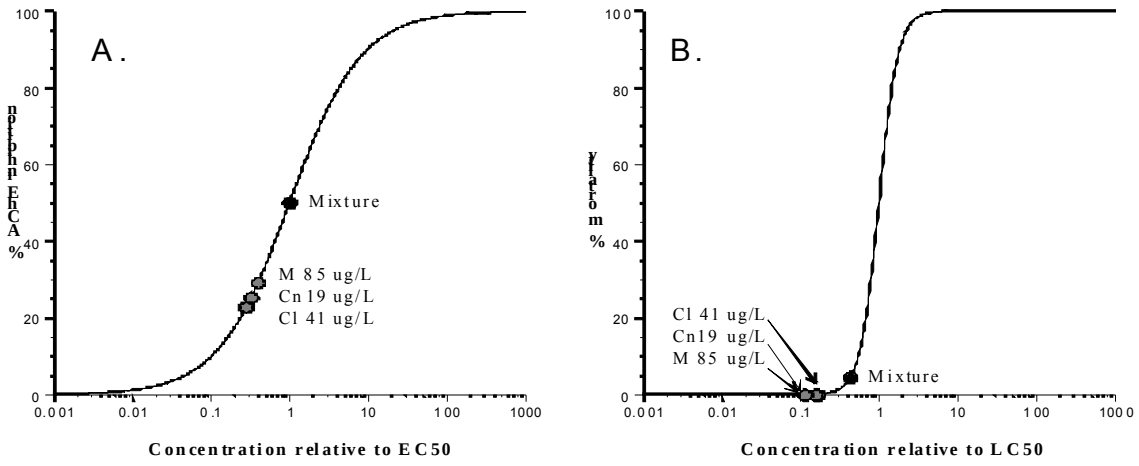

Figure 42. Percent AChE inhibition (A.) and percent mortality (B.) for salmonids expected from exposure to carbaryl (Cl), carbofuran (Cn), and methomyl (M) as separate constituents and as mixtures (Cl 41 µg/L, Cn 19 µg/L, and M 85 µg/L)[4].

We used a variety of exposure estimates and monitoring data to evaluate responses to different mixtures of carbaryl, carbofuran, and methomyl (Table 73). The predicted additive responses from these mixtures ranged from 16-74% inhibition of AChE and 0.01-74% mortality. The predicted additive response to AChE inhibition is likely to result in increased behavioral consequences to salmonids. What is not captured in these responses is the likelihood of exposure to the various mixture concentrations. The PRZM-EXAMS values were estimates selected from EPA simulations of western crops. The scenarios were representative of use rates and numbers of applications on current product labels. Additionally, we used 60 d, time-weighted averages of exposure rather than predicted peak concentrations as exposure to multiple pesticides would be expected to occur more frequently over chronic durations. This may underestimate effects as responses assumed 96 h exposure. Site specific considerations will also have an influence on the frequency of exposure.

[4] EPA's default pesticide slope was used for acute mortality (3.63 or probit slope of 4.5) [EPA 2004]. The slope used for AChE inhibition was based on pooling data from five cholinesterase-inhibiting insecticides; including carbofuran, carbaryl, chlorpyrifos, diazinon, and malathion Laetz, C. A., D. H. Baldwin, et al. (2009). "The synergistic toxicity of pesticide mixtures: Implications for risk assessment and the conservation of endangered Pacific salmon." Environmental Health Perspectives **117**: 348-353..

Table 73. Predicted AChE inhibition and mortality from estimated and measured exposure to carbaryl, carbofuran, and methomyl.

	Concentration (µg/L)	% AChE Inhibition	% Mortality
Modeling: PRZM-EXAMS 60-day averages[1] (from Table 49)			
Carbaryl	12	8.34	0.00
Carbofuran	19	25.39	0.04
Methomyl	81	28.33	0.09
Additive response		**44.30**	**1.38**
Modeling: GENEEC 90-day averages (from Table 50)			
Sweet Corn			
Carbaryl	229	60.67	42.10
Carbofuran	53	47.67	1.63
Methomyl	49	19.61	0.01
Additive response		**72.24**	**73.62**
Potatoes			
Carbaryl	101	41.28	3.59
Carbofuran	106	63.93	17.02
Methomyl	34	14.66	0.00
Additive response		**71.95**	**59.44**
Citrus			
Carbaryl	280	65.25	60.14
Methomyl	21	9.76	0.00
Additive response		**66.25**	**62.97**
Monitoring: NAWQA maxima in 4 states (from Table 54)			
Carbaryl	33.5	19.59	0.07
Carbofuran	32.2	36.02	0.27
Methomyl	0.82	0.48	0.00
Additive response		**44.22**	**1.79**
Monitoring: California CDPR database maxima (from Table 55)			
Carbaryl	8.4	6.07	0.00
Carbofuran	5.2	8.93	0.00
Methomyl	5.4	2.85	0.00
Additive response		**15.58**	**0.01**
Monitoring: Washington EIM database maxima (from Table 56)			
Carbaryl	10	7.09	0.00
Carbofuran	2.3	4.29	0.00
Methomyl	0.17	0.11	0.00
Additive response		**10.60**	**0.00**

[1]PRZM-EXAMS estimates for carbaryl in California peaches (2 applications at 7 lb a.i./acre), carbofuran in California artichokes (1 application at 2 lb a.i./acre), and methomyl in lettuce (10 applications at 0.9 lb a.i./acre). Although current labeling may not be consistent for these uses (peaches, artichokes, and lettuce), the use rate and number of applications are consistent with other labeled uses within the action area.

The GENEEC estimates are 90 d, time-weighted averages that were based on labeled uses of the three compounds in sweet corn, potatoes, and citrus. We found no restrictions that would

prevent co-application or sequential applications of carbaryl, carbofuran, and methomyl. The application rates assumed were consistent with current labels and generally representative of use rates authorized for many crop and non-crop uses. An exception was the assumed carbaryl use rate in citrus (12 lb a.i./acre), which is substantially higher than the maximum use rate approved for most crops.

The NAWQA, CDPR, and EIM monitoring values represent the maximum concentrations found in the respective databases. The values cited were all measured within the four states and the vast majority is from waters that contain or drain to listed salmonid habitats. Most of the detections in these, and other monitoring studies that did not target specific applications of the three chemicals occurred at or below the µg/L level. We expect that exposure at these levels will be common in drainages where the three products are used extensively.

Evaluation of Risk Hypotheses: Individual Salmonids

In this phase of our analysis we examine the weight of evidence from the scientific and commercial data to determine whether it supports or refutes a given risk hypothesis. We also highlight general uncertainties and data gaps associated with the data. In some instances there may be no information related to a given hypothesis. If the evidence supports the hypothesis we determine whether it warrants an assessment either at the population-level, or affects PCEs to such a degree, to warrant an analysis on the potential to reduce the conservation value of designated critical habitat.

1. Exposure to carbaryl, carbofuran, and methomyl is sufficient to:

A. Kill salmonids from direct, acute exposure.

A large body of laboratory toxicity data indicates that anadromous salmonids die following short-term (< 96 h) exposure to the three insecticides at levels above 200 µg/L. We expect concentrations of carbaryl, carbofuran, and methomyl in salmonid off-channel habitats will reach lethal levels based on exposure concentrations derived from monitoring data, EPA's modeling estimates, and NMFS modeling estimates (See *Exposure Analysis*). The youngest swimming salmonids appear to be the most likely to die from short-term, acutely toxic exposures in these habitats. It is less likely that adults would be killed by acute concentrations in most freshwater aquatic habitats compared to juveniles. However, if adults are present in smaller off-channel

habitats during aerial applications or severe runoff events death is possible, particularly from carbaryl and carbofuran. The available monitoring data, if representative of salmonid habitats, indicated that concentrations rarely achieve LC50 values for the three compounds in freshwaters. However, it is unlikely that peak concentrations are reflected in the monitoring data, and given the acutely toxic nature of carbamates, a brief exposure would be sufficient to cause effects. As described in the *Exposure Analysis*, monitoring data are limited when compared to the range of habitats used by salmonids. Few data were found that targeted applications and subsequent concentrations in edge of field habitats which typically show much higher concentrations than weekly, monthly, or seasonal monitoring efforts. Although we found no information on egg survival following acute exposures, we do not expect death of eggs from these insecticides as entry into the eggs via the water column is unlikely. Further support for acute lethality to fish is found in field incidences of death attributed to carbaryl, carbofuran, and methomyl that EPA ranked as "probable". We located several incidents showing death of freshwater fish following exposures to *N*-methyl carbamates. We expect juveniles of listed salmonids to be at the highest risk of death when in small freshwater off-channel and edge habitats, and secondarily in estuarine habitats where carbaryl is applied directly to mudflats. In conclusion, the available information on measured and expected concentrations of the three insecticides supports this hypothesis. We translate the fitness level consequences of reduced survival from mortality of juvenile salmonids to potential population-level consequences using population models (see population modeling section below).

B. Reduce salmonid survival through impacts to growth.

Fish growth is reduced following long-term exposures to carbofuran and methomyl in fathead minnows and rainbow trout, respectively. EPA reported on a single test that measured growth effects to fathead minnows following 30 and 60 d exposure to carbaryl at 0, 8, 17, 62, 210, and 680 µg/L (Carlson 1971). No statistically significant effects on growth were reported in this study. It is difficult to extrapolate from this one study with a warm water species to potential growth effects to ESA-listed salmonids especially given that salmonids appear substantially more sensitive to carbaryl's acute toxicity than fathead minnows (96 h LC50s for salmonids range from 250-4,500µg/L carbaryl and for fathead minnows 7,700-14,600 µg/L). Additionally, 20% and 50% inhibition of AChE in salmonids occurs at concentrations as low as 23 and 185 µg/L, respectively (Labenia, Baldwin et al. 2007) and this inhibition was found to affect

swimming behavior (Labenia, Baldwin et al. 2007). Reduced growth occurred at 56 µg/L for carbofuran and 142 µg/L for methomyl. Only one test result was reported for each pesticide. We did not identify any studies that provided a quantitative relationship between growth and fish survival in the field or lab. However, there is abundant literature that shows salmonids that are smaller in size have reduced first year survival (Appendix 1). Additionally, exposure to sublethal concentrations of other AChE inhibitors (chlorpyrifos and diazinon) for acute durations does cause reduced feeding success, which likely results in impacts to growth (Scholz, Truelove et al. 2000; Sandahl, Baldwin et al. 2005). We expect that juvenile fish exposed to carbaryl, carbofuran, and methomyl during their freshwater residency will feed less successfully, resulting in lower growth rates and reduced sizes. Exposure concentrations will likely vary temporally and spatially for salmonids depending on life history, pesticide use, and environmental conditions. The available information support that growth is likely reduced where salmonids are exposed to more than 56 µg/L carbofuran and to concentrations below LC50 for carbaryl and methomyl, although the exact concentrations that may cause growth reduction are currently unknown. The weight of evidence supports the conclusion that fitness level consequences from reduced size are likely to occur in individual salmonids exposed to the three *N*-methyl carbamates. Therefore, we address the potential for population-level repercussions due to reduced growth using species-specific population models.

C. Reduce salmonid growth through impacts on the availability and quantity of salmonid prey

We address several lines of evidence to determine the likelihood of reduced salmonid growth from impacts to aquatic invertebrate prey. The first line of evidence we evaluated is whether salmonid prey items are sensitive to acute and chronic exposures from expected concentrations of the three carbamates. These primarily involved evaluating laboratory experimental results that reported on incidences of death or sublethal effects. We located a total of 10, 4, and 14 survival estimates (24, 48, 72, and 96 h EC/LC50s) for carbaryl, carbofuran, and methomyl, respectively. Based on an evaluation of the assessment endpoints, we found a robust body of exposure and toxicity data that indicated salmonid aquatic prey are highly sensitive and affected by expected exposures to each of the insecticides as well as from mixtures containing the three insecticides. We expect death and a variety of sublethal effects to salmonid prey items.

The second line of evidence is whether field level reductions in aquatic invertebrates correlate to *N*-methyl carbamate insecticide use and/or concentrations in salmonid habitats. We found several examples supporting this line of evidence. The available laboratory and field data show reductions in aquatic invertebrate taxa and reductions in invertebrate abundances following applications of carbofuran and carbaryl (Table 67). Furthermore, field studies explicitly investigated whether real world applications and subsequent pesticide drift and/or runoff into aquatic environments affected receiving water aquatic communities. One compelling study measured pre- and post-application aquatic community responses from field applications of carbaryl at 0.75 and 1 lb/acre (these rates are at the lower end of approved maximum application rates, up to 12 lbs/acre) (Courtemanch and Gibbs 1980). Applications correlated to substantial drift of salmonid prey type aquatic invertebrates, of which most were dead or dying. More striking was that population reductions of plecoptera (stoneflies) persisted for sixty days (Courtemanch and Gibbs 1980). Runoff from fields treated with carbofuran at 2.68 lbs a.i./ acre contained concentrations as high as 264 µg/L in the field ditches that drained to a stream where carbofuran was measured at 27 µg/L (Matthiessen, Shearan et al. 1995). Caged amphipods present in the stream all died during peak runoff following a rain event one month after the carbofuran application. This indicated that carbofuran can persist in soil and mobilize by rain into subsequent runoff and ultimately elicit toxic responses from stream invertebrates (Matthiessen, Shearan et al. 1995). Although we found no field studies with methomyl, we expect that it would similarly reduce aquatic invertebrate populations at higher concentrations than carbaryl and carbofuran based on its toxicity profile.

The third line of evidence we evaluated was whether salmonids showed reduced growth in areas of low prey availability, particularly those areas coinciding with use of carbaryl, carbofuran, and methomyl. An evaluation of this line is complicated by multiple factors affecting habitat quality *i.e.,* water quantity, quality, riparian zone condition, etc., which in turn affects prey items and salmonids. We were unable to locate information attributing reduced growth in salmonids to specific insecticide exposures that reduced prey, as most studies focused on measuring direct effects on salmonids or direct effects on invertebrates (see review by Schulz 2004). However, there are multiple field experiments and studies that demonstrate reduced fish growth resulting from reduced prey availability (Brazner and Kline 1990; Metcalfe, Fraser et al. 1999; Baxter,

Fresh et al. 2007) or document fish growth rates below maximal potential growth rates when prey are limited (Dineen, Harrison et al. 2007).

One study, in particular, tested the hypothesis that single applications of the OP insecticide chlorpyrifos (0.5, 5, 20 μg/L) to outdoor ponds (littoral enclosures) would reduce the abundance of invertebrates and cause diet changes that would result in reduced growth rates of juvenile fish (Brazner and Kline 1990). The results are direct, empirical evidence that support this hypothesis. Growth rates of fathead minnow larvae were reduced significantly in all chlorpyrifos-containing treatments due to reduction in prey abundance. At 15 d post-treatment, the reductions in growth rate compared to control fish were the most pronounced and coincided with the greatest reductions in invertebrates. Stomach contents of minnows were identified throughout the experiment. By day 7 mean numbers of protozoans, chironomids, rotifers, cladocerans, mean total number of prey being eaten per fish, and mean species richness were greater in unexposed treatments compared to some of the other treatments. On day 15, most of the differences were more pronounced. The results strongly support the conclusion that foraging opportunities were better in untreated enclosures and unexposed larvae grew significantly more compared to chlorpyrifos-treated enclosures. Furthermore, the reductions in prey items in diets mirrored the reduction in prey items in the enclosures. We did not find any study results with *N*-methyl carbamates, but we make the inference that concentrations of the three *N*-methyl carbamates that are sufficient to reduce aquatic prey would also lead to reduced fish growth. This further supports the hypothesis that reduction in prey abundances translates to reductions in subsequent ration as well as individual growth. The authors concluded that "low levels of contaminants that induce slower growth in young-of-the-year fish through food chain effects or other means may eventually reduce the survival and recruitment of these fish."

Collectively, the lines of evidence strongly support the overall hypothesis. Thus, we carry reduced prey impacts to the next level of analysis (*i.e.,* the population-level). We conducted population modeling exercises based on reduced abundances of salmonid prey, presented in the next section, (*Effects to Salmonid Populations from the Proposed Action*).

D. Impair swimming which leads to reduced growth (via reductions in feeding), delayed and interrupted migration patterns, survival (via reduced predator avoidance), and reproduction (reduced spawning success).

Swimming is a critical function for anadromous salmonids. The primary line of evidence for this hypothesis is impaired swimming behaviors following exposure to carbaryl, carbofuran, and methomyl. A secondary line of evidence for this hypothesis is studies showing swimming behavior modification following exposure to other AChE-inhibiting chemicals such as the OPs, as we anticipate the results are similar in nature. Several studies regarding the effects of carbaryl on the swimming related behaviors were reviewed, with effects on predator avoidance, schooling, and feeding behaviors occurring at carbaryl concentrations of ~100-1,000 µg/L in laboratory studies (Weis and Weis 1974; Arunachalam, Jeyalakshmi et al. 1980; Little, Archeski et al. 1990; Carlson, Bradbury et al. 1998; Labenia, Baldwin et al. 2007). Only one study was available for carbofuran showing effects to social behaviors at 5 µg/L (Saglio, Trijasse et al. 1996), and no studies were located for methomyl. Concentrations at which effects were noted for carbaryl and carbofuran are within the ranges of concentrations estimated by the various modeling methods, especially for the off-channel habitat locations. We anticipate similar effects will occur with methomyl because it has the same mechanism of action as carbaryl and carbofuran, inhibition of AChE (which is correlated to swimming impacts). However, we expect it will take greater concentrations of methomyl compared to carbaryl and carbofuran to affect swimming. We expect that these levels are likely from concentrations resulting from aerial drift into off-channel habitats. This is because concentrations of methomyl necessary for AChE inhibition and acute lethality (LC50) are greater than carbaryl and carbofuran concentrations necessary to inhibit AChE and kill fish. We also discussed compelling evidence that OPs impair salmonid swimming behaviors and also show associated reductions in AChE activity.

The most sensitive swimming endpoints are those associated with swimming activity compared to those that measure swimming capacity (Little and Finger 1990; Little, Archeski et al. 1990). The ecological consequences to salmonids from aberrant swimming behaviors are implied primarily through the impairment of feeding, translating to reduced growth. Impaired swimming behavior correlated with both AChE inhibition and increased mortality from predation (Labenia, Baldwin et al. 2007). Although NMFS was unable to locate results from field or laboratory experiments for the other remaining endpoints of this hypothesis, we conclude that swimming

behaviors are affected by the three insecticides. Adverse effects to swimming-associated behaviors are directly attributed to AChE inhibition, leading to potential reductions in an individual's fitness (*i.e.,* growth, migration, survival, and reproduction). We therefore translate impaired swimming to potential impacts on salmonid populations. Based on concentrations generated in modeling, NMFS believes concentrations of carbaryl and carbofuran, applied in accordance with current labels, are sufficient to impair swimming behavior of salmonids in some environments. As we located no studies that evaluated the effects of methomyl on swimming behaviors in fish, we do not know the exact levels sufficient to impair swimming except to say that levels well below reported LC50s can impair swimming. Swimming-mediated behaviors are frequently impaired at 0.3 – 5.0% of reported fish LC50s, and that 75% of reported adverse effects to swimming occurred at concentrations lower than reported LC50s (Little and Finger 1990). Taken together this information supports methomyl affecting swimming behaviors below reported LC50s. We expect methomyl at hundreds of µg/L (expected from currently approved applications) to impair swimming.

E. Reduce olfactory-mediated behaviors resulting in consequences to survival, migration, and reproduction.

In the Opinion regarding effects of chlorpyrifos, diazinon, and malathion on listed salmonids (NMFS 2008), sufficient data were available to conclude that olfactory-mediated behaviors were affected by those pesticides. Fewer data were available to assess the effects of carbaryl, carbofuran, and methomyl on these endpoints. Evidence is unclear as to mode of action for insecticide-mediated olfactory impairment. Thus, conclusions drawn based on data for OPs may not necessarily be applicable to *N*-methyl carbamates. Data currently available are conflicting, with the one study available for carbaryl showing no apparent effect on olfaction on juvenile cutthroat trout at concentrations of up to 500 µg/L. Three studies regarding olfactory effects of carbofuran were located and reviewed, and these indicated olfactory effects in several species of fish (including two salmonids) at concentrations ranging from 1-10 µg/L. These concentrations are within both the ranges estimated by modeling, and the ranges measured in all monitoring data sets. No data were available for methomyl. While data are not conclusive, based on what is known, and giving the benefit of the doubt to the species, NMFS believes it is reasonable to assume that these types of effects will occur from carbofuran exposures. Therefore, we discuss the potential implications at the population-level.

F. Exposure to mixtures of carbaryl, carbofuran, and methomyl can act in combination to increase adverse effects to salmonids and salmonid habitat.

The exposure and toxicity information we compiled, reviewed, and analyzed support the risk hypothesis, although less mixture data were available for the carbamates addressed in this Opinion than the OPs addressed in the previous Opinion (NMFS 2008). Evidence of additive and synergistic effects on survival and AChE inhibition in salmonids were identified. Multiple, independent study results supported additive toxicity from measured AChE inhibition. We therefore conducted an analysis of potential mixtures on the levels of AChE inhibition and the potential for a greater reduction in survival predicated on simple additivity. The analysis showed that both survival and AChE inhibition of individuals is likely affected to a greater degree than from exposure to a single chemical alone. We also expect that assessment endpoints influenced by AChE inhibition are likely affected to a greater degree when in the presence of more than one of the three insecticides. Considerable uncertainty arises as to the level of impairment caused by mixtures for some endpoints, as dose responses have not been characterized for some pesticide combinations. We conclude that this hypothesis is supported by the available information and we assess the potential for population-level consequences below.

G. Exposure to other stressors of the action including degradates, adjuvants, tank mixtures, and other active and other ingredients in pesticide products containing carbaryl, carbofuran, and methomyl cause adverse effects to salmonids and their habitat.

Fifteen of the carbamate formulations contain other a.i.s, including malathion (OP insecticide), bifenthrin (pyrethroid insecticide), rotenone (insecticide/piscicide), metaldehyde (mulloscicide), captan (phthalidimide fungicide), and cupric sulfate (toxic to algae, aquatic invertebrates, and fish). No data regarding the joint toxicity of these multi-a.i. products were presented in the BEs or located in open literature. However, given that these pesticides are also toxic to aquatic life it is reasonable to assume the salmonids and/or their prey items will exhibit a greater toxic response when exposed to multiple a.i.s than to a single one. We are unable to estimate the magnitude of such a response, and other than for malathion, are not currently able to evaluate whether the response would fall into an additive, synergistic, or antagonistic category. Based on mixture data discussed elsewhere in this Opinion, we assume additivity for carbaryl, carbofuran, and methomyl.

Some toxicity data were available in the BEs for formulations not containing additional a.i.s. Based on that data, no specific conclusions can be drawn as to whether formulations are, in general, more or less toxic than the technical grade a.i. However, it should be noted that adjuvants which increase either uptake (such as penetrants or surfactants that make physiological membranes more permeable) or length of exposure (attractants, or emulsions that increase time in the water column) are likely to increase toxicity of the a.i.

Only a limited amount of data were available to evaluate toxicity of the degradates of carbaryl, carbofuran, and methomyl. Monitoring data indicate that 1-napthol, a degradate of carbaryl, and 3-hydoxycarbofuran, a degradate of carbofuran, occur in measurable quantities in the environment. Based on the monitoring data, 1-napthol co-occurs with carbaryl in both water column and sediment. Toxicity information presented in the BE indicates that 1-napthol is approximately an order of magnitude less toxic than parent carbaryl for aquatic invertebrates. No data were given in the BE regarding the toxicity of 1-napthol to fish. We did locate one open literature study evaluating the effects of 1-napthol on fish, which indicated it was 2-5 times more toxic than the parent carbaryl (Shea and Berry 1983). No toxicity data were located for 3-hydroxycarbofuran or 3-ketocarbofuran, but based on structural similarities, the toxicity is likely similar to the parent carbofuran. Based on fate data presented in the BEs, 3-hydroxycarbofuran and 3-ketocarbofuran appear to occur in soil rather than in the water column. Both are shown as being non-detectable to representing 2-5% of applied parent material. Together, they could represent 6-7% of applied, assuming they were measured in the same test. Neither the BE nor the Science Chapter specify if that is the case.

Overall, while NMFS cannot quantify the increased toxicity of exposure to other stressors of the action such as additional a.i.s, degradates, and adjuvants, the existing body of information indicates these compounds are likely to cause and/or exacerbate adverse effects on salmonids and their habitat caused by carbaryl, carbofuran, and methomyl.

We did not receive a complete list of the currently registered formulations containing carbaryl, carbofuran, and methomyl from EPA. Thus, we cannot make any definitive conclusions for every stressor of the action. However, we did evaluate the exposure and response to a commonly

used surfactant/adjuvant mixed with, or found in pesticide formulations. We reasoned if the data support adverse effects from this one of more than 4,000 substances, then other unidentified inert ingredients could also be toxic and may pose a significant risk to salmonids and their habitat. We selected NP polyethoxylates and NP because of their widespread use in pesticide formulations and abundance of information regarding environmental concentrations and adverse effects to salmonids and their prey. The data indicated that these surfactants can kill outright, disrupt endocrine systems, particularly reproductive physiology, and bioaccumulate in benthic invertebrates from expected concentrations in the environment (Arsenault, Fairchild et al. 2004; Madsen, Skovbolling et al. 2004; Jardine, MacLatchy et al. 2005; Luo, Ban et al. 2005; McCormick, O'Dea et al. 2005; Segner 2005; Hutchinson, Ankley et al. 2006; Lerner, Bjornsson et al. 2007; Lerner, Bjornsson et al. 2007). Importantly, we found studies that linked Atlantic salmon population crashes in Canada to use of NP in insecticide formulations. However, the BEs did not provide any information as to the prevalence of this material in formulations of the three OP insecticides that pertain to this consultation. We did receive confirmation from the technical registrant of methomyl that no methomyl containing formulation they make contains NP. Significant uncertainty surrounds the number and type of compounds, as well as the toxicity of these other materials used in pesticide formulations. As a result, we must caveat our conclusions regarding population-level responses with the uncertainty that the actual risk posed to listed salmonids and their habitat is likely greater when all ingredients are taken into account.

H. Exposure to other pesticides present in the action area can act in combination with carbaryl, carbofuran, and methomyl to increase effects to salmonids and their habitat.

The available toxicity and exposure data support the hypothesis. Other carbamates and OPs found in the action area likely result in additive or synergistic effects to exposed salmonids and aquatic invertebrates. The magnitude of effects will depend on the duration and concentrations of exposure.

I. Exposure to elevated temperatures can enhance the toxicity of the stressors of the action.

We found no consistent correlation with elevated temperature and toxicity of the three *N*-methyl carbamates. However, salmonids are coldwater species, and exposure to elevated temperatures increases physiological stress, thus making them more susceptible to other stressors. Additionally, other AChE inhibitors such as OPs are more toxic to salmonids and aquatic

invertebrates exposed to elevated temperatures, so where elevated temperatures co-occur with OPs and carbamates the effect to aquatic life is likely greater than at lower temperatures. Many salmonid populations reside in watersheds which have been listed by the four western states as impaired due to temperature exceedances. We therefore discuss qualitatively temperature impacts on salmonids population responses to the stressors of the action.

J. Exposure to specific pH ranges can affect the toxicity of the stressors of the action.

Some data indicate acute toxicity of carbaryl and carbofuran increases as pH increased based on the available freshwater fish assays (Mayer and Ellersieck 1986). Other data indicated that toxicity was reduced in pH greater than 9 due to rapid hydrolysis *i.e.,* a half-life of 30 minutes in pond mesocosms. For methomyl, pH seems to have less of an influence on hydrolysis rates. Within the Pacific Northwest and California pH varies seasonally and typically may range from 6 – >9. We expect that salmonids exposed to both pH ranges at or near physiological tolerance limits and the three insecticides concurrently may die at relatively lower concentrations compared to salmonids exposed in laboratory assays. We therefore discuss qualitatively pH impacts on salmonids population responses to the stressors of the action.

Effects to Salmonid Populations from the Proposed Action

Here we translate individual fitness consequences to potential population-level effects using both quantitative and qualitative methods. We quantitatively translate reduced survival of juveniles based on four-day exposures to four populations of salmonids including ocean-type Chinook, stream-type Chinook, coho, and sockeye salmon. We employ a life history population model that incorporates changes in first-year juvenile survival rates and then translates them into predicted changes in the modeled population's intrinsic rate of growth, *i.e.,* lambda (Appendix 1). We discuss the percent change in lambda in the context of expected concentrations of the three insecticides in salmonid habitats. We focus on the concentrations at which a significant departure occurs from the unexposed population and compare them to expected environmental concentrations described in the *Exposure Analysis*. We also discuss in general terms the likelihood of exposure to the range of pesticide concentrations that occur in salmonid habitats.

In a second modeling exercise, we translate reductions in growth of juvenile salmon from AChE inhibition and from reduced prey abundances to potential population impacts using individual-based growth and life history population models (Appendix 1). These two endpoints (AChE inhibition and reduced prey abundance) are combined in the model to evaluate population-level effects due to reductions in first year survival of juveniles (Appendix 1). Similar to the survival models, percent change in lambda is the output. We discuss the significance of population changes in the context of departures from normal variability of the unexposed population and expected environmental concentrations. We conclude this section on population-level effects with a discussion of population-level responses to other affected salmonid endpoints that were not modeled. These include effects from other stressors of the proposed action, mixture effects, and effects to behaviors from impaired olfaction and AChE inhibition such as swimming behaviors.

Salmonid Population Models

We selected four generalized life history strategies to model (Appendix 1). We ran general life history matrix models for coho salmon (*Oncorhynchus kisutch*), sockeye salmon (*O. nerka*) and ocean-type and stream-type Chinook salmon (*O. tshawytscha*). We did not construct a steelhead (*O. mykiss*) life history model due to the lack of demographic information. Chum salmon (*O. keta*) were omitted from the growth model exercise because they migrate to marine systems soon after emerging from the gravel and the model assesses early life stage growth effects over a minimum of 140 d in freshwater systems. The basic salmonid life history we modeled consisted of hatching and rearing in freshwater, smoltification in estuaries, migration to the ocean, maturation at sea, and returning to the natal freshwater stream for spawning followed shortly by death. For specific information on how we constructed the models see Appendix 1.

Effects to salmonid populations from death of sub-yearling juveniles

An acute toxicity model was constructed that estimated the population-level impacts of subyearling juvenile (referred to as juveniles within this section) mortality resulting from exposure to concentrations of carbaryl, carbofuran, and methomyl. These models excluded sublethal and indirect effects of the pesticide exposures and focused on the population-level outcomes resulting from an annual 4 d exposure of all juveniles in the population to carbaryl, carbofuran, and methomyl from single exposures. Death of juveniles was implemented as a

change in first-year survival rate for each of the salmon life-history strategies modeled. We also addressed mixture toxicity of the three insecticides in the model using exposure concentrations derived from EPA modeling estimates and from NMFS' modeling estimates of off-channel habitats. Model output is displayed in Tables 74-77.

The percent changes in lambdas increased as concentrations of the three carbamates increased. Increases in direct mortality during the first year of life produced large impacts on the population growth rates for all the life history strategies. Model results for stream-type Chinook salmon showed significant impacts at lower concentrations than the other modeled populations. This result is primarily due to the size of the standard deviation of the unexposed population. Percent changes in lambda were deemed significant if they were outside of one standard deviation from the unexposed population. The relative sensitivity of the life history models producing the greatest to the least changes in population growth rate for equivalent impact on survival rates was coho salmon, ocean-type Chinook salmon, stream-type Chinook salmon, and sockeye salmon. We note that the choice of LC50 is an important driver for these results. Therefore, an LC50 above or below the ones used here will result in a different dose-response. We selected the lowest reported salmonid LC50 from the available information to ensure that risk is not underestimated. However, if the actual environmental 96 h LC50 is lower, then the model will under-predict mortality. If the actual environmental acute LC50 is higher, then the model will over-predict mortality.

These results indicate that exposure of salmonid populations to carbaryl, carbofuran, and methomyl for four days at the reported LC50s would have severe consequences to the population's growth rate. If exposure occurred every year for each new cohort, population growth rate would be reduced and recovery efforts would be slowed. For those natural populations with current lambdas of less than one, risk of extinction would increase substantially, especially if several successive generations were exposed. For each of the combinations of species and insecticide, we denoted the relative concentration at which the percent change in lambda is deemed significantly different from the unexposed populations *e.g.,* a 9.1% change in lambda is estimated at 190 µg/L carbaryl for ocean-type Chinook salmon. These population effect thresholds assume exposure to all the juveniles in the population.

Carbaryl's thresholds for the four species ranged from 129-190 μg/L, carbofuran's from 89-126 μg/L, and methomyl's from 287-431 μg/L. These results can be compared to expected concentrations shown in Figure 39, Figure 40, and Figure 41. All of the thresholds overlap with expected concentrations for the three insecticides. The overlap primarily occurs with NMFS modeled estimates for off-channel habitats.

When we compare the population threshold concentrations to expected levels in salmonid habitats described in the exposure section, it is likely that some individuals within a population will be exposed during their freshwater juvenile life stage, particularly those juveniles exposed while using off-channel habitats. Additionally, four day averages from GENEEC runs, but not from PRZM-EXAMS, exceed these threshold concentrations. It is uncertain how appropriate EPA's model estimates are for salmonid habitats, but taken at face value juveniles exposed to GENEEC-derived concentrations would die. Population-level effects are expected from these exposures if the majority of the individuals that comprise the populations are exposed during their freshwater residency. The likelihood of population effects from death of juveniles increases for those populations that spend longer periods in freshwaters such as steelhead, stream-type Chinook, and coho salmon. We also expect additional acute mortalities from juveniles that are exposed to 24(c) carbaryl applications in Washington estuaries, although we do not know how many individuals are exposed each year. For those populations with lambdas greater than one, reductions in lambda from death of juveniles can also lead to consequences to abundance and productivity. Consequently, attainment of recovery goals would take longer to achieve for populations with reduced lambdas. Many of the populations that are categorized as core populations or are important to individual strata, have lambdas just above one and are essential to survival and recovery goals. Slight changes in lambda, even as small as 3-4%, would result in reduced abundances and/or increased time to meet population recovery goals.

Table 74. Modeled output for Ocean-type Chinook salmon exposed to 4 d exposures of carbaryl, carbofuran, and methomyl reporting the impacted factors of survival as percent dead, lambda and standard deviation, and percent change in lambda compared to an unexposed population.

Carbaryl	0 µg/L	50 µg/L	100 µg/L	200 µg/L	250 µg/L	350 µg/L	500 µg/L	750 µg/L
% dead	0	0	3	31	50	77	93	98
Lambda (STD)	1.09 (0.1)	1.08 (0.1)	1.08 (0.1)	0.98 (0.09)	0.89 (0.08)	0.71 (0.06)	.53 (0.05)	0.36 (0.03)
% change in lambda	NA	NS	NS (-1)	-10	-18	-34	-52	-67
Threshold for significant change in lambda	-9.1 % ~ 190 µg/L							
Carbofuran	0 µg/L	50 µg/L	100 µg/L	150 µg/L	164 µg/L	200 µg/L	250 µg/L	350 µg/L
% dead	0	1	14	42	50	67	82	94
Lambda (STD)	1.09 (0.10)	1.09 (0.10)	1.04 (0.10)	0.93 (0.08)	0.89 (0.08)	0.78 (0.07)	0.67 (0.06)	0.5 (0.04)
% change in lambda	NA	NS	NS (-4)	-15	-18	-27	-39	-54
Threshold for significant change in lambda	-9.1 % ~ 126 µg/L							
Methomyl	0 µg/L	250 µg/L	400 µg/L	500 µg/L	560 µg/L	700 µg/L	900 µg/L	1,100 µg/L
% dead	0	5	23	40	50	69	85	92
Lambda (STD)	1.09 (0.10)	1.07 (0.10)	1.08 (0.9)	0.94 (0.08)	0.89 (0.08)	0.78 (0.07)	0.64 (0.06)	0.54 (0.05)
% change in lambda	NA	NS(-1)	NS(-7)	-14	-18	-29	-41	-51
Threshold for significant change in lambda	-9.1 % ~ 431 µg/L							

NA denotes non applicable; NS denotes values less than one standard deviation of lambda expressed as the percent of lambda. (Calculated value, omitted when less than or equal to one)

Table 75. Modeled output for Stream-type Chinook salmon exposed to 4 d exposures of carbaryl, carbofuran, and methomyl reporting the impacted factors of survival as percent dead, lambda and standard deviation, and percent change in lambda compared to an unexposed population

Carbaryl	0 µg/L	50 µg/L	100 µg/L	200 µg/L	250 µg/L	350 µg/L	500 µg/L	750 µg/L
% dead	0	0	3	31	50	77	93	98
Lambda (STD)	1.00 (0.03)	1.00 (0.03)	0.99 (0.03)	0.91 (0.03)	0.84 (0.03)	0.69 (0.02)	0.53 (0.02)	0.37 (0.01)
% change in lambda	NA	NS	NS (-1)	-9	-16	-31	-47	-63
Threshold for significant change in lambda	-3.1 % ~ 129 µg/L							
Carbofuran	0 µg/L	50 µg/L	100 µg/L	150 µg/L	164 µg/L	200 µg/L	250 µg/L	350 µg/L
% dead	0	1	14	42	50	67	82	94
Lambda (STD)	1.0 (0.03)	1.0 (0.03)	0.96 (0.03)	0.87 (0.03)	0.84 (0.03)	0.76 (0.02)	0.65 (0.02)	0.5 (0.01)
% change in lambda	NA	NS	-4	-13	-16	-24	-35	-50
Threshold for significant change in lambda	-3.1 % ~ 89 µg/L							
Methomyl	0 µg/L	250 µg/L	400 µg/L	500 µg/L	560 µg/L	700 µg/L	900 µg/L	1,100 µg/L
% dead	0	5	23	40	50	69	85	92
Lambda (STD)	1.0 (0.03)	0.99 (0.03)	0.94 (0.03)	0.88 (0.03)	0.84 (0.03)	0.75 (0.02)	0.63 (0.02)	0.54 (0.02)
% change in lambda	NA	NS(-1)	-6	-12	-16	-25	-37	-46
Threshold for significant change in lambda	-3.1 % ~ 287 µg/L							

NA denotes non applicable; NS denotes values less than one standard deviation of lambda expressed as the percent of lambda. (Calculated value, omitted when less than or equal to one)

Table 76. Modeled output for Coho salmon exposed to 4 d exposures of carbaryl, carbofuran, and methomyl reporting the impacted factors of survival as percent dead, lambda and standard deviation, and percent change in lambda compared to an unexposed population.

Carbaryl	0 µg/L	50 µg/L	100 µg/L	200 µg/L	250 µg/L	350 µg/L	500 µg/L	750 µg/L
% dead	0	0	3	31	50	77	93	98
Lambda (STD)	1.03 (0.05)	1.03 (0.05)	1.02 (0.05)	0.91 (0.05)	0.82 (0.04)	0.69 (0.03)	0.42 (0.02)	0.27 (0.01)
% change in lambda	NA	NS	NS(-1)	-12	-21	-39	-58	-74
Threshold for significant change in lambda	-5.3 % ~ 144 µg/L							
Carbofuran	0 µg/L	50 µg/L	100 µg/L	150 µg/L	164 µg/L	200 µg/L	250 µg/L	350 µg/L
% dead	0	1	14	42	50	67	82	94
Lambda (STD)	1.03 (0.05)	1.02 (0.05)	0.98 (0.05)	0.86 (0.05)	0.82 (0.04)	0.71 (0.04)	0.58 (0.03)	0.40 (0.02)
% change in lambda	NA	NS(-1)	NS(-5)	-17	-21	-31	-44	-61
Threshold for significant change in lambda	-5.3 % ~ 98 µg/L							
Methomyl	0 µg/L	250 µg/L	400 µg/L	500 µg/L	560 µg/L	700 µg/L	900 µg/L	1,100 µg/L
% dead	0	5	23	40	50	69	85	92
Lambda (STD)	1.03 (0.05)	1.01 (0.05)	0.94 (0.05)	0.87 (0.05)	0.82 (0.04)	0.69 (0.04)	0.55 (0.03)	0.44 (0.02)
% change in lambda	NA	NS(-2)	-8	-16	-21	-32	-47	-57
Threshold for significant change in lambda	-5.6 % ~ 338 µg/L							

NA denotes non applicable; NS denotes values less than one standard deviation of lambda expressed as the percent of lambda. (Calculated value, omitted when less than or equal to one)

Table 77. Modeled output for Sockeye salmon exposed to 4 d exposures of carbaryl, carbofuran, and methomyl reporting the impacted factors of survival as percent dead, lambda and standard deviation, and percent change in lambda compared to an unexposed population

Carbaryl	0 µg/L	50 µg/L	100 µg/L	200 µg/L	250 µg/L	350 µg/L	500 µg/L	750 µg/L
% dead	0	0	3	31	50	77	93	98
Lambda (STD)	1.01 (0.06)	1.01 (0.06)	1.00 (0.06)	0.92 (0.05)	0.86 (0.05)	0.71 (0.04)	0.55 (0.03)	0.40 (0.02)
% change in lambda	NA	NS	NS(-1)	-8	-15	-30	-46	-61
Threshold for significant change in lambda	-5.6 % ~ 169 µg/L							
Carbofuran	0 µg/L	50 µg/L	100 µg/L	150 µg/L	164 µg/L	200 µg/L	250 µg/L	350 µg/L
% dead	0	1	14	42	50	67	82	94
Lambda (STD)	1.01 (0.06)	1.01 (0.06)	0.97 (0.05)	0.89 (0.05)	0.86 (0.05)	0.78 (0.04)	0.67 (0.04)	0.52 (0.03)
% change in lambda	NA	NS	NS(-4)	-12	-15	-23	-34	-48
Threshold for significant change in lambda	-5.6% ~ 114 µg/L							
Methomyl	0 µg/L	250 µg/L	400 µg/L	500 µg/L	560 µg/L	700 µg/L	900 µg/L	1,100 µg/L
% dead	0	5	23	40	50	69	85	92
Lambda (STD)	1.01 (0.06)	1.00 (0.06)	0.95 (0.05)	0.89 (0.05)	0.86 (0.05)	0.76 (0.04)	0.65 (0.04)	0.56 (0.03)
% change in lambda	NA	NS(-1)	-6	-11	-15	-24	-36	-45
Threshold for significant change in lambda	-5.3 % ~ 391 µg/L							

NA denotes non applicable; NS denotes values less than one standard deviation of lambda expressed as the percent of lambda. (Calculated value, omitted when less than or equal to one)

The population exercises discussed thus far focused on the effects from exposures to a single annual application of an insecticide; however, we know that these insecticides likely occur together in environmental mixtures and are frequently applied multiple times. To address the potential population-level effects to environmental mixtures of the three insecticides, we ran the same models with a calculated percent mortality predicted using dose-addition. We applied the

same additivity model described in the previous *Mixtures* section to predict the cumulative percentage of death in an exposed population. Table 78 shows the model's prediction from three scenarios. We did not use the data from ambient monitoring programs to devise a scenario because the programs were not designed to capture peak concentrations from drift or runoff into juvenile salmonid rearing areas. We did run a few modeling runs with median values of the three insecticides taken from ambient monitoring data. The results showed no statistically significant reductions in lambda for the four populations. In scenario 1, 5% of exposed individuals are expected to die following 4 d exposures to the estimated concentrations from PRZM-EXAMS 24 h averages from EPA's BEs. For carbaryl, we selected a 2 lbs/acre applied aerially with four applications to apples in Oregon which resulted in a concentration of 19 μg/L. For carbofuran, we selected a 2 lb/acre ground application to artichokes in California which resulted in a concentration of 35 μg/L. For methomyl, we selected 0.9 lbs/acre applied ten times to lettuce in California which resulted in a concentration of 88 μg/L. If these events were to occur in a watershed, 5% of the individuals are expected to die, which would not lead to a population-level effect (*i.e.,* reduction in lambda), based on juvenile mortality.

In contrast, the other two scenarios showed substantial and severe percent reductions in lambda for each of the modeled populations; reductions in lambda ranged from 27-52% (Table 78) In scenario 2, we selected 90 d GENEEC-modeled scenarios for corn from Table 50. Concentrations of the three insecticides were as follows: carbaryl = 229 μg/L, carbofuran = 53 μg/L, and methomyl = 49 μg/L. The toxicity is largely a result of the carbaryl concentration, as it was close to the 96 h LC50 of 250 μg/L. In scenario 3, concentrations from drift into off-channel habitats (0.5 m deep) were calculated using the AgDrift model and included a 100 ft no-spray buffer for methomyl. For carbaryl, 5 lb/acre applied once aerially with a fine-medium spray droplet size resulted in a concentration of 335 μg/L. For carbofuran, 1 lb/acre applied once also with a fine-medium spray droplet size resulted in a concentration of 67 μg/L. For methomyl, 0.9 lbs/acre applied once resulted in a concentration of 17.1 μg/L. Cumulatively, these three concentrations would result in 89% mortality of exposed juveniles which reduce lambdas of the four salmonid populations by 41-52%, a substantial effect.

The likelihood of scenarios 2 and 3 occurring is difficult to predict due to the lack of detailed information on watershed characteristics, salmonid presence, the numbers of salmonids exposed, the duration of exposure, and the climatic variables leading to drift. Scenarios 2 and 3 may represent infrequent events, but if a substantial part of a population of listed salmonids is exposed to these mixtures, a severe reduction in a population's abundance is expected.

Table 78. Modeled output for Ocean-type Chinook, Stream-type Chinook, Sockeye, and Coho salmon exposed to 4 d exposures of carbaryl-, carbofuran-, and methomyl-containing mixtures. The table denotes the impacted factors of survival as percent dead, lambda and standard deviation, and percent change in lambda compared to an unexposed population

Scenario 1: PRZM-EXAMS 24-h averages	Ocean-type Chinook	Stream-type Chinook	Sockeye	Coho
% dead	5	5	5	5
Lambda (SD)	1.07 (0.10)	0.99 (0.03)	1.00 (0.06)	1.01 (0.05)
% change in lambda	NS(-1)	NS(-1)	NS(-1)	NS(-2)
Scenario 2: GENEEC 90-d averages	Ocean-type Chinook	Stream-type Chinook	Sockeye	Coho
% dead	74	74	74	74
Lambda (SD)	0.74 (0.07)	0.72 (0.02)	0.74 (0.04)	0.66 (0.04)
% change in lambda	-32	-28	-27	-36
Scenario 3: Offchannel habitats 0.5 m deep	Ocean-type Chinook	Stream-type Chinook	Sockeye	Coho
% dead	89	89	89	89
Lambda (SD)	0.59 (0.05)	0.58 (0.02)	0.60 (0.03)	0.49 (0.03)
% change in lambda	-46	-42	-41	-52

NA denotes non applicable; NS denotes values less than one standard deviation of lambda expressed as the percent of lambda. (Calculated value, omitted when less than or equal to one)

Effects to salmonid populations from reduced size of juveniles due to impaired feeding and reduced abundance of aquatic prey

To evaluate the potential for adverse effects to juvenile growth resulting from carbaryl, carbofuran, and methomyl on Pacific salmonid populations, we developed a model (Appendix 1). The model links AChE inhibition, feeding behavior, prey availability, and somatic growth of individual salmon to the productivity of salmon populations expressed as a percent change in lambda (a population's intrinsic rate of growth). The model scenarios (single insecticide or multiple pulses of single insecticides) assume annual exposure of all the subyearling juveniles in the population and their prey to the insecticide. Similar to the survival model, we developed the growth model for four populations of salmonids: ocean-type Chinook, stream-type Chinook, sockeye, and coho salmon.

We integrated two avenues of effect to juvenile salmonids' growth from exposure to the three *N*-methyl carbamates (Appendix 1). The first avenue is a result of AChE inhibition on the feeding success and subsequent effects to growth of juvenile salmonids. Study results with juvenile salmonids show that feeding success is reduced following exposures to AChE inhibitors (Sandahl, Baldwin et al. 2005). The second avenue the model addresses is the potential for reductions in juvenile growth due to reduction in available prey. Salmon are often found to be food limited in freshwater aquatic habitats, suggesting that a reduction in prey due to insecticide exposure may further stress salmon and lead to reduced growth rates. Field mesocosm data support this assertion, showing reduced growth of juvenile fish following exposure to the AChE inhibitor, chlorpyrifos (Brazner and Kline 1990). Furthermore, based on our review of the sensitivities of aquatic invertebrates to the three insecticides, we expect reductions in densities and altered composition of the salmonid prey communities.

Reductions in aquatic prey are included in the model because of the high relative toxicity of pesticides to salmonid prey and the extended duration of effects on prey communities. Juvenile salmonids are largely opportunistic, feeding on a diverse community of aquatic and terrestrial invertebrate taxa that are entrained in the water column or on the surface (Higgs, Macdonald et al. 1995). As a group, these invertebrates are among the more sensitive taxa for which there is toxicity data, but within this group, there is a wide range of sensitivities (Table 64, Table 65).

The three insecticides are highly toxic to aquatic macroinvertebrates; and concentrations that are not expected to kill salmonids are often lethal for their invertebrate prey (*e.g.,* for carbaryl, range of mean LC50s for salmonids = 250-3,000 μg/L, vs. range of geometric mean EC50s for water fleas = 3-120 μg/L). In particular, prey items that are preferred by small juvenile salmonids (including midge larvae, water fleas, mayflies, caddisflies, and stoneflies) are among the most sensitive aquatic macroinvertebrates. In addition, effects on the prey community can persist for extended periods of time (weeks, months, years), resulting in effects on fish feeding and growth long after an exposure has ended (Ward, Arthington et al. 1995; Van den Brink, van Wijngaarden et al. 1996; Liess and Schulz 1999; Colville, Jones et al. 2008).

Selection of aquatic invertebrate toxicity values to represent salmonid prey items

The model requires for each insecticide an EC50 (defined as a 50% reduction in the biomass of salmonid prey items) and a corresponding slope (Appendix 1). The term "EC50" will be used in this section to describe short-term survival data for aquatic invertebrates (death and immobility). To determine what levels of the three pesticides reduce aquatic invertebrate numbers, we reviewed the available field and laboratory studies. We found robust data for carbaryl, carbofuran, and methomyl with respect to laboratory acute toxicity tests that measured survival at 24-, 48-, 72-, and 96 h with an array of aquatic invertebrates. We did not locate a field study that measured aquatic community response to a range of concentrations of the three insecticides. Therefore, we did not select concentration data from field experiments as we did in NMFS' 2008 Opinion on the registration of chlorpyrifos, diazinon, and malathion (NMFS 2008).

To determine a single effect concentration to use in the model analyses, a search was completed using the EPA's ECOTOX database for each pesticide (http://cfpub.epa.gov/ecotox/). Several criteria were used to determine which reported effect concentrations were included in the final analysis. The data included were from studies on taxa that are known to be salmonid prey (or are functionally similar to salmonid prey); these include a diverse group of aquatic insects and worms and fresh and saltwater crustaceans. Studies with exposures of at least 24 h and not more than 96 h were included. Studies examining shorter and longer exposure times are known to affect invertebrates (Peterson, Jepson et al. 2001), but these were excluded so that estimated EC50s would be comparable. Studies reporting survival EC50s in which mortality or immobilization was the recorded endpoint were included. Data derived for sublethal endpoints

(*e.g.*, growth or reproduction) were not included. If specific data were represented more than once in the ECOTOX output, duplicates were eliminated. Data from recent peer-reviewed studies that report survival EC50s were also included (Norberg-King, Durhan et al. 1991; Takahashi and Hanazato 2007). Next, we calculated the geometric mean when more than one survival EC50 was reported for a species.

Probability distributions of aquatic prey survival toxicity values (EC50s)

We plotted the survival EC50 data for each of the three insecticides using cumulative probability distributions. We also plotted the data based on all test results for the species without taking the geometric means. From the distributions of the data, a single effect concentration and slope were derived to best represent the diverse community of prey available in juvenile salmonid freshwater and estuarine habitats. The distributions of individual EC50s and the geometric means of EC50s by taxa were analyzed to estimate the 50th, 10th, and 5th percentiles. Figure 43 shows the distributions of geometric means of EC50s by taxa. Specifically, for each pesticide, a probability plot was used to graph the EC50 concentrations normalized to a normal probability distribution. For each plot, the X axis is scaled in probability (between zero and 100%) and shows the percentage of entire data whose value is less than the data point. The Y axis displays the range of the data on a log scale. The results of a linear regression of the log-transformed concentrations are shown and highlight the lognormal distribution of the data (Figure 43). In the regression equation, the normsinv function returns the inverse of the standard normal cumulative distribution. The standard normal distribution has a mean of zero and a standard deviation of one. For example, given a percentile value of 50 (*i.e.,* a probability of 0.5), normsinv(50) returns a value of zero. The plots and regressions were performed using KaleidaGraph 4.03 (Synergy Software).

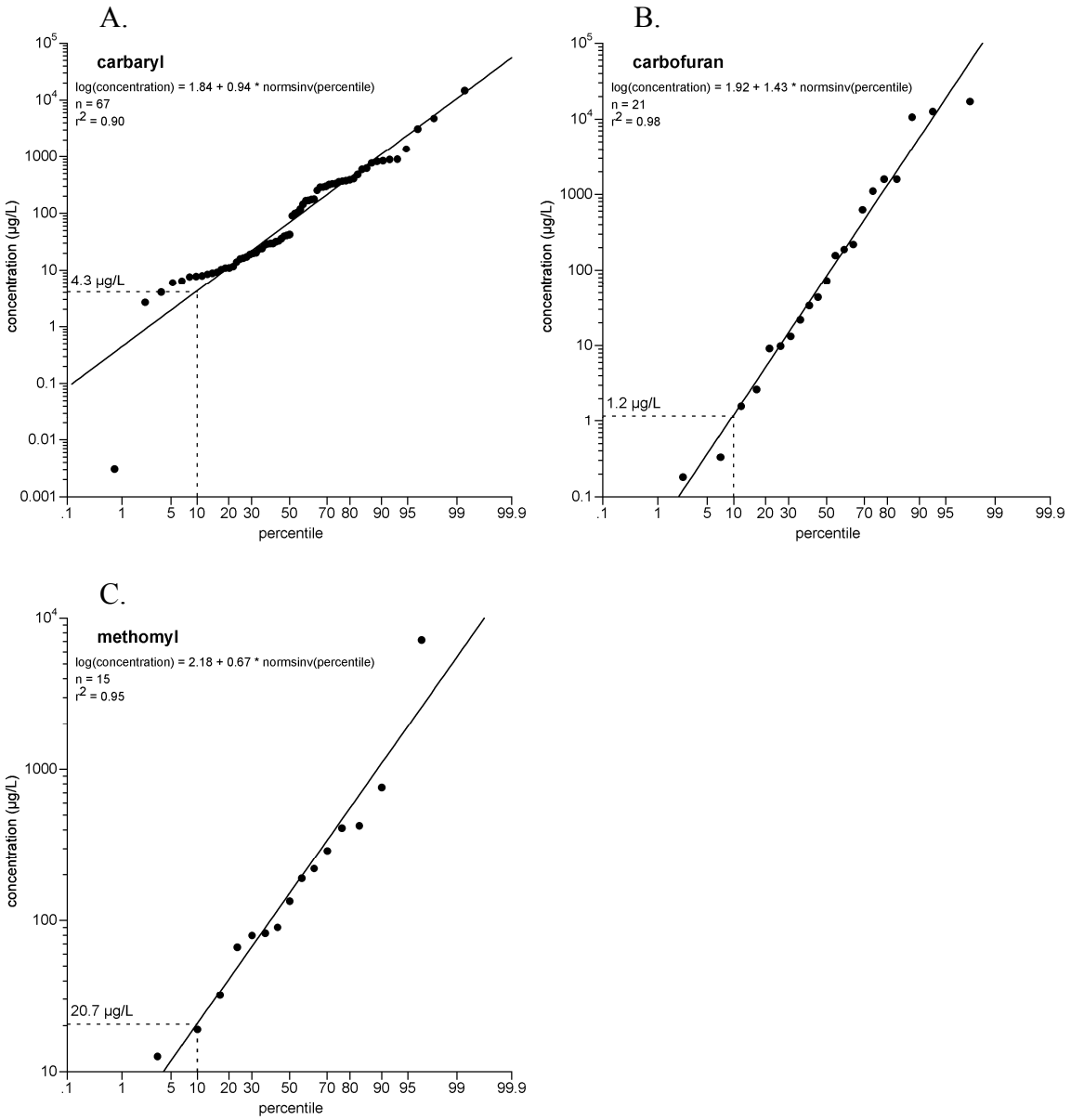

Figure 43. Probability plot for each pesticide showing the distribution of the geometric means of the EC50s for each aquatic invertebrate species. The straight line shows the result of a linear regression. In the regression equation, the normsinv() function returns the inverse of the standard normal cumulative distribution. See text for more details. A) Plot of carbaryl EC50s. B) Plot of carbofuran EC50s. C) Plot of methomyl EC50s.

In Table 79, concentrations are reported for each insecticide associated with either the 50th, 10th, or 5th percentiles derived from probability distribution plots with all study results (plots not shown) or with species geometric means. Percentiles from the species geometric means show

higher concentrations compared to the "all studies" plots. This is likely a reflection that when individual study results are considered separately, the species with the greater number of EC50 study results is found at the lower end of the distribution.

Table 79. Carbaryl, carbofuran, and methomyl survival EC50 concentrations at 50th , 10th , and 5th percentiles from probability distribution plots.

	Concentration of EC50 at each percentile (μg/L)		
	50%	10%	5%
All studies probability distribution plot			
Carbaryl	45.23	2.29	0.98
Carbofuran	58.95	0.94	0.29
Methomyl	128.9	12.93	6.74
Species geometric means probability distribution plot			
Carbaryl	69.53	4.33	1.97
Carbofuran	89.95	1.22	0.37
Methomyl	150.76	20.74	11.82

We selected the 10th percentile from each of the pesticide plots to represent the survival EC50 for salmonid prey. The associated 10th percentile for carbaryl (4.33 μg/L), carbofuran (1.22 μg/L), and methomyl (20.74 μg/L) was used as input for the population growth model exercises. The 10th percentile is a reasonable selection because the data included in the meta-analysis were limited to concentrations that caused mortality or immobilization within a short period of time (1-4 days). A growing number of studies on a variety of insecticides have reported that concentrations well below LC50s can cause delayed mortality or sublethal effects that may scale up to affect aquatic invertebrate populations, especially in scenarios with multiple exposures and/or other stressors. Evidence for ecologically significant sublethal or delayed effects to aquatic invertebrates includes reduced growth rates (Schulz and Liess 2001; Forbes and Cold 2005), altered behavior (Johnson, Jepson et al. 2008), reduced emergence (Schulz and Liess 2001; Johnson, Jepson et al. 2008), reduced reproduction (Cold and Forbes 2004; Forbes and Cold 2005), and reduced predator defenses (Sakamoto, Chang et al. 2006; Johnson, Jepson et al. 2008).

Additionally, the available toxicity data – and therefore the data included for these analyses– are from studies using taxa hearty enough to survive laboratory conditions. Studies specifically examining salmonid prey that are more difficult to rear in the laboratory have documented

relatively low survival EC50 values when exposed to current use insecticides (Johnson, Jepson et al. 2008), including carbaryl (Peterson, Jepson et al. 2001; Johnson, Jepson et al. 2008).

The selection of the 10th percentile is a reasonable choice in keeping with general risk management practices of protecting the aquatic community. The standard procedure the U.S. EPA Office of Water uses in establishing Aquatic Life Criteria is to protect to the 5th percentile of a species sensitivity distribution that includes all genera of aquatic species for which valid data are available (EPA 1995). Their procedure involves combining species data into a genus mean value so that multiple tests on one sensitive species do not unduly influence the outcome, and evaluating a specified group of taxa. As we had already selected for the sensitive end of the spectrum by using salmonid prey items, and did not collapse species data into a genus mean, we used the 10th percentile. In the probabilistic risk assessment for carbofuran (EPA 2005), OPP evaluated effects on the 5th, 50th, and 95th percentiles of separate species sensitivity distributions for fish and invertebrates, although it was not clear in the document which was the preferred percentile for risk management.

Modeling availability of unaffected prey

Reductions in benthic invertebrate densities can lead to long-term reductions in prey availability and reductions in fish growth (Davies and Cook 1993). That said, prey densities are not usually reduced to zero (Wallace, Lugthart et al. 1989). Therefore, it is assumed that regardless of the exposure scenario, prey abundance would not drop below a specific "floor" of prey availability. This floor is included in the model to reflect an assumption that a minimal yet constant terrestrial subsidy of prey and/or an aquatic community with tolerant individuals would be available as prey, regardless of pesticide exposure and in addition to the constant recovery rate (see below).

Therefore, even in extreme exposure scenarios, some prey will be available, as determined by the value assigned to the floor; in some highly degraded systems this may or may not be the case. No studies have quantified this floor for the purpose of estimating prey availability, but several studies have documented reductions in overall benthic insect densities of 75-98% (Wallace, Lugthart et al. 1989; Anderson, Hunt et al. 2003; Anderson, Phillips et al. 2006). Because benthic densities are typically correlated with drift densities (Hildebrand 1974; Waters and Hokenstrom 1980), these reductions likely result in similar reductions of prey. Therefore,

assuming there is also some constant rate of terrestrial invertebrate subsidy in addition to a residual aquatic community, a floor of 0.20, or 20% of fish ration, is reasonable. The model does not include any additional impacts to fish via dietary exposure from contaminated prey, or any potential synergistic or additive effects to the aquatic invertebrates that may be result from multiple stressors (Schulz and Liess 2001).

Modeling spikes in invertebrate drift following insecticide exposure

"Catastrophic drift" of invertebrates, due to acute mortality and/or emigration of benthic prey into the water column is frequently observed following exposure to insecticides (Davies and Cook 1993; Schulz and Liess 2001; Schulz 2004). Drift rates within hours of exposure can be more than 10,000 times the natural background drift (Cuffney 1984), and fish have been found to exploit this by feeding beyond satiation (Haines 1981; Davies and Cook 1993). The duration and magnitude of the spike in drift of prey is dependent in part on the physical properties and dose of the pesticide; however, the spike is generally ephemeral and returns to natural, background levels within hours to days (Haines 1981; Kreutzweiser and Sibley 1991). Likewise, the magnitude of the spike is dependent in part on the benthic density of prey; the spike in drift from communities that have been reduced by previous exposures is smaller than the spike from previously undisturbed communities (Cuffney 1984; Wallace, Huryn et al. 1991). To reflect this temporary increase in prey availability, the model includes a one-day prey spike for the day following an exposure (Appendix 1). The model also accounts for this short-term increase in prey availability by allowing fish to feed at a maximum rate of 1.5 times their normal, optimal ration.

Modeling recovery of salmonid prey

We selected a 1% recovery in prey biomass per day. Reports of recovery of invertebrate prey populations, once pesticide exposure has ended, range from within days to more than a year (Cuffney 1984; Kreutzweiser and Sibley 1991; Pusey, Arthington et al. 1994; Ward, Arthington et al. 1995; Van den Brink, van Wijngaarden et al. 1996; Liess and Schulz 1999; Colville, Jones et al. 2008). The dynamics of recovery are complicated by several factors, including the details of the pesticide exposure(s) as well as habitat and landscape conditions (Liess and Schulz 1999) (Van den Brink, Baveco et al. 2007). In watersheds with undisturbed upstream habitats, recovery can be rapid due to a healthy source of invertebrates that can immigrate via drift and/or aerial colonization (for adult insects) (Heckmann and Friberg 2005). However, in watersheds

dominated by agricultural or urban land uses, healthy upstream or nearby habitats may be limited and consequently, recolonization by salmonid prey is likely reduced (Liess and Von der Ohe 2005; Schriever, Ball et al. 2007). Additionally, many large, high-quality prey take a year or more to develop (Merritt and Cummins 1995) indicating that recovery of biomass (as compared to prey density) is likely a limiting factor (Cuffney 1984). Recovery to pre-disturbance levels is unlikely in aquatic habitats where invertebrate abundances are repeatedly reduced by stressors. We consider a 1% (control prey abundance per day) recovery rate as ecologically realistic to represent recolonization by invertebrates in salmonid habitats (Ward, Arthington et al. 1995; Van den Brink, van Wijngaarden et al. 1996; Colville, Jones et al. 2008).

Growth model results

Exposure to single insecticides for 4-, 21- , and 60 day exposure durations

Population model outputs for the four salmon populations are summarized as dose-response curves in Figures 44-47. As expected, greater reductions in population growth resulted from longer exposures to the insecticides. The primary factor driving the magnitude of change in lambda was the Prey Abundance parameter for each insecticide *i.e.*, the 10th percentile survival EC50 for salmonid prey. The AChE parameter for each of the insecticides was a secondary factor compared to Prey Abundance. This is largely because the salmonid EC50s for AChE were much higher, typically by an order of magnitude, than the prey survival EC50s.

Similar trends in effects were seen for each pesticide across all four life history strategies modeled. This is apparent by the similar shape of the dose-response curves across species. The curves plateau when there is no more reduction possible in the aquatic community *i.e.,* the 20% biomass of the aquatic invertebrate community is reached. Once that plateau is achieved, further reductions in lambda are minimal with increasing concentrations. Clearly, the most toxic of the pesticides affected salmon populations at lower concentrations, as is observed with carbaryl and carbofuran where concentrations in the low μg/L range are sufficient to reduce populations' growth rates compared to methomyl where 20 μg/L or greater are needed to reduce lambdas. One factor that contributed to the similar responses observed was the use of the same surrogate toxicity values for all four life history strategies. The stream-type Chinook salmon (Figure 45) and sockeye salmon **(**Figure 46) models produced very similar results as measured as the final

output of percent change in population growth rate. The ocean-type Chinook salmon model output (Figure 44) produced the next most extreme response, and coho salmon output (Figure 46) showed the greatest changes in lambda resulting from the pesticide exposures. When looking for similarities in parameters to explain the ranking, no single life history parameter or characteristic, such as lifespan, reproductive ages, age distribution, lambda and standard deviation, or first-year survival show a pattern that matches this consistent output **(**Appendix 1**)**. Combining these factors into the transition matrix for each life history and conducting the sensitivity and elasticity analyses revealed that changes in first-year survival produced the greatest changes in lambda. While some life history characteristics may lead a population to be more vulnerable to an impact, the culmination of age structure, survival and reproductive rates as a whole strongly influences the population-level response.

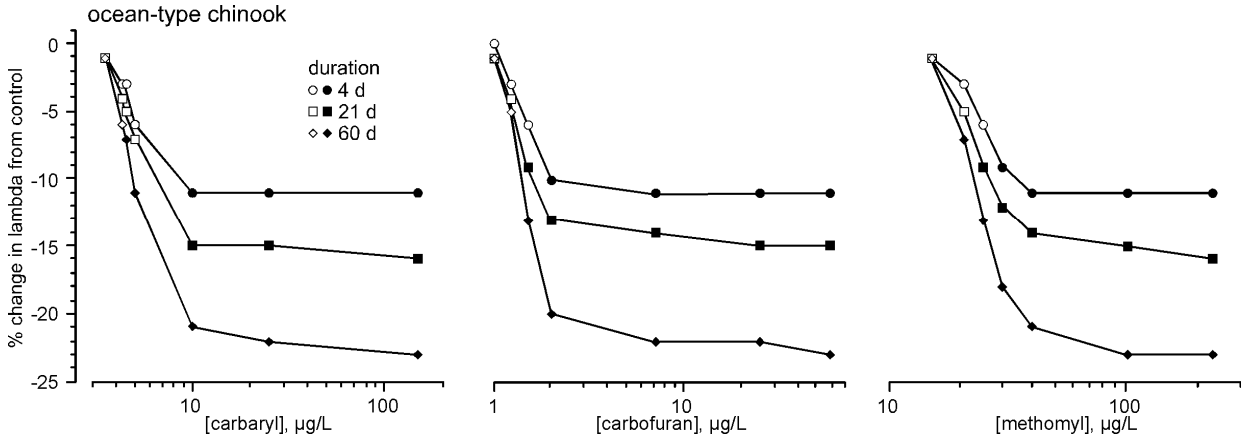

Figure 44. Percent change in lambda for Ocean-type Chinook salmon following 4 d, 21 d, and 60 d exposures to carbaryl, carbofuran, and methomyl. Open symbols denote a percent change in lambda of less than one standard deviation from control population. Closed symbols represent a percent change in lambda of more than one standard deviation from control population.

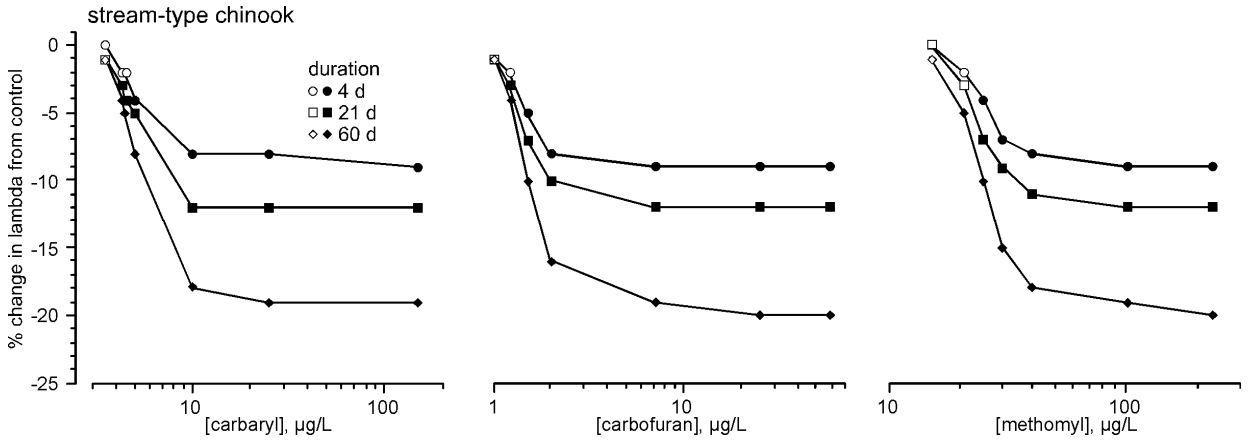

Figure 45. Percent change in lambda for Stream-type Chinook salmon following 4 d, 21 d, and 60 d exposures to carbaryl, carbofuran, and methomyl. Open symbols denote a percent change in lambda of less than one standard deviation from control population. Closed symbols represent a percent change in lambda of more than one standard deviation from control population.

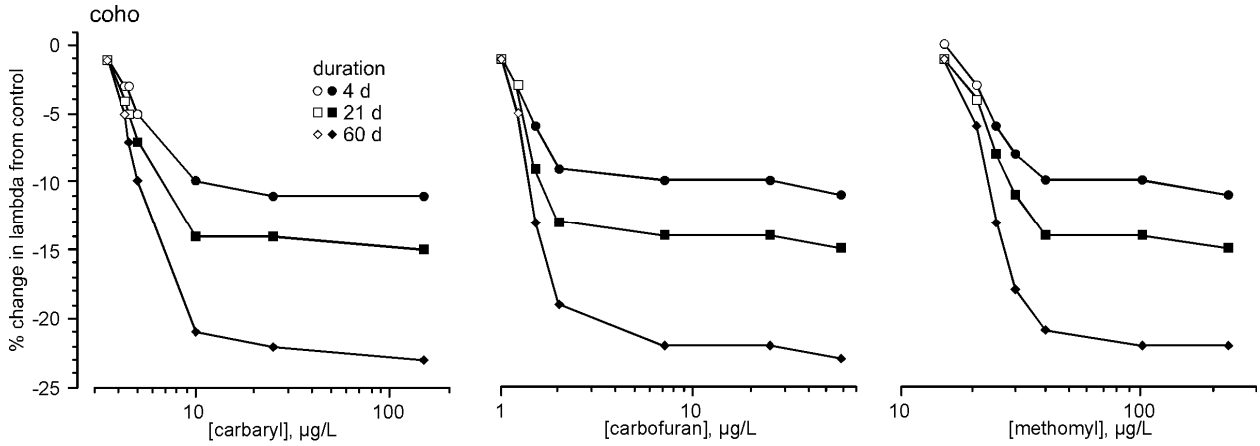

Figure 46. Percent change in lambda for Coho salmon following 4 d, 21 d, and 60 d exposures to carbaryl, carbofuran, and methomyl. Open symbols denote a percent change in lambda of less than one standard deviation from control population. Closed symbols represent a percent change in lambda of more than one standard deviation from control population.

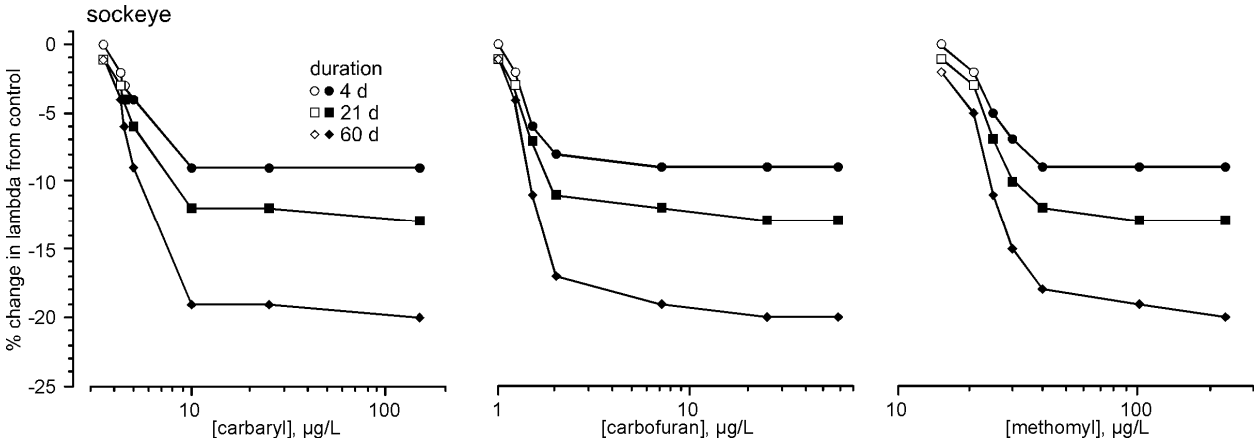

Figure 47. Percent change in lambda for sockeye salmon following 4 d, 21 d, and 60 d exposures to carbaryl, carbofuran, methomyl. Open symbols denote a percent change in lambda of less than one standard deviation from control population. Closed symbols represent a percent change in lambda of more than one standard deviation from control population.

By applying some of these changes in lambda to known threatened and endangered populations' lambdas from Appendix 2, significant reductions in population viabilities are anticipated. For example, if the Puget Sound Chinook salmon Green River population with a lambda of 0.67 is exposed to carbaryl at 10.0 μg/L for 4 d, a concentration attainable in off-channel habitats, we would expect a reduction in lambda by 11% (Table 74) or 8% (Table 75) depending whether the individuals exhibit ocean-type or stream-type life histories. These reductions would be severe to the population and are primarily a result of reductions in juvenile growth from impacts to salmonid prey. Even for those lambdas that are well above one such as Central Valley Chinook salmon Spring Runs' Butte Creek population (lambda = 1.3), reductions of 11% would have major consequences to a population's viability from reduced growth of juveniles. The repercussions to these populations' viabilities are increased with increasing concentrations, durations, multiple applications, and when mixtures are incorporated.

Exposure to multiple applications of carbaryl or methomyl

We constructed two scenarios to evaluate the potential population effects from multiple applications of carbaryl and methomyl (Table 80). We used concentrations from AgDrift model outputs to estimate drift contributions of carbaryl into an off-channel habitat (Table 52). Populations exposed to carbaryl drift within off-channel habitats following four applications would experience severe declines in population growth rate ranging from 15-19%. Interestingly, a single application would result in notable reductions in the four modeled population's lambdas as well, ranging from 8-11%. Similar to the carbaryl modeled scenario, methomyl applied to sweet corn ten times (the label allows for 14 applications at 1 d intervals) resulted in significant reductions in lambdas ranging from 6-8%. A single application did not result in a significant reduction in lambda for any of the four populations.

Table 80. Multiple application scenarios for carbaryl and methomyl and predicted percent change in lambdas for salmon populations

	Carbaryl	Methomyl
Crop examples	Almonds, chestnuts, pecans, filberts, walnuts, pistachios	Sweet corn
Application rate	5 lbs a.i./acre	0.45 lbs a.i./acre
Number of applications/yr	4	10
Application interval	14 days	3 days
Method of application	Aerial (fine-medium droplet distribution)	aerial (fine-medium droplet distribution)
No-application Buffer	none	100 ft
Off-channel habitat characteristics	water depth = 0.5 m Initial average concentration 335 μg/L; 24 h exposure	water depth = 0.5 m Initial average concentration 8.55 μg/L; 96 h exposure
% change in Lambda		
Ocean-type Chinook	-19%	-8%
Stream-type Chinook	-15%	-6%
Sockeye	-16%	-7%
Coho	-18%	-8%

Population-level consequences from other affected salmonid assessment endpoints and other stressors of the action

In this section we present the population-level consequences from individual effects that are not amenable to population modeling. In most cases we lack the empirical data to conduct population modeling for these endpoints. Thus, we use qualitative methods to infer population-level responses. We focus on the population metrics of abundance and productivity. Both are metrics used by NMFS to assess a population's viability and both can be compromised by the chemicals assessed in this Opinion. Individual fitness consequences that reduce survival, growth, reproduction, or migration can lead to reduced salmonid population viability if sufficient numbers of individuals comprising a population are affected, and are more pronounced when affected over multiple generations. If the reductions in fitness result in reducing a population's survival or recovery potential, then we consider whether the ESU or DPS is impacted (See *Integration and Synthesis* section).

With the proposed action it is difficult to place an exact number on the percentage of a population that is affected or how frequently a population is affected because of the lack of information on and wide variability in the spatial and temporal uses of the registered formulations containing carbaryl, carbofuran, and methomyl, compounded by the imperfect data on where salmonids are at any given time. However, NMFS has sufficient information to make reasonable inferences from the available use, exposure, and response data on the likelihood of population-level consequences. Below we address whether the remaining fitness level consequences identified from the risk hypotheses affect the viability of salmonid populations. As mentioned earlier, we focus on the potential for reduced population abundance and productivity.

Impaired swimming and olfactory–mediated behaviors

All life stages of salmonids rely on their inherent ability to smell, to swim, and to navigate through a variety of habitats over their life span and to ultimately spawn successfully in natal waters and complete their life cycle. We have shown that exposure to carbaryl and carbofuran, compared to effects concentrations necessary to impair swimming behaviors, appears sufficient to do so in some environments, especially in rearing locations for the juveniles. Although no data were available to evaluate the effect of methomyl on swimming behavior, we find it reasonable to apply the conclusions drawn for carbaryl and carbofuran due to the chemicals sharing a similar mechanism of toxic action. Specifically, we expect that salmonids with impaired swimming behaviors from AChE inhibition will show reduced feeding, delayed or interrupted migration, reduced survival, and reduced reproductive success. We conclude that exposed populations are likely to have reduced abundance and productivity as a result of impaired swimming.

Based on the information we reviewed for carbaryl, carbofuran, and methomyl on salmonid olfaction, we find differences in expected responses. For carbaryl, we conclude that it is unlikely to affect salmonid olfaction at estimated concentrations. For methomyl, we located no information on its effects to fish olfaction, and given the variation in olfactory responses measured from other AChE inhibitors (OPs and carbamates) it is uncertain whether methomyl will affect olfaction. For carbofuran, definitive evidence shows that olfaction in fish is affected at low μg/L concentrations.

Because olfaction plays an important role in a suite of ecologically relevant behaviors that are affected when an individual salmonid's olfaction is impaired, we include this endpoint in our analysis. Lack of predator avoidance behaviors by juvenile and adult salmonids reduces the probability of surviving predation events. Juvenile salmonids with impaired olfaction may fail to properly imprint on their natal waters, which later in life leads to adults straying *i.e.,* migrating into and spawning in streams other than their natal stream. Adults that do not return to natal waters are a functional loss to recruitment of a population. Adult male salmonids that do find their way back to natal stream or river reaches and are subsequently exposed to the three insecticides may lose some or all of their olfactory capacity, even from a short-term exposure. Female salmonids release odorants to trigger male priming hormones and to alert males of a female's spawning condition. However, male fish with reduced olfactory capacity may not detect these cues, as demonstrated in a study on carbofuran (Bretaud, Saglio et al. 2002). Thus spawning synchronization could be compromised and recently laid eggs may go unfertilized. Unfertilized eggs may result in reduced productivity and abundance for a population if sufficient numbers of spawning events are missed. Again, we find it difficult to accurately predict when these impairments and missed spawning opportunities occur, primarily as a result of incomplete pesticide use information, difficulty in conducting field experiments with adult salmonids, and uncertainties surrounding extent of effects and concentrations which may trigger them. Because imprinting, avoiding predators, homing, and spawning are likely affected when exposed to carbofuran, we conclude these additional effects cannot be dismissed. Therefore, we expect populations exposed to carbofuran will show reduced reproductive rates, reduced return rates, and reduced intrinsic rates of growth when sufficient numbers of individuals are affected.

Starvation during a critical life stage transition

Salmonids emerge from redds (nests) with a yolk-sac as their initial food source (yolk-sac fry). Once the yolk-sac has been completely absorbed, they must begin exogenous feeding. Fry have limited energy reserves, and if they are unable to properly swim or detect and capture prey the onset of starvation occurs rapidly. Because juvenile salmon are limited by gape width, prey at this stage are limited to very small aquatic invertebrates. The stressors of the action likely affect this critical life stage transition in several ways, leading to increased early life stage mortality. Impaired swimming and olfaction affects the fry's ability to detect and capture prey. Prey may

be killed outright by the stressors of the action leading to reduced prey availability or the complete absence of prey. These same areas also have off-channel habitats where fry seek shelter and food and those areas are highly susceptible to the highest concentrations of the three insecticides. Therefore, we expect reductions in a population's abundance where transitioning yolk-sac fry are exposed to the stressors of the action. All salmonid ESUs share this common life stage transition and therefore are at risk.

Death of returning adults

We discussed and analyzed with models the importance of juveniles to population viability. However, we did not address possible implications of returning adults dying from exposure to the stressors of the action. An adult returning from the ocean to natal freshwaters is important to a population's survival and recovery for many reasons. Notably, less than one percent of adults generally complete their life cycle. For populations with lambdas well below 1, every adult is crucial to a population's viability. We expect that some sensitive adults will die from short-term exposures before they spawn within some of the populations, particularly those that spawn in intensive agricultural watersheds and urban/suburban environments where elevated temperatures, other AChE-inhibiting insecticides, and low pHs are present. The lower end concentrations that kill 50% of exposed salmonids fall in the hundreds of μg/L. For methomyl, we expect that fewer adults would die compared to carbofuran and carbaryl based on differences in toxic potencies. We still expect that sensitive individuals exposed to concentrations below the LC50 will die. These concentrations are expected in habitats receiving drift from aerial applications. The persistence of these concentrations will vary with habitat, but for those habitats with lower pHs and minimal flow sensitive adult salmonids are expected to be killed. We cannot quantify the number of adults lost to a given population in a given year. For those populations where each adult salmonid is important to viability, we expect reductions in both productivity and abundance.

Synergistic toxicity

With certain combinations and specific concentrations of carbaryl and carbofuran, synergism occurs, translating into increased inhibition of AChE and in some cases increased rates of mortality among exposed salmonids. We have no data either supporting or refuting synergism for methomyl. We have no predictive models for synergistic toxicity. However, where we

expect co-occurrence of the three insecticides, we expect synergism may occur if high enough concentrations exist. Generally, these concentrations must exceed individual LC50s for the three compounds, which is most likely to occur in areas with extensive crop uses where applications overlap in space and time. In these areas, even more fish would die from synergistic effects than predicted based on the additive toxicity for carbaryl, carbofuran, and methomyl. Juveniles and returning adults may experience synergistic toxicity. Whether or not death occurs is dependent on exposure duration and concentrations of the three insecticides. Typically, adults are less sensitive than early lifestages, however it is very difficult to conduct toxicity assays with pre-spawn adult salmoninds. Pre-spawn adults have used up most of their accumulated fat, converting it into gamete production, and will die soon after spawning. We are unsure how sensitive these adults are to toxic pesticides, but expect in their physiological state that they will be as or more sensitive than juveniles. We expect that some adults that occupy or spawn in shallow, low flow systems will be impacted from synergistic toxicity. Therefore, population-level effects could be more pronounced, depending upon the number of individuals and the importance of those individuals to the survival and recovery of the population. We conclude that based on the expected environmental concentrations of the three insecticides, synergism is likely in many off-channel habitats resulting in increased rates of death to juveniles and to adults.

Toxicity from other stressors of the action

We identified inert ingredients, adjuvants (NP), tank mixtures (recommended on pesticide product labels), degradates (1-napthol, 3-hydroxycarbofuran), and other pesticide a.i.s (malathion, bifenthrin, rotenone, metaldehyde, captan, and cupric sulfate) as toxic to salmonids and their prey. There remain substantial data gaps on the expected concentrations of these chemicals in salmonid habitats. However, some chemicals are detected at concentrations that pose substantial risk to listed salmonids and their prey (*e.g.,* malathion, NP). The risk posed by these other stressors to salmonid populations is complicated by the same factors we discussed for carbaryl, carbofuran, and methomyl (*i.e.,* the numbers of individuals exposed, the uncertainty surrounding the temporal and spatial uses of these chemicals, etc.). Severe population reductions of Atlantic salmon in Canada were attributed specifically to the use of NP within a pesticide formulation (Fairchild, Swansburg et al. 1999; Brown and Fairchild 2003). We conclude that given the use and co-application of these chemicals with carbaryl, carbofuran, and methomyl, exposed individuals are at increased risk of the suite of toxic effects expected from these

substances. Substantial uncertainty also exists regarding the identity of other ingredients in formulations further complicating our ability to predict overall toxicity to salmonids and their prey as a result of pesticide use. Exposed populations are at increased risk of reduced abundance and productivity from these chemicals. However, NMFS is unable to accurately describe the level of risk.

Conclusion on population-level effects

We conclude that many of the populations of threatened and endangered salmonids covered by this consultation will likely show reductions in viability, particularly those that are comprised of juvenile life histories that rear for weeks to years in freshwater habitats found in intensive agricultural and residential/urban areas. Juvenile coho salmon, steelhead, and ocean- and stream-type Chinook salmon use these types of rearing areas for extended periods which overlaps with pesticide applications. Of greatest concern are for those independent populations for each ESU or DPS distributed in high use areas of carbaryl, carbofuran, and methomyl.

Based on these facts, we expect that where the geographic range of listed populations overlaps with intensive cropping patterns and urban/residential areas severe effects to abundance and productivity are anticipated from exposure to the three pesticides. However, due to the impending phase out of carbofuran, we expect the likelihood of exposure and therefore toxicity to decline rapidly as existing products stocks are depleted. Population effects are largely a result of reduced salmonid prey abundances and subsequent reduced growth of juveniles. Although less of a factor, individual fitness consequences are also likely in some areas due to impaired swimming.

Effects to Designated Critical Habitat: Evaluation of Risk Hypotheses

Presently, critical habitat has been designated for 26 of the 28 listed salmonid ESUs, all of which is located within the action area. Designated critical habitat within the action area includes spawning and rearing areas, freshwater migratory corridors, and nearshore and estuarine areas, and includes essential physical and biological features. When NMFS designated critical habitat for the 26 salmonid ESU/DPSs, NMFS identified PCEs essential for the conservation of the species. The PCEs NMFS identified are those sites and habitat components that function to

support one or more lifestages. For this opinion, the primary PCEs potentially affected are prey availability and water quality degradation in spawning and rearing areas, freshwater migratory corridors, and nearshore and estuarine areas.

The effects of the proposed action on prey and water quality PCEs are addressed below by weighing the available evidence either supporting or refuting the critical habitat-related risk hypotheses. NMFS reviewed and presented the toxicological information available for habitat assessment endpoints within the *Response Analysis* section. Included are the PCEs prey availability and water quality. If these PCEs are likely impacted by the stressors of the action, we address the potential for reductions to the associated conservation value of the designated critical habitat in the *Effects of the Proposed Action to Designated Critical Habitat* Section.

Critical Habitat Risk Hypotheses based on potential effects to PCEs:

> *Risk Hypothesis 1. Exposure to the stressors of the action is sufficient to reduce abundances of aquatic prey items of salmonids.*

We evaluated two lines of evidence to determine whether this hypothesis is supported by the available information. The first is whether data support the occurrence of adverse effects to salmonid prey items from the stressors of the action. The second is whether reductions in abundances of salmonid prey items occur in areas of documented exposure to the stressors of the action. We found overwhelming evidence in support of the first line of evidence. The stressors of the action are expected to kill large numbers and types of aquatic species that serve as prey to salmonids, especially when carbaryl, carbofuran, and methomyl are present together and/or co-occur with other insecticides. The concentrations we summarized indicate that alone each of the insecticides can also kill prey at expected environmental concentrations.

The IBI and other metrics of aquatic community health were reviewed to evaluate the second line of evidence. In areas of intensive agriculture, where we expect use of the stressors of the action, biological integrity is often significantly reduced (Cuffney et al 1997). Many of the preferred salmonid prey items are present only in low numbers or absent altogether in these areas. We see similar depauperate communities in urban areas. We recognize many other limiting factors contribute to poor condition of these aquatic communities. However, these

insecticides and their formulations may be responsible for a substantial portion. In fact, several studies have shown toxicity to salmonid prey items from field collected waters and sediment due to pesticide residues (Cuffney, Meador et al. 1997; Hall, Killen et al. 2006).

We therefore expect that spawning, rearing, and migratory areas will be affected by the stressors of the action resulting in reduced abundances of aquatic prey items. The magnitude in reduction of prey is difficult to ascertain, however where designated critical habitats overlap with high potential use areas such as agricultural or urban dominated flood plains, we expect pronounced reductions. These areas support fry and juvenile growth and development which are predicated on an abundant and diverse source of prey. Reductions in prey availability may affect the conservation value and the ability of the habitat features to support salmonids. In summary, the available information shows prey items of ESA-listed salmonids are affected by the stressors of the action to an extent warranting an analysis of whether the conservation value of designated critical habitat is negatively affected.

> *Risk hypothesis 2. Exposure to the stressors of the action is sufficient to degrade water quality in designated critical habitat.*

We addressed this hypothesis by comparing exposure concentrations to toxicity data. The results of the comparison indicate that expected concentrations from the proposed action trigger adverse effect levels for salmonids and their prey (see *Exposure Analysis* and *Response Analysis* sections). Based on pesticide uses described in the *Description of the Action* section coupled with expected concentrations presented in the *Exposure Analysis* section (*i.e.,* concentrations derived from surface water monitoring data, EPA and NMFS modeling estimates), we expect these concentrations to be present in designated critical habitat and therefore to degrade water quality. In many of the watersheds containing designated critical habitats, water quality is identified as a major limiting factor to salmonid production. The proposed action is likely to further degrade water quality in spawning, rearing, and migratory areas. Collectively, this information supports the conclusion that designated critical habitats are likely degraded throughout the four states and further analysis is warranted to determine the potential to reduce the conservation value of designated critical habitats.

We attempted to compare expected concentrations of these pesticides to U.S. Water Quality Criteria designated pursuant the Clean Water Act, however none are published. We then evaluated whether any of the state waters within designated critical habitat are listed as impaired by carbaryl, carbofuran, and/or methomyl by searching state 303(d) lists (discussed in the *Environmental Baseline* section). Currently, state water quality standards have been developed for carbaryl and carbofuran, but not for methomyl. Unfortunately, surface water sampling is not conducted on all freshwater habitats (including designated critical habitats) within the action area and as a result we do not discount areas not sampled. For these reasons, it is also not possible to determine from 303(d) lists the magnitude of water quality degradation to designated critical habitat. We also do not rely on 303(d) lists as the sole source of information for degradation of water quality. In California, Oregon, and Washington some streams have been placed on the 303(d) list for carbaryl and carbofuran (see *Environmental Baseline* section) which indicates that water quality can be degraded by the stressors of the action in salmonid habitats. We located no listings for methomyl, and we located no listings for the three pesticides in the state of Idaho.

Areas of Uncertainty

In this section we list the predominant uncertainties and data gaps uncovered by our analysis of the effects of the proposed action. We do not discuss the entire suite of uncertainties, but highlight those likely have the most influence on the present analysis.

- Description of the action. We lacked a complete description of EPA-authorized uses of pesticides containing carbaryl, carbofuran, and methomyl as described in labeling of all pesticide products containing these a.i.s.

- Exposure resulting from non-agricultural uses. We lacked exposure estimates of stressors of the action associated with non-agricultural uses of these pesticides.

- Exposure to and toxicity of pesticide formulations and adjuvants. Minimal information was found on formulations, adjuvants, and on other/inert ingredients within registered formulations.

- Exposure to mixtures. We lacked information on permitted tank mixtures. Additionally, given that relatively few tank mix combinations are prohibited, it was not feasible to evaluate all potential combinations of tank mixtures. Pesticide mixtures are found in

freshwater throughout the listed-salmonid habitat areas. However, mixture constituents and concentrations are highly variable.

- Toxicity of mixtures. The toxicity of most environmental mixtures is unknown.

- Synergistic responses. Exposure to combinations of carbaryl, carbofuran, methomyl, and/or other combinations of OP and carbamate insecticides can result in synergistic responses. However, we are not aware of a method to predict synergistic responses.

Cumulative Effects

Cumulative effects include the effects of future state, tribal, local, or private actions that are reasonably certain to occur in the action area considered by this Opinion. Future federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA.

During this consultation, NMFS searched for information on future state, tribal, local, or private actions that were reasonably certain to occur in the action area. NMFS conducted electronic searches of business journals, trade journals, and newspapers using Google and other electronic search engines. Those searches produced reports on projected population growth, commercial and industrial growth, and global warming. Trends described below highlight the effects of population growth on existing populations and habitats for all 28 ESUs/DPSs. Changes in the near-term (five-years; 2014) are more likely to occur than longer-term projects (10-years; 2019). Projections are based upon recognized organizations producing best available information and reasonable rough-trend estimates of change stemming from these data. NMFS analysis provides a snapshot of the effects from these future trends on listed ESUs.

States along the Pacific west coast, which also contribute water to major river systems, are projected to have the most rapid growth of any area in the U.S. within the next few decades. This is particularly true for coastal states. California, Idaho, Oregon, and Washington are forecasted to have double digit increases in population for each decade from 2000 to 2030 (USCB 2005). Overall, the west coast region [which also includes four additional states (Arizona, Utah, Nevada, and Alaska) beyond the action area] had a projected population of 65.6 million people in 2005. This figure will eventually grow to 70.0 million in 2010 and 74.4 million in 2015. At this rate, such growth will make the Pacific coast states the most populous region in the nation.

Although general population growth stems from development of metropolitan areas, growth in the western states is projected from the enlargement of smaller cities rather than from major metropolitan areas. Of the 42 metropolitan areas that experienced a 10% growth or greater

between 2000 and 2007, only seven have populations greater than one million people. Of these major cities, one and two cities are from Oregon and California, respectively. They include Portland-Vancouver-Beaverton, OR (1.83%/year), Riverside-San Bernadino-Ontario, CA (3.63%/year), and Sacramento-Arden-Arcade-Roseville, CA (2.34%/year).

Urban Growth

As these cities border coastal or riverine systems, diffuse and extensive growth will increase overall volume of contaminant loading from wastewater treatment plants and sediments from sprawling urban and suburban development into riverine, estuarine, and marine habitats. Urban runoff from impervious surfaces and roadways may also contain oil, heavy metals, PAHs, and other chemical pollutants and flow into state surface waters. Inputs of these point and non-point pollution sources into numerous rivers and their tributaries will affect water quality in available spawning and rearing habitat for salmon. Based on the increase in human population growth, we expect an associated increase in the number of NPDES permits issued and the potential listing of more 303(d) waters with high pollutant concentrations in state surface waters.

Mining

Mining has historically been a major component of western state economies. With national output for metals increasing at 4.3% annually (little oil, but some gas is drawn from western states), output of western mines should increase markedly (Woods and Figueroa 2007). Increases in mining activity will add to existing significant levels of mining contaminants entering river basins. Given this trend, we expect existing water degradation in many western streams that feed into or provide spawning habitat for threatened and endangered salmonid populations will be exacerbated.

Agriculture

As the western states have large tracts of irrigated agriculture, a rise in agricultural output is anticipated. Impacts from heightened agricultural production will likely result in two negative impacts on listed Pacific salmonids (Woods and Figueroa 2007). The first impact is the greater use and application of pesticide, fertilizers, and herbicides and their increased concentrations and

entry into freshwater systems. Carbaryl, carbofuran, and methomyl, and other pollutants from agricultural runoff may further degrade existing salmonid habitats. Second, increased output and water diversions for agriculture may also place greater demands upon limited water resources. Water diversions will reduce flow rates and alter habitat throughout freshwater systems. As water is drawn off, contaminants will become more concentrated in these systems, exacerbating contamination issues in habitats for protected species.

Recreation

The western states are widely known for scenic and natural beauty. Increasing resident and tourist use will place additional strain on the natural state of park and nature areas that are also utilized by protected species. Hiking, camping, and recreational fishing in these natural areas is unlikely to have any extensive effects on water quality.

The above non-federal actions are likely to pose continuous unquantifiable negative effects on listed salmonids addressed in this Opinion. Each activity has undesirable negative effects on water quality. They include increases in sedimentation, loss of riparian shade (increasing temperatures), increased point and non-point pollution discharges, decreased infiltration of rainwater (leading to decreases in shallow groundwater recharge, decreases in hyporheic flow, and decreases in summer low flows).

Nevertheless, there are also non-federal actions likely to occur in or near surface waters in the action area that may have beneficial effects on the 28 ESUs. They include implementation of riparian improvement measures, fish habitat restoration projects, and BMPs (*e.g.,* associated with timber harvest, grazing, agricultural activities, urban development, road building, recreational activities, and other non-point source pollution controls).

NMFS expects many of the current anthropogenic effects described in the *Environmental Baseline* will continue. Listed Pacific salmonids are exposed to harvest, hatchery, hydropower, and habitat degradation activities. With regard to water quality, fish are continually exposed to pesticides, contaminants, and other pollutants during their early life history phase and during adult migratory returns to their natal streams for spawning.

NMFS also expects the natural phenomena in the action area (*e.g.,* oceanographic features, ongoing and future climate change, storms, natural mortality) will continue to influence listed Pacific salmonids as described in the *Environmental Baseline*. Climate change effects are expected to be evident as alterations to water yield, peak flows, and stream temperature. Other effects, such as increased vulnerability to catastrophic wildfires, may occur as climate change alters the structure and distribution of forest and aquatic systems.

Coupled with EPA's registration of carbaryl, carbofuran, and methomyl, climate change, and the effects from anthropogenic growth on the natural environment will continue to affect and influence the overall distribution, survival, and recovery of Pacific salmonids in California, Idaho, Oregon, and Washington.

Integration and Synthesis

The Integration and Synthesis section is the final step of NMFS' assessment of the risk posed to listed Pacific salmonids and critical habitat as a result of EPA's registration of carbaryl, carbofuran, and methomyl. In this section, we perform two evaluations: whether it is reasonable to expect the proposed action is likely to (1) reduce both survival and recovery of the species in the wild and (2) result in the destruction or adverse modification of designated critical habitat.

To address species survival and recovery, we discuss the likelihood of the proposed action to reduce the viability of the salmonid species to such an extent that increased extinction rates are likely. Specifically, we address whether we expect reductions in a population's abundance and productivity from the stressors of the action to affect a species (ESU or DPS). We also address whether the conservation value of the physical and biological features of critical habitat is retained. We address whether we expect reductions in the PCEs for prey availability and degradation of water quality from the stressors of the action to reduce the conservation value of designated critical habitat. Conclusions for each ESU/DPS and associated designated critical habitat are found in the *Conclusion* section.

Effects of the Proposed Action at the Species Level

In our *Effects of the Proposed Action* section we assessed the effects of the federal action to listed Pacific salmonids. We discussed the exposure, response, and risks to individuals when they co-occur with the allowable uses of carbaryl, carbofuran, and methomyl. In addition to the a.i.s, we also considered their metabolites and degradates, other active and inert ingredients included in their product formulations, tank mixtures, and adjuvants authorized on their product labels within the action area. Our analysis also considered the possibility of co-occurrence of carbaryl, carbofuran, or methomyl with other AChE-inhibiting pesticides resulting in additive or synergistic effects to salmonids within freshwater habitats. We assessed the stressors of the action in the context of differing life histories, declining populations, and degraded water quality and habitat conditions within the distribution of listed species.

The life history of listed salmonids plays a large role in determining exposure. Adult salmon and steelhead spend weeks to several months in freshwater habitats during their migration and spawning. Immediately after emerging from the gravel substrate, salmonid fry move to habitat where they can swim freely and forage. Chinook salmon, coho salmon, and steelhead fry typically select off-channel habitats associated with their natal rivers and streams. Off-channel habitats provide fry with protection from the primary water flow within rivers and streams. Diverse invertebrate communities also populate off-channel habitats, adding to juvenile salmonids' reliance on these areas. Coho salmon and steelhead rear in freshwater for more than a year. Sockeye salmon fry most frequently distribute to shallow beach areas in the littoral zones of lakes before moving into deeper water and taking on a more pelagic existence. In contrast, chum salmon migrate downstream to estuaries near the mouth of their parent stream almost immediately. Fry reside in estuaries for as little as one or two weeks before moving offshore or into deeper habitats within the nearshore environment.

Based on general knowledge of field runoff and drift from pesticide applications, we expect higher pesticide concentrations in edge-of-field, low-flow, and shallow aquatic systems. Therefore, Chinook salmon, coho salmon, and steelhead have an increased risk of exposure due to their preference for off-channel habitats. Coho salmon and steelhead are at greater risk of exposure because of their extended residency periods.

We expect carbaryl, carbofuran, and methomyl found in surface water runoff and pesticide drift will cause acute lethality and sublethal effects to juvenile salmonids. Based on exposure for four days at the reported LC50s, a severe consequence to a salmonid population's growth rate is expected. The most pronounced effects are within off-channel habitats based on NMFS exposure estimates. The likelihood of population-level effects as a result of mortalities of juvenile salmonids increases as populations spend longer periods in freshwater adjacent to agricultural or developed areas. Species at the greatest risk include steelhead, coho, stream-type Chinook, and ocean-type Chinook salmon.

Methomyl concentrations required to result in population-level impacts are not expected to occur in the majority of aquatic habitats used by juveniles. However, we expect that carbaryl and

carbofuran applications could cause population-level effects through acute mortality of juveniles, particularly in areas of intensive agriculture and large urban or residential areas. We also expect acute mortalities of juveniles from applications of carbaryl to forests and from exposure to 24(c) carbaryl applications in estuaries in Washington State. However, we do not know how many individuals are exposed each year due to these uses.

Sublethal effects caused by AChE inhibition, such as impaired swimming and olfactory-mediated behaviors, are also expected to result in adverse population-level effects. Swimming is a critical function for salmonids. Individuals with impaired swimming ability will show reduced feeding, delayed or interrupted migration, reduced survival, and reduced reproductive success. We expect that carbaryl, carbofuran, and methomyl will occur at concentrations high enough to impair swimming ability in occupied shallow water habitats. These effects may lead to population-level consequences that hinder the survival and recovery of listed species.

Olfactory-mediated behaviors are also vital for salmonid survival. These behaviors include detecting and avoiding predators, recognizing kin, locating natal waters for spawning, and reproduction. Juvenile salmonids with impaired olfactory-mediated behaviors can lose their ability to imprint on natal streams and avoid predators. Spawning is triggered by olfactory-mediated cues given and received by both sexes. If olfaction is inhibited, salmon may not recognize these cues, resulting in reduced reproduction. The available information suggests that carbaryl does not inhibit olfaction. Therefore, we do not expect to see effects to olfactory mediated behaviors from carbaryl exposure. Currently there is not enough information to determine the effect of methomyl on olfaction. However, exposure to carbofuran at low µg/L concentrations will likely result in the impairment of olfactory-mediated behaviors. That in turn will lead to increased predation and ultimately reduced juvenile and adult survivorship. As pesticide exposure increases we expect to see more pronounced effects due to additive and synergistic effects.

We also expect indirect effects from the a.i.s through reduced salmonid prey abundance and subsequent reduced juvenile growth and probability of survival. Feeding during the period immediately following emergence is vital for the survival of all ESA-listed Pacific salmonid fry.

Once fry have completely absorbed the yolk-sac, they are dependent on the local invertebrate population and may starve if sufficient food is not available. As salmonid prey are sensitive to the expected exposures to each of the insecticides, as well as from mixtures containing the three a.i.s, we expect death and a variety of sublethal effects to salmonid prey. If the salmonid prey base is limited while fry are in this life stage, juvenile growth will be significantly hindered. Many of the invertebrate communities are already degraded due to poor habitat conditions and poor water quality. These conditions make it more difficult for the prey base to recover following an exposure event. Thus, juvenile survivorship will be low and may consequently lead to a decrease in lambda for the affected population.

Based on the NMFS growth models, a four-day exposure to expected concentrations of carbaryl, carbofuran, and methomyl will substantially reduce a population's growth rate due to prey base reduction. All four life history types modeled demonstrated this effect. As exposure duration increases, we expect more pronounced effects on salmonid prey abundance and a longer prey recovery period leading to further reduced salmonid growth and decreased survival.

We expect that all effects will be more pronounced in drainage basins that include high use areas, *i.e.,* major agricultural, urban, or residential centers. To determine which ESUs/DPSs will be affected by the action, we compare the range of each species to the locations of high use land classes. Species that occupy major agricultural basins, such as the Willamette basin or California Central Valley, have a much higher risk of exposure than species found in uninhabited, non-agricultural areas.

California Coastal Chinook Salmon

The CC Chinook salmon ESU consists of 10 historically functionally independent populations in California from Humboldt County in the north to Sonoma County in the south. Historic annual escapement was around 73,000 fish with most of these being produced in the Eel River. Today, annual returns to the Eel River system is estimated at 150 to 2,800 fish. Runs in the Russian River may be viable, though the short-term trend is negative. Lack of data precludes development of population growth rates or trends for all other populations.

The *Status of Listed Resources* and *Environmental Baseline* sections indicate that fisheries, timber harvest, vineyards and other agriculture, non-native fish species, and migration barriers negatively affect this ESU. Adverse effects on Chinook salmon habitat include a high percentage of fines in the streams' bottom substrate, lack of large instream woody debris, reduced riparian vegetation, elevated water temperatures, degraded water quality, increased predation, and barriers that limit access to tributaries. The combined impacts from these multiple threats continue to affect the CC Chinook salmon. Accumulation of fine sediment in the bottom substrate, contamination of waters, lack of riparian vegetation, and non-natives fish species are expected to impact invertebrate abundance and composition in streams within the ESU.

Most of the agriculture and urban developments are concentrated in the Russian River valley and on alluvial plains of coastal rivers. Vineyards and smaller centers are dispersed along coastal watersheds. Based on the crop types, we expect carbaryl and methomyl are commonly applied throughout the growing season in the Russian River basin. We also expect use of the a.i.s on the alluvial plain of the lower Eel River and its estuary, and to a lesser extent along the lower portions and estuaries of other coastal streams. Carbaryl is expected to be used the entire year within urban/residential areas. Existing stocks of carbofuran are also expected to be applied throughout the growing season. In California, there are 61 pesticides that inhibit AChE approved for use and we expect that application of other AChE inhibiting pesticides will co-occur with the a.i.s, exacerbating adverse effects from AChE inhibition. However, monitoring data for pesticides in streams within the CC Chinook salmon ESU is lacking. Adults within Willapa Bay during 24(c) carbaryl application to oyster beds are likely exposed to this compound and may experience additional mortalities.

CC Chinook spawning occurs on gravel beds in the mainstem of rivers and larger tributaries. Fry use the floodplain, stream margins, and side channels to rear after emergence from the redds in December through mid-April. Downstream migration of juveniles starts as early as February and most enter marine waters before mid-summer.

We expect the proposed uses of carbaryl and carbofuran pesticide products that contaminate aquatic habitats will lead to individual fitness level consequences and subsequent population-

level consequences. Land use and crop type data indicate that, while not a major agricultural center, the CC Chinook will be exposed to all three a.i.s. We expect that exposure to methomyl may lead to individual fitness consequences, but not to an extent that would affect population growth rates. The risk to this species' survival and recovery from the stressors of the action is high for carbaryl and carbofuran, but low for methomyl.

Central Valley Spring-run Chinook Salmon

The CV Spring-run Chinook salmon ESU includes four populations of Spring-run populations in the upper Sacramento River and its tributaries. The distribution within the Sacramento River basin is now mostly restricted to accessible areas below dams in the mainstem river and in three of its tributaries: Deer, Mill, and Butte Creeks. Abundance remains far below the estimated 700,000 once entering the Sacramento-San Joaquin Rivers system. The number of Spring-run Chinook salmon spawning in the Sacramento River has averaged about 9,800 annually since 2000. While most populations within the ESU are at or above replacement, the Sacramento River population has been steadily decreasing.

The major threats to this ESU identified in the *Status of Listed Resources* and *Environmental Baseline* sections include impaired or loss of habitat, predation, contamination, and water management. Reservoir dams in the Sacramento River have prevented the ESU from using its historic spawning locations. Physical channel habitat has been altered through sediment input from mining, levee construction, and removal of riparian vegetation for levee maintenance. Detected pesticides in the Sacramento River include thiobencarb, carbofuran, molinate, simazine, metolachlor, and dacthal, chlorpyrifos, carbaryl, and diazinon. State and federal water diversions in the south Sacramento-San Joaquin Delta (Delta) have resulted in increased mortality through prolonged migration and entrainment at the water diversion facilities. We also expect that application of other AChE inhibiting pesticides will co-occur with carbaryl, carbofuran, and methomyl in the waters within the ESU and exacerbate adverse effects from AChE inhibition.

With the high density of agriculture in the Sacramento River valley and the Sacramento-San Joaquin Delta (Delta), application of all three a.i.s is expected. Large urban centers occur along the Sacramento River and San Francisco Bay. Young and adult migrating Chinook salmon are

also exposed to poor water quality from agricultural runoff that enters the Delta from the San Joaquin River. Carbaryl and methomyl can be applied to several crops throughout the growing season in the Central Valley. Existing stocks of carbofuran are also expected to be applied throughout the growing season. Carbaryl is approved for use throughout the year within urban/residential areas

The CV Spring-run Chinook salmon is categorized as an ocean-type fish. The young salmon emerge from the gravel from November through May and outmigration starts within four months. While the majority emigrates soon after emergence, some juveniles emigrate as yearlings with the onset of fall storms. Juveniles' seaward migration follows the mainstem Sacramento River, through the Delta, and across San Francisco Bay. Off-channel habitats within the lower Sacramento River floodplains, especially the Yollo Bypass, are particularity important for CV Chinook salmon juveniles during rearing and migration (Sommer, Nobriga et al. 2001; Sommer, Harrell et al. 2005).

The widespread uses of these pesticides have substantial overlap with rearing and migratory habitat of the CV Spring-run Chinook salmon ESU. The CV Spring-run Chinook salmon exhibit high variation in abundance, have restricted distribution, and are exposed to pesticides and other pollutants during rearing and downstream migration. We expect the proposed uses of the three carbamates may contaminate aquatic habitats and lead to both individual fitness and subsequentr population-level consequesnces. Therefore, the risk to this species' survival and recovery from the stressors of the action is high from carbaryl, carbofuran, and methomyl.

Lower Columbia River Chinook salmon

The LCR Chinook salmon ESU includes 32 historical populations in tributaries from the ocean to the Big White Salmon River, Washington and Hood River, Oregon. The ESU also includes 17 artificial propagation programs. LCR Chinook salmon numbers began to decline by the early 1900s from habitat degradation and excessive harvest rates. Many of these populations have low abundance. The annual population growth rates for 14 independent populations range from 0.93 to 1.037.

The major threats to this ESU identified in the *Status of Listed Resources* and *Environmental Baseline* sections include hydromorphological changes from hydropower development, loss of tidal marsh and swamp habitat, and reduced or eliminated access to subbasin headwaters from by the construction of non-federal dams. LCR Chinook salmon spawning and rearing habitats in tributary mainstems have been adversely affected by sedimentation, elevated water temperature, and reduced habitat diversity. The survival of yearlings in the ocean is also affected by habitat conditions in the estuary, such as changes in food availability and the presence of contaminants.

NAWQA sampling in surface waters within the ESU range detected more than 50 pesticides in streams. Concentrations of ten pesticides, including carbaryl and carbofuran, also exceeded EPA's chronic toxicity aquatic life criteria (Wentz, Bonn et al. 1998). The combined impacts from these multiple threats continue to affect this ESU.

Most of the highly developed land and agricultural areas in this ESU's range are adjacent to salmonid habitat. Registered uses of carbaryl, carbofuran, and methomyl include applications to crop agricultural sites, residential sites, and urban sites. Registered 24(c) uses in Oregon include carbofuran application to potatoes, nursery stock, sugar beets, and watermelons. Based on land use patterns, we expect the highest exposure to these chemicals to occur in the Lewis River basin, Clackamas River basin, and Hood River basin.

Mature LCR Fall-run Chinook salmon enter freshwater in August through October to spawn in large river mainstems. After emergence, fry typically select off-channel habitats associated with their natal rivers and streams. Juveniles eventually emigrate from freshwater, usually within six months of hatching. LCR Spring-run Chinook salmon enter freshwater in March through June to spawn in upstream tributaries. These fish generally emigrate from freshwater as yearlings. As juveniles overwinter in shallow, freshwater habitats, they are likely to experience higher exposure to pesticides, other contaminants, and elevated temperature. In northern rivers, juveniles may rear in freshwater for two years or more. Given their long residence time in shallow freshwater habitats, LCR Chinook salmon are vulnerable to high pesticide exposures. Also, if adults and juveniles are within Willapa Bay during 24(c) carbaryl application to oyster beds they are likely exposed to this compound and may likely experience additional mortalities.

Given the life history of LCR Chinook salmon, we expect the proposed uses of carbaryl, carbofuran, and methomyl pesticide products may contaminate aquatic habitats and lead to individual fitness and subsequent population-level consequences. Therefore, the risk to this species' survival and recovery from the stressors of the action is high for carbaryl, carbofuran, and methomyl.

Upper Columbia River Spring-run Chinook salmon

The UCR Spring-run Chinook salmon ESU includes 11 populations and 7 artificial propagation programs in the state of Washington. The four known annual population growth rates range from 0.99 to 1.1. Based on 1980-2004 returns, the average annual population growth rate for this ESU is estimated at 0.93. One historical population is considered extinct.

The major threats to UCR Chinook salmon identified in the *Status of Listed Resources* and *Environmental Baseline* sections include reduced tributary stream flow and impaired fish passage from hydroelectric dams. Additionally, degradation of the tributary habitat and impaired water quality from development negatively affect this ESU. Pesticide detections in UCR Chinook salmon freshwater habitats are well documented. NAWQA sampling from 1992-1995 in the Central Columbia Plateau detected numerous pesticides in surface water (Williamson, Munn et al. 1998). Carbaryl was detected in 5% of samples, and carbofuran was detected in 6%. Methomyl was not detected. While detections of these three chemicals did not exceed water quality standards, concentrations of six other pesticides exceeded EPA criteria for the protection of aquatic life. Listed salmonids are commonly exposed to combinations of carbaryl, carbofuran, and methomyl, other compounds, and other mixtures of cholinesterase-inhibiting insecticides.

Registered uses of carbaryl, carbofuran, and methomyl include applications to crop agricultural sites, residential sites, and urban sites. Registered 24(c) uses in Washington State include carbofuran application to potatoes and spinach grown for seed. About 3% of the land has been developed and 3.5% has been cultivated for crops. Areas with the potential for high exposure in the Upper Columbia River basin are the Methow, Entiat, and Wenatchee River basins.

UCR Spring-run Chinook salmon begin returning from the ocean in the early spring. After migration, they hold in freshwater tributaries until spawning in mid- to late August. Fish spawn in the major tributaries leading to the Columbia River between Rock Island and Chief Joseph dams. UCR Spring-run Chinook salmon fry typically select off-channel habitats associated with their natal rivers and streams to rear. Juveniles spend a year in freshwater before migrating to the ocean in the spring of their second year of life. The duration of juvenile rearing in shallow freshwater habitats increases their susceptibility to higher exposures of pesticides, contaminants, and elevated temperature.

Given the life history of UCR Spring-run Chinook salmon, we expect the proposed uses of carbaryl, carbofuran, and methomyl pesticide products that contaminate aquatic habitats will lead to individual fitness and subsequent population-level consequences, *i.e.*, reductions in population viability. Therefore, the risk to this species' survival and recovery from the stressors of the action is high for carbaryl, carbofuran, and methomyl.

Puget Sound Chinook Salmon

The Puget Sound ESU includes all runs of Chinook salmon in the Puget Sound region from the North Fork Nooksack River to the Elwha River on the Olympic Peninsula. This includes 31 historic quasi-independent populations and 26 artificial propagations programs. Of the historic populations, only 22 are considered extant. The estimated total run size for this ESU in the early 1990s was 240,000 fish. During a recent five-year period, the geometric mean of natural spawners in populations of this ESU ranged from 222 to just over 9,489 fish (Good, Waples et al. 2005). Recent five-year and long-term productivity trends remain below replacement for the majority of the 22 extant populations of Puget Sound Chinook salmon. The annual population growth rate known for these populations ranged from 0.75 to 1.17.

The major threats to the Puget Sound Chinook salmon identified in the *Status of Listed Resources* and *Environmental Baseline* sections include degraded freshwater and marine habitat from agricultural activities and urbanization. Poor forestry practices have also reduced water quality in the upper river tributaries for this ESU. Elevated temperature, water diversions, and poor water quality across land use categories pose significant threats to the status of Puget Sound

Chinook salmon. Furthermore, there has been extensive urbanization in this region. Well over two million people inhabit the area, with most development occurring along rivers and coastline.

Pesticide use and detections in the ESU's watershed are well documented. NAWQA sampling conducted in 2006 in the Puget Sound basin detected numerous pesticides and other synthetic organic chemicals in streams and rivers. However, mixtures of chemicals found in agricultural and urban settings differ. Urban streams sampled in Puget Sound showed the highest detections for carbaryl, diazinon, and malathion. Carbaryl was detected at 60% of urban sampling sites (Ebbert, Embrey et al. 2000). Diazinon was detected at all urban sites, frequently at concentrations that exceeded EPA guidelines for protecting aquatic life (Bortleson and Ebbert 2000).

Registered uses of carbaryl, carbofuran, and methomyl include applications to crop agricultural sites, residential sites, and urban sites. In addition, Washington has 24(c) registrations for carbofuran use on spinach grown for seed and potatoes. Land classes indicate high-use of the three a.i.s in the following drainage basins: Nooksack, Skagit River, Stillaguamish, Skykomish, Snoqualimie, Snohomish, Lake Washington, Duwamish, and Puyallup. Roughly 7% of the lowland areas (below 1,000 ft elevation) in the Puget Sound region are covered by impervious surfaces, which increase urban runoff containing pollutants and contaminants into streams. Pollutants carried into streams from urban runoff include pesticides, heavy metals, PCBs, PBDEs, PAHs, pharmaceuticals, nutrients, and sediments. As such, we expect salmonid populations within the ESU to be exposed to carbaryl, carbofuran, and methomyl. Further, monitoring data shows that we can expect concurrent exposure with other AChE inhibiting chemicals, which will exacerbate the severity of effects. Adults within Willapa Bay during 24(c) carbaryl application to oyster beds are likely exposed to this compound and may experience additional mortalities.

Puget Sound stream-type Chinook salmon fry typically rear in shallow off-channel habitats associated with their natal rivers and streams. Juveniles generally have long freshwater residences of one or more years before migrating to the ocean.

Given the life history of the Puget Sound Chinook salmon, we expect that the proposed uses of carbaryl, carbofuran, and methomyl pesticide products may lead to individual fitness consequences and subsequent population-level consequences, *i.e.*, reductions in population viability. Therefore, the risk to this species' survival and recovery from the stressors of the action is high for carbaryl, carbofuran, and methomyl.

Sacramento River Winter-run Chinook salmon

The Sacramento River Winter-run Chinook salmon ESU includes only one population in Sacramento River, California. The current spawning distribution of Sacramento River Winter-run salmon is restricted to a short portion of the mainstem Sacramento River below Keswick Dam. Historic run estimates for the Sacramento River are as large as 200,000 fish (Brown et al. 1994). Estimated natural production has fluctuated greatly over the past two decades. In 2007, estimated natural production was 4,461 fish. The population's annual growth rate ranged from 0.870 to 1.090.

The major threats to this ESU identified in the *Status of Listed Resources* and *Environmental Baseline* sections indicate impaired or loss of habitat, predation, contamination, and water management negatively affect this ESU. Reservoir dams in the Sacramento River have eliminated the ESU from its historic spawning locations. Today, the ESU depends on the ability of the BOR to manage cold water through reservoir storage and releases to support adult holding, spawning, incubation, and rearing. The physical channel habitat has been altered through sediment input from mining, levee construction, and removal of riparian vegetation for levee maintenance. Pesticides are frequently detected in the Sacramento River including thiobencarb, carbofuran, molinate, simazine, metolachlor, dacthal, chlorpyrifos, carbaryl, and diazinon. Carbofuran is commonly detected in agricultural areas but less so in urban sites while carbaryl is commonly detected in all urban sites. Modification of hydrology has resulted in increased mortality through stranding, increased predation, prolonged migration, and entrainment at water diversion facilities.

About 10% of the land within this ESU is developed; large areas of urban centers occur along the Sacramento River and San Francisco Bay. As about 21% of land within the ESU is cultivated,

all three a.i.s are expected to be applied to several crops within the ESU. Agriculture activity is prominent in the lower Sacramento River and within the Delta. Chinook salmon are also exposed to poor water quality from agricultural runoff that enters the Delta from the San Joaquin River. The Mediterranean climate in California, with dry summers and fall storms, may result in high concentration of these contaminants in run-off during the onset of the rainy season. These high concentrations can overlap with juvenile presence in the river system and movement into floodplains for rearing.

Winter-run adults enter the Sacramento River in early spring with spawning peaking in May and June. Spawning occurs in the Sacramento River downstream of the Keswick Dam. Fry rear in the Sacramento River for a few weeks to months before starting outmigration in late July, peaking in November and December. During outmigration, the young salmon migrate down the Sacramento River, through the Delta and San Francisco Bay. Juvenile winter-run Chinook salmon appear in the Delta from October to early May where they may rear in the fresher upstream portions for up to two months.

We expect that the proposed uses of carbaryl, carbofuran, and methomyl pesticide products will lead to both individual fitness level and subsequent population-level consequences. Registered uses of these a.i.s indicate overlap with the spawning, rearing, and migratory habitat of the one extant population in this ESU. Thus, the risk to this species' survival and recovery from the stressors of the proposed action is high for carbaryl, carbofuran, and methomyl.

Snake River Fall-run Chinook salmon

The SR Fall-run Chinook salmon ESU is comprised of a single population that spawns and rears in the mainstem Snake River and its tributaries below Hells Canyon Dam. Only 10 to 15% of the historical range of this ESU remains. Estimated historical returns from 1938 to 1949 were 72,000 fish annually (Bjornn and Horner 1980). The average abundance (1,273) of SR Fall-run Chinook salmon over the most recent 10-year period is below the 3,000 natural spawner average abundance thresholds identified as a minimum for recovery. The annual population growth rate for this single population is 1.02. Two historical populations are considered extirpated.

The major threats to this ESU identified in the *Status of Listed Resources* and *Environmental Baseline* sections include impaired stream flows and barriers to fish passage in tributaries from hydroelectric dams. During the 1960s and 1970s, approximately 80% of the ESU's historic habitat was eliminated or severely degraded by the construction of the Hells Canyon complex and the lower Snake River dams. Additionally, degraded freshwater habitats in the estuary, mainstem, and tributaries from development and land use activities negatively affect this ESU. Agricultural activities, urban communities, and industries are concentrated along the Snake River and near the mouths of major tributary valleys. Thus, stream water quality and biological communities in the downstream portion of the upper Snake River basin are degraded. The combined impacts from these multiple threats continue to affect SR Fall-run Chinook salmon.

Registered uses of carbaryl, carbofuran, and methomyl include applications to crop agricultural sites, residential sites, and urban sites. Registered 24(c) uses within this ESU include carbofuran application to potatoes and spinach grown for seed in Washington. The remaining spawning and rearing area of the SR Fall-run Chinook salmon is potentially a high-use area for these chemicals, as it is adjacent to agricultural and residential areas. About 14% of the land has been developed. Dryland agriculture occurs in the lower Clearwater Basin, with crops including wheat, peas, and lentils. Alfalfa, hay, and grasses are also grown in the lower Clearwater as well as the lower Salmon River basin. Thus, ESU exposure to these pesticides is likely. Adults within Willapa Bay during 24(c) carbaryl application to oyster beds are likely exposed to this compound and may experience additional mortalities.

Adult SR Fall-run Chinook salmon enter the Columbia River in July and August. Spawning occurs from October through November above Lower Granite Dam in the mainstem Snake River and in the lower reaches of the larger tributaries, such as the Salmon and Clearwater Rivers. Fry emerge from redds beginning in March or April, then rear for two months or more in the sandy littoral zone along the river margin. Juveniles begin migration in June along the edges of rivers, where they are at risk of exposure to higher concentrations of pesticides from drift and runoff. Their duration in shallow freshwater habitats increases their chances of higher exposure to pesticides, contaminants, and elevated temperature. Most fish exhibit an ocean-type life cycle,

completing migration to the Pacific during the first year of life, though some overwinter inlow-velocity pools created by the hydroelectric dams.

Given the life history of SR Fall-run Chinook salmon, we expect the proposed uses of carbaryl and carbofuran pesticide products may lead to individual fitness level consequences and subsequent population-level consequences. We expect that exposure to methomyl may lead to individual fitness consequences, but not to an extent that would affect population growth rates. Land class data indicate that exposure of the carbamates to SR Fall-run Chinook salmon is possible. The risk to this species' survival and recovery from the stressors of the action is high for carbaryl and carbofuran, but low for methomyl.

Snake River Spring/Summer-run Chinook salmon

This ESU includes 32 historical populations in the Snake River basin which drains portions of southeastern Washington, northeastern Oregon, and north/central Idaho. Historically, the Salmon River system may have supported more than 40% of the total return of Spring/Summer-run Chinook salmon to the Columbia system (Fulton 1968). The long-term trends in productivity indicate a shrinking population. However, recent trends in productivity, buoyed by the last five years, are approaching replacement levels. The annual population growth known for 18 populations ranged from 0.97 to 1.1. Historical populations above Hells Canyon are considered extinct.

The major threats to this ESU identified in the *Status of Listed Resources* and *Environmental Baseline* sections include degraded water quality in the freshwater estuary, tributaries, and coastal habitats from land use activities and hydroelectric dams. Significant threats to SR Spring/Summer-run Chinook salmon include elevated temperature, water diversions, and poor water quality.

Some spawning and rearing areas of the SR Spring/Summer Run Chinook are in forested areas, where carbaryl may be applied. The likelihood of exposure in forested areas is unknown. Registered 24(c) uses within this ESU include carbofuran application to potatoes and spinach grown for seed in Washington. Dryland agriculture occurs in lower Clearwater Basin, with crops

including wheat, peas, and lentils. Alfalfa, hay, and grasses are also grown in the lower Clearwater as well as the lower Salmon River basin. All three a.i.s are registered for use on alfalfa. Agricultural activities and urban communities, are concentrated along the Snake River and near the mouths of major tributary valleys, thus stream water quality and biological communities in the downstream portion of the upper Snake River basin are degraded.

SR Spring/Summer-run Chinook salmon spawn at high elevations in the headwater tributaries of the Clearwater, Grande, Ronde, Salmon, and Imnaha Rivers. Spawning is complete by the second week of September. Eggs incubate and hatch in late winter and early spring of the following year. The fry typically overwinter in shallow off-channel habitats associated with their natal rivers and streams. Juveniles become active seaward migrants during the following spring as yearlings (Connor, Sneva et al. 2005).

Given the life history of SR Spring/Summer-run Chinook salmon, we expect the proposed uses of carbaryl and carbofuran pesticide products that contaminate aquatic habitats will lead to individual fitness level consequences and subsequent population-level consequences. The uses of these materials along the migratory route of SR Spring/Summer-run Chinook salmon, may cause acute lethality or temporary AChE inhibition. We expect that exposure to methomyl may lead to individual fitness consequences, but not to an extent that would affect population growth rates. The risk to this species' survival and recovery from the stressors of the action is high for carbaryl and carbofuran, but low for methomyl.

Upper Willamette River Chinook Salmon

The UWR Chinook salmon ESU includes all eight naturally spawned populations residing in the Clackamas River and the Upper Willamette River above Willamette Falls. It also includes seven artificial propagation programs. The population in the McKenzie River is the only population that is naturally producing, and current estimates indicate a negative growth rate. Historically, the Upper Willamette River supported large numbers (exceeding 275,000 fish) of UWR Chinook salmon. Current abundance of natural-origin fish is estimated at less than 10,000.

The major threats to this ESU identified in the *Status of Listed Resources* and *Environmental Baseline* sections include habitat loss due to blockages from hydroelectric dams and irrigation diversions, and degraded water quality within the Willamette mainstem and the lower reaches of its tributaries. Elevated water temperature also poses a significant threat to the status of UWR Chinook salmon. Fifty pesticides were detected in streams that drain both agricultural and urban areas. Forty-nine pesticides were detected in streams draining agricultural land, while 25 were detected in streams draining urban areas. Ten of these pesticides, including carbaryl and carbofuran, exceeded EPA criteria for the protection of freshwater aquatic life from chronic toxicity (Wentz, Bonn et al. 1998). The combined impacts from these threats continue to affect UWR Chinook salmon.

Based on the crop types, we expect that carbaryl and methomyl are commonly applied in the Willamette Valley throughout the growing season. Existing stocks of carbofuran are also expected to be applied throughout the growing season. Registered 24(c) uses in Oregon include carbofuran application to potatoes, nursery stock, sugar beets, and watermelons. The Willamette Basin is the largest agricultural area in Oregon. In 1992 the Willamette Basin accounted for 51% of Oregon's total gross farm sales and 58% of Oregon's crop sales. About one-third of the agricultural land is irrigated and most of it is adjacent to the mainstem Willamette River. Urban developments are also located primarily in the valley along the mainstem Willamette River. We expect carbaryl to be used throughout the year in urban and residential areas. Given that major urban and agricultural areas are located adjacent to the mainstem Willamette, ESU exposure to these pesticides is likely. We also expect that other AChE inhibiting pesticides will co-occur with carbaryl, carbofuran, and methomyl in the waters of the Willamette Valley and exacerbate adverse effects from AChE inhibition.

Chinook salmon fry typically select shallow off-channel habitats associated with their natal rivers and streams. Juveniles generally rear in freshwater for several months to more than one year before migrating to the ocean. Their duration in shallow freshwater habitats increases their susceptibility to higher exposures of pesticides, contaminants, and elevated temperature. UWR Chinook salmon exhibit an earlier time of entry into the Columbia River and estuary than other spring Chinook salmon ESUs (Meyers, Kope et al. 1998). Although most juveniles from interior

spring Chinook salmon populations reach the mainstem migration corridor as yearlings, some juvenile Chinook salmon in the lower Willamette River are sub-yearlings (Friesen, Vile et al. 2004). Off-channel habitats within the Willamette Valley floodplain are particularity important for rearing fry and are actively being identified, reconnected and restored. We expect fry to be exposed to the three insecticides when applications overlap with fry occurrence and will further depress abundances of the available prey.

Based on land use and the life history of UWR Chinook salmon, we expect that this ESU will be compromised by reduced lambdas of affected populations. The risk to this species' survival and recovery from the stressors of the action is high for carbaryl, carbofuran, and methomyl.

Columbia River Chum Salmon

This ESU includes two remaining populations of 16 historical populations in the lower reaches (the Lower Gorge tributaries and Grays River) of the Columbia River. Thus, about 88% of the historic populations are extirpated or nearly so. In the early 1900s, the run numbered in the hundreds of thousands to a million returning adults. The size of the Lower Gorge population is estimated at 400-500 individuals, down from a historical level of greater than 8,900 (Good, Waples et al. 2005). Previous estimates of the Grays River population range from 331 to 812 individuals. However, the population increased in 2002 to as many as 10,000 individuals (Good, Waples et al. 2005). Overall, the lambda values indicate a long-term downward trend at 0.954 and 0.984, respectively.

The major threats to this ESU identified in the *Status of Listed Resources* and *Environmental Baseline* sections are hydromodification and habitat loss. Of the salmonids, chum salmon are most averse to negotiating obstacles in their migratory pathway. Thus, they are more highly impacted by the Columbia River hydropower system – specifically the Bonneville Dam (Johnson, Grant et al. 1997). The water quality in the lower Columbia River is poor. Recent USGS studies have demonstrated the presence of 25 pesticide compounds in surface waters, including carbaryl (Ebbert and Embry 2002). Although the habitat restoration project for the Grays River will likely provide some benefit to the population, we are unable to quantify the overall net effect for salmonids at this time.

Land use data indicate that the Columbia River chum salmon may be at risk of pesticide exposure. In addition to general uses, registered 24(c) uses in Oregon include carbofuran application to potatoes, nursery stock, sugar beets, and watermelons. The locations of high-pesticide use areas and the preferential use of river-edge habitat by chum salmon indicate that the species is at risk of pesticide exposure. The developed area surrounding the cities of Portland and Vancouver occurs along the migratory route of the Lower Gorge chum.

Columbia River chum salmon fry emerge between March and May and emigrate shortly thereafter to nearshore estuarine environments (Salo 1991). This is in sharp contrast to other salmonid behavior and indicates that chum salmon are less dependent on freshwater conditions for survival. After emergence, juvenile Columbia River chum salmon spend around 24 days feeding in the estuary. Adults return to spawn in the lower reaches of the Columbia River between the ages of two and five from mid-October through December. An average of ten days is spent in the freshwater by the spawning adults.

Given the life history of the Columbia River chum salmon, we expect that the proposed uses of carbaryl, carbofuran, and methomyl pesticide products may lead to individual fitness level consequences. We expect that exposure will occur, resulting in both acute lethality and sublethal olfactory-mediated effects. However, we do not expect these effects to occur at a scale that would have population-level effects. As chum fry are more precocious and quickly leave natal streams, they are less reliant on the local invertebrate population. Given the life history of Columbia River chum salmon, the risk to this species' survival and recovery from the proposed stressors of the action is low for carbaryl, carbofuran, and methomyl.

Hood Canal Summer-run Chum Salmon

This ESU includes 16 historical, naturally spawned populations of summer-run chum salmon in Olympic Peninsula Rivers between Hood Canal and Dungeness Bay, Washington, as well as eight artificial propagation programs. Of the historically existing populations, seven are believed to be extirpated. Most of the extirpated populations occurred on the eastern side of the canal. Only two of the remaining populations have long-term trends above replacement; long-term

lambda values of the nine existing populations range from 0.85 to 1.39 (Good, Waples et al. 2005). The Hood Canal Summer-run chum salmon populations are the subject of an intense hatchery program intended to bolster numbers. As much as 60% of the spawning populations are hatchery-raised fish.

The major threat to this ESU identified in the *Status of Listed Resources* and *Environmental Baseline* sections is habitat degradation. The combined effects of degraded floodplains, estuarine, and riparian habitats, along with reduced stream flow and sedimentation, have had a profound negative impact on this ESU.

The land use and environmental data indicate that the Hood Canal Summer-run chum may be exposed to carbaryl, carbofuran, and methomyl. There is no cultivated crop land and less than 6% of the ESU is developed. Washington's 24(c) registrations for carbofuran use are not expected to be employed in this region. We do expect some exposure due to residential uses.

The Hood Canal Summer-run chum spawn from mid-September through mid-October (Tynan 1997). Emergence generally occurs from early February through mid April. Upon emerging, fry immediately commence downstream migration to estuaries (Tynan 1997). Upon arrival in the estuary, salmon fry inhabit nearshore areas in shallow water. In Puget Sound, they have been observed to reside in the top 6 inches of surface water and extremely close to the shoreline (Tynan 1997). This behavior increases the likelihood of acute exposure to drift and runoff events.

Given the life history of the Hood Canal Summer-run chum, we expect the proposed uses of carbofuran, carbaryl, and methomyl pesticide products may contaminate aquatic habitats and lead to individual fitness level consequences. We expect that exposure will occur, resulting in lethality and sublethal olfactory-mediated effects. We do not, however, expect that these effects will have population-level consequences. As chum fry are more precocious and quickly leave natal streams, they are less reliant on the local invertebrate population. Therefore, risk to this species' survival and recovery from the stressors of the action is low for carbaryl, carbofuran, and methomyl.

Central California Coast Coho Salmon

The CCC coho salmon ESU includes 11 historical independent populations within counties from Mendocino to Santa Cruz in California. Coho populations in three larger watersheds, as well as some in smaller watersheds, have been extirpated or are nearly so. Historical escapement has been estimated between 200,000 and 500,000 fish. Current escapements are not known, though a minimum of 6,570 adult coho salmon are estimated to return to coastal streams within the ESU. Long-term population trends do not exist for any of the populations in this ESU. More fish enter northern streams but variation in abundance between cohorts can be large with one cohort often dominating. Southern streams produce few naturally spawned fish of all cohorts.

CCC coho salmon populations have been adversely affected by loss of riparian cover, elevated water temperatures, alteration of channel morphology, loss of winter habitat, and siltation. High water temperatures prevent coho salmon from inhabiting several streams within the ESU. Pesticides are expected to enter rivers as drift during application in agricultural areas. Highly contaminated runoff into the Russian River, San Francisco Bay, and into rivers south of the Golden Gate Bridge is expected during the first fall storms. We expect that application of other AChE inhibiting pesticides will co-occur with carbaryl, carbofuran, and methomyl in the waters within the ESU and exacerbate adverse effects from AChE inhibition.

The majority of agricultural land use is concentrated in the Russian River watershed and watersheds south of the Golden Gate Bridge. High density urban development and urban centers occur in the San Francisco Bay and in the Russian River basin. All three a.i.s are expected to be applied to several crops within the Russian River basin and the Santa Cruz stratum during the growing season. Carbaryl is expected to be used within urban/residential areas throughout the entire year.

The movements of mature adults are influenced by stream flow; entry often occurs during the first large winter storms. Similarly, CCC coho salmon adults must wait in the lower river for sufficient flow to be able to reach spawning grounds. Fry emerge in spring and remain in the stream for up to 18 months. Newly emerged fry use backwater, side channels, and shallow channel edges. During winter, juveniles inhabit side channels, sloughs, backwater, and other

protected channel features. The off-channel floodplain habitats provide feeding and growth opportunities that are important before smoltification and seaward migration in the spring. The presence of discrete brood years (BYs) makes coho salmon more vulnerable to environmental perturbations than other salmonids because a failed BY is unlikely to be replaced by other BYs.

Land use data indicate substantial overlap between high-use areas and fish runs in the Russian River, San Francisco Bay, and the Santa Cruz area. In several streams, one or more BYs are at the verge of extinction, and heavy pesticide exposure may result in the loss of a BY. We expect the proposed use of the three carbamates will lead to both individual fitness level consequences and subsequent population-level consequences. Therefore, the risk to this species' survival and recovery from the proposed action is high for carbaryl, carbofuran, and methomyl.

Lower Columbia River Coho Salmon

The LCR coho salmon ESU includes all naturally spawned coho salmon populations in streams and tributaries to the Columbia River in Washington and Oregon from the mouth of the Columbia up to and including the White Salmon and Hood rivers, and along the Willamette to Willamette Falls, Oregon. The ESU includes 26 historical populations and 25 artificial propagation programs. Over 90% of the historic populations of LCR coho salmon are considered extirpated. Most populations have very low numbers and have been replaced by hatchery production. Only two populations have a degree of natural spawning – the Sandy River and the Clackamas River. The annual population growth rates known for the Sandy River and Clackamas River are 1.102 and 1.028, respectively.

The major threats to LCR coho salmon identified in the *Status of Listed Resources* and *Environmental Baseline* sections include reduced water flow in the mainstem and estuary from irrigation diversions and hydroelectric dams. Additionally, degraded water quality in freshwater and tributary habitats negatively affects this ESU. Among the various types of habitat threats, elevated temperature, water diversions, and poor water quality have significant influence on the status of LCR coho salmon.

Pesticide use and detections in LCR coho salmon freshwater habitats are well documented. NAWQA sampling in surface waters within the ESU range detected more than 50 pesticides in streams within this ESU. Ten pesticides exceeded EPA's criteria for the protection of aquatic life from chronic toxicity, including carbaryl. The combined impacts from these multiple threats continue to affect this ESU.

Registered uses of carbaryl, carbofuran, and methomyl include applications to crop agricultural sites, residential sites, and urban sites. Registered 24(c) uses in Oregon include carbofuran application to potatoes, nursery stock, sugar beets, and watermelons. Agricultural and urban development occurs along the Columbia River and the basins of its major tributaries. Both the Sandy and Clackamas Rivers drain parts of the Willamette Basin – a major agricultural area. Thus, ESU exposure to these pesticides is likely.

LCR coho salmon enter freshwater from August through December. Coho salmon spawn in November and December: emergence from the redds occurs between March and July. Fry typically select off-channel habitats associated with their natal rivers and streams to rear. The juvenile coho salmon reside in shallow freshwater habitats for more than one year. The long residence in these habitats increases their likelihood of experiencing significant exposure to pesticides and other contaminants.

Given the life history of LCR coho salmon, we expect the proposed uses of carbaryl, carbofuran, and methomyl pesticide products may lead to both individual fitness level and subsequent population-level consequences. The risk to this species' survival and recovery from the stressors of the action is high for carbaryl, carbofuran, and methomyl.

SONCC *coho salmon*

The SONCC coho salmon ESU includes coho salmon in streams between Cape Blanco, Oregon, and Punta Gorda, California, and three artificial propagation programs in the Klamath, Trinity, and Rogue Rivers. Little information on abundance trends exists for the streams within the ESU. However, available information indicates that Eel River and Southern populations are at high risk from critically low abundances. Northern populations may have larger runs. Recent

estimated escapement in the Klamath River is about 2,000 fish. The Rogue River spawner run ranged from 7,800 to 12,213 coho salmon from 1999 to 2001, though many are of hatchery origin.

The threats to this ESU include road crossings and other migration barriers, timber harvest and agricultural activities, and water management. Adverse effects on the SONCC coho salmon consist of barriers that limit access to tributaries, lack of large instream woody debris, reduced riparian vegetation, and elevated water temperature. The Klamath River, one of the largest rivers, is 303(d) listed because aquatic habitat has been degraded due to excessively high water temperatures and algae blooms associated with high nutrient loads, water impoundments, and agricultural water diversions (USEPA 1993). Pesticides used in land management activities are expected to enter stream mainstems and tributaries during application as drift and as runoff.

A large portion of the agricultural and municipal land uses within this ESU is concentrated in the upper Klamath and Rogue Rivers. A diverse array of crops is produced in these areas each year. Some agriculture and smaller urban centers are dispersed on the lower alluvial coastal plains and in rivers valleys of coastal rivers. Active forest management occurs throughout the watersheds within this ESU, and application of pesticide products is anticipated.

Spawning occurs from November through January, depending on the occurrence of fall and winter storms. Fry incubate for four to eight weeks before emergence in the spring. Newly emerged fry rear in backwater, side channels, and shallow channel edges for up to 18 months. During winter, juveniles inhabit side channels, sloughs, backwater, and other protected channel features. The off-channel and floodplain habitats provide feeding and growth opportunities that are important before smoltification and seaward migration in spring. The three-year life cycle of coho salmon, with limited exchange between cohorts, makes them more vulnerable to environmental perturbations than other salmonids.

Agricultural and urban land uses overlap substantially with this ESU, particularly in the Interior Rogue and Klamath rivers. Because of this overlap, we expect that the proposed uses of carbaryl, carbofuran, and methomyl will result in both individual fitness and population-level

effects. In several streams, one or more BYs are at the verge of extinction. Exposure to the three a.i.s can result in loss of weak BYs. Low population abundance levels and the discrete cohort life history of the coho salmon make the SONCC ESU more vulnerable to environmental stressors. Therefore the risk to the survival and recovery of the SONCC ESU from the stressors of the action is high.

Oregon Coast Coho Salmon

The OC coho salmon ESU includes 11 naturally spawned populations in Oregon coastal streams south of the Columbia River and north of Cape Blanco and one hatchery stock. While none of the populations have become extinct, the ESU's current abundance levels are less than 10% of historic populations. OC coho salmon abundance estimates from 2000 to 2007 ranged from a low of 51,875 to a high of 260,000 naturally produced spawners. Long-term trends in ESU productivity remain strongly negative.

The major threats to this ESU identified in the *Status of Listed Resources* and *Environmental Baseline* sections are habitat degradation from logging, road construction, urban development, mining, agriculture, and recreation. Within the various types of habitat, elevated temperature, water diversions, and poor water quality also affect the status of OC coho salmon. The combined impacts from these multiple threats continue to affect OC coho salmon.

Crop rotation patterns and crop types influence the distribution and frequency of pesticides within an area. Based on limited agricultural activities, we expect that carbaryl and existing stocks of carbofuran may be applied on a limited scale throughout the growing season. Registered 24(c) uses in Oregon include carbofuran application to potatoes, nursery stock, sugar beets, and watermelons. We also expect carbaryl use within urban and residential areas throughout the entire year. However, we expect no to very low applications of methomyl throughout the growing season. Although carbaryl and carbofuran may be applied to pine seedlings, we expect no to low applications in these forests. As runoff from urban and agricultural areas may drain into adjacent streams, ESU exposure to these pesticides is likely. However, given the above land uses and expected low application of the three carbamates, we

expect lower incidences of fish exposure to these compounds in surface waters following application.

OC coho salmon enter rivers in September or October; spawning occurs in December. Fry emerge between March and July, then move to shallow areas near the stream banks. Juvenile coho salmon are often found in small streams less than five ft wide, and may migrate considerable distances to rear in lakes and off-channel ponds. Generally, coho salmon spend 18 months rearing in freshwater before moving out into the ocean. Given this duration spent in shallow freshwater habitats, they are more likely to experience higher pesticide exposure and contaminants.

Given the limited applications of the three carbamates and low incidences within land uses that overlap with the range of OC coho, exposure is possible, although not likely to be extensive. We do not expect that exposure will have effects at the population level. Therefore, the risk to this species' survival and recovery from the stressors of the action is low for carbaryl, carbofuran, and methomyl.

Ozette Lake Sockeye Salmon

This ESU is made up of only one historic population. Natural spawning aggregations remain on two beaches of Ozette Lake. Two tributary spawning groups were initiated in1992 through hatchery programs. Peak run size in the 1940s has been estimated to be between 3,000 and 18,000 fish, and actual production (*i.e.*, including harvest) may have been as high as 50,000. Recent estimates put the population at 3,600 – 4,600 individuals (Haggerty, Ritchie et al. 2007). The supplemental hatchery program began with out-of-basin stocks and make up an average of 10% of the run. The proportion of beach spawners originating from the hatchery is unknown but likely low. Uncertainty in past population counts coupled with poorly documented historical abundance prevents calculation of population growth rates and trends.

Major threats to this population identified in the *Status of Listed Resources* and *Environmental Baseline* sections are siltation of spawning habitat from logging activities within the watershed and genetic effects from past interbreeding with kokanee. Almost 80% of the land cover for this

ESU is evergreen forest. Between 1940 and 1984, 85% of the basin was clear-cut logged (Blum 1988). Roughly 77% of the land in Ozette Basin is managed for timber production (Jacobs, Larson et al. 1996). The extent to which pesticide products are currently used by these companies is unknown.

Ozette Lake is in a sparsely populated area, with less than 1% of land developed. No crop land was identified in NLCD data (Table 32). The land use and environmental data indicate that the Ozette Lake sockeye salmon may be exposed to carbaryl or carbofuran if applied in the watershed. Carbaryl is registered for a number of non-agricultural applications which may take place in forested and residential areas. Additionally, the area has a small population, making residential use of carbaryl within the ESU a possibility. We do not expect 24(c) registrations of carbofuran will be used within this ESU, though it may be applied to pine seedlings. However, there are few data available on use and no monitoring data are currently available. We do not expect methomyl to be used within the boundaries of this ESU.

Ozette Lake sockeye salmon enter the lake between April and August, and spawning occurs late October through February. Fry emerge from gravel redds in the spring and emigrate to the open waters of the lake where they remain for a full year. They then smolt as 1-year olds and migrate to the open ocean. The majority of Ozette Lake sockeye salmon return to spawn as four-year old fish after spending two full years at sea.

Given the life history of the Ozette Lake sockeye, we expect that that the proposed uses of carbaryl and carbofuran pesticide products may contaminate aquatic habitats used by sockeye in a way that might lead to individual fitness level consequences. While the uses of these materials may lead to some overlap with the Ozette Lake sockeye, the existing and likely future land uses should limit the applications of pesticides containing the three carbamates. Consequently, the risk posed by the proposed action to Ozette Lake sockeye salmon's survival and recovery is low for carbaryl, carbofuran, and methomyl.

Snake River Sockeye Salmon

The SR sockeye salmon ESU historically includes populations in five Idaho lakes as well as artificially propagated sockeye salmon from the Redfish Lake Captive Broodstock Program. Only one hatchery-sustained population remains and is found in Redfish Lake. This population is listed as endangered and has an extremely high risk of extinction. Current smolt-to-adult survival of sockeye originating from the Stanley Basin lakes is rarely greater than 0.3% (Hebdon, Kline et al. 2004). No natural origin adults have returned to Redfish Lake to spawn since 1998; the population is maintained entirely by propagation efforts. Around 30 fish of hatchery origin return to spawn each year (FCRPS 2008).

The major threats to this ESU identified in the *Status of Listed Resources* and *Environmental Baseline* sections include impaired tributary flow and passage, migration barriers, degraded water quality, and hydromodification of the Columbia and Snake Rivers. Like the Ozette Lake ESU, the SR sockeye occupy a relatively undeveloped area with very little cropland (Table 37) However, the SR sockeye have the longest migration of any sockeye salmon, traveling 900 miles inland. These waters are contaminated by drift and runoff from both agricultural and urban areas. Exposure during migration likely adds to the low survivorship of smolts. The land use and environmental data indicate that the SR sockeye may be exposed to carbaryl, carbofuran, and methomyl during migration. Registered 24(c) uses within this ESU include carbofuran application to potatoes and spinach grown for seed in Washington.

Historically, sockeye salmon entered the Columbia River system in June and July, and arrived at Redfish Lake between August and September (FCRPS 2008). Spawning occurred in lakeshore gravel and generally peaked in October. Fry emerged in the spring (April and May) then migrated to open waters of the lake to feed. Juvenile sockeye remained in the lake for one to three years before migrating through the Snake and Columbia Rivers to the ocean. Adult sockeye spent two or three years in the open ocean before returning to Redfish Lake to spawn.

During adult and juvenile migrations the sockeye are at their greatest risk of exposure to the stressors of the action. Sockeye salmon making the 900 mile journey each way pass along many

miles where agricultural crops are at the river's edge. Drift and runoff occurring in conjunction with sockeye salmon migration is expected to cause adverse effect.

Given the life history of the SR sockeye, we expect the proposed uses of carbaryl, carbofuran, and methomyl pesticide products may lead to individual fitness level consequences. However, we do not expect fry to be exposed to the a.i.s, although some exposure may occur during adult migration and lead to acute lethality or temporary AChE inhibition. However, this exposure is not expected to occur at a frequency that would cause effects at the population level. Therefore, the risk to this species' survival and recovery from the stressors of the action is low for carbaryl, carbofuran, and methomyl.

Central California Coast steelhead

The CCC steelhead DPS includes all naturally spawned steelhead in streams from the Russian River south to Aptos Creek. This area includes streams entering the San Francisco Bay. The DPS consists of nine historic independent populations. There is limited information on the abundance of these populations, but all are in severe decline.

The major threats to this DPS identified in the *Status of Listed Resources* and *Environmental Baseline* sections are dams and other migration barriers, urbanization and channel modification, agricultural activities, predators, hatcheries, and water diversions. Throughout the species' range, habitat conditions and quality have been degraded by a lack of channel complexity, eroded banks, turbid and contaminated water, low summer flow and high water temperatures, an array of contaminants found at toxic levels, and restricted access to cooler head waters from migration barriers. There is limited monitoring data from streams within this DPS. The combined impacts of these threats continue to affect the CCC steelhead.

Crop farming is concentrated in low laying areas and floodplains along the estuaries and stream valleys of the Russian River and Santa Cruz drainage basins. Christmas trees production occurs in these areas in addition to a variety of food crops. Carbaryl and methomyl are registered for a variety crops grown in the Russian River valley and in the San Mateo and Santa Cruz counties. Registered 24(c) uses for carbaryl in California include application to fruits and nuts, prickly

pear cactus, ornamental plants, and non-food crops. Methomyl has 24(c) registrations for insect control on ornamentals, beans, soybeans, radishes, sweet potatoes, Chinese broccoli, broccoli raab, and pumpkins. The a.i.s are therefore expected to be used throughout the growing season. Existing stocks of carbofuran are also expected to be applied throughout the growing season. Further, 16% of the DPS' range consists of developed urban and residential land, mostly within the San Francisco Bay and Russian River basin. Carbaryl is expected to be used the entire year within the urban/residential areas.

The CCC steelhead populations are all of the winter-type. Fry emerge in spring and rear in smaller tributaries and off-channel habitats. During periods with high flows, they move into floodplain habitat. Juvenile steelhead remain in freshwater for one or more years before migrating downstream to smolt.

The registered uses of the three carbamates indicate substantial overlap with the CCC steelhead populations, especially in the San Francisco Bay, Russian River, and Santa Cruz area. We expect that the proposed uses of the three carbamates may contaminate spawning and rearing habitats and lead to both individual fitness level and population -level consequences. Thus, the risk to this species' survival and recovery from the stressors of the proposed action is high for carbaryl, carbofuran, and methomyl.

California Central Valley Steelhead

The CCV steelhead DPS includes all naturally spawned steelhead in the Sacramento River, San Joaquin River, and their tributaries. This area includes streams entering the Sacramento-San Joaquin Delta (Delta) east of Chipps Island. All populations rear and migrate through the Sacramento River, San Joaquin River, Delta, and San Francisco Bay. The current distribution is severely reduced and fragmented compared to historical distributions. About 6,000 river miles of river habitat have been reduced to 300 miles. Historical returns within the DPS may have approached two million adults annually. Current annual run size for the entire Sacramento-San Joaquin system today is estimated at less than 10,000 returning adults.

The *Status of Listed Resources* and *Environmental Baseline* sections indicate that dams and other migration barriers, urbanization and channel modification, agricultural activities, introduced non-native predators, hatcheries, and large scale water management and diversions negatively affect this DPS. Steelhead habitat has been highly degraded by reduced channel complexity, eroded banks, increased water temperature, migration barriers restricting access to cooler head waters, and decreased water quality from contaminants. Numerous NAWQA, CDPR, and other assessments found high concentration of contaminants in both the San Joaquin and Sacramento Rivers and their tributaries. In the San Joaquin Basin, seven pesticides exceeded EPA criteria for aquatic life. These pesticides include diuron, trifluralin, azinphos-methyl, carbaryl, chlorpyrifos, diazinon, and malathion. The combined impacts from these threats continue to affect the CCV steelhead.

Approximately 27% of the land within the DPS is developed for cultivation of crops (Table 38). High densities of crop farming occur throughout the San Joaquin Basin, in the Sacramento-San Joaquin Delta, and along lower Sacramento River. Further, 9.2% of the DPS consists of urban development. Based on the crop types, we expect carbaryl, carbofuran, and methomyl are commonly applied in the Central Valley throughout the growing season. In urban and residential areas, we expect carbaryl to be applied throughout the year. Monitoring in the San Joaquin basin found 48 of 83 pesticides tested for. Seven pesticides (diuron, trifluralin, azinphos-methyl, carbaryl, chlorpyrifos, diazinon, and malathion) exceeded criteria for the protection of aquatic life. Pesticides detected in the Sacramento River included thiobencarb, carbofuran, molinate, simazine, metolachlor, dacthal, chlorpyrifos, carbaryl, and diazinon. Carbofuran was most often detected in agricultural sites while carbaryl was also found in all urban sites tested.

All of the steelhead populations within this DPS exhibit the winter-type life history, though detailed information about the CCV steelhead life history is not available. Juvenile steelhead remain in freshwater for one or more years before migrating downstream to enter the ocean. The CCV steelhead use the lower Sacramento River and the Delta for rearing and as migration corridor. Some may utilize tidal marshes, non-tidal freshwater marshes, and other shallow areas in the Delta for rearing areas for short periods during outmigration to the ocean.

The registered uses of the three carbamates indicate substantial overlap with the CCV steelhead populations, especially in the lower Sacramento River and Delta. We expect that the proposed uses may contaminate spawning and rearing habitats and lead to both individual fitness and population-level consequences. Thus, the risk to this species' survival and recovery from the stressors of the proposed action is high for carbaryl, carbofuran, and methomyl.

Lower Columbia River Steelhead

The LCR Steelhead DPS includes 23 historical, naturally-spawned steelhead populations in Columbia River tributaries on the Washington side between the Cowlitz and Wind Rivers in Washington and on the Oregon side between the Willamette and Hood Rivers. Historical counts from the Cowlitz, Kalama, and Sandy Rivers suggest the ESU probably exceeded 20,000 fish. During the 1990s, fish abundance dropped to 1,000 to 2,000 fish. Many of the populations in this DPS are small, and the long- and short-term trends in abundance of all individual populations are negative. The annual population growth rate known for nine independent populations ranged from 0.945 to 1.06.

The major threats to this DPS identified in the *Status of Listed Resources* and *Environmental Baseline* sections include dams; water diversion; destruction or degradation of riparian habitat; and land use practices (logging, agriculture, and urbanization). Tributary hydropower development has created barriers and reduced fish access, ultimately affecting the spatial structure within the independent populations. Within the various types of habitat, water diversions, elevated temperature, and poor water quality also affect the status of LCR steelhead. Pesticides have also been detected in LCR steelhead habitats. NAWQA sampling from 1991-1995 in surface waters within the DPS range detected more than 50 pesticides in streams. Ten pesticides exceeded EPA's criteria for the protection of aquatic life from chronic toxicity. These pesticides include carbaryl, carbofuran, atrazine, chlorpyrifos, and malathion. The combined impacts from these multiple threats continue to affect this DPS.

Most of the highly developed land and agricultural areas in this DPS's range are adjacent to salmonid habitat. Registered uses of carbaryl, carbofuran, and methomyl include applications to crop agricultural sites, residential sites, and urban sites. Registered 24(c) uses in Oregon include

carbofuran application to potatoes, nursery stock, sugar beets, and watermelons. Based on the crop types, we expect that carbaryl and methomyl are commonly applied in the Lewis River subbasin throughout the growing season and within urban and residential areas throughout the entire year for carbaryl. Existing stocks of carbofuran are also expected to be applied throughout the growing season. Thus, DPS exposure to these pesticides is likely.

This DPS includes winter- and summer-run types. Summer-run steelhead return to freshwater between May and November. They enter the Columbia River in a sexually immature condition and require several months in freshwater before spawning. Winter-run steelhead enter freshwater from November to April. These fish are close to sexual maturation and spawn shortly after arrival in their natal streams. Steelhead fry typically rear in off-channel habitats associated with their natal rivers and streams for more than a year. Given this duration, juveniles are likely to experience pesticide exposure.

Given the life history of LCR steelhead, we expect the proposed uses of carbaryl, carbofuran, and methomyl pesticide products may contaminate rearing habitats and lead to individual fitness and subsequent population-level consequences. The risk to this species' survival and recovery from the stressors of the action is high for carbaryl, carbofuran, and methomyl.

Middle Columbia River Steelhead

The MCR steelhead DPS includes 19 populations in Oregon and Washington subbasins upstream of the Hood and Wind River systems to and including the Yakima River. Historical run estimates for the Yakima River imply that annual species abundance may have exceeded 300,000 returning adults (Busby, Wainwright et al. 1996), whereas only 1,000 – 4,000 currently spawn. The most recent 10-year period indicated trends in abundance were positive for approximately half of the independent populations and negative for the remainder. Growth rates ranged from 0.97 to 1.02. Two historical populations are considered extinct.

Agricultural development is high within the range of MCR steelhead. Based on crop types and allowable uses, we expect that carbaryl and methomyl are commonly applied in the Yakima River basin, Walla Walla River basin, Deschutes River basin, and the John Day River basin

throughout the growing season. Existing stocks of carbofuran are also expected to be applied throughout the growing season. In urban and residential areas, carbaryl will likely be applied throughout the entire year. Registered 24(c) uses within this ESU include carbofuran application to potatoes, nursery stock, sugar beets, and watermelons in Oregon and to potatoes and spinach grown for seed in Washington. Given the high amount of agriculture in these areas, we also expect other AChE inhibiting pesticides will co-occur with carbaryl, carbofuran, and methomyl and exacerbate adverse effects from AChE inhibition. Thus, DPS exposure to these pesticides is expected to be high

Mature adults (three to five years old) may enter rivers any month of the year and spawn in late winter or spring. Swim–up fry usually inhabit shallow water along banks of streams or aquatic habitats on stream margins. Steelhead rear in a variety of freshwater habitats and most remain in freshwater for two to three years. Some individuals, however, have stayed for as many as six to seven years. Most MCR steelhead smolt at two years and spend one to two years in the ocean prior to re-entering the freshwater to spawn.

Intense agricultural development has a high degree of overlap with the spawning and rearing areas of the MCR steelhead DPS. Given the long residency periods in freshwater, we expect that the proposed uses of of the three carbamates may lead to both individual fitness and population-level consequences. Therefore, the risk to this species' survival and recovery from the stressors of the action is high for carbaryl, carbofuran, and methomyl.

Northern California Steelhead

The NC steelhead DPS includes all naturally spawned steelhead in California coastal river basins from Redwood Creek southward to, but not including, the Russian River, as well as two artificial propagation programs. Historical estimates of annual production for this DPS are upwards of 200,000 fish. Exact information on abundance is lacking for most of the streams within the DPS, though most populations are in decline. The DPS includes 15 historically independent populations of winter steelhead and 10 populations of summer steelhead. None of the winter steelhead populations are viable due to low abundance and production.

The major threats to this DPS identified in the *Status of Listed Resources* and *Environmental Baseline* sections are timber harvest, forest roads, vineyard developments, and road crossings and dams. Stressors to the NC steelhead include lack of large instream woody debris, reduced riparian vegetation, elevated water temperature, increased predation, and barriers that limit access to tributaries. The combined impacts from these multiple threats continue to affect the NC steelhead.

About 85% of the land use for this DPS consists of forests and chaparral (Table 26). Atlhough carbaryl may be applied in forested areas, the extent of exposure is unknown. There are areas of Mendocino County with a high density of vineyards, and there is some crop farming in low laying areas and floodplains along the estuaries and lower reaches of coastal streams. Coastal communities are located at the mouths of several streams within the NC steelhead DPS. Based on the crop types, we expect carbaryl, carbofuran, and methomyl to be commonly applied throughout the growing season in these areas. Carbaryl is expected to be used the entire year within urban and residential areas. However, because agricultural and urban development is not concentrated in any one basin, the risk of exposure to any given population is decreased. Additionally, the majority of steelhead juveniles rear at higher elevations in the watersheds with less agricultural influence. The fry, then, are less likely to be exposed during critical life stages.

The winter-type steelhead enters rivers as mature adults between November and April to spawn. The summer-type enters the stream in immature condition between May and October. Early arriving summer steelehead move high into the upper watersheds where they hold in deep pools throughout the summer before spawning in fall. In northern California, juvenile steelhead remain in freshwater for two or more years before migrating downstream to smolt. Juvenile steelheads spend a variable amount of time in the estuary before entering the open ocean.

We expect the proposed uses of carbaryl, carbofuran, and methomyl pesticides products within this DPS may lead to individual fitness effects, ranging from acute lethality to temporary AChE inhibition. However, exposure of NC steelhead populations to the three carbamates will be limited given the amount of overlap between agriculture, residential and urban development and spawning and rearing habitat. As such, we do not expect exposure to result in population-level

consequences. Therefore, the risk to the survival and recovery of NC steelhead from the proposed action is low for carbaryl, carbofuran, and methomyl.

Puget Sound Steelhead

The Puget Sound steelhead is comprised of 21 populations, some of which have both summer and winter runs. Steelhead occur in all major watersheds within the Sound and out to the Elwha River. Of the winter runs, 17 had declining and four had increasing population trends. Summer run abundance trends are not available. Estimated run size for Puget Sound steelhead in the early 1980s is approximately 100,000 winter-run steelhead and 20,000 summer-run steelhead.

The major threats to this DPS identified in the *Status of Listed Resources* and *Environmental Baseline* sections are habitat degradation from logging, road construction, urban development, mining, agriculture, and recreation; water diversions; and poor water quality. In particular, elevated temperature, water diversions, and poor water quality have the most significant influences on the status of Puget Sound steelhead. Furthermore, there has been extensive urbanization in this region. Well over two million people inhabit the area, with most development occurring along rivers and coastline.

Pesticide use and detections in the DPS's watershed are also well documented. 2006 NAWQA sampling in the Puget Sound basin detected 26 pesticides and 74 other synthetic organic chemicals in streams and rivers, with different mixtures of chemicals linked to agricultural and urban settings. Urban streams sampled in Puget Sound showed the highest detections for carbaryl, diazinon, and malathion. Diazinon was also frequently detected in urban streams at concentrations that exceeded EPA guidelines for protecting aquatic life (Bortleson and Ebbert 2000).

Registered uses of carbaryl, carbofuran, and methomyl include applications to crop agricultural sites, residential sites, and urban sites. In addition, Washington has 24(c) registrations for carbofuran use on spinach grown for seed and potatoes. Land classes indicate high use of the three a.i.s in the following drainage basins: Nooksack, Skagit River, Stillaguamish, Skykomish, Snoqualimie, Snohomish, Lake Washington, Duwamish, and Puyallup. Roughly 7% of the

lowland areas (below 1,000 ft elevation) in the Puget Sound region are covered by impervious surfaces, which increase urban runoff containing pollutants and contaminants into streams. Pollutants carried into streams from urban runoff include pesticides, heavy metals, PCBs, PBDEs, PAHs, pharmaceuticals, nutrients, and sediments. Thus, we expect salmonid populations within the ESU to be exposed to carbaryl, carbofuran, and methomyl. Further, monitoring data shows that we can expect concurrent exposure with other AChE inhibiting chemicals, leading to a pronounced severity of effects.

Summer steelhead enter freshwater between May and October, while winter steelhead enter between November and April. Spawning generally occurs in late winter or spring. Immediately after leaving the gravel, swim-up fry usually inhabit shallow water along banks of stream or aquatic habitats on stream margins. Steelhead rear in a wide variety of freshwater habitats, generally for two to three years. However, they may possibly reside up to six to seven years in freshwater environments. Following the rearing period, they smolt and migrate to sea in the spring.

We expect the proposed uses of carbaryl, carbofuran, and methomyl pesticide products that contaminate aquatic habitats may lead to both individual fitness level and subsequent population-level consequences. The risk to this species' survival and recovery from the stressors of the action is high for carbaryl, carbofuran, and methomyl.

Snake River Basin Steelhead

The SR steelhead DPS includes 23 naturally spawned populations below impassable natural and man-made barriers in streams in the Columbia River Basin upstream from the Yakima River, Washington, to the U.S.-Canada border. The Snake River supports about 63% of the natural-origin production of steelhead in the Columbia River Basin. The 10-year average for natural-origin steelhead passing Lower Granite Dam between 1996 and 2005 is 28,303 adults. Annual population growth rates show mixed long- and short-term trends in abundance and productivity. The annual population growth rate is known for eight independent populations and range 0.89 to 1.08. One historical population is likely extirpated.

The major threats to this DPS identified in the *Status of Listed Resources* and *Environmental Baseline* sections include hydrosystem mortality, water diversions, excessive sediment, and degraded water quality. Elevated temperature also impacts the status of SR steelhead. Pesticides have been detected in SR steelhead freshwater habitats. NAWQA sampling in 1992-1995 in the DPS's watersheds detected Eptam, atrazine, desethylatrazine, metolachlor, and alachlor. Carbaryl and carbofuran were detected in only 1% of samples. The combined impacts from these multiple threats continue to affect SR steelhead.

Some spawning and rearing habitat of the Snake River steelhead is in forested areas, where carbaryl may be applied. However, the likelihood of exposure in forested areas is unknown. Registered 24(c) uses within this ESU include carbofuran application to potatoes and spinach grown for seed in Washington. Dryland agriculture occurs in lower Clearwater Basin, with crops including wheat, peas, and lentils. Alfalfa, hay, and grasses are also grown in the lower Clearwater as well as the lower Salmon River basin. All three a.i.s are registered for use on alfalfa. Agricultural activities and urban communities are concentrated along the Snake River and near the mouths of major tributary valleys, thus stream water quality and biological communities in the downstream portion of the upper Snake River basin are degraded. Given that urban and agricultural areas are located adjacent to streams in the Lower Clearwater River drainage, DPS exposure to these pesticides is likely.

Sexually immature adult Snake River summer steelheads enter the Columbia River from late June to October. Adults migrate upriver until they reach Snake River tributaries where they spawn between March and May of the following year. Emergence occurs by early June in low elevation streams and as late mid-July at higher elevations. After hatching, juvenile SR steelhead typically select off-channel habitats associated with their natal rivers and streams for rearing. They spend two to three years in freshwater before they smolt and migrate to the ocean. Juvenile steelhead are more likely to be exposed to pesticides and other contaminants because of their long freshwater residency period.

Given the life history of SR steelhead, we expect the proposed uses of carbaryl and carbofuran pesticide products that contaminate aquatic habitats will lead to individual fitness level

consequences and subsequent population-level consequences. The uses of these materials in some natal areas and along migratory routes may cause acute lethality, temporary AChE inhibition, and reduced growth. We expect that exposure to methomyl may lead to individual fitness consequences, but not to an extent that would affect population growth rates. The risk to SR steelhead survival and recovery from the stressors of the action is high for carbaryl and carbofuran, but low for methomyl.

South-Central California Coast Steelhead

The S-CCC steelhead DPS includes all naturally spawned steelhead in streams from the Pajaro River to the Santa Maria River. The major basins in the S-CCC steelhead range are the Pajaro River system and the Salinas River system. Carmel River, a smaller basin, also supports a stable run of steelhead. Historic abundance estimates for the DPS imply an annual return may have been upwards of 20,000 fish. The estimated production in five of the major rivers indicates a return of less than 500 adults.

The major threats to this DPS identified in the *Status of Listed Resources* and *Environmental Baseline* sections are dams and other migration barriers, urbanization and channel modification, agricultural activities, and wildfires. These activities has resulted in reduced channel complexity, eroded banks, increased water temperature, migration barriers restricting access to cooler head waters, and decreased water quality from contaminants.

About 7% of the DPS is developed for cultivation of crops; a large portion of this land is in the Salinas River valley. Crops are concentrated in low laying areas and floodplains along the estuaries and lower reaches of streams. Based on the crop types, we expect carbaryl, carbofuran, and methomyl are commonly applied within the DPS throughout the growing season. Approximately 8% of the DPS has been developed for urban and residential purposes. Developed areas are located at the mouth of several streams within the S-CCC steelhead DPS. We expect carbaryl use in urban/residential areas throughout the entire year.

All S-CCC steelhead are a winter-run life history. Juvenile steelhead remain in freshwater for one or more years before migrating downstream to smolt. Steelhead in this area consists of two

life history groups: one where the juveniles rear for one or two years mainly in freshwater and another where the juveniles rear at the upper end of coastal lagoons for the first or second summer.

In conclusion, based on the long freshwater residence time of steelhead and the considerable overlap between S-CCC steelhead distribution and expected pesticide use, we expect that the S-CCC may experience high levels of exposure. We expect that proposed uses of the three carbamates that contaminate spawning and rearing habitats may lead to both individual fitness and population-level consequences. Therefore, the risk to the survival and recovery of S-CCC from the proposed action is high for carbaryl, carbofuran, and methomyl.

Southern California Steelhead

The SC steelhead DPS includes populations in five major and several small coastal river basins in California from the Santa Maria River to the U.S. – Mexican border. It is estimated that the species' current distribution constitutes about 1% of the historical distribution. Current abundance is considerably reduced with an estimated escapement of 500 fish for four of the larger rivers. Long-term estimates and population trends are lacking for the streams within the DPS.

The major threats to this DPS identified in the *Status of Listed Resources* and *Environmental Baseline* sections are dams and other migration barriers, urbanization and channel modification, agricultural activities, and wildfires. As a result of these activities, the stream substrate contains a high proportion of fines, stream channels lack complexity, banks are eroding, migration barriers restrict fish access to cooler head waters and tributaries, and the water is turbid and contaminated.

Agriculture is concentrated in low laying areas and floodplains along the estuaries and lower reaches of streams. Carbaryl, carbofuran, and methomyl are expected to be commonly used for several crops during the growing season. Large areas of dense development exist in the counties of Santa Barbra to San Diego. Carbaryl is expected to be used within urban/residential areas throughout the entire year. The NAWQA analysis detected more than 58 pesticides in ground

and surface waters within the heavily populated Santa Ana basin, including multiple AChE inhibitors. The invertebrate community in the basin is heavily altered by pesticide influence. Carbaryl was detected in 42% or urban samples but few detections exceeded standards for protection of aquatic life. Carbofuran was also detected but not in levels exceeding standards. The application of other AChE inhibiting pesticides is expect to co-occur with the a.i.s, and exacerbate adverse effects from AChE inhibition.

All steelhead populations in this DPS are winter-type. Juvenile steelheads remain in freshwater for one or more years before migrating downstream to smolt. SC steelhead consists of two life history groups: one where the juveniles rear for one or two years mainly in freshwater and another where the juveniles rear at the upper end of coastal lagoons for the first or second summer.

We expect the proposed uses of carbaryl, carbofuran, and methomyl pesticides products that contaminate aquatic habitat will lead to both individual fitness consequences and subsequent population-level consequences. There is substantial overlap between urban and agricultural areas and the spawning and rearing habitats of the SC steelhead populations. Therefore, the risk to this species' survival and recovery from the stressors of the action is high for carbaryl, carbofuran, and methomyl.

Upper Columbia River Steelhead

The UCR steelhead DPS includes all naturally spawned populations below natural and man-made impassable barriers in the Columbia River basin upstream from the Yakima River, Washington, to the U.S.-Canada border. The DPS is comprised of four naturally-spawned populations and six artificial propagation programs in Washington State. The historical independent populations are located within the Wenatchee, Entiat, Methow, and Okanogan river systems. Abundance data indicate that all populations are below the minimum threshold for recovery. The annual population growth rates range between 1.067 and 1.086. Overall adult returns are dominated by hatchery fish.

The major threats to this DPS identified in the *Status of Listed Resources* and *Environmental Baseline* sections include dams that block fish migration and alter river hydrology; water diversions; destruction or degradation of riparian habitat; and land use practices (logging, agriculture, urbanization). Elevated water temperature and poor water quality also affect the status of UCR steelhead. Pesticides have also been detected in UCR steelhead freshwater habitats. NAWQA sampling from 1992-1995 in the Central Columbia Plateau detected numerous pesticides in surface water (Williamson et al. 1998). Carbaryl was detected in 5% of samples, and carbofuran was detected in 6%. Methomyl was not detected. While detections of these three chemicals did not exceed water quality standards, concentrations of six other pesticides exceeded EPA criteria for the protection of aquatic life. The co-occurrence of atrazine with carbaryl and other OPs in aquatic habitats increases the likelihood of adverse responses in salmonids and their aquatic prey. The combined impacts from these multiple threats continue to affect UCR steelhead.

Land uses within this DPS range include agricultural, urban and residential development. Based on the crop types, we expect that carbaryl and methomyl are commonly applied in the Wenatchee, Methow, and Entiat subbasins throughout the growing season. Existing stocks of carbofuran are also expected to be applied throughout the growing season. As runoff containing pesticides and other contaminants from the above land uses drain into the Wenatchee, Entiat, and Methow Rivers, DPS exposure to these pesticides is likely. We also expect other AChE inhibiting pesticides will co-occur with carbaryl, carbofuran, and methomyl in the waters of the Wenatchee, Entiat, Methow, and Lower Crab Creek subbasins and exacerbate adverse effects from AChE inhibition.

UCR adults return to the Columbia River in the late summer and early fall. UCR steelhead spawn and rear in the major tributaries to the Columbia River between Rock Island and Chief Joseph dams. Adults reach spawning areas in late spring of the calendar year following entry into the river. Newly emerged fry move about considerably and seek suitable rearing habitat, such as stream margins or cascades. Steelhead fry typically select off-channel habitats associated with their natal rivers and stream for extended periods of rearing. Fry move downstream in the fall in search of suitable overwintering habitat (Chapman, Hillman et al.

1994). Most juvenile steelhead spend two or three years in freshwater before migrating to the ocean. Some juvenile steelhead may spend up to seven years rearing in freshwater before migrating to sea. Given the long duration in shallow freshwater habitats, juveniles are more likely to experience higher pesticide exposure, contaminants, and elevated temperature.

We expect that the proposed uses of carbaryl, carbofuran, and methomyl may contaminate the rearing habitat of UCR steelhead and lead to individual fitness and population-level effects. Therefore, the risk to this species' survival and recovery from the stressors of the action is high for carbaryl, carbofuran, and methomyl.

Upper Willamette River Steelhead

The UWR steelhead DPS includes all naturally spawned late-fall populations below natural and man-made impassable barriers in the Willamette River, Oregon, and its tributaries upstream from Willamette Falls to the Calapooia River. The DPS is comprised of four historical populations. Steelhead populations within this DPS have been declining, on average, since 1971 and have exhibited large fluctuations in abundance. Long-term trends in the annual population growth rate are less than one. The annual population growth rate of the four independent populations ranged from 0.97 to 1.023.

The major threats to this ESU identified in the *Status of Listed Resources* and *Environmental Baseline* sections include habitat loss due to blockages from hydroelectric dams and irrigation diversions, and degraded water quality within the Willamette mainstem and the lower reaches of its tributaries. Additionally, pesticide use and detections in UWR steelhead freshwater habitats are well documented. Fifty pesticides were detected in streams that drain both agricultural and urban areas. Forty-nine pesticides were detected in streams draining agricultural land, while 25 pesticides were detected in streams draining urban areas. Ten of these pesticides, including carbaryl and carbofuran, exceeded EPA criteria for the protection of freshwater aquatic life for chronic toxicity (Wentz, Bonn et al. 1998). The combined impacts from these multiple threats continue to affect UWR steelhead.

Based on the crop types, we expect that carbaryl and methomyl are commonly applied in the Willamette Valley throughout the growing season. Existing stocks of carbofuran are also expected to be applied throughout the growing season. Registered 24(c) uses in Oregon include carbofuran application to potatoes, nursery stock, sugar beets, and watermelons. The Willamette Basin is the largest agricultural area in Oregon. In 1992 the Willamette Basin accounted for 51% of Oregon's total gross farm sales and 58% of Oregon's crop sales. About one-third of the agricultural land is irrigated and most of it is adjacent to the mainstem Willamette River. Urban developments are also located primarily in the valley along the mainstem Willamette River. We expect carbaryl to be used throughout the year in urban and residential areas. Given that major urban and agricultural areas are located adjacent to the mainstem Willamette, DPS exposure to these pesticides is likely. We also expect that other AChE inhibiting pesticides will co-occur with carbaryl, carbofuran, and methomyl in the waters of the Willamette Valley and exacerbate adverse effects from AChE inhibition.

UWR steelhead enter the Willamette River in January and February and ascend to their spawning areas in late March or April. After emergence, steelhead fry typically rear in off-channel habitats associated with their natal rivers and streams for two to three years. Smolt migration past Willamette Falls begins in early April and extends through early June, with peak migration in early to mid-May. Most spend two years in the ocean before re-entering freshwater to spawn.

Much of the Willamette Valley has been converted to agricultural purposes. Based on the co-occurrence of high use land classes with spawning and rearing habitats, we expect that the proposed uses of the three carbamates may contaminate spawning and rearing habitats and lead to both individual fitness and population-level effects. Therefore, the risk to this species' survival and recovery from the stressors of the action is high for carbaryl, carbofuran, and methomyl.

Summary of Species-Level Effects

In the preceding section NMFS described expected population-level effects in terms of reductions in annual growth rate, productivity (reproduction), and abundance (numbers of salmonids). We concluded that all but Ozette Lake sockeye salmon, Snake River sockeye

salmon, Northern California steelhead, Columbia River chum salmon, Hood Canal summer-run chum salmon, and Oregon Coast coho salmon populations will likely show reductions in viability due to the reregistration of carbaryl and carbofuran. We also concluded that all but Ozette Lake sockeye salmon, Snake River sockeye salmon, Northern California steelhead, Columbia River chum salmon, Hood Canal summer-run chum salmon, Oregon Coast coho salmon, Snake River fall-run Chinook salmon, Snake River spring-summer-run Chinook salmon, California Coastal Chinook salmon, and Snake River steelhead populations will likely show reductions in viability due to the reregistration of methomyl. The effects of EPA's proposed action are first manifested at the individual-level where reductions in individual fitness are expected. We showed that an individual's survival, migration, and growth are all significantly reduced by the proposed action. We also showed that these reductions are likely intensified by co-occurring stressors in the action area including the presence of other carbamates and OP insecticides in the action area.

Therefore, given the severity of expected changes in the annual population growth rate for affected populations, it is likely that California Coastal Chinook salmon, Central Valley spring-run Chinook salmon, LCR Chinook salmon, Puget Sound Chinook salmon, Sacramento River winter-run Chinook salmon, Snake River fall-run Chinook salmon, Snake River spring/summer-run Chinook salmon, UCR spring-run Chinook salmon, Upper Willamette River Chinook salmon, Central California Coast coho salmon, Southern Oregon and Northern Coastal California coho salmon, Central California Coast steelhead, California Central Valley steelhead, LCR steelhead, MCR steelhead, Snake River Basin steelhead, South-Central California Coast steelhead, Southern California steelhead, UCR steelhead, and Upper Willamette River steelhead will experience reductions in viability, which ultimately reduces the likelihood of survival and recovery of these species. The Ozette Lake sockeye salmon, Snake River sockeye salmon, Northern California steelhead, Columbia River chum salmon, Hood Canal summer-run chum salmon, and Oregon Coast coho salmon will not likely experience reductions in viability.

Effects of the Proposed Action to Designated Critical Habitat

NMFS' critical habitat analysis determines whether the proposed action will destroy or adversely modify critical habitat for ESA-listed species by examining any change in the conservation value

of the essential features of critical habitat. Our analysis does not rely on the regulatory definition of 'adverse modification or destruction' of critical habitat. Instead, this analysis focuses on statutory provisions of the ESA, including those in Section 3 that define "critical habitat" and "conservation," those in Section 4 that describe the designation process, and those in Section 7 setting forth the substantive protections and procedural aspects of consultation.

NMFS has designated critical habitat for all listed Pacific salmonids except for LCR coho salmon and Puget Sound steelhead. The action area encompasses all designated critical habitat areas considered in this Opinion. The PCEs for each listed species, where they have been designated, are described in the *Status of Listed Resources* section of this Opinion. The PCEs identify those physical or biological features that are essential to the conservation of the species that may require special management considerations or protections. As the species addressed in this Opinion have similar life history characteristics, they share many of the same PCEs. These PCEs include sites essential to support one or more life stages (sites for spawning, rearing, migration, and foraging) and contain physical or biological features essential to the conservation of the ESU/DPS, such as:

1. freshwater spawning sites with water quantity and quality conditions and substrate supporting spawning, incubation and larval development;
2. freshwater rearing sites with water quantity and floodplain connectivity to form and maintain physical habitat conditions and support juvenile growth and mobility; water quality and forage supporting juvenile development; and natural cover such as shade, submerged and overhanging large wood, log jams and beaver dams, aquatic vegetation, large rocks and boulders, side channels, and undercut banks;
3. freshwater migration corridors free of obstruction, along with water quantity and quality conditions and natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, side channels, and undercut banks supporting juvenile and adult mobility and survival;
4. estuarine areas free of obstruction, along with water quality, water quantity, and salinity conditions supporting juvenile and adult physiological transitions between fresh and saltwater; natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, and side channels; and juvenile and adult forage, including aquatic invertebrates and fishes, supporting growth and maturation;
5. nearshore marine areas free of obstruction with water quality and quantity conditions and forage, including aquatic invertebrates and fishes, supporting growth and maturation; and

natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, and side channels; and

6. offshore marine areas with water quality conditions and forage, including aquatic invertebrates and fishes, supporting growth and maturation.

At the time that each habitat area was designated as critical habitat, that area contained one or more PCEs within the acceptable range of values required to support the biological processes for which the species use that habitat. We identified PCEs of prey availability and water quality in freshwater spawning sites, freshwater rearing sites, migratory corridors, and estuarine and nearshore marine areas as susceptible to the effects of the proposed action. We evaluated whether prey availability and water quality are likely affected by the proposed action and formulated risk hypotheses for these PCEs. We relied upon pesticide use information (see the *Description of the Action* section), surface water monitoring data, EPA modeling estimates, and NMFS modeling estimates (see *Exposure Analysis* section) to determine likely aquatic concentrations. Based on our analysis within the *Effects of the Proposed Action* section, the proposed action will reduce prey availability and degrade water quality within freshwater spawning habitat, freshwater rearing habitat, and migration corridors.

Direct exposure to carbaryl, carbofuran, and methomyl and the other chemical stressors of the action within freshwater will have an effect on Pacific salmonid critical habitat that overlaps with intense agricultural and residential/urban land uses. The *Environmental Baseline* discusses the extent of anthropogenic alteration of salmonid habitat within the action area. As established in *Effects of the Action to Listed Species* Section, agricultural, urban, and residential areas overlap with salmonids' geographic range to differing degrees between ESUs/DPSs. As noted in the *Effects of the Proposed Action* section, pesticides most often occur in the aquatic environment as mixtures. Carbaryl, carbofuran, and methomyl are found in environmental mixtures. Based on evidence of additive and synergistic effects of these compounds, we expect mortality of large numbers and types of aquatic insects, which are prey items for salmon. A reduction in salmonid prey abundance poses subsequent impacts on the overall growth of salmonid juveniles, especially during their first year of survival.

Reduction in Prey

Freshwater spawning, rearing, and migratory habitats must provide forage areas that support juvenile development. A reduction in the abundance of prey items will decrease the conservation value of these habitats, as they will support fewer individuals, especially during a salmonid's first year of survival. Given the environmental baseline conditions of the aquatic systems, the existing invertebrate community is already depauperate in many of these areas and requires longer periods for recovery following each pesticide application event. The a.i.s in surface runoff and pesticide drift entering freshwater rearing habitats will exacerbate reductions in insect communities that are salmonid prey items in these degraded systems. We expect that designated critical habitats that support juvenile feeding and growth will be contaminated by the proposed uses of carbaryl, carbofuran, and methomyl to the extent that the habitat is precluded from serving its intended role in the survival and recovery of listed salmonids. The overall conservation value of designated critical habitat, whether low, medium, or high, will not meet its intended role to support the survival and recovery of the species.

Reduction in Water Quality

Drift and runoff from areas of intensive urban and agricultural development will likely contain carbaryl, carbofuran, and methomyl in addition to other pesticides - particularly other AChE-inhibiting pesticides, chemical pollutants, and sediments that also degrade water quality. Depending on the available water flow, amount of shade from LWD and intact riparian zones, and water temperature in aquatic habitats, the toxicity of carbaryl, carbofuran, and methomyl in tributary and stream waters may become more pronounced. Reductions in water quality may reduce the conservation value of designated habitats used for spawning, rearing, and migration. Furthermore restoration actions promoted in many of the salmonid recovery plans focus on increasing flood plain connectivity and creating new off-channel habitats. These actions are proposed in agricultural and urban flood plains that overlap with uses of the three insecticides. Water quality (as well as prey availability) may be degraded in these newly constructed habitats from the stressors of the action- effectively precluding intended benefits to rearing juvenile salmonids. We expect that proposed uses may contaminate these areas, thereby precluding habitat from its intended purpose in supporting the survival and recovery of listed Pacific salmonids.

The precise change in the conservation value of critical habitat within the ESU/DPS from the proposed action cannot be quantified and will likely vary according to the specific designated critical habitat. However, based on the effects described above, it is reasonably likely that the proposed action will have a large, local, negative reduction in that conservation value of designated critical habitat within highly developed agricultural, residential, and urban areas. The duration, frequency, and severity of these reductions will vary according to overall numbers and volume of applications of carbaryl, carbofuran, and methomyl in areas of designated critical habitat, among other variables.

Therefore, we expect that the registration of carbaryl and carbofuran will adversely affect designated critical habitat of all listed Pacific salmonids except for that of Ozette Lake sockeye salmon, Snake River sockeye salmon, Northern California steelhead, Columbia River chum salmon, Hood Canal summer-run chum salmon, and Oregon Coast coho salmon. We also expect that the reregistration of methomyl will adversely affect designated critical habitat of all listed Pacific salmonids, except for that of Ozette Lake sockeye salmon, Snake River sockeye salmon, Northern California steelhead, Columbia River chum salmon, Hood Canal summer-run chum salmon, Oregon Coast coho salmon, Snake River fall-run Chinook salmon, Snake River spring-summer-run Chinook salmon, California Coastal Chinook salmon, and Snake River steelhead.

Conclusion

Carbaryl and Carbofuran

After reviewing the current status of California Coastal Chinook salmon, Central Valley spring-run Chinook salmon, LCR Chinook salmon, Puget Sound Chinook salmon, Sacramento River winter-run Chinook salmon, Snake River fall-run Chinook salmon, Snake River spring/summer-run Chinook salmon, UCR spring-run Chinook salmon, Upper Willamette River Chinook salmon, Central California Coast coho salmon, LCR coho salmon, Southern Oregon and Northern Coastal California coho salmon, California Central Valley steelhead, Central California Coast steelhead, LCR steelhead, MCR steelhead, Puget Sound steelhead, Snake River Basin steelhead, South Central California coast steelhead, Southern California steelhead, UCR steelhead, and Upper Willamette River steelhead, the environmental baseline for the action area,

the effects of the proposed action, and the cumulative effects, it is NMFS' Opinion that the registration of carbaryl and carbofuran is likely to jeopardize the continued existence of these endangered or threatened species (Table 81).

It is NMFS' Opinion that the registration of carbaryl and carbofuran is not likely to jeopardize the continued existence of Ozette Lake sockeye salmon, Snake River sockeye salmon, Northern California steelhead, Columbia River chum salmon, Hood Canal summer-run chum salmon, and Oregon Coast coho salmon (Table 81).

After reviewing the current status of designated critical habitat for California Coastal Chinook salmon, Central Valley spring-run Chinook salmon, LCR Chinook salmon, Puget Sound Chinook salmon, Sacramento River winter-run Chinook salmon, Snake River fall-run Chinook salmon, Snake River spring/summer-run Chinook salmon, UCR spring-run Chinook salmon, Upper Willamette River Chinook salmon, Columbia River chum salmon, Central California Coast coho salmon, Southern Oregon/Northern Coastal California coho salmon, California Central Valley steelhead, Central California Coast steelhead, LCR steelhead, MCR steelhead, Snake River Basin steelhead, South-Central California coast steelhead, Southern California steelhead, UCR steelhead, and Upper Willamette River steelhead, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is NMFS' Opinion that the registration of carbaryl and carbofuran, is likely to result in the destruction or adverse modification of critical habitat of these endangered and threatened species (Table 82).

It is NMFS' Opinion that the registration of carbaryl and carbofuran is not likely to result in the destruction or adverse modification of critical habitat of Ozette Lake sockeye salmon, Snake River sockeye salmon, Northern California steelhead, Columbia River chum salmon, Hood Canal summer-run chum salmon, and Oregon Coast coho salmon (Table 82).

Methomyl

After reviewing the current status of Central Valley spring-run Chinook salmon, LCR Chinook salmon, Puget Sound Chinook salmon, Sacramento River winter-run Chinook salmon, UCR spring-run Chinook salmon, Upper Willamette River Chinook salmon, Central California Coast

coho salmon, LCR coho salmon, Southern Oregon and Northern Coastal California coho salmon, California Central Valley steelhead, Central California Coast steelhead, LCR steelhead, MCR steelhead, Puget Sound steelhead, South Central California coast steelhead, Southern California steelhead, UCR steelhead, and Upper Willamette River steelhead, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is NMFS' Opinion that the registration of methomyl is likely to jeopardize the continued existence of these endangered or threatened species (Table 81).

It is NMFS' Opinion that the registration of methomyl is not likely to jeopardize the continued existence of California Coastal Chinook salmon, Snake River fall-run Chinook salmon, Snake River spring/summer-run Chinook salmon, Ozette Lake sockeye salmon, Snake River sockeye salmon, Northern California steelhead, Columbia River chum salmon, Hood Canal summer-run chum salmon, Oregon Coast coho salmon, and Snake River steelhead (Table 81).

After reviewing the current status of designated critical habitat for Central Valley spring-run Chinook salmon, LCR Chinook salmon, Puget Sound Chinook salmon, Sacramento River winter-run Chinook salmon, UCR spring-run Chinook salmon, Upper Willamette River Chinook salmon, Central California Coast coho salmon, LCR coho salmon, Southern Oregon and Northern Coastal California coho salmon, California Central Valley steelhead, Central California Coast steelhead, LCR steelhead, MCR steelhead, Puget Sound steelhead, South Central California coast steelhead, Southern California steelhead, UCR steelhead, and Upper Willamette River steelhead, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is NMFS' Opinion that the registration of methomyl is likely to result in the destruction or adverse modification of critical habitat of these endangered and threatened species (Table 82).

It is NMFS' Opinion that the registration of methomyl is not likely to result in the destruction or adverse modification of critical habitat of California Coastal Chinook salmon, Snake River fall-run Chinook salmon, Snake River spring/summer-run Chinook salmon, Ozette Lake sockeye salmon, Snake River sockeye salmon, Northern California steelhead, Columbia River chum

salmon, Hood Canal summer-run chum salmon, Oregon Coast coho salmon, and Snake River steelhead (Table 82).

Table 81. Jeopardy and Non-Jeopardy Determinations for Listed Species

Common Name *(Scientific Name)*	Distinct Population Segment or Evolutionarily Significant Unit	Carbaryl	Carbofuran	Methomyl
Chinook salmon *Oncorhynchus tshawytscha*	California Coastal	Jeopardy		Non-Jeopardy
	Central Valley Spring-run	Jeopardy		
	Lower Columbia River			
	Upper Columbia River Spring-run			
	Puget Sound			
	Sacramento River Winter-run			
	Snake River Fall-run	Jeopardy		Non-Jeopardy
	Snake River Spring/Summer-run			
	Upper Willamette River	Jeopardy		
Chum salmon *Oncorhynchus keta*	Columbia River	Non-Jeopardy		
	Hood Canal Summer-run			
Coho salmon *Oncorhynchus kisutch*	Lower Columbia River	Jeopardy		
	Oregon Coast	Non-Jeopardy		
	Southern Oregon & Northern California Coast	Jeopardy		
	Central California Coast			
Sockeye salmon *Oncorhynchus nerka*	Ozette Lake	Non-Jeopardy		
	Snake River			
Steelhead *Oncorhynchus mykiss*	Central California Coast	Jeopardy		
	California Central Valley			
	Lower Columbia River			
	Middle Columbia River			
	Northern California	Non-Jeopardy		
	Puget Sound	Jeopardy		
	Snake River	Jeopardy		Non-Jeopardy
	South-Central California Coast	Jeopardy		
	Southern California			
	Upper Columbia River			
	Upper Willamette River			

Table 82. Adverse Modification Determinations for Designated Critical Habitat of Listed Species

Common Name *(Scientific Name)*	Distinct Population Segment or Evolutionarily Significant Unit	Carbaryl	Carbofuran	Methomyl
Chinook salmon *Oncorhynchus tshawytscha*	California Coastal	Adverse Modification		No Adverse Modification
	Central Valley Spring-run	Adverse Modification		
	Lower Columbia River			
	Upper Columbia River Spring-run			
	Puget Sound			
	Sacramento River Winter-run			
	Snake River Fall-run	Adverse Modification		No Adverse Modification
	Snake River Spring/Summer-run			
	Upper Willamette River	Adverse Modification		
Chum salmon *Oncorhynchus keta*	Columbia River	No Adverse Modification		
	Hood Canal Summer-run			
Coho salmon *Oncorhynchus kisutch*	Lower Columbia River	No Designated Critical Habitat		
	Oregon Coast	No Adverse Modification		
	Southern Oregon & Northern California Coast	Adverse Modification		
	Central California Coast			
Sockeye salmon *Oncorhynchus nerka*	Ozette Lake	No Adverse Modification		
	Snake River			
Steelhead *Oncorhynchus mykiss*	Central California Coast	Adverse Modification		
	California Central Valley			
	Lower Columbia River			
	Middle Columbia River			
	Northern California	No Adverse Modification		
	Puget Sound	No Designated Critical Habitat		
	Snake River	Adverse Modification		No Adverse Modification
	South-Central California Coast	Adverse Modification		
	Southern California			
	Upper Columbia River			
	Upper Willamette River			

Reasonable and Prudent Alternatives

This Opinion has concluded that EPA's proposed registration of pesticides containing carbaryl and carbofuran is likely to jeopardize the continued existence of 22 endangered and threatened Pacific salmonids and is likely to destroy or adversely modify designated critical habitat for 20 threatened and endangered salmonids. The Opinion further concluded that EPA's proposed registration of pesticides containing methomyl is likely to jeopardize the continued existence of 18 endangered and threatened Pacific salmonids and is likely to destroy or adversely modify designated critical habitat for 16 threatened and endangered salmonids. "Jeopardize the continued existence of" means "to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species" (50 CFR §402.02).

Regulations (50 CFR §402.02) implementing section 7 of the ESA define reasonable and prudent alternatives as alternative actions, identified during formal consultation, that: (1) can be implemented in a manner consistent with the intended purpose of the action; (2) can be implemented consistent with the scope of the action agency's legal authority and jurisdiction; (3) are economically and technologically feasible; and (4) NMFS believes would avoid the likelihood of jeopardizing the continued existence of listed species or resulting in the destruction or adverse modification of critical habitat.

NMFS reached this conclusion because measured and predicted concentrations of the three a.i.s in salmonid habitats, particularly in off-channel habitats[5], are likely to cause adverse effects to listed Pacific salmonids including significant reductions in growth and survival. For carbaryl and carbofuran, 22 ESUs/DPSs of listed Pacific salmonids are likely to suffer reductions in

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[5] Off-channel habitat – water bodies and/or inundated areas that are connected (accessible to salmonid juveniles) seasonally or annually to the main channel of a stream including but not limited to features such as side channels, alcoves, ox bows, ditches, and floodplains.

Main channel –the stream channel that includes the thalweg (longitudinal continuous deepest portion of the channel.

viability given the severity of expected changes in abundance and productivity associated with the proposed action. Similarly for methomyl, 18 ESUs/DPSs of listed Pacific salmonids are likely to suffer reductions in viability. These adverse effects are expected to appreciably reduce the likelihood of both the survival and recovery of these listed Pacific salmonids. EPA's proposed registration of carbaryl and carbofuran is also likely to result in the destruction or adverse modification of critical habitat for 20 affected ESUs/DPSs because of adverse effects on salmonid prey and water quality in freshwater rearing, spawning, and foraging areas. EPA's proposed registration of methomyl is also likely to result in the destruction or adverse modification of critical habitat for 16 affected ESUs/DPSs because of adverse effects on salmonid prey and water quality in freshwater rearing, spawning, and foraging areas.

The Reasonable and Prudent Alternative (RPA) accounts for the following issues: (1) the action will result in exposure to other chemical stressors in addition to the a.i. that may increase the risk of the action to listed species, including unspecified inert ingredients, adjuvants, and tank mixes; (2) exposure to chemical mixtures containing carbaryl, carbofuran, and methomyl and other cholinesterase-inhibiting compounds result in additive and synergistic responses; and (3) exposure to other chemicals and physical stressors (*e.g.,* pH and temperature) in the baseline habitat will likely intensify response to carbaryl, carbofuran, and methomyl.

The action as implemented under the RPA will remove the likelihood of jeopardy and of destruction or adverse modification of critical habitat. In the proposed RPA, NMFS does not attempt to ensure there is no take of listed species. NMFS believes take will occur, and has provided an incidental take statement exempting that take from the take prohibitions, so long as the action is conducted according to the RPA and reasonable and prudent measures (RPM). Avoiding take altogether would most likely entail canceling registration, or prohibiting use in watersheds inhabited by salmonids. NMFS recognizes that carbofuran's registration is currently in the process of being cancelled. However, NMFS is uncertain when and if cancellation will occur. Furthermore, existing stocks under older labels would remain and are currently allowed to be applied. The RPA and RPMs therefore apply to carbofuran as well. The goal of the RPA is to reduce exposure to ensure that the action is not likely to jeopardize listed species or destroy or adversely modify critical habitat.

The RPA is comprised of six required elements that must be implemented in its entirety within one year of the receipt of EPA's Opinion to ensure the proposed registration of these pesticides is not likely to jeopardize endangered or threatened Pacific salmonids under the jurisdiction of NMFS or destroy or adversely modify critical habitat that has been designated for these species. All elements of the RPA apply only to those ESUs/DPSs where there is jeopardy or the destruction or adverse modification of critical habitat. These elements rely upon recognized practices for reducing drift and runoff of pesticide products into aquatic habitats.

Specific Elements of the Reasonable and Prudent Alternative

Elements 1-4 shall be specified on FIFRA labels of all pesticide products containing carbaryl, carbofuran, and methomyl used in California, Idaho, Oregon, and Washington. Alternatively, the label could direct pesticide users to the EPA's Endangered Species Protection Program (ESPP) bulletins that specify elements 1-4. For purposes of this RPA salmonid habitats are defined as freshwaters, estuarine habitats, and nearshore marine habitats including bays within the ESU/DPS ranges including migratory corridors. The freshwater habitats include intermittent streams and other temporally connected habitats to salmonid-bearing waters. Freshwater habitats also include all known types of off-channel habitats as well as drainages, ditches, and other man-made conveyances to salmonid habitats that lack salmonid exclusion devices (*e.g.*, screens).

Element 1.

Do not apply pesticide products[6] within specified buffers of salmonid habitats (Table 83). Buffers only apply to those salmonid habitats where NMFS concluded jeopardy or the destruction or adverse modification of designated critical habitat for listed Pacific salmonids. Buffers also only apply when water exists in the stream or habitat and shall be measured from the water's edge of salmonid habitat, including off-channel habitat, to the point of deposition (below spray nozzle).

Pesticide buffers are recognized tools to reduce pesticide loading into aquatic habitats from drift. EPA, USFWS, NMFS, courts, and state agencies routinely enlist buffers as pesticide load

[6] Use of the term "pesticide products" in the Reasonable and Prudent Alternative section of the Opinion refers to pesticide products containing carbaryl, carbofuran, and methomyl.

reduction measures. EPA requires the use of buffers on end-use product labels for ground and/or aerial applications for some products that pose risk to aquatic systems. For example, many methomyl containing end-use products have mandated buffers of 25, 100, and 450 ft for ground, aerial, and Ultra Low Volume applications, respectively. CDPR has pesticide use limitations of 120 and 600 ft buffers for carbaryl, carbofuran, and methomyl-containing pesticides when the wind is blowing toward sensitive areas. On June 14, 1989, USFWS issued a Biological Opinion for 165 listed species and 112 pesticide a.i.s. Prescribed buffers under species-specific RPAs ranged from 60 ft (ground applications) to one half mile (aerial applications). Many of EPA's historical county bulletins for endangered species referenced a 60 ft buffer for ground applications and a 300 ft buffer for aerial spraying. One court decision prescribed mandatory 60 ft (ground) and 300 ft (aerial) buffers for applications within the ranges of ESA-listed Pacific salmonids. NMFS has prescribed a range of buffers in ESA consultations for herbicide and insecticide application actions by agencies such as the U.S. Forest Service and Bureau of Land Management overlapping with ESA-listed salmonid habitats. Herbicide buffers ranged from 0 ft to 500 ft depending on application type, rate, and frequency. Insecticide buffers ranged from 0 ft to 200 ft depending on application type, rate, and frequency.

NMFS generated estimated environmental concentrations for the three *N*-methyl carbamates for off-channel habitats using the AgDrift model (set to EPA Tier 1 simulation defaults). NMFS generated values for a range of buffer sizes in 100 ft increments for ground applications (0 – 1,000 ft), and aerial applications (0 – 1,000 ft). The dimensions of the off-channel habitat modeled were 32.8 ft (10 m) wide and 0.328 ft (0.1 m) deep. Key model assumptions include:

- Drift as the only pathway of exposure;
- A single application of each a.i.; and
- The estimates represent instantaneous average concentrations across the entire habitat modeled.

Table 83. Mandatory pesticide no application buffers for ground and aerial applications

Rate	Carbaryl	Carbofuran	Methomyl
lbs/ acre	No Application Buffer (ft)		
Ground Applications			
0 -1	200	200	50
≥1-3	300	300	NA
≥3-5	400	400	NA
≥5-10	500	500	NA
≥10	600	600	NA
Aerial Applications			
All rates	1000	1000	600

NA – Not Applicable. Methomyl has no current registrations permitting maximum applications ≥ 1 lb ai/A

The estimated concentrations decline as buffer size increases **(**Table 84**).** We note the disparity between the concentrations predicted by the two models. For example, at 100 ft. the predicted concentrations are 4.4 µg/L from a ground application and 92.9 µg/L from an aerial application. The two results are not directly comparable because the models use different methods to predict amount of drift.

Table 84. Estimated environmental concentrations of carbaryl, carbofuran, and methomyl applied at the rate of 1 lb per acre for ground and aerial applications.

Ground application, low boom, ASAE very fine-fine droplet distribution, 50th percentile estimates EPA Tier 1 simulations	
Buffer (ft)	Off-Channel (10 m * 0.1 m) (µg/L)
0	76.427
10	20.168
100	4.406
200	2.568
300	1.813
400	1.392
500	1.122
600	0.933
700	0.794
800	0.688
900	0.604
997	0.583
Aerial application, fine-medium droplet distribution. EPA Tier 1 simulation	
Buffer (ft)	Off-Channel (10 m * 0.1 m) (µg/L)
0	333.566
10	260.482
100	92.888
200	48.985
300	33.096
400	25.289
500	20.902
600	18.010
700	16.035
800	14.692
900	13.719
997	12.983

Based on the population growth modeling exercises, a four-day exposure to expected concentrations of carbaryl, carbofuran, and methomyl will substantially reduce a population's growth rate due to prey base reduction. All four life history types modeled demonstrated this effect. As exposure duration and application rate increases, we expect more pronounced effects on salmonid prey abundance and recovery timing leading to further reduced salmonid growth. We expect that some juvenile salmonids are likely to experience reductions in growth. However, the prescribed buffers are intended to avoid population-level effects. We also expect that prey

items will die from these exposures. The likelihood of impacting salmonid prey availability, an identified PCE, is substantially reduced by these buffers.

The majority of buffers described earlier are smaller than the buffers prescribed in this element. Concentrations expected with smaller buffers would lead to a greater probability of affecting populations and PCEs especially in habitats that are compromised from a variety of stressors (described in the *Environmental Baseline* section).

The scenario we modeled with AgDrift in this RPA element is expected to occur when all of the modeled variables are present *e.g.*, specific wind speed, wind direction, release height, size of off-channel habitat, droplet size distribution, etc. The input variables are relevant to field conditions and the frequency of this exact scenario occurring remains unknown. We selected this scenario to represent off-channel habitats used by a sensitive salmonid life stage *i.e.*, juveniles. NMFS believes that these buffers will remove a substantial portion of risk attributed to pesticide drift.

Element 2. Do not apply when wind speeds are greater than or equal to 10 mph as measured using an anemometer immediately prior to application. Because wind conditions may change during application of pesticide products, commence applications on the side nearest the aquatic habitat and proceed away from the aquatic habitat.

Element 3. For all uses do not apply pesticide products when soil moisture is at field capacity, or when a storm event likely to produce runoff from the treated area is forecasted by NOAA/NWS (National Weather Service), to occur within 48 h following application.

Element 4. Report all incidents of fish mortality that occur within four days of application and within the vicinity of the treatment area to EPA OPP (703-305-7695).

Element 5. In addition to the labeling requirements above, EPA shall develop and implement a NMFS-approved effectiveness monitoring plan for off-channel habitats with annual reports. The plan shall identify representative off-channel habitats within agricultural areas prone to drift and

runoff of pesticides. The number and locations of off-channel habitat sampling sites shall include currently used off-channel habitats by threatened and endangered Pacific salmonids identified by NMFS biologists and will include at least two sites for each general species (ESU or DPS; *i.e.,* coho salmon, chum salmon, steelhead, sockeye salmon, and ocean-type Chinook and stream-type Chinook salmon). The plan shall collect daily surface water samples targeting at least three periods during the application season for seven days. Collected water samples will be analyzed for current-use OPs and carbamates following USGS schedule for analytical chemistry. The report shall be submitted to NMFS OPR and will summarize annual monitoring data and provide all raw data.

*Element 6***.** This element is specific to Washington State's 24(c) for carbaryl applications on estuarine mudflats. As this use is specific for application on mudflats within estuaries, elements 1, 3, and 4 are not applicable for this use. Elements 2 and 5 are required. A monitoring program approved by NMFS OPR shall be established in Willapa Bay and Grays Harbor to determine the presence, AChE activity, and genetic source populations of captured juvenile salmonids. For example, a monitoring program shall be implemented to determine salmonid health at five locations using beach seines with the first incoming tide after carbaryl application. Additionally, fyke nets placed in five channels proximate to sprayed mudflats shall be used to determine and health at first outgoing tide after carbaryl application. All dead or dying salmonids, if any, shall be collected and genetically analyzed to determine source population origin. Additionally, muscle and brain AChE activity shall be measured in collected dead or dying salmonids. A subset of the live salmonids captured in seines and nets shall be genetically analyzed to determine source population origin. Annual reports shall be submitted to NMFS and include the raw data and summaries of the raw data including number of fish caught, species of salmonids, genetic analysis results, AChE activity results of brain and muscle samples, and number of dead or dying salmonids collected. The sampling effort shall be conducted annually as long as carbaryl is allowed for use in Willapa Bay and Grays Harbor.

Although NMFS has concluded that EPA's action for carbaryl and carbofuran is likely to jeopardize 22 listed ESUs/DPSs and destroy or adversely modify 20 designated critical habitats during the 15-year duration of the proposed action, NMFS does not believe that the effects of the

action will attain this level in the year between issuance of this Opinion and EPA's implementation of the RPA. NMFS has further concluded that EPA's action for methomyl is likely to jeopardize 18 listed ESUs/DPSs and destroy or adversely modify designated critical habitats for 16 listed species during the 15-year duration of the proposed action. As with carbaryl and carbofuran, NMFS does not believe that the effects of the action for methomyl will attain this level in the year between issuance of this Opinion and EPA's implementation of the RPA. Products containing these three a.i.s have been in use for some time. NMFS believes that these products have contributed to ESU/DPS declines, but not to the extent that one year of additional use as now authorized would lead to likely jeopardy or adverse modification.

Based on the above conclusions on the effects of EPA's proposed registration of pesticide products containing carbaryl, carbofuran, and methomyl, the EPA is required to notify NMFS OPR of its final decision on implementation of the RPA.

Incidental Take Statement

Section 9 of the ESA and federal regulation pursuant to section 4(d) of the ESA prohibits the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by NMFS to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the ESA provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

Amount or Extent of Take Anticipated

As described earlier in this Opinion, this is a consultation on the EPA's registration of pesticide products containing carbaryl, carbofuran, and methomyl, and their formulations as they are used

in the Pacific Northwest and California and the impacts of these applications on listed ESUs/DPSs of Pacific salmonids. The EPA authorizes use of these pesticide products for pest control purposes across multiple landscapes. The goal of this Opinion is to evaluate the impacts to NMFS' listed resources from the EPA's broad authorization of applied pesticide products. This Opinion is a partial consultation because pursuant to the court's order, EPA sought consultation on only 26 listed Pacific salmonids under NMFS' jurisdiction. However, even though the court's order did not address the two more recently listed ESUs and DPSs, NMFS analyzed the impacts of EPA's actions to them because they belong to the same taxon and the analysis requires consideration of the same information. Consultation with NMFS will be completed when EPA makes effect determinations on all remaining species under NMFS' jurisdiction and consults with NMFS as necessary.

For this Opinion, NMFS anticipates the general direct and indirect effects that would occur from EPA's registration of pesticide products across the states of California, Idaho, Oregon, and Washington to 28 listed Pacific salmonids under NMFS' jurisdiction during the 15-year duration of the proposed action. Recent and historical surveys indicate that listed salmonids occur in the action area, in places where they will be exposed to the stressors of the action. The RPAs are designed to reduce this exposure but not eliminate it. Pesticide runoff and drift of carbaryl, carbofuran, and methomyl are most likely to reach streams and other aquatic sites when they are applied to crops and other land use settings located adjacent to wetlands, riparian areas, ditches, off-channel habitats, and intermittent streams. These inputs into aquatic habitats are especially high when rainfall immediately follows applications. The effects of pesticides and other contaminants found in urban runoff especially from areas with a high degree of impervious surfaces may also exacerbate degraded water quality conditions of receiving waters used by salmon. Urban runoff is also generally warmer in temperature and elevated water temperature pose negative effects on certain life history phases for salmon, increasing susceptibility to chemical stressors. The range of effects of the three a.i.s on salmonids include reductions in growth, prey capture, and swimming ability, impaired olfaction affecting homing and reproductive behaviors, and increased susceptibility to predation and disease. Thus, we expect some exposed fish will respond to these effects by changing normal behaviors. In some cases, fish may die, be injured, or suffer sublethal effects. These results are not the purpose of the

proposed action. Therefore, incidental take of listed salmonids is reasonably certain to occur over the 15-year duration of the proposed action.

Given the variability of real-life conditions, the broad nature and scope of the proposed action, and the migratory nature of salmon, the best scientific and commercial data available are not sufficient to enable NMFS to estimate a specific amount of incidental take associated with the proposed action. As explained in the *Description of the Proposed Action* and the *Effects of the Proposed Action* sections, NMFS identified multiple uncertainties associated with the proposed action. Areas of uncertainty include:

1. Incomplete information on the proposed action (*i.e.,* no master label summarizing all authorized uses of pesticide products containing carbaryl, carbofuran, and methomyl);
2. Limited use and exposure data on stressors of the action for non-agricultural uses of these pesticides;
3. Minimal information on exposure and toxicity for pesticide formulations, adjuvants, and other/inert ingredients within registered formulations;
4. No information on permitted tank mixtures and associated exposure estimates;
5. Limited data on toxicity of environmental mixtures;
6. No known method to predict synergistic responses from exposure to combinations of the three a.i.s;
7. Annual variable conditions regarding land use, crop cover, and pest pressure;
8. Variable temporal and spatial conditions within each ESU, especially at the population-level; and
9. Variable conditions of water bodies in which salmonids live.

NMFS therefore identifies as a surrogate for the allowable extent of take the ability of this action to proceed without any fish kills attributed to the use of carbaryl, carbofuran, or methomyl or any compounds, degradates, or mixtures in aquatic habitats containing individuals from any ESU/DPS. Because of the difficulty of detecting salmonid deaths, the fishes killed are not to be listed salmonids. Salmonids appear to be more sensitive to these compounds, so that if there are kills of other freshwater fishes attributed to use of these pesticides, it is likely that salmonids have also died, even if no dead salmonids can be located. In addition, if stream conditions due to pesticide use kill less sensitive fishes in certain areas, the potential for lethal and non-lethal takes in downstream areas increases. A fish kill is considered attributable to one of these three ingredients, its metabolites, or degradates, if measured concentrations in surface waters are at

levels expected to kill fish, if AChE measurements were taken of the fish carcass and correlate to fish death, if pesticides were applied in the general area, and if pesticide drift or runoff was witnessed or apparent.

NMFS notes that with increased monitoring and study of the impact of these pesticides on water quality, particularly water quality in off-channel habitats, NMFS will be able to refine this incidental take statement, and future incidental take statements, to allow other measures of the extent of take.

Reasonable and Prudent Measures

The measures described below are non-discretionary, and must be undertaken by the EPA so that they become binding conditions of any grant or permit issued to the applicant(s), as appropriate, for the exemption in section 7(o)(2) to apply. The EPA has a continuing duty to regulate the activity covered by this incidental take statement. If the EPA (1) fails to assume and implement the terms and conditions or (2) fails to require the applicant(s) to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the EPA must report the progress of the action and its impact on the species to NMFS OPR as specified in the incidental take statement. [50 CFR§402.14(i)(3)].

To satisfy its obligations pursuant to section 7(a)(2) of the ESA, the EPA must monitor (a) the direct, indirect, and cumulative impacts of its long-term registration of pesticide products containing carbaryl, carbofuran, and methomyl; (b) evaluate the direct, indirect, or cumulative impacts of pesticide misapplications in the aquatic habitats in which they occur; and (c) the consequences of those effects on listed Pacific salmonids under NMFS' jurisdiction. The purpose of the monitoring program is for the EPA to use the results of the monitoring data and modify the registration process in order to reduce exposure and minimize the effect of exposure where pesticides will occur in salmonid habitat.

The EPA shall:

1. Minimize the amount and extent of incidental take from use of pesticide products containing carbaryl, carbofuran, and methomyl by reducing the potential of chemicals reaching the water;
2. Monitor any incidental take or surrogate measure of take that occurs from the action; and
3. Report annually to NMFS OPR on the monitoring results from the previous season.

Terms and Conditions

To be exempt from the prohibitions of section 9 of the ESA, within one year following the date of issuance of this Opinion, the EPA must comply with the following terms and conditions. These terms and conditions implement the reasonable and prudent measure described above. These terms and conditions are non-discretionary.

1. a. EPA shall include the following instructions requiring reporting of fish kills either on the labels for all products containing carbaryl, carbofuran, and methomyl or in ESPP Bulletins:

   NOTICE: Incidents where salmon appear injured or killed as a result of pesticide applications shall be reported to NMFS OPR at 301-713-1401 and EPA at 703-305-7695. The finder should leave the fish alone, make note of any circumstances likely causing the death or injury, location and number of fish involved, and take photographs, if possible. Adult fish should generally not be disturbed unless circumstances arise where an adult fish is obviously injured or killed by pesticide exposure, or some unnatural cause. The finder may be asked to carry out instructions provided by NMFS OPR to collect specimens or take other measures to ensure that evidence intrinsic to the specimen is preserved.

   b. EPA shall report to NMFS OPR any incidences regarding carbaryl, carborfuran, or methomyl effects on aquatic ecosystems added to its incident database that it has classified as probable or highly probable.

   c. Do not apply pesticide products when wind speeds are greater than or equal to 10 mph as measured using an anemometer immediately prior to application. When applying pesticide products, commence applications on the side nearest the aquatic habitat and proceed away from the aquatic habitat.

2. For all uses do not apply pesticide products when soil moisture is at field capacity, or when a storm event likely to produce runoff from the treated area is forecasted by NOAA/NWS (National Weather Service), to occur within 48 h following application.

Conservation Recommendations

Section 7(a) (1) of the ESA directs federal agencies to use their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information.

The following conservation recommendations would provide information for future consultations involving future authorizations of pesticide a.i.s that may affect listed species:

1. Conduct mixture toxicity analysis in screening-level and endangered species biological evaluations;
2. Develop models to estimate pesticide concentrations in off-channel habitats; and
3. Develop models to estimate pesticide concentrations in aquatic habitats associated with non-agricultural applications, particularly in residential and industrial environments.

In order for NMFS to be kept informed of actions minimizing or avoiding adverse effects or benefiting listed species or their habitats, the EPA should notify NMFS OPR of any conservation recommendations it implements in the final action.

Reinitiation Notice

This concludes formal consultation on the EPA's proposed registration of pesticide products containing carbaryl, carbofuran, and methomyl and their formulations to ESA-listed Pacific salmonids under the jurisdiction of the NMFS. As provided in 50 CFR 402.16, reinitiation of formal consultation is required where discretionary federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the extent of take specified in the *Incidental Take Statement* is exceeded; (2) new information reveals effects of this action that may affect listed species or designated critical habitat in a manner or to an extent not previously considered in this biological opinion; (3) the identified action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in this Opinion; or (4) a new species is listed or critical habitat designated that may be affected by the identified action. If reinitiation of consultation appears warranted due to one or more of the above circumstances, EPA must contact NMFS OPR. If none of these reinitiation triggers are

met within the next 15 years, then reinitiation will be required because the Opinion only covers the action for 15 years.

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Appendix 1: Population Modeling

Introduction

To assess the potential for adverse impacts of the anticholinesterase insecticides on Pacific salmon populations, a model was developed that explicitly links impairments in the biochemistry, behavior, prey availability and somatic growth of individual salmon to the productivity of salmon populations. More specifically, the model connects known effects of the pesticides on salmon physiology and behavior with community-level effects on salmon prey to estimate population-level effects on salmon. The model used here is an extension of one developed for investigating the direct effects of pesticides on the biochemistry, behavior, and growth of ocean-type Chinook salmon (Baldwin et al., in press).

In the freshwater portion of their life, Pacific salmon may be exposed to insecticides that act by inhibiting acetylcholinesterase (AChE). AChEe is a crucial enzyme in the proper functioning of cholinergic synapses in the central and peripheral nervous systems of vertebrates and invertebrates. Of consequence to salmon, anticholinesterase insecticides have been shown to interfere with salmon swimming behavior (Beauvais et al. 2000, Brewer et al. 2001, Sandahl et al. 2005), feeding behavior (Sandahl et al. 2005), foraging behavior (Morgan and Kiceniuk 1990), homing behavior (Scholz et al. 2000), anti-predator behaviors (Scholz et al. 2000), and reproductive physiology (Moore and Waring 1996, Waring and Moore 1997, Scholz et al. 2000).

Anticholinesterase insecticides have also been found to reduce benthic densities of aquatic invertebrates and alter the composition of aquatic communities (Liess and Schulz 1999, Schulz and Liess 1999, Schulz et al. 2002, Fleeger et al. 2003, Schulz 2004, Chang et al. 2005, Relyea 2005). Spray drift and runoff from agricultural and urban areas can expose aquatic invertebrates to relatively low concentrations of insecticides for as little as minutes or hours, but populations of many taxa can take months or even years to recover to pre-exposure or reference densities (Wallace et al. 1991, Liess and Schulz 1999, Anderson et al. 2003, Stark et al. 2004). For example, when an aquatic macroinvertebrate community in a German stream was exposed to runoff containing parathion (an AChE inhibitor) and fenvalerate (another commonly used insecticide), eight of eleven abundant species disappeared and the remaining three were reduced in abundance (Liess and Schulz 1999). Long-term changes in invertebrate densities and community composition likely result in reductions in salmon prey availability. Therefore, in

addition to the direct impacts that AChE inhibitors have on salmon, there may also be, independently, significant indirect effects to salmon via their prey (Peterson et al. 2001a). Wild juvenile salmon feed primarily on invertebrates in the water column and those trapped on the water's surface, actively selecting the largest items available (Healey 1991, Quinn 2005). Salmon are often found to be food limited (Quinn 2005), suggesting that a reduction in prey number or size due to insecticide exposure may further stress salmon. For example, Davies and Cook (1993) found that several months following a spray drift event, benthic and drift densities were still reduced in exposed stream reaches. Consequently, brown trout in the exposed reaches fed less and grew at a slower rate compared to those in unexposed stream reaches (Davies and Cook 1993). Although the insecticide in their study was cypermethrin (a pyrethroid), similar reductions in macroinvertebrate density and recovery times have been found in studies with AChE inhibitors (Liess and Schulz 1999, Schulz et al. 2002), suggesting indirect effects to salmon via prey availability may be similar.

One likely biological consequence of reduced swimming, feeding, foraging, and prey availability is a reduction in food uptake and, subsequently, a reduction in somatic growth of exposed fish. Juvenile growth is a critical determinant of freshwater and marine survival for Chinook salmon (Higgs et al. 1995). Reductions in the somatic growth rate of salmon fry and smolts are believed to result in increased size-dependent mortality (Healey 1982, West and Larkin 1987, Zabel and Achord 2004). Zabel and Achord (2004) observed size-dependent survival for juvenile salmon during the freshwater phase of their outmigration. Mortality is also higher among smaller and slower growing salmon because they are more susceptible to predation during their first winter (Healey 1982, Holtby et al. 1990, Beamish and Mahnken 2001). These studies suggest that factors affecting the organism and reducing somatic growth, such as anticholinesterase insecticide exposure, could result in decreased first-year survival and, thus, reduce population productivity.

Changes to the size of juvenile salmon from exposure to carbaryl, carbofuran, and methomyl were linked to salmon population demographics. We used size-dependent survival of juveniles during a period of their first year of life. We did this by constructing and analyzing general life history matrix models for coho salmon (*Oncorhynchus kisutch*), sockeye salmon (*O. nerka*), and

ocean-type and stream-type Chinook salmon (*O. tshawytscha*). A steelhead (*O. mykiss*) life history model was not constructed due to the lack of demographic information relating to the proportions of resident and anadromous individuals, the freshwater residence time of steelhead, and rates of repeated spawning. The basic salmonid life history modeled consisted of hatching and rearing in freshwater, smoltification in estuaries, migration to the ocean, maturation at sea, and returning to the natal freshwater stream for spawning followed shortly by death. Differences between the modeled strategies are lifespan of the female, time to reproductive maturity, and the number and relative contribution of the reproductive age classes (Figure 1). The coho females we modeled reach reproductive maturity at age 3 and provide all of the reproductive contribution. Sockeye females reach maturity at age 4 or 5, but the majority of reproductive contributions are provided by age 4 females. Chinook salmon females can mature at age 3, 4, or 5, with the majority of the reproductive contribution from ages 4 and 5. The primary difference between the ocean-type and stream-type Chinook salmon is the juvenile freshwater residence with ocean-type juveniles migrating to the ocean as sub-yearlings and stream-type overwintering in freshwater and migrating to the ocean as yearlings. The models depicted general populations representing each life history strategy and were constructed based upon literature data described below. Specific populations were not modeled due to the difficulty in finding sufficient demographic and reproductive data for a single population.

A separate acute toxicity model was constructed that estimated the population-level impacts of juvenile mortality resulting from exposure to lethal concentrations of carbaryl, carbofuran, and methomyl. These models excluded sublethal and indirect effects of the pesticide exposures and focused on the population-level outcomes resulting from an annual exposure of juveniles to a pesticide. The lethal impact was implemented as a change in first year survival for each of the salmon life history strategies.

The overall model endpoint used to assess population-level impacts for both the growth and acute lethality models was the percent change in the intrinsic population growth rate (lambda, λ) resulting from the pesticide exposure. Change in λ is an accepted population parameter often used in evaluating population productivity, status, and viability. The National Marine Fisheries Service uses changes in λ when estimating the status of species, conducting risk and viability

assessments, developing endangered species recovery plans, composing biological opinions, and communicating with other federal, state and local agencies (McClure et al. 2003). While values of $\lambda<1.0$ indicate a declining population, negative changes in lambda greater than the natural variability for the population indicate a loss of productivity. This can be a cause for concern since the decline could make a population more susceptible to dropping below 1.0 due to impacts from multiple stressors.

The following models were developed to serve as a means to assess the potential effects on ESA-listed salmon populations from exposure to AChE inhibiting pesticides, including *N*-methyl carbamates and organophosphorus insecticides. The growth model focuses on the impacts to prey abundance and a salmon's ability to feed which are integrated into reductions in juvenile growth. Assessing the results from different pesticide exposure scenarios relative to a control (*i.e.*, unexposed) scenario can indicate the potential for sublethal pesticide exposures to lead to changes in the somatic growth and survival of individual sub-yearling salmon. Consequently, subsequent changes in salmon population dynamics as indicated by percent change in a population's intrinsic rate of increase assists us in forecasting the potential population-level impacts to listed populations. Also, the model helps us understand the potential influence of life history strategies that might explain differential results within the species modeled.

Methods

The model consists of two parts, an organismal portion and a population portion. The organismal portion of the model links AChE inhibition and reduced prey abundance from insecticide exposure to potential reductions in the growth of individual fish. The population portion of the model links the sizes of individual sub-yearling salmon to their survival and the subsequent growth of the population. Models were constructed using MATLAB 7.7.0 (R2008b) (The MathWorks, Inc. Natick, MA).

Organismal Model

For the organismal model a relationship between AChE activity and somatic growth of salmonid fingerlings was developed using a series of relationships between pesticide exposure, AChE activity, feeding behavior, food uptake, and somatic growth rate (Figures 2-4). The model

incorporates empirical data when available. Since growth and toxicity data are limited, extrapolation from one salmon species to the others was done with the assumption that the salmon stocks would exhibit similar physiological and toxicological responses. Sigmoidal dose-response relationships based upon the AChE inhibition EC50 values and their slopes are used to determine the level of AChE activity (Figure 2A, 2B, 2C) from the exposure concentration of each pesticide exposure or pulse.

A linear relationship based on empirical data related AChE activity to feeding behavior (Sandahl et al. 2005, Figure 2D). Feeding behavior was then assumed to be directly proportional to food uptake, defined as potential ration (Figure 2E). The potential ration expresses the amount of food the organism can consume when prey abundance is not limiting. Potential ration over time (Figure 2F) depicts how the food intake of individual fish changes in response to the behavioral effects of the pesticide exposure over the modeled growth period. Potential ration is equal to final ration if no effects on prey abundance are incorporated (Figure 4). If effects of pesticide exposure on prey abundance are incorporated, final ration is the product of potential ration (relating to the fish's ability to capture prey, Figure 2) and the relative abundance of prey available following exposure (Figure 3). Next, additional empirical data (*e.g.*, Weatherley and Gill 1995) defined the relationship between final ration and somatic growth rate (Figure 4C). While the empirical relationship is more complex (*e.g.*, somatic growth rate plateaus at rations above maximum feeding), a linear model was considered sufficient for the overall purpose of this model. Finally, the model combines these linear models relating AChE activity to feeding behavior, feeding behavior to potential ration, and final ration to somatic growth rate to produce a linear relationship between AChE activity and somatic growth rate (Figure 4D). One important assumption of the model is that the relationships are stable, *i.e.*, do not change with time. The relationships would need to be modified to incorporate time as a variable if, for example, fish are shown to compensate over time for reduced AChE activity to improve their feeding behavior and increase food uptake.

Juvenile salmonids are largely opportunistic, feeding on a diverse community of aquatic and terrestrial invertebrate taxa that are entrained in the water column or on the surface (Higgs et al. 1995). As a group, these invertebrates are among the more sensitive taxa for which there is

toxicity data, but within this group, there is a wide range of sensitivities. To determine a single effect concentration to use in the model analyses, a search was completed using the EPA's Ecotox database for each pesticide (http://cfpub.epa.gov/ecotox/). Several criteria were used to determine which reported effect concentrations were included in the final analysis. The data included were from studies on taxa that are known to be salmonid prey (or are functionally similar to salmonid prey); these include a diverse group of fresh and saltwater crustaceans, aquatic insects and worms. Studies with exposures of at least 24 hours (h) and not more than 96 h were included. Studies examining shorter and longer exposure times are known to affect invertebrates (*e.g.*, Peterson et al. 2001b), but these were excluded so that estimated EC50s would be comparable to previous analyses (NMFS 2008). Studies reporting invertebrate LC50s and EC50s in which mortality or immobilization of invertebrates was the recorded endpoint were included; the term "EC50" will be used in this report to describe all of these included data. Data derived for sublethal endpoints (*e.g.*, growth or reproduction) were not included. If specific data were represented more than once in the Ecotox output, duplicates were eliminated. Data from several recent peer-reviewed studies that are not yet included in the Ecotox data base, but report effect concentrations that caused mortality, were also included.

From the distributions of those data, a single effect concentration and slope were derived to best represent the diverse community of prey available in juvenile salmonid freshwater and estuarine habitats. The distributions of individual invertebrate EC50s and the geometric means of EC50s by taxa were analyzed to estimate the 50th, 10th, and 5th percentiles. Figure 43shows the distribution of geometric means of EC50s by taxa for the 10th percentile and Table 79shows the concentrations for the percentiles. Specifically, for each pesticide, a probability plot was used to graph the EC50 concentrations normalized to a normal probability distribution. For each plot, the X axis is scaled in probability (between zero and 100%) and shows the percentage of entire data whose value is less than the data point. The Y axis displays the range of the data on a log scale. The results of a linear regression of the log-transformed concentrations are shown and highlight the lognormal distribution of the data (Figure 43). In the regression equation, the normsinv() function returns the inverse of the standard normal cumulative distribution. The standard normal distribution has a mean of zero and a standard deviation of one. For example,

given a percentile value of 50 (*i.e.*, a probability of 0.5), normsinv(50) returns a value of zero. The plots and regressions were performed using KaleidaGraph 4.03 (Synergy Software).

The decision to use the 10th percentile rather than the 50th percentile is consistent with previous designations by EPA, and is reasonable because of the relative sensitivity of invertebrates that are most likely consumed by juveniles. In addition, the 10th percentile is a reasonable threshold because the data included in the meta-analysis were limited to concentrations that caused mortality or immobilization within a short period of time (1-4 days). A growing number of studies on a variety of insecticides have reported that concentrations well below LC50s can cause delayed mortality or sublethal effects that may scale up to affect populations, especially in scenarios with multiple exposures and/or other stressors. Evidence for ecologically significant sublethal or delayed effects includes reduced growth rates (Schulz and Liess 2001b, Forbes and Cold 2005), altered behavior (Johnson et al. 2008), reduced emergence (Schulz and Liess 2001a), reduced reproduction (Cold and Forbes 2004, Sakamoto et al. 2006), and reduced predator defenses (Sakamoto et al. 2006, Johnson et al. 2008). Finally, the available toxicity data – and therefore the data included for these analyzes – are from studies using taxa hearty enough to survive laboratory conditions. Studies specifically examining salmonid prey that are more difficult to rear in the laboratory have documented relatively low LC50 or EC50 values when exposed to current-use pesticides (*e.g.*, Peterson et al. 2001a, Johnson et al. 2008). It is noteworthy that the most relevant invertebrate study for carbaryl – a study using a diverse group of seven salmonid prey taxa collected from streams in the Pacific Northwest – reports LC50s for carbaryl with a geometric mean of 26.28 µg/L (range 11.1 – 61.0) (Peterson et al. 2001a).

The models allow exposures that can include multiple AChE-inhibiting pesticides over various time pulses. Sigmoidal dose-response relationships, at steady-state, between each single pesticide exposure and 1) AChE activity and 2) relative prey abundance are modeled using specific EC50s and EC50s and slopes (Figure 2B and 3B). The timecourse for each exposure was built into the model as a pulse with a defined start and end during which the exposure remained constant (Figure 2A and 3A). The timecourse for AChE activity, on the other hand, was modeled using two single-order exponential functions, one for the time required for the exposure to reach full effect and the other for time required for complete recovery following the

end of the exposure (time-to-effect$_{\text{AChE activity}}$ and time-to-recovery$_{\text{AChE activity}}$, respectively; Figure 2C). The apparent activity level was back-calculated to result in a relative concentration (concentration/ AChE inhibition EC50) for each day of the growth period for each pulse. The relative concentration for each day was summed across all the pulses to result in a total apparent concentration for each day. The sigmoid slope used in the calculation of AChE activity using the apparent concentration was the arithmetic mean of the sigmoid slopes for each pesticide present on each day. The timecourse for relative prey abundance was modeled incorporating a one day spike in prey drift relative to the toxicity and available prey base followed by a drop in abundance due to the toxic impacts (Figure 3C). Recovery is assumed to be due to a constant influx of invertebrates from connected habitats (aquatic and terrestrial) that are not exposed to the pesticide. Incoming organisms are subject to toxicity if pesticides are still present and this alters the rate of recovery during exposures. Incorporating dynamic effects and recovery variables allows the model to simulate differences in the pharmacokinetics (*e.g.*, the rates of uptake from the environment and of detoxification) of various pesticides and simulate differences in invertebrate community response and recovery rates (see below).

The relationship between final ration and somatic growth rate (Figure 4C) produces a relationship representing somatic growth rate over time (Figure 4D), which is then used to model individual growth rate and size over time. The growth models were run for 1,000 individual fish, with initial weight selected from a normal distribution with a mean of 1.0 g and standard deviation of 0.1 g. The size of 1.0 g was chosen to represent sub-yearling size in the spring prior to the onset of pesticide application. For each iteration of the model (one day for the organismal model), the somatic growth rate is calculated for each fish by selecting the parameter values from normal distributions with specified means and standard deviations (Table 1). The weight for each fish is then adjusted based on the calculated growth rate to generate a new weight for the next iteration. The length (days) to run the growth portion of the model was selected to represent the time from when the fish enter the linear portion of their growth trajectory in the mid to late spring until they change their growth pattern in the fall due to reductions in temperature and resources or until they migrate out of the system. The outputs of the organismal model that are handed to the population models consist of mean weights (with standard deviations) after the

species-appropriate growth period (Table 2). A sensitivity analysis was run to determine the influence of the parameter values on the output of the growth model.

The parameter values defining control conditions that are constant for all the modeled species are listed in Table 1. Model parameters such as the length of the growth period and control daily growth rate that are species specific are listed in Table 2. Each exposure scenario was defined by a concentration and exposure time for each pesticide. The duration of time until full effect for the pesticides was assumed to be within a few days (Ferrari et al. 2004), with a half-life of 0.5 days.

For prey, it is assumed there is a constant, independent influx of prey from upstream habitats that will eventually (depending on the rate selected) return prey abundance to 1. As mentioned above, however, these invertebrates are subject to exposure once added to the system, and therefore prey recovery rate is a product of the influx rate as well as the exposure scenario. While recovery rates reported in the literature vary, it is assumed a 1% recovery rate is ecologically realistic (Ward et al. 1995, Van den Brink et al. 1996, Colville et al. 2008). It was also assumed that regardless of the exposure scenario, relative prey abundance would not drop below a specific floor (Figure 3B). This assumption depends on a minimal yet constant terrestrial subsidy of prey and/or an aquatic community with tolerant individuals that would be available as prey, regardless of pesticide exposure and in addition to the constant recovery rate. No studies specify floors per se, but studies quantifying invertebrate densities following highly toxic exposures indicate a floor of 0.2 is ecologically realistic (*i.e.*, regardless of the exposure, 20% of a fish's ration will be available daily; *e.g.*, Cuffney et al. 1984). Finally, because prey availability has been found to increase dramatically albeit briefly following pesticide exposures (due to immediate mortality and/or emigration of benthic prey into the water column; Davies and Cook 1993, Schulz 2004), a one-day prey spike is included for the day following an exposure. The relative magnitude of the spike is calculated as the product of the standing prey availability the day prior to exposure (minus the floor), the toxicity of the exposure, and a constant of 20. This calculation therefore accounts for the potential prey that are available and the severity of the exposure. The spike will be greater when more prey are available and/or the toxicity of the

exposure is greater; alternatively, the spike will be small when few prey are available and/or the exposure toxicity is low.

Below are the mathematical equations used to derive Figures 2, 3, and 4.

Figures 2A and 3A use a step function:

time < start; exposure = 0

start ≤ time ≤ end; exposure = exposure concentration(s)

time > end; exposure = 0.

Figures 2B and 3B use a sigmoid function:

y = bottom + (top – bottom)/(1 + (exposure concentration/EC50)^slope).

For 2B, y = AChE activity, top = Ac, bottom = 0.

For Figure 3B, y = prey abundance, top = Pc (in this case 1), bottom = Pf.

Figures 2D, 2E, and 4C use a linear function (the point-slope form of a line):

y = m*(x – x1) + y1.

For 2D, m = Mfa, x1 = Ac, and y1 = Fc.

For 2E, m = Mrf (computed as Rc/Fc), x1 = Fc, and y1 = Rc.

For 4C, m = Mgr, x1 = Rc, and y1 = Gc.

Figure 2C uses a series of exponential functions:

time < start; y = c

start ≤ time ≤ end; y = c – (c – i)*(1 – exp(-ke*(time – start)))

time > end; ye = c – (c – i)*(1 – exp(-ke*(end – start)))

y = ye + (c – ye)*(1 – exp(-kr*(time – end))).

For Figure 2C, c = Ac, i = Ai, ke = ln(2)/AChE effect half-life, kr = ln(2)/AChE recovery half-life. For Figure 2C the value of ye is calculated to determine the amount of inhibition that is reached during the exposure time, which may not be long enough to reach the maximum level of inhibition.

For Figure 3C, an exposure pulse would result in a 1-day spike followed by a decline to the impacted level based upon the prey toxicity. During exposures resulting in low prey toxicity, toxicity-limited recovery can occur. After exposure ends a constant rate of recovery proceeds until control drift is reached or another exposure occurs

```
preyavail=preydrift(day-1)-floor;
preytox=1/(1+(concentration)^preyslope);
preyrecrate=0.01;
preydriftrec = preyrecrate*preytox.
time=start; spike=(-1+10^(1.654*preyavail))*(1-preytox)
        preydrift =preydrift+spike
start ≤ time ≤ end;  preydrift=(preyavail*preytox)+preyrdriftrec+floor;
time>end; preydrift = preydrift(day-1)+preydriftrec
```

Figure 2F is generated by using the output of Figure 2C for a given time as the input for 2D and using the resulting output of 2D as the input for 2E. The resulting output of 2E produces a single time point in the relationship in 2F. Performing this series of computations across multiple days produces the entire relationship in 2F. 4D is generated by taking the outputs of 4A and 4B for the same day. Note the relationship of 4A is equivalent to 2F. The resulting outputs of 4A and 4B are multiplied to produce a final ration for a given day. The prey abundance (4B) available for consumption during a prey spike is capped at a maximum of 1.5*control drift to provide a limited benefit to the individual fish. The final ration is used as input for 4C to generate 4D.

Population Model

The weight distributions from the organismal growth portion of the model are used to calculate size-dependent first-year survival for a life history matrix population model for each species and life history type. This incorporates the impact that reductions in size could have on population growth rate and abundance. The first-year survival element of the transition matrix incorporates a size-dependent survival rate for a three- or four-month interval (depending upon the species) which takes the juveniles up to 12 months of age. This time represents the 4-month early winter survival in freshwater for stream-type Chinook salmon, coho, and sockeye models. For ocean-

type Chinook salmon, it is the 3-month period the sub-yearling smolt spend in the estuary and nearshore habitats (*i.e.*, estuary survival). The weight distributions from the organismal model are converted to length distributions by applying condition factors from data for each modeled species (cf; 0.0095 for sockeye and 0.0115 for all others) as shown in Equation L.

Equation L: length(mm) = ((fish weight(g)/cf)^(1/3))*10

The relationship between length and early winter or estuary survival rate was adapted from Zabel and Achord (2004) to match the survival rate for each control model population (Howell et al. 1985, Kostow 1995, Myers et al. 2006). The relationship is based on the length of a sub-yearling salmon relative to the mean length of other competing sub-yearling salmon of the same species in the system, Equation D, and relates that relative difference to size-dependent survival based upon Equation S. The values for α and resulting size-dependent survival (survival ϕ) for control runs for each species are listed in Table 2. The constant α is a species-specific parameter defined such that it produces the correct control survival ϕ value when Δlength equals zero.

Equation D: Δlength = fish length(mm) – mean length(mm)

Equation S: Survival $\phi = (e^{(\alpha+(0.0329*\Delta length))}) / (1 + e^{(\alpha+(0.0329*\Delta length))})$

Randomly selecting length values from the normal distribution calculated from the organismal model output size and applying equations 1 and 2 generates a size-dependent survival probability for each fish. This process was replicated 1,000 times for each exposure scenario and simultaneously 1,000 times for the paired control scenario and results in a mean size-dependent survival rate for each population. The resulting size-dependent survival rates are inserted in the calculation of first-year survival in the respective control and pesticide-exposed transition matrices.

The investigation of population-level responses to pesticide exposures uses life history projection matrix models. Individuals within a population exhibit various growth, reproduction, and survivorship rates depending on their developmental or life history stage or age. These age specific characteristics are depicted in the life history graph (Figure 1A-D) in which transitions are depicted as arrows. The nonzero matrix elements represent transitions corresponding to reproductive contribution or survival, located in the top row and the subdiagonal of the matrix, respectively (Figure 1E). The survival transitions in the life history graph are incorporated into

the n x n square matrix (A) by assigning each age a number (1 through n) and each transition from age i to age j becomes the element a_{ij} of matrix A (i = row, j = column) and represent the proportion of the individuals in each age passing to the next age as a result of survival. The reproductive element (a_{1j}) gives the number of offspring that hatch per individual in the contributing age, j. The reproductive element value incorporates the proportion of females in each age, the proportion of females in the age that are sexually mature, fecundity, fertilization success, and hatch success.

In order to understand the relative impacts of a short-term exposure of a single pesticide on exposed vs. unexposed fish, we used parameters for an idealized control population that exhibits an increasing population growth rate. All characteristics exhibit density independent dynamics. The models assume closed systems, allowing no migration impact on population size. No stochastic impacts are included beyond natural variability as represented by selecting parameter values from a normal distribution about a mean each model iteration (year). Ocean conditions, freshwater habitat, fishing pressure, and marine resource availability were assumed constant and density independent.

In the model an individual fish experiences an exposure once as a sub-yearling (during its first spring) and never again. The pesticide exposure is assumed to occur annually. All sub-yearlings within a given population are assumed to be exposed to the pesticide. No other age classes experience the exposure. The model integrates this as every brood class being exposed as sub-yearlings and thus the vital demographic rates of the transition matrix are continually impacted in the same manner. Regardless of the level of AChE inhibition due to the direct exposure, only the sublethal effects are incorporated in the models at this time.

The model recalculates first-year survival for each run using a size-dependent survival value selected from a normal distribution with the mean and standard deviation produced by Equation S. Population model output consists of the percent change in lambda from the unexposed control populations derived from the mean of two thousand calculations of both the unexposed control population and the pesticide exposed population. Change in lambda, representing alterations to

the population productivity, was selected as the primary model output for reasons outlined previously.

A prospective analysis of the transition matrix, A, (Caswell 2001) explored the intrinsic population growth rate as a function of the vital rates. The intrinsic population growth rate, λ, equals the dominant eigenvalue of A and was calculated using matrix analysis software (MATLAB version 7.7.0 by The Math Works Inc., Natick, MA). Therefore, λ is calculated directly from the matrix and running projections of abundances over time is redundant and unnecessary. The stable age distribution, the proportional distribution of individuals among the ages when the population is at equilibrium, is calculated as the right normalized eigenvector corresponding to the dominant eigenvalue λ. Variability was integrated by repeating the calculation of λ 2,000 times selecting the values in the transition matrix from their normal distribution defined by the mean standard deviation. The influence of each matrix element, a_{ij}, on λ was assessed by calculating the sensitivity values for A. The sensitivity of matrix element a_{ij} equals the rate of change in λ with respect to a_{ij}, defined by $\delta\lambda/\ \delta a_{ij}$. Higher sensitivity values indicate greater influence on λ. The elasticity of matrix element a_{ij} is defined as the proportional change in λ relative to the proportional change in a_{ij}, and equals (a_{ij}/λ) times the sensitivity of a_{ij}. One characteristic of elasticity analysis is that the elasticity values for a transition matrix sum to unity (one). The unity characteristic also allows comparison of the influence of transition elements and comparison across matrices.

Due to differences in the life history strategies, specifically lifespan, age at reproduction and first year residence and migration habits, four life history models were constructed. This was done to encompass the different responses to freshwater pesticide exposures and assess potentially different population-level responses. Separate models were constructed for coho, sockeye, ocean-type and stream-type Chinook salmon. In all cases transition values were determined from literature data on survival and reproductive characteristics of each species.

A life history model was constructed for coho salmon (*O. kisutch*) with a maximum age of 3. Spawning occurs in late fall and early winter with emergence from March to May. Fry spend 14-18 months in freshwater, smolt and spend 16-20 months in the saltwater before returning to

spawn (Pess et al. 2002). Survival numbers were summarized in Knudsen et al. (2002) as follows. The average fecundity of each female is 4,500 with a standard deviation of 500. The observed number of males:females was 1:1. Survival from spawning to emergence is 0.3 (0.07). Survival from emergence to smolt is 0.0296 (0.00029) and marine survival is 0.05 (0.01). All parameters followed a normal distribution (Knudson et al. 2002). The calculated values used in the matrix are listed in Table 4. The growth period for first year coho was set at 180 days to represent the time from mid-spring to mid-fall when the temperatures and resources drop and somatic growth slows (Knudson et al. 2002).

Life history models for sockeye salmon (*O. nerka*) were based upon the lake wintering populations of Lake Washington, Washington, USA. These female sockeye salmon spend one winter in freshwater, then migrate to the ocean to spend three to four winters before returning to spawn at ages 4 or 5. Jacks return at age 2 after only one winter in the ocean. The age proportion of returning adults is 0.03, 0.82, and 0.15 for ages 3, 4 and 5, respectively (Gustafson et al.1997). All age 3 returning adults are males. Hatch rate and first-year survival were calculated from brood year data on escapement, resulting presmolts and returning adults (Pauley et al. 1989), and fecundity (McGurk 2000). Fecundity values for age 4 females were 3,374 (473) and for age 5 females were 4,058 (557) (McGurk 2000). First-year survival rates were 0.737/month (Gustafson et al. 1997). Ocean survival rates were calculated based upon brood data and the findings that 90% of ocean mortality occurs during the first 4 months of ocean residence (Pauley et al. 1989). Matrix values used in the sockeye baseline model are listed in Table 4. The 168 day growth period represents the time from lake entry to early fall when the temperature drops and somatic growth slows (Gustafson et al. 1997).

A life history model was constructed for ocean-type Chinook salmon (*O. tshawytscha*) with a maximum female age of 5 and reproductive maturity at ages 3, 4, or 5. Ocean-type Chinook salmon migrate from their natal stream within a couple months of hatching and spend several months rearing in estuary and nearshore habitats before continuing on to the open ocean. Transition values were determined from literature data on survival and reproductive characteristics from several ocean-type Chinook salmon populations in the Columbia River system (Healey and Heard 1984, Howell et al. 1985, Roni and Quinn 1995, Ratner et al. 1997,

PSCCTC 2002, Green and Beechie 2004). The sex ratio of spawners was approximately 1:1. Estimated size-based fecundity of 4,511(65), 5,184(89), and 5,812(102) was calculated based on data from Howell et al., 1985, using length-fecundity relationships from Healy and Heard (1984). Control matrix values for the Chinook model are listed in Table 4. The growth period of 140 days encompasses the time the fish rear in freshwater prior to entering the estuary and open ocean. The first three months of estuary/ocean survival are the size-dependent stage. Size data for determining sub-yearling Chinook salmon condition indices came from data collected in the lower Columbia River and estuary (Johnson et al. 2007).

An age-structured life history matrix model for stream-type Chinook salmon with a maximum age of 5 was defined based upon literature data on Yakima River spring Chinook from Knudsen et al. (2006) and Fast et al. (1988), with sex ratios of 0.035, 0.62 and 0.62 for females spawning at ages 3, 4, and 5, respectively. Length data from Fast et al. (1988) was used to calculate fecundity from the length-fecundity relationships in Healy and Heard (1984). The 184-day growth period produces control fish with a mean size of 96 mm, within the observed range documented in the fall prior to the first winter (Beckman et al. 2000). The size-dependent survival encompasses the 4 early winter months, up until the fish are 12 months old.

Acute Toxicity Model

In order to estimate the population-level responses of exposure to lethal pesticide concentrations, acute mortality models were constructed based upon the control life history matrices described above. The acute responses are modeled as direct reduction in the first-year survival rate (S1). All sub-yearling salmon are assumed to be exposed in each scenario. Exposures are assumed to result in a cumulative reduction in survival as defined by the concentration and the dose-response curve as defined by the LC50 and slope for each pesticide. A sigmoid dose-response relationship is used to accurately handle responses well away from LC50 and to be consistent with other does-response relationships. The model inputs for each scenario are the exposure concentration and acute fish LC50, as well as the sigmoid slope for the LC50. For a given concentration a pesticide survival rate (1-mortality) is calculated and is multiplied by the control first-year survival rate, producing an exposed scenario first-year survival for the life history matrix. Variability is incorporated as described above using mean and standard deviation of normally

distributed survival and reproductive rates and model output consists of the percent change in lambda from unexposed control populations derived from the mean of 1,000 calculations of both the unexposed control population and the pesticide exposed population. The percent change in lambda is considered different from control when the difference is greater than the percent of one standard deviation from the control lambda.

Results

Sensitivity Analysis

A sensitivity analysis conducted on the organismal model revealed that changes in the control somatic growth rate had the greatest influence on the final weights (Table 1). While this parameter value was experimentally derived for another species (sockeye salmon; Brett et al. 1969), this value was adapted for each model species and is within the variability reported in the literature for other salmonids (reviewed in Weatherley and Gill 1995). Other parameters related to the daily growth rate calculation, including the growth to ration slope (Mgr) and the control ration produced strong sensitivity values. Initial weight, the prey recovery rate and the prey floor also strongly influenced the final weight values (Table 1). Large changes (0.5 to 2X) in the other key parameters produced proportionate changes in final weight.

The sensitivity analysis of all four of the control population matrices predicted the greatest changes in population growth rate (λ) result from changes in first-year survival. Parameter values and their corresponding sensitivity values are listed in Table 4. The elasticity values for the transition matrices also corresponded to the driving influence of first-year survival, with contributions to lambda of 0.33 for coho, 0.29 for ocean-type Chinook salmon, 0.25 for stream-type Chinook salmon, and 0.24 for sockeye.

Model Output

Organismal and population model outputs for all scenarios are shown in Tables 74-78 and were summarized in Figures 44-47 in the main text of the Opinion. As expected, greater changes in population growth resulted from longer exposures to the pesticides. The factors driving the level of change in lambda were the Prey Drift and relative AChE Activity parameters determined by the toxicity values for each pesticide (Table 3). The low Prey Abundance EC_{50} values drive the

effects for all three compounds at most concentrations investigated since they have higher AChE EC50 values (Table 3). Output from the acute toxicity models was presented in the Risk Characterization section of the main text. Increases in direct mortality during the first year of life produced large impacts on the population growth rates for all the life history strategies.

While strong trends in effects were seen for each pesticide across all four life history strategies modeled, some slight differences were apparent. The similarity in patterns likely stems from using the same toxicity values for all four models, while the differences are consequences of distinctions between the life history matrices. The stream-type Chinook salmon and sockeye models produced very similar results as measured as the percent change in population growth rate. The ocean-type Chinook salmon and coho models output produced the greatest changes in lambda resulting from the pesticide exposures. When looking for similarities in parameters to explain the ranking, no single life history parameter or characteristic, such as lifespan, reproductive ages, age distribution, lambda and standard deviation, or first-year survival show a pattern that matches this consistent output. Combining these factors into the transition matrix for each life history and conducting the sensitivity and elasticity analyses revealed that changes in first-year survival produced the greatest changes in lambda. In addition, the elasticity analysis can be used to predict relative contribution to lambda from changes in first-year survival on a per unit basis. As detailed by the elasticity values reported above, the same change in first-year survival will produce a slightly greater change in the population growth rate for coho and ocean-type Chinook salmon than for stream-type Chinook salmon and sockeye. While some life history characteristics may lead a population to be more vulnerable to an impact, the culmination of age structure, survival and reproductive rates as a whole strongly influences the population-level response.

Figure 1: Life-History Graphs and Transition Matrix for coho (A), sockeye (B) and Chinook salmon (C). The life history graph for a population labeled by age, with each transition element labeled according to the matrix position, a_{ij}, i row and j column. Dashed lines represent reproductive contribution and solid lines represent survival transitions. D) The transition matrix for the life history graph depicted in C.

Figure 2: Relationships used to link anticholinesterase exposure to the organism's ability to acquire food (potential ration). See text for details. Relationships in B, C, and D use empirical data. Closed circles represent control conditions. Open circles represent the exposed (inhibited) condition. A) Representation of a constant level of anticholinesterase pesticide exposure (either a single compound or mixtures). B) Sigmoidal relationship between exposure concentration and steady-state AChE activity showing a dose-dependent reduction defined by control activity (horizontal line, Ac), sigmoidal (*i.e.*, hille) slope (AChE slope), and the concentration producing 50% inhibition (vertical line, EC50). C) Timecourse of AChE inhibition based on modeling the time-to-effect and time-to-recovery as single exponential curves with different time-constants. At the start of the exposure AChE activity will be at control and then decline toward the inhibited activity (Ai) based on Panel B. D) Linear model relating AChE activity to feeding behavior using a line that passes through the feeding (Fc) and activity (Ac) control conditions with a slope of Mfa. E) The relationship between feeding behavior and the potential ratio an organism could acquire (if not food limited) used a line passing through the control conditions (Fc as in Panel D and the control ration, Rc) and through the origin producing a slope (Mrf) equal to Rc/Fc. F) Timecourse for effect of exposure to anticholinesterase on potential ration produced by combining C and E.

Figure 3: Relationships used to link anticholinesterase exposure to the availability of prey. See text for details. Relationships in B and C utilize empirical data. Closed circles represent control conditions. Open circles represent the exposed (inhibited) condition. A) Representation of a constant level of anticholinesterase pesticide exposure (either single compound or mixtures). B) Sigmoidal relationship between exposure concentration and relative prey abundance showing a dose-dependent reduction defined by control abundance (horizontal line at 1, Pc), sigmoid (*i.e.*, hille) slope (prey slope), the concentration producing a 50% reduction in prey (vertical line,

EC_{50}), and a minimum abundance always present (horizontal line denoted as floor, Pf). C) Timecourse of prey abundance including a 1-day spike in prey drift relative to the available prey and the level of toxicity followed by a drop to the level of impact or the floor whichever is greater. During extended exposures at low toxicity recovery can begin at the constant prey influx rate multiplied by the current level of toxicity. After exposure recovery to control prey drift is at the constant rate of influx from upstream habitats.

Figure 4: Relationships used to link anticholinesterase exposure to growth rate relating to long-term weight gain of each fish. See text for details. Relationships in A, B, and C utilize empirical data. Closed circles represent control conditions. Open circles (*e.g.*, Ai) represent the exposed (inhibited) condition. A&B) Relationships describing the timecourse of the effects of anticholinesterase exposure on the organisms ability to capture food (Panel A, potential ration) and the availability of food to capture (Panel B, relative prey abundance). The figures are the same as those in Figures 2F and 3C, respectively. For a given exposure concentration and time, multiplying potential ration by relative prey abundance yields the final ration acquired by the organism. C) A linear model was used to relate final ration to growth rate using a line passing through the control conditions and through the maintenance condition with a slope denoted by Mgr. D) Timecourse for effect of exposure to anticholinesterase on growth rate produced by combining A, B, & C.

Table 1. List of values used for control parameters to model organismal growth and the model sensitivity to changes in the parameter.

Parameter	Value[1]	Error[2]	Sensitivity[3]
acetylcholinesterase activity (Ac)	1.0[4,5]	0.06[5]	-0.167
feeding (Fc)	1.0[4,5]	0.05[5]	0.088
ration (Rc)	5% weight/day[6]	0.05[7]	-0.547
feeding vs. activity slope (Mfa)	1.0[5]	0.1[5]	-0.047
ration vs. feeding slope (Mrf)	5 (Rc/Fc)	-	-
growth vs. ration slope (Mgr)	0.35[6]	0.02[6]	-0.547
growth vs. activity slope (Mga)	1.75 (Mfa*Mrf*Mgr)	-	-
initial weight	1 gram[8]	0.1[8]	1.00
control prey drift	1.0[4]	0.05[11]	0.116
AChE impact time-to-effect ($t_{1/2}$)	0.5 day[9]	n/a	0.005
AChE time-to-recovery ($t_{1/2}$)	0.25 days[10]	n/a	-0.0001
prey floor	0.20[11]	n/a	0.178
prey recovery rate	0.01[12]	n/a	0.323
somatic growth rate (Gc)	1.3[13]	0.06[6]	2.531

[1] mean value of a normal distribution used in the model or constant value when no corresponding error is listed

[2] standard deviation of the normal distribution used in the model

[3] mean sensitivity when baseline parameter is changed over range of 0.5 to 2-fold

[4] other values relative to control

[5] derived from Sandahl et al., (2005)

[6] derived from Brett et al., (1969)

[7] data from Brett et al., (1969) has no variability (ration was the independent variable) so a variability of 1% was selected to introduce some variability

[8] consistent with field-collected data for juvenile Chinook salmon (Nelson et al., 2004)

[9] estimated from Ferrari et al., 2004

[10] consistent with Labenia et al., 2007

[11] estimated from Van den Brink et al., 1996

[12] derived from Ward et al., 1995, Van den Brink et al., 1996, Colville et al., 2008

[13] derived from Brett and adapted for ocean-type Chinook salmon, used for sensitivity analysis

Table 2. Species specific control parameters to model organismal growth and survival rates. Growth period and survival rate are determined from the literature data listed for each species. Gc and α were calculated to make the basic model produce the appropriate size and survival values from the literature.

	Chinook Stream-type[1]	Chinook Ocean-type[2]	Coho[3]	Sockeye[4]
days to run organismal growth model	184	140	184	168
growth rate % body wt/day (Gc)	1.28	1.30	0.90	1.183
α from equation S	-0.33	-1.99	-0.802	-0.871
Control Survival ϕ	0.418	0.169	0.310	0.295

[1] Values from data in Healy and Heard 1984, Fast et al., 1988, Beckman et al., 2000, Knudsen et al., 2006
[2] Values from data in Healey and Heard 1984, Howell et al., 1985, Roni and Quinn 1995, Ratner et al.,1997, PSCCTC 2002, Green and Beechie, 2004, Johnson et al., 2007
[3] Values from data in Pess et al., 2002, Knudsen et al., 2002
[4] Values from data in Pauley et al., 1989, Gustafson et al., 1997, McGurk 2000

Table 3. Effects values (μg/L) and slopes for AChE activity, acute fish lethality, and prey abundance dose-response curves.

compound	AChE Activity EC_{50}[1] □g/L	AChE Activity slope	Fish lethality LC_{50}[2] □g/L	Fish lethality slope[3]	Prey Abundance EC_{50}[4] □g/L	Prey Abundance Slope[5]
carbaryl	145.8	0.95	250	3.63	4.33	5.5
carbofuran	58.4	0.95	164	3.63	1.22	5.5
methomyl	213	0.95	560	3.63	20.74	5.5

[1] Values from Laetz et. al 2009
[2] Values from EPA BEs
[3] sigmoidal slope that produces responses with a probit slope of Peterson, see text.
[4] Values from analysis of global search of reported LC50 and EC50s reported in EPA's Ecotox database. See text.
[5] Values from Peterson et al., 2001

Table 4. Matrix transition element and sensitivity (S) and elasticity (E) values for each model species. These control values are listed by the transition element taken from the life history graphs as depicted in Figure 1 and the literature data described in the method text. Blank cells indicate elements that are not in the transition matrix for a particular species. The influence of each matrix element on λ was assessed by calculating the sensitivity (S) and elasticity (E) values for A. The sensitivity of matrix element a_{ij} equals the rate of change in λ with respect to the transition element, defined by $\delta\lambda / \delta a$. The elasticity of transition element a_{ij} is defined as the proportional change in λ relative to the proportional change in a_{ij}, and equals (a_{ij}/λ) times the sensitivity of a_{ij}. Elasticity values allow comparison of the influence of individual transition elements and comparison across matrices.

Transition Element	Chinook Stream-type			Chinook Ocean-type			Coho			Sockeye		
	Value[1]	S	E	Value[2]	S	E	Value[3]	S	E	Value[4]	S	E
S1	0.0643	3.844	0.247	0.0056	57.13	0.292	0.0296	11.59	0.333	0.0257	9.441	0.239
S2	0.1160	2.132	0.247	0.48	0.670	0.292	0.0505	6.809	0.333	0.183	1.326	0.239
S3	0.17005	1.448	0.246	0.246	0.476	0.106				0.499	0.486	0.239
S4	0.04	0.319	0.0127	0.136	0.136	0.0168				0.1377	0.322	0.0437
R3	0.5807	0.00184	0.0011	313.8	0.0006	0.186	732.8	0.000469	0.333			
R4	746.73	0.000313	0.233	677.1	0.000146	0.0896				379.57	0.000537	0.195
R5	1020.36	1.25E-05	0.0127	1028	1.80E-05	0.0168				608.7	7.28E-05	0.0437

[1] Value calculated from data in Healy and Heard 1984, Fast et al., 1988, Beckman et al., 2000, Knudsen et al., 2006

[2] Value calculated from data in Healey and Heard 1984, Howell et al., 1985, Roni and Quinn 1995, Ratner et al., 1997, PSCCTC 2002, Green and Beechie, 2004, Johnson et al., 2007

[3] Value calculated from data in Pess et al., 2002, Knudsen et al., 2002

[4] Value calculated from data in Pauley et al., 1989, Gustafson et al., 1997, McGurk 2000

Figure 1.

A. Coho

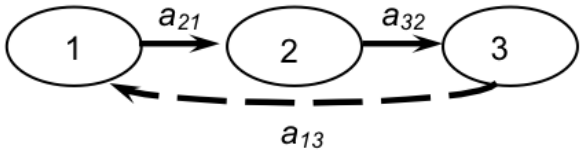

B. Sockeye

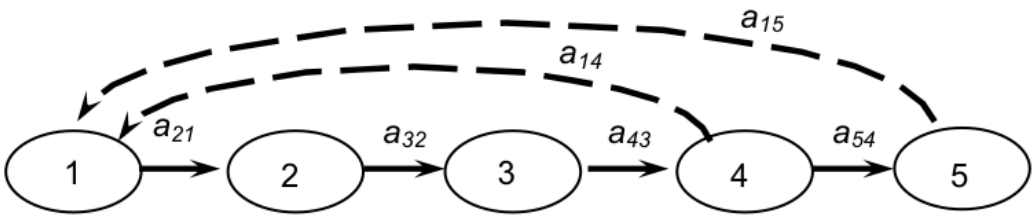

C. Chinook, ocean-type and stream-type

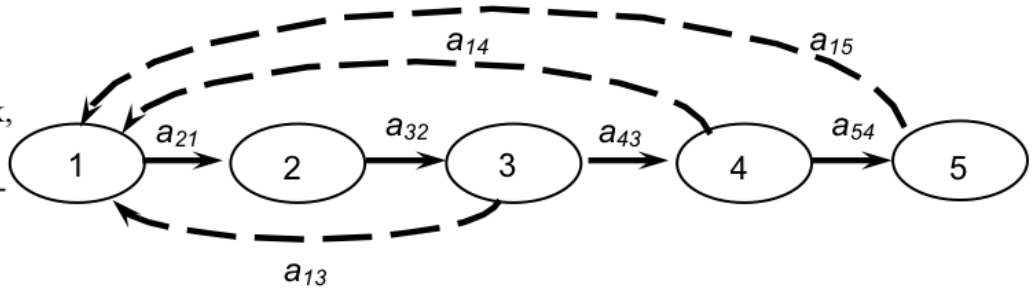

D. Transition Matrix

$$A=\begin{bmatrix} 0 & 0 & R3=a_{13} & R4=a_{14} & R5=a_{15} \\ S1=a_{21} & 0 & 0 & 0 & 0 \\ 0 & S2=a_{32} & 0 & 0 & 0 \\ 0 & 0 & S3=a_{43} & 0 & 0 \\ 0 & 0 & 0 & S4=a_{54} & 0 \end{bmatrix}$$

Figure 2.

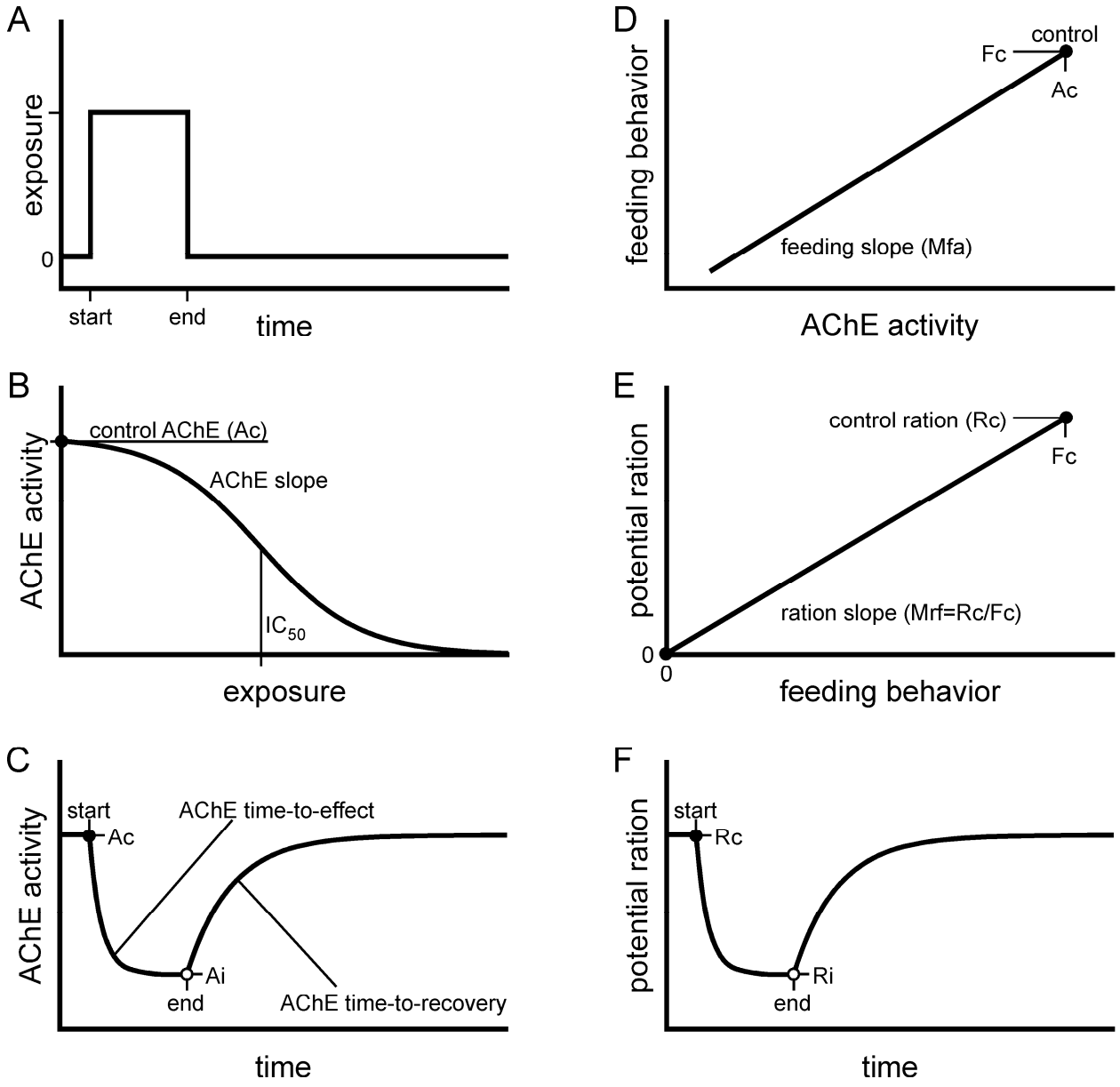
A
exposure
0
start
end
time
B
AChE activity
control AChE (Ac)
AChE slope
IC50
exposure
C
AChE activity
start
Ac
AChE time-to-effect
Ai
end
AChE time-to-recovery
time
D
feeding behavior
control
Fc
Ac
feeding slope (Mfa)
AChE activity
E
potential ration
control ration (Rc)
Fc
ration slope (Mrf=Rc/Fc)
0
0
feeding behavior
F
potential ration
start
Rc
Ri
end
time

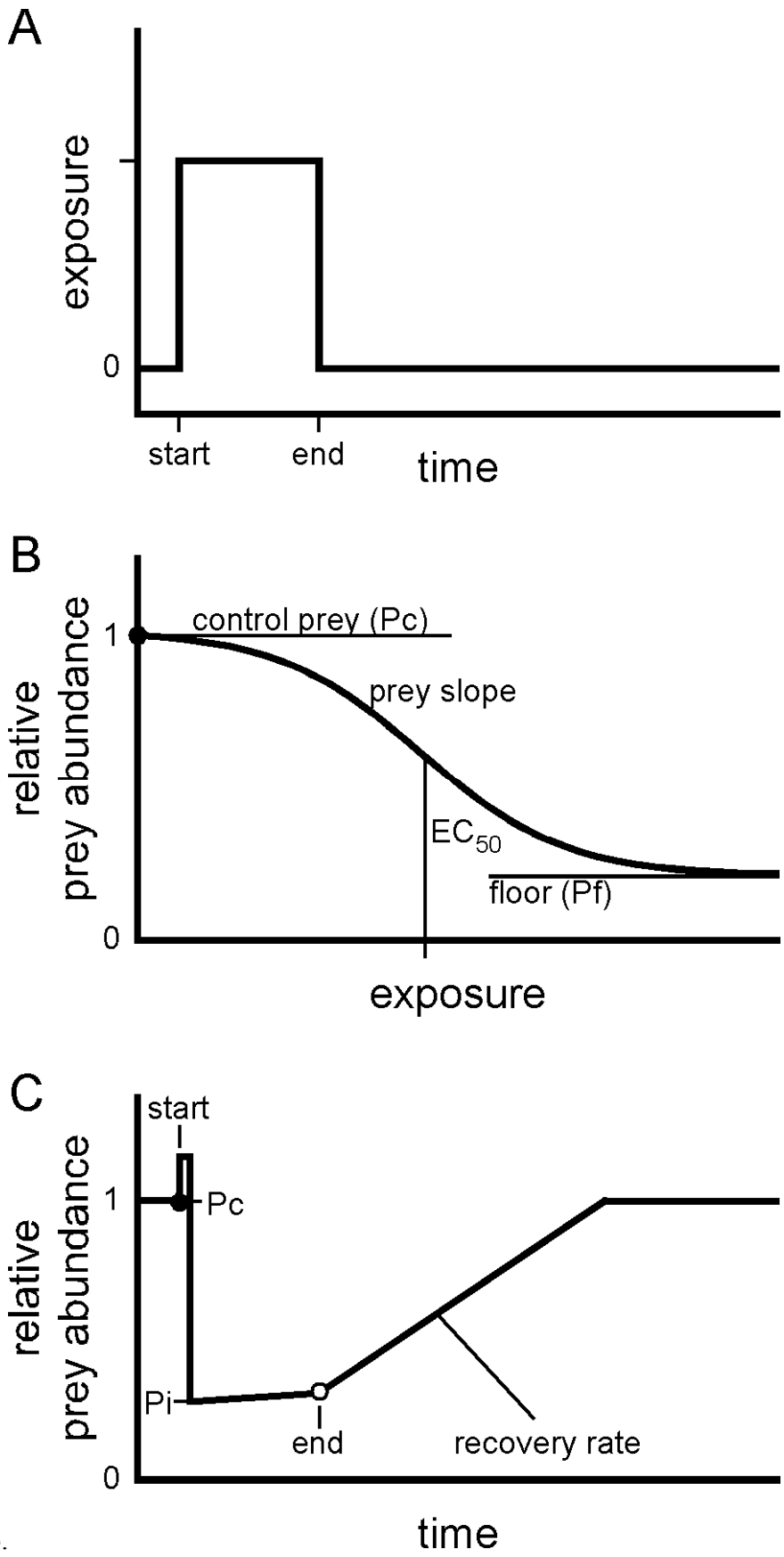
A
exposure
0
start
end
time
B
relative
prey abundance
1
control prey (Pc)
prey slope
EC50
floor (Pf)
0
exposure
C
start
relative
prey abundance
1
Pc
Pi
end
recovery rate
0
time

Figure 3.

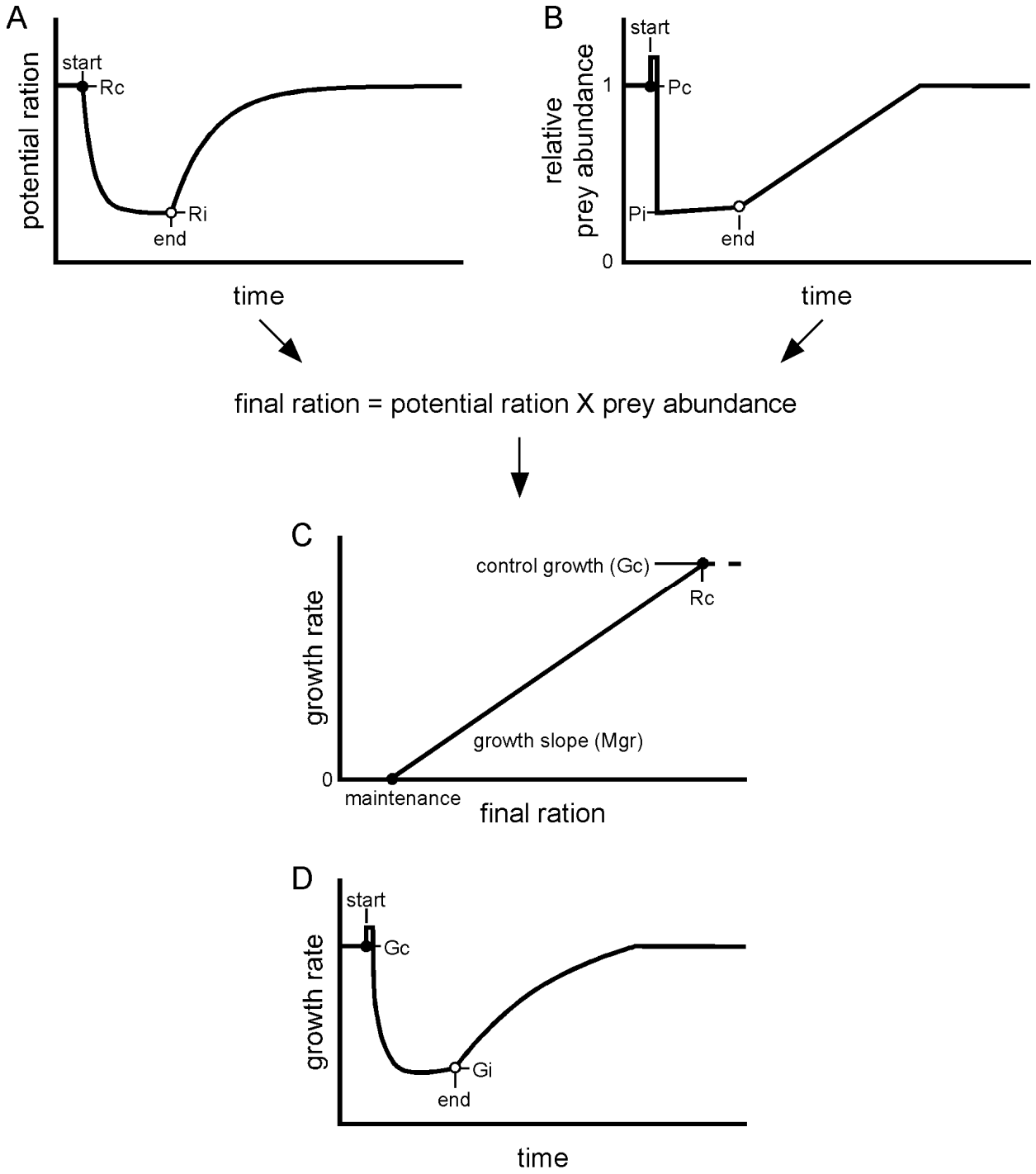
A
potential ration
start
Rc
Ri
end
time
B
relative
prey abundance
start
1
Pc
Pi
end
0
time
final ration = potential ration X prey abundance
C
growth rate
control growth (Gc)
Rc
growth slope (Mgr)
0
maintenance
final ration
D
growth rate
start
Gc
Gi
end
time

Figure 4.

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Appendix 2. Species and Population Annual Rates of Growth

Chinook Salmon

ESU	Population	λ - H=0	95% CI -lower	95% CI - upper
California Coastal	Eel River	N/A	N/A	N/A
	Redwood Creek	N/A	N/A	N/A
	Mad River	N/A	N/A	N/A
	Humboldt Bay tributaries	N/A	N/A	N/A
	Bear River	N/A	N/A	N/A
	Mattole River	N/A	N/A	N/A
	Tenmile to Gualala	N/A	N/A	N/A
	Russain River	N/A	N/A	N/A
Central Valley Spring - Run (Good et al., 2005 - 90% CI)	Butte Creek - spring run	1.300	1.060	1.600
	Deer Creek - spring run	1.170	1.040	1.350
	Mill Creek - spring run	1.190	1.000	1.470
Lower Columbia River (Good et al., 2005) (# = McElhany et al., 2007)	Youngs Bay	N/A	N/A	N/A
	Grays River - fall run	0.944	0.739	1.204
	Big Creek	N/A	N/A	N/A
	Elochoman River - fall run	1.037	0.813	1.323
	Clatskanie River #	0.990	0.824	1.189
	Mill, Abernathy, Germany Creeks - fall run	0.981	0.769	1.252
	Scappose Creek	N/A	N/A	N/A
	Coweeman River - fall run	1.092	0.855	1.393
	Lower Cowlitz River - fall run	0.998	0.776	1.282
	Upper Cowlitz River - fall run	N/A	N/A	N/A
	Toutle River - fall run	N/A	N/A	N/A
	Kalamaha River - fall run	0.937	0.763	1.242
	Salmon Creek / Lewis River - fall run	0.984	0.771	1.256
	Clackamas River - fall run	N/A	N/A	N/A
	Washougal River - fall run	1.025	0.803	1.308
	Sandy River - fall run	N/A	N/A	N/A
	Lower Gorge tributaries	N/A	N/A	N/A
	Upper Gorge tributaries - fall run	0.959	0.751	1.224
	Hood River - fall run	N/A	N/A	N/A
	Big White Salmon River - fall run	0.963	0.755	1.229
	Sandy River - late fall run	0.943	0.715	1.243
	North Fork Lewis River - late fall run	0.968	0.756	1.204
	Upper Cowlitz River - spring run	N/A	N/A	N/A
	Cispus River	N/A	N/A	N/A
	Tilton River	N/A	N/A	N/A
	Toutle River - spring run	N/A	N/A	N/A
	Kalamaha River - spring run	N/A	N/A	N/A
	Lewis River - spring run	N/A	N/A	N/A
	Sandy River - spring run #	0.961	0.853	1.083
	Big White Salmon River - spring run	N/A	N/A	N/A
	Hood River - spring run	N/A	N/A	N/A

Chinook Salmon (continued)

ESU	Population	λ - H=0	95% CI -lower	95% CI - upper
Upper Columbia River Spring - Run (FCRPS)	Methow River	1.100	N/A	N/A
	Twisp River	N/A	N/A	N/A
	Chewuch River	N/A	N/A	N/A
	Lost / Early River	N/A	N/A	N/A
	Entiat River	0.990	N/A	N/A
	Wenatchee River	1.010	N/A	N/A
	Chiawawa River	N/A	N/A	N/A
	Nason River	N/A	N/A	N/A
	Upper Wenatchee River	N/A	N/A	N/A
	White River	N/A	N/A	N/A
	Little Wenatchee River	N/A	N/A	N/A
Puget Sound (only have λ where hatchery fish = native fish), (Good et al., 2005)	Nooksack - North Fork	0.750	0.680	0.820
	Nooksack - South Fork	0.940	0.880	0.990
	Lower Skagit	1.050	0.960	1.140
	Upper Skagit	1.050	0.990	1.110
	Upper Cascade	1.060	1.010	1.110
	Lower Sauk	1.010	0.890	1.130
	Upper Sauk	0.960	0.900	1.020
	Suiattle	0.990	0.930	1.050
	Stillaguamish - North Fork	0.920	0.880	0.960
	Stillaguamish - South Fork	0.990	0.970	1.010
	Skykomish	0.870	0.840	0.900
	Snoqualmie	1.000	0.960	1.040
	North Lake Washington	1.070	1.000	1.140
	Cedar	0.990	0.920	1.060
	Green	0.670	0.610	0.730
	White	1.160	1.100	1.220
	Puyallup	0.950	0.890	1.010
	Nisqually	1.040	0.970	1.110
	Skokomish	1.040	1.000	1.080
	Dosewallips	1.170	1.070	1.270
	Duckabush	N/A	N/A	N/A
	Hamma Hamma	N/A	N/A	N/A
	Mid Hood Canal	N/A	N/A	N/A
	Dungeness	1.090	0.980	1.200
	Elwha	0.950	0.840	1.060
Sacramento River Winter - Run (Good, 2005 - 90% CI))	Sacramento River - winter run	0.970	0.870	1.090

Chinook Salmon (continued)

ESU	Population	λ - H=0	95% CI -lower	95% CI - upper
Snake River Fall - Run (Good, 2005)	Lower Snake River	1.024	N/A	N/A
Snake River Spring/Summer - Run (FCRPS)	Tucannon River	1.000	N/A	N/A
	Wenaha River	1.100	N/A	N/A
	Wallowa River	N/A	N/A	N/A
	Lostine River	1.050	N/A	N/A
	Minam River	1.050	N/A	N/A
	Catherine Creek	0.970	N/A	N/A
	Upper Grande Ronde River	N/A	N/A	N/A
	South Fork Salmon River	1.110	N/A	N/A
	Secesh River	1.070	N/A	N/A
	Johnson Creek	N/A	N/A	N/A
	Big Creek Spring Run	1.090	N/A	N/A
	Big Creek Summer Run	1.090	N/A	N/A
	Loon Creek	N/A	N/A	N/A
	Marsh Creek	1.080	N/A	N/A
	Bear Valley / Elk Creek	1.100	N/A	N/A
	North Fork Salmon River	N/A	N/A	N/A
	Lemhi River	1.020	N/A	N/A
	Pahsimeroi River	1.080	N/A	N/A
	East Fork Salmon Spring Run	1.040	N/A	N/A
	East Fork Salmon Summer Run	1.040	N/A	N/A
	Yankee Fork Spring Run	N/A	N/A	N/A
	Yankee Fork Summer Run	N/A	N/A	N/A
	Valley Creek Spring Run	N/A	N/A	N/A
	Valley Creek Summer Run	N/A	N/A	N/A
	Upper Salmon Spring Run	1.060	N/A	N/A
	Upper Salmon Summer Run	1.060	N/A	N/A
	Alturas Lake Creek	N/A	N/A	N/A
	Imnaha River	1.050	N/A	N/A
	Big Sheep Creek	N/A	N/A	N/A
	Lick Creek	N/A	N/A	N/A
Upper Williamette River (McElhany et al., 2007)	Clackamas River	0.967	0.849	1.102
	Molalla River	N/A	N/A	N/A
	North Santiam River	N/A	N/A	N/A
	South Santiam River	N/A	N/A	N/A
	Calapooia River	N/A	N/A	N/A
	McKenzie River	0.927	0.761	1.129
	Middle Fork Williamette River	N/A	N/A	N/A
	Upper Fork Williamette River	N/A	N/A	N/A

Chum Salmon

ESU	Population	λ - H=0	95% CI -lower	95% CI - upper
Columbia River	Youngs Bay	N/A	N/A	N/A
	Grays River	0.954	0.855	1.064
	Big Creek	N/A	N/A	N/A
	Elochoman River	N/A	N/A	N/A
	Clatskanie River	N/A	N/A	N/A
	Mill, Abernathy and German Creeks	N/A	N/A	N/A
	Scappose Creek	N/A	N/A	N/A
	Cowlitz River	N/A	N/A	N/A
	Kalama River	N/A	N/A	N/A
	Lewis River	N/A	N/A	N/A
	Salmon Creek	N/A	N/A	N/A
	Clackamus River	N/A	N/A	N/A
	Sandy River	N/A	N/A	N/A
	Washougal River	N/A	N/A	N/A
	Lower Gorge tributaries	0.984	0.883	1.096
	Upper Gorge tributaries	N/A	N/A	N/A
Hood Canal Summer - Run (only have λ where hatchery fish reproductive potential = native fish; Good et. al., 2005)	Jimmycomelately Creek	0.850	0.690	1.010
	Salmon / Snow Creeks	1.230	1.130	1.330
	Big / Little Quilcene rivers	1.390	1.170	1.610
	Lilliwaup Creek	1.190	0.750	1.630
	Hamma Hamma River	1.300	1.110	1.490
	Duckabush River	1.100	0.930	1.270
	Dosewallips River	1.170	0.930	1.410
	Union River	1.150	1.050	1.250
	Chimacum Creek	N/A	N/A	N/A
	Big Beef Creek	N/A	N/A	N/A
	Dewetto Creek	N/A	N/A	N/A

Coho Salmon

ESU	Population	λ - H=0	95% CI -lower	95% CI - upper
Central California Coast	Ten Mile River	N/A	N/A	N/A
	Noyo River	N/A	N/A	N/A
	Big River	N/A	N/A	N/A
	Navarro River	N/A	N/A	N/A
	Garcia River	N/A	N/A	N/A
	Other Mendacino County Rivers	N/A	N/A	N/A
	Gualala River	N/A	N/A	N/A
	Russain River	N/A	N/A	N/A
	Other Sonoma County Rivers	N/A	N/A	N/A
	Martin County	N/A	N/A	N/A
	San Mateo County	N/A	N/A	N/A
	Santa Cruz County	N/A	N/A	N/A
	San Lorenzo River	N/A	N/A	N/A
Lower Columbia River (Good et al., 2005)	Youngs Bay	N/A	N/A	N/A
	Grays River	N/A	N/A	N/A
	Elochoman River	N/A	N/A	N/A
	Clatskanie River	N/A	N/A	N/A
	Mill, Abernathy, Germany Creeks	N/A	N/A	N/A
	Scappose Creek	N/A	N/A	N/A
	Cispus River	N/A	N/A	N/A
	Tilton River	N/A	N/A	N/A
	Upper Cowlitz River	N/A	N/A	N/A
	Lower Cowlitz River	N/A	N/A	N/A
	North Fork Toutle River	N/A	N/A	N/A
	South Fork Toutle River	N/A	N/A	N/A
	Coweeman River	N/A	N/A	N/A
	Kalama River	N/A	N/A	N/A
	North Fork Lewis River	N/A	N/A	N/A
	East Fork Lewis River	N/A	N/A	N/A
	Upper Clackamas River	1.028	0.898	1.177
	Lower Clackamas River	N/A	N/A	N/A
	Salmon Creek	N/A	N/A	N/A
	Upper Sandy River	1.102	0.874	1.172
	Lower Sandy River	N/A	N/A	N/A
	Washougal River	N/A	N/A	N/A
	Lower Columbia River gorge tributaries	N/A	N/A	N/A
	White Salmon	N/A	N/A	N/A
	Upper Columbia River gorge tributaries	N/A	N/A	N/A
	Hood River	N/A	N/A	N/A

Coho Salmon (continued)

ESU	Population	λ - H=0	95% CI -lower	95% CI - upper
Southern Oregon and Northern California Coast	Southern Oregon and Northern California Coast	N/A	N/A	N/A
Oregon Coast	Necanicum	N/A	N/A	N/A
	Nehalem	N/A	N/A	N/A
	Tillamook	N/A	N/A	N/A
	Nestucca	N/A	N/A	N/A
	Siletz	N/A	N/A	N/A
	Yaquima	N/A	N/A	N/A
	Alsea	N/A	N/A	N/A
	Siuslaw	N/A	N/A	N/A
	Umpqua	N/A	N/A	N/A
	Coos	N/A	N/A	N/A
	Coquille	N/A	N/A	N/A

Sockeye Salmon

ESU	Population	λ - H=0	95% CI -lower	95% CI - upper
Ozette Lake	Ozette Lake	N/A	N/A	N/A
Snake River	Snake River	N/A	N/A	N/A

Steelhead

DPS	Population	λ - H=0	95% CI -lower	95% CI - upper
Central California Coast (Good et al., 2005)	Russain River	N/A	N/A	N/A
	Lagunitas	N/A	N/A	N/A
	San Gregorio	N/A	N/A	N/A
	Waddell Creek	N/A	N/A	N/A
	Scott Creek	N/A	N/A	N/A
	San Vincente Creek	N/A	N/A	N/A
	San Lorenzo River	N/A	N/A	N/A
	Soquel Creek	N/A	N/A	N/A
	Aptos Creek	N/A	N/A	N/A
California Central Valley (Good et al., 2005)	Sacramento River	0.950	0.900	1.020
Lower Columbia River (Good et al., 2005)	Cispus River	N/A	N/A	N/A
	Tilton River	N/A	N/A	N/A
	Upper Cowlitz River	N/A	N/A	N/A
	Lower Cowlitz River	N/A	N/A	N/A
	Coweeman River	0.908	0.792	1.041
	South Fork Toutle River	0.938	0.830	1.059
	North Fork Toutle River	1.062	0.915	1.233
	Kalama River - winter run	1.010	9.130	1.117
	Kalama River - summer run	0.981	0.889	1.083
	North Fork Lewis River - winter run	N/A	N/A	N/A
	North Fork Lewis River - summer run	N/A	N/A	N/A
	East Fork Lewis River - winter run	N/A	N/A	N/A
	East Fork Lewis River - summer run	N/A	N/A	N/A
	Salmon Creek	N/A	N/A	N/A
	Washougal River - winter run	N/A	N/A	N/A
	Washougal River - summer run	1.003	0.884	1.138
	Clackamas River	0.971	0.901	1.047
	Sandy River	0.945	0.850	1.051
	Lower Columbia gorge tributaries	N/A	N/A	N/A
	Upper Columbia gorge tributaries	N/A	N/A	N/A

Steelhead (continued)

DPS	Population	λ - H=0	95% CI -lower	95% CI - upper
Middle Columbia River (Good et al., 2005)	Klickitat River	N/A	N/A	N/A
	Yakima River	1.009	N/A	N/A
	Fifteenmile Creek	0.981	N/A	N/A
	Deschutes River	1.022	N/A	N/A
	John Day - upper main stream	0.975	N/A	N/A
	John Day - lower main stream	0.981	N/A	N/A
	John Day - upper north fork	1.011	N/A	N/A
	John Day - lower north fork	1.013	N/A	N/A
	John Day - middle fork	0.966	N/A	N/A
	John Day - south fork	0.967	N/A	N/A
	Umatilla River	1.007	N/A	N/A
	Touchet River	0.961	N/A	N/A
Northern California (Good et al., 2005)	Redwood Creek	N/A	N/A	N/A
	Mad River - winter run	1.000	0.930	1.050
	Eel River - summer run	0.980	0.930	1.040
	Mattole River	N/A	N/A	N/A
	Ten Mile river	N/A	N/A	N/A
	Noyo River	N/A	N/A	N/A
	Big River	N/A	N/A	N/A
	Navarro River	N/A	N/A	N/A
	Garcia River	N/A	N/A	N/A
	Gualala River	N/A	N/A	N/A
	Other Humboldt County streams	N/A	N/A	N/A
	Other Mendocino County streams	N/A	N/A	N/A
Puget Sound*	Puget Sound	N/A	N/A	N/A
Snake River (Good et al., 2005)	Tucannon River	0.886	N/A	N/A
	Lower Granite run	0.994	N/A	N/A
	Snake A run	0.998	N/A	N/A
	Snake B run	0.927	N/A	N/A
	Asotin Creek	N/A	N/A	N/A
	Upper Grande Ronde River	0.967	N/A	N/A
	Joseph Creek	1.069	N/A	N/A
	Imnaha River	1.045	N/A	N/A
	Camp Creek	1.077	N/A	N/A
South-Central California Coast	South-Central California Coast	N/A	N/A	N/A
Southern California	Santa Ynez River	N/A	N/A	N/A
	Ventura River	N/A	N/A	N/A
	Matilija River	N/A	N/A	N/A
	Creek River	N/A	N/A	N/A
	Santa Clara River	N/A	N/A	N/A

Steelhead (continued)

DPS	Population	λ - H=0	95% CI -lower	95% CI - upper
Upper Columbia River (Good et al., 2005)	Wenatchee / Entiat Rivers	1.067	N/A	N/A
	Methow / Okanogan Rivers	1.086	N/A	N/A
Upper Williamette River (McElhany et al., 2007)	Molalla River	0.988	0.790	1.235
	North Santiam River	0.983	0.789	1.231
	South Santiam River	0.976	0.855	1.114
	Calapooia River	1.023	0.743	1.409

Appendix 3: Abbreviations

7-DADMax	7-day average of the daily maximum
ACA	Alternative Conservation Agreement
AChE	acetylcholinesterase
a.i.	active ingredient
APEs	alkylphenol ethoxylates
APHIS	U.S. Department of Agriculture Animal Plant and Health Inspection Service
BE	Biological Evaluation
BEAD	Biological and Economic Analysis Divsion
BLM	Bureau of Land Management
BMP	Best Management Practices
BOR	Bureau of Reclaimation
BOR	Bureau of Reclamation
BPA	Bonneville Power Administration
BRT	Biological Review Team (NOAA Fisheries)
BY	Brood Years
CAISMP	California Aquatic Invasive Species Management Plan
CALFED	CALFED Bay-Delta Program (California Resource Agency)
CBFWA	Columbia Basin Fish and Wildlife Authority
CBI	Confidential Business Information
CC	California Coastal
CCC	Central California Coast
CCV	Central California Valley
CDPR	California Department of Pesticide Regulation
CHART	Critical Habitat Assessment Review Team
CIDMP	Comprehensive Irrigation District Management Plan
CFR	Code of Federal Regulations
cfs	cubic feet per second
CDFG	California Department of Fish and Game
Corps	U.S. Department of the Army Corps of Engineers

CSOs	combined sewer/stormwater overflows
CSWP	California State Water Project
CURES	Coalition for Urban/Rural Environmental Stewardship
CVP	Central Valley Projects
CVRWQCB	Central Valley Regional Water Quality Control Board
CWA	Clean Water Act
d	day
DCI	Date Call-Ins
DDD	Dichloro Diphenyl Dichloroethane
DDE	Diphenyl Dichlorethylene
DDT	Dichloro Diphenyl Trichloroethane
DER	Data Evaluation Review
DEQ	Oregon Department of Environmental Quality
DIP	Demographically Independent Population
DOE	Washington State Department of Ecology
DPS	Distinct Population Segment
EC	Emulsifiable Concentrate Pesticide Formulation
EC_{50}	Median Effect Concentration
EEC	Estimated Environmental Concentration
EFED	Environmental Fate and Effects Division
EIM	Environmental Information Management
EPA	U.S. Environmental Protection Agency
ESPP	Endangered Species Protection Program
ESA	Endangered Species Act
ESU	Evolutionarily Significant Unit
EU	European Union
EXAMS	Tier II Surface Water Computer Model
FERC	Federal Energy Regulatory Commission
FCRPS	Federal Columbia River Power System
FFDCA	Federal Food and Drug Cosmetic Act
FIFRA	Federal Insecticide, Fungicide, and Rodenticide Act

FQPA	Food Quality Protection Act
ft	feet
GENEEC	Generic Estimated Exposure Concentration
h	hour
HCP	Habitat Conservation Plan
HSRG	Hatchery Scientific Review Group
HUC	Hydrological Unit Code
IBI	Indices of Biological Integrity
ICTRT	Interior Columbia Technical Recovery Team
ILWP	Irrigated Lands Waiver Program
IPCC	Intergovernmental Panel on Climate Change
IRED	Interim Re-registration Decision
LCFRB	Lower Columbia Fish Recovery Board
ISG	Independent Science Group
ITS	Incidental Take Statement
km	kilometer
Lbs	Pounds
LC_{50}	Median Lethal Concentration.
LCR	Lower Columbia River
LOAEC	Lowest Observed Adverse Effect Concentration.
LOEL	Lowest Observed Adverse Effect level
LOC	Level of Concern
LOEC	Lowest Observed Effect Concentration
LOQ	Limit of Quantification
LWD	Large Woody Debris
m	meter
MCR	Middle Columbia River
mg/L	milligrams per liter
MOA	Memorandum of Agreement
MPG	Major Population Group
MRID	Master Record Identification Number

MTBE	Methyl tert-butyl ether
NASA	National Aeronautics and Space Administration
NAWQA	U.S. Geological Survey National Water-Quality Assessment
NC	Northern California
NEPA	National Environmental Protection Agency
NLCD	Natural Land Cover Data
NP	Nonylphenol
NPDES	National Pollutant Discharge Elimination System
NPS	National Parks Services
NRCS	Natural Resources Conservation Service
NWS	National Weather Service
NEPA	National Environmental Policy Act
NMA	National Mining Association
NMC	*N*-methyl carbamates
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NOAEC	No Observed Adverse Effect Concentration
NPDES	National Pollution Discharge Eliminating System
NPIRS	National Pesticide Information Retrieval System
NRC	National Research Council
OC	Oregon Coast
ODFW	Oregon Division of Fish and Wildlife
OP	Organophosphates
Opinion	Biological Opinion
OPP	EPA Office of Pesticide Program
PAH	polyaromatic hydrocarbons
PBDEs	polybrominated diphenyl ethers
PCBs	polychlorinated biphenyls
PCEs	primary constituent elements
POP	Persistent Organic Pollutants
ppb	Parts Per Billion

PPE	Personal Protection Equipment
PSP	Pesticide Stewardship Partnerships
PSAMP	Puget Sound Assessment and Monitoring Program
PSAT	Puget Sound Action Team
PRIA	Pesticide Registration Improvement Act
PRZM	Pesticide Root Zone Model
PUR	Pesticide Use Reporting
QA/QC	Quality Assurance/Quality Control
RED	Re-registration Eligibility Decision
REI	Restricted Entry Interval
RPA	Reasonable and Prudent Alternatives
RPM	reasonable and prudent measures
RQ	Risk Quotient
SAP	Scientific Advisory Panel
SAR	smolt-to-adult return rate
SASSI	Salmon and Steelhead Stock Inventory
SC	Southern California
S-CCC	South-Central California Coast
SONCC	Southern Oregon Northern California Coast
SLN	Special Local Need (Registrations under Section 24(c) of FIFRA)
SR	Snake River
TCE	Trichloroethylene
TCP	3,5,6-trichloro-2-pyridinal
TGAI	Technical Grade Active Ingredient
TIE	Toxicity Identification Evaluation
TMDL	Total Maximum Daily Load
TRT	Technical Recovery Team
UCR	Upper Columbia River
USFS	United States Forest Service
USC	United States Code
USFWS	United States Fish and Wildlife Service

USGS	United States Geological Survey
UWR	Upper Willamette River
VOC	Volatile Organic Compounds
VSP	Viable Salmonid Population
WDFW	Washington Department of Fish and Wildlife
WLCRTRT	Willamette/Lower Columbia River Technical Review Team
WQS	Water Quality Standards
WWTIT	Western Washington Treaty Indian Tribes
WWTP	Wastewater Treatment Plant

Appendix 4: Glossary

303(d) waters Section 303 of the federal Clean Water Act requires states to prepare a list of all surface waters in the state for which beneficial uses – such as drinking, recreation, aquatic habitat, and industrial use - are impaired by pollutants. These are water quality limited estuaries, lakes, and streams that do not meet the state's surface water quality standards and are not expected to improve within the next two years. After water bodies are put on the 303(d) list they enter into a Total Maximum Daily Load Clean Up Plan.

Active ingredient	The component(s) that kills or otherwise affects the pest. A.i.s are always listed on the label (FIFRA 2(a)).
Adulticide	A compound that kills the adult life stage of the pest insect.
Anadromous Fish	Species that are hatched in freshwater migrate to and mature in salt water and return to freshwater to spawn.
Adjuvant	A compound that aides the operation or improves the effectiveness of a pesticide.
Alevin	Life history stage of a salmonid immediately after hatching and before the yolk-sac is absorbed. Alevins usually remain buried in the gravel in or near the egg nest (redd) until their yolk sac is absorbed when they swim up and enter the water column.
Anadromy	The life history pattern that features egg incubation and early juvenile development in freshwater migration to sea water for adult development, and a return to freshwater for spawning.
Assessment Endpoint	Explicit expression of the actual ecological value that is to be protected (*e.g.*, growth of juvenile salmonids).

Bioaccumulation	Accumulation through the food chain (*i.e.*, consumption of food, water/sediment) or direct water and/or sediment exposure.
Bioconcentration	Uptake of a chemical across membranes, generally used in reference to waterborne exposures.
Biomagnification	Transfer of chemicals via the food chain through two or more trophic levels as a result of bioconcentration and bioaccumulation.
Degradates	New compounds formed by the transformation of a pesticide by chemical or biological reactions.
Distinct Population Segment	A listable entity under the ESA that meets tests of discreteness and significance according to USFWS and NMFS policy. A population is considered distinct (and hence a "species" for purposes of conservation under the ESA) if it is discrete fro an significant to the remainder of its species based n factors such as physical, behavioral, or genetic characteristics, it occupies an unusual or unique ecological setting, or its loss would represent a significant gap in the species' range.
Escapement	The number of fish that survive to reach the spawning grounds or hatcheries. The escapement plus the number of fish removed by harvest form the total run size.
Evolutionarily Significant Unit	A group of Pacific salmon or steelhead trout that is (1) substantially reproductively isolated from other conspecific units and (2) represent an important component of the evolutionary legacy of the species.
Fall Chinook	This salmon stock returns from the ocean in late summer and early

Salmon	fall to head upriver to its spawning grounds, distinguishing it from other stocks which migrate in different seasons.
Fate	Dispersal of a material in various environmental compartments (sediment, water air, biota) as a result of transport, transformation, and degradation.
Flowable	A pesticide formulation that can be mixed with water to form a suspension in a spray tank.
Fry	Stage in salmonid life history when the juvenile has absorbed its yolk sac and leaves the gravel of the redd to swim up into the water column. The fry stage follows the alevin stage and in most salmonid species is followed by the parr, fingerling, and smolt stages. However, chum salmon juveniles share characteristics of both the fry and smolt stages and can enter sea water almost immediately after becoming fry.
Half-pounder	A life history trait of steelhead exhibited in the Rogue, Klamath, Mad, and Eel Rivers of southern Oregon and northern California. Following smoltification, half-pounders spend only 2-4 months in the ocean, then return to fresh water. They overwinter in fresh water and emigrate to salt water again the following spring. This is often termed a false spawning migration, as few half-pounders are sexually mature.
Hatchery	Salmon hatcheries use artificial procedures to spawn adults and raise the resulting progeny in fresh water for release into the natural environment, either directly from the hatchery or by transfer into another area. In some cases, fertilized eggs are outplanted (usually in "hatch-boxes"), but it is more common to release fry or smolts.
Inert ingredients	"an ingredient which is not active" (FIFRA 2(m)). It may be toxic or enhance the toxicity of the active ingredient.

Iteroparous	Capable of spawning more than once before death
Jacks	Male salmon that return from the ocean to spawn one or more years before full-sized adults return. For coho salmon in California, Oregon, Washington, and southern British Columbia, jacks are 2 years old, having spent only 6 months in the ocean, in contrast to adults, which are 3 years old after spending 1 ½ years in the ocean.
Jills	Female salmon that return from the ocean to spawn one or more years before full-sized adult returns. For sockeye salmon in Oregon, Washington, and southern British Columbia, jills are 3 years old (age 1.1), having spent only one winter in the ocean in contrast to more typical sockeye salmon that are age 1.2, 1.32.2, or 2.3 on return.
Kokanee	The self-perpetuating, non-anadromous form of *O. nerka* that occurs in balanced sex ration populations and whose parents, for several generations back, have spent their whole lives in freshwater.
Lambda	Also known as Population growth rate, or the rate at which the abundance of fish in a population increases or decreases.
LRL	Laboratory Reporting Level (USGS NAWQA data)- Generally equal to twice the yearly determined LT-MDL. The LRL controls false negative error. The probability of falsely reporting a non-detection for a sample that contained an analyte at a concentration equal to or greater that the LRL is predicted to be less than or equal to 1 percent.
Major Population Group (MPG)	A group of salmonid populations that are geographically and genetically cohesive. The MPG is a level of organization between demographically independent populations and the ESU.

Main channel	The stream channel that includes the thalweg (longitudinal continuous deepest portion of the channel.
Metabolite	A transformation product resulting from metabolism.
Mode of Action	A series of key processes that begins with the interaction of a pesticide with a receptor site and proceeds through operational and anatomical changes in an organisms that result in sublethal or lethal effects.
Natural fish	A fish that is produced by parents spawning in a stream or lake bed, as opposed to a controlled environment such as a hatchery.
Nonylphenols	A type of APE and is an example of an adjuvant that may be present as an ingredient of a formulated product or added to a tank mix prior to application.
Off-channel habitat	Water bodies and/or inundated areas that are connected (accessible to salmonid juveniles) seasonally or annually to the main channel of a stream including but not limited to features such as side channels, alcoves, ox bows, ditches, and floodplains.
Parr	The stage in anadromous salmonid development between absorption of the yolk sac and transformation to smolt before migration seaward.
Persistence	The tendency of a compound to remain in its original chemical form in the environment.
Pesticide	Any substance or mixture of substances intended for preventing, destroying, repelling or mitigating any pest.

Reasonable and Prudent Alternative (RPA)	Recommended alternative actins identified during formal consultation that can be implemented in a manner consistent with the scope of the Federal agency's legal authority an jurisdiction, that are economically an technologically feasible, an that the Services believes would avoid the likelihood of jeopardizing the continued existence of the listed species or the destruction or adverse modification of designated critical habitat.
Redd	A nest constructed by female salmonids in streambed gravels where eggs are deposited and fertilization occurs.
Riparian area	Area with distinctive soils an vegetation between a stream or other body of water and the adjacent upland. It includes wetlands and those portions of flood plains an valley bottoms that support riparian vegetation.
Risk	The probability of harm from actual or predicted concentrations of a chemical in the aquatic environment – a scientific judgement.
Salmonid	Fish of the family *Salmonidae*, including salmon, trout, chars, grayling, and whitefish. In general usage, the term usually refers to salmon, trout, and chars.
SASSI	A cooperative program by WDFW and WWTIT to inventory and evaluate the status of Pacific salmonids in Washington State. The SASSI report is a series of publications from this program.
Semelparous	The condition in an individual organism of reproducing only once in a lifetime.

Smolt	A juvenile salmon or steelhead migrating to the ocean and undergoing physiological changes to adapt from freshwater to a saltwater environment.
Sublethal	Below the concentration that directly causes death. Exposure to sublethal concentrations of a material may produce less obvious effect on behavior, biochemical, and/or physiological function of the organism often leading to indirect death.
Surfactant	A substance that reduces the interfacial or surface tension of a system or a surface-active substance.
Synergism	A phenomenon in which the toxicity of a mixture of chemicals is greater than that which would be expected from a simple summation of the toxicities of the individual chemicals present in the mixture.
Technical Grade Active Ingredient (TGAI)	Pure or almost pure active ingredient. Available to formulators. Most toxicology data are developed with the TGAI. The percent AI is listed on all labels.
Technical Recovery Teams (TRT)	Teams convened by NOAA Fisheries to develop technical products related to recovery planning. TRTs are complemented by planning forums unique to specific states, tribes, or reigns, which use TRT and other technical products to identify recovery actions.
Teratogenic	Effects produced during gestation that evidence themselves as altered structural or functional processes in offspring.
Total Maximum	defines how much of a pollutant a water body can tolerate (absorb)

Daily Load (TMDL)	daily and remain compliant with applicable water quality standards. All pollutant sources in the watershed combined, including non-point sources, are limited to discharging no more than the TMDL.
Unique Mixture	A specific combination of 2 or more compounds, regardless of the presence of other compounds.
Viable Salmonid Population	An independent population of Pacific salmon or steelhead trout that has a negligible risk of extinction over a 100-year time frame. Viability at the independent population scale is evaluated based on the parameters of abundance, productivity, spatial structure, and diversity.
VSP Parameters	Abundance, productivity, spatial structure, and diversity. These describe characteristics of salmonid populations that are useful in evaluating population viability. See NOAA Technical Memorandum NMFS-NWFSC-, "Viable salmonid populations and the recovery of evolutionarily significant units," McElhany et al., June 2000.
WDFW	Washington Department of Fish and Wildlife is a co-manager of salmonids and salmonid fisheries in Washington State with WWTIT and other fisheries groups. The agency was formed in the early 1990s by the combination of the Washington Department of Fisheries and the Washington Department of Wildlife.
WWTIT	Western Washington Treaty Indian Tribes is an organization of Native American tribes with treaty fishing rights recognized by the U.S. government. WWTIT is a co-manager of salmonids and salmonid fisheries in western Washington in cooperation with the WDFW and other fisheries groups.

WQS	"A water quality standard defines the water quality goals of a waterbody, or portion thereof, by designating the use or uses to be made of the water and by setting criteria necessary to protect public health or welfare, enhance the quality of water and serve the purposes of the Clean Water Act." Each state is responsible for maintaining water quality standards.

NPDES Municipal Storm-Water Permit
(NPDES No. CAS0108766)

Fiscal Year 2008-2009

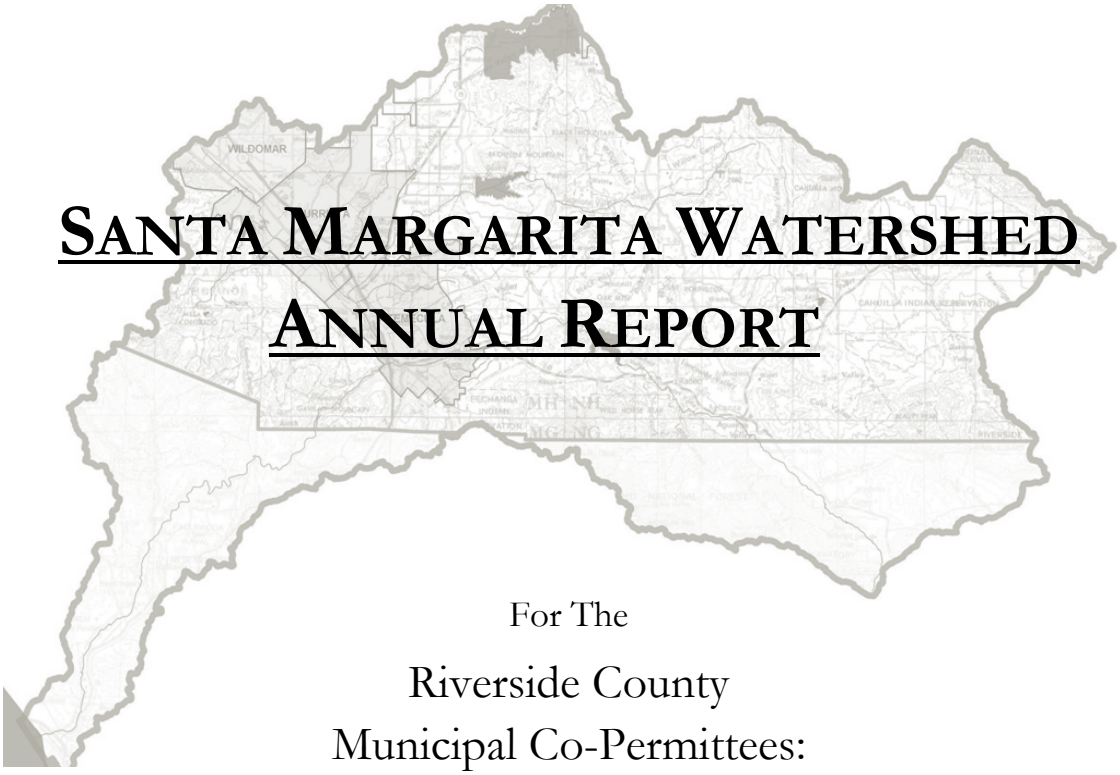

SANTA MARGARITA WATERSHED ANNUAL REPORT

For The

Riverside County
Municipal Co-Permittees:

- County of Riverside
- City of Murrieta
- City of Temecula
- Riverside County Flood Control and Water Conservation District (District)

And covering regional activities within the new cities of Menifee and Wildomar

Board Order No. R9-2004-001
California Regional Water Quality Control Board
San Diego Region

CERTIFICATION

FY 2008-2009 Watershed Annual Report

For the

Santa Margarita Watershed

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Signed: Mark H. Wills Date: 10/29/09

Mark H. Wills
Chief of Regulatory Division
Riverside County Flood Control
and Water Conservation District

Bill Luna
County Executive Officer

Jay E. Orr
Assistant County Executive Officer

Executive Office, County of Riverside

County of Riverside Certification Statement

I Certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based upon my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Gary M. Christmas
Signature

Gary Christmas, Chief Deputy County Executive Officer

September 30, 2009
Date

Robert T. Andersen Administrative Center
4080 Lemon Street • 4th Floor • Riverside, California 92501 • (951) 955-1100 • Fax (951) 955-1105

SANTA MARGARITA WATERSHED ANNUAL PROGRESS REPORT

Reporting Period
July 1, 2008 to June 30, 2009

CERTIFICATION STATEMENT

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Signature

Mr. Patrick A. Thomas / Director of Public Works
Name & Title

10/26/09
Date

WATERSHED ANNUAL REPORT CERTIFICATION STATEMENT

I certify under penalty of law that this document and all attachments were prepared or reviewed under my direction or supervision in accordance with a system designed to ensure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Signature

Daniel A. York, City Engineer
Name and Title, Printed or Typed

October 20, 2009
Date

EXECUTIVE SUMMARY

This Watershed Annual Report documents the area-wide and watershed-based Urban Runoff management programs and activities that were implemented by the Permittees during Fiscal Year 2008-2009 (July 1, 2008 through June 30, 2009) to reduce pollutants in Urban Runoff to the Maximum Extent Practicable (MEP). The regional programs reported upon herein are described in the Riverside County Drainage Area Management Plan (DAMP), which serves as the Permittees Watershed SWMP. These programs have been created and implemented in accordance with and to comply with the requirements of Provision K and the Monitoring and Reporting Program (MRP) of the Municipal Separate Storm Sewer System (MS4) Permit issued to the Riverside County Permittees by the San Diego Regional Water Quality Control Board (Regional Board) on July 14, 2004 (Board Order R9-2004-001). This is the third MS4 permit issued for the Santa Margarita Region of Riverside County (SMR) by the Regional Board and is referred to as the "Third-term SMR Permit".

This reporting period covers the fifth year and final year of the five-year duration of the Third Term MS4 Permit. In January 2009, 180 days before the expiration of the Third Term Permit, the Permittees submitted their Report of Waste Discharge (ROWD) to the Regional Board as their application for the Fourth-Term of the SMR Permit. This ROWD included a comprehensive analysis of the effectiveness of the Permittees' storm-water management programs and resulted in specific and included specific recommendations for enhancing these programs. This annual report continues the documentation.

Within this Watershed Annual Report the terms "Watershed SWMP" and "DAMP" are used interchangeably, and the term "Standard Urban Storm-water Management Plan (SUSMP)" referenced in the SMR Permit is hereinafter referred to as the "Water Quality Management Plan (WQMP)". Additional terms and acronyms used in this Watershed Annual Report are defined in the glossary included in the DAMP.

A copy of the Third-term SMR Permit is included as Appendix C of the DAMP.

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A. OVERVIEW OF THE UPPER SANTA MARGARITA WATERSHED

A.1. OVERVIEW OF THE SMR

The SMR is defined as the area delineated by the Riverside-San Diego County boundary line on the south and the Santa Margarita River watershed boundary line on the north, east, and west as shown in Figure A-1. The area includes portions of unincorporated County of Riverside and the Cities of Murrieta and Temecula. Portions of the newly incorporated cities of Menifee and Wildomar are also located within the SMR and have submitted their Notice of Intent to comply with the fourth-term permit as part of the ROWD. Further, the SMR is comprised entirely of the Murrieta Creek and Temecula Creek sub-watersheds.

It is important to recognize that the Clean Water Act exempts agricultural activities from regulation under NPDES. Further, under federal and state law, Permittees do not have legal jurisdiction over storm-water discharges into their respective MS4 from:

- State and Federal facilities,
- Utilities and special districts,
- Native American tribal lands.

Photo A-1: Santa Margarita River, just below confluence of Murrieta and Temecula Creeks

Although these areas may exist within Riverside County, they are not included in the SMR. However, the current Permit requires the Permittees to coordinate with these stakeholders to reduce discharges from their lands. In addition, other point and non-point source discharges otherwise permitted by or under the jurisdiction of the Regional Board may affect water quality in the Murrieta and Temecula Creek watersheds. Current land uses within the SMR are shown on the Watershed Facilities Map in Appendix F.

The area of Riverside County under the jurisdiction of the Regional Board is approximately 548 square miles, which is less than 8 percent of the 7,300 square miles within Riverside County. Not counting the two newly incorporated cities, only three of the 24 existing general-purpose municipalities within Riverside County are located within the SMR. Figure A-1 below shows the Permit area and the incorporated Cities.

Figure A-1

SANTA MARGARITA RIVER WATERSHED

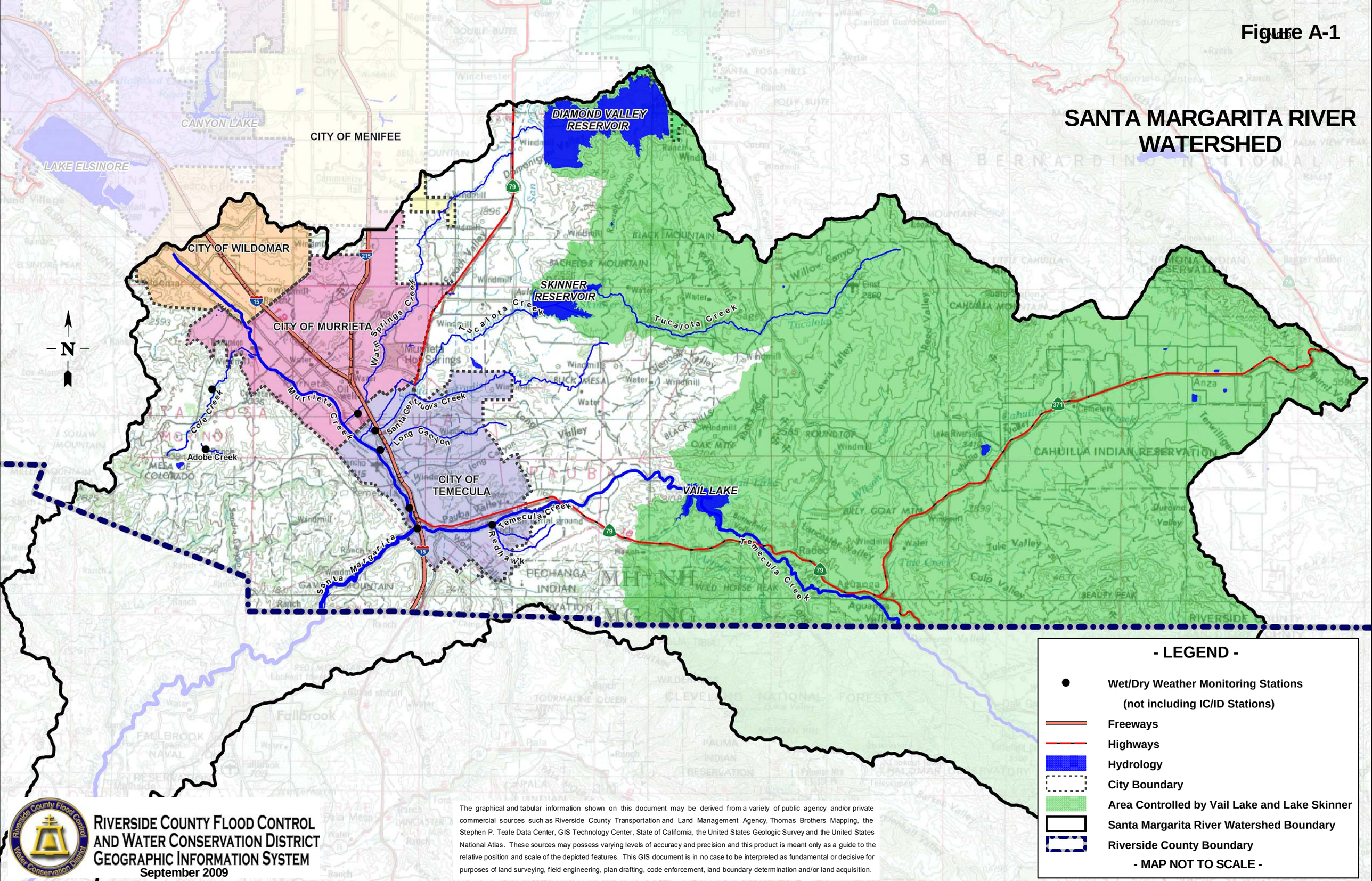

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
GEOGRAPHIC INFORMATION SYSTEM
September 2009

The graphical and tabular information shown on this document may be derived from a variety of public agency and/or private commercial sources such as Riverside County Transportation and Land Management Agency, Thomas Brothers Mapping, the Stephen P. Teale Data Center, GIS Technology Center, State of California, the United States Geologic Survey and the United States National Atlas. These sources may possess varying levels of accuracy and precision and this product is meant only as a guide to the relative position and scale of the depicted features. This GIS document is in no case to be interpreted as fundamental or decisive for purposes of land surveying, field engineering, plan drafting, code enforcement, land boundary determination and/or land acquisition.

A.2. CHANGES IN POPULATION

The California Department of Finance estimates that as of January 1, 2009, the total population of the whole of Riverside County was approximately 2,107,653[1]. Of the 2.10 million people, roughly 256,194 persons[2] (12%) reside within the SMR. Approximately 31,163 persons reside in unincorporated county areas while approximately 225,031 persons reside within incorporated cities.

Figure A-2 2009 Population Distribution within SMR [3]

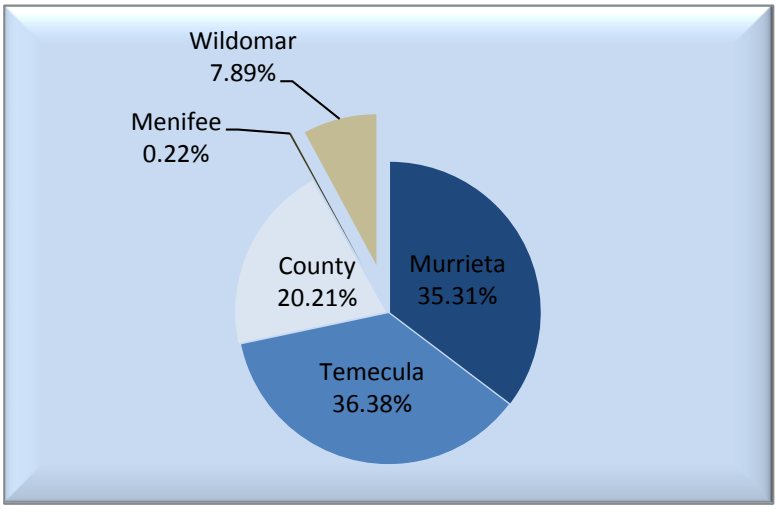

Table A-1 shows the population data for years 2004-2009 for the neighboring counties and for each of the Cities within the Permit area between years 2004 and 2009. Throughout the first four years of the Third-term of the SMR Permit (2004-2008), population growth in Riverside County was significantly higher than in neighboring counties and was also greater than the percent change in population in the entire State. However, this has not been the case for Fiscal year 2008-2009 wherein current estimates show a net reduction in population within the SMR. This limited growth and economic hardship is forecasted to continue well into the next permit term as described in the 2009 ROWD.

1 State of California, Department of Finance, E-1 population Estimates for Cities, Counties and the State with Annual Percent Change — January 1, 2008 and 2009. Sacramento, California, May 2009

2 Aerial image analysis based upon 2007 imagery and State identified trend of declined population in unincorporated Riverside County.

3 The recently incorporated cities of Menifee and Wildomar have submitted their notice of intent to participate in the upcoming 4th Term MS4 Permit as part of the 2009 ROWD.

Table A-1: Population History [a]

	1/1/2004	1/1/2005	1/1/2006	1/1/2007	1/1/2008	1/1/2009
Regional Populations [a]						
State	36,271,091	36,728,196	37,195,240	37,662,518	38,049,462	38,292,687
Los Angeles County	10,107,451	10,166,417	10,257,994	10,331,939	10,363,850	10,393,185
Orange County	3,022,613	3,047,054	3,071,924	3,098,121	3,121,151	3,139,017
San Bernardino County	1,897,950	1,950,806	1,993,983	2,028,013	2,055,766	2,060,950
San Diego County	3,013,014	3,039,277	3,064,113	3,098,269	3,146,274	3,173,407
Riverside County	1,807,858	1,888,311	1,966,607	2,031,625	2,088,322	2,107,653
SMR Populations						
Unincorporated Area	ND	ND	ND	55,291[d]	57,005[d]	31,163[c]
Menifee[b]	N/A	N/A	N/A	N/A	N/A	613[c]
Murrieta	79,045	85,648	93,567	97,257	100,173	99,574[c]
Temecula	78,841	81,921	94,575	97,935	101,057	102,604[c]
Wildomar[b]	N/A	N/A	N/A	N/A	N/A	22,240[c]

(a) Unless otherwise noted, data derived from State of California, Department of Finance, E-1 population Estimates for Cities, Counties and the State with Annual Percent Change — January 1, 2008 and 2009. Sacramento, California, May 2009

(b) The recently incorporated cities of Menifee and Wildomar have submitted their notice of intent to participate in the upcoming 4th Term MS4 Permit as part of the 2009 SMR ROWD.

(c) Aerial image analysis based upon 2007 imagery and State identified trend of declined population in unincorporated Riverside County.

(d) Derived from the Riverside County Progress Report, Riverside County Center for Demographic Research/TLMA.

(e) ND = No Data

A.3. CHANGES IN LAND USE

In 1956, only 0.3 percent of the SMR (less than two square miles) was urbanized.[4] Over half a century later, even with a significant rate of growth in population relative to the State and neighboring counties, approximately 87 percent of the SMR remains in non-urban land uses (rural residential, agriculture, preserves and open space, state lands, federal lands, and tribal lands). Further, almost thirty percent (30%) of the watershed within the county consists of federal, state, and tribal lands[5] that are not under the jurisdiction of the Permittees' MS4 programs.

Changes in zoned land uses from 2008 to 2009 are shown in on the next page in Table A-2. A Map of the various land uses in the SMR is included in Appendix F.

[4] State of California Department of Public Works, Division of Water Resources, Bulletin No. 57, Santa Margarita River Investigation, Volume I, June 1956.

[5] Riverside County Assessor Parcel Data, Close of Roll 2009.

Table A-2: Zoned Land Use

	2008					2009							Change	
	(Acres)				% of Total	(Acres)						% of Total	2008 to 2009	
	Uninc[b]	Murrieta	Temecula	Total		Uninc[b]	Menifee	Murrieta	Temecula	Wildomar	Total		(Acres)	%
Commercial	2,878	3,178	2,284	8,339	2.5%	3,002	9	2,168	2,197	559	7,935	2.3%	-404	-0.2%
Industrial	114	212	637	963	0.3%	114	8	212	648	37	1,019	0.3%	55	0.0%
Urban Residential (< 1 acre)	2,619	4,850	5,187	12,656	3.7%	2,612	34	4,850	5,189	1,475	14,160	4.1%	1,504	0.3%
Parks & Recreation Facilities	1,247	1,182	1,862	4,291	1.3%	1,499	85	1,209	1,890	122	4,805	1.4%	513	0.1%
Streets & Roads	9,057	3,178	3,204	15,439	4.6%	9,071	65	3,188	3,217	870	16,411	4.7%	973	0.2%
Subtotal – Urban Land Use	**15,914**	**12,600**	**13,174**	**41,689**	**12.3%**	**16,298**	**200**	**11,627**	**13,141**	**3,063**	**44,330**	**12.7%**	**2,641**	**0.4%**
Preserves & Open Space	49,601	3,318	1,222	54,141	16.0%	50,144	0	3,153	1,213	1,566	56,076	16.1%	1,936	0.1%
Rural Residential (> 1 acre)	99,886	3,748	3,139	106,773	31.5%	99,134	497	3,823	3,130	2,548	109,132	31.3%	2,359	-0.2%
Agriculture	35,248	973	169	36,389	10.7%	35,202	55	853	113	1,996	38,220	11.0%	1,831	0.2%
Highways & Roads	--	--	--	0	0.0%	--	--	--	--	--	0	0.0%	0	0.0%
Federal/State/Tribal Lands/Non-County Jurisdiction (Exempt)	96,927	1,546	1,604	100,076	29.5%	96,730	0	1,604	1,634	902	100,870	28.9%	794	-0.6%
No Land Use Designation	--	--	--	0	0.0%	--	--	--	--	--	0	0.0%	0	0.0%
Total	**297,576**	**22,184**	**19,308**	**339,068**	**100%**	**297,509**	**752**	**21,060**	**19,231**	**10,075**	**348,627**	**100.0%**	**9,560**	**0.0%**

(a) 2008 figures based upon Riverside County Assessor Parcel Data, Close of Roll 2008. 2009 figures based on County Assessor Parcel Data, Close of Roll, 2009

(b) Uninc = Unincorporated County

A.4. CONSERVED LANDS

Approximately 136 square miles, or 25% of the Permit Area has been successfully conserved as part of the Permittee's implementation of the Western Riverside County Multiple Species Habitat Conservation Plan (MSHCP). Additionally, through the continued implementation of the MSHCP much of the remaining non-urbanized area will ultimately be conserved, totaling approximately 43% of the Permit Area.

Figure A-3: Conservation within the Santa Margarita Region of Riverside County

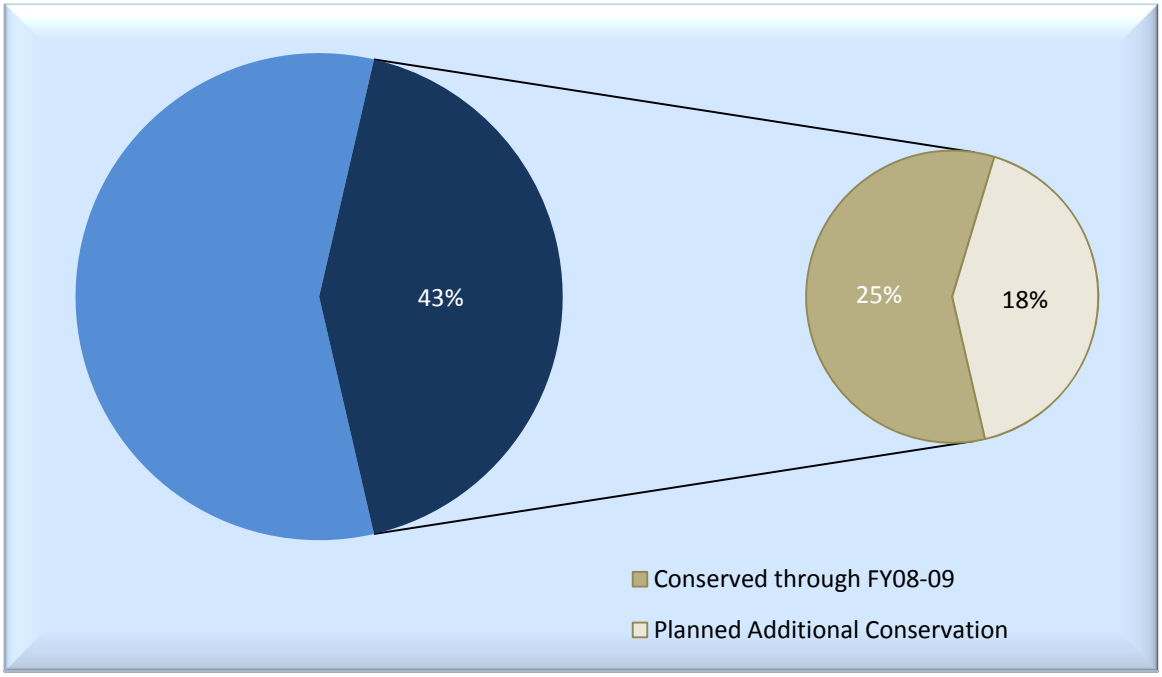

Additional information regarding the MSHCP can be found in Section G.3.3 and the current status of the MSHCP can be found in Section H.1.1.a) of this report.

Figure A-4 contains a map of the currently conserved lands within the Santa Margarita Watershed.

Figure B-4: Santa Margarita Watershed MSHCP Acquisitions and Public/Quasi-Public Conserved Lands
Pre-Plan Thru FY 2009

020015

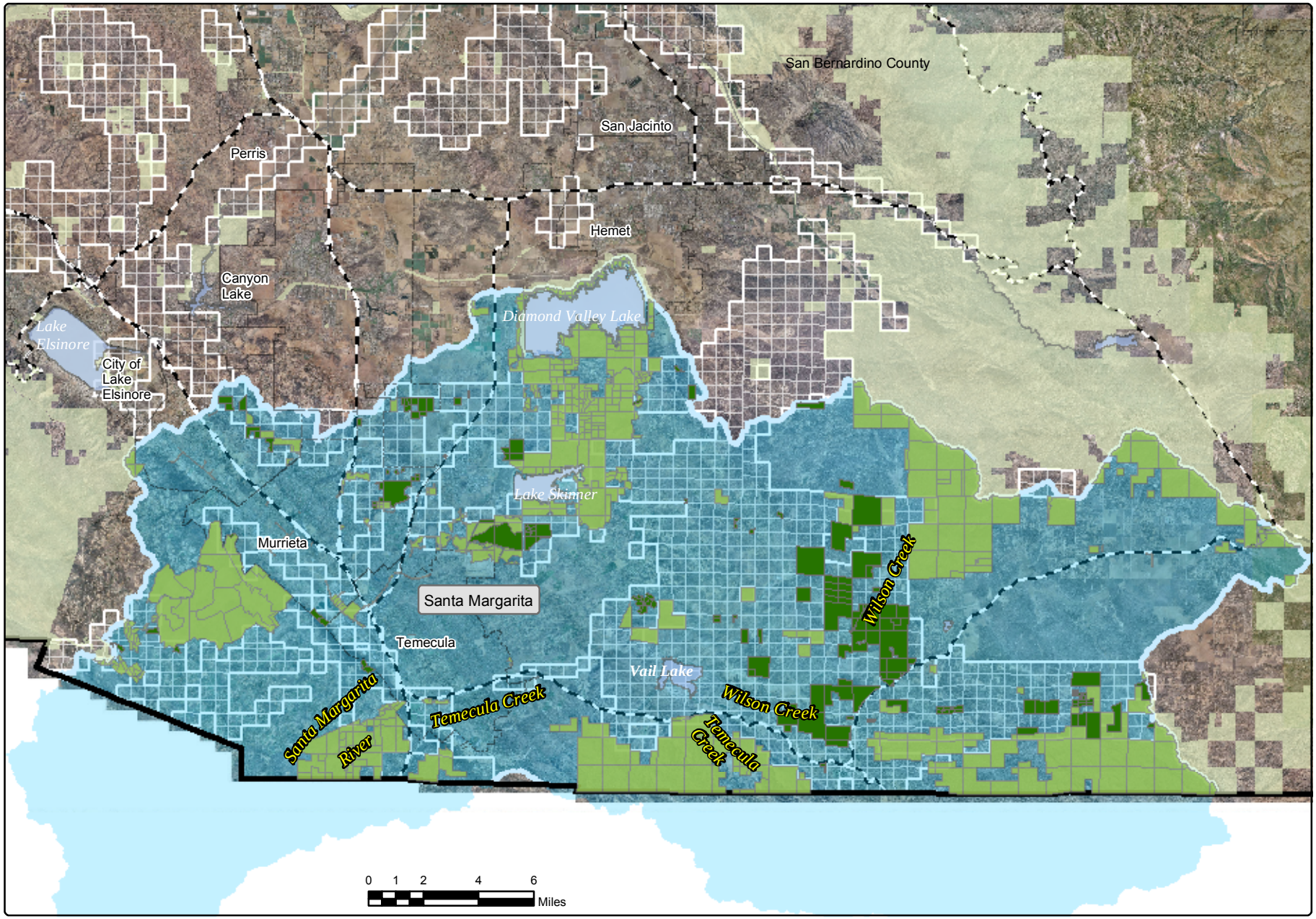

July 2009

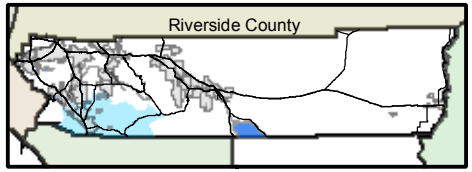

Santa Margarita Watershed
Waterbodies
Creeks & Rivers
City Boundaries
Highways
Public/Quasi-Public Conserved Lands

Conserved Lands within Santa Margarita Watershed for Riverside County

MSHCP Conserved Lands 15,089.59 Acres Approx.

Public/Quasi-Public Conserved Lands 72,317.54 Acres Approx.

B. A DESCRIPTION OF EFFORTS TO COORDINATE WITH OTHER STAKEHOLDERS IN THE SANTA MARGARITA RIVER WATERSHED, INCLUDING SAN DIEGO COUNTY AND THE US MARINE CORPS BASE CAMP PENDLETON.

B.1. INTRODUCTION

The Permittees schedule at least one annual meeting with representatives from the San Diego County MS4 Permittees within the Santa Margarita River watershed, Camp Pendleton, U.S. Bureau of Reclamation (Bureau), and others. The purpose of these meetings is to:

- Exchange ideas of how to address sources of Focus Area Constituents of Concern and evaluate effectiveness of actions;
- Collaborate with water districts in an effort to reduce irrigation water runoff; and
- Consider grant applications to coordinate and prioritize water quality projects that address Focus Area Constituents of Concern.

And to Discuss:

- Land use planning;
- Monitoring data and potential management measures to target Focus Area Constituents of Concern;
- The proposed Santa Margarita Lagoon Total Maximum Daily Load (Lagoon TMDL);
- Watershed based planning issues and a watershed model for the Santa Margarita River;
- Implementation of the Integrated Regional Watershed Management Plan for the Upper Santa Margarita Watershed, and its coordination with the adjacent San Diego and Orange County Integrated Regional Watershed Management Plans
- Formation of a Watershed Council
- Coordination of regional monitoring programs within the Santa Margarita Watershed

These meetings may occur from within the context of another workgroup, such as the Santa Margarita River Executive Management Team, or as separately called meetings, as appropriate. Several of these efforts are inter-coordinated and have been administered, at stakeholder request, by the Bureau. The Bureau administered efforts are coordinated by the Santa Margarita River Executive Management Team (SMREMT). The IRWM and Watershed Council efforts are conducted outside the management of the Bureau and the SMREMT.

The District, in consultation with the Permittees, participates in several additional cooperative activities through formal or informal regional stakeholder workgroups. These efforts can broadly be categorized as management efforts to address general storm-water quality issues that also pertain to the Santa Margarita River watershed.

These efforts may be expanded, reduced or abandoned over time based on budget, changing regulations, program needs, program effectiveness consideration, or other factors.

B.2. SANTA MARGARITA RIVER EXECUTIVE MANAGEMENT TEAM (SMREMT)

During FY2008-2009, the District and the Permittees continued their participation in the SMREMT. The SMREMT's goal is to facilitate high-level communication and planning among stakeholders in the Santa Margarita watershed to aggressively identify and address the highest priority water quality concerns, including 303(d) listings.

Participants include:

- District,
- U.S. Bureau of Reclamation (Bureau)
- Western Municipal Water District
- Eastern Municipal Water District
- Fallbrook Public Utilities District,
- U.S. Marine Corps Camp Pendleton
- County of San Diego
- Mission Resource Conservation District (MRCD)
- Elsinore-Murrieta-Anza RCD,
- Regional Board
- San Diego State University.

The SMREMT oversees the Lagoon TMDL Workgroup and the Water Quality Monitoring Group (WQMG) described below. Two **(2)** meetings were held specifically for the SMREMT within the reporting period. The stakeholder representatives that attend the SMREMT meetings are typically the same as for the TMDL Workgroup. As such many SMREMT meetings are combined with Lagoon TMDL Workgroup meetings and are reported upon in section B.3 below.

Copies of meeting Agendas for the SMREMT (where available) are contained in Appendix A.

B.3. LAGOON TMDL WORKGROUP

On July 19, 2006 the Regional Board issued an investigative order (Order R9-2006-0076) to the stakeholders in the Santa Margarita River Watershed to gather monitoring data for the development of a nutrient TMDL for the Santa Margarita Lagoon.

In compliance with this Order, the Permittees have been working with the Regional Board and the other stakeholders through the SMREMT to fund and oversee the development of a comprehensive program to collect data that will in turn be used by Regional Board staff to model the various inputs to the lagoon and develop this TMDL.

Eleven (11) meetings were held for the Lagoon TMDL Workgroup within the reporting period.

The status of the Permittees' compliance with Order R9-2006-0076 is described in Appendix G, Section G-7.4. Copies of meeting Agendas for the Lagoon TMDL Workgroup (where available) are contained in Appendix A.

B.4. SANTA MARGARITA WATERSHED WATER QUALITY MONITORING GROUP (WQMG)

The WQMG is a subcommittee of the SMREMT (described in section B.2) and was established to coordinate the monitoring efforts of various stakeholders in the Santa Margarita watershed. Many of these stakeholders are also involved in the broader monitoring coordination effort for of the greater Southern California region through the SMC (described in section B.5). This group meets as needed to discuss monitoring issues specific to the Santa Margarita Watershed.

Parties involved in this group are:

- District
- United States Bureau of Reclamation (Bureau)
- San Diego County,
- California Department of Transportation (Caltrans),
- United States Marine Corps Base, Camp Pendleton,
- City of Temecula,
- City of Murrieta,
- Eastern Municipal Water District,
- Rancho California Water District,
- Fallbrook Public Utilities District

There were no meetings held for the WQMG within the reporting period.

B.5. SOUTHERN CALIFORNIA STORMWATER MONITORING COALITION (SMC)

The SMC was formed in 2001 by cooperative agreement of the Phase I municipal storm-water NPDES lead Permittees, the NPDES regulatory agencies in southern California and the Southern California Coastal Water Research Project (SCCWRP). The overall goal for the SMC is to establish a Southern California storm-water research and monitoring agenda that would focus on improving storm-water monitoring science coordinate data collection efforts, and evaluating the effects of storm-water discharges to receiving waters specific to Southern California.

The District participates in the Storm-water Monitoring Coalition (SMC) on behalf of the SMR Permittees. The SMC includes representatives from:

- SWRCB
- Los Angeles RWQCB,
- San Diego RWQCB,
- Santa Ana RWQCB,
- District,
- Los Angeles County,
- Orange County,
- San Bernardino County,
- San Diego County,
- Ventura County,
- Caltrans
- City of Los Angeles.
- SCCWRP
- United States Environmental Protection Agency, Region 9,
- United States Environmental Protection Agency, Office of Research and Development

The District, on behalf of the Permittees, is currently working with the SMC on several regional studies including:

- A Hydromodification Study (see Appendix G, Section G-7.2.1)
- A Low Impact Development Study. (see Appendix G, Section G-7.2.2)
- Laboratory Inter-calibration Study (See Appendix G, Section G-7.5)
- LID BMP Study (See Appendix G, Section G-7.2.2)
- Regional Bio-assessment Monitoring Program (See Appendix G, Section G-7.5)
- Standardization of Toxicity Testing Methods (See Appendix G, Section G-7.5)

Additionally, the District is also coordinating with the Southern California Coastal Water Research Project (SCCWRP), who facilitates the SMC, to collect data on natural loadings of various pollutants from watersheds throughout Southern California.

At least Nine (9) SMC Meetings were held within the Reporting Period and consisted of either general meetings of the SMC or meetings specific to the above regional studies. Copies of meeting agendas (where available) are contained in Appendix A.

The SMC Annual Report is included in Appendix D.

B.6. CALIFORNIA STORMWATER QUALITY ASSOCIATION (CASQA)

CASQA assists the State Water Resources Control Board (SWRCB) and MS4 Permittees throughout California in implementing the National Pollutant Discharge Elimination System (NPDES) storm-water mandates of the Federal Clean Water Act. In fulfilling this purpose, CASQA recommends objectives and procedures for storm-water discharge control programs which:

- Are technically and economically feasible;
- Provide significant environmental benefits and protect water resources;
- Promote the advancement of storm-water management technology; and
- Effect compliance with state and federal laws, regulations and policies.

CASQA also holds workshops on and develops methods and materials for important technical issues such as:

- Low Impact Development
- Water Quality BMP's
- Hydromodification
- Green Building
- Monitoring
- Program Effectiveness Assessment
- Pesticides
- Many Others

In September 2008, District staff attended CASQA's Annual Conference on behalf of the Permittees, where many of these issues were featured in focused workshops or the subject of technical presentations. Additionally Jason Uhley is the conference chair for the upcoming 2009 Conference in San Diego (November '09)

The Permittees have strongly supported CASQA's mission and use CASQA's resources to improve their respective compliance programs. Several Riverside County District NPDES section staff are active in various ongoing CASQA programs including:

- **Mark Wills,**
  - Board Member
  - Treasurer
- **Jason Uhley,**
  - Legislative Chair
  - Conference Chair
  - Pesticides Committee
- **Arlene Chun,**
  - Monitoring Committee
  - Pesticides Committee

District staff, on behalf of the Permittees, attended over thirty (30) CASQA meetings, not including the 2008 conference. Copies of agendas for these CASQA meetings (where available) are contained in Appendix A.

The CASQA Annual Report is included in Appendix D.

B.7. INTEGRATED REGIONAL WATER MANAGEMENT WORKGROUP (IRWM)

Because the upper Santa Margarita watershed was not included in the San Diego County Integrated Regional Water Management Plan (IRWMP), the IRWM has focused its efforts on the development of an IRWMP for the upper portion of the watershed. The intent of the IRWMP was to pave the way for greater watershed-wide coordination and management of water resources within the Santa Margarita watershed as a whole, as well as adjoining watershed and regional planning efforts.

The IRWMP for the upper Santa Margarita watershed was completed on July 31, 2007 and is currently being implemented. More information on the IRWMP can be found in Section G.3.1 of this report.

Participants in the IRWM include:

- The SMR Permittees,
- Rancho California Water District,
- Elsinore-Murrieta-Anza Resource Conservation District,
- Trout Unlimited,
- Riverside Lands Conservancy,
- San Diego State University/Santa Margarita Ecological Reserve,
- Southwestern Riverside County Multi-Species Reserve,
- US Bureau of Reclamation,
- Eastern Municipal Water District,
- Western Municipal Water District,
- The Nature Conservancy,
- California Department of Fish and Game,
- U.S. Army Corps of Engineers (USACE),
- Regional Board.

Eleven (11) meetings were held for the IRWM within the reporting period.

Copies of agendas for IRWM meetings (where available) are contained in Appendix A.

C. AN ASSESSMENT OF WATER QUALITY IN THE SANTA MARGARITA REGION, THIS ASSESSMENT SHALL INCLUDE DATA FROM THE PREVIOUS MONITORING REPORT.

This reporting requirement is addressed in the conclusion of the Monitoring Annual Report (Appendix G).

D. IDENTIFICATION OF WATER QUALITY IMPROVEMENT OR DEGRADATION IN THE SANTA MARGARITA REGION

This reporting requirement is addressed in the conclusion of the Monitoring Annual Report (Appendix G-6.3.6).

E. A PRIORITIZATION OF WATER QUALITY PROBLEMS AND POTENTIAL SOURCES IN THE SANTA MARGARITA REGION

This reporting requirement is addressed in the conclusion of the Monitoring Annual Report (Appendix G Section G-6.3.1)

F. A DESCRIPTION OF WATERSHED SPECIFIC EDUCATIONAL ACTIVITIES CONDUCTED DURING THE REPORTING PERIOD

F.1. INTRODUCTION

This section provides an overview of watershed specific public education activities conducted by the Permittees. Public education materials distributed during this reporting period have been included at the end of the Public Education section.

In addition to the Public Education program described in this section, the District, on behalf of the Permittees organizes and coordinates a Training program for municipal employees and inspectors. This training program is described in Section G.8.2 of this report.

F.1.1. PROGRAM OVERVIEW

The Riverside County NPDES Permittees have established an ongoing watershed based public education and outreach program known as the **Only Rain down the Storm Drain** pollution prevention program. The specific objectives of the public education program include:

- Fostering a broad public awareness of water pollution concerns;
- Increasing public acceptance of pollution prevention activities to curtail everyday human behaviors that contribute to water quality problems;
- Educating/informing the general public, regulators and key local government and state decision makers on Urban Runoff conditions in Riverside County; and
- Promoting stewardship of all local water resources.

The **Only Rain down the Storm Drain** program implements the public awareness objectives by focusing on three areas of pollutant reduction/prevention:

- Public Behavior;
- Proper Management of Pollutants,
- Business Specific Outreach.

In addition, when attempting to make use of the finite resources available to the Public Education Program, the Permittees use these management goals to ensure that resources are used effectively:

- Focusing on pollutants of concern specific to each watershed region;
- Coordinating public education efforts with adjacent storm-water management programs and other related education programs to share resources, coordinate outreach efforts and avoid unnecessary duplication;
- Adapt public education programs and objectives, based on effectiveness analysis, to address changing MS4 programs and goals, and

- Establish an outreach educational partnership with the staff at the San Diego Regional Water Quality Control Board on at least one event in the Santa Margarita Watershed.

F.1.2. PROGRAM HIGHLIGHTS

The public education program was significantly improved this year. Program highlights include:

- Incorporation of Television Outreach through KVCR and PBS on the "Greenworks" and "Curiosity Quest" programs.
- The public education program has updated the format of its public awareness survey and continues to be present and conduct surveys at various community events. The survey results are tallied to help determine and measure the public's awareness of urban runoff pollution. There is also an on-line survey on the NPDES website, to encourage people to challenge their knowledge of stormwater pollution problems and behaviors. It is our hope that the final analysis will be a reminder to people to refrain from engaging in some of their environmentally negative outdoor activities.
- The District NPDES website has gone through an overhaul to provide the public and businesses information on the **Only Rain down the Storm Drain** program.
- The program continues to update its brochures and develop outreach programs specific to the needs of Riverside County's unique watersheds. Revisions this year include link updates, and revamping existing brochures and the development of new brochures for:
  - *OUTDOOR CLEANING ACTIVITIES* (now includes information for Professional Mobile Service Providers)
  - *LANDSCAPING AND GARDENING*
  - *TIPS FOR HORSE CARE*; (Equestrian Care and Management)
  - *PET WASTE*,
  - *TIPS FOR MAINTAINING A SEPTIC TANK SYSTEM*,
  - *AUTOMOTIVE MAINTENANCE AND CAR CARE*, and
  - *STREAM BANK STABILIZATION*.
- Initiation of a billboard advertisement within the Santa Margarita Watershed.
- Development of a new 'Lenticular' magnet that promotes control of fertilizer, pesticides, oil & grease, pet waster and household chemicals.
- Provide outreach material for County and District new employee orientation sessions regarding appropriate storm-water stewardship practices, including clean water information and promotional items that link back to the County's "**Only Rain**

down the Storm Drain" message. In addition, attendees receive a carry bag containing After the Storm, *Outdoor Cleaning Activities, Pool and Spa Maintenance, Pet Care* and *Tips for Horse Care* brochures. Reinforcement of messages to curtail negative behaviors also come in the form of a vehicle air freshener, shop rag, dust pan and key chain ALL imprinted with the "**Only Rain Down the Storm Drain**" logo and the 1-800 Toll Free line for reporting illegal disposal.

F.2. Santa Margarita Pollutants of Concern

Based on a review of monitoring data collected and reported upon in the previous year's annual report (FY07-08), the Regional Board's 303(d) List and discussions among the Co-Permittees, the pollutants of concern identified in the following sub-sections have been targeted for this watershed, and specific outreach activities are identified to address each. More discussion on the identification of pollutants of concern can be found in Monitoring Annual Report (Appendix G).

In addition, the District has developed other outreach materials to focus on other pollutants and pollutant causing activities/businesses commonly associated with urban runoff. These additional outreach materials are described in Sections F.5 through F.7.

F.2.1. Pesticides Associated with Urban Pest Control

- Provided guidance to the Permittees (www.ecowise.com) for standard language on integrated pest management (IPM) for municipal pest management contracts.
- Partnered with the Agricultural Commissioner in the distribution of educational material as part of the Pesticide Applicator's License Renewal information package and training workshops.
- During this fiscal year, the Riverside County Agricultural Commissioner's Office reported the following:
  - Restricted Materials Permits = 701; Operator Identification Numbers = 556
  - Agricultural Pest Control = 326; Structural Pest Control = 476
  - In processing the Permits/Operator ID Numbers and registering pest control businesses, "After the Storm" and EPA's booklet, "Storm-Water Pollution and the Solutions" are distributed.
- Coordinating with nurseries to distribute material containing messages about the use of pesticides through the popular Southern California Heritage Gardening DVD guide and our *SAFE* spray bottles that provide non-toxic garden pesticides and household cleaning recipes.

- '*Home Garden Workshops'* at nurseries and garden shows to inform residents about less-toxic pesticide alternatives for the garden.
- The distribution of the *WATER WISE GARDENING FOR THE INLAND EMPIRE* and the *SOUTHERN CALIFORNIA HERITAGE GARDENING GUIDE* on water-wise landscape design, irrigation, IPM guidance, plant encyclopedia and helpful maintenance tips all in a handy CD.
- '*KEEP OUR WATER CLEAN'* Public Services Announcement video.
- The '**Only Rain Down the Storm Drain'** presentations conducted by Mission Resource Conservation District discusses the effects of pesticides can have on local waterways.
- Completed updates to the NPDES training presentations for Permittee staff involved in municipal facilities operation and maintenance, and inspectors of commercial and industrial facilities. These updates incorporated a more specific focus on the appropriate use, timing and application of pesticides, and encourage the use of Integrated Pest Management (IPM) as a substitute.
- Provided information during two (2) episodes of the television show '*GreenWorks*' on KVCR.
- Completed the new *LANDSCAPE MANAGEMENT* brochure.

F.2.2. NUTRIENTS ASSOCIATED WITH URBAN DEVELOPMENT AND LAND USES

- The Agricultural Commissioner and UC Riverside Cooperative Extension both assist in the distribution of **Only Rain down the Storm Drain** materials. In addition, local nurseries distribute these materials, along with the County's FREE Compost Workshop announcement flyer and "How To" Composting book;
- "*KEEP OUR WATER CLEAN*" a video that focuses on proper use of fertilizers and avoiding excess runoff from sprinklers;
- A section of the County's Household Hazardous Waste flyer is dedicated to informing residents about the problem of storm-water pollution and provide simple pollution prevention activities;
- The "*AFTER THE STORM*" brochure;
- *STORM-WATER POLLUTION AND THE SOLUTIONS*
- Construction Activities brochure and the construction poster.
- The **'Only Rain Down the Storm Drain'** presentations conducted by Mission Resource Conservation District discusses the effects fertilizers can have on local waterways.

- Newly completed *Landscape and Gardening* brochure
- Newly completed *Tips for Maintaining a Septic Tank System* brochure
- Newly completed *Pet Waste* Brochure
- Newly completed *Tips for Horse Care* brochure covering equestrian care and management.
- Provided information during two (2) episodes of the television show '*GreenWorks*' on KVCR.

F.2.3. Pathogens Associated with Urban Activities

- Construction, municipal, industrial/commercial and new development training focusing on the need to address pathogen sources within the watershed;
- Contracted with S. Groner and Associates (SGA) to distribute pet waste information in pet stores, veterinarian clinics, kennels and pet grooming facilities;
- Coordination with Riverside County Animal Control Department and private "no kill" pet shelters to distribute "*What's the Scoop*" and "*After the Storm*" brochures to families adopting pets at the shelters;
- Newly completed *Landscape and Gardening* brochure
- Newly completed *Tips for Maintaining a Septic Tank System* brochure
- Newly completed *Industrial/Commercial* brochure including information on 'nurdles' (Plastic pellets used in manufacturing).

F.2.4. Sedimentation associated with Urban Development and Land Uses

- Construction, municipal, industrial/commercial and new development training focusing on the need to address erosion control and sedimentation within the watershed.
- County Building Inspectors distribute both the construction brochure and poster during site visits.
- Newly completed *Stream bank Stabilization* Fact Sheet.
- Newly completed *Landscape and Gardening* brochure.
- Independent storm-water educators are provided with our construction activities materials for their regularly scheduled Riverside County training sessions.

- Distribution of dust pans featuring the "**Only Rain Down the Storm Drain**" message to promote the dry cleaning of drive ways and impervious surfaces;
- Distribution of sponges and shop cloths to promote clean-up of spills and not letting them discharge into the storm drain;
- *CONSTRUCTION POSTER*;
- Adult storm-water education presentations include instruction on controlling soil erosion;
- The "*AFTER THE STORM*" brochure;
- General *CONSTRUCTION ACTIVITIES* brochure.

IN DEVELOPMENT

- Revised Construction poster

F.2.5. METALS ASSOCIATED WITH AUTOMOTIVE SOURCES

The primary metallic pollutants within the region are copper from brake pad wear and lead from lost wheel weights. The Permittees are currently coordinating through CASQA (as further described in Section B.6) to educate and promote statewide and national change to these problems that are caused by the societal use of a currently accepted technology.

F.3. 24-HOUR WATERSHED-WIDE OUTREACH PORTALS

The Permittees maintain three 24-hour watershed wide portals to receive and distribute information regarding the **Only Rain down the Storm Drain** program. These portals include a *website*, a *1-800 number*, an *e-mail address* and links from the County's main page and other websites to the District main page for reporting illegal storm drain disposal and obtaining printed materials.

F.3.1. STORM-WATER PROTECTION PROGRAM WEBSITE

The District operates a website that provides information on how to report illegal dumping, clogged storm drains and lack of curb markers, as well as provide information opportunities for public participation in program development and general information about Urban Runoff pollution prevention techniques. The website is located at: www.rcflood.org and during the **08/09 Fiscal Year there were 145,553 hits reported.** There is also a link on the County's main page advocating reporting illegal storm drain disposal by clicking on the familiar **Only Rain down the Strom Drain** logo.

Most of the District's outreach materials have been scanned into an electronic .pdf file formats and are available for download. Online Order forms and phone numbers are also available to assist internet customers in obtaining brochures posters and promotional items that are not available for viewing on line.

The website contains pages specific to the following target audiences:

- General Public/ Residents
- Businesses
- Developers
- Contractors
- Schools and Teachers
- Kid's Page

In addition, the website contains links to:

- Locate your local watershed
- An online media library
- Material order forms
- 1-800 Toll Free Line to
- Report storm drain pollution
- On-line survey
- Other resources

F.3.2. STORM-WATER TOLL FREE 1-800 HOTLINE

On October, 1994, a Toll Free "800" telephone number (1-800-506-2555) for reporting suspected storm-water pollution and obtaining pollution prevention information was established. This call line links to County Environmental Health or County Waste Management to obtain grass re-cycling, composting, or household hazardous waste collection workshop dates and locations. The 24-hour hotline also allows callers to report clogged catch basin inlets, illegal dumping and other illicit discharge violations. Finally, the hotline allows people to order public education materials and/or request storm-water presentations for schools or community groups. The Toll Free Hotline number is widely publicized in all public education outreach materials, listed in telephone directories, and registered in Riverside County 911, a non-profit community help line.

The 1-800 line transfers callers to appropriate Permittee departments based on caller selections. Callers requesting information on pollution collection activities are transferred to either County Environmental Health or Waste Management depending on their specific selection. Callers reporting illicit discharges are directed to County Code Enforcement, who accepts the calls and then re-directs them to appropriate Permittee Code Enforcement Departments. Calls for public education materials or presentations are routed to the District's front desk, and then to the District's Public Education Staff. The specific text to the hotline is included in this report.

The provider of the Toll Free Hotline, Riverside County Information Technology, tracks the number of incoming calls. The number of Toll Free calls received and tracked from **June, 08 through May, 09 was 1,169, with 158 inquiries originating from the Santa Margarita Region.** County Communications promises to continue improving and working on its tracking program.

Figure F-1 shows the script implemented for the Toll Free 1-800 hotline.

Figure F-1: Toll Free 800 Line Dialogue

ONLY RAIN DOWN THE STORM DRAIN POLLUTION PREVENTION PROGRAM TOLL FREE 800 LINE DIALOGUE

Thank you for calling the Storm-water/Clean Water Protection Program. To better serve the needs of our County communities, please listen carefully to the following options:

If this is an emergency, or you wish to report a significant release or threatened releases of hazardous material into the storm drain or elsewhere in the environment, please hang up and immediately Dial 911

For water service connection, disconnection, or any other water utility information, call your local water service provider.

- To report illegal dumping at residential, commercial, industrial or construction sites, please call Environmental Health at 909 955-8982, or *PRESS #1* to be directly connected.
- For information regarding Household Hazardous Waste Collection Events, please *PRESS #2* (Drops to 951 358-5256)
- To report clogged storm drains, faded or missing storm drain ONLY RAIN IN THE STORM DRAIN markers, *PRESS #3* (District lobby line)
- For General or specific business types of Storm-water Pollution prevention information or to receive promotionals *PRESS #3* (District lobby line)
  - Thank you for your interest in obtaining information on storm drain pollution protection. Basic, construction, industrial, commercial and children's storm-water protection outreach packets are available. For a quick response to your request, please slowly and clearly leave your name, address, city and zip code. Also state the type and quantity of the materials you are interested in receiving. Should you need additional assistance, provide your area code and phone number and someone will contact you as soon as possible.
- To inquire about our FREE storm-water classroom presentations, workshops, youth group activities and other outreach programs, *PRESS #4*
  - The Storm-water/Clean Water Public education Program offers classroom presentations, workshops, youth group activities, special event opportunities and other programs.
  - For inquiries for the Temecula or Murrieta area, please *PRESS #1* (Drops to Mission Resource Conservation District at 760—728-1332)
  - For inquiries in all other Riverside County areas, *PRESS #2* (Drops to Riverside Resource Conservation District 951 683-7691)
- For Grass re-cycling and composting information or workshops, please *PRESS #5* (Drops to 951 486-3200)
- For additional assistance regarding our storm drain pollution protection program during regular business office hours, Monday through Friday from 7:30 a.m. to 5:30 p.m. *PRESS #6*

F.3.3. E-MAIL

The Permittees also maintain an e-mail address that can be used to report illicit discharges or request storm-water related public information. The email address is: fcnpdes@rcflood.org

In most cases, public information request e-mails received at this address are responded to within 2 business days.

F.4. COORDINATION WITH OTHER STAKEHOLDERS

The **Only Rain down the Storm Drain** Program collaborates extensively to leverage available resources. Partnerships have been established with local environmental groups, business organizations, cities, public and private entities. These partnerships help maximize the use of existing distribution outlets, events, programs and materials. Impressions, attendance, and other measures of effectiveness relative to these programs are included in the Measurable Goals portion of this Watershed Annual Report.

To facilitate statewide awareness of storm-water public education, educate local and state decision makers, and assist in the development of more effective public education outreach programs, the District participates in the following public education committees:

- Public Information Public Participation Committee (PIPP) – A subcommittee of the California Storm-water Quality Association, and
- Western Regional Pollution Prevention Network (WRPPN)
- Water Education and Conservation Committee (WEAC)

To leverage education outreach resources and coordinate public education activities with other environmental programs, the Permittees closely coordinate and/or have existing partnerships with the following entities/organizations:

- Household Hazardous Waste Information Exchange (HHWIE) copy included;
- Mission Resource Conservation District (MRCD);
- Partnership with Mission Resource Conservation District and Riverside-Corona Resource Conservation District to provide student education outreach in the Santa Ana and Santa Margarita Watersheds
- Partnership with Mission Resource Conservation District and Riverside Corona Resource Conservation District to provide adult education outreach activities in the Santa Ana and Santa Margarita Watersheds
- Partnership with Mission Resource Conservation District and Riverside-Corona Resource Conservation District to provide support services for public education outreach activities at community events

- California Regional Environmental Education Community Network (CREEC);
- Public Affairs Network (PAN)
- Western Riverside Council of Governments

In addition, the **Only Rain down the Storm Drain** program also coordinates with the following City/County departments to distribute appropriate storm-water education outreach materials:

- City/County/District Front Counters
- County Assessor and Recorder
- County Waste Management
- County Environmental Health Department
- Household Hazardous Waste
- County Agriculture Department
- County Code Enforcement
- County Economic Development Agency
- County Animal Control
- County Fleet Services
- County Housing
- County Human Resources
- County & City Library Systems
- County Safety
- County Parks
- Transportation and Land Management
- County Business License
- City of Temecula Library
- City of Murrieta Library

In general, brochures and promotional items are provided to make the storm-water pollution prevention materials visible and accessible to the public at all times in lobbies, training sessions, through customer interactions and new employee orientations.

Finally, the **Only Rain down the Storm Drain** program also coordinates with the following state and/or local government or business entities to distribute public education information:

- Western Riverside Council of Governments
- South Coast Air Quality Management District
- Santa Rosa Plateau
- State Bureau of Reclamation
- Metropolitan Water District
- Lake Elsinore/San Jacinto Watershed Authority
- City of Temecula
- City of Murrieta
- Rancho California Water District
- Department of Water Resources Southern District
- Western Municipal Water District
- City of Riverside Public Utilities
- Eastern Municipal Water District
- DVL Water Education Center (WEC)
- Habitat for Humanity
- SAWPA
- Temecula Museum

F.5. OUTREACH TOOLS TO CHANGE PUBLIC BEHAVIOR

The **Only Rain down the Storm Drain** Program conducts a wide range of outreach activities to residents, students, community groups, new home owners, public employees, businesses, and homeowner associations; informing them of how their "everyday activities" may contribute to the pollution of Receiving Waters, and encouraging them to adopt alternatives that will lessen or eliminate pollution-causing behaviors. *Program efforts include providing information on pollution prevention techniques and informing residents about the proper disposal of household hazardous wastes, used motor oil, pesticides, pet waste and litter.* Public education materials and media emphasizes that all citizens have a role in reducing and preventing the polluting of Receiving Waters. The goal is to present a clear and consistent message that explains the simple connections between people's everyday activities and their impacts upon Receiving Water quality.

As the public education and outreach program continues to be implemented and enhanced, the Permittees hope to broaden public awareness of Urban Runoff quality problems, promote proper disposal of household hazardous waste and motor oil, encourage illegal discharge reporting, foster good stewardship of Receiving Waters, and take personal responsibility for their actions in preventing pollution.

While public education outreach at events indicates that most people are willing to act in an environmentally responsible manner when given simple ways to avoid polluting our water bodies; most are unaware of the sources of pollution from everyday urban land use. The "**Only Rain down the Storm Drain**" pollution prevention program, using various media forms, educates county-wide to modify behaviors by preventing storm-water pollution by focusing on residents, general public, students, and home gardeners.

F.5.1. DIRECT OUTREACH METHODS

The **Only Rain down the Storm Drain** program interfaces directly with the public via program staff, or through contracts and partnerships at community events, home improvement stores, school education programs, and adult education programs and/or by providing classroom based training. Specific outreach activities, segregated by target audiences, are described below.

F.5.1.a) General Community Outreach

The **Only Rain down the Storm Drain** program participates in various community events to ensure that our message is delivered to the largest possible municipal audience. These community events also provide an opportunity to survey attendees and assess their public knowledge of storm-water pollution prevention.

In addition, the **Only Rain down the Storm Drain** Pollution Prevention program has partnered with *Riverside County Waste Management* to ensure that a minimum number of Household Hazardous Waste and Antifreeze, Batteries, Oil and Paint Collection Centers and/or Events are held within each of Riverside County's principal watersheds (Santa Margarita, Santa Ana, and Whitewater). These events provide free disposal sites for common pollutants that can impair Receiving Waters.

The program's urban runoff materials and promotional items are also distributed through Community Clean up partnerships with *Riverside County Code Enforcement Administration,* whose undertaking is to achieve voluntary compliance in all phases of community revitalization. Staff works closely with the Community Improvement Specialists, ensuring that residential storm-water pollution prevention material packets are on hand for distribution on inspection visits, complaint investigations and at neighborhood or community presentations.

When a complaint warranting an investigation is received, the information is entered into a database and then followed up with an NPDES staff inspection. Following the investigation, when appropriate the inspector then canvasses the area with storm drain pollution prevention brochures, household hazardous waste collection schedules, and/or door hangers.

Finally, the Permittees participated in the annual Santa Margarita Watershed Cleanup Day, with City, County and District staff participating to remove trash and debris from local watercourses. Following the cleanup activities, the **Only Rain down the Storm Drain** Program either provided outreach from their booth or provided informational items and promotional items to the volunteers at the post-event barbecue.

F.5.1.b) School Outreach

ELEMENTARY (K-6)

THE MISSION RESOURCE CONSERVATION DISTRICT (MRCD) continues to provide a variety of K-6 education programs for the Only Rain down the Storm Drain Program. The K-6 education program includes materials such as the Water Pollution Prevention Patrol workbook, the Fancy Fin hands-on classroom presentation and accompanying coloring book, various word match and crossword activity sheets and videos. A second story line featuring Fancy Fin and her friend Phinnious J. Green (a Pacific Tree Frog) educate students about point and non-point pollution and their effects on the environment and other creatures in the watershed. School materials are offered to all public and private schools in the Menifee, Murrieta, Temecula and Wildomar areas, as well as to youth groups such as the Boy and Girl Scouts, Boys and Girls Clubs and Community Recreation Facilities.

The upcoming *CURIOSITY QUEST* video will also be provided to educators as a tool for storm-water education.

SECONDARY SCHOOLS

A video entitled "*HOW TO CONDUCT AN ENVIRONMENTALLY FRIENDLY CAR WASH AND MAKE MONEY TOO*" was developed for the "*Car Wash Challenge*" fundraising program. Over time, the overall preparation necessary for sponsoring a *Car Wash Challenge* presented too many challenges and retail selling has since become a greener and more profitable school fundraiser.

Next fiscal year, secondary students will be provided presentations with the aid of an enhanced three-dimensional watershed area map displaying pollutants of concern (as per the 303(d) List), impaired waters, watershed boundaries and watershed stakeholders. The detailing and enhancing the map will help students appreciate the unique topography of their watershed and the negative impacts of non-point discharge into area receiving waters.

F.5.1.c) Adult Outreach

Adult presentations are given through community outreach efforts by County Community Code Enforcement Officers. The Community Officers are provided materials about storm-water impacts that could occur from improper application of paint, pesticides or fertilizers to share with residents of their focused community.

The adult packet includes residential specific information (*After the Storm*; *What's the Scoop*; and *HHW Schedule*). All of the **Only Rain down the Storm Drain** materials are imprinted with the 800 Toll Free number to call to report illegal disposal or to obtain additional information. The children receive a Fancy Finn coloring book and box of crayons made from soybeans.

The **Only Rain down the Storm Drain** program contracts with *Mission Resource Conservation District* and *Riverside-Corona Resource Conservation District (RCRCD)* to provide urban runoff educational presentations to community groups who call and request such services.

The program's "*Home Garden Care Guide*" – provided the inspiration for the development of a series of "*Home Garden Workshops*". The *Riverside-Corona Resource Conservation District (RCRCD)* has developed a home garden workshop that encourages the use of alternatives to chemical fertilizers and pesticides in the garden through techniques such as companion planting, incorporating plans that attract beneficial insects, composting, and mulching. These workshops are presented at various community events and at the request of local nurseries, home owners associations, or other entities.

S. Groner Associates has been retained to prepare and present workshops at major home improvement stores throughout Riverside County. These workshops include a handout that educates the store's employees about storm-water impacts that could occur from improper application of paint, pesticides or fertilizers. Attendees at the workshop also receive **Only Rain down the Storm Drain** information and promotional items to help re-enforce storm-water protection message. The employees are then able to share with customers the proper use and disposal of products that are potential storm drain pollutants. Point of purchase displays, tear sheets and counter displays have been installed at strategic locations to educate the public directly. **There were 4 Home Improvement Store workshops provided in the Santa Margarita Watershed region.**

Valley Greeters once was a door to door "Meet and Greet" organization to new residents or homeowners who, along with local business coupons gave newcomers to the Temecula and Murrieta area urban runoff information and promotionals. *Due to the economic downturn, Valley Greeters has since closed its doors.*

F.5.2. BROCHURES

F.5.2.a) Residential Outreach Materials:

- *AFTER THE STORM*;
- *LANDSCAPING AND GARDENING*;
- *TIPS FOR HORSE CARE*;
- *WHAT'S THE SCOOP* (Dogs, Cats and Equestrian Animal Waste);
- *TIPS FOR MAINTAINING A SEPTIC TANK SYSTEM*;
- *AUTOMOTIVE MAINTENANCE AND CAR CARE* (being revised);
- *STREAM BANK STABILIZATION* fact sheet;
- *HOUSEHOLD HAZARDOUS WASTE* Collection Schedules;
- *OUTDOOR CLEANING ACTIVITIES AND PROFESSIONAL MOBILE SERVICE PROVIDERS*
- *SWIMMING POOL, JACUZZI AND FOUNTAIN MAINTENANCE*;
- *EARTH DAY FLYER*; and
- *POLLUTION PREVENTION FLYER*.

F.5.2.b) Other Outreach Materials

In addition to the brochures mentioned above, the program utilizes other effective outreach materials such as, magnets, billboard ads, newspaper supplements, trade programs, flyers, calendars, promotional items, workbooks, curriculum, shop rags, dust pans, key chains, compressed sponges, shelf talkers, tear sheets, posters and print ads to foster interest in the program.

A door hanger is also being utilized to help address problem discharges that are commonly observed in residential settings. The door hanger notifies the recipient that a problem discharge was observed and asks help from recipients to prevent problem discharge by following recommended pollution prevention activities. The door hanger is provided to all cities and is used by various County departments and the NPDES staff, when conducting field or site activities/inspections.

F.5.3. MAILING INSERTS

The **Only Rain down the Storm Drain** Pollution Prevention Program publicizes the dates and locations of household hazardous waste collection events through the use of mail inserts. Inserts are included in various utility bills and special notices. An example insert is shown in Figure F-2 below.

Figure F-2: Example HHW Insert

HHW Collection Event Scheduled for (date here)

There will be a Household Hazardous Waste (HHW) collection event at the **NAME OF LOCATION** located at

_____ADDRESS_____

On _____DATE_____ , 200X from 9 a.m. to 2 p.m.

HHW collection events provide you the opportunity to properly dispose of HHW and it's FREE! HHW products are paints, motor oil, bleach, cleaners, furniture polish, aerosol cans, etc. Visit www.rivcoeh.org for more information.

Never throw these items in the trash, as they may injure sanitation workers and contaminate landfills and the surrounding area.

NEVER pour any HHW into the gutter or down a storm drain.

Storm drains connect directly to local rivers, lakes and streams and not treatment plants.

Here are some important guidelines to follow:

You may bring up to five (5) gallons of a hazardous liquid waste or a total of 50 pounds maximum per car per trip (State Law). Multiple trips are allowed. Containers shall be marked and secured to prevent leaks. Containers holding gasoline will not be returned.

HHW includes deodorizers, cleaners, bleaches, floor wash, spot remover, drain cleaner, furniture polish, aerosol cans, latex paint, weed killers, fertilizers, antifreeze, pesticides, oil-based paint, pool chlorine, household and auto batteries, garden chemicals and motor oil.

The following will not be accepted:

Business or Non-profit waste, Explosives/Ammunition; Medical waste; Waste in 55-gallon drums; Radio-active materials; appliances and tires

The event will be canceled if rained out or excessive winds.

For more information, call 951-358-5256

F.5.4. MEDIA OUTREACH

The **Only Rain down the Storm Drain** program continues to utilize various forms of print and electronic media to reach the public and promote the reduction of urban runoff. Media forms such as, supplement newspaper inserts, fliers, and advertisements help increase public awareness of storm-water pollution and environmental protection.

- Through a partnership between Riverside and San Bernardino Counties, the District is sponsoring a 1-hour episode of the PBS show for kids called *'CURIOSITY QUEST'*. The episode will *focus on many of the impacts that residential activities can have on storm-water* including:
  - Landscape Care
  - Pool Maintenance
  - Pet Waste
  - Automotive Care
  - Household Hazardous Waste
- This episode will be broadcast nationwide and will be available royalty free for the Permittees to use on local access television stations.
- The PBS show *"GREENWORKS" conducted two 30-minute interviews* of Program staff on the County's Storm-water Program.
- A colorful billboard graphic with a simple storm drain message was designed and posted on a 12' x 36' *illuminated billboard at the I-15 north of Winchester*. Within the advertisement contract period, this billboard generated over 3,373,530 impressions. Billboard availability in the Santa Margarita region has always been extremely limited due to the long term billboard advertising contracts held by the many area casino properties. Since last year, the economic forecast has taken a down turn making prime billboard advertising locations more available and will be considered for the 09/10 Year.
- A relatively new addition to the Public Outreach Program is the supply trailer, featuring brightly colored graphics that surround the trailer. The graphic is a brightly colored text and advertises the "**Only Rain down the Storm Drain**" message. This convenient trailer functions as a moving billboard, as it transports public education/outreach materials to special events and large venues throughout Riverside County.
- The E-Z up (portable shade) is imprinted with the **Only Rain down the Storm Drain** message.

- The **Only Rain down the Storm Drain** exhibitor's gazebo is imprinted with **Only Rain down the Storm Drain** messages and colorful graphics depicting the importance of clean water.

F.5.5. COOPERATIVE USED OIL PROGRAM

The *Western Riverside Council of Governments (WRCOG)* is responsible for administering the Used Oil Block Cycle Grant for ten cities within WRCOG's boundaries. These cities include: Banning, Beaumont, Canyon Lake, Lake Elsinore, Murrieta, Norco, Perris, Riverside, San Jacinto and Temecula. The target audience is the Do It Yourselfers (DIY'ers).

One of WRCOG's goals is to make it convenient for DIY'ers to recycle their used oil and to make it easy for them to find a Certified Center accepting used oil. In order for these centers to be certified, they need to apply for certification with the California Integrated Waste Management Board (CIWMB). WRCOG contacts the Non-Certified Centers in the jurisdictions to explain the program and hopefully interest them in becoming certified, the potential for decreasing the amount of illegally dumped motor oil increases with the addition of new Certified Centers within driving distance of the DIY'er.

WRCOG also provides secure oil containers on an as needed basis to the Certified Centers for distribution among DIY'ers at no cost, to minimize the chance of spillage and a hazardous situation. **During this fiscal year, 1,440 motor oil drain containers were distributed and 203,218 gallons of motor oil was collected (up 54,612 gallons from last year).**

WRCOG also conducts site visits at all certified centers in jurisdictions to ensure center compliance to state and local mandates. This one on one interaction provides the attention needed to answer questions the centers have. Materials are periodically provided to the centers such as: brochures, magnets, and state regulatory information. **3,638 used oil filters were collected during this period.**

WRCOG's program also includes public education. This includes hosting booths at large venue events, conducting surveys to see how informed the local community is regarding used oil recycling, distributing brochures in both English and Spanish with information regarding used oil drop-off locations, curbside programs and other local recycling programs. The program also maintains an English and Spanish 1-800 hotline that can be used to get answers to any recycling question a resident may have regarding, "where the nearest Certified Center is located?" and "where can I find a used oil container?". The phone number is printed on all distributed materials including the

oil containers. As mentioned, WRCOG provides brochures in Spanish, as Riverside County has a large Spanish-speaking population that needs to be reached. By educating this group with the right information concerning used oil recycling, WRCOG hopes an increase in used oil recycling will occur throughout our jurisdictions.

WRCOG provides equal services to all jurisdictions regardless of their grant contribution. The goal is the same with all the jurisdictions, an increase in used oil collections for recycling. WRCOG offers these services to make it more convenient for the DIY'ers to recycle and result in the increase of recycled used oil.

F.5.6. WESTERN RIVERSIDE COUNTY CLEAN CITIES PROGRAM

WRCOG also participates in large venue events to promote the use of alternative vehicle fuels. Car Care for Clean Air whose objective is to increase public awareness regarding the benefits of proper vehicle maintenance and repair. These events give staff an opportunity to assess how informed the local community is regarding recycling and also allows us to distribute brochures and informational flyers that will assist people in finding the nearest recycling center.

F.6. OUTREACH TOOLS TO A BUSINESS SPECIFIC AUDIENCE

The **Only Rain down the Storm Drain** program conducts a wide range of outreach activities to businesses; informing them of how their "everyday activities" may contribute to the pollution of Receiving Waters, and encouraging them to adopt alternatives that will lessen or eliminate polluting-causing activities. Program efforts include providing information on pollution prevention techniques and informing businesses about the proper disposal of wastes. Public education materials and media emphasize the theme that all businesses have a role to play in reducing and preventing the polluting of Receiving Waters. The goal is to present a clear and consistent message that explains the simple connections between a business' everyday activities and their impacts upon Receiving Water quality.

Originally, the business outreach program mainly consisted of the development and distribution of formal BMP guidance and to business associations thorough the Business Press, a trade publication. The program has now expanded to include direct outreach to businesses through Riverside County's Business Licensing Program. Discussion of the current Business Specific Outreach tools implemented by the Permittees is provided below.

F.6.1. DIRECT BUSINESS OUTREACH ACTIVITIES

Through the *Compliance Assistance Program (CAP),* a partnership with County Environmental Health, restaurants and businesses that handle hazardous wastes are inspected for potential storm-water impacts from their activities. Each business is provided with educational information specific to their typical business activities.

Within the 08/09 Fiscal Year, the Board of Supervisors passed legislation to require all businesses in Riverside County to obtain a business license. Billing inserts were developed for the County's Transportation and Land Management's, Business License Division and are included in all license renewal notices. New businesses receive their storm-water education that is affixed to their application.

Our partnership with the County's Business License Department established last year continues to be successful with providing direct outreach to business owners about behaviors that contribute to water quality problems. Direct outreach is made in the form of an insert that is issued to new business license applicants, and inserted into annual renewal reminders. The insert includes information on the "**Only Rain down the Storm Drain**" program and the Toll Free 800 number portal used for reporting illegal storm drain disposal.

The first year of the business license program distributed 979 storm-water pollution prevention informational items. The 07/08 Year resulted in the issuance of 7,503 awareness inserts. For the 08/09 Year new business license applications accounted for **1,700 new businesses and including license renewals, a total of 7,600 impressions were made.**

S. Groner Associates has been retained to prepare and present workshops at major home improvement stores throughout Riverside County. The workshops include a handout educating store employees about storm-water impacts that could occur from improper application of paint, pesticides or fertilizers. Attendees at the workshop also receive "**Only Rain down the Storm Drain**" information and promotionals to help reinforce the urban runoff message. Employees are then able to share with customers the proper use and disposal of products that can contaminate receiving waters. Point of purchase displays, tear sheets and counter displays have been installed at planned locations to provide a brief education to the public directly. *SGA's full report has been provided at the end of this section.*

F.6.2. BROCHURES

F.6.2.a) Commercial:

- *AFTER THE STORM*;
- *FOOD FACILITIES*;
- *OUTDOOR CLEANING ACTIVITIES AND PROFESSIONAL MOBILE SERVICE PROVIDERS*
- *AUTOMOTIVE MAINTENANCE & CAR CARE*
- *STORM-WATER POLLUTION AND THE SOLUTIONS*.

F.6.2.b) Industrial:

- *AFTER THE STORM*;
- *OUTDOOR CLEANING ACTIVITIES AND PROFESSIONAL MOBILE SERVICE PROVIDERS*;
- *STORM-WATER POLLUTION AND THE SOLUTIONS*;

IN DEVELOPMENT

- *YOUR FACILITY MAY NEED A STORM-WATER PERMIT* (this brochure will contain both industrial and commercial industries in 08/09 and released in FY 09/10.

F.6.2.c) Construction:

- *AFTER THE STORM*;
- *STORM-WATER POLLUTION AND THE SOLUTIONS*;
- *OUTDOOR CLEANING ACTIVITIES AND PROFESSIONAL MOBILE SERVICE PROVIDERS*;
- *GENERAL CONSTRUCTION & SITE SUPERVISION*.

PENDING

- Once the new Construction Permit has been approved, updates will begin on the *CONSTRUCTION BROCHURE* and *CONSTRUCTION POSTER*.

F.6.3. POSTERS

Best Management Practices (BMP) posters for automotive, food service establishments (available in both English and Spanish) and construction employees are available. The posters address activities associated with the automotive repair industry, and the food/restaurant industry that may pose a threat to water quality. The well

written and illustrated posters list recommended storm-water BMPs and are designed to serve as reminders for the employees.

F.6.4. MEDIA OUTREACH

No additional Media was used to target a business specific audience because education through the business license programs venue was determined to be the most effective method available to reach county businesses. The results of the outreach effort attracts the attention of general types of business activities that threaten water quality and reference the County Flood Control District and CASQA websites for BMPs that can be implemented to reduce stormwater pollution.

F.6.5. SUPPLEMENTAL ENVIRONMENTAL PROJECTS

County Environmental Health has established a *Supplemental Environmental Project (SEP)*. Funding for the SEP comes from monetary fines paid by violators found guilty of environmental crimes. These monetary revenues are then used to develop new environmental protection programs or enhance existing ones. The following are stormwater outreach efforts that utilized SEP funds:

- Conoco Phillips SEP resulted in the development of two posters for Fueling Stations and Service Bay Servicing
- Downs Energy SEP resulted in the development of a billboard advertisement.

To date, there have been no other SEP funds directed to the NPDES program for environmental projects.

F.7. OUTREACH TOOLS SPECIFIC TO POLLUTANTS

The **Only Rain down the Storm Drain** program conducts a wide range of outreach activities focusing on reduction of certain pollutants in the Receiving Waters. These outreach activities focus on sources of those pollutants whether it is residential, business, municipal or some other state or federal source. Education materials explain how "everyday activities" of potential sources may contribute to the pollution of Receiving Waters, and encourage the sources to adopt alternative approaches to pollutant management that will lessen or eliminate pollution causing activities. Program efforts include providing information on pollution prevention techniques and informing sources about the proper disposal of pollutants. Public education materials and media emphasize the theme that all citizens/businesses have a role to play in reducing and preventing the polluting of Receiving Waters. The goal is to present a clear and consistent message that explains the simple connections between a business' everyday activities and their impacts upon Receiving Water quality.

Each subsection that follows identifies how existing outreach materials previously described address specific potential pollutant sources in the watershed.

F.7.1. USE OF PESTICIDES, FERTILIZERS, AND HERBICIDES.

- Through a partnership between Riverside and San Bernardino Counties, the District is sponsoring a 1-hour episode of the PBS show for kids called *'CURIOSITY QUEST'*. The episode will *focus on many of the impacts that residential activities can have on storm-water* including Landscape Care. This episode will be broadcast nationwide and will be available royalty free for the Permittees to use on local access television stations.

- The Riverside County Agricultural Commissioner's Pesticide Applicator's License renewal information package includes materials on the proper use of pesticides and offers information on training workshops. The license renewal process requires continuing education of applicants and detailed record keeping of pesticide applications. Municipal employees that are responsible for the application of pesticides are encouraged to obtain and maintain credentials as Certified Applicators and/or licensed Pest Control Advisors.

- The Riverside County Agricultural Commissioner's Agency, provided registrants and permit recipients with the *AFTER THE STORM* and *OUTDOOR CLEANING ACTIVITIES* (now includes information for professional mobile service providers) brochures, and *HOME COMPOSTING MADE EASY* booklet. The continued success of this partnership has resulted in **2,259** pesticide professionals receiving the required MS4 materials during the 08/09 Fiscal Year. This year, outreach material has expanded to include the *HOME*

COMPOSTING MADE EASY BOOKLET; *SOUTHERN CALIFORNIA HERITAGE GARDENING GUIDE (DVD)*; and spray bottles with handy non-toxic garden and household recipes imprinted on the bottle and Compost Workshop locations and dates.

- The "*Home Garden Workshops*" conducted at nurseries and garden shows inform residents on less-toxic alternatives for the garden.
- The "*KEEP OUR WATER CLEAN*" film covers proper use of pesticides, fertilizers and herbicides, as well as, excess runoff from sprinklers.
- The **Only Rain down the Storm Drain** Annual National Pollution Prevention Week insert informs County residents about the problems of storm-water pollution and provides clear and simple pollution prevention activities in the garden.
- The **Only Rain down the Storm Drain** presentations conducted by MRCD discuss the effects of pesticides and fertilizers on local waterways.
- The *2009 ENVIRONMENTAL CALENDAR* included a wide array of storm-water protection information. It was designed specifically to attract the adult audience with information on listing best management practices, scheduled special events, household hazardous waste collection sites, used oil collection sites, home garden workshops and citywide clean ups. Each month has a featured water body and a bit of background on the water pictorial.
- S. Groner Associates has been retained to prepare and present *employee workshops at major home improvement stores* throughout Riverside County. The employee is then well prepared to discuss the proper use and disposal of chemicals. The workshops include information on BMPs that the public should be aware of for pesticide and fertilizer application, use and storage. HHW tear sheets dispensers are placed at or near herbicide and pesticide locations.

F.7.2. EDUCATE/INFORM ON IMPACTS FROM LITTERING AND IMPROPER WASTE DISPOSAL.

- Replacing the "*HOUSEHOLD HAZARDOUS WASTE - A GUIDE FOR PROPER DISPOSAL OF HHW AND THE USE OF ENVIRONMENTALLY FRIENDLY PRODUCTS*" guide is a spray bottle imprinted with non-toxic recipes on the side of the bottle for garden and/or household cleaning projects. The After the Storm brochure accompanies each spray bottle distributed.
- Through a partnership between Riverside and San Bernardino Counties, the District is sponsoring a 1-hour episode of the PBS show for kids called *'CURIOSITY QUEST'*. The episode will *focus on many of the impacts that residential activities can have on storm-water* including Household Hazardous Waste. This episode

will be broadcast nationwide and will be available royalty free for the Permittees to use on local access television stations.

- Through classroom activity books, work sheets, coloring books and presentations, children are taught to put trash in its proper place, to never throw any hazardous products in the trash, and to properly dispose of chemicals at a location near them.
- All **Only Rain down the Storm Drain** brochures and the 'lenticular' magnet encourage residents to report illegal dumping to the **Only Rain down the Storm Drain** toll-free phone number.
- The MRCD adult presentation discuss the various pollutants of concern that contribute to storm-water pollution – including trash and debris – residents are reminded to always pick-up waste and dispose of it properly. These days, requests for adult presentations are few, but overall outreach efforts at events at the larger venues might be sufficient for this age group.
- The door hanger *"A STORM DRAIN DUMPING VIOLATION HAS BEEN FOUND IN YOUR NEIGHBORHOOD"* is a friendly reminder to inform residents about the effects of improper waste disposal and encourages them to participate with simply pollution prevention suggestions.

F.7.3. EDUCATE/INFORM ON IMPACTS FROM DUMPING POLLUTANTS INTO STORM DRAINAGE SYSTEMS.

- The "*THE AFTER THE STORM*" brochures informs residents of the negative environmental impacts caused by pollutants allowed to enter storm drains.
- The "*KEEP OUR WATER CLEAN*" DVD and PSAs inform residents about the problem of storm-water pollution and describes pollution prevention activities.
- The school program stresses the message of never dumping anything into a storm drain. Both the Santa Margarita Classroom activity book and the *"FANCY FIN"* presentation specifically address this issue.
- *MRCD* works with organized volunteer groups for catch basin marking events throughout the Murrieta and Temecula Valleys. The durable, circular vibrant storm drain curb marker adheres to the inlet opening on the curb face with the clear message that reminds residents to NEVER POUR ANYTHING down a storm drain.
- The *"Only Rain in the Drain" song*, produced by the **Only Rain down the Storm Drain** program for the elementary school education program, also addresses the improper dumping issue.

- The MRCD adult presentation addresses the issue of improperly dumping pollutants into the storm drain and advises residents that storm drains connect directly – without treatment – to local waterways.
- The "*2009 Environmental Calendar*" contained various informative and visual water reminders as to why all of us should keep wastes out of the storm drain system, more specifically, **Only Rain down the Storm Drain**.
- The door hanger "*A Storm Drain Dumping Violation has been found in YOUR neighborhood*" informs residents about the effects of dumping pollutants into the storm drains, encourages them to follow simple pollution prevention activities and curtails illegal dumping behavior.
- S. Groner Associates has been retained to prepare and present *employee workshops at major home improvement stores* throughout Riverside County, so that employees can properly communicate this message to their customers. The workshops also discuss that paints or paint-related products should never be disposed of in a storm drain or gutter.

F.7.4. Educate on impacts from gasoline, fuel oil, and oil and grease.

- The *"Automotive Maintenance & Car Care"* BMP brochure specifically identifies recommended BMPs that address the problem of gasoline, oil and grease entering into storm drains.
- Through a partnership between Riverside and San Bernardino Counties, the District is sponsoring a 1-hour episode of the PBS show for kids called *'Curiosity Quest'*. The episode will *focus on many of the impacts that residential activities can have on storm-water* including Automotive Care. This episode will be broadcast nationwide and will be available royalty free for the Permittees to use on local access television stations.
- Nearly all **Only Rain down the Storm Drain** brochures, utility inserts, advertisements, the school program, and audio and video media provide information on the water quality impacts from improper disposal and spills from gasoline, oil and chemicals in a general context.
- The *"Keep Our Water Clean"* DVD specifically covers the topic of grease and oil from vehicles.
- The **Only Rain down the Storm Drain** program works cooperatively with the Permittees' motor oil recycling programs to distribute information on the "why" and "how to" of used motor oil disposal. The motor oil recycling programs actively distribute the **Only Rain down the Storm Drain** materials in conjunction

with their outreach efforts since both programs are working toward the same goal of environmental protection through pollution prevention.

- The new and improved *OUTDOOR CLEANING ACTIVITIES AND PROFESSIONAL MOBILE SERVICE PROVIDERS* brochure informs customers that vehicle fluids pose a threat to local waterways and groundwater resources and provides BMPs to keep these pollutants out of the storm drains.
- The *"2009 ENVIRONMENTAL CALENDAR"* provided a full page section on recycling motor oil. The calendar included information on the environmental problems spilled motor oil can cause.
- Environmental Health Household Hazardous Waste (HHW) Collection Schedule is provided with all of our storm-water related materials and promotionals. The schedule covers the times, dates and locations of both temporary and permanent facilities and is released in two sections:.July 1st through December 31st, and January 1st through June 30th.

F.7.5. EDUCATE/INFORM ON IMPACTS FROM AIRBORNE PARTICLES.

- The County of Riverside has an active Employee Rideshare Program, which encourages employees to carpool, vanpool, use transit, cycle or walk to work. Also, the County actively supports the use of zero/low emission vehicles. The County's Fleet Services includes a variety of alternative vehicles including CNG, propane, electric and methanol powered vehicles.
- Various County facilities are installing alternative fuel fueling stations to expand the use of alternative energy vehicles. This is a direct result of the County Board Policy to use alternative fuel vehicles as the "first choice" when purchasing or leasing vehicles.
- The County of Riverside is an active member of the Clean Cities Coalition and provides financial support for various clean air efforts/activities throughout the County.
- The District is involved in South Coast Air Quality Management District's Lawn Mower Exchange Program, whereby gas mowers are replaced with a new cordless electric mower.

F.7.6. EDUCATE ON THE NEED TO KEEP STORM-WATER FROM CONTACTING POTENTIAL CONTAMINANTS.

- The "*STORM-WATER POLLUTION….WHAT YOU SHOULD KNOW*" brochures informs residents about keeping storm-water from contacting potential contaminants and explains various pollution prevention activities. It also advises residents to keep common storm-water pollutants from entering our storm drains.
- The *AUTOMOTIVE MAINTENANCE & CAR CARE*, *the FOOD SERVICE INDUSTRY*, and the *GENERAL CONSTRUCTION & SITE SUPERVISION* BMP brochures all advise facility and site operators to properly manage pollutant sources and prevent polluted storm-water from entering storm drains. The brochures also inform owner/operators that local ordinances strictly prohibit the discharge of pollutants to the storm drain system or local waterways without a permit.

F.7.7. EDUCATE ON THE CLEAN-UP AND PROPER DISPOSAL OF PET WASTE.

- The "*WHAT'S THE SCOOP*" and "*AFTER THE STORM*" brochures addresses the need to pick-up animal waste and to dispose of it properly.
- Through a partnership between Riverside and San Bernardino Counties, the District is sponsoring a 1-hour episode of the PBS show for kids called *'CURIOSITY QUEST'*. The episode will *focus on many of the impacts that residential activities can have on storm-water* including Pet Waste. This episode will be broadcast nationwide and will be available royalty free for the Permittees to use on local access television stations.
- The school activity book and the "*FANCY FIN*" presentation discuss the proper disposal of pet waste.
- The "*KEEP OUR WATER CLEAN*" DVD also addresses the topic of the proper disposal of pet waste and the impacts to our waterways.
- The **Only Rain down the Storm Drain** adult storm-water presentation discusses proper disposal of pet waste and actually includes a DVD showing how bad this problem can be. The pictures from a distance depict small yellow flags marking pet waste deposits in what is obviously a very popular dog walking area.
- The Pollution Prevention Week is a recognized blue/green and white flyer informational and is released every September. Along with other useful BMP's, the flyer does have an article that specifically addresses pet waste under the article "*WHAT'S THE SCOOP . . . TIPS FOR A HEALTHY PET AND A HEALTHIER ENVIRONMENT*".

- The *EARTH DAY FLYERS* released every April, contains an article on the hazards of pet droppings.
- The *"2009 ENVIRONMENTAL CALENDAR"* reminds us to always "pick up animal waste". The accompanying message informs residents of the effects of pet waste on local waterways.
- The District does not allow the disposal of pet waste or other trash within its facilities. Signage has been installed at access gates and perimeters to discourage illegal dumping and encourage reporting thereof. At the start of the program, the District purchased "Dogipots," (containers that hold pet waste bags), and had them installed in County Parks. Upkeep and additional purchases of Dogipots are the responsibility of County Parks staff. The District has also purchased pet leash tags with the storm-water hotline number repeating the "**Only Rain down the Storm Drain**" message.

F.7.8. DEVELOP PROGRAMS FOR LANDOWNERS ON EROSION AND SEDIMENT CONTROL PRACTICES.

- The "*AFTER THE STORM*" brochure and the school program addresses the topic of controlling soil erosion.
- The "*STREAM BANK STABILIZATION*" fact sheet gives relevant information to land owners about managing stream courses.
- The **Only Rain down the Storm Drain** program continues to work cooperatively with both *MRCD* and *RCRCD* to offer various workshops on the topic and has conducted additional workshops for the needs of the storm-water program. These workshops have been offered to both Permittee staff and the general public.
- The **Only Rain down the Storm Drain** storm-water presentation was modified to specifically address soil erosion as it relates to the Santa Margarita Watershed and what homeowners and businesses can do to minimize soil erosion.

F.7.9. COVER CONTAMINANTS AND PREVENT RUNOFF THROUGH POLLUTED AREAS.

- The *OUTDOOR CLEANING ACTIVITIES AND PROFESSIONAL MOBILE SERVICE PROVIDERS*, *FOOD SERVICE INDUSTRY*, *AND AUTOMOTIVE MAINTENANCE AND CAR CARE* brochures all include specific BMPs to cover outside work areas; keep dumpster lids closed; prevent run-off at work and material storage areas; cover exposed stockpiles; avoid wash down of paved surfaces that drain to storm drains; and many other BMPs that help prevent pollutants from entering the storm drains.

- The *industrial/commercial training workshop* included specific segments on covering outside materials to prevent contaminated runoff. The target group for this workshop is staff that is responsible for conducting NPDES Urban Runoff inspections of industrial/commercial facilities.

F.7.10. EDUCATE MUNICIPALITIES/AGENCIES ON THE NEED FOR VEHICLE INSPECTIONS.

- As part of the municipal employee-training program, various departments have been instructed to inform employees about the need for vehicle inspections and have been provided with a complete training package to help in this area. Included in the training information are brochures, posters and vehicle air fresheners that Fleet Services personnel have distributed at their garage/work sites.
- Departments and agencies are also encouraged to use alternative fuel vehicles that not only help reduce vehicle emissions but also, in some cases (*e.g.*, electric vehicles), eliminate the use of motor oil and antifreeze. The County highly encourages its Departments to convert to these types of vehicles, whenever possible.
- The municipal employee training workshops are conducted by AEI-CASC and cover such topics as inspecting vehicles and equipment for fluid leakages.

F.8. PUBLIC EDUCATION MATERIAL

Examples of various the Public Education materials the Permittees distribute are included in Appendix B of this report.

G. A DESCRIPTION OF ALL AREA-WIDE AND WATERSHED-BASED ACTIVITIES CONDUCTED DURING THE REPORTING PERIOD.

G.1. INTRODUCTION

This section provides a summary of area-wide and watershed-based activities that were conducted during the reporting period, but not specifically described elsewhere in this report. This section also documents programs described within the DAMP that are implemented on a regional scale, rather than by each Permittee individually. Due to the small percentage of urbanization and small population within the SMR, the Permittees leverage resources by implementing several regional programs which makes these programs both cost effective and protective of water quality.

G.2. PROGRAM MANAGEMENT ACTIVITIES

The Permittees meet regularly to discuss the implementation of the MS4 compliance programs, to disseminate information regarding the current status of the various watershed-wide activities, and to discuss regional, state, and national issues related to storm-water quality. These discussions occur through various formal and informal means including the following established meetings:

G.2.1. MANAGEMENT STEERING COMMITTEE (MSC) MEETINGS

The Permittees established the MSC to address Urban Runoff management policies for the Santa Ana Region (SAR) and SMR and to review and approve revisions to the DAMP and the SAR and SMR Implementation Agreements. In addition, the MSC facilitates coordination with related water quality management programs and monitoring and establishes positions relative to legislative and regulatory initiatives. The MSC consists of city managers or equivalent representatives from each of the Co-Permittees and an executive-level representative from the County. The General Manager-Chief Engineer of the District participates on the MSC as Chair. The District provides staff support to the MSC. The MSC meets quarterly or as determined by the Chair. MSC meeting agendas and minutes are included in Appendix A.

G.2.2. SUMMARY OF TECHNICAL ADVISORY COMMITTEE (TAC) MEETINGS

A TAC has been established consisting of representatives formally appointed by the city manager or equivalent of each Permittee. The purpose of the TAC is to coordinate the implementation of the DAMP and overall MS4 Permit compliance program. The TAC members also provide technical assistance and support to facilitate coordination with related water quality management programs and monitoring and to respond to

legislative and regulatory initiatives. The District chairs and provides staff support to the TAC. TAC meeting agendas and minutes are included in Appendix A.

G.2.3. DEVELOPMENT OF REGIONAL AND STATEWIDE SCIENCE AND STUDIES

The Permittees are supporting the further development of Regional and Statewide science and studies to address issues relating to and impacting storm-water quality and to better manage the NPDES MS4 Storm-water Programs. Many of these efforts are coordinated through the SMC while others are undertaken independently by the Permittees. Additionally, the Permittees participate in CASQA, which helps coordinate and disseminate information about the science, methods and experiences of the various MS4 Programs and requirements throughout the state.

The studies and related activities that the Permittees are participating in address are summarized below and fully reported on in the indicated sections of this report:

- Participation in the *CALIFORNIA ASSOCIATION OF STORM-WATER QUALITY AGENCIES* (CASQA, Section B.6) – To follow, coordinate and disseminate information about the science, methods and experiences of the various MS4 Programs and requirements throughout the state.
- Participation in the *SOUTHERN CALIFORNIA STORM-WATER MONITORING COALITION* (SMC, Section B.5) – To develop the technical information necessary to better understand storm-water mechanisms and impacts, and then develop the tools that will effectively and efficiently improve storm-water decision-making.
- Involvement in the *SCCWRP HYDROMODIFICATION STUDY* (See Appendix G, Section G-7.2.1) – Developing tools to assess stream susceptibility to the Hydromodification effects of new development, and for the implementation of hydromodification management measures.
- Participation in the *SMC LOW IMPACT DEVELOPMENT STUDY* (See Appendix G, Section G-7.2.2) – To develop a comprehensive program to incorporate LID strategies and techniques into the planning and design of public and private sector projects.
- Development of a *LID BMP TESTING AND DEMONSTRATION FACILITY* (See Appendix G, Section G-7.2.2) – To develop technical guidance for, perform field training on, and to monitor the performance of LID features.
- Completion of a *TOXICITY REDUCTION EVALUATION* (TRE, see Section G.2.4) – to understand the sources of toxicity in our receiving waters and assess methodologies to mitigate the resulting water quality impairments.

- Participation in the *Development of Local Pesticide Regulatory Activities* (See Appendix G, Section G-7.5) – To develop activities that focus on providing input to the USEPA and the California Department of Pesticide Regulation to improve implementation of pesticide regulations to more fully protect water quality.
- Participation in efforts to *Standardize Toxicity Testing Methods* (See Appendix G, Section G-7.5) – To provide more comparable data between MS4 permit areas.
- Participation in a *Laboratory Inter-calibration Study* (See Appendix G, Section G-7.5) – To ensure quality and comparability among analytical laboratories.
- Involvement in *Regional Bio-assessment Protocol Studies* (See Appendix G, Section G-7.5) – To develop an Index of Biological Integrity (IBI) that is appropriate for low gradient streams.

G.2.4. Submittal of the Report of Waste Discharge

On January 15th, 2009 the Permittees submitted their Report of Waste Discharge (ROWD) to the Regional Board. In this report the Permittees performed a comprehensive review and analysis of their programs, and determined that their overall programs have been successful in protecting water quality, especially in light of the substantial (almost 300%) growth that has occurred within the region. Nevertheless, as part of their proactive and iterative management of their programs, the Permittees made recommendations for specific new and/or modified programs and activities that will further enhance their ability to effectively address the identified water quality problems.

These recommendations included:

- *Municipal Action Levels (MALs)* (Programmatically Based) to ensure that their programs continue to be effective at meeting their goals, and to identify areas that may need attention.
- *Enhanced Program Effectiveness Assessments*, to provide clear goals for the Permittees' programs and a clear and measurable system to determine the Permittees' effectiveness at working toward each goal. The proposed system of effectiveness assessments includes:
  - *Goals* for each program area,
  - *Measureable metrics* to determine progress toward each goal,
  - Assessments that quantify effectiveness at each level of the *CASQA effectiveness methodology*
  - *Timeframes* of assessment
  - *MALs* (described above).

- *Revised/Enhanced IC/ID Monitoring Program* to:
  - Distribute the monitoring sites throughout the Santa Margarita Region to detect Illicit Discharges closer to their source before they become excessively diluted.
  - Increase efficiency and consistency in sampling resulting in enhanced data quality.
  - Enhance response time to identify IC/IDs.
- *Post Construction BMP Tracking and Inspection program* to ensure the ongoing maintenance and effectiveness of Treatment Control BMPs.
- *Revisions to the Dry Weather Monitoring Program* to help develop a regional approach to watershed assessment. *
- Development of an *LID Manual and Design Guidance* to provide additional guidance for and to encourage use of Low Impact Development BMPs.*
- Construction of an *LID BMP testing facility*. To foster an increased knowledge and understanding of the implementation, effectiveness and maintenance of various types of LID BMP's. *
- *Addressing Pesticide Toxicity through the Plan of Action described in the Toxicity Reduction Evaluation* (TRE), which included a five-year plan (to coincide with the 5-year life of the 4th Term MS4 Permit) with specific actions for each year.*

As the Permittees had structured these enhancements in a manner that would best focus their resources to the benefit of water quality, the intent of the recommended activities summarized above is to have any new and/or revised requirements in the upcoming 4th Term MS4 Permit be based upon and supportive of these recommended actions.

* Although the Permittees are still operating under their 3rd term Permit, through the Permittees' ongoing iterative management of their programs, they have continued to move their programs forward by proactively implementing the asterisked items above.

The ROWD can be accessed in the *'Compliance Documents'* section of the following web site:

http://rcflood.org/NPDES/SantaMargaritaWS.aspx

G.2.5. TOXICITY REDUCTION EVALUATION FOR PYRETHROID PESTICIDES

In January 2009, the Permittees completed and submitted a Toxicity Reduction Evaluation (TRE) as part of the Report of Waste Discharge (ROWD). This evaluation identified that the primary source of toxicity within the SMR is likely Pyrethroid pesticides and included an extensive literature review of potentially applicable management measures. Many of the most appropriate actions to address Pyrethroid Pesticides had already been proactively implemented by the Permittees. Further the TRE established a five-year plan of action for addressing the toxicity that the Permittees are preparing to implement consistent with the pending fourth-term MS4 Permit.

Below is a summary of some of the actions that are already being implemented by the Permittees

- Distributed to the Permittees, *guidance published by Eco-Wise* on developing standard language for including IPM in municipal pest management contracts.
- *Produced educational materials* for use by each municipality that include messages about the proper use of pesticides and encouraging IPM. These educational materials are further discussed in Section F.7.1 of this report.
- Coordinating with Department of Pesticide Regulation (DPR) on an *upcoming Pyrethroid Pesticide evaluation*.
- Provide input and comments to DPR regarding proposed *Pesticide Working Group Studies.*
- Peer review of the *'2008 Summary of Pesticide Use Report'* prepared by the UP3 project.
- Presented on urban pesticide issues at the September 2008 *Western Regional Urban Pest Ant Workgroup* at UC Riverside.
- Coordinating meetings with the *Riverside County Agricultural Commission* to help coordinate activities related to pesticide management.
- *Updated NPDES Training* (Described in Section G.8.2) to include information on the impacts that improper application of pesticides has on the environment and to encourage the use of IPM.
- Proposing to establish an *agreement with the U.C. Extension's Master Gardener program* in fiscal year 2010-2011 to *support master gardener hotline staffing*, local presentation and other outreach by the U.C. Master Gardeners to provide residents with information on integrated pest management techniques that minimize pesticide application.

- Pursued a grant with UCR to *develop tools and guidance for pesticide application as part of the USEPA project "IMPLEMENTING IPM PROGRAMS TO CONTROL ANTS IN URBAN COMMUNITIES"*.

G.2.6. ENCOURAGING WATER CONSERVATION

The District and the County of Riverside are participating in the Riverside County Water Task Force which is a proactive regional forum for diverse stakeholders to discuss critical water-related issues and develop regional solutions. Their mission is to ensure the reliability, sustainability, and quality of the water resources within Riverside County through stakeholder communication and regional collaboration.

In 2008/09 the Task Force developed a Local Model Landscape Water Use Efficiency Ordinance intended to be a regional solution to the State mandated requirements of AB1881. Other activities of the Task Force include tracking and responding to state water supply legislation, actively participating in a Bay Delta solution, sponsoring a regional Water Symposium, promoting training in drought tolerant landscaping, engaging local decision makers, and developing new methods to incentivize water conservation efforts. More information on the Riverside County Water Task Force may be found at:

http://www.h2oriversidecounty.org/

G.3. WATERSHED PLANNING ACTIVITIES

The Permittees are active in pursuing watershed-based planning efforts, and within the reporting period have participated in the following efforts.

G.3.1. INTEGRATED REGIONAL WATERSHED MANAGEMENT PLAN (IRWMP)

An IRWMP has been developed and is being implemented for the Upper Santa Margarita Watershed through the coordinated efforts of agencies described in Section B.7 of this report. IRWMPs are the gold standard of watershed based planning. The IRWMP was initiated by Rancho California Water District, the County of Riverside and the District and established the following nine (9) planning objectives for the stakeholders:

- Develop a more reliable and diverse portfolio of water supplies;
- Promote economic, social and environmental sustainability;
- Improve water quality;
- Restore, enhance and maintain habitats and open spaces;
- Promote sustainable floodplain management;
- Promote appropriate recreational opportunities;
- Promote appropriate land use planning;
- Increase stakeholder involvement and stewardship; and
- Maximize implementation of water resources projects.

Projects were then selected that support various listed planning objectives with focus placed on projects that integrated multiple objectives. Based on the IRWMP, several stakeholders submitted an application for Prop 50 IRWM Implementation Grant projects, including the District, who requested the funds to complete the Murrieta Creek Flood Control, Environmental Restoration and Recreation Project. A copy of the IRWMP was included in the 2006-2007 Watershed Annual Report.

The Status of the implementation of the IRWMP is described in Section H.1.1.d)

G.3.2. SPECIAL AREA MANAGEMENT PLAN (SAMP)

Starting in 2001, the US Army Corps of Engineers (USACE) Los Angeles District, in conjunction with the Permittees, the Regional Board and other stakeholders, has pursued the development of a Special Area Management Plan (SAMP) within the San Jacinto and Upper Santa Margarita Watersheds. SAMPs are a regulatory tool that the Corps may utilize within a "geographic area of special sensitivity". Corps Districts are encouraged to develop and implement SAMPs to "reduce challenges associated with traditional case-by-case review" [404 permitting] but only where it is likely to "result in a definitive regulatory product". The objectives of the SAMP are to ensure that "development interests can plan with predictability and environmental interests are assured that individual and cumulative impacts are analyzed in the context of broad ecosystem needs"[6]

This collaborative and comprehensive watershed based planning effort will identify, prioritize and protect high priority "Waters of the U.S.", while also considering the needs of future growth and infrastructure development. The SAMP will be used to assist Federal, State and local agencies with their regulatory permit decision making processes to protect, restore and enhance aquatic resources, while accommodating various types of development activities and infrastructure projects. The Upper Santa Margarita and San Jacinto watersheds include such resources as woodlands, wetlands, freshwater marshes, vernal pools, streams, lakes and rivers that will be evaluated and protected under the project. The final product of the SAMP will be the establishment of an abbreviated or expedited regulatory permitting process by the Corps under Section 404 of the Clean Water Act. Additionally, the California Department of Fish and Game is preparing a Master Streambed Alteration Agreement in conjunction with the SAMP to provide an expedited permitting process under the State's Section 1600 of the Fish and Game Code.

The status of the SAMP effort is included in Section H.1.1.b) of this report.

[6] USACE Regulatory Guidance Letter No. 05-09; Special Area Management Plans, December 7, 2005

G.3.3. WESTERN RIVERSIDE COUNTY MULTIPLE SPECIES HABITAT CONSERVATION PLAN (MSHCP)

As part of their Watershed-Based Planning Activities, the Permittees continue to lead efforts to mitigate the impact of new development on water quality in the SMR through participation in the Western Riverside County Multiple Species Habitat Conservation Plan (MSHCP). The MSHCP is a joint effort of the Santa Margarita Region Permittees, and others stakeholders that was adopted in June of 2003. It is a comprehensive, multi-jurisdictional Habitat Conservation Plan focusing on conservation of species and their associated habitats in western Riverside County. The MSHCP is one of several large, multi-jurisdictional habitat planning efforts in southern California with the overall goal of maintaining biological and ecological diversity within a rapidly urbanizing region. The MSHCP will allow Riverside County and its cities to better control local land-use decisions and maintain a strong economic climate in the region while addressing the requirements of the state and federal Endangered Species Acts. Further, the MSHCP's special provisions for the protection of existing Riverine/Riparian communities will ensure protection and preservation of natural watercourses

Through the implementation of the MSHCP, much of the remaining non-urbanized lands within the SMR will ultimately be conserved.

A summary of the status of this effort is described in Section H.1.1.a) and the annual report for the MSHCP is included in Appendix D.

G.4. DEVELOPMENT PLANNING ACTIVITIES

The Permittees are supporting and developing a number of methodologies to advance their capabilities to avert storm-water pollution through creation and implementation of various development planning practices. The findings of these studies will provide the basis for future amendments to the Watershed and Individual SWMPs.

G.4.1. HYDROMODIFICATION STUDY

The Permittees have implemented numeric criteria to control runoff from new developments as described in the DAMP. Additionally, the Permittees are participating in a regional hydromodification study conducted by SCCWRP, to increase understanding of hydromodification problems and potential management measures, and provide a basis and the tools for developing revised criteria as needed.

A full description of these efforts is provided in the Special Studies section of the Monitoring Annual Report (Appendix G, Section G-7.1).

G.4.2. LOW IMPACT DEVELOPMENT (LID) STUDY

The Permittees are participating in a study coordinated by the Southern California Monitoring Coalition (SMC, Section B.5) to develop a LID BMP design manual.

This study is described in the Special Studies section of the Monitoring Annual Report (Appendix G, Section G-7.1).

G.4.3. LOW IMPACT DEVELOPMENT TESTING AND DEMONSTRATION FACILITY

In the interest of fostering an increased knowledge and understanding of the implementation, effectiveness and maintenance of various types of LID BMP's, the District will be reconstructing much of the grounds surrounding the District's headquarters at a cost of almost 1.2 million dollars, to incorporate a Low Impact Development Testing and Demonstration Facility. This project and its benefits are further described in the Special Studies section of the Monitoring Annual Report (Appendix G, Section G-7.1).

G.4.4. LID BMP DESIGN MANUAL

The District is currently coordinating with the SMC LID BMP grant project referenced in Section G.4.2 to develop a LID Supplement for the current BMP Design Manual contained in the WQMP. This project and its benefits are further described in the Special Studies section of the Monitoring Annual Report (Appendix G, Section G-7.1).

G.5. MUNICIPAL ACTIVITIES

Under the second-term SMR Permit, the Permittees developed a Municipal Facilities Strategy to identify BMPs for various activities that are typically conducted at municipal facilities. The municipal facilities of concern identified by the Permittees included maintenance yards, vehicle and equipment maintenance areas, waste transfer stations, corporation and storage yards, and parks and recreational facilities. In addition, the Permittees identified BMPs for street sweeping, catch basin cleaning, landscape and swimming pool maintenance activities, MS4 maintenance activities, and the application of pesticides. The Municipal Facilities Strategy was incorporated into Chapter 5 of the DAMP as part of the permit update process. The following table updates the Public Agency Facilities Matrix contained within the DAMP.

G.5.1. UPDATED PUBLIC AGENCIES FACILITIES MATRIX

Table G-1 lists the types and numbers of municipal facilities operated by the Permittees.

Table G-1: Permittee Facilities Matrix

	Corporate Yards	Parks & Recreation Facilities	Ware-houses	Fire Stations	Police Stations	Hazardous Materials Storage	Animal Shelters	Swimming Pools	Water Treatment Facilities
District [(a)]	--	--	--	--	--	--	--	--	--
County	3	3	--	11	--	1	--	--	--
Murrieta [(b)]	1	50 [(c)]	--	4	1	--	--	1	--
Temecula	1	43	--	3	2 [(d)]	--	--	3	--

(a) The District has no municipal facilities, other than MS4, in the Santa Margarita Region.

(b) Numbers of facilities within City Limits.

(c) There are forty-four (47) parks and three (3) recreational facilities within City of Murrieta limits.

(d) Although within city limits, these stations are operated by the Riverside County Sheriff's Department.

G.5.2. UPDATED DRAINAGE MAPS

An updated MS4 map is included in Appendix F of this report and Appendix D of the DAMP. As with the FY2007-2008 Watershed Annual Report, the map included in this year's report has been enhanced to better incorporate presentation of the entire drainage system including natural or unmaintained drainages, thus allowing viewers to trace watercourses from their point of initiation all the way to receiving waters.

Additionally, in accordance with the recommendations submitted in the ROWD, the Permittees are working to add additional information onto the MS4 Maps. While gathering the information needed to complete these map layers is an on-going process, the drainage maps included in Appendix F now includes the delineation of HUC Sub-Drainage areas.

A GIS database is also maintained by the District which identifies all receiving waters, all CWA section 303(d) impaired receiving waters, existing and planned land uses, MS4s, major highways, and jurisdictional boundaries. Work to improve the maps is ongoing. A GIS Web-Map with much of this information is available on the District's Website at:

http://rcflood.org/gis_npdes/home.htm

G.6. INDUSTRIAL AND COMMERCIAL ACTIVITIES

The regional Industrial and Commercial Activities program includes the implementation of the Compliance Assistance Program (CAP), which makes use of existing County Department of Environmental Health site inspections as described in Section 8 of the DAMP. As the responsible Certified Unified Program Agency (CUPA) in Riverside County, the County Department of Environmental Health is responsible for regularly inspecting all sites within the County that handle hazardous waste. The County Department of Environmental Health also inspects all food service restaurants within the SMR at least annually.

Revisions to the inspection program requirements contained within the Third-term SMR Permit expanded the scope of the overall commercial/industrial inspection program beyond the ability of the CAP to solely address. In addition, the Third-term SMR Permit required inventories/databases of facilities, prioritization of industrial and commercial sources relative to the potential to impact water quality, and specified inspection frequencies based upon facility priority. To address these expanded requirements, each municipal Permittee now implements a supplemental inspection program for Commercial and Industrial facilities not adequately covered by the CAP.

The revised industrial and commercial sources program continues to have both regional and local jurisdiction components. Although the overall industrial/commercial inspection program has grown beyond the CAP, the CAP still addresses most of the facilities identified in the Third-term SMR Permit. With its relatively low cost, the CAP remains a cost effective approach to mitigating the impacts of industrial and commercial facilities on the MS4 and Receiving Waters.

G.6.1. CAP SUMMARY REPORT

Under the CAP, County Department of Environmental Health inspectors added a storm-water compliance survey to their regular inspection process. *The CAP program performed **406** Facility inspections during this reporting period.* Completed surveys were forwarded to the appropriate Permittees for their records, review and further action, if necessary. Individual inspection results are contained in each of the Permittee's Annual Reports.

Appendix C contains a listing of the facilities inspected under the CAP program.

G.7. ILLICIT CONNECTION / ILLICIT DISCHARGE (IC/ID) ACTIVITIES

Each Permittee implements its own IC/ID monitoring program. In addition to and complementing these programs, the following watershed based IC/ID activities are conducted.

G.7.1. HAZMAT RESPONSE TEAMS

The Haz-Mat Emergency Response Team is a partnership program with combined efforts from the Riverside County Fire Department and the Hazardous Material Branch of Environmental Health. The Haz-Mat Response Team is staffed daily by firefighters/Haz-Mat specialists at two separate locations. Hazmat 34 is stationed at the Winchester Fire Station and Hazmat 81 is stationed at the Palm Desert Fire Station. The Hazmat Team oversees the NPDES program for the County Fire Department's fire stations and facilities and provides training to the employees of the Fire Department.

Appendix C contains a detailed report of the Haz-Mat Team Activities within the reporting period.

G.7.2. COMPLAINT CALL SUMMARY LOGS

In addition to each Permittee's individual programs to handle complaint calls and IC/ID reports, the District on behalf of the Permittees maintains a "800" telephone number and an e-mail address for anonymous public reporting of Illicit Discharges, and additionally, the District monitors CAL EMA (California Emergency Management Agency) spill reports. Through these, the District receives reports on and ensures proper response to Illicit Connections, Illicit Discharges and Spills throughout the county.

Following is a summary of the total number and nature of complaints fielded by the District within the reporting period.

Illicit Discharges (ID): **4**
Illicit Connections (IC): **0**
Spills (S): **41**
Total: 45

A key component of this public reporting program is the "1-800" number maintained by the District on behalf of the Permittees. As described in Section F.3.2, this "1-800" telephone number enables callers to report activities suspected of causing pollution. The total number of calls received on the 1-800 line during the reporting period was **1,169**. Please note that hang-ups or disconnects are not included in the total.

Additional Details are provided in the effectiveness assessments summarized in Section H.1.3.d), and copies of the reports are provided in Appendix C

G.7.3. WATERSHED CLEAN-UP EVENT SUMMARY

The Santa Margarita Watershed Clean Up event was held on November 1th, 2008. Over 120 people volunteered for this event, and about 12 tons of waste was removed. Since 1995, volunteers have collected more than 1,300 tons of trash during the annual cleanups. To encourage the public to keep their communities clean, the District always participates in watershed clean up events by providing manpower, equipment and storm-water related promotional items and brochures.

A Flyer and a Newspaper Article that promoted this event are included in Appendix C of this report.

G.7.4. HOUSEHOLD HAZARDOUS WASTE/ANTIFREEZE, BATTERY, OIL AND LATEX PAINT (HHW/ABOP)

One of the principal components of the Permittees' source control efforts are the HHW and ABOP collection programs conducted by the County's Environmental Health Department. The Permittees contribute funding to ensure that sufficient HHW and ABOP events are held each year. Within this reporting period, *54 HHW/ABOP events were held within the SMR involving 3,300 participants and collected over 100 tons of waste*. The goal of these programs is to provide convenient alternatives to illegally disposing of wastes into the MS4. Additional information regarding the quantities of materials collected during the reporting period is identified in Section H.1.4.a).

G.8. TRAINING & EDUCATIONAL ACTIVITIES

G.8.1. PUBLIC EDUCATION

On behalf of the Permittees, the District conducts a watershed wide Public Education Program. This program is fully described in Section F of this report.

G.8.2. NPDES TRAINING

The Permittees jointly fund NPDES stormwater training and education programs tailored for their Municipal staff. These training programs are designed to train Municipal employees on the proper use and implementation of BMP's appropriate for their field of work.

This year, the following new courses were added to the NPDES training program:

- CAP Storm-Water Survey Training
- Whitewater WQMP training (specific to portion of Riverside County within jurisdiction of Colorado Regional Board.)

Additionally, all of the existing training modules (WQMP, Construction, Municipal, and Industrial-Commercial) have been updated to include information on proper management of pesticides and to enhance focus on addressing the pollutants of concern within the County.

Of the six training courses the program now offers, five are applicable to the SMR and are described below:

CONSTRUCTION TRAINING

- Targets staff that conduct:
- Construction Site Inspections / Enforcement
- Public Works Construction Activities
- Grading/Building Permit Review Staff
- Any staff reviewing or preparing construction project SWPPP's

INDUSTRIAL – COMMERCIAL TRAINING

- Targets health, building and code enforcement staff that conduct:
- Industrial/Commercial Site Inspections / Enforcement for Water Quality Ordinances.

MUNICIPAL TRAINING

Targets Permittee maintenance Workers in:

- Building Services
- Parks Department
- Fleet Services
- Warehouse/Receiving Personnel
- Building and Grounds Maintenance

WQMP TRAINING

- Targets staff involved with:
  - Planning
  - Engineering
  - Plan Review and Plan Check
  - Grading/Building Permit Review
  - Post Construction BMP Inspection

CAP TRAINING

- County Environmental Health inspectors that are implementing the CAP program for inspections of Industrial and Commercial facilities. (These employees formerly attended the Industrial – Commercial Training)

Tables summarizing attendance to these trainings are provided in Section H.1.3.e) of this report. Copies of the training attendance sheet are included in Appendix E. AEI-CASC is contracted by the District to present the training.

G.9. PUBLIC INVOLVEMENT

All major permit compliance programs were developed during the FY 2004 -2005 period, therefore, there were no significant revisions to the DAMP or SMR programs warranting public involvement. Nevertheless the permittees facilitated the following opportunities for the public to become involved in protecting water quality.

G.9.1. OPEN MEETINGS

- *TAC meetings* are scheduled monthly and are open to the public. The TAC meetings are described in Section G.2.2.
- The Bureau of Reclamation, on behalf of the SMREMT has held several publicly noticed meetings to discuss SMR watershed issues and priorities.

G.9.2. OTHER ACTIVITIES INVOLVING THE PUBLIC

- The *Watershed Cleanup* described in section G.7.3 was sponsored by the Permittees and *included over 120 public volunteers and removed 12 tons of waste* from the Santa Margarita Watershed.
- *Fifty-four (54) Household Hazardous Waste collection events have been held* and involve the public in ensuring that wastes are disposed of properly. During this reporting period there were *3,300 participants* and, *over 100 tons of waste was collected*.

G.10. MONITORING ACTIVITIES

On behalf of the Permittees, the District implements a watershed based monitoring program which is fully reported upon in Appendix G of this report. This program includes direct sampling and analysis for wet and dry weather flows. The program also participates in a number of regional special studies that the Permittees participate in to address various water quality problems. These special studies are listed below, and additional information can be found in Appendix G - Section G-7.0.

- SCCWRP Hydromodification Study
- Toxicity Reduction Evaluation (TRE) for Pyrethroid pesticides in the SMR
- Lagoon Investigation Order No. R9-2006-0076
- Involvement in State Pesticide Regulatory and Reevaluation Activities
- Laboratory Inter-calibration Study
- Standardization of Toxicity Testing Methods
- Index of Biological Integrity for Low Gradient Streams
- Regional Watershed Monitoring Program

G.11. BUDGET

Expenditures identified below reflect costs incurred by the District for implementing its own NPDES program and to implement the regional watershed programs. The District does not track its direct implementation costs separately from the Regional Programs, nor does it track costs separately for many permit provisions.

Future compliance costs could increase significantly to address TMDL monitoring requirements in future fiscal years. In addition, the shown budget for FY2009-2010 only includes costs associated with compliance with the Order 2004-001. Undetermined additional costs may be incurred as part of the review and development of the fourth-term MS4 Permit and associated compliance programs.

Table G-2: Regional Program Costs

	Fiscal Year 2008-2009		Fiscal Year 2009-2010	
	Capital Expenditures	O&M/ Admin Expenditure	Capital Expenditures	O&M/ Admin Expenditure
Program Management [(a)]	N/A	$393,606	N/A	$582,590
Annual Fee for MS4 NPDES Permit	N/A	0	N/A	$4,000
Development Planning [(b)]	N/A	N/A	N/A	N/A
Industrial and Commercial Inspections (CAP Program)	N/A	$25,000	N/A	$19,830
Illicit Connections & Illegal Discharges Program (HAZMAT, HHW/ABOP Collections)	N/A	$66,500	N/A	$66,500
Municipal Facilities and Activities [(b)]	N/A	N/A	N/A	N/A
Training, Public Education & Outreach	N/A	$69,000	N/A	$74,910
Monitoring Program	N/A	$307,158	N/A	$200,200
Other	N/A	$0	N/A	$0
Contributions to Other Programs	N/A	$0	N/A	$0
Total	**N/A**	**$861,264**	**N/A**	**$948,030**

(a) Program Management includes all costs not directly tracked below, and includes staffing, administration & overhead, and consultant services.

(b) Costs for these regional program elements are not directly tracked but are included in the Program Management costs shown.

A description of the sources of funds that were utilized during the previous fiscal year and the sources of funds proposed to meet the necessary expenditures for the subsequent year, including legal restrictions on the use of such funds are as follows:

Table G-3: Source of Funds

	Amount Available	Percent of Total Program Funding	Restrictions on Use (if applicable)
Santa Margarita Watershed Benefit Assessment Fund	$444,830	50.71%	District NPDES compliance costs, excess funds used to fund regional NPDES activities.
Santa Margarita Watershed Permittee Implementation Agreement	$422,323	48.15%	Regional NPDES Compliance Programs.
Spending Against Reserves	$0	0%	District NPDES Compliance Costs
Miscellaneous Revenue	~$10,000	1.14%	Interest, Other Misc.
TOTAL	**$877,153**	**100%**	

ADDITIONAL COMMENTS/INFORMATION:

The Permittees are working with other stakeholder groups to leverage funds for regional planning objectives including the following: [NOTE many of the State's grant funding programs have been suspended]

Prop 13/40/50 Grant Funds – Working cooperatively with San Diego County, Bureau of Reclamation and other stakeholders to implement a Watershed Management Plan for the Santa Margarita River Watershed. (See Section B.7)

Storm-water Monitoring Coalition – The SMR Permittees are partnering with other participants in the SMC to fund monitoring projects to address high priority water quality issues as described in Section B.5.

Mission Resource Conservation District – Partnering with stakeholders in the SMR through the MRCD to implement watershed education, monitoring, and clean up programs.

Santa Ana Watershed Project Authority – Jointly fund a low impact development (LID) BMP testing and demonstration facility for southern California. The facility will be a retrofit of the District's compound in Riverside. Data collected from the facility will be used to update the BMP Design Manual, develop numeric criteria for hydromodification, and provide data for statewide efforts to better define the effectiveness of LID BMPs. The facility will also serve as a regional demonstration facility for southern California MS4 Permittees. Additional information regarding this project is available in the Appendix G (Section G-7.2.2).

Southern California Coastal Watershed Research Project – Jointly fund a regional study the impacts of hydromodification on southern California streams and assess possible mitigation measures. Additional information regarding this project is available in the Special Project's section of the Monitoring and Reporting Annual Report (Section G-7.1).

H. AN ASSESSMENT OF OVERALL PROGRAM EFFECTIVENESS BASED ON MEASURABLE GOALS ESTABLISHED IN THE DAMP

In the 4th year annual report and in the subsequent ROWD, the Permittees performed a comprehensive assessment of the effectiveness of their overall programs. Section 5.3 of the ROWD found that the Permittees' programs have been and continue to be effective at addressing the Focus Area Constituents of Concern. This section contains a continuance of these assessments based upon the short-term and a long term strategies described in Appendix S of the DAMP.

While program effectiveness assessment is a key step in the iterative process of program implementation, it should be realized that effectiveness assessment itself is a part of a management process that is also evolving. Assessing program effectiveness is recognized as a challenge for program managers across California, and the Riverside County Storm-water Program has supported the efforts of CASQA to develop guidance in this area at a statewide level. As such, the ROWD also includes recommendations for revised reporting formats and proposes a new method for effectiveness assessments based upon the CASQA methodology, which will provide a better and more transparent view into the Permittees compliance activities in the fourth term MS4 Permit.

H.1. SHORT TERM MEASURES OF EFFECTIVENESS

The short-term strategy for assessing the effectiveness of the DAMP (Watershed SWMP) requires the development of measurable goals and measures of effectiveness for programs proposed to mitigate the impacts of Focus Area Constituents of Concern. The measures of effectiveness track the year-to-year implementation of the regional programs. The measures of effectiveness also are used as part of the Long-Term Strategy to measure the effectiveness of the Watershed SWMP as described in Provision K.2.m of the Watershed SWMP. The Measures of Effectiveness for the regional programs are presented below.

H.1.1. ENCOURAGE WATERSHED BASED PLANNING EFFORTS

SUMMARY EFFECTIVENESS ANALYSIS:

During the Reporting Period and throughout the implementation of the 3rd Term Permit, the Permittees have been effective at encouraging Watershed-Based Planning Efforts. Section G.3 describes the efforts undertaken within the reporting period. A summary of these efforts is provided below and the current status of these efforts is described in the following sections.

- Participation in the *INTEGRATED REGIONAL WATERSHED MANAGEMENT PLAN* (IRWMP, Section G.3.1) for the Upper Santa Margarita Watershed. – Promoting watershed-wide coordination and management of water resources.
- Participation in the development of the *SPECIAL AREA MANAGEMENT PLAN* (SAMP, Section G.3.2) – Working with the Corps of Engineers and other regulatory agencies to assess Clean Water Act Section 404 permitting on a regional scale to protect, restore and enhance aquatic resources, while accommodating various types of development activities and infrastructure projects.
- Participation in the *WESTERN RIVERSIDE COUNTY MULTIPLE SPECIES HABITAT CONSERVATION PLAN* (MSHCP, Section G.3.3) – To conserve endangered species and sensitive habitat areas including Riparian/Riverine habitat.

The Permittees believe that the combined efforts not only meet but exceed the minimum requirements established by the Watershed SWMP and the measurable goals established for addressing the highest priority Water Quality Problems in the Santa Margarita watershed.

Specific measurable metrics are as follows:

H.1.1.a) Annual Summary Reports of Benefits of MSHCP Implementation

The MSCHP effort (described in Section G.3.3) continues to purchase critical habitat and stream-bank properties through grants and local MSHCP funding mechanisms to ensure preservation of the region's natural resources. As of the end of FY08-09, approximately 87,407 acres have been conserved, representing about 25% of the Santa Margarita Watershed region of Riverside County.

It is estimated that by roughly 2028 (25 years of MSHCP implementation), the plan will have conserved approximately 43% of the SMR through the creation of approximately 150,000 acres of permanent habitat reserve lands.

Figure H-1: Conservation within the SMR

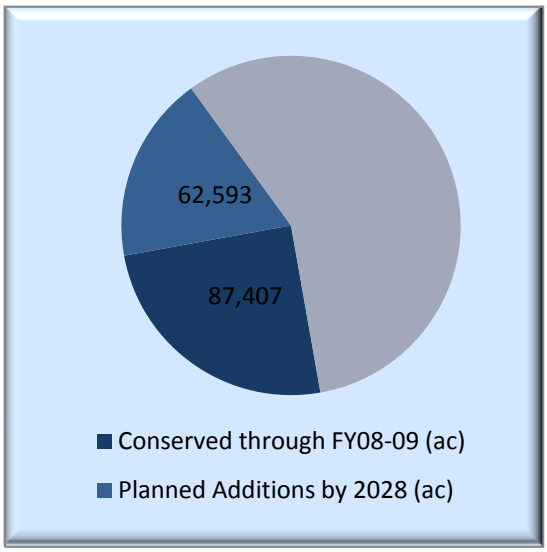

Figure H-2: Conservation Area Acquired Through Implementation of MSHCP

Note: Due to discrepancies discovered in the methodologies used to generate the information in **Error! Reference source not found.**, the shown Yearly Acquisistions should be considered rough approximations. The total Conserved Land shown for 2009 (representing FY08-09) is considered accurate, and the methodology used to generate this number will be used consistently in future annual reports.

It is estimated that after 25 years of implementation, the planned acquisitions will be complete, however the number of acres acquired per year is dependent upon many factors that are largely dependent upon the economy during that year and as such the acquisitions can vary significantly from year to year. The continuing implementation of the MSHCP represented in Figure H-2 above demonstrates the Permittees' ongoing efforts to support watershed based planning and conservation within the watershed.

The MSHCP is described in Section G.3.3 of this report.

H.1.1.b) Annual Summary Report of SAMP Development

The $4.5 million in appropriations received since FY 2001 has allowed the Corps to complete a 'Landscape Level Aquatic Resource Delineation' and 'Functional Assessment' to determine the value of waters and wetlands within the San Jacinto and Upper Santa Margarita watersheds.

During the past two years the Corps did not receive any funding for the SAMP and all efforts were put on hold. The Corps has received new funding this fiscal year and the project is once again moving forward. Additionally, the District has partnered with the Riverside County Transportation and Land Management Agency, The Riverside County Resource Conservation Authority and The Riverside County Transportation Commission to assist the Corps with the final stages of the SAMP which include the development of the expedited regulatory products, the identification of the conservation/mitigation areas and completion of the necessary NEPA/CEQA documents. The goal is to have the SAMP completed by FY 2009-10.

The SAMP is further described in Section G.3.2 of this report.

H.1.1.c) Summary Report of Watershed Stakeholder meetings and agendas.

As part of the implementation of the various watershed-based planning efforts described in this report, the Permittees hold or attend meetings with the various watershed stakeholders. These meetings are described in Section B of this report and agendas for these meetings (as available) are provided in Appendix A.

H.1.1.d) Summary Report on the Status of IRWMP

IRWMP was finalized on July 31, 2007 and is currently being implemented. A grant application was submitted in August 2008. However, the application was not funded by DWR, in part due to concern that the IRWMP did not fully address the SMR watershed. As a result, The IRWM committee formed a tri-county committee with their IRWM counterparts in San Diego County and Orange County to discuss boundary coordination issues and determine how to allocate remaining Proposition 84 IRWM funds. A MOU was developed between the three IRWM plans within the San Diego Region in March 2009. The MOU established a permanent 3-county coordinating committee (Tri-County Facilitation and Coordination Committee) to ensure coordination of cross-boundary issues. In June 2009, the District, County and RCWD also participated in the DWR IRWMP Regional Acceptance Process (RAP). As a result, the IRWMP is proposed for approval by the state without condition on 9/1/2009.

The IRWMP is described in Section G.3.1 of this Report.

H.1.1.e) Summary Report of status of WQMP and BMP Guidance

District and County staff are continuing their efforts to develop guidance for the implementation of Low Impact Development (LID) BMPs and for addressing Hydromodification.

There are *four (4) active efforts ongoing*; these efforts are summarized in Section G.4 of this report and complete descriptions, and the status of these efforts can be found in Appendix G - Section G-7.2, Special Studies.

H.1.2. CONTINUE TO SUPPORT DEVELOPMENT OF REGIONAL SCIENCE AND OTHER STUDIES TO FURTHER UNDERSTAND AND MITIGATE WATER QUALITY IMPAIRMENTS

SUMMARY EFFECTIVENESS ANALYSIS:

During the Reporting Period and throughout the implementation of the 3rd Term Permit, the Permittees have extensively supported the development of regional science to further understand and mitigate water quality impairments and are working to meet the goals described in the Watershed SWMP section K.2.l. As such the Permittees have been effective in addressing this section.

H.1.2.a) Annual Status Reports of ongoing studies

Within this reporting period, *the Permittees have supported ten (10) separate regional studies* to further develop the science of managing storm-water. A summary of the specific efforts undertaken within the reporting period is provided in Section G.2.3 of this report.

H.1.3. PUBLIC EDUCATION AND OUTREACH

SUMMARY OF EFFECTIVENESS ANALYSIS:

A detailed and complete effectiveness analysis of this component was provided within the 2009 ROWD. Since that analysis, the Permittees have continued to collect the measureable metrics, and this year's data is presented below, indicating the continued and ongoing effectiveness of the Public Education Component. It should be noted that the Permittees implement a consistent public education program across the County, with modifications to focus on specific watershed issues as necessary. To this end, many of the metrics provided below are Countywide as it is consistent with the implementation of the Public Education Program. SMR specific metrics are provided where available.

Additionally, many of these metrics are not conducive to trend analysis as variables such as event venues change from year to year. The Public Education program is continually looking for better and more effective opportunities to present the message of 'Only Rain in the Storm Drain'.

H.1.3.a) Track materials distributed

This section includes an accounting of the attendance to outreach events and the number of materials distributed.

Table H-1: Countywide Educational Materials Outreach

Attendance and/or Outreach Materials Distributed	FY04-05	FY05-06	FY06-07	FY07-08	FY08-09
Calendars	25,000	20,000	N/A	20,000	20,000
After the Storm Brochure	20,000	60,000	40,000	40,000	40,000
Outdoor Cleaning Activities	20,000	25,000	15,000	5,606 Brochure updated	18,000
Construction BMP Brochure	11,450	1,607	6,000	590 Revision pending permit approval	0 Revision pending permit approval
Automotive Maintenance and Car Care Brochure	16,400	1,062	16,000	0 Brochure to be updated	0 Brochure being updated
HHW Schedules	20,000	20,000	20,000	20,000	20,000
What's the Scoop Brochure	17,750	25,000	20,000	20,000	20,000
Pool, Spa and Fountain Brochure	16,900	25,000	14,000	6,620 Brochure updated	6,000
Food Facilities Brochure	7,850	1,379	10,000	185	1,600
Construction Poster	3,700	272	1,200	520 To be updated	0 To be updated
Car Care Poster	2,450	39	1,200	40	200
Food Services Poster	4,500	1,650	700	825	450
Fueling Station Poster	200	12	100	40	130
Service Bay Station Poster	200	12	100	40	130
Santa Margarita Children's Workbook	3,000	5,500	4,000	2,500	2,700
Fancy Fin Coloring Book	20,000	20,000	40,000	30,000	20,000
Urban Runoff Outreach Survey	200	500	1,500	1,500	1,008
Utility Inserts	84,000	84,000	84,000	84,000	84,000

H.1.3.b) Track public education events attended

This section includes an accounting of the attendance to public education events and/or the number of materials distributed at the event.

Table H-2: Classroom Presentations and Residential Outreach

	FY04-05	FY05-06	FY06-07	FY07-08	FY08-09
School Outreach Presentations by MRCD	2,310 students 104 classes	136 classes	3,884 students	6,870 students	3,463 students, 193 presentations
Animal Control Outreach	2,490	2,620	2,000	66 stores 57 posters	ND
Boy & Girls Club Event Temecula, New	N/A	N/A	N/A	9/13/07 1,455 pcs.	0
I-215 Conference Temecula	N/A	N/A	9/06 997+	9/19/07 1,200 pcs.	2,600 pcs
New Employee Orientation	Aug. 19, 2004 100	2,900	3,000	3,320	96 pcs
Valley Greeters	Murrieta -990 Temecula - 1,113	674 Temecula 930 Murrieta	216	Shelved pending economy	0
Recycling Alley in Murrieta	July 4, 2004 750	N/A	N/A	N/A	0
Santa Margarita Clean Up	Sept 25, 2004 400	Nov 12, 2005 350	Oct 14, 2006 200	No Clean Up	Nov. 1, 2008 12 tons
Temecula Car Show	Oct 8. 2004 35,000	Event Cancelled	N/A	N/A	1,500 pcs
Murrieta Hot Springs Mobile Home Park, New	N/A	N/A	N/A	4/28/08 1,200 pcs.	0
Wildomar Community Celebration	Nov 16, 2004 350	N/A	Nov 9 2006 200	Est. 100	0
Temecula Flower Show	Apr 30, 2005 750	N/A	4/28/07 100	4/17/08 650	1,200 pcs
Temecula Valley Museum , New outreach partnership	N/A	N/A	N/A	6/13/08 6,440 pcs.	17
Temecula Water Festival Now at DVL location	May 7, 2005 5,538	N/A	May 5, 2007 500+	450+	N/A
Temecula Public Safety Expo	N/A	Nov 3, 2005 200+	N/A	N/A	0
Wildomar Town Hall Meeting	N/A	Dec 3, 2005 300	200	N/A	N/A

Table H-3: Industrial / Commercial Outreach

	Attendance and/or Outreach Materials Distributed				
	FY04-05	FY05-06	FY06-07	FY07-08	FY08-09
Business Outreach Packets mailed to new businesses identified in the Business Press	313	1,333	979	7,503	7,500 (approx)
CAP Food Service Outreach	2,218*	303	237	230+	187 businesses
Inland Empire Economic Briefing and Business Exposition, sponsored by the Press Enterprise.	4/22/05 500	N/A	997+	1,100+	N/A
Industrial/Commercial Training (Materials provided to inspectors for re-distribution)	N/A	N/A	4/15/07 44	99 ppl	79 ppl
Hazmat Facility Inspections	1,979*	241	237		219 businesses

* County-wide

Table H-4: Development Activities Outreach

	FY04-05	FY05-06	FY06-07	FY07-08	FY08-09
Public Education - Affidavits	N/A	N/A	10	11	4
AEI/CASC Training for Development Review	1/31/05 75 - Temecula	6/21/06 64 - Murrieta	10/18/06 - 28 11/19/07 - 31 11/20/07 - 45	4/16, 17 & 22/08 - 131	5/4/08, 6/9/08, 11/3/08
BIA Presentation	N/A	Mar. 22, 2006 240	N/A	8/22/07 -20 2/29/08 -1 3/18/08 -2	N/A

H.1.3.c) Track media impressions

This section includes an estimate of the media impressions made during the fiscal year. Many of these metrics are not conducive to trend analysis as variables such as the media outlets change from year to year. The Public Education program is continually looking for better and more effective opportunities to present the message of 'Only Rain in the Storm Drain'.

Table H-5: Estimated Media Impressions

Attendance / Materials Distributed	FY04-05	FY05-06	FY06-07	FY07-08	FY08-09
Earth Day Flier (Penny Saver)	650,000	685,500	687,500	650,000	650,000
Pollution Prevention Flier (Penny Saver)	650,000	667,000	691,000	670,000	670,000
City of Temecula Newsletter article	32,000	N/A	N/A	32,000	N/A
Billboard	N/A	20,792,700	N/A	32,000	3,373,530
District Page Hits	N/R	N/R	68,330	170,778	145,553
Public Ed Storm-water Web Page	N/R	7,767	N/R	3,387	3,096
County Website Page	N/R	55,932	N/R	350,000	N/R
Tear sheets (hotline & website info)	1,000	1,271	1,471	1,971	17,450
County Postage Stamp "Only Rain Down the Storm Drain" 1-800 number	5,164,844	5,275,142	N/A	N/A	N/A
Chemical Products Shelf Talker	5,200	450	1,800	1,500	126
Herbicides and Pesticides Shelf Talker	6,750	300	10,556	15,000	126
Paint Products Shelf Talkers	4,700	750	10,556	15,000	126
Hazardous Chemicals Shelf Talker	1,650	300	4,025	4,025	126
Environmental Calendar	300,000	300,000	150,000	150,000	150,000
HHW Schedules	100,000	15,000	100,000	77,000	40,000
SMART Yellow Pages* Estimated only	100,000	100,000	200,000	100,000	100,000
Business Cards w logo and number*	1,000	N/A	2,000	3,000	3,500
Fact Sheets	N/A	N/A	350	104	105
TOTALS	5,685,144	5,756,912	479,287	365,629	5,153,743

H.1.3.d) The Number of Urban Runoff Complaints received through hotlines

During this reporting period, 45 Urban Runoff complaint reports were received by the District through the regional reporting portals, i.e., telephone calls, e-mail requests, and/or mail. Currently, the specific method of "receipt" of the complaints directed to the District is not tracked.

Additional complaints that may have been fielded directly by the other Permittees are reported within the respective Permittee's annual report.

Of the 45 reports received by the District, 41 (91%) were Spill reports that were received via copy of a Cal EMA (California Emergency Management Agency) report. Eight (8) of the spill reports involved sewage discharges. The remaining four (4) were reported illicit discharges, which generally consisted of illegal dumping.

Copies of these reports and any follow up investigations are provided in Appendix C. Additional information regarding these reports can be found in the District's Individual Annual Report.

Table H-6: Total Number of Calls to '800' Hotline

2004-05	2005-06	2006-07	2007-08	2008-09
100	2,015	1,648	1,317	1,169

Note: These numbers are for the entire County of Riverside. The number of inquiries originating from the Santa Margarita Region was *158*.

H.1.3.e) The Number of Permittee staff receiving Riverside County NPDES training for activities related to DAMP implementation

The training sessions accounted for in these tables are described in Section G.8.2 of this report, and consist of the regional training provided by the '**Only Rain down the Drain**" program. Additional training may have been attended by individual Permittee staff; such training is documented in the corresponding individual annual report.

Table H-7: Training Attendance - Municipal Facilities Operation and Maintenance

Municipal	11/4/08	11/6/08	11/18/08	5/5/09	5/26/09	Total
District	2	0	0	57	0	**59**
County	8	10	4	9	14	**45**
Murrieta	28	0	4	0	0	**32**
Temecula	1	27	0	0	0	**28**

Table H-8: Training Attendance - Water Quality Management Plan Review/Approval

WQMP	11/3/08 (AM)	11/3/08 (PM)	5/4/09 (AM)	5/4/09 (PM)	6/9/09 (AM)	Total
District	10	8	9	7	4	**38**
County	6	13	8	3	2	**32**
Murrieta	1	0	3	0	0	**4**
Temecula	0	0	0	6	11	**17**

Table H-9: Training Attendance - Industrial / Commercial Facility Inspections

Industrial/ Commercial	11/4/08	11/18/08	5/26/09	Total
District	1	0	0	**1**
County	0	0	15	**15**
Murrieta	0	0	1	**1**
Temecula	0	0	4	**4**

Table H-10: Training Attendance - CAP Storm-water Inspections

CAP	6/2/08
District	1
County	71

Table H-11: Training Attendance - Construction Site Inspections

Construction	9/29/08 (AM)	9/29/08 (PM)	9/30/08 (AM)	9/30/08 (PM)	5/27/09 (AM)	5/27/09 (PM)	Total
District	0	1	7	1	0	0	**9**
County	18	15	27	32	11	13	**116**
Murrieta	0	0	0	0	1	0	**1**
Temecula	8	0	9	0	0	0	**17**

H.1.3.f) Provide summary report of on-going program modifications

In fiscal year 2007-2008 the Permittees initiated or completed the following program improvements to the **Only Rain down the Storm Drain** Program:

- Updated the *Outdoor Cleaning Activities* brochure to ensure that it adequately addresses issues related to mobile operators, power washers and carpet cleaners. Additional resource information and phone numbers, as well as legislative mandates will be added. (In Process)
- Update the Santa Margarita Watershed map from its basic layout to one that clearly characterizes the significant tributaries.
- Completed the following new brochures:
  - *Tips for Maintaining a Septic Tank System*
  - *Tips for Horse Care*
  - *Landscape Management*
  - *Pet Waste*
  - *Outdoor Cleaning Activities*
- Continued enhancement to the following brochure :
  - *Automotive Maintenance and Car Care*

H.1.4. WASTE COLLECTION AND WATERSHED CLEAN-UP EVENTS

SUMMARY OF EFFECTIVENESS ANALYSIS:

The Permittees continue to support and collect data on waste collection and watershed clean up events. The Watershed Clean Up event also continues to generate interest and press coverage. The Permittees have determined this to be an effective component of their program.

H.1.4.a) Annual summary report of materials removed/collected

During FY 2007-2008, ten (10) HHW collection events were held within the SMR. Also there were forty-four (44) ABOP events staged at the County's Transportation Maintenance Yard in Murrieta which serviced a total of 1,927 participants. A total of more than 200,000 pounds of waste were collected through these events. A detailed breakdown of the HHW and ABOP waste streams is included in Appendix C.

Table H-12: Waste Collection Event Summary

	FY04-05		FY05-06		FY06-07		FY07-08		FY08-09	
	Participants	Lbs collected	Participants	Lbs collected	Participants	Lbs collected	Participants	Lbs collected	Participants	Lbs collected
HHW/ E-Waste	1,238	78,000	1,460	93,700	1,483	109,226	1,103	109,226	1,138	82,504
HHW Rural	N/A	N/A	350	76,500	372	61504	539	114,862	234	31,599
ABOP	1,490	63,000	1,740	89,400	1,713	83,355	1,708	81,755	1,927	94,803
Totals	2,728	141,000	3,550	259,600	3,568	254,085	3,350	305,843	3,299	208,906

H.1.4.b) Santa Margarita Watershed Clean Up Event

The Santa Margarita Watershed Clean Up event was held on November 1st, 2008. Over *120 people volunteered* for this event, and about *12 tons of waste was removed*. Since 1995, volunteers have collected more than 1,300 tons of trash during the annual cleanups. To encourage the public to keep their communities clean, the District supports these watershed clean up events by providing manpower, equipment and storm-water related promotional items and brochures.

H.1.4.c) Annual summary report of public outreach conducted as part of collection/removal events

Outreach materials are provided to participants and event organizers at Watershed Clean Up events.The volunteers are made up of those who need to complete community service hours; part of their rehabilitation; Boy and Girl Scout Project; environmental organizations, families, and environmental enthusiasts; etc.

H.2. LONG TERM MEASURES OF EFFECTIVENESS

The objective of the Watershed SWMP is to maintain and/or improve the quality of Receiving Waters within the SMR by mitigating impacts of Constituents of Concern in urban runoff using regional programs, while considering economic, social and environmental resource limitations. The Permittees' long-term effectiveness analysis was incorporated in the ROWD submitted to the Regional Board on January 15th, 2009. As described therein, the Permittees programs have been shown to be effective overall as indicated by the lack of correlation between the monitoring data and the significant growth that has occurred in the region.

H.3. OTHER MEASURES OF EFFECTIVENESS

The Permittees continually review their programs for effectiveness. These reviews can use the measurable metrics and goals required by the Permit, however, the most effective program enhancements tend to occur as the result of diligent program implementation by program coordinators. The following items are additional activities that the Permittees have undertaken during the reporting period that further demonstrate the Permittee's commitment to the iterative management of their programs and ensuring their programs remain effective and efficient.

H.3.1. SUBMITTAL OF REPORT OF WASTE DISCHARGE

In January 2009 the Permittees submitted the Report of Waste Discharge (ROWD). As a demonstration of the Permittees' effectiveness in Program Management, this

document incorporated a comprehensive analysis of the Permittees programs and recommended a suite of programmatic revisions to the Regional and Individual Programs to further enhance their programs and ensure they continue to meet the MEP standard in the next permit term. The ROWD is described in section G.2.4.

H.3.2. WEB SITE UPGRADE

The Permittees continue to improve the efficiency and efficacy of their MS4 compliance programs. An integral facet of the NPDES program and education of the public has been the District's internet web site. The District's previous NPDES website contained only a single page listing various program compliance documents and a link to its Public Education web site.

An internal web site review was completed in January 2009, and a new NPDES web site became publically available in early June 2009. Whereas the old web site was not particularly user friendly and was burdensome to navigate and locate specific documents, these problems have been addressed via the new site. The redesigned web site can be accessed at http://www.rcflood.org/NPDES. Many improvements were made, including the following:

- The front page describes each of the three major watersheds in which the District is involved;
- Each of the watersheds has its own individual web page;
- Other web pages were added for Public Notices, Developers, Training, Public Education, Monitoring, Storm-water Facts, Links and Contact information;
- Allows online training registration for classes sponsored by the District;
- Provides watershed identification and map for specific locations;
- Enables easy access to a Public Education Calendar of Events; and
- Watershed compliance documents can be readily located.

Future improvements are planned to improve the Public Education webpage. The District hopes to complete additional improvements during the next fiscal year.

H.3.3. ONLINE POSTING OF ANNUAL REPORTS

In an effort to promote public awareness, the Permittees have posted the previous year's annual reports on-line for public access.

H.3.4. TRAINING PROGRAM UPDATES

In an effort to ensure that the NPDES Training programs for Municipal Employees are effective and providing appropriate training to all Municipal Staff that are involved in the Permittees' NPDES activities, several updates to the training program were made or initiated within the reporting period.

- Creation of a specialized training for Compliance Assistance Program (CAP) storm-water inspectors.
- Updated all training modules to include discussion on the water quality impacts of pesticides, and provided information on how each training group can use or encourage IPM in their duties.
- Updated all training modules to enhance focus on addressing the pollutants of concern.
- Acquisition of Form Scanning and Recognition Software to track and assess the effectiveness of the training sessions.

H.3.5. DATA TRACKING

In an effort to improve their ability to track and efficiently catalogue information from all aspects of their compliance activities, the District has acquired a software package that allows creation of scan-able forms that can be filled out by hand. Further this software will scan the filled-out forms and recognize the hand-filled information and transfer the results into a database for use and/or analysis.

This software can have applicability in many aspects of the Permittees compliance activities and is currently planned for use in the Public Education and Municipal Training programs.

In a time where permit requirements are exceeding fiscal constraints upon Permittees, one of the principal benefits of this software package will be to free up staff time to focus on responding to data collected, and on managing and enhancing other program areas.

I. RECOMMENDED ACTIVITIES TO BE CONDUCTED JOINTLY BY THE PERMITTEES TO ADDRESS THE IDENTIFIED WATER QUALITY PROBLEMS

Based on the water quality problems identified in Appendix G of this report and the effectiveness evaluations described in Section H herein, the Permittees recommend the following activities be implemented. The Permittees make adjustments to their compliance programs on an on-going basis as water quality problems are identified or as implementation issues warrant. As such many of the activities described or referenced herein have already been initiated and therefore are also described in Section G of this report.

Activities that have been recommended in past annual reports and have now been completed are described in Section G of this report.

I.1. IMPLEMENT RECOMMENDATIONS IN THE REPORT OF WASTE DISCHARGE

On January 15th 2009, the Permittees submitted their Report of Waste Discharge (ROWD) to the Regional Board. *Section G.2.4 of this report describes the ROWD* including highlights of the recommended activities that the Permittees' proposed to incorporate into their compliance programs as part of their anticipated 4th Term MS4 Permit.

Although still operating under their 3rd Term MS4 Permit, the Permittees have continued to move their programs forward by proactively implementing several of the activities recommended in the ROWD. These activities are summarized below.

- Revisions to the Dry Weather Monitoring Program
- Development of an LID Manual and Design Guidance
- Construction of an LID BMP testing facility.
- Addressing Pesticide Toxicity through implementing year 1 of the Plan of Action identified in the TRE.

The Permittees plan to continue their proactive implementation of these now existing activities within the next reporting period.

I.2. POLLUTANT TARGETED ACTIVITIES

The Permittees concluded in Section 5.3.1 of the 2009 ROWD that "…no significant program modifications are necessary to continue to protect and improve the quality of the Receiving Waters". Nevertheless, this section describes activities that the Permittees plan to implement as part of their ongoing and iterative management of their MS4 discharges to ensure that pollutant discharges are continually reduced to the MEP. Listed below are the

DRAFT

pollutant-targeted activities the Permittees are proposing to address the Water Quality Problems described in Appendix G. These Pollutant-Targeted activities are in addition to the general activities described in Section 6 of the DAMP that address a broad range of pollutants typically expected to be generated within Urban areas.

I.2.1. PESTICIDES

I.2.1.a) Implement Plan of Action Identified in the Toxicity Reduction Evaluation (TRE)

The Permittees completed and submitted their Toxicity Reduction Evaluation (TRE) as part of their Report of Waste Discharge (ROWD) in January 2009. This TRE identified a plan of action that the Permitees proposed to implement beginning with their 4th term permit. Although the 4th term Permit is not yet adopted, the Permittees have proactively begun implementing many of the 'Year 1' recommendations included therein; these activities are reported upon in Section G.2.5 of this report.

I.2.1.b) Participate in CASQA Pesticides Subcommittee

The Permittees recommend continuing participation in the Pesticides Subcommittee of CASQA (see section B.6). This committee provides a forum for the collection and dissemination of information regarding pesticide impacts, a uniform voice for commenting on state and federal regulations and legislation, a forum to identify and resolve monitoring issues, and a forum to comprehensively identify and/or develop methods of reducing the impact pesticides have on our environment.

I.2.1.c) Continue Existing Outreach and Education

The Permittees will continue dissemination of their existing public education and outreach materials that address Pesticides. These are described in Section F.2.1 of this report.

I.2.1.d) Pursue distribution of educational materials within Home Depot Stores regarding pesticide alternatives.

With recent support from Home Depot corporate offices for the *"Our Water Our World Program"*, the Permittees are looking into installing shelf displays that will inform customers about alternatives to the use of chemical pesticides.

I.2.1.e) Support proposed USEPA Project: "Implementing IPM Programs to Control Ants in Urban Communities"

The District with the support of the Permittees has committed to supporting this program proposed by USEPA to limit the use of pesticides to control ant populations. This project is scheduled for 2010 through 2012.

I.2.2. NUTRIENTS

I.2.2.a) Continue Education Programs

The Permittees will continue dissemination of their existing educational materials that address Nutrients. These are described in Section F.2.2 of this report, and *include the recently completed PET WASTE, TIPS FOR HORSE CARE and TIPS FOR MAINTAINING A SEPTIC TANK SYSTEM brochures.*

I.2.3. PATHOGENS

I.2.3.a) Continue Education Programs

The Permittees will continue dissemination of their existing educational materials that address Pathogens. These are described in Section F.2.3 and include the recently completed brochures on managing septic systems, pet waste, and equestrian management.

I.2.4. METALS

The primary urban source of copper and lead in the regions waters are from brake pad wear and lost automotive wheel weights, respectively. The Permittees are currently, and propose to continue coordinating through CASQA to reduce metallic pollutant loads in regional waters by promoting statewide and national change to these national problems that are caused by societal use of currently accepted technologies. To date, several automotive manufacturers have committed to evaluating reformulated brake pads and converting from lead to steel tire weights. Additional work needs to be done, however, as there are still several third-party manufacturers who are not participating in the process and who are distributing problematic components to automotive shops and automotive enthusiasts throughout the country.

I.2.4.a) Brake Pad Partnership

The Permittees recommend continued participation through CASQA in Sustainable Conservation's efforts to bring together government regulators, brake pad manufacturers; storm-water management agencies and environmentalists to research the impacts of brake wear debris on water quality. Through this effort, the brake pad manufacturers have agreed to bring new products to market within five years if brake pad wear is determined to have significant potential to impair water quality.

I.3. CONTINUE EXISTING REGIONAL PROGRAMS

As indicated in the introduction to Section H herein, the Permittees programs have been shown to be effective. As such, and notwithstanding the recommended activities described in Sections I.1 and I.2 above, the Permittees recommend continuing the overall breadth and scope of their other ongoing regional activities described in the DAMP and this Annual Report.

It should be noted that although the Permittees recommend continuing their existing programs, specific activities may be revised or ended depending upon the ongoing and iterative nature of these programs.

J. PROPOSED REVISIONS TO THE WATERSHED SWMP

The Permittees are continually revising their compliance programs to adjust to programmatic and water quality issues as they arise. Section I of this report identifies the activities that the Permittees propose to implement to ensure that any such issues are addressed. Those revisions that warrant amendment of the Watershed SWMP are identified below.

J.1. PROVISION K.2.D – CONSTITUENTS OF CONCERN

The Constituents of Concern, including Table K-4 in the Watershed SWMP (DAMP Appendix S) will be updated to reflect the current constituents of concern as described in Appendix G to this annual report. (Table G-38)

J.2. ADDITIONAL REVISIONS PENDING ADOPTION OF THE 4TH TERM MS4 PERMIT

Based upon a comprehensive review and analysis of their existing programs, the Permittees recommended several programmatic enhancements in their 2009 ROWD, that they recommended to be incorporated within the upcoming 4th Term MS4 Permit. To the extent that the 4th Term Permit incorporates those recommendations, the Permittee's compliance plans, including as appropriate the Watershed SWMP, will be updated accordingly.

Although still operating under their 3rd term MS4 Permit, as noted in section I.1, the Permittees have proactively implemented several of the enhancements recommended in the ROWD. The Permittees have determined that these proactively implemented programs do not necessitate a revision to the Watershed SWMP at this time.

J.3. OTHER REVISIONS

Sections I.2 and I.3 of this annual report identify other recommended activities to address water quality within the SMR that will be continued or initiated within the next reporting period. These recommended activities, while demonstrating the Permittee's iterative management of their programs, are within the existing framework of, and do not necessitate any revisions to the Watershed SWMP. As such, no further revisions to the Watershed SWMP are proposed at this time.

Riverside County Flood Control

RFCWQ4 V26 Output 10/22/2009

777 Temecula Creek below Pala Rd
1145 Cadmium, Total in mg/l
Benchmark 0.005, Source = BPO

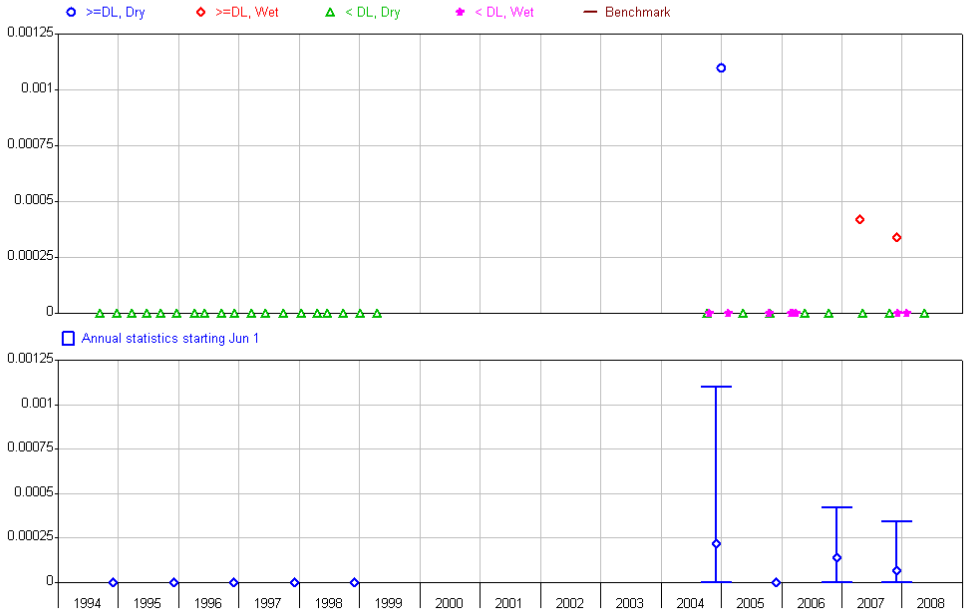

Riverside County Flood Control

RFCWQ4 V26 Output 10/22/2009

020094

777 Temecula Creek below Pala Rd
1150 Calcium in mg/l

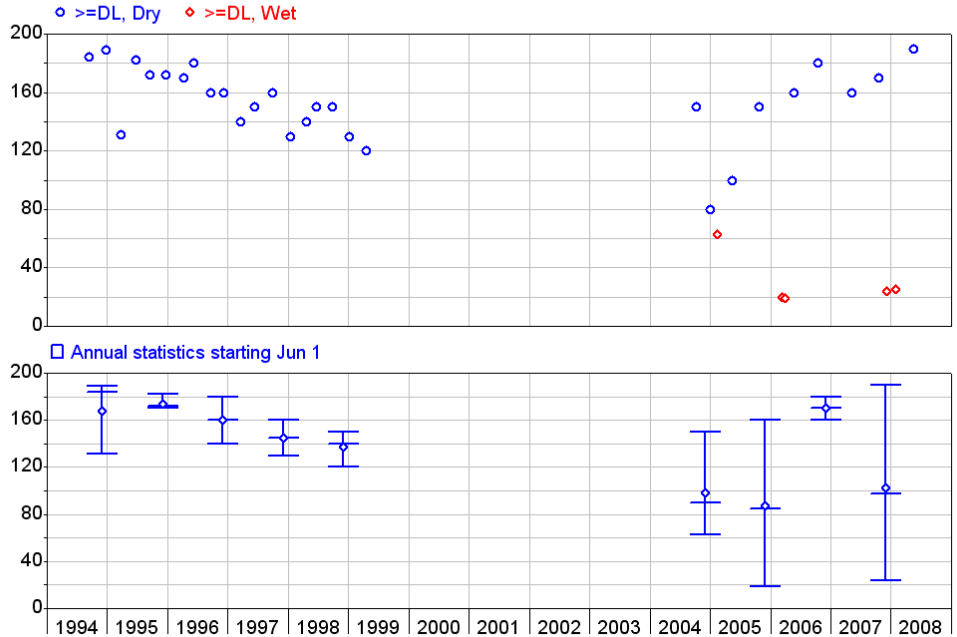

Riverside County Flood Control

RFCWQ4 V26 Output 10/22/2009

777 Temecula Creek below Pala Rd
1153 Carbophenothion in ug/l

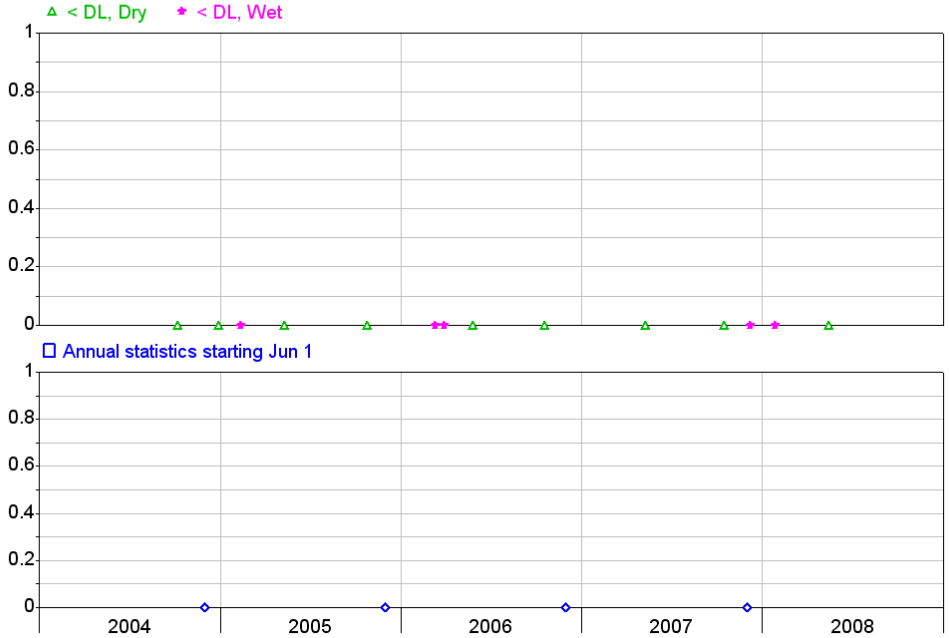

Riverside County Flood Control

RFCWQ4 V26 Output 10/22/2009

777 Temecula Creek below Pala Rd
1155 Carbon, total organic (TOC) in mg/l

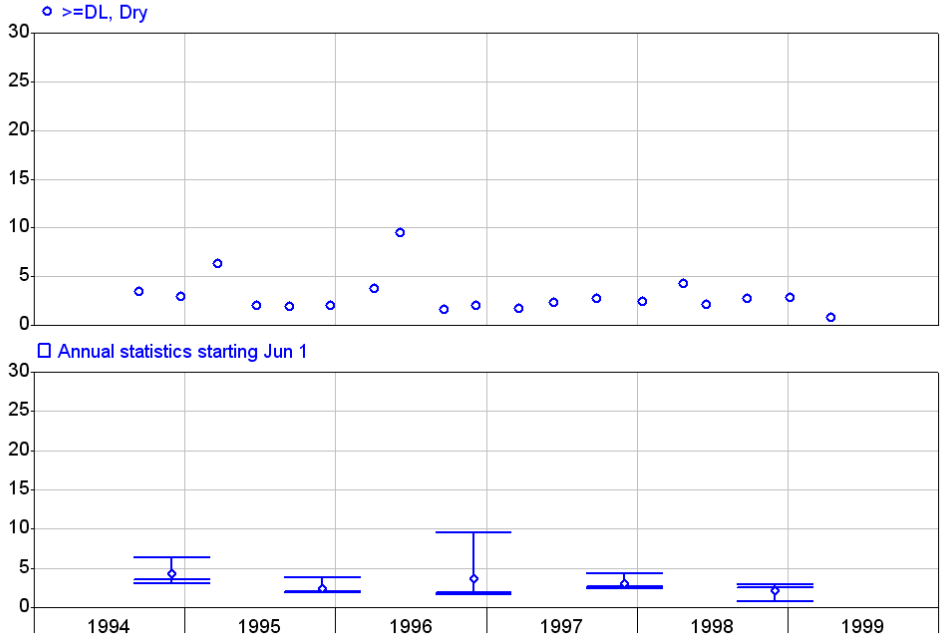

Riverside County Flood Control

RFCWQ4 V26 Output 10/22/2009

777 Temecula Creek below Pala Rd
1180 Chromium, all valences in mg/l
Benchmark 0.05, Source = BPO

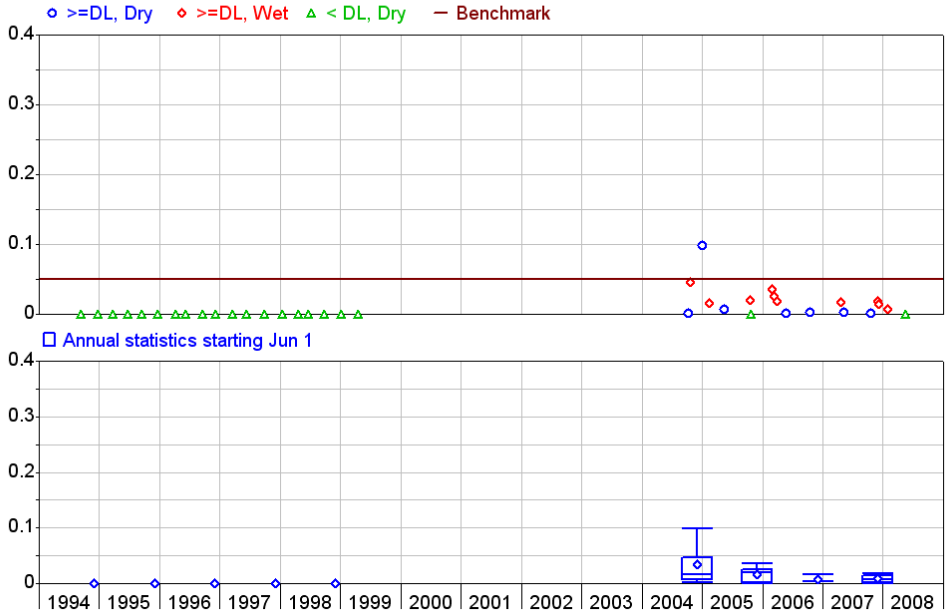

Riverside County Flood Control

RFCWQ4 V26 Output 10/22/2009

020095

777 Temecula Creek below Pala Rd
1182 Chlorpyrifos-Methyl + Methyl Parathion in ug/l
Data period 06/01/2005 to 05/31/2006

Riverside County Flood Control

RFCWQ4 V26 Output 10/22/2009

777 Temecula Creek below Pala Rd
1185 Chromium, hexavalent in mg/l

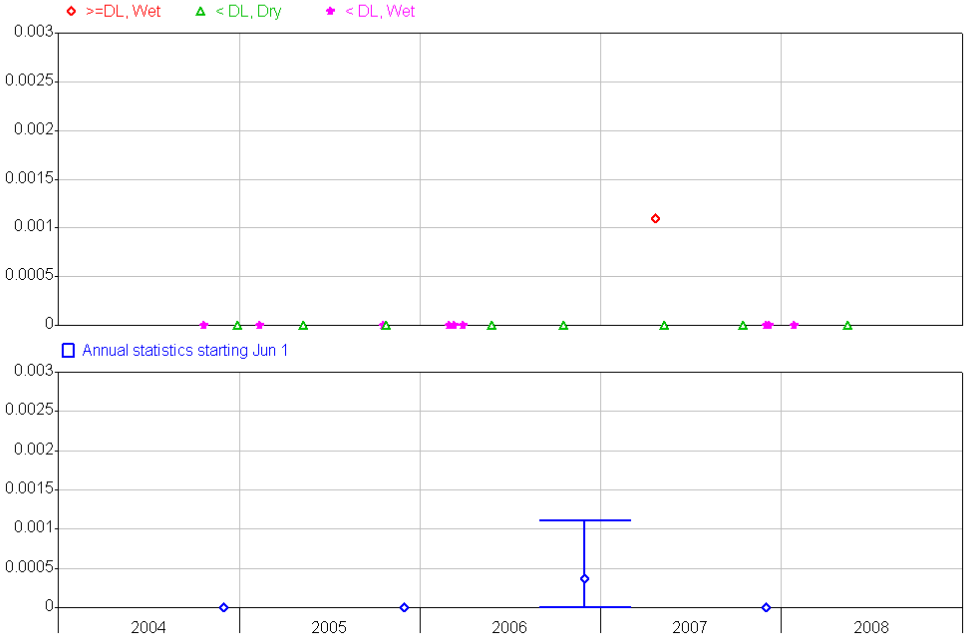

Riverside County Flood Control

RFCWQ4 V26 Output 10/22/2009

777 Temecula Creek below Pala Rd
1195 Color
Benchmark 20, Source = BPO

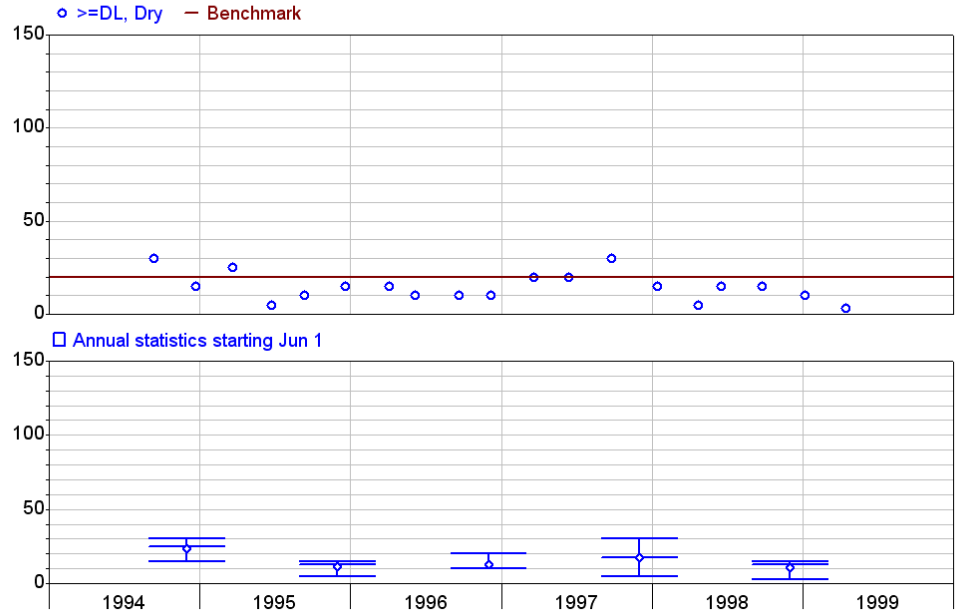

Riverside County Flood Control

RFCWQ4 V26 Output 10/22/2009

777 Temecula Creek below Pala Rd
1255 Fluoride in mg/l
Benchmark 1, Source = BPO

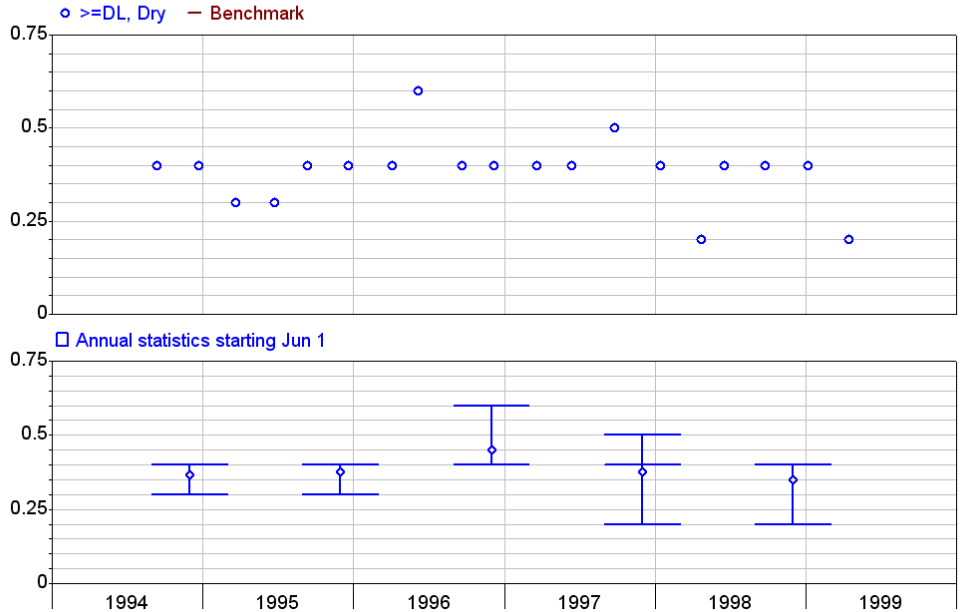

Riverside County Flood Control

RFCWQ4 V26 Output 10/22/2009

020096

777 Temecula Creek below Pala Rd
1256 Fonophos in ug/l

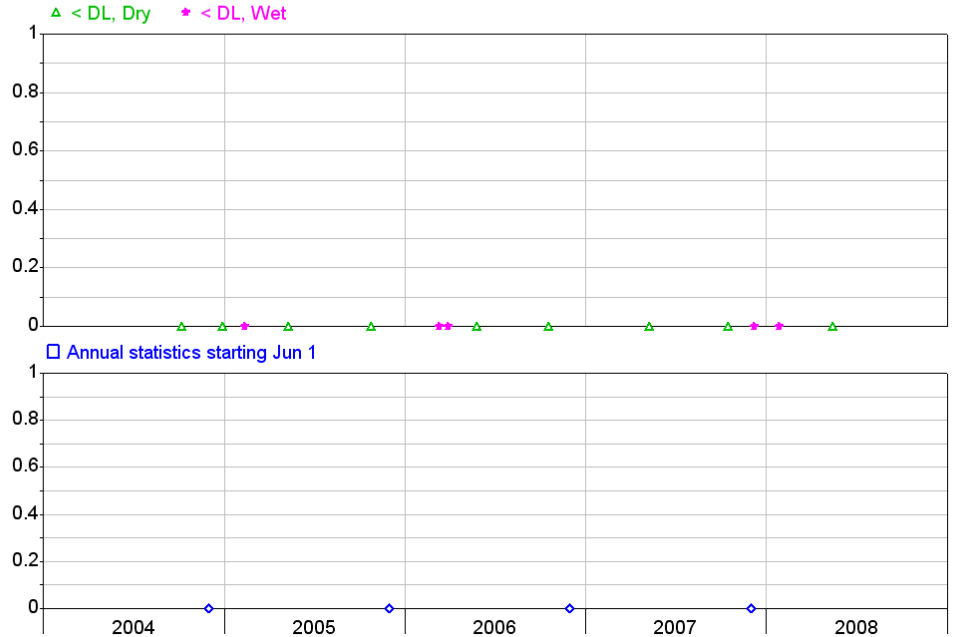

Riverside County Flood Control

RFCWQ4 V26 Output 10/22/2009

777 Temecula Creek below Pala Rd
1265 Hardness, total (CaCO3) in mg/l

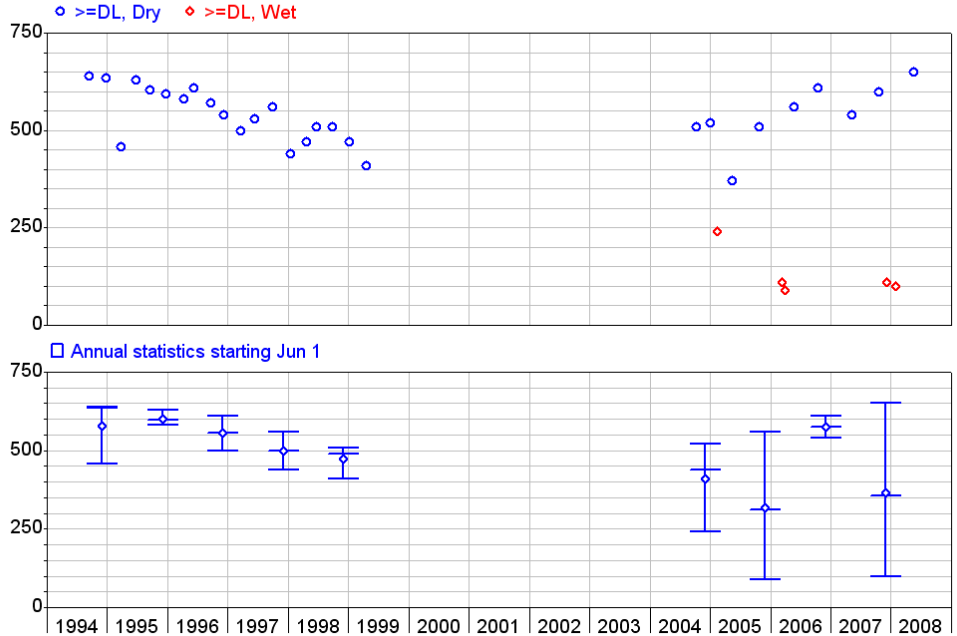

Riverside County Flood Control

RFCWQ4 V26 Output 10/22/2009

777 Temecula Creek below Pala Rd
1270 Hydrocarbons, total petroleum in mg/l

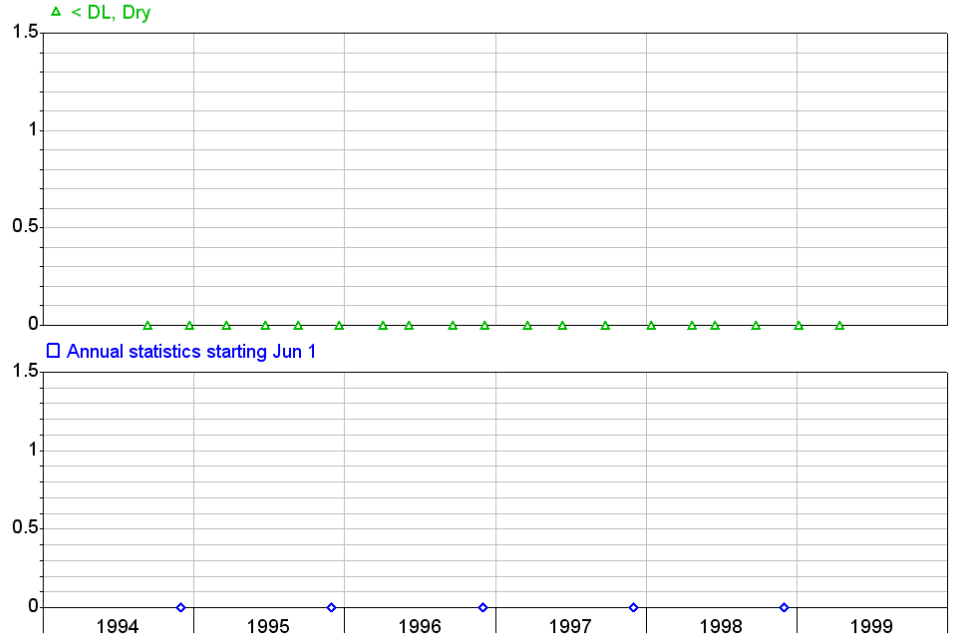

Riverside County Flood Control

RFCWQ4 V26 Output 10/22/2009

777 Temecula Creek below Pala Rd
1275 Hydroxide (OH) in mg/l

< DL, Dry

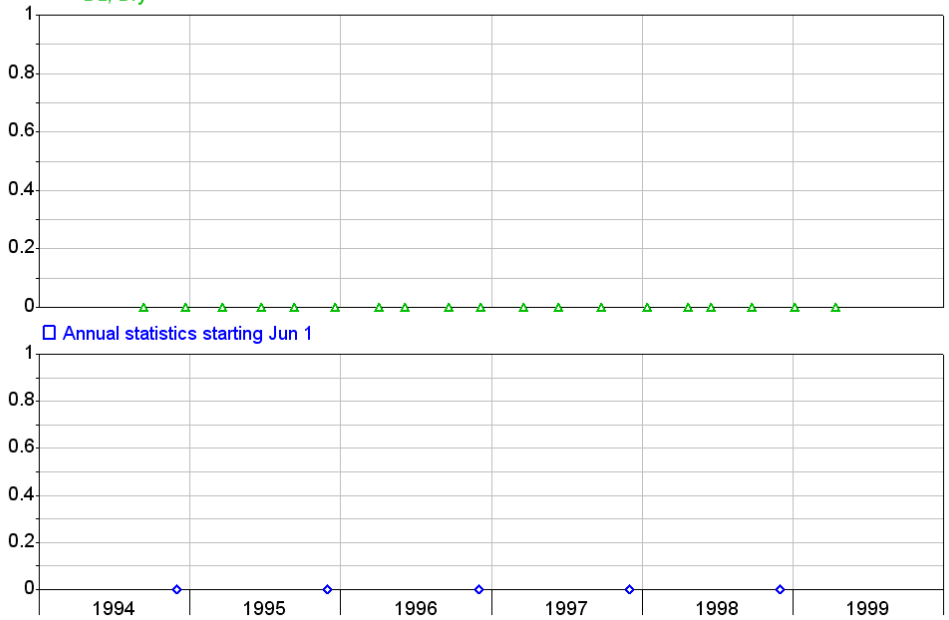

Riverside County Flood Control

RFCWQ4 V26 Output 10/22/2009

020097

777 Temecula Creek below Pala Rd
1290 Lead, Total in mg/l

>=DL, Dry >=DL, Wet < DL, Dry

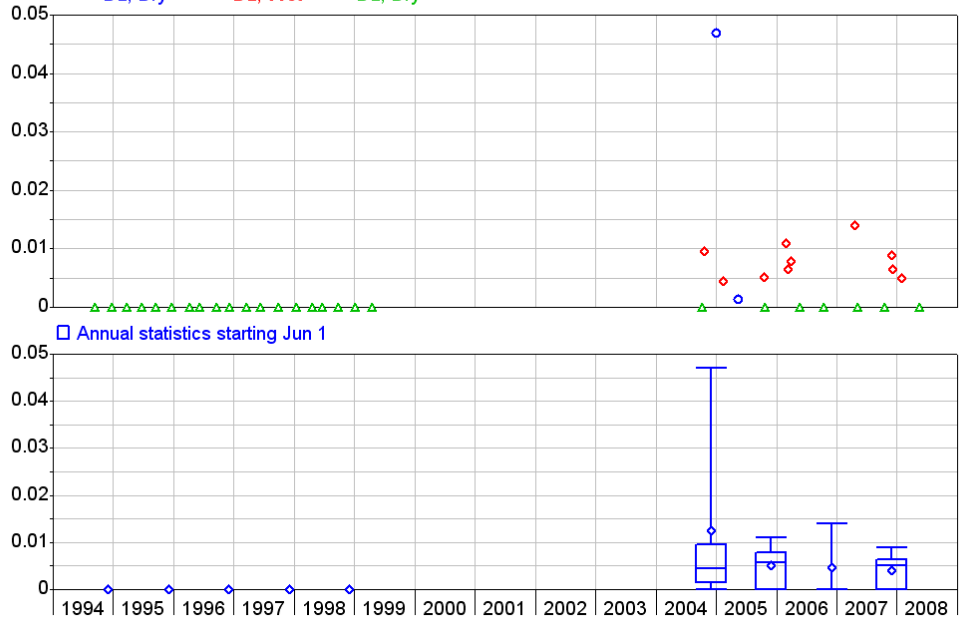

Riverside County Flood Control

RFCWQ4 V26 Output 10/22/2009

777 Temecula Creek below Pala Rd
1291 Leptophos in ug/l

< DL, Dry < DL, Wet

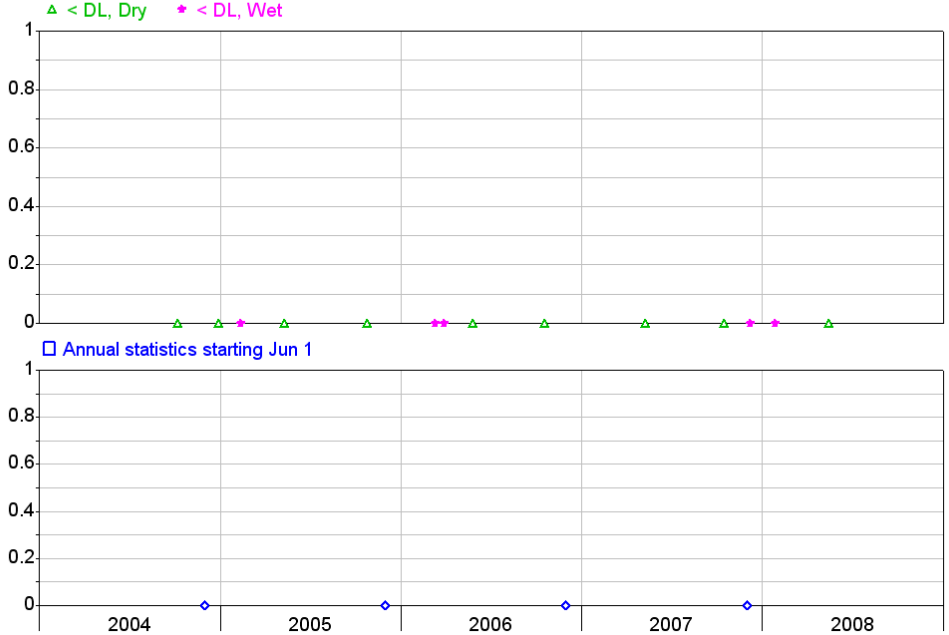

Riverside County Flood Control

RFCWQ4 V26 Output 10/22/2009

777 Temecula Creek below Pala Rd
1292 Lindane in ug/l
Benchmark 0.2, Source = BPO

< DL, Wet Benchmark

Riverside County Flood Control

RFCWQ4 V26 Output 10/22/2009

777 Temecula Creek below Pala Rd
1314 Naled in ug/l

< DL, Dry < DL, Wet

Riverside County Flood Control

RFCWQ4 V26 Output 10/22/2009

020098

777 Temecula Creek below Pala Rd
1315 Napthalene in ug/l

< DL, Dry < DL, Wet

Riverside County Flood Control

RFCWQ4 V26 Output 10/22/2009

777 Temecula Creek below Pala Rd
1320 Nickel, Total in mg/l
Benchmark 0.1, Source = BPO

>=DL, Dry >=DL, Wet < DL, Dry Benchmark

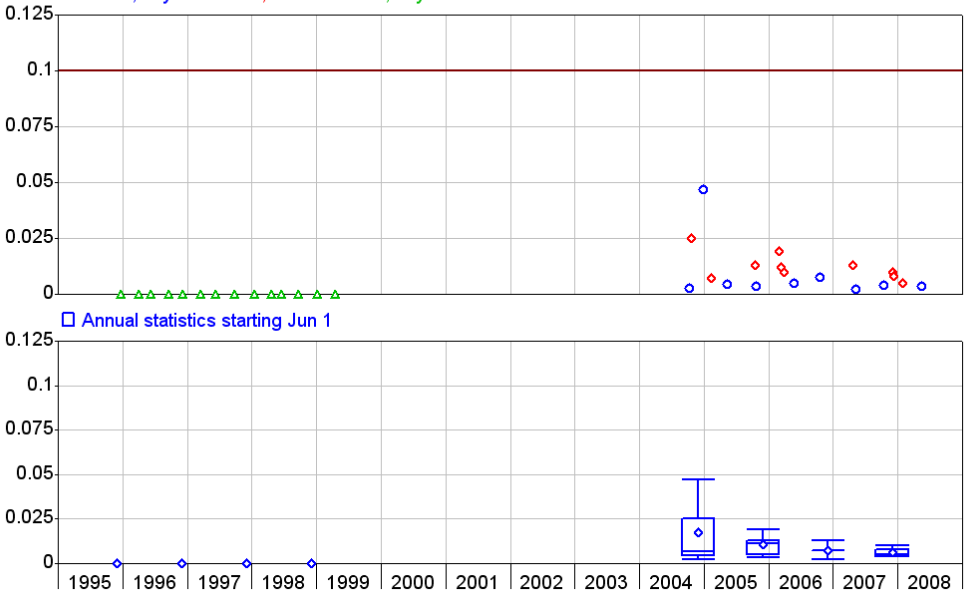

Riverside County Flood Control

RFCWQ4 V26 Output 10/22/2009

777 Temecula Creek below Pala Rd
1331 Nitrobenzene in ug/l

< DL, Wet

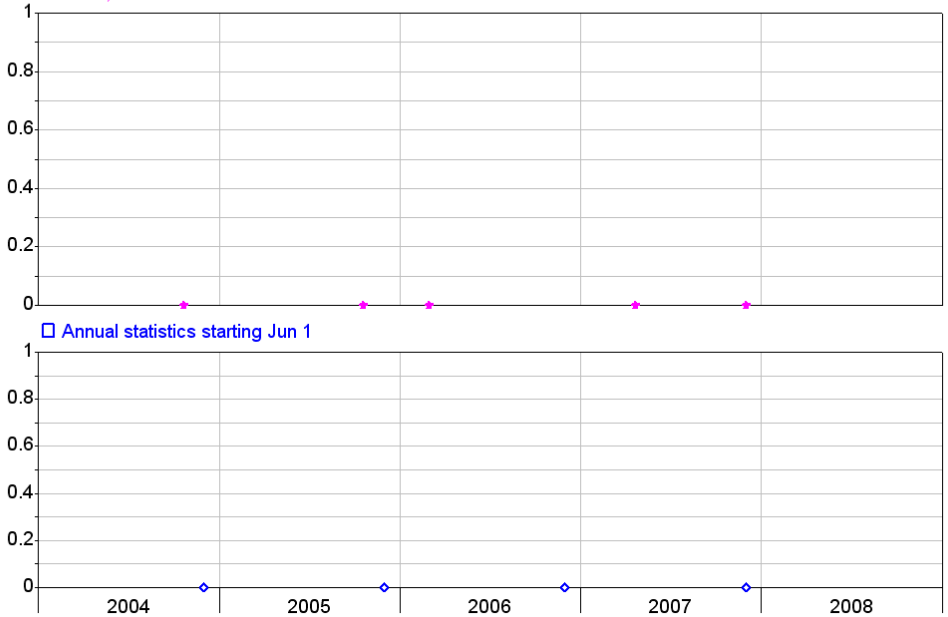

Riverside County Flood Control

RFCWQ4 V26 Output 10/22/2009

777 Temecula Creek below Pala Rd
1535 Silver, Total in mg/l
Benchmark 0.1, Source = BPO

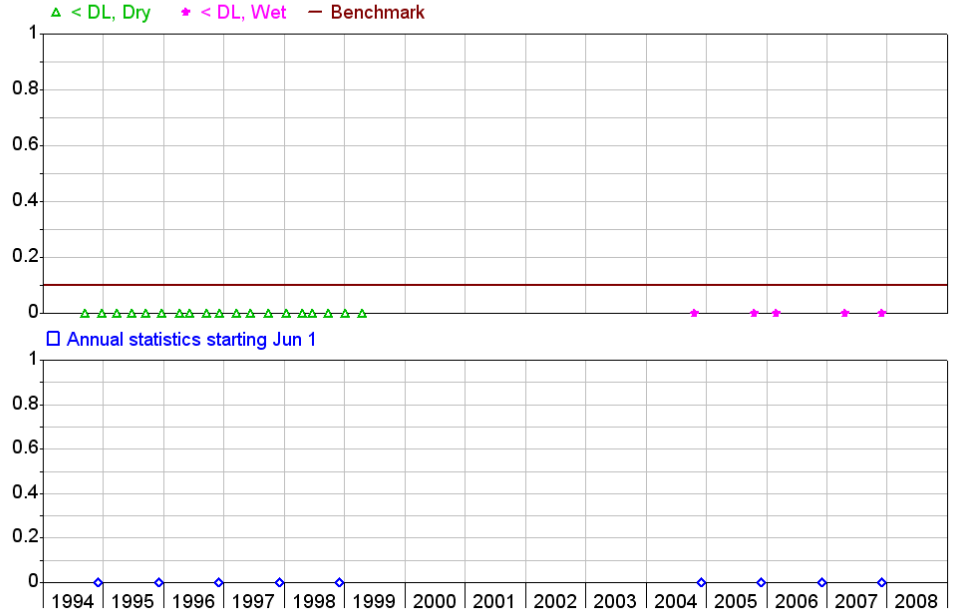

Riverside County Flood Control

RFCWQ4 V26 Output 10/22/2009

020099

777 Temecula Creek below Pala Rd
1536 Simazine in ug/l
Benchmark 4, Source = BPO

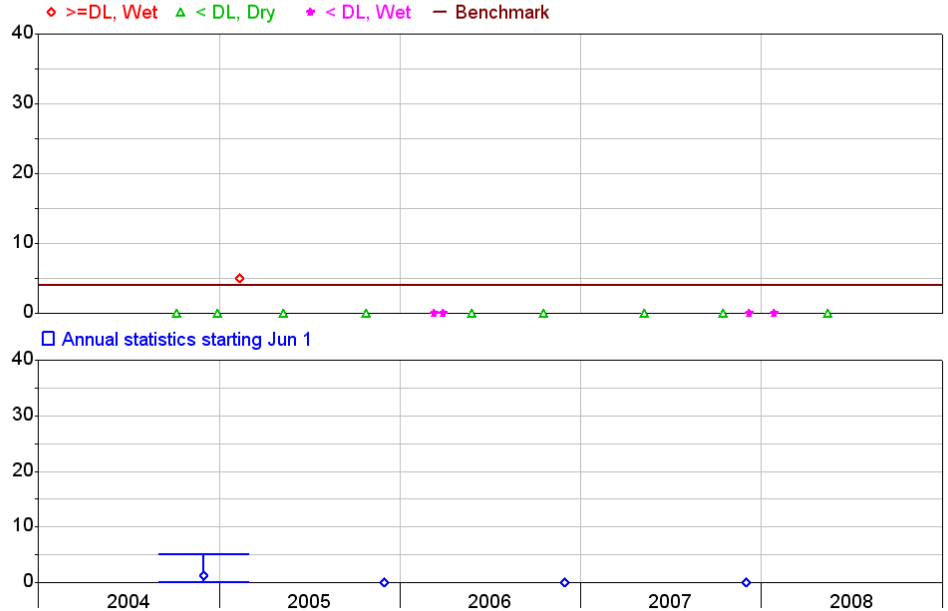

Riverside County Flood Control

RFCWQ4 V26 Output 10/22/2009

777 Temecula Creek below Pala Rd
1540 Sodium in mg/l

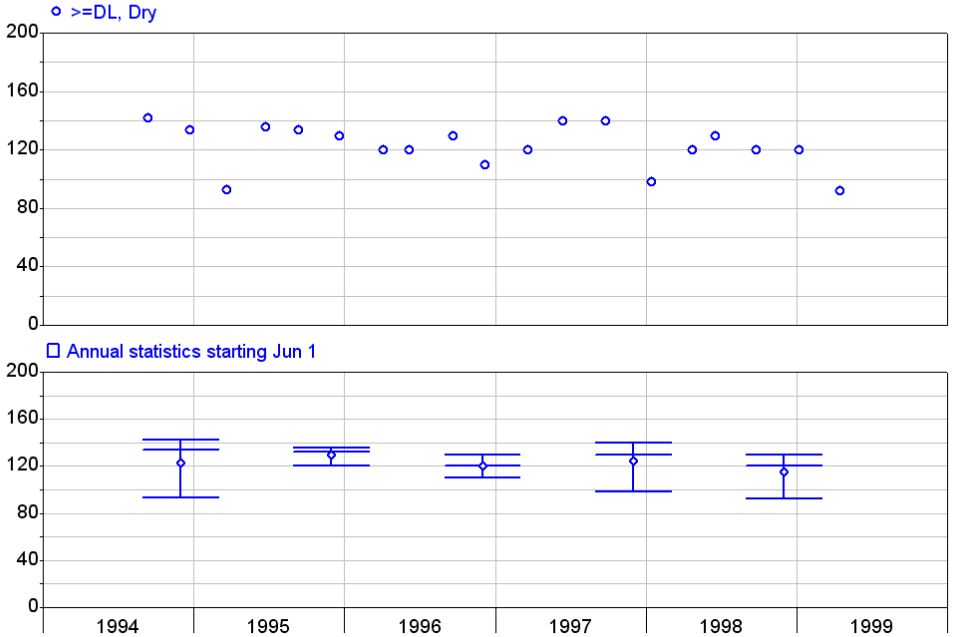

Riverside County Flood Control

RFCWQ4 V26 Output 10/22/2009

777 Temecula Creek below Pala Rd
1615 Solids, total in mg/l

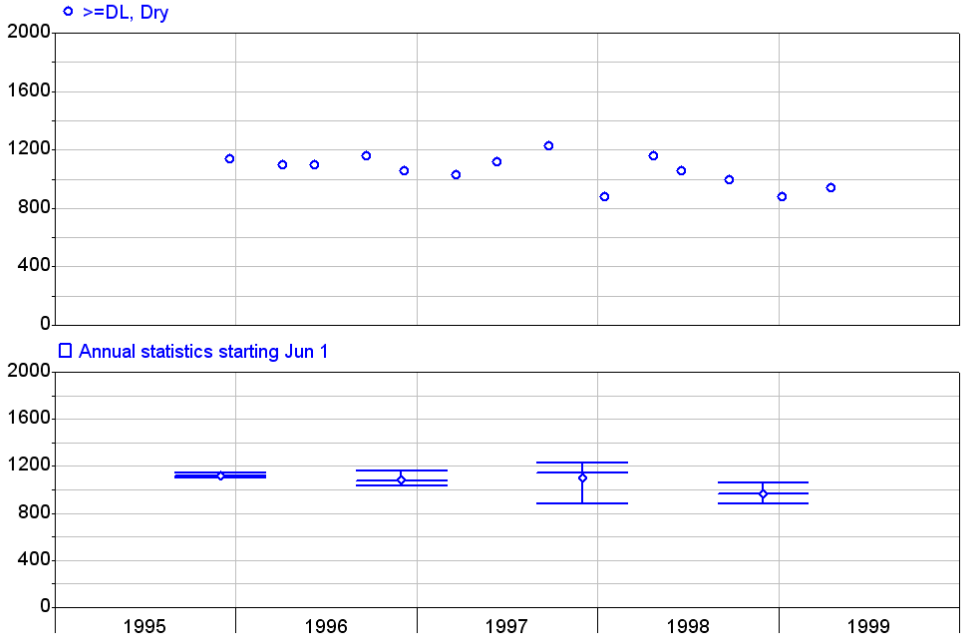

Riverside County Flood Control

RFCWQ4 V26 Output 10/22/2009

777 Temecula Creek below Pala Rd
1700 Zinc, Total in mg/l
Benchmark 5, Source = BPO

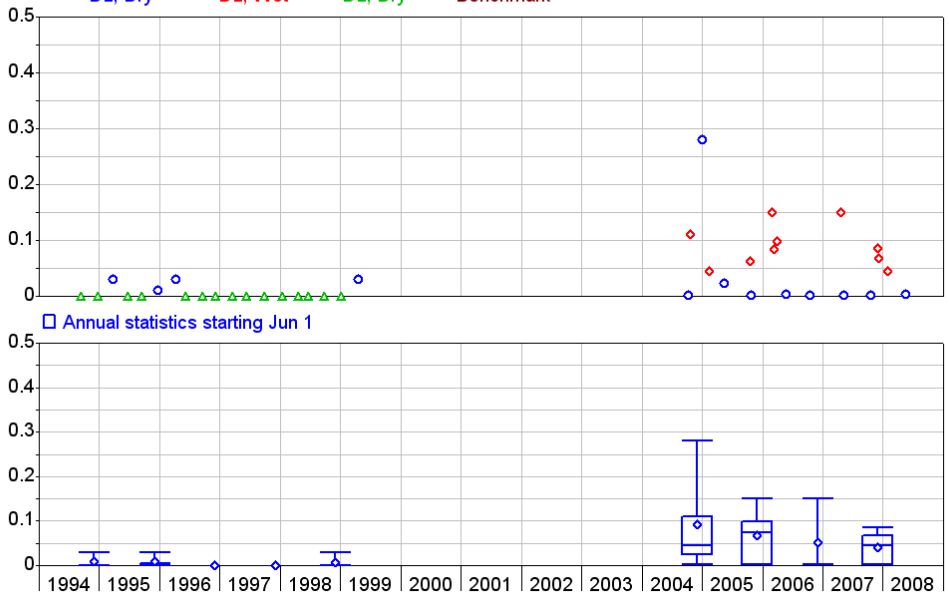

Riverside County Flood Control

RFCWQ4 V26 Output 10/22/2009

020100

777 Temecula Creek below Pala Rd
1705 pH, field
Benchmark 6.5..8.5, Source = BPO

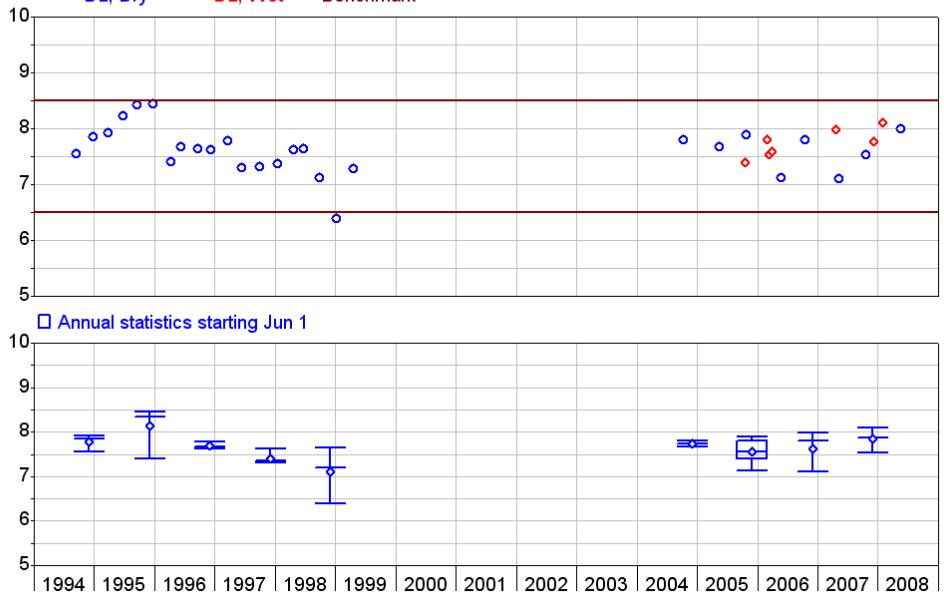

Riverside County Flood Control

RFCWQ4 V26 Output 10/22/2009

777 Temecula Creek below Pala Rd
1710 pH, lab in Units
Benchmark 6.5..8.5, Source = BPO

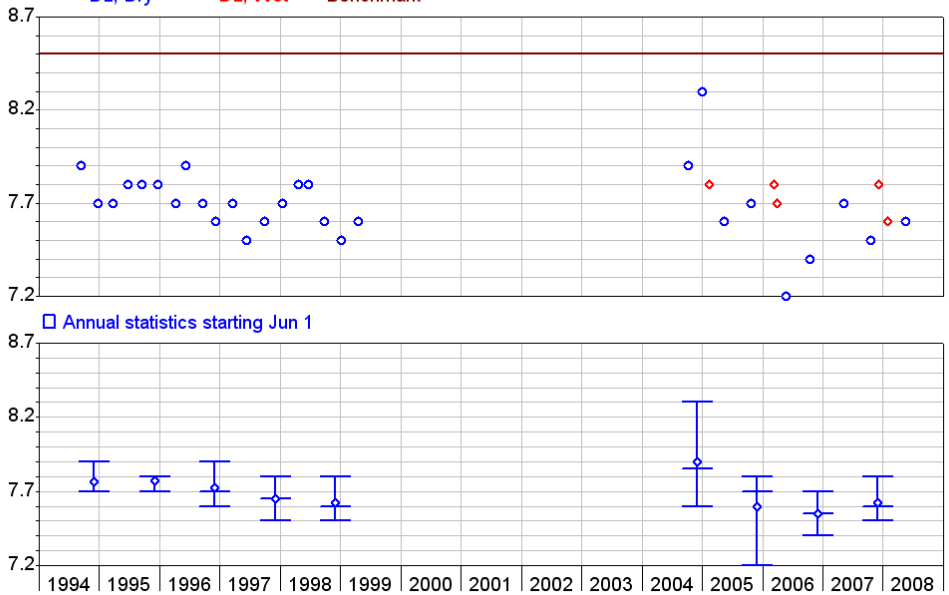

Riverside County Flood Control

RFCWQ4 V26 Output 10/22/2009

777 Temecula Creek below Pala Rd
1715 Diazinon in ug/l

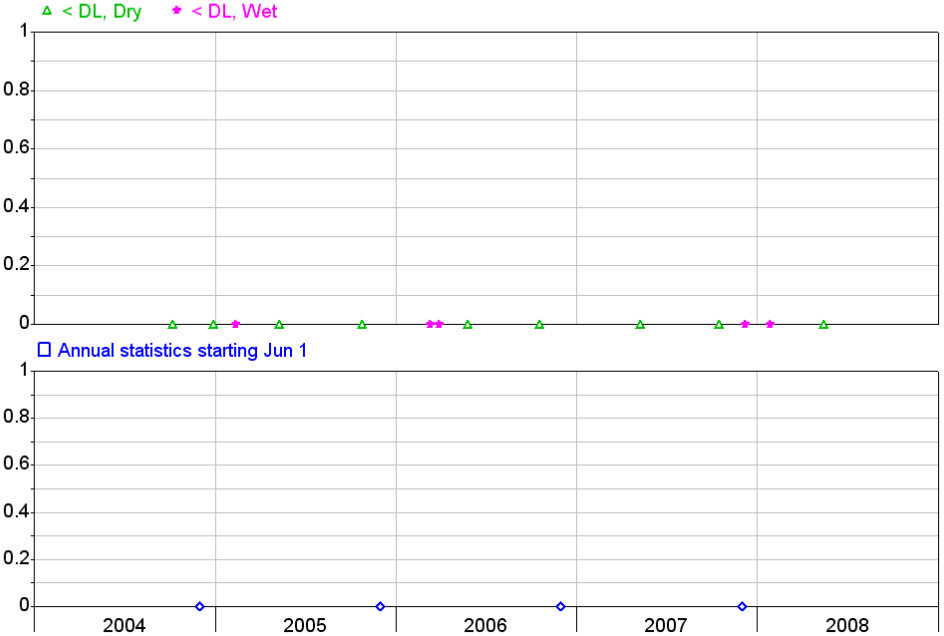

Riverside County Flood Control

RFCWQ4 V26 Output 10/22/2009

778 Murrieta Creek at Temecula (Lower Murrieta Creek)
1145 Cadmium, Total in mg/l
Benchmark 0.005, Source = BPO

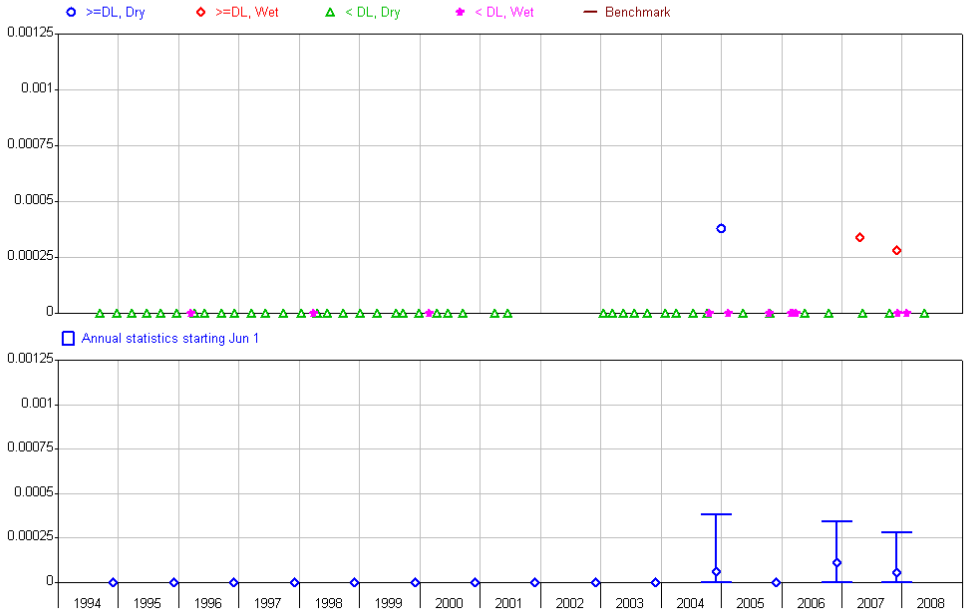

Riverside County Flood Control

RFCWQ4 V26 Output 10/22/2009

020101

778 Murrieta Creek at Temecula (Lower Murrieta Creek)
1150 Calcium in mg/l

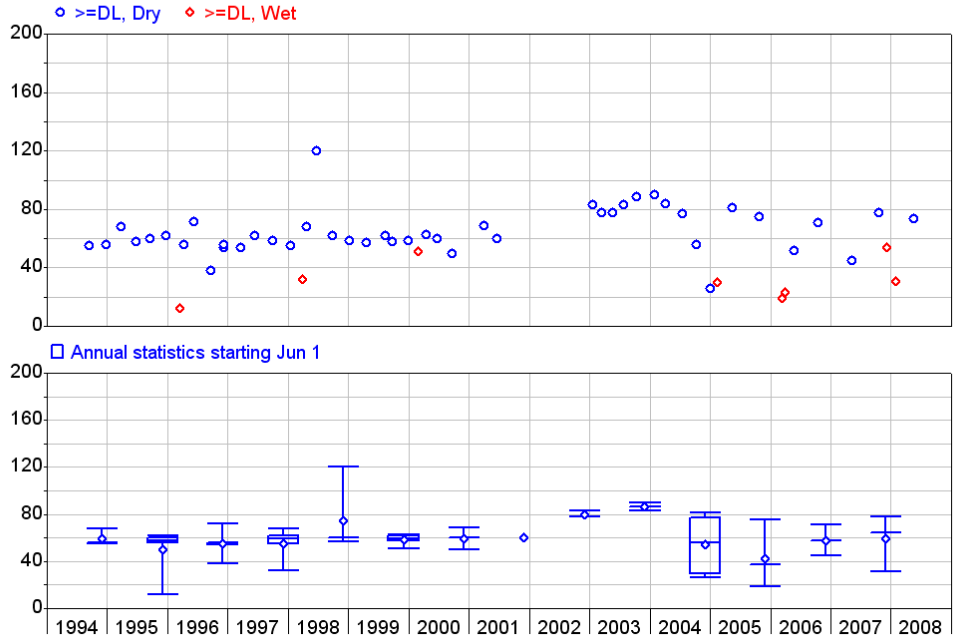

Riverside County Flood Control

RFCWQ4 V26 Output 10/22/2009

778 Murrieta Creek at Temecula (Lower Murrieta Creek)
1153 Carbophenothion in ug/l

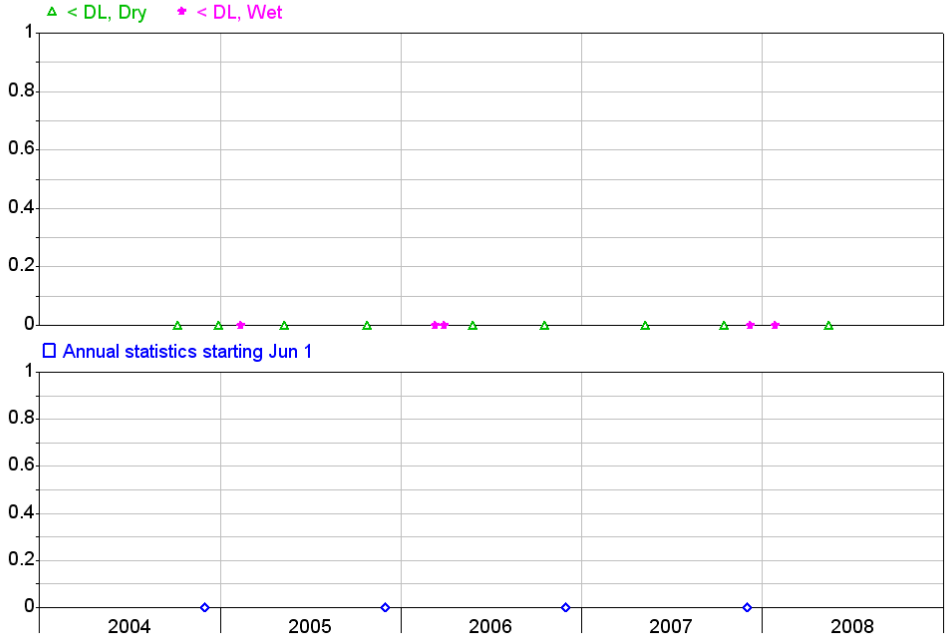

Riverside County Flood Control

RFCWQ4 V26 Output 10/22/2009

778 Murrieta Creek at Temecula (Lower Murrieta Creek)
1155 Carbon, total organic (TOC) in mg/l

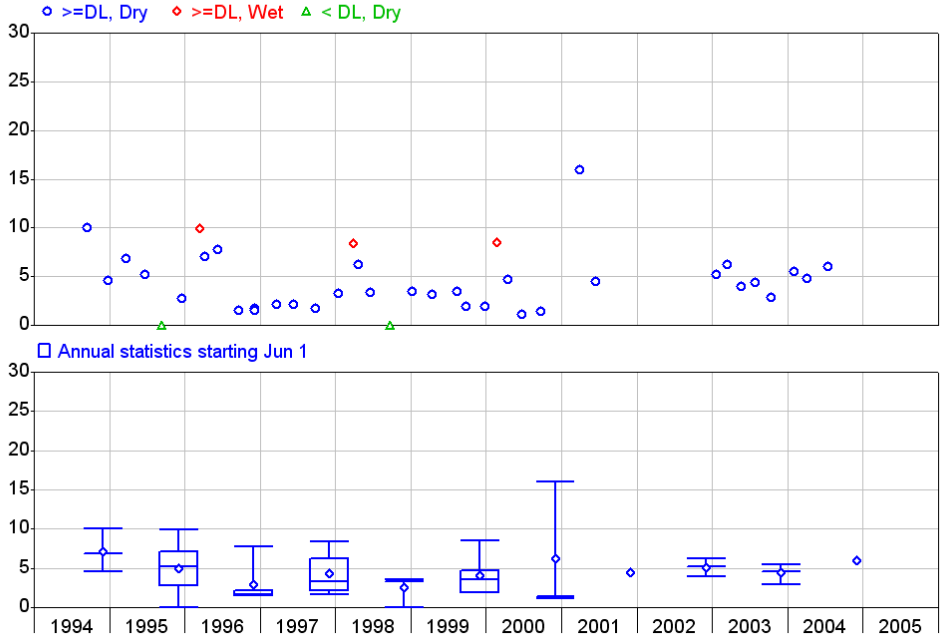

Riverside County Flood Control

RFCWQ4 V26 Output 10/22/2009

778 Murrieta Creek at Temecula (Lower Murrieta Creek)
1180 Chromium, all valences in mg/l
Benchmark 0.05, Source = BPO

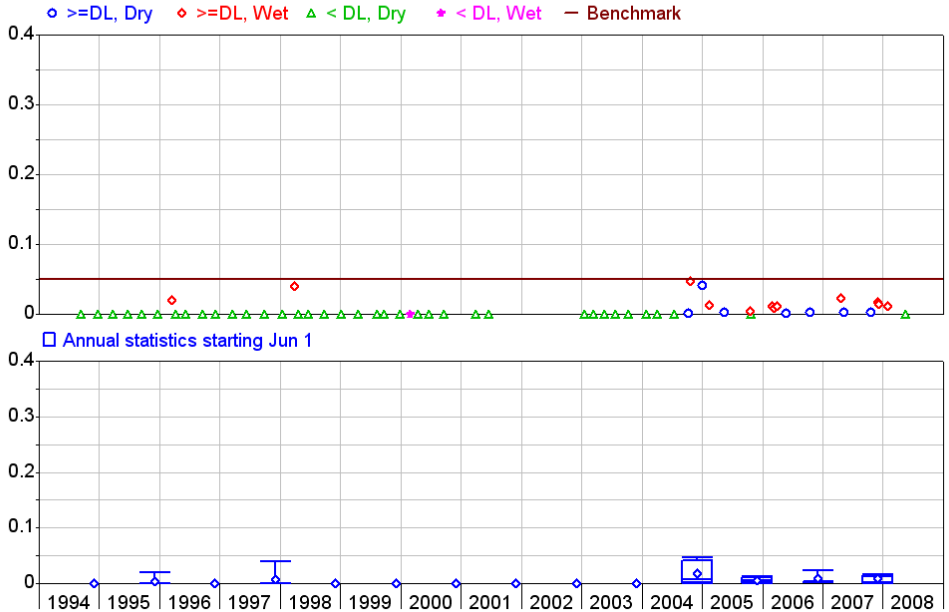

Riverside County Flood Control

RFCWQ4 V26 Output 10/22/2009

020102

778 Murrieta Creek at Temecula (Lower Murrieta Creek)
1182 Chlorpyrifos-Methyl + Methyl Parathion in ug/l
Data period 06/01/2005 to 05/31/2006

Riverside County Flood Control

RFCWQ4 V26 Output 10/22/2009

778 Murrieta Creek at Temecula (Lower Murrieta Creek)
1185 Chromium, hexavalent in mg/l

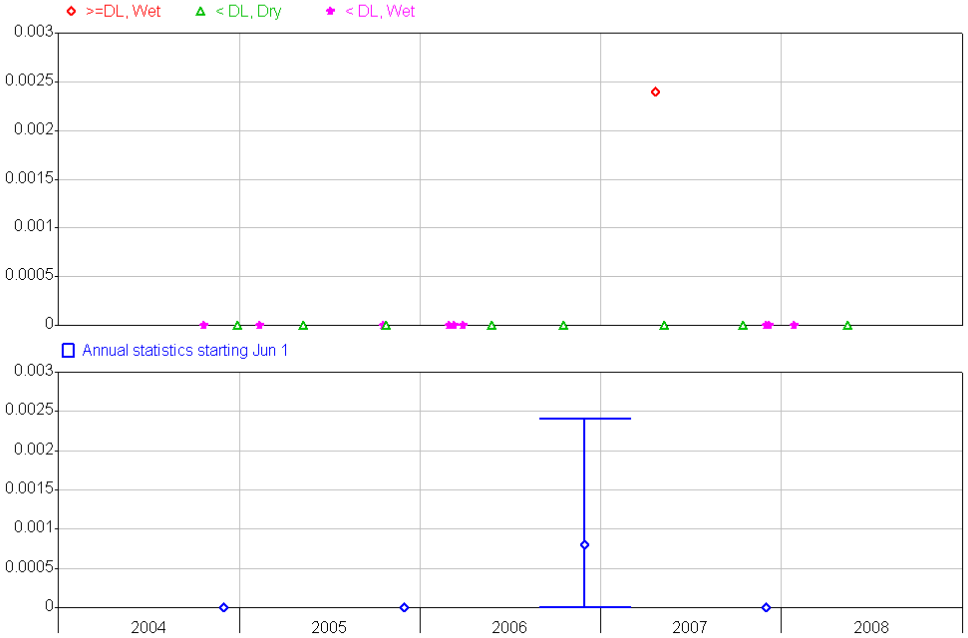

Riverside County Flood Control

RFCWQ4 V26 Output 10/22/2009

778 Murrieta Creek at Temecula (Lower Murrieta Creek)
1195 Color
Benchmark 20, Source = BPO

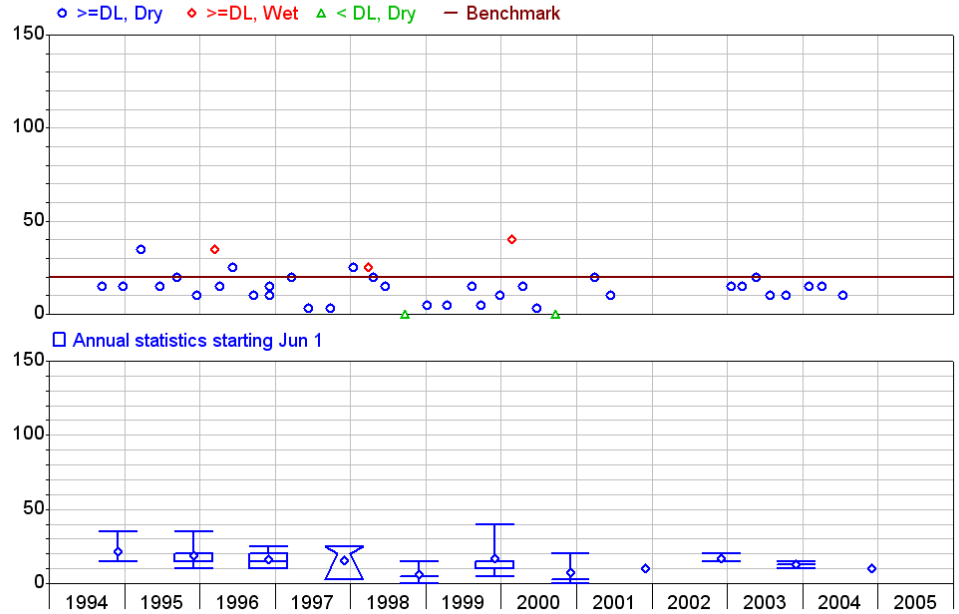

Riverside County Flood Control

RFCWQ4 V26 Output 10/22/2009

778 Murrieta Creek at Temecula (Lower Murrieta Creek)
1255 Fluoride in mg/l
Benchmark 1, Source = BPO

○ >=DL, Dry ◇ >=DL, Wet △ < DL, Dry — Benchmark

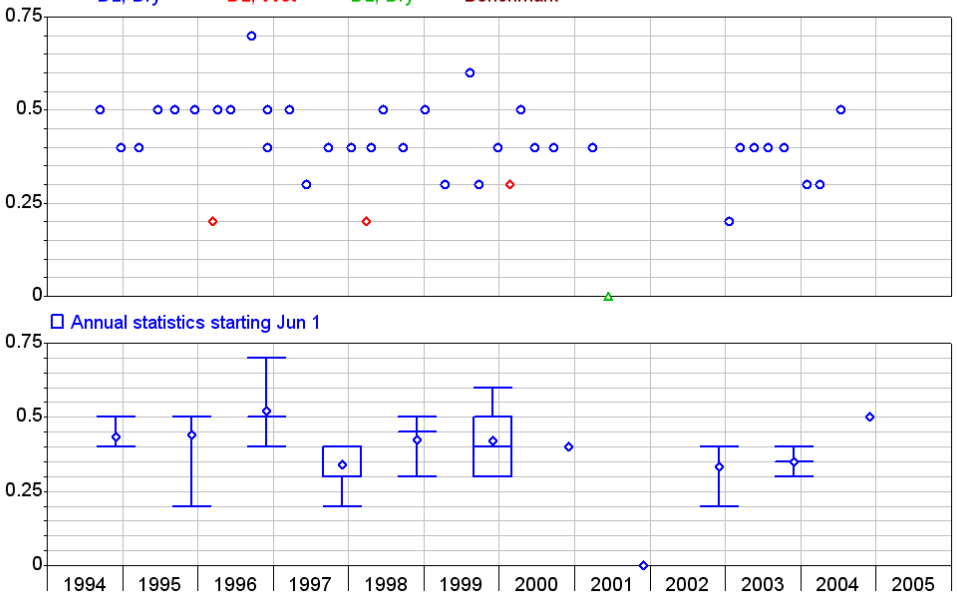

Riverside County Flood Control

RFCWQ4 V26 Output 10/22/2009

020103

778 Murrieta Creek at Temecula (Lower Murrieta Creek)
1256 Fonophos in ug/l

△ < DL, Dry ✱ < DL, Wet

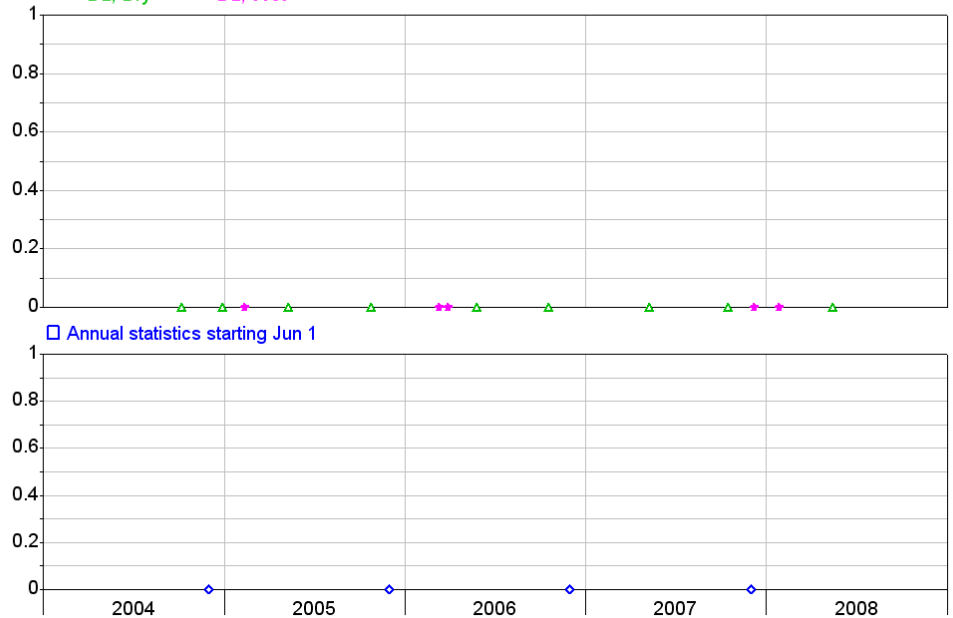

Riverside County Flood Control

RFCWQ4 V26 Output 10/22/2009

778 Murrieta Creek at Temecula (Lower Murrieta Creek)
1265 Hardness, total (CaCO3) in mg/l

○ >=DL, Dry ◇ >=DL, Wet

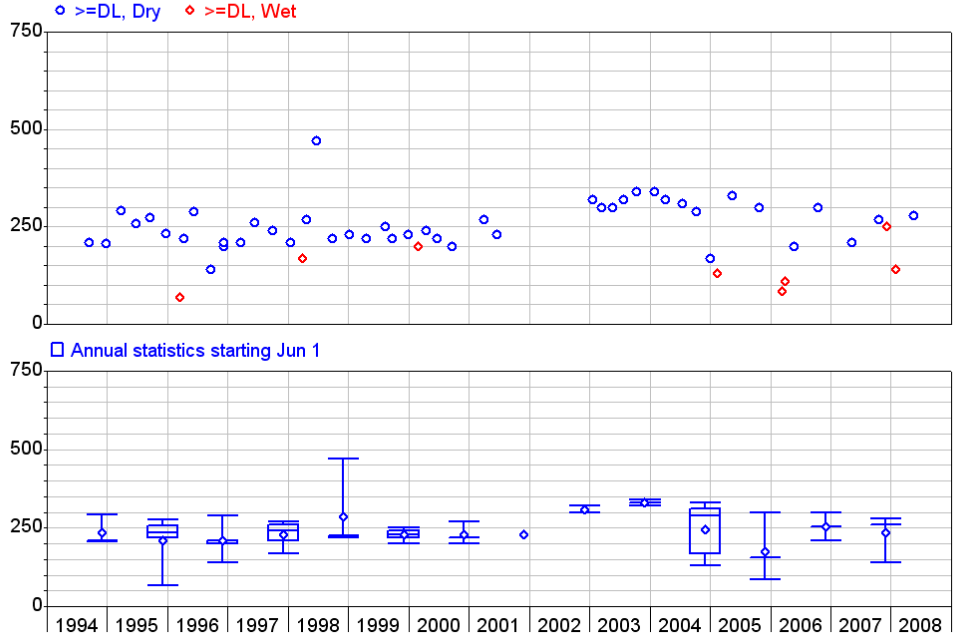

Riverside County Flood Control

RFCWQ4 V26 Output 10/22/2009

778 Murrieta Creek at Temecula (Lower Murrieta Creek)
1270 Hydrocarbons, total petroleum in mg/l

○ >=DL, Dry △ < DL, Dry ✱ < DL, Wet

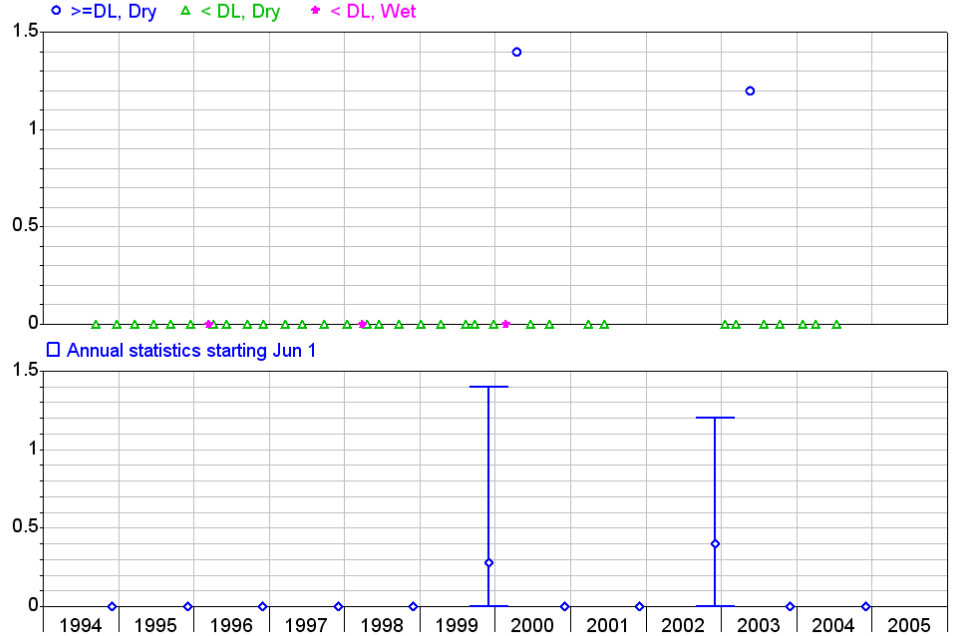

Riverside County Flood Control

RFCWQ4 V26 Output 10/22/2009

778 Murrieta Creek at Temecula (Lower Murrieta Creek)
1275 Hydroxide (OH) in mg/l

< DL, Dry < DL, Wet

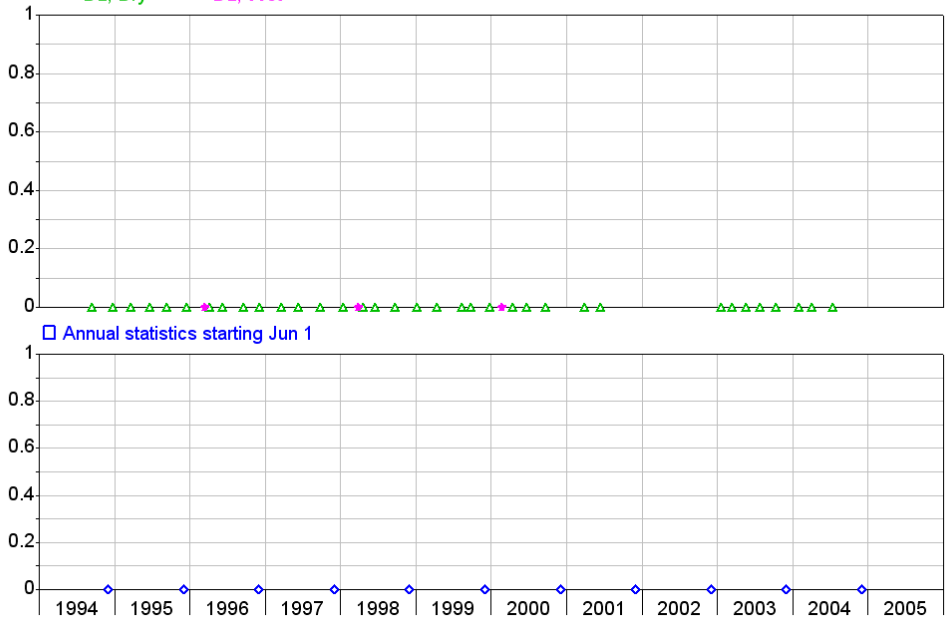

Riverside County Flood Control

RFCWQ4 V26 Output 10/22/2009

020104

778 Murrieta Creek at Temecula (Lower Murrieta Creek)
1290 Lead, Total in mg/l

>=DL, Dry >=DL, Wet < DL, Dry < DL, Wet

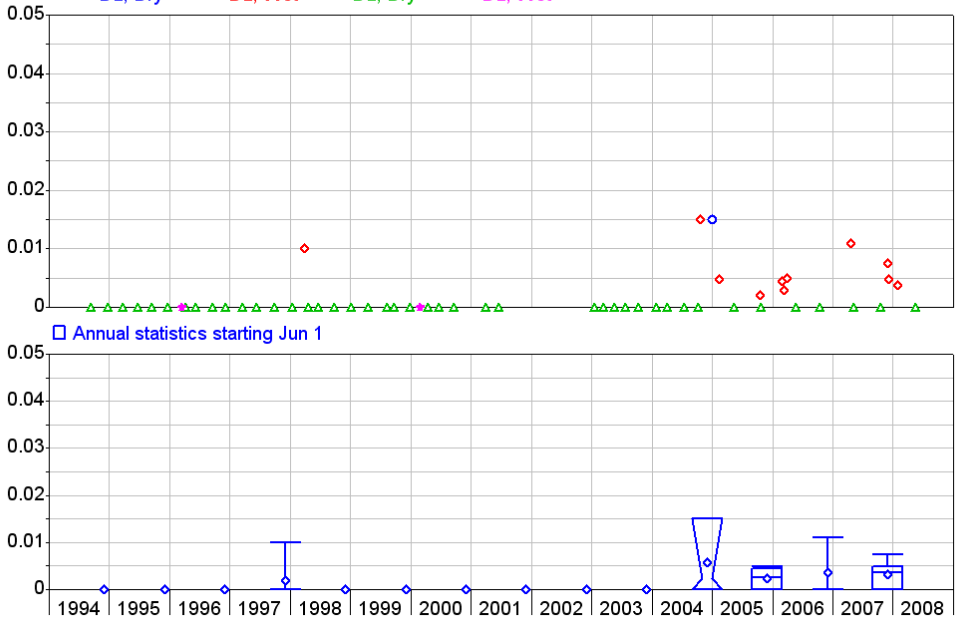

Riverside County Flood Control

RFCWQ4 V26 Output 10/22/2009

778 Murrieta Creek at Temecula (Lower Murrieta Creek)
1291 Leptophos in ug/l

< DL, Dry < DL, Wet

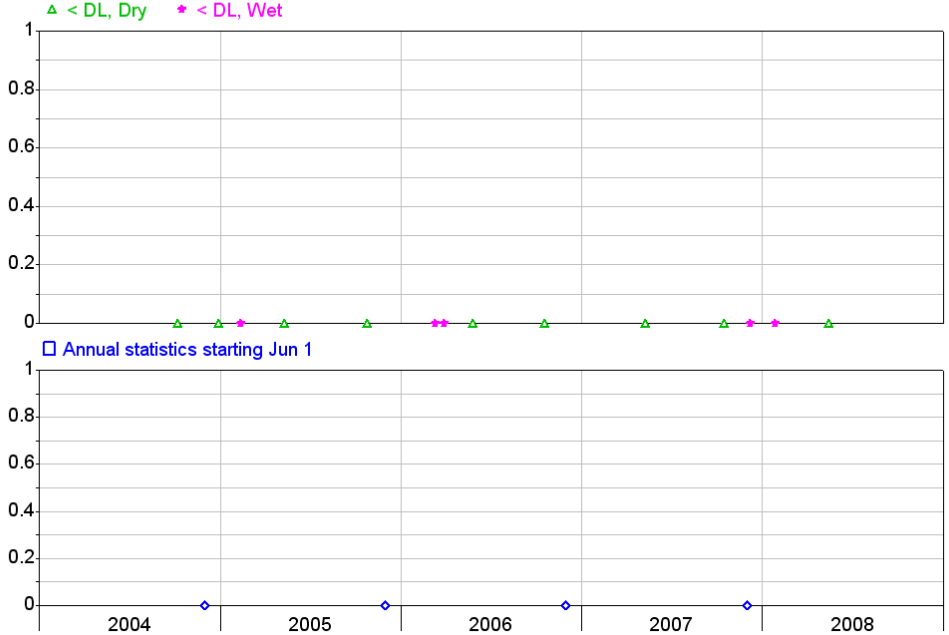

Riverside County Flood Control

RFCWQ4 V26 Output 10/22/2009

778 Murrieta Creek at Temecula (Lower Murrieta Creek)
1292 Lindane in ug/l
Benchmark 0.2, Source = BPO

< DL, Wet Benchmark

Riverside County Flood Control

RFCWQ4 V26 Output 10/22/2009

778 Murrieta Creek at Temecula (Lower Murrieta Creek)
1314 Naled in ug/l

< DL, Dry < DL, Wet

Riverside County Flood Control

RFCWQ4 V26 Output 10/22/2009

020105

778 Murrieta Creek at Temecula (Lower Murrieta Creek)
1315 Napthalene in ug/l

< DL, Dry < DL, Wet

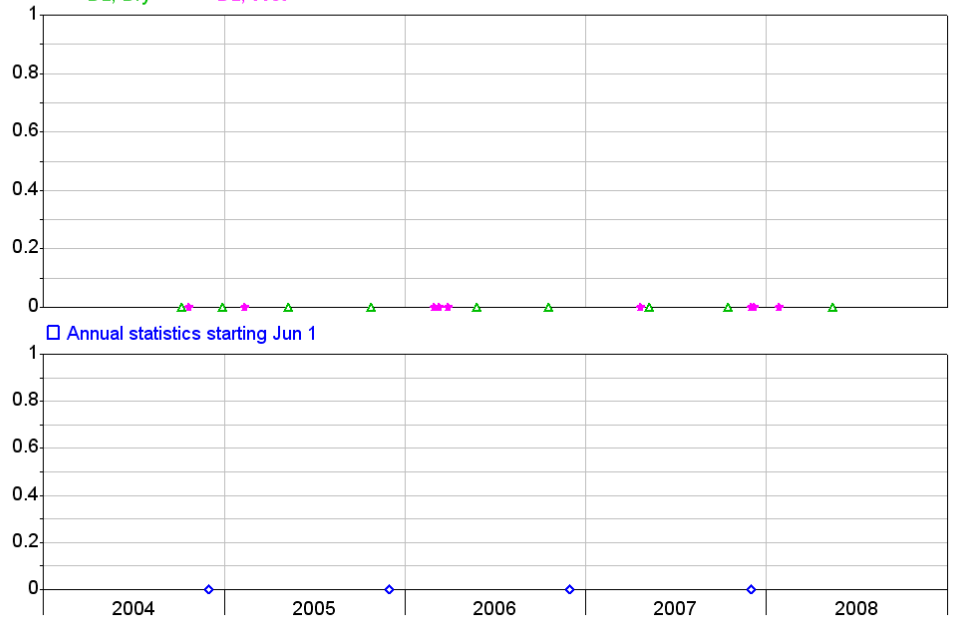

Riverside County Flood Control

RFCWQ4 V26 Output 10/22/2009

778 Murrieta Creek at Temecula (Lower Murrieta Creek)
1320 Nickel, Total in mg/l
Benchmark 0.1, Source = BPO

>=DL, Dry >=DL, Wet < DL, Dry < DL, Wet Benchmark

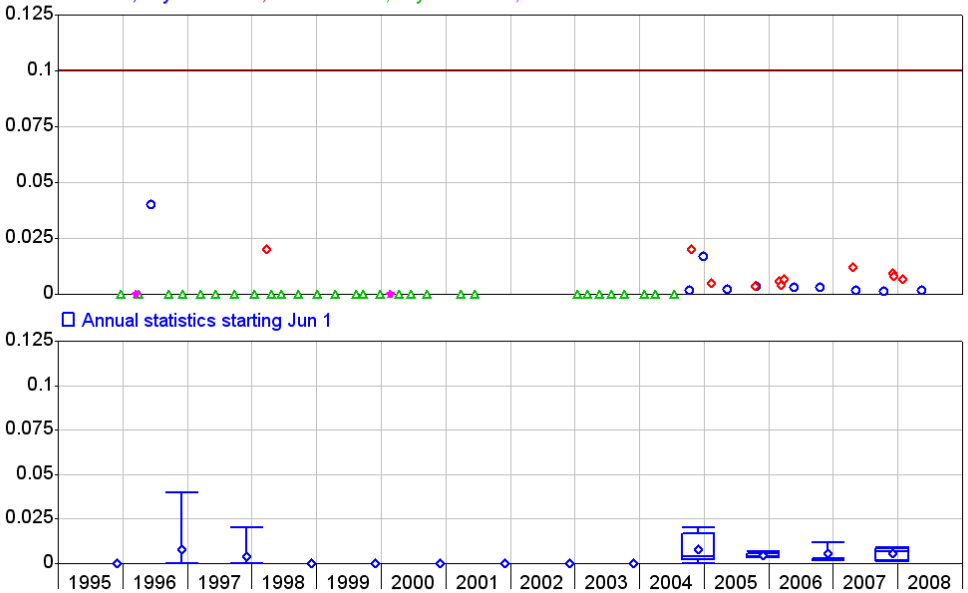

Riverside County Flood Control

RFCWQ4 V26 Output 10/22/2009

778 Murrieta Creek at Temecula (Lower Murrieta Creek)
1331 Nitrobenzene in ug/l

< DL, Wet

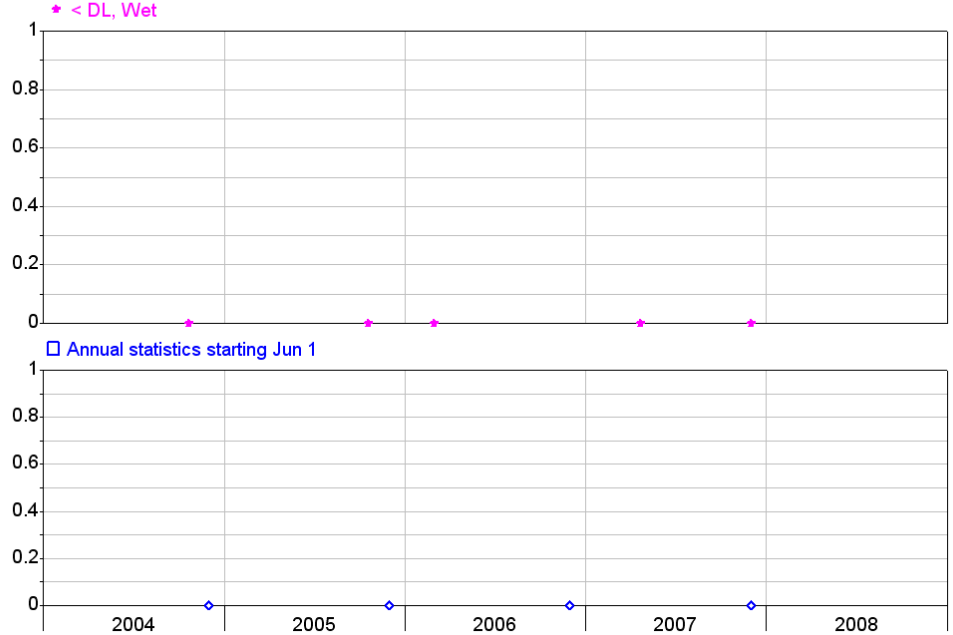

Riverside County Flood Control

RFCWQ4 V26 Output 10/22/2009

778 Murrieta Creek at Temecula (Lower Murrieta Creek)
1535 Silver, Total in mg/l
Benchmark 0.1, Source = BPO

△ < DL, Dry ✱ < DL, Wet — Benchmark

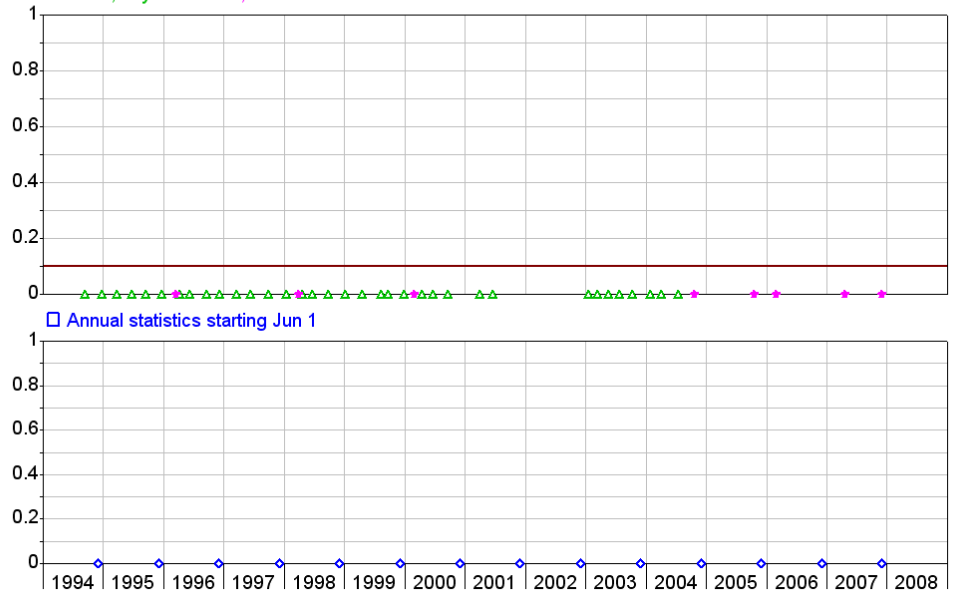

Riverside County Flood Control

RFCWQ4 V26 Output 10/22/2009

020106

778 Murrieta Creek at Temecula (Lower Murrieta Creek)
1536 Simazine in ug/l
Benchmark 4, Source = BPO

○ >=DL, Dry ◇ >=DL, Wet △ < DL, Dry ✱ < DL, Wet — Benchmark

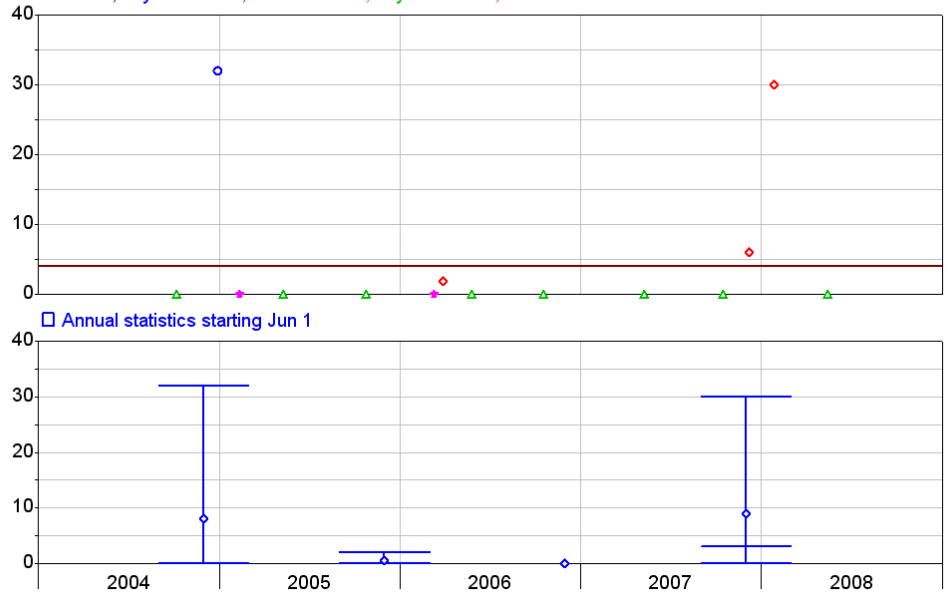

Riverside County Flood Control

RFCWQ4 V26 Output 10/22/2009

778 Murrieta Creek at Temecula (Lower Murrieta Creek)
1540 Sodium in mg/l

○ >=DL, Dry ◇ >=DL, Wet

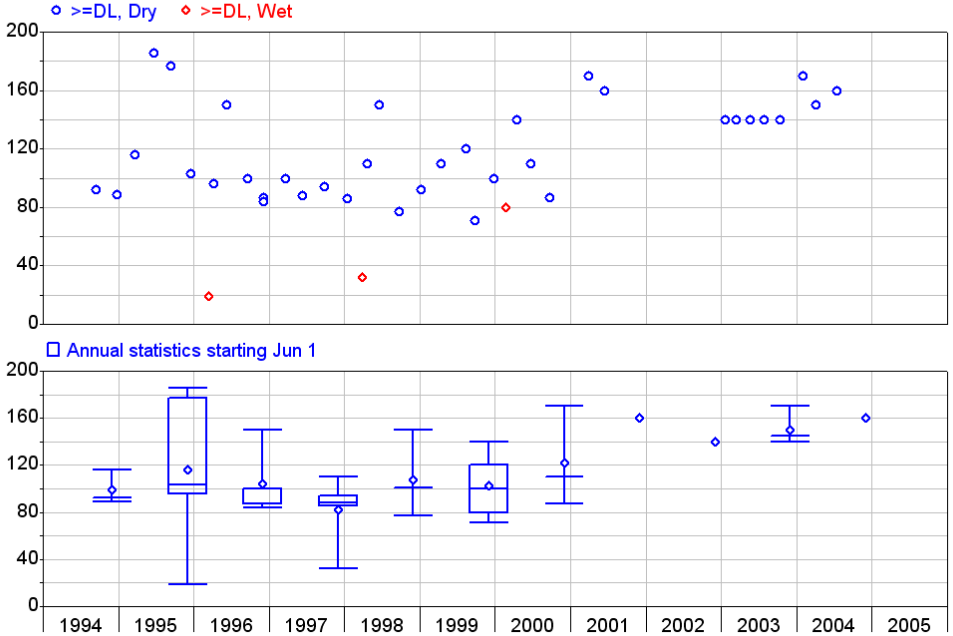

Riverside County Flood Control

RFCWQ4 V26 Output 10/22/2009

778 Murrieta Creek at Temecula (Lower Murrieta Creek)
1615 Solids, total in mg/l

○ >=DL, Dry ◇ >=DL, Wet

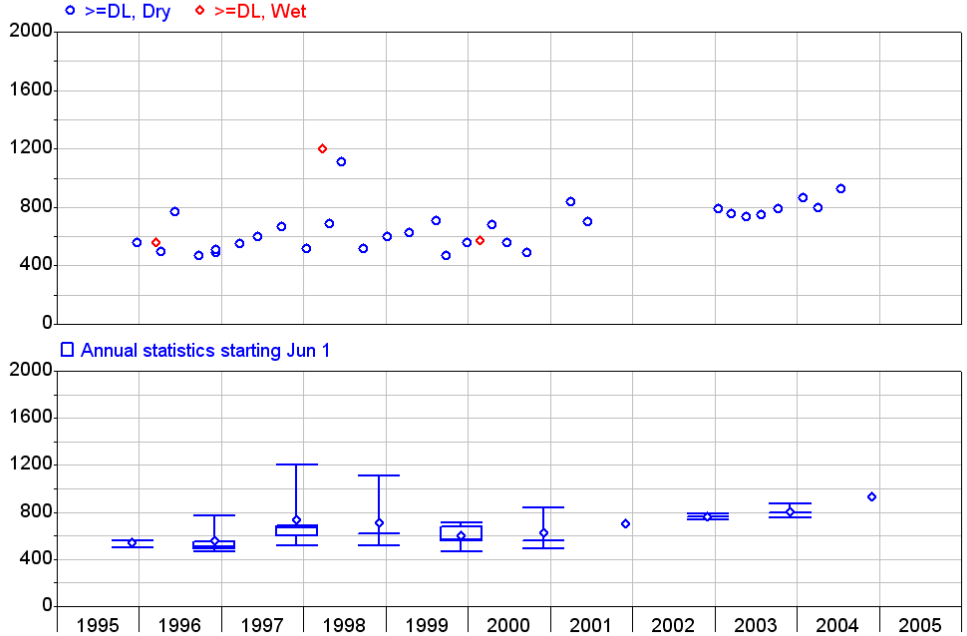

Riverside County Flood Control

RFCWQ4 V26 Output 10/22/2009

778 Murrieta Creek at Temecula (Lower Murrieta Creek)
1698 Vinyl Chloride in ug/l
Benchmark 0.5, Source = BPO

< DL, Dry < DL, Wet Benchmark

Riverside County Flood Control

RFCWQ4 V26 Output 10/22/2009

020107

778 Murrieta Creek at Temecula (Lower Murrieta Creek)
1700 Zinc, Total in mg/l
Benchmark 5, Source = BPO

>=DL, Dry >=DL, Wet < DL, Dry Benchmark

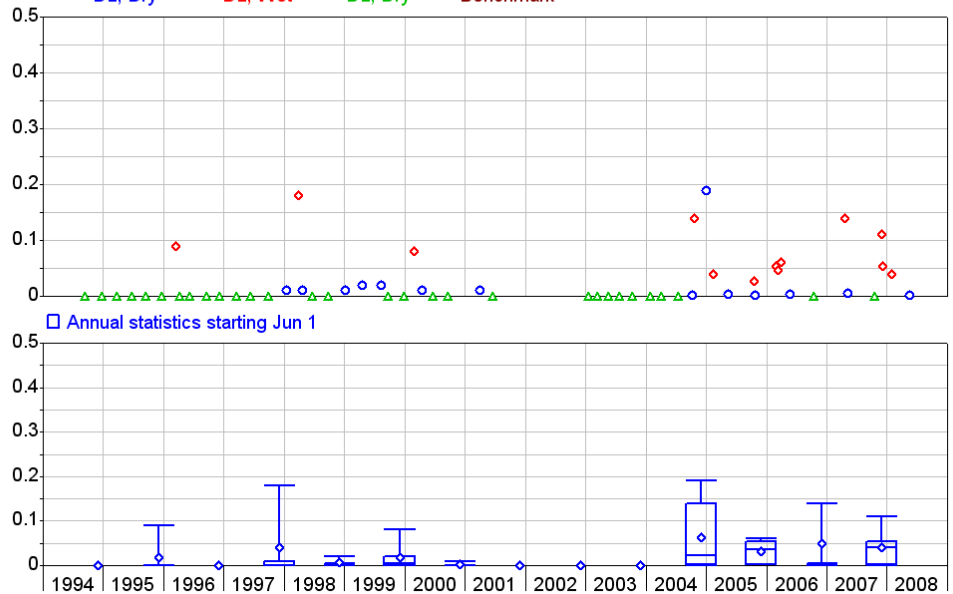

Riverside County Flood Control

RFCWQ4 V26 Output 10/22/2009

778 Murrieta Creek at Temecula (Lower Murrieta Creek)
1705 pH, field
Benchmark 6.5..8.5, Source = BPO

>=DL, Dry >=DL, Wet Benchmark

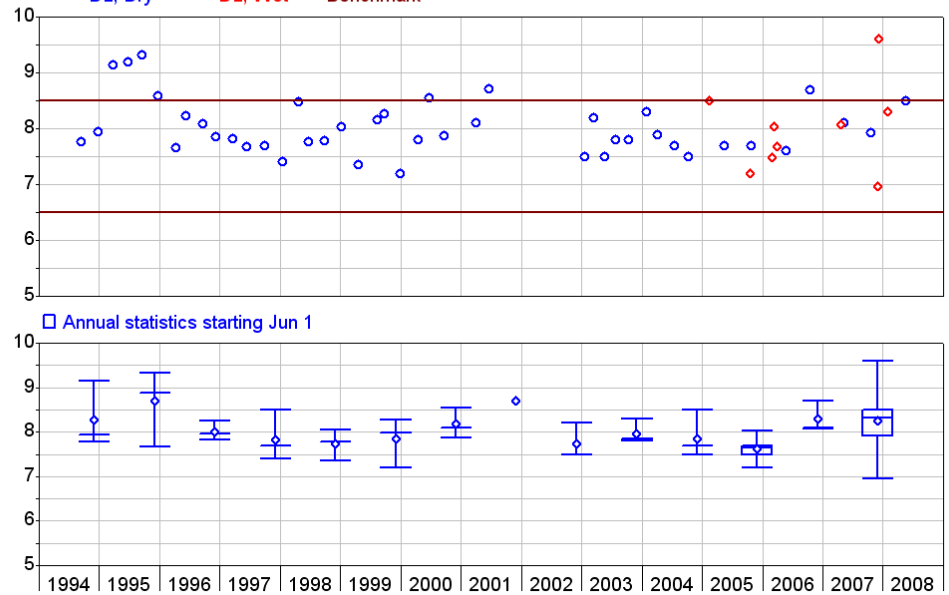

Riverside County Flood Control

RFCWQ4 V26 Output 10/22/2009

778 Murrieta Creek at Temecula (Lower Murrieta Creek)
1710 pH, lab in Units
Benchmark 6.5..8.5, Source = BPO

>=DL, Dry >=DL, Wet Benchmark

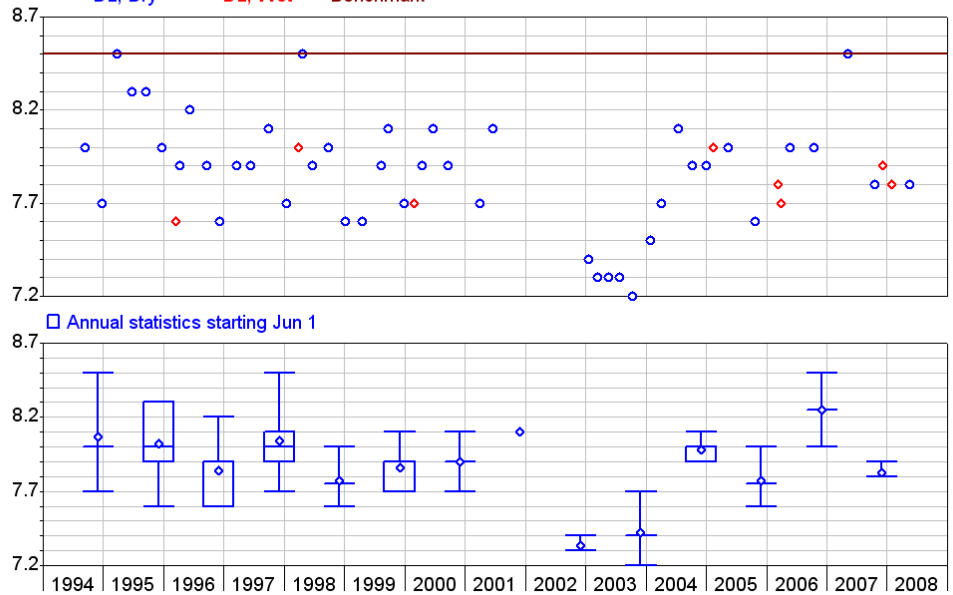

Riverside County Flood Control

RFCWQ4 V26 Output 10/22/2009

397 Warm Springs Creek near Murrieta
1210 Copper, Total in mg/l
Benchmark 1, Source = BPO

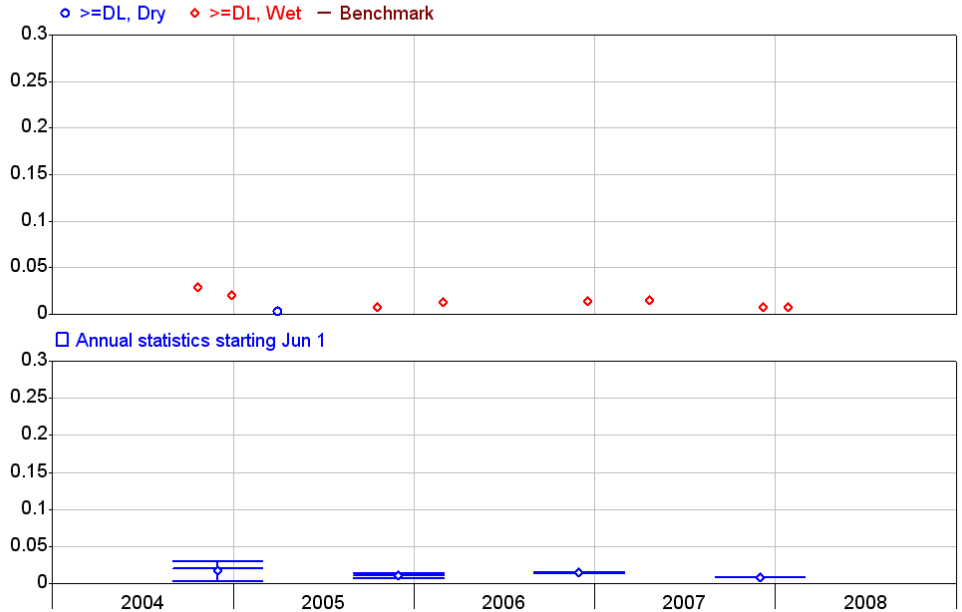

Riverside County Flood Control

RFCWQ4 V26 Output 10/22/2009

020108

397 Warm Springs Creek near Murrieta
1225 Detergent-MethyleneBlueActiveS in mg/l
Benchmark 0.5, Source = BPO

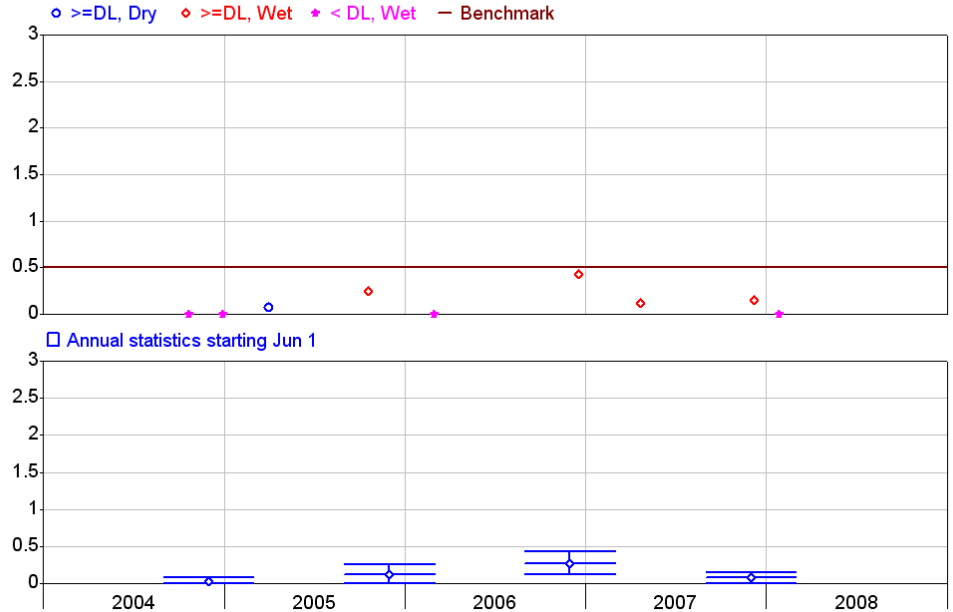

Riverside County Flood Control

RFCWQ4 V26 Output 10/22/2009

397 Warm Springs Creek near Murrieta
1227 Diazinon in P/Billon

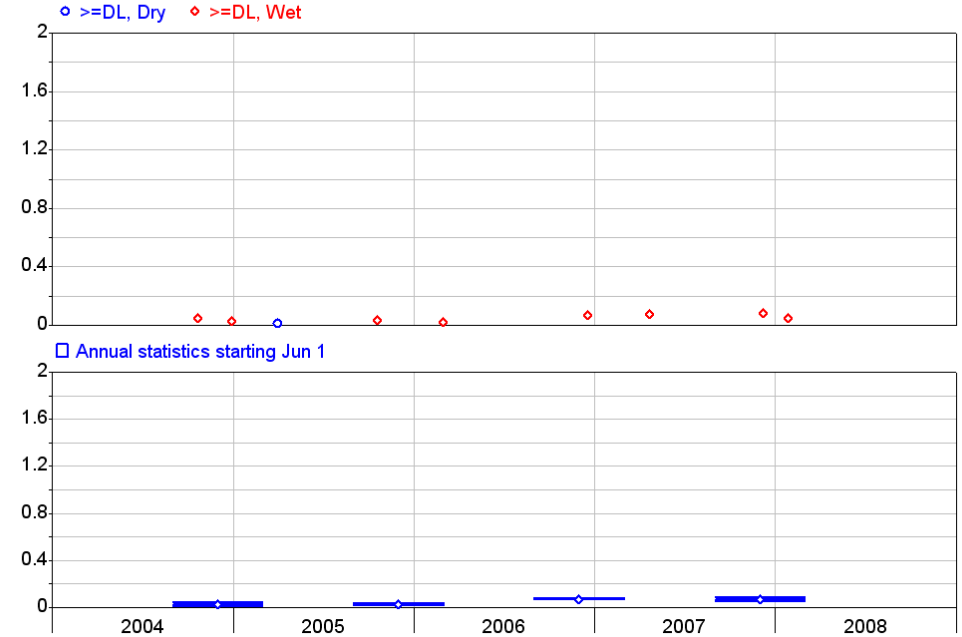

Riverside County Flood Control

RFCWQ4 V26 Output 10/22/2009

397 Warm Springs Creek near Murrieta
1265 Hardness, total (CaCO3) in mg/l

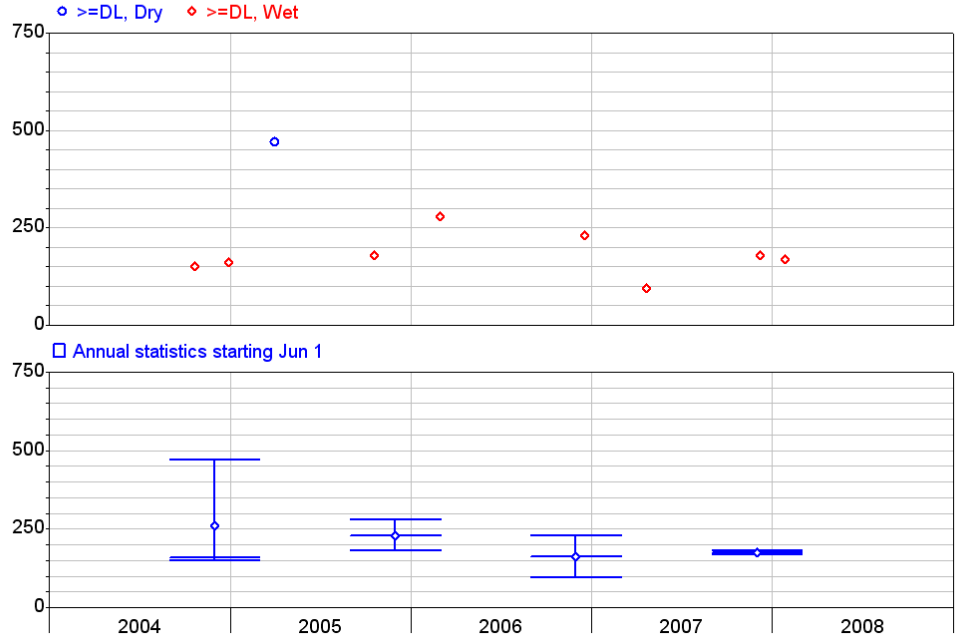

Riverside County Flood Control

RFCWQ4 V26 Output 10/22/2009

397 Warm Springs Creek near Murrieta
1285 Iron in mg/l
Benchmark 0.3, Source = BPO

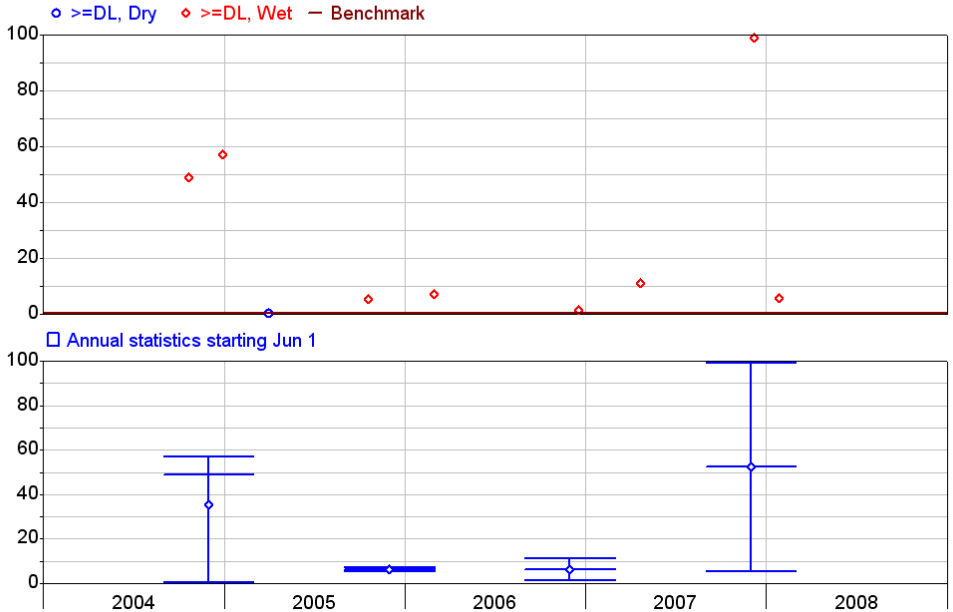

Riverside County Flood Control

RFCWQ4 V26 Output 10/22/2009

020109

397 Warm Springs Creek near Murrieta
1287 Lead Dissolved in ug/l

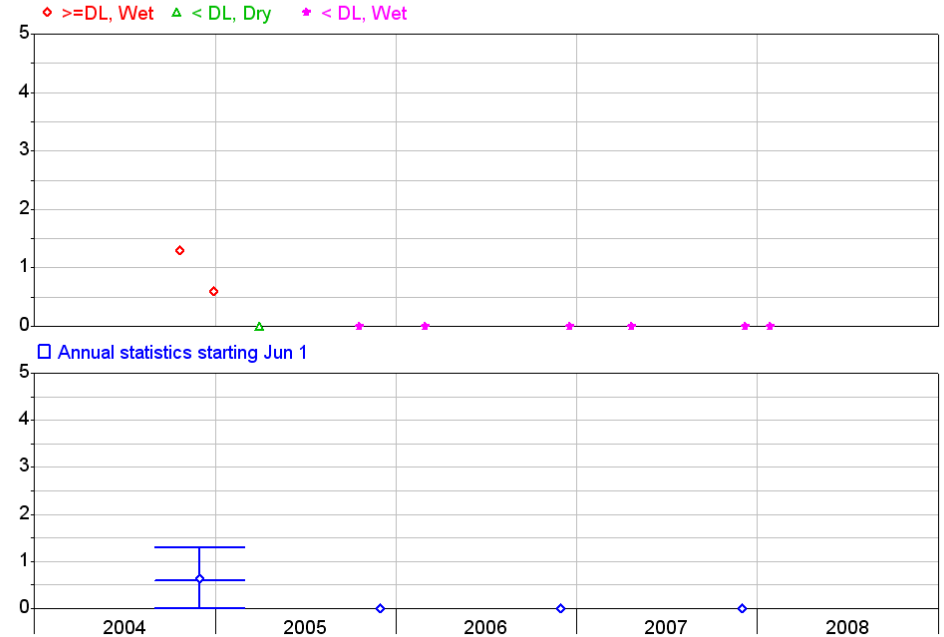

Riverside County Flood Control

RFCWQ4 V26 Output 10/22/2009

397 Warm Springs Creek near Murrieta
1300 Magnesium in mg/l

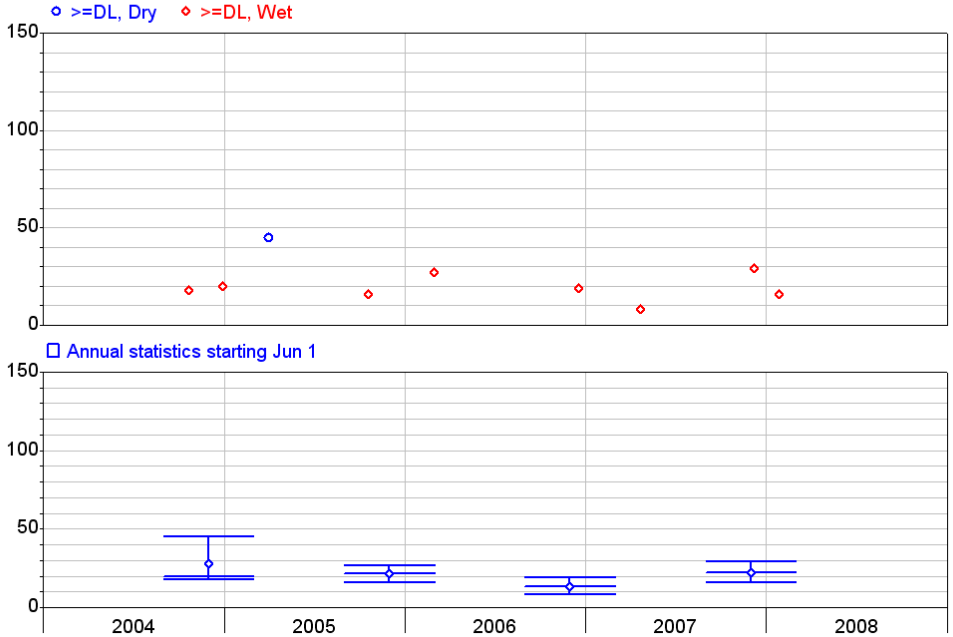

Riverside County Flood Control

RFCWQ4 V26 Output 10/22/2009

397 Warm Springs Creek near Murrieta
1305 Manganese, Total in mg/l
Benchmark 0.05, Source = BPO

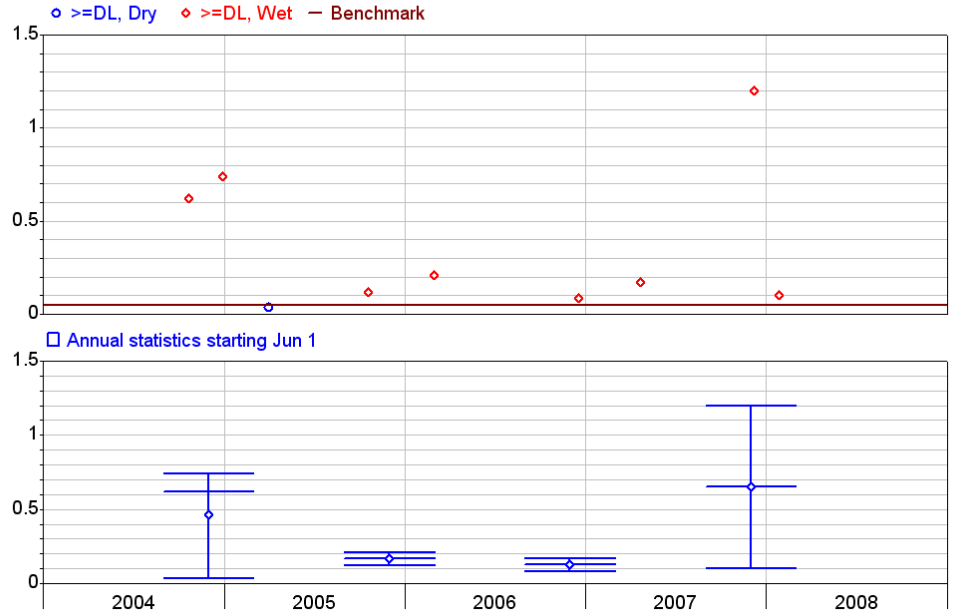

Riverside County Flood Control

RFCWQ4 V26 Output 10/22/2009

768 Redhawk Channel D/S of Overland Dr
1145 Cadmium, Total in mg/l
Benchmark 0.005, Source = BPO

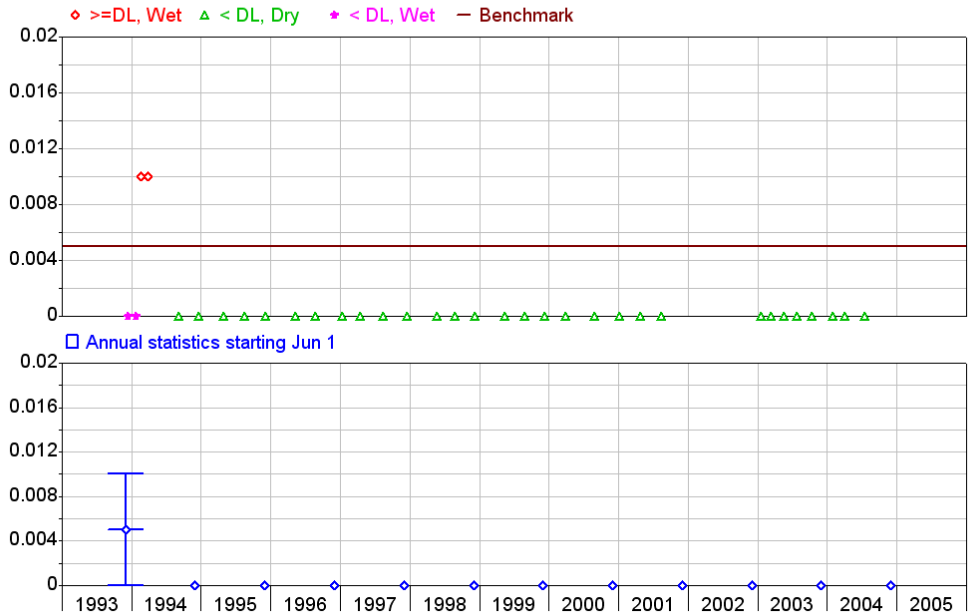

Riverside County Flood Control

RFCWQ4 V26 Output 10/22/2009

020110

768 Redhawk Channel D/S of Overland Dr
1150 Calcium in mg/l

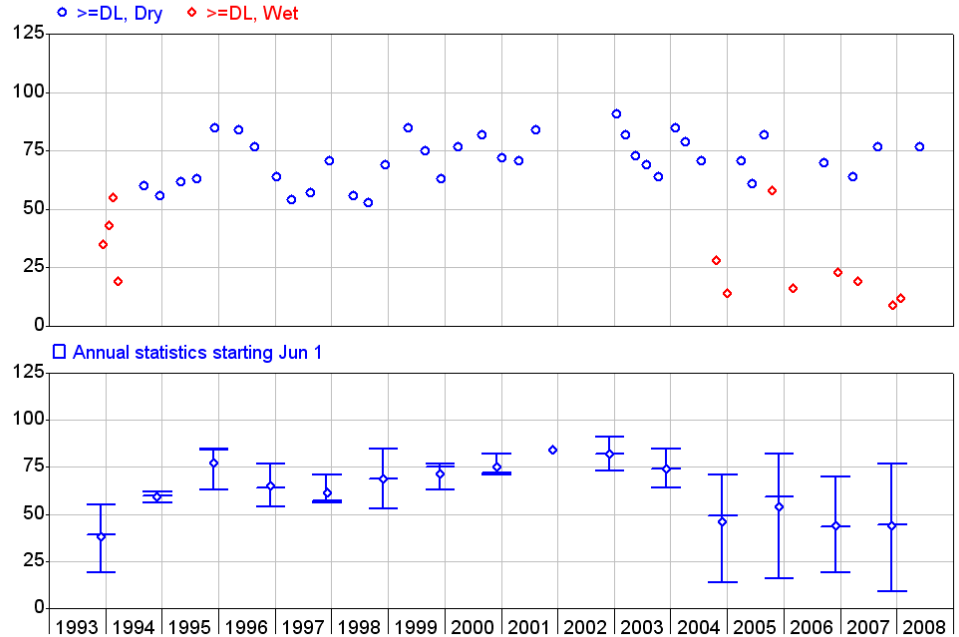

Riverside County Flood Control

RFCWQ4 V26 Output 10/22/2009

768 Redhawk Channel D/S of Overland Dr
1155 Carbon, total organic (TOC) in mg/l

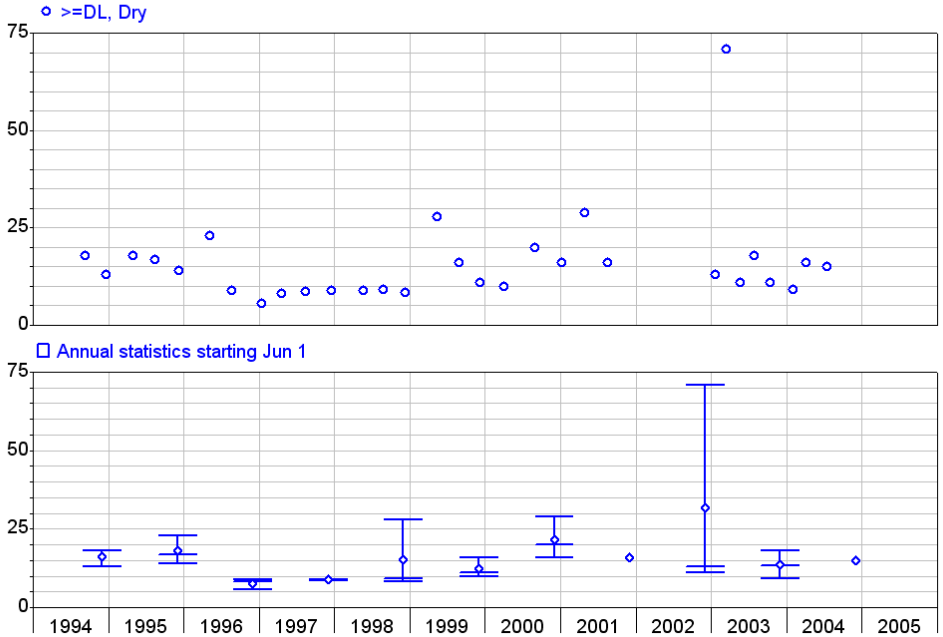

Riverside County Flood Control

RFCWQ4 V26 Output 10/22/2009

768 Redhawk Channel D/S of Overland Dr
1160 Carbonate (CO3) in mg/l

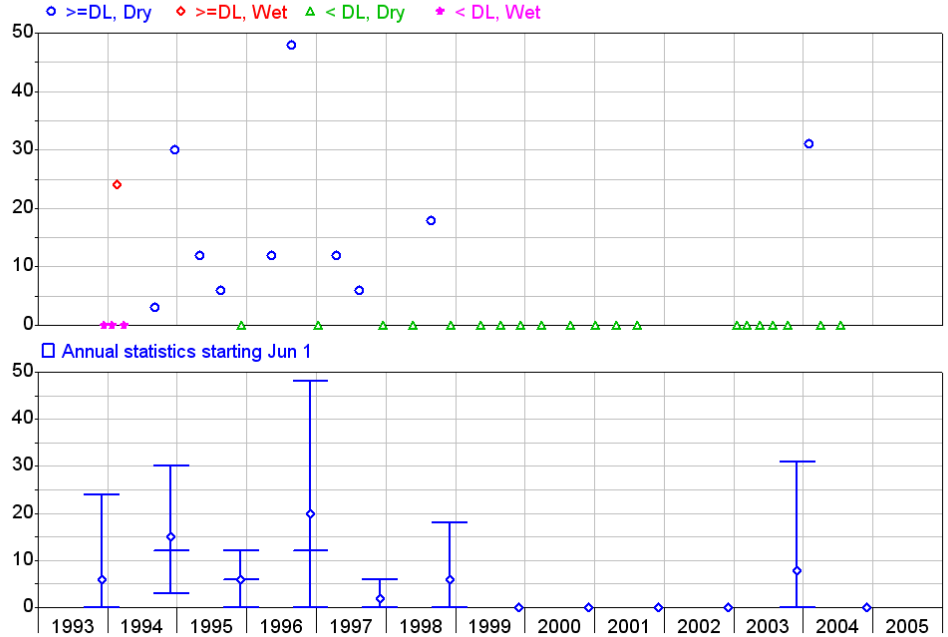

Riverside County Flood Control

RFCWQ4 V26 Output 10/22/2009

768 Redhawk Channel D/S of Overland Dr
1165 Chloride in mg/l
Benchmark 250, Source = BPO

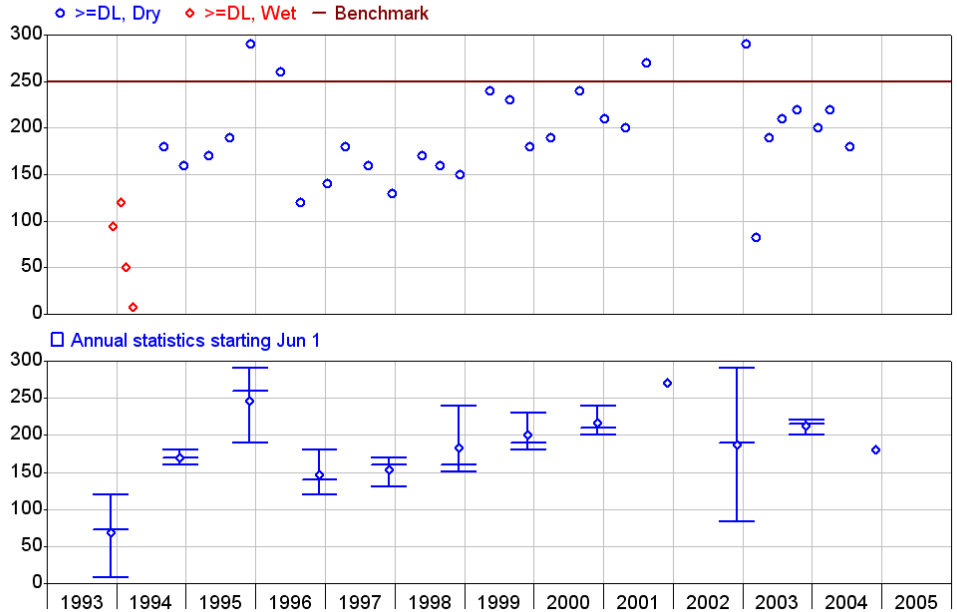

Riverside County Flood Control

RFCWQ4 V26 Output 10/22/2009

020111

768 Redhawk Channel D/S of Overland Dr
1174 Chlorpyrifos in ug/l
Data period 06/01/2007 to 05/31/2008

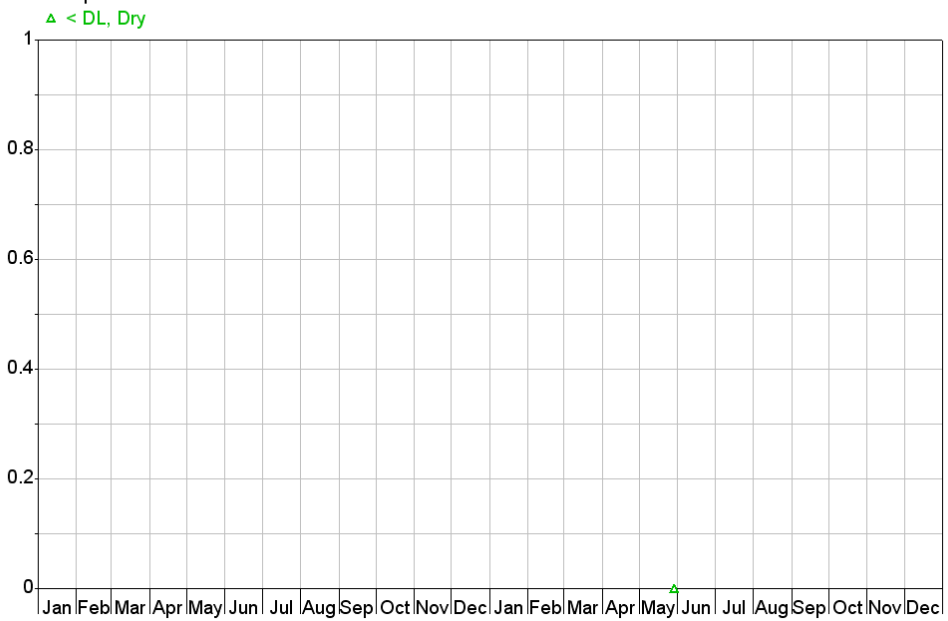

Riverside County Flood Control

RFCWQ4 V26 Output 10/22/2009

768 Redhawk Channel D/S of Overland Dr
1178 Chlorpyrifos (ELISA) in PPB

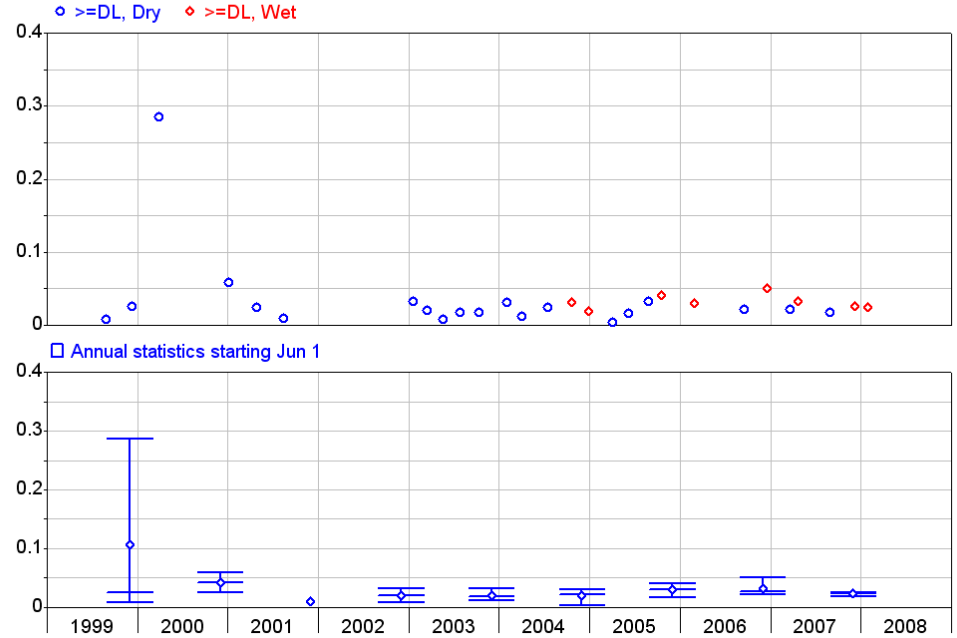

Riverside County Flood Control

RFCWQ4 V26 Output 10/22/2009

768 Redhawk Channel D/S of Overland Dr
1180 Chromium, all valences in mg/l
Benchmark 0.05, Source = BPO

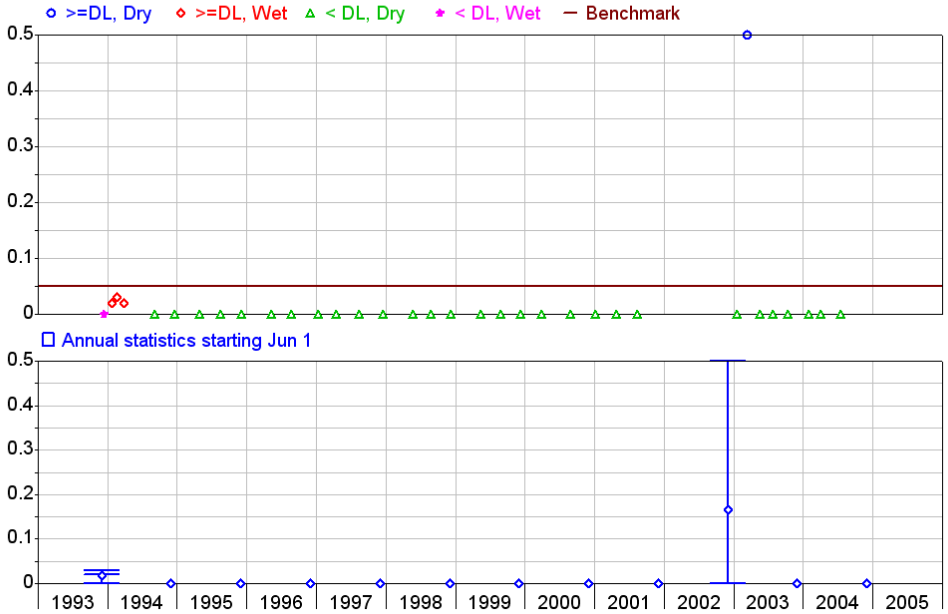

Riverside County Flood Control

RFCWQ4 V26 Output 10/22/2009

768 Redhawk Channel D/S of Overland Dr
1235 ElectroChemical Balance in me/l

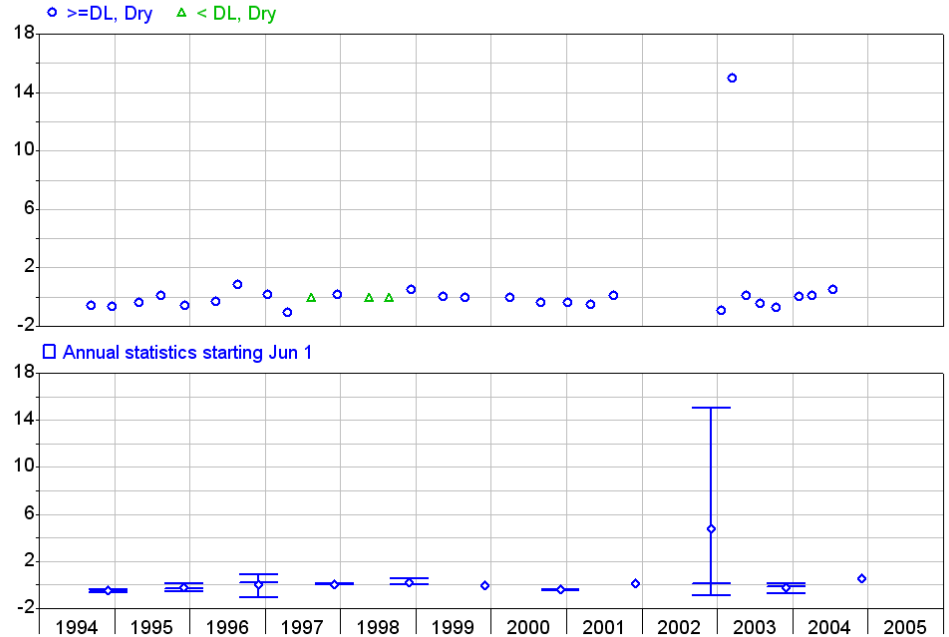

Riverside County Flood Control

RFCWQ4 V26 Output 10/22/2009

020112

768 Redhawk Channel D/S of Overland Dr
1255 Fluoride in mg/l
Benchmark 1, Source = BPO

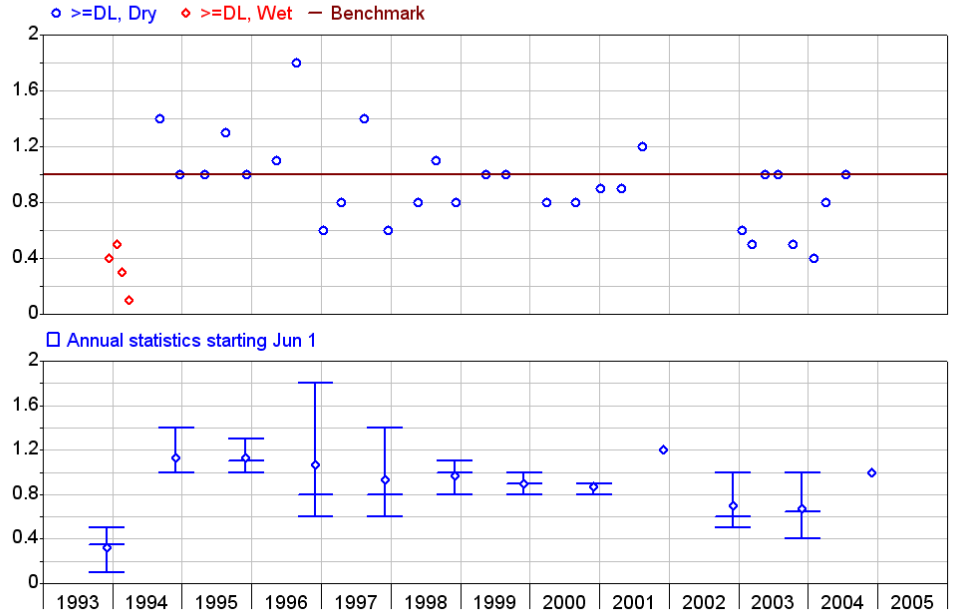

Riverside County Flood Control

RFCWQ4 V26 Output 10/22/2009

768 Redhawk Channel D/S of Overland Dr
1265 Hardness, total (CaCO3) in mg/l

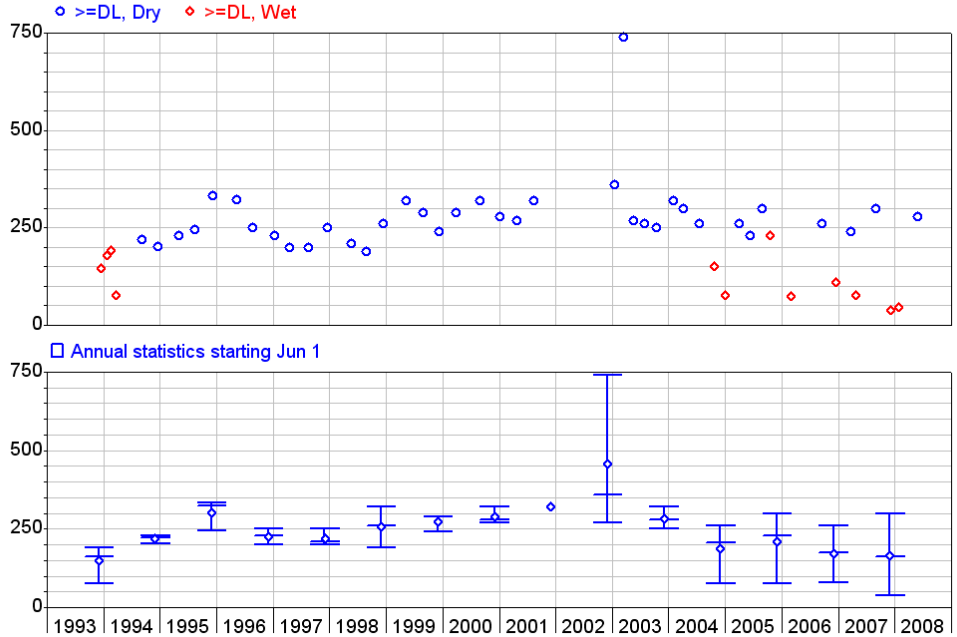

Riverside County Flood Control

RFCWQ4 V26 Output 10/22/2009

768 Redhawk Channel D/S of Overland Dr
1270 Hydrocarbons, total petroleum in mg/l

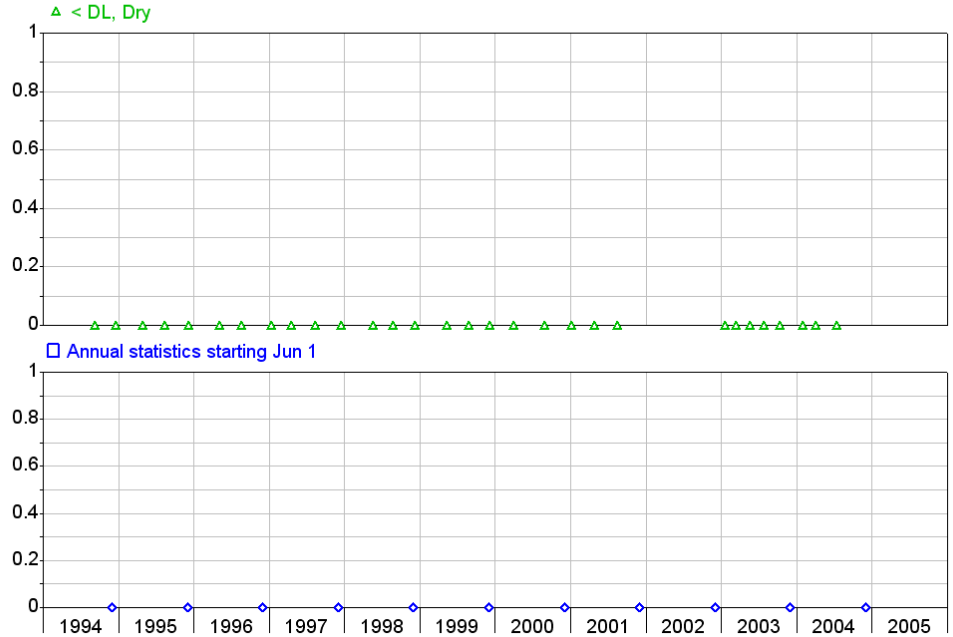

Riverside County Flood Control

RFCWQ4 V26 Output 10/22/2009

768 Redhawk Channel D/S of Overland Dr
1275 Hydroxide (OH) in mg/l

< DL, Dry < DL, Wet

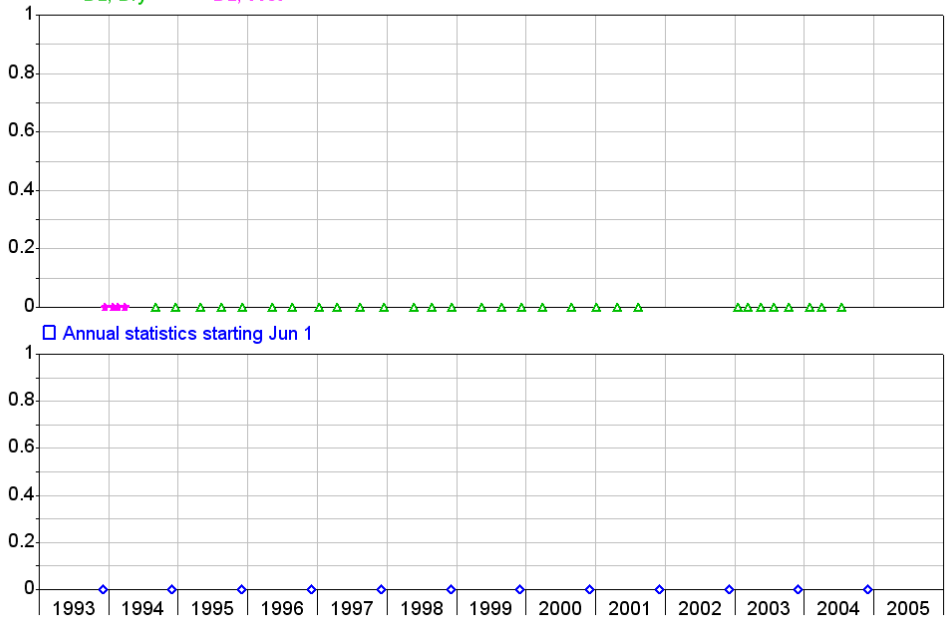

Riverside County Flood Control

RFCWQ4 V26 Output 10/22/2009

020113

768 Redhawk Channel D/S of Overland Dr
1285 Iron in mg/l
Benchmark 0.3, Source = BPO

>=DL, Dry >=DL, Wet Benchmark

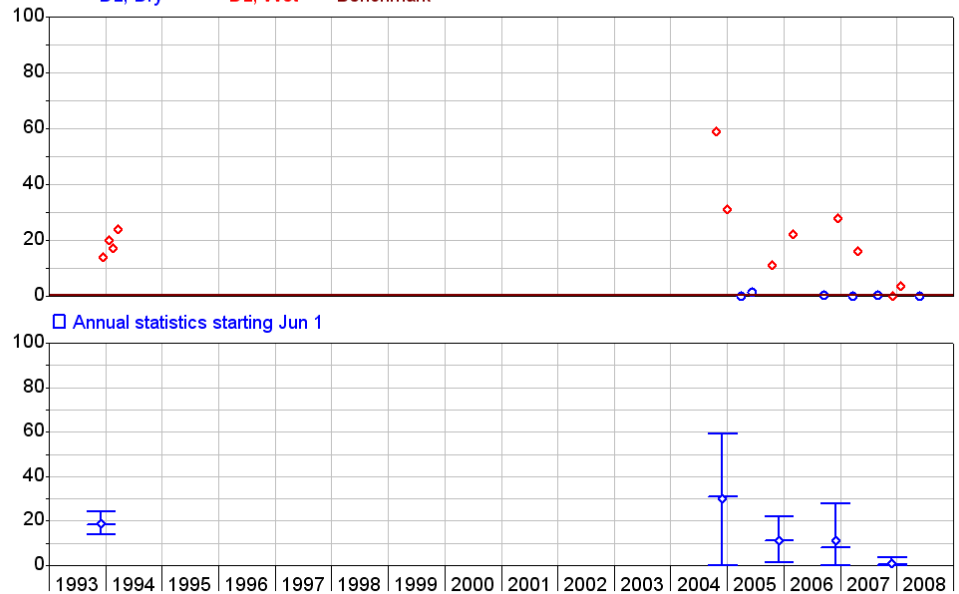

Riverside County Flood Control

RFCWQ4 V26 Output 10/22/2009

768 Redhawk Channel D/S of Overland Dr
1287 Lead Dissolved in ug/l

>=DL, Dry >=DL, Wet < DL, Dry < DL, Wet

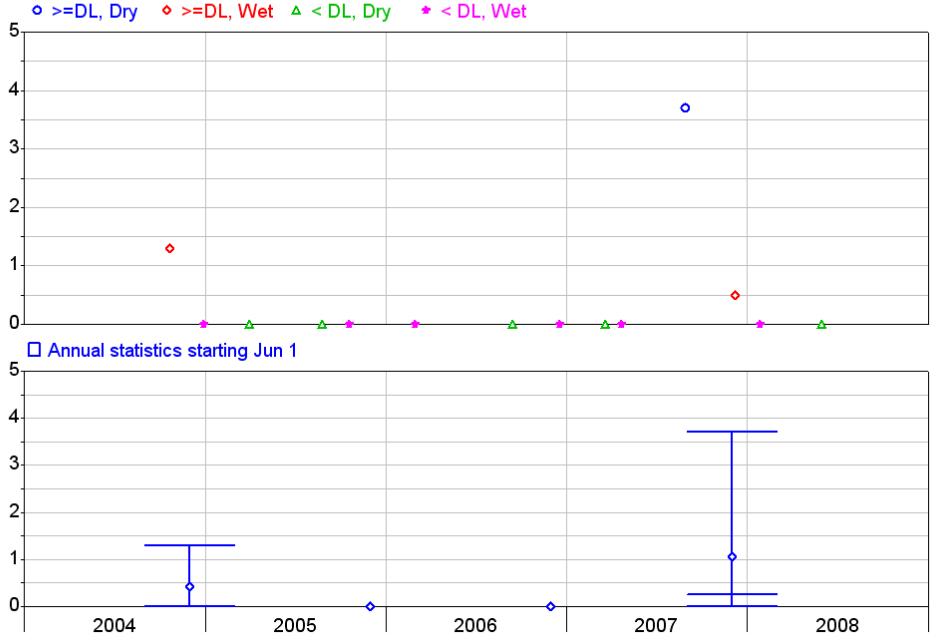

Riverside County Flood Control

RFCWQ4 V26 Output 10/22/2009

768 Redhawk Channel D/S of Overland Dr
1290 Lead, Total in mg/l

>=DL, Dry < DL, Dry < DL, Wet

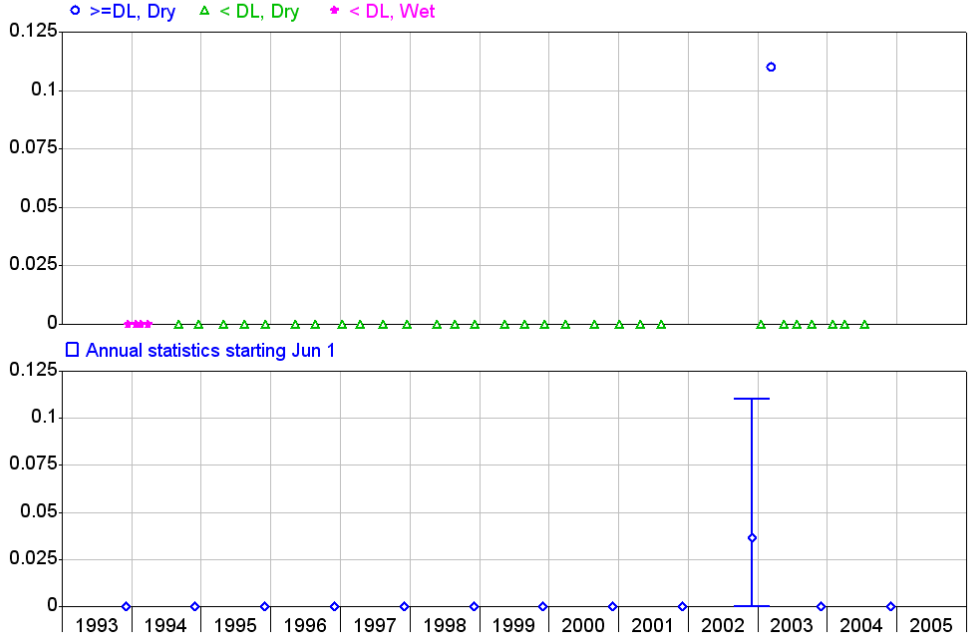

Riverside County Flood Control

RFCWQ4 V26 Output 10/22/2009

768 Redhawk Channel D/S of Overland Dr
1300 Magnesium in mg/l

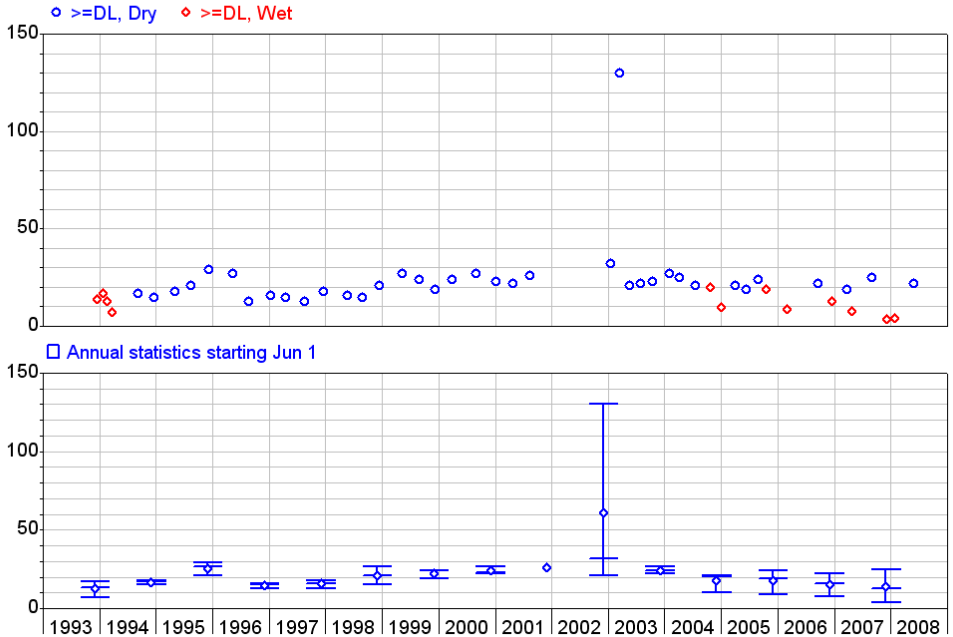

Riverside County Flood Control

RFCWQ4 V26 Output 10/22/2009

020114

768 Redhawk Channel D/S of Overland Dr
1305 Manganese, Total in mg/l
Benchmark 0.05, Source = BPO

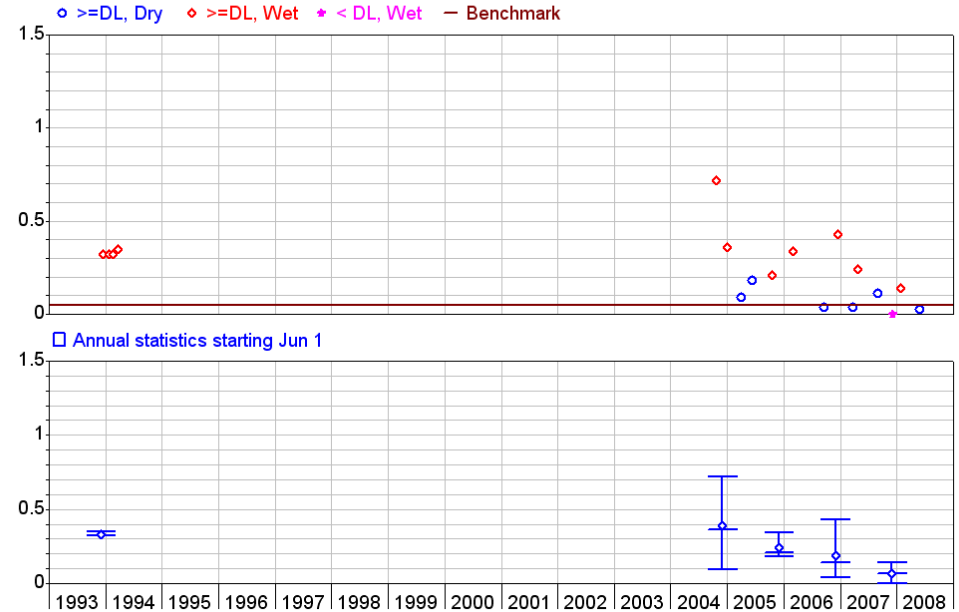

Riverside County Flood Control

RFCWQ4 V26 Output 10/22/2009

768 Redhawk Channel D/S of Overland Dr
1310 Mercury, Total in mg/l
Benchmark 0.002, Source = BPO

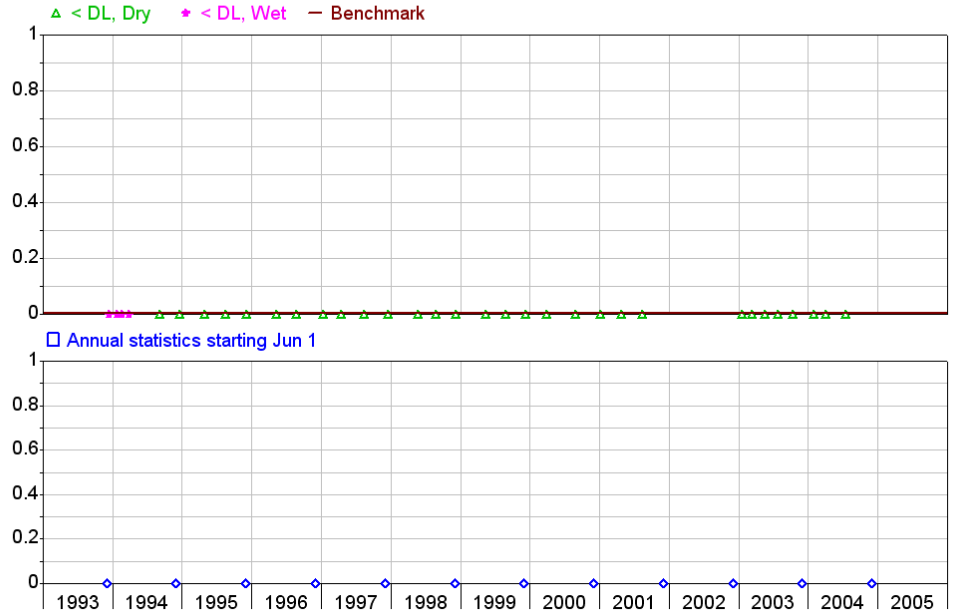

Riverside County Flood Control

RFCWQ4 V26 Output 10/22/2009

768 Redhawk Channel D/S of Overland Dr
1320 Nickel, Total in mg/l
Benchmark 0.1, Source = BPO

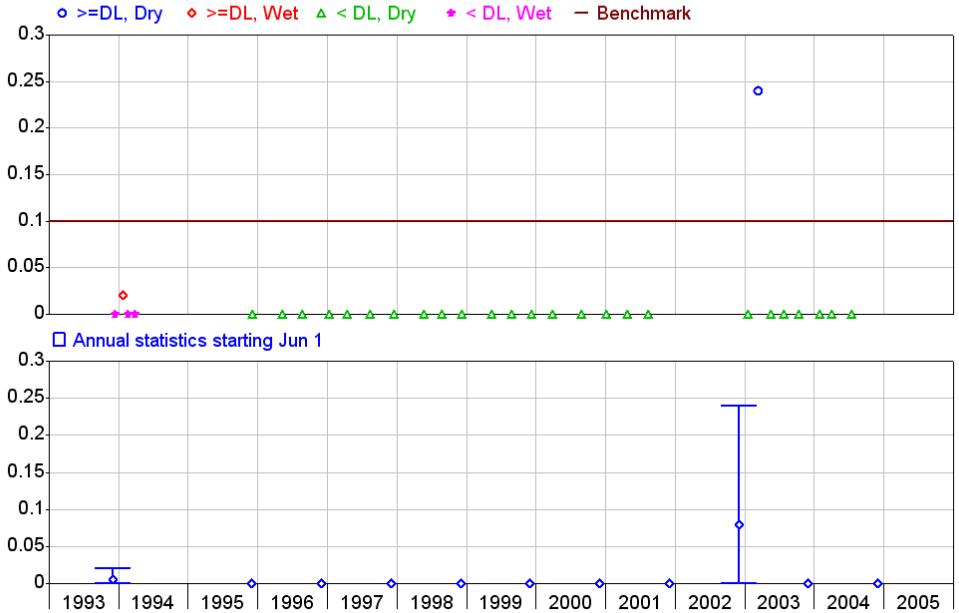

Riverside County Flood Control

RFCWQ4 V26 Output 10/22/2009

768 Redhawk Channel D/S of Overland Dr
1520 Selenium, Total in mg/l
Benchmark 0.05, Source = BPO

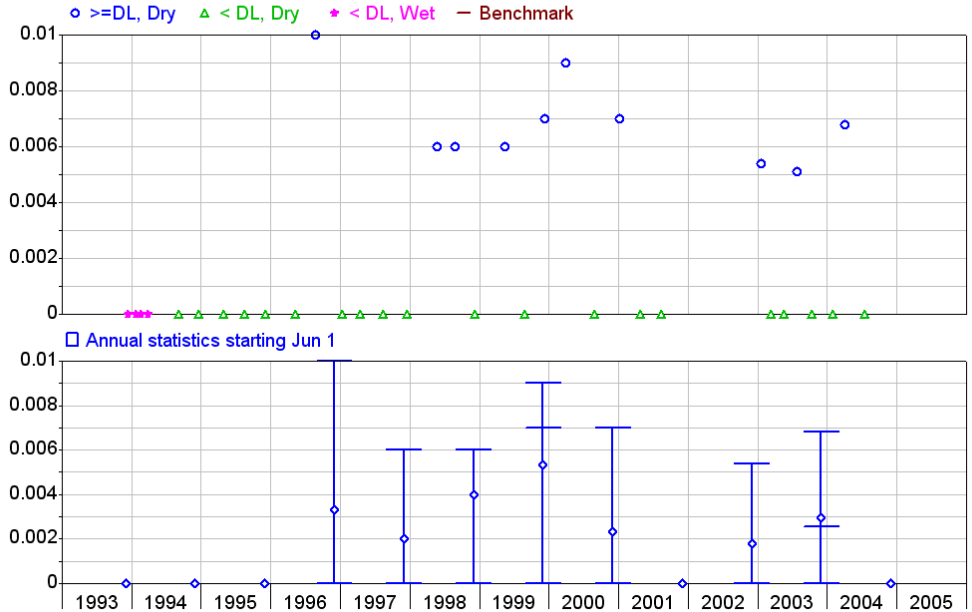

Riverside County Flood Control

RFCWQ4 V26 Output 10/22/2009

020115

768 Redhawk Channel D/S of Overland Dr
1535 Silver, Total in mg/l
Benchmark 0.1, Source = BPO

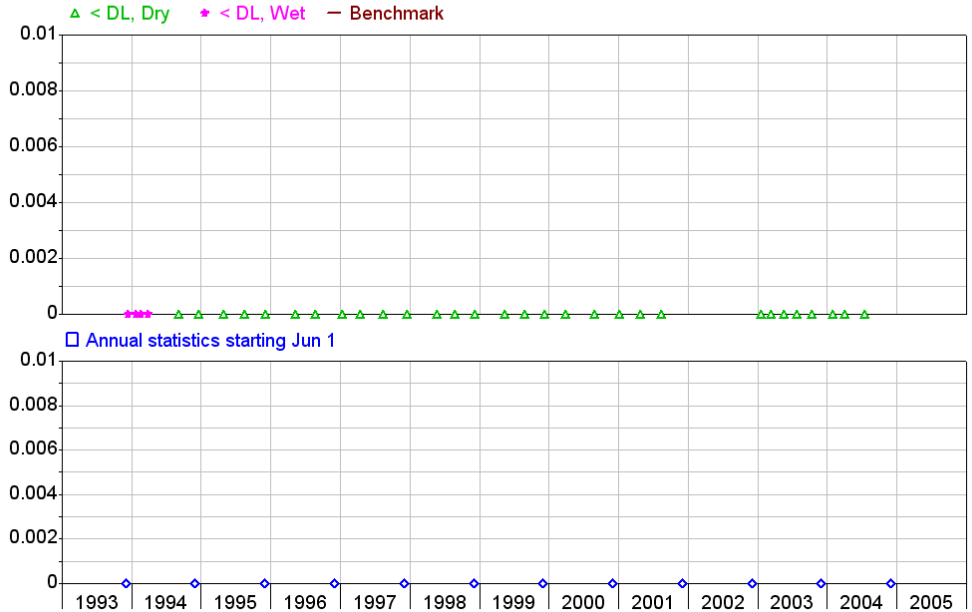

Riverside County Flood Control

RFCWQ4 V26 Output 10/22/2009

768 Redhawk Channel D/S of Overland Dr
1540 Sodium in mg/l

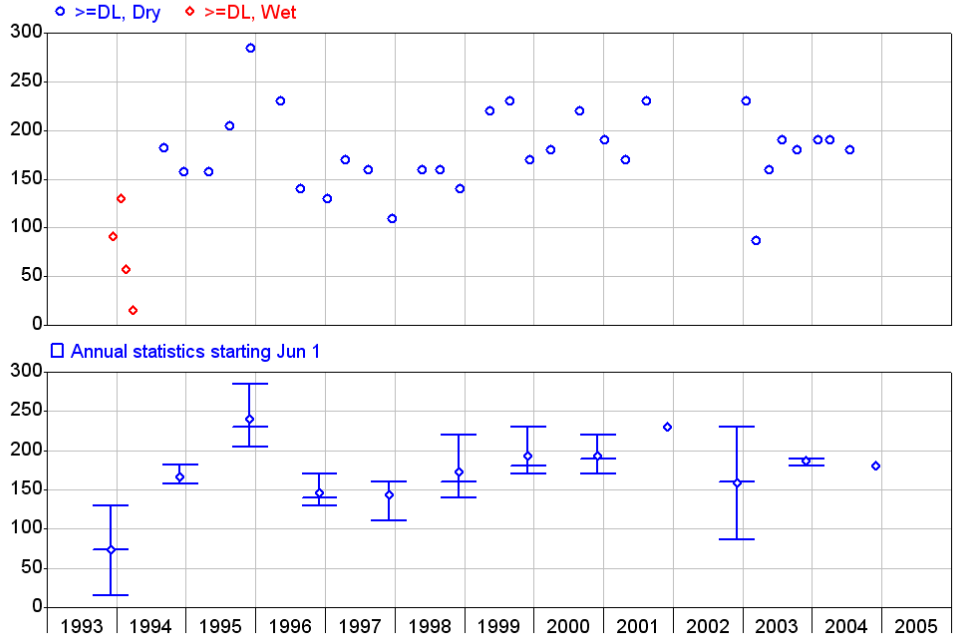

Riverside County Flood Control

RFCWQ4 V26 Output 10/22/2009

768 Redhawk Channel D/S of Overland Dr
1615 Solids, total in mg/l

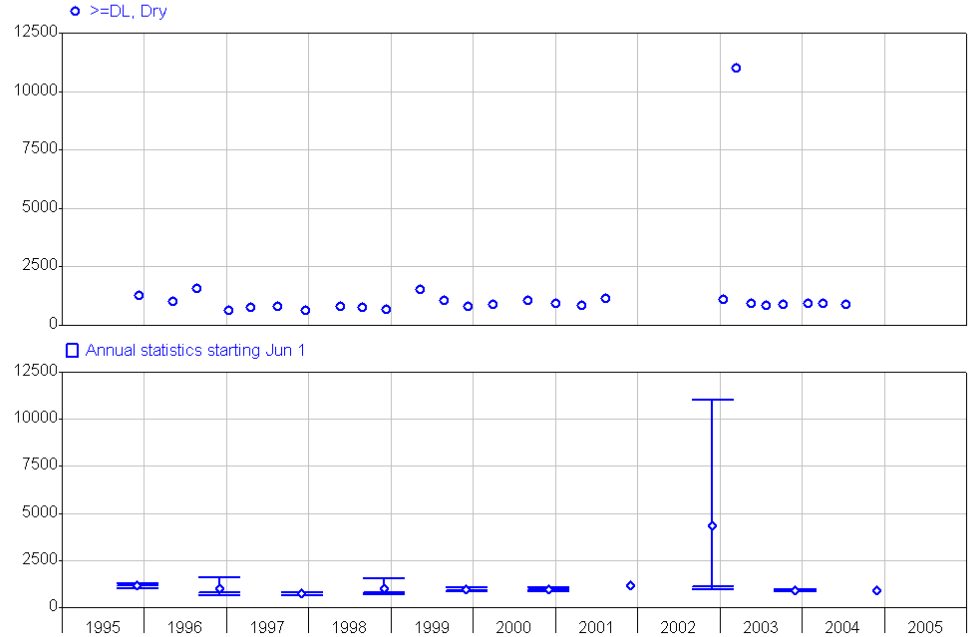

Riverside County Flood Control

RFCWQ4 V26 Output 10/22/2009

768 Redhawk Channel D/S of Overland Dr
1680 Total Cations

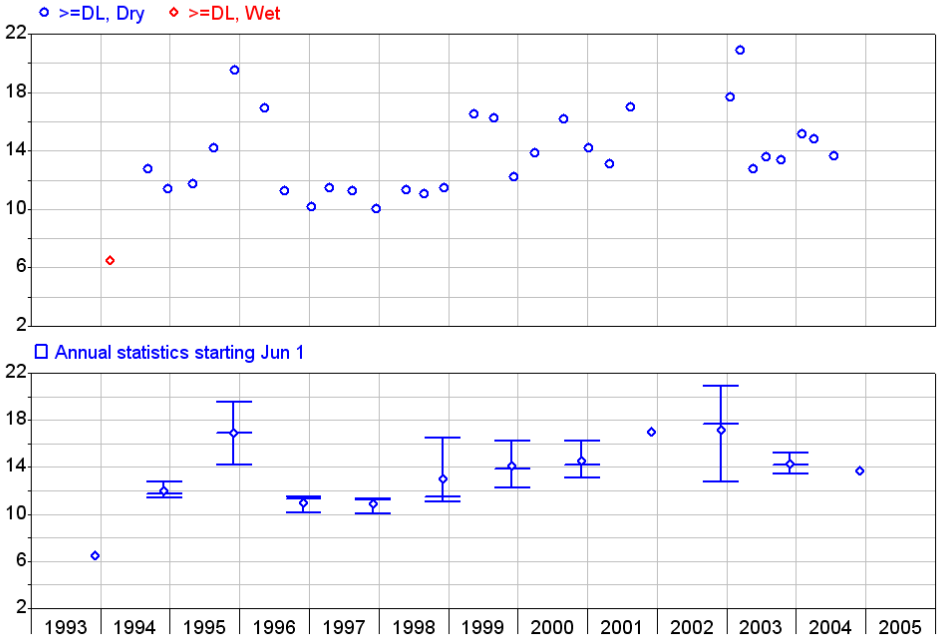

Riverside County Flood Control

RFCWQ4 V26 Output 10/22/2009

020116

768 Redhawk Channel D/S of Overland Dr
1690 Turbidity, field
Benchmark 20, Source = BPO

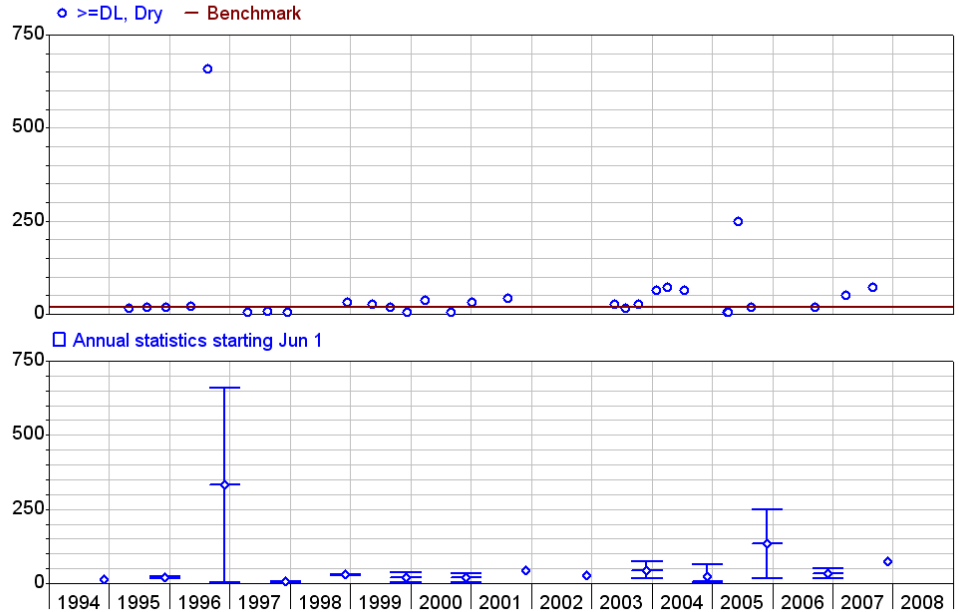

Riverside County Flood Control

RFCWQ4 V26 Output 10/22/2009

768 Redhawk Channel D/S of Overland Dr
1695 Turbidity, lab in Ntu
Benchmark 20, Source = BPO

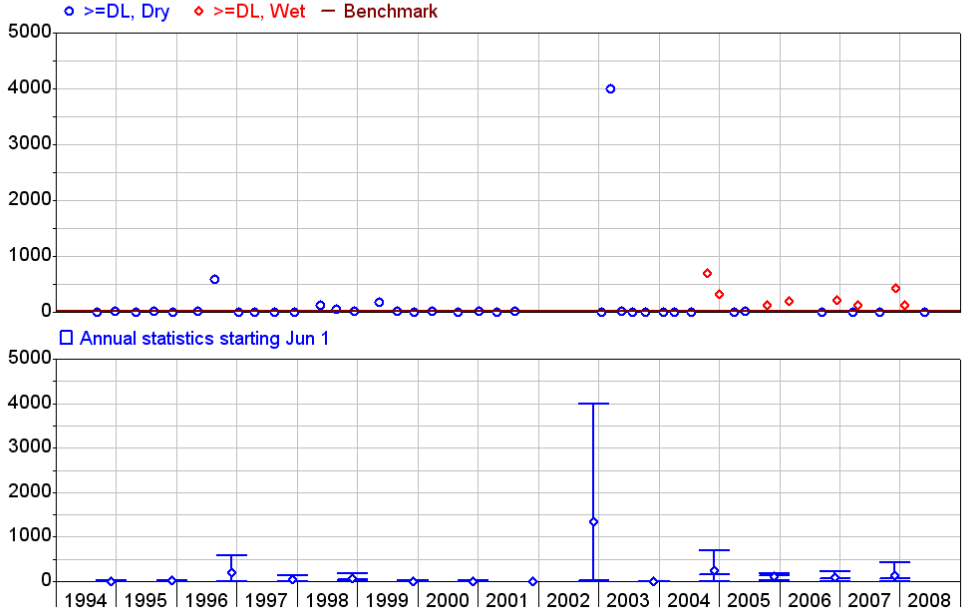

Riverside County Flood Control

RFCWQ4 V26 Output 10/22/2009

768 Redhawk Channel D/S of Overland Dr
1700 Zinc, Total in mg/l
Benchmark 5, Source = BPO

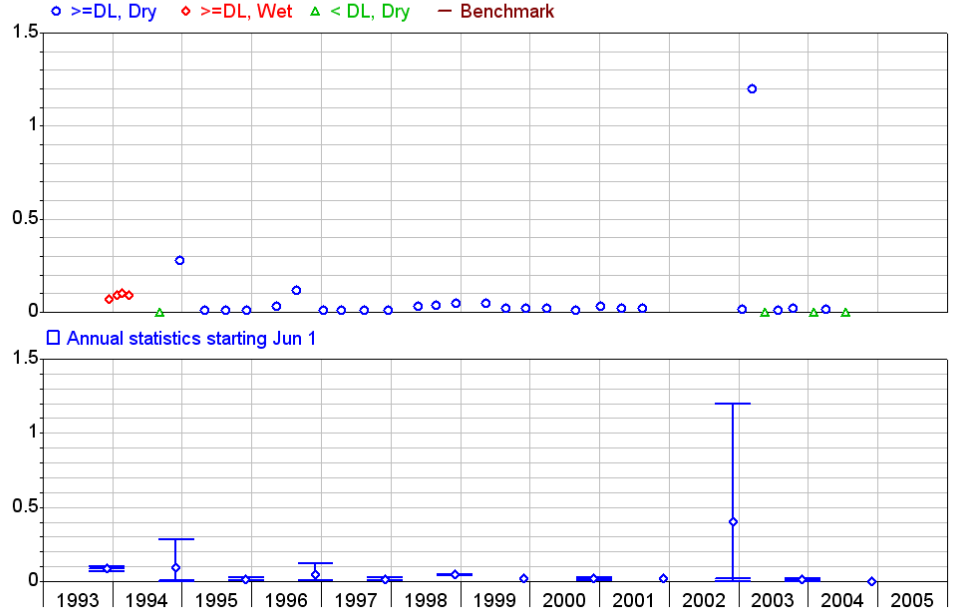

Riverside County Flood Control

RFCWQ4 V26 Output 10/22/2009

774 Lateral A of Santa Gertrudis Channel - Temecula
1125 Bicarbonate (HCO3) in mg/l
Data period 06/01/1993 to 05/31/1994

◇ >=DL, Wet

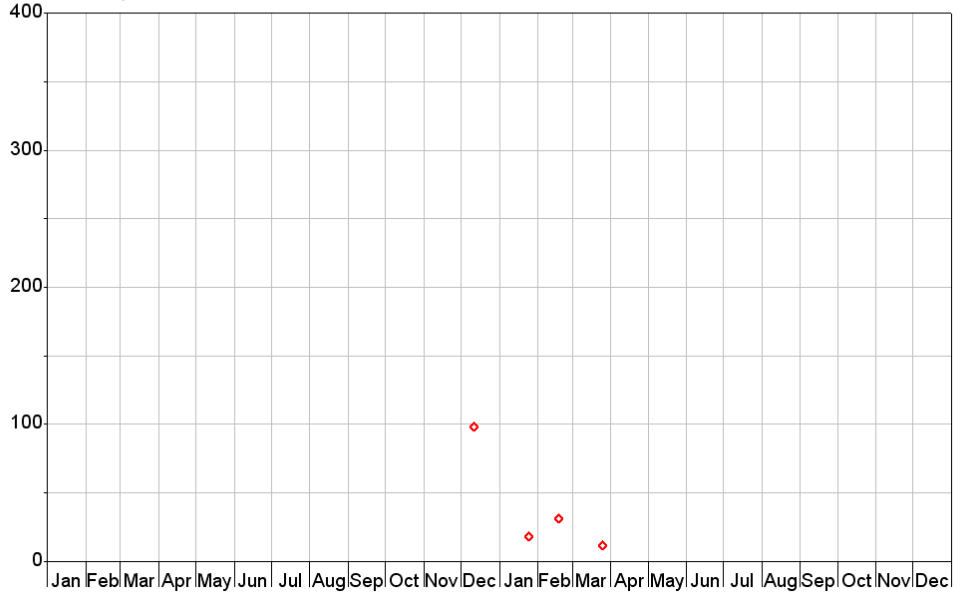

Riverside County Flood Control

RFCWQ4 V26 Output 10/22/2009

020117

774 Lateral A of Santa Gertrudis Channel - Temecula
1135 Boron in mg/l
Data period 06/01/1993 to 05/31/1994
Benchmark 0.75, Source = BPO

◇ >=DL, Wet ✱ < DL, Wet — Benchmark

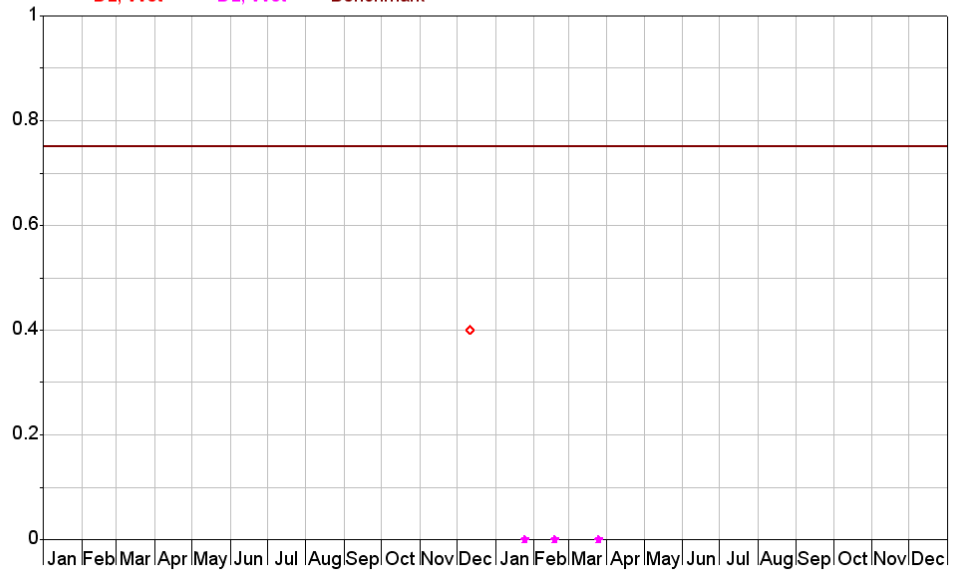

Riverside County Flood Control

RFCWQ4 V26 Output 10/22/2009

774 Lateral A of Santa Gertrudis Channel - Temecula
1145 Cadmium, Total in mg/l
Data period 06/01/1993 to 05/31/1994
Benchmark 0.005, Source = BPO

◇ >=DL, Wet ✱ < DL, Wet — Benchmark

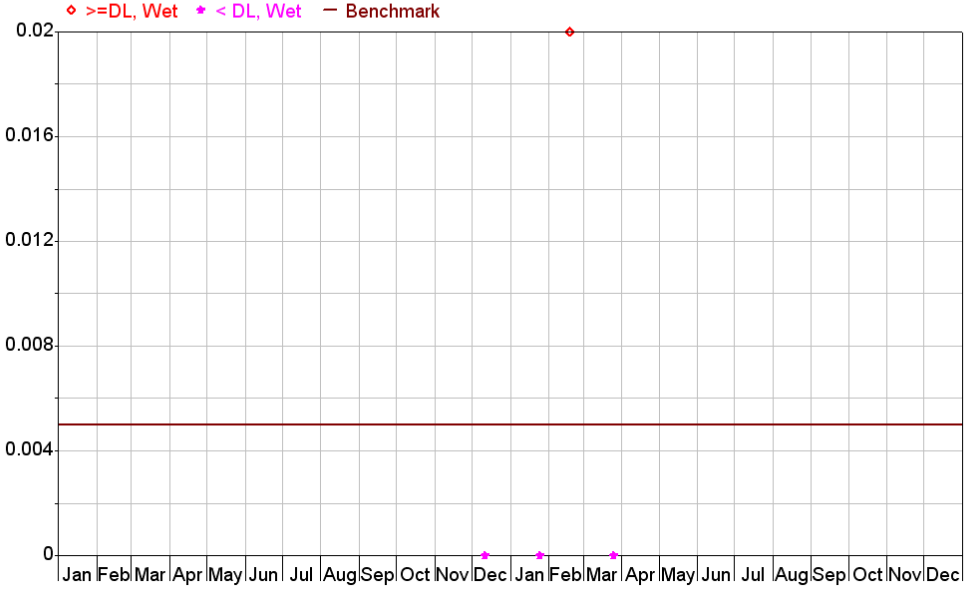

Riverside County Flood Control

RFCWQ4 V26 Output 10/22/2009

774 Lateral A of Santa Gertrudis Channel - Temecula
1150 Calcium in mg/l

○ >=DL, Dry ◇ >=DL, Wet

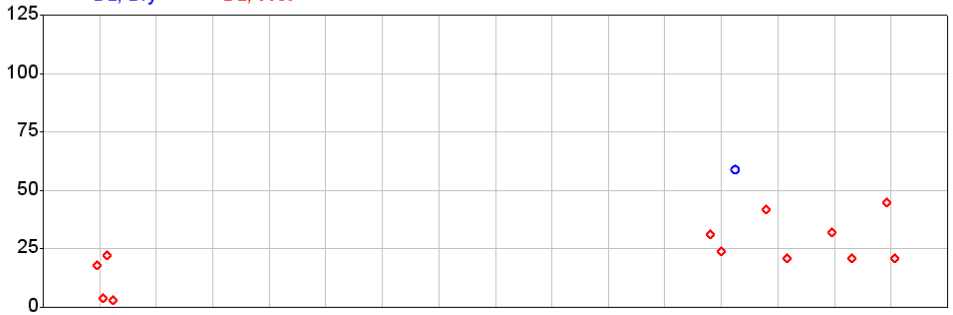

□ Annual statistics starting Jun 1

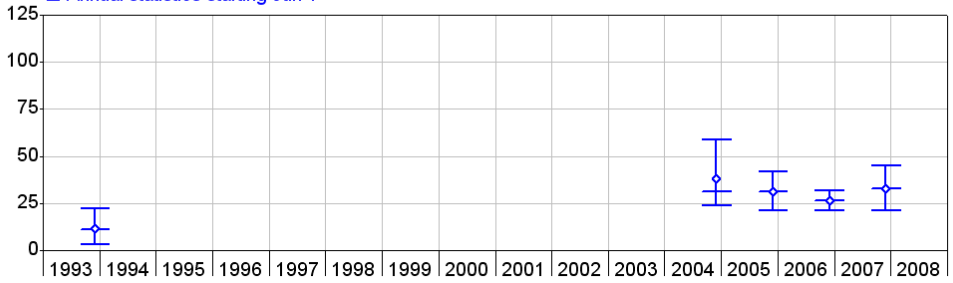

Riverside County Flood Control

RFCWQ4 V26 Output 10/22/2009

774 Lateral A of Santa Gertrudis Channel - Temecula
1160 Carbonate (CO3) in mg/l
Data period 06/01/1993 to 05/31/1994

* < DL, Wet

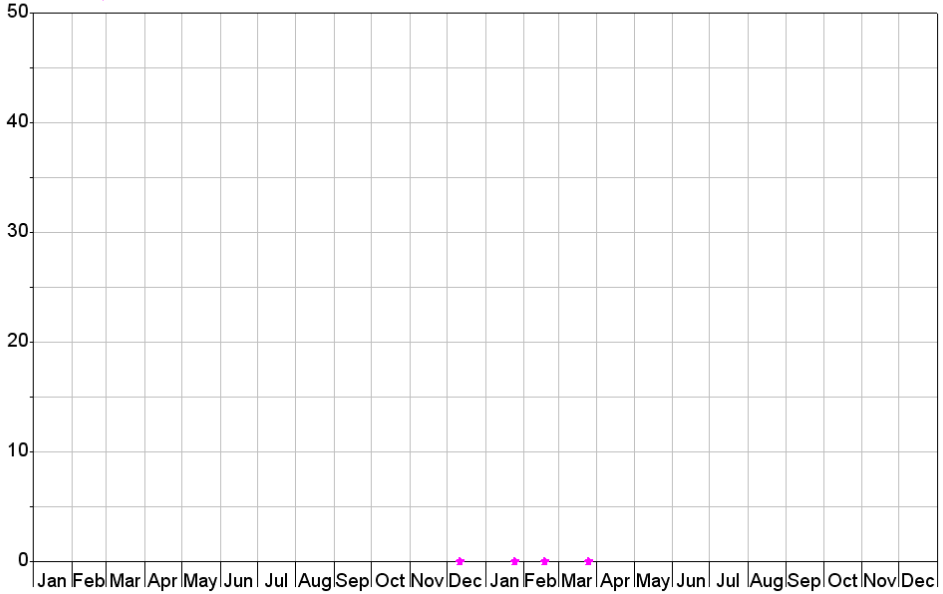

Riverside County Flood Control

RFCWQ4 V26 Output 10/22/2009

020118

774 Lateral A of Santa Gertrudis Channel - Temecula
1165 Chloride in mg/l
Data period 06/01/1993 to 05/31/1994
Benchmark 250, Source = BPO

◇ >=DL, Wet — Benchmark

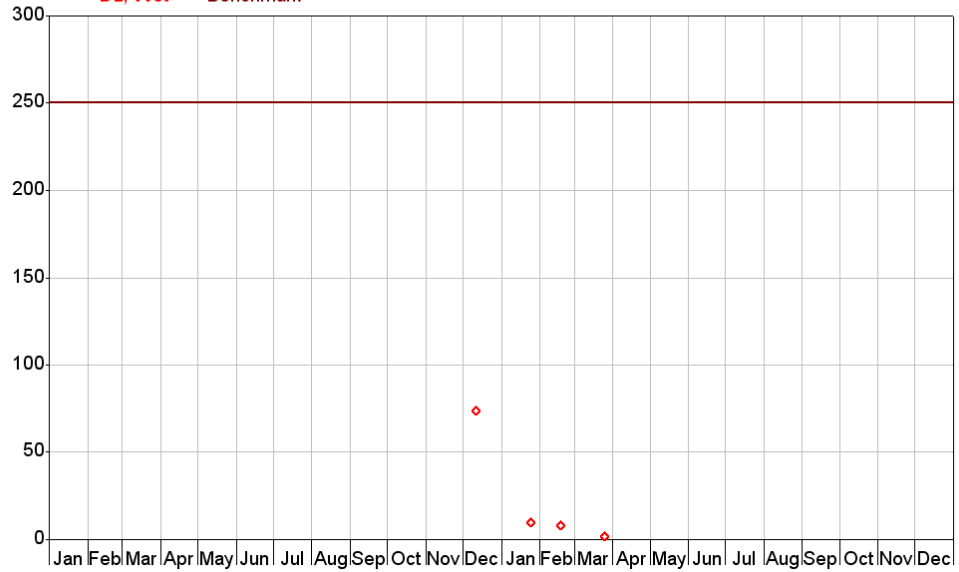

Riverside County Flood Control

RFCWQ4 V26 Output 10/22/2009

774 Lateral A of Santa Gertrudis Channel - Temecula
1178 Chlorpyrifos (ELISA) in PPB

○ >=DL, Dry ◇ >=DL, Wet

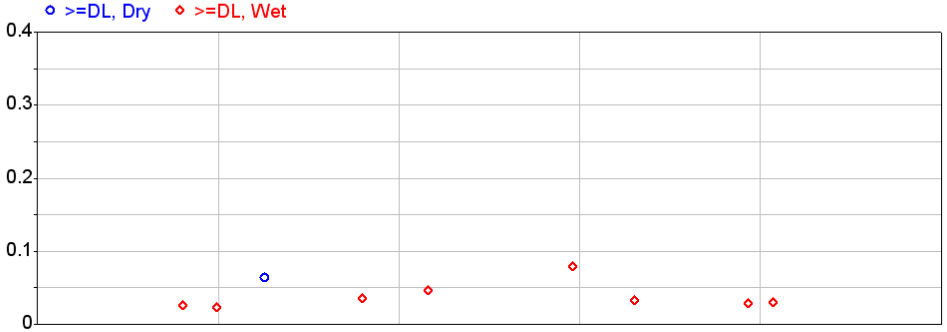

□ Annual statistics starting Jun 1

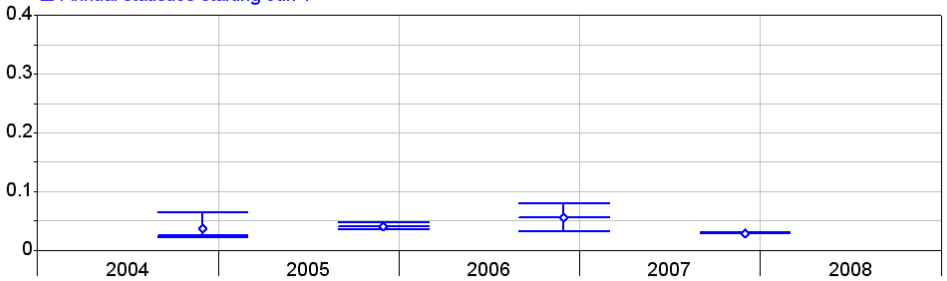

Riverside County Flood Control

RFCWQ4 V26 Output 10/22/2009

774 Lateral A of Santa Gertrudis Channel - Temecula
1180 Chromium, all valences in mg/l
Data period 06/01/1993 to 05/31/1994
Benchmark 0.05, Source = BPO

◇ >=DL, Wet * < DL, Wet — Benchmark

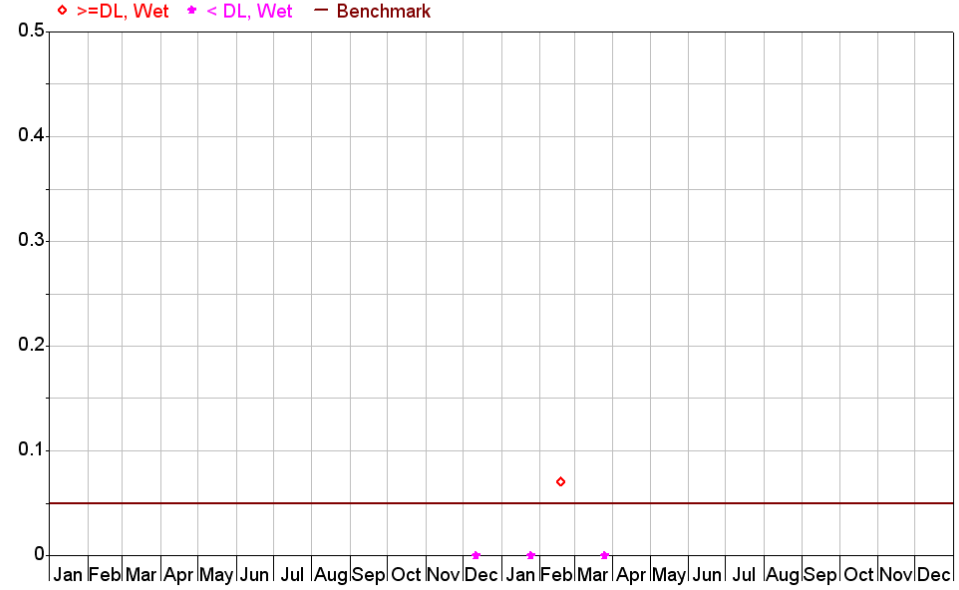

Riverside County Flood Control

RFCWQ4 V26 Output 10/22/2009

774 Lateral A of Santa Gertrudis Channel - Temecula
1255 Fluoride in mg/l
Data period 06/01/1993 to 05/31/1994
Benchmark 1, Source = BPO

◇ >=DL, Wet ✱ < DL, Wet — Benchmark

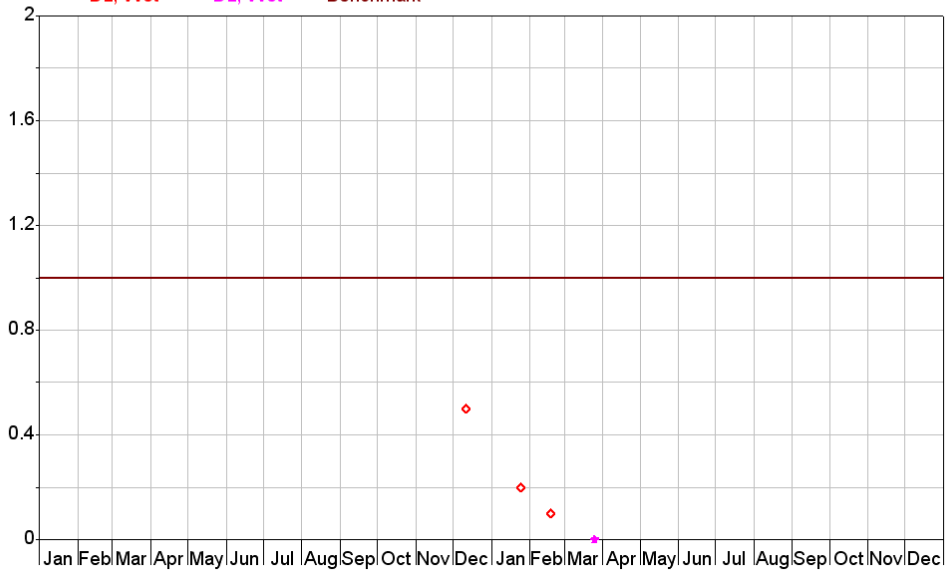

Riverside County Flood Control

RFCWQ4 V26 Output 10/22/2009

020119

774 Lateral A of Santa Gertrudis Channel - Temecula
1265 Hardness, total (CaCO3) in mg/l

○ >=DL, Dry ◇ >=DL, Wet

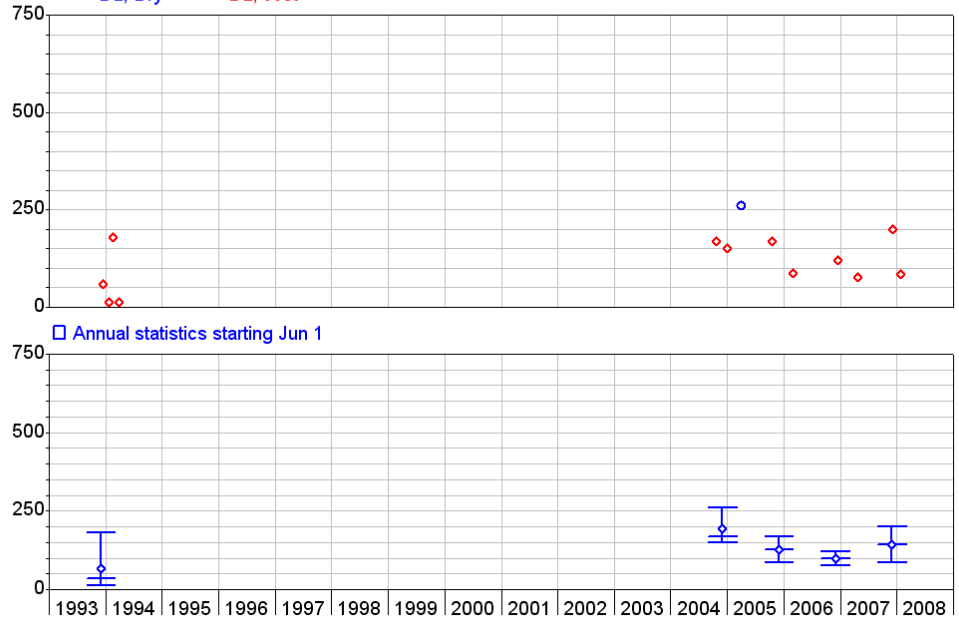

Riverside County Flood Control

RFCWQ4 V26 Output 10/22/2009

774 Lateral A of Santa Gertrudis Channel - Temecula
1275 Hydroxide (OH) in mg/l
Data period 06/01/1993 to 05/31/1994

✱ < DL, Wet

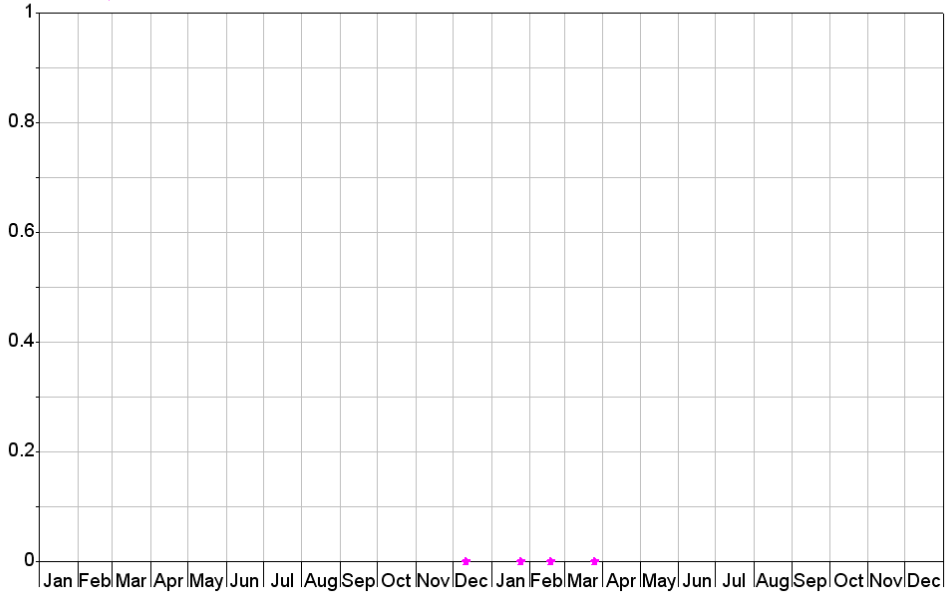

Riverside County Flood Control

RFCWQ4 V26 Output 10/22/2009

774 Lateral A of Santa Gertrudis Channel - Temecula
1285 Iron in mg/l
Benchmark 0.3, Source = BPO

○ >=DL, Dry ◇ >=DL, Wet — Benchmark

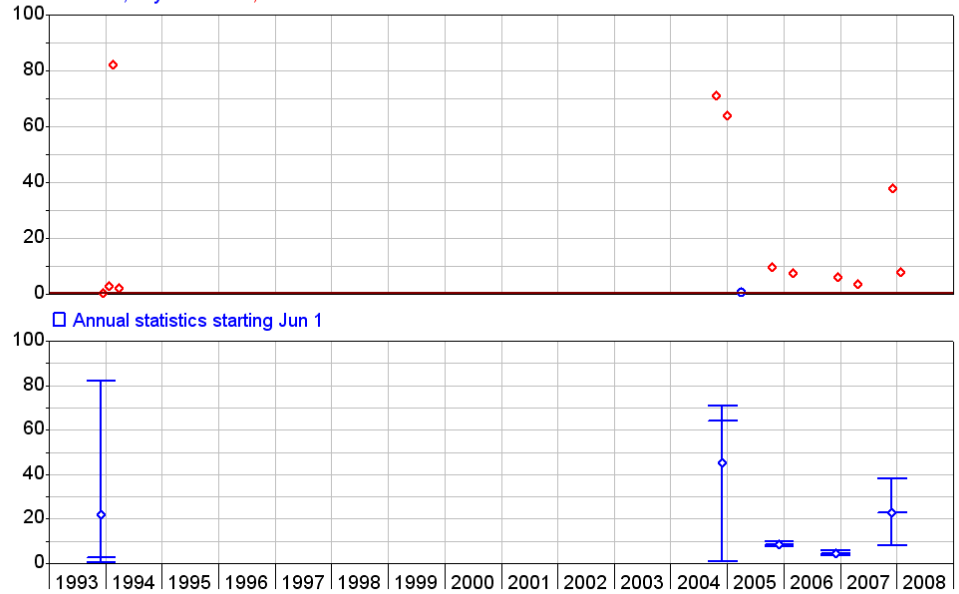

Riverside County Flood Control

RFCWQ4 V26 Output 10/22/2009

774 Lateral A of Santa Gertrudis Channel - Temecula
1287 Lead Dissolved in ug/l

Riverside County Flood Control

RFCWQ4 V26 Output 10/22/2009

020120

774 Lateral A of Santa Gertrudis Channel - Temecula
1290 Lead, Total in mg/l

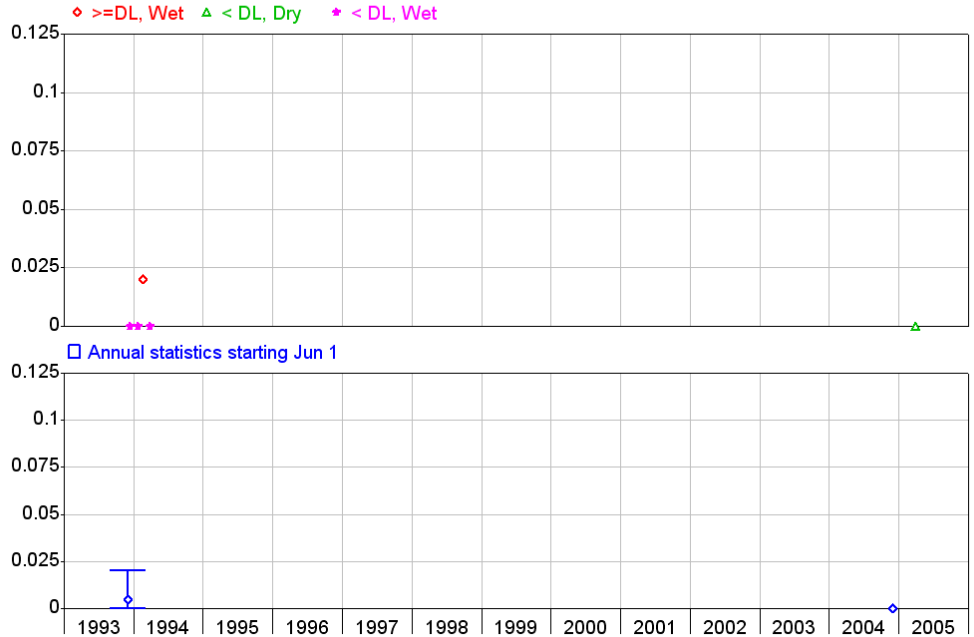

Riverside County Flood Control

RFCWQ4 V26 Output 10/22/2009

774 Lateral A of Santa Gertrudis Channel - Temecula
1300 Magnesium in mg/l

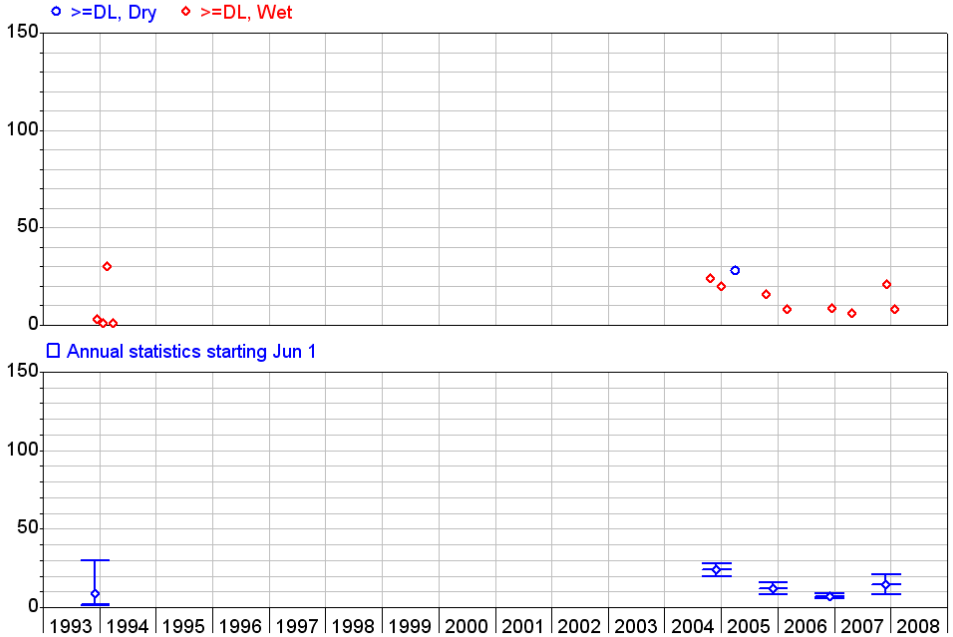

Riverside County Flood Control

RFCWQ4 V26 Output 10/22/2009

774 Lateral A of Santa Gertrudis Channel - Temecula
1305 Manganese, Total in mg/l
Benchmark 0.05, Source = BPO

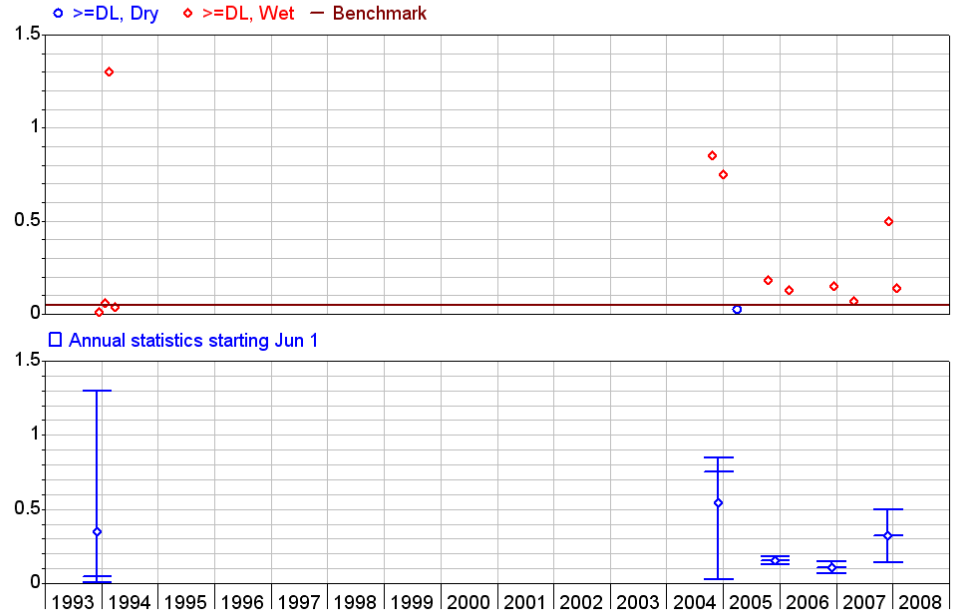

Riverside County Flood Control

RFCWQ4 V26 Output 10/22/2009

774 Lateral A of Santa Gertrudis Channel - Temecula
1310 Mercury, Total in mg/l
Data period 06/01/1993 to 05/31/1994
Benchmark 0.002, Source = BPO

< DL, Wet — Benchmark

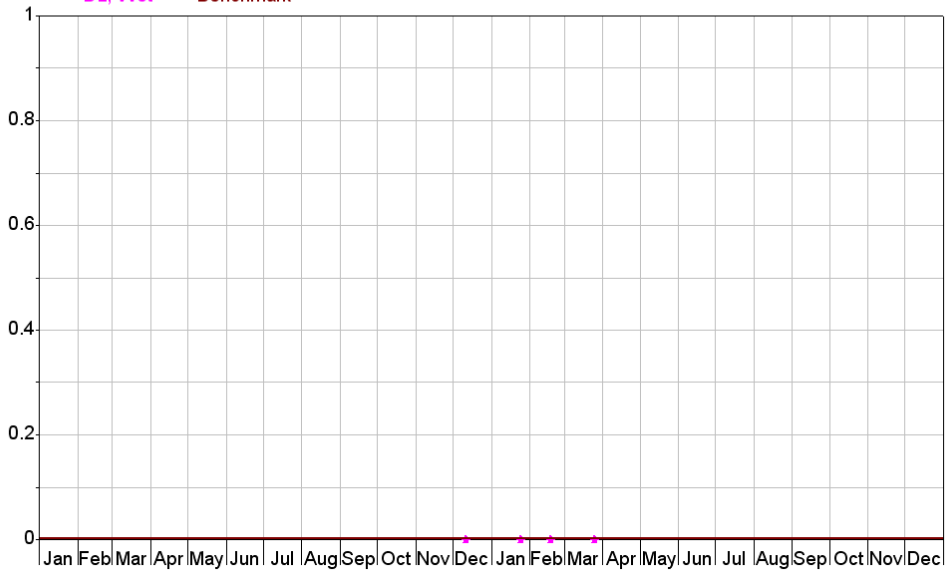

Riverside County Flood Control

RFCWQ4 V26 Output 10/22/2009

020121

774 Lateral A of Santa Gertrudis Channel - Temecula
1320 Nickel, Total in mg/l
Data period 06/01/1993 to 05/31/1994
Benchmark 0.1, Source = BPO

>=DL, Wet < DL, Wet — Benchmark

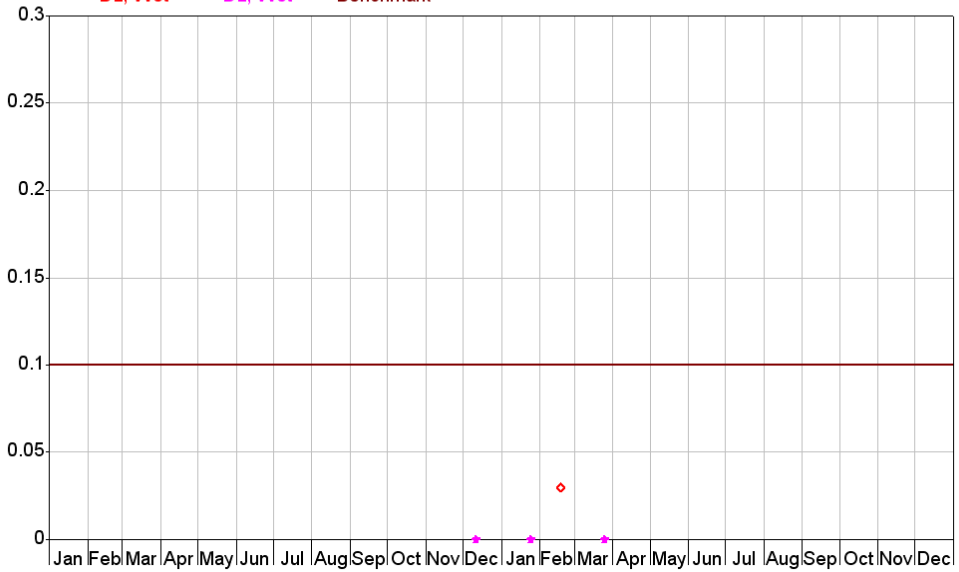

Riverside County Flood Control

RFCWQ4 V26 Output 10/22/2009

774 Lateral A of Santa Gertrudis Channel - Temecula
1340 Nitrogen, nitrate (N) in mg/l
Benchmark 10, Source = BPO

>=DL, Wet < DL, Dry < DL, Wet — Benchmark

Annual statistics starting Jun 1

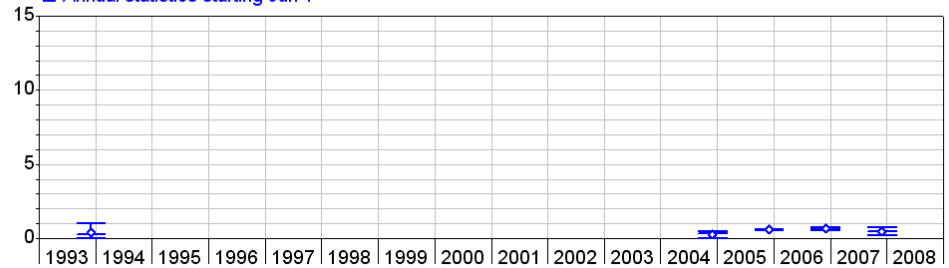

Riverside County Flood Control

RFCWQ4 V26 Output 10/22/2009

774 Lateral A of Santa Gertrudis Channel - Temecula
1345 Nitrogen, nitrite (N) in mg/l
Benchmark 1.0, Source = BPO

>=DL, Wet < DL, Dry < DL, Wet — Benchmark

Annual statistics starting Jun 1

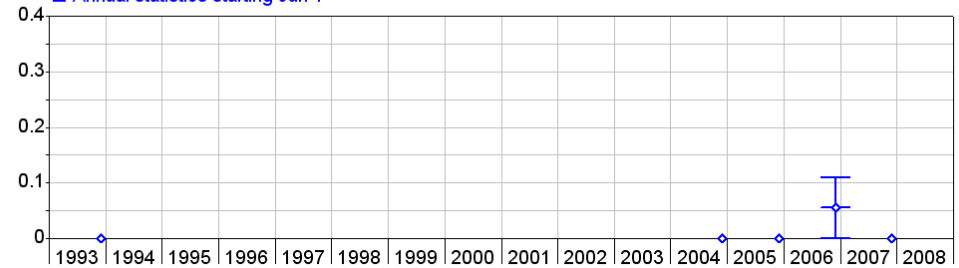

Riverside County Flood Control

RFCWQ4 V26 Output 10/22/2009

774 Lateral A of Santa Gertrudis Channel - Temecula
1500 Potassium in mg/l
Data period 06/01/1993 to 05/31/1994

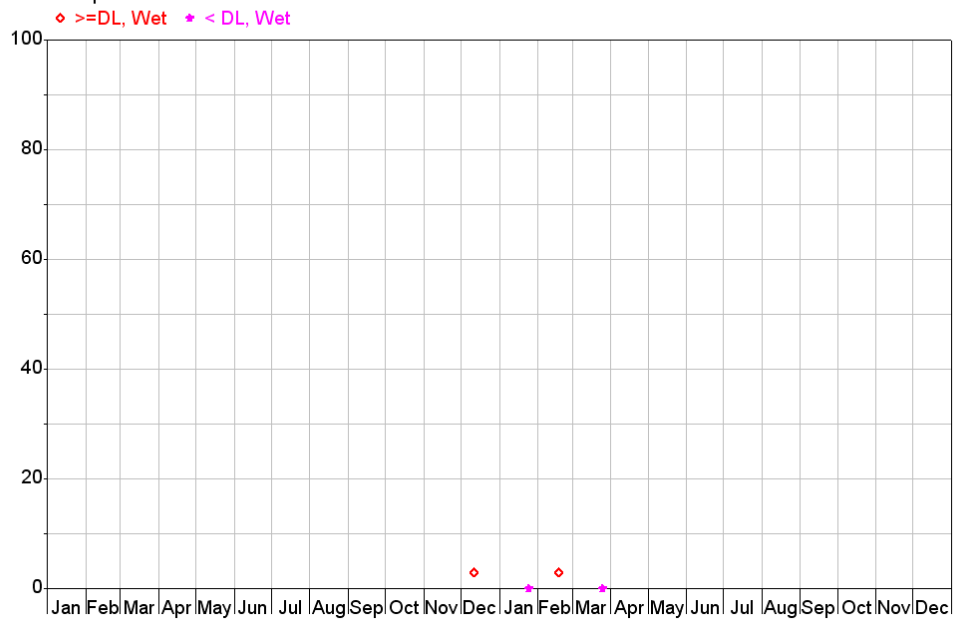

Riverside County Flood Control

RFCWQ4 V26 Output 10/22/2009

020122

774 Lateral A of Santa Gertrudis Channel - Temecula
1515 Redox Potential, field in mv

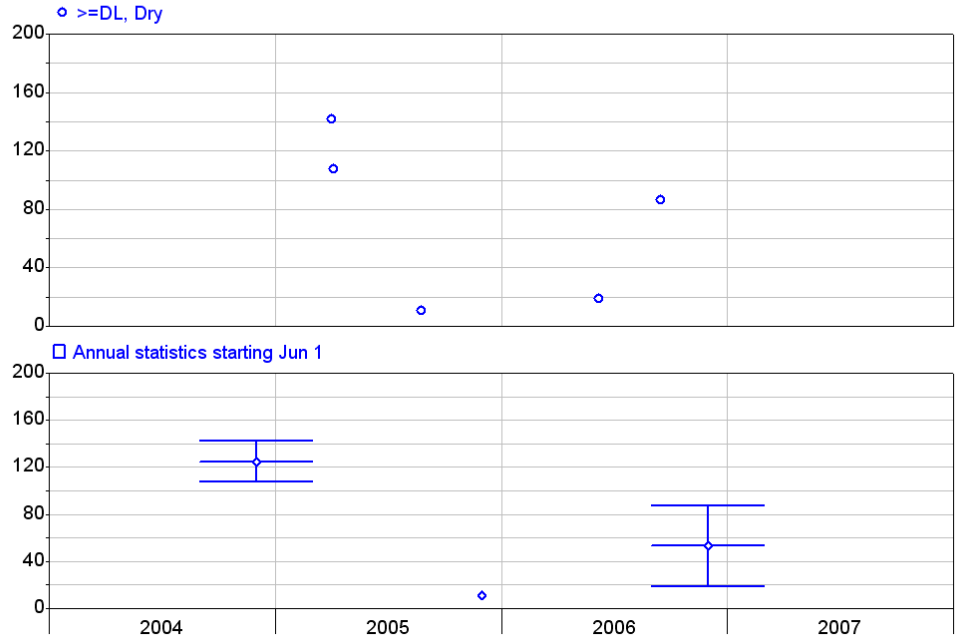

Riverside County Flood Control

RFCWQ4 V26 Output 10/22/2009

774 Lateral A of Santa Gertrudis Channel - Temecula
1520 Selenium, Total in mg/l
Data period 06/01/1993 to 05/31/1994
Benchmark 0.05, Source = BPO

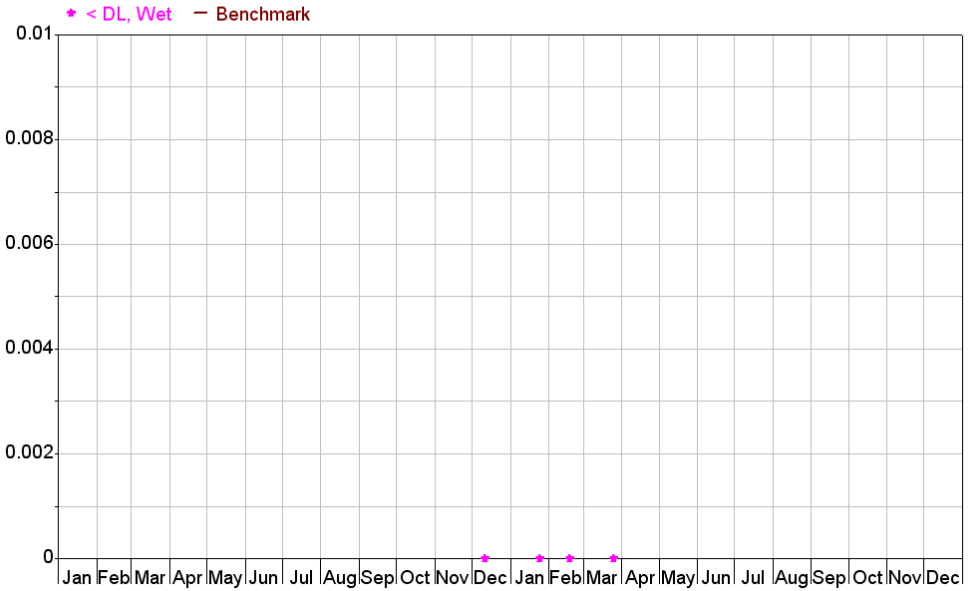

Riverside County Flood Control

RFCWQ4 V26 Output 10/22/2009

774 Lateral A of Santa Gertrudis Channel - Temecula
1535 Silver, Total in mg/l
Data period 06/01/1993 to 05/31/1994
Benchmark 0.1, Source = BPO

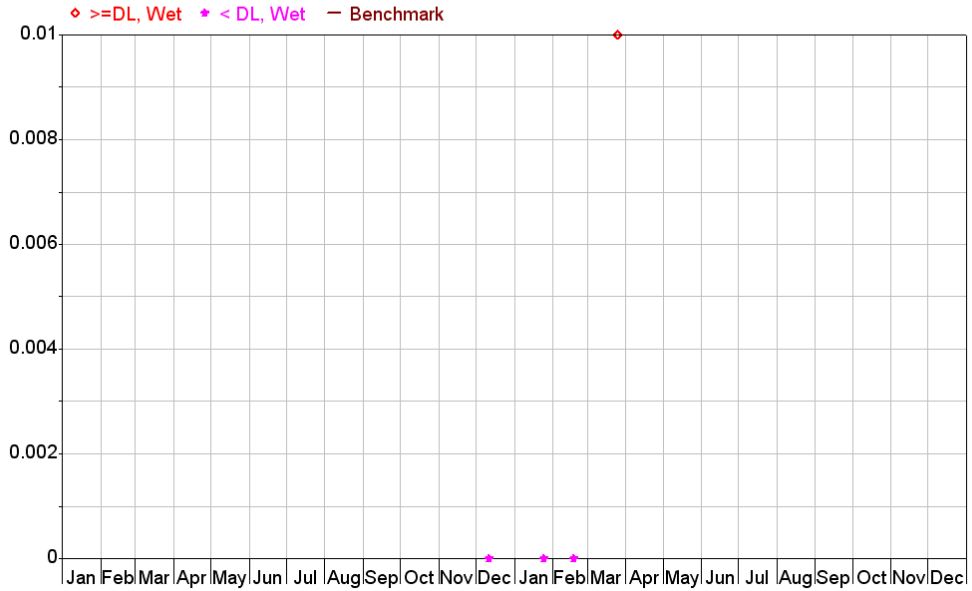

Riverside County Flood Control

RFCWQ4 V26 Output 10/22/2009

774 Lateral A of Santa Gertrudis Channel - Temecula
1680 Total Cations
Data period 06/01/1993 to 05/31/1994

◇ >=DL, Wet

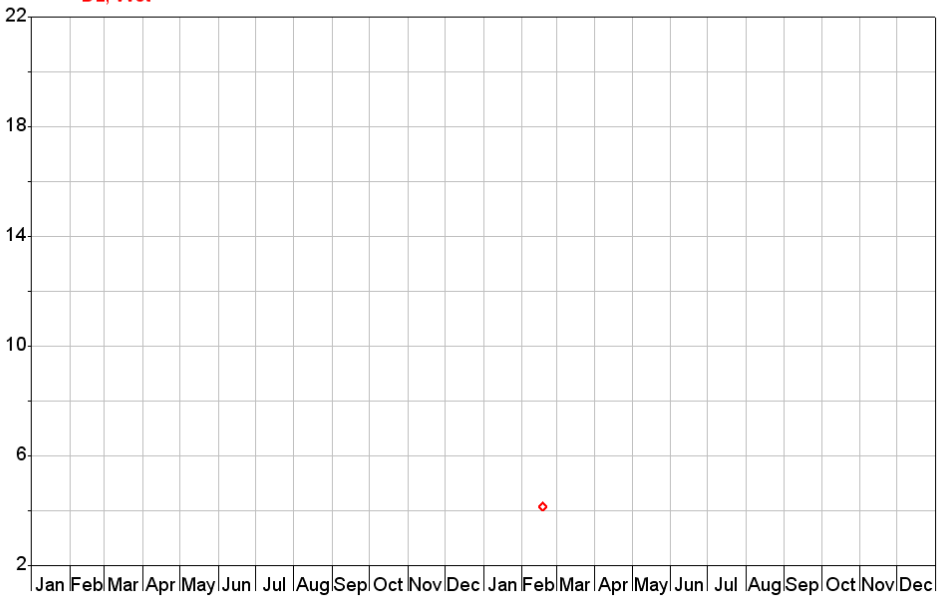

Riverside County Flood Control

RFCWQ4 V26 Output 10/22/2009

020123

774 Lateral A of Santa Gertrudis Channel - Temecula
1690 Turbidity, field
Benchmark 20, Source = BPO

○ >=DL, Dry — Benchmark

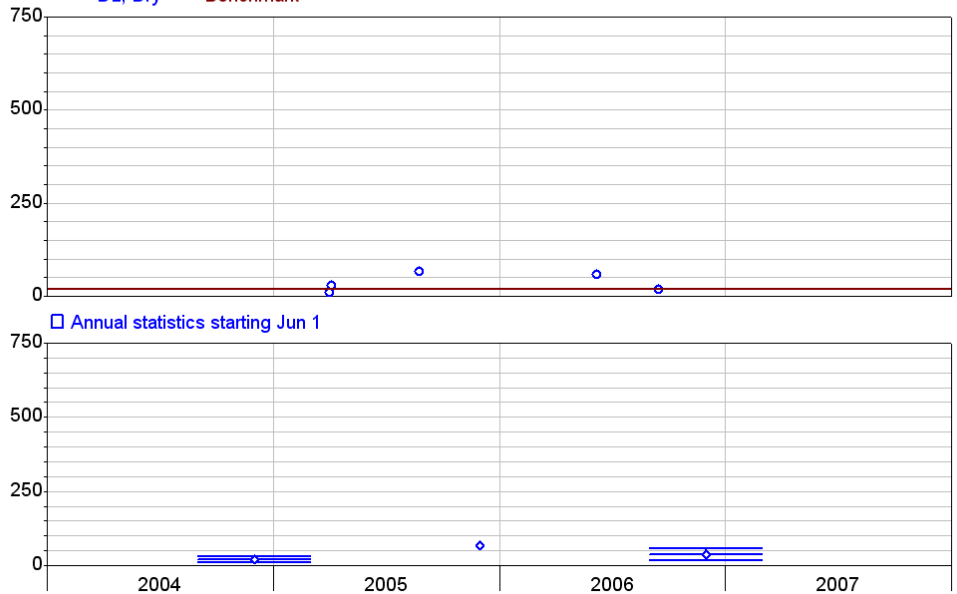

Riverside County Flood Control

RFCWQ4 V26 Output 10/22/2009

774 Lateral A of Santa Gertrudis Channel - Temecula
1695 Turbidity, lab in Ntu
Benchmark 20, Source = BPO

○ >=DL, Dry ◇ >=DL, Wet — Benchmark

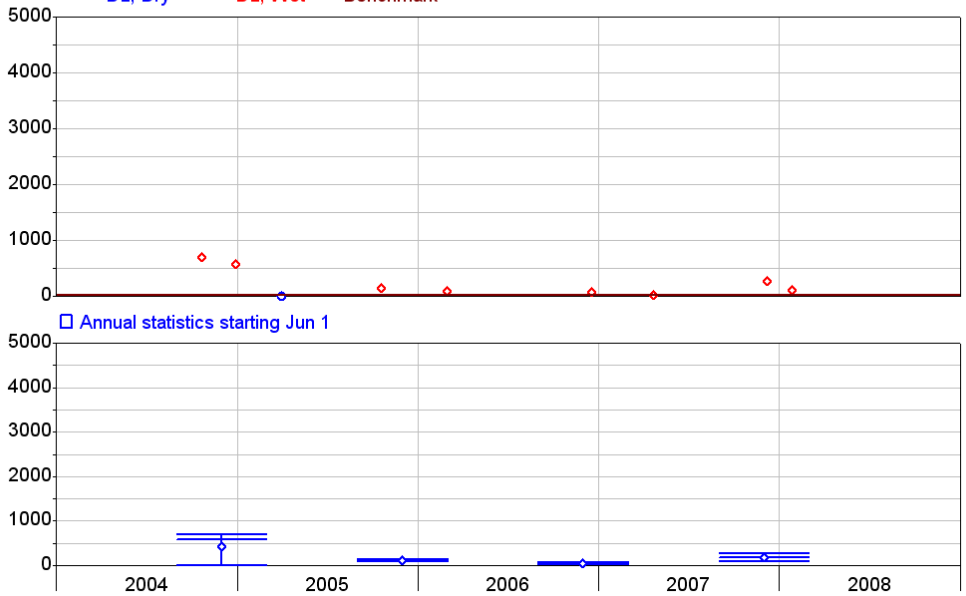

Riverside County Flood Control

RFCWQ4 V26 Output 10/22/2009

774 Lateral A of Santa Gertrudis Channel - Temecula
1700 Zinc, Total in mg/l
Data period 06/01/1993 to 05/31/1994
Benchmark 5, Source = BPO

◇ >=DL, Wet — Benchmark

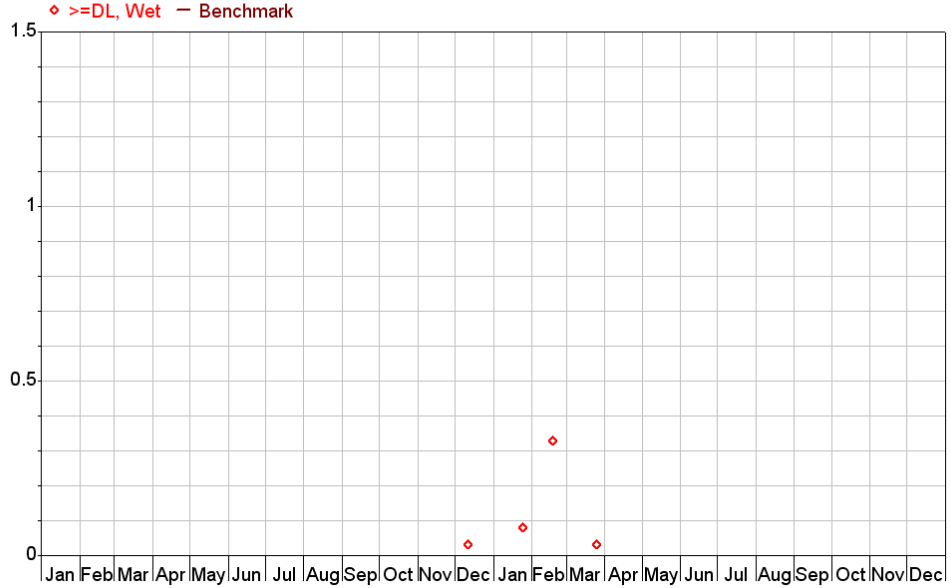

Riverside County Flood Control

RFCWQ4 V26 Output 10/22/2009

780 Long Canyon Creek near Murrieta Creek
1285 Iron in mg/l
Benchmark 0.3, Source = BPO

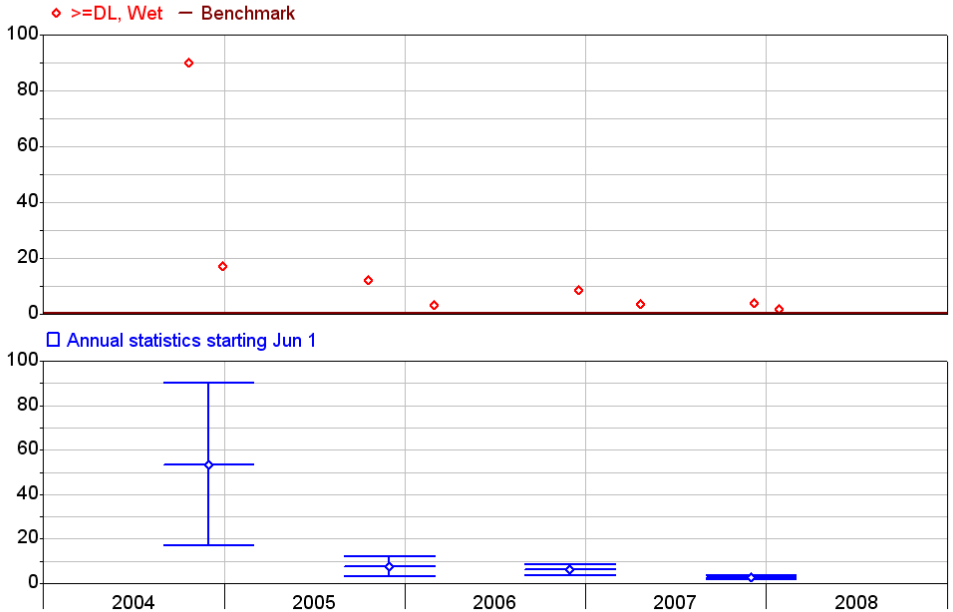

Riverside County Flood Control

RFCWQ4 V26 Output 10/22/2009

020124

780 Long Canyon Creek near Murrieta Creek
1287 Lead Dissolved in ug/l

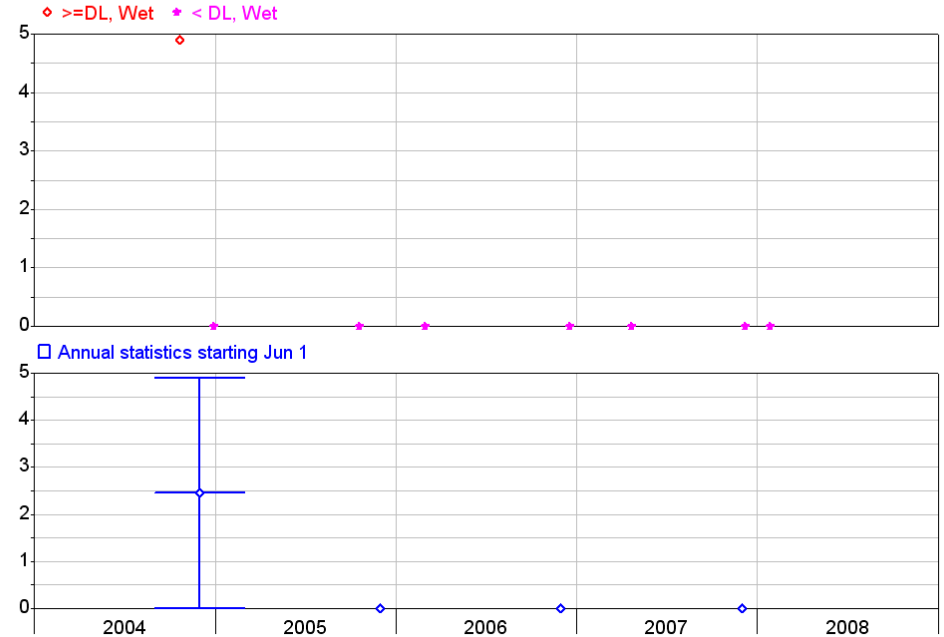

Riverside County Flood Control

RFCWQ4 V26 Output 10/22/2009

780 Long Canyon Creek near Murrieta Creek
1300 Magnesium in mg/l

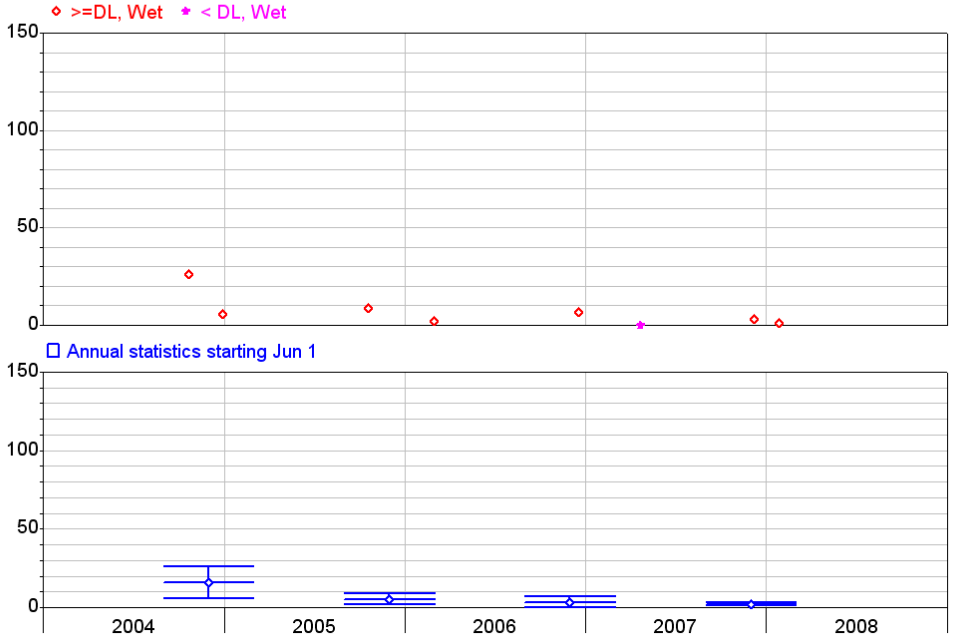

Riverside County Flood Control

RFCWQ4 V26 Output 10/22/2009

780 Long Canyon Creek near Murrieta Creek
1305 Manganese, Total in mg/l
Benchmark 0.05, Source = BPO

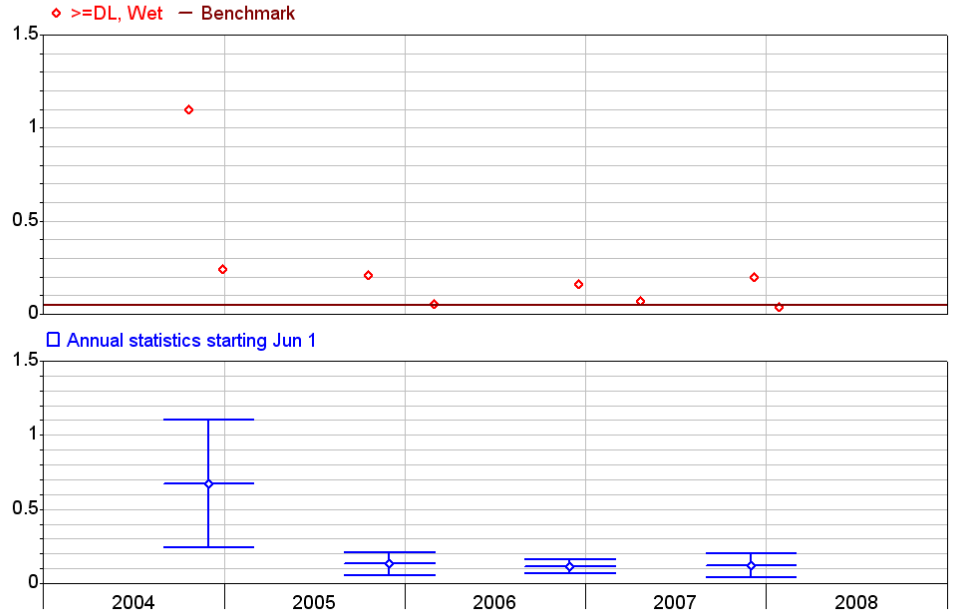

Riverside County Flood Control

RFCWQ4 V26 Output 10/22/2009

020125

780 Long Canyon Creek near Murrieta Creek

1265 Hardness, total (CaCO3) in mg/l

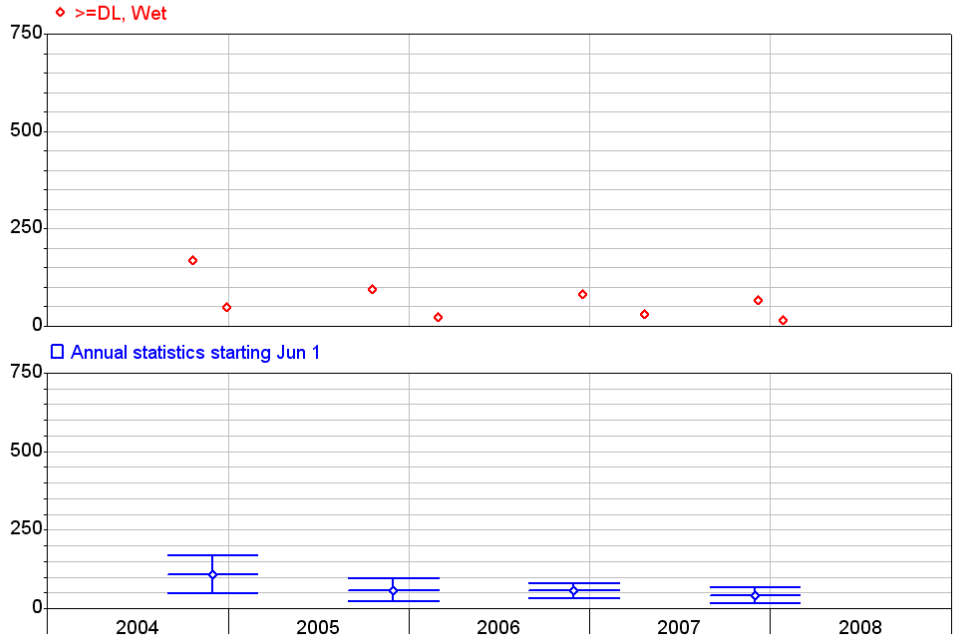

APPENDIX A

MEETING AGENDAS AND NOTES

MSC MEETINGS

RIVERSIDE COUNTY STORMWATER MANAGEMENT PROGRAM
MANAGEMENT STEERING COMMITTEE
SANTA ANA & SANTA MARGARITA REGIONS

MEETING AGENDA

(Lunch Served)
11:30 a.m.* – 12:30 p.m. October 16, 2008
Room C/D
Riverside County Administrative Office, Fourth Floor
4080 Lemon Street, Riverside, CA 92501

* meeting to begin at 11:30 a.m. or immediately following the WRCOG TAC meeting should it end later than 11:30

1. Welcome and Self Introduction – Jason Uhley, RCFC&WCD

2. Review October 16, 2008 Agenda and Approval of April 17, 2008 Meeting Minutes – Jason Uhley, RCFC&WCD

3. Santa Ana/Santa Margarita Program Status - Jason Uhley, RCFC&WCD
   - Legislative Update
   - Permit Renewal Update
     - Summary of Discussion with RWQCB staff

4. TMDL Development - Jason Uhley, RCFC&WCD
   - Lake Elsinore and Canyon Lake Nutrient TMDL
   - Middle Santa Ana River Watershed Bacteria Indicator TMDL
   - Canyon Lake Bacteria Indicator TMDL

5. New Agenda Items/Schedule Next MSC Meetings - Jason Uhley, RCFC&WCD
   - Schedule MSC Meetings for the upcoming year*

*Tentative meeting dates pending WRCOG 2008 schedule

P8/121480

RIVERSIDE COUNTY STORMWATER MANAGEMENT PROGRAM
MANAGEMENT STEERING COMMITTEE
SANTA ANA/SANTA MARGARITA REGIONS

MEETING MINUTES
for
October 16, 2008

Attendees:

Jason Uhley	RCFC&WCD
Albert Martinez	RCFC&WCD
Charlene Warren	RCFC&WCD
Mark Wills	RCFC&WCD
Alex Gann	County of Riverside
Mike Shetler	County of Riverside
Joe Aklufi	City of Beaumont
Alan Kapanicas	City of Beaumont
Ron Espalin	City of Calimesa
Lori Moss	City of Canyon Lake
Rudy Fandel	City of Corona
Kent Wegelin	City of Moreno Valley
George Wentz	City of Menifee
Bill Woolsey	City of Murrieta
Jeff Allred	City of Norco
Tom Boyd	City of Riverside
Barry McClellan	City of San Jacinto
Aldo Licitra	City of Temecula
Terry Fitzwater	City of Wildomar

1. Welcome and Self Introductions – Jason Uhley, RCFC&WCD

Jason introduced Mark Wills as the new Chief of the District's Regulatory Division and Albert Martinez as the Santa Ana NPDES MS4 Permit Coordinator. He then initiated self introductions of attendees and welcomed the new cities of Menifee and Wildomar.

2. Review October 16, 2008 Agenda and Approval of April 17, 2008 Meeting Minutes – Jason Uhley, RCFC&WCD

Item 2A (Announcements) was added to the agenda. The group reviewed the minutes of April 17, 2008. There were no changes to the minutes.

a. Announcements – Jason reminded the group that the MSC meeting is required by the Santa Ana Permit and City Managers or designated representatives are required to attend 3 out of 4 of the meetings per fiscal year. He added that the new MS4 Permit draft is expected to be issued sometime in December and negotiation of the Santa Margarita Permit is expected to begin in January

2009. For new members, a Santa Ana region program executive summary was provided to outline the program elements.

b. The State is going through budget issues and has raised fees for NPDES MS4 permits. The Construction Permit was incorporated into the MS4 Permit therefore only one permit fee will be raised. Please see fee schedule provided at the meeting for city fees. The money obtained from the cities is intended to pay for the State's cost to administer the NPDES MS4 Construction/Permit as well as to offset the cost for other programs such as monitoring and non-point programs. Comments on the fees were submitted to the State through CASQA.

Handouts Provided

- Agenda for October 16, 2008
- Minutes for April 17, 2008
- MS4 Permit Renewal: Tri-County Meeting October 2, 2008 Draft Agenda
- Santa Ana Region NPDES Program Executive Summary
- Water Quality Management Plan (WQMP) for Urban Runoff (For New Development/Significant Redevelopment)
- As Adopted by Resolution 2008-0073 California Code of Regulations, Title 23. Division 3. Chapter 9. Waste Discharge Reports and Requirements Article 1. Fees

3. Santa Ana/Santa Margarita Program Status- Jason Uhley, RCFC&WCD

Legislative Update – There are no new legislations adopted.

Permit Renewal Update

- **Summary of Discussion with RWQCB staff** - Jason focused on the Santa Ana Permit noting that EPA has gotten involved and wants consistency in the permits and would like to have 1 permit for all 3 counties (Orange, San Bernardino and Riverside). The Santa Ana Regional Board as well as Permittees has issues with this. The Regional Board is supportive of the 3 counties and their efforts in keeping the permits separate. The 3 counties regulated by the Regional Board are talking among their permit managers to discuss the permit renewal. Key topics include TMDL incorporation, new development and LID, program effectiveness, hydromodification and downstream erosion, inspections of BMPs, municipal measures to be incorporated to collect data, monitoring program and measureable goals. Also included was language on smart growth. Please see MS4 Permit Renewal Agenda handout for items of discussion.

4. ***TMDL Development – Jason Uhley, RCFC&WCD***

Lake Elsinore and Canyon Lake TMDL - Renegotiation of the Cooperative Agreement between cities and other agencies is expected to begin in January. Permittees will have to start looking at who will pay for implementation of in-lake control measures, axial flow pumps, aeration systems etc. that are reducing or controlling the pollutant loads to the lake. Each of the cities has an obligation to reduce nutrients to the lake. One way is to be very aggressive at implementing BMPs in the municipalities for both existing and new development and the other is to try and sequester the nutrients in the lake. Research has shown that it is most cost effective to try and sequester the nutrients. Discussion on regulatory compliance, water quality objectives, operation of the lakes, LESJWA, pursuing grants, load reductions, municipal performance measures, measureable goals and associated costs were further discussed among the group. Permittees will need to document how they are reducing loads. A group of experts will be brought on board to assist Permittees and it is important to attend future meetings.

Jason further talked about draft language that is being proposed by the Orange County MS4 Permit that will likely end up in the Santa Ana MS4 Permit for the new development section. Kent Wegelin will be taking the lead on this effort. Kent noted that Permittees will want to take a look at item 2(i) of the draft that addresses streets, roads, highways and freeways of 5,000 square feet of paved surface. Jason added that 3(a) is also an issue of concern. Comments on the draft language is due by Friday, October 24, 2008. Please see handout for more information.

Middle Santa Ana River TMDL - The first phase has been completed on this TMDL which was basically determining what storm drain systems were sources of human bacteria. Box Springs was determined to be one of those storm drains in Riverside County in which the source of the problem was addressed. The other 2 systems were in San Bernardino County. Cities will need to take quick action to control waste. Brown and Caldwell will be conducting testing for Permittees. Further discussion ensued on BMPs, water quality, Regional Board expectations, public education and Permittee plans of identifying and controlling human sources of bacteria in an effort to reduce costs endured by the cities.

Canyon Lake Bacteria Indicator TMDL - The monitoring program for the lake is expected to begin in 2008 in hopes to have it removed from the 303(d) list.

Other items discussed were, public education outreach, public education materials that are free to the cities, ACA13 which was cannibalized to support other measures and Prop. 218 stormwater fees. Please contact Florence Mowrer (FBMowrer@rcflood.org) of the District for public education and promotional materials.

5. ***New Agenda Items/Schedule Next Meeting***
   - Schedule MSC Meetings for the upcoming year*

NEXT MEETING IS SET FOR
January 15, 2009
AT
RIVESIDE COUNTY EXECUTIVE OFFICE, FOURTH FLOOR
4080 Lemon Street, Riverside, CA 92501

Visit the StormWater/Clean Water Protection Program website at:
http://www.rcflood.org/depts/flood/YouCanHelp.asp.
The Site contains a variety of useful stormwater program information including links to other stormwater management programs and related web sites.

P8/123165

RIVERSIDE COUNTY STORMWATER MANAGEMENT PROGRAM
MANAGEMENT STEERING COMMITTEE
SANTA ANA & SANTA MARGARITA REGIONS

MEETING AGENDA

(Lunch Served)
11:30 a.m.* – 12:30 p.m. January 15, 2009
Room C/D
Riverside County Administrative Office, Fourth Floor
4080 Lemon Street, Riverside, CA 92501

* meeting to begin at 11:30 a.m. or immediately following the WRCOG TAC meeting should it end later than 11:30

1. Welcome and Self Introduction – Jason Uhley, RCFC&WCD

2. Review January 15, 2009 Agenda and Approval of October 16, 2008 Meeting Minutes – Jason Uhley, RCFC&WCD

3. Santa Ana/Santa Margarita Program Status - Jason Uhley, RCFC&WCD
   - Permit Renewal Presentation
   - CAP Program Summary
   - BMP Consistency Summary
   - Budget Estimates for 09/10

4. TMDL Development - Jason Uhley, RCFC&WCD
   - Lake Elsinore and Canyon Lake Nutrient TMDL
   - Middle Santa Ana River Watershed Bacteria Indicator TMDL
   - Canyon Lake Bacteria Indicator TMDL

5. Potential Proposition 84 Grant Opportunities

6. New Agenda Items/Schedule Next MSC Meetings - Jason Uhley, RCFC&WCD
   - Schedule MSC Meetings for the upcoming year*

*Tentative meeting dates pending WRCOG 2009 schedule

P8/123167

RIVERSIDE COUNTY STORMWATER MANAGEMENT PROGRAM
MANAGEMENT STEERING COMMITTEE
SANTA ANA/SANTA MARGARITA REGIONS

MEETING MINUTES
for
January 15, 2009

Attendees:

Jason Uhley	RCFC&WCD
Albert Martinez	RCFC&WCD
Charlene Warren	RCFC&WCD
Mark Wills	RCFC&WCD
Mike Shetler	County of Riverside
Bob Collacott	URS Corporation
Joe Aklufi	City of Beaumont
Alan Kapanicas	City of Beaumont
Randy Anstine	City of Calimesa
Lori Moss	City of Canyon Lake
Bob Bohan	City of Canyon Lake
Tom Koper	City of Corona
Rudy Fandel	City of Corona
Kent Wegelin	City of Moreno Valley
George Wentz	City of Menifee
Brad Kutzner	City of Menifee
Bob Moehling	City of Murrieta
Jeff Allred	City of Norco
Michael Morales	City of Perris
Tom Boyd	City of Riverside
Barry McClellan	City of San Jacinto
Aldo Licitra	City of Temecula
Dan York	City of Temecula

1. ***Welcome and Self Introductions – Jason Uhley, RCFC&WCD***

Jason Uhley welcomed everyone to the meeting and initiated self introductions of attendees.

2. ***Review January 15, 2009 Agenda and Approval of October 16, 2008 Meeting Minutes – Jason Uhley, RCFC&WCD***

Mike Shetler requested that the recent AB885 workshop on septic tank systems be added to the agenda. Jason changed the order of agenda items 4 (TMDL Development) and 5 (Potential Proposition 84 Grant Opportunities).

Jason noted that cities are required to attend 3 of the 4 MSC meetings per fiscal year. Jason noted that the January 15, 2009 meeting was the 2nd meeting of the fiscal year. There were no changes to the meeting minutes. Minutes were approved.

Handouts Provided

- Agenda for January 15, 2009
- Minutes for October 16, 2008
- 2009-2010 NPDES Cooperative Agreement Cost Sharing Estimates

3. Santa Ana/Santa Margarita Program Status - Jason Uhley, RCFC&WCD

- **Permit Renewal Presentation** - Jason informed the group that the Ventura County Permit and the draft Orange County Permit were out for public review. He added that some of the language in the Orange County Permit may be incorporated into the Riverside County Permit. To bring the group up to speed on the Permit he has asked the District's Consultant, Bob Collacott, to give the group a presentation on the Orange County Permit. The presentation touched on:

    - Permit background information
    - Local Implementation Plans (LIP)
    - Receiving Water Limitations
    - Construction Program Impacts
    - Industrial/Commercial Inspection Impacts
    - Proposed Residential Program
    - Significant changes to the New Development programs, including new requirements for Low Impact Development and Hydromodification
    - Alternative / In Lieu Programs for New Development
    - Permittee Facilities/Activities Impacts
    - Additional Training Requirements
    - Watershed Action Plans
    - TMDL Compliance and Cost Sharing

  Per the request of Jeff Allred, a copy of the PowerPoint presentation was sent via email to the group of attendees following the meeting. Please refer to the PowerPoint presentation for more detailed information.

  Jason informed the group that the District, on behalf of Permittees is preparing a comment letter on the draft Orange County Permit. The comment letter will be provided to the TAC representatives for review and comments, then to City Managers. The group further engaged in a lengthy conversation on the following:

    - Benefit Assessments/Economic Concerns
    - Need for Riverside County representatives to be appointed to Regional Board
    - Low Impact Development (LID)
    - Inspection Program Requirements
    - Monitoring Program
    - Post Construction BMP Inspections (general support for self certification program)
    - GIS Tracking Systems
    - Glossary of terms and definitions for Orange County Permit

  Jason also noted that the Santa Margarita Report of Waste Discharge (ROWD) was being submitted to the San Diego Regional Board January 15, 2009 by the District. Jason thanked the cities of Murrieta, Temecula, Wildomar, and Menifee, Riverside County and District staff for their participation with the ROWD. Jason noted that

permit renewal discussions with the San Diego Regional Board would also be starting shortly.

- **CAP Program Summary**
  Mike reported that Riverside County has eliminated the Compliance Assistance Program (CAP) for the unincorporated areas of Riverside County due to expanded inspection requirements in the Santa Margarita Region NPDES MS4 Permit. The inspections in the unincorporated County will now be addressed through a business registration and licensing program which also includes a stormwater element. The new program is administered by the County's Building and Safety Department. Because the new permits may expand the scope of the business inspection programs beyond the capability of the Environmental Health CAP, he added that the option of contracting with the County's Building and Safety Department to conduct inspections can be made available to the cities should they have the need. However, it is likely that the new inspection program will not be as cost effective as the CAP because the CAP was able to leverage Environmental Health's existing inspection programs.

  Jason asked for confirmation from the group that the comment letter he will be putting together will state that Permittees wish to defend the CAP (due to its cost effectiveness and effectiveness as addressing pollutants of concern). Jason also asked if the City Managers supported comments recommending that post construction BMP inspection programs support self certification approaches. It was believed that if such inspections are required, that self-certifications were an economic approach to compliance that was appropriate for the current economic climate. There were no objections from the group.

- **BMP Consistency Summary**
  Jason stated that there were discrepancies between the development BMP approval processes for the various cities. He noted that the TAC had asked him to query the MSC about their interest in establishing a standardized policy for BMP acceptance. Jason noted:

  - Permit is vague regarding what BMPs are acceptable
  - Many city plan check staff do not have information readily available to challenge developer assumptions regarding BMP effectiveness
  - Regional Board identified in audit the inappropriate use of BMPs in some cities
  - Lack of consistency in BMP approval leads to developers questioning why some cities accept certain BMPs and others don't
  - Data is available on BMP effectiveness, however, it needs to be collected, analyzed and codified in a single document that can be used by the cities

  Discussion ensued. The MSC supported the concept of a BMP Consistency Policy and requested that the TAC develop such a policy and bring it before the MSC for approval.

- **Budget Estimates for 2009-10**
  Jason reviewed the 2009-2010 NPDES Cooperative Agreement Cost Sharing Estimates for both the Santa Ana and Santa Margarita NPDES Permit regions (handout).

He noted that for the cities in the Santa Margarita NPDES MS4 Permit area, the costs for Santa Margarita Lagoon TMDL are up in air at this point. A meeting is scheduled for February 18th with the San Diego Regional Board to further discuss costs associated with the Lagoon TMDL.

Lori Moss thanked Jason for his efforts.

4. ***Potential Proposition 84 Grant Opportunities***

There is a stormwater grant chapter defined in Prop 84 which is explicitly for municipal governments and can be used for MS4 compliance activities. The total available funds are approximately $100,000,000. 80% of the chapter's funds are targeted at public works projects that implement LID, the other 20% are targeted at projects that address TMDL compliance. Jason advised the cities to think of projects such as road projects and other upcoming public works projects that could possibly qualify for the grant funds. In order to qualify for the funds, the project must demonstrate that it can be completed by 2013. More information is available at:

http://www.swrcb.ca.gov/water_issues/programs/grants_loans/prop84/index.shtml

Jason also noted that pending federal legislation may provide additional grants and/or low interest loans for public works projects throught the Clean Water State Revolving Funds. More information is available at:

http://www.swrcb.ca.gov/water_issues/programs/grants_loans/srf/index.shtml

5. ***TMDL Development – Jason Uhley, RCFC&WCD***

- **Lake Elsinore and Canyon Lake TMDL** – The County of Riverside, Riverside County Flood Control, and cities of Hemet, Moreno Valley, and Perris received 13267 letters from the Regional Board notifying them that there are potential agricultural operations that are taking place on city lands and, as such, the cities are responsible for complying with the agricultural operator requirements in the TMDL. The letters indicated that the cities could independently address TMDL requirements or participate in, and fund, an existing agricultural cooperative that is addressing the TMDL (Western Riverside County of Agricultural Coalition). The Cities must declare their intent to participate with the Western Riverside County of Agricultural Coalition program by April 15th.

  The 13267 letters went out to several hundred land owners in the San Jacinto watershed. There is a process described in the letter to challenge improperly identified parcels. Jason recommended that the cities go through each of the parcels identified in the 13267 letter to make sure that there are actually agricultural activities occurring. Improperly identified parcels should be challenged. Jason specifically noted that in some cases private parcels with city easements were improperly identified as being city responsibility. Several MSC members noted concern regarding cities being identified in both MS4 and agricultural requirements for the TMDL. Jason explained how the TMDL and TMDL Task Force was developed and structured. Jason noted that the 13267 letters were consistent with the TMDL and TMDL Task Force. Jason also noted that if agricultural activities were occurring on city lands, that participating in the agricultural effort was the most cost effective solution. Jason also recommended that the cities attempt to recover costs from the actual agricultural operators.

Jason also noted that the existing TMDL Task Force Agreement expires in 2010 and will need to be re-negotiated later this year.

- **AB885 Workshop on Septic Tank Systems (subsequently added to agenda)**
  The Lake Elsinore and Canyon Lake TMDL also requires cities to develop a Sanitary Sewer Management Plan. Permittees have negotiated with the Regional Board to have the plan stayed pending the completion of AB885 legislation which will ultimately promulgate new statewide regulations for septic system management. A workshop regarding the draft regulations was held January 14, 2009. County staff attended the workshop and Mike Shetler provided the group with a summary of the workshop. He noted that AB855 was legislated in 2000 and the State Board was supposed to have promulgated regulations by 2004. The proposed regulations are highly contentious due to requirements for septic system inspections, mandatory clean out frequencies and requirements for failed septic system replacement with advanced treatment systems. There will be 12 workshops held on the matter. A Permit adoption hearing is set for February 9, 2009 in Sacramento on regulations (this adoption hearing has since been delayed).

- **Middle Santa Ana River TMDL**
  There was no news reported on the Middle Santa Ana River TMDL.

- **Canyon Lake Bacteria Indicator TMDL**
  LESJWA has agreed to use some of their left over Prop 13 grant money to implement a Bacteria Sampling Program on Canyon Lake. LESJWA expects that the data will show that Canyon Lake is not impaired for bacteria, thus providing data to support having it delisted from the 303(d) list.

6. New Agenda Items/Schedule Next Meeting

- Schedule MSC Meetings for the upcoming year* - Future meeting dates are scheduled for March 19th and April 16th (tentative) or June 18th.

NEXT MEETING IS SET FOR
March 19, 2009
AT
RIVESIDE COUNTY EXECUTIVE OFFICE, FIFTH FLOOR, ROOM C
4080 Lemon Street, Riverside, CA 92501

Visit the StormWater/Clean Water Protection Program website at:
http://www.rcflood.org/depts/flood/YouCanHelp.asp.
The site contains a variety of useful stormwater program information including links to other stormwater management programs and related web sites.

RIVERSIDE COUNTY STORMWATER MANAGEMENT PROGRAM
MANAGEMENT STEERING COMMITTEE
SANTA ANA & SANTA MARGARITA REGIONS

MEETING AGENDA

(Lunch Served)
11:30 a.m.* – 12:30 p.m. April 16, 2009
Riverside County Administrative Office, Fifth Floor Room C
4080 Lemon Street, Riverside, CA 92501

* meeting to begin at 11:30 a.m. or immediately following the WRCOG TAC meeting should it end later than 11:30

1. Welcome and Self Introduction – Jason Uhley, RCFC&WCD

2. Review April 16, 2009 Agenda and Approval of January 15, 2009 Meeting Minutes – Jason Uhley, RCFC&WCD

3. Santa Ana/Santa Margarita Program Status - Jason Uhley, RCFC&WCD
   - Permit Renewal Status
     1. South Orange County MS4 Permit
     2. North Orange County MS4 Permit

4. TMDL Development - Jason Uhley, RCFC&WCD
   - Lake Elsinore and Canyon Lake Nutrient TMDL
   - Middle Santa Ana River Watershed Bacteria Indicator TMDL
   - Santa Ana Region Draft 303(d) List

5. Presentation on Draft South Orange County MS4 Permit (San Diego Board) – URS

6. New Agenda Items/Schedule Next MSC Meetings - Jason Uhley, RCFC&WCD
   - Schedule next MSC Meeting*

*Tentative meeting dates pending WRCOG 2009 schedule

P8/124606

RIVERSIDE COUNTY STORMWATER MANAGEMENT PROGRAM
MANAGEMENT STEERING COMMITTEE
SANTA ANA/SANTA MARGARITA REGIONS

MEETING MINUTES
for
April 16, 2009

Attendees:

Jason Uhley	RCFC&WCD
Albert Martinez	RCFC&WCD
Claudio Padres	RCFC&WCD
Charlene Warren	RCFC&WCD
Mark Wills	RCFC&WCD
Bob Collacott	URS Corporation
Joe Aklufi	City of Beaumont
Randy Anstine	City of Calimesa
Bob Bohan	City of Canyon Lake
Rudy Fandel	City of Corona
Michele Hindersinn	City of Corona
Lyndy Lewis	City of Corona
Yolanda Macalalad	City of Corona
Len Wood	City of Hemet
Brad Kutzner	City of Menifee
Kent Wegelin	City of Moreno Valley
Bill Woolsey	City of Murrieta
Jeff Allred	City of Norco
Michael Morales	City of Perris
Tom Boyd	City of Riverside
Barry McClellan	City of San Jacinto
Aldo Licitra	City of Temecula
Ron Grider	City of Wildomar

1. ***Welcome and Self Introductions – Jason Uhley, RCFC&WCD***

Jason Uhley welcomed everyone to the meeting and initiated self introductions of attendees.

2. ***Review April 16, 2009 Agenda and Approval of January 15, 2009 Meeting Minutes – Jason Uhley, RCFC&WCD***

Item 4A (BMP Policy Status Update) was added to the agenda. There were no changes to the minutes. Minutes were approved.

The April 16, 2009 meeting was the 3rd of the 4 required meetings for the fiscal year. Those cities who have attended at least three are not required to attend the May 21, 2009 meeting. However, should the Santa Ana MS4 Permit be released by that time, it will be important for city representatives to attend. Attendees were advised to pay close attention to the May 21st agenda for this item.
NOTE: As of May 7, 2009 the Santa Ana MS4 Permit had not been released.

Handouts Provided

- Agenda for April 16, 2009
- Minutes for January 15, 2009

3. ***Santa Ana/Santa Margarita Program Status - Jason Uhley, RCFC&WCD***

- **Permit Renewal Status**
  1. **South Orange County MS4 Permit**
     This Permit is issued by the San Diego Regional Board and may end up being used in Riverside County as a model for the Santa Margarita Region MS4 Permit. The Permit drafted by San Diego Board staff is, in many ways, more prescriptive and onerous than the Ventura County MS4 Permit that has garnered statewide attention. It is significantly more prescriptive than the draft MS4 Permit issued for northern Orange County by the Santa Ana Board. Please see agenda item 5 for more information on the South Orange County MS4 Permit.

  2. **North Orange County MS4 Permit**
     This Permit is issued by the Santa Ana Regional Board to the Orange County Permittee group. This Permit is very likely to be a model for the Riverside County Santa Ana Watershed MS4 Permit. District staff has been following the north Orange County Permit very closely and has provided policy related comments to the Santa Ana Regional Board. Jason noted that Orange County has generally done a good job of working with Board staff and environmental special interests to negotiate a reasonable Permit, particularly in regards to the administration of new development provisions. However, several provisions of the Permit are very vague and are subject to interpretation. In as much as portions of the Orange County Permit are incorporated into our MS4 Permit, Jason intends to focus on clarifying the intent of Permit programs. Updates to follow.

4. ***TMDL Development – Jason Uhley, RCFC&WCD***

- **Lake Elsinore and Canyon Lake Nutrient TMDL** – The Lake Elsinore/Canyon Lake TMDL Task Force is currently studying treatment options for Canyon Lake. Jason recommended that City Managers remain abreast of the work of the Task Force. The Task Force is in the process of developing local and regional BMP programs to mitigate the current use impairments at the lakes. The cities will be expected to participate in these programs by Board staff. Though Permittees will be given options regarding how to comply with the TMDL, it is likely that the in-lake treatment systems will be more cost effective for most cities. Cities opting out of regional treatment systems will need to be developing alternative compliance programs. The Task Force is also updating a computer model of the entire watershed based on monitoring over the last five years. The output of the model will be used to reallocate liability and responsibility for each of the cities based on how much load the cities are estimated to be contributing to the lake. Because there are significant ramifications to the assumptions contained in the model regarding present and future land use and other factors, it is important for city representatives to play close attention to this item.

- **Middle Santa Ana River Watershed Bacteria Indicator TMDL**
  This TMDL is addressing bacteria in the Santa Ana River. Initial TMDL efforts were focused on identifying tributaries to the River that appeared to be significant sources of human fecal contamination. Initial data indicated that Box Springs Channel was a significant source of human-sourced bacteria input. Due to a fortuitous sewer relocation project, a sewer cross-connection to Box Springs Channel was detected by the City of Riverside. City and District staff worked to abate the cross-connection. Subsequent data collection indicates that the source of human fecal contamination has been controlled. The Task Force is now focusing on the next tier of potential sources of human contamination, which are Chino and Cucamonga Creeks in San Bernardino County. San Bernardino County will be required to develop a source assessment monitoring plan, and based on the results, deploy appropriate BMPs. San Bernardino County is in the process of developing the monitoring plan. It is expected that the plan, and subsequent BMP deployment, may cost several hundred thousand dollars. Next year, Riverside County cities will likely be required to initiate similar scale plans on other tributaries of the Santa Ana River. Mark Wills inquired as to how natural in-river sources will be addressed by the TMDL. Jason noted that the Stormwater Quality Standards Task Force, which is a separate, but related Task Force is re-evaluating current REC 1 Water Quality Standards for the Santa Ana River. They are expected to develop revised criteria to recognize and account for the impacts of natural sources of bacteria, exempt wet weather flows from REC 1 standards, and adjust the standards to reflect the current state of science. However, the proposed revisions will not relieve the cities of identifying and abating human sources of bacteria which are detected via DNA analyses of bacteria now required by the Regional Board.

- **Santa Ana Region Draft 303 (d) List**
  Section 303(d) of the federal Clean Water Act and 40 CFR §130.7 require states to develop a list of waterbodies that do not meet water quality standards and are not supporting designated beneficial uses. The 303(d) List identifies the pollutant or stressor causing impairment and establishes a schedule for developing a control plan to address the impairment. The Santa Ana Regional Board posted their draft of the 303(d) List about 2 months ago for the Santa Ana Region. The Permittees have worked closely with Board staff and many initial proposed listings have been eliminated due to additional data, corrections to the data, and other factors. The 303(d) List now only proposes the addition of a pH listing for Temescal, copper listing for Santa Ana River, Reach 3 (wet weather only) and a sediment toxicity listing for Lake Elsinore. Initially more than 20 new listings were proposed. The Regional Board does not intend to take any action on these listings/TMDLs until they are mandated by federal law, possibly 2020/2021.

4a - BMP Policy Committee

Previously the Santa Ana Technical Advisory Committee group asked the MSC for direction regarding the implementation of a BMP Uniformity Policy. The MSC supported such a policy. Kent Wegelin was designated to take the lead on the development of the policy for the SA/SM TAC. He reported that the BMP Policy Committee had a kick off meeting 2 weeks ago where there were a number of unanticipated questions, concerns and suggestions brought up. The Committee will begin evaluating these and will look at a number of published documents and

resources the group can use to develop the BMP Policy. The BMP Policy Committee will meet again in the next few weeks.

5. ***Presentation on Draft South Orange County MS4 Permit (San Diego Board) – URS***

Bob Collacott discussed the following key management issues for these cities with regard to the South Orange County MS4 Permit, which is likely to become a model for the Santa Margarita NPDES MS4 Permit (issued to Menifee, Wildomar, Temecula, Murrieta, the County of Riverside and RCFC&WCD):

- Asserts Permit not an "Unfunded State Mandate"
- Standards of compliance based on numeric standards
- Expansion of New Development requirements
- Requirements for retrofit
- Expansion of monitoring/special studies
- If applied in the Santa Margarita Region, would result in significant increase in compliance costs

6. ***New Agenda Items/Schedule Next Meeting***

- Schedule next MSC Meetings – The next meeting was set for May 21st.

NEXT MEETING IS SET FOR
May 21, 2009
AT
RIVESIDE COUNTY EXECUTIVE OFFICE, FIFTH FLOOR, ROOM C
4080 Lemon Street, Riverside, CA 92501

Visit the StormWater/Clean Water Protection Program website at:
http://www.rcflood.org/depts/flood/YouCanHelp.asp.
The site contains a variety of useful stormwater program information including links to other stormwater management programs and related web sites.

P8/125117

RIVERSIDE COUNTY STORMWATER MANAGEMENT PROGRAM
MANAGEMENT STEERING COMMITTEE
SANTA ANA & SANTA MARGARITA REGIONS

MEETING AGENDA

(Lunch Served)
11:30 a.m.* – 12:30 p.m. May 21, 2009
Riverside County Administrative Office, Fifth Floor Room C
4080 Lemon Street, Riverside, CA 92501

* meeting to begin at 11:30 a.m. or immediately following the WRCOG TAC meeting should it end later than 11:30

1. Welcome and Self Introduction – Jason Uhley, RCFC&WCD

2. Review May 21, 2009 Agenda and Approval of April 16, 2009 Meeting Minutes – Jason Uhley, RCFC&WCD

3. Santa Ana/Santa Margarita Program Status - Jason Uhley, RCFC&WCD
   - General Construction Permit
   - Permit Renewal Status
     1. South Orange County MS4 Permit
     2. North Orange County MS4 Permit

4. TMDL Development - Jason Uhley, RCFC&WCD
   - Lake Elsinore and Canyon Lake Nutrient TMDL
   - Middle Santa Ana River Watershed Bacteria Indicator TMDL
   - Santa Ana Region Draft 303(d) List

5. New Agenda Items/Schedule Next MSC Meetings - Jason Uhley, RCFC&WCD
   - Schedule next MSC Meeting

P8/125118

TAC MEETINGS

MEETING AGENDA

NPDES
SANTA ANA / SANTA MARGARITA
TECHNICAL ADVISORY COMMITTEE

10:00 a.m. – 12:00 p.m. Thursday, July 24, 2008
Riverside County Flood Control District
1995 Market Street
Riverside, CA 92501

I. Introductions

II. Agenda Changes

III. Review of Minutes: June 26, 2008

IV. Announcements
   A. Permit Renewal Update
   B. Notice of Violation

V. Public Education Program – Florence Mowrer

VI. TMDL Progress Report – Jason Uhley
   A. Middle Santa Ana River Bacteria Indicator TMDL Update
      - Next Meeting – Thursday, September 4, 2008 from 1:30 p.m. to 4:00 p.m.
   B. Lake Elsinore/Canyon Lake TMDL Update
      - Next Meeting – August 26, 2008 1:30 p.m. to 4:00 p.m.
   C. San Diego Lagoons TMDL/Investigation Order Update
      - Next Meeting – USBR, Wednesday, August 13, 2008, 1:30 p.m. to 3:30 p.m.

VII. Santa Ana/Santa Margarita Region Programs – Jason Uhley
   A. Stormwater Quality Standards Task Force Update
      - Next Meeting - Thursday, September 4, 2008 from 9:30 a.m. to 1:30 p.m.
      - General Construction Permit

VIII. Open Discussion
   A. Santa Ana RWQCB
   B. San Diego RWQCB
   C. U.S. EPA – Region IX
   D. Round Table

IX. New Agenda Items/Schedule Next Meeting – August 28, 2008

P8/120141

MEETING AGENDA

NPDES
SANTA ANA / SANTA MARGARITA
TECHNICAL ADVISORY COMMITTEE

10:00 a.m. – 12:00 p.m. Thursday, August 28, 2008
Riverside County Flood Control District
1995 Market Street
Riverside, CA 92501

I. Introductions

II. Agenda Changes

III. Review of Minutes: July 24, 2008

IV. Announcements
- A. Permit Renewal Update
- B. Notice of Violation
- C. CASQA Conference September 23-24, 2008
- D. RFQ Announcement
- E. Annual Report

V. Public Education Program – Florence Mowrer

VI. TMDL Progress Report – Jason Uhley
- A. Middle Santa Ana River Bacteria Indicator TMDL Update
  - Next Meeting – Thursday, September 4, 2008 from 1:30 p.m. to 4:00 p.m.
- B. Lake Elsinore/Canyon Lake TMDL Update
  - Next Meeting – August 26, 2008 1:30 p.m. to 4:00 p.m.
- C. San Diego Lagoons TMDL/Investigation Order Update
  - Next Meeting – USBR, Wednesday, September 17, 2008, 10:00 a.m. to 12:00 p.m.

VII. Santa Ana/Santa Margarita Region Programs – Jason Uhley
- A. Stormwater Quality Standards Task Force Update
  - Next Meeting - Thursday, September 4, 2008 from 9:30 a.m. to 1:30 p.m.
- B. General Construction Permit

VIII. Open Discussion
- A. Santa Ana RWQCB
- B. San Diego RWQCB
- C. U.S. EPA – Region IX
- D. Round Table

IX. New Agenda Items/Schedule Next Meeting – October 23, 2008 (September Dark Due to CASQA Conference)

Member Agencies:

Banning
Beaumont
Calimesa
Canyon Lake
Cathedral City
Coachella
Coachella Valley Water District
Corona
County of Riverside
Desert Hot Springs
Hemet
Indian Wells
Indio
La Quinta
Lake Elsinore
Moreno Valley
Murrieta
Norco
Palm Desert
Palm Springs
Perris
Rancho Mirage
Riverside City
Riverside County Flood Control District
San Jacinto
Temecula

NPDES
SANTA ANA / SANTA MARGARITA
TECHNICAL COMMITTEE
Meeting Minutes
for
August 28, 2008

Attendees:

Arlene Chun	Riverside County Flood Control District
Ann Iaali	Riverside County Flood Control District
Albert Martinez	Riverside County Flood Control District
Florence Mowrer	Riverside County Flood Control District
Claudio Padres	Riverside County Flood Control District
Jason Uhley	Riverside County Flood Control District
Charlene Warren	Riverside County Flood Control District
Alex Gann	Riverside County Executive Office
Steve Horn	Riverside County Facilities Management
Glen Higa	Riverside County Transportation
Adriana Soares	Riverside County Transportation
Keith Elliott	CRWQCB – Santa Ana Region
Ben Neill	CRWQCB – San Diego Region
John Wilder	City of Beaumont
Bob French	City of Calimesa
Mike McCabe	City of Calimesa
James Grimm	City of Canyon Lake
Michele Hindersinn	City of Corona
Jeff Potts	City of Corona
Linda Nixon	City of Hemet
Kent Wegelin	City of Moreno Valley
Farida Naceem	City of Murrieta
Lori Askew	City of Norco
Jessie Powell	City of Perris
Berlinda McCadney	City of Riverside
Michael Yasmer	City of Riverside
Mike Emberton	City of San Jacinto
Aldo Licitra	City of Temecula
Mike Kimberlain	Kristar
Bob Collacott	URS Corporation
Sean Motlagh	Tri Lake Consultants

I. *Introductions*

Albert Martinez welcomed everyone to the August 28, 2008 NPDES Santa Ana/Santa Margarita Technical Advisory Committee Meeting and initiated the self introductions of attendees. Ann Iaali was introduced as the new Whitewater Permit Manager.

II. *Agenda Changes*

Agenda item IV B (Notice of Violation) was removed and replaced with LID Update. Item F (Pesticides) was added under agenda item IV.

III. *Review of Minutes: July 24, 2008*

There were no changes to the meeting minutes. Minutes were approved.

Handouts and Materials Provided:

- August 28, 2008 Agenda, July 24, 2008 Minutes, and Roster
- CASQA NewsFlash #s 2008-15 ~ 2008-17
- Public Education and Outreach Report – August 28, 2008
- Home Gardens Community Clean-Up Event (The Posting, Volume 2, Issue 8 by: TLMA)
- 2007-2008 Stormwater Education Program Presentations (MRCD)
- Education Program Report, August 2008 Santa Ana River Watershed
- Santa Ana Watershed Stormwater Classroom Presentation July 1st – September 30th 2008
- Stormwater Education Program Report , August 2008 Santa Margarita and Santa Ana River Watersheds
- Stormwater Education Program Presentation, August 2008
- EPA – Fact Sheet: Water Quality Improvement Initiative

IV. *Announcements*

A. *Permit Renewal Update* – Keith noted that there were no changes. A draft of the permit will be available to Permittees by the end of the year, prior to being released to the public.

B. *LID Update –* Jason announced that the District's LID project is moving forward. The District's parking compound will be reconstructed. Parallel effort is going on between CASQA and the Southern California Monitoring Coalition to develop a LID/BMP design manual. Drafts of the manual will be released in the upcoming weeks. Jason inquired as to those who would like to volunteer to sit on the committee that's reviewing the manual. Those interested were asked to contact Jason via email. Jason explained the construction process of the District's LID project, noting that the primary purpose of the project is to show developers and municipal staff the technology of what things will look like in the field so that municipal staff can get a sense of what they are approving and developers can see how it would fit into their sites. The following items were further discussed:

- Project fact sheets will be made available (before and after photos/comparisons)
- Re-Development/Retrofitting

Riverside County Flood Control and Water Conservation District
1995 Market Street • Riverside, CA 92501 • (951) 955-1200 • FAX (951) 788-9965

- Flow and water quality data to be collected
- Preimposed effective pervious area
- Monitoring the maintenance effect of the BMPs
- District to develop a BMP design manual of its own

C. ***CASQA Conference September 23-24, 2008*** – District NPDES staff will be attending the CASQA Conference. Due to the conference there will be no TAC meeting in September.

D. ***RFQ Announcement*** – Albert announced that the District has received RFQ submittals from 14 firms and is currently working to obtain a pre-qualification list of consultants for regulatory compliance and ancillary professional services. Questions regarding the RFQ should be addressed to Albert.

E. ***Annual Report*** – Santa Ana Annual Report forms were sent out to Permittees on August 19, 2008. Training sign in sheets were sent August 21, 2008. James Grimm commented that he may not have received the information; Albert noted that he will be resending him the information via email. Berlinda McCadney requested that the sign-in sheets be sent to her electronically. Summaries of the Riverside County Environmental Health CAP/Food Facilities inspections performed for Permittees will be emailed soon.

F. ***Pesticides*** – Jason reported that there has been pyrethoid pesticides detected in the monitoring data within the Santa Margarita Region. Efforts are being made to find ways to get information out to the public on how to properly use pesticides. The District is working through CASQA who is working with the Department of Pesticide Regulation to get the labeling requirments changed. Jason further noted that UCR received a grant to look at Integrated Pest Management (IPM) methods for ant control in which he conducted a presentation to UCR staff who is coordinating with the District in an effort to develop IPM measures for pest control products. Permittees will be updated on the progress of development. Further discussion ensued among the group on pesticides and water quality.

V. ***Public Education Program – Florence Mowrer***

Flo gave an update on the efforts of the District's Public Education Program. The following items were discussed:

- Curb markers and facility signs available
- Pollution Prevention Week schedule
- TLMA has begun to insert the Only Rain Down the Storm Drain logo in their newsletter (see handout)
- Illuminated cross read billboard located just before the I-15/I-215 split in Murrieta
- Changes being made to the District's website; Permittee suggestions should be addressed to Ann Iaali of the District
- Flo working on Annual Report; orders will be on hold unless urgent
- Maps needed from Permittees for each watershed for the annual report

Please see handouts provided at meeting for more public education information.

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VI. TMDL Progress Report – Jason Uhley

A. Middle Santa Ana River Bacteria Indicator TMDL Update

- Next Meeting - Thursday, September 18, 2008 – 1:30 p.m. - 4:00 p.m.
  Albert reported that the cities of Pomona and Claremont will be joining the Task Force. Albert announced that the correct meeting date is September 18th

B. Lake Elsinore/Canyon Lake TMDL Update

- Next Meeting – Tuesday, October 28, 2008 - 1:30 p.m. – 4:00 p.m.
  - Presentation conducted by Western Riverside County Agriculture Coalition (WRCAC)
  - Ramifications for cities (cost share)
  - AG lands open shares
  - Task Force will go dark September – next meeting is October 28th
  - Contract has been approved with Brown and Caldwell to conduct the TMDL monitoring for the Task Force

C. San Diego Lagoons TMDL/Investigation Order Update

- Next Meeting – USBR, Wednesday, September 17, 2008 from 10:00 a.m.-12:00 p.m. ~ Claudio Padres reported on the August 19th meeting. The topic of the meeting was the outfall that had been dry but noticed flows in June in the channel from groundwater. He briefly discussed the following items:
  - Issues with lab results (dissolved nitrogen and dissolved solids)
  - Channel owned by North County Transportation may be removed
  - AG fields going away (rumor); needs additional data
  - Estimate for lidar survey ($6,000-$10,000); no decision on if it will actually be done

VII. Santa Ana/Santa Margarita Region Programs – Jason Uhley

A. Stormwater Quality Standards Task Force Update

- Next Meeting: Thursday, September 11, 2008 from 8:30 a.m. to 1:30 p.m.
  There will be a presentation on recreational uses to the Regional Board on September 5, 2008. Permittees were advised to attend the meeting and provide their input. The topic of a wet weather exemption on recreational uses will be discussed at the next meeting.

B. General Construction Permit

No news on the General Construction Permit.

VIII. Open Discussion

A. ***Santa Ana RWQCB –*** No comments

B. ***San Diego RWQCB*** – The executive officer sent a letter to the Permittees regarding their responsibilities and requirements for the upcoming wet season. Meeting scheduled with Regional Board and District staff September 8th to discuss the ROWD.

C. ***U.S. EPA – Region IX –*** Not present

D. ***Round Table –*** The City of Moreno Valley produced a video on hazardous material disposal. The city is also in the process of converting two of San Diego County's videos for use in Riverside County. Flo will have the videos available for Permittee use. Thanks went out to Kent Wegelin and the City of Moreno Valley.

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Training notification was sent via email requesting Permittees to submit the number of attendees they intend on sending to training. It is recommended that all construction inspectors attend the fall training due to the upcoming rainy season.

IX. ***New Agenda Items / Schedule Next Meeting***

There were no agenda item requests from the group. September meeting is canceled due to the CASQA Conference. Next meeting will be held October 23, 2008.

If there are any questions or items for the next meeting agenda, please contact the Flood Control District's NPDES Section at 951.955.4375. Suggestions are always welcome.

Please visit the "Only Rain Down the Storm Drain" Public Education Program website at: http://www.floodcontrol.co.riverside.ca.us. The site contains a variety of useful stormwater program information including links to other stormwater management programs and related websites.

NEXT MEETING IS SET FOR:

THURSDAY, October 23, 2008 10:00 A.M.
AT
RIVERSIDE COUNTY ADMINISTRATIVE OFFICE
4080 Lemon Street 4th Floor Room C/D
Riverside, CA 92501

P8121835

MEETING AGENDA

NPDES
SANTA ANA / SANTA MARGARITA
TECHNICAL ADVISORY COMMITTEE

10:00 a.m. – 12:00 p.m. Thursday, October 23, 2008
RIVERSIDE COUNTY ADMINISTRATIVE OFFICE
4080 Lemon Street 4th Floor Room C/D
Riverside, CA 92501

I. Introductions

II. Agenda Changes

III. Review of Minutes: August 28, 2008

IV. Announcements
- A. Permit Renewal Update
- B. CASQA Conference Summary
- C. RFQ Pre-Qualification List Status
- D. Annual Report

V. Public Education Program – Florence Mowrer

VI. TMDL Progress Report – Jason Uhley
- A. Middle Santa Ana River Bacteria Indicator TMDL Update
  - Next Meeting – Thursday, October 23, 2008 from 1:30 p.m. to 4:00 p.m.
- B. Lake Elsinore/Canyon Lake TMDL Update
  - Next Meeting – Tuesday, October 28, 2008 1:30 p.m. to 4:00 p.m.
- C. San Diego Lagoons TMDL/Investigation Order Update
  - Next Meeting – USBR, Tuesday, November 18, 2008, 10:00 a.m. to 12:00 p.m.

VII. Santa Ana/Santa Margarita Region Programs – Jason Uhley
- A. Stormwater Quality Standards Task Force Update
  - Next Meeting - Thursday, October 23, 2008 from 8:30 a.m. to 1:30 p.m.
- B. General Construction Permit

VIII. Open Discussion
- A. Santa Ana RWQCB
- B. San Diego RWQCB
- C. U.S. EPA – Region IX
- D. Round Table

IX. New Agenda Items/Schedule Next Meeting – November 20, 2008

X. Hydrophix Presentation - Brian Martello

Member Agencies:

Banning
Beaumont
Calimesa
Canyon Lake
Cathedral City
Coachella
Coachella Valley Water District
Corona
County of Riverside
Desert Hot Springs
Hemet
Indian Wells
Indio
La Quinta
Lake Elsinore
Moreno Valley
Murrieta
Norco
Palm Desert
Palm Springs
Perris
Rancho Mirage
Riverside City
Riverside County Flood Control District
San Jacinto
Temecula

NPDES
SANTA ANA / SANTA MARGARITA
TECHNICAL COMMITTEE
Meeting Minutes
for
October 23, 2008

Attendees:

Albert Martinez	Riverside County Flood Control District
Claudio Padres	Riverside County Flood Control District
Charlene Warren	Riverside County Flood Control District
Mike Shetler	Riverside County Executive Office
Doug Thompson	Riverside County Environmental Health
Vikki Kuntz	Riverside County Facilities Management
Glen Higa	Riverside County Transportation
Keith Elliott	CRWQCB – Santa Ana Region
Ben Neill	CRWQCB – San Diego Region
John Wilder	City of Beaumont
Bob French	City of Calimesa
Mike McCabe	City of Calimesa
James Grimm	City of Canyon Lake
Michele Hindersinn	City of Corona
Jeff Potts	City of Corona
Phuong Hunter	City of Moreno Valley
Kent Wegelin	City of Moreno Valley
Bill Woolsey	City of Murrieta
Lori Askew	City of Norco
Jessie Powell	City of Perris
Tim King	City of Riverside
Maria Lamping	City of Riverside
Michael Yasmer	City of Riverside
Sandy McKay	City of San Jacinto
Aldo Licitra	City of Temecula
Bob Collacott	URS Corporation
Bill Flores	HDR
Sean Motlagh	Tri Lake Consultants
Brian Martello	Hydrophix
Jaime Bruins	Hydrophix
Duane Cook	Hydrophix

I. *Introductions*

Albert Martinez welcomed everyone to the October 23, 2008 NPDES Santa Ana/Santa Margarita Technical Advisory Committee Meeting and initiated the self introductions of attendees.

II. *Agenda Changes*

Agenda item E (Regional Board Scoping Meeting) was added under Announcements.

III. *Review of Minutes: August 28, 2008*

There were no changes to the meeting minutes. Minutes were approved.

Handouts and Materials Provided:

- October 23, 2008 Agenda, August 28, 2008 Minutes, and Roster
- CASQA NewsFlash #s 2008-18 ~ 2008-21
- Hydrophix brochures

IV. *Announcements*

A. ***Permit Renewal Update*** – Albert reported that Jason Uhley, along with San Bernardino and Orange County, met with Michael Adackapara of the Santa Ana Regional Board regarding the Permit. A draft of the Permit will be available by the end of 2008 with the goal of having it adopted by early 2009.

B. ***CASQA Conference Summary*** – Claudio Padres reported on the CASQA Conference held September 22-24 in which there were over 500 people in attendance. Topics of the conference included:

- Research and Policy Planning
- Development of TMDLs
- Hydromodification and LID
- Stormwater Program Effectiveness

C. ***RFQ Pre-Qualification List Status*** – The District will be processing the Form 11 to the County Board of Supervisor's November 18th for the RFQ for On-Call NPDES Regulatory Compliance and Ancillary Professional Services.

D. ***Annual Report*** – Albert reported that most of the annual reporting forms had been received from the cities, yet there were a couple that still needed to be submitted. Claudio added that Santa Margarita's Annual Report is due October 31st. Watershed Report information for the Santa Margarita Region is still needed from the cities.

E. ***Regional Board Scoping Meeting*** – The SWRCB held a CEQA Scoping Meeting regarding proposed revisions to the REC Water Quality Standards. The revisions may include new water quality objectives, wet weather exemptions, monitoring requirements, etc. The SWQSTF members provided a coordinated presentation to the SWRCB regarding the work of the Task Force and the need to allow local RWQCB to develop their own standards. Jason spoke on behalf of the Riverside County Permittees for the Task Force. A letter was also developed and submitted ot the

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SWRCB on behalf of the SWQSTF members. EPA has previously provided testimony recommending that the state adopt a single statewide standard for REC objectives.

V. Public Education Program – Florence Mowrer

The October Public Education Report was sent via email to Permittees on October 22nd by Florence Mowrer of the District.

VI. TMDL Progress Report – Jason Uhley

***A.* Middle Santa Ana River Bacteria Indicator TMDL Update –**

- Next Meeting - Thursday, October 23, 2008 – 1:30 p.m. - 4:00 p.m.
  Los Angeles County will be doing a presentation on how they are dealing with the Bacteria TMDL in the LA River which is similar to the Middle Santa Ana River Bacteria Indicator TMDL at the October 23rd meeting MSAR TMDL Meeting. The MSAR Task Force will also be discussing which MS4s need further monitoring based on the initial monitoring program.

***B.* Lake Elsinore/Canyon Lake TMDL Update**

- Next Meeting – Tuesday, October 28, 2008 - 1:30 p.m. – 4:00 p.m.
  There was no meeting in September. The next meeting is scheduled for October 28th.

***C.* San Diego Lagoons TMDL/Investigation Order Update**

- Next Meeting – USBR, Tuesday, November 18, 2008 from 10:00 a.m.-12:00 p.m.
  Claudio Padres reported that index sampling was conducted at the end of September and data should be available within 3-4 weeks. Also, data from the ocean inlet survey was submitted to CDM. There have been issues with the data readings and work is in progress to resolve those issues. Claudio added that the Regional Board is offering an opportunity to implement 3rd party TMDLs and will be holding a stakeholder meeting in December to discuss these issues.

VII. Santa Ana/Santa Margarita Region Programs – Jason Uhley

***A.* Stormwater Quality Standards Task Force Update**

- Next Meeting: Thursday, Ocotober 23, 2008 from 8:30 a.m. to 1:30 p.m.
  Albert announced that there was a meeting taking place October 23rd in which he and Jason would be in attendance.

***B.* General Construction Permit**

- Keith Elliott stated that the goal is to have the draft permit available by the end of the year.

VIII. Open Discussion

A. Santa Ana RWQCB – No comments

B. San Diego RWQCB – No comments

C. U.S. EPA – Region IX – Not present

D. Round Table – Michele Hindersinn inquired as to guidance regarding foreclosed homes with swimming pools issues. Albert stated to her that he would send the Permittees guidance information via email. Bob Collacott led a brief discussion on swimming pool issues and concerns.

P8122355

IX. ***New Agenda Items / Schedule Next Meeting***

There were no agenda item requests from the group. Next meeting will be held November 20, 2008 at the Riverside County Flood Control District.

X. ***Hydrophix Presentation – Brian Martello***

Hydrophix representatives gave a presentation on the Smart Sponge and Antimicrobial Smart Sponge Plus. Handouts and a CD were provided.

If there are any questions or items for the next meeting agenda, please contact the Flood Control District's NPDES Section at 951.955.4375. Suggestions are always welcome.

Please visit the "Only Rain Down the Storm Drain" Public Education Program website at: http://www.floodcontrol.co.riverside.ca.us. The site contains a variety of useful stormwater program information including links to other stormwater management programs and related websites.

NEXT MEETING IS SET FOR:

THURSDAY, November 20, 2008 10:00 A.M.
AT
RIVERSIDE COUNTY FLOOD CONTROL DISTRICT
1995 Market Street Conference Room 1
Riverside, CA 92501

P8122355

MEETING AGENDA

NPDES
SANTA ANA / SANTA MARGARITA
TECHNICAL ADVISORY COMMITTEE

10:00 a.m. – 2:00 p.m. Thursday, November 20, 2008
Riverside County Flood Control District
1995 Market Street
Riverside, CA 92501

I. Introductions

II. Agenda Changes

III. Review of Minutes: October 23, 2008

IV. Announcements
- A. Permit Renewal Update
- B. NAS Report
- C. RFQ Pre-Qualification List Status
- D. Annual Report
- E. MSC Meeting Reminder

V. Public Education Program – Florence Mowrer

VI. TMDL Progress Report – Albert Martinez
- A. Middle Santa Ana River Bacteria Indicator TMDL Update
  - Next Meeting – Thursday, January 15, 2009 from 1:30 p.m. to 4:00 p.m.
- B. Lake Elsinore/Canyon Lake TMDL Update
  - Next Meeting – TBD
- C. San Diego Lagoons TMDL/Investigation Order Update
  - Next Meeting – USBR, Tuesday, December 9, 2008, 10:00 a.m. to 12:00 p.m.

VII. Santa Ana/Santa Margarita Region Programs – Albert Martinez
- A. Stormwater Quality Standards Task Force Update
  - Next Meeting - Thursday, November 20, 2008 from 9:30 a.m. to 1:30 p.m.
- B. General Construction Permit

VIII. Open Discussion
- A. Santa Ana RWQCB
- B. San Diego RWQCB
- C. U.S. EPA – Region IX
- D. Round Table

IX. New Agenda Items/Schedule Next Meeting – December 18, 2008 (will include Closed Session)

X. Presentation – Hydromodification Program by Dr. Eric Stein Principal Scientist at SCCWRP

XI. Closed Session

Storm Water Clean Water PROTECTION PROGRAM

Member Agencies:

Banning
Beaumont
Calimesa
Canyon Lake
Cathedral City
Coachella
Coachella Valley Water District
Corona
County of Riverside
Desert Hot Springs
Hemet
Indian Wells
Indio
La Quinta
Lake Elsinore
Moreno Valley
Murrieta
Norco
Palm Desert
Palm Springs
Perris
Rancho Mirage
Riverside City
Riverside County Flood Control District
San Jacinto
Temecula

NPDES
SANTA ANA / SANTA MARGARITA
TECHNICAL COMMITTEE
Meeting Minutes
for
November 20, 2008

Attendees:

Arlene Chun	Riverside County Flood Control District
Ann Iaali	Riverside County Flood Control District
Albert Martinez	Riverside County Flood Control District
Claudio Padres	Riverside County Flood Control District
Charlene Warren	Riverside County Flood Control District
Mike Shetler	Riverside County Executive Office
Steve Horn	Riverside County Facilities Management
Glen Higa	Riverside County Transportation
Adriana Soares	Riverside County Transportation
Bob French	City of Calimesa
Mike McCabe	City of Calimesa
James Grimm	City of Canyon Lake
Michele Hindersinn	City of Corona
Jeff Potts	City of Corona
Linda Nixon	City of Hemet
Phuong Hunter	City of Moreno Valley
Kent Wegelin	City of Moreno Valley
Bill Woolsey	City of Murrieta
Lori Askew	City of Norco
Jessie Powell	City of Perris
Sandy Caldwell	City of Riverside
Jessica Chin	City of Riverside
Michael Yasmer	City of Riverside
Mike Emberton	City of San Jacinto
Aldo Licitra	City of Temecula
Mark Baker	CONTECH Stormwater
Mike Kimberlain	Kristar
Jerry Leopard	Kristar
Bob Collacott	URS Corporation
Sean Motlagh	Tri Lake Consultants
Eric Stein	SCCWRP
Jason Pereira	California Watershed Engineering

I. *Introductions*

Albert Martinez welcomed everyone to the November 20, 2008 NPDES Santa Ana/Santa Margarita Technical Advisory Committee Meeting and initiated the self introductions of attendees.

II. *Agenda Changes*

Agenda item F (Draft Guidelines for Prop. 84) was added under Announcements.

III. *Review of Minutes: October 23, 2008*

There were no changes to the meeting minutes. Minutes were approved.

Handouts and Materials Provided:

- November 20, 2008 Agenda, October 23, 20008 Minutes, and Roster
- CASQA NewsFlash #s 2008-22 ~ 2008-23

IV. *Announcements*

A. Permit Renewal Update – Draft Permit is expected to be released by the end of 2008.

B. NAS Report – The National Academy of Sciences (NAS) Report is designed to promote Municipal Action Levels, numeric impervious area and increased volume limitations and makes recommendations directly to EPA.

C. RFQ Pre-Qualification List Status – The list was approved Tuesday, November 18, 2008. Letters will be sent to selected consultants after Thanksgiving.

D. Annual Report – Albert announced that he is working to finalize the Santa Ana Annual Report and hopes to have it delivered to the Santa Ana Regional Board by November 26, 2008.

E. MSC Meeting Reminder – Albert announced that the next MSC meeting is scheduled for January 15, 2009 and advised Permittees to be sure to remind their City Managers of the meeting.

F. Prop. 84 Grant – The Prop. 84 Grant only applies to public agencies and can only be used for Permit compliance. The grant is desigend for public agencies to incorporate LID features into public works projects.

V. *Public Education Program – Albert Martinez*

- Outdoor Activities brochure was sent yesterday via email to Permittees
- The Outdoor Activities brochures are available for pick up November 20th at the District's front counter for Permittees who submitted orders
- There are 2 brochures due to be released: Tips for Landscaping and Gardening and one on Industrial/Commercial Facilities
- Aldo inquired as to whether or not Permittees can be provided a draft of the brochures prior to their production. Albert advised him to contact Flo with regards to his question

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VI. ***TMDL Progress Report – Albert Martinez***

A. Middle Santa Ana River Bacteria Indicator TMDL Update –

- Next Meeting – January 15, 2009 from 1:30 p.m. - 4:00 p.m.
  Discussion of the January 15th meeting will be geared towards Source Assessment in the Santa Ana Region and the public education task of the grant.

B. Lake Elsinore/Canyon Lake TMDL Update -

- Next Meeting – TBD
  Albert announced that the next meeting is scheduled for January 27, 2009 at 1:30 p.m. and will focus on review of the budget. He also noted that the Task Force is running out of funds due to the Agricultural Stakeholders not being a part of funding the Task Force.

C. San Diego Lagoons TMDL/Investigation Order Update

- Next Meeting – USBR, Tuesday, December 9, 2008 (Conference Call Meeting)
  Arlene Chun reported on the San Diego Lagoons TMDL. Discussion included the following:

  - Waiting on the 3rd storm and keeping eye on weather
  - Meeting with Regional Board on December 18th to discuss questionable data concerns as well as TMDL funding
  - Conference call tentatively scheduled for December 9th. Formal meeting scheduled for January 15, 2009
  - Bob Collacott inquired as to what the water quality data issues were. Arlene noted that they were getting dissolved nutrients higher than total nutrients and some of the analysis were conducted outside of the holding times

VII. ***Santa Ana/Santa Margarita Region Programs – Albert Martinez***

A. Stormwater Quality Standards Task Force Update

- Next Meeting: Thursday, November 20, 2008 from 9:30 a.m. to 1:30 p.m.
  The Task Force is still defining REC use definitions. Tim Moore gave a presentation to the State Board and updated the Board on the work of the Task Force. In addition, the Task Force advocated for REC uses to be established at a regional basis although EPA would like statewide consistency.

B. General Construction Permit

- The State Board is hoping to adopt the Permit by Fall 2009 and prior to EPA's Federal Permit which will include Effluent Limitations Guidelines. Albert also noted that the Linear Permit will be incorporated into the General Construction Permit so that there are not 2 separate permits.

VIII. ***Open Discussion***

A. Santa Ana RWQCB – Not in attendance
B. San Diego RWQCB – Not in attendance
C. U.S. EPA – Region IX – Not in attendance

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D. ***Round Table –*** Bob noted that they are currently working on the renewal of the ROWD for tha Santa Margarita Region that is due January 15, 2009. Claudio Padres added that he needs information regarding Permittee programs over the last 4 years as soon as possible to begin incorporating it into the ROWD. An excel spreadsheet was sent to Santa Margarita Region Permittees for them to use to input that information and forward back to him. A meeting will be setup to further discuss the ROWD. Claudio further noted that the new cities of Wildomar and Menifee will need to be involved in the ROWD process. As to date, there has been no feedback from the San Diego Regional Board regarding the 2008 Santa Margarita Annual Report.

IX. ***New Agenda Items / Schedule Next Meeting***

There were no agenda item requests from the group. Next meeting will be held December 18, 2008 at the Riverside County Flood Control District.

If there are any questions or items for the next meeting agenda, please contact the Flood Control District's NPDES Section at 951.955.4375. Suggestions are always welcome.

Please visit the "Only Rain Down the Storm Drain" Public Education Program website at: http://www.floodcontrol.co.riverside.ca.us. The site contains a variety of useful stormwater program information including links to other stormwater management programs and related websites.

NEXT MEETING IS SET FOR:

THURSDAY, December 18, 2008 10:00 A.M.
AT
RIVERSIDE COUNTY FLOOD CONTROL DISTRICT
1995 Market Street Conference Room 1
Riverside, CA 92501

P8122710

MEETING AGENDA

NPDES
SANTA ANA / SANTA MARGARITA
TECHNICAL ADVISORY COMMITTEE

10:00 a.m. – 12:00 p.m. Thursday, December 18, 2008
Riverside County Flood Control District
1995 Market Street
Riverside, CA 92501

I. Introductions

II. Agenda Changes

III. Review of Minutes: November 20, 2008

IV. Announcements
- A. Permit Renewal Update
- B. CASQA Webcast
- C. MSC Meeting Reminder

V. Public Education Program – Florence Mowrer

VI. TMDL Progress Report – Albert Martinez
- A. Middle Santa Ana River Bacteria Indicator TMDL Update
  - Next Meeting – Thursday, January 15, 2009 from 1:30 p.m. to 4:00 p.m.
- B. Lake Elsinore/Canyon Lake TMDL Update
  - Next Meeting – Tuesday, January 27, 2009 from 1:30 p.m. to 4:00 p.m.
- C. San Diego Lagoons TMDL/Investigation Order Update
  - Next Meeting – USBR, Tuesday, January 20, 2009, 10:00 a.m. to 12:00 p.m.

VII. Santa Ana/Santa Margarita Region Programs – Albert Martinez
- A. Stormwater Quality Standards Task Force Update
  - Next Meeting - Wednesday, January 7, 2009 from 9:30 a.m. to 1:30 p.m.
- B. General Construction Permit

VIII. Open Discussion
- A. Santa Ana RWQCB
- B. San Diego RWQCB
- C. U.S. EPA – Region IX
- D. Round Table

IX. New Agenda Items/Schedule Next Meeting – January 22, 2009

X. Closed Session

Member Agencies:

Banning
Beaumont
Calimesa
Canyon Lake
Cathedral City
Coachella
Coachella Valley Water District
Corona
County of Riverside
Desert Hot Springs
Hemet
Indian Wells
Indio
La Quinta
Lake Elsinore
Moreno Valley
Murrieta
Norco
Palm Desert
Palm Springs
Perris
Rancho Mirage
Riverside City
Riverside County Flood Control District
San Jacinto
Temecula

NPDES
SANTA ANA / SANTA MARGARITA
TECHNICAL COMMITTEE
Meeting Minutes
for
December 18, 2008

Attendees:

Arlene Chun	Riverside County Flood Control District
Albert Martinez	Riverside County Flood Control District
Claudio Padres	Riverside County Flood Control District
Charlene Warren	Riverside County Flood Control District
Mike Shetler	Riverside County Executive Office
Steve Horn	Riverside County Facilities Management
Glen Higa	Riverside County Transportation
Keith Elliott	CRWQCB – Santa Ana Region
Maria Macario	CRWQCB – Santa Ana Region
Michele Hindersinn	City of Corona
Jeff Potts	City of Corona
Linda Nixon	City of Hemet
Kent Wegelin	City of Moreno Valley
Bill Woolsey	City of Murrieta
Lori Askew	City of Norco
Jessie Powell	City of Perris
Sandy Caldwell	City of Riverside
Jessica Chin	City of Riverside
Michael Yasmer	City of Riverside
Sandy McKay	City of San Jacinto
Mark Baker	CONTECH Stormwater
Bob Collacott	URS Corporation
Sean Motlagh	Tri Lake Consultants

I. *Introductions*

Albert Martinez welcomed everyone to the November 20, 2008 NPDES Santa Ana/Santa Margarita Technical Advisory Committee Meeting and initiated the self introductions of attendees.

II. *Agenda Changes*

Under item IX, date of next meeting is January 22, 2009.

III. *Review of Minutes: November 20, 2008*

There were no changes to the meeting minutes. Minutes were approved.

Handouts and Materials Provided:

- December 18, 2008 Agenda, November 20, 2008 Minutes, and Roster
- CASQA NewsFlash #s 2008-24 ~ 2008-25

IV. *Announcements*

A. Permit Renewal Update – Keith announced that the goal is still to have the Draft Permit released by the end of 2008 but may not be until early January 2009.

B. CASQA Webcast – The District will be sponsoring the CASQA Meeting on January 9, 2009 via webcast at the District office Conference Room 1. The meeting is being held in San Diego, CA.

C. MSC Meeting Reminder – Meeting is scheduled for January 15, 2009. Presentations on BMP Effectiveness and CAP Program will be conducted at the meeting. Further details to be discussed among Permittees.

V. *Public Education Program – Albert Martinez*

Calendars are available for pick up at the front counter. Permittees are welcomed and encouraged to submit photos to be considered for inclusion in future calendar issues.

VI. *TMDL Progress Report – Albert Martinez*

***A.* Middle Santa Ana River Bacteria Indicator TMDL Update –**

- Next Meeting – Thursday, January 15, 2009 from 1:30 p.m. to 4:00 p.m.
  There was no update provided on the Middle Santa Ana River Bacteria TMDL. Albert announced that the next meeting is scheduled for January 15th.

***B.* Lake Elsinore/Canyon Lake TMDL Update -**

- Next Meeting – Tuesday, January 27, 2009 from 1:30 p.m. to 4:00 p.m.
  There was no update provided on the Lake Elsinore/Canyon Lake TMDL. Albert announced that the next meeting is scheduled for January 27th.

***C.* San Diego Lagoons TMDL/Investigation Order Update**

- Next Meeting – USBR, Tuesday, January 20, 2009, 10:00 a.m. to 12:00 p.m.
  Arlene reported that CDM had conducted the 3rd storm and data would be filtering in over the next few months. Final report is due to Regional Board

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around June 2009. A meeting is scheduled for December 18th in Escondido to discuss funding situations and data received from the University labs.

VII. ***Santa Ana/Santa Margarita Region Programs – Albert Martinez***

A. **Stormwater Quality Standards Task Force Update**

- Next Meeting: Wednesday, January 7, 2009 from 9:30 a.m. to 1:30 p.m.
  Albert reported that during the last Task Force meeting the group was updated on the latest activity at various sites throughout Riverside and San Bernardino Counties. The Task Force will potentially be looking at new sites. Albert added that should Permittees know of any new sites that they would like the Task Force to look at, feel free to notify him. Also, the Task Force is looking to hold meetings every 3 weeks in 2009 in an effort to accomplish the goals of the Task Force.

B. **General Construction Permit**

Keith Elliott reported that the Regional Board is still working to get the draft Riverside County MS4 Permit released by the end of 2008. He added that the Orange County MS4 Permittees have asked for a 30-day extension for the comment period for their permit. Reasons for the extension are to get the major interested parties into a discussion with respect to hydrologic conditions of concern and the effective impervious area.

Keith added that the Regional Board has been guided by EPA to make sure that there are measureable goals in the MS4 Permit. He stated that the Regional Board is open to any ideas from Permittees on how to reach hydrologic conditions of concern but still have measureable goals. It is anticipated that Permittees will get an advanced draft of the permit but there will not be a lot of time for Permittees to review it prior to public release. It should be released to the public early February in which the 3 counties will have a combined workshop on March 6th.

Bob Collacott inquired as to if the draft Riverside County MS4 Permit was based on the current 2002 Riverside County Permit or was it based on the draft Orange County Permit. Keith informed him that it started out as being a modification of the existing permit and there is a lot of information that has not changed. Permittees will see a blend of all 3 county permits in their permit.

Maria Macario inquired as to if comments had yet been submitted by the District on the draft Orange County MS4 Permit. Albert informed her that they had not yet submitted comments but will be doing so soon.

VIII. ***Open Discussion***

- ***A. Santa Ana RWQCB –*** Regional Board staff had no further comments.
- ***B. San Diego RWQCB*** – Not in attendance
- ***C. U.S. EPA – Region IX –*** Not in attendance
- ***D. Round Table –*** There were no comments from group.

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IX. New Agenda Items / Schedule Next Meeting

There were no agenda item requests from the group. Next meeting will be held January 22, 2009 at the Riverside County Flood Control District.

If there are any questions or items for the next meeting agenda, please contact the Flood Control District's NPDES Section at 951.955.4375. Suggestions are always welcome.

Please visit the "Only Rain Down the Storm Drain" Public Education Program website at: http://www.floodcontrol.co.riverside.ca.us. The site contains a variety of useful stormwater program information including links to other stormwater management programs and related websites.

NEXT MEETING IS SET FOR:

THURSDAY, January 22, 2009 11:00 A.M.
AT
RIVERSIDE COUNTY FLOOD CONTROL DISTRICT
1995 Market Street Conference Room 1
Riverside, CA 92501

Riverside County Flood Control and Water Conservation District
1995 Market Street • Riverside, CA 92501 • (951) 955-1200 • FAX (951) 788-9965

MEETING AGENDA

NPDES
SANTA ANA / SANTA MARGARITA
TECHNICAL ADVISORY COMMITTEE

11:00 a.m. – 12:00 p.m. Thursday, January 22, 2009
Riverside County Flood Control District
1995 Market Street
Riverside, CA 92501

I. Introductions

II. Agenda Changes

III. Review of Minutes: December 18, 2008

IV. Announcements
   A. Permit Renewal Update
   B. MSC Meeting Update

V. Public Education Program – Florence Mowrer

VI. TMDL Progress Report – Albert Martinez
   A. Middle Santa Ana River Bacteria Indicator TMDL Update
      - Next Meeting – Wednesday, February 11, 2009 from 9:30 a.m. to 12:30 p.m.
   B. Lake Elsinore/Canyon Lake TMDL Update
      - Next Meeting – Tuesday, January 27, 2009 from 1:30 p.m. to 4:00 p.m.
   C. San Diego Lagoons TMDL/Investigation Order Update
      - Next Meeting – USBR, Tuesday, January 20, 2009, 10:00 a.m. to 12:00 p.m.

VII. Santa Ana/Santa Margarita Region Programs – Albert Martinez
   A. Stormwater Quality Standards Task Force Update
      - Next Meeting - Thursday, February 12, 2009 from 9:30 a.m. to 1:30 p.m.
   B. General Construction Permit

VIII. Open Discussion
   A. Santa Ana RWQCB
   B. San Diego RWQCB
   C. U.S. EPA – Region IX
   D. Round Table

IX. New Agenda Items/Schedule Next Meeting – February 26, 2009

X. ORCO Block Co., Inc. Presentation - Veronica Muth

P8/123333

Member Agencies:

Banning
Beaumont
Calimesa
Canyon Lake
Cathedral City
Coachella
Coachella Valley Water District
Corona
County of Riverside
Desert Hot Springs
Hemet
Indian Wells
Indio
La Quinta
Lake Elsinore
Moreno Valley
Murrieta
Norco
Palm Desert
Palm Springs
Perris
Rancho Mirage
Riverside City
Riverside County Flood Control District
San Jacinto
Temecula

NPDES
SANTA ANA / SANTA MARGARITA
TECHNICAL COMMITTEE
Meeting Minutes
for
January 22, 2009

Attendees:

Ann Iaali	Riverside County Flood Control District
Albert Martinez	Riverside County Flood Control District
Claudio Padres	Riverside County Flood Control District
Jason Uhley	Riverside County Flood Control District
Charlene Warren	Riverside County Flood Control District
Mike Shetler	Riverside County Executive Office
Steve Horn	Riverside County Facilities Management
Keith Elliott	CRWQCB – Santa Ana Region
Mike Roth	CRWQCB – Santa Ana Region
Bob French	City of Calimesa
Mike McCabe	City of Calimesa
Bob Bohan	City of Canyon Lake
Michele Hindersinn	City of Corona
Tom Koper	City of Corona
Jeff Potts	City of Corona
Linda Nixon	City of Hemet
Phuong Hunter	City of Moreno Valley
Kent Wegelin	City of Moreno Valley
Bill Woolsey	City of Murrieta
Dan Cuthbertson	City of Norco
Jessie Powell	City of Perris
Sandy Caldwell	City of Riverside
Samantha Eshelman	City of Riverside
Tim King	City of Riverside
Michael Yasmer	City of Riverside
Mike Emberton	City of San Jacinto
Aldo Licitra	City of Temecula
Jon Crawford	City of Wildomar
Veronica Muth	ORCO Block Co.
Juan Tejeda	ORCO Block Co.

I. *Introductions*

Albert Martinez welcomed everyone to the January 22, 2009 NPDES Santa Ana/Santa Margarita Technical Advisory Committee Meeting and initiated the self introductions of attendees.

II. *Agenda Changes*

Agenda items C (Training) and D (De Minimus Discharge) were added under agenda item II (Announcements).

III. *Review of Minutes: December 18, 2008*

There were no changes to the meeting minutes. Minutes were approved.

Handouts and Materials Provided:

- January 22, 2009 Agenda, December 18, 2008 Minutes, and Roster
- CASQA NewsFlash #s 2009-01

IV. *Announcements*

A. ***Permit Renewal Update*** – Keith Elliott informed the group that Regional Board management staff has been focusing on the draft Orange County MS4 Permit. He noted that stakeholders are meeting to discuss the Permit and the 5% effective impervious area permit requirement and was uncertain as to when the draft Riverside County MS4 Permit would be released.

B. ***MSC Meeting Update –*** Albert provided a summary of the January 15th MSC meeting. Items of discussion included:

- Draft Orange County MS4 Permit presentation conducted by Bob Collacott to MSC attendees
- Presentation on CAP Program and effects that the draft Orange County MS4 Permit has on the CAP Program
- Discussion on BMP consistency (to be discussed more in closed session)

C. ***NPDES Training –*** Claudio Padres stated that the revised scanned training sign-in sheets were emailed to Permittees earlier in the week. He also noted that due to cumbersome issues when sending training notifications via email, that he would now be sending the email to NPDES Permittees only and asked that Permittees be sure to notify their staff directly of training information.

D. ***De Minimus Discharge*** – A draft of the De Minimus Discharge Permit was released a couple of weeks ago by the Regional Board. Albert stated that it appears from information he's received that construction dewatering for Permittee activities will be included as a non-stormwater discharge in the Riverside County MS4 Permit.

V. *Public Education Program – Albert Martinez*

Albert reported on the efforts of the District's Public Education Program. Items of his discussion included the following:

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- There are only 5 boxes of the 2009 calendars available
- 2009 Household Hazardous Waste (HHW) schedules are available
- January 2009 Public Education Report emailed to Permittees January 20, 2009
- KVCR will be at the District to interview Jason and Florence January 22nd at 2:00 p.m. for a Greenworks segment and the District's Public Education Department that will air February 9, 2009; CDs of the show will be available for Permittess
- New billboard locations are being considered that will focus on BMP activities
- District's Public Education Department will be distributing outreach materials at the Temecula car show
- District's Public Education Department partnering with Santa Margarita Regional Board on a outreach event

VI. ***TMDL Progress Report – Albert Martinez***

A. Middle Santa Ana River Bacteria Indicator TMDL Update –

- Next Meeting – Thursday, February 11, 2009 from 9:30 a.m. to 12:30 p.m.
  Due to language in the contract stating that the budget can not exceed $300,000 the budget will need to be revised. Albert added that it has been reported that a lot of state grants have been frozen and it is uncertain as to when the Task Force will be receiving funds from their grants.

B. Lake Elsinore/Canyon Lake TMDL Update -

- Next Meeting – Tuesday, January 27, 2009 from 1:30 p.m. to 4:00 p.m.
  There was no meeting in the month of December. The next meeting is set for January 27th.

C. San Diego Lagoons TMDL/Investigation Order Update

- Next Meeting – USBR, Tuesday, January 20, 2009, 10:00 a.m. to 12:00 p.m.
  Claudio provided a brief update on the efforts of the San Diego Lagoons TMDL, reporting that a 4th data submission was provided to the Regional Board at the beginning of the month. He added that CDM is planning to have a cleaner draft of the Quality Assurance Report available by the next Task Force meeting scheduled for **February 17, 2009 from 10:00 a.m. – 12:00 p.m. at the Bureau of Reclamation** office in Temecula. There will also be a Executive Management Team meeting February 18, 2009 from 1:30 – 3:30 at the Bureau of Reclamation office in Temecula. District consultants will be meeting with SCCWRP to discuss discrepancies between total dissolved and total nutrient results where the results are coming in greater than total. The continuation of modeling development. Still pursuing Prop 84 grants.

VII. ***Santa Ana/Santa Margarita Region Programs – Albert Martinez***

A. Stormwater Quality Standards Task Force Update

- Next Meeting: Thursday, February 12, 2009 from 9:30 a.m. to 1:30 p.m.
  Albert announced that Jason was currently in attendance at the January 22, 2009 Task Force meeting at SAWPA to discuss and finalize REC use definitions and high flow language. The next meeting is set for February 12th.

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B. **General Construction Permit –** Keith Elliott noted that as Regional Board staff he anticipates one last review (within the next 10 days) of the Permit prior to it being available to the public. He added that Permittees can anticipate seeing it towards the end of the month.

VIII. ***Open Discussion***

A. ***Santa Ana RWQCB –*** Keith commented on the 2007/2008 Santa Ana Annual Report, noting that there were several Permittees whose construction, commercial and industrial databases were not submitted and none of the electronic versions were provided in a searchable format. He asked that this information be submitted to the Regional Board as soon as possible.

B. ***San Diego RWQCB*** – Not in attendance

C. ***U.S. EPA – Region IX –*** Not in attendance

D. ***Round Table –*** Aldo Licitra inquired as to any changes to the upcoming training. Claudio briefly discussed changes that are being looked at for future training classes. The next set of training classes will be provided in Fall 2009.

IX. ***New Agenda Items / Schedule Next Meeting***

There were no agenda item requests from the group. Next meeting will be held February 26, 2009 at the Riverside County Flood Control District.

If there are any questions or items for the next meeting agenda, please contact the Flood Control District's NPDES Section at 951.955.4375. Suggestions are always welcome.

Please visit the "Only Rain Down the Storm Drain" Public Education Program website at: http://www.floodcontrol.co.riverside.ca.us. The site contains a variety of useful stormwater program information including links to other stormwater management programs and related websites.

X. ***ORCO Block Co., Inc. Presentation – Veronica Muth***

ORCO Block Co., Inc. gave a presentation on their products and services.

NEXT MEETING IS SET FOR:

THURSDAY, February 26, 2009 10:00 A.M.
AT
RIVERSIDE COUNTY FLOOD CONTROL DISTRICT
1995 Market Street Conference Room 1
Riverside, CA 92501

Riverside County Flood Control and Water Conservation District
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MEETING AGENDA

NPDES
SANTA ANA / SANTA MARGARITA
TECHNICAL ADVISORY COMMITTEE

10:00 a.m. – 12:00 p.m. Thursday, February 26, 2009
Riverside County Flood Control District
1995 Market Street
Riverside, CA 92501

I. Introductions

II. Agenda Changes

III. Review of Minutes: January 22, 2009

IV. Announcements
   A. Permit Renewal Update
   B. MSC Meeting Update

V. Public Education Program – Florence Mowrer

VI. TMDL Progress Report – Albert Martinez
   A. Middle Santa Ana River Bacteria Indicator TMDL Update
      - Next Meeting – Wednesday, March 25, 2009 from 9:30 a.m. to 12:30 p.m.
   B. Lake Elsinore/Canyon Lake TMDL Update
      - Next Meeting – Tuesday, February 24, 2009 from 1:30 p.m. to 4:00 p.m.
   C. San Diego Lagoons TMDL/Investigation Order Update
      - Next Meeting – USBR, TBD

VII. Santa Ana/Santa Margarita Region Programs – Albert Martinez
   A. Stormwater Quality Standards Task Force Update
      - Next Meeting - Thursday, March 5, 2009 from 9:30 a.m. to 1:30 p.m.
   B. General Construction Permit

VIII. Open Discussion
   A. Santa Ana RWQCB
   B. San Diego RWQCB
   C. U.S. EPA – Region IX
   D. Round Table

IX. New Agenda Items/Schedule Next Meeting – March 26, 2009

P8/123798

Storm Water Clean Water PROTECTION PROGRAM

Member Agencies:

Banning
Beaumont
Calimesa
Canyon Lake
Cathedral City
Coachella
Coachella Valley Water District
Corona
County of Riverside
Desert Hot Springs
Hemet
Indian Wells
Indio
La Quinta
Lake Elsinore
Menifee
Moreno Valley
Murrieta
Norco
Palm Desert
Palm Springs
Perris
Rancho Mirage
Riverside City
Riverside County Flood Control District
San Jacinto
Temecula
Wildomar

NPDES
SANTA ANA / SANTA MARGARITA
TECHNICAL COMMITTEE
Meeting Minutes
for
February 26, 2009

Attendees:

Ann Iaali	Riverside County Flood Control District
Albert Martinez	Riverside County Flood Control District
Claudio Padres	Riverside County Flood Control District
Charlene Warren	Riverside County Flood Control District
Mike Shetler	Riverside County Executive Office
Steve Horn	Riverside County Facilities Management
Adriana Soares	Riverside County Transportation
Keith Elliott	CRWQCB – Santa Ana Region
Kishen Prathivadi	City of Beaumont
Bob French	City of Calimesa
Mike McCabe	City of Calimesa
James Grimm	City of Canyon Lake
Michele Hindersinn	City of Corona
Jeff Potts	City of Corona
Kent Wegelin	City of Moreno Valley
Bill Woolsey	City of Murrieta
Doug Norfolk	City of Norco
Susan Almanza	City of Perris
Sandy Caldwell	City of Riverside
Jessica Chin	City of Riverside
Michael Yasmer	City of Riverside
Sandy McKay	City of San Jacinto
Chris Sunde	City of San Jacinto
Aldo Licitra	City of Temecula
Ron Grider	City of Wildomar
Mark Baker	CONTECH Stormwater
Jaime Aderhold	J2A Environmental
Bob Collacott	URS Corporation

I. *Introductions*

Albert Martinez welcomed everyone to the February 26, 2009 NPDES Santa Ana/Santa Margarita Technical Advisory Committee Meeting and initiated the self introductions of attendees.

II. *Agenda Changes*

Albert added Item X (Permittee Closed Session) to the agenda.

III. *Review of Minutes: January 22, 2009*

Jessica Chin noted that she was in attendance at the January 22nd TAC meeting (meeting minutes did not reflect this). Subsequently, after review of the meeting recording and meeting sign-in sheet, there was no record of her attendance, however, the City of Riverside did receive credit for other Riverside representatives who attended the meeting. There are no changes to the meeting minutes. Minutes are approved.

Handouts and Materials Provided:

- February 26, 2009 Agenda, January 22, 2009 Minutes, and Roster
- CASQA NewsFlash #s 2009-02, 2009-03 and 2009-04
- Trident Curb Screen – Take Care of the Sea flyer
- Clean Water Act Org Chart

IV. *Announcements*

A. ***Permit Renewal Update*** – There is no new update from the Regional Board regarding the Riverside County Permittee comment letter on the draft Orange County MS4 Permit but they have received it and currently Jason Uhley and Matt Yeager (San Bernardino County) are working on scheduling a meeting within the next couple of weeks with Gerard Thibeault and Michael Adackapara to discuss the Riverside and San Bernardino Counties MS4 Permits. Albert inquired as to if Permittees had any comments on the comment letter sent to them via email. There were no comments from Permittees.

B. ***MSC Meeting Update*** **–** The next MSC meeting is set for March 19th at 11:30 a.m. at the County Administrative Center, 5th Floor, Room C. Subsequently, this meeting has been canceled. The next meeting is set for April 16th.

V. *Public Education Program – Albert Martinez*

There was no Public Education Report available for the month of February. The Public Education Department is waiting for the updated list on school presentations from the Resource Conservation Districts (RCDs).

VI. *TMDL Progress Report – Albert Martinez*

A. Middle Santa Ana River Bacteria Indicator TMDL Update

- Next Meeting – Thursday, March 25, 2009 from 9:30 a.m. to 12:30 p.m.
  The budget has been reduced slightly and it was mentioned that the cost share will be reduced for the stakeholders during fiscal year 2009-10 and will be reflected on the invoices.

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B. **Lake Elsinore/Canyon Lake TMDL Update**

- Next Meeting – Tuesday, February 24, 2009 from 1:30 p.m. to 4:00 p.m.
  Albert reported that attendance was low at the last meeting. He stated that future meetings will be held to discuss the budget noting that it would be beneficial for Permittees to attend. He also noted that the draft 303(d) list came out in which Lake Elsinore was listed for sediment toxicity. Bob Collacott and Arlene Chun are working on providing a draft comment letter to the Regional Board by April 17th and will also be coordinating with San Bernardino County on the matter. Bob added that there were 5 waterbodies in the Santa Ana Region that are listed for additional impairments. Those listed are the Santa Ana River, Hole Lake, Lake Elsinore, Cucamonga Creek, and Day Creek.

C. **San Diego Lagoons TMDL/Investigation Order Update**

- Next Meeting – USBR, TBD
  Claudio Padres reported that the Bureau of Reclamation is still looking into the possibility for the third party TMDL effort. The next meeting is scheduled for March 17th. The Bureau of Reclamation is scheduled to meet with the Regional Board on March 16th. There is an EMT meeting set for sometime in April.

VII. ***Santa Ana/Santa Margarita Region Programs – Albert Martinez***

A. **Stormwater Quality Standards Task Force Update**

- Next Meeting: Thursday, March 5, 2009 from 9:30 a.m. to 1:30 p.m.
  Albert announced that work is being done to finalize REC use definitions and the Temporary High Flow Suspension language. The next meeting is set for March 6th at SAWPA.

B. **General Construction Permit –** A draft of the Permit may be available March 6th. There will be one workshop and comments are due in April. Updates will be provided to Permittees. Keith added that the State Board is still shooting for a March release.

VIII. ***Open Discussion***

A. ***Santa Ana RWQCB –*** Keith informed the group that the General Industrial Permit would not be reviewed until the Construction Permit is available.

B. ***San Diego RWQCB*** – Not in attendance

C. ***U.S. EPA – Region IX –*** Not in attendance

D. ***Round Table –*** Michele Hindersinn inquired as to the status of Keith Elliot's request at the last TAC meeting regarding the Annual Report electronic information being submitted to the Regional Board. Albert advised the Permittees that the information had been given to the Regional Board on January 28, 2009.

Albert touched on previous discussion among Permittees regarding a BMP consistency policy due to be developed by the TAC members. He added that Kent

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Wegelin will be taking charge on developing the policy and asked if any other cities were interested in assisting with the development of the policy. Several cities showed their interest. A meeting will be set up to further discuss the matter.

Bob made mention on why and how the economy is affecting cities financing, programs, budget etc. and asked if anyone would like to volunteer information on how their city has been affected. Further discussion took place amongst the Permittees.

IX. New Agenda Items / Schedule Next Meeting

There were no agenda item requests from the group. Next meeting will be held March 26, 2009 at the Riverside County Flood Control District.

If there are any questions or items for the next meeting agenda, please contact the Flood Control District's NPDES Section at 951.955.4375. Suggestions are always welcome.

Please visit the "Only Rain Down the Storm Drain" Public Education Program website at: http://www.floodcontrol.co.riverside.ca.us/stormwater/. The site contains a variety of useful stormwater program information including links to other stormwater management programs and related websites.

X. Closed Session

Permittees engaged in closed session discussion.

NEXT MEETING IS SET FOR:

THURSDAY, March 26, 2009 10:00 A.M.
AT
RIVERSIDE COUNTY FLOOD CONTROL DISTRICT
1995 Market Street Conference Room 1
Riverside, CA 92501

P8/124248

MEETING AGENDA

NPDES
SANTA ANA / SANTA MARGARITA
TECHNICAL ADVISORY COMMITTEE

10:00 a.m. – 12:00 p.m. Thursday, March 26, 2009
Riverside County Flood Control District
1995 Market Street
Riverside, CA 92501

I. Introductions

II. Agenda Changes

III. Review of Minutes: February 26, 2009

IV. Announcements
   A. Permit Renewal Update
   B. MSC Meeting
   C. Draft Orange County MS4 Permit (San Diego Region)

V. Public Education Program – Florence Mowrer

VI. TMDL Progress Report – Albert Martinez
   A. Middle Santa Ana River Bacteria Indicator TMDL Update
      - Next Meeting – Wednesday, March 25, 2009 from 9:30 a.m. to 12:30 p.m.
   B. Lake Elsinore/Canyon Lake TMDL Update
      - Next Meeting – Tuesday, March 24, 2009 from 1:30 p.m. to 4:00 p.m.
   C. San Diego Lagoons TMDL/Investigation Order Update
      - Next Meeting – USBR, Tuesday, March 24, 2009 from 10:00 a.m. to 12:00 p.m.

VII. Santa Ana/Santa Margarita Region Programs – Albert Martinez
   A. Stormwater Quality Standards Task Force Update
      - Next Meeting - Thursday, March 26, 2009 from 9:30 a.m. to 1:30 p.m.
   B. General Construction Permit

VIII. Open Discussion
   A. Santa Ana RWQCB
   B. San Diego RWQCB
   C. U.S. EPA – Region IX
   D. Round Table

IX. New Agenda Items/Schedule Next Meeting – April 23, 2009

P8/124249

Member Agencies:

Banning
Beaumont
Calimesa
Canyon Lake
Cathedral City
Coachella
Coachella Valley Water District
Corona
County of Riverside
Desert Hot Springs
Hemet
Indian Wells
Indio
La Quinta
Lake Elsinore
Menifee
Moreno Valley
Murrieta
Norco
Palm Desert
Palm Springs
Perris
Rancho Mirage
Riverside City
Riverside County Flood Control District
San Jacinto
Temecula
Wildomar

NPDES
SANTA ANA / SANTA MARGARITA
TECHNICAL COMMITTEE
Meeting Minutes
for
March 26, 2009

Attendees:

Arlene Chun	Riverside County Flood Control District
Linda Garcia	Riverside County Flood Control District
Ann Iaali	Riverside County Flood Control District
Albert Martinez	Riverside County Flood Control District
Claudio Padres	Riverside County Flood Control District
Jason Uhley	Riverside County Flood Control District
Mike Shetler	Riverside County Executive Office
Steve Horn	Riverside County Facilities Management
Glenn Higa	Riverside County Transportation
Adriana Soares	Riverside County Transportation
Keith Elliott	CRWQCB – Santa Ana Region
Bob French	City of Calimesa
Mike McCabe	City of Calimesa
Michele Hindersinn	City of Corona
Jeff Potts	City of Corona
Linda Nixon	City of Hemet
Brad Kutzner	City of Menifee
Kent Wegelin	City of Moreno Valley
Bill Woolsey	City of Murrieta
Lori Askew	City of Norco
Susan Almanza	City of Perris
Sandy Caldwell	City of Riverside
Michael Yasmer	City of Riverside
Sean Motlagh	City of San Jacinto
Aldo Licitra	City of Temecula
Ron Grider	City of Wildomar
Mark Baker	CONTECH Stormwater
Bob Collacott	URS Corporation
Bill Flores	HDR

I. *Introductions*

Albert Martinez welcomed everyone to the March 26, 2009 NPDES Santa Ana/Santa Margarita Technical Advisory Committee Meeting and initiated the self introductions of attendees.

II. *Agenda Changes*

Item D (Santa Ana Regional Board 2nd draft of Orange County Permit) was added under Item IV (Announcements).

Item X (Closed Session) was added to the agenda.

III. *Review of Minutes: February 26, 2009*

There were no changes to the meeting minutes. Minutes were approved.

Handouts and Materials Provided:

- March 26, 2009 Agenda, February 26, 2009 Minutes, and Roster
- CASQA NewsFlash #s 2009-05 and 2009-04

IV. *Announcements*

A. *Permit Renewal Update* – Keith Elliott informed the group that the Santa Ana Regional Board's focus has been on the Orange County Permit. There has been no progress with the San Bernardino or Riverside County Permits since the last update.

B. *MSC Meeting Update* – The March 19th MSC meeting was cancelled. The next meeting is scheduled for April 16th.

C. *Draft Orange County MS4 Permit (San Diego Region)*

Claudio Padres stated that the San Diego Regional Board has issued a draft Permit to the Orange County Permittee group. A workshop is scheduled for the draft Permit April 3rd, a Board meeting April 8th, and a public hearing June 10th. Comments must be submitted by April 24th in order to be heard at the June 10th hearing. Ben Neil has informed Claudio that San Diego Regional Board staff is currently working on the Orange County Permit. Once that is complete (August/September), they will begin to work on the Santa Margarita Region Permit.

D. *Santa Ana Regional Board 2nd draft of Orange County Permit*

Albert announced that the 2nd draft Orange County MS4 Permit was released by the Santa Ana Regional board on March 25th and is available on the Regional Board's website. Comments on the draft Permit are due to the Regional Board by April 9th. A public hearing is set for April 24th. Keith added that there's a possibilitiy that the Permit will be adopted at the April 24th hearing.

V. *Public Education Program – Albert Martinez*

Albert discussed the following public education items:

- Runoff materials distributed at the Rock Run event in Temecula March 13th and 14th

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- District staff is currently working on outlining improvements to the public education program
- Classroom presentations are not automatically conducted at each school; schools must request that the District conduct the presentations
- Letters are being sent to school districts informing them of the public education program
- District staff is working with San Bernardino County to help provide a more uniform public education program for 5th and 6th graders in the Inland Empire and are looking to partner with Curiosity Quest PBS to develop a program for stormwater (geared toward 5th and 6th graders). A meeting will be held the first week of April with San Bernardino County and PBS staff to further discuss the partnership.

VI. ***TMDL Progress Report – Albert Martinez***

A. Middle Santa Ana River Bacteria Indicator TMDL Update

- Next Meeting – Thursday, March 25, 2009 from 9:30 a.m. to 12:30 p.m.
  NOTE: Albert advised attendees that the next meeting is set for **May 20th at 1:30 p.m.** Key items to be discussed at the meeting are source assessment on various sites, alternative lab analysis for bacterial indicators, and reducing lab analysis costs.

B. Lake Elsinore/Canyon Lake TMDL Update

- Next Meeting – Tuesday, March 24, 2009 from 1:30 p.m. to 4:00 p.m.
  NOTE: Albert advised attendees that the next meeting is actually set for **Monday, April 27th at 2:00 p.m.**

C. San Diego Lagoons TMDL/Investigation Order Update

- Next Meeting – USBR, Tueday, March 24, 2009 from 10:00 a.m. to 12:00 p.m.
  Claudio informed attendees that the March 24th meeting has been postponed to April 1st from 10:00 a.m. - 12:00 p.m.

VII. ***Santa Ana/Santa Margarita Region Programs – Albert Martinez***

A. Stormwater Quality Standards Task Force Update

- Next Meeting: Thursday, March 26, 2009 from 9:30 a.m. to 1:30 p.m.
  NOTE: Albert advised attendees that the next meeting is actually set for **Thursday, April 16th at 9:30 a.m.** at SAWPA. Work continues in an effort to establish REC use definitions and high flow suspension language. Tim Moore and the Task Force is meeting today (March 26th) to discuss REC 2 uses. Jason will be meeting with Tim to further discuss REC 2 use. Work is expected to be finalized soon.

B. **General Construction Permit –** Keith noted that the there was a request to do a re-work of the Permit itself so that is reads better. A draft of the Permit is expected to be released by the end of March or April with adoption expected in October.

VIII. ***Open Discussion***

A. ***Santa Ana RWQCB*** **–** Keith advised Permittees that there are lots of permits (construction sites) being terminated due to suspension of activities. WDID #s can be checked on the State Board's web-site to see if the site is active. Bob Collacott

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inquired as to the implications for the cities and county in terms of enforcing stormwater requirements for the terminated construction sites. Keith stated that a new WDID # is given when the site is not active and there is a new owner. Keith will provide Permittees with more detailed and confirmed information on termination of permits, Notice of Termination letters, and enforcing ordinances once the permit is terminated. Further discussion ensued among the group regarding expectations for MS4 Permittees.

B. ***San Diego RWQCB*** – Not in attendance

C. ***U.S. EPA – Region IX*** – Not in attendance

D. ***Round Table*** – Riverside County Water Task Force new web address is http://www.h2oriversidecounty.org/.

The 2009 CASQA conference will be held at Mission Bay Hilton Hotel in San Diego, CA November 2nd – 4th 2010. Next year's conference will be held in Riverside County.

District staff advised meeting attendees that due to the new carpeting in the conference room, there will be no drinks allowed that do not have caps/lids.

IX. ***New Agenda Items / Schedule Next Meeting***

There were no agenda item requests from the group. Next meeting will be held April 23, 2009 at the Riverside County Flood Control District.

If there are any questions or items for the next meeting agenda, please contact the Flood Control District's NPDES Section at 951.955.4375. Suggestions are always welcome.

Please visit the "Only Rain Down the Storm Drain" Public Education Program website at: http://www.floodcontrol.co.riverside.ca.us/stormwater/. The site contains a variety of useful stormwater program information including links to other stormwater management programs and related websites.

X. ***Closed Session***

Permittees engaged in closed session discussion.

NEXT MEETING IS SET FOR:

THURSDAY, April 23, 2009 10:00 A.M.
AT
RIVERSIDE COUNTY FLOOD CONTROL DISTRICT
1995 Market Street Conference Room 1
Riverside, CA 92501

Riverside County Flood Control and Water Conservation District
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MEETING AGENDA

NPDES
SANTA ANA / SANTA MARGARITA
TECHNICAL ADVISORY COMMITTEE

10:00 a.m. – 12:00 p.m. Thursday, April 23, 2009
Riverside County Flood Control District
1995 Market Street
Riverside, CA 92501

I. Introductions

II. Agenda Changes

III. Review of Minutes: March 26, 2009

IV. Announcements
- A. Permit Renewal Update
  - Status of Santa Ana OC Permit
  - Status of San Diego OC Permit
    - i. Next public workshop
- B. MSC Meeting Update
- C. 303(d) List update

V. Public Education Program – Florence Mowrer

VI. TMDL Progress Report – Albert Martinez
- A. Middle Santa Ana River Bacteria Indicator TMDL Update
  - Next Meeting – Wednesday, May 20, 2009 from 1:30 p.m. to 4:00 p.m.
- B. Lake Elsinore/Canyon Lake TMDL Update
  - Next Meeting – Tuesday, April 27, 2009 from 1:30 p.m. to 4:00 p.m.
- C. San Diego Lagoons TMDL/Investigation Order Update
  - Next Meeting – TBD

VII. Santa Ana/Santa Margarita Region Programs – Albert Martinez
- A. Stormwater Quality Standards Task Force Update
  - Next Meeting - Thursday, April 30, 2009 from 9:30 a.m. to 1:30 p.m.
- B. General Construction Permit

VIII. Open Discussion
- A. Santa Ana RWQCB
- B. San Diego RWQCB
- C. U.S. EPA – Region IX
- D. Round Table

IX. New Agenda Items/Schedule Next Meeting – May 28, 2009

P8/124708

Member Agencies:

Banning
Beaumont
Calimesa
Canyon Lake
Cathedral City
Coachella
Coachella Valley Water District
Corona
County of Riverside
Desert Hot Springs
Hemet
Indian Wells
Indio
La Quinta
Lake Elsinore
Menifee
Moreno Valley
Murrieta
Norco
Palm Desert
Palm Springs
Perris
Rancho Mirage
Riverside City
Riverside County Flood Control District
San Jacinto
Temecula
Wildomar

NPDES
SANTA ANA / SANTA MARGARITA
TECHNICAL COMMITTEE
Meeting Minutes
for
April 23, 2009

Attendees:

Ann Iaali	Riverside County Flood Control District
Albert Martinez	Riverside County Flood Control District
Claudio Padres	Riverside County Flood Control District
Jason Uhley	Riverside County Flood Control District
Charlene Warren	Riverside County Flood Control District
Mike Shetler	Riverside County Executive Office
Steve Horn	Riverside County Facilities Management
Glenn Higa	Riverside County Transportation
Adriana Soares	Riverside County Transportation
Keith Elliott	CRWQCB – Santa Ana Region
Bob French	City of Calimesa
Mike McCabe	City of Calimesa
Bob Bohan	City Canyon Lake
Michele Hindersinn	City of Corona
Jeff Potts	City of Corona
Linda Nixon	City of Hemet
Brad Kutzner	City of Menifee
Phuong Hunter	City of Moreno Valley
Lori Askew	City of Norco
Susan Almanza	City of Perris
Sandy Caldwell	City of Riverside
Jessica Chin	City of Riverside
Michael Yasmer	City of Riverside
Sean Motlagh	City of San Jacinto
Ron Grider	City of Wildomar
Jamie Aderhold	J2A Environmental
Mark Baker	CONTECH Stormwater
Bob Collacott	URS Corporation
Bill Flores	HDR

I. *Introductions*

Albert Martinez welcomed everyone to the April 23, 2009 NPDES Santa Ana/Santa Margarita Technical Advisory Committee Meeting and initiated the self introductions of attendees.

II. *Agenda Changes*

Item X (Closed Session) was added to the agenda.

III. *Review of Minutes: March 26, 2009*

There were no changes to the meeting minutes. Minutes were approved.

Handouts and Materials Provided:

- April 23, 2009 Agenda, March 26, 2009 Minutes, and Roster
- CASQA NewsFlash #s 2009-06, 2009-07 and 2009-08
- Education Program Report for April 2009 Santa Ana River Watershed
- July 1, 2008 to November 30, 2008 Santa Ana Watershed Stormwater Classroom Presentation list

IV. *Announcements*

A. *Permit Renewal Update*

- **Status of Santa Ana OC Permit**
  Jason Uhley announced that the OC Permit is scheduled to be adopted Friday, April 24, 2009. The hearing is a continuation of the April adoption hearing. Testimony will be limited to the LID provisions of the OC Permit. More discussion to follow in closed session.
- **Status of San Diego OC Permit**
  i. **Next public workshop** – Claudio will advise Permittees via email of the next workshop date. Claudio noted there was a staff workshop two weeks ago. Topics of discussion included:.
    - Numeric effluent limits
    - Municipal Action Levels
    - Definition of stormwater
    - Variation between Santa Ana and San Diego versions of the OC Permit.
    - Removal of the word urban from the term urbanrunoff
    - Scheduling of a meeting with Regional Board and OC staff the week of April 20th
    - EPA comments regarding the SA OC Permit

B. *MSC Meeting Update* –

MSC attendees were updated on the status on both the draft San Diego and Santa Ana RWQCB OC Permits. Kent Wegelin gave an update on the BMP Consistency Policy at the April 16, 2009 meeting. The next MSC meeting is set for May 21, 2009. Bob Collacott provided a presentation summarizing the key issues of the draft San Diego OC Permit.

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C. ***303 (d) List update)***

An email was sent to Permittees April 22, 2009 summarizing the status of the 303 (d) List. Jason stated that there were three waterbodies (Ph for Temescal, copper for the Santa Ana River, and sediment toxicity in Lake Elsinore) being added to the 303 (d) List.

V. ***Public Education Program – Florence Mowrer***

Albert reported on the following Public Education items:

- RCRCD Report emailed to Permittees on April 21st
- No slap braclets, mood pencils, shoe laces available at this time - no shop cloths available until next fiscal year
- Regional Board staff member attended Earth Night in support of the Public Education Program
- Florence will be at the Water Education Center Saturday April 25th and Penny Skog will be at the Riverside Flower Show
- Stream stabilization fact sheet is close to being published; per the request of Permittees, a draft of the stream stabilization fact sheet was previously emailed to Permittees for their review and comments

VI. ***TMDL Progress Report – Albert Martinez***

A. **Middle Santa Ana River Bacteria Indicator TMDL Update**

- Next Meeting – Wednesday, May 20, 2009 from 1:30 p.m. to 4:00 p.m.
  There was no meeting in the month of April 2009. Next meeting is set for May 20th.

B. **Lake Elsinore/Canyon Lake TMDL Update**

- Next Meeting – Tuesday, April 27, 2009 from 1:30 p.m. to 4:00 p.m.
  There was no update provided on the LE/CL TMDL. A meeting is scheduled for April 27th. Items to be discussed include a status update on the 303 (d) List and the Regional Board's release of a draft amendment to the Elsinore Valley Municipal Water District Effluent Discharge Permit in an effort to incorporate requirements into the TMDL. Jason noted the importance of the April 27th meeting and encouraged Permittees to attend.

C. **San Diego Lagoons TMDL/Investigation Order Update**

- Next Meeting – TBD
  There was no news reported on this item.

VII. ***Santa Ana/Santa Margarita Region Programs – Albert Martinez***

A. **Stormwater Quality Standards Task Force Update**

- Next Meeting: Thursday, April 30, 2009 from 9:30 a.m. to 1:30 p.m.
  A meeting was scheduled for the afternoon of April 23rd.
  NOTE: The April 30th meeting has been rescheduled to May 21st.

B. **General Construction Permit –** Keith reported that notices are being prepared and he expects that the Permit will be released to the public at any time. Bill Flores added

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that he received an email from Sandy Matthews that the draft had in fact been released earlier that morning.

VIII. ***Open Discussion***

A. ***Santa Ana RWQCB –*** Jason inquired as to the status of the draft Santa Ana Permit. Keith advised him that it may be around June when the draft is released.

B. ***San Diego RWQCB*** – Not in attendance

C. ***U.S. EPA – Region IX –*** Not in attendance

D. ***Round Table –*** Jason thanked Sandy Caldwell for his work with the NPDES Program over the past several years and congratulated him on his retirement. Bill Flores inquired as to if the Permit would be implemented at the adoption hearing April 24th. Jason informed him that most permits are implemented about a year from their adoption. Keith added that there is a time schedule in the Permit to refer to. Jason informed the group that the CASQA Conference registration is open and if possible to budget this year for the 2010 conference.

IX. ***New Agenda Items / Schedule Next Meeting***

There were no agenda item requests from the group. Next meeting will be held May 21, 2009 at the Riverside County Flood Control District.

If there are any questions or items for the next meeting agenda, please contact the Flood Control District's NPDES Section at 951.955.4375. Suggestions are always welcome.

Please visit the "Only Rain Down the Storm Drain" Public Education Program website at: http://www.floodcontrol.co.riverside.ca.us/stormwater/. The site contains a variety of useful stormwater program information including links to other stormwater management programs and related websites.

X. ***Closed Session***

Permittees engaged in closed session discussion.

NEXT MEETING IS SET FOR:

THURSDAY, May 21, 2009 10:00 A.M.
AT
RIVERSIDE COUNTY FLOOD CONTROL DISTRICT
1995 Market Street Conference Room 1
Riverside, CA 92501

P8125223

MEETING AGENDA

NPDES
SANTA ANA / SANTA MARGARITA
TECHNICAL ADVISORY COMMITTEE

10:00 a.m. – 12:00 p.m. Thursday, May 28, 2009
Riverside County Flood Control District
1995 Market Street
Riverside, CA 92501

I. Introductions

II. Agenda Changes

III. Review of Minutes: April 23, 2009

IV. Announcements
- A. Permit Renewal Update
  - Status of Santa Ana OC Permit
  - Status of San Diego OC Permit
    - i. Next public workshop
- B. MSC Meeting Update
- C. 303(d) List update

V. Public Education Program – Florence Mowrer

VI. TMDL Progress Report – Claudio Padres
- A. Middle Santa Ana River Bacteria Indicator TMDL Update
  - Next Meeting – Wednesday, July 8, 2009 from 9:30 a.m. to 12:00 p.m.
- B. Lake Elsinore/Canyon Lake TMDL Update
  - Next Meeting – Tuesday, August 3, 2009 from 1:30 p.m. to 4:00 p.m.
- C. San Diego Lagoons TMDL/Investigation Order Update
  - Next Meeting – TBD

VII. Santa Ana/Santa Margarita Region Programs – Claudio Padres
- A. Stormwater Quality Standards Task Force Update
  - Next Meeting - TBD
- B. General Construction Permit

VIII. Open Discussion
- A. Santa Ana RWQCB
- B. San Diego RWQCB
- C. U.S. EPA – Region IX
- D. Round Table

IX. New Agenda Items/Schedule Next Meeting – June 25, 2009

Storm Water Clean Water PROTECTION PROGRAM

Member Agencies:

Banning
Beaumont
Calimesa
Canyon Lake
Cathedral City
Coachella
Coachella Valley Water District
Corona
County of Riverside
Desert Hot Springs
Hemet
Indian Wells
Indio
La Quinta
Lake Elsinore
Menifee
Moreno Valley
Murrieta
Norco
Palm Desert
Palm Springs
Perris
Rancho Mirage
Riverside City
Riverside County Flood Control District
San Jacinto
Temecula
Wildomar

NPDES
SANTA ANA / SANTA MARGARITA
TECHNICAL COMMITTEE
Meeting Minutes
for
May 28, 2009

Attendees:

Arlene Chun	Riverside County Flood Control District
Ann Iaali	Riverside County Flood Control District
Claudio Padres	Riverside County Flood Control District
Charlene Warren	Riverside County Flood Control District
Adriana Soares	Riverside County Transportation
Mike Roth	CRWQCB – Santa Ana Region
Bob French	City of Calimesa
Mike McCabe	City of Calimesa
Bob Bohan	City of Canyon Lake
Michele Hindersinn	City of Corona
Jeff Potts	City of Corona
Brad Kutzner	City of Menifee
Kent Wegelin	City of Moreno Valley
Bill Woolsey	City of Murrieta
Lori Askew	City of Norco
Susan Almanza	City of Perris
Rob Van Zanten	City of Riverside
Jessica Chin	City of Riverside
Sean Motlagh	City of San Jacinto
Aldo Licitra	City of Temecula
Ron Grider	City of Wildomar
Bill Flores	HDR
Nida Saleem	Whitson Contracting Management

I. *Introductions*

Claudio Padres welcomed everyone to the May 23, 2009 NPDES Santa Ana/Santa Margarita Technical Advisory Committee Meeting and initiated the self introductions of attendees.

II. *Agenda Changes*

Items D (CASQA) and E (General Meeting Webcast) was added under agenda item IV (Announcements).

Item C (303(d)) List Update was removed from the agenda.

Agenda Item X (Closed Session) was added to the agenda.

III. *Review of Minutes: April 23, 2009*

There were no changes to the meeting minutes. Minutes were approved.

Handouts and Materials Provided:

- May 28, 2009 Agenda, April 23,2009 Minutes, and Roster
- CASQA NewsFlash #s 2009-09 and 2009-10
- General Construction Permit Update

IV. *Announcements*

A. *Permit Renewal Update*

- **Status of Santa Ana OC Permit** – The Permit was adopted last week. During the adoption hearing the Regional Board provided clarification on some of the intent of the documentation regarding infiltration.
- **Status of San Diego OC Permit** – There was a workshop held May 26th that focused on LID provisions within the draft Permit. Changes were proposed during the workshop in an effort to gain more continuity between the Santa Ana and San Diego Regional Boards. There will be a public workshop July 1st. Comments are due to the Regional Board by June 19th.
    - Next public workshop - TBD

B. ***MSC Meeting Update –*** Claudio announced that he was not in attendance of the May 21st meeting; no update was provided.

C. ***303(d) List Update –*** No discussion. This item was removed from the agenda.

D. ***CASQA –*** CASQA is now offering a registration discount on the upcoming CASQA Conference if purchased by June 30th. The discounted cost is $399 versus the standard rate of $525.

E. ***General Meeting Webcast –*** The District hosted a webcast of CASQAs May 2009 General Meeting and will continue to host future CASQA meetings via webcast at the District office. Aldo inquired about CASQA offering a free webcast for day one of the conference only. Claudio will check on this and get back to Permittees.

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Mike Roth inquired as to if there was any interesting new research discussed on infiltration at the conference. Bill Flores provided a general overview of the meeting and informed Mike that there was discussion on rain water harvesting issues/concerns and that all presentations for the conference are available on CASQAs website. Permittees must login as a member to view them.

V. ***Public Education Program – Claudio Padres***

Claudio provided a status update on efforts of the Public Education Department events, brochures and materials.

- The are new lenticular magnets available and ready for pickup at the front counter for Permittees who have ordered them. Magnets were also made available at the meeting.
- No shop cloths or sponges available at the time/ Low inventory on air freshners
- Spring training in the Desert area May 28th / New training for CAP inspectors June 2nd/1 more WQMP training June 9th
- Volunteers needed to man the public education booth at the Southern California Fair in Perris
- Water Symposium in Palm Springs May 28th / Home and Garden Show May 29th – 31st at the Riverside Convention Center / Events in Canyon Lake on the 30th and Beaumont from the 4th - 7th
- District staff attended a presentation on pesticides given by SGA at the Moreno Valley Home Depot
- Stream Stabilization flyer still in production
- HHW schedule available; new schedule will be available August 2009

VI. ***TMDL Progress Report – Claudio Padres***

A. **Middle Santa Ana River Bacteria Indicator TMDL Update**

- **Next Meeting – Wednesday, July 8, 2009 from 9:30 a.m. to 12:00 p.m.**
  CDM is reviewing the workplan for the next fiscal year in which they will focus efforts to identify human fecal sources and potential BMPs to abate sources from two storm drains in San Bernardino County. CDM will be sending out a draft revision to the plan and requesting comments from the MSAR Task Force. The MSAR Task Force received approval from the State to move forward with grant project tasks but it unsure if grant reimbursement will go through because of state budget issues.

B. **Lake Elsinore/Canyon Lake TMDL Update**

- **Next Meeting – Tuesday, August 3, 2009 from 1:30 p.m. to 4:00 p.m.**
  They are evaluating EVMWD proposed revisions to the Permit for discharge to the Lake. There will be a hearing in July on the matter, date and time TBD.

C. **San Diego Lagoons TMDL/Investigation Order Update**

- Next Meeting – TBD
  Due to funding issues there is still discussion on weather or not SCCWRP will do the model as a 3rd party TMDL effort. QA and QC reports for the monitoring data are still being reviewed.

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VII. ***Santa Ana/Santa Margarita Region Programs – Claudio Padres***

A. **Stormwater Quality Standards Task Force Update**
Next Meeting: TBD – Claudio stated that he did not have the date for the next meeting. He added that REC II standards are still being reviewed and the first use attainability analyses (UAA) for the Santa Ana Delhi Channel is being done. This UAA will serve as the model for how future analyses will be done.

B. **General Construction Permit –** The Permit was released April 23rd. Albert Martinez, URS Corporation and Linda Nixon are working on a draft comment letter on the Permit. Comments will be out to Permittees the week of June 8th and due to State Board on June 17th. The Permit is tentatively scheduled for adoption in the Fall. A brief discussion of the grandfathering clause ensued briefly among the group, where under the current draft of the General Construction Permit, construction projects that are active upon adoption of the Permit will not be fully grandfathered and will have to meet some enhanced requirements of the new Permit. Claudio noted that it will be important to provide flexibility in municipal construction specifications to allow for compliance with the new Permit without requiring change-orders.

VIII. ***Open Discussion***

A. ***Santa Ana RWQCB –*** Mike informed the group that EPA has a new webpage for road BMPs in MS4s.

B. ***San Diego RWQCB*** – Not in attendance

C. ***U.S. EPA – Region IX –*** Not in attendance

D. ***Round Table –*** There was an inquiry as to if there was any update on the Riverside County MS4 Permit. Mike stated that the Permit is going up the Regional Board's chain of command and is similar to the Orange County Permit. Claudio added that to date there has been no release of the draft San Diego Permit. Bob Collacott noted that the existing Permit is still in effect until the new one is released.

IX. ***New Agenda Items / Schedule Next Meeting***

There were no agenda item requests from the group. Next meeting will be held June 25, 2009 at the Riverside County Flood Control District.

If there are any questions or items for the next meeting agenda, please contact the Flood Control District's NPDES Section at 951.955.4375. Suggestions are always welcome.

Please visit the "Only Rain Down the Storm Drain" Public Education Program website at: http://www.rcflood.org/stormwater/. The site contains a variety of useful stormwater program information including links to other stormwater management programs and related websites.

X. ***Closed Session***

Permittees engaged in closed session discussion.

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NEXT MEETING IS SET FOR:

THURSDAY, June 25, 2009 10:00 A.M.
AT
RIVERSIDE COUNTY FLOOD CONTROL DISTRICT
1995 Market Street Conference Room 1
Riverside, CA 92501

P8125554

MEETING AGENDA

NPDES
SANTA ANA / SANTA MARGARITA
TECHNICAL ADVISORY COMMITTEE

10:00 a.m. – 12:00 p.m. Thursday, June 25, 2009
Riverside County Flood Control District
1995 Market Street
Riverside, CA 92501

I. Introductions

II. Agenda Changes

III. Review of Minutes: May 28, 2009

IV. Announcements
- A. Status of San Diego OC Permit
- B. Status of Santa Ana Permit
- C. Whitewater NPDES MS4 Permit
- D. MSC Meeting Update
- E. New Website
- F. Annual Reports
- G. NPDES Training Program Update

V. Public Education Program – Florence Mowrer
- A. Curiosity Quest

VI. TMDL Progress Report – Albert Martinez
- A. Middle Santa Ana River Bacteria Indicator TMDL Update
  - Next Meeting – Wednesday, July 8, 2009 from 9:30 a.m. to 12:00 p.m.
- B. Lake Elsinore/Canyon Lake TMDL Update
  - Next Meeting – Monday, August 3, 2009 from 2:00 p.m. to 4:00 p.m.
- C. San Diego Lagoons TMDL/Investigation Order Update
  - Next Meeting – TBD

VII. Santa Ana/Santa Margarita Region Programs – Albert Martinez
- A. Stormwater Quality Standards Task Force Update
  - Next Meeting – Thursday, July 9, 2009 from 9:30 a.m. to 12:00 p.m.
- B. General Construction Permit

VIII. Open Discussion
- A. Santa Ana RWQCB
- B. San Diego RWQCB
- C. U.S. EPA – Region IX
- D. Round Table

IX. New Agenda Items/Schedule Next Meeting – July 23, 2009

Member Agencies:

Banning
Beaumont
Calimesa
Canyon Lake
Cathedral City
Coachella
Coachella Valley Water District
Corona
County of Riverside
Desert Hot Springs
Hemet
Indian Wells
Indio
La Quinta
Lake Elsinore
Moreno Valley
Murrieta
Norco
Palm Desert
Palm Springs
Perris
Rancho Mirage
Riverside City
Riverside County Flood Control District
San Jacinto
Temecula

NPDES
SANTA ANA / SANTA MARGARITA
TECHNICAL COMMITTEE
Meeting Minutes
for
July 24, 2008

Attendees:

Arlene Chun	Riverside County Flood Control District
Albert Martinez	Riverside County Flood Control District
Breanna Marcinek	Riverside County Flood Control District
Florence Mowrer	Riverside County Flood Control District
Penny Nanney	Riverside County Flood Control District
Claudio Padres	Riverside County Flood Control District
Glen Higa	Riverside County Transportation
Adriana Soares	Riverside County Transportation
Keith Elliott	CRWQCB – Santa Ana Region
Mike Roth	CRWQCB – Santa Ana Region
Ben Neill	CRWQCB – San Diego Region
John Wilder	City of Beaumont
Bob French	City of Calimesa
Mike McCabe	City of Calimesa
James Grimm	City of Canyon Lake
Michele Hindersinn	City of Corona
Jeff Potts	City of Corona
Phuong Hunter	City of Moreno Valley
Kent Wegelin	City of Moreno Valley
Farida Naceem	City of Murrieta
Lori Askew	City of Norco
Jessie Powell	City of Perris
Jessica Chin	City of Riverside
Tim King	City of Riverside
Al Pielin	City of Riverside
Michael Yasmer	City of Riverside
Sandy McKay	City of San Jacinto
Aldo Licitra	City of Temecula
Jamie Aderhold	J2A Environmental
Mark Baker	CONTECH Stormwater
Del Ross	EMARCD
Bill Flores	HDR
Bob Collacott	URS Corporation
Sean Motlagh	Tri Lake Consultants

I. *Introductions*

Albert Martinez welcomed everyone to the July 24, 2008 NPDES Santa Ana/Santa Margarita Technical Advisory Committee Meeting and initiated the self introductions of attendees. Claudio Padres was introduced as the new Santa Margarita Permit Manager for the District.

II. *Agenda Changes*

The following items were added to the agenda under IV- Announcements:

- Item C –CASQA Conference
- Item D – RFQ
- Item E – Water Quality Newsletter
- Item F – Annual Report

Agenda item X – Closed Session was added to the agenda.

III. *Review of Minutes: June 26, 2008*

There were no changes to the meeting minutes. Minutes were approved.

Handouts and Materials Provided:

- July 24, 2008 Agenda, June 26, 2008 Minutes, and Roster
- CASQA NewsFlash #s 2008-13 ~ 2008-14
- CASQA Conference (handout)

IV. *Announcements – Albert Martinez*

A. Permit Renewal Update – Keith Elliott announced that a draft of the Permit should be released by the end of 2008. The Permit is expected to be adopted early 2009.

B. Notice of Violation – The County of Riverside and the City of Temecula received NOVs from the San Diego Regional Board. Albert noted that the County has responded to the Regional Board regarding the NOV and Temecula was currently working on their response.

C. CASQA Conference – CASQA Conference is scheduled for September 22-24, 2008 at the Oakland Marriot Center. See handout provided at meeting for more information.

D. RFQ – Albert announced that the District released a Request for Qualifications (RFQ) for On-Call National Pollutant Discharge Elimination System (NPDES) Regulatory Compliance and Ancillary Professional Services July 7th and all Statement of Qualifications are required to be submitted to the District by August 21st.

E. Water Quality Newsletter – Anyone interested in the newsletter (Urban and Highway Stormwater Runoff) created by G. Fred Lee can see Albert Martinez for a copy.

F. Annual Report – Santa Ana Region annual reporting forms are due to go out to Permittees in the next several weeks.

V. *Public Education Program – Arlene Chun*

Florence Mowrer emailed Permittees the July 2008 Public Education Report for the Santa Ana Watershed and the July Santa Ana Watershed Stormwater Classroom Presentations summary on July 23rd. Please refer to these documents for public education information.

VI. *TMDL Progress Report – Arlene Chun*

***A.* Middle Santa Ana River Bacteria Indicator TMDL Update**

- Next Meeting - Thursday, September 4, 2008 – 1:30 p.m. to 4:00 p.m.
  Arlene reported that work is being done on the Box Springs Source Assessment and by luck a cross connection into a 18 inch strom drain was found on the grounds of Riverside Community College (RCC) that fed into the channel. That connection has since been severed, sanitized and 2 bacteriodes tests have been ran and have come back negative.

  Bob Collacott noted that RCC is a school district and is not under the jurisdiction of Permittees.

B. **Lake Elsinore/Canyon Lake TMDL Update**

- Next Meeting – Tuesday, August 26, 2008 - 1:30 p.m. to 4:00 p.m.
  There was nothing reported on this TMDL.

C. **San Diego Lagoons TMDL/Investigation Order Update**

- Next Meeting – USBR, Wednesday, August 13, 2008 - 1:30 p.m. to 3:30 p.m.
  The August 13th meeting is scheduled to be held via conference call. The following were briefly discussed:
- CDM will be speaking with Steve Carter (Tetra Tech) regarding bathymetry data
- Inlet survey on the 18th
- Problems with academic labs
- Invoices will be sent out around September [Note: as of 8/19 meeting there will be no additional invoices for this fiscal year]
- Transect sampling taking place July 24th
- Index 3 sampling taking place week of July 21st

VII. ***<u>Santa Ana/Santa Margarita Region Programs – Albert Martinez</u>***

A. **Stormwater Quality Standards Task Force Update**

- Next Meeting: Thursday, September 4, 2008 from 9:30 a.m. to 1:30 p.m.
  The discussion topic of the September 4th meeting will be wet weather exemption. Albert informed the Permittees that if they have opinions they should attend the meeting.

B. ***General Construction Permit***

- June 4, 2008 Hearing ~ Keith reported that comments are still being reviewed and he had no date as to when a draft will be released.

VIII. ***<u>Open Discussion</u>***

A. ***Santa Ana RWQCB –*** No comments

B. ***San Diego RWQCB*** – Ben Neill informed the group that the Writ of Mandate does not cover the San Diego Region and they will not be making any changes as to how their Board is working. He noted that the Board's lawyers will handle the Writ of Mandate. Ben added that the Board will go forward with the Orange County Permit and expects the Riverside County Permit to look like the Orange County Permit.

C. ***U.S. EPA – Region IX –*** Not present

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D. ***Round Table –*** Inquiry was made as to how the Santa Ana Regional Board perceives the Writ of Mandate. Keith noted that management is still looking into the matter.

An announcement was made stating that SAWPA is sponsoring a Regional Watershed Planning meeting July 26th at 2:00 p.m. at the Sunkist Center in Riverside.

IX. ***New Agenda Items / Schedule Next Meeting***

There were no agenda item requests from the group.

If there are any questions or items for the next meeting agenda, please contact the Flood Control District's NPDES Section at 951.955.4375. Suggestions are always welcome.

Please visit the "Only Rain Down the Storm Drain" Public Education Program website at: http://www.rcflood.org. The site contains a variety of useful stormwater program information including links to other stormwater management programs and related websites.

NEXT MEETING IS SET FOR:

THURSDAY, August 28, 2008 10:00 A.M.
AT
RIVERSIDE COUNTY FLOOD CONTROL DISTRICT
1995 Market Street
Riverside, CA 92501

X. ***Closed Session***

Permittees engaged in a closed session discussion.

Storm Water Clean Water PROTECTION PROGRAM

Member Agencies:

Banning
Beaumont
Calimesa
Canyon Lake
Cathedral City
Coachella
Coachella Valley Water District
Corona
County of Riverside
Desert Hot Springs
Hemet
Indian Wells
Indio
La Quinta
Lake Elsinore
Menifee
Moreno Valley
Murrieta
Norco
Palm Desert
Palm Springs
Perris
Rancho Mirage
Riverside City
Riverside County Flood Control District
San Jacinto
Temecula
Wildomar

NPDES
SANTA ANA / SANTA MARGARITA
TECHNICAL COMMITTEE
Meeting Minutes
for
June 25, 2009

Attendees:

Arlene Chun	Riverside County Flood Control District
Ann Iaali	Riverside County Flood Control District
Albert Martinez	Riverside County Flood Control District
Claudio Padres	Riverside County Flood Control District
Jason Uhley	Riverside County Flood Control District
Charlene Warren	Riverside County Flood Control District
Glenn Higa	Riverside County Transportation
Steve Horn	Riverside County Facilities Management
Adriana Soares	Riverside County Transportation
Keith Elliott	CRWQCB – Santa Ana Region
Mike Roth	CRWQCB – Santa Ana Region
Mark Grey	BIA Southern California
Kishen Prathivadi	City of Beaumont
Bob Bohan	City of Canyon Lake
Michele Hindersinn	City of Corona
Kent Wegelin	City of Moreno Valley
Mark Westover	City of Moreno Valley
Bill Woolsey	City of Murrieta
Lori Askew	City of Norco
Susan Almanza	City of Perris
Rob Van Zanten	City of Riverside
Jessica Chin	City of Riverside
Billie Bryant	City of San Jacinto
Aldo Licitra	City of Temecula
Ron Grider	City of Wildomar
Bob Collacott	URS Consulting
Del Ross	EMARCD
Mark Baker	CONTECH Stormwater
Nida Saleem	Whitson Contracting Management

I. *Introductions*

Jason Uhley welcomed everyone to the June 25, 2009 NPDES Santa Ana/Santa Margarita Technical Advisory Committee Meeting and initiated the self introductions of attendees.

II. *Agenda Changes*

Agenda item X (Closed Session) was added to the agenda.
Agenda item H (Santa Ana Bioassessment) was added under IV (Announcements).

III. *Review of Minutes: May 28, 2009*

There were no changes to the meeting minutes. Minutes were approved.

Handouts and Materials Provided:

- June 25, 2009 Agenda, May 25, 2009 Minutes, and Roster
- CASQA NewsFlash #s 2009-11 and 2009-12

IV. *Announcements*

A. *Status of San Diego OC Permit* – Claudio Padres announced that the draft amendment of the San Diego OC Permit had been released and was emailed to the Santa Margarita Permittees. There is a Board hearing (not adoption hearing) July 1st. Jason briefly discussed the Permit and Permittee request to the San Diego Regional Board that Riverside County's existing MS4 Permit be used as the basis for a new MS4 Permit. The Regional Board staff had previously indicated that the OC Permit would serve as the template. There has been no response from the Regional Board on the matter as of yet. High priority items of concern in the OC Permit are the landscape irrigation prohibition LID provisions, MALs, and NELs.

B. *Status of Santa Ana Permit* – Keith announced that the draft San Bernardino County MS4 Permit is moving forward and expected to be released prior to the draft Riverside County MS4 Permit. The following items were touched on.

- San Bernardino County adoption hearing in October
- July public hearing workshop for San Bernardino County and August public hearing workshop for Riverside County. Subsequently, the workshop for the San Bernardino County MS4 Permit has since been postponed to August 3rd and will now discuss both San Bernardino County and Riverside County MS4 Permits
- Status of Appeal of OC Permit
- Expect late July early August to be real busy
- Pre-review draft may possibily be available early/mid July
- San Bernardino Draft Permit expected be available on the Regional Board's website June 26th
- Jason to contact Michael Adakapara to get a more definitive schedule for the Permit.

C. *Whitewater NPDES MS4 Permit* – The Whitewater Permit was adopted May 2008. Permittees were required to have the SWMP Implemented by June 15, 2009. The Whitewater Region is now implementing WQMP requirements. Jason noted that the

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Colorado River Regional Board will take action on the SWMP within the next few months.

D. ***MSC Meeting Update –*** The last MSC meeting was held May 21st. The meeting was very short as Permittees are awaiting the release of the Santa Ana MS4 Permit. The next meeting is set for October 15th; this meeting may be moved up to an earlier date pending the release of the Santa Ana MS4 Permit.

E. ***New Website –*** Ann Iaali gave a demonstration of the District's new NPDES website. Several Permittees suggested that NPDES Stormwater staff contact information for the cities be included on the webpage. Ann will follow up on comments and suggestions provided by Permittees.

F. ***Annual Reports –*** Albert informed Permittees that the Annual Reporting Forms will be going out in the next 2 weeks and is asking that the Annual Reports be submitted a little early this year. Santa Margarita reporting forms will be going out early as well.

G. ***NPDES Training Program Update –*** The District has completed its annual Spring training. Fall training will be offered in the next several months. Claudio Padres discussed changes to the training courses and the streamlining of the presentations. Permittees were advised to contact Claudio should they have any ideas, suggestions, or comments on bettering the training program. He briefly reported on some of the changes to training, noting that one of the biggest changes so far is the WQMP updates. Permittees who would like to be involved with the restructuring of the training program should coordinate with Claudio. Certificates were provided at the meeting for several city staff members who attended the Spring training.

H. ***Santa Ana Bioassessment Program – Santa Ana Bioassessment Program –*** Arlene explained that the District coordinates with the Stormwater Monitoring Coalition (SMC) and the program has been in development over the last 3-4 years. This bioassessment program is a regional effort from Ventura County south to San Diego County and east to San Bernardino and Riverside Counties, with SCCWRP as the lead/coordinating agency. This regional bioassessment program parallels the State Board's Perennial Stream Assessment that is taking place statewide under SWAMP. The SMC program requires that all stream reaches being assessed must be flowing *through* September so that SMC results will be comparable to SWAMP's results. This program is part of the Santa Ana MS4 Permit requirements.

In Riverside County, the 1st year of a 5-year sampling plan began Monday, June 22nd. There are 3 sites in the Middle Santa Ana Region – SAR downstream of Hamner and 2 sites on Cucamonga Creek. 2 sites in the San Jacinto Watershed, both in Perris Valley Channel and 1 site in the Santa Margarita Region – Temecula Creek under the I-15 bridge. Each site is assessed with SWAMP protocols (bioassessment – physical habitat, algae/periphyton, bugs), California Rapid Assessment Method (CRAM), water column toxicity, metals, conventional parameters, etc. There will be 6 new sites assessed each year of the program. Mike Roth inquired about dry stream analysis;

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SCCWRP is conducting a separate study on these streams. Jason noted that ambient stream conditions will be compared.

V. *Public Education Program – Jason Uhley*

A. *Curiosity Quest* – Albert sent Permittees a request to provide information for possible homes in their city that exemplified xerascaping, artifical turf or water efficient landscaping. Three homes were chosen, one in each of the cities of Moreno Valley, Corona, and Rialto which will be highlighted in the show. Hosts of the show will be taking a look at proper carwash, pool, and pet management. The show will air on PBS and Permittees can use the 2-5 minute segments for their local public access channels. DVD copies of the episode will be provided to Permittess. Jason thanked Permittees for their contributions to the home findings.

VI. *TMDL Progress Report – Jason Uhley*

A. Middle Santa Ana River Bacteria Indicator TMDL Update

- **Next Meeting – Wednesday, July 8, 2009 from 9:30 a.m. to 12:00 p.m.**
  The Source Assessment Plan is being put together for the 2009/2010 fiscal year. Permittees who are a part of this TMDL and have not had a chance to take a look at the plan need to review the plan and be ready to provide comments at the July 8th meeting. It is important in that the plan establishes the procedures Permittees will be using from this year forward.

B. Lake Elsinore/Canyon Lake TMDL Update

- **Next Meeting – Monday, August 3, 2009 from 2:00 p.m. to 4:00 p.m.**
  The Bioassessment Program is being put together to conduct lake monitoring. The Regional Board is proposing to update the EVMWD discharge Permit that allows them to discharge reclaimed water into Lake Elsinore. This is something that needs to be watched carefully because the language incorporated into their Permit is likely to be incorporated into our Permit. More discussion during closed session.

C. San Diego Lagoons TMDL/Investigation Order Update

- Next Meeting – TBD
  Arlene stated that the final data use ability and assessment review has been put together. There were extensive comments provided by the Navy, Marines, and San Diego County and will be submitted to the Regional Board on the 30th.

VII. *Santa Ana/Santa Margarita Region Programs – Albert Martinez*

A. Stormwater Quality Standards Task Force Update

- **Next Meeting – Thursday, July 9, 2009 from 9:30 to 12:00 p.m.**
  The issue of how the Task Force is going to set a numeric standard has been a concern. The proposed solution is to not include a water quality objective number in the REC 2 objective however, the Task Force is going to put a numeric antidegregation number in the objective. Jason talked further of the possible directions in which this may be approached.

B. General Construction Permit

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Albert informed the group that a GCP comment letter was emailed to Permittees June 24, 2009 and thanked all who provided comments. The group discussed comments that were addressed in the letter.

VIII. ***Open Discussion***

A. ***Santa Ana RWQCB –*** Keith reiterated that the MS4 Permit is a high priority at this time.

B. ***San Diego RWQCB*** – Not in attendance

C. ***U.S. EPA – Region IX –*** Not in attendance

D. ***Round Table –*** Mark Grey of BIA thanked the District for their work efforts and comments submitted on the OC Permit. He briefly discussed BIA's position on the OC Permit.

Jason reported that the design of the District's LID compound is about 95% complete. The entire facility will be retrofitted to require LID BMPs prior to discharge from any of the discharge points.

IX. ***New Agenda Items / Schedule Next Meeting***

There were no agenda item requests from the group. Next meeting will be held July 23, 2009 at the Riverside County Flood Control District.

If there are any questions or items for the next meeting agenda, please contact the Flood Control District's NPDES Section at 951.955.4375. Suggestions are always welcome.

Please visit the "Only Rain Down the Storm Drain" Public Education Program website at: http://www.rcflood.org/stormwater/. The site contains a variety of useful stormwater program information including links to other stormwater management programs and related websites.

X. ***Closed Session***

Permittees engaged in closed session discussion.

NEXT MEETING IS SET FOR:

THURSDAY, July 23, 2009 10:00 A.M.
AT
RIVERSIDE COUNTY FLOOD CONTROL DISTRICT
1995 Market Street Conference Room 1
Riverside, CA 92501

P8126095

SMREMT MEETINGS

SANTA MARGARITA RIVER WATERSHED EXECUTIVE MANAGEMENT TEAM

AGENDA

February 18, 2009
1:30 – 3:30 PM

Location: Bureau of Reclamation, Southern California Area Office
27708 Jefferson Avenue, Suite 202
Temecula, CA 92590
Phone: 951 – 695 – 5310

1:30	**Introductions**
1:35	**Review Meeting Objectives:** 1- Update group on Lagoon & Mainstem projects 2- RWQCB position for a SMR 3rd party TMDL 3- Clarify group's position on a watershed project relative to: a. WEF-USEPA discussion i. Sidebar 1 on page 7 ii. Sidebar 3 on page 9 iii. Sidebar 4 on page 10 b. SWRB's draft recycled water policy – salt-nutrient management plans c. Extent / Scope of watershed project d. Merging / Keep separate the lagoon study 4- Identify opportunities to move project forward in 2009-2010
1:45	**Discussion:** 1. Project Updates 2. Overview: 3rd Party TMDL Formation 3. SMR Watershed project – direction, scope, group position 4. Upcoming Opportunities 5. Next Steps
3:30	**Summary**

Meeting Agenda

SANTA MARGARITA RIVER WATERSHED
EXECUTIVE MANAGEMENT TEAM

August 20, 2008
10:00 – 12:00 PM

U.S. Bureau of Reclamation
Southern California Area Office
27708 Jefferson Avenue, Suite 202
Temecula, CA 92590
(951) 695-5310

1. Introductions

2. General Update
   a. WQMG
   b. Stakeholder Meeting
   c. Studies – Lagoon & Mainstem
   d. Phase 4

3. MOA Review

4. Phase 4 Scope of Work

5. Next Steps / Meeting

LAGOON MEETINGS

Meeting Agenda

Santa Margarita River Watershed

Executive Order Lagoon TMDL Sampling

July 15, 2008
10:00 AM to 12:00 PM

U.S. Bureau of Reclamation
Southern California Area Office
27708 Jefferson Avenue, Suite 202
Temecula, CA 92590
(951) 695-5310

1. Introductions

2. Contractor Update

   a. Index 3
   b. Inlet Survey
   c. Field & Lab data – QA
   d. Bathymetry: 2007 aerial v. 2002 work

3. MOA / Next invoices

4. Other

5. Next Meeting:

   August 19 2008 – 10:00 AM to 12:00 PM

Meeting Agenda
Santa Margarita River Watershed

Executive Order Lagoon TMDL Sampling

August 19, 2008

10:00 AM – 12:00 PM

U.S. Bureau of Reclamation
Southern California Area Office
27708 Jefferson Avenue, Suite 202
Temecula, CA 92590

I. Introductions

II. Main Issue: Discuss storm channel discharge into the lagoon that Pendleton staff estimates at approx 6-7 GPM and it is high in nitrate/nitrites and how this may impact the current monitoring program and model.

III. LIDAR

IV. Cost-Sharing

V. Other business
   a. TDN/TN values
   b. 3rd Storm

VI. Next meeting

Meeting Agenda
Santa Margarita River Watershed

Executive Order Lagoon TMDL Sampling

September 17, 2008

10:00 AM – 12:00 PM

U.S. Bureau of Reclamation
Southern California Area Office
27708 Jefferson Avenue, Suite 202
Temecula, CA 92590

I. Introductions

II. Monitoring Update

III. Lagoon outfall pipe

IV. Next steps (i.e., discharge has stopped & only 1 sampling event occurred…is/was this a significant nutrient loading)

V. Next meeting

Meeting Agenda
Santa Margarita River Watershed

Executive Order Lagoon TMDL Sampling

October 14, 2008

10:00 AM – 12:00 PM

U.S. Bureau of Reclamation
Southern California Area Office
27708 Jefferson Avenue, Suite 202
Temecula, CA 92590

I. Introductions

II. Monitoring Update

III. Data Submittal

IV. Upcoming Wet Season

V. Next meeting

Meeting Agenda

Santa Margarita River Watershed

Executive Order Lagoon TMDL Sampling

November 18, 2008
10:00 AM to 12:00 PM

U.S. Bureau of Reclamation
Southern California Area Office
27708 Jefferson Avenue, Suite 202
Temecula, CA 92590
(951) 695-5310

1. Introductions

2. Contractor Update

   a. Lab data
   b. Weather forecast

3. Q & A

4. Next Meeting:

   December 16 2008 – 10:00 AM to 12:00 PM

MEETING AGENDA

California Regional Water Quality Control Board
San Diego Region

Lagoons Monitoring Data Reporting

Thursday, December 18, 2008
1:30 – 3:30 p.m.
City of Escondido, Training Room #1

I. Introductions/Meeting Overview (*Wayne Chiu*)

II. Recap of lagoons conceptual models and monitoring work plan development (*Martha Sutula*)

III. Update on SCCWRP studies and related projects (*Martha Sutula*)

IV. Data quality issues (*Martha Sutula/Wayne Chiu/Consultants*)
-Laboratory analytical data
-Field data

V. Data reporting elements and format (*All*)

VI. Current status and next steps of lagoons modeling and development of TMDLs (*Wayne Chiu/All*)

VII. Next steps

Escondido City Hall
201 North Broadway

020214

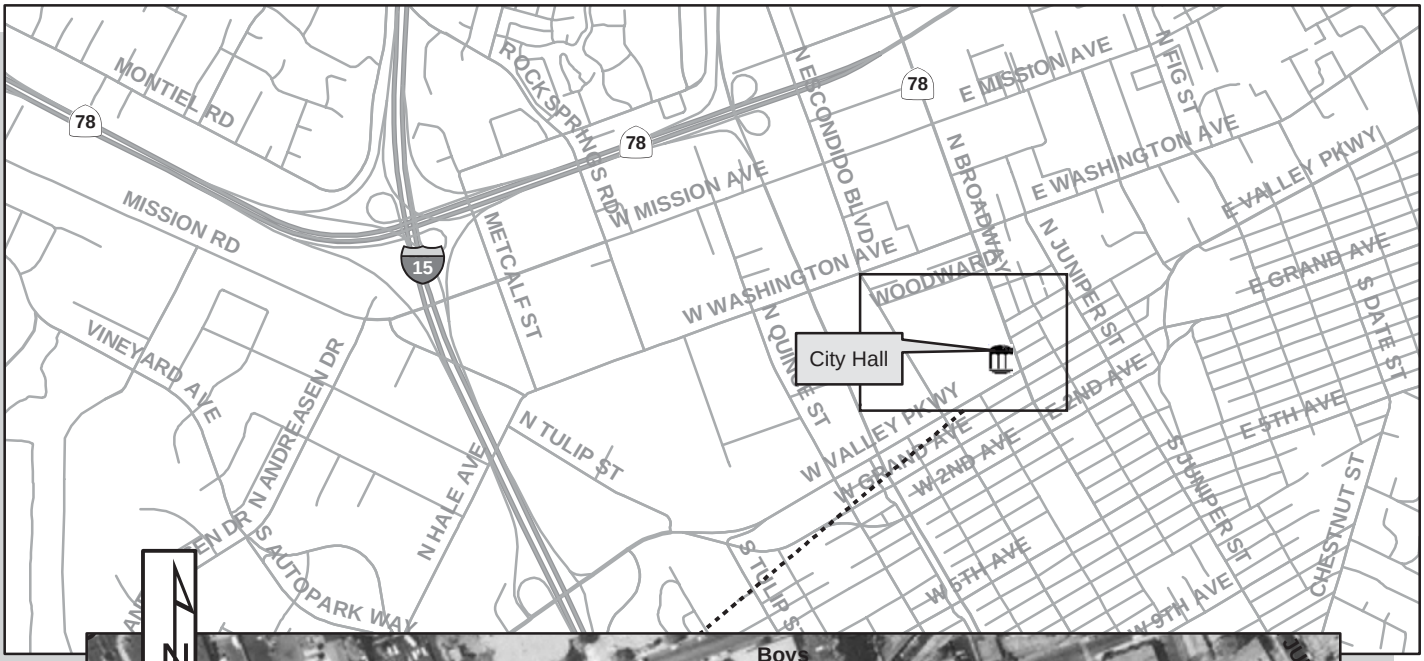

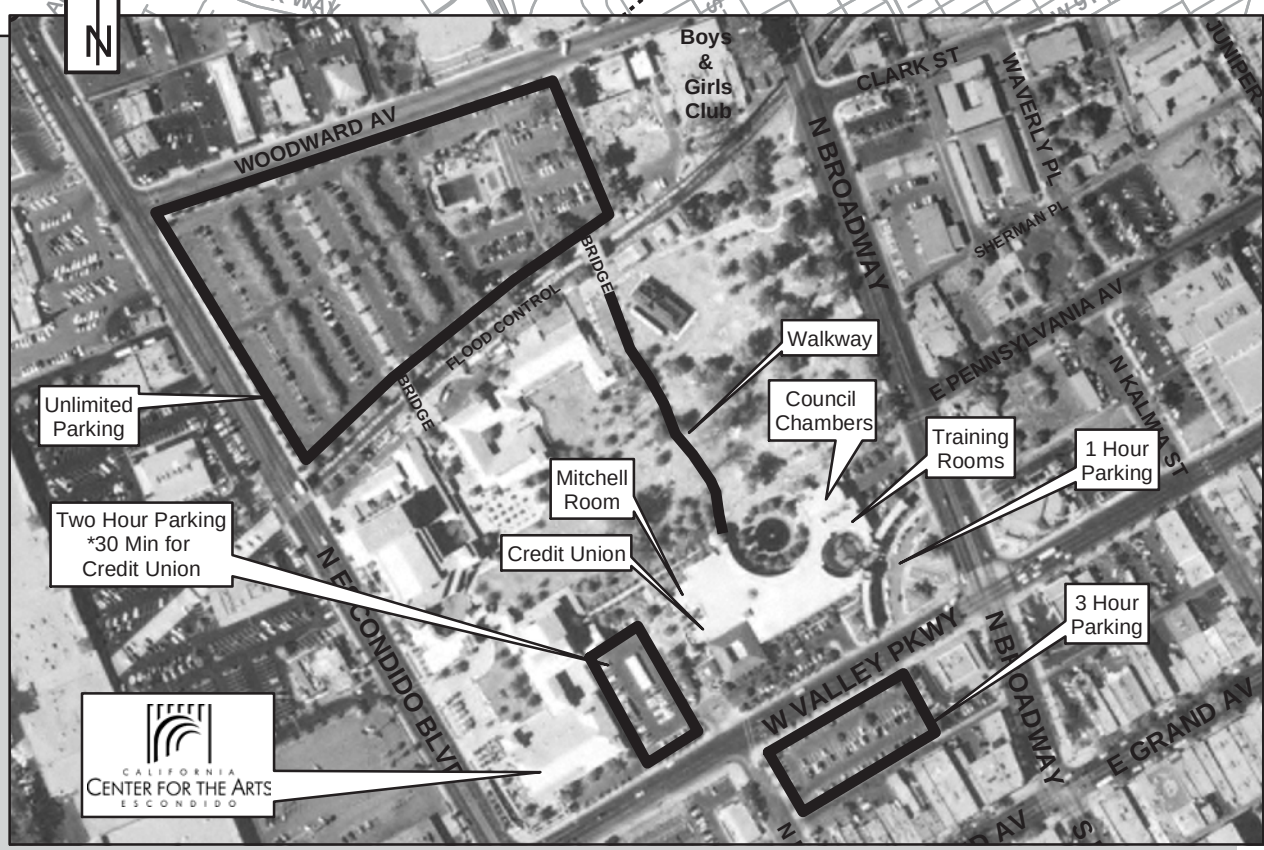

Directions:

From Interstate 15:

Take Valley Parkway (Downtown) exit and head east. When Valley Parkway crosses over Centre City Parkway it becomes Second Avenue. Turn left onto Escondido Blvd. Cross over Valley Parkway, turn right into the parking lot just after the CA Center for the Arts.

From Highway 78:

Continue east on Highway 78 into Escondido. When 78 ends at the light, turn right on Broadway. Just past Washington Ave, turn right on Woodward Ave. The parking lot is on the left, just on the other side of the Boys & Girls Club.

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Meeting Agenda
Santa Margarita River Watershed

Executive Order Lagoon TMDL Sampling

December 19, 2008

10:00 AM

I. Introductions

II. 3rd Storm Sampling Update

III. Data reporting update from Regional Board meeting 12/18/08

IV. 3rd Party TMDL Alternative

V. Funding Prop 84 SW grant.

VI. Other business.

Meeting Agenda
Santa Margarita River Watershed

Executive Order Lagoon TMDL Sampling

January 20, 2009

10:00 AM – 12:00 PM

U.S. Bureau of Reclamation
Southern California Area Office
27708 Jefferson Avenue, Suite 202
Temecula, CA 92590

I. Introductions

II. Data Submittal

III. Next meeting

SANTA MARGARITA RIVER WATERSHED EXECUTIVE MANAGEMENT TEAM

AGENDA

February 18, 2009
1:30 – 3:30 PM

Location: Bureau of Reclamation, Southern California Area Office
27708 Jefferson Avenue, Suite 202
Temecula, CA 92590
Phone: 951 – 695 – 5310

1:30	**Introductions**
1:35	**Review Meeting Objectives:** 1- Update group on Lagoon & Mainstem projects 2- RWQCB position for a SMR 3rd party TMDL 3- Clarify group's position on a watershed project relative to: a. WEF-USEPA discussion i. Sidebar 1 on page 7 ii. Sidebar 3 on page 9 iii. Sidebar 4 on page 10 b. SWRB's draft recycled water policy – salt-nutrient management plans c. Extent / Scope of watershed project d. Merging / Keep separate the lagoon study 4- Identify opportunities to move project forward in 2009-2010
1:45	**Discussion:** 1. Project Updates 2. Overview: 3rd Party TMDL Formation 3. SMR Watershed project – direction, scope, group position 4. Upcoming Opportunities 5. Next Steps
12:00	**Summary**

Meeting Agenda
Santa Margarita River Watershed

Executive Order Lagoon TMDL Sampling

April 1, 2009

10:00 AM – 12:00 PM

U.S. Bureau of Reclamation
Southern California Area Office
27708 Jefferson Avenue, Suite 202
Temecula, CA 92590

I. Introductions

II. Review Draft Report and Data

III. Provide Comments/Feedback

IV. Next Steps

a. Final Report
b. Data Submittal
c. Modelling

V. Open Discussion

VI. Additional meeting(s)

Meeting Agenda
Santa Margarita River Watershed

Executive Order Lagoon TMDL Sampling

June 11, 2009

10:00 AM – 12:00 PM

U.S. Bureau of Reclamation
Southern California Area Office
27708 Jefferson Avenue, Suite 202
Temecula, CA 92590

I. Introductions

II. Review DUAR

III. Provide Comments/Feedback

SMC MEETINGS

Stormwater Monitoring Coalition Steering Committee
Meeting Agenda
September 9, 2008
10:00 a.m. – 12:30 p.m. (Pacific Time)
at
Riverside County Flood Control and Water Conservation District
1995 Market Street, Riverside, CA 92501

http://maps.yahoo.com/maps_result?addr=1995+Market+Street%2C&csz=Riverside%2CCA+92501&country=us&new=1&name=&qty=

Conference Call In: (913) 227-1219, Code 425157

1. Introductions, meetings and announcements

2. Update on SMC website - Chris Crompton (County of Orange)

3. SMC Annual Report – Ken Schiff (SCCWRP)

4. Agreements – Chris Crompton
    a. Distribution of SMC Master Agreement D06-049
    b. Distribution of Low Impact Development (LID) Agreement D06-051
    c. Distribution of SMC Research Agenda Agreement D07-025
    d. Implementation of regional bioassessment program D08-026
    e. Toxicity amendment to laboratory intercalibration study

5. Ongoing project updates (as necessary)
    a. LID project status – Matt Yeager (SB County Flood)
    b. Hydromodification project status – Eric Stein (SCCWRP)
    c. Post-fire monitoring – Eric Stein
    d. Other projects

6. Future projects
    a. Follow-up discussion on proposed projects for 2008-09
        i. Trash and debris monitoring approaches and protocols
        ii. New intercalibration constituents
        iii. Stormwater data compilation study
        iv. BMP effectiveness testing
    b. SMC members are invited to present future projects for consideration

7. Committee member items

8. Next Meeting

Southern California Stormwater Monitoring Coalition
Steering Committee Meeting Agenda
December 9, 2008
10:00 a.m. –2:00 p.m. (Pacific Time)
at
Southern California Coastal Water Research Project
3535 Harbor Blvd, Costa Mesa, CA 92626
Conference Call In: see separate attachment

1. Introductions, meetings and announcements
   Minutes – send comments to Ken if any.

2. Update on SMC website - Chris Crompton (County of Orange)
   LID manual section updated (12/8/08) – password protected (see email).
   Need links to organization pages. **Request from those who have not submitted.**

3. Agreements – Chris Crompton
   a. Approval status of Low Impact Development (LID) Agreement D06-051
      - Approved—San Diego, Ventura, Riverside, Orange, CASQA, SCCWRP, SMC, San Bernardino
      - County of LA – working on it.
      - City of LA (will not be able to contribute this time around)
      - City of Long Beach (still working on it)
      - Request signature pages from Regional Boards
   b. Final review of SMC Research Agenda Agreement D07-025
      - Small functional update; cost decreased slightly
      - City of LA is in!
      - **Email Chris confirmation that parties are onboard by 12/19/08**
      - Thought: perhaps add planner onto selection of panel members (Jimmy). Send Ken names of potential experts & he will contact them.
   c. Final review of Regional Bioassessment Agreement D08-026
      - 3rd draft. See email from this morning.
      - Title change;
      - Pages 2-3 – addition of language "to incorporate the BIOASSESSMENT PROGRAM in stormwater permits in place of current bioassessment programs" (Arne suggestion)
        - Perhaps add "municipal"? Dependent perhaps on Caltrans' participation

- Q: what is intent of language addition? A: Puts in writing the intent of REPLACING this bioassessment program with MS4 requirements.
- Add SWRCB? Mesh SWAMP with this program – additional funds (Ken). SWAMP/SWRCB participation/depth of intent seems weak in the agreement. **Talk to SWAMP/SWRCB to draft "Whereas" portion (Ken).** Great idea to have State as a signatory; however, execution in timely fashion may take a while. **Also, "whereas" for RB coordination.**
- Need to act on this agreement quickly (Spring 09); otherwise allocated RB funds may be spent elsewhere

- S 14. Reorganization.
- Ex. B: List of participating agencies. Commit today if possible. Xavier, Chris & Matt will get together w/ City of LA (Sharam) before Christmas to see where they are at. **City of LA.**
- **Long Beach** – answer next week (1/2 share)
- Co. LA – on board
- Caltrans – dep. on what's on permit. Perhaps next week.
- San Diego Co. – On board. Permittees voted to be on board; but awaiting formal Permit amendment (trade w/ other permit requirements).
- LA Sanitation – not in. Talk to San Gabriel WS Council. Let's not add them now, but if money comes in, then great.
- (Jimmy) Data made public? As long as data is available, then its ok w/ Jimmy. Regional program – 1st year report, annual progress reports, final report? Appendix A Table – it's flexible enough. Bioassessment WG will determine what should be in the reports.
- [ABC note: Jimmy asked if Riverside is on board. Told him yes.]
- **FAST-TRACK! GET CHRIS ANY COMMENTS IN NEXT 2 WEEKS.**

d. Toxicity amendment to Laboratory Intercalibration Agreement D-05-022
- Exhibits C&D (first draft).
- Billings for Year 2 going out today.
- Sent out as scope some time back.
- A similar toxicity calibration was done on sediment samples during the BIGHT program.
- 2 species: 1 marine, 1 freshwater.
- Recalibration (similar to chemistry labs)? Number of Toxicity labs small and do not have high turnover. Let's do one for now; of course, more is better.
- Can add members since we are doing an amendment (current list on 1st page of Ex. C)
- **Please review and give Ken feedback; discussion at next meeting.**

4. Ongoing project updates (as necessary)

a. LID project status – Matt Yeager (SB County Flood)
- Matt's LID powerpoint (see email)
  - i. Draft Manual (**comments due Jan. 9, 2009**); Chapter 9(?) takes a long time to load – give it time. Final draft target: July 2009.
- **Arlene: Pre-testing this winter for pre-bmp retrofit (TALK TO JASON/MIKE CAIRNS/MATT RICH).**
- LGC presentation (Ventura County): "Reviewing Codes – Now What?"

i. Draft is done, but waiting for feedback/comment from Ventura. Early 2009 – out with product hopefully. (Email: nisenson@gmail.com (sp?))
ii. Opportunity? Work with planning and zoning to insert LID even where less that 5000sf disturbance occurs.

- Thoughts: What could be a potential project? What do we need to do to implement (perhaps) the LGC findings to make LID work? Do we take the findings/draft codes to a City?
- (Xavier) Leave the permit aside. While the permit may be a catalyst, the SMC is interested in moving forward with LID now. (Matt/Chris) We need prioritization of the 130 LGC findings. (LGC) Perhaps start with local manuals? (Chris) Regional approaches that are common to all SMC members may be a good start for this SMC. Could LGC perhaps propose a scope for a future project w/ the SMC? (LGC) Need to talk to colleagues & see what happens in Ventura. Matt has a good point, though. (X) Need to include the other 5 counties as the SMC is a regional organization; need for most regional benefit. (M) Evaluate plans of each county (6). (C) Take findings of Ventura and work from there; there may be commonality among all 6 counties.

b. Hydromodification project status – Ken Schiff (SCCWRP)
- Add-on to original hydromod proj (identify which streams at greatest risk; what are effects of hydromodification (& develop modeling tools to identify risk factors); what are potential mgmt actions/screening tools for these at risk locations. Eric Stein is lead. Completed GIS tools. Perhaps present screening tool at March meeting. **Looking for volunteer counties for field validation in summer. Ask Jason & verify w/ Ken.**

c. Post-fire monitoring – Ken Schiff
- In collaboration w/ Co. San Diego. Workshop in August 2008. Eric has draft report and will be out for review soon. Haven't been able to take advantage of recent fires (LA County). We can go ahead and take advantage of these recent fires if we want to. Draft may be on website soon.
- Thoughts/suggestions: Address multi-county fires. Kit of minimum requirements of what to do.

d. Laboratory Intercalibration – Ken Schiff
- **Invoices out. RCFC—Invoice #1743**
- Moving forward to invite labs to participate in the intercalibration study. **Review and send comments to Ken**. Letter will be sent out
- SS, nutrients/metals, pyrethroids (water/sediment?), OP pesticides. How about PAHs & chlorinated pesticides? Agreement has OP/chlorinated pesticides. Would need to add/amend for pyrethroids.
- Going w/ OP & chlorinated.

e. Stormwater data compilation study – Ken Schiff
- Handout ("Bight '08 Offshore Water Quality Monitoring Storm Water Update")
- SCCWRP compiles now.
- Mass emissions for POTWs calculated (POTWs send SCCWRP samples monthly) & reported in SCCWRP's annual reports. Will be starting for stormwater (nutrients will be first test). However, not everyone measures the same thing. BIGHT '08 program: stormwater data was received (extra sample, SCCWRP-analyzed); good timing w/ this data compilation.

f. Other projects – none to discuss.

5. Future projects - Follow-up on proposed projects
    a. Trash and debris monitoring approaches and protocols – Arne Anselm & Ted von Bitner
        - There's a SWAMP standard, modified slightly by each implementing entity (usually for receiving waters).
        - Ted's presentation (OC monitoring project in Fullerton Creek).
        - (Chris) Could this be a BMP effectiveness project versus a Trash Characterization study? OC findings point towards more of a non-point source of trash (e.g., wind) since screens are helping trash keep out of the stormdrain.
        - (LA Co.) Currently working on a plan to address non-point sources of trash. Apparently, current plans in LA Co. & TMDL are not making a difference in the amount of trash collected (Malibu Creek Trash TMDL).
        - (J) More interested in actual effectiveness of the BMPs in place. What is the level of local enforcement/money spent/effort effectiveness? Which one is doing a better job?
        - (Arne) Sounds like 2 projects – method assessment/source id & BMP effectiveness. Portion of BMP effectiveness may be labor intensive however.
        - (Steve W) – OPC likely to fund SCCWRP to look at a trash study statewide. Time frame starts Summer 2009. Overall trash on beaches. Subset of drainage area to focus on looking at plastics. Not a lot of money. Just a survey of whether trash is getting better or worse on the beaches.
        - (Chris) Perhaps we need to see OPC's scope and hopefully refocus the SMC's thoughts.
        - (X) Jenny Malloy (federal level) – "What are municipalities doing to reduce marine debris?"
        - (J) Is there a rapid assessment method out there to focus on our limited resources? With our limited resources, can we just focus on determining what/where the hot spots are?
        - (C) We need to sit down and think this through offline (subset). Come back at next meeting. (Steve, Jimmy, Ted, Chris, Arne).
    b. BMP effectiveness testing – Mike Borst (EPA-ORD) – no update/presentation
    c. LID implementation constraints – Matt Yeager
        - (covered earlier in LGC presentation)
    d. Discussion of other potential projects for 2009-10
        - Martha Sutulu (SCCWRP) – nutrients, presentation. Characterization of nutrient sources from SoCal watersheds (proposal for submission to the prop 84 RFP)
            i. Need for nutrient source characterization. Data lacking on relative magnitude of wet and dry weather sources of nutrients from land cover types. Nutrient criteria in streams and estuaries (SD NNE project).
            ii. Prop 84 SW program RFP presents opportunity to address regional data gap. SCCWRP may not be eligible for this prop – may need to join forces.
            iii. Develop conceptual model; collect data; perhaps develop/propose mgmt tools.
            iv. Rough budget: $1M. 20-25% match (SMC?) paper, piggyback w/ current program.
            v. (C) Time frame for submitting pre-proposals? Approval w/ SB, submission rapid. Comments on RFP due Dec. 19. CASQA Jan meeting – talk on this prop 84 SW program.

vi. Looking for partnership w/ government agency. [ABC note: could this help in TMDL implementation? Check w/ LESJWA/SJR Council].
vii. Perhaps a concept proposal for next meeting. Effects-based modeling.

6. Committee member items

7. Next Meeting – Tuesday, March 3, 2008. SCCWRP. 10-12:30 p.m.

Southern California Stormwater Monitoring Coalition
Steering Committee Meeting Agenda
March 3, 2009
10:00 a.m. –12:30 p.m. (Pacific Time)
at
Southern California Coastal Water Research Project
3535 Harbor Blvd, Costa Mesa, CA 92626
Conference Call In: see separate attachment

1. Introductions, meetings and announcements

2. Agreements – Chris Crompton
    a. Approval status of Low Impact Development (LID) Agreement D06-051
    b. Final review of SMC Research Agenda Agreement D07-025
    c. Final review of Regional Bioassessment Agreement D08-026
    d. Toxicity amendment to Laboratory Intercalibration Agreement D05-022

3. Ongoing project updates (as necessary)
    a. LID project status – Matt Yeager (SB County Flood)
    b. Hydromodification project status – Eric Stein (SCCWRP)
    c. Post-fire monitoring – Eric Stein
    d. Laboratory intercalibration – Ken Schiff
    e. Stormwater data compilation study – Eric Stein and Shelly Moore
    f. Other projects

4. Future projects - Follow-up on proposed projects
    a. LID implementation constraints proposal from LGC – Matt Yeager
    b. Nutrient source characterization study – Martha Sutula
    c. Regional collaboration on new permit issues – Matt Yeager
    d. Discussion of other potential projects for 2009-10

    (Trash and debris follow-up deferred until June meeting)

5. Committee member items

6. Next Meeting

Southern California Stormwater Monitoring Coalition
Steering Committee Meeting Agenda
June 2, 2009
10:00 a.m. –12:30 p.m. (Pacific Time)
at
Southern California Coastal Water Research Project
3535 Harbor Blvd, Costa Mesa, CA 92626
Conference Call In: see separate attachment

1. Introductions, meetings and announcements

2. Ongoing project updates (as necessary)
    a. Post-fire monitoring – Eric Stein (SCCWRP)
    b. LID project status – Matt Yeager (SB County Flood)
    c. Stormwater data compilation study – Eric Stein and Shelly Moore (SCCWRP)
    d. Laboratory intercalibration – Ken Schiff (SCCWRP)
    e. Hydromodification project status – Eric Stein
    f. Other projects

3. Agreements – Chris Crompton (County of Orange)
    a. Approval status of Low Impact Development (LID) Agreement D06-051
    b. Status of SMC Research Agenda Agreement D07-025
    c. Status of Regional Bioassessment Agreement D08-026
    d. Toxicity amendment to Laboratory Intercalibration Agreement D05-022

4. Future projects - Follow-up on proposed projects (as necessary)
    a. LID implementation constraints updated proposal from LGC – Matt Yeager
    b. NOAA regional impervious data layer – Eric Stein
    c. Regional collaboration on new permit issues – Chris Crompton/Matt Yeager
    d. Southern California BMP effectiveness – Xavier Swamikannu (LARWQCB)
    e. Trash and debris monitoring – Arne Anselm (Ventura WPD)/Ted von Bitner (Orange County)
    f. Nutrient source characterization study – Martha Sutula (SCCWRP)
    g. Discussion of other potential projects for 2009-10

5. Committee member items

6. Next Meeting

IRWM MEETINGS

Tri-County Funding Area Coordination Committee DWR Meeting

Wednesday February 4th 2009 2:00 PM

Bonderson Building at 901 P St. Sacramento, CA 95814
Large Conference Room on the Second Floor of West B wing a the far right end

Meet-up location: La Bou Bakery & Cafe: Downtown
1100 O St # 1 Sacramento, CA 95814 (916) 447-4281, Map Link here

Attending

DWR

- Paula Landis, acting DPLA chief
- Tracie Billington
- Ralph Svetich
- Norman Shopay
- Anna Aljabiry

San Diego Funding Region

- Matt Stone Rancho California Water District/Riverside
- Perry Louck, Rancho California Water District/Riverside
- Mary Anne Skorpanich, County of Orange
- Tom Rosales, South Orange County Wastewater Authority
- Toby Roy, San Diego Water Authority
- Marci Stirer, City of San Diego
- Tom West, RMC Water
- Daniel Cozad, Integrated Planning and Management

Goals of the meeting

- Help DWR understand the Tri-County FACC and our commitments to plan together
- Why we are not SOLELY county line separate
- What are their doubts or questions
- Why what we are doing works and should be supported in the RAP

Determinations/Discussions for the Conference Call

- Who will take which roles?
- Changes to the order or supporting points
- How much time to leave for questions (talking points are aimed at 20-30 min)
- Follow-up from the meeting
- What to do if we get immediate acceptance
- What to do if we get immediate rejection

Potential Questions

Who is doing more to cooperate among planning areas?
What is DWR's official view of what the right region size is?
What is the overriding benefit to larger region if it does not work locally?

Messages/Talking Points

1) Introductions – We are planning Together

a) Committed to planning together, where we were, are now and are going (graphic leave behind)
b) We have documented our commitment (Tri-County FACC MOU in legal review)
c) 7 reasons Water Supply, Wastewater, Groundwater, Land use, Flood protection, Stormwater and Environmental Resources (on leave behind sheet)

2) One Size Does Not Fit All in California

a) Funding area cooperation, regional integration and sub-regional planning is working
b) We cover the entire funding area, we are separated into planning subregions or communities of interest that work in our region (map on leave behind sheet)
c) Our overlay areas ensure integration of watershed areas that cross planning regions
d) In Southern California built water/wastewater systems carry more institutional weight than watersheds due to small groundwater basins and many small coastal watersheds
e) This size and layout fits the region, allows comfort for local elected officials and real engagement of DAC, federal, tribal, habitat, flood control, etc. on a sub-regional basis

3) How and why we chose this structure

a) Reviewed 5 alternatives for 15 factors and chose this structure, made changes to the plan
b) MOU documents terms allocating funding in a fair manner while preserving integration
c) Consistent with how we work together, eg, Regional Board TMDL, Stormwater, etc.
d) Allows independent IRWM funding (Measure M - OC, Tribal agreements - Riv Co.)
e) We will create common plan elements, regional description and others
f) Members of Each Regional Advisory Committee attend the other RAC meetings

4) Focused on the Planning and Cooperative Integration

a) We focused on engaging communities and planning not creating additional bureaucracies
b) Larger IRWM programs are not better at engagement or interaction with DAC, disengaged local non-profits, only region agency staff attend if too large.
c) Precedent for using county lines in Regional Board and the Legislatures division of the South Coast Region into San Diego, Santa Ana and LA subregions
d) Many regions faced this issue, consolidation now would distract planning, reduce trust

5) Future Cooperative efforts

a) We continue to build relationships and develop additional ways to work together
b) Common schedules and data management are possible
c) Additional common planning components and possibly grant will be reviewed
d) Evaluation of common strategies, objectives, and priorities
e) Search for not just collaboration but efficiency and ensuring the highest quality of multi-benefit projects are funded and completed

6) RAP submission and Interviews

a) Working together to prepare a common application
b) Would like to interview together

7) Recap, Questions and Closing

We are pleased to announce that a Watershed Panel will be convened at our August 25th RAC meeting!

Developing a better understandingof watershed issues was identified as a priority for the RAC, so we haveconvened a group to present current and future watershed planning activities throughout the Region. The purpose of the panel is to identify opportunities for the IRWM effort to bring watershed planning to a consistent level in the Region's hydrologic units. The group will also explore how thewatershed approach could reformulate the IRWM governance structure. We look forward to seeing you there!

Regional Advisory Committee Meeting #18
NAugust 25, 2008
9 a.m. – 11:30 p.m.
San Diego County Water Authority
4677 Overland Ave., San Diego CA 92123
(858) 522-6600

Thank you!
Rosalyn

CASQA MEETINGS

CASQA Pesticides Subcommittee members,

Our next meeting will be Monday August 11 at 1:30 p.m. The agenda is in preparation and will be out soon.

The call-in information is:

Phone: Phone: 1-866-495-8302 Code: 2563789

Please let me know if you won't be able to participate.

Kelly Moran
TDC Environmental
CASQA Pesticides Subcommittee Co-Chair

DRAFT AGENDA

Monday August 11 1:30 p.m.

1. Review/amend agenda (Dave, 5 mins.)

2. *Need* volunteer to take meeting notes for today's call

AND Develop plan for notetaking on future calls (Dave 5 mins)

3. Announcements and updates (All, 5 mins) --Any announcements from participants --CASQA Conference registration is open, need to encourage attendance

(Kelly)

--Pesticide monitoring data complete (Armand) --Outcome of request to EPC for Supplemental funding for subcommittee activities (Dave)

--UP3 Project pyrethroid use estimates report published--thanks to reviewers! (Kelly)

4. DPR Pyrethroid Reevaluation (Kelly & All, 30 mins)

—DPR responses to our comments (Kelly)

-continue planning for a meeting with DPR/PWG to share information about modeling, monitoring, and our regulatory context

5. Supplemental funding (Dave 5 mins.)

6. Overall strategy with DPR (Kelly, 15 minutes)

7. Next meeting (Dave, 5 mins)

--Set date & time for next subcommittee teleconference

--Make list of items for discussion

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Sept. 23 - Tuesday Morning				
Opening & Keynote 8:30 - 9:40	**Peter Gleick - "Storms and Water in the 21st Century"**			
Break 9:40 - 10:00				
Session 1	**Track A** **Construction General Permit**	**Track B** **Planning and Monitoring Assessment**	**Track C** **Bacteria Source Tracking**	**Track D** **Stormwater Management and Treatment**
10:00 - 10:30	Field Implementation of the New Construction Permit Sandy Mathews: LWA	Biological Health of Streams in the Highly Urbanized Los Angeles Basin: Status and Trends Bill Isham: Weston Solutions, Inc.	Evaluation of Environmental Toolkit for Fecal Microbial Source Tracking Alexander Schriewer: UC Davis	Design of Regional Urban Watershed Dry-weather Flow Treatment System-Talbert Lake Diversion Project Bruce M. Phillips: PACE
10:35 - 11:05	Inside the New Construction Permit Greg Gearheart: SWRCB	Assessing Stormwater Program Progress Through Dry Weather Monitoring Brock Bernstein	Bacteria Fate and Transport in the Infamous Los Angeles River Dustin Bambic: AMEC	Daly City Vision: Converting a Flood-Prone Area into a Multi-Benefit Site Celine Monget: RMC Water
11:10 - 11:40	Construction Industry Coalition on Water Quality Evaluation of Construction Site Erosion and Sediment Control BMPs to meet TMDL Waste Load Allocations Mark Grey: CICWQ	Planning for Productivity. NPDES Industrial and Commercial Inspections. Achieving Quality and Quantity Results Chandra Santiago: AEI-CASC	How Microbial Source Tracking can Help Define Sources, Abatement and Policy in a Bacterial TMDL: Tecolote Creek Gretel Roberts: Weston Solutions, Inc.	Neighborhood Watershed Stormwater Management: The Elmer Avenue Neighborhood Retrofit Project Edward Belden: LA & San Gabriel Rivers Watershed Council
Alternates		Design of Bio-Retention Cells: Integrated Volume and Flow Based Hydrologic Analysis Luis Parra-Rosales: Adams Engineering	Implementation and Prioritization of Bacterial Indicator TMDL Compliance Activities in the Middle Santa Ana River Watershed Don Schroeder: CDM	Stormwater Management on San Francisco's Cesar Chavez Street – a Conceptual Plan for Low Impact Design in an Ultra-urban Landscape Phoebe Grow: RMC Water
Exhibitor Break 11:40 - 12:00				
Lunch and Awards Program 12:00 - 1:30				

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Sept. 23 - Tuesday Afternoon				
Lunch and Awards Program 12:00 - 1:30				
Session 2	**Track A** **Research - Runoff Impacts and Treatment**	**Track B** **Monitoring and Treatment Assessment**	**Track C** **Water Quality Monitoring and Treatment**	**Track D** **LID Implementation**
1:30 - 2:00	Endocrine Disrupting Compounds in Urban Runoff: Is There A Problem Chris Campbell - Geosyntec	In situ Bioassays Using Rainbow Trout Embryos for Evaluation of Stormwater Receiving Environments Chessy Knight: Nautilus Environmental	The Bottom Line: Estimating the Cost of Monitoring Provisions in the New Bay Area Municipal Regional Permit Khalil Abu-Saba: Brown and Caldwell	Implementation of Low Impact Development at Various Scales – An Engineer Design Approach Hong Lin: CONTECH
2:05 - 2:35	Small-Scale Studies on Alternative Media for Stormwater Treatment Dipen Patel: CSU Sacramento	Optimizing Stormwater Sampling Using Watershed Model Output Drew Ackerman: SCCWRP	Coordinated Monitoring by SWAMP and Stormwater Agencies: Watershed Contaminant Trends and Pyrethroids in Urban Streams John Hunt: UC Davis	The Road to Low Impact Development - Green Streets and Parking Lots in San Mateo County Matt Fabry: SMCWPPP
2:40 - 3:10	Direct and Indirect Effects of So. Cal. Wildfires on Storm Water Runoff of Metals and PAHs Eric Stein: SCCWRP	Small Particle Removal Performance of Full-Scale Stormwater Filters John Johnston: CSU Sacramento	Sediment Chemistry and Toxicity in Urban Wetlands Jeff Brown: SCCWRP	Making Local Regulations "LID-Friendly" – A Case Study of One California Community Rebecca Winer-Skonovd: LWA
Alternates	Automated System Protects Napa River Matt Hromatka: Clear Water Compliance Services, Inc.	BayFilter – Testing and Verification of a Stormwater Treatment Technology Alex Weisz: BaySaver Technologies	Development of the Agua Hedionda Watershed Management Plan – Incorporating Quantitative Analyses Steve Carte: Tetra Tech, Inc.	Hydrologic and Water Quality Benefits of Low Impact Design: A Case Study Sarah McIlroy: Stantec Consulting, Inc.
Break 3:10 - 3:40				
Session 3	**Construction Training and Inspection**	**Program and Monitoring Assessment**	**Planning - Integrated Regional Management**	**BMP Design and Implementation**
3:45 - 4:15	Developing a Statewide Training Program for Construction General Permit Compliance Greg Gearheart: SWRCB Eric Bernsten: SWRCB Daniel Apt: RBF Consulting	The Next Step – Conducting Program Effectiveness Assessments for Annual Reports. Lessons From Around the State Karen Ashby: LWA	Integrated Water Management Chris Kloss: LID Center	Beyond BMP Design by Rules-Of-Thumb - A Simple Hydrograph Approach to Designing Bioretention and Filtration BMPs. Jeffrey Endicott: AEI-CASC
4:20 - 5:00	Sacramento County Post-Construction BMP Inspector Training Summer Christensen: Sac. Co.	Water Quality Monitoring & Stormwater BMP Treatment Effectiveness Lawrence Magura: Black & Veatch	A Regional Stormwater Treatment Approach: Regional Retrofitting Study Orange County, California Daniel Apt: RBF Consulting	A New Direction for Stormwater Filtration Joel Garbon Imbrium Systems
Alternates	Green Roofs and Their Multiple Environmental Benefits Daniel Apt: RBF Consulting	Techniques to Improve Storm Water Monitoring and Your Bottom Line! Peter Wilde: ADH Environmental	Conditional Waivers for Irrigated Lands-Current Regulation of Agricultural Discharges Amy Storm: LWA	Simple Structural Methods for Urban Stormwater Pollution Reduction Targeting Trash, Gross-Pollutants, Hydrocarbons, and Bacteria T.J. Mullen: BMP Products, Inc.
Exhibitor Sponsored Reception 5:30 - 7:30				

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Sept. 24 - Wednesday Morning				
Session 4	**Track A** **Hydromodification Planning and Management**	**Track B** **BMP Effectiveness**	**Track C** **LID - Planning**	**Track D** **Stormwater Management and TMDL Compliance**
8:30 - 9:00	Managing Hydromodification in Steep Terrain Jeff Haltiner: PWA	International Stormwater BMP Database Enhancements and Updates Eric Strecker: Geosyntec	Site Specific Considerations in LID Feasibility and Effectiveness Lisa Austin: Geosyntec	Climate Change and Stormwater Quality Management: Opportunities for Collaboration Regulatory Management and Revenue Generation John Bliss: SCI Consulting Group
9:05 - 9:35	A Stream Susceptibility Identification Tool for Use in Hydromodification Planning Chris Bowles: CBEC	A Robust Statistical Approach for Summarizing Stormwater Quality Data with Non-Detects and Unknown Distributions Marc Leisenring: Geosyntec	Implementing LID in Contra Costa: Review, Design, and Construction of New Developments and Redevelopments: Panel Discussion Dan Cloak: Dan Cloak Environmental Consulting	TMDLS and Watershed Management: What are the Options for Stormwater Treatment – LA Anna Lantin: RBF Consulting
9:40 - 10:10	Relationships Between Detention Basin Volume and Hydraulic Detention Time: A Modeling Study Dave Alderete: CSU Sacramento	BMP Effectiveness Evaluation Using the Triad Approach Mark Pumford and Scott Johnson City of Oxnard		Urban Runoff Management in the Los Angeles Area: Approach for Achieving TMDL Compliance Reza Iranpour: City of Los Angeles
Alternates		Santa Monica Bans Polystyrene Food Containers and Opens Corporate Doors Karl Bruskotter: City of Santa Monica	Low Impact Development in a Built Environment Catherine Tyrrell: Malcolm Pirnie	Water Quality Trading: Where is California? Persephene St. Charles: RMC
Break 10:10 - 10:40				
Session 5	**Bacteria Tracking and Treatment**	**Pollutant and Program Assessment**	**Public Education**	**Stormwater Management, Collaboration, and Regulation**
10:40 - 11:10	What Have We Learned From Bacterial Source Tracking Studies Joan Brackin: Weston Solutions	Spatial and Temporal Variability of Pollutant Loading in Ballona Creek Mike Anghera: Weston Solutions	Web Trappings: Enticing Web Visitors and Bringing Them Back Tiffany Jonick: S. Groner Associates	BASMAA - A Model for Collaboration and Innovation Geoff Brosseau: BASMAA
11:15 - 11:45	Bacterra™- Discussion of the Benefits, Mechanisms and Efficiencies for Bacteria Removal Mindy Ruby: Filterra	Assessment of Proposition O Projects in the City of Los Angeles, CA for Storm Water Clean-up Mi-Hyun Park: UCLA	10 Education Pieces That Work Tom Lawrence: Consultant	Using Numerics to Define MEP: The Legal and Technical Implications Tess Dunham: Somach, Simmons & Dunn
Alternates	Development of a Bacteria TMDL within a Stakeholder Process: Los Angeles River Jagjit Kaur: CH2M HILL	City of Los Angeles' Activities to Meet Stormwater Regulations Huub Cox: City of Los Angeles	Effective and Efficient Outreach and Education for the 21st century J. Michael Huls : Huls Env. Media	The Dynamics of Collaboration in an Enforcement Setting Andre Monette: Best & Krieger, LLP
Lunch 12:00 - 1:15				

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Sept. 24 - Wednesday Afternoon				
Lunch 12:00 - 1:15				
Session 6	Track A Pesticides	Track B BMP Assessment	Track C Smart Growth v. LID	Track D BMP Implementation
1:15 - 1:45	Five Decades After Silent Spring: : Now It's Your Problem Armand Ruby: Consultant	Assessing the Use of Turbidity as a Storm Water Runoff Quality Assessment Tool Sandy Mathews: LWA	Stormwater Management on Smart Growth Sites: New Ways of Thinking. Tom Richman: Consultant	Stormwater Treatment with Aluminum-Based Coagulants: Promises and Problems Jeff Curtis: ECO:LOGIC Engineering
1:50 - 2:20	Urban Runoff as a Source of Pyrethroid Pesticides from Residential Areas Donald Weston: University of California	Analysis of Legacy Organochlorine Concentration and Loads: Application of a New Sampling Method and Use of Regression Modeling to Assist in Source Identification and Load Estimation Stuart Goong: County of Orange	The Integration of Low Impact Development (LID), Green Highways, and Green Infrastructure with Smart Growth Principles and New Urbanism Principles Neil Weinstein: LID Center	Erosion Control Performance Studies on Ornamental Vegetation, Compost, and Jute Netting Misty Scharff: CSU Sacramento
2:25 - 2:55	Insecticide Wash-Off From Urban Hard Surfaces Brant Jorgenson: UC Davis	BMPs – Design, Monitoring and Efficiency Assessment Suraj Shankar: Weston Solutions, Inc.	Lessons Learned and Innovative Approaches for LID Techniques in an Urbanized Watershed to meet an Integrated TMDL and Watershed Strategy in Southern California David Pohl: Weston Solutions, Inc.	Simulating Stormwater Treatment Performance of Man-made Lake BMPs Ron J. Rovansek: PACE
3:00 - 3:30	Pesticide Detections in Dry and Wet Weather Surface Runoff from Single-Family Residences Darren Haver: University of California Cooperative Extension- Orange County	Post Construction BMP Maintenance – What Have We Learned from Our California Experience? Vaikko Allen: CONTECH	I-5 North Corridor Storm Water Quality Master Plan Wilfred Hsu: CH2M HILL	Voluntary Compliance By San Diego County Schools - A Non-Traditional Small MS4 Success Story Stephen Herrera: Owen Psomas
3:35 - 4:05	The Pesticide Reality Shock: How to Deal with Synthetic Pyrethroid Assessments in Urban Runoff Monitoring Programs Dave Renfrew: Weston Solutions, Inc	**ALTERNATE** The Use and Assessment of Natural Treatment Wetlands (WetTraq) Andrea Crumpacker: Weston Solutions, Inc.	**ALTERNATE** San Diego Hydromodification Management Plan: Setting the Standard for Southern California Municipal Storm Water Programs Nancy Gardiner: Brown and Caldwell	**ALTERNATE** Representing Stormwater BMP Influence at a Watershed Scale: A Case Study of the Lake Tahoe Clarity TMDL Implementation Plan for Urban Areas John Riverson: Tetra Tech, Inc.

020239

California Stormwater Quality Association™

Dedicated to the Advancement of Stormwater Quality Management, Science and Regulation

Meeting Notice & Agenda

Friday, November 14, 2008, 9:00 a.m. to 3:00 p.m.
Hilton Hotel, Costa Mesa
3050 Bristol Street, Costa Mesa, California 92626 714-540-7000

Meeting Fee: Pre-register by November 7, $45 – Members / $45 – Regulators / $65 – Non-members
Meeting Fee: After November 7 and at door, $60 – Members / $60 – Regulators / $80 – Non-members
Registration online until 5:00 pm, November 13
LIVE Webcast now available – Purchase individual use or site use access online until Thursday November 13
Meeting fee payable at the door beginning at 8:00 a.m. – Check preferred, no credit cards at the door
Meeting fee includes lunch. CASQA is a 501(c)(3) non-profit corporation. CASQA Tax Identification Number: 55-0797265

Integrating Water Quality, Hydrograph Modification and Stormwater Permitting

I. Welcome / Introductions / Announcements (9:00 – 9:15)
Chris Crompton, Chair / Scott Taylor, Vice Chair / Geoff Brosseau, Executive Director

II. Integrating Water Quality, Hydrograph Modification and Stormwater Permitting – I: Introduction (9:15 – 9:30)
Richard Boon, County of Orange

Impervious Surface Coefficients: A Tool for Analysis and Management (9:30 – 10:00)
Barbara Washburn, PhD, OEHA

Deficiency of Watershed Sediment Yield and its Impact on Channel Hydromodification (10:00 – 10:30)
Hasan Nouri, PE, President, Rivertech

Development of Tools for Hydromodification Assessment and Management (10:30 – 11:00)
Eric Stein, PhD, SCCWRP

Q&A (11:00 – 11:45)

III. Statewide Permit Renewal Update (11:45 – 12:00)
Sandy Mathews & Mack Walker, LWA

Lunch (12:00 – 1:15)

IV. State and Federal Reports (1:15 – 1:30)
USEPA, SWRCB, and RWQCBs

V. Integrating Water Quality, Hydrograph Modification and Stormwater Permitting – II: A Methodology for Integrating Water Quality and Hydromodification (1:30 – 2:00)
Tom Cahill, P.E. Cahill Associates Inc.

Case Studies (Los Angeles) (2:00 – 2:20)
Catherine Tyrrell, Senior Associate-Water Resources, Malcom Pirnie

Case Studies (Orange and Ventura Counties) (2:20 – 2:40)
Aaron Poresky, Geosyntec

Q&A (2:40 – 2:55)

VI. Closing (2:55 – 3:00)
Chris Crompton, Chair

The content of presentations by individuals and organizations other than CASQA has not been officially reviewed, approved, or endorsed in any way by CASQA or any of its employees or agents.
Any opinions or conclusions expressed in the presentations are the opinions and conclusions of the speakers and are not necessarily the opinions or conclusions of CASQA or any of its employees or agents.

P.O. Box 2105 Menlo Park CA 94026-2105 650.366.1042 www.casqa.org info@casqa.org

Call-in details:

PHONE: 1-866-495-8302

CODE: 5554347896

Action items resulting from the 11/6/08 meeting:

- Provide update re: CA Water Quality Monitoring Council 11/18 meeting/draft recommendations (Armand)
- Forward SoCal ASBS monitoring plan to group (Geremew)
- Forward CASQA pyrethroid pesticides research compilation to group (Armand)
- Review/comment on CWP Monitoring Guidance document (Chris S./Chris C.)
- Prepare two requests for CASQA funding: 1) Monitoring/Research Agenda - Web Access; 2) Regulatory and Technical Assistance (Armand; for EPC meeting 11/13/08)

Issues to track/follow-up on:

- ASBS Special Provisions/monitoring - Central Coast, NorCal (group)
- Ask SCCWRP about SMC hydromod/monitoring study (Jay/Armand)
- Toxicity testing for episodic (storm-based) events; appropriate exposure times (group)
- Ventura County draft permit/Municipal Action Levels/sampling timing/period (group)

Please let me know if I've missed anything. Meeting notes to follow. Thanks - Armand

Armand Ruby Consulting

P.O. Box 945, Capitola, CA 95010

Tel.: 831-477-1214

Web Site: www.armandrubyconsulting.com

Guest: Li-Ming He, Scientist with DPR. Will be giving an update on the DPR Urban Monitoring Project.

The call-in information is:
Phone: Phone: 1-866-495-8302 Code: 2563789

DRAFT AGENDA

Wednesday, December 10 at 10 a.m.

1. Review/amend agenda (Dave, 2 mins.)

2. *Need* volunteer to take meeting notes for today's call

3. Announcements and updates (All, 5 mins)
--Any announcements from participants

4. DPR's Urban Monitoring Project (Li-Ming He, DPR, 30 mins)
--Lee will provide an update on DPR's monitoring of urban creeks
--Presentation slides will be send prior to teleconference

5. EPA Antimicrobials Data Rule - Swimming Pools (Kelly, 5 minutes)
--Update on schedule/confirm process for comment letter to EPA

6. Fundraising (Dave, 5 minutes)

7. DPR Pyrethroid Reevaluation (All, 20 minutes)
--Update on recent DPR activities (Kelly)
--Attorney consultation update (Dave)
--joint letter with Tri-TAC to Cal-EPA delayed
--Statewide agency meeting with DPR (Dave)
--Cost estimates memo (Armand)

8. Next meeting (Dave, 5 mins)
--Set date & time for next subcommittee teleconference
--Make list of items for discussion

California Stormwater Quality Association™

Dedicated to the Advancement of Stormwater Quality Management, Science and Regulation

Meeting Notice & Agenda

Friday, January 9, 2009, 9:00 a.m. to 3:00 p.m.
San Diego Marriott Mission Valley, San Diego
8757 Rio San Diego Drive, San Diego, California 92108; 619-692-3800

Meeting Fee: Pre-register by NOON, January 6, $45 – Members / $45 – Regulators / $65 – Non-members
Meeting Fee: After NOON, January 6 and at door, $60 – Members / $60 – Regulators / $80 – Non-members
Registration online until 5:00 pm, January 8
LIVE Webcast option available–Purchase individual use or site use access online until Thursday January 8
Meeting fee payable at the door beginning at 8:00 a.m. – Check preferred, no credit cards at the door
Meeting fee includes lunch. CASQA is a 501(c)(3) non-profit corporation. CASQA Tax Identification Number: 55-0797265

Annual Federal and State Stormwater Program Updates

I. Welcome / Introductions / Announcements (9:00 – 9:15)
Hosts: Chris Crompton, Chair / Scott Taylor, Vice Chair / Geoff Brosseau, Executive Director

II. Federal and State Update on Stormwater Management and Water Quality Issues (9:15 – 10:30)
John Kemmerer, Associate Director, Water Division, USEPA Region 9
Dorothy Rice, Executive Director, State Water Resources Control Board

III. NRC Report on Urban Stormwater Management in the United States (10:30 – 12:00)
Laura Ehlers, Senior Staff Officer, Water Science and Technology Board,
National Research Council, National Academy of Sciences
Greg Schaner, Attorney Adviser, Permits Division, USEPA Office of Wastewater Management

Lunch (12:00 – 1:15)

IV. State and Federal Reports (1:15 – 1:40)
USEPA, SWRCB, and RWQCBs

V. Preparing for the Proposition 84 Stormwater Grant Program (1:40 – 2:55)
Lessons Learned from the ASBS Grant Program
Julé Rizzardo, Senior Water Resources Control Engineer, State Water Resources Control Board

Guidance for Preparing Effective Stormwater Grant Applications
Jim Maughan, Asst. Deputy Director, Div of Financial Assistance, State Water Resources Control Board
Erin Ragazzi, Senior Environmental Scientist, State Water Resources Control Board

VI. Closing (2:55 – 3:00)
Chris Crompton, Chair

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CASQA Pesticides Subcommittee members,

Our next teleconference meeting will be Monday January 26 at 10 a.m.

The agenda is below. The meeting will focus on prioritization and planning to accomplish key actions in light of the loss of support from the UP3 Project due to the statewide stop-work order for all grant-funded projects.

The call-in information is:

Phone: Phone: 1-866-495-8302 Code: 2563789

Please let us know if you won't be able to participate.

Dave Tamayo and Kelly Moran
CASQA Pesticides Subcommittee Co-Chairs

CASQA Pesticides Subcommittee

Agenda & Draft Notes
Monday, January 26, 2009 at 10 a.m.

DAVE's NOT PRESENT, Jamison

1. Review/amend agenda (Jamison, 2 mins.)

Jamison Crosby, Arlene Chun, Kelly Moran, Christine Couch, Armand Ruby
2. *Need* volunteer to take meeting notes for today's call
3. Announcements and updates (All, 5 mins)
--Any announcements from participants Meeting w/ DPR (Jamison)

4. Designate acting co-chair during Dave's absence (Dave, 3 mins)
--Jamison Crosby has volunteered to serve as acting Co-Chair during Dave's absence
--also, contract management duties (Jamison) -- approving invoices (eg Kelly & Armand)

--for Item 8 -- finance mgmt. needs to be worked out, esp in Dave's absence (end of Feb).

5. UP3 Project status (Kelly, 5 mins)
--statewide stop-work order issued 12/18; State Bond-funded projects.
--Work may be stopped until summer -- can't work on projects until State has CASH IN HAND.

Est. $10,000/month of work not being done. Athena website, etc.; Kelly tech work. CASQA supplying some funds over couple of months to keep on DPR radar.

--Overview of what's not being addressed. (See also item #8 below)

AQUATIC PESTICIDES APPLICATION PERMIT. There was a court decision that overturne EPA decision re. pesticides to water bodies whether or not to have NPDES permit. YOU NEED AN NPDES PERMIT TO APPLY PESTICIDES IN WATER BODIES. AFFECTS MOSQUITO ABATEMENT, ETC. NOW AT RISK OF LITIGATION. STATE REGULATIONS ARE STILL IN PLACE! EPA HAS NOT DEVELOPED GUIDANCE FOR THE STATE(S) YET. TALK TO THE STATE BOARD.

Microbial rule (biocides, algicides) -- EPA review letter: there will be no State Board letter to EPA on this (re: chemical analysis & data, endangered species handling, cooling towers, degradation, economic analysis) Data rule, comments due April 6th; however, things still in flux due to new administration (Lisa Jackson, EPA) so we may not know when the rule is finalled as new admin is reviewing everything from previous administration. Could this buy us some time?

Pesticides affecting salmon (west coast), endangered species act. Kelly has noticed label notice at OSH concerning this (not by carbaryl, etc., but by metal-based?). Application of pesticides/EPA process unclear. Was on January UP3 meeting agenda. Broad requirement, Bush Administration rule; EPA's risk assessment is "enough". Rule overturned; EPA changed risk assessment, however still broad. Ag & urban application of pesticides are included.

6. Fundraising (Dave, 5 minutes)--letter

Arlene & Christine: please review this letter. Meeting 2:30pm Wednesday. 1/15/09 draft is okay to review as well.
--update on long-term fundraising planning
--introduce emergency need for interim funding

7. DPR Pyrethroid Reevaluation (All, 10 minutes)
--Attorney consultation update (Dave). Alameda County counsel looked over. DPR is required to required to provide data w/in 2 years.
--Water Board actions (Kelly). Dorothy Rice met w/ Maryann Warmerdam before Christmas. Board involvement has been helping. However, meeting with DPR was suggested through CASQA and all are hopeful to keep moving forward.
--EPA label language (Kelly). EPA is close to issuing voluntary (?) label changes. Pre-construction termaticide treatments. Label-direction changes. February? CASQA had previously commented on this & EPA has implemented those comments.
--Statewide agency meeting with DPR (Dave). Jan 13. Jamison Crosby, Dave Tamayo, Jim Scanlin, Jason Uhley, Geoff Brosseau, Ron Manwill; Chris Riordan (DPR Chief Deputy Director), Chuck Andrews (Deputy Director for Registration). DPR will be proceeding differently in the future. Receptive, committing to being more directive during the reevaluation. DPR will be telling PWG how to proceed, esp. with testing, etc. DPR will continue to involve CASQA in future. Stewardship program that PWG is developing; DPR did not have specifics. Pre-issuance draft of directive from DPR to PWG (giving PWG specifics for studies; focus on bifenthrins?) may be available to review/comment end of February to CASQA. Previously, these drafts were made available to water boards for their comments; this is a new method. Kelly had been reviewing these drafts through the water boards, and have updated the committee. Shall meeting participatants send an email to DPR to remind DPR of the draft directive? Great idea!

Coming up Next (meeting) -- Dave's perspective, legal opinion. Perhaps include next steps w/ DPR. Joint letter w/ Tritac(?) -- including legal opinion. State Board: Future workshop? Do we want to agendize this? Public forum/work session. Invited speakers to speak on certain topics. Workshop could help move things along.

8. Planning for needed actions - prioritization, funding strategy (All, 30 mins)
--List of upcoming items requiring action (Kelly). DPR requests detailed review of PWG Grass Runoff study(Kelly emailed link). Are there scientific problems with these reports? DPR has sent this request to review. State Board may not be commenting as may not have staff and the work furlough. CASQA should write a comment letter--how to handle this? Note: takes a week to go through Board EPC (letter, etc.) review. We need to start drafting letter mid February to get through subcommittee reivew & Board EPC; start review now.

--PWG Grass Runoff study (comments due 3/13)

--PWG building material washoff study (due in May), still to be made available.

--EPA Antimicrobials data rule/swimming pools (due 4/6)
--No subsidy from UP3 Project for these comments: former plans to handle these comments are no longer feasible

--Other priority items (all)

--joint letter with Tri-TAC to Cal-EPA

--keeping pressure on DPR without UPC meetings

--Others?

--discuss priorities

--develop plan to accomplish needed actions

--who does what

--set internal review deadlines for grass runoff study

Armand & Kelly will get together to talk estimate on accomplishing the above comment letters.

9. Cost estimates memo (Armand, 5 mins)
--Status and schedule. Was not able to devote much time on this. Question: what is the next most immediate need? Armand would like to set an internal deadline. Would need this info to send to DPR & EPA to bolster our concerns. Would like to include in EPA Antimicrobials data rule comment letter. Have deadline our next meeting data, plus meeting to discuss above comment letters.

10. Next meeting (Jamison, 5 mins). Funding letter -- W 1/28/09 2:30pm; Subcommittee meeting -- W 2/25/09 10-12pm; Priority Task Fund meeting (funding for PWG/EPA comment letters) -- W 2/04/09 10 am.
--Make list of items for discussion: Kelly will develop agenda for subcommittee meeting.

Hello everyone,

We'll be using my conference line for our call tomorrow at 2:30. Call in is 877-336-1828 access code 9177212#

Jamison Crosby

Pesticides
ubcommittee fundin.

1. Agenda Review. On the call: Dave Tamayo, Jamison Crosby, Kelly Moran, Arlene Chun, Christine Couch, Athena Honore, Jim Scanlin.

2. Funding & letter discussion

(Jamison) BASMAA -- Geoff brought up CASQA letter. Immediate reaction -- Water Board should dip into their ACL monies. We could get shut down with only the municipalities involved. Perhaps send Water Board a similar letter. Athena had conversations w/ other staff to determine what other types of funding to move forward. Discussed small "leverages" for some monies, supplemental environmental projects, fines, etc. Some work is in progress. Note, not sufficient, temporary, but at least there may be some money. (Kelly) Note this may not be a potential monies source with the upcoming enforcement policies coming on line. There may be some communication issues surrounding the request that may need to be resolved.

(Dave) It's important to have the board to help fund this as it is a statewide problem; and it is a good idea to also involve them by sending them this letter. Are there also other alternatives, even in small amounts. How about private sources? (Armand) Our work is on the front line. How about national organizations as they may be promoting several issues regarding pesticides; but it is unknown how their economic status stands. (Kelly) Sad to say, there is no money. Funding ideas and discussion ensued. This is a good discussion and should continue.

Will we be developing a parallel letter to send to the Water Boards? It is recommended that we need to meet with the Regional Boards prior to sending the Water Board's letter. Include in muni letter that the water boards will be pursued.

Suggestion: separate from the actual letter, seek CASQA Board support to approach water boards. Athena says that this may be counterproductive as she feels that she has already done that within the water board (talked to Tom Mumley). Something along lines: CASQA is committed to working with the water boards to contribute to UP3 (with discussions conducted prior to making this statement). Between now & letter distribution, need to sit down and discuss this, internally within CASQA and internally within the water boards.

It seems that sending out this letter is not important as we may not receive the funds now. Let's work on funding the priority tasks from within our programs first and have the discussions with the water board prior to sending out the letter. Another suggestion -- how about we approach the individual agencies first to get their buy in/support before bringing the letter to the CASQA Board.

3. Wrap up funding request letter. We will pursue first approaching individual agencies before sending the letter to the CASQA Board.

4. Next steps. Let's state what we need; modify what we have right now (eg attachments) as we approach our agencies for support. Do we calculate out their fair share or leave it up to them? Seems more prudent to have the true fair share, give agencies a number. Armand will have cost estimates draft

before next subcommittee meeting (Feb. 25). Let's also shoot for the full amount of funding. When should we be ready to begin talking to people? Feb. 25th; would be beneficial to have Armand's cost estimate.

UP3 Scope/Costs -- are there activities missing that your agency currently participate in/coordinate? Also, need to have a separate activities list specific to CASQA.

5. CASQA Priority Actions (Kelly's list) -- deadlines fast approaching. Included, but not in writing -- ability to hold UPC meetings (Kelly/Athena's letter circa Christmas time). Funding until summer. Need to set date to discuss more in detail. Also, may need more documentation for funding request for immediate needs list and UPC.

Discussion on Feb. 4th teleconference.

The call-in information is:

Phone: 1-866-495-8302 Code: 2563789

1. Review/amend agenda (Dave, 2 mins.)

2. *Need* volunteer to take meeting notes for today's call (2 mins.). Jamison.

Present today: Ron Manuel, Arlene Chun, Kelly Moran, Dave Tamayo, Jamison Crosby, Athena Honore, Christine Couch, Armand Ruby, Dave Renfrew.

3. Funding plan for 4 near-term CASQA letters to DPR and EPA (All, 30-40 mins.)
--Draft scope of work and budget are attached (See "Priority Action Items Known As of 01-28-09.doc")

Riverside County--$7000 (Armand's review of PWG documents)

Sacramento County -- $3000 (Kelly's tasks)

Contra Costa County -- still exploring.

CASQA funding -- can we tap into the money? Supposedly, $10,000 is our budget. Don't know if there will be any adjustments, or if it is the final/adopted budget. Kelly says it sounded like a done deal. We'll need to be careful in balancing the CASQA money as once its gone, its gone for the rest of the year. We'll have to nurse these funds (Dave).
--Schedule: Some work items must be completed in February
--Budget: no UP3 Project subsidy possible
--Additional letters are likely in 2009 (but are not specifically known at this time)
--Discuss options for funding this immediate work
--Develop list of action items

4. Interim funding request from UP3 Project (All, 30-40 minutes) $26,250 over next 5 months to keep heat on DPR, hold UPC meetings.
--Draft scope of work and budget are attached (See "UP3 Gap Funding Request_020209.doc")
--Review scope/budget and answer questions
--Discuss options for assembling funding
--Discuss other possible funders (e.g., POTWs)
--Develop list of action items

5. Next meeting: Wednesday February 25 10 a.m.

Conference Participant:
1. At the specified time, dial the Access Number 1.800.786.1922
2. When prompted, enter your Participant Code followed by #
3. Your Participant Code is 87779856

Dear Subcommittee: this is a confirmation that the subcommittee will meet via teleconference as planned tomorrow Feb. 24 at 2:00 PM. Agenda and call-in info to follow.

Meanwhile I am forwarding information regarding a topic for tomorrow's agenda - the requirements for field filtration of dissolved metals samples. For those who have monitoring requirements that include dissolved metals, this may be an issue of some significance. I would like to hear from any members who have been doing this in the field already.

Here is the link to the March 2007 Federal Register EPA Methods notice, which I think is the most recent:
http://www.epa.gov/fedrgstr/EPA-WATER/2007/March/Day-12/w1073.htm

The holding time and preservation requirements are in Table II; most of the relevant stuff is in the footnotes to that table:

\7\ - metals filtration

\17\ - mercury filtration

\21\ - general

Filter w/in 15 minutes clearly is the law of the land for most metals (and ortho-P). For mercury, however, the lab has to filter w/in 24 hours of sampling, so that could be either a solution or an issue, as the alternative is to filter in the field "in a designated clean area", which is a bigger deal.

This guidance is written with point source dischargers (esp. WWTPs) in mind, where you typically set up a composite for a pre-determined (us. 24 hour) time period, and therefore know when the last aliquot will be collected. There will need to be some adjustments made in the typical stormwater sampling routine to conform to this requirement.

Armand Ruby Consulting

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Tel.: 831-477-1214

Web Site: www.armandrubyconsulting.com

CASQA Monitoring and Science Subcommittee
Teleconference: Tues., Feb. 24, 2009 - 2:00 PM.

MEETING NOTES

1) Introductions/Note-taker

Approximately 20 people participated in the conference call.

Pavitra Rammohan with PBS&J volunteered to provide the meeting notes.

2) Review/Amend Agenda

No changes

3) Updates:

CA Water Quality Monitoring Council [Armand]

As mentioned during the previous meeting, the Monitoring Council aims at improving implementation and tracking of water quality monitoring in order to enhance local, state, federal, tribal and private efforts in addressing point and nonpoint source pollution and protecting designated uses. The Council described a concept of theme-based portals that would provide ready access to a variety of assessment information. Armand briefed the group on the meeting conducted on February 2nd, 2009, at Costa Mesa. The first submittal of recommendations was provided to SWRCB on Dec 1, 2008, with the principal recommendation to proceed with improved access to water quality data statewide. This is an attempt to standardize web accessibility to existing information sources. The focus of the meeting was to set up the web portal to provide accessibility to different web resources of statewide water quality data. One category would address core assessment questions or concerns, such as: Is it safe to swim at the beach? Follow up work will involve the more difficult issues of standardizing data management and monitoring protocols.

SWAMP – upcoming stormwater guidance [Armand]

The Surface Water Ambient Monitoring Program (SWAMP) is a statewide monitoring effort designed to assess the conditions of surface waters throughout California. It was proposed to integrate existing water quality monitoring activities of the State Water Resources Control Board (SWRCB) and the Regional Water Quality Control Boards, as well as to coordinate these activities with other monitoring programs. The SWRCB, along with the US EPA, are responsible for reporting on the status of California's water quality in order to provide a scientific basis for management priorities and regulatory actions.

Armand mentioned the already-developed SWAMP monitoring protocols and the typical CA NPDES permit requirement to report water quality data as per SWAMP database protocols. The group discussed the SWAMP format; both Orange County and released Ventura County are required to report the data in a SWAMP compatible format. Some programs are required to report data in Storm Water Monitoring Coalition (SMC) compatible format. Ted von Bitner of Orange County indicated that having the database SWAMP compatible significantly increases (doubles or triples) the size of the database. SWAMP will produce storm water monitoring guidance to be released in 2009 and

Armand will be part of the review panel to provide comments on the guidance document. He will also solicit comments or feedback from the group.

CA Dept. of Pesticide Regulation urban runoff monitoring [Armand]

Armand described DPR's ongoing study to test for pyrethroid pesticides in the runoff generated from urban areas. Several sites are being monitored in northern California (Sacramento and Bay Area) and southern Cal. (San Diego). The draft study report is to be reviewed by the Pesticide Subcommittee and then forwarded to the DPR for review. Armand will forward the study report and CASQA letter, and encouraged the group to review the study report and offer input or comments.

ASBS Program [Steen Trump/Geremew Amenu]

The ASBS program is being carried out as a pilot study in Southern California under Bight '08. It will serve as a template or guidance for Northern and Central California. They will initiate a program similar to the one in Southern California. Key questions involve implementation of the program and potential funding form the state for the ASBS program.

SCCWRP/SMC hydromodification monitoring study

No meeting has been conducted since last summer (2008). The next meeting is scheduled to be held this summer. The goal of the storm water research program, led by Colorado State University Fort Collins and Storm water Monitoring Coalition (SMC), is to develop tools to assess the effects of hydromodification and increased runoff volumes, and develop watershed models that can be used to evaluate potential management scenarios. This is a long term project. One of the group members indicated that SCCWRP is looking for volunteer counties and sites to validate the study. They have completed the first round of studies and the next step is to validate assessments.

Ventura County draft permit/Municipal Action Levels

Arne Anselm and Mark Pumford, who work for agencies in Ventura County, laid out some of the highlights of the new permit:

1. Attachment F: Monitoring Program: The first storm event of the wet season that produces a 20% or greater increase in base stream flow, and 2 additional storm events; all storm events shall be separated by 7 days of dry weather (less than 0.1 inch of rainfall) from the previously measurable storm event (0.25 inches of rain). The 20% trigger is an improvement and was requested. The group discussed that since the Ventura County watershed is not fully developed (only one-third of the County is developed), 0.25 inches of rain may not generate measurable runoff. The group discussed about how the term mass emission station (an air pollution term) can be related in terms of storm water quality; this presumably will be similar to the Bight study element used to estimate the types and amounts of pollutants discharged into the ocean. The permit language is confused. The constituent list is extensive, but is about the same as in the previous draft.

2. The big additions are outfall monitoring and the MALs, which are the big issue. Armand noted that Ventura did perform outfall monitoring in its original permit term, but has not had to do so since the 1990's. If the Permittee's discharge exceeds a certain level (similar to Action levels in San Diego County), a follow up sampling, followed by the documentation of the iterative process is required.

3. The new permit also requires that the results of monitoring from each mass emission station conducted in accordance with the Standard Operating Procedure submitted under Standard Provision 14 of Attachment F shall be sent electronically to the Regional Water Board's Storm Water site, no later than 90 days from sample collection date, highlighting exceedances (Pollutants of Concern, POC) to the Basin Plan objectives for all test results, and the CTR for acute criteria with corresponding sampling dates per mass emission station.

4. Bioassessment monitoring must be performed through participation in the Southern California Municipal Storm Water Monitoring Coalition's (SMC's) regional program. Issues include difficulties in selecting reference streams, and those streams that become dry in the summer season.

5. Section 1.7 of the Permit involves compliance with water quality objectives. These objectives are set for receiving waters and cannot be used for discharges in MS4s. Armand provided his interpretation of the permit saying that the discharge in the MS4 could potentially cause exceedance when it reaches the receiving water body. The group agreed that it was not worded correctly.

The comment period to provide feedback is 45 days (Mid April 2009).

Construction General Permit monitoring requirements

Discussion deferred to next meeting.

4) **Toxicity testing for episodic (storm-based) events/exposure times – white paper presentation/discussion – follow-up actions [Group discuss]**

White paper on toxicity testing and exposure time issues specific to Calleguas Creek has been developed and is under review. Mark mentioned that EPA is considering revising the toxicity TMDL for Calleguas Creek; a meeting is being held on that issue. The idea is to incorporate TMDLs in NPDES permit.

Armand asked where the group might go with this issue on more of a statewide level; Mark suggested a meeting with Jon Bishop and Deb Smith; Chris recommended involving Ken Schiff. .

5) **Technical Issues:**
Field filtration for dissolved metals – stormwater experience?

Armand asked the group if any filter samples in the field. Ted indicated that it is problematic esp. during wet weather, as it could result in contamination of samples. How would filtration for composites be performed? Filtering each aliquot would be impractical. Bruce indicated that they do filtering of dissolved metals for dry weather sampling involving grab sample collection and performing follow-up investigations for IC/IDs.

Gretel Roberts mentioned that they do filter samples, both grab and composite. She cautioned the group on how some of the filters used could become a source of Zinc in the samples.

The County of San Diego indicated that they do not use filters for sampling for storm water. Most of the group members use test kits in the field to obtain measurements.

The group discussed the need for a study comparing the data obtained by filtering samples in the field versus filtering samples in the lab.

Field pH measurement – stormwater experience?

Group members report pH is typically measured in the field using pH meter and probe during grab sampling, even when composite sampling is ongoing.

6) 2009 activities/CASQA budget; EPC meeting summary [Armand]

Although the subcommittee did not receive CASQA funding in the adopted budget, the EPC expressed support for funding the transfer of the Monitoring and Research Agenda web portal to the new CASQA platform, and it is hoped that we still may receive funding for this important project. The funding from the state for other CASQA activities is still being reviewed and does not appear positive for 2009.

7) Schedule next telemeeting

Next Subcommittee meeting scheduled for March 31st (Tuesday), 2009, at 2:00 PM.

CASQA Monitoring and Science Subcommittee
Teleconference: Tues., Mar. 31, 2009 - 2:00 PM.

AGENDA

Call-in details:
Access Number 1.800.786.1922
Participant Code is 87779856#

1) Introductions
    Volunteer note-taker?

2) Review/Amend Agenda as needed

3) Updates:
    CA Water Quality Monitoring Council [Armand]
    SWAMP – upcoming stormwater guidance [Armand]
    CA Dept. of Pesticide Regulation urban runoff monitoring [Armand]
    ASBS Program [Steen Trump/Geremew Amenu]
    SCCWRP/SMC hydromodification monitoring study
    Other

4) New Permits/Monitoring Requirements
    Ventura County draft permit/Municipal Action Levels/sample req's.
    SF Bay Area Municipal Regional Permit (MRP)
    Construction General Permit monitoring requirements

5) Data Access/Display (re: statewide CA WQMC web portal effort)

6) Technical Issues/Follow-up:
    Field filtration for dissolved metals – stormwater
    Field pH measurement – stormwater
    Toxicity testing for episodic (storm-based) events/exposure times – white paper presentation/discussion – follow-up actions

7) 2009 activities/CASQA budget; EPC meeting summary [Armand]

8) Schedule next telemeeting
    Tues. 4/28 or Wed. 4/29?

CASQA Monitoring and Science Subcommittee

Teleconference: Tues., March 31, 2009 - 2:00 PM.

MEETING NOTES

1. Attendees: Armand Ruby (Subcommittee Chair), Chris Stransky, Arne Anselm, Steen Trump, Paul Randall, Arlene Chun, Peter Mangarella, Bruce Moore, Jody Edmunds, Adrienne Cibor (volunteer note-taker), Jay Shrake (Low attendance today due to Cesar Chavez state holiday)
2. Amendments to agenda: none
3. Topic Updates

California Water Quality Monitoring Council (Monitoring Council) [Armand Ruby (AR)]

- Info on the Council's activities is sent by e-mail from state's Listserv; subscribe through the on-line sign-up or let AR know if you need more info
- An alternate is needed to represent stormwater (CASQA) on the Council; call or email AR with ideas or to volunteer. Should be someone experienced in storm water quality monitoring, knows the issues, and is comfortable representing CASQA membership. Time commitment: meetings approx. every other month, rotates between SoCal (usually SCCWRP) and Sac., documents to review, conference meeting prep., etc.

SWAMP stormwater monitoring guidance – still no status update, should be some word this Thursday. Will need subcommittee review/input. [AR]

CA Dept. of Pesticide Regulation (DPR) Urban Runoff Monitoring [AR]

- DPR has Pyrethroid Working Group (PWG) conducting studies to determine impacts. AR to forward copy of study simulating rainfall on lawn after pesticide application.

ASBS Program [Steen Trump]

- Nothing new out yet but new special protection guidance expected soon.
- 3 Monitoring questions:
  1. What is the range of natural WQ at reference locatons?
  2. How does WQ at ASBS coastline compare to WQ at reference locations?
  3. How does the natural WQ compare at ASBS locations with and without discharges?

  SCCWRP currently working on #3, has sampled in S. Ca. and parts of N. and Central Ca., pre- and post-storm samples in receiving water.

- North coast ASBS stakeholders (Trinidad head, Kings Range, and Redwood National Park ASBS') submitted a request last week to form a N. coast regional monitoring group (as opposed to the Board's vision of one N. Ca. group from Marin to the Oregon border). Still awaiting a response from Dominic.

SCCWRP/SMC Hydromodification Monitoring Study

- Project on hold. Arne Anselm [AA] said the bonds are frozen. Once unfrozen, will take approx 18 months to complete. Possibly complete 2012. San Diego County is volunteering a few sites for validation; not sure about funding.

4. New Permits/Monitoring Requirements

Orange County Permit

Bruce Moore [BM]: tentative draft permit for San Diego region includes municipal action levels (MALs) for wet weather & enforceable numeric effluent limits (NELs) for dry weather. Runoff monitoring permit with the word "urban" removed, includes all runoff. Bruce to email to Armand who will forward to the group. The nationwide dataset was used to develop MALs – this is an issue b/c nationwide average levels tend to be higher; whereas CTR and Basin Plan were used for the NELs.

[BM] Potential problems w/MALs incl. high levels of Cd, Ni, Zn in approx. 25% of storm drains in S. Orange County due to seepage from groundwater affected by geological formations. Nothing new in OC permit re: pesticides, just continuing pyrethroid monitoring. TIE requirement from model monitoring program (metric table depending on results). Dry weather NEL requirements: total phosphorous, TDS, fecal coliform, Cd, Cu, Ni).

Ventura County Permit

Arne Anselm [AA]: Major outfall monitoring of pipes 36" or greater (wet weather), results compared to MAL's for just 5 or 6 constituents.
Dry weather monitoring (have to hunt for sites): includes aquatic toxicity; TIE requirement from model monitoring program (metric table depending on results). TIE clearly laid out same as for irrigated lands, 50% mortality triggers TIE. Discussion of which species to use for invertebrate testing, *Ceriodaphnia* or *Hyalella? Ceriodaphnia* more sensitive to TDS, *Hyalella* may be more sensitive to pesticides. All three species tested in first year (invertebrate, vertebrate, algae), then most sensitive only.

[AA] Pyrethroid insecticide study at two sites, twice during permit cycle. Once at beginning, once near 5 year end. Includes sediment toxicity, no water column toxicity. It used to be a wet weather event but difficult to get sediment safely during wet weather. [AR] suggested to check out an article written by Robert Holmes *et. al.* on SWAMP Pyrethroid study In "Environmental Science & Technology" 2008.

Bioassessment – cooperating w/regional study. Beach WQ monitoring – wet season, weekly at 10 sites.

Construction General Permit – still not issued.

5. Data Access/Display – item deferred to next meeting

6. Technical Issues
    - Next steps re: white paper on appropriate tox testing approaches - AR to check with Ken Schiff/SCCWRP re: SoCal study.
    - Geremew brought up a permit requirement to determine optimal sampling design for wet weather monitoring; AR to forward info and group follow up at next meeting.
    - Arne mentioned having toxaphene hits in receiving waters; group to have follow up discussion.

7. 2009 Activities/CASQA Budget; EPC Meeting Summary [AR]
    - Nothing new to report. Besides member dues, main portion of annual CASQA income is derived from annual conference – evaluation of any additional funding that may become available will be done after that happens in November.

8. Schedule Next Meeting
    - Group agreed on Tues. 4/28 at 2:00 PM for next meeting.

CASQA Pesticides Subcommittee members,
Our next meeting will be Tuesday, March 31, from 10 a.m. to noon. The agenda is below. We'll be planning our next steps for interactions with DPR.

The call-in information is:

Number: 1-800-786-1922
Code: 46864387#
Note: The phone system will prompt you for your name; please press "#" after you say it.

Please let us know if you won't be able to participate.

Jamison Crosby (acting) & Kelly Moran
CASQA Pesticides Subcommittee Co-Chairs

_____

CASQA Pesticides Subcommittee

DRAFT Agenda
Tuesday, March 31, from 10 a.m. to noon

1. Review/amend agenda (Jamison, 5 mins.)
2. *Need* volunteer to take meeting notes for today's call (Dave Tamayo)
3. Announcements and updates (All, 10 mins)
--Any announcements from participants
Kelly: PWG hired URS as their consultant for re-evaluation. Jody Edmunds is URS consultant; requested to join our conference call. Conflict of interest? CASQA has open meeting policy, however. Shall we apply "Executive Session" to our agendas? Looks like we will. Kelly will talk to Jody after call. Will talk about at next EPC meeting.

--Recent meetings (Dave)
Member National Pesticides Board (pretreatment) – how to better regulate pretreatment regarding termite control? Label changes, etc.
International IPM, Portland, OR. Armand & Dave made presentation on structural pest control.
PMAC – primarily focused on results of internal survey of membership, how to proceed w/ PMAC.
Discussion on how to deal with urban issues.

--Geoff's DPR interactions (Kelly)
Phone calls & meetings w/ Chuck Andrews (DPR). Building rapport.

--Antimicrobials Data Rule letter to EPA nearly done (Kelly) – off to EPC review. Sending final Monday (4/6)

--Slowdown on EPA pyrethroids label language changes (Kelly) –

--Any information from members on state/Federal pesticides activities (ALL - in lieu of usual UP3 update)

--UP3 funding/restart status (Kelly) – Palo Alto has contributed $2500 for Kelly to do UP3 duties.
$15k through CASQA; $10k for subcommittee. DPR considering $5k.
State has sold some bonds, but mostly for monies owed.

4. Permit updates (Jamison & Ron, 15 minutes)
--SF Bay Area Municipal Regional Permit (MRP) (Jamison)
Response to comments (previous draft) in 2 weeks ago. Comment period for current draft due 4/3 (Friday). Monitoring requirements were where most of the comments addressed. 100% increase in monitoring costs is projected (C.8 section of permit only); $1-3M (C8, 11, 12, 13, 14) price tag for entire monitoring program.

--Ventura Permit (Ron). Armand. Extensive monitoring section as well. Pyrethroids/toxicity study to establish baseline and/or trends through permit term (sediment & water column). Additional general pesticides monitoring. Ceriodaphnia changed to hyallela? Pyrethroids

--Others?

5. Riverside Toxicity Reduction Evaluation (TRE) (Arlene & Armand, 10
minutes). $0.90 per resident spent on monitoring (TIE/TRE). Does not include public ed, etc.

6. Herbicides (Dave R. and all, 10 minutes) TABLED.
--Are any of concern?
--Is there a monitoring list?

7. EPA OPP/OW "Harmonization" activities (Kelly and all, 10 mins)
--Past: Letter from EPA and CASQA response (last meeting). Reopening this task. Patty Tembrook (EPA 9) is on the workgroup. Too late for comments from CASQA. (Note, we did not have resources in January).
--Process/schedule information (Kelly). Workgroup (through Patty) will share with us their science workplan. Plan to execute this summer. Workshop in August (Washington, D.C.). How about meeting here or webcast – to be worked out.
--Plan of action (all). Review work plan; submit comments? PPDC next meeting is 4/22/09 (Pesticide Program Dialogue Committee; Dave sits on this); may be good to have work plan reviewed by that time. Dave will be flying to DC for this meeting; also, he will be meeting w/ Debbie Edwards (chair of PPDC and also is deputy director of an EPA division Of. Poll Prev. & Toxic Substances).

8. DPR Surface Water Regulations (Kelly and all, 10 mins)
--Notice (attached)
--What's happening (Kelly). General concept similar to another regulatory structure (groundwater protection, enacted by legislation previously to protect GW through measures – pesticides had been detected in GW). Waterboards are reviewing right now (due end of April); Kelly hopes to be able to guide Waterboards. We may see the plan in May; **HEADS UP!!!!**
--Plan of action (all). **Email contact on notice to be put on the email list!** (Done

3/31/09)

Make new list for tasks – discuss at next meeting.

9. DPR direction to PWG on Pyrethroid Reevaluation (Kelly and All, 10 minutes). **EXTREMELY IMPORTANT!**

--Discuss DPR approach (attached) (All). Schedule separate call to discuss this. Also, it is not clear where DPR is heading.
--Schedule/process for preparation of letter (all). Perhaps it would be better to wait and see.
Questions: is the approach good? Are these studies good; will it answer questions.

10. Cost estimates memo (Armand, 5 mins)
--Status and revised schedule. Now working on this. Proposed draft date: April 22, 2009.

11. Next meeting (Jamison, 5 mins)
--Set date & time for next subcommittee teleconference
--Make list of items for discussion.

CASQA Monitoring and Science Subcommittee
Teleconference: Tues., April 28, 2009 - 2:00 PM.

AGENDA

Call-in details:
Access Number 1.800.786.1922
Participant Code is 87779856#

1) Introductions

Volunteer note-taker (Bryn)?

2) Review/Amend Agenda as needed

3) Updates:

CA Water Quality Monitoring Council [Armand]. Met 4/2/09. Interesting presentations. Standardized access to data, monitoring protocols. Can get onto List Serve via State Board. Alternate for Armand (talk to Armand before next EPC)

SWAMP – upcoming stormwater guidance [Armand]. SCCWRP helping to develop w/ SWAMP folks. Armand will request that subcommittee to provide comment when guidance is available.

ASBS Program [Steen Trump/Geremew Amenu]. No real update. Few points made. Will try to talk/coordinate w/ Caltrans.

Construction General Permit monitoring requirements [Sandy M.]. Req. effluent monitoring from sites. 3 risk levels for projects, range from visual (Level 1) to grab samples (L2 & L3). Grab samples @ all discharge points w/in 1hr of flow plus 1 sample at beginning & end of work day. There are action levels (Turbidity=200 NTU, 6.5<pH<8.5) and numeric effluent limits (500 NTU, 6<ph<9).

L2: no receiving water monitoring.

L3: If exceed NEL, must monitor receiving water monitoring & monitor SSC (ASTM method)

NOI/etc/SWPPP electronic submittal to State.

Bioassessment (SWAMP) of receiving water before & after construction project. Monitoring personnel must qualify w/ SWAMP protocols.

SSC (variant of TSS). Sampling is USGS technique. Very difficult to comply w/ sampling protocol for SSC. Not sure how sampling protocol can be done w/ construction flows (sheet/gutter/pipe discharge). Perhaps talk to Roger James regarding sampling protocols (guy who works w/ Gary Minton).

Active Treatment Systems – separate effluent limits; now an option. Lower effluent limits.

Non-visual monitoring remains in permit.

Monitoring is everyday of every storm event.

Municipal member impacts – will need to comply w/ these monitoring program requirements! BIG QUESTION: to what degree will municipalities w/ CGP in their jurisdictions be reviewing monitoring results (eg., as part of their inspections)?

Owner of land (few exceptions) can only apply for the permit.

On-going projects up to 2 years will be grandfathered as L1.

This is a draft. Public comments due June 17th. June 3rd is public hearing, not an adoption hearing. No workshop scheduled. Construction subcommittee is working on comments. Hoping to get draft talking points out prior to June 3rd hearing.

Looking for comments on Monitoring aspects. Sandy will forward timeline to Armand.

Other (none)

4) CA Dept. of Pesticide Regulation pyrethroids re-evaluation [Armand]

MS4 Cost info needed! TODAY!

Grass Wash-off Study review; Building Wash-off study

5) Data Access/Display (re: statewide CA WQMC web portal effort) – deferred to future meeting.

6) Technical Issues/Follow-up:

Field filtration for dissolved metals – stormwater

Toxicity testing for episodic (storm-based) events/exposure times – white paper presentation/discussion – follow-up actions

Optimal sampling design for wet weather EMCs – forwarded this afternoon. Defer discussion for next meeting.

Notable/unexpected monitoring "hits" [Arne's note on seeing toxaphene in receiving water sampling]

7) 2009 activities/CASQA budget; EPC meeting summary [Armand]

8) Schedule next telemeeting

Tues. 5/26 2pm. or Wed. 5/27?

CASQA Pesticides Subcommittee members,
Next meeting Monday May 4, 10 a.m. to noon. Please let us know if you won't be able to participate.

Call-in: Number: 1-800-786-1922
Code: 87779856# (note: New code!)
Note: The phone system will prompt you for your name; please press "#" after you say it.
Dave Tamayo, Kelly Moran, Jamison Crosby
CASQA Pesticides Subcommittee Co-Chairs

_____

CASQA Pesticides Subcommittee
Agenda
Monday May 4, 10 a.m. to noon

1. Review/amend agenda (Dave, 5 mins.)
2. Recruit note taker.
3. Discuss co-chair changes
4. Announcements and updates (All, 10 mins)
   --Any announcements from participants
   -- updates on permits
   --Recent EPA meetings (Dave)
   --Information from members on state/Federal pesticides activities (ALL - in lieu of usual UP3 update)
   --UP3 funding/restart status (Kelly)
   --Next meeting Tues. May 19
5. Court Decision Reinstates Permit Requirements for Pesticide Applications to Surface Water (Mike Blankinship & Kelly, 15 mins)
   --Status of Court Decision overturning EPA rule defining pesticides as not being pollutants under Clean Water Act (Kelly)
   --Risks for CASQA members (Lawsuits against mosquito abatement districts) (Kelly)
   --California Aquatic Pesticide Application General Permits: Renewal of current permits, implementation (Mike)
6. DPR Draft Direction to PWG for Pyrethroid Reevaluation (Dave, Armand, Kelly and All, 30 minutes)
   --Discussions with DPR, URS, PWG(Dave, Armand Kelly)
   --Calls with PCOC (Kelly)
   --Next Steps/potential timeline
7. Plan for response to items from DPR (Dave, all, 15 mins)
   --Study plan for controlled urban runoff study (due 6/26)
   --Building material washoff study report (due 6/29)
   --Change in scope for review of DPR direction to PWG (due 5/15)
   --Discuss above items - scope/budget/funding/process to complete
8. Cost estimates memo (Armand, 5 mins)
   --Update
9. Next meeting (Dave, 5 mins)
   --Set date & time for next subcommittee teleconference
   --Make list of items for discussion

From: CASQA [info@casqa.org]
Sent: Friday, May 01, 2009 3:42 PM
To: Padres, Claudio
Subject: Don't Miss CASQA's May 15th General Membership Meeting and Webcast on "Stormwater Harvesting and Reuse – A New Component of Stormwater Permitting"

CALIFORNIA STORMWATER QUALITY ASSOCIATION
Dedicated to the Advancement of Stormwater Quality Management, Science, and Regulation

ANNOUNCEMENT:
May 1, 2009

Contact: info@CASQA.org

Don't Miss CASQA's May 15th General Membership Meeting on

"Stormwater Harvesting and Reuse - A New Component of Stormwater Permitting"

- LIVE WEBCAST AVAILABLE -

Friends of CASQA,

For the first time, CASQA will devote an entire quarterly meeting to exploring stormwater harvesting and reuse. The subject matter is extremely timely for those involved with both water supply and stormwater management given the ongoing drought conditions affecting much of the western U.S. It is also an important emerging issue in stormwater permits as current tentative orders are starting to prioritize stormwater harvesting and reuse, along with infiltration, as preferred strategies of Low Impact Development.

The agenda for the meeting brings together a diverse range of experts that will help shape our understanding this important topic including:

1. An overview of policy and integration issues from a water supply, sanitary sewer and stormwater perspective
2. An exploration of regulatory barriers and solutions - for example: Are there water rights issues? Can stormwater be used within buildings for non-potable uses? What are the public health issues?
3. A review of case studies where stormwater has been successfully harvested and reused at a facility and a regional scale.

The agenda is available by clicking here; registration to attend the meeting and watch the webcast is open - click here to register.

- **ATTEND IN PERSON:** Register online until 5:00 pm, May 14th. Meeting fee payable at the door beginning at 8:00 a.m. - Check preferred, no credit cards at the door.
- **LIVE WEBCAST:** Purchase individual use or site use access online until noon Thursday, May 14th.

- **THEME:** Stormwater Harvesting and Reuse: A New Component of Stormwater Permitting 920266
- **DATE:** Friday, May 15, 2009; 9 am - 3:15 pm
- **LOCATION:** Waterfront Hotel in Jack London Square, Oakland

The California Stormwater Quality Association (CASQA) has been a leader since 1989 when the field of stormwater management was in its infancy. CASQA's membership is composed of a diverse range of stormwater quality management organizations and individuals, including cities, counties, special districts, industries, and consulting firms throughout the state. A large part of our mission is to assist water quality programs in California to learn collectively from the individual experiences of its members, to learn from the mistakes and avoid the pitfalls.

WWW.CASQA.ORG

# # #

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CASQA | PO BOX 2105 | Menlo Park | CA | 94025

APPENDIX B

PUBLIC EDUCATION MATERIALS AND INFORMATION

New / Revised Public Education Brochures

(Included in hard copy report only)

Included Brochures:

- Tips for Horse Care
- Outdoor Cleaning Activities and Professional Mobile Service Providers
- What you should know for Landscape and Gardening
- What you should know for Industrial and Commercial Facilities
- Tips for Maintaining a Septic Tank System
- What you should know for The Food Service Industry
- What you should know for Automotive Maintenance and Car Care
- What's the Scoop?
- Stream bank Stabilization Fact Sheet

Misc Public Education Materials and Information

Website Survey

NPDES Survey

Page 1 of 1

Exit this survey

NPDES Survey

1. NPDES Public Education

1. Gender?

- Male
- Female

2. Age Group?

- 18 to 25
- 26 to 30
- 31 to 35
- 36 to 40
- 41 to 45
- 46 to 50
- 51 to 55
- 55+

3. Water that leaves your lawn from Irrigation (water sprinkler
down streets and/or storm drains and then directly to...

- Sewage Treatment Plants
- Streams, r

4. Which of the following can LEGALLY be disposed into the stor

- Usable Household Chemicals
- Empty Household Chemicals containers
- Yard waste/clippings/leaves
- Pet Waste
- Paint
- Motor Oil/
- Cigarette t
- None of th

5. Do you feel that you are well informed and aware of illegal d
impact in your community or streams, rivers and lakes?

- Yes
- No

6. Thank You for completing our survey. For an opportunity to v
provide your mailing address below. (Optional)

Done

Survey Powered by:
SurveyMonkey.com
"Surveys Made Simple."

http://www.surveymonkey.com/s.aspx?sm=AI66_2fx5M4zvCggNOHV

1. Gender?		R
Male		63.60%
Female		36.40%

2. Age Group?		R
18 to 25		31.80%
26 to 30		13.60%
31 to 35		9.10%
36 to 40		22.70%
41 to 45		4.50%
46 to 50		9.10%
51 to 55		4.50%
55+		4.50%

3. Water that leaves your lawn from Irrigation (water sprinklers), Car washing and Rain flows down streets and/or storm drains and then directly to...		R
Sewage Treatment Plants		35.00%
Streams, rivers & lakes		65.00%

4. Which of the following can LEGALLY be disposed into the storm drain? (Circle all that apply)		R
Usable Household Chemicals		18.20%

The Website Survey was recently developed and released to help evaluate overall public understanding of storm water runoff issues. The survey was uploaded late in the year, but still generated 22 completed surveys before the end of Fiscal Year 08/09.

Survey Results:

#1 Male 66.7%

Female 33.3%

#2 28.6% are between 18 to 25 years old

23.8% 36 to 40

#3 63.2% to streams, rivers & lakes

#4 61.9% Nothing in the storm drain

#5 68.2% Felt they were aware of the negative impacts illegal dumping makes.

otted Map

LAMAR

Riverside County Flood Contro

Map #1

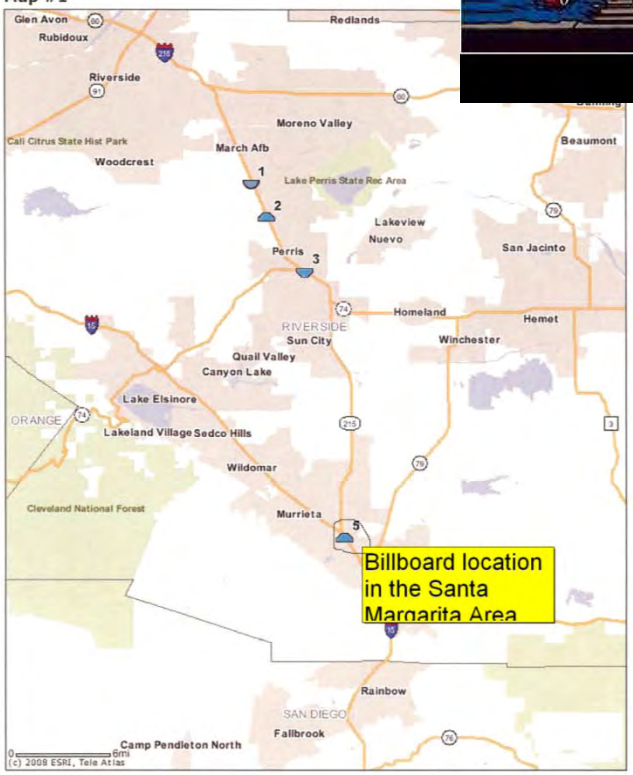

Above and Left: The map indicating the location and to the top right of that is the billboard illustration as placed on a laminated billboard structure in the Santa Margarita area.

Below: An image of lenticular magnet. The boxes below change to another graphic for a total of six illustrations in one magnet.

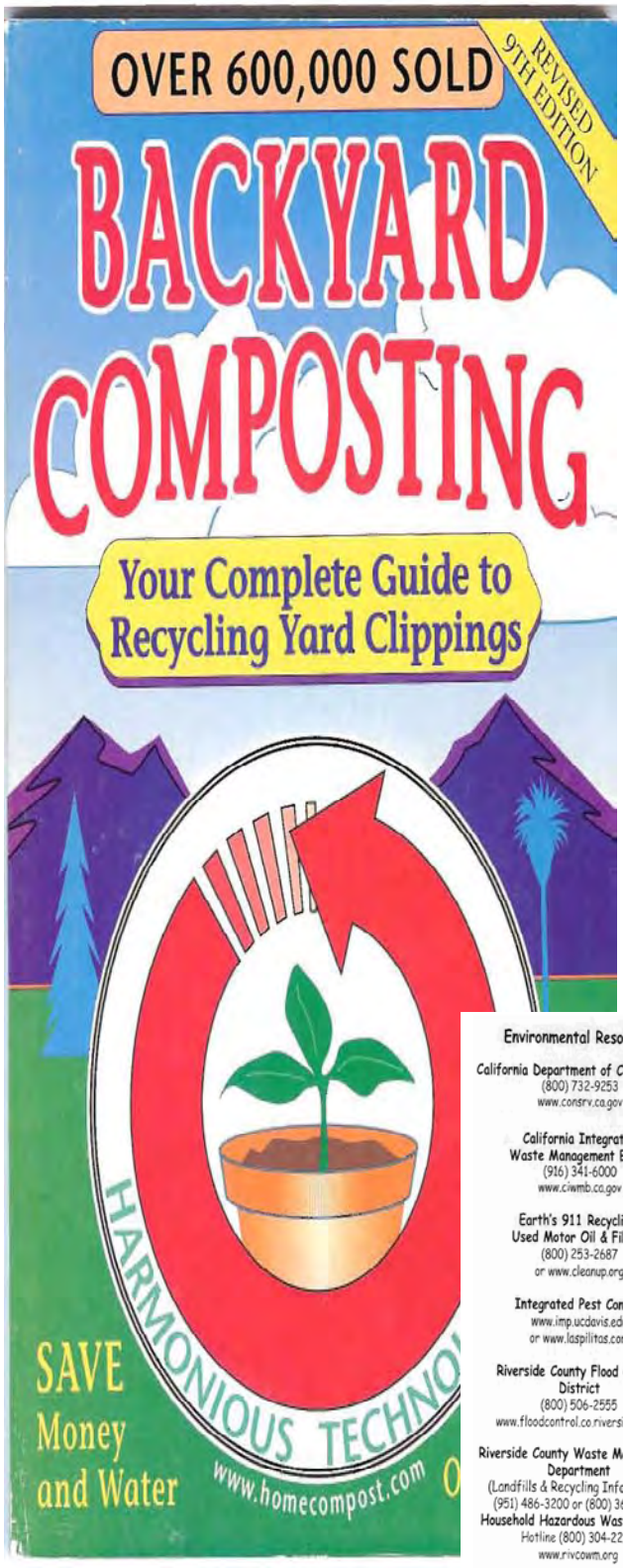

To address the Santa Margarita Pollutants of Concern, Outreach education addresses the problems with over-using **Pesticides**, the proper use of **Nutrients** and the hazards of **Pathogens** in our water systems are addressed at

- Home Garden Workshops,
- County Waste Management's FREE Composting Workshop and at
- Home Improvement Store tablings (one on one outreach at home improvement stores).

Left: *Backyard Composting book* is given to all who attend the workshops.

Below: A sample composting *workshop schedule* for Riverside County.

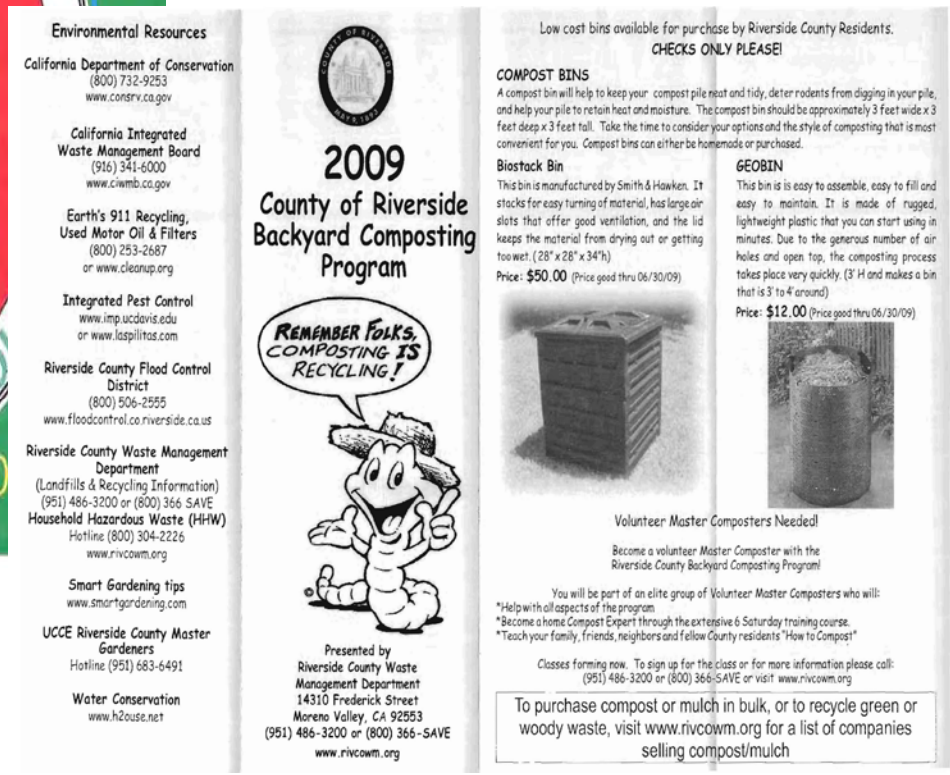

Environmental Resources

California Department of Conservation
(800) 732-9253
www.consrv.ca.gov

California Integrated Waste Management Board
(916) 341-6000
www.ciwmb.ca.gov

Earth's 911 Recycling, Used Motor Oil & Filters
(800) 253-2687
or www.cleanup.org

Integrated Pest Control
www.imp.ucdavis.edu
or www.laspilitas.com

Riverside County Flood Control District
(800) 506-2555
www.floodcontrol.co.riverside.ca.us

Riverside County Waste Management Department
(Landfills & Recycling Information)
(951) 486-3200 or (800) 366 SAVE
Household Hazardous Waste (HHW)
Hotline (800) 304-2226
www.rivcowm.org

Smart Gardening tips
www.smartgardening.com

UCCE Riverside County Master Gardeners
Hotline (951) 683-6491

Water Conservation
www.h2ouse.net

2009
County of Riverside Backyard Composting Program

REMEMBER FOLKS, COMPOSTING IS RECYCLING!

Presented by
Riverside County Waste Management Department
14310 Frederick Street
Moreno Valley, CA 92553
(951) 486-3200 or (800) 366-SAVE
www.rivcowm.org

Low cost bins available for purchase by Riverside County Residents.
CHECKS ONLY PLEASE!

COMPOST BINS
A compost bin will help to keep your compost pile neat and tidy, deter rodents from digging in your pile, and help your pile to retain heat and moisture. The compost bin should be approximately 3 feet wide x 3 feet deep x 3 feet tall. Take the time to consider your options and the style of composting that is most convenient for you. Compost bins can either be homemade or purchased.

Biostack Bin
This bin is manufactured by Smith & Hawken. It stacks for easy turning of material, has large air slots that offer good ventilation, and the lid keeps the material from drying out or getting too wet. (28" x 28" x 34"h)
Price: $50.00 (Price good thru 06/30/09)

GEOBIN
This bin is is easy to assemble, easy to fill and easy to maintain. It is made of rugged, lightweight plastic that you can start using in minutes. Due to the generous number of air holes and open top, the composting process takes place very quickly. (3' H and makes a bin that is 3' to 4' around)
Price: $12.00 (Price good thru 06/30/09)

Volunteer Master Composters Needed!

Become a volunteer Master Composter with the Riverside County Backyard Composting Program!

You will be part of an elite group of Volunteer Master Composters who will:
*Help with all aspects of the program
*Become a home Compost Expert through the extensive 6 Saturday training course.
*Teach your family, friends, neighbors and fellow County residents "How to Compost"

Classes forming now. To sign up for the class or for more information please call: (951) 486-3200 or (800) 366-SAVE or visit www.rivcowm.org

To purchase compost or mulch in bulk, or to recycle green or woody waste, visit www.rivcowm.org for a list of companies selling compost/mulch

floodcontrol.co.riverside.ca.us

Dashboard

Jul 1, 2008 - Jun 30, 2009

Comparing to: Site

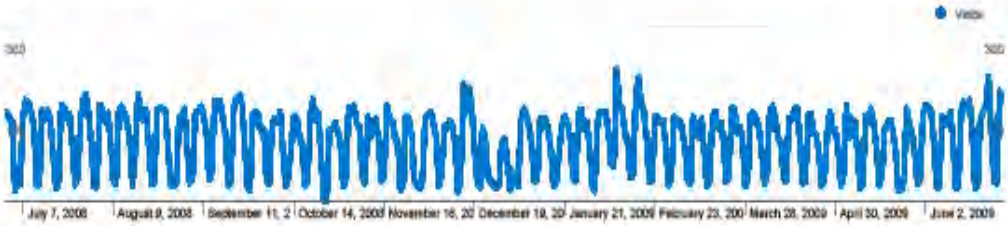

Site Usage

40,930 Visits

27.29% Bounce Rate

145,553 Pageviews

00:02:12 Avg. Time on Site

3.56 Pages/Visit

60.50% % New Visits

Visitors Overview

Visitors

26,021

Map Overlay world

Traffic Sources Overview

- Search Engines 22,162.00 (54.15%)
- Referring Sites 9,980.00 (24.38%)
- Direct Traffic 8,783.00 (21.46%)
- Other 5 (0.01%)

Referencing A.3.1

The **website** continues to be improved by adding the kind of information and resource links about urban pollution, their causes and prevention.

The www.rcflood.org web site received during the 08/09 Year, *42,051 hits*.

Mission Resource Conservation District

Stormwater Education Program Report for the

Santa Margarita Watershed

Annual Report 2008/2009

The Storm water Program was presented to 193 classrooms in Fiscal Year08/09/2009. :

School District	Presentations	Students
Lake Elsinore	6	126
Menifee	40	755
Murrieta	63	739
Temecula	84	1,843
TOTAL	193	3,463

The goal of the Fancy Fin presentations and the Watershed model is to leave students at each grade level with a basic understanding of the concept of watershed, the definition of storm water, how water becomes polluted, and the difference between point and non-point source pollution. Presentations always end with an interactive conversation about what they can to help keep waterways clean. This conversation has an emphasis on recycling, reusing and reducing which help support the growing number of school recycling programs.

While achieving these storm water goals, we also tie the subject matter into the grade appropriate state science standards which address physical sciences, life science, earth science and investigation and experimentation. For example, we addressed the water cycle at a grade appropriate level which served as a basis for understanding how water on earth moves between the oceans and land through a process of evaporation and condensation. This is part of the physical science standard for California. At a kindergarten level, this concept is as basic as letting them know that water can be liquid or solid. In third and fourth grades the watershed presentations help students understand not only the water cycle but also the role of land forms in moving water between ocean and land.

Referencing: A.5.1

Mission Resource Conservation District provides the following educational presentations and services in the Santa Margarita Region:

- Student education outreach
- Adult education outreach
- Support services for public education outreach activities at community events

Mission Resource Conservation District

Stormwater Education Program Report for the

Santa Margarita Watershed

Annual Report 2008/2009

Page 2

Number of presentations by grade:

Kindergarten:	23
First grade:	32
Second grade:	69
Second/Third Combination:	1
Third grade:	27
Fourth grade:	8
Fifth grade:	15
Sixth, seventh	
Eight	4

The Storm Water presentations are appropriate for all grade levels and the use of the Fancy Fin series, graduating to the watershed model in 4th through 8th grade, makes them age and grade appropriate.

Distribution of materials:

Student bags are individually packed with a parent letter, household hazardous waste detective sheet and either a Fancy Fin coloring book (k-3) or a Storm water Pollution Patrol Book and age appropriate collaterals. The individual packing of take home bags relieves the teacher of this and insures that the material is taken home at the end of the day. Addition of the County's list of recycling and house hold hazardous waste events would be an excellent addition.

Outreach events:

Mission Resource Conservation District always responds to requests to do public events but this last year we did not receive any so we devoted the budget to school presentations.

Mission Resource Conservation District Stormwater Education Program Report for the Santa Margarita WatershedAnnual Report 2008/2009

2008-2009 STORMWATER EDUCATION PROGRAM PRESENTATIO

Storm Water/Clean Water Protection Program
Riverside County Flood Control

Date	School/Organization	City	Presentations	Grade Level	Presentation Type	School District	Area
5-Aug-08	Ridgemoor	Sun City	4	K	Fancy Fin	Menifee	Santa Margarita
7-Aug-08	Ridgemoor	Sun City	1	K	Fancy Fin	Menifee	Santa Margarita
14-Aug-08	Ridgemoor	Sun City	2	5	Enviro	Menifee	Santa Margarita
18-Aug-08	Alamos Elem.	Temecula	4	2	Fancy Fin	Temecula	Santa Margarita
21-Aug-08	Temecula Mdl	Temecula	3	6	Enviro	Temecula	Santa Margarita
22-Aug-08	Temecula Mdl	Temecula	2	6	Enviro	Temecula	Santa Margarita
25-Aug-08	Temecula Mdl	Temecula	3	6	Enviro	Temecula	Santa Margarita
26-Aug-08	Temecula Mdl	Temecula	2	6	Enviro	Temecula	Santa Margarita
5-Sep-08	Ridgemoor	Sun City	1	3	Fancy Fin	Menifee	Santa Margarita
9-Sep-08	Ridgemoor	Sun City	3	5	Enviro	Menifee	Santa Margarita
15-Sep-08	Temecula Luiseno	Temecula	4	3	Fancy Fin	Temecula	Santa Margarita
17-Sep-08	Evans Ranch	Sun City	3	3	Fancy Fin	Menifee	Santa Margarita
18-Sep-08	Temecula Luiseno	Temecula	2	3	Fancy Fin	Temecula	Santa Margarita
26-Sep-08	Pauba Valley	Temecula	2	5	Enviro	Temecula	Santa Margarita
1-Oct-08	Vail Elementary	Temecula	4	K	Fancy Fin	Temecula	Santa Margarita
7-Oct-08	Alamos Elementary	Temecula	3	3	Enviro	Temecula	Santa Margarita
10-Oct-08	Temecula Luiseno	Temecula	4	4	Enviro	Temecula	Santa Margarita
14-Oct-08	Sparkman Elem.	Temecula	4	K	Fancy Fin	Temecula	Santa Margarita
20-Oct-08	Alamos Elem.	Temecula	4	3	Enviro	Temecula	Santa Margarita
27-Oct-08	Avaxat Elem.	Murrieta	3	5	Enviro	Murrieta	Santa Margarita
4-Nov-08	Alta Murrieta	Murrieta	3	1	Fancy Fin	Murrieta	Santa Margarita
5-Nov-08	Evans Ranch	Sun City	3	3	Enviro	Murrieta	Santa Margarita
7-Nov-08	Alta Murrieta	Murrieta	3	1	Fancy Fin	Murrieta	Santa Margarita
11-Nov-08	Monte Vista	Murrieta	3	5	Enviro	Murrieta	Santa Margarita
12-Nov-08	Rail Ranch	Murrieta	3	2	Fancy Fin	Murrieta	Santa Margarita
17-Nov-08	Donald Graham	Murrieta	5	2	Fancy Fin	Murrieta	Santa Margarita
21-Nov-08	Rail Ranch	Murrieta	3	2	Fancy Fin	Murrieta	Santa Margarita
1-Dec-08	Sparkman Elem.	Temecula	3	2	Fancy Fin	Temecula	Santa Margarita
2-Dec-08	Butterfield	L.E.U.	3	1	Fancy Fin	Lake Elsinore "	Santa Margarita
2-Dec-08	Butterfield	L.E.U.	1	2,3	Fancy Fin	Lake Elsinore "	Santa Margarita
4-Dec-08	Lisa J Mails	Murrieta	2	5	Enviro	Murrieta	Santa Margarita
11-Dec-08	Lisa J Mails	Murrieta	2	5	Enviro	Murrieta	Santa Margarita
13-Jan-08	Pauba Valley	Temecula	4	3	Fancy Fin	Temecula	Santa Margarita
14-Jan-08	Ridgemoor	Menifee	4	2	Fancy Fin	Menifee	Santa Margarita
15-Jan-09	Evans Ranch	Menifee	3	2	Fancy Fin	Menifee	Santa Margarita
16-Jan-09	Sparkman Elem.	Temecula	2	5	Enviro	Temecula	Santa Margarita
20-Jan-09	Pauba Valley	Temecula	3	3	Fancy Fin	Temecula	Santa Margarita
21-Jan-09	Evans Ranch	Menifee	3	2	Fancy Fin	Menifee	Santa Margarita
23-Jan-09	William Collier	Wildomar	2	1	Fancy Fin	Lake Elsinore "	Santa Margarita
26-Jan-09	Tovashal	Murrieta	4	2	Fancy Fin	Murrieta	Santa Margarita
28-Jan-09	Monte Vista	Murrieta	3	1	Fancy Fin	Murrieta	Santa Margarita
29-Jan-09	Monte Vista	Murrieta	3	1	Fancy Fin	Murrieta	Santa Margarita
2-Feb-09	Alta Murrieta	Murrieta	4	2	Fancy Fin	Murrieta	Santa Margarita

11-Feb-09	Alta Murrieta	Murrieta	2	2	Fancy Fin	Murrieta	Santa Margarita
11-Feb-09	Lisa J Mails	Murrieta	4	4	Enviro	Murrieta	Santa Margarita
11-Feb-09	Evans Ranch	Menifee	3	1	Fancy Fin	Menifee	Santa Margarita
18-Feb-09	Evans Ranch	Menifee	3	1	Fancy Fin	Menifee	Santa Margarita
20-Feb-09	E.Hale Curran	Murrieta	1	2	Fancy Fin	Murrieta	Santa Margarita
			2	K/3	Fancy Fin	Murrieta	Santa Margarita
			4	1	Fancy Fin	Murrieta	Santa Margarita
23-Feb.-09	Alamos Elem.	Temecula	3	2	Fancy Fin	Temecula	Santa Margarita
24-Feb-09	Alamos Elem.	Temecula	3	2	Fancy Fin	Temecula	Santa Margarita
2-Mar-09	Crowne Hill	Temecula	3	2	Fancy Fin	Temecula	Santa Margarita
3-Mar-09	French Valley	Temecula	4	2	Fancy Fin	Temecula	Santa Margarita
4-Mar-09	French Valley	Temecula	3	2	Fancy Fin	Temecula	Santa Margarita
5-Mar-09	Crowne Hill	Temecula	3	2	Fancy Fin	Temecula	Santa Margarita
9-Mar-09	Rancho Elem.	Temecula	5	1	Fancy Fin	Temecula	Santa Margarita
17-Mar-09	Temecula Luiseno	Temecula	3	2	Fancy Fin	Temecula	Santa Margarita
18-Mar-09	Ridgemoor	Menifee	4	2	Fancy Fin	Menifee	Santa Margarita
19-Mar-09	Temecula Luiseno	Temecula	4	2	Fancy Fin	Temecula	Santa Margarita
7-Apr-09	Ridgemoor	Menifee	2	K	Fancy Fin	Menifee	Santa Margarita
24-Apr-09	DaVina Academy	Temecula	4	6,7,8	Enviro	Temecula	Santa Margarita
27-Apr-09	Monte Vista Ele	Murrieta	3	K	Fancy Fin	Murrieta	Santa Margarita
28-Apr-09	Monte Vista Ele	Murrieta	3	K	Fancy Fin	Murrieta	Santa Margarita
			193				

*L.E.U. is for Lake Elsinore Unified School District
**Enviro. is an abbrieviation for the Enviroscape, a watershed model

Riverside County Stormwater Public Education Program

Summary of Activities for Fiscal Year 2008-2009

Referencing A.5.1

The following report is from SGA (Steve Groner and Associates). They have been retained to prepare and present workshops at major home improvement stores throughout Riverside County providing training and offering information to employees and customers the proper uses and disposals for paint, pesticides and fertilizers .

sga
S.GRONER ASSOCIATES, INC.

Riverside County "Only Rain Down the Storm Drain"
SGA's Summary of Activities

PURPOSE

According to the Environmental Protection Agency, storm water pollution is the leading cause of water contamination across the nation. To address this issue, the Riverside County Storm Water Public Education Program seeks to reduce the amount of pollutants – including pesticides, fertilizers, paint and pet waste– from being discharged into the storm drain system and ending up in our rivers, beaches and oceans. The program focuses on outreaching to target audiences associated with these specific pollutants with the pollution prevention message.

GOALS

The program has three (3) primary goals:

- Continue to increase awareness of storm water pollution and its impact on our environment;
- Continue to educate residents and businesses on how to change their behavior to minimize pollution; and
- Maintain compliance with the NPDES Municipal Storm Water Permit.

STRATEGY

To achieve the goals of the program and to maximize the program's available resources in order to yield the greatest amount of pollution reduction, the program executed a comprehensive set of pollutant-specific outreach activities. The strategy of the program focuses on directing Riverside County residents and businesses to available outreach materials to prevent storm water pollution. The program's educational materials each identified a pollutant and the simple pollution prevention behavior(s) associated with it. Whenever possible, messages were delivered in settings tied to these pollutants, such as placing paint tip cards in paint stores and placing posters reminding pet owners to pickup after their dog in pet facilities.

NON-MEDIA OUTREACH

To deliver the storm water pollution prevention message, the programexecuted an expansive set of outreach activities. This included formingpartnerships with garden centers/nurseries, paint stores, hardware stores, home improvement stores and pet facilities in order to place outreach materials. Outreach materials included fact sheets, tearsheets andshelftalkers. Fact sheets that explained storm water pollution prevention tipswere given to store staff. Tearsheets, promoting the program's phonenumbers, website and a list of common items accepted at the household hazardous waste collection centers, were placed on counters and checkoutstands. Shelftalkers, with tearsheets attached, provided pollution preventiontips and were placed in the appropriate aisles relating to the specific pollutant.

This allowed customers to tear off individual sheets and take the information with them. Additionally, the program utilized a pet poster placed in pet facilities to encourage pet owners to pick up after their pets in order to prevent pollution. Fact sheets, tearsheets, shelftalkers and posters promoted the (800) 506-2555 and (951) 358-5256 hotlines along with the www.rcflood.org website, as resources of more information for residents and businesses. In addition, owners, managers and employees were educated on storm water pollution. Once educated, the staff, seen as experts by the customers, served as catalysts to spread the storm water pollution prevention message to "do-it -yourselfers" who may be unintentionally engaged in various polluting activities during their home projects or pet owners who may not be picking up after their dog(s) resulting in pollution. By having staff deliver the storm water pollution prevention message, the program has the advantage of "the messenger" constantly being at the customers' disposal, thereby being able to effectively reach and educate a large group of potential polluters.

Partnership with Garden Centers/Nurseries, Paint Stores, Hardware Stores and Home Improvement Stores

Goals

- Continue to develop and maintain corporate and private partnerships with garden centers/nurseries, paint stores, hardware stores and home improvement stores throughout the County.
- Continue to place public educational materials in appropriate locations (paint tip cards on paint counter, etc.) in stores throughout the County.
- Promote the (800) 506-2555 and (951) 358-5256 hotlines along with the www.rcflood.org website. Encourage residents, businesses and store staff to refer to these resources when they want more information on storm water pollution prevention and proper household hazardous waste disposal.
- Continue to develop and maintain partnerships with home improvement stores in order to conduct tablings in front of the stores while providing outreach materials to residents in their community with the storm water pollution prevention message.

S SGA
Riverside County Storm Water Public Education Program
Annual Report for Fiscal Year 2008-2009

Results

• Maintained partnerships with 94 garden centers/nurseries, paint stores,hardware stores and home improvement stores.

Worked with stores to train 257 employees on Best Management Practices (BMP) and the proper disposal of pesticides, fertilizers and paint furthering their ability to pass on these pollution prevention messages to their customers.

•

Distributed approximately 17,681 public education materials at stores throughout the County; including fact sheets, tearsheets and shelftalkers).

Listed below is a summary of the materials placed at garden centers/nurseries, paint stores, hardware stores and home improvement stores:

- Partner Stores: 94
- Fact Sheets (pollution prevention tips): 105
- Tearsheets (hotline and website resource information): 17,450
- Shelftalkers (tips on pesticide, fertilizer and paint): 126

• Developed partnerships with major home improvement stores and held 5 tablings at Home Depot and/or Lowe's. Set up a table with the program information near the front of the store. Distributed public education materials and spoke one-on-one to residents regarding stormwater pollution prevention, educating 953 residents.

Listed below is a summary of the materials distributed at home improvement store tablings:

- Tablings: 5
- Tearsheets (hotline and website resource information): 903
- Fact Sheets (pollution prevention tips): 250
- Outdoor Cleaning Brochures: 154
- HHW Booklets: 353
- Stormwater Sponges: 170
- Air Fresheners: 207
- Pens: 392
- Key Chains 281
- Highlighters 116

Partnership with Pet Facilities

Goals

• Continue to develop and maintain corporate and private partnerships between the program and pet facilities, including pet stores, grooming facilities, animal hospitals and animal shelters.
• Continue to place public educational materials in pet facilities. Materials included posters which stressed the negative impact of pet waste to the storm drain system.

4.2.2 Results

• Partnered with 91 major pet store chains – such as PETCO and PetSmart – as well as smaller independent pet stores, veterinarian clinics, kennels and grooming facilities to outreach to pet owners.
Placed 83 pet posters.
Trained 134 employees.

Listed below is a summary of the materials placed at pet facilities:
 Partner Facilities: 91
 Posters: 83

MATERIAL DEVELOPMENT

The material development portion of the program included the reprinting of collateral materials including pet posters and tearsheets.

Goals

• Reprint and create new materials with storm water program information.

Results

• *Collateral items:* Collateral materials were reprinted, including pet posters and tearsheets.

To leverage education outreach resources, the "Only Rain Down the Storm Drain" Program coordinates and partnerships with Western Riverside Council of Governments (WRCOG). Their report is as follows:

Western Riverside Council of Governments

School Outreach Report

(Santa Margarita Area highlighted)

Date	Function	Jurisdiction	Program
8/18/2008	SWTC Meeting	ALL	COOP
8/21/2008	Banning Mixer	Banning	Litter
9/13/2008	Moreno Valley Youth Fest	Moreno Valley	Used Oil
9/13/2008	Perris/Mead Health Fair	Mead	Used Oil & TUMF
9/19/2008	Corona HHW Event	Corona	Used Oil
9/20/2008	Corona HHW Event	Corona	Used Oil
10/2-5/2008	Banning Stage Coach Days	Banning	Clean Cities & Used Oil
10/4/2008	I-215/60 Clean up	County/Moreno Valley/Riverside	Litter
10/6/2008	Meeting Pass Bus Expo	Banning & Calimesa	oil
10/7/2008	Corona Buss Expo	Corona	Clean Cities & Oil
10/8/2008	Sunlakes E-Waste Event	Banning	Banning
10/10/2008	Granite Hill School assembly	Riverside	Litter
10/15/2008	Temecula Business Expo	Temecula	Clean Cities & Oil
10/17/2008	Perris School Assembly	Perris	Litter
10/18/2008	Beaumont Radio Remote	Beaumont	Used Oil
10/18/2008	Temecula Cleanup	Temecula	Used Oil
10/20/2008	SWTC Meeting	ALL	COOP
10/22/2008	HHWIE	ALL	Solid Waste & Used Oil
11/1/2008	Banning Business Expo	Banning	COOP
11/1/2008	Environmental Youth Conference	ALL	Clean Cities and COOP
11/1/2008	Banning Bulky Goods	Banning	Banning
11/15/2008	Temecula Radio Remote	Temecula	Used Oil
11/15/2008	Temecula HHW Event	Temecula	Used Oil
11/15/2008	Banning HHW event	Banning	Used Oil
12/5/2008	Corona HHW Event	Corona	Used Oil
12/6/2008	Corona HHW Event	Corona	Used Oil
12/10/2008	Green Summit for School	ALL	Litter
12/11/2008	Murrieta Chamber event	Murrieta	Solid Waste
12/15/2008	SWTC Meeting	ALL	COOP
1/29/2009	Park Hill Elementary Care Fair	San Jacinto	Litter
2/11/2009	Riverside Elementary School Enviro. Club Meeting	Riverside	Litter
2/17/2009	SWTC Meeting	ALL	COOP
2/18/2009	AB 939 Workshop	ALL	COOP
2/19/2009	Lake Elsinore Chamber event	Lake Elsinore	Solid Waste
3/9/2009	Rail Ranch Elementary School Assembly	Murrieta	Litter
3/12/2009	Solid Waste Forum Mini- Conference	ALL	Solid Waste and Litter
3/14/2009	Bulky Goods Day	Banning	Banning
3/16/2009	Central Elementary School Assembly	Banning	Litter
3/19/2009	Hemmerling Elementary School Assembly	Banning	Litter
3/19/2009	Val Verde High Career Fair	Perris	Clean Cities and Litter

Western Riverside Council of Government's Education Outreach Effort Report for Fiscal Year 08/09

Date	Function	Jurisdiction	Program
3/26/2009	Central Elementary School Assembly	Banning	Litter
3/28/2009	Banning Recycle Fair	Banning	Banning
4/2/2009	Earth Night	ALL	Clean Cities and Litter
4/11/2009	Temecula Cleanup	Temecula	Oil
4/14/2009	Troth Elementary School Assembly	Mira Loma	Litter
4/16/2009	Alcott Elementary School Assembly	Riverside	Litter
4/17/2009	Corona HHW Event	Corona	oil
4/18/2009	Corona HHW Event	Corona	oil
4/18/2009	Canyon Lake Boater Event	Canyon Lake	oil
4/18/2009	Dos Lagos Earth Day	ALL	All
4/20/2009	SWTC Meeting	ALL	COOP
4/23/2009	Magnolia Elementary School Assembly	Riverside	Litter
4/25/2009	Banning Community Cleanup	Banning	Litter
4/28-4/30	BIOCYCLE conference	ALL	Solid Waste and Litter
5/2/2009	Banning HHW event	Banning	Oil
5/2/2009	Riverside Show and Go	Riverside	Riverside Oil
5/9/2009	Riverside Oil event	Riverside	Riverside Oil
5/9/2009	San Jacinto Clean up	San Jacinto	Litter
5/15/2009	Rainbow Ridge Elementary School Assembly	Moreno Valley	Litter
5/16/2009	Lake Perris Boater Event	Perris	Boater Oil
5/16/2009	Keep Riverside Clean and Beautiful	Riverside	Litter
5/18/2009	La Granada Elementary School Assembly	Riverside	Litter
5/21/2009	E. Hale Elementary School Assembly	Murrieta	Litter
5/22/2009	Nicholas Valley Elementary School Assembly	Temecula	Litter
5/28/2009	E. Hale Elementary School Assembly	Murrieta	Litter
5/30/2009	Lake Elsinore Oil event	Lake Elsinore	Oil
5/30/2009	Riverside Oil event	Riverside	Riverside Oil
6/3/2009	Banning E-waste collection event	Banning	Banning
6/8/2009	La Granada Elementary School Assembly	Riverside	Litter
6/12/2009	Corona HHW Event	Corona	Oil
6/13/2009	Corona HHW Event	Corona	Oil
6/13/2009	Perris Rods and Rail	ALL	ALL
6/20/2009	Lake Elsinore Boater Event	ALL	Oil
6/20/2009	Banning Bulky Goods	Banning	Banning
6/30/2009	Banning Recycle Business Workshop	Banning	Banning
8/18/2008	SWTC Meeting	ALL	COOP
8/21/2008	Banning Mixer	Banning	Litter
9/13/2008	Moreno Valley Youth Fest	Moreno Valley	Used Oil
9/13/2008	Perris/Mead Health Fair	Mead	Used Oil & TUMF
9/19/2008	Corona HHW Event	Corona	Used Oil
9/20/2008	Corona HHW Event	Corona	Used Oil

Western Riverside Council of Government's Education Outreach Effort Report for Fiscal Year 08/09

Date	Function	Jurisdiction	Program
10/4/2008	I-215/60 Clean up	County/Moreno Valley/Riverside	Litter
10/6/2008	Meeting Pass Bus Expo	Banning & Calimesa	oil
10/7/2008	Corona Buss Expo	Corona	Clean Cities & Oil
10/8/2008	Sunlakes E-Waste Event	Banning	Banning
10/10/2008	Granite Hill School assembly	Riverside	Litter
10/15/2008	Temecula Business Expo	Temecula	Clean Cities & Oil
10/17/2008	Perris School Assembly	Perris	Litter
10/18/2008	Beaumont Radio Remote	Beaumont	Used Oil
10/18/2008	Temecula Cleanup	Temecula	Used Oil
10/20/2008	SWTC Meeting	ALL	COOP
10/22/2008	HHWIE	ALL	Solid Waste & Used Oil
11/1/2008	Banning Business Expo	Banning	COOP
11/1/2008	Environmental Youth Conference	ALL	Clean Cities and COOP
11/1/2008	Banning Bulky Goods	Banning	Banning
11/15/2008	Temecula Radio Remote	Temecula	Used Oil
11/15/2008	Temecula HHW Event	Temecula	Used Oil
11/15/2008	Banning HHW event	Banning	Used Oil
12/5/2008	Corona HHW Event	Corona	Used Oil
12/6/2008	Corona HHW Event	Corona	Used Oil
12/10/2008	Green Summit for School	ALL	Litter
12/11/2008	Murrieta Chamber event	Murrieta	Solid Waste
12/15/2008	SWTC Meeting	ALL	COOP
1/29/2009	Park Hill Elementary Care Fair	San Jacinto	Litter
2/11/2009	Riverside Elementary School Enviro Club Meeting	Riverside	Litter
2/17/2009	SWTC Meeting	ALL	COOP
2/18/2009	AB 939 Workshop	ALL	COOP
2/19/2009	Lake Elsinore Chamber event	Lake Elsinore	Solid Waste
3/9/2009	Rail Ranch Elementary School Assembly	Murrieta	Litter
3/12/2009	Solid Waste Forum Mini- Conference	ALL	Solid Waste and Litter
3/14/2009	Bulky Goods Day	Banning	Banning
3/16/2009	Central Elementary School Assembly	Banning	Litter
3/19/2009	Hemmerling Elementary School Assembly	Banning	Litter
3/19/2009	Val Verde High Career Fair	Perris	Clean Cities and Litter
3/25/2009	HHWIE	ALL	oil
3/26/2009	Central Elementary School Assembly	Banning	Litter
3/28/2009	Banning Recycle Fair	Banning	Banning
4/2/2009	Earth Night	ALL	Clean Cities and Litter
4/11/2009	Temecula Cleanup	Temecula	Oil
4/14/2009	Troth Elementary School Assembly	Mira Loma	Litter
4/16/2009	Alcott Elementary School Assembly	Riverside	Litter
4/17/2009	Corona HHW Event	Corona	oil
4/18/2009	Corona HHW Event	Corona	oil
4/18/2009	Canyon Lake Boater Event	Canyon Lake	oil
4/18/2009	Dos Lagos Earth Day	ALL	All
4/20/2009	SWTC Meeting	ALL	COOP
4/23/2009	Magnolia Elementary School Assembly	Riverside	Litter
4/25/2009	Banning Community Cleanup	Banning	Litter

Western Riverside Council of Government's Education Outreach Effort Report for Fiscal Year 08/09

Date	Function	Jurisdiction	Program
5/2/2009	Banning HHW event	Banning	Oil
5/2/2009	Riverside Show and Go	Riverside	Riverside Oil
5/9/2009	Riverside Oil event	Riverside	Riverside Oil
5/9/2009	San Jacinto Clean up	San Jacinto	Litter
5/15/2009	Rainbow Ridge Elementary School Assembly	Moreno Valley	Litter
5/16/2009	Lake Perris Boater Event	Perris	Boater Oil
5/16/2009	Keep Riverside Clean and Beautiful	Riverside	Litter
5/18/2009	La Granada Elementary School Assembly	Riverside	Litter
5/21/2009	E. Hale Elementary School Assembly	Murrieta	Litter
5/22/2009	Nicholas Valley Elementary School Assembly	Temecula	Litter
5/28/2009	E. Hale Elementary School Assembly	Murrieta	Litter
5/30/2009	Lake Elsinore Oil event	Lake Elsinore	Oil
5/30/2009	Riverside Oil event	Riverside	Riverside Oil
6/3/2009	Banning E-waste collection event	Banning	Banning
6/8/2009	La Granada Elementary School Assembly	Riverside	Litter
6/12/2009	Corona HHW Event	Corona	Oil
6/13/2009	Corona HHW Event	Corona	Oil
6/13/2009	Perris Rods and Rail	ALL	ALL
6/20/2009	Lake Elsinore Boater Event	ALL	Oil
6/20/2009	Banning Bulky Goods	Banning	Banning
6/30/2009	Banning Recycle Business Workshop	Banning	Banning

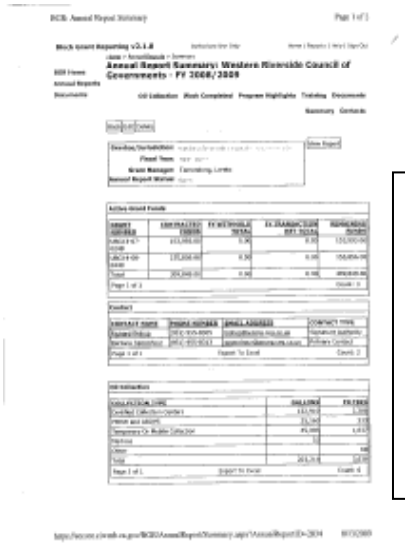

Annual Report Sumary from Western Riverside Council of Governments 2008/09

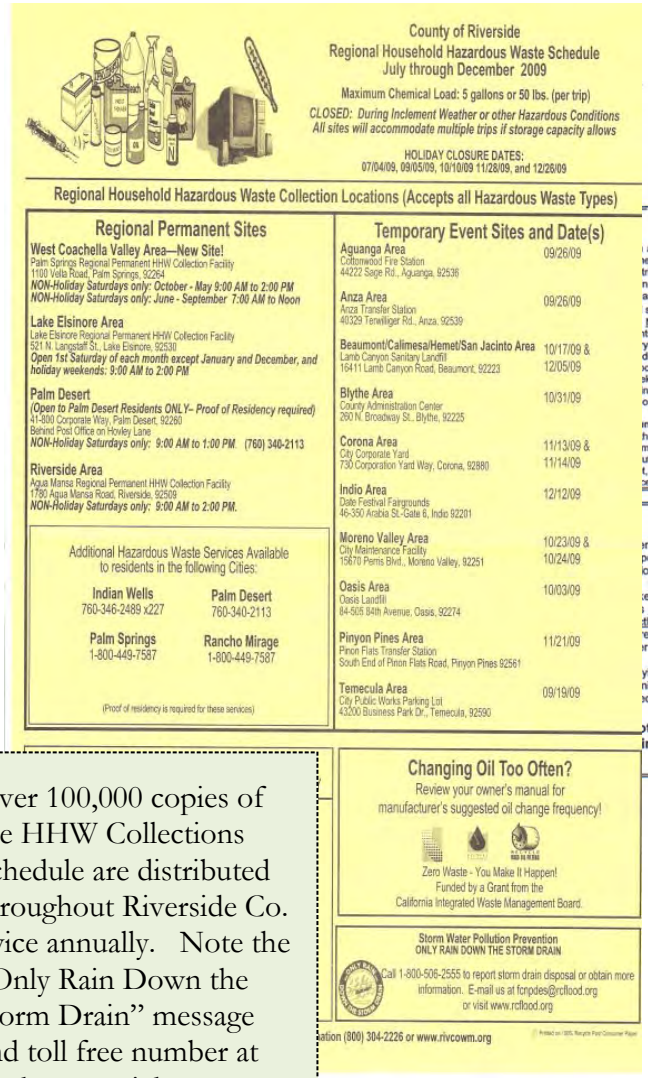

County of Riverside
Regional Household Hazardous Waste Schedule
July through December 2009

Maximum Chemical Load: 5 gallons or 50 lbs. (per trip)

CLOSED: During Inclement Weather or other Hazardous Conditions
All sites will accommodate multiple trips if storage capacity allows

HOLIDAY CLOSURE DATES:
07/04/09, 09/05/09, 10/10/09 11/28/09, and 12/26/09

Regional Household Hazardous Waste Collection Locations (Accepts all Hazardous Waste Types)

Regional Permanent Sites

West Coachella Valley Area—New Site!
Palm Springs Regional Permanent HHW Collection Facility
1100 Vella Road, Palm Springs, 92264
NON-Holiday Saturdays only: October - May 9:00 AM to 2:00 PM
NON-Holiday Saturdays only: June - September 7:00 AM to Noon

Lake Elsinore Area
Lake Elsinore Regional Permanent HHW Collection Facility
521 N. Langstaff St., Lake Elsinore, 92530
Open 1st Saturday of each month except January and December, and holiday weekends: 9:00 AM to 2:00 PM

Palm Desert
(Open to Palm Desert Residents ONLY– Proof of Residency required)
41-800 Corporate Way, Palm Desert, 92260
Behind Post Office on Hovley Lane
NON-Holiday Saturdays only: 9:00 AM to 1:00 PM (760) 340-2113

Riverside Area
Agua Mansa Regional Permanent HHW Collection Facility
1780 Agua Mansa Road, Riverside, 92509
NON-Holiday Saturdays only: 9:00 AM to 2:00 PM.

Additional Hazardous Waste Services Available to residents in the following Cities:

Indian Wells 760-346-2489 x227	**Palm Desert** 760-340-2113
Palm Springs 1-800-449-7587	**Rancho Mirage** 1-800-449-7587

(Proof of residency is required for these services)

Temporary Event Sites and Date(s)

Aguanga Area Cottonwood Fire Station 44222 Sage Rd., Aguanga, 92536	09/26/09
Anza Area Anza Transfer Station 40329 Terwilliger Rd., Anza, 92539	09/26/09
Beaumont/Calimesa/Hemet/San Jacinto Area Lamb Canyon Sanitary Landfill 16411 Lamb Canyon Road, Beaumont, 92223	10/17/09 & 12/05/09
Blythe Area County Administration Center 260 N. Broadway St., Blythe, 92225	10/31/09
Corona Area City Corporate Yard 730 Corporation Yard Way, Corona, 92880	11/13/09 & 11/14/09
Indio Area Date Festival Fairgrounds 46-350 Arabia St.-Gate 6, Indio 92201	12/12/09
Moreno Valley Area City Maintenance Facility 15670 Perris Blvd., Moreno Valley, 92251	10/23/09 & 10/24/09
Oasis Area Oasis Landfill 84-505 84th Avenue, Oasis, 92274	10/03/09
Pinyon Pines Area Pinon Flats Transfer Station South End of Pinon Flats Road, Pinyon Pines 92561	11/21/09
Temecula Area City Public Works Parking Lot 42200 Business Park Dr., Temecula, 92590	09/19/09

Changing Oil Too Often?
Review your owner's manual for manufacturer's suggested oil change frequency!

Zero Waste - You Make It Happen!
Funded by a Grant from the
California Integrated Waste Management Board.

Storm Water Pollution Prevention
ONLY RAIN DOWN THE STORM DRAIN
Call 1-800-506-2555 to report storm drain disposal or obtain more information. E-mail us at fcnpdes@rcflood.org or visit www.rcflood.org

ation (800) 304-2226 or www.rivcowm.org

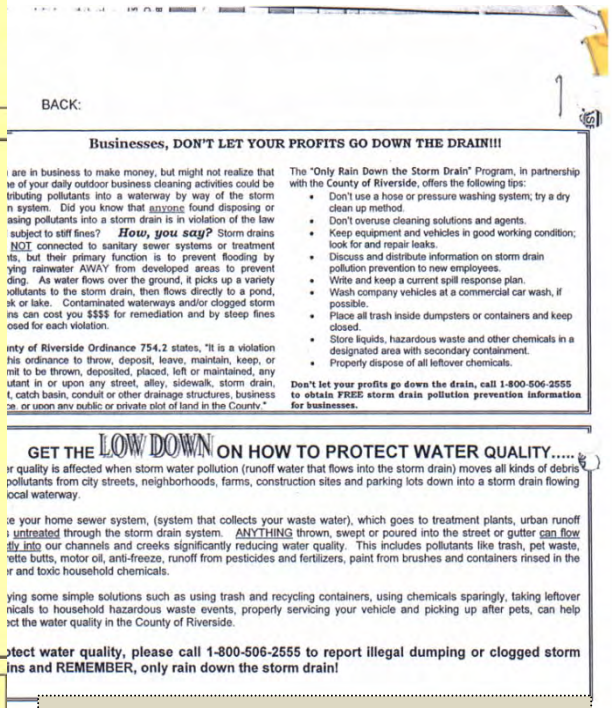

BACK:

Businesses, DON'T LET YOUR PROFITS GO DOWN THE DRAIN!!!

are in business to make money, but might not realize that e of your daily outdoor business cleaning activities could be tributing pollutants into a waterway by way of the storm n system. Did you know that anyone found disposing or asing pollutants into a storm drain is in violation of the law subject to stiff fines? ***How, you say?*** Storm drains NOT connected to sanitary sewer systems or treatment nts, but their primary function is to prevent flooding by ying rainwater AWAY from developed areas to prevent ding. As water flows over the ground, it picks up a variety ollutants to the storm drain, then flows directly to a pond, k or lake. Contaminated waterways and/or clogged storm ins can cost you $$$$ for remediation and by steep fines osed for each violation.

nty of Riverside Ordinance 754.2 states, "It is a violation his ordinance to throw, deposit, leave, maintain, keep, or mit to be thrown, deposited, placed, left or maintained, any utant in or upon any street, alley, sidewalk, storm drain, t, catch basin, conduit or other drainage structures, business e, or upon any public or private plot of land in the County."

The "Only Rain Down the Storm Drain" Program, in partnership with the County of Riverside, offers the following tips:

- Don't use a hose or pressure washing system; try a dry clean up method.
- Don't overuse cleaning solutions and agents.
- Keep equipment and vehicles in good working condition; look for and repair leaks.
- Discuss and distribute information on storm drain pollution prevention to new employees.
- Write and keep a current spill response plan.
- Wash company vehicles at a commercial car wash, if possible.
- Place all trash inside dumpsters or containers and keep closed.
- Store liquids, hazardous waste and other chemicals in a designated area with secondary containment.
- Properly dispose of all leftover chemicals.

Don't let your profits go down the drain, call 1-800-506-2555 to obtain FREE storm drain pollution prevention information for businesses.

GET THE LOW DOWN ON HOW TO PROTECT WATER QUALITY.....

r quality is affected when storm water pollution (runoff water that flows into the storm drain) moves all kinds of debris pollutants from city streets, neighborhoods, farms, construction sites and parking lots down into a storm drain flowing ocal waterway.

e your home sewer system, (system that collects your waste water), which goes to treatment plants, urban runoff untreated through the storm drain system. ANYTHING thrown, swept or poured into the street or gutter can flow tly into our channels and creeks significantly reducing water quality. This includes pollutants like trash, pet waste, rette butts, motor oil, anti-freeze, runoff from pesticides and fertilizers, paint from brushes and containers rinsed in the r and toxic household chemicals.

ying some simple solutions such as using trash and recycling containers, using chemicals sparingly, taking leftover nicals to household hazardous waste events, properly servicing your vehicle and picking up after pets, can help ect the water quality in the County of Riverside.

tect water quality, please call 1-800-506-2555 to report illegal dumping or clogged storm ins and REMEMBER, only rain down the storm drain!

Over 100,000 copies of the HHW Collections Schedule are distributed throughout Riverside Co. twice annually. Note the "Only Rain Down the Storm Drain" message and toll free number at the bottom right corner.

Above is a utility insert sample prepared at the request of our co-permittees for a mass mailing project. The double-sided message lists HHW local schedules on one side and urban water discharge pollution prevention activities on the other. The average distribution of an insert is 40,000 copies.

A SMALL SAMPLE OF OUR

GROWING

LIBRARY OF RESOURCES

020288

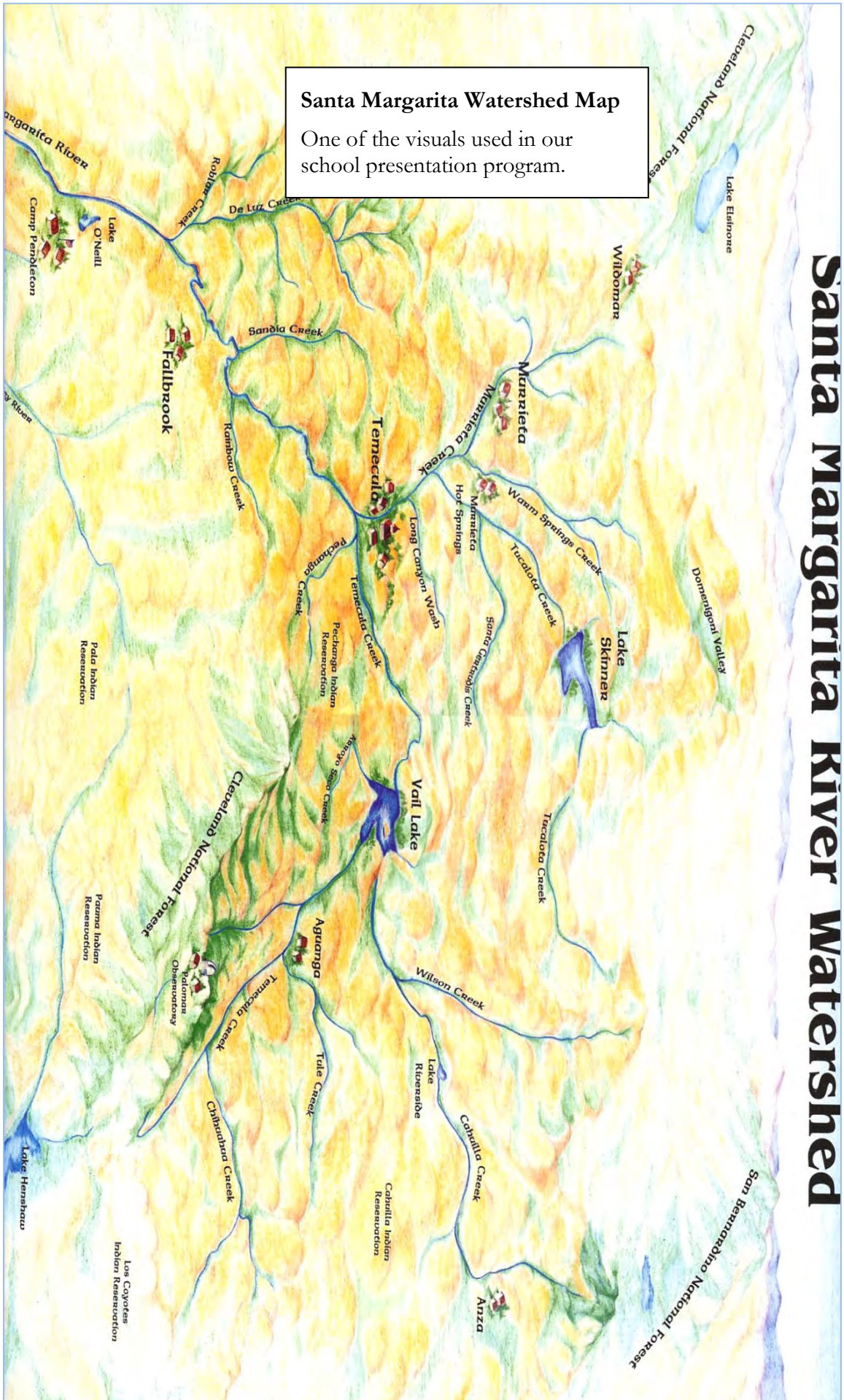

Santa Margarita Watershed Map

One of the visuals used in our school presentation program.

Referencing A.5.1.

Events in the Santa Margarita region either attended to or participated in monetarily or through informational distribution.

SANTA MARGARITA WATERSHED
08/09 EVENTS LIST

07-21-08	Mission RCD	Judy Mitchell	1,200
08-15-08	Mission RCD		1,500
08-20-08	Mission RCD		15,290
	Temescal Fair	RCFCD	4,526
	Menifee Festival	RCFCD	2,594
	Creekside Gas Mart/Temecula		2
	Menifee Unified High School		20
	Mission RCD		200
	City of Temecula		100
	City of Murrieta		100
	City of Murrieta		2,900
	Diamond Valley Lake		50
	Mission RCD		3,160
	Mission RCD		2,700
	Mission RCD		2,500
	Mission RCD		900
	Temecula Rod Run		1,100
	Mission RCD		1,500
	Temecula Valley Museum		17
	DPSS Temecula		10
	Community Water Festival		6,696
	City of Temecula/ Temecula Kid's Day		1,500
	City of Temecula		250
	City of Murrieta		100
	City of Menifee		100
	City of Murrieta		48
	City of Temecula		100
	City of Murrieta		1,125

Some of our promotional items:

Ruler s– Educational with an emphasis on History.

Children's I.D. and Pet I.D. Kits - Education with a community safety element.

Pet I.D. Kits – Education with a pet responsibility element.

Curbmarker: Used to identify inlets for 10 years.

Toilet strips – Detect s leaks in toilet fixtures.

Crayons- Nontoxic as they are made from soybeans.

Pill box as a reminder to keeps prescription drugs away from our water resources.

Not shown: Dust pans, shoelaces, shop cloths, sponges and vehicle air fresheners.

Total number of iter

An Overview of the Santa Margarita Household Hazardous Waste Collection Report

* Full report available in Appendix C.

Location	Service Dates	Number of Service Days in FY 2008/2009	Contractor Cost	Total Vehicles	Batteries (Auto) (lbs) 45#/unit	Nicad/ Lithium Batteries (lbs)	Waste Oil (lbs) 8.5 lb/gal	Anti-Freeze (lbs) 8.5 lb/gal	Latex Paint (lbs) 10 lb/gal	Oil Filters (lbs)
Murrieta ABOP HHW Collection Facility										
	All non-holiday Saturdays	**44**	**$ 37,029**	**1,927**	**9,810**	**221**	**25,160**	**3,528**	**51,655**	**1,264**
Temporary HHW Collection Facility (THHWCF) Events										
Aguanga	10/18/2008	1	**$ 750**	11	69	0	850	34	0	0
Aguanga	5/30/2009	1	**$ 900**	12	255	0	425	0	250	4
Subtotal		**2**	**$ 1,650**	**23**	**324**	**0**	**1,275**	**34**	**250**	**4**
Anza	9/27/2008	1	**$ 5,336**	67	407	0	2,635	128	1,200	85
Anza	12/20/2008	1	**$ 1,650**	24	90	0	850	0	500	14
Anza	3/28/2009	1	**$ 4,575**	62	642	16	2,848	0	700	41
Subtotal		**3**	**$ 11,561**	**153**	**1,139**	**16**	**6,333**	**128**	**2,400**	**140**
Pinyon Pines	11/15/2008	1	**$ 1,725**	28	759	27	638	26	650	38
Pinyon Pines	5/16/2009	1	**$ 2,025**	30	203	10	680	255	400	31
Subtotal		**2**	**$ 3,750**	**58**	**962**	**37**	**1,318**	**281**	**1,050**	**69**
Temecula	9/13/2008	1	**$ 26,519**	382	2,233	90	1,488	340	5,250	15
Temecula	1/31/2009	1	**$ 34,875**	495	1,448	194	1,488	425	9,000	55
Temecula	5/9/2009	1	**$ 18,750**	261	923	56	1,275	340	3,700	13
Subtotal		**3**	**$ 80,144**	**1,138**	**4,604**	**340**	**4,250**	**1,105**	**17,950**	**83**
TOTAL THHWCF		**10**	**97,105**	**1,372**	**7,029**	**393**	**13,176**	**1,548**	**21,650**	**296**
TOTAL AMOUNTS FROM ALL HHW FACILITY TYPES IN SANTA MARGARITA WATERSHED										
		54	**$ 134,134**	**3,299**	**16,839**	**614**	**38,336**	**5,076**	**73,305**	**1,560**

HOME IMPROVEMENT STORE OUTREACH

Lowe's: 40390 Winchester Rd.
Temecula, CA 92591
Saturday, June 13, 2009

Approximately **103 residents** in the Santa Margarita Watershed area of Riverside County were educated on stormwater pollution. Public outreach consultant, SGA, distributed the following public education materials to residents:

- 103 HHW Tearsheets
- 50 Tabling Fact Sheets
- 2 Outdoor Cleaning Guide Brochure
- 50 HHW Booklets
- 100 Stormwater Pens

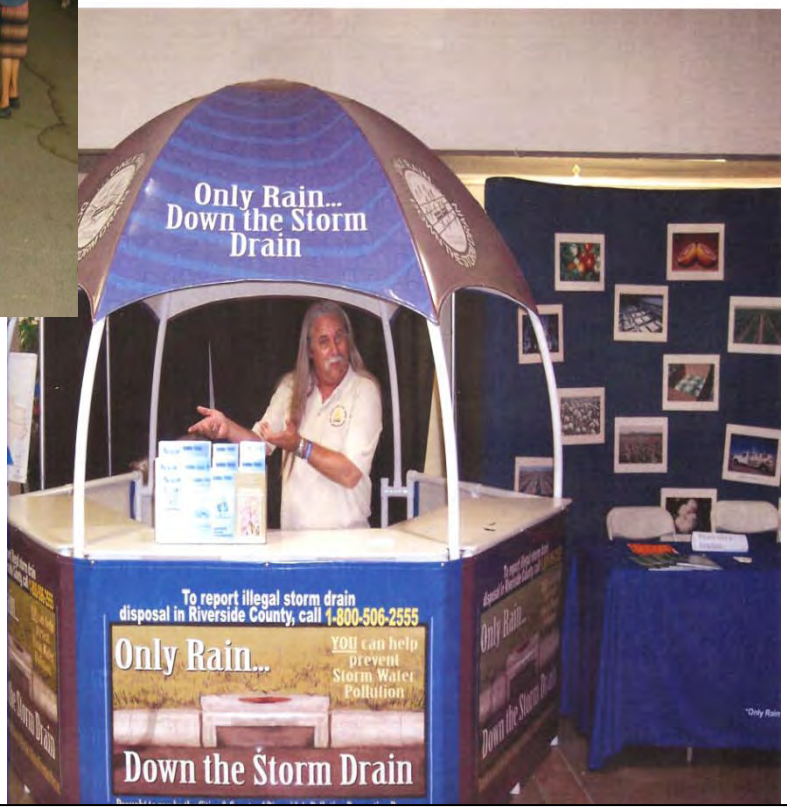

Top: The EZ-Up identifies the agency and the accompanying tablecloth the "Only Rain Down the Storm Drain" slogan and logo.

Left: The value of one on one community outreach and education can lead to others sharing the message with their friends and neighbors.

Above: The gazebo and "Only Rain Down the Storm Drain" logo is an easily recognizable exhibit that draws attendees at fairs and community events. The illustrations on the skirt cross language barriers and encourage DIY behaviors.

Missing: The "Only Rain Down the Storm Drain" trailer that is brightly text wrapped with the program logo, storm drain inlet as the gazebo above and "Only Rain Down the Storm Drain" message.

Calls to 1-800 Hotline

Date	Time	Calling Number	City, State	Min:Sec	Charges
6/16/2008	7:56 AM	760-922-7387	BLYTHE, CA	1:06	0.04
6/16/2008	1:18 PM	951-966-2812	RIVERSIDE, CA	1:00	0.03
6/16/2008	1:19 PM	951-966-2812	RIVERSIDE, CA	4:06	0.13
6/17/2008	10:34 AM	951-735-3985	CORONA, CA	2:30	0.08
6/17/2008	11:18 AM	951-582-0441	CORONA, CA	1:30	0.05
6/18/2008	11:14 AM	909-762-0753	POMONA, CA	0:18	0.01
6/18/2008	11:18 AM	951-733-6689	CORONA, CA	2:36	0.08
6/19/2008	1:28 PM	951-785-5923	ARLINGTON, CA	2:30	0.08
6/19/2008	3:02 PM	951-485-5840	MORENO, CA	0:54	0.03
6/19/2008	3:13 PM	951-677-5876	MURRIETA, CA	2:18	0.07
6/19/2008	3:15 PM	951-677-5876	MURRIETA, CA	2:30	0.08
6/19/2008	3:52 PM	909-460-0525	ONTARIO, CA	0:54	0.03
6/20/2008	7:34 AM	951-894-2540	MURRIETA, CA	2:24	0.08
6/20/2008	7:37 AM	951-894-2540	MURRIETA, CA	2:30	0.08
6/20/2008	8:00 AM	951-894-2540	MURRIETA, CA	2:42	0.09
6/20/2008	8:47 AM	951-653-4041	MORENO, CA	1:48	0.06
6/20/2008	8:51 AM	951-845-9246	BANNING, CA	3:54	0.12
6/20/2008	8:55 AM	951-845-9246	BANNING, CA	1:24	0.04
6/20/2008	12:51 PM	760-668-3160	PALM SPG, CA	2:24	0.08
6/20/2008	12:55 PM	760-668-3160	PALM SPG, CA	1:48	0.06
6/20/2008	12:57 PM	760-668-3160	PALM SPG, CA	2:18	0.07
6/20/2008	2:48 PM	909-484-3278	UPLAND, CA	0:18	0.01
6/21/2008	9:46 AM	951-224-3735	RIVERSIDE, CA	1:48	0.06
6/21/2008	9:59 AM	760-668-3160	PALM SPG, CA	2:00	0.06
6/21/2008	2:09 PM	951-302-2759	TEMECULA, CA	1:48	0.06
6/22/2008	5:24 PM	951-242-9770	MORENO, CA	1:54	0.06
6/23/2008	8:28 AM	951-672-1709	SUN CITY, CA	2:12	0.07
6/23/2008	9:51 AM	951-302-2759	TEMECULA, CA	2:30	0.08
6/23/2008	10:07 AM	951-302-2759	TEMECULA, CA	0:42	0.02
6/23/2008	3:18 PM	951-243-5484	SUNNYMEAD, CA	1:48	0.06
6/24/2008	4:49 AM	760-772-2982	PALMDESERT, CA	1:36	0.05
6/24/2008	9:56 AM	951-894-1359	MURRIETA, CA	3:00	0.1
6/24/2008	12:28 PM	951-894-1359	MURRIETA, CA	1:48	0.06
6/24/2008	12:30 PM	951-894-1359	MURRIETA, CA	2:30	0.08
6/24/2008	2:27 PM	951-242-9770	MORENO, CA	2:42	0.09
6/24/2008	8:06 PM	760-899-9799	INDIO, CA	1:42	0.05

6/25/2008	1:00 PM	951-686-6608	RIVERSIDE, CA	2:36	0.08
6/25/2008	3:49 PM	951-657-0122	PERRIS, CA	0:54	0.03
6/26/2008	8:52 AM	951-894-1359	MURRIETA, CA	1:48	0.06
6/26/2008	10:21 AM	951-445-1033	MURRIETA, CA	0:36	0.02
6/26/2008	10:23 AM	951-505-4190	RIVERSIDE, CA	2:42	0.09
6/26/2008	10:41 AM	951-445-1033	MURRIETA, CA	2:06	0.07
6/26/2008	11:15 AM	951-302-9651	TEMECULA, CA	3:00	0.1
6/26/2008	11:30 AM	951-674-9117	ELSINORE, CA	2:30	0.08
6/26/2008	12:03 PM	951-505-4190	RIVERSIDE, CA	2:18	0.07
6/26/2008	12:05 PM	951-505-4190	RIVERSIDE, CA	2:24	0.08
6/26/2008	12:11 PM	951-505-4190	RIVERSIDE, CA	0:24	0.01
6/26/2008	4:00 PM	951-325-8210	HOMELAND, CA	1:36	0.05
6/26/2008	4:01 PM	951-325-8210	HOMELAND, CA	3:06	0.1
6/26/2008	4:05 PM	951-325-8210	HOMELAND, CA	1:48	0.06
6/27/2008	10:37 AM	951-354-9465	ARLINGTON, CA	2:30	0.08
6/27/2008	11:36 AM	951-354-9465	ARLINGTON, CA	1:06	0.04
6/27/2008	11:47 AM	760-469-6055	PALMDESERT, CA	0:36	0.02
6/27/2008	12:53 PM	951-780-0875	WOODCREST, CA	3:48	0.12
6/27/2008	2:36 PM	951-276-0503	RIVERSIDE, CA	1:42	0.05
6/27/2008	2:40 PM	951-766-1551	HEMET DA, CA	2:18	0.07
6/27/2008	3:54 PM	951-489-9707	MORENO, CA	2:00	0.06
6/27/2008	4:08 PM	951-445-1033	MURRIETA, CA	3:00	0.1
6/27/2008	4:51 PM	951-354-9465	ARLINGTON, CA	0:54	0.03
6/27/2008	8:57 PM	951-343-7762	ARLINGTON, CA	3:12	0.1
6/27/2008	9:01 PM	951-343-7762	ARLINGTON, CA	2:42	0.09
6/27/2008	9:05 PM	951-343-7762	ARLINGTON, CA	2:30	0.08
6/28/2008	9:03 AM	951-785-8953	ARLINGTON, CA	1:12	0.04
6/28/2008	9:05 AM	951-785-8953	ARLINGTON, CA	0:48	0.03
6/28/2008	11:03 PM	760-285-8551	PALM SPG, CA	0:42	0.02
6/30/2008	7:45 AM	951-471-2573	ELSINORE, CA	1:36	0.05
7/1/2008	10:01 AM	909-628-3454	CHINO, CA	1:42	0.05
7/1/2008	10:03 AM	909-628-3454	CHINO, CA	2:24	0.08
7/1/2008	11:59 AM	909-800-1088	S BERNDINO, CA	2:06	0.07

7/1/2008	1:46 PM 909-874-6080	RIALTO, CA	0:48	0.03
7/2/2008	9:41 AM 951-789-4268	WOODCREST, CA	2:12	0.07
7/2/2008	9:44 AM 951-789-4268	WOODCREST, CA	1:18	0.04
7/2/2008	9:46 AM 951-789-4268	WOODCREST, CA	2:06	0.07
7/2/2008	12:31 PM 951-662-1273	RIVERSIDE, CA	4:24	0.14
7/2/2008	3:07 PM 951-656-3704	MORENO, CA	1:00	0.03
7/2/2008	3:18 PM 951-509-9269	ARLINGTON, CA	4:54	0.16
7/2/2008	3:38 PM 951-656-2759	MORENO, CA	4:24	0.14
7/2/2008	4:22 PM 951-765-0636	HEMET DA, CA	2:12	0.07
7/2/2008	4:24 PM 951-765-0636	HEMET DA, CA	1:42	0.05
7/2/2008	4:26 PM 951-765-0636	HEMET DA, CA	3:30	0.11
7/2/2008	4:41 PM 951-674-5462	ELSINORE, CA	4:42	0.15
7/3/2008	9:23 AM 760-250-5348	PALM SPG, CA	0:48	0.03
7/3/2008	2:52 PM 951-278-4155	CORONA, CA	1:36	0.05
7/3/2008	6:01 PM 951-674-6219	ELSINORE, CA	0:18	0.01
7/6/2008	9:18 AM 951-240-9019	TEMECULA, CA	2:24	0.08
7/7/2008	10:19 AM 909-912-1250	UPLAND, CA	0:18	0.01
7/7/2008	12:05 PM 951-676-9181	TEMECULA, CA	0:54	0.03
7/7/2008	2:11 PM 951-805-0302	ELSINORE, CA	2:42	0.09
7/7/2008	4:21 PM 909-226-4465	ONTARIO, CA	3:06	0.1
7/7/2008	4:47 PM 951-276-9997	RIVERSIDE, CA	2:18	0.07
7/8/2008	9:52 AM 951-760-9096	TEMECULA, CA	2:06	0.07
7/8/2008	10:03 AM 951-760-9096	TEMECULA, CA	1:42	0.05
7/8/2008	12:00 PM 951-760-9096	TEMECULA, CA	1:30	0.05
7/8/2008	12:41 PM 951-375-1619	TEMECULA, CA	1:24	0.04
7/8/2008	12:46 PM 951-375-1619	TEMECULA, CA	0:42	0.02
7/9/2008	12:56 PM 951-552-4180	ARLINGTON, CA	0:36	0.02
7/10/2008	8:23 AM 951-684-2127	RIVERSIDE, CA	2:30	0.08
7/10/2008	8:33 AM 951-684-2127	RIVERSIDE, CA	2:30	0.08
7/10/2008	9:26 AM 951-272-8292	CORONA, CA	4:48	0.15
7/10/2008	11:52 AM 951-354-2888	ARLINGTON, CA	3:00	0.1
7/10/2008	12:06 PM 951-354-2888	ARLINGTON, CA	1:42	0.05
7/10/2008	1:39 PM 760-770-9808	PALM SPG, CA	3:06	0.1
7/10/2008	4:31 PM 951-780-5123	WOODCREST, CA	3:00	0.1
7/11/2008	8:48 AM 951-207-2175	CORONA, CA	0:54	0.03

7/11/2008	9:35 AM 760-601-6466	PALMDESERT, CA	3:00	0.1
7/11/2008	9:41 AM 951-789-4268	WOODCREST, CA	1:54	0.06
7/11/2008	9:42 AM 951-845-1113	BANNING, CA	3:18	0.11
7/11/2008	9:43 AM 951-789-4268	WOODCREST, CA	2:42	0.09
7/11/2008	9:46 AM 951-789-4268	WOODCREST, CA	0:30	0.02
7/11/2008	9:46 AM 951-789-4268	WOODCREST, CA	1:06	0.04
7/11/2008	10:15 AM 951-845-1113	BANNING, CA	1:12	0.04
7/11/2008	1:40 PM 951-780-5123	WOODCREST, CA	2:00	0.06
7/11/2008	1:45 PM 951-780-5123	WOODCREST, CA	3:00	0.1
7/11/2008	2:45 PM 951-461-7171	MURRIETA, CA	3:42	0.12
7/11/2008	6:15 PM 909-910-9378	S BERNDINO, CA	1:48	0.06
7/11/2008	6:17 PM 909-910-9378	S BERNDINO, CA	3:06	0.1
7/11/2008	8:55 PM 951-784-9523	RIVERSIDE, CA	0:36	0.02
7/12/2008	1:36 PM 909-574-2909	FONTANA, CA	0:36	0.02
7/13/2008	5:07 PM 951-780-4187	WOODCREST, CA	0:54	0.03
7/13/2008	5:08 PM 951-780-4187	WOODCREST, CA	2:36	0.08
7/14/2008	1:08 PM 951-682-1885	RIVERSIDE, CA	2:12	0.07
7/14/2008	1:38 PM 951-780-5123	WOODCREST, CA	3:06	0.1
7/14/2008	3:32 PM 909-885-3435	S BERNDINO, CA	1:18	0.04
7/14/2008	4:12 PM 951-845-1113	BANNING, CA	1:48	0.06
7/15/2008	9:42 AM 951-925-2797	HEMET DA, CA	1:24	0.04
7/15/2008	9:44 AM 951-925-2797	HEMET DA, CA	6:36	0.21
7/15/2008	10:30 AM 951-697-6496	MORENO, CA	0:18	0.01
7/15/2008	11:13 AM 951-776-4601	WOODCREST, CA	0:48	0.03
7/15/2008	11:37 AM 951-776-4601	WOODCREST, CA	3:12	0.1
7/15/2008	11:41 AM 951-776-4601	WOODCREST, CA	4:42	0.15
7/15/2008	2:52 PM 909-391-4422	ONTARIO, CA	1:18	0.04
6/16/2008	7:56 AM 760-922-7387	BLYTHE, CA	1:06	0.04
6/16/2008	1:18 PM 951-966-2812	RIVERSIDE, CA	1:00	0.03
6/16/2008	1:19 PM 951-966-2812	RIVERSIDE, CA	4:06	0.13
6/17/2008	10:34 AM 951-735-3985	CORONA, CA	2:30	0.08
6/17/2008	11:18 AM 951-582-0441	CORONA, CA	1:30	0.05
6/18/2008	11:14 AM 909-762-0753	POMONA, CA	0:18	0.01
6/18/2008	11:18 AM 951-733-6689	CORONA, CA	2:36	0.08
6/19/2008	1:28 PM 951-785-5923	ARLINGTON, CA	2:30	0.08

6/19/2008	3:02 PM 951-485-5840	MORENO, CA	0:54	0.03
6/19/2008	3:13 PM 951-677-5876	MURRIETA, CA	2:18	0.07
6/19/2008	3:15 PM 951-677-5876	MURRIETA, CA	2:30	0.08
6/19/2008	3:52 PM 909-460-0525	ONTARIO, CA	0:54	0.03
6/20/2008	7:34 AM 951-894-2540	MURRIETA, CA	2:24	0.08
6/20/2008	7:37 AM 951-894-2540	MURRIETA, CA	2:30	0.08
6/20/2008	8:00 AM 951-894-2540	MURRIETA, CA	2:42	0.09
6/20/2008	8:47 AM 951-653-4041	MORENO, CA	1:48	0.06
6/20/2008	8:51 AM 951-845-9246	BANNING, CA	3:54	0.12
6/20/2008	8:55 AM 951-845-9246	BANNING, CA	1:24	0.04
6/20/2008	12:51 PM 760-668-3160	PALM SPG, CA	2:24	0.08
6/20/2008	12:55 PM 760-668-3160	PALM SPG, CA	1:48	0.06
6/20/2008	12:57 PM 760-668-3160	PALM SPG, CA	2:18	0.07
6/20/2008	2:48 PM 909-484-3278	UPLAND, CA	0:18	0.01
6/21/2008	9:46 AM 951-224-3735	RIVERSIDE, CA	1:48	0.06
6/21/2008	9:59 AM 760-668-3160	PALM SPG, CA	2:00	0.06
6/21/2008	2:09 PM 951-302-2759	TEMECULA, CA	1:48	0.06
6/22/2008	5:24 PM 951-242-9770	MORENO, CA	1:54	0.06
6/23/2008	8:28 AM 951-672-1709	SUN CITY, CA	2:12	0.07
6/23/2008	9:51 AM 951-302-2759	TEMECULA, CA	2:30	0.08
6/23/2008	10:07 AM 951-302-2759	TEMECULA, CA	0:42	0.02
6/23/2008	3:18 PM 951-243-5484	SUNNYMEAD, CA	1:48	0.06
6/24/2008	4:49 AM 760-772-2982	PALMDESERT, CA	1:36	0.05
6/24/2008	9:56 AM 951-894-1359	MURRIETA, CA	3:00	0.1
6/24/2008	12:28 PM 951-894-1359	MURRIETA, CA	1:48	0.06
6/24/2008	12:30 PM 951-894-1359	MURRIETA, CA	2:30	0.08
6/24/2008	2:27 PM 951-242-9770	MORENO, CA	2:42	0.09
6/24/2008	8:06 PM 760-899-9799	INDIO, CA	1:42	0.05
6/25/2008	1:00 PM 951-686-6608	RIVERSIDE, CA	2:36	0.08
6/25/2008	3:49 PM 951-657-0122	PERRIS, CA	0:54	0.03
6/26/2008	8:52 AM 951-894-1359	MURRIETA, CA	1:48	0.06
6/26/2008	10:21 AM 951-445-1033	MURRIETA, CA	0:36	0.02
6/26/2008	10:23 AM 951-505-4190	RIVERSIDE, CA	2:42	0.09
6/26/2008	10:41 AM 951-445-1033	MURRIETA, CA	2:06	0.07
6/26/2008	11:15 AM 951-302-9651	TEMECULA, CA	3:00	0.1
6/26/2008	11:30 AM 951-674-9117	ELSINORE, CA	2:30	0.08

6/26/2008	12:03 PM 951-505-4190	RIVERSIDE, CA	2:18	0.07
6/26/2008	12:05 PM 951-505-4190	RIVERSIDE, CA	2:24	0.08
6/26/2008	12:11 PM 951-505-4190	RIVERSIDE, CA	0:24	0.01
6/26/2008	4:00 PM 951-325-8210	HOMELAND, CA	1:36	0.05
6/26/2008	4:01 PM 951-325-8210	HOMELAND, CA	3:06	0.1
6/26/2008	4:05 PM 951-325-8210	HOMELAND, CA	1:48	0.06
6/27/2008	10:37 AM 951-354-9465	ARLINGTON, CA	2:30	0.08
6/27/2008	11:36 AM 951-354-9465	ARLINGTON, CA	1:06	0.04
6/27/2008	11:47 AM 760-469-6055	PALMDESERT, CA	0:36	0.02
6/27/2008	12:53 PM 951-780-0875	WOODCREST, CA	3:48	0.12
6/27/2008	2:36 PM 951-276-0503	RIVERSIDE, CA	1:42	0.05
6/27/2008	2:40 PM 951-766-1551	HEMET DA, CA	2:18	0.07
6/27/2008	3:54 PM 951-489-9707	MORENO, CA	2:00	0.06
6/27/2008	4:08 PM 951-445-1033	MURRIETA, CA	3:00	0.1
6/27/2008	4:51 PM 951-354-9465	ARLINGTON, CA	0:54	0.03
6/27/2008	8:57 PM 951-343-7762	ARLINGTON, CA	3:12	0.1
6/27/2008	9:01 PM 951-343-7762	ARLINGTON, CA	2:42	0.09
6/27/2008	9:05 PM 951-343-7762	ARLINGTON, CA	2:30	0.08
6/28/2008	9:03 AM 951-785-8953	ARLINGTON, CA	1:12	0.04
6/28/2008	9:05 AM 951-785-8953	ARLINGTON, CA	0:48	0.03
6/28/2008	11:03 PM 760-285-8551	PALM SPG, CA	0:42	0.02
6/30/2008	7:45 AM 951-471-2573	ELSINORE, CA	1:36	0.05
7/1/2008	10:01 AM 909-628-3454	CHINO, CA	1:42	0.05
7/1/2008	10:03 AM 909-628-3454	CHINO, CA	2:24	0.08
7/1/2008	11:59 AM 909-800-1088	S BERNDINO, CA	2:06	0.07
7/1/2008	1:46 PM 909-874-6080	RIALTO, CA	0:48	0.03
7/2/2008	9:41 AM 951-789-4268	WOODCREST, CA	2:12	0.07
7/2/2008	9:44 AM 951-789-4268	WOODCREST, CA	1:18	0.04
7/2/2008	9:46 AM 951-789-4268	WOODCREST, CA	2:06	0.07
7/2/2008	12:31 PM 951-662-1273	RIVERSIDE, CA	4:24	0.14
7/2/2008	3:07 PM 951-656-3704	MORENO, CA	1:00	0.03
7/2/2008	3:18 PM 951-509-9269	ARLINGTON, CA	4:54	0.16
7/2/2008	3:38 PM 951-656-2759	MORENO, CA	4:24	0.14
7/2/2008	4:22 PM 951-765-0636	HEMET DA, CA	2:12	0.07

7/2/2008	4:24 PM 951-765-0636	HEMET DA, CA	1:42	0.05
7/2/2008	4:26 PM 951-765-0636	HEMET DA, CA	3:30	0.11
7/2/2008	4:41 PM 951-674-5462	ELSINORE, CA	4:42	0.15
7/3/2008	9:23 AM 760-250-5348	PALM SPG, CA	0:48	0.03
7/3/2008	2:52 PM 951-278-4155	CORONA, CA	1:36	0.05
7/3/2008	6:01 PM 951-674-6219	ELSINORE, CA	0:18	0.01
7/6/2008	9:18 AM 951-240-9019	TEMECULA, CA	2:24	0.08
7/7/2008	10:19 AM 909-912-1250	UPLAND, CA	0:18	0.01
7/7/2008	12:05 PM 951-676-9181	TEMECULA, CA	0:54	0.03
7/7/2008	2:11 PM 951-805-0302	ELSINORE, CA	2:42	0.09
7/7/2008	4:21 PM 909-226-4465	ONTARIO, CA	3:06	0.1
7/7/2008	4:47 PM 951-276-9997	RIVERSIDE, CA	2:18	0.07
7/8/2008	9:52 AM 951-760-9096	TEMECULA, CA	2:06	0.07
7/8/2008	10:03 AM 951-760-9096	TEMECULA, CA	1:42	0.05
7/8/2008	12:00 PM 951-760-9096	TEMECULA, CA	1:30	0.05
7/8/2008	12:41 PM 951-375-1619	TEMECULA, CA	1:24	0.04
7/8/2008	12:46 PM 951-375-1619	TEMECULA, CA	0:42	0.02
7/9/2008	12:56 PM 951-552-4180	ARLINGTON, CA	0:36	0.02
7/10/2008	8:23 AM 951-684-2127	RIVERSIDE, CA	2:30	0.08
7/10/2008	8:33 AM 951-684-2127	RIVERSIDE, CA	2:30	0.08
7/10/2008	9:26 AM 951-272-8292	CORONA, CA	4:48	0.15
7/10/2008	11:52 AM 951-354-2888	ARLINGTON, CA	3:00	0.1
7/10/2008	12:06 PM 951-354-2888	ARLINGTON, CA	1:42	0.05
7/10/2008	1:39 PM 760-770-9808	PALM SPG, CA	3:06	0.1
7/10/2008	4:31 PM 951-780-5123	WOODCREST, CA	3:00	0.1
7/11/2008	8:48 AM 951-207-2175	CORONA, CA	0:54	0.03
7/11/2008	9:35 AM 760-601-6466	PALMDESERT, CA	3:00	0.1
7/11/2008	9:41 AM 951-789-4268	WOODCREST, CA	1:54	0.06
7/11/2008	9:42 AM 951-845-1113	BANNING, CA	3:18	0.11
7/11/2008	9:43 AM 951-789-4268	WOODCREST, CA	2:42	0.09
7/11/2008	9:46 AM 951-789-4268	WOODCREST, CA	0:30	0.02
7/11/2008	9:46 AM 951-789-4268	WOODCREST, CA	1:06	0.04
7/11/2008	10:15 AM 951-845-1113	BANNING, CA	1:12	0.04
7/11/2008	1:40 PM 951-780-5123	WOODCREST, CA	2:00	0.06

7/11/2008	1:45 PM 951-780-5123	WOODCREST, CA	3:00	0.1
7/11/2008	2:45 PM 951-461-7171	MURRIETA, CA	3:42	0.12
7/11/2008	6:15 PM 909-910-9378	S BERNDINO, CA	1:48	0.06
7/11/2008	6:17 PM 909-910-9378	S BERNDINO, CA	3:06	0.1
7/11/2008	8:55 PM 951-784-9523	RIVERSIDE, CA	0:36	0.02
7/12/2008	1:36 PM 909-574-2909	FONTANA, CA	0:36	0.02
7/13/2008	5:07 PM 951-780-4187	WOODCREST, CA	0:54	0.03
7/13/2008	5:08 PM 951-780-4187	WOODCREST, CA	2:36	0.08
7/14/2008	1:08 PM 951-682-1885	RIVERSIDE, CA	2:12	0.07
7/14/2008	1:38 PM 951-780-5123	WOODCREST, CA	3:06	0.1
7/14/2008	3:32 PM 909-885-3435	S BERNDINO, CA	1:18	0.04
7/14/2008	4:12 PM 951-845-1113	BANNING, CA	1:48	0.06
7/15/2008	9:42 AM 951-925-2797	HEMET DA, CA	1:24	0.04
7/15/2008	9:44 AM 951-925-2797	HEMET DA, CA	6:36	0.21
7/15/2008	10:30 AM 951-697-6496	MORENO, CA	0:18	0.01
7/15/2008	11:13 AM 951-776-4601	WOODCREST, CA	0:48	0.03
7/15/2008	11:37 AM 951-776-4601	WOODCREST, CA	3:12	0.1
7/15/2008	11:41 AM 951-776-4601	WOODCREST, CA	4:42	0.15
7/15/2008	2:52 PM 909-391-4422	ONTARIO, CA	1:18	0.04
8/16/2008	11:02 AM 951-769-7872	BANNING, CA	7:00	0.22
8/16/2008	7:21 PM 951-549-3697	CORONA, CA	0:18	0.01
8/17/2008	12:38 AM 760-922-6731	BLYTHE, CA	0:36	0.02
8/18/2008	1:24 PM 951-928-1614	LAKEVIEWNU, CA	4:00	0.13
8/19/2008	3:45 PM 951-940-8418	PERRIS, CA	0:36	0.02
8/19/2008	4:38 PM 951-681-5708	MIRA LOMA, CA	1:36	0.05
8/21/2008	9:35 AM 951-229-4120	PERRIS, CA	0:54	0.03
8/21/2008	9:36 AM 951-681-1222	MIRA LOMA, CA	2:36	0.08
8/21/2008	9:39 AM 951-681-1222	MIRA LOMA, CA	0:54	0.03
8/21/2008	9:40 AM 951-681-1222	MIRA LOMA, CA	1:06	0.04
8/21/2008	12:05 PM 951-653-7942	MORENO, CA	3:48	0.12
8/21/2008	2:17 PM 951-941-0581	RIVERSIDE, CA	1:00	0.03
8/21/2008	2:19 PM 951-941-0581	RIVERSIDE, CA	0:48	0.03
8/22/2008	9:50 AM 951-929-7912	HEMET DA, CA	7:24	0.24
8/22/2008	4:11 PM 760-327-0442	PALM SPG, CA	1:18	0.04
8/23/2008	8:14 PM 951-242-6981	MORENO, CA	3:54	0.12
8/25/2008	3:45 PM 951-694-9537	TEMECULA, CA	2:24	0.08

8/25/2008	3:48 PM 951-694-9537	TEMECULA, CA	1:06	0.04
8/25/2008	4:24 PM 951-924-8693	MORENO, CA	1:48	0.06
8/25/2008	4:26 PM 951-924-8693	MORENO, CA	0:30	0.02
8/26/2008	7:58 AM 951-929-7912	HEMET DA, CA	0:18	0.01
8/26/2008	7:58 AM 951-929-7912	HEMET DA, CA	4:42	0.15
8/26/2008	10:30 AM 951-789-0123	WOODCREST, CA	10:00	0.32
8/26/2008	12:28 PM 951-956-6833	PERRIS, CA	5:18	0.17
8/26/2008	2:43 PM 951-445-1389	MURRIETA, CA	4:12	0.13
8/26/2008	2:52 PM 760-318-7424	PALM SPG, CA	5:42	0.18
8/26/2008	4:21 PM 760-318-7424	PALM SPG, CA	1:48	0.06
8/26/2008	4:25 PM 760-318-7424	PALM SPG, CA	3:36	0.12
8/26/2008	4:32 PM 760-318-7424	PALM SPG, CA	6:30	0.21
8/26/2008	4:35 PM 951-312-6492	RIVERSIDE, CA	3:00	0.1
8/27/2008	8:18 AM 760-534-9097	PALM SPG, CA	10:36	0.34
8/27/2008	9:37 AM 951-600-5742	MURRIETA, CA	4:24	0.14
8/27/2008	1:35 PM 951-260-3396	HEMT HEMT, CA	2:06	0.07
8/28/2008	9:12 AM 760-641-5883	PALM SPG, CA	0:18	0.01
8/28/2008	9:13 AM 951-769-1621	BANNING, CA	1:48	0.06
8/28/2008	9:15 AM 951-769-1621	BANNING, CA	4:30	0.14
8/28/2008	10:26 AM 760-322-1951	PALM SPG, CA	3:54	0.12
8/28/2008	10:50 AM 951-250-2137	RIVERSIDE, CA	3:30	0.11
8/28/2008	11:06 AM 951-926-6710	HOMELAND, CA	4:54	0.16
8/28/2008	12:53 PM 951-443-4299	PERRIS, CA	0:54	0.03
8/28/2008	1:14 PM 951-443-4299	PERRIS, CA	7:18	0.23
8/28/2008	4:32 PM 951-929-9822	HEMET DA, CA	0:24	0.01
8/28/2008	5:51 PM 951-371-6617	CORONA, CA	1:42	0.05
8/28/2008	5:55 PM 951-870-6360	CORONA, CA	1:24	0.04
8/28/2008	5:57 PM 951-371-6617	CORONA, CA	1:00	0.03
8/28/2008	5:58 PM 951-371-6617	CORONA, CA	0:48	0.03
8/28/2008	6:03 PM 951-371-6617	CORONA, CA	0:54	0.03
8/29/2008	8:06 AM 951-371-8152	CORONA, CA	0:18	0.01
8/29/2008	8:46 AM 951-343-9568	ARLINGTON, CA	1:42	0.05
8/29/2008	8:49 AM 951-343-9568	ARLINGTON, CA	4:30	0.14
8/29/2008	11:52 AM 760-322-1951	PALM SPG, CA	9:06	0.29
8/29/2008	2:10 PM 951-736-1881	CORONA, CA	1:42	0.05
8/29/2008	2:12 PM 951-736-1881	CORONA, CA	1:48	0.06
8/29/2008	2:14 PM 951-736-1881	CORONA, CA	7:30	0.24
8/29/2008	2:17 PM 909-790-9223	CALIMESA, CA	3:12	0.1
8/29/2008	3:41 PM 951-461-9264	MURRIETA, CA	1:12	0.04
8/29/2008	3:46 PM 951-461-9264	MURRIETA, CA	1:54	0.06
8/29/2008	3:48 PM 951-461-9264	MURRIETA, CA	2:18	0.07

8/29/2008	4:09 PM 951-674-6943	ELSINORE, CA	0:42	0.02
8/29/2008	5:45 PM 951-294-2265	TEMECULA, CA	0:42	0.02
8/29/2008	5:47 PM 951-294-2265	TEMECULA, CA	1:48	0.06
8/30/2008	12:35 AM 951-675-8438	RIVERSIDE, CA	0:18	0.01
8/30/2008	2:07 AM 951-924-8613	MORENO, CA	1:42	0.05
8/30/2008	10:01 AM 951-303-3154	TEMECULA, CA	1:18	0.04
8/30/2008	10:37 AM 909-578-6532	FONTANA, CA	1:30	0.05
9/2/2008	6:51 AM 951-250-2137	RIVERSIDE, CA	3:54	0.12
9/2/2008	11:38 AM 951-538-9984	RIVERSIDE, CA	4:00	0.13
9/2/2008	12:24 PM 951-368-3172	RIVERSIDE, CA	1:30	0.05
9/2/2008	1:59 PM 951-672-7682	SUN CITY, CA	10:48	0.35
9/2/2008	3:22 PM 951-368-3172	RIVERSIDE, CA	1:00	0.03
9/2/2008	3:24 PM 951-368-3172	RIVERSIDE, CA	0:48	0.03
9/2/2008	4:35 PM 951-735-5771	CORONA, CA	1:54	0.06
9/3/2008	9:16 AM 951-276-1218	RIVERSIDE, CA	0:18	0.01
9/3/2008	2:23 PM 760-568-2064	PALMDESERT, CA	2:36	0.08
9/4/2008	7:22 AM 951-277-2106	TEMSCL CNY, CA	0:18	0.01
9/4/2008	7:23 AM 951-277-2106	TEMSCL CNY, CA	1:06	0.04
9/4/2008	7:24 AM 951-277-2106	TEMSCL CNY, CA	0:48	0.03
9/4/2008	7:49 AM 951-694-9461	TEMECULA, CA	1:54	0.06
9/4/2008	9:52 AM 951-736-8001	CORONA, CA	3:54	0.12
9/4/2008	10:16 AM 951-442-1052	PERRIS, CA	0:18	0.01
9/4/2008	10:21 AM 909-381-0591	S BERNDINO, CA	4:24	0.14
9/4/2008	10:37 AM 858-353-3944	DEL MAR, CA	4:18	0.14
9/4/2008	10:41 AM 951-735-5631	CORONA, CA	0:48	0.03
9/4/2008	12:00 PM 951-734-3637	CORONA, CA	6:06	0.2
9/5/2008	10:43 AM 951-972-4704	TEMECULA, CA	1:48	0.06
9/6/2008	9:46 AM 951-735-1045	CORONA, CA	0:36	0.02
9/8/2008	10:47 AM 951-303-1499	TEMECULA, CA	9:24	0.3
9/8/2008	12:40 PM 951-461-3432	MURRIETA, CA	2:36	0.08
9/8/2008	2:37 PM 951-360-7698	MIRA LOMA, CA	0:18	0.01
9/8/2008	2:37 PM 951-360-7698	MIRA LOMA, CA	4:06	0.13
9/9/2008	7:12 PM 951-201-8831	RIVERSIDE, CA	0:54	0.03
9/10/2008	9:23 AM 951-461-3432	MURRIETA, CA	2:18	0.07

9/10/2008	9:48 AM	951-582-9878	CORONA, CA	2:48	0.09
9/10/2008	12:10 PM	951-353-0252	ARLINGTON, CA	1:54	0.06
9/10/2008	12:12 PM	951-353-0253	ARLINGTON, CA	1:12	0.04
9/10/2008	1:37 PM	951-201-8831	RIVERSIDE, CA	0:18	0.01
9/10/2008	2:53 PM	951-229-3834	PERRIS, CA	1:36	0.05
9/10/2008	2:58 PM	951-201-8831	RIVERSIDE, CA	0:48	0.03
9/11/2008	8:54 AM	951-488-0530	MORENO, CA	0:54	0.03
9/11/2008	11:44 AM	951-454-1086	CORONA, CA	1:48	0.06
9/11/2008	11:46 AM	951-454-1086	CORONA, CA	1:42	0.05
9/11/2008	1:26 PM	951-325-7616	HOMELAND, CA	5:00	0.16
9/11/2008	7:24 PM	951-898-8444	CORONA, CA	3:06	0.1
9/12/2008	11:49 AM	951-784-7403	RIVERSIDE, CA	6:00	0.19
9/12/2008	3:15 PM	760-342-9767	INDIO, CA	1:00	0.03
9/12/2008	3:47 PM	909-713-1345	MARSHALL, CA	0:54	0.03
9/12/2008	5:12 PM	951-677-6246	MURRIETA, CA	0:54	0.03
9/13/2008	9:32 AM	909-713-1345	MARSHALL, CA	1:42	0.05
9/13/2008	12:51 PM	951-928-5406	LAKEVIEWNU, CA	1:42	0.05
9/15/2008	1:55 PM	951-776-2877	WOODCREST, CA	2:00	0.06
9/15/2008	5:04 PM	951-776-2877	WOODCREST, CA	5:18	0.17
9/16/2008	1:19 PM	951-656-8214	MORENO, CA	1:18	0.04
9/17/2008	9:49 AM	909-266-4304	S BERNDINO, CA	0:42	0.02
9/17/2008	9:50 AM	951-280-9631	CORONA, CA	0:42	0.02
9/17/2008	10:02 AM	951-369-5052	RIVERSIDE, CA	1:54	0.06
9/17/2008	10:04 AM	951-369-5052	RIVERSIDE, CA	2:00	0.06
9/17/2008	12:50 PM	951-683-8471	RIVERSIDE, CA	4:18	0.14
9/17/2008	5:19 PM	909-881-9734	MARSHALL, CA	1:48	0.06
9/18/2008	7:17 AM	760-325-3404	PALM SPG, CA	6:54	0.22
9/18/2008	8:08 AM	760-772-3993	PALMDESERT, CA	1:42	0.05
9/18/2008	10:44 AM	951-296-2464	TEMECULA, CA	6:00	0.19
9/19/2008	9:44 AM	951-278-1830	CORONA, CA	2:06	0.07
9/19/2008	10:50 AM	951-751-7410	CORONA, CA	4:36	0.15
9/20/2008	12:14 PM	951-273-9531	CORONA, CA	0:24	0.01
9/21/2008	11:31 PM	909-723-2921	S BERNDINO, CA	1:36	0.05
9/22/2008	11:00 AM	951-698-4995	MURRIETA, CA	2:18	0.07
9/22/2008	11:02 AM	951-698-4995	MURRIETA, CA	2:30	0.08

9/22/2008	11:49 AM 858-610-4982	SNDG MRMS, CA	7:12	0.23
9/22/2008	5:12 PM 760-345-1006	PALMDESERT, CA	1:36	0.05
9/22/2008	5:36 PM 909-884-6018	S BERNDINO, CA	3:12	0.1
9/23/2008	1:38 PM 619-572-3933	SAN DIEGO, CA	0:54	0.03
9/23/2008	6:46 PM 951-609-2625	ELSINORE, CA	0:42	0.02
9/23/2008	6:47 PM 951-609-2625	ELSINORE, CA	1:42	0.05
9/24/2008	10:13 AM 951-279-8620	CORONA, CA	3:24	0.11
9/24/2008	2:26 PM 951-259-2719	PERRIS, CA	1:30	0.05
9/24/2008	2:28 PM 951-259-2719	PERRIS, CA	0:24	0.01
9/25/2008	10:48 AM 951-734-5522	CORONA, CA	1:42	0.05
9/25/2008	12:12 PM 951-927-8105	HEMET DA, CA	5:18	0.17
9/25/2008	6:04 PM 951-340-9031	CORONA, CA	1:42	0.05
9/26/2008	12:43 PM 951-515-2538	CORONA, CA	0:18	0.01
9/26/2008	2:37 PM 951-926-9231	HOMELAND, CA	10:00	0.32
9/27/2008	7:20 AM 760-408-0992	PALM SPG, CA	5:06	0.16
9/27/2008	8:00 AM 760-408-0992	PALM SPG, CA	2:42	0.09
9/27/2008	8:03 AM 760-408-0992	PALM SPG, CA	2:30	0.08
9/27/2008	8:26 AM 760-408-0992	PALM SPG, CA	4:06	0.13
9/27/2008	8:38 AM 760-408-0992	PALM SPG, CA	2:00	0.06
9/27/2008	3:27 PM 760-329-5910	DSERTHTSPG, CA	0:18	0.01
9/27/2008	3:34 PM 909-213-5633	COLTON, CA	0:24	0.01
9/28/2008	10:41 AM 951-849-7681	BANNING, CA	0:36	0.02
9/28/2008	11:22 AM 951-658-3863	HEMET DA, CA	0:18	0.01
9/28/2008	11:23 AM 951-658-3863	HEMET DA, CA	4:00	0.13
9/28/2008	8:47 PM 760-320-2805	PALM SPG, CA	1:00	0.03
9/29/2008	7:10 AM 760-325-2744	PALM SPG, CA	1:42	0.05
9/29/2008	9:59 AM 951-780-0379	WOODCREST, CA	19:24	0.62
9/29/2008	1:07 PM 951-325-7782	HOMELAND, CA	1:54	0.06
9/29/2008	3:17 PM 951-240-9995	TEMECULA, CA	0:24	0.01
9/29/2008	3:31 PM 951-663-9607	HEMET DA, CA	4:06	0.13
9/29/2008	4:32 PM 909-854-4372	FONTANA, CA	2:54	0.09
9/29/2008	4:51 PM 909-854-4372	FONTANA, CA	2:12	0.07
9/29/2008	5:28 PM 951-445-8406	MURRIETA, CA	3:18	0.11
9/30/2008	5:13 PM 951-736-1849	CORONA, CA	0:54	0.03
10/1/2008	9:22 AM 951-685-8563	MIRA LOMA, CA	0:48	0.03
10/1/2008	11:21 AM 951-781-4275	RIVERSIDE, CA	2:30	0.08
10/1/2008	12:57 PM 909-709-9813	S BERNDINO, CA	3:36	0.12
10/1/2008	1:01 PM 909-709-9813	S BERNDINO, CA	1:00	0.03

10/1/2008	1:20 PM 951-787-1940	RIVERSIDE, CA	2:48	0.09
10/1/2008	1:25 PM 951-787-1940	RIVERSIDE, CA	0:42	0.02
10/1/2008	2:35 PM 951-784-2975	RIVERSIDE, CA	5:00	0.16
10/2/2008	8:09 AM 909-496-3975	S BERNDINO, CA	0:30	0.02
10/2/2008	11:21 AM 951-681-9262	MIRA LOMA, CA	1:18	0.04
10/2/2008	11:24 AM 951-681-9262	MIRA LOMA, CA	3:18	0.11
10/2/2008	12:42 PM 951-680-0981	RIVERSIDE, CA	1:48	0.06
10/2/2008	12:44 PM 951-680-0981	RIVERSIDE, CA	6:42	0.21
10/2/2008	3:16 PM 951-278-8001	CORONA, CA	4:48	0.15
10/2/2008	3:37 PM 951-782-3467	RIVERSIDE, CA	2:12	0.07
10/3/2008	8:43 AM 909-930-1466	ONTARIO, CA	2:18	0.07
10/3/2008	9:21 AM 951-789-1664	WOODCREST, CA	4:12	0.13
10/3/2008	10:24 AM 760-912-5225	VICTORVL, CA	0:54	0.03
10/3/2008	12:04 PM 951-735-1730	CORONA, CA	1:42	0.05
10/3/2008	12:17 PM 951-591-4169	PERRIS, CA	0:54	0.03
10/3/2008	1:35 PM 951-304-7837	MURRIETA, CA	1:48	0.06
10/3/2008	4:40 PM 760-340-2560	PALMDESERT, CA	12:42	0.41
10/4/2008	8:58 AM 951-840-6520	ARLINGTON, CA	2:54	0.09
10/4/2008	12:16 PM 951-780-6192	WOODCREST, CA	6:06	0.2
10/4/2008	12:22 PM 951-780-6192	WOODCREST, CA	3:54	0.12
10/5/2008	1:08 AM 760-699-7909	PALM SPG, CA	0:48	0.03
10/6/2008	8:03 AM 951-679-4352	SUN CITY, CA	1:48	0.06
10/6/2008	8:05 AM 951-679-4352	SUN CITY, CA	1:00	0.03
10/6/2008	8:23 AM 951-698-9497	MURRIETA, CA	1:12	0.04
10/6/2008	8:33 AM 760-871-1900	ESCONDIDO, CA	1:18	0.04
10/6/2008	12:01 PM 951-354-6304	ARLINGTON, CA	6:12	0.2
10/6/2008	3:10 PM 951-609-1799	ELSINORE, CA	1:42	0.05
10/6/2008	3:12 PM 951-609-1799	ELSINORE, CA	0:48	0.03
10/7/2008	9:38 AM 760-770-0300	PALM SPG, CA	11:06	0.36
10/7/2008	10:55 AM 951-817-1017	CORONA, CA	0:18	0.01
10/7/2008	11:43 AM 951-736-0991	CORONA, CA	0:18	0.01
10/7/2008	2:14 PM 951-698-4872	MURRIETA, CA	0:18	0.01
10/8/2008	8:13 AM 909-528-1350	MENTONE, CA	0:18	0.01
10/8/2008	8:15 AM 951-552-5005	ARLINGTON, CA	2:24	0.08
10/8/2008	11:14 AM 951-532-4279	CORONA, CA	2:36	0.08

10/8/2008	12:42 PM 951-279-6222	CORONA, CA	3:24	0.11	
10/8/2008	2:07 PM 951-679-7336	SUN CITY, CA	7:00	0.22	
10/8/2008	2:08 PM 951-845-1959	BANNING, CA	4:30	0.14	
10/8/2008	2:54 PM 951-541-5200	TEMECULA, CA	0:18	0.01	
10/8/2008	4:49 PM 909-902-5979	CHINO, CA	1:48	0.06	
10/8/2008	4:51 PM 909-902-9359	CHINO, CA	1:12	0.04	
10/8/2008	4:52 PM 909-902-5731	CHINO, CA	1:18	0.04	
10/8/2008	4:53 PM 909-902-5979	CHINO, CA	0:24	0.01	
10/9/2008	12:42 PM 760-469-3280	PALMDESERT, CA	1:30	0.05	
10/9/2008	12:44 PM 760-469-3280	PALMDESERT, CA	0:24	0.01	
10/9/2008	3:13 PM 760-419-7440	VISTA, CA	2:00	0.06	
10/9/2008	3:16 PM 760-419-7440	VISTA, CA	4:18	0.14	
10/10/2008	9:46 AM 951-694-3479	TEMECULA, CA	0:18	0.01	
10/11/2008	9:10 AM 951-279-4796	CORONA, CA	0:18	0.01	
10/11/2008	12:26 PM 760-469-3280	PALMDESERT, CA	1:42	0.05	
10/12/2008	7:44 PM 760-447-2623	BARSTOW, CA	7:12	0.23	
10/13/2008	1:24 PM 951-743-3100	RIVERSIDE, CA	3:18	0.11	
10/13/2008	1:55 PM 951-845-2369	BANNING, CA	1:48	0.06	
10/14/2008	9:12 AM 951-735-3293	CORONA, CA	0:18	0.01	
10/14/2008	10:35 AM 951-325-9913	HOMELAND, CA	4:42	0.15	
10/14/2008	12:41 PM 951-734-7597	CORONA, CA	3:54	0.12	
10/14/2008	1:41 PM 951-683-9541	RIVERSIDE, CA	1:48	0.06	P
10/14/2008	1:43 PM 951-683-9541	RIVERSIDE, CA	1:36	0.05	P
10/14/2008	1:49 PM 951-278-1322	CORONA, CA	9:36	0.31	
10/14/2008	2:04 PM 951-894-6515	MURRIETA, CA	2:12	0.07	
10/15/2008	11:21 AM 909-573-4849	CHINO, CA	4:18	0.14	
10/16/2008	7:41 AM 951-674-3837	ELSINORE, CA	1:36	0.05	
10/16/2008	8:58 AM 760-844-2294	PALM SPG, CA	0:18	0.01	
10/16/2008	12:27 PM 909-801-4345	REDLANDS, CA	0:18	0.01	
10/16/2008	3:46 PM 909-557-0235	REDLANDS, CA	0:30	0.02	
10/16/2008	3:48 PM 909-557-0235	REDLANDS, CA	1:00	0.03	
10/17/2008	10:17 AM 951-734-8762	CORONA, CA	1:42	0.05	
10/17/2008	1:56 PM 951-925-6430	HEMET DA, CA	1:48	0.06	
10/17/2008	4:36 PM 760-599-1400	VISTA, CA	0:36	0.02	
10/18/2008	9:29 AM 951-837-0693	MURRIETA, CA	4:00	0.13	
10/20/2008	8:49 AM 951-244-6154	SUN CITY, CA	4:06	0.13	
10/20/2008	12:58 PM 760-318-0035	PALM SPG, CA	5:18	0.17	
10/20/2008	4:50 PM 951-943-1206	PERRIS, CA	2:36	0.08	
10/20/2008	4:53 PM 951-943-1206	PERRIS, CA	2:54	0.09	
10/21/2008	9:55 AM 951-479-8207	CORONA, CA	0:24	0.01	

10/21/2008	12:08 PM 951-704-8313	MURRIETA, CA	0:18	0.01
10/22/2008	11:12 AM 760-360-2554	PALMDESERT, CA	11:18	0.36
10/22/2008	12:40 PM 951-461-0723	MURRIETA, CA	8:00	0.26
10/23/2008	8:56 AM 951-789-5840	WOODCREST, CA	3:00	0.1
10/23/2008	10:59 AM 951-684-2221	RIVERSIDE, CA	3:54	0.12
10/23/2008	11:11 AM 951-277-8068	TEMSCL CNY, CA	1:30	0.05
10/23/2008	11:38 AM 951-789-5840	WOODCREST, CA	3:48	0.12
10/23/2008	4:59 PM 760-568-9274	PALMDESERT, CA	6:06	0.2
10/24/2008	8:44 AM 951-795-6567	TEMECULA, CA	10:24	0.33
10/24/2008	8:55 AM 951-795-6567	TEMECULA, CA	1:48	0.06
10/24/2008	8:58 AM 951-795-6567	TEMECULA, CA	2:24	0.08
10/24/2008	9:50 AM 951-202-7231	RIVERSIDE, CA	5:36	0.18
10/24/2008	11:01 AM 951-656-2945	MORENO, CA	4:00	0.13
10/24/2008	12:09 PM 951-284-5777	CORONA, CA	2:42	0.09
10/24/2008	2:42 PM 951-781-3983	RIVERSIDE, CA	1:48	0.06
10/25/2008	3:47 PM 951-737-1904	CORONA, CA	1:00	0.03
10/25/2008	3:48 PM 951-737-1904	CORONA, CA	2:00	0.06
10/27/2008	11:55 AM 951-813-1107	MURRIETA, CA	7:06	0.23
10/28/2008	9:26 AM 951-684-6258	RIVERSIDE, CA	1:18	0.04
10/28/2008	10:25 AM 951-278-8537	CORONA, CA	1:54	0.06
10/28/2008	12:51 PM 951-308-2000	TEMECULA, CA	9:18	0.3
10/28/2008	6:16 PM 951-323-2684	RIVERSIDE, CA	1:00	0.03
10/28/2008	6:37 PM 951-764-7457	TEMECULA, CA	0:54	0.03
10/29/2008	8:47 AM 951-526-6645	TEMECULA, CA	2:30	0.08
10/29/2008	12:07 PM 951-220-1675	CORONA, CA	2:24	0.08
10/29/2008	1:09 PM 760-832-8890	PALM SPG, CA	1:48	0.06
10/29/2008	2:12 PM 951-677-9317	MURRIETA, CA	9:48	0.31
10/29/2008	3:17 PM 951-487-0187	HEMT SNJC, CA	1:48	0.06
10/29/2008	3:20 PM 951-487-0187	HEMT SNJC, CA	3:24	0.11
10/29/2008	3:25 PM 951-487-0187	HEMT SNJC, CA	21:18	0.68
10/30/2008	4:35 PM 909-864-1150	HIGHLAND, CA	0:42	0.02
10/31/2008	9:56 AM 951-687-7585	ARLINGTON, CA	5:18	0.17
10/31/2008	10:12 AM 951-440-9990	MURRIETA, CA	2:24	0.08

10/31/2008	11:37 AM 951-582-0281	CORONA, CA	2:06	0.07
10/31/2008	11:39 AM 951-582-0281	CORONA, CA	6:48	0.22
10/31/2008	1:06 PM 951-781-0415	RIVERSIDE, CA	6:00	0.19
10/31/2008	1:16 PM 619-954-3414	SAN DIEGO, CA	5:00	0.16
10/31/2008	1:25 PM 951-202-1824	RIVERSIDE, CA	1:42	0.05
10/31/2008	1:47 PM 909-427-9312	FONTANA, CA	7:42	0.25
11/1/2008	9:49 AM 760-863-1695	INDIO, CA	1:48	0.06
11/1/2008	9:51 AM 760-863-1695	INDIO, CA	0:18	0.01
11/1/2008	11:46 AM 951-526-6335	TEMECULA, CA	2:36	0.08
11/2/2008	2:12 PM 951-300-8942	RIVERSIDE, CA	0:18	0.01
11/2/2008	2:49 PM 951-303-6287	TEMECULA, CA	2:00	0.06
11/3/2008	8:27 AM 760-416-5710	PALM SPG, CA	6:42	0.21
11/4/2008	2:12 PM 951-276-0621	RIVERSIDE, CA	0:30	0.02
11/5/2008	9:58 AM 909-772-7974	ONTARIO, CA	1:48	0.06
11/5/2008	11:10 AM 951-233-3948	RIVERSIDE, CA	0:24	0.01
11/5/2008	2:43 PM 951-676-1339	TEMECULA, CA	4:42	0.15
11/5/2008	3:03 PM 951-218-2864	RIVERSIDE, CA	3:00	0.1
11/5/2008	3:13 PM 951-676-1339	TEMECULA, CA	1:48	0.06
11/5/2008	3:40 PM 951-845-5898	BANNING, CA	4:36	0.15
11/6/2008	12:57 PM 909-627-2639	CHINO, CA	3:42	0.12
11/6/2008	4:06 PM 951-789-2883	WOODCREST, CA	1:42	0.05
11/7/2008	7:44 AM 951-765-1907	HEMET DA, CA	0:36	0.02
11/7/2008	10:19 AM 951-359-0444	ARLINGTON, CA	0:18	0.01
11/7/2008	11:44 AM 951-216-1504	TEMECULA, CA	0:54	0.03
11/8/2008	8:35 AM 760-343-3095	PALMDESERT, CA	1:48	0.06
11/8/2008	10:15 AM 951-734-4583	CORONA, CA	3:12	0.1
11/8/2008	10:18 AM 951-652-9593	HEMET DA, CA	1:42	0.05
11/8/2008	11:56 AM 951-816-5935	MURRIETA, CA	0:36	0.02
11/8/2008	12:02 PM 951-816-5935	MURRIETA, CA	0:54	0.03
11/8/2008	2:52 PM 951-656-6461	MORENO, CA	3:54	0.12
11/9/2008	1:10 AM 951-244-5027	SUN CITY, CA	1:42	0.05
11/9/2008	11:47 AM 951-683-1433	RIVERSIDE, CA	0:48	0.03
11/10/2008	8:09 AM 951-926-3263	HOMELAND, CA	2:30	0.08
11/10/2008	9:10 AM 951-681-7118	MIRA LOMA, CA	0:48	0.03
11/10/2008	9:47 AM 909-875-5015	RIALTO, CA	4:00	0.13
11/10/2008	9:52 AM 909-875-5015	RIALTO, CA	9:48	0.31

11/10/2008	4:32 PM 951-680-1977	RIVERSIDE, CA	1:48	0.06
11/10/2008	4:34 PM 951-680-1977	RIVERSIDE, CA	2:06	0.07
11/11/2008	9:43 AM 951-658-6915	HEMET DA, CA	0:42	0.02
11/11/2008	4:14 PM 760-423-4424	PALMDESERT, CA	0:18	0.01
11/11/2008	4:17 PM 760-340-0671	PALMDESERT, CA	2:12	0.07
11/12/2008	9:55 AM 760-202-3073	PALM SPG, CA	4:18	0.14
11/12/2008	10:38 AM 951-442-0231	PERRIS, CA	1:24	0.04
11/12/2008	10:43 AM 760-202-3073	PALM SPG, CA	4:36	0.15
11/12/2008	3:11 PM 951-270-0348	CORONA, CA	0:54	0.03
11/13/2008	8:28 AM 951-506-4619	TEMECULA, CA	3:00	0.1
11/13/2008	9:19 AM 951-768-2507	CORONA, CA	1:30	0.05
11/13/2008	9:52 AM 951-532-4279	CORONA, CA	1:48	0.06
11/13/2008	11:16 AM 951-780-7222	WOODCREST, CA	3:30	0.11
11/14/2008	9:41 AM 951-781-3982	RIVERSIDE, CA	1:36	0.05
11/14/2008	11:23 AM 951-736-3316	CORONA, CA	1:18	0.04
11/14/2008	11:31 AM 760-864-4199	PALM SPG, CA	0:18	0.01
11/14/2008	11:34 AM 760-864-4199	PALM SPG, CA	0:30	0.02
11/14/2008	11:52 AM 951-736-3316	CORONA, CA	1:36	0.05
11/14/2008	4:00 PM 951-929-1860	HEMET DA, CA	7:24	0.24
11/14/2008	4:15 PM 951-682-8220	RIVERSIDE, CA	1:48	0.06
11/14/2008	4:17 PM 951-682-8224	RIVERSIDE, CA	1:36	0.05
11/14/2008	4:19 PM 951-682-8220	RIVERSIDE, CA	0:18	0.01
11/14/2008	4:21 PM 951-682-8220	RIVERSIDE, CA	1:42	0.05
11/14/2008	4:23 PM 951-682-8220	RIVERSIDE, CA	1:00	0.03
11/15/2008	3:42 PM 951-845-2953	BANNING, CA	1:48	0.06
11/15/2008	7:13 PM 951-672-8325	SUN CITY, CA	1:06	0.04
11/17/2008	9:11 AM 951-371-3449	CORONA, CA	0:18	0.01
11/17/2008	1:13 PM 951-808-9124	CORONA, CA	1:36	0.05
11/18/2008	11:03 AM 951-682-8224	RIVERSIDE, CA	9:54	0.32
11/19/2008	7:27 AM 951-371-5089	CORONA, CA	1:36	0.05
11/19/2008	8:30 AM 951-776-4167	WOODCREST, CA	5:00	0.16
11/19/2008	11:07 AM 951-894-3537	MURRIETA, CA	0:18	0.01
11/19/2008	11:10 AM 951-601-1451	MORENO, CA	3:42	0.12
11/19/2008	11:14 AM 951-601-1451	MORENO, CA	2:12	0.07
11/19/2008	11:18 AM 951-601-1451	MORENO, CA	1:48	0.06
11/19/2008	11:24 AM 951-601-1451	MORENO, CA	1:30	0.05
11/19/2008	1:42 PM 951-680-1977	RIVERSIDE, CA	1:42	0.05
11/19/2008	2:14 PM 951-924-8693	MORENO, CA	0:36	0.02
11/19/2008	2:51 PM 951-734-0686	CORONA, CA	19:36	0.63

11/20/2008	10:20 AM 951-276-9521	RIVERSIDE, CA	1:48	0.06
11/20/2008	10:22 AM 951-787-0605	RIVERSIDE, CA	2:12	0.07
11/20/2008	11:18 AM 951-697-6538	MORENO, CA	2:18	0.07
11/20/2008	2:53 PM 951-845-3393	BANNING, CA	1:42	0.05
11/20/2008	3:48 PM 951-684-6533	RIVERSIDE, CA	4:42	0.15
11/21/2008	9:39 AM 951-302-2646	TEMECULA, CA	5:24	0.17
11/21/2008	1:49 PM 760-574-1087	INDIO, CA	6:00	0.19
11/22/2008	9:56 AM 951-549-9627	CORONA, CA	1:36	0.05
11/23/2008	3:00 PM 951-660-2986	RIVERSIDE, CA	5:00	0.16
11/24/2008	8:32 AM 760-568-1523	PALMDESERT, CA	0:42	0.02
11/24/2008	11:12 AM 951-658-3863	HEMET DA, CA	4:12	0.13
11/24/2008	1:21 PM 951-660-2986	RIVERSIDE, CA	4:42	0.15
11/24/2008	2:53 PM 951-296-5320	TEMECULA, CA	5:12	0.17
11/24/2008	2:56 PM 951-675-5145	RIVERSIDE, CA	3:00	0.1
11/24/2008	3:01 PM 951-675-5145	RIVERSIDE, CA	0:48	0.03
11/24/2008	3:07 PM 951-675-5145	RIVERSIDE, CA	2:54	0.09
11/24/2008	3:25 PM 951-675-5145	RIVERSIDE, CA	0:36	0.02
11/24/2008	3:45 PM 951-675-5145	RIVERSIDE, CA	5:54	0.19
11/24/2008	3:52 PM 951-675-5145	RIVERSIDE, CA	6:12	0.2
11/24/2008	4:12 PM 951-675-5145	RIVERSIDE, CA	2:12	0.07
11/24/2008	4:15 PM 951-675-5145	RIVERSIDE, CA	7:06	0.23
11/24/2008	4:38 PM 951-675-5145	RIVERSIDE, CA	2:24	0.08
11/24/2008	4:41 PM 951-675-5145	RIVERSIDE, CA	11:54	0.38
11/24/2008	7:12 PM 760-288-4446	DSERTHTSPG, CA	0:18	0.01
11/25/2008	9:42 AM 951-302-9151	TEMECULA, CA	9:12	0.29
11/25/2008	9:58 AM 951-302-9151	TEMECULA, CA	7:24	0.24
11/25/2008	11:59 AM 909-790-7563	CALIMESA, CA	1:48	0.06
11/25/2008	12:21 PM 909-252-0089	S BERNDINO, CA	0:18	0.01
11/25/2008	2:17 PM 909-628-5422	CHINO, CA	3:48	0.12
11/25/2008	2:32 PM 951-461-9806	MURRIETA, CA	0:48	0.03
11/25/2008	3:33 PM 951-766-0182	HEMET DA, CA	4:12	0.13
11/26/2008	3:51 PM 951-415-2220	CORONA, CA	0:24	0.01
11/28/2008	10:02 AM 951-302-6890	TEMECULA, CA	0:18	0.01
11/28/2008	11:05 AM 951-314-6710	CORONA, CA	1:48	0.06

11/28/2008	11:32 AM	760-641-1488	PALM SPG, CA	1:36	0.05
11/28/2008	12:26 PM	951-768-6116	CORONA, CA	3:54	0.12
11/28/2008	7:57 PM	951-741-1557	CORONA, CA	0:18	0.01
11/29/2008	9:07 AM	951-780-8037	WOODCREST, CA	2:30	0.08
11/29/2008	10:04 AM	951-719-6720	TEMECULA, CA	4:30	0.14
11/29/2008	12:22 PM	909-475-9937	MARSHALL, CA	1:48	0.06
11/29/2008	12:24 PM	909-475-9937	MARSHALL, CA	1:00	0.03
11/29/2008	12:26 PM	909-475-9937	MARSHALL, CA	1:36	0.05
11/29/2008	5:14 PM	951-296-5052	TEMECULA, CA	1:30	0.05
11/30/2008	10:38 AM	951-742-1856	RIVERSIDE, CA	1:48	0.06
11/30/2008	10:47 AM	951-742-1856	RIVERSIDE, CA	4:48	0.15
12/1/2008	9:11 AM	951-272-4861	CORONA, CA	1:54	0.06
12/2/2008	10:41 AM	951-907-9239	RIVERSIDE, CA	7:12	0.23
12/3/2008	10:39 AM	951-243-9491	SUNNYMEAD, CA	4:42	0.15
12/3/2008	11:47 AM	951-212-4543	RIVERSIDE, CA	0:18	0.01
12/3/2008	1:21 PM	951-922-3922	BANNING, CA	0:18	0.01
12/3/2008	3:00 PM	951-515-5060	CORONA, CA	1:48	0.06
12/3/2008	3:03 PM	951-515-5060	CORONA, CA	1:42	0.05
12/3/2008	4:57 PM	951-522-3356	RIVERSIDE, CA	0:30	0.02
12/4/2008	5:30 AM	951-301-9507	SUN CITY, CA	1:48	0.06
12/4/2008	10:30 AM	951-658-3863	HEMET DA, CA	7:06	0.23
12/5/2008	9:25 AM	951-734-9589	CORONA, CA	0:18	0.01
12/5/2008	10:20 AM	909-473-7641	MUSCOY, CA	0:54	0.03
12/5/2008	10:58 AM	951-522-1887	RIVERSIDE, CA	6:12	0.2
12/6/2008	8:15 AM	951-657-1128	PERRIS, CA	0:18	0.01
12/6/2008	8:46 AM	951-657-1128	PERRIS, CA	2:24	0.08
12/6/2008	8:49 AM	951-657-1128	PERRIS, CA	4:30	0.14
12/6/2008	8:54 AM	951-657-1128	PERRIS, CA	0:18	0.01
12/7/2008	9:23 AM	951-657-1128	PERRIS, CA	0:18	0.01
12/7/2008	9:24 AM	951-657-1128	PERRIS, CA	0:18	0.01
12/7/2008	7:37 PM	760-541-9848	INDIO, CA	0:30	0.02
12/7/2008	8:32 PM	760-396-6303	INDIO, CA	0:18	0.01
12/8/2008	10:25 AM	951-359-1754	ARLINGTON, CA	0:48	0.03
12/8/2008	3:26 PM	909-539-3223	CHINO, CA	0:48	0.03
12/8/2008	5:05 PM	760-343-7155	PALMDESERT, CA	1:54	0.06
12/9/2008	10:42 AM	909-862-9572	HIGHLAND, CA	0:18	0.01
12/9/2008	10:48 AM	951-817-5025	CORONA, CA	0:24	0.01
12/9/2008	11:42 AM	909-268-1881	ONTARIO, CA	0:42	0.02
12/9/2008	11:44 AM	909-268-1881	ONTARIO, CA	0:24	0.01

12/9/2008	12:11 PM 760-328-8558	PALM SPG, CA	5:36	0.18
12/9/2008	6:26 PM 760-396-3407	INDIO, CA	0:42	0.02
12/10/2008	10:49 AM 951-591-4759	PERRIS, CA	0:18	0.01
12/10/2008	2:19 PM 951-766-5915	HEMET DA, CA	7:06	0.23
12/10/2008	2:25 PM 760-202-4608	PALM SPG, CA	4:48	0.15
12/10/2008	2:29 PM 951-676-6476	TEMECULA, CA	1:48	0.06
12/10/2008	2:30 PM 951-676-6476	TEMECULA, CA	1:48	0.06
12/11/2008	2:13 PM 760-251-2446	DSERTHTSPG, CA	1:06	0.04
12/11/2008	3:48 PM 951-471-8869	ELSINORE, CA	2:12	0.07
12/11/2008	3:50 PM 951-471-8869	ELSINORE, CA	1:48	0.06
12/11/2008	3:52 PM 951-471-8869	ELSINORE, CA	1:06	0.04
12/11/2008	4:33 PM 951-522-7311	RIVERSIDE, CA	4:42	0.15
12/11/2008	5:30 PM 951-926-5309	HOMELAND, CA	3:18	0.11
12/12/2008	1:57 PM 760-784-1757	BISHOP, CA	1:54	0.06
12/14/2008	12:59 PM 951-473-3073	MURRIETA, CA	0:54	0.03
12/14/2008	1:01 PM 951-473-3073	MURRIETA, CA	0:30	0.02
12/15/2008	8:36 AM 760-325-6830	PALM SPG, CA	0:18	0.01
12/15/2008	10:00 AM 760-324-9580	PALM SPG, CA	2:24	0.08
12/15/2008	5:38 PM 951-736-5726	CORONA, CA	10:18	0.33
12/16/2008	9:10 AM 951-278-8676	CORONA, CA	2:48	0.09
12/16/2008	10:24 AM 951-733-6877	CORONA, CA	0:48	0.03
12/16/2008	1:24 PM 760-347-1433	INDIO, CA	3:06	0.1
12/16/2008	4:27 PM 951-736-0138	CORONA, CA	1:54	0.06
12/16/2008	4:52 PM 951-280-0957	CORONA, CA	1:54	0.06
12/17/2008	1:01 PM 951-246-4175	SUN CITY, CA	1:30	0.05
12/17/2008	3:42 PM 951-926-9229	HOMELAND, CA	0:24	0.01
12/17/2008	4:24 PM 760-396-0723	INDIO, CA	0:36	0.02
12/18/2008	5:34 PM 760-396-0723	INDIO, CA	1:00	0.03
12/18/2008	6:19 PM 760-396-0723	INDIO, CA	0:36	0.02
12/19/2008	8:19 AM 951-461-2800	MURRIETA, CA	5:12	0.17
12/19/2008	10:22 AM 951-929-3371	HEMET DA, CA	2:30	0.08
12/19/2008	10:46 AM 951-541-4314	TEMECULA, CA	1:36	0.05
12/19/2008	10:49 AM 951-541-4314	TEMECULA, CA	1:54	0.06
12/19/2008	2:12 PM 951-277-2106	TEMSCL CNY, CA	0:18	0.01
12/20/2008	1:49 PM 951-314-4887	CORONA, CA	4:06	0.13
12/21/2008	11:14 AM 951-544-2798	RIVERSIDE, CA	1:00	0.03
12/22/2008	11:52 AM 909-993-5800	CHINO, CA	5:12	0.17
12/22/2008	2:44 PM 951-756-3187	RIVERSIDE, CA	3:42	0.12

12/22/2008	3:04 PM	909-942-5879	UPLAND, CA	6:06	0.2
12/22/2008	3:31 PM	951-276-9695	RIVERSIDE, CA	2:18	0.07
12/23/2008	4:08 PM	951-823-7110	RIVERSIDE, CA	0:18	0.01
12/24/2008	10:46 AM	951-929-4765	HEMET DA, CA	7:00	0.22
12/27/2008	11:21 AM	951-894-7547	MURRIETA, CA	2:30	0.08
12/27/2008	1:38 PM	619-654-3138	EL CAJON, CA	5:30	0.18
12/29/2008	9:42 AM	951-343-9568	ARLINGTON, CA	6:42	0.21
12/29/2008	10:07 AM	951-343-9568	ARLINGTON, CA	7:00	0.22
12/29/2008	10:15 AM	951-343-9568	ARLINGTON, CA	2:06	0.07
12/29/2008	10:18 AM	951-343-9568	ARLINGTON, CA	0:18	0.01
12/29/2008	10:18 AM	951-343-9568	ARLINGTON, CA	6:24	0.2
12/29/2008	12:25 PM	951-685-2007	MIRA LOMA, CA	1:48	0.06
12/29/2008	3:16 PM	760-835-1154	PALM SPG, CA	0:18	0.01
12/29/2008	4:35 PM	951-682-3792	RIVERSIDE, CA	5:06	0.16
12/29/2008	7:53 PM	951-852-9083	TEMECULA, CA	0:36	0.02
12/30/2008	9:18 AM	951-737-9853	CORONA, CA	3:24	0.11
12/30/2008	9:21 AM	951-737-9853	CORONA, CA	6:06	0.2
12/30/2008	11:07 AM	951-371-3362	CORONA, CA	1:06	0.04
12/30/2008	4:06 PM	951-940-7623	PERRIS, CA	1:54	0.06
12/30/2008	4:08 PM	951-940-7623	PERRIS, CA	4:36	0.15
12/30/2008	4:13 PM	951-940-7623	PERRIS, CA	6:12	0.2
1/2/2009	9:04 AM	951-294-1137	TEMECULA, CA	1:36	0.05
1/2/2009	9:33 AM	951-926-3969	HOMELAND, CA	1:48	0.06
1/4/2009	9:13 AM	951-943-0464	PERRIS, CA	5:00	0.16
1/4/2009	9:20 AM	951-943-0464	PERRIS, CA	0:36	0.02
1/5/2009	9:33 AM	951-926-3969	HOMELAND, CA	2:24	0.08
1/5/2009	11:01 AM	760-831-9200	PALM SPG, CA	4:54	0.16
1/5/2009	12:43 PM	909-877-4639	RIALTO, CA	4:54	0.16
1/5/2009	3:06 PM	951-237-1779	RIVERSIDE, CA	1:42	0.05
1/5/2009	3:08 PM	951-237-1779	RIVERSIDE, CA	0:48	0.03
1/5/2009	3:09 PM	951-237-1779	RIVERSIDE, CA	0:48	0.03
1/5/2009	4:21 PM	951-678-0812	ELSINORE, CA	0:30	0.02
1/6/2009	12:16 PM	951-681-6339	MIRA LOMA, CA	5:00	0.16
1/6/2009	12:45 PM	951-926-5309	HOMELAND, CA	3:24	0.11
1/6/2009	1:20 PM	951-279-2503	CORONA, CA	0:30	0.02
1/7/2009	9:46 AM	760-343-0445	PALMDESERT, CA	5:18	0.17

1/8/2009	11:53 AM 909-524-2236	POMONA, CA	1:48	0.06
1/9/2009	8:31 AM 951-739-5825	CORONA, CA	3:48	0.12
1/9/2009	2:35 PM 951-734-6304	CORONA, CA	1:24	0.04
1/9/2009	3:39 PM 951-276-9525	RIVERSIDE, CA	2:24	0.08
1/9/2009	3:42 PM 951-787-0419	RIVERSIDE, CA	1:36	0.05
1/9/2009	3:46 PM 951-276-0503	RIVERSIDE, CA	1:54	0.06
1/9/2009	3:48 PM 951-276-1352	RIVERSIDE, CA	2:06	0.07
1/9/2009	3:50 PM 951-928-4423	LAKEVIEWNU, CA	1:48	0.06
1/9/2009	3:53 PM 951-928-4423	LAKEVIEWNU, CA	3:30	0.11
1/9/2009	3:58 PM 951-928-4423	LAKEVIEWNU, CA	3:12	0.1
1/9/2009	4:01 PM 951-928-4423	LAKEVIEWNU, CA	4:00	0.13
1/9/2009	4:06 PM 951-928-4423	LAKEVIEWNU, CA	2:12	0.07
1/11/2009	6:48 AM 951-689-6863	ARLINGTON, CA	1:36	0.05
1/11/2009	7:12 AM 951-247-9806	MORENO, CA	1:42	0.05
1/12/2009	2:35 PM 951-657-0606	PERRIS, CA	5:30	0.18
1/12/2009	3:37 PM 951-276-1123	RIVERSIDE, CA	1:42	0.05
1/13/2009	1:58 PM 951-780-7670	WOODCREST, CA	6:30	0.21
1/13/2009	2:56 PM 909-783-2564	COLTON, CA	6:42	0.21
1/13/2009	2:59 PM 951-658-3863	HEMET DA, CA	5:00	0.16
1/14/2009	8:42 AM 951-787-6707	RIVERSIDE, CA	2:30	0.08
1/14/2009	8:45 AM 951-781-0986	RIVERSIDE, CA	1:12	0.04
1/14/2009	9:42 AM 951-696-3600	MURRIETA, CA	0:18	0.01
1/14/2009	12:01 PM 951-696-3649	MURRIETA, CA	1:30	0.05
1/14/2009	3:08 PM 951-659-0164	IDYLLWILD, CA	1:12	0.04
1/16/2009	2:29 PM 951-243-2879	SUNNYMEAD, CA	0:24	0.01
1/17/2009	10:58 AM 951-685-5340	MIRA LOMA, CA	2:00	0.06
1/17/2009	11:54 AM 951-695-0485	RANCHOCFRN, CA	4:48	0.15
1/17/2009	5:31 PM 951-567-4651	MORENO, CA	0:42	0.02
1/19/2009	11:30 AM 951-277-4502	TEMSCL CNY, CA	2:06	0.07
1/19/2009	11:32 AM 951-277-4502	TEMSCL CNY, CA	3:30	0.11
1/19/2009	12:24 PM 951-741-3430	CORONA, CA	2:18	0.07
1/19/2009	2:29 PM 951-301-8795	SUN CITY, CA	5:18	0.17
1/20/2009	8:45 AM 951-757-5406	TEMECULA, CA	3:12	0.1
1/20/2009	10:24 AM 951-684-3113	RIVERSIDE, CA	3:06	0.1

1/20/2009	12:42 PM 951-674-6943	ELSINORE, CA	0:42	0.02
1/20/2009	2:12 PM 951-490-9552	PERRIS, CA	0:18	0.01
1/20/2009	3:15 PM 909-936-1946	HIGHLAND, CA	0:48	0.03
1/20/2009	3:43 PM 760-396-0127	INDIO, CA	1:06	0.04
1/20/2009	3:46 PM 760-396-0127	INDIO, CA	0:30	0.02
1/20/2009	4:41 PM 760-396-0127	INDIO, CA	1:24	0.04
1/20/2009	4:43 PM 760-396-0127	INDIO, CA	2:36	0.08
1/21/2009	9:32 AM 951-926-4410	HOMELAND, CA	4:18	0.14
1/21/2009	9:37 AM 951-681-1664	MIRA LOMA, CA	5:00	0.16
1/21/2009	11:11 AM 951-906-7739	RIVERSIDE, CA	1:48	0.06
1/21/2009	11:13 AM 951-906-7739	RIVERSIDE, CA	7:30	0.24
1/21/2009	4:30 PM 951-680-9090	RIVERSIDE, CA	0:48	0.03
1/23/2009	8:32 AM 951-442-1052	PERRIS, CA	0:18	0.01
1/23/2009	10:27 AM 951-208-4052	MORENO, CA	0:18	0.01
1/23/2009	10:30 AM 951-533-9331	RIVERSIDE, CA	0:48	0.03
1/23/2009	10:47 AM 951-208-4052	MORENO, CA	0:18	0.01
1/23/2009	2:49 PM 909-591-9169	CHINO, CA	1:12	0.04
1/23/2009	4:25 PM 760-646-4048	APPLE VLY, CA	1:00	0.03
1/26/2009	8:45 AM 760-770-2033	PALM SPG, CA	1:54	0.06
1/26/2009	9:23 AM 760-776-8938	PALMDESERT, CA	4:54	0.16
1/26/2009	10:45 AM 760-961-7611	APPLE VLY, CA	0:18	0.01
1/27/2009	9:52 AM 760-327-1642	PALM SPG, CA	1:48	0.06
1/27/2009	10:05 AM 909-357-5787	FONTANA, CA	1:30	0.05
1/27/2009	11:48 AM 760-328-9000	PALM SPG, CA	1:42	0.05
1/28/2009	2:57 PM 909-565-8027	FONTANA, CA	2:00	0.06
1/29/2009	8:30 AM 760-399-9773	INDIO, CA	2:36	0.08
1/29/2009	3:50 PM 951-787-9177	RIVERSIDE, CA	0:18	0.01
1/29/2009	4:14 PM 951-672-3534	SUN CITY, CA	3:06	0.1
1/29/2009	4:20 PM 951-672-3534	SUN CITY, CA	2:36	0.08
1/30/2009	10:02 AM 951-254-0410	CORONA, CA	2:18	0.07
1/30/2009	10:21 AM 909-397-4400	POMONA, CA	1:30	0.05
1/30/2009	10:23 AM 951-272-0543	CORONA, CA	0:36	0.02
1/30/2009	10:24 AM 951-272-0543	CORONA, CA	0:18	0.01
1/30/2009	12:23 PM 909-481-5623	UPLAND, CA	1:36	0.05
1/30/2009	12:25 PM 909-481-5623	UPLAND, CA	0:30	0.02
1/30/2009	1:06 PM 951-609-4740	ELSINORE, CA	1:42	0.05
1/30/2009	1:38 PM 951-276-9995	RIVERSIDE, CA	2:36	0.08
1/30/2009	1:41 PM 951-276-9960	RIVERSIDE, CA	1:06	0.04
1/30/2009	1:42 PM 951-276-9516	RIVERSIDE, CA	1:54	0.06

1/30/2009	2:42 PM 951-940-1192	PERRIS, CA	2:18	0.07
1/30/2009	3:44 PM 951-360-7741	MIRA LOMA, CA	5:54	0.19
1/30/2009	9:55 PM 951-514-8911	TEMECULA, CA	1:42	0.05
1/31/2009	7:30 AM 951-360-7741	MIRA LOMA, CA	2:36	0.08
1/31/2009	10:28 AM 951-654-5667	SANJACINTO, CA	4:18	0.14
1/31/2009	10:47 AM 951-565-0241	WOODCREST, CA	0:18	0.01
1/31/2009	10:59 AM 951-789-1607	WOODCREST, CA	1:42	0.05
2/2/2009	8:49 AM 951-805-7533	ELSINORE, CA	1:42	0.05
2/2/2009	10:12 AM 909-984-7280	ONTARIO, CA	1:48	0.06
2/2/2009	11:54 AM 951-208-1616	MORENO, CA	3:30	0.11
2/2/2009	3:04 PM 951-587-6877	TEMECULA, CA	8:24	0.27
2/3/2009	10:30 AM 760-391-2627	INDIO, CA	0:18	0.01
2/3/2009	1:06 PM 951-698-3345	MURRIETA, CA	0:42	0.02
2/3/2009	1:39 PM 951-684-6073	RIVERSIDE, CA	5:00	0.16
2/3/2009	3:11 PM 951-276-9522	RIVERSIDE, CA	1:06	0.04
2/3/2009	3:13 PM 951-276-1349	RIVERSIDE, CA	1:06	0.04
2/3/2009	3:14 PM 951-276-9525	RIVERSIDE, CA	1:48	0.06
2/3/2009	3:16 PM 951-276-9525	RIVERSIDE, CA	1:30	0.05
2/3/2009	3:18 PM 951-276-1366	RIVERSIDE, CA	1:54	0.06
2/3/2009	3:28 PM 951-781-1904	RIVERSIDE, CA	1:00	0.03
2/4/2009	5:12 PM 760-534-5447	PALM SPG, CA	0:24	0.01
2/5/2009	7:53 AM 951-781-0986	RIVERSIDE, CA	1:48	0.06
2/5/2009	9:19 AM 951-276-2467	RIVERSIDE, CA	2:30	0.08
2/5/2009	9:50 AM 760-202-4668	PALM SPG, CA	2:30	0.08
2/5/2009	9:52 AM 760-202-4668	PALM SPG, CA	0:48	0.03
2/5/2009	11:39 AM 951-571-4041	MORENO, CA	11:00	0.35
2/5/2009	1:07 PM 951-302-6631	TEMECULA, CA	4:06	0.13
2/5/2009	2:31 PM 951-340-1222	CORONA, CA	2:36	0.08
2/6/2009	9:33 AM 909-613-1837	CHINO, CA	1:42	0.05
2/9/2009	10:22 AM 909-889-2530	S BERNDINO, CA	0:18	0.01
2/9/2009	4:03 PM 951-698-7277	MURRIETA, CA	0:36	0.02
2/10/2009	8:40 AM 760-413-8462	PALM SPG, CA	2:24	0.08
2/10/2009	9:01 AM 951-340-1222	CORONA, CA	6:12	0.2
2/10/2009	9:54 AM 909-770-3366	FONTANA, CA	0:30	0.02
2/10/2009	11:30 AM 760-922-9107	BLYTHE, CA	2:00	0.06
2/10/2009	12:32 PM 760-321-5717	PALM SPG, CA	3:36	0.12

2/10/2009	12:55 PM	951-245-8030	ELSINORE, CA	0:54	0.03
2/10/2009	2:04 PM	951-681-4967	MIRA LOMA, CA	6:00	0.19
2/10/2009	2:10 PM	951-681-4967	MIRA LOMA, CA	3:18	0.11
2/10/2009	2:13 PM	760-578-9241	PALMDESERT, CA	1:06	0.04
2/10/2009	2:14 PM	760-578-9241	PALMDESERT, CA	0:36	0.02
2/10/2009	2:15 PM	760-578-9241	PALMDESERT, CA	0:24	0.01
2/10/2009	5:12 PM	951-253-5490	ELSINORE, CA	4:00	0.13
2/11/2009	8:49 AM	760-899-2314	INDIO, CA	1:06	0.04
2/11/2009	9:04 AM	951-253-5489	ELSINORE, CA	2:30	0.08
2/11/2009	1:52 PM	951-571-4041	MORENO, CA	4:30	0.14
2/11/2009	3:25 PM	951-303-8055	TEMECULA, CA	2:54	0.09
2/12/2009	10:43 AM	951-325-8972	HOMELAND, CA	3:18	0.11
2/12/2009	11:50 AM	951-213-7375	RIVERSIDE, CA	0:18	0.01
2/13/2009	1:44 PM	951-926-8828	HOMELAND, CA	1:42	0.05
2/14/2009	8:50 AM	951-533-7238	RIVERSIDE, CA	3:06	0.1
2/14/2009	11:28 AM	951-314-4620	CORONA, CA	5:24	0.17
2/14/2009	6:48 PM	951-259-8670	PERRIS, CA	0:42	0.02
2/16/2009	9:14 AM	951-369-8587	RIVERSIDE, CA	1:24	0.04
2/16/2009	10:37 AM	951-675-2813	RIVERSIDE, CA	1:12	0.04
2/16/2009	11:48 AM	760-323-1838	PALM SPG, CA	5:54	0.19
2/16/2009	2:13 PM	619-222-4255	SAN DIEGO, CA	1:12	0.04
2/17/2009	10:25 AM	951-325-8972	HOMELAND, CA	7:36	0.24
2/18/2009	2:28 PM	951-926-6049	HOMELAND, CA	0:48	0.03
2/23/2009	11:41 AM	858-626-8200	LA JOLLA, CA	1:54	0.06
2/23/2009	11:43 AM	858-626-8200	LA JOLLA, CA	4:54	0.16
2/23/2009	2:44 PM	909-381-4071	S BERNDINO, CA	1:30	0.05
2/23/2009	7:42 PM	951-282-3523	HEMT HEMT, CA	3:00	0.1
2/24/2009	2:34 AM	951-689-6252	ARLINGTON, CA	2:48	0.09
2/24/2009	2:37 AM	951-689-6252	ARLINGTON, CA	2:12	0.07
2/24/2009	8:42 AM	951-637-7477	ARLINGTON, CA	0:18	0.01
2/24/2009	11:01 AM	951-691-5082	MURRIETA, CA	0:18	0.01
2/24/2009	2:22 PM	951-280-4106	CORONA, CA	1:24	0.04
2/25/2009	12:28 PM	951-340-1342	CORONA, CA	0:24	0.01
2/26/2009	12:46 PM	760-778-9996	PALM SPG, CA	0:42	0.02

2/26/2009	10:16 PM 760-398-1048	INDIO, CA	1:48	0.06
2/27/2009	4:45 PM 951-347-0274	RIVERSIDE, CA	5:24	0.17
2/27/2009	4:57 PM 951-347-0274	RIVERSIDE, CA	5:18	0.17
2/27/2009	8:11 PM 760-778-1410	PALM SPG, CA	0:36	0.02
2/28/2009	10:03 AM 951-833-2479	CORONA, CA	3:42	0.12
3/2/2009	9:54 AM 951-694-6400	TEMECULA, CA	2:24	0.08
3/3/2009	11:33 AM 951-715-0136	RIVERSIDE, CA	2:54	0.09
3/3/2009	11:38 AM 951-715-0131	RIVERSIDE, CA	5:12	0.17
3/3/2009	5:06 PM 951-927-5573	HEMET DA, CA	0:30	0.02
3/4/2009	9:34 AM 951-736-3356	CORONA, CA	5:48	0.19
3/4/2009	10:09 AM 951-719-2600	TEMECULA, CA	8:06	0.26
3/4/2009	1:30 PM 619-977-0440	SAN DIEGO, CA	0:18	0.01
3/4/2009	3:01 PM 951-929-1438	HEMET DA, CA	6:48	0.22
3/4/2009	3:08 PM 951-929-1438	HEMET DA, CA	1:48	0.06
3/4/2009	3:10 PM 951-929-1438	HEMET DA, CA	1:18	0.04
3/4/2009	3:11 PM 951-929-1438	HEMET DA, CA	3:18	0.11
3/4/2009	4:02 PM 760-391-4000	INDIO, CA	1:18	0.04
3/5/2009	11:15 AM 951-328-1586	RIVERSIDE, CA	1:48	0.06
3/5/2009	11:25 AM 951-247-4709	MORENO, CA	14:54	0.48
3/5/2009	4:06 PM 760-898-5584	PALM SPG, CA	0:18	0.01
3/5/2009	4:09 PM 760-898-5584	PALM SPG, CA	0:18	0.01
3/5/2009	4:41 PM 760-898-5584	PALM SPG, CA	0:18	0.01
3/5/2009	4:42 PM 760-898-5584	PALM SPG, CA	0:18	0.01
3/7/2009	8:55 AM 760-398-4180	INDIO, CA	0:18	0.01
3/7/2009	9:33 AM 760-674-9107	PALMDESERT, CA	4:30	0.14
3/7/2009	12:10 PM 951-738-0344	CORONA, CA	2:48	0.09
3/7/2009	6:14 PM 951-654-7658	SANJACINTO, CA	0:18	0.01
3/7/2009	8:56 PM 951-352-1334	ARLINGTON, CA	1:30	0.05
3/9/2009	1:23 PM 951-928-2891	LAKEVIEWNU, CA	2:24	0.08
3/9/2009	1:26 PM 951-928-2892	LAKEVIEWNU, CA	1:48	0.06
3/9/2009	1:46 PM 951-928-2892	LAKEVIEWNU, CA	3:24	0.11
3/9/2009	1:50 PM 951-928-2891	LAKEVIEWNU, CA	1:48	0.06
3/10/2009	8:56 AM 951-943-9246	PERRIS, CA	1:48	0.06
3/10/2009	8:58 AM 951-943-9246	PERRIS, CA	7:12	0.23
3/10/2009	3:30 PM 951-256-1201	CORONA, CA	0:36	0.02
3/10/2009	4:41 PM 951-652-0313	HEMET DA, CA	6:54	0.22
3/11/2009	9:26 AM 909-706-2697	POMONA, CA	0:18	0.01
3/11/2009	9:42 AM 909-706-2697	POMONA, CA	1:30	0.05
3/11/2009	10:02 AM 951-304-7895	MURRIETA, CA	0:54	0.03

3/11/2009	10:03 AM 951-304-7859	MURRIETA, CA	0:24	0.01	
3/11/2009	10:04 AM 951-304-7863	MURRIETA, CA	1:42	0.05	
3/11/2009	1:43 PM 951-905-1598	RIVERSIDE, CA	2:30	0.08	
3/11/2009	1:46 PM 951-905-1598	RIVERSIDE, CA	2:54	0.09	
3/11/2009	3:09 PM 951-678-9581	ELSINORE, CA	1:00	0.03	P
3/11/2009	4:28 PM 951-766-8293	HEMET DA, CA	3:06	0.1	
3/12/2009	9:59 AM 951-296-5321	TEMECULA, CA	2:00	0.06	
3/12/2009	11:43 AM 951-805-0210	ELSINORE, CA	5:24	0.17	
3/12/2009	11:49 AM 951-805-0210	ELSINORE, CA	0:48	0.03	
3/12/2009	3:35 PM 951-279-3454	CORONA, CA	1:48	0.06	
3/12/2009	4:10 PM 951-256-6256	CORONA, CA	1:42	0.05	
3/13/2009	10:16 AM 951-737-6451	CORONA, CA	7:06	0.23	
3/13/2009	10:21 AM 951-805-9028	ELSINORE, CA	0:18	0.01	
3/13/2009	12:38 PM 951-473-0952	MURRIETA, CA	1:54	0.06	
3/13/2009	1:04 PM 951-736-7134	CORONA, CA	1:24	0.04	
3/13/2009	1:07 PM 760-636-9624	PALMDESERT, CA	3:12	0.1	
3/14/2009	11:59 AM 951-452-7085	RIVERSIDE, CA	3:48	0.12	
3/14/2009	7:25 PM 951-940-4584	PERRIS, CA	1:12	0.04	
3/16/2009	8:13 AM 951-737-8314	CORONA, CA	2:18	0.07	
3/16/2009	8:56 AM 760-578-9138	PALMDESERT, CA	6:18	0.2	
3/16/2009	9:13 AM 951-784-4327	RIVERSIDE, CA	1:12	0.04	
3/16/2009	9:15 AM 951-784-4327	RIVERSIDE, CA	7:00	0.22	
3/16/2009	11:18 AM 951-922-0200	BANNING, CA	3:18	0.11	
3/16/2009	1:20 PM 951-491-0270	TEMECULA, CA	4:06	0.13	
3/16/2009	5:37 PM 951-849-3484	BANNING, CA	0:48	0.03	
3/17/2009	12:19 PM 951-845-3600	BANNING, CA	7:06	0.23	
3/17/2009	12:40 PM 760-324-4210	PALM SPG, CA	1:42	0.05	
3/17/2009	12:42 PM 760-324-4210	PALM SPG, CA	0:48	0.03	
3/18/2009	10:13 AM 951-375-0366	TEMECULA, CA	0:48	0.03	
3/18/2009	10:51 AM 951-789-6255	WOODCREST, CA	2:06	0.07	
3/18/2009	2:46 PM 951-243-8763	SUNNYMEAD, CA	3:36	0.12	
3/18/2009	4:05 PM 951-532-4171	CORONA, CA	5:12	0.17	
3/18/2009	4:20 PM 951-532-4171	CORONA, CA	4:36	0.15	
3/19/2009	9:53 AM 858-692-0814	LA JOLLA, CA	3:12	0.1	
3/19/2009	9:59 AM 858-692-0814	LA JOLLA, CA	1:48	0.06	
3/19/2009	10:01 AM 858-692-0814	LA JOLLA, CA	0:48	0.03	
3/19/2009	12:51 PM 951-684-1552	RIVERSIDE, CA	0:48	0.03	

3/20/2009	6:59 AM	760-325-5015	PALM SPG, CA	1:48	0.06
3/20/2009	7:02 AM	760-325-5015	PALM SPG, CA	1:48	0.06
3/20/2009	11:05 AM	951-351-9706	ARLINGTON, CA	0:48	0.03
3/20/2009	11:06 AM	951-351-9706	ARLINGTON, CA	0:48	0.03
3/20/2009	11:06 AM	951-824-0196	RIVERSIDE, CA	3:30	0.11
3/23/2009	9:34 AM	909-240-1428	ONTARIO, CA	2:12	0.07
3/23/2009	12:27 PM	951-545-7661	CORONA, CA	0:18	0.01
3/23/2009	1:12 PM	951-737-7657	CORONA, CA	0:48	0.03
3/23/2009	6:10 PM	951-375-7500	TEMECULA, CA	1:30	0.05
3/24/2009	8:47 AM	619-885-3154	SAN DIEGO, CA	6:36	0.21
3/24/2009	10:36 AM	951-616-8939	MORENO, CA	2:54	0.09
3/24/2009	11:33 AM	951-351-0883	ARLINGTON, CA	1:30	0.05
3/25/2009	12:13 AM	951-303-6769	TEMECULA, CA	1:24	0.04
3/25/2009	11:57 AM	951-765-3700	HEMET DA, CA	0:18	0.01
3/25/2009	12:11 PM	951-707-6522	CORONA, CA	3:30	0.11
3/26/2009	10:35 AM	951-232-1895	RIVERSIDE, CA	2:06	0.07
3/27/2009	7:13 AM	760-289-6423	INDIO, CA	7:06	0.23
3/27/2009	7:32 AM	951-616-8939	MORENO, CA	4:06	0.13
3/27/2009	10:25 AM	951-340-3571	CORONA, CA	2:54	0.09
3/27/2009	2:32 PM	760-778-5261	PALM SPG, CA	4:00	0.13
3/28/2009	12:04 PM	951-235-7995	RIVERSIDE, CA	0:48	0.03
3/28/2009	3:38 PM	760-329-3462	DSERTHTSPG, CA	3:24	0.11
3/30/2009	9:10 AM	760-771-9081	INDIO, CA	2:06	0.07
3/30/2009	4:40 PM	909-835-1322	COLTON, CA	2:36	0.08
3/31/2009	9:16 AM	951-277-1771	TEMSCL CNY, CA	1:54	0.06
4/1/2009	12:12 PM	951-698-5684	MURRIETA, CA	5:54	0.19
4/2/2009	11:33 AM	760-770-0598	PALM SPG, CA	4:00	0.13
4/2/2009	1:07 PM	760-449-8083	PALM SPG, CA	1:48	0.06
4/2/2009	1:09 PM	760-449-8083	PALM SPG, CA	1:48	0.06
4/2/2009	1:53 PM	760-325-4062	PALM SPG, CA	0:18	0.01
4/3/2009	7:58 AM	760-574-5682	INDIO, CA	3:00	0.09
4/3/2009	9:19 AM	951-623-3328	PERRIS, CA	1:30	0.05
4/3/2009	9:21 AM	951-340-0655	CORONA, CA	1:54	0.06
4/3/2009	9:34 AM	951-340-0655	CORONA, CA	1:48	0.06
4/3/2009	10:12 AM	951-674-0898	ELSINORE, CA	4:06	0.13
4/4/2009	9:58 AM	951-452-7085	RIVERSIDE, CA	4:42	0.15
4/4/2009	10:49 AM	951-677-4367	MURRIETA, CA	6:12	0.2
4/6/2009	7:00 AM	951-689-6863	ARLINGTON, CA	2:00	0.06
4/6/2009	10:08 AM	951-652-7130	HEMET DA, CA	4:30	0.14

4/6/2009	1:53 PM 951-698-8547	MURRIETA, CA	0:30	0.02	
4/6/2009	3:31 PM 951-654-8268	SANJACINTO, CA	1:42	0.05	
4/6/2009	3:33 PM 951-654-8268	SANJACINTO, CA	2:06	0.07	
4/6/2009	3:37 PM 951-654-8268	SANJACINTO, CA	2:18	0.07	
4/6/2009	3:40 PM 951-654-8268	SANJACINTO, CA	0:48	0.03	
4/7/2009	8:12 AM 951-735-0587	CORONA, CA	0:42	0.02	
4/7/2009	9:16 AM 951-245-9057	ELSINORE, CA	1:48	0.06	P
4/7/2009	9:19 AM 951-245-9057	ELSINORE, CA	0:48	0.03	P
4/7/2009	10:21 AM 760-221-5949	VICTORVL, CA	1:12	0.04	
4/7/2009	3:00 PM 951-609-0917	ELSINORE, CA	0:18	0.01	P
4/7/2009	4:00 PM 909-790-9223	CALIMESA, CA	4:42	0.15	
4/8/2009	2:03 PM 760-835-4112	PALM SPG, CA	2:18	0.07	
4/9/2009	8:07 AM 951-642-7161	CORONA, CA	5:06	0.16	
4/9/2009	1:26 PM 951-929-7856	HEMET DA, CA	0:24	0.01	
4/9/2009	1:44 PM 951-765-5298	HEMET DA, CA	1:48	0.06	
4/10/2009	10:56 AM 951-697-6830	MORENO, CA	1:48	0.06	
4/10/2009	1:40 PM 951-485-2425	MORENO, CA	4:18	0.14	
4/11/2009	2:53 PM 951-924-3673	MORENO, CA	1:24	0.04	
4/13/2009	9:14 AM 951-780-6170	WOODCREST, CA	1:48	0.06	
4/13/2009	9:16 AM 951-780-6170	WOODCREST, CA	3:18	0.11	
4/13/2009	11:24 AM 760-340-5944	PALMDESERT, CA	0:42	0.02	
4/13/2009	12:35 PM 909-307-8063	REDLANDS, CA	13:48	0.44	
4/13/2009	3:40 PM 951-302-8860	TEMECULA, CA	4:42	0.15	
4/14/2009	9:33 AM 951-273-7635	CORONA, CA	5:54	0.19	
4/14/2009	10:04 AM 619-781-2030	CHULAVISTA, CA	3:06	0.1	
4/14/2009	12:37 PM 951-235-5612	RIVERSIDE, CA	1:36	0.05	
4/14/2009	3:30 PM 760-200-4213	PALMDESERT, CA	6:00	0.19	
4/14/2009	6:02 PM 951-637-0028	ARLINGTON, CA	0:18	0.01	
4/15/2009	7:53 AM 951-687-3815	ARLINGTON, CA	4:12	0.13	
4/15/2009	8:37 AM 951-375-0366	TEMECULA, CA	2:48	0.09	
4/15/2009	1:44 PM 951-654-7770	SANJACINTO, CA	0:18	0.01	
4/15/2009	2:57 PM 951-760-9699	TEMECULA, CA	1:48	0.06	
4/15/2009	5:41 PM 951-676-9181	TEMECULA, CA	1:00	0.03	
4/15/2009	9:18 PM 951-925-0378	HEMET DA, CA	0:18	0.01	
4/15/2009	9:18 PM 951-925-0378	HEMET DA, CA	8:24	0.27	

4/16/2009	7:51 AM 951-925-4705	HEMET DA, CA	2:36	0.08
4/16/2009	9:58 AM 951-473-0241	MURRIETA, CA	1:30	0.05
4/16/2009	11:02 AM 760-391-5531	INDIO, CA	1:00	0.03
4/16/2009	11:03 AM 760-391-5531	INDIO, CA	1:48	0.06
4/16/2009	11:05 AM 760-391-5531	INDIO, CA	0:36	0.02
4/16/2009	12:34 PM 760-202-1200	PALM SPG, CA	4:48	0.15
4/16/2009	4:09 PM 760-347-7160	INDIO, CA	3:06	0.1
4/16/2009	4:12 PM 760-343-2835	PALMDESERT, CA	1:48	0.06
4/16/2009	5:34 PM 951-658-4519	HEMET DA, CA	5:36	0.18
4/17/2009	8:54 AM 951-272-9523	CORONA, CA	0:36	0.02
4/17/2009	9:32 AM 951-682-9992	RIVERSIDE, CA	0:48	0.03
4/17/2009	9:55 AM 951-545-4283	CORONA, CA	2:18	0.07
4/17/2009	11:43 AM 951-834-6938	MURRIETA, CA	1:48	0.06
4/17/2009	1:10 PM 951-943-4303	PERRIS, CA	3:06	0.1
4/17/2009	2:08 PM 951-696-5011	MURRIETA, CA	4:54	0.16
4/17/2009	2:13 PM 760-580-6140	ESCONDIDO, CA	0:18	0.01
4/17/2009	2:14 PM 951-272-1743	CORONA, CA	0:24	0.01
4/17/2009	2:48 PM 909-393-5629	CHINO, CA	2:06	0.07
4/17/2009	2:51 PM 909-597-1821	CHINO, CA	0:48	0.03
4/17/2009	6:06 PM 760-799-6057	PALM SPG, CA	0:54	0.03
4/18/2009	7:47 AM 951-735-5802	CORONA, CA	0:42	0.02
4/18/2009	10:10 AM 951-737-7657	CORONA, CA	1:18	0.04
4/18/2009	10:18 AM 951-658-9306	HEMET DA, CA	2:18	0.07
4/18/2009	10:20 AM 951-658-9306	HEMET DA, CA	1:30	0.05
4/20/2009	3:05 PM 951-672-4100	SUN CITY, CA	1:54	0.06
4/20/2009	3:37 PM 951-685-0607	MIRA LOMA, CA	0:18	0.01
4/20/2009	3:54 PM 951-924-9732	MORENO, CA	0:36	0.02
4/20/2009	3:55 PM 951-924-9732	MORENO, CA	0:30	0.02
4/21/2009	11:08 AM 951-791-0848	HEMET DA, CA	6:30	0.21
4/21/2009	1:00 PM 951-849-8030	BANNING, CA	0:18	0.01
4/21/2009	2:33 PM 951-765-0828	HEMET DA, CA	4:48	0.15
4/21/2009	2:39 PM 951-737-0540	CORONA, CA	0:18	0.01
4/21/2009	3:46 PM 760-343-2835	PALMDESERT, CA	0:54	0.03
4/21/2009	4:04 PM 951-239-1592	MURRIETA, CA	1:48	0.06
4/21/2009	4:05 PM 951-239-1592	MURRIETA, CA	0:36	0.02
4/22/2009	9:56 AM 760-772-6631	PALMDESERT, CA	7:24	0.24
4/22/2009	10:50 AM 951-785-6400	ARLINGTON, CA	3:54	0.12
4/22/2009	1:27 PM 951-928-4184	LAKEVIEWNU, CA	0:18	0.01
4/22/2009	4:14 PM 909-721-3332	ONTARIO, CA	1:30	0.05
4/22/2009	4:35 PM 951-704-4710	MURRIETA, CA	2:30	0.08

4/22/2009	4:38 PM 951-704-4710	MURRIETA, CA	4:24	0.14
4/23/2009	1:30 PM 951-674-3146	ELSINORE, CA	1:06	0.04
4/23/2009	3:50 PM 951-689-4725	ARLINGTON, CA	1:42	0.05
4/23/2009	6:52 PM 951-361-2565	MIRA LOMA, CA	1:48	0.06
4/24/2009	7:33 AM 951-652-7849	HEMET DA, CA	0:18	0.01
4/24/2009	8:34 AM 951-693-2171	TEMECULA, CA	4:54	0.16
4/24/2009	12:30 PM 951-780-1661	WOODCREST, CA	3:18	0.11
4/24/2009	1:50 PM 760-775-9475	INDIO, CA	2:00	0.06
4/24/2009	4:30 PM 951-301-4482	SUN CITY, CA	0:24	0.01
4/25/2009	9:42 AM 951-204-1007	RIVERSIDE, CA	3:12	0.1
4/25/2009	10:59 AM 760-328-8670	PALM SPG, CA	4:36	0.15
4/25/2009	11:22 AM 951-323-6897	RIVERSIDE, CA	0:36	0.02
4/25/2009	1:06 PM 951-427-1394	CORONA, CA	2:36	0.08
4/26/2009	8:04 PM 760-619-5221	INDIO, CA	0:18	0.01
4/27/2009	11:03 AM 951-685-5787	MIRA LOMA, CA	2:48	0.09
4/27/2009	11:49 AM 760-469-6074	PALMDESERT, CA	1:42	0.05
4/27/2009	3:30 PM 951-210-4960	PERRIS, CA	0:36	0.02
4/27/2009	4:32 PM 951-677-3806	MURRIETA, CA	5:00	0.16
4/28/2009	9:20 AM 760-346-1670	PALMDESERT, CA	5:42	0.18
4/28/2009	7:16 PM 951-214-1763	MORENO, CA	1:42	0.05
4/29/2009	9:40 AM 760-322-1513	PALM SPG, CA	1:42	0.05
4/29/2009	9:42 AM 760-322-1513	PALM SPG, CA	0:48	0.03
4/29/2009	3:41 PM 760-771-1288	INDIO, CA	4:54	0.16
4/30/2009	2:20 PM 951-565-3540	WOODCREST, CA	0:18	0.01
4/30/2009	2:48 PM 858-699-7731	LA JOLLA, CA	1:30	0.05
5/1/2009	10:51 AM 951-849-1299	BANNING, CA	0:18	0.01
5/1/2009	1:14 PM 909-821-1282	ONTARIO, CA	0:24	0.01
5/1/2009	1:14 PM 909-821-1282	ONTARIO, CA	0:24	0.01
5/2/2009	11:18 AM 951-686-0696	RIVERSIDE, CA	3:12	0.1
5/3/2009	9:59 AM 760-333-4771	PALM SPG, CA	2:00	0.06
5/4/2009	8:08 AM 760-200-8657	PALMDESERT, CA	1:36	0.05
5/4/2009	9:38 AM 858-565-9573	LNDA VSTA, CA	0:48	0.03
5/4/2009	10:26 AM 951-784-7396	RIVERSIDE, CA	0:54	0.03
5/4/2009	10:28 AM 951-784-7396	RIVERSIDE, CA	0:48	0.03
5/4/2009	3:44 PM 951-587-9221	TEMECULA, CA	0:30	0.02
5/5/2009	9:16 AM 858-565-9573	LNDA VSTA, CA	1:12	0.04

5/5/2009	12:01 PM 951-696-0680	MURRIETA, CA	0:18	0.01
5/5/2009	1:09 PM 951-471-1268	ELSINORE, CA	0:18	0.01
5/6/2009	9:57 AM 909-867-9481	RUNNINGSPG, CA	5:48	0.19
5/6/2009	2:37 PM 951-737-2893	CORONA, CA	3:36	0.12
5/7/2009	11:10 AM 951-244-1033	SUN CITY, CA	4:30	0.14
5/7/2009	12:37 PM 951-242-6213	MORENO, CA	2:30	0.08
5/7/2009	4:22 PM 951-925-1723	HEMET DA, CA	2:24	0.08
5/7/2009	4:25 PM 951-925-1583	HEMET DA, CA	2:00	0.06
5/8/2009	9:52 AM 951-681-7435	MIRA LOMA, CA	3:06	0.1
5/8/2009	3:08 PM 951-226-8548	ELSINORE, CA	5:42	0.18
5/9/2009	12:13 PM 951-219-2626	MURRIETA, CA	13:54	0.44
5/9/2009	2:32 PM 951-304-3465	MURRIETA, CA	2:54	0.09
5/10/2009	10:10 AM 909-824-7322	COLTON, CA	0:18	0.01
5/11/2009	11:49 AM 760-341-7721	PALMDESERT, CA	1:48	0.06
5/11/2009	11:51 AM 760-341-7721	PALMDESERT, CA	6:36	0.21
5/11/2009	12:27 PM 951-352-5300	ARLINGTON, CA	4:36	0.15
5/11/2009	1:23 PM 951-924-9124	MORENO, CA	6:06	0.2
5/11/2009	1:30 PM 951-924-9124	MORENO, CA	3:36	0.12
5/11/2009	2:34 PM 951-515-4029	CORONA, CA	5:36	0.18
5/12/2009	10:14 AM 951-308-6387	TEMECULA, CA	1:12	0.04
5/12/2009	10:30 AM 951-658-6146	HEMET DA, CA	1:48	0.06
5/12/2009	10:32 AM 951-310-3369	CORONA, CA	3:18	0.11
5/12/2009	10:34 AM 951-658-6146	HEMET DA, CA	0:48	0.03
5/12/2009	10:36 AM 951-260-3618	HEMT HEMT, CA	1:42	0.05
5/12/2009	2:05 PM 951-236-6411	RIVERSIDE, CA	3:36	0.12
5/12/2009	2:40 PM 951-845-8066	BANNING, CA	4:18	0.14
5/13/2009	8:12 AM 951-780-3216	WOODCREST, CA	5:18	0.17
5/13/2009	11:39 AM 951-926-9052	HOMELAND, CA	1:48	0.06
5/13/2009	11:40 AM 951-652-9335	HEMET DA, CA	6:24	0.2
5/13/2009	11:41 AM 909-204-9218	UPLAND, CA	3:36	0.12
5/13/2009	1:13 PM 951-296-6900	TEMECULA, CA	3:42	0.12
5/13/2009	3:09 PM 951-657-4871	PERRIS, CA	2:30	0.08
5/13/2009	3:33 PM 951-242-2077	MORENO, CA	0:42	0.02
5/13/2009	3:56 PM 951-313-3932	RIVERSIDE, CA	4:12	0.13
5/14/2009	2:30 PM 951-719-8781	TEMECULA, CA	1:42	0.05
5/14/2009	2:32 PM 951-719-8781	TEMECULA, CA	5:12	0.17
5/15/2009	8:49 AM 951-696-4101	MURRIETA, CA	8:00	0.26

5/15/2009	9:14 AM 951-696-4101	MURRIETA, CA	5:36	0.18
5/15/2009	11:02 AM 951-549-6961	CORONA, CA	3:12	0.1
5/15/2009	12:00 PM 760-310-6184	VISTA, CA	3:24	0.11
5/15/2009	12:05 PM 760-310-6184	VISTA, CA	2:48	0.09
5/15/2009	2:08 PM 951-922-2757	BANNING, CA	3:24	0.11
5/15/2009	4:21 PM 951-769-1465	BANNING, CA	2:24	0.08
5/16/2009	9:45 AM 951-217-3892	RIVERSIDE, CA	3:30	0.1
5/16/2009	12:47 PM 951-317-7503	CORONA, CA	6:06	0.18
5/17/2009	12:24 PM 760-779-0338	PALMDESERT, CA	0:18	0.01
5/17/2009	4:36 PM 951-943-0902	PERRIS, CA	2:00	0.06
5/17/2009	5:39 PM 951-570-6588	PERRIS, CA	0:18	0.01
5/18/2009	3:53 PM 951-737-0675	CORONA, CA	0:36	0.02
5/18/2009	4:54 PM 951-658-3863	HEMET DA, CA	4:36	0.14
5/18/2009	5:11 PM 951-440-3575	MURRIETA, CA	2:12	0.06
5/19/2009	12:12 PM 951-371-3930	CORONA, CA	1:48	0.05
5/19/2009	12:57 PM 951-926-9560	HOMELAND, CA	3:48	0.11
5/19/2009	2:42 PM 951-270-5008	CORONA, CA	2:12	0.06
5/19/2009	2:42 PM 951-734-4333	CORONA, CA	1:48	0.05
5/19/2009	2:45 PM 951-734-4333	CORONA, CA	1:36	0.05
5/19/2009	2:46 PM 951-734-4333	CORONA, CA	0:48	0.02
5/19/2009	3:05 PM 951-312-8087	RIVERSIDE, CA	8:06	0.24
5/19/2009	3:22 PM 951-515-9417	CORONA, CA	7:24	0.22
5/20/2009	9:25 AM 951-371-3305	CORONA, CA	5:54	0.17
5/20/2009	6:20 PM 951-894-7252	MURRIETA, CA	0:36	0.02
5/20/2009	7:14 PM 760-360-9930	PALMDESERT, CA	0:18	0.01
5/20/2009	7:15 PM 760-360-9930	PALMDESERT, CA	1:48	0.05
5/20/2009	7:20 PM 760-360-9930	PALMDESERT, CA	0:24	0.01
5/20/2009	7:21 PM 760-360-9930	PALMDESERT, CA	0:18	0.01
5/20/2009	7:26 PM 760-360-9930	PALMDESERT, CA	0:30	0.01
5/20/2009	8:15 PM 760-360-9930	PALMDESERT, CA	1:48	0.05
5/21/2009	8:38 AM 760-413-6958	PALM SPG, CA	1:30	0.04
5/21/2009	11:27 AM 951-699-0437	TEMECULA, CA	2:12	0.06
5/21/2009	11:31 AM 909-763-0843	S BERNDINO, CA	1:42	0.05
5/21/2009	8:38 PM 760-360-9930	PALMDESERT, CA	0:42	0.02
5/22/2009	11:07 AM 909-645-5962	COLTON, CA	4:36	0.14
5/22/2009	11:11 AM 909-645-5962	COLTON, CA	1:48	0.05
5/22/2009	11:15 AM 909-645-5962	COLTON, CA	2:00	0.06
5/22/2009	12:43 PM 909-383-9049	S BERNDINO, CA	1:42	0.05

5/22/2009	12:55 PM	619-279-7899	SAN DIEGO, CA	1:42	0.05
5/22/2009	4:52 PM	909-772-4456	ONTARIO, CA	1:48	0.05
5/23/2009	2:57 PM	951-533-2399	RIVERSIDE, CA	1:06	0.03
5/24/2009	9:13 AM	951-780-6134	WOODCREST, CA	0:54	0.03
5/25/2009	2:35 PM	951-751-7235	CORONA, CA	0:54	0.03
5/26/2009	10:47 AM	909-772-1127	ONTARIO, CA	6:54	0.2
5/26/2009	11:42 AM	951-687-7707	ARLINGTON, CA	4:18	0.13
5/26/2009	12:14 PM	951-737-9760	CORONA, CA	7:12	0.21
5/26/2009	1:11 PM	951-265-3564	TEMECULA, CA	1:48	0.05
5/26/2009	3:14 PM	951-686-2702	RIVERSIDE, CA	5:30	0.16
5/26/2009	3:40 PM	909-702-0233	ONTARIO, CA	4:18	0.13
5/26/2009	3:45 PM	909-702-0233	ONTARIO, CA	3:24	0.1
5/26/2009	4:06 PM	909-702-0233	ONTARIO, CA	0:18	0.01
5/27/2009	8:37 AM	951-769-2430	BANNING, CA	4:06	0.12
5/27/2009	11:32 AM	951-302-7435	TEMECULA, CA	1:36	0.05
5/27/2009	11:46 AM	951-696-2516	MURRIETA, CA	1:48	0.05
5/27/2009	4:16 PM	760-345-1868	PALMDESERT, CA	4:30	0.13
5/27/2009	4:26 PM	951-741-7930	CORONA, CA	2:24	0.07
5/27/2009	8:15 PM	951-684-4630	RIVERSIDE, CA	0:36	0.02
5/28/2009	7:38 AM	951-906-4530	RIVERSIDE, CA	1:48	0.05
5/28/2009	8:22 AM	760-340-2541	PALMDESERT, CA	4:42	0.14
5/28/2009	9:05 AM	760-898-9963	PALM SPG, CA	4:00	0.12
5/28/2009	9:52 AM	951-272-0188	CORONA, CA	7:18	0.22
5/28/2009	9:52 AM	760-345-1868	PALMDESERT, CA	4:06	0.12
5/28/2009	1:46 PM	951-764-1047	TEMECULA, CA	1:42	0.05
5/28/2009	3:20 PM	909-335-2900	REDLANDS, CA	1:42	0.05
5/28/2009	5:41 PM	951-663-1271	HEMET DA, CA	1:36	0.05
5/28/2009	5:43 PM	951-663-1271	HEMET DA, CA	1:12	0.04
5/28/2009	5:44 PM	951-663-1271	HEMET DA, CA	1:24	0.04
5/28/2009	6:36 PM	760-360-9930	PALMDESERT, CA	0:36	0.02
5/29/2009	6:57 AM	909-463-2640	ETIWANDA, CA	0:18	0.01
5/29/2009	11:54 AM	951-817-1017	CORONA, CA	5:12	0.15
5/29/2009	12:01 PM	951-652-7130	HEMET DA, CA	4:18	0.13
5/29/2009	3:29 PM	951-687-7707	ARLINGTON, CA	4:00	0.12
5/29/2009	3:41 PM	951-687-7707	ARLINGTON, CA	3:30	0.1
5/29/2009	3:58 PM	951-687-7707	ARLINGTON, CA	1:48	0.05

5/30/2009	3:00 PM	909-534-6024	S BERNDINO, CA	2:42	0.08
5/31/2009	9:12 AM	760-345-2121	PALMDESERT, CA	6:00	0.18
5/31/2009	9:38 AM	760-345-2121	PALMDESERT, CA	3:24	0.1
5/31/2009	11:01 AM	760-345-2121	PALMDESERT, CA	7:48	0.23
6/1/2009	10:31 AM	951-520-8529	CORONA, CA	0:18	0.01
6/1/2009	11:46 AM	951-304-3186	MURRIETA, CA	8:18	0.24
6/1/2009	3:23 PM	951-316-2516	CORONA, CA	3:12	0.09
6/2/2009	8:07 AM	951-723-0847	SUN CITY, CA	1:54	0.06
6/2/2009	12:38 PM	760-728-8048	FALLBROOK, CA	3:42	0.11
6/2/2009	12:55 PM	951-941-4376	RIVERSIDE, CA	2:36	0.08
6/2/2009	1:54 PM	951-369-1422	RIVERSIDE, CA	7:18	0.22
6/2/2009	1:55 PM	951-840-8889	ARLINGTON, CA	1:48	0.05
6/2/2009	1:57 PM	951-840-8889	ARLINGTON, CA	2:36	0.08
6/3/2009	11:29 AM	760-321-4087	PALM SPG, CA	1:06	0.03
6/3/2009	12:07 PM	951-279-6623	CORONA, CA	0:24	0.01
6/3/2009	1:42 PM	951-204-5377	RIVERSIDE, CA	3:36	0.11
6/4/2009	10:51 AM	951-683-5370	RIVERSIDE, CA	2:12	0.06
6/4/2009	12:59 PM	951-684-1094	RIVERSIDE, CA	0:36	0.02
6/4/2009	1:34 PM	951-926-3493	HOMELAND, CA	4:24	0.13
6/4/2009	2:29 PM	909-821-1282	ONTARIO, CA	1:42	0.05
6/4/2009	5:08 PM	951-733-2381	CORONA, CA	0:54	0.03
6/5/2009	8:16 AM	951-658-8237	HEMET DA, CA	4:18	0.13
6/5/2009	10:25 AM	951-685-5939	MIRA LOMA, CA	1:36	0.05
6/5/2009	12:37 PM	909-534-5654	S BERNDINO, CA	7:36	0.22
6/6/2009	7:04 AM	951-781-7925	RIVERSIDE, CA	5:12	0.15
6/6/2009	10:19 AM	951-696-3623	MURRIETA, CA	1:54	0.06
6/6/2009	12:06 PM	951-491-5693	TEMECULA, CA	4:36	0.14
6/6/2009	1:04 PM	760-772-9997	PALMDESERT, CA	6:42	0.2
6/6/2009	2:04 PM	951-734-8960	CORONA, CA	0:18	0.01
6/7/2009	12:13 PM	951-657-5564	PERRIS, CA	4:00	0.12
6/8/2009	9:16 AM	951-679-5033	SUN CITY, CA	7:12	0.21
6/8/2009	11:11 AM	760-250-9095	PALM SPG, CA	4:18	0.13
6/8/2009	11:13 AM	951-898-2598	CORONA, CA	6:00	0.18
6/8/2009	11:25 AM	951-270-0156	CORONA, CA	5:06	0.15
6/8/2009	11:32 AM	951-738-1898	CORONA, CA	1:24	0.04
6/8/2009	12:33 PM	951-270-0156	CORONA, CA	0:18	0.01

6/9/2009	12:18 PM	951-767-0500	HEMT SAGE, CA	7:18	0.22
6/9/2009	4:45 PM	951-294-4685	TEMECULA, CA	1:36	0.05
6/10/2009	10:12 AM	951-898-3774	CORONA, CA	0:18	0.01
6/10/2009	11:00 AM	760-346-7893	PALMDESERT, CA	3:12	0.09
6/10/2009	11:11 AM	951-279-8380	CORONA, CA	2:18	0.07
6/10/2009	11:15 AM	951-279-8380	CORONA, CA	1:36	0.05
6/10/2009	6:22 PM	951-210-9659	PERRIS, CA	0:18	0.01
6/11/2009	8:56 AM	951-675-1670	RIVERSIDE, CA	1:48	0.05
6/11/2009	11:23 AM	909-821-1282	ONTARIO, CA	8:18	0.24
6/11/2009	11:38 AM	951-323-0344	RIVERSIDE, CA	3:42	0.11
6/11/2009	1:56 PM	951-852-1010	TEMECULA, CA	0:18	0.01
6/11/2009	4:00 PM	951-681-6481	MIRA LOMA, CA	2:18	0.07
6/11/2009	4:16 PM	951-454-6950	CORONA, CA	1:48	0.05
6/11/2009	7:00 PM	951-492-1286	HEMET DA, CA	2:18	0.07
6/12/2009	10:22 AM	951-734-2423	CORONA, CA	1:36	0.05
6/12/2009	10:28 AM	951-734-2423	CORONA, CA	0:54	0.03
6/12/2009	11:16 AM	951-737-0540	CORONA, CA	2:48	0.08
6/12/2009	7:51 PM	951-222-2101	RIVERSIDE, CA	0:24	0.01
6/13/2009	10:00 AM	760-243-8800	VICTORVL, CA	0:42	0.02
6/13/2009	3:47 PM	951-738-0812	CORONA, CA	11:36	0.34
6/13/2009	5:40 PM	951-213-2187	RIVERSIDE, CA	1:48	0.05
6/15/2009	7:42 AM	760-296-7394	INDIO, CA	1:36	0.05
6/15/2009	7:48 AM	760-296-7394	INDIO, CA	0:24	0.01
6/15/2009	12:35 PM	951-203-3680	RIVERSIDE, CA	0:48	0.02
6/15/2009	6:24 PM	760-296-7394	INDIO, CA	0:42	0.02
6/15/2009	6:28 PM	760-296-7394	INDIO, CA	0:30	0.01
6/15/2009	9:41 PM	951-205-1384	RIVERSIDE, CA	0:24	0.01

2008	**Total Calls**
June	66
July	65
August	65
September	96
October	118
November	114
December	87

2009	**Total Calls**
January	95
February	68
March	96
April	114
May	126
June	59

APPENDIX C

ADDITIONAL REORTS ON WATERSHED BASED ACTIVITES

ANNUAL REPORT OF RIVERSIDE COUNTY FIRE DEPARTMENT HAZARDOUS MATERIALS EMERGENCY RESPONSE TEAM ACTIVITIES

020333

RIVERSIDE COUNTY
FIRE DEPARTMENT

210 West San Jacinto Avenue • Perris, California 92570 • (951) 940-6900 • Fax (951) 940-6910

John Hawkins
Fire Chief

Proudly serving the unincorporated areas of Riverside County and the Cities of:

Banning
❖
Beaumont
❖
Calimesa
❖
Canyon Lake
❖
Coachella
❖
Desert Hot Springs
❖
Indian Wells
❖
Indio
❖
Lake Elsinore
❖
La Quinta
❖
Moreno Valley
❖
Palm Desert
❖
Perris
❖
Rancho Mirage
❖
San Jacinto
❖
Temecula

Board of Supervisors

Bob Buster,
District 1

John Tavaglione,
District 2

Jim Venable,
District 3

Roy Wilson,
District 4

Marion Ashley,
District 5

July 3, 2009

To: Riverside County Flood Control and
Water Conservation District
NPDES Section

Re: 2008/2009 Annual Report on Hazardous
Materials Emergency Response Team Activities

Attached is the Annual Report on Hazardous Materials Response Team activities for FY 2008/2009. Responses included in this annual summary are for the Santa Ana, Santa Margarita and Whitewater Rivers and the respective Regional Boards. Should you require clarification or further information, please contact us at your convenience.

Respectfully submitted,

Kyle P. Ferris
Fire Apparatus Engineer/Hazmat Specialist
Hazardous Materials Response Team 34
(951) 926 3591

2008/09 Annual Report
Riverside County Fire Department
Hazardous Materials Emergency Response Team Activities

Santa Ana, Santa Margarita and Whitewater Regions

July 3, 2009

Prepared for

Riverside County Flood Control
and Water Conservation District

Cal Fire/Riverside County Fire Department
210 West San Jacinto Street
Perris, CA 92570

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1.0 Summary

This report addresses the Riverside County Fire Department's Hazardous Materials Response Team activities for the period of July 1, 2008 to June 30, 2009. The report details program development, public outreach efforts, municipal staff training, runoff prevention measures, and call summary. Hazardous Material Response Team activities included in this report were actual hazardous material releases that potentially threatened the watersheds of the Santa Ana, Santa Margarita, and Whitewater Rivers overseen by the Riverside County Flood Control and Water Conservation District.

2.0 Introduction to the Hazardous Materials Response Team

The 2008/2009 Annual Report on Hazardous Materials Emergency Response Team Activities summarizes responses to environmental emergencies for the purpose of controlling the release of toxic materials and minimizing the impact on public safety and the environment. The Riverside County Fire Department Hazardous Materials Response Team, established in 1986, continues with its mission of providing service within Riverside County through a partnership program that combines the efforts from Cal Fire/Riverside County Fire Department and the Hazardous Material Branch of Riverside County Environmental Health.

The Hazardous Materials Response Team responds to environmental emergencies within the County of Riverside and proves mutual aid to Imperial County. An additional responsibility of the HMRT is oversight and coordination of the NPDES Storm Water Discharge Permit for Riverside County Fire Department facilities. The HMRT oversees maintenance and implementation of the Storm Water Pollution Prevention Program (SWPPP) for county fire stations and facilities which includes the implementation of Best Management Practices (BMPs) municipal employee training and Riverside County Fire Fighting Agencies BMPs.

Riverside County Fire Department is one of the largest fire departments within California in both geographic coverage and firefighting personnel, providing emergency service to Riverside County and the cities of Banning, Beaumont, Calimesa, Coachella, Desert Hot Springs, Indian Wells, Indio, La Quinta, Moreno Valley, Palm Desert, Perris, Rancho Mirage, San Jacinto, and Temecula. The Riverside County Fire Department operates 96 fire stations with over 1200 employees.

3.0 Program Management and Development

With the continued development and population growth of Riverside County, total numbers of emergency incidents are increasing. Riverside County Fire Department is committed to meeting the demand for public service and has developed plans and contingencies for continued expansion through placement of new facilities and additional personnel. With the increase in the total number of emergency incidents, there is a related increase in Hazardous Materials related incidents. The Hazardous Material Response Team is meeting this increase in service with the following program developments:

- FY 2001/2002, this year saw the development of two dedicated Hazardous Materials Response Teams, consisting of five Firefighter/Hazardous Material Technicians per team. Team One is located in Winchester, CA and Team two is located in Palm Desert, CA.

- FY 2002/2003, the purchase of three new hazardous materials response vehicles, consisting of two support trucks, and a tractor-trailer main unit. The main unit was assigned to Hazmat Team 1 and one support truck is assigned to each team. There have been additional purchases of equipment and monitors to ensure a full compliment of tools for both teams.

- FY 2003/2004, two Mass Decontamination Response Trailers, capable of treating 200 patients per hour, were purchased with grant money and placed in-service for both teams. A change in the designators for the Hazardous Materials Response Teams was made; “Hazmat 1” and “Hazmat 2” became “Hazmat 34” and “Hazmat 81”, to reflect the geographic locations of the Hazmat Response teams, improving communications and organization.

- FY 2004/2005, participating fire departments within Riverside County developed Best Management Practices (BMPs) that are intended to be used by fire fighting agencies for urban runoff management. These BMPs are a requirement of the Riverside County Municipal Stormwater permit (section XI.B) adopted by the Santa Ana Regional Water Quality Control Board (SARWQCB). Due to an operational need the two response teams were combined into one team and separated into three locations.

- FY 2005/2006, the Hazardous Materials Response Team was reorganized into two distinct teams, Hazmat 34 at Winchester Fire Station 34 and Hazmat 81 at North Bermuda Dunes Fire Station 81. Daily on duty staff is 10 Hazardous Materials Specialists providing service to the county.

- FY 2006/2007, approximately $25000.00 was expended on Vetter air bags to replace older complements and add to the capabilities of Hazmat 81. Vetter air bags are a significant tool that can be used to occlude accidental discharges from impacting the storm water system. Further developments, the installation of MDTs (mobile data terminals) in all front line fire equipment, and Riverside County environmental health officer vehicles. This allows for improvements in locating and responding to incidents, orthographic mapping of incidents and integrating technology which the ability to access the Health Department's Business Response Plans. A $400,000 purchase has been approved to replace the main Hazmat Response Team vehicle at Station 81 and it is scheduled to be placed in service in FY 2007/2008.

- FY 2007/2008, with the growing needs of Hazardous Materials Response, the Hazardous Materials Response Team was granted additional staffing at each station. Winchester Fire Station 34 and Bermuda Dunes Fire Station 81 each have a Paramedic Engine with Hazmat trained people on them. This increased the daily staffing to 16 Hazardous Materials Technicians and Specialist to provide service to the county.

- FY 2008/2009, unfortunately, due to the tough economical times, we have cut the staffing that we were granted last year. The minimum staffing at Winchester Fire Station 34 and Bermuda Dunes Fire Station 81 is 5 Hazardous Materials Technicians and Specialists. We will still be able to provide the same service that we have over the years, we will just have a longer response time. This is due to the fact that we are now cross staffing a fire engine and the Hazmat team.

4.0 Public Education

The Hazardous Materials Response Team is available for public education, and dedicates time to provide information and education regarding environmental safety and Storm Water Pollution Prevention. Both teams have participated in public relation and education events during FY 2008/2009 on an average of 1- 2 per month. Hazmat Response Team personnel are made available to provide information and education through direct public contact, and materials. These events have included:

- The Riverside County Fair held annually at Indio, CA.
- Educational presentations at public schools, grades K through 12.
- Safety fairs held at the cities of La Quinta, Hemet, Perris, Moreno Valley, and Temecula.
- Public events within Riverside County.

Public information and education is provided through materials that the Hazardous Materials Response Team hands out during the various events that are attended during the year and information that team members provide during equipment displays.

- "Household Hazardous Waste Collection Site Schedule" (schedule) Riverside County Environmental Health.
- "Household Hazardous Waste" (pamphlet), Stormwater Cleanwater Protection Program.
- "Stormwater Pollution, What You Should Know" (pamphlet) Stormwater Cleanwater Protection Program.
- "Stormwater Pollution, Outdoor Cleaning Activities" (pamphlet) Stormwater Cleanwater Protection Program.
- "Storm Drains Flow directly to our Waterways" (poster) Stormwater Cleanwater Protection Program.

5.0 Municipal Employee Training

Successful Storm Water Pollution Prevention is dependent upon a standard operation policy and effective education of department employees. Team members from the Hazardous Material Response Team are available to train and educate the approximately 1200 Riverside County Fire Department personnel on the Storm Water Pollution Prevention Program and the National Pollution Discharge Elimination System. In previous years, the training was conducted at individual fire stations, or during employee orientation at Clark Training Center.

To comply with NPDES permit requirements for municipal employee training, and to ensure a consistent training program, Riverside County Fire Department produced a video training program that is distributed to all 96 fire department facilities to compliment the SWPPP manuals that are available for reference at the facilities. Employees are encouraged to view the program on an annual basis. The training covers BMPs, (best management practices) that apply to municipal facilities.

Fire Station/Municipal Facility Activities

- Dispensing of Fuel.
- Vehicle and equipment parking and storage.
- Vehicle and equipment maintenance.
- Vehicle and equipment washing and cleaning.
- Leak and spill cleanup.
- Landscape, garden, and general maintenance and cleaning.
- Loading, handling, storage of chemicals, oil, trash, and debris.

6.0 Prevention Measures

Members of the Hazardous Materials Response Team were involved in the development of best management practices (BMPs) that are used by participating Riverside County fire fighting agencies for urban runoff management. These best management practices were a requirement of the Riverside County Municipal Storm Water Permit (section XI.B) adopted by the Santa Ana Regional Water Quality Control Board in 2004.

The Riverside County Fire Chief's Association adopted the fire department activities to provide guidance to firefighting personnel for management of urban runoff. The BMPs, when followed, minimize discharges of runoff to the municipal separate storm sewer system (MS4) associated with firefighting activities such as fire training, emergency scene spills, discharges and firefighting.

The following Emergency and Non-emergency Firefighting Activities were addressed:

- Discharges associated with fire training activities.
- Discharges associated with post-emergency fire fighting activities.
- Discharges associated with activities conducted at fire department facilities.
- Discharges associated with emergency fire fighting activities.
- Stormwater NPDES training of fire department employees.

7.0 Incident Summary

From July of 2008 through June of 2009 the Hazardous Materials Response Teams, Hazmat 34 and Hazmat 81, responded to a total of **571** hazardous materials related incidents. **234** of these incidents were a threat or potential threat to the stormwater system of Riverside County Flood Control and the Santa Ana, Santa Margarita and Whitewater watersheds.

• Santa Ana Watershed	103
• Whitewater Watershed	68
• Santa Margarita Watershed	63
• Total	234

The average length of time spent on a hazardous materials related incident is two hours. Based on **234** flood control related incidents, the Hazardous Materials Response Team provided **468** service hours to the Riverside County Flood Control District.

HMRT 34 FLOOD CONTROL CALLS FOR FY 08/09

DATE	INCIDENT	ADDRESS	WATERSHED
7/1/2008	8058159	11970 Vista Da Cerros, Moreno Valley, CA 92555	Santa Ana
7/11/2008	8061173	27616 Ellis Ave., Romoland, CA 92571	Santa Ana
7/12/2008	8061536	27715 Jefferson Ave., Temecula, CA 92591	Santa Margarita
7/12/2008	8061658	22405 Post Rd., Good Hope, CA 92570	Santa Ana
7/13/2008	8061939	3450 Cottonwood, San Jacinto, CA 92582	Santa Ana
7/14/2008	8062153	22500 Adrienne Ave., Moreno Valley, CA 92553	Santa Ana
7/17/2008	8062948	27498 Avenida Del Oro, Temecula, CA 92592	Santa Margarita
7/19/2008	8063615	31151 Riverside Ave., Lake Elsinore, CA 92530	Santa Margarita
7/24/2008	8065029	Mayberry c/o Meridian, Hemet, CA 92544	Santa Margarita
7/25/2008	8065581	6198 Beach St., Mira Loma, CA 92509	Santa Ana
7/30/2008	8067043	Amazon c/o Sopwith, Hemet, CA 92544	Santa Ana
7/31/2008	8067208	33170 Holland Rd., Winchester, CA 92596	Santa Margarita
8/13/2008	8071139	32951 Maiden Ln., Lake Elsinore, CA 92530	Santa Margarita
8/13/2008	8071168	I-15 c/o Hwy 60, Glen Avon, CA 91572	Santa Ana
8/14/2008	8071431	16830 Lake Shore Dr., Lake Elsinore, CA 92530	Santa Margarita
8/14/2008	8071438	22950 Carancho Rd., Temecula, CA 92590	Santa Margarita
8/14/2008	8071454	543 W. County Line Rd., Calimesa, CA 92320	Santa Ana
8/14/2008	8071482	Sunnymead Blvd. c/o Kitching St., Moreno Valley, CA 92553	Santa Ana
8/19/2008	8072988	29275 Santiago Rd., Temecula, CA 92592	Santa Margarita
8/21/2008	8073427	Hwy 60 c/o Pedley Rd., Sunny Slope, CA 92509	Santa Ana
8/21/2008	8073431	3710 Temescal Canyon Rd., Corona, CA 92881	Santa Ana
8/22/2008	8073708	I-10 c/o Cherry Valley Blvd., Calimesa, CA 92320	Santa Ana
8/22/2008	8073752	Mockingbird Cyn. c/o Van Buren Ave., Woodcrest, CA 92503	Santa Ana
8/26/2008	8074979	Brodiaea Ave. c/o Moreno Beach Dr., Moreno Valley, CA 92555	Santa Ana
8/27/2008	8075296	2830 Barrett Rd., Perris, CA 92571	Santa Ana
8/27/2008	8075382	2225 Via Cerro Rd., Rubidoux, CA 92509	Santa Ana
9/1/2008	8076934	28716 Via Montezuma Rd., Temecula, CA 92540	Santa Margarita
9/3/2008	8077559	I-10 c/o Sunset Ave., Banning, CA 92220	Santa Ana
9/4/2008	8077848	29356 Central Ave., Lake Elsinore, CA 92532	Santa Margarita
9/8/2008	8079214	33291 Little John Way, El Cariso, CA 92530	Santa Ana

9/8/2008	8079282	30107 Antelope Rd., Menifee, CA 92584	Santa Margarita
9/12/2008	8080323	1501 E. 6th St., Beaumont, CA 92220	Santa Ana
9/14/2008	8080834	26200 Calvert St., Winchester, CA 92596	Santa Margarita
9/14/2008	8081115	1600 Ramsey St., Banning, CA 92220	Santa Ana
9/14/2008	8081133	5900 Canal St., Rubidoux, CA 92509	Santa Ana
9/16/2008	8081597	38000 Orchard St., Beaumont, CA 92223	Santa Ana
9/26/2008	8084804	I-15 c/o Rail Rd. Cyn., Lake Elsinore, CA 92532	Santa Margarita
9/28/2008	8085285	17801 Lake Perris Blvd., Perris, CA 92571	Santa Ana
9/28/2008	8085377	Hwy 60 c/o Gilman Springs Rd., Moreno Valley, CA 92555	Santa Ana
9/29/2008	8085693	5585 Felspar St., Pedley, CA 92509	Santa Ana
9/29/2008	8085727	12364 Perris Blvd., Moreno Valley, CA 92557	Santa Ana
10/1/2008	8086254	I-10 c/o Cherry Valley Blvd., Calimesa, CA 92320	Santa Ana
10/17/2008	8091047	24760 Sunnymead Blvd. Moreno Valley, CA 92557	Santa Ana
10/17/2008	8091116	Miliken Ave., c/o Hwy 60, Glen Avon, CA 91752	Santa Ana
10/18/2008	8091345	32150 Gene Welmas Dr., Mecca, CA 92254	Whitewater
10/20/2008	8091890	7084 Archibald Ave., Norco, CA 92860	Santa Ana
10/22/2008	8092454	835 Mapes Rd., Perris, CA 92571	Santa Margarita
10/24/2008	8093174	23500 Harville St., Mead Valley, CA 92570	Santa Ana
10/25/2008	8093454	328 Malvert St., Perris, CA 92570	Santa Margarita
10/25/2008	8093581	4500 Muth Way, Glen Avon, CA 92504	Santa Ana
10/26/2008	8093865	48230 Hwy 74, Val Vista , CA 92544	Santa Margarita
10/31/2008	8095450	30000 Huan Rd., Menifee, CA 92584	Santa Margarita
11/4/2008	8096735	Soboba Rd. c/o State St., San Jacinto, CA 92583	Santa Ana
11/13/2008	8099370	718 Brookside Ln., Beaumont, CA 92223	Santa Ana
11/14/2008	8099612	31500 Antelope Rd., Menifee, CA 92584	Santa Margarita
11/14/2008	8099705	Wolfstore Rd. c/o Apis Rd. Rancho California, CA 92592	Santa Margarita
11/18/2008	8103950	25399 Railroad Cyn. Rd. Lake Elsinore, CA 92532	Santa Ana
11/30/2008	8104691	23930 Loraine Ct. Moreno Valley, CA 92557	Santa Ana
12/4/2008	8105745	Etiwanda Ave. c/o Riverside Dr., Glen Avon, CA 91752	Santa Ana
12/5/2008	8106087	8790 Mission Blvd., Riverside, CA 92509	Santa Ana
12/8/2008	8107129	43906 Leena Way, Temecula, CA 92592	Santa Margarita
12/8/2008	8107298	12000 Elm St., Beaumont, CA 92223	Santa Ana
12/16/2008	8109619	12000 Temescal Cyn. Rd., Corona, CA 92883	Santa Ana
12/18/2008	8110355	7916 Hall St., Norco, CA 92860	Santa Ana
12/19/2008	8110649	15800 Indian St. Moreno Valley, CA 92551	Santa Ana
12/20/2008	8111022	24000 Briggs Rd., Nuevo, CA 92597	Santa Ana
12/21/2008	8111202	45800 Hwy 79, Aguanga, CA 92536	Santa Margarita

12/21/2008	8111215	18 Bella Varzi, Lake Elsinore, CA 92532	Santa Margarita
12/21/2008	8111242	35600 Ramona Expressway, San Jacinto, CA 92567	Santa Ana
12/23/2008	8111750	29800 Ramona Expressway, Nuevo, CA 92567	Santa Ana
12/23/2008	8111874	19898 Barton St., Mead Valley, CA 92570	Santa Ana
12/23/2008	8111882	12000 Temescal Cyn. Rd., Glen Ivy, CA 92883	Santa Ana
12/26/2008	8112754	42400 Avenida Alvarado, Temecula 92591	Santa Margarita
12/27/2008	8113052	32898 Silver Charm, Menifee, CA 92584	Santa Margarita
12/29/2008	8113674	Omar St. c/o Ramsey St., Beaumont, CA 92220	Santa Ana
12/29/2008	8113738	38120 East Benton Rd., Temecula, CA 92592	Santa Margarita
12/30/2008	8113928	13700 Theodore St., Moreno Valley, CA 92555	Santa Ana
12/30/2008	8113990	29750 Ironwood Dr., Moreno Valley, CA 92555	Santa Ana
12/31/2008	8114240	26500 Lazy Creek Rd., Menifee, CA 92596	Santa Margarita
1/3/2009	9000769	21600 Cottonwood Ave., Riverside, CA 92507	Santa Ana
1/3/2009	9000786	42692 Margarita Rd., Temecula, CA 92591	Santa Margarita
1/4/2009	9001166	721 Sunset Ave. #134, Banning, CA 92220	Santa Ana
1/8/2009	9002323	Alessandro Blvd. c/o Theodore St., Moreno Valley, CA 92555	Santa Ana
1/9/2009	9002831	I-15 c/o Hwy 60, Glen Avon, CA 91572	Santa Ana
1/10/2009	9003027	27620 Goetz Rd., Perris, CA 92570	Santa Margarita
1/10/2009	9003056	31798 Calle Cataldo, Temecula, CA 92592	Santa Margarita
1/12/2009	9003586	43998 E. Stetson Ave., Hemet, CA 92544	Santa Margarita
1/13/2009	9003853	8000 Redlands Blvd., Moreno Valley, CA 92555	Santa Ana
1/13/2009	9003893	198 N. Terra Cotta Rd., Lake Elsinore, CA 92532	Santa Margarita
1/14/2009	9004162	Pennsylvania Ave. off ramp, Beaumont, CA 92223	Santa Ana
1/22/2009	9006626	13500 Decker Cyn. Rd., Lake Elsinore, CA 92530	Santa Margarita
1/23/2009	9007144	501 W. Florida Ave., Hemet, CA 92545	Santa Margarita
1/27/2009	9008080	Hwy 60 c/o Country Village Rd., Glen Avon, CA 92509	Santa Ana
1/27/2009	9008212	Etiwanda Ave. c/o Iberia, Mira Loma, CA 91752	Santa Ana
2/1/2009	9009893	20000 Bernasconi Rd., Nuevo, CA 92567	Santa Ana
2/1/2009	9009940	28620 Bridge Water Ln., Menifee, CA 92584	Santa Margarita
2/4/2009	9010674	3810 Wacker Ln., Mira Loma, CA 92509	Santa Ana
2/5/2009	9011016	41098 Reid Ct., Temecula, CA 92592	Santa Margarita
2/6/2009	9011294	28750 Pujol St., Temecula, CA 92592	Santa Margarita
2/6/2009	9011332	24201 Orange Ave., Perris, CA 92570	Santa Ana

2/9/2006	9011819	3040 Reservoir Ave., Nuevo, CA 92567	Santa Ana
2/13/2009	9013556	26271 Iris St., Moreno Valley, CA 92550	Santa Ana
2/20/2009	9015642	Ridgeview c/o 54 St., Mira Loma, CA 91752	Santa Ana
2/22/2009	9016390	Struble c/o vista Way, Menifee, CA 92587	Santa Margarita
2/23/2009	9016656	Hwy 60 c/o Van Buren Ave., Glen Avon, CA 92509	Santa Ana
2/24/2009	9016942	Vista Montana Ct., Temecula, CA 92563	Santa Ana
2/28/2009	9018255	22000 Oleander Ave., Mead Valley, CA 92570	Santa Ana
2/28/2009	9018266	17800 Markham St., Mead Valley, CA 92570	Santa Ana
3/7/2009	9020425	I-15 c/o Winchester Rd., Temecula, CA 92591	Santa Margarita
3/10/2009	9021308	I-15 c/o Hwy 79, Temecula CA, 92591	Santa Margarita
3/10/2009	9021377	3400 Florine Ave., Rubidoux, CA 92509	Santa Ana
3/12/2009	9021845	Hwy 60 c/o Jack Rabbit Trl., Moreno Valley, CA 92555	Santa Ana
3/14/2009	9022490	Singleton Rd. c/o Calimesa, Calimesa, CA 92320	Santa Ana
3/18/2009	9023855	39562 Winchester Rd., Temecula, CA 92591	Santa Margarita
3/19/2009	9024053	5598 Wilson St., Rubidoux, CA 92509	Santa Ana
3/19/2009	9024271	23991 Sunnymead Blvd., Moreno Valley, CA 92553	Santa Ana
3/20/2009	9024660	4545 Hamner Ave., Mira Loma, CA 91752	Santa Ana
3/21/2009	9024935	9405 58th St., Pedley, CA 91752	Santa Ana
3/23/2009	9025629	Hwy 60 c/o Valley Blvd., Rubidoux, CA 92509	Santa Ana
3/24/2009	9025906	1537 East Esplanade Ave., San Jacinto, CA 92583	Santa Ana
3/29/2009	9027454	9150 61st St., Pedley, CA 92509	Santa Ana
3/31/2009	9028127	Hwy 74 @ mm 54.5, Idyllwild, CA 92544	Santa Ana
3/31/2009	9028266	32189 Camino Guarda, Temecula, CA 92592	Santa Margarita
4/1/2009	9028386	I-10 c/o Sunset Ave., Banning, CA 92220	Santa Ana
4/4/2009	9029460	Lesser Ln. c/o Goetz Rd., Menifee, CA 92584	Santa Margarita
4/8/2009	9030771	8134 Bridal Rd., Pedley, CA 92509	Santa Ana
4/8/2009	9030786	Leon Rd. c/o Holland Rd., Menifee, CA 92584	Santa Margarita
4/10/2009	9031289	I-15 c/o Clinton Keith Rd., Wildomar, CA 92595	Santa Margarita
4/13/2009	9032451	31454 Royal Oaks Dr., Temecula, CA 92591	Santa Margarita
4/14/2009	9032625	1673 Marin Ct., San Jacinto, CA 92583	Santa Ana
4/19/2009	9034314	1462 Hunter Moon Way, Beaumont, CA 92233	Santa Ana
4/21/2009	9034931	2300 Pico Ave., Nuevo, CA 92567	Santa Ana
4/21/2009	9035001	80 E. Dawes St., Perris, CA 92571	Santa Ana
4/21/2009	9035071	25700 Lancaster Dr., Sun City, CA 92586	Santa Margarita
4/23/2009	9035517	1301 Case Rd., Perris, CA 92585	Santa Ana
4/23/2009	9035536	25000 Briggs Rd., Romoland, CA 92586	Santa Margarita
4/23/2009	9035539	3060 Mathews Rd., Winchester, CA 92596	Santa Margarita

4/27/2009	9036867	16701 Washington St., Woodcrest, CA 92504	Santa Ana
4/29/2009	9037352	18098 Grand Ave., Lake Elsinore, CA 92530	Santa Margarita
4/30/2009	9037763	19500 Alexander Rd., Mead Valley, CA 92504	Santa Ana
5/1/2009	9038050	1301 Case Rd., Perris, CA 92585	Santa Ana
5/2/2009	9038316	39450 Lone Ridge Dr., Temecula, CA 92591	Santa Margarita
5/2/2009	9038484	I-215 c/o Nuevo Rd., Perris, CA 92585	Santa Ana
5/6/2009	9039629	31220 Samantha Ln., Temecula, CA 92592	Santa Margarita
5/12/2009	9041781	14001 Old Hwy 215, Moreno Valley, CA 92507	Santa Ana
5/13/2009	9042038	32500 Temecula Pkwy., Temecula, CA 92590	Santa Margarita
5/13/2009	9042073	27620 Commerce Center Dr., Temecula, CA 92592	Santa Margarita
5/18/2009	9042073	16000 Indian St., Moreno Valley, CA 92551	Santa Ana
5/19/2009	9044057	30037 Happy Hunter Dr., Canyon Lake, CA 92587	Santa Margarita
5/20/2009	9044318	Ironwood c/o Highland Blvd., Moreno Valley, CA 92553	Santa Ana
5/22/2009	9044869	435 E. 4th St., Beaumont, CA 92223	Santa Ana
5/22/2009	9045038	13200 Arvonna Dr., Moreno Valley, CA 92263	Santa Ana
5/25/2009	9045939	29398 Leon Rd., Winchester, CA 92596	Santa Margarita
6/1/2009	9048000	7968 Saddletree Crt., Eastvale, CA 92880	Santa Ana
6/2/2009	9048410	29014 Dallas Rd., Winchester, CA 92584	Santa Margarita
6/6/2009	9049663	11740 Kayal Ave., Moreno Valley, CA 92551	Santa Ana
6/8/2009	9050257	32155 Temecula Pkwy., Temecula, CA 92592	Santa Margarita
6/9/2009	9050650	13200 Arvonna Dr., Moreno Valley, CA 92257	Santa Ana
6/11/2009	9051178	Rawson Rd. c/o Washington St., Winchester, CA 92596	Santa Margarita
6/12/2009	9051369	35230 Los Alamos Rd., Temecula, CA 92595	Santa Margarita
6/12/2009	9051398	28952 Newport Rd., Temecula, CA 92591	Santa Margarita
6/22/2009	9054601	22000 Bundy Cyn. Rd., Wildomar, CA 92595	Santa Margarita
6/23/2009	9054878	33890 Rancho California Rd., Temecula, CA 92591	Santa Margarita
6/30/2009	9057139	2240 N. Alessandro Ave., San Jacinto, CA 92583	Santa Ana

HMRT 81 FLOOD CONTROL CALLS FOR FY 08/09

DATE	INCIDENT #	ADDRESS	WATERSHED
7/2/2008	8058568	Ramon Rd. c/o Varner Rd., Thousand Palms, CA 92276	Whitewater
7/6/2008	8059697	Varner Rd. c/o Washington St., Palm Desert, CA 92211	Whitewater
7/12/2008	8061579	I-10 c/o Monroe St., Indio, CA 92201	Whitewater
7/15/2008	8062322	I-10 c/o Washington St., Palm Desert, CA 92211	Whitewater
7/24/2008	8065072	39000 Bob Hope Dr., Rancho Mirage, CA 92270	Whitewater
8/4/2008	8068515	Pipeline Rd. c/o Kellogg Rd., Palm Springs, CA 92258	Whitewater
8/5/2008	8068670	Monroe St. c/o Oleander Rd., Indio, CA 92201	Whitewater
8/6/2008	8069136	Calhoun St. c/o Hwy 111, Indio, CA 92201	Whitewater
8/7/2008	8069229	Hwy 111c/o Atrium Way, Rancho Mirage, CA 92270	Whitewater
8/8/2008	8069740	78980 Martinique Dr., Palm Desert, CA 92211	Whitewater
8/11/2008	8070621	78200 Dinah Shore Dr., Palm Desert, CA 92211	Whitewater
8/26/2008	8074925	I-10 c/o Main St., Cabazon, CA 92230	Whitewater
8/28/2008	8075676	64570 Acoma Ave., Desert Hot Springs, CA 92240	Whitewater
8/29/2008	8076135	46652 Dillon Rd., Coachella, CA 92236	Whitewater
9/7/2008	8078934	35000 Gerald Ford Dr., Palm Desert, CA 92211	Whitewater
9/13/2008	8080625	47340 Jefferson Rd., Indio, CA 92201	Whitewater
9/21/2008	8083146	79500 Hwy 111, La Quinta, CA 92253	Whitewater
9/25/2008	8084384	47368 Dr. Carreion Dr., Indio, CA 92201	Whitewater
9/25/2008	8084523	Dillon Rd. c/o Thousand Palms Rd., Sky Valley, CA 92241	Whitewater
9/30/2008	8085919	89900 Ave. 82 c/o 86 Exwy., Oasis, CA 92274	Whitewater
10/6/2008	8087711	1326 Ramsey St., Banning, CA 92220	Santa Ana
10/8/2008	8088052	77899 Wolf Rd., Palm Desert, CA 92211	Whitewater
10/8/2008	8088333	66760 Granada Rd., Desert Hot Springs, CA 92240	Whitewater
10/15/2008	8090418	Hwy 111 c/o 86 Exwy., Mecca, CA 92254	Whitewater
10/17/2008	8091185	29181 Desert Charm Rd., Indio Hills, CA 92236	Whitewater
10/18/2008	8091345	32150 Gene Welmas Dr., Mecca, CA 92254	Whitewater
10/26/2008	8093846	72305 Varner Rd., Thousand Palms, CA 92276	Whitewater
10/28/2008	8094574	Hwy 86 c/o Ave. 52, Coachella, CA 92236	Whitewater
11/5/2008	8096901	47340 Jefferson Rd., Indio, CA 92201	Whitewater
11/7/2008	8097537	1515 North Sunrise Way, Palm Springs, CA 92262	Whitewater
11/11/2008	8098782	47960 Austin Dr., Indio, CA 92201	Whitewater
11/12/2008	8099050	86 Exwy c/o Airport Blvd., Thermal, CA 92274	Whitewater
11/13/2008	8099277	I-10 c/o Red Cloud Rd., Desert Center, CA 92239	Whitewater
11/15/2008	8100131	I-10 c/o Highland Springs Ave., Beaumont, CA 92220	Santa Ana
11/17/2008	8100745	Hwy 74 c/o Pitahaya St., Palm Desert CA, 92260	Whitewater
11/18/2008	8100932	Monroe St. c/o I-10, Indio, CA 92201	Whitewater

11/29/2008	8104386	65187 Club Cir., Desert Hot Springs, CA 92240	Whitewater
12/4/2008	8106016	41710 St. Annes Bay Dr., Bermuda Dunes, CA 92203	Whitewater
12/11/2008	8107993	80000 Fred Waring Dr. c/o Jefferson Dr., La Quinta, CA 92253	Whitewater
12/17/2008	8109666	45525 Via Corona, Indian Wells, CA 92210	Whitewater
1/12/2009	9003746	Ave. 42 c/o Adams St., Bermuda Dunes, CA 92203	Whitewater
1/13/2009	9004027	Adams Rd. c/o Ave. 38, Bermuda Dunes, CA 92211	Whitewater
1/15/2009	9004454	38180 Del Webb Blvd., Bermuda Dunes, CA 92211	Whitewater
2/4/2009	9010704	16731 Riveria Rd., Blythe, CA 92255	Whitewater
2/6/2009	9011396	Hwy 86 c/o Ave. 52, Coachella, CA 92236	Whitewater
2/15/2009	9014077	I-10 c/o Eagle Mountain Rd., Desert Center, 92236	Whitewater
2/25/2009	9017181	I-10 c/o Jefferson Rd., Indio, CA 92203	Whitewater
3/2/2009	9018893	42500 Washington St., Palm Desert, CA 92211	Whitewater
3/16/2009	9022936	41550 Carlotta Rd., Palm Desert, CA 92211	Whitewater
3/17/2009	9023656	Berkley Rd. c/o Varner Rd., Palm Desert, CA 92211	Whitewater
4/9/2009	9031140	81120 Avenida Casteler, Indio, CA 92201	Whitewater
4/11/2009	9031668	Hwy 177 c/o I-10, Desert Center, CA 92236	Whitewater
4/20/2009	9034659	44900 El Dorado Dr., Indian Wells, CA 92210	Whitewater
4/24/2009	9035763	I-10 c/o Corn Springs, Desert Center, CA 92236	Whitewater
4/24/2009	9035838	34000 Monterey Dr., Palm Desert, CA 92211	Whitewater
4/25/2009	9036267	34500 Monterey Dr., Palm Desert, CA 92211	Whitewater
4/29/2009	9037402	12135 Octillo Rd., Desert Hot Springs, CA 92240	Whitewater
5/3/2009	9038886	72056 North Shore St., Thousand Palms, CA 92276	Whitewater
5/4/2009	9039028	40851 Bob Hope Dr., Rancho Mirage, CA 92270	Whitewater
5/7/2009	9040001	I-10 c/o Dillon Rd., Indio, CA 92236	Whitewater
5/8/2009	9040405	42215 Washington St., Palm Desert, CA 92211	Whitewater
5/18/2009	9043922	I-10 c/o Haugen Lehmann Way, Cabazon, CA 92230	Santa Ana
5/19/2009	9044129	46350 Jackson St., Indio, CA 92201	Whitewater
5/29/2009	9047102	47000 Jefferson St., Indio, CA 92201	Whitewater
6/3/2009	9048633	82844 Plymouth Dr., Indio, CA 92201	Whitewater
6/6/2009	9049759	40265 Galindo Rd., Indio, CA 92201	Whitewater
6/17/2009	9058883	I-10 c/o Washington St., Palm Desert, CA 92211	Whitewater
6/18/2009	9053311	84386 Cabazon Ave., Indio, CA 92201	Whitewater
6/19/2009	9053657	Fillmore St. c/o Ave. 66, Thermal, CA 92274	Whitewater
6/22/2009	905426	10225 State Park Rd., Mecca, CA 92254	Whitewater

IC/ID REPORTS RECEIVED BY DISTRICT

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1976

Type	Illicit Discharge
Received Date	4/30/2009
APN	906-070-074
First Name	Mark
Last Name	Mandel
Complainant Address	
Complainant City	Murrieta
Complainant Zip Code	92562
Phone	951 722-8906
Received By	David Ortega
Complaint Adderess	41891 Kalmia Street, Suite A
Complaint City	Murrieta
Complaint Zip Code	92562
Location	Creative Hydroseed

Complaint Grass seed has been dumped in a 'washout' area on the complaint address; the residual hydroseed has migrated on to the access road of the Riverside County Flood Control (RCFC) District facility: "Murrieta Creek Master Drainage Plan - Line F".

Findings 4/30/09: David Ortega, of the NPDES Section at the RCFC, (951) 955-4390, received a call today from Mark Mandel, Riverside County Code Enforcement, about this complaint.

Action 5/1/09: Mr. Ortega went to the site today and took a few photos of the hydroseed that has been dumped on the ground of the business located at the complaint address. Mr. Ortega also noticed that some of the hydroseed from this 'washout' area had migrated onto the access road of the RCFC District facility. Mr. Ortega went to the office of the complaint address and spoke with Jana Rush. She escorted Mr. Ortega to the fenced in 'washout' area to take a better look at the hydroseed that was dumped. Mr. Ortega took a few more photos and then told Ms. Rush that he would find out how severe this matter is. Later that day, Mr. Ortega briefed J. Uhley, of the NPDES Section at the RCFC about this incident. Mr. Uhley stated to Mr. Ortega that hydroseed is a big factor of nutrient loads in that watershed. 5/4/09: Mr. Ortega spoke briefly with Cheryl Roberts of Creative Hydroseed today about the 'washout' area at her business. Mr. Ortega stated that he will have to get with the City of Murrieta's Code Enforcement to find out how they would like to proceed with this matter. Ms. Roberts did say that "she is willing to cooperate with getting things cleaned up and getting a better 'washout' area engineered and in place as soon as possible". 5/20/09: Mark Mandel of County of Code Enforcement called Mr. Ortega today to inform him that Jason Jones, Murrieta Code Enforcement, (951) 461-6331, will be handling this matter. Mr. Mandel sent an email to Mr. Ortega about this and also stating that the business owner will be taking steps to reduce the risk of hydroseed run-off into the RCFC District's facility as well as off of the business property. These steps include: 1. Installing a curb in the rear of the property where they conduct the washouts of their hydroseeding business at the end of each day. 2. Installing an NPDES compliant concrete washout box for the hydroseeding residue. 3. Hiring an engineer to design a permanent concrete vault or pit with pumps to capture the hyroseeding residue and recycle it on the property. 6/17/09: Mr. Ortega and P. Nanney of the NPDES Section met briefly today with the owners of Creative Hydroseed to view the improved BMP's to the hydroseed washout area. Mr. Ortega gave the owners a few pamphlets about the County's Stormwater/Cleanwater program. Mr. Ortega also took a few photos of the installed BMP on site.

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1879

Type Illicit Discharge

Received Date 3/16/2009

APN 920-110-009

First Name Avelino

Last Name Valencia

Complainant Address

Complainant City Temecula

Complainant Zip Code 92591

Phone 951 955-1307

Received By David Ortega

Complaint Adderess

Complaint City Temecula

Complaint Zip Code 92591

Location Santa Gertrudis Creek Channel, just east of Winchester Road

Complaint A 100 gallon, metal tank, has been dumped in the Santa Gertrudis Creek Channel (a Riverside County Flood Control District facility), just east of Winchester Road. Not certain if there is any type of product in the tank that could be hazardous.

Findings 3/16/09: Avelino Valencia, of the Operations & Maintenance Section at the Riverside County Flood Control (RCFC) District, called David Ortega, in the NPDES Section at the RCFC, about this complaint. Mr. Valencia stated to Mr. Ortega that a guy from one of the field crews called this in today. Mr. Valencia told Mr. Ortega, at first, that the tank is located "downstream" of Winchester Road. And that the tank is in the creek bottom. 3/18/09: David Ortega spoke to Richard Garza today about this matter. Mr. Garza stated that he and others from one of the O & M field crews located this tank "about two months ago". Mr. Garza continued to say that "he notified Mark Luna about this who said that he would report it to others in the office". When the field crew members discovered this in the channel, they were hoping to mow the vegetation around it. They moved this tank slightly and noticed that some product was leaking from the bottom of the tank onto the soil. They quickly uprighted the tank and mowed around it. Mr. Valencia also stated that they (O & M) were hoping to remove it from the channel and bring the tank back here to the District because they "assumed" that there was "motor oil" in the tank because of the product that they saw leaking from it.

Action 3/16/09: Mr. Ortega called Kelly Winters, of Riverside County Haz.-Mat., (951) 453-5804, about this complaint. Mr. Winters stated that before he left for the day that he would go to this area to locate the tank and find out the status of it then he would call back to Mr. Ortega. Later in this day, Mr. Winters called back to Mr. Ortega and stated that he looked in Santa Gertrudis Creek Channel from Winchester Road to Margarita Road and could not locate the tank. Mr. Ortega told Mr. Winters that he will call him back tomorrow morning about this matter. 3/17/09, 1510 hours: Mr. Ortega arrived at the site and eventually located the tank in the Santa Gertrudis Creek Channel; upstream of Winchester Road near N. General Kearny Road. Mr. Ortega took a few photos while on site today. He noticed an information plate on the tank that stated it was a tank made "for butane gases only". Mr. Ortega called Mr. Winters back today to set up a time for tomorrow (3/18/09) to meet on site: 0830 hours. 3/18/09, 0830 hours: Mr. Ortega met with Mr. Winters and Jim Sappington of County Haz.-Mat. and with a crew from the Riverside County Fire Department, Emergency Response Unit. Mr. Winters used a "drum thief" to get some product out of the tank to perform a hazard categorization (haz.-cat.). The haz.-cat. of the product was a pH 7, combustible hydrocarbon. After the haz.-cat., Mr. Ortega was given permission by Mr. Winters to call a contractor to remove the tank and product from the site. Eventually, Filter Recycling came to the site today and removed 65 gallons of product from the tank. They also poured a bag of dry sorbent into the tank to inert any residue. They removed the tank off of the site today as well. Mr. Ortega took photos of the work performed by Filter Recycling today. The product went off site on Uniform Hazardous Waste Manifest# 003807833 JJK as 'Waste, Flammable Liquids, N.O.S. 3, UN1993' The tank went off site on Uniform Hazardous Waste Manifest# 004852776 JJK as 'on-RCRA Hazardous Waste Solid'.

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1867

Type	Illicit Discharge
Received Date	12/23/2008
APN	
First Name	Eileen
Last Name	Boken
Complainant Address	
Complainant City	Various
Complainant Zip Code	
Phone	415 972-3757
Received By	David Ortega
Complaint Adderess	Various
Complaint City	Various
Complaint Zip Code	
Location	Various

Complaint Mobile detail businesses are operating in Temecula, Murrieta, Wildomar, and Lake Elsinore area. The following tip is from the US EPA National Tips Database: "recently, I noticed quite a bit of activity involving 'mobile detail' businesses that are engaged in the business of car washing, steam cleaning, waxing, polishing, etc. I believe the Clean Water Act clearly states that home owners are exempt washing their personal vehicle. However, when one engages as a business (for profit) it is considered industrial waste water. Therefore, what is occurring is industrial waste water being dumped intentionally in the drain systems. Who should supervise this? You tell me, you are the 'expert' folks. Who is responsible? Cities like Temecula, Murrieta, and Lake Elsinore who have granted these businesses licenses to operate.

Findings 12/23/08: David Ortega, of the NPDES Section of the Riverside County Flood Control (RCFC), called and spoke to Eileen Boken at the US EPA today about this matter. She stated that if I need more information about this complaint, that I should call Mr. Harry Paez, of Wildomar, at (951) 678-1682. He is the one who provided the complaint onto the US EPA National Tips Database.

Action 12/23/09: Mr. Ortega called and spoke to Mr. Paez today about this complaint. Mr. Paez was very concerned that this type of business practice, from 'mobile detailers' continue on a daily basis in the cities mentioned in his complaint. Mr. Ortega asked Mr. Paez if there is a specific name and/or phone number to any of these type of mobile detailers that are possibly in violation. Mr. Paez stated that he did not have any specific names of businesses, nor any specific dates of possible violations, nor any specific addresses that this has occurred. Mr. Paez stated that "Riverside County should have their employees drive around these cities to monitor this type of activity". Mr. Ortega stated to Mr. Paez that if and when he witnesses an active discharge happening, then he can call Mr. Ortega at his cell phone# (951) 961-9574, and either he will mobilize to the site and/or someone from County Code Enforcement will drive to the site. Mr. Ortega also stated to Mr. Paez that there is not much that can be done now for some incident that occurred sometime ago with no names of businesses, no phone numbers to the businesses, and no photos showing the possible infractions.

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1695

Type	Illicit Discharge
Received Date	10/31/2008
APN	948-310-010
First Name	Jason
Last Name	Jones
Complainant Address	
Complainant City	Murrieta
Complainant Zip Code	92563
Phone	951 461-6331
Received By	David Ortega
Complaint Adderess	
Complaint City	Murrieta
Complaint Zip Code	92563
Location	Murrieta Valley I-215 Retention Basin

Complaint Illegal dumping of mattresses, palm fronds and trash in the Riverside County Flood Control (RCFC) District facility: "Murrieta Valley I-215 Retention Basin".

Findings 10/30/08, 1642 hours: Officer Jason Jones, City of Murrieta Code Enforcement, (951) 461-6331, called and left a voice mail message for David Ortega in the NPDES Section of the RCFC concerning the nature of the complaint. 10/31/08, 0715 hours: David Ortega of the RCFC forwarded the voice mail message to Mark Biloki of the RCFC; at his direct line. Mr. Ortega also forwarded the voice mail message to Jason Uhley of the RCFC. Mr. Ortega also called Mr. Jones and left him a voice mail message to give him the cell phone for Mark Biloki, (951) 288-5254, and to suggest that Mr. Jones call Mr. Biloki concerning this matter. Mr. Jones stated in his voice mail message that "he is hoping someone from the RCFC District will be coming out either today or tomorrow (11/1/08) to clean up the items from the I-215 basin so that he can close out his report".

Action 11/3/08: Mark Biloki of the RCFC, Operations & Maintenance Section, sent an email today to David Ortega at the RCFC stating that the illegally dumped materials were cleaned up on Saturday, 11/1/08.

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1683

Type	Illicit Discharge
Received Date	10/17/2008
APN	909-090-001
First Name	Tiffany
Last Name	Zimmer
Complainant Address	
Complainant City	Murrieta
Complainant Zip Code	92562
Phone	951 461-6330
Received By	Claudio Padres
Complaint Adderess	25070 Hayes Ave.
Complaint City	Murrieta
Complaint Zip Code	92562
Location	Murrieta Creek ~200yd south of Ivy on West Side

Complaint 10/17/2008 - Tiffany Zimmer from City of Murrieta Code Enforcement called to ask if we owned a portion of Murrieta Creek between Hayes Ave and Newday. Stated that a person was caught dumping green waste in Murrieta Creek there. I told her that I would look into it and call back.

Findings 10/17/2008 - Found that the property is not owned by the District. It is under the jurisdiction of CDFG and District must obtain permits for maintenance in this area. Spoke with Murrieta Police Officer Bennett who stated that they caught the person in the act dumping Palm Fronds within the creek bed. The property owner (who employed the person caught dumping) came to the scene and told the officer that he owns the land. Officer Bennett told the person to stop the dumping and made them remove the debris. Murrieta Police issued incident number 082910103 regarding this matter.

Action Officer Bennett asked me when he should report such dumping. I informed Officer Bennett that any dumping within a waterway regardless of ownership is illegal and should be reported.

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1994

Type	Spill
Received Date	6/25/2009
APN	57-304-007
First Name	NRC
Last Name	
Complainant Address	
Complainant City	Anza
Complainant Zip Code	92539
Phone	
Received By	David Ortega
Complaint Adderess	38100-38200 Fisher Road
Complaint City	Anza
Complaint Zip Code	92539
Location	

Complaint Per NRC Report# 909723, the caller is reporting that the SRP is dumping oil onto the ground on his property.

Findings 6/25/09: NRC called the California Emergency Management Agency (CEMA) to report this release. The CEMA issued a Hazardous Materials Spill Report, Control# 09-4584, concerning this incident. The CEMA report states that no water was involved from this release. The Riverside County Environmental Health Department was notified about this incident. There are no Riverside County Flood Control District facilities in the area of the complaint address that could have been impacted from this release. NOTE: The complaint APN listed in this report is a reference APN only.

Action

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1993

Type	Spill
Received Date	6/25/2009
APN	922-210-048
First Name	Eastern Municipal Water District (EMWD)
Last Name	
Complainant Address	
Complainant City	Temecula
Complainant Zip Code	92592
Phone	
Received By	David Ortega
Complaint Adderess	29170 Front Street
Complaint City	Temecula
Complaint Zip Code	92592
Location	

Complaint 9,000 gallons of raw sewage was released due to a lift station failure that caused the manhole to back up and spill out. River flows south from Riverside County into San Diego County.

Findings 6/25/09: EMWD called the California Emergency Management Agency (CEMA) to report this release. The CEMA issued a Hazardous Materials Spill Report, Control# 09-4582, concerning this incident. The CEMA report states that it is unknown if any drinking water was impacted from this release. The CEMA report also states that water was involved in the Santa Margarita River. The CEMA report states that the sewage was contained but was considered unrecoverable. The Riverside County Environmental Health Department and the San Diego RWQCB were notified about this incident. There are no Riverside County Flood Control District facilities in the area of the complaint address that could have been impacted from this release. NOTE: The complaint APN listed in this report is a reference APN only.

Action 6/25/09, 0805 hours: The CEMA received a situation update concerning this incident. RP provided an update to the quantity released, which is 4,000 gallons.

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1990

Type	Spill
Received Date	6/23/2009
APN	943-120-022
First Name	CHP Temecula
Last Name	
Complainant Address	
Complainant City	Rancho California
Complainant Zip Code	92591
Phone	0
Received By	David Ortega
Complaint Adderess	
Complaint City	Rancho California
Complaint Zip Code	92591
Location	Calle Contento North of Rancho California Road

Complaint A combination of muriatic acid, chlorine and pH balancer (adding up to a total of about 20 gallons) was released due to a traffic accident involving a pool service vehicle; less than 20 gallons of pool cleaning chemicals were spilled on the roadway, mostly within the vehicle. The injuries due to chemical spill, only the collision.

Findings 6/23/09: CHP Temecula called the California Emergency Management Agency (CEMA) to report this release. The CEMA issued a Hazardous Materials Spill Report, Control# 09-4554, concerning this incident. The CEMA report states that no water was involved from this release. The CEMA report also states that the substances were contained and cleaned up by the Fire Department. CHP, County Health, and the Fire Department were on scene concerning this incident. The Riverside County Environmental Health Department were notified about this release. The nearest Riverside County Flood Control District facility is located about 1.1 miles to the southwest of the complaint location: "AD159 - Butterfield Stage Road Storm Drain".

Action

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1988

Type	Spill
Received Date	6/19/2009
APN	380-160-013
First Name	Rancho Water District (RWD)
Last Name	
Complainant Address	
Complainant City	Murrieta
Complainant Zip Code	92562
Phone	
Received By	David Ortega
Complaint Adderess	23072 Rancho Mirlo Road
Complaint City	Murrieta
Complaint Zip Code	92562
Location	

Complaint 250 gallons of raw sewage was released due to a break in a 2" copper service line leading to air vac; it caused an overflow in the vault.

Findings 6/19/09: RWD called the California Emergency Management Agency (CEMA) to report this release. The CEMA issued a Hazardous Materials Spill Report, Control# 09-4481, concerning this incident. The CEMA report states that no water was involved from this release. The CEMA report also states that the sewage was contained and cleaned up the reporting party (RWD). The Riverside County Environmental Health Department was notified about this incident. The nearest Riverside County Flood Control District facility is located about 1.2 miles to the southeast of the complaint address: "Murrieta Creek Master Drainage Plan - Line G".

Action

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1966

Type	Spill
Received Date	6/7/2009
APN	906-050-002
First Name	Western Municipal Water District (WMWD)
Last Name	
Complainant Address	
Complainant City	Murrieta
Complainant Zip Code	92562
Phone	
Received By	David Ortega
Complaint Adderess	
Complaint City	Murrieta
Complaint Zip Code	92562
Location	Lemon Street and Jefferson Avenue

Complaint 375 gallons of waste water was released from a manhole due to a main line blockage. A small amount went into a storm drain and was cleaned up.

Findings 6/7/09: WMWD called the California Emergency Management Agency (CEMA) to report this release. The CEMA issued a Hazardous Materials Spill Report, Control# 09-4194, concerning this incident. The CEMA report states that no water was involved from this release. The CEMA report also states that the substance was contained and cleaned up by the responsible party. The Riverside County Environmental Health Department and the RWQCB San Diego were notified about this incident. The nearest Riverside County Flood Control District facility is located about .2 mile to the southwest of the complaint location: "Murrieta Creek Master Drainage Plan - Line F-1". NOTE: The complaint APN listed in this report is a reference APN only.

Action

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1964

Type	Spill
Received Date	6/4/2009
APN	
First Name	Veeder Root
Last Name	
Complainant Address	
Complainant City	Murrieta
Complainant Zip Code	92562
Phone	
Received By	David Ortega
Complaint Adderess	39850 Los Alamos
Complaint City	Murrieta
Complaint Zip Code	92562
Location	Exxon Mobil

Complaint 1 ounce of gasoline was released was caused by an autoshut off failure at a pump.

Findings 6/4/09: Veeder Root called the California Emergency Management Agency (Cal-EMA) to report this release. The Cal-EMA issued a Hazardous Materials Spill Report, Control# 09-4139, concerning this incident. The Cal-EMA report states that no water was involved from this release. The Cal-EMA report also states that the gasoline was contained and was "unrecoverable". The Riverside County Environmental Health Department was notified about this incident. The nearest Riverside County Flood Control District facility is located about .1 mile to the west of the complaint address, "Murrieta Valley - Coliseum Way Storm Drain.

Action

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1957

Type	Spill
Received Date	5/26/2009
APN	904-601-015
First Name	Southern Ca. Edison (SCE)
Last Name	
Complainant Address	
Complainant City	Murrieta
Complainant Zip Code	92562
Phone	0
Received By	David Ortega
Complaint Adderess	23794 Scarlet Oak Drive
Complaint City	Murrieta
Complaint Zip Code	92562
Location	

Complaint 2 gallons of mineral oil, non PCB, was released from a pad mounted transformer that was discovered as leaking. No waterways were affected.

Findings 5/26/09: SCE called the California Emergency Management Agency (CEMA) to report this release. The CEMA issued a Hazardous Materials Spill Report, Control# 09-3939, concerning this incident. The CEMA report states that no water was involved from this release. The CEMA report also states that the substance was contained and cleaned up by a contractor. The Riverside County Environmental Health Department was notified about this incident. The nearest Riverside County Flood Control District facility is located about .5 mile to the east, southeast of the complaint address: "Murrieta Creek Master Drainage Plan - Line G".

Action

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1935

Type	Spill
Received Date	5/7/2009
APN	948-500-003
First Name	Veeder Root
Last Name	
Complainant Address	
Complainant City	Murrieta
Complainant Zip Code	92562
Phone	
Received By	David Ortega
Complaint Adderess	39850 Los Alamos Road
Complaint City	Murrieta
Complaint Zip Code	92562
Location	

Complaint .25 gallons of gasoline was released due to customer error. The nozzle fell from the tank.

Findings 5/7/09: Veeder Root called the California Emergency Management Agency (Cal-EMA) to report this release. The Cal-EMA issued a Hazardous Materials Spill Report, Control# 09-3499, concerning this incident. The Cal-EMA report states that no water was involved from this release. The Cal-EMA report also states that the gasoline was contained and was cleaned up by the reporting party (Veeder Root). The Riverside County Environmental Health Department was notified about this incident. The nearest Riverside County Flood Control District facility is located about .1 mile to the west of the complaint address, "Murrieta Valley - Coliseum Way Storm Drain.

Action

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1934

Type	Spill
Received Date	5/6/2009
APN	904-754-005
First Name	Southern California Edison (SCE)
Last Name	
Complainant Address	
Complainant City	Murrieta
Complainant Zip Code	92562
Phone	0
Received By	David Ortega
Complaint Adderess	23852 Cloverleaf Way
Complaint City	Murrieta
Complaint Zip Code	92562
Location	

Complaint 68 gallons of Non-PCB Mineral oil was released from a pad mounted transformer that failed. The release went out on the front lawn of a residence.

Findings 5/6/09: SCE called the California Emergency Management Agency (CAL-EMA) to report this release. The CAL-EMA issued a Hazardous Materials Spill Report, Control# 09-3496, concerning this incident. The CAL-EMA report states that no water was involved from this release. The CAL-EMA report also states that the substance was contained and cleaned up by Double Barrel Contractor. The Riverside County Environmental Health Department was notified about this incident. The nearest Riverside County Flood Control District facility is located about .5 mile to the east of the complaint address: "Murrieta Creek Master Drainage Plan - Line G".

Action

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1915

Type	Spill
Received Date	4/18/2009
APN	
First Name	Southern California Edison (SCE)
Last Name	
Complainant Address	
Complainant City	Murrieta
Complainant Zip Code	92562
Phone	0
Received By	David Ortega
Complaint Adderess	26895 Sayence
Complaint City	Murrieta
Complaint Zip Code	92562
Location	

Complaint 10 gallons of non-PCB mineral oil was released due to rust deterioration on a pad-mounted transformer that resulted in equipment failure. An outside contractor (AIS) is currently performing clean up.

Findings 4/18/09: SCE called the California Emergency Management Agency (CEMA) to report this release. The CEMA issued a Hazardous Materials Spill Report, Control# 09-3062, concerning this incident. The CEMA report states that no water was involved from this release. The Riverside County Environmental Health and Riverside County CUPA were notified about this incident. NOTE: There is no complaint APN attached to this report because it is unknown where this address is in the City of Murrieta and/or in the County. Therefore, it is also unknown if this complaint address is near a Riverside County Flood Control District facility or not.

Action

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1907

Type	Spill
Received Date	4/10/2009
APN	900-040-007
First Name	CHP - San Diego
Last Name	
Complainant Address	
Complainant City	Murrieta
Complainant Zip Code	92562
Phone	
Received By	David Ortega
Complaint Adderess	
Complaint City	Murrieta
Complaint Zip Code	92562
Location	Southbound 215 Freeway, just south of Clinton Keith Road

Complaint An unknown amount of Nebutyl Acetate was released from a tank vehicle that had leaked the product onto the road shoulder. The product is evaporating and clean up is in progress. No waterways were affected.

Findings 4/10/09: CHP - San Diego called the California Emergency Management Agency (CEMA) to report this release. The CEMA issued a Hazardous Materials Spill Report, Control# 09-2880, concerning this incident. The CEMA report states that no water was involved from this release. The CEMA report also states that the substance was contained and cleaned up by CalTrans. CalTrans, CHP, and the Fire Department were on scene concerning this incident. The Riverside County Environmental Health Department, Murrieta Police Department, and the Fire Department were notified about this release. The nearest Riverside County Flood Control District facility is located about .9 mile to the west of the complaint location: "California Oaks - Via Segovia Storm Drain." NOTE: The complaint APN listed in this report is a reference APN only.

Action

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1887

Type	Spill
Received Date	3/26/2009
APN	909-290-009
First Name	Eastern Municipal Water District (EMWD)
Last Name	
Complainant Address	
Complainant City	Temecula
Complainant Zip Code	92590
Phone	0
Received By	David Ortega
Complaint Adderess	42565 Avenida Alvarado
Complaint City	Temecula
Complaint Zip Code	92590
Location	

Complaint 1.8 to 2 gallons Ferric Chloride - 48% was released.

Findings 3/26/09: EMWD called the California Emergency Management Agency (CEMA) to report this release. The CEMA issued a Hazardous Materials Spill Report, Control# 09-2531, concerning this incident. The CEMA report states that no water and no drinking water was involved and/or impacted from this release. The CEMA report also states that a delivery driver doing a delivery thought he was empty, and was clearing the house. There was product still inside which was released during the clearing process onto him and the spill containment area. The driver was wearing protective clothing and is in process of chemical removal now from his person. No injury is being reported at this time. NRC Report# 900985 for this incident. The Riverside County Environmental Health Department and the NRC were notified about this release. The nearest Riverside County Flood Control District facility is located about .8 mile to the northeast of the complaint address: "Murrieta Creek at Winchester Road." NOTE: The complaint APN listed in this report is a reference APN only.

Action

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1884

Type	Spill
Received Date	3/23/2009
APN	964-060-001
First Name	Metropolitan Water Dist. (MWD)
Last Name	
Complainant Address	
Complainant City	Winchester
Complainant Zip Code	92596
Phone	
Received By	David Ortega
Complaint Adderess	33740 Borel Road
Complaint City	Winchester
Complaint Zip Code	92596
Location	

Complaint 1 pint of sulfuric acid was released while actuating a valve. A leak started and was then stopped.

Findings 3/23/09: MWD called the California Emergency Management Agency (CEMA) to report this release. The CEMA issued a Hazardous Materials Spill Report, Control# 09-2466, concerning this incident. The CEMA report states that no water was involved from this release. The CEMA report also states that the substance was contained and cleaned up by the reporting party (MWD). The Riverside County Environmental Health Department was notified about this incident. There are no Riverside County Flood Control District facilities in the area of the complaint address that could have been impacted from this release.

Action

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1864

Type	Spill
Received Date	3/11/2009
APN	947-182-039
First Name	So. Cal. Edison (SCE)
Last Name	
Complainant Address	
Complainant City	Murrieta
Complainant Zip Code	92562
Phone	
Received By	David Ortega
Complaint Adderess	39660 Almansa Court
Complaint City	Murrieta
Complaint Zip Code	92562
Location	

Complaint 20 to 30 gallons of mineral oil, non PCB, was released due to a malfunction of a pad-mounted transformer.

Findings 3/11/09: SCE called the California Emergency Management Agency (CEMA) to report this release. The CEMA issued a Hazardous Materials Spill Report, Control# 09-2178, concerning this incident. The CEMA report states that no water was involved from this release. The CEMA report also states that the substance was contained and cleaned up by a contractor. The Riverside County Environmental Health Department was notified about this incident. The nearest Riverside County Flood Control District facility is located about .6 mile to the north, northwest of the complaint address: "California Oaks - Nutmeg Street Storm Drain".

Action

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1845

Type	Spill
Received Date	2/21/2009
APN	376-060-021
First Name	Eastern Municipal Water District (EMWD)
Last Name	
Complainant Address	
Complainant City	Wildomar
Complainant Zip Code	92595
Phone	
Received By	David Ortega
Complaint Adderess	21422 South Palomar Road
Complaint City	Wildomar
Complaint Zip Code	92595
Location	

Complaint 50 gallons of sodium bisulfite was released from an above ground storage tank and into secondary containment.

Findings 2/21/09: EMWD called the California Emergency Management Agency (CEMA) to report this release. The CEMA issued a Hazardous Materials Spill Report, Control# 09-1510, concerning this incident. The CEMA report states that no water was involved from this release. The CEMA report also states that the substance was contained and cleaned up by the reporting party (EMWD). The Riverside County Environmental Health Department was notified about this incident. The nearest Riverside County Flood Control District facility is located about .3 mile to the southwest of the complaint address: "Wildomar Master Drainage Plan Channel". NOTE: The complaint APN listed in this report is a reference APN only.

Action

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1841

Type	Spill
Received Date	2/19/2009
APN	909-290-009
First Name	Eastern Municipal Water Dist. (EMWD)
Last Name	
Complainant Address	
Complainant City	Temecula
Complainant Zip Code	92590
Phone	
Received By	David Ortega
Complaint Adderess	42565 Avenida Alvarado
Complaint City	Temecula
Complaint Zip Code	92590
Location	

Complaint An unknown amount of reclaimed chlorinated water was released due to a wash-water line that failed.

Findings 2/19/09: EMWD called the California Emergency Management Agency (CEMA) to report this release. The CEMA issued a Hazardous Materials Spill Report, Control# 09-1430, concerning this incident. The CEMA report states that water was involved in Murrieta Creek from this release; no drinking water was impacted. The release has entered an adjacent creek that runs along the property. The CEMA report also states that the substance was contained and cleaned up by the responsible party. Remediation will include pumping the affected portion of the creek back into the system. The Riverside County Environmental Health Department and CUPA were notified about this incident. The nearest Riverside County Flood Control District facility is located about .8 mile to the northeast of the complaint address: "Murrieta Creek at Winchester Road." NOTE: The complaint APN listed in this report is a reference APN only.

Action

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1832

Type	Spill
Received Date	2/12/2009
APN	964-060-001
First Name	Metro. Water Dist. So. Cal. (MWD)
Last Name	
Complainant Address	
Complainant City	Winchester
Complainant Zip Code	92596
Phone	
Received By	David Ortega
Complaint Adderess	
Complaint City	Winchester
Complaint Zip Code	92596
Location	Station 48 Plus 10, Borel Rd. and Auld St.

Complaint 5 gallons of hydraulic oil was released to soil due to a hydraulic line that was loose on a piece of equipment.

Findings 2/12/09: MWD called the California Emergency Management Agency (CEMA) to report this release. The CEMA issued a Hazardous Materials Spill Report, Control# 09-1208, concerning this incident. The CEMA report states that no water and no drinking water was involved and/or impacted from this release. The CEMA report also states that the substance was contained and cleaned up by the reporting party (MWD). The Riverside County Environmental Health Department was notified about this incident. There are no Riverside County Flood Control District facilities in the area of the complaint address that could have been impacted from this release.

Action

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1823

Type	Spill
Received Date	2/5/2009
APN	964-060-001
First Name	Metropolitan Water District (MWD)
Last Name	
Complainant Address	
Complainant City	Winchester
Complainant Zip Code	92596
Phone	
Received By	David Ortega
Complaint Adderess	33740 Borel Road
Complaint City	Winchester
Complaint Zip Code	92596
Location	

Complaint 8 ounces of chlorine was released. Caller advised that an employee was performing a hook up for the trailer to the chlorine system. A leaking valve caused the release of chlorine gas and the employee inhaled it. The employee was taken to the hospital to be treated.

Findings 2/5/09: MWD called the California Emergency Management Agency (CEMA) to report this release. The CEMA issued a Hazardous Materials Spill Report, Control# 09-1059, concerning this incident. The CEMA report states that no water was involved. The CEMA report also states that the substance was contained and cleaned up by the reporting party (MWD). The Riverside County Environmental Health Department was notified about this incident. There are no Riverside County Flood Control District facilities in the area of the complaint address that could have been impacted from this release.

Action

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1808

Type	Spill
Received Date	1/24/2009
APN	900-310-021
First Name	Eastern Municipal Water Dist. (EMWD)
Last Name	
Complainant Address	
Complainant City	Murrieta
Complainant Zip Code	92563
Phone	
Received By	David Ortega
Complaint Adderess	27843 Wintergrove Way
Complaint City	Murrieta
Complaint Zip Code	92563
Location	

Complaint 2,000 gallons of sewage was released as an overflow from a manhole due to an unknown blockage.

Findings 1/24/09: EMWD called the California Emergency Management Agency (CEMA) to report this release. The CEMA issued a Hazardous Materials Spill Report, Control# 09-0729, concerning this incident. The CEMA report states that no drinking water was impacted from this release, however water was involved in a storm drain. The CEMA report also states that the sewage was contained and cleaned up by the reporting party (EMWD). The Riverside County Environmental Health Department was notified about this incident. The nearest Riverside County Flood Control District facility is located about .9 mile to the south of the complaint address: "Murrieta Valley I-215 Basin."

Action

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1802

Type	Spill
Received Date	1/17/2009
APN	922-120-017
First Name	Eastern Municipal Water Dist. (EMWD)
Last Name	
Complainant Address	
Complainant City	Temecula
Complainant Zip Code	92590
Phone	
Received By	David Ortega
Complaint Adderess	29170 Front Street
Complaint City	Temecula
Complaint Zip Code	92590
Location	

Complaint 15,750 gallons of sewage was released from a manhole due to a lift station failure. The release was unrecoverable.

Findings 1/17/09: EMWD called the California Emergency Management Agency (CEMA) to report this release. The CEMA issued a Hazardous Materials Spill Report, Control# 09-0403, concerning this incident. The CEMA report states that no drinking water was impacted from this release, however water was involved in the Santa Margarita River. The CEMA report also states that the sewage was contained and cleaned up by the reporting party (EMWD). The Riverside County Environmental Health Department was notified about this incident. The nearest Riverside County Flood Control District facility is located about .5 mile north of the complaint APN: "Murrieta Creek Channel". NOTE: The complaint APN listed in this report is a reference APN only.

Action 1/17/09, 1517 hours: A situation update came in to the CEMA concerning this incident. Riverside County advised the SDO that a block was placed in between where the spill occurred and the intake for the drinking water source, so no sewage will go into the drinking water.

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1799

Type	Spill
Received Date	1/16/2009
APN	920-301-002
First Name	Eastern Municipal Water Dist. (EMWD)
Last Name	
Complainant Address	
Complainant City	Temecula
Complainant Zip Code	92563
Phone	
Received By	David Ortega
Complaint Adderess	27293 Cresta Del Norte
Complaint City	Temecula
Complaint Zip Code	92563
Location	

Complaint 350 gallons of sewage was released from an unknown cause; possibly some kind of blockage.

Findings 1/16/09: EMWD called the California Emergency Management Agency (CEMA) to report this release. The CEMA issued a Hazardous Materials Spill Report, Control# 09-0384, concerning this incident. The CEMA report states that this is an ongoing release. Water was involved in a storm drain/ Tucaloca Creek/ Murrieta Creek/ Santa Margarita River/ Pacific Ocean. Drinking water was not impacted from this incident. The CEMA report also states that the sewage was contained and cleaned up by the responsible party. The Riverside County Environmental Health Department and the RWQCB were notified about this release. The nearest Riverside County Flood Control District facility is located adjacent to the complaint address: "Santa Gertrudis Valley Sierra Madre Drive Storm Drain."

Action

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1784

Type	Spill
Received Date	12/23/2008
APN	964-060-001
First Name	Metro. Water Dist. (MWD)
Last Name	
Complainant Address	
Complainant City	Winchester
Complainant Zip Code	92596
Phone	
Received By	David Ortega
Complaint Adderess	3770 Borel Road
Complaint City	Winchester
Complaint Zip Code	92596
Location	Skinner Filtration Plant

Complaint 200 gallons of diesel was released from a portable container that was knocked over.

Findings 12/23/08: MWD called the Governor's Office of Emergency Services (OES) to report this release. The OES issued a Hazardous Materials Spill Report, Control# 08-9102, concerning this incident. The OES report states that no water was involved. The OES report also states that the substance was contained and cleaned up by a contractor. The Riverside County Environmental Health Department was notified about this incident. There are no Riverside County Flood Control District facilities in the area of the complaint address that could have been impacted from this release.

Action

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1777

Type	Spill
Received Date	12/20/2008
APN	909-290-009
First Name	Eastern Municipal Water District (EMWD)
Last Name	
Complainant Address	
Complainant City	Temecula
Complainant Zip Code	92590
Phone	
Received By	David Ortega
Complaint Adderess	42565 Avenida Alvarado Street
Complaint City	Temecula
Complaint Zip Code	92590
Location	

Complaint 62 gallons of sodium bisulfite was released when a gauge on the discharge side of the pump had a seal failure which resulted in the release of the substance.

Findings 12/20/08: EMWD called the Governor's Office of Emergency Services (OES) to report this release. The OES issued a Hazardous Materials Spill Report, Control# 08-9037, concerning this incident. The OES report states that no water was involved from this release. The OES report also states that the substance was contained in a wet well within the facility and will not impact any outside waterways. Cleanup will be performed by the reporting party (EMWD). The Riverside County Environmental Health Department was notified about this incident. The nearest Riverside County Flood Control District facility is located about .8 mile to the northeast of the complaint address: "Murrieta Creek at Winchester Road." NOTE: The complaint APN listed in this report is a reference APN only.

Action

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1774

Type	Spill
Received Date	12/18/2008
APN	964-060-001
First Name	Metropolitan Water Dist. So. Ca. (MWD)
Last Name	
Complainant Address	
Complainant City	Winchester
Complainant Zip Code	92596
Phone	
Received By	David Ortega
Complaint Adderess	33740 Borel Road
Complaint City	Winchester
Complaint Zip Code	92596
Location	

Complaint .5 gallon of caustic soda was released due to a sample valve being partially open during a delivery. Caller states substance released to a tank farm containment area where it mixed with rain water in the containment area.

Findings 12/18/09: MWD called the Governor's Office of Emergency Services (OES) to report this release. The OES issued a Hazardous Materials Spill Report, Control# 08-9001, concerning this incident. The OES report states that no water was involved. The OES report also states that the substance was contained and cleaned up by the reporting party (MWD). The Riverside County Environmental Health Department was notified about this incident. There are no Riverside County Flood Control District facilities in the area of the complaint address that could have been impacted from this release.

Action

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1744

Type	Spill
Received Date	12/4/2008
APN	943-230-003
First Name	Riverside County Health Department
Last Name	
Complainant Address	
Complainant City	Rancho California
Complainant Zip Code	92591
Phone	0
Received By	David Ortega
Complaint Adderess	
Complaint City	Rancho California
Complaint Zip Code	92591
Location	Anza Road and Rancho California Road

Complaint 1,000 gallons of sewage leaked out of seepage pits and flowed into a storm drain on Anza Road. On site maintenance advises there are 4 seepage pits with a valve that directs the flow. The valve was turned in such a way as to direct entire flow to one pit. Once valve was adjust all was fine. It is believed to be under 1,000 gallons, but RP will check with staff that was on scene and advise.

Findings 12/4/08: The Riverside County Health Department called the Governor's Office of Emergency Services (OES) to report this release. The OES issued a Hazardous Materials Spill Report, Control# 08-8658, concerning this incident. The OES report states that this is a "historical report"; meaning that this release occurred on 11/29/08. Water was involved in a storm drain to an unknown location. It is unknown if drinking water was impacted. The OES report also states that the sewage was contained and cleaned up by the responsible party. The Riverside County Environmental Health Department were notified about this incident. The nearest Riverside County Flood Control District facility is located about 1.9 miles to the west, southwest of the complaint location: "Temecula VLY Butterfield Stage Road". NOTE: The complaint APN listed in this report is a reference APN only.

Action 12/4/08, 0811 hours: A situation update came into the OES concerning this incident. The Riverside County Environmental Health Department states that personnel on scene advise amount released is unknown, however release did occur over a period of a few days to a week. The Riverside County Environmental Health Department also state that the on-site maintenance person was Alejandro Pizana.

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1728

Type	Spill
Received Date	11/29/2008
APN	909-290-009
First Name	Eastern Municipal Water District (EMWD)
Last Name	
Complainant Address	
Complainant City	Temecula
Complainant Zip Code	92590
Phone	0
Received By	David Ortega
Complaint Adderess	42565 Avenida Alvarado
Complaint City	Temecula
Complaint Zip Code	92590
Location	Temecula Regional Water Reclamation Facility

Complaint 2,804 gallons of secondary sludge was released while draining and cleaning the residual out of a secondary aeration tank. The released occurred due to the pump discharge hose being dislodged from the discharge point. In addition, 934 gallons of the substance went into a dry storm drain and no waterways were impacted. Clean up crews are enroute to the scene.

Findings 11/29/08: EMWD called the Governor's Office of Emergency Services (OES) to report this release. The OES issued a Hazardous Materials Spill Report, Control# 08-8534, concerning this incident. The OES report states that no water was involved from this release. The OES report also states that the substance was contained and cleaned up by the reporting party (EMWD). The Riverside County Environmental Health Department and the San Diego RWQCB were notified about this incident. The nearest Riverside County Flood Control District facility is located about .8 mile to the northeast of the complaint address: "Murrieta Creek at Winchester Road."

Action 11/29/08, 1313 hours: A situation update came into the OES concerning this incident. Received NRC Report# 891266 regarding this release. 1650 hours: Another situation update came into the OES concerning this incident. The total amount released was 16,824 gallons. The amount that went into the storm drain was 6,732 gallons but still no water ways were impacted.

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1705

Type	Spill
Received Date	11/10/2008
APN	948-045-007
First Name	So. Cal. Edison (SCE)
Last Name	
Complainant Address	
Complainant City	Murrieta
Complainant Zip Code	92562
Phone	0
Received By	David Ortega
Complaint Adderess	40005 Via Verano
Complaint City	Murrieta
Complaint Zip Code	92562
Location	

Complaint 20 gallons of mineral oil (unknown PCBs) was released from an underground transformer that was found to be leaking.

Findings 11/10/08: SCE called the Governor's Office of Emergency Services (OES) to report this release. The OES issued a Hazardous Materials Spill Report, Control# 08-8091, concerning this incident. The OES report states that the leak was contained to the transformer area. No waterways were affected. The Riverside County Environmental Health Department was notified about this release. The nearest Riverside County Flood Control District facility is located about .8 mile to the south of the complaint APN: "Murrieta VY Coliseum Way Storm Drain". NOTE: The complaint APN listed in this report is a reference APN only.

Action

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1702

Type	Spill
Received Date	11/6/2008
APN	918-130-021
First Name	CHP
Last Name	
Complainant Address	
Complainant City	Temecula
Complainant Zip Code	92592
Phone	
Received By	David Ortega
Complaint Adderess	
Complaint City	Temecula
Complaint Zip Code	92592
Location	Northbound I-15 Freeway at the Rainbow Scale facility

Complaint 1 ounce of acetone was on the side of a 55 gallon drum.

Findings 11/6/08: CHP called the Governor's Office of Emergency Services (OES) to report this substance. The OES issued a Hazardous Materials Spill Report, Control# 08-8003, concerning this incident. The OES report states that this is a "historical" report; the incident occurred on 10/24/08. No water and no drinking water was involved and/or impacted from the substance. The OES report also states that the substance was contained. The Riverside County Environmental Health Department was notified about this incident. There are no Riverside County Flood Control District facilities in the area of the complaint location that could have been impacted from the substance. NOTE: The complaint APN listed in this report is a reference APN only.

Action

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1652

Type	Spill
Received Date	9/24/2008
APN	904-762-007
First Name	So. Cal. Edison (SCE)
Last Name	
Complainant Address	
Complainant City	Murrieta
Complainant Zip Code	92562
Phone	
Received By	David Ortega
Complaint Adderess	38145 Placer Creek Street
Complaint City	Murrieta
Complaint Zip Code	92562
Location	

Complaint 2 gallons of mineral oil was released due to equipment malfunction and pad mounted transformer released mineral oil on to soil and a driveway.

Findings 9/24/08: SCE Called the Governor's Office of Emergency Services (OES) to report this release. The OES issued a Hazardous Materials Spill Report, Control# 08-6919, concerning this incident. The OES report states that no water and no drinking water was involved and/or impacted from this release. The OES also states that the substance was contained and cleaned up by a contractor. The Riverside County Environmental Health Department was notified about this incident. The nearest Riverside County Flood Control District facility is located about .9 mile to the east of the complaint address: "Murrieta Creek MDP Line G at Washington".

Action

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1632

Type	Spill
Received Date	9/12/2008
APN	964-060-001
First Name	Metro. Water Dist. So. Cal. (MWD)
Last Name	
Complainant Address	
Complainant City	Winchester
Complainant Zip Code	92596
Phone	
Received By	David Ortega
Complaint Adderess	33740 Borel Road
Complaint City	Winchester
Complaint Zip Code	92596
Location	

Complaint 1 ounce of flourasalicic acid was released when a bolt hole on the holding tank leaked.

Findings 9/12/08: MWD called the Governor's Office of Emergency Services (OES) to report this release. The OES issued a Hazardous Materials Spill Report, Control# 08-6689, concerning this incident. The OES report states that no water was involved from this release. The OES report also states that the substance was contained and cleaned up by the responsible party. The Riverside County Environmental Health Department was notified about this incident. There are no Riverside County Flood Control District facilities in the area of the complaint address that could have been impacted from this release.

Action

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1630

Type	Spill
Received Date	9/11/2008
APN	964-060-001
First Name	Metro. Water Dist. So. Cal. (MWD)
Last Name	
Complainant Address	
Complainant City	Winchester
Complainant Zip Code	92596
Phone	
Received By	David Ortega
Complaint Adderess	33740 Borel Road
Complaint City	Winchester
Complaint Zip Code	92596
Location	

Complaint .5 gallon of Ferric Chloride was released during a transfer operation that caused a tank to overfill.

Findings 9/11/08: MWD called the Governor's Office of Emergency Services (OES) to report this release. The OES issued a Hazardous Materials Spill Report, Control# 08-6649, concerning this incident. The OES report states that no water was involved from this release. The OES report also states that the substance was contained and cleaned up by the responsible party. The Riverside County Environmental Health Department was notified about this incident. There are no Riverside County Flood Control District facilities in the area of the complaint address that could have been impacted by this release.

Action

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1625

Type	Spill
Received Date	9/9/2008
APN	964-060-001
First Name	Metro. Water Dist. L.A. (MWD)
Last Name	
Complainant Address	
Complainant City	Winchester
Complainant Zip Code	92596
Phone	
Received By	David Ortega
Complaint Adderess	33740 Borel Road
Complaint City	Winchester
Complaint Zip Code	92596
Location	

Complaint 8 ounces of aqua-ammonia was released as a leak on a transfer pump.

Findings 9/9/08: MWD called the Governor's Office of Emergency Services (OES) to report this release. The OES issued a Hazardous Materials Spill Report, Control# 08-6601, concerning this incident. The OES report states that no water was involved from this release. The OES report also states that the substance was contained and cleaned up by the responsible party. County Health was notified about this incident. There are no Riverside County Flood Control District facilities in the area of the complaint address that could have been impacted from this release.

Action

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1623

Type	Spill
Received Date	9/8/2008
APN	964-060-001
First Name	Metropolitan Water District of
Last Name	Southern California (MWD)
Complainant Address	
Complainant City	Winchester
Complainant Zip Code	92396
Phone	
Received By	David Ortega
Complaint Adderess	33740 Borel Road
Complaint City	Winchester
Complaint Zip Code	92396
Location	Robert A. Skinner Filtration Plant

Complaint .5 gallon of oil based paint was released when one of the workers dropped a container and spilled the substance out onto the asphalt.

Findings 9/8/08: MWD called the Governor's Office of Emergency Services (OES) to report this release. The OES issued a Hazardous Materials Spill Report, Control# 08-6556, concerning this incident. The OES report states that no water was involved from this release. The OES report also states that the substance was contained and cleaned up by the reporting party (MWD). The Riverside County Environmental Health Department was notified about this incident. There are no Riverside County Flood Control District facilities in the area of the complaint address that could have been impacted from this release

Action

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1621

Type	Spill
Received Date	9/6/2008
APN	909-290-009
First Name	Eastern Municipal Water Dist. (EMWD)
Last Name	
Complainant Address	
Complainant City	Temecula
Complainant Zip Code	92590
Phone	
Received By	David Ortega
Complaint Adderess	42565 Avenida Alvarado
Complaint City	Temecula
Complaint Zip Code	92590
Location	

Complaint 180 gallons of ferric chloride was released from the pump due to a fitting breaking sometime between 1630 hours on 9/5/08 and 0600 hours on 9/6/08.

Findings 9/6/08: EMWD called the Governor's Office of Emergency Services (OES) to report this release. The OES issued a Hazardous Materials Spill Report, Control# 08-6506, concerning this incident. The OES report states that no water was involved from this release. The OES report also states that the substance was contained. The Riverside County Environmental Health Department and Riverside County Haz.-Mat. were notified about this incident. The nearest Riverside County Flood Control District facility is located about .8 mile to the northeast of the complaint address: "Murrieta Creek at Winchester Road."

Action

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1612

Type Spill

Received Date 9/2/2008

APN 921-740-003

First Name Riverside County Environmental

Last Name Health Haz.-Mat. (County Haz.-Mat.)

Complainant Address

Complainant City Temecula

Complainant Zip Code 92590

Phone 0

Received By David Ortega

Complaint Adderess

Complaint City Temecula

Complaint Zip Code 92590

Location On Via Montezuma, cross street of Del Rio Road

Complaint 5 gallons of a mixture of motor oil, transmission oil, and Gasoline was released due to a solo accident that resulted in the vehicle going over the side of the road and into a creek (Murrieta Creek).

Findings 9/1/08, 1150 hours: County Haz.-Mat. called the Governor's Office of Emergency Services (OES) to report this release. The OES issued a Hazardous Materials Spill Report, Control# 08-6384, concerning this incident. The OES report states that no drinking water was impacted from this release however, water was involved in Murrieta Creek. The OES report also states that the vehicle has been extracted but substance has been released to the creek bed. Absorbent pads have been placed to contain substance and Flood Control will be contacted regarding determining who will clean up. Police Dept., Cal Fire, and Temecula Public Works were on scene concerning this incident. The Riverside County Environmental Health Department was notified about this release.

Action 9/2/08: David Ortega spoke briefly to Christine Parsons today about this incident that occurred yesterday on Labor Day. Ms. Parsons said that she was on call this past weekend and left voice messages to Mark Biloki and Steve Thomas of the Riverside County Flood Control (RCFC) with no response from either since yesterday about this release into Murrieta Creek. Ms. Parsons referred Mr. Ortega to call Jim Sappington of County Haz.-Mat., (951) 377-8407, today about this incident. Mr. Ortega left a voice message for Aldo Licitra to call him back today. Mr. Ortega spoke briefly with Mr. Sappington today about this release near Murrieta Creek. Mr. Sappington stated that Cal Fire had set out some absorbent pads on the spilled material. Mr. Sappington also said that he traded voice messages today with Mr. Licitra of the City of Temecula about the impacted area. Mr. Sappington said that Mr. Licitra will have a City of Temecula crew pick up the pads tomorrow (9/3/08). 9/5/08: David Ortega, (951) 955-4390), of the RCFC District spoke briefly to Aldo Licitra, City of Temecula, about this incident. Mr. Licitra emailed an update about this release to Ben Neill of the RWQCB, to Mike Shetler at the Riverside County Executive Office, to J. Uhley, C. Padres and to David Ortega at the RCFC and to others. The email stated that, "Once the City (Temecula) was notified, immediate actions were implemented. Although Murrieta Creek does not fall under the City's maintenance jurisdiction, assistance was provided to the Haz Mat team to ensure their safety during their operations. The accident occurred on a low-flow crossing at Via Montezuma. The area affected by the accident was limited to a small section of shallow ponded water immediately adjacent to the crossing and did not move beyond the crossing. The vehicle was immediately removed from the crossing and an array of absorbent pads were placed by both the Hazmat team and the City maintenance crew on areas where sheen was observed. The City (Temecula) subsequently removed these pads once the sheen was absorbed. No further impacts were observed at the location of the incident. The City re-opened the low-flow access immediately afterward. The City appreciates the collective efforts between Haz Mat, Flood Control, and the County in resolving this issue".

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1584

Type	Spill
Received Date	8/15/2008
APN	964-060-001
First Name	Metro. Water Dist. (MWD)
Last Name	
Complainant Address	
Complainant City	Winchester
Complainant Zip Code	92396
Phone	0
Received By	David Ortega
Complaint Adderess	33740 Borel Road
Complaint City	Winchester
Complaint Zip Code	92396
Location	

Complaint 1 ounce of Ferric Chloride was released as drops from the last couple of deliveries.

Findings 8/15/08: MWD called the Governor's Office of Emergency Services (OES) to report this release. The OES issued a Hazardous Materials Spill Report, Control# 08-5954, concerning this incident. The OES report states that no water was involved from this release. The OES report also states that the substance was contained and cleaned up by the responsible party. The Riverside County Environmental Health Department was notified about this incident. There are no Riverside County Flood Control District facilities in the area of the complaint address that could have been impacted from this release.

Action

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1579

Type	Spill
Received Date	8/13/2008
APN	935-200-005
First Name	So. Cal. Edison (SCE)
Last Name	
Complainant Address	
Complainant City	Riverside County
Complainant Zip Code	92590
Phone	
Received By	David Ortega
Complaint Adderess	
Complaint City	Riverside County
Complaint Zip Code	92590
Location	Teramo Street and Charm Street

Complaint 10 gallons of mineral oil/Non-PCB was released from a pad mounted transformer due to an equipment failure.

Findings 8/13/08: SCE called the Governor's Office of Emergency Services (OES) to report this release. The OES issued a Hazardous Materials Spill Report, Control# 08-5891, concerning this incident. The OES report states that this release affected concrete, soil and grass. No water was involved from this incident. The OES report also states that the substance was contained and cleaned up by a contractor. The Riverside County Environmental Health Department was notified about this release. There are no Riverside County Flood Control District facilities in the area of the complaint location that could have been impacted from this incident. NOTE: The complaint APN listed in this report is a reference APN only.

Action

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1571

Type	Spill
Received Date	8/5/2008
APN	935-220-012
First Name	So. Cal. Edison (SCE)
Last Name	
Complainant Address	
Complainant City	Riverside County
Complainant Zip Code	92590
Phone	
Received By	David Ortega
Complaint Adderess	25367 Terreno
Complaint City	Riverside County
Complaint Zip Code	92590
Location	

Complaint 25 gallons of mineral oil/ Non-PCB was released onto the soil within an avocado grove from a pad-mounted transformer that failed.

Findings 8/5/08: SCE called the Governor's Office of Emergency Services (OES) to report this release. The OES issued a Hazardous Materials Spill Report, Control# 08-5682, concerning this incident. The OES report states that no water was involved from this release. The OES report also states that the substance was contained and will be cleaned up by AES (Contractor). The Riverside County Environmental Health Department was notified about this incident. There are no Riverside County Flood Control District facility in the area of the complaint address that could have been impacted from this release. NOTE: The complaint APN listed in this report is a reference APN only.

Action

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1561

Type	Spill
Received Date	7/28/2008
APN	909-290-009
First Name	Eastern Municipal Water District (EMWD)
Last Name	
Complainant Address	
Complainant City	Temecula
Complainant Zip Code	92590
Phone	
Received By	David Ortega
Complaint Adderess	42565 Avenida Alvarado
Complaint City	Temecula
Complaint Zip Code	92590
Location	

Complaint 1,000 gallons of secondary recycled water was released due to a valve that was left open.

Findings 7/28/08: EMWD called the Governor's Office of Emergency Services (OES) to report this release. The OES issued a Hazardous Materials Spill Report, Control# 08-5496, concerning this incident. The OES report states that no water and no drinking water was involved and/or impacted from this release. The OES report also states that the substance was contained and cleaned up by the reporting party (EMWD). The Riverside County Environmental Health Department was notified about this incident. The nearest Riverside County Flood Control District facility is located about .8 mile to the northeast of the complaint address: "Murrieta Creek at Winchester Road."

Action

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1557

Type	Spill
Received Date	7/22/2008
APN	929-040-013
First Name	Southern California Edison (SCE)
Last Name	
Complainant Address	
Complainant City	Riverside County
Complainant Zip Code	92562
Phone	
Received By	David Ortega
Complaint Adderess	34970 Via Sereno
Complaint City	Riverside County
Complaint Zip Code	92562
Location	

Complaint 20 gallons of unknown PCB mineral oil was released when a car hit a pad-mounted transformer.

Findings 7/22/08: SCE called the Governor's Office of Emergency Services (OES) to report this release. The OES issued a Hazardous Materials Spill Report, Control# 08-5354, concerning this incident. The OES report states that no water was involved from this release. The OES report also states that the substance was contained and cleaned up by a contractor. The Riverside County SO and the Riverside County Environmental Health Department were notified about this incident. There are no Riverside County Flood Control District facilities in the area of the complaint address that could have been impacted from this release.

Action

Riverside County Flood Control and Water Conservation District

NPDES Complaint No. 1526

Type	Spill
Received Date	7/7/2008
APN	572-050-002
First Name	NRC
Last Name	
Complainant Address	
Complainant City	Anza
Complainant Zip Code	92539
Phone	
Received By	David Ortega
Complaint Adderess	
Complaint City	Anza
Complaint Zip Code	92539
Location	Off Highway 371 next to the Anza Recycling Yard

Complaint As stated per the NRC Report# 876516, a caller reported that oil spilled from several 55 gallon drums onto the ground and was covered up with gravel by the company.

Findings 7/7/08: NRC called the Governor's Office of Emergency Services (OES) to report this spill. The OES issued a Hazardous Materials Spill Report, Control# 08-4967, concerning this incident. The OES report states that no water and no drinking water was involved and/or impacted from this spill. The OES report also states that it is unknown if the spill oil was contained and/or cleaned up. The Riverside County Environmental Health Department was notified about this incident. There are no Riverside County Flood Control District facilities in the area of the complaint location that could have been impacted from this spill. NOTE: The complaint APN listed in this report is a reference APN only.

Action

HOUSEHOLD HAZARDOUS WASTE / ANTIFREEZE, BATTERIES, OIL AND LATEX PAINT COLLECTION

Riverside County Waste Management Department
Household Hazardous Waste Collection Program
FY 2008/2009 Activities in
Santa Margarita Watershed

Location	Service Dates	Number of Service Days in FY 2008/2009	Contractor Cost	Total Vehicles	Batteries (Auto) (lbs) 45#/unit	Nicad/ Lithium Batteries (lbs)	Waste Oil (lbs) 8.5 lb/gal	Anti-Freeze (lbs) 8.5 lb/gal	Latex Paint (lbs) 10 lb/gal	Oil Filters (lbs)	Alkaline Batteries (lbs)	Mercury (lbs)	Propane (lbs)	Paint Related (lbs)	Fluor. Tubes (lbs) 0.2 lbs/linear foot	Flam. Solid/Liq (lbs)	Reuse (lbs)	Poison (lbs)	Acid (lbs)
Murrieta ABOP HHW Collection Facility																			
	All non-holiday Saturdays	**44**	**$ 37,029**	**1,927**	**9,810**	**221**	**25,160**	**3,528**	**51,655**	**1,264**	**797**	**0**	**0**	**657**	**0**	**511**	**0**	**0**	**0**
Temporary HHW Collection Facility (THHWCF) Events																			
Aguanga	10/18/2008	1	**$ 750**	11	69	0	850	34	0	0	15	0	180	694	4	167	0	0	0
Aguanga	5/30/2009	1	**$ 900**	12	255	0	425	0	250	4	10	0	6	0	11	0	0	72	18
Subtotal		**2**	**$ 1,650**	**23**	**324**	**0**	**1,275**	**34**	**250**	**4**	**25**	**0**	**186**	**694**	**15**	**167**	**0**	**72**	**18**
Anza	9/27/2008	1	**$ 5,336**	67	407	0	2,635	128	1,200	85	31	0	190	862	0	1,854	20	471	361
Anza	12/20/2008	1	**$ 1,650**	24	90	0	850	0	500	14	7	0	0	340	0	551	0	213	9
Anza	3/28/2009	1	**$ 4,575**	62	642	16	2,848	0	700	41	70	0	226	773	23	904	2	215	9
Subtotal		**3**	**$ 11,561**	**153**	**1,139**	**16**	**6,333**	**128**	**2,400**	**140**	**108**	**0**	**416**	**1,975**	**23**	**3,309**	**22**	**899**	**379**
Pinyon Pines	11/15/2008	1	**$ 1,725**	28	759	27	638	26	650	38	38	0	5	201	11	0	0	136	0
Pinyon Pines	5/16/2009	1	**$ 2,025**	30	203	10	680	255	400	31	16	0	27	473	16	220	0	285	0
Subtotal		**2**	**$ 3,750**	**58**	**962**	**37**	**1,318**	**281**	**1,050**	**69**	**54**	**0**	**32**	**674**	**27**	**220**	**0**	**421**	**0**
Temecula	9/13/2008	1	**$ 26,519**	382	2,233	90	1,488	340	5,250	15	430	5	1,751	3,173	162	3,462	0	547	136
Temecula	1/31/2009	1	**$ 34,875**	495	1,448	194	1,488	425	9,000	55	645	6	775	3,338	203	4,447	2	583	245
Temecula	5/9/2009	1	**$ 18,750**	261	923	56	1,275	340	3,700	13	256	6	159	2,170	49	2,577	0	191	113
Subtotal		**3**	**$ 80,144**	**1,138**	**4,604**	**340**	**4,250**	**1,105**	**17,950**	**83**	**1,331**	**17**	**2,685**	**8,681**	**414**	**10,486**	**2**	**1,321**	**494**
TOTAL THHWCF		**10**	**97,105**	**1,372**	**7,029**	**393**	**13,176**	**1,548**	**21,650**	**296**	**1,518**	**17**	**3,319**	**12,024**	**479**	**14,182**	**24**	**2,713**	**891**
TOTAL AMOUNTS FROM ALL HHW FACILITY TYPES IN SANTA MARGARITA WATERSHED																			
		54	**$ 134,134**	**3,299**	**16,839**	**614**	**38,336**	**5,076**	**73,305**	**1,560**	**2,315**	**17**	**3,319**	**12,681**	**479**	**14,693**	**24**	**2,713**	**891**

Riverside County Waste Management Department
Household Hazardous Waste Collection Program
FY 2008/2009 Activities in
Santa Margarita Watershed

Location	Service Dates	Number of Service Days in FY 2008/2009	Contractor Cost	Total Vehicles	Base (lbs)	Oxidizer (lbs)	Other (lbs)	Aerosols (lbs)	Asbestos (lbs)	Sharps (lbs)	CRTs (lbs)	Misc E-waste (lbs)	Total Pounds Shipped
Murrieta ABOP HHW Collection Facility													
	All non-holiday Saturdays	**44**	**$ 37,029**	**1,927**	**0**	**0**	**1,200**	**0**	**0**	**0**	**0**	**0**	**94,803**
Temporary HHW Collection Facility (THHWCF) Events													
Aguanga	10/18/2008	1	**$ 750**	11	0	0	0	18	0	0	60	20	2,111
Aguanga	5/30/2009	1	**$ 900**	12	0	8	0	26	0	7	26	520	1,638
Subtotal		**2**	**$ 1,650**	**23**	**0**	**8**	**0**	**44**	**0**	**7**	**86**	**540**	**3,749**
Anza	9/27/2008	1	**$ 5,336**	67	130	12	659	133	0	53	40	20	9,291
Anza	12/20/2008	1	**$ 1,650**	24	0	0	0	11	0	0	780	160	3,525
Anza	3/28/2009	1	**$ 4,575**	62	46	9	33	88	0	0	0	280	6,925
Subtotal		**3**	**$ 11,561**	**153**	**176**	**21**	**692**	**232**	**0**	**53**	**820**	**460**	**19,741**
Pinyon Pines	11/15/2008	1	**$ 1,725**	28	0	0	309	16	0	0	1,420	600	4,874
Pinyon Pines	5/16/2009	1	**$ 2,025**	30	0	0	16	28	0	15	360	200	3,235
Subtotal		**2**	**$ 3,750**	**58**	**0**	**0**	**325**	**44**	**0**	**15**	**1,780**	**800**	**8,109**
Temecula	9/13/2008	1	**$ 26,519**	382	326	18	36	486	0	114	6,680	4,100	30,842
Temecula	1/31/2009	1	**$ 34,875**	495	224	51	185	800	0	166	6,460	4,560	35,300
Temecula	5/9/2009	1	**$ 18,750**	261	268	18	106	351	0	132	1,760	1,900	16,363
Subtotal		**3**	**$ 80,144**	**1,138**	**818**	**87**	**327**	**1,637**	**0**	**412**	**14,900**	**10,560**	**82,504**
TOTAL THHWCF		**10**	**97,105**	**1,372**	**994**	**116**	**1,344**	**1,957**	**0**	**487**	**17,586**	**12,360**	**114,103**
TOTAL AMOUNTS FROM ALL HHW FACILITY TYPES IN S													
		54	**$ 134,134**	**3,299**	**994**	**116**	**2,544**	**1,957**	**0**	**487**	**17,586**	**12,360**	**208,906**

WATERSHED CLEANUP FLYER AND ARTICLE

Please Join Us!

SANTA MARGARITA RIVER

WATERSHED CLEAN UP

November 1, 2008, 8am-12pm

The 26.2 mile watershed of the Santa Margarita River provides habitat for plants and animals in San Diego and Riverside Counties. Since 1995, volunteers have prevented over 1400 tons of trash from polluting our creeks and entering the Pacific Ocean.

8:00 am Report to one of the staging areas below to pick up
your free Clean Up T-shirt, garbage bags,
and directions to your clean up area.

12:00 pm Free barbecue for volunteers
at Perrit Park in Lakeland Village

Murrieta Staging Areas:

Santa Rosa Plateau Ecological Reserve, 39400 Clinton Keith Road
Murrieta Police Station, 24701 Jefferson Avenue

For more information, contact Carole Bell at (951) 677-6951x223 or cbell@tnc.org
Community Service Hours are available

Sponsored by: Supervisor Bob Buster, CR&R, WM and EMARCD

PE.com Press Enterprise Article

Volunteers move mountains of debris from areas around Murrieta

10:00 PM PDT on Saturday, November 1, 2008

By JERRY SOIFER
Special to The Press-Enterprise

MURRIETA - Joe Bobak, a transplant from Chicago to Murrieta, searched the Web site of his new hometown for a place he could take his daughter trick-or-treating on Halloween.

Instead, he found an announcement of the cleanup of the watershed of the Santa Margarita River west of Murrieta. Bobak and his wife, Lauren, were two of 125 people who attempted to purge trash and all forms of pollution Saturday from the Santa Rosa Plateau Reserve, the Lakeland Village area, Lake Elsinore and the environs of Murrieta.

The group picked up about 25 tons of waste such as a hot tub, enough discarded parts to build an auto and the skeletal remains of animals, including what may have been a horse.

Carole Anne Bell, manager of the reserve who started the event in 1994, said, "The (De Luz) Canyon looks free of trash as of this moment. What makes this a success is all these people joining together."

People came from as far as Norco, Woodcrest and Bonsall in San Diego County. "This is the good half of humanity," Bryce Miller, of Bonsall, said of his colleagues working in DeLuz Canyon.

"That's the bad half," Miller said, pointing at the rubble they had pushed up the side of a hill.

Bobak said he joined the cleanup effort to get out of the house and to exercise.

Riverside County code workers hooked up a chain to the hot tub to haul it up from the side of the canyon before it was loaded on a truck.

"Once we got it attached (to the chain), it wasn't too hard," said Mike Slaick, county flood control operator.

The Bobaks, Miller and Murrieta residents Zach and Beth Principe needed mountaineering skills to inch their way down the side of the canyon to retrieve trash. Zach Principe found a wallet filled with credit cards. Beth found a pillow which she flung

like a Frisbee. They found a child's bicycle with its training wheels, and legal documents that might have been divorce papers.

Kim Hull, 16, a Murrieta Valley High School junior, found desks, plastic piping and lockers while working off Jackson Avenue in Murrieta. "We filled a whole Dumpster," Kim said. "I was sweating. It wasn't that hot."

Vance Usui, a teacher at Norco High School, brought five students to give them "a first-hand look at what we do to the environment and to also get some community service hours."

Bell said the cleanup was scheduled in mid-fall to avoid the heat. Large satellite dishes were a common find at previous cleanups because smaller ones were coming into vogue, Bell said.

At noon, the volunteers joined county workers and Cal Fire firefighters for a picnic at Perret Park in Lakeland Village. Cal Fire Capt. John Crater said, "This is an example of leadership in the community and getting to know their neighbors. The more of these events they have, the closer the community becomes."

Samantha Dempster, of Woodcrest, collects shirts with the cleanup insignia the way runners amass shirts from races.

She wore the shirt from the 2004 cleanup Saturday.

Erin Snyder, of Riverside, worked at her third cleanup in the space of a month.

"This is such a pretty county site," said Snyder who was wearing a shirt from the 2006 cleanup. "It's a great excuse to get out here."

http://www.pe.com/localnews/inland/stories/PE_News_Local_N_scleanup02.48b1411.html

Riverside County Flood Control and Water Conservation District

Accomplishments for Murrieta Creek Clean Up

Filter ((((..\Start Date Actual is from #11/1/08#) And (..\Start Date Actual is through #11/1/08#)) And (..\rcfc zone is equal to "7")) And (..\rcfc project is equal to "00020"))

7 00020 MURRIETA CREEK CHANNEL

Activity Number: 110 **Activity Name:** Supervision

Quantity: 18.00

Total Quantity: 18.00 **Unit:** Workhour

Activity Number: 404 **Activity Name:** Trash Pickup

Quantity: 4.65

Total Quantity: 4.65 **Unit:** Ton

Activity Number: 7000 **Activity Name:** Debris taken out of Channels

Quantity: 7.35

Total Quantity: 7.35 **Unit:** Ton

CAP INSPECTIONS REPORT

Food Facilities inspected as part of CAP program

FY 2008-2009

020405

Murrieta

PR0038920	Aliberto's Mexican Food	25312 Madison Ave Ste #102	Murrieta	9/23/08
PR0005098	ALTA MURRIETA ELEMENTARY SCHOOL	39475 WHITEWOOD RD	MURRIETA	11/6/08
PR0005263	ANDY'S CAFE	40469 MURRIETA HOT SPRINGS RD	MURRIETA	9/8/08
PR0008985	ANTELOPE HILLS ELEMENTARY	36105 E MURRIETA OAKS Ave	MURRIETA	10/30/08
PR0038294	Anthony's Lounge & Restorante	24630 Washington Ave #100	Murrieta	9/24/08
PR0038210	Applebee's Neighborhood Grill & Bar	24872 Madison Ave	Murrieta	1/15/09
PR0035931	AROMAS COFFEE AND FLORAL CO	29950 HUNTER RD 103	Murrieta	8/6/08
PR0004941	AVAXAT ELEMENTARY SCHOOL	24300 LAS BRISAS Rd	MURRIETA	10/30/08
PR0039759	Baja Grill	40663 Murrieta Hot Springs Rd	Murrieta	2/18/09
PR0008470	BELLA VISTA MIDDLE SCHOOL	31650 BROWNING ST	MURRIETA	12/2/08
PR0036899	Board'z Grill	39509 Los Alamos Rd D	Murrieta	8/6/08
PR0039096	Booster Juice	24635 Madison Ave	Murrieta	11/6/08
PR0007099	BUCHANAN ELEMENTARY	40121 TORREY PINES RD	MURRIETA	11/6/08
PR0009407	CARL'S JR.	28023 SCOTT RD	MURRIETA	9/10/08
PR0039593	Catch of the Day Seafood Grill	40365 Murrieta Hot Springs Rd Ste #C-14	Murrieta	1/13/09
PR0008306	CHINA PANDA	39252 WINCHESTER RD 121	MURRIETA	10/29/08
PR0007186	CHUY'S MESQUITE BROILER	25401 MADISON AVE	MURRIETA	1/15/09
PR0006906	COLE CANYON ELEMENTARY SCHOOL	23750 VIA ALISOL	MURRIETA	9/17/08
PR0039395	Cookie's Cafe	25030 Hamcock Ave Ste #104	Murrieta	1/12/09
PR0005368	DEL TACO #249	40465 ALTA MURRIETA DR	MURRIETA	8/11/08
PR0042451	Dick's Sporting Goods	40404 Murrieta Hot Springs Rd	Murrieta	5/26/09
PR0005097	E. HALE CURRAN ELEMENTARY SCHOOL	40855 CHACO CANYON RD	MURRIETA	9/17/08
PR0039450	E1-X / Mini Melts Dist	26692 Pierce Cir Ste #B	Murrieta	1/13/09
PR0006836	FRENCH VALLEY CAFE	37552 WINCHESTER RD	MURRIETA	9/8/08
PR0038837	Fresh and Easy	39530 Murrieta Hot Springs Rd	Murrieta	9/9/08
PR0003813	GOLDEN PHOENIX--OOB	25100 HANCOCK AVE 105	MURRIETA	1/12/09
PR0036179	Hole In One Donuts & Bagels	40119 Murrieta Hot Springs Rd	Murrieta	8/19/08
PR0005231	HONEYCUTT FARMS	40477 MURRIETA HOT SPRINGS RD	MURRIETA	8/12/08
PR0006460	HOT WOK CHINESE FOOD	40469 MURRIETA HOT SPRINGS RD	MURRIETA	8/12/08
PR0040078	Jack in the Box	33080 Antelope Rd	Murrieta	2/10/09
PR0037948	Juice It Up	27890 Clinton Keith Rd #G	Murrieta	7/2/08
PR0038029	KR's Chicken & Ribs	41539 Kalmia St #120	Murrieta	10/30/08
PR0038029	KR's Chicken & Ribs	41539 Kalmia St #120	Murrieta	8/4/08
PR0010409	LE PETIT CAFE	26499 JEFFERSON AVE #F	MURRIETA	10/30/08
PR0018253	Lisa J Mails Elementary School	35185 Briggs	Murrieta	11/12/08
PR0039802	Little Caesars Pizza #5955	39209 Winchester Rd Ste #103	Murrieta	1/29/09
PR0008007	MONTE VISTA ELEMENTARY SCHOOL	37420 VIA MIRA MOSA	MURRIETA	11/6/08
PR0039567	Murrieta Home Brew Emporium	38750 Sky Canyon Dr	Murrieta	12/23/08
PR0037713	Murrieta Pizza Factory--OOB	40477 Murrieta Hot Springs Rd # D3	Murrieta	9/22/08
PR0005940	MURRIETA VALLEY HIGH SCHOOL	24105 WASHINGTON AVE	MURRIETA	9/17/08
PR0005940	MURRIETA VALLEY HIGH SCHOOL	24105 WASHINGTON AVE	MURRIETA	12/3/08
PR0008932	OAK MEADOWS ELEMENTARY SCHOOL	28600 POINSETTIA ST	MURRIETA	10/30/08
PR0039917	Office Depot #2371	24500 Village Walk	Murrieta	1/23/09
PR0003746	PEONY CHINESE CUISINE	39525 LOS ALAMOS RD	MURRIETA	9/10/08
PR0040382	Pho Tho Vietnamese Restaurant	40250 Murrieta Hot Springs Rd Ste #101	Murrieta	3/17/09
PR0005099	RAIL RANCH ELEMENTARY SCHOOL	25030 VIA SANTEE Rd	MURRIETA	11/6/08
PR0039349	Rubio's Murrieta Store	40436 Murrieta Hot Springs Rd	Murrieta	11/18/08
PR0004880	SCGA MEMBERS' CLUB AT RANCHO CALIFORNIA	39500 ROBERT TRENT JONES PKWAY	MURRIETA	10/21/08
PR0039801	Scott-Murrieta Service Station LP	33070 Antelope Rd	Murrieta	1/20/09
PR0037351	SGC Sushi Japanese Restaurant	40461 Murrieta Hot Springs Rd Ste J-2	Murrieta	8/12/08
PR0006155	SHIVELA MIDDLE SCHOOL	24515 LINCOLN AVE	MURRIETA	12/3/08
PR0004907	SIDELINES SPORTS BAR & GRILL	24910 WASHINGTON AVE	MURRIETA	11/6/08
PR0004907	SIDELINES SPORTS BAR & GRILL	24910 WASHINGTON AVE	MURRIETA	6/9/09
PR0005297	SIZZLER	40489 MURRIETA HOT SPRINGS RD	MURRIETA	9/8/08
PR0038244	Smokin Joe's Pizza Deli	38365 Innovation Ct	Murrieta	9/23/08
PR0038401	Subway	31460 Murrieta Hot Springs	Murrieta	10/16/08
PR0008392	SWEET LAYERS CAKES & PASTRIES	29992 HUNTER RD 103	MURRIETA	9/10/08
PR0037917	T K's Donuts & Ice Cream	41539 Kalmia St #107	Murrieta	7/2/08
PR0009123	TACO BELL #22691	39056 WINCHESTER RD	MURRIETA	8/5/08
PR0003022	TACO BELL #5081	39557 LOS ALAMOS RD	MURRIETA	8/12/08
PR0039494	Taco's Durango	41539 Kalmia St #105	Murrieta	1/21/09
PR0007458	THAI ORCHID RESTAURANT	25359 MADISON AVE F101	MURRIETA	11/18/08
PR0035693	The Mill	24690 Washington ST	Murrieta	11/12/08
PR0006827	THOMPSON MIDDLE SCHOOL	42400 NIGHTHAWK WAY	MURRIETA	9/24/08
PR0006622	TOVASHAL ELEMENTARY SCHOOL	23801 SAINT RAPHAEL DR	MURRIETA	10/30/08
PR0039054	Truly Madly Sweetly	41539 Kalmia Ste #102	Murrieta	10/29/08
PR0040796	Unique Pizza & Subs	25383 Madison Ave	Murrieta	4/8/09
PR0008008	VISTA MURRIETA HIGH SCHOOL	28251 CLINTON KEITH RD	MURRIETA	10/30/08
PR0006973	WAL-MART #2952	41200 MURRIETA HOT SPRINGS RD	MURRIETA	7/31/08
PR0008521	WARM SPRINGS MIDDLE SCHOOL	39245 CALLE DE FORTUNA	MURRIETA	11/6/08
PR0039925	White Lime Yogurt	39540 Murrieta Hot Springs Rd	Murrieta	1/28/09
PR0039496	Xtreme Frozen Yogurt	27890 Clinton Keith Rd Ste #C	Murrieta	12/2/08

Food Facilities inspected as part of CAP program

FY 2008-2009

Total Site Visits for Murrieta - 72

Food Facilities inspected as part of CAP program

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020407

Temecula

PR0038170	5th Ave Dog House	41958 Fifth St	Temecula	9/23/08
PR0040047	Abbott Vascular Coffee Bar	41888 Motorcar Pkwy	Temecula	3/18/09
PR0006641	ABBY REINKE ELEMENTARY SCHOOL	43799 SUNNY MEADOWS DR	TEMECULA	9/9/08
PR0009803	AIYARA THAI CUISINE	41533 MARGARITA RD	TEMECULA	1/15/09
PR0008461	ALAMOS ELEMENTARY SCHOOL	38200 PACIFIC PARK DR	TEMECULA	12/2/08
PR0037420	America's Wholesale Ice Cream--OOB	26111 Ynez Rd #B-2	Temecula	8/13/08
PR0005113	ARBY'S	27702 JEFFERSON AVE	TEMECULA	1/14/09
PR0041041	Arco Am/Pm	27691 Ynez Rd	Temecula	5/7/09
PR0009924	BASKIN ROBBINS--OOB	31891 RANCHO CALIFORNIA RD 300	TEMECULA	7/9/08
PR0009739	BJ'S RESTAURANT	26500 YNEZ RD	TEMECULA	10/30/08
PR0038295	Bob's Big Boy	27313 Jefferson Ave	Temecula	7/28/08
PR0006844	BURGER KING	40520 WINCHESTER RD	TEMECULA	10/28/08
PR0037985	California Tea & Coffee Brewery	40315 Winchester Rd #A	Temecula	7/25/08
PR0039873	Chevron Extra Mile Station	28900 Rancho California	Temecula	1/7/09
PR0003876	CHEVRON FOOD MART	40635 WINCHESTER RD	TEMECULA	10/29/08
PR0003819	CHILIS GRILL & BAR	27645 YNEZ RD	TEMECULA	2/3/09
PR0008546	CHIPOTLE MEXICAN GRILL	40573 MARGARITA RD E	TEMECULA	10/29/08
PR0039845	Chronic Tacos	27523 Ynez Rd	Temecula	4/21/09
PR0008988	CROWNE HILL ELEMENTARY SCHOOL	33535 OLD KENT RD	TEMECULA	10/2/08
PR0037683	Daly's Frozen--OOB	28480 Old Town Front St D	Temecula	7/2/08
PR0004452	DEL TACO #395	27445 JEFFERSON AVE	TEMECULA	1/14/09
PR0009095	DEL TACO #763	30607 HWY 79 S	TEMECULA	7/11/08
PR0006832	DEL TACO #835	40375 WINCHESTER RD	TEMECULA	10/22/08
PR0003353	DENNY'S #1947--OOB	28915 RANCHO CALIFORNIA RD	TEMECULA	1/13/09
PR0004958	EL POLLO LOCO #3337	27375 JEFFERSON AVE	TEMECULA	1/13/09
PR0009263	EL TORITO RESTAURANT	40517 MARGARITA RD	TEMECULA	10/29/08
PR0007981	ERLE STANLEY GARDNER MIDDLE SCHOOL	45125 VIA DEL CORONADO	TEMECULA	12/4/08
PR0040336	ET's Lounge	27423 Jefferson Ave	Temecula	5/15/09
PR0040335	Filipinoy Asian Market	31141 Temecula Pkwy Ste #4	Temecula	3/17/09
PR0005982	FISH HOUSE VERA CRUZ	26700 YNEZ RD	TEMECULA	10/30/08
PR0039364	Fresh & Easy	44060 Margarita Rd	Temecula	1/29/09
PR0037918	Giant New York Pizza Co--OOB	27371 Jefferson Ave #S	Temecula	8/12/08
PR0040076	Goldilocks Bakery and Restaurant	27480 YNEZ Rd STE #O-1	Temecula	3/18/09
PR0040302	Great Harvest Bread Co	31795 Rancho California Rd	Temecula	3/16/09
PR0008455	GREAT OAKS HIGH SCHOOL-SNACK BAR-200	32555 DEER HOLLOW WAY	TEMECULA	11/20/08
PR0006599	HELEN HUNT JACKSON ELEMENTARY SCHOOL	32400 CAMINO SAN DIMAS	TEMECULA	11/20/08
PR0004613	JACK IN THE BOX #48--OOB	27410 JEFFERSON AVE	TEMECULA	11/18/08
PR0006600	JAMES L. DAY MIDDLE SCHOOL	40775 CAMINO CAMPOS VERDE	TEMECULA	9/30/08
PR0038147	Juice It Up! Village Walk	39848 Winchester Rd #8	Temecula	8/6/08
PR0004774	LA CASITA NUEVA	27645 JEFFERSON AVE	TEMECULA	10/30/08
PR0039803	Little Caesars Pizza #5956	44066 Margarita Rd Ste # 4	Temecula	2/2/09
PR0040692	Lucille's Smokehouse BBQ	40748 Winchester Rd	Temecula	5/12/09
PR0003340	MAD MADELINES	28495 FRONT ST	TEMECULA	10/22/08
PR0040512	Mangoz Ultimate Frozen Yogurt	40573 Margarita Rd #B	Temecula	4/8/09
PR0004940	MARGARITA MIDDLE SCHOOL	30600 MARGARITA RD	TEMECULA	12/2/08
PR0038283	Mariscos El Cuete	32459 Temecula Pkwy # D-107	Temecula	9/15/08
PR0004646	MCDONALD'S	28100 Jefferson Ave	TEMECULA	11/13/08
PR0036852	Meritage At Callaway	32720 Rancho California Rd	Temecula	7/1/08
PR0039100	Mr Shish Restaurant	28120 Jefferson Ave Ste #A101	Temecula	1/14/09
PR0010311	MR YOU EXPRESS	31795 RANCHO CALIFORNIA RD 100	TEMECULA	7/9/08
PR0005274	NICHOLAS VALLEY ELEMENTARY SCHOOL	39600 N GENERAL KEARNY Rd	TEMECULA	12/2/08
PR0038558	Noodles Of The World	32965 Temecula Parkway	Temecula	11/4/08
PR0040841	Noodles Of The World	30590 Rancho California Rd Ste C303	Temecula	4/29/09
PR0038206	Oak Mountain Winery	36522 Via Verde	Temecula	12/4/08
PR0040389	P F Chang's China Bistro	40762 Winchester Rd #400	Temecula	4/6/09
PR0006303	PALOMA ELEMENTARY SCHOOL	42940 VIA RAMI	TEMECULA	10/2/08
PR0039592	Pami Kabob House	41257 Margarita Rd Ste #B101	Temecula	1/30/09
PR0041437	Papa Paul's Restaurant	27470 Commerce Center Dr	Temecula	5/7/09
PR0036982	Papa Paul's Restaurant--OOB	27535 Jefferson Ave	Temecula	9/30/08
PR0006451	PAUBA VALLEY ELEMENTARY	33215 REGINA DR	TEMECULA	9/9/08
PR0038827	Pizza Fusion	40695 Winchester Rd Ste #C1	Temecula	11/18/08
PR0004752	RANCHO ELEMENTARY SCHOOL	31530 LA SERENA WAY	TEMECULA	10/2/08
PR0042480	Rancho Fruit Market	28670 Old Town Front St	Temecula	5/29/09
PR0005482	RED HAWK ELEMENTARY SCHOOL	32045 CAMINO SAN JOSE	TEMECULA	11/20/08
PR0042402	Ruby Tuesday 6201	41785 Nicole Ln	Temecula	5/29/09
PR0006947	SAIGON NOODLE HOUSE	27523 JEFFERSON AVE	TEMECULA	11/7/08
PR0005051	SERRANO'S FRESCO GRILL	27315 JEFFERSON AVE	TEMECULA	11/4/08
PR0039862	Shakey's Pizza Parlor	26479 Ynez Rd Ste #C	Temecula	1/9/09
PR0039442	South Coast Winery- Snack Bar	34843 Rancho California Rd	Temecula	12/4/08
PR0004938	SPARKMAN ELEMENTARY SCHOOL	32225 PIO PICO Rd	TEMECULA	9/9/08
PR0038150	Starbucks Coffee #14486	39848 Winchester Rd	Temecula	8/6/08
PR0004571	SUSHI HOUSE ONE +	27725 JEFFERSON AVE -104	TEMECULA	11/7/08

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PR0042625	Sweet Lumpy's BBQ	41915 3rd St	Temecula	6/26/09
PR0006712	T.G.I. FRIDAY'S	40830 WINCHESTER RD	TEMECULA	11/4/08
PR0005657	TACO BELL #19515	41005 WINCHESTER RD	TEMECULA	10/29/08
PR0039913	Tacos El Gordo	27590 Jefferson Ave	Temecula	2/11/09
PR0040196	Taqueria Los Campeones	41925 Motorcar Pkwy	Temecula	2/25/09
PR0039552	Tastee Tacos	43049 Margarita Rd Ste #A103	Temecula	12/4/08
PR0005100	TEMECULA ELEMENTARY SCHOOL	41951 MORAGA RD	TEMECULA	9/30/08
PR0038721	Temecula Luiseno Elementary	45754 N Wolf Creek Dr	Temecula	12/4/08
PR0004324	TEMECULA MIDDLE SCHOOL	42075 MEADOWS PKWY	TEMECULA	10/2/08
PR0038973	Temecula Valley Elks #2801	28061 Diaz	Temecula	10/2/08
PR0004647	TEMECULA VALLEY HIGH SCHOOL	31555 RANCHO VISTA RD	TEMECULA	10/7/08
PR0005109	TEMECULA VALLEY HS CAMPUS SNACK BAR	31350 RANCHO VISTA RD	TEMECULA	10/7/08
PR0038928	The Blue Peacock	27536 Ynez Rd	Temecula	11/10/08
PR0008089	THE FORGE	42170 SARAH WAY B	TEMECULA	11/12/08
PR0042166	The Gambling Cowboy Chophouse &	42072 Fifth St #303	Temecula	5/22/09
PR0038044	The Melting Pot	39738 Winchester Rd	Temecula	8/7/08
PR0038492	The Public House	41971 Main St	Temecula	9/23/08
PR0005283	THE SWEET BEAN	30590 RANCHO CALIFORNIA RD	TEMECULA	7/9/08
PR0009441	TOBIN ELEMENTARY SCHOOL	45200 MORGAN HILL DR	TEMECULA	9/9/08
PR0004325	VAIL ELEMENTARY SCHOOL	29915 MIRA LOMA DR	TEMECULA	10/7/08
PR0006410	VAIL RANCH MIDDLE SCHOOL	33340 CAMINO PIEDRA ROJO	TEMECULA	9/9/08
PR0042400	Vesuvio Brick Fired Pizza	27371 Jefferson Ave Ste #S	Temecula	5/21/09
PR0004803	VINCE'S SPAGHETTI EXPRESS	28145 JEFFERSON	TEMECULA	11/13/08
PR0005658	VINTAGE HILLS ELEMENTARY SCHOOL	42240 CAMINO ROMO	TEMECULA	10/7/08
PR0039145	Virginia Barbeque	30571 Temecula Pkwy Ste #C	Temecula	11/4/08
PR0010329	WENDI DONUTS	31867 RANCHO CALIFORNIA RD	TEMECULA	7/9/08
PR0042407	Whimsical Yogurt & Gelato	40756 Winchester Rd	Temecula	5/29/09
PR0042403	White Lime	30630 Rancho California Rd Ste #503	Temecula	6/29/09
PR0040724	Williams Sonoma #795	40764 Winchester Rd Ste #560	Temecula	4/9/09
PR0007606	WILSON CREEK WINERY	35960 RANCHO CALIFORNIA RD	TEMECULA	11/4/08
PR0039329	Wilson Creek Winery Restaurant	35960 Rancho California Rd	Temecula	11/4/08
PR0040666	Yard House	40770 Winchester Rd Ste #750	Temecula	4/9/09
PR0039903	Yogurt Island	32240 Temecula Pkwy Ste #B106	Temecula	2/4/09
PR0042465	Yogurt Point	29073 Overland Dr Ste #J	Temecula	5/29/09
PR0037977	Zarka Cigar Lounge	28120 Jefferson Ave Ste# B202	Temecula	7/2/08

Total Site Visits for Temecula - 107

WILDOMAR

PR0006301	BROWN MIDDLE SCHOOL	21861 GRAND AVE	WILDOMAR	10/27/08
PR0040457	Checkerboard Deli	36068 Hidden Springs Ste #B	Wildomar	4/7/09
PR0039673	Denny's #7830	23857 Clinton Keith Rd	Wildomar	1/21/09
PR0038509	La Cresta Mexican Grill	23865 Clinton Keith Rd #2	Wildomar	9/30/08
PR0038514	Panda Express	23861 Clinton Keith Rd Ste 1	Wildomar	9/30/08
PR0009047	RONALD REAGAN ELEMENTARY SCHOOL	35445 PORRAS RD	WILDOMAR	10/27/08
PR0004333	WILDOMAR ELEMENTARY SCHOOL	21575 PALOMAR ST	WILDOMAR	10/27/08
PR0009379	WILLIAM COLLIER ELEMENTARY SCHOOL	20150 MAYHALL DR	WILDOMAR	10/29/08

Total Site Visits for WILDOMAR - 8

TOTAL SITE VISITS: 187

Hazardous Materials Facilities inspected as part of CAP program

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Murrieta

PR0033621	1st Class Collision Murrieta	41729 Eastman Dr	Murrieta	1/15/09
PR0023695	A-1 Murrieta Auto Repair	26622 Jefferson Ave #103	Murrieta	1/15/09
PR0023726	Affordable Automotive Repair	41604 Date St Ste.D	Murrieta	5/28/09
PR0019702	Airmech Inc	37552 Winchester Rd	Murrieta	7/30/08
PR0038081	Albertson's #6609	28047 Scott Rd	Murrieta	3/12/09
PR0033141	Albertson's #6734	39224 Winchester Rd	Murrieta	2/23/09
PR0032786	Alta Dry Cleaners	40365 Murrieta Hot Sprgs #C-1	Murrieta	1/13/09
PR0023293	Alta Dry Cleaners	40365 Murrieta Hot Sprgs #C-1	Murrieta	8/19/08
PR0019732	Auto Techniques	41340 Pear St #15	Murrieta	1/22/09
PR0040172	Autobahn Automotive	26871 Hobie Cir #B-1	Murrieta	1/22/09
PR0034046	AutoZone #5566	40950 California Oaks Rd	Murrieta	7/25/08
PR0023402	Baliani Automotive	26450 Jefferson Ave #104	Murrieta	1/27/09
PR0021213	Big O Tires	40420 California Oaks Rd	Murrieta	8/8/08
PR0031137	Black's Auto Repair	25760 Washington Ave	Murrieta	4/20/09
PR0033838	Brunswick California Oaks Bowl	40440 California Oaks Rd	Murrieta	7/31/08
PR0031558	Caliber Collision Centers	41416 Pear St	Murrieta	4/29/09
PR0029662	California Auto Centers	26860 Jefferson Ave #I	Murrieta	4/29/09
PR0023067	California Oaks Carwash/Quick Lu	40933 California Oaks Rd	Murrieta	7/2/08
PR0031104	California Oaks Shell	40981 California Oaks Rd	Murrieta	2/3/09
PR0028363	Calvary Chapel Conference Cente	39405 Murrieta Hot Sprgs Rd	Murrieta	3/17/09
PR0032421	Cameron Welding Supply	41341 Date St	Murrieta	5/28/09
PR0032979	Capri Cleaners	40119 Murrieta Hot Sprgs Rd	Murrieta	1/12/09
PR0033784	Carl's Jr #1105	40980 California Oaks Rd	Murrieta	8/7/08
PR0033596	Carriage Motors, Inc	26825 Auto Mall Pkwy	Murrieta	2/25/09
PR0040805	Carrier Sales & Distribution, LLC	41710 Reagan Wy	Murrieta	6/1/09
PR0034066	Chevron Station #21-0409	39440 Murrieta Hot Springs Rd	Murrieta	5/5/09
PR0028096	Chevron Stations Inc. #1484/2012	40500 California Oaks Rd	Murrieta	4/2/09
PR0033788	Chuck E Cheese #414	25110 Hancock Ave	Murrieta	3/5/09
PR0020242	Classic Cleaners-OOB OOB	40605 California Oaks Rd #G1	Murrieta	8/19/08
PR0032532	Convenience Retailers LLC-OOB	41010 California Oaks Rd	Murrieta	1/13/09
PR0022157	CVS Pharmacy #9628	25080 Hancock Ave	Murrieta	3/5/09
PR0025974	Excaliber Fuels #5	40648 California Oaks Rd	Murrieta	11/26/08
PR0029929	Excaliber Fuels #5	40648 California Oaks Rd	Murrieta	1/8/09
PR0022448	Express Tire - Murrieta	40615 California Oaks Rd	Murrieta	8/8/08
PR0022360	EZ Lube #115	40430 California Oaks Rd	Murrieta	7/31/08
PR0028199	Faith Quality Auto Body, Inc.	41130 Nick Ln	Murrieta	4/28/09
PR0028213	Gentle Dry Cleaners	25060 Hancock Ave #101	Murrieta	3/5/09
PR0023425	High Tech Auto	26450 Jefferson Ave #103	Murrieta	1/27/09
PR0030701	Home Depot #668	25100 Madison Ave	Murrieta	5/27/09
PR0028205	Hot Springs Cleaners	40469 Murrieta Hot Sprgs Rd #G1	Murrieta	1/13/09
PR0028292	International Immunology Corp	25549 Adams Ave	Murrieta	1/8/09
PR0028280	James Allen Collision Center II	41109 Sandalwood Cir	Murrieta	3/16/09
PR0032329	Johnson Machinery Rentals	41105 Raintree Ct	Murrieta	2/2/09
PR0029972	Kip Incorporated	25740 Washington Ave	Murrieta	4/20/09
PR0034035	Kragen Auto Parts #1430	40951 California Oaks Rd	Murrieta	7/25/08
PR0026296	Madison Shell #68569	25336 Madison Ave	Murrieta	12/8/08
PR0023721	Murrieta 76	39460 Murrieta Hot Springs Rd	Murrieta	10/14/08
PR0033911	Murrieta Hot Springs Shell	40452 Murrieta Hot Springs Rd	Murrieta	5/19/09
PR0033504	Murrieta Volkswagon	41300 Date St	Murrieta	2/25/09
PR0033099	MVUSD Transportation Facility	41870 Mc Alby Ct	Murrieta	6/1/09
PR0030564	Pro-Tec	41376 Pear St	Murrieta	1/22/09
PR0040564	Pure Chiropractic	25136 Hancock Ave Ste C	Murrieta	3/5/09
PR0026685	Ralphs Grocery Company #118	23801 Washington Ave	Murrieta	11/13/08
PR0032430	RCP Block & Brick	25725 Jefferson Ave	Murrieta	1/28/09
PR0033725	RK Sport Inc	26900 Jefferson Ave #A	Murrieta	2/2/09
PR0023777	S & T Saab Volvo Specialist	26622 Jefferson #105	Murrieta	1/15/09
PR0039847	Scott-Murrieta Service Station LP	33070 Antelope Rd	Murrieta	5/27/09
PR0033974	Seven Eleven #33484	28015 Scott Rd	Murrieta	3/12/09
PR0034493	Seven-Eleven #33552	40210 Murrieta Hot Springs Rd	Murrieta	2/26/09

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PR0033282	Southern California Gas Co	25620 Jefferson St	Murrieta	5/6/09
PR0031701	Spectrum Cleaners III	40964 California Oaks Rd	Murrieta	7/25/08
PR0032328	Star Trac Strength Inc	41180 Raintree Ct	Murrieta	2/2/09
PR0030853	Stater Bros. Market #139	25050 Hancock Ave	Murrieta	3/5/09
PR0035161	Superior Ready Mix Concrete	26165 Adams Ave	Murrieta	5/28/09
PR0023270	Target Store #1283	41040 California Oaks Rd	Murrieta	8/14/08
PR0042282	Temecula Auto Body & Paint	41196 Nick Ln	Murrieta	4/28/09
PR0033837	The Movie Experience	41090 California Oaks Rd	Murrieta	8/7/08
PR0030708	USA Station #68168	39055 Winchester Rd	Murrieta	3/23/09
PR0028243	Verizon/Murrieta CO	24961 Washington Ave	Murrieta	6/3/09
PR0026705	Vons Fuel Center #2660	29910 Murrieta Hot Sprgs Rd #B	Murrieta	10/20/08
PR0023401	Worldwide Autoworks	26450 Jefferson #105	Murrieta	1/27/09
	Total Site Visits for Murrieta - 71			

Temecula

PR0022876	A 1 Auto	28696 Via Montezuma #101	Temecula	2/19/09
PR0038911	Above All Auto Body, Inc	27516 Commerce Center Dr #A&B	Temecula	10/14/08
PR0023459	Adobe Plaza Cleaners	27625 Jefferson Ave #100	Temecula	10/2/08
PR0031317	Airgas West Inc	41735 Rider Wy	Temecula	5/19/09
PR0030854	Albertson's #6706	30530 Rancho California Rd	Temecula	9/10/08
PR0022434	APD Technologies, Inc-OOB OOE	42066 Avenida Alvarado #F	Temecula	3/12/09
PR0026102	Arco #5928/Prestige Stations-OO	27691 Ynez Rd	Temecula	7/22/08
PR0022407	Arco #6305/Prestige Stations #63	40212 Winchester Rd	Temecula	8/13/08
PR0023786	Arrow Engines	43162 Blackdeer Loop Ste.A	Temecula	7/21/08
PR0024170	Ask Terry Automotive	28733 Via Montezuma #J	Temecula	11/3/08
PR0021879	Auto Care Experts, Inc	42295 Avenida Alvarado #1	Temecula	7/7/08
PR0019731	Auto Doctor- Thompson Magnetic	42255 Baldaray Cir Ste.D	Temecula	7/16/08
PR0022741	Auto World Service Center	27495 Commerce Center Dr #B	Temecula	7/29/08
PR0019831	Autocenter Autobody Of Temecul	28710 Las Haciendas # B	Temecula	7/31/08
PR0038764	Automedics	42103 Rio Nedo # 103	Temecula	8/26/08
PR0023869	AutoZone #5936	40345 Winchester Rd	Temecula	2/24/09
PR0035040	BJ's Restaurant & Brewhouse	26500 Ynez Rd	Temecula	4/21/09
PR0024384	Bostik Findley Inc	27460 Bostik Ct	Temecula	7/28/08
PR0034540	Burger King	30534 Rancho California Rd	Temecula	3/5/09
PR0025149	California Highway Patrol	27685 Commerce Center Dr	Temecula	9/26/08
PR0034501	Carl's Jr #1023	30660 Rancho California Rd	Temecula	1/20/09
PR0028062	Cemex Construction Materials Pa	29065 Front St	Temecula	11/26/08
PR0040669	Central Service Station LP	44239 Margarita Rd	Temecula	6/3/09
PR0019862	Chase Auto Repair	27516 Commerce Center Dr #C	Temecula	8/19/08
PR0019862	Chase Auto Repair	27516 Commerce Center Dr #C	Temecula	3/3/09
PR0019813	Chevron Jefferson Street	27560 Jefferson Ave	Temecula	11/26/08
PR0025921	Chevron SS #1492/201596	40635 Winchester Rd	Temecula	12/23/08
PR0026094	Chevron SS #1838/204029	31669 Hwy 79	Temecula	12/29/08
PR0034030	Chick-fil-A-OOB OOB	40531 Margarita Rd	Temecula	2/25/09
PR0034322	Chipotle Mexican Grill	40573 Margarita Rd #A	Temecula	2/25/09
PR0023435	Continental Cleaners	33175 S Hwy 79 Ste.D	Temecula	7/23/08
PR0024107	Creative Touch Interiors	43085 Business Park Dr Ste B	Temecula	9/23/08
PR0019840	Creekside Gas And Food Mart	29115 Front St	Temecula	2/17/09
PR0038709	Cycle Shack	32839 Temecula Pkwy #B	Temecula	3/24/09
PR0023669	DCH Acura of Temecula	26705 Ynez Rd	Temecula	1/21/09
PR0020212	DCH Chrysler Jeep Temecula-OC	26799 Ynez Rd	Temecula	1/21/09
PR0020216	DCH Honda of Temecula	26755 Ynez Rd	Temecula	1/21/09
PR0019852	Del Rio Enterprise	42181 Avenida Alvarado	Temecula	8/19/08
PR0034619	Denny's	28915 Rancho California Rd	Temecula	2/19/09
PR0019856	Dial Automotive	43175 Blackdeer Lp	Temecula	7/7/08
PR0023732	Discount Auto Service	41680 Enterprise Cir S	Temecula	11/3/08
PR0022079	Dutch Dry Cleaners	27461 Jefferson Ave	Temecula	3/18/09
PR0019873	EMWD Temecula Valley Regiona	42565 Avenida Alvarado	Temecula	8/12/08

Hazardous Materials Facilities inspected as part of CAP program

FY 2008-2009

PR0020138	Enterprise Automotive	28696 Via Montezuma #105	Temecula	4/13/09
PR0040329	Express Tire	44092 Margarita Rd	Temecula	2/5/09
PR0022537	Express Tire - Temecula	29095 Front St	Temecula	9/17/08
PR0020040	ExxonMobil Oil Corporation #1019	44520 Bedford Ct	Temecula	4/20/09
PR0020037	ExxonMobil Oil Corporation #1084	29500 Rancho California Rd	Temecula	2/19/09
PR0023276	ExxonMobil Oil Corporation #1913	33165 Hwy 79	Temecula	9/25/08
PR0037891	EZ Lube #85	30625 Temecula Pkwy	Temecula	7/31/08
PR0039626	Food 4 Less #319	26419 Ynez Rd	Temecula	3/17/09
PR0021464	Fourth Street Automotive	41935 4th St	Temecula	9/24/08
PR0030867	Frazee Paint & Wallcovering	27355 Jefferson Ave Ste.G	Temecula	3/18/09
PR0023264	Front St. Service Station LP	44987 Front St	Temecula	10/22/08
PR0034671	Gilmore Liquid Air Co	42217 Rio Nedo #B102	Temecula	4/21/09
PR0022275	Gold Prospectors Assoc of Ameri	43445 Business Park Dr #113	Temecula	11/3/08
PR0019913	Graphics Unlimited Lithography-C	43171 Business Park Dr	Temecula	7/23/08
PR0022288	Grizzle & Hunter Plastics LLC	27957 Diaz Rd	Temecula	9/24/08
PR0024108	HD Supply White Cap Constructic	28065 Diaz Rd	Temecula	8/25/08
PR0023239	Home Depot #1028	32020 Hwy 79	Temecula	7/30/08
PR0034257	Jack in the Box #0048-OOB OOB	27410 Jefferson Ave	Temecula	3/9/09
PR0020193	Jiffy Lube #1878	30690 Rancho California Rd	Temecula	5/27/09
PR0023608	Johnson Matthey	27449 Colt Ct	Temecula	8/25/08
PR0023642	Label Productions of California	43135 Blackdeer Loop #B	Temecula	7/24/08
PR0020010	Lewis Cleaners	29760 Rancho California Rd #101	Temecula	3/12/09
PR0032287	Line-X of Temecula Valley	28069 Diaz Rd #F	Temecula	9/24/08
PR0023109	Long Machine, Inc.	27450 Colt Ct	Temecula	11/3/08
PR0022042	M A C Products Inc	43214 Blackdeer Loop #113	Temecula	7/30/08
PR0021219	Magic Cleaners	41925 Motor Car Pkwy #E	Temecula	5/20/09
PR0019855	Magnecomp Corp.	26201 Ynez Rd #103	Temecula	4/21/09
PR0025299	McMillan Farm Management	35350 Rancho California Rd	Temecula	12/18/08
PR0022429	Minuteman Press	27452 Jefferson Ave	Temecula	5/20/09
PR0021438	Molding International Engineering	42136 Avenida Alvarado	Temecula	7/24/08
PR0021182	Murrieta Valley RV Service	27882 Del Rio Rd	Temecula	9/17/08
PR0020020	My Tech Automotive-OOB OOB	42346 Rio Nedo St #G	Temecula	1/21/09
PR0020020	My Tech Automotive-OOB OOB	42346 Rio Nedo St #G	Temecula	10/6/08
PR0020058	National Process Industries Inc	42250 Baldaray Cir	Temecula	10/1/08
PR0020073	Old Town Tire & Service	28700 Front St	Temecula	9/17/08
PR0026445	Palomar Village Shell	42197 Margarita Rd	Temecula	10/15/08
PR0034397	Panda Express #834	32195 S Hwy 79 Ste.C	Temecula	4/14/09
PR0019727	Pauley Equipment Company	28374 Felix Valdez Ave	Temecula	7/29/08
PR0028402	Pedley Propane	42046 Rio Nedo St	Temecula	5/20/09
PR0028417	Polycraft Inc	42075 Avenida Alvarado	Temecula	7/8/08
PR0022907	Pro Auto Collision	42011 E Avenida Alvarado #C	Temecula	7/9/08
PR0023589	Quality 1 Auto Service	27512 W Enterprise Cir	Temecula	11/13/08
PR0038269	Rainbow Service Station	30535 Temecula Pkwy	Temecula	8/20/08
PR0023320	Ramona Tire And Service Center	31955 Via Rio Temecula Rd	Temecula	3/19/09
PR0020136	Rancho Car Wash	27378 Jefferson Ave	Temecula	10/7/08
PR0037535	Rancho Cleaners	27477 Ynez Rd	Temecula	7/9/08
PR0022110	Rancho Ford Lincoln Mercury	26895 Ynez Rd	Temecula	3/18/09
PR0026135	Rancho Shell #68623	29750 Rancho California Rd	Temecula	1/5/09
PR0029748	RCWD Ace Bowen Pump Station	29025 Via Santa Rosa	Temecula	6/10/09
PR0039301	RCWD Calle Breve PS		Temecula	6/10/09
PR0029752	RCWD Carancho Pump Station	43695 El Calamar Rd	Temecula	6/10/09
PR0028481	RCWD De Portola Pump Station	40110 Cordova Dr	Temecula	6/10/09
PR0034159	RCWD Doherty Pump Station	43250 Elm St	Temecula	6/9/09
PR0029743	RCWD East Bluff Pump Station	42500 Block of Business Park Dr	Temecula	6/9/09
PR0028461	RCWD RC Pump Station #2 Well	31690 Rancho California Rd	Temecula	6/9/09
PR0034158	RCWD VDC	37100 Block De Portola Rd	Temecula	6/10/09
PR0028445	RCWD Well #108	40000 Block Margarita Rd	Temecula	6/9/09
PR0028444	RCWD Well #309	26585 Madison Ave	Temecula	6/9/09
PR0022312	Redhawk Shell #68622	44260 Redhawk Pkwy	Temecula	2/4/09
PR0020154	Roadside Automotive & Tire Roac	42346 Rio Nedo St # A	Temecula	4/13/09

Hazardous Materials Facilities inspected as part of CAP program

FY 2008-2009

PR0038913	S & P Automotive	42103 Rio Nedo # 105	Temecula	9/12/08
PR0023387	Saturn Of Temecula-OOB OOB	27430 Ynez Rd	Temecula	2/25/09
PR0024198	Sears Auto Center #2658	40680 Winchester Rd	Temecula	11/12/08
PR0023070	Sears Roebuck & Company #110	40710 Winchester Rd	Temecula	11/12/08
PR0040629	Shahin Shaath	27691 Ynez Rd	Temecula	5/4/09
PR0020219	SKS, Inc	41981 Avenida Alvarado	Temecula	6/9/09
PR0020187	Solid State Stamping Inc	43350 Business Park Dr #1	Temecula	10/1/08
PR0019832	South Bay Cable Corp	42033 Rio Nedo St	Temecula	10/6/08
PR0036840	Stater Bros. Market #138 (Red Ha	31813 Temecula Pkwy	Temecula	7/10/08
PR0021686	Superior Auto Repair	28733 Via Montezuma #C	Temecula	7/22/08
PR0021761	T.V.S. Complete Auto Care	28822 Front St #107	Temecula	11/18/08
PR0035842	Taco Bell #19515	41005 Winchester Rd	Temecula	1/20/09
PR0022068	Target Stores #359	29676 Rancho California Rd	Temecula	4/1/09
PR0038902	Techstar Automotive-OOB OOB	43094 Via Dos Picos #D	Temecula	9/11/08
PR0037602	Temecula 76	28903 Rancho California Rd	Temecula	8/15/08
PR0033197	Temecula Auto Repair & Radiator	43191 Rancho Wy	Temecula	2/3/09
PR0020215	Temecula Car Wash	29766 Rancho California Rd	Temecula	3/11/09
PR0023619	Temecula Motorcycle Service	41860 Enterprise Cir S	Temecula	11/12/08
PR0020045	Temecula Print	40610 County Center Dr #471	Temecula	11/13/08
PR0023208	Temecula Quick Lube	29764 Rancho California	Temecula	8/27/08
PR0039110	Temecula Valley Paint	27641 Commerce Center Dr	Temecula	10/7/08
PR0026058	Temecula Valley School District	40516 Roripaugh Rd	Temecula	11/26/08
PR0034323	Temeku Cinema	26463 Ynez Rd	Temecula	3/4/09
PR0022798	Temeku Hills Golf Club	41687 Temeku Dr	Temecula	3/11/09
PR0034278	The Movie Experience	27531 Ynez Rd	Temecula	3/4/09
PR0019959	The Tranny Shop, Inc.	42346 Rio Nedo St #I	Temecula	10/6/08
PR0022922	Thompson's Discount Tire Center	28007 Jefferson Ave Ste E	Temecula	10/9/08
PR0024041	Toyota of Temecula Valley	41892 Motor Car Pkwy	Temecula	2/4/09
PR0020244	Toyota Of Temecula Valley	26631 Ynez Rd	Temecula	2/4/09
PR0038675	Transmission Plus	28733 Via Montezuma #G	Temecula	4/14/09
PR0038910	Ultra Motorcycles-OOB OOB	42180 Sarah Wy	Temecula	9/9/08
PR0031426	Vail Lake Resort	40940 Hwy 79	Temecula	7/7/08
PR0022684	Vail Ranch Cleaners	31821 Hwy 79 #B5	Temecula	4/14/09
PR0028247	Verizon/Rancho California CO	41963 Moreno Rd	Temecula	9/29/08
PR0032079	Verizon/Redhawk CO	32505 Hwy 79	Temecula	9/29/08
PR0037090	Ynez Shell Food Mart/Car Wash	26680 Ynez Rd	Temecula	10/16/08

Total Site Visits for Temecula - 139

Wildomar

PR0038549	Arco AM/PM	36228 Hidden Springs Rd	Wildomar	7/30/08
PR0037751	Arco AM/PM	33986 Orange St	Wildomar	3/11/09
PR0039863	Bundy Canyon Turf Supply	21400 Bundy Canyon Rd	Wildomar	12/1/08
PR0022471	FCP, Inc	23100 Baxter Rd	Wildomar	8/20/08
PR0036117	HBPARKCO Contruction, Inc	33861 Mission Trail	Wildomar	2/25/09
PR0038869	Marc Cohen Trucking, Inc	31705 Central Ave #B	Wildomar	8/12/08
PR0019568	Round Up Liquor & Deli	20651 Palomar St	Wildomar	10/30/08
PR0035662	Seven Eleven #33595	32060 Clinton Keith Rd	Wildomar	10/20/08
PR0023473	USA Station #68238	23905 Catt Rd	Wildomar	12/19/08

Total Site Visits for Wildomar - 9

TOTAL SITE VISITS: 219

020413

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APPENDIX E

TRAINING ATTENDANCE SHEETS

NEW DEVELOPMENT TRAINING

PLEASE SIGN IN

020416

NPDES STORMWATER QUALITY TRAINING FOR
WQMP Training
Riverside County Flood Control & Water Conservation District

Meeting of: Monday, November 3 - 08:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
1	David	Cooper	Other	Consultant; Bureau Veritas	(858) 735-1352	
2	Guy	Pegan	City of Moreno Valley	Public Works	(951) 413-3115	
3	Josh	Frohman	City of Moreno Valley	Public Works	(951) 413-3251	
4	Timothy	Kearns	Riverside County	Facilities Management	(951) 955-9467	
5	Andres	Alfaro	Riverside County	Facilities Management	(951) 823-2724	
6	Arthur	Miller	Riverside County	Facilities Management		
7	Jim	Rossman	Riverside County	Facilities Management	(951) 901-5091	
8	Donald	Delgadillo	RCFC & WCD	Flood Control	(951) 955-4683	
9	Daisy	Barreto	RCFC & WCD	Plan Check	(951) 955-1269	
10	Jianhong	Xiong	Other	Consultant for RCFC & WCD	(858) 451-6100	
11	Lori	Wolfe	RCFC & WCD	Plan Check	(714) 402-9645	
12	Komy	Ghods	RCFC & WCD	Design	(951) 955-1326	
13	Mark	Westover	City of Moreno Valley	Public Works	(951) 413-3114	
14	DEEPAK	SOLANKI	City of Moreno Valley	CAPITAL PROJECTS DIVISION	(909) 268-7639	
15	Anabella	Hedman	Other	Consultant for RCFC & WCD	(858) 869-4851	
16	Monte	Bowers	Other	Consultant for RCFC & WCD	(858) 451-6100	
17	Marc	Crispin	Riverside County	Facilities Management	(951) 955-0167	

NPDES STORMWATER QUALITY TRAINING FOR
WQMP Training
Riverside County Flood Control & Water Conservation District

Meeting of: Monday, November 3 - 08:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
18	Larry	Gonzales	City of Moreno Valley	Public Works	(951) 413-3130	
19	Marge	Lazarus	City of Moreno Valley	Public Works	(951) 413-3130	
20	Sergio	Pena	Riverside County	Facilities Management	(951) 955-2809	
21	kyle	gallup	RCFC & WCD	design	(951) 955-8627	
22	Mike	Wong	RCFC & WCD	Design	(951) 955-1205	
23	Amy	McNeill	RCFC & WCD	Design	(951) 955-1268	Amy McNeill
24	JERAMY	JACKSON	MORENO VALLEY		951 413-3174	
25	VIKKI	KUNTZ	COUNTY/FRIV.	DESIGN & CONST	951 955 0164	
26	~~KEVIN~~ STEVE	HORN	" "	" "	951.955.2549	
27	Lance	Noland	County of Riverside	EDA	955-9698	
28	JOHN	ALFRED	COUNTY OF RIVERSIDE	FACILITIES MGMT.	951-955 4844	
29	~~LORI~~	~~WOLFE~~				
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PLEASE SIGN IN

020418

NPDES STORMWATER QUALITY TRAINING FOR
WQMP Training
Riverside County Flood Control & Water Conservation District

Meeting of: Monday, November 3 - 13:00 - 17:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
1	Christopher	Wiberg	City of Moreno Valley	Public Works	(951) 413-3130	
2	Edward	Perez	RCFC & WCD	Plan Check	(714) 750-7275	
3	Bruce	Norris	Riverside County	Facilities Management	(951) 955-0353	
4	Dawn	Torres	Riverside County	Facilities Management	(951) 955-4880	
5	Rita	Medellin	Riverside County	Facilities Management	(951) 955-0395	
6	Jeremy	Mueller	Riverside County	Facilities Management	(951) 955-4845	
7	Kent	Wegelin	City of Moreno Valley	Public Works	(951) 413-3497	
8	Arman	BULAONG Bualong	City of Perris	Engineering	(951) 943-6504	
9	Chris	Sunde	City of Perris	Engineering	(951) 943-6504	
10	John	Carmona	Whitewater Regional Board	NPDES Unit		
11	Ken	Horsley	RCFC & WCD	Planning	(858) 866-0128	
12	Lombardo	Detrinidad	RCFC & WCD	Planning	(619) 866-0128	
13	Rachel	McLure	City of Riverside	Parks, Recreation, & Community Services Department	(951) 826-2028	
14	Derek	Petersen	RCFC & WCD	Planning	(619) 920-6430	
15	Jeff	Fulton	RCFC & WCD	Plan Check	(760) 603-6091	
16	Nancy	Cano	Riverside County	Facilities Management	(951) 955-0392	
17	Rebecca	Tsagris	Riverside County	Facilities Management	(951) 955-8764	

NPDES STORMWATER QUALITY TRAINING FOR
WQMP Training
Riverside County Flood Control & Water Conservation District

Meeting of: Monday, November 3 - 13:00 - 17:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
18	Quang	Nguyen	City of Moreno Valley	Public Works	(951) 413-3130	
19	Michael	Cairns	RCFC & WCD	Plan Check	(858) 866-0128	
20	Dennis	Downs	Riverside County	Facilities Management	(951) 955-0391	
21	Sean	Motlagh	Other	City of Perris, City of San Jacinto	(951) 943-6504	
22	Bob	Moehling	City of Murrieta	Engineering	(951) 304-2489	
23	Tim	Taylor	City of Hemet	Engineering	(951) 765-3889	
24	John	Kerenyi	City of Moreno Valley	Public Works Transportation Engineering	(951) 413-3199	
25	Henry	Ngo	City of Moreno Valley	Public Works	(951) 413-3130	
26	Ewina	Lau	City of Riverside	Parks, Recreation, & Community Services Department	(951) 826-2012	
27	Bill	Woolsey	City of Murrieta	Engineering	(951) 461-6073	Bill Woolsey
28	John	Hogard	City of Moreno Valley	Public Works	(951) 413-3130	
29	Alfredo	Del Toro	Riverside County	Facilities Management	(951) 955-8324	
30	Frank	Gonzales	Riverside County	Facilities Management	(951) 955-8467	
31	Jason	Plotkin	Riverside County	Facilities Management		
32	Nahid	Selbe	Riverside County	Facilities Management	(951) 955-4728	Nahid N. Selbe
33	Dane	Winkelman	Riverside County	Facilities Management	(951) 955-0394	
34	Rizaldy	Baluyot	Riverside County	Facilities Management	(951) 955-4889	
35	Randy	McDaniel	City of Riverside	Park Planning	(951) 826-2006	

NPDES STORMWATER QUALITY TRAINING FOR
WQMP Training
Riverside County Flood Control & Water Conservation District

Meeting of: Monday, November 3 - 13:00 - 17:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
36	ANN	IAALI	RCFC&WCD	NPDES	955 1245	[illegible]
37	JAY	MARBOUR	RWQCB-7	NPDES	760	776-8981
38	John	Carman	" "	"	"	
39	Daisy	Barreto	RCFC&WCD	Plan Check	955-1269	Daisy Barreto
40	Robert	Vasquez	RCFC&WCD	Design II		[illegible]
41	HANG	NGUYEN	CITY OF MORENO VALL	NPDES	951-413-3216	[illegible]
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PLEASE SIGN IN

020421

NPDES STORMWATER QUALITY TRAINING FOR
WQMP Training
Riverside County Flood Control & Water Conservation District

Meeting of: Monday, May 4 - 08:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
1	Kevin	Marstall	City of Riverside	Public Works	(951) 826-5345	
2	Ingrid	Outlaw	Riverside County	Economic Development Agency	(951) 955-8069	
3	Trish	Field	Riverside County	Economic Development Agency	(951) 955-8069	
4	Rudy	Martinez	Riverside County	Transportation Department	(951) 955-1095	
5	Cenk	Yavas	RCFC & WCD	Plan Check	(714) 750-7275	
6	Brian	Robertson	RCFC & WCD	Plan Check	(714) 750-7275	
7	Steve	Charette	City of Temecula	Public Works	(951) 694-6411	
8	Chris	Vlahos	City of Temecula	Public Works	(951) 694-6411	
9	Bill	McAteer	City of Temecula	Public Works	(951) 694-6411	
10	Amer	Attar	City of Temecula	Public Works	(951) 694-6411	
11	Todd	Bilo	Riverside County	Environmental Compliance Division	(951) 955-1870	
12	Sam	Gonzalez	Riverside County	Environmental Compliance Division	(951)955-2559	
13	Everett	Duckworth	RCFC & WCD	planning	(951) 955-9412	
14	Vikki	Kuntz	Other	DOFM	(951) 955-0166	
15	Kahlil	Amin	RCFC & WCD	Design	(951) 955-1200	
16	Chandra	Santiago	Riverside County	Environmental Compliance Division	(951) 955-5996	
17	Rusel	Baker	Riverside County	Environmental Compliance Division	(951) 955-2268	
18	Phil	Broesalme	Riverside County	Environmental Compliance Division	(951) 955-3185	
19	Julianna	Gonzalez	RCFC & WCD	Planning	(951) 955-8064	

020422

NPDES STORMWATER QUALITY TRAINING FOR
WQMP Training
Riverside County Flood Control & Water Conservation District

Meeting of: Monday, May 4 - 08:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
20	ALAN	BOSIA	City of Riverside	Public Works-Contracts Adminstration	(951) 377-5514	
21	Richard	Carrera	Riverside County	Environmental Compliance Division	(951) 955-8116	
22	Emi	Tanitomi	RCFC & WCD	CValdo Plan Checking	(858) 866-0218	
23	David	Zarate	RCFC & WCD	CValdo Plan Checking	(858) 866-0128	
24	Dominick	Lombardi	Riverside County	Economic Development Agency	(951) 955-6622	
25	Edwin	Quinonez	Santa Margarita Regional Board	Flood Control - Project Planning	(951) 955-1917	
26	Tina	Hanson	RCFC & WCD	Subdivisions	(951) 955-2511	
27	Shaheen	Mooman	RCFC & WCD	Development Review	(951) 955-1318	
28	Donna	Puentes	City of Riverside	Public Works-Contracts Adminstration	(951) 712-4962	
29	Matt	Ciarlo	City of Riverside	Public Works-Contracts Adminstration	(951) ~~346~~ 236-4130	
30	Robert	Savant	City of Riverside	Public Works-Contracts Adminstration	(951) 346-6170	
31	JACK	LYNN	City of Riverside	Public Works-Contracts Adminstration	(951) 712-2321	
32	Mayra	De La Torre	City of Temecula	Public Works	(951) 694-6411	
33	Will	Becerra	City of Temecula	Public Works	(951) 694-6411	
34	Chris	White	City of Temecula	Public Works	(951) 694-6411	
35	John	Pourkazemi	City of Temecula	Public Works	(951) 694-6411	

Mike	Hasapes	" " San Jacinto	Planning	951 487-7330	Mike Hasapes
Daniel	Borges	Hemet	Public works	951 634 1206	Daniel Borges
Tommy	Rodriguez	Hemet	Public Works	951 760 0550	Tommy Rodriguez
Robert	Morgan	Hemet	Public works	951 973-3495	
MATT	TAYLOR	HEMET	PUBLIC WORKS	(951) 526-3394	
Arturo	Navarro	Hemet	Public works	(951) 654-9787	
JAMES	Wood	Hemet	"	951 765-3712	

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020423

NPDES STORMWATER QUALITY TRAINING FOR

WQMP Training - Santa Ana and Santa Margarita Regions

Riverside County Flood Control & Water Conservation District

Meeting of: Monday, May 4 - 13:00 - 17:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
1	ERIC	LOMELI	RCFC & WCD	DESIGN 1	(951) 955-8601	
2	Helio	Takano	RCFC & WCD	Planning	(951) 955-1348	
3	Mekbib	Degaga	Riverside County	RCFC and WCD	(951) 955-1214	
4	Edward	Luna	City of Palm Springs	Wastewater Treatment	(760) 899-2314	
5	Avlin	Odviar	City of Temecula	Public Works	(951) 694-6411	
6	John	Salazar	City of Temecula	Public Works	(951) 694-6411	
7	Annie	Bostre-Le	City of Temecula	Public Works	(951) 694-6411	
8	Claudia	Steiding	Other	DOFM	(951) 955-8174	
9	Chris	Sunde	Other	Cities of Perris, Canyon Lake & San Jacinto	(951) 943-6504	
10	Kendra	Hannah-Meistrell	City of Temecula	Public Works	(951) 694-6411	
11	David	McBride	City of Temecula	Public Works	(951) 694-6411	
12	Travis	Randel	City of Riverside	Planning	(951) 826-5932	
13	Gustavo	Gonzalez	City of Riverside	Planning	(951) 826-5931	
14	~~Arman~~ SEAN	~~Sotarag~~ MOTLAGH	Other	Cities of Perris, Canyon Lake & San Jacinto	(951) 943-6504	
15	Cassandra	Weiss	RCFC & WCD	Planning	(951) 955-1612	
16	Eric	Russell	RCFC & WCD	Development Review	(951) 955-1211	
17	Jeff	Crawford	Riverside County	Transportation Department	(951) 955-1095	
18	Bob	Moehling	City of Murrieta	Engineering	(951) 461-6036	
19	Aldo	Licitra	City of Temecula	Public Works	(951) 694-6411	
20	Charles	de Chambeau	RCFC & WCD	Development Review	(951) 955-1298	
21	Vicente	Giron	City of Moreno Valley	Public Works	(951) 413-3107	
22	Lisa	McCullough	City of San Jacinto	Community Development	(951) 537-6360	
23	Bill	Woolsey	City of Murrieta	Engineering	(951) 461-6073	
24	Jennifer	Gale	RCFC & WCD	Flood	(951) 955-4050	
25	Dale	Anderson	RCFC & WCD	Planning	(951) 955-1345	

... continued Next Page

NPDES STORMWATER QUALITY TRAINING FOR

WQMP Training - Santa Ana and Santa Margarita Regions

Riverside County Flood Control & Water Conservation District

Meeting of: Monday, May 4 - 13:00 - 17:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
26	Clement	Jimenez	City of Moreno Valley	Public Works Land Development	(951) 413-3121	
27	Kack	Sung	Riverside County	~~Environmental Compliance Division~~ PLAN REVIEW/ENGR	(951) 955-2036	
28	Carole	Kendrick	City of Hemet	Planning Department	(951) 765-2373	Carole Kendrick
29	Soledad	Carrisoza	City of Hemet	Planning Department	(951) 765-2376	Soledad Carrisoza
30	Jorge	Biagioni	City of Hemet	Public Works Engineering	(951) 765-2362	
31	Todd	Shibata	City of Moreno Valley	Riverside County Waste Management	951 486-3261	
32	Jeff	Hitch	City of Murrieta	Public Works/Engineering	(951) 461-6076	
33	Katie	Chamberlain	City of Riverside	Planning	(951) 826-2369	
34	Moises	Lopez	City of Riverside	Planning	(951) 826-5264	
35	Lance	Noland	RCRDA	Redevelopment Agency	5-9698	
36	Bill	MCATEER	City of Temecula	Public Works	951-694-6411	
37	~~Vicente~~	~~Girón~~	~~City of Moreno Valley~~	~~Public Works/Land Dev.~~	~~951-486-3707~~	
38	ASHER	HARTEL	CITY OF SAN JACINTO	PLANNING	951-487-7307	
39	SOARES	ADRIANA	Riverside County	Transportation	(951)955-1862	Adriana Soares
40						

NPDES STORMWATER QUALITY TRAINING FOR

WQMP Training - Santa Ana and Santa Margarita Regions

Riverside County Flood Control & Water Conservation District

Meeting of: Tuesday, June 9, 2009 - 08:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signature
1	Kent	Allen	RCFC & WCD	Design	(951) 955-1270	
2	Mike	Beutler	Other	City of Menifee	(951) 672-6777	
3	Annie	Bostre-Le	City of Temecula	Public Works	(951) 694-6411	
4	Barbara	Bouska	City of Riverside	Planning	(951) 826-5507	
5	Patricia	Brenes	City of Riverside	Planning	(951) 826-5933	
6	Marc	Brewer	Riverside County	Parks	(951) 955-4316	
7	Arman	Bulaong	Other	Cities of Perris, Canyon Lake & San Jacinto	(951) 943-6504	
8	FRED	CERDA	City of Riverside	Public Works-Contracts Adminstration	(951) 712-4966	
9	Katie	Chamberlain	City of Riverside	Planning	(951) 826-2369	
10	Trish	Field	Riverside County	Economic Development Agency	(951) 955-8069	
11	Stuart	Fisk	City of Temecula	~~Public Works~~ Planning	(951) 694-6411	
12	Julianna	Gonzalez	RCFC & WCD	Planning	(951) 955-8064	
13	Erlan	Gonzalez	Riverside County	Economic Development Agency	(951) 955-8069	
14	Steve	Hayes	City of Riverside	Planning	(951) 826-5775	
15	Diana	Hernandez	RCFC & WCD	Design	(951) 955-1329	
16	Paloma	Hernandez-Barker	Riverside County	Economic Development Agency	(951) 955-8069	
17	Paul	Johnson	City of Canyon Lake	Operations	(951) 244-6841	
18	Eric	Jones	City of Temecula	Public Works	(951) 694-6400	
19	Brad	Kutzner	Other	City of Menifee	(951) 672-6777	
20	Demeke	Muarega	RCFC & WCD	Design 2		
21	Linda	Nixon	City of Hemet	Public Works	(951) 765-3880	Linda Nixon

PLEASE SIGN IN

NPDES STORMWATER QUALITY TRAINING FOR

WQMP Training - Santa Ana and Santa Margarita Regions

Riverside County Flood Control & Water Conservation District

Meeting of: Tuesday, June 9, 2009 - 08:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signature
22	Ingrid	Outlaw	Riverside County	Economic Development Agency	(951) 955-8069	
23	Dana	Schuma	City of Temecula	Public Works	(951) 694-6400	
24	Yvette	Sennewald	City of Riverside	Planning	(951) 826-5168	
25	Kyle	Smith	City of Riverside	Planning	(951) 826-5220	
26	Robert	Van Zanten	City of Riverside	Public Works	(951) 826-5875	
27	Dale	West	City of Temecula	Public Works	(951) 694-6400	
28						
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PLEASE SIGN IN

MUNICIPAL TRAINING

PLEASE SIGN IN

020428

NPDES STORMWATER QUALITY TRAINING FOR
Municipal Training
Riverside County Flood Control & Water Conservation District

Meeting of: Tuesday, November 4 - 08:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
1	Daniel	Monto	City of Moreno Valley	Public Works	(951) 413-3485	
2	Renee	Power	City of Norco	~~Parks, Recreation and Community Services~~ Animal control Dept	737 8972	
3	Lance	Noland	Riverside County	Econo0mic Development Agency	(951) 955-9698	
4	mike	blanco	City of Norco	Public Works	951-270-5607	
5	Keith	Price	City of Norco	Parks, Recreation and Community Services	(951) 545-7891	
6	Bob	March	City of Norco	Parks, Recreation and Community Services	(951) 545-7892	Robert March
7	Michelle	Anglin	City of Norco	Parks, Recreation and Community Services	951-545-7903	
8	Brandie	Potter	City of Norco	Parks, Recreation and Community Services	951-545-7894	
9	Roger	Jackson	City of San Jacinto	Public Works	(951) 654-4041	Roger Jackson
10	Jim	Cash	City of San Jacinto	Public Works	(951) 654-4041	Jim Cash
11	Ray	Sanchez	City of San Jacinto	Public Works	(951) 654-4041	
12	Ben	Haskell	City of San Jacinto	Public Works	(951) 654-4041	
13	Chris	Wyrick	City of Norco	Parks, Recreation and Community Services	951 545 7890	
14	Henk	Koke	City of Norco	Parks, Recreation and Community Services	951-545-7899	
15	Jeff	Woodley	City of Banning	Engineering/Public Works	(951) 922-3286	Jeff Woodley
16	Ramiro	Garcia	City of Banning	Engineering/Public Works	(951) 922-3286	Ramiro Garcia
17	Carlos	Navarro	City of Banning	Engineering/Public Works	951-922-3291	Carlos Navarro

NPDES STORMWATER QUALITY TRAINING FOR
Municipal Training
Riverside County Flood Control & Water Conservation District

Meeting of: Tuesday, November 4 - 08:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
18	Quang	Nguyen	City of Moreno Valley	Public Works	(951) 413-3159	
19	Terrence	Piorkowski	City of Norco	Public Works	(951) 270-5607	
20	derek	lacombe	City of Norco	Public Works	951-270-5607	
21	nate	salazar	City of Norco	Public Works		
22	ryan	McIntyre	City of Norco	Public Works		
23	Lyndon	Lorance ,	City of Norco	Public Works		
24	Zachary	Foster	City of Moreno Valley	Public Works	(951) 203-4997	
25	Ann	iaali	RCFC & WCD	NPDES, Regulatory Division		
26	Miguel	Mariscal	City of Banning	Parks/Street Maintenance Division	(951) 922-3320	
27	Steven	Horn	Riverside County	Facilities Management	(951) 955-2549	
28	Randy	West	City of Temecula	Public Works	(951) 694-6411	
29	Robert	Florez	City of Moreno Valley	Special Districts	(951) 413-3471	
30	Bill	Shesgreen	City of Banning	Parks/Street Maintenace Division	(951) 922-3286	
31	Pete	Schlensker	City of Banning	Engineering/Public Works	(951) 922-3286	
32	Steve	Parker	City of Banning	Engineering/Public Works	951-922-3512	
33	Daniel	Cover	City of Moreno Valley	Public Works/ Special districts	(951) 413-3503	
34	Robert	Johnson	Riverside County	Facilities Management	(951) 782-2458	

NPDES STORMWATER QUALITY TRAINING FOR
Municipal Training
Riverside County Flood Control & Water Conservation District

Meeting of: Tuesday, November 4 - 08:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
35	Terry	Anderson	Riverside County	Facilities Management	(951) 782-2449	
36	Ross	Rither	Riverside County	Facilities Management	(951) 358-5483	
37	Gilbert	Montanez	Riverside County	Facilities Management	(951) 955-4806	
38	Kevin	Short	Riverside County	Facilities Management	(951) 955-4115	
39	Arthur	Fong	Riverside County	Facilities Management	(951) 955-2500	
40	Stuart	Sheldon	City of Moreno Valley	Public Works	(951) 413-3483	
41	Tony	Silvas	City of Moreno Valley	Public Works Special Districts	(951) 616-7299	
42	Dave	Carrico	City of San Jacinto	Public Works	(951) 654-4041	
43	Joe	Vilchis	City of San Jacinto	Public Works	(951) 654-4041	
44	Frank	Zaldivar	City of San Jacinto	Public Works	(951) 654-4041	
45	Gilbert	Gonzales	City of San Jacinto	Public Works	(951) 654-4041	
46	Alfonso	Zubia	City of San Jacinto	Public Works	(951) 654-4041	
47	John	Holmes	City of San Jacinto	Public Works	(951) 654-4041	
48	ANN	Iaali	Riverside County	RCFC&WCD NPDES	955-1248	
49						
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NPDES STORMWATER QUALITY TRAINING FOR
Municipal Training
Riverside County Flood Control & Water Conservation District

Meeting of: Tuesday, November 4 - 08:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
52						
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PLEASE SIGN IN

020432

NPDES STORMWATER QUALITY TRAINING FOR
Municipal Training
Murrieta City Hall

Meeting of: Thursday, November 6 - 08:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
1	Brad	Buron	City of Temecula	Public Works	(951) 694-6411	
2	Mark	Levis	City of Temecula	Public Works	(951) 694-6411	
3	Jim	Smith	City of Temecula	Public Works	(951) 694-6411	
4	David	Davis	City of Temecula	Public Works	(951) 694-6411	
5	Mario	Munoz	City of Temecula	Community Services	(951) 694-6480	
6	John	Maisey	City of Temecula	Public Works	(951) 694-6480	
7	George	DeLaRosa	City of Temecula	Community Services	(951) 694-6480	
8	Jose	Diaz	City of Temecula	Community Services	(951) 694-6480	
9	Matt	Wiechec	City of Temecula	Community Services	(951) 694-6480	
10	Richard	Serven	City of Temecula	Community Services	(951) 694-6480	
11	David	Thurman	City of Temecula	Community Services	(951) 694-6480	
12	Dino	Camberos	City of Temecula	Community Services	(951) 694-6480	
13	Steve	Sterling	City of Temecula	Community Services	(951) 694-6480	
14	Richard	Shea	City of Temecula	Community Services	(951) 694-6480	
15	Karl	Nordgren	City of Temecula	Community Services	(951) 694-6480	
16	Kevin	Harrington	City of Temecula	Community Services	(951) 694-6480	
17	Tim	Stockton	City of San Jacinto	Public Works	(951) 654-4041	

NPDES STORMWATER QUALITY TRAINING FOR
Municipal Training
Murrieta City Hall

Meeting of: Thursday, November 6 - 08:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
18	Matt	Wicks	City of San Jacinto	Public Works	(951) 654-4041	
19	Kenny	Rodger	City of San Jacinto	Public Works	(951) 654-4041	
20	Kevin	Carranza	City of San Jacinto	Public Works	(951) 654-4041	
21	Victor	Vasquez	City of San Jacinto	Public Works	(951) 654-4041	
22	Paul	Swancott	City of Murrieta	Planning	(951) 304-2489	
23	Cory	Hammond	City of Murrieta	Public Works	(951) 304-2489	
24	Lanker	Figueroa	City of Murrieta	Public Works	(951) 304-2489	
25	Mike	Brooks	City of Murrieta	Public Works	(951) 304-2489	
26	Sarah	Russell	City of Murrieta	Public Works	(951) 304-2489	Sarah Russell
27	David	Hendry	City of Murrieta	Public Works	(951) 304-2489	
28	Ken	Jones	City of Murrieta	Engineering	(951) 304-2489	
29	Mike	Almodovar	City of Murrieta	Public Works	(951) 304-2489	
30	Daniel	Scroggins	City of Murrieta	Public Works	(951) 304-2489	
31	Aaron	Rintamaki	City of Murrieta	Planning	(951) 304-2489	
32	Israel	Reyes	City of Murrieta	Community Services	(951) 461-6124	
33	Jose	Munoz	City of Murrieta	Community Services	(951) 461-6124	
34	Juan	Del Val	City of Murrieta	Community Services	(951) 461-6124	

NPDES STORMWATER QUALITY TRAINING FOR
Municipal Training
Murrieta City Hall

Meeting of: Thursday, November 6 - 08:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
35	Larry	Gross	City of Murrieta	Community Services	(951) 461-6124	
36	Mike	Bigay	City of Murrieta	Community Services	(951) 461-6124	
37	Hoang	Nguyen	City of Moreno Valley	Public Works	(951) 413-3216	Hoang Nguyen
38	Manuel	Moran	Riverside County	Facilities Management	(950) 600-6240	
39	Rodney	Tidwell	City of Temecula	Public Works	(951) 694-6411	
40	Bruce	Wedeking	City of Temecula	Community Services	(951) 694-6480	
41	Aldo	Licitra	City of Temecula	Public Works	(951) 694-6411	Aldo Licitra
42	Danny	Marks	City of Murrieta	Community Services	(951) 461-6124	
43	Mark	Bolschweiler	City of Murrieta	Public Works	(951) 304-2489	
44	Mike	Burris	City of Murrieta	Public Works	(951) 304-2489	
45	Lucas	Haynes	City of Murrieta	Public Works	(951) 304-2489	
46	Robert	Edmonds	City of Murrieta	Public Works	(951) 304-2489	
47	Nick	Vaughn	City of Murrieta	Public Works	(951) 304-2489	
48	Alberto	Aspe	City of Murrieta	Community Services	(951) 461-6124	
49	Chris	Payne	City of Temecula	Public Works	(951) 694-6411	
50	Flint	Norman	City of Temecula	Public Works	(951) 694-6411	
51	Larry	Romine	City of Temecula	Public Works	(951) 694-6411	

NPDES STORMWATER QUALITY TRAINING FOR
Municipal Training
Murrieta City Hall

Meeting of: Thursday, November 6 - 08:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
52	Juan	Jaime	City of Temecula	Public Works	(951) 694-6411	
53	Ryan	Castillo	City of Temecula	Public Works	(951) 694-6411	
54	Perry	Ludwig	City of Temecula	Public Works	(951) 694-6411	
55	Gus	Gonzalez	City of Temecula	Public Works	(951) 694-6411	
56	John	Ward	City of Temecula	Public Works	(951) 694-6411	
57	Bradley	Moore	Riverside County	Facilities Management	(951) 696-3441	
58	Danny	Astorga	City of San Jacinto	Public Works	(951) 654-4041	
59	Alex	Garcia	City of San Jacinto	Public Works	(951) 654-4041	
60	Mark	Halman	City of San Jacinto	Public Works	(951) 654-4041	
61	KRAIG	JACKSON	CITY OF MOVAL	CAND DEV	413-3474	
62	Matt	Nicks	City of San Jac.	Public Works		
63	DINO	CAMBEROS	Temecula	TCSD		
64	RON	STUART	MURRIETA	CSD	9514616124	
65	BOB	KAST	"	"	"	
66	RICK	THOMPSON	"	"	"	
67	JOSE	ALFARO	EXCEL LANDSCAPE	SUPERVISOR	9617359650	
68	PHIL	ESNAYRA	CITY OF MURRIETA	C.S.D	951-532-7513	

NPDES STORMWATER QUALITY TRAINING FOR
Municipal Training
Murrieta City Hall

Meeting of: Thursday, November 6 - 08:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
69	Venita	Anderson	Code Enforcement	PD	4616332	Venita Anderson
70	Gena	Dickson	Code Enfo Mgr.	PD	4616334	G Dickson
71	George	Nelson	Code Enforcement	PD	461-6338	
72	Linda	Mejia	Code Enf.	PD	461-6337	
73	Paul	Swancott	City Murrieta	Planning	461-6063	Paul Swancott CM
74	MIKE	BROOKS	MURRIETA	PW MAINT.	461-6401	
75	JASON	JONES	"	CODE ENF.	461-6331	
76	James	Smith	Temecula	Public works	303-3164	
77	Bill	Woolsey	Murrieta	ENG	461-6073	Bill Woolsey
78	Rick	Shea	Temecula	C.S.		
79						
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NPDES STORMWATER QUALITY TRAINING FOR
Municipal Training
Coachella Valley Water District

Meeting of: Tuesday, November 18 - 08:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
1	Brandon	Garcia	Riverside County	Transportation Department	(951) 955-1095	
2	Donald	Raymond	Riverside County	Transportation Department	(951) 955-1095	Don Raymond
3	Alana	Townsend	City of Palm Desert	Public Works	(760) 346-0611	Alana Townsend
4	James	Breihan	City of Palm Springs	Aviation	(760) 318-3823	
5	Edward	Graff	City of Palm Springs	Aviation	(760) 318-2824	
6	Cora	Salas	City of Palm Desert	Public Works	(760) 346-0611	
7	Scott	Hamilton	City of La Quinta	Public Works		
8	Demetrio	Pecina	City of La Quinta	Public Works		
9	Ed	Houston	CVWD	Safety/Human Resources	(760) 398-2651	
10	Javier	Miranda	CVWD	Trades & Support	(760) 398-2651	Reyes Luna for Javier Miranda
11	Javier	Loredo	CVWD	Trades & Support	(760) 398-2651	
12	Rick	Adamson	CVWD	Trades & Support	(760) 398-2651	
13	Juan	Hernandez	City of Palm Desert	Parks	(760) 346-0611	
14	Valerie	Wagner	City of Palm Springs	Street Maintenance	(760) 322-8364	Valerie Wagner
15	Larry	Naranjo	Riverside County	Facilities Management	(760) 921-5042	
16	George	Herrera	City of Palm Springs	Street Maintenance	(760) 322-8364	
17	Adam	Servin	Riverside County	Facilities Management	(760) 863-8704	

18	Andy	Luna	Riverside County	Facilities Management	(760) 393-3253	
19	Jay	Mirpour	Whitewater Regional Board	Stormwater	(760) 776-8981	
20	Erich	Konrad	City of Palm Springs	Fleet Operations	760 323 8168	
21	David	Flint	City of Palm Desert	Building Maintenance	(760) 346-0611	
22	Cyril	Snake	City of Palm Desert	Building Maintenance	(760) 346-0611	
23	Marco	Zamudio	City of Palm Desert	Public Works	(760) 346-0611	
24	Joe	Rojas	City of Palm Desert	Public Works	(760) 346-0611	
25	James	Lindsey	City of La Quinta	Public Works	(760) 777-7052	
26	Adolfo	Cabrera	City of La Quinta	Public Works		
27	Tim	Batten	City of La Quinta	Public Works		
28	Raphael	Alvarado	City of La Quinta	Public Works		
29	Agustin	Arellano	City of La Quinta	Public Works		
30	Steven	Rakestraw	City of Palm Springs	Fleet Operations	(760) 323-8168	
31	Jesus	Padilla	City of Palm Desert	Public Works	(760) 346-0611	
32	Frank	Duran	City of Palm Desert	Public Works	(760) 346-0611	
33	Ernesto	Teran	City of Palm Desert	Parks	(760) 346-0611	
34	Daniel	Lopez	City of Palm Desert	Public Works	(760) 346-0611	
35	Ruben	Castaneda	City of La Quinta	Public Works		
36	James	Staight	City of La Quinta	Public Works		
37	Beto	Gonzales	City of La Quinta	Public Works		
38	Alex	Martinez	City of La Quinta	Public Works		

39	Pablo	Rivera	City of Indian Wells	Public Works	(760) 776-0237	
40	Ryan	Bowen	City of Indian Wells	Public Works	(760) 776-0237	
41	Francisco	Torres	City of Palm Desert	Public Works	(760) 346-0611	
42	Jaime	Macias	City of Palm Springs	Fleet Operations	760 323-8168	
43	Freddy	Rios	City of Palm Desert	Public Works	(760) 346-0611	
44	Brian	Petree	City of Norco	Parks, Recreation and Community Services		
45	John	Carmona	Whitewater Regional Board	NPDES Unit	(760) 340-4521	
46	THOMAS	TVEIT	CITY OF COACHELLA	BLDG DEPT	760 398 3002	
47	ROBERT	RUEDA	CITY OF COACHELLA	PUBLIC WORKS	760 398 5744	
48	Gabriel	Pérez	City of Coachella	Community Development	760 398-3102	
49	Gabriel	Papp	" " "	" "	" " "	
50	PAVEL	HORN	CATHEDRAL CITY	ENG. DEPT.	760 770-0320	
51	Ramon	Villalobos	City of INDIO	Equipment Operator	760-347-1058	
52	Margarito	Bautista	City of Coachella	PUBLIC WORKS - streets	760) 398-4202	
53	JESSE	Nunez	City of Coachella	Public work - streets	(760) 398-4202	
54	ALEX	ALARCON	City of COACHELLA	CODE ENFORCEMENT	(760) 398-4978	
55	GEORGE	INSUEZ	CITY OF COACHELLA	PUBLIC WORKS	760) 398-5744	
56	OSCAR	RODAS	CITY OF CATHEDRAL CITY	ENGINEERING	(760) 770-0327	
57	Sergio	Samaniego	City of Palm Desert	Public works	(760) 346-0611	
58	[illegible]	Jimenez	C.V.W.D.	INSPECTOR	760) 822-2906	
59	Jim	Kreizinger	C.V.W.D.	INSPECTOR	760 4859437	

020440

MAINTENANCE SAFETY MEETING SIGN IN

TRAINER: CLAUDIO PADRES

TOPIC: NPDES TRAINING

Video☐

Date: 5/5/09

EMPLOYEE	SIGNATURE
Aleman-Lopez, Ramiro	
Alls, Jr., Eugene	Eugene Alls Jr
Alvino, John	
Amis, Timmy	Timmy Amis
Arias, Jessie	
Biloki, Mark	Mark Biloki
Chavez, Roger	
Clark, Ken	Ken Clark
Clark II, Kenneth (Steve)	
Crawford, Michael	
D'Aprile, Frank	
Drake, Carl	Carl L Drake
Espinoza, Jose	Jose Espinoza
Garza, Richard	
Glassey, Mike	
Guillen, David	
Gutknecht, Josh	
Haro, Ivan	Ivan Haro
Haskins, George	
Haywood, Michael	
Healy, Stuart	
Hernandez, Brian	
Hernandez, Tom	
House, Steve	
Houston, Walter	
Houwaart, Alex	

EMPLOYEE	SIGNATURE
Huggins, John	
Hurtado, Phil	
Jones, David	
Kriner, Travis	
Luce, James	
Luna, Mark	
Lysiak, Robert	
Macias, Christopher	
McGee, Raynard	
McPherson, George	
Melendrez, Tim	
Mitchell, Tyrone	
Moore, Edward	
Muela, Jr, Mario	
Necochea, Walter	
Negrete, Miguel	
Newson, John	
O'Malley, Mike	
Pena, Peter	
Picazo, Michael	
Pinon, Jaime	
Prichard, Matthew	
Regan, Tim	
Riemer, Rodney	
Rogers, George	
Rossi, Michael	
Rubio, Gabriel	
Ruiz, George	

EMPLOYEE	SIGNATURE
Salazar, Angel	
Seager, Richard	
Silva, Mario	
Slaick, Mike	
Slaick, Nicholas	
Smith, Ryan	
Taylor, John	
Tovar, Jess	
Underhill, Edward	
Valdez, Hector	
Valencia, Avelino	
Valerdi, Mauricio	
Vaughan, Ronnie	
Vega, Augustin	
Viall, Phillip	
Villegas, Carlos	
Villegas, Raul	
Whitmore, Bryan	

NPDES STORMWATER QUALITY TRAINING FOR
Municipal Training
Riverside County Flood Control & Water Conservation District

Meeting of: Tuesday, May 5 - 12:30 - 16:30

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
1	Steve	Wolny	City of Hemet	Public Works-Facilities Maintenance	(951) 765-3712	
2	Joel	Dyer	City of Hemet	Public Works-Facilities Maintenance	(951) 765-3712	
3	Paul	McCalley	City of Hemet	Public Works-Facilities Maintenance	(951) 765-3712	
4	John	Huston	City of Hemet	Public Works-Equipment Maintenance	(951) 765-3712	
5	Chris	Walters	City of Hemet	Public Works-Equipment Maintenance	(951) 765-3712	
6	Bill	Bryant	City of San Jacinto	Public Works	(951) 654-4041	
7	Barry	Mulcock	City of San Jacinto	Public Works	(951) 654-4041	
8	Edgar	Marquez	City of Moreno Valley	Special Districts	(951) 413-3490	
9	Joe	Carpenter	City of Murrieta	CSD	(951) 461-6124	
10	Melecia	Price	City of Murrieta	CSD	(951) 461-6124	
11	Rudy	Martinez	Riverside County	Transportation Department	(951) 955-1095	
12	Edward	Sandoval	Riverside County	Transportation Department	(951) 955-1095	
13	Jeremy	Stroschein	Riverside County	Transportation Department	(951) 955-1095	
14	Mihai	Dan	City of Indian Wells	Public Works	(760) 776-0237	
15	Chris	Wiggins	City of Indian Wells	Public Works	(760) 776-0237	
16	Mark	Durbin	City of Murrieta	CSD	(951) 461-6124	
17	Mike	Emberton	City of San Jacinto	Public Works	(951) 654-4041	
18	Lhoran	Burr	City of Indian Wells	Public Works	(760) 776-0237	
19	Brian	Draper	City of Moreno Valley	Riverside County Waste Management		
20	Nibardo	Orozco	City of Moreno Valley	Public Works	(951) 413-3514	
21	Barry	Verdusco	City of Moreno Valley	Public works/Special Districts	(951) 616-7296	
22	Ralph	Scharffenberg	City of Moreno Valley	Public Works/Special Districts Division	(951) 413-3472	
23	valin	gray	City of Moreno Valley	public works	(951) 413-3486	
24	Gayle	Cuneo	RCFC & WCD	Maintenance	(951) 955-1311	
25	Ben	Aborita	City of Moreno Valley	Riverside County Waste Management		
26	Peter	Aker	City of Moreno Valley	Riverside County Waste Management		

NPDES STORMWATER QUALITY TRAINING FOR
Municipal Training
Riverside County Flood Control & Water Conservation District

Meeting of: Tuesday, May 5 - 12:30 - 16:30

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
27	Scott	Kraak	City of Moreno Valley	Riverside County Waste Management	951-846 3273	
28	Jeff	Mitchell	City of Moreno Valley	Riverside County Waste Management	951 486-3324	
29	Kerry	Moore	City of Moreno Valley	Riverside County Waste Management	951 486 3322	
30	Bob	Cartwright	Other	City of Menifee	(951) 672-6777	
31	BILL	WOOLSEY	MURRIETA	ENGINEERING	461-6073	Bill Woolsey
32	Ryan	Smith	Riverside County	Flood Control	955-1661	
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NPDES STORMWATER QUALITY TRAINING FOR
Municipal Training
Riverside County Flood Control & Water Conservation District

Meeting of: Tuesday, May 26 - 08:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
1	Taylor	Matthew	City of Hemet	Public Works-Parks Department	(951) 765-3712	
2	James	Wood	City of Hemet	Public Works-Parks Department	(951) 765-3712	
3	Robert	Morgan	City of Hemet	Public Works-Parks Department	(951) 765-3712	
4	Jose	Fernandez	City of Hemet	Public Works-Equipment Maintenance	(951) 765-3712	
5	John	Damm	City of Hemet	Public Works-Equipment Maintenance	(951) 765-3712	
6	Matt	Devere	City of Hemet	Public Works-Facilities Maintenance	(951) 765-3712	
7	Karl	Bornemann	City of Hemet	Public Works-Facilities Maintenance	(951) 765-3712	
8	Jim	Powell	City of Hemet	Public Works-Facilities Maintenance	(951) 765-3712	
9	Dan	Mudrovich	City of San Jacinto	Public Works	(951) 654-4041	D.M.
10	Brian	Hernandez	RCFC & WCD	Maintenance	(951) 955-2109	
11	Walter	Necochea	RCFC & WCD	Maintenance	(951) 955-1246	
12	Steve	Fries	City of Moreno Valley	Services	(951) 413-3799	
13	Martin	Bowman	City of Riverside	Fleet Management	(951) 351-6157	
14	Ken	Lathrop	City of Riverside	Fleet Management	(951) 351-6157	
15	William	Mastas	City of Palm Springs	Streets/Traffic		
16	Raul	Hernandez	City of Palm Springs	Streets/Traffic		

17	Fredrick	Collins	City of Palm Springs	Streets/Traffic		
18	Freddy	Rios	City of Palm Springs	Streets/Traffic		
19	Charles	Whyel	City of Palm Springs	Streets/Traffic		
20	Shane	Wilkerson	City of Palm Springs	Streets/Traffic		
21	Jason	Smith	City of San Jacinto	Public Works	(951) 654-4041	
22	Tom	Ash	Riverside County	Parks	(951) 906-9777	
23	Adriana	Soaresw	Riverside County	Transportation	(951) 955-1862	
24	Jeff	Crawford	Riverside County	Transportation Department		
25	Daniel	Ramirez	Riverside County	Transportation Department	(951) 955-1095	
26	Mario	Macias	Riverside County	Transportation Department	(951) 955-1095	
27	Albert	Rodriguez	City of La Quinta	Public Works	(760) 777-7052	
28	Steve	Kochell	City of La Quinta	Public Works	(760) 777-7053	
29	Carl	Szoyka	City of Banning	Street	(951) 922-3286	
30	Tom	Lara	City of Banning	Street	(951) 922-3286	
31	Ruben	Macias	City of Banning	Street	(951) 922-3286	
32	Lisa	McCullough	City of San Jacinto	Community Development	(951) 537-6360	
33	Tommy	Rodriguez	City of Hemet	Public Works-Parks Department	(951) 765-3712	
34	David	Hensley	City of Moreno Valley	Riverside County Waste Management	951 483 3324	
35	Jim	Mikkelson	City of Moreno Valley	Riverside County Waste Management	951 901-520	
36	Kaniz	Quazi	City of Moreno Valley	Riverside County Waste Management	951 486 3246	
37	Steve	Armitage	City of Banning	Street	(951) 922-3286	

38	Gourley	Collins	City of Banning	Street	(951) 922-3286	
39	Daniel	Borges	City of Hemet	Public Works-Parks Department	(951) 765-3712	
40	Arturo	Navarro	City of Hemet	Public Works-Parks Department	(951) 765-3712	
41	Sean	Vance	City of San Jacinto	Public Works	(951) 654-4041	
42	Scott	Bryant	City of Moreno Valley	Riverside County Waste Management	312-2383	
43	John	Kennedy	Riverside County	Transportation Department	(951) 955-1095	
44	Gabriel	Rubio	RCFC & WCD	Maintenance	(951) 955-2109	
45	Ron	Baxter	Riverside County	Parks	(951) 637-6984	RJB
46	Dan	Nove	Riverside County	Parks	(951) 955-6998	
47	Jim	Davis	Riverside County	Parks	(951) 906-9327	
48	John	Burns	Riverside County	Parks John Burns	(951) 906-9321	
49	Pat	Milos	City of Catherdal City	Public Works	(760) 770-0390	
50	Joe	Montalvo	City of Moreno Valley	Riverside County Waste Management		
51	John	Newson	RCFC & WCD	Maintenance		
52	Stuart	Healy	RCFC & WCD	Maintenance	(951) 955-2109	
53	michael	dietrick	CVWD	inspections	(760) 861-3598	
54	Mario	Castillo	WM.	Mechanic		
55	Paul	Hoffman	WM	Mechanic	951 986 9300	
56	Robert	Fontes	city Palm Springs	Mechanic Tec III	760-323-8168	
57	LARRY	STICKLES	CITY Palm Springs	PARTS SPECIALIST	760-323-8172	
58	LARRY	STICKLES				

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INDUSTRIAL/COMMERCIAL TRAINING

PLEASE SIGN IN

020450

NPDES STORMWATER QUALITY TRAINING FOR
Industrial/Commercial Training
Riverside County Flood Control & Water Conservation District

Meeting of: Tuesday, November 4 - 13:00 - 17:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
1	Joe	Mullen	City of San Jacinto	Public Works	(951) 654-4041	
2	Jeff	Potts	City of Corona	Public Works	951-736-2442	
3	Dennis	Hurford	City of Norco	Building and Safety	(951) 270-5689	
4	Jeramy	Jackson	City of Moreno Valley	Public Works	(951) 413-3474	
5	Lori	Askew	City of Norco	Engineering	(951) 270-5678	
6	Sheldon	Zell	City of Norco	Fire Department	(951) 737-8097	
7	Mark	Solano	City of Corona	Department of Water & Power	(951) 279-3558	
8	Rudy	Fandel	City of Corona	Department of Water & Power	(951) 736-2476	
9	Craig	Leyland	City of San Jacinto	Public Works	(951) 654-4041	
10	Ralph	Durrett	City of San Jacinto	Public Works	(951) 654-4041	
11	HOANG	NGUYEN	CITY OF MORENO VAL	"	951 413-3216	
12	ANN	JAPLI	County of Riverside	RCFC &WCD -NPDES	9557248	
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NPDES STORMWATER QUALITY TRAINING FOR
Industrial/Commercial Training
Coachella Valley Water District

Meeting of: Tuesday, November 18 - 13:00 - 17:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
1	Hart	Ponder	City of Palm Desert	Code Enforcement	(760) 346-0611	
2	Pedro	Rodriguez	City of Palm Desert	Code Enforcement	(760) 346-0611	Pedro Rodriguez
3	Shawn	Kilpatrick	City of Palm Desert	Code Enforcement	(760) 346-0611	Shawn M Kilp
4	Johnny	Terfehr	City of Palm Desert	Code Enforcement	(760) 346-0611	
5	Michael	Adkins	City of Palm Desert	Code Enforcement	(760) 346-0611	Michael P Adk
6	Sara	Toyoda	City of Indio	Public Works	(760) 391-4149	Sara Toyoda
7	Leland	Bishop	City of Indio	Public Works	760-391-4067	Leland Bish
8	John	Carmona	Whitewater Regional Board	NPDES Unit	7603404521	JCar
9	Brett	Daniels	City of Coachella	Environmental Programs Director	(760) 398-3002	
10	Bob	French	City of Calimesa	Public Workds	(909) 795-9801	Bob
11	Mike	McCabe	City of Calimesa	Public Works	(909) 795-9801	Mike
12	Butch	Scheffer	City of Calimesa	Public Works	(909) 795-9801	B Sch
13	BOB	OKREN	City of Palm Springs	COMPLIANCE	(760) 343-6505	R Okren
14	TRAVIS	JOHNSON	CITY OF COACHELLA	FLEET	(760) 272-6909	TMK John
15	JOHN	BROWN	CITY of Coachell	Building + Safety	760-398-3002	John B
16	[illegible]	INGUEZ	City of Coachella	Public Works	(760) 398-5744	[illegible]
17						

NPDES STORMWATER QUALITY TRAINING FOR
Industrial/Commercial Training
Riverside County Flood Control & Water Conservation District

Meeting of: Tuesday, May 26 - 13:00 - 17:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
1	Ken	Huntzinger	City of Palm Springs	Wastewater Treatment	(760) 323-8166	
2	Mike	Yasmer	City of Riverside	Environmental Compliance	(951) 351-6145	
3	Gary	Merk	City of Riverside	Code Enforcement	(951) 826-5224	
4	Hector	Molina	City of Coachella	Code Enforcement	(760) 398-4978	
5	Heida	Osvold	City of Temecula	Building and Safety	(951) 694-6439	
6	Brian	Clements	City of Temecula	Building and Safety	(951) 694-6439	
7	Sam	Gonzalez	Riverside County	Environmental Compliance Division		
8	Cynthia	Black	Riverside County	Code Enforcement	(951) 485-5849	
9	Ryan	Dolan	Riverside County	Code Enforcement	(951) 791-3601	
10	Bob	French	City of Calimesa	Public Works	(909) 795-9801	
11	Michael	Ray	City of Moreno Valley	Riverside County Waste Management	951 247 [illegible]	
12	Xente	Baker	City of Corona	Fire	(951) 736-2257	
13	Rusel	Baker	Riverside County	Environmental Compliance Division		
14	Todd	Bilo	Riverside County	Environmental Compliance Division	951-955-1876	
15	Mark	Solano	City of Corona	Dept. of Water & Power	(951) 279-3558	
16	Lionel	Ornelas	City of Corona	Dept. of Water & Power	(951) 279-3668	

17	Paul	Shaffer	City of Corona	Dept. of Water & Power	(951) 279-3592	
18	Joseph	Ainsworth	City of Moreno Valley	Riverside County Waste Management	486-3265	
19	Don	Chase	City of Moreno Valley	Riverside County Waste Management		
20	Emily	Chau	City of Moreno Valley	Riverside County Waste Management		
21	Oren	Cook	City of Moreno Valley	Riverside County Waste Management	951-486-3274	
22	Marques	Crews	City of Moreno Valley	Riverside County Waste Management	(951) 314-7752	
23	Joseph	Williams	City of Moreno Valley	Riverside County Waste Management	951 286 7741	
24	Art	Fuentes	City of Moreno Valley	Riverside County Waste Management	951 486-3274	
25	Chris	Green	City of Moreno Valley	Riverside County Waste Management	522-0860	
26	Sam	Guerrero	City of Moreno Valley	Riverside County Waste Management	951-567-6942	
27	Jessica	Nguyen	City of Moreno Valley	Riverside County Waste Management	951 486 3255	
28	Justin	Brown	City of Moreno Valley	Riverside County Waste Management	237-3111	
29	Rodney	Koenig	City of Moreno Valley	Riverside County Waste Management	544-7210	
30	Richard	Lopez	City of Moreno Valley	Riverside County Waste Management	909 254 3418	
31	Randall	Marrs	City of Moreno Valley	Riverside County Waste Management	640 5840	
32	Raymond	Martinez	City of Moreno Valley	Riverside County Waste Management		
33	Juan Mario	Ortega	City of Moreno Valley	Riverside County Waste Management	312-6857	
34	Vidal "Tim"	Evans	City of Moreno Valley	Riverside County Waste Management	(951)486-3275	
35	Mario	Ramirez	City of Moreno Valley	Riverside County Waste Management	(951)275-3672	
36	Darryl	Root	City of Moreno Valley	Riverside County Waste Management		
37	George	Solorio	City of Moreno Valley	Riverside County Waste Management		

38	George	Solorio, Jr.	City of Moreno Valley	Riverside County Waste Management		
39	Travis	Taylor	City of Moreno Valley	Riverside County Waste Management	486-3276	
40	Kurt	Van Dusen	City of Moreno Valley	Riverside County Waste Management	486-3307	
41	Sarah	Watrous	City of Moreno Valley	Riverside County Waste Management	486-325	
42	Juan	Yepez	City of Moreno Valley	Riverside County Waste Management	909 341-3655	
43	Palmer	James	Riverside County	Code Enforcement	(951) 245-3212	
44	Rick	Davis	City of Moreno Valley	Riverside County Waste Management	951 845-1477	
45	Jean	Voshall	City of Temecula	Code Enforcement	(951) 302-4144	Dean Voshall
46	Maria	~~Ching~~ COLET	City of Temecula	Public Works	(951) 302-4144	
47	Richard	Carrera	Riverside County	Environmental Compliance Division	951-955-8116	
48	Michael	Sanders	Riverside County	Code Enforcement	(951) 600-6130	
49	Amber	Miller	Riverside County	Environmental Compliance Division	(951) 955-1871	A Miller
50	~~Allen~~ TIM	~~Pielin~~ KING	City of Riverside	Public Works	(951) 351-6072	
51	Larry	Stickles	City of Palm Springs	Fleet Operations	(760) 323-8168	
52	Michele	Hindersinn	City of Corona	Public Works	(951) 736-2248	
53	Danny	Gregorio	Riverside County	Environmental Compliance Division	(951) 955-1951	
54	Anthony	Moreno	City of La Quinta	Building & Safety	(760) 777-7034	
55	Roger	Miller	Riverside County	Environmental Compliance Division	(951) 955-0886	R. Miller
56	Rene	Rosales	City of Coachella	Code Enforcement	(760) 398-4978	
57	Bruce	Pelletier	City of Indian Wells	Building and Safety	(760) 776-0230	
58	Noah	Rau	City of Moreno Valley	Riverside County Waste Management	951-486-3267	

59	Donald	Gerber	City of Moreno Valley	Riverside County Waste Management	4863206	
60	Michelle	Douglas	City of Riverside	Public Work ECS		

61 Larry Salazar City of Riverside Public Work ECS

62 George Ahing City of Riverside " " "

Bill Woolsey City of Murrieta Public Works/Eng. 461-6073 Bill Woolsey

Mike Yasmer City of Riverside

JAMES PALMER COUNTY OF RIVERSIDE CODE ENFORCEMEN 245-3166

ED LUNA Veolia Water NA FOG Compliance (760) 702-7876

CINDY SWAVELY ENVIRONMENTAL COMPLIANCE CITY OF RIVERSIDE 951 712-2555

CONSTRUCTION TRAINING

PLEASE SIGN IN

020457

NPDES STORMWATER QUALITY TRAINING FOR
Construction Training
Riverside County Flood Control & Water Conservation District

Meeting of: Monday, September 29 - 08:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
1	Kris	Harper	City of Banning	Public Utilities		
2	Joe	Arias	City of Banning	Public Utilities		
3	Roger	Ohms	City of Banning	Public Utilities		
4	Mike	Steen	City of Banning	Public Utilities		
5	Jason	Smith	City of Banning	Public Utilities		
6	Erick	Shackelford	City of Riverside	Public Utilities - Water Field	(951) 351-6350	
7	lewis	barry	Riverside County	Building & Safety	(951) 955-1800	BARRY LEWIS
8	Douglass	Gardenias	Riverside County	Transportation Department	(951) 955-1095	
9	James	Wilson	Riverside County	Transportation Department	(951) 955-1095	
10	Jeffrey	Kukulka	Riverside County	Waste Management	909 288 6610	
11	Brian	Hawkinson	Riverside County	Waste Management		
12	Mark	Hunt	Riverside County	Waste Management		
13	Rob	Istik	Riverside County	Waste Management		
14	Scott	Kraak	Riverside County	Waste Management		
15	Nguyen	Jessica	Riverside County	Waste Management		Jessica nguyen
16	Joe	Schupp	Riverside County	Waste Management		
17	Evangelina	Zapien	Riverside County	Waste Management		
18	RYAN	RIGHETTI	Riverside County	TRANSPORTATION	(951) 659-2603	
19	Rick	Fite	Riverside County	TRANSPORTATION	(951) 659-2603	
20	Morgan	Newlin	City of Hemet	Public Works Engineering	(951) 765-3855	

NPDES STORMWATER QUALITY TRAINING FOR
Construction Training
Riverside County Flood Control & Water Conservation District

Meeting of: Monday, September 29 - 08:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
21	Daniel	Valenzuela	City of La Quinta	Public Works	(760) 777-7096	
22	Randy	Olgren	City of Riverside	PU Electric Field	(951) 351-6351	
23	Rick	Skelton	City of Riverside	PU Electric Field	(951) 351-6351	
24	Rusty	Clarke	City of Riverside	PU Electric Field	(951) 351-6351	
25	Roger	Wagner	City of Riverside	PU Electric Field	(951) 351-6351	
26	Greg	Yates	City of Riverside	PU Electric Field	(951) 351-6351	
27	Bill	Crumley	City of Riverside	PU Electric Field	(951) 351-6351	
28	Dave	McLellan	City of Riverside	PU Electric Field	(951) 351-6351	
29	Bruce	Taylor	City of Riverside	PU Electric Field	(951) 351-6351	
30	Casey	Whitney	City of Riverside	PU Electric Field	(951) 351-6351	
31	Dale	Underwood	City of Riverside	PU Electric Field	(951) 351-6351	
32	Matt	Field	City of Banning	Public Utilities		
33	Michael	Colantuono	City of Banning	Public Utilities		
34	Mario	Elizondo	City of Banning	Public Utilities		
35	michael	ramek	Riverside County	Building & Safety	(951) 955-1800	
36	ted	gascoigne	Riverside County	Building & Safety	(951) 955-1800	
37	rendell	klaarenbeek	Riverside County	Building & Safety	(951) 955-1800	
38	Shea	Anti	Riverside County	Waste Management		
39	Tim	Evans	Riverside County	Waste Management		
40	Donald	Gerber	Riverside County	Waste Management		

NPDES STORMWATER QUALITY TRAINING FOR
Construction Training
Riverside County Flood Control & Water Conservation District

Meeting of: Monday, September 29 - 08:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
41	Christopher	Green	Riverside County	Waste Management		
42	Jason	Woods	City of Banning	Public Utilities		
43	Gregory	Oliver	City of Riverside	Public Utilities - Water Field	(951) 351-6350	
44	william	peppas	Riverside County	Building & Safety	(951) 955-1800	
45	richard	sharp	Riverside County	Building & Safety	(951) 955-1800	
46	Kenneth	McGregor	City of Riverside	Public Utilities - Water Field	(951) 351-6350	
47	Michael	Baggett	City of Riverside	Public Utilities - Water Field	(951) 351-6350	
48	Al	orozco	City of Riverside	Public Utilities - Water Field	(951) 351-6350	
49	gary	Kirby	City of Riverside	Public Utilities - Water Field	(951) 351-6350	
50	Randall	Marrs	Riverside County	Waste Management	951 640 5840	
51	Todd	Shibata	Riverside County	Waste Management	462 1 8	
52	SCOTT	KNAAR				
53	CHRIS	GREEN				
54	[illegible]	[illegible]	City of Banning	Utilities		
55	ERICK	SHACKELFORD	City of Riv.	utilities		
56	Rodney	Koenig	Riverside C.	waste Management	951-544-7210	
57	[illegible]	Sharpe	County [illegible]			
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PLEASE SIGN IN

020460

NPDES STORMWATER QUALITY TRAINING FOR
Construction Training
Riverside County Flood Control & Water Conservation District

Meeting of: Monday, September 29 - 13:00 - 17:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
1	Chuck	Peebles	City of San Jacinto	Engineering	(951) 654-3592	
2	Tamrat	Seyoum	City of Riverside	Water Department	(951) 826-5672	
3	Annie	Bostre-Le	City of Temecula	Public Works	(951) 694-6411	
4	Robert	Bohan	City of Canyon Lake	Special Enforcement	(951) 244-2955	
5	John	Bivens	City of Canyon Lake	Special Enforcement	(951) 244-2955	
6	Richard	Rupert	City of Canyon Lake	Special Enforcement	(951) 244-2955	
7	Lance	Noland	Riverside County	Econo0mic Development Agency	(951) 955-9698	
8	Linda	Nixon	City of Hemet	Public Works Engineering	(951) 765-3880	
9	Kent	Wegelin	City of Moreno Valley	Public Works	(951) 413-3497	
10	Jay	PEEBLES Hutchinson	City of San Jacinto	Engineering	(951) 654-3592	Chuck Peebles James C Hutchinson
11	Leo	Ferrando	City of Riverside	Water Department	(951) 826-5694	
12	Eric	Escobar	City of Riverside	Water Department	(951) 826-2253	Eric Escobar
13	Arman	Bualong BULAONG	City of Perris	Engineering	(951) 943-6504	
14	Pavel	Horn	City of Catherdal City	Engineering	(760) 770-0329	
15	Ismael	Pando	City of Hemet	Public Works Engineering	(951) 765-2361	
16	David	McBride	City of Temecula	Public Works	(951) 694-6411	
17	Dan	York	City of Temecula	Public Works	(951) 694-6411	
18	Jeramy	Jackson	City of Moreno Valley	Public Works	(951) 413-3474	
19	Steve	Grewe	Riverside County	Transportation Department	(951) 955-1095	
20	Robert	Morris	Riverside County	Transportation Department	(951) 955-1095	
21	John C.	Wilson	Riverside County	Transportation Department	(951) 955-1095	
22	mark	mandel	Riverside County	TLMA/Code Enforcement	(951) 955-8802	

NPDES STORMWATER QUALITY TRAINING FOR
Construction Training
Riverside County Flood Control & Water Conservation District

Meeting of: Monday, September 29 - 13:00 - 17:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
23	Art	Fuentes	Riverside County	Waste Management	951-486-3274	
24	Kaniz	Quazi	Riverside County	Waste Management		
25	Manuel	Ruiz	Riverside County	Waste Management		
26	Samuel	Theodora	City of Canyon Lake	Special Enforcement	(951) 244-2955	
27	Daniel	Cuthbertson	City of Norco	Public Works	(951) 545-7872	
28	Ann	Iaali	RCFC & WCD	NPDES, Regulatory Division	(951) 955-1248	
29	nohemi	johnston	Riverside County	TLMA/Code Enforcement	(951) 955-8802	
30	Oscar	Rodas	City of Catherdal City	Engineering	(760) 770-0327	
31	Terry	Huemer	City of Perris	Engineering	(951) 943-6504	
32	marco	diaz	Riverside County	TLMA/Code Enforcement	(951) 955-8802	
33	Jon	Salazar	City of Temecula	Public Works	(951) 694-6411	
34	Mayra	De La Torre	City of Temecula	Public Works	(951) 694-6411	
35	Kendra	Hannah-Meistrell	City of Temecula	Public Works	(951) 694-6411	
36	Steve	Beswick	City of Temecula	Public Works	(951) 694-6411	
37	Mike	Hudson	City of Temecula	Public Works	(951) 694-6411	
38	Steve	Charette	City of Temecula	Public Works	(951) 694-6411	
39	John	Shelton	Riverside County	Transportation Department	(951) 955-1095	
40	Chad	Davies	Riverside County	Economic Development Agency-Aviation Division	(951) 955-9417	
41	Kelley	Donovan	Riverside County	Transportation Department	(951) 955-1095	
42	Randy	White	Riverside County	Transportation Department	(951) 955-1095	
43	Eddie	Godinez	City of Moreno Valley	Public Works	(951) 413-3127	
44	Alex	Ramirez	City of Moreno Valley	Public Works	(951) 413-3123	

NPDES STORMWATER QUALITY TRAINING FOR
Construction Training
Riverside County Flood Control & Water Conservation District

Meeting of: Monday, September 29 - 13:00 - 17:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
45	Joanna	Dorham	City of Moreno Valley	Public Works	(951) 413-3192	
46	Chuck	Thurman	City of Banning	Public Utilities	951-922-3260	Chuck Thurman
47	Rick	Diaz	City of Banning	Public Utilities	9512324934	
48	Tim	McLaughlin	City of Banning	Public Utilities	951 922 3260	
49	Cameron	Hawley	City of Banning	Public Utilities	951849-1506	Cl Hawley ok. Legend
50	Ryan	Frisby	City of Banning	Public Utilities	(951)314-1650	
51	Marques	Crews	Riverside County	Waste Management	(951)486-3269	
52	Noah	Rau	Riverside County	Waste Management	951-486-3200	Noah Rau
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PLEASE SIGN IN

020463

NPDES STORMWATER QUALITY TRAINING FOR
Construction Training
Riverside County Flood Control & Water Conservation District

Meeting of: Tuesday, September 30 - 08:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
1	BRENT	MYTINGER	RCFC & WCD	Inspection	(909) 560-1142	
2	Jeremy	Stroschein	Riverside County	Transportation Department		
3	Ray	Dunn	RCFC & WCD	Construction Inspection	(951) 955-1315	
4	Jesus	Pizano	Riverside County	Transportation Department	(951) 955-1095	
5	Barry	Temple	RCFC & WCD	Construction Inspection	(951) 955-1315	
6	Gabriel	Novello	City of Banning	Engineering/Public Works	(951) 922-3130	
7	Bill	Russell	City of Banning	Engineering/Public Works	(951) 922-3130	
8	Waren	Woodstock	City of Banning	Engineering/Public Works	(951) 922-3130	
9	Guero	Cervantes	City of Perris	Engineering Department	(951) 943-6504	
10	Greg	Butler	City of Temecula	Public Works	(951) 694-6411	
11	Avlin	Odviar	City of Temecula	Public Works	(951) 694-6411	
12	Tony	Colarossi	City of La Quinta	Public Works	(760) 777-7089	
13	Michael	Davis	Riverside County	Transportation Department	(951) 955-1095	
14	Tim	Fagg	RCFC & WCD	Construction Inspection	(951) 955-1236	
15	Charles	McBride	City of Riverside	Water Department	(951) 538-6972	
16	Michael	Morrison	Riverside County	Transportation Department	(951) 955-1095	
17	Habib	Hariri	City of Riverside	Water Department	(951) 826-5304	

NPDES STORMWATER QUALITY TRAINING FOR
Construction Training
Riverside County Flood Control & Water Conservation District

Meeting of: Tuesday, September 30 - 08:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
18	Todd	Jorgenson	City of Riverside	Water Department	(951) 233-6381	
19	Claudia	Steiding	Riverside County	Facilities Management	(951) 955-8174	
20	Vikki	Kuntz	Riverside County	Facilities Management	(951) 955-0166	
21	David	Hatch	City of Riverside	PUBLIC WORKS	(951) 288-3632	
22	JACK	PALOMAREZ	City of Riverside	PUBLIC WORKS	(951) 712-4972	
23	FRED	CERDA	City of Riverside	PUBLIC WORKS	(951) 712-4966	
24	Mike	Luna	RCFC & WCD	Construction Inspection	(909) 908-0978	
25	Will	Becerra	City of Temecula	Public Works	(951) 694-6411	
26	John	Pourkazemi	City of Temecula	Public Works	(951) 694-6411	
27	Andy	Lindsay	City of Riverside	Public Utilities - Water Field	(951) 351-6368	
28	Chris	Joranco	City of Riverside	Public Utilities - Water Field	(951) 351-6350	
29	William	Ryan	City of Riverside	Public Utilities - Water Field	(951) 351-6350	
30	Richard	Ryno	City of Riverside	Public Utilities - Water Field	(951) 351-6350	
31	Robert	Lucas	City of Riverside	Public Utilities - Water Field	(951) 351-6350	
32	Jim	Grady	City of Riverside	Public Utilities - Water Field	(951) 351-6350	
33	Gene	Lewis	RCFC & WCD	Construction administration	(951) 850-6917	
34	Miguel	Perez	City of Riverside	Public Utilities - Water Field	(951) 351-6350	

NPDES STORMWATER QUALITY TRAINING FOR
Construction Training
Riverside County Flood Control & Water Conservation District

Meeting of: Tuesday, September 30 - 08:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
35	Jeffrey	Karalun	City of Riverside	Public Utilities - Water Field	(951) 351-6350	
36	William	Cates	City of Riverside	Public Utilities - Water Field	(951) 351-6350	
37	Victor	Velasquez	City of Riverside	Public Utilities - Water Field	(951) 351-6339	
38	Steven	Horn	Riverside County	Facilities Management	(951) 955-2549	
39	Dario	Samonte	RCFC & WCD	Construction Inspection	(909) 560-0199	Dario Sam
40	Jeff	Lewellen	Riverside County	Transportation Department	(951) 955-1095	
41	Richard "Rick"	Ott	Riverside County	Transportation Department	(951) 955-1095	Richard Ott
42	Stewart	Noble	City of Riverside	Water Department	(951) 538-6970	
43	Roger	Florez	Riverside County	Transportation Department	(951) 955-1095	Roger Flo
44	Tracy	Bravo	Riverside County	Transportation Department	(951) 955-1095	
45	Rene	Guzman	Riverside County	Transportation Department	(951) 955-1095	Rene
46	Joseph	Bohne	Riverside County	Transportation Department	(951) 955-1095	
47	Mike	Lynch	City of Banning	Engineering/Public Works	(951) 922-3130	
48	David	Matier	City of Banning	Engineering/Public Works	(951) 922-3130	
49	carol	lucero	Riverside County	TLMA/Code Enforcement	(951) 955-8802	Carol Lucero
50	donna	payne	Riverside County	TLMA/Code Enforcement	(951) 955-8802	D Payne
51	patricia	silva	Riverside County	TLMA/Code Enforcement	(951) 955-8802	

NPDES STORMWATER QUALITY TRAINING FOR
Construction Training
Riverside County Flood Control & Water Conservation District

Meeting of: Tuesday, September 30 - 13:00 - 17:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
52	Travis	Taylor	Riverside County	Waste Management	951-486-3273	
53	Justin	Brown	Riverside County	Waste Management	951-486-3278	
54	Michael	Ray	Riverside County	Waste Management	9512471761	M.I. Ray
55	Donald	Chase	Riverside County	Waste Management		Donald Chase
56	George	Solorio	Riverside County	Waste Management	951-318-1994	George Solorio
57	Jim	Mikkelson	Riverside County	Waste Management	951-550-0324	Donald Chase 951 323-1155
58	Mario	Ramirez	Riverside County	Waste Management	9514861-3270	
59	Panda	Workman	Riverside County	Waste Management	951-486-3276	Panda
60	Juan	Yepez	Riverside County	Waste Management	951-486-3265	Juan Yepez
61	Tom	M Ray	" "	TRANS.	951-658-5234	Tom M Ray
62	Nancy	Beltran	City of Hemet	Engineering Dept.	951-765-3877	
63	MAC	McCall	City of Hemet	ENGINEERING DEPT	951-847-5737	MAC McCall
64	Daniel	Nicholson	Riverside Co	TRANS	951-955-6793	
65	Rick	Fite	Riverside Co	Dist. Rd. Maint. Sup.	9511659-2603	Rick Fite
66	~~Monty~~	~~Santa~~	~~R~~			
67	Henry	Gutierrez	Riverside Co	Equipt operator II	909-872-4019	Henry M Gutierrez
68						

PLEASE SIGN IN

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NPDES STORMWATER QUALITY TRAINING FOR
Construction Training
Riverside County Flood Control & Water Conservation District

Meeting of: Tuesday, September 30 - 13:00 - 17:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
1	Marianne	Parker	City of Temecula	Public Works	909-707-8254	
2	William	Taylor	City of Temecula	Public Works	(951) 302-4144	
3	Rodney	Koenig	Riverside County	Waste Management		
4	RYAN	RIGHETTI	Riverside County	TRANSPORTATION	(951) 659-2603	
5	Monica	Telles	Riverside County	EDA	(760) 863-2541	
6	Der	Xiong	Riverside County	EDA	(951) 955-3421	
7	Jim	Ayres	Riverside County	Economic Development Agency	(760) 863-2552	
8	Anna	Rodriguez	Riverside County	Economic Development Agency	(760) 863-2537	
9	Leah	Rodriguez	Riverside County	Economic Development Agency	(760) 863-2534	
10	Joaquin	Tijerina	Riverside County	Economic Development Agency	(760) 863-2529	
11	Larry	Bennett	Riverside County	Transportation Department	(951) 955-1095	
12	Henry	Gutierrez	Riverside County	Transportation Department	(951) 955-1095	
13	Zuri	Lowe	Riverside County	Transportation Department	(951) 955-1095	
14	Byron	Moreno	Riverside County	Transportation Department	(951) 955-1095	
15	Jeff	Gullett	Riverside County	Transportation Department	(951) 955-1095	
16	William E.	Anderson	Riverside County	Transportation Department	(951) 955-1095	
17	Monty	Smith	Riverside County	Transportation Department	(951) 955-1095	

NPDES STORMWATER QUALITY TRAINING FOR
Construction Training
Riverside County Flood Control & Water Conservation District

Meeting of: Tuesday, September 30 - 13:00 - 17:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
18	Jeremy	Seward	Riverside County	Transportation Department	(951) 955-1095	
19	Hoang	Nguyen	City of Moreno Valley	Public Works	(951) 413-3216	Hoang Nguyen
20	Chris	Sunde	City of Perris	Engineering	(951) 943-6504	
21	STEVEN	HOWARD	City of Riverside	PUBLIC WORKS	(951) 712-3904	Steve Howard
22	James	Caddel	City of Riverside	PUBLIC WORKS	(951) 329-7703	
23	Jean	Voshall	City of Temecula	Public Works	(951) 302-4144	Jean Voshall
24	Tom	Cole	City of Temecula	Public Works	(951) 302-4144	
25	JUVENTINO	GARCIA	City of Riverside	PUBLIC WORKS	(951) 826-5599	
26	Tom	Mckay	Riverside County	transportation	(951) 313-2154	
27	Mac	McCall	City of Hemet	Public Works Engineering	(951) 765-2360	
28	Douglas	Norfolk	City of Norco	Eng.	(951) 545-7894	Douglas W. Norfolk
29	Mervyn	Manalo	Riverside County	EDA	(951) 955-3408	
30	Melvyn "Matt"	Sayre	Riverside County	Transportation Department	(951) 955-1095	
31	Salvador	Lopez	Riverside County	Transportation Department	(951) 955-1095	Salvador Lopez, T #17
32	Lisa	Elder	Riverside County	Transportation Department	(951) 955-1095	
33	Julie	Meyer	Riverside County	Transportation Department	(951) 955-1095	Julie Meyer
34	Sean	Motlagh	Other	City of Perris, City of San Jacinto	(951) 943-6504	

NPDES STORMWATER QUALITY TRAINING FOR
Construction Training
Riverside County Flood Control & Water Conservation District

Meeting of: Tuesday, September 30 - 13:00 - 17:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
35	Xavier	Jacobo	City of Riverside	Water Department	(951) 538-3461	
36	Jim	Henke	City of Riverside	Water Department	(951) 538-3451	
37	Cesar	Gutierrez	Riverside County	Transportation Department	(951) 955-1095	
38	angela	frazier	Riverside County	TLMA/Code Enforcement	(951) 955-8802	
39	Bill	McAteer	City of Temecula	Public Works	(951) 694-6411	
40	Amer	Attar	City of Temecula	Public Works	(951) 694-6411	
41	Laura	Bragg	City of Temecula	Public Works	(951) 694-6411	
42	David	Maus	Riverside County	Transportation Department	(951) 955-1095	
43	Kevin	Gillette	Riverside County	Transportation Department	(951) 955-1095	
44	Thomas	Shipley	Riverside County	Transportation Department	(951) 955-1095	
45	Yolanda	Macalalad	City of Corona	Public Works	(951) 279-3748	
46	Danny	Astorga	City of Moreno Valley	Public Works	(951) 413-3119	
47	Gabriel	Gonzalez	City of Moreno Valley	Public Works	(951) 413-3252	
48	Mosallam	Almasri	City of Moreno Valley	Public Works	(951) 413-3113	
49	Preston "Jerry"	Lytle	Riverside County	Transportation Department	(951) 955-1095	
50	Koran	Manka	Riverside County	Transportation Department	(951) 955-1095	
51	Harvey	McCoy	Riverside County	Transportation/Operations	(951) 658-5234	

NPDES STORMWATER QUALITY TRAINING FOR
Construction Training
Riverside County Flood Control & Water Conservation District

Meeting of: Tuesday, September 30 - 08:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
52	jamison	cole	Riverside County	TLMA/Code Enforcement	(951) 955-8802	Jamison Cole
53	Bob	French	City of Calimesa	Public Workds	(909) 795-9801	
54	jeannie	chambelain	Riverside County	TLMA/Code Enforcement	(951) 955-8802	Jeannie Chamberlain
55	roy	ryder	Riverside County	TLMA/Code Enforcement	(951) 955-8802	
56	Mike	McCabe	City of Calimesa	Public Works	(909) 795-9801	
57	Luis	Tapia	City of Riverside	Water Department	(951) 538-3456	
58	Gary	Moss	Riverside County	Transportation Department	(951) 955-1095	Gary Moss
59	Jay	Oldham	City of Temecula	Public Works	(951) 694-6411	
60	Henry	Olivo	RCFC & WCD	Construction Administration	(951) 955-1288	
61	Gary	Lundberg	RCFC	Inspection	9095601147	
62	Byron	Moreno	Trans Dept			
63	Mayra	DeLaTorre	city of Temecula	Public Works	(951) 6946411	
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NPDES STORMWATER QUALITY TRAINING FOR

Construction Training

Riverside County Flood Control & Water Conservation District

Meeting of: Wednesday, May 27 - 08:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
1	Robert	Parker	City of Desert Hot Springs	Public Works	(760) 272-6016	
2	Paul	Goble	City of La Quinta	Public Works	(760) 777-7087	
3	Amy	Yu	City of La Quinta	Public Works	(760) 777-7047	
4	Richard "Mike"	Call	Riverside County	Transportation Department	(951) 955-1095	
5	Brigitte	Dunmire	Riverside County	Transportation Department	(951) 955-1095	
6	Patrick	Watson	Riverside County	Transportation Department	(951) 955-1095	
7	Paul	Gearhart	City of Riverside	Public Utilities - Water Field	(951) 351-6350	
8	Richard	Gastelum	City of Riverside	Public Utilities - Water Field	(951) 351-6350	
9	Jeff	Kukulka	City of Moreno Valley	Riverside County Waste Management		
10	Thomas	Collins	City of Riverside	Public Utilities - Water Field	(951) 351-6350	
11	Ed	Wimmer	City of La Quinta	Public Works	(760) 777-7088	
12	James	O'Neal	City of Moreno Valley	Riverside County Waste Management		
13	Renata	Purkart	City of Moreno Valley	Riverside County Waste Management		
14	James	Thompson	City of Banning	Public Works	(951) 922-3130	
15	Kevin	Meredith	City of La Quinta	Building & Safety	(760) 777-7017	
16	George	Munoz	City of La Quinta	Building & Safety	(760) 777-7099	
17	Michael	Morris	City of La Quinta	Building & Safety	(760) 777-7014	
18	Anthony	Moreno	City of La Quinta	Building & Safety	(760) 777-7034	
19	Chris	Trinidad	City of Beaumont	Public Works	(951) 769-6999	
20	Ron	Allen	City of Beaumont	Public Works	(951) 769-6999	
21	Joe	Janda	City of Beaumont	Public Works	(951) 769-6999	
22	Susan	James	City of Riverside	Parks and Recreation	(951) 684-4120	
23	George	Boyden	Riverside County	Transportation Department	(951) 955-1095	
24	Jesus	Mendoza	Riverside County	Transportation Department		
25	Trai	Nguyen	Riverside County	Transportation Department		
26	Kimberly	Cohen	City of Corona	Fire	(951) 279-3775	
27	Cris	Dragomir	City of Moreno Valley	Riverside County Waste Management		
28	Eduardo	Castellanos	City of Moreno Valley	Riverside County Waste Management		
29	Nimrod	Garay	City of Moreno Valley	Riverside County Waste Management		
30	Joseph	Hickman	City of Moreno Valley	Riverside County Waste Management		
31	Rob	Istik	~~City of Moreno Valley~~	Riverside County Waste Management		

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Construction Training

Riverside County Flood Control & Water Conservation District

Meeting of: Wednesday, May 27 - 08:00 - 12:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signature
32	Jim	Henke	City of Riverside	Water Engineering	(951) 538-3451	
33	Diedre	Locati	City of Corona	Fire Department	(951) 279-3762	Diedre Locati
34	Cindi	Schmitz	City of Corona	Fire Department	(951) 736-2220	C. Schmitz
35	Brenda	Salas	Riverside County	Economic Development Agency	(951) 955-8069	
36	VICTOR	MOORE	City of Riverside	Public Works-Contracts Adminstration	(951) 232-7139	
37	JUVENTINO	GARCIA	City of Riverside	Public Works-Contracts Adminstration	(951) 640-2885	
38	BARNEY	HUNTER	City of Riverside	Public Works-Contracts Adminstration	(951) 712-3947	
39	Donna	Puentes	City of Riverside	Public Works-Contracts Adminstration	(951) 712-4962	
40	Robert	Savant	City of Riverside	Public Works-Contracts Adminstration	(951) 346-6170	RDS
41	James	Caddel	City of Riverside	Public Works-Contracts Adminstration	(951) 329-7703	
42	TIM	DEXTER	City of Riverside	Public Works-Contracts Adminstration	(951) 712-4974	
43	JUAN	ROJAS	City of Riverside	Public Works-Contracts Adminstration	(951) 538-3037	Juan Rojas
44	DANNY	CWIAK	City of Riverside	Public Works-Contracts Adminstration	(951) 377-5514	Danny Cwiak
45	Freeman	Axtell	Riverside County	Transportation Department	(951) 955-1095	
46	Lisa	Elder	Riverside County	Transportation Department	(951) 955-1095	
47	Paul	Castillo	Riverside County	Transportation Department	(951) 955-1095	
48	David	Hylkema	Riverside County	Transportation Department	(951) 955-1095	
49	MICHAEL	MOTT	City of Palm Springs	Engineering / Public Works	(760) 323-8253	
50	John	Contrado	City of Corona	Public Works Department	(951) 279-3512	
51	Ken	Dagenais	City of Corona	Public Works Department	(951) 736-2456	
52	Darren	Young	City of Corona	Public Works Department	(951) 736-2304	
53	Brian	Ladnier	City of Corona	Public Works Department	(951) 279-3647	Brian Ladnier
54	Michele	Hindersinn	City of Corona	Public Works	(951) 736-2248	
55	Ibrahim	Massoud	City of Riverside	Public Works	(951) 826-5805	Massoud
56	Reza	Asghapour	City of Indian Wells	Building and Safety	(760) 776-0237	
57	Bacilio	Gutierrez	City of Riverside	Public Utilities - Water Field	(951) 351-6350	
58	William	Harris	City of Riverside	Public Utilities - Water Field	(951) 351-6350	
59	Pete	Diaz	City of Riverside	Public Utilities - Water Field	(951) 351-6384	
60	Mark	Ensign	City of Riverside	Public Utilities - Water Field	(951) 351-6350	
61	Mike	Ernate	City of Indian wells	Public Works	(760) 836-9595	
62	Anthony	Diaz	City of Indian wells	Public Works	(760) 776-8090	
63	Pat	Milos	Cathedral City	Public Work	760-770-0390	

NPDES STORMWATER QUALITY TRAINING FOR

Construction Training

Riverside County Flood Control & Water Conservation District

Meeting of: Wednesday, May 27 - 08:00 - 12:00 SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signuature
	RENE	MARTINEZ	CITY OF PALM SPRINGS	ENG / PUBLIC WORKS	760 323-8253	[illegible]
	PHIL	BROESTRUP	COUNTY OF RIVERSIDE	ENV-INSP. B&S	955-3185	Phil C Bro[illegible]
	BILL	WOOLSEY	CITY OF MURRIETA	ENG. / P.W.	461-6073	Bill Woolsey
	ROBERT	PARKER				

ROBERT PARKER CITY OF DESERT HOT SPRINGS PUBLIC WORKS 760) 272-6016 [illegible]

020474

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NPDES STORMWATER QUALITY TRAINING FOR
Construction Training
Riverside County Flood Control & Water Conservation District

Meeting of: Wednesday, May 27 - 13:00 - 17:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signature
1	Moises	Rodarte	City of La Quinta	Building & Safety for	(760) 777-7128	Elizabeth Escatto
2	Wayne	Campbell	City of La Quinta	Building & Safety	(760) 777-7098	
3	Sean	Motlagh	Other	Cities of Perris, Canyon Lake & San Jacinto	(951) 943-6504	
4	Bryan	McKinney	City of La Quinta	Public Works	(760) 777-7045	
5	Rachel Sarah	McLure	City of Riverside	Parks and Recreation	(951) 826-2028	
6	DANIEL	SIMMONS	City of Riverside	Public Works-Contracts Adminstration	(951) 712-4952	
7	Keith	Barnett	Riverside County	Transportation Department	(951) 955-1095	
8	Mark	Hughes	Riverside County	Transportation Department	(951) 955-1095	
9	Guero	Cervantes	City of Perris	Engineering	(951) 943-6504	
10	Stewart	Noble	City of Riverside	Water Engineering	(951) 538-6970	
11	Deby	Conrad	City of La Quinta	Building & Safety	(760) 777-7022	
12	Nicasio "Nick"	Sison	Riverside County	Transportation Department	(951) 955-1095	
13	Amber	Miller	Riverside County	Environmental Compliance Division	955-1871	
14	Roger	Miller	Riverside County	Environmental Compliance Division	955 0886	
15	Michael	Sanders	Riverside County	Code Enforcement	(951) 600-6130	
16	Luis H	Tapia	City of Riverside	Water Engineering	(951) 538-3456	
17	Jeff	Gow	~~City of Moreno Valley~~ Riverside County	Riverside County Waste Management		
18	Ben	Mah	City of Moreno Valley	Riverside County Waste Management	6-3248	
19	Michael	McKinley	City of Moreno Valley	Riverside County Waste Management	2471863	
20	Dan	Olea	~~City of~~ Moreno Valley	Riverside County Waste Management	951-486-3202	
21	Rob	Owen	City of Beaumont	Public Works	(951) 769-6999	
22	Alfredo	Ignacio	City of Beaumont	Public Works	(951) 769-6999	
23	Kevin	Joyce	~~City of Moreno Valley~~	Riverside County Waste Management	2471849	
24	Bob	Cartwright	Other	City of Menifee	(951) 672-6777	
25	Matt	Ciarlo	City of Riverside	Public Works-Contracts Adminstration	(951) 346-4130	Matt Ciarlo
26	Mike	Neal	City of Beaumont	Public Works	(951) 769-6999	
27	William	Jackson	Riverside County	Transportation Department	(951) 955-1095	
28	Eric	Lohr	Riverside County	Transportation Department	(951) 955-1095	
29	Gabriel	Munoz	Riverside County	Transportation Department	(951) 955-1095	
30	Bondie	Baker	City of Indian Wells	Public Works	(760) 776-0237	
31	Danny	Gregorio	Riverside County	Environmental Compliance Division		Dan Gregorio
32	Phil	Broesalme	Riverside County	Environmental Compliance Division		
33	Chandra	Santiago	Riverside County	Environmental Compliance Division		
34	Larry	Joseph	City of Moreno Valley	Riverside County Waste Management		
35	Edward	Wee Eng	City of Moreno Valley	Riverside County Waste Management	951 486 3221	

NPDES STORMWATER QUALITY TRAINING FOR
Construction Training
Riverside County Flood Control & Water Conservation District

Meeting of: Wednesday, May 27 - 13:00 - 17:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Phone No	Signature
36	Jackie	Misuraca	City of La Quinta	Building & Safety	(760) 777-7021	
37	Lance	Noland	Riverside County	EDA	(951) 955-9698	
38	STEVEN	HOWARD	City of Riverside	Public Works-Contracts Adminstration	(951) 712-3904	
39	DON	BUCHANAN	City of Riverside	Public Works-Contracts Adminstration	(951) 712-4970	
40	JIM	STONE	City of Riverside	Public Works-Contracts Adminstration	(951) 712-4972	Jim Stone
41	JACK	LYNN	City of Riverside	Public Works-Contracts Adminstration	(951) 712-2321	
42	FRED	CERDA	City of Riverside	Public Works-Contracts Adminstration	(951) 712-4966	
43	David	Hatch	City of Riverside	Public Works-Contracts Adminstration	(951) 288-3632	
44	Ewina	Lau	City of Riverside	Parks and Recreation	(951) 826-2012	
45	Elmer	Datuin	Riverside County	Transportation Department	(951) 955-1095	
46	Steven	Wann	Riverside County	Transportation Department	(951) 955-1095	
47	Reda "George"	Yassa	Riverside County	Transportation Department	(951) 955-1095	
48	Randy	McDaniel	City of Riverside	Park Planning	(951) 826-2006	
49	Tom	Hall	City of Corona	Public Works Department	(951) 739-4816	
50	Dave	Shreve	City of Corona	Public Works Department	(951) 817-5706	David L. Shreve
51	Rosario	Ruvalcaba	City of Corona	Public Works Department	(951) 739-4813	
52	David	Mitchell	City of Corona	Public Works Department	(951) 279-3510	
53	Anthony	Diaz	City of Indian Wells	Public Works	(760) 776-0237	
54	Michael	Errante	City of Indian Wells	Public Works	(760) 776-0237	
55	Jeff	Potts	City of Corona	Public Works	(951) 736-2442	
56	Chuck	Peebles	City of San Jacinto	Engineering	(951) 654-3592	
57	Mike	Beutler	Other	City of Menifee	(951) 672-6777	
58	Brad	Kutzner	Other	City of Menifee	(951) 672-6777	
59	Kevin	Rhodes	~~City of Moreno Valley~~ RIV. COUNTY	Riverside County Waste Management	951-236-2888	
60	Brian	Stephenson	~~City of Moreno Valley~~	Riverside County Waste Management	(951) 315-7298	
61	KEN	DAGRAIS	C of CORONA	P W	951 736-2456	
62	Kevin	Meredith	City La Quinta	Building + Safety	760 777-7017	
63	MIKE	MORRIS	CITY LA QUINTA	BUILDING & SAFETY	760 777-7014	
64	Elizabeth	Escott	CITY OF LA QUINTA	Building & Safety	760 777-7110	Elizabeth Escott
65						

CAP TRAINING

PLEASE SIGN-IN

020477

NPDES STORMWATER QUALITY TRAINING FOR

Compliance Assistance Program - Stormwater Training

Riverside County Flood Control

Meeting of: 2009, Tuesday, June 2 - 09:00 - 11:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Office	Signature
1	Stacy	Anderson	County of Riverside	Environmental Health - DES	Area 5 (Murrieta)	
2	Sandy	Arnett	County of Riverside	Environmental Health - DES	Area 2 (Hemet)	Sandy Arnett
3	Bonessa	Arpa	County of Riverside	Environmental Health - DES	Area 2 (Hemet)	
4	Shantel	Bacon	County of Riverside	Environmental Health - DES	Area 3 (Palm Springs)	Shantel Bacon
5	Martha	Bahia	County of Riverside	Environmental Health - HazMat	Riverside	
6	Bruce	Bailey	County of Riverside	Environmental Health - HazMat	Corona	
7	Darrel	Balancier	County of Riverside	Environmental Health - DES	Area 3 (Palm Springs)	
8	Brad	Ballen	County of Riverside	Environmental Health - HazMat	Indio	
9	Heidi	Barrios	County of Riverside	Environmental Health - DES	Area 2 (Hemet)	Heidi Barrios
10	Dan	Blum	County of Riverside	Environmental Health - DES	Area 4 (Indio)	
11	Andrea	Briones	County of Riverside	Environmental Health - DES	Area 1 (Riverside)	Andrea Briones
12	Carolyn	Brown	County of Riverside	Environmental Health - HazMat	Hemet	
13	Sandy	Bunchek	County of Riverside	Environmental Health - HazMat	Corona	Sandy Bunchek
14	Kristen	Burnham	County of Riverside	Environmental Health - DES	Area 5 (Murrieta)	Kristen Burnham
15	Jeff	Bustamante	County of Riverside	Environmental Health - HazMat	Hemet	
16	Edina	Camama	County of Riverside	Environmental Health - DES	Area 3 (Palm Springs)	Edi Camama

NPDES STORMWATER QUALITY TRAINING FOR

Compliance Assistance Program - Stormwater Training

Riverside County Flood Control

Meeting of: 2009, Tuesday, June 2 - 09:00 - 11:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Office	Signature
17	Betsy	Capps	County of Riverside	Environmental Health - DES	Area 6 (Corona)	
18	Brent	Casey	County of Riverside	Environmental Health - DES	Area 1 (Riverside)	
19	Ken	Chandler	County of Riverside	Environmental Health - DES	Area 6 (Corona)	
20	Jose	Chavez	County of Riverside	Environmental Health - DES	Area 3 (Palm Springs)	
21	Kris	Cowen	County of Riverside	Environmental Health - DES	Area 3 (Palm Springs)	
22	Nicholas	Crain	County of Riverside	Environmental Health - HazMat	Hemet	
23	Sarah	Crossman	County of Riverside	Environmental Health - DES	Area 1 (Riverside)	
24	Sandi	Delao	County of Riverside	Environmental Health - DES	Area 1 (Riverside)	
25	Fritzy	Devera	County of Riverside	Environmental Health - DES	Special Projects	
26	Bonnie	~~Diefking~~ Dier King	County of Riverside	Environmental Health - DES	Area 5 (Murrieta)	
27	Dottie	Ellis-Merki	County of Riverside	Environmental Health - DES	Area 1 (Riverside)	
28	Ralph	Fregoso	County of Riverside	Environmental Health - DES	Area 1 (Riverside)	
29	Win	Ganly	County of Riverside	Environmental Health - DES	Area 4 (Indio)	
30	Jenny	Gonseca	County of Riverside	Environmental Health - DES	Area 4 (Indio)	
31	Marcie	Graefe	County of Riverside	Environmental Health - DES	Area 3 (Palm Springs)	
32	Richard	Guerrero	County of Riverside	Environmental Health - HazMat	Corona	

NPDES STORMWATER QUALITY TRAINING FOR

Compliance Assistance Program - Stormwater Training

Riverside County Flood Control

Meeting of: 2009, Tuesday, June 2 - 09:00 - 11:00

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	First Name	Last Name	Municipality	Department	Office	Signature
33	My	Ha	County of Riverside	Environmental Health - DES	Area 2 (Hemet)	
34	Michael	Hernandez	County of Riverside	Environmental Health - DES	Area 4 (Indio)	
35	Antonio	Islas	County of Riverside	Environmental Health - DES	Area 1 (Riverside)	A. Islas
36	Kelly	Kersten	County of Riverside	Environmental Health - HazMat	Corona	Kelly Kersten
37	Kristine	Kim	County of Riverside	Environmental Health - DES	Area 6 (Corona)	
38	Bob	Lehmann	County of Riverside	Environmental Health - HazMat	ER Day Team	
39	Lillana	Lizalde	County of Riverside	Environmental Health - DES	Area 5 (Murrieta)	Lilliana Lizalde
40	Jeff	Lojeski	County of Riverside	Environmental Health - DES	Special Projects	Jeff Lojeski
41	Alberto	Lopez	County of Riverside	Environmental Health - DES	Area 2 (Hemet)	
42	Krisin	Lorge	County of Riverside	Environmental Health - DES	Area 6 (Corona)	Kristin Lorge
43	Jenay	Marcotte	County of Riverside	Environmental Health - DES	Special Projects	Jenay Marcotte
44	Brian	McGowan	County of Riverside	Environmental Health - DES	Area 4 (Indio)	
45	Mike	Mendoza	County of Riverside	Environmental Health - DES	Area 1 (Riverside)	Michael A. Mendoza
46	Paul	Mitchell	County of Riverside	Environmental Health - HazMat	Riverside	
47	Lisa	Mitchell	County of Riverside	Environmental Health - HazMat	ER Day Team	
48	Gino	Monterroso	County of Riverside	Environmental Health - HazMat	Corona	

NPDES STORMWATER QUALITY TRAINING FOR

Compliance Assistance Program - Stormwater Training

Riverside County Flood Control

Meeting of: 2009, Tuesday, June 2 - 09:00 - 11:00

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	First Name	Last Name	Municipality	Department	Office	Signature
49	David	Moran	County of Riverside	Environmental Health - DES	Area 4 (Indio)	
50	Doug	Osborn	County of Riverside	Environmental Health - DES	Special Projects	
51	Neil	Ozonur	County of Riverside	Environmental Health - HazMat	Corona	
52	Christine	Parsons	County of Riverside	Environmental Health - HazMat	Corona	
53	Sheila	Peralta	County of Riverside	Environmental Health - DES	Area 5 (Murrieta)	
54	Stephanie	Percival	County of Riverside	Environmental Health - DES	Area 2 (Hemet)	
55	Lester	Powell	County of Riverside	Environmental Health - DES	Area 1 (Riverside)	
56	Jim	Ray	County of Riverside	Environmental Health - HazMat	Indio	
57	Gregg	Reyes	County of Riverside	Environmental Health - DES	Special Projects	
58	John	Riddell	County of Riverside	Environmental Health - HazMat	Indio	
59	Bobby	Riggs	County of Riverside	Environmental Health - HazMat	Indio	
60	Jason	Roy	County of Riverside	Environmental Health - DES	Area 2 (Hemet)	
61	Enrique	Rueda	County of Riverside	Environmental Health - DES	Area 5 (Murrieta)	
62	Dena	Sampel	County of Riverside	Environmental Health - DES	Area 6 (Corona)	
63	Jim	Sappington	County of Riverside	Environmental Health - HazMat	ER Day Team	
64	Bernie	Schleicher	County of Riverside	Environmental Health - HazMat	Corona	

NPDES STORMWATER QUALITY TRAINING FOR

Compliance Assistance Program - Stormwater Training

Riverside County Flood Control

Meeting of: 2009, Tuesday, June 2 - 09:00 - 11:00

SIGN-IN SHEET

	First Name	Last Name	Municipality	Department	Office	Signature
65	Mike	Shalhub	County of Riverside	Environmental Health - HazMat	Hemet	
66	Carolinn	Shay	County of Riverside	Environmental Health - HazMat	Indio	Carolinn Shay
67	Tyler	Skrove	County of Riverside	Environmental Health - DES	Area 5 (Murrieta)	
68	Ryan	Smith	County of Riverside	Environmental Health - HazMat	Hemet	
69	Jean	Strey	County of Riverside	Environmental Health - DES	Special Projects	
70	Daisy	Tepetitla	County of Riverside	Environmental Health - DES	Area 6 (Corona)	Daisy E. Tepetitla
71	Karen	Tracy	County of Riverside	Environmental Health - DES	Area 3 (Palm Springs)	
72	Jess	Trinidad	County of Riverside	Environmental Health - DES	Area 6 (Corona)	
73	Manny	Vargas	County of Riverside	Environmental Health - HazMat	Hemet	
74	Kristen	Vejar	County of Riverside	Environmental Health - DES	Area 4 (Indio)	
75	Nichael	Walling	County of Riverside	Environmental Health - HazMat	Indio	
76	Lynne	Wilder	County of Riverside	Environmental Health - DES	Area 2 (Hemet)	Lynne Wilder
77	Kelly	Winters	County of Riverside	Environmental Health - HazMat	ER Day Team	
78	C. Kevin	Yang	County of Riverside	Environmental Health - HazMat	Indio	
79						
80						

APPENDIX F

WATERSHED MS4 MAP

APPENDIX G

MONITORING ANNUAL REPORT

WARREN D. WILLIAMS
General Manager-Chief Engineer

020484

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RIVERSIDE, CA 92501
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123267

RIVERSIDE COUNTY FLOOD CONTROL
AND WATER CONSERVATION DISTRICT

January 15, 2009

Mr. John Robertus, Executive Officer
California Regional Water Quality
Control Board – San Diego Region
9174 Sky Park Court, Suite 100
San Diego, California 92123

Dear Mr. Robertus:

Re: Report of Waste Discharge for the Santa Margarita River Region of Riverside County Order No. R9-2004-001, NPDES No. CAS0108766

This letter and the enclosures comprise the Report of Waste Discharge (ROWD) for the area-wide municipal separate storm sewer system (MS4) National Pollutant Discharge Elimination System (NPDES) Permit No. CAS0108766, San Diego Regional Water Quality Control Board Order No. R9-2004-001. This ROWD is an application for renewal of the area-wide MS4 NPDES Permit for Riverside County Flood Control and Water Conservation District (RCFC&WCD), the County of Riverside (County), and the incorporated cities of Riverside County within the upper Santa Margarita River watershed (Menifee, Murrieta, Temecula, and Wildomar) collectively referred to herein as "Permittees."

Order No R9-2004-001 does not specify the requirements of the ROWD. However, the attached ROWD includes the following information:

- Applicant information, including Permittee contacts, legal authorities, description of the Permit Area, and funding sources;
- Overview of the upper Santa Margarita River watershed, including population, land use, Receiving Waters, and the MS4;
- Changes in land use and/or population over the 2004 MS4 Permit term and projections for changes over the next MS4 Permit term;
- Highlights of the Permittee compliance programs over the 2004 MS4 Permit term;
- Evaluations of the Permittees existing compliance programs based on water quality data collected to date; and

- Activities the Permittees propose to undertake during the next MS4 Permit term, including implementation of Low Impact Development (LID) requirements and compliance assessments and targets.

In addition, the ROWD includes an assessment of the economic conditions and the projected impact of these conditions on sources of compliance program funding. Based on this assessment, it appears that the major challenge facing the Permittees over the next MS4 Permit term will be maintaining existing compliance programs. In 2004 both the Permittees and the San Diego Regional Water Quality Control Board (Regional Board) staff invested significant time and resources in the development of the current MS4 NPDES Permit (hereinafter referred to as the 2004 MS4 Permit) which define the current compliance program. The Permittees believe, with exceptions outlined in the ROWD, that the existing Permit is protective of water quality and should be reissued as is.

Permittee representatives met with Regional Board staff on September 8, 2008 to obtain guidance for preparation of the ROWD. In that meeting, Regional Board staff provided their expectations regarding the ROWD. Based on the Permittee internal discussions and discussions with Regional Board staff, the Permittees propose to maintain the provisions of the 2004 MS4 Permit and DAMP with limited modifications to reflect:

- Updated references to related orders by the San Diego Regional Board and State Water Resources Control Board (State Board);
- Identification of impairments to Receiving Waters in the Santa Margarita Region;
- Evolution of compliance programs;
- Further standardization and definition of terms;
- Deletion of requirements in the 2004 MS4 Permit that described the development of compliance program elements which were incorporated into the 2005 DAMP;
- Implementation of LID/Hydromodification requirements for New Development projects;
- Implementation of compliance assessments and action levels;
- Necessary modifications to the Watershed SWMP and Individual SWMPs for the 2004 - 2009 MS4 Permit term; and
- Regional Board staff comments made during the term of the 2004 MS4 Permit, including comments received during the September 8th ROWD coordination meeting.

Especially given the existing and projected economic conditions, the Permittees goal is to work with the Regional Board staff to further refine the provisions of the 2004 MS4 Permit to enhance the effectiveness of existing compliance programs within available funding. In addition, the Permittees will work with the Regional Board staff to ensure that the requirements and expectations of the fourth term MS4 NPDES Permit are clear and unambiguous and that the focus is on addressing identified water quality problems in the Receiving Waters

We look forward to working with the Regional Board staff in the renewal of the area-wide MS4 NPDES Permit. If you have any questions, please call Jason Uhley at 951.955.1273 or Claudio Padres at 951.955.8602.

Very truly yours,

WARREN D. WILLIAMS
General Manager-Chief Engineer

Enclosures: ROWD (one hard copy and one CD)

c: Santa Margarita River Region MS4 Permittees, w/CD
Eugene Bromley, USEPA Region IX, w/CD
James Smith, CRWQCB – San Diego Region
Ben Neill, CRWQCB – San Diego Region
David Huff, Riverside County Office of Legal Counsel, w/CD
Robert Collacott, URS, w/CD

CP:JU:bjp

REPORT OF WASTE DISCHARGE

Submitted To

SAN DIEGO REGIONAL WATER QUALITY CONTROL BOARD
(Order No. R9-2004-001)

and

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY – REGION IX
(NPDES No. CAS0108766)

JANUARY 15, 2009

SANTA MARGARITA RIVER REGION

RIVERSIDE COUNTY

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT,
COUNTY OF RIVERSIDE, CITY of MENIFEE, CITY of MURRIETA,
CITY of TEMECULA, and CITY of WILDOMAR

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1.0 Executive Summary

On July 14, 2004 the San Diego Regional Water Quality Control Board (Regional Board) adopted Order No. R9-2004-001, an area-wide National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) permit (2004 MS4 Permit); this permit expires on July 14, 2009. A Report of Waste Discharge (ROWD) for renewal of the 2004 MS4 Permit must be submitted no later than 180 days in advance of the expiration date (i.e., by January 15, 2009).

This ROWD is an application for renewal of the 2004 MS4 Permit (NPDES No. CAS0108766) for the MS4 owned and operated by the Riverside County Flood Control and Water Conservation District (District), the County of Riverside (County), and the incorporated cities of Riverside County within the upper Santa Margarita River watershed (collectively, the Permittees). The newly incorporated cities of Menifee and Wildomar are included in this application as a Notice of Intent to participate in the updated MS4 Permit.

The content of this document is structured to identify:

- Information about the applicants (Section 3.0),
- Information on the area to be covered under the MS4 Permit (Section 4.0),
- An overall evaluation of the Permittees' existing programs based on water quality trends (Section 5.0),
- Accomplishments and recommendations for the Permittees' regionally implemented programs (Section 6.0) and
- Accomplishments and recommendations for the programs implemented as part of the Individual Stormwater Management Plans (SWMPs) (Section 7.0).

The Riverside County Drainage Area Management Plan (DAMP) documents the model implementation plan from which each of the existing Permittees has developed their respective Individual SWMP to implement the DAMP. In addition a Watershed SWMP has been developed to describe the programs that will be implemented regionally. The Annual Reports submitted to date describe the implementation of these SWMPs and document how they have evolved over time.

This ROWD builds on these Annual Reports by highlighting the major accomplishments of these programs, evaluating the long-term effectiveness of the programs and recommending revisions to the programs to enhance the efficiency and effectiveness of the programs to manage Urban Runoff to protect Receiving Water quality. To promote clarity of intent, terms defined in the 2004 MS4 Permit are capitalized in this ROWD.

Due to the impacts of the current economic recession on Permittee budgets and the effectiveness of existing Urban Runoff management programs, the Permittees' primary focus during the next MS4 Permit term will be on maintaining existing compliance programs in the face of significant cuts in basic municipal programs and services. Riverside County is one of the areas most affected by the mortgage crisis and the Santa Margarita Region is one of the most impacted areas of Riverside County. This crisis is having significant impacts on Permittee resources and projections for a deepening recession promises to exacerbate these impacts. Further, monitoring data indicates that the existing compliance programs have been effective in maintaining water quality. This ROWD focuses on maintaining the fundamental

structure and content of the Riverside County DAMP and the Individual SWMPs. However, the Permittees have identified several enhancements and/or alterations to their programs that can be implemented to continue to increase the effectiveness of these programs, without increasing costs.

1.1 Highlights of Program Implementation

Sections 6 and 7 of this ROWD describe the numerous accomplishments of the Permittees programs during the 2004 MS4 Permit term. Some highlights of the major accomplishments for the Permittees include:

- Development and implementation of a Water Quality Management Plan (WQMP) that addresses post-construction Urban Runoff management for New and Significant Re-Development.
- Development and implementation of the Watershed SWMP and the Permittee's Individual SWMPs.
- Development of handbook to standardize post-construction Best Management Practice (BMP) selection and design in Riverside County. Ongoing updates to the handbook include a plan to incorporate and promote low impact development design concepts.
- Development and enhancements to the design template for developing project-specific WQMPs
- Development of a Frequently Asked Question (FAQ) document to assist developers and plan review staff in understanding WQMP requirements and expectations.
- Development of coordinated BMP manual for firefighting agencies.
- Development, implementation and maintenance of Permittee databases to track construction sites 1-acre or larger. In addition, the Permittees have standardized a construction reporting spreadsheet used for Annual Reports, updated inspection forms, and enhanced the construction outreach program.
- Creation of Permittee databases to track industrial and commercial facilities.
- Creation and maintenance of the Storm Water Protection website that offers educational resources and free brochures targeting residents, businesses, developers, contractors, and elementary school children.
- Partnership with the Mission Resource Conservation District to provide an educational outreach programs targeting both schools and adults.
- Continued participation in the Consolidated Program for Water Quality Monitoring (Consolidated Monitoring Program) that includes collection of water quality samples at MS4 outfalls and Receiving Waters.
- Participation in regional and statewide monitoring efforts such as the Southern California Monitoring Committee (SMC), Southern California Coastal Water Commission and National Water Resources Institute.
- Participation in the California Stormwater Quality Association (CASQA), including the leadership roles of Officer, Director, and Legislative Chair.
- Development of the Upper Santa Margarita Region Integrated Regional Watershed Management Plan

- Continued partnership and coordination with the Bureau of Reclamation on a watershed plan and water quality model for the Santa Margarita watershed
- Continued participation in the Santa Margarita Lagoon nutrient Total Maximum Daily Load (TMDL) development process
- Participated in a stakeholder workgroup process led by Regional Board staff to revise REC 1 Basin Plan requirements for TMDLs

1.2 Summary Evaluation of Program Implementation

The trend analysis presented in Section G-8.2 of the FY 2007/2008 Watershed Annual Report and reviewed in Section 5.3 of this ROWD indicates that after almost 14 years of active Permittee involvement in MS4 Permit related Urban Runoff management programs, the significant increase in population (over 300 percent) and associated rapid urbanization that the area has experienced has not resulted in any statistically significant increases in Pollutant concentrations in Receiving Waters in the Santa Margarita Region. This indicates that the Permittees MS4 programs are and have been protective of Receiving Water quality. Pyrethroid pesticides, the one Pollutant that does appear to be linked to urbanization, has been addressed through a Toxicity Reduction Evaluation process, outreach programs, and Permittee participation to address pyrethroid pesticides and other pesticide sources at the state and federal level.

To enhance the effectiveness of the MS4 Permit compliance programs, the Permittees have agreed to implement compliance program revisions as described in sections 6 and 7 of this ROWD.

1.3 Summary of Major Recommendations for Program Revision

As described in section 3.4 of this ROWD, the Permittees are facing unprecedented fiscal impacts resulting from the national and state economic crises. The impacts on the Permittees are especially severe due to the disproportionate impact of home foreclosures in the Santa Margarita Region coupled with plummeting sales tax revenue. Unfortunately, it is anticipated that the economic conditions will persist for a significant portion of the term of the next MS4 Permit. During this period, the Permittee's MS4 compliance programs will increasingly compete with more fundamental public services for finite and dwindling resources. The challenge and priority for the Permittees will be to maintain the existing compliance programs in the face of cuts in basic programs and services.

Nevertheless, and although the various programs implemented as part of the Watershed SWMP and the Riverside County DAMP have been determined to be effective overall, Sections 6 and 7 of this ROWD identify certain areas wherein the Permittees are proposing changes to improve the effectiveness, efficiency, and transparency of these programs.

The program revisions recommended in this ROWD reconfigure existing programs in a manner that will increase the Permittees' overall ability to protect Urban Runoff quality, while limiting additional costs that would make these revisions cost-prohibitive in light of the current and foreseeable economy. Some of the major recommendations include:

Enhance Program Effectiveness Assessments and Incorporate Action Levels (Section 6.1.2.1)

The Permittees have carefully evaluated their MS4 Permit compliance programs and annual reporting forms. Based on this review the Permittees determined that:

- The overarching goal of the program is to ensure that Urban Runoff does not cause or contribute to non-attainment of Beneficial Uses in the upper Santa Margarita River watershed;
- Permittee compliance programs are process based and, consistent with the Maximum Extent Practical (MEP) approach, are incrementally adjusted as part of the annual reports and comprehensively reevaluated and if necessary, revamped as part of each ROWD;
- Monitoring data should be used to drive long term program assessments and assess goal attainment as part of the ROWD; and
- Process based Municipal Action Levels (MALs) should be used to evaluate annual program implementation to ensure that programs are implemented to the MEP and identify the needs for incremental adjustments.

The Permittees have proposed revised Effectiveness Assessment metrics and MALs for use in Permittee Annual Reports consistent with the aforementioned findings and as described further in Section 6.1.2.1. The MALs are intended to function as triggers, or minimum bars that if breached, would require the Permittees to evaluate the appropriate program elements to determine if adjustments are necessary to attain the MEP standard. The Permittee proposal will not only add transparency to the Permittees compliance programs but assist Permittees in evaluating and adjusting their Permit compliance programs to assist in attaining Water Quality Standards. Further, the proposed effectiveness assessment metrics can be implemented without significantly increasing the Permittees' program costs.

Revisions to the IC/ID Program (Section 7.8.2)

During the 2007/2008 MS4 Program audits conducted by PG Environmental and Regional Board staff, several questions were raised regarding the Permittees existing Illicit Connection/Illegal Discharge(IC/ID) field monitoring programs. The Permittees have evaluated the Regional Board and PG Environmental staff's comments and proposed a revised IC/ID Program based on the following:

- Random selection of MS4 outfalls throughout the Santa Margarita Region;
- Rotating MS4 outfall sites annually to maximize coverage of the MS4;
- Partnering one District staff person with one city/county code enforcement officer for data collection to ensure consistency in sampling procedure/collection and quick response to detected IC/ID events.

Implementation of a Post-Construction Treatment Control BMP Inspection Program (Section 7.2.2.6)

Consistent with Regional Board staff's request to consider development of a post-construction Treatment Control BMP inspection program, the Permittees have developed a proposal that they plan to implement when economic conditions allow. This proposal would enhance the existing business and Permittee facility inspection programs described in the Riverside County DAMP by incorporating inspections and maintenance verification of Treatment Control BMPs. Treatment Control BMPs constructed as part of residential developments, or other developments not captured by the Permittees' existing business inspections would be addressed through an annual self-certification program.

Revisions to the Dry Weather Monitoring Program (Section 6.4.4.1)

The Permittees have committed to participating in the Regional Watershed Monitoring Program developed in conjunction with the Southern California Coastal Water Research Project (SCCWRP). Six annual monitoring events were scheduled for the upper Santa Margarita River watershed. Consistent with the agreement reached by SCCWRP, Permittee, and Regional Board staff, three of these sites would be collected by the Permittees and three through the Surface Water Ambient Monitoring Program (SWAMP). The costs for implementing the three sites to be implemented by the Permittees would be offset by reducing the Permittees existing dry weather triad monitoring events (three stations) from twice a year to annually.

Development of a LID Manual (Section 7.2.2.1)

The Permittees have committed to develop a Low Impact Development (LID) Implementation Manual based on the LID Manual currently being developed by the SMC and CASQA.

Hydromodification Management Plan (Section 7.2.2.2)

The Permittees have committed to develop a revised hydromodification management plan based on the findings of the final SCCWRP Hydromodification Management report currently under development.

Participate in a Watershed Based TMDL for the Santa Margarita Lagoon (Section 6.4.4.7)

The Permittees understand that, due to economic conditions, State funding for the Santa Margarita Lagoon watershed-based TMDL has been withdrawn. As described in Section 3.4, economic conditions are also impacting the Permittees' funding sources and the Permittees are struggling to maintain sufficient resources to fund their existing compliance programs. Therefore, the Permittees cannot currently support committing additional funds toward a third party TMDL effort. The Permittees are, however, agreeable to discussing with the Regional Board a elimination or reduction of various required compliance activities that are not measurably enhancing the their ability to attain Water Quality Standards, which in turn could allow the Permittees to redirect some of their existing resources into the third party TMDL effort. Some program elements that could be considered for discussion are described in Section 6.4.4.7.

Pyrethroid Pesticide BMP Implementation

The Permittees have committed to implementing several BMPs to address possible urban sources of pyrethroid pesticides. In addition the Permittees have committed to working through CASQA to facilitate regulatory change in pyrethroid pesticide use to curtail potential causes of receiving water impairment.

Adjustments to the Monitoring Program

The Permittees have proposed additional revisions to the monitoring program to streamline implementation and increase its utility.

2.0 Introduction

The Regional Board adopted Order No. R9-2004-001 (NPDES No. CAS0108766), an area-wide NPDES MS4 permit (2004 MS4 Permit) on July 14, 2004. This ROWD is a required component for renewal of the 2004 MS4 Permit. The 2004 MS4 Permit authorizes discharges of Urban Runoff from the MS4 owned and operated by the Permittees.

Capitalized terms used in this ROWD are defined in the glossary of the Riverside County DAMP. The Riverside County DAMP serves as the model compliance document used by the Permittees to develop the Watershed and Individual SWMPs. To save costs and increase the effectiveness of the MS4 Permit compliance programs, the Permittees will maintain the Riverside County DAMP as the primary document that describes Permittee compliance programs. The Permittees individual and regional compliance programs are then described in more detail in the Individual and Watershed SWMPs.

This ROWD has been written and formatted to address the requirements outlined in United States Environmental Protection Agency (USEPA) *Interpretative Policy Memorandum on Reapplication Requirements for Municipal Separate Storm Sewer Systems* contained in the Federal Register, Volume 61, page 41698 (61 FR 41698), and to include commitments made in the various compliance documents, annual reports and in meetings with the Regional Board.

Additionally, as discussed in the meeting with Regional Board staff on September 9, 2008 and as supported by the above mentioned USEPA guidance, this ROWD relies on the fourth year Annual Reports to document the programs implemented by the Permittees. The fourth year Annual Report also includes a comprehensive evaluation of Permittee monitoring data to date and includes preliminary recommendations for Permittee compliance programs based on that data. As part of the ROWD process, the Permittees have reassessed their existing programs that are described in the Annual Reports, the monitoring conclusions and program recommendations contained in the fourth year Annual Reports, and in this ROWD, are making additional recommendations for revisions to improve the efficiency and effectiveness of these programs at improving and protecting the quality of our Receiving Waters.

The following sections of the ROWD are summarized as follows:

Section 3.0 - Information about the Permittees, their legal authority to implement the existing and proposed programs, the Permit Area, and the Permittee's funding sources and economic outlook relative to continued funding of the MS4 Permit compliance programs.

Section 4.0 – Information about the upper Santa Margarita River watershed, including physiography and geology, hydrology, climate, population, land use, surface water bodies and their Beneficial Uses and Impairments, and the MS4. This information provides context for the MS4 Permit compliance program in the Santa Margarita Region.

Section 5.0 – An overall evaluation of the Permittees existing programs based on water quality data collected to date and proposed compliance program modifications.

Section 6.0 – Evaluation of regional compliance programs, including a summary of accomplishments and proposed program revisions.

Section 7.0 – Evaluation of compliance programs individually implemented by the Permittees, including a summary of accomplishments and proposed program revisions.

3.0 Applicant Information

3.1 Permittee Contact Information

Table 1 provides the contact information for each of the Permittees in the Santa Margarita Region.

Table 1. Permittee Contact Information

	Primary Contact	Staff Contact	Address
District	Warren D. Williams General Manager, Chief Engineer 951.955.1275	Jason Uhley Engineering Project Manager 951.955.1273 juhley@rcflood.org	1995 Market Street Riverside, CA 92501
City of Menifee[1]	George Wentz City Manager 951.672.6777	Addison Smith Building Official 951.672.6777	29683 New Hub Drive, Suite C Menifee, CA 92586
City of Murrieta	Patrick A. Thomas Director of Public Works 951.304.2489	Bill Woolsey 951.461.6073 WWoolsey@murrieta.org	1 Town Center 24601 Jefferson Avenue Murrieta, CA 92562
City of Temecula	Daniel A. York City Engineer 951.694.6411	Aldo Licitra 951.694.6411 aldo.licitra@cityoftemecula.org	43200 Business Park Drive Temecula, CA 92589
City of Wildomar[1]	John Danielson City Manager 951.677.7751	Michael Kashiwagi, P.E. Director of Municipal Services (916) 683-3340 X 15 (Office) (916) 206-2238 (Cell) Local Cell 909.200.0523	23873 Clinton Keith Road, Suite 111 Wildomar, CA 92595
County of Riverside	Gary Christmas Chief Deputy County Executive Officer	Mike Shetler Senior Management Analyst 951.955.1110 mshetler@rceo.org	4080 Lemon Street, Suite 400 Riverside, CA 92501

3.2 Statement of Legal Authority

The Co-Permittees have adopted ordinances regarding the management of Urban Runoff. The ordinances provide the Permittees with the legal authority to implement the requirements of the 2004 MS4 Permit and 40 CFR Section 122.26(d)(2)(i)(A-F). The Permittees also provided certification of adequate legal authority to comply with the 2004 MS4 Permit and to implement the Riverside County DAMP to the

[1] As the Cities of Menifee and Wildomar are recently incorporated, the County of Riverside is currently handling their stormwater and MS4 permitting issues. Once these cities are fully established and staffed, updated contact information will be provided to the Board. The cities will assume responsibility for their programs on October 1, 2009.

Regional Board. However, it is noted that the newly incorporated cities of Menifee and Wildomar will submit their certifications following adoption of the updated MS4 Permit.

However, there are limitations to the authority the Permittees have for enforcement actions. The Permittees do not have legal authority over discharges into their respective MS4 facilities that originate from agricultural activities, state and federal facilities, utilities and special districts, Native American tribal lands, wastewater management agencies and other point and non-point source discharges otherwise permitted by, or under the jurisdiction of, the Regional Board or USEPA. Examples of non-point sources of Pollutants not under the control of the Permittees include materials from operation of internal combustion engines, atmospheric deposition, brake pad wear, tire wear, residues from lawful application of pesticides, nutrient runoff from agricultural activities, and leaching of naturally occurring minerals from local geography.

Also, the Permittees do not have the authority to enforce the provisions of California's General Permit for Storm Water Discharges Associated with Industrial Activities (General Permit-Industrial) or California's General Permit for Storm Water Discharges Associated with Construction Activity (General Permit-Construction). The State Water Resources Control Board (State Board) issues these NPDES permits, and neither the State Board nor the Regional Board has the authority under the Clean Water Act to delegate responsibility for administering these NPDES permit programs to the Permittees. However, the Permittees' local storm water and erosion control ordinances may address items similar to those identified in these statewide NPDES permits.

3.3 Permit Area

The Permit Area is defined as the urbanized area serviced by the Permittee's MS4 facilities. The Permit Area is located within the area delineated by the County boundary line on the south and the limits of the jurisdiction of the San Diego Regional Board on the north, east, and west. It is important to recognize that the Clean Water Act exempts agricultural activities from regulation under NPDES and the Permittees do not have legal jurisdiction over storm water discharges into their MS4 facilities from:

- California and federal facilities,
- Areas under the jurisdiction of San Diego County,
- Utilities and special districts, and
- Native American tribal lands.

These areas are not included in the Permit Area. In addition, other point and non-point source discharges otherwise permitted by or under the jurisdiction of the Regional Board or USEPA may affect water quality in the Murrieta and Temecula Creek watersheds.

The area of Riverside County under the jurisdiction of the Regional Board is less than 8 percent of the 7,300 square miles within Riverside County. Of the 27 municipalities within the whole of Riverside County, only five include areas under the jurisdiction of the Regional Board.

3.4 Funding Sources and Economic Projections

3.4.1 Funding Sources

The costs incurred by the Permittees in implementing the SWMPs fall into two broad categories:

- **Shared Costs**. These are costs that fund activities performed mostly by the District under the Implementation Agreements. These activities include coordinating the overall storm water program, coordinating other interagency cooperative efforts such as the Compliance Assistance Program (CAP), participating in CASQA activities, representing Permittees at meetings of the Regional Board or State Board and other public forums; preparing and submitting compliance reports and other reports required under the MS4 Permit, conducting Urban Runoff monitoring and public education outreach programs, responding to Water Code Section 13267 requests, providing other program documentation, and coordinating consultant studies, Permittee meetings, and training seminars.
- **Individual Permittee Costs for Individual SWMP Implementation**. These are costs incurred by each Permittee for implementing within its jurisdiction the BMPs (drainage facility inspections for illicit connections, drainage facility maintenance, drain inlet/catch basin stenciling, emergency spill response, street sweeping, litter control, public education, construction activity inspection, development of implementation plans, etc.) comprising the Individual SWMPs.

Historically, the Permittees have employed several funding methods to finance their MS4 Permit compliance activities. Unfortunately, the mortgage crisis, collapse of the housing market, and the economic recession has resulted in the cessation of virtually all development activity and has significantly reduced property and sales tax revenue. Property tax revenues have been reduced by the high level of foreclosure activity, reduced property values and a significant decline in assessed valuations. Property tax revenues have been further reduced by homeowner requests for reassessments to reflect the reduced property values. The impact of these economic conditions on the Permittees in the Santa Margarita Region has been particularly severe. As a result, the aggregate funding available to the Permittees has been severely reduced, and it is anticipated that this condition will continue well into and possibly throughout the next Permit term. The funding methods historically used and the effects of the economic situation on the availability of funds through these sources are summarized as follows:

- **Santa Margarita Watershed Benefit Assessment Area**. In 1991, the District established the Santa Margarita Watershed Benefit Assessment Area to fund its MS4 Permit compliance activities. Currently, the Benefit Assessment revenues fund the District's share of the area-wide MS4 Permit program activities and the District's individual compliance activities as a Permittee. Under the Benefit Assessment each parcel is taxed based on the impervious area of each parcel at a set rate established by District Ordinance 14. This rate has not been increased since 1991 due to Proposition 218. In 2007/08 the Santa Margarita Benefit Assessment generated approximately $410,000 dollars in revenue.

  Outlook: The District expects at best to maintain, if not see temporary reductions in Benefit Assessment revenues due to the significant number of homes that are not paying property tax due to foreclosure. Pursuant to Article 13.D of the California Constitution, an increase in the established Benefit Assessment rate to compensate for these reductions requires approval of 2/3

of the voters or 50 percent of the property owners and is highly unlikely given the current economic climate. Revenues will not increase until the development industry recovers.

- **General Fund /Other Revenues**. The County and the cities utilize general fund revenue to finance most of their MS4 Permit compliance activities. General fund revenue is generated by property tax, sales tax, and auto license taxes.

  Outlook: The Permittees expect a continued reduction in th**e funds** available through General Fund / Other Revenues through at least FY 2009 /2010. Although optimistic that conditions will begin to stabilize toward the end of 2009, the Permittees cannot speculate as to when revenues will recover to previous levels.

- **Fees**. Several Permittees charge fees for services such as inspections, plan check, and other recoverable costs related to compliance with the 2004 MS4 Permit. These fees cover both the direct and indirect costs associated with conducting these inspections/reviews including associated compliance tracking and reporting.

  Outlook: It is notable that, with the virtual collapse of the development industry in the Santa Margarita Region, the fees received by the Permittees have been significantly reduced. With this reduced level of fee-based income, maintenance of the existing inspection and plan review programs will place an increased burden on overall funding of the compliance programs. The Permittees do not expect revenues from fees to recover until the development industry recovers. Even with recovery of the development industry, it is anticipated that over the long-term, revenues from fees will be reduced for the City of Temecula and the County due to the reduced area remaining for development within their jurisdictions.

- **Grants.** The Permittees have actively pursued and, as available, used Grants to fund compliance programs.

  Outlook: In December the state's budget crisis resulted in a directive to state agencies from the Department of Finance to halt projects that rely on bond funds, including those funded by Prop 40, Prop 50, or Prop 84. The State of California is the primary source of grant funding for water quality projects. Future availability of funds to resume grant-funded projects is uncertain.

It is clear that the current economic climate and that of the foreseeable future is creating a significant burden upon the Permittees that will make the continuance of all existing MS4 Permit compliance programs increasingly difficult. New funding sources or alternative combinations of funding sources will likely be required to ensure continued funding of even the current MS4 Permit compliance programs.

3.4.2 Economic Projections

According to Chicago Title, Southwest Riverside County has experienced a very significant increase in supply of single-family residential units on the market. As a result, housing price indicators are very negative. In the majority of the Southwest Riverside submarket, the pending price is less than the closing price indicating general price weakness. The October, 2008 count of bank owned (REO) properties for Riverside County as a whole was 12,078. The number of home in foreclosure was 23,480. The presence of high levels of REO properties will continue to negatively affect home prices. In addition, the level of foreclosures is increasing.

With regard to other sectors of the economy, Riverside County has taken a serious turn for the worst in 2008, with projections indicating that the severe downturn will continue through 2009 at the very least.

The economic difficulties being faced in the Southwest Riverside submarket is the result of the dramatic downturn in the housing market in this area, the national financial turmoil, the worldwide credit crisis, and the increasing consumer debt crisis. According to Beacon Economics, a respected economics consulting firm in Los Angeles, Inland Southern California is clearly at the epicenter of this economic turmoil, with extremely high rates of unemployment at present. Unemployment rates in Inland Southern California are expected to reach 12.4 percent before this deep recession is over. Housing prices are expected to continue their precipitous decline from their peak levels in the two Inland Southern California counties through at least 2011. According to Dataquick, median home prices in Riverside County peaked at $415,000 in January 2007. At the end of this cycle, the median home price in Riverside County is expected to be $198,000. Figure 1 depicts the median housing price in Riverside County over the period 1990 to August 2008.

Figure 1. Riverside County Median Housing Price (1990 – August 2008)

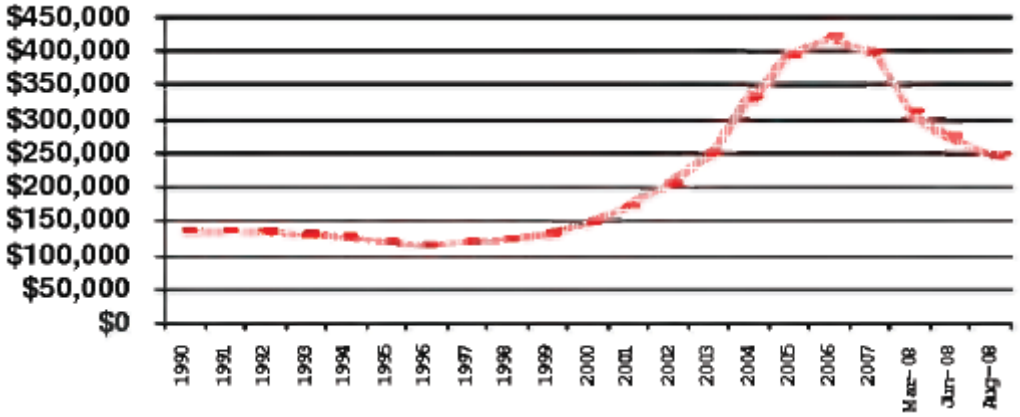

Source: Riverside County Center for Demographic Research. 2008. Riverside County Progress Report, pg 14.

Local Government sales tax revenues remained fairly stagnant through 2006 and began to decline in early 2007, according to Beacon. By the second quarter of 2008, taxable sales in Riverside County declined by 7.7 percent. The decline is expected to continue with taxable sales possibly bottoming out by 2010. Recovery of these reduced revenue streams will likely not occur within the next permit term.

As a direct outcome of the current economy and the economic outlook into the next MS4 Permit term, the number of New Developments proposals has plummeted and any significant rebound is not forecast. New and redevelopment projects will likely remain minimal. As shown in Figure 2, the number of housing units being added each year has dropped below the levels seen at any point in time during the 2004 MS4 Permit. These numbers will likely continue to decrease for a significant portion of the new MS4 Permit term.

Figure 2. Riverside County Housing Units Added (1990 – 2008)

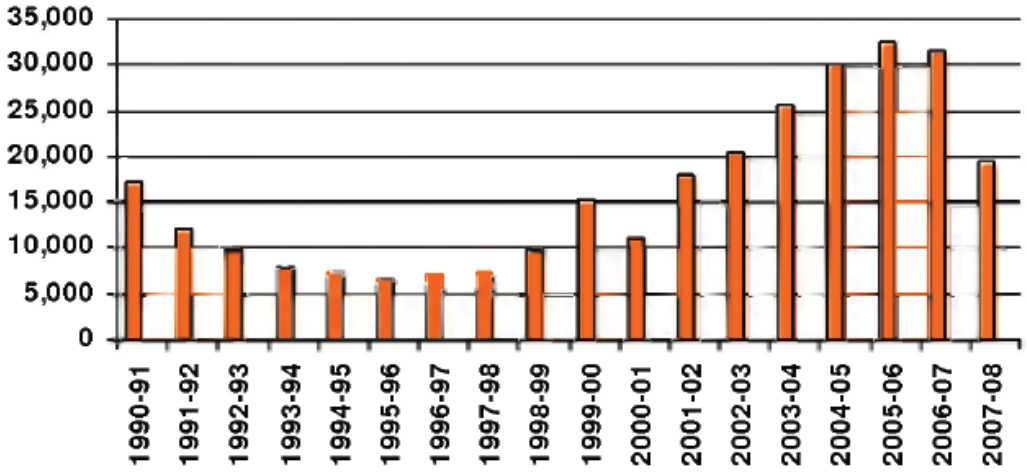

Source: Riverside County Center for Demographic Research. 2008. Riverside County Progress Report, pg 12.

These economic issues and projections directly affect and limit both:

1. The need for including enhanced new and re-development requirements in the new MS4 Permit, and
2. The Permittees ability to fund, and even seek new funding sources for additional MS4 Permit requirements for new and re-development projects.

Therefore, as described in Section 7.2, the Permittees are not recommending and cannot financially support any significant increases to their Development Planning activities. Permittee specific projections are as follows:

3.4.2.1 County of Riverside

The County is operating with a structural deficit of $12 million and plans a 25 percent budget reduction from FY 2008/2009 through FY 2011/2012. The County's current budget of $4.7 billion represents a 5 percent reduction from the previous year and next year's budget is expected to be cut by 10 percent. These cuts are directly associated with the overall decline in property values and the high number of foreclosures. There are concerns about having to use discretionary funds to meet State mental health and social service mandates. In addition, the County is dependent on funds from federal and state sources. If during this time of economic crisis federal and state funding sources are reduced or eliminated, any unfunded State and Federal programs will be terminated. Only core County programs will continue.

The primary source of general fund revenue is from property taxes and sales tax. With the unprecedented number of foreclosures, reduced property values, and declining sales tax revenue, general fund revenue is in a downward spiral. Another source of funding is through the Solid Waste Tipping Fees paid at the County landfills. Volume is down 15 percent since 2006 with anticipated downward trend to 40 percent reduction in solid waste through 2014. Programs that are partially funded through tipping fee allotments will be impacted. Due to the declining economy the recycling market has collapsed. Virtually no recyclable materials are being shipped for reprocessing. This loss of revenue and increased disposal costs is further impacting the general fund.

Cuts of 25 percent for all Net County Cost general fund programs will translate into reduction of County services and elimination of unfunded state and federal programs. Only core value programs will be provided (including public safety and fee programs)

The County has instituted a hiring freeze and required each department to create a report outlining the projected effects of the budget cuts. The County currently employs over 20,000 people, and layoffs are expected to result from the findings of these departmental reports. It is anticipated that this will impact program delivery for stormwater related activities. No County department will be able to sustain current staffing levels as they try to meet the 25 percent budget reduction strategy.[2] [3]

3.4.2.2 City of Menifee

The newly incorporated City of Menifee FY 2008/2009 initial budget was estimated from their comprehensive fiscal analysis that was submitted to the Local Agency Formation Commission during the incorporation process. Because of the economic uncertainty, and the fact that the City is only now beginning to staff positions, it is unknown what the immediate impact of the fiscal crisis will be. The County is responsible for assisting the City in meeting its MS4 Permit compliance requirements during the first year of incorporation which expires October 1, 2009. Currently, the level of property tax revenue that will be available to the City is uncertain. Funding for MS4 Permit compliance requirements was not explicitly budgeted. A financial hardship currently exists because of the costs associated with incorporation.

3.4.2.3 City of Murrieta

The City of Murrieta's FY 2008/2009 budget did not increase compared to FY 2007/2008. Adjustments were made to reflect less revenue and to absorb any operating costs. However, budget cuts are anticipated for FY 2009/2010 because the immediate economic outlook is not good. There have been approximately 2,000 home foreclosures within the City. Sales tax revenue is estimated to drop 12.5 percent, property tax revenue will drop, and the State took approximately $525,000 out of redevelopment funds. Murrieta did not receive any vehicle licensing fees from the State and it appears likely that the State will take more revenue from the Cities to solve its budget problems. New NPDES requirements that increase compliance costs will create a financial hardship for the City.

3.4.2.4 City of Temecula

Various ongoing tax and investment revenues adopted in the City of Temecula's FY 2008-09 general fund revenues are projected to decrease from FY 2007-08. Sales and use tax revenues are expected to decrease in FY 2008-09 compared to FY 2007-08. This decrease is primarily the result of the decline in general consumer goods, electronic retail, and auto sales. Property tax revenue is also expected to decrease due to decreases in supplemental tax receipts attributed to the impact of the housing crisis. Investment interest revenue is also anticipated to decrease due to a decline in interest rates.

As a result of the 2008/2009 State budget, Temecula's redevelopment agency will have to shift existing funds from property taxes to the State's Education Revenue Augmentation Fund coffer for schools and

[2] "The Realities of Recession in California: A Statewide Report by U.S. Senator Barbara Boxer, December, 2008, p. 18.

[3] Riverside County Executive Office, January, 2008.

colleges. As such, the amount due from the Temecula Redevelopment Agency is expected to be $898,685. As the State of California continues to address its budget deficit, the City of Temecula faces the possibility of additional revenue shifts to State coffers, further losing future revenue streams and threatening existing service levels.

In addition, a Press-Enterprise article dated December 9, 2008, reported that "Between 25 and 30 part-time Temecula employees will be without work in the new year as City officials deal with a lack of revenue and less work to go around." Furthermore, "the city is not immune to the economic slowdown, which has forced its neighbors to lay off workers and slash spending to counter drops in sales tax receipts and building permit fees. In May, the City's Finance Director reported that revenues were down $3 million compared to two years ago."

With these current and projected reductions in revenue and staff, additional requirements in the MS4 Permit or upcoming TMDL-related requirements, without any corresponding cost-equivalent offsets, will exceed the City's ability to effectively implement these new requirements and will begin to compromise the City's existing efforts to manage the existing MS4 Permit requirements.

3.4.2.5 City of Wildomar

The newly incorporated City of Wildomar FY 2008/2009 initial budget was estimated from their comprehensive fiscal analysis that was submitted to the Local Agency Formation Commission during the incorporation process. Because of the economic uncertainty, and the fact that the City is only now beginning to staff positions, it is unknown what the immediate impact of the fiscal crisis will be. The County is responsible for assisting the City in meeting its MS4 Permit compliance requirements the first year of incorporation that expires July 1, 2009. Currently, the level of property tax revenue that will be available to the City is uncertain. Funding for MS4 Permit compliance requirements was not explicitly budgeted. A financial hardship currently exists because of the costs associated with incorporation.

4.0 Overview of the Upper Santa Margarita River Watershed

4.1 Physiography and Geology

The upper Santa Margarita River watershed is defined as that portion of the Santa Margarita River watershed above the confluence of Murrieta and Temecula Creeks and includes the City of Temecula and portions of the Cities of Menifee, Murrieta, Wildomar, unincorporated County areas, portions of the Cleveland and San Bernardino National Forests, the Cahuilla, Ramona, Pauma, and Pechanga Indian Reservations and properties under the jurisdiction of Caltrans and a variety of special districts. The watershed is bounded by several mountain ranges, including the Santa Ana and Santa Margarita mountains to the North and the Palomar Mountains to the South. The upper Santa Margarita watershed includes areas in Riverside and San Diego Counties and encompasses approximately 588 square miles.

The upper Santa Margarita watershed includes two major sub-basins, drained by Temecula and Murrieta Creeks. Temecula Creek has a drainage area of 366 square miles, with steep rugged topography in the Palomar and Thomas Mountain areas and rolling hills below. The upper 316 square miles of this basin is controlled by Vail Lake (completed in 1949). Murrieta Creek has a drainage area of 222 square miles, with over 50 square miles controlled by Skinner Reservoir (completed in 1974). Although the watershed area is somewhat smaller and less rugged than the Temecula Basin, flood flows have the potential to create greater damage as they flow through the Cities of Temecula and Murrieta.

Temecula and Murrieta Creeks join along the Elsinore fault zone at the head of Temecula Canyon to form the Santa Margarita River. The Temecula Canyon is approximately five miles long, and is a steep, narrow, and rocky canyon. The San Diego-Riverside county line crosses through the Temecula Canyon. From here, the river traverses 27 miles to the Pacific Ocean.[4]

4.1.1 Watershed Characteristics

Over 50 percent of the Santa Margarita watershed has been controlled by the construction of Vail Dam in 1949 and Skinner Reservoir in 1974, which created a significant storage capacity in the upper watershed.[5] [6] 52 percent of the upper Santa Margarita River watershed is controlled by the dams. Due to this storage capacity, peak flow rates during major flow events for both existing and future land use conditions will be lower than under natural conditions.[7] [8]

[4] Santa Margarita Watershed Study: Hydrologic and Watershed Processes, Phillips, Williams and Associates, Ltd., October 26, 1998, page 1.

[5] Santa Margarita Watershed Study: Hydrologic and Watershed Processes, Phillips, Williams and Associates, Ltd., October 26, 1998, page 14.

[6] Philip Williams & Associates, Santa Margarita Watershed Study: Hydrology and Watershed Processes, October 26, 1998, p. 14.

[7] Philip Williams & Associates, Santa Margarita Watershed Study: Hydrology and Watershed Processes, October 26, 1998, p. 20.

[8] Santa Margarita Watershed Study: Hydrologic and Watershed Processes, Phillips, Williams and Associates, Ltd., October 26, 1998, page 20.

4.1.2 Stream Flow Characteristics

Murrieta and Temecula Creeks are perennial interrupted streams, i.e., they include reaches in which the flow is continuous and others where flow is ephemeral. The areas of perennial flow are located in mountain area tributaries outside of the urbanized areas serviced by the MS4s. The perennial flows disappear by seepage into the sands and gravels and resurface upstream of the confluence of Murrieta and Temecula Creeks. The creeks in the urbanized areas of the watershed, located primarily in the valley, are ephemeral and flows are only observed during and immediately after significant storm events. During major storms, after initial wetting, periods of intense rainfall result in rapid increases in stream flow in steep foothill and mountain areas.[9] "Runoff in streams in the watershed is derived primarily from rainfall, and as a result, stream flows exhibit monthly and seasonal variations similar to those shown by the precipitation records. Absence of snow pack in the tributary watershed results in a rapid decrease in flow of streams at the conclusion of the winter precipitation season. Following severe storms, discharge in the larger streams often increases in a few hours time from practically no flow to a rate of thousands of cubic feet per second. Stream flows vary greatly from month to month and from season to season."[10]

Rising groundwater is currently observed in Murrieta Creek below its confluence with the Santa Gertrudis Channel. This is consistent with the observations with the rising groundwater conditions observed by the State of California in 1956.[11] Rising groundwater is also observed in Temecula Creek approximately one quarter mile upstream of the Interstate 15 bridge. In 1956, the State of California observed more extensive rising groundwater conditions occurring as far upstream as the Highway 79 bridge. Based on the virtual absence of non-storm water flows and the rising groundwater conditions in lower Murrieta and Temecula Creeks observed prior to development of the watershed, there is no evidence that the rising groundwater is due to Urban Runoff nor that Urban Runoff has affected the quality of rising groundwater. However, use and disposal of reclaimed water and agricultural and landscape irrigation in the watershed may affect groundwater quality. Until October 2002, the Rancho California Water District augmented the flow of the Santa Margarita River with reclaimed water at a point about five miles upstream from the Temecula gauging station. Since that time, the Rancho California Water District has diverted reclaimed water to the Santa Ana watershed and instead discharged imported water at a location downstream of the confluence of Murrieta and Temecula Creeks in order to meet water supply obligations to Camp Pendleton.

For the average annual event, it is estimated that approximately 89 percent of the volume of runoff in the Santa Margarita Region is due to non-urban land uses not regulated under the federal storm water program. For the 100-year 24-hour event, 93 percent of the volume of runoff will be due to non-urban land uses. These estimates are based on the assumption that precipitation is constant across the watershed. However, precipitation (and resultant runoff volumes) in the non-urbanized upland areas is as much as four times greater than that from the urbanized valley areas.[12]

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[9] Riverside Flood Control and Water Conservation District, "Hydrologic Data for 1975-76 Season," March 1982, p. 49.

[10] State of California Department of Public Works, Division of Water Resources, Bulletin No. 57, Santa Margarita River Investigation, Volume I, June 1956, p. 48.

[11] State of California Department of Public Works Division of Water Resources, Bulletin No. 57, "Santa Margarita River Investigation," Volume I, June 1956, p. 48.

[12] State of California Department of Public Works, Division of Water Resources, Bulletin No. 57, Santa Margarita River Investigation, Volume I, June 1956, p. 11

4.2 Climate

"The climate of the Santa Margarita River watershed is typically Mediterranean, being characterized by warm dry summers and cool rainy winters. About 75 percent of the precipitation occurs during the four-month period from December through March. Mean annual depth of precipitation ranges from less than 10 inches near Vail Reservoir to over 40 inches west of Palomar Observatory, varying with elevation and topographic influences."[13] Precipitation increases with increases in elevation to the summit of the Coastal range. Shading effects of the Coastal range lead to a marked decrease of precipitation throughout the lower portions of the Inland area. Precipitation increases again farther away from the Coastal range in the northeastern area of the Inland area.[14] The significant and varied orographic features also make rainfall prediction particularly challenging in the urbanized portion of the watershed.

4.3 Population and Land Use

4.3.1 Population

The California Department of Finance estimates that as of January 1, 2008, the total population of Riverside County was about 2,088,322. Of the 2.1 million people, approximately 272,621 persons (or 13 percent) reside within the portion of Riverside County under the jurisdiction of the San Diego Regional Board. As shown in Figure 3, approximately 51,314 persons[15] reside in the unincorporated area while approximately 221,307 persons reside within the cities of Menifee, Murrieta, Temecula and Wildomar.

Figure 3. Santa Margarita Region Population by Permittee (2008)

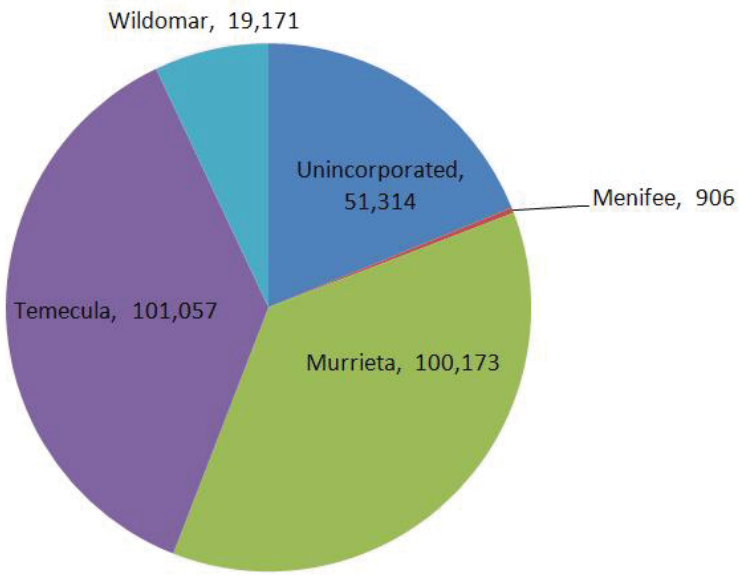

[13] State of California Department of Public Works, Division of Water Resources, Bulletin No. 57, Santa Margarita River Investigation, Volume I, June 1956, p. 11.

[14] State of California Department of Public Works, Division of Water Resources, Bulletin No. 57, Santa Margarita River Investigation, Volume I, June 1956, p. 38.

[15] Population estimate for the portion of unincorporated Riverside County within the Santa Margarita River watershed developed by the County TLMA GIS Demographics Unit based on the 2000 Census.

Although the second term and 2004 MS4 Permits covered a period of time that saw a significant amount of growth, due to the current and foreseeable economic conditions described in Section 3.4.2 of this report and decreasing areas available for development, growth during the next MS4 Permit term will be quite limited. In fact, the projected growth rate through 2015 will be significantly less than has been seen since the early 1990s. Figure 4 shows the combined populations of the Cities of Murrieta and Temecula since 1997 and projected through 2015. Similar trends are expected for the unincorporated areas and the portions of the cities of Wildomar and Menifee within the watershed.

Figure 4. Cities of Murrieta and Temecula Combined Population (1997 – 2015)

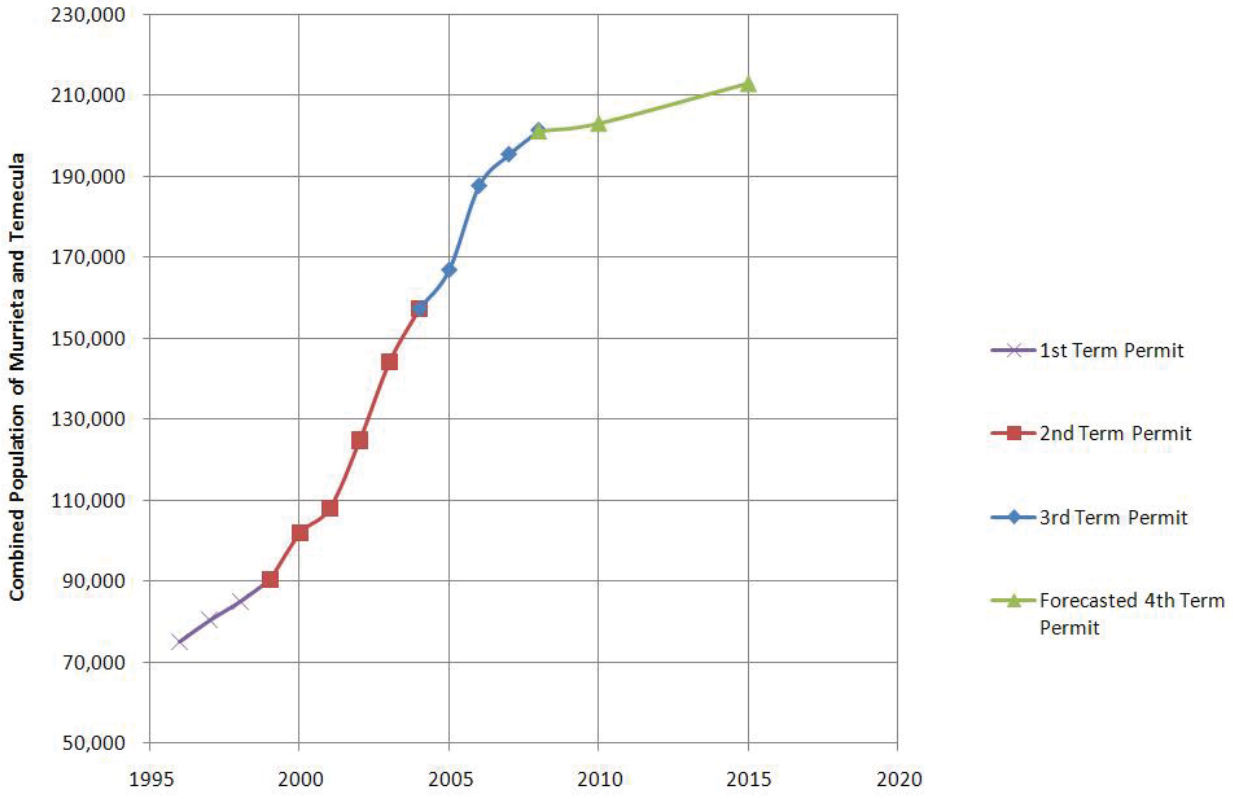

Source: Riverside County Center for Demographic Research. 2008. Riverside County Progress Report, pgs 92 & 124.

Figure 4 clearly demonstrates the dramatic reduction in growth that is expected for the term of the next MS4 Permit when compared to previous permit terms.[16] Establishing trend lines for the population in these cities further demonstrates that the growth rate (population added per year) will be lower than the previous growth rate by approximately 86 percent.

[16] 2008 Riverside County Progress Report

Table 2 shows population projections for the all of the Permittees into the year 2015.

Table 2. Population of Santa Margarita Region Co-Permittees

Co-Permittee	Year			Change (2009 to 2015)
	Estimate 2008 (a)	Estimate 2009 (b)	Projected 2015 (b)	
City of Menifee	906[c]	927[c]	5,232[c]	464%
City of Murrieta	100,173	102,277	109,715	7.3%
City of Temecula	101,057	101,356[d]	103,150	1.8%
City of Wildomar	19,171[c]	19,589[c]	20,127[c]	2.7%
Unincorporated County of Riverside	51,314[c]	52,436[c]	53,793[c]	2.6%
Total	272,621	276,585	292,017	5.6%

Notes:

(a) Unless otherwise noted, populations were obtained from the State of California, Department of Finance, E-4 Population Estimates for Cities, Counties and the State, May 2008.

(b) Unless otherwise noted, projected populations were obtained from Riverside County Center for Demographic Research. Riverside County Progress Report, 2008

(c) Data provided by County of Riverside, Executive Office.

(d) Data provided by City of Temecula.

Since the District is not a general purpose government, it is not included in this listing. Although the current population of the City of Menifee in the Permit Area is small, it is anticipated that the population will increase as it annexes unincorporated areas. Similarly, it is anticipated that the cities of Murrieta and Temecula will gain population as they annex unincorporated areas. It is not anticipated that Wildomar will see significant population increases as it is bounded on all sides by other cities and lands reserved under the MSHCP.

4.3.2 Land Use

Land uses in Riverside County within the Santa Margarita Region include open space, residential, commercial, light industrial, heavy industrial, and agriculture. The agricultural land uses include row crops, nurseries, citrus groves and vineyards, dairies, ranches, poultry and hog farms, and other agricultural related uses with one single-family residence allowed per 10 acres (County of Riverside General Plan, Land Use Element 2003). The conversion of agricultural lands and open space to other "developed" land uses has been ongoing and will continue, although at a much lower rate than previously experienced. Land uses in the Santa Margarita Region are shown in Table 3. These land uses are based on the County of Riverside Assessor Parcel Data, current as of February 2006. It should be noted that the land uses below represent ***zoned*** land uses rather than ***actual*** land uses. This overstates the actual area of urban land use in the Santa Margarita Region. Also, changes in zoning designations can cause odd fluctuations in year-to-year date.

A map of the zoned land uses is provided in Appendix A.

In 1956, only 0.3 percent of the Santa Margarita River watershed (less than two square miles) was urbanized.[17] Although there has been a significant rate of growth in population relative to the State and

[17] State of California Department of Public Works, Division of Water Resources, Bulletin No. 57, Santa Margarita River Investigation, Volume I, June 1956.

neighboring counties, half a century later, approximately 88 percent of the Santa Margarita River watershed remains as non-urban land uses (rural residential, agriculture, preserves and open space, state lands, federal lands, and tribal lands). Further, almost one-third of the upper Santa Margarita River watershed consists of federal, state, and tribal lands that are not under the jurisdiction of the Permittees' MS4 programs. It is projected that the population of Riverside County will increase approximately 5.6 percent by 2015. If the urbanized area increases proportional to population, 87 percent of the upper Santa Margarita River watershed would remain in non-urban land uses in 2015.

Table 3. 2009 Santa Margarita Region Land Uses

Urban Land Use	Acreage[(a)]	% of Land Use Subtotal	% of Total Land Use
Commercial	8,339	20.0%	2.5%
Industrial	963	2.3%	0.3%
Urban Residential (< 1 acre)	12,656	30.4%	3.7%
Parks & Recreation Facilities	4,291	10.3%	1.3%
Streets & Roads	15,439	37.0%	4.6%
Subtotal – Urban Land Use	41,688		12.3%
Non Urban Land Uses			
Preserves & Open Space	54,141	18.2%	16.0%
Rural Residential (> 1 acre)	106,773	35.9%	31.5%
Agriculture	36,389	12.2%	10.7%
Federal/State/Tribal Lands/Non-County Jurisdiction	100,076	33.7%	29.5%
Subtotal Non Urban Land Use	297,379		87.7%
Total Urban & Non Urban Land Use	339,067		100%

(a) As reported in the FY 2007/2008 Watershed Annual Report.

4.3.3 Conserved Lands

The Western Riverside County Multiple Species Habitat Conservation Plan (MSHCP) was adopted in June of 2003. It is a comprehensive, multi-jurisdictional Habitat Conservation Plan focusing on conservation of species and their associated habitats in western Riverside County. The MSHCP is one of several large, multi-jurisdictional habitat planning efforts in southern California with the overall goal of maintaining biological and ecological diversity within a rapidly urbanizing region. The MSHCP will allow Riverside County and its cities to better control local land-use decisions and maintain a strong economic climate in the region while addressing the requirements of the state and federal Endangered Species Acts. Further, as floodplains and streams tend to support critical habitat, the MSHCP will preserve many of the remaining natural streams and establish significant buffer areas between those systems and urban land uses.

Much of the remaining non-urbanized lands in the Santa Margarita Region will ultimately be incorporated into the MSHCP. The MSHCP will result in a conserved area in excess of 500,000 acres and focuses on conservation of 146 species. The MSHCP Conservation Area includes approximately 347,000 acres on

existing Public/Quasi-Public Lands and approximately 153,000 acres of Additional Reserve Land. A large portion of the conserved lands are in the upper Santa Margarita watershed (at least 145,000 acres). There are approximately 72,318 acres of existing public or quasi-public lands preserved within the upper Santa Margarita River watershed area located in Riverside County.

4.3.4 Anticipated Development 2009-2015

Proposed development during the next MS4 Permit term is an important indicator of potential new Urban Runoff sources. To the extent possible, the Permittees have identified significant New Development projects that, if constructed, will result in the conversion of primarily undeveloped land to developed land. This section describes the expected development within Permittee cities. Consistent with the current and forecasted economic conditions and population estimates, and as supported by the population information and forecasts presented in Section 4.3.1, the Permittees anticipate that the term of the upcoming MS4 Permit will be a time of little development. Following are summaries of anticipated development during the upcoming MS4 Permit.

4.3.4.1 County of Riverside

Projected trends for the County of Riverside's land use can be referenced in the Riverside County General Plan. Maps depicting the areas of future development and type of land use can be found in the General Plan maps that are accessible at http://www.rctlma.org/generalplan/area_maps.html.

- With the incorporation of the cities of Wildomar and Menifee the remaining unincorporated County area to be built out in the Santa Margarita Region during the upcoming MS4 Permit term is going to be considerably smaller.
- It is anticipated that, over the next five years, additional annexations will occur in each of the four city areas (Temecula, Murrieta, Wildomar and Menifee) that will further reduce the unincorporated County area in the Santa Margarita Region.
- The unincorporated County area in the upper Santa Margarita River watershed (east of Temecula, Menifee and Murrieta) will remain in rural, open space and additional MSHCP land uses. In addition, due to drought conditions and depletion of aquifers the prospects of New Development is unlikely. Water districts in the region cannot offer "will serve" letters to provide for water resources they do not have. Infrastructure for water supply and municipal water treatment, MS4 and flood control facilities are virtually non-existent in this area.
- Due to downturn in economy, Development Impact Fees (DIF) and Transportation Uniform Mitigation Fees (TUMF) are and will continue to be significantly under funded. This reduction in transportation funding will result in fewer road and infrastructure projects during the term of the upcoming MS4 Permit. The Transportation Department has projected limited projects for the Santa Margarita Region. The Clinton Keith Road widening project is still in the planning stages. Due to budgetary constraints, unless projects are fully funded through County finance mechanisms (TUMF, DIF, state and federal pass through from bonds and grants) most projects will be put on hold through 2012.

4.3.4.2 City of Menifee

Projected development trends for the City of Menifee are unknown, sphere of influence and annexation opportunities will allow for limited growth once the economic uncertainty of the region is resolved.

4.3.4.3 City of Murrieta

The area north of Clinton Keith Road along the east side of the I-215 freeway should see some construction towards the end of the next MS4 Permit term. Grading for the construction of a hospital has started along the freeway and it is anticipated that supporting development will follow once the hospital is open. Overall the Planning Department is receiving few applications for New Development projects. For example, a Planning Commission meeting scheduled for January 2009 has been cancelled because there are no New Development items to discuss. In light of the current and foreseeable economic conditions, the City does not anticipate any substantial New Development activity for the next few years, with limited growth possibly resuming toward the end of the next MS4 Permit term.

4.3.4.4 City of Temecula

The City of Temecula is currently experiencing a significant leveling trend in development. Throughout 2008, fewer applications were being processed than in previous years. As such, Temecula does not anticipate processing any substantial number of New Development applications within the next MS4 Permit term. It is anticipated that applications from hereon will be limited to smaller in-fill and redevelopment projects. In addition, proposed annexation areas will be limited to areas that will be set aside mostly for conservation. As Temecula is on the verge of build-out, approximately 1 percent of developable land remains available throughout the City for New Development.

4.3.4.5 City of Wildomar

Projected trends for the City of Wildomar are unknown, sphere of influence opportunities will allow for limited growth once the economic uncertainty of the region is resolved.

4.4 Surface Water Bodies, Beneficial Uses, and Impairments

Approximately eight percent of Riverside County drains into surface water bodies within the jurisdiction of the Regional Board. Those surface water bodies (or portions thereof) are listed in Sections 4.4.1 and 4.4.2.

Rivers and Streams

- Santa Margarita River (Hydrologic Unit Basin Number 2.22)
  - Murrieta Creek
    - Slaughterhouse Canyon
  - Cole Canyon
    - Warm Springs Creek
      - Diamond Valley Reservoir
  - Santa Gertrudis Creek
    - Tucalota Creek
    - Lake Skinner
  - Temecula Creek (Hydrologic Unit Basin Number 2.92)
    - Iron Spring Canyon
  - Temecula Creek (Hydrologic Unit Basin Number 2.84)
    - Tule Creek
      - Million Dollar Canyon
    - Cottonwood Creek
  - Vail Lake
    - Wilson Creek
      - Cahuilla Creek (Hydrologic Unit Basin Number 2.73)
        - Hamilton Creek
      - Cahuilla Creek (Hydrologic Unit Basin Number 2.71)
        - Elder Creek
    - Arroyo Seco Creek
    - Kolb Creek
  - Temecula Creek (Hydrologic Unit Basin Number 2.52)
    - Pechanga Creek
- Santa Margarita River (Hydrologic Unit Basin Number 2.21)
  - DeLuz Creek

4.4.1 Beneficial Uses

The upper Santa Margarita River watershed supports a variety of ecosystems and provides many Beneficial Uses (Table 4)[18]. The ultimate goal of the Riverside County DAMP and the Watershed and Individual SWMPs is to manage Urban Runoff in a manner protective of the Beneficial Uses of these Receiving Waters.

Table 4. Beneficial Uses of Receiving Waters
Upper Santa Margarita River Watershed

Beneficial Use	Murrieta Creek	Cole Canyon	Warm Springs Creek	Santa Gertrudis Creek	Long Valley	Temecula Creek	Santa Margarita River
Municipal and Domestic Supply	X	X	X	X	X	X	X
Agricultural Supply	X	X	X	X	X	X	X
Industrial Service Supply	X	X	X	X	X	X	X
Industrial Process Supply	X	X	X	X	X	X	
Ground Water Recharge	X					X	
Contact Water Recreation				X	X	X	X
Non-contact Water Recreation	X	X	X	X	X	X	X
Warm Freshwater Habitat	X	X	X	X	X	X	X
Cold Freshwater Habitat							X
Wildlife Habitat	X	X	X	X	X	X	X
Rare, Threatened or Endangered Species							X

4.4.2 Current Water Quality Concerns and Issues

Urban Runoff discharged to MS4s in Riverside County ultimately flows to various surface water bodies (inland streams, lakes, and reservoirs) and typically carries Pollutants that originate from numerous dispersed and uncontrolled sources. Examples of Pollutants that may be present in Urban Runoff are fertilizer, heavy metals, nutrients, petroleum products, sediment, bacteria, chemicals, and litter.

Because the upper Santa Margarita River watershed is large and has many land uses, the water quality concerns in sub-watersheds vary. However, each land use can potentially contribute Pollutants to nearby streams, rivers, and lakes. The infrastructure that supports people's activities (e.g., roads, parks, MS4, and wastewater collection and treatment facilities) may contribute to water quality concerns if not properly managed. Other sources of stormwater runoff, including agricultural areas, are exempt from the requirements of the NPDES permitting program established under the Clean Water Act. In addition, some Pollutants, such as total suspended solids, may be found at elevated levels in runoff from non-urban land uses. Further, certain activities that generate Pollutants present in Urban Runoff are beyond the ability of the Permittees to eliminate. Examples of these include operation of internal combustion engines, atmospheric deposition, brake pad wear, tire wear, residues from lawful application of pesticides, nutrient runoff from agricultural activities, and leaching of naturally occurring minerals from local geography.

[18] www.waterboards.ca.gov/rwqcb9/programs/

As required by Section 303(d) of the Clean Water Act, the State Board maintains a list all waters in the State that do not meet the Water Quality Standards established in the Basin Plans prepared by the Regional Boards for protection of Beneficial Uses. This list, referred to as the "303(d) List," details the Pollutant or stressor on each named water body, the potential source of Pollution, estimated affected area, as well as a priority for development of the associated TMDL. A TMDL is a plan that identifies how much Pollutant load a specific Impaired Waterbody can sustain without impacts to its Beneficial Uses. In addition to identifying the maximum Pollutant load, a TMDL is used to develop implementation plans to meet Water Quality Standards for a designated water body. Table 5 summarizes the 2006 303(d) List of Impaired Waterbodies within the upper Santa Margarita River watershed, as well as the year in which a TMDL is proposed for approval. No TMDLs have been established for Receiving Waters in the upper Santa Margarita River watershed.

Table 5. 2006 303(d) Listings for the Santa Margarita Region

Water Body	Pollutant	Potential Sources	Area Affected	Proposed TMDL Completion
Santa Margarita River (Upper)	Phosphorus	Urban runoff/storm sewers Unknown nonpoint source Unknown point source	18 miles	2019
Murrieta Creek	Iron Manganese Nitrogen Phosphorous	Source unknown Source unknown Source unknown Urban runoff/storm sewers Unknown nonpoint source Unknown point source	12 miles 12 miles 12 miles 12 miles	2019 2019 2019 2019
Temecula Creek	Nitrogen Phosphorus Total dissolved solids	Source unknown Source unknown	44 miles 44 miles	2019 2019

Table G-35 of Appendix G to the Annual Report 2007-2008 additionally identifies pyrethroid pesticides (bifenthrin and permethrin), bacteria (E. coli and fecal coliform), lead, and sediment (turbidity) as Pollutants of Concern in the upper Santa Margarita River watershed that warrant focused attention by Permittee implementation programs. These constituents have been detected intermittently or persistently at Triad and Tributary monitoring stations.

4.5 Municipal Separate Storm Sewer System

A map depicting the MS4 facilities owned and operated by the Permittees is provided in Appendix B.

5.0 Program Evaluation Based on Water Quality Trends

The overall effectiveness of the Permittees programs is assessed based on the analysis of water quality data obtained as part of the Consolidated Monitoring Program. Approximately 14 years of data have been collected through this program and have been cumulatively analyzed in the fourth-year monitoring Annual Report.

5.1 Inherent Limitations to Analyzing Water Quality Data

There are inherent limitations to analyzing water quality data from storm water. Storm water runoff is very different from mechanical wastewater or water treatment processes that usually incorporate water quality monitoring. Discharges from mechanical processes such as treated wastewater effluent and industrial discharges usually:

- Come from a single or a few readily identifiable sources;
- Are generally consistent in flow rate and chemical character from day to day; and
- Can be easily instrumented.

Conversely, Urban Runoff non-point source flows, such as those collected and analyzed as part of the MS4 Permit monitoring programs usually:

- Come from multitudes of unidentifiable or hidden sources, many of which are non-Urban in nature:
  - State, federal or tribal lands
  - Natural leaching of soils
  - Wildlife
  - Aerial deposition
  - Wildfires
- Vary widely in flow rate in response to precipitation events
- Vary widely in chemical character at any given moment due to:
  - Unidentified episodic issues related to natural phenomena
  - Magnitude of rainfall and extent of contributing area
  - Potential one-time illicit discharges that were not identified at the time of sampling
  - Unforeseen or unidentified consequences of changes in numerous land use policies (fire management, development, etc)
- Are subject to significant natural random variation; and
- Cannot be easily instrumented due to the wide variation in depth and velocity and associated impacts of natural or unnatural aggradation and degredation of natural stream beds.

Because ephemeral storm water flows are, by their very nature, particularly random in character, it may take many years before monitoring data trends can be detected or to determine the effectiveness of an

Urban Runoff control measure. Power analyses were conducted for fecal coliform, metals, and nutrients at the stations monitored in the Santa Ana Region during the 2005/06 reporting period. Power analysis is used to determine how many years of monitoring would be required to detect a given trend in the data. This tool was developed by the SCCWRP. Based on the results, for biennial monitoring, and having an 80 percent chance of detecting a change in concentration, it would take about 5-10 years of data collection to detect a change of 50 percent in concentration, 10-15 years of data to detect a 25 percent change, and 15-30+ years of data to detect a 10 percent change. It is expected that results would be similar for other parameters measured in the monitoring program in the Santa Margarita Region.

5.2 Focus Area Constituents of Concern

During the 2004 MS4 Permit term, monitoring data indicated that one or more receiving water samples have been found to contain the following constituents at levels that exceeded Basin Plan Objectives (BPO). As such they have been identified as constituents of concern.

- Nutrients (Ammonia as N, Phosphorus
- Pyrethroid Pesticides (Permethrin, Bifenthrin)
- Pathogen Indicators (E.coli, Fecal Coliform)
- Lead
- Turbidity (lab)

5.3 Analysis of Water Quality Trends

As discussed in the 2008 Santa Margarita Region Annual Monitoring Report, the results of the trend analysis and regression calculations indicate that there are no statistically significant trends in the water quality monitoring data. The lack of trends in the data presented in the Annual Monitoring Report contrasts with the rapid population growth over the same time frame. As discussed in the Annual Monitoring Report, population growth from 1990 to 2008 was approximately 300 percent for the Santa Margarita Region. This significant growth in population and resulting urban land use area contrasts sharply with the lack of statistically significant increases in concentrations of constituents of concern that would otherwise be expected in stormwater runoff from urbanized areas.

These results demonstrate and can be attributed to the effectiveness of the Permittees' programs at addressing the Focus Area Constituents of Concern, which are targeted and designed to prevent the discharge of these constituents into the Receiving Waters.

5.3.1 Recommended Compliance Program Modifications to Address Focus Area Constituents of Concern

Based on the analysis described above and in Appendix G of the 2008 Watershed Annual Report, no significant program modifications are necessary to continue to protect and improve the quality of the Receiving Waters.

Although the Permittees programs have been shown to be protective of Receiving Water quality, through continual evaluation of the programs being implemented and on-going water quality monitoring, additional measures are being proposed as part of this ROWD to address changing conditions and ensure

the ongoing effectiveness of the programs. Recommended changes to ensure the ongoing effectiveness of the Permittees programs are described in Sections 6 and 7 of this report.

6.0 Evaluation and Recommendations for Regionally Implemented Programs

6.1 Program Management

The District is the Principal Permittee for each of the three MS4 permits issued by the three Regional Boards that have jurisdiction in Riverside County. As Principal Permittee, the District performs management functions including coordination with the Regional Boards, preparation of compliance documents and Annual Reports, participation in studies and external cooperative efforts and dissemination of information to the Permittees. The Permittees implement some compliance programs that are common to all of the Permittees and which are implemented on a Countywide or regional basis to increase cost effectiveness and efficiency. Typically, the District also manages Countywide and regional programs.

6.1.1 Program Management Accomplishments and Programmatic Improvements

During the term of the 2004 MS4 Permit the following accomplishments were achieved.

- Updated the Implementation Agreement that sets forth the responsibilities of the Principal Permittee and the Co-Permittees.
- Revised the Riverside County DAMP to reflect requirements in the 2004 MS4 Permit, which served as a model document for the Permittees Watershed and Individual SWMPs.
- Developed Santa Margarita Region Watershed SWMP
- Participated in the Santa Margarita River Executive Management Team (SMREMT) to identify and address the highest priority water quality concerns in the Santa Margarita watershed, including development of a watershed model to assist with land use planning and TMDL development, coordinating watershed monitoring, and developing formal agreements between interested stakeholders for the purposes of evaluating impairment listing and data gaps in the watershed.
- Continued progress with the SMREMT on a uniform watershed plan and model for the Santa Margarita Watershed through the Santa Margarita Watershed Supply Augmentation, Water Quality Protection, and Environmental Enhancement Program.
- Participated in the Santa Margarita Lagoon TMDL workgroup in funding and overseeing the development of a comprehensive program to collect data and model the various inputs to the lagoon to be used to develop a TMDL to address nutrients.
- Participated in the Santa Margarita Watershed Water Quality Monitoring Group to coordinate the monitoring efforts of various stakeholders in the Santa Margarita watershed.
- Participated in the SMC to improve stormwater monitoring science, coordinate data collection efforts, and evaluate the effects of stormwater discharges to receiving waters specific to Southern California.
- Participated actively in various efforts of CASQA.

- Participated in the completion of an Integrated Regional Water Management Plan for the upper Santa Margarita Watershed to help pave the way for greater watershed-wide coordination and management of water resources within the upper watershed as a whole, as well as adjoining watershed and regional planning efforts.
- Participated in the development and implementation of the MSHCP for Western Riverside County which contains a comprehensive land use plan that ultimately conserves the environmental resources and habitat of approximately half of the Santa Margarita Region.
- Participated in the development of a Special Area Management Plan (SAMP) to further manage receiving waters at a watershed scale for the upper Santa Margarita Watershed by identifying, prioritizing and protecting the highest priority Waters of the U.S., while considering the broader needs of growth and transportation improvements.
- Developed and updated methods to track program effectiveness such as resident surveys, tracking hotline inquiries, and web counters.
- Enhanced Public Education program through development of new outreach materials and programs.

6.1.2 Proposed Revisions to Regional Program Management

6.1.2.1 Enhanced Program Effectiveness Assessments and Municipal Action Levels

To ensure that the Permittee's programs continue to be effective at managing the effects of Urban Runoff on Receiving Water quality, the Permittees will revise the Program Effectiveness Assessments for both the Individual SWMP and the Watershed SWMP as part of their implementation of the new MS4 Permit. An assessment strategy based on the CASQA Municipal Stormwater Program Effectiveness Assessment Guidance has been established including the establishment of:

- Measurable goals for each component,
- Measurable metrics to assess progress toward those goals,
- CASQA Effectiveness Levels for each metric; to indicate the level at which each metric can demonstrate the effectiveness of the Permittee's programs at addressing each goal.
- Timeframes in which the Permittees expect to be able to assess effectiveness using each metric.
- Municipal Action Levels (MALs) for appropriate metrics to ensure a minimum level of program implementation and identify shortcomings that could affect the Permittee's progress toward the established goals. The MALs would not be permit compliance measures, but triggers for further Permittee evaluation of the affected compliance program.

If a MAL for a metric is exceeded, the Permittees will review implementation of that program component to identify the cause of the exceedance and identify needed adjustments to avoid future exceedances. The findings of these reviews and any recommended adjustments to the Permittees programs will be reported in the corresponding section of the Annual Report submitted the following year. Further research is particularly needed to establish appropriate Municipal Action Levels for the various program areas.

After a review of the stormwater program, the Permittees have established an initial Assessment Methodology for each component including preliminary goals, measurable metrics, effectiveness levels,

timeframes and MALs for each. These initial assessment methodologies are included in tabular format in Appendix C. Although the Permittees believe the basic proposal is viable, The Permittees will review and finalize these Assessment Methodologies and associated metrics within one year following adoption of the new MS4 Permit as additional data and analysis is necessary to support specific action levels.

6.1.2.2 Revised Reporting Format

The Permittees recommend substantial revisions to the MS4 Permit requirements for the layout of the Annual Report. The Permit requires substantial duplication of reporting, which either increases the volume of the Annual Report, or requires substantial cross-referencing. In either case, it is confusing to write, and most likely, confusing to read. The Permittees recommend a meeting with Regional Board staff in the development of the new MS4 Permit to discuss methods to streamline and clarify reporting requirements.

6.1.2.3 Maintain Enhanced Watershed / MS4 Map

The Permittees are in the process of collecting data to support an enhanced MS4 facilities map. Updates completed to date are provided in the map in Appendix B. This enhanced map demonstrates initial efforts to identify the locations of:

- Receiving Waters
- MS4 facilities
- Areas of historical perennial flows
- Known blow off locations
- Wastewater storage ponds
- Sub-drainage areas
- Known non-Permittee facilities
- 36-inch diameter and larger outfalls

This map will be used to help in the tracking of IC/ID events and issues and continued updates will be submitted with the Annual Reports. The Permittees will continue to enhance this map over the next MS4 Permit term. As described in the Annual Report, the District is in the process of upgrading their web page that offers public access the District's various NPDES activities. Along with these web site upgrades, additional layers will be added to the Web-based GIS map.

6.1.2.4 Elimination of the Watershed SWMP as a separate compliance document from the Riverside County DAMP

The Santa Margarita Region is comprised of only a single watershed. Further, the Permittees' regional compliance programs are described in the Riverside County DAMP. Maintenance of a separate and duplicative Watershed SWMP is confusing, cumbersome, and does not contribute to protection of Receiving Water quality. The Permittees request that the next MS4 Permit be drafted in a fashion that allows the Permittees to maintain the Riverside County DAMP as the primary document describing regional compliance programs for western Riverside County including the Santa Margarita Region. Any

necessary changes for requirements included in the new MS4 Permit will be updated /added to the Riverside County DAMP.

6.2 Permittee Training Programs

6.2.1 Summary

The Permittees jointly fund comprehensive training and education programs for Permittee staff. These training programs are designed to train Permittee employees on the proper use and implementation of BMPs appropriate for their field of work. There are four distinct training courses currently offered including Construction Inspection, Municipal Maintenance, Industrial-Commercial Facility Inspection, and New Development Planning.

6.2.2 NPDES Training Program Accomplishments and Programmatic Improvements

- Evaluated and tested various knowledge retention methods.
- Performed Training Enhancement Analysis study (2005-2006)
- Created an on-line training registration web page where attendees can also obtain training materials.
- Annually updated training materials to address Pollutants of Concern (2005-2007)
- Added component to training to address proper use, application and timing of application of Pesticides (2007-2008)
- Began developing a formalized testing and effectiveness analysis approach (2008)

Highlights
Municipal Training: **14** Training Sessions; **900** Attendees
Construction Training: **22** Training Sessions; **626** Attendees
Industrial-Commercial Training: **11** Training Sessions; 426 Attendees
New Development Training: **13** Training Sessions; **345** Attendees

6.2.3 Long-Term Effectiveness Assessment

Throughout the term of the 2004 MS4 Permit the Permittees have evaluated and implemented various quizzes as part of the NPDES training courses. These efforts were intended to assess the retention of knowledge of the attendees and, as described in Provision K.2.m of the Watershed SWMP, serve as a component of the assessment of the long term effectiveness of the Watershed SWMP.

The quizzes used to assess employees' retention of knowledge have evolved over time as the Permittees found what worked and what did not. Quiz questions that were found to be confusing or misleading were refined or eliminated. Thus, a question-by-question analysis of the results is not possible. Instead, results from a number of the training courses with reasonably comparable quizzes were aggregated and an average score (percent correct) was established for each of these training sessions. The results of this analysis are presented in Figure 5.

Figure 5. Training Pre-Test and Post-Test Analysis

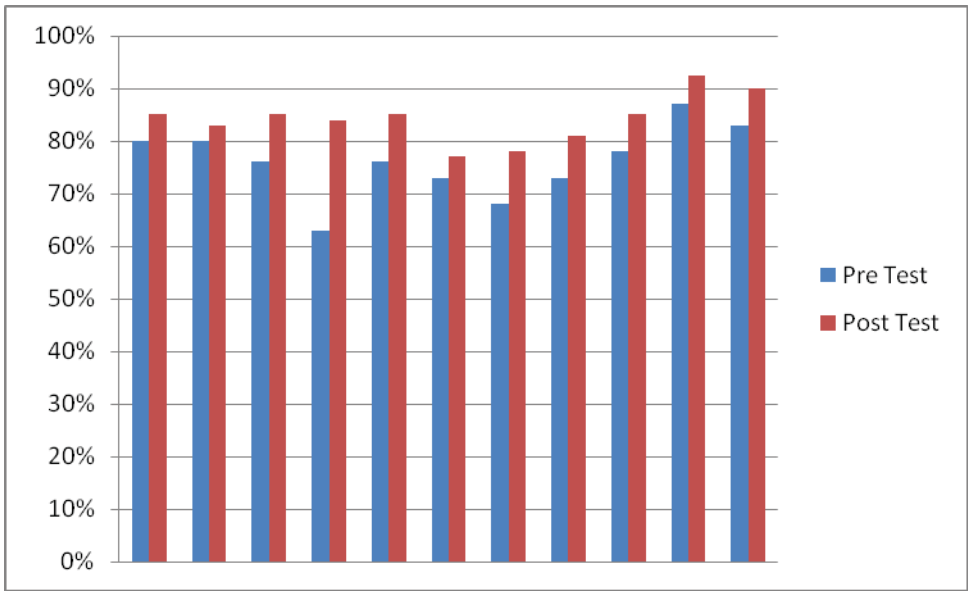

Although the required random-sample nature of this analysis is not conducive to the analysis of trends across time, two findings become evident from this analysis:

1. Permittee inspection, maintenance and planning staff generally have a high level of understanding of issues related to stormwater Pollution in their field of work.
2. Average scores on quizzes administered after the training sessions were always higher than scores on quizzes administered before the training session.

Finding 1 above can be attributed to the Permittee's proactive efforts to ensure that their employees are aware of the issues in their field of work that could contribute to stormwater Pollution. This includes annual attendance at the NPDES training courses, and on-the-job training, reminders and meetings. This fact alone is a strong indicator of the effectiveness of the Permittees training programs.

Finding 2 above demonstrates that after attending the NPDES training courses, the attendees have a higher level of understanding of the issues in their field of work related to stormwater Pollution. This indicates that the training materials, delivery and content were effective.

Based on these analyses, general feedback from the training programs, and the overall effectiveness of the Permittees' programs (as described in Section 5.3 herein) the Permittees believe their training programs to be effective. Nevertheless, the following revisions to the training programs have been identified and are proposed for implementation with the new permit to ensure ongoing effectiveness.

6.2.4 Proposed Revisions

6.2.4.1 Continued focus on Focus Area Pollutants of Concern

The Permittees commit to continue to revise the Permittee training programs to focus on Pollutants of Concern.

6.2.4.2 Standardized Effectiveness Quizzes

Over the course of the 2004 MS4 Permit, the Permittees have evaluated various methods of assessing the retention of knowledge and are now recommending a standardized approach to assessing the effectiveness of the training program.

The Permittees plan to create standardized quizzes to assess the retention of knowledge and increased understanding as a result of the Permittees' training sessions. This includes establishing core messages that the Permittees want to impart upon the attendees and, creating clear and understandable quiz questions for each core message.

This approach will help the Permittees identify if any core training messages are not being retained by attendees and to subsequently modify the training. The Permittees also hope that this approach will yield results that will, over time, demonstrate that the knowledge among Permittee staff of issues related to storm water Pollution is increasing, thus clearly demonstrating that the NPDES Training program is effective.

As a necessary part of this effort, a database to track responses will also be created.

6.2.4.3 Attendance Tracking Mechanism

At each training session a sign-in sheet is provided to track attendance to the session. Included in the sign-in sheet is an indication of the Permittee that each attendee is representing. After each training session, these sign-in sheets are scanned to PDF files and sent to each Permittee for their records. This approach requires that each Permittee manually review the sign-in sheets to determine who and how many of their staff attended the training.

The District, on behalf of the Permittees, is currently investigating various form scanning and recognition software packages to determine the feasibility of creating a sign-in sheet that, when scanned, will automatically transfer the attendance list into a database. This would facilitate tracking of staff attendance by each Permittee. At this time the District has not determined if a feasible and cost efficient program is available that will accomplish their needs.

6.3 Public Education

6.3.1 Summary

To leverage finite resources, the Permittees jointly fund a public education program. The District implements this program to disseminate information about Urban Runoff issues and to provide education on how activities may impact Receiving Waters.

The Permittees have established an ongoing watershed-based public education and outreach program known as the **Only Rain Down the Storm Drain** Pollution Prevention Program. The specific objectives of this program include:

- Fostering a broad public awareness of water Pollution concerns;
- Increasing public acceptance of Pollution Prevention activities to curtail everyday human behaviors that contribute to water quality problems;
- Educating/informing the general public, regulators and key local government and state decision makers on Urban Runoff conditions in Riverside County; and
- Promoting stewardship of local water resources.

The **Only Rain Down the Storm Drain** Program implements the public awareness objectives by focusing on three areas of Pollutant reduction/prevention:

- Public behavior;
- Proper management of Pollutants; and
- Business specific education outreach.

In addition, when attempting to make use of the finite resources available to the Public Education Program, the Permittees use these management goals to ensure that resources are used effectively:

- Focusing on Pollutants of Concern specific to each watershed region;
- Coordinating public education efforts with adjacent storm water management programs and other related education programs to share resources, coordinate outreach efforts, and avoid duplication of effort; and
- Adapt public education programs and objectives, based on effectiveness analysis, to address changing MS4 program requirements and objectives.

6.3.2 Public Education Program Accomplishments and Programmatic Improvements

The Public Education Program has developed and distributed the following educational materials during the 2004 MS4 Permit term:

- *After the Storm* – a citizen's guide to understanding MS4 Pollution in your neighborhood or when performing daily activities.
- *Automotive Maintenance & Car Care* – guidelines for keeping your auto shop or retail fuel facility in environmental shape.

- *Outdoor Cleaning Activities* – guideline for outdoor cleaning activities and wastewater disposal.
- *Pools, Spas and Fountains* –Environmental maintenance suggestions for pool, spa, and fountain owners.
- *What's the Scoop* – tips for a healthy pet and a healthier environment.
- *Household Hazardous Waste* – A schedule of collection locations for proper disposal of HHW.
- *Stormwater Pollution Found in Your Neighborhood* – door hanger.
- *Equestrian Management* – Recommendations for BMPs related to equestrian activities.
- *Spray Bottles* – Including directions to make environmental friendly recipes for pest control and household cleaning

The Permittees also initiated development of the following outreach materials

- *Landscaping and Gardening Brochure* – Initiated development a new brochure to address outdoor residential landscaping and gardening activities.
- *Septic System Management Brochure* – initiated development of a brochure to assist with septic system management.

In addition to the information provided on the Storm Water Protection website, the Public Education and Outreach Program has:

- Updated the Public Education and Outreach Program web page.
- Tested and/or implemented several new Public Education and Outreach Program effectiveness tracking mechanisms including call tracking, web counters, testing, and bilingual surveys.
- Enhanced the toll free storm water Pollution reporting hot line to include public education information and support for the public and other interested stakeholders.
- Obtained a trailer with "**Only Rain Down the Storm Drain**" graphics specifically designed for transporting materials to outreach events. It is also used as part of the booth at outreach events.
- Initiated billboard advertising within the Santa Margarita Region.
- Worked with the Mission Resource Conservation District to implement presentations to elementary and middle schools and staff to raise public awareness of Urban Runoff management issues and source control methods and to encourage volunteers, partners, and groups to gather annually for a trash and debris clean-up day in the Santa Margarita Region.
- Developed special newspaper and billing inserts, fliers and advertisements to raise public awareness of Urban Runoff management issues and source control methods. A radio advertising campaign was also developed and implemented for a time.
- Developed and presented workshops regarding household hazardous waste use and proper disposal at major home improvement stores throughout Riverside County.
- Placed advertisements in the Penny Saver and Bargain Bulletin to raise public awareness of Urban Runoff management.

- In cooperation with certain County Service Areas or other programs, pet waste signs with bag dispensers have been installed at various parks to help encourage the proper disposal of animal waste.
- Cooperated with the Western Riverside Council of Government in the Used Oil Block Cycle Grant that decreases the amount of illegally dumped motor oil by promoting the addition of new Certified Oil Collection Centers.
- Established a partnership with County Environmental Health whereby businesses cited by Environmental Health for violations of ordinances related to stormwater issues may be allowed to implement a Supplemental Environmental Project in conjunction with the **Only Rain Down the Storm Drain** program.

6.3.3 Long-Term Effectiveness Assessment

Effectiveness metrics of the Public Education and Outreach Program during the 2004 MS4 Permit term are presented in Section J.1.3 of the FY 2007/2008 Watershed Annual Report. The data indicates that overall impressions have continually exceeded the number of residents in the watershed, HHW/ABOP pounds of waste collected and pounds of waste collected per person have steadily increased over the term of the 2004 MS4 Permit.

In 2005, the **Only Rain Down the Storm Drain** program developed and implemented a survey to be distributed at Public Outreach events to assess the public's level of knowledge related to stormwater Pollution. This original "long" survey contained 13 questions in both English and Spanish as shown in Figure 6.

This survey was used for fiscal years 2005-06 and 2006-07. Through this period of implementation it was found that the survey took too much time to complete and reduced the level of response from event attendees. Therefore, the survey was subsequently revised to a shorter version with revised questions for the 2007-08 fiscal year. The revised "Short" survey that is currently used is shown in Figure 7.

Figure 6. Original "Long" Survey Utilized at Public Outreach Events

Zip Code_____ Age_____ Sex F__ M__ Date:_____

THINK YOU KNOW ABOUT STORM DRAIN POLLUTION PREVENTION?

1. Where do you think **storm drain** contents go or flow to? __Treatment Plant __Streams, rivers & lakes

2. Where do you think **sewer pipes** contents go or flow to? __Treatment Plant __Streams, rivers & lakes

3. Are storm drains and sewers part of the same or separate systems? __Same __Separate __Don't know

4. Have you ever been to a Household Hazardous Waste **(HHW)** Collection Event? __Yes __No

5. Did you know that **A.B.O.P.** Antifreeze, Batteries, Oil, and Latex Paint locations and mobile **HHW** Collection Events provide safe havens for the disposal of pollutants? __Yes __No

6. If you have a lawn or garden, where do you (or your gardener) dispose of the green waste (grass, clippings or other)? **(Check all that apply)**

   ☐Trash/garbage ☐Compost/Mulch pile ☐Take to compost facility
   ☐Leave on lawn ☐Removed by gardener ☐Other:_____

7. Where is the best location to wash your vehicles?
   (Check only one)

   ☐Pavement (driveway, street) ☐Dirt Area
   ☐Lawn or Grass ☐Other_____

8. Do you change the motor oil in your vehicle yourself? __Yes __No

   If **Yes**, where do you dispose of it? **(Check all that apply)**

   __in the garbage __at a curbside collection program
   __down the storm drain __collection center (Jiffy Lube, Kragen, etc.)
   __pour it on the ground __Other_____

9. If you have a pet, how often do you pick up after your pet?
   9. a) in your yard? **9. b)** when you walk the pet?

   ☐Always ☐Sometimes ☐Never ☐Always ☐Sometimes ☐Never

10. Do you think, anything ,other than rainwater, that flows into the storm drains (i.e., trash, chemicals, pet waste, etc.) considered a pollutant? __Yes __No

11. Have you seen or heard the slogans "Only Rain Down the Drain" or "Only Rain Down the Storm Drain"?
    __Yes __No If yes, where? __Radio __Newspaper __ Flier __Billboard __Street Fair, Festival, etc.

12. Are there State laws and local ordinances which STRICTLY PROHIBIT the dumping of pollutants **(EVERYTHING, EXCEPT RAIN WATER)** into the storm drain systems or waterways? ___Yes ___No

13. After this booth visit, have you increased your understanding of storm drain pollution prevention? __Yes __No

Thank you for your time and input... Remember, YOU can do your part by calling our Toll Free Line (1-800-506-2555) to report illegal storm drain pollutant disposal anywhere in Riverside County, or to get more information about storm drain pollution protection to help promote "ONLY RAIN DOWN THE STORM DRAIN".

Figure 7. Revised "Short" Survey Utilized at Public Outreach Events

DO YOU KNOW HOW TO PROTECT OUR STREAMS, RIVERS and LAKES?

City_____ Zip Code_____ Age_____ Sex □ F □ M Date: _____

1) Water that leaves your lawn from **Irrigation (water sprinklers), Car washing** and **Rain** flows down streets and/or storm drains and then directly to…

☐ Sewage Treatment Plants ☐ Streams, rivers & lakes

2) Which of the following can LEGALLY be disposed into the storm drain? (*Circle all that apply*)

- **Useable Household Chemicals**
- **Yard waste/clippings/leaves**
- **Paint**
- **Cigarette butts**
- **Empty Household Chemicals containers**
- **Pet Waste**
- **Motor Oil / antifreeze**
- **None of these**

3) Do you feel you are well informed and aware of illegal dumping into the storm drain and its impact in your community or streams, rivers and lakes?

☐ Yes ☐ No

HOW DID YOU DO?

1) Water that leaves your lawn from irrigation, washing your car, or rainwater runoff can pickup motor oil and grease from vehicles, excess fertilizer from your lawn, bacteria from pet waste, and excess pesticides from your yard. These pollutants can be carried down streets and storm drains directly to our streams, lakes, and rivers without treatment! That is why we must take care to properly dispose of waste, maintain our vehicles, and use fertilizers, pesticides and other chemicals only as specified on their labels.

2) It is illegal to dispose of any chemical, constituent or waste into a storm drain! Report illegal disposal of chemicals, constituents, or waste to storm drains at **1(800) 506-2555.** You may properly dispose of many of the wastes listed above by doing the following things:

- **Usable and empty household chemicals, paint, motor oil** – Properly dispose these at Household Hazardous Waste and/or Antifreeze, Batteries, Oil and Paint disposal facilities and events. Call **1 (800) 506-2555** for information on disposal locations and special drop off events near you.
- **Pet waste** – Carefully pick up and dispose in the nearest trash receptacle.
- **Grass, clippings, leaves and yard waste** – Collect and dispose in green waste bins or composting areas that are designed to prevent the compost from mixing with excess irrigation water and/or rainwater runoff.

3) Would you like to learn more about protecting our streams, rivers and lakes or wish to report on a illegal storm drain disposal in your area or request a classroom or group demonstration……

Visit www.rcflood.org or call 1 (800) 506-2555.

ONLY RAIN DOWN THE STORM DRAIN

Remember…Only Rain Down the Storm Drain!

Results have been tabulated for all of the "Long" surveys received and they have been analyzed to determine trends in public awareness. The "Short" survey has been used at two events to date, one of which was quite recent and its results have not yet been tabulated. Using the "Long" survey results, nine questions were used to assess any trends in public awareness. The remaining questions were determined to be either confusing or not applicable to the intent of the assessment. The results of this assessment of survey results are shown in Figure 8.

Figure 8. Assessment of Survey Results (2005-06 vs. 2006-07)

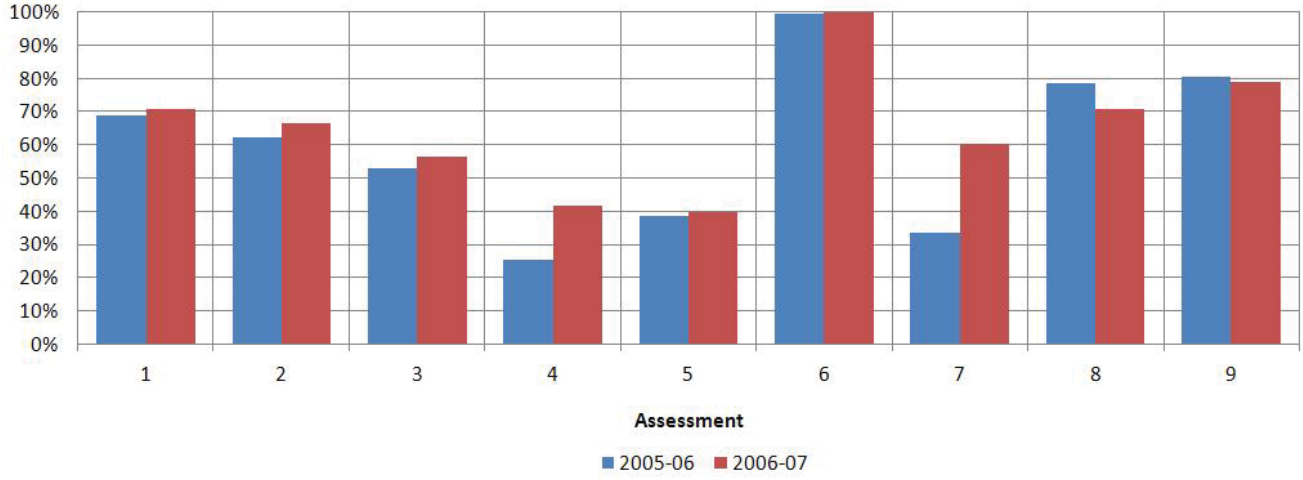

The results shown in the chart in Figure 8 are percent of survey takers that responded as described below:

- Assessment 1: Percent of respondents that understood that storm drains do not go to treatment plants.
- Assessment 2: Percent of respondents that understood that sewer lines go to treatment plants.
- Assessment 3: Percent of respondents that understood that sanitary sewers and storm drains are separate systems.
- Assessment 4: Percent of respondents that had attended a Household Hazardous Waste collection event.
- Assessment 5: Percent of respondents that understood that the best place to wash a car is on the lawn or grass.
- Assessment 6: Percent of respondents that change their own oil that reported that they properly dispose of it.
- Assessment 7: Percent of respondents that have heard of the "Only Rain Down the Storm Drain" program.
- Assessment 8: Percent of respondents that dumping of anything except storm water is a violation of laws and ordinances.
- Assessment 9: Percent of respondents that felt that visiting the Outreach Booth at the event increased their understanding of storm drain Pollution Prevention.

Although implementation of the "Long" survey was limited before it was modified to its current form, the results available do indicate an increase in understanding of these basic principles and can be attributed to the effectiveness of the Permittee's Public Education program. As additional survey results are collected and tabulated, further analysis will be performed to ensure the ongoing effectiveness of the program.

6.3.4 Proposed Revisions

To better address residential sources of pesticides, the Permittees are proposing to coordinate with the University of California Extension Program to enhance the implementation of the U.C. Extension's Master Gardener program in the Santa Margarita Region. Along with information regarding use of drought tolerant landscaping techniques and appropriate methods of fertilizer and irrigation application, the U.C. Master Gardeners also provide residents with information on integrated pest management techniques that minimize pesticide application. The Permittees are proposing to establish an agreement with the U.C. Extension's Master Gardener program in fiscal year 2010-2011 to support master gardener hotline staffing, local presentation and other outreach by the U.C. Master Gardeners.

In addition, through the Permittee's ongoing efforts to internally assess the efficiency and efficacy of their MS4 compliance programs, it was determined that an overhaul of the District's web site was needed. The District's web site contains the public education web site and a technical resource site with the various compliance documents for the program. It was found that information available through the site was often difficult to find and was not user friendly and sometimes was out of date. The Permittees are now reviewing this site to identify and implement needed changes

6.4 Receiving Water Monitoring Program

6.4.1 Summary

A Summary of the Monitoring Program is contained in Appendix G of the Watershed Monitoring Report.

6.4.2 Monitoring Program Accomplishments and Programmatic Improvements

The Monitoring Program accomplished the following goals during the term of the 2004 MS4 Permit:

- Subcontracted monitoring data collection and analysis to MACTEC, Inc. to enhance data collection and reporting capabilities.
- Developed and implemented a Triad Monitoring Program (bioassessment, Toxicity and chemical monitoring) consistent with the goals of the SMC Model Monitoring Program
- Developed watershed boundaries and land use information for all monitoring stations
- Updated the format and technical content of the monitoring Annual Report
- Added fire map information to assist with assessing potential Pollutant sources
- Enhanced monitoring data databases to be compatible with SCCWRP/SMC standard reporting protocols.
- Enhanced monitoring methods to incorporate use of automatic sampling equipment where appropriate

- Conducted several Toxicity Identification Evaluations that led to the identification of pyrethroid pesticides as a cause of wet weather Toxicity in Murrieta and Temecula Creeks and a Toxicity Reduction Evaluation that identified additional BMPs necessary to control sources of pyrethroid pesticides.
- Coordination with the CASQA Pesticide Committee on comments and presentations to California Department of Pesticide Regulation, UC Riverside and others regarding the impacts of pyrethroid pesticides and the need to change regulatory requirements regarding the use of pyrethroid pesticides.
- Participation in or coordination of several BMP studies, including coordination of new development BMP treatment studies (as required by conditions of approval) and the District's LID BMP Demonstration and Testing Facility.
- Continued to update and enhance the Consolidated Monitoring Program to incorporate new monitoring collection methods and data analysis protocols.

6.4.2.1 Participation in Regional Monitoring Efforts

- Participation in the monitoring programs to support development of the Santa Margarita Lagoon TMDL.
- Continued participation in regional and statewide Monitoring and Science efforts such as the Southern California Monitoring Committee to develop:
  - Lab inter-calibration of chemical, bioassessment and Toxicity testing methods
  - Testing methods for bioassessment and Toxicity in Southern California streams
  - Bacterial Reference Watershed Study
  - A storm water research needs report for southern California
- Partnered with SCCWRP on developing hydromodification guidance for Southern California including participation in a series of hydromodification workshops for a CASQA conference.
- Coordination with SCCWRP on the development of the Regional Watershed Monitoring Program for Southern California.

6.4.3 Effectiveness Assessment

The Watershed Monitoring Program was evaluated as part of the Regional Board audits in 2007-2008. As a result of those audits several enhancements were made to the monitoring program, including update of constituent lists, subcontracting of data collection to a monitoring consultant with automatic sampling capabilities, and updates to the Consolidated Monitoring Program and Monitoring Annual Report formats. The Permittees believe that as a result of these changes, the overall monitoring program is effective. However, the revisions presented in section 6.4.4 are recommended to increase monitoring data utility or overall program effectiveness.

6.4.4 Proposed Revisions to Monitoring Program

In updating the Monitoring and Reporting Program, the Permittees request that Regional Board staff meet with them to discuss the following proposed modifications to the monitoring program:

6.4.4.1 Revise Dry Weather Monitoring Program

As noted in Section G.7 (Special Studies) of Appendix G of the FY 2007-2008 Watershed Monitoring Annual Report, the Permittees participated in a SMC Study to develop a regional approach to watershed assessment. The Permittees, in conjunction with Regional Board staff, committed to participating in the resulting watershed monitoring program. The Permittees agreed to monitor three rotating dry weather stations identified for the Santa Margarita Region. Additionally, three stations are to be collected by Regional Board (or SCCWRP staff) using SWAMP funds, and the remaining three will be located in the Santa Ana Watershed region of Riverside County. In exchange for the commitment to participate in the program, the Regional Board staff agreed to reduce the current dry weather monitoring requirements in the new MS4 Permit from two (2) events annually to (1) event annually for each Triad monitoring stations. This would effectively eliminate three existing dry weather samples. The Permittees recommend a meeting with Regional Board staff to discuss these options prior to the release of the draft Permit.

6.4.4.2 Clarify Analyte List

As described in Section G-8.1.5 of the 2008 Monitoring Report (Appendix G of the FY 2007/2008 Watershed Annual Report), 168 analytes have never been detected in samples collected under the current program. The Permittees request that requirements to analyze for these constituents be eliminated unless or until a reason to believe they may be present in stormwater arises.

Basin Plan Objectives are expressed in terms of total metals, while California Toxics Rule (CTR) criteria are expressed in terms of dissolved metals. Although the Permittees do not support comparison of stormwater data to CTR values, the Permit requires it. The Permittees recommend deletion of this requirement. However, if this language is to remain, in order to properly compare results for metals to both sets of objectives, both total and dissolved fractions will be analyzed by the laboratory for the following metals: arsenic, cadmium, chromium (III), chromium (VI), copper, lead, mercury, nickel, selenium, silver, and zinc.

6.4.4.3 Clarify Mobilization Criteria

The District is proposing the following amendment to the monitoring mobilization criteria based on experience and the difficulties faced collecting the first storm and the analysis of the USEPA criteria specific to the Temecula National Weather Service weather station (Consolidated Monitoring Program, Section 4.C.2):

> "Note: If the QPF indicates that more than 0.3-inch is predicted for any 6-hour period, mobilization for sampling will occur."

The District's experience over the past three years indicates that intensities greater than 0.3" in six hours are likely to produce runoff and would warrant mobilization, even on a dry watershed. Further, these mobilization criteria are consistent with EPA-833-B-92-001 guidance regarding minimum depths/durations for storm sampling.

The Permittees recommend that the Regional Board amend the MS4 Permit to reflect these Mobilization Criteria. Due to issues with stream gauges operated by the United States Geological Survey (USGS), the Permittees have concluded that preparing post-storm forensics based on USGS data is not of significant value. A simple test of comparing Quantitative Precipitation Forecast (QPF) reports with actual rainfall and the mobilization criteria should be sufficient to determine compliance with the MS4 Permit.

Mobilization criteria should also reflect practical limitations to storm water monitoring by excluding national holiday periods (Thanksgiving, Christmas, and New Year's Day in particular) and quantifying the probability and the lead time between the forecast and actual rainfall that must be met in order to mobilize.

6.4.4.4 Reduce Wet Weather Events

As was noted in the audits, the Permittees have experienced consistent difficulty collecting three storm events in the upper Santa Margarita River watershed. The Permittees also noted that the San Diego County MS4 Permit only requires the collection of samples from two wet weather events. The Permittees request that the monitoring program for Riverside County be revised to require collection of two storm events. This would not only reduce opportunities for unavoidable non-compliance, it would also be a prudent cost saving measure that would not alter the overall effectiveness of the Permittees monitoring programs.

6.4.4.5 Clarify Triad Method and Follow-up Actions

The MS4 Permit included an early draft of the Triad method envisioned by the Model Monitoring Program (MMP) developed by the SMC. The result was a misapplication of the final Triad approach envisioned by the MMP. Toxicity is currently required to be sampled for at the Triad stations during wet weather events, but not during dry weather when the bioassessments occur. According to the SMC MMP, the three components of the Triad approach (chemistry, Toxicity, and bioassessment) should be conducted at the same time. Bioassessments cannot be conducted during wet weather due to safety concerns and the planning necessary. For this reason the MMP recommends the full triad for dry weather and only chemistry and Toxicity for wet weather.

In an effort to be proactive and supportive of good science, the Permittees have taken the following actions to ensure proper application of the Triad approach:

- Beginning with the 2007-2008 season, Toxicity sampling will be conducted during dry weather, at the same time as the bioassessments and dry weather chemistry sampling events are conducted. Thus, the full Triad approach will be conducted during dry weather. Wet weather monitoring will focus on Toxicity and chemistry. This action will modify the current program to be consistent with the MMP approach.
- The 2006-2007 Annual Report established the framework for proper application of the Triad method (full triad for dry weather, chemistry and Toxicity only for wet weather) by adding new tables (G-21 through G-27), in anticipation of properly applying the Triad method in the 2007-2008 Annual Report.

The Permittees further recommend clarifying the definitions of "persistent", "consistent", and "magnitude" as used in the MS4 Permit to be consistent with the intent of the MMP. In addition, the MS4 Permit inappropriately limits Triad analysis by defining a "fair" Index of Biological Integrity scores as automatically indicative of benthic alteration. This limitation needs to be corrected to prevent Permittee

resources from being inappropriately diverted to expensive source assessment studies. The MMP (and the SMC) envision that watersheds will be prioritized for follow up action based on their relative quality to one another. The envisioned analysis would compare watersheds from throughout southern California. The Permittees support this coordinated and comprehensive approach to addressing water quality.

6.4.4.6 Recognize Limitations of Laboratory Analysis of Bacteria

Babcock Labs prefers to accept bacteria samples between the hours of 7:00 a.m. and 4:00 p.m. during normal business days, and 9:00 a.m. and 12:00 p.m. on weekends. Although Babcock will accept bacteria samples outside those hours, acceptance is contingent upon payment of substantial overtime rates to ensure laboratory staff availability to receive and analyze the samples.

The timing of bacteria sample collection, particularly within the context of automatic sampling, will require consideration of the sample's four-hour holding time and available laboratory receiving hours. The Permittees request that the Permit be modified to only require collection of bacteria samples such that they can be delivered during the regular working hours of the lab to avoid excessive laboratory costs.

6.4.4.7 Participate in a Watershed Based TMDL for the Santa Margarita Lagoon

The Permittees understand that, due to economic conditions, State funding for the Santa Margarita Lagoon Watershed-Based TMDL has been withdrawn. As described in section 3.4, these economic conditions are also impacting the Permittee's funding sources and they are struggling to maintain resources to fund existing compliance programs. The Permittees currently cannot support additional expenditures associated with assisting in funding a watershed-based TMDL effort. However, the Permittees are agreeable to discussing a re-prioritization of compliance activities in order to reallocate existing Permittee resources for this purpose. For example, where current MS4 Permit compliance programs elements are not measurably enhancing attainment of Water Quality Standards, the Permittees would consider reduction or elimination of those requirements to support reallocation of the associated funding to the development of the watershed based TMDL. Program elements that may be considered for discussion include:

- Toxicity/Pyrethroid Monitoring – Under the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA) local regulation of pesticides, including pyrethroid pesticides is pre-empted. The Permittees are expending significant resources at the State and Federal level to facilitate regulatory changes in the allowable uses of pyrethroid pesticides, which have been implicated in causing toxicity in receiving waters throughout California. The Permittees have also recognized pyrethroid pesticides as a Pollutant of Concern for the upper Santa Margarita River watershed. The Permittees believe that public education and outreach regarding use and more stringent regulation/management of pesticides, including pyrethroid pesticides, represents the most effective means of controlling pesticides in Urban Runoff. However, continued Toxicity tests, Toxicity Identification Evaluations, and direct monitoring for pyrethroid pesticides are not likely to enhance the Permittee's ability to reduce/eliminate pyrethroid pesticides in Receiving Waters. Greater Receiving Water quality benefits may be realized by reallocating the resources currently allocated to these activities to the development of the watershed-based TMDL.
- Reduction in General Monitoring Requirements – The Permittees continue to expend significant resources on Receiving Water and outfall monitoring and the benefits of these monitoring activities are limited. Further, these costs have more than doubled over the term of the 2004 MS4

Permit due to audit findings recommending the implementation of automatic sampling equipment. Revised MS4 Permit requirements that provide for a simplified monitoring program may allow cost savings to be reallocated from data collection and processing to development of the watershed-based TMDL.

- Watershed/Individual Annual Reporting – The current Annual Reporting requirements are time, labor and cost-intensive exercises. Revised MS4 Permit requirements that provide for a simplified Annual Report requirements would not necessarily produce substantial cost savings (because is the reports are typically produced in-house); however, they would free up staff resources to assist with TMDL development.
- IC/ID Monitoring – Although the Permittees support regular visual inspection of MS4 facilities to identify IC/IDs, field measurements and sampling has not proven to be effective for this purpose. Although sampling of identified IC/IDs for later enforcement purposes may be appropriate, IC/IDs that have been identified and eliminated in the Santa Margarita Region typically result from visual observations and subsequent follow-up efforts by Permittee staff, not field measurements and water quality samples. Revised MS4 Permit requirements that provide for visual inspections of MS4 facilities to identify IC/IDs may yield cost savings that could be reallocated to development of the watershed-based TMDL.

There may be additional opportunities for modification of MS4 Permit requirements to focus the expenditure of Permittee funds on those activities that are most effective at protecting Receiving Water quality. Although the resources available for Permittee compliance activities are finite, the Permittees are supportive of modifications to the MS4 Permit that, while working within available funding limitations, enhance their ability to protect and enhance the quality of Receiving Waters.

7.0 Evaluation and Recommendations for Individual SWMP Programs

The Riverside County DAMP is a programmatic document developed by the Permittees in the Santa Ana and Santa Margarita Regions. It outlines the major programs and policies that the Permittees individually and/or collectively implement to manage Urban Runoff for the protection of Receiving Waters in Western Riverside County, including the Santa Margarita Region. The Riverside County DAMP provides a model for the development of a Permittees' Individual SWMPs in the Santa Margarita Region.

The Permittees continue to support a uniform approach to the implementation of MS4 Permit compliance programs in order to facilitate increased transparency and understanding for residents, regulated entities, and Permittee staff. For this reason, the discussions below focus on programmatic changes to the compliance programs that are necessary to maintain the effectiveness of the model compliance programs described in the Riverside County DAMP. Upon adoption of the new MS4 Permit, the Riverside County DAMP and Individual SWMPs will be revised accordingly.

7.1 Program Management

There are typically multiple Permittee departments that are responsible for implementing the elements of the Individual SWMPs. Each Permittee has designated an NPDES Coordinator who coordinates the overall Permittee compliance programs, collects and analyzes compliance program data, develops and maintains the Individual SWMPs, compiles and submits necessary reports, coordinates with other Permittees, stakeholders and Regional Board staff, and conducts other necessary duties as assigned.

To facilitate inter-Permittee coordination and funding of regional compliance activities such as the Public Education and Monitoring programs, the Permittees have entered into an Implementation Agreement that defines the roles and responsibilities of each Permittee and assigns cost shares for regional programs defined in the agreement. The Implementation Agreement also requires each Permittee to designate an NPDES Coordinator who is also responsible for representing the Permittee's interest at Permittee coordination meetings such as the monthly Santa Ana/Santa Margarita Technical Advisory Committee.

The Permittees in the Santa Margarita and Santa Ana Regions participate in a Management Steering Committee made up of the City Managers, County Executive Officer, and the District's Chief Engineer; or their assigned alternate. Participation in the Management Steering Committee is not mandatory; however, it provides a management-level forum to address Urban Runoff management policies for the Permit Area and coordination of the review, and necessary revisions to the Riverside County DAMP and Implementation Agreement. In addition, the Management Steering Committee promotes a higher level of awareness of the MS4 Permit compliance program by each Permittee's senior management staff.

7.1.1 Accomplishments and Programmatic Improvements

Collectively, the Permittees Program Management activities have achieved:

- Development of the Riverside County DAMP, WQMP and Individual SWMPs following adoption of the 2004 MS4 Permit.
- Revised the Implementation Agreement to account for necessary program enhancements resulting from the new MS4 Permit.

- Established and held monthly meetings of a Technical Advisory Committee comprising of each Permittee's NPDES coordinator, to discuss and coordinate response to issues that arise through the ongoing implementation of the Riverside County DAMP-based programs.
- Voluntarily participate in a Management Steering Committee comprised of Permittee upper management (City Manager or equivalent) to provide a forum to discuss major policy issues related to MS4 Permit compliance program implementation. This also helps the major decision makers within each organization to stay abreast of the status of the implementation of the Riverside County DAMP and aware of upcoming issues and approaches taken by other Permittees.
- Enhanced enforcement and compliance elements of the Riverside County DAMP.
- Developed the Integrated Regional Watershed Management Plan (IRWMP) for the Upper Santa Margarita Watershed.
- Continued progress with the Bureau of Reclamation, San Diego County and other stakeholders on a uniform watershed plan and model for the Santa Margarita River watershed.

7.1.2 Recommended Revisions and Enhancements to Program Management Efforts

7.1.2.1 Assessment Metrics and Municipal Action Levels

To ensure that the Permittee's programs continue to be effective at managing the impact of Urban Runoff on Receiving Water quality, the Permittees will revise the Program Effectiveness Assessments for both the Individual SWMP and the Watershed SWMP following adoption of the new MS4 Permit. These planned changes are further described in Section 6.1.2.1 of this ROWD. The Permittees also recommend streamlining of the reporting forms to focus on the revised Program Effectiveness Assessments.

7.1.2.2 Revised Reporting Format

As a result of continued program effectiveness assessment, following adoption of the new MS4 Permit, the Permittees will update annual reporting forms to incorporate specific reporting requirements for the effectiveness assessment metrics and to remove inappropriate, outdated, or ineffective reporting requirements.

7.2 Development Planning

This program element links each Permittee's General Plan, environmental review process, and development approval and permitting processes to the later phases of detailed design, construction and operation. The development approval and permitting processes carries forth project-specific requirements in the form of conditions of approval, project plans, and design specifications that support tracking, inspection, and enforcement actions.

7.2.1 Development Planning Program Element Accomplishments and Programmatic Improvements

During the term of the 2004 MS4 Permit, the development planning program accomplishments and programmatic improvements included:

- Developed the WQMP to address post construction stormwater runoff quality for New and Significant Re-Development Projects.
- Development of a FAQ for WQMP projects to assist with implementing the WQMP program.
- Developed and subsequently enhanced a BMP design guidance manual to standardize the construction of post construction BMPs.
- Participation in the SMC efforts to develop a LID manual.
- Participation in SCCWRP's hydromodification studies to develop scientifically based hydromodification design guidance for Southern California.
- Enhanced online watershed maps to assist developers and the public with identifying areas tributary to Impaired Waterbodies.
- Adopted and implemented a MSHCP to ensure the regional-scale protection of habitat and natural resources in the approval process for New Developments.

7.2.2 Proposed Revisions to the Development Planning Program Element

7.2.2.1 Low Impact Development

The Permittees will revise the Riverside County Storm Water Quality Best Management Practice Design Handbook to (1) better incorporate LID design concepts, and (2) incorporate guidance to describe how developments can offset Treatment Control and hydromodification impacts with LID concepts including infiltration, evapo-transpiration, reuse, and onsite stormwater management. These revisions will follow the completion of the SMC LID BMP Manual and SCCWRPs Hydromodification Study. See the FY 2007-2008 Watershed Annual Report, Appendix G, Section G.7.2 for additional detail.

7.2.2.2 Hydromodification

As committed to in the 2004 WQMP (now Appendix O to the Riverside County DAMP), the Permittees have developed numeric guidance for hydromodification and are now working with SCCWRP to develop enhanced hydromodification guidance for Southern California. The Permittees will use the completed guidance to update the WQMP, BMP Design Handbook and other guidance as necessary to effectively mitigate hydromodification impacts. See the FY 2007-2008 Watershed Annual Report, Appendix G, Section G.7.2 for additional detail.

7.2.2.3 BMP Design Criteria

The Permittees will revise the Riverside County Storm Water Quality Best Management Practice Design Handbook to incorporate additional design guidance to clarify those Treatment Control BMPs that are effective at removing sediment-bound pesticides such as pyrethroid pesticides (consistent with the recommendations of the Toxicity Reduction Evaluation contained in Appendix D.

7.2.2.4 TMDLs

The Permittees will revise the DAMP to identify and include BMPs that are necessary to mitigate the impacts of Urban Runoff on Impaired Waterbodies.

7.2.2.5 Roads

The Permittees believe that standard WQMP requirements for public works road projects create potential avenues for unavoidable non-compliance. The Permittees would like to review this priority development category with Regional Board Staff to develop a better system to manage public works road projects.

7.2.2.6 Inspect and Verify Maintenance of Post Construction Treatment Control BMPs to Ensure Ongoing Effectiveness

As economic conditions allow, the Permittees propose to implement the following approach to inspect and/or verify maintenance of Treatment Control BMPs implemented on Priority Development Projects to ensure their ongoing effectiveness. The development of the program described below will require the Permittee resources that are unavailable in the current economic climate, particularly considering that it would likely require the Permittees to abandon the CAP in lieu of a local Permittee inspection program. The resources that will be required to ramp up new inspection programs are unavailable and may not become available during the term of the new MS4 Permit; however when the economy recovers sufficiently the Permittees propose to implement the program described below.

Integrated Management Practice (IMP) Exemption:

For the purposes of this program, IMPs include BMPs that are landscape based or otherwise serve an additional purpose other than Treatment Control. IMPs will be exempted from Inspection and Maintenance Tracking / Certification requirements if solely through the regular maintenance of the feature's secondary (non-treatment) functions and with Permittee concurrence, it can reasonably be expected that the treatment efficacy of the IMP will be ensured in perpetuity. An example that may satisfy this exemption would be a grassy swale that is mowed as part of regular landscape maintenance, whereas a BMP with a media filter which requires periodic resetting or replacement to maintain treatment effectiveness would not be exempted.

Priority Development projects will be exempted from all Treatment Control BMP Inspection and Maintenance Tracking / Certification requirements if they completely meet their Treatment Control requirements by implementing only IMPs that meet these criteria.

Priority Industrial and Commercial

The following requirements will apply to new priority Commercial and Industrial developments subject to the Permit's Commercial and Industrial business inspection requirements.

- Inspection

  Sites will be inspected per the Individual SWMPs current inspection frequency requirements that are based on the potential of the site to contribute to water quality impairments. At these inspections, in addition to the normal inspection requirements, all Treatment Control BMPs at the site will be inspected. In other words, all Treatment Control BMPs at high-priority facilities will be inspected annually; Treatment Control BMPs at medium-priority facilities will inspected biennially and Treatment Control BMPs at low-priority facilities will be inspected once during the term of the MS4 Permit. Improperly maintained BMPs may subject the maintenance entity to license suspension or administrative citations.

- Proof of Maintenance

  Maintenance records demonstrating compliance with the O&M procedures in the WQMP must be available for review at the time of the inspection. Failure to demonstrate that the BMPs have been maintained appropriately may result in license suspension or other enforcement actions.

Other Priority Developments

The following requirements will apply to new priority residential developments and businesses not otherwise subject to the Permit's Commercial and Industrial business inspection requirements.

- Proof of Maintenance and Self Certification

  The maintenance entity identified in the WQMP will be required to submit maintenance records including a signed certification to the Co-Permittee. The frequency of these submittals will be based on the relative maintenance requirements of the Treatment Control BMPs implemented on that site. BMPs will be categorized into groups as having High, Medium or Low maintenance requirements. If a WQMP project utilizes high-maintenance Treatment Control BMPs it will be categorized as a High-priority residential development, etc. High-Priority residential developments will be required to submit records annually, Medium – biennially, and Low – once every five years. Failure to report will result in administrative citations against the maintenance entity.

Permittee Projects and Permittee Maintained Treatment Control BMPs

This requirement will be included as part of the existing Permittee facility inspection program and inspected per the frequency requirements specified in the Riverside County DAMP.

7.3 Private Development Construction Activities

The Permittees have reviewed their ordinances to ensure that they are adequate to control discharges to the MS4 from construction sites to the MEP. For construction projects that will disturb one acre or more, the Permittees require proof of compliance with the General Permit-Construction prior to issuance of building/grading permits (a copy of the Notice of Intent filed with the State Board). Each of the Co-Permittees provides training for their construction inspectors regarding the proper installation and

maintenance of erosion and sediment control BMPs. Education and outreach to the building industry (developers, construction contractors, engineering firms, etc.) regarding managing discharges from construction sites is also incorporated into the "**Only Rain Down the Storm Drain** Pollution Prevention Program," the Permittees' area-wide public education and outreach program.

7.3.1 Private Development Construction Activities Program Element Accomplishments and Programmatic Improvements

- The Permittees annually distribute construction activities posters to construction sites as part of construction outreach program.
- A standardized construction activity reporting spreadsheet was developed for the Annual Reports.
- The construction inspection forms were updated.
- The Co-Permittees developed and maintained inventory databases of construction sites 1-acre or larger for which they have issued a building or grading permit.
- Prioritized inspections to help target construction activities that present the highest risk to water quality.

Highlights
Conducted over **17,000** construction site inspections
Initiated over **3,800** enforcement actions to gain compliance
626 attendees to NPDES Construction training

7.3.2 Proposed Revisions to the Private Development Construction Activities Program Element

The Permittees are not proposing revisions to their existing construction inspection programs at this time. As previously described, the Permittees expect that development activity will be greatly reduced during the term of the new MS4 Permit. Regional Board staff has however raised the issue of abandoned construction sites. Regulation of abandoned construction sites has proven challenging due to bankruptcy of project proponents, non-responsiveness or inability to locate underlying investment banks that actually own the developments, and the practical limitations encountered by the Permittees in calling bonds. As the Regional Board has enforcement capabilities that often surpass those of the Permittees, to ensure that this issue is effectively addressed the Permittees ask for the close cooperation and support of the Regional Board. Nonetheless, the Permittees are committed to continuing the use of their IC/ID programs, code enforcement tools, and other ordinance authorities to control, to the extent allowable under law, abandoned parcels that are not properly stabilized.

7.4 Existing Development – Permittee Facilities and Activities

The Municipal Facilities Strategy which has been consolidated into Section 5 of the Riverside County DAMP provides guidance for identifying potential storm water Pollutant sources and for selecting appropriate BMPs for implementation at identified facilities of concern owned and operated by the Permittees. The Permittees are implementing the provisions of the Municipal Facilities Strategy within their respective jurisdictions via processes described in their Individual SWMPs. To assist the Permittees in implementing this program, training focused on storm water regulatory requirements and BMPs related

to Permittee maintenance facilities and roadway maintenance activities were conducted twice annually during the 2004 MS4 Permit term.

7.4.1 Permittee Facilities and Activities Program Element Accomplishments and Programmatic Improvements

- The District coordinated preparation of GIS-based maps for Permittee MS4 facilities. The MS4 maps are updated annually with new information provided by the Permittees as part of the Annual Reporting process.
- Development of a GIS Browser that allows interested parties to view MS4 Facilities from the District's website.
- Updated Model Facilities Pollution Prevention Plan for Permittee facilities not requiring coverage under the Industrial General Permit.

Highlights
900 attendees to Municipal NPDES training

7.4.2 Proposed Revisions to Permittee Facilities and Activities Program Element

7.4.2.1 FPPP Guidance

The Permittees commit to developing a revised WQMP template for Permittee projects that better facilitates translation of WQMP BMP requirements into Facility Pollution Prevention Plans, where appropriate.

7.4.2.2 Integrated Pest Management

The Permittees commit to including Ecowise's standardized language for contracted pesticide management services in Permittee pesticide management contracts.

7.5 Commercial and Industrial Sources

The Principal Permittee and the County have implemented the CAP through which the County Department of Environmental Health makes use of existing inspection programs to address storm water compliance survey/inspections of restaurants and facilities that must secure a hazardous materials permit for either storing, handling or generating hazardous materials. As the responsible Certified Unified Program Agency in Riverside County, the County Department of Environmental Health is responsible for regularly inspecting all sites within the County that handle hazardous waste. The CAP is implemented in those cities and unincorporated areas that do not maintain an individual industrial/commercial inspection program through other mechanisms such as POTW waste pre-treatment programs or business license inspection programs.

Revisions to the inspection program requirements contained within the 2004 MS4 Permit expanded the scope of the overall commercial/industrial inspection program beyond the ability of the CAP to address. Each Co-Permittee now implements a supplemental inspection program for facilities not covered by the CAP. In addition, the 2004 MS4 Permit required inventories/databases of facilities, prioritization of

industrial and commercial sources relative to the potential to impact water quality, and specified inspection frequencies based upon facility priority.

The revised industrial and commercial sources program continues to have both regional and local jurisdiction components. Although the overall industrial/commercial inspection program has grown beyond the CAP, the CAP still addresses most of the facilities identified in the 2004 MS4 Permit. With its low overhead cost, it remains a cost effective approach to mitigating the impacts of industrial and commercial facilities on the MS4 and Receiving Waters.

7.5.1 Commercial and Industrial Program Element Accomplishments and Programmatic Improvements

- Reviewed and updated several educational brochures for distribution to inspected facilities.
- Developed outreach posters for gas and automotive service stations.
- Developed standardized inspection reporting forms for Annual Reports.
- Updated food service surveys.
- Extended the agreement with the County's Department of Environmental Health executed in 1999 for the area-wide CAP for the inspection of commercial and industrial facilities through June 30, 2009.
- Created Permittee databases for the inspected commercial and industrial facilities.
- Revised the Riverside County DAMP to reflect development of the industrial and commercial facility database that contains the following information: facility name, address, city, zip code, and Standard Industrial Classification (SIC) codes.
- Provided public education information regarding NPDES storm water permits to any new businesses listed in the Press Enterprise.

Highlights
3,974 inspections of Industrial and Commercial facilities
Over **1000** enforcement actions taken
426 attendees to Municipal NPDES training

7.5.2 Proposed Revisions to Commercial and Industrial Sources Program Element

The expected future expansion of the Commercial and Industrial Inspection Program to address Treatment Control BMPs as described in Section 7.2.2.6 would likely result in an expansion of the CAP that is beyond the ability of Environmental Health staff to accommodate and still achieve their own mandated inspection requirements. The Permittees are therefore proposing to amend the Riverside County DAMP and Individual SWMPs to recognize not only the CAP inspection program but also Permittee specific alternative programs that may develop during the term of the next MS4 Permit.

7.6 Residential Sources

The residential program focuses on educating residents about activities that can potentially contribute to beneficial use impairment. The residential program outreach is focused on Pollutants of Concern. The residential program is primarily implemented through the Regional Public Education Program; however, each Permittee typically conducts additional outreach. In those cases where residential Illegal Discharges are identified, appropriate code enforcement actions are also taken.

7.6.1 Accomplishments and Programmatic Improvements

The residential program achieved the following accomplishments during the term of the 2004 MS4 Permit:

- Developed several new outreach brochures and tools to promote changes in knowledge and behavior regarding activities that potentially generated Pollutants of Concern including landscape and gardening brochure, spray bottles with non-toxic pest control or cleaner recipes, septic system management brochure, updated outdoor activities brochure, and pet waste brochure.
- Implemented billboard advertising promoting "**Only Rain Down the Storm Drain**" message
- Purchased a new trailer to transport public education materials. The trailer is wrapped in graphics supporting the "**Only Rain Down the Storm Drain**" message.
- Point of Sale Outreach Programs to customers of hardware stores regarding paint, pesticides and fertilizers.
- Partnership with Valley Greeters to deliver "**Only Rain Down the Storm Drain**" information to new residents in the Santa Margarita Region.
- Promotion and participation in the annual Santa Margarita Watershed Clean Up Day.
- Continued supplemental support of the HHW/ABOP waste collection programs
- Continued update and revision of the public education information page
- Continued implementation and enhancement of school outreach programs conducted by Mission Resource Conservation District
- Reproduction and distribution of the After the Storm poster

7.6.2 Recommended Revisions

Although the Permittees continue to annually assess and modify outreach materials and programs, the Permittees are not recommending any substantive revisions to this program element at this time.

7.7 Public Education and Outreach

Although the bulk of public education and outreach activities are conducted by the District on behalf of the Permittees, the Permittees also conduct outreach activities. These activities include providing informational pamphlets at counters, conducting presentations for local businesses or developers, maintaining a stormwater page or appropriate stormwater links on their individual websites, conducting employee training programs, and attending various public events.

7.7.1 Public Education and Outreach Program Element Accomplishments and Programmatic Improvements

The Public Education and Outreach Program Element had the following accomplishments and improvements over the term of the 2004 Permit (not including those identified in Section 7.6.1):

- Use of a CEQA-style public participation process to develop the Riverside County DAMP, SWMPs, and WQMP
- Duplication and use of the USEPA construction site poster to educate construction site operators
- Distribution of stormwater outreach information to various businesses and construction sites through code enforcement, and building and grading inspectors
- Development and distribution of a automotive shop BMP poster
- Advertisements in the Business Press
- Update of the outdoor activities brochure for mobile operators

7.7.2 Recommended Changes

Although the Permittees continue to annually assess and modify outreach materials and programs, the Permittees are not recommending any substantive revisions to this program element at this time.

7.8 Elimination of Illicit Connections and Illegal Discharges

The Riverside County DAMP describes the discharge limitations and prohibitions applicable to the Permittee's MS4 (Section 4.1), procedures to be implemented when persistent exceedances of Water Quality Standards are identified (Section 4.2), responding to and reporting Illegal Discharges (Section 4.4), enforcement measures for IC/IDs (Section 4.5), measures to control litter (Section 4.6), measures to manage sanitary wastes (Section 4.7), and programs to promote collection and proper disposal of hazardous waste (Section 4.8).

7.8.1 IC/ID Program Element Accomplishments and Programmatic Improvements

- Developed Sanitary Sewer Overflow Procedures in coordination with the sanitary sewer operators in the Santa Ana and Santa Margarita Regions and implemented annual updates to Sanitary Sewer Overflow Procedures to ensure proper contact information for outside agencies.
- Established an electronic tracking system for NPDES complaints received through the toll free "Report Storm Water Pollution" hotline, OES or otherwise reported to the District.
- Enhanced public outreach regarding illegal dumping including brochures for: Outdoor Activities, Fountains & Swimming Pools, and Pet Waste, establishment of a Santa Margarita watershed Clean-Up Day and coordination with the County of Riverside Trash Task Force.

- Initiated a cooperative program with the County Environmental Health Department to promote Environmental Enhancement Projects in lieu of fines for environmental crime cases. This initiative resulted in a billboard advertising campaign and BMP posters addressing appropriate BMPs for gas stations and garages.
- Established IC/ID Monitoring Program

Highlights
1,263 potential IC/ID reports received and responded to
Over **5,500** calls received on stormwater pollution hotlines
94 IC/ID Monitoring events
5 monitoring events where field screening exceeding criteria

7.8.2 Proposed Revisions to IC/ID Program Element

The Permittees re-evaluated their existing IC/ID monitoring programs as part of this ROWD. The Permittees believe that the overall monitoring program is effective. However, the Permittees plan to revise their approach to the implementation of the Illicit Discharge monitoring program to increase monitoring data utility or overall program effectiveness.

7.8.2.1 Revise IC/ID Monitoring Program

The Permittees plan to revise their approach to the implementation of the IC/ID monitoring program. The goals of the recommended revisions are to:

- Relocate the IC/ID monitoring sites at MS4 outfalls.
- Distribute the monitoring sites throughout the Santa Margarita Region to detect Illicit Discharges closer to their source before they become excessively diluted.
- Increase efficiency and consistency in sampling resulting in enhanced data quality.
- Enhance response time to identify IC/IDs.

A model Illicit Discharge monitoring plan that accomplishes these goals is described below; a final plan will be incorporated into updated compliance documents with the new MS4 Permit.

7.8.2.2 Model Illicit Discharge Monitoring Plan

The Municipal Permittees will identify MS4 outfalls that could be used for monitoring sites based on maps of the MS4 facilities. This list of preliminary sites will be then field checked to determine the accessibility of the sites and feasibility for inclusion in the IC/ID monitoring program. Inaccessible sites or sites determined to be otherwise infeasible will be removed from the list.

Each Municipal Permittee except Menifee will then divide the list of the viable sites within their jurisdiction into groups of four. As Menifee only has one MS4, it will only monitor that one site. Each group of four sites will be monitored for a period of one year, twice during the dry season. Once all sites have been monitored for a year, sites will be repeated.

A monitoring team will be formed including one District and one Municipal Permittee staff member. The District staff will perform all monitoring/screening activities. The Municipal Permittee staff will be available to assist and will be responsible for initiating any necessary follow-up actions. This approach will provide consistency in screening and monitoring data collection and will allow the Municipal Permittee with jurisdiction over the tributary land use to be immediately aware of exceedances and initiate appropriate follow-up actions.

REPORT OF WASTE DISCHARGE

Submitted To

SAN DIEGO REGIONAL WATER QUALITY CONTROL BOARD
(Order No. R9-2004-001)

and

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY – REGION IX
(NPDES No. CAS0108766)

JANUARY 15, 2009

SANTA MARGARITA RIVER REGION

RIVERSIDE COUNTY

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT,
COUNTY OF RIVERSIDE, CITY of MENIFEE, CITY of MURRIETA,
CITY of TEMECULA, and CITY of WILDOMAR

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1.0 Executive Summary

On July 14, 2004 the San Diego Regional Water Quality Control Board (Regional Board) adopted Order No. R9-2004-001, an area-wide National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) permit (2004 MS4 Permit); this permit expires on July 14, 2009. A Report of Waste Discharge (ROWD) for renewal of the 2004 MS4 Permit must be submitted no later than 180 days in advance of the expiration date (i.e., by January 15, 2009).

This ROWD is an application for renewal of the 2004 MS4 Permit (NPDES No. CAS0108766) for the MS4 owned and operated by the Riverside County Flood Control and Water Conservation District (District), the County of Riverside (County), and the incorporated cities of Riverside County within the upper Santa Margarita River watershed (collectively, the Permittees). The newly incorporated cities of Menifee and Wildomar are included in this application as a Notice of Intent to participate in the updated MS4 Permit.

The content of this document is structured to identify:

- Information about the applicants (Section 3.0),
- Information on the area to be covered under the MS4 Permit (Section 4.0),
- An overall evaluation of the Permittees' existing programs based on water quality trends (Section 5.0),
- Accomplishments and recommendations for the Permittees' regionally implemented programs (Section 6.0) and
- Accomplishments and recommendations for the programs implemented as part of the Individual Stormwater Management Plans (SWMPs) (Section 7.0).

The Riverside County Drainage Area Management Plan (DAMP) documents the model implementation plan from which each of the existing Permittees has developed their respective Individual SWMP to implement the DAMP. In addition a Watershed SWMP has been developed to describe the programs that will be implemented regionally. The Annual Reports submitted to date describe the implementation of these SWMPs and document how they have evolved over time.

This ROWD builds on these Annual Reports by highlighting the major accomplishments of these programs, evaluating the long-term effectiveness of the programs and recommending revisions to the programs to enhance the efficiency and effectiveness of the programs to manage Urban Runoff to protect Receiving Water quality. To promote clarity of intent, terms defined in the 2004 MS4 Permit are capitalized in this ROWD.

Due to the impacts of the current economic recession on Permittee budgets and the effectiveness of existing Urban Runoff management programs, the Permittees' primary focus during the next MS4 Permit term will be on maintaining existing compliance programs in the face of significant cuts in basic municipal programs and services. Riverside County is one of the areas most affected by the mortgage crisis and the Santa Margarita Region is one of the most impacted areas of Riverside County. This crisis is having significant impacts on Permittee resources and projections for a deepening recession promises to exacerbate these impacts. Further, monitoring data indicates that the existing compliance programs have been effective in maintaining water quality. This ROWD focuses on maintaining the fundamental

structure and content of the Riverside County DAMP and the Individual SWMPs. However, the Permittees have identified several enhancements and/or alterations to their programs that can be implemented to continue to increase the effectiveness of these programs, without increasing costs.

1.1 Highlights of Program Implementation

Sections 6 and 7 of this ROWD describe the numerous accomplishments of the Permittees programs during the 2004 MS4 Permit term. Some highlights of the major accomplishments for the Permittees include:

- Development and implementation of a Water Quality Management Plan (WQMP) that addresses post-construction Urban Runoff management for New and Significant Re-Development.
- Development and implementation of the Watershed SWMP and the Permittee's Individual SWMPs.
- Development of handbook to standardize post-construction Best Management Practice (BMP) selection and design in Riverside County. Ongoing updates to the handbook include a plan to incorporate and promote low impact development design concepts.
- Development and enhancements to the design template for developing project-specific WQMPs
- Development of a Frequently Asked Question (FAQ) document to assist developers and plan review staff in understanding WQMP requirements and expectations.
- Development of coordinated BMP manual for firefighting agencies.
- Development, implementation and maintenance of Permittee databases to track construction sites 1-acre or larger. In addition, the Permittees have standardized a construction reporting spreadsheet used for Annual Reports, updated inspection forms, and enhanced the construction outreach program.
- Creation of Permittee databases to track industrial and commercial facilities.
- Creation and maintenance of the Storm Water Protection website that offers educational resources and free brochures targeting residents, businesses, developers, contractors, and elementary school children.
- Partnership with the Mission Resource Conservation District to provide an educational outreach programs targeting both schools and adults.
- Continued participation in the Consolidated Program for Water Quality Monitoring (Consolidated Monitoring Program) that includes collection of water quality samples at MS4 outfalls and Receiving Waters.
- Participation in regional and statewide monitoring efforts such as the Southern California Monitoring Committee (SMC), Southern California Coastal Water Commission and National Water Resources Institute.
- Participation in the California Stormwater Quality Association (CASQA), including the leadership roles of Officer, Director, and Legislative Chair.
- Development of the Upper Santa Margarita Region Integrated Regional Watershed Management Plan

- Continued partnership and coordination with the Bureau of Reclamation on a watershed plan and water quality model for the Santa Margarita watershed
- Continued participation in the Santa Margarita Lagoon nutrient Total Maximum Daily Load (TMDL) development process
- Participated in a stakeholder workgroup process led by Regional Board staff to revise REC 1 Basin Plan requirements for TMDLs

1.2 Summary Evaluation of Program Implementation

The trend analysis presented in Section G-8.2 of the FY 2007/2008 Watershed Annual Report and reviewed in Section 5.3 of this ROWD indicates that after almost 14 years of active Permittee involvement in MS4 Permit related Urban Runoff management programs, the significant increase in population (over 300 percent) and associated rapid urbanization that the area has experienced has not resulted in any statistically significant increases in Pollutant concentrations in Receiving Waters in the Santa Margarita Region. This indicates that the Permittees MS4 programs are and have been protective of Receiving Water quality. Pyrethroid pesticides, the one Pollutant that does appear to be linked to urbanization, has been addressed through a Toxicity Reduction Evaluation process, outreach programs, and Permittee participation to address pyrethroid pesticides and other pesticide sources at the state and federal level.

To enhance the effectiveness of the MS4 Permit compliance programs, the Permittees have agreed to implement compliance program revisions as described in sections 6 and 7 of this ROWD.

1.3 Summary of Major Recommendations for Program Revision

As described in section 3.4 of this ROWD, the Permittees are facing unprecedented fiscal impacts resulting from the national and state economic crises. The impacts on the Permittees are especially severe due to the disproportionate impact of home foreclosures in the Santa Margarita Region coupled with plummeting sales tax revenue. Unfortunately, it is anticipated that the economic conditions will persist for a significant portion of the term of the next MS4 Permit. During this period, the Permittee's MS4 compliance programs will increasingly compete with more fundamental public services for finite and dwindling resources. The challenge and priority for the Permittees will be to maintain the existing compliance programs in the face of cuts in basic programs and services.

Nevertheless, and although the various programs implemented as part of the Watershed SWMP and the Riverside County DAMP have been determined to be effective overall, Sections 6 and 7 of this ROWD identify certain areas wherein the Permittees are proposing changes to improve the effectiveness, efficiency, and transparency of these programs.

The program revisions recommended in this ROWD reconfigure existing programs in a manner that will increase the Permittees' overall ability to protect Urban Runoff quality, while limiting additional costs that would make these revisions cost-prohibitive in light of the current and foreseeable economy. Some of the major recommendations include:

Enhance Program Effectiveness Assessments and Incorporate Action Levels (Section 6.1.2.1)

The Permittees have carefully evaluated their MS4 Permit compliance programs and annual reporting forms. Based on this review the Permittees determined that:

- The overarching goal of the program is to ensure that Urban Runoff does not cause or contribute to non-attainment of Beneficial Uses in the upper Santa Margarita River watershed;
- Permittee compliance programs are process based and, consistent with the Maximum Extent Practical (MEP) approach, are incrementally adjusted as part of the annual reports and comprehensively reevaluated and if necessary, revamped as part of each ROWD;
- Monitoring data should be used to drive long term program assessments and assess goal attainment as part of the ROWD; and
- Process based Municipal Action Levels (MALs) should be used to evaluate annual program implementation to ensure that programs are implemented to the MEP and identify the needs for incremental adjustments.

The Permittees have proposed revised Effectiveness Assessment metrics and MALs for use in Permittee Annual Reports consistent with the aforementioned findings and as described further in Section 6.1.2.1. The MALs are intended to function as triggers, or minimum bars that if breached, would require the Permittees to evaluate the appropriate program elements to determine if adjustments are necessary to attain the MEP standard. The Permittee proposal will not only add transparency to the Permittees compliance programs but assist Permittees in evaluating and adjusting their Permit compliance programs to assist in attaining Water Quality Standards. Further, the proposed effectiveness assessment metrics can be implemented without significantly increasing the Permittees' program costs.

Revisions to the IC/ID Program (Section 7.8.2)

During the 2007/2008 MS4 Program audits conducted by PG Environmental and Regional Board staff, several questions were raised regarding the Permittees existing Illicit Connection/Illegal Discharge(IC/ID) field monitoring programs. The Permittees have evaluated the Regional Board and PG Environmental staff's comments and proposed a revised IC/ID Program based on the following:

- Random selection of MS4 outfalls throughout the Santa Margarita Region;
- Rotating MS4 outfall sites annually to maximize coverage of the MS4;
- Partnering one District staff person with one city/county code enforcement officer for data collection to ensure consistency in sampling procedure/collection and quick response to detected IC/ID events.

Implementation of a Post-Construction Treatment Control BMP Inspection Program (Section 7.2.2.6)

Consistent with Regional Board staff's request to consider development of a post-construction Treatment Control BMP inspection program, the Permittees have developed a proposal that they plan to implement when economic conditions allow. This proposal would enhance the existing business and Permittee facility inspection programs described in the Riverside County DAMP by incorporating inspections and maintenance verification of Treatment Control BMPs. Treatment Control BMPs constructed as part of residential developments, or other developments not captured by the Permittees' existing business inspections would be addressed through an annual self-certification program.

Revisions to the Dry Weather Monitoring Program (Section 6.4.4.1)

The Permittees have committed to participating in the Regional Watershed Monitoring Program developed in conjunction with the Southern California Coastal Water Research Project (SCCWRP). Six annual monitoring events were scheduled for the upper Santa Margarita River watershed. Consistent with the agreement reached by SCCWRP, Permittee, and Regional Board staff, three of these sites would be collected by the Permittees and three through the Surface Water Ambient Monitoring Program (SWAMP). The costs for implementing the three sites to be implemented by the Permittees would be offset by reducing the Permittees existing dry weather triad monitoring events (three stations) from twice a year to annually.

Development of a LID Manual (Section 7.2.2.1)

The Permittees have committed to develop a Low Impact Development (LID) Implementation Manual based on the LID Manual currently being developed by the SMC and CASQA.

Hydromodification Management Plan (Section 7.2.2.2)

The Permittees have committed to develop a revised hydromodification management plan based on the findings of the final SCCWRP Hydromodification Management report currently under development.

Participate in a Watershed Based TMDL for the Santa Margarita Lagoon (Section 6.4.4.7)

The Permittees understand that, due to economic conditions, State funding for the Santa Margarita Lagoon watershed-based TMDL has been withdrawn. As described in Section 3.4, economic conditions are also impacting the Permittees' funding sources and the Permittees are struggling to maintain sufficient resources to fund their existing compliance programs. Therefore, the Permittees cannot currently support committing additional funds toward a third party TMDL effort. The Permittees are, however, agreeable to discussing with the Regional Board a elimination or reduction of various required compliance activities that are not measurably enhancing the their ability to attain Water Quality Standards, which in turn could allow the Permittees to redirect some of their existing resources into the third party TMDL effort. Some program elements that could be considered for discussion are described in Section 6.4.4.7.

Pyrethroid Pesticide BMP Implementation

The Permittees have committed to implementing several BMPs to address possible urban sources of pyrethroid pesticides. In addition the Permittees have committed to working through CASQA to facilitate regulatory change in pyrethroid pesticide use to curtail potential causes of receiving water impairment.

Adjustments to the Monitoring Program

The Permittees have proposed additional revisions to the monitoring program to streamline implementation and increase its utility.

2.0 Introduction

The Regional Board adopted Order No. R9-2004-001 (NPDES No. CAS0108766), an area-wide NPDES MS4 permit (2004 MS4 Permit) on July 14, 2004. This ROWD is a required component for renewal of the 2004 MS4 Permit. The 2004 MS4 Permit authorizes discharges of Urban Runoff from the MS4 owned and operated by the Permittees.

Capitalized terms used in this ROWD are defined in the glossary of the Riverside County DAMP. The Riverside County DAMP serves as the model compliance document used by the Permittees to develop the Watershed and Individual SWMPs. To save costs and increase the effectiveness of the MS4 Permit compliance programs, the Permittees will maintain the Riverside County DAMP as the primary document that describes Permittee compliance programs. The Permittees individual and regional compliance programs are then described in more detail in the Individual and Watershed SWMPs.

This ROWD has been written and formatted to address the requirements outlined in United States Environmental Protection Agency (USEPA) *Interpretative Policy Memorandum on Reapplication Requirements for Municipal Separate Storm Sewer Systems* contained in the Federal Register, Volume 61, page 41698 (61 FR 41698), and to include commitments made in the various compliance documents, annual reports and in meetings with the Regional Board.

Additionally, as discussed in the meeting with Regional Board staff on September 9, 2008 and as supported by the above mentioned USEPA guidance, this ROWD relies on the fourth year Annual Reports to document the programs implemented by the Permittees. The fourth year Annual Report also includes a comprehensive evaluation of Permittee monitoring data to date and includes preliminary recommendations for Permittee compliance programs based on that data. As part of the ROWD process, the Permittees have reassessed their existing programs that are described in the Annual Reports, the monitoring conclusions and program recommendations contained in the fourth year Annual Reports, and in this ROWD, are making additional recommendations for revisions to improve the efficiency and effectiveness of these programs at improving and protecting the quality of our Receiving Waters.

The following sections of the ROWD are summarized as follows:

Section 3.0 - Information about the Permittees, their legal authority to implement the existing and proposed programs, the Permit Area, and the Permittee's funding sources and economic outlook relative to continued funding of the MS4 Permit compliance programs.

Section 4.0 – Information about the upper Santa Margarita River watershed, including physiography and geology, hydrology, climate, population, land use, surface water bodies and their Beneficial Uses and Impairments, and the MS4. This information provides context for the MS4 Permit compliance program in the Santa Margarita Region.

Section 5.0 – An overall evaluation of the Permittees existing programs based on water quality data collected to date and proposed compliance program modifications.

Section 6.0 – Evaluation of regional compliance programs, including a summary of accomplishments and proposed program revisions.

Section 7.0 – Evaluation of compliance programs individually implemented by the Permittees, including a summary of accomplishments and proposed program revisions.

3.0 Applicant Information

3.1 Permittee Contact Information

Table 1 provides the contact information for each of the Permittees in the Santa Margarita Region.

Table 1. Permittee Contact Information

	Primary Contact	Staff Contact	Address
District	Warren D. Williams General Manager, Chief Engineer 951.955.1275	Jason Uhley Engineering Project Manager 951.955.1273 juhley@rcflood.org	1995 Market Street Riverside, CA 92501
City of Menifee[1]	George Wentz City Manager 951.672.6777	Addison Smith Building Official 951.672.6777	29683 New Hub Drive, Suite C Menifee, CA 92586
City of Murrieta	Patrick A. Thomas Director of Public Works 951.304.2489	Bill Woolsey 951.461.6073 WWoolsey@murrieta.org	1 Town Center 24601 Jefferson Avenue Murrieta, CA 92562
City of Temecula	Daniel A. York City Engineer 951.694.6411	Aldo Licitra 951.694.6411 aldo.licitra@cityoftemecula.org	43200 Business Park Drive Temecula, CA 92589
City of Wildomar[1]	John Danielson City Manager 951.677.7751	Michael Kashiwagi, P.E. Director of Municipal Services (916) 683-3340 X 15 (Office) (916) 206-2238 (Cell) Local Cell 909.200.0523	23873 Clinton Keith Road, Suite 111 Wildomar, CA 92595
County of Riverside	Gary Christmas Chief Deputy County Executive Officer	Mike Shetler Senior Management Analyst 951.955.1110 mshetler@rceo.org	4080 Lemon Street, Suite 400 Riverside, CA 92501

3.2 Statement of Legal Authority

The Co-Permittees have adopted ordinances regarding the management of Urban Runoff. The ordinances provide the Permittees with the legal authority to implement the requirements of the 2004 MS4 Permit and 40 CFR Section 122.26(d)(2)(i)(A-F). The Permittees also provided certification of adequate legal authority to comply with the 2004 MS4 Permit and to implement the Riverside County DAMP to the

[1] As the Cities of Menifee and Wildomar are recently incorporated, the County of Riverside is currently handling their stormwater and MS4 permitting issues. Once these cities are fully established and staffed, updated contact information will be provided to the Board. The cities will assume responsibility for their programs on October 1, 2009.

Regional Board. However, it is noted that the newly incorporated cities of Menifee and Wildomar will submit their certifications following adoption of the updated MS4 Permit.

However, there are limitations to the authority the Permittees have for enforcement actions. The Permittees do not have legal authority over discharges into their respective MS4 facilities that originate from agricultural activities, state and federal facilities, utilities and special districts, Native American tribal lands, wastewater management agencies and other point and non-point source discharges otherwise permitted by, or under the jurisdiction of, the Regional Board or USEPA. Examples of non-point sources of Pollutants not under the control of the Permittees include materials from operation of internal combustion engines, atmospheric deposition, brake pad wear, tire wear, residues from lawful application of pesticides, nutrient runoff from agricultural activities, and leaching of naturally occurring minerals from local geography.

Also, the Permittees do not have the authority to enforce the provisions of California's General Permit for Storm Water Discharges Associated with Industrial Activities (General Permit-Industrial) or California's General Permit for Storm Water Discharges Associated with Construction Activity (General Permit-Construction). The State Water Resources Control Board (State Board) issues these NPDES permits, and neither the State Board nor the Regional Board has the authority under the Clean Water Act to delegate responsibility for administering these NPDES permit programs to the Permittees. However, the Permittees' local storm water and erosion control ordinances may address items similar to those identified in these statewide NPDES permits.

3.3 Permit Area

The Permit Area is defined as the urbanized area serviced by the Permittee's MS4 facilities. The Permit Area is located within the area delineated by the County boundary line on the south and the limits of the jurisdiction of the San Diego Regional Board on the north, east, and west. It is important to recognize that the Clean Water Act exempts agricultural activities from regulation under NPDES and the Permittees do not have legal jurisdiction over storm water discharges into their MS4 facilities from:

- California and federal facilities,
- Areas under the jurisdiction of San Diego County,
- Utilities and special districts, and
- Native American tribal lands.

These areas are not included in the Permit Area. In addition, other point and non-point source discharges otherwise permitted by or under the jurisdiction of the Regional Board or USEPA may affect water quality in the Murrieta and Temecula Creek watersheds.

The area of Riverside County under the jurisdiction of the Regional Board is less than 8 percent of the 7,300 square miles within Riverside County. Of the 27 municipalities within the whole of Riverside County, only five include areas under the jurisdiction of the Regional Board.

3.4 Funding Sources and Economic Projections

3.4.1 Funding Sources

The costs incurred by the Permittees in implementing the SWMPs fall into two broad categories:

- **Shared Costs**. These are costs that fund activities performed mostly by the District under the Implementation Agreements. These activities include coordinating the overall storm water program, coordinating other interagency cooperative efforts such as the Compliance Assistance Program (CAP), participating in CASQA activities, representing Permittees at meetings of the Regional Board or State Board and other public forums; preparing and submitting compliance reports and other reports required under the MS4 Permit, conducting Urban Runoff monitoring and public education outreach programs, responding to Water Code Section 13267 requests, providing other program documentation, and coordinating consultant studies, Permittee meetings, and training seminars.
- **Individual Permittee Costs for Individual SWMP Implementation**. These are costs incurred by each Permittee for implementing within its jurisdiction the BMPs (drainage facility inspections for illicit connections, drainage facility maintenance, drain inlet/catch basin stenciling, emergency spill response, street sweeping, litter control, public education, construction activity inspection, development of implementation plans, etc.) comprising the Individual SWMPs.

Historically, the Permittees have employed several funding methods to finance their MS4 Permit compliance activities. Unfortunately, the mortgage crisis, collapse of the housing market, and the economic recession has resulted in the cessation of virtually all development activity and has significantly reduced property and sales tax revenue. Property tax revenues have been reduced by the high level of foreclosure activity, reduced property values and a significant decline in assessed valuations. Property tax revenues have been further reduced by homeowner requests for reassessments to reflect the reduced property values. The impact of these economic conditions on the Permittees in the Santa Margarita Region has been particularly severe. As a result, the aggregate funding available to the Permittees has been severely reduced, and it is anticipated that this condition will continue well into and possibly throughout the next Permit term. The funding methods historically used and the effects of the economic situation on the availability of funds through these sources are summarized as follows:

- **Santa Margarita Watershed Benefit Assessment Area**. In 1991, the District established the Santa Margarita Watershed Benefit Assessment Area to fund its MS4 Permit compliance activities. Currently, the Benefit Assessment revenues fund the District's share of the area-wide MS4 Permit program activities and the District's individual compliance activities as a Permittee. Under the Benefit Assessment each parcel is taxed based on the impervious area of each parcel at a set rate established by District Ordinance 14. This rate has not been increased since 1991 due to Proposition 218. In 2007/08 the Santa Margarita Benefit Assessment generated approximately $410,000 dollars in revenue.

  Outlook: The District expects at best to maintain, if not see temporary reductions in Benefit Assessment revenues due to the significant number of homes that are not paying property tax due to foreclosure. Pursuant to Article 13.D of the California Constitution, an increase in the established Benefit Assessment rate to compensate for these reductions requires approval of 2/3

of the voters or 50 percent of the property owners and is highly unlikely given the current economic climate. Revenues will not increase until the development industry recovers.

- **General Fund /Other Revenues**. The County and the cities utilize general fund revenue to finance most of their MS4 Permit compliance activities. General fund revenue is generated by property tax, sales tax, and auto license taxes.

  Outlook: The Permittees expect a continued reduction in th**e funds** available through General Fund / Other Revenues through at least FY 2009 /2010. Although optimistic that conditions will begin to stabilize toward the end of 2009, the Permittees cannot speculate as to when revenues will recover to previous levels.

- **Fees**. Several Permittees charge fees for services such as inspections, plan check, and other recoverable costs related to compliance with the 2004 MS4 Permit. These fees cover both the direct and indirect costs associated with conducting these inspections/reviews including associated compliance tracking and reporting.

  Outlook: It is notable that, with the virtual collapse of the development industry in the Santa Margarita Region, the fees received by the Permittees have been significantly reduced. With this reduced level of fee-based income, maintenance of the existing inspection and plan review programs will place an increased burden on overall funding of the compliance programs. The Permittees do not expect revenues from fees to recover until the development industry recovers. Even with recovery of the development industry, it is anticipated that over the long-term, revenues from fees will be reduced for the City of Temecula and the County due to the reduced area remaining for development within their jurisdictions.

- **Grants.** The Permittees have actively pursued and, as available, used Grants to fund compliance programs.

  Outlook: In December the state's budget crisis resulted in a directive to state agencies from the Department of Finance to halt projects that rely on bond funds, including those funded by Prop 40, Prop 50, or Prop 84. The State of California is the primary source of grant funding for water quality projects. Future availability of funds to resume grant-funded projects is uncertain.

It is clear that the current economic climate and that of the foreseeable future is creating a significant burden upon the Permittees that will make the continuance of all existing MS4 Permit compliance programs increasingly difficult. New funding sources or alternative combinations of funding sources will likely be required to ensure continued funding of even the current MS4 Permit compliance programs.

3.4.2 Economic Projections

According to Chicago Title, Southwest Riverside County has experienced a very significant increase in supply of single-family residential units on the market. As a result, housing price indicators are very negative. In the majority of the Southwest Riverside submarket, the pending price is less than the closing price indicating general price weakness. The October, 2008 count of bank owned (REO) properties for Riverside County as a whole was 12,078. The number of home in foreclosure was 23,480. The presence of high levels of REO properties will continue to negatively affect home prices. In addition, the level of foreclosures is increasing.

With regard to other sectors of the economy, Riverside County has taken a serious turn for the worst in 2008, with projections indicating that the severe downturn will continue through 2009 at the very least.

The economic difficulties being faced in the Southwest Riverside submarket is the result of the dramatic downturn in the housing market in this area, the national financial turmoil, the worldwide credit crisis, and the increasing consumer debt crisis. According to Beacon Economics, a respected economics consulting firm in Los Angeles, Inland Southern California is clearly at the epicenter of this economic turmoil, with extremely high rates of unemployment at present. Unemployment rates in Inland Southern California are expected to reach 12.4 percent before this deep recession is over. Housing prices are expected to continue their precipitous decline from their peak levels in the two Inland Southern California counties through at least 2011. According to Dataquick, median home prices in Riverside County peaked at $415,000 in January 2007. At the end of this cycle, the median home price in Riverside County is expected to be $198,000. Figure 1 depicts the median housing price in Riverside County over the period 1990 to August 2008.

Figure 1. Riverside County Median Housing Price (1990 – August 2008)

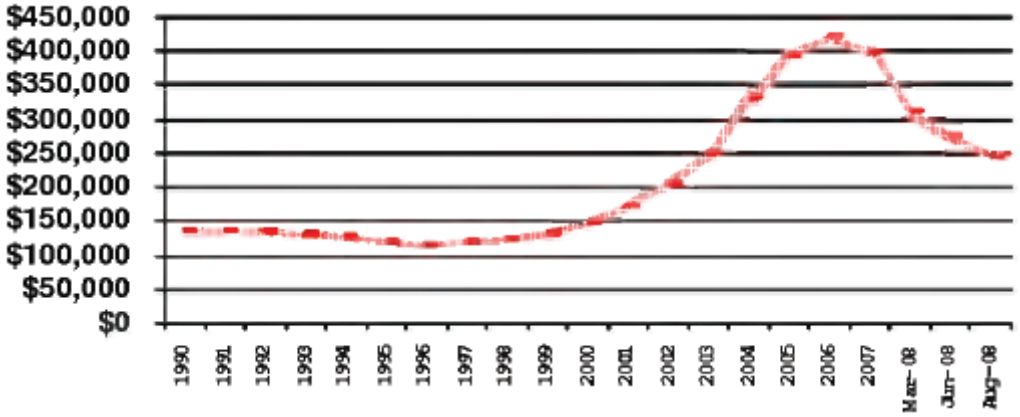

Source: Riverside County Center for Demographic Research. 2008. Riverside County Progress Report, pg 14.

Local Government sales tax revenues remained fairly stagnant through 2006 and began to decline in early 2007, according to Beacon. By the second quarter of 2008, taxable sales in Riverside County declined by 7.7 percent. The decline is expected to continue with taxable sales possibly bottoming out by 2010. Recovery of these reduced revenue streams will likely not occur within the next permit term.

As a direct outcome of the current economy and the economic outlook into the next MS4 Permit term, the number of New Developments proposals has plummeted and any significant rebound is not forecast. New and redevelopment projects will likely remain minimal. As shown in Figure 2, the number of housing units being added each year has dropped below the levels seen at any point in time during the 2004 MS4 Permit. These numbers will likely continue to decrease for a significant portion of the new MS4 Permit term.

Figure 2. Riverside County Housing Units Added (1990 – 2008)

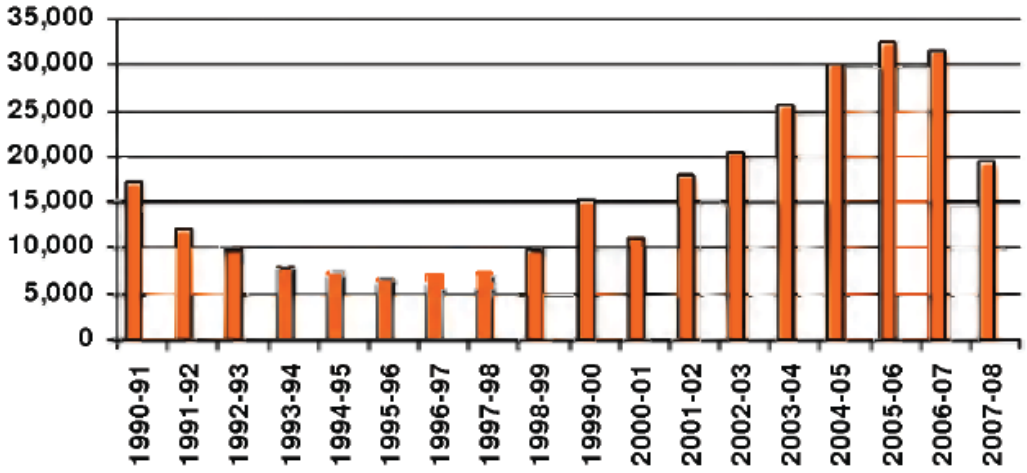

Source: Riverside County Center for Demographic Research. 2008. Riverside County Progress Report, pg 12.

These economic issues and projections directly affect and limit both:

1. The need for including enhanced new and re-development requirements in the new MS4 Permit, and
2. The Permittees ability to fund, and even seek new funding sources for additional MS4 Permit requirements for new and re-development projects.

Therefore, as described in Section 7.2, the Permittees are not recommending and cannot financially support any significant increases to their Development Planning activities. Permittee specific projections are as follows:

3.4.2.1 County of Riverside

The County is operating with a structural deficit of $12 million and plans a 25 percent budget reduction from FY 2008/2009 through FY 2011/2012. The County's current budget of $4.7 billion represents a 5 percent reduction from the previous year and next year's budget is expected to be cut by 10 percent. These cuts are directly associated with the overall decline in property values and the high number of foreclosures. There are concerns about having to use discretionary funds to meet State mental health and social service mandates. In addition, the County is dependent on funds from federal and state sources. If during this time of economic crisis federal and state funding sources are reduced or eliminated, any unfunded State and Federal programs will be terminated. Only core County programs will continue.

The primary source of general fund revenue is from property taxes and sales tax. With the unprecedented number of foreclosures, reduced property values, and declining sales tax revenue, general fund revenue is in a downward spiral. Another source of funding is through the Solid Waste Tipping Fees paid at the County landfills. Volume is down 15 percent since 2006 with anticipated downward trend to 40 percent reduction in solid waste through 2014. Programs that are partially funded through tipping fee allotments will be impacted. Due to the declining economy the recycling market has collapsed. Virtually no recyclable materials are being shipped for reprocessing. This loss of revenue and increased disposal costs is further impacting the general fund.

Cuts of 25 percent for all Net County Cost general fund programs will translate into reduction of County services and elimination of unfunded state and federal programs. Only core value programs will be provided (including public safety and fee programs)

The County has instituted a hiring freeze and required each department to create a report outlining the projected effects of the budget cuts. The County currently employs over 20,000 people, and layoffs are expected to result from the findings of these departmental reports. It is anticipated that this will impact program delivery for stormwater related activities. No County department will be able to sustain current staffing levels as they try to meet the 25 percent budget reduction strategy.[2] [3]

3.4.2.2 City of Menifee

The newly incorporated City of Menifee FY 2008/2009 initial budget was estimated from their comprehensive fiscal analysis that was submitted to the Local Agency Formation Commission during the incorporation process. Because of the economic uncertainty, and the fact that the City is only now beginning to staff positions, it is unknown what the immediate impact of the fiscal crisis will be. The County is responsible for assisting the City in meeting its MS4 Permit compliance requirements during the first year of incorporation which expires October 1, 2009. Currently, the level of property tax revenue that will be available to the City is uncertain. Funding for MS4 Permit compliance requirements was not explicitly budgeted. A financial hardship currently exists because of the costs associated with incorporation.

3.4.2.3 City of Murrieta

The City of Murrieta's FY 2008/2009 budget did not increase compared to FY 2007/2008. Adjustments were made to reflect less revenue and to absorb any operating costs. However, budget cuts are anticipated for FY 2009/2010 because the immediate economic outlook is not good. There have been approximately 2,000 home foreclosures within the City. Sales tax revenue is estimated to drop 12.5 percent, property tax revenue will drop, and the State took approximately $525,000 out of redevelopment funds. Murrieta did not receive any vehicle licensing fees from the State and it appears likely that the State will take more revenue from the Cities to solve its budget problems. New NPDES requirements that increase compliance costs will create a financial hardship for the City.

3.4.2.4 City of Temecula

Various ongoing tax and investment revenues adopted in the City of Temecula's FY 2008-09 general fund revenues are projected to decrease from FY 2007-08. Sales and use tax revenues are expected to decrease in FY 2008-09 compared to FY 2007-08. This decrease is primarily the result of the decline in general consumer goods, electronic retail, and auto sales. Property tax revenue is also expected to decrease due to decreases in supplemental tax receipts attributed to the impact of the housing crisis. Investment interest revenue is also anticipated to decrease due to a decline in interest rates.

As a result of the 2008/2009 State budget, Temecula's redevelopment agency will have to shift existing funds from property taxes to the State's Education Revenue Augmentation Fund coffer for schools and

[2] "The Realities of Recession in California: A Statewide Report by U.S. Senator Barbara Boxer, December, 2008, p. 18.

[3] Riverside County Executive Office, January, 2008.

colleges. As such, the amount due from the Temecula Redevelopment Agency is expected to be $898,685. As the State of California continues to address its budget deficit, the City of Temecula faces the possibility of additional revenue shifts to State coffers, further losing future revenue streams and threatening existing service levels.

In addition, a Press-Enterprise article dated December 9, 2008, reported that "Between 25 and 30 part-time Temecula employees will be without work in the new year as City officials deal with a lack of revenue and less work to go around." Furthermore, "the city is not immune to the economic slowdown, which has forced its neighbors to lay off workers and slash spending to counter drops in sales tax receipts and building permit fees. In May, the City's Finance Director reported that revenues were down $3 million compared to two years ago."

With these current and projected reductions in revenue and staff, additional requirements in the MS4 Permit or upcoming TMDL-related requirements, without any corresponding cost-equivalent offsets, will exceed the City's ability to effectively implement these new requirements and will begin to compromise the City's existing efforts to manage the existing MS4 Permit requirements.

3.4.2.5 City of Wildomar

The newly incorporated City of Wildomar FY 2008/2009 initial budget was estimated from their comprehensive fiscal analysis that was submitted to the Local Agency Formation Commission during the incorporation process. Because of the economic uncertainty, and the fact that the City is only now beginning to staff positions, it is unknown what the immediate impact of the fiscal crisis will be. The County is responsible for assisting the City in meeting its MS4 Permit compliance requirements the first year of incorporation that expires July 1, 2009. Currently, the level of property tax revenue that will be available to the City is uncertain. Funding for MS4 Permit compliance requirements was not explicitly budgeted. A financial hardship currently exists because of the costs associated with incorporation.

4.0 Overview of the Upper Santa Margarita River Watershed

4.1 Physiography and Geology

The upper Santa Margarita River watershed is defined as that portion of the Santa Margarita River watershed above the confluence of Murrieta and Temecula Creeks and includes the City of Temecula and portions of the Cities of Menifee, Murrieta, Wildomar, unincorporated County areas, portions of the Cleveland and San Bernardino National Forests, the Cahuilla, Ramona, Pauma, and Pechanga Indian Reservations and properties under the jurisdiction of Caltrans and a variety of special districts. The watershed is bounded by several mountain ranges, including the Santa Ana and Santa Margarita mountains to the North and the Palomar Mountains to the South. The upper Santa Margarita watershed includes areas in Riverside and San Diego Counties and encompasses approximately 588 square miles.

The upper Santa Margarita watershed includes two major sub-basins, drained by Temecula and Murrieta Creeks. Temecula Creek has a drainage area of 366 square miles, with steep rugged topography in the Palomar and Thomas Mountain areas and rolling hills below. The upper 316 square miles of this basin is controlled by Vail Lake (completed in 1949). Murrieta Creek has a drainage area of 222 square miles, with over 50 square miles controlled by Skinner Reservoir (completed in 1974). Although the watershed area is somewhat smaller and less rugged than the Temecula Basin, flood flows have the potential to create greater damage as they flow through the Cities of Temecula and Murrieta.

Temecula and Murrieta Creeks join along the Elsinore fault zone at the head of Temecula Canyon to form the Santa Margarita River. The Temecula Canyon is approximately five miles long, and is a steep, narrow, and rocky canyon. The San Diego-Riverside county line crosses through the Temecula Canyon. From here, the river traverses 27 miles to the Pacific Ocean.[4]

4.1.1 Watershed Characteristics

Over 50 percent of the Santa Margarita watershed has been controlled by the construction of Vail Dam in 1949 and Skinner Reservoir in 1974, which created a significant storage capacity in the upper watershed.[5] [6] 52 percent of the upper Santa Margarita River watershed is controlled by the dams. Due to this storage capacity, peak flow rates during major flow events for both existing and future land use conditions will be lower than under natural conditions.[7] [8]

[4] Santa Margarita Watershed Study: Hydrologic and Watershed Processes, Phillips, Williams and Associates, Ltd., October 26, 1998, page 1.

[5] Santa Margarita Watershed Study: Hydrologic and Watershed Processes, Phillips, Williams and Associates, Ltd., October 26, 1998, page 14.

[6] Philip Williams & Associates, Santa Margarita Watershed Study: Hydrology and Watershed Processes, October 26, 1998, p. 14.

[7] Philip Williams & Associates, Santa Margarita Watershed Study: Hydrology and Watershed Processes, October 26, 1998, p. 20.

[8] Santa Margarita Watershed Study: Hydrologic and Watershed Processes, Phillips, Williams and Associates, Ltd., October 26, 1998, page 20.

4.1.2 Stream Flow Characteristics

Murrieta and Temecula Creeks are perennial interrupted streams, i.e., they include reaches in which the flow is continuous and others where flow is ephemeral. The areas of perennial flow are located in mountain area tributaries outside of the urbanized areas serviced by the MS4s. The perennial flows disappear by seepage into the sands and gravels and resurface upstream of the confluence of Murrieta and Temecula Creeks. The creeks in the urbanized areas of the watershed, located primarily in the valley, are ephemeral and flows are only observed during and immediately after significant storm events. During major storms, after initial wetting, periods of intense rainfall result in rapid increases in stream flow in steep foothill and mountain areas.[9] "Runoff in streams in the watershed is derived primarily from rainfall, and as a result, stream flows exhibit monthly and seasonal variations similar to those shown by the precipitation records. Absence of snow pack in the tributary watershed results in a rapid decrease in flow of streams at the conclusion of the winter precipitation season. Following severe storms, discharge in the larger streams often increases in a few hours time from practically no flow to a rate of thousands of cubic feet per second. Stream flows vary greatly from month to month and from season to season."[10]

Rising groundwater is currently observed in Murrieta Creek below its confluence with the Santa Gertrudis Channel. This is consistent with the observations with the rising groundwater conditions observed by the State of California in 1956.[11] Rising groundwater is also observed in Temecula Creek approximately one quarter mile upstream of the Interstate 15 bridge. In 1956, the State of California observed more extensive rising groundwater conditions occurring as far upstream as the Highway 79 bridge. Based on the virtual absence of non-storm water flows and the rising groundwater conditions in lower Murrieta and Temecula Creeks observed prior to development of the watershed, there is no evidence that the rising groundwater is due to Urban Runoff nor that Urban Runoff has affected the quality of rising groundwater. However, use and disposal of reclaimed water and agricultural and landscape irrigation in the watershed may affect groundwater quality. Until October 2002, the Rancho California Water District augmented the flow of the Santa Margarita River with reclaimed water at a point about five miles upstream from the Temecula gauging station. Since that time, the Rancho California Water District has diverted reclaimed water to the Santa Ana watershed and instead discharged imported water at a location downstream of the confluence of Murrieta and Temecula Creeks in order to meet water supply obligations to Camp Pendleton.

For the average annual event, it is estimated that approximately 89 percent of the volume of runoff in the Santa Margarita Region is due to non-urban land uses not regulated under the federal storm water program. For the 100-year 24-hour event, 93 percent of the volume of runoff will be due to non-urban land uses. These estimates are based on the assumption that precipitation is constant across the watershed. However, precipitation (and resultant runoff volumes) in the non-urbanized upland areas is as much as four times greater than that from the urbanized valley areas.[12]

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[9] Riverside Flood Control and Water Conservation District, "Hydrologic Data for 1975-76 Season," March 1982, p. 49.

[10] State of California Department of Public Works, Division of Water Resources, Bulletin No. 57, Santa Margarita River Investigation, Volume I, June 1956, p. 48.

[11] State of California Department of Public Works Division of Water Resources, Bulletin No. 57, "Santa Margarita River Investigation," Volume I, June 1956, p. 48.

[12] State of California Department of Public Works, Division of Water Resources, Bulletin No. 57, Santa Margarita River Investigation, Volume I, June 1956, p. 11

4.2 Climate

"The climate of the Santa Margarita River watershed is typically Mediterranean, being characterized by warm dry summers and cool rainy winters. About 75 percent of the precipitation occurs during the four-month period from December through March. Mean annual depth of precipitation ranges from less than 10 inches near Vail Reservoir to over 40 inches west of Palomar Observatory, varying with elevation and topographic influences."[13] Precipitation increases with increases in elevation to the summit of the Coastal range. Shading effects of the Coastal range lead to a marked decrease of precipitation throughout the lower portions of the Inland area. Precipitation increases again farther away from the Coastal range in the northeastern area of the Inland area.[14] The significant and varied orographic features also make rainfall prediction particularly challenging in the urbanized portion of the watershed.

4.3 Population and Land Use

4.3.1 Population

The California Department of Finance estimates that as of January 1, 2008, the total population of Riverside County was about 2,088,322. Of the 2.1 million people, approximately 272,621 persons (or 13 percent) reside within the portion of Riverside County under the jurisdiction of the San Diego Regional Board. As shown in Figure 3, approximately 51,314 persons[15] reside in the unincorporated area while approximately 221,307 persons reside within the cities of Menifee, Murrieta, Temecula and Wildomar.

Figure 3. Santa Margarita Region Population by Permittee (2008)

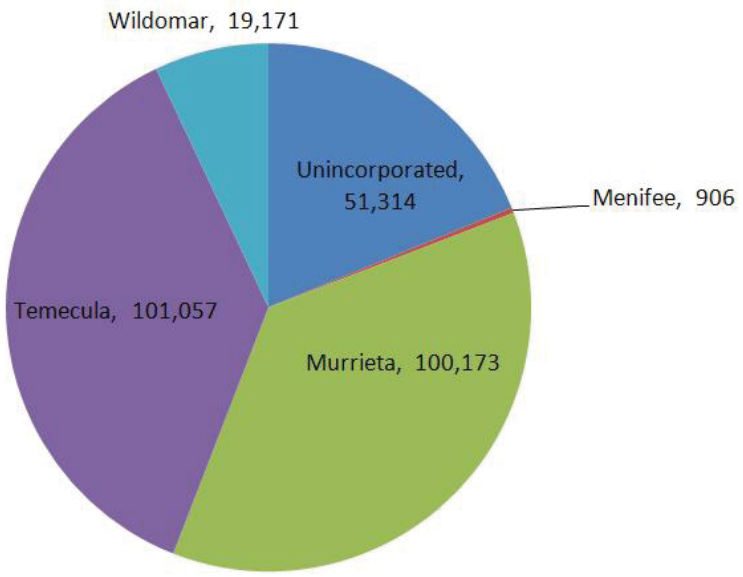

[13] State of California Department of Public Works, Division of Water Resources, Bulletin No. 57, Santa Margarita River Investigation, Volume I, June 1956, p. 11.

[14] State of California Department of Public Works, Division of Water Resources, Bulletin No. 57, Santa Margarita River Investigation, Volume I, June 1956, p. 38.

[15] Population estimate for the portion of unincorporated Riverside County within the Santa Margarita River watershed developed by the County TLMA GIS Demographics Unit based on the 2000 Census.

Although the second term and 2004 MS4 Permits covered a period of time that saw a significant amount of growth, due to the current and foreseeable economic conditions described in Section 3.4.2 of this report and decreasing areas available for development, growth during the next MS4 Permit term will be quite limited. In fact, the projected growth rate through 2015 will be significantly less than has been seen since the early 1990s. Figure 4 shows the combined populations of the Cities of Murrieta and Temecula since 1997 and projected through 2015. Similar trends are expected for the unincorporated areas and the portions of the cities of Wildomar and Menifee within the watershed.

Figure 4. Cities of Murrieta and Temecula Combined Population (1997 – 2015)

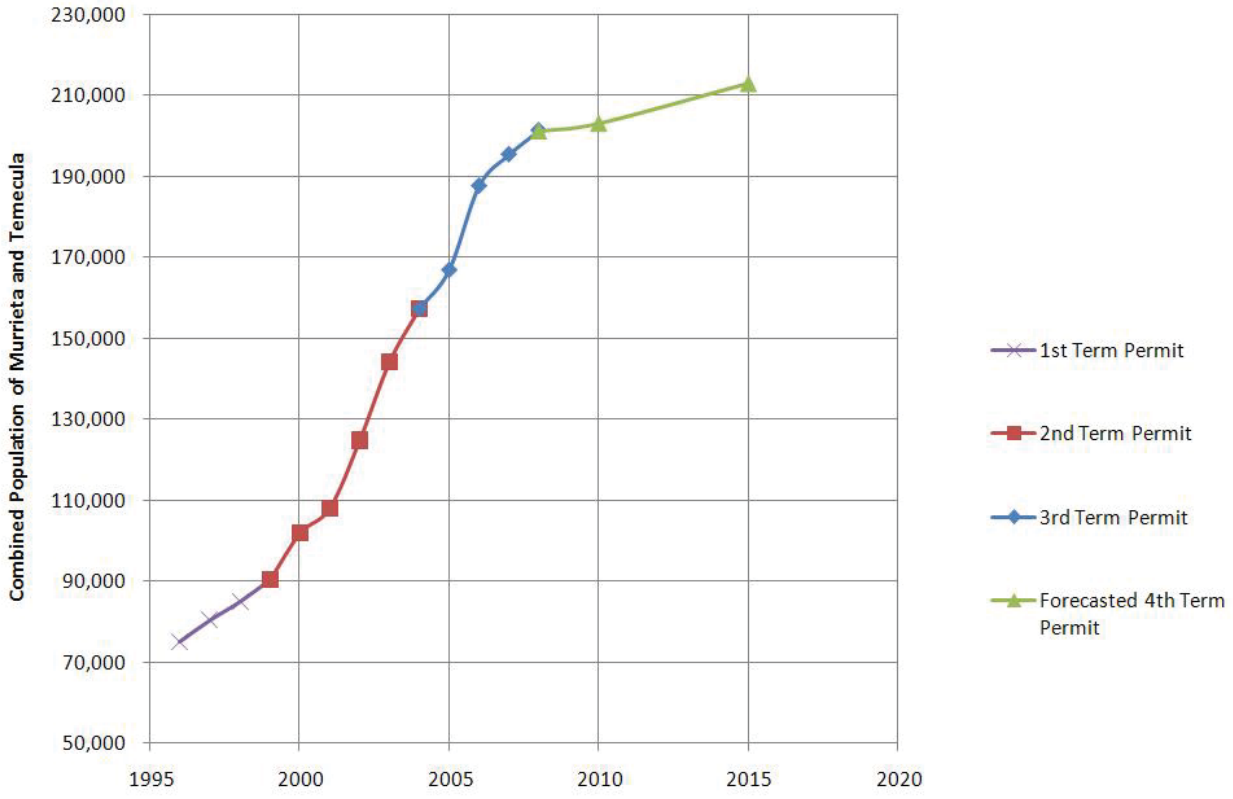

Source: Riverside County Center for Demographic Research. 2008. Riverside County Progress Report, pgs 92 & 124.

Figure 4 clearly demonstrates the dramatic reduction in growth that is expected for the term of the next MS4 Permit when compared to previous permit terms.[16] Establishing trend lines for the population in these cities further demonstrates that the growth rate (population added per year) will be lower than the previous growth rate by approximately 86 percent.

[16] 2008 Riverside County Progress Report

Table 2 shows population projections for the all of the Permittees into the year 2015.

Table 2. Population of Santa Margarita Region Co-Permittees

Co-Permittee	Year			Change (2009 to 2015)
	Estimate 2008 (a)	Estimate 2009 (b)	Projected 2015 (b)	
City of Menifee	906[c]	927[c]	5,232[c]	464%
City of Murrieta	100,173	102,277	109,715	7.3%
City of Temecula	101,057	101,356[d]	103,150	1.8%
City of Wildomar	19,171[c]	19,589[c]	20,127[c]	2.7%
Unincorporated County of Riverside	51,314[c]	52,436[c]	53,793[c]	2.6%
Total	272,621	276,585	292,017	5.6%

Notes:

(a) Unless otherwise noted, populations were obtained from the State of California, Department of Finance, E-4 Population Estimates for Cities, Counties and the State, May 2008.

(b) Unless otherwise noted, projected populations were obtained from Riverside County Center for Demographic Research. Riverside County Progress Report, 2008

(c) Data provided by County of Riverside, Executive Office.

(d) Data provided by City of Temecula.

Since the District is not a general purpose government, it is not included in this listing. Although the current population of the City of Menifee in the Permit Area is small, it is anticipated that the population will increase as it annexes unincorporated areas. Similarly, it is anticipated that the cities of Murrieta and Temecula will gain population as they annex unincorporated areas. It is not anticipated that Wildomar will see significant population increases as it is bounded on all sides by other cities and lands reserved under the MSHCP.

4.3.2 Land Use

Land uses in Riverside County within the Santa Margarita Region include open space, residential, commercial, light industrial, heavy industrial, and agriculture. The agricultural land uses include row crops, nurseries, citrus groves and vineyards, dairies, ranches, poultry and hog farms, and other agricultural related uses with one single-family residence allowed per 10 acres (County of Riverside General Plan, Land Use Element 2003). The conversion of agricultural lands and open space to other "developed" land uses has been ongoing and will continue, although at a much lower rate than previously experienced. Land uses in the Santa Margarita Region are shown in Table 3. These land uses are based on the County of Riverside Assessor Parcel Data, current as of February 2006. It should be noted that the land uses below represent ***zoned*** land uses rather than ***actual*** land uses. This overstates the actual area of urban land use in the Santa Margarita Region. Also, changes in zoning designations can cause odd fluctuations in year-to-year date.

A map of the zoned land uses is provided in Appendix A.

In 1956, only 0.3 percent of the Santa Margarita River watershed (less than two square miles) was urbanized.[17] Although there has been a significant rate of growth in population relative to the State and

[17] State of California Department of Public Works, Division of Water Resources, Bulletin No. 57, Santa Margarita River Investigation, Volume I, June 1956.

neighboring counties, half a century later, approximately 88 percent of the Santa Margarita River watershed remains as non-urban land uses (rural residential, agriculture, preserves and open space, state lands, federal lands, and tribal lands). Further, almost one-third of the upper Santa Margarita River watershed consists of federal, state, and tribal lands that are not under the jurisdiction of the Permittees' MS4 programs. It is projected that the population of Riverside County will increase approximately 5.6 percent by 2015. If the urbanized area increases proportional to population, 87 percent of the upper Santa Margarita River watershed would remain in non-urban land uses in 2015.

Table 3. 2009 Santa Margarita Region Land Uses

Urban Land Use	Acreage[(a)]	% of Land Use Subtotal	% of Total Land Use
Commercial	8,339	20.0%	2.5%
Industrial	963	2.3%	0.3%
Urban Residential (< 1 acre)	12,656	30.4%	3.7%
Parks & Recreation Facilities	4,291	10.3%	1.3%
Streets & Roads	15,439	37.0%	4.6%
Subtotal – Urban Land Use	41,688		12.3%
Non Urban Land Uses			
Preserves & Open Space	54,141	18.2%	16.0%
Rural Residential (> 1 acre)	106,773	35.9%	31.5%
Agriculture	36,389	12.2%	10.7%
Federal/State/Tribal Lands/Non-County Jurisdiction	100,076	33.7%	29.5%
Subtotal Non Urban Land Use	297,379		87.7%
Total Urban & Non Urban Land Use	339,067		100%

(a) As reported in the FY 2007/2008 Watershed Annual Report.

4.3.3 Conserved Lands

The Western Riverside County Multiple Species Habitat Conservation Plan (MSHCP) was adopted in June of 2003. It is a comprehensive, multi-jurisdictional Habitat Conservation Plan focusing on conservation of species and their associated habitats in western Riverside County. The MSHCP is one of several large, multi-jurisdictional habitat planning efforts in southern California with the overall goal of maintaining biological and ecological diversity within a rapidly urbanizing region. The MSHCP will allow Riverside County and its cities to better control local land-use decisions and maintain a strong economic climate in the region while addressing the requirements of the state and federal Endangered Species Acts. Further, as floodplains and streams tend to support critical habitat, the MSHCP will preserve many of the remaining natural streams and establish significant buffer areas between those systems and urban land uses.

Much of the remaining non-urbanized lands in the Santa Margarita Region will ultimately be incorporated into the MSHCP. The MSHCP will result in a conserved area in excess of 500,000 acres and focuses on conservation of 146 species. The MSHCP Conservation Area includes approximately 347,000 acres on

existing Public/Quasi-Public Lands and approximately 153,000 acres of Additional Reserve Land. A large portion of the conserved lands are in the upper Santa Margarita watershed (at least 145,000 acres). There are approximately 72,318 acres of existing public or quasi-public lands preserved within the upper Santa Margarita River watershed area located in Riverside County.

4.3.4 Anticipated Development 2009-2015

Proposed development during the next MS4 Permit term is an important indicator of potential new Urban Runoff sources. To the extent possible, the Permittees have identified significant New Development projects that, if constructed, will result in the conversion of primarily undeveloped land to developed land. This section describes the expected development within Permittee cities. Consistent with the current and forecasted economic conditions and population estimates, and as supported by the population information and forecasts presented in Section 4.3.1, the Permittees anticipate that the term of the upcoming MS4 Permit will be a time of little development. Following are summaries of anticipated development during the upcoming MS4 Permit.

4.3.4.1 County of Riverside

Projected trends for the County of Riverside's land use can be referenced in the Riverside County General Plan. Maps depicting the areas of future development and type of land use can be found in the General Plan maps that are accessible at http://www.rctlma.org/generalplan/area_maps.html.

- With the incorporation of the cities of Wildomar and Menifee the remaining unincorporated County area to be built out in the Santa Margarita Region during the upcoming MS4 Permit term is going to be considerably smaller.
- It is anticipated that, over the next five years, additional annexations will occur in each of the four city areas (Temecula, Murrieta, Wildomar and Menifee) that will further reduce the unincorporated County area in the Santa Margarita Region.
- The unincorporated County area in the upper Santa Margarita River watershed (east of Temecula, Menifee and Murrieta) will remain in rural, open space and additional MSHCP land uses. In addition, due to drought conditions and depletion of aquifers the prospects of New Development is unlikely. Water districts in the region cannot offer "will serve" letters to provide for water resources they do not have. Infrastructure for water supply and municipal water treatment, MS4 and flood control facilities are virtually non-existent in this area.
- Due to downturn in economy, Development Impact Fees (DIF) and Transportation Uniform Mitigation Fees (TUMF) are and will continue to be significantly under funded. This reduction in transportation funding will result in fewer road and infrastructure projects during the term of the upcoming MS4 Permit. The Transportation Department has projected limited projects for the Santa Margarita Region. The Clinton Keith Road widening project is still in the planning stages. Due to budgetary constraints, unless projects are fully funded through County finance mechanisms (TUMF, DIF, state and federal pass through from bonds and grants) most projects will be put on hold through 2012.

4.3.4.2 City of Menifee

Projected development trends for the City of Menifee are unknown, sphere of influence and annexation opportunities will allow for limited growth once the economic uncertainty of the region is resolved.

4.3.4.3 City of Murrieta

The area north of Clinton Keith Road along the east side of the I-215 freeway should see some construction towards the end of the next MS4 Permit term. Grading for the construction of a hospital has started along the freeway and it is anticipated that supporting development will follow once the hospital is open. Overall the Planning Department is receiving few applications for New Development projects. For example, a Planning Commission meeting scheduled for January 2009 has been cancelled because there are no New Development items to discuss. In light of the current and foreseeable economic conditions, the City does not anticipate any substantial New Development activity for the next few years, with limited growth possibly resuming toward the end of the next MS4 Permit term.

4.3.4.4 City of Temecula

The City of Temecula is currently experiencing a significant leveling trend in development. Throughout 2008, fewer applications were being processed than in previous years. As such, Temecula does not anticipate processing any substantial number of New Development applications within the next MS4 Permit term. It is anticipated that applications from hereon will be limited to smaller in-fill and redevelopment projects. In addition, proposed annexation areas will be limited to areas that will be set aside mostly for conservation. As Temecula is on the verge of build-out, approximately 1 percent of developable land remains available throughout the City for New Development.

4.3.4.5 City of Wildomar

Projected trends for the City of Wildomar are unknown, sphere of influence opportunities will allow for limited growth once the economic uncertainty of the region is resolved.

4.4 Surface Water Bodies, Beneficial Uses, and Impairments

Approximately eight percent of Riverside County drains into surface water bodies within the jurisdiction of the Regional Board. Those surface water bodies (or portions thereof) are listed in Sections 4.4.1 and 4.4.2.

Rivers and Streams

- Santa Margarita River (Hydrologic Unit Basin Number 2.22)
  - Murrieta Creek
    - Slaughterhouse Canyon
  - Cole Canyon
    - Warm Springs Creek
      - Diamond Valley Reservoir
  - Santa Gertrudis Creek
    - Tucalota Creek
    - Lake Skinner
  - Temecula Creek (Hydrologic Unit Basin Number 2.92)
    - Iron Spring Canyon
  - Temecula Creek (Hydrologic Unit Basin Number 2.84)
    - Tule Creek
      - Million Dollar Canyon
    - Cottonwood Creek
  - Vail Lake
    - Wilson Creek
      - Cahuilla Creek (Hydrologic Unit Basin Number 2.73)
        - Hamilton Creek
      - Cahuilla Creek (Hydrologic Unit Basin Number 2.71)
        - Elder Creek
    - Arroyo Seco Creek
    - Kolb Creek
  - Temecula Creek (Hydrologic Unit Basin Number 2.52)
    - Pechanga Creek
- Santa Margarita River (Hydrologic Unit Basin Number 2.21)
  - DeLuz Creek

4.4.1 Beneficial Uses

The upper Santa Margarita River watershed supports a variety of ecosystems and provides many Beneficial Uses (Table 4)[18]. The ultimate goal of the Riverside County DAMP and the Watershed and Individual SWMPs is to manage Urban Runoff in a manner protective of the Beneficial Uses of these Receiving Waters.

Table 4. Beneficial Uses of Receiving Waters
Upper Santa Margarita River Watershed

Beneficial Use	Murrieta Creek	Cole Canyon	Warm Springs Creek	Santa Gertrudis Creek	Long Valley	Temecula Creek	Santa Margarita River
Municipal and Domestic Supply	X	X	X	X	X	X	X
Agricultural Supply	X	X	X	X	X	X	X
Industrial Service Supply	X	X	X	X	X	X	X
Industrial Process Supply	X	X	X	X	X	X	
Ground Water Recharge	X					X	
Contact Water Recreation				X	X	X	X
Non-contact Water Recreation	X	X	X	X	X	X	X
Warm Freshwater Habitat	X	X	X	X	X	X	X
Cold Freshwater Habitat							X
Wildlife Habitat	X	X	X	X	X	X	X
Rare, Threatened or Endangered Species							X

4.4.2 Current Water Quality Concerns and Issues

Urban Runoff discharged to MS4s in Riverside County ultimately flows to various surface water bodies (inland streams, lakes, and reservoirs) and typically carries Pollutants that originate from numerous dispersed and uncontrolled sources. Examples of Pollutants that may be present in Urban Runoff are fertilizer, heavy metals, nutrients, petroleum products, sediment, bacteria, chemicals, and litter.

Because the upper Santa Margarita River watershed is large and has many land uses, the water quality concerns in sub-watersheds vary. However, each land use can potentially contribute Pollutants to nearby streams, rivers, and lakes. The infrastructure that supports people's activities (e.g., roads, parks, MS4, and wastewater collection and treatment facilities) may contribute to water quality concerns if not properly managed. Other sources of stormwater runoff, including agricultural areas, are exempt from the requirements of the NPDES permitting program established under the Clean Water Act. In addition, some Pollutants, such as total suspended solids, may be found at elevated levels in runoff from non-urban land uses. Further, certain activities that generate Pollutants present in Urban Runoff are beyond the ability of the Permittees to eliminate. Examples of these include operation of internal combustion engines, atmospheric deposition, brake pad wear, tire wear, residues from lawful application of pesticides, nutrient runoff from agricultural activities, and leaching of naturally occurring minerals from local geography.

[18] www.waterboards.ca.gov/rwqcb9/programs/

As required by Section 303(d) of the Clean Water Act, the State Board maintains a list all waters in the State that do not meet the Water Quality Standards established in the Basin Plans prepared by the Regional Boards for protection of Beneficial Uses. This list, referred to as the "303(d) List," details the Pollutant or stressor on each named water body, the potential source of Pollution, estimated affected area, as well as a priority for development of the associated TMDL. A TMDL is a plan that identifies how much Pollutant load a specific Impaired Waterbody can sustain without impacts to its Beneficial Uses. In addition to identifying the maximum Pollutant load, a TMDL is used to develop implementation plans to meet Water Quality Standards for a designated water body. Table 5 summarizes the 2006 303(d) List of Impaired Waterbodies within the upper Santa Margarita River watershed, as well as the year in which a TMDL is proposed for approval. No TMDLs have been established for Receiving Waters in the upper Santa Margarita River watershed.

Table 5. 2006 303(d) Listings for the Santa Margarita Region

Water Body	Pollutant	Potential Sources	Area Affected	Proposed TMDL Completion
Santa Margarita River (Upper)	Phosphorus	Urban runoff/storm sewers Unknown nonpoint source Unknown point source	18 miles	2019
Murrieta Creek	Iron Manganese Nitrogen Phosphorous	Source unknown Source unknown Source unknown Urban runoff/storm sewers Unknown nonpoint source Unknown point source	12 miles 12 miles 12 miles 12 miles	2019 2019 2019 2019
Temecula Creek	Nitrogen Phosphorus Total dissolved solids	Source unknown Source unknown	44 miles 44 miles	2019 2019

Table G-35 of Appendix G to the Annual Report 2007-2008 additionally identifies pyrethroid pesticides (bifenthrin and permethrin), bacteria (E. coli and fecal coliform), lead, and sediment (turbidity) as Pollutants of Concern in the upper Santa Margarita River watershed that warrant focused attention by Permittee implementation programs. These constituents have been detected intermittently or persistently at Triad and Tributary monitoring stations.

4.5 Municipal Separate Storm Sewer System

A map depicting the MS4 facilities owned and operated by the Permittees is provided in Appendix B.

5.0 Program Evaluation Based on Water Quality Trends

The overall effectiveness of the Permittees programs is assessed based on the analysis of water quality data obtained as part of the Consolidated Monitoring Program. Approximately 14 years of data have been collected through this program and have been cumulatively analyzed in the fourth-year monitoring Annual Report.

5.1 Inherent Limitations to Analyzing Water Quality Data

There are inherent limitations to analyzing water quality data from storm water. Storm water runoff is very different from mechanical wastewater or water treatment processes that usually incorporate water quality monitoring. Discharges from mechanical processes such as treated wastewater effluent and industrial discharges usually:

- Come from a single or a few readily identifiable sources;
- Are generally consistent in flow rate and chemical character from day to day; and
- Can be easily instrumented.

Conversely, Urban Runoff non-point source flows, such as those collected and analyzed as part of the MS4 Permit monitoring programs usually:

- Come from multitudes of unidentifiable or hidden sources, many of which are non-Urban in nature:
  - State, federal or tribal lands
  - Natural leaching of soils
  - Wildlife
  - Aerial deposition
  - Wildfires
- Vary widely in flow rate in response to precipitation events
- Vary widely in chemical character at any given moment due to:
  - Unidentified episodic issues related to natural phenomena
  - Magnitude of rainfall and extent of contributing area
  - Potential one-time illicit discharges that were not identified at the time of sampling
  - Unforeseen or unidentified consequences of changes in numerous land use policies (fire management, development, etc)
- Are subject to significant natural random variation; and
- Cannot be easily instrumented due to the wide variation in depth and velocity and associated impacts of natural or unnatural aggradation and degredation of natural stream beds.

Because ephemeral storm water flows are, by their very nature, particularly random in character, it may take many years before monitoring data trends can be detected or to determine the effectiveness of an

Urban Runoff control measure. Power analyses were conducted for fecal coliform, metals, and nutrients at the stations monitored in the Santa Ana Region during the 2005/06 reporting period. Power analysis is used to determine how many years of monitoring would be required to detect a given trend in the data. This tool was developed by the SCCWRP. Based on the results, for biennial monitoring, and having an 80 percent chance of detecting a change in concentration, it would take about 5-10 years of data collection to detect a change of 50 percent in concentration, 10-15 years of data to detect a 25 percent change, and 15-30+ years of data to detect a 10 percent change. It is expected that results would be similar for other parameters measured in the monitoring program in the Santa Margarita Region.

5.2 Focus Area Constituents of Concern

During the 2004 MS4 Permit term, monitoring data indicated that one or more receiving water samples have been found to contain the following constituents at levels that exceeded Basin Plan Objectives (BPO). As such they have been identified as constituents of concern.

- Nutrients (Ammonia as N, Phosphorus
- Pyrethroid Pesticides (Permethrin, Bifenthrin)
- Pathogen Indicators (E.coli, Fecal Coliform)
- Lead
- Turbidity (lab)

5.3 Analysis of Water Quality Trends

As discussed in the 2008 Santa Margarita Region Annual Monitoring Report, the results of the trend analysis and regression calculations indicate that there are no statistically significant trends in the water quality monitoring data. The lack of trends in the data presented in the Annual Monitoring Report contrasts with the rapid population growth over the same time frame. As discussed in the Annual Monitoring Report, population growth from 1990 to 2008 was approximately 300 percent for the Santa Margarita Region. This significant growth in population and resulting urban land use area contrasts sharply with the lack of statistically significant increases in concentrations of constituents of concern that would otherwise be expected in stormwater runoff from urbanized areas.

These results demonstrate and can be attributed to the effectiveness of the Permittees' programs at addressing the Focus Area Constituents of Concern, which are targeted and designed to prevent the discharge of these constituents into the Receiving Waters.

5.3.1 Recommended Compliance Program Modifications to Address Focus Area Constituents of Concern

Based on the analysis described above and in Appendix G of the 2008 Watershed Annual Report, no significant program modifications are necessary to continue to protect and improve the quality of the Receiving Waters.

Although the Permittees programs have been shown to be protective of Receiving Water quality, through continual evaluation of the programs being implemented and on-going water quality monitoring, additional measures are being proposed as part of this ROWD to address changing conditions and ensure

the ongoing effectiveness of the programs. Recommended changes to ensure the ongoing effectiveness of the Permittees programs are described in Sections 6 and 7 of this report.

6.0 Evaluation and Recommendations for Regionally Implemented Programs

6.1 Program Management

The District is the Principal Permittee for each of the three MS4 permits issued by the three Regional Boards that have jurisdiction in Riverside County. As Principal Permittee, the District performs management functions including coordination with the Regional Boards, preparation of compliance documents and Annual Reports, participation in studies and external cooperative efforts and dissemination of information to the Permittees. The Permittees implement some compliance programs that are common to all of the Permittees and which are implemented on a Countywide or regional basis to increase cost effectiveness and efficiency. Typically, the District also manages Countywide and regional programs.

6.1.1 Program Management Accomplishments and Programmatic Improvements

During the term of the 2004 MS4 Permit the following accomplishments were achieved.

- Updated the Implementation Agreement that sets forth the responsibilities of the Principal Permittee and the Co-Permittees.
- Revised the Riverside County DAMP to reflect requirements in the 2004 MS4 Permit, which served as a model document for the Permittees Watershed and Individual SWMPs.
- Developed Santa Margarita Region Watershed SWMP
- Participated in the Santa Margarita River Executive Management Team (SMREMT) to identify and address the highest priority water quality concerns in the Santa Margarita watershed, including development of a watershed model to assist with land use planning and TMDL development, coordinating watershed monitoring, and developing formal agreements between interested stakeholders for the purposes of evaluating impairment listing and data gaps in the watershed.
- Continued progress with the SMREMT on a uniform watershed plan and model for the Santa Margarita Watershed through the Santa Margarita Watershed Supply Augmentation, Water Quality Protection, and Environmental Enhancement Program.
- Participated in the Santa Margarita Lagoon TMDL workgroup in funding and overseeing the development of a comprehensive program to collect data and model the various inputs to the lagoon to be used to develop a TMDL to address nutrients.
- Participated in the Santa Margarita Watershed Water Quality Monitoring Group to coordinate the monitoring efforts of various stakeholders in the Santa Margarita watershed.
- Participated in the SMC to improve stormwater monitoring science, coordinate data collection efforts, and evaluate the effects of stormwater discharges to receiving waters specific to Southern California.
- Participated actively in various efforts of CASQA.

- Participated in the completion of an Integrated Regional Water Management Plan for the upper Santa Margarita Watershed to help pave the way for greater watershed-wide coordination and management of water resources within the upper watershed as a whole, as well as adjoining watershed and regional planning efforts.
- Participated in the development and implementation of the MSHCP for Western Riverside County which contains a comprehensive land use plan that ultimately conserves the environmental resources and habitat of approximately half of the Santa Margarita Region.
- Participated in the development of a Special Area Management Plan (SAMP) to further manage receiving waters at a watershed scale for the upper Santa Margarita Watershed by identifying, prioritizing and protecting the highest priority Waters of the U.S., while considering the broader needs of growth and transportation improvements.
- Developed and updated methods to track program effectiveness such as resident surveys, tracking hotline inquiries, and web counters.
- Enhanced Public Education program through development of new outreach materials and programs.

6.1.2 Proposed Revisions to Regional Program Management

6.1.2.1 Enhanced Program Effectiveness Assessments and Municipal Action Levels

To ensure that the Permittee's programs continue to be effective at managing the effects of Urban Runoff on Receiving Water quality, the Permittees will revise the Program Effectiveness Assessments for both the Individual SWMP and the Watershed SWMP as part of their implementation of the new MS4 Permit. An assessment strategy based on the CASQA Municipal Stormwater Program Effectiveness Assessment Guidance has been established including the establishment of:

- Measurable goals for each component,
- Measurable metrics to assess progress toward those goals,
- CASQA Effectiveness Levels for each metric; to indicate the level at which each metric can demonstrate the effectiveness of the Permittee's programs at addressing each goal.
- Timeframes in which the Permittees expect to be able to assess effectiveness using each metric.
- Municipal Action Levels (MALs) for appropriate metrics to ensure a minimum level of program implementation and identify shortcomings that could affect the Permittee's progress toward the established goals. The MALs would not be permit compliance measures, but triggers for further Permittee evaluation of the affected compliance program.

If a MAL for a metric is exceeded, the Permittees will review implementation of that program component to identify the cause of the exceedance and identify needed adjustments to avoid future exceedances. The findings of these reviews and any recommended adjustments to the Permittees programs will be reported in the corresponding section of the Annual Report submitted the following year. Further research is particularly needed to establish appropriate Municipal Action Levels for the various program areas.

After a review of the stormwater program, the Permittees have established an initial Assessment Methodology for each component including preliminary goals, measurable metrics, effectiveness levels,

timeframes and MALs for each. These initial assessment methodologies are included in tabular format in Appendix C. Although the Permittees believe the basic proposal is viable, The Permittees will review and finalize these Assessment Methodologies and associated metrics within one year following adoption of the new MS4 Permit as additional data and analysis is necessary to support specific action levels.

6.1.2.2 Revised Reporting Format

The Permittees recommend substantial revisions to the MS4 Permit requirements for the layout of the Annual Report. The Permit requires substantial duplication of reporting, which either increases the volume of the Annual Report, or requires substantial cross-referencing. In either case, it is confusing to write, and most likely, confusing to read. The Permittees recommend a meeting with Regional Board staff in the development of the new MS4 Permit to discuss methods to streamline and clarify reporting requirements.

6.1.2.3 Maintain Enhanced Watershed / MS4 Map

The Permittees are in the process of collecting data to support an enhanced MS4 facilities map. Updates completed to date are provided in the map in Appendix B. This enhanced map demonstrates initial efforts to identify the locations of:

- Receiving Waters
- MS4 facilities
- Areas of historical perennial flows
- Known blow off locations
- Wastewater storage ponds
- Sub-drainage areas
- Known non-Permittee facilities
- 36-inch diameter and larger outfalls

This map will be used to help in the tracking of IC/ID events and issues and continued updates will be submitted with the Annual Reports. The Permittees will continue to enhance this map over the next MS4 Permit term. As described in the Annual Report, the District is in the process of upgrading their web page that offers public access the District's various NPDES activities. Along with these web site upgrades, additional layers will be added to the Web-based GIS map.

6.1.2.4 Elimination of the Watershed SWMP as a separate compliance document from the Riverside County DAMP

The Santa Margarita Region is comprised of only a single watershed. Further, the Permittees' regional compliance programs are described in the Riverside County DAMP. Maintenance of a separate and duplicative Watershed SWMP is confusing, cumbersome, and does not contribute to protection of Receiving Water quality. The Permittees request that the next MS4 Permit be drafted in a fashion that allows the Permittees to maintain the Riverside County DAMP as the primary document describing regional compliance programs for western Riverside County including the Santa Margarita Region. Any

necessary changes for requirements included in the new MS4 Permit will be updated /added to the Riverside County DAMP.

6.2 Permittee Training Programs

6.2.1 Summary

The Permittees jointly fund comprehensive training and education programs for Permittee staff. These training programs are designed to train Permittee employees on the proper use and implementation of BMPs appropriate for their field of work. There are four distinct training courses currently offered including Construction Inspection, Municipal Maintenance, Industrial-Commercial Facility Inspection, and New Development Planning.

6.2.2 NPDES Training Program Accomplishments and Programmatic Improvements

- Evaluated and tested various knowledge retention methods.
- Performed Training Enhancement Analysis study (2005-2006)
- Created an on-line training registration web page where attendees can also obtain training materials.
- Annually updated training materials to address Pollutants of Concern (2005-2007)
- Added component to training to address proper use, application and timing of application of Pesticides (2007-2008)
- Began developing a formalized testing and effectiveness analysis approach (2008)

Highlights
Municipal Training: **14** Training Sessions; **900** Attendees
Construction Training: **22** Training Sessions; **626** Attendees
Industrial-Commercial Training: **11** Training Sessions; 426 Attendees
New Development Training: **13** Training Sessions; **345** Attendees

6.2.3 Long-Term Effectiveness Assessment

Throughout the term of the 2004 MS4 Permit the Permittees have evaluated and implemented various quizzes as part of the NPDES training courses. These efforts were intended to assess the retention of knowledge of the attendees and, as described in Provision K.2.m of the Watershed SWMP, serve as a component of the assessment of the long term effectiveness of the Watershed SWMP.

The quizzes used to assess employees' retention of knowledge have evolved over time as the Permittees found what worked and what did not. Quiz questions that were found to be confusing or misleading were refined or eliminated. Thus, a question-by-question analysis of the results is not possible. Instead, results from a number of the training courses with reasonably comparable quizzes were aggregated and an average score (percent correct) was established for each of these training sessions. The results of this analysis are presented in Figure 5.

Figure 5. Training Pre-Test and Post-Test Analysis

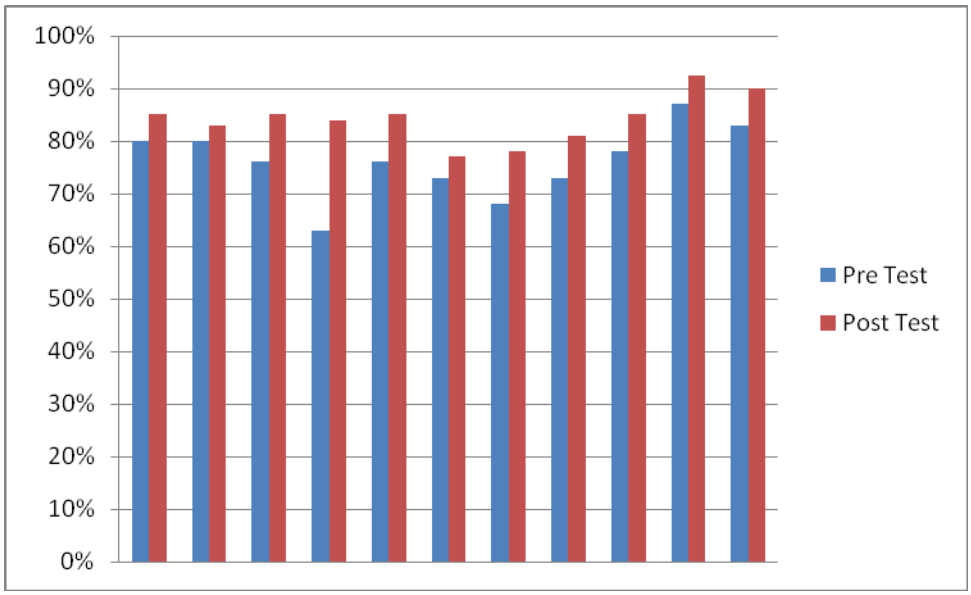

Although the required random-sample nature of this analysis is not conducive to the analysis of trends across time, two findings become evident from this analysis:

1. Permittee inspection, maintenance and planning staff generally have a high level of understanding of issues related to stormwater Pollution in their field of work.
2. Average scores on quizzes administered after the training sessions were always higher than scores on quizzes administered before the training session.

Finding 1 above can be attributed to the Permittee's proactive efforts to ensure that their employees are aware of the issues in their field of work that could contribute to stormwater Pollution. This includes annual attendance at the NPDES training courses, and on-the-job training, reminders and meetings. This fact alone is a strong indicator of the effectiveness of the Permittees training programs.

Finding 2 above demonstrates that after attending the NPDES training courses, the attendees have a higher level of understanding of the issues in their field of work related to stormwater Pollution. This indicates that the training materials, delivery and content were effective.

Based on these analyses, general feedback from the training programs, and the overall effectiveness of the Permittees' programs (as described in Section 5.3 herein) the Permittees believe their training programs to be effective. Nevertheless, the following revisions to the training programs have been identified and are proposed for implementation with the new permit to ensure ongoing effectiveness.

6.2.4 Proposed Revisions

6.2.4.1 Continued focus on Focus Area Pollutants of Concern

The Permittees commit to continue to revise the Permittee training programs to focus on Pollutants of Concern.

6.2.4.2 Standardized Effectiveness Quizzes

Over the course of the 2004 MS4 Permit, the Permittees have evaluated various methods of assessing the retention of knowledge and are now recommending a standardized approach to assessing the effectiveness of the training program.

The Permittees plan to create standardized quizzes to assess the retention of knowledge and increased understanding as a result of the Permittees' training sessions. This includes establishing core messages that the Permittees want to impart upon the attendees and, creating clear and understandable quiz questions for each core message.

This approach will help the Permittees identify if any core training messages are not being retained by attendees and to subsequently modify the training. The Permittees also hope that this approach will yield results that will, over time, demonstrate that the knowledge among Permittee staff of issues related to storm water Pollution is increasing, thus clearly demonstrating that the NPDES Training program is effective.

As a necessary part of this effort, a database to track responses will also be created.

6.2.4.3 Attendance Tracking Mechanism

At each training session a sign-in sheet is provided to track attendance to the session. Included in the sign-in sheet is an indication of the Permittee that each attendee is representing. After each training session, these sign-in sheets are scanned to PDF files and sent to each Permittee for their records. This approach requires that each Permittee manually review the sign-in sheets to determine who and how many of their staff attended the training.

The District, on behalf of the Permittees, is currently investigating various form scanning and recognition software packages to determine the feasibility of creating a sign-in sheet that, when scanned, will automatically transfer the attendance list into a database. This would facilitate tracking of staff attendance by each Permittee. At this time the District has not determined if a feasible and cost efficient program is available that will accomplish their needs.

6.3 Public Education

6.3.1 Summary

To leverage finite resources, the Permittees jointly fund a public education program. The District implements this program to disseminate information about Urban Runoff issues and to provide education on how activities may impact Receiving Waters.

The Permittees have established an ongoing watershed-based public education and outreach program known as the **Only Rain Down the Storm Drain** Pollution Prevention Program. The specific objectives of this program include:

- Fostering a broad public awareness of water Pollution concerns;
- Increasing public acceptance of Pollution Prevention activities to curtail everyday human behaviors that contribute to water quality problems;
- Educating/informing the general public, regulators and key local government and state decision makers on Urban Runoff conditions in Riverside County; and
- Promoting stewardship of local water resources.

The **Only Rain Down the Storm Drain** Program implements the public awareness objectives by focusing on three areas of Pollutant reduction/prevention:

- Public behavior;
- Proper management of Pollutants; and
- Business specific education outreach.

In addition, when attempting to make use of the finite resources available to the Public Education Program, the Permittees use these management goals to ensure that resources are used effectively:

- Focusing on Pollutants of Concern specific to each watershed region;
- Coordinating public education efforts with adjacent storm water management programs and other related education programs to share resources, coordinate outreach efforts, and avoid duplication of effort; and
- Adapt public education programs and objectives, based on effectiveness analysis, to address changing MS4 program requirements and objectives.

6.3.2 Public Education Program Accomplishments and Programmatic Improvements

The Public Education Program has developed and distributed the following educational materials during the 2004 MS4 Permit term:

- *After the Storm* – a citizen's guide to understanding MS4 Pollution in your neighborhood or when performing daily activities.
- *Automotive Maintenance & Car Care* – guidelines for keeping your auto shop or retail fuel facility in environmental shape.

- *Outdoor Cleaning Activities* – guideline for outdoor cleaning activities and wastewater disposal.
- *Pools, Spas and Fountains* –Environmental maintenance suggestions for pool, spa, and fountain owners.
- *What's the Scoop* – tips for a healthy pet and a healthier environment.
- *Household Hazardous Waste* – A schedule of collection locations for proper disposal of HHW.
- *Stormwater Pollution Found in Your Neighborhood* – door hanger.
- *Equestrian Management* – Recommendations for BMPs related to equestrian activities.
- *Spray Bottles* – Including directions to make environmental friendly recipes for pest control and household cleaning

The Permittees also initiated development of the following outreach materials

- *Landscaping and Gardening Brochure* – Initiated development a new brochure to address outdoor residential landscaping and gardening activities.
- *Septic System Management Brochure* – initiated development of a brochure to assist with septic system management.

In addition to the information provided on the Storm Water Protection website, the Public Education and Outreach Program has:

- Updated the Public Education and Outreach Program web page.
- Tested and/or implemented several new Public Education and Outreach Program effectiveness tracking mechanisms including call tracking, web counters, testing, and bilingual surveys.
- Enhanced the toll free storm water Pollution reporting hot line to include public education information and support for the public and other interested stakeholders.
- Obtained a trailer with "**Only Rain Down the Storm Drain**" graphics specifically designed for transporting materials to outreach events. It is also used as part of the booth at outreach events.
- Initiated billboard advertising within the Santa Margarita Region.
- Worked with the Mission Resource Conservation District to implement presentations to elementary and middle schools and staff to raise public awareness of Urban Runoff management issues and source control methods and to encourage volunteers, partners, and groups to gather annually for a trash and debris clean-up day in the Santa Margarita Region.
- Developed special newspaper and billing inserts, fliers and advertisements to raise public awareness of Urban Runoff management issues and source control methods. A radio advertising campaign was also developed and implemented for a time.
- Developed and presented workshops regarding household hazardous waste use and proper disposal at major home improvement stores throughout Riverside County.
- Placed advertisements in the Penny Saver and Bargain Bulletin to raise public awareness of Urban Runoff management.

- In cooperation with certain County Service Areas or other programs, pet waste signs with bag dispensers have been installed at various parks to help encourage the proper disposal of animal waste.
- Cooperated with the Western Riverside Council of Government in the Used Oil Block Cycle Grant that decreases the amount of illegally dumped motor oil by promoting the addition of new Certified Oil Collection Centers.
- Established a partnership with County Environmental Health whereby businesses cited by Environmental Health for violations of ordinances related to stormwater issues may be allowed to implement a Supplemental Environmental Project in conjunction with the **Only Rain Down the Storm Drain** program.

6.3.3 Long-Term Effectiveness Assessment

Effectiveness metrics of the Public Education and Outreach Program during the 2004 MS4 Permit term are presented in Section J.1.3 of the FY 2007/2008 Watershed Annual Report. The data indicates that overall impressions have continually exceeded the number of residents in the watershed, HHW/ABOP pounds of waste collected and pounds of waste collected per person have steadily increased over the term of the 2004 MS4 Permit.

In 2005, the **Only Rain Down the Storm Drain** program developed and implemented a survey to be distributed at Public Outreach events to assess the public's level of knowledge related to stormwater Pollution. This original "long" survey contained 13 questions in both English and Spanish as shown in Figure 6.

This survey was used for fiscal years 2005-06 and 2006-07. Through this period of implementation it was found that the survey took too much time to complete and reduced the level of response from event attendees. Therefore, the survey was subsequently revised to a shorter version with revised questions for the 2007-08 fiscal year. The revised "Short" survey that is currently used is shown in Figure 7.

Figure 6. Original "Long" Survey Utilized at Public Outreach Events

Zip Code_____ Age_____ Sex F__ M__ Date:_____

THINK YOU KNOW ABOUT STORM DRAIN POLLUTION PREVENTION?

1. Where do you think **storm drain** contents go or flow to? __Treatment Plant __Streams, rivers & lakes

2. Where do you think **sewer pipes** contents go or flow to? __Treatment Plant __Streams, rivers & lakes

3. Are storm drains and sewers part of the same or separate systems? __Same __Separate __Don't know

4. Have you ever been to a Household Hazardous Waste **(HHW)** Collection Event? __Yes __No

5. Did you know that **A.B.O.P.** Antifreeze, Batteries, Oil, and Latex Paint locations and mobile **HHW** Collection Events provide safe havens for the disposal of pollutants? __Yes __No

6. If you have a lawn or garden, where do you (or your gardener) dispose of the green waste (grass, clippings or other)? **(Check all that apply)**

   ☐Trash/garbage ☐Compost/Mulch pile ☐Take to compost facility
   ☐Leave on lawn ☐Removed by gardener ☐Other:_____

7. Where is the best location to wash your vehicles?
   (Check only one)

   ☐Pavement (driveway, street) ☐Dirt Area
   ☐Lawn or Grass ☐Other_____

8. Do you change the motor oil in your vehicle yourself? __Yes __No

   If **Yes**, where do you dispose of it? **(Check all that apply)**

   __in the garbage __at a curbside collection program
   __down the storm drain __collection center (Jiffy Lube, Kragen, etc.)
   __pour it on the ground __Other_____

9. If you have a pet, how often do you pick up after your pet?
   9. a) in your yard? 9. b) when you walk the pet?

   ☐Always ☐Sometimes ☐Never ☐Always ☐Sometimes ☐Never

10. Do you think, anything ,other than rainwater, that flows into the storm drains (i.e., trash, chemicals, pet waste, etc.) considered a pollutant? __Yes __No

11. Have you seen or heard the slogans "Only Rain Down the Drain" or "Only Rain Down the Storm Drain"?
    __Yes __No If yes, where? __Radio __Newspaper __ Flier __Billboard __Street Fair, Festival, etc.

12. Are there State laws and local ordinances which STRICTLY PROHIBIT the dumping of pollutants **(EVERYTHING, EXCEPT RAIN WATER)** into the storm drain systems or waterways? ___Yes ___No

13. After this booth visit, have you increased your understanding of storm drain pollution prevention? __Yes __No

Thank you for your time and input... Remember, YOU can do your part by calling our Toll Free Line (1-800-506-2555) to report illegal storm drain pollutant disposal anywhere in Riverside County, or to get more information about storm drain pollution protection to help promote "ONLY RAIN DOWN THE STORM DRAIN".

Figure 7. Revised "Short" Survey Utilized at Public Outreach Events

DO YOU KNOW HOW TO PROTECT OUR STREAMS, RIVERS and LAKES?

City_____ Zip Code_____ Age_____ Sex □ F □ M Date: _____

1) Water that leaves your lawn from **Irrigation (water sprinklers), Car washing** and **Rain** flows down streets and/or storm drains and then directly to…

☐ Sewage Treatment Plants ☐ Streams, rivers & lakes

2) Which of the following can LEGALLY be disposed into the storm drain? (*Circle all that apply*)

- **Useable Household Chemicals**
- **Yard waste/clippings/leaves**
- **Paint**
- **Cigarette butts**
- **Empty Household Chemicals containers**
- **Pet Waste**
- **Motor Oil / antifreeze**
- **None of these**

3) Do you feel you are well informed and aware of illegal dumping into the storm drain and its impact in your community or streams, rivers and lakes?

☐ Yes ☐ No

HOW DID YOU DO?

1) Water that leaves your lawn from irrigation, washing your car, or rainwater runoff can pickup motor oil and grease from vehicles, excess fertilizer from your lawn, bacteria from pet waste, and excess pesticides from your yard. These pollutants can be carried down streets and storm drains directly to our streams, lakes, and rivers without treatment! That is why we must take care to properly dispose of waste, maintain our vehicles, and use fertilizers, pesticides and other chemicals only as specified on their labels.

2) It is illegal to dispose of any chemical, constituent or waste into a storm drain! Report illegal disposal of chemicals, constituents, or waste to storm drains at **1(800) 506-2555.** You may properly dispose of many of the wastes listed above by doing the following things:

- **Usable and empty household chemicals, paint, motor oil** – Properly dispose these at Household Hazardous Waste and/or Antifreeze, Batteries, Oil and Paint disposal facilities and events. Call **1 (800) 506-2555** for information on disposal locations and special drop off events near you.
- **Pet waste** – Carefully pick up and dispose in the nearest trash receptacle.
- **Grass, clippings, leaves and yard waste** – Collect and dispose in green waste bins or composting areas that are designed to prevent the compost from mixing with excess irrigation water and/or rainwater runoff.

3) Would you like to learn more about protecting our streams, rivers and lakes or wish to report on a illegal storm drain disposal in your area or request a classroom or group demonstration……

Visit www.rcflood.org or call 1 (800) 506-2555.

ONLY RAIN DOWN THE STORM DRAIN

Remember…Only Rain Down the Storm Drain!

Results have been tabulated for all of the "Long" surveys received and they have been analyzed to determine trends in public awareness. The "Short" survey has been used at two events to date, one of which was quite recent and its results have not yet been tabulated. Using the "Long" survey results, nine questions were used to assess any trends in public awareness. The remaining questions were determined to be either confusing or not applicable to the intent of the assessment. The results of this assessment of survey results are shown in Figure 8.

Figure 8. Assessment of Survey Results (2005-06 vs. 2006-07)

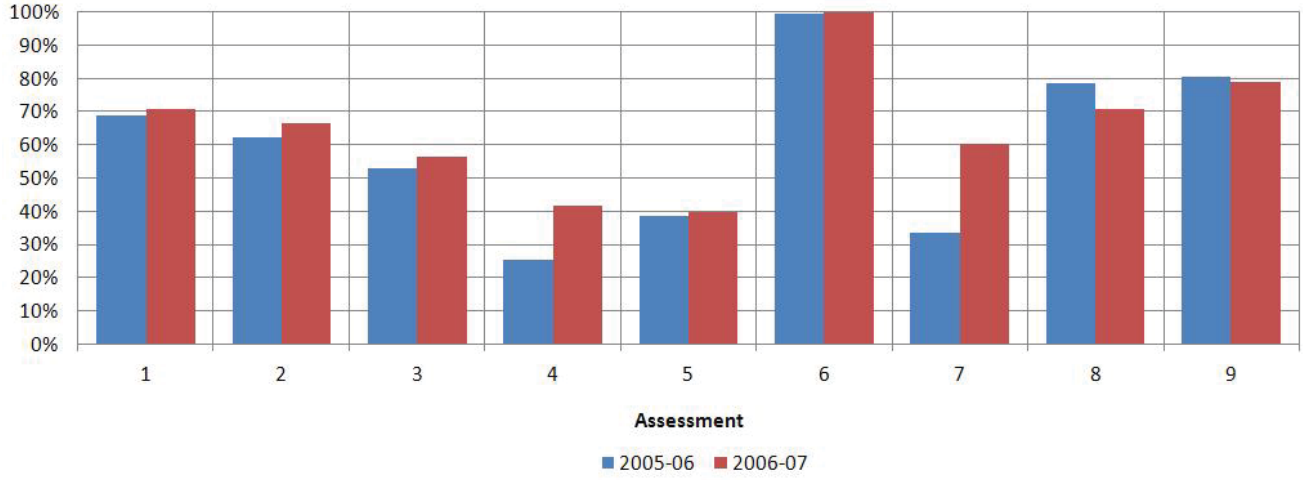

The results shown in the chart in Figure 8 are percent of survey takers that responded as described below:

- Assessment 1: Percent of respondents that understood that storm drains do not go to treatment plants.
- Assessment 2: Percent of respondents that understood that sewer lines go to treatment plants.
- Assessment 3: Percent of respondents that understood that sanitary sewers and storm drains are separate systems.
- Assessment 4: Percent of respondents that had attended a Household Hazardous Waste collection event.
- Assessment 5: Percent of respondents that understood that the best place to wash a car is on the lawn or grass.
- Assessment 6: Percent of respondents that change their own oil that reported that they properly dispose of it.
- Assessment 7: Percent of respondents that have heard of the "Only Rain Down the Storm Drain" program.
- Assessment 8: Percent of respondents that dumping of anything except storm water is a violation of laws and ordinances.
- Assessment 9: Percent of respondents that felt that visiting the Outreach Booth at the event increased their understanding of storm drain Pollution Prevention.

Although implementation of the "Long" survey was limited before it was modified to its current form, the results available do indicate an increase in understanding of these basic principles and can be attributed to the effectiveness of the Permittee's Public Education program. As additional survey results are collected and tabulated, further analysis will be performed to ensure the ongoing effectiveness of the program.

6.3.4 Proposed Revisions

To better address residential sources of pesticides, the Permittees are proposing to coordinate with the University of California Extension Program to enhance the implementation of the U.C. Extension's Master Gardener program in the Santa Margarita Region. Along with information regarding use of drought tolerant landscaping techniques and appropriate methods of fertilizer and irrigation application, the U.C. Master Gardeners also provide residents with information on integrated pest management techniques that minimize pesticide application. The Permittees are proposing to establish an agreement with the U.C. Extension's Master Gardener program in fiscal year 2010-2011 to support master gardener hotline staffing, local presentation and other outreach by the U.C. Master Gardeners.

In addition, through the Permittee's ongoing efforts to internally assess the efficiency and efficacy of their MS4 compliance programs, it was determined that an overhaul of the District's web site was needed. The District's web site contains the public education web site and a technical resource site with the various compliance documents for the program. It was found that information available through the site was often difficult to find and was not user friendly and sometimes was out of date. The Permittees are now reviewing this site to identify and implement needed changes

6.4 Receiving Water Monitoring Program

6.4.1 Summary

A Summary of the Monitoring Program is contained in Appendix G of the Watershed Monitoring Report.

6.4.2 Monitoring Program Accomplishments and Programmatic Improvements

The Monitoring Program accomplished the following goals during the term of the 2004 MS4 Permit:

- Subcontracted monitoring data collection and analysis to MACTEC, Inc. to enhance data collection and reporting capabilities.
- Developed and implemented a Triad Monitoring Program (bioassessment, Toxicity and chemical monitoring) consistent with the goals of the SMC Model Monitoring Program
- Developed watershed boundaries and land use information for all monitoring stations
- Updated the format and technical content of the monitoring Annual Report
- Added fire map information to assist with assessing potential Pollutant sources
- Enhanced monitoring data databases to be compatible with SCCWRP/SMC standard reporting protocols.
- Enhanced monitoring methods to incorporate use of automatic sampling equipment where appropriate

- Conducted several Toxicity Identification Evaluations that led to the identification of pyrethroid pesticides as a cause of wet weather Toxicity in Murrieta and Temecula Creeks and a Toxicity Reduction Evaluation that identified additional BMPs necessary to control sources of pyrethroid pesticides.
- Coordination with the CASQA Pesticide Committee on comments and presentations to California Department of Pesticide Regulation, UC Riverside and others regarding the impacts of pyrethroid pesticides and the need to change regulatory requirements regarding the use of pyrethroid pesticides.
- Participation in or coordination of several BMP studies, including coordination of new development BMP treatment studies (as required by conditions of approval) and the District's LID BMP Demonstration and Testing Facility.
- Continued to update and enhance the Consolidated Monitoring Program to incorporate new monitoring collection methods and data analysis protocols.

6.4.2.1 Participation in Regional Monitoring Efforts

- Participation in the monitoring programs to support development of the Santa Margarita Lagoon TMDL.
- Continued participation in regional and statewide Monitoring and Science efforts such as the Southern California Monitoring Committee to develop:
  - Lab inter-calibration of chemical, bioassessment and Toxicity testing methods
  - Testing methods for bioassessment and Toxicity in Southern California streams
  - Bacterial Reference Watershed Study
  - A storm water research needs report for southern California
- Partnered with SCCWRP on developing hydromodification guidance for Southern California including participation in a series of hydromodification workshops for a CASQA conference.
- Coordination with SCCWRP on the development of the Regional Watershed Monitoring Program for Southern California.

6.4.3 Effectiveness Assessment

The Watershed Monitoring Program was evaluated as part of the Regional Board audits in 2007-2008. As a result of those audits several enhancements were made to the monitoring program, including update of constituent lists, subcontracting of data collection to a monitoring consultant with automatic sampling capabilities, and updates to the Consolidated Monitoring Program and Monitoring Annual Report formats. The Permittees believe that as a result of these changes, the overall monitoring program is effective. However, the revisions presented in section 6.4.4 are recommended to increase monitoring data utility or overall program effectiveness.

6.4.4 Proposed Revisions to Monitoring Program

In updating the Monitoring and Reporting Program, the Permittees request that Regional Board staff meet with them to discuss the following proposed modifications to the monitoring program:

6.4.4.1 Revise Dry Weather Monitoring Program

As noted in Section G.7 (Special Studies) of Appendix G of the FY 2007-2008 Watershed Monitoring Annual Report, the Permittees participated in a SMC Study to develop a regional approach to watershed assessment. The Permittees, in conjunction with Regional Board staff, committed to participating in the resulting watershed monitoring program. The Permittees agreed to monitor three rotating dry weather stations identified for the Santa Margarita Region. Additionally, three stations are to be collected by Regional Board (or SCCWRP staff) using SWAMP funds, and the remaining three will be located in the Santa Ana Watershed region of Riverside County. In exchange for the commitment to participate in the program, the Regional Board staff agreed to reduce the current dry weather monitoring requirements in the new MS4 Permit from two (2) events annually to (1) event annually for each Triad monitoring stations. This would effectively eliminate three existing dry weather samples. The Permittees recommend a meeting with Regional Board staff to discuss these options prior to the release of the draft Permit.

6.4.4.2 Clarify Analyte List

As described in Section G-8.1.5 of the 2008 Monitoring Report (Appendix G of the FY 2007/2008 Watershed Annual Report), 168 analytes have never been detected in samples collected under the current program. The Permittees request that requirements to analyze for these constituents be eliminated unless or until a reason to believe they may be present in stormwater arises.

Basin Plan Objectives are expressed in terms of total metals, while California Toxics Rule (CTR) criteria are expressed in terms of dissolved metals. Although the Permittees do not support comparison of stormwater data to CTR values, the Permit requires it. The Permittees recommend deletion of this requirement. However, if this language is to remain, in order to properly compare results for metals to both sets of objectives, both total and dissolved fractions will be analyzed by the laboratory for the following metals: arsenic, cadmium, chromium (III), chromium (VI), copper, lead, mercury, nickel, selenium, silver, and zinc.

6.4.4.3 Clarify Mobilization Criteria

The District is proposing the following amendment to the monitoring mobilization criteria based on experience and the difficulties faced collecting the first storm and the analysis of the USEPA criteria specific to the Temecula National Weather Service weather station (Consolidated Monitoring Program, Section 4.C.2):

> "Note: If the QPF indicates that more than 0.3-inch is predicted for any 6-hour period, mobilization for sampling will occur."

The District's experience over the past three years indicates that intensities greater than 0.3" in six hours are likely to produce runoff and would warrant mobilization, even on a dry watershed. Further, these mobilization criteria are consistent with EPA-833-B-92-001 guidance regarding minimum depths/durations for storm sampling.

The Permittees recommend that the Regional Board amend the MS4 Permit to reflect these Mobilization Criteria. Due to issues with stream gauges operated by the United States Geological Survey (USGS), the Permittees have concluded that preparing post-storm forensics based on USGS data is not of significant value. A simple test of comparing Quantitative Precipitation Forecast (QPF) reports with actual rainfall and the mobilization criteria should be sufficient to determine compliance with the MS4 Permit.

Mobilization criteria should also reflect practical limitations to storm water monitoring by excluding national holiday periods (Thanksgiving, Christmas, and New Year's Day in particular) and quantifying the probability and the lead time between the forecast and actual rainfall that must be met in order to mobilize.

6.4.4.4 Reduce Wet Weather Events

As was noted in the audits, the Permittees have experienced consistent difficulty collecting three storm events in the upper Santa Margarita River watershed. The Permittees also noted that the San Diego County MS4 Permit only requires the collection of samples from two wet weather events. The Permittees request that the monitoring program for Riverside County be revised to require collection of two storm events. This would not only reduce opportunities for unavoidable non-compliance, it would also be a prudent cost saving measure that would not alter the overall effectiveness of the Permittees monitoring programs.

6.4.4.5 Clarify Triad Method and Follow-up Actions

The MS4 Permit included an early draft of the Triad method envisioned by the Model Monitoring Program (MMP) developed by the SMC. The result was a misapplication of the final Triad approach envisioned by the MMP. Toxicity is currently required to be sampled for at the Triad stations during wet weather events, but not during dry weather when the bioassessments occur. According to the SMC MMP, the three components of the Triad approach (chemistry, Toxicity, and bioassessment) should be conducted at the same time. Bioassessments cannot be conducted during wet weather due to safety concerns and the planning necessary. For this reason the MMP recommends the full triad for dry weather and only chemistry and Toxicity for wet weather.

In an effort to be proactive and supportive of good science, the Permittees have taken the following actions to ensure proper application of the Triad approach:

- Beginning with the 2007-2008 season, Toxicity sampling will be conducted during dry weather, at the same time as the bioassessments and dry weather chemistry sampling events are conducted. Thus, the full Triad approach will be conducted during dry weather. Wet weather monitoring will focus on Toxicity and chemistry. This action will modify the current program to be consistent with the MMP approach.
- The 2006-2007 Annual Report established the framework for proper application of the Triad method (full triad for dry weather, chemistry and Toxicity only for wet weather) by adding new tables (G-21 through G-27), in anticipation of properly applying the Triad method in the 2007-2008 Annual Report.

The Permittees further recommend clarifying the definitions of "persistent", "consistent", and "magnitude" as used in the MS4 Permit to be consistent with the intent of the MMP. In addition, the MS4 Permit inappropriately limits Triad analysis by defining a "fair" Index of Biological Integrity scores as automatically indicative of benthic alteration. This limitation needs to be corrected to prevent Permittee

resources from being inappropriately diverted to expensive source assessment studies. The MMP (and the SMC) envision that watersheds will be prioritized for follow up action based on their relative quality to one another. The envisioned analysis would compare watersheds from throughout southern California. The Permittees support this coordinated and comprehensive approach to addressing water quality.

6.4.4.6 Recognize Limitations of Laboratory Analysis of Bacteria

Babcock Labs prefers to accept bacteria samples between the hours of 7:00 a.m. and 4:00 p.m. during normal business days, and 9:00 a.m. and 12:00 p.m. on weekends. Although Babcock will accept bacteria samples outside those hours, acceptance is contingent upon payment of substantial overtime rates to ensure laboratory staff availability to receive and analyze the samples.

The timing of bacteria sample collection, particularly within the context of automatic sampling, will require consideration of the sample's four-hour holding time and available laboratory receiving hours. The Permittees request that the Permit be modified to only require collection of bacteria samples such that they can be delivered during the regular working hours of the lab to avoid excessive laboratory costs.

6.4.4.7 Participate in a Watershed Based TMDL for the Santa Margarita Lagoon

The Permittees understand that, due to economic conditions, State funding for the Santa Margarita Lagoon Watershed-Based TMDL has been withdrawn. As described in section 3.4, these economic conditions are also impacting the Permittee's funding sources and they are struggling to maintain resources to fund existing compliance programs. The Permittees currently cannot support additional expenditures associated with assisting in funding a watershed-based TMDL effort. However, the Permittees are agreeable to discussing a re-prioritization of compliance activities in order to reallocate existing Permittee resources for this purpose. For example, where current MS4 Permit compliance programs elements are not measurably enhancing attainment of Water Quality Standards, the Permittees would consider reduction or elimination of those requirements to support reallocation of the associated funding to the development of the watershed based TMDL. Program elements that may be considered for discussion include:

- Toxicity/Pyrethroid Monitoring – Under the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA) local regulation of pesticides, including pyrethroid pesticides is pre-empted. The Permittees are expending significant resources at the State and Federal level to facilitate regulatory changes in the allowable uses of pyrethroid pesticides, which have been implicated in causing toxicity in receiving waters throughout California. The Permittees have also recognized pyrethroid pesticides as a Pollutant of Concern for the upper Santa Margarita River watershed. The Permittees believe that public education and outreach regarding use and more stringent regulation/management of pesticides, including pyrethroid pesticides, represents the most effective means of controlling pesticides in Urban Runoff. However, continued Toxicity tests, Toxicity Identification Evaluations, and direct monitoring for pyrethroid pesticides are not likely to enhance the Permittee's ability to reduce/eliminate pyrethroid pesticides in Receiving Waters. Greater Receiving Water quality benefits may be realized by reallocating the resources currently allocated to these activities to the development of the watershed-based TMDL.
- Reduction in General Monitoring Requirements – The Permittees continue to expend significant resources on Receiving Water and outfall monitoring and the benefits of these monitoring activities are limited. Further, these costs have more than doubled over the term of the 2004 MS4

Permit due to audit findings recommending the implementation of automatic sampling equipment. Revised MS4 Permit requirements that provide for a simplified monitoring program may allow cost savings to be reallocated from data collection and processing to development of the watershed-based TMDL.

- Watershed/Individual Annual Reporting – The current Annual Reporting requirements are time, labor and cost-intensive exercises. Revised MS4 Permit requirements that provide for a simplified Annual Report requirements would not necessarily produce substantial cost savings (because is the reports are typically produced in-house); however, they would free up staff resources to assist with TMDL development.
- IC/ID Monitoring – Although the Permittees support regular visual inspection of MS4 facilities to identify IC/IDs, field measurements and sampling has not proven to be effective for this purpose. Although sampling of identified IC/IDs for later enforcement purposes may be appropriate, IC/IDs that have been identified and eliminated in the Santa Margarita Region typically result from visual observations and subsequent follow-up efforts by Permittee staff, not field measurements and water quality samples. Revised MS4 Permit requirements that provide for visual inspections of MS4 facilities to identify IC/IDs may yield cost savings that could be reallocated to development of the watershed-based TMDL.

There may be additional opportunities for modification of MS4 Permit requirements to focus the expenditure of Permittee funds on those activities that are most effective at protecting Receiving Water quality. Although the resources available for Permittee compliance activities are finite, the Permittees are supportive of modifications to the MS4 Permit that, while working within available funding limitations, enhance their ability to protect and enhance the quality of Receiving Waters.

7.0 Evaluation and Recommendations for Individual SWMP Programs

The Riverside County DAMP is a programmatic document developed by the Permittees in the Santa Ana and Santa Margarita Regions. It outlines the major programs and policies that the Permittees individually and/or collectively implement to manage Urban Runoff for the protection of Receiving Waters in Western Riverside County, including the Santa Margarita Region. The Riverside County DAMP provides a model for the development of a Permittees' Individual SWMPs in the Santa Margarita Region.

The Permittees continue to support a uniform approach to the implementation of MS4 Permit compliance programs in order to facilitate increased transparency and understanding for residents, regulated entities, and Permittee staff. For this reason, the discussions below focus on programmatic changes to the compliance programs that are necessary to maintain the effectiveness of the model compliance programs described in the Riverside County DAMP. Upon adoption of the new MS4 Permit, the Riverside County DAMP and Individual SWMPs will be revised accordingly.

7.1 Program Management

There are typically multiple Permittee departments that are responsible for implementing the elements of the Individual SWMPs. Each Permittee has designated an NPDES Coordinator who coordinates the overall Permittee compliance programs, collects and analyzes compliance program data, develops and maintains the Individual SWMPs, compiles and submits necessary reports, coordinates with other Permittees, stakeholders and Regional Board staff, and conducts other necessary duties as assigned.

To facilitate inter-Permittee coordination and funding of regional compliance activities such as the Public Education and Monitoring programs, the Permittees have entered into an Implementation Agreement that defines the roles and responsibilities of each Permittee and assigns cost shares for regional programs defined in the agreement. The Implementation Agreement also requires each Permittee to designate an NPDES Coordinator who is also responsible for representing the Permittee's interest at Permittee coordination meetings such as the monthly Santa Ana/Santa Margarita Technical Advisory Committee.

The Permittees in the Santa Margarita and Santa Ana Regions participate in a Management Steering Committee made up of the City Managers, County Executive Officer, and the District's Chief Engineer; or their assigned alternate. Participation in the Management Steering Committee is not mandatory; however, it provides a management-level forum to address Urban Runoff management policies for the Permit Area and coordination of the review, and necessary revisions to the Riverside County DAMP and Implementation Agreement. In addition, the Management Steering Committee promotes a higher level of awareness of the MS4 Permit compliance program by each Permittee's senior management staff.

7.1.1 Accomplishments and Programmatic Improvements

Collectively, the Permittees Program Management activities have achieved:

- Development of the Riverside County DAMP, WQMP and Individual SWMPs following adoption of the 2004 MS4 Permit.
- Revised the Implementation Agreement to account for necessary program enhancements resulting from the new MS4 Permit.

- Established and held monthly meetings of a Technical Advisory Committee comprising of each Permittee's NPDES coordinator, to discuss and coordinate response to issues that arise through the ongoing implementation of the Riverside County DAMP-based programs.
- Voluntarily participate in a Management Steering Committee comprised of Permittee upper management (City Manager or equivalent) to provide a forum to discuss major policy issues related to MS4 Permit compliance program implementation. This also helps the major decision makers within each organization to stay abreast of the status of the implementation of the Riverside County DAMP and aware of upcoming issues and approaches taken by other Permittees.
- Enhanced enforcement and compliance elements of the Riverside County DAMP.
- Developed the Integrated Regional Watershed Management Plan (IRWMP) for the Upper Santa Margarita Watershed.
- Continued progress with the Bureau of Reclamation, San Diego County and other stakeholders on a uniform watershed plan and model for the Santa Margarita River watershed.

7.1.2 Recommended Revisions and Enhancements to Program Management Efforts

7.1.2.1 Assessment Metrics and Municipal Action Levels

To ensure that the Permittee's programs continue to be effective at managing the impact of Urban Runoff on Receiving Water quality, the Permittees will revise the Program Effectiveness Assessments for both the Individual SWMP and the Watershed SWMP following adoption of the new MS4 Permit. These planned changes are further described in Section 6.1.2.1 of this ROWD. The Permittees also recommend streamlining of the reporting forms to focus on the revised Program Effectiveness Assessments.

7.1.2.2 Revised Reporting Format

As a result of continued program effectiveness assessment, following adoption of the new MS4 Permit, the Permittees will update annual reporting forms to incorporate specific reporting requirements for the effectiveness assessment metrics and to remove inappropriate, outdated, or ineffective reporting requirements.

7.2 Development Planning

This program element links each Permittee's General Plan, environmental review process, and development approval and permitting processes to the later phases of detailed design, construction and operation. The development approval and permitting processes carries forth project-specific requirements in the form of conditions of approval, project plans, and design specifications that support tracking, inspection, and enforcement actions.

7.2.1 Development Planning Program Element Accomplishments and Programmatic Improvements

During the term of the 2004 MS4 Permit, the development planning program accomplishments and programmatic improvements included:

- Developed the WQMP to address post construction stormwater runoff quality for New and Significant Re-Development Projects.
- Development of a FAQ for WQMP projects to assist with implementing the WQMP program.
- Developed and subsequently enhanced a BMP design guidance manual to standardize the construction of post construction BMPs.
- Participation in the SMC efforts to develop a LID manual.
- Participation in SCCWRP's hydromodification studies to develop scientifically based hydromodification design guidance for Southern California.
- Enhanced online watershed maps to assist developers and the public with identifying areas tributary to Impaired Waterbodies.
- Adopted and implemented a MSHCP to ensure the regional-scale protection of habitat and natural resources in the approval process for New Developments.

7.2.2 Proposed Revisions to the Development Planning Program Element

7.2.2.1 Low Impact Development

The Permittees will revise the Riverside County Storm Water Quality Best Management Practice Design Handbook to (1) better incorporate LID design concepts, and (2) incorporate guidance to describe how developments can offset Treatment Control and hydromodification impacts with LID concepts including infiltration, evapo-transpiration, reuse, and onsite stormwater management. These revisions will follow the completion of the SMC LID BMP Manual and SCCWRPs Hydromodification Study. See the FY 2007-2008 Watershed Annual Report, Appendix G, Section G.7.2 for additional detail.

7.2.2.2 Hydromodification

As committed to in the 2004 WQMP (now Appendix O to the Riverside County DAMP), the Permittees have developed numeric guidance for hydromodification and are now working with SCCWRP to develop enhanced hydromodification guidance for Southern California. The Permittees will use the completed guidance to update the WQMP, BMP Design Handbook and other guidance as necessary to effectively mitigate hydromodification impacts. See the FY 2007-2008 Watershed Annual Report, Appendix G, Section G.7.2 for additional detail.

7.2.2.3 BMP Design Criteria

The Permittees will revise the Riverside County Storm Water Quality Best Management Practice Design Handbook to incorporate additional design guidance to clarify those Treatment Control BMPs that are effective at removing sediment-bound pesticides such as pyrethroid pesticides (consistent with the recommendations of the Toxicity Reduction Evaluation contained in Appendix D.

7.2.2.4 TMDLs

The Permittees will revise the DAMP to identify and include BMPs that are necessary to mitigate the impacts of Urban Runoff on Impaired Waterbodies.

7.2.2.5 Roads

The Permittees believe that standard WQMP requirements for public works road projects create potential avenues for unavoidable non-compliance. The Permittees would like to review this priority development category with Regional Board Staff to develop a better system to manage public works road projects.

7.2.2.6 Inspect and Verify Maintenance of Post Construction Treatment Control BMPs to Ensure Ongoing Effectiveness

As economic conditions allow, the Permittees propose to implement the following approach to inspect and/or verify maintenance of Treatment Control BMPs implemented on Priority Development Projects to ensure their ongoing effectiveness. The development of the program described below will require the Permittee resources that are unavailable in the current economic climate, particularly considering that it would likely require the Permittees to abandon the CAP in lieu of a local Permittee inspection program. The resources that will be required to ramp up new inspection programs are unavailable and may not become available during the term of the new MS4 Permit; however when the economy recovers sufficiently the Permittees propose to implement the program described below.

Integrated Management Practice (IMP) Exemption:

For the purposes of this program, IMPs include BMPs that are landscape based or otherwise serve an additional purpose other than Treatment Control. IMPs will be exempted from Inspection and Maintenance Tracking / Certification requirements if solely through the regular maintenance of the feature's secondary (non-treatment) functions and with Permittee concurrence, it can reasonably be expected that the treatment efficacy of the IMP will be ensured in perpetuity. An example that may satisfy this exemption would be a grassy swale that is mowed as part of regular landscape maintenance, whereas a BMP with a media filter which requires periodic resetting or replacement to maintain treatment effectiveness would not be exempted.

Priority Development projects will be exempted from all Treatment Control BMP Inspection and Maintenance Tracking / Certification requirements if they completely meet their Treatment Control requirements by implementing only IMPs that meet these criteria.

Priority Industrial and Commercial

The following requirements will apply to new priority Commercial and Industrial developments subject to the Permit's Commercial and Industrial business inspection requirements.

- Inspection

  Sites will be inspected per the Individual SWMPs current inspection frequency requirements that are based on the potential of the site to contribute to water quality impairments. At these inspections, in addition to the normal inspection requirements, all Treatment Control BMPs at the site will be inspected. In other words, all Treatment Control BMPs at high-priority facilities will be inspected annually; Treatment Control BMPs at medium-priority facilities will inspected biennially and Treatment Control BMPs at low-priority facilities will be inspected once during the term of the MS4 Permit. Improperly maintained BMPs may subject the maintenance entity to license suspension or administrative citations.

- Proof of Maintenance

  Maintenance records demonstrating compliance with the O&M procedures in the WQMP must be available for review at the time of the inspection. Failure to demonstrate that the BMPs have been maintained appropriately may result in license suspension or other enforcement actions.

Other Priority Developments

The following requirements will apply to new priority residential developments and businesses not otherwise subject to the Permit's Commercial and Industrial business inspection requirements.

- Proof of Maintenance and Self Certification

  The maintenance entity identified in the WQMP will be required to submit maintenance records including a signed certification to the Co-Permittee. The frequency of these submittals will be based on the relative maintenance requirements of the Treatment Control BMPs implemented on that site. BMPs will be categorized into groups as having High, Medium or Low maintenance requirements. If a WQMP project utilizes high-maintenance Treatment Control BMPs it will be categorized as a High-priority residential development, etc. High-Priority residential developments will be required to submit records annually, Medium – biennially, and Low – once every five years. Failure to report will result in administrative citations against the maintenance entity.

Permittee Projects and Permittee Maintained Treatment Control BMPs

This requirement will be included as part of the existing Permittee facility inspection program and inspected per the frequency requirements specified in the Riverside County DAMP.

7.3 Private Development Construction Activities

The Permittees have reviewed their ordinances to ensure that they are adequate to control discharges to the MS4 from construction sites to the MEP. For construction projects that will disturb one acre or more, the Permittees require proof of compliance with the General Permit-Construction prior to issuance of building/grading permits (a copy of the Notice of Intent filed with the State Board). Each of the Co-Permittees provides training for their construction inspectors regarding the proper installation and

maintenance of erosion and sediment control BMPs. Education and outreach to the building industry (developers, construction contractors, engineering firms, etc.) regarding managing discharges from construction sites is also incorporated into the "**Only Rain Down the Storm Drain** Pollution Prevention Program," the Permittees' area-wide public education and outreach program.

7.3.1 Private Development Construction Activities Program Element Accomplishments and Programmatic Improvements

- The Permittees annually distribute construction activities posters to construction sites as part of construction outreach program.
- A standardized construction activity reporting spreadsheet was developed for the Annual Reports.
- The construction inspection forms were updated.
- The Co-Permittees developed and maintained inventory databases of construction sites 1-acre or larger for which they have issued a building or grading permit.
- Prioritized inspections to help target construction activities that present the highest risk to water quality.

Highlights
Conducted over **17,000** construction site inspections
Initiated over **3,800** enforcement actions to gain compliance
626 attendees to NPDES Construction training

7.3.2 Proposed Revisions to the Private Development Construction Activities Program Element

The Permittees are not proposing revisions to their existing construction inspection programs at this time. As previously described, the Permittees expect that development activity will be greatly reduced during the term of the new MS4 Permit. Regional Board staff has however raised the issue of abandoned construction sites. Regulation of abandoned construction sites has proven challenging due to bankruptcy of project proponents, non-responsiveness or inability to locate underlying investment banks that actually own the developments, and the practical limitations encountered by the Permittees in calling bonds. As the Regional Board has enforcement capabilities that often surpass those of the Permittees, to ensure that this issue is effectively addressed the Permittees ask for the close cooperation and support of the Regional Board. Nonetheless, the Permittees are committed to continuing the use of their IC/ID programs, code enforcement tools, and other ordinance authorities to control, to the extent allowable under law, abandoned parcels that are not properly stabilized.

7.4 Existing Development – Permittee Facilities and Activities

The Municipal Facilities Strategy which has been consolidated into Section 5 of the Riverside County DAMP provides guidance for identifying potential storm water Pollutant sources and for selecting appropriate BMPs for implementation at identified facilities of concern owned and operated by the Permittees. The Permittees are implementing the provisions of the Municipal Facilities Strategy within their respective jurisdictions via processes described in their Individual SWMPs. To assist the Permittees in implementing this program, training focused on storm water regulatory requirements and BMPs related

to Permittee maintenance facilities and roadway maintenance activities were conducted twice annually during the 2004 MS4 Permit term.

7.4.1 Permittee Facilities and Activities Program Element Accomplishments and Programmatic Improvements

- The District coordinated preparation of GIS-based maps for Permittee MS4 facilities. The MS4 maps are updated annually with new information provided by the Permittees as part of the Annual Reporting process.
- Development of a GIS Browser that allows interested parties to view MS4 Facilities from the District's website.
- Updated Model Facilities Pollution Prevention Plan for Permittee facilities not requiring coverage under the Industrial General Permit.

Highlights
900 attendees to Municipal NPDES training

7.4.2 Proposed Revisions to Permittee Facilities and Activities Program Element

7.4.2.1 FPPP Guidance

The Permittees commit to developing a revised WQMP template for Permittee projects that better facilitates translation of WQMP BMP requirements into Facility Pollution Prevention Plans, where appropriate.

7.4.2.2 Integrated Pest Management

The Permittees commit to including Ecowise's standardized language for contracted pesticide management services in Permittee pesticide management contracts.

7.5 Commercial and Industrial Sources

The Principal Permittee and the County have implemented the CAP through which the County Department of Environmental Health makes use of existing inspection programs to address storm water compliance survey/inspections of restaurants and facilities that must secure a hazardous materials permit for either storing, handling or generating hazardous materials. As the responsible Certified Unified Program Agency in Riverside County, the County Department of Environmental Health is responsible for regularly inspecting all sites within the County that handle hazardous waste. The CAP is implemented in those cities and unincorporated areas that do not maintain an individual industrial/commercial inspection program through other mechanisms such as POTW waste pre-treatment programs or business license inspection programs.

Revisions to the inspection program requirements contained within the 2004 MS4 Permit expanded the scope of the overall commercial/industrial inspection program beyond the ability of the CAP to address. Each Co-Permittee now implements a supplemental inspection program for facilities not covered by the CAP. In addition, the 2004 MS4 Permit required inventories/databases of facilities, prioritization of

industrial and commercial sources relative to the potential to impact water quality, and specified inspection frequencies based upon facility priority.

The revised industrial and commercial sources program continues to have both regional and local jurisdiction components. Although the overall industrial/commercial inspection program has grown beyond the CAP, the CAP still addresses most of the facilities identified in the 2004 MS4 Permit. With its low overhead cost, it remains a cost effective approach to mitigating the impacts of industrial and commercial facilities on the MS4 and Receiving Waters.

7.5.1 Commercial and Industrial Program Element Accomplishments and Programmatic Improvements

- Reviewed and updated several educational brochures for distribution to inspected facilities.
- Developed outreach posters for gas and automotive service stations.
- Developed standardized inspection reporting forms for Annual Reports.
- Updated food service surveys.
- Extended the agreement with the County's Department of Environmental Health executed in 1999 for the area-wide CAP for the inspection of commercial and industrial facilities through June 30, 2009.
- Created Permittee databases for the inspected commercial and industrial facilities.
- Revised the Riverside County DAMP to reflect development of the industrial and commercial facility database that contains the following information: facility name, address, city, zip code, and Standard Industrial Classification (SIC) codes.
- Provided public education information regarding NPDES storm water permits to any new businesses listed in the Press Enterprise.

Highlights
3,974 inspections of Industrial and Commercial facilities
Over **1000** enforcement actions taken
426 attendees to Municipal NPDES training

7.5.2 Proposed Revisions to Commercial and Industrial Sources Program Element

The expected future expansion of the Commercial and Industrial Inspection Program to address Treatment Control BMPs as described in Section 7.2.2.6 would likely result in an expansion of the CAP that is beyond the ability of Environmental Health staff to accommodate and still achieve their own mandated inspection requirements. The Permittees are therefore proposing to amend the Riverside County DAMP and Individual SWMPs to recognize not only the CAP inspection program but also Permittee specific alternative programs that may develop during the term of the next MS4 Permit.

7.6 Residential Sources

The residential program focuses on educating residents about activities that can potentially contribute to beneficial use impairment. The residential program outreach is focused on Pollutants of Concern. The residential program is primarily implemented through the Regional Public Education Program; however, each Permittee typically conducts additional outreach. In those cases where residential Illegal Discharges are identified, appropriate code enforcement actions are also taken.

7.6.1 Accomplishments and Programmatic Improvements

The residential program achieved the following accomplishments during the term of the 2004 MS4 Permit:

- Developed several new outreach brochures and tools to promote changes in knowledge and behavior regarding activities that potentially generated Pollutants of Concern including landscape and gardening brochure, spray bottles with non-toxic pest control or cleaner recipes, septic system management brochure, updated outdoor activities brochure, and pet waste brochure.
- Implemented billboard advertising promoting "**Only Rain Down the Storm Drain**" message
- Purchased a new trailer to transport public education materials. The trailer is wrapped in graphics supporting the "**Only Rain Down the Storm Drain**" message.
- Point of Sale Outreach Programs to customers of hardware stores regarding paint, pesticides and fertilizers.
- Partnership with Valley Greeters to deliver "**Only Rain Down the Storm Drain**" information to new residents in the Santa Margarita Region.
- Promotion and participation in the annual Santa Margarita Watershed Clean Up Day.
- Continued supplemental support of the HHW/ABOP waste collection programs
- Continued update and revision of the public education information page
- Continued implementation and enhancement of school outreach programs conducted by Mission Resource Conservation District
- Reproduction and distribution of the After the Storm poster

7.6.2 Recommended Revisions

Although the Permittees continue to annually assess and modify outreach materials and programs, the Permittees are not recommending any substantive revisions to this program element at this time.

7.7 Public Education and Outreach

Although the bulk of public education and outreach activities are conducted by the District on behalf of the Permittees, the Permittees also conduct outreach activities. These activities include providing informational pamphlets at counters, conducting presentations for local businesses or developers, maintaining a stormwater page or appropriate stormwater links on their individual websites, conducting employee training programs, and attending various public events.

7.7.1 Public Education and Outreach Program Element Accomplishments and Programmatic Improvements

The Public Education and Outreach Program Element had the following accomplishments and improvements over the term of the 2004 Permit (not including those identified in Section 7.6.1):

- Use of a CEQA-style public participation process to develop the Riverside County DAMP, SWMPs, and WQMP
- Duplication and use of the USEPA construction site poster to educate construction site operators
- Distribution of stormwater outreach information to various businesses and construction sites through code enforcement, and building and grading inspectors
- Development and distribution of a automotive shop BMP poster
- Advertisements in the Business Press
- Update of the outdoor activities brochure for mobile operators

7.7.2 Recommended Changes

Although the Permittees continue to annually assess and modify outreach materials and programs, the Permittees are not recommending any substantive revisions to this program element at this time.

7.8 Elimination of Illicit Connections and Illegal Discharges

The Riverside County DAMP describes the discharge limitations and prohibitions applicable to the Permittee's MS4 (Section 4.1), procedures to be implemented when persistent exceedances of Water Quality Standards are identified (Section 4.2), responding to and reporting Illegal Discharges (Section 4.4), enforcement measures for IC/IDs (Section 4.5), measures to control litter (Section 4.6), measures to manage sanitary wastes (Section 4.7), and programs to promote collection and proper disposal of hazardous waste (Section 4.8).

7.8.1 IC/ID Program Element Accomplishments and Programmatic Improvements

- Developed Sanitary Sewer Overflow Procedures in coordination with the sanitary sewer operators in the Santa Ana and Santa Margarita Regions and implemented annual updates to Sanitary Sewer Overflow Procedures to ensure proper contact information for outside agencies.
- Established an electronic tracking system for NPDES complaints received through the toll free "Report Storm Water Pollution" hotline, OES or otherwise reported to the District.
- Enhanced public outreach regarding illegal dumping including brochures for: Outdoor Activities, Fountains & Swimming Pools, and Pet Waste, establishment of a Santa Margarita watershed Clean-Up Day and coordination with the County of Riverside Trash Task Force.

- Initiated a cooperative program with the County Environmental Health Department to promote Environmental Enhancement Projects in lieu of fines for environmental crime cases. This initiative resulted in a billboard advertising campaign and BMP posters addressing appropriate BMPs for gas stations and garages.
- Established IC/ID Monitoring Program

Highlights
1,263 potential IC/ID reports received and responded to
Over **5,500** calls received on stormwater pollution hotlines
94 IC/ID Monitoring events
5 monitoring events where field screening exceeding criteria

7.8.2 Proposed Revisions to IC/ID Program Element

The Permittees re-evaluated their existing IC/ID monitoring programs as part of this ROWD. The Permittees believe that the overall monitoring program is effective. However, the Permittees plan to revise their approach to the implementation of the Illicit Discharge monitoring program to increase monitoring data utility or overall program effectiveness.

7.8.2.1 Revise IC/ID Monitoring Program

The Permittees plan to revise their approach to the implementation of the IC/ID monitoring program. The goals of the recommended revisions are to:

- Relocate the IC/ID monitoring sites at MS4 outfalls.
- Distribute the monitoring sites throughout the Santa Margarita Region to detect Illicit Discharges closer to their source before they become excessively diluted.
- Increase efficiency and consistency in sampling resulting in enhanced data quality.
- Enhance response time to identify IC/IDs.

A model Illicit Discharge monitoring plan that accomplishes these goals is described below; a final plan will be incorporated into updated compliance documents with the new MS4 Permit.

7.8.2.2 Model Illicit Discharge Monitoring Plan

The Municipal Permittees will identify MS4 outfalls that could be used for monitoring sites based on maps of the MS4 facilities. This list of preliminary sites will be then field checked to determine the accessibility of the sites and feasibility for inclusion in the IC/ID monitoring program. Inaccessible sites or sites determined to be otherwise infeasible will be removed from the list.

Each Municipal Permittee except Menifee will then divide the list of the viable sites within their jurisdiction into groups of four. As Menifee only has one MS4, it will only monitor that one site. Each group of four sites will be monitored for a period of one year, twice during the dry season. Once all sites have been monitored for a year, sites will be repeated.

A monitoring team will be formed including one District and one Municipal Permittee staff member. The District staff will perform all monitoring/screening activities. The Municipal Permittee staff will be available to assist and will be responsible for initiating any necessary follow-up actions. This approach will provide consistency in screening and monitoring data collection and will allow the Municipal Permittee with jurisdiction over the tributary land use to be immediately aware of exceedances and initiate appropriate follow-up actions.

Appendix A
2008 Land Use Map

SANTA MARGARITA WATERSHED

COUNTY OF RIVERSIDE, CALIFORNIA

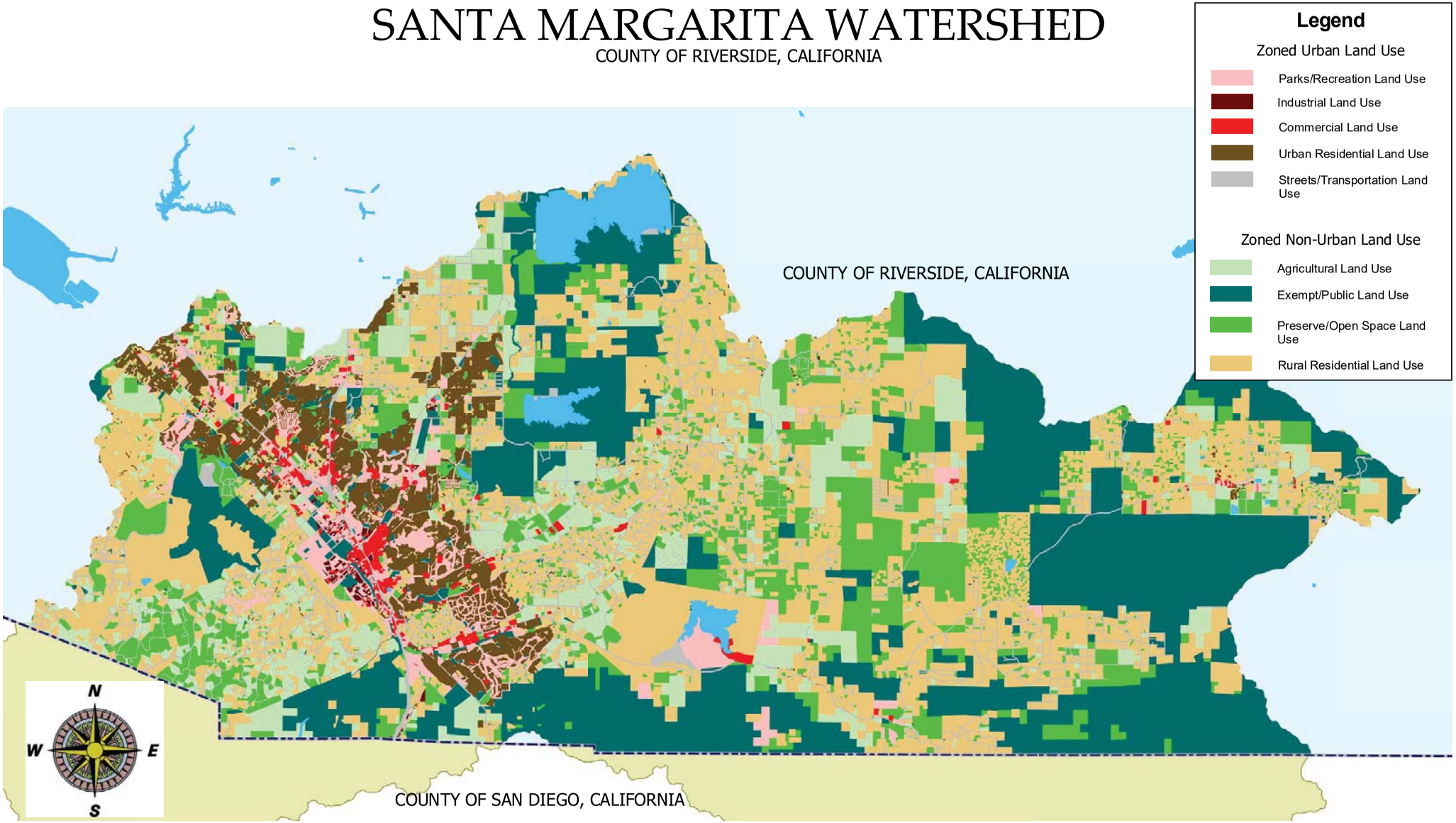

SANTA MARGARITA WATERSHED
WITH ZONED LAND USES
DELINEATED

(REVISED 14 JAN 09)

020612

SANTA MARGARITA WATERSHED

WITHIN RIVERSIDE COUNTY, CALIFORNIA

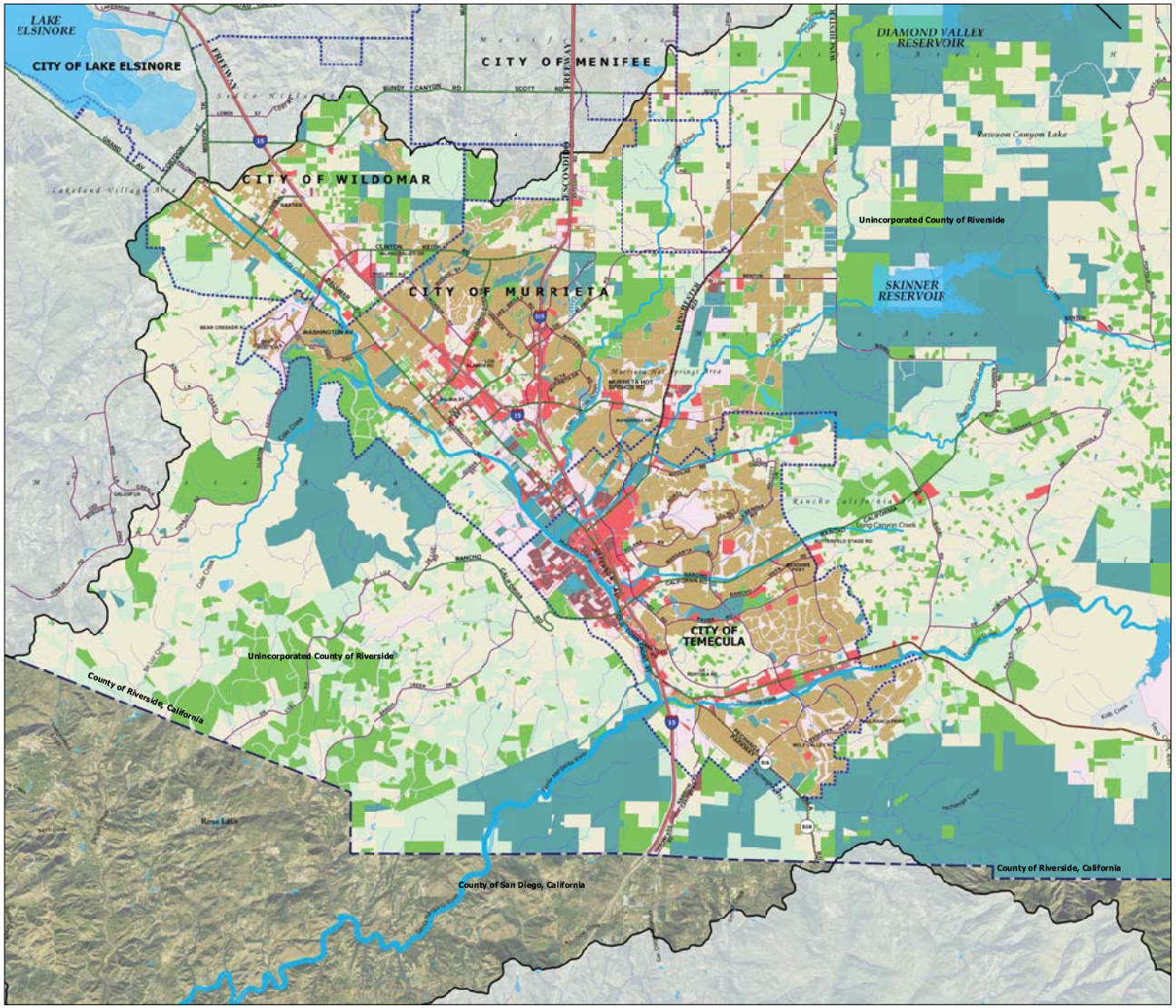

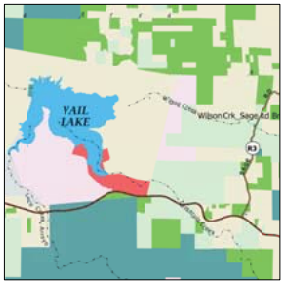

DETAIL 1

1:50,000

1 0 1 2 3 4 Statute Miles

1 0 1 2 3 4 5 Kilometers

DETAIL 2

1:50,000

1 0 1 2 3 4 Statute Miles

1 0 1 2 3 4 5 Kilometers

Legend

- US Freeways
- State Highways
- County Roads
- Primary Arterial Roads
- Secondary Collector Roads
- Waterbodies
- Watercourses
- Railroads
- Incorporated Areas
- Santa Margarita Watershed Boundary
- County of Riverside Boundary

Zoned Urban Land Use

- Commercial Land Use
- Industrial Land Use
- Parks/Recreation Land Use
- Urban Land Use
- Street/Roads Lands Use

Zoned Non-Urban Land Use

- Agricultural Land Use
- Exempt Land Use
- Preserve/Open Space Land Use
- Rural Residential Land Use

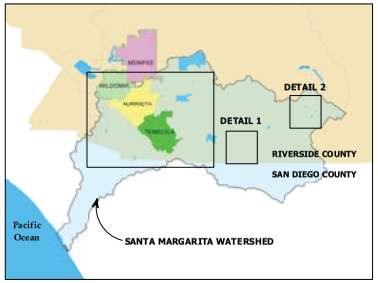

VICINITY MAP

NOT TO SCALE

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT GEOGRAPHIC INFORMATION SYSTEM

1:50,000

1 0 1 2 3 4 Statute Miles

1 0 1 2 3 4 5 Kilometers

The graphical and tabular information shown on this document may be derived from a variety of public agency and/or private commercial sources such as Riverside County Transportation and Land Management Agency, Thomas Brothers Mapping, the Stephen P. Teale Data Center, GIS Technology Center, State of California, the United States Geologic Survey and the United States National Atlas. These sources may possess varying levels of accuracy and precision and this product is meant only as a guide to the relative position and scale of the depicted features. This GIS document is in no case to be interpreted as fundamental or decisive for purposes of land surveying, field engineering, plan drafting, code enforcement, land boundary determination and/or land acquisition.

SANTA MARGARITA REGION OF RIVERSIDE COUNTY ZONED LAND USE

(REVISED 13JAN09)

020613

Appendix B
Santa Margarita Region MS4 Facility Maps

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

RIVERSIDE, CALIFORNIA

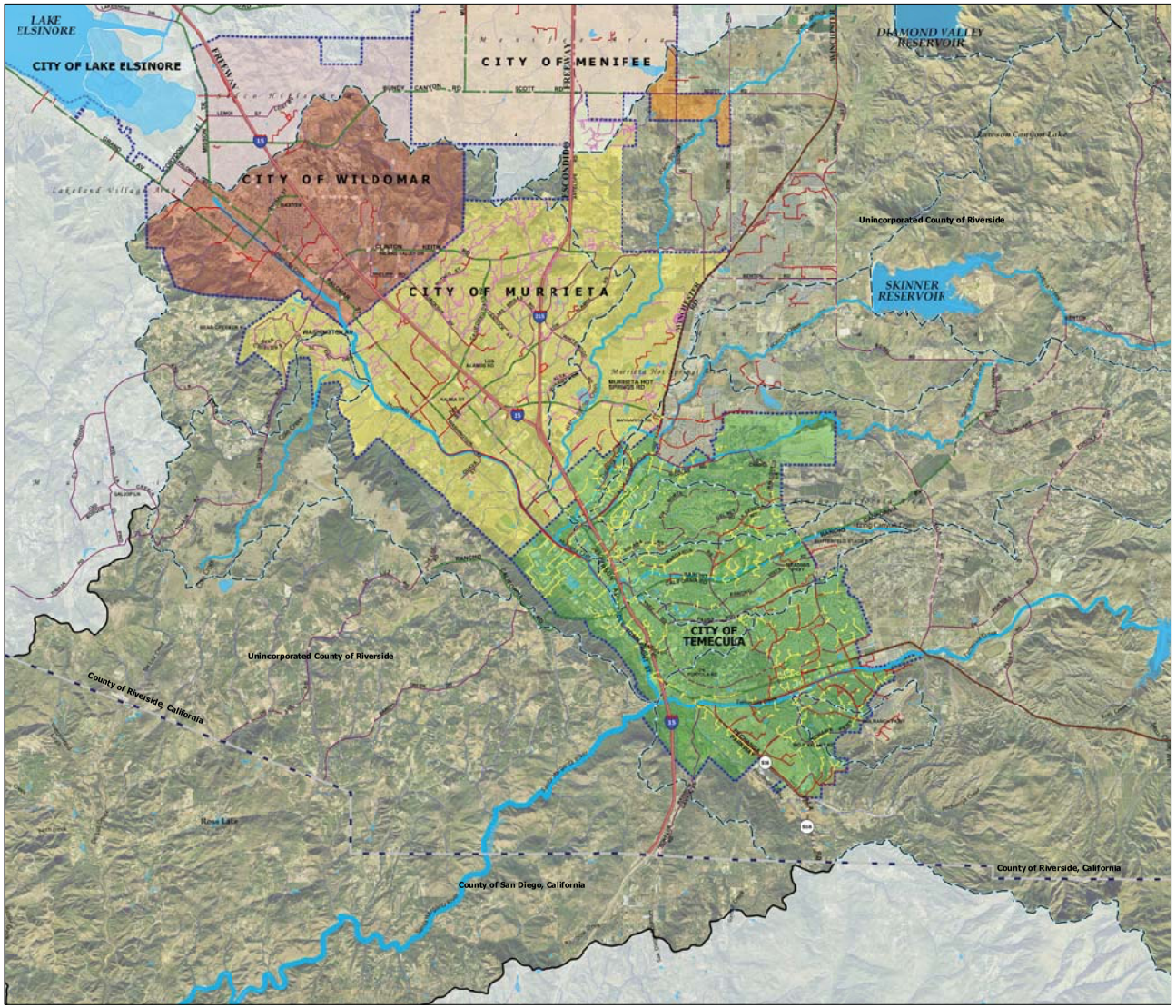

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DETAIL 2

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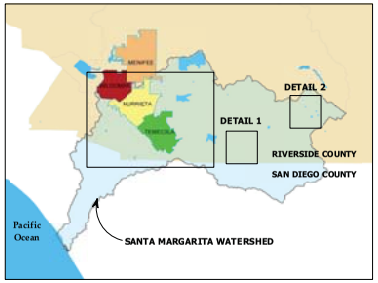

VICINITY MAP

NOT TO SCALE

Legend

- RCFC MS4 Facilities
- Riverside County MS4 Facilities
- City of Murrieta MS4 Facilities
- City of Temecula MS4 Facilities
- US Freeways
- State Highways
- County Roads
- Primary Arterial Roads
- Secondary Collector Roads
- Monitoring Drainage Boundaries
- Waterbodies
- Watercourses
- Railroads
- Incorporated Areas
- Santa Margarita Watershed
- County of Riverside Boundary

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT GEOGRAPHIC INFORMATION SYSTEM

1:50,000

1 0 1 2 3 4 Statute Miles

1 0 1 2 3 4 5 Kilometers

The graphical and tabular information shown on this document may be derived from a variety of public agency and/or private commercial sources such as Riverside County Transportation and Land Management Agency, Thomas Brothers Mapping, the Stephen P. Teale Data Center, GIS Technology Center, State of California, the United States Geologic Survey and the United States National Atlas. These sources may possess varying levels of accuracy and precision and this product is meant only as a guide to the relative position and scale of the depicted features. This GIS document is in no case to be interpreted as fundamental or decisive for purposes of land surveying, field engineering, plan drafting, code enforcement, land boundary determination and/or land acquisition.

SANTA MARGARITA WATERSHED FACILITIES MAP with Current MS4 Facilities Delineated

(REVISED 13JAN09)

020615

Appendix C
Initial Assessment Methodologies based on CASQA approach

Construction Component Effectiveness Assessments

Goals

I Ensure that all Construction Sites have applicable permits from the Permittee.

II Increase the percentage of Construction Sites that are in compliance with Permittee building and grading permits

III Place additional focus on Construction Sites during Wet Season

IV Ensure that construction inspection staff are properly trained and informed of the issues related to stormwater quality

Goal Addressed	Measureable Metrics Collected / Compiled Annually	Highest Potential CASQA Effectiveness Level	Effectiveness Assessment Timeframe	Outcome required to support Effectiveness Level	Can a Reasonable Municipal Action Level be developed?
I	% of active construction sites that are discovered without building/grading permits	2	Permit Term	Decreasing Trend or minimal %	Y
II	% of active High/Medium priority sites subjected to enforcement beyond verbal/written warnings	3	Permit Term	Decreasing Trend or minimal %	N
II, III	% of active High/Medium priority sites subjected to enforcement beyond verbal/written warnings **during wet season**	3	Permit Term	Decreasing Trend or minimal %	N
II	% of enforcement actions that reached each level of enforcement	3	Permit Term	Trend toward lower levels	N
III	% of active permitted construction sites provided wet weather reminders	2	Annually	N/A	Y
IV	% of construction inspectors receiving annual training	1	Annually	N/A	Y

020617

Development Planning Component Effectiveness Assessments

Goals

I Develop Design Guidance for Low Impact Development (LID) BMPs

III Encourage the use of LID-Based Treatment Control BMPs

IV Ensure that appropriate planning staff are trained in WQMP requirements

Goal Addressed	Measureable Metrics Collected / Compiled Annually	Highest Potential CASQA Effectiveness Level	Effectiveness Assessment Timeframe	Outcome required to support Effectiveness Level	Can a Reasonable Municipal Action Level be developed?
I	Status of SMC LID BMP Design Manual	1	Within Permit Term	Completion	Y
II	% of WQMP projects that met the exemption requirements for inspection and maintenance reporting by implementing only LID-Based Treatment Control BMPs	3	Permit Term	Increasing Trend	N
III	% of applicable planning staff that attended WQMP training.	1	Annually	N/A	Y

020618

Permittee Facilities and Activities Program Effectiveness Assessments

Goals

I Ensure that Permittee Facilities have adequate BMPs implemented and that they are properly maintained
II Ensure that Channels and Inlets are kept free from trash and debris
III Encourage the use of Integrated Pest Management (IPM) on Permittee Facilities
IV Maintain an updated GIS map of the MS4 system
V Ensure the Permittee facility operators and maintenance workers are properly trained in issues related to water quality.

Goal Addressed	Measureable Metrics Collected / Compiled Annually	Highest Potential CASQA Effectiveness Level	Effectiveness Assessment Timeframe	Outcome required to support Effectiveness Level	Can a Reasonable Municipal Action Level be developed?
I	% of facilities with appropriate BMPs identified	1	Annually	N/A	Y
I	% of Facilities provided reminders of appropriate BMPs	2	Annually	N/A	Y
I	% of annual facility inspections finding deficiencies in BMP implementation that require follow-up actions	3	Permit Term	Decreasing Trend or minimal %	Y
I	Average % of deficiencies identified in the previous year's inspections that were addressed.	3	Permit Term	Increasing Trend or high %	Y
II	Estimated Tons of Waste removed from Streets	4	Annually	N/A	N
II	Estimated Tons of Waste removed from Inlets	4	Annually	N/A	N
II	Estimated Tons of Waste removed from Open Channels	5	Annually	N/A	N
III	% of Pest Control Contracts that include language promoting or requiring IPM	1	Annually	N/A	N
IV	% of new Permittee-maintained MS4 facilities added to GIS Map	1	Annually	N/A	Y
V	% of Permittee Facility and MS4 operators and maintenance staff that attended training.	1	Annually	N/A	Y

Industrial-Commercial Facilities Program Effectiveness Assessments

Goals

I Maintain an updated and prioritized list of Industrial and Commercial Facilities

II Ensure the each Industrial and Commercial Facility has implemented BMPs that are appropriate for the activities and features at that facility

III Ensure that implemented BMPs are properly maintained to ensure their effective operation

IV Implement enforcement measures as necessary to reduce the occurance and recurrance of violations

V Ensure that inspectors are appropriately trained to identify problem areas and BMPs maintenance issues.

Goal Addressed	Measureable Metrics Collected / Compiled Annually	Highest Potential CASQA Effectiveness Level	Timeframe to Determine Effectiveness	Outcome required to support Effectiveness Level	Can a Reasonable Municipal Action Level be developed?
I	% of new facilities added to database and prioritized	1	Annually	N/A	Y
II	% of inspected facilities with adequate Minimum BMPs in place at time of inspection	3	Permit Term	Increasing Trend or High %	N
III	% of inspected WQMP facilities subject to Post Construction Treatment Control BMP Inspection, with adequately maintained Treatment Control BMP	3	Permit Term	Increasing Trend or High %	N
IV	% of inspected High/Medium priority facilities that were subjected to enforcement beyond verbal/written warnings	3	Permit Term	Decreasing Trend or Low %	N
IV	% of enforced sites that are repeat offenders	3	Permit Term	Decreasing Trend or Low %	N
IV	% / Number of enforcement actions that reached each level of enforcement	3	Permit Term	Trend toward lower enforcement	N
V	Percent of applicable inspectors that attended training	1	Annually	N/A	Y

020620

Residential Program Effectiveness Assessments

Goals

I Raise awareness among residents of activities that may be contributing to stormwater pollution
II Increase public awareness of BMPs for residential activities
III Increase public participation in hazardous material collection events
IV Increase public involvement in keeping the watershed clean
V Encourage the use of Alternative Pest Control Methods

Goal Addressed	Measureable Metrics Collected / Compiled Annually	Highest Potential CASQA Effectiveness Level	Timeframe to Determine Effectiveness	Outcome required to support Effectiveness Level	Can a Reasonable Municipal Action Level be developed?
I	Number of outreach events to Schools	1	Annually	N/A	N
II	Number and type of educational materials distributed that target residential activities	1	Annually	N/A	Y
I, II	Results of Public Ed Surveys	2	Permit Term	Increasing or high level of Knowledge	Y
III	Gallons of Used Oil Collected through Used Oil Block Cycle Grant	4	Annually	N/A	Y
III	Total Pounds collected at HHW/ABOP events	4	Annually	N/A	Y
III	Total Number of participants at HHW/ABOP events	3	Annually	Increasing Trend	Y
IV	Pounds of trash removed through Watershed Cleanup Events	4	Annually (as events occur)	NA	N
V	Number of Home Improvement stores provided outreach and customer educational information for pesticide use	2	Annually	Increasing Trend	Y

020621

Detection and Elimination of Illicit Discharges and Connections Effectiveness Assessments

I Revise and enhance IC/ID Monitoring Program
II Reduce the occurance of Illicit Connections and Discharges
III Increase public reporting of improper disposal into MS4
IV Ensure the IC/ID reports are reviewed and responded to in a timely manner
V Ensure the confirmed IC/ID events are eliminated as quickly as possible
VI Ensure the IC/ID response staff are trained to identify potential sources of Illicit Discharges and recommend BMPs to prevent such discharges

Goal Addressed	Measureable Metrics Collected / Compiled Annually	Highest Potential CASQA Effectiveness Level	Timeframe to Determine Effectiveness	Outcome required to support Effectiveness Level	Can a Reasonable Municipal Action Level be developed?
I	Revise IC/ID Monitoring Program to screen random MS4 outfalls	1	N/A	N/A	N
II	% of IC/ID Monitoring events with sampleable flow	1	Permit Term	N/A	N
II	% of IC/ID Monitoring events that exceeded criteria and required follow-up	5	Permit Term	Decreasing Trend or low %	N
III	Number of IC/ID reports received	2	Annually	Increasing Trend	N
IV	% of IC/ID reports responded to within 1 business day of receipt	1	Annually	N/A	Y
V	% of confirmed and source-identified IC/ID incidents that required enforcement beyond verbal or written wardnings to eliminate	3	Permit Term	Decreasing Trend or minimal %	N
V	% of each type / level of enforcement	3	Permit Term	Trend toward lower levels	N
VI	% of IC/ID response staff receiving training	1	Annually	N/A	Y

020622

Appendix D
Toxicity Reduction Evaluation for Pyrethroid Pesticides

Riverside County Flood Control and Water Conservation District

Riverside County – Santa Margarita Region Pyrethroid Source Identification Toxicity Reduction Evaluation

Final Phase II Report
January 2009

MACTEC
9177 Sky Park Court
San Diego, California 92123
858-278-3600 FAX 858-278-5300

Executive Summary

This document is the Phase II report for the Santa Margarita Region (SMR) Pyrethroid Source Identification Toxicity Reduction Evaluation (TRE) conducted by the SMR Permittees to identify the source(s) of toxicity in the SMR and develop a plan to reduce the toxicity. This report documents the Permittees' ongoing and proposed efforts to identify and reduce sources of pyrethroid pesticide toxicity associated with urban runoff.

Data gathered under this TRE was compared to data from neighboring counties. Based on available data, problems with pyrethroid-induced toxicity in urban runoff are common among municipalities in Southern California, and methods for addressing the problems are comparable.

A literature review was conducted to determine appropriate source control and treatment control BMPs for reducing the concentration and load of pyrethroids in storm water runoff. The literature source, the estimated potential for reducing pyrethroid-induced toxicity, and possible concerns about implementing the BMP are summarized.

Based on the results of the literature review, BMPs are evaluated for applicability and potential effectiveness in the SMR watershed. Many of the most effective and appropriate BMPs are currently being implemented by the Permittees.

A search for pending legislation did not identify any pending legislation pertaining to pyrethroid pesticides.

The most effective strategy to prevent water quality impacts from legal pesticide uses was identified as state or federal regulatory change involving effective labeling and use restrictions. The Permittees propose a five year plan to continue, review, and enhance current activities to reduce pyrethroid-induced toxicity.

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1.0 Introduction

This document is the Phase II report for the Santa Margarita Region (SMR) Pyrethroid Source Identification Toxicity Reduction Evaluation (TRE) conducted by the County of Riverside, the City of Murrieta, the City of Temecula, and the Riverside County Flood Control and Water Conservation District (District, collectively Permittees). The Phase I Status Report (RCFCWCD, 2008) contains the work plan for Phase II and an outline of the topics in this report, as well as additional background information. This Phase II report is divided into six sections.

Section 1 describes the purpose of the TRE and provides an overview of the approach taken by the Permittees. Section 1 also contains a discussion of the regulatory framework of the TRE, a brief project background, a description of the Santa Margarita watershed, pyrethroid pesticide background and usage, and management questions and objectives.

Section 2 describes available pyrethroid and toxicity data from other counties in Southern California, and compares the data to data from Riverside County. The data and comparisons are included to demonstrate that the problems and solutions relating to pyrethroid pesticides facing the Permittees are similar to those of neighboring counties in the region.

Section 3 presents the results of the literature review conducted for this study of pesticide reduction Best Management Practices (BMPs).

Section 4 discusses potential pesticide reduction BMPs, the status of the Permittees implementation of the BMPs, and, when applicable, examples of the implementation of the BMPs in other municipalities. Section 4 also contains a table summarizing the potential BMPs, their advantages and disadvantages, and relative cost.

Section 5 discusses pending legislation relating to pyrethroid pesticides.

Section 6 presents the five-year course of action the Permittees propose to follow to reduce pyrethroid-induced toxicity in the SMR.

1.1 Purpose and Overview of Approach

The purpose of the TRE is to identify the source(s) of toxicity in the SMR and develop a plan to reduce the toxicity. The results of Phase I of the TRE are contained in the TRE Status Report (Riverside, 2008). This Phase II report for the TRE study documents the Permittees' ongoing and proposed efforts to identify and reduce sources of pyrethroid pesticide toxicity associated with urban runoff. The goal of Phase II is to establish a course of action and develop modifications to the Permittee's Storm Water Management Plans (SWMPs) to more effectively control the sources of toxicity that were identified in Phase I of the TRE. The Permittees will incorporate the course of action and SWMP modifications into the Report of Waste Discharge (ROWD) that will be submitted to the RWQCB in January 2009.

Phase II activities included:

- A comparison of toxicity and chemistry results to data from adjacent Phase I municipal separate storm sewer system (MS4) permit areas, including San Diego County and Orange County.
- A literature review of current studies and a survey of pesticide reduction BMPs.
- A search for pending legislation regarding pyrethroid pesticides.
- Development of a proposed course of action for the Permittees.

A literature review was conducted of BMP information available from the Urban Pesticide Pollution Prevention (UP3) Project and other pesticide management programs and documents. Information on relevant BMPs was compiled and evaluated to identify potential BMPs that are available to mitigate urban sources of pyrethroids. Existing Permittee programs, such as outreach, regulation, and BMP implementation, were then evaluated for improvement opportunities.

The proposed course of action was determined with consideration of the adequacy of data collection (sufficient precipitation and runoff to collect adequate data) and pending

regulatory actions by California Department of Pesticide Regulation (DPR), and the United States Environmental Protection Agency (EPA).

Land uses in Riverside County are comparable to those in neighboring Orange County and San Diego County, and pyrethroid pesticide-induced toxicity has been observed in those counties. The Permittees are committed to identifying and addressing water quality issues with methods consistent with those used by other stakeholders in Southern California. To this end, data gathered under this TRE was compared to data from neighboring counties, and current pesticide reduction programs used by municipalities throughout California were reviewed.

Source control and treatment control BMPs were researched and evaluated for potential effectiveness in reducing pyrethroid pesticide-induced toxicity in the Santa Margarita watershed. Many of the most effective BMPs are currently implemented by the Permittees, and several have been implemented within the previous Permit term (2004-2008). A proposed five-year course of action for the Permittees was developed by combining the results of the research with the existing programs.

1.2 Regulatory Framework

At the federal level, the authority to regulate pesticide manufacture and use is assigned to the United States Environmental Protection Agency (EPA) under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA). In California, pesticide use is regulated at the state level by the DPR. In the SMR, the Permittees are required under the Clean Water Act to control discharges of pollutants, including pesticides that produce water toxicity, to and from their MS4 under the National Pollutant Discharge Elimination System (NPDES).

This TRE was performed as required by Monitoring and Reporting Program (MRP) R9-2004-001.

The MRP, Section II. A. I. 4, states:

> *"When results from the chemistry, toxicity, and bioassessment monitoring…indicate urban runoff-induced degradation, Permittees shall evaluate the extent and causes of urban runoff pollution in receiving waters and prioritize management actions to eliminate or reduce sources. Toxicity Identification Evaluations (TIEs) shall be used to determine the cause of the toxicity, and Toxicity Reduction Evaluations (TREs) shall be used to identify sources and implement management actions to reduce pollutants in urban runoff causing toxicity."*

As local regulation of pesticide use is generally preempted by federal and state law, the Permitttees' authorities are limited to addressing illegal disposal of pesticides, promoting public education, setting the example for minimum pesticide use, and coordinating with the federal and state agencies to facilitate regulatory changes at the state and federal level.

1.3 Project Background

Phase I of the TRE consisted of the toxicity monitoring begun in 2004 and the Toxicity Identification Evaluations (TIE) was initiated in the spring of 2007. The Phase I Status Report (RCFCWCD, 2008) provides a full project background. Toxicity monitoring at Temecula Creek and Murrieta Creek was initiated in 2004 using EPA protocol with the following indicator species: *Ceriodaphnia dubia*, *Selenastrum capricornutum*, and *Hyalella azteca*. Toxicity testing during the 2004-2008 reporting period indicated persistent wet weather toxicity to *Hyalella* in both Temecula Creek and Murrieta Creek. Toxicity was not observed to either *Ceriodaphnia* or *Selenastrum* in any of the samples collected over the four annual reporting periods beginning in the fall of 2004.

Toxicity Identification Evaluations (TIEs) were conducted on the wet weather samples collected from Temecula Creek and Murrieta Creek beginning in April 2007, in accordance with Table 2 of the MRP. The TIEs indicated that pyrethroids were the primary source of toxicity and biological degradation in both Murrieta Creek and Temecula Creek.

As a result of the toxicity and TIEs, storm water monitoring for pyrethroids was initiated in 2007-2008. Results indicate that the pyrethroids permethrin and/or bifenthrin are present in wet weather water samples taken at Murrieta Creek and Temecula Creek.

To further assess the impacts of pyrethroid pesticides the Permittees instituted Dry Weather Toxicity Testing and direct measurement of pyrethroid pesticide concentrations in dry weather water samples during the 2007-2008 reporting period. Toxicity and pyrethroid pesticides were not detected in dry weather water samples at either Murrieta Creek or Temecula Creek.

Phase I of the TRE concluded with the Phase I Status Report. The Phase I Status Report included studies to better characterize patterns and sources of toxicity and to evaluate the hypothesis that the *Hyalella* toxicity is due to pyrethroids.

Bifenthrin and permethrin appear to be the primary toxic elements in Temecula Creek and Murrieta Creek. While bifenthrin and permethrin were applied to both agricultural and non-agricultural land uses, the major sources of pyrethroid toxicity in the SMR are non-agricultural activities. Permethrin was applied more than any other pyrethroid pesticide in the urban landscape. Bifenthrin and permethrin application rates were one and three orders of magnitude higher for structural control applications than agricultural applications in Riverside County. Structural control appears to represent 93% of the total pyrethroids use for Riverside County.

The Status Report outlined the plan for Phase II of the TRE, and this report presents the results of Phase II.

1.4 Watershed Description

The SMR encompasses approximately 750 square miles in southwestern Riverside and northern San Diego Counties (see Figure 1-1). The upper (northeast) portion of the SMR is in Riverside County with the remainder in San Diego County. The SMR is subdivided into the Temecula Creek and Murrieta Creek sub-watersheds and has an arid Mediterranean climate. Creeks in the SMR are ephemeral. Flow in Temecula Creek and in Murrieta Creek results almost exclusively from groundwater during the dry season. It is rare to find flow during dry weather at the tributary stations, and usually this flow infiltrates before reaching Temecula Creek or Murrieta Creek (2006-2007 Monitoring Annual Report). While the ephemeral streams in the SMR are technically receiving waters, the term "Receiving Waters" as used in this TRE Status Report refers exclusively to Murrieta Creek and Temecula Creek.

The Santa Margarita River is formed by the confluence of Murrieta Creek and Temecula Creek. The confluence is located in Riverside County, approximately five miles northeast of San Diego County. The Santa Margarita River flows from Riverside County into San Diego County through the community of Fallbrook and Marine Corps Base Camp Pendleton. The lower estuary and river are protected by Camp Pendleton and are much less developed than surrounding areas in Southern California. The Santa Margarita River is able to support a relative abundance of wildlife and habitats in part because of its undeveloped state.

Figure 1-1

Riverside County Santa Margarita Watershed

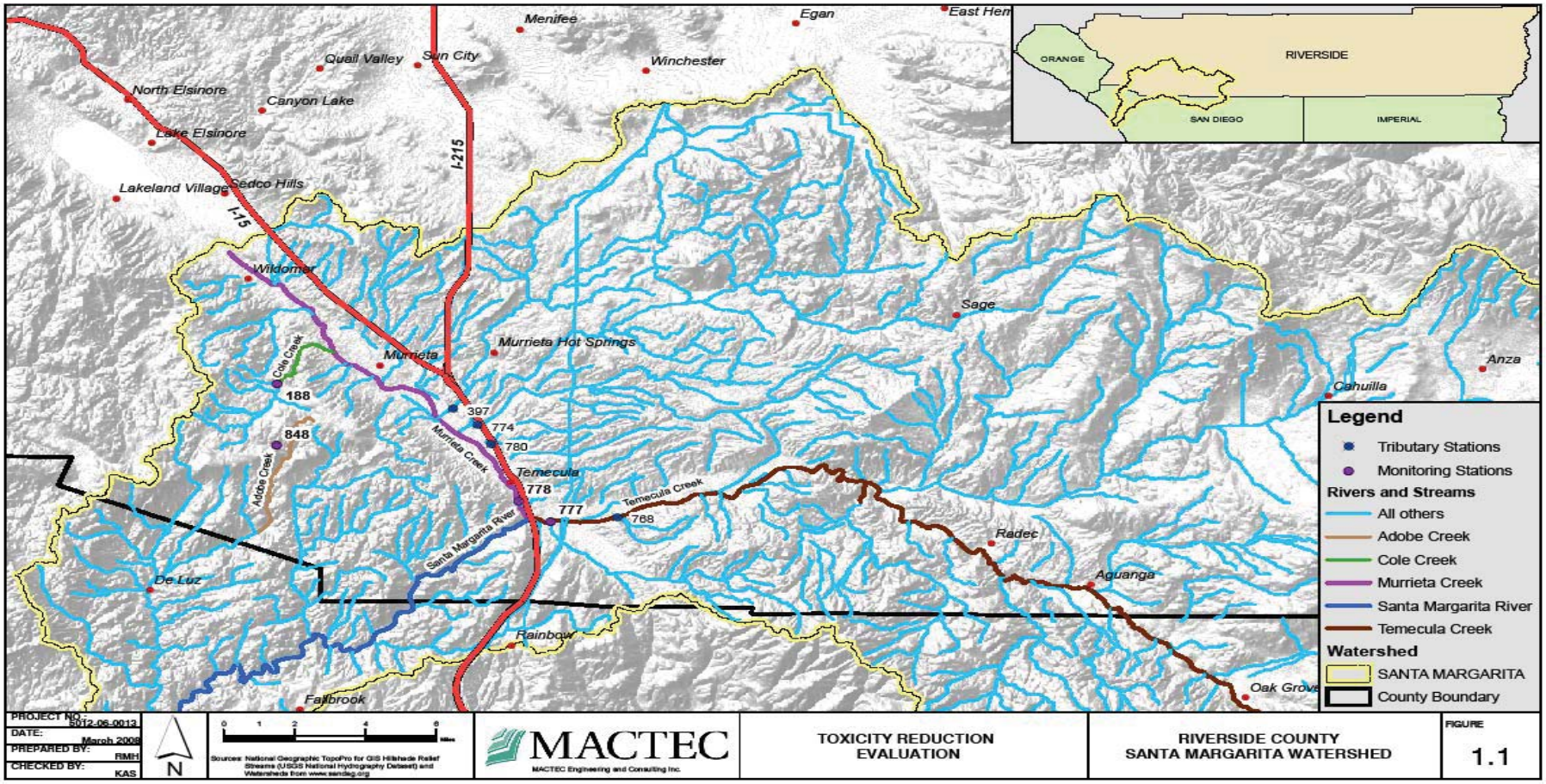

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As presented in Table 1-1, the total population in the SMR of Riverside County is significantly less than adjacent watersheds covered under similar Phase I MS4 NPDES permits.

Table 1-1

San Diego Region Populations

Jurisdiction	Population
Orange County	3,002,048
San Diego County	2,941,454
SMR/Riverside County	250,483
Unincorporated	55,291
Murrieta	97,257
Temecula	97,935

1.5 Pyrethroid Pesticide Background and Usage

A statewide compilation of the presence and effects of pyrethroid pesticides in urban surface waters, prepared in July 2008 and presented at the 2008 California Association of Stormwater Quality Agencies (CASQA) Conference, outlined the rise in pyrethroid use and its increased presence in urban waterways (Ruby, 2008). A comprehensive survey of pesticide use in Sacramento, San Diego, and Orange Counties also concluded that, as the older pesticides chlorpyrifos and diazinon have been phased out, pyrethroid pesticides have seen increased usage (Wilen, 2005). The Urban Pesticide Pollution Prevention (UP3) Project confirms that pyrethroids are the cause of toxicity in numerous California waterways, particularly in urban waterways. The UP3 Project (www.up3project.org) publishes an annual review of new scientific findings on pesticides in urban surface water (TDC, 2007). Since 2005, the reviews have consistently indicated that pyrethroid use continues to increase and that pyrethroids are found to be the cause of toxicity in urban waterways. The pyrethroid use information is confirmed by data published by the DPR.

Pyrethrins are natural insecticides that are derived from an extract of chrysanthemum flowers. Pyrethroids are synthetic versions of pyrethrins. These chemicals act on the nervous system of insects. Commercial pyrethroid pesticides often contain a synergist that works by restricting the enzymes insects use to detoxify pyrethroids. While pyrethroids have been shown to be one of the least poisonous insecticides to mammals, the effects depend on the level of exposure, the health of the animal, and the environmental circumstances.

Pyrethroids applied in urban areas enter the storm drainage system of the MS4 by surface runoff and are transported directly to receiving waters. Other potential urban sources are runoff from irrigation with reclaimed water, application overspray, and atmospheric deposition. Pyrethroids transported via the MS4, from whatever source, are considered to be non-point discharges. Agriculture, nursery, and urban/suburban uses are the main categories of sources of pyrethroids in the receiving waters of the SMR.

Outdoor structural pest control is the predominant urban use of pyrethroids in most watersheds. However, in the SMR, the acreage dedicated to agricultural land use exceeds the urban land use area by approximately 2:1. Pyrethroid insecticides are applied to a variety of crops in the SMR and California throughout the year. According to the DPR, pyrethroids are commonly used on fruit and nut trees, row crops, and in nurseries. Six of the primary pyrethroids used in California agriculture, in order of decreasing amount applied in 2003, are permethrin, esfenvalerate, lambda-cyhalothrin, cyfluthrin, bifenthrin, and cypermethrin. Therefore, agricultural sources of pyrethroids were considered.

TIE methods for pyrethroids are still being developed. Effective methods require the ability to measure low concentrations of pyrethroids, and this remains a challenge. Fortunately, the development of TIE methods for pyrethroids is progressing and moving towards standardization (San Francisco Estuary Project, 2007). TIEs are planned for storm water samples collected during 2008-2009 when toxicity is evident.

1.6 Management Questions and Objectives

This TRE is designed to confirm the toxic element observed in the samples collected in the Santa Margarita Region, identify likely sources of the toxic element, and propose mitigation measures for those sources. TIEs identified pyrethroids pesticides as the likely toxic element. As the MRP specifies that a TRE must be conducted following toxicant identification through a TIE, Phase I of the TRE focused on the pyrethroids identified as the source of toxicity in the 2007 TIEs. To support this TRE, the Permittees commissioned additional wet and dry weather toxicity testing, water column pyrethroid testing, additional TIEs to verify the persistence of pyrethroids as the toxicant. Based on the resulting information, the TRE evaluates the specific sources of toxicity and likely mitigation.

This TRE study assumes that pyrethroid sources and resultant toxicity patterns in the SMR are similar to those in neighboring counties, in particular San Diego and Orange Counties. Under this assumption, the Permittees hypothesized that pyrethroids would be detected in samples at most if not all monitoring locations, that the samples would exhibit toxicity to *Hyalella,* and that TIEs would indicate pyrethroids as the cause of the toxicity. Unlike other regions, dry weather toxicity is not expected in the SMR, as dry weather flows are supported primarily by groundwater.

Based on this assumption, this TRE was designed to provide information to help answer the following five management questions related to the toxicity:

1) Is the pyrethroid toxicity persistent in Temecula Creek and Murrieta Creek?
2) Does the toxicity occur during dry weather?
3) Are there any obvious sources of illicit discharge of pyrethroids that can be abated?
4) What are the likely sources of pyrethroid toxicity in the SMR?
5) What potential management measures are available to the Permittees to mitigate the impacts of pyrethroid pesticide application?

Answers to the first four questions are detailed in the Phase I Status Report. Briefly, toxicity is persistent in the creeks during wet weather, but is not evident in dry weather samples. No

obvious sources of illicit discharge were found. The likely primary source of pyrethroids is structural control performed by pest control operators (PCOs). The final question is addressed during Phase II and is the focus of this report.

2.0 Data Comparison

An assumption of this TRE study is that pyrethroid sources and resultant toxicity patterns in the SMR are analogous to those in similar counties, in particular neighboring San Diego and Orange Counties. To verify this assumption, it was necessary to compare data collected in SMR to data collected in other locations. As part of the 2008 CASQA pyrethroids data compilation, monitoring results were summarized from studies that investigated the presence and effects of pyrethroid pesticides in urban areas of California (Ruby, 2008). The CASQA summary listed the frequency of detection of various pyrethroid pesticides and results of toxicity testing for different indicator species. Results from various northern and Southern California locations were detailed, including results of water column studies from Orange, San Diego and Sacramento Counties.

Pyrethroids, as a class of chemicals, have an affinity for particles and they are considered to be relatively hydrophobic; they are therefore commonly found in sediments of waterways downstream of their application sites. The initial toxicity studies leading to the identification of pyrethroids as pervasive environmental contaminants in California were performed on sediment samples by Don Weston and his colleagues at the University of California, Berkeley (Weston et al., 2005; Amweg et al., 2006). Recently, improvements in analytical methods for pyrethroids in water, and modification of toxicity studies to more effectively test for pyrethroid-based toxicity in water, have lead to increasing evidence of the presence of pyrethroids in water column samples, and toxic effects in the water matrix (see citations for Orange and San Diego County in Ruby, 2008).

Extensive work has been performed on the environmental presence and effects of pyrethroids in urban areas of the neighboring Orange and San Diego counties; however, much of this work has been performed on sediment samples. Although the sediment monitoring results do not correspond directly with the SMR water column test results, sediments are considered to be effective integrators of contaminants from the contributing storm water flows. The deposited sediments are produced as particles settle out from the passing water over some

period of time, and tend to accumulate until they are washed away by higher-velocity flows. Summaries of the relevant sediment study results are therefore included in the discussion that follows.

In Orange County, an ongoing study being performed by UC Davis, in conjunction with UC Riverside and the Orange County UC Cooperative Extension, has consistently found bifenthrin and permethrin in water column runoff samples from residential areas (Haver et al., 2007; Oki, personal communication). In samples from four residential sites they have detected bifenthrin in 100% of samples, with the number of samples varying from 48 to 57 per site (Oki, personal communication). In sediment samples collected in recent years from the Santa Ana Region of Orange County, bifenthrin is commonly detected (32 of 56 samples) and permethrin less frequently so (4 of 56 samples), with sediment toxicity to *Hyalella* common (39 of 54 samples tested were moderately or highly toxic; see summary in Ruby, 2008).

In a 2005 study of six Orange County residential storm drainages and seven tributary streams draining commercial/residential land uses, bifenthrin was detected in 95% of dry weather samples and 100% of wet weather samples (Budd et al., 2007). Because treatment of nursery products is mandatory to control Red Imported Fire Ants, an older DPR study, conducted in 1999-2002, found occasional detects of bifenthrin in urban runoff samples, along with frequent detects in nursery runoff from several Orange County sites.

In San Diego County, under NPDES Permit monitoring conducted since 2004, pyrethroids have been commonly detected in water samples from several receiving waters, and toxicity to *Hyalella* has been increasingly observed in water samples (see summary in Ruby, 2008). Bifenthrin was detected in 12 of 15 samples collected from 2005-2006 and 2006-2007; detection frequency was 100% in samples from Chollas Creek, Agua Hedionda, and Tecolote Creek. Toxicity to *Hyalella* was observed in 22 of 57 samples tested over the three year period, 2004-2007. In a TIE study performed on Chollas Creek samples during 2005-2006,

67% of samples were acutely toxic to *Hyalella*, and the toxicity was found to be likely due to pyrethroids.

In a 2004-2005 study performed by UC Davis and others, sediments from Switzer Creek at its outlet to San Diego Harbor were found to be highly toxic; bifenthrin and permethrin were detected at high concentrations, and a sediment TIE identified pyrethroids as the likely cause of the observed toxicity (Anderson et al., in press). As part of a statewide survey of urban waterways, sediments were tested from several receiving waters in San Diego County. All were found to be highly toxic to *Hyalella* (Holmes et al., in press).

To further compare the pyrethroid sources and toxicity patterns in the SMR to other counties, the CASQA data summary was analyzed to select the studies which reported results for the same constituents and effects identified in the SMR, specifically permethrin, bifenthrin, and toxicity to *Hyalella*. The total number of detections for the different monitoring locations was divided by the total number of samples taken at the sites to calculate the percentage of samples with detectable concentrations of pyrethroids. This normalized metric allowed for comparison of the various datasets.

While permethrin is among the more commonly-used pyrethroids, it is much less toxic to aquatic life than bifenthrin (TDC, 2007). For the purposes of this assessment, bifenthrin detection frequency and frequency of toxic effects were used as the metrics for comparison.

Comparative results for bifenthrin are summarized in Figure 2-1. Data were available for two creeks in Sacramento County and three locations in San Diego County, in addition to the data collected for SMR. Two samples were taken at the Sacramento County sampling locations. For San Diego County, each creek was sampled three times except for Chollas Creek, which was sampled six times. The SMR was sampled a total of eight times. In most cases, bifenthrin was detected in over 80% of samples. Only at Elk Grove Creek in Sacramento County was bifenthrin detected at a notably lower percentage.

Figure 2-1

Percentage of Samples with Bifenthrin Detections

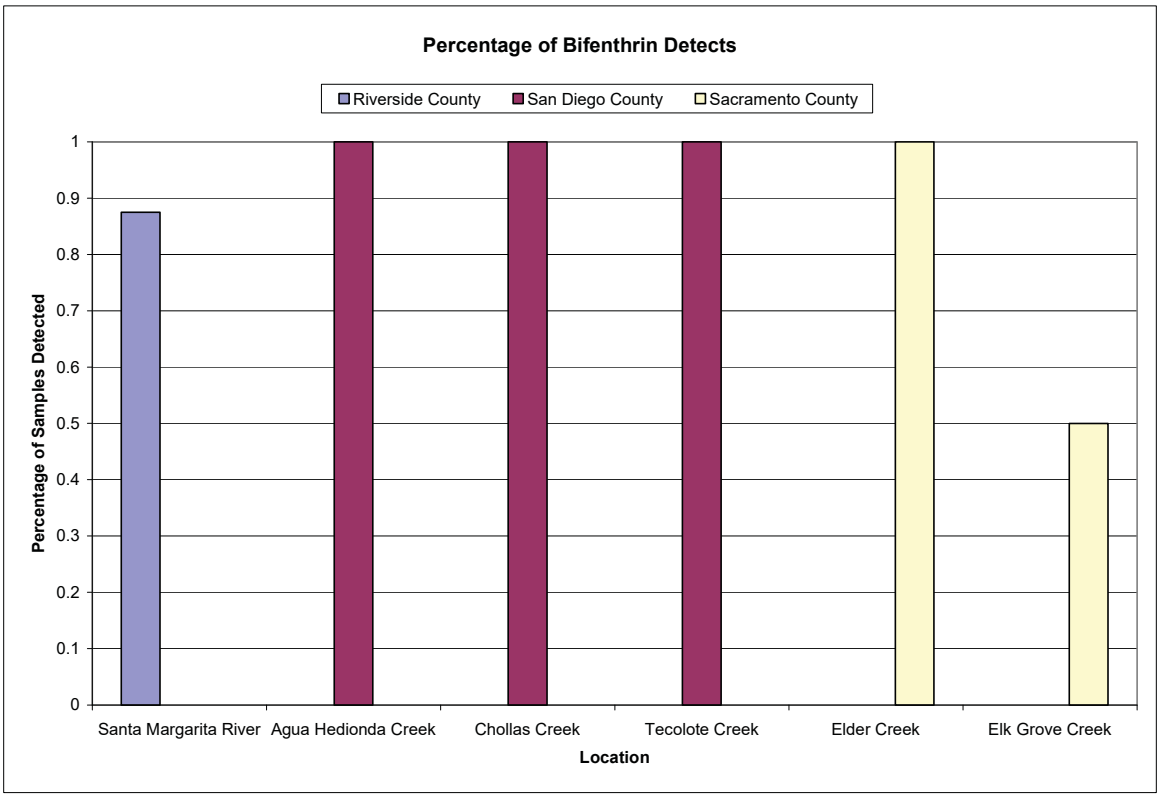

Toxicity to *Hyalella* was documented in water samples from San Diego County, along with the SMR. Toxicity testing was performed on samples from seven San Diego County water bodies. The sample sets ranged from three to nine toxicity tests (Aqua Hedionda, San Dieguito River, Tijuana River, and Chollas Creek). In the SMR, a total of eight toxicity tests were performed on samples from Murrieta Creek and Temecula Creek. The results for frequency of acute toxicity from the SMR were within the range of the results for similar sites in San Diego County (see Figure 2-2).

After comparing the results from different locations, the assumption that pyrethroid sources and resultant toxicity patterns in the SMR are similar to those in similar counties appears to be valid.

Figure 2-2

Percentage of Samples with Acute Toxicity to *Hyalella*

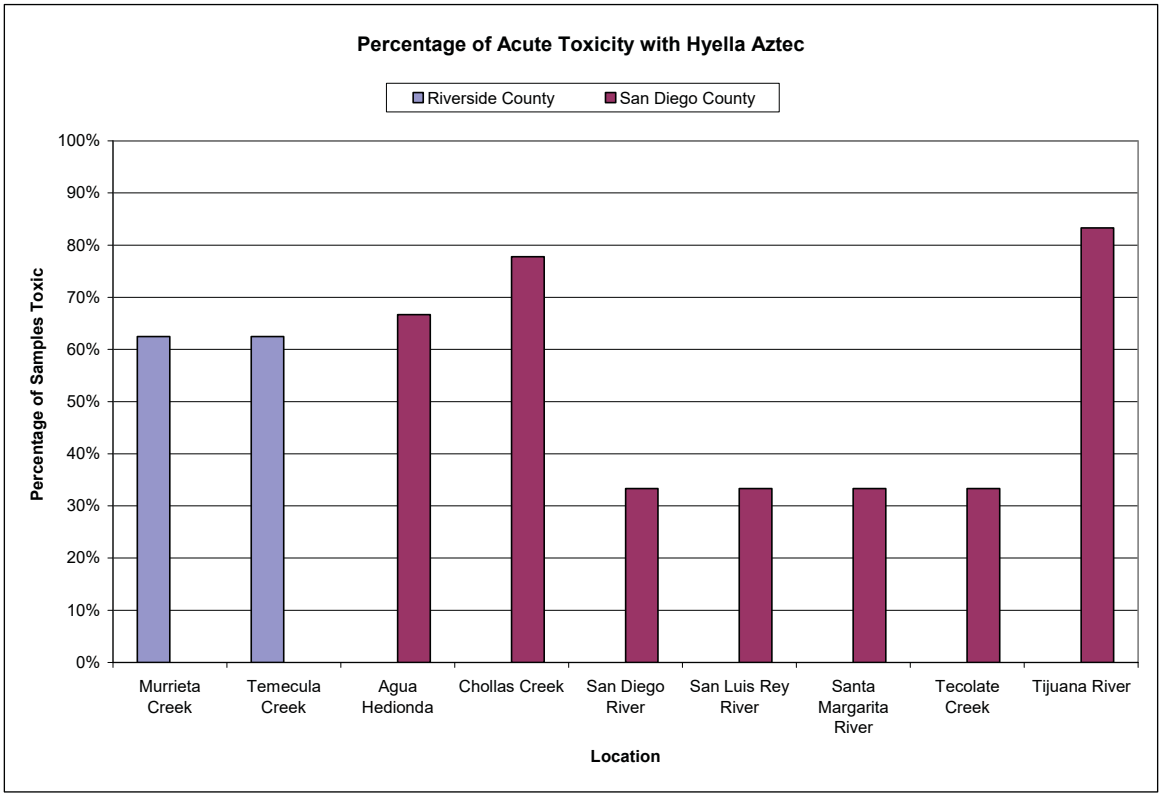

3.0 Literature Review

A literature review was conducted during December, 2008 to determine appropriate BMPs for reducing the concentration and load of pyrethroids in storm water runoff. An initial search was made of the Urban Pollution Prevention Program (UP3) website (www.up3program.org) for potential examples of BMP strategies implemented specifically for pyrethroids. The United States Environmental Protection Agency website and the CASQA website were also reviewed for pyrethroid specific BMPs. Widespread use of pyrethroids is relatively recent, and there has been little direct evaluation of BMPs for pyrethroids. Further research was conducted on general storm water BMPs, and their potential for pyrethroid reduction was evaluated based on the design of the BMP and the chemical behavior of pyrethroids.

To identify pending legislation that may be related to pyrethroid pesticides, web searches were conducted on the websites for DPR, the California legislature, the EPA, and the Library of Congress. However, no pending legislation was identified as relevant to pyrethroid pesticides.

Table 3-1 below presents the findings of the literature review. BMPs are categorized as either source control or treatment control, and within each category they are sorted by type. The literature source, a summary of the BMP, the estimated potential for reducing pyrethroid-induced toxicity, and possible concerns about implementing the BMP are provided. See Section 4 for further information about each type of BMP.

Table 3-1
Literature Review Matrix

Type of BMP	Literature Source	Summary	Ability to Reduce Toxicity Caused by Pyrethroids	Storm Water Concerns
Source Control				
Regulatory	Pesticides of Interest for Urban Surface Water Quality. Urban Pesticides Use Trends Annual Report. July 2008.	Suggests regulatory changes as a result of increased toxicity due to pyrethroid use	Potentially High	Supplementary to other BMPs, Will take years to show results
Regulatory	Improving Urban Pesticide Regulatory Activities to Protect Water Quality – Annual Update 2007. November 2007.	Discusses recent state and federal regulatory pesticide activities on an annual basis	Potentially High	Supplementary to other BMPs, Will take years to show results
Regulatory	California Department of Pesticide Regulation. http://www.cdpr.ca.gov/docs/registration/reevaluation/chemicals/pyrethroids.htm. 2007.	The reevaluation of the widespread presence of synthetic pyrethroid residues in the sediment of both agricultural and urban dominated California waterways at levels toxic to Hyalella azteca (H. azteca).	Potentially High	Supplementary to other BMPs, Will take years to show results
Integrated Pest Management (IPM)	Building Maintenance - Structural Integrated Pest Management. June 2008.	Promotes reduction in pesticide use through use of municipality IPM and hiring of PCO's trained in IPM	Potentially High	Does not eliminate all uses of pyrethroids
IPM	California Stormwater BMP Handbook. January 2003.	Promotes prevention of pesticide use through use hiring of PCOs that use IPM as an alternative	Potentially High	Does not eliminate all uses of pyrethroids
IPM	City of Santa Monica Toxics Use Reduction Program Integrated Pest Management. June 1997.	Overview of IPM program initiated by the City of Santa Monica	Potentially High	Does not eliminate all uses of pyrethroids
IPM	National Management Measures to Control Nonpoint Source Pollution from Urban Areas. November 2005.	EPA document discussing management practices to help reduce pesticide use	Potentially High	Does not eliminate all uses of pyrethroids
IPM	National Pollutant Discharge Elimination System (NPDES) Phase II BMP & Measureable Goal Examples. February 2008.	Provides examples and goals of good housekeeping BMPs	Potentially High	Does not eliminate all uses of pyrethroids
IPM	The Monterey Bay Green Gardener Program "sample curriculum". www.green-gardener.org/about. Accessed December 2008.	Informs the public and landscapers about the green gardener program and how to get involved	Potentially High	Does not eliminate all uses of pyrethroids

Table 3-1 (continued)
Literature Review Matrix

Type of BMP	Literature Source	Summary	Ability to Reduce Toxicity Caused by Pyrethroids	Storm Water Concerns
Source Control				
IPM	Western IPM Center. www.wripmc.org. Last updated 12/23/2008.	Pest management information specific to region, state, or territory.	Potentially High	Does not directly address pyrethroids
IPM	EcoWise Certified. www.ecowisecertified.com. Accessed December 2008.	Information on IPM program design, developing contracts for structural IPM, and pilot program aimed at developing IPM certification.	Potentially High	Does not directly address pyrethroids
IPM	Our Water Our World. www.ourwaterourworld.org. Copyright 2008.	Contains assorted fact sheets on specific pests and methods to manage them without using hazardous materials.	Potentially High	Addresses pyrethroids in water pollution fact sheet.
IPM	UP3 Project. www.up3project.org. November 2008.	Provides tools to municipalities to reduce municipal pesticide use and to conduct outreach to their communities on less-toxic methods of pest control	Potentially High	Addresses pyrethroids toxic impact on water bodies.
IPM	State of California Green California. www.green.ca.gov/EPP/building/structipm.htm. Accessed December 2008.	Provides information on structural IPM.	Potentially High	Addresses pyrethroids impact on storm water.
IPM	San Francisco Department of the Environment. http://www.sfenvironment.org/our_programs/topics.html?ti=1. Accessed December 2008.	Contains information regarding key components of integrated pest management.	Potentially High	Addresses pyrethroids impact on storm water.
Low Impact Development	Low-Impact Development Design Strategies: An Integrated Approach. June 1999.	Discusses LID design strategies and successes, including storm water controls	Potentially High	Does not directly address Pyrethroids
Low Impact Development	Low Impact Development Handbook: Stormwater Management Strategies. December 2007.	Reviews many LID techniques appropriate for Southern California's climate	Potentially High	Does not directly address Pyrethroids
Public Outreach	County of Los Angeles Department of Public WorksStorm Water/Urban Runoff Public Education Model Program. Fiscal Year 2002.	Provides Los Angeles specific examples of Public Outreach and Education	Potentially High	Change is up to individuals, needs cumulative effect

Table 3-1 (continued)
Literature Review Matrix

Type of BMP	Literature Source	Summary	Ability to Reduce Toxicity Caused by Pyrethroids	Storm Water Concerns
Source Control				
Public Outreach	Drainage Area Management Plan - Santa Ana and Santa Margarita Regions. July 2005.	Discusses local outreach actions conducted by the Permittees	Potentially High	Change is up to individuals, needs cumulative effect
Public Outreach	Environmental Justice Pilot Project Pest Management Assessment: Soil Fumigant and Organophosphate Insecticide Use and Alternatives - Parlier, Fresno County, California. October 2007.	Study of Agricultural pesticide use in Fresno area, including use of reduced risk pesticides	Potentially High	Unknown potential water quality and toxicity issues
Public Outreach	National Management Measures to Control Nonpoint Source Pollution from Urban Areas. November 2005.	EPA document discussing management practices to help reduce pesticide use	Potentially High	Change is up to individuals, needs cumulative effect
Public Outreach	National Pollutant Discharge Elimination System (NPDES) Phase II BMP & Measureable Goal Examples. February 2008.	Provides examples and goals of public outreach BMPs	Potentially High	Change is up to individuals, needs cumulative effect
Public Outreach	Pesticides of Interest for Urban Surface Water Quality. Urban Pesticides Use Trends Annual Report. July 2008.	Contains recommendations for public education based on analysis of pyrethroid use trends	Potentially High	Change is up to individuals, needs cumulative effect
Treatment Control				
Extended Detention Basin	Santa Clara Valley Urban Runoff Pollution Prevention Program Commercial Site Design Examples. February 2007.	Shows examples of different structural treatment methods and their effectiveness	Moderate	Improper maintenance could lead to other water quality issues
Extended Detention Basin	California Stormwater BMP Handbook. January 2003.	Reviews extended detention basin BMP methods, concerns, and goals	Moderate	Improper maintenance could lead to other water quality issues
Extended Detention Basin	Ventura Countywide Stormwater Quality Management Program Technical Guidance Manual for Stormwater Quality Control Measures. July 2002.	Reviews many BMP methods and contains information specific to Southern California	Moderate	Improper maintenance could lead to other water quality issues

Table 3-1 (continued)
Literature Review Matrix

Type of BMP	Literature Source	Summary	Ability to Reduce Toxicity Caused by Pyrethroids	Storm Water Concerns
Treatment Control				
Infiltration Basin	California Stormwater BMP Handbook. January 2003.	Reviews infiltration basin BMP methods, concerns, and goals	Potentially High	Improper maintenance could lead to other water quality issues
Infiltration Basin	Ventura Countywide Stormwater Quality Management Program Technical Guidance Manual for Stormwater Quality Control Measures. July 2002.	Reviews infiltration basin BMP methods, concerns, and goals	Potentially High	Improper maintenance could lead to other water quality issues
Infiltration Trench	California Stormwater BMP Handbook. January 2003.	Reviews infiltration trench methods of BMP methods, concerns, and goals	Potentially High	Improper maintenance could lead to other water quality issues
Infiltration Trench	Ventura Countywide Stormwater Quality Management Program Technical Guidance Manual for Stormwater Quality Control Measures. July 2002.	Reviews infiltration trench methods of BMP methods, concerns, and goals	Potentially High	Improper maintenance could lead to other water quality issues
Media Filter	California Stormwater BMP Handbook. January 2003.	Reviews media filter BMP methods, concerns, and goals	Potentially High	Improper maintenance could lead to other water quality issues
Media Filter	Ventura Countywide Stormwater Quality Management Program Technical Guidance Manual for Stormwater Quality Control Measures. July 2002.	Reviews many BMP methods and contains information specific to Southern California	Potentially High	Improper maintenance could lead to other water quality issues
Pervious Pavement	California Stormwater BMP Handbook. January 2003.	Reviews pervious pavement BMP methods, concerns, and goals	Potentially High	Improper maintenance could lead to other water quality issues
Pervious Pavement	Low Impact Development Handbook: Stormwater Management Strategies. December 2007.	Discusses LID strategies for assistance in storm water management	Potentially High	May contaminate groundwater

4.0 BMP Analysis

Based on the literature review and the findings of Phase I of the TRE, BMPs were evaluated for their applicability to the SMR. Because the toxicity appears to be principally a wet weather phenomenon, and because the Permittees' jurisdiction includes the urbanized area of the watershed, the analysis focused on BMPs designed to reduce the amount of storm water pollution caused by urban runoff.

The potentially applicable BMPs are divided into Source Control and Treatment Control BMPs and are discussed in detail below. Through the Permittee's proactive efforts to protect the quality of the receiving waters and their beneficial uses, many programs addressing these broad categories are either already in place or are actively being developed. The implementation status for each specific BMP is discussed. Examples of BMP implementation by other municipalities in the region are included as a tool for evaluating the consistency of the Permittees' program with other programs in the region.

4.1 Source Control BMPs

Source control BMPs are designed to curtail pollution at the source before it has the opportunity to enter the storm drain system and pollute waterways. They are generally the preferred type of BMP because reduction of pollution occurs at the source, before runoff has become contaminated (CASQA, 2003). The types of broad categories of source control BMPs that identified as most appropriate for the Santa Margarita watershed are: pursuing regulatory change, implementing IPM strategies including LID, and public outreach and education.

4.1.1 Regulatory Action

Status: Currently being implemented by the Permittees.

Pesticide manufacturers are required to receive approval by USEPA and California DPR for specific pesticide uses, and both agencies can impose use restrictions to prevent unwanted impacts on the environment and public health. At the federal level, a fundamental regulatory disconnect exists between pesticide approval (registration) under FIFRA and water pollution control programs under the Clean Water Act. This has resulted in a repeating pattern, in which a) pesticides are approved for use without sufficient consideration of potential environmental effects, b) water quality and other ecological impacts accrue, c) use restrictions are applied to the offending products (sometimes involving widespread bans on use), and d) new pesticides are approved for use, with subsequent environmental impacts.

In 1962 Rachel Carson published *Silent Spring*, documenting the widespread ecological consequences of pesticide applications. The federal government responded by banning the use of DDT and other organochlorine pesticides, based on extensive evidence of environmental impacts through the process of bioaccumulation. The ban has lead to dramatic recoveries in affected populations of bald eagles and other species; however, the legacy of these long-lasting pesticides near-shore dumping areas in Los Angeles County and elsewhere remains (IWS, 2007).

Eventually the organochlorine pesticides were replaced principally by organophosphate pesticides, especially in urban uses. In the mid-1990s municipal storm water monitoring programs began to document that commonly-used organophosphate pesticides, especially diazinon and chlorpyrifos, were present at toxic levels and causing toxicity to aquatic organisms, principally the common water flea, *Ceriodaphnia*. Although not bioaccumulative, diazinon and chlorpyrifos were discovered to cause widespread toxicity in urban runoff and local receiving waters (TDC, 2001). USEPA subsequently banned most urban uses of diazinon and chlorpyrifos, although EPA's main motivation involved human health effects

on the pesticide applicators, and water quality was not an important factor in those decisions. Again, the ban was also immediately effective, reflected in reduced concentrations of diazinon and chlorpyrifos in urban water samples, and fewer occurrences of organophosphate-based water column toxicity (c.f., references in Ruby, 2008 for San Diego County Municipal Copermittees Annual Urban Runoff Monitoring Reports). But pesticide manufacturers simply replaced the OP pesticides in their products with other active ingredients, principally pyrethroids. Shortly thereafter, researchers and municipal storm water programs began documenting toxic effects from the new pyrethroid products. The pyrethroid impacts were first documented in sediments, and the affected test organism shifted from *Ceriodaphnia* to the sediment-dwelling *Hyalella*.

In the cases of both organochlorine (DDT) and organophosphate (diazinon, chlorpyrifos) pesticides, federal limitations or bans on uses were effective in ameliorating the associated environmental impacts. In both cases, however, new pesticide products were approved for use that then caused related but different impacts to the environment. Therefore it is clear that the most effective strategy for preventing environmental impacts from pesticide use involves implementing an effective process of pesticide approval and registration that comprehensively accounts for and mitigates against such impacts.

For more than ten years CASQA and various other California state and local agencies have promoted better regulation of pesticides at the federal level, encouraging use restrictions as the most effective means of source control. California water quality agencies have sent comment letters to USEPA and DPR on guidance pertaining to the application of pesticides to surface waters and on recommended environmental hazard statements for residential outdoor pesticides (TDC, 2007). These efforts are beginning to show some modest signs of success. In a recent letter to stakeholders, EPA outlined an approach to provide better cooperation between the Office of Pesticide Programs (OPP) and the Office of Water (OW), to allow for “environmentally protective and scientifically defensible effects assessment judgments about contaminants that are or may be found in ambient water”. The Riverside County Permittees plan to continue their support of these efforts through ongoing

participation in the CASQA Pesticides Subcommittee, the Urban Pesticide Pollution Prevention (UP3) Project, and the Urban Pesticide Committee. The Permittees also plan to request that the RWQCB become involved in advocating for more effective pesticide regulation at the state and federal levels.

The Permittees are members of a CASQA subcommittee that addresses pesticide uses impacting stormwater discharges. Effort focuses on providing input to the USEPA and the California Department of Pesticide Regulation (DPR) to improve pesticides regulations so that they more fully protect water quality and are better aligned with the Clean Water Act and California Water Code. (RCFCWCD, 2008). CASQA has also been active in supporting DPR's ongoing reevaluation of allowable pyrethroid pesticide uses (TDC, 2007).

Increasingly, the regulatory response to the water quality impacts resulting from *legal uses of approved pesticides* has been for regional water boards to impose limitations on the allowable loadings of pesticides to impaired waters through the TMDL process. Local agencies have little or no jurisdiction over sales or use of these pesticide products, and therefore do not have the full authority needed to perform loading reductions in resulting TMDLs. An effective regulatory solution must occur at the state and federal levels, to regulate allowable pesticide uses to effectively prevent such water quality impacts.

Current legislation requires users of certain pesticides to be trained, often certified, in the use of those pesticides and to report the amounts applied (State of California, 2008). A similar regulatory approach could be used to promote pesticide alternatives, such as for PCOs to train and certify their technicians in the use of IPM methods (Quarles, 2002). The Permittees are considering supporting regulatory action by the state to include IPM training for PCOs in the requirements for certification and training on the use of pesticides.

Environmentally sensitive and flexible zoning ordinances may be adopted to facilitate the use of LID principles, thereby encouraging private developers to use LID principles (Prince Georges County, 1999). Additional land use restrictions or alternatives to present zoning

laws may help reduce urban storm water runoff, potentially reducing pyrethroid loadings in receiving waters. The Permittees plan to continue promoting LID implementation through interagency communications and cooperation.

4.1.2 Integrated Pest Management

Status: Currently being implemented by the Permittees.

IPM is "a decision-making process for managing pests that uses monitoring to determine pest injury levels, and combines biological, cultural, mechanical, physical, and chemical tools and other management practices to control pests in a safe, cost effective, and environmentally sound manner that contributes to the protection of public health" (Carlsen, 2008). IPM can further be described as an approach to solving pest problems by using information about the pest and landscape to eradicate the pest's habitat in a manner that poses the least risk to humans (Ecology Action, 2007). IPM has many different aspects that help to reduce pests and in turn cause a reduction in pesticide use, including green gardening and structurally integrated pest management (SIPM). BMPs that are typically used as part of an IPM strategy are described in the following sub-sections.

4.1.2.1 Green Gardening

Status: Not currently being implemented by the Permittees, program under consideration and will be enacted in the near future.

The Green Gardener program, implemented through landscapers, promotes environmentally responsible landscaping to reduce the use and need for pesticides. In general, education of gardening and landscape maintenance staff is beneficial for pest reduction as part of an IPM program. It provides alternative methods to landscapers, such as reducing outdoor sources of ants by elimination of their food and water sources through management of honeydew producing insects and plants associated with them (UC Davis, 2007). The Green Gardener

program encourages businesses to participate in environmentally sound landscape maintenance. Healthy landscapes are more resistant to pests (Ecology Action, 2007). Pests that do not have a suitable habitat will leave to find a more hospitable environment. When the pests leave, then there is a lessened need for pesticide applications and lower risk of pyrethroids entering storm water.

The County of Santa Barbara implemented a Green Gardener Program, in which landscapers are encouraged to take a class at the local city college, covering subjects such as IPM strategies and environmentally beneficial landscaping to obtain a "Green Gardener" card. They are then placed on the Green Gardener list, which is then promoted to the public by the County (County of Santa Barbara, 2008). The program benefits both parties; gardeners receive education and advertising at a nominal cost, and the County receives the benefit of more environmentally-friendly landscaping and a reduction in the use of pesticides. Municipalities may promote this type of program by contracting with landscaping companies that have their employees trained in green gardening practices.

Encouraged by the success of the Santa Barbara Green Gardener Program, the Monterey Bay area instituted a similar program. "The goal of the program was to educate and certify local gardeners in resource efficient and pollution prevention landscape management practices" (Ecology Action, 2007). With the support of the State of California Water Resources Control Board, more municipalities are likely to follow (Ecology Action, 2007).

4.1.2.2 Pest Control Contracting

Status: Currently partially implemented by the Permittees.

Many municipalities contract pesticide applications to professional PCOs. Contracting only with PCOs that have IPM training and certification can help realize IPM models and goals. The recently completed EcoWise Certified IPM Contracting Tool Kit (www.EcoWiseCertified.org), provides resources for municipal agencies to use in developing such a program. The EcoWise IPM Tool Kit includes:

- Elements to consider when developing an IPM policy
- Roles and responsibilities of the agency or business in an IPM program
- How to hire and work with a professional IPM service provider

The Took Kit also includes the EcoWise IPM Process along with a number of other helpful resources and sample documents.

Because PCOs are responsible for the majority of pesticides applied in urban areas, distribution of information regarding less-toxic alternatives, lower-use application techniques, and proper disposal, practices to professional applicators is an essential component of the Permitee's pesticide control effort. The Permittees currently distribute information to PCOs through the Public Outreach and Education Program (see Section 4.1.3).

The City of Palo Alto's Regional Water Quality Control Plant includes IPM requirements in their contracts with PCOs (City of Palo Alto, 2008). The City of Santa Monica, as a part of their SIPM program, specified IPM requirements in their PCO contracts (Raphael, 1997). Use of PCOs with IPM training and certification by municipalities encourages local PCOs to invest in IPM training and certification, which in turn, allows their expertise in IPM to expand beyond just the municipality itself (Quarles, 2002). Education of PCOs, hiring only PCOs that have IPM training, and contracting specifically for IPM by local agencies may

create more public awareness and reduce the use of pyrethroids in the Santa Margarita watershed.

4.1.2.3 Structurally Integrated Pest Management Program

Status: Currently being implemented by the Permittees, with additional programs under consideration.

SIPM is a program that controls the access of pests to buildings and the potential food sources within them by protecting the structure itself from pests, with minimal use of pesticides. The Permittees intend to lead by example, sharing success through public outreach programs and encouraging individuals and businesses to do the same. SIPM is a long term solution offering positive potential impacts on budget, reduction of pests and, reduction of pyrethroid pesticide use. Note that SIPM should not be confused with category of pesticide use referred to as structural pest control. SIPM is a BMP designed to reduce the use of pesticides in a structural pest control program.

The City of Santa Monica implemented an SIPM program and experienced a reduction in pests and in the use of pesticides. In addition, Santa Monica reduced pest management costs by 30% (State of California, 2008). California law requires a SIPM strategy for all state-owned buildings and schools (State of California, 2008). The three main aspects of a SIPM strategy are facility design and LID, monitoring, and facility maintenance.

<u>Facility Design</u>

Status: Currently being implemented by the Permittees.

Facility design can play a large role in the exclusion of potential pests. "A facility's planning, design, and construction provides an opportunity to incorporate features that help to exclude pests, minimize pest habitat, and promote proper sanitation" (NIH, 1999). It can also reduce

storm water runoff (NAHB, 2008). Exclusion of pests helps reduce pest infestations and in turn the need for pyrethroid pesticide use. For example, ensuring that the design holds plants and mulch several inches away from the foundation of a building may assist the reduction of ant populations immediately adjacent to the building (UC Davis, 2007). A reduction in storm water runoff may also reduce the amount of pyrethroids that enter receiving waters. Facility designs can incorporate aspects of LID, as discussed below. New development and redevelopment may incorporate designs that aid in the exclusion of pests and the reduction of urban runoff, which may contribute to a reduction of pollutant loads, including pyrethroids.

Pest Monitoring

Status: Currently in not use by the Permittees, program under consideration.

Monitoring structures and adjacent areas may help prevent pest infestations and quickly identify potential problems. Traps, visual inspections, and staff interviews assist in the identification of areas and conditions that may foster pest activity (NIH, 1999). Monitoring for ants, for example, may consist of simple inspections of facilities such as looking under sinks and along pipes and electrical wires (UC Davis, 2007). The City of Santa Monica, as a part of their SIPM, provided training to all general staff, purchasing, carpenters and custodial staff. Specific presentations were given to groups, such as the custodial staff, who learned about products used in control of ant and cockroach populations and general sanitation. The staff is trained in the identification of potential pest infestations and habitat conditions that may foster pest activity (Raphael, 1997). Early identification of pest infestations can increase the effectiveness of specific treatments and reduce the overall need for pesticide use.

Sanitation and Facility Maintenance

Status: Currently not being implemented by the Permittees, program under consideration.

Proper sanitation includes reducing clutter and pest habitat and incorporating proper facility and waste management practices. Records of maintenance and housekeeping conditions may help track pest problems and assist in the determination of whether corrective action is needed or has been taken in a timely manner (NIH, 1999). Sanitation and facility maintenance involves the housekeeping staff, the building maintenance staff, and the landscaping staff.

Improper storage of waste may affect urban runoff, and it may create a hospitable environment for pests, particularly ants. Initial, low-cost steps that municipalities may take to improve waste handling are: controlling litter, keeping waste collection areas clean, and insuring proper disposal of pyrethroid pesticide products, if used, and educating employees and the public. Simple solutions such as rinsing out soda bottles and emptying trash daily prove effective to reduce insect infestations, particularly ants (UC Davis, 2007). An important component of an SIPM monitoring program is regular inspections of solid waste containers for structural damage or leaks (CASQA, 2004).

Educating custodial staff, such as was done in the City of Santa Monica, can reduce the amount of improperly disposed pesticides (Raphael, 1997). Designating staff members to perform a daily checklist of areas around the structure to ensure cleanliness and proper storage of waste can assist the efforts to reduce potential pest infestations and leakage of hazardous waste (CASQA, 2004).

Building maintenance staff also benefit from education and acceptance of responsibility for pest management. Maintenance crews can contribute to an SIPM strategy by securing the structure, such as caulking holes and cracks, assisting in the removal of clutter, and installing

door sweeps (State of California, 2008). Caulking holes in structures can prove effective in keeping ants out of facilities (UC Davis, 2007). Upkeep on building maintenance helps reduce potential pest habitat, and thus may reduce the need for application of pyrethroid pesticides.

Reduction of pest habitat around structures may reduce pest populations in and around structures. Marin County, as part of its integrated pest management program, has reduced rat habitat around the local Civic Center and in turn has seen suppression of the rat population (Carlsen, 2008). Programs similarly tailored to ants may result in a positive effect of pest reduction within the SMR. For example, banding tree trunks with tanglefoot or similar sticky substances can keep ants away from trees (UC Davis, 2007). Education and training may be provided to Permittee landscaping crews to assist in proper vegetation removal and, when necessary, pesticide use. Landscaping crews may be informed that pyrethroid pesticides or any less toxic pesticides are to be used only when a pest problem arises to an intolerable level, that they are not administered when a wet weather event is expected and only when low wind speeds are present (CASQA, 2004). Education of landscaping crews to remove pest habitat may reduce the need for pyrethroid use thus reducing the potential risk of pyrethroids entering storm water runoff.

Also, utilizing low water using vegetation and alternative landscaping techniques such as xeriscaping or naturescaping are efforts that landscape crews can take to reduce pyrethroids in urban runoff. Landscaping crews may also help preserve the water efficiency of the landscape through properly timed fertilizing, weeding, pruning, and pest control. For example, proper collection and disposal of yard clippings can prevent loose vegetation that has possibly been treated with pyrethroid pesticides from entering waterways or storm water drainage systems such as MS4s (CASQA, 2004). Reduction in pest habitat and proper landscaping maintenance may help reduce pest problems, and thus the need for pyrethroid pesticides.

4.1.3 Public Outreach and Education

Status: Currently being implemented by the Permittees.

Public Outreach and Education programs inform the public about storm water issues, proper use and disposal of publically available chemicals, and alternatives to pyrethroid pesticides. Reaching out to the public and providing information about the dangers of pyrethroids pesticides encourages citizens to make educated decisions about pesticide use. It also may accelerate state and federal regulatory changes regarding pyrethroid use through public promotion of such changes. According to the EPA, public education and awareness can be a "key component" in any BMP program for storm water management (EPA, 2008).

The District has enacted a public outreach program to help reduce the potential for pyrethroid pesticides to contaminate receiving waters. This program has initiated: distribution of educational materials to hardware store employees, active participation and distribution of outreach for HHW/ABOP facilities to provide for free venues to dispose of excess pesticides, and distribution of EPA and CalEPA materials to the public. The District also promotes the use of less toxic pesticides, provides education on storm water issues in public schools, and has enacted a multimedia campaign to control urban sources of pyrethroid pesticides (RCFCWCD, 2005).

<u>Education and Outreach to Businesses</u>

Status: Currently being implemented by the Permittees.

Distribution of information regarding pesticides to businesses, particularly hardware stores, is crucial for reducing pyrethroid use and misuse at its source. Education on pyrethroid runoff to local hardware stores may assist local hardware store employees to educate their customers on alternative methods of pest control. An Orange County survey from 2001 found that 55% of pest control products were purchased at hardware stores (Wilen, 2001). In

2006, Riverside County had 177,562 pounds of reported non-agricultural usage of pyrethroid pesticides (RCFCWCD, 2008). Reduction in usage may lead to a reduction of pyrethroids in urban storm water runoff. Educating hardware store employees about urban water quality impacts of pyrethroid pesticides may help reduce the usage and thus the toxicity of runoff in the Santa Margarita Watershed resulting from pyrethroid use, as employees have the ability to recommend alternative methods of pest management to their customers.

Education of nursery employees about pyrethroid management and IPM techniques may also yield significant source control benefits. In general, nursery employees tend to be more knowledgeable about pesticides than employees at hardware stores (Wilen, 2001). Nurseries that use and sell pyrethroids offer the highest return on outreach resources, while those nurseries that have chosen alternate pest management methods serve as examples of IPM in practice. In a recent Riverside County survey, one nursery stated that they do not use pesticides and if their nursery does experience a pest infestation, it is treated naturally (RCFCWCD, 2008). Such nurseries are likely to encourage their clients and customers to use the same methods. Education and outreach can lead to cooperation and sharing of successful and unsuccessful methods of IPM and ultimately reduce pyrethroid pesticide use and toxicity of storm water runoff.

Businesses not in the industry of pesticide sales may also benefit from outreach. The District directs outreach efforts to all businesses; those in the business of selling or using pesticides, and those that are not. The District has coordinated with the County's Business License Department to include an educational insert of the "Only Rain Down the Storm Drain" program to new business license applicants and annual renewal reminders (CRWQCBSD, 2008). Informing companies on proper disposal of hazardous materials such as pesticides is crucial to prevent pyrethroid containers from being improperly disposed of, leaking, and then contributing to storm water pollution.

Several Southern California cities conduct general business outreach as well. Cities such as Carson, Gardena, Inglewood, and Lomita distribute informational pamphlets on storm water

pollution relating to landscaping and gardening practices to general businesses (DCWMAC, 2007). Such information informs businesses of alternate methods of pest control beyond pesticide use and imparts knowledge about storm water quality issues. Thus, dissemination of educational materials to local businesses is intended to help reduce pyrethroid runoff by ensuring proper disposal of pesticides and encouraging alternate methods of pest control.

Educational and Outreach to the General Public

Status: Currently being implemented by the Permittees.

The District distributes educational materials within the Santa Margarita Region such as EPA sponsored pamphlets in order to promote reduced use of pyrethroid pesticides and educate the public about alternate practices of pest management. The public purchases retail pesticides and uses them, presumably, according to the manufacturer's instructions and in compliance with regulations listed on the packaging, including proper disposal of empty containers in the municipal waste stream. However, even when used properly, retail pesticides have the potential to contaminate urban runoff, and homeowners may be unaware of the downstream consequences of pesticide use. Depending on the landscaping practices in a neighborhood, promoting alternative pest management strategies and educating the public on storm water quality and pesticide use may be the most beneficial way to reduce the source of pyrethroids in urban runoff (Wilen, 2005).

The District distributes educational materials within other public outreach programs and maintains pest management information on the internet. The District also distributes brochures to educate the public on lawn and garden maintenance, fertilization, and pesticide and household chemical use (RCFCWCD, 2005). These educational materials provide public education on alternative pest control methods, limiting individual use of pyrethroids, and proper disposal of pesticide containers.

Many municipalities perform storm water outreach at festivals and public events by participating in the events and by distributing brochures. The Cities of Lawndale and Torrance plan and attend public festivals and rent booth space to educate the public about storm water quality and the use of pyrethroids (DCWMAC, 2007). Cities including Carson, Gardena, Inglewood, and Lomita distribute informational pamphlets on storm water pollution relating to household activities and landscaping and gardening practices to the general public (DCWMAC, 2007). The District participates in events such as the Children's Groundwater Festival, the Southern California Fair, the Community Water Festival, and the Santa Margarita Watershed Clean Up (RCFCWCD, 2005). The Permittees, as well as other municipalities within California, participate in public events and distribute informative materials as a portion of their current public outreach programs.

Education on proper disposal of pesticides

Status: Currently being implemented by the Permittees.

Improper disposal of pesticides is a potential contributor to storm water contamination. Empty containers be disposed of in the municipal waste stream are not likely to contribute to storm water pollution, however, unused pesticides may enter the MS4 by leaking in transit. In Orange County in 2001, 54.5% of people surveyed claimed to have disposed of unwanted pesticides in the municipal waste stream, and 78.6% did not know the location of a household waste disposal site (Wilen, 2001). The District has created a partnership with Riverside County Waste Management to provide educational programs and materials on proper disposal of unwanted waste, including pesticide containers (RCFCWCD, 2005).

Multimedia Outreach

Status: *Currently being implemented by the Permittees.*

The EPA suggests using multiple media sources to promote and educate on storm water impacts, particularly through public service messages (EPA, 2007). Mass media has proven to be a key source of pollution prevention information for the general public (LADPW, 2002). The District currently participates in a multimedia advertising campaign including: maintaining a website that provides information, distributing mailing inserts regarding water quality issues through various county entities, and billboard advertising campaigns. Many other municipalities, such as the Cities of Palo Alto and Lawndale, also use the world wide web to provide information to the public (City of Palo Alto, 2008) (DCWMAC, 2007).

Public School Programs

Status: *Currently being implemented by the Permittees.*

A storm water education program for public schools is a concept supported by the EPA (EPA, 2007). The County of Los Angeles has incorporated public school educational programs into its outreach program (LADPW, 2002). The District focuses storm water education efforts on elementary school students (RCFCWCD, 2005). For example, sixth-grade students at Warm Springs Middle School were given an interactive presentation regarding storm water pollution with an enviroscape model that excited and engaged the students; a presentation that has been given over 150 times during the 2003-2004 school year (Jamescourie, 2004). Educational programs in public schools are intended to produce long-term benefits to storm water runoff quality.

Education on Lower Risk Alternative Pesticides

Status: Currently being implemented by the Permittees.

Part of Public outreach includes suggesting less toxic alternatives to pyrethroid pesticides, such as those listed on the Our Water Our World website (www.ourwaterourworld.org). Lower risk pesticides have reduced impacts on human health, lessened toxicity to non-target organisms, decreased potential for water contamination, and lower pest resistance potential (Matteson et al., 2007). The District distributes materials associated with the "Our Water Our World" organization (RCFCWCD, 2008).

However, some of the lower risk pesticides are toxic to beneficial arthropods and still have the potential to pollute surface and ground water (Matteson et al., 2007). Pyrethroids were developed as a less toxic alternative from organophosphate pesticides (Quarles, 2002). In the Santa Margarita Watershed, there was a decrease in water toxicity to *Ceriodaphnia* and an increase in toxicity to *Hyalella* as organophosphate pesticides such as chlorpyrifos and diazinon and were replaced by pyrethroids (RCFCWCD, 2008). The effects on storm water runoff of lower risk pesticides must be carefully evaluated before they are promoted as effective solutions to urban storm water runoff pollution.

4.1.4 Low Impact Development (LID)

Status: Currently being implemented by the Permittees.

LID involves environmentally-friendly building and development designs that mitigate impacts to land and water. LID functions by managing storm water at its source, incorporating a variety of runoff control techniques, using natural features as design features, and protecting natural resources (NAHB, 2008). Municipalities that promote LID have the potential to reduce municipal infrastructure and maintenance costs while balancing growth needs with environmental protection (NAHB, 2008). LID practices include "small scale,

decentralized treatment practices" that include conservation of open space, a reduction of impervious surfaces, and the incorporation of water controls (NAHB, 2008). Reduction of urban runoff volumes may reduce the loadings of pyrethroids to receiving waters in urban areas.

In 2007, EPA implemented a retrofit of the agency headquarters in Washington, D.C., incorporating LID designs to assist with storm water retention (EPA, 2007). Retention of storm water on the land helps prevent pollutants from entering streams and rivers (EPA, 2007). One of the main goals of the EPA LID retrofit was to demonstrate several LID techniques and encourage government agencies and developers to use them (EPA, 2007). LID may be used in conjunction with IPM programs, which would reduce the amount of pesticides used and minimize the urban storm water runoff of pyrethroids. The County of San Diego's most recent MS4 permit requires implementation of LID techniques (County of San Diego, 2007); this appears likely to continue as a trend with other permits in the region as they are renewed. The incorporation of LID principles into development regulations in the Santa Margarita watershed provides a potential solution to runoff of pyrethroids into receiving waters.

4.2 Treatment Control BMPs

Treatment Control BMPs are typically structural devices engineered with the intent to remove pollutants from storm water. Treatment BMPs require construction and long term maintenance, but can be extremely effective (CASQA, 2003). Although treatment BMP's have not been thoroughly investigated specifically for reduction of pyrethroids, some methods may be useful. Pyrethroids bind tightly to soil particles so there is a high probability that pyrethroids would be removed with suspended solids when they pass through treatment BMPs. In addition, pyrethroids degrade over time; permethrin, for example, has a half life in soil of about 30 days and about 10 days on certain plant life. Because pyrethroids have low mobility in soil, infiltration-based treatment BMPs have a low probability of contributing to groundwater contamination (NPTN, 1997).

From the list of available treatment BMP's identified in Table 3-1, the types of treatment BMPs feasible for pyrethroid treatment in the Santa Margarita Watershed, considering the climate, local vegetation, and soil types present are: pervious pavement, media filters, extended detention basins, infiltration basins, and infiltration trenches.

These BMPs and their potential to remove pyrethroids from storm water runoff are described below.

4.2.1 Pervious Pavement

Status: Currently being implemented by Permittees under LID program.

Pervious or porous pavement is "a system comprising a load-bearing, durable surface together with an underlying layered structure that temporarily stores water prior to infiltration or drainage to a controlled outlet" (CASQA, 2003). Pervious surfaces include grass, gravel, and porous concrete and asphalt (CASQA, 2003). The multi layer system assists in preventing pyrethroid pollution by providing a stable structure for pyrethroids to bind to and degrade, thus helping to prevent their transport in to receiving waters. Silts that are deposited within the pavement may need infrequent controlled waste disposal (CASQA, 2003).

The advantage of porous pavement is that urban runoff is reduced while treatment is provided and it is an effective drainage solution in confined urban areas. However, porous pavement is not a viable option on high traffic or high speed roads due to safety issues. There is a small chance that it may contaminate groundwater. It is fairly easy to replace, should there be a clog or damaged area, as small areas can individually be paved (CASQA, 2003). The use of pervious pavement appears to be a growing trend.

4.2.2 Media Filter

Status: Currently being implemented by Permittees via sand filters.

Storm water media filters are usually two-chambered including a pretreatment settling basin and a filter bed filled with sand or other absorptive filtering media. As storm water flows into the first chamber, large particles settle out, and then finer particles and other pollutants are removed as storm water flows through the filtering media in the second chamber. Media filters are highly effective at removing sediment from storm water flows (CASQA, 2003). They are appropriate in low flow areas, particularly with sandy soil. Washington D.C. and Austin, TX have both successfully implemented media filters to treat storm water (VCSQMP, 2002). They "are well suited to Southern California because they do not require vegetation and require less space than other treatment control measures with similar removal efficiencies when a partial treatment sedimentation basin is used" (VCSQMP, 2002).

However, media filters clog easily when exposed to high sediment loads and may decrease in effectiveness after being in use for a few years (CASQA, 2003). A media filter is not appropriate for areas with erosive soil upstream from the treatment filter (VCSQMP, 2002). The lack of abundant native vegetation in the Santa Margarita watershed contributes to a high potential for erosion, so media filters may not be effective in the long term due to clogging. When clogging does occur, media filters may become a nuisance due to mosquito or midge breeding in pooled waters (CASQA, 2003).

4.2.3 Extended Detention Basin

Status: Currently not being implemented by the Permittees for pyrethroid reduction.

An extended detention basin (EDB) is a permanent basin "formed by excavation and/or construction of embankments to temporarily detain the Stormwater Quality Design Volume

(SQDV) of storm water runoff to allow sedimentation of particulates to occur before the runoff is discharged"(VCSQMP, 2002). EDBs are constructed with an outlet at the bottom that allows for a slow, time-controlled release. The ultimate goal of EDBs is to level off peak storm water runoff rates (VCSQMP, 2002). Santa Clara Valley and the City of Palo Alto have noted that their detention basins have helped with the reduction of pollutants (EOA, 2004) (City of Palo Alto, 2008). Pyrethroids could be removed in the basin through settling of particulates.

Extended detention basins can serve multiple purposes as they provide for significant trash removal as well (CASQA, 2003). Maintenance is needed to ensure that the pond fully drains after large wet weather events, to avoid creation of standing pools causing mosquito or other vector habitats (CASQA, 2003). Extended detention basins are most effective when used in conjunction with other control measures, and are only moderately successful at removal of sediment. EDBs require relatively large amounts of land and therefore may not be feasible in urban areas of the Santa Margarita watershed (VCSQMP, 2002). There are no available examples of test results from municipalities using an extended detention basin for reduction of pyrethroid pesticides.

4.2.4 Infiltration Basin

Status: Currently not being implemented by the Permittees for pyrethroid reduction.

An infiltration basin is a shallow impoundment that is designed to infiltrate storm water and utilize the natural ability of soil to remove pollutants in storm water runoff (CASQA, 2003). Infiltration basins store runoff until it eventually enters the soil and infiltrates into the water table (CASQA, 2003). The soil present in the Santa Margarita Region is extremely pervious and may work well with an infiltration basin treatment structure.

Since pyrethroids adsorb onto soil, pyrethroids are likely to be removed from the storm water into the soil. However, there is a slight possibility that they may be resuspended into the

groundwater. Monitoring of pilot sites would be required to determine if there is transport of pyrethroids to the water table.

As with detention basins, maintenance is needed to ensure that the basin fully drains after large wet weather events to avoid creation of standing pools causing mosquito or other vector habitats. Infiltration basins may fail if the storm water volume is greater than the design volume (VCSQMP, 2002). Since infiltration basins require a large amount of open space, installation in urban areas is problematic. There are no available examples of test results from municipalities using infiltration basins for reduction of pyrethroid pesticides.

4.2.5 Infiltration Trench

Status: Currently not being implemented by the Permittees for pyrethroid reduction.

An infiltration trench is a long and narrow ditch that collects storm water runoff by storing it in the voids in a rock bed and allowing it to infiltrate to the soil matrix (CASQA, 2003). Infiltration trenches are extremely effective at removing fine sediment particles and associated pollutants (CASQA, 2003). Naturally pervious soils are required (VCSQMP, 2002). The Santa Margarita watershed has naturally pervious soils, which would allow for the removal of pyrethroids from the water and into the sandy soil.

Infiltration trenches are typically used in conjunction with grass lined channels or grass filter areas located upstream for maximum removal of sediment and larger particles (VCSQMP, 2002). Due to the arid environment in the Santa Margarita Region, grass lined channels, or even vegetated strips, would require irrigation to maintain the vegetation. If the infiltration trench clogs, it can become a source for mosquito breeding. There are no available examples of test results from municipalities using infiltration trenches for reduction of pyrethroid pesticides.

4.3 BMP Evaluation

A summary of the relative advantages, disadvantages and costs of the various BMPs identified in Sections 4.1 and 4.2 above is presented in Table 6.1 below. The table includes advantages, disadvantages, and the relative cost of implementing the BMPs.

Table 6.1
BMP Comparison Table

BMP Technology	Advantages	Disadvantages	Relative Cost*
Source Control			
Regulatory Change	Reduces the availability of pyrethroids on the market	May take years to achieve full effect	$
Integrated Pest Management	Engages businesses and the public in environmentally sound gardening practices	Need to ensure that employees are following protocols	$
	Has been implemented in various locations throughout CA and the US	Could have some resistance from employees who are use to standard practices	
	SIPM can be put in place directly by the Permittees	Some may find the organic methods of gardening to be too time consuming	
	SIPM can be incorporated directly into current maintenance activities		
	Includes LID aspects		
Public Outreach and Education	EPA states that Public Outreach is key for any BMP program	Cannot control the direct actions of public but only educate	$
	Copermittees have already implemented a public outreach program	Hard to measure the direct impact of pollutant reduction	
	Employees of business have direct impact on the buying choices of the general public		
	Programs have been implemented by many municipalities		

Table 6.1 (continued)
BMP Comparison Table

BMP Technology	Advantages	Disadvantages	Relative Cost*
Treatment Control			
Porous Pavement	Reduces runoff volume while reducing pollutant load as well	Requires ongoing minimal maintenance	$ to $$ depending on size
	Can be easily replaced depending on the size and location of design	No known measured reduction of pyrethroids.	
Media Filter	Do not require vegetation	No known measured reduction of pyrethroids.	$$$
	Highly effective in removal of sediments	Clogging is an issue because of the erosion potential in the watershed.	
	Requires less space than other treatment controls for sediment removal		
Extended Detention Basin	Known for significant trash	Large footprint Moderately successful at removing sediment	$$$
	Standard BMP with many years of maintenance and operational information available	Create an area with vector breeding potential	
		No known measured reduction of pyrethroids.	
Infiltration Basin and Trench	Uses natural ability of soil to remove pollutants.	Unknown if pyrethroids would be transported to the groundwater table.	$ to $$$
	Local soils would allow infiltration	Would require a pilot study to determine transport.	
		No known measured reduction of pyrethroids.	
		Clogging of outlet structure	
		Accumulation of metals in soil	

*Relative Cost: $ = $0 to $50,000, $$ = $50,001 to $100,000, $$$>100,000

5.0 Pending Legislation

There is no relevant pending state legislation relating to pyrethroid pesticides from the California Department of Pesticide Regulation or, in general, the State of California as of December, 2008 (State of California, 2008) (CDPR, 2008). In August 2006, the DPR put rules in place to control insecticide sprays during the dormant season. During winter, pesticides are applied to dormant tree and vine crops to kill overwintering pests and diseases. The new rules restrict the use of most dormant insecticides when residuals can run off into water (DPR 2007-08 Progress Report). However, there are no additional updates relating to pending pyrethroid legislation at this time.

There is no relevant pending federal legislation relating to pyrethroid pesticides from the United States Congress as of December, 2008 (Library of Congress, 2008). Although the EPA is working on proposed mitigation labeling for non-agricultural pyrethroids, there is no indication as to when this legislation may be enacted (TDC, 2007).

6.0 Proposed Course of Action

The Permittees intend to use a phased approach to address the identified sources of pyrethroid pesticides causing toxicity in surface waters of the SMR watershed. As described in Section 4, various source control BMPs and treatment control BMPs are available to address these sources. However, the use of pyrethroid pesticides can not be directly regulated by local governments. The most effective control strategy involves effective labeling and use restrictions via state or federal regulatory action, to prevent water quality impacts from legal pesticide uses. The proposed course of action involves an adaptive management approach with the following broad elements:

- Pursue state and federal regulatory change through CASQA
- Implement a set of source controls targeted specifically at urban pesticide use,
- Through the annual reporting process, monitor the implementation of those controls, assess effectiveness, and identify sources or areas where additional effort is needed,
- Evaluate whether additional controls, including treatment controls, may be needed to further reduce pyrethroid pollution,
- Implement additional controls as needed,
- Continue to monitor implementation, as well as conditions within the target receiving waters, assess effectiveness, and re-evaluate control program

The Permittees will continue to support CASQA and/or other agencies pursuing regulatory change in labeling or use limitations for pyrethroid pesticides. This support will include participation in the CASQA Pesticides Subcommittee and the Urban Pesticide Committee, and supporting the implementation of the Urban Pesticide Pollution Prevention (UP3) Project. Permittee staff will continue to provide staff time and resources necessary for the CASQA Pesticides Subcommittee to complete its negotiations with the California Department of Pesticide Regulation and USEPA regarding labeling and use limitations for pyrethroids.

Source control is generally a more cost-effective approach to pollution abatement than treatment control, as source controls do not involve the costly capital investments of treatment controls. As discussed previously, CASQA, EPA, and other agencies and experts

recommend a source control program as an essential component of a successful pollution reduction strategy.

The basis of source control involves preventing the entrance of the subject pollutant into the discharge stream. For pyrethroid pesticides, this means preventing the pesticide from entering the municipal storm drain system through urban runoff. This can take place by intervention at the various steps in the pest control process:

- Point of sale: reducing the purchase of pyrethroid products through education of PCOs and the public in consequences of pesticide use and alternative means of pest control, including integrated pest management (IPM)
- Application: reducing use of pyrethroids on site through education of PCOs and the public into the importance of proper application methods and the potential consequences of pesticide use, as well as pest control alternatives (IPM techniques)
- Off-site Transport: reducing movement of pyrethroids into municipal storm drain system via use of Green Gardener approaches, IPM, and LID building techniques to reduce irrigation water use, retain storm water runoff on-site, and provide on-site mitigation for runoff pollutants (via grassy swales, infiltration, etc.)

A five-year pyrethroid pollutant reduction program is proposed by the Permittees.

<u>Year 1</u>

- Continue to support state and federal efforts to improve pyrethroid pesticide regulation
- Continue to publicize/promote the services of IPM-certified PCOs, to encourage businesses and homeowners to choose their services
- Continue to implement local agency contracting rules to require contracting of IPM-certified PCOs for municipal pest control (through EcoWise Certified IPM Contracting Tool Kit, e.g.)
- Continue point-of-sale education effort providing instruction in pesticide alternatives and proper use/application (using materials available through Our Water Our World, UP3 Project, CASQA members, e.g.)
- Continue efforts to develop and implement LID guidance for planning and development

Year 2

- Coordinate with the University of California (UC) Extension Master Gardener Program to extend its services to the Temecula/Murrieta area to further promote and support the use of IPM by local residents
- Re-evaluate, enhance as needed, and continue measures implemented in Year 1

Year 3

- Conduct programmatic assessment as part of third-year annual report, evaluate successes and areas where additional efforts are needed and adjust program accordingly
- Re-evaluate, enhance as needed, and continue measures implemented in Years 1 and 2

Year 4

- Evaluate effectiveness of BMPs using water quality monitoring data as part of fourth year annual report
- Re-evaluate, enhance as needed, and continue implementation of revised program as defined in Year 3

Year 5

- Conduct programmatic assessment, evaluate successes and areas where additional efforts are needed as part of ROWD process
- Identify additional program elements, including source and/or treatment controls, as needed to effect required pollutant reductions; revise program accordingly
- Re-evaluate, enhance as needed, and continue implementation of revised program as defined in Year 3

Many of the source control materials and programs needed are readily available through existing programs such as EcoWise Certified, Green Gardener, Our Water Our World, the UP3 Project, and the Western IPM Center. The following websites provide further information on these and other programs:

Urban Pesticide Pollution Prevention (UP3) Project: www.up3project.org
Green Gardener Program: www.green-gardener.org/about
Western Integrated Pest Management Center: www.wripmc.org
EcoWise Certified Integrated Pest Management: www.ecowisecertified.com
Our Water Our World: www.ourwaterourworld.org
Green California: www.green.ca.gov/EPP/building/structipm.htm

City of San Francisco: http://www.sfenvironment.org/our_programs/topics.html?ti=1
DPR: http://www.cdpr.ca.gov/docs/registration/reevaluation/chemicals/pyrethroids.htm

As a practical measure, it will be necessary to evaluate individual Permittee capabilities and resources, and develop a specific work plan for implementation of the pyrethroid pollutant reduction program.

It is also essential to develop and implement the pyrethroid pollutant reduction program in coordination with other regulatory requirements, especially other pollutant reduction programs mandated under the storm water NPDES Permit and/or load allocations required by TMDLs within the SMR watershed.

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2009 REPORT OF WASTE DISCHARGE

CERTIFICATION

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Signed _____

Warren D. Williams
General Manager - Chief Engineer
Riverside County Flood Control
and Water Conservation District

2009 REPORT OF WASTE DISCHARGE

CERTIFICATION

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Signed: Gary M. Christmas Date: 1/8/09

Gary M. Christmas
Chief Deputy County Executive Officer
Riverside County Executive Office

2009 REPORT OF WASTE DISCHARGE

CERTIFICATION

CITY
OF
MENIFEE

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Signed: _____
George A. Wentz, City Manager
City of Menifee

2009 REPORT OF WASTE DISCHARGE

RIVERSIDE COUNTY FLOOD CONTROL & WATER CONSERVATION DISTRICT

CERTIFICATION STATEMENT

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Patrick A. Thomas

Signature

Mr. Patrick A. Thomas / Director of Public Works

Name & Title

January 8, 2009

Date

2009 REPORT OF WASTE DISCHARGE

CERTIFICATION

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Signed: _____

Bill Hughes
Director of Public Works
City of Temecula

CITY COUNCIL MEMBERS

BOB CASHMAN
BRIDGETTE MOORE
MARSHA SWANSON
SCOTT FARNAM
SHERYL ADE

2009 REPORT OF WASTE DISCHARGE

CERTIFICATION

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Signed: _____
John Danielson, City Manager
City of Wildomar

23873 Clinton Keith Road | Suite 201 | Wildomar, CA 92595 | 951.677.7751 PHONE | 951.698.1463 FAX
www.cityofwildomar.org

SANTA MARGARITA WATERSHED

COUNTY OF RIVERSIDE, CALIFORNIA

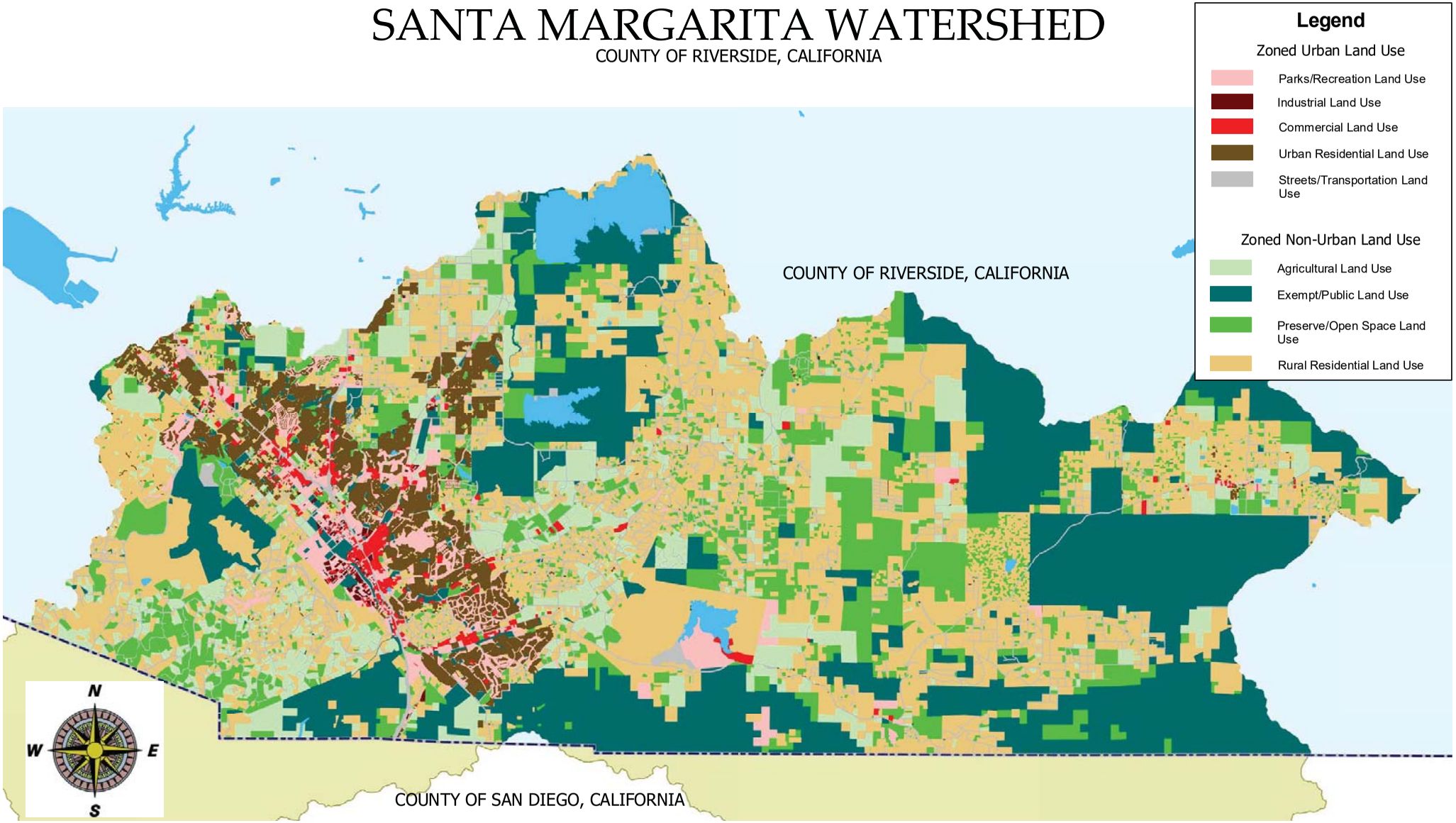

SANTA MARGARITA WATERSHED
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(REVISED 14 JAN 09)

SANTA MARGARITA WATERSHED

WITHIN RIVERSIDE COUNTY, CALIFORNIA

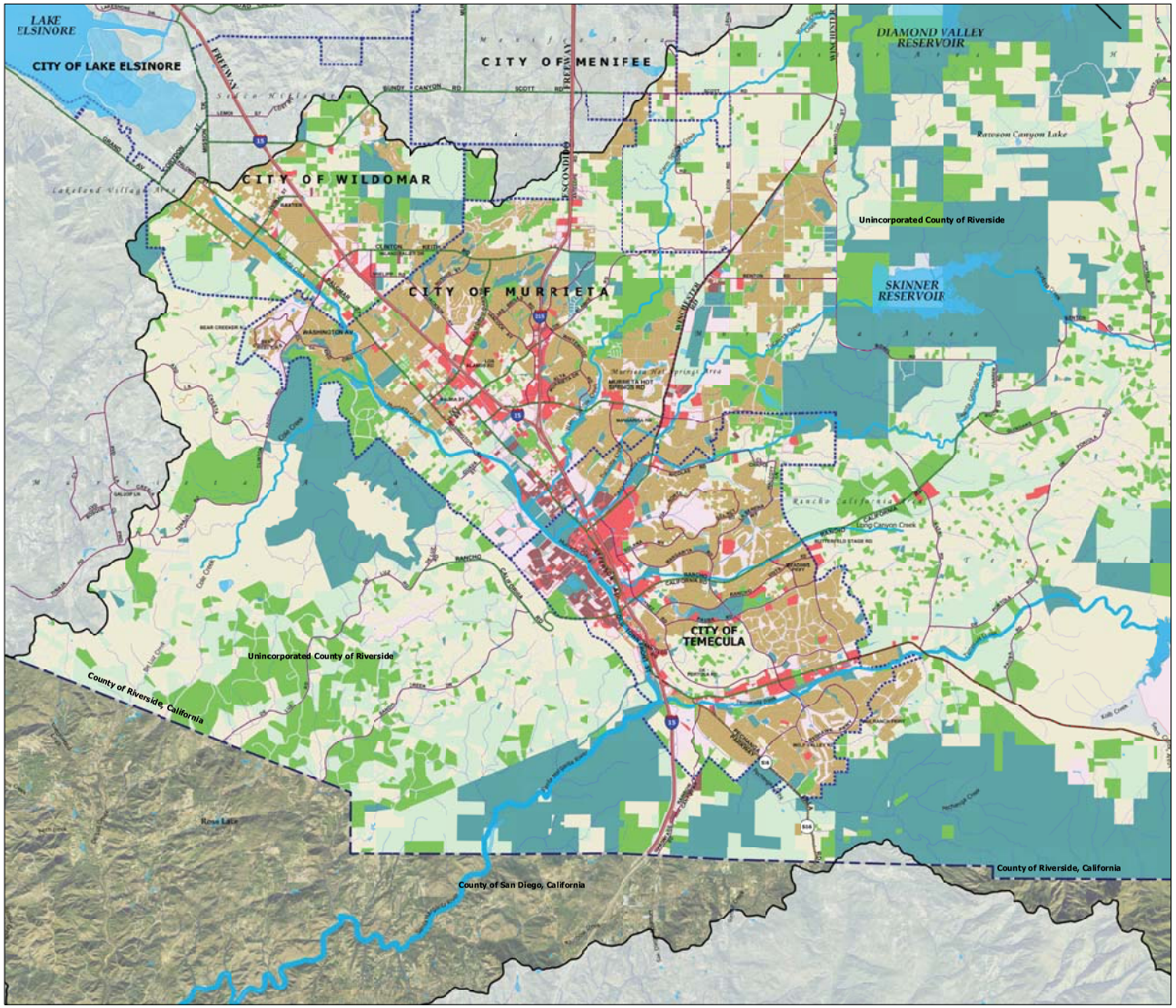

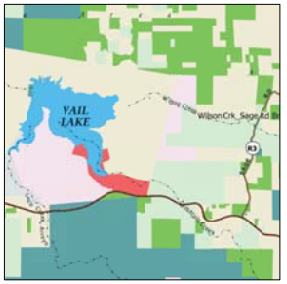

DETAIL 1

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Legend

- US Freeways
- State Highways
- County Roads
- Primary Arterial Roads
- Secondary Collector Roads
- Waterbodies
- Watercourses
- Railroads
- Incorporated Areas
- Santa Margarita Watershed Boundary
- County of Riverside Boundary

Zoned Urban Land Use

- Commercial Land Use
- Industrial Land Use
- Parks/Recreation Land Use
- Urban Land Use
- Street/Roads Lands Use

Zoned Non-Urban Land Use

- Agricultural Land Use
- Exempt Land Use
- Preserve/Open Space Land Use
- Rural Residential Land Use

DETAIL 2

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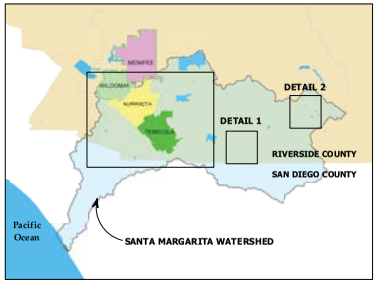

VICINITY MAP

NOT TO SCALE

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT GEOGRAPHIC INFORMATION SYSTEM

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SANTA MARGARITA REGION OF RIVERSIDE COUNTY ZONED LAND USE

(REVISED 13JAN09)

020688

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

RIVERSIDE, CALIFORNIA

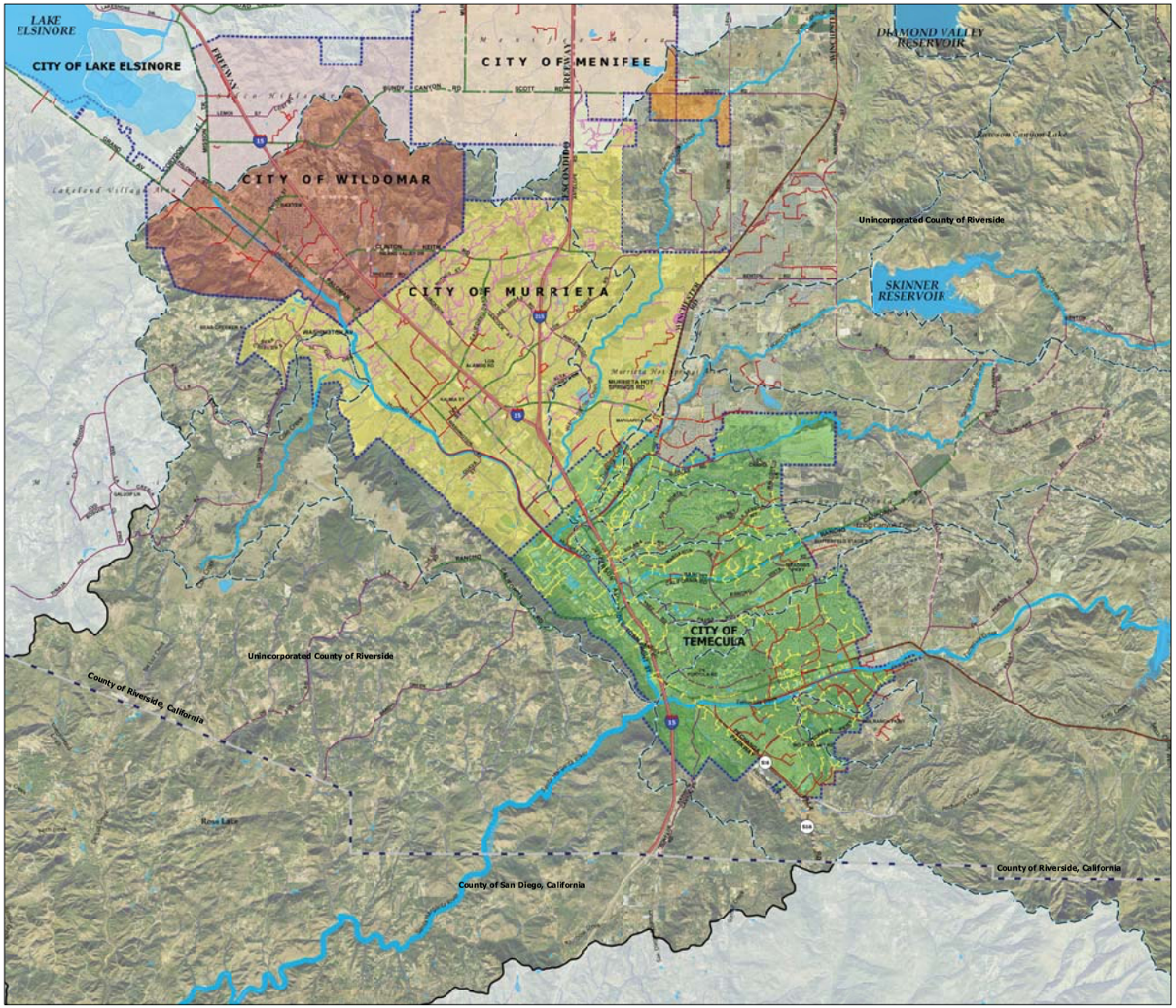

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DETAIL 2

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Legend

- RCFC MS4 Facilities
- Riverside County MS4 Facilities
- City of Murrieta MS4 Facilities
- City of Temecula MS4 Facilities
- US Freeways
- State Highways
- County Roads
- Primary Arterial Roads
- Secondary Collector Roads
- Monitoring Drainage Boundaries
- Waterbodies
- Watercourses
- Railroads
- Incorporated Areas
- Santa Margarita Watershed
- County of Riverside Boundary

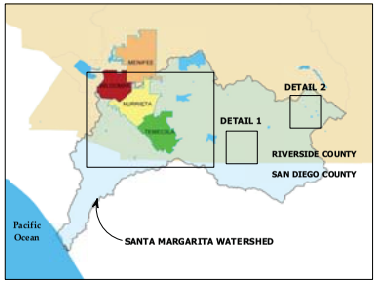

VICINITY MAP

NOT TO SCALE

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT GEOGRAPHIC INFORMATION SYSTEM

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SANTA MARGARITA WATERSHED FACILITIES MAP with Current MS4 Facilities Delineated

(REVISED 13JAN09)

020689

Construction Component Effectiveness Assessments

Goals

I Ensure that all Construction Sites have applicable permits from the Permittee.

II Increase the percentage of Construction Sites that are in compliance with Permittee building and grading permits

III Place additional focus on Construction Sites during Wet Season

IV Ensure that construction inspection staff are properly trained and informed of the issues related to stormwater quality

Goal Addressed	Measureable Metrics Collected / Compiled Annually	Highest Potential CASQA Effectiveness Level	Effectiveness Assessment Timeframe	Outcome required to support Effectiveness Level	Can a Reasonable Municipal Action Level be developed?
I	% of active construction sites that are discovered without building/grading permits	2	Permit Term	Decreasing Trend or minimal %	Y
II	% of active High/Medium priority sites subjected to enforcement beyond verbal/written warnings	3	Permit Term	Decreasing Trend or minimal %	N
II, III	% of active High/Medium priority sites subjected to enforcement beyond verbal/written warnings **during wet season**	3	Permit Term	Decreasing Trend or minimal %	N
II	% of enforcement actions that reached each level of enforcement	3	Permit Term	Trend toward lower levels	N
III	% of active permitted construction sites provided wet weather reminders	2	Annually	N/A	Y
IV	% of construction inspectors receiving annual training	1	Annually	N/A	Y

Development Planning Component Effectiveness Assessments

Goals

I Develop Design Guidance for Low Impact Development (LID) BMPs

III Encourage the use of LID-Based Treatment Control BMPs

IV Ensure that appropriate planning staff are trained in WQMP requirements

Goal Addressed	Measureable Metrics Collected / Compiled Annually	Highest Potential CASQA Effectiveness Level	Effectiveness Assessment Timeframe	Outcome required to support Effectiveness Level	Can a Reasonable Municipal Action Level be developed?
I	Status of SMC LID BMP Design Manual	1	Within Permit Term	Completion	Y
II	% of WQMP projects that met the exemption requirements for inspection and maintenance reporting by implementing only LID-Based Treatment Control BMPs	3	Permit Term	Increasing Trend	N
III	% of applicable planning staff that attended WQMP training.	1	Annually	N/A	Y

Permittee Facilities and Activities Program Effectiveness Assessments

Goals

I Ensure that Permittee Facilities have adequate BMPs implemented and that they are properly maintained
II Ensure that Channels and Inlets are kept free from trash and debris
III Encourage the use of Integrated Pest Management (IPM) on Permittee Facilities
IV Maintain an updated GIS map of the MS4 system
V Ensure the Permittee facility operators and maintenance workers are properly trained in issues related to water quality.

Goal Addressed	Measureable Metrics Collected / Compiled Annually	Highest Potential CASQA Effectiveness Level	Effectiveness Assessment Timeframe	Outcome required to support Effectiveness Level	Can a Reasonable Municipal Action Level be developed?
I	% of facilities with appropriate BMPs identified	1	Annually	N/A	Y
I	% of Facilities provided reminders of appropriate BMPs	2	Annually	N/A	Y
I	% of annual facility inspections finding deficiencies in BMP implementation that require follow-up actions	3	Permit Term	Decreasing Trend or minimal %	Y
I	Average % of deficiencies identified in the previous year's inspections that were addressed.	3	Permit Term	Increasing Trend or high %	Y
II	Estimated Tons of Waste removed from Streets	4	Annually	N/A	N
II	Estimated Tons of Waste removed from Inlets	4	Annually	N/A	N
II	Estimated Tons of Waste removed from Open Channels	5	Annually	N/A	N
III	% of Pest Control Contracts that include language promoting or requiring IPM	1	Annually	N/A	N
IV	% of new Permittee-maintained MS4 facilities added to GIS Map	1	Annually	N/A	Y
V	% of Permittee Facility and MS4 operators and maintenance staff that attended training.	1	Annually	N/A	Y

Industrial-Commercial Facilities Program Effectiveness Assessments

Goals

I Maintain an updated and prioritized list of Industrial and Commercial Facilities

II Ensure the each Industrial and Commercial Facility has implemented BMPs that are appropriate for the activities and features at that facility

III Ensure that implemented BMPs are properly maintained to ensure their effective operation

IV Implement enforcement measures as necessary to reduce the occurance and recurrance of violations

V Ensure that inspectors are appropriately trained to identify problem areas and BMPs maintenance issues.

Goal Addressed	Measureable Metrics Collected / Compiled Annually	Highest Potential CASQA Effectiveness Level	Timeframe to Determine Effectiveness	Outcome required to support Effectiveness Level	Can a Reasonable Municipal Action Level be developed?
I	% of new facilities added to database and prioritized	1	Annually	N/A	Y
II	% of inspected facilities with adequate Minimum BMPs in place at time of inspection	3	Permit Term	Increasing Trend or High %	N
III	% of inspected WQMP facilities subject to Post Construction Treatment Control BMP Inspection, with adequately maintained Treatment Control BMP	3	Permit Term	Increasing Trend or High %	N
IV	% of inspected High/Medium priority facilities that were subjected to enforcement beyond verbal/written warnings	3	Permit Term	Decreasing Trend or Low %	N
IV	% of enforced sites that are repeat offenders	3	Permit Term	Decreasing Trend or Low %	N
IV	% / Number of enforcement actions that reached each level of enforcement	3	Permit Term	Trend toward lower enforcement	N
V	Percent of applicable inspectors that attended training	1	Annually	N/A	Y

Residential Program Effectiveness Assessments

Goals

I Raise awareness among residents of activities that may be contributing to stormwater pollution
II Increase public awareness of BMPs for residential activities
III Increase public participation in hazardous material collection events
IV Increase public involvement in keeping the watershed clean
V Encourage the use of Alternative Pest Control Methods

Goal Addressed	Measureable Metrics Collected / Compiled Annually	Highest Potential CASQA Effectiveness Level	Timeframe to Determine Effectiveness	Outcome required to support Effectiveness Level	Can a Reasonable Municipal Action Level be developed?
I	Number of outreach events to Schools	1	Annually	N/A	N
II	Number and type of educational materials distributed that target residential activities	1	Annually	N/A	Y
I, II	Results of Public Ed Surveys	2	Permit Term	Increasing or high level of Knowledge	Y
III	Gallons of Used Oil Collected through Used Oil Block Cycle Grant	4	Annually	N/A	Y
III	Total Pounds collected at HHW/ABOP events	4	Annually	N/A	Y
III	Total Number of participants at HHW/ABOP events	3	Annually	Increasing Trend	Y
IV	Pounds of trash removed through Watershed Cleanup Events	4	Annually (as events occur)	NA	N
V	Number of Home Improvement stores provided outreach and customer educational information for pesticide use	2	Annually	Increasing Trend	Y

Detection and Elimination of Illicit Discharges and Connections Effectiveness Assessments

I Revise and enhance IC/ID Monitoring Program
II Reduce the occurance of Illicit Connections and Discharges
III Increase public reporting of improper disposal into MS4
IV Ensure the IC/ID reports are reviewed and responded to in a timely manner
V Ensure the confirmed IC/ID events are eliminated as quickly as possible
VI Ensure the IC/ID response staff are trained to identify potential sources of Illicit Discharges and recommend BMPs to prevent such discharges

Goal Addressed	Measureable Metrics Collected / Compiled Annually	Highest Potential CASQA Effectiveness Level	Timeframe to Determine Effectiveness	Outcome required to support Effectiveness Level	Can a Reasonable Municipal Action Level be developed?
I	Revise IC/ID Monitoring Program to screen random MS4 outfalls	1	N/A	N/A	N
II	% of IC/ID Monitoring events with sampleable flow	1	Permit Term	N/A	N
II	% of IC/ID Monitoring events that exceeded criteria and required follow-up	5	Permit Term	Decreasing Trend or low %	N
III	Number of IC/ID reports received	2	Annually	Increasing Trend	N
IV	% of IC/ID reports responded to within 1 business day of receipt	1	Annually	N/A	Y
V	% of confirmed and source-identified IC/ID incidents that required enforcement beyond verbal or written wardnings to eliminate	3	Permit Term	Decreasing Trend or minimal %	N
V	% of each type / level of enforcement	3	Permit Term	Trend toward lower levels	N
VI	% of IC/ID response staff receiving training	1	Annually	N/A	Y

020696

Riverside County Flood Control and Water Conservation District

Riverside County – Santa Margarita Region Pyrethroid Source Identification Toxicity Reduction Evaluation

Final Phase II Report
January 2009

MACTEC
9177 Sky Park Court
San Diego, California 92123
858-278-3600 FAX 858-278-5300

Executive Summary

This document is the Phase II report for the Santa Margarita Region (SMR) Pyrethroid Source Identification Toxicity Reduction Evaluation (TRE) conducted by the SMR Permittees to identify the source(s) of toxicity in the SMR and develop a plan to reduce the toxicity. This report documents the Permittees' ongoing and proposed efforts to identify and reduce sources of pyrethroid pesticide toxicity associated with urban runoff.

Data gathered under this TRE was compared to data from neighboring counties. Based on available data, problems with pyrethroid-induced toxicity in urban runoff are common among municipalities in Southern California, and methods for addressing the problems are comparable.

A literature review was conducted to determine appropriate source control and treatment control BMPs for reducing the concentration and load of pyrethroids in storm water runoff. The literature source, the estimated potential for reducing pyrethroid-induced toxicity, and possible concerns about implementing the BMP are summarized.

Based on the results of the literature review, BMPs are evaluated for applicability and potential effectiveness in the SMR watershed. Many of the most effective and appropriate BMPs are currently being implemented by the Permittees.

A search for pending legislation did not identify any pending legislation pertaining to pyrethroid pesticides.

The most effective strategy to prevent water quality impacts from legal pesticide uses was identified as state or federal regulatory change involving effective labeling and use restrictions. The Permittees propose a five year plan to continue, review, and enhance current activities to reduce pyrethroid-induced toxicity.

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1.0 Introduction

This document is the Phase II report for the Santa Margarita Region (SMR) Pyrethroid Source Identification Toxicity Reduction Evaluation (TRE) conducted by the County of Riverside, the City of Murrieta, the City of Temecula, and the Riverside County Flood Control and Water Conservation District (District, collectively Permittees). The Phase I Status Report (RCFCWCD, 2008) contains the work plan for Phase II and an outline of the topics in this report, as well as additional background information. This Phase II report is divided into six sections.

Section 1 describes the purpose of the TRE and provides an overview of the approach taken by the Permittees. Section 1 also contains a discussion of the regulatory framework of the TRE, a brief project background, a description of the Santa Margarita watershed, pyrethroid pesticide background and usage, and management questions and objectives.

Section 2 describes available pyrethroid and toxicity data from other counties in Southern California, and compares the data to data from Riverside County. The data and comparisons are included to demonstrate that the problems and solutions relating to pyrethroid pesticides facing the Permittees are similar to those of neighboring counties in the region.

Section 3 presents the results of the literature review conducted for this study of pesticide reduction Best Management Practices (BMPs).

Section 4 discusses potential pesticide reduction BMPs, the status of the Permittees implementation of the BMPs, and, when applicable, examples of the implementation of the BMPs in other municipalities. Section 4 also contains a table summarizing the potential BMPs, their advantages and disadvantages, and relative cost.

Section 5 discusses pending legislation relating to pyrethroid pesticides.

Section 6 presents the five-year course of action the Permittees propose to follow to reduce pyrethroid-induced toxicity in the SMR.

1.1 Purpose and Overview of Approach

The purpose of the TRE is to identify the source(s) of toxicity in the SMR and develop a plan to reduce the toxicity. The results of Phase I of the TRE are contained in the TRE Status Report (Riverside, 2008). This Phase II report for the TRE study documents the Permittees' ongoing and proposed efforts to identify and reduce sources of pyrethroid pesticide toxicity associated with urban runoff. The goal of Phase II is to establish a course of action and develop modifications to the Permittee's Storm Water Management Plans (SWMPs) to more effectively control the sources of toxicity that were identified in Phase I of the TRE. The Permittees will incorporate the course of action and SWMP modifications into the Report of Waste Discharge (ROWD) that will be submitted to the RWQCB in January 2009.

Phase II activities included:

- A comparison of toxicity and chemistry results to data from adjacent Phase I municipal separate storm sewer system (MS4) permit areas, including San Diego County and Orange County.
- A literature review of current studies and a survey of pesticide reduction BMPs.
- A search for pending legislation regarding pyrethroid pesticides.
- Development of a proposed course of action for the Permittees.

A literature review was conducted of BMP information available from the Urban Pesticide Pollution Prevention (UP3) Project and other pesticide management programs and documents. Information on relevant BMPs was compiled and evaluated to identify potential BMPs that are available to mitigate urban sources of pyrethroids. Existing Permittee programs, such as outreach, regulation, and BMP implementation, were then evaluated for improvement opportunities.

The proposed course of action was determined with consideration of the adequacy of data collection (sufficient precipitation and runoff to collect adequate data) and pending

regulatory actions by California Department of Pesticide Regulation (DPR), and the United States Environmental Protection Agency (EPA).

Land uses in Riverside County are comparable to those in neighboring Orange County and San Diego County, and pyrethroid pesticide-induced toxicity has been observed in those counties. The Permittees are committed to identifying and addressing water quality issues with methods consistent with those used by other stakeholders in Southern California. To this end, data gathered under this TRE was compared to data from neighboring counties, and current pesticide reduction programs used by municipalities throughout California were reviewed.

Source control and treatment control BMPs were researched and evaluated for potential effectiveness in reducing pyrethroid pesticide-induced toxicity in the Santa Margarita watershed. Many of the most effective BMPs are currently implemented by the Permittees, and several have been implemented within the previous Permit term (2004-2008). A proposed five-year course of action for the Permittees was developed by combining the results of the research with the existing programs.

1.2 Regulatory Framework

At the federal level, the authority to regulate pesticide manufacture and use is assigned to the United States Environmental Protection Agency (EPA) under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA). In California, pesticide use is regulated at the state level by the DPR. In the SMR, the Permittees are required under the Clean Water Act to control discharges of pollutants, including pesticides that produce water toxicity, to and from their MS4 under the National Pollutant Discharge Elimination System (NPDES).

This TRE was performed as required by Monitoring and Reporting Program (MRP) R9-2004-001.

The MRP, Section II. A. I. 4, states:

> *"When results from the chemistry, toxicity, and bioassessment monitoring…indicate urban runoff-induced degradation, Permittees shall evaluate the extent and causes of urban runoff pollution in receiving waters and prioritize management actions to eliminate or reduce sources. Toxicity Identification Evaluations (TIEs) shall be used to determine the cause of the toxicity, and Toxicity Reduction Evaluations (TREs) shall be used to identify sources and implement management actions to reduce pollutants in urban runoff causing toxicity."*

As local regulation of pesticide use is generally preempted by federal and state law, the Permitttees' authorities are limited to addressing illegal disposal of pesticides, promoting public education, setting the example for minimum pesticide use, and coordinating with the federal and state agencies to facilitate regulatory changes at the state and federal level.

1.3 Project Background

Phase I of the TRE consisted of the toxicity monitoring begun in 2004 and the Toxicity Identification Evaluations (TIE) was initiated in the spring of 2007. The Phase I Status Report (RCFCWCD, 2008) provides a full project background. Toxicity monitoring at Temecula Creek and Murrieta Creek was initiated in 2004 using EPA protocol with the following indicator species: *Ceriodaphnia dubia*, *Selenastrum capricornutum*, and *Hyalella azteca*. Toxicity testing during the 2004-2008 reporting period indicated persistent wet weather toxicity to *Hyalella* in both Temecula Creek and Murrieta Creek. Toxicity was not observed to either *Ceriodaphnia* or *Selenastrum* in any of the samples collected over the four annual reporting periods beginning in the fall of 2004.

Toxicity Identification Evaluations (TIEs) were conducted on the wet weather samples collected from Temecula Creek and Murrieta Creek beginning in April 2007, in accordance with Table 2 of the MRP. The TIEs indicated that pyrethroids were the primary source of toxicity and biological degradation in both Murrieta Creek and Temecula Creek.

As a result of the toxicity and TIEs, storm water monitoring for pyrethroids was initiated in 2007-2008. Results indicate that the pyrethroids permethrin and/or bifenthrin are present in wet weather water samples taken at Murrieta Creek and Temecula Creek.

To further assess the impacts of pyrethroid pesticides the Permittees instituted Dry Weather Toxicity Testing and direct measurement of pyrethroid pesticide concentrations in dry weather water samples during the 2007-2008 reporting period. Toxicity and pyrethroid pesticides were not detected in dry weather water samples at either Murrieta Creek or Temecula Creek.

Phase I of the TRE concluded with the Phase I Status Report. The Phase I Status Report included studies to better characterize patterns and sources of toxicity and to evaluate the hypothesis that the *Hyalella* toxicity is due to pyrethroids.

Bifenthrin and permethrin appear to be the primary toxic elements in Temecula Creek and Murrieta Creek. While bifenthrin and permethrin were applied to both agricultural and non-agricultural land uses, the major sources of pyrethroid toxicity in the SMR are non-agricultural activities. Permethrin was applied more than any other pyrethroid pesticide in the urban landscape. Bifenthrin and permethrin application rates were one and three orders of magnitude higher for structural control applications than agricultural applications in Riverside County. Structural control appears to represent 93% of the total pyrethroids use for Riverside County.

The Status Report outlined the plan for Phase II of the TRE, and this report presents the results of Phase II.

1.4 Watershed Description

The SMR encompasses approximately 750 square miles in southwestern Riverside and northern San Diego Counties (see Figure 1-1). The upper (northeast) portion of the SMR is in Riverside County with the remainder in San Diego County. The SMR is subdivided into the Temecula Creek and Murrieta Creek sub-watersheds and has an arid Mediterranean climate. Creeks in the SMR are ephemeral. Flow in Temecula Creek and in Murrieta Creek results almost exclusively from groundwater during the dry season. It is rare to find flow during dry weather at the tributary stations, and usually this flow infiltrates before reaching Temecula Creek or Murrieta Creek (2006-2007 Monitoring Annual Report). While the ephemeral streams in the SMR are technically receiving waters, the term "Receiving Waters" as used in this TRE Status Report refers exclusively to Murrieta Creek and Temecula Creek.

The Santa Margarita River is formed by the confluence of Murrieta Creek and Temecula Creek. The confluence is located in Riverside County, approximately five miles northeast of San Diego County. The Santa Margarita River flows from Riverside County into San Diego County through the community of Fallbrook and Marine Corps Base Camp Pendleton. The lower estuary and river are protected by Camp Pendleton and are much less developed than surrounding areas in Southern California. The Santa Margarita River is able to support a relative abundance of wildlife and habitats in part because of its undeveloped state.

Figure 1-1

Riverside County Santa Margarita Watershed

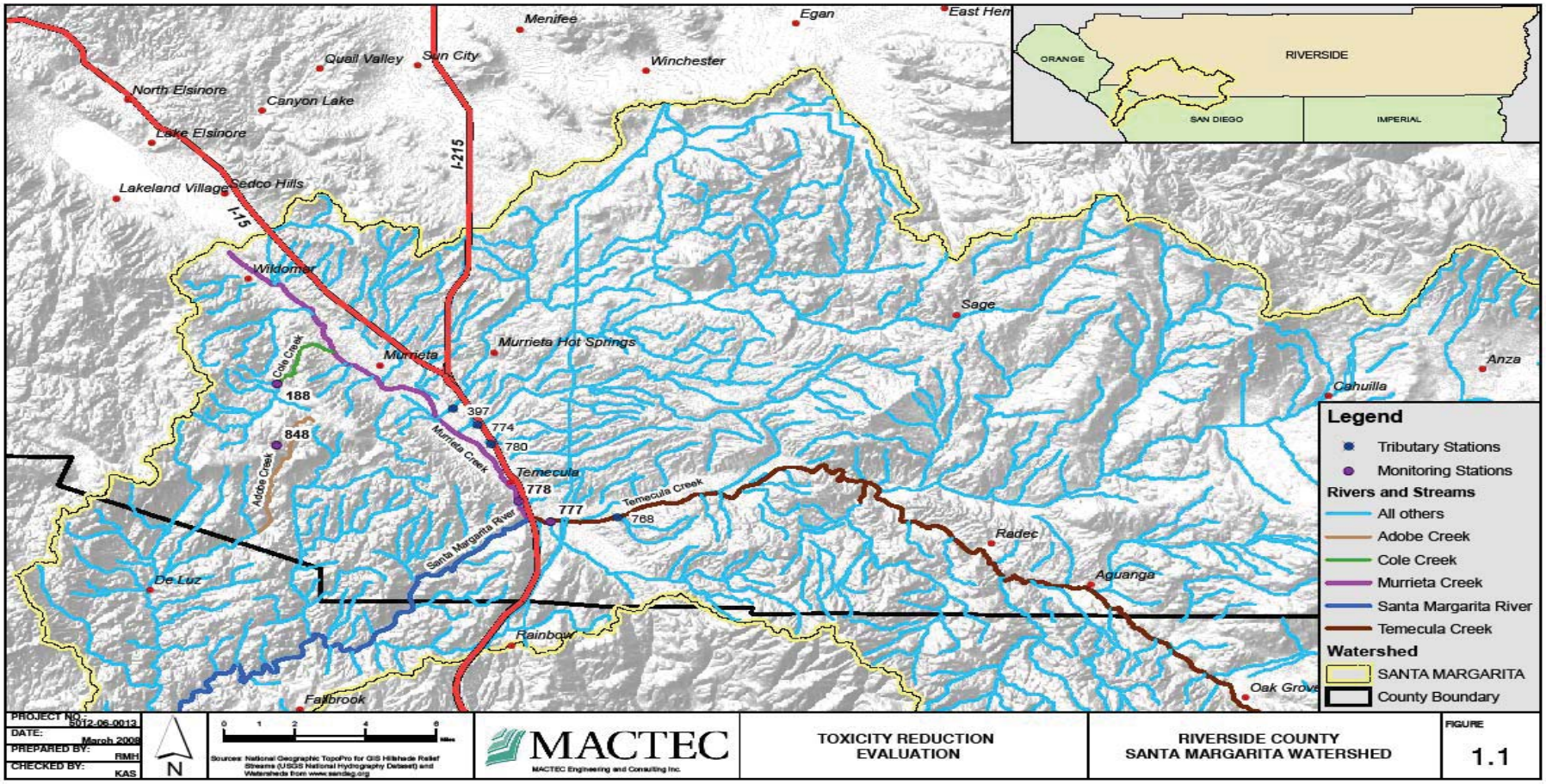

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As presented in Table 1-1, the total population in the SMR of Riverside County is significantly less than adjacent watersheds covered under similar Phase I MS4 NPDES permits.

Table 1-1

San Diego Region Populations

Jurisdiction	Population
Orange County	3,002,048
San Diego County	2,941,454
SMR/Riverside County	250,483
Unincorporated	55,291
Murrieta	97,257
Temecula	97,935

1.5 Pyrethroid Pesticide Background and Usage

A statewide compilation of the presence and effects of pyrethroid pesticides in urban surface waters, prepared in July 2008 and presented at the 2008 California Association of Stormwater Quality Agencies (CASQA) Conference, outlined the rise in pyrethroid use and its increased presence in urban waterways (Ruby, 2008). A comprehensive survey of pesticide use in Sacramento, San Diego, and Orange Counties also concluded that, as the older pesticides chlorpyrifos and diazinon have been phased out, pyrethroid pesticides have seen increased usage (Wilen, 2005). The Urban Pesticide Pollution Prevention (UP3) Project confirms that pyrethroids are the cause of toxicity in numerous California waterways, particularly in urban waterways. The UP3 Project (www.up3project.org) publishes an annual review of new scientific findings on pesticides in urban surface water (TDC, 2007). Since 2005, the reviews have consistently indicated that pyrethroid use continues to increase and that pyrethroids are found to be the cause of toxicity in urban waterways. The pyrethroid use information is confirmed by data published by the DPR.

Pyrethrins are natural insecticides that are derived from an extract of chrysanthemum flowers. Pyrethroids are synthetic versions of pyrethrins. These chemicals act on the nervous system of insects. Commercial pyrethroid pesticides often contain a synergist that works by restricting the enzymes insects use to detoxify pyrethroids. While pyrethroids have been shown to be one of the least poisonous insecticides to mammals, the effects depend on the level of exposure, the health of the animal, and the environmental circumstances.

Pyrethroids applied in urban areas enter the storm drainage system of the MS4 by surface runoff and are transported directly to receiving waters. Other potential urban sources are runoff from irrigation with reclaimed water, application overspray, and atmospheric deposition. Pyrethroids transported via the MS4, from whatever source, are considered to be non-point discharges. Agriculture, nursery, and urban/suburban uses are the main categories of sources of pyrethroids in the receiving waters of the SMR.

Outdoor structural pest control is the predominant urban use of pyrethroids in most watersheds. However, in the SMR, the acreage dedicated to agricultural land use exceeds the urban land use area by approximately 2:1. Pyrethroid insecticides are applied to a variety of crops in the SMR and California throughout the year. According to the DPR, pyrethroids are commonly used on fruit and nut trees, row crops, and in nurseries. Six of the primary pyrethroids used in California agriculture, in order of decreasing amount applied in 2003, are permethrin, esfenvalerate, lambda-cyhalothrin, cyfluthrin, bifenthrin, and cypermethrin. Therefore, agricultural sources of pyrethroids were considered.

TIE methods for pyrethroids are still being developed. Effective methods require the ability to measure low concentrations of pyrethroids, and this remains a challenge. Fortunately, the development of TIE methods for pyrethroids is progressing and moving towards standardization (San Francisco Estuary Project, 2007). TIEs are planned for storm water samples collected during 2008-2009 when toxicity is evident.

1.6 Management Questions and Objectives

This TRE is designed to confirm the toxic element observed in the samples collected in the Santa Margarita Region, identify likely sources of the toxic element, and propose mitigation measures for those sources. TIEs identified pyrethroids pesticides as the likely toxic element. As the MRP specifies that a TRE must be conducted following toxicant identification through a TIE, Phase I of the TRE focused on the pyrethroids identified as the source of toxicity in the 2007 TIEs. To support this TRE, the Permittees commissioned additional wet and dry weather toxicity testing, water column pyrethroid testing, additional TIEs to verify the persistence of pyrethroids as the toxicant. Based on the resulting information, the TRE evaluates the specific sources of toxicity and likely mitigation.

This TRE study assumes that pyrethroid sources and resultant toxicity patterns in the SMR are similar to those in neighboring counties, in particular San Diego and Orange Counties. Under this assumption, the Permittees hypothesized that pyrethroids would be detected in samples at most if not all monitoring locations, that the samples would exhibit toxicity to *Hyalella,* and that TIEs would indicate pyrethroids as the cause of the toxicity. Unlike other regions, dry weather toxicity is not expected in the SMR, as dry weather flows are supported primarily by groundwater.

Based on this assumption, this TRE was designed to provide information to help answer the following five management questions related to the toxicity:

1) Is the pyrethroid toxicity persistent in Temecula Creek and Murrieta Creek?
2) Does the toxicity occur during dry weather?
3) Are there any obvious sources of illicit discharge of pyrethroids that can be abated?
4) What are the likely sources of pyrethroid toxicity in the SMR?
5) What potential management measures are available to the Permittees to mitigate the impacts of pyrethroid pesticide application?

Answers to the first four questions are detailed in the Phase I Status Report. Briefly, toxicity is persistent in the creeks during wet weather, but is not evident in dry weather samples. No

obvious sources of illicit discharge were found. The likely primary source of pyrethroids is structural control performed by pest control operators (PCOs). The final question is addressed during Phase II and is the focus of this report.

2.0 Data Comparison

An assumption of this TRE study is that pyrethroid sources and resultant toxicity patterns in the SMR are analogous to those in similar counties, in particular neighboring San Diego and Orange Counties. To verify this assumption, it was necessary to compare data collected in SMR to data collected in other locations. As part of the 2008 CASQA pyrethroids data compilation, monitoring results were summarized from studies that investigated the presence and effects of pyrethroid pesticides in urban areas of California (Ruby, 2008). The CASQA summary listed the frequency of detection of various pyrethroid pesticides and results of toxicity testing for different indicator species. Results from various northern and Southern California locations were detailed, including results of water column studies from Orange, San Diego and Sacramento Counties.

Pyrethroids, as a class of chemicals, have an affinity for particles and they are considered to be relatively hydrophobic; they are therefore commonly found in sediments of waterways downstream of their application sites. The initial toxicity studies leading to the identification of pyrethroids as pervasive environmental contaminants in California were performed on sediment samples by Don Weston and his colleagues at the University of California, Berkeley (Weston et al., 2005; Amweg et al., 2006). Recently, improvements in analytical methods for pyrethroids in water, and modification of toxicity studies to more effectively test for pyrethroid-based toxicity in water, have lead to increasing evidence of the presence of pyrethroids in water column samples, and toxic effects in the water matrix (see citations for Orange and San Diego County in Ruby, 2008).

Extensive work has been performed on the environmental presence and effects of pyrethroids in urban areas of the neighboring Orange and San Diego counties; however, much of this work has been performed on sediment samples. Although the sediment monitoring results do not correspond directly with the SMR water column test results, sediments are considered to be effective integrators of contaminants from the contributing storm water flows. The deposited sediments are produced as particles settle out from the passing water over some

period of time, and tend to accumulate until they are washed away by higher-velocity flows. Summaries of the relevant sediment study results are therefore included in the discussion that follows.

In Orange County, an ongoing study being performed by UC Davis, in conjunction with UC Riverside and the Orange County UC Cooperative Extension, has consistently found bifenthrin and permethrin in water column runoff samples from residential areas (Haver et al., 2007; Oki, personal communication). In samples from four residential sites they have detected bifenthrin in 100% of samples, with the number of samples varying from 48 to 57 per site (Oki, personal communication). In sediment samples collected in recent years from the Santa Ana Region of Orange County, bifenthrin is commonly detected (32 of 56 samples) and permethrin less frequently so (4 of 56 samples), with sediment toxicity to *Hyalella* common (39 of 54 samples tested were moderately or highly toxic; see summary in Ruby, 2008).

In a 2005 study of six Orange County residential storm drainages and seven tributary streams draining commercial/residential land uses, bifenthrin was detected in 95% of dry weather samples and 100% of wet weather samples (Budd et al., 2007). Because treatment of nursery products is mandatory to control Red Imported Fire Ants, an older DPR study, conducted in 1999-2002, found occasional detects of bifenthrin in urban runoff samples, along with frequent detects in nursery runoff from several Orange County sites.

In San Diego County, under NPDES Permit monitoring conducted since 2004, pyrethroids have been commonly detected in water samples from several receiving waters, and toxicity to *Hyalella* has been increasingly observed in water samples (see summary in Ruby, 2008). Bifenthrin was detected in 12 of 15 samples collected from 2005-2006 and 2006-2007; detection frequency was 100% in samples from Chollas Creek, Agua Hedionda, and Tecolote Creek. Toxicity to *Hyalella* was observed in 22 of 57 samples tested over the three year period, 2004-2007. In a TIE study performed on Chollas Creek samples during 2005-2006,

67% of samples were acutely toxic to *Hyalella*, and the toxicity was found to be likely due to pyrethroids.

In a 2004-2005 study performed by UC Davis and others, sediments from Switzer Creek at its outlet to San Diego Harbor were found to be highly toxic; bifenthrin and permethrin were detected at high concentrations, and a sediment TIE identified pyrethroids as the likely cause of the observed toxicity (Anderson et al., in press). As part of a statewide survey of urban waterways, sediments were tested from several receiving waters in San Diego County. All were found to be highly toxic to *Hyalella* (Holmes et al., in press).

To further compare the pyrethroid sources and toxicity patterns in the SMR to other counties, the CASQA data summary was analyzed to select the studies which reported results for the same constituents and effects identified in the SMR, specifically permethrin, bifenthrin, and toxicity to *Hyalella*. The total number of detections for the different monitoring locations was divided by the total number of samples taken at the sites to calculate the percentage of samples with detectable concentrations of pyrethroids. This normalized metric allowed for comparison of the various datasets.

While permethrin is among the more commonly-used pyrethroids, it is much less toxic to aquatic life than bifenthrin (TDC, 2007). For the purposes of this assessment, bifenthrin detection frequency and frequency of toxic effects were used as the metrics for comparison.

Comparative results for bifenthrin are summarized in Figure 2-1. Data were available for two creeks in Sacramento County and three locations in San Diego County, in addition to the data collected for SMR. Two samples were taken at the Sacramento County sampling locations. For San Diego County, each creek was sampled three times except for Chollas Creek, which was sampled six times. The SMR was sampled a total of eight times. In most cases, bifenthrin was detected in over 80% of samples. Only at Elk Grove Creek in Sacramento County was bifenthrin detected at a notably lower percentage.

Figure 2-1

Percentage of Samples with Bifenthrin Detections

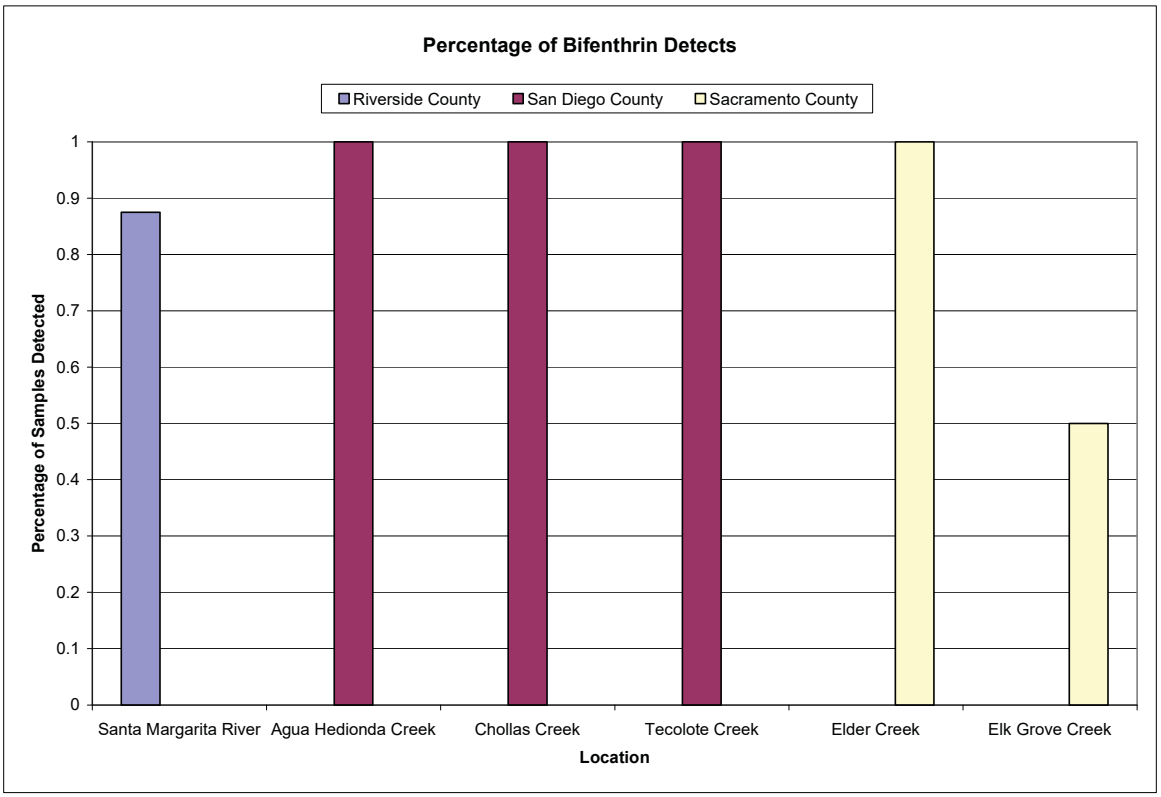

Toxicity to *Hyalella* was documented in water samples from San Diego County, along with the SMR. Toxicity testing was performed on samples from seven San Diego County water bodies. The sample sets ranged from three to nine toxicity tests (Aqua Hedionda, San Dieguito River, Tijuana River, and Chollas Creek). In the SMR, a total of eight toxicity tests were performed on samples from Murrieta Creek and Temecula Creek. The results for frequency of acute toxicity from the SMR were within the range of the results for similar sites in San Diego County (see Figure 2-2).

After comparing the results from different locations, the assumption that pyrethroid sources and resultant toxicity patterns in the SMR are similar to those in similar counties appears to be valid.

Figure 2-2

Percentage of Samples with Acute Toxicity to *Hyalella*

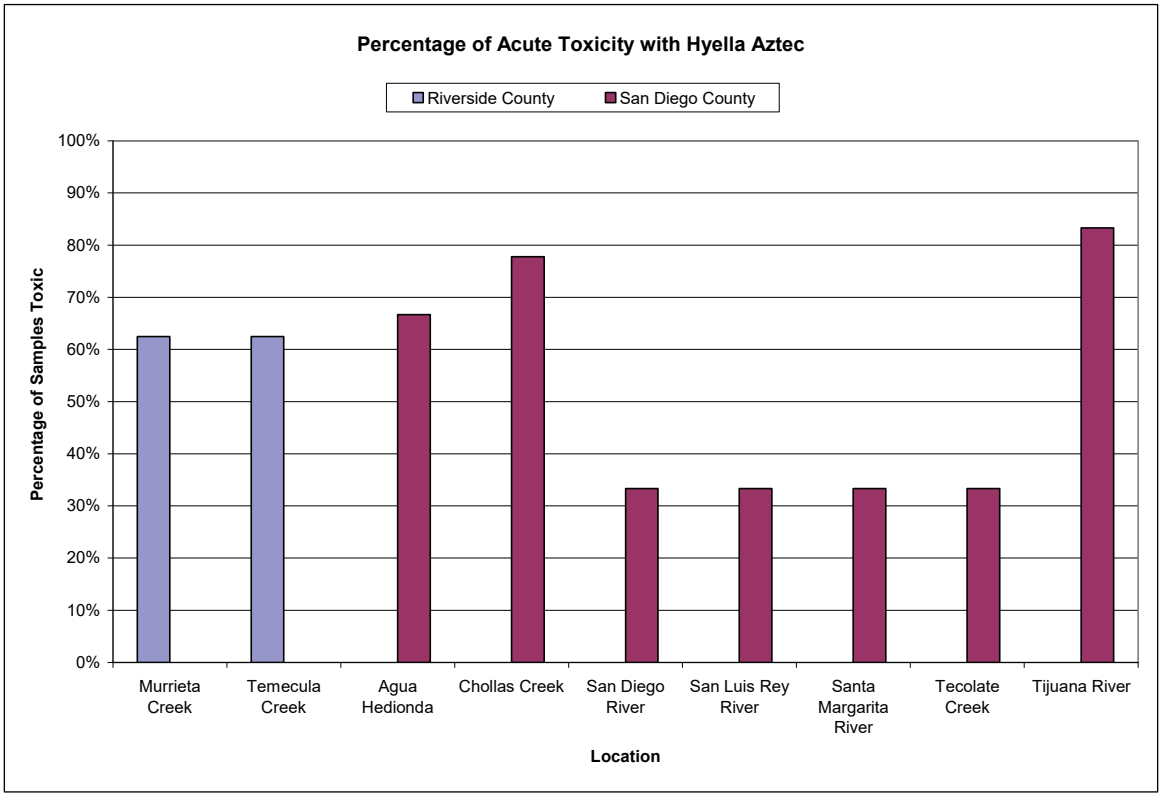

3.0 Literature Review

A literature review was conducted during December, 2008 to determine appropriate BMPs for reducing the concentration and load of pyrethroids in storm water runoff. An initial search was made of the Urban Pollution Prevention Program (UP3) website (www.up3program.org) for potential examples of BMP strategies implemented specifically for pyrethroids. The United States Environmental Protection Agency website and the CASQA website were also reviewed for pyrethroid specific BMPs. Widespread use of pyrethroids is relatively recent, and there has been little direct evaluation of BMPs for pyrethroids. Further research was conducted on general storm water BMPs, and their potential for pyrethroid reduction was evaluated based on the design of the BMP and the chemical behavior of pyrethroids.

To identify pending legislation that may be related to pyrethroid pesticides, web searches were conducted on the websites for DPR, the California legislature, the EPA, and the Library of Congress. However, no pending legislation was identified as relevant to pyrethroid pesticides.

Table 3-1 below presents the findings of the literature review. BMPs are categorized as either source control or treatment control, and within each category they are sorted by type. The literature source, a summary of the BMP, the estimated potential for reducing pyrethroid-induced toxicity, and possible concerns about implementing the BMP are provided. See Section 4 for further information about each type of BMP.

Table 3-1
Literature Review Matrix

Type of BMP	Literature Source	Summary	Ability to Reduce Toxicity Caused by Pyrethroids	Storm Water Concerns
Source Control				
Regulatory	Pesticides of Interest for Urban Surface Water Quality. Urban Pesticides Use Trends Annual Report. July 2008.	Suggests regulatory changes as a result of increased toxicity due to pyrethroid use	Potentially High	Supplementary to other BMPs, Will take years to show results
Regulatory	Improving Urban Pesticide Regulatory Activities to Protect Water Quality – Annual Update 2007. November 2007.	Discusses recent state and federal regulatory pesticide activities on an annual basis	Potentially High	Supplementary to other BMPs, Will take years to show results
Regulatory	California Department of Pesticide Regulation. http://www.cdpr.ca.gov/docs/registration/reevaluation/chemicals/pyrethroids.htm. 2007.	The reevaluation of the widespread presence of synthetic pyrethroid residues in the sediment of both agricultural and urban dominated California waterways at levels toxic to Hyalella azteca (H. azteca).	Potentially High	Supplementary to other BMPs, Will take years to show results
Integrated Pest Management (IPM)	Building Maintenance - Structural Integrated Pest Management. June 2008.	Promotes reduction in pesticide use through use of municipality IPM and hiring of PCO's trained in IPM	Potentially High	Does not eliminate all uses of pyrethroids
IPM	California Stormwater BMP Handbook. January 2003.	Promotes prevention of pesticide use through use hiring of PCOs that use IPM as an alternative	Potentially High	Does not eliminate all uses of pyrethroids
IPM	City of Santa Monica Toxics Use Reduction Program Integrated Pest Management. June 1997.	Overview of IPM program initiated by the City of Santa Monica	Potentially High	Does not eliminate all uses of pyrethroids
IPM	National Management Measures to Control Nonpoint Source Pollution from Urban Areas. November 2005.	EPA document discussing management practices to help reduce pesticide use	Potentially High	Does not eliminate all uses of pyrethroids
IPM	National Pollutant Discharge Elimination System (NPDES) Phase II BMP & Measureable Goal Examples. February 2008.	Provides examples and goals of good housekeeping BMPs	Potentially High	Does not eliminate all uses of pyrethroids
IPM	The Monterey Bay Green Gardener Program "sample curriculum". www.green-gardener.org/about. Accessed December 2008.	Informs the public and landscapers about the green gardener program and how to get involved	Potentially High	Does not eliminate all uses of pyrethroids

Table 3-1 (continued)
Literature Review Matrix

Type of BMP	Literature Source	Summary	Ability to Reduce Toxicity Caused by Pyrethroids	Storm Water Concerns
Source Control				
IPM	Western IPM Center. www.wripmc.org. Last updated 12/23/2008.	Pest management information specific to region, state, or territory.	Potentially High	Does not directly address pyrethroids
IPM	EcoWise Certified. www.ecowisecertified.com. Accessed December 2008.	Information on IPM program design, developing contracts for structural IPM, and pilot program aimed at developing IPM certification.	Potentially High	Does not directly address pyrethroids
IPM	Our Water Our World. www.ourwaterourworld.org. Copyright 2008.	Contains assorted fact sheets on specific pests and methods to manage them without using hazardous materials.	Potentially High	Addresses pyrethroids in water pollution fact sheet.
IPM	UP3 Project. www.up3project.org. November 2008.	Provides tools to municipalities to reduce municipal pesticide use and to conduct outreach to their communities on less-toxic methods of pest control	Potentially High	Addresses pyrethroids toxic impact on water bodies.
IPM	State of California Green California. www.green.ca.gov/EPP/building/structipm.htm. Accessed December 2008.	Provides information on structural IPM.	Potentially High	Addresses pyrethroids impact on storm water.
IPM	San Francisco Department of the Environment. http://www.sfenvironment.org/our_programs/topics.html?ti=1. Accessed December 2008.	Contains information regarding key components of integrated pest management.	Potentially High	Addresses pyrethroids impact on storm water.
Low Impact Development	Low-Impact Development Design Strategies: An Integrated Approach. June 1999.	Discusses LID design strategies and successes, including storm water controls	Potentially High	Does not directly address Pyrethroids
Low Impact Development	Low Impact Development Handbook: Stormwater Management Strategies. December 2007.	Reviews many LID techniques appropriate for Southern California's climate	Potentially High	Does not directly address Pyrethroids
Public Outreach	County of Los Angeles Department of Public WorksStorm Water/Urban Runoff Public Education Model Program. Fiscal Year 2002.	Provides Los Angeles specific examples of Public Outreach and Education	Potentially High	Change is up to individuals, needs cumulative effect

Table 3-1 (continued)
Literature Review Matrix

Type of BMP	Literature Source	Summary	Ability to Reduce Toxicity Caused by Pyrethroids	Storm Water Concerns
Source Control				
Public Outreach	Drainage Area Management Plan - Santa Ana and Santa Margarita Regions. July 2005.	Discusses local outreach actions conducted by the Permittees	Potentially High	Change is up to individuals, needs cumulative effect
Public Outreach	Environmental Justice Pilot Project Pest Management Assessment: Soil Fumigant and Organophosphate Insecticide Use and Alternatives - Parlier, Fresno County, California. October 2007.	Study of Agricultural pesticide use in Fresno area, including use of reduced risk pesticides	Potentially High	Unknown potential water quality and toxicity issues
Public Outreach	National Management Measures to Control Nonpoint Source Pollution from Urban Areas. November 2005.	EPA document discussing management practices to help reduce pesticide use	Potentially High	Change is up to individuals, needs cumulative effect
Public Outreach	National Pollutant Discharge Elimination System (NPDES) Phase II BMP & Measureable Goal Examples. February 2008.	Provides examples and goals of public outreach BMPs	Potentially High	Change is up to individuals, needs cumulative effect
Public Outreach	Pesticides of Interest for Urban Surface Water Quality. Urban Pesticides Use Trends Annual Report. July 2008.	Contains recommendations for public education based on analysis of pyrethroid use trends	Potentially High	Change is up to individuals, needs cumulative effect
Treatment Control				
Extended Detention Basin	Santa Clara Valley Urban Runoff Pollution Prevention Program Commercial Site Design Examples. February 2007.	Shows examples of different structural treatment methods and their effectiveness	Moderate	Improper maintenance could lead to other water quality issues
Extended Detention Basin	California Stormwater BMP Handbook. January 2003.	Reviews extended detention basin BMP methods, concerns, and goals	Moderate	Improper maintenance could lead to other water quality issues
Extended Detention Basin	Ventura Countywide Stormwater Quality Management Program Technical Guidance Manual for Stormwater Quality Control Measures. July 2002.	Reviews many BMP methods and contains information specific to Southern California	Moderate	Improper maintenance could lead to other water quality issues

Table 3-1 (continued)
Literature Review Matrix

Type of BMP	Literature Source	Summary	Ability to Reduce Toxicity Caused by Pyrethroids	Storm Water Concerns
Treatment Control				
Infiltration Basin	California Stormwater BMP Handbook. January 2003.	Reviews infiltration basin BMP methods, concerns, and goals	Potentially High	Improper maintenance could lead to other water quality issues
Infiltration Basin	Ventura Countywide Stormwater Quality Management Program Technical Guidance Manual for Stormwater Quality Control Measures. July 2002.	Reviews infiltration basin BMP methods, concerns, and goals	Potentially High	Improper maintenance could lead to other water quality issues
Infiltration Trench	California Stormwater BMP Handbook. January 2003.	Reviews infiltration trench methods of BMP methods, concerns, and goals	Potentially High	Improper maintenance could lead to other water quality issues
Infiltration Trench	Ventura Countywide Stormwater Quality Management Program Technical Guidance Manual for Stormwater Quality Control Measures. July 2002.	Reviews infiltration trench methods of BMP methods, concerns, and goals	Potentially High	Improper maintenance could lead to other water quality issues
Media Filter	California Stormwater BMP Handbook. January 2003.	Reviews media filter BMP methods, concerns, and goals	Potentially High	Improper maintenance could lead to other water quality issues
Media Filter	Ventura Countywide Stormwater Quality Management Program Technical Guidance Manual for Stormwater Quality Control Measures. July 2002.	Reviews many BMP methods and contains information specific to Southern California	Potentially High	Improper maintenance could lead to other water quality issues
Pervious Pavement	California Stormwater BMP Handbook. January 2003.	Reviews pervious pavement BMP methods, concerns, and goals	Potentially High	Improper maintenance could lead to other water quality issues
Pervious Pavement	Low Impact Development Handbook: Stormwater Management Strategies. December 2007.	Discusses LID strategies for assistance in storm water management	Potentially High	May contaminate groundwater

4.0 BMP Analysis

Based on the literature review and the findings of Phase I of the TRE, BMPs were evaluated for their applicability to the SMR. Because the toxicity appears to be principally a wet weather phenomenon, and because the Permittees' jurisdiction includes the urbanized area of the watershed, the analysis focused on BMPs designed to reduce the amount of storm water pollution caused by urban runoff.

The potentially applicable BMPs are divided into Source Control and Treatment Control BMPs and are discussed in detail below. Through the Permittee's proactive efforts to protect the quality of the receiving waters and their beneficial uses, many programs addressing these broad categories are either already in place or are actively being developed. The implementation status for each specific BMP is discussed. Examples of BMP implementation by other municipalities in the region are included as a tool for evaluating the consistency of the Permittees' program with other programs in the region.

4.1 Source Control BMPs

Source control BMPs are designed to curtail pollution at the source before it has the opportunity to enter the storm drain system and pollute waterways. They are generally the preferred type of BMP because reduction of pollution occurs at the source, before runoff has become contaminated (CASQA, 2003). The types of broad categories of source control BMPs that identified as most appropriate for the Santa Margarita watershed are: pursuing regulatory change, implementing IPM strategies including LID, and public outreach and education.

4.1.1 Regulatory Action

Status: Currently being implemented by the Permittees.

Pesticide manufacturers are required to receive approval by USEPA and California DPR for specific pesticide uses, and both agencies can impose use restrictions to prevent unwanted impacts on the environment and public health. At the federal level, a fundamental regulatory disconnect exists between pesticide approval (registration) under FIFRA and water pollution control programs under the Clean Water Act. This has resulted in a repeating pattern, in which a) pesticides are approved for use without sufficient consideration of potential environmental effects, b) water quality and other ecological impacts accrue, c) use restrictions are applied to the offending products (sometimes involving widespread bans on use), and d) new pesticides are approved for use, with subsequent environmental impacts.

In 1962 Rachel Carson published *Silent Spring*, documenting the widespread ecological consequences of pesticide applications. The federal government responded by banning the use of DDT and other organochlorine pesticides, based on extensive evidence of environmental impacts through the process of bioaccumulation. The ban has lead to dramatic recoveries in affected populations of bald eagles and other species; however, the legacy of these long-lasting pesticides near-shore dumping areas in Los Angeles County and elsewhere remains (IWS, 2007).

Eventually the organochlorine pesticides were replaced principally by organophosphate pesticides, especially in urban uses. In the mid-1990s municipal storm water monitoring programs began to document that commonly-used organophosphate pesticides, especially diazinon and chlorpyrifos, were present at toxic levels and causing toxicity to aquatic organisms, principally the common water flea, *Ceriodaphnia*. Although not bioaccumulative, diazinon and chlorpyrifos were discovered to cause widespread toxicity in urban runoff and local receiving waters (TDC, 2001). USEPA subsequently banned most urban uses of diazinon and chlorpyrifos, although EPA's main motivation involved human health effects

on the pesticide applicators, and water quality was not an important factor in those decisions. Again, the ban was also immediately effective, reflected in reduced concentrations of diazinon and chlorpyrifos in urban water samples, and fewer occurrences of organophosphate-based water column toxicity (c.f., references in Ruby, 2008 for San Diego County Municipal Copermittees Annual Urban Runoff Monitoring Reports). But pesticide manufacturers simply replaced the OP pesticides in their products with other active ingredients, principally pyrethroids. Shortly thereafter, researchers and municipal storm water programs began documenting toxic effects from the new pyrethroid products. The pyrethroid impacts were first documented in sediments, and the affected test organism shifted from *Ceriodaphnia* to the sediment-dwelling *Hyalella*.

In the cases of both organochlorine (DDT) and organophosphate (diazinon, chlorpyrifos) pesticides, federal limitations or bans on uses were effective in ameliorating the associated environmental impacts. In both cases, however, new pesticide products were approved for use that then caused related but different impacts to the environment. Therefore it is clear that the most effective strategy for preventing environmental impacts from pesticide use involves implementing an effective process of pesticide approval and registration that comprehensively accounts for and mitigates against such impacts.

For more than ten years CASQA and various other California state and local agencies have promoted better regulation of pesticides at the federal level, encouraging use restrictions as the most effective means of source control. California water quality agencies have sent comment letters to USEPA and DPR on guidance pertaining to the application of pesticides to surface waters and on recommended environmental hazard statements for residential outdoor pesticides (TDC, 2007). These efforts are beginning to show some modest signs of success. In a recent letter to stakeholders, EPA outlined an approach to provide better cooperation between the Office of Pesticide Programs (OPP) and the Office of Water (OW), to allow for “environmentally protective and scientifically defensible effects assessment judgments about contaminants that are or may be found in ambient water”. The Riverside County Permittees plan to continue their support of these efforts through ongoing

participation in the CASQA Pesticides Subcommittee, the Urban Pesticide Pollution Prevention (UP3) Project, and the Urban Pesticide Committee. The Permittees also plan to request that the RWQCB become involved in advocating for more effective pesticide regulation at the state and federal levels.

The Permittees are members of a CASQA subcommittee that addresses pesticide uses impacting stormwater discharges. Effort focuses on providing input to the USEPA and the California Department of Pesticide Regulation (DPR) to improve pesticides regulations so that they more fully protect water quality and are better aligned with the Clean Water Act and California Water Code. (RCFCWCD, 2008). CASQA has also been active in supporting DPR's ongoing reevaluation of allowable pyrethroid pesticide uses (TDC, 2007).

Increasingly, the regulatory response to the water quality impacts resulting from *legal uses of approved pesticides* has been for regional water boards to impose limitations on the allowable loadings of pesticides to impaired waters through the TMDL process. Local agencies have little or no jurisdiction over sales or use of these pesticide products, and therefore do not have the full authority needed to perform loading reductions in resulting TMDLs. An effective regulatory solution must occur at the state and federal levels, to regulate allowable pesticide uses to effectively prevent such water quality impacts.

Current legislation requires users of certain pesticides to be trained, often certified, in the use of those pesticides and to report the amounts applied (State of California, 2008). A similar regulatory approach could be used to promote pesticide alternatives, such as for PCOs to train and certify their technicians in the use of IPM methods (Quarles, 2002). The Permittees are considering supporting regulatory action by the state to include IPM training for PCOs in the requirements for certification and training on the use of pesticides.

Environmentally sensitive and flexible zoning ordinances may be adopted to facilitate the use of LID principles, thereby encouraging private developers to use LID principles (Prince Georges County, 1999). Additional land use restrictions or alternatives to present zoning

laws may help reduce urban storm water runoff, potentially reducing pyrethroid loadings in receiving waters. The Permittees plan to continue promoting LID implementation through interagency communications and cooperation.

4.1.2 Integrated Pest Management

Status: Currently being implemented by the Permittees.

IPM is "a decision-making process for managing pests that uses monitoring to determine pest injury levels, and combines biological, cultural, mechanical, physical, and chemical tools and other management practices to control pests in a safe, cost effective, and environmentally sound manner that contributes to the protection of public health" (Carlsen, 2008). IPM can further be described as an approach to solving pest problems by using information about the pest and landscape to eradicate the pest's habitat in a manner that poses the least risk to humans (Ecology Action, 2007). IPM has many different aspects that help to reduce pests and in turn cause a reduction in pesticide use, including green gardening and structurally integrated pest management (SIPM). BMPs that are typically used as part of an IPM strategy are described in the following sub-sections.

4.1.2.1 Green Gardening

Status: Not currently being implemented by the Permittees, program under consideration and will be enacted in the near future.

The Green Gardener program, implemented through landscapers, promotes environmentally responsible landscaping to reduce the use and need for pesticides. In general, education of gardening and landscape maintenance staff is beneficial for pest reduction as part of an IPM program. It provides alternative methods to landscapers, such as reducing outdoor sources of ants by elimination of their food and water sources through management of honeydew producing insects and plants associated with them (UC Davis, 2007). The Green Gardener

program encourages businesses to participate in environmentally sound landscape maintenance. Healthy landscapes are more resistant to pests (Ecology Action, 2007). Pests that do not have a suitable habitat will leave to find a more hospitable environment. When the pests leave, then there is a lessened need for pesticide applications and lower risk of pyrethroids entering storm water.

The County of Santa Barbara implemented a Green Gardener Program, in which landscapers are encouraged to take a class at the local city college, covering subjects such as IPM strategies and environmentally beneficial landscaping to obtain a "Green Gardener" card. They are then placed on the Green Gardener list, which is then promoted to the public by the County (County of Santa Barbara, 2008). The program benefits both parties; gardeners receive education and advertising at a nominal cost, and the County receives the benefit of more environmentally-friendly landscaping and a reduction in the use of pesticides. Municipalities may promote this type of program by contracting with landscaping companies that have their employees trained in green gardening practices.

Encouraged by the success of the Santa Barbara Green Gardener Program, the Monterey Bay area instituted a similar program. "The goal of the program was to educate and certify local gardeners in resource efficient and pollution prevention landscape management practices" (Ecology Action, 2007). With the support of the State of California Water Resources Control Board, more municipalities are likely to follow (Ecology Action, 2007).

4.1.2.2 Pest Control Contracting

Status: Currently partially implemented by the Permittees.

Many municipalities contract pesticide applications to professional PCOs. Contracting only with PCOs that have IPM training and certification can help realize IPM models and goals. The recently completed EcoWise Certified IPM Contracting Tool Kit (www.EcoWiseCertified.org), provides resources for municipal agencies to use in developing such a program. The EcoWise IPM Tool Kit includes:

- Elements to consider when developing an IPM policy
- Roles and responsibilities of the agency or business in an IPM program
- How to hire and work with a professional IPM service provider

The Took Kit also includes the EcoWise IPM Process along with a number of other helpful resources and sample documents.

Because PCOs are responsible for the majority of pesticides applied in urban areas, distribution of information regarding less-toxic alternatives, lower-use application techniques, and proper disposal, practices to professional applicators is an essential component of the Permitee's pesticide control effort. The Permittees currently distribute information to PCOs through the Public Outreach and Education Program (see Section 4.1.3).

The City of Palo Alto's Regional Water Quality Control Plant includes IPM requirements in their contracts with PCOs (City of Palo Alto, 2008). The City of Santa Monica, as a part of their SIPM program, specified IPM requirements in their PCO contracts (Raphael, 1997). Use of PCOs with IPM training and certification by municipalities encourages local PCOs to invest in IPM training and certification, which in turn, allows their expertise in IPM to expand beyond just the municipality itself (Quarles, 2002). Education of PCOs, hiring only PCOs that have IPM training, and contracting specifically for IPM by local agencies may

create more public awareness and reduce the use of pyrethroids in the Santa Margarita watershed.

4.1.2.3 Structurally Integrated Pest Management Program

Status: Currently being implemented by the Permittees, with additional programs under consideration.

SIPM is a program that controls the access of pests to buildings and the potential food sources within them by protecting the structure itself from pests, with minimal use of pesticides. The Permittees intend to lead by example, sharing success through public outreach programs and encouraging individuals and businesses to do the same. SIPM is a long term solution offering positive potential impacts on budget, reduction of pests and, reduction of pyrethroid pesticide use. Note that SIPM should not be confused with category of pesticide use referred to as structural pest control. SIPM is a BMP designed to reduce the use of pesticides in a structural pest control program.

The City of Santa Monica implemented an SIPM program and experienced a reduction in pests and in the use of pesticides. In addition, Santa Monica reduced pest management costs by 30% (State of California, 2008). California law requires a SIPM strategy for all state-owned buildings and schools (State of California, 2008). The three main aspects of a SIPM strategy are facility design and LID, monitoring, and facility maintenance.

<u>Facility Design</u>

Status: Currently being implemented by the Permittees.

Facility design can play a large role in the exclusion of potential pests. "A facility's planning, design, and construction provides an opportunity to incorporate features that help to exclude pests, minimize pest habitat, and promote proper sanitation" (NIH, 1999). It can also reduce

storm water runoff (NAHB, 2008). Exclusion of pests helps reduce pest infestations and in turn the need for pyrethroid pesticide use. For example, ensuring that the design holds plants and mulch several inches away from the foundation of a building may assist the reduction of ant populations immediately adjacent to the building (UC Davis, 2007). A reduction in storm water runoff may also reduce the amount of pyrethroids that enter receiving waters. Facility designs can incorporate aspects of LID, as discussed below. New development and redevelopment may incorporate designs that aid in the exclusion of pests and the reduction of urban runoff, which may contribute to a reduction of pollutant loads, including pyrethroids.

Pest Monitoring

Status: Currently in not use by the Permittees, program under consideration.

Monitoring structures and adjacent areas may help prevent pest infestations and quickly identify potential problems. Traps, visual inspections, and staff interviews assist in the identification of areas and conditions that may foster pest activity (NIH, 1999). Monitoring for ants, for example, may consist of simple inspections of facilities such as looking under sinks and along pipes and electrical wires (UC Davis, 2007). The City of Santa Monica, as a part of their SIPM, provided training to all general staff, purchasing, carpenters and custodial staff. Specific presentations were given to groups, such as the custodial staff, who learned about products used in control of ant and cockroach populations and general sanitation. The staff is trained in the identification of potential pest infestations and habitat conditions that may foster pest activity (Raphael, 1997). Early identification of pest infestations can increase the effectiveness of specific treatments and reduce the overall need for pesticide use.

Sanitation and Facility Maintenance

Status: Currently not being implemented by the Permittees, program under consideration.

Proper sanitation includes reducing clutter and pest habitat and incorporating proper facility and waste management practices. Records of maintenance and housekeeping conditions may help track pest problems and assist in the determination of whether corrective action is needed or has been taken in a timely manner (NIH, 1999). Sanitation and facility maintenance involves the housekeeping staff, the building maintenance staff, and the landscaping staff.

Improper storage of waste may affect urban runoff, and it may create a hospitable environment for pests, particularly ants. Initial, low-cost steps that municipalities may take to improve waste handling are: controlling litter, keeping waste collection areas clean, and insuring proper disposal of pyrethroid pesticide products, if used, and educating employees and the public. Simple solutions such as rinsing out soda bottles and emptying trash daily prove effective to reduce insect infestations, particularly ants (UC Davis, 2007). An important component of an SIPM monitoring program is regular inspections of solid waste containers for structural damage or leaks (CASQA, 2004).

Educating custodial staff, such as was done in the City of Santa Monica, can reduce the amount of improperly disposed pesticides (Raphael, 1997). Designating staff members to perform a daily checklist of areas around the structure to ensure cleanliness and proper storage of waste can assist the efforts to reduce potential pest infestations and leakage of hazardous waste (CASQA, 2004).

Building maintenance staff also benefit from education and acceptance of responsibility for pest management. Maintenance crews can contribute to an SIPM strategy by securing the structure, such as caulking holes and cracks, assisting in the removal of clutter, and installing

door sweeps (State of California, 2008). Caulking holes in structures can prove effective in keeping ants out of facilities (UC Davis, 2007). Upkeep on building maintenance helps reduce potential pest habitat, and thus may reduce the need for application of pyrethroid pesticides.

Reduction of pest habitat around structures may reduce pest populations in and around structures. Marin County, as part of its integrated pest management program, has reduced rat habitat around the local Civic Center and in turn has seen suppression of the rat population (Carlsen, 2008). Programs similarly tailored to ants may result in a positive effect of pest reduction within the SMR. For example, banding tree trunks with tanglefoot or similar sticky substances can keep ants away from trees (UC Davis, 2007). Education and training may be provided to Permittee landscaping crews to assist in proper vegetation removal and, when necessary, pesticide use. Landscaping crews may be informed that pyrethroid pesticides or any less toxic pesticides are to be used only when a pest problem arises to an intolerable level, that they are not administered when a wet weather event is expected and only when low wind speeds are present (CASQA, 2004). Education of landscaping crews to remove pest habitat may reduce the need for pyrethroid use thus reducing the potential risk of pyrethroids entering storm water runoff.

Also, utilizing low water using vegetation and alternative landscaping techniques such as xeriscaping or naturescaping are efforts that landscape crews can take to reduce pyrethroids in urban runoff. Landscaping crews may also help preserve the water efficiency of the landscape through properly timed fertilizing, weeding, pruning, and pest control. For example, proper collection and disposal of yard clippings can prevent loose vegetation that has possibly been treated with pyrethroid pesticides from entering waterways or storm water drainage systems such as MS4s (CASQA, 2004). Reduction in pest habitat and proper landscaping maintenance may help reduce pest problems, and thus the need for pyrethroid pesticides.

4.1.3 Public Outreach and Education

Status: Currently being implemented by the Permittees.

Public Outreach and Education programs inform the public about storm water issues, proper use and disposal of publically available chemicals, and alternatives to pyrethroid pesticides. Reaching out to the public and providing information about the dangers of pyrethroids pesticides encourages citizens to make educated decisions about pesticide use. It also may accelerate state and federal regulatory changes regarding pyrethroid use through public promotion of such changes. According to the EPA, public education and awareness can be a "key component" in any BMP program for storm water management (EPA, 2008).

The District has enacted a public outreach program to help reduce the potential for pyrethroid pesticides to contaminate receiving waters. This program has initiated: distribution of educational materials to hardware store employees, active participation and distribution of outreach for HHW/ABOP facilities to provide for free venues to dispose of excess pesticides, and distribution of EPA and CalEPA materials to the public. The District also promotes the use of less toxic pesticides, provides education on storm water issues in public schools, and has enacted a multimedia campaign to control urban sources of pyrethroid pesticides (RCFCWCD, 2005).

<u>Education and Outreach to Businesses</u>

Status: Currently being implemented by the Permittees.

Distribution of information regarding pesticides to businesses, particularly hardware stores, is crucial for reducing pyrethroid use and misuse at its source. Education on pyrethroid runoff to local hardware stores may assist local hardware store employees to educate their customers on alternative methods of pest control. An Orange County survey from 2001 found that 55% of pest control products were purchased at hardware stores (Wilen, 2001). In

2006, Riverside County had 177,562 pounds of reported non-agricultural usage of pyrethroid pesticides (RCFCWCD, 2008). Reduction in usage may lead to a reduction of pyrethroids in urban storm water runoff. Educating hardware store employees about urban water quality impacts of pyrethroid pesticides may help reduce the usage and thus the toxicity of runoff in the Santa Margarita Watershed resulting from pyrethroid use, as employees have the ability to recommend alternative methods of pest management to their customers.

Education of nursery employees about pyrethroid management and IPM techniques may also yield significant source control benefits. In general, nursery employees tend to be more knowledgeable about pesticides than employees at hardware stores (Wilen, 2001). Nurseries that use and sell pyrethroids offer the highest return on outreach resources, while those nurseries that have chosen alternate pest management methods serve as examples of IPM in practice. In a recent Riverside County survey, one nursery stated that they do not use pesticides and if their nursery does experience a pest infestation, it is treated naturally (RCFCWCD, 2008). Such nurseries are likely to encourage their clients and customers to use the same methods. Education and outreach can lead to cooperation and sharing of successful and unsuccessful methods of IPM and ultimately reduce pyrethroid pesticide use and toxicity of storm water runoff.

Businesses not in the industry of pesticide sales may also benefit from outreach. The District directs outreach efforts to all businesses; those in the business of selling or using pesticides, and those that are not. The District has coordinated with the County's Business License Department to include an educational insert of the "Only Rain Down the Storm Drain" program to new business license applicants and annual renewal reminders (CRWQCBSD, 2008). Informing companies on proper disposal of hazardous materials such as pesticides is crucial to prevent pyrethroid containers from being improperly disposed of, leaking, and then contributing to storm water pollution.

Several Southern California cities conduct general business outreach as well. Cities such as Carson, Gardena, Inglewood, and Lomita distribute informational pamphlets on storm water

pollution relating to landscaping and gardening practices to general businesses (DCWMAC, 2007). Such information informs businesses of alternate methods of pest control beyond pesticide use and imparts knowledge about storm water quality issues. Thus, dissemination of educational materials to local businesses is intended to help reduce pyrethroid runoff by ensuring proper disposal of pesticides and encouraging alternate methods of pest control.

Educational and Outreach to the General Public

Status: Currently being implemented by the Permittees.

The District distributes educational materials within the Santa Margarita Region such as EPA sponsored pamphlets in order to promote reduced use of pyrethroid pesticides and educate the public about alternate practices of pest management. The public purchases retail pesticides and uses them, presumably, according to the manufacturer's instructions and in compliance with regulations listed on the packaging, including proper disposal of empty containers in the municipal waste stream. However, even when used properly, retail pesticides have the potential to contaminate urban runoff, and homeowners may be unaware of the downstream consequences of pesticide use. Depending on the landscaping practices in a neighborhood, promoting alternative pest management strategies and educating the public on storm water quality and pesticide use may be the most beneficial way to reduce the source of pyrethroids in urban runoff (Wilen, 2005).

The District distributes educational materials within other public outreach programs and maintains pest management information on the internet. The District also distributes brochures to educate the public on lawn and garden maintenance, fertilization, and pesticide and household chemical use (RCFCWCD, 2005). These educational materials provide public education on alternative pest control methods, limiting individual use of pyrethroids, and proper disposal of pesticide containers.

Many municipalities perform storm water outreach at festivals and public events by participating in the events and by distributing brochures. The Cities of Lawndale and Torrance plan and attend public festivals and rent booth space to educate the public about storm water quality and the use of pyrethroids (DCWMAC, 2007). Cities including Carson, Gardena, Inglewood, and Lomita distribute informational pamphlets on storm water pollution relating to household activities and landscaping and gardening practices to the general public (DCWMAC, 2007). The District participates in events such as the Children's Groundwater Festival, the Southern California Fair, the Community Water Festival, and the Santa Margarita Watershed Clean Up (RCFCWCD, 2005). The Permittees, as well as other municipalities within California, participate in public events and distribute informative materials as a portion of their current public outreach programs.

Education on proper disposal of pesticides

Status: Currently being implemented by the Permittees.

Improper disposal of pesticides is a potential contributor to storm water contamination. Empty containers be disposed of in the municipal waste stream are not likely to contribute to storm water pollution, however, unused pesticides may enter the MS4 by leaking in transit. In Orange County in 2001, 54.5% of people surveyed claimed to have disposed of unwanted pesticides in the municipal waste stream, and 78.6% did not know the location of a household waste disposal site (Wilen, 2001). The District has created a partnership with Riverside County Waste Management to provide educational programs and materials on proper disposal of unwanted waste, including pesticide containers (RCFCWCD, 2005).

Multimedia Outreach

Status: Currently being implemented by the Permittees.

The EPA suggests using multiple media sources to promote and educate on storm water impacts, particularly through public service messages (EPA, 2007). Mass media has proven to be a key source of pollution prevention information for the general public (LADPW, 2002). The District currently participates in a multimedia advertising campaign including: maintaining a website that provides information, distributing mailing inserts regarding water quality issues through various county entities, and billboard advertising campaigns. Many other municipalities, such as the Cities of Palo Alto and Lawndale, also use the world wide web to provide information to the public (City of Palo Alto, 2008) (DCWMAC, 2007).

Public School Programs

Status: Currently being implemented by the Permittees.

A storm water education program for public schools is a concept supported by the EPA (EPA, 2007). The County of Los Angeles has incorporated public school educational programs into its outreach program (LADPW, 2002). The District focuses storm water education efforts on elementary school students (RCFCWCD, 2005). For example, sixth-grade students at Warm Springs Middle School were given an interactive presentation regarding storm water pollution with an enviroscape model that excited and engaged the students; a presentation that has been given over 150 times during the 2003-2004 school year (Jamescourie, 2004). Educational programs in public schools are intended to produce long-term benefits to storm water runoff quality.

Education on Lower Risk Alternative Pesticides

Status: Currently being implemented by the Permittees.

Part of Public outreach includes suggesting less toxic alternatives to pyrethroid pesticides, such as those listed on the Our Water Our World website (www.ourwaterourworld.org). Lower risk pesticides have reduced impacts on human health, lessened toxicity to non-target organisms, decreased potential for water contamination, and lower pest resistance potential (Matteson et al., 2007). The District distributes materials associated with the "Our Water Our World" organization (RCFCWCD, 2008).

However, some of the lower risk pesticides are toxic to beneficial arthropods and still have the potential to pollute surface and ground water (Matteson et al., 2007). Pyrethroids were developed as a less toxic alternative from organophosphate pesticides (Quarles, 2002). In the Santa Margarita Watershed, there was a decrease in water toxicity to *Ceriodaphnia* and an increase in toxicity to *Hyalella* as organophosphate pesticides such as chlorpyrifos and diazinon and were replaced by pyrethroids (RCFCWCD, 2008). The effects on storm water runoff of lower risk pesticides must be carefully evaluated before they are promoted as effective solutions to urban storm water runoff pollution.

4.1.4 Low Impact Development (LID)

Status: Currently being implemented by the Permittees.

LID involves environmentally-friendly building and development designs that mitigate impacts to land and water. LID functions by managing storm water at its source, incorporating a variety of runoff control techniques, using natural features as design features, and protecting natural resources (NAHB, 2008). Municipalities that promote LID have the potential to reduce municipal infrastructure and maintenance costs while balancing growth needs with environmental protection (NAHB, 2008). LID practices include "small scale,

decentralized treatment practices" that include conservation of open space, a reduction of impervious surfaces, and the incorporation of water controls (NAHB, 2008). Reduction of urban runoff volumes may reduce the loadings of pyrethroids to receiving waters in urban areas.

In 2007, EPA implemented a retrofit of the agency headquarters in Washington, D.C., incorporating LID designs to assist with storm water retention (EPA, 2007). Retention of storm water on the land helps prevent pollutants from entering streams and rivers (EPA, 2007). One of the main goals of the EPA LID retrofit was to demonstrate several LID techniques and encourage government agencies and developers to use them (EPA, 2007). LID may be used in conjunction with IPM programs, which would reduce the amount of pesticides used and minimize the urban storm water runoff of pyrethroids. The County of San Diego's most recent MS4 permit requires implementation of LID techniques (County of San Diego, 2007); this appears likely to continue as a trend with other permits in the region as they are renewed. The incorporation of LID principles into development regulations in the Santa Margarita watershed provides a potential solution to runoff of pyrethroids into receiving waters.

4.2 Treatment Control BMPs

Treatment Control BMPs are typically structural devices engineered with the intent to remove pollutants from storm water. Treatment BMPs require construction and long term maintenance, but can be extremely effective (CASQA, 2003). Although treatment BMP's have not been thoroughly investigated specifically for reduction of pyrethroids, some methods may be useful. Pyrethroids bind tightly to soil particles so there is a high probability that pyrethroids would be removed with suspended solids when they pass through treatment BMPs. In addition, pyrethroids degrade over time; permethrin, for example, has a half life in soil of about 30 days and about 10 days on certain plant life. Because pyrethroids have low mobility in soil, infiltration-based treatment BMPs have a low probability of contributing to groundwater contamination (NPTN, 1997).

From the list of available treatment BMP's identified in Table 3-1, the types of treatment BMPs feasible for pyrethroid treatment in the Santa Margarita Watershed, considering the climate, local vegetation, and soil types present are: pervious pavement, media filters, extended detention basins, infiltration basins, and infiltration trenches.

These BMPs and their potential to remove pyrethroids from storm water runoff are described below.

4.2.1 Pervious Pavement

Status: Currently being implemented by Permittees under LID program.

Pervious or porous pavement is "a system comprising a load-bearing, durable surface together with an underlying layered structure that temporarily stores water prior to infiltration or drainage to a controlled outlet" (CASQA, 2003). Pervious surfaces include grass, gravel, and porous concrete and asphalt (CASQA, 2003). The multi layer system assists in preventing pyrethroid pollution by providing a stable structure for pyrethroids to bind to and degrade, thus helping to prevent their transport in to receiving waters. Silts that are deposited within the pavement may need infrequent controlled waste disposal (CASQA, 2003).

The advantage of porous pavement is that urban runoff is reduced while treatment is provided and it is an effective drainage solution in confined urban areas. However, porous pavement is not a viable option on high traffic or high speed roads due to safety issues. There is a small chance that it may contaminate groundwater. It is fairly easy to replace, should there be a clog or damaged area, as small areas can individually be paved (CASQA, 2003). The use of pervious pavement appears to be a growing trend.

4.2.2 Media Filter

Status: Currently being implemented by Permittees via sand filters.

Storm water media filters are usually two-chambered including a pretreatment settling basin and a filter bed filled with sand or other absorptive filtering media. As storm water flows into the first chamber, large particles settle out, and then finer particles and other pollutants are removed as storm water flows through the filtering media in the second chamber. Media filters are highly effective at removing sediment from storm water flows (CASQA, 2003). They are appropriate in low flow areas, particularly with sandy soil. Washington D.C. and Austin, TX have both successfully implemented media filters to treat storm water (VCSQMP, 2002). They "are well suited to Southern California because they do not require vegetation and require less space than other treatment control measures with similar removal efficiencies when a partial treatment sedimentation basin is used" (VCSQMP, 2002).

However, media filters clog easily when exposed to high sediment loads and may decrease in effectiveness after being in use for a few years (CASQA, 2003). A media filter is not appropriate for areas with erosive soil upstream from the treatment filter (VCSQMP, 2002). The lack of abundant native vegetation in the Santa Margarita watershed contributes to a high potential for erosion, so media filters may not be effective in the long term due to clogging. When clogging does occur, media filters may become a nuisance due to mosquito or midge breeding in pooled waters (CASQA, 2003).

4.2.3 Extended Detention Basin

Status: Currently not being implemented by the Permittees for pyrethroid reduction.

An extended detention basin (EDB) is a permanent basin "formed by excavation and/or construction of embankments to temporarily detain the Stormwater Quality Design Volume

(SQDV) of storm water runoff to allow sedimentation of particulates to occur before the runoff is discharged"(VCSQMP, 2002). EDBs are constructed with an outlet at the bottom that allows for a slow, time-controlled release. The ultimate goal of EDBs is to level off peak storm water runoff rates (VCSQMP, 2002). Santa Clara Valley and the City of Palo Alto have noted that their detention basins have helped with the reduction of pollutants (EOA, 2004) (City of Palo Alto, 2008). Pyrethroids could be removed in the basin through settling of particulates.

Extended detention basins can serve multiple purposes as they provide for significant trash removal as well (CASQA, 2003). Maintenance is needed to ensure that the pond fully drains after large wet weather events, to avoid creation of standing pools causing mosquito or other vector habitats (CASQA, 2003). Extended detention basins are most effective when used in conjunction with other control measures, and are only moderately successful at removal of sediment. EDBs require relatively large amounts of land and therefore may not be feasible in urban areas of the Santa Margarita watershed (VCSQMP, 2002). There are no available examples of test results from municipalities using an extended detention basin for reduction of pyrethroid pesticides.

4.2.4 Infiltration Basin

Status: Currently not being implemented by the Permittees for pyrethroid reduction.

An infiltration basin is a shallow impoundment that is designed to infiltrate storm water and utilize the natural ability of soil to remove pollutants in storm water runoff (CASQA, 2003). Infiltration basins store runoff until it eventually enters the soil and infiltrates into the water table (CASQA, 2003). The soil present in the Santa Margarita Region is extremely pervious and may work well with an infiltration basin treatment structure.

Since pyrethroids adsorb onto soil, pyrethroids are likely to be removed from the storm water into the soil. However, there is a slight possibility that they may be resuspended into the

groundwater. Monitoring of pilot sites would be required to determine if there is transport of pyrethroids to the water table.

As with detention basins, maintenance is needed to ensure that the basin fully drains after large wet weather events to avoid creation of standing pools causing mosquito or other vector habitats. Infiltration basins may fail if the storm water volume is greater than the design volume (VCSQMP, 2002). Since infiltration basins require a large amount of open space, installation in urban areas is problematic. There are no available examples of test results from municipalities using infiltration basins for reduction of pyrethroid pesticides.

4.2.5 Infiltration Trench

Status: Currently not being implemented by the Permittees for pyrethroid reduction.

An infiltration trench is a long and narrow ditch that collects storm water runoff by storing it in the voids in a rock bed and allowing it to infiltrate to the soil matrix (CASQA, 2003). Infiltration trenches are extremely effective at removing fine sediment particles and associated pollutants (CASQA, 2003). Naturally pervious soils are required (VCSQMP, 2002). The Santa Margarita watershed has naturally pervious soils, which would allow for the removal of pyrethroids from the water and into the sandy soil.

Infiltration trenches are typically used in conjunction with grass lined channels or grass filter areas located upstream for maximum removal of sediment and larger particles (VCSQMP, 2002). Due to the arid environment in the Santa Margarita Region, grass lined channels, or even vegetated strips, would require irrigation to maintain the vegetation. If the infiltration trench clogs, it can become a source for mosquito breeding. There are no available examples of test results from municipalities using infiltration trenches for reduction of pyrethroid pesticides.

4.3 BMP Evaluation

A summary of the relative advantages, disadvantages and costs of the various BMPs identified in Sections 4.1 and 4.2 above is presented in Table 6.1 below. The table includes advantages, disadvantages, and the relative cost of implementing the BMPs.

Table 6.1
BMP Comparison Table

BMP Technology	Advantages	Disadvantages	Relative Cost*
Source Control			
Regulatory Change	Reduces the availability of pyrethroids on the market	May take years to achieve full effect	$
Integrated Pest Management	Engages businesses and the public in environmentally sound gardening practices	Need to ensure that employees are following protocols	$
	Has been implemented in various locations throughout CA and the US	Could have some resistance from employees who are use to standard practices	
	SIPM can be put in place directly by the Permittees	Some may find the organic methods of gardening to be too time consuming	
	SIPM can be incorporated directly into current maintenance activities		
	Includes LID aspects		
Public Outreach and Education	EPA states that Public Outreach is key for any BMP program	Cannot control the direct actions of public but only educate	$
	Copermittees have already implemented a public outreach program	Hard to measure the direct impact of pollutant reduction	
	Employees of business have direct impact on the buying choices of the general public		
	Programs have been implemented by many municipalities		

Table 6.1 (continued)
BMP Comparison Table

BMP Technology	Advantages	Disadvantages	Relative Cost*
Treatment Control			
Porous Pavement	Reduces runoff volume while reducing pollutant load as well	Requires ongoing minimal maintenance	$ to $$ depending on size
	Can be easily replaced depending on the size and location of design	No known measured reduction of pyrethroids.	
Media Filter	Do not require vegetation	No known measured reduction of pyrethroids.	$$$
	Highly effective in removal of sediments	Clogging is an issue because of the erosion potential in the watershed.	
	Requires less space than other treatment controls for sediment removal		
Extended Detention Basin	Known for significant trash	Large footprint Moderately successful at removing sediment	$$$
	Standard BMP with many years of maintenance and operational information available	Create an area with vector breeding potential	
		No known measured reduction of pyrethroids.	
Infiltration Basin and Trench	Uses natural ability of soil to remove pollutants.	Unknown if pyrethroids would be transported to the groundwater table.	$ to $$$
	Local soils would allow infiltration	Would require a pilot study to determine transport.	
		No known measured reduction of pyrethroids.	
		Clogging of outlet structure	
		Accumulation of metals in soil	

*Relative Cost: $ = $0 to $50,000, $$ = $50,001 to $100,000, $$$>100,000

5.0 Pending Legislation

There is no relevant pending state legislation relating to pyrethroid pesticides from the California Department of Pesticide Regulation or, in general, the State of California as of December, 2008 (State of California, 2008) (CDPR, 2008). In August 2006, the DPR put rules in place to control insecticide sprays during the dormant season. During winter, pesticides are applied to dormant tree and vine crops to kill overwintering pests and diseases. The new rules restrict the use of most dormant insecticides when residuals can run off into water (DPR 2007-08 Progress Report). However, there are no additional updates relating to pending pyrethroid legislation at this time.

There is no relevant pending federal legislation relating to pyrethroid pesticides from the United States Congress as of December, 2008 (Library of Congress, 2008). Although the EPA is working on proposed mitigation labeling for non-agricultural pyrethroids, there is no indication as to when this legislation may be enacted (TDC, 2007).

6.0 Proposed Course of Action

The Permittees intend to use a phased approach to address the identified sources of pyrethroid pesticides causing toxicity in surface waters of the SMR watershed. As described in Section 4, various source control BMPs and treatment control BMPs are available to address these sources. However, the use of pyrethroid pesticides can not be directly regulated by local governments. The most effective control strategy involves effective labeling and use restrictions via state or federal regulatory action, to prevent water quality impacts from legal pesticide uses. The proposed course of action involves an adaptive management approach with the following broad elements:

- Pursue state and federal regulatory change through CASQA
- Implement a set of source controls targeted specifically at urban pesticide use,
- Through the annual reporting process, monitor the implementation of those controls, assess effectiveness, and identify sources or areas where additional effort is needed,
- Evaluate whether additional controls, including treatment controls, may be needed to further reduce pyrethroid pollution,
- Implement additional controls as needed,
- Continue to monitor implementation, as well as conditions within the target receiving waters, assess effectiveness, and re-evaluate control program

The Permittees will continue to support CASQA and/or other agencies pursuing regulatory change in labeling or use limitations for pyrethroid pesticides. This support will include participation in the CASQA Pesticides Subcommittee and the Urban Pesticide Committee, and supporting the implementation of the Urban Pesticide Pollution Prevention (UP3) Project. Permittee staff will continue to provide staff time and resources necessary for the CASQA Pesticides Subcommittee to complete its negotiations with the California Department of Pesticide Regulation and USEPA regarding labeling and use limitations for pyrethroids.

Source control is generally a more cost-effective approach to pollution abatement than treatment control, as source controls do not involve the costly capital investments of treatment controls. As discussed previously, CASQA, EPA, and other agencies and experts

recommend a source control program as an essential component of a successful pollution reduction strategy.

The basis of source control involves preventing the entrance of the subject pollutant into the discharge stream. For pyrethroid pesticides, this means preventing the pesticide from entering the municipal storm drain system through urban runoff. This can take place by intervention at the various steps in the pest control process:

- Point of sale: reducing the purchase of pyrethroid products through education of PCOs and the public in consequences of pesticide use and alternative means of pest control, including integrated pest management (IPM)
- Application: reducing use of pyrethroids on site through education of PCOs and the public into the importance of proper application methods and the potential consequences of pesticide use, as well as pest control alternatives (IPM techniques)
- Off-site Transport: reducing movement of pyrethroids into municipal storm drain system via use of Green Gardener approaches, IPM, and LID building techniques to reduce irrigation water use, retain storm water runoff on-site, and provide on-site mitigation for runoff pollutants (via grassy swales, infiltration, etc.)

A five-year pyrethroid pollutant reduction program is proposed by the Permittees.

<u>Year 1</u>

- Continue to support state and federal efforts to improve pyrethroid pesticide regulation
- Continue to publicize/promote the services of IPM-certified PCOs, to encourage businesses and homeowners to choose their services
- Continue to implement local agency contracting rules to require contracting of IPM-certified PCOs for municipal pest control (through EcoWise Certified IPM Contracting Tool Kit, e.g.)
- Continue point-of-sale education effort providing instruction in pesticide alternatives and proper use/application (using materials available through Our Water Our World, UP3 Project, CASQA members, e.g.)
- Continue efforts to develop and implement LID guidance for planning and development

Year 2

- Coordinate with the University of California (UC) Extension Master Gardener Program to extend its services to the Temecula/Murrieta area to further promote and support the use of IPM by local residents
- Re-evaluate, enhance as needed, and continue measures implemented in Year 1

Year 3

- Conduct programmatic assessment as part of third-year annual report, evaluate successes and areas where additional efforts are needed and adjust program accordingly
- Re-evaluate, enhance as needed, and continue measures implemented in Years 1 and 2

Year 4

- Evaluate effectiveness of BMPs using water quality monitoring data as part of fourth year annual report
- Re-evaluate, enhance as needed, and continue implementation of revised program as defined in Year 3

Year 5

- Conduct programmatic assessment, evaluate successes and areas where additional efforts are needed as part of ROWD process
- Identify additional program elements, including source and/or treatment controls, as needed to effect required pollutant reductions; revise program accordingly
- Re-evaluate, enhance as needed, and continue implementation of revised program as defined in Year 3

Many of the source control materials and programs needed are readily available through existing programs such as EcoWise Certified, Green Gardener, Our Water Our World, the UP3 Project, and the Western IPM Center. The following websites provide further information on these and other programs:

Urban Pesticide Pollution Prevention (UP3) Project: www.up3project.org
Green Gardener Program: www.green-gardener.org/about
Western Integrated Pest Management Center: www.wripmc.org
EcoWise Certified Integrated Pest Management: www.ecowisecertified.com
Our Water Our World: www.ourwaterourworld.org
Green California: www.green.ca.gov/EPP/building/structipm.htm

City of San Francisco: http://www.sfenvironment.org/our_programs/topics.html?ti=1
DPR: http://www.cdpr.ca.gov/docs/registration/reevaluation/chemicals/pyrethroids.htm

As a practical measure, it will be necessary to evaluate individual Permittee capabilities and resources, and develop a specific work plan for implementation of the pyrethroid pollutant reduction program.

It is also essential to develop and implement the pyrethroid pollutant reduction program in coordination with other regulatory requirements, especially other pollutant reduction programs mandated under the storm water NPDES Permit and/or load allocations required by TMDLs within the SMR watershed.

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Profile of the City of Corona

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SCAG Regional Council District 63 includes five cities:
Canyon Lake, Corona, Lake Elsinore, Menifee, and Wildomar
Represented by: **Hon. Thomas Buckley**

This project was funded by the Southern California Association of Governments and shared with the City of Corona. SCAG regularly provides local governments with services including planning data and information, technical assistance such as GIS training, and planning assistance such as analyses of visioning, infill, real estate investment, and fiscal impact.

SCAG wishes to recognize the City of Corona for volunteering to participate in a regionally funded demonstration project through the Compass Blueprint program. This partnership is a showcase for collaborative planning based on a shared vision on how to address the challenge of population, housing and employment growth and change.

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May 2009

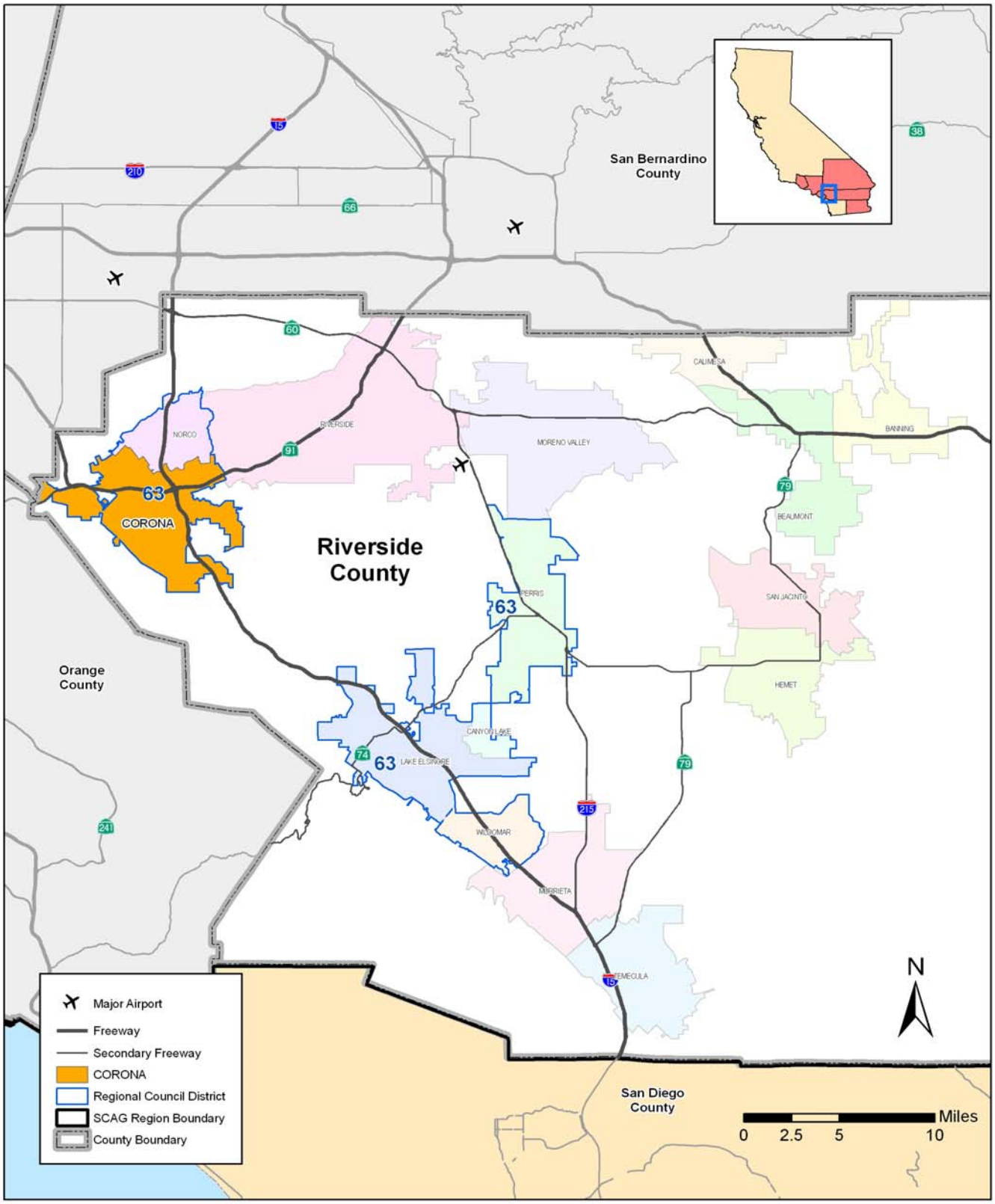
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May 2009

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I. Introduction

The purpose of this report is to offer the City of Corona with updated information and to assist in their planning activities. Information with respect to, for example, demographic, socio-economic and housing, is obtained from a myriad of sources. In addition, data related to education is also included. The report focuses on the major changes in the city since 2000 in comparison with that of Riverside County. The information presented and interpreted in this report shows current trends, and may be utilized by the City as part of the basis for making its future policies.

STATISTICAL DATA

Category	*Corona*	*Riverside County*	*Corona relative to Riverside County*	*SCAG Region*
Population (2008)	147,428	2,088,322	7.10%	18,636,934
Median Age (Yrs)	30.8	31.8	-1.0	33.5
White (Non-Hispanic)	38.90%	43.00%	6.40%	35.30%
Asian (Non-Hispanic)	9.40%	5.10%	13.00%	11.30%
Black (Non-Hispanic)	7.60%	5.80%	9.30%	6.80%
American Indian	0.30%	0.50%	4.60%	0.30%
All Other Non-Hispanic	3.90%	3.40%	8.10%	2.30%
Hispanic	39.90%	42.20%	6.70%	43.90%
Number of Households (2008)	43,827	671,036	6.50%	5,849,833
Number of Housing Units (2008)	45,485	773,331	5.90%	6,224,661
Home Ownership Rate	68.90%	70.20%	6.40%	54.70%
Average Household Size (2008)	3.3	3.1	0.2	3.1
Median Family Income (2007) ($)	78,737	60,180	18,557	61,901
Median Existing Home Price (2008) ($)	365,000	260,000	105,000	382,300
Number of Jobs (2008)	67,467	653,793	10.30%	7,845,378

Source: Claritas, Inc., 2007, California Department of Finance, Data Quick Information Systems, SCAG.

II. Population

Population Growth

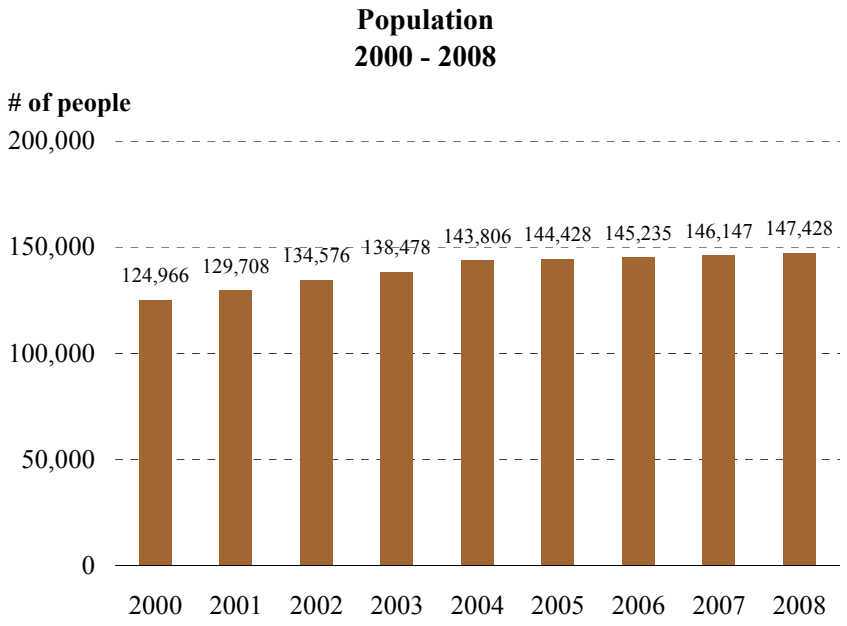

Source: California Department of Finance, E-5, May 2008

- Between 2000 and 2008, the total population of the city increased by almost 22,500, reaching 147,428 in 2008.
- During this 8-year period, the city's population growth of 18 percent was well below the Riverside County growth of 35 percent.
- In 2008, the City of Corona was ranked as the 3rd most populous city in the county behind Riverside and Moreno Valley.

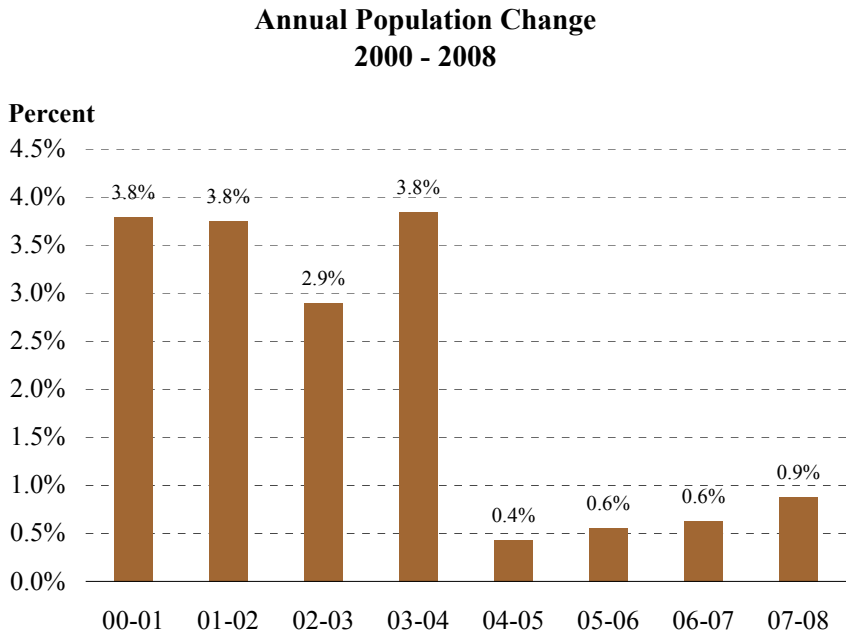

Source: California Department of Finance, E-5, May 2008

- After somewhat steady growth between 2000 and 2003, population growth slowed significantly between 2004 and 2008.

Population by Age

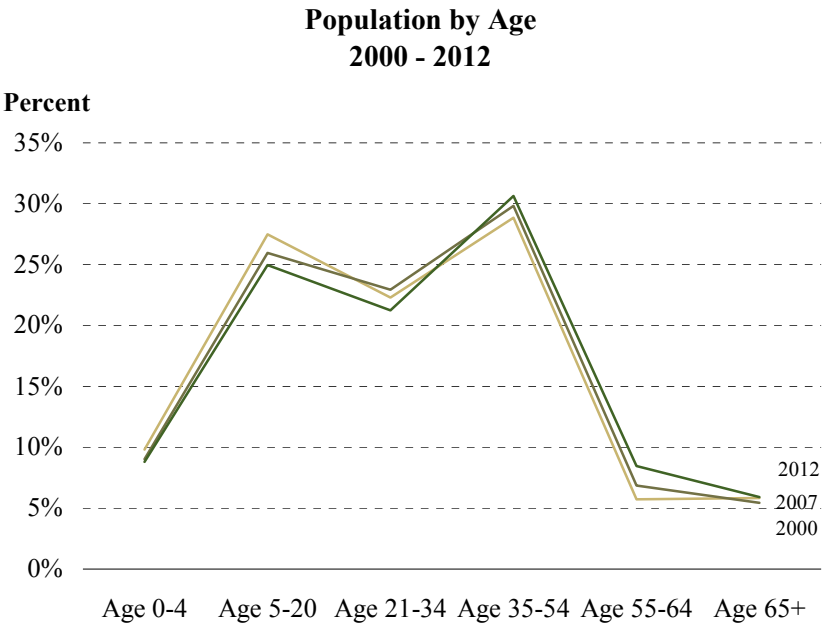

Source: Claritas, Inc., 2007 and U.S. Census Bureau: Summary File 1, 2000

- Between 2000 and 2012, the population in Corona continues to be dominated by the middle-aged working cohort (35 to 54 years old) and the school-age populations (5 to 20 years old). Together, they are projected to remain 56 percent of the total population in 2012, matching 2000.
- Between 2000 and 2012, the population between ages 55 and 64 is projected to increase from 6 percent to 8 percent of the total population, reflecting primarily the aging of the baby boomers.
- During this 12-year period, the share of the age cohort (21 to 34 years old), however, is projected to decrease from 22 to 21 percent.

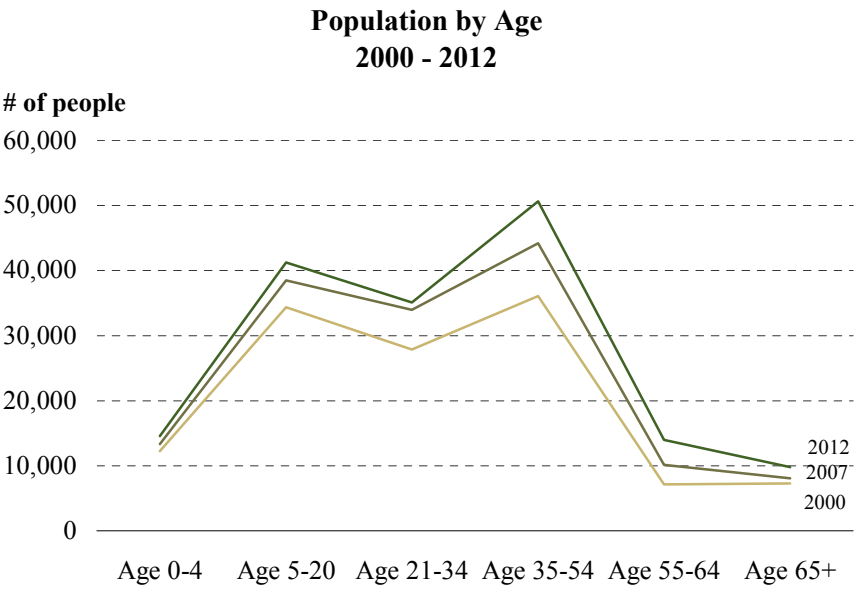

Source: Claritas, Inc., 2007 and U.S. Census Bureau: Summary File 1, 2000

- As to the population by age group, those aged 35 and older are projected to increase significantly. Specifically, between 2000 and 2012, the middle-aged working cohort (35 to 54 years old) is projected to increase by almost 14,600.

Population by Race/Ethnicity

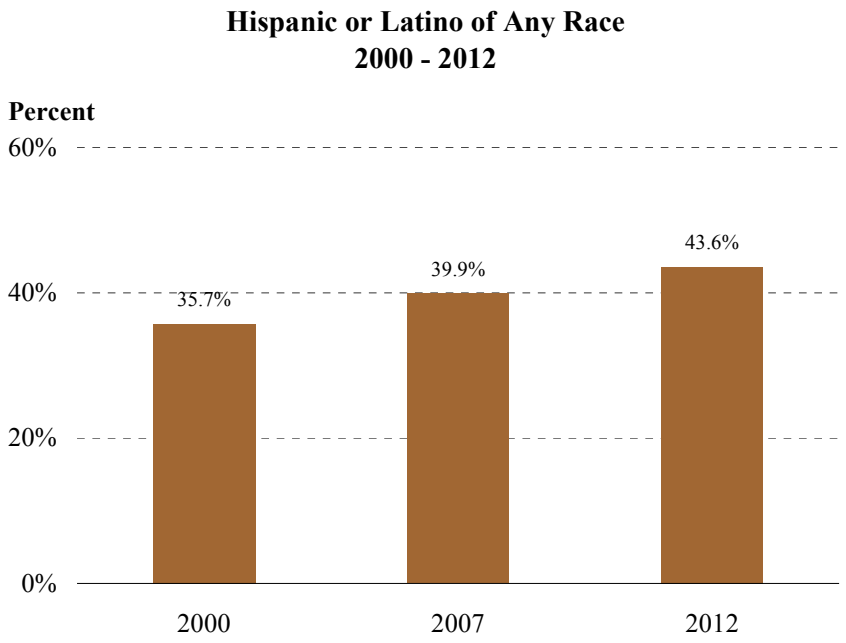

Source: Claritas, Inc., 2007 and U.S. Census Bureau: Summary File 1, 2000

- Between 2000 and 2007, the share of Hispanic population in the city increased from nearly 36 to 40 percent. Hispanics are the fastest growing ethnic group in the city and their population share is projected to further increase to almost 44 percent in 2012.

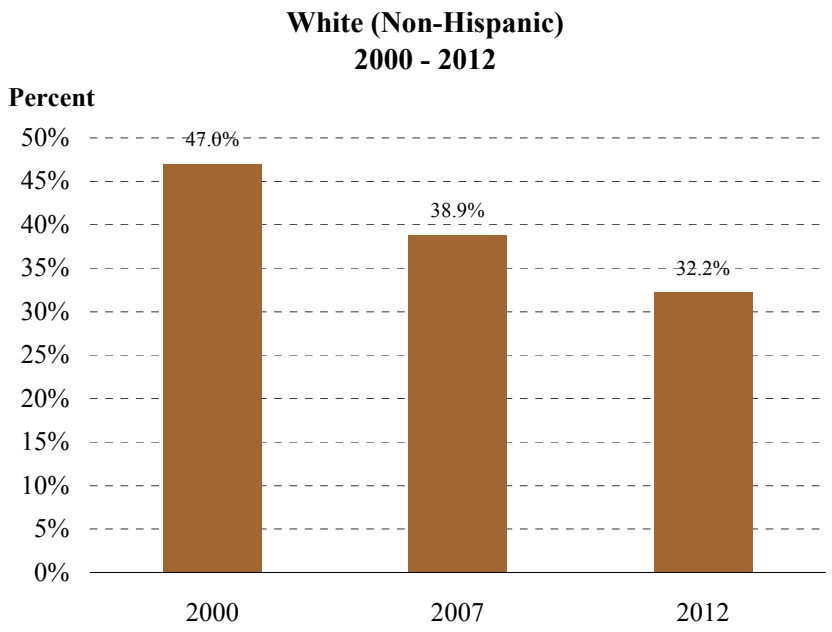

Source: Claritas, Inc., 2007 and U.S. Census Bureau: Summary File 1, 2000

- Like most cities in Southern California, since 2000, the share of non-Hispanic White population has been declining, while the share of other ethnic groups (particularly Hispanic and Asian) has been increasing and is projected to continue to rise through 2012.

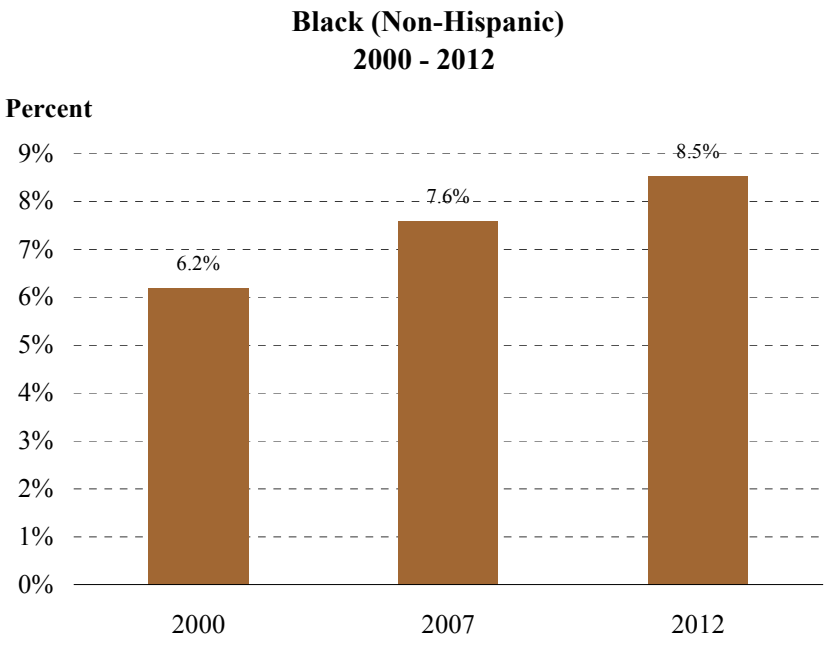

Source: Claritas, Inc., 2007 and U.S. Census Bureau: Summary File 1, 2000

- Between 2000 and 2007, the share of non-Hispanic Black population in the city increased very slightly from 6.2 to 7.6 percent, and is projected to increase to 8.5 percent in 2012.

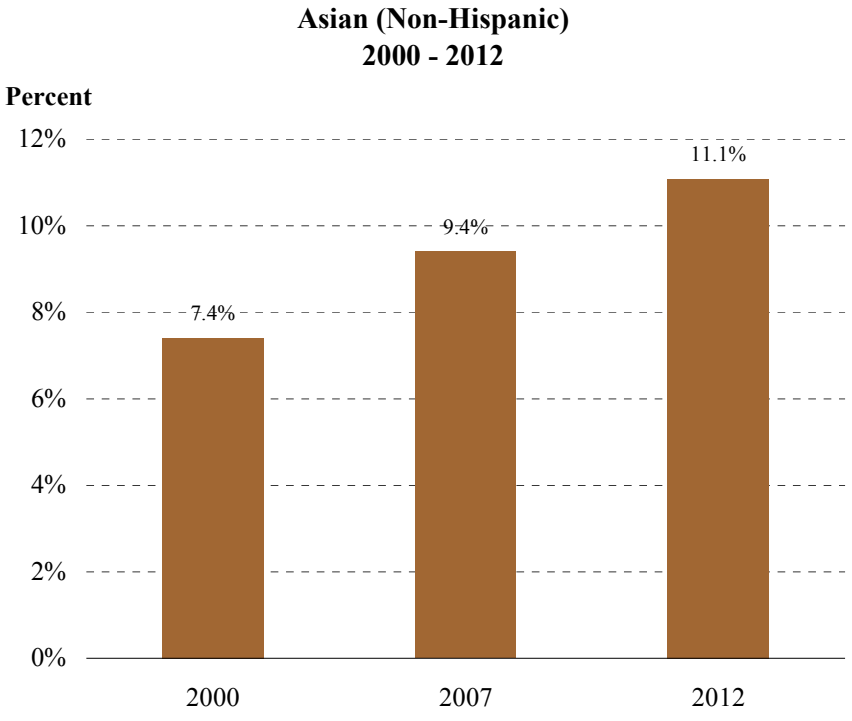

Source: Claritas, Inc., 2007 and U.S. Census Bureau: Summary File 1, 2000

- The share of the Asian population in the city increased from 7.4 percent in 2000 to over 9 percent in 2007. Asian population in the city is projected to further increase to approximately 11 percent in 2012.

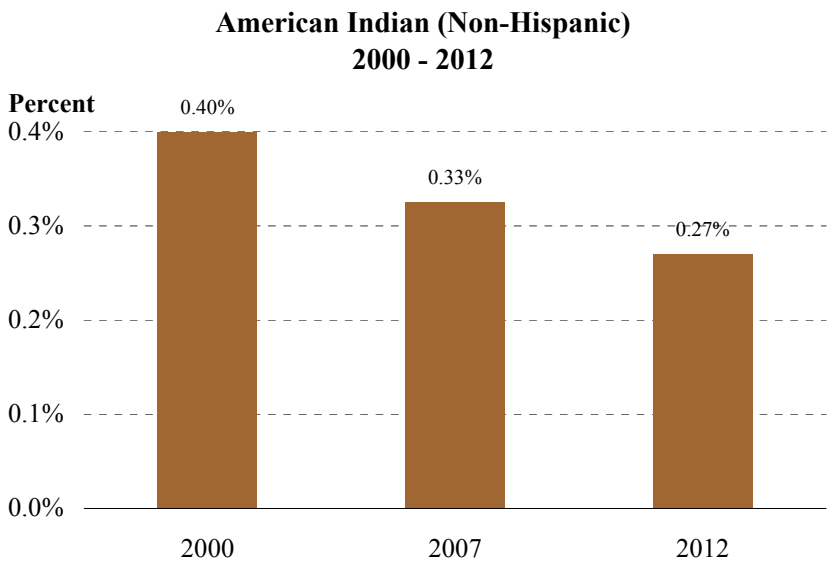

Source: Claritas, Inc., 2007 and U.S. Census Bureau: Summary File 1, 2000

- Between 2000 and 2012, the share of the American Indian population in Corona is expected to decline slightly from 0.4 to 0.27 percent.

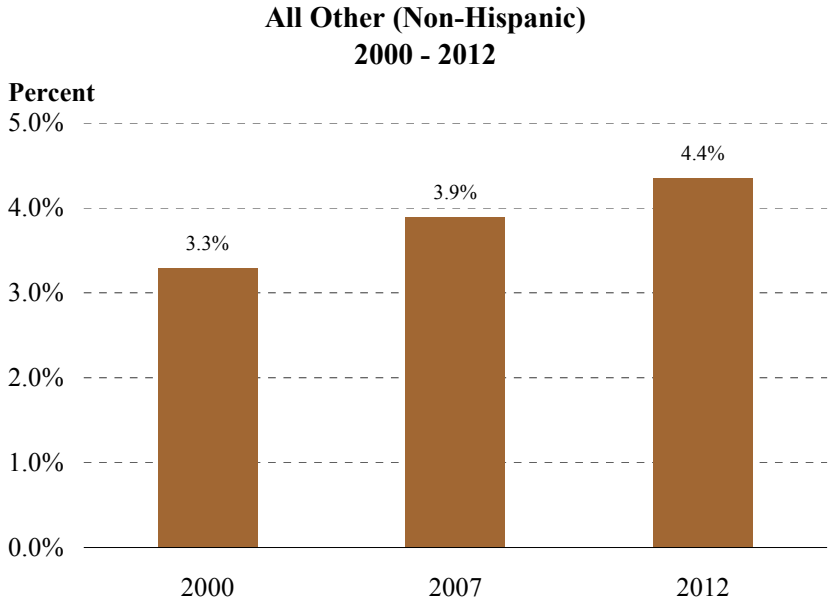

Source: Claritas, Inc., 2007 and U.S. Census Bureau: Summary File 1, 2000

- During the 12-year period, the share of all other non-Hispanic population group is estimated to grow slightly from 3.3 to 4.4 percent.

III. Households

Number of Households

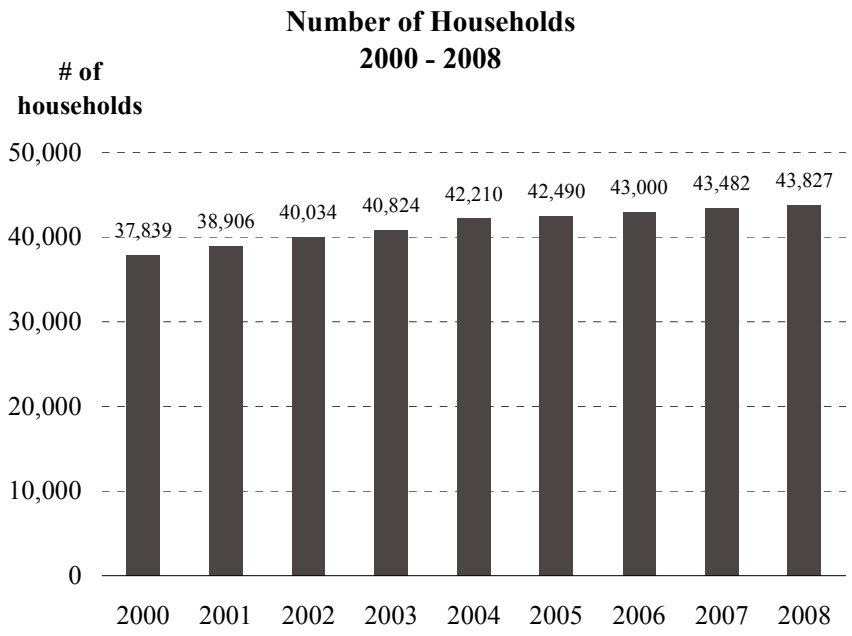

Source: California Department of Finance, E-5, May 2008

- Between 2000 and 2008, the total number of households in the city increased by almost 6,000, or about 16 percent, lower than the city's population growth of 18 percent.

Average Household Size

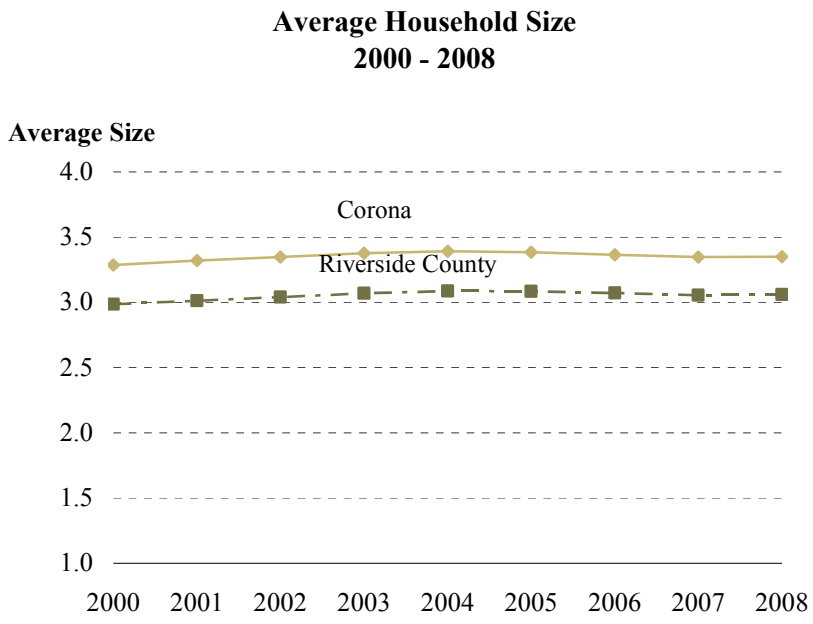

Source: California Department of Finance, E-5, May 2008

- In 2008, the city's average household size was 3.3, higher than the county average of 3.1.
- Between 2000 and 2008, average household size increased slightly in the city and the county, but the difference between them remained constant.

Households by Size

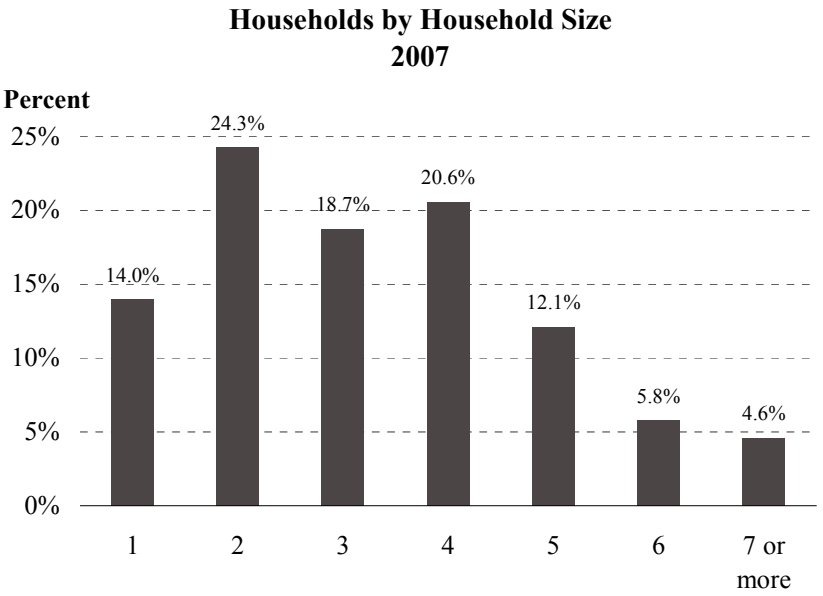

Source: Claritas, Inc., 2007

- Fifty-seven percent of all Corona households have 3 people or fewer.
- About 14 percent of the households are single-person households, much lower than the county share of 32 percent.
- Nearly 23 percent of all households in the City have at least 5 people.

Households by Income

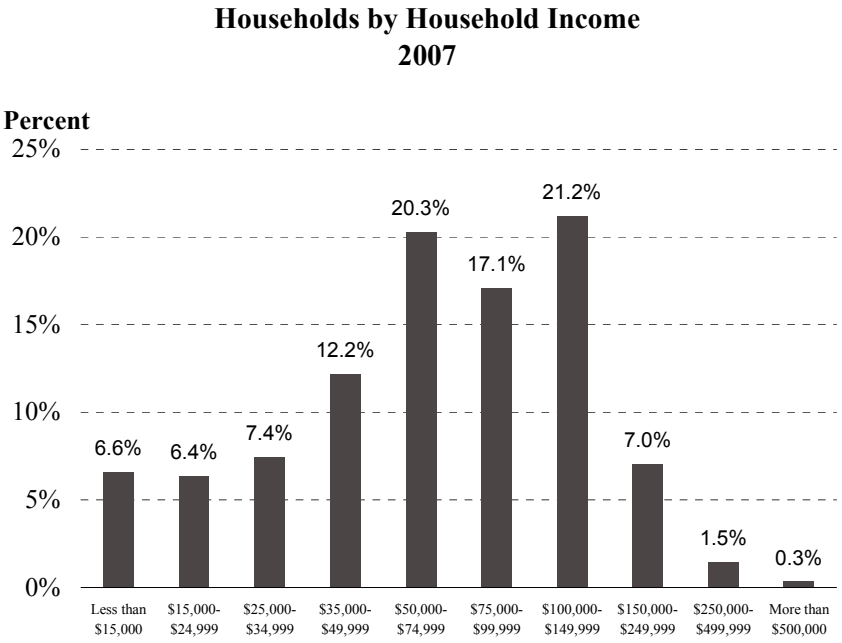

Source: Claritas, Inc., 2007

- In 2007, about 33 percent of households earned less than $50,000.
- Approximately 37 percent of the households earned between $50,000 and $100,000.

IV. Housing

Housing Production

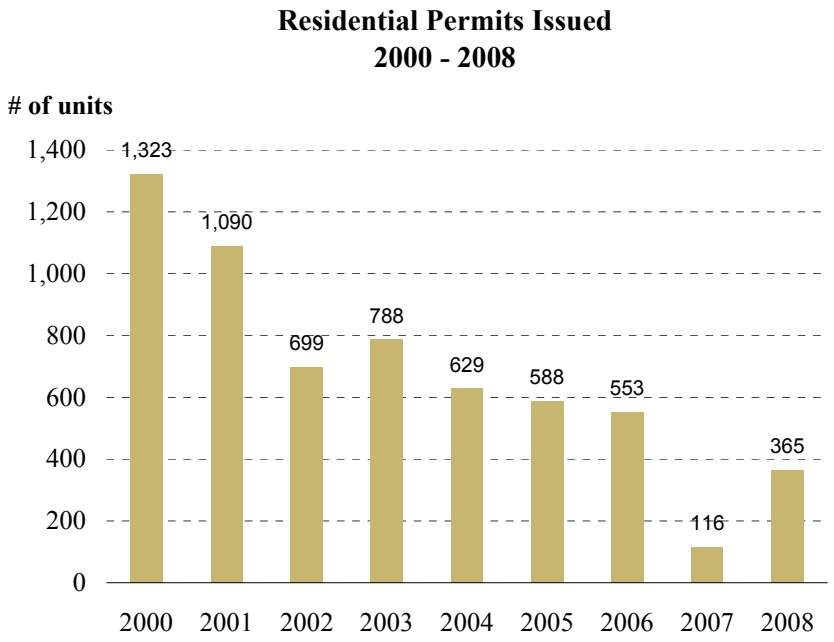

Source: Construction Industry Research Board, 2000-2008

- Between 2000 and 2008, 6,151 new residential permits were issued. However, only 17 percent of these were issued in the last 3 years.

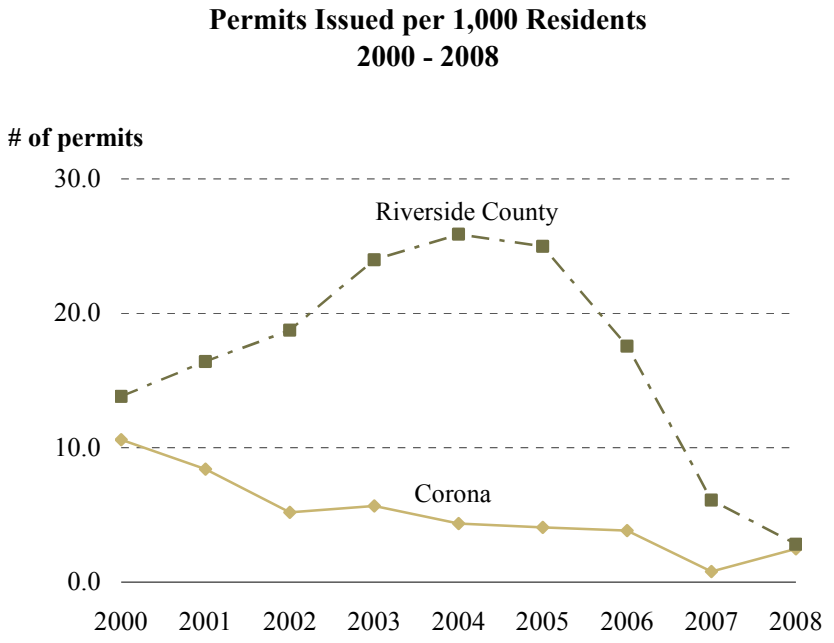

Source: Construction Industry Research Board, 2000-2008 and SCAG

- The City had significantly lower levels of permits issued per 1,000 residents when compared to the county as a whole.

Housing Values

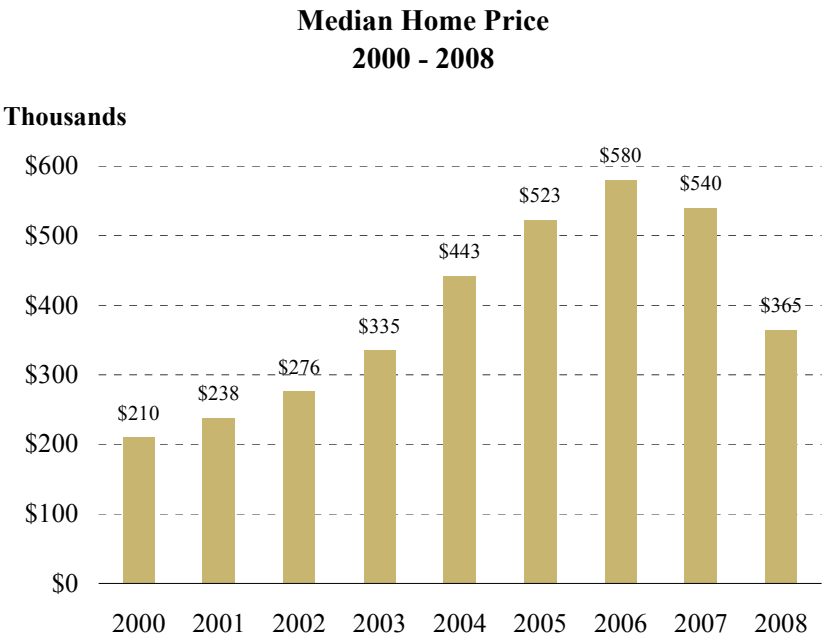

Source: Data Quick Information Systems, 2009

- Between 2000 and 2006, median home sale prices more than doubled, jumping from $210,000 to almost $580,000.
- Median home prices declined slightly between 2006 and 2007 and quite substantially between 2007 and 2008.
- In 2008, the median home price in Corona was $365,000, $105,000 higher than the county median.

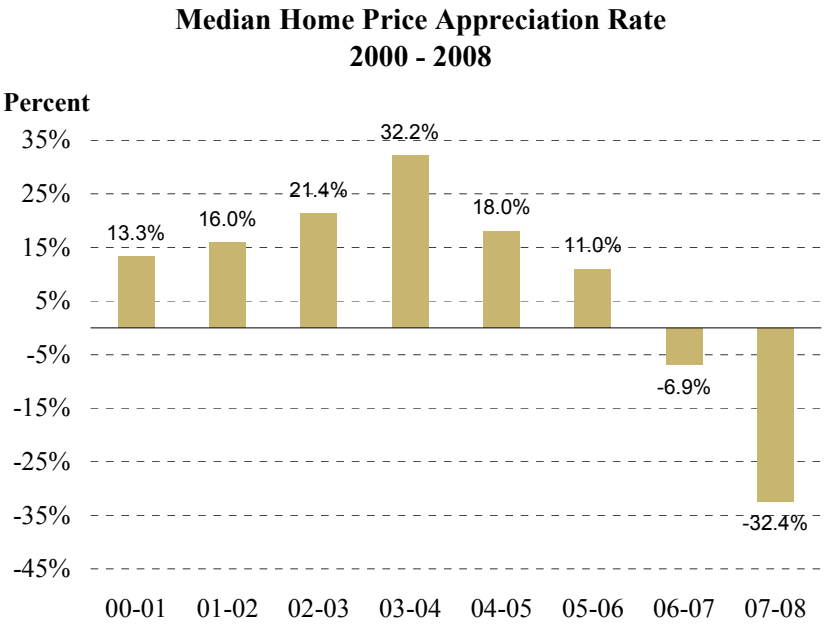

Source: Data Quick Information Systems, 2009

- Between 2000 and 2006, annual home price appreciation rates were between 11 and 33 percent.
- In sharp contrast, median home price dropped by 7 percent between 2006 and 2007 and 32 percent between 2007 and 2008.

V. Employment

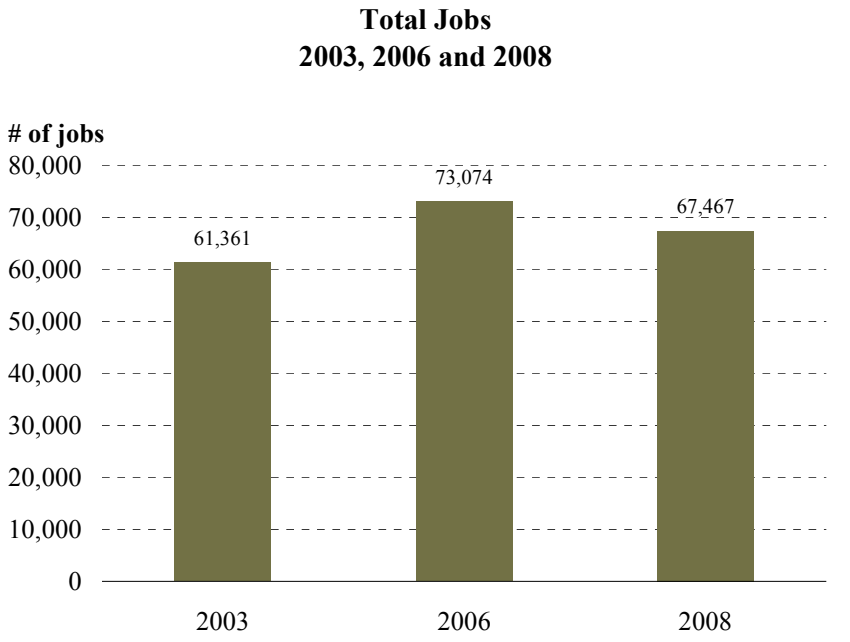

Source: California Employment Development Department, 2003, 2006 & 2008 and SCAG

- In 2008, total jobs in Corona reached 67,467, about 10 percent greater than its 2003 level.
- Total jobs in the city included wage and salary jobs and jobs held by business owners and self-employed persons. The total job count does not include unpaid volunteers or family workers, and private household workers.

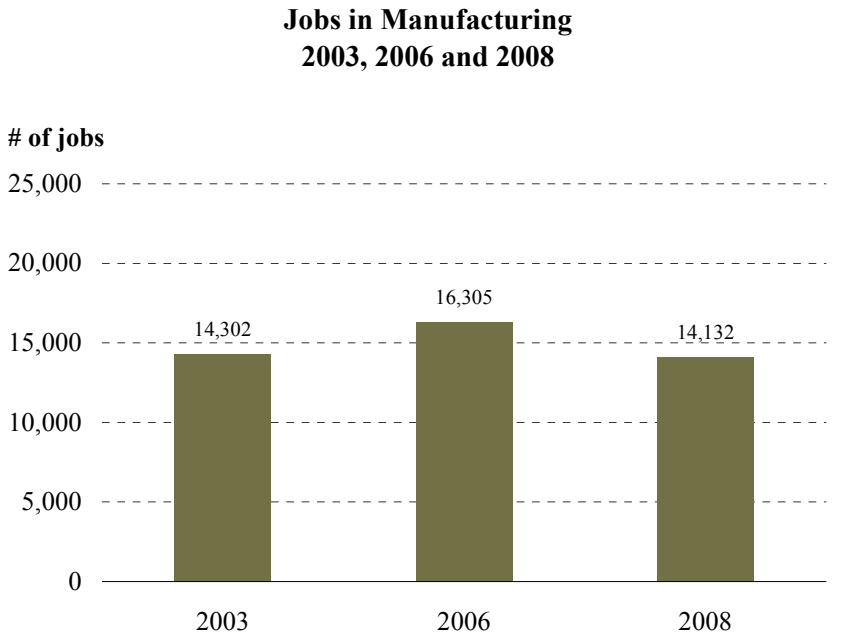

Source: California Employment Development Department, 2003, 2006 & 2008 and SCAG

- Between 2003 and 2008, the number of manufacturing jobs in Corona decreased by 1 percent.

Source: California Employment Development Department, 2003, 2006 & 2008 and SCAG

- Construction jobs include those engaged in both residential and non-residential construction.
- Between 2003 and 2006, construction jobs in the city increased by 2,963, or 33 percent. However between 2006 and 2008, construction jobs decreased by 31 percent.

Source: California Employment Development Department, 2003, 2006 & 2008 and SCAG

- Between 2003 and 2006, the number of retail trade jobs in the city increased by 1,638, or 23 percent. Retail trade jobs decreased slightly by 2 percent, between 2006 and 2008

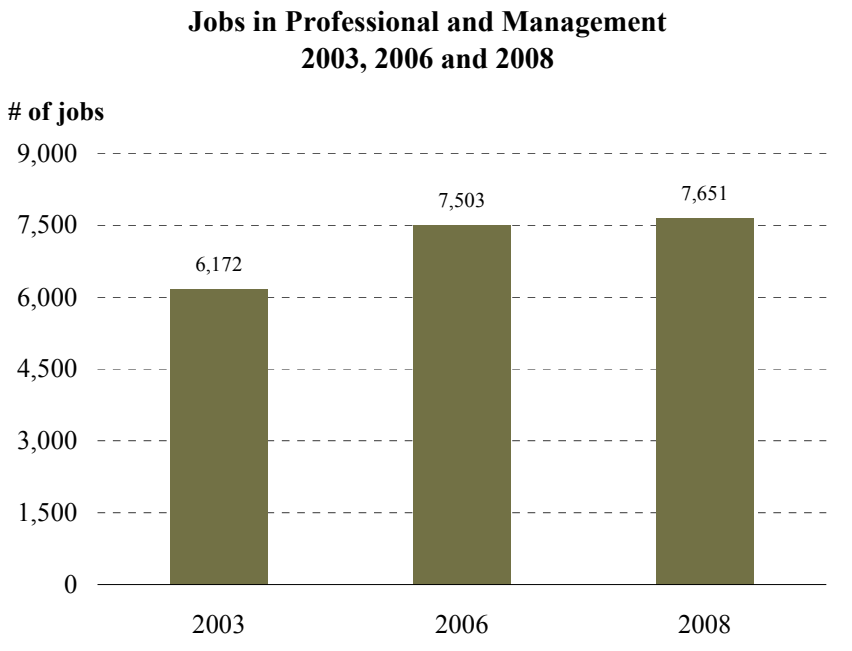

Source: California Employment Development Department, 2003, 2006 & 2008 and SCAG

- Jobs in the professional and management sector include those employed in, for example, professional and technical services, management of companies, and administration and support.
- Between 2003 and 2006, the number of professional and management jobs increased by about 1,330, or 22 percent. Despite a decrease in overall employment from 2006 to 2008, this sector added 2 percent.

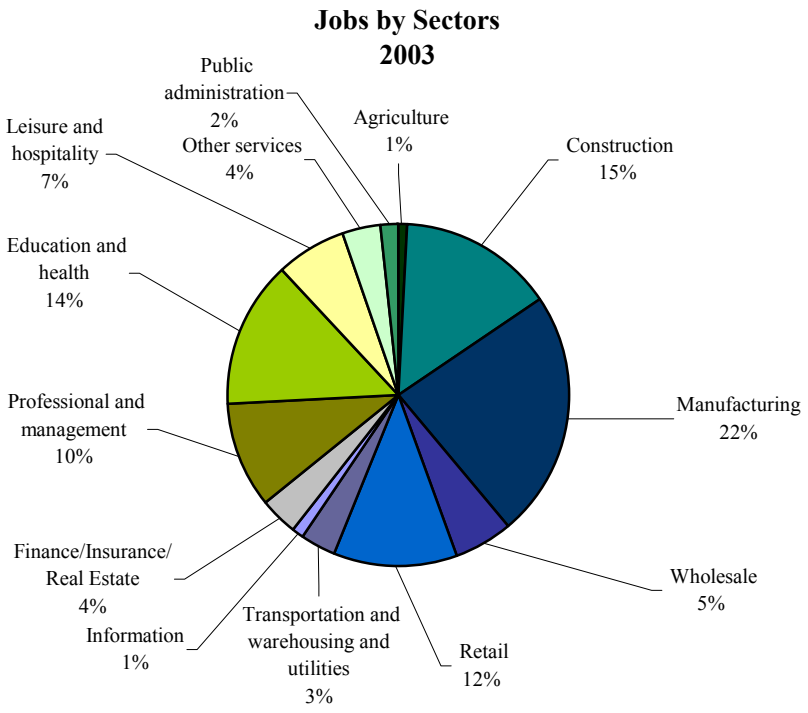

Source: California Employment Development Department, 2003 and SCAG

- Between 2003 and 2008, there were slight changes in the share of jobs by sector in the city. Specifically, during this period, the share of manufacturing jobs decreased from 22 percent to 20 percent while the share of construction jobs decreased from 15 to 12 percent.

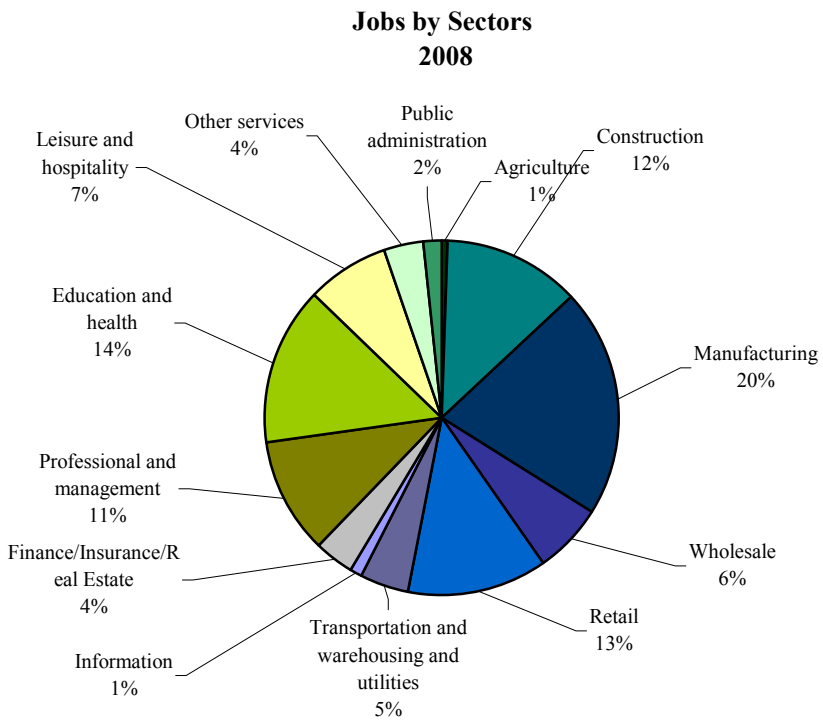

Source: California Employment Development Department, 2008 and SCAG

- In 2008, the manufacturing sector remained the largest sector, accounting for20 percent of total jobs in the city.
- Other large sectors included education and health services (14 percent), retail (13 percent), and construction (12 percent).

Average Salaries

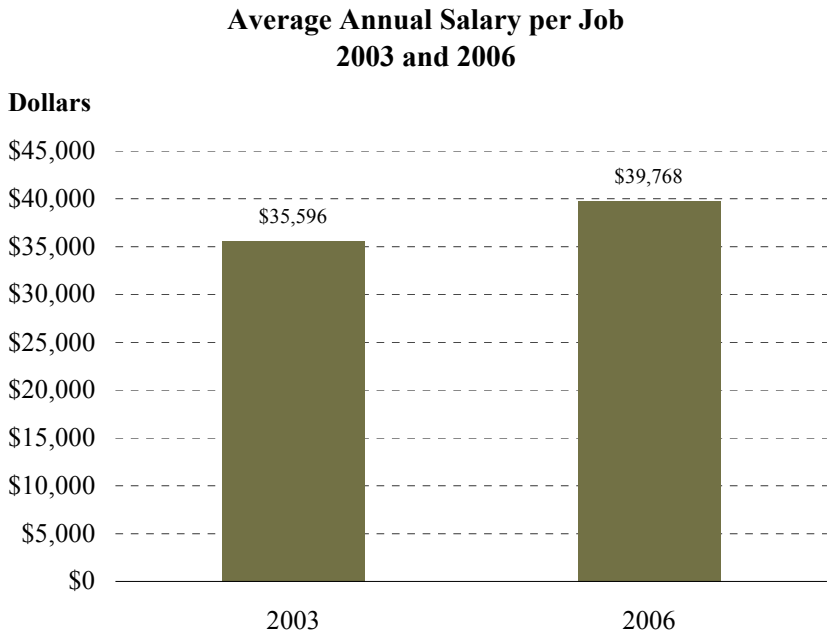

Source: California Employment Development Department, 2003 & 2006

- Average salaries per job in the city increased from $35,596 in 2003 to $39,768 in 2006, a 12 percent increase, which was slightly lower then the inflation rate of 13 percent during the same period for Southern California.

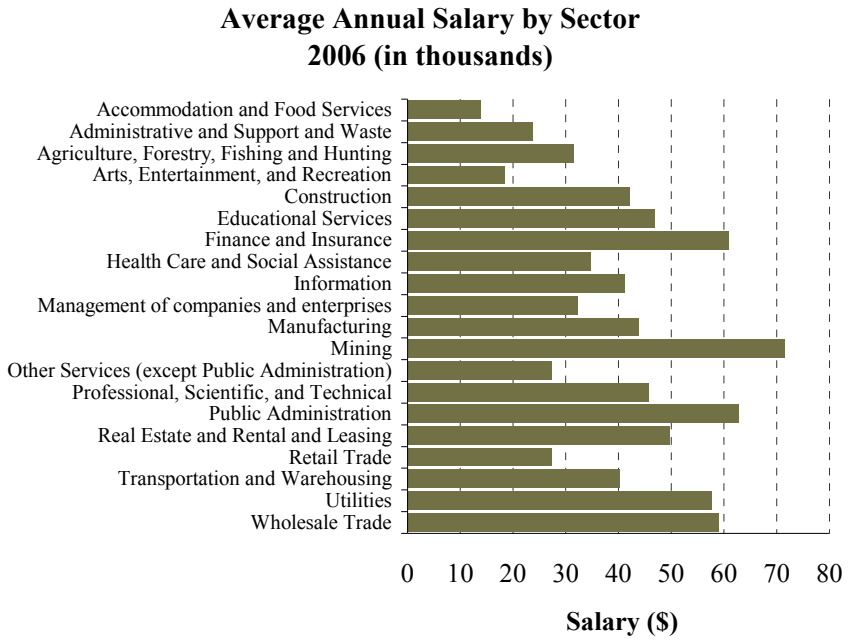

Source: California Employment Development Department, ES-202, 2006

- In 2006, the sector providing the highest salary per job in Corona was Mining ($71,456).
- The Accommodation and Food Services sector provided the lowest annual salary per job ($13,884).

VI. Retail Sales

Source: California Board of Equalization, 2000-2007

- Real (inflation adjusted) retail sales increased by almost 50 percent between 2000 and 2007.
- Real retail sales increased every year between 2001 and 2005, but declined by 2 percent in 2006 and 7 percent in 2007.

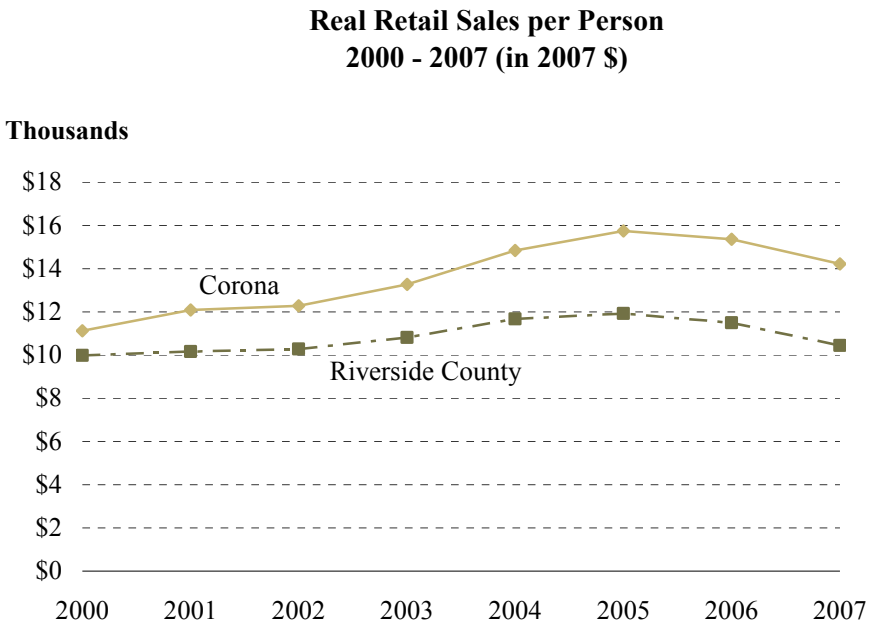

Source: California Board of Equalization, 2000-2007 and SCAG

- Between 2000 and 2007, real retail sales per person for the city increased from $11,100 to $14,200.
- This mirrored the trend for the county as a whole.

VII. Education

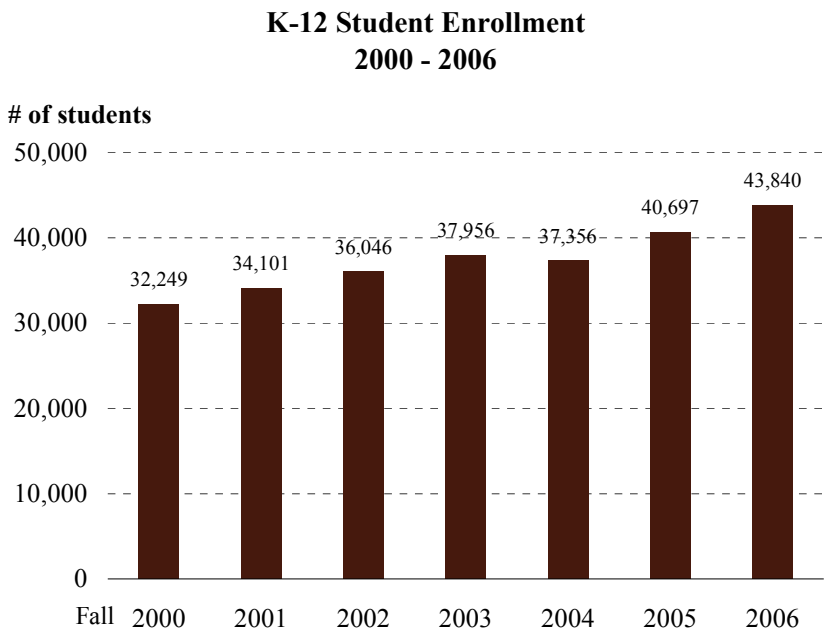

Source: National Center for Education Statistics, 2000-2006

- Between 2000 and 2006, total K-12 public school enrollment for schools within the city increased by almost 11,600 (36 percent) to 43,840 students.

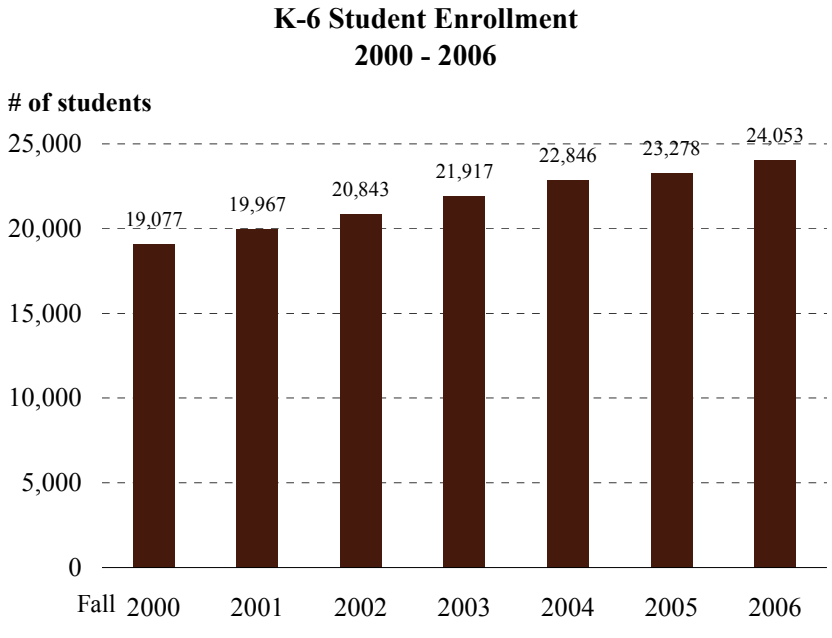

Source: National Center for Education Statistics, 2000-2006

- Between 2000 and 2006, total public elementary school enrollment increased steadily by almost 5,000 students, or 26 percent.

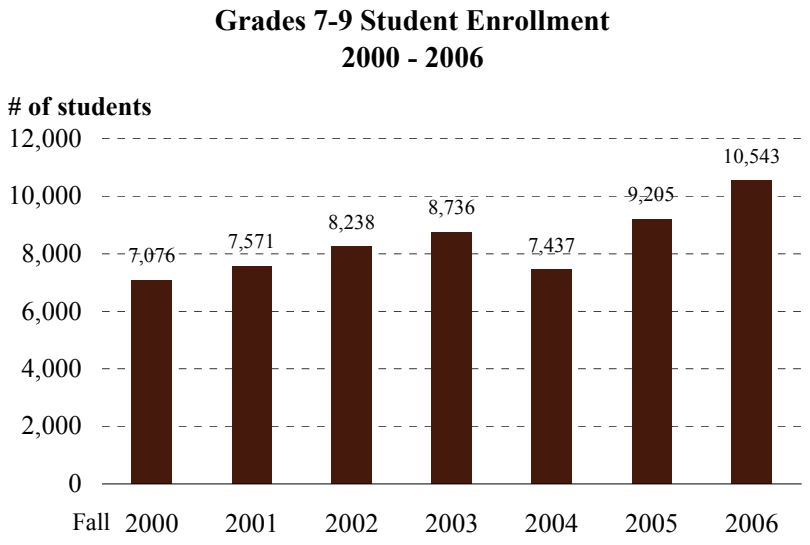

Source: National Center for Education Statistics, 2000-2006

- Between 2000 and 2003, total public school enrollment for grades 7-9 increased by 1,660 students, or 23 percent.
- Total public school enrollment for grades 7-9 declined by about 1,300, or 15, percent from 2003 to 2004.
- Enrollment for grades 7-9 increased by 42 percent between 2004 and 2006.

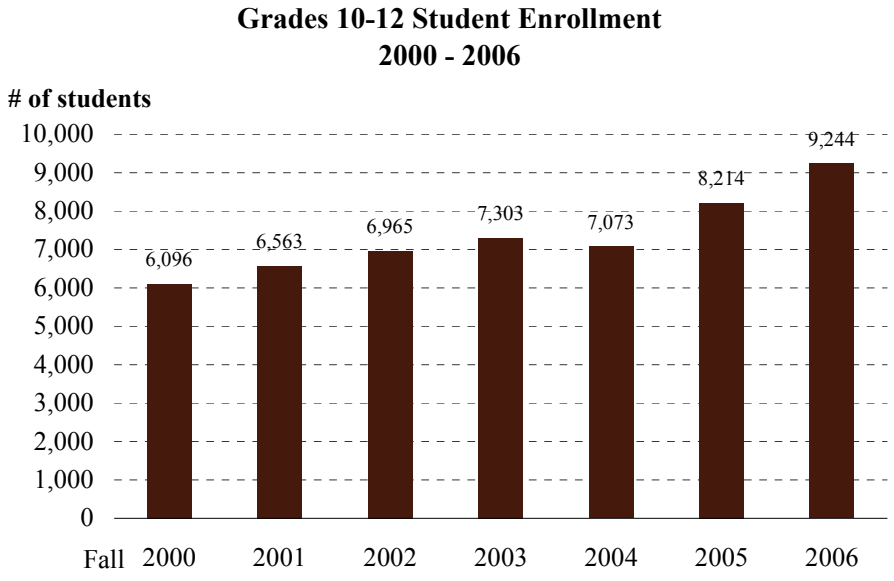

Source: National Center for Education Statistics, 2000-2006

- Between 2000 and 2006, total student enrollment increased by 52 percent for grades 10-12.

VIII. References

California Department of Finance, Demographic Research Unit

California Employment Development Department Labor Market Information Division

California State Board of Equalization

Construction Industry Research Board

Claritas, Inc.

Data Quick Information Systems

National Center for Education Statistics

U.S. Census Bureau

IX. Methodology

Explanation of City Relative to County

In the table on page 1 of this report, the reference of City "Relative to County" for absolute numbers indicates the difference between the city number and the county number. For example, the Median Age of City A being 30 and the Median Age of County B being 35 would show a relative difference of 5. For data that is a percentage, the relative difference is based on the city as a percentage of the county total.

Population

The population for each jurisdiction was based on California Department of Finance data. These are the official state population and housing estimates. The 2000 figure was based on U.S. Census figures for April 1, 2000 while subsequent years represent the city's population as of January 1 of each year.

Graphs for population based on age and race were tabulated using Census 2000 data and Claritas, Inc.

Households

The number of households for each jurisdiction was based on California Department of Finance data. The 2000 figure was based on U.S. Census figures for April 1, 2000 while subsequent years represent the city's households as of January 1 of each year.

Households by size were calculated based on Claritas, Inc. data.

Housing

Residential permits issued were obtained using Construction Industry Research Board data, which are collected by Counties from self-reporting of individual cities. The number of permits issued is reflective of all types of residential permit activity, including, but not limited to new units, replacement units due to demolition, and additions.

The median home price was calculated based on total home sales in the city, including single family units and condominiums. The median price does not reflect the entire universe of housing in the jurisdictions, only those that sold within the calendar year.

The data was compiled from Data Quick Information Systems.

Employment

Employment data is based on the California Employment Development Department (EDD) county totals and is adjusted by SCAG. SCAG adjusts the data by adding self-employed to the EDD wage and salary county totals. Due to EDD methodology, employment data is based on the location of a company's payroll and not necessarily the location of physical offices.

Retail Sales

Retail sales data is obtained from the California Board of Equalization, which does not publish individual point-of-sale data. All data is adjusted for inflation.

Education

Student enrollment data is based on public schools that are physically located within city boundaries. Data is obtained from the National Center for Education Statistics.

Choice of Data Sources

The following factors were considered in choosing the data sources used for this report:

- Available for all jurisdictions in the SCAG region
- The most recognized source on the subject
- Data sources are in the public domain
- Data available on an annual basis

The same data sources are used for all jurisdictional profiles (except where noted) to maintain overall reporting consistency. The jurisdiction is not constrained from using other data sources for their planning activities.

The preparation of this report has been financed in part through grants from the Federal Highway Administration and Federal Transit Administration, U.S. Department of Transportation, under the Metropolitan Planning Program, Section 104(f) of Title 23, U.S. Code. The contents of this report do not necessarily reflect the official views or policy of the U.S. Department of Transportation. Additional assistance was provided by the California Department of Transportation.

X. Acknowledgements

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Jacob Lieb, Manager
Frank Wen, Manager
Ying Zhou, Regional Planner Specialist

Notes:

Profile of the City of Temecula

Southern California Association of Governments' (SCAG) Regional Council includes 67 Districts which represent 189 cities in the SCAG region.

SCAG Regional Council District 5 includes four cities:
Hemet, Murrieta, San Jacinto, and Temecula
Represented by: **Hon. Ron Roberts**

This project was funded by the Southern California Association of Governments and shared with the City of Temecula. SCAG regularly provides local governments with services including planning data and information, technical assistance such as GIS training, and planning assistance such as analyses of visioning, infill, real estate investment, and fiscal impact.

SCAG wishes to recognize the City of Temecula for volunteering to participate in a regionally funded demonstration project through the Compass Blueprint program. This partnership is a showcase for collaborative planning based on a shared vision on how to address the challenge of population, housing and employment growth and change.

Southern California Association of Governments
May 2009

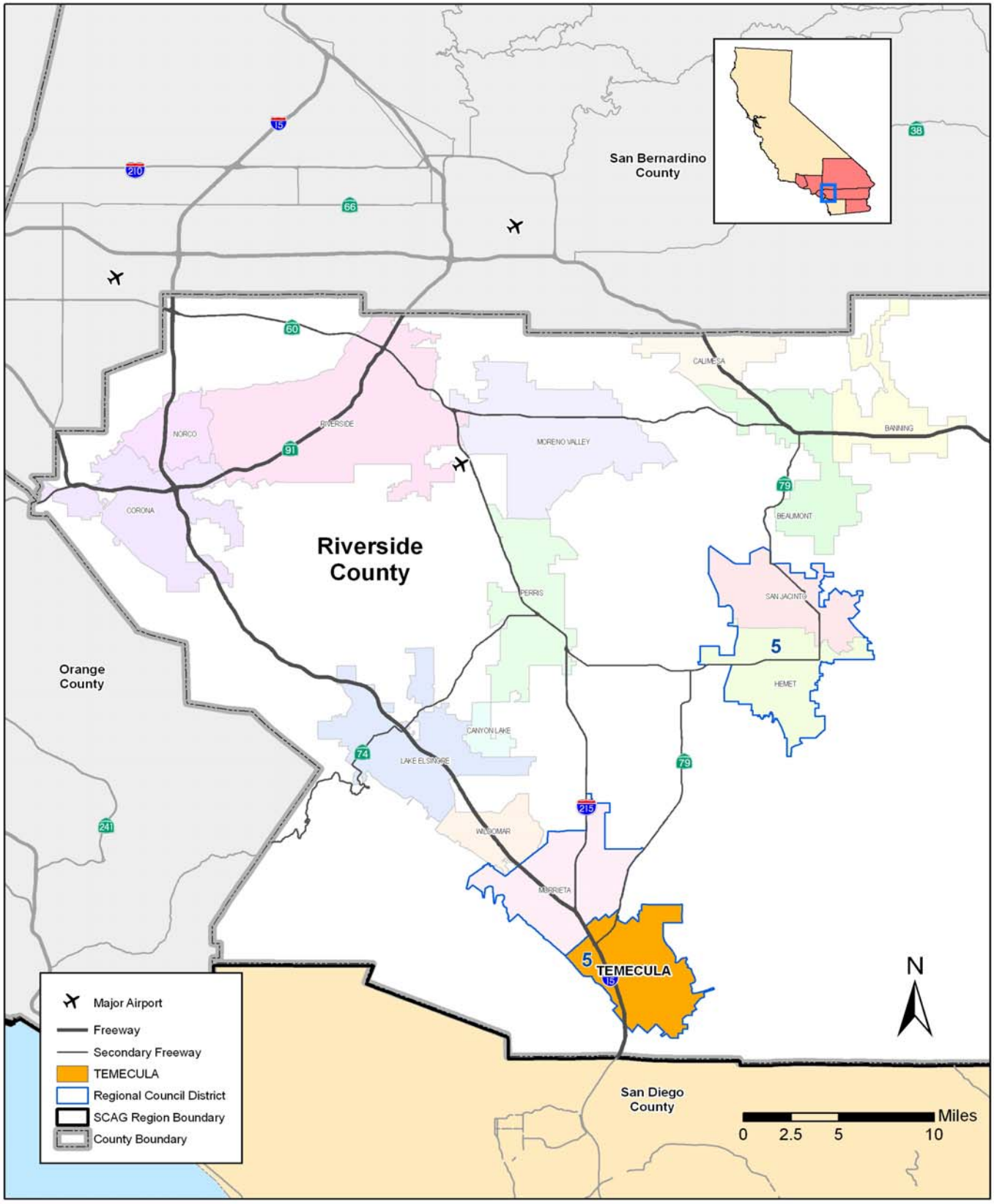
San Bernardino County
Riverside County
Orange County
San Diego County
RIVERSIDE
NORCO
CORONA
MORENO VALLEY
CALIMESA
BANNING
BEAUMONT
PERRIS
SAN JACINTO
HEMET
CANYON LAKE
LAKE ELSINORE
WILDOMAR
MURRIETA
TEMECULA
5
15
210
66
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79
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215
241
38
N
Major Airport
Freeway
Secondary Freeway
TEMECULA
Regional Council District
SCAG Region Boundary
County Boundary
Miles
0
2.5
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10

Southern California Association of Governments
Regional Council Roster

May 2009

Members	Representing
Hon. Richard Dixon, Lake Forest, President	District 13
Hon. Jon Edney, El Centro, 1st Vice-President	District 1
Hon. Gary Ovitt, Immediate Past President	San Bernardino County
Hon. Victor Carrillo	Imperial County
Hon. Mike Antonovich	Los Angeles County
Hon. Mark Ridley-Thomas	Los Angeles County
Hon. Chris Norby	Orange County
Hon. Jeff Stone	Riverside County
Hon. Linda Parks	Ventura County
Hon. Antonio Villaraigosa (At-Large)	Los Angeles City
Hon. Art Brown, Buena Park	OCTA
Hon. Robin Lowe, Hemet	RCTC
Hon. Kelly Chastain, Colton	SANBAG
Hon. Keith Millhouse, Moorpark	VCTC
Hon. Greg Pettis, Cathedral City	District 2
Hon. Bonnie Flickinger, Moreno Valley	District 3
Hon. Ron Loveridge, Riverside	District 4
Hon. Ron Roberts, Temecula	District 5
Hon. Pat Gilbreath, Redlands	District 6
Hon. Larry McCallon, Highland	District 7
Hon. Deborah Robertson, Rialto	District 8
Hon. Paul Eaton, Montclair	District 9
Hon. Glenn Duncan, Chino	District 10
Hon. Bill Jahn, Big Bear Lake	District 11
Hon. Paul Glaab, Laguna Niguel	District 12
Hon. Beth Krom, Irvine	District 14
Hon. Leslie Daigle, Newport Beach	District 15
VACANT	District 16
Hon. John Nielsen, Tustin	District 17
Hon. Leroy Mills, Cypress	District 18
Hon. Bob Hernandez, Anaheim	District 19
Hon. Andy Quach, Westminster	District 20
Hon. Sharon Quirk, Fullerton	District 21
Hon. John Beauman, Brea	District 22
Hon. Larry Nelson, Artesia	District 23
Hon. Gene Daniels, Paramount	District 24
Hon. David Gafin, Downey	District 25

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Hon. Barbara Calhoun, Compton	District 26
Hon. Frank Gurule, Cudahy	District 27
Hon. Judy Dunlap, Inglewood	District 28
Hon. Val Lerch, Long Beach	District 29
Hon. Tonia Reyes-Uranga, Long Beach	District 30
Hon. Stan Carroll, La Habra Heights	District 31
Hon. Margaret Clark, Rosemead	District 32
Hon. Keith Hanks, Azusa	District 33
Hon. Barbara Messina, Alhambra	District 34
Hon. Robert Harbicht, Arcadia	District 35
Hon. Mike Ten, South Pasadena	District 36
Hon. Carol Herrera, Diamond Bar	District 37
Hon. Paula Lantz, Pomona	District 38
Hon. Susan Rhilinger, Torrance	District 39
Hon. Judy Mitchell, Rolling Hills Estates	District 40
Hon. Pam O'Connor, Santa Monica	District 41
Hon. Frank Quintero, Glendale	District 42
VACANT	District 43
Hon. Dennis Washburn, Calabasas	District 44
Hon. Bryan MacDonald, Oxnard	District 45
Hon. Glen Becerra, Simi Valley	District 46
Hon. Carl Morehouse, San Buenaventura	District 47
Hon. Ed Reyes, Los Angeles	District 48
Hon. Wendy Greuel, Los Angeles	District 49
Hon. Dennis Zine, Los Angeles	District 50
Hon. Tom LaBonge, Los Angeles	District 51
Hon. Jack Weiss, Los Angeles	District 52
Hon. Tony Cardenas, Los Angeles	District 53
Hon. Richard Alarcon, Los Angeles	District 54
Hon. Bernard Parks, Los Angeles	District 55
Hon. Jan Perry, Los Angeles	District 56
Hon. Herb Wesson, Los Angeles	District 57
Hon. Bill Rosendahl, Los Angeles	District 58
Hon. Greig Smith, Los Angeles	District 59
Hon. Eric Garcetti, Los Angeles	District 60
Hon. Jose Huizar, Jr., Los Angeles	District 61
Hon. Janice Hahn, Los Angeles	District 62
Hon. Thomas Buckley, Lake Elsinore	District 63
Hon. Gil Coerper, Huntington Beach	District 64
Hon. Ginger Coleman, Apple Valley	District 65
Hon. Melanie Fesmire, Indio	District 66
Hon. Nury Martinez, San Fernando	District 67
Hon. Mark Calac, Pechanga Band of Luiseno Indians	Tribal Govt. Rep

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I. Introduction

The purpose of this report is to offer the City of Temecula with updated information and to assist in their planning activities. Information with respect to, for example, demographic, socio-economic and housing, is obtained from a myriad of sources. In addition, data related to education is also included. The report focuses on the major changes in the city since 2000 in comparison with that of Riverside County. The information presented and interpreted in this report shows current trends, and may be utilized by the City as part of the basis for making its future policies.

STATISTICAL DATA

Category	*Temecula*	*Riverside County*	*Temecula relative to Riverside County*	*SCAG Region*
Population (2008)	101,057	2,088,322	4.80%	18,636,934
Median Age (Yrs)	30.5	31.8	-1.3	33.5
White (Non-Hispanic)	61.00%	43.00%	6.90%	35.30%
Asian (Non-Hispanic)	7.60%	5.10%	7.20%	11.30%
Black (Non-Hispanic)	3.90%	5.80%	3.20%	6.80%
American Indian	0.50%	0.50%	4.80%	0.30%
All Other Non-Hispanic	4.30%	3.40%	6.10%	2.30%
Hispanic	22.80%	42.20%	2.60%	43.90%
Number of Households (2008)	31,135	671,036	4.60%	5,849,833
Number of Housing Units (2008)	32,453	773,331	4.20%	6,224,661
Home Ownership Rate	75.20%	70.20%	5.00%	54.70%
Average Household Size (2008)	3.2	3.1	0.1	3.1
Median Family Income (2007) ($)	81,958	60,180	21,778	61,901
Median Existing Home Price (2008) ($)	320,000	260,000	60,000	382,300
Number of Jobs (2008)	39,941	653,793	6.10%	7,845,378

Source: Claritas, Inc., 2007, California Department of Finance, Data Quick Information Systems, SCAG.

II. Population

Population Growth

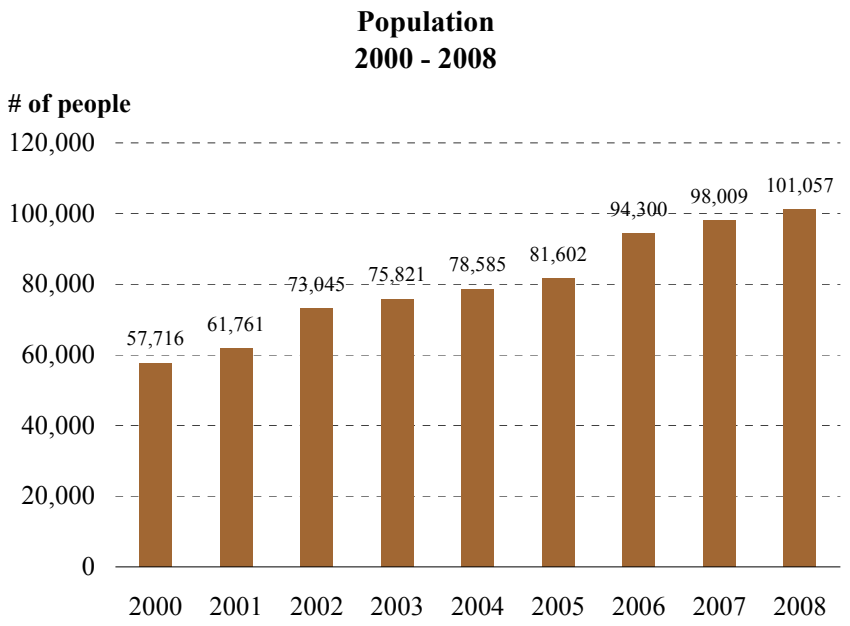

Source: California Department of Finance, E-5, May 2008

- Between 2000 and 2008, the total population of the city increased by over 43,000, reaching 101,057 in 2008.
- During this 8-year period, the city's population growth rate of 75 percent was well above the Riverside County rate of 35 percent.

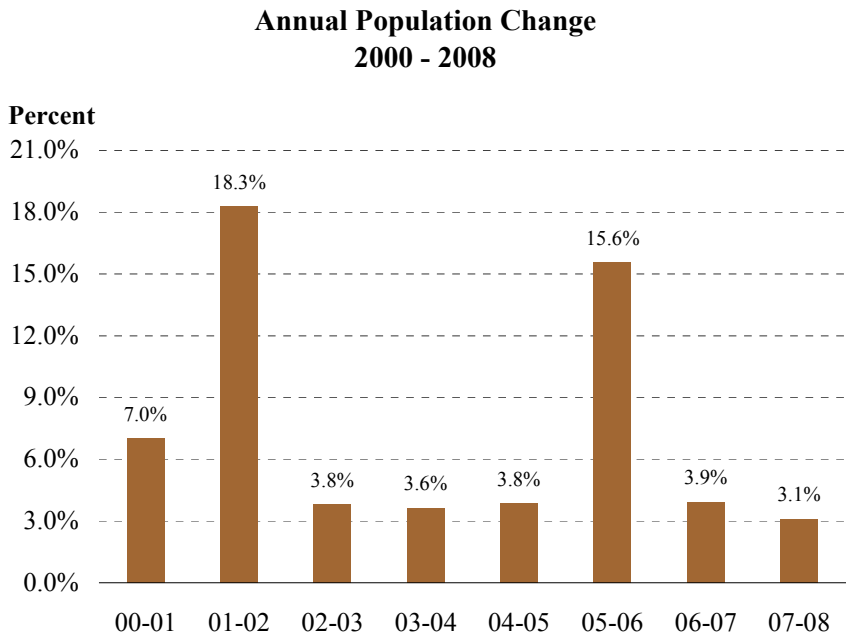

Source: California Department of Finance, E-5, May 2008

- Aside from sharp surges in growth between 2001 and 2002, and again between 2005 and 2006, population growth was otherwise slow and steady between 2000 and 2008.
- At its growth peak between 2001 and 2002, the city saw a growth rate of over 18 percent, or about 11,300 additional residents.

Population by Age

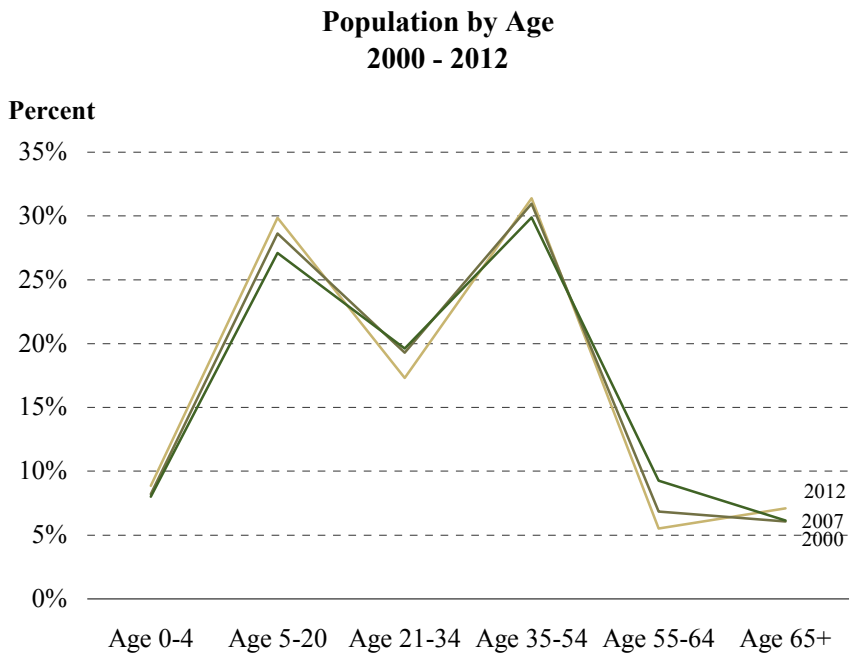

Source: Claritas, Inc., 2007 and U.S. Census Bureau: Summary File 1, 2000

- Between 2000 and 2012, the population in Temecula continues to be dominated by the middle-aged working cohort (35 to 54 years old) and the school-age population (5 to 20 years old). Together, they accounted for 61 percent of the total population in 2000, and are projected to account for 57 percent in 2012.
- Between 2000 and 2012, the share of the population aged 55 to 64 is projected to increase from 6 percent to 9 percent, reflecting primarily the aging of the baby boomers.
- During this 12-year period, the share of the population aged 21 to 34 is also projected to increase, from 17 percent to 20 percent.

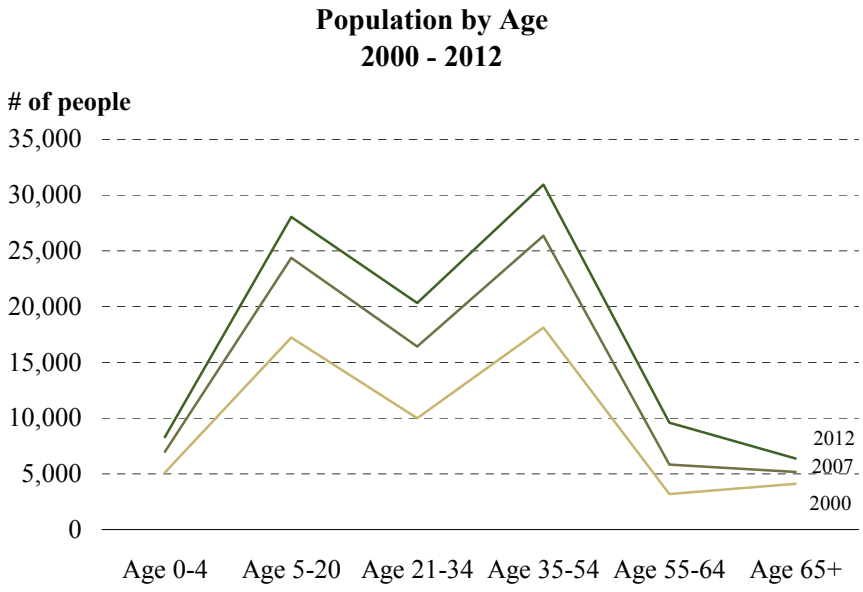

Source: Claritas, Inc., 2007 and U.S. Census Bureau: Summary File 1, 2000

- The population of every age group is projected to increase, some significantly. Specifically, between 2000 and 2012, the population group aged 35 to 54 is projected to increase by nearly 13,000.

Population by Race/Ethnicity

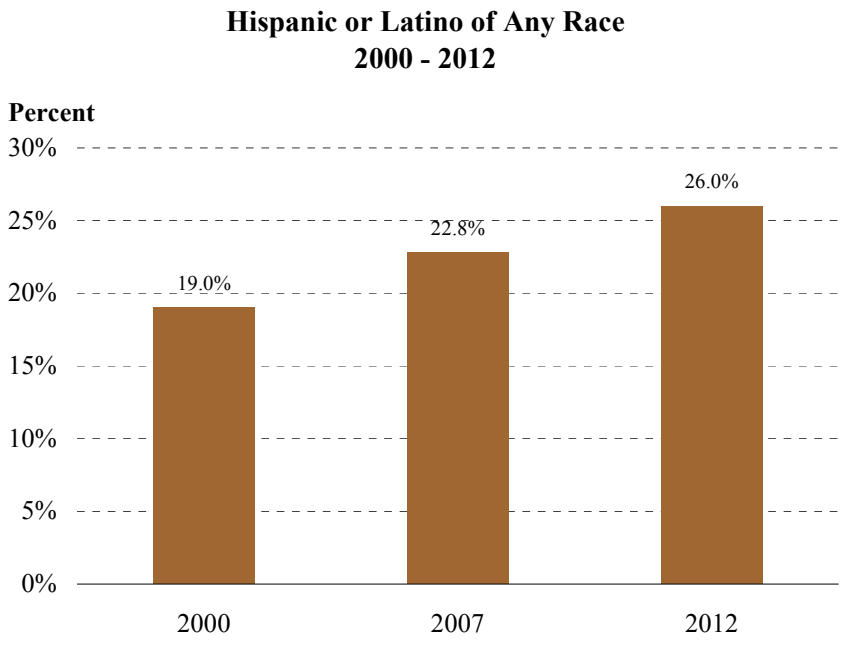

Source: Claritas, Inc., 2007 and U.S. Census Bureau: Summary File 1, 2000

- Between 2000 and 2007, the share of Hispanic population in the city increased from 19 to 23 percent. Hispanics are the fastest growing ethnic group in the city and their population share is projected to further increase to 26 percent in 2012.

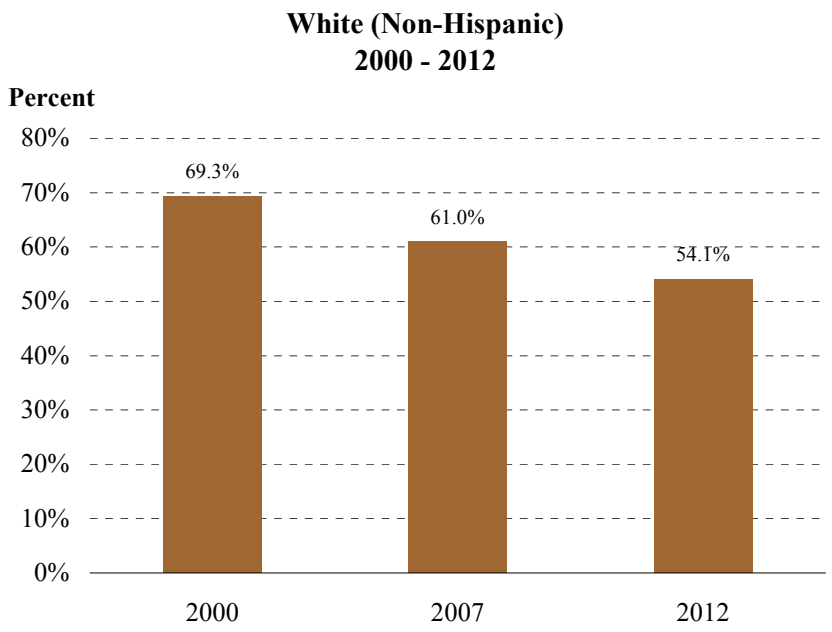

Source: Claritas, Inc., 2007 and U.S. Census Bureau: Summary File 1, 2000

- Like most cities in Southern California, since 2000, the share of non-Hispanic White population has been declining, while the share of other ethnic groups (particularly Hispanic and Asian) has been increasing and is projected to continue to rise through 2012.

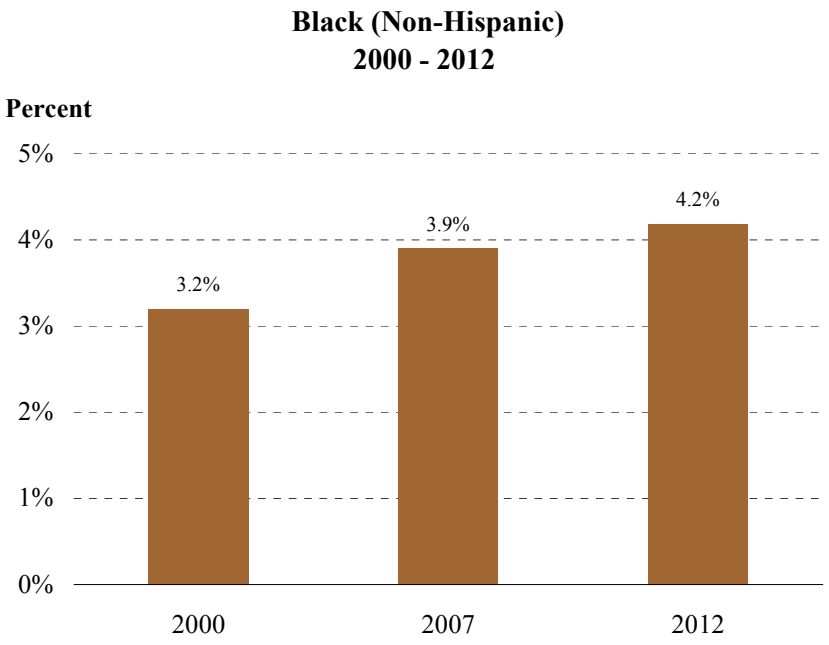

Source: Claritas, Inc., 2007 and U.S. Census Bureau: Summary File 1, 2000

- Between 2000 and 2007, the share of the non-Hispanic Black population in the city increased slightly from 3.2 to 3.9 percent.

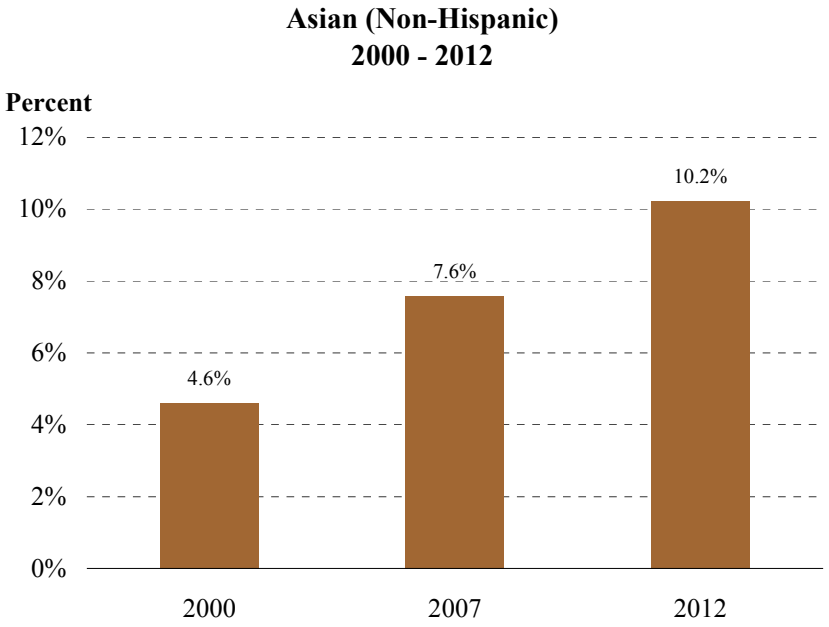

Source: Claritas, Inc., 2007 and U.S. Census Bureau: Summary File 1, 2000

- The share of the Asian population in the city increased from 4.6 percent in 2000 to 7.6 percent in 2007. The Asian population in the city is projected to further increase to over 10 percent in 2012.

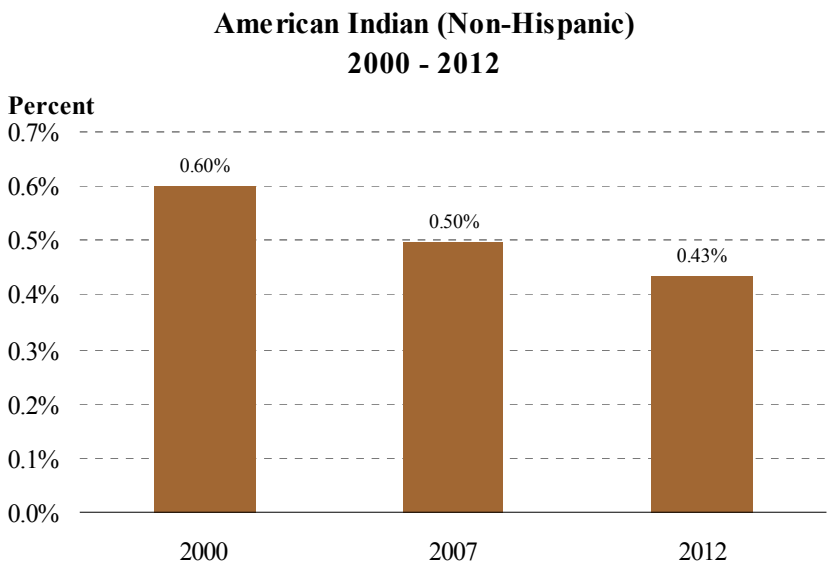

Source: Claritas, Inc., 2007 and U.S. Census Bureau: Summary File 1, 2000

- Between 2000 and 2012, the share of the American Indian population in Temecula is estimated to decrease slightly from 0.6 percent to 0.4 percent.

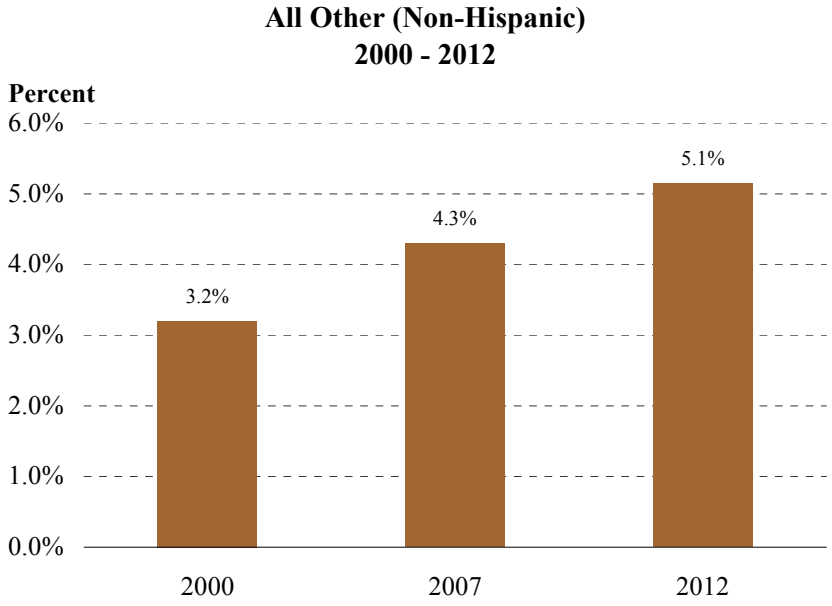

Source: Claritas, Inc., 2007 and U.S. Census Bureau: Summary File 1, 2000

- During the 12-year period, the share of the all other non-Hispanic population group is estimated to increase from 3.2 to 5.1 percent.

III. Households

Number of Households

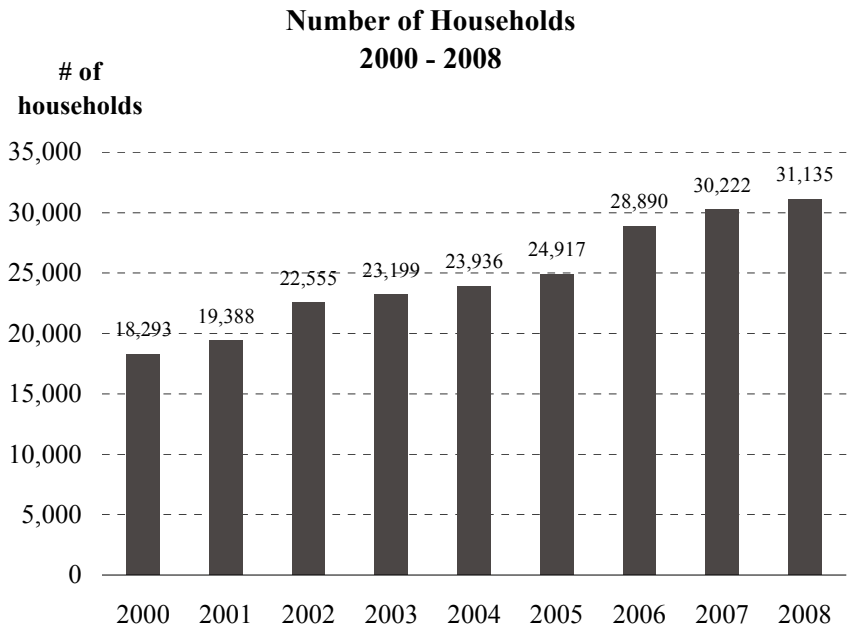

Source: California Department of Finance, E-5, May 2008

- Between 2000 and 2008, the total number of households in the city increased by nearly 13,000, or 70 percent, just under its population growth rate of 75 percent.
- During this 8-year period, the city's household growth rate of 70 percent was more than twice than the county rate of 31 percent.

Average Household Size

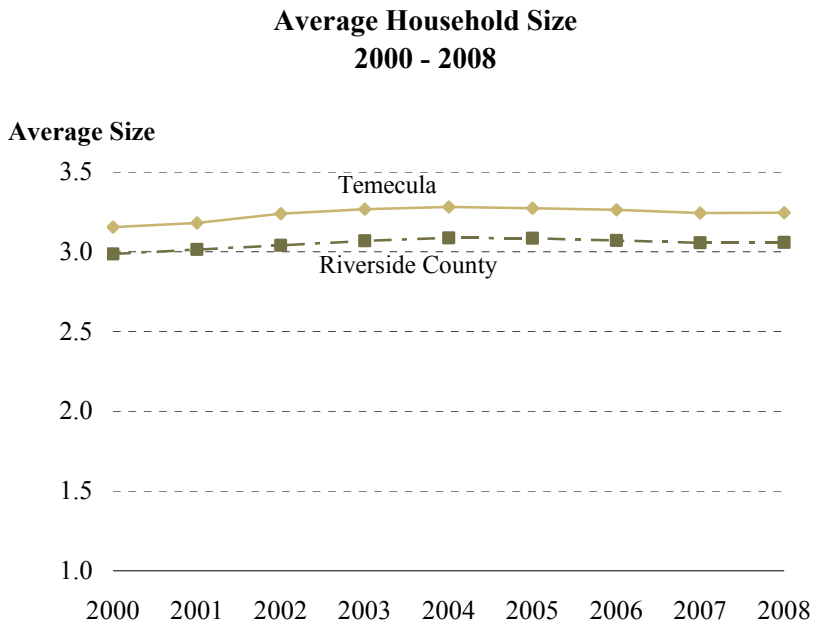

Source: California Department of Finance, E-5, May 2008

- In 2008, the city's average household size was 3.2, slightly higher than the county average of 3.1.
- Between 2000 and 2008, average household size increased slightly in the city and the county, but the difference between them remained constant.

Households by Size

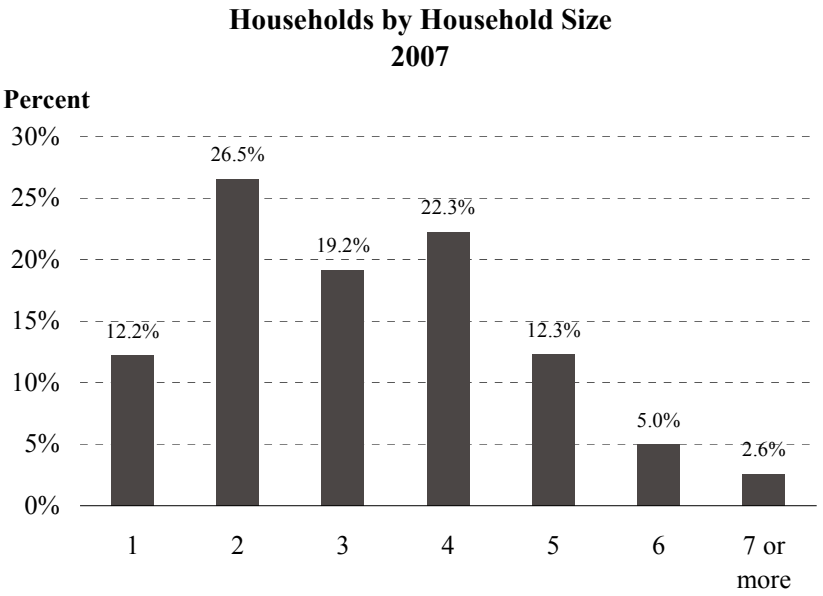

Source: Claritas, Inc., 2007

- Close to 60 percent of all Temecula households have 3 people or fewer.
- About 12 percent of the households are single-person households, much lower than the county share of 21 percent.
- About 20 percent of all households in the city have at least 5 people.

Households by Income

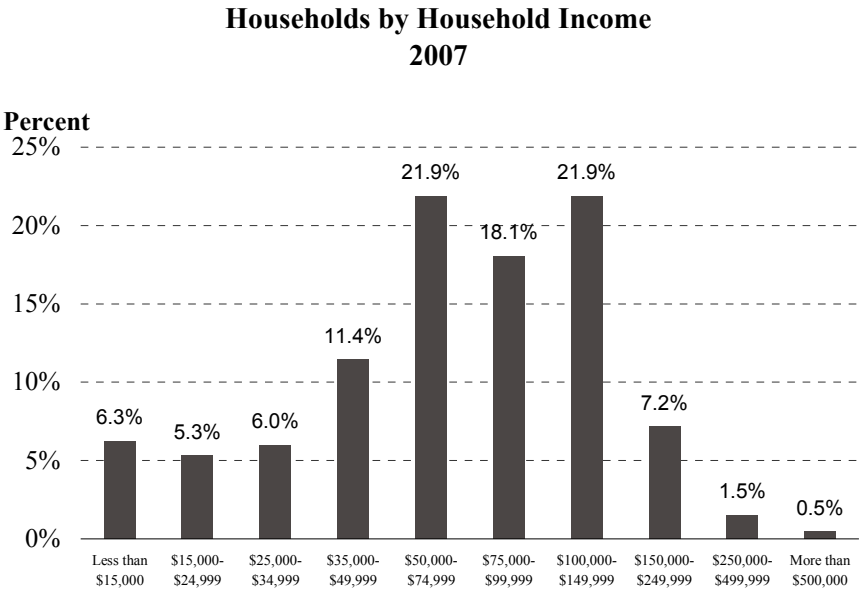

Source: Claritas, Inc., 2007

- In 2007, nearly 30 percent of households earned less than $50,000.
- About 40 percent of the households earned between $50,000 and $100,000.

IV. Housing

Housing Production

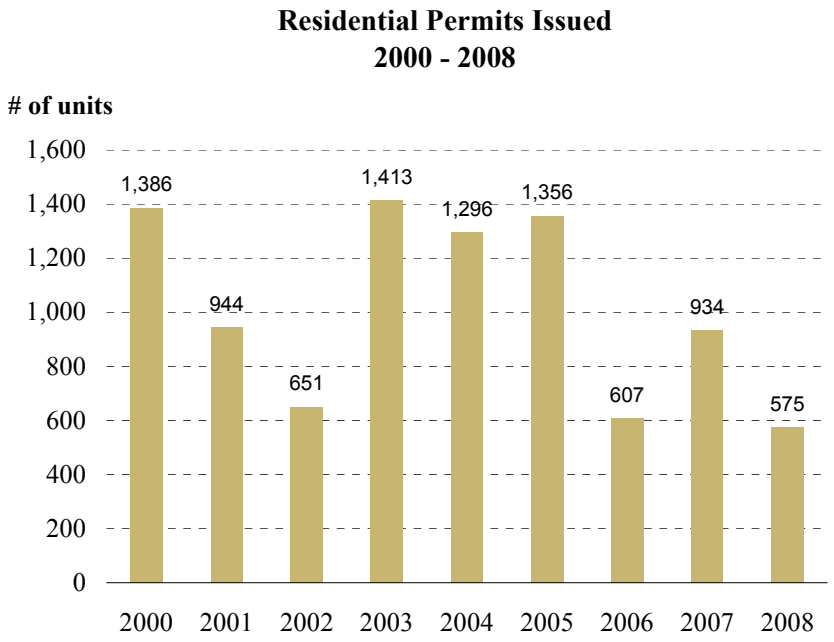

Source: Construction Industry Research Board, 2000-2008

- Between 2000 and 2008, 9,162 new residential permits were issued. Only 23 percent were issued in the past 3 years.

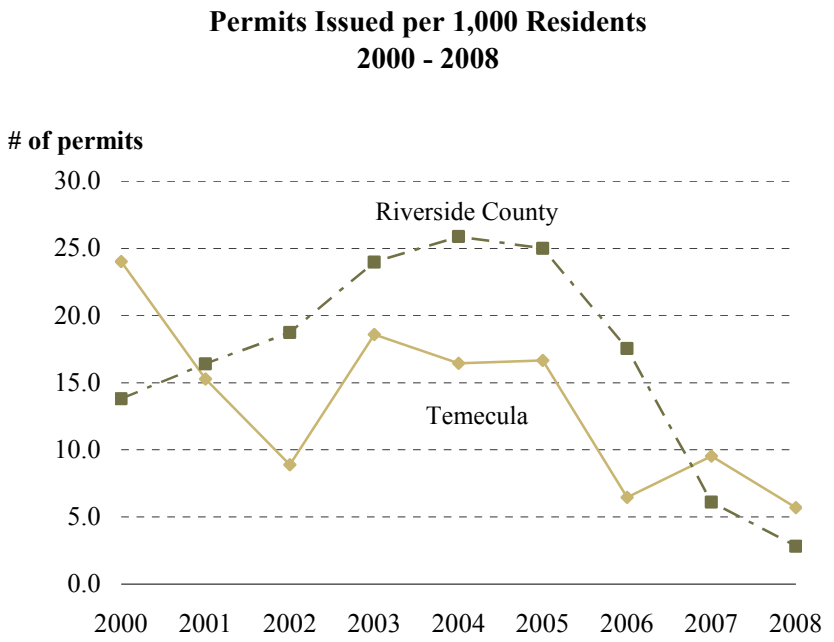

Source: Construction Industry Research Board, 2000-2008 and SCAG

- Except for 2000, 2007, and 2008, the city generally had lower levels of permits issued per 1,000 residents when compared to the county as a whole.

Housing Values

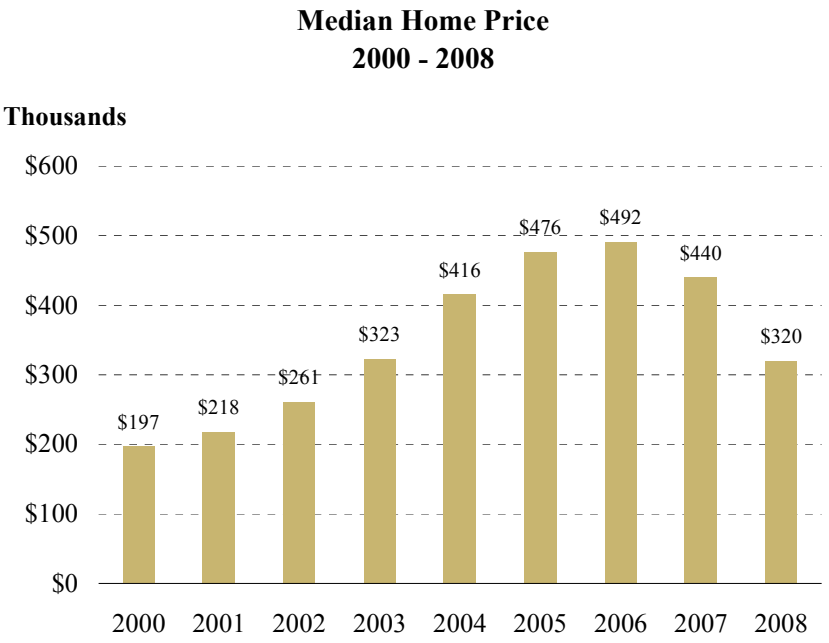

Source: Data Quick Information Systems, 2009

- Between 2000 and 2006, median home sale prices increased by 150 percent, jumping from $197,000 to $492,000.
- Median home prices dropped modestly between 2006 and 2007 and more severely between 2007 and 2008.
- In 2008, the median home price in Temecula was $320,000, $60,000 higher than the Riverside County median.

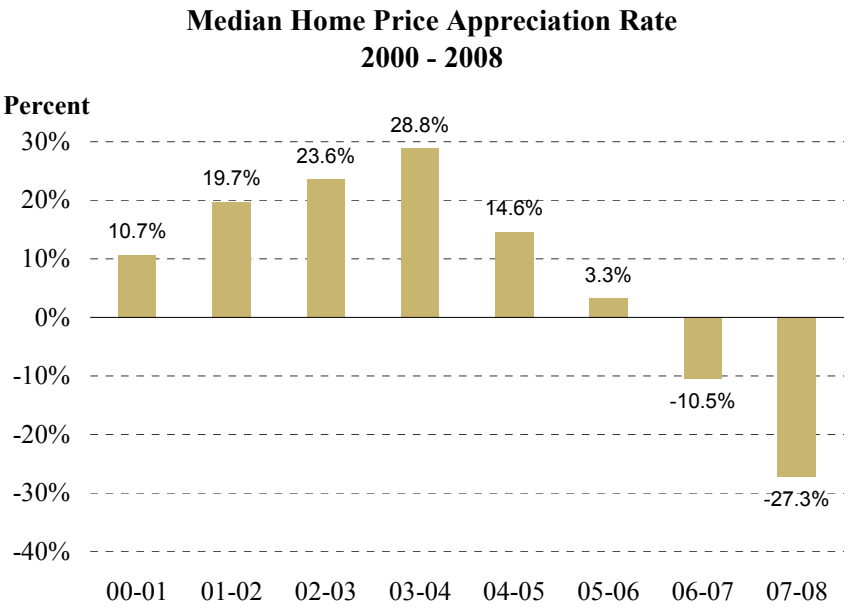

Source: Data Quick Information Systems, 2009

- Between 2001 and 2005, annual home price appreciation rates were between 10 and 29 percent.
- In contrast, the median home price increased by only 3 percent from 2005 to 2006, dropped by almost 11 percent between 2006 and 2007, and dropped by over 27 percent between 2007 and 2008.

V. Employment

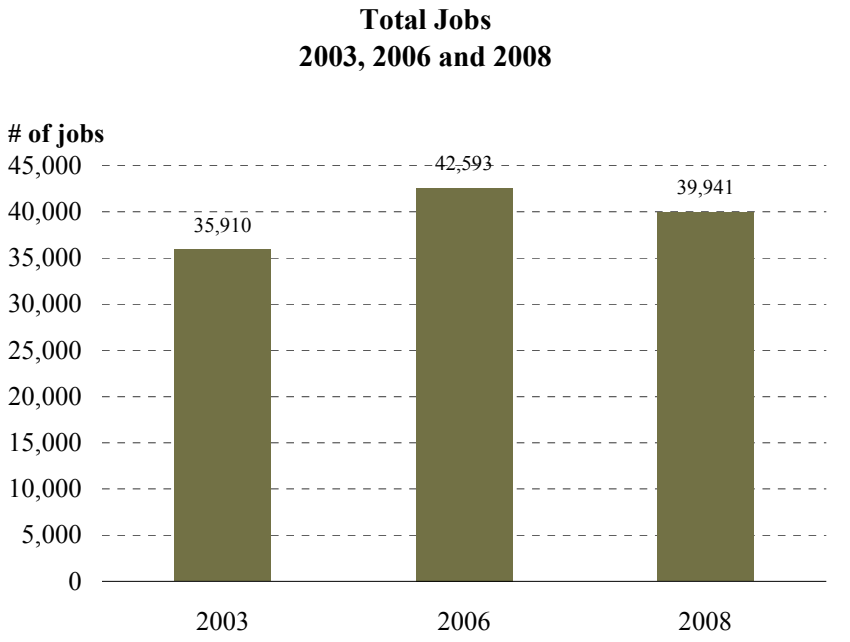

Source: California Employment Development Department, 2003, 2006 & 2008 and SCAG

- In 2008, total jobs in Temecula reached 39,941, about 11 percent greater than its 2003 level.
- Total jobs in the city included wage and salary jobs and jobs held by business owners and self-employed persons. The total job count does not include unpaid volunteers or family workers, and private household workers.

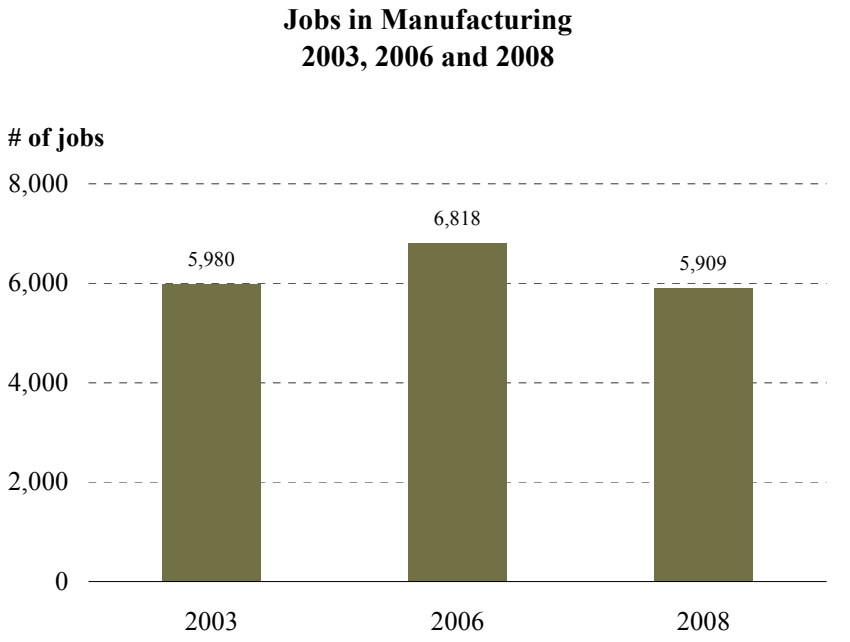

Source: California Employment Development Department, 2003, 2006 & 2008 and SCAG

- Between 2003 and 2008, the number of manufacturing jobs in Temecula decreased by 1 percent.

Jobs in Construction
2003, 2006 and 2008

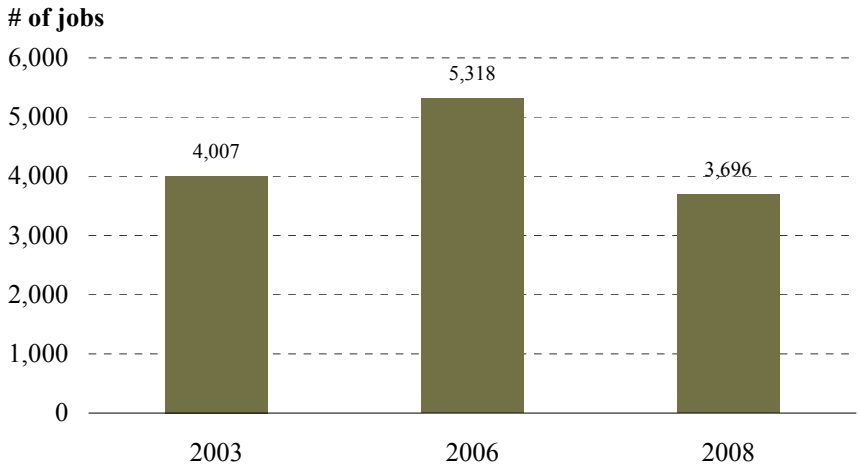

Source: California Employment Development Department, 2003, 2006 & 2008 and SCAG

- Construction jobs include those engaged in both residential and non-residential construction.
- Between 2003 and 2006, construction jobs in the city increased by 1,311, or 33 percent. However between 2006 and 2008 construction jobs decreased by 31 percent.

Jobs in Retail Trade
2003, 2006 and 2008

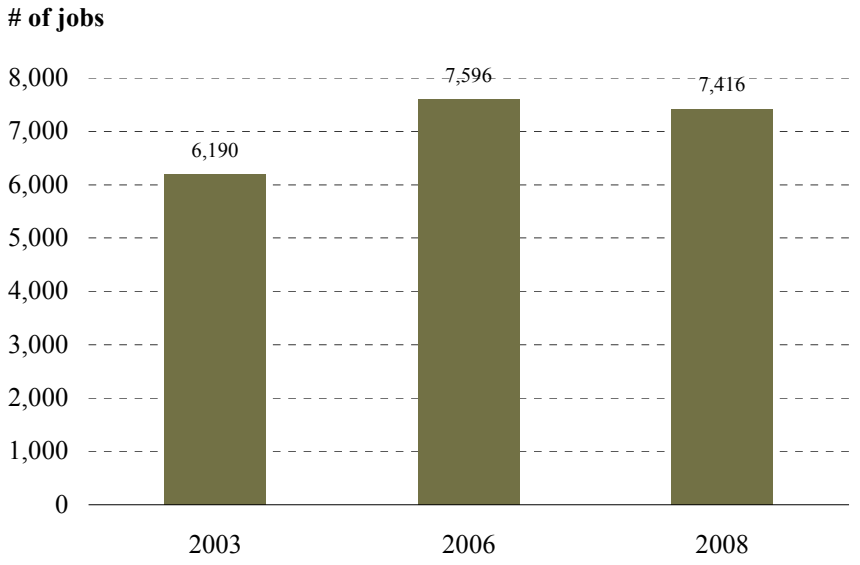

Source: California Employment Development Department, 2003, 2006 & 2008 and SCAG

- Between 2003 and 2006, the number of retail trade jobs in the city increased by 1,406, or 23 percent. Retail trade jobs decreased slightly by 2 percent between 2006 and 2008.

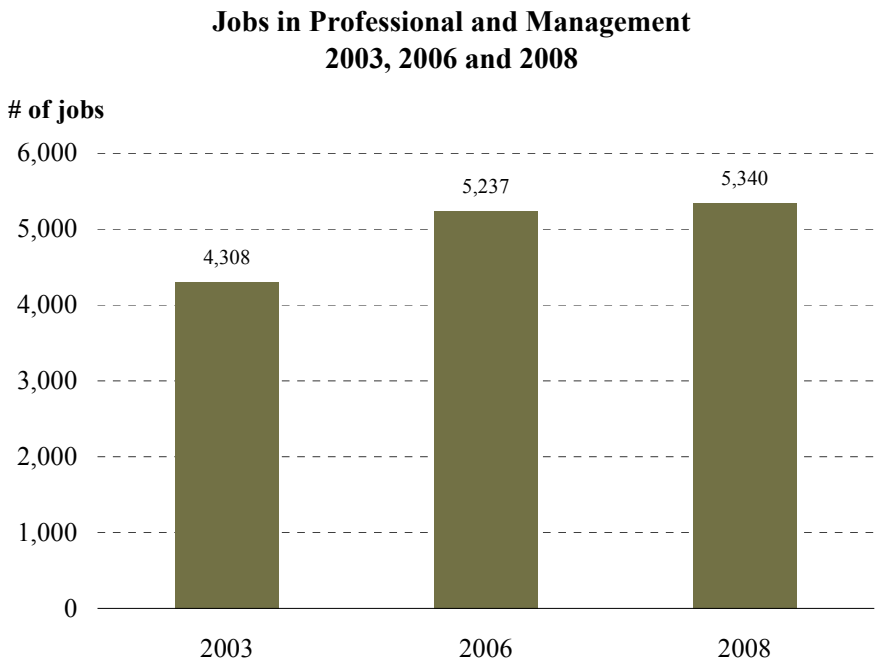

Source: California Employment Development Department, 2003, 2006 & 2008 and SCAG

- Jobs in the professional and management sector include those employed in, for example, professional and technical services, management of companies, and administration and support.
- Between 2003 and 2006, the number of professional and management jobs increased by 929, or 22 percent. Despite a decrease in overall employment between 2006 and 2008, this sector added 2 percent.

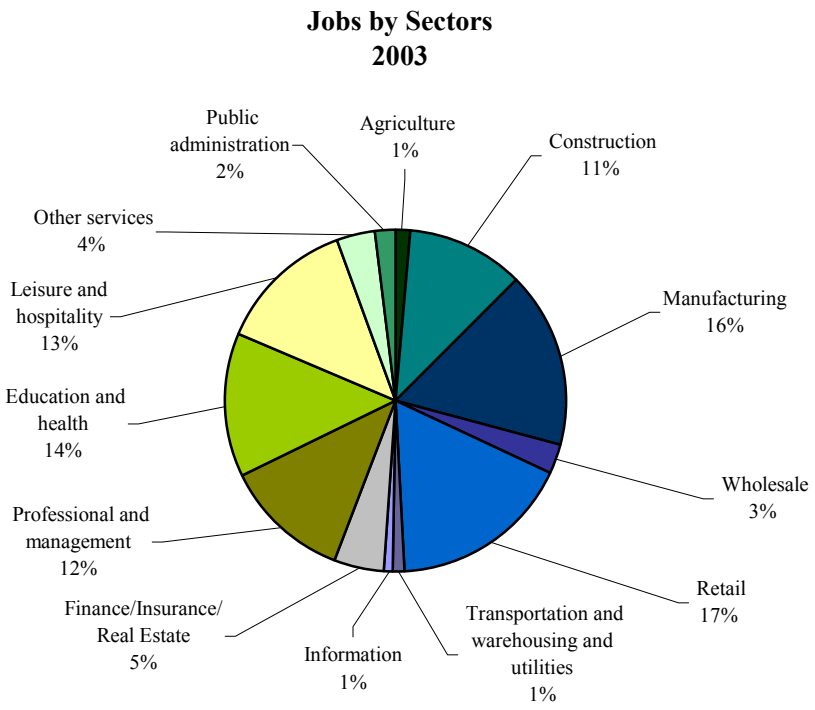

Source: California Employment Development Department, 2003 and SCAG

- Between 2003 and 2008, there were only slight changes in the share of jobs by sector in the city. Specifically, during this period, the share of education and health jobs remained at 14 percent while the share of construction jobs decreased from 11 to 9 percent.

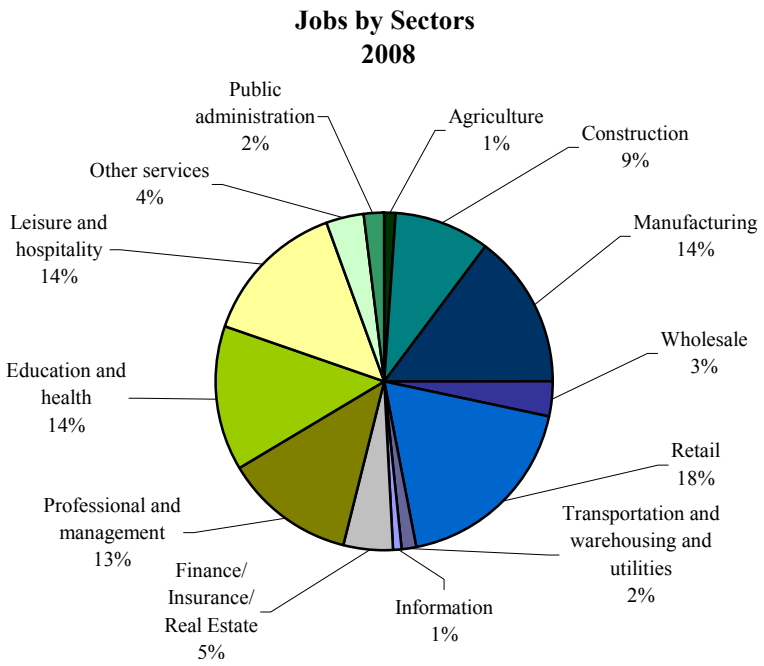

Source: California Employment Development Department, 2008 and SCAG

- In 2008, the retail sector remained the largest sector, accounting for 18 percent of total jobs in the city.
- Other large sectors included manufacturing, education and health services, and leisure and hospitality (all at 14 percent), and professional and management (13 percent).

Average Salaries

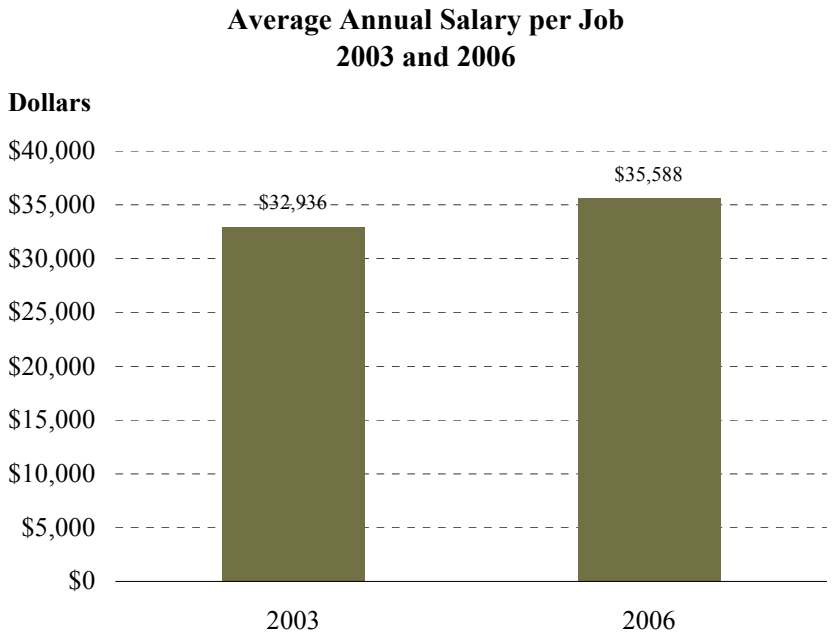

Source: California Employment Development Department, 2003 & 2006

- Average salaries per job in the city increased from $32,936 in 2003 to $35,588 in 2006, an 8 percent increase, which was below the inflation rate of 13 percent during the same period for Southern California.

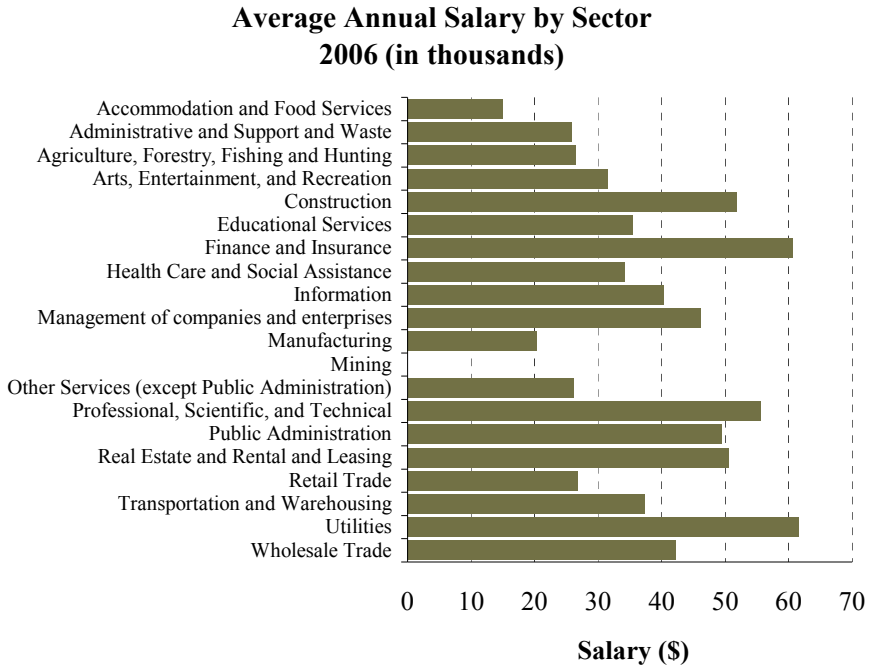

Source: California Employment Development Department, ES-202, 2006

- In 2006, the sector providing the highest salary per job in Temecula was Utilities ($61,648).
- The Accommodation and Food Services sector provided the lowest annual salary per job ($15,016).

VI. Retail Sales

Source: California Board of Equalization, 2000-2007

- Real (inflation adjusted) retail sales increased by 52 percent between 2000 and 2007.
- Real retail sales peaked in 2005 and declined by 10 percent between 2005 and 2007.

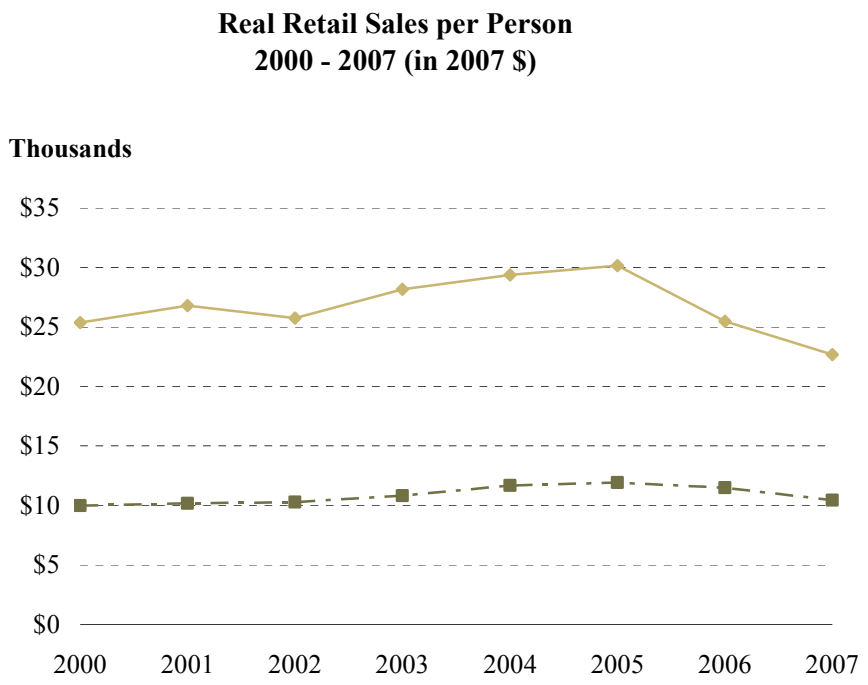

Source: California Board of Equalization, 2000-2007 and SCAG

- Between 2000 and 2007, real retail sales per person for the city decreased from $25,400 to $22,700, while that of the county increased.

VII. Education

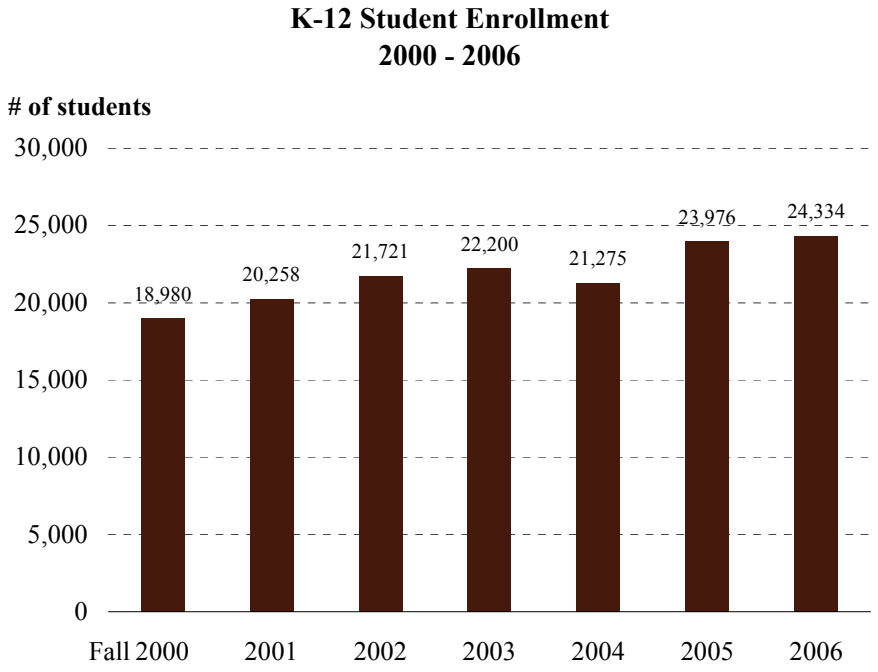

Source: National Center for Education Statistics, 2000-2006

- Between 2000 and 2006, total K-12 public school enrollment for schools within the city increased by 5,354 (28 percent) to 24,334 students.
- Total K-12 public school enrollment decreased from 2003 to 2004 but then increased by 14 percent between 2004 and 2006.

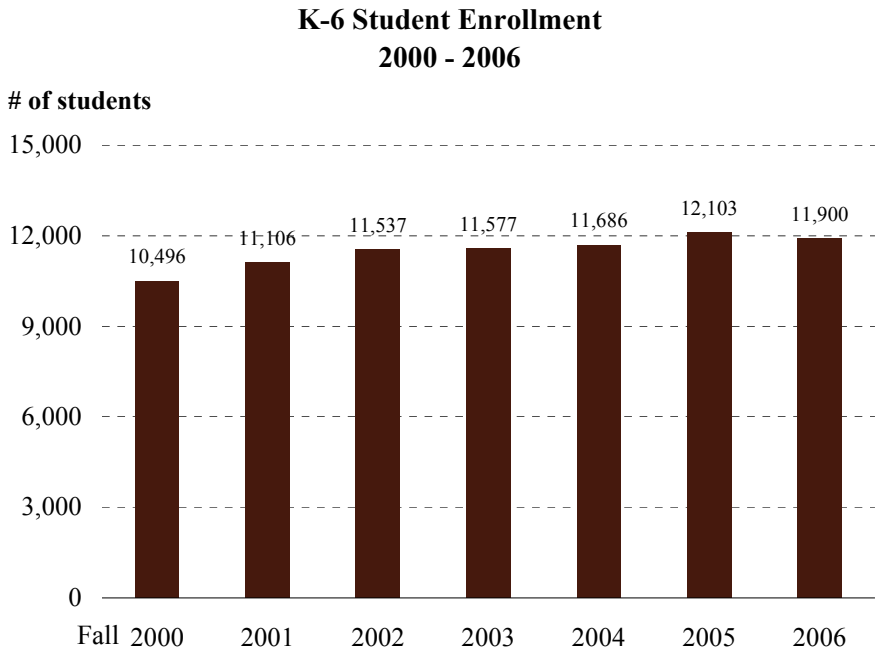

Source: National Center for Education Statistics, 2000-2006

- Total public elementary school enrollment in the city grew modestly between 2000 and 2006.
- During this time, total public elementary school enrollment increased by about 1,400 students, or 13 percent.

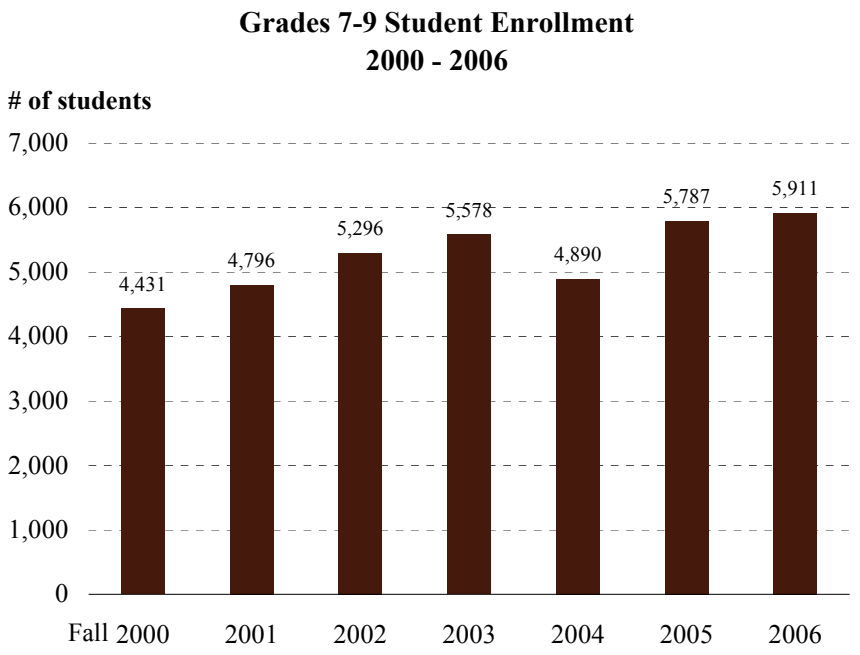

Source: National Center for Education Statistics, 2000-2006

- Between 2000 and 2003, total public school enrollment for grades 7-9 increased by over 1,100 students.
- Enrollment for grades 7-9 then declined by about 690 from 2003 to 2004 before surging by over 1,020 students (21 percent) to a high of 5,911 in 2006.

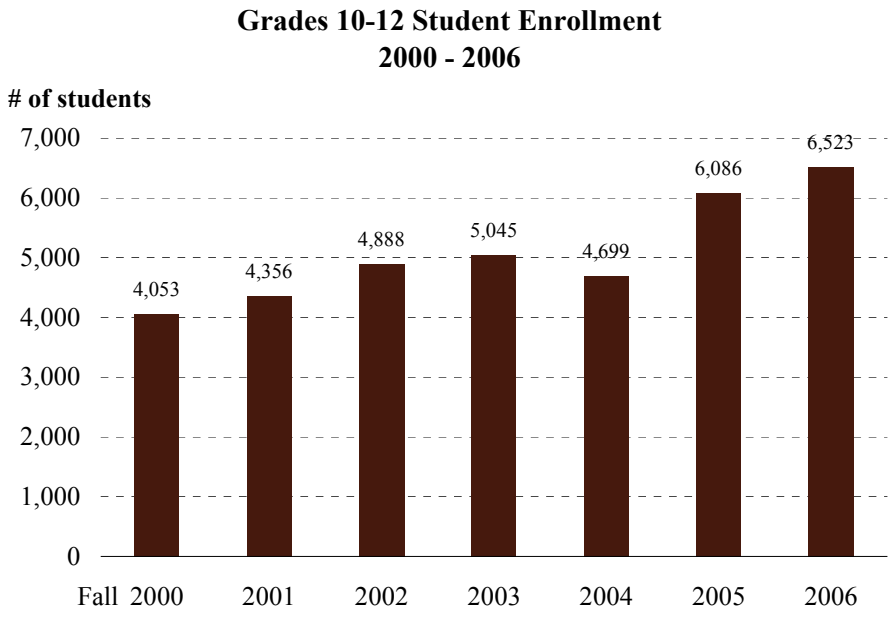

Source: National Center for Education Statistics, 2000-2006

- Between 2000 and 2003, total public school enrollment for grades 10-12 increased by approximately 990, or 24 percent.
- Between 2003 and 2004, total student enrollment then declined by about 350 students before surging by 39 percent between 2004 and 2006, which mirrors a similar surge in enrollment for grades 7-9.

VIII. References

California Department of Finance, Demographic Research Unit

California Employment Development Department Labor Market Information Division

California State Board of Equalization

Construction Industry Research Board

Claritas, Inc.

Data Quick Information Systems

National Center for Education Statistics

U.S. Census Bureau

IX. Methodology

Explanation of City Relative to County

In the table on page 1 of this report, the reference of City "Relative to County" for absolute numbers indicates the difference between the city number and the county number. For example, the Median Age of City A being 30 and the Median Age of County B being 35 would show a relative difference of 5. For data that is a percentage, the relative difference is based on the city as a percentage of the county total.

Population

The population for each jurisdiction was based on California Department of Finance data. These are the official state population and housing estimates. The 2000 figure was based on U.S. Census figures for April 1, 2000 while subsequent years represent the city's population as of January 1 of each year.

Graphs for population based on age and race were tabulated using Census 2000 data and Claritas, Inc.

Households

The number of households for each jurisdiction was based on California Department of Finance data. The 2000 figure was based on U.S. Census figures for April 1, 2000 while subsequent years represent the city's households as of January 1 of each year.

Households by size were calculated based on Claritas, Inc. data.

Housing

Residential permits issued were obtained using Construction Industry Research Board data, which are collected by Counties from self-reporting of individual cities. The number of permits issued is reflective of all types of residential permit activity, including, but not limited to new units, replacement units due to demolition, and additions.

The median home price was calculated based on total home sales in the city, including single family units and condominiums. The median price does not reflect the entire universe of housing in the jurisdictions, only those that sold within the calendar year.

The data was compiled from Data Quick Information Systems.

Employment

Employment data is based on the California Employment Development Department (EDD) county totals and is adjusted by SCAG. SCAG adjusts the data by adding self-employed to the EDD wage and salary county totals. Due to EDD methodology, employment data is based on the location of a company's payroll and not necessarily the location of physical offices.

Retail Sales

Retail sales data is obtained from the California Board of Equalization, which does not publish individual point-of-sale data. All data is adjusted for inflation.

Education

Student enrollment data is based on public schools that are physically located within city boundaries. Data is obtained from the National Center for Education Statistics.

Choice of Data Sources

The following factors were considered in choosing the data sources used for this report:

- Available for all jurisdictions in the SCAG region
- The most recognized source on the subject
- Data sources are in the public domain
- Data available on an annual basis

The same data sources are used for all jurisdictional profiles (except where noted) to maintain overall reporting consistency. The jurisdiction is not constrained from using other data sources for their planning activities.

The preparation of this report has been financed in part through grants from the Federal Highway Administration and Federal Transit Administration, U.S. Department of Transportation, under the Metropolitan Planning Program, Section 104(f) of Title 23, U.S. Code. The contents of this report do not necessarily reflect the official views or policy of the U.S. Department of Transportation. Additional assistance was provided by the California Department of Transportation.

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Notes:

Profile of the City of Murrieta

Southern California Association of Governments' (SCAG) Regional Council includes 67 Districts which represent 189 cities in the SCAG region.

SCAG Regional Council District 5 includes four cities:
Hemet, Murrieta, San Jacinto, and Temecula
Represented by: **Hon. Ron Roberts**

This project was funded by the Southern California Association of Governments and shared with the City of Murietta. SCAG regularly provides local governments with services including planning data and information, technical assistance such as GIS training, and planning assistance such as analyses of visioning, infill, real estate investment, and fiscal impact.

ASSOCIATION of GOVERNMENTS

Southern California Association of Governments
May 2009

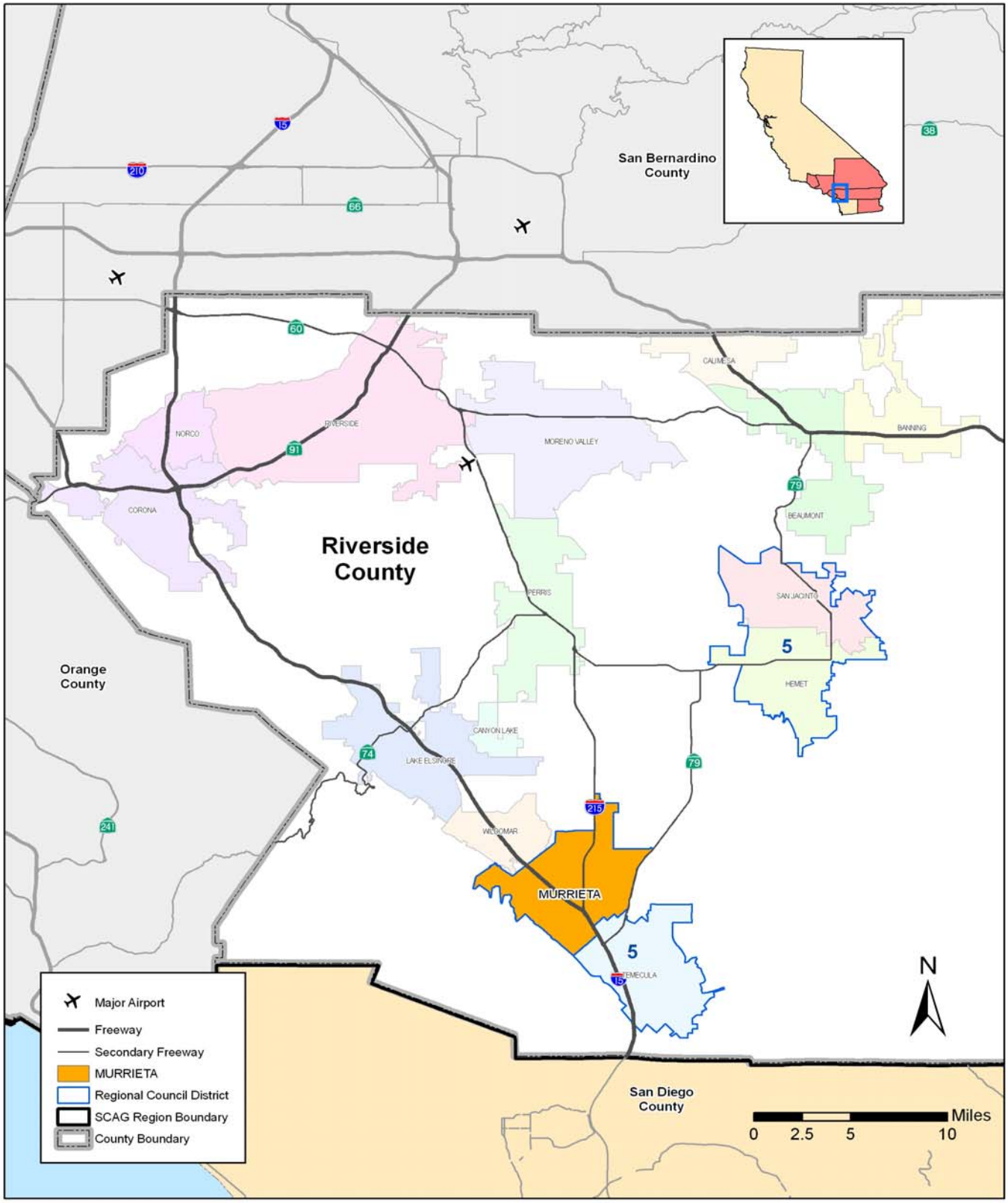
San Bernardino County
Riverside County
Orange County
San Diego County
RIVERSIDE
NORCO
CORONA
MORENO VALLEY
CALIMESA
BANNING
BEAUMONT
PERRIS
SAN JACINTO
HEMET
CANYON LAKE
LAKE ELSINORE
WILDOMAR
MURRIETA
TEMECULA
5
5
Major Airport
Freeway
Secondary Freeway
MURRIETA
Regional Council District
SCAG Region Boundary
County Boundary
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Southern California Association of Governments
Regional Council Roster

May 2009

Members	Representing
Hon. Richard Dixon, Lake Forest, President	District 13
Hon. Jon Edney, El Centro, 1st Vice-President	District 1
Hon. Gary Ovitt, Immediate Past President	San Bernardino County
Hon. Victor Carrillo	Imperial County
Hon. Mike Antonovich	Los Angeles County
Hon. Mark Ridley-Thomas	Los Angeles County
Hon. Chris Norby	Orange County
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Hon. Antonio Villaraigosa (At-Large)	Los Angeles City
Hon. Art Brown, Buena Park	OCTA
Hon. Robin Lowe, Hemet	RCTC
Hon. Kelly Chastain, Colton	SANBAG
Hon. Keith Millhouse, Moorpark	VCTC
Hon. Greg Pettis, Cathedral City	District 2
Hon. Bonnie Flickinger, Moreno Valley	District 3
Hon. Ron Loveridge, Riverside	District 4
Hon. Ron Roberts, Temecula	District 5
Hon. Pat Gilbreath, Redlands	District 6
Hon. Larry McCallon, Highland	District 7
Hon. Deborah Robertson, Rialto	District 8
Hon. Paul Eaton, Montclair	District 9
Hon. Glenn Duncan, Chino	District 10
Hon. Bill Jahn, Big Bear Lake	District 11
Hon. Paul Glaab, Laguna Niguel	District 12
Hon. Beth Krom, Irvine	District 14
Hon. Leslie Daigle, Newport Beach	District 15
VACANT	District 16
Hon. John Nielsen, Tustin	District 17
Hon. Leroy Mills, Cypress	District 18
Hon. Bob Hernandez, Anaheim	District 19
Hon. Andy Quach, Westminster	District 20
Hon. Sharon Quirk, Fullerton	District 21
Hon. John Beauman, Brea	District 22
Hon. Larry Nelson, Artesia	District 23
Hon. Gene Daniels, Paramount	District 24
Hon. David Gafin, Downey	District 25

MAY 2009 - REGIONAL COUNCIL ROSTER – PAGE 2

Hon. Barbara Calhoun, Compton	District 26
Hon. Frank Gurule, Cudahy	District 27
Hon. Judy Dunlap, Inglewood	District 28
Hon. Val Lerch, Long Beach	District 29
Hon. Tonia Reyes-Uranga, Long Beach	District 30
Hon. Stan Carroll, La Habra Heights	District 31
Hon. Margaret Clark, Rosemead	District 32
Hon. Keith Hanks, Azusa	District 33
Hon. Barbara Messina, Alhambra	District 34
Hon. Robert Harbicht, Arcadia	District 35
Hon. Mike Ten, South Pasadena	District 36
Hon. Carol Herrera, Diamond Bar	District 37
Hon. Paula Lantz, Pomona	District 38
Hon. Susan Rhilinger, Torrance	District 39
Hon. Judy Mitchell, Rolling Hills Estates	District 40
Hon. Pam O'Connor, Santa Monica	District 41
Hon. Frank Quintero, Glendale	District 42
VACANT	District 43
Hon. Dennis Washburn, Calabasas	District 44
Hon. Bryan MacDonald, Oxnard	District 45
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Hon. Wendy Greuel, Los Angeles	District 49
Hon. Dennis Zine, Los Angeles	District 50
Hon. Tom LaBonge, Los Angeles	District 51
Hon. Jack Weiss, Los Angeles	District 52
Hon. Tony Cardenas, Los Angeles	District 53
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Hon. Bernard Parks, Los Angeles	District 55
Hon. Jan Perry, Los Angeles	District 56
Hon. Herb Wesson, Los Angeles	District 57
Hon. Bill Rosendahl, Los Angeles	District 58
Hon. Greig Smith, Los Angeles	District 59
Hon. Eric Garcetti, Los Angeles	District 60
Hon. Jose Huizar, Jr., Los Angeles	District 61
Hon. Janice Hahn, Los Angeles	District 62
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Hon. Gil Coerper, Huntington Beach	District 64
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Hon. Nury Martinez, San Fernando	District 67
Hon. Mark Calac, Pechanga Band of Luiseno Indians	Tribal Govt. Rep

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I. Introduction

The purpose of this report is to offer the City of Murietta with updated information and to assist in their planning activities. Information with respect to, for example, demographic, socio-economic and housing, is obtained from a myriad of sources. In addition, data related to education is also included. The report focuses on the major changes in the city since 2000 in comparison with that of Riverside County. The information presented and interpreted in this report shows current trends, and may be utilized by the City as part of the basis for making its future policies.

STATISTICAL DATA

Category	*Murrieta*	*Riverside County*	*Murrieta relative to Riverside County*	*SCAG Region*
Population (2008)	100,173	2,088,322	4.80%	18,636,934
Median Age (Yrs)	32.4	31.8	0.6	33.5
White (Non-Hispanic)	65.80%	43.00%	7.30%	35.30%
Asian (Non-Hispanic)	5.20%	5.10%	4.90%	11.30%
Black (Non-Hispanic)	3.90%	5.80%	3.20%	6.80%
American Indian	0.40%	0.50%	4.20%	0.30%
All Other Non-Hispanic	3.80%	3.40%	5.40%	2.30%
Hispanic	20.90%	42.20%	2.40%	43.90%
Number of Households (2008)	32,664	671,036	4.90%	5,849,833
Number of Housing Units (2008)	34,248	773,331	4.40%	6,224,661
Home Ownership Rate	80.30%	70.20%	5.60%	54.70%
Average Household Size (2008)	3.0	3.1	-0.1	3.1
Median Family Income (2007) ($)	81,355	60,180	21,175	61,901
Median Existing Home Price (2008) ($)	285,000	260,000	25,000	382,300
Number of Jobs (2008)	13,653	653,793	2.10%	7,845,378

Source: Claritas, Inc., 2007, California Department of Finance, Data Quick Information Systems, SCAG.

II. Population

Population Growth

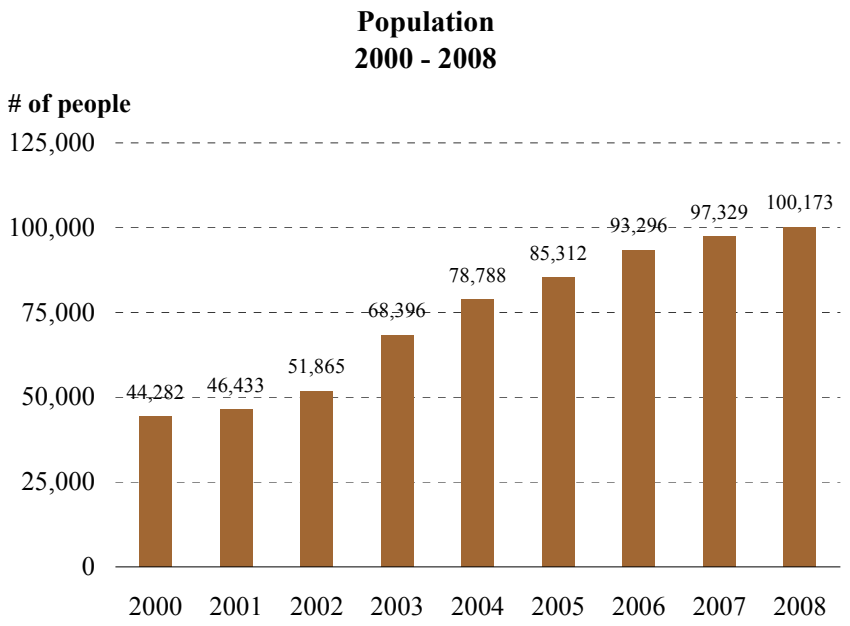

Source: California Department of Finance, E-5, May 2008

- Between 2000 and 2008, the total population of the city more than doubled, growing from 44,282 to 100,173.
- During this 8-year period, the city's population growth rate was well above the Riverside County rate of 35.2 percent.

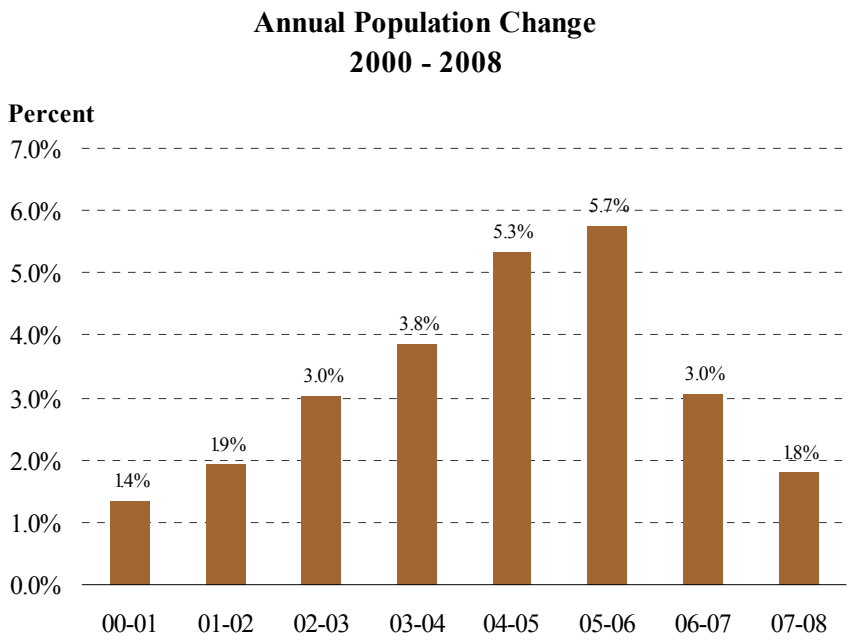

Source: California Department of Finance, E-5, May 2008

- After somewhat steady growth between 2000 and 2006, population growth slowed significantly between 2006 and 2008.
- Between 2007 and 2008, the city's annual growth rate was approximately 1.8 percent, or about 2,800 additional residents.

Population by Age

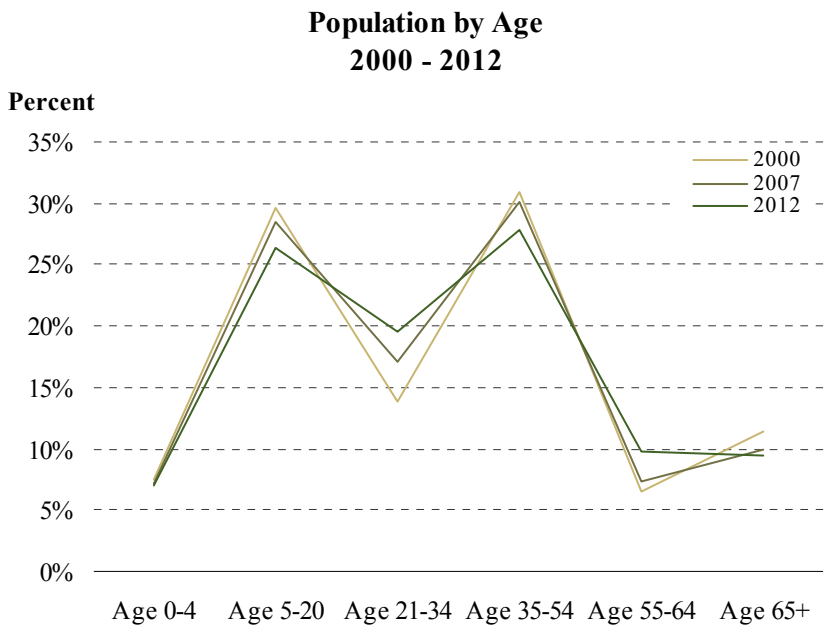

Source: Claritas, Inc., 2007 and U.S. Census Bureau: Summary File 1, 2000

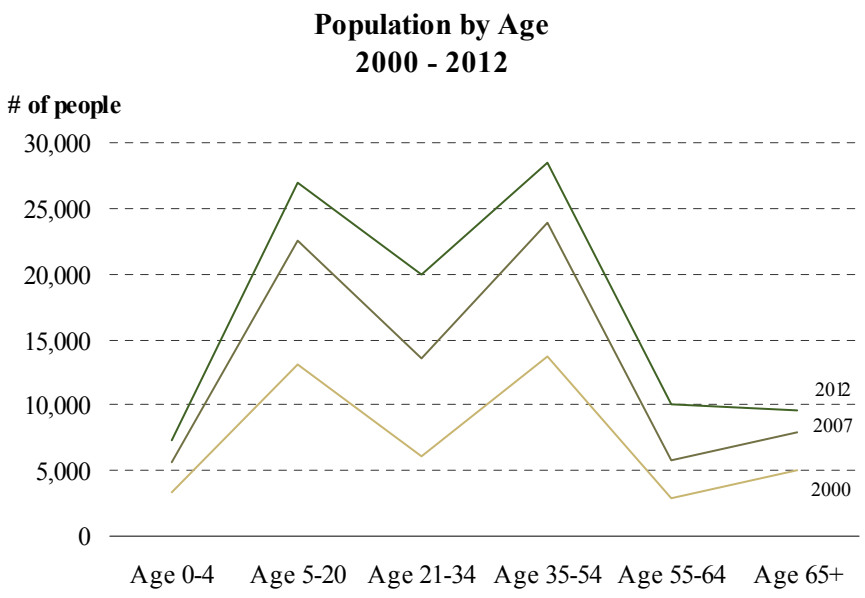

Source: Claritas, Inc., 2007 and U.S. Census Bureau: Summary File 1, 2000

- Between 2000 and 2012, the population in Murrieta continues to be dominated by the middle-aged working cohort (35 to 54 years old) and the school-age populations (5 to 20 years old). Together, they are projected to account for 54 percent of the total population in 2012, decreasing from 61 percent in 2000.
- Between 2000 and 2012, the share of population between ages 55 and 64 is projected to increase from 7 percent to almost 10 percent, reflecting primarily the aging of the baby boomers.
- During this 12-year period, the share of the age cohort (21 to 34 years old) is projected to increase significantly from 14 percent to 20 percent.
- As to the population by age group, those aged 35 and older are projected to increase significantly. Specifically, between 2000 and 2012, the population group ages 55 and over are projected to increase by more than 10,000.

Population by Race/Ethnicity

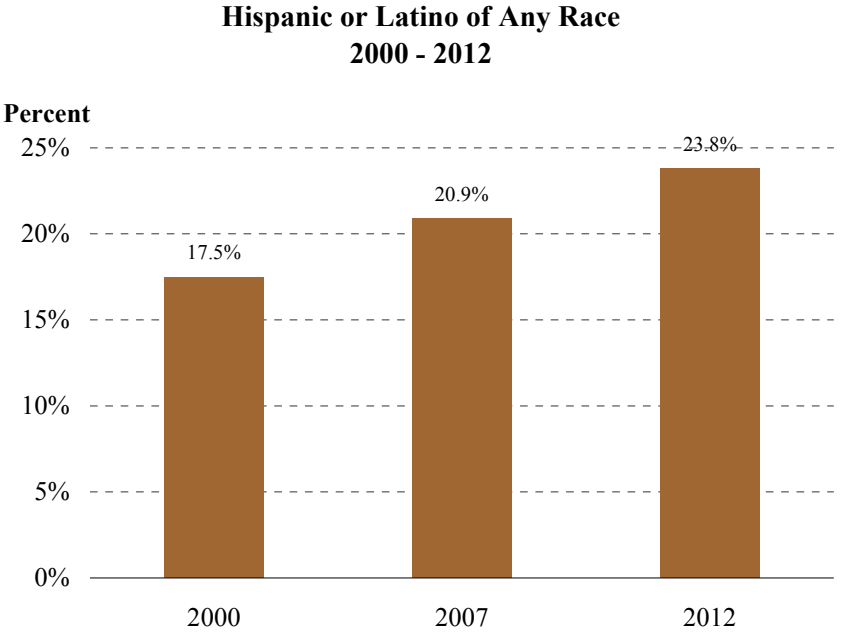

Source: Claritas, Inc., 2007 and U.S. Census Bureau: Summary File 1, 2000

- Between 2000 and 2007, the share of Hispanic population in the city increased from 18 to 21 percent. Hispanics are the fastest growing ethnic group in the city and their population share is projected to further increase to 24 percent in 2012.

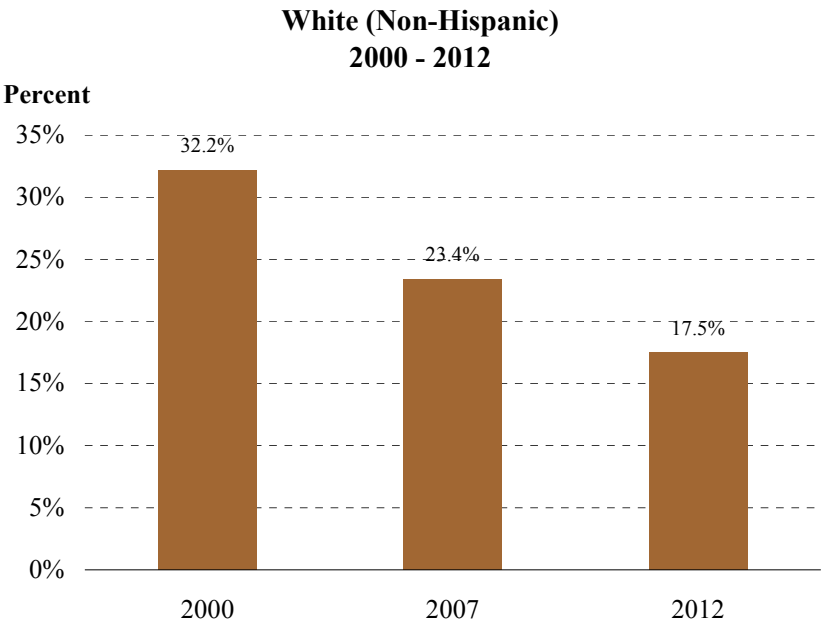

Source: Claritas, Inc., 2007 and U.S. Census Bureau: Summary File 1, 2000

- Like most cities in Southern California, since 2000, the share of non-Hispanic White population has been declining, while the share of other ethnic groups (particularly Hispanic and Asian) has been increasing and is projected to continue to rise through 2012.

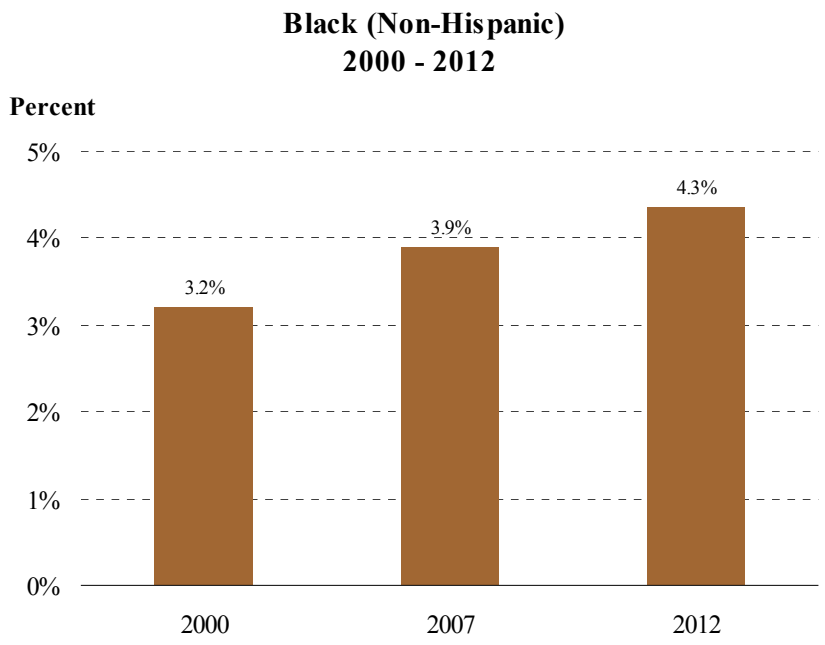

Source: Claritas, Inc., 2007 and U.S. Census Bureau: Summary File 1, 2000

- Between 2000 and 2007, the share of non-Hispanic Black population in the city increased very slightly from 3.2 to 3.9 percent, and is projected to increase to 4.3 percent in 2012.

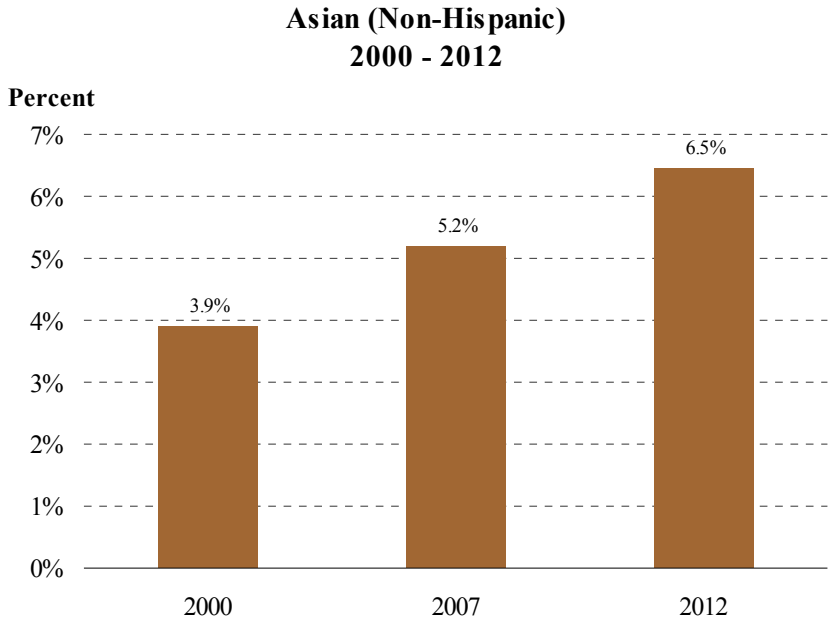

Source: Claritas, Inc., 2007 and U.S. Census Bureau: Summary File 1, 2000

- The share of the Asian population in the city increased from 3.9 percent in 2000 to 5.2 percent in 2007. Asian population in the city is projected to further increase to 6.5 percent in 2012.

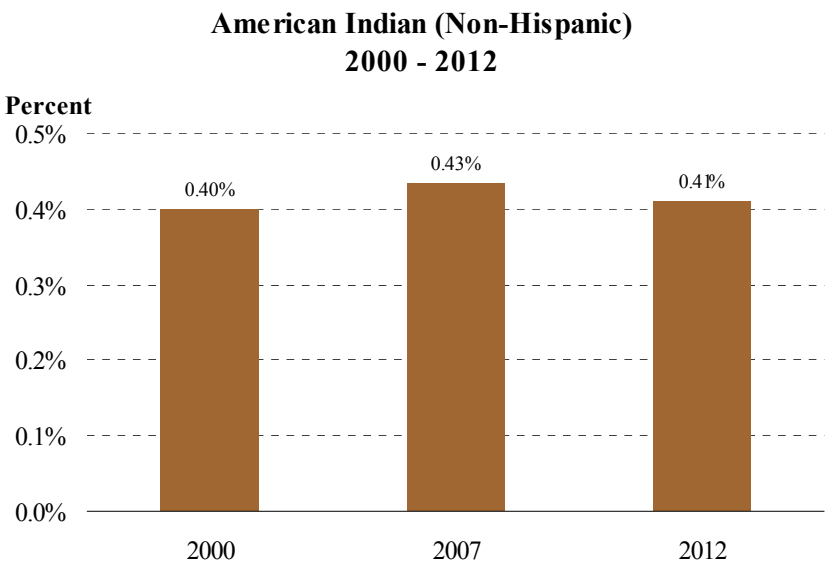

Source: Claritas, Inc., 2007 and U.S. Census Bureau: Summary File 1, 2000

- Between 2000 and 2012, the share of the American Indian population in Murrieta is estimated to remain stable at 0.4 percent.

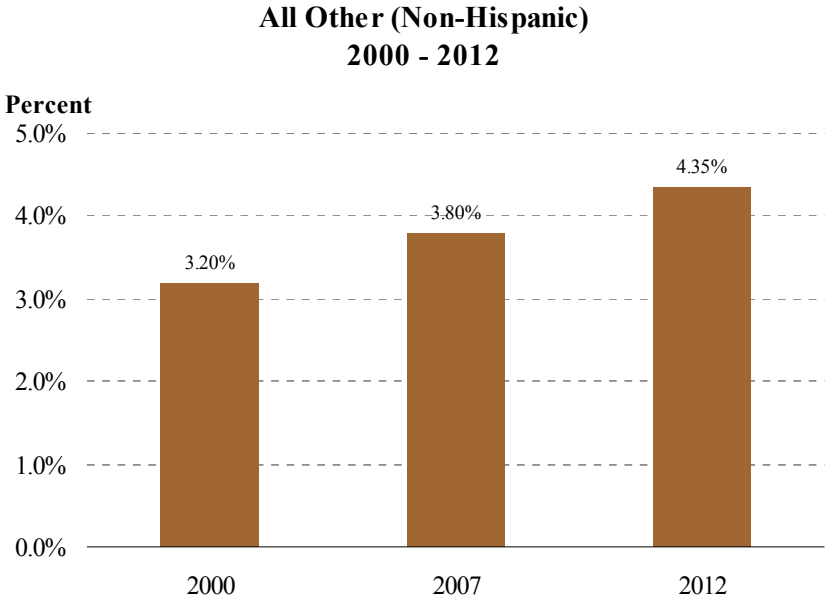

Source: Claritas, Inc., 2007 and U.S. Census Bureau: Summary File 1, 2000

- During the 12-year period, the share of all other non-Hispanic population group is also estimated to increase from 3.2 to 4.4 percent.

III. Households

Number of Households

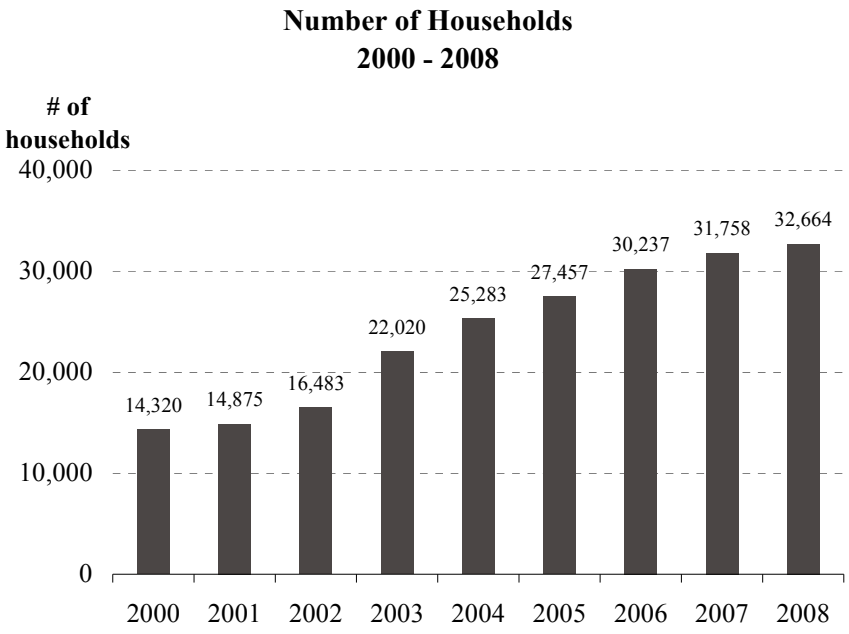

Source: California Department of Finance, E-5, May 2008

- Between 2000 and 2008, the total number of households in the city increased by over 18,000, more than doubling, reflecting its population growth in this time period.
- During this 8-year period, the city's household growth rate was much higher than the county rate of 31 percent.

Average Household Size

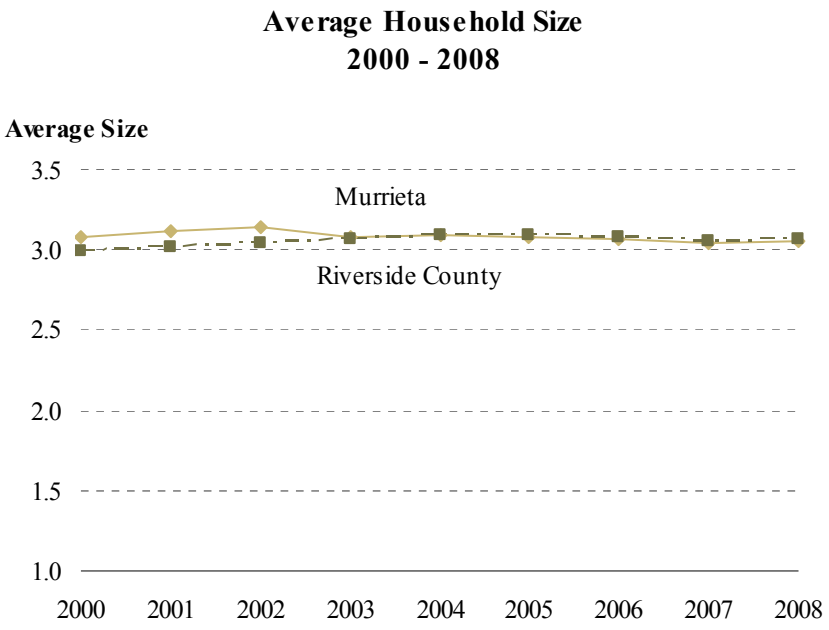

Source: California Department of Finance, E-5, May 2008

- In 2008, the city's average household size was about 3, almost the same as the county average.
- Between 2000 and 2008, average household size generally stayed stable in the city and the county.

Households by Size

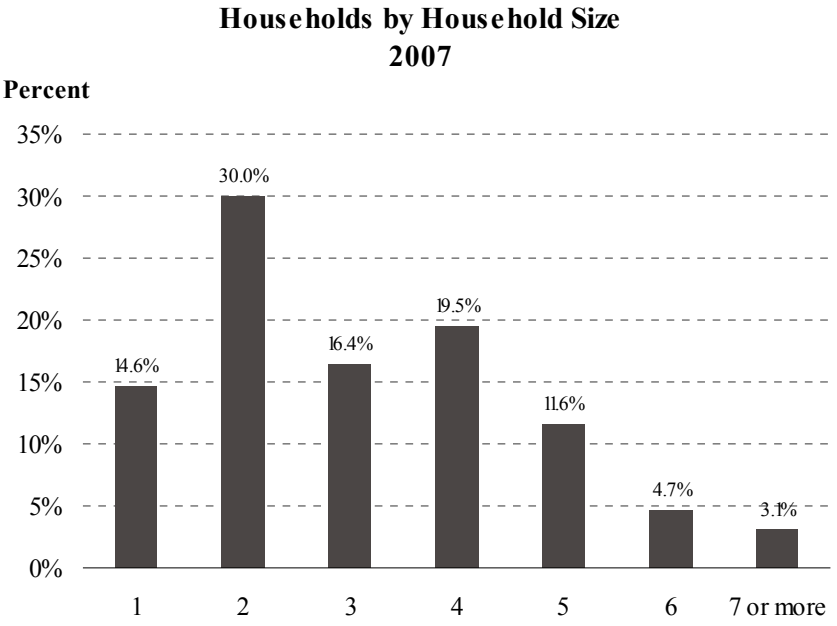

Source: Claritas, Inc., 2007

- Close to 61 percent of all Murrieta households have 3 people or fewer.
- About 15 percent of the households are single-person households, much lower than the county share of 21 percent.
- About 19 percent of all households in the city have at least 5 people.

Households by Income

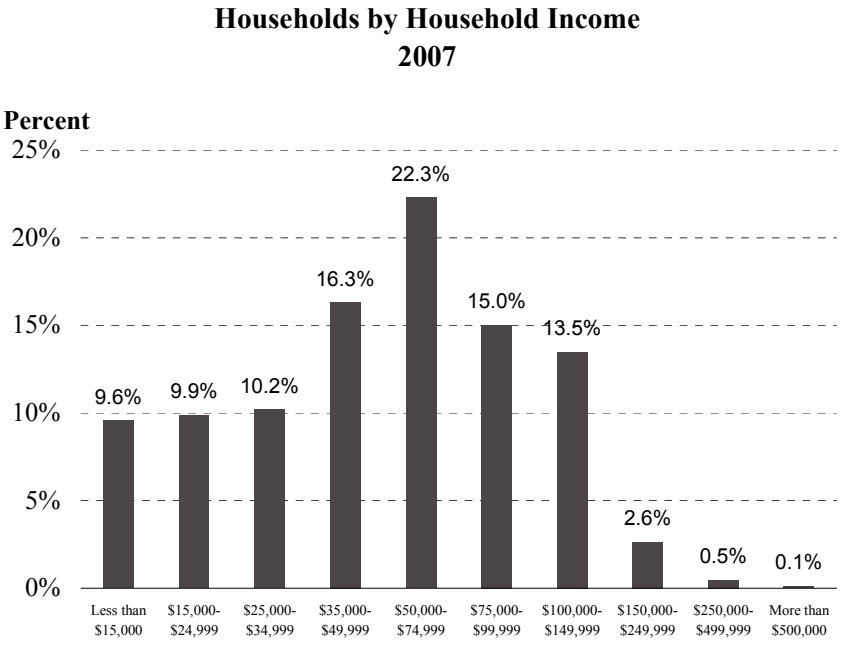

Source: Claritas, Inc., 2007

- In 2007, about 46 percent of households earned less than $50,000.
- Over 37 percent of the households earned between $50,000 and $100,000.

IV. Housing

Housing Production

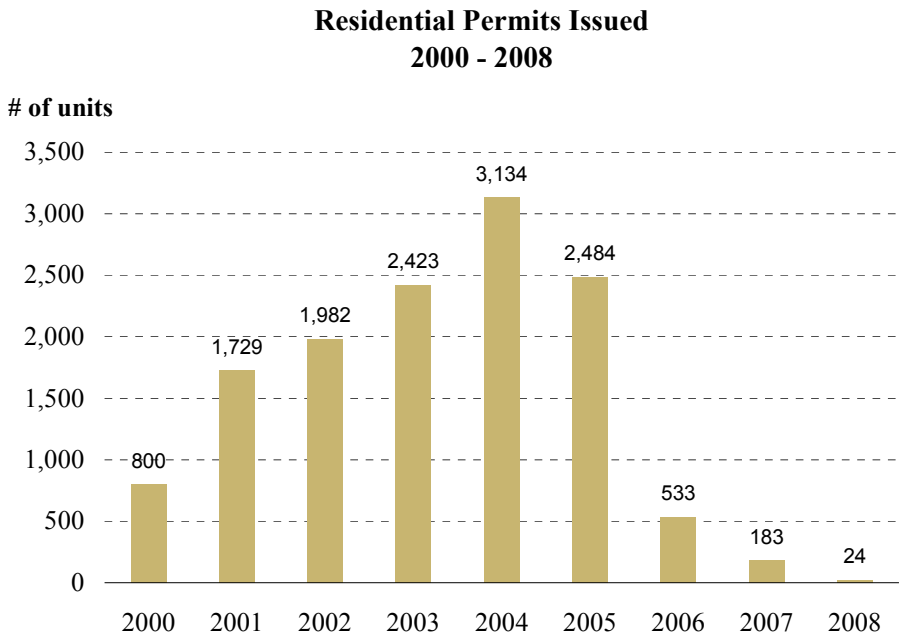

Source: Construction Industry Research Board, 2000-2008

- Between 2000 and 2008, 13,292 new residential permits were issued. Only 6 percent of these were issued in the last 3 years.

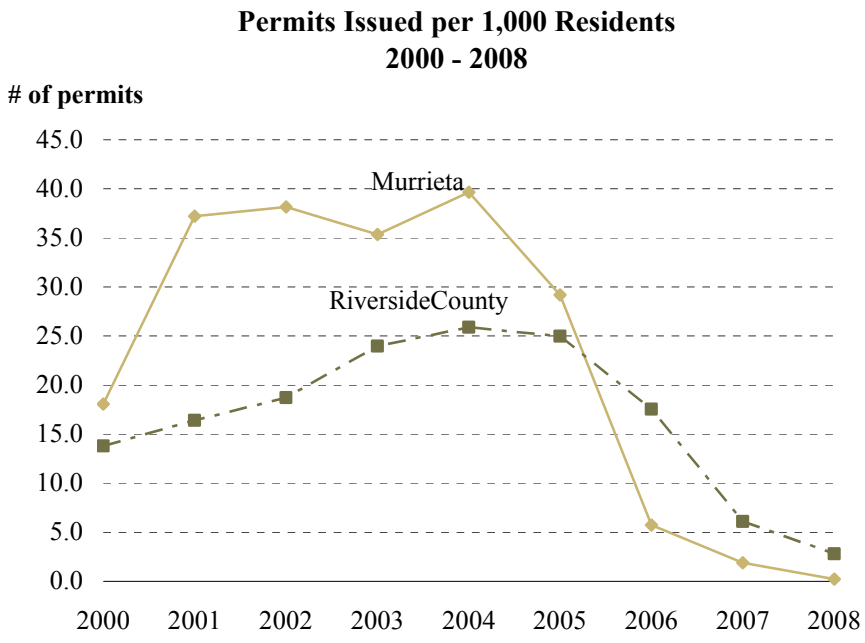

Source: Construction Industry Research Board, 2000-2008 and SCAG

- From 2000 to 2005, the city had higher levels of permits issued per 1,000 residents when compared to the county as a whole, but trailed the county figures between 2006 and 2008.

Housing Values

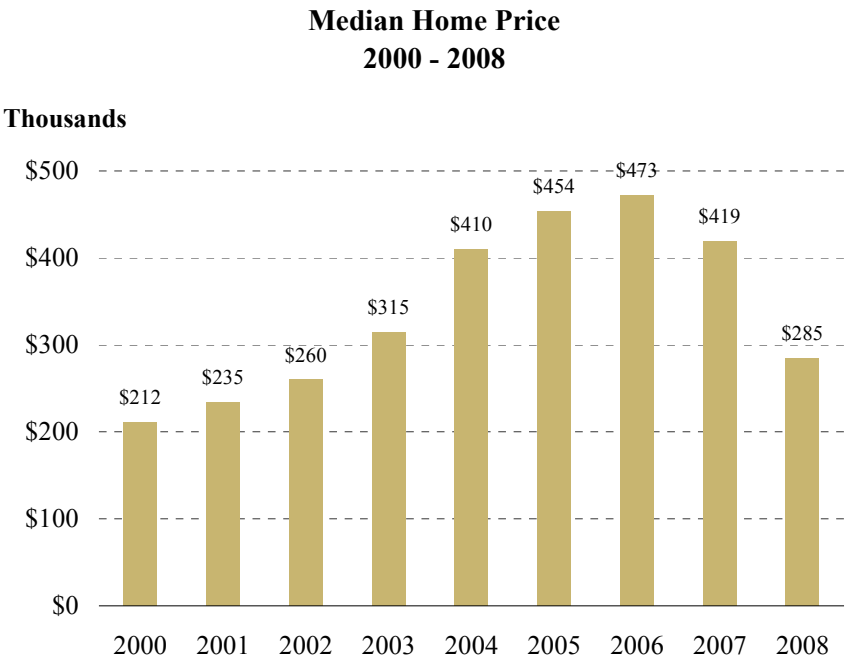

Source: Data Quick Information Systems, 2009

- Between 2000 and 2006, median home sale prices more than doubled, jumping from $212,000 to almost $473,000.
- Median home prices dropped by $54,000 between 2006 and 2007 and by $134,000 between 2007 and 2008.
- In 2008, the median home price in Murrieta was $285,000, $25,000 higher than that in Riverside County.

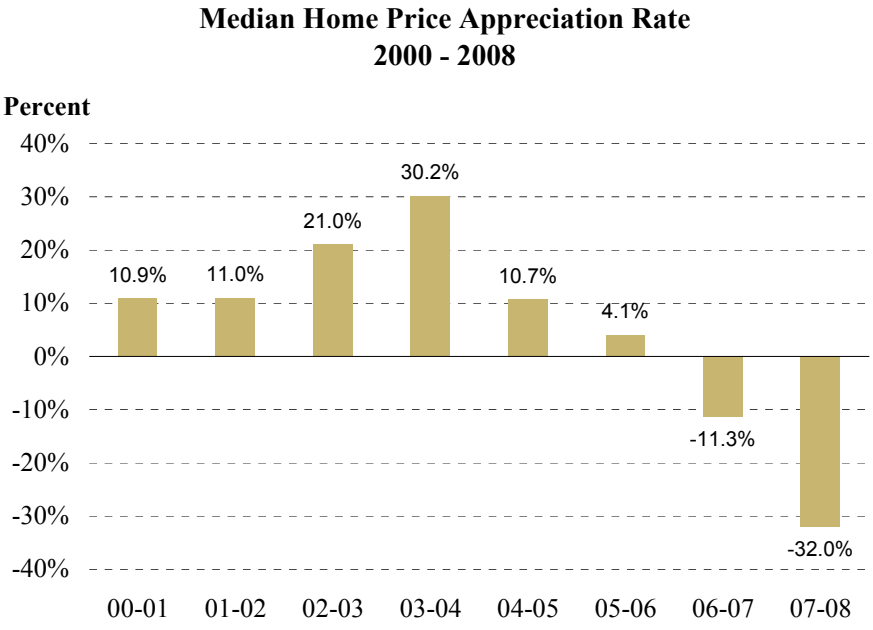

Source: Data Quick Information Systems, 2009

- Between 2001 and 2006, annual home price appreciation rates were between 4 and 31 percent.
- In sharp contrast, median home price dropped by 11 percent between 2006 and 2007 and 32 percent between 2007 and 2008.

V. Employment

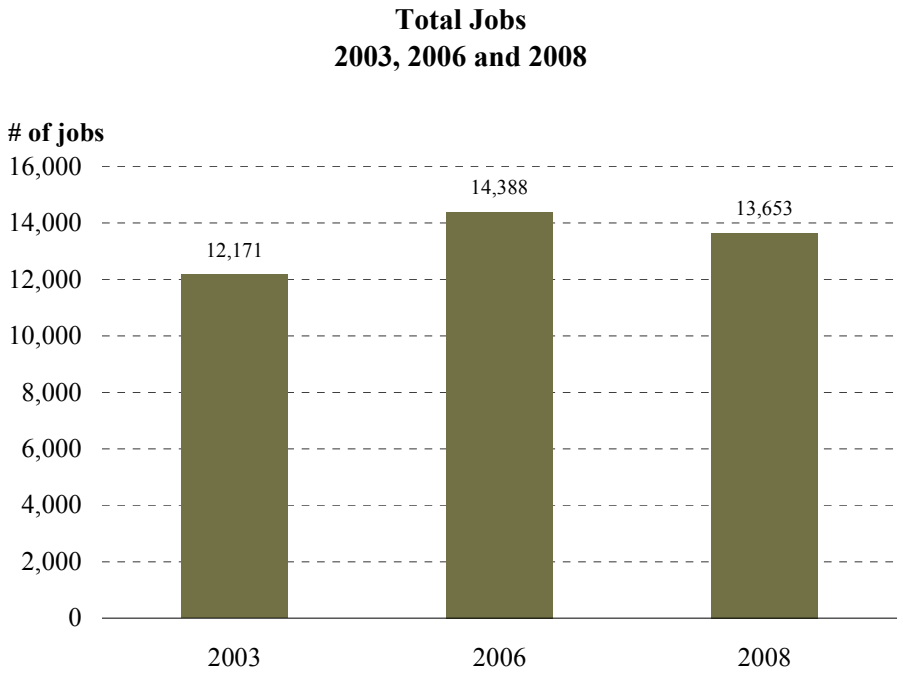

Source: California Employment Development Department, 2003, 2006 & 2008 and SCAG

- In 2008, total jobs in Murrieta reached 13,653, about 12 percent greater than its 2003 level.
- Total jobs in the city included wage and salary jobs and jobs held by business owners and self-employed persons. The total job count does not include unpaid volunteers or family workers, and private household workers.

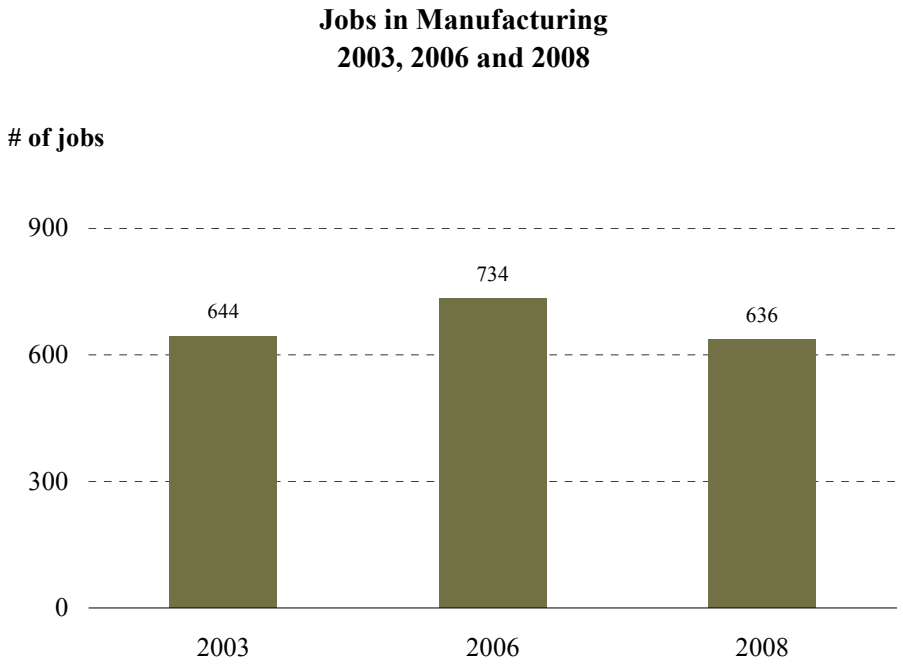

Source: California Employment Development Department, 2003, 2006 & 2008 and SCAG

- Between 2003 and 2008, the number of manufacturing jobs in Murrieta decreased by 1 percent.

Jobs in Construction
2003, 2006 and 2008

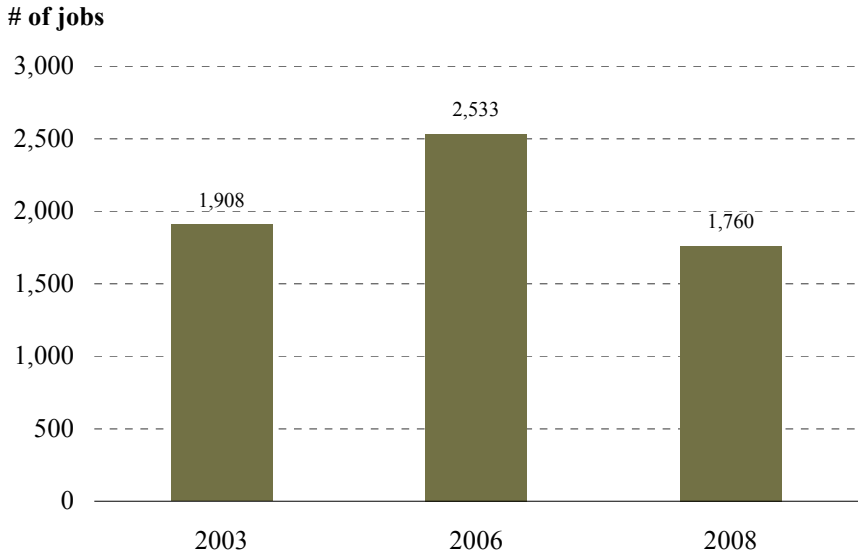

Source: California Employment Development Department, 2003, 2006 & 2008 and SCAG

- Construction jobs include those engaged in both residential and non-residential construction.
- Between 2003 and 2006, construction jobs in the city increased by 625, or 33 percent. However between 2006 and 2008, construction jobs declined by 31 percent.

Jobs in Retail Trade
2003, 2006 and 2008

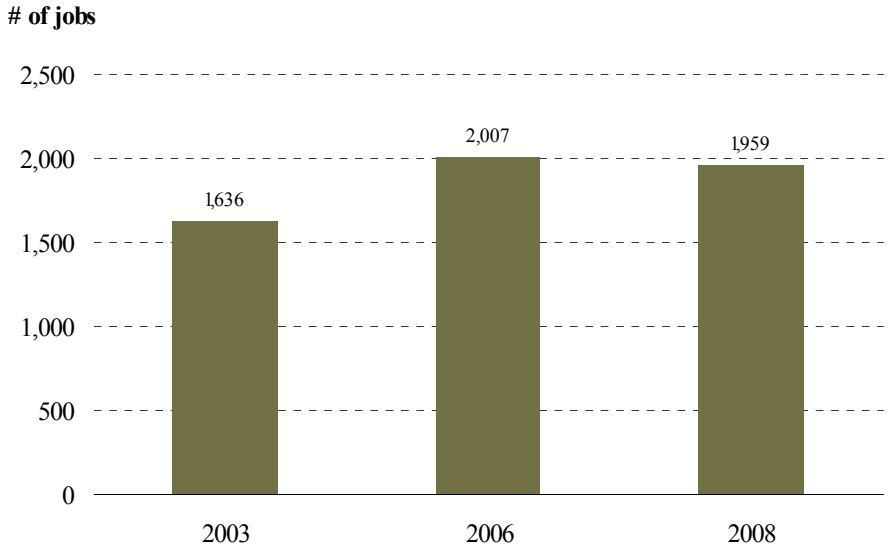

Source: California Employment Development Department, 2003, 2006 & 2008 and SCAG

- Between 2003 and 2008, the number of retail trade jobs in the city increased by 323, or 20 percent.

Source: California Employment Development Department, 2003, 2006 & 2008 and SCAG

- Jobs in the professional and management sector include those employed in, for example, professional and technical services, management of companies, and administration and support.
- Between 2003 and 2006, the number of professional and management jobs increased by 273, or 22 percent. Despite a decrease in overall employment between 2006 and 2008, this sector added 2 percent.

Jobs by Sectors
2003

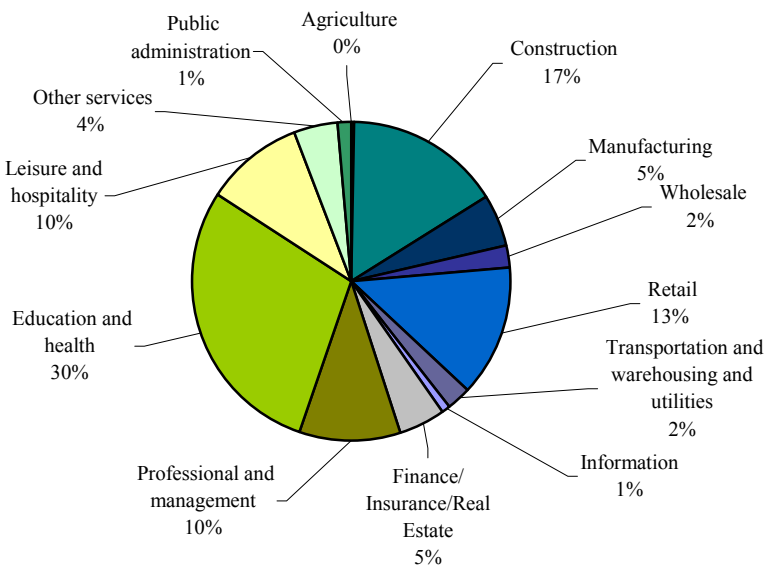

Source: California Employment Development Department, 2003 and SCAG

- Between 2003 and 2008, there were only slight changes in the share of jobs by sector in the city. Specifically, during this period, the share of education and health jobs remained at 30 percent, the share of construction jobs fell from 17 to 13 percent, and leisure and hospitality and professional and management each increased share by 1 percent.

Jobs by Sectors
2008

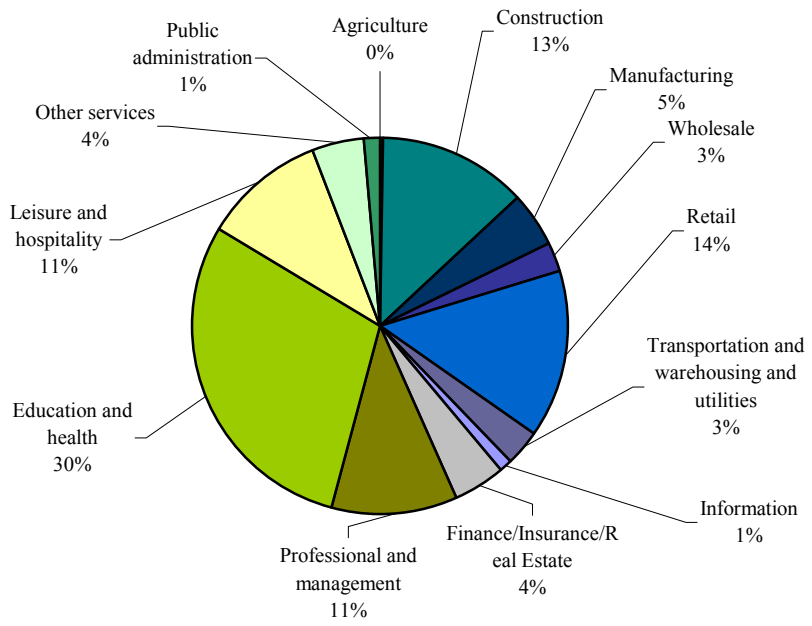

Source: California Employment Development Department, 2008 and SCAG

- In 2008, the education and health sector remained the largest sector, accounting for 30 percent of total jobs in the city.
- Other large sectors included construction (13 percent), retail (14 percent), professional and management (11 percent) and leisure and hospitality (11 percent).

Average Salaries

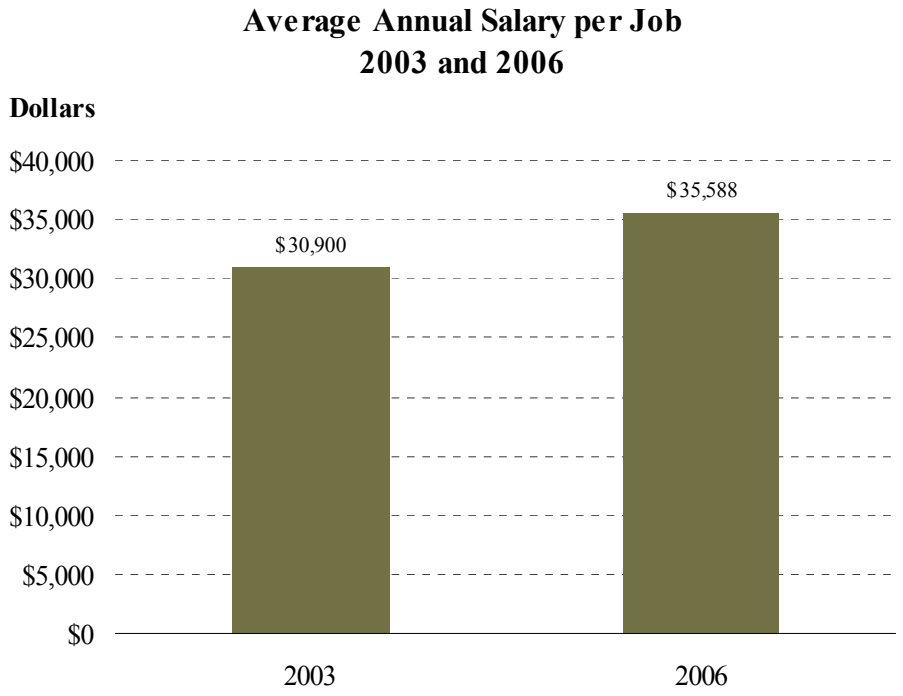

Source: California Employment Development Department, 2003 & 2006

- Average salaries per job in the city increased from $30,900 in 2003 to $35,588 in 2006, a 15 percent increase, which was above the inflation rate of 13 percent during the same period for Southern California.

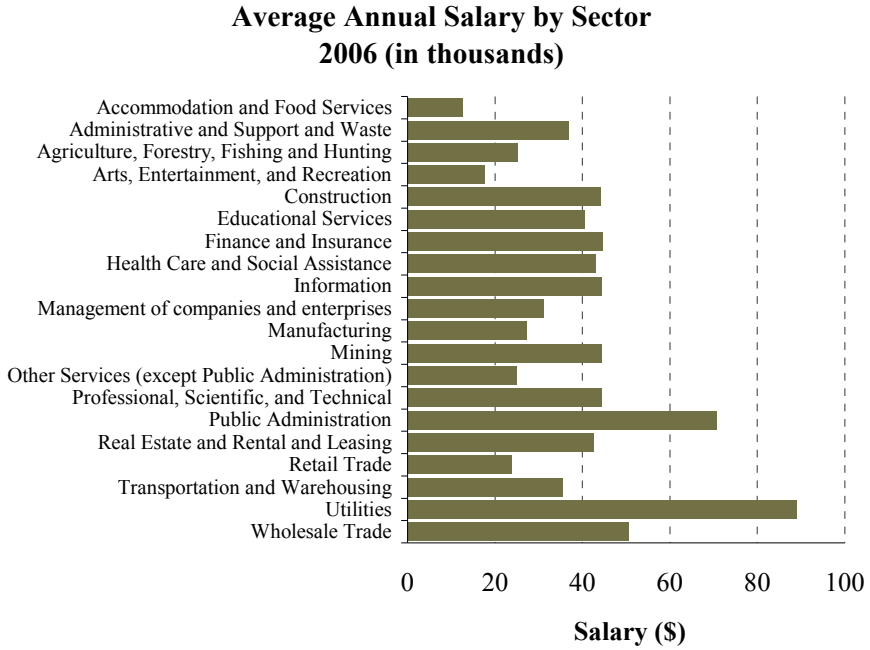

Source: California Employment Development Department, ES-202, 2006

- In 2006, the sector providing the highest salary per job in Murrieta was Utilities ($89,124).
- The Accommodation and Food Services sector provided the lowest annual salary per job ($12,660).

VI. Retail Sales

Source: California Board of Equalization, 2000-2007

- Real (inflation adjusted) retail sales more than doubled between 2000 and 2007.
- The city had steady growth of real retail sales between 2000 and 2006 with a decline of 6 percent between 2006 and 2007.

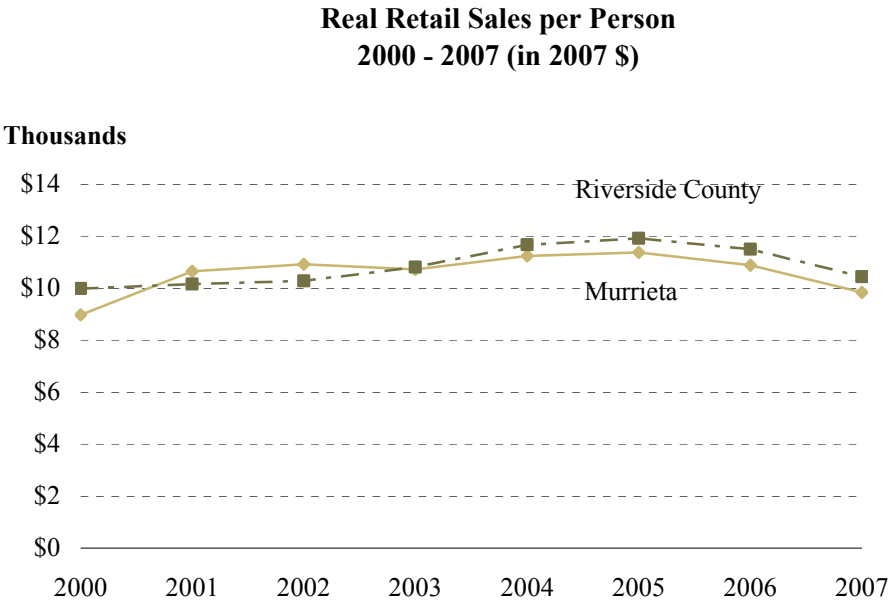

Source: California Board of Equalization, 2000-2007 and SCAG

- Between 2000 and 2007, real retail sales per person for the city increased from $9,000 to $9,800.

VII. Education

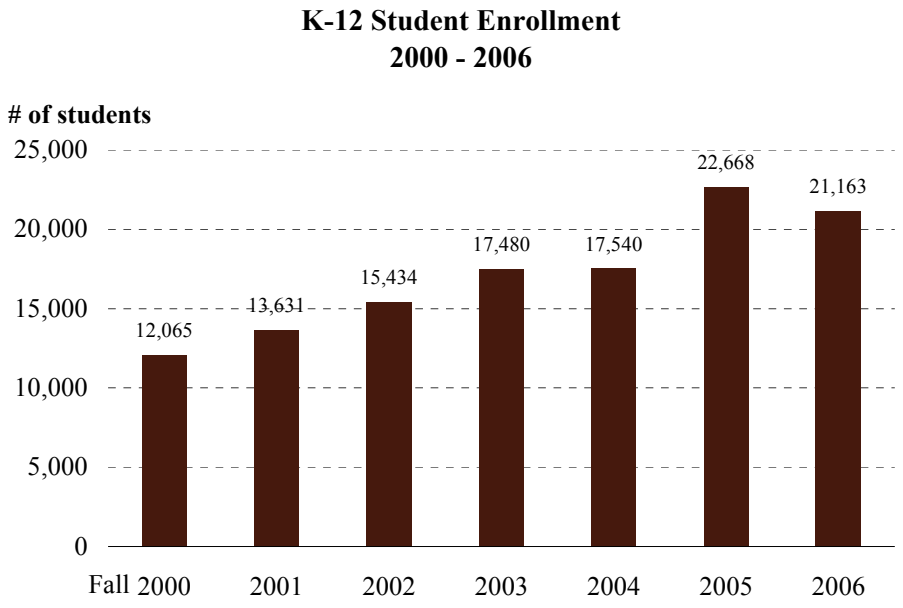

Source: National Center for Education Statistics, 2000-2006

- Between 2000 and 2006, total K-12 public school enrollment for schools within the city increased by almost 9,100 (75 percent) to 21,163 students.
- Enrollment growth occurred each year, except for 2006.

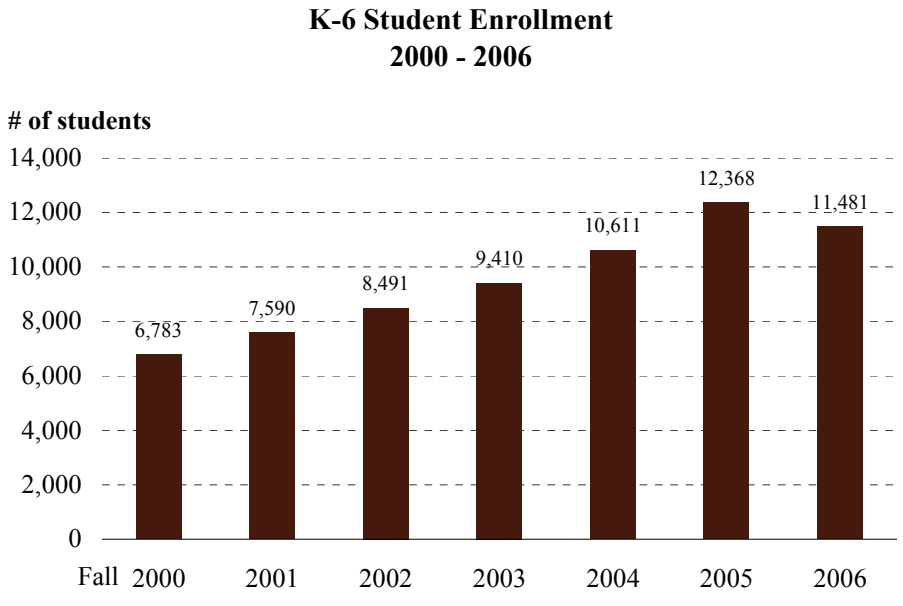

Source: National Center for Education Statistics, 2000-2006

- Between 2000 and 2005, total public elementary school enrollment increased steadily by about 5,600 students, or 82 percent. Enrollment of K-6 students declined by 7 percent between 2005 and 2006.

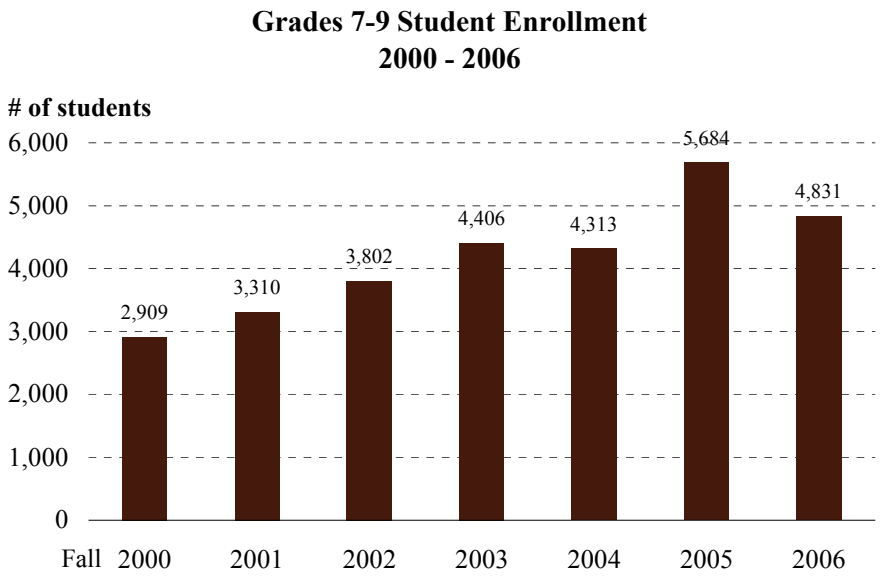

Source: National Center for Education Statistics, 2000-2006

- Between 2000 and 2006, total public school enrollment for grades 7-9 increased by over 1,900 students, or 66 percent.
- Growth would have been more substantial if not for a decline of 15 percent between 2005 and 2006.

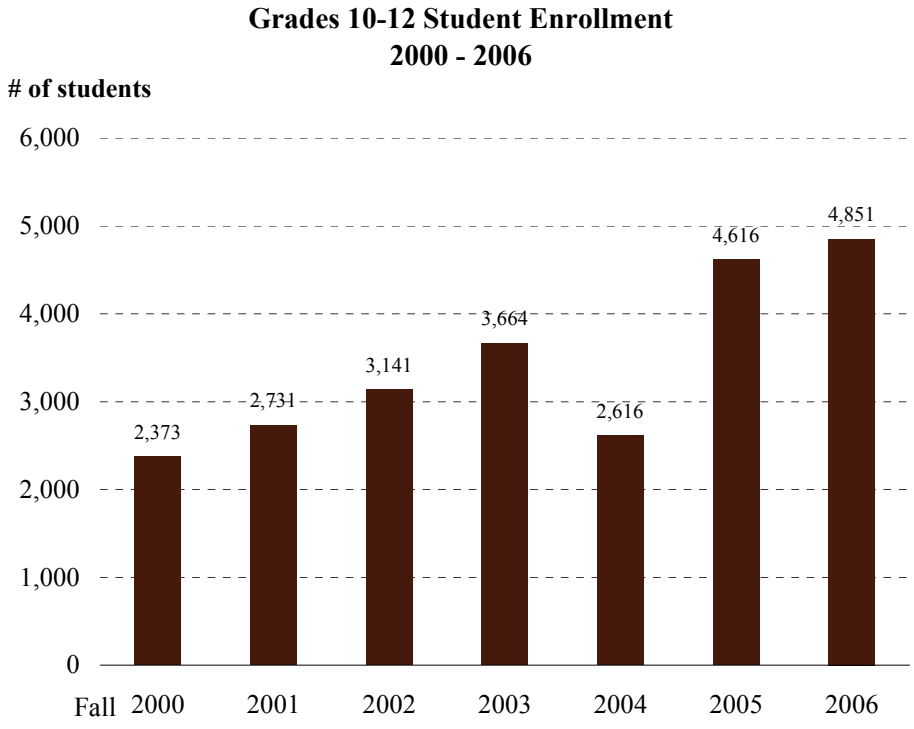

Source: National Center for Education Statistics, 2000-2006

- Between 2000 and 2006, total public school enrollment for grades 10-12 increased by approximately 2,500, more than doubling the 2000 enrollment level.

VIII. References

California Department of Finance, Demographic Research Unit

California Employment Development Department Labor Market Information Division

California State Board of Equalization

Construction Industry Research Board

Claritas, Inc.

Data Quick Information Systems

National Center for Education Statistics

U.S. Census Bureau

IX. Methodology

Explanation of City Relative to County

In the table on page 1 of this report, the reference of City "Relative to County" for absolute numbers indicates the difference between the city number and the county number. For example, the Median Age of City A being 30 and the Median Age of County B being 35 would show a relative difference of 5. For data that is a percentage, the relative difference is based on the city as a percentage of the county total.

Population

The population for each jurisdiction was based on California Department of Finance data. These are the official state population and housing estimates. The 2000 figure was based on U.S. Census figures for April 1, 2000 while subsequent years represent the city's population as of January 1 of each year.

Graphs for population based on age and race were tabulated using Census 2000 data and Claritas, Inc.

Households

The number of households for each jurisdiction was based on California Department of Finance data. The 2000 figure was based on U.S. Census figures for April 1, 2000 while subsequent years represent the city's households as of January 1 of each year.

Households by size were calculated based on Claritas, Inc. data.

Housing

Residential permits issued were obtained using Construction Industry Research Board data, which are collected by Counties from self-reporting of individual cities. The number of permits issued is reflective of all types of residential permit activity, including, but not limited to new units, replacement units due to demolition, and additions.

The median home price was calculated based on total home sales in the city, including single family units and condominiums. The median price does not reflect the entire universe of housing in the jurisdictions, only those that sold within the calendar year.

The data was compiled from Data Quick Information Systems.

Employment

Employment data is based on the California Employment Development Department (EDD) county totals and is adjusted by SCAG. SCAG adjusts the data by adding self-employed to the EDD wage and salary county totals. Due to EDD methodology, employment data is based on the location of a company's payroll and not necessarily the location of physical offices.

Retail Sales

Retail sales data is obtained from the California Board of Equalization, which does not publish individual point-of-sale data. All data is adjusted for inflation.

Education

Student enrollment data is based on public schools that are physically located within city boundaries. Data is obtained from the National Center for Education Statistics.

Choice of Data Sources

The following factors were considered in choosing the data sources used for this report:

- Available for all jurisdictions in the SCAG region
- The most recognized source on the subject
- Data sources are in the public domain
- Data available on an annual basis

The same data sources are used for all jurisdictional profiles (except where noted) to maintain overall reporting consistency. The jurisdiction is not constrained from using other data sources for their planning activities.

The preparation of this report has been financed in part through grants from the Federal Highway Administration and Federal Transit Administration, U.S. Department of Transportation, under the Metropolitan Planning Program, Section 104(f) of Title 23, U.S. Code. The contents of this report do not necessarily reflect the official views or policy of the U.S. Department of Transportation. Additional assistance was provided by the California Department of Transportation.

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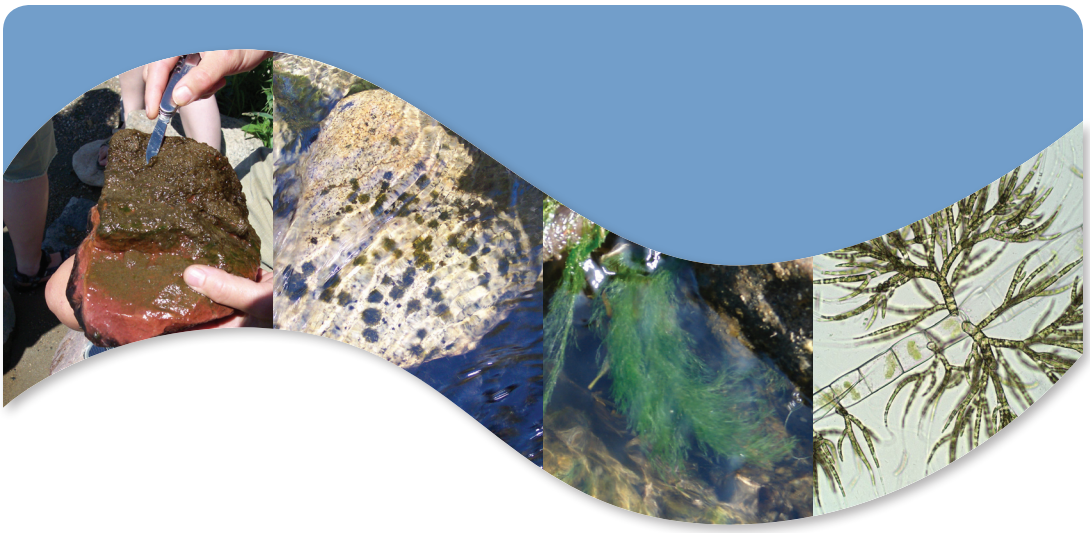

SWAMP
Surface Water Ambient Monitoring Program

SWAMP Bioassessment Procedures 2009

Standard Operating Procedures for Collecting Stream Algae Samples and Associated Physical Habitat and Chemical Data for Ambient Bioassessments in California

June 2009

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ACKNOWLEDGEMENTS A

This Standard Operating Procedures (SOP) manual represents the contributions of a wide range of researchers and field crews. The algal specimen collection methodology presented represents a modification of the U.S. Environmental Protection Agency's (EPA's) Environmental Monitoring and Assessment Program (EMAP) multihabitat sampling protocol (Peck et al. 2006). Point-intercept estimation of macroalgal cover has been adapted from the U.S. Geological Survey's (USGS's) National Water Quality Assessment (NAWQA) pilot procedures (J. Berkman, pers comm.), and assessment of microalgal thickness has been adapted from Stevenson and Rollins (2006). The physical habitat (PHab) methods are identical to those presented in the SWAMP Bioassessment protocol of Ode (2007), with the exception of the point-intercept method for determining algal cover, which is an add-on to the PHab pebble count procedure. The PHab procedures are, in turn, minor modifications of those used in EMAP and developed by EPA's Office of Research and Development (ORD, Peck et al. 2006).

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LIST OF ACRONYMS & ABBREVIATIONS L

Acronyms & Abbreviations	Definitions
AFDM	Ash-Free Dry Mass
BMI	Benthic Macroinvertebrate
chl a	Chlorophyll *a*
CPOM	Coarse Particulate Organic Matter
DO	Dissolved Oxygen
EMAP	Environmental Monitoring and Assessment Program (of the U.S. EPA)
GPS	Global Positioning System
IBI	Index of Biotic Integrity
MCM	Margin-Center-Margin
NAD	North American Datum
NAWQA	National Water Quality Assessment (of the U.S. Geological Survey)
NBO	Neutrally Buoyant Object
NNE	Nutrient Numeric Endpoints
OSPR	Office of Spill Prevention and Response (of the California Department of Fish and Game)
PHab	Physical Habitat
QAPrP	Quality Assurance Program Plan (of SWAMP)
ORD	Office of Research and Development (of the U.S. EPA)
RBP	Rapid Bioassessment Procedures
RWB	Reachwide Benthos
SOP	Standard Operating Procedures
SWAMP	Surface Water Ambient Monitoring Program
TRC	Targeted Riffle Composite

SECTION 1 INTRODUCTION

This document is the Standard Operating Procedure (SOP) for collecting and field-processing stream algae for the California State Water Resources Control Board's Surface Water Ambient Monitoring Program (SWAMP). Instructions are provided for the following:

- collection of samples for taxonomic identification of diatoms and soft-bodied algae
- collection of samples for determination of biomass based on chlorophyll *a* and ash-free dry mass (AFDM)
- estimation of percent algal cover

The document is designed to serve as a stand-alone SOP if algae are the only bioindicators being assessed at a given site. However, it can also serve as an add-on module to the existing SWAMP SOP for bioassessment using benthic macroinvertebrates (BMIs). Much of the procedure for collecting physical habitat (PHab) data is identical for these two assemblages. However, some PHab elements assessed in conjunction with BMI bioassessment are not included for algal bioassessment, because they are more specific to BMI habitat needs than to algae. Conversely, one PHab element for algal bioassessment (i.e., point-intercept estimation of algal cover) is not part of the BMI SOP. It should also be noted that, while the standard PHab protocol associated with BMI sampling includes both a "Full" and a "Basic" (simplified) version, a distinction between basic and full protocols for algae has not been established.

This SOP requires the reachwide benthos (RWB) sampling method to be used whenever algae bioassessment is conducted under the SWAMP program. Other appropriate sampling methods will be allowed if specific monitoring objectives require the use of alternative methods or if consistent data comparability in long-term monitoring projects is desired. For SWAMP funded projects, the project proponent must have the approval of the SWAMP bioassessment coordinator and the SWAMP Quality Assurance Officer before the use of alternative methods. For other projects and/or programs working towards SWAMP comparability, deviations should be approved by their project manager and project Quality Assurance (QA) officer.

For quick reference, Table 1 provides a list of elements common and distinct to the two SWAMP bioassessment assemblages. In general, if both BMIs and algae are being collected at a given site, the PHab procedure as described in Ode (2007) should be followed, with the exception of the pebble count, which should be conducted according to this SOP, because it incorporates instructions for algal cover point-intercept data collection. More specifically, if bioassessment involving the Full BMI protocol plus algae is to be implemented at a given site, practitioners should follow the Full protocol of Ode (2007), and add only Section 3.4 (re: water chemistry), Sections 4 and 5, and Sections 6.9-6.11 from this SOP.

Table 1
Sample and data collection elements included in algal and BMI bioassessment (Ode 2007).
X indicates elements included in algal bioassessment. F indicates elements that are part of the "Full" protocol for conducting BMI bioassessment, B corresponds to elements of the "Basic" BMI protocol, and O indicates elements that are "Optional".

Element	Algae[1]	BMIs
Layout of reach, marking transects, recording GPS coordinates	X	B, F
Notable field conditions	X	B, F
Temperature, pH, specific conductance, DO, alkalinity	X	B, F
Turbidity, Silica	O	O
Water chemistry for lab analysis (see list in Section 3.4)	X	
Algal Sampling for Taxonomic IDs	X	
Algal Sampling for Biomass Assessment	X	O
BMI Sampling for Taxonomic IDs		B, F
Wetted Width	X	B, F
Bankfull Dimensions	X	F
Depth and Pebble Count + CPOM	X	F
Percent Algal Cover (point-intercept with Pebble Count)	X	
Cobble Embeddedness	X	F
Canopy Cover	X	B, F
Gradient	X	B[2], F
Sinuosity		F
Human Influence	X	F
Riparian Vegetation		F
Instream Habitat		F
Bank Stability	X	B, F
Flow Habitat Delineation	X	B, F
Discharge	X	F
Photo documentation	X	B,F
Selected Rapid Bioassessment Procedure (RBP) visuals		F

1. A distinction between Basic and Full protocols for algae has not been established.
2. For BMIs, a single, reachwide measurement of gradient is required for Basic, but gradient is measured between all adjacent transect pairs for Full.

Depending upon the requirements of the monitoring effort, different components of this SOP might be incorporated or omitted. For instance, if stream productivity in terms of algae is the primary concern of the assessment, one may wish to collect only biomass samples and algal cover point-intercept data. Alternatively, one will need to collect algal assemblages (for quantification of diatom and/or soft-bodied algal taxa) in order to make more refined inferences about water quality and stream condition (e.g., by applying an algal Index of Biotic Integrity (IBI)).

This SOP is organized in such a way as to facilitate the inclusion or omission of certain elements based on the goals of the monitoring effort. A list of field supplies is provided in Appendix A. It is organized according to the materials needed for each type of sampling and data collection. In order to facilitate decisions about algal indicators to assess for program-specific needs, the introduction to Section 4 discusses what algal indicators serve which monitoring purposes.

SECTION 2 GETTING STARTED

Several considerations come into play when planning an algae-sampling effort. For instance, time of year can be an important determinant of stream algae abundance as well as the type of community likely to be encountered. Likewise, a minimum amount of surface water is a prerequisite to conducting bioassessment. The following section provides guidelines to help practitioners determine when sampling is appropriate for a given reach and also some pointers to help prepare for field work.

2.1 WHEN TO SAMPLE

It is recommended that sampling for stream algae be carried out during the same period as BMI sampling, generally from May through September, depending on the region. This time frame may eventually be modified (e.g., expanded) based on the results of ongoing index period studies.

It should be noted that high-velocity storm flows can remove macroalgae and biofilms from the stream bottom. Sampling must be done at least a month after any storm event that has generated enough stream power to mobilize cobbles and sand/silt capable of scouring stream substrates, in order to allow ample time for recolonization of scoured surfaces (Round 1991; Kelly et al. 1998; Stevenson and Bahls in Barbour et al. 1999).

2.2 BEFORE SETTING OUT FOR THE FIELD

- Proper precautions should be taken at all times in order to avoid transferring invasive organisms and pathogens between sites. This includes the implementation of effective equipment decontamination procedures. Refer to Appendix B for additional information.
- Use the equipment checklist provided in Appendix A to make sure all necessary supplies are brought along.
- Check with contract lab on sampling containers, and shipping and storage of samples.
- Have in mind at least three sites to visit per day (target two, but plan for at least one additional site as a back up if one of the first two sites is not useable.)
- Prepare, and double check, site dossiers to make sure they are complete with maps/directions to sites and scaled aerial photo(s). Bring along county maps, atlases, and Thomas Guides to further aid location of sites. Also bring along any site access permits, passes, and/or keys, as needed (and be aware that some landowners require notice prior to each site visit).

2.3 BEFORE LEAVING VEHICLE FOR SITE

Make sure the vehicle is parked in a safe spot and there are no "No Parking" signs. Stick a business card with cell phone number in the driver's window. Be sure to display the brown administrative pass placard if you are on National Forest land (or a letter of permission, if applicable).

2.4 DETERMINING WHETHER SITE IS APPROPRIATE FOR SAMPLING

Make an initial survey of the potential monitoring reach from the stream banks (being sure to not disturb the instream habitat). Ensure that there is sufficient water in the stream reach to facilitate collection of algae and water samples. In order for a reach to be in appropriate condition for sampling, at least half of the reach should have a wetted width of at least 1m, and there should be no more than 3 transects that are completely dry. If there is some flexibility in terms of where to place the sampling reach, strive for as few dry transects as possible (and preferably none).

Sites should be safe to sample and legally accessible. The time required to access the sampling sites should also be a consideration in planning which sites to visit, in order to ensure that sample holding times can be met (see Table 2 on page 11 for holding-time information).

REACH DELINEATION AND WATER CHEMISTRY SAMPLING 3

Before sample and data collection can begin, the monitoring reach must be identified and delineated. This requires setting up sampling transects along the stream reach of interest. Once the reach is delineated, information about reach location and condition will need to be documented. Water chemistry parameters must also be recorded, and certain samples collected.

A set of field forms for recording information about monitoring sites, algal samples, and associated water chemistry and PHab data is provided in Appendix C. The field forms are also available in electronic version on an portable computer. It is imperative that you confirm throughout the data collection effort at each site that all necessary data have been recorded on the field forms correctly, by double-checking values, and confirming spoken values with your field partner(s). As a general practice, you should conduct a final check across all datasheets to confirm that there are no missing values before you leave the site, and rectify any blanks. *Note: Field forms may be updated periodically. It is imperative that field crews ensure that they are always using the most current field forms. Updated forms can be accessed from the SWAMP website at: http://swamp.mpsl.mlml.calstate.edu/resources-and-downloads*

3.1 DELINEATING AND DOCUMENTING THE MONITORING REACH

To delineate the monitoring reach, you will need to scout it in its entirety in order to make sure that it is of adequate length for sampling algae. During this process, try to stay out of the channel as much as possible, to avoid disturbing the stream bottom, which could compromise the samples and data that will be collected.

SWAMP's standard algae (and BMI) sampling layout consists of a 150 m reach or a 250 m reach, depending upon the average wetted width of the channel. In some circumstances (see below), reach length can be $<$ 150 m, but this should be avoided whenever possible. If the actual reach length is other than 150 m or 250 m, this should be noted and explained on the field forms. Under these circumstances, you will need to determine the useable length of the reach, and how to space your transects so that you can fit them into the reach at equal distances from one to the next.

The wetted channel is the zone that is inundated with water and the wetted width is the distance between the sides of the channel at the point where substrates are no longer surrounded by surface water. Estimate the average wetted width of the reach. If this value is $\leq$ 10 m, you will end up using 150 m for your monitoring reach length. If the average wetted width is $>$ 10 m, you will use a 250 m long reach.

To set up the monitoring reach, begin a little outside of what you anticipate will be the outer boundary (based on aerials and maps) and count 150 large steps, or 250 large steps (for most adults, a large step is roughly equal to a meter), by walking along the bank. This will give a rough idea about the location of the ends of the study reach. However, keep in mind that once this is determined, the actual distances between transects and intertransects (and consequently, the reach length) will need to be more accurately measured.

As you go, identify where hydrologic inputs that could potentially modify the water chemistry environment occur along the length of the reach. If possible, there should be no tributaries or "end-of-pipe" outfalls feeding into the channel within the monitoring reach. Other features that should not be present within a monitoring reach are: bridge crossings (which shade the stream bottom and can artificially reduce or prevent algal growth), changes between natural and man-made (i.e., concrete) channel bottoms, waterfalls, and impoundments (dams and weirs). If any of such features occur within the reach, and there is not enough room to accommodate a 150-m reach or 250-m reach entirely upstream or downstream of such a feature, then the reach can be somewhat < 150 m. Whatever the reach length turns out to be (150 m, 250 m, or other), record it on the datasheet under "Reach Length".

3.2 MARKING THE TRANSECTS

The monitoring reach will be divided into 11 equidistant main transects that are arranged perpendicularly to the direction of flow. There will also be 10 additional transects (designated "inter-transects"), one between each pair of adjacent main transects, to give a total of 21 transects per monitoring reach. Main transects are designated "A" through "K", while inter-transects are designated by their nearest upstream and downstream main transects ("AB", "BC", etc.).

Once you have identified the upper and lower limits of the monitoring reach, determine the coordinates of the downstream end using a Global Positioning System (GPS) set to the North American Datum 1983 (NAD 83)[3], and record this information in decimal degrees (to five decimal places) on the datasheet under "Reach Documentation". Install a colored flag at water's edge on one of the banks at this location to indicate the first "main transect", or "A". Establish the positions of the remaining transects and inter-transects by heading along the entire length of the monitoring reach (again, staying out of the water/channel as much as possible) and using the transect tape or a segment of rope of appropriate length to measure off successive segments of 7.5 m (for streams of wetted width ≤ 10 m), or 12.5 m (for streams > 10 m wetted width). For monitoring reaches of non-standard length, you will divide the total, targeted length of the reach by 20 to derive the distance between the adjacent main, and inter-, transects. As you measure off the distances, always follow the virtual, mid-channel line, and not the water's edge (which may be irregular, and not reflective of the true stream curvilinear distance).

3. Be aware that some GPS units re-set themselves to factory default settings when the batteries are changed. This can include the datum. Therefore, anytime you remove batteries from your unit, double check that the unit is still set to the NAD83 datum after the batteries have been replaced.

At the end of each measured segment as you head along the stream, mark the transect location on the bank with a flag. We recommend alternating between two different flag colors (e.g., orange could correspond to main transects, and yellow to inter-transects). Determine transect orientations, and where on the banks to place the flags, by visually projecting perpendicularly from the mid-channel to the banks. Refer to Figure 1 for a visual representation of proper transect alignment relative to the stream's direction of flow. When you have finished, the downstream-most flag will correspond to main transect "A", and the upstream-most flag (the 21st in the entire series of main and inter- transects) will correspond to main transect "K".

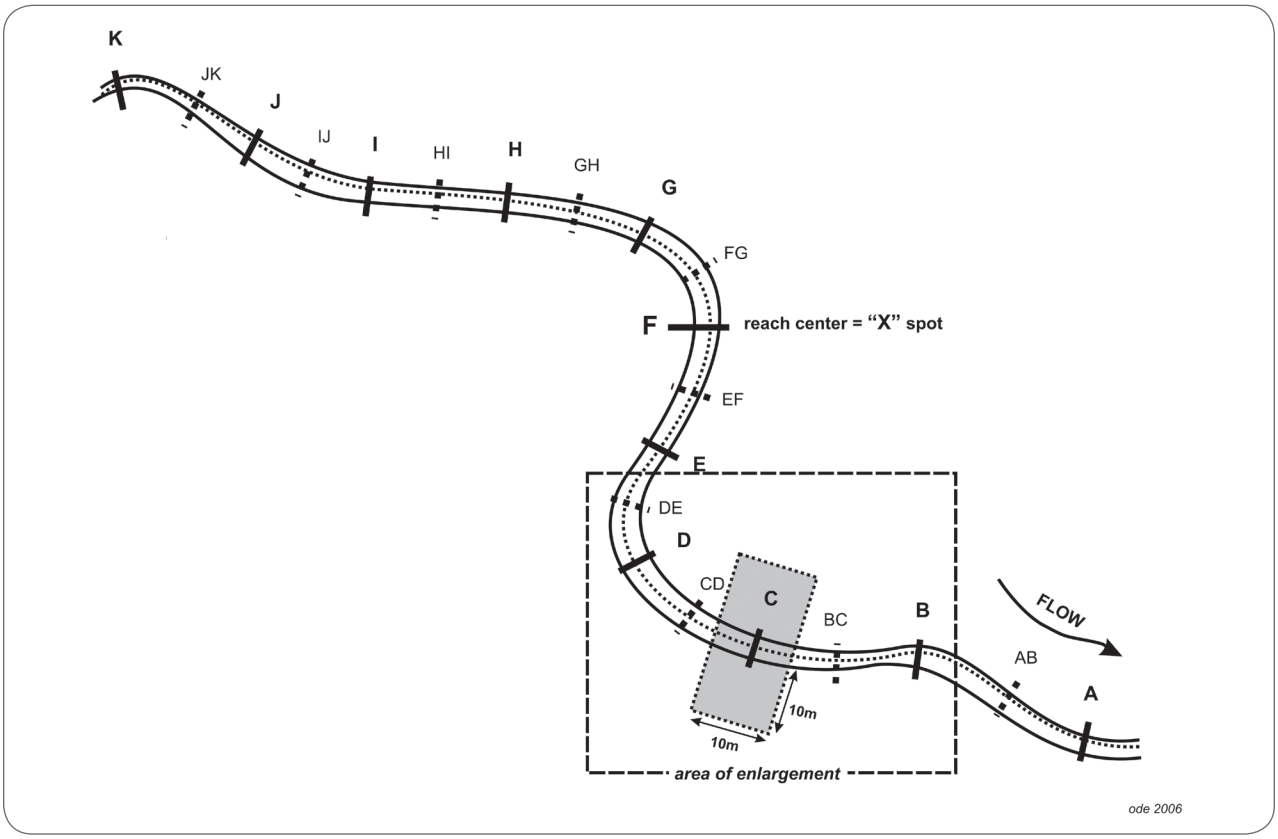

Figure 1. Reach layout geometry for physical habitat (PHab) and biological sampling showing positions of 11 main transects (A-K) and the 10 supplemental inter-transects (AB-JK). The area highlighted in the figure is expanded in Figure 11. Note: reach length = 150 m for streams ≤ 10 m average wetted width, and reach length = 250 m for streams > 10 m average wetted width (reprinted from Ode 2007).

3.3 NOTABLE FIELD CONDITIONS

Record under "Notable Field Conditions" any evidence of recent flooding, fire, or other disturbances that might influence algae samples. Especially note if flow conditions have been affected by recent rainfall, which can cause significant under-sampling of algal biomass and diversity. If you are unaware of recent fire or rainfall events, select the "no" option on the forms. Record the dominant land use and land cover in the area surrounding the reach by evaluating land cover within 50 m of either side of the stream reach. You can

use a scaled aerial photograph of the site and vicinity to guide you. *Note: Before heading out to the field, it is convenient to add a 150 m (or 250 m) line adjacent the stream to be sampled in order to get an idea about the anticipated approximate upstream and downstream boundaries of the monitoring reach.*

3.4 WATER CHEMISTRY

Measure and record common ambient water chemistry measurements (pH, dissolved oxygen (DO), specific conductance, alkalinity, and water temperature) just outside of the reach, at the downstream end, near the same location that the GPS coordinates were taken. This should be done in such a way that it does not interfere with biotic sampling and PHab data collection, but also in such a way that water samples are not compromised by other sampling activities upstream (e.g., by suspension of matter from the stream bottom into the water column, and consequently the introduction of this matter into the water chemistry samples).

Water chemistry measurements are typically taken with a handheld, water-quality meter (e.g., YSI, Hydrolab), but field test kits (e.g., Hach) can provide acceptable information if they are properly calibrated. For appropriate calibration methods, calibration frequency, and accuracy checks, consult the current SWAMP Quality Assurance Program Plan (QAPrP)[4], or follow manufacturer's guidelines. *Note 1: If characteristics of the site prohibit downstream entry, measurements may be taken at other points in the reach. In all cases, ambient chemistry measurements should be taken at the start of the survey (i.e., before algae sampling and PHab data collection). Note 2: A digital titrator (e.g., Hach) using low-concentration acid (such as 0.16N H_2SO_4) as the titrant is recommended for determining alkalinity in low-alkalinity streams (i.e., approximately 100 mg/L $CaCO_3$ or less).*

A suite of analytes must also be evaluated to aid in interpretation of the algal data. These are listed below. Consult the SWAMP QAPrP for specific instructions on the proper techniques for collecting, preserving, and storing these water samples until analysis.

- Nitrate as N (NO_3)
- Nitrite as N (NO_2)
- Ammonia as N (NH_3)
- Nitrogen, Total (TN)[5]
- Orthophosphate as P (dissolved; SRP)
- Phosphorous, Total (TPHOS)
- Dissolved Organic Carbon (DOC)
- Chloride (Cl)

- Silica as SiO_2, dissolved (Note: this analyte is recommended for research purposes, but is not part of the standard algae protocol)

4. This document is available online from the SWAMP website: http://www.swrcb.ca.gov/water_issues/programs/swamp/docs/qapp/swamp_qapp_master090108a.pdf
5. Total Nitrogen can be calculated from Total Kjeldahl Nitrogen (TKN), Nitrate (NO_3) and Nitrite (NO_2)

SECTION 4
REACHWIDE BENTHOS SAMPLING OF ALGAE

The following is a short introduction of several types of algal indicators that can be monitored as part of a bioassessment effort. For a more detailed discussion, see Fetscher and McLaughlin (2008). The most appropriate indicators to include in a given program will ultimately depend upon that program's goals, because the various indicators provide information at varying levels of resolution and applicability to different uses. Likewise, the various indicators require different levels of investment in terms of field work and lab work. Percent algal cover, for instance, is a rapid means of estimating algal primary productivity that can be carried out entirely in the field and is conducted in tandem with the PHab pebble count. Therefore, percent algal cover is an appropriate, fast, and inexpensive parameter for citizen monitoring groups if they are concerned about increased algal biomass. Other estimators of algal biomass include chlorophyll *a* and AFDM, which involve quantitative collection of algae, preservation, and subsequent laboratory analysis. Algal biomass is a key component of the California Nutrient Numeric Endpoints (NNE) framework. Higher resolution information about algal assemblages can be used in algal IBIs, and offers more in-depth insight into water quality. For this type of data, algal specimens must be collected quantitatively (and qualitatively, in the case of soft-bodied algae). The quantitative samples are then fixed/preserved carefully and subjected to taxonomic analysis.

While the percent algal cover data are recorded in conjunction with standard PHab procedures, and do not require the collection of samples, all the other types of data described in this protocol require reachwide benthos (RWB) sampling of algal specimens in a manner analogous to that which is carried out for BMIs.

All four of the algal samples described in this SOP: chlorophyll *a*, AFDM, diatom assemblage, and soft-bodied algal assemblage, can be obtained from a single composite sample generated by the RWB method. Which combination of these samples to prepare and submit for laboratory processing will depend on the needs of the monitoring program. To aid in the selection of algal indicators, Table 2 provides a summary of their attributes.

Table 2
Types of algal indicators and considerations for their assessment.

	Algal indicator for	Collection method	Collection vessel	Preservation/fixation methods and holding times	Qualitative live sample required?
Percent algal cover	Stream productivity measured as algal abundance	Point-intercept add-on to the PHab pebble count	N/A	N/A	N/A
Chlorophyll a[6]	Stream productivity measured as algal biomass; key indicator for the Nutrient Numeric Endpoints (NNE) framework	RWB sample collection	Glass-fiber filter	Wet ice, dark (foil-wrapped); freezing within 4h, and analysis within 28d	N/A
AFDM	Stream productivity measured as biomass of organic matter (including algae); indicator for the NNE framework	RWB sample collection	Glass-fiber filter (pre-combusted[7])	Wet ice, dark (foil-wrapped); freezing within 4h, and analysis within 28d	N/A
Diatoms	Used in IBIs. Indicative of factors such as trophic status; organic enrichment; low DO; siltation; pH; metals	RWB sample collection	50 mL centrifuge tube	Add 10% buffered formalin for a 2% final concentration immediately after collection; keep dark and away from heat	Optional
Soft-bodied algae[8]	Used in IBIs. Indicative of factors such as nitrogen limitation/ trophic status; siltation; pH; temperature, light availability, nuisance/ toxic algal blooms	RWB sample collection	50 mL centrifuge tube	Keep unfixed samples in dark on wet (NOT DRY) ice; add glutaraldehyde (to a 2.5% final concentration) as soon as possible, but no later than 4 days after sampling; after fixing, keep dark and away from heat	Required

6. It is valuable to assess both chlorophyll *a* and phaeophytin *a* (the degradation product of the former) content of algal samples, as this may provide a more robust assessment of algal biomass.
7. Precombustion is recommended in order to remove any possible residual organic matter from the filter.
8. For the purposes of this SOP, the soft-bodied assemblage includes cyanobacteria (an explanation of the rationale for this is provided in Fetscher and McLaughlin 2008)

4.1 GENERAL CONSIDERATIONS FOR SAMPLING ALGAE

This SOP describes the RWB method for collecting stream algae. It employs an objective approach for selecting sub-sampling locations that is built upon the 11 main transects described in the previous section. This approach is analogous to the SWAMP procedure for BMI sampling (Ode 2007), and is ultimately based on EPA's Environmental Monitoring and Assessment Program (EMAP; Peck et al. 2006). After collection, the 11 sub-samples are composited into a single sample per site (sampling reach).

The RWB method can be used to sample any wadeable stream reach since it does not target specific habitats. Because sampling locations are defined by the transect layout, the position of individual sub-sampling spots may fall within a variety of "erosional[9]" or "depositional[10]" habitats, each of which has implications for the type of substrate likely to be encountered and therefore the type of sampling device to use.

For the RWB method, the sub-sampling position alternates between left, center, and right portions of the transects, as one proceeds upstream from one transect to the next. These sampling locations are defined as the points at 25% ("left[11]"), 50% ("center") and 75% ("right") of the wetted width in high-gradient systems, and at "margin-center-margin" (MCM) positions in low-gradient systems. The RWB-MCM method should be only used in low-gradient streams where channel substrates are nearly uniform, resulting in low diversity within the channel. The interim cut-off between "low" and "high" gradient is 1%. Best professional judgment can be used to estimate whether the stream reach should be treated as low- or high-gradient. However, if there is uncertainty about the gradient, it should be measured prior to collecting the biotic assemblage samples. See Section 4.2 for specific instructions about where algae sampling locations should be positioned at the margins of low-gradient sampling reaches.

Algae should be sampled prior to PHab data collection (described in Sections 6-8), so as not to disturb the algae by trampling the transects, as occurs during the PHab process. Furthermore, to avoid disturbing the transects for eventual collection of PHab data, as with BMIs, algae should be collected at a location that is systematically offset from each transect (see Section 4.2).

4.2 COLLECTION OF ALGAE IN CONJUNCTION WITH BENTHIC MACROINVERTEBRATES

If only algae (or only BMIs) are being collected for bioassessment, then the specimens should be collected 1m downstream of the transects. If both assemblages are being sampled, then the algae should be collected upstream of the spot where the BMIs are collected, according to the schematic in Figure 2. BMIs must be collected BEFORE algae at each of the transects, in order to minimize the chances disturbing BMIs during algal collection. After the BMIs are collected at each spot, the algae sample should be taken ¼ m upstream

9. Erosional – habitats in the stream that are dominated by fast-moving water, such as riffles, where stream power is more likely to facilitate erosion (suspension) of loose benthic material than deposition; examples of "erosional" substrates include cobbles and boulders.
10. Depositional – habitats in the stream that are dominated by slow-moving water, such as pools, where deposition of materials from the water column is more likely to occur than erosion (or (re)suspension) of bed materials; examples of "depositional" substrates include silt and sand.
11. For our purposes, "left" is defined as the left bank when facing downstream.

from the center of the upper edge of the "scar" in the stream bottom left from the BMI sampling. It is important to make sure that the surface from which algae will be collected has not been disturbed (by the BMI sampling, or otherwise) prior to sampling the algae.

Note: If only algae (and not BMIs) are being collected in a low-gradient reach, the collection location should be 1 m downstream of the transect and, for each of the "margin" positions, at a distance of 15 cm from the wetted margin of the bank. Fifteen centimeters is chosen because it is approximately ½ the width of a D-frame net.

If duplicates are to be sampled (of either or both assemblages), locations for sampling them should be arranged as depicted in Figure 2 (the duplicates are shown in light grey). *Note: For convenience, only Transects A through C are shown, but the same pattern of placement should be rotated across all 11 transects.*

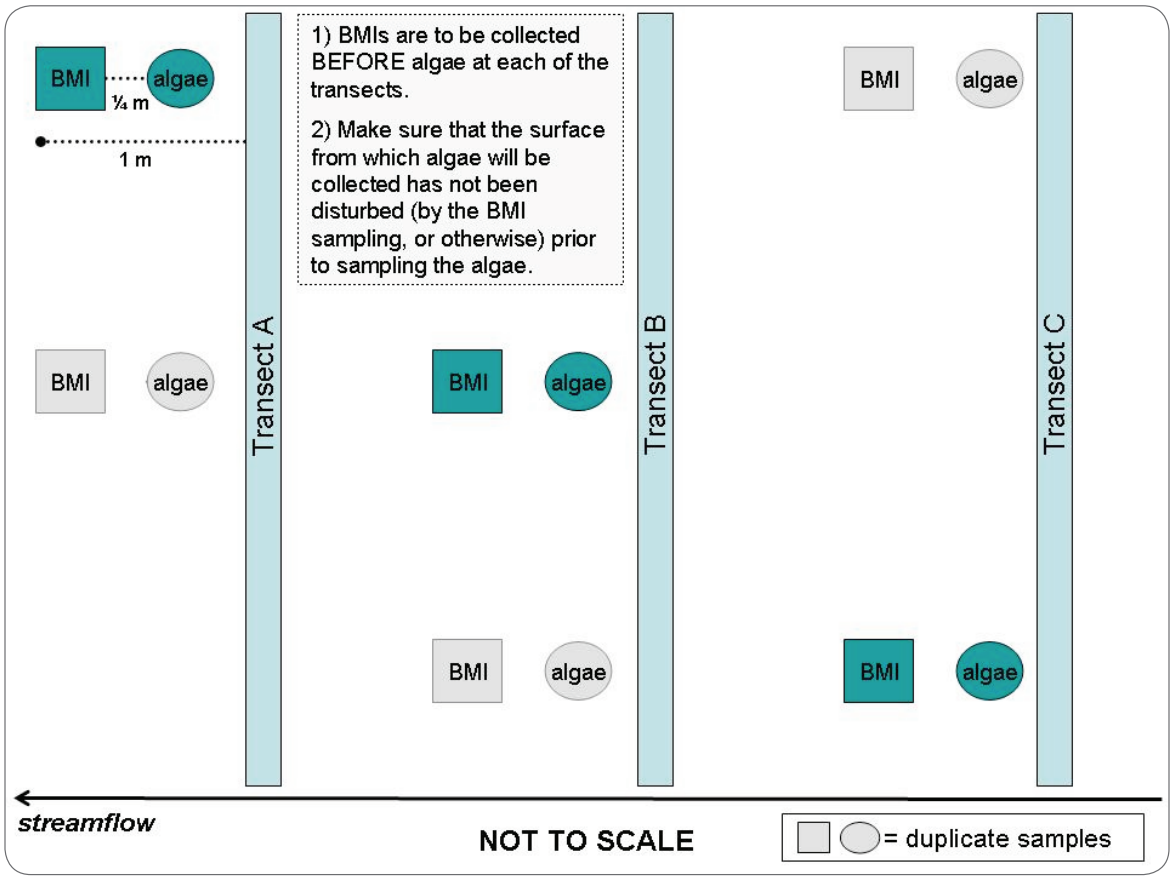

Figure 2. Sampling array for collection of algae, BMIs, and duplicates of each assemblage. For convenience, only Transects A through C are shown, but the same pattern of placement should be rotated across all 11 transects.

4.3 PROCEDURE FOR COLLECTION OF QUANTITATIVE ALGAL SAMPLES

During all phases of algae sampling and processing, in order to preserve specimen integrity, every attempt should be made to keep the sample material out of the sun, and in general, to protect the algae from heat and desiccation, as much as possible. This is necessary in order to reduce the risk of chlorophyll *a* degradation, limit cell division post-collection, and curb senescence/decay of live soft-bodied algae (especially for the qualitative samples; see Section 5.4). The need to maintain the integrity of the algal samples during collection and processing should always be borne in mind when planning the sampling scheme for a given site.

In addition, before sampling at any given site, the dish tub that will contain sample material must be scrubbed with a stiff-bristled brush or scouring pad and thoroughly rinsed with stream water, so that no algal material is carried over from the previous site to contaminate the current sample. The same applies to all other algae sampling apparati (toothbrushes for scrubbing, graduated cylinders, turkey basters, PVC and rubber delimiters, spatulas, syringe scrubbers, etc.).

4.3.1 Identifying the Sampling Locations

As with BMIs, algae sample collection should begin at Transect A and proceed upstream to Transect K. Except in circumstances in which the substrate to be sampled cannot be removed from the stream, a single sample of substrate material that corresponds to the objectively determined sampling point is gathered at each transect and placed in the plastic dish tub. The sample should always be collected from the substrate that is "uppermost" within the stream, and therefore has the highest probability of exposure to sun. For example, if at a given sampling point there is a thick layer of macroalgae above the stream bottom, the substrate collected at that point would be macroalgae itself, not the cobble, sand, or whatever other substrate lies beneath it. Proceeding from transect to transect with the dish tub, the sample collector rotates through the three collection positions in the following order: left at the first transect ("A"), center at the next transect ("B"), right at the next transect ("C"), then back to the left side ("D"), and so on through Transect K.

As substrates are gathered, a tally is taken of the number of samples that correspond to each of the classes of sampling device based on the surface area they sample: 1) 12.6 cm^2 for the PVC or rubber delimiters, and 2) 5.3 cm^2 for the syringe scrubber. The tallies are recorded in the Algae Samples field form under Collection Device. This information will ultimately be used to determine total stream surface area sampled at each site, which in turn will be used to calculate the soft-bodied algal biovolume and the biomass values. It may be helpful to use a tally meter in order to avoid having to carry a datasheet during substrate collection.

4.3.2 Collecting Erosional Substrates

If the substrate type that falls under the sampling spot is in erosional habitat and can be removed from the stream (e.g., a cobble, a piece of wood, or a piece of coarse gravel with an exposed surface area of at least 12.6 cm^2), carefully lift the substrate, moving slowly in an effort to disturb its top surface as minimally as

possible, and remove it from the stream. Then wipe any excess sand, silt, or BMIs, if present, off the bottom of the piece of substrate, and place it in the dish tub. It is helpful to place the substrate in such a way that makes it obvious what surface was facing upward when it was removed from the stream. Eventually, when you isolate a sample of algae from this substrate, you will want to obtain your sample from the portion of the substrate that had been exposed to the surface of the stream (and not buried) during the period leading up to the sampling event. For pieces of substrate with an exposed surface area that is $< 12.6\ cm^2$, the PVC delimiter should be used (Section 4.3.3).

Be sure to place the substrate (e.g., cobble) in the dish tub in such a way that surfaces covered with non-target algae are not rubbing against anything, which could cause non-target algae to slough off into the tub, thus artificially inflating the amount of algae collected. To avoid this problem, and especially if a large number of cobbles are likely to be sampled across a given stream reach, one may choose to isolate the algal specimen from each cobble as it is selected, rather than collecting all the cobbles into the dish tub and then isolating the algal specimens from them after all transects have been sampled. See Section 4.3.9 for further elaboration on this alternative approach.

Figure 3. PVC Delimiter

4.3.3 Collecting Depositional Substrates

If the substrate type that falls under the sampling spot is removable and is in depositional habitat (e.g., silt, sand, fine gravel), and/or has an exposed surface area per particle that is $< 12.6\ cm^2$, you will use a PVC delimiter. This is a plastic coring device with an internal diameter of 4 cm (Figure 3). Instructions for making a PVC delimiter are provided in Appendix D.

Isolate a specific quantity of sand/silt/gravel, centered on the sampling spot, by pressing into the top 1 cm of sediment with a PVC delimiter. Gently slide a masonry or kitchen spatula beneath the delimiter, being careful to keep the collected sediment contained within. Pull the PVC delimiter out of the water (with the spatula still in place) and remove any extra sediment from the spatula around the outside of the delimiter. Transfer the contents held in the delimiter by the spatula to the dish tub. Be sure not to pour the sediment sample on top of any cobbles that may be in the dish tub, as this could result in the sloughing of non-target algae from the cobbles into the dish tub, thus artificially inflating the amount of algae collected.

4.3.4 Collecting Sections of Macroalgae

If the substrate you hit on a given transect is a mass of macroalgae (e.g., a mass of attached filamentous algae underwater, or an unattached, floating mat that is believed to be native to the reach being sampled, and not imported from upstream), position the spatula directly under the macroalgae and press the PVC delimiter into the algae to define a $12.6\ cm^2$ area. Use a sharp razor blade or knife to cut away and discard any extra material from around the edges of the delimiter (do not simply pull it away, as this will distort the specimen and remove biomass from the targeted material). Add the macroalgal specimen that was isolated by the PVC delimiter to the dish tub.

When collecting a mass/mat of macroalgae, it is important to capture the full thickness of the macroalgae within the delimiter. To do this, from the side of the sampling area, slide your hand under the mat to feel where the bottom is, slide the spatula down to that spot, and then press the PVC delimiter downward slowly to "sandwich" the targeted section of macroalgae between the delimiter and the spatula. It is important to try not to bunch the macroalgae up nor stretch it out unnaturally, as the goal is to collect a representative sample of the algae as it occurs in the stream.

4.3.5 Collecting Sections of Macrophytes

If the substrate to be sampled is part of an immersed macrophyte, or old, dead leaves settled at the bottom of a pool, use the PVC delimiter/spatula combination to isolate a 12.6 cm^2 section of substrate that has been exposed to the surface of the stream. As with the macroalgae (Section 4.3.4), cut away and discard the extra material that falls outside the delimiter using a razor blade.

Figure 4. Syringe Scrubber

4.3.6 Collecting from Concrete, Bedrock, and Boulders

If the substrate falling under a sampling spot cannot be removed from the water (as in the case of bedrock, a boulder, or a concrete channel bottom), use a "syringe scrubber" device (Davies and Gee 1993; Figure 4) to collect an algae sample underwater. Instructions for making a syringe scrubber are provided in Appendix D.

To use this device, affix a fresh, white scrubbing pad circle onto the bottom of the syringe plunger using the Velcro® hooks on the end of the plunger. Press the plunger down so that the bottom of the scrubbing pad is flush with the bottom of the barrel. Then submerge the instrument, press the syringe firmly against the substrate, and rotate the syringe scrubber 3 times in order to collect the biofilm from the substrate surface onto the scrubbing pad. If the surface of the substrate where your sampling point fell is not flat enough to allow for a tight seal with the syringe barrel, objectively choose whatever sufficiently flat area on the exposed face of the substrate is closest to where the original point fell, and sample there.

After sampling, and before removing the syringe scrubber from the substrate, gently retract the plunger just slightly, so it is not up against the substrate anymore, but not so much that it pulls a lot of water into the barrel. Carefully slide the spatula under syringe barrel (which should be pulled just slightly away from the substrate on one side to allow the spatula to slide under), trying not to allow too much water to rush into the barrel. Then pull the instrument back up out of the water with the spatula still firmly sealed against the syringe-barrel bottom.

Hold the syringe scrubber over the dish tub and then remove the spatula, allowing any water to fall into the tub. Carefully detach the pad from the plunger and hold the pad over the tub. Using rinse water sparingly, remove as much algal material from the pad as possible by rinsing it off with the wash bottle, or a turkey baster, filled with stream water (from the current site—never carried over from a previous site), and

wringing it into the dish tub before discarding the used pad. Start this process by rinsing from the backside of the pad (the side that had been affixed to the plunger) to "push" the collected algae forward out of the front surface of the pad.

It is recommended that a fresh (new) pad be used each time a sample is collected, even within the same stream reach. Under no circumstances should the same pad be used at more than one site.

4.3.7 Collecting from Other Substrate Types

If other substrate types are encountered, they can be sampled from as long as there is good reason to believe that they were not recently introduced into the stream (e.g., by flowing from the upstream regions, or by recently falling into the stream), as they would then not be representative of the local instream environment. Use the collection instrument you deem to be most appropriate to sample the substrate and, as with any substrate, be sure to account for the surface area sampled (in this case, using the "Other" box on the Collection Device portion of the field forms).

4.3.8 Removal of Algae from Collected Substrates

After having sub-sampled substrates across the monitoring reach, there should be 11 transects' worth of material in the dish tub. Depending on the types of habitats in the stream and substrates encountered, the tub may contain cobbles, and/or sand, and/or gravel, and/or small pieces of wood, macroalgae, or macrophyte. Now a measured quantity of the algae clinging to these substrates must be removed and suspended in water to form a "composite sample" according to the instructions in the following sections.

For erosional substrate types that were removed from the stream (e.g., cobbles and small pieces of wood), use a rubber delimiter to isolate a 12.6 cm^2 area from which algae will be removed. A rubber delimiter can be made from a mountain bike tire with a hole cut out and reinforced with an appropriately sized rubber washer (Figure 5). Appendix D describes the procedure for making a rubber delimiter.

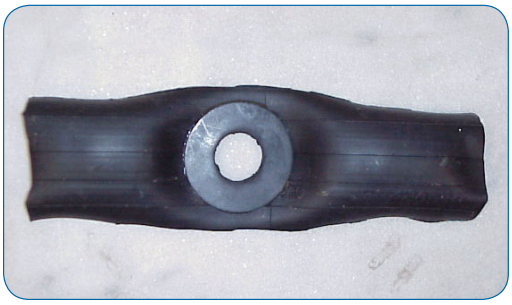

Figure 5. Rubber Delimiter

Wrap the rubber delimiter around the substrate to expose the desired sampling surface through the hole. Take care to ensure that the surface that will be scrubbed is truly the upper (generally at least somewhat "slimy") surface of the substrate as it had been oriented in the stream. Dislodge attached algae from this area by brushing it with a firm-bristled toothbrush (remember that this toothbrush must first have been thoroughly rinsed since the previous site to avoid contamination with algal specimens from other streams). If there is a thick mat of algae, or the algae is firmly encrusted on the surface of the substrate, use forceps or a razor blade first to dislodge the larger matter and put this in the dish tub. Then scrub the area with the brush.

Make sure that the entire surface within the delimiter has been scrubbed well in order to remove all the algae in that area. Fill a wash bottle or turkey baster with stream water from the current site (never carried over from a previous stream). Using as minimal a volume of water as possible, rinse the scrubbed algae from the sample area into the dish tub. Take care to squirt water only on the surface that is showing through the hole in the delimiter, and not anywhere else on the substrate's surface. It is helpful to invert the rock when rinsing so that the target surface is facing down toward the dish tub, and the rinsate drips off the sampling spot directly into the tub rather than flowing along the (non-target) sides of the substrate. Use water sparingly for each piece of substrate, because you should attempt to use no more than 400-500 mL total for the full suite of 11 samples collected along the transects (this includes any water used for rinsing algae off of sampling devices into the dish tub). After scrubbing is complete, rinse the delimiter and the brush into the dish tub, also. The scrubbed part of the substrate should feel relatively rough when you have finished, meaning that essentially all of the algae have been removed. After the sampling area on the piece of substrate has been thoroughly scrubbed and rinsed, the piece of substrate can be returned to the stream.

For depositional samples (e.g., silt, sand, or gravel), there is no need to isolate a specific area of the substrate within the dish tub, because the sample area was pre-isolated by using the PVC delimiter during collection. Simply massage all the sand and/or silt in the dish tub thoroughly between the fingers to dislodge any clinging algae. For pieces of gravel, use a toothbrush to remove algal material from surfaces.

Rinse the sediment thoroughly (but as sparingly as possible) with stream water so as to create a suspension of the dislodged microalgae (i.e., the sample). The final volume of the sample liquid in the dish tub will be measured before the algal taxonomic and biomass samples are prepared (described below). To do this, the liquid in the tub will be separated from the rinsed sediment such that the volume measured does not include sediment. After the liquid sample has been retrieved and measured, the rinsed sediment will be discarded back into the stream.

Other types of substrate, like pieces of macrophyte or dead leaves that had been collected with the PVC delimiter, should also be massaged between the fingers and rinsed into the tub in order to remove the algae coating them.

For macroalgal clumps there is a special step required for processing the samples. This procedure is described in detail in Section 5.3.

4.3.9 Alternative Approach: Processing Samples at Each Transect

It is also acceptable to isolate the algal specimens from each "piece" of substrate collected before moving on to the next transect. This approach has the disadvantage of requiring that all algae sampling/scraping tools be carried along with the collector as s/he proceeds up the stream, and that s/he pause to isolate the algae several times across the stream reach rather than one time at the end of all the transects. However, it limits the amount of substrate material that needs to be carried in the dish tub, thus making it lighter. This could be particularly important if a large number of cobbles are encountered across sampling points, such that it

could be difficult or impossible to carry them all to Transect K, or to carry them in such a way that non-target algae can easily be prevented from sloughing off into the tub via abrasion. For convenience, one may elect to wear a fisherman's vest to facilitate carrying all the algae sampling/scraping tools that will need to be brought along on the substrate sampling trip if employing this alternative approach.

SECTION 5
ALGAL SAMPLE PROCESSING

Four different types of laboratory samples may be prepared from the composite sample:

- Identification/Enumeration Samples
  1. Diatoms
  2. Soft-bodied algae
- Biomass Samples
  3. Chlorophyll *a* ("chl *a*")
  4. Ash-free dry mass ("AFDM")

5.1 GENERAL CONSIDERATIONS FOR PROCESSING ALGAL SAMPLES

The general process for sample preparation is as follows. The Identification/enumeration samples are each aliquoted into 50-mL centrifuge tubes and chemically fixed (preserved). Diatom samples are fixed in the field with formalin immediately following collection, and soft-bodied algae samples are fixed in a laboratory with glutaraldehyde within four days of collection. The chlorophyll *a* and AFDM samples are collected on filters in the field and stored on wet ice, and then frozen as soon as possible after returning from the field (and within four hours of collection). The filters are kept frozen until analysis, which should occur within 28 days of collection. If the field crew is spending the night in a hotel, it is necessary to buy dry ice to freeze the biomass filters upon finishing the day's fieldwork, and to keep them on dry ice until the samples can be transferred to the freezer back at the lab.

Algae sample labels are shown in Figure 6. Recorded on each sample label are the volume of the composite sample (described in Sections 5.2.1 and 5.3.2), and the TOTAL area of stream bottom sampled (based on which sampling devices were used; described in Sections 4.3.2 - 4.3.7), as well as the volume of sample aliquoted (for the taxonomic ID samples) or filtered (for the chlorophyll *a* and ADFM samples). All of these values should be recorded on the field forms, as well, under the Algae Samples section. On the sample labels, the sample type: "chl *a*", "AFDM", "diatoms", or "soft" is circled, and all the remaining information on each label, like Site Code, Date, and site coordinates is filled out.

Latitude: N_____W_____ circle one: NAD27 NAD83
Longitude: N_____W_____
Stream Name: _____
Site Name/ Code: _____County: ___
Composite mL: _____ Area Sampled: _____cm^2
Rep #: ___ mL: ____ Date: _____ Time:_____
Collector: _____ Sample: circle one: chl *a* AFDM

Latitude: N_____W_____ circle one: NAD27 NAD83
Longitude: N_____W_____
Stream Name: _____
Site Name/ Code: _____County: ___
Composite mL: _____ Area Sampled: _____cm^2
Rep #: ___ mL: ____ Date: _____ Time:_____
Collector: _____ Sample: circle one: diatoms soft

Figure 6. Labels for biomass and taxonomic identification samples.

Before preparing the algae samples it is necessary to determine two things:

- Are there any clumps of macroalgae in the composite sample (as opposed to just microalgae suspended in liquid)?

AND

- Is a soft-bodied algal taxonomic sample going to be prepared?

The answers to these questions will determine the course of action for preparing the algae samples for a given site:

- If there is no macroalgal clump, liquid composite sample will simply be added to each taxonomic ID sample tube (40 mL for diatoms and 45 mL for soft-bodied algae). Biomass samples will also be prepared using the liquid composite sample, as is.
- If there is a macroalgal clump present, but no soft-bodied sample will be prepared, the entire clump will be chopped into fine bits (resulting in strands that are eyelash-length or shorter) and incorporated directly into the liquid portion of the composite sample, and the mixture will be shaken to homogenize it before preparing the diatom and/or biomass samples.
- If there is a macroalgal clump AND a soft-bodied algal taxonomic ID sample is to be prepared, then a more complex procedure must be employed in order to properly process the macroalgae before preparing the various samples.

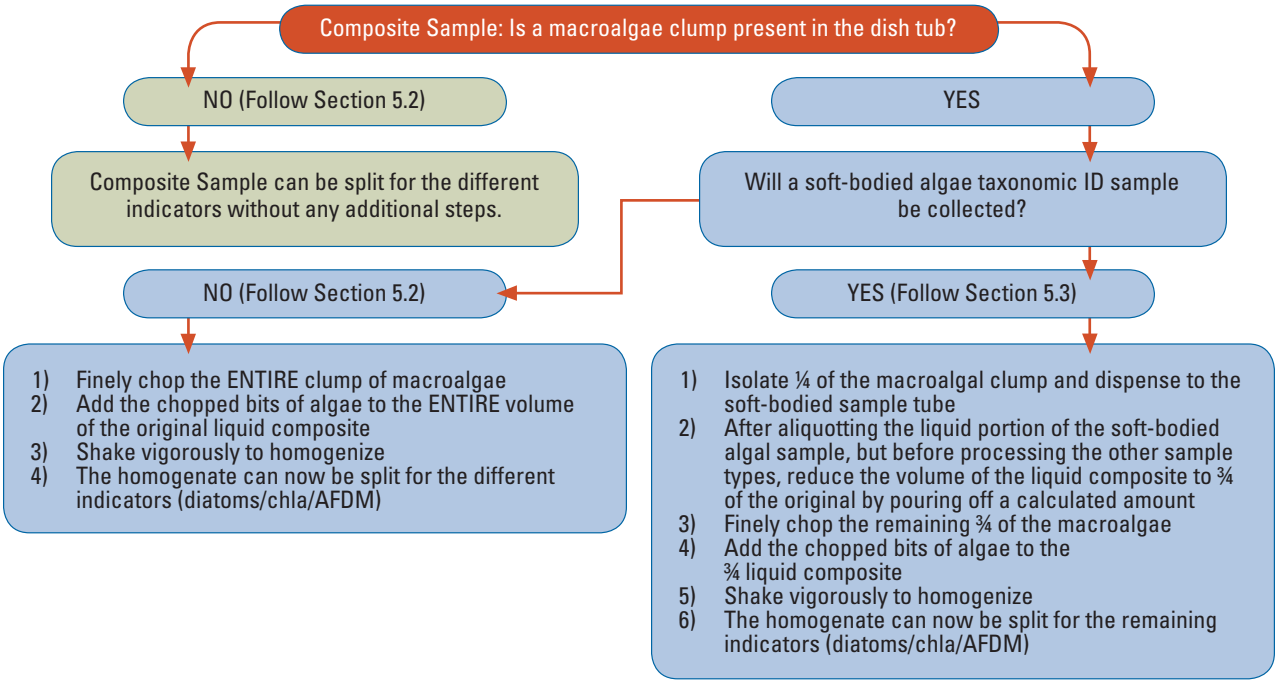

Figure 7. Summary of major sample-processing decision points based on presence of macroalgal clump(s) and need to prepare soft-bodied algal samples.

Figure 7 provides a summary of the various sample-processing steps that are involved, and the following sections describe the procedures in detail. Use Section 5.2. if there is NO macroalgal clump present in the dish tub OR a soft-bodied algal sample will be NOT be prepared. Use Section 5.3 if there IS a macroalgal clump present AND a soft-bodied algal sample will be prepared.

5.2 SAMPLE PROCESSING WHEN THERE IS NO MACROALGAL CLUMP OR WHEN NO SOFT-BODIED SAMPLE IS BEING PREPARED

This section describes the sample-processing procedure for the situation in which there was either 1) no macroalgal clump in the dish tub containing the composite sample material, or 2) no soft-bodied algal sample will be prepared. If there was no macroalgal clump but both soft bodied algae AND other sample types are to be prepared, follow all the instruction in this section with the exception of the final portion of Section 5.2.1 that is italicized and in orange font, and discusses how to process macroalgae when preparing only diatom and/or biomass samples.

If there is a macroalgal clump, but no soft-bodied algae sample is to be collected, follow the instructions in this section, including the final, italicized portion of Section 5.2.1, and skip Section 5.2.2, which deals with soft-bodied algal sample processing.

5.2.1 Measuring the Composite Liquid Volume

Once algal specimens have been removed from all the substrates (e.g., sand, gravel, cobble, wood, leaves) in the dish tub, according to the procedure described in Section 4, thoroughly agitate the liquid to get as much as possible of the microalgae into suspension, and then immediately pour the liquid into a CLEAN graduated cylinder to measure its volume. Try to leave all substrate material (e.g., silt, sand) behind. Transfer the measured liquid into a CLEAN 1L plastic bottle. Using a minimal amount of stream water, rinse the substrate once or twice with stream water until it appears that little to no additional suspended material (microalgae) is coming off. Add this rinsate to the graduated cylinder to measure it also. If necessary, repeat this process (regularly agitating the dish tub) until all the liquid has been measured and transferred to the sample bottle. Use water sparingly, because the total sample volume (plus rinsate) should be no more than about 400-500 mL.

Because you are leaving as much as possible of the silt, sand, and any large substrate material behind, the final volume should reflect only the liquid component of the sample plus rinse water. Record the total volume of all the liquid that had been in the dish tub, including any that was used for rinsing the substrates and sampling devices, on the field sheet under the Algae Samples section. This is the COMPOSITE VOLUME. This value will also be recorded on all algae sample labels (i.e., for the diatom and soft-bodied algae taxonomic ID samples, the chlorophyll *a*, and the AFDM).

Note: If no soft-bodied algae sample is to be prepared, but there is a macroalgal clump in the sample, separate the clump from the liquid portion of the sample, measure and record the composite volume of the liquid (as described above), then cut the macroalgal clump into very fine pieces (resulting in strands that are eyelash-length or shorter) with CLEAN scissors and add these pieces to the composite liquid. The pieces should be chopped small enough so that they practically "blend" into the liquid (i.e., distinct fragments of macroalgae are not easily discernible), because the goal is to "homogenize" the macroalgae into the liquid as much as possible. Shake vigorously to homogenize the macroalgal fragments into the liquid. Then proceed to Section 5.2.3 and beyond to prepare the diatom and/or biomass samples.

5.2.2 Preparing the Soft-Bodied Algae Taxonomic ID Sample

Pour freshly-agitated liquid composite sample into the soft-bodied algae sample tube to the 45 mL mark. Midway through pouring, the composite sample should be swirled some more (first clockwise, then counter-clockwise) to ensure that the microalgae are still fully suspended. Cap the tube tightly. Completely fill out a sample label and affix it to the sample tube. Cover the label completely with clear plastic tape to prevent the writing on the label from smearing. Place the tube in the wet ice chest to keep it in the dark and as cold as possible, but make sure it is never allowed to freeze.

Note: As soon as possible, and no longer than four days after collection of the sample, glutaraldehyde must be added to the tube (to a final concentration of 2.5%, by adding 5 mL of 25% glutaraldehyde to 45 mL of sample) and distributed throughout the sample by agitation and turning the tube upside down repeatedly. Glutaraldehyde is necessary for fixing soft-bodied algal samples in order to preserve fine morphological features and the color of pigments, as both can be crucial characters for taxonomic determination. Glutaraldehyde is a hazardous substance that poses a number of safety risks. As such, it should be handled in a fume hood by trained personnel wearing appropriate gear. Refer to Appendix E for an SOP for the use of glutaraldehyde.

Members of the field crew can either have the glutaraldehyde added to the samples back at their own lab, or arrange for the glutaraldehyde to be added to the samples by the taxonomy lab. In either case, the unfixed samples must be kept in the dark and on wet ice (but not allowed to freeze), and must be fixed within four days of collection (and preferably sooner). If the taxonomy lab will be adding the fixative, it is imperative to plan ahead to arrange for this to be done, and also to clearly mark which tubes will need to have fixative added to them. Once the samples are fixed, it is no longer imperative to store them on wet ice. Following fixation, they can simply be stored in a cool, dark place.

5.2.3 Preparing the Diatom Taxonomic ID Sample

Diatom samples should be fixed as soon as possible after collection to reduce the possibility of cell division post-sampling. A 10% solution of buffered formalin is used to fix diatoms, and instructions for preparing this solution are provided in Appendix D.

To prepare the diatom sample, aliquot 40 mL of freshly-agitated composite liquid into the diatom ID sample tube, swirling the composite sample bottle again midway through pouring to keep the microalgae suspended. Add 10 mL of the 10% buffered formalin to the sample. This can be done using a small syringe or bulb pipette. Alternatively, if preferred, the centrifuge tubes for the diatom samples can be pre-loaded with 10 mL of the 10% buffered formalin and 40 mL of sample can be added carefully to the fixative, to avoid having to dispense the fixative in the field.

Notes: Fixatives such as formalin must be used with great care. Be sure to wear formalin-safe gloves and safety goggles when using the fixative, as it should never be touched with bare hands or allowed to splash onto skin or into eyes. Also make sure it is used only in a very well-ventilated place and avoid breathing in any fumes. Minimize the amount of time that vessels containing formalin are open. Fixative added to the sample must not be allowed to ooze outside the vessel that contains it, including the sample tubes. Refer to Appendix F for an SOP for the use of formalin.

Cap the tube tightly and shake it to mix the formalin into the sample. Fill out a sample label and affix it to the sample tube. Cover the label completely with clear plastic tape to prevent the writing on the label from smearing. Keep the fixed diatom samples in the dark and away from extreme heat.

5.2.4 Preparing the Biomass Samples

The remaining composite sample liquid can be used to prepare the chlorophyll *a* and AFDM filters as described below.

Chlorophyll *a* samples:

The procedure to filter chlorophyll *a* samples should be carried out quickly, and in the shade as much as possible, to minimize exposure of the sample to light, and minimize chlorophyll *a* degradation thereby. For the chlorophyll *a* samples, use CLEAN filter forceps (rinsed with DI water three times) to center a glass fiber filter (47 mm, 0.7 µm pore size) onto the mesh platform of a CLEAN filtering tower apparatus (rinsed with DI water three times), and rinse the filter a little with DI water to seat it well into the mesh before attaching the filter reservoir on top. Never touch the filters with hands or anything other than clean forceps.

Agitate the composite sample to resuspend all the microalgal material. Carefully measure 25 mL using a small, CLEAN graduated cylinder (rinsed with DI water three times). Midway through pouring the 25 mL, swirl the composite sample again to ensure that the material is still fully suspended. Pour the remainder of the 25 mL, and then pour the measured sample into the filter reservoir. Once empty, rinse the graduated cylinder with a few mL of DI water, and add this to the reservoir.

To filter the sample, create a gentle vacuum with the hand pump. Be sure to proceed very slowly, and pump only one stroke at a time until all of the liquid in the sample is passed through the filter. Pressure on the sample should never exceed 7 psi, as this could cause cells to burst and release contents, including chlorophyll *a*, into the filtrate and be lost. If it becomes impossible to filter a whole 25 mL of the sample and

remove the water efficiently, discard the filter and try again with a smaller volume (e.g., 10 mL). It is not necessary to collect on multiple filters to try to achieve a total volume of 25 mL. Simply filter as much as possible on a single filter, up to 25 mL, and then use that filter as the sample. Be sure to record the volume of the composite sample that was actually filtered, both on the datasheet, and on the sample label.

Rinse the sides of the filter reservoir with a few mL of DI water, and continue filtering until the water is drawn down. The filter should not be sucked dry, but rather left slightly moist, in order to avoid applying excessive pressure to the sample, which could cause algal cells to burst. After the liquid has passed through, check the filter to see if there are any bits of non-algal plant matter (like tiny seedlings or bits of leaves). If so, remove them with clean forceps, being careful not to remove any algae in the process. If possible, rinse the removed items with DI water onto the filter before discarding them. Remove the filter from the filtering device. *Note: Always thoroughly rinse the sides of the filter reservoir and the interface between the mesh filter seating and the screw-on part of the reservoir with DI water between samples.*

Being careful not to remove any of the collected material from the filter, fold the filter in half (with the sample material on the inside) using the forceps, and place it inside a clean, snap-top Petri dish[13]. Envelop the Petri dish completely within a small sheet of aluminum foil in order to prevent any light from reaching the filter. Place the covered Petri dish and its corresponding, completely filled-out sample label (face outward) into a 100 mL Whirl-pak bag[14], purge as much of the air out of the bag as possible, "whirl" it shut, and seal it tightly with its wire tabs, so that water in the cooler will not be able to enter the bag. *Note 1: If the Whirl-pak bags contain a lot of air, they will float on top of the ice water in the cooler, and they then run the risk of not being kept cold enough. Shove the sample packet down into the ice in the cooler. Note 2: A clean, clear plastic centrifuge tube is also an acceptable container in which to store the filter. It must also be properly labeled, wrapped in aluminum foil, and kept submerged in wet ice.*

Keep chlorophyll *a* filters as cold as possible and place in the freezer or dry ice as soon as possible (and within four hours of collection); the holding time for the chlorophyll *a* filters is 28 days from collection, when kept frozen.

Ash-free dry mass (AFDM) samples:

For the AFDM samples, you should use glass-fiber filters (47 mm, 0.7 µm pore size) that have been precombusted. Never touch the filters with hands or anything other than a CLEAN forceps (rinsed with DI water three times). The filters to use should be labeled "for AFDM", and stored in aluminum sleeves. Follow the same process as that used for chlorophyll *a* sample filtering. After all the liquid has passed through, check the filter to see if there are any pieces of non-algal plant matter (such bits of leaves or wood). If so, remove them with a clean forceps (rinsed with DI water three times), being careful not to remove any algae in the process. The goal with AFDM, for the purposes of this SOP, is to target the ALGAL portion of the organic matter in the sample, and therefore field crews should do their best to remove non-algal contributors

13. It may be beneficial to write the Site Code or sample ID code on the Petri dish itself, in addition to filling out the full sample label.
14. Other bag types are acceptable only if they are water-tight (note that Ziploc bags often leak when submerged).

of organic matter from the sample. Remove the filter from the filtering device. *Note: Always thoroughly rinse the sides of the filter reservoir and the interface between the mesh filter seating and the screw-on part of the reservoir with DI water between samples.*

Use the forceps to fold the AFDM filter in half (with the sample material on the inside) and wrap it loosely in a small sleeve of clean aluminum foil. Be careful not to squeeze the filter, which could cause the sample to ooze from the filter onto the aluminum sleeve. Store the filter in a sealed 100 mL Whirl-pak bag containing a completely filled-out sample label, including the volume that was filtered (i.e., 25 mL or otherwise). As with the chlorophyll *a*, purge as much of the air out of each bag as possible, "whirl" it shut, and seal tightly with the wire tabs. Shove the sample packet down into the ice in the cooler. *Note: A clean, clear plastic centrifuge tube is also an acceptable container in which to store the filter. It must also be properly labeled and kept submerged in wet ice.*

Keep AFDM filters as cold as possible until the samples can be frozen back at the lab that evening, or place on dry ice until they can be stored in the lab freezer. The holding time for the AFDM samples is 28 days from collection, when kept frozen.

5.3 PROCESSING SOFT-BODIED AND OTHER SAMPLE TYPES WHEN A MACROALGAL CLUMP IS PRESENT

The following is a description of how to proceed when a soft-bodied algal taxonomic ID sample is to be prepared AND macroalgal clump(s) are present in the sample in the dish tub. A flowchart of this procedure is provided in Appendix G. It is recommended that this flowchart be printed out in color, laminated (if possible) or printed out on water-proof paper, and brought along to the field for quick reference on handling macroalgal clumps in the composite sample. The reason for the extra step in the processing of the macroalgae for the purposes of the soft-bodied algae sample is that it maintains larger, more intact macroalgal specimens for examination in the laboratory, rather than chopping up all of the macroalgal specimens before sending them to the lab. This is important, because availability of intact specimens greatly improves the chances that the taxonomist will be able to identify the soft-bodied algae to low taxonomic levels.

5.3.1 Isolating and Dividing the Macroalgal Clump

For this procedure, the macroalgal clump is first removed from the dish tub, wrung out gently, and rolled into a cylinder shape that is relatively even in thickness along its length. If there is more than one type of macroalgae in the sample, the various types should be layered on top of one another lengthwise so that they are represented in roughly constant proportions across the length of the "cylinder". The cylinder is measured with a ruler and a quarter of its length is cut off with scissors and put into the (still empty) soft-bodied algae ID centrifuge tube[15]. The clump is pushed down into the tube, and the top is flattened, so that the volume

15. It is unlikely that the ¼ macroalgal clump will occupy all the space in the sample tube, but if it does, a second tube will be needed in order to accommodate all the sample material plus liquid. If such an action is taken, it should be noted in the Comments section of the field sheets and the tubes should be clearly identified as belonging to the same sample, for record keeping purposes.

of the clump can be estimated using the graduations on the tube. The estimated volume of this clump will be used in a calculation (see Equation 1 and Figure 8). The remaining three-quarters length of cylinder is set aside in the shade/cool. It is recommended that this section be placed in a Ziploc bag, sealed, and put in the wet ice cooler.

5.3.2 Measuring the Composite Liquid Volume

Once algal specimens have been removed from all the substrates (e.g., sand, gravel, cobble, wood, leaves) in the dish tub, according to the procedure described in Section 4, gently agitate the dish tub to suspend the microalgae in the liquid, and then start pouring this suspension into a CLEAN graduated cylinder to measure the volume of the liquid. Try to leave all substrate material (e.g., silt, sand) behind. Transfer the measured liquid into a CLEAN 1L plastic bottle. Using a minimal amount of stream water, rinse the substrate once or twice with stream water until it appears that little to no additional suspended material (microalgae) is coming off. Add this rinsate to the graduated cylinder to measure it also. If necessary, repeat this process (regularly agitating the dish tub) until all the liquid has been measured and transferred to the sample bottle. Use water sparingly, because the total sample volume plus rinsate should be no more than about 400-500 mL.

Because you are leaving as much of the silt, sand, and any large substrate material behind as possible, the final volume should reflect only the liquid component of the sample plus rinse water. Record the total volume of all the liquid that had been in the dish tub, including any that was used for rinsing the substrates and sampling devices, on the field sheet under the Algae Samples section. This is the COMPOSITE VOLUME. This value will also be recorded on all algae sample labels (i.e., for the diatom and soft-bodied algae taxonomic ID samples, the chlorophyll *a*, and the AFDM).

5.3.3 Preparing the Soft-Bodied Algae Taxonomic ID Sample

Pour freshly-agitated liquid composite sample from the 1-L bottle into the soft-bodied algae sample tube (on top of the clump of macroalgae) up to the 45 mL mark. Midway through pouring, the composite sample should be swirled some more (first clockwise, then counter-clockwise) to ensure that the microalgae are still fully suspended. Cap the tube tightly. Completely fill out a sample label and affix it to the sample tube. Cover the label completely with clear plastic tape to prevent the writing on the label from smearing. Place the tube in the wet ice chest to keep it in the dark and as cold as possible, but make sure it is never allowed to freeze.

Note: As soon as possible, and no longer than four days after collection of the sample, glutaraldehyde must be added to the tube (to a final concentration of 2.5%, by adding 5 mL of 25% glutaraldehyde to 45 mL of sample) and distributed throughout the sample by agitation and turning the tube upside down repeatedly. Glutaraldehyde is necessary for soft-bodied algal samples in order to preserve fine morphological features and the color of pigments, as both can be crucial characters for taxonomic determination. Glutaraldehyde is a hazardous substance that poses a number of safety risks. As such, it should be handled in a fume hood by trained personnel wearing appropriate gear. Refer to Appendix E for an SOP for the use of glutaraldehyde.

Members of the field crew can either have the glutaraldehyde added to the samples back at their own lab, or arrange for the glutaraldehyde to be added to the samples by the taxonomy lab. In either case, the unfixed samples must be kept in the dark and on wet ice (but not allowed to freeze), and must be fixed within four days of collection (and preferably sooner). If the taxonomy lab will be adding the fixative, it is imperative to plan ahead to arrange for this to be done, and also to clearly mark which tubes will need to have fixative added to them. Once the samples are fixed, it is no longer imperative to store them on wet ice. Following fixation, they can simply be stored in a cool, dark place.

5.3.4 Preparing the Diatom Taxonomic ID Sample

After the soft-bodied algal sample has been prepared, and before preparing the diatom sample (and biomass samples, which will be discussed in the next section), the volume of the remaining composite liquid must be reduced to equal ¾ of the original volume[16]. This is necessary because ¼ of the macroalgae clump was taken out of the composite sample but a full ¼ was not removed from the water portion. As such, the original ratio between water and macroalgae must be restored before further sample preparation.

The following procedure is used to reduce the volume of liquid composite to ¾ of the original. For convenience, you can use this formula (Figure 8) to calculate how many mL to pour off and discard from the composite:

Equation 1. Adjusting the volume of composite sample

volume (mL) of composite to pour off = (0.25 * C) – 45 + A

where "C" is the original composite volume and "A" is the approximate volume of the clump of macroalgae that was placed in the soft-bodied algae sample tube (tamped down and flattened). You may wish to fill out a copy of the Ratio Restoration worksheet shown in Figure 8 to calculate the amount of composite to pour off.

Liquid Portion of Composite Sample: _____ mL = C

Volume of 1/4 macroalgal chunk: _____ mL = A

Volume of Liquid Composite to Pour Off: (0.25 X C) – 45 + A = _____ mL

Figure 8. Ratio restoration worksheet.

16. For example, if the original composite volume was 480mL, you will be discarding enough composite liquid to get down to 360 mL.

As always, be sure to agitate the composite liquid adequately in order to resuspend any settled microalgae before pouring off the calculated volume.

Once the required amount of composite liquid has been discarded, the remaining ¾ of the macroalgal clump ("cylinder") is cut into very fine pieces with a scissors (resulting in strands that are eyelash-length or shorter), and these are added to the reduced-volume composite liquid. The pieces should be chopped small enough so that they practically "blend" into the liquid (i.e., distinct fragments of macroalgae are not easily discernible), because the goal is to "homogenize" the macroalgae into the liquid as much as possible. Now the ratio of macroalgae to liquid from the original sample in the dish tub is restored. Cap the composite bottle and shake vigorously to homogenize the bits into the liquid as much as possible, while not agitating so hard as to risk busting cells and releasing chlorophyll.

Diatom samples should be fixed as soon as possible after collection to reduce the possibility of cell division post-sampling. A 10% solution of buffered formalin is used to fix diatoms, and instructions for preparing this solution are provided in Appendix D.

To prepare the diatom sample, aliquot 40 mL of freshly-agitated sample homogenate into the diatom ID sample tube, swirling the composite sample bottle again midway through pouring to keep the algal material suspended. Add 10mL of the 10% buffered formalin to the sample. This can be done using a small syringe or bulb pipette. Alternatively, if preferred, the centrifuge tubes for the diatom samples can be pre-loaded with 10 mL of the 10% buffered formalin and 40 mL of sample can be added carefully to the fixative, to avoid having to dispense the fixative in the field.

Note: Fixatives such as formalin must be used with great care. Be sure to wear formalin-safe gloves and safety goggles when using the fixative, as it should never be touched with bare hands or allowed to splash onto skin or into eyes. Also make sure it is used only in a very well-ventilated place and avoid breathing in any fumes. Minimize the amount of time that vessels containing formalin are open. Fixative added to the sample must not be allowed to ooze outside the vessel that contains it, including the sample tubes. Refer to Appendix F for an SOP for the use of formalin.

Cap the tube tightly and shake it to mix the formalin into the sample. Fill out a sample label and affix it to the sample tube. Cover the label completely with clear plastic tape to prevent the writing on the label from smearing. Keep the fixed diatom samples in the dark and away from extreme heat.

5.3.5 Preparing the Biomass Samples

The remaining composite sample homogenate can be used to prepare the chlorophyll *a* and AFDM filters according to the following procedure.

Chlorophyll *a* samples:

The procedure to filter chlorophyll *a* samples should be carried out quickly, and in the shade as much as possible, to minimize exposure of the sample to light, and minimize chlorophyll *a* degradation thereby. For the chlorophyll *a* samples, use CLEAN filter forceps (rinsed with DI water three times) to center a glass fiber filter (47 mm, 0.7 µm pore size) onto the mesh platform of CLEAN filtering tower apparatus (rinsed with DI water three times), and rinse the filter a little with DI water to seat it well into the mesh before attaching the filter reservoir on top. Never touch the filters with hands or anything other than clean forceps.

Agitate the composite sample homogenate to resuspend all the macroalgal fragments and microalgal material. Carefully measure 25 mL using a small, CLEAN graduated cylinder (rinsed with DI water three times). Midway through pouring the 25 mL, swirl the homogenate again to ensure that the material is still fully suspended. Pour the remainder of the 25 mL, and then pour the measured homogenate into the filter reservoir. Once empty, rinse the graduated cylinder with a few mL of DI water, and add this to the reservoir.

To filter the sample, create a gentle vacuum with the hand pump. Be sure to proceed very slowly, and pump only one stroke at a time until all of the liquid in the sample is passed through the filter. Pressure on the sample should never exceed 7 psi, as this could cause cells to burst and release contents, including chlorophyll *a*, into the filtrate and be lost. If it becomes impossible to filter a whole 25 mL of the sample and remove the water efficiently, discard the filter and try again with a smaller volume (e.g., 10 mL). It is not necessary to collect on multiple filters to try to achieve a total volume of 25 mL. Simply filter as much as possible on a single filter, up to 25 mL, and then use that filter as the sample. Be sure to record the volume of the composite sample that was actually filtered, both on the datasheet, and on the sample label.

Rinse the sides of the filter reservoir with a few mL of DI water, and continue filtering until the water is drawn down. The filter should not be sucked dry, but rather left slightly moist, in order to avoid applying excessive pressure to the sample, which could cause algal cells to burst. After all the liquid has passed through, check the filter to see if there are any bits of non-algal plant matter (like tiny seedlings or bits of leaves). If so, remove them with clean forceps, being careful not to remove any algae in the process. Remove the filter from the filtering device. *Note: Always thoroughly rinse the sides of the filter reservoir and the interface between the mesh filter seating and the screw-on part of the reservoir with DI water between samples.*

Fold the filter in half (with the sample material on the inside) using the forceps, and place it inside a clean, snap-top Petri dish. Envelope the Petri dish completely within a small sheet of aluminum foil in order to prevent any light from reaching the filter. Place the covered Petri dish and its corresponding, completely filled-out sample label (face outward) into a 100 mL Whirl-pak bag, purge as much of the air out of the bag as possible, "whirl" it shut, and seal it tightly with its wire tabs, so that water in the cooler will not be able to enter the bag. *Note: If the Whirl-pak bags contain a lot of air, they will float on top of the ice water in the cooler, and they then run the risk of not being kept cold enough. Shove the sample packet down into the ice in the cooler.*

Keep chlorophyll *a* filters as cold as possible and place in the freezer or dry ice as soon as possible (and within four hours of collection); the holding time for the chlorophyll *a* filters is 28 days from collection, when kept frozen.

Ash-free dry mass (AFDM) samples:

For the AFDM samples, you should use glass-fiber filters (47 mm, 0.7 µm pore size) that have been precombusted. Never touch the filters with hands or anything other than a clean forceps (rinsed with DI water three times). The filters to use should be labeled "for AFDM", and stored in aluminum sleeves. Follow the same process as that used for chlorophyll *a* sample filtering. After all the liquid has passed through, check the filter to see if there are any bits of non-algal plant matter (such as bits of leaves or wood). If so, remove them with clean forceps (rinsed with DI water three times), being careful not to remove any algae in the process. Remove the filter from the filtering device. *Note: Always thoroughly rinse the sides of the filter reservoir and the interface between the mesh filter seating and the screw-on part of the reservoir with DI water between samples.*

Use the forceps to fold the AFDM filter in half (with the sample material on the inside) and wrap it loosely in a small sleeve of clean aluminum foil. Be careful not to squeeze the filter, which could cause the sample to ooze from the filter onto the aluminum sleeve. Store the filter in a sealed 100 mL Whirl-pak bag containing a completely filled-out sample label, including the volume that was filtered (i.e., 25 mL or otherwise). As with the chlorophyll *a*, purge as much of the air out of each bag as possible, "whirl" it shut, and seal tightly with the wire tabs. Shove the sample packet down into the ice in the cooler.

Keep AFDM filters as cold as possible until the samples can be frozen back at the lab that evening, or place on dry ice until they can be stored in the lab freezer. The holding time for the AFDM samples is 28 days from collection, when kept frozen.

5.4 PROCEDURE FOR COLLECTING QUALITATIVE ALGAL SAMPLES

If your program calls for the collection of soft-bodied taxonomic ID samples, then you will also need to collect a "qualitative" sample at every monitoring reach. The qualitative samples consist of a composite of all types of soft-bodied algae visible within the reach. This is of value because it can provide a fairly exhaustive list of soft-bodied algal taxa present at the site and can also aid identification of taxa captured in the RWB sampling, since it allows larger, more intact specimens to be collected than those that may end up in the more heavily processed quantitative sample (described above). In addition, if the qualitative sample is kept cool and in the dark, and is delivered to the lab in a timely manner (i.e., as quickly as possible, and within two weeks of collection), the live specimens can be cultured, which can also aid in identification. For example, some taxa in the Zygnematales cannot be identified to species level unless they are in a sexual phase during examination. If asexual at the time of collection (which is the typical situation), live specimens could be induced to a sexual phase in the lab. Collection of a qualitative diatom sample is optional, and is typically not needed for general bioassessment purposes.

For qualitative soft-bodied algal samples, collect specimens of all obviously different types of macroalgal filaments and mats, as well as microalgae (in the forms of scrapings using a razor blade or knife), and depositional samples (suctioned from along the surface of sediments using a clean turkey baster). Note that some algae (e.g., species of *Chara*, *Paralemanea*, and *Vaucheria*) have morphologies similar to submerged macrophytes or mosses. In addition, algae are not always green, and may instead be dark-brownish, golden, reddish, or bluish-green. Some cyanobacteria (which should also be collected for the qualitative sample), such as members of the genus *Nostoc*, look like gelatinous globules, or sacs, ranging in size anywhere from smaller than a pea to larger than a lime. Online image searches of these taxa and others will help the collector develop an eye for the variety of types of algae that may be encountered in streams. If you suspect something may be algae, but are not sure, it is always preferable to collect some of it for the qualitative sample. The laboratory will determine whether it qualifies for inclusion in the species list. Collect from as many distinct locations as possible throughout the reach so as to capture as much of the apparent diversity in the reach as you can. Also, when possible, try to grab part of the holdfast structures that attached the macroalgae to the substrate, as these structures can be useful for taxonomic identification.

Since these samples are merely qualitative, and not quantitative, you need not worry about collecting them in a manner that is representative of their relative abundances within the reach. *Note: If there is only a small amount of macroalgae in the stream, it should be allocated preferentially to the soft-bodied algae laboratory sample, as opposed to the diatoms (if a diatom qualitative sample is being collected), because it is primarily needed for the soft-bodied algal identification work (although diatoms can live as epiphytes on macroalgae, so macroalgal samples are also of values for the diatom work).*

Using a thick, waterproof marker, label a Whirl-pak bag with the Site Code, Date, Sample ID, and "soft" (or "diatom", if also collecting a diatom sample). Fill the bag with a total volume of up to 100 mL of qualitative algae sample + water. Purge any extra air from the bag, seal with the wire tabs by twisting them together (not just folding them, as this can result in leakage), tuck the ends of the wire tabs inward so that they cannot poke other bags, and store in the cooler on wet ice in the field. Be careful not to place the bags right up against ice or frozen blue-ice bags, because this could cause the algae to freeze and thus destroy the sample. Unlike with the quantitative samples, **do not add glutaraldehyde or formalin** (or any other fixative) to these qualitative samples. Keep the qualitative samples on wet ice and refrigerate immediately upon return to the lab. Because they are not preserved, these samples should be examined by a taxonomist as soon as possible (and within two weeks, at most), as they can decompose fairly rapidly. Decomposition is of particular concern for the soft-bodied algae sample.

If it is impossible to get the soft-bodied qualitative samples to a taxonomist within two weeks of sample collection, then split the qualitative samples in half, transfer one half to a 50 mL centrifuge tube and preserve it with glutaraldehyde (to a 2.5% final concentration) and leave the other half un-fixed (but continue to store in the cold/dark until examination by a taxonomist). This should be done in order to preserve part of the sample for morphological identification, but still maintain some possibility of keeping some specimens alive, in case culturing is necessary. *Note: Glutaraldehyde is a hazardous substance that can*

pose health and safety risks. Add glutaraldehyde in a fume hood, wearing safety goggles and glutaraldehyde-safe gloves. Refer to Appendix E for more detailed instructions on the safe handling of glutaraldehyde.

5.5 ALGAL SAMPLING QUALITY ASSURANCE / QUALITY CONTROL

The SWAMP bioassessment group is currently developing guidelines for quality assurance and quality control for bioassessment procedures. Future revisions to this document will include more specific information covering personnel qualifications, training and field audit procedures, procedures for field calibration, procedures for chain of custody documentation, requirements for measurement precision, health and safety warnings, cautions (actions that would result in instrument damage or compromised samples), and interferences (consequences of not following the SOP).

It is recommended that duplicate sampling of algae occur at 10% of study sites. The recommended method for collecting duplicates is at adjacent positions along the sampling transect according to the scheme depicted in Figure 2. Both samples should be collected at each transect before moving on to the next transect. When duplicate samples are collected at a site, the full suite of information about the algae samples (composite volume, numbers of each sampling device used, amount filtered, etc.) will need to be recorded for each replicate. This information can be recorded on a duplicate copy of the "Algae Samples" field sheet. Alternatively, the data cells on this sheet can be divided in half to accommodate information for each replicate. If the latter, it is important to keep track of which values go with which replicate.

In addition to including composite volume, area sampled (total, for all sampling devices used), and amount filtered (for the biomass samples) on the sample labels and field sheets, this information should also be included on the chain-of-custody sheets that are submitted to the algae analytical and taxonomy laboratories. This will facilitate efficient calculation of several types of data output, because this information is needed both for the biomass results and for the soft-bodied algae biovolume results.

6 PHYSICAL HABITAT TRANSECT-BASED MEASUREMENTS TO ACCOMPANY ALGAL BIOASSESSMENT

Once all algae samples have been collected at a given transect, PHab data collection can begin there. PHab data are designed to assess the physical habitat conditions of the stream reach being sampled. Knowledge about the PHab parameters can aid interpretation of the biotic assemblage data collected. Data for the following PHab parameters will be entered on transect-specific datasheets (corresponding to each of the 11 main transects along the monitoring reach). These datasheets are provided in Appendix C.

It should be noted that the data collection procedures for the parameters below reflect those that are described in the SWAMP BMI Bioassessment SOP (Ode 2007). With respect to PHab assessment, the only deviation between this SOP and that of Ode (2007) is in terms of omission of certain parameters. However, where there is overlap in parameters between the two SOPs, they are assessed in exactly the same manner. The one exception to this is the addition, in this SOP, of percent algal cover determination to the pebble count as described in Ode (2007). Also, note that because the datasheets in Appendix C are multi-purpose datasheets, developed for both BMIs and algae, they include some PHab parameters that are not a part of this SOP. Specifically, the following PHab data that appear on the datasheets are not collected when only algae are being sampled: 1) Riparian vegetation, and 2) Instream habitat complexity. As such, these sections are not filled out on the datasheets when only algae samples are being collected.

6.1 WETTED WIDTH

The wetted channel is the zone that is inundated with water and the wetted width is the distance between the sides of the channel at the point where substrates are no longer surrounded by surface water. Measure the wetted stream width and record this in the box at the top of the Transect data form.

6.2 BANKFULL WIDTH

The bankfull channel is the zone of maximum water inundation in a normal flow year (one-to-two year flood events). Since most channel formation processes are believed to act when flows are within this zone, bankfull dimensions provide a valuable indication of relative size of the waterbody.

Scout along the stream margins to identify the location of the bankfull margins on either bank by looking for evidence of annual or semi-annual flood events. Examples of useful evidence include topographic, vegetative, or geologic cues (changes in bank slope, changes from annual to perennial vegetation, changes in the size distribution of surface sediments). While the position of drift material caught in vegetation may be

a helpful aid, this can lead to very misleading measurements. *Note: The exact nature of this evidence varies widely across a range of stream types and geomorphic characteristics. It is helpful to investigate the entire reach when attempting to interpret this evidence because the true bankfull margin may be obscured at various points along the reach. Often the bankfull position is easier to interpret from one bank than the other; in these cases, it is easiest to infer the opposite bank position by projecting across the channel. Additionally, height can be verified by measuring the height from both edges of the wetted channel to the bankfull height (these heights should be equal).*

Stretch a tape from bank to bank at the bankfull position. Measure the width of the bankfull channel from bank to bank at bankfull height and perpendicular to the direction of stream flow.

6.3 BANKFULL HEIGHT

Measure bankfull height (the vertical distance between the **water surface** and the height of the bank, Figure 9) and record in the boxes at the top of the Transect data form under "Bankfull Width" and "Bankfull Height".

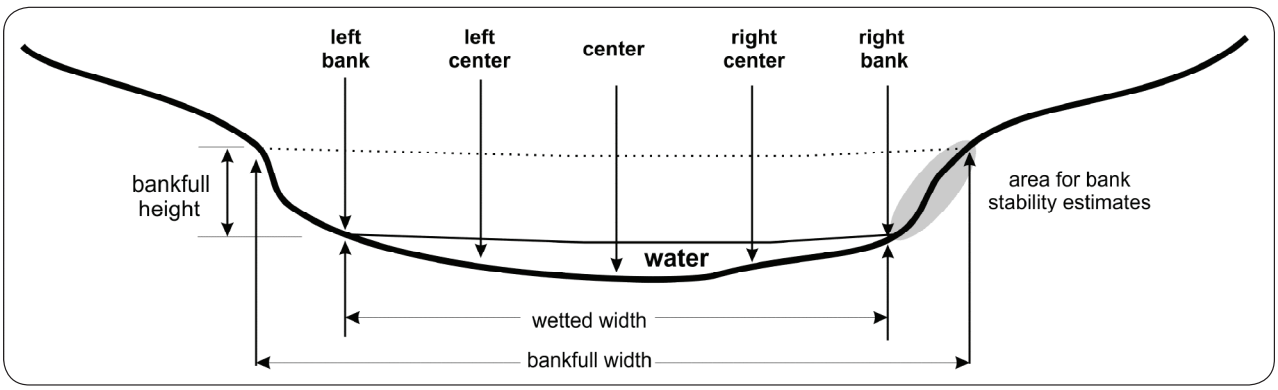

Figure 9. Cross sectional diagram of a typical stream channel showing locations of substrate measurements, wetted and bankfull width measurements, and bank stability visual estimates (reprinted from Ode 2007).

6.4 "PEBBLE COUNT": TRANSECT SUBSTRATES

Particle size frequency distributions often provide valuable information about instream habitat conditions that affect benthic communities. The Wolman pebble count technique is a widely used and cost-effective method for estimating the particle size distribution and produces data that correlate with costly, but more quantitative bulk sediment samples. Coarse particulate organic matter (CPOM, particles of organic material such as leaves that are greater than 1.0 mm in diameter) is a general indicator of the amount of

allochthonous organic matter available at a site, and its measurement can provide valuable information about the basis of the food web in a stream reach. The presence of CPOM associated with each particle is quantified at the same time that particles are measured for the pebble counts.

Transect substrate measurements are taken at five equidistant points along each transect (Figure 9). Divide the wetted stream width by four to get the distance between the five points (Left Bank, Left Center, Center, Right Center and Right Bank) and use a measuring device to locate the positions of these points (e.g., a stadia rod or measuring tape). Once the positions are identified, lower a folding meter stick through the water column perpendicular to both the flow and the transect to identify the particle located at the tip of the meter stick. *Note: It is important that you are not subjective about selecting a particle, as this will result in failing to generate an accurate assessment of the size class distribution of particles present in that stream reach.*

6.5 DEPTH

With the folding meter stick, measure the depth from the water surface to the top of the particle to the nearest cm and record on the datasheet.

Table 3
Particle size class codes, descriptions, and measurements (adapted from Ode 2007)

Size Class	Code Size Class Description	Common Size Reference	Size Class Range
RS	bedrock, smooth	larger than a car	> 4 m
RR	bedrock, rough	larger than a car	> 4 m
XB	boulder, large	meter stick to car	1 - 4 m
SB	boulder, small	basketball to meter stick	25 cm - 1.0 m
CB	cobble	tennis ball to basketball	64 - 250 mm
GC	gravel, coarse	marble to tennis ball	16 - 64 mm
GF	gravel, fine	ladybug to marble	2 – 16 mm
SA	sand	gritty to ladybug	0.06 – 2 mm
FN	fines	not gritty	< 0.06 mm
HP	hardpan (consolidated fines)		< 0.06 mm
WD	wood		
RC	concrete/ asphalt		
OT	other		

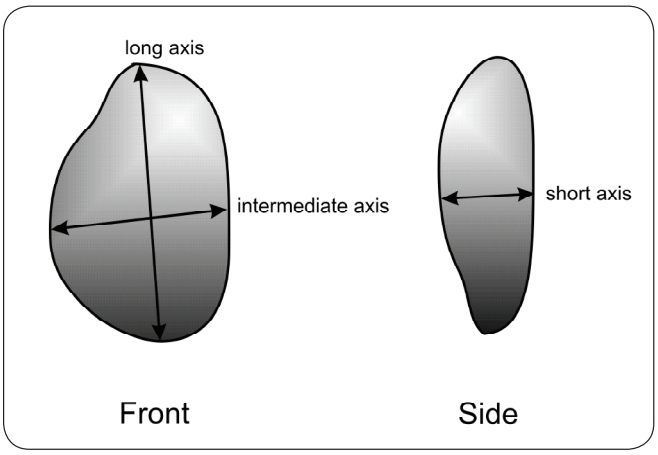

Figure 10. Diagram of three major perpendicular axes of substrate particles. The intermediate axis is recorded for pebble counts (reprinted from Ode 2007).

6.6 PARTICLE SIZE CLASS

Remove the particle from the streambed. Assign the particle to one of the size classes listed in Table 3 (these are also provided in a box on the transect form), based on its intermediate axis length (Figure 10). Record this information under Substrate size class.

Be sure to use measurements or the established codes for particle size class. If the latter, confirm the 2-letter codes for the particles as you call them out to your partner recording the data to ensure you are using the correct codes.

6.7 COBBLE EMBEDDEDNESS

It is generally agreed that the degree to which fine particles fill interstitial spaces has a significant impact on the ecology of benthic organisms and fish, but techniques for measuring this impact vary greatly. Here we define embeddedness as the volume of cobble-sized particles (64-250 mm) that is buried by fine and sand particles (< 2.0 mm diameter).

When a cobble-sized particle is encountered during the pebble count, visually estimate the percentage of the cobble's volume that has been buried by fine/sand particles (this will likely require removing the cobble from the streambed). Record, to the nearest 5%, the embeddedness of up to 25 cobble-sized particles within the sampling reach in the corresponding "% Cobble Embed" field for each cobble.

If 25 cobbles are not encountered during the pebble count, supplement the cobbles by conducting a "random walk" through the reach. Starting at a random point in the reach, follow a line from one bank to the other at a randomly chosen angle. Once at the other bank reverse the process with a new randomly chosen angle. Enter any of these additional embeddedness values at the bottom of the first page of the set of field forms, under "ADDITIONAL COBBLE EMBEDDEDNESS MEASURES".

If 25 cobble sized particles are not present in the entire reach, then record the values for however many cobbles are present.

6.8 CPOM

Record the presence or absence of Coarse Particulate Organic Matter (CPOM) that is > 1 mm diameter, and within 1 cm of the particle.

6.9 ALGAL COVER

Algal cover refers to the amount of algae in the stream reach, both in terms of 1) microalgal coatings ("slimy-ness") on stream substrates and 2) macroalgae (e.g., filaments, mats, globules). Algal cover is estimated by a point-intercept approach that entails collecting information about the presence/absence of both types of algae (as well as thickness, for the microalgae) at each of the points along the transects associated with the pebble count. If the imaginary point corresponding to each pebble in the pebble count intercepts algae, then algae is recorded as "present" at that point. The percentage of the points across the sampling reach that have algae present yields an estimate of the percent algal cover.

For each point along the pebble count, record information about algae as follows. For any film-like coating of algae (referred to as "Microalgae" on the datasheet) present on the surface of the substrate at that point, estimate the presence/thickness category according to the scheme in Table 4. For thicker microalgal layers, a small metal or plastic rod with demarcations at 1, 5, and 20 mm can be used for measurement. For layers too thin to measure, use the diagnostic criteria listed in the last column of Table 4. Note that these thickness codes refer only to microalgal coatings/films on substrate. They do not refer to thickness of macroalgal filaments/mats; macroalgal thickness is not assessed in this protocol. Be sure to collect microalgal thickness data from whatever substrate is topmost within the stream and therefore is most likely to be exposed to sunlight. Sometimes this substrate is not the actual pebble used in the pebble count, but rather a substrate type that occurs above the pebble, such as a thick mat of macroalgae that is above (and covering) the stream bottom. Microalgal species (which can include diatoms and unicellular soft-bodied algae) can grow as "epiphytes" upon macroalgal filaments and mats, coating them with a slimy, tinted film.

Table 4
Microalgal thickness codes and descriptions (adapted from Stevenson and Rollins 2006).

Code	Thickness	Diagnostics
0	No microalgae present	The surface of the substrate feels rough, not slimy.
1	Present, but not visible	The surface of the substrate feels slimy, but the microalgal layer is too thin to be visible.
2	<1mm	Rubbing fingers on the substrate surface produces a brownish tint on them, and scraping the substrate leaves a visible trail, but the microalgal layer is too thin to measure.
3	1-5mm	
4	5-20mm	
5	> 20mm	
Z	Cannot determine if a microalgal layer is present	
D	Dry point	

Note: Sometimes, due to the nature of the substrate, it can be difficult to discern whether a microalgal layer is present (particularly if it is very thin). For example, in the case of very fine sediments, the dark color of the silt can obscure the diagnostic color of a microalgal layer, and the inherent "sliminess" of very fine silt may make tactile determination of microalgae impossible. Therefore, when silt is the substrate, only relatively thick layers of microalgae might be easily discernible. If presence/absence of a microalgal layer cannot be determined with certainty, score microalgal thickness as "Z". It is highly recommended that the data recorder cross the "Z" in order to reduce the possibility that it is confused with a "2" when the data are entered into the database.

In addition to recording the presence and thickness of microalgae on the surfaces of substrates, record the presence/absence of attached macroalgae in the water column, as well as unattached, floating macroalgal mats on the water's surface, corresponding to each pebble count sampling point. Do this by envisioning an imaginary "line" extending from the water's surface down to the stream bottom where the target "pebble" lies (particularly in turbulent water, it may be helpful to use a viewing bucket (Appendix D) in order to see below the water's surface; the use of the viewing bucket is optional). If this line intercepts macroalgae, either floating on the water's surface, or somewhere within the water column, the appropriate algal class(es) should be recorded as "present". Attached macroalgal filaments have an obvious physical connection to something (like a cobble, boulder, or a gravel bed) lying on the bottom of the stream, whereas for unattached macroalgae, there is no obvious physical connection with the streambed, and the algae is just freely floating at or near the water's surface. For each class of macroalgae (Attached and Unattached), mark "P" (for "present") if intercepted by the sampling point and "A" (for "absent") if not intercepted.

Bear in mind that, because pebble counts span the "wetted width" of each transect, the expectation is that even the pebbles at the bank positions will generally be at least moist, and sometimes even submerged. As such, it is important to realize that algal cover can occur at the bank positions of the pebble count as well as intermediate positions across the stream. An exception to this is when the pebble surface is completely dry. Section 6.11 provides instructions for data collection in this situation.

6.10 MACROPHYTES

If a vascular plant (i.e., a macrophyte) is intercepted by the imaginary line associated with the pebble count point, mark "P" for "present" under Macrophytes. Otherwise, mark "A" for absent. Include only herbaceous plants that are rooted underwater. Examples of macrophytes include cattails, tules, rushes, sedges, monkeyflowers, speedwells, knotweeds, and watercress.

6.11 DRY SUBSTRATES

To determine how to collect data at dry sampling points, it is necessary to first establish whether the dry area in question lies within the stream's active channel (i.e., therefore regularly inundated during storms), or whether the point is on a stable island (i.e., therefore rarely, if ever, inundated). Stable islands are typically

vegetated, often with woody shrubs or trees, and have heights near or exceeding bankfull height. Pebble counts should not be conducted on stable islands. If the transect spans a portion of the study reach in which the channel is bifurcated such that there are two channels with an intervening island, the entire transect should be placed across the dominant channel, and all five pebble count points should be located on that side.

If the point falls on a dry surface that is within the usual active channel (i.e., subject to regular disturbance by flows), then pebble count/algal cover data from the dry point should be recorded as follows:

- score Depth as 0
- score particle Size Class and Embeddedness as described above for wet particles
- score all the algae variables (Microalgae, Macroalgae Attached, and Macroalgae Unattached) as "D" for "dry"
- leave CPOM and Macrophytes "blank" (i.e., do not circle anything). These parameters will register as NR (Not Recorded) in the database.

Ordinarily, the sampling transect would span the wetted width of the channel, but when no water is present at a given transect, evidence of the typical wetted extent of the active channel will need to be used to infer appropriate transect boundaries. Such indicators can include the transition from vegetated to unvegetated area (i.e., moving from banks to active channel), as well as the presence of dried algae, water stains, microtopographic transitions, changes in substrate composition, and others.

6.12 BANK STABILITY

The vulnerability of stream banks to erosion is often of interest in bioassessments because of its direct relationship with sedimentation.

For each transect, record a visual assessment of bank vulnerability in the region between the wetted width and bankfull width of the stream margins and between the upstream and downstream inter-transects. Choose one of three vulnerability states: eroded (evidence of mass wasting), vulnerable (obvious signs of bank erosion or unprotected banks), or stable.

6.13 HUMAN INFLUENCE

For the left and right banks, estimate a 10 x 10 m riparian area centered on the edges of the transect (see Figure 11). In the "Human Influence" section of the Transect data sheet, record the presence of 14 human influence categories in three spatial zones relative to this 10 x 10 m square (between the wetted edge and bankfull margin, between the bankfull margin and 10 m from the stream, and between 10 m and 50 m beyond the stream margins): 1) walls/rip-rap/dams, 2) buildings, 3) pavement/cleared lots, 4) roads/

railroads, 5) pipes (inlets or outlets), 6) landfills or trash, 7) parks or lawns (e.g., golf courses), 8) row crops, 9) pasture/ rangelands, 10) logging/ timber harvest activities, 11) mining activities, 12) vegetative management (herbicides, brush removal, mowing), 13) bridges/ abutments, 14) orchards or vineyards. Circle all combinations of impacts and locations that apply, but be careful to not double-count any human influence observations.

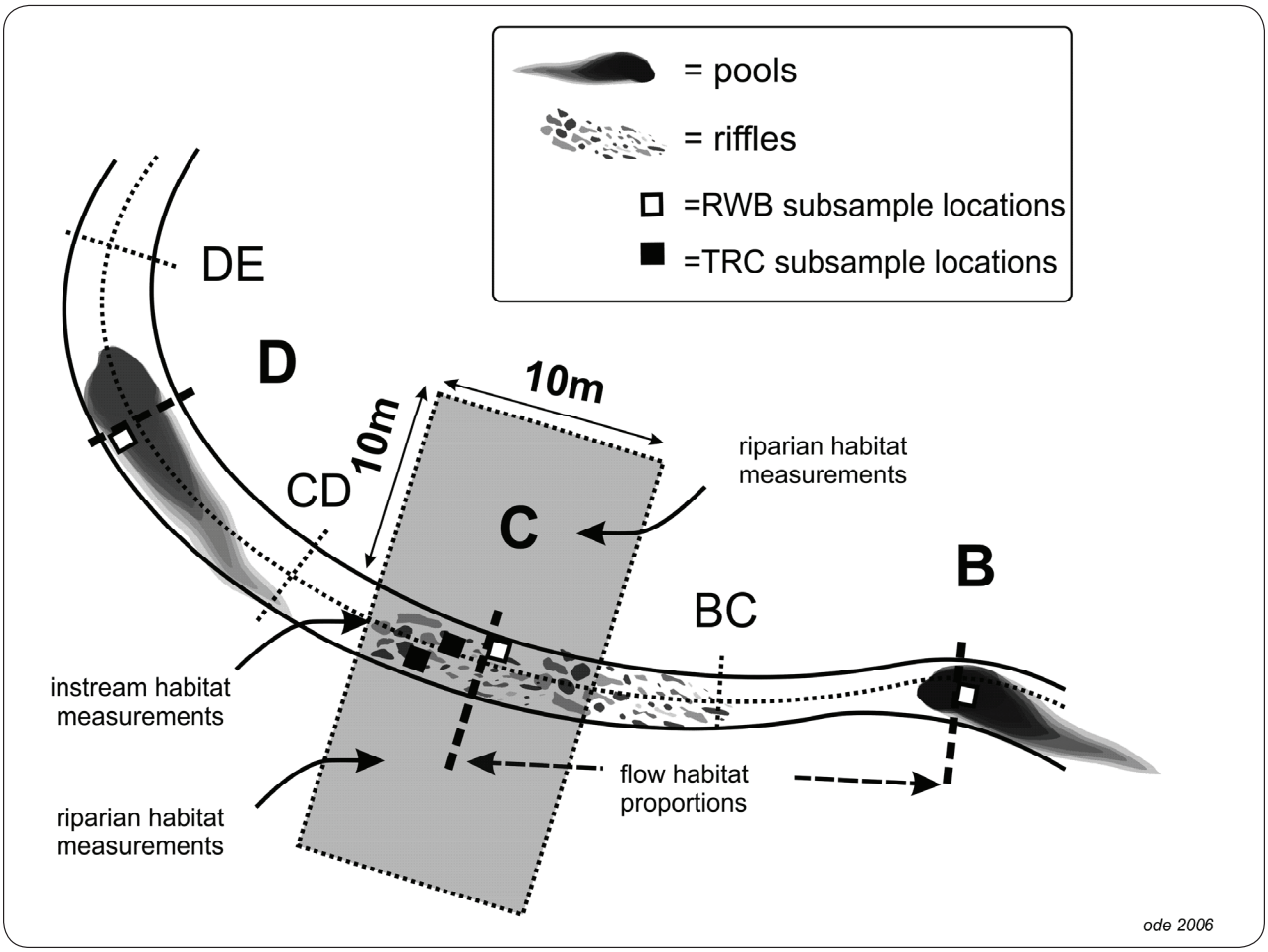

Figure 11. Section of the standard reach expanded from Figure 1 showing the appropriate positions for collecting algae samples (the white square, labeled "RWB" in the legend box) and flow habitat proportion measurements (reprinted from Ode 2007).

Record the presence of any of the 14 human influence categories in the stream channel within a zone 5 m upstream and 5 m downstream of the transect.

6.14 DENSIOMETER READINGS (CANOPY COVER)

The densiometer is read by counting the number of line intersections that are obscured by overhanging vegetation. Before using, the densiometer should be modified by taping off the lower left and right portions of the mirror in order to emphasize overhead vegetation over foreground vegetation (the main source of bias in canopy density measurements; see Figure 12.)

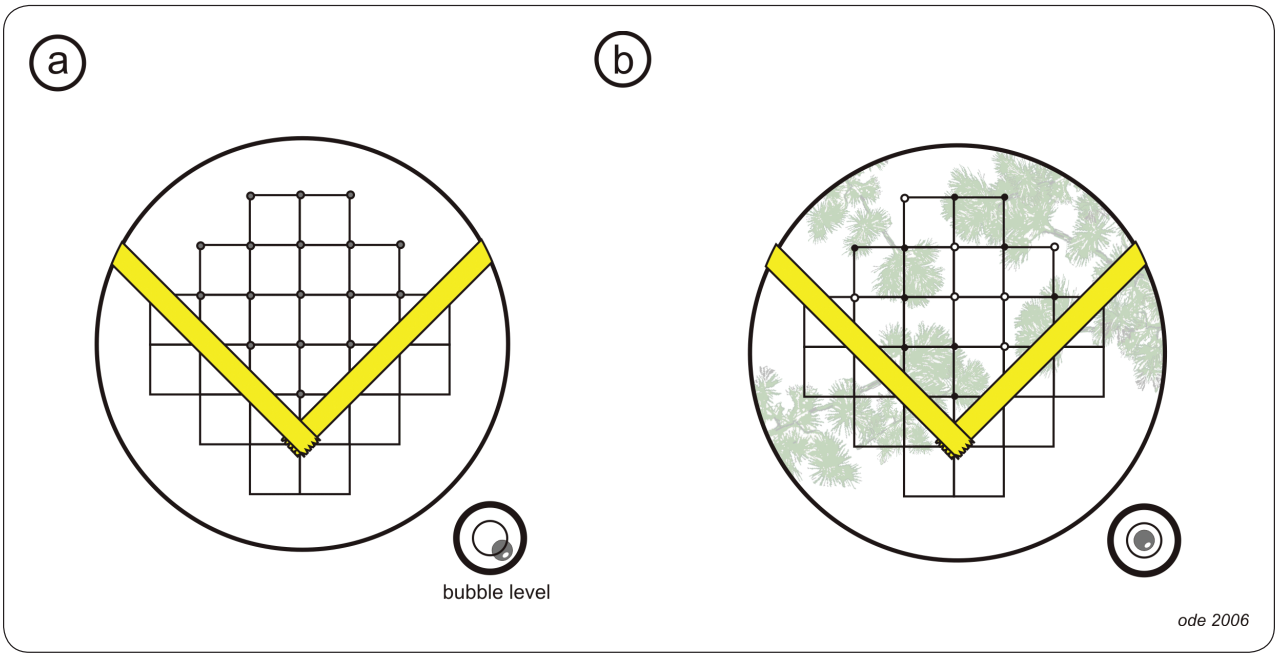

Figure 12. Representation of the mirrored surface of a convex spherical densiometer showing the position for taping the mirror and the intersection points used for the densiometer reading. The score for the hypothetical condition in (b) is 10 covered intersection points out of 17 possible. Note the position of the bubble level in (b) when the densiometer is leveled (reprinted from Ode 2007).

All densiometer readings should be taken with the bubble leveled, and 0.3 m (1 ft) above the water surface. The densiometer should be held just far enough from the squatting observer's body so that his/her forehead is just barely obscured by the intersection of the two pieces of tape.

Take and record four 17-point readings from the center of each transect: a) facing upstream, b) facing downstream, c) facing the left bank, d) facing the right bank. Optional readings can also be taken at the left and right banks (facing away from the stream, for these positions).

PHYSICAL HABITAT INTER-TRANSECT-BASED MEASUREMENTS 7

While most measures are taken at or relative to the main transects, a few measures are recorded at transects located at the midpoint between main transects. These are called "Inter-transects". The following measurements are taken relative to the Inter-transects: 1) Wetted Width, 2) Flow Habitats, and 3) "Pebble Count": Transect Substrates (including algal cover, as for the main transects).

7.1 INTER-TRANSECT WETTED WIDTH

Measure the same way that Transect wetted width was measured.

7.2 INTER-TRANSECT SUBSTRATES AND PERCENT ALGAL COVER

Collect these data the same way that Transect substrates and percent algal cover data were collected.

7.3 FLOW HABITATS

Because many benthic organisms prefer specific flow and substrate microhabitats, the proportional representation of these habitats in a reach is often of interest in bioassessments. There are many different ways to quantify the proportions of different flow habitats. This procedure produces a semi-quantitative measure consisting of 10 transect-based visual estimates.

At each Inter-transect, identify the percentage of six different habitat types in the region between the upstream Transect and downstream Transect: 1) cascades, 2) falls, 3) rapids, 4) riffles, 5) runs, 6) glides, 7) pools, and 8) dry areas. Record percentages to the nearest 5% — the total percentage of surface area for each section must equal 100%.

A description of each of these flow habitat types is provided below:

- cascades: short, high-gradient drops in stream bed elevation often accompanied by boulders and considerable turbulence
- falls: high-gradient drops in elevation of the stream bed associated with an abrupt change in the bedrock
- rapids: sections of stream with swiftly flowing water and considerable surface turbulence (rapids tend to have larger substrate sizes than riffles)
- riffles: "shallow/fast"; riffles are shallow sections where the water flows over coarse stream bed particles that create mild to moderate surface turbulence (< 0.5 m deep, > 0.3 m/s)
- runs: "deep/fast"; long, relatively straight, low-gradient sections without flow obstructions. The stream bed is typically even and the water flows faster than it does in a pool (> 0.5 m deep, > 0.3 m/s)
- glides: "shallow/slow"; sections of stream with little or no turbulence, but faster velocity than pools (< 0.5 m deep, < 0.3 m/s)
- pools: "deep/slow"; a reach of stream that is characterized by deep, low-velocity water and a smooth surface (> 0.5 m deep, < 0.3 m/s)
- dry: any surface area within the channel's wetted width that is above water

After you have collected all the above Transect-, and Inter-transect-, based measurements, collect data on Gradient. Also, if you have not already done so, take photographs at specific Transects, as indicated below. After you have collected Gradient data at each Transect, and have taken photographs where indicated, remove the corresponding flag from the stream bank.

7.4 PHOTOGRAPHS

Take a minimum of four (4) photographs of the reach at the following locations: a) Transect A facing upstream, b) Transect F facing upstream, c) Transect F facing downstream, and d) Transect K facing downstream. It is also desirable to take a photograph at Transect A facing downstream and Transect K facing upstream to document conditions immediately adjacent to the reach. Digital photographs should be used. Record the image numbers on the front page of the field form under "Photographs". *Note: An easy way to keep track of which site each series of photographs belongs to is to take a close-up of the front data sheet (containing legible site code and date) for that site prior to taking the series of photos.*

SECTION 8 REACHWIDE MEASUREMENTS

This last section describes PHab measurements of attributes specific to the stream reach as a whole. These include gradient of the reach and stream discharge.

8.1 GRADIENT

The gradient of a stream reach is one of the major stream classification variables, giving an indication of potential water velocities and stream power, which are in turn important controls on aquatic habitat and sediment transport within the reach. The data collected for gradient are recorded on the "Slope and Bearing" form.

Note: An autolevel should be used for reaches with a percent slope of less than or equal to 1%. Either a clinometer or an autolevel may be used for reaches with a percent slope of greater than 1%, and sometimes a clinometer is preferable in really steep areas that are also heavily vegetated. The following description is for clinometer-based slope measurements. In reaches that are close to 1%, you will not know whether you are above or below the 1% slope cutoff. In these cases, default to use of an autolevel, which is described further below.

Clinometer method:

Transect to transect measurements taken with a clinometer are used to calculate the average slope through a reach. This measurement works best with two people, one taking the readings at the upstream transect ("backsighting") and the other holding a stadia rod at the downstream transect. If you cannot see the mid point of the next transect from the starting point, use the supplemental sections (indicating the proportion of the total length represented by each section). Otherwise, leave these blank.

Beginning with the upper transect (Transect K), one person (the measurer) should stand at the water margin with a clinometer held at eye level. A second person should stand at the margin of the next downstream transect (Transect J) with a stadia rod flagged at the eye level of the person taking the clinometer readings. Be sure you mark your eye level while standing on level ground! Adjust for water depth by measuring from the same height above the water surface at both transects. This is most easily accomplished by holding the base of the stadia rod at water level. *Note: An alternative technique is to use two stadia rods pre-flagged at the eye-height of the person taking the readings.*

Use a clinometer to measure the percent slope of the water surface (not the streambed) between the upstream transect and the downstream transect by sighting to the flagged position on the stadia rod. The clinometer reads both percent slope and degree of the slope. Be careful to read and record percent slope

rather than degrees slope (the measurements differ by a factor of ~2.2). Percent slope is the scale on the right hand side as you look through most clinometers. *Note: If an autolevel or hand level is used, record the elevation difference (rise) between transects and the segment length (run) instead of the percent slope (autolevel instructions are provided in the following section).*

If the stream reach geometry makes it difficult to sight a line between transects, divide the distance into two sections and record the slope and the proportion of the total segment length between transects for each of these sections in the appropriate boxes on the slope form (supplemental segments). Do not measure slope across dry land (e.g., across a meander bend).

Proceed downstream to the next transect pair (I-J) and continue to record slope between each pair of transects until measurements have been recorded for all transects. If you have finished all the other transect and inter-transect based measurements for PHab, you may remove the transect flags as you go.

Autolevel method (preferred):

To measure gradient using an autolevel, identify a good spot to set up the autolevel, preferably somewhere around the center of the reach (if there is good visibility from this location to both the upstream and downstream ends of the reach.) Set up the autolevel on very stable, and preferably fairly flat, ground. Set the height of the autolevel to comfortable eye level for the operator. Level the plane of view of the autolevel by balancing it using the bubble. Start by adjusting the legs, and then fine-tune the adjustment using the knobs. Once balanced, begin "shooting" the change in the height of the water level of the stream from transect to transect. Try to start with one of the outer transects (like A). Have a field partner at Transect A hold the Stadia rod at water's edge and perpendicular to the ground. Viewing through the autolevel (and focusing as necessary), look at the Stadia rod and note to the smallest demarcation on the stadia rod the height at which the autolevel line of view (i.e., the middle line in the viewfinder) hits. Record this information, and then have the Stadia rod holder proceed to the next transect (e.g., Transect B), again holding the base of the Stadia rod at water's edge. Very carefully, rotate the head of the autolevel so that it points to the new Stadia rod location. *Note: Take care not to bump the autolevel out of its position, because if this happens, you will not be able to take a height measurement of Transect B's water surface relative to that of Transect A, to determine the slope between the two transects.*

If the autolevel is bumped out of position before all the measurements are done, or if there is a point along the reach at which there is no longer a clear line of sight from the autolevel to the Stadia rod positioned at the transect, at water's edge, a new location must be set up for the autolevel. In order to maintain a relationship between water heights of the various transects already measured, it will be necessary to "re-shoot" the height of the water at the last transect for which a valid measurement was attained. From there, assuming there is no more disturbance to the position of the autolevel, you can continue cycling through the remaining transects from the new position. On the Slope and Bearing Form corresponding to autolevel use, indicate when the autolevel's position has been changed. If it is necessary to move the autolevel at some point, the transect that was measured from the original and the new position will be listed twice on

the datasheet: once for the original position, and once for the new. Also indicate the distance between main transects (i.e., 15 m, 25 m or other). These pieces of information will later be used to determine the slopes between transects and for the reach as a whole.

8.2 STREAM DISCHARGE

Stream discharge is the volume of water that moves past a point in a given amount of time and is generally reported as cubic feet per second (cfs) or cubic meters per second (cms). Because discharge is directly related to water volume, discharge affects the concentration of nutrients, fine sediments and pollutants; and discharge measurements are critical for understanding impacts of disturbances such as impoundments, water withdrawals and water augmentation. Discharge is also closely related to many habitat characteristics including temperature regimes, physical habitat diversity, and habitat connectivity. As a direct result of these relationships, stream discharge is often also a strong predictor of biotic community composition. Since stream volume can vary significantly on many different temporal scales (diurnal, seasonal, inter-annually), it can also be very useful for understanding variation in stream condition.

It is preferable to take discharge measurements in sections where flow velocities are greater than 0.5 ft/s and most depths are greater than 15 cm, but slower velocities and shallower depths can be used. If flow volume is sufficient for a transect-based "velocity-area" discharge calculation, this is by far the preferred method. If flow volume is too low to permit this procedure or if your flow meter fails, use the "neutrally buoyant object/ timed flow" method.

8.2.1 Discharge: Velocity Area Method

The layout for discharge measurements under the velocity-area (VA) method is illustrated in Figure 13. Flow velocity should be measured with either a Swoffer Instruments propeller-type flow meter or a Marsh-McBirney inductive probe flow meter.

Select the best location in the reach for measuring discharge. To maximize the repeatability of the discharge measurement, choose a transect with the most uniform flow (select hydraulically smooth flow whenever possible) and simplest cross-sectional geometry. It is acceptable to move substrates or other obstacles to create a more uniform cross-section before beginning the discharge measurements.

Data for this parameter will be entered in the "Discharge Measurements" section of the datasheet with the basic site information at the top ("Reach Documentation"). Measure the wetted width of the discharge transect and divide this into 10 to 20 equal segments. The use of more segments gives a better discharge calculation, but is impractical in small channels. A minimum of 10 intervals should be used when stream width permits, but interval width should not be less than 15 cm.

At each interval, record the distance from the bank to the end of the interval. Using the top-setting rod that comes with the flow velocity meter, measure the median depth of the interval. Standing downstream of the

transect to avoid interfering with the flow, use the top-setting rod to set the probe of the flow meter at the midpoint of the interval, at 0.6 of the interval depth (this position generally approximates average velocity in the water column), and at right angles to the transect (facing upstream). See Figure 13 for positioning detail.

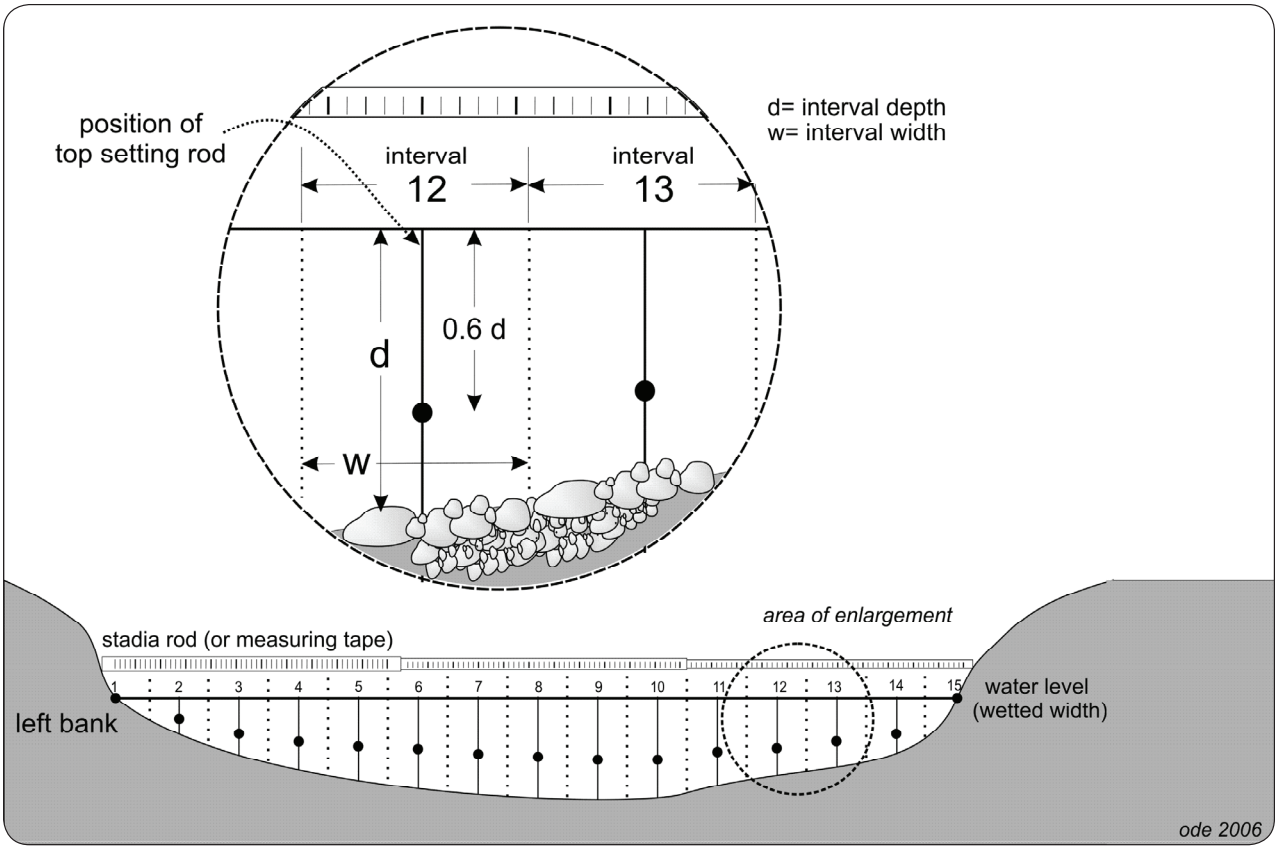

Figure 13. Diagram of layout for discharge measurements under the velocity-area method showing proper positions for velocity probe (black dots; reprinted from Ode 2007).

Allow the flow velocity meter to equilibrate for 10-20 seconds, then record velocity to the nearest ft/s. If the option is available, use the flow averaging setting on the flow meter. *Note 1: Under very low flow conditions, flow velocity meters may register readings of zero even when there is noticeable flow. In these situations, record a velocity of 0.5x the minimum flow detection capabilities of the instrument. Complete these steps on each of the intervals across the stream. Note 2: The first and last intervals usually have depths and velocities of zero.*

8.2.2 Discharge: Neutrally Buoyant Object Method

If streams are too shallow to use a flow velocity meter, the neutrally buoyant object (NBO) method should be used to measure flow velocity. However, since this method is less precise than the flow velocity meter

it should only be used if absolutely necessary. A neutrally buoyant object (one whose density allows it to just balance between sinking and floating) will act as if it were nearly weightless, thus its movement will approximate that of the water it floats in better than a light object. A piece of orange peel works well. To estimate the flow velocity through a reach, three transects are used to measure the cross-sectional areas within the test section sub-reach and three flow velocity estimates are used to measure average velocity through the test reach. To improve precision in velocity measurements, the reach segment should be long enough for the float time to last at least 10-15 seconds.

The position of the discharge sub-reach is not as critical as it is for the velocity-area method, but the same criteria for selection of a discharge reach apply to the neutrally buoyant object method. Identify a section that has relatively uniform flow and a uniform cross sectional shape.

The cross sectional area is estimated in a manner that is similar to, but less precise than, that used in the velocity area method. Measure the cross sectional area in one to three places in the section designated for the discharge measurement (three evenly-spaced cross sections are preferred, but one may be used if the cross section through the reach is very uniform). Record the width once for each cross section and measure depth at five equally-spaced positions along each transect.

Record the length of the discharge reach.

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GLOSSARY OF TERMS USED IN SOP G

Terms & Definitions	
TERM	**DEFINITION**
Aliquot	a measured portion of a sample, or subsample, or to measure a portion of a sample or subsample
Ash-free dry mass (AFDM)	the portion, by mass, of a dried sample that is represented by organic matter; the concentration of AFDM per stream surface area sampled can be used as a surrogate for algal biomass
Benthic algae	algae that are anchored to, or have at one point been anchored to, the stream bottom, in contrast to planktonic algae which are free-floating in the water column
Biofilm	a matrix/film adhering to stream substrata and consisting of microorganisms (e.g., algae, fungi, bacteria, protozoans) and detritus
Chlorophyll *a*	primary light receptor/photosynthetic pigment in algae and higher plants; the concentration of this pigment per stream surface area sampled provides an estimate of algal biomass
Composite sample	volume of all the liquid material amassed during sampling, including water used for rinsing substrate and sampling devices. Final composite volume should not exceed 400-500 ml.
Cyanobacteria	historically referred to as "blue-green" algae, but actually bacteria that are capable of photosynthesis and co-occur with true benthic algae in streams; useful as a bioindicator, and field-sampled and laboratory-processed concurrently with soft-bodied algae
Depositional	habitats in the stream that are dominated by slow-moving water, such as pools, where deposition of materials from the water column is more likely to occur than erosion (or (re)suspension) of loose bed materials; examples of "depositional" substrates include silt and sand
Diatom	a unicellular alga that possesses a rigid, silicified (silica-based) cell wall in the form of a "pill box"
Erosional	habitats in the stream that are dominated by fast-moving water, such as riffles, where stream power is more likely to facilitate erosion (suspension) of loose benthic material than deposition; examples of "erosional" substrates include cobbles and boulders
Homogenate	mixture of liquid composite sample and finely chopped fragments of macroalgae
Index of Biotic Integrity (IBI)	a quantitative assessment tool that uses information about the composition of one or more assemblages of organisms to make inferences about condition the environment they occupy (e.g., the assemblage of interest could be diatoms or benthic macroinvertebrates living in a stream)
Macroalgae	soft bodied algae that form macroscopically discernible filaments, mats, or globose structures
Microalgae	diatoms and microscopic soft-bodied algae, including unicellular forms; can co-occur with other microorganisms in a biofilm
Reachwide benthos (RWB)	method for biotic assemblage sample collection that does not target a specific substrate type, but rather objectively selects sampling locations across the reach, allowing for any of a number of substrate types to be represented in the resulting composite sample
Soft-bodied algae	non-diatom algal taxa; for the purposes of this SOP, cyanobacteria are subsumed under this assemblage
Wetted width	the distance between the sides of the channel at the point where substrates are no longer surrounded by surface water

List of Supplies for Stream Algae Sampling and Associated Data Collection A

Table 5.
General Supplies and Ambient Water Chemistry Collection

Item	Quantity / Site	Specifications
Sampling SOP (this document)	1/person	
Equipment decontamination supplies		See Appendix B
Hip or chest waders, or wading boots/shoes (not felt-soled)	at least 1 pair/ person	
Digital camera	1	
Full set of datasheets printed on waterproof paper (e.g., Rite-in-the-Rain™)	1 full set (and spare set recommended)	
Fine-tipped and thick-tipped waterproof/alcohol-proof pens and markers; pencils	2-3 each	
Clipboard	2-3	
Site dossier containing site maps, aerials, etc.	1	Add a 150 m scale line to aerials adjacent to stream
Thomas Guide and regional maps	as needed	
Centigrade thermometer	1	
pH meter	1	
DO meter and spare membrane	1	
Conductivity meter	1	
Turbidimeter and vial(s) (optional)	1	
Field alkalinity meter or test kit (e.g., Hach)	1	
Water chemistry containers	as needed	
Calibration standards	1	
Spare batteries for meters	as needed	
First aid kit	1	

Table 6.
Algal Taxonomic and Biomass Sample Collection

Needed for[1]:	Item	Quantity / Site	Specifications
D, S, C, A	White dish tub, rectangular, plastic, 11.5 qt	1	Use white, not colored
D, S, C, A	Scrubbing brush or scouring pad to clean dish tub, etc.	1	
D, S, C, A	Composite sample receiving bottle with cap, 1 L, plastic	1	Fisher 02-912-038
D, S, C, A	Graduated cylinder, 500 mL and 25 mL, plastic	1 each	Fisher 03-007-42 & 03-007-39
D, S, C, A	Bottle brush to clean graduated cylinders, etc.	1 sm, 1 lg	
D, S, C, A	PVC delimiter, 12.6 cm^2 area	1	See Appendix D
D, S, C, A	Spatula (> 12.6 cm^2 surface area)	1	
D, S, C, A	Rubber delimiter, 12.6 cm^2 area	1	See Appendix D
D, S, C, A	Toothbrush, firm-bristled	1	
D, S, C, A	Syringe scrubber, 60 mL syringe, 5.3 cm^2 area	1	See Appendix D
D, S, C, A	White (non-pigmented) scrubbing-pad circles	11 per replicate	See Appendix D
D, S, C, A	Tally meter (optional)	1	Ben Meadows 9JB-102385
D, S, C, A	Scissors	1	
D, S, C, A	Wash bottles	2	Label bottles with "stream water", and "DI water"
D, S, C, A	Razor blades or Swiss army knife	1	
D, S, C, A	Sample labels (printed on waterproof paper)	4 per replicate	See Figure 6
D, S, C, A	Clear plastic tape, 5 cm wide	Length of ~20cm per replicate	
D, S, C, A	Ice chest with wet ice	1 (2 preferred if multiple sites to be sampled)	
D, S, C, A	Fisherman's vest (optional)	1	
D, S	Centrifuge tubes, 50 mL, plastic	2 per replicate	Cole Parmer 06344-27
D, S	Rack for 50 mL centrifuge tubes	1	
D	10% formalin solution buffered with borax	10 mL per replicate	See Appendix D
D	Formalin-resistant gloves	1 pair	
D	Safety goggles or face shield	1	
D	Small syringe or bulb pipette	1	

1. "D" = diatom sample, "S" = soft-bodied algal sample, "C" = chlorophyll a sample, "A" = ash-free dry mass sample

Needed for[1]:	Item	Quantity / Site	Specifications
D	Vermiculite packing material	as needed	
S	Turkey baster	1	
S (see note)	25% glutaraldehyde solution (to be dispensed in a laboratory fume hood, wearing appropriate safety gear)	5 mL per replicate	*Note: could be added by taxonomy lab, with prior notification*
S	Calculator	1	
S	Small metric ruler (waterproof)	1	
S	Small Ziploc bag	1	
S, C, A	Whirl-pak bag, 100 mL	3 per replicate	Cole Parmer 06498-00
C, A	Filter forceps	1	Fisher 0975350
C, A	Filtering chamber/tower, 47 mm, plastic	1	Hach 2254400
C, A	Hand vacuum pump	1	Fisher 13-874-612B
C, A	Aluminum foil	~100 cm^2 per replicate	
C, A	Deionized water	500 mL	
C, A	Dry ice (if not returning to lab immediately following the day's fieldwork)	10 lbs	
C	Glass fiber filter, 47 mm, 0.7 µm pore size	1 per replicate	Fisher 09804142H
C	Snapping Petri dish, 47 µm	1 per replicate	Fisher 08-757-105
A	Glass fiber filter, 47 mm, 0.7 µm pore size; foil-wrapped and pre-combusted for ash-free dry mass (AFDM)	1 per replicate	

1. "D" = diatom sample, "S" = soft-bodied algal sample, "C" = chlorophyll a sample, "A" = ash-free dry mass sample

Table 7.
Physical Habitat Data Collection

Item	Quantity / Site	Specifications
GPS receiver	1	
Transect tape; 150 m	1	
Lengths of rope (7.5 m and 12.5 m)	1 each	
Small metric folding ruler (waterproof)	1	
Digital watch	1	
Stadia rod	1	
Clinometer	1	
Autolevel and tripod	1	
Current velocity meter and top-setting rod	1	
Convex spherical densiometer	1	Taped to expose only 17 intersections of the grid (see Figure 12)
Transect flags	21 total	Two colors; label with main transect (11 ct.) and inter-transect (10 ct.) names
Algae viewing bucket (optional)	1	See Appendix D
Small/slender rod with 1, 5, and 20 mm marks	1	For measuring microalgal thickness
Rangefinder (optional)	1	
Fresh orange peel	1	

Information Resources for Avoiding Introduction of Invasive Species and Pathogens into Streams

B

The following is an adaptation of an excerpt taken from an EMAP-based Quality Assurance Project Plan developed by the California Department of Fish and Game Aquatic Bioassessment Laboratory (2008).

Organisms of concern in the U.S. include, but may not be limited to, Eurasian watermilfoil (*Myriophyllum spicatum*), New Zealand mud snail (*Potamopyrgus antipodarum*), zebra mussel (*Dreissena polymorpha*), *Myxobolus cerebralis* (the sporozoan parasite that causes salmonid whirling disease), and *Batrachochytrium dendrobatidis* (a chytrid fungus that threatens amphibian populations).

Field crews must be aware of regional species of concern, and take appropriate precautions to avoid transfer of these species. Crews should make every attempt to be apprised of the most up-to-date information regarding the emergence of new species of concern, as well as new advances in approaches to hygiene and decontamination to prevent the spread of all such organisms (e.g., Hosea and Finlayson, 2005; Schisler et al., 2008).

There are several online sources of information regarding invasive species, including information on cleaning and disinfecting gear:

Whirling Disease Foundation
www.whirling-disease.org

USDA Forest Service - Preventing Accidental Introductions of Freshwater Invasive Species
www.fs.fed.us/invasivespecies/documents/Aquatic_is_prevention.pdf

California Department of Fish and Game
www.dfg.ca.gov

U.S. Geological Survey Nonindigenous Aquatic Species: general information about freshwater invasive species
http://nas.er.usgs.gov

Protect Your Waters - Co-sponsored by the U.S. Fish and Wildlife Service
www.protectyourwaters.net/hitchhikers

The California State Water Resources Control Board Aquatic Invasive Species website

www.swrcb.ca.gov/water_issues/programs/swamp/ais

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BIOASSESSMENT FIELD DATA SHEETS WITH ALGAE C

SWAMP Field Forms for Benthic Macroinvertebrates, Algae, and Physical Habitat Sample and Data Collection. *Note: Field forms may be updated periodically. It is imperative that field crews ensure that they are always using the most current field forms. Updated forms can be accessed from the SWAMP website at: http://swamp.mpsl.mlml.calstate.edu/resources-and-downloads*

SWAMP Stream Habitat Characterization Form *FULL VERSION* *Revision Date: March 30th, 2009*

REACH DOCUMENTATION

Standard Reach Length (wetted width ≤ 10 m) = 150 m Distance between transects = 15 m
Alternate Reach Length (wetted width >10 m) = 250 m Distance between transects = 25 m

Project Name:	Date:	Time:
Stream Name:	Site Name/ Description:	
Site Code:	Crew Members:	
Latitude (actual – decimal degrees): ºN	datum: NAD83	
Longitude (actual – decimal degrees): ºW	other:	

AMBIENT WATER QUALITY MEASUREMENTS

turbidity and silica are optional; calibration date required

Temp (°C)		pH		Alkalinity (mg/L)		Turbidity (ntu)	
		cal. date				cal. date	
Dissolved O^2 (mg/L)		Specific. Conduct (µS/cm)		Salinity. (ppt)		Silica (mg/L)	
cal. date		cal. date		cal. date		cal. date	

REACH LENGTH

Actual Length (m) *(see reach length guidelines at top of form)*	
Explanation:	

DISCHARGE MEASUREMENTS

1st measurement = left bank (looking downstream)

check if discharge measurements not possible (explain in field notes section) ☐

VELOCITY AREA METHOD (preferred)

cal. date

Transect Width (m):

	Distance from Left Bank (cm)	Depth (cm)	Velocity (ft/sec)		Distance from Left Bank (cm)	Depth (cm)	Velocity (ft/sec)
1				11			
2				12			
3				13			
4				14			
5				15			
6				16			
7				17			
8				18			
9				19			
10				20			

BUOYANT OBJECT METHOD (use ONLY if velocity area method not possible)

	Float 1	Float 2	Float 3
Distance (m)			
Float Time (sec)			

Float Reach Cross Section

width (m) depth(cm)	Upper Section	Middle Section	Lower Section
Width			
Depth 1			
Depth 2			
Depth 3			
Depth 4			
Depth 5			

NOTABLE FIELD CONDITIONS (check one box per topic)

Evidence of recent rainfall (enough to increase surface runoff)	NO		minimal		>10% flow increase	
Evidence of fires in reach or immediately upstream (<500 m)	NO		< 1 year		< 5 years	
Dominant landuse/ landcover in area surrounding reach	Agriculture		Forest		Rangeland	
	Urban/ Industrial		Suburb/Town		Other	

ADDITIONAL COBBLE EMBEDDEDNESS MEASURES

(carry over from transect forms if needed; measure in %)

1	2	3	4	5	6	7	8	9	10	11	12	13
14	15	16	17	18	19	20	21	22	23	24	25	

Site Code:	Date: __ __ / __ __ / __ __ __ __

SLOPE and BEARING FORM (transect based - for Full PHAB only)

AUTOLEVEL	
CLINOMETER	
HANDLEVEL	
OTHER	

Starting Transect	MAIN SEGMENT (record percent of inter-transect distance in each segment **if supplemental segments are used**)					SUPPLEMENTAL SEGMENT (record percent of inter-transect distance in each segment **if supplemental segments are used**)				
	Stadia rod measurements	Slope (%) or Elevation Difference cm ☐ % ☐	Segment Length (m)	Bearing (0°-359°)	Percent of Total Length (%)	Stadia rod measurements	Slope or Elevation Difference cm ☐ % ☐	Segment Length (m)	Bearing (0°-359°)	Percent of Total Length (%)
K										
J										
I										
H										
G										
F										
E										
D										
C										
B										
A										
additional calculation area										

ADDITIONAL HABITAT CHARACTERIZATION

High Gradient ☐ Low Gradient ☐

Parameter	Optimal	Suboptimal	Marginal	Poor
Epifaunal Substrate/ Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover (50% for low-gradient streams); mix of submerged logs, undercut banks, cobble or other stable habitat	40-70% mix of stable habitat (30-50% for low-gradient streams); well-suited for full colonization potential	20-40% mix of stable habitat (10-30% in low-gradient streams); substrate frequently disturbed or removed	Less than 20% stable habitat (10% in low-gradient streams); lack of habitat is obvious; substrate unstable or lacking
Score:	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% of the bottom affected by sediment deposition (<20% in low-gradient streams)	Some new increase in bar formation, mostly from gravel, sand, or fine sediment; 5-30% of the bottom affected (20-50% in low-gradient streams)	Moderate deposition of new gravel, sand, or fine sediment on bars; 30-50% of the bottom affected (50 - 80% in low-gradient streams)	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently (>80% in low-gradient streams)
Score:	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern	Some channelization present, (e.g., bridge abutments); evidence of past channelization (> 20yrs) may be present but recent channelization not present	Channelization may be extensive: embankments or shoring structures present on both banks; 40 to 80% of stream reach disrupted	Banks shored with gabian or cement; Over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely
Score:	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

Site Code:	Site Name:		Date: __ __ / __ __ / 2009
Wetted Width (m):	Bankfull Width (m):	Bankfull Height (m):	**Transect A**

Transect Substrates

Position	Dist from LB (m)	Depth (cm)	mm/ size class	% Cobble Embed.	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes
Left Bank					P A		P A D	P A D	P A
Left Center					P A		P A D	P A D	P A
Center					P A		P A D	P A D	P A
Right Center					P A		P A D	P A D	P A
Right Bank					P A		P A D	P A D	P A

Note: Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of the size class categories listed on the supplemental page (direct measurements preferred)

Microalgae Thickness Codes
0 = No microalgae present, Feels rough, not slimy;
1 = Present but not visible, Feels slimy;
2 = Present and visible but <1mm; Rubbing fingers on surface produces a brownish tint on them, scraping leaves visible trail.
3 = 1-5mm;
4 = 5-20mm;
5 = >20mm;
Z = Cannot determine if microalgae present, substrate too small or covered with silt.
D = Dry, not assessed

RIPARIAN VEGETATION
(facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy (>75%)
2 = Moderate (10-40%)

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	0 1 2 3 4	0 1 2 3 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	0 1 2 3 4	0 1 2 3 4
Ground Cover (<0.5 m high)		
Woody shrubs & saplings <0.5 m	0 1 2 3 4	0 1 2 3 4
Herbs/ grasses	0 1 2 3 4	0 1 2 3 4
Barren, bare soil/ duff	0 1 2 3 4	0 1 2 3 4

INSTREAM HABITAT COMPLEXITY

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	0 1 2 3 4
Aquatic Macrophytes/ Emergent Vegetation	0 1 2 3 4
Boulders	0 1 2 3 4
Woody Debris >0.3 m	0 1 2 3 4
Woody Debris <0.3 m	0 1 2 3 4
Undercut Banks	0 1 2 3 4
Overhang. Vegetation	0 1 2 3 4
Live Tree Roots	0 1 2 3 4
Artificial Structures	0 1 2 3 4

DENSIOMETER READINGS (0-17)
count covered dots

Center Left	
Center Upstream	
Center Downstream	
Center Right	
Optional	
Left Bank	
Right Bank	

HUMAN INFLUENCE
(circle only the closest to wetted channel)

0 = Not Present;
B = On Bank;
C = Between Bank & 10m from Channel;
P = >10m+<50m from Channel;
Channel (record Yes or No)

	Left Bank	Channel	Right Bank
Walls/ Rip-rap/ Dams	P C B 0	Y N	0 B C P
Buildings	P C B 0	Y N	0 B C P
Pavement/ Cleared Lot	P C B 0		0 B C P
Road/ Railroad	P C B 0	Y N	0 B C P
Pipes (Inlet/ Outlet)	P C B 0	Y N	0 B C P
Landfill/ Trash	P C B 0	Y N	0 B C P
Park/ Lawn	P C B 0		0 B C P
Row Crop	P C B 0		0 B C P
Pasture/ Range	P C B 0		0 B C P
Logging Operations	P C B 0		0 B C P
Mining Activity	P C B 0	Y N	0 B C P
Vegetation Management	P C B 0		0 B C P
Bridges/ Abutments	P C B 0	Y N	0 B C P
Orchards/ Vineyards	P C B 0		0 B C P

BANK STABILITY
(score zone 5m upstream and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	vulnerable	stable
Right Bank	eroded	vulnerable	stable

TAKE PHOTOGRAPHS
(check box if taken & record photo code)

Downstream (**optional**) ☐

Upstream (**required**) ☐

Inter-Transect: AB

Wetted Width (m):

Inter-Transect Substrates

Position	Dist from LB (m)	Depth (cm)	mm/ size class	% Cobble Embed.	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes
Left Bank					P A		P A D	P A D	P A
Left Center					P A		P A D	P A D	P A
Center					P A		P A D	P A D	P A
Right Center					P A		P A D	P A D	P A
Right Bank					P A		P A D	P A D	P A
	Note: Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of the size class categories listed on the supplemental page (direct measurements preferred)								

Microalgae Thickness Codes

0 = No microalgae present, Feels rough, not slimy;
1 = Present but not visible, Feels slimy;
2 = Present and visible but <1mm; Rubbing fingers on surface produces a brownish tint on them, scraping leaves visible trail.
3 = 1-5mm;
4 = 5-20mm;
5 = >20mm;
Z = Cannot determine if microalgae present, substrate too small or covered with silt.
D = Dry, not assessed

FLOW HABITATS
(% between transects, total=100%)

Channel Type	%
Cascade/ Falls	
Rapid	
Riffle	
Run	
Glide	
Pool	
Dry	

SWAMP Stream Habitat Characterization Form *FULL VERSION* *Revision Date: March 30th, 2009*

Site Code:	Site Name:		Date: __ __ / __ __ / 2009
Wetted Width (m):	Bankfull Width (m):	Bankfull Height (m):	**Transect B**

Transect Substrates

Position	Dist from LB (m)	Depth (cm)	mm/ size class	% Cobble Embed.	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes
Left Bank					P A		P A D	P A D	P A
Left Center					P A		P A D	P A D	P A
Center					P A		P A D	P A D	P A
Right Center					P A		P A D	P A D	P A
Right Bank					P A		P A D	P A D	P A

Note: Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of the size class categories listed on the supplemental page (direct measurements preferred)

Microalgae Thickness Codes
0 = No microalgae present, Feels rough, not slimy;
1 = Present but not visible, Feels slimy;
2 = Present and visible but <1mm; Rubbing fingers on surface produces a brownish tint on them, scraping leaves visible trail.
3 = 1-5mm;
4 = 5-20mm;
5 = >20mm;
Z = Cannot determine if microalgae present, substrate too small or covered with silt.
D = Dry, not assessed

Riparian Vegetation
(facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy (>75%)
2 = Moderate (10-40%)

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	0 1 2 3 4	0 1 2 3 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	0 1 2 3 4	0 1 2 3 4
Ground Cover (<0.5 m high)		
Woody shrubs & saplings <0.5 m	0 1 2 3 4	0 1 2 3 4
Herbs/ grasses	0 1 2 3 4	0 1 2 3 4
Barren, bare soil/ duff	0 1 2 3 4	0 1 2 3 4

Instream Habitat Complexity

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	0 1 2 3 4
Aquatic Macrophytes/ Emergent Vegetation	0 1 2 3 4
Boulders	0 1 2 3 4
Woody Debris >0.3 m	0 1 2 3 4
Woody Debris <0.3 m	0 1 2 3 4
Undercut Banks	0 1 2 3 4
Overhang. Vegetation	0 1 2 3 4
Live Tree Roots	0 1 2 3 4
Artificial Structures	0 1 2 3 4

Densiometer Readings (0-17)
count covered dots

Center Left	
Center Upstream	
Center Downstream	
Center Right	
Optional	
Left Bank	
Right Bank	

Human Influence
(circle only the closest to wetted channel)

0 = Not Present;
B = On Bank;
C = Between Bank & 10m from Channel;
P = >10m+<50m from Channel;
Channel (record Yes or No)

	Left Bank	Channel	Right Bank
Walls/ Rip-rap/ Dams	P C B 0	Y N	0 B C P
Buildings	P C B 0	Y N	0 B C P
Pavement/ Cleared Lot	P C B 0		0 B C P
Road/ Railroad	P C B 0	Y N	0 B C P
Pipes (Inlet/ Outlet)	P C B 0	Y N	0 B C P
Landfill/ Trash	P C B 0	Y N	0 B C P
Park/ Lawn	P C B 0		0 B C P
Row Crop	P C B 0		0 B C P
Pasture/ Range	P C B 0		0 B C P
Logging Operations	P C B 0		0 B C P
Mining Activity	P C B 0	Y N	0 B C P
Vegetation Management	P C B 0		0 B C P
Bridges/ Abutments	P C B 0	Y N	0 B C P
Orchards/ Vineyards	P C B 0		0 B C P

Bank Stability
(score zone 5m upstream and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	vulnerable	stable
Right Bank	eroded	vulnerable	stable

Inter-Transect: BC

Wetted Width (m):

Inter-Transect Substrates

Position	Dist from LB (m)	Depth (cm)	mm/ size class	% Cobble Embed.	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes
Left Bank					P A		P A D	P A D	P A
Left Center					P A		P A D	P A D	P A
Center					P A		P A D	P A D	P A
Right Center					P A		P A D	P A D	P A
Right Bank					P A		P A D	P A D	P A
	Note: Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of the size class categories listed on the supplemental page (direct measurements preferred)								

Microalgae Thickness Codes

0 = No microalgae present, Feels rough, not slimy;
1 = Present but not visible, Feels slimy;
2 = Present and visible but <1mm; Rubbing fingers on surface produces a brownish tint on them, scraping leaves visible trail.
3 = 1-5mm;
4 = 5-20mm;
5 = >20mm;
Z = Cannot determine if microalgae present, substrate too small or covered with silt.
D = Dry, not assessed

FLOW HABITATS
(% between transects, total=100%)

Channel Type	%
Cascade/ Falls	
Rapid	
Riffle	
Run	
Glide	
Pool	
Dry	

SWAMP Stream Habitat Characterization Form *FULL VERSION* *Revision Date: March 30th, 2009*

Site Code:	Site Name:		Date: __ __ / __ __ / 2009
Wetted Width (m):	Bankfull Width (m):	Bankfull Height (m):	**Transect C**

Transect Substrates

Position	Dist from LB (m)	Depth (cm)	mm/ size class	% Cobble Embed.	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes
Left Bank					P A		P A D	P A D	P A
Left Center					P A		P A D	P A D	P A
Center					P A		P A D	P A D	P A
Right Center					P A		P A D	P A D	P A
Right Bank					P A		P A D	P A D	P A

Note: Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of the size class categories listed on the supplemental page (direct measurements preferred)

Microalgae Thickness Codes
0 = No microalgae present, Feels rough, not slimy;
1 = Present but not visible, Feels slimy;
2 = Present and visible but <1mm; Rubbing fingers on surface produces a brownish tint on them, scraping leaves visible trail.
3 = 1-5mm;
4 = 5-20mm;
5 = >20mm;
Z = Cannot determine if microalgae present, substrate too small or covered with silt.
D = Dry, not assessed

Riparian Vegetation
(facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy (>75%)
2 = Moderate (10-40%)

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	0 1 2 3 4	0 1 2 3 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	0 1 2 3 4	0 1 2 3 4
Ground Cover (<0.5 m high)		
Woody shrubs & saplings <0.5 m	0 1 2 3 4	0 1 2 3 4
Herbs/ grasses	0 1 2 3 4	0 1 2 3 4
Barren, bare soil/ duff	0 1 2 3 4	0 1 2 3 4

Instream Habitat Complexity

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	0 1 2 3 4
Aquatic Macrophytes/ Emergent Vegetation	0 1 2 3 4
Boulders	0 1 2 3 4
Woody Debris >0.3 m	0 1 2 3 4
Woody Debris <0.3 m	0 1 2 3 4
Undercut Banks	0 1 2 3 4
Overhang. Vegetation	0 1 2 3 4
Live Tree Roots	0 1 2 3 4
Artificial Structures	0 1 2 3 4

Densiometer Readings (0-17)
count covered dots

Center Left	
Center Upstream	
Center Downstream	
Center Right	
Optional	
Left Bank	
Right Bank	

Human Influence
(circle only the closest to wetted channel)

0 = Not Present;
B = On Bank;
C = Between Bank & 10m from Channel;
P = >10m+<50m from Channel;
Channel (record Yes or No)

	Left Bank	Channel	Right Bank
Walls/ Rip-rap/ Dams	P C B 0	Y N	0 B C P
Buildings	P C B 0	Y N	0 B C P
Pavement/ Cleared Lot	P C B 0		0 B C P
Road/ Railroad	P C B 0	Y N	0 B C P
Pipes (Inlet/ Outlet)	P C B 0	Y N	0 B C P
Landfill/ Trash	P C B 0	Y N	0 B C P
Park/ Lawn	P C B 0		0 B C P
Row Crop	P C B 0		0 B C P
Pasture/ Range	P C B 0		0 B C P
Logging Operations	P C B 0		0 B C P
Mining Activity	P C B 0	Y N	0 B C P
Vegetation Management	P C B 0		0 B C P
Bridges/ Abutments	P C B 0	Y N	0 B C P
Orchards/ Vineyards	P C B 0		0 B C P

Bank Stability
(score zone 5m upstream and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	vulnerable	stable
Right Bank	eroded	vulnerable	stable

Inter-Transect: CD

Wetted Width (m):

Inter-Transect Substrates

Position	Dist from LB (m)	Depth (cm)	mm/ size class	% Cobble Embed.	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes
Left Bank					P A		P A D	P A D	P A
Left Center					P A		P A D	P A D	P A
Center					P A		P A D	P A D	P A
Right Center					P A		P A D	P A D	P A
Right Bank					P A		P A D	P A D	P A
	Note: Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of the size class categories listed on the supplemental page (direct measurements preferred)								

Microalgae Thickness Codes

0 = No microalgae present, Feels rough, not slimy;
1 = Present but not visible, Feels slimy;
2 = Present and visible but <1mm; Rubbing fingers on surface produces a brownish tint on them, scraping leaves visible trail.
3 = 1-5mm;
4 = 5-20mm;
5 = >20mm;
Z = Cannot determine if microalgae present, substrate too small or covered with silt.
D = Dry, not assessed

FLOW HABITATS
(% between transects, total=100%)

Channel Type	%
Cascade/ Falls	
Rapid	
Riffle	
Run	
Glide	
Pool	
Dry	

SWAMP Stream Habitat Characterization Form *FULL VERSION* *Revision Date: March 30th, 2009*

Site Code:	Site Name:		Date: __ __ / __ __ / 2009
Wetted Width (m):	Bankfull Width (m):	Bankfull Height (m):	**Transect D**

Transect Substrates

Position	Dist from LB (m)	Depth (cm)	mm/ size class	% Cobble Embed.	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes
Left Bank					P A		P A D	P A D	P A
Left Center					P A		P A D	P A D	P A
Center					P A		P A D	P A D	P A
Right Center					P A		P A D	P A D	P A
Right Bank					P A		P A D	P A D	P A

Note: Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of the size class categories listed on the supplemental page (direct measurements preferred)

Microalgae Thickness Codes
0 = No microalgae present, Feels rough, not slimy;
1 = Present but not visible, Feels slimy;
2 = Present and visible but <1mm; Rubbing fingers on surface produces a brownish tint on them, scraping leaves visible trail.
3 = 1-5mm;
4 = 5-20mm;
5 = >20mm;
Z = Cannot determine if microalgae present, substrate too small or covered with silt.
D = Dry, not assessed

Riparian Vegetation
(facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy (>75%)
2 = Moderate (10-40%)

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	0 1 2 3 4	0 1 2 3 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	0 1 2 3 4	0 1 2 3 4
Ground Cover (<0.5 m high)		
Woody shrubs & saplings <0.5 m	0 1 2 3 4	0 1 2 3 4
Herbs/ grasses	0 1 2 3 4	0 1 2 3 4
Barren, bare soil/ duff	0 1 2 3 4	0 1 2 3 4

Instream Habitat Complexity

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	0 1 2 3 4
Aquatic Macrophytes/ Emergent Vegetation	0 1 2 3 4
Boulders	0 1 2 3 4
Woody Debris >0.3 m	0 1 2 3 4
Woody Debris <0.3 m	0 1 2 3 4
Undercut Banks	0 1 2 3 4
Overhang. Vegetation	0 1 2 3 4
Live Tree Roots	0 1 2 3 4
Artificial Structures	0 1 2 3 4

Densiometer Readings (0-17)
count covered dots

Center Left	
Center Upstream	
Center Downstream	
Center Right	
Optional	
Left Bank	
Right Bank	

Human Influence
(circle only the closest to wetted channel)

0 = Not Present;
B = On Bank;
C = Between Bank & 10m from Channel;
P = >10m+<50m from Channel;
Channel (record Yes or No)

	Left Bank	Channel	Right Bank
Walls/ Rip-rap/ Dams	P C B 0	Y N	0 B C P
Buildings	P C B 0	Y N	0 B C P
Pavement/ Cleared Lot	P C B 0		0 B C P
Road/ Railroad	P C B 0	Y N	0 B C P
Pipes (Inlet/ Outlet)	P C B 0	Y N	0 B C P
Landfill/ Trash	P C B 0	Y N	0 B C P
Park/ Lawn	P C B 0		0 B C P
Row Crop	P C B 0		0 B C P
Pasture/ Range	P C B 0		0 B C P
Logging Operations	P C B 0		0 B C P
Mining Activity	P C B 0	Y N	0 B C P
Vegetation Management	P C B 0		0 B C P
Bridges/ Abutments	P C B 0	Y N	0 B C P
Orchards/ Vineyards	P C B 0		0 B C P

Bank Stability
(score zone 5m upstream and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	vulnerable	stable
Right Bank	eroded	vulnerable	stable

Inter-Transect: DE

Wetted Width (m):

Inter-Transect Substrates

Position	Dist from LB (m)	Depth (cm)	mm/ size class	% Cobble Embed.	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes
Left Bank					P A		P A D	P A D	P A
Left Center					P A		P A D	P A D	P A
Center					P A		P A D	P A D	P A
Right Center					P A		P A D	P A D	P A
Right Bank					P A		P A D	P A D	P A
	Note: Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of the size class categories listed on the supplemental page (direct measurements preferred)								

Microalgae Thickness Codes

0 = No microalgae present, Feels rough, not slimy;
1 = Present but not visible, Feels slimy;
2 = Present and visible but <1mm; Rubbing fingers on surface produces a brownish tint on them, scraping leaves visible trail.
3 = 1-5mm;
4 = 5-20mm;
5 = >20mm;
Z = Cannot determine if microalgae present, substrate too small or covered with silt.
D = Dry, not assessed

FLOW HABITATS
(% between transects, total=100%)

Channel Type	%
Cascade/ Falls	
Rapid	
Riffle	
Run	
Glide	
Pool	
Dry	

SWAMP Stream Habitat Characterization Form *FULL VERSION* *Revision Date: March 30th, 2009*

Site Code:	Site Name:		Date: __ __ / __ __ / 2009
Wetted Width (m):	Bankfull Width (m):	Bankfull Height (m):	**Transect E**

Transect Substrates

Position	Dist from LB (m)	Depth (cm)	mm/ size class	% Cobble Embed.	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes
Left Bank					P A		P A D	P A D	P A
Left Center					P A		P A D	P A D	P A
Center					P A		P A D	P A D	P A
Right Center					P A		P A D	P A D	P A
Right Bank					P A		P A D	P A D	P A

Note: Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of the size class categories listed on the supplemental page (direct measurements preferred)

Microalgae Thickness Codes
0 = No microalgae present, Feels rough, not slimy;
1 = Present but not visible, Feels slimy;
2 = Present and visible but <1mm; Rubbing fingers on surface produces a brownish tint on them, scraping leaves visible trail.
3 = 1-5mm;
4 = 5-20mm;
5 = >20mm;
Z = Cannot determine if microalgae present, substrate too small or covered with silt.
D = Dry, not assessed

Riparian Vegetation
(facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy (>75%)
2 = Moderate (10-40%)

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	0 1 2 3 4	0 1 2 3 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	0 1 2 3 4	0 1 2 3 4
Ground Cover (<0.5 m high)		
Woody shrubs & saplings <0.5 m	0 1 2 3 4	0 1 2 3 4
Herbs/ grasses	0 1 2 3 4	0 1 2 3 4
Barren, bare soil/ duff	0 1 2 3 4	0 1 2 3 4

Instream Habitat Complexity

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	0 1 2 3 4
Aquatic Macrophytes/ Emergent Vegetation	0 1 2 3 4
Boulders	0 1 2 3 4
Woody Debris >0.3 m	0 1 2 3 4
Woody Debris <0.3 m	0 1 2 3 4
Undercut Banks	0 1 2 3 4
Overhang. Vegetation	0 1 2 3 4
Live Tree Roots	0 1 2 3 4
Artificial Structures	0 1 2 3 4

Densiometer Readings (0-17)
count covered dots

Center Left	
Center Upstream	
Center Downstream	
Center Right	
Optional	
Left Bank	
Right Bank	

Human Influence
(circle only the closest to wetted channel)

0 = Not Present;
B = On Bank;
C = Between Bank & 10m from Channel;
P = >10m+<50m from Channel;
Channel (record Yes or No)

	Left Bank	Channel	Right Bank
Walls/ Rip-rap/ Dams	P C B 0	Y N	0 B C P
Buildings	P C B 0	Y N	0 B C P
Pavement/ Cleared Lot	P C B 0		0 B C P
Road/ Railroad	P C B 0	Y N	0 B C P
Pipes (Inlet/ Outlet)	P C B 0	Y N	0 B C P
Landfill/ Trash	P C B 0	Y N	0 B C P
Park/ Lawn	P C B 0		0 B C P
Row Crop	P C B 0		0 B C P
Pasture/ Range	P C B 0		0 B C P
Logging Operations	P C B 0		0 B C P
Mining Activity	P C B 0	Y N	0 B C P
Vegetation Management	P C B 0		0 B C P
Bridges/ Abutments	P C B 0	Y N	0 B C P
Orchards/ Vineyards	P C B 0		0 B C P

Bank Stability
(score zone 5m upstream and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	vulnerable	stable
Right Bank	eroded	vulnerable	stable

Inter-Transect: EF

Wetted Width (m):

Inter-Transect Substrates

Position	Dist from LB (m)	Depth (cm)	mm/ size class	% Cobble Embed.	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes
Left Bank					P A		P A D	P A D	P A
Left Center					P A		P A D	P A D	P A
Center					P A		P A D	P A D	P A
Right Center					P A		P A D	P A D	P A
Right Bank					P A		P A D	P A D	P A
	Note: Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of the size class categories listed on the supplemental page (direct measurements preferred)								

Microalgae Thickness Codes

0 = No microalgae present, Feels rough, not slimy;
1 = Present but not visible, Feels slimy;
2 = Present and visible but <1mm; Rubbing fingers on surface produces a brownish tint on them, scraping leaves visible trail.
3 = 1-5mm;
4 = 5-20mm;
5 = >20mm;
Z = Cannot determine if microalgae present, substrate too small or covered with silt.
D = Dry, not assessed

FLOW HABITATS
(% between transects, total=100%)

Channel Type	%
Cascade/ Falls	
Rapid	
Riffle	
Run	
Glide	
Pool	
Dry	

SWAMP Stream Habitat Characterization Form *FULL VERSION* *Revision Date: March 30th, 2009*

Site Code:	Site Name:		Date: __ __ / __ __ / 2009
Wetted Width (m):	Bankfull Width (m):	Bankfull Height (m):	**Transect F**

Transect Substrates

Position	Dist from LB (m)	Depth (cm)	mm/ size class	% Cobble Embed.	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes
Left Bank					P A		P A D	P A D	P A
Left Center					P A		P A D	P A D	P A
Center					P A		P A D	P A D	P A
Right Center					P A		P A D	P A D	P A
Right Bank					P A		P A D	P A D	P A

Note: Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of the size class categories listed on the supplemental page (direct measurements preferred)

Microalgae Thickness Codes
0 = No microalgae present, Feels rough, not slimy;
1 = Present but not visible, Feels slimy;
2 = Present and visible but <1mm; Rubbing fingers on surface produces a brownish tint on them, scraping leaves visible trail.
3 = 1-5mm;
4 = 5-20mm;
5 = >20mm;
Z = Cannot determine if microalgae present, substrate too small or covered with silt.
D = Dry, not assessed

RIPARIAN VEGETATION
(facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy (>75%)
2 = Moderate (10-40%)

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	0 1 2 3 4	0 1 2 3 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	0 1 2 3 4	0 1 2 3 4
Ground Cover (<0.5 m high)		
Woody shrubs & saplings <0.5 m	0 1 2 3 4	0 1 2 3 4
Herbs/ grasses	0 1 2 3 4	0 1 2 3 4
Barren, bare soil/ duff	0 1 2 3 4	0 1 2 3 4

INSTREAM HABITAT COMPLEXITY

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	0 1 2 3 4
Aquatic Macrophytes/ Emergent Vegetation	0 1 2 3 4
Boulders	0 1 2 3 4
Woody Debris >0.3 m	0 1 2 3 4
Woody Debris <0.3 m	0 1 2 3 4
Undercut Banks	0 1 2 3 4
Overhang. Vegetation	0 1 2 3 4
Live Tree Roots	0 1 2 3 4
Artificial Structures	0 1 2 3 4

DENSIOMETER READINGS (0-17)
count covered dots

Center Left	
Center Upstream	
Center Downstream	
Center Right	
Optional	
Left Bank	
Right Bank	

HUMAN INFLUENCE
(circle only the closest to wetted channel)

0 = Not Present;
B = On Bank;
C = Between Bank & 10m from Channel;
P = >10m+<50m from Channel;
Channel (record Yes or No)

	Left Bank	Channel	Right Bank
Walls/ Rip-rap/ Dams	P C B 0	Y N	0 B C P
Buildings	P C B 0	Y N	0 B C P
Pavement/ Cleared Lot	P C B 0		0 B C P
Road/ Railroad	P C B 0	Y N	0 B C P
Pipes (Inlet/ Outlet)	P C B 0	Y N	0 B C P
Landfill/ Trash	P C B 0	Y N	0 B C P
Park/ Lawn	P C B 0		0 B C P
Row Crop	P C B 0		0 B C P
Pasture/ Range	P C B 0		0 B C P
Logging Operations	P C B 0		0 B C P
Mining Activity	P C B 0	Y N	0 B C P
Vegetation Management	P C B 0		0 B C P
Bridges/ Abutments	P C B 0	Y N	0 B C P
Orchards/ Vineyards	P C B 0		0 B C P

BANK STABILITY
(score zone 5m upstream and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	vulnerable	stable
Right Bank	eroded	vulnerable	stable

TAKE PHOTOGRAPHS
(check box if taken & record photo code)

Downstream (**required**) ☐

Upstream (**required**) ☐

Inter-Transect: FG

Wetted Width (m):

Inter-Transect Substrates

Position	Dist from LB (m)	Depth (cm)	mm/ size class	% Cobble Embed.	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes
Left Bank					P A		P A D	P A D	P A
Left Center					P A		P A D	P A D	P A
Center					P A		P A D	P A D	P A
Right Center					P A		P A D	P A D	P A
Right Bank					P A		P A D	P A D	P A
	Note: Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of the size class categories listed on the supplemental page (direct measurements preferred)								

Microalgae Thickness Codes

0 = No microalgae present, Feels rough, not slimy;
1 = Present but not visible, Feels slimy;
2 = Present and visible but <1mm; Rubbing fingers on surface produces a brownish tint on them, scraping leaves visible trail.
3 = 1-5mm;
4 = 5-20mm;
5 = >20mm;
Z = Cannot determine if microalgae present, substrate too small or covered with silt.
D = Dry, not assessed

FLOW HABITATS
(% between transects, total=100%)

Channel Type	%
Cascade/ Falls	
Rapid	
Riffle	
Run	
Glide	
Pool	
Dry	

SWAMP Stream Habitat Characterization Form *FULL VERSION* *Revision Date: March 30th, 2009*

Site Code:	Site Name:		Date: __ __ / __ __ / 2009
Wetted Width (m):	Bankfull Width (m):	Bankfull Height (m):	**Transect G**

Transect Substrates

Position	Dist from LB (m)	Depth (cm)	mm/ size class	% Cobble Embed.	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes
Left Bank					P A		P A D	P A D	P A
Left Center					P A		P A D	P A D	P A
Center					P A		P A D	P A D	P A
Right Center					P A		P A D	P A D	P A
Right Bank					P A		P A D	P A D	P A

Note: Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of the size class categories listed on the supplemental page (direct measurements preferred)

Microalgae Thickness Codes
0 = No microalgae present, Feels rough, not slimy;
1 = Present but not visible, Feels slimy;
2 = Present and visible but <1mm; Rubbing fingers on surface produces a brownish tint on them, scraping leaves visible trail.
3 = 1-5mm;
4 = 5-20mm;
5 = >20mm;
Z = Cannot determine if microalgae present, substrate too small or covered with silt.
D = Dry, not assessed

Riparian Vegetation
(facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy (>75%)
2 = Moderate (10-40%)

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	0 1 2 3 4	0 1 2 3 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	0 1 2 3 4	0 1 2 3 4
Ground Cover (<0.5 m high)		
Woody shrubs & saplings <0.5 m	0 1 2 3 4	0 1 2 3 4
Herbs/ grasses	0 1 2 3 4	0 1 2 3 4
Barren, bare soil/ duff	0 1 2 3 4	0 1 2 3 4

Instream Habitat Complexity

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	0 1 2 3 4
Aquatic Macrophytes/ Emergent Vegetation	0 1 2 3 4
Boulders	0 1 2 3 4
Woody Debris >0.3 m	0 1 2 3 4
Woody Debris <0.3 m	0 1 2 3 4
Undercut Banks	0 1 2 3 4
Overhang. Vegetation	0 1 2 3 4
Live Tree Roots	0 1 2 3 4
Artificial Structures	0 1 2 3 4

Densiometer Readings (0-17)
count covered dots

Center Left	
Center Upstream	
Center Downstream	
Center Right	
Optional	
Left Bank	
Right Bank	

Human Influence
(circle only the closest to wetted channel)

0 = Not Present;
B = On Bank;
C = Between Bank & 10m from Channel;
P = >10m+<50m from Channel;
Channel (record Yes or No)

	Left Bank	Channel	Right Bank
Walls/ Rip-rap/ Dams	P C B 0	Y N	0 B C P
Buildings	P C B 0	Y N	0 B C P
Pavement/ Cleared Lot	P C B 0		0 B C P
Road/ Railroad	P C B 0	Y N	0 B C P
Pipes (Inlet/ Outlet)	P C B 0	Y N	0 B C P
Landfill/ Trash	P C B 0	Y N	0 B C P
Park/ Lawn	P C B 0		0 B C P
Row Crop	P C B 0		0 B C P
Pasture/ Range	P C B 0		0 B C P
Logging Operations	P C B 0		0 B C P
Mining Activity	P C B 0	Y N	0 B C P
Vegetation Management	P C B 0		0 B C P
Bridges/ Abutments	P C B 0	Y N	0 B C P
Orchards/ Vineyards	P C B 0		0 B C P

Bank Stability
(score zone 5m upstream and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	vulnerable	stable
Right Bank	eroded	vulnerable	stable

Inter-Transect: GH

Wetted Width (m):

Inter-Transect Substrates

Position	Dist from LB (m)	Depth (cm)	mm/ size class	% Cobble Embed.	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes
Left Bank					P A		P A D	P A D	P A
Left Center					P A		P A D	P A D	P A
Center					P A		P A D	P A D	P A
Right Center					P A		P A D	P A D	P A
Right Bank					P A		P A D	P A D	P A
	Note: Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of the size class categories listed on the supplemental page (direct measurements preferred)								

Microalgae Thickness Codes

0 = No microalgae present, Feels rough, not slimy;
1 = Present but not visible, Feels slimy;
2 = Present and visible but <1mm; Rubbing fingers on surface produces a brownish tint on them, scraping leaves visible trail.
3 = 1-5mm;
4 = 5-20mm;
5 = >20mm;
Z = Cannot determine if microalgae present, substrate too small or covered with silt.
D = Dry, not assessed

FLOW HABITATS
(% between transects, total=100%)

Channel Type	%
Cascade/ Falls	
Rapid	
Riffle	
Run	
Glide	
Pool	
Dry	

SWAMP Stream Habitat Characterization Form *FULL VERSION* *Revision Date: March 30th, 2009*

Site Code:	Site Name:		Date: __ __ / __ __ / 2009
Wetted Width (m):	Bankfull Width (m):	Bankfull Height (m):	**Transect H**

Transect Substrates

Position	Dist from LB (m)	Depth (cm)	mm/ size class	% Cobble Embed.	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes
Left Bank					P A		P A D	P A D	P A
Left Center					P A		P A D	P A D	P A
Center					P A		P A D	P A D	P A
Right Center					P A		P A D	P A D	P A
Right Bank					P A		P A D	P A D	P A

Note: Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of the size class categories listed on the supplemental page (direct measurements preferred)

Microalgae Thickness Codes
0 = No microalgae present, Feels rough, not slimy;
1 = Present but not visible, Feels slimy;
2 = Present and visible but <1mm; Rubbing fingers on surface produces a brownish tint on them, scraping leaves visible trail.
3 = 1-5mm;
4 = 5-20mm;
5 = >20mm;
Z = Cannot determine if microalgae present, substrate too small or covered with silt.
D = Dry, not assessed

Riparian Vegetation
(facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy (>75%)
2 = Moderate (10-40%)

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	0 1 2 3 4	0 1 2 3 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	0 1 2 3 4	0 1 2 3 4
Ground Cover (<0.5 m high)		
Woody shrubs & saplings <0.5 m	0 1 2 3 4	0 1 2 3 4
Herbs/ grasses	0 1 2 3 4	0 1 2 3 4
Barren, bare soil/ duff	0 1 2 3 4	0 1 2 3 4

Instream Habitat Complexity

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	0 1 2 3 4
Aquatic Macrophytes/ Emergent Vegetation	0 1 2 3 4
Boulders	0 1 2 3 4
Woody Debris >0.3 m	0 1 2 3 4
Woody Debris <0.3 m	0 1 2 3 4
Undercut Banks	0 1 2 3 4
Overhang. Vegetation	0 1 2 3 4
Live Tree Roots	0 1 2 3 4
Artificial Structures	0 1 2 3 4

Densiometer Readings (0-17)
count covered dots

Center Left	
Center Upstream	
Center Downstream	
Center Right	
Optional	
Left Bank	
Right Bank	

Human Influence
(circle only the closest to wetted channel)

0 = Not Present;
B = On Bank;
C = Between Bank & 10m from Channel;
P = >10m+<50m from Channel;
Channel (record Yes or No)

	Left Bank	Channel	Right Bank
Walls/ Rip-rap/ Dams	P C B 0	Y N	0 B C P
Buildings	P C B 0	Y N	0 B C P
Pavement/ Cleared Lot	P C B 0		0 B C P
Road/ Railroad	P C B 0	Y N	0 B C P
Pipes (Inlet/ Outlet)	P C B 0	Y N	0 B C P
Landfill/ Trash	P C B 0	Y N	0 B C P
Park/ Lawn	P C B 0		0 B C P
Row Crop	P C B 0		0 B C P
Pasture/ Range	P C B 0		0 B C P
Logging Operations	P C B 0		0 B C P
Mining Activity	P C B 0	Y N	0 B C P
Vegetation Management	P C B 0		0 B C P
Bridges/ Abutments	P C B 0	Y N	0 B C P
Orchards/ Vineyards	P C B 0		0 B C P

Bank Stability
(score zone 5m upstream and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	vulnerable	stable
Right Bank	eroded	vulnerable	stable

Inter-Transect: HI

Wetted Width (m):

Inter-Transect Substrates

Position	Dist from LB (m)	Depth (cm)	mm/ size class	% Cobble Embed.	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes
Left Bank					P A		P A D	P A D	P A
Left Center					P A		P A D	P A D	P A
Center					P A		P A D	P A D	P A
Right Center					P A		P A D	P A D	P A
Right Bank					P A		P A D	P A D	P A
	Note: Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of the size class categories listed on the supplemental page (direct measurements preferred)								

Microalgae Thickness Codes

0 = No microalgae present, Feels rough, not slimy;
1 = Present but not visible, Feels slimy;
2 = Present and visible but <1mm; Rubbing fingers on surface produces a brownish tint on them, scraping leaves visible trail.
3 = 1-5mm;
4 = 5-20mm;
5 = >20mm;
Z = Cannot determine if microalgae present, substrate too small or covered with silt.
D = Dry, not assessed

FLOW HABITATS
(% between transects, total=100%)

Channel Type	%
Cascade/ Falls	
Rapid	
Riffle	
Run	
Glide	
Pool	
Dry	

SWAMP Stream Habitat Characterization Form *FULL VERSION* *Revision Date: March 30th, 2009*

Site Code:	Site Name:		Date: __ __ / __ __ / 2009
Wetted Width (m):	Bankfull Width (m):	Bankfull Height (m):	**Transect I**

Transect Substrates

Position	Dist from LB (m)	Depth (cm)	mm/ size class	% Cobble Embed.	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes
Left Bank					P A		P A D	P A D	P A
Left Center					P A		P A D	P A D	P A
Center					P A		P A D	P A D	P A
Right Center					P A		P A D	P A D	P A
Right Bank					P A		P A D	P A D	P A

Note: Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of the size class categories listed on the supplemental page (direct measurements preferred)

Microalgae Thickness Codes
0 = No microalgae present, Feels rough, not slimy;
1 = Present but not visible, Feels slimy;
2 = Present and visible but <1mm; Rubbing fingers on surface produces a brownish tint on them, scraping leaves visible trail.
3 = 1-5mm;
4 = 5-20mm;
5 = >20mm;
Z = Cannot determine if microalgae present, substrate too small or covered with silt.
D = Dry, not assessed

Riparian Vegetation
(facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy (>75%)
2 = Moderate (10-40%)

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	0 1 2 3 4	0 1 2 3 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	0 1 2 3 4	0 1 2 3 4
Ground Cover (<0.5 m high)		
Woody shrubs & saplings <0.5 m	0 1 2 3 4	0 1 2 3 4
Herbs/ grasses	0 1 2 3 4	0 1 2 3 4
Barren, bare soil/ duff	0 1 2 3 4	0 1 2 3 4

Instream Habitat Complexity

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	0 1 2 3 4
Aquatic Macrophytes/ Emergent Vegetation	0 1 2 3 4
Boulders	0 1 2 3 4
Woody Debris >0.3 m	0 1 2 3 4
Woody Debris <0.3 m	0 1 2 3 4
Undercut Banks	0 1 2 3 4
Overhang. Vegetation	0 1 2 3 4
Live Tree Roots	0 1 2 3 4
Artificial Structures	0 1 2 3 4

Densiometer Readings (0-17)
count covered dots

Center Left	
Center Upstream	
Center Downstream	
Center Right	
Optional	
Left Bank	
Right Bank	

Human Influence
(circle only the closest to wetted channel)

0 = Not Present;
B = On Bank;
C = Between Bank & 10m from Channel;
P = >10m+<50m from Channel;
Channel (record Yes or No)

	Left Bank	Channel	Right Bank
Walls/ Rip-rap/ Dams	P C B 0	Y N	0 B C P
Buildings	P C B 0	Y N	0 B C P
Pavement/ Cleared Lot	P C B 0		0 B C P
Road/ Railroad	P C B 0	Y N	0 B C P
Pipes (Inlet/ Outlet)	P C B 0	Y N	0 B C P
Landfill/ Trash	P C B 0	Y N	0 B C P
Park/ Lawn	P C B 0		0 B C P
Row Crop	P C B 0		0 B C P
Pasture/ Range	P C B 0		0 B C P
Logging Operations	P C B 0		0 B C P
Mining Activity	P C B 0	Y N	0 B C P
Vegetation Management	P C B 0		0 B C P
Bridges/ Abutments	P C B 0	Y N	0 B C P
Orchards/ Vineyards	P C B 0		0 B C P

Bank Stability
(score zone 5m upstream and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	vulnerable	stable
Right Bank	eroded	vulnerable	stable

Inter-Transect: IJ

Wetted Width (m):

Inter-Transect Substrates

Position	Dist from LB (m)	Depth (cm)	mm/ size class	% Cobble Embed.	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes
Left Bank					P A		P A D	P A D	P A
Left Center					P A		P A D	P A D	P A
Center					P A		P A D	P A D	P A
Right Center					P A		P A D	P A D	P A
Right Bank					P A		P A D	P A D	P A

Note: Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of the size class categories listed on the supplemental page (direct measurements preferred)

Microalgae Thickness Codes

0 = No microalgae present, Feels rough, not slimy;
1 = Present but not visible, Feels slimy;
2 = Present and visible but <1mm; Rubbing fingers on surface produces a brownish tint on them, scraping leaves visible trail.
3 = 1-5mm;
4 = 5-20mm;
5 = >20mm;
Z = Cannot determine if microalgae present, substrate too small or covered with silt.
D = Dry, not assessed

FLOW HABITATS
(% between transects, total=100%)

Channel Type	%
Cascade/ Falls	
Rapid	
Riffle	
Run	
Glide	
Pool	
Dry	

SWAMP Stream Habitat Characterization Form *FULL VERSION* *Revision Date: March 30th, 2009*

Site Code:	Site Name:		Date: __ __ / __ __ / 2009
Wetted Width (m):	Bankfull Width (m):	Bankfull Height (m):	**Transect J**

Transect Substrates

Position	Dist from LB (m)	Depth (cm)	mm/ size class	% Cobble Embed.	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes
Left Bank					P A		P A D	P A D	P A
Left Center					P A		P A D	P A D	P A
Center					P A		P A D	P A D	P A
Right Center					P A		P A D	P A D	P A
Right Bank					P A		P A D	P A D	P A

Note: Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of the size class categories listed on the supplemental page (direct measurements preferred)

Microalgae Thickness Codes
0 = No microalgae present, Feels rough, not slimy;
1 = Present but not visible, Feels slimy;
2 = Present and visible but <1mm; Rubbing fingers on surface produces a brownish tint on them, scraping leaves visible trail.
3 = 1-5mm;
4 = 5-20mm;
5 = >20mm;
Z = Cannot determine if microalgae present, substrate too small or covered with silt.
D = Dry, not assessed

Riparian Vegetation
(facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy (>75%)
2 = Moderate (10-40%)

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	0 1 2 3 4	0 1 2 3 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	0 1 2 3 4	0 1 2 3 4
Ground Cover (<0.5 m high)		
Woody shrubs & saplings <0.5 m	0 1 2 3 4	0 1 2 3 4
Herbs/ grasses	0 1 2 3 4	0 1 2 3 4
Barren, bare soil/ duff	0 1 2 3 4	0 1 2 3 4

Instream Habitat Complexity

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	0 1 2 3 4
Aquatic Macrophytes/ Emergent Vegetation	0 1 2 3 4
Boulders	0 1 2 3 4
Woody Debris >0.3 m	0 1 2 3 4
Woody Debris <0.3 m	0 1 2 3 4
Undercut Banks	0 1 2 3 4
Overhang. Vegetation	0 1 2 3 4
Live Tree Roots	0 1 2 3 4
Artificial Structures	0 1 2 3 4

Densiometer Readings (0-17)
count covered dots

Center Left	
Center Upstream	
Center Downstream	
Center Right	
Optional	
Left Bank	
Right Bank	

Human Influence
(circle only the closest to wetted channel)

0 = Not Present;
B = On Bank;
C = Between Bank & 10m from Channel;
P = >10m+<50m from Channel;
Channel (record Yes or No)

	Left Bank	Channel	Right Bank
Walls/ Rip-rap/ Dams	P C B 0	Y N	0 B C P
Buildings	P C B 0	Y N	0 B C P
Pavement/ Cleared Lot	P C B 0		0 B C P
Road/ Railroad	P C B 0	Y N	0 B C P
Pipes (Inlet/ Outlet)	P C B 0	Y N	0 B C P
Landfill/ Trash	P C B 0	Y N	0 B C P
Park/ Lawn	P C B 0		0 B C P
Row Crop	P C B 0		0 B C P
Pasture/ Range	P C B 0		0 B C P
Logging Operations	P C B 0		0 B C P
Mining Activity	P C B 0	Y N	0 B C P
Vegetation Management	P C B 0		0 B C P
Bridges/ Abutments	P C B 0	Y N	0 B C P
Orchards/ Vineyards	P C B 0		0 B C P

Bank Stability
(score zone 5m upstream and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	vulnerable	stable
Right Bank	eroded	vulnerable	stable

Inter-Transect: JK

Wetted Width (m):

Inter-Transect Substrates

Position	Dist from LB (m)	Depth (cm)	mm/ size class	% Cobble Embed.	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes
Left Bank					P A		P A D	P A D	P A
Left Center					P A		P A D	P A D	P A
Center					P A		P A D	P A D	P A
Right Center					P A		P A D	P A D	P A
Right Bank					P A		P A D	P A D	P A
	Note: Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of the size class categories listed on the supplemental page (direct measurements preferred)								

Microalgae Thickness Codes

0 = No microalgae present, Feels rough, not slimy;
1 = Present but not visible, Feels slimy;
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4 = 5-20mm;
5 = >20mm;
Z = Cannot determine if microalgae present, substrate too small or covered with silt.
D = Dry, not assessed

FLOW HABITATS
(% between transects, total=100%)

Channel Type	%
Cascade/ Falls	
Rapid	
Riffle	
Run	
Glide	
Pool	
Dry	

Site Code:	Site Name:		Date: __ __ / __ __ / 2009
Wetted Width (m):	Bankfull Width (m):	Bankfull Height (m):	**Transect K**

Transect Substrates

Position	Dist from LB (m)	Depth (cm)	mm/ size class	% Cobble Embed.	CPOM	Microalgae Thickness Code	Macroalgae Attached	Macroalgae Unattached	Macrophytes
Left Bank					P A		P A D	P A D	P A
Left Center					P A		P A D	P A D	P A
Center					P A		P A D	P A D	P A
Right Center					P A		P A D	P A D	P A
Right Bank					P A		P A D	P A D	P A

Note: Substrate sizes can be recorded either as direct measures of the median axis of each particle or one of the size class categories listed on the supplemental page (direct measurements preferred)

Microalgae Thickness Codes
0 = No microalgae present, Feels rough, not slimy;
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5 = >20mm;
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D = Dry, not assessed

RIPARIAN VEGETATION
(facing downstream)

0 = Absent (0%) 3 = Heavy (40-75%)
1 = Sparse (<10%) 4 = Very Heavy (>75%)
2 = Moderate (10-40%)

Vegetation Class	Left Bank	Right Bank
Upper Canopy (>5 m high)		
Trees and saplings >5 m high	0 1 2 3 4	0 1 2 3 4
Lower Canopy (0.5 m-5 m high)		
All vegetation 0.5 m to 5 m	0 1 2 3 4	0 1 2 3 4
Ground Cover (<0.5 m high)		
Woody shrubs & saplings <0.5 m	0 1 2 3 4	0 1 2 3 4
Herbs/ grasses	0 1 2 3 4	0 1 2 3 4
Barren, bare soil/ duff	0 1 2 3 4	0 1 2 3 4

INSTREAM HABITAT COMPLEXITY

0 = Absent (0%)
1 = Sparse (<10%)
2 = Moderate (10-40%)
3 = Heavy (40-75%)
4 = Very Heavy (>75%)

Filamentous Algae	0 1 2 3 4
Aquatic Macrophytes/ Emergent Vegetation	0 1 2 3 4
Boulders	0 1 2 3 4
Woody Debris >0.3 m	0 1 2 3 4
Woody Debris <0.3 m	0 1 2 3 4
Undercut Banks	0 1 2 3 4
Overhang. Vegetation	0 1 2 3 4
Live Tree Roots	0 1 2 3 4
Artificial Structures	0 1 2 3 4

DENSIOMETER READINGS (0-17)
count covered dots

Center Left	
Center Upstream	
Center Downstream	
Center Right	
Optional	
Left Bank	
Right Bank	

HUMAN INFLUENCE
(circle only the closest to wetted channel)

0 = Not Present;
B = On Bank;
C = Between Bank & 10m from Channel;
P = >10m+<50m from Channel;
Channel (record Yes or No)

	Left Bank	Channel	Right Bank
Walls/ Rip-rap/ Dams	P C B 0	Y N	0 B C P
Buildings	P C B 0	Y N	0 B C P
Pavement/ Cleared Lot	P C B 0		0 B C P
Road/ Railroad	P C B 0	Y N	0 B C P
Pipes (Inlet/ Outlet)	P C B 0	Y N	0 B C P
Landfill/ Trash	P C B 0	Y N	0 B C P
Park/ Lawn	P C B 0		0 B C P
Row Crop	P C B 0		0 B C P
Pasture/ Range	P C B 0		0 B C P
Logging Operations	P C B 0		0 B C P
Mining Activity	P C B 0	Y N	0 B C P
Vegetation Management	P C B 0		0 B C P
Bridges/ Abutments	P C B 0	Y N	0 B C P
Orchards/ Vineyards	P C B 0		0 B C P

BANK STABILITY
(score zone 5m upstream and 5m downstream of transect between bankfull - wetted width)

Left Bank	eroded	vulnerable	stable
Right Bank	eroded	vulnerable	stable

TAKE PHOTOGRAPHS
(check box if taken & record photo code)

Downstream (**required**) ☐

Upstream (**optional**) ☐

Site Code:	Date: __ __ / __ __ / __ __ __ __	**FULL FORM**

BENTHIC INVERTEBRATE SAMPLES

Collection Method (indicate standard or margin-center-margin)			Replicate #	# jars
RWB (standard)	**RWB** (MCM)	**TRC**		
RWB (standard)	**RWB** (MCM)	**TRC**		
RWB (standard)	**RWB** (MCM)	**TRC**		
RWB (standard)	**RWB** (MCM)	**TRC**		

Field Notes/ Comments:

Chemistry Equipment ID

Analyte	Equipment
pH	
temperature	
dissolved oxygen	
specific conductance	
salinity	
alkalinity	
turbidity	
dissolved silica	
Velocity	

Check if a water chemistry **grab** sample was collected (nutrients, SSC, etc.)	
Check if a DUPLICATE water chemistry **grab** sample was collected	
Check if a water chemistry **integrated** sample was collected (e.g., chl a, AFDM)	
Check if a DUPLICATE water chemistry **integrated** sample was collected	

ALGAE SAMPLES

Check if duplicate algae assemblage ID samples collected ☐

Collection Device (sum # of transects per device)	Rubber Delimiter (area=12.6cm^2)		PVC Delimiter (area=12.6cm^2)		Syringe Scrubber (area=5.3cm^2)		Other area=	
Composite Volume (mL)		Assemblage ID volume **(diatoms)** (50 mL tube)			Chlorophyll a volume (25 mL **(preferred volume)**, use GF/F filter)			
Number of transects sampled (0-11)		Assemblage ID volume **(soft algae)** (50 mL tube)			Biomass volume (25 mL **(preferred volume)**, use GF/F filter)			

ADDITIONAL PHOTOGRAPHS

Description	Photo Code	Description	Photo Code

Flow Habitat Type	DESCRIPTION
Cascades	Short, high gradient drop in stream bed elevation often accompanied by boulders and considerable turbulence
Falls	High gradient drop in elevation of the stream bed associated with an abrupt change in the bedrock
Rapids	Sections of stream with swiftly flowing water and considerable surface turbulence. Rapids tend to have larger substrate sizes than riffles
Riffles	Shallow sections where the water flows over coarse stream bed particles that create mild to moderate surface turbulence; (< 0.5 m deep, > 0.3 m/s).
Runs	Long, relatively straight, low-gradient sections without flow obstructions. The stream bed is typically even and the water flows faster than it does in a pool; (> 0.5 m deep, > 0.3 m/s). A **step-run** is a series of runs separated by short riffles or flow obstructions that cause discontinuous breaks in slope
Glides	A section of stream with little or no turbulence, but faster velocity than pools; (< 0.5 m deep, < 0.3 m/s)
Pools	A reach of stream that is characterized by deep, low-velocity water and a smooth surface; (> 0.5 m deep, < 0.3 m/s)

Size Class Code	Size Class Range	Size Class Description	Common Size Reference
RS	> 4 m	bedrock, smooth	larger than a car
RR	> 4 m	bedrock, rough	larger than a car
XB	1 - 4 m	boulder, large	meter stick to car
SB	25 cm - 1.0 m	boulder, small	basketball to meter stick
CB	64 - 250 mm	cobble	tennis ball to basketball
GC	16 - 64 mm	gravel, coarse	marble to tennis ball
GF	2 – 16 mm	gravel, fine	ladybug to marble
SA	0.06 – 2 mm	sand	gritty to ladybug
FN	< 0.06 mm	fines	not gritty
HP	< 0.06 mm	hardpan (consolidated fines)	
WD	NA	wood	
RC	NA	concrete/ asphalt	
OT	NA	other	

BANK STABILITY Although this measure of the degree of erosive potential is subjective, it can provide clues to the erosive potential of the banks within the reach. Assign the category whose description best fits the conditions in the area between the wetted channel and bankfull channel (see figure below)	
Eroded	Banks show obvious signs of erosion from the current or previous water year; banks are usually bare or nearly bare
Vulnerable	Banks have some vegetative protection (usually annual growth), but not enough to prevent erosion during flooding
Stable	Bank vegetation has well-developed roots that protect banks from erosion; alternately, bedrock or artificial structures (e.g., concrete/ rip-rap) prevent bank erosion

CPOM/ COBBLE EMBEDDEDNESS

CPOM: Record presence (P) or absence (A) of coarse particulate organic matter (>1.0 mm particles) within 1 cm of each substrate particle

Cobble Embeddedness: Visually estimate % embedded by fine particles (record to nearest 5%)

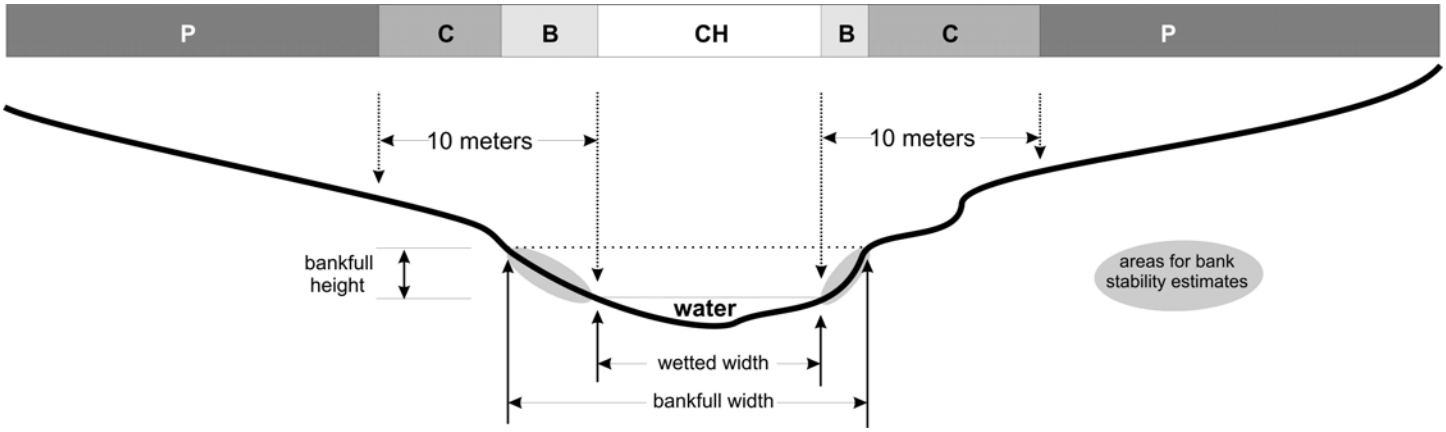

Figure 1. Cross-sectional diagram of stream transect indicating regions for assessing human influence measures:

- The measurement zone extends 5 meters upstream and 5 meters downstream of each transect
- Record one category for each bank and for the wetted channel (3 values possible)
- In reaches with wide banks, region "C" may be entirely overlapped by region "B"; in these cases, circle "B"
- Region "P" extends from 10 meters to the distance that can be seen from the channel, but not greater than 50 m

SLOPE and BEARING FORM	***EXAMPLE***	AUTOLEVEL	X
		CLINOMETER	
		HANDLEVEL	

Starting Transect	MAIN SEGMENT (record percent of inter-transect distance in each segment **if supplemental segments are used**)						SUPPLEMENTAL SEGMENT (record percent of inter-transect distance in each segment **if supplemental segments are used**)					
	Stadia rod measurements		Slope (%) or Elevation Difference cm ■ % □	Segment Length (m)	Bearing (0°-359°)	Percent of Total Length (%)	Stadia rod measurements		Slope or Elevation Difference cm □ % □	Segment Length (m)	Bearing (0°-359°)	Percent of Total Length (%)
K	**1.41**											
J	**1.44**		**3**	**15**	**140**	**100**						
I	**1.45**		**1**	**15**	**145**	**100**						
H	**1.49**	**1.03**	**4**	**15**	**150**	**100**						
G		**1.06**	**3**	**15**	**143**	**100**						
F		**1.10**	**4**	**15**	**187**	**100**						
E		**1.15**	**5**	**15**	**195**	**100**						

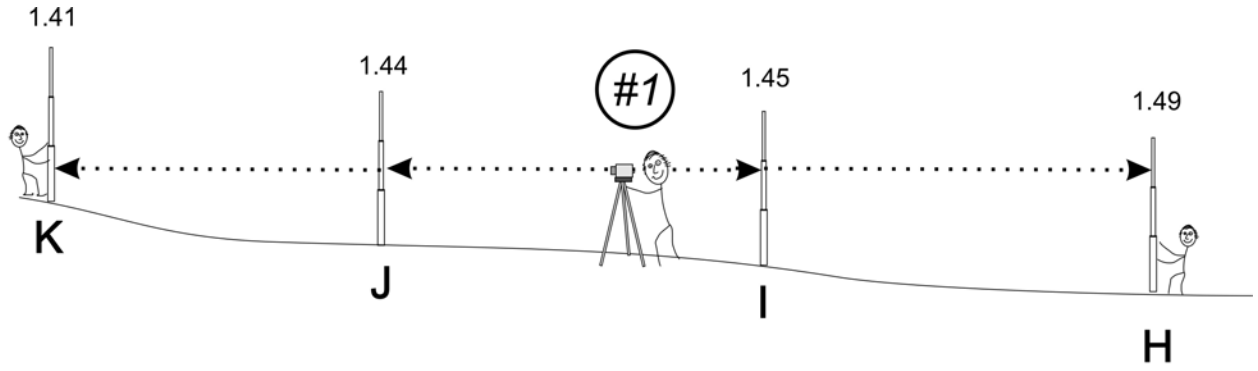

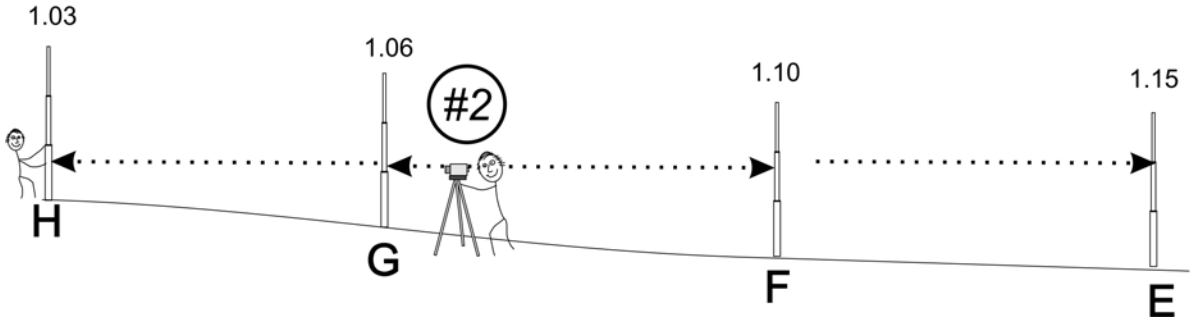

1. Level the autolevel at Position #1
2. Place base of stadia rod at water level every time
3. Sight to stadia rod at Transect K, then Transect J
4. Rotate scope and sight to Transects I and H.
5. Move level to Position #2 and re-level
6. Re-sight to stadia rod at Transect H, then Transect G
7. Rotate scope and sight to Transects F and E

Note: Sites will vary in the number of separate level positions needed to survey the reach.

CONSTRUCTION OF ALGAE SAMPLING TOOLS D

This appendix provides step-by-step instructions for constructing the devices used for sampling algae. It also provides a recipe for the formalin fixative for diatoms.

1. RUBBER DELIMITER

The rubber delimiter for use on "erosional"/hard substrates like cobbles and wood is made from a sliced-open mountain bike inner tube that has a 4-cm diameter hole cut in the middle. The hole should be reinforced with a rubber gasket affixed to the tire with rubber cement.

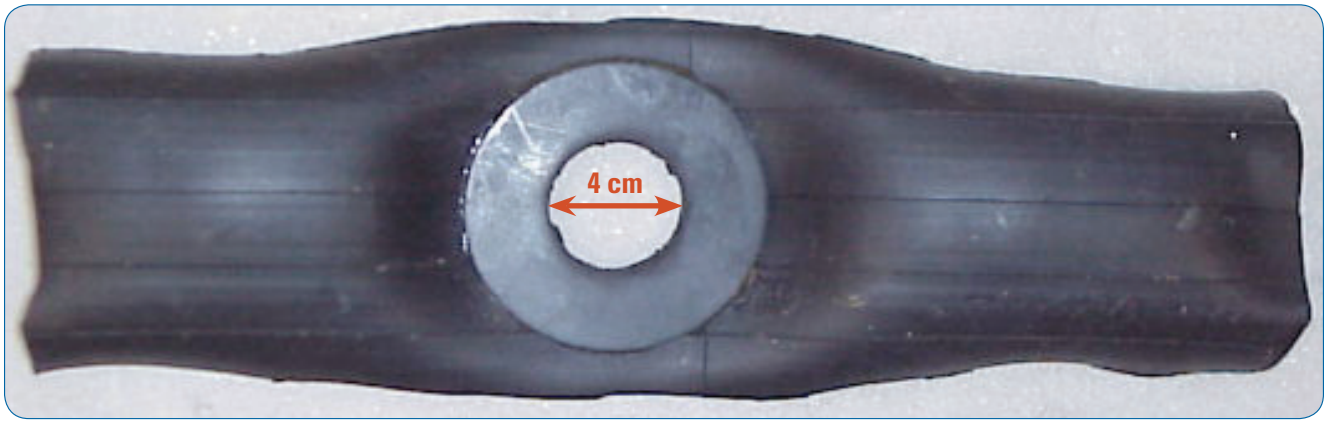

2. PVC DELIMITER

The PVC delimiter for "depositional"/soft substrates like sand, small gravel, and silt is made from a 1½" sewer cleanout, which can be found at a home-improvement or plumbing supply store. The hole in the bottom of the cleanout is 4 cm in diameter. The bottom edge of the cleanout is filed to make it sharp, to ease insertion into silt/sand. To facilitate consistent sampling, it is useful to paint a bright line indicating a depth of 1 cm around the outer surface of the bottom of the sampling device. This indicates the depth to which to insert the delimiter when sampling.

3. SYRINGE SCRUBBER

The syringe scrubber is for use on hard substrates that cannot be picked up out of the stream, like submerged bedrock and concrete channel bottoms. It is made from a 60 mL syringe barrel with the end cut off and its plunger fitted with Velcro-type material. Disposable, white (non-pigmented) scrubbing pads circles are then affixed to the end of the plunger and used to scrub the algae from the substrate.

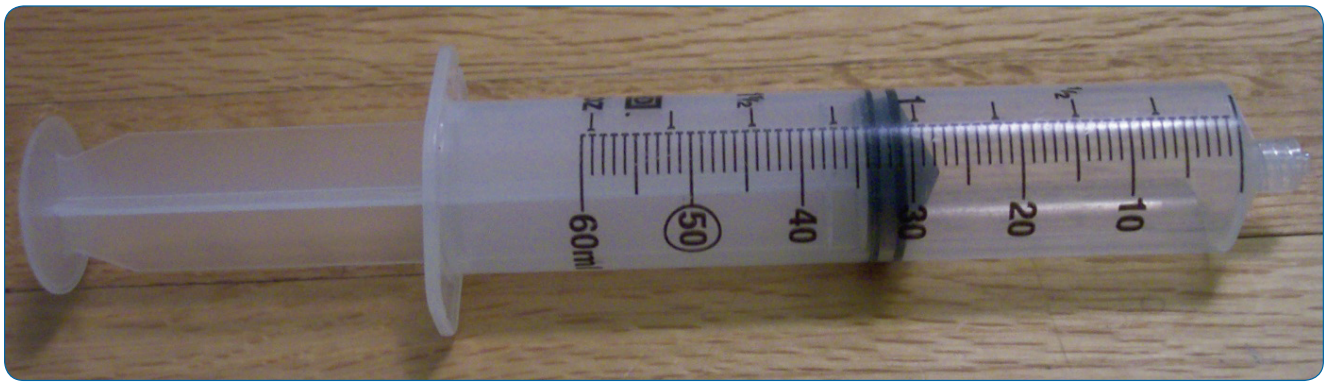

You will need a 60-mL plastic syringe for each sampler you want to make. Remove the plunger and saw the conical end off the plastic syringe, then sand the bottom so it is flat all the way around and fits tightly against a flat surface.

Firmly affix the rubber end to the plastic plunger by removing the rubber tip, applying glue to the "naked" end of the plunger, and replacing the rubber cap. Allow glue to cure. Then cut the conical part off the plunger tip so that only a flat surface of rubber remains.

Cut a circle of Velcro®-style hook material to fit the size of the plunger. Use a waterproof adhesive to affix the "Velcro®" circle to the end of the plunger.

Obtain some white scrubbing pad material (make sure it is not pigmented so it will not end up interfering with eventual chlorophyll *a* analysis of the samples collected.) Cut a supply of circles to fit the size of the plunger.

Before each sampling event, attach a fresh circular scrubbing pad to the end of the plunger. This is a head-on view of the plunger, with the scrubbing pad circle attached.

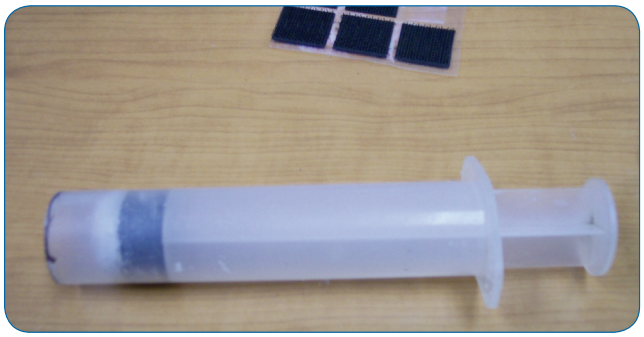

This is what the syringe sampler looks like when it is ready to be used.

4. VIEWING BUCKET (OPTIONAL)

A viewing bucket can be useful for visualizing submerged algae, particularly in instances of a turbulent stream surface that obscures the stream bottom. A viewing bucket can be constructed from a narrow cylinder of clear Plexiglas (approximately 8 inches in diameter) whose bottom is fitted with a circle of thick glass, and secured in place with a silicone seal. If desired, one or two handles can also be fashioned out of Plexiglas and attached to the side(s) of the cylinder. The use of the viewing bucket is optional.

5. PREPARING A 1-L SOLUTION OF 10-PERCENT BUFFERED FORMALIN (MOULTON ET AL. 2002)

1. Add 100 mL of formaldehyde (37-40%) to 900 mL of water in a chemically resistant, non-breakable bottle.
2. Add about 3 g of borax to 10 mL of water and mix.
3. Add dissolved borax solute, to buffer formalin solution.
4. Tightly seal the bottle and mix by carefully inverting the bottle several times.
5. Label the outside of the bottle with "10-percent buffered formalin," the date of preparation, and related hazardous chemical stickers.

REFERENCE

Moulton II, S.R., J.G. Kennen, R.M. Goldstein, and J.A. Hambrook. 2002. Revised protocols for sampling algal, invertebrate, and fish communities as part of the National Water-Quality Assessment Program, Open-File Report 02-150.

STANDARD OPERATING PROCEDURES (SOP) FOR USING GLUTARALDEHYDE FOR THE PRESERVATION OF SOFT ALGAE

E

(adapted from the Aquatic Bioassessment Laboratory, California Department of Fish and Game)

Note: Glutaraldehyde must only be handled by trained individuals who understand the safe handling and use of this chemical

1. SCOPE AND APPLICATION

Glutaraldehyde is a colorless liquid with a pungent odor used as a preservative and sterilant. This SOP covers the use of Glutaraldehyde by Department of Fish and Game OSPR laboratories as a preservative for soft bodied algae.

2. PHYSICAL HAZARDS

The physical hazards associated with the use of Glutaraldehyde include:

- Incompatibility with strong oxidizing substances and bases
- Corrosive to metals
- Production of Carbon Monoxide and Carbon Dioxide during decomposition
- Discolors on exposure to air

3. HEALTH HAZARDS

The health hazards associated with the use of Glutaraldehyde include;

Inhalation

- Regulatory limit of 0.05 ppm as a ceiling level
- Chemical burns to the respiratory tract
- Asthma and shortness of breath
- Headache, dizziness, and nausea

Skin

- Sensitization or allergic reactions, hives
- Irritations and burns
- Staining of the hands (brownish or tan)

Eyes

- Irritation and burns. Eye contact causes moderate to severe irritation, experienced as discomfort or pain, excessive blinking and tear production
- May cause permanent visual impairment
- Conjunctivitis and corneal damage

Ingestion

- Gastrointestinal tract burns; Central nervous system depression, excitement
- Nausea, vomiting
- Unconsciousness, coma, respiratory failure, death

Note: Oral toxicity of Glutaraldehyde ***increases*** *with dilution*

4. ENGINEERING CONTROLS

Strict engineering controls will be followed when using Glutaraldehyde. This chemical and processes using this chemical will only be used under a laboratory fume hood meeting the requirements of Title 8, CCR Section 5154.1. At no time will containers of Glutaraldehyde be opened outside of an operating fume hood. Personnel using Glutaraldehyde will designate an area of the lab for its use. The area where it is used will be noticed with a sign reading:

CAUTION GLUTARALDEHYDE IN USE

Only trained personnel will be allowed to enter the designated area when using Glutaraldehyde.

5. PERSONAL PROTECTIVE EQUIPMENT

Personal Protective Equipment (PPE) is required to be worn at all times when working with Glutaraldehyde. This includes:

Eye Protection

- Chemical splash goggles; or
- Safety glasses with face shield

Hand Protection

- Nitrile or Polyvinyl Chloride (vinyl) gloves

Body Protection

- Lab coat with polypropylene splash apron that cover the arms

Any PPE with noticeable contamination will be immediately removed and the affected area washed with water. Gloves and apron will be removed before leaving the designated area. Disposable PPE (gloves and aprons) will not be re-worn. Disposable PPE will be disposed of in a sealed waste receptacle approved for hazardous waste. Any non-disposable PPE (lab coats, chemical goggles) with noticeable contamination will be rinsed or cleaned as soon as practical, and secured in a manner that does not allow contamination of laboratory personnel. Respiratory protection will not be required as long as strict engineering controls are followed.

6. SAFETY SHOWER AND EYEWASH

All employees using Glutaraldehyde must be aware of the location and use of the laboratory safety shower and eyewash, and must be able to reach it within 10 seconds from the time of contamination. At no time will processes using Glutaraldehyde be allowed that do not provide access to a safety shower and eyewash. Employees who have skin or eye contact with Glutaraldehyde will immediately stop all processes and proceed to the safety shower and eyewash station. The employee will rinse the affected area for a minimum of 15 minutes. If eye contact has occurred, the upper and lower eyelids must be lifted to allow adequate flushing of the eyes.

7. SPECIAL HANDLING PROCEDURES AND STORAGE REQUIREMENTS

Procedures will be followed that reduce exposure to Glutaraldehyde vapor to the lowest reasonable level. This includes:

- Ensure Glutaraldehyde is only used under a fume hood
- Use only enough Glutaraldehyde to perform the required procedure
- Every effort must be made to minimize splashing, spilling, and personnel exposure
- Once specimens are preserved, they will be capped or secured in a way that does not allow Glutaraldehyde vapor to escape into the lab
- At no time will open containers be removed from the fume hood
- All containers of Glutaraldehyde or solutions containing Glutaraldehyde will be appropriately marked with the chemical name, and hazard warning label at the end of the work day or whenever there is a personnel change
- Glutaraldehyde will be stored in tightly closed containers in a cool, secure, and properly marked location

8. WASTE DISPOSAL

Excess Glutaraldehyde and all waste material containing Glutaraldehyde must be placed in an unbreakable secondary container labeled with the following “HAZARDOUS WASTE GLUTARALDEHYDE.” Wastes will be disposed of through the laboratory hazardous waste contract.

9. SPILL AND ACCIDENT PROCEDURES

Drips and splashes will be wiped up immediately with a sponge, towel, or mop. Any material used to clean spills will be disposed of as hazardous waste. Large spills (Greater than 300 CC) require response by a local Hazmat team. The Hazmat team will be called by the laboratory supervisor. In the event of a large spill personnel will immediately leave the laboratory, and not re-enter until cleared by the laboratory supervisor.

10. TRAINING

All personnel engaged in the use of Glutaraldehyde will be trained on the hazards associated with this chemical, before use. The training will include;

- OSPR's Hazard Communication Program and information contained in the chemical's Material Safety Data Sheet (MSDS)
- Health hazards and routes of exposure
- Specific procedures and techniques for use and handling
- Use of PPE and engineering controls
- The contents and requirements of this Standard Operating Procedure.

STANDARD OPERATING PROCEDURES (SOP) FOR USING FORMALIN FOR THE PRESERVATION OF DIATOMS

F

(adapted from the US EPA EMAP program; Peck et al. 2006)

Note: Formalin must only be handled by trained individuals who understand the safe handling and use of this chemical. All personnel engaged in the use of formalin will be trained on the hazards associated with this chemical before use. The training will include the information contained in the chemical's Material Safety Data Sheet (MSDS).

Formaldehyde (or formalin) is highly allergenic, toxic, and dangerous to human health (potentially carcinogenic) if utilized improperly. Formalin vapors and solution are extremely caustic and may cause severe irritation on contact with skin, eyes, or mucous membranes. Formaldehyde is a potential carcinogen, and contact with it should be avoided. Wear gloves and safety glasses and always work in a well-ventilated area. In case of contact with skin or eyes, rinse immediate with large quantities of water. Store stock solution in sealed containers in a safety cabinet or cooler lined with vermiculite or other absorbent material. If possible, transport outside the passenger compartment of a vehicle.

During the course of field activities, a team may observe or be involved with an accidental spill or release of hazardous materials. In such cases, take the proper action and do not become exposed to something harmful. The following guidelines should be applied:

- First and foremost during any environmental incident, it is extremely important to protect the health and safety of all personnel. Take any necessary steps to avoid injury or exposure to hazardous materials. You should always err on the side of personal safety for yourself and your fellow field crew members.
- Never disturb, or even worse, retrieve improperly disposed hazardous materials from the field and bring them back to a facility for disposal. To do so may worsen the impact to the area of the incident, incur personal or organizational liability, cause personal injury, or cause unbudgeted expenditures of time and money for proper treatment and disposal of material. However, it is important not to ignore environmental incidents. You are required to notify the proper authorities of any incident of this type so they can take the necessary actions to respond properly to the incident.

Follow Department of Transportation (DOT) and the Occupational Safety and Health Administration (OSHA) regulations for handling, transporting, and shipping hazardous material such as formalin and ethanol. Regulations pertaining to formalin are in the Code of Federal Regulations (CFR, specifically 29 CFR 1910.1048).

These requirements should be summarized for all hazardous materials being used for the project and provided to field personnel. Transport formalin and ethanol in appropriate containers with absorbent material. Dispose of all wastes in accordance with approved procedures (e.g., National Institute for Occupational Safety and Health 1981, US EPA 1986).

To dispense formalin in the field, wear formalin-safe gloves and safety goggles. Use a small syringe or bulb pipette to add 10 mL of 10% buffered formalin solution to 40 mL of the diatom sample in a 50 mL centrifuge tube. Alternatively, in order to avoid dispensing formalin solution in the field, clean 50 mL centrifuge tubes that will hold the diatom samples can also be pre-loaded with 10 mL of 10% buffered formalin in a laboratory fume hood prior to going into the field.

The preparation of the 10% buffered formalin stock solution should always be done by trained personnel under a laboratory fume hood while wearing protective gloves, clothing, and goggles.

REFERENCE

Peck, D. V., A. T. Herlihy, B. H. Hill, R. M. Hughes, P. R. Kaufmann, D. Klemm, J. M. Lazorchak, F. H. McCormick, S. A. Peterson, P. L. Ringold, T. Magee, and M. Cappaert. 2006. Environmental Monitoring and Assessment Program-Surface Waters Western Pilot Study: Field operations manual for wadeable streams. U.S. Environmental Protection Agency, Washington, D.C. EPA/620/R-06/003.

PROCESSING SOFT-BODIED ALGAL AND DIATOM SAMPLES WHEN MACROALGAL CLUMPS ARE IN THE SAMPLE

G

The first step involves delivering a known quantity of macroalgae to the soft-bodied algae sample tube.

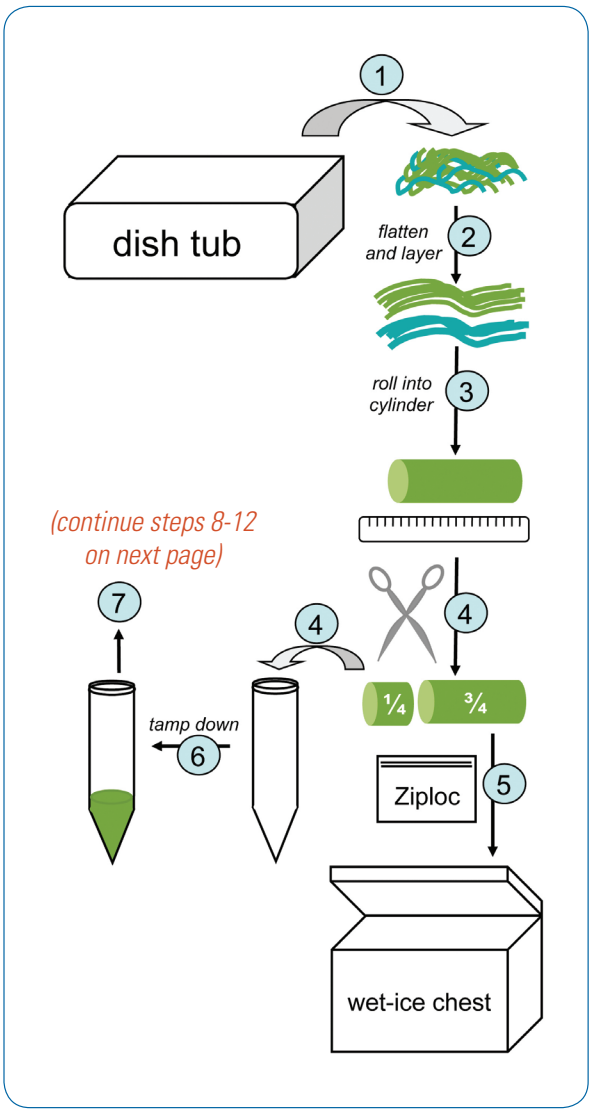

1) Gently wring excess water out of macroalgae and remove from dish tub.

2) Flatten each distinct taxon of macroalgae into even "sheets" and lay atop one another to distribute the volume of each as equally as possible.

3) Once the various layers of macroalgae are evenly spread upon one another, gently roll the stack into a cylinder shape that is roughly straight and even in thickness along its length.

4) Measure and cut off ¼ of the cylinder and place that piece into the empty soft-bodied algae taxonomic ID sample tube.

5) Seal the remaining ¾ of the macroalgae in a clean plastic bag and place inside a cool, dark place such as the wet-ice chest.

6) Using a clean, blunt-ended object, tamp down the ¼ clump of macroalgae in the tube to make it dense and flatten the top surface. Estimate the volume of the macroalgal clump using the graduations on the tube and record this value on the Ratio Restoration worksheet (Figure 8).

7) Add composite sample solution to the tube according to directions on next page.

Some of the liquid composite sample is now added to the tube containing the macroalgae, but first the volume of the entire liquid composite collected must be measured.

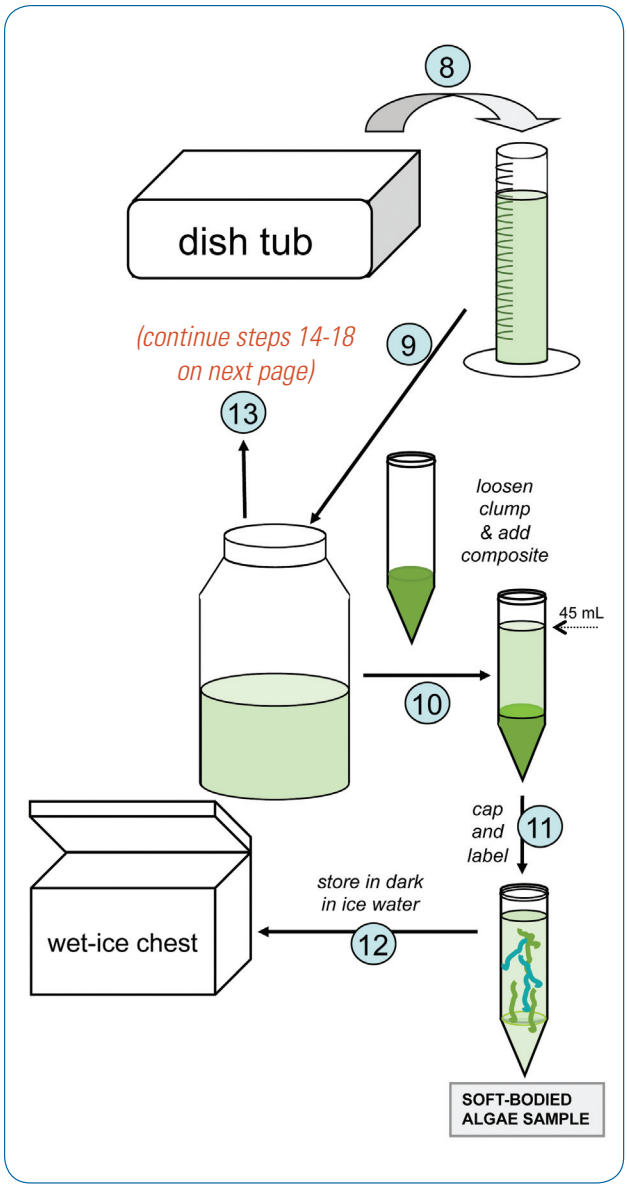

8) Agitate the composite sample in the dish tub in order to suspend and mix the microalgae. Wait a few seconds to let the sand/silt settle. Quickly pour only the liquid (leaving silt/sand behind) into a graduated cylinder to measure its volume. Rinse substrate as necessary. Record TOTAL volume of the composite liquid (+ rinsate) on the datasheet, sample labels, and Ratio Restoration worksheet.

9) Pour the liquid composite sample into a clean, 1 L sample bottle

10) Loosen the macroalgae in the sample tube a little so it is no longer a dense clump lodged in the bottom and then pour freshly-agitated composite liquid into sample tube up to the 45 mL mark.

11) Cap the sample tube tightly. Affix a filled-out label to sample tube and cover with clear tape.

12) Place the tube in the dark in a wet-ice chest (not dry ice). Do not allow the algae to freeze. **Glutaraldehyde will need to be added to the tube within 4 days of sample collection, and preferably as soon as possible.**

13) According to directions on the next page, restore the original ratio of macroalgae to liquid composite in order to prepare the remainder of the samples.

The remainder of the macroalgae is now cut into tiny bits, which are added back to the liquid composite. **But the original ratio of macroalgae:liquid must first be restored.** The diatom and biomass samples are then prepared.

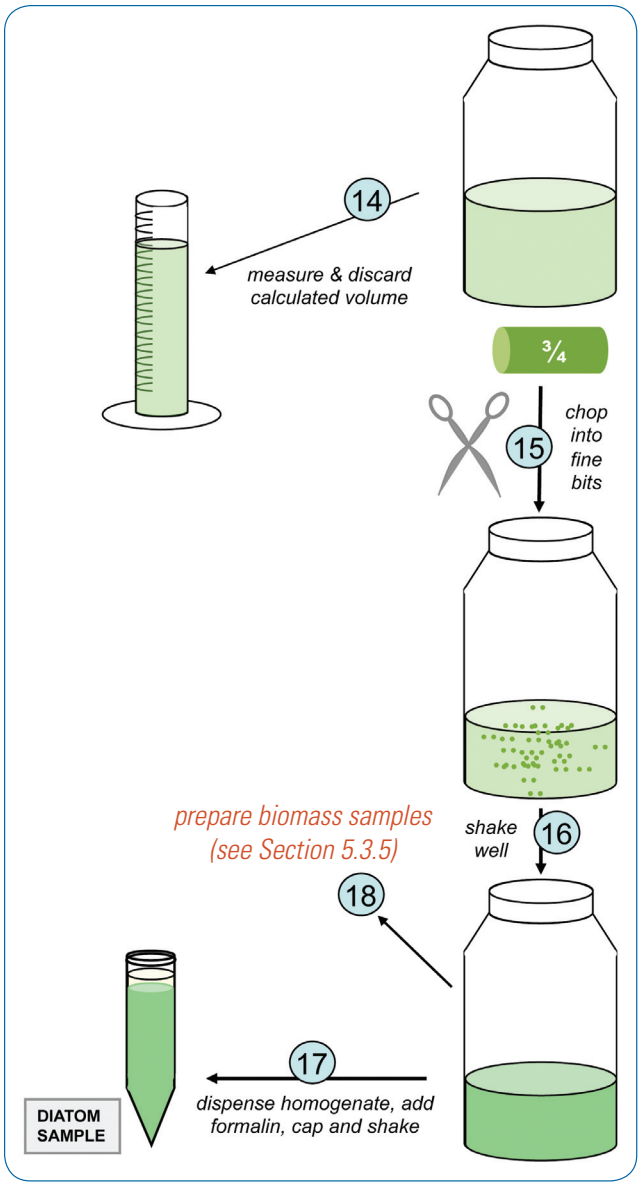

14) Use your Ratio Restoration worksheet to determine how much of the liquid composite to pour off. First shake the bottle vigorously, then measure and discard the appropriate volume.

15) Remove the macroalgal clump from the wet-ice chest. Chop the algae into **very fine** (eyelash length or smaller) pieces and add these to the liquid composite.

16) Cap and shake the bottle vigorously in order to homogenize the chopped algae into the liquid as thoroughly as possible.

17) Pour 40 mL of the freshly-agitated homogenate into the diatom sample tube. Add 10 mL 10% buffered formalin solution, observing all formalin safety precautions. Cap the tube, shake, and affix a sample label.

18) After both taxonomic ID samples have been prepared, the remainder of the homogenate is used for the biomass samples (chlorophyll *a* and ash-free dry mass). 25 mL of freshly shaken homogenate is filtered for each biomass sample. See Section 5.3.5.

SWAMP
Surface Water
Ambient Monitoring
Program

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SOUTHERN CALIFORNIA STEELHEAD RECOVERY PLAN

Public Review Draft Version: July 2009

Southwest Regional Office
National Marine Fisheries Service
Long Beach, CA

DISCLAIMER

Recovery plans identify recovery actions, based upon the best scientific and commercial data available, necessary for the protection and recovery of listed species. Plans published by the National Marine Fisheries Service (NMFS) are guidance documents, not regulatory documents; identification of an action to be implemented by any public or private party does not create a legal obligation beyond existing legal requirements. Recovery plans do not necessarily represent the views, official positions or approval of any individuals or agencies involved in the plan formulation, other than NMFS. They represent the official position of NMFS only after they have been signed by the Assistant Administrator. Nothing in this plan should be construed as a commitment or requirement that any general agency obligate or pay funds in any one fiscal year in excess of appropriations made by Congress for that fiscal year in contravention of the Anti-Deficiency Act, 31 U.S.C 1341, or any other law or regulation. Approved recovery plans are subject to modification as warranted by new findings, changes in species status, and the completion of recovery actions.

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Final recovery plans can be downloaded from the NMFS website:

http://www.nmfs.noaa.gov/pr/recovery/plans.htm

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EXECUTIVE SUMMARY

Status of Southern California Coast Steelhead

Steelhead is the anadromous form of the species *Oncorhynchus mykiss*. The term "anadromous" refers to the species' life-history strategy of migrating to the ocean as juvenile and sub-adult fish and then returning to spawn in the freshwater stream where they were born after several years of growth in the ocean. Steelhead populations along the west coast of the United States have experienced substantial declines in abundance as a result of human activities such as water development, flood control programs, forestry practices, agricultural activities, mining, and urbanization that have degraded, simplified, and fragmented aquatic habitats. In southern California, at the southern limit of the range for anadromous *O. mykiss* in North America, it is estimated that annual runs have declined dramatically from 32,000-46,000 returning adults historically, to less than 500 returning adults today (Good *et al.,* 2005).

Steelhead in southern California comprise a "distinct population segment" (DPS) of the species *O. mykiss* that is ecologically and reproductively discrete from the remainder of the species along the West Coast. Therefore, under the under Federal Endangered Species Act of 1973 (ESA), this DPS qualifies for protection as an individual species. In 1997, the Southern California Steelhead DPS was first listed as an "endangered" species, or a species that is in danger of extinction throughout all or a significant portion of its range.

Recovery Planning

The ESA mandates that the National Oceanic and Atmospheric Administration (NOAA), National Marine Fisheries Service (NMFS) develop and implement Recovery Plans for the conservation (recovery) of listed species. The development and implementation of a Recovery Plan for the Southern California Steelhead DPS is considered vital to the continued persistence and recovery of anadromous *O. mykiss* in this region.

The Southern California Steelhead DPS encompasses *O. mykiss* populations in watersheds from the Santa Maria River (just north of Point Conception) south to the Tijuana River at the U.S.-Mexico border. For recovery planning purposes, this area is known as the Southern California Steelhead (SCS) Recovery Planning Area. It includes those portions of coastal watersheds that are at least seasonally accessible to anadromous *O. mykiss* entering from the ocean or that would be accessible in the absence of man-made passage barriers.

Recovery Plans developed under the ESA are guidance documents, not regulatory documents. However, the ESA envisions Recovery Plans as the central organizing tool for guiding the recovery of listed species. Recovery Plans also guide federal agencies in fulfilling their obligations under Section 7(a) (1) of the ESA, which calls on all federal agencies to "utilize their authorities in furtherance of the purposes of this Act by carrying out programs for the conservation of endangered species and threatened species." In addition to outlining proactive measures to achieve species recovery, Recovery Plans provide a context and framework for implementing other provisions of the ESA with respect to a particular species, including consultations on federal agency activities under Section 7(a)(2) and the development of Habitat Conservation Plans in accordance with Section 10(a)(1)(B).

This Recovery Plan serves as a guideline for achieving recovery criteria and goals by describing the criteria by which NMFS would measure species recovery, the strategy to achieve recovery, and the recovery actions necessary to achieve viable populations of steelhead within the SCS Recovery Planning Area.

Environmental Setting

The topography of the SCS Recovery Planning Area is dominated by a series of steep mountain ranges, coastal valleys, and coastal terraces. Watersheds within the region fall into two basic categories: those characterized by short coastal streams draining mountain ranges immediately adjacent to the coast (*e.g.*, Santa Ynez, Santa Monica, Santa Ana mountains), and those watersheds containing larger river systems that extend inland through gaps in the coastal ranges (*e.g.*, Santa Maria, Santa Ynez, Ventura, Santa Clara, San Gabriel, Santa Ana, and San Diego Rivers).

The climate in the SCS Recovery Planning Area is Mediterranean, with long dry summers and brief winters with short, sometimes intense cyclonic winter storms. Rainfall is restricted almost exclusively to the winter months (December through March), though the extreme southern portion of the SCS Recovery Planning Area is subject to occasional summer storms originating from the Gulf of California. Snow accumulation is generally small and of short duration, and does not contribute significantly to peak run-off in this region. The California floristic province is also subject to an El Niño/La Niña weather cycle that can significantly affect winter precipitation, causing highly variable rainfall and significant changes in oceanic conditions between years. Additionally, there is a wide disparity between winter rainfall from north to south, as well as between coastal plains and inland mountainous areas.

Base flows (average dry-season flows) in these rivers are determined by groundwater inputs, which are transported to the surface through faults and fractured rock formations. Many rivers and streams in this region naturally exhibit interrupted base flow patterns (*i.e.,* alternating river reaches with perennial and seasonal surface flow) controlled by geologic formations, and the strongly seasonal precipitation pattern characteristic of a Mediterranean climate. Water temperatures are generally highest during summer months, but can be locally cooled by springs, seeps, and rising groundwater, creating refugia where conditions remain suitable for salmonids, even during the summer.

Significant portions of the upper watersheds within the SCS Recovery Planning Area are contained within four national forests (Los Padres, Angeles, San Bernardino, and Cleveland National Forests). These forests are managed primarily for water production and recreation (with limited grazing and oil, gas, and mineral production).

Urban development is concentrated in coastal areas and inland valleys, with the most expansive and densest urban development located within the Los Angeles Basin. The Recovery Planning Area is home to more than 20 million people, over half the population of the State of California. Some coastal valleys, and foothills, are extensively developed with agriculture, principally row-crops, citrus and fruit trees, and vineyards.

Recovery Goals and Viability Criteria

The overarching goal of this Recovery Plan is the recovery of the Southern California Steelhead DPS and its removal from the Federal List of Endangered and Threatened Wildlife (50 C.F.R. 17.11). To achieve this goal, the ESA requires that Recovery Plans, to the maximum extent practical, incorporate objective measurable criteria which, when met, would result in a determination in accordance with the provisions of the ESA that the species be delisted (50 CFS 17.11 and 17.12).

Recovery criteria are built upon criteria recommended by the NMFS Technical Recovery Team (TRT) for the identification of viable anadromous *O. mykiss* populations and DPS. A ***viable population*** is defined as a population having a negligible risk (<5%) of extinction due to threats from demographic variation, non-catastrophic environmental variation, and genetic diversity changes over a 100-year time frame. A ***viable DPS*** is comprised of a sufficient number of viable populations sufficiently dispersed spatially, but well connected enough to maintain long-term (1,000-year) persistence and evolutionary potential (McElhany *et al*. 2000). The viability criteria are intended to describe characteristics of the species and its natural environments necessary for both individual populations and the DPS as a whole to be viable, *i.e.*, persist over a specific period of time, regardless of other ongoing anthropogenic effects.

Recovery of the endangered Southern California Steelhead DPS will require recovery of a sufficient number of viable populations within each of five Biogeographic Population Groups (BPGs) defined by the TRT. Recovery of these individual populations is necessary to conserve the natural diversity (genetic, phenotypic, and behavioral), spatial distribution, and abundance of the species, and thus the long-term viability of the DPS as a whole. Each population, which may be contained within a single watershed or may be a group of interacting fish between adjacent or nearby watersheds, must exhibit a set of biological characteristics (*e.g.*, minimum mean annual run size, persistence over long-term oceanic conditions and variation, spawner density, anadromous fraction, *etc*.) in order to be considered viable. Additionally, the DPS as a whole must contain a minimal number of viable populations, or interacting trans-basin populations, within each BPG that inhabit watersheds with drought refugia (needed to sustain juvenile populations throughout the low-flow period), are geographically separated (to maintain maximum genetic diversity and also to spread out the risk of extinction due to local disasters or other mortality factors), and exhibit the natural life-history diversity of the species (fluvial-anadromous, lagoon-anadromous, and freshwater resident).

Achieving species recovery will require a number of coordinated activities, including: implementation of the strategic and threat-specific recovery actions identified in this Recovery Plan; monitoring of existing population's response to recovery actions; and further research into the diverse life-history patterns and adaptations of southern anadromous *O. mykiss* to a semi-arid and highly dynamic environment (*e.g.*, the ecological relationship between anadromous and non-anadromous life-history patterns).

Effective implementation of recovery actions will also entail: (1) extensive public education (including the general public, non-governmental agencies, and local, regional, State, and Federal governmental agencies,) regarding the role and value of the species within the larger watershed environment; (2) development of cooperative relationships with private land owners, special

districts, and local governments with direct control and responsibilities over non-federal land-use practices; (3) participation in the land use and water planning and regulatory processes of local, regional, State, and Federal agencies; (4) close cooperation with other state resource agencies such as the California Department of Fish and Game, California Coastal Commission, CalTrans, and the California Department of Parks and Recreation; and (5) partnering with federal resource agencies, including the U.S. Forest Service, U.S. Fish and Wildlife Service, National Park Service, U.S. Bureau of Reclamation, U.S. Bureau of Land Management, U.S. Army Corps of Engineers, U.S. Department of Transportation, U.S. Department of Defense, and the U.S. Environmental Protection Agency.

Recovery Strategy

A comprehensive strategic framework is necessary to serve as a guide to integrate the actions contributing to the larger goal of recovery of the Southern California Steelhead DPS. This strategic framework incorporates the concepts of viability at both the population and DPS levels, and the identification of threats and recovery actions for specific BPGs.

NMFS has identified core populations intended to serve as the foundation for the recovery of the species in the Recovery Planning Area. In addition, threats assessments for the species indicate that recovery actions related to the modification of existing passage barriers and changes in water storage and management regimes within certain rivers of the Recovery Planning Area are critical to the recovery of the species. High quality habitat exists above the significant passage barriers in these river systems. As a result, NMFS expects significant improvements in species status once they are able to access these areas for spawning and rearing of young steelhead.

There remain uncertainties regarding the level of recovery necessary to achieve population viability, therefore, additional research and monitoring of anadromous *O. mykiss* populations within the SCS Recovery Planning Area is an essential component of this Recovery Plan. As this Recovery Plan is implemented over time, additional information will become available to: 1) refine the viability criteria; 2) up-date and refine the threats assessment and related recovery actions; 3) determine whether individual threats have been abated; and 4) evaluate the overall viability of anadromous *O. mykiss* in the SCS Recovery Planning Area. Additionally, there will be a review of the recovery actions implemented and population and habitat responses to these actions at the 5-year and 10-year status reviews of the DPS.

Recovery Actions

Many complex and inter-related biological, economic, social, and technological issues must be addressed in order to recover anadromous *O. mykiss* in the Southern California Steelhead DPS. Policy changes at the federal, state and local levels will likely be necessary to implement many of the recovery actions identified in this Recovery Plan. For example, without substantial strides in water conservation throughout southern California, flow conditions for anadromous salmonids will limit recovery. Similarly, recovery is unlikely without programs to restore properly functioning historic habitat such as estuaries, and access to upstream spawning and rearing habitat. Many of the recovery actions identified in this Recovery Plan also address watershed-wide processes which will positively affected a wide variety of native species (including other

state and federally listed species) by restoring natural ecosystem functions. In addition, human uses of aquatic habitats such as recreation will benefit from these measures.

Although the recovery of this species is expected to be a long process, the TRT recommended certain actions that should be implemented as soon as possible to help guide the recovery process for the Southern California Steelhead DPS (Boughton *et al.* 2007). Additional and more specific recovery actions to address specific threat sources in individual watersheds are discussed in the text.

Implementation and Cost Estimates

Implementation of this Recovery Plan by NMFS will take many forms. To achieve recovery, NMFS will need to promote the Recovery Plan and provide needed technical information and assistance to other entities responsible for actions that may impact the species' recovery. NMFS should work with key partners on planning and implementation of all high priority recovery actions. Additionally it will be important to work with cities and counties to ensure that protective measures consistent with recovery objectives are included in their General Plans and Local Coastal Plans. NMFS should also work with state and federal regional entities on Regional Water Control Board Basin Plans and U.S. Forest Service Plans.

An implementation schedule describing time frames and costs associated with individual recovery actions is under development. Estimating total cost to recovery is much more challenging, if not impossible to estimate for a variety of reasons. These reasons include the large geographic extent of the SCS Recovery Planning Area; the need to refine recovery criteria; the need to complete watershed-specific investigations such as barrier inventories and assessments; the establishment of flow regimes for individual watersheds; and the review and possible modification of a variety of exiting land-use and water management plans (including waste discharge requirements) under a variety of local, state, and federal jurisdictions. Additionally, the biological response of many of the recovery actions is uncertain, and achieving full recovery will be a long-term effort likely requiring decades, while addressing new stressors that emerge over time. In some instances, however, NMFS is able to estimate the costs associated with certain common restoration activities such as those undertaken as part of the California Department of Fish and Game Fisheries Restoration Grants Program. Appendix E of this document contains estimates for these categories of typical watershed restoration actions.

Nonetheless, the criteria and recovery actions identified in this Recovery Plan provide a comprehensive road-map for recovery and are consistent with many ongoing activities intended to protect and or restore ecosystem functions in southern California watersheds. As a result, many of these recovery actions will be undertaken by local, state and federal agencies, as well as non-governmental organizations and other private entities as a part of their local ecosystem protection efforts. Also, the wide variety of threats to steelhead provide for a variety of potential funding sources available to develop and implement these recovery actions, often as part of other ongoing natural resource restoration, management, and mitigation programs.

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WHAT IS A RECOVERY PLAN?

The Endangered Species Act (ESA) was signed into law in 1973 for the purposes of conserving the ecosystems upon which species in danger of extinction depend. The National Oceanic and Atmospheric Administration's (NOAA) National Marine Fisheries Service (NMFS) is responsible for ESA implementation for listed marine and anadromous species. The Southern California Distinct Population Segment (DPS) of steelhead (*Oncorhynchus mykiss*) is listed as an endangered species under the ESA. As such, the ESA requires NMFS to develop and implement a recovery plan to ensure the survival and recovery of this species. The plight of these fish is severe and unless the causes of their decline are addressed immediately, they will likely go extinct in our children's lifetime.

Recovery is defined as the process of restoring listed species and their ecosystems to the point that they no longer require the protections of the ESA. A recovery plan serves as a road map for species recovery—it lays out where we need to go and how best to get there. Without a plan to organize, coordinate and prioritize the many possible recovery actions on the part of Federal, State, local, and tribal agencies, local watershed councils and districts, and private citizens, our efforts may be inefficient, ineffective, or even misdirected. Prompt development and implementation of a recovery plan will target limited resources effectively. Although recovery plans are guidance documents, not regulatory documents, the ESA clearly envisions recovery plans as the central organizing tool for guiding each species' progress toward recovery.

Recovery plans outline the processes needed to stop or reverse the species' decline, neutralize threats, and bring the species back from possible extinction to a point where the protections of the ESA are no longer necessary.

DOCUMENT GOALS AND ORGANIZATION

The goal of this recovery plan is to provide the framework for recovery and delisting steelhead populations within the Southern California DPS. The ESA mandates application of all methods and procedures which are necessary to provide for the conservation and survival of listed species, to the extent that measures pursuant to the ESA will no longer be necessary. Therefore, the plan conveys:

- An assessment of the threats facing the species, including those identified when the species was listed and any new threats;
- A strategy to achieve recovery that is transparent and adaptable;
- The actions NMFS believes are critical to abating those threats and restoring habitat conditions and species' health; and
- Criteria to measure the achievement of recovery.

Furthermore, it is the intent of the ESA that recovery plans guide Federal agencies in fulfilling their obligations under ESA section 7(a)(1), which calls on all Federal agencies to "utilize their authorities in furtherance of the purposes of this Act by carrying out programs for the conservation of endangered species and threatened species…" This will involve coordinating with Federal agencies, including but not limited to the U.S. Fish and Wildlife Service, in implementing recovery actions. In addition to outlining strictly proactive measures to achieve the species' recovery, recovery plans provide context and a framework for implementation of other provisions of the ESA with respect to a particular species, such as section 7(a) (2) consultations intended to ensure Federal agency activities are not likely to jeopardize listed species or development of section 10(a) (1) (B) Habitat Conservation Plans (HCP).

This recovery plan is structured to provide the reader with (1) an introduction to the species and the recovery planning process, (2) an overview of Southern California DPS steelhead biology and ecology, (3) a discussion of the past, present, and future threats to species' recovery including the listing factors identified in the *Federal Register*, (4) the objectives and specific criteria used to determine species recovery or eligibility for "down listing" or "delisting" under the ESA, (5) the strategy NMFS recommends to focus recovery efforts on foundation populations and essential actions for recovery, (6) NMFS' role in using and implementing the recovery plan for the benefit of the species and its ecosystem, and (7) a presentation of the specific areas, threats and recommended recovery actions needed throughout the DPS to achieve recovery of the species.

1. Introduction

"There is a charm in fishing for trout in the small stream, and this is multiplied a hundred times, with the attendant excitement, for the angler who seeks the great fresh-run steelhead in the little rivers of the Southern California Coast. . . And so little rivers, granted sufficient rainfall to give them life, possess one thing in common. These sturdy migrants forge swiftly and surely over the tidal bars and up the current perhaps a dozen or two-score miles to the spawning bars at the headwaters far back in a deep dark canyon of the Coast Range."

Claude M. Kreider. Steelhead. G.P. Putnam's Sons, New York. 1948

1.1 SOUTHERN CALIFORNIA STEELHEAD AT RISK

Steelhead are the anadromous, or ocean-going, form of the species *Oncorhynchus mykiss.* Historically, these fish were the only abundant salmon species that occurred naturally within the coast ranges of southern California (Jordan and Evermann 1896, 1923; Jordon and Gilbert 1881). Steelhead entered the rivers and streams draining the Coast Ranges from Point Conception to the U.S. Mexican Border during the winter months when storms produced sufficient runoff to breach the sandbars at the rivers mouths and provided fish passage to upstream spawning and rearing habitats. These fish and their progeny were sought out by recreational anglers during the winter, spring and summer fishing seasons (Boydstun 1973; Capelli 1974; Combs 1972; Fry 1938, 1973; Hubbs 1946; Kreider 1948; Nehlsen, *et al.* 1991; Shapovalov 1944, 1945; Swift 1993).

Steelhead Anglers, Ventura River Estuary 1909

Following the dramatic rise in southern California's human population after World War II, and the associated land and water development within coastal drainages (particularly major dams and water diversions), steelhead abundance rapidly declined, leading to the extirpation of populations in many watersheds, and leaving only sporadic and remnant populations in the rest. While the steelhead populations declined sharply, most coastal watersheds retained populations of the non-anadromous life-history form of the species (commonly known as resident or rainbow trout), often in the upper reaches of watersheds within National Forest lands that were protected from the impacts of human development. In fact, a substantial portion of these upper watersheds,

which contain the majority of historical spawning and rearing habitats for anadromous *O. mykiss*, remain intact and protected from intensive development as a result of their inclusion in the four large National Forests in southern California: the Los Padres, Angeles, San Bernardino, and Cleveland National Forests.

Our goal is to prevent the extinction of steelhead in the wild and ensure the long-term persistence of self-sustaining, and ultimately harvestable, wild populations of steelhead across the DPS by addressing those factors limiting the species' ability to survive and reproduce in the wild. The species can be removed from the list of federally-protected threatened and endangered species only after this goal has been reached. Recovery of steelhead will require reducing threats to the long-term persistence of wild populations, maintaining multiple interconnected populations of steelhead across the diverse habitats of their native range, and preserving the diversity of steelhead life-history strategies that allow the species to withstand natural environmental variability—both intra-annually and over the long-term.

To recover steelhead, the following objectives have been identified:

1. Prevent steelhead extinction by protecting existing populations and their habitats.
2. Maintain current distribution of steelhead and restore distribution to previously occupied areas that are essential for recovery.
3. Increase abundance of steelhead to viable population levels, including the expression of all life history forms and strategies.
4. Conserve existing genetic diversity and provide opportunities for interchange of genetic material between and within metapopulations.
5. Maintain and restore suitable habitat conditions and characteristics for all life-history stages so that viable populations can be sustained.
6. Conduct research and monitoring necessary to refine and demonstrate attainment of recovery criteria.

1.2 SOUTHERN CALIFORNIA STEELHEAD LISTING HISTORY

After NMFS completed a comprehensive status review of all west coast steelhead populations (Busby, *et al.* 1996), southern California populations were proposed for listing by NMFS as an endangered Evolutionarily Significant Unit (ESU) on August 9, 1996 (61 FR 41541). An ESU is composed of a group of conspecific populations that are substantially reproductively–isolated from other con-specific populations, and that possess important elements of the evolutionary legacy of the species which are expressed genetically and have adaptive value (Waples 1991, 1995). The Southern California Steelhead ESU was formally listed as endangered on August 18, 1997 (62 FR 43937). The original ESU boundaries during the first listing of 1997 were from the Santa Maria River south to Malibu Creek. Following this initial listing, *O. mykiss* were discovered in watersheds south of Malibu Creek (Topanga Creek in Los Angeles County and San Mateo Creek in Orange County) and genetic testing confirmed that these *O. mykiss* were most closely related to the more northern populations of the Southern California Steelhead ESU. This resulted in the range for the ESU being extended south to the U.S.-Mexico border on May 1, 2000 (67 FR 21586).

Following another status review of west coast steelhead populations in 2005 (Good *et al.* 2005), a final ESA listing determination for the endangered Southern California Steelhead DPS was issued on January 5, 2006 (71 FR 834). During the time between the initial listing and the 2006 listing, NMFS adopted the DPS designation for steelhead to replace the ESU designation in order to be consistent with listing policies utilized by the U. S. Fish and Wildlife Service. The DPS Policy (61 FR 4722) uses similar but slightly different criteria from the ESU Policy for determining when a group of organisms constitutes a DPS. A group of organisms is discrete if it is "markedly separated from other populations of the same taxon as a consequence of physical, physiological, ecological, and behavioral factors" but does not have to exhibit reproductive isolation. The final designation for the Southern California Steelhead DPS encompasses all naturally spawned steelhead between the Santa Maria River (inclusive) and the U.S.-Mexico border. Consequently, this DPS includes only those *O. mykiss* whose freshwater habitat occurs below impassible barriers, whether artificial or natural, and which exhibit an anadromous life history. Individuals that have originated in freshwater above impassible barriers and exhibit an anadromous life history are also considered as part of the DPS when they are within waters below the barrier.

1.3 DESIGNATED CRITICAL HABITAT

The ESA requires NMFS to designate critical habitat for all listed species. Critical habitat is defined as specific areas where physical or biological features essential to the conservation (recovery) of the species exist and may require special management considerations or protection. For recovery planning and implementation purposes, these physical or biological features can be viewed as the set of habitat characteristics or conditions that are the end goal of many recovery actions.

When designating critical habitat, NMFS considers certain habitat features called "primary constituent elements" (PCEs) that are essential to support one or more life-history stage(s) of the listed species (50 CFR 424.12b). PCEs considered essential for the conservation of the Southern California Steelhead DPS are those sites and habitat components that support one or more life stages and contain physical or biological features essential to survival, growth, and reproduction. These PCEs include:

Freshwater spawning sites with sufficient water quantity and quality and adequate substrate (*i.e.*, spawning gravels of appropriate sizes) to support spawning, incubation and larval development.

Freshwater rearing sites with sufficient water quantity and floodplain connectivity to form and maintain physical habitat conditions and allow development and mobility; sufficient water quality to support growth and development; food and nutrient resources such as terrestrial and aquatic invertebrates and forage fish; and natural cover such as shade, submerged and overhanging large wood, log jams, beaver dams, aquatic vegetation, large rocks and boulders, side channels, and undercut banks.

Freshwater migration corridors free of obstruction and excessive risk of predation with adequate water quantity to allow for juvenile and adult mobility; cover, shelter, and holding areas for juveniles and adults; and adequate water quality to allow for survival.

Estuarine areas that provide uncontaminated water and substrates; food and nutrient sources to support growth and development; and connected shallow water areas and wetlands to cover and shelter juveniles.

Marine areas with sufficient water quality to support growth, development and mobility; food and nutrient resources such as marine invertebrates and forage fish; and nearshore marine habitats with adequate depth, cover and marine vegetation to provide shelter.

The final critical habitat designation for the Southern California Steelhead DPS was issued on September 2, 2005 (70 FR 52488). A total of 708 miles of stream habitat were designated as critical habitat from the 32 watersheds within the range of this DPS. Critical habitat for the Southern California Steelhead DPS includes most, but not all occupied habitat from the Santa Maria River in southern San Luis Obispo County to San Mateo Creek in northern San Diego County, but excludes some occupied habitat based on economic considerations and all military lands with occupied habitat. Critical habitat was not designated for most of the watersheds south of Malibu Creek with the exception of San Juan Creek and San Mateo Creek. The stream channels with designated critical habitat are listed in 70 FR 52488.

1.4 THE RECOVERY PLANNING PROCESS

The ESA, as amended (16 U.S.C. 1531 *et seq.*), mandates that NOAA-NMFS develop and implement recovery plans for the conservation and survival of listed species. The Southern California Steelhead DPS was listed as endangered in 1997 under the ESA. The development and implementation of a recovery plan for the Southern California Steelhead DPS is considered vital to the continued persistence and recovery of steelhead in this region.

NMFS has established a "recovery planning area" for the purposes of developing this recovery plan and guiding the implementation of actions to recover this species. The Southern California Steelhead (SCS) Recovery Planning Area extends from the Santa Maria River south to the Tijuana River at the U.S.-Mexico border and includes those portions of coastal watersheds that are at least seasonally accessible to steelhead entering from the ocean and the upstream portions of some watersheds that are currently inaccessible to steelhead due to man-made barriers. NMFS' Southwest Region (SWR) Protected Resources Division (PRD) in Long Beach, California is responsible for the development of the recovery plan for the Southern California Steelhead DPS.

The recovery plan serves as a guideline for achieving recovery goals by describing the biological criteria that the listed species (and individual populations) must exhibit, and the steps that must be taken to meet these criteria. Although recovery plans provide guidance, they are not regulatory documents. However, the ESA envisions recovery plans as the central organizing tool for guiding the recovery of listed species. Recovery plans also guide federal agencies in fulfilling their obligations under Section 7(a)(1) of the ESA, which calls on all federal agencies to "utilize their authorities in furtherance of the purposes of this Act by carrying out programs for the conservation of endangered species and threatened species..." In addition to outlining proactive measures to achieve species recovery, recovery plans provide a context and framework for implementing other provisions of the ESA, including consultations on federal agency activities under Section 7(a)(2) and the development of HCPs in accordance with Section 10(a)(1)(B).

Recovery plans are also intended to be used to inform, local, state, as well as tribal and non-governmental entities and individuals who may wish to participate in the conservation and recovery of the species, or who are engaged in activities which may adversely affect that species. The success of a recovery plan depends upon the cooperation of all stakeholders and planning and regulatory entities to ensure appropriate implementation.

Pursuant to Section 4(f) of the ESA, a recovery plan must be developed for species listed as threatened or endangered, and this plan must be implemented unless it is found not to promote the conservation of the species. A recovery plan must include the following:

- Objective, measurable criteria, which when met, will allow delisting of the species (see Chapter 4);
- A description of site-specific management actions necessary for recovery (see Chapters 7 through 11); and
- Estimates of the time and cost to carry out the recommended recovery measures (see Chapters 7 through 11).

Past recovery plans have generally focused on the abundance, productivity, habitat, and other life-history characteristics of a species. While knowledge of these characteristics is important for making sound conservation management decisions, the long-term sustainability of a threatened or endangered species can only be ensured by alleviating the threats that are contributing to the decline of that species or impeding its recovery. Therefore, the identification of such threats is a key component of any recovery program (NMFS 2006).

The Interim Endangered and Threatened Species Recovery Planning Guidance document (NMFS 2006) recommends "*…using a threats assessment for species with multiple threats to help identify the relative importance of each threat to the species' status, and, therefore, to prioritize recovery actions in a manner most likely to be effective for the species' recovery*." This recovery plan uses this recommended approach to identify and prioritize threats to the Southern California Steelhead DPS. The prioritized threats are then used to guide the identification of specific recovery actions. Chapter 4 summarizes the threats across the DPS and Chapters 8 through 12 provide threats assessment results within different geographic areas of the DPS. The threats assessment methodology is discussed in Appendix D.

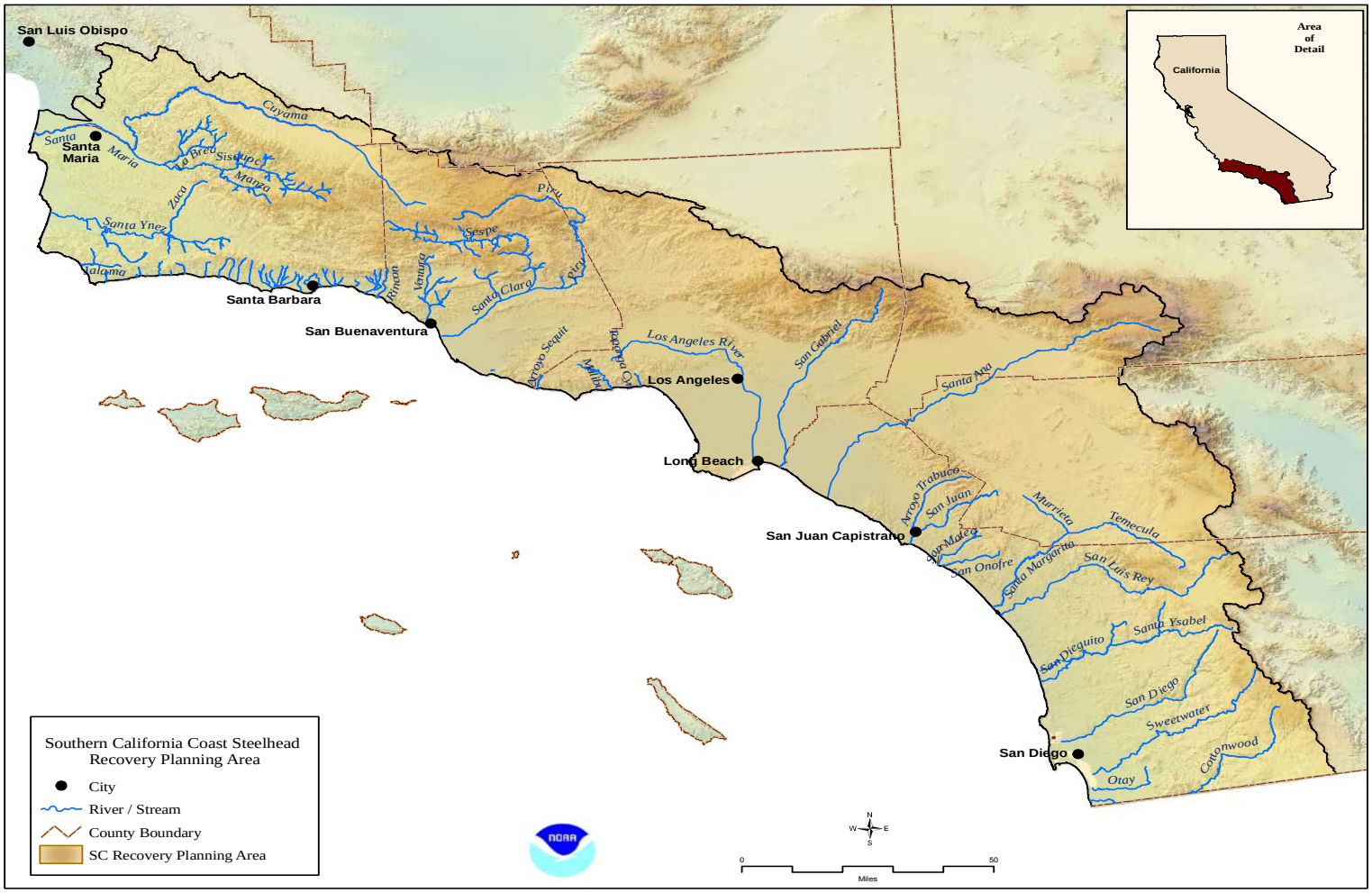

Figure 1-1. Southern California Steelhead Recovery Planning Area. Boundaries of Recovery Planning Area extend beyond the current distribution of the listed species.

1.4.1 Southern California Steelhead Technical Recovery Team

As part of its recovery planning efforts, NMFS SWR assembled a team of scientists with a wide variety of expertise in biological and physical sciences to provide technical assistance to the recovery planning process for southern California steelhead; this group is known as the Technical Recovery Team (TRT). NMFS' intent in establishing the TRT was to seek geographic and species-specific expertise to develop a scientific foundation for the recovery planning. The TRT produced and published a number of Technical Memoranda, which provide a description of the unimpaired historic populations within the Recovery Planning Area (Boughton *et al.* 2006), and identified viability criteria for anadromous *O. mykiss* in the Southern California Steelhead DPS (Boughton *et al*. 2007). Additionally, NOAA Fisheries' Southwest Science Center produced and published a number of additional Technical Memoranda dealing with potential over-summering habitat in the region (Boughton *et al.* 2006), and the reduction of the southern range limit of anadromous *O. mykiss* (Boughton *et al*. 2006). Finally, NOAA Fisheries Southwest Science Center undertook a number of genetic investigations in an attempt to identify the population structure of the Southern California Steelhead DPS, and provided scientific review of local and regional recovery efforts (Girman and Garza 2006, Clemento and Garza 2007).

1.4.2 Public Participation

Local, state, and federal support of recovery planning by those whose activities directly affect the listed species, and whose actions will be most affected by recovery requirements, is essential to the successful implementation of any recovery plan. NMFS supports and participates in collaborative efforts to develop and implement recovery plans by engaging local communities, State and Federal entities, and other stakeholders.

As part of the recovery planning process, NMFS published a notice of intent to prepare a recovery plan for the species in the Federal Register and conducted a series of Recovery Planning Workshops, to solicit information on threats and recovery actions as part of the development of the recovery plan for the Southern California Steelhead DPS. Public workshops were held in Ventura, California on April 4-5, 2007 and May 31, 2007 and in Carlsbad, California on June 1, 2007 and April 12-13, 2008.

At these workshops, NMFS provided a general overview of:

- The federal recovery planning process;
- The preliminary timeline for NMFS recovery plan development;
- The current understanding of steelhead populations and their habitats;
- An outline of the threats assessment process; and
- A summary of the threats identified during the initial public workshops.

Following the overview, workshop participants were separated into smaller facilitated breakout groups to identify threats to specific steelhead populations and their habitats. In the final set of workshops, breakout groups identified potential recovery actions for specific populations and habitats. Information obtained from these workshops was used in the development of a formal threats assessment analysis using The Nature Conservancy's Conservation Action Planning

(CAP) threats assessment methodology (see Appendix D), and the identification of a full suite of recovery actions based on those threats.

NMFS has also established a web page to provide ongoing updates and information to the public about the recovery planning process, access to recovery plan materials (when available) and implementation of recovery actions. The home web page for NMFS SWR salmonid recovery planning is accessible at: http://swr.nmfs.noaa.gov/recovery/index.htm. The web page for recovery planning and implementation for the Southern California Steelhead DPS (including the Recovery Plan, related NOAA Technical Memorandum, and Threats Assessment summaries) can be found at: http://swr.nmfs.noaa.gov/recovery/So_Cal.htm.

Finally, recovery of the species cannot occur without public involvement in the planning and implementation process. NMFS encourages the efforts of watershed groups dedicated to improving watershed ecosystem conditions. NMFS believes it is critically important to base ESA recovery plans for steelhead on the many Federal, State, regional, local, and private conservation efforts already underway throughout the region. Local support of recovery plans by those whose activities directly affect the listed species, and whose actions will be most affected by recovery efforts, is essential. NMFS therefore supports and participates in locally-led collaborative efforts to develop recovery plans, involving local communities, State and Federal entities, and other stakeholders. We anticipate that watershed groups and private entities can utilize the information and recommendations provided in this recovery plan to further refine and develop recovery actions to abate threats and meet recovery objectives.

2. Steelhead Biology and Ecology

"[W]e must constantly keep in mind that variation, i.e., deviation from the norm, is one of the most marked characteristics of animal life. And of the vertebrates, the trout are among the most variable of all. Further, of the trout the steelhead is one of the most variable forms. . . . As an example, in the coastal streams most fish migrate in their first year, third, four, or fifth years, or do not migrate at all."

Leo Shapovalov and Alan C. Taft,
Life Histories of Steelhead Trout and Silver Salmon, 1954

2.1 SPECIES TAXONOMY AND LIFE HISTORY

Oncorhynchus mykiss is one of seven Pacific salmon in the genus *Oncorhynchus* that are native to the North American coast. O. *mykiss*, along with the other species of Pacific salmon exhibit an anadromous life history, which means that juveniles of the species undergo a change that allows them to migrate to and mature in salt water before returning to their natal rivers or streams (*i.e.,* streams where they were spawned) to reproduce and complete their life cycle.

Two principle recovery objectives are to increase abundance of steelhead, and to preserve the expression of all life-history strategies. An illustration of the various life-history strategies that occur in the Southern California Steelhead DPS is shown in Figure 2-1. These strategies are further discussed in the text below. The figure may be best understood by tracing the various pathways a freshwater juvenile may follow. Those pathways may remain entirely within freshwater ecosystems or transition between freshwater, estuarine and marine ecosystems. The use of these different environments may confer advantages or disadvantages to the survival and success of the individual depending on the conditions of those environments.

Adult steelhead (Figure 2-2) spawn in coastal watersheds and their progeny (Figure 2-3) rear in freshwater or estuarine habitats prior to migrating to the sea. Within this basic life-history pattern, the species exhibits a greater variation in the time and location spent at each life-history stage than the other Pacific salmon within the genus *Oncorhynchus*.

The life history of steelhead generally involves rearing in freshwater for one to three years before migrating to the ocean and spending two to four years maturing in the marine environment before returning to spawn in freshwater. This life-history strategy is referred to as "fluvial-anadromous," referring to the river or stream focus of the strategy. Out-migration to the ocean (*i.e.,* emigration) usually occurs in the late winter and spring. In some watersheds, juveniles may rear in a lagoon or estuary for several weeks or months prior to entering the ocean. The timing of

emigration is influenced by a variety of factors such as photoperiod, streamflow, temperature, and breaching of the sandbar at the river's mouth. These out-migrating juveniles, termed smolts (Figure 2.4), live and grow to maturity in the ocean for two to four years before returning to freshwater to reproduce.

The ocean phase of steelhead has not been studied extensively, though marine migration studies of other species of *Oncorhynchus* have encountered only isolated specimens of *O. mykiss* and as a result it is believed that the species does not generally congregate in large schools as do other Pacific salmon of the genus *Oncorhynchus* (Burgner *et al*. 1980, 1992; Groot and Margolis 1991). As a result, their movement patterns at sea are poorly understood. Some fish are known to remain in coastal waters relatively close to their natal rivers, while others may range widely in the North Pacific (Quinn 2005).

Returning adults may migrate from several miles to hundreds of miles upstream to reach their spawning grounds. The specific timing of spawning can vary by a month or more among streams within a region, occurring in winter and early spring, depending on factors such as run-off and sand bar breaching. Once they reach their spawning grounds, females use their caudal fin to excavate a nest (redd) in streambed gravels where they deposit their eggs. After fertilization by the male, the female covers the redd (often during construction of additional upstream redds) with a layer of gravel, where the embryos (alevins) incubate within the gravel. Hatching time varies from about three weeks to two months depending on water temperature. The young fish emerge from the gravel two to six weeks after hatching. Adults do not necessarily die after spawning and may return to the ocean, sometimes repeating their spawning migration one or more times. It is rare for steelhead to spawn more than twice before dying, and most that do so are females (Moyle 2002). The frequency of repeat spawning among southern California populations has not been investigated, and it is therefore unknown how it may differ from other populations, or the role repeat spawning plays in the population dynamics in southern California. Additional details regarding this species' life history can be found in Shapovalov and Taft (1954), Barnhart (1986, 1991), Bjornn and Reiser (1991), and Quinn (2005).

This species may also display a non-anadromous life-history pattern (*i.e.*, a "freshwater-resident" strategy). It has been common practice to refer to non-anadromous individuals that complete their entire life-history cycle (incubating, hatching, rearing, maturing, reproducing, and dying) in freshwater as rainbow trout, while referring to those emigrating to and maturing in the ocean as steelhead. However, this terminology does not capture the complexity of the life-history cycles exhibited by native *O. mykiss. I*ndividuals can complete their life-history cycle completely in freshwater, or they can migrate to the ocean after one to three years, and spend two to four years in the marine environment before returning to freshwater rivers and streams to spawn.

Additionally, "rainbow trout" which have completed their life-history cycle entirely in freshwater sometimes produce progeny which become anadromous and emigrate to the ocean and return as adults to spawn in freshwater. Conversely, it has also been shown that steelhead may produce progeny which complete their entire life cycle in freshwater. This switching of life-history strategies has been demonstrated by studying the microchemistry of *O. mykiss* otoliths (small inner ear bones), where time spent in marine and fresh waters can effectively be tracked by the presence or absence of certain ocean-derived elements in the bone tissue. Zimmerman and

Reeves (2000) used this technique to uncover occasional life-history switching in *O. mykiss* populations in Oregon. O. *mykiss* in the Southern California Steelhead DPS have not yet been examined in this way, but various lines of evidence (*e.g.*, inland resident fish exhibiting smolting characteristics, river systems producing smolts with no regular access for adult steelhead) indicate that switching between freshwater and anadromous life cycles is likely occurring. The cues that trigger this phenomenon are unknown, but may be linked to environmental variation. For example, juvenile residency can be strongly influenced by the hydrologic cycle in southern California, where extended droughts can cause juveniles to become land-locked and therefore unable to reach the ocean (Boughton *et al*. 2006, 2007).

Figure 2-1. Summary of the various life-history strategies exhibited by Southern California *O. mykiss* and the life-stage specific terminology.

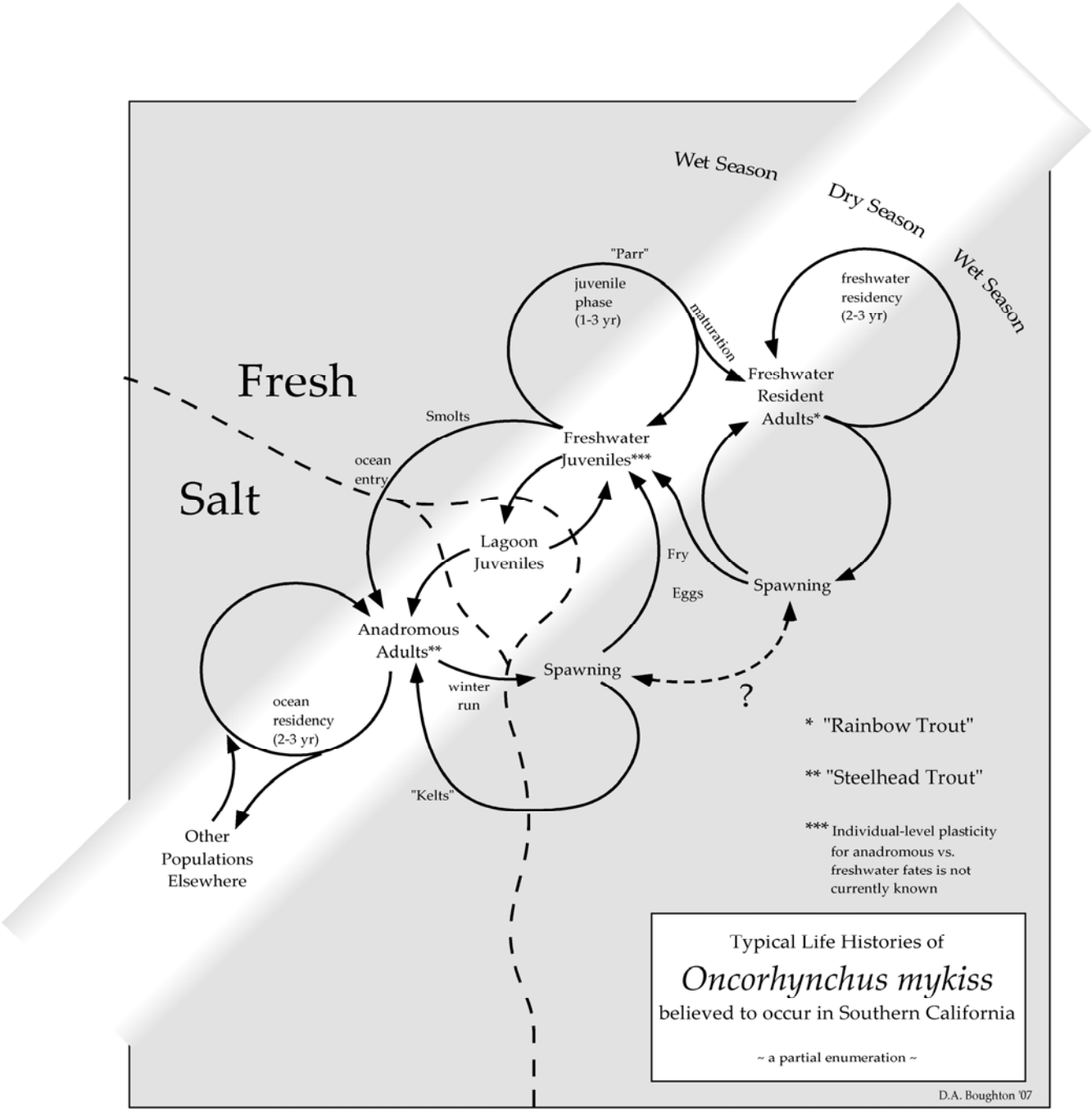

Figure 2-2. Adult female anadromous *O. mykiss* (approx. 75 cm), Carpinteria Creek, Santa Barbara County, 2008.

Figure 2-3. Juvenile *O. mykiss* (approx. 10 cm), Juncal Creek, Santa Barbara County, 2003

Figure 2-4. Steelhead smolt (approximately 17 cm) confluence Ventura River and San Antonio Creek 2008

Lastly, there is a third type of life-history strategy displayed by *O. mykiss* that is referred to as "lagoon-anadromous." Bond (2006), working at a study site in northern Santa Cruz County, has recently shown that each summer a fraction of juvenile *O. mykiss* over-summered in the estuary of their natal creek. Like southern California estuaries, this estuary was cut off from the ocean during the summer by the formation of a sandbar spit, creating a seasonal lagoon. Bond (2006) showed that many juveniles grow fast enough after their first year of lagoon rearing to migrate to

the ocean, and most enter the ocean at a larger size than fish rearing in freshwater habitats of the stream system. Larger size generally enhances survival in the ocean, and the lagoon-reared fish represented a large majority of the returning adult spawning population (Bond 2006).

Within each of the three basic life-history strategies (fluvial-anadromous, freshwater-resident, and lagoon-anadromous), there is additional variation, including examples of finer-scale habitat switching, such as multiple movements between lagoon and freshwater habitats in the course of a single summer; and also so-called "adfluvial" populations that inhabit reservoirs but spawn in tributary creeks.

2.2 SPECIES FRESHWATER DISTRIBUTION AND POPULATION STRUCTURE

Differences between the historical and current distributions of this species illustrate their present endangered status. Many populations have become extirpated, particularly near the southern extent of their range (*i.e.,* in the southern portion of the DPS, south of the Santa Monica Mountains) (Boughton, *et al.* 2005; Xanthippe 2005). Individual populations within this DPS have been severely reduced or in many cases extirpated (Table 2-1, Figure 2-5). Many of the southernmost watersheds may have originally supported sporadic steelhead populations, or intermittent resident populations that experienced repeated local extinctions and recolonizations in dry and wet cycles, respectively.

NMFS conducted an extensive *O. mykiss* population survey in 2002 of most of the coastal watersheds within the Southern California Steelhead DPS (Boughton and Fish 2003). Of the 46 watersheds in which steelhead were known to have occurred historically, between 37 and 43 percent were still occupied by either resident fish or steelhead (a range was reported for the occupancy estimate because several watersheds could not be surveyed). Three watersheds were considered vacant of steelhead because they were dry, 17 were considered vacant due to the presence of impassible barriers to all known spawning habitat, and six were considered vacant because the survey found no evidence of *O. mykiss*. Seventeen watersheds with no known historical record of steelhead occurrence were surveyed; none of these were found to be occupied during the 2002 survey. The distributional study of 2002 also determined that *O. mykiss* was present in two systems (Gaviota Creek and San Mateo Creek) where it was previously reported to be extinct by Nehlsen *et al*. (1991).

One of the recovery objectives of this plan is to maintain current distribution of steelhead and restore distribution to previously occupied areas. Fish-passage barriers appear to have played a large role in watershed-wide extirpations of steelhead; however, in many cases ancestors of sea-run steelhead continue to persist as resident populations above barriers in these same stream systems, and in some cases produce progeny, with exhibit smolt-like characteristics, that emigrate downstream, past the barriers, to the ocean. In an investigation of the contraction of the southern range limit of *O. mykiss*, these populations have been recently documented to occur above barriers in approximately 77 of the instances where steelhead have been lost below the barriers (Boughton *et al.* 2005).

These resident populations could include fish that are considered naturally persistent residents, descendants of steelhead that have been blocked from downstream emigration by barriers and

have been forced to adopt a resident-type life cycle (*i.e.,* "residualized" populations), or perhaps progeny of stocked *O. mykiss* found above barriers to steelhead migration (Boughton et al. 2005).

Table 2-1. Southern California watersheds historically occupied by populations of steelhead (listed from north to south). Several watersheds with historical populations now have barriers that block migration to portions of the watershed.

WATERSHED[1]	CURRENTLY OCCUPIED[2]
Santa Maria River	Yes
Santa Ynez River	Yes
Jalama Creek	Negative obs.[3]
Cañada de Santa Anita	Yes
Cañada de la Gaviota	Yes
Cañada San Onofre	Negative obs.
Arroyo Hondo	Yes
Arroyo Quemado	Barrier[2]
Tajiguas Creek	Barrier
Cañada del Refugio	Negative obs.
Cañada del Venadito	Barrier
Cañada del Corral	Yes
Cañada del Capitan	Negative obs.
Gato Canyon	Not determined
Dos Pueblos Canyon	Yes
Eagle Canyon	Not determined
Tecolote Creek	Yes
Bell Canyon	Barrier
Goleta Slough Complex	Yes
Arroyo Burro	Yes
Mission Creek	Yes
Montecito Creek	Yes
Oak Creek	Barrier
San Ysidro Creek	Yes
Romero Creek	Yes
Arroyo Paredon	Yes
Carpinteria Salt Marsh Complex	Barrier
Carpinteria Creek	Yes
Rincon Creek	Yes
Ventura River	Yes

WATERSHED[1]	CURRENTLY OCCUPIED[2]
Santa Clara River	Yes
Big Sycamore Canyon	Negative obs.
Arroyo Sequit	Yes
Solstice Creek	Yes
Malibu Creek	Yes
Topanga Canyon	Yes
Los Angeles River	Yes
San Gabriel River	Yes
Santa Ana River	Barrier
San Juan Creek	Yes
San Mateo Creek	Yes
San Onofre Creek	Dry
Santa Margarita River	Negative obs.
San Luis Rey River	Yes
San Dieguito River	Yes
Sweetwater River	Yes
Otay River	Barrier
Tijuana River	Not determined

[1] *A watershed includes all of the tributaries and main-stem which share a common outlet to the ocean.*

[2] *Data from: Becker*, et al. *2008; Boughton* et al. *(2006); Sleeper (2002); Titus* et al. *(2006); M. Larson, California Department of Fish and Game, personal communication (2007).*

[3] *"Negative obs." means juveniles were not observed during a spot-check of best-occurring summer habitat in 2002. "Dry" indicates the stream had no discharge in anadromous reaches during the summer of 2002. "Barrier" indicates that all over-summering habitat was determined to be above an anthropogenic barrier, believed to be impassable, and therefore steelhead were not expected to be present. See Boughton* et al. *(2005).*

Several reports describe the historical populations of the Southern California Steelhead DPS (Boughton *et al*. 2005; Boughton and Goslin 2006; Boughton *et al*. 2006, 2007). Using this information, the TRT proposed a structure for the Southern California Steelhead DPS that breaks into five Biogeographic Population Groups (BPGs) (Table 2-2). The division of steelhead populations into Biogeographic Population Groups utilized two basic rules: First, populations were sorted into a coastal super-group and an inland super-group, based on whether or not the most potential freshwater habitats lay on an ocean-facing watershed subject to marine based climate inversion and orographic precipitation from off-shore weather systems. Second, within the coastal and inland super-groups, populations were sorted into groups defined by contiguous areas with broadly similar physical geography and hydrology. The combinations of these

physical characteristics represent differing natural selective regimes for steelhead populations utilizing the individual watersheds. These differing physical characteristics have lead to life-history and genetic adaptations that can enable the populations to persist in widely varying habitat regimes represented by the Biogeographic Population Groups. The purpose of delineating the BPGs is to guide recovery efforts across the DPS to ensure the preservation and recovery of the range of natural diversity of the Southern California Steelhead DPS. From north to south, these BPGs are known as: Monte Arido Highlands, Conception Coast, Santa Monica Mountains, Mojave Rim, and Santa Catalina Gulf Coast (Figure 2-5).

Table 2-2. Ecological characteristics of BPGs in the Southern California steelhead DPS (originally Table 4 in Boughton et al. 2007).

Southern California Steelhead ESU

Population Group	Ecological Characteristics				
	Migration Corridor	Migration reliability	Summer Climate Refugia	Intermittent Streams	Winter Precipitation
Monte Arido Highlands	Long alluvial valleys	Moderate/ Low	Montane	Many	60 – 75 cm (highlands)
Conception Coast	Coastal terrace	Moderate	Marine	Many	30 – 60 cm
Santa Monica Mountains	Short, steep	Low	Marine	Many	30 – 60 cm
Mojave Rim	Long alluvial valleys	Very Low	Montane	Many	75 – 135 cm (highlands)
Santa Catalina	Coastal terrace	Low	Marine	Many	mostly <75 cm
Gulf Coast	& mesas				

The separate watersheds comprising each BPG are generally considered as individual *O. mykiss* populations (*i.e.,* one watershed = one population of steelhead). Thus, single BPGs encompass multiple watersheds and multiple *O. mykiss* populations. However, many coastal watersheds in several of the BPGs (*e.g.*, Conception Coast, Santa Monica Mountains) are relatively small, and may be capable of supporting only small steelhead runs. The basis for the persistence of independent steelhead populations in these small watersheds is uncertain and further research is needed. The TRT (Boughton *et al.* 2007) propose that at least three scenarios (not necessarily mutually exclusive) are plausible:

1) Some of the populations in the coastal BPGs, though small, may be exceptionally stable and sustain the continued presence of steelhead in neighboring watersheds via adult dispersal between watersheds (an independent population supporting one or more dependent populations, thus forming a metapopulation).
2) Adult dispersal between neighboring watersheds within a coastal BPG may be common enough to knit together the steelhead in individual watersheds into a small number of "trans-watershed" populations (an independent population comprised of the fish from two or more neighboring streams, thus forming a metapopulation).
3) The populations in the coastal BPGs may be dependent upon occasional or frequent adult dispersal pulses from populations in the larger inland BPGs.

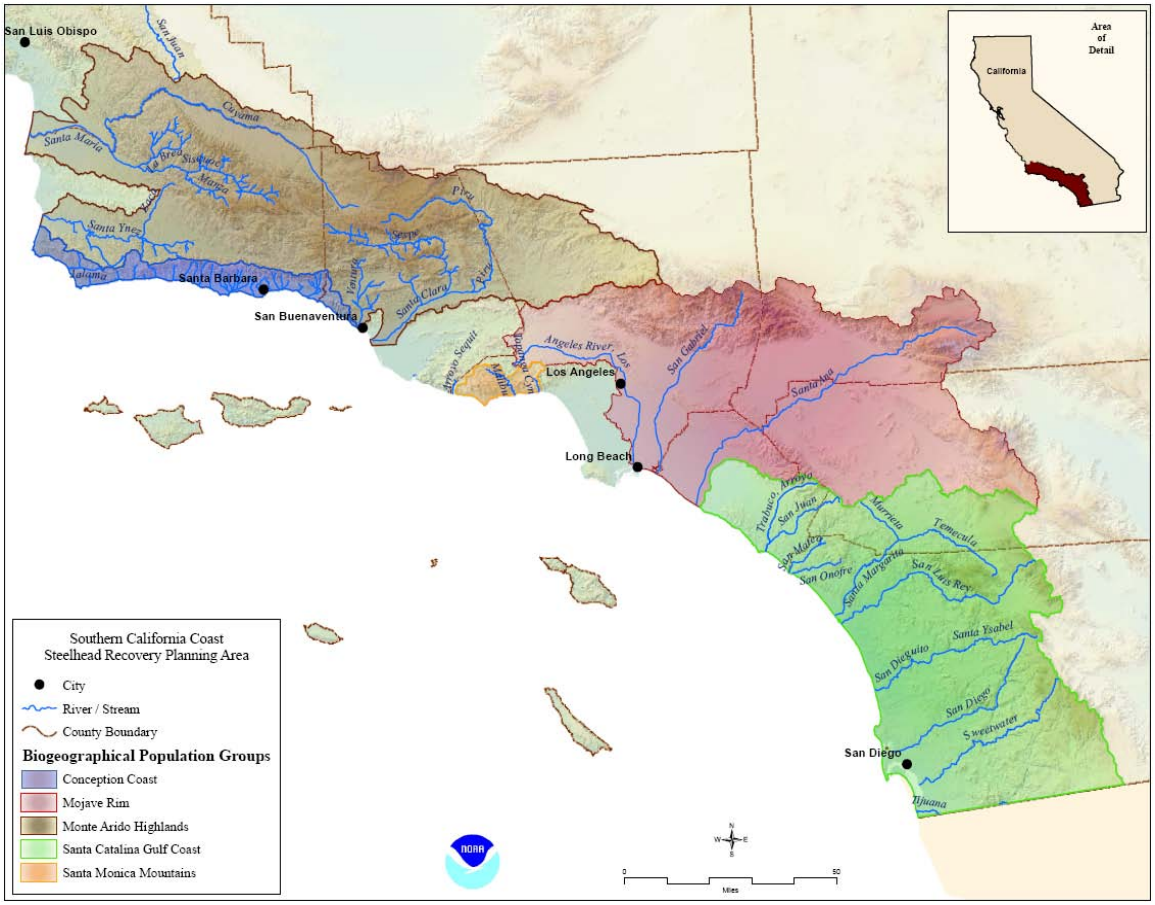

Figure 2-5. Biogeographic Population Groups (BPGs) in the Southern California Steelhead Recovery Planning Area (after Boughton *et al*. 2007).

In characterizing the historic, pre-European settlement population structure of the Southern California Steelhead DPS, the TRT: 1) identified the original anadromous *O. mykiss* populations and attempted to determined which ones were still extant; 2) delineated the potential unimpaired geographic extent of each population on a watershed scale; 3) estimated the relative potential viability of each population in its (hypothetical) unimpaired state; and 4) assessed the potential demographic independence of each population in its (hypothetical) unimpaired state. This analysis entailed a consideration of available historical and current data on the distribution and abundance of *O. mykiss*, new genetic data, landscape data, climate data, and stream discharge data. However, data limitations, particularly a lack of long-term run-size data, prevented the TRT from providing definitive characterizations of pre-European or current anadromous *O. mykiss* populations, including the geographic extent of individual populations, their intrinsic viability, or demographic independence. For a discussion of the constraints imposed by limited relevant data see Boughton *et al*. (2006) and see Appendix B for relative viability rankings of populations, and Appendix C for populations grouped by BPG.

2.3 SPECIES ABUNDANCE

One of the recovery objectives for steelhead is to increase abundance of steelhead, including the expression of all life history forms and strategies. Current population abundances are extremely small, with no watersheds currently exhibiting annual runs of returning adults of more than a dozen fish, at most, in recent years, and the presence of steelhead in watersheds is often sporadic (Busby *et al.* 1996; Good *et al*. 2005). It has been estimated that the steelhead populations in this region have declined dramatically from annual runs totaling between 32,000 and 46,000 adults to less than 500 total adults (Busby *et al*. 1996). However, this run-size estimate is based on information from only the four major watersheds bearing steelhead (Santa Ynez River, Ventura River, Santa Clara River, and Malibu Creek) located in the northern portion of the SCS Recovery Planning Area. Run-size estimates from coastal and inland watersheds south of the Los Angeles Watershed have generally not been estimated or recorded. Additionally, available run-size estimates represent only average annual estimates, and do not describe the wide annual variation in run-size that would be expected in a region with a highly variable climate and habitat conditions. Quantitative estimates historic of historic runs in the Southern California Steelhead DPS are based largely on observations made by California Department of Fish and Game (CDFG) personnel. No long term (20+ years) time-series data are available for any of the populations within this DPS. Since the listing of southern California steelhead, there have been increased efforts made to make periodic observations of adults as well as more systematic monitoring on a few major watersheds with recently constructed fish passage facilities (*e.g.*, Robles Diversion on the Ventura River and Vern Freeman Diversion on the Santa Clara River).

2.4 SPECIES GENETIC STRUCTURE AND DIVERSITY

A recovery objective for steelhead is to restore and conserve genetic diversity and interchange of genetic material between and within populations. Since the late 1980s, a number of genetic studies have been conducted to clarify the structure of *O. mykiss* populations within the Southern California Steelhead DPS. These studies have provided useful insights into the historic distribution of the species, as well as the potential influence of past (and current) stocking

practices within the watersheds historically occupied by native *O. mykiss. B*erg and Gall (1988) surveyed steelhead populations throughout California, including a small number of populations from the Southern California Steelhead DPS. They discovered considerable variability among California populations, but did not discern a clear geographic pattern to the variation. Busby *et al.* (1996) also reported a high level of genetic variability in California coastal populations, including four from the Southern California Steelhead DPS. Busby *et al.* (1996) also found an allozyme allele fixed in some populations but entirely absent in others, which is unprecedented in anadromous salmonids, except when comparing populations at the extreme ends of their ranges.

Recent genetic investigations have shed light on the relationship between steelhead and the *O. mykiss* above barriers within the Southern California Steelhead DPS. Girman and Garza (2006) determined that above barrier *O. mykiss* were more closely associated with below-barrier populations than to populations from other watersheds; that they were more related to the fish below the barrier than to any other populations. In addition, their results supported the idea that planted hatchery fish from other watersheds have had no detectable influence on the genetics of above-barrier populations. These results indicate that the above-barrier populations are not the descendents of hatchery fish. They are most likely the descendents of contiguous *O. mykiss* populations, because most of these areas have historical accounts of steelhead populations prior to construction of the barriers. While the fish that remain above barriers do not have an opportunity to interbreed with sea-run steelhead, they can and in some cases do produce progeny, with exhibit smolt-like characteristics, that emigrate downstream, past the barriers, to the ocean.

A more recent genetics study of *O. mykiss* in the Santa Ynez River reaches similar conclusions (Garza and Clemento 2007). The major conclusions of the study included: 1) the spatial genetic structure of the Santa Ynez River watershed was similar to most other coastal watersheds; 2) the estimated effective population size[1] in two tributaries varied between approximately 25-50 individuals; 3) there were significant differences between populations from four sub-watersheds (Salsipuedes, Juncal, Santa Cruz, and Hilton Creeks); and 4) all four populations (two below and two above barriers to anadromy) are primarily of coastal ancestry.

2.5 HABITAT CHARACTERISTICS OF THE SOUTHERN CALIFORNIA STEELHEAD RECOVERY PLANNING AREA

The major watersheds of the planning area include the Santa Maria, Santa Ynez, Ventura, and Santa Clara Rivers, all of which are located in the northern portion of the SCS Recovery Planning Area (Busby *et al*. 1996; Good *et al*. 2005). South of the Santa Monica Bay, several major drainages and a number of smaller streams once supported runs of anadromous *O. mykiss* (of unknown size and frequency); these include the Los Angeles, San Gabriel, Santa Ana, Santa Margarita, San Luis

[1] The effective population size (N_e) can be generally thought of as the number of individuals that contribute offspring to the next generation, and is generally smaller than the absolute population size (N). It is a basic parameter in many models in population genetic.

Rey, San Dieguito, San Diego, Sweetwater Rivers, and San Juan and San Mateo Creeks (Swift *et al.* 1993; Titus *et al*. 2006).

Significant portions of the upper watersheds within the SCS Recovery Planning Area are contained within four national forests (Los Padres, Angeles, Cleveland, and San Bernardino National Forests). These forests are managed primarily for water production and recreation (with limited grazing and oil, gas, and mineral production). Urban development is centered in coastal areas and inland valleys, with the most expansive and densest urban development located within the Los Angeles Watershed. Coastal valleys, and some foothills, are extensively developed with agriculture, principally row-crops, citrus and fruit trees, and vineyards (Hornbeck 1983; Keeley1993; Lantis *et al*. 1981; Lockmann 1981; Stephenson and Calcarone 1999; U.S. Forest Service 2006).

The SCS Recovery Planning Area is characterized by geologically young mountainous topography with a number of inland valleys and coastal terraces. The geomorphology (*i.e.,* the shape and composition of the land) is strongly influenced by tectonic activity and various other signs of stress (*e.g.*, highly folded and faulted rocks of varying types), including metamorphic formations (*i.e.,* rocks that have changed type over time) in the Central Coast Ranges, sedimentary formations (*i.e.,* formations comprised of sediment deposited out of the air, ice, wind, gravity and/or water flows) in the Transverse Ranges, and metamorphic-granite formations (*i.e.,* igneous rock formed from cooled magma) in the southern Peninsular Ranges. The legacy of tectonic activity and other physical stresses has created the steep slopes and unconsolidated rock formations that characterize this region. These geologic factors combined with an active, annual fire-cycle and intense winter storms have created spatially complex and frequently unstable river and stream habitats where anadromous fishes and other aquatic species live (Bailey 1966; Faber *et al*. 1989; Felton 1965; Norris and Webb 1990; Norris 2003; Sugihara *et al.* 2006).

The SCS Recovery Planning Area is characterized by ten broad native terrestrial plant communities within the Californian floristic province: Estuarine Wetlands, Beach and Dunes, Riparian Forests, Coastal Prairie, Coastal Sage Scrub, Oak Woodlands, Chaparral, Valley Grasslands, Vernal Pools, and Southern California Conifer Forests (Barbour, *et al*. 2007; Ferren *et al*. 1995; Hickman 1993; Munz 1974; Sawyer and Keeler-Wolf 1995). Upland areas of the northern portion of the SCS Recovery Planning Area are dominated by a mix of Chaparral, Valley Grasslands, Oak Woodlands, and Southern California Conifer Forests. Upland areas of the southern portion of the SCS Recovery Planning Area are dominated by Southern Coastal Scrub, Valley Grassland, Oak Woodland, and Southern California Conifer Forests. Both of these upland areas are subject to catastrophic wildfires (Sugihara *et al.* 2006). Riparian forests consist of deciduous species. Large segments of the valley grasslands and riparian forests have been converted for agricultural, residential, and a variety of other commercial land-uses (Barbour *et al*. 2007; California Department of Fish and Game 2003; Holland 1996; Kreissman 1991; Mayer and Laundenslayer 1988; Stephenson and Calcarone 1999; Warner and Hendrix 1984). However, the interior uplands within the four National Forests are largely undeveloped, and a number of large parks, preserves, and greenbelts have been created in recent years on non-Federal lands.

The climate in the California floristic province is Mediterranean, with long dry summers and short, sometimes intense cyclonic winter storms. Rainfall is restricted almost exclusively to the winter months (December through March), though the extreme southern portion of the SCS Recovery Planning Area is subject to occasional summer storms originating from the Gulf of California. The California floristic province is subject to an El Niño/La Niña weather cycle which can significantly affect winter precipitation, causing highly variable rainfall between years. Additionally, there is a wide disparity between winter rainfall from north to south, as well as between coastal plains and inland mountainous areas. Mean annual precipitation ranges along the coast (north to south) from 32 to 24 centimeters (cm) per year, with larger variations (24-90 cm/year) from the coast inland (west to east) due to the orographic (i.e., lifting) effects of the various mountain ranges. Fog along the coastal areas is typical in late spring and summer, extending inland along coastal reaches with valleys extending into the interior. This fog has been shown to moderate conditions for rearing *O. mykiss* in these lower, coastal reaches (Bailey 1966; Barbour *et al*. 2007; Felton 1965; Hornbeck 1983; Karl 1979).

River flows vary greatly between seasons, and can be highly flashy during the winter season, changing by several orders of magnitude over a few hours in response to winter storms. Snow accumulation is generally small and of short duration, and does not contribute significantly to peak run-off. Base flows in some river reaches can be influenced significantly by groundwater stored and transported through faults and fractured rock formations. Many rivers and streams naturally exhibit interrupted base flow patterns (alternating channel reaches with and without surface flow) controlled by geologic formations, and a strongly seasonal precipitation pattern characteristic of a Mediterranean climate. Water temperatures are generally highest during summer months, but can be locally controlled by springs, seeps, and rising groundwater, creating micro-aquatic conditions suitable for salmonids (Boughton, et al. 2008; Faber et al. 1999; Harrison et al. 2005; Jacobs 1993; Mount 1995; Reid and Wood 1976).

3. Factors Leading to Federal Listing

"Steelhead on the west coast of the United States have experienced dramatic declines in abundance during the past several decades as a result of human-induced and natural factors. The scientific literature is replete with information documenting the decline of steelhead populations and anadromous salmonid habitats. There is no single factor solely responsible for this decline."

Factors for Decline: A Supplement to the Notice of Determination for West Coast Steelhead under the Endangered Species Act, 1996

When evaluating a species for protection under the ESA, the law provides that the Secretary of Commerce must consider whether any one (or more) of five listing factors affect the species. Listing factors deal with those aspects of the species' biology or habitat that affect the level of threat to the species' continued persistence. The ESA requires that in developing recovery plans for listed species, each of the factors which contributed to the species' listing as threatened or endangered be addressed in the recovery actions identified in recovery plans.

The five listing factors are:

A. Present or Threatened Destruction, Modification, or Curtailment of Habitat or Range;

B. Over-Utilization for Commercial, Recreational, Scientific, or Educational Purposes;

C. Disease and Predation;

D. Inadequacy of Existing Regulatory Mechanisms; and,

E. Other Natural or Human-Made Factors Affecting Continued Existence.

NMFS' listing determinations (65 FR 36074, June 7, 2000; 64 FR 14517, March 25, 1999; 63 FR 42588, August 10, 1998; 63 FR 13347, March 19, 1998; 62 FR 43937, August 18, 1997), and supporting technical reports (*e.g.*, Busby *et al.*, 1996; NMFS, 1996) have provided a detailed discussion of the factors affecting steelhead at the time of listing. There was no single factor solely responsible for the decline of southern California steelhead; however, of these factors, the destruction and modification of habitat and natural and man-made factors had been identified as the primary causes for the decline of the Southern California Steelhead DPS.

In this chapter, we present a summary of the factors identified at the time of the listing of the species. All of these factors are still persistent and there have been few changes to the factors

affecting the species since the time of listing. The following chapter, Chapter 4, discusses the current threats facing the Southern California Steelhead DPS and represents our current understanding of how the listing factors continue to affect the species.

3.1 FACTOR A: Present or Threatened Destruction, Modification or Curtailment of Habitat or Range

Southern California steelhead declined in large part as a result of agriculture, mining, and urbanization activities that have resulted in the loss, degradation, simplification, and fragmentation of habitat. Water storage, withdrawal, conveyance, and diversions for agriculture, flood control, domestic, and hydropower purposes have greatly reduced or eliminated historically accessible habitat. Modification of natural flow regimes by dams and other water control structures have resulted in increased water temperatures, changes in fish community structures, depleted flow necessary for migration, spawning, rearing, flushing of sediments from spawning gravels, and reduced gravel recruitment. In addition to these indirect effects these structures have also resulted in increased direct mortality of adult and juvenile steelhead. Land-use activities associated with urban development, mining, agriculture, ranching, and recreation have significantly altered steelhead habitat quantity and quality. Associated impacts of these activities include: alteration of stream bank and channel morphology; alteration of ambient stream water temperatures; degradation of water quality; elimination of spawning and rearing habitats; fragmentation of available habitats; elimination of downstream recruitment of spawning gravels and large woody debris; removal of riparian vegetation resulting in increased stream bank erosion; and increased sedimentation input into spawning and rearing areas resulting in the loss of channel complexity, pool habitat, suitable gravel substrate, and large woody debris. In addition, a significant percentage of estuarine habitats have been lost across the range of the DPS with an average of 22 percent of estuarine habitat remaining. The condition of these remaining wetland habitats is largely degraded, with many wetland areas at continued risk of loss or further degradation. Although many historically harmful practices have been halted, much of the historical damage remains to be addressed, and the necessary restoration activities will likely require decades. Many of these threats are associated with most of the larger river systems such as the Santa Maria, Santa Ynez, Ventura, Santa Clara, Los Angeles, San Gabriel, Santa Ana, Santa Margarita, San Luis Rey, San Dieguito, and San Diego rivers, and many also apply to the smaller coastal systems such as Malibu, San Juan, and San Mateo creeks.

3.2 FACTOR B: Over-Utilization for Commercial, Recreational, Scientific, or Educational Purposes

NMFS had previously concluded that recreational harvest is a limiting factor for Southern California steelhead (Busby, *et al.* 1996, 1997; Good, *et al.* 2005; NMFS 1996a). Steelhead are not targeted in commercial fisheries. High seas driftnet fisheries in the past may have contributed slightly to a decline of this species in local areas – thought Steelhead are not targeted in commercial fisheries - but are not believed to be principally responsible for the large declines in abundance observed along most of the Pacific coast over the past several decades. Sport and commercial harvest of steelhead in the ocean is prohibited by CDFG (California Department of Fish and Game 2007).

Steelhead populations traditionally supported an important recreational fishery throughout their range. Recreational angling for both winter adult steelhead and summer rearing juveniles is a popular sport. Recreational angling in coastal rivers and streams for native steelhead has increased the mortality of adults (which represent the current generation of brood stock) and juveniles (which represent the future generations of brood stock). During periods of decreased habitat availability (*e.g.*, drought conditions or summer low flow when fish are concentrated in freshwater habitats), the impacts of recreational fishing on native anadromous stocks may be heightened.

Until the listing of the Southern California Steelhead DPS as endangered, recreational angling for *O. mykiss* was permitted in all coastal drainages (and continues in areas above barriers, such as major dams, which are currently impassible to fish migrating upstream). Angling for both adults and juveniles in those portions of coastal rivers and streams accessible to anadromous runs from the ocean (with the notable exceptions of Sisquoc, Manzana, and Davy Brown Creeks in Santa Barbara County, and upper portions of Sespe Creek in Ventura County) has been eliminated through modification of the CDFG's angling regulations following the listing of the DPS as endangered in 1997.

3.3 FACTOR C: Disease and Predation

Infectious disease is one of many factors that can influence adult and juvenile steelhead survival. Specific diseases such as bacterial kidney disease, Ceratomyxosis, Columnaris, Furunculosis, infectious hematopoietic necrosis, redmouth and black spot disease, Erythrocytic Inclusion Body Syndrome, and whirling disease among others are present and are known to affect steelhead and salmon (Noga 2000; Rucker *et al*. 1953; Wood 1979). Very little current or historical information exists to quantify changes in infection levels and mortality rates attributable to these diseases for steelhead. However, studies have shown that native fish tend to be less susceptible to pathogens than hatchery cultured and reared fish (Buchanon *et al*. 1983).

Introductions of non-native aquatic species (including fishes and amphibians) and habitat modifications (*e.g.*, reservoirs, altered flow regimes, *etc.*) have resulted in increased predator populations in numerous river systems, thereby increasing the level of predation experienced by native salmonids (NMFS 1996a). Non-native species, particularly fishes and amphibians such as basses and bullfrogs have been introduced and spread widely. These species can prey upon rearing juvenile steelhead, compete with native juvenile steelhead for living space, cover, and food, and can also act as vectors for non-native diseases.

Artificially induced summer low-flow conditions may also benefit non-native species, exacerbate spread of diseases, and permit increased avian predation. NMFS concluded that the information available on these impacts to steelhead did not suggest that the DPS was in danger of extinction, or likely to become so in the foreseeable future, because of disease or predation.

3.4 FACTOR D: Inadequacy of Existing Regulatory Mechanisms

3.4.1 Federal Mechanisms

At the time of listing, several principal federal regulatory and planning mechanisms affected the conservation of steelhead populations within the Southern California Coast Steelhead DPS (NMFS 1996b, 1997). These included: 1) land management practices within the four U.S. National Forests within the DPS (Los Padres, Angeles, San Bernardino, and Cleveland); 2) the regulation of dredging and the placement of fill within the waters of the United States by the U.S. Army Corps of Engineers (USACE) through the Clean Water Act (CWA) Section 404 Program; 3) the Federal Emergency Management Agency (FEMA) administration of a Flood Insurance Program which strongly influences the development in waterways and floodplains; and 4) inadequate implementation of the CWA sections 303(d)(1)(C) and (D) to protect beneficial uses associated with aquatic habitats, including fishery resources, particularly with respect to non-point sources of pollution (including increased sedimentation from routine maintenance and emergency flood control activities within the active channel and floodplain).

For example, the USACE's program is implemented through the issuance of a variety of Individual, Nation-Wide and Emergency permits. Permitted activities should not "cause or contribute to significant degradation of the waters of the United States." A variety of factors, including inadequate staffing, training, and in some cases policy direction, resulted in ineffective protection of aquatic habitats important to migrating, spawning, or rearing steelhead. The deficiencies of the current program are particularly acute during large-scale flooding events, such as those associated with El Niño conditions, which can put additional strain on the administration of the CWA Section 404 program.

Similarly, the National Flood Insurance Program regulations allow for development in the margins of active waterways if they are protected against 100-year flood events, and do not raise the water elevations within the active channel (floodway) more than one foot during such flood events. This standard does not adequately reflect the dynamic, mobile nature of watercourses in southern California, and the critical role that margins of active waterways (riparian areas) play in the maintenance of aquatic habitats. In addition, FEMA programs for repairing flood related damages (Public Assistance Program, Individual and Households Program, and Hazard Mitigation Grant Program) promote the replacement of damaged facilities and structures in their original locations, which are prone to repeated damage from future flooding, and thus lead to repeated disturbance of riparian and aquatic habitats important to migrating, spawning, or rearing steelhead.

3.4.2 Non-Federal Mechanisms

At the time of listing, several principal non-federal regulatory and planning mechanisms affected the conservation of steelhead populations within the Southern California Steelhead DPS (NMFS 1996b, 1997). These included: 1) administration of the California State Water Resources Control Board (SWRCB) water rights permitting system which controls utilization of waters for beneficial uses throughout the state; 2) state and local government permitting programs for land uses on non-federal and non-state owned lands; 3) administration of the Fish and Game Code Section 1600 (Streambed Alteration Agreements) program; and 4) the lack of a Coast-Wide Anadromous Fish Monitoring Plan for California to inform regulatory actions such as angling restrictions.

For example, the SWRCB water rights permitting system contains provisions (including public trust provisions) for the protection of instream aquatic resources. However, the system does not provide an explicit regulatory mechanism to implement the CDFG Code Section 5937 requirement to protect fish populations below impoundments. Additionally, SWRCB generally lacks the oversight and regulatory authority over groundwater development comparable to surface water developments for out-of-stream beneficial uses.

The Section 1600 Streambed Alteration Agreements program is the principal mechanism through which the CDFG provides protection of riparian and aquatic habitats. Inadequate funding, staffing levels, training, and administrative support have led to inconsistent implementation of this program, resulting in inadequate protection of riparian and aquatic habitats important to migrating, spawning and rearing steelhead.

Finally, monitoring of stocks (particularly annual run-sizes) is essential to assess current and future status of the listed species as well as to develop basic ecological information about listed salmon and steelhead. However, the Coast-Wide Anadromous Fish Monitoring Plan remains unfinished and funding for its implementation has not been identified or secured.

3.5 FACTOR E: Other Natural or Human-Made Factors Affecting Continued Existence

This factor category encompasses two specific threats to the species identified at the time of listing. These are: 1) environmental variability and 2) stocking programs. Similar to the other listing factors, these threats persist and recent information about environmental variability, including the effects of ocean conditions on the survival of salmonid populations and increases in wildfire occurrence and severity, indicate that the threat from "environmental variability" can be expected to increase. The current and future threat to species recovery from environmental variation is further discussed in Chapter 4.

3.5.1 Environmental Variability

Variability in natural environmental conditions has both masked and exacerbated the problems associated with degraded and altered riverine and estuarine habitats. Floods and persistent drought conditions have reduced already limited spawning, rearing, and migration habitats. Furthermore, El Nino events and periods of unfavorable ocean-climate conditions can threaten the survival of steelhead populations already reduced to low abundance levels due to the loss and degradation of freshwater and estuarine habitats. However, periods of favorable ocean productivity and high marine survival can offset poor habitat conditions elsewhere and result in dramatic increases in population abundance and productivity.

3.5.2 Stocking Programs

There are no steelhead hatcheries operating in or supplying hatchery reared steelhead to the Southern California Steelhead DPS. However, there is an extensive stocking program of hatchery cultured and reared, non-anadromous *O. mykiss* which supports a "put-and-take" fishery that is stocked for removal by fishermen. These stockings are now generally conducted in non-

anadromous waters (though other non-native game species such as smallmouth bass and bullhead catfish are stocked into anadromous waters by a variety of public and private entities).

While some of these programs have succeeded in providing seasonal fishing opportunities, the impacts of these programs on native, naturally-reproducing steelhead stocks are not well understood. Competition, genetic introgression, and disease transmission resulting from hatchery introductions may significantly reduce the production and survival of native, naturally-reproducing steelhead. Collection of native steelhead for hatchery broodstock purposes can harm small or dwindling natural populations. Artificial propagation can also, in some situations, play an important role in steelhead recovery through carefully controlled supplementation programs, but are not a substitute for naturally-reproducing populations.

4. Current DPS-level Threats Assessment

"A widespread trend observed in this Steelhead Recovery Planning Area is severe to very severe degradation of habitat conditions along the mainstem of impaired watersheds, while the upper mainstem and tributaries retain relatively high habitat values for steelhead."

Southern California Coast Steelhead Recovery Planning Area: Threats Assessment
Hunt & Associates 2008

Anadromous *O. mykiss* in southern California face significant threats from water and land management practices that have degraded or curtailed freshwater and estuarine habitats, reducing the capability of the species to persist within most watersheds throughout a range of environmental conditions. In addition, the persistence and recovery of the species is threatened by predicted shifts in climatic and oceanographic conditions that the species may not be able to survive given the current condition of the species and the freshwater and estuarine ecosystems.

Table 4-1 summarizes the top-ranked[2] sources of threats across the range of the DPS. These were identified as part of the threats assessment performed for watersheds within each BPG. The threat sources with a "very high" or "high" severity ranking within the largest percentage of the watersheds across the DPS are dams and surface water diversions, wildfires, and groundwater extraction. Urban development, levees and channelization, and other passage barriers also affect a large percentage of steelhead watersheds in the DPS. Finally, while not captured in the structured threats assessment process that ranked the other threats to the species (by threat source categories associated with Biogeographic Population Groups), the impacts of environmental variability, including projected changes in precipitation patterns and the consequences of fluctuations in ocean conditions play a significant role in the persistence and recovery of the Southern California Steelhead DPS and are dealt with in Section 4.2.5.

This chapter provides an introduction to the threats assessment process and summarizes the results of NMFS' threats assessment at the DPS level. Summaries of the threats posed to individual BPGs are presented in the chapters devoted to each BPG.

[2] Threat sources were ranked in terms of the level of contribution and irreversibility of the stressors emanating from the threat source. See Appendix D for further information.

4.1 THREATS ASSESSMENT PROCESS

NMFS assessed the current and expected future threats to the species' persistence and recovery primarily through the use of The Nature Conservancy's Conservation Action Planning (CAP) methodology. This methodology and NMFS' application to the threats assessment for southern California steelhead is further detailed in Appendix D. Use of this methodology allows NMFS to organize the best available information and professional judgment on the threats facing the species into electronic workbooks that are programmed to summarize and track the information for use in developing and implementing recovery actions designed to address the identified threats. The threats assessment process is intended to be iterative so that new information can be incorporated as it becomes available or as periodic status reviews of the species occur.

Current conditions of critical habitat elements for steelhead were assessed given available information from a variety of sources including published and unpublished reports. The severity of threats posed directly to steelhead or their habitat was estimated and ranked. Based on the initial threats assessment, the threats and associated sources of those threats across the range of the DPS, within each BPG, and within specific watersheds were identified. A listing of the individual watersheds that were evaluated in the CAP workbooks that were used to summarize threats at these scales can be found in Appendix D.

In addition to the CAP threats assessment process, NMFS considered the best available information regarding the impacts of predicted shifts in climate and the marine environment on the ability of the species to recover. These two threats are not easily reflected in the CAP workbooks and so do not show up in the tables depicting the threats assessments results below. However, NMFS considers the threats posed by shifting climate and a varying marine environment when recommending a recovery strategy for the species and particular recovery actions. The primary method by which the species will be able to persist and recover in the face of changing environmental conditions in the freshwater or marine environment is the achievement of viable levels of abundance within well-distributed populations across a landscape of accessible habitats that support the different life stages and strategies used by the species. Recovery actions to address climate and marine environmental conditions are therefore embedded within recovery actions designed to support these objectives.

4.2 CURRENT DPS-WIDE THREATS ASSESSMENT SUMMARY

The following discussion presents the available information on the current and future threats faced by the species. The discussion is organized around the threat sources listed above. The information presented in this chapter is a summary of the threats faced by the species across the range of the DPS. Specific information on threats within the different BPGs is presented in BPG-specific chapters and associated appendices.

The overall current conditions of 45 major watersheds within the SCS Recovery Planning Area were generally rated as "Fair" to "Poor" (see CAP Workbook summaries for more detailed information). Only four of the 45 watersheds analyzed were rated with an overall condition of

Table 4-1. High or Very High severity threat sources identified for the SCS Recovery Planning Area by BPG. Percentages reflect the percent of component watersheds that ranked the threat source as "Very High" or "High." See individual BPG Threat Summaries in their respective chapters for additional information.

	Biogeographic Population Group (BPG)					
Threat Source*	**Monte Arido Highlands**	**Conception Coast**	**Santa Monica Mountains**	**Mojave Rim**	**Santa Catalina Gulf Coast**	**Average Percentage Affected**
Dams and Surface Water Diversions	**85%**	**30%**	**20%**	**88%**	**90%**	**63%**
Wildfires	**85%**	**50%**	**20%**	**75%**	**60%**	**58%**
Groundwater Extraction	**62%**	**60%**		**63%**	**100%**	**57%**
Urban Development	**62%**	**40%**	**20%**	**63%**	**70%**	**51%**
Levees and Channelization	**38%**	**50%**	**20%**	**63%**	**60%**	**46%**
Other Passage Barriers	**8%**	**80%**	**60%**	**13%**	**40%**	**40%**
Flood Control	**62%**	**20%**		**88%**	**20%**	**38%**
Roads	**15%**	**60%**	**100%**		**10%**	**37%**
Agricultural Development	**62%**	**40%**			**60%**	**32%**
Recreational Facilities	**31%**	**30%**	**60%**		**30%**	**30%**
Non-Native Species	**54%**		**20%**		**30%**	**21%**

"Good" or "Very Good" (due in some cases to relatively good access to spawning and rearing habitats) in the CAP Workbook analyses: San Antonio Creek and Santa Paula Creek in the Monte Arido Highlands BPG, Arroyo Hondo in the Conception Coast BPG, and Topanga Canyon Creek in the Santa Monica Mountains BPG. Many of the watersheds contain high-quality spawning and rearing habitat, but are compromised by one or more anthropogenic factors (*e.g.*, Matilija Creek [dam], North Fork Matilija Creek [other passage barriers], and Sespe Creek [excessive groundwater extraction and diversions in the lower reaches] in the Monte Arido Highlands BPG). A widespread trend observed in the SCS Recovery Planning Area is severe to very severe degradation of habitat conditions along the mainstem of impaired watersheds, while the upper mainstem and tributaries retain relatively high habitat values for steelhead.

4.2.1 Dams, Surface Water Diversions and Groundwater Extraction

Dams, surface water diversions, and groundwater extraction are common across the SCS Recovery Planning Area, especially on the larger rivers, such as the Santa Maria, Santa Ynez, Ventura, Santa Clara (tributaries), San Gabriel, and Santa Ana rivers, some of which contain three major dams on the mainstem alone. Loss of surface flows or other passage impediments along the mainstem of the river affects important upstream tributaries in terms of providing spawning and rearing habitat, even if the tributaries themselves remain undisturbed. Re-establishing or maintaining connections between the ocean and upper watersheds expands access to historically important spawning and rearing habitats, and significantly improves habitat conditions in these watersheds for steelhead, as well as the existing populations of native residualized and non-anadromous *O. mykiss* that currently are isolated above dams and reservoirs.

Dams also negatively affect the hydrology, sediment transport processes, and geomorphology of the affected drainages. In addition, dams and reservoirs frequently include recreational development for fishing and camping, which can introduce non-native predators and/or competitors (*e.g.*, largemouth bass, crayfish, western mosquitofish) as well as promote trampling of the active channel, which can lead to direct loss of redds.

4.2.2 Agricultural and Urban Development, Roads, and Other Passage Barriers

Human population density is high in some parts of the SCS Recovery Planning Area and development pressures in general are located in the coastal terraces and middle and lower watershed areas. Population density is a relative measure of intensity of land use and impacts to individual watersheds. Some of these watersheds have been extensively developed for agriculture, which typically utilizes floodplain land first. In addition, the upland slopes in several of the watersheds in the Conception Coast BPG and Santa Catalina Gulf Coast BPG are extensively planted in orchard crops. The typical pattern of urban and agricultural development focuses on the flatter portions of a watershed, typically within the floodplain and usually along the mainstem of the drainage and one or more tributaries, thereby magnifying potential impacts to steelhead even if most of the watershed remains undeveloped. Public ownership of lands in the SCS Recovery Planning Area varies widely between watersheds but generally decreases southward. Although public ownership of these watersheds (National Forest and BLM lands, military reservations, *etc.*) can be extensive, these public lands are typically concentrated in the upper watersheds leaving the middle and lower watersheds subject to private development.

Estuaries are used by steelhead as rearing areas for juveniles and smolt as well as staging areas for smolt acclimating to saline conditions in preparation for entering the ocean and adults acclimating to freshwater in preparation for spawning. Approximately 75 percent of estuarine habitats across the SCS Recovery Planning Area have been lost (Table 4-2), and the remaining 25 percent are constrained by agricultural and urban development, levees, and transportation corridors highways and railroads. Estuarine habitat loss varies widely across BPGs, with the Santa Maria River and Santa Ynez River estuaries being the most physically intact, though they are impaired by reduced freshwater inflows and point and non-point waste discharges from both municipal and agricultural sources.

4.2.3 Flood Control, Levees and Channelization

Urban and agricultural conversion of floodplain lands flanking the mainstem of these rivers and streams typically requires levees or other structures to protect these lands from flooding. The urban and agricultural reaches of all of the watersheds in the SCS Recovery Planning Area have been subjected to some degree of channelization and/or levee construction with the resulting loss or degradation of the riparian corridor and streambed. Flood control practices and associated channelization of streams and placement of levees impair the function and quality of stream habitats. Habitat impairments for *O. mykiss* may include increased water temperature, incision of the streambed and loss of structural complexity and instream refugia (meanders, pools, undercut banks, *etc.*), complete loss of bed and bank habitat, increased sedimentation, turbidity, and substrate embeddedness, and excessive nutrient loading.

4.2.4 Non-Native Species

There are no steelhead hatcheries operating in or supplying hatchery reared *O. mykiss* to the Southern California Steelhead DPS. However, there is an extensive stocking program of hatchery cultured and reared, non-anadromous *O. mykiss* that supports a put-and-take fishery. These stockings are now generally conducted in non-anadromous waters. Other non-native game species, such as smallmouth bass and bullhead catfish, are often stocked into anadromous waters by a variety of public and private entities. While some of these programs have succeeded in providing seasonal fishing opportunities, the impacts of these programs on native, naturally-reproducing *O. mykiss* stocks are not well understood. Competition and disease transmission resulting from hatchery introductions may significantly reduce the production and survival of native, naturally-reproducing steelhead. Collection of native steelhead for hatchery broodstock purposes can also harm already small or dwindling natural populations. Artificial propagation, in some situations, can play an important role in steelhead recovery through carefully controlled supplementation programs, but they are not a substitute for naturally reproducing populations.

California's steelhead stocking practices have distributed non-native steelhead stocks in many coastal rivers and streams in California. Because of problems associated with the practice of transplanting non-native steelhead stocks, CDFG developed its Salmon and Steelhead Stock Management Policy. This policy recognizes that such stock mixing can be detrimental and seeks to maintain the genetic integrity of all identifiable stocks of salmon and steelhead in California, as well as minimize interactions between hatchery and natural populations. To protect the genetic integrity of individual salmon and steelhead stocks, this policy directs CDFG to evaluate the stocks of each salmon and steelhead stream and classify it according to its probable genetic

source and degree of integrity (McEwan and Jackson 1996). Additionally, CDFG has eliminated the stocking of hatchery cultured and reared fish in most coastal streams where steelhead have direct access from the ocean.

In addition to the intentional introduction of non-native game species of fish, many other non-native species of wildlife and plant species have been introduced into the watersheds of southern California which have the potential to displace native species, or adversely affect aquatic habitat conditions. Invasive plants such as the Giant reed *(Arundo donax)* and Tamarisk (*Tamarix* spp.) currently displace extensive areas of native riparian vegetation in major drainages such as the Santa Clara and San Luis Rey River drainages, and in some cases can reduce surface flows through the uptake of large amounts of groundwater; non-native plant species such as Water Primrose (*Ludwigia uruguayensis*) can displace aquatic living space, and in extreme conditions inhibit or block the instream movement of fish. Non-native plants can also reduce the natural diversity of insects that are important food sources for juvenile *O. mykiss.*

4.2.5 Estuarine Loss

The mouths of most southern California watersheds are characterized by one of several distinct types of estuaries formed by a combination of coastal topography, geology, and the hydrologic characteristics of the watershed (Ferren *et al.* 1995). Because estuaries are located at the downstream end of coastal watersheds, and on relatively level coastal plains which are the most heavily urbanized portions of southern California, they have been subjected to a majority of the DPS-wide threats identified through the threats assessment. Estuarine functions have been adversely affected in a wide variety of ways (*e.g.*, degradation of water quality, modification of hydrologic patterns, changes in species composition), but the single best indicator of the threat to estuarine functions is loss of wetland acreage, through a range of activities, including filling, diking, and draining. Table 4-2 provides a summary of the relative loss of southern California wetland estuarine acreage for some of the estuaries associated with steelhead populations in southern California for which information was available. (See Chapter 2, "Steelhead Biology and Ecology" and the discussion below for the role of estuaries in the life history of southern California steelhead).

Table 4-2. Estuarine habitat loss in component watersheds of the SCS Recovery Planning Area by BGP.

BPG	Watershed	Remaining Estuarine Habitat (% of historical habitat)	BPG Average
Monte Arido Highlands	Santa Maria River	81	*56% remaining*
	Santa Ynez River	94	
	Ventura River	32	
	Santa Clara River	15	
Conception Coast	Gaviota Creek	25	*6% remaining*
	Arroyo Hondo	5	
	Tecolote Creek	25	
	Goleta Slough	31	
	Mission Creek	10	
	Montecito Creek	5	
	Carpinteria Creek	20	
	Rincon Creek	5	
Santa Monica Mountains	Big Sycamore Canyon Creek	10	*17% remaining*
	Arroyo Sequit	10	
	Malibu Creek	34	
	Las Flores Canyon Creek	3	
	Topanga Canyon Creek	30	
Mojave Rim	Los Angeles River	0	*2% remaining*
	San Gabriel River	2	
	Santa Ana River	3	
Santa Catalina Gulf Coast	San Juan River	10	*28% remaining*
	San Mateo Creek	76	
	San Onofre Creek	20	
	Santa Margarita River	41	
	San Luis Rey River	10	
	San Dieguito River	43	
	San Diego River	9	
	Sweetwater River	5	
	Otay River	14	
	Tijuana River	52	

4.2.6 Environmental Variability

Climatic variation has exacerbated the problems associated with degraded and altered riverine and estuarine habitats. For example, periodic drought conditions reduce already limited spawning, rearing and migration habitat in southern California. Productive ocean periods may help to temporarily offset reduced recruitment from degraded freshwater habitat conditions (Busby *et al.* 1996). Although difficult to quantify, the positive or negative effects of environmental variation between years and across longer periods of time can swamp the positive or negative effects of anthropogenic threats. Given this possibility, actions that allow the species to capitalize on positive environmental conditions or withstand negative conditions are critical.

4.2.6.1 Climate Change Effects on Steelhead

Over the course of their life-cycle steelhead occupy both freshwater and marine environments. Freshwater habitats are critical for their reproductive phase, providing suitable habitat for the deposition, fertilization, and incubation of eggs in nests (redds) created by adults in spawning gravels. Freshwater habitats also provide a sheltered environment, relatively free of native predator species, and with suitable food sources, for rearing juveniles. Marine habitats are important for the growth and maturation of sub-adults, providing more abundant and appropriately sized food sources to support the large numbers of maturing fish emigrating from coastal watersheds of the Southern California Coast Steelhead Recovery Planning Area, as well as fish originating from other coastal watersheds of the North Pacific Watershed (Moyle 2002; Quinn 2005). Both freshwater and marine environments are affected by weather and climatic conditions that vary on time scales ranging from hours to millennia. Despite the highly mobile nature of steelhead, and their ability to exploit freshwater and marine habitats in multiple ways, they remain vulnerable to changes in their environment due to projected climate changes resulting from anthropogenic activities which have altered and will continue to alter the region's and the world's climate into the foreseeable future.

The weather regime prevailing over a region is not static, but can change either cyclically or directionally over extended periods (Barry, et al. 1998; Bradley, and Jones 1995; Burroughs 2003). The current climate of the SCS Recovery Planning Area is classified as Mediterranean. This climatic regime is characterized by two distinct annual seasons: a long rainless season extending from May through November and a brief rainy season from December through March. Rainfall is associated with brief, but intense, cyclonic winter storms, though the extreme southern portion of the SCS Steelhead Recovery Planning Area is subject to occasional summer storms originating from the Gulf of California. This region is also subject to an El Niño/La Niña weather cycle which varies in length from seven to ten years. This large-scale weather pattern can significantly affect winter precipitation, causing highly variable rainfall and significant changes in oceanic conditions between years (Changnon, 2000; Intergovernmental Panel on Climate Change 2007; Philander 1990, 2004). In addition to these temporal climatic patterns, there is a wide disparity between winter rainfall from north to south, as well as between coastal plains and inland mountainous areas. Annual precipitation ranges along the coast (north to south) from 32 to 24 cm, with larger variations (24 – 90 cm) due to the orographic effects of the various mountain ranges (Bailey 1966; Felton 1965).

River discharge, and therefore freshwater habitat conditions, within southern California watersheds is strongly influenced by the intra- and inter-annual pattern of short-duration cyclonic storms (*e.g.,* frequency, timing, and intensity). As a result, river discharge varies greatly between seasons, and can be highly flashy (rapidly increased flows with high volume but short duration) during the winter season, changing by several orders of magnitude over a few hours. Snow accumulation is generally small and of short duration, and does not contribute significantly to peak run-off. Base flows in some river reaches can be influenced significantly by groundwater stored and transported through alluvium, faults, and fractured rock formations. Many rivers and streams naturally exhibit interrupted base flow patterns (alternating channel reaches with perennial and seasonal surface flow) controlled by geologic formations, and the strongly seasonal precipitation pattern characteristic of a Mediterranean climate (Boughton *et al.* 2008; Faber *et al.*, 1989).

The potential effects of projected future climate changes are manifold and complex, varying in range and intensity, across various landscape scales and ecosystem types, and also include human responses to such effects of climate change as sea-level rise, reduced rainfall and runoff, and increase wildfire frequency and intensity. Recent assessments of global climate change and climate change in the United States summarize the general effects on ecosystems (Intergovernmental Panel on Climate Change 2007; Backland *et al.* 2008; Bedsworth and Hanak 2008; and Gutowski, *et al*. 2008; Bedsworth and Hanak 2008; Hanak and Moreno 2008; Barbour and Kueppers 2008; Luers and Mastrandrea 2008; and Hanak and Lund 2008). These effects include (1) warmer atmospheric temperatures; (2) rises in sea level due to ice cap melting and thermal expansion of ocean water; (3) acidification of ocean waters; (4) increased droughts (frequency, severity, and duration) coupled with more severe cyclonic storms (intensity and duration) which will very likely increase soil erosion; (5) increases in the intensity, frequency and duration of wildland fires; (6) decreased water availability particularly in arid lands, affecting a variety of watershed processes, including run-off, erosion, sedimentation, and a variety of hill-slope process ranging from ravel to mass-wasting and debris flows; (7) increases in water temperatures in rivers and streams that are very likely to have both direct and indirect effects on aquatic systems; (8) alterations in stream morphology (e.g., occurrence and distribution of sediments, pools, riffles, etc.) as a result of changes in the frequency and intensity of high-flow events in response to changes in precipitation patterns; and (9) changes in the composition, distribution, and abundance of species occupying arid lands due to exceedance of the physiological limits of the native community.

Climate change has the potential to profoundly affect both terrestrial and freshwater ecosystems in California (Bakke 2008; Barbour and Kueppers 2008). There are a number of negative effects on steelhead and their freshwater and estuarine habitats which are of particular significance. These are summarized below:

Rainfall and Runoff. Steelhead depend on adequate rainfall and run-off during their migratory seasons to both enter and emigrate from coastal watersheds. In southern California adequate stream flow is not only necessary for adults to reach upstream spawning areas and juveniles to emigrate to the ocean, but also to breach the sand bar, which seasonally forms at the mouth of most coastal rivers and streams, to allow entrance to and escapement from the watershed.

Rivers and riparian areas (and associated wetland areas) make up less than one percent of the landscape in arid regions such as southern California. These highly productive ecosystems are embedded within upland systems with much lower productivity. The primary driver of terrestrial hydrologic systems is precipitation. Most of the United States experienced increases in precipitation and stream flow and decreases in drought during the second half of the past century. However, there are indications that increases in the severity and duration of droughts have increased in the western and southwestern United States. The full effects of these changes on aquatic organisms such as *O. mykiss* are not well known. However, the introductions of non-native fish and habitat modifications have caused extinctions of numerous endemic species, sub-species, and individual populations of fishes, mollusks, and insects since the late 1800s. The declines in the distribution or abundance of endemic aquatic species has been attributed to a variety of anthropogenic activities coupled with reductions in rainfall and runoff: competitive or predatory interactions with introduced non-native species, livestock grazing, commercial sport fisheries, groundwater pumping, introduced species hybridization, water pollution, recreation and habitat modifications.

Groundwater. Groundwater is an important source of surface flows during dry periods in many Southern California watersheds. Groundwater can therefore contribute to sustaining suitable over-summering juvenile rearing conditions in mainstem and tributary habitats. Surface flows can be maintained as a result of the intersection of a high groundwater table or through transmission water through geologic fault systems. The effects of climate change on groundwater systems has not been as extensively studied as have the effects of climate change on surface water systems. One recent investigation in the Santa Ynez Mountains of Southern California suggests that an increase in the biomass of watersheds dominated by chaparral is likely to increase with the increase of atmospheric CO_2 and atmospheric temperature, leading to reductions in summer stream flow (Tague 2008). Other Global Climate Models projecting a decrease in vegetative cover would lead to an increase in summer stream flow.

Water Temperature. Increased minimum atmospheric temperatures and warmer spring and summer temperatures have lead to increased stream temperatures in most of the continental Unites States. Increased stream temperatures likely will have both direct and indirect adverse impacts on juvenile *O. mykiss*, by subjecting the species to physiological stress, and altering the aquatic environment through such modifications as reducing dissolved oxygen levels or increased the growth of algae and rooted aquatic vegetation. Elevated stream temperatures can also favor the proliferation of non-native warm water species that can compete for living space, and also prey on native *O. mykiss*, particularly juveniles. Changes in water temperature are most likely to occur during low-flow periods that coincide with over-summering rearing juvenile *O. mykiss*. Stream temperature increases have already begun to be detected across the United States, though no comprehensive analysis similar to streamflow trends has been conducted.

Wildland Fire. Chaparral is the predominant vegetation type within the SCS Recovery Planning Area. Wildfires are a natural phenomenon essential for the periodic renewal of chaparral plant communities (Sugihara *et al.* 2006). In addition, wildfires can have at least temporary major impacts on freshwater habitats of anadromous and non-anadromous *O. mykiss.* These effects range from increasing the erosion, transportation, and deposition of massive amounts of fine sediments in to watercourses containing coarser-grained spawning gravels to destroying riparian

vegetation. The frequency and size of wildfires is expected to increase as a result of increases in atmospheric temperatures.

Santa Ana winds and human-triggered ignitions play an important role in the fire regime of southern California chaparral and scrubland forests. Santa Ana winds occur primarily during the fall and winter and are driven by large-scale patterns of atmospheric circulation resulting from high pressure over the Great Watershed coupled with low pressure off the coast of southern California, which drives dry air toward the coast. These winds can reach up to 100 km/hr and can spread fires rapidly, sometimes burning 30,000 ha of chaparral and shrub vegetation per day. Using General Global Climate Models, Miller and Schlegel (2006) predict that the total number of annual Santa Ana wind events would not change over the next 30 years, though one of the General Climate Model simulations showed a shift in the seasonal cycle, with fewer Santa Ana wind events occurring in September and more occurring in December. The potential implications of this shift for the fire regime are unclear (Keeley *et al.* 1999).

Sea Level Rise. One of the several life-history strategies exhibited by steelhead is the "lagoon-anadromous" strategy in which juveniles rear a portion of the year in the estuary of their natal river or stream. Studies in small coastal estuaries seasonally closed off from the ocean by sand bars have shown these areas to be productive rearing areas for *O. mykiss*, with juveniles growing fast enough to migrate to the ocean after their first year, and generally at a larger size than juveniles rearing in the freshwater portion of the stream system. Fish that enter the ocean at a larger size exhibit greater survival rates in the ocean, and thus tend to be disproportionately represented in the adult spawning population (Bond 2006).

Current climate trends predict a future of warmer oceans and melting glaciers and icecaps, all of which are expected to raise mean sea levels, leading to the inundation and displacement of many estuaries and lagoons. A rise sea level will most dramatically affect those estuaries which have been confined by surrounding development that prohibits their boundaries from naturally shifting in response to inundation. Projections for sea-level rise by 2100 vary from 0.18 to 0.58 m, to 0.5 to. 1.4 m. (Edgerton 1991; Intergovernmental Panel on Climate Change 2007, Rahmstorf 2007, Raper and Braithwaite 2006). Paleoclimatic data suggest that the rate of future melting of Greenland and Antarctic ice sheets and related sea-level rise could be faster than currently projected (Overpeck *et al*. 2006).

A projected 1m rise in sea level would lead to the potential inundation of 65 percent of the coastal marshlands and estuaries in the continental United States. In addition to the inundation and displacement of estuaries/lagoons, there would be shifts in the quality of the habitats in affected coastal regions. Prior to being inundated, coastal watersheds would become saline due to saltwater intrusion into the surface and groundwater.

4.2.6.2 Marine Environment

Steelhead spend a majority of their life cycle in the marine environment, and only enter freshwater habitats for brief periods to reproduce. Unlike the other anadromous Pacific salmon in the genus *Oncorhynchus*, steelhead do not die after entering freshwater to spawn, but may return to the marine environment, and complete another year of ocean growth before returning to freshwater to repeat their reproductive cycle. Also, steelhead have not been observed in the

marine environment in large aggregating schools with well-defined ocean migratory patterns. The incidental capture of steelhead in the marine environment as a by-catch of commercial fishing activities is uncommon. As a result of the apparent dispersal of single individuals or small groups in the marine environment, information on the movements, feeding habits, and predator-prey relationships of steelhead have not been extensively studied and are not well understood. While steelhead are subjected to the same basic oceanic conditions (*e.g.*, currents, water temperature, up-welling, abundance of prey base, predator-prey interactions, and water quality) as other anadromous Pacific salmon, they may respond and be affected by such conditions differentially because of their unique behavioral, physiological and other ecological characteristics. However, as with other anadromous Pacific salmon, conditions in the marine environment are crucial to the growth, maturation, mortality, and abundance of returning adult steelhead to their freshwater spawning habitats.

California Current Ecosystem

The California Current Ecosystem (CCE) is one of eight large marine ecosystems within the jurisdiction of the United States. The northern end of the current is dominated by strong seasonal variability in winds, temperature, upwelling, plankton production and the spawning times of many fishes, whereas the southern end of the current has much less seasonal variability. For some groups of organisms, the northern end of the CCE is dominated by sub-arctic boreal fauna whereas the southern end is dominated by tropical and sub-tropical species. Faunal boundaries (*i.e.*, regions where rapid changes in species composition are observed) are known for the waters between Cape Blanco Oregon/Cape Mendocino California, and in the vicinity of Point Conception California. Higher trophic level organisms often take advantage of the strong seasonal cycles of production in the north by migrating to the region during the summer to feed. Animals which exhibit this behavior include pelagic seabirds such as black-footed albatross and sooty shearwaters, fishes such as Pacific whiting and sardines, and gray and humpback whales. Climate signals in this region are quite strong. During the past 10 years, the North Pacific has seen two El Niño events (1997/98, 2002/03), one La Niña event (1999), a four-year climate regime shift to a cold phase from 1999 until late 2002, followed by a four-year shift to warm phase from 2002 until 2006. The response of ocean conditions, plankton and fish to these events is well documented in the scientific literature. The biological responses are often so strong that the animals give early warning of events.

Climate-Induced California Current Ecosystem Issues

Numerous climate stressors (*e.g.*, warming, sea level rise, freshwater flow) impact productivity and structure throughout the CCE. It is difficult to isolate the effect of individual stressors on most individual species, and most of these stressors impact many species at multiple trophic levels. Five climate-related issues are of greatest concern in the CCE (National Marine Fisheries Service 2007e). The following provides a summary of these issues based upon the analysis developed as part of a NMFS framework for a long-term plan to address climate impacts on living marine resources (National Marine Fisheries Service 2007e).

1. Future climate variability in the context of global climate change and a warmer planet

One of the likely consequences of global climate change will be a more volatile climate with greater extreme events on the intra-seasonal to inter-annual scales. For the CCE this will mean

more frequent and severe winter storms, with greater wind mixing, higher waves and coastal erosion, and more extreme precipitation events and years, which would impact coastal circulation and stratification. Some global climate models predict a higher frequency of El Niño events; others predict that the intensity of these events will be stronger. If true, primary and secondary production will be greatly reduced in the CCE, with negative effects transmitted up the food chain.

The Pacific Decadal Oscillation (PDO) is a pattern of Pacific climate variability that shifts phases approximately every 20 to 30 years. During a "warm", or "positive", phase, the west Pacific becomes cool and part of the eastern ocean warms and during a "cool" or "negative" phase, the opposite pattern occurs. Most models project roughly the same timing and frequency of decadal variability in the North Pacific under the impacts of global warming. However, combined with the global warming trend, the CCE is likely to experience a greater frequency of years consistent with historical periods of lower productivity (*e.g.,* positive PDO values). We know from ongoing observations that a positive PDO and warmer ocean result in dominance of small warm-water zooplankton (which are lipid-depleted) which may result in food chains with lower bioenergetic content. By about 2030, it is expected that the *minima* in decadal regimes will be *above* the historical mean of the 20th century (*i.e.*, the greenhouse gas warming trend will be as large as natural variability).

2. The extent and timing of freshwater input and its impact on the nearshore habitat of anadromous fishes

While variability in ocean conditions has substantial impacts on salmon survival and growth, future changes in freshwater and river conditions will also likely have a great effect on production of anadromous fish. Potential changes in rainfall and snow pack are likely to increase winter and spring runoff but decrease summer runoff. Climate models project the 21st century will feature greater precipitation in the Pacific Northwest, extreme winter precipitation events in California, and a more rapid spring melt leading to a shorter, more intense spring period of river flow and freshwater discharge. This will greatly alter coastal stratification and mixing, riverine plume formation and evolution, and the timing of transport of anadromous populations to and from the ocean.

3. The timing and strength of the spring transition and its effect on production and recruitment of marine populations

The chief issue for the CCE is the onset and length of the upwelling season: when upwelling begins and ends (*i.e.,* the “spring” and “fall” transitions). The biological transition date provides an estimate of when seasonal cycles of significant plankton and euphausiid production are initiated. At present there is some evidence that coastal upwelling has become stronger over the past several decades due to greater contrasts between warming of the land (resulting in lower atmospheric pressure over the continent) relative to ocean warming. The greater cross-shelf pressure gradient will result in higher alongshore wind speeds and the potential for more upwelling (Bakun, 1990). Regional climate models project that not only will upwelling-favorable winds will be stronger in summer, but that the peak in seasonal upwelling will occur later in the summer (Snyder *et al.* 2003).

Even though northward winds that cause coastal upwelling are likely to increase in magnitude, it

is not known if these winds will be able to over-ride increased water column stratification (see issue 4, below). That is, the winds may not be able to mix this light buoyant water or transport it offshore resulting in the inability of the cold nutrient-rich water to be brought to the sea surface. Thus, phytoplankton blooms may not be as intense, which may impact organisms up the food chain (Roemmich and McGowan, 1995).

Given that the future climate will be warmer, the upper ocean at the Watershed scale will almost certainly be, on average, more stratified. This will make it more difficult for upwelling to mix the upper layers of the coastal ocean, and will make offshore Ekman pumping less effective at bringing nutrients into the photic zone. The result will be lower primary productivity everywhere (with the possible exception of the nearshore coastal upwelling zones).

Should global warming result in shorter winters in the north Pacific, areas where production is light limited may see higher productivity, in the northern California Current for example. That is, we know that phytoplankton blooms are initiated as early as February in the northern California in years when storm intensity is low, and this has been the case in most years since 2002. These early blooms result in bursts in egg production by both copepods and euphausiids, thus initiating a cohort of animals that will reach adulthood one-two months earlier than a cohort that is initiated with the onset of upwelling in March or April. The result would be a longer plankton production season. Alternatively, regional climate projections are for a later shift in the start time, peak times and end of the upwelling season, which could counter the idea of a longer upwelling season.

4. Ocean warming, increased stratification and their effect on pelagic habitat

This issue focuses on the central and southern California Current, and on the organisms that utilize the upper ocean habitat in this region. Generally warmer ocean conditions will cause a northward shift in the distribution of most species, and possibly the creation of reproductive populations in new regions. Existing faunal boundaries are likely to remain as strong boundaries, but their resiliency to shifts in ocean conditions due to global climate change is not known. Warmer water temperatures will also affect freshwater salmon habitats, by reducing habitat opportunity on both spatial and seasonal time scales. In coastal and oceanic regions, the southern boundaries of the pelagic habitat of many populations will likely shift northward.

Warmer air temperatures may lead to increased stratification of the coastal CCE. The warmer temperatures will increase the heat flux into the ocean. Mixing and diffusion are not likely to redistribute this heat rapidly enough to prevent an increase in thermal stability and stratification of the upper ocean. The vertical gradient in ocean temperature off California has intensified over the past several decades (Palacios *et al*. 2004). Areas with enhanced riverine input into the coastal ocean will also see greater vertical stratification. Moreover, increased melting of glaciers in the Gulf of Alaska coupled with warmer sea surface temperatures will result in increased stratification of the Gulf. Since some of the source waters that supply the northern California Current originate in the Gulf of Alaska, more stratified source waters will contribute to increased stratification of coastal waters of the northern California Current.

5. Changes in gyre strength, regional transport, and source waters to the California Current and their impact on species distribution and community structure

The California Current begins at the northern tip of Vancouver Island Canada, and ends somewhere between Punta Eugenia and the tip of Baja California Mexico. The alongshore extent is on the order of 28° of latitude (51°N to 23°N). As the current flows from north to south, the waters warm and mix with offshore waters such that both temperature and salinity increase gradually in a southward direction. Not surprisingly, observations of the biota of the California Current show that there are pronounced latitudinal differences in the species composition of plankton, fish, and benthic communities, ranging from cold water boreal sub-arctic species in the north to warm water subtropical species in the south. Changes in abundance and species composition can be gradual in some cases, but it is widely accepted that faunal boundaries (zones of rapid change in species composition) are present in the waters in the vicinity of Capes Blanco and Mendocino, and at Point Conception. The strongest contrasts are seen during summer.

The strong contrast in species composition between shelf and offshore waters during summer is due to the upwelling process. A combination of upwelling itself along with the sub-arctic water which feeds the inshore arm of the northern end of the CCE create conditions favorable for development of a huge biomass of sub-arctic zooplankton. This pattern is slightly modified as a function of the phase of the PDO. During cool phase, all of the northern CCE becomes more sub-Arctic in character (both shelf-slope-oceanic regions); during warm phase of the PDO, the water masses and associated copepod community becomes far more similar to a sub-tropical community. Copepod biodiversity increases in coastal waters, due to shoreward movement of offshore waters onto the continental shelf, due to either weakening of southward wind stress in summer or strengthening of northward wind stress in winter. Thus, when PDO is in positive phase, a greater proportion of the water entering the northern end of the current is sub-tropical in character rather than sub-Arctic.

Regardless of the season, the source waters that feed into the California Current from the north and from offshore can exert some control the over the phytoplankton and zooplankton species that dominate the current. Hooff and Peterson (2006) suggest that knowledge of source waters is critical to understanding ecosystem dynamics in the shelf waters of the Northern CCE because waters from the Gulf of Alaska carry large, lipid-rich copepods to the shelf waters, whereas waters coming from an offshore source carry small, oceanic lipid-poor copepods to the shelf waters. Thus PDO changes may result in local food chains that have vastly different bioenergetic content. Given for example that (a) salmon returns are low when the PDO is in a positive, warm-water phase, but high when the PDO is in a negative, cold-water phase, (b) salmon returns to Pacific Northwest rivers are highly correlated with copepod community structure (Peterson and Schwing 2003, Peterson et al., 2006) we suggest that variations in the bio-energetic content of the food web represent a mechanistic link between PDO sign change and salmon survival.

Northward shifts in distribution are also possible. Generally warmer conditions could result in a northward shift in the distribution of some species, and possibly the creation of reproductive populations in new regions. Examples include Pacific whiting which migrate far to the north, to Canada, during warm summers. Moreover, there is evidence that both hake and sardines are now spawning in waters off Oregon and Washington (R. Emmett, personal communication, Northwest Fisheries Science Center).

Alternatively, if upwelling strengthens due to global climate change, regardless of the sign of the PDO, cold-water species should still be favored in the coastal upwelling zones. However, the onshore-offshore gradients in temperature and species abundance should strengthen if offshore waters become warmer and upwelling becomes stronger, creating stronger upwelling fronts, and perhaps a greater level of mesoscale activity. It is unclear how faunal boundaries might be affected.

5. Steelhead Recovery Goals, Objectives & Criteria

"Recovery is the process by which listed species and their ecosystems are restored and their future safeguarded to the point that protections under the ESA are no longer needed. A variety of actions may be necessary to achieve the goal of recovery, such as the ecological restoration of habitat or implementation of conservation measures with stakeholders."

Interim Endangered and Threatened Species Recovery Planning Guidance, National Marine Fisheries Service, 2007

5.1 DPS RECOVERY GOAL

Our goal is *to prevent the extinction of southern California steelhead in the wild and ensure the long-term persistence of viable, self-sustaining, harvestable, interacting wild populations of steelhead distributed across the DPS*. Recovery of this DPS will require reducing threats to the long-term persistence of multiple populations that are geographically dispersed among the diverse habitats of the species' range, preserving the diversity of steelhead life-history strategies and adaptations (*e.g.* switching between resident and anadromous forms, emigration age, timing and frequency of anadromous runs, dispersal rates between watersheds, and local habitat adaptations).

Recovery of the DPS will require the protection, restoration, and maintenance of habitats of sufficient quantity, quality, and natural complexity throughout the DPS so that the full range of all life-history forms of *O. mykiss* are able to successfully use as many types of habitat as possible, in as many ways as possible, in order to overcome the natural challenges of a highly variable natural environment and random or unpredictable biological processes.

A **viable population** is defined as a population having a negligible risk (<5%) of extinction due to threats from demographic variation, non-catastrophic environmental variation, and genetic diversity changes over a 100-year time frame. A **viable DPS** is comprised of a sufficient number of viable populations broadly distributed throughout the DPS but sufficiently well-connected through ocean and freshwater dispersal to maintain long-term (1,000-year) persistence and evolutionary potential (McElhany *et al*. 2000).

5.2 DPS RECOVERY OBJECTIVES

To ensure recovery of the DPS, specific recovery objectives are necessary to guide recovery efforts and to measure the species' progress towards recovery. Similarly, specific, measurable and objective criteria are also necessary to ensure the recovery goal is met.

Steelhead in southern California occupy a wide array of watersheds, some portions of which are severely disturbed with highly modified natural watershed processes and streamflows. Under these degraded habitat conditions, steelhead populations in some watersheds have declined to very low numbers where they continue to persist. In other watersheds, populations have been extirpated, particularly at the southern end of the species' range. Existing threats constrain the species current distribution to small portions of its historic range and preclude the species from expressing its full range of life-history strategies to respond to varying habitat conditions. In order to recover, the species needs substantially higher numbers of returning adults, successful spawning and rearing in freshwater and estuarine environments, and successful migration of juveniles to the ocean. To achieve these goals, it is critically important to preserve and restore the species' existing habitat, as well as restore its access to historically important spawning and rearing habitats. Individual watersheds, and in some cases groups of watersheds, must have the capacity to support self-sustaining populations of steelhead in the face of natural variation in environmental conditions such as droughts, floods, variable ocean-rearing conditions, wildfires, and long-term climate changes.

To recover steelhead, the following objectives have been identified:

1. Prevent steelhead extinction by protecting existing populations and their habitats
2. Maintain current distribution of steelhead and restore distribution to previously occupied areas
3. Increase abundance of steelhead to viable population levels, including the expression of all life-history forms and strategies
4. Conserve existing genetic diversity and provide opportunities for interchange of genetic material between and within viable populations
5. Maintain and restore suitable habitat conditions and characteristics to support all life-history stages of viable populations
6. Conduct research and monitoring necessary to refine and demonstrate attainment of recovery criteria

5.3 RECOVERY CRITERIA

Prior to determinations that a species has "recovered" and can be removed from the List of Threatened and Endangered Species (*i.e.,* delisting) or have its protective status lowered from "endangered" to "threatened" (*i.e.,* down listing), certain criteria for recovery, related to the condition of the species and the status of the threats to the species, must be met. In the case of delisting the Southern California Steelhead DPS, biological recovery criteria regarding the

abundance, productivity, spatial structure, and diversity of the populations within the DPS and the DPS as a whole, are the measures of recovery. Threats abatement criteria are indicators that key threats to the populations and DPS have been abated or controlled. Both types of recovery criteria will be used by NMFS to assess whether the species is recovering (moving towards meeting the criteria, and down listing may be appropriate) or has recovered (meets the criteria and delisting may be appropriate). Several of the criteria are not yet measurable or quantitative because additional research is needed to define or refine them. For this reason one of the five recovery objectives focuses on the research and monitoring needed to refine the criteria and directly measure whether steelhead populations are meeting the criteria. In addition, NMFS has proposed down listing criteria that would mark the transition between endangered and threatened status for the Southern California Steelhead DPS, but further information is needed for refinement of these criteria as well. Given the species' condition and the severity of the threats to the species, significant increases in population and DPS health and reductions in critical threat sources are needed before the species' risk of extinction shifts from imminent to the "foreseeable future." In the meantime, strategies and actions needed to move the species towards a threatened status are the same as those needed for recovery.

5.3.1 Biological Recovery Criteria

The TRT developed general viability criteria for both individual steelhead populations and for the DPS as a whole. These criteria describe characteristics of both individual populations and the DPS that if achieved would indicate that the DPS is viable, and therefore at a low risk of extinction over a specific period of time (for a detailed discussion of the methods used by the TRT to develop the recommended viability criteria, please see Boughton *et al.* 2007). The population and DPS criteria are independent of anthropogenic effects in the sense that they must be met regardless of habitat conditions and human-caused threats. The time frame and related recommended criteria address the preservation of the evolutionary potential of the species (*i.e.*, existing genetic, phenotypic, and behavioral diversity) by ensuring that the DPS will persist over a long enough period of time to exhibit future evolutionary changes such as adaptation or diversification in response to environmental changes. Preserving the evolutionary potential of the species is an important component in ensuring the species' long-term viability.

The viability criteria recommended by the TRT provide guidance for judging recovery of steelhead populations and the DPS given our current level of knowledge. All of the recommended criteria carry varying levels of uncertainty depending on the amount of information available on steelhead in the SCS Recovery Planning Area. Given the high levels of scientific uncertainty, NMFS proposes to adopt many of the viability criteria as recovery criteria until such time as sufficient scientific information is available to refine the criteria for assessing population and DPS viability.

Table 5-1 summarizes the recovery criteria proposed for the Southern California Steelhead DPS. The population level criteria apply to certain populations in all of the BPGs (see Chapter 2 and Table 2-2, "Steelhead Biology and Ecology", and Chapter 6 "Recovery Strategy" for a discussion of these populations). Further research is needed to refine the population specific criteria in all BPGs, as well as the role of each of the BPGs in the recovery of the DPS. At a minimum, all BPGs

Table 5-1. Biological Recovery Criteria for the Southern California Steelhead DPS

POPULATION-LEVEL CRITERIA – Apply to Populations selected to meet DPS-level criterion D.1.1		
Criterion Type	**Recovery Threshold**	**Notes**
P.1 Mean Annual Run Size	Run size is sufficient to result in an extinction risk of <5% within 100 yrs	Monitoring run size will provide information on year-to year fluctuations in the population necessary to determining the appropriate recovery threshold for individual populations. Research on the role of non-anadromous spawning fraction in stabilizing anadromous faction will also enable refinement of the minimum recovery threshold (see Boughton *et al.* [2007] for discussion of steps in determination of threshold value for each viable population).
P.2 Ocean Conditions	Run Size criterion met during poor ocean conditions	"Poor ocean conditions" determined empirically, or size criterion met for at least 6 decades
P.3 Spawner Density	*Unknown at present*	Research needed
P.4 Anadromous Fraction	N = 100% of Mean Annual Run Size	Requires further research
DPS-LEVEL CRITERIA		
Criterion Type	**Recovery Threshold**	
D.1 Biogeographic Diversity	1. Biogeographic Population Group contains minimum number of viable populations: Monte Arido Highlands (4 populations); Conception Coast (3 populations); Mojave Rim (3 populations); Santa Monica Mountains (3 populations); Santa Catalina Gulf Coast (8 populations) (see Boughton *et al*. 2007 for detailed discussion) 2. Viable populations inhabit watersheds with drought refugia 3. Viable populations separated from one another by at least 68 km or as widely dispersed as possible	
D.2 Life-History Diversity	Viable populations exhibit all three life-history types (fluvial-anadromous, lagoon-anadromous, freshwater resident)	

It is assumed that all spawner criteria represent escapement (*i.e.*, unharvested spawning adults) rather than migrating adults that may be captured before having an opportunity spawn.

will need to achieve sufficient spatial structure and diversity (*i.e.,* two of the four criteria that define a viable DPS in the wild). Dispersal of steelhead between BPGs may be an important mechanism for maintaining viability of steelhead populations. In addition, preservation of the resident form of the species and habitats that support that life-history form may be critical to conserving the genetic diversity of steelhead and provide stock that can re-establish and support the fluvial-anadromous and lagoon-anadromous life-history strategies.

5.3.1.1 Discussion of Population-Level Recovery Criteria

Criterion P.1 – Mean Annual Run Size. There is substantial uncertainty regarding the mean annual run size that would represent viable anadromous *O. mykiss* populations throughout the DPS. The TRT estimated a mean annual run size for the DPS using a robust method and quantitative field data for one anadromous *O. mykiss* population and 19 Chinook salmon populations in California's Central Valley. The resulting criterion of 4,150 spawners per year provides for a 95 percent chance of persistence of the population over 100 years and applies to a generalized situation where there are no quantitative field data on specific local populations. Based on the irregular inter-annual patterns of precipitation, anecdotal accounts of highly variable spawning runs and the expectation that larger abundances buffer populations against the increased extinction risks that come with variations in freshwater and marine survival, it can be expected that an average of 4,150 spawners per year, and persisting through a cycle of poor ocean conditions would be adequate to safeguard a population (See also discussion below of P.2 – Ocean Conditions). This target may be biologically feasible in larger watersheds within the SCS Recovery Planning Area (for example, rivers within the Monte Arido Highlands), but may be too high for some relatively small populations that may be viable at average run sizes well below 4,150 (*e.g.,* because of reliable access to spawning and rearing areas, a stable freshwater environment, the role of non-anadromous forms of *O. mykiss*, inter-watershed exchanges of anadromous forms of *O. mykiss*, or other factors).

The separate watersheds comprising each BPG are treated as individual steelhead populations for the purposes of meeting the run-size criterion. Because of uncertainty regarding the applicability of 4,150 spawners per year to many of the watersheds within the DPS and the lack of current data to develop more refined criteria, this recovery plan proposes that performance-based run-size criteria be developed for different core populations throughout the DPS. Development of this criterion for each population would utilize a precautionary approach towards determining run sizes that provide for a 95 percent chance of persistence of the population over 100 years. In general, the 4,150 number can be thought of as an approximate upper bound on what the ultimate viability targets will turn out to be, although there is a chance that development of a performance-based criterion would result in values higher than 4,150 spawners in some watersheds (Boughton, *et al*. 2007).

Methods exist for estimating extinction risk through the use of time-series of spawner counts (Holmes 2001, Lindley 2003, Dennis *et al*. 2006). In general, about 20 years of data are necessary to obtain reasonable confidence in such estimates (Lindley 2003), though recovery to some level is necessary in many watersheds in order to have a sufficient number of spawners to refine performance-based criterion. The performance criterion development approach requires that we learn about some key risk factors before settling on final viability targets, including: 1) the magnitude of year-to-year fluctuations in spawner abundance; 2) the magnitude and duration of

poor ocean survival during poor ocean conditions; and 3) the ability or inability of rainbow trout to contribute progeny to steelhead populations and thereby bolster steelhead populations during periods of otherwise poor survival. Obviously, these factors and the years of data collection required highlight the critical need for immediate implementation of population abundance monitoring in key watersheds. However, some populations may currently have run sizes so low that obtaining accurate counts would be difficult because of the small sample size, or surveying may be detrimental because of the associated mortality associated with sampling techniques. Collecting useful data may not be practical until such populations have been recovered to some level, depending on the field methods used for monitoring. Boughton *et al.* (2007) describe a decision tree for use in refining and establishing a viability criterion for mean population size.

Criterion P.2 – Ocean Conditions. Year-to-year variation in a population's survival and/or reproduction can cause large fluctuations in population growth rate irrespective of population size. Consequently, larger variance causes the number of fish to fluctuate more, increasing the chance of the population fluctuating to zero. A large mean population growth rate lowers this risk by shortening the recovery time from downward fluctuations, and a large mean population size keeps the population further away from zero to begin with.

Variation in ocean conditions is known to have dramatic impacts on marine survival of Pacific salmonids. A conservative working assumption is that salmonid ocean survival fluctuates widely and is connected with variations in ocean conditions. Periods of poor ocean conditions (as reflected in a significant increase in mean ocean mortality of *O. mykiss*) can last for two decades and may result in as much as a five-fold decrease in ocean survival of salmonids. A population that meets the run-size criterion (P.1) during a period of good ocean survival is likely to decline to risky levels when ocean survival deteriorates for long periods. Therefore, a simple but effective criterion for ocean condition is that the run size criterion must be met during a period of poor ocean survival. This criterion could be met via two distinct strategies:

1. Monitor population size for at least the duration of the longest-period climate "cycle" (about 60 years according to Mantua and Hare [2002], though others dispute the notion of predictable cycles), or
2. Concurrently monitor population size and ocean survival, so that periods of low ocean survival can be empirically determined.

Data on ocean survival (derived from smolt counts combined with adult counts) should be useful for separating the effects of ocean cycles and watershed conditions on population growth. Investment in both smolt counts and adult counts allows an estimation of ocean survival as distinct from freshwater production and survival (with only adult counts, the vital rates in the two habitats are confounded and cannot be estimated separately). In addition, short-term improvements in run size due to watershed restoration could be distinguished from short-term improvement due to ocean cycles. The Coastal Monitoring Plan being prepared by NMFS and CDFG provides for a series of "Life Cycle Monitoring Stations" which involve the monitoring of smolt and spawners to allow ocean survival to be estimated for specific watersheds; if fish from other watersheds have similar rates of ocean survival, these results could be extrapolated to address this issue for southern California steelhead.

As performance-based run-size criteria are developed for populations within this DPS, the methods and data used to develop those values may change the ocean conditions criterion or even preclude the need for such a specific criterion. As discussed above, the magnitude and duration of poor ocean survival on the extinction risk of the population is a key factor to consider when developing the run-size criterion.

Criterion P.3 – Spawner Density. The distribution of adult or juvenile fish across a watershed has benefits and risks to the viability of the population. If too thinly spread-out, populations can decline as a result of the difficulty of locating mates, but may also reduce their vulnerability to localized catastrophes or environmental variations by occupying a broader range of habitats. If too densely packed, populations may be more vulnerable to unpredictable environmental events as all the members of the population experience the same conditions. The TRT felt that a viability criterion related to the density of spawners in a population is warranted, particularly for populations that were historically large, but are unlikely to be recovered to those historic levels due to a risk that a thinly dispersed population in such a watershed could meet the criterion for mean size, and yet not be viable. The TRT also believes that the viability threshold should be high enough to ensure that fish generally inhabit good-quality habitats that promote the resilience of the population. A potentially suitable threshold for both these purposes is the density at which intra-specific competition for redd sites becomes observable. For coho salmon (*O. kisutch*) this appears to be on average about 40 spawners per kilometer (one spawning pair per 50 meters of stream length), although individual streams vary considerably around this mean (Bradford *et al*. 2000). However, the TRT could not find data for deriving a corresponding steelhead criterion. The Coastal Monitoring Plan proposed to implement redd-counting for monitoring salmon and steelhead in the northern coastal area of California (Aptos Creek to the Oregon border). This should provide data that will be useful for deriving a specific spawner density criterion; also redd-counts could be made in the southern Life-Cycle Monitoring Stations if it is necessary for developing specific southern California criterion.

Criterion P.4 – Anadromous Fraction. Anadromous fraction is the mean fraction of reproductive adults that are anadromous (steelhead). Steelhead in the Southern California DPS co-occur with rainbow trout. Elsewhere, steelhead have been observed to have trout among their progeny, and vice versa (Zimmerman and Reeves 2000). We do not know how often these transitions occur in southern California, or what factors bring them about, though clearly individual populations can have more than one life-history type. Depending on the rate of transition, a group of resident and anadromous fish may function as a single population; two completely distinct populations; or something in between.

Interchange between resident and anadromous fish groups would almost certainly lower the extinction risk of both groups, for the same two reasons that dispersal between separate steelhead populations reduces risk—the existence of a "rescue effect" and the possibility of recolonization (Hanski and Gilpin 1997). The rescue effect would occur at low steelhead abundance, when input from the trout population prevents their complete disappearance. Recolonization occurs when steelhead disappear completely, but are regenerated by the trout population (via "recolonization" of the steelhead niche). These phenomena may have maintained steelhead in the Santa Clara River system in recent times, since modern steelhead runs appear far too small to be self-sustaining (Boughton 2005). Unfortunately, lack of data on life-history polymorphism prevents a

reasonable estimate for the magnitude of the rescue effect, or for a viability threshold for anadromous fraction. Lacking such data, the criterion for anadromous fraction must assume that the rescue effect is negligible, and that anadromous fraction must be 100%—that is, when applying the population size criterion discussed previously, 100% of the spawners must be anadromous. Future research on this topic could be used to estimate a viability threshold that is more efficient than the precautionary "100% rule." One of the most useful scientific tools for addressing the interchange question involves otolith microchemistry; because this technique requires lethal sampling of fish, a scientific collecting permit under section 10(1)(A) of the ESA would be required to authorize mortality using this methodology. However, in populations where anadromous fish are currently quite rare, it will probably be necessary to recover run sizes somewhat before numbers are sufficient for useful empirical research.

5.3.1.2 DPS-Level Recovery Criteria

Criterion D.1 (.1, .2, and .3) – Biogeographic Diversity. This criterion contains three elements that address issues of redundancy and separation between populations and within-watershed conditions to provide for resilience against natural environmental events such as droughts and wildfires. The BPGs are an important component in the recovery of this DPS and all BPGs must be restored to viability before the DPS as a whole can be recovered. The delineation of BPGs was based on suites of basic environmental conditions (*e.g.* large inland and short coastal stream networks in a range of climatic, terrestrial, and aquatic regimes). The recovery of multiple watersheds and populations in each BPG ensures that there are sufficient populations within the BPG and across the DPS to provide resiliency in the face of environmental fluctuations, and also that a variety of habitat types and conditions are represented (*e.g.* different stream gradients and estuary size, complexity and function).

Recovery of this DPS will require recovery of a sufficient number of viable populations (or sets of interacting trans-watershed populations) within each of the five BPGs to conserve the natural diversity (genetic, phenotypic, and behavioral), spatial distribution, and resiliency of the DPS as a whole.

Criterion D.2 – Life-History Diversity. Also essential to the recovery and long-term conservation of this DPS is the preservation and restoration of all the life-history forms and strategies the species has evolved to exploit the diversity and range of habitat conditions that are characteristic of southern California. These life-history forms include the fluvial-anadromous, lagoon-anadromous, and freshwater life-history patterns exhibited by native *O. mykiss* throughout the DPS. Achieving this goal will require a number of closely coordinated activities, such as further research into the diverse life-history patterns and adaptations of steelhead to a semi-arid and highly dynamic environment including the ecological relationship between non-anadromous and anadromous populations; monitoring of existing populations; and the implementation of the recovery plan. The two most important families of research questions for management purposes are: 1) which ecological conditions favor particular life-history forms; and 2) what ecological conditions promote and prompt plasticity in life-history trajectories, and to what extent does such plasticity stabilize the anadromous DPS? Answers to the first question would allow focusing on management activities (*e.g.,* removal of physical or hydrologic migration barriers,) to produce the suite of conditions that promote the coexistence of the different life-history forms; answers to the second would help refine the viability criteria P.1 (Mean Annual Run Size), P.4

(Anadromous Fraction), and D.2 (Life-History Diversity). Regarding the last criterion, it research may indicate that not all life-history forms may have to be present in all viable populations on a regular basis, but only periodically.

5.4 THREATS ABATEMENT CRITERIA

The current threat regime that is impeding the ability of anadromous *O. mykiss* to recover must be addressed to meet the population and DPS-level recovery criteria described above. In addition, our efforts to reduce the threats facing the species must also take into consideration future threats to species recovery such as climate change, ongoing human population growth, and associated land and water developments. Here we define basic threats abatement criteria for use in measuring the success of recovery efforts. The identified existing and future threats (see sections 8.4 – 12.4 for each BPG) fall within the categories of listing factors identified during the species listing process. Each of these factors must be addressed prior to making a determination that a species has recovered and no longer requires the protections of the ESA.

This plan prioritizes recovery actions for the watersheds within the BPGs according to the role of the watershed in recovery of the species, the severity of the threat addressed by the action, and the listing factors addressed by the action. Each recovery action has been given a priority of 1, 2, or 3 as defined in the NMFS Interim Recovery Planning Guidance (see box, below, for definitions) and with an additional descriptor: A) if the action addresses the first listing factor regarding the destruction or curtailment of the species' habitat, or B) if the action addresses one of the other four listing factors. Where the recovery action addresses both types of listing factors, the descriptor is based on the principal listing factor addressed. Priority 1 actions are aimed to prevent the DPS as a whole, though they may be implemented on individual populations that are critical to prevent the extinction of the DPS. Priority 2 actions are intended to avoid prejudicing the recovery of the DPS as a whole by ensuring that populations essential to recovery are not further degraded or lost, thus precluding the full recovery of the DPS. Priority 3 actions are the full suite of actions necessary to meet all the viability criteria identified for the full recovery of the DPS (including individual populations).

Priority 1: Actions that must be taken to prevent extinction or to prevent the species from declining irreversibly.

Priority 2: Actions that must be taken to prevent a significant decline in species population/habitat quality or in some other significant negative impact short of extinction.

Priority 3: All other actions necessary to provide for full recovery of the species.

As a basic threats abatement criterion, NMFS proposes that all watershed threats having a priority 1 recovery action be abated to a "low" level using the same threats assessment process used to establish threat levels for this plan.

In addition, for watershed threats with recovery actions ranked as either priority 2 or 3, the threat must be abated one level below its current threat ranking based on the analysis methodology used in the threats assessment (*e.g*. abate from "high" to "medium," or "medium" to "low").

An example of the application of these threats abatement criteria can be seen in Table 5-2. In this example, high-level (red) threats associated with high-priority (1A and 1B) recovery actions must be abated to low (green) levels. However, high-level threats associated with secondary (2A and 2B) priority recovery actions need only be abated one threat level to medium (yellow).

Table 5-2. Example application of basic threats abatement criteria

Threat	Current Threat Level	Recovery Action Rank	Target Abatement Level for Recovery
Culverts and Road Crossings (Passage Barriers)		1A	
Urban Development		1B	
Wildfires		1B	
Roads		2B	
Groundwater Extraction		2B	

These basic threats abatement criteria are supplemented by additional criteria that are specific to particular conditions NMFS believes are critical to meet the recovery goal for the species. The criteria are linked to one or more of the listing factors identified for the Southern California steelhead DPS. Only Listing Factor B, Over-utilization, does not have a specific threat abatement criteria identified as changes in fishing regulations have already ameliorated the threat posed to the species from angling. These threat abatement criteria are that:

- Viable populations have unimpeded access to previously occupied habitats (Listing Factors A, D, and E).
- Freshwater migration corridors supporting viable populations meet the life-history and habitat requirements of steelhead (Listing Factors A, C, D, and E).
- Watersheds supporting viable populations have habitat conditions and characteristics that support all life-history stages (Listing Factors A, C, D, and E).
- Adequate funding, staffing, and training are provided to state and federal regulatory agencies to ensure the ecosystem and species protections of state and federal requirements are properly implemented and remain in place (Listing Factor D).
- Standardized monitoring of populations and their habitats in each BPG across the DPS evaluates the effectiveness of recovery actions and measures progress towards recovery (Listing Factors D and E).

5.5 PROVISIONAL RECLASSIFICATION CRITERIA

5.5.1 Reclassification of an Endangered Species.

When a species is listed as endangered, it is appropriate to identify intermediate recovery criteria which if achieved would allow for the reclassification (or down listing) of the species from endangered to threatened. A threatened species is defined in the ESA as "any species which is likely to become endangered species within the foreseeable future throughout all or a significant portion of its range" but is not currently in danger of extinction (Sec 3 [19]).

The determination regarding reclassification must be made by the Secretary of Commerce based on any one or a combination of the following factors which are also used for listing a species under the ESA:

1. the present or threatened destruction, modification, or curtailment of its habitat or range;
2. over utilization for commercial recreational, scientific or educational purposes;
3. disease or predation;
4. the inadequacy of existing regulatory mechanisms; or
5. other natural or manmade factors affecting its continued existence.

The reclassification of a species from endangered to threatened, as with the initial listing, must be based on the best scientific and commercial data available, without reference to possible economic or other impacts, after conducting a status review of the species. The ESA provides for a process for regularly assessing the status of a listed species through the completion of periodic review of the species that are listed as threatened or endangered to ensure that the listing status of a species remains current. Specifically, Section 4(c) (2) of the ESA provides that:

> "The Secretary shall –
>
> (A) conduct , at lest one every five years a review of all species included in a list . . . and which is in effect at the time of such review; and
>
> (B) determine on the basis of such review whether any such species should-
>
> (i) be removed from such list;
>
> (ii) be changed in status from an endangered species to threatened species; or
>
> (iii) be changed in status for a threatened species to an endangered species."

Evaluating the status of a species for potential reclassification requires an explicit analysis of the threats specified under the five listing factors, in addition to an evaluation of the population or other demographic parameters of the listed species (e.g., anadromous fraction, life-history types, etc.) Status reviews of a species periodically conducted by NMFS may serve as a 5-year review for the purposes of reclassification.

As with recovery criteria, reclassification criteria address both the status of the species (biological criteria) and the status of the threats to the species (threats abatement criteria). The biological criteria deal with the abundance, spatial distribution, and diversity of the populations within the

DPS, and the DPS as a whole. The threats abatement criteria are indicators that the key threats to the population and the DPS as a whole have been abated or controlled.

Because of the uncertainty regarding key recovery criteria (*e.g.*, annual run size) reclassification criteria must necessarily be both provisional and precautionary (see discussion regarding recovery criteria in sections 5.3.1.1 5.3.1.2). Further, reclassification criteria must ensure that the full recovery of the species is not prejudiced or precluded by failing to address the fundamental threats to the species, including, but not limited to its natural spatial distribution and diversity. The reclassification criteria identified below, if met, are intended to achieve partial recovery of the species, and ultimately contribute to the full recovery and delisting of the speic1es. These criteria constitute a sub-set of the recovery criteria and address the most significant threats in the highest priority watersheds in each of the five BPGs with in the DPS. Full recovery will require addressing the full set of recovery criteria, including lower priority threats in the full suite of watersheds which would constitute a recovered DPS.

5.5.1 Population Level Reclassification Criteria

The following reclassification criteria must be met for the specified number of populations in each of the five BPGs (listed below) to down-list the species from endangered to threatened:

- *Population Reclassification Criterion PR 1: Mean Annual Run Size* – Run size is sufficient to result in an extinction risk of <5% within 50 years (not including poor ocean conditions).

- *Population Reclassification Criterion PR 2: Anadromous Fraction* – N= 100% of Mean Annual Run Size.

5.5.2 DPS-Level Reclassification Criteria

The following reclassification criteria must be met for the DPS to down-list the species from endangered to threatened:

- DPS Biogeographic Diversity Criteria DR 1: Meet the population level reclassification criteria for the specified number of populations in each of the five BPGs:

Monte Arido Highlands BPG:	2 Core 1 Populations
Conception Coast BPG:	2 Core 1 Populations
Santa Monica Mountains BPG:	1 Core 1 Population
Mojave Rim BPG:	1 Core 1 Population
Catalina Gulf Coast BPG:	2 Core 1 Populations

5.5.3 Reclassification Threats Abatement Criteria

In order to meet the above population and DPS level reclassification criteria the current threat regime that is impeding the ability of anadromous *O. mykiss* to recover must be addressed. The threats analysis conducted for the endangered southern California steelhead has prioritized recovery actions in each BPG (See Table 6-2). Priority 1 recovery actions are defined as those actions that must be taken to prevent the extinction of the species, or to prevent the species from

declining irreversibly, thus precluding the recovery of the species. To meet the reclassification threat abatement criteria the threat levels identified as high priority threats in the Core 1 populations must be reduced to medium or low, which ever is necessary to meet the population level reclassification criteria.

As noted above these reclassification criteria are provisional and precautionary, and before reclassification can occur, the status of the species must be evaluated, either through a five-year review or a separate status review pursuant to the requirements of the ESA and applicable administrative regulations.

6. Steelhead Recovery Strategy

"The aim of the Federal Endangered Species Act (ESA) is to recover species that would otherwise go extinct, and to that end it requires the Federal government to prepare recovery plans. A recovery plan outlines a strategy for lowering extinction risk to an acceptable level and has two components: a technical part and a policy part."

NOAA Fisheries Technical Recovery Team, Population Characterization for Recovery Planning, 2006

For millennia southern California steelhead have successfully dealt with natural environmental fluctuations such as prolonged droughts, flash-floods, uncontrolled wildfires, sea-level alternations, periodic massive influxes of sedimentation, and climate changes—natural environmental fluctuations which also currently challenge the human population of southern California.

Of the approximately 37 million people currently living in California, approximately 23 million live in the southern California counties of Santa Barbara, Ventura, Los Angeles, Orange, Riverside, San Bernardino, and San Diego. As a result of this extensive human population, and related development, steelhead populations, along with many other indigenous species of both animals and plants, have been severely reduced or extirpated in many coastal watersheds. Despite extensive landscape modifications, steelhead have continued to persist, in one or more of its several life-history forms, in portions of many southern California watersheds, including some of the most highly urbanized.

Recovery of viable, self-sustaining populations of anadromous southern California steelhead will entail the re-integration of these populations into the human configured landscape. Such re-integration will necessarily entail an effort to restore habitats and operate the human built system in ways which conserves and better utilizes land and water resources in mutually beneficial ways—for southern California steelhead and the current and projected human population. Addressing these challenges therefore provides an opportunity to meet a wide variety of public policy objectives to ensure a sustainable future for the endangered southern California steelhead, as well as other native riparian species, including a number of other federally listed species such as California red-legged frog, Southwestern willow flycatcher, Least Bell's vireo, Arroyo toad, Tidewater goby and Western snowy plover, and the human population occupying the southern California landscape.

Under present conditions, the viability of individual populations is more likely achievable by focusing recovery efforts on larger watersheds capable of sustaining larger populations, and DPS

viability is more likely to be achievable by focusing on the most widely-dispersed set of such core populations capable of maintaining dispersal connectivity between southern California coastal watersheds.

The recovery strategy is the approach undertaken to attain the individual recovery criteria and objectives and, in turn, the ultimate recovery goal of de-listing the Southern California Steelhead DPS. The recovery strategy set forth in this recovery plan identifies the foundation watersheds where recovery of viable populations is necessary to achieve the recovery goal and critical watershed-specific actions (*e.g.*, removal of migration barriers and protection and restoration of spawning and rearing habitats) that are necessary for reversing the effects of past and ongoing threats to population abundance, growth rate, diversity, and spatial structure of endangered steelhead. An integral element in the recovery strategy is the development and implementation of a research and monitoring program which will provide the additional information necessary to refine recovery criteria and objectives, as well as assess the effectiveness of recovery actions and the overall success of the recovery program.

Effective implementation of recovery actions will require: (1) extensive public education (including the general public, non-governmental agencies, and local, regional, State, and Federal governmental agencies) regarding the role and value of the species within the larger watershed environment; (2) development of cooperative relationships with private land owners, special districts, and local governments with direct control and responsibilities over non-federal land-use practices; (3) participation in the land use and water planning and regulatory processes of local, regional, State, and Federal agencies; (4) close cooperation with other state resource agencies such as the California Department of Fish and Game, California Coastal Commission, CalTrans, and the California Department of Parks and Recreation; and (5) partnering with federal resource agencies, including the U.S. Forest Service, U.S. Fish and Wildlife Service, National Park Service, U.S. Bureau of Reclamation, U.S. Bureau of Land Management, U.S. Army Corps of Engineers, U.S. Department of Transportation, U.S. Department of Defense, and the U.S. Environmental Protection Agency.

An implementation schedule describing time frames and costs associated with individual recovery actions is under development. Estimating total cost to recovery is much more challenging, if not impossible to estimate for a variety of reasons. These reasons include the large geographic extent of the SCS Recovery Planning Area; the need to refine recovery criteria; the need to complete watershed-specific investigations such as barrier inventories and assessments; the establishment of flow regimes for individual watersheds; and the review and possible modification of a variety of exiting land-use and water management plans (including waste discharge requirements) under a variety of local, state, and federal jurisdictions. Additionally, the biological response of many of the recovery actions is uncertain, and achieving full recovery will be a long-term effort likely requiring decades, while addressing new stressors that emerge over time. In some instances, however, NMFS is able to estimate the costs associated with certain common restoration activities such as those undertaken as part of the California Department of Fish and Game Fisheries Restoration Grants Program. Appendix E of this document contains estimates for these categories of typical watershed restoration actions.

6.1 CORE POPULATIONS

The findings of the TRT (*e.g.,* Boughton *et al*. 2006) and NMFS' own investigations indicate certain key watersheds and the steelhead populations within those watersheds that form the foundation of the recovery of the Southern California Steelhead DPS (Table 4-4). These watersheds exhibit the physical and hydrological characteristics (*e.g.,* large spatial area, perennial and reliable winter streamflow, stream network extending inland) that are most likely to sustain independently viable populations, and that are critical for ensuring viability of the DPS as a whole. Population viability is more likely achievable by focusing recovery efforts on larger watersheds in each Biogeographic Population Group capable of sustaining larger populations, and DPS viability is more likely achievable by focusing on the most widely-dispersed set of such core populations capable of maintaining dispersal connectivity (see Boughton *et al.* 2006).

In table 6-1 populations are identified as Core 1, Core 2, or Core 3. The Core 1 populations are those populations identified as a high priority for recovery actions based on a variety of factors, including: the intrinsic potential of the population in an unimpaired condition; the role of the population in meeting the spatial and/or redundancy viability criteria; the conditions of the population, the severity of the threats facing the populations; the potential ecological or genetic diversity the watershed and population could provide to the species; and the capacity of the watershed and population to respond to the critical recovery actions needed to abate those threats. Core 1 populations form the nucleus of the recovery strategy and must meet the population-level biological recovery criteria set out in Table 5-1. NMFS believes that this set of Core 1 populations should be the first focus of an overall recovery effort. Core 2 populations also form part of the recovery strategy by contributing to the set of populations necessary to achieve recovery criteria such as minimum numbers of viable populations needed within a BPG. Similar to Core 1 populations, Core 2 populations must eventually meet the biological recovery criteria for populations set out in Table 5-1; however, these populations are of secondary importance in terms of recommended priority of recovery efforts. Finally, the complete attainment of DPS-level biological recovery criteria may also require recovery or stabilization of populations listed as Core 3. For example, further research is needed to refine certain recovery criteria such as the redundancy and separation of populations required to withstand wildland fires. Dispersal connectivity between populations and genetic diversity may be enhanced by working to recover smaller Core 3 populations that serve as stepping stones for dispersal.

Populations identified as being Core 1 and 2 populations would be expected to meet the population recovery criteria either as a single population or a group of interacting trans-watershed populations such as those that might exist in the Conception Coast and more southerly BPGs (Santa Monica Mountains and Santa Catalina Gulf Coast). Further research is needed to identify these interacting groups. In the interim, the population-level recovery criteria are proposed to apply to each core population.

Table 6-1. Preliminary designation of Core 1, 2, and 3 *O. mykiss* populations within the Southern California Steelhead DPS.

BPG	POPULATION	FOCUS FOR RECOVERY
Monte Arido Highlands	**Santa Maria River**	**Core 1**
	Santa Ynez River	**Core 1**
	Ventura River	**Core 1**
	Santa Clara River	**Core 1**
Conception Coast*	Jalama Creek	Core 3
	Canada de Santa Anita	Core 3
	Canada de la Gaviota	**Core 2**
	Agua Caliente	Core 3
	Canada San Onofre	Core 3
	Arroyo Hondo	Core 3
	Arroyo Quemado	Core 3
	Tajiguas Creek	Core 3
	Canada del Refugio	Core 3
	Canada del Venadito	Core 3
	Canada del Corral	Core 3
	Canada del Capitan	Core 3
	Gato Canyon	Core 3
	Dos Pueblos Canyon	Core 3
	Eagle Canyon	Core 3
	Tecolote Canyon	Core 3
	Bell Canyon	Core 3
	Goleta Slough Complex	**Core 2**
	Arroyo Burro	Core 3
	Mission Creek	**Core 1**
	Montecito Creek	Core 3
	Oak Creek	Core 3
	San Ysidro Creek	Core 3
	Romero Creek	Core 3
	Arroyo Paredon	Core 3
	Carpinteria Salt Marsh Complex	Core 3
	Carpinteria Creek	**Core 1**
	Rincon Creek	**Core 1**

Table 6-1 cont'd. Preliminary designation of Core 1, 2, and 3 *O. mykiss* populations within the Southern California Steelhead DPS.

Santa Monica Mountains	Big Sycamore Canyon	Core 3
	Arroyo Sequit	**Core 2**
	Malibu Creek	**Core 1**
	Topanga Canyon	**Core 2**
	Solstice Creek	Core 3
Mojave Rim	Los Angeles River	Core 3
	San Gabriel River	**Core 1**
	Santa Ana River	**Core 2**
Santa Catalina Gulf Coast	**San Juan Creek**	**Core 1**
	San Mateo Creek	**Core 2**
	San Onofre Creek	Core 3
	Santa Margarita River	Core 2
	San Luis Rey River	**Core 1**
	San Diego River	Core 3
	Sweetwater River	Core 3
	Otay River	Core 3
	Tijuana River	Core 3

**Note: If further research determines that individual populations are not viable, restoration of more closely spaced populations may be required to achieve the minimum number of viable populations for this BPG.*

*** Note: these BPGs may not have had consistent anadromy, which complicates the designation of populations that need to achieve viability.*

Public and private groups should not be dissuaded from undertaking actions that alleviate threats to the species in Core 3 watersheds, though the success of restoring Core 3 watersheds is likely contingent on the success in restoring nearby Core 1 and Core 2 populations. While sufficient information regarding threats and the biology and ecology of the species is available to define an overall recovery strategy, there still remain questions regarding the ecology of the species (*e.g.*, function of certain habitats in the life history of the species, relationship between the anadromous and resident forms, rate of dispersal between watersheds). In light of this uncertainty, a prudent approach is to define a recovery strategy based on the existing information on Core 1 and 2 watersheds while recovery opportunities in Core 3 watersheds continue to be actively pursued as a precaution to reduce the risk of extinction. Therefore, while the Core 1 and 2 watersheds form the foundation for recovery of the Southern California Steelhead DPS, recovery actions to alleviate threats should be undertaken in other watersheds to complement this recovery implementation strategy.

6.2 CRITICAL RECOVERY ACTIONS

The recovery actions in this recovery strategy represent the critical elements for alleviating major threats to endangered steelhead in core watersheds. Actions are also specified to address limited knowledge regarding the biology and ecology of the species, as well as its changing status within individual core watersheds.

Critical recovery actions should have the highest priority across the DPS and within core watersheds to achieve recovery objectives and criteria. In the tables describing recommended recovery actions for populations within the DPS, these actions have received a priority ranking of 1. Opportunistically, other recovery actions may be implemented prior to these actions, but NMFS considers these critical actions to be the keystones for population recovery or measurement of recovery; such actions are also widely recognized in the scientific literature as addressing threats which have caused the wide-spread decline of steelhead throughout its natural range. See for, example, Aspen Institute 2002; Boughton, *et al.* 2005; Graf, *et al*. 2002, 2003; Hayes, *et al.* 2008; Moyle, *et al.* 2008; Stanley and Doyle 2003.

Although a wide range of anthropogenic activities have contributed to the high extinction risk of the Southern California Steelhead DPS, two types of developments and activities pose the principal threats to the species: (1) impassable barriers, and (2) water storage and withdrawal, including groundwater extraction (see Table 4-1 in Chapter 4). These threats affect basic life-history phases of the species (egg-to-smolt survival and smolt-to-spawner survival) throughout the DPS and are key components of the risks posed to the species. Accordingly, this recovery strategy places a high priority on recovery actions that alleviate threats related to impassable barriers and water storage and withdrawal. Closely related to providing access to rearing habitats is the need to ensure that the ecological functions of those habitats are protected and, where impaired, are restored. The critical recovery actions to address these two threats within the Core 1 watersheds are listed below in Table 6-2.

With regard to effects of impassable barriers on endangered steelhead, the recovery objectives include restoring steelhead distribution to previously occupied areas and restoring genetic diversity and natural interchange within populations and metapopulations. One of the threats abatement criteria identified to meet these objectives is to allow the species unimpeded volitional access to historical spawning and rearing habitats. Such historical habitats are often situated in protected areas such as National Forests, and exhibit critical characteristics such as suitable substrate, sustained base flows, and refugia such as pool habitats. Besides allowing access to historical habitats, dam modification provides additional ecological benefits that are essential to attaining the recovery objectives. Such benefits include maintaining genetic and ecological diversity, population abundance, growth rates, and buffering against natural and anthropogenic catastrophic disturbances (*e.g.,* wildfires, droughts, debris flows) though restoration of the natural spatial population structure of the Southern California Steelhead DPS. Mechanistic solutions to fish passage such as trap-and-truck operations are problematic for a variety of reasons, including: the limitations in the operations during high flows when fish are most like to be migrating; periodic mechanical failures which result in migration delays, or lost migration opportunities; and the expense of personnel and equipment to maintain such operations. They are therefore are not expected to effectively abate the threat posed by dams which block fish

passage. See for example, Cada, *et al.* 1993, 1995; Caudill, *et al*. 2007; Colt and White (eds.) 1991; Fleming, *et al.* 1991; Godinho *et al.* 1991; Lucas, and Baras. 2001; Oldani and Baigum 2002; Nemeth and Kiefer 1999; Pompeu and Martinez 2007. If dam modification (including removal or breaching) is determined to be technically or economically infeasible, alternative approaches for providing sustainable volitional passage of steelhead must be implemented. The selected alternative must be expected to provide ecological benefits that are similar to expected benefits from dam removal or breaching.

Water storage (*e.g.,* reservoirs, managed groundwater Watersheds) and withdrawals (*e.g.,* groundwater pumping, surface-water diversions) can have the effect of altering the pattern and magnitude of streamflow. Recovery Objectives 2 and 5 include the restoration of steelhead distribution to previously occupied areas and the restoration of suitable habitat conditions and characteristics for all life-history stages of steelhead. Threats abatement criteria identified to meet these objectives include the restoration and protection of these habitat conditions and characteristics. The essential recovery actions involve either halting the alteration of the pattern and magnitude of streamflow where and when such an option is available, or implementing measures (*e.g.,* operating criteria) to ensure that a more natural (*i.e.,* pre-impact timing, frequency, duration, magnitude, and rate-of-change) streamflow is restored. There are many sites within core watersheds where past and present anthropogenic activities continue to alter the pattern and magnitude of streamflow and for which critical recovery actions are identified. In some situations, other actions to address impassable barriers may fully or partially eliminate threats to the pattern and magnitude of streamflow, thereby addressing two principal threats to the species: physical blockage of fish passage, and reduction or elimination of surface flows. The restoration of natural flow regime will also contribute toward restoring rearing habitats.

Regarding rearing habitats, fast juvenile growth is one the most effective strategies for successfully completing the early life-history stages (fertilized egg to smolt) of the anadromous life-history form, and ensuring survival during the ocean phase prior to return as spawning adults. Studies have demonstrated high growth rates in some seasonal lagoons, and possibly other freshwater habitats which provide suitable over-summering habitat. The identification, protection, and where necessary, restoration of such habitats is therefore another critical recovery action.

The critical recovery actions identified here do not diminish the importance of continuing to undertake actions that, while not the focus of this recovery strategy, directly promote the attainment and maintenance of essential habitat functions for individual populations within the Southern California Steelhead DPS. Resource managers and stakeholders should continue to implement recovery actions that: (1) curb unnatural inputs of fine sediments to waterways, (2) promote the establishment and maintenance of streamside vegetation and flood-plain connectivity and function, and (3) encourage the formation and preservation of complex instream habitat. To reduce further degradation of habitat characteristics and condition in watersheds throughout the entire range of the DPS, local stakeholders should continue to undertake those actions that complement the critical recovery actions in Core 1 watersheds.

Finally, conservation hatcheries may contribute to the recovery of the Southern California Steelhead DPS in a variety of ways, including: (1) providing a means to preserve local

populations faced with immediate extirpation as a result of catastrophic events such as wildfires, toxic spills, dewatering of watercourses, etc; (2) reintroduction of populations in restored watersheds; and (3) augmentation of small populations to accelerate the rate of recovery. Issues which should be considered prior to implementing a conservation hatchery program, include: (1) conditions under which rescue, reestablishment or supplementation could be used in wild steelhead recovery, (2) methods for rescue, reestablishment or supplementation, and (3) protocols for evaluating the effectiveness of such conservation hatchery functions over time. Conservation hatcheries and species' establishment program should not serve as surrogates for establishing and preserving essential habitat functions for endangered steelhead particularly where anthropogenic activities have created threats that constrain or eliminate habitat functions and values. Regarding the first function, raising (or rescuing) and releasing juveniles can require a considerable expenditure of resources for a relatively small biological return because of the naturally low productive rate of juvenile fish, the majority of which subsequent to supplementation or rescue and releasing will die in the ocean before reproducing as adults. Additionally, such program could result in the unintentional survival of smaller smolts as a result of being freed from natural rearing competition, rather than larger (though fewer) smolts with a higher ocean survival rate. (For additional discussion of the role of conservation hatcheries see Chapter 13, "Research, Monitoring, and Adaptive Management".)

Table 6-2. Critical recovery actions for Core 1 *O. mykiss* populations within the Southern California Steelhead DPS.

BPG	POPULATION	CRITICAL RECOVERY ACTION
Monte Arido Highlands	Santa Maria River	Implement operating criteria to ensure the pattern and magnitude of water releases from Twitchell Dam comport with the natural or pre-dam pattern and magnitude of streamflow. Physically modify Twitchell Dam to allow unimpeded volitional migration of steelhead to upstream spawning and rearing habitats. Identify protect, and where necessary, restore estuarine and freshwater rearing habitats.
	Santa Ynez River	Implement operating criteria to ensure the pattern and magnitude of water releases from Bradbury, Gibraltar, and Juncal dams comport with the natural or pre-dam pattern and magnitude of streamflow. Physically modify Bradbury, Gibraltar, and Juncal dams to allow unimpeded volitional migration of steelhead to upstream spawning and rearing habitats. Identify protect, and where necessary, restore estuarine and freshwater rearing habitats.
	Ventura River	Implement operating criteria to ensure the pattern and magnitude of water releases from Casitas, Matilija, and Robles Diversion dams comport with the natural or pre-dam pattern and magnitude of streamflow. Physically modify Casitas, Matilija, and Robles Diversion dams to allow unimpeded volitional migration of steelhead to upstream spawning and rearing habitats. Identify protect, and where necessary, restore estuarine and freshwater rearing habitats.
	Santa Clara River	Implement operating criteria to ensure the pattern and magnitude of water releases from Vern Freeman Diversion, Santa Felicia, Pyramid, and Castaic dams comport with the natural or pre-dam pattern and magnitude of streamflow. Physically modify Vern Freeman Diversion, Harvey Diversion, Santa Felicia, and Pyramid dams to allow unimpeded volitional migration of steelhead to upstream spawning and rearing habitats. Identify protect, and where necessary, restore estuarine and freshwater rearing habitats.
Conception Coast	Mission Creek, Carpinteria Creek, and Rincon Creek	Halt the unnatural dry-season reduction in the amount and extent of surface water to restore natural or pre-impact over-summering habitat characteristics and condition for steelhead. Physically modify road crossings, highways, and railways to allow unimpeded volitional migration of steelhead to upstream spawning and rearing habitats. Identify protect, and where necessary, restore estuarine and freshwater rearing habitats.
Santa Monica Mountains	Malibu Creek	Remove Rindge and Malibu dams, and physically modify road crossings, to allow unimpeded volitional migration of steelhead to upstream spawning and rearing habitats. Identify protect, and where necessary, restore estuarine and freshwater rearing habitats.
Mojave Rim	San Gabriel River	Implement operating criteria to ensure the pattern and magnitude of water releases from Morris, San Gabriel, and Cogswell dams comport with the natural or pre-dam pattern and magnitude of streamflow in downstream reaches. Physically modify Morris, San Gabriel, Cogswell, and Santa Fe dams, and road, highway, and railway crossings to allow unimpeded volitional migration of steelhead to upstream spawning and rearing habitats. Identify protect, and where necessary, restore estuarine and freshwater rearing habitats.
Santa Catalina Gulf Coast	San Juan Creek	Physically modify road crossings, highways, and railways to allow unimpeded volitional migration of steelhead to upstream spawning and rearing habitats. Identify protect, and where necessary, restore estuarine and freshwater rearing habitats.
	San Luis Rey River	Implement operating criteria to ensure the pattern and magnitude of water releases from Pilgram, Turner, Lower and Upper Stehly, Aqua Tibia, Henshaw, and Eagles Nest dams comport with the natural or pre-dam pattern and magnitude of streamflow in downstream reaches. Physically modify all dams, and road, highway, and railway crossings to allow unimpeded volitional migration of steelhead to upstream spawning and rearing habitats. Identify protect, and where necessary, restore estuarine and freshwater rearing habitats.

[1] *"Pattern and magnitude" refers to timing, duration, frequency, magnitude, and rate-of-change.*
[2] *Physically modifying a dam may incidentally restore the natural or pre-dam pattern and magnitude of streamflow.*

6.3 RESTORING STEELHEAD ACCESS TO HISTORICAL HABITATS THAT ARE CURRENTLY INACCESSIBLE AND UNOCCUPIED BY THE SPECIES

We identify restoring steelhead access to historical spawning and rearing habitats (*i.e.,* areas upstream of introduced barriers that are currently unoccupied by anadromous *O. mykiss*) as an essential action for recovering endangered steelhead. In this section, we summarize the ecological rationale for this specific recovery action. Central to the rationale is the historical steelhead population structure and distribution, and the necessity of historical habitats for reducing extinction risk and increasing population growth rate (*i.e.,* the productivity of a population).

The characteristics and condition of historical habitats must remain functional to support the intended conservation role for the species, and information currently indicates unoccupied areas are essential for conserving endangered steelhead. Implementing these essential recovery actions will require removing or physically modifying anthropogenic barriers, which we expect will generate questions regarding the feasibility of undertaking such activities. In response to such questions we summarize information here that indicates barrier removal and physical modification would be feasible and successful (*i.e.,* would increase population growth rates).

Native steelhead historically existed in areas that are currently inaccessible

Knowing where the species existed prior to the construction of migration barriers is essential for identifying the watersheds where restoring access to historical spawning and rearing habitats would be appropriate. Based on an extensive review of the distribution of the species we have reliable scientific information indicating the specific coastal watersheds where steelhead historically existed (Boughton *et al*. 2006). Investigation of the genetic structure of juvenile *O. mykiss* collected from freshwater habitats, including instream areas upstream of migration barriers within Core 1 populations, confirm that the present-day populations are dominated by ancestry of indigenous southern coastal steelhead (Nielsen *et al.* 1997, Clemento *et al.* 2008). Populations of *O. mykiss* that exist upstream of introduced barriers are largely or entirely descended from relic *O. mykiss* populations ascending the watersheds historically. These findings as well as the intrinsic potential of certain watershed-specific populations for recovering this species (e.g., Boughton *et al*. 2006) contribute to NMFS' basis for recommending that steelhead access be restored, especially within Core 1 populations.

Restoring species access to historical habitats will reduce extinction risk and increase population growth rate

Artificial migration barriers are a major cause of habitat loss and fragmentation within the endangered Southern California DPS of steelhead, and have resulted in a high risk of species' extinction. Restoring steelhead access to historical habitats is necessary to reduce extinction risk to a level that is considered negligible over a 100-year period. Understanding how this recovery action would reduce extinction risk requires knowledge of the factors that affect extinction risk and population growth rate.

Population extinction risk is related to the numerical abundance of the population, which itself is related to the extent that the species is distributed over space (*i.e.,* population spatial structure)

and the degree that diversity of life history traits is not restricted. Small populations with limited spatial structure are particularly susceptible to extinction, owing to their increased susceptibility to demographic and environmental fluctuations, and loss of genetic variability. With regard to life history traits, steelhead possess a suite of traits, such as anadromy, timing of spawning, emigration, and immigration, fecundity, age-at-maturity, behavior, physiological and genetic characteristics. The more diverse these traits (or the more these traits are not restricted), the more likely the species is to survive a spatially and temporally fluctuating environment (McElhany *et al*. 2000). Overall, the greater a species' geographic distribution and the less constrained the diversity of life history traits, the more likely the species is able to withstand stochastic environmental variation and achieve and maintain a rate of population growth that is viable (*i.e.,* reduces the extinction risk to a negligible level).

With regard to the endangered Southern California DPS of steelhead, evidence indicates anthropogenic activities have severely truncated population spatial structure and eliminated certain life history traits. While the species was historically widespread, artificial migration barriers have resulted in populations that are sparsely distributed over space and significantly reduced in number. These barriers prevent steelhead from migrating within rivers and to and from the ocean, a critical part of the species' life cycle. Barriers preclude steelhead from accessing spawning habitats and interacting with the freshwater form of *O. mykiss*, both of which are necessary to produce young and withstand stochastic environmental fluctuations.

As a result, specific areas within the broader geographical area that is occupied by the species are inadequate for conservation of the species (*e.g.,* Boughton *et al*. 2005, Good *et al.* 2005, Boughton *et al*. 2007, Gustafson *et al*. 2007, NMFS 2008a). The available information demonstrates that unoccupied areas are essential for the conservation and recovery of the species.

The means for increasing population growth rate depends, in large part, on the factors that have caused the species to experience a high risk of becoming extinct. The available information that is the basis of this recovery plan demonstrates that loss of historical spawning and rearing habitats through the construction of artificial migration barriers, and elimination of critical life history traits (*e.g.,* migration, interaction and exchange between the anadromous and resident forms of *O. mykiss*), are central reasons for the high risk of extinction. An effective recovery strategy for increasing population growth rate and reducing extinction risk to a level that is considered negligible over a 100-year period involves giving back essential habitats to steelhead and restoring ecological traits that are critical for the species to complete its life cycle. Restoring steelhead access to historical habitats would achieve these objectives. The foregoing is the principal recovery strategy embodied in this recovery plan.

Habitats within inaccessible areas are capable of supporting essential life-history functions

The available information describing the abundance and distribution of *O. mykiss* demonstrates that historical habitats possess the capability to support production of steelhead. Investigators commonly use information on the abundance or distribution of stream fish as a means to infer the existence of suitable habitat for a species. Fishery investigations performed in selected coastal watersheds by state and federal resources agencies and academia (*e.g*., Moore 1980, Deinstadt *et*

al. 1990, Douglas 1995, Carpanzano 1996) report on the abundance and distribution of *O. mykiss*, including in areas upstream of artificial barriers within Core 1 populations. These investigations indicate that the existing habitats are suitable for spawning and rearing of *O. mykiss*, as evident by the finding of young-of-the-year and older juvenile trout. Inferring the existence of suitable habitat for the anadromous form of *O. mykiss* based on the presence of the resident form is reasonable and ecologically appropriate given that the resident and anadromous forms simply represent different life histories of the same species.

With regard to the amount of suitable steelhead habitat, the findings of fishery investigations and habitat evaluations that report the amount of habitat in the basin indicate the existence of hundreds of miles of stream network across the Core 1 populations. Numerous streams within Core 1 populations provide an extensive amount of habitat (*e.g.*, Moore 1980, Thomas R. Payne and Associates 2003), which we know is capable of supporting spawning and rearing because reproduction and rearing of multiple age groups and life stages of *O. mykiss* have been documented (*e.g.*, Moore 1980, Deinstadt *et al*. 1990, Douglas 1995, Carpanzano 1996). The extensive habitat is expected to produce a large number of steelhead.

Restoring steelhead migration to historical habitats upstream of anthropogenic barriers is expected to be feasible and successful

While implementing the barrier recovery actions will not be without logistical and technical challenges, NMFS' experience as well as the available information regarding fish passage at man-made structures indicate implementation is feasible and would be successful.

With regard to the technical feasibility, physically modifying or partially or completely removing dams, diversions, grade-control structures, and highway crossings for the purpose of restoring upstream migration of steelhead is not insurmountable because such activities are commonly undertaken to restore habitat characteristics and condition for populations of stream fish (*e.g.*, Smith *et al*. 2000, The Heinz Center 2002). Locally, NMFS has collaborated with project proponents on a variety of fish-passage projects that have involved removal or modification of a highway structure, diversion, or dam for the purpose of either improving or restoring migration of steelhead to historical spawning and rearing habitats. NMFS is currently collaborating with stakeholders on the restoration river ecosystems including the Ventura River in California and the Elwha River in Washington, both of which require the removal of dams to allow anadromous salmonids access to historical habitats.

With regard to the expected success from restoring steelhead migration to historical habitats, the available information indicates that restoring steelhead access to historical spawning and rearing habitats would increase population growth rate. Making barriers passable for migratory species has the functional effect of restoring fish access to historical spawning and rearing habitats – effectively increasing breeding and living space for the species. Given the extensive amount of stream network upstream of the barriers within Core 1 populations alone (estimates indicate several hundred miles of stream network exist), we expect historical habitats to be capable of producing a large number of steelhead.

Another reason we expect the recovery action would increase population growth rate involves the existing character of the historical habitats. Information indicates the historical habitats are serving as a refuge freshwater habitat that is safeguarding the anadromous species. Reproduction of *O. mykiss* and extensive suitable habitat has been noted upstream of introduced barriers (*e.g.*, Moore 1980, Deinstadt *et al*. 1990, Douglas 1995) as well as *O. mykiss* that exhibit ancestral native steelhead genetics (Nielsen *et al*. 1997, Clemento et al 2008). These fish possess the ability to transform into smolts and migrate to the ocean (*e.g.*, Thrower *et al*. 2004). Even today, large adult *O. mykiss* leave the freshwater lakes that have formed behind dams and undertake steelhead-like migrations during the wet season and spawn in upstream tributaries (Bloom 2005). The characteristics of the populations upstream of artificial migration barriers, and the quantity and quality of habitat, suggest the areas would support a large and naturally reproducing population for the purpose of conserving this endangered species.

Besides increasing population growth rate, restoring steelhead access to historical spawning and rearing habitats within Core 1 populations is expected to produce four additional benefits for buffering the species against extirpation (these benefits further underscore the necessity and value of unoccupied areas for conserving endangered steelhead). First, an increase in population spatial structure would be observed. The spatial structure of a population is important because the spatial distribution can affect evolutionary processes and, therefore, alter the ability of a population to adapt to spatial or temporal changes in the species' environment. Populations that are thinly distributed over space are susceptible to experiencing poor population growth rate and loss of genetic diversity, and are more likely to not withstand the effects of widely fluctuating environmental conditions.

Second, ecological interactions between the resident and anadromous form of *O. mykiss* would be restored, thereby contributing to the viability of the anadromous form. The two life-history forms can be sympatric and genetically similar (Docker and Heath 2003, Narum *et al*. 2004, McPhee *et al*. 2007) and the resident form can produce anadromous progeny and vice versa (Zimmerman and Reeves 2000, McPhee *et al*. 2007). These findings emphasize the survival advantage of the resident form to the anadromous form of *O. mykiss*, particularly under certain environmental conditions. Extended periods of no or low rainfall can limit migratory conditions and preclude steelhead from reaching freshwater spawning areas. During such periods, resident *O. mykiss* can be the only life-history form spawning and producing progeny with the innate ability to resume anadromy, which favors future persistence of the anadromous form. By contrast, the anadromous form can recolonize watersheds following periods of extended drought and temporary extirpation of the resident form.

Third, restoring steelhead access to historical spawning and rearing habitats upstream of artificial migration barriers would promote ecological traits (phenotypic and genotypic) that must be represented and maintained to promote long-term viability of the species (Boughton *et al*. 2007). Some of these traits involve the capability to migrate long distances and tolerate elevated water temperatures. Many coastal watersheds supporting Core 1 populations extend considerably inland, which requires that steelhead have the physical ability to migrate long distances to access spawning areas in upper reaches. The ability to migrate long distance promotes population diversity. Because these same populations extend into areas that are dry and warm, populations are exposed to environmental conditions that promote formation of specific adaptations such as

the ability to tolerate hot and dry climates. The ability to migrate long distances and tolerate elevated water temperature and modest habitats is particularly important for increasing genetic and ecological diversity.

Fourth, the expected increase in population growth rate is projected to favor increased abundance in neighboring Core 2 and Core 3 populations. When restored to an "unimpaired" condition, Core 1 populations are expected to support formation of steelhead numbers in adjacent population units. The creation and maintenance of populations in several adjacent population units effectively increases numbers of individuals in the broad population (*i.e.,* scale of the DPS). Given the risk of extinction that small populations face (*e.g.*, Pimm *et al*. 1988, Primack 2004), a larger number of individuals decrease the risk that the broad population would possess weakened viability.

6.4 CRITICAL RESEARCH NEEDS FOR RECOVERY

Successful implementation of the recovery plan and measurement of the species' progress towards recovery requires two critical elements of scientific research and monitoring: (1) population abundance monitoring within core watersheds and (2) other research efforts in core watersheds to develop more refined biological recovery criteria. As discussed in Chapter 5, long-term and consistent population abundance monitoring is necessary to further refine biological recovery criteria such as the mean annual run size. This monitoring can also measure the effectiveness of restoration and recovery efforts within particular watersheds and shed light on the influence of freshwater and marine environmental factors on the long term survival and recovery of steelhead in southern California.

Research efforts should be focused on developing a better understanding of the following topics: 1) reliability of migration corridors; 2) productivity of freshwater tributary nursery areas; 3) evaluation of role of seasonal lagoons, particularly for juvenile rearing; 4) productivity of freshwater mainstem habitats; 5) roles of intermittent freshwater habitats for both spawning and rearing; 6) spawner density as an indicator of individual population viability; 7) relationship between anadromous (steelhead) and non-anadromous (resident) forms and population structure and viability; and, 8) rates of dispersal between individual populations. With respect to topics 2 through 4, the aim is to identify and protect, and where necessary, restore, those habitats which specifically promote the anadromous life-history form, by among other things producing high number of fast-growing and large smolts, and avoid inadvertently promoting only the freshwater life-history form of *O. mykiss*. In addition to these biological research topics, research into basic habitat dynamics should be conducted to provide additional direction in habitat protection and restoration. Such research includes the effects of the wildland fire regime and climate change effects on freshwater habitat; environmental factors that affect freshwater temperatures; and, factors producing freshwater refugia that sustain *O. mykiss* during seasonal or prolonged droughts.

Chapter 13 further details the recommended research and monitoring program NMFS believes is necessary for the successful implementation of the recovery program. This program is currently in draft form and subject to revision as comments are offered by scientific experts and as new information further refines the questions and criteria that are the subject of research efforts.

6.5 RECOVERY STRATEGIES TO ADDRESS CLIMATE CHANGE AND MARINE ENVIRONMENT VARIABILITY

Climate change and the conditions in the marine environment are driven by processes on a global scale and are generally not amenable to direct management on a regional scale such as the SCS Recovery Planning Area (Riggs, 2002, 2004). However, recognizing the potential challenges posed by climate change and related conditions within the marine environment, is useful in designing a recovery strategy which has the greatest likelihood of achieving recovery of the species. Species can respond to climate change in three basic ways: 1) evolve or rely on existing adaptations; 2) colonize new locations with suitable habitat; and 3) go extinct. Given the uncertainties regarding climate change scenarios and localized responses, the most precautionary recovery strategy is to maximize the pathways for adapting and/or colonizing habitats. The two essential components which address the potential adverse effects of climate change on the species freshwater and marine environment are:

1. Protect habitat by ameliorating existing and future anthropogenic threats and improve current habitat conditions.

This component encompasses such restoration activities as removing passage to prime upstream spawning and rearing habitats; restoring flow regimes which are essential for both adult and juvenile instream migration; regulating flood control and other instream activities which disrupt river and riparian habitats; and restoring and managing estuarine habitats to ensure that they provide acclimation and rearing opportunities.

2. Establish broadly distributed viable populations within each Biogeographic Population Group by protecting and restoring functional habitat conditions, and controlling and abating existing and future threats.

The over-arching recovery strategy of protecting and restoring multiple populations across the diverse landscape characteristic of the SCS Recovery Planning Area is intended to allow the species to continue to evolve adaptations to cope with a dynamic and challenging environment.

Within this basic framework, the Recovery Plan identified specific recovery actions within watersheds of each of the five Biogeographic Population Groups which are intended to address and ameliorate specific adverse effects from projected climate change and related oceanic conditions; most significantly, these include impacts on stream flows, wildfires, riparian habitats, and estuaries. The population and DPS-level biological recovery criteria are intended to establish a threshold for recovery that will ensure the species will persist over an extended period of time, and through long-term (decadal) marine cycles. Southern California steelhead have evolved a wide variety of life-history patterns to exploit the diversity and range of habitat and habitat conditions characteristics of the vegetation, geology, hydrology, and climate characteristics across the range of the DPS. The preservation of such life-history patterns is essential to the recovery and long-term conservation of the species.

7. Summary of DPS-wide Recovery Actions

"The basic recovery strategy reflected in the identified recovery actions mimics the strategy that the species exhibits in its natural distribution among the various watersheds in their unaltered state, and provide the most effective strategy for conserve the natural diversity (genetic, phenotypic and behaviors) and redundancy of the populations necessary to ensure the long-term viability of individual populations, and the listed species as a whole."

Southern California Coast Steelhead Recovery Planning Area: Recovery Actions
Hunt & Associates 2008

The SCS Recovery Planning Area is characterized by severe to very severe degradation of habitat conditions along the lower mainstem rivers where development is concentrated, while the upper mainstem and tributaries, often situated within the four southern California National Forests, retain relatively high habitat values for anadromous *O. mykiss*. Because the mainstems of these drainages are the conduits that connect upstream spawning and rearing habitats with the ocean, recovery actions in watersheds impaired in this manner focus on reducing the severity of anthropogenic impacts along the mainstems resulting from encroachment into riparian areas and related flood control activities in order to promote connectivity between the ocean and upstream spawning and rearing habitats. Additionally, degraded estuarine conditions stemming from filling, artificial sandbar manipulation, and both point and non-point waste discharges are addressed by specific recovery actions for the SCS Recovery Planning Area.

This chapter describes DPS-level recovery actions and provides a narrative description of widespread watershed-specific recovery actions. DPS-level recovery actions are recommendations that are designed to address widespread and often multiple threat sources across the range of the DPS such as the inadequate implementation and enforcement of local, state, and federal regulations. Subsequent chapters describe BPG-specific conditions, the results of threats assessments for component watersheds and the recommended recovery actions for each component watershed.

An array of natural and anthropogenic conditions has reduced the population size and historical distribution of southern California steelhead. Many of these causes of decline are systemic and persistent, crossing numerous environmental and political boundaries. The sources and reasons for decline are identified in Federal Register Notices and this recovery plan. Effectively addressing these causes of decline involves multiple challenges and opportunities that include: (1) development of new and effective implementation of current laws, policies, and regulations; (2) securing adequate funding for recovery implementation; (3) developing strategic

partnerships; (4) assuring effective prioritization of restoration, threat abatement, and monitoring actions; and (5) conducting education and outreach.

7.1 DPS-WIDE RECOVERY ACTIONS

DPS-wide recovery actions addressing widespread threat sources include the following:

- Work with owners, operators, local, state and federal agencies to implement operating criteria to ensure the pattern and magnitude of water releases from water storage and diversion facilities such as those listed in Table 6-2 and the recovery action tables comport with the natural or pre-dam pattern and magnitude of streamflow.
- Physically modify passage barriers such as the dams and diversion facilities listed in Table 6-2 and the recovery action tables to allow unimpeded volitional migration of steelhead to upstream spawning and rearing habitats. Examples of important fish passage barriers identified include: Robles Diversion on the Ventura River, Matilija Dam on the Ventura River, Vern Freeman Diversion on the Santa Clara River, and Rindge Dam on Malibu Creek;
- Encourage CDFG and NMFS to finalize and implement the Statewide Coastal Monitoring Plan. Implementation of the Statewide Coastal Monitoring Plan is essential for evaluating the long-term viability of southern California steelhead as well as other species of listed salmonids in California;
- Prioritize restoration funds, notably the Pacific Coast Salmon Restoration Fund and California's FGRP, in Core 1 watersheds.
- Promote restoration projects to provide access to historic steelhead spawning and rearing habitats and increase egg-to-smolt life-stage survival;
- Encourage appropriate agencies to secure funding for, and engage in, full enforcement of relevant laws, codes, regulations and ordinances protective of steelhead and their habitats;
- Work with CalTrans, counties, and others with oversight on road practices to reduce or remove transportation-project-related barriers to upstream and downstream passage including railroads and similar structures;
- Inventory and assess impediments to fish passage and identify and provide appropriate fish passage opportunities in the watersheds historically supporting anadromous runs within the southern range extension (Mojave Rim and Santa Catalina Gulf Coast BPGs);
- Enhance protection of natural in-channel and riparian habitats, including adequate control of flood-control activities (both routine maintenance and emergency measures), off-road vehicle use, and in-river sand and gravel mining practices to be commensurate with habitat and life-history requirements of steelhead.
- Reduce water pollutants such as fine sediments, pesticides, and other non-point source, and point source waste discharges commensurate with habitat and life-history requirements of steelhead. This should be accomplished through watershed and management and regulation of public and private facilities releasing waste-discharges.

- ❑ Close remaining areas currently open to angling below impassible barriers of all anadromous waters; in anadromous watersheds, assess impacts of angling on native *O. mykiss* above barriers which are currently impassible to upstream-migrating steelhead.
- ❑ Eliminate the stocking of hatchery-reared fish in anadromous waters. Where stocking is otherwise appropriate, use sterile triploid fish in all waters where stocked fish may enter anadromous waters.
- ❑ Convene a committee of agency and institutional scientists (*e.g.*, the DFG, NMFS' Fisheries Science Centers, U. Fish and Wildlife Service) for the purpose of developing guidelines for the management and operation of a conservation hatchery program for endangered steelhead. NMFS would implement the guidelines, which will be consistent with the overall purpose of preserving the natural genetic and phenotypic characteristics that promote life-history variability through captive broodstock, supplementation, and gene-bank programs, and reducing the short-term or immediate risk of extinction to the species.
- ❑ Assess the condition of and restore estuarine habitats through the control of fill, waste discharges, and establishment of buffers, to be commensurate with the habitat and life-history requirements of steelhead.
- ❑ Control artificial breaching and/or draining of coastal estuaries to be commensurate with habitat and life-history requirements of steelhead (including rearing juveniles and migrating adults).
- ❑ Evaluate and mitigate the effects of transportation corridors and facilities on estuarine fluvial processes. When vehicular, railroad, or utility crossings over estuaries are replaced, up-graded, retrofitted, or enlarged, reduce or eliminate existing approach-fill and maximize the clear spanning of upstream active channel(s), floodways, and floodplains to accommodate natural river and estuarine fluvial processes.
- ❑ Conduct research on the relationship between resident and anadromous forms of *O. mykiss*, and the population dynamics (*e.g.*, distribution, abundance, residualization, homing/straying, and recolonization rates); extend genetic research and analysis to include the southern range extension (Mojave Rim and Santa Catalina Gulf Coast BPGs).
- ❑ Identify an appropriate institution or facilities and develop the necessary authorization for the permanent curation of deceased *O. mykiss* specimens for the purpose of making available specimens for examination and study to present and future scientific researchers.
- ❑ Monitor annual fluctuations of *O. mykiss* populations (anadromous and resident) in larger inland rivers systems and short coastal streams in all BPGs.
- ❑ Survey and monitor the distribution and abundance of non-native species and plants and animals that degrade natural habitats or compete with native species within larger river systems and short coastal streams identified as core populations. Initiate efforts to eliminate, reduce, or control such non-native, invasive species.
- ❑ Encourage amendments to Army Corps 404 Clean Water Act exemptions for farming, logging, and ranching activities; terminate Section 404(f) exemptions for discharges of dredged or fill material into US waters (channelization) associated with agriculture, logging, ranching and farming;

- Work with Federal and State agencies to coordinate and develop programmatic permits for incidental take authorization for actions that contribute to the recovery of southern California steelhead and their habitats.

7.2 RECOVERY ACTION NARRATIVES

Table 7-1 contains a narrative description of recovery actions common throughout many of the watersheds discussed within this recovery plan. These narratives provide specific information on the objectives and steps required to implement recovery actions summarized in the recovery action tables for each watershed in later chapters. Parties implementing actions within each watershed should use the narratives within this table to understand the recommended recovery actions.

Table 7-1. Recovery Actions Glossary

Threat Source	Recovery Action	Detailed Description
Agricultural Development	Develop, adopt, and implement agricultural land-use planning policies and standards	Develop, adopt, and implement land-use planning policies and development standards that restrict further agricultural development within the floodplain/riparian corridor to protect *all O. mykiss* life-history stages, including adult and juvenile migration, spawning, incubation and rearing, and their associated habitats.
	Relocate livestock grazing and water sources	Develop and implement a plan to relocate livestock grazing outside a 100-foot wide riparian buffer on either side of the channel and estuary to protect instream and riparian habitats essential for all *O. mykiss* life-history stages, including adult and juvenile migration, spawning, incubation and rearing, and their associated habitats. Develop and implement a plan to provide alternative upland water sources for livestock.
	Relocate agricultural development and restore riparian zone	Develop and implement a plan to relocate agricultural development in the floodplain to create a minimum 100-foot wide riparian buffer from the edge of the riparian corridor or top-of-bank (whichever is greater); restore and revegetate a minim 100-foot wide buffer to allow the channel to re-establish natural structural diversity to protect all *O. mykiss* life-history stages, including adult and juvenile migration, spawning, incubation and rearing, and their associated habitats.
	Develop and implement a watershed-wide sediment management plan	Develop and implement a watershed-wide sediment management plan that identifies sources of sediment input (and related agriculturally generated nutrients) and effects on benthic habitats, and prescribes remediation measures which will protect *all O. mykiss* life-history stages, including adult and juvenile migration, spawning, incubation and rearing, and their associated habitats.
Agricultural Effluents	Develop and implement a plan to minimize runoff from agricultural activities	Develop and implement a plan to reduce or eliminate nutrient runoff and sediment inputs into natural watercourses from agricultural activities to provide water quality suitable for all *O. mykiss* life-history stages, including adult and juvenile migration, spawning, incubation and rearing, and their associated habitat conditions.
Dams and Surface Water Diversions	Develop and implement water management plan	Develop and implement a water management plan for the mainstem and major tributaries to identify the maximum diversion rates for surface water diversions that will maintain surface flows necessary to support all *O. mykiss* life-history stages, including unimpeded adult and juvenile *O. mykiss* migration, and suitable spawning and rearing habitat conditions.
	Develop and implement operational plan for selected dams	Develop and implement an operational plan to provide seasonal releases from selected dams necessary to provide surface flows in the mainstem necessary to support all *O. mykiss* life-history stages, including adult and juvenile *O. mykiss* migration, spawning, incubation and rearing, and their associated habitats.
	Provide fish passage around selected dam or diversion or remove barriers	Develop and implement a plan to provide seasonal unimpeded fish passage for adult and juvenile *O. mykiss* around selected dam or diversion to provide access to upstream spawning and rearing habitats.
	Remove Dam	Where applicable, Implement plans to remove selected dams to provide unimpeded fish passage for adult and juvenile O. mykiss and restore the reservoir area to provide access to upstream spawning and rearing habitats and to support all *O. mykiss* life-history stages, including adult and juvenile migration, spawning, incubation and rearing, and their associated habitats.
	Conduct hydrological analysis (dam releases)	Conduct hydrological analysis to determine seasonal releases (timing, duration and magnitude) from selected Dams necessary to necessary to support all *O. mykiss* life-history stages, including adult and juvenile migration, spawning, incubation and rearing, and their associated habitats.

Threat Source	Recovery Action	Detailed Description
Culverts and Road Crossings (Passage Barriers)	Develop and implement a plan to remove or modify all identified fish passage barriers within the watershed	Develop and implement a plan to remove or modify all fish passage barriers identified within the watershed to provide unimpeded adult and juvenile *O. mykiss* migration between the estuary and upstream spawning and rearing habitats, and reduce intrusion into the riparian corridor. (see relevant Steelhead Assessment and Recovery Opportunities reports for Southern CA counties and watersheds)
	Conduct a watershed-wide fish passage barrier assessment	Conduct a watershed-wide fish passage barrier assessment between the ocean and all upstream spawning and rearing areas. This passage barrier assessment should utilize the protocols identified in the California Department of Fish and Game's California Salmonid Stream Habitat Restoration Manual (2003).
Flood Control	Develop and implement a plan to minimize disturbance of instream habitats and riparian vegetation	Develop and implement a flood control maintenance plan to minimize the frequency and intensity of disturbance of instream habitats and riparian vegetation (e.g., modification of natural channel morphology and removal of native vegetation) of the mainstem and tributaries to protect all *O. mykiss* life-history stages, including adult and juvenile migration, spawning, incubation and rearing, and their associated habitats.
Groundwater Extraction	Conduct hydrological analysis (groundwater)	Conduct hydrological analysis to identify groundwater extraction regimes' effect on the natural pattern (timing and duration) and magnitude of surface flows in the mainstem, tributaries, and the estuary.
	Develop and implement a groundwater monitoring program	Develop and implement a groundwater monitoring program to guide management of groundwater extractions to provide surface flows necessary to support all *O. mykiss* life-history stages, including adult and juvenile *O. mykiss* migration, spawning, incubation and rearing, and their associated habitats.
Levees and Channelization	Develop and implement a plan to restore natural channel features where feasible	Develop and implement a plan to modify channelized portions of the mainstem and tributaries wherever feasible to restore natural channel features, including natural channel bottom morphology and riparian vegetation, to protect all *O. mykiss* life-history stages, including adult and juvenile migration, spawning, incubation and rearing, and their associated habitats.
	Develop and implement a flood control maintenance program	Develop and implement a flood control maintenance program that minimizes the frequency and intensity of disturbance of instream habitats and riparian vegetation (e.g., modification of natural channel morphology and removal of native vegetation) to protect all *O. mykiss* life-history stages, including adult and juvenile migration, spawning, incubation and rearing, and their associated habitats.
	Develop and implement a plan to vegetate levees and minimize herbicide use near levees	Develop and implement a plan to vegetate levees with native, naturally occurring vegetation wherever feasible and minimize the use of herbicides to control native vegetation adjacent to existing levees to protect all *O. mykiss* life-history stages, including adult and juvenile migration, spawning, incubation and rearing, and their associated habitats.
	Develop and implement a stream bank and riparian corridor restoration plan	Develop and implement a stream bank and riparian corridor restoration plan to reduce channel incision, sedimentation from bank erosion, and reduce or eliminate the need for artificial bank stabilization; wherever feasible, remove rip-rap and other artificial bank stabilization features on mainstem and tributaries and replace with bio-engineered bank stabilization.
	Develop and implement a plan to abandon artificial channels	Develop and implement a plan to abandon artificial channels; create new natural channel that allows for natural channel morphology (e.g., meanders, etc.) and unimpeded access for adult and juvenile migration to upstream spawning and rearing habitats.

Threat Source	Recovery Action	Detailed Description
Mining and Quarrying	Review and modify aggregate mining operations	Review aggregate mining operations (past, current and future) for conformance with the National Marine Fisheries Services Guidelines for Removal of Sediment from Freshwater Salmonid Habitat (2004). Modify aggregate current and future operations, where necessary to comply with the relevant provisions of the guidelines, and remediate past or terminated operations to protect all *O. mykiss* life-history stages, including adult and juvenile migration, spawning, incubation and rearing, and their associated habitats.
	Develop and implement a plan to remove and maintain quarry and landslide debris from the channel	Develop and implement a plan to remove quarry debris and landslide from the channel, maintain the channel free from such debris, and establish a minimum 50-foot riparian buffer with native, locally occurring species at rock quarry, to protect all O. mykiss life-history stages, including adult and juvenile *O. mykiss* migration, and spawning and rearing habitats.
Non-Native Species	Develop and implement a watershed-wide plan to assess the impacts of non-native species and develop control measures	Develop and implement a watershed-wide plan to identify and determine the distribution and density of non-native species, assess their impacts on all *O. mykiss* life-history stages, and eliminate or control non-native species of plants and animals (particularly fish and amphibians); restore riparian and upland areas with native, locally occurring plant species to protect all *O. mykiss* life-history stages, including adult and juvenile migration, spawning, incubation and rearing, and their associated habitats.
	Develop and implement a non-native species monitoring program	Develop and implement an on-going monitoring program to track the status and impacts of non-native species of plants and animals on all *O. mykiss* life-history stages, particularly rearing juveniles.
	Develop and implement a public educational program on non-native species impacts	Develop and implement a public education program (including signage at public access points) to inform the general public of the adverse effects of introducing non-native species into natural ecosystems.
Other Recovery Actions	Develop and implement an estuary restoration and management plan	Develop and implement a restoration and management plan for the relevant Estuary. To the maximum extent feasible, the plan should include restoring the physical configuration, size and diversity of the wetland habitats, eliminating exotic species, controlling artificial breaching of the sand bar, and establishing a minimum buffer to restore estuarine functions and promote *O. mykiss* use (including rearing and acclimation) of the estuary.
	Review and modify applicable County and/or City Local Coastal Plans	Review applicable County and/or City Local Coastal Plans and modify to provide specific provisions for the protection of all *O. mykiss* life-history stages, including adult and juvenile migration, spawning, incubation and rearing, and their associated habitats.
	Review applicable Integrated Natural Resources Management Plans	Review the Vandenberg Air Force Base Integrated Natural Resources Management Plan and modify to provide specific provisions for the protection and restoration of all *O. mykiss* life-history stages, including adult and juvenile migration, spawning, incubation and rearing, and their associated habitats.
Roads	Relocate roadways outside of riparian corridor and restore abandoned roadways	Develop and implement a plan to relocate roads outside of a 300-foot wide riparian/floodplain corridor wherever feasible; restore and re-vegetate abandoned roadways with native, locally occurring species to reduce sedimentation and protect all steelhead life-history stages, including adult and juvenile migration, spawning, incubation and rearing, and their associated habitat conditions.
	Retrofit storm drains to filter runoff from roadways	Develop and implement a plan to retrofit storm drains to filter runoff from roadways to remove sediments and pollutants before it enters natural watercourses to protect all *O. mykiss* life-history stages, including adult and juvenile migration, spawning, incubation and rearing, and their associated habitats.

Threat Source	Recovery Action	Detailed Description
Roads (continued)	Develop and implement a plan to remove or reduce approach-fill for relevant railroad lines and roads	Develop and implement a plan to remove or reduce approach-fill for relevant railroad lines and roads and maximize the clear spanning of upstream active channel, floodway, and floodplain to accommodate natural river and estuarine fluvial processes.
Recreational Facilities	Develop, adopt, and implement recreational land-use planning policies	Develop, adopt, and implement land-use policies to prohibit off-road vehicular activity within the riparian/floodplain corridor of the mainstem and tributaries necessary to protect all *O. mykiss* life-history stages, including adult and juvenile migration, spawning, incubation and rearing, and their associated habitats.
	Review development and management plans for selected parks and national forests	Review development and management plans for selected parks and national forest lands and modify to provide specific provisions to protect all *O. mykiss* life-history stages, including adult and juvenile migration, spawning, incubation and rearing, and their associated habitats. Provide specific provisions for the restoration and protection of creeks, rivers, estuaries, wetlands and riparian/floodplain areas, including a minimum 100-foot setback for all development from estuarine and riparian habitats. Regulate the use of day-use areas and other recreational facilities to minimize impacts to aquatic and wetland habitats to protect all *O. mykiss* life-history stages, including adult and juvenile migration, spawning, incubation and rearing.
	Develop and implement a public educational program on watershed processes	Develop and implement a public educational program (including signage at public access points) to promote public understanding of watershed processes (including the natural fire-cycle) and *O. mykiss* ecology to protect all O. mykiss life-history stages, including adult and juvenile migration, spawning, incubation and rearing, and their associated habitats.
Urban Development	Develop, adopt, and implement urban land-use planning policies and standards	Develop, adopt and implement land-use planning policies and development standards that restrict further development in the floodplain/riparian corridor to protect all *O. mykiss* life-history stages, including adult and juvenile migration, spawning, incubation and rearing, and their associated habitats.
	Retrofit storm drains in developed areas	Develop and implement a plan to retrofit storm drains in developed areas to filter sediments and pollutants in runoff from impervious surfaces before it enters natural watercourses to protect all *O. mykiss* life-history stages, including adult and juvenile migration, spawning, incubation and rearing, and their associated habitats.
	Develop and implement a riparian restoration plan that focuses on replacing artificial bank stabilization structures wherever feasible	Develop and implement a riparian restoration plan throughout the mainstem and tributaries that focuses on replacing artificial bank stabilization structures wherever feasible to create a minimum 50-foot wide riparian buffer on either side of mainstem and tributaries, and re-vegetate with native, locally occurring species.
Urban Effluents	Review California Regional Water Quality Control Board Central Coast Region Watershed Plans and modify applicable stormwater permits	Review California Regional Water Quality Control Board Central Coast Region Watershed Plans, and any applicable Stormwater Permit, and modify to provide specific provisions for the protection of all *O. mykiss* life-history stages, including adult and juvenile migration, spawning, incubation and rearing, and their associated habitats.
	Review, assess and modify if necessary all NPDES wastewater discharge permits	Review and assess all National Pollution Elimination Discharge System (NPDES) wastewater discharge permits to determine effects of discharge on adult and juvenile *O. mykiss* migration, spawning, and rearing habits. Modify discharge requirements, if necessary, to ensure discharge is adequate to protect all *O. mykiss* life-history stages, including adult and juvenile migration, spawning, incubation and rearing, and their associated habitats.

Threat Source	Recovery Action	Detailed Description
Urban Effluents (continued)	Review, assess and modify, if necessary, residential wastewater septic treatment facilities	Review and assess residential wastewater septic treatment facilities to determine effects of discharge on adult and juvenile O. mykiss migration, spawning, and rearing habits. Modify septic systems, if necessary, to ensure discharge is adequate to protect all *O. mykiss* life-history stages, including adult and juvenile migration, spawning, incubation and rearing, and their associated habitats.
Wildfires	Develop and implement an integrated wildland fire and hazardous fuels management plan	Develop and implement an integrated wildland fire and hazardous fuels management plan, including monitoring, remediation and adaptive management, to reduce potentially catastrophic wildland fire effects to steelhead and their habitat and preserve natural ecosystem processes (including sediment deposition)

8. Monte Arido Highlands Biogeographic Population Group

"Assessment at the group level indicates a priority for securing inland populations in southern Coast Ranges and Transverse Ranges, and a need to maintain not just the fluvial-anadromous life-history form, but also lagoon-anadromous and freshwater-resident forms in each population."

NOAA Fisheries Technical Recovery Team, Viability Criteria for the South-Central and Southern California, 2007

8.1 LOCATION AND PHYSICAL CHARACTERISTICS

The Monte Arido Highlands BPG region encompasses four medium to large coastal watersheds and eight sub-watersheds that drain the western half of the Transverse Range in southern San Luis Obispo, Santa Barbara, Ventura, and eastern Los Angeles counties. The Santa Maria River watershed proper is a small, coastal drainage formed by the confluence of two large interior watersheds: the Cuyama River and the Sisquoc River, which together drain most of the Sierra San Rafael, Sierra Madre, and Caliente ranges.

The Santa Ynez River drains the south-facing slopes of the Sierra San Rafael and north-facing slopes of the Santa Ynez Mountains. The Santa Maria Rivers drains a coastal subsidence Watershed formed by crustal elongation and clockwise rotation of the Santa Ynez Mountains. The Ventura River drains the coastal slopes of the eastern end of the Santa Ynez Mountains and the western end of the Transverse Range. The Santa Clara River drains much of the western Transverse Range, including the northern slopes of the San Gabriel Mountains. The mainstems of the Santa Maria and Santa Ynez rivers are oriented east-to-west and discharge to the Pacific Ocean in western Santa Barbara County. The Ventura and Santa Clara watersheds abut the upper watersheds of the Santa Maria and Santa Ynez rivers, but their mainstems flow south and southwest into the Pacific Ocean in southern Ventura County (Figure 8-1).

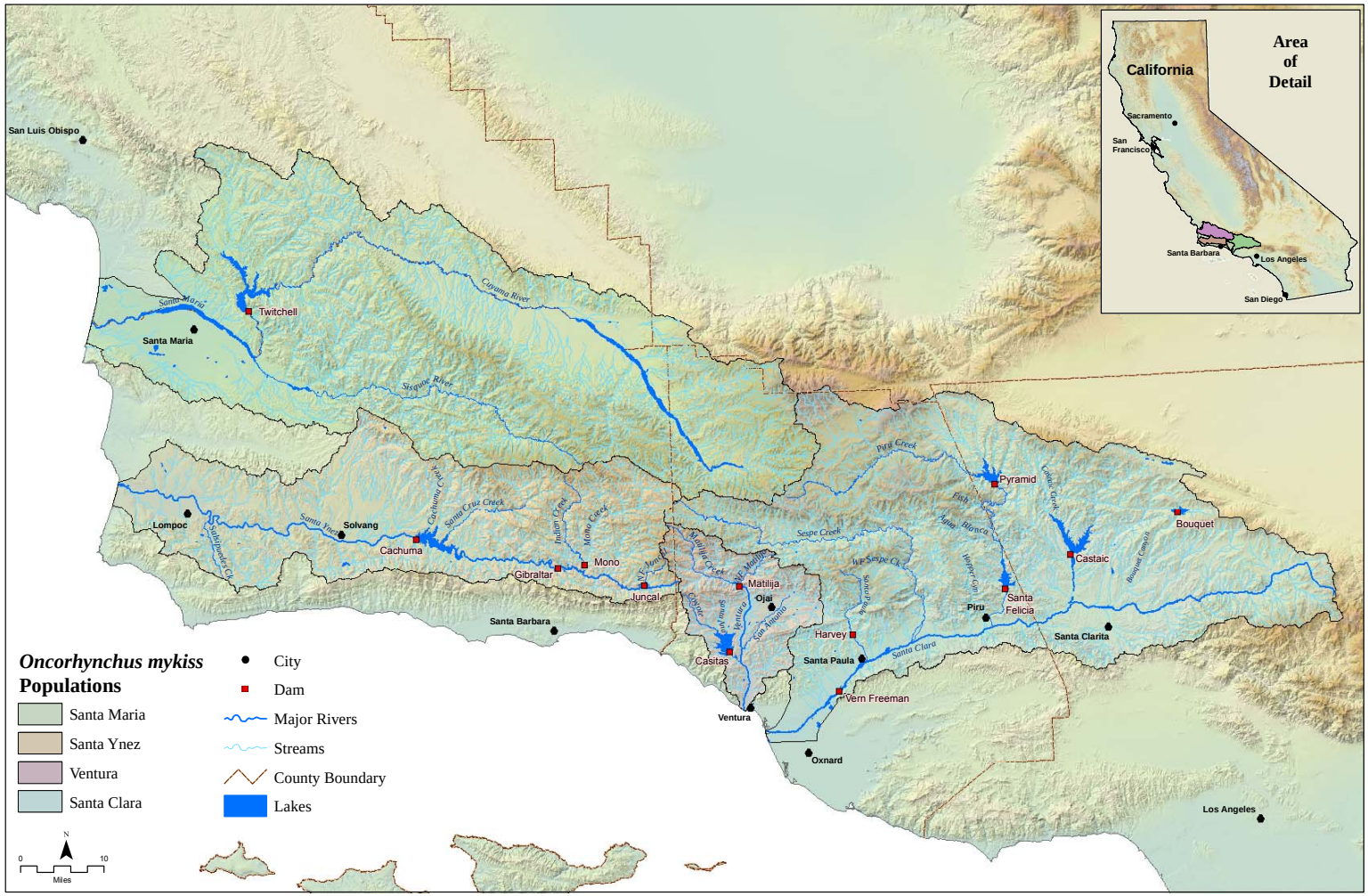

Figure 8-1. The Monte Arido Highlands BGP region. Thirteen populations/watersheds were analyzed in this region: three in the Santa Maria River watershed; one in the Santa Ynez River watershed, five in the Ventura River watershed, and four in the Santa Clara River watershed.

These watersheds are highly disparate in terms of slope, aspect, and size, but share one common feature: the interior portions are mountainous and include high peak elevations, ranging between 5,700 and 8,600 feet above sea level. Each of these watersheds flows across a coastal terrace, but the Santa Maria, Santa Ynez, and Santa Clara rivers traverse broad coastal plains before entering the Pacific Ocean. Overall, stream lengths tend to be very long, owing to high topographic relief in the interior watersheds. The Santa Maria River watershed (Cuyama River sub-watershed) extends the furthest inland—almost 90 miles between the mouth and the limits of the upper watershed.

Average annual precipitation in the Santa Maria River and Santa Clara River watersheds is much lower than the other two because the former include extensive arid interior regions. Although rainfall amounts generally increase with elevation, such orographic (*i.e.,* lifting) effects are concentrated in the most coastal mountainous portions of these watersheds, and much of the interior portions lie in "rain shadows" of the coastal portions of the watersheds.

For example, Old Man Mountain at 5,500 feet above sea level in the Ventura River watershed not only receives five to ten times the amount of precipitation that falls on lower coastal locations only a few miles away, but also receives much more rainfall than interior peaks of comparable elevation in this region. The drainages in these watersheds exhibit "flashy" flow patterns during and after storm events and peak winter and summer base flows can vary by several orders of magnitude.

Extensive portions of the mainstems of all four major watersheds in the Monte Arido Highlands BPG region exhibit intermittent flows (with isolated pools) in summer because of a combination of strong seasonal variation in rainfall and anthropogenic factors.

8.2 LAND USE

Table 8-1 summarizes land use and population density in Monte Arido Highlands BPG region. The coastal terrace and floodplains of these watersheds receive the most intensive land use. The interiors are largely uninhabited and include several federally-designated wilderness areas within the Los Padres National Forest: San Rafael, Dick Smith, Matilija, Chumash, and Sespe. Additionally, there are two federally-designated Wild and Scenic rivers within the Los Padres National Forest: the Sisquoc River (Wild) in the Santa Maria River watershed, and Sespe Creek (Wild and Scenic) in the Santa Clara River watershed. Human population density increases steadily to the south, and averages about 129 persons per square mile over the BPG region. The Santa Maria River watershed has the lowest population density (66 persons/square mile), while the Santa Clara River watershed, which extends into northeastern Los Angeles County, has the highest population density (216 persons/square mile).

In most of these watersheds, the first land-use change was livestock ranching and dry farming, followed by irrigated row-crop agriculture. Urbanization followed this trend on the coastal plain, with current coastal population centers at Santa Maria, Lompoc, Buellton, Ventura, and Oxnard. More recently (decades ago), interior portions of the floodplain of the Santa Clara River that were converted to agriculture (primarily orchards), have experience strong urban growth

Table 8-1. Physical and Land-Use Characteristics of Watersheds in the Monte Arido Highlands BPG.

PHYSICAL CHARACTERISTICS					LAND USE				
WATERSHEDS (north to south)	**Area** (acres)[1]	**Area** (sq. miles)[1]	**Stream Length**[2] (miles)	**Ave. Ann. Rainfall**[3] (inches)	**Total Human Population**	**Public Ownership***	**Urban Area**[5]	**Agriculture/ Barren**[5]	**Open Space**[5]
Santa Maria River**	1,187,491	1,855	2,941	17.2	123,043	49%	10%	3%	87%
Santa Ynez River	576,717	901	1,543	18.3	74,900	39%	7%	3%	90%
Ventura River	144,967	227	409	18.8	44,550	48%	6%	9%	85%
Santa Clara River	1,040,223	1,625	2,485	16.7	350,363	54%	6%	7%	87%
TOTAL or AVERAGE	**2,949,398**	**4,608**	**7,378**	**17.7**	**592,856**	**48%**	**7%**	**6%**	**87%**

[1] From: CDFFP CalWater 2.2 Watershed delineation, 1999 (www.ca.nrcs.usda.gov/features/calwater/)
[2] From: CDFG 1:1,000,000 Routed stream network, 2003 (www.calfish.org/)
[3] From: USGS Hydrologic landscape regions of the U.S., 2003 (1 km grid cells)
[4] From: CDFFP Census 2000 block data (migrated), 2003
[5] From: CDFFP Multi-source land cover data (v02_2), 2002 (100 m grid cells) (http://frap.cdf.ca.gov/data/frapgisdata/select.asp)
** Includes National Forest Lands only; does not include State or County Parks or Military Reservations (from: http://old.casil.ucdavis.edu/casil/gis.ca.gov/teale/govtowna/)*
*** The Santa Maria River watershed includes the Cuyama River and Sisquoc River sub-watersheds.*

and now include population centers at Santa Paula, Fillmore, and, most recently, the Santa Clarita-Castaic-Newhall area in Los Angeles County. The upper watersheds throughout this region are in the Los Padres and Angeles national forests; the coastal and middle watersheds are mostly privately owned. Semi-developed rural land, used for livestock ranching and orchard production covers extensive portions of the coastal and middle portions of these watersheds.

Agricultural uses (orchard production, row crops, and livestock ranching), are important land uses that directly or indirectly impact watershed processes throughout these watersheds. Particularly in the lower Santa Maria, Santa Ynez, and Santa Clara River watersheds, transverse broad coastal watersheds or plains have mostly been converted to agriculture. The Santa Ynez River and the Ventura River watersheds have been transformed by a series of dams constructed to serve municipal water needs for the cities of Goleta, Santa Barbara, Montecito, Summerland, Carpinteria, and Ventura. A major diversion on the lower mainstem and three large dams in the upper watershed on Piru and Castaic creeks has similarly affected habitat and accessibility for anadromous *O. mykiss* in the Santa Clara River drainage. Municipal and agricultural water sources also include numerous groundwater wells located throughout the floodplains of these watersheds.

8.3 CURRENT WATERSHED CONDITIONS

Watershed conditions were assessed for the mainstems of the four major rivers and for eight sub-watersheds in the Monte Arido Highlands BPG region. The mainstem and major tributaries of most of the drainages in this BPG region offer fair to poor habitat conditions for anadromous *O. mykiss*. Some tributaries to the Santa Maria River (*i.e.,* Sisquoc River), Ventura River (*i.e.,* Matilija Creek), and the Santa Clara River (*i.e.,* Sespe Creek) afford better habitat quality. Indicator ratings for the watersheds were typically downgraded during our threats assessment due to the presence of fish-passage barriers (see below). Good-quality to excellent-quality habitat is generally found in the upper watersheds above these barriers, particularly in the Sisquoc River, Matilija Creek mainstem, North Fork Matilija Creek, San Antonio Creek, Santa Paula Creek, and Sespe Creek drainages. Sespe Creek probably supports the highest-quality and most extensive spawning and rearing habitat for anadromous *O. mykiss* in this BPG region, but is frequently isolated from the estuary and ocean by water management activities elsewhere in the watershed that reduce or eliminate surface flows along extensive reaches of the mainstem. Several photographs of the Monte Arido Highlands BPG region are provided in Figure 8-2.

Twitchell Dam on the Cuyama River is located near the Sisquoc River confluence and blocks passage to the very large Cuyama River watershed, including several tributaries (*e.g.,* Pine Creek). Surface flows in the Cuyama River disappear for most of the year because of groundwater pumping throughout the arid Cuyama Valley to water row crops that have been extensively planted on the floodplain. Access to the equally large Sisquoc River watershed for anadromous *O. mykiss* is severely limited because Twitchell Dam is managed for aquifer recharge in the Santa Maria Valley with the aim of minimizing surface flows to the ocean. Consequently, the Santa Maria River, which is the access corridor for both the Cuyama and Sisquoc rivers, is dry most of the year in most years.

Figure 8-2. Photographs of Monte Arido BPG region.

Santa Ynez River

Santa Maria River

Ventura River

Santa Clara River

Sespe Creek – Santa Clara River Tributary

Santa Ana Creek – Ventura River Tributary

Twitchell Dam

Bradbury Dam

Matilija Dam

Santa Felicia Dam

Bradbury Dam, Gibraltar Dam, and Juncal Dam on the middle and upper mainstem of the Santa Ynez River and the Mono Debris Watershed Dam on Mono Creek, and upper tributary the Santa Ynez River block access to at least 70% of the highest quality spawning and rearing habitat within this watershed. Union Pacific Railroad tracks traverse the mainstem of each of the rivers and streams near their mouths, which has damaged estuarine habitat and created additional passage impediments for anadromous *O. mykiss*.

Matilija Dam and Casitas Dam on the mainstem of Matilija Creek and Coyote Creek, respectively, have eliminated access to 90% of the highest quality spawning habitat in the Ventura River watershed. The planning and implementation of a project to remove Matilija Dam is underway. The Robles Diversion Dam on the mainstem has recently been retrofitted with a fish-passage facility, but diversions and operational limitations still limit fish passage below and above the facilities.

Santa Felicia Dam and Pyramid Dam on Piru Creek effectively block fish passage to spawning and rearing habitat in this major tributary of the Santa Clara River; additionally, the operation of these two dams restricts access to all of the major tributaries below Piru Creek by the reduction of surface flows (including magnitude and duration) in the mainstem of the Santa Clara River and to the estuary; fish passage is further impacted by the operation of Bouquet Dam on Castaic Creek, an upper tributary of the Santa Clara River.

Agricultural and urban development has severely constrained floodplain connectivity on sections the floodplains of the Santa Maria River, lower Sisquoc River, Santa Ynez River, Ventura River, Coyote Creek, San Antonio Creek, Santa Clara River, and lower Sespe Creek. Levees, channelization, and other flood control structures and activities, including related flood control activities (levee and vegetation management, *etc.*), constrict the floodplain and alter natural channel morphology (and affect sediment transport processes), which limit instream habitat diversity and riparian corridor structure.

Non-native species are a widespread threat source in the Monte Arido Highlands BPG. Most or all of the reservoirs formed by these dams support sport fishing that has intentionally or accidentally introduced non-native fishes that prey on or compete with *O. mykiss*. These species have moved out of the reservoirs into the mainstem and tributaries, including reaches above and below the dams and established reproducing populations (*e.g.*, crayfish, largemouth bass, sunfish, catfish, carp, western mosquitofish, bullfrogs, *etc.*). Bullfrogs and carp are common throughout the mainstem of the Santa Ynez and Ventura rivers. The African clawed frog (*Xenopus laevis*), a significant predator of native amphibians and fish, infests much of the mainstem of the Santa Clara River from the estuary upstream to Fillmore, including large tributaries such as Santa Paula Creek and Hopper Canyon Creek. Additionally, the highly invasive non-native giant reed (*Arundo donax*) has displaced large areas of native riparian vegetation in the Ventura River and Santa Clara River watersheds, and continues to spread to other areas.

Because of the chaparral dominated upland areas, fire is an important factor in slope erosion and sediment inputs to watersheds throughout this region. Increased fire frequency can increase slope erosion and sediment input to streams, resulting in long-term changes to substrate texture

and embeddedness, water quality (*e.g.*, turbidity), and water temperature (loss of riparian canopy cover). The Sisquoc River, North Fork Matilija Creek, and Piru Creek watersheds were identified as potentially severely threatened by mass wasting of slopes and loss of riparian canopy cover due to fires that occurred in 2006 and 2007 that covered most of their watersheds, but substantial portions of each of these watersheds have burned in the past 50 years. All of the watersheds in this BPG region are naturally susceptible to wildfires, but have experienced larger and more intense fires because of the development and management of these watersheds.

The estuaries at the mouth of the Santa Maria River and Santa Ynez River are relatively physically intact, retaining 81% to 94% of their historic size, respectively, although both are impacted by agricultural and urban effluent discharge. The Ventura River estuary has been reduced by approximately 68% due to urban and agricultural encroachment (*e.g.*, Ventura County Fairgrounds, Emma Wood State Beach, Union Pacific Railroad bridge, Highway 101 bridge). The Santa Clara River estuary has been reduced by approximately 85% due to agricultural and oil development, levee construction, and the development of the Ventura Marina and McGrath State Beach. Because estuaries are the gateway used by both immigrating adults and emigrating juveniles moving between the marine and freshwater environments, estuarine loss affects anadromous *O. mykiss* throughout the entire watershed. The remaining estuarine habitats are subject to degradation from urban, agricultural, and/or recreational development and loss of freshwater inflows. Surface flows diverted from the mainstem for urban and agricultural use adversely affect both water quality and the seasonal breaching pattern of the sandbar at the mouth of the estuary.

Despite widespread and varied habitat degradation to the coastal and middle mainstems of all four major river systems, native rainbow trout populations still inhabit the relatively high-quality habitat upstream of the dams in this region, and small numbers of steelhead attempt to enter and spawn in each of the watersheds of the Monte Arido Highlands BPG region when flow conditions are suitable.

8.4 THREATS AND THREAT SOURCES

Varying numbers and intensities of habitat impairments (sources of threats) were identified in the CAP Workbooks analyses, ranging from seven sources in the North Fork Matilija Creek watershed to 21 in the Cuyama River watershed. "High" and "Very High" sources of threats involving fish-passage barriers created by dams and lack of surface flows caused by groundwater extraction or surface flow diversions disproportionately impact habitat conditions in all of the watersheds in this BPG region. For example, Sespe Creek, which is relatively undisturbed and supports some of the best spawning habitat in the BPG region, is severely threatened by urban development occurring downstream along the mainstem of the Santa Clara River watershed. This development includes water management activities that interrupt the connection between this sub-watershed, the mainstem, estuary, and ocean.

Fifteen anthropogenic activities ranked as the top five sources of stress to steelhead within each watershed in the Monte Arido BPG and are strongly associated with urban and agricultural development and recreation (Table 8-2).

Table 8-2. Threat source rankings in each watershed in the Monte Arido Highlands BPG (see CAP Workbooks for details).

Monte Arido Highlands BPG Component Watersheds (north to south)													
Threat Sources	Santa Maria River	Cuyama River	Sisquoc River	Santa Ynez River	Ventura River	Coyote Creek	Matilija Creek mainstem	North Fork Matilija Creek	San Antonio Creek	Santa Clara River*	Santa Paula Creek	Sespe Creek	Piru Creek
Dams and Surface Water Diversions													
Groundwater Extraction													
Agricultural Development													
Urban Development													
Recreational Facilities													
Non-Native Species													
Levees and Channelization													
Flood Control													
Wildfires													
Mining and Quarrying													
Roads													
Urban Effluents													
Agricultural Effluents													
Other Passage Barriers													

Key: Threat cell colors represent threat rating from CAP Workbook: Red = Very High threat; Yellow = High threat; Light green = Medium threat; Dark green = Low threat

**Wildfires were not identified during the CAP Workbook analyses as one of the top five threats in several of these watersheds, but recent fires in coastal watershed since 2007 could result in significant habitats impacts.*

8.5 SUMMARY

Dams, surface water diversions (including groundwater extraction) driven by agricultural and urban development on the major rivers of the Monte Arido Highlands BPG region (Santa Maria River, Santa Ynez River, Ventura River, and Santa Clara River) have had the most severe impacts on the steelhead populations in this BPG region, cutting off access to upstream spawning and rearing habitats and reducing both the magnitude and duration of flows, as well as altering the timing of flows necessary for immigration of adults and emigration of juveniles. Table 8-3 summarizes the critical recovery actions needed within the Core 1 populations of this BPG.

Table 8-3. Critical recovery actions for Core 1 populations within the Monte Arido Highlands BPG.

POPULATION	CRITICAL RECOVERY ACTION
Santa Maria River	Implement operating criteria to ensure the pattern and magnitude of water releases from Twitchell Dam comport with the natural or pre-dam pattern and magnitude of streamflow. Physically modify Twitchell Dam to allow unimpeded volitional migration of steelhead to upstream spawning and rearing habitats. Identify, protect, and where necessary restore estuarine and freshwater rearing habitats.
Santa Ynez River	Implement operating criteria to ensure the pattern and magnitude of water releases from Bradbury, Gibraltar, and Juncal dams comport with the natural or pre-dam pattern and magnitude of streamflow. Physically modify Bradbury, Gibraltar, and Juncal dams to allow unimpeded volitional migration of steelhead to upstream spawning and rearing habitats. Identify, protect, and where necessary restore estuarine and freshwater rearing habitats.
Ventura River	Implement operating criteria to ensure the pattern and magnitude of water releases from Casitas, Matilija, and Robles Diversion dams comport with the natural or pre-dam pattern and magnitude of streamflow. Physically modify Casitas, Matilija, and Robles Diversion dams to allow unimpeded volitional migration of steelhead to upstream spawning and rearing habitats. Identify, protect, and where necessary restore estuarine and freshwater rearing habitats.
Santa Clara River	Implement operating criteria to ensure the pattern and magnitude of water releases from Vern Freeman Diversion, Santa Felicia, Pyramid, and Castaic dams comport with the natural or pre-dam pattern and magnitude of streamflow. Physically modify Vern Freeman Diversion, Harvey Diversion, Santa Felicia, and Pyramid dams to allow unimpeded volitional migration of steelhead to upstream spawning and rearing habitats. Identify, protect, and where necessary restore estuarine and freshwater rearing habitats.

Restoring conditions for steelhead passage, spawning, and/or rearing in these watersheds will require multiple, long-term, measures related to water management, recreation, and fish passage past large dams. Impediments to fish passage stemming from the construction and operation of dams and groundwater extraction, modification of channel morphology and adjacent to riparian habitats through flood control, instream activities such as sand gravel mining, and loss of estuarine functions caused by filling and point and non-point water discharges from agriculture an other anthropogenic activities should be further evaluated and addressed.

The threats sources discussed in this section should be the focus of a variety of recovery actions to address specific stresses to anadromous *O. mykiss* viability. Spatial and temporal data acquired on specific indicators associated with threat sources or stresses, such as water temperature, pH, nutrients, *etc.*, are generally inadequate to be the target of specific recovery actions. This type of data acquisition should be the subject of site-specific investigation in order to refine the primary recovery actions or to target additional recovery actions as part of any recovery strategy for the Monte Arido Highlands BPG. Tables 8-4 through 8-7 below rank and describe proposed recovery actions for each sub-watershed in the Monte Arido BPG including the estimated cost for implementing such actions over the first five fiscal years.

Table 8-4. Southern California Steelhead DPS Recovery Action Matrix for Santa Maria River Sub-Watersheds (Monte Arido Highlands BPG).

Action #	Recovery Action Description	Responsible Parties	Threat Source	Listing Factors (1 - 5)	Action Rank (1A, 1B, 2A, 2B, 3A, 3B)	Task Duration	Fiscal Year Costs ($K)				
							FY1	FY2	FY3	FY4	FY5
Santa Maria Mainstem											
	Conduct hydrological analysis (groundwater)		Groundwater Extraction	1, 4	1B						
	Develop and implement a groundwater monitoring program		Groundwater Extraction	1, 4	1B						
	Develop and implement a restoration and management plan for the Santa Maria River Estuary		Other Recovery Actions	1, 2, 3, 4, 5	1B						
	Review development and management plans for all recreational areas (e.g., Dunes Center/Rancho Guadalupe Dunes Preserve) to provide for the restoration and protection of the Santa Maria River Watershed, estuary and riparian/floodplain area		Recreational Facilities	1, 2, 3, 4, 5	1B						
	Develop and implement an integrated wildland fire and hazardous fuels management plan, including monitoring, remediation and adaptive management, to reduce potentially catastrophic wildland fire effects to steelhead and their habitat and preserve natural ecosystem processes (including sediment deposition)		Wildfires	1, 4, 5	1B						
	Develop, adopt, and implement land-use planning policies and standards		Agricultural Development	1, 4	2B						
	Review and modify aggregate mining operations		Mining and Quarrying	1, 4, 5	2B						
	Review and modify applicable County and/or City Local Coastal Plans		Other Recovery Actions	1, 2, 3, 4, 5	2B						
	Develop and implement a public educational program		Recreational Facilities	1,3,5	2B						

Action #	Recovery Action Description	Responsible Parties	Threat Source	Listing Factors (1 - 5)	Action Rank (1A, 1B, 2A, 2B, 3A, 3B)	Task Duration	Fiscal Year Costs ($K)				
							FY1	FY2	FY3	FY4	FY5
	Review U.S. Forest Service Los Padres National Forest Land Management Plan (Southern California National Forest Vision, Forest Strategy, and Design Criteria)		Recreational Facilities	1, 2, 3, 4, 5	2B						
	Review California Regional Water Quality Control Board Central Coast Region Watershed Plans and modify applicable stormwater permits		Urban Effluents	1, 4	2B						
	Review, assess and modify if necessary all NPDES wastewater discharge permits (e.g., Santa Maria Wastewater Treatment Facility)		Urban Effluents	1, 4	2B						
	Develop and implement a plan to minimize runoff from agricultural activities		Agricultural Effluents	1, 4	2B						
	Develop and implement a plan to remove or physically modify all fish passage barriers identified in the Santa Maria River Watershed to allow unimpeded volitional migration of steelhead to upstream spawning and rearing habitats (see Steelhead Migration Assessment and Recovery Opportunities for the Sisquoc River, California 2003)		Culverts and Road Crossings (Passage Barriers)	1, 4	3A						
	Develop and implement a watershed-wide sediment management plan		Agricultural Development	1, 4	3B						
	Relocate livestock grazing and water sources		Agricultural Development	1, 4,	3B						
	Develop and implement a water management plan		Dams and Surface Water Diversions	1, 3, 4	3B						
	Develop and implement a flood control maintenance program		Levees and Channelization	1, 4	3B						
	Develop and implement a plan to vegetate levees and minimize herbicide use near levees		Levees and Channelization	1, 4	3B						

Action #	Recovery Action Description	Responsible Parties	Threat Source	Listing Factors (1 - 5)	Action Rank (1A, 1B, 2A, 2B, 3A, 3B)	Task Duration	Fiscal Year Costs ($K)				
							FY1	FY2	FY3	FY4	FY5
	Develop and implement a non-native species monitoring program		Non-Native Species	1, 3, 5	3B						
	Develop and implement a public educational program on non-native species impacts		Non-Native Species	1, 3, 5	3B						
	Retrofit storm drains to filter runoff from roadways		Roads	1, 4	3B						
	Develop, adopt, and implement urban land-use planning policies and standards		Urban Development	1, 4	3B						
	Retrofit storm drains in developed areas		Urban Development	1, 4	3B						
	Develop and implement a plan to minimize disturbance of instream habitats and riparian vegetation		Flood Control	1, 4	3B						
	Develop and implement a plan to restore natural channel features where feasible		Levees and Channelization	1, 4	3B						
	Develop and implement a plan to assess the impacts of non-native species and develop control measures		Non-Native Species	1, 3, 5	3B						
	Relocate roadways outside of riparian corridor and restore abandoned roadways		Roads	1, 4	3B						
	Relocate agricultural development		Agricultural Development	1, 4							
Cuyama River											
	Physically modify Twitchell Dam to allow unimpeded volitional migration of steelhead to upstream spawning and rearing habitats		Dams and Surface Water Diversions	1, 3, 4	1A						
	Conduct hydrological analysis and implement operating criteria to ensure the pattern and magnitude of releases from Twitchell Dam comport with the natural pre-dam pattern and magnitude of streamflow		Dams and Surface Water Diversions	1, 3, 4	1B						

Action #	Recovery Action Description	Responsible Parties	Threat Source	Listing Factors (1 - 5)	Action Rank (1A, 1B, 2A, 2B, 3A, 3B)	Task Duration	Fiscal Year Costs ($K)				
							FY1	FY2	FY3	FY4	FY5
	Implement operating criteria to ensure the pattern and magnitude of water releases from Twitchell Dam comport with the natural or pre-dam pattern and magnitude of streamflow		Dams and Surface Water Diversions	1, 3, 4	1B						
	Develop and implement an integrated wildland fire and hazardous fuels management plan, including monitoring, remediation and adaptive management, to reduce potentially catastrophic wildland fire effects to steelhead and their habitat and preserve natural ecosystem processes (including sediment deposition)		Wildfires	1, 4, 5	2B						
	Develop and implement a plan to minimize runoff from agricultural activities		Agricultural Effluents	1, 4	2B						
	Develop and implement a plan to remove or physically modify all fish passage barriers identified in the Santa Maria River Watershed to allow unimpeded volitional migration of steelhead to upstream spawning and rearing habitats (see Steelhead Migration Assessment and Recovery Opportunities for the Sisquoc River, California 2003)		Culverts and Road Crossings (Passage Barriers)	1, 4	3A						
	Develop and implement a watershed-wide sediment management plan		Agricultural Development	1, 4	3B						
	Develop, adopt, and implement land-use planning policies and standards		Agricultural Development	1, 4	3B						
	Relocate agricultural development		Agricultural Development	1, 4	3B						
	Relocate livestock grazing and water sources		Agricultural Development	1, 4,	3B						
	Conduct hydrological analysis (groundwater)		Groundwater Extraction	1, 4	3B						

Action #	Recovery Action Description	Responsible Parties	Threat Source	Listing Factors (1 - 5)	Action Rank (1A, 1B, 2A, 2B, 3A, 3B)	Task Duration	Fiscal Year Costs ($K)				
							FY1	FY2	FY3	FY4	FY5
	Develop and implement a groundwater monitoring program		Groundwater Extraction	1, 4	3B						
	Develop and implement a flood control maintenance program		Levees and Channelization	1, 4	3B						
	Develop and implement a plan to vegetate levees and minimize herbicide use near levees		Levees and Channelization	1, 4	3B						
	Review and modify aggregate mining operations		Mining and Quarrying	1, 4, 5	3B						
	Develop and implement a non-native species monitoring program		Non-Native Species	1, 3, 5	3B						
	Develop and implement a public educational program on non-native species impacts		Non-Native Species	1, 3, 5	3B						
	Review and modify applicable County and/or City Local Coastal Plans		Other Recovery Actions	1, 2, 3, 4, 5	3B						
	Develop and implement a public educational program		Recreational Facilities	1, 2, 3, 4, 5	3B						
	Develop, adopt, and implement recreational land-use planning policies		Recreational Facilities	1, 2, 4	3B						
	Review U.S. Forest Service Los Padres National Forest Land Management Plan (Southern California National Forest Vision, Forest Strategy, and Design Criteria)		Recreational Facilities	1, 2, 3, 4, 5	3B						
	Retrofit storm drains to filter runoff from roadways		Roads	1, 4	3B						
	Develop, adopt, and implement urban land-use planning policies and standards		Urban Development	1, 4	3B						
	Retrofit storm drains in developed areas		Urban Development	1, 4	3B						

Action #	Recovery Action Description	Responsible Parties	Threat Source	Listing Factors (1 - 5)	Action Rank (1A, 1B, 2A, 2B, 3A, 3B)	Task Duration	Fiscal Year Costs ($K)				
							FY1	FY2	FY3	FY4	FY5
	Review California Regional Water Quality Control Board Central Coast Region Watershed Plans and modify applicable stormwater permits		Urban Effluents	1, 4	3B						
	Review, assess and modify if necessary all NPDES wastewater discharge permits (e.g., Cuyama Community Sanitation District Treatment Facility)		Urban Effluents	1, 4	3B						
	Develop and implement a plan to minimize disturbance of instream habitats and riparian vegetation		Flood Control	1, 4	3B						
	Develop and implement a plan to restore natural channel features where feasible		Levees and Channelization	1, 4	3B						
	Develop and implement a plan to assess the impacts of non-native species and develop control measures		Non-Native Species	1, 3, 5	3B						
	Relocate roadways outside of riparian corridor and restore abandoned roadways		Roads	1, 4	3B						
Sisquoc River											
	Develop and implement an integrated wildland fire and hazardous fuels management plan, including monitoring, remediation and adaptive management, to reduce potentially catastrophic wildland fire effects to steelhead and their habitat and preserve natural ecosystem processes (including sediment deposition)		Wildfires	1, 4, 5	1B						
	Develop and implement a watershed-wide sediment management plan		Agricultural Development	1, 4	2B						
	Develop, adopt, and implement land-use planning policies and standards		Agricultural Development	1, 4	2B						

Action #	Recovery Action Description	Responsible Parties	Threat Source	Listing Factors (1 - 5)	Action Rank (1A, 1B, 2A, 2B, 3A, 3B)	Task Duration	Fiscal Year Costs ($K)				
							FY1	FY2	FY3	FY4	FY5
	Relocate agricultural development		Agricultural Development	1, 4	2B						
	Relocate livestock grazing and water sources		Agricultural Development	1, 4,	2B						
	Develop and implement a water management plan		Dams and Surface Water Diversions	1, 3, 4	2B						
	Conduct hydrological analysis (groundwater)		Groundwater Extraction	1, 4	2B						
	Develop and implement a groundwater monitoring program		Groundwater Extraction	1, 4	2B						
	Review and modify aggregate mining operations		Mining and Quarrying	1, 4, 5	2B						
	Develop and implement a non-native species monitoring program		Non-Native Species	1, 3, 5	2B						
	Develop and implement a public educational program on non-native species impacts		Non-Native Species	1, 3, 5	2B						
	Develop and implement a public educational program		Recreational Facilities	1, 2, 3, 4, 5	2B						
	Develop, adopt, and implement recreational land-use planning policies		Recreational Facilities	1, 2, 4	2B						
	Review U.S. Forest Service Los Padres National Forest Land Management Plan (Southern California National Forest Vision, Forest Strategy, and Design Criteria)		Recreational Facilities	1, 2, 3, 4, 5	2B						
	Develop and implement a plan to minimize runoff from agricultural activities		Agricultural Effluents	1, 4	2B						

Action #	Recovery Action Description	Responsible Parties	Threat Source	Listing Factors (1 - 5)	Action Rank (1A, 1B, 2A, 2B, 3A, 3B)	Task Duration	Fiscal Year Costs ($K)				
							FY1	FY2	FY3	FY4	FY5
	Develop and implement a plan to remove or modify all fish passage barriers identified in the Santa Maria River Watershed (see Steelhead Migration Assessment and Recovery Opportunities for the Sisquoc River, California 2003)		Culverts and Road Crossings (Passage Barriers)	1, 4	3A						
	Develop and implement a flood control maintenance program		Levees and Channelization	1, 4	3B						
	Develop and implement a plan to vegetate levees and minimize herbicide use near levees		Levees and Channelization	1, 4	3B						
	Review and modify applicable County and/or City Local Coastal Plans		Other Recovery Actions	1, 2, 3, 4, 5	3B						
	Develop, adopt, and implement urban land-use planning policies and standards		Urban Development	1, 4	3B						
	Retrofit storm drains in developed areas		Urban Development	1, 4	3B						
	Review California Regional Water Quality Control Board Central Coast Region Watershed Plans and modify applicable stormwater permits		Urban Effluents	1, 4	3B						
	Review, assess and modify if necessary all NPDES wastewater discharge permits		Urban Effluents	1, 4	3B						
	Develop and implement a plan to minimize disturbance of instream habitats and riparian vegetation		Flood Control	1, 4	3B						
	Develop and implement a plan to restore natural channel features where feasible		Levees and Channelization	1, 4	3B						
	Develop and implement a plan to assess the impacts of non-native species and develop control measures		Non-Native Species	1, 3, 5	3B						

Action #	Recovery Action Description	Responsible Parties	Threat Source	Listing Factors (1 - 5)	Action Rank (1A, 1B, 2A, 2B, 3A, 3B)	Task Duration	Fiscal Year Costs ($K)				
							FY1	FY2	FY3	FY4	FY5
	Relocate roadways outside of riparian corridor and restore abandoned roadways		Roads	1, 4	3B						
	Retrofit storm drains to filter runoff from roadways		Roads	1, 4							

Table 8-5. Southern California Steelhead DPS Recovery Action Matrix for Santa Ynez River Watershed (Monte Arido Highlands BPG).

Action #	Recovery Action Description	Responsible Parties	Threat Source	Listing Factors (1 - 5)	Action Rank (1A, 1B, 2A, 2B, 3A, 3B)	Task Duration	Fiscal Year Costs ($K)				
							FY1	FY2	FY3	FY4	FY5
	Physically modify Bradbury, Gibraltar, and Juncal dams to allow unimpeded volitional migration of steelhead to upstream spawning and rearing habitats		Dams and Surface Water Diversions	1, 3, 4	1A						
	Develop and implement water management plan		Dams and Surface Water Diversions	1, 3, 4	1B						
	Implement operating criteria to ensure the pattern and magnitude of water releases from Bradbury, Gibraltar, and Juncal dams comport with the natural or pre-dam pattern and magnitude of streamflow		Dams and Surface Water Diversions	1, 3, 4	1B						
	Conduct hydrological analysis (groundwater)		Groundwater Extraction	1, 4	1B						
	Develop and implement a groundwater monitoring program		Groundwater Extraction	1, 4	1B						
	Review and modify applicable County and/or City Local Coastal Plans		Other Recovery Actions	1, 2, 3, 4, 5	1B						
	Review and modify the Vandenberg Air Force Base Integrated Natural Resources Management Plan		Other Recovery Actions	1, 2, 3, 4, 5	1B						
	Conduct feasibility study to assess the potential for restoration of the Santa Ynez River estuary"	VAFB	Other Recovery Actions								
	Develop and implement an estuary restoration and management plan for the Santa Ynez estuary		Other Recovery Actions	1, 2, 3, 4, 5	1B						
	Review development and management plans of the Santa Ynez River Estuary		Recreational Facilities	1, 2, 4	1B						
	Develop and implement an integrated wildland fire and hazardous fuels management plan, including monitoring,		Wildfires	1, 4, 5	1B						

Action #	Recovery Action Description	Responsible Parties	Threat Source	Listing Factors (1 - 5)	Action Rank (1A, 1B, 2A, 2B, 3A, 3B)	Task Duration	Fiscal Year Costs ($K)				
							FY1	FY2	FY3	FY4	FY5
	remediation and adaptive management, to reduce potentially catastrophic wildland fire effects to steelhead and their habitat and preserve natural ecosystem processes (including sediment deposition)										
	Develop and implement a plan to remove or physically modify all fish passage barriers identified in the Santa Ynez River Watershed to allow unimpeded volitional migration of steelhead to upstream spawning and rearing habitats (see Steelhead Migration Assessment and Recovery Opportunities for the Santa Ynez River, California 2003; and Lower Santa Ynez River Fish Management Plan, 2000)		Culverts and Road Crossings (Passage Barriers)	1, 4	2A						
	Develop and implement a watershed-wide sediment management plan		Agricultural Development	1, 4	2B						
	Develop, adopt, and implement land-use planning policies and standards		Agricultural Development	1, 4	2B						
	Relocate agricultural development		Agricultural Development	1, 4	2B						
	Relocate livestock grazing and water sources		Agricultural Development	1, 4,	2B						
	Develop and implement a plan to minimize runoff from agricultural activities		Agricultural Effluents	1, 4	2B						
	Develop and implement a plan to minimize disturbance of instream habitats and riparian vegetation		Flood Control	1, 4	2B						
	Develop and implement a plan to restore natural channel features where feasible		Levees and Channelization	1, 4	2B						
	Develop and implement a flood control maintenance program		Levees and Channelization	1, 4	2B						
	Develop and implement a plan to vegetate levees and minimize herbicide use near		Levees and Channelization	1, 4	2B						

Action #	Recovery Action Description	Responsible Parties	Threat Source	Listing Factors (1 - 5)	Action Rank (1A, 1B, 2A, 2B, 3A, 3B)	Task Duration	Fiscal Year Costs ($K)				
							FY1	FY2	FY3	FY4	FY5
	levees										
	Review and modify aggregate mining operations		Mining and Quarrying	1, 4, 5	2B						
	Develop and implement a watershed-wide plan to assess the impacts of non-native species and develop control measures		Non-Native Species	1, 3, 5	2B						
	Develop and implement a non-native species monitoring program		Non-Native Species	1, 3, 5	2B						
	Develop and implement a public educational program on non-native species impacts		Non-Native Species	1, 3, 5	2B						
	Develop and implement a public educational program		Recreational Facilities	1, 2, 3, 4, 5	2B						
	Review U.S. Forest Service Los Padres National Forest Land Management Plan (Southern California National Forest Vision, Forest Strategy, and Design Criteria)		Recreational Facilities	1, 2, 3, 4, 5	2B						
	Retrofit storm drains to filter runoff from roadways		Roads	1, 4	2B						
	Relocate roadways outside of riparian corridor and restore abandoned roadways		Roads	1, 4	2B						
	Develop, adopt, and implement urban land-use planning policies and standards		Urban Development	1, 4	2B						
	Retrofit storm drains in developed areas		Urban Development	1, 4	2B						
	Review California Regional Water Quality Control Board Central Coast Region Watershed Plans and modify applicable stormwater permits		Urban Effluents	1, 4	2B						

Action #	Recovery Action Description	Responsible Parties	Threat Source	Listing Factors (1 - 5)	Action Rank (1A, 1B, 2A, 2B, 3A, 3B)	Task Duration	Fiscal Year Costs ($K)				
							FY1	FY2	FY3	FY4	FY5
	Review, assess and modify if necessary all NPDES wastewater discharge permits (e.g., Lompoc Regional Wastewater Treatment Facility and Santa Ynez Band Wastewater Treatment Facility)		Urban Effluents	1, 4	2B						

Table 8-6. Southern California Steelhead DPS Recovery Action Matrix for Ventura River Sub-Watersheds (Monte Arido Highlands BPG).

Action #	Recovery Action Description	Responsible Parties	Threat Source	Listing Factors (1 - 5)	Action Rank (1A, 1B, 2A, 2B, 3A, 3B)	Task Duration	Fiscal Year Costs ($K)				
							FY1	FY2	FY3	FY4	FY5
Mainstem Ventura River											
	Physically modify Robles Diversion dam to allow unimpeded volitional migration of steelhead to upstream spawning and rearing habitats		Dams and Surface Water Diversions	1, 3, 4	1A						
	Conduct hydrological analysis (groundwater)		Groundwater Extraction	1, 4	1A						
	Develop and implement a groundwater monitoring program		Groundwater Extraction	1, 4	1A						
	Develop and implement a water management plan		Dams and Surface Water Diversions	1, 3, 4	1B						
	Develop and implement operating criteria to ensure the pattern and magnitude of water releases from Casitas, Matilija, and Robles Diversion and Foster Park dams comport with the natural or pre-dam pattern and magnitude of streamflow		Dams and Surface Water Diversions	1, 3, 4	1B						
	Develop and implement a restoration and management plan for the Ventura River Estuary		Other Recovery Actions	1, 2, 3, 4, 5	1B						
	Review development and management plans for all recreational areas (e.g., Emma Wood State Beach, City of Ventura Seaside Wilderness Park) to provide for the restoration and protection of the Ventura River Watershed, estuary and riparian/floodplain area		Recreational Facilities	1, 2, 3, 4, 5	1B						
	Develop and implement an integrated wildland fire and hazardous fuels management plan, including monitoring, remediation and adaptive management, to reduce potentially catastrophic wildland fire effects to steelhead and their habitat and preserve natural ecosystem processes		Wildfires	1, 4, 5	1B						

Action #	Recovery Action Description	Responsible Parties	Threat Source	Listing Factors (1 - 5)	Action Rank (1A, 1B, 2A, 2B, 3A, 3B)	Task Duration	Fiscal Year Costs ($K)				
							FY1	FY2	FY3	FY4	FY5
	(including sediment deposition)										
	Develop, adopt, and implement land-use planning policies and standards		Agricultural Development	1, 4	2B						
	Relocate agricultural development		Agricultural Development	1, 4	2B						
	Relocate livestock grazing and water sources		Agricultural Development	1, 4,	2B						
	Develop and implement a plan to minimize disturbance of instream habitats and riparian vegetation		Flood Control	1, 4	2B						
	Develop and implement a flood control maintenance program		Levees and Channelization	1, 4	2B						
	Develop and implement a plan to restore natural channel features where feasible		Levees and Channelization	1, 4	2B						
	Develop and implement a plan to vegetate levees and minimize herbicide use near levees		Levees and Channelization	1, 4	2B						
	Develop and implement a non-native species monitoring program		Non-Native Species	1, 3, 5	2B						
	Develop and implement a plan to assess the impacts of non-native species and develop control measures		Non-Native Species	1, 3, 5	2B						
	Develop and implement a public educational program on non-native species impacts		Non-Native Species	1, 3, 5	2B						
	Review and modify applicable County and/or City Local Coastal Plans		Other Recovery Actions	1, 2, 3, 4, 5	2B						
	Develop and implement a public educational program		Recreational Facilities	1,3,5	2B						

Action #	Recovery Action Description	Responsible Parties	Threat Source	Listing Factors (1 - 5)	Action Rank (1A, 1B, 2A, 2B, 3A, 3B)	Task Duration	Fiscal Year Costs ($K)				
							FY1	FY2	FY3	FY4	FY5
	Review U.S. Forest Service Los Padres National Forest Land Management Plan (Southern California National Forest Vision, Forest Strategy, and Design Criteria)		Recreational Facilities	1, 2, 3, 4, 5	2B						
	Relocate roadways outside of riparian corridor and restore abandoned roadways		Roads	1, 4	2B						
	Retrofit storm drains to filter runoff from roadways		Roads	1, 4	2B						
	Develop, adopt, and implement urban land-use planning policies and standards		Urban Development	1, 4	2B						
	Retrofit storm drains in developed areas		Urban Development	1, 4	2B						
	Review California Regional Water Quality Control Board Central Coast Region Watershed Plans and modify applicable stormwater permits		Urban Effluents	1, 4	2B						
	Review, assess and modify if necessary all NPDES wastewater discharge permits (e.g., Ojai Valley Sanitary District Wastewater Treatment Facility)		Urban Effluents	1, 4	2B						
	Develop and implement a watershed-wide sediment management plan		Agricultural Development	1, 4	2B						
	Develop and implement a plan to minimize runoff from agricultural activities		Agricultural Effluents	1, 4	2B						
	Develop, adopt, and implement recreational land-use planning policies		Recreational Facilities	1, 2, 3, 4, 5	2B						
	Physically modify or remove all passage barriers in the Ventura River Watershed to allow unimpeded volitional migration of steelhead to upstream spawning and rearing habitats		Culverts and Road Crossings (Passage Barriers)	1, 4	3A						

Action #	Recovery Action Description	Responsible Parties	Threat Source	Listing Factors (1 - 5)	Action Rank (1A, 1B, 2A, 2B, 3A, 3B)	Task Duration	Fiscal Year Costs ($K)				
							FY1	FY2	FY3	FY4	FY5
	Review and modify aggregate mining operations		Mining and Quarrying	1, 4, 5	3B						
Coyote Creek											
	Physically modify Casitas Dam to allow unimpeded volitional migration of steelhead to upstream spawning and rearing habitats		Dams and Surface Water Diversions	1, 3, 4	1A						
	Develop and implement a water management plan		Dams and Surface Water Diversions	1, 3, 4	2B						
	Develop and implement operating criteria to ensure the pattern and magnitude of water releases from Casitas Dam comport with the natural or pre-dam pattern and magnitude of streamflow		Dams and Surface Water Diversions	1, 3, 4	1B						
	Develop and implement an integrated wildland fire and hazardous fuels management plan, including monitoring, remediation and adaptive management, to reduce potentially catastrophic wildland fire effects to steelhead and their habitat and preserve natural ecosystem processes (including sediment deposition)		Wildfires	1, 4, 5	1B						
	Physically modify or remove all fish passage barriers identified in the Coyote Creek Watershed to allow unimpeded volitional migration of steelhead to upstream spawning and rearing habitats		Culverts and Road Crossings (Passage Barriers)	1, 4	2A						
	Develop, adopt, and implement land-use planning policies and standards		Agricultural Development	1,4	2B						
	Relocate agricultural development		Agricultural Development	1,4	2B						
	Relocate livestock grazing and water sources		Agricultural Development	1,4	2B						
	Develop and implement a watershed-wide sediment management plan		Agricultural Development	1, 4	2B						

Action #	Recovery Action Description	Responsible Parties	Threat Source	Listing Factors (1 - 5)	Action Rank (1A, 1B, 2A, 2B, 3A, 3B)	Task Duration	Fiscal Year Costs ($K)				
							FY1	FY2	FY3	FY4	FY5
	Develop and implement a plan to minimize runoff from agricultural activities		Agricultural Effluents	1, 4	2B						
	Develop and implement a plan to minimize disturbance of instream habitats and riparian vegetation		Flood Control	1, 4	2B						
	Conduct hydrological analysis (groundwater)		Groundwater Extraction	1, 4	2B						
	Develop and implement a groundwater monitoring program		Groundwater Extraction	1, 4	2B						
	Develop and implement a non-native species monitoring program		Non-Native Species	1, 3, 5	2B						
	Develop and implement a public educational program on non-native species impacts		Non-Native Species	1, 3, 5	2B						
	Develop and implement a public educational program		Recreational Facilities	1,3,5	2B						
	Review development and management plans for all County recreational areas (e.g., E.P. Foster Memorial Park) to provide for the restoration and protection of the Coyote Creek and riparian/floodplain areas		Recreational Facilities	1, 2, 3, 4, 5	2B						
	Review U.S. Forest Service Los Padres National Forest Land Management Plan (Southern California National Forest Vision, Forest Strategy, and Design Criteria)		Recreational Facilities	1, 2, 3, 4, 5	2B						
	Review California Regional Water Quality Control Board Central Coast Region Watershed Plans and modify applicable stormwater permits		Urban Effluents	1, 4	2B						
	Develop and implement a flood control maintenance program		Levees and Channelization	1, 4	3B						

Action #	Recovery Action Description	Responsible Parties	Threat Source	Listing Factors (1 - 5)	Action Rank (1A, 1B, 2A, 2B, 3A, 3B)	Task Duration	Fiscal Year Costs ($K)				
							FY1	FY2	FY3	FY4	FY5
	Develop and implement a plan to restore natural channel features where feasible		Levees and Channelization	1, 4	3B						
	Develop and implement a plan to vegetate levees and minimize herbicide use near levees		Levees and Channelization	1, 4	3B						
	Develop and implement a plan to assess the impacts of non-native species and develop control measures		Non-Native Species	1, 3, 5	3B						
	Relocate roadways outside of riparian corridor and restore abandoned roadways		Roads	1, 4	3B						
	Retrofit storm drains to filter runoff from roadways		Roads	1, 4	3B						
	Develop, adopt, and implement urban land-use planning policies and standards		Urban Development	1, 4	3B						
	Retrofit storm drains in developed areas		Urban Development	1, 4	3B						
	Review, assess and modify if necessary all NPDES wastewater discharge permits (e.g., Fillmore Wastewater Treatment Facility, Santa Paula Wastewater Treatment Facility, and Ventura Wastewater Treatment Facility)		Urban Effluents	1, 4	3B						
Matilija Creek											
	Physically remove Matilija Dam to allow unimpeded volitional migration of steelhead to upstream spawning and rearing habitats		Dams and Surface Water Diversions	1, 3, 4	1A						
	Develop and implement a water management plan		Dams and Surface Water Diversions	1, 3, 4	1B						
	Conduct hydrological analysis (groundwater)		Groundwater Extraction	1, 4	1B						
	Develop and implement a groundwater monitoring program		Groundwater Extraction	1, 4	1B						

Action #	Recovery Action Description	Responsible Parties	Threat Source	Listing Factors (1 - 5)	Action Rank (1A, 1B, 2A, 2B, 3A, 3B)	Task Duration	Fiscal Year Costs ($K)				
							FY1	FY2	FY3	FY4	FY5
	Develop and implement an integrated wildland fire and hazardous fuels management plan, including monitoring, remediation and adaptive management, to reduce potentially catastrophic wildland fire effects to steelhead and their habitat and preserve natural ecosystem processes (including sediment deposition)		Wildfires	1, 4, 5	1B						
	Develop and implement a non-native species monitoring program		Non-Native Species	1, 3, 5	2B						
	Develop and implement a plan to assess the impacts of non-native species and develop control measures		Non-Native Species	1, 3, 5	2B						
	Develop and implement a public educational program on non-native species impacts		Non-Native Species	1, 3, 5	2B						
	Review development and management plans for County recreational areas (e.g., Matilija Reservoir) to provide specific provisions for the restoration and protection of the Matilija Creek riparian/floodplain area		Recreational Facilities	1, 2, 3, 4, 5	2B						
	Review, assess and modify, if necessary, residential wastewater septic treatment facilities		Urban Effluents	1, 4	2B						
	Develop and implement a watershed-wide sediment management plan		Agricultural Development	1, 4	2B						
	Develop and implement a plan to minimize runoff from agricultural activities		Agricultural Effluents	1, 4	2B						
	Develop, adopt, and implement recreational land-use planning policies		Recreational Facilities	1, 2, 3, 4, 5	2B						
	Physically modify or remove all fish passage barriers identified in the Matilija Creek Watershed to allow unimpeded volitional migration of steelhead to upstream spawning and rearing habitats		Culverts and Road Crossings (Passage Barriers)	1, 4	3A						

Action #	Recovery Action Description	Responsible Parties	Threat Source	Listing Factors (1 - 5)	Action Rank (1A, 1B, 2A, 2B, 3A, 3B)	Task Duration	Fiscal Year Costs ($K)				
							FY1	FY2	FY3	FY4	FY5
	Develop and implement a plan to minimize disturbance of instream habitats and riparian vegetation		Flood Control	1, 4	3B						
	Develop and implement a flood control maintenance program		Levees and Channelization	1, 4	3B						
	Develop and implement a plan to restore natural channel features where feasible		Levees and Channelization	1, 4	3B						
	Develop and implement a plan to vegetate levees and minimize herbicide use near levees		Levees and Channelization	1, 4	3B						
	Review and modify aggregate mining operations		Mining and Quarrying	1, 4, 5	3B						
	Relocate roadways outside of riparian corridor and restore abandoned roadways		Roads	1, 4	3B						
	Retrofit storm drains to filter runoff from roadways		Roads	1, 4	3B						
	Develop, adopt, and implement urban land-use planning policies and standards		Urban Development	1.4	3B						
	Retrofit storm drains in developed areas		Urban Development	1,4	3B						
	Review California Regional Water Quality Control Board Central Coast Region Watershed Plans and modify applicable stormwater permits		Urban Effluents	1, 4	3B						
	Review, assess and modify if necessary all NPDES wastewater discharge permits		Urban Effluents	1, 4	3B						
	Develop and implement a public educational program		Recreational Facilities	1,3,5							
North Fork Matilija Creek											

Action #	Recovery Action Description	Responsible Parties	Threat Source	Listing Factors (1 - 5)	Action Rank (1A, 1B, 2A, 2B, 3A, 3B)	Task Duration	Fiscal Year Costs ($K)				
							FY1	FY2	FY3	FY4	FY5
	Physically modify or remove all fish passage barriers identified in the North Fork Matilija Creek Watershed to allow unimpeded volitional migration of steelhead to upstream spawning and rearing habitats		Culverts and Road Crossings (Passage Barriers)	1, 4	1A						
	Develop and implement a plan to remove and maintain quarry and landslide debris from the channel		Mining and Quarrying	1, 4, 5	1A						
	Develop and implement an integrated wildland fire and hazardous fuels management plan, including monitoring, remediation and adaptive management, to reduce potentially catastrophic wildland fire effects to steelhead and their habitat and preserve natural ecosystem processes (including sediment deposition)		Wildfires	1, 4, 5	1B						
	Relocate livestock grazing and water sources		Agricultural Development	1,4	2B						
	Develop and implement a water management plan		Dams and Surface Water Diversions	1, 3, 4	2B						
	Review and modify aggregate mining operations		Mining and Quarrying	1, 4, 5	2B						
	Develop and implement a non-native species monitoring program		Non-Native Species	1, 3, 5	2B						
	Develop and implement a public educational program on non-native species impacts		Non-Native Species	1, 3, 5	2B						
	Develop and implement a public educational program		Recreational Facilities	1,3,5	2B						
	Review U.S. Forest Service Los Padres National Forest Land Management Plan (Southern California National Forest Vision, Forest Strategy, and Design Criteria)		Recreational Facilities	1, 2, 3, 4, 5	2B						

Action #	Recovery Action Description	Responsible Parties	Threat Source	Listing Factors (1 - 5)	Action Rank (1A, 1B, 2A, 2B, 3A, 3B)	Task Duration	Fiscal Year Costs ($K)				
							FY1	FY2	FY3	FY4	FY5
	Develop and implement a watershed-wide sediment management plan		Agricultural Development	1, 4	2B						
	Develop and implement a plan to minimize runoff from agricultural activities		Agricultural Effluents	1, 4	2B						
	Develop, adopt, and implement recreational land-use planning policies		Recreational Facilities	1, 2, 3, 4, 5	2B						
	Develop and implement a plan to minimize disturbance of instream habitats and riparian vegetation		Flood Control	1, 4	3B						
	Conduct hydrological analysis		Groundwater Extraction	1, 4	3B						
	Develop and implement a groundwater monitoring program		Groundwater Extraction	1, 4	3B						
	Develop and implement a flood control maintenance program		Levees and Channelization	1, 4	3B						
	Develop and implement a plan to restore natural channel features where feasible		Levees and Channelization	1, 4	3B						
	Develop and implement a plan to assess the impacts of non-native species and develop control measures		Non-Native Species	1, 3, 5	3B						
	Relocate roadways outside of riparian corridor and restore abandoned roadways		Roads	1, 4	3B						
	Retrofit storm drains to filter runoff from roadways		Roads	1, 4	3B						
	Develop, adopt, and implement urban land-use planning policies and standards		Urban Development	1.4	3B						
	Retrofit storm drains in developed areas		Urban Development	1,4	3B						
	Develop and implement a plan to vegetate levees and minimize herbicide use near levees		Levees and Channelization	1, 4							

Action #	Recovery Action Description	Responsible Parties	Threat Source	Listing Factors (1 - 5)	Action Rank (1A, 1B, 2A, 2B, 3A, 3B)	Task Duration	Fiscal Year Costs ($K)				
							FY1	FY2	FY3	FY4	FY5
San Antonio Creek											
	Develop and implement a plan to minimize runoff from agricultural activities		Agricultural Effluents	1, 4	1A						
	Conduct hydrological analysis (groundwater)		Groundwater Extraction	1, 4	1B						
	Develop and implement a groundwater monitoring program		Groundwater Extraction	1, 4	1B						
	Develop and implement an integrated wildland fire and hazardous fuels management plan, including monitoring, remediation and adaptive management, to reduce potentially catastrophic wildland fire effects to steelhead and their habitat and preserve natural ecosystem processes (including sediment deposition)		Wildfires	1, 4, 5	1B						
	Physically modify or remove all fish passage barriers identified in the San Antonio Creek Watershed to allow unimpeded volitional migration of steelhead to upstream spawning and rearing habitats		Culverts and Road Crossings (Passage Barriers)	1, 4	2A						
	Develop and implement a watershed-wide sediment management plan		Agricultural Development	1, 4	2B						
	Develop, adopt, and implement land-use planning policies and standards		Agricultural Development	1,4	2B						
	Relocate agricultural development		Agricultural Development	1,4	2B						
	Relocate livestock grazing and water sources		Agricultural Development	1,4	2B						
	Develop and implement a water management plan		Dams and Surface Water Diversions	1, 3, 4	2B						

Action #	Recovery Action Description	Responsible Parties	Threat Source	Listing Factors (1 - 5)	Action Rank (1A, 1B, 2A, 2B, 3A, 3B)	Task Duration	Fiscal Year Costs ($K)				
							FY1	FY2	FY3	FY4	FY5
	Develop and implement a plan to minimize disturbance of instream habitats and riparian vegetation		Flood Control	1, 4	2B						
	Develop and implement a flood control maintenance program		Levees and Channelization	1, 4	2B						
	Develop and implement a plan to restore natural channel features where feasible		Levees and Channelization	1, 4	2B						
	Develop and implement a plan to vegetate levees and minimize herbicide use near levees		Levees and Channelization	1, 4	2B						
	Develop and implement a non-native species monitoring program		Non-Native Species	1, 3, 5	2B						
	Develop and implement a plan to assess the impacts of non-native species and develop control measures		Non-Native Species	1, 3, 5	2B						
	Develop and implement a public educational program on non-native species impacts		Non-Native Species	1, 3, 5	2B						
	Develop and implement a public educational program		Recreational Facilities	1,3,5	2B						
	Review development and management plans for County recreational areas (e.g., e.g., Camp Comfort) to provide specific provisions for the restoration and protection of the San Antonio Creek riparian/floodplain area		Recreational Facilities	1, 2, 3, 4, 5	2B						
	Review U.S. Forest Service Los Padres National Forest Land Management Plan (Southern California National Forest Vision, Forest Strategy, and Design Criteria)		Recreational Facilities	1, 2, 3, 4, 5	2B						
	Relocate roadways outside of riparian corridor and restore abandoned roadways		Roads	1, 4	2B						

Action #	Recovery Action Description	Responsible Parties	Threat Source	Listing Factors (1 - 5)	Action Rank (1A, 1B, 2A, 2B, 3A, 3B)	Task Duration	Fiscal Year Costs ($K)				
							FY1	FY2	FY3	FY4	FY5
	Develop, adopt, and implement urban land-use planning policies and standards		Urban Development	1.4	2B						
	Retrofit storm drains in developed areas		Urban Development	1,4	2B						
	Review California Regional Water Quality Control Board Central Coast Region Watershed Plans and modify applicable stormwater permits		Urban Effluents	1, 4	2B						
	Review, assess and modify if necessary all NPDES wastewater discharge permits		Urban Effluents	1, 4	2B						
	Develop and implement a plan to minimize runoff from agricultural activities		Agricultural Effluents	1, 4	2B						
	Develop, adopt, and implement recreational land-use planning policies		Recreational Facilities	1, 2, 3, 4, 5	2B						

Table 8-7. Southern California Steelhead DPS Recovery Action Matrix for Santa Clara River Sub-Watersheds (Monte Arido Highlands BPG).

Action #	Recovery Action Description	Responsible Parties	Threat Source	Listing Factors (1 - 5)	Action Rank (1A, 1B, 2A, 2B, 3A, 3B)	Task Duration	Fiscal Year Costs ($K)				
							FY1	FY2	FY3	FY4	FY5
Mainstem Santa Clara											
	Physically modify Vern Freeman Diversion Dam to allow unimpeded volitional migration of steelhead to upstream spawning and rearing habitats		Dams and Surface Water Diversions	1, 3, 4	1A						
	Develop and implement operating criteria to ensure the pattern and magnitude of water releases from Vern Freeman Diversion Dam comport with the natural or pre-dam pattern and magnitude of streamflow		Dams and Surface Water Diversions	1, 3, 4	1A						
	Develop and implement a water management plan		Dams and Surface Water Diversions	1, 3, 4	1B						
	Conduct hydrological analysis (groundwater)		Groundwater Extraction	1, 4	1B						
	Develop and implement a groundwater monitoring program		Groundwater Extraction	1, 4	1B						
	Develop and implement a flood control maintenance program		Levees and Channelization	1, 4	1B						
	Develop and implement a plan to restore natural channel features where feasible		Levees and Channelization	1, 4	1B						
	Develop and implement a plan to vegetate levees and minimize herbicide use near levees		Levees and Channelization	1, 4	1B						
	Develop and implement a restoration and management plan for the Santa Clara River Estuary		Other Recovery Actions	1, 2, 3, 4, 5	1B						
	Review development and management plans for McGrath State Beach to provide for the restoration and protection of the Santa Clara River Watershed, estuary and riparian/floodplain area		Recreational Facilities	1, 2, 3, 4, 5	1B						

Action #	Recovery Action Description	Responsible Parties	Threat Source	Listing Factors (1 - 5)	Action Rank (1A, 1B, 2A, 2B, 3A, 3B)	Task Duration	Fiscal Year Costs ($K)				
							FY1	FY2	FY3	FY4	FY5
	Develop and implement an integrated wildland fire and hazardous fuels management plan, including monitoring, remediation and adaptive management, to reduce potentially catastrophic wildland fire effects to steelhead and their habitat and preserve natural ecosystem processes (including sediment deposition)		Wildfires	1, 4, 5	1B						
	Physically modify or remove all fish passage barriers in the Santa Clara River Watershed to allow unimpeded volitional migration of steelhead to upstream spawning and rearing habitats (see Santa Clara River Steelhead Trout Assessment and Recovery Opportunities, 2005)		Culverts and Road Crossings (Passage Barriers)	1, 4	2A						
	Develop and implement a watershed-wide sediment management plan		Agricultural Development	1, 4,	2B						
	Develop, adopt, and implement land-use planning policies and standards		Agricultural Development	1, 4	2B						
	Develop and implement a plan to minimize runoff from agricultural activities		Agricultural Effluents	1, 4	2B						
	Develop and implement a plan to minimize disturbance of instream habitats and riparian vegetation		Flood Control	1, 4	2B						
	Review and modify aggregate mining operations		Mining and Quarrying	1, 4, 5	2B						
	Develop and implement a non-native species monitoring program		Non-Native Species	1, 3, 5	2B						
	Develop and implement a plan to assess the impacts of non-native species and develop control measures		Non-Native Species	1, 3, 5	2B						
	Review and modify applicable County and/or City Local Coastal Plans		Other Recovery Actions	1, 2, 3, 4, 5	2B						

Action #	Recovery Action Description	Responsible Parties	Threat Source	Listing Factors (1 - 5)	Action Rank (1A, 1B, 2A, 2B, 3A, 3B)	Task Duration	Fiscal Year Costs ($K)				
							FY1	FY2	FY3	FY4	FY5
	Develop and implement a public educational program		Recreational Facilities	1, 2, 3, 4, 5	2B						
	Review development and management plans for all County and City recreational areas (e.g., Olivas Park Golf Course, Buena Ventura Golf Course, River Ridge Golf Club) to provide for the restoration and protection of the Santa Clara River Watershed, estuary and riparian/floodplain area		Recreational Facilities	1, 2, 3, 4, 5	2B						
	Review California Regional Water Quality Control Board Central Coast Region Watershed Plans and modify applicable stormwater permits		Urban Effluents	1, 4	2B						
	Review, assess and modify if necessary all NPDES wastewater discharge permits		Urban Effluents	1, 4	2B						
	Relocate agricultural development		Agricultural Development	1, 4,	2B						
	Relocate livestock grazing and water sources		Agricultural Development	1, 4,	2B						
	Develop and implement a public educational program on non-native species impacts		Non-Native Species	1, 3, 5	2B						
	Review U.S. Forest Service Los Padres National Forest Land Management Plan (Southern California National Forest Vision, Forest Strategy, and Design Criteria)		Recreational Facilities	1, 2, 3, 4, 5	2B						
	Develop, adopt, and implement recreational land-use planning policies		Recreational Facilities	1, 2, 3, 4, 5	3B						
	Relocate roadways outside of riparian corridor and restore abandoned roadways		Roads	1, 4	3B						
	Retrofit storm drains to filter runoff from roadways		Roads	1, 4	3B						

Action #	Recovery Action Description	Responsible Parties	Threat Source	Listing Factors (1 - 5)	Action Rank (1A, 1B, 2A, 2B, 3A, 3B)	Task Duration	Fiscal Year Costs ($K)				
							FY1	FY2	FY3	FY4	FY5
	Develop, adopt, and implement urban land-use planning policies and standards		Urban Development	1, 4	3B						
	Retrofit storm drains in developed areas		Urban Development	1, 4	3B						
Santa Paula Creek											
	Physically modify Harvey Diversion Dam to allow unimpeded volitional migration of steelhead to upstream spawning and rearing habitats		Dams and Surface Water Diversions	1, 3, 4	1A						
	Implement operating criteria to ensure the pattern and magnitude of water releases from Harvey Diversion Dam comport with the natural or pre-dam pattern and magnitude of streamflow		Dams and Surface Water Diversions	1, 3, 4	1A						
	Develop and implement a water management plan		Dams and Surface Water Diversions	1, 3, 4	1B						
	Develop and implement a flood control maintenance program		Levees and Channelization	1, 4	1B						
	Develop and implement a plan to restore natural channel features where feasible		Levees and Channelization	1, 4	1B						
	Develop and implement a plan to vegetate levees and minimize herbicide use near levees		Levees and Channelization	1, 4	1B						
	Develop and implement an integrated wildland fire and hazardous fuels management plan, including monitoring, remediation and adaptive management, to reduce potentially catastrophic wildland fire effects to steelhead and their habitat and preserve natural ecosystem processes (including sediment deposition)		Wildfires	1, 4, 5	1B						
	Develop and implement a watershed-wide sediment management plan		Agricultural Development	1, 4	2B						

Action #	Recovery Action Description	Responsible Parties	Threat Source	Listing Factors (1 - 5)	Action Rank (1A, 1B, 2A, 2B, 3A, 3B)	Task Duration	Fiscal Year Costs ($K)				
							FY1	FY2	FY3	FY4	FY5
	Develop, adopt, and implement land-use planning policies and standards		Agricultural Development	1, 4	2B						
	Develop and implement a plan to minimize runoff from agricultural activities		Agricultural Effluents	1, 4	2B						
	Develop and implement a plan to minimize disturbance of instream habitats and riparian vegetation		Flood Control	1, 4	2B						
	Conduct hydrological analysis (groundwater)		Groundwater Extraction	1, 4	2B						
	Develop and implement a non-native species monitoring program		Non-Native Species	1, 3, 5	2B						
	Develop and implement a public educational program		Recreational Facilities	1, 2, 4	2B						
	Review development and management plans for all County and City recreational areas (e.g., Steckel Park) to provide for the restoration and protection of the Santa Clara River Watershed, estuary and riparian/floodplain area		Recreational Facilities	1, 2, 3, 4, 5	2B						
	Relocate roadways outside of riparian corridor and restore abandoned roadways		Roads	1, 4	2B						
	Develop, adopt, and implement urban land-use planning policies and standards		Urban Development	1, 4	2B						
	Retrofit storm drains in developed areas		Urban Development	1, 4	2B						
	Review California Regional Water Quality Control Board Central Coast Region Watershed Plans and modify applicable stormwater permits		Urban Effluents	1, 4	2B						
	Review, assess and modify if necessary all NPDES wastewater discharge permits		Urban Effluents	1, 4	2B						

Action #	Recovery Action Description	Responsible Parties	Threat Source	Listing Factors (1 - 5)	Action Rank (1A, 1B, 2A, 2B, 3A, 3B)	Task Duration	Fiscal Year Costs ($K)				
							FY1	FY2	FY3	FY4	FY5
	Relocate agricultural development		Agricultural Development	1, 4,	2B						
	Relocate livestock grazing and water sources		Agricultural Development	1, 4,	2B						
	Develop and implement a public educational program on non-native species impacts		Non-Native Species	1, 3, 5	2B						
	Review U.S. Forest Service Los Padres National Forest Land Management Plan (Southern California National Forest Vision, Forest Strategy, and Design Criteria)		Recreational Facilities	1, 2, 3, 4, 5	2B						
	Physically modify or remove all fish passage barriers in the Santa Clara River Watershed to allow unimpeded volitional migration of steelhead to upstream spawning and rearing habitats (see Santa Clara River Steelhead Trout Assessment and Recovery Opportunities, 2005)		Culverts and Road Crossings (Passage Barriers)	1, 4	3A						
	Review and modify aggregate mining operations		Mining and Quarrying	1, 4, 5	3B						
	Develop and implement a plan to assess the impacts of non-native species and develop control measures		Non-Native Species	1, 3, 5	3B						
Sespe Creek											
	Develop and implement a water management plan		Dams and Surface Water Diversions	1, 3, 4	1B						
	Conduct hydrological analysis (groundwater)		Groundwater Extraction	1, 4	1B						
	Develop and implement a groundwater monitoring program		Groundwater Extraction	1, 4	1B						

Action #	Recovery Action Description	Responsible Parties	Threat Source	Listing Factors (1 - 5)	Action Rank (1A, 1B, 2A, 2B, 3A, 3B)	Task Duration	Fiscal Year Costs ($K)				
							FY1	FY2	FY3	FY4	FY5
	Develop and implement an integrated wildland fire and hazardous fuels management plan, including monitoring, remediation and adaptive management, to reduce potentially catastrophic wildland fire effects to steelhead and their habitat and preserve natural ecosystem processes (including sediment deposition)		Wildfires	1, 4, 5	1B						
	Develop and implement a watershed-wide sediment management plan		Agricultural Development	1, 4	2B						
	Develop, adopt, and implement land-use planning policies and standards		Agricultural Development	1, 4	2B						
	Develop and implement a plan to minimize runoff from agricultural activities		Agricultural Effluents	1, 4	2B						
	Develop and implement a plan to minimize disturbance of instream habitats and riparian vegetation		Flood Control	1, 4	2B						
	Develop and implement a flood control maintenance program		Levees and Channelization	1, 4	2B						
	Develop and implement a plan to restore natural channel features where feasible		Levees and Channelization	1, 4	2B						
	Develop and implement a plan to vegetate levees and minimize herbicide use near levees		Levees and Channelization	1, 4	2B						
	Review and modify aggregate mining operations		Mining and Quarrying	1, 4, 5	2B						
	Develop and implement a non-native species monitoring program		Non-Native Species	1, 3, 5	2B						
	Develop and implement a plan to assess the impacts of non-native species and develop control measures		Non-Native Species	1, 3, 5	2B						
	Develop and implement a public educational program		Recreational Facilities	1, 2, 3, 4, 5	2B						

Action #	Recovery Action Description	Responsible Parties	Threat Source	Listing Factors (1 - 5)	Action Rank (1A, 1B, 2A, 2B, 3A, 3B)	Task Duration	Fiscal Year Costs ($K)				
							FY1	FY2	FY3	FY4	FY5
	Review development and management plans for U.S. Forest Service Los Padres National Forest to provide for the restoration and protection of the Santa Clara River Watershed, estuary and riparian/floodplain area		Recreational Facilities	1, 2, 3, 4, 5	2B						
	Review California Regional Water Quality Control Board Central Coast Region Watershed Plans and modify applicable stormwater permits		Urban Effluents	1, 4	2B						
	Relocate agricultural development		Agricultural Development	1, 4,	2B						
	Relocate livestock grazing and water sources		Agricultural Development	1, 4,	2B						
	Develop and implement a public educational program on non-native species impacts		Non-Native Species	1, 3, 5	2B						
	Review U.S. Forest Service Los Padres National Forest Land Management Plan (Southern California National Forest Vision, Forest Strategy, and Design Criteria)		Recreational Facilities	1, 2, 3, 4, 5	2B						
	Physically modify or remove all fish passage barriers in the Santa Clara River Watershed to allow unimpeded volitional migration of steelhead to upstream spawning and rearing habitats (see Santa Clara River Steelhead Trout Assessment and Recovery Opportunities, 2005)		Culverts and Road Crossings (Passage Barriers)	1, 4	3A						
	Relocate roadways outside of riparian corridor and restore abandoned roadways		Roads	1, 4	3B						
	Retrofit storm drains to filter runoff from roadways		Roads	1, 4	3B						

Action #	Recovery Action Description	Responsible Parties	Threat Source	Listing Factors (1 - 5)	Action Rank (1A, 1B, 2A, 2B, 3A, 3B)	Task Duration	Fiscal Year Costs ($K)				
							FY1	FY2	FY3	FY4	FY5
	Review, assess and modify if necessary all NPDES wastewater discharge permits (e.g., Cuyama Community Sanitation District Treatment Facility)		Urban Effluents	1, 4	3B						
	Develop, adopt, and implement urban land-use planning policies and standards		Urban Development	1, 4							
	Retrofit storm drains in developed areas		Urban Development	1, 4							
Piru Creek											
	Physically modify Santa Felicia and Pyramid dams to allow unimpeded volitional migration of steelhead to upstream spawning and rearing habitats		Dams and Surface Water Diversions	1, 3, 4	1A						
	Develop and implement operating criteria to ensure the pattern and magnitude of water releases from Santa Felicia and Pyramid dams comport with the natural or pre-dam pattern and magnitude of streamflow		Dams and Surface Water Diversions	1, 3, 4	1A						
	Develop and implement a flood control maintenance program		Levees and Channelization	1, 4	1A						
	Develop and implement a plan to vegetate levees and minimize herbicide use near levees		Levees and Channelization	1, 4	1A						
	Develop and implement a plan to restore natural channel features where feasible		Levees and Channelization	1, 4	1B						
	Review and modify aggregate mining operations		Mining and Quarrying	1, 4, 5	1B						
	Develop and implement an integrated wildland fire and hazardous fuels management plan, including monitoring, remediation and adaptive management, to reduce potentially catastrophic wildland fire effects to steelhead and their habitat and preserve natural ecosystem processes (including sediment deposition)		Wildfires	1, 4, 5	1B						

Action #	Recovery Action Description	Responsible Parties	Threat Source	Listing Factors (1 - 5)	Action Rank (1A, 1B, 2A, 2B, 3A, 3B)	Task Duration	Fiscal Year Costs ($K)				
							FY1	FY2	FY3	FY4	FY5
	Develop and implement a watershed-wide sediment management plan		Agricultural Development	1, 4	2B						
	Develop, adopt, and implement land-use planning policies and standards		Agricultural Development	1, 4	2B						
	Develop and implement a plan to minimize runoff from agricultural activities		Agricultural Effluents	1, 4	2B						
	Conduct hydrological analysis (groundwater)		Groundwater Extraction	1, 4	2B						
	Develop and implement a groundwater monitoring program		Groundwater Extraction	1, 4	2B						
	Develop and implement a non-native species monitoring program		Non-Native Species	1, 3, 5	2B						
	Develop and implement a plan to assess the impacts of non-native species and develop control measures		Non-Native Species	1, 3, 5	2B						
	Develop and implement a public educational program		Recreational Facilities	1, 2, 4	2B						
	Review development and management plans for City, United Water Conservation District and U.S. Forest Service Los Padres National Forest recreational areas to provide for the restoration and protection of the Santa Clara River Watershed, estuary and riparian/floodplain area		Recreational Facilities	1, 2, 3, 4, 5	2B						
	Develop, adopt, and implement urban land-use planning policies and standards		Urban Development	1, 4	2B						
	Retrofit storm drains in developed areas		Urban Development	1, 4	2B						
	Review California Regional Water Quality Control Board Central Coast Region Watershed Plans and modify applicable stormwater permits		Urban Effluents	1, 4	2B						

Action #	Recovery Action Description	Responsible Parties	Threat Source	Listing Factors (1 - 5)	Action Rank (1A, 1B, 2A, 2B, 3A, 3B)	Task Duration	Fiscal Year Costs ($K)				
							FY1	FY2	FY3	FY4	FY5
	Relocate agricultural development		Agricultural Development	1, 4,	2B						
	Relocate livestock grazing and water sources		Agricultural Development	1, 4,	2B						
	Develop and implement a public educational program on non-native species impacts		Non-Native Species	1, 3, 5	2B						
	Review U.S. Forest Service Los Padres National Forest Land Management Plan (Southern California National Forest Vision, Forest Strategy, and Design Criteria)		Recreational Facilities	1, 2, 3, 4, 5	2B						
	Physically modify or remove all fish passage barriers in the Santa Clara River Watershed to allow unimpeded volitional migration of steelhead to upstream spawning and rearing habitats (see Santa Clara River Steelhead Trout Assessment and Recovery Opportunities, 2005)		Culverts and Road Crossings (Passage Barriers)	1, 4	3A						
	Develop and implement a plan to minimize disturbance of instream habitats and riparian vegetation		Flood Control	1, 4	3B						
	Relocate roadways outside of riparian corridor and restore abandoned roadways		Roads	1, 4	3B						
	Retrofit storm drains to filter runoff from roadways		Roads	1, 4	3B						
	Review, assess and modify if necessary all NPDES wastewater discharge permits		Urban Effluents	1, 4	3B						

9. Conception Coast Biogeographic Population Group

"Assessment at the group level indicates a priority for securing inland populations in southern Coast Ranges and Transverse Ranges, and a need to maintain not just the fluvial-anadromous life-history form, but also lagoon-anadromous and freshwater-resident forms in each population."

NOAA Fisheries Technical Recovery Team
Viability Criteria for South-Central and Southern California, 2007

9.1 LOCATION AND PHYSICAL CHARACTERISTICS

The Conception Coast BPG region encompasses eight small, coastal watersheds that drain a 50-mile long stretch of the south-facing slopes of the Santa Ynez Mountains in southern Santa Barbara County and extreme southwestern Ventura County (Figure 9-1). The Santa Ynez Mountains are an east-west trending spur of the Transverse Range that creates some of the steepest watersheds in any of the five BPG regions in the SCS Recovery Planning Area. Peak elevations reach 4,300 feet within a few miles of the Pacific Ocean. These watersheds are relatively homogeneous in slope, aspect, and size, with steep upper watersheds and lower watersheds that cut across a relatively narrow coastal terrace.

Stream lengths are relatively short in this BPG region. The Gaviota Creek watershed penetrates the furthest inland (about seven miles). Goleta Slough, the largest estuary in this BPG region, is formed by the confluence of several sub-watersheds: Tecolotito Creek, Los Carneros Creek, San Pedro Creek, Las Vegas Creek, Maria Ygnacio Creek, San Jose Creek, and Atascadero Creek. Of these, the latter three watersheds were evaluated using the CAP analyses. The second largest estuary in this BPG region, Carpinteria Slough, is formed by a synclinal Watershed fed by Santa Monica Creek and several minor drainages that are not included in the watersheds covered in the Conception Coast BPG region. Precipitation in this region increases strongly with increasing elevation. Rainfall amounts in the upper watersheds can be five to six times higher than on the coastal terrace of these watersheds during the same storm event, and the steep topography creates extremely "flashy" flows.

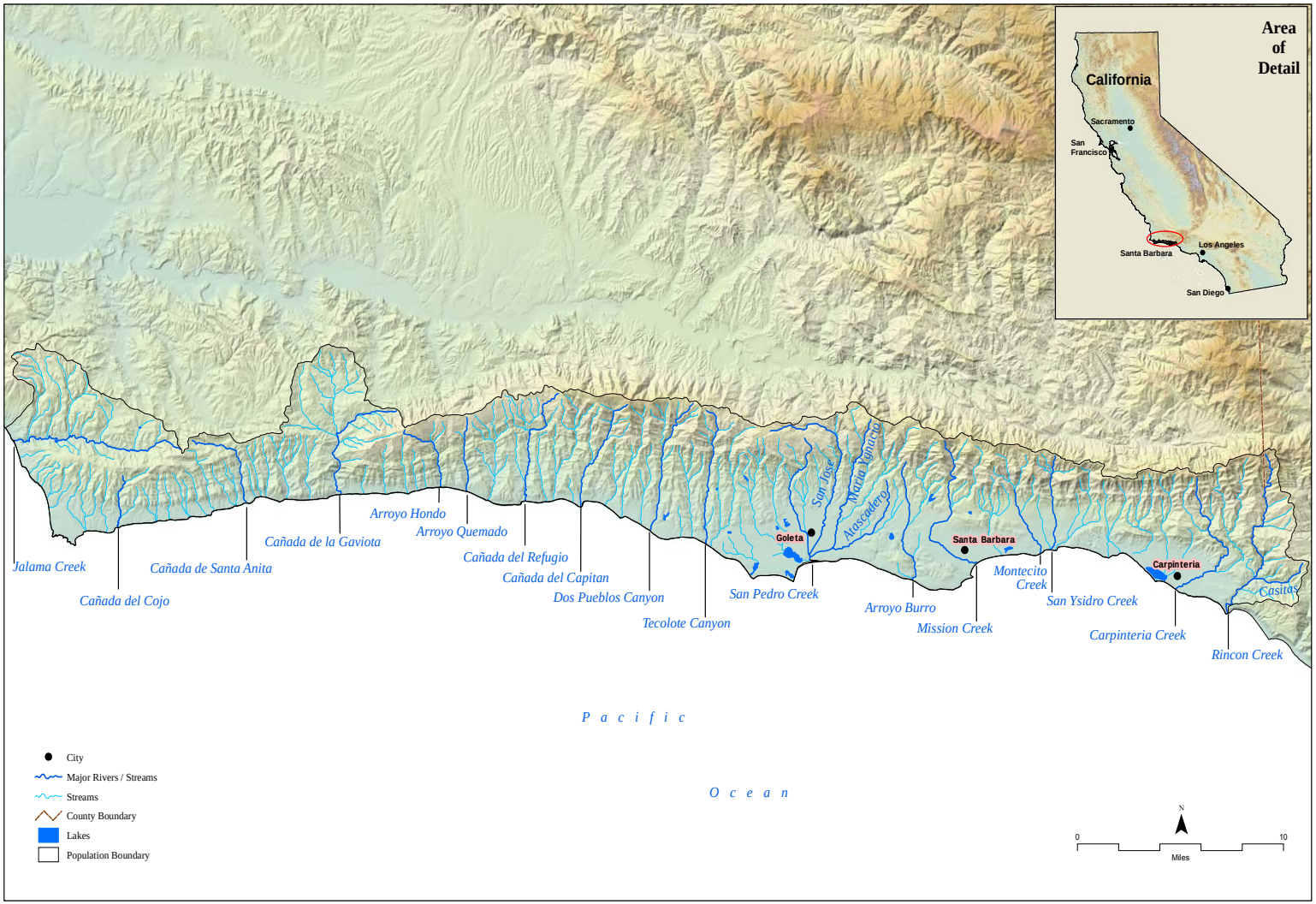

Figure 9-1. The Conception Coast BPG region. Ten steelhead populations/watersheds were analyzed in this region.

9.2 LAND USE

Table 9-1 summarizes land use and population density in this region. The coastal terrace and middle portions of these watersheds receive the most intensive land use. Human population density varies widely between the component watersheds, averaging about 605 persons per square mile over the entire BPG region. The western half of the BPG region has very low population density (1 to 59 persons/square mile), while the Goleta Slough and Mission Creek watersheds average 1,201 and 3,491 persons per square mile, respectively (see Table 9-1 for additional comparisons).

In most of the watersheds in this BPG region, the first land use change was livestock ranching and dry farming, followed by irrigated row-crop agriculture, particularly orchard crops such as avocados, lemons, and walnuts. Most recently, steeper slopes in the middle reaches of some watersheds have been developed with avocado and other orchard crops. Urbanization followed this trend on the coastal plain in the eastern half of this BPG region then moved up into the more mountainous portions of the watersheds as cities grew in size. The upper watersheds throughout this region are located within the Los Padres National Forest; whereas the coastal and middle watersheds are mostly privately owned. Semi-developed rural land and orchards cover extensive portions of the coastal and middle portions of the western watersheds. Most of the Arroyo Hondo watershed has recently been put under a conservation easement and is managed by the Land Trust of Santa Barbara County.

A number of coastal areas in this region have been developed as County and State Parks, including Jalama Beach County Park (Jalama Creek), Gaviota State Beach (Gaviota Creek), Refugio State Beach (Refugio Creek), El Capitan State Beach (El Capitan Creek), Goleta Beach County Park (mouth of Goleta Slough), Arroyo Burro Beach County Park (Arroyo Burro Creek), City of Santa Barbara beaches (east and west of mouth of Mission Creek), Carpinteria State Beach (Carpinteria Creek), and Rincon Beach County Park (Rincon Creek). Each of these parks is located around the mouth of these drainages, including the estuary.

Agriculture (orchard cultivation and livestock ranching), are important land uses that directly or indirectly impact watershed processes throughout these watersheds. Most of the municipal water for Goleta, Santa Barbara, Montecito, Summerland, and Carpinteria is supplied by reservoirs on the middle and upper mainstem of the Santa Ynez River on the north side of the Santa Ynez Range. This municipal water source is supplemented by groundwater wells located throughout the coastal terrace. The ranches that support irrigated orchard crops in these watersheds also depend heavily on groundwater as their source for agricultural water. Some large ranches have diversions and dams on their property to create reservoirs for agricultural use (*e.g.*, Glen Annie Canyon, an unnamed tributary of Dos Pueblos Creek, and Gato Creek).

Some of these reservoirs support small populations of bullfrogs and non-native predatory fish (*e.g.*, Dos Pueblos Creek tributary reservoir), but the majority of the drainages in these watersheds are relatively free from these predators. Non-native crayfish and western mosquitofish, which may prey on *O. mykiss* eggs, occur in many urbanized drainages. Tecolotito Creek in the Goleta Slough watershed supports a reproducing population of African clawed frogs (*Xenopus laevis*), which may be a predator on certain *O. mykiss* life-stages.

Table 9-1. Physical and Land-Use Characteristics of Watersheds in the Conception Coast BPG region.

PHYSICAL CHARACTERISTICS						LAND USE			
WATERSHEDS (west to east)	**Area** (acres)[1]	**Area** (sq. miles)[1]	**Stream Length**[2] (miles)	**Ave. Ann. Rainfall**[3] (inches)	**Total Human Population**	**Public Ownership***	**Urban Area**[5]	**Agriculture/ Barren**[5]	**Open Space**[5]
Jalama Creek	15800	25	45	17.4	59			< 1%	
Canada de Santa Anita	2067	3	5	17.4	16			< 1%	
Gaviota Creek	12912	20	39	17.5	40			1%	
Arroyo Hondo	2796	4	6	17.8	1			< 1%	
Tecolote Creek	3726	6	11	19	339			18%	
Goleta Slough**	30410	48	92	19.2	57,664			16%	
Mission Creek	7760	12	16	19.6	41,890			3%	
Montecito Creek	3970	6	11	19.5	2,453			< 1%	
Carpinteria Creek	10712	17	25	19.8	3,493			20%	
Rincon Creek	9422	15	25	19.3	324			23%	
TOTAL or AVERAGE	**213099**	**333**	**560*** **	**18.6**	**201,459*** **		**16%**	**8%**	**74%**

[1] From: CDFFP CalWater 2.2 Watershed delineation, 1999 (www.ca.nrcs.usda.gov/features/calwater/)
[2] From: CDFG 1:1,000,000 Routed stream network, 2003 (www.calfish.org/)
[3] From: USGS Hydrologic landscape regions of the U.S., 2003 (1 km grid cells)
[4] From: CDFFP Census 2000 block data (migrated), 2003
[5] From: CDFFP Multi-source land cover data (v02_2), 2002 (100 m grid cells) (http://frap.cdf.ca.gov/data/frapgisdata/select.asp)
** Includes National Forest Lands only; does not include State or County Parks or Military Reservations (from: http://old.casil.ucdavis.edu/casil/gis.ca.gov/teale/govtowna/)*
** Goleta Slough" includes analyses only for San Jose, San Pedro, Maria Ygnacio, and Atascadero creeks.
**** Total for entire BPG region, not component watersheds.*

9.3 CURRENT WATERSHED CONDITIONS

Watershed conditions were assessed for ten watersheds in the Conception Coast BPG region. In general, instream, riparian, and floodplain conditions for steelhead in these watersheds offer fair to good habitat conditions for anadromous *O. mykiss*, although conditions vary widely within and between watersheds, depending on land uses. The upper watersheds consistently support good to excellent quality spawning and rearing habitat; however, conditions in each of these watersheds deteriorate downstream on the coastal plain. Highway 101 and the Union Pacific Railroad tracks traverse the mainstem of each of these watersheds at or in close proximity to their mouths, which has damaged estuarine habitat and created passage impediments for anadromous *O. mykiss*. Agricultural activities, such as groundwater extraction, have reduced surface flows and degraded habitat conditions in the lower and middle portions of these watersheds. Urban development dominates the lower reaches of the Goleta Slough, Mission Creek, Montecito Creek, and Carpinteria Creek watersheds. Several photographs of the Conception Coast BPG region are provided in Figure 9-2.

Most of these watersheds also exhibit high road densities. The Arroyo Hondo watershed provides the least disturbed conditions for steelhead in this BPG because of low-intensity land use and its inclusion in a natural reserve system managed by the Land Trust of Santa Barbara County. The Goleta Slough watershed (San Jose, San Pedro, Maria Ygnacio, and Atascadero creeks) and the Mission Creek and Rincon Creek watersheds exhibit the least favorable conditions; however, their upper watersheds sustain reproducing populations of non-anadromous *O. mykiss* and occasionally anadromous forms despite urbanization, channelization, channel maintenance, and other urban land uses throughout their lower reaches.

The terrain of the Santa Ynez Mountains results in development on steep slopes, often accompanied by road cuts to provide access, thus affecting watershed processes such as erosion and sedimentation. Development has also occurred along narrow riparian corridors, which encourages bank stabilization, levee construction, and other flood control activities that physically constrain the ability of streams to maintain natural channel morphology and riparian vegetation.

Estuarine habitats at the mouths of these watersheds in this BPG region have been reduced in size by 70 percent to 95 percent by the development of roads and railroads, urbanization, and development of recreational facilities. Historically, these estuaries were relatively small with two notable exceptions. Goleta Slough, formed by the confluence of several watersheds, and the estuary associated with Mission Creek, comprised extensive wetland habitats in this BPG region, encompassing thousands of acres. The remaining estuarine habitats are subject to constriction and isolation by development, surface runoff from roads and other impervious surfaces, as well as a reduction in the amount and quality of surface flows resulting from groundwater extraction.

Figure 9-2. Photographs of Conception Coast BPG region.

Santa Ynez Mountains

Rincon Creek

Mission Creek

Mission Creek Estuary

9.4 THREATS AND THREAT SOURCES

Varying numbers and intensity of habitat impairments (sources of threats) were identified in the CAP Workbooks analyses, ranging from 10 in the Gaviota Creek and Arroyo Hondo watersheds to 17 in the Rincon Creek watershed. "Severe" and "Very Severe" sources of threats exist in all of the watersheds in this BPG region, but the Arroyo Hondo watershed has the least number and severity of threats for anadromous *O. mykiss*. Threat sources are concentrated in the middle and lower portions of the watersheds and are associated with urban and agricultural development. The number and severity of threats generally diminishes in the upper, undeveloped portion of these watersheds. Anadromous and non-anadromous *O. mykiss* spawn in the upper reaches of most, and even in the degraded lower reaches of some of these drainages, such as Maria Ygnacio, Mission, and Carpinteria creeks.

Thirteen anthropogenic activities, all strongly associated with urban and agricultural development, ranked as the top five sources of stress to *O. mykiss* in the Conception Coast BPG watersheds (Table 9-2). Road density, including roads in close proximity to stream riparian zones, and passage barriers associated with transportation corridors, consistently ranked as "Severe" to "Very Severe" threat sources. Proximal stressors associated with increased road density, especially roads near the drainage, include increased non-point pollution, sedimentation, substrate embeddedness, floodplain encroachment and constriction, channel incision, and loss of channel structural complexity.

Increased road density also leads to increased frequency of road crossings, culverts, and other structures that can form passage barriers, preventing anadromous *O. mykiss* from accessing spawning and rearing habitat. As previously stated, Highway 101 and the Union Pacific Railroad tracks cross the mainstem of each of these watersheds near their mouths, in most cases through culverts. Highway 101 and the railroad tracks typically crossed these drainages by filling streambeds with earthen berms and forcing streams to flow through culverts of varying lengths. In some cases, construction of these transportation corridors reduced the extent of estuarine habitat. The Highway 101 culvert on Rincon Creek and a number of other creeks is an impassable barrier preventing anadromous *O. mykiss* from reaching spawning and rearing habitat and isolating formerly anadromous populations in the upper watershed.

Groundwater extraction for municipal and agricultural use also is a pervasive threat source among these watersheds. Widespread pumping of groundwater routinely eliminates surface flows and de-waters pools in portions of most of these drainages. The magnitude of loss of surface flows and the severity of passage barriers is exacerbated during years of below-average precipitation. These effects negatively impact multiple *O. mykiss* life stages (*e.g.*, development of eggs, alevins, fry, and parr).

Increasing urbanization of the Tecolote Creek, Goleta Slough, Mission Creek, Montecito Creek, and Carpinteria Creek watersheds creates a number of threat sources ranging from increased road density to floodplain encroachment and the increased need for flood control structures, such as levees and channelization, and greater channel maintenance.

Five other threat sources are specific to one or two watersheds and have seriously degraded habitat conditions for steelhead there. For example, past quarrying activities in Rincon Creek have created a rock barrier that completely blocks upstream migration of anadromous *O. mykiss* and severely impedes downstream migration of resident non-anadromous *O. mykiss* above this barrier. Fire has recently burned much of the Gaviota Creek watershed and erosion of burned slopes in the watershed is a significant, though diminishing source of sediment. Gaviota State Beach campground was developed along the shores of the estuary at the mouth of the Gaviota Creek watershed and has affected the size of the estuary, degraded water quality, and created a severe passage impediment at a road crossing that provides access to Gaviota State Beach campground and Hollister Ranch. Jalama Creek and Canada de Santa Anita have dams or other severe passage impediments on their mainstems and tributaries.

9.5 SUMMARY

Culverts and road crossing (along with other fish passage barriers such as small dams) are widespread throughout the Conception Coast BPG region, cutting off or severely reducing access to upstream spawning and rearing habitats for anadromous *O. mykiss*. Groundwater extraction has significantly altered flow regimes, particularly in the lower stream reaches, and thus adversely affected both upstream and downstream fish passage and spawning and rearing opportunities. Levees and channelization associated with urban encroachment have restricted or eliminated riparian habitat, and urban and agricultural development (particularly on steep slopes) has altered run-off patterns and increased erosion and sedimentation, particularly in lower stream reaches. Table 9-3 summarizes the critical recovery actions needed within the Core 1 populations of this BPG.

Table 9-2. Threat source rankings in component watersheds in the Conception Coast BPG region (see CAP Workbooks for individual watersheds for details).

Threat Sources	Conception Coast BPG Component Watersheds (east to west)									
	Jalama Creek	Canada de Santa Anita	Gaviota Creek	Arroyo Hondo	Tecolote Creek	Goleta Slough*	Mission Creek	Monte-cito Creek	Carpinteria Creek	Rincon Creek
Roads										
Culverts & Crossings (passage barrier)										
Groundwater Extraction										
Levees and Channelization										
Urban Development										
Wildfires										
Recreational Facilities										
Non-Point Pollution										
Flood Control										
Mining and Quarrying										
Agricultural Development										
Dams and Surface Water Diversions										
Livestock Ranching										

Key: Threat cell colors represent threat rating from CAP Workbook: Red = Very High threat; Yellow = High threat; Light green = Medium threat; Dark green = Low threat.

** Wildfires were not identified during the CAP Workbook analyses as one of the top five threats in several of these watersheds, but recent fires in coastal watershed sin 2007 could result in significant habitat impacts.*

Table 9-3. Critical recovery actions for Core 1 populations within the Conception Coast BPG.

POPULATION	CRITICAL RECOVERY ACTION
Mission Creek	Halt the unnatural dry-season reduction in the amount and extent of surface water to restore natural or pre-impact over-summering habitat characteristics and condition for steelhead. Physically modify road crossings, highways, and railways to allow unimpeded volitional migration of steelhead to upstream spawning and rearing habitats. Identify, protect, and where necessary restore estuarine and freshwater rearing habitats.
Carpinteria Creek	Halt the unnatural dry-season reduction in the amount and extent of surface water to restore natural or pre-impact over-summering habitat characteristics and condition for steelhead. Physically modify road crossings, highways, and railways to allow unimpeded volitional migration of steelhead to upstream spawning and rearing habitats. Identify, protect, and where necessary restore estuarine and freshwater rearing habitats.
Rincon Creek	Halt the unnatural dry-season reduction in the amount and extent of surface water to restore natural or pre-impact over-summering habitat characteristics and condition for steelhead. Physically modify road crossings, highways, and railways to allow unimpeded volitional migration of steelhead to upstream spawning and rearing habitats. Identify, protect, and where necessary restore estuarine and freshwater rearing habitats.

Restoring conditions for anadromous *O. mykiss* passage, spawning, and/or rearing in these watersheds will require multiple, long-term, measures related to water management, and barrier removal or improvements. Impediments to fish passage stemming from the construction and maintenance of roads and other transportation corridors, privately-owned dams and other passage barriers on some drainages, groundwater extraction, modification of channel morphology and adjacent riparian habitats for flood control, and other instream activities need to be further evaluated for this BPG. Additionally, the loss of estuarine functions caused by filling and pollution from point and non-point agricultural and other anthropogenic waste discharges need to be addressed further in this region.

The threat sources discussed in this section should be the focus of a variety of recovery actions to address specific stresses on anadromous *O. mykiss* viability. Spatial and temporal data acquired on specific indicators associated with threat sources or stresses such as water temperature, pH, nutrients, *etc.*, are generally inadequate to be the target of specific recovery actions. This type of data acquisition should be the subject of site-specific investigations in order to refine the primary recovery actions or to target additional recovery actions as part of any recovery strategy for the Conception Coast. Tables 9-4 through 9-13 below rank and describe proposed recovery actions for each sub-watershed in the Conception Coast BPG including the estimated cost for implementing such actions over the first five fiscal years.

Table 9-4. Southern California Steelhead DPS Recovery Action Matrix for the Jalama Creek Watershed (Conception Coast BPG).

Action #	Recovery Action Description	Responsible Parties	Threat Source	Listing Factors (1 - 5)	Action Rank (1A, 1B, 2A, 2B, 3A, 3B)	Task Duration	Fiscal Year Costs ($K)				
							FY1	FY2	FY3	FY4	FY5
	Physically modify road crossings, highways, and railways to allow unimpeded volitional migration of steelhead to upstream spawning and rearing habitats		Culverts and Road Crossings (Passage Barriers)	1, 4	1A						
	Develop and implement an integrated wildland fire and hazardous fuels management plan, including monitoring, remediation and adaptive management, to reduce potentially catastrophic wildland fire effects to steelhead and their habitat and preserve natural ecosystem processes (including sediment deposition)		Wildfires	1, 4, 5	1B						
	Conduct hydrological analysis (groundwater)		Groundwater Extraction	1, 4	2B						
	Develop and implement a groundwater monitoring program		Groundwater Extraction	1, 4	2B						
	Develop and implement a restoration and management plan for the Jalama Creek Estuary		Other Recovery Actions	1, 2, 3, 4, 5	2B						
	Review, assess and modify if necessary all NPDES wastewater discharge permits		Urban Effluents	1, 4	2B						
	Develop and implement a watershed-wide sediment management plan		Agricultural Development	1, 4	3B						
	Relocate livestock grazing and water sources		Agricultural Development	1, 4,	3B						
	Develop and implement a flood control maintenance program		Levees and Channelization	1, 4	3B						
	Develop and implement a stream bank and riparian corridor restoration plan		Levees and Channelization	1, 4	3B						
	Develop and implement a watershed-wide plan to assess the impacts of non-native species and develop control measures		Non-Native Species	1, 3, 5	3B						
	Develop and implement a non-native species monitoring program		Non-Native Species	1, 3, 5	3B						

Action #	Recovery Action Description	Responsible Parties	Threat Source	Listing Factors (1 - 5)	Action Rank (1A, 1B, 2A, 2B, 3A, 3B)	Task Duration	Fiscal Year Costs ($K)				
							FY1	FY2	FY3	FY4	FY5
	Develop and implement a public educational program on non-native species impacts		Non-Native Species	1, 3, 5	3B						
	Review and modify applicable County and/or City Local Coastal Plans		Other Recovery Actions	1, 2, 3, 4, 5	3B						
	Relocate roadways outside of riparian corridor and restore abandoned roadways		Roads	1, 4	3B						
	Retrofit storm drains to filter runoff from roadways		Roads	1, 4	3B						
	Develop, adopt, and implement urban land-use planning policies and standards		Urban Development	1, 4	3B						
	Retrofit storm drains in developed areas		Urban Development	1, 4	3B						
	Review California Regional Water Quality Control Board Los Angeles Region Watershed Plans and modify applicable stormwater permits		Urban Effluents	1, 4	3B						

Table 9-5. Southern California Steelhead DPS Recovery Action Matrix for the Canada de Santa Anita Creek Watershed (Conception Coast BPG).

Action #	Recovery Action Description	Responsible Parties	Threat Source	Listing Factors (1 - 5)	Action Rank (1A, 1B, 2A, 2B, 3A, 3B)	Task Duration	Fiscal Year Costs ($K)				
							FY1	FY2	FY3	FY4	FY5
	Physically modify road crossings, highways, and railways to allow unimpeded volitional migration of steelhead to upstream spawning and rearing habitats		Culverts and Road Crossings (Passage Barriers)	1, 4	1A						
	Develop and implement an integrated wildland fire and hazardous fuels management plan, including monitoring, remediation and adaptive management, to reduce potentially catastrophic wildland fire effects to steelhead and their habitat and preserve natural ecosystem processes (including sediment deposition)		Wildfires	1, 4, 5	1B						
	Develop and implement a watershed-wide plan to assess the impacts of non-native species and develop control measures		Non-Native Species	1, 3, 5	2B						
	Develop and implement a plan to remove or reduce approach-fill for Union Pacific Railroad line and Hollister Ranch Road		Roads	1, 4	2B						
	Review, assess and modify if necessary all NPDES wastewater discharge permits		Urban Effluents	1, 4, 5	2B						
	Develop and implement a watershed-wide sediment management plan		Agricultural Development	1, 4	3B						
	Relocate livestock grazing and water sources		Agricultural Development	1, 4,	3B						
	Conduct hydrological analysis (groundwater)		Groundwater Extraction	1, 4	3B						
	Develop and implement a groundwater monitoring program		Groundwater Extraction	1, 4	3B						
	Develop and implement a flood control maintenance program		Levees and Channelization	1, 4	3B						

Action #	Recovery Action Description	Responsible Parties	Threat Source	Listing Factors (1 - 5)	Action Rank (1A, 1B, 2A, 2B, 3A, 3B)	Task Duration	Fiscal Year Costs ($K)				
							FY1	FY2	FY3	FY4	FY5
	Develop and implement a stream bank and riparian corridor restoration plan		Levees and Channelization	1, 4	3B						
	Develop and implement a non-native species monitoring program		Non-Native Species	1, 3, 5	3B						
	Develop and implement a public educational program on non-native species impacts		Non-Native Species	1, 3, 5	3B						
	Develop and implement a restoration and management plan for the Santa Anita Creek Estuary		Other Recovery Actions	1, 2, 3, 4, 5	3B						
	Review and modify applicable County and/or City Local Coastal Plans		Other Recovery Actions	1, 3, 4, 5	3B						
	Relocate roadways outside of riparian corridor and restore abandoned roadways		Roads	1, 4	3B						
	Develop, adopt, and implement urban land-use planning policies and standards		Urban Development	1, 4	3B						
	Retrofit storm drains in developed areas		Urban Development	1, 4	3B						
	Review California Regional Water Quality Control Board Los Angeles Region Watershed Plans and modify applicable stormwater permits		Urban Effluents	1, 4, 5	3B						

Table 9-6. Southern California Steelhead DPS Recovery Action Matrix for the Gaviota Creek Watershed (Conception Coast BPG).

Action #	Recovery Action Description	Responsible Parties	Threat Source	Listing Factors (1 - 5)	Action Rank (1A, 1B, 2A, 2B, 3A, 3B)	Task Duration	Fiscal Year Costs ($K)				
							FY1	FY2	FY3	FY4	FY5
	Physically modify road crossings, highways, and railways to allow unimpeded volitional migration of steelhead to upstream spawning and rearing habitats		Culverts and Road Crossings (Passage Barriers)	1, 4	1A						
	Develop and implement a restoration and management plan for the Gaviota Creek Estuary		Other Recovery Actions	1, 2, 3, 4, 5	1B						
	Develop and implement an integrated wildland fire and hazardous fuels management plan, including monitoring, remediation and adaptive management, to reduce potentially catastrophic wildland fire effects to steelhead and their habitat and preserve natural ecosystem processes (including sediment deposition)		Wildfires	1, 4, 5	1B						
	Conduct hydrological analysis (groundwater)		Groundwater Extraction	1, 4	2B						
	Develop and implement a groundwater monitoring program		Groundwater Extraction	1, 4	2B						
	Develop and implement a flood control maintenance program		Levees and Channelization	1, 4	2B						
	Develop and implement a stream bank and riparian corridor restoration plan		Levees and Channelization	1, 4	2B						
	Relocate roadways outside of riparian corridor and restore abandoned roadways. Re-route existing Gaviota State Beach/Hollister Ranch access road and replace existing road crossings with clear span bridge		Roads	1, 4	2B						
	Retrofit storm drains to filter runoff from roadways (i.e., highway 101)		Roads	1, 4	2B						
	Develop, adopt, and implement urban land-use planning policies and standards		Urban Development	1, 4	2B						

Action #	Recovery Action Description	Responsible Parties	Threat Source	Listing Factors (1 - 5)	Action Rank (1A, 1B, 2A, 2B, 3A, 3B)	Task Duration	Fiscal Year Costs ($K)				
							FY1	FY2	FY3	FY4	FY5
	Retrofit storm drains in developed areas		Urban Development	1, 4	2B						
	Develop and implement a riparian restoration plan that focuses on replacing artificial band stabilization structures wherever feasible		Urban Development	1, 4	2B						
	Develop and implement a watershed-wide sediment management plan		Agricultural Development	1, 4	3B						
	Relocate livestock grazing and water sources		Agricultural Development	1, 4,	3B						
	Develop, adopt, and implement agricultural land-use planning policies and standards		Agricultural Development	1, 4,	3B						
	Develop and implement a watershed-wide plan to assess the impacts of non-native species and develop control measures		Non-Native Species	1, 3, 5	3B						
	Develop and implement a non-native species monitoring program		Non-Native Species	1, 3, 5	3B						
	Develop and implement a public educational program on non-native species impacts		Non-Native Species	1, 3, 5	3B						
	Review and modify applicable County and/or City Local Coastal Plans		Other Recovery Actions	1, 3, 4, 5	3B						
	Review California Regional Water Quality Control Board Los Angeles Region Watershed Plans and modify applicable stormwater permits		Urban Effluents	1, 4, 5	3B						
	Review, assess and modify if necessary all NPDES wastewater discharge permits		Urban Effluents	1, 4, 5	3B						

Table 9-7. Southern California Steelhead DPS Recovery Action Matrix for the Arroyo Hondo Creek Watershed (Conception Coast BPG).

Action #	Recovery Action Description	Responsible Parties	Threat Source	Listing Factors (1 - 5)	Action Rank (1A, 1B, 2A, 2B, 3A, 3B)	Task Duration	Fiscal Year Costs ($K)				
							FY1	FY2	FY3	FY4	FY5
	Physically modify road crossings, highways, and railways to allow unimpeded volitional migration of steelhead to upstream spawning and rearing habitats		Culverts and Road Crossings (Passage Barriers)	1, 4	1A						
	Develop and implement a restoration and management plan for the Arroyo Hondo Estuary		Other Recovery Actions	1, 2, 3, 4, 5	1B						
	Develop and implement an integrated wildland fire and hazardous fuels management plan, including monitoring, remediation and adaptive management, to reduce potentially catastrophic wildland fire effects to steelhead and their habitat and preserve natural ecosystem processes (including sediment deposition)		Wildfires	1, 4, 5	1B						
	Develop and implement a watershed-wide sediment management plan		Agricultural Development	1, 4	3B						
	Conduct hydrological analysis (groundwater)		Groundwater Extraction	1, 4	3B						
	Develop and implement a groundwater monitoring program		Groundwater Extraction	1, 4	3B						
	Develop and implement a flood control maintenance program		Levees and Channelization	1, 4	3B						
	Develop and implement a stream bank and riparian corridor restoration plan		Levees and Channelization	1, 4	3B						
	Develop and implement a watershed-wide plan to assess the impacts of non-native species and develop control measures		Non-Native Species	1, 3, 5	3B						
	Develop and implement a non-native species monitoring program		Non-Native Species	1, 3, 5	3B						

Action #	Recovery Action Description	Responsible Parties	Threat Source	Listing Factors (1 - 5)	Action Rank (1A, 1B, 2A, 2B, 3A, 3B)	Task Duration	Fiscal Year Costs ($K)				
							FY1	FY2	FY3	FY4	FY5
	Develop and implement a public educational program on non-native species impacts		Non-Native Species	1, 3, 5	3B						
	Review and modify applicable County and/or City Local Coastal Plans		Other Recovery Actions	1, 3, 4, 5	3B						
	Relocate roadways outside of riparian corridor and restore abandoned roadways.		Roads	1, 4	3B						
	Develop and implement a plan to remove or reduce approach-fill for Highway 1		Roads	1, 4	3B						
	Retrofit storm drains to filter runoff from roadways (i.e., highway 101)		Roads	1, 4	3B						
	Develop, adopt, and implement urban land-use planning policies and standards		Urban Development	1, 4	3B						
	Retrofit storm drains in developed areas		Urban Development	1, 4	3B						
	Review California Regional Water Quality Control Board Los Angeles Region Watershed Plans and modify applicable stormwater permits		Urban Effluents	1, 4, 5	3B						
	Review, assess and modify if necessary all NPDES wastewater discharge permits		Urban Effluents	1, 4, 5	3B						

Table 9-8. Southern California Steelhead DPS Recovery Action Matrix for the Tecolote Creek Watershed (Conception Coast BPG).

Action #	Recovery Action Description	Responsible Parties	Threat Source	Listing Factors (1 - 5)	Action Rank (1A, 1B, 2A, 2B, 3A, 3B)	Task Duration	Fiscal Year Costs ($K)				
							FY1	FY2	FY3	FY4	FY5
	Physically modify road crossings, highways, and railways to allow unimpeded volitional migration of steelhead to upstream spawning and rearing habitats		Culverts and Road Crossings (Passage Barriers)	1, 4	1A						
	Develop and implement a restoration and management plan for the Tecolote Estuary		Other Recovery Actions	1, 2, 3, 4, 5	1A						
	Develop and implement an integrated wildland fire and hazardous fuels management plan, including monitoring, remediation and adaptive management, to reduce potentially catastrophic wildland fire effects to steelhead and their habitat and preserve natural ecosystem processes (including sediment deposition)		Wildfires	1, 4, 5	1B						
	Develop and implement a watershed-wide sediment management plan		Agricultural Development	1, 4	2B						
	Develop, adopt, and implement agricultural land-use planning policies and standards		Agricultural Development	1, 4,	2B						
	Retrofit storm drains to filter runoff from roadways (i.e., highway 101)		Roads	1, 4	2B						
	Review California Regional Water Quality Control Board Los Angeles Region Watershed Plans and modify applicable stormwater permits		Urban Effluents	1, 4, 5	2B						
	Review, assess and modify if necessary all NPDES wastewater discharge permits		Urban Effluents	1, 4, 5	2B						
	Relocate livestock grazing and water sources		Agricultural Development	1, 4,	3B						
	Conduct hydrological analysis (groundwater)		Groundwater Extraction	1, 4	3B						
	Develop and implement a groundwater monitoring program		Groundwater Extraction	1, 4	3B						

Action #	Recovery Action Description	Responsible Parties	Threat Source	Listing Factors (1 - 5)	Action Rank (1A, 1B, 2A, 2B, 3A, 3B)	Task Duration	Fiscal Year Costs ($K)				
							FY1	FY2	FY3	FY4	FY5
	Develop and implement a flood control maintenance program		Levees and Channelization	1, 4	3B						
	Develop and implement a stream bank and riparian corridor restoration plan		Levees and Channelization	1, 4	3B						
	Develop and implement a watershed-wide plan to assess the impacts of non-native species and develop control measures		Non-Native Species	1, 3, 5	3B						
	Develop and implement a non-native species monitoring program		Non-Native Species	1, 3, 5	3B						
	Develop and implement a public educational program on non-native species impacts		Non-Native Species	1, 3, 5	3B						
	Review and modify applicable County and/or City Local Coastal Plans		Other Recovery Actions	1, 3, 4, 5	3B						
	Relocate roadways outside of riparian corridor and restore abandoned roadways. Re-route existing Gaviota State Beach/Hollister Ranch access road and replace existing road crossings with clear span bridge		Roads	1, 4	3B						
	Develop, adopt, and implement urban land-use planning policies and standards		Urban Development	1, 4	3B						
	Retrofit storm drains in developed areas		Urban Development	1, 4	3B						
	Relocate agricultural development and restore riparian zone		Agricultural Development	1, 4,							

Table 9-9. Southern California Steelhead DPS Recovery Action Matrix for the Goleta Slough Watershed (Conception Coast BPG).

Action #	Recovery Action Description	Responsible Parties	Threat Source	Listing Factors (1 - 5)	Action Rank (1A, 1B, 2A, 2B, 3A, 3B)	Task Duration	Fiscal Year Costs ($K)				
							FY1	FY2	FY3	FY4	FY5
	Physically modify road crossings, highways, and railways to allow unimpeded volitional migration of steelhead to upstream spawning and rearing habitats		Culverts and Road Crossings (Passage Barriers)	1, 4	1A						
	Develop and implement a restoration and management plan for the Goleta Slough Estuary		Other Recovery Actions	1, 2, 3, 4, 5	1B						
	Develop, adopt, and implement urban land-use planning policies and standards		Urban Development	1, 4	1B						
	Develop and implement an integrated wildland fire and hazardous fuels management plan, including monitoring, remediation and adaptive management, to reduce potentially catastrophic wildland fire effects to steelhead and their habitat and preserve natural ecosystem processes (including sediment deposition)		Wildfires	1, 4, 5	1B						
	Develop and implement a watershed-wide sediment management plan		Agricultural Development	1, 4	2B						
	Develop, adopt, and implement agricultural land-use planning policies and standards		Agricultural Development	1, 4,	2B						
	Relocate agricultural development and restore riparian zone		Agricultural Development	1, 4,	2B						
	Conduct hydrological analysis (groundwater)		Groundwater Extraction	1, 4	2B						
	Develop and implement a groundwater monitoring program		Groundwater Extraction	1, 4	2B						
	Develop and implement a flood control maintenance program		Levees and Channelization	1, 4	2B						
	Develop and implement a stream bank and riparian corridor restoration plan		Levees and Channelization	1, 4	2B						

Action #	Recovery Action Description	Responsible Parties	Threat Source	Listing Factors (1 - 5)	Action Rank (1A, 1B, 2A, 2B, 3A, 3B)	Task Duration	Fiscal Year Costs ($K)				
							FY1	FY2	FY3	FY4	FY5
	Develop and implement a plan to abandon artificial channel created for lower San Jose Creek		Levees and Channelization	1, 4	2B						
	Review and modify applicable County and/or City Local Coastal Plans		Other Recovery Actions	1, 2, 3, 4, 5	2B						
	Relocate roadways outside of riparian corridor and restore abandoned roadways		Roads	1, 4	2B						
	Retrofit storm drains to filter runoff from roadways (e.g., Highway 101, city and county streets)		Roads	1, 4	2B						
	Retrofit storm drains in developed areas		Urban Development	1, 4	2B						
	Develop and implement a riparian restoration plan throughout mainstem that focuses on replacing artificial bank stabilization structures wherever feasible		Urban Development	1, 4	2B						
	Review, assess and modify if necessary all NPDES wastewater discharge permits (e.g., Goleta Sanitary District Wastewater Treatment Facility)		Urban Effluents	1, 4	2B						
	Review California Regional Water Quality Control Board Los Angeles Region Watershed Plans and modify applicable stormwater permits		Urban Effluents	1, 4	2B						
	Develop and implement a watershed-wide plan to assess the impacts of non-native species and develop control measures		Non-Native Species	1, 3, 5	3B						
	Develop and implement a non-native species monitoring program		Non-Native Species	1, 3, 5	3B						
	Develop and implement a public educational program on non-native species impacts		Non-Native Species	1, 3, 5	3B						

Table 9-10. Southern California Steelhead DPS Recovery Action Matrix for the Mission Creek Watershed (Conception Coast BPG).

Action #	Recovery Action Description	Responsible Parties	Threat Source	Listing Factors (1 - 5)	Action Rank (1A, 1B, 2A, 2B, 3A, 3B)	Task Duration	Fiscal Year Costs ($K)				
							FY1	FY2	FY3	FY4	FY5
	Physically modify road crossings, highways, and railways to allow unimpeded volitional migration of steelhead to upstream spawning and rearing habitats		Culverts and Road Crossings (Passage Barriers)	1, 4	1A						
	Develop and implement a restoration and management plan for the Mission Creek Estuary		Other Recovery Actions	1, 2, 3, 4, 5	1B						
	Develop and implement an integrated wildland fire and hazardous fuels management plan, including monitoring, remediation and adaptive management, to reduce potentially catastrophic wildland fire effects to steelhead and their habitat and preserve natural ecosystem processes (including sediment deposition)		Wildfires	1, 4, 5	1B						
	Conduct hydrological analysis (groundwater)		Groundwater Extraction	1, 4	2B						
	Develop and implement a groundwater monitoring program		Groundwater Extraction	1, 4	2B						
	Develop and implement a flood control maintenance program		Levees and Channelization	1, 4	2B						
	Develop and implement a stream bank and riparian corridor restoration plan		Levees and Channelization	1, 4	2B						
	Develop and implement a watershed-wide plan to assess the impacts of non-native species and develop control measures		Non-Native Species	1, 3, 5	2B						
	Develop and implement a non-native species monitoring program		Non-Native Species	1, 3, 5	2B						
	Develop and implement a public educational program on non-native species impacts		Non-Native Species	1, 3, 5	2B						
	Retrofit storm drains to filter runoff from roadways (e.g., highway 101)		Roads	1, 4	2B						

Action #	Recovery Action Description	Responsible Parties	Threat Source	Listing Factors (1 - 5)	Action Rank (1A, 1B, 2A, 2B, 3A, 3B)	Task Duration	Fiscal Year Costs ($K)				
							FY1	FY2	FY3	FY4	FY5
	Develop, adopt, and implement urban land-use planning policies and standards		Urban Development	1, 4	2B						
	Retrofit storm drains in developed areas		Urban Development	1, 4	2B						
	Review, assess and modify if necessary all NPDES wastewater discharge permits (e.g., El Estero Wastewater Treatment Facility)		Urban Effluents	1, 4	2B						
	Review California Regional Water Quality Control Board Los Angeles Region Watershed Plans and modify applicable stormwater permits		Urban Effluents	1, 4	2B						
	Develop and implement a watershed-wide sediment management plan		Agricultural Development	1, 4	3B						
	Review and modify applicable County and/or City Local Coastal Plans		Other Recovery Actions	1, 2, 3, 4, 5	3B						
	Relocate roadways outside of riparian corridor and restore abandoned roadways		Roads	1, 4	3B						

Table 9-11. Southern California Steelhead DPS Recovery Action Matrix for the Montecito Creek Watershed (Conception Coast BPG).

Action #	Recovery Action Description	Responsible Parties	Threat Source	Listing Factors (1 - 5)	Action Rank (1A, 1B, 2A, 2B, 3A, 3B)	Task Duration	Fiscal Year Costs ($K)				
							FY1	FY2	FY3	FY4	FY5
	Develop and implement an integrated wildland fire and hazardous fuels management plan, including monitoring, remediation and adaptive management, to reduce potentially catastrophic wildland fire effects to steelhead and their habitat and preserve natural ecosystem processes (including sediment deposition)		Wildfires	1, 4, 5	1B						
	Physically modify road crossings, highways, and railways to allow unimpeded volitional migration of steelhead to upstream spawning and rearing habitats		Culverts and Road Crossings (Passage Barriers)	1, 4	2A						
	Develop and implement a watershed-wide sediment management plan		Agricultural Development	1, 4	3B						
	Conduct hydrological analysis (groundwater)		Groundwater Extraction	1, 4	3B						
	Develop and implement a groundwater monitoring program		Groundwater Extraction	1, 4	3B						
	Develop and implement a flood control maintenance program		Levees and Channelization	1, 4	3B						
	Develop and implement a stream bank and riparian corridor restoration plan		Levees and Channelization	1, 4	3B						
	Develop and implement a watershed-wide plan to assess the impacts of non-native species and develop control measures		Non-Native Species	1, 3, 5	3B						
	Develop and implement a non-native species monitoring program		Non-Native Species	1, 3, 5	3B						
	Develop and implement a public educational program on non-native species impacts		Non-Native Species	1, 3, 5	3B						

Action #	Recovery Action Description	Responsible Parties	Threat Source	Listing Factors (1 - 5)	Action Rank (1A, 1B, 2A, 2B, 3A, 3B)	Task Duration	Fiscal Year Costs ($K)				
							FY1	FY2	FY3	FY4	FY5
	Review and modify applicable County and/or City Local Coastal Plans		Other Recovery Actions	1, 2, 3, 4, 5	3B						
	Relocate roadways outside of riparian corridor and restore abandoned roadways		Roads	1, 4	3B						
	Develop and implement a plan to remove or reduce approach-fill for Union Pacific Railroad and Highway 101		Roads	1, 4	3B						
	Retrofit storm drains to filter runoff from roadways (e.g., Highway 101, city and county streets)		Roads	1, 4	3B						
	Develop, adopt, and implement urban land-use planning policies and standards		Urban Development	1, 4	3B						
	Retrofit storm drains in developed areas		Urban Development	1, 4	3B						
	Develop and implement a riparian restoration plan that focuses on replacing artificial bank stabilization structures wherever feasible		Urban Development	1, 4	3B						
	Review, assess and modify if necessary all NPDES wastewater discharge permits (El Estero Wastewater Treatment Facility)		Urban Effluents	1, 4	3B						
	Review California Regional Water Quality Control Board Los Angeles Region Watershed Plans and modify applicable stormwater permits		Urban Effluents	1, 4	3B						

Table 9-12. Southern California Steelhead DPS Recovery Action Matrix for the Carpinteria Creek Watershed (Conception Coast BPG).

Action #	Recovery Action Description	Responsible Parties	Threat Source	Listing Factors (1 - 5)	Action Rank (1A, 1B, 2A, 2B, 3A, 3B)	Task Duration	Fiscal Year Costs ($K)				
							FY1	FY2	FY3	FY4	FY5
	Physically modify road crossings, highways, and railways to allow unimpeded volitional migration of steelhead to upstream spawning and rearing habitats		Culverts and Road Crossings (Passage Barriers)	1, 4	1A						
	Develop and implement a restoration and management plan for the Carpinteria Creek Estuary		Other Recovery Actions	1, 2, 3, 4, 5	1B						
	Develop and implement an integrated wildland fire and hazardous fuels management plan, including monitoring, remediation and adaptive management, to reduce potentially catastrophic wildland fire effects to steelhead and their habitat and preserve natural ecosystem processes (including sediment deposition)		Wildfires	1, 4, 5	1B						
	Develop and implement a watershed-wide sediment management plan		Agricultural Development	1, 4	2B						
	Develop, adopt, and implement agricultural land-use planning policies and standards		Agricultural Development	1, 4,	2B						
	Relocate orchard and agricultural development and restore riparian zone		Agricultural Development	1, 4,	2B						
	Conduct hydrological analysis (groundwater)		Groundwater Extraction	1, 4	2B						
	Develop and implement a groundwater monitoring program		Groundwater Extraction	1, 4	2B						
	Develop and implement a flood control maintenance program		Levees and Channelization	1, 4	2B						
	Develop and implement a stream bank and riparian corridor restoration plan		Levees and Channelization	1, 4	2B						
	Review and modify applicable County and/or City Local Coastal Plans		Other Recovery Actions	1, 2, 3, 4, 5	2B						

Action #	Recovery Action Description	Responsible Parties	Threat Source	Listing Factors (1 - 5)	Action Rank (1A, 1B, 2A, 2B, 3A, 3B)	Task Duration	Fiscal Year Costs ($K)				
							FY1	FY2	FY3	FY4	FY5
	Relocate roadways outside of riparian corridor and restore abandoned roadways		Roads	1, 4	2B						
	Develop and implement a plan to remove or reduce approach-fill for Union Pacific Railroad line and Highway 101		Roads	1, 4	2B						
	Retrofit storm drains to filter runoff from roadways (e.g., Highway 101, city and county streets)		Roads	1, 4	2B						
	Develop, adopt, and implement urban land-use planning policies and standards		Urban Development	1, 4	2B						
	Retrofit storm drains in developed areas		Urban Development	1, 4	2B						
	Develop and implement a riparian restoration plan throughout mainstem that focuses on replacing artificial bank stabilization structures wherever feasible		Urban Development	1, 4	2B						
	Review, assess and modify if necessary all NPDES wastewater discharge permits (e.g., Carpinteria Sanitary District Wastewater Treatment Facility)		Urban Effluents	1, 4	2B						
	Review California Regional Water Quality Control Board Los Angeles Region Watershed Plans and modify applicable stormwater permits		Urban Effluents	1, 4	2B						
	Develop and implement a watershed-wide plan to assess the impacts of non-native species and develop control measures		Non-Native Species	1, 3, 5	3B						
	Develop and implement a public educational program on non-native species impacts		Non-Native Species	1, 3, 5	3B						
	Develop and implement a non-native species monitoring program		Non-Native Species	1, 3, 5							

Table 9-13. Southern California Steelhead DPS Recovery Action Matrix for the Rincon Creek Watershed (Conception Coast BPG).

Action #	Recovery Action Description	Responsible Parties	Threat Source	Listing Factors (1 - 5)	Action Rank (1A, 1B, 2A, 2B, 3A, 3B)	Task Duration	Fiscal Year Costs ($K)				
							FY1	FY2	FY3	FY4	FY5
	Physically modify road crossings, highways, and railways to allow unimpeded volitional migration of steelhead to upstream spawning and rearing habitats		Culverts and Road Crossings (Passage Barriers)	1, 4	1A						
	Develop and implement a restoration and management plan for the Rincon Creek Estuary		Other Recovery Actions	1, 2, 3, 4, 5	1B						
	Develop and implement an integrated wildland fire and hazardous fuels management plan, including monitoring, remediation and adaptive management, to reduce potentially catastrophic wildland fire effects to steelhead and their habitat and preserve natural ecosystem processes (including sediment deposition)		Wildfires	1, 4, 5	1B						
	Develop and implement a watershed-wide sediment management plan		Agricultural Development	1, 4	2B						
	Develop, adopt, and implement agricultural land-use planning policies and standards		Agricultural Development	1, 4,	2B						
	Relocate orchard and agricultural development and restore riparian zone		Agricultural Development	1, 4,	2B						
	Conduct hydrological analysis (groundwater)		Groundwater Extraction	1, 4	2B						
	Develop and implement a groundwater monitoring program		Groundwater Extraction	1, 4	2B						
	Develop and implement a flood control maintenance program		Levees and Channelization	1, 4	2B						
	Develop and implement a stream bank and riparian corridor restoration plan		Levees and Channelization	1, 4	2B						
	Review and modify applicable County and/or City Local Coastal Plans		Other Recovery Actions	1, 2, 3, 4, 5	2B						

Action #	Recovery Action Description	Responsible Parties	Threat Source	Listing Factors (1 - 5)	Action Rank (1A, 1B, 2A, 2B, 3A, 3B)	Task Duration	Fiscal Year Costs ($K)				
							FY1	FY2	FY3	FY4	FY5
	Relocate roadways outside of riparian corridor and restore abandoned roadways		Roads	1, 4	2B						
	Develop and implement a plan to remove or reduce approach-fill for Union Pacific Railroad line and Highway 101		Roads	1, 4	2B						
	Retrofit storm drains to filter runoff from roadways (e.g., Highway 101, city and county streets)		Roads	1, 4	2B						
	Develop, adopt, and implement urban land-use planning policies and standards		Urban Development	1, 4	2B						
	Develop and implement a riparian restoration plan throughout mainstem that focuses on replacing artificial bank stabilization structures wherever feasible		Urban Development	1, 4	2B						
	Review, assess and modify if necessary all NPDES wastewater discharge permits (e.g., Carpinteria Sanitary District Wastewater Treatment Facility)		Urban Effluents	1, 4	2B						
	Review California Regional Water Quality Control Board Los Angeles Region Watershed Plans and modify applicable stormwater permits		Urban Effluents	1, 4	2B						
	Develop and implement a plan to remove and maintain quarry debris from the channel		Mining and Quarrying	1, 4, 5	2B						
	Develop and implement a watershed-wide plan to assess the impacts of non-native species and develop control measures		Non-Native Species	1, 3, 5	3B						
	Develop and implement a non-native species monitoring program		Non-Native Species	1, 3, 5	3B						
	Develop and implement a public educational program on non-native species impacts		Non-Native Species	1, 3, 5	3B						

10. Santa Monica Mountains Biogeographic Population Group

"Assessment at the group level indicates a priority for securing inland populations in southern Coast Ranges and Transverse Ranges, and a need to maintain not just the fluvial-anadromous life-history form, but also lagoon-anadromous and freshwater-resident forms in each population."

NOAA Fisheries Technical Recovery Team
Viability Criteria for South-Central and Southern California Steelhead, 2007

10.1 LOCATION AND PHYSICAL CHARACTERISTICS

The Santa Monica Mountains BPG region consists of five coastal watersheds located in southern Ventura and western Los Angeles counties. These watersheds drain the east-west coastal Santa Monica Mountains. These mountains are composed of recently uplifted marine and volcanic formations that extend approximately 32 miles from the Oxnard Plain in the west to the Los Angeles Watershed in the east. With the exception of Malibu Creek, these watersheds are relatively small and do not extend inland beyond the Santa Monica Mountains. The watersheds, from west to east, are: Big Sycamore Canyon Creek, Arroyo Sequit, Malibu Creek, Las Flores Canyon Creek, and Topanga Canyon Creek (Figure 10-1). The Santa Monica Mountains BPG region is similar to the Conception Coast BPG region in that it is comprised of a series of short, nearly parallel streams that drain steep south- facing slopes, with an average elevation of less than 2,500 feet.

The annual seasonal rainfall in the watersheds of this BPG region is approximately 18 inches, although rainfall is lower along the coast and increases with increasing elevation in the upper reaches of the watersheds. Malibu Creek is the largest watershed of the five watersheds, encompassing approximately 110 square miles and, unlike other coastal streams in the Big Sur Coast and Conception Coast BPG regions, penetrates through a break in the Santa Monica Mountains to drain a portion of its north-facing slopes and the south-facing slopes of the Simi Hills. Calleguas Creek and the Los Angeles River drain the remainder of the northern slopes of the Santa Monica Mountains.

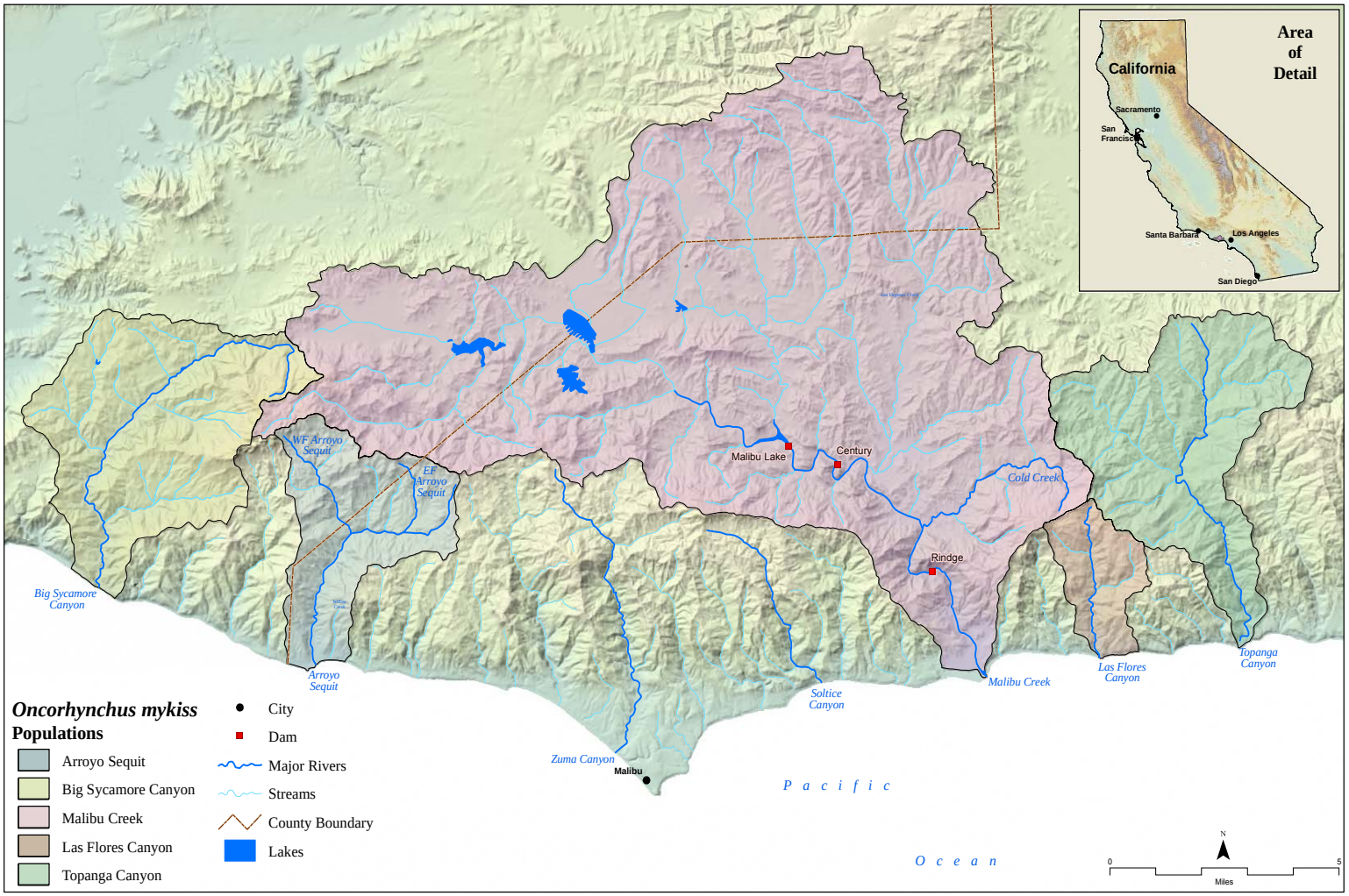

Figure 10-1. The Santa Monica Mountains BPG region. Five steelhead populations/watersheds were analyzed in this region.

10.2 LAND USE

Table 10-1 summarizes land use and population density in Santa Monica Mountains BPG region. A significant portion of the Santa Monica Mountains BPG region is undeveloped, and portions are publicly held as part of the Santa Monica Mountains National Recreation Area, seven state parks and beaches (Point Mugu State Park, Malibu Creek State Park, Leo Carrillo State Beach, Topanga State Park, R.H. Meyer Memorial State Beach, Dan Blocker State Beach, and Will Rogers State Park), and several local parks and beaches, including Zuma County Beach and Solstice Canyon Park. The large amount of public land and recreational facilities, coupled with the proximity to a large urban area (the Los Angeles Watershed) results in the watersheds here receiving very high recreational use.

Development within these watersheds is principally residential, with some commercial and recreational development concentrated near the mouths of several of the streams. The Malibu Creek and Topanga Canyon Creek watersheds support the highest human population densities. Watersheds in the western portion of the Santa Monica Mountains generally have less development and significantly more area in public ownership than watersheds in the eastern half of the range. Human population density and private land ownership increases in the Santa Monica Mountains from west to east with increasing proximity to the Los Angeles Watershed. Agricultural conversion of watershed lands is generally light throughout the BPG region.

10.3 CURRENT WATERSHED CONDITIONS

Watershed conditions were assessed for the five major drainages in the Santa Monica Mountains BPG region. The mainstem and major tributaries of most of the drainages in this BPG region offer fair to good habitat conditions for anadromous *O. mykiss*. Existing habitat quality was rated as "Fair" in the Big Sycamore Canyon, Arroyo Sequit, Malibu Creek, and Las Flores Canyon watersheds, and "Good" in the Topanga Canyon Creek watershed. Existing conditions within the Topanga Canyon Creek watershed are relatively good, despite having the second highest human population density in this BPG region (Table 10-1). For example, Topanga Canyon Creek is characterized by perennial flows, high-quality instream and riparian conditions, an absence of non-native predators, and migration barriers, if present, are seasonally passable. Several photographs of the Santa Monica Mountains BPG region are provided in Figure 10-2.

Because of the proximity of the Santa Monica Mountains to large urban areas, there is significant pressure to develop and maintain recreational facilities. Each of the watersheds in the Santa Monica Mountains BPG region supports one or more coastal and inland campgrounds and other high-use recreational facilities. This is particularly the case in the Big Sycamore Creek, Arroyo Sequit, and Malibu Creek watersheds, where large portions of the watersheds are publicly owned. Recreational activities are recurring sources of direct and indirect threats to anadromous *O. mykiss* including: roadway stream crossings in and around campgrounds that pose physical barriers to upstream and/or downstream movement migration; introduction of non-native plants and animals; disturbance to stream banks and instream habitats, and even redds by foot traffic and off-road vehicles; loss of or disturbance to riparian corridors around campgrounds; and constriction of the floodplain. The type and number of threats posed by recreational facilities

Table 10-1. Physical and Land-Use Characteristics of Watersheds in the Santa Monica Mountains BPG region.

PHYSICAL CHARACTERISTICS						LAND USE			
WATERSHEDS (west to east)	**Area** (acres)[1]	**Area** (sq. miles)[1]	**Stream Length**[2] (miles)	**Ave. Ann. Rainfall**[3] (inches)	**Total Human Population**	**Public Ownership***	**Urban Area**[5]	**Agriculture/ Barren**[5]	**Open Space**[5]
Big Sycamore Canyon Creek	13,649	21	32	17.9	27	76%	< 1%	< 1%	99%
Arroyo Sequit	7,572	12	17	17.9	370	38%	3%	1%	96%
Malibu Creek	70,726	110	161	18.0	74,585	7%	23%	2%	75%
Las Flores Canyon Creek	2,908	5	6	18.5	1,144	5%	15%	< 1%	85%
Topanga Canyon Creek	12,616	20	30	17.9	5,561	2%	15%	< 1%	85%
TOTAL or AVERAGE	**107,471**	**168**	**246**	**18.0**	**81,687**	**---**	**18%**	**1%**	**81%**

[1] From: CDFFP CalWater 2.2 Watershed delineation, 1999 (www.ca.nrcs.usda.gov/features/calwater/)
[2] From: CDFG 1:1,000,000 Routed stream network, 2003 (www.calfish.org/)
[3] From: USGS Hydrologic landscape regions of the U.S., 2003 (1 km grid cells)
[4] From: CDFFP Census 2000 block data (migrated), 2003
[5] From: CDFFP Multi-source land cover data (v02_2), 2002 (100 m grid cells) (http://frap.cdf.ca.gov/data/frapgisdata/select.asp)
** Includes National Recreation Areas, State Parks, and County (from: http://old.casil.ucdavis.edu/casil/gis.ca.gov/teale/govtowna/)*

Figure 10-2. Photographs of Santa Monica Mountains BPG region.

Malibu Creek

Malibu Coast

Rindge Dam – Malibu Creek

Arroyo Sequit

Topanga Creek

varies significantly between watersheds, from single locations such a road crossing on Arroyo Sequit, to multiple sites, such as numerous floodplain campgrounds or multiple stream crossings in the Malibu Creek watershed.

The Malibu Creek watershed is highly constrained by two major dams: the Rindge Dam and the Malibu Lake Dam. The former structure is located approximately two stream miles upstream of the lagoon and blocks access to over 90% of the anadromous *O. mykiss* spawning and rearing habitat within Malibu Creek. Rindge Dam also has isolated native non-anadromous *O. mykiss* that would otherwise be anadromous and prevents the periodic re-colonization of upstream habitats that may experience periodic temporary extirpations as a result of natural stochastic processes, such as wildfires, droughts, and landslides. These dams have numerous effects on physical, hydrological, and habitat characteristics of the middle and lower reaches of the Malibu Creek. Dams also create and maintain favorable habitat conditions for several species of non-native fishes and bullfrogs, which may affect one or more life-history stages of *O. mykiss* either directly (*e.g.,* predation) or indirectly (*e.g.,* competition for food). Non-native crayfish, snails, fishes, and bullfrogs are particularly problematic in the Malibu Creek and Las Flores Canyon Creek watersheds.

The terrain of the Santa Monica Mountains results in development on steep slopes, often accompanied by road cuts to provide access, thus affecting watershed processes such as erosion and sedimentation. Development has also occurred along narrow riparian corridors, which encourages bank stabilization, levee construction, and other flood control activities, and physically constrains the ability of streams to maintain natural channel morphology and riparian vegetation.

Increased residential development, including high road densities, has significantly altered natural fire regimes in the Santa Monica Mountains BPG region because it has allowed human access to almost all portions of the component watersheds. Fires have consumed 71% to 100% of the Big Sycamore Canyon Creek, Arroyo Sequit, Malibu Creek, and Las Flores Canyon Creek watersheds within the past 25 years, including recent fires in 2007. Approximately 32% of the Topanga Canyon Creek watershed has burned in the last 25 years (see CAP Workbooks for specifics). Increased fire frequency can increase slope erosion and sediment inputs to streams, resulting in long-term changes to substrate composition and embeddedness, water quality (*e.g.*, turbidity), and water temperature (*e.g.*, loss of riparian canopy cover). Anadromous *O. mykiss* in each of the watersheds in the Santa Monica Mountains BPG region have been subjected to such secondary fire effects.

Estuarine habitat loss in the component watersheds of the Santa Monica Mountains BPG region ranges from 66 percent to 97 percent. Malibu Creek formerly had the largest estuary of any watershed in the BPG region and still has the highest amount of remaining estuarine habitat (34%). Topanga Canyon Creek has the second highest amount of remaining estuarine habitat (30%), but the estuary is highly impacted by Highway 1, commercial development, and recreational activities. Road construction, bridges, levees, floodplain encroachment by residential and commercial development (*e.g.*, the City of Malibu and Malibu Colony in Malibu Creek) have significantly reduced estuarine habitat in almost watersheds in this BPG region.

10.4 THREATS AND THREAT SOURCES

The relatively high population and development pressures along the coastal portions of the Santa Monica Mountains, coupled with the proximity to the densely populated Los Angeles Watershed, creates a series of recurring, severe to very severe threats to the persistence of anadromous *O. mykiss* in each of the component watersheds in this BPG region. The number of threat sources used by the CAP Workbooks in determining threat status for the Santa Monica Mountains BPG watersheds varied from eight in the Big Sycamore Canyon Creek watershed to 16 in the Malibu Creek watershed.

Ten anthropogenic activities ranked as the top five sources of stress to anadromous *O. mykiss* in the Santa Monica Mountains BPG (Table 10-2). Each watershed has a unique combination of threats; however, recurring threats among most or all of the watersheds include: high road density, including roads in close proximity to riparian corridors, impacts from recreational facilities, and barriers to migration at culverts and roadway stream crossings. Other threats are unique to particular watersheds, such as the Rindge and Malibu Lake dams on Malibu Creek.

10.5 SUMMARY

Road density is high throughout the Santa Monica Mountains BPG region, both on private and public lands. Road density, particularly roads that are within 300 feet of riparian corridors are affecting each of these watersheds by altering surface runoff patterns and stream hydrographs, and encroaching on floodplains and decreasing floodplain connectivity. Such road density creates the need for bank stabilization and levee construction to protect development, which in turn provides conduits for sediment, pollutant, and bacterial inputs to the watercourse. In other cases, road crossings create barriers to upstream and downstream movement of adult and juvenile anadromous *O. mykiss*. Table 10-3 summarizes the critical recovery actions needed within the Core 1 populations of this BPG.

Table 10-2. Threat source rankings in the component watersheds of the Santa Monica Mountains BPG region (see CAP Workbook for details).

Santa Monica Mountains BPG Component Watersheds (west to east)					
Threat Sources	Big Sycamore Canyon Creek	Arroyo Sequit	Malibu Creek	Las Flores Canyon Creek	Topanga Canyon Creek
Roads					
Recreational Facilities					
Other Passage Barriers					
Wildfires*					
Urban Development					
Levees and Channelization					
Dams and Surface Water Diversions					
Non-Native Species					
Pipeline Crossing*					
Non-Point Pollution					

Key: Threat cell colors represent threat rating from CAP Workbook: Red = Very High threat; Yellow = High threat; Light green = Medium threat; Dark green = Low threat

**Wildfires were not identified during the CAP Workbook analyses as one of the top five threats in these watersheds, but recent fires in coastal watershed sin 2007 could result in significant impacts to steelhead habitats.*

Table 10-3. Critical recovery actions for Core 1 populations within the Santa Monica Mountains BPG.

POPULATION	CRITICAL RECOVERY ACTION
Malibu Creek	Remove Rindge and Malibu dams, and physically modify road crossings, to allow unimpeded volitional migration of steelhead to upstream spawning and rearing habitats. Identify, protect, and where necessary, restore estuarine and freshwater rearing habitats.

Restoring conditions for anadromous *O. mykiss* passage, spawning, and/or rearing in these watersheds will require multiple, long-term, measures related to water management, recreation, and fish passage. Impediments to fish passage stemming from the construction and maintenance of roads and other transportation corridors, dams and other passage barriers, groundwater extraction, and modification of channel morphology and adjacent riparian habitats by flood control measures need to be further evaluated for this BPG. Additionally, the loss of estuarine functions caused by filling and pollution from point and non-point agricultural and other anthropogenic waste discharges need to be addressed further in this region

Threat sources should be the focus of a variety of recovery actions to address specific stresses on anadromous *O. mykiss* viability. Spatial and temporal data acquired on specific indicators associated with threat sources or stresses such as water temperature, pH, nutrients, *etc.*, are generally inadequate to be the target of specific recovery actions. This type of data acquisition should be the subject of site-specific investigations in order to refine the primary recovery actions or to target additional recovery actions part of any recovery strategy for the Santa Monica Mountains BPG. Tables 10-4 through 10-8 below rank and describe proposed recovery actions for each sub-watershed in the Santa Monica Mountains BPG including the estimated cost for implementing such actions over the first five fiscal years.

Table 10-4. Southern California Steelhead DPS Recovery Action Matrix for the Big Sycamore Canyon Creek Watershed (Santa Monica Mountains BPG).

Action #	Recovery Action Description	Responsible Parties	Threat Source	Listing Factors (1 - 5)	Action Rank (1A, 1B, 2A, 2B, 3A, 3B)	Task Duration	Fiscal Year Costs ($K)				
							FY1	FY2	FY3	FY4	FY5
	Physically modify road crossings, highways, and railways to allow unimpeded volitional migration of steelhead to upstream spawning and rearing habitats		Culverts and Road Crossings (Passage Barriers)	1, 4	1A						
	Develop and implement an integrated wildland fire and hazardous fuels management plan, including monitoring, remediation and adaptive management, to reduce potentially catastrophic wildland fire effects to steelhead and their habitat and preserve natural ecosystem processes (including sediment deposition)		Wildfires	1, 4, 5	1A						
	Develop and implement a restoration and management plan for the Big Sycamore Creek Estuary		Other Recovery Actions	1, 2, 3, 4, 5	2A						
	Review and modify applicable County and/or City Local Coastal Plans		Other Recovery Actions	1, 2, 3, 4, 5	2A						
	Review California Regional Water Quality Control Board Los Angeles Region Watershed Plans and modify applicable stormwater permits		Urban Effluents	1, 4, 5	2B						
	Review development and management plans for Point Mugu State Park		Recreational Facilities	1, 2, 3, 4, 5	2B						
	Review Santa Monica Mountains National Recreation Area General Management Plan		Recreational Facilities	1, 2, 3, 4, 5	2B						
	Provide fish passage around dams or diversion or remove barriers		Dams and Surface Water Diversions	1, 3, 4	2B						
	Develop and implement a flood control maintenance program		Levees and Channelization	1, 4	3B						
	Develop and implement a stream bank and riparian corridor restoration plan		Levees and Channelization	1, 4	3B						

Action #	Recovery Action Description	Responsible Parties	Threat Source	Listing Factors (1 - 5)	Action Rank (1A, 1B, 2A, 2B, 3A, 3B)	Task Duration	Fiscal Year Costs ($K)				
							FY1	FY2	FY3	FY4	FY5
	Develop and implement a watershed-wide plan to assess the impacts of non-native species and develop control measures		Non-Native Species	1, 3, 5	3B						
	Develop and implement a non-native species monitoring program		Non-Native Species	1, 3, 5	3B						
	Develop and implement a public educational program on non-native species impacts		Non-Native Species	1, 3, 5	3B						
	Relocate roadways outside of riparian corridor and restore abandoned roadways		Roads	1, 4	3B						
	Retrofit storm drains to filter runoff from roadways		Roads	1, 4	3B						
	Develop, adopt, and implement urban land-use planning policies and standards		Urban Development	1, 4	3B						
	Retrofit storm drains in developed areas		Urban Development	1, 4	3B						
	Review, assess and modify if necessary all NPDES wastewater discharge permits		Urban Effluents	1, 4	3B						
	Develop and implement a public educational program on watershed processes		Recreational Facilities	1, 2, 3, 4, 5	3B						
	Develop and implement water management plan		Dams and Surface Water Diversions	1, 3, 4	3B						

Table 10-5. Southern California Steelhead DPS Recovery Action Matrix for the Arroyo Sequit Creek Watershed (Santa Monica Mountains BPG).

Action #	Recovery Action Description	Responsible Parties	Threat Source	Listing Factors (1 - 5)	Action Rank (1A, 1B, 2A, 2B, 3A, 3B)	Task Duration	Fiscal Year Costs ($K)				
							FY1	FY2	FY3	FY4	FY5
	Physically modify road crossings, highways, and railways to allow unimpeded volitional migration of steelhead to upstream spawning and rearing habitats		Culverts and Road Crossings (Passage Barriers)	1, 4	1A						
	Relocate roadways outside of riparian corridor and restore abandoned roadways		Roads	1, 4	1A						
	Develop and implement an integrated wildland fire and hazardous fuels management plan, including monitoring, remediation and adaptive management, to reduce potentially catastrophic wildland fire effects to steelhead and their habitat and preserve natural ecosystem processes (including sediment deposition)		Wildfires	1, 4, 5	1A						
	Physically modify dams/diversions to allow unimpeded volitional migration of steelhead to upstream spawning and rearing habitats		Dams and Surface Water Diversions	1, 3, 4	1A						
	Develop and implement a plan to remove the small, non-functional water impoundments on the east and west forks of Arroyo Sequit		Dams and Surface Water Diversions	1, 3, 4	1A						
	Develop and implement water management plan		Dams and Surface Water Diversions	1, 3, 4	1B						
	Develop and implement a restoration and management plan for the Arroyo Sequit Creek Estuary		Other Recovery Actions	1, 2, 3, 4, 5	2A						
	Review and modify applicable County and/or City Local Coastal Plans		Other Recovery Actions	1, 2, 3, 4, 5	2A						
	Develop and implement a flood control maintenance program		Levees and Channelization	1, 4	2B						
	Develop and implement a stream bank and riparian corridor restoration plan		Levees and Channelization	1, 4	2B						

Action #	Recovery Action Description	Responsible Parties	Threat Source	Listing Factors (1 - 5)	Action Rank (1A, 1B, 2A, 2B, 3A, 3B)	Task Duration	Fiscal Year Costs ($K)				
							FY1	FY2	FY3	FY4	FY5
	Retrofit storm drains to filter runoff from roadways		Roads	1, 4	2B						
	Review California Regional Water Quality Control Board Los Angeles Region Watershed Plans and modify applicable stormwater permits		Urban Effluents	1, 4, 5	2B						
	Review development and management plans for Leo Carrillo State Park		Recreational Facilities	1, 2, 3, 4, 5	2B						
	Review Santa Monica Mountains National Recreation Area General Management Plan		Recreational Facilities	1, 2, 3, 4, 5	2B						
	Develop and implement a watershed-wide plan to assess the impacts of non-native species and develop control measures		Non-Native Species	1, 3, 5	3B						
	Develop and implement a non-native species monitoring program		Non-Native Species	1, 3, 5	3B						
	Develop and implement a public educational program on non-native species impacts		Non-Native Species	1, 3, 5	3B						
	Develop, adopt, and implement urban land-use planning policies and standards		Urban Development	1, 4	3B						
	Retrofit storm drains in developed areas		Urban Development	1, 4	3B						
	Review, assess and modify if necessary all NPDES wastewater discharge permits		Urban Effluents	1, 4	3B						
	Develop and implement a public educational program on watershed processes		Recreational Facilities	1, 2, 3, 4, 5	3B						

Table 10-6. Southern California Steelhead DPS Recovery Action Matrix for the Malibu Creek Watershed (Santa Monica Mountains BPG).

Action #	Recovery Action Description	Responsible Parties	Threat Source	Listing Factors (1 - 5)	Action Rank (1A, 1B, 2A, 2B, 3A, 3B)	Task Duration	Fiscal Year Costs ($K)				
							FY1	FY2	FY3	FY4	FY5
	Physically modify road crossings, highways, and railways to allow unimpeded volitional migration of steelhead to upstream spawning and rearing habitats		Culverts and Road Crossings (Passage Barriers)	1, 4	1A						
	Remove or physically modify Rindge and Malibu dams to allow unimpeded volitional migration of steelhead to upstream spawning and rearing habitats		Dams and Surface Water Diversions	1, 3, 4	1A						
	Develop and implement water management plan		Dams and Surface Water Diversions	1, 3, 4	1B						
	Develop and implement an integrated wildland fire and hazardous fuels management plan, including monitoring, remediation and adaptive management, to reduce potentially catastrophic wildland fire effects to steelhead and their habitat and preserve natural ecosystem processes (including sediment deposition)		Wildfires	1, 4, 5	1A						
	Develop and implement a restoration and management plan for the Malibu Creek Estuary		Other Recovery Actions	1, 2, 3, 4, 5	2A						
	Review and modify applicable County and/or City Local Coastal Plans		Other Recovery Actions	1, 2, 3, 4, 5	2A						
	Develop and implement a flood control maintenance program		Levees and Channelization	1, 4	2B						
	Develop and implement a stream bank and riparian corridor restoration plan		Levees and Channelization	1, 4	2B						
	Review development and management plans for Malibu State Park		Recreational Facilities	1, 2, 3, 4, 5	2B						
	Review Santa Monica Mountains National Recreation Area General Management Plan		Recreational Facilities	1, 2, 3, 4, 5	2B						

Action #	Recovery Action Description	Responsible Parties	Threat Source	Listing Factors (1 - 5)	Action Rank (1A, 1B, 2A, 2B, 3A, 3B)	Task Duration	Fiscal Year Costs ($K)				
							FY1	FY2	FY3	FY4	FY5
	Review, assess and modify if necessary all NPDES wastewater discharge permits (e.g., Las Virgenes Municipal Water District Wastewater Treatment Facility)		Urban Effluents	1, 4	2B						
	Review California Regional Water Quality Control Board Los Angeles Region Watershed Plans and modify applicable stormwater permits		Urban Effluents	1, 4, 5	2B						
	Develop and implement a watershed-wide plan to assess the impacts of non-native species and develop control measures		Non-Native Species	1, 3, 5	3B						
	Develop and implement a non-native species monitoring program		Non-Native Species	1, 3, 5	3B						
	Develop and implement a public educational program on non-native species impacts		Non-Native Species	1, 3, 5	3B						
	Develop and implement a public educational program on watershed processes		Recreational Facilities	1, 2, 3, 4, 5	3B						
	Relocate roadways outside of riparian corridor and restore abandoned roadways		Roads	1, 4	3B						
	Retrofit storm drains to filter runoff from roadways		Roads	1, 4	3B						
	Develop, adopt, and implement urban land-use planning policies and standards		Urban Development	1, 4	3B						
	Retrofit storm drains in developed areas		Urban Development	1, 4	3B						

Table 10-7. Southern California Steelhead DPS Recovery Action Matrix for the Las Flores Canyon Creek Watershed (Santa Monica Mountains BPG).

Action #	Recovery Action Description	Responsible Parties	Threat Source	Listing Factors (1 - 5)	Action Rank (1A, 1B, 2A, 2B, 3A, 3B)	Task Duration	Fiscal Year Costs ($K)				
							FY1	FY2	FY3	FY4	FY5
	Physically modify road crossings, highways, and railways to allow unimpeded volitional migration of steelhead to upstream spawning and rearing habitats		Culverts and Road Crossings (Passage Barriers)	1, 4	3A						
	Physically dams/diversions to allow unimpeded volitional migration of steelhead to upstream spawning and rearing habitats		Dams and Surface Water Diversions	1, 3, 4	3A						
	Develop and implement water management plan		Dams and Surface Water Diversions	1, 3, 4	3B						
	Develop and implement a flood control maintenance program		Levees and Channelization	1, 4	3B						
	Develop and implement a stream bank and riparian corridor restoration plan		Levees and Channelization	1, 4	3B						
	Develop and implement a watershed-wide plan to assess the impacts of non-native species and develop control measures		Non-Native Species	1, 3, 5	3B						
	Develop and implement a non-native species monitoring program		Non-Native Species	1, 3, 5	3B						
	Develop and implement a public educational program on non-native species impacts		Non-Native Species	1, 3, 5	3B						
	Develop and implement a restoration and management plan for the Los Flores Canyon Creek Estuary		Other Recovery Actions	1, 2, 3, 4, 5	3B						
	Review and modify applicable County and/or City Local Coastal Plans		Other Recovery Actions	1, 2, 3, 4, 5	3B						
	Review development and management plans for Los Flores Creek and Estuary		Recreational Facilities	1, 2, 3, 4, 5	3B						
	Develop and implement a public educational program on watershed processes		Recreational Facilities	1, 2, 3, 4, 5	3B						

Action #	Recovery Action Description	Responsible Parties	Threat Source	Listing Factors (1 - 5)	Action Rank (1A, 1B, 2A, 2B, 3A, 3B)	Task Duration	Fiscal Year Costs ($K)				
							FY1	FY2	FY3	FY4	FY5
	Review Santa Monica Mountains National Recreation Area General Management Plan		Recreational Facilities	1, 2, 3, 4, 5	3B						
	Relocate roadways outside of riparian corridor and restore abandoned roadways		Roads	1, 4	3B						
	Retrofit storm drains to filter runoff from roadways		Roads	1, 4	3B						
	Develop, adopt, and implement urban land-use planning policies and standards		Urban Development	1, 4	3B						
	Retrofit storm drains in developed areas		Urban Development	1, 4	3B						
	Review, assess and modify if necessary all NPDES wastewater discharge permits (e.g., Las Virgenes Municipal Water District Wastewater Treatment Facility)		Urban Effluents	1, 4	3B						
	Review California Regional Water Quality Control Board Los Angeles Region Watershed Plans and modify applicable stormwater permits		Urban Effluents	1, 4, 5	3B						
	Develop and implement an integrated wildland fire and hazardous fuels management plan, including monitoring, remediation and adaptive management, to reduce potentially catastrophic wildland fire effects to steelhead and their habitat and preserve natural ecosystem processes (including sediment deposition)		Wildfires	1, 4, 5	3B						

Table 10-8. Southern California Steelhead DPS Recovery Action Matrix for the Topanga Canyon Creek Watershed (Santa Monica Mountains BPG).

Action #	Recovery Action Description	Responsible Parties	Threat Source	Listing Factors (1 - 5)	Action Rank (1A, 1B, 2A, 2B, 3A, 3B)	Task Duration	Fiscal Year Costs ($K)				
							FY1	FY2	FY3	FY4	FY5
	Physically modify road crossings, highways, and railways to allow unimpeded volitional migration of steelhead to upstream spawning and rearing habitats		Culverts and Road Crossings (Passage Barriers)	1, 4	1A						
	Develop and implement an integrated wildland fire and hazardous fuels management plan, including monitoring, remediation and adaptive management, to reduce potentially catastrophic wildland fire effects to steelhead and their habitat and preserve natural ecosystem processes (including sediment deposition)		Wildfires	1, 4, 5	1A						
	Physically modify dams/diversions to allow unimpeded volitional migration of steelhead to upstream spawning and rearing habitats		Dams and Surface Water Diversions	1, 3, 4	2A						
	Develop and implement a restoration and management plan for the Topanga Creek Estuary		Other Recovery Actions	1, 2, 3, 4, 5	2A						
	Develop and implement water management plan		Dams and Surface Water Diversions	1, 3, 4	2B						
	Develop and implement a flood control maintenance program		Levees and Channelization	1, 4	2B						
	Develop and implement a stream bank and riparian corridor restoration plan		Levees and Channelization	1, 4	2B						
	Develop and implement a watershed-wide plan to assess the impacts of non-native species and develop control measures		Non-Native Species	1, 3, 5	2B						
	Develop and implement a non-native species monitoring program		Non-Native Species	1, 3, 5	2B						
	Develop and implement a public educational program on non-native species impacts		Non-Native Species	1, 3, 5	2B						

Action #	Recovery Action Description	Responsible Parties	Threat Source	Listing Factors (1 - 5)	Action Rank (1A, 1B, 2A, 2B, 3A, 3B)	Task Duration	Fiscal Year Costs ($K)				
							FY1	FY2	FY3	FY4	FY5
	Review and modify applicable County and/or City Local Coastal Plans		Other Recovery Actions	1, 2, 3, 4, 5	2B						
	Review development and management plans for Topanga State Park		Recreational Facilities	1, 2, 3, 4, 5	2B						
	Review Santa Monica Mountains National Recreation Area General Management Plan		Recreational Facilities	1, 2, 3, 4, 5	2B						
	Relocate roadways outside of riparian corridor and restore abandoned roadways		Roads	1, 4	2B						
	Retrofit storm drains to filter runoff from roadways		Roads	1, 4	2B						
	Develop, adopt, and implement urban land-use planning policies and standards		Urban Development	1, 4	2B						
	Retrofit storm drains in developed areas		Urban Development	1, 4	2B						
	Review, assess and modify if necessary all NPDES wastewater discharge permits		Urban Effluents	1, 4	2B						
	Review California Regional Water Quality Control Board Los Angeles Region Watershed Plans and modify applicable stormwater permits		Urban Effluents	1, 4, 5	2B						
	Develop and implement a public educational program on watershed processes		Recreational Facilities	1, 2, 3, 4, 5	3B						

11. Mojave Rim Biogeographic Population Group

"Assessment at the group level indicates a priority for securing inland populations in southern Coast Ranges and Transverse Ranges, and a need to maintain not just the fluvial-anadromous life-history form, but also lagoon-anadromous and freshwater-resident forms in each population."

NOAA Fisheries Technical Recovery Team
Viability Criteria for South-Central and Southern California Steelhead, 2007

11.1 LOCATION AND PHYSICAL CHARACTERISTICS

The Mojave Rim BPG region encompasses three large coastal watersheds that drain the northern slopes of the Santa Monica Mountains and the coastal slopes of the San Gabriel and San Bernardino mountains in southern Los Angeles County, southwestern San Bernardino, and western Riverside and Orange counties: the Los Angeles River, San Gabriel River, and the Santa Ana River (Figure 4-10). Major tributaries in these drainages include: Arroyo Seco in the Los Angeles River watershed; the East and West forks of the San Gabriel River, and Mill and Lytle creeks in the upper Santa Ana River watershed. The upper portion of each of these watersheds includes steep, mountainous terrain and the lower watersheds cut across the Los Angeles Watershed—an extensive coastal plain. The Los Angeles, San Gabriel, and Santa Ana rivers have not always discharged to the Pacific Ocean at their current locations, but sometimes migrated across the Los Angeles Watershed and discharged as far west as Ballona Creek and as far east as present-day Huntington Beach. The Los Angeles, San Gabriel, and Santa Ana rivers currently discharge to the Pacific Ocean within 20 miles of each other in southern Los Angeles and northern Orange counties. The component watersheds are large, extending up to 83 miles inland in the case of the Santa Ana River watershed (Figure 11-1).

Average annual precipitation in these three watersheds is higher than that of the two adjacent BPG regions (*i.e.,* the Santa Monica Mountains and Santa Catalina Gulf Coast) because the upper watersheds include the San Gabriel and San Bernardino mountain ranges, whose upper elevations receive high annual rainfall and snowfall (Table 11-1). Rainfall along the coastal terrace portion of each of these watersheds is significantly lower than in the mountainous portions. Many of the mainstem rivers and tributaries in the Mojave Rim BPG region flow

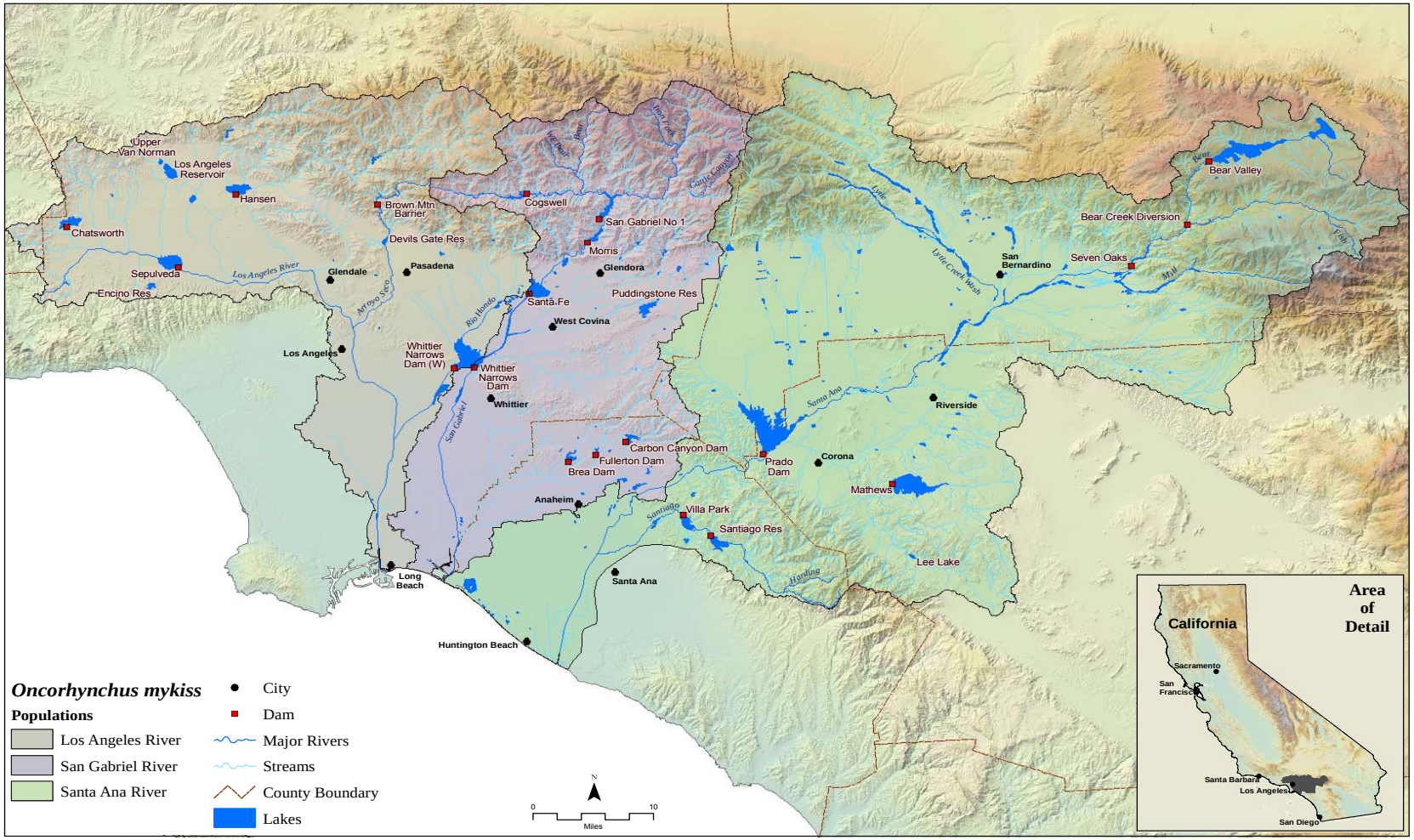

Figure 11-1. The Mojave Rim BPG region. Eight *O. mykiss* populations/watersheds were analyzed in this region: two in the Los Angeles River watershed; three in the San Gabriel River watershed, and; three in the Santa Ana River watershed.

across the relatively flat Los Angeles Watershed, with comparatively few small tributaries for watersheds of their size. As a result, the overall stream length in these watersheds is less than that in other BPG regions of comparable size.

11.2 LAND USE

Table 11-1 summarizes land use and population density in this region. This BPG region encompasses the second-largest metropolitan area in the United States. Human population density here is the highest of any of the five BPG regions, averaging 2,964 persons per square mile, over six times greater than the next most densely populated BPG region, the Santa Catalina Gulf Coast. Population density is much greater in some of the component watersheds, for example, the Los Angeles River watershed supports 5,237 persons per square mile. Population centers are mostly concentrated in the Los Angeles Watershed portions of these watersheds, but the interior portions of the Santa Ana River watershed also have extensive metropolitan areas.

There are at least 20 dams on the mainstem and/or major tributaries of each of the three drainages in this BPG that are large enough to be regulated by the California Department of Water Resources and/or Department of Defense (also see Figure 11-1 for distribution and size of reservoirs). These dams are owned and operated by federal, state, public utility, local government, or private interests for irrigation, flood control and storm water management, recreation, municipal water supply, fire protection, farm ponds, or some combination of these purposes. Most of the reservoirs and lakes in this region receive high recreational use and many are sources of non-native crayfish, fishes, and bullfrogs, and other non-native species that prey on or compete with *O. mykiss* for food and habitat space.

Public land ownership is concentrated in the upper portions of these watersheds, mostly within the Angeles National Forest, San Bernardino National Forest, and the northern portion of Cleveland National Forest. These three National Forests encompass several federally-designated wilderness areas: the San Gabriel and Sheep Mountain Wilderness Areas (Angeles National Forest); San Gorgonio, Cucamonga, San Jacinto, Santa Rosa, and Big Horn Mountain Wilderness Areas (San Bernardino National Forest), and Aqua Tibia Wilderness Area (Cleveland National Forest). Additionally, several rivers have been evaluated for inclusion in the federally-designated Wild and Scenic River system: Little Rock Creek, North and South forks of the San Gabriel River (tributaries to the San Gabriel River), Middle Fork Lytle Creek, Bear Creek, and Siberia Creek (tributaries to the Santa Ana River). Agriculture (row crop, orchard cultivation, and livestock ranching), used to be important land uses throughout the flatter portions of these watersheds, but have largely been displaced by urban development.

11.3 CURRENT WATERSHED CONDITIONS

Watershed conditions were assessed for eight watersheds and sub-watersheds in the Mojave Rim BPG region. In general, instream, riparian, and floodplain conditions for anadromous *O. mykiss* are poor in this BPG region, reflecting pervasive urban conversion of watershed lands, particularly along the mainstems of these drainages, but even in the upper sub-watersheds of the

Table 11-1. Physical and Land Use Characteristics of Watersheds in the Mojave Rim BPG region.

PHYSICAL CHARACTERISTICS						**LAND USE**			
WATERSHEDS (north to south)	**Area** (acres)[1]	**Area** (sq. miles)[1]	**Stream Length**[2] (miles)	**Ave. Ann. Rainfall**[3] (inches)	**Total Human Population**	**Public Ownership***	**Urban Area**[5]	**Agriculture/ Barren**[5]	**Open Space**[5]
Los Angeles River	535,923	837	766	19.1	4,383,260	25%	61%	1%	38%
San Gabriel River	463,167	723	784	19.8	2,417,034	35%	53%	2%	46%
Santa Ana River	1,141,195	1,783	2,074	17.3	3,109937	29%	37%	8%	55%
TOTAL or AVERAGE	**2,140,285**	**3,343**	**3,624**	**18.7**	**9,910,231**	**30%**	**50%**	**4%**	**46%**

[1] From: CDFFP CalWater 2.2 Watershed delineation, 1999 (www.ca.nrcs.usda.gov/features/calwater/)
[2] From: CDFG 1:1,000,000 Routed stream network, 2003 (www.calfish.org/)
[3] From: USGS Hydrologic landscape regions of the U.S., 2003 (1 km grid cells)
[4] From: CDFFP Census 2000 block data (migrated), 2003
[5] From: CDFFP Multi-source land cover data (v02_2), 2002 (100 m grid cells) (http://frap.cdf.ca.gov/data/frapgisdata/select.asp)
** National Forest Lands only; Military Reservations or State and County Parks not included.*

Santa Ana River watershed. The upper watersheds of the San Gabriel River watershed (East and West forks) still provide good to very good habitat conditions for resident *O. mykiss*, but these fish are isolated from the anadromous component of the population found in the mainstem. Several photographs of the Mojave Rim BPG region are provided in Figure 11-2.

The mainstems of the Los Angeles, San Gabriel, and Santa Ana rivers, including the main tributaries of the latter, provide little suitable spawning or rearing habitat for anadromous *O. mykiss* because of fish-passage barriers, channelization and flood control activities, loss of surface flows, and impaired water quality. The East and West forks of the San Gabriel River watershed, above Morris and Cogswell dams and their reservoirs, are mostly are in public ownership (Angeles National Forest and Cleveland National Forest) and these reaches provide relatively good habitat conditions. Both of these sub-watersheds support reproducing populations of non-anadromous *O. mykiss* that are isolated from their anadromous counterparts downstream of the dams.

Urban and agricultural conversion of coastal and middle reaches of these watersheds has created a number of severe stressors on anadromous *O. mykiss*. High road density throughout the floodplains has constricted the mainstems of these rivers to narrow channels, increased sediment and non-point pollutant inputs, and degraded rearing and spawning habitats (including estuaries). Nutrient and coliform bacteria loading from agricultural and wastewater treatment effluents degrades water quality in most of these drainages. In urban areas, channelization, levee construction, and other flood control activities have completely removed instream and riparian habitat from extensive reaches of the mainstems of the lower Los Angeles River, Santa Ana River, and San Gabriel.

Other significant threat sources in the Mojave Rim BPG region are recreational facilities, wildfire, and the loss of extensive estuarine habitat. Most watersheds receive very high recreational use because of their proximity to large urban areas. Trash, foot traffic, and off-road vehicle traffic have significantly affected instream and riparian habitats along extensive reaches of the upper watersheds. Fires have burned 21% and 26% of the San Gabriel River and Santa Ana River watersheds, respectively, in the past 25 years and may be significant, widespread, and long-term sources of sedimentation, turbidity, substrate embeddedness, and loss of riparian canopy cover. The historically extensive estuaries that formed at the mouths of the Los Angeles River, San Gabriel River, and Santa Ana River have been all but eliminated by urban and commercial development.

Despite widespread habitat degradation to the coastal and middle mainstems in these watersheds, native non-anadromous *O. mykiss* populations still persist upstream of the dams in this BPG region, and small numbers of anadromous *O. mykiss* attempt to enter and spawn in each of the watersheds when flow conditions are suitable.

11.4 THREATS AND THREAT SOURCES

Habitat impairments were rated as severe to very severe in five of the eight watersheds and sub-watersheds in this BPG region because of the very high human population densities. Ten anthropogenic activities ranked as the top five sources of stresses to steelhead and their habitat in

the Mojave Rim BPG (Table 11-2). These sources of threats focus on water management activities to serve municipal uses (dams, surface water diversions, and groundwater extraction). Dams and surface water diversions in this BPG region have been constructed to serve mostly urban purposes. These dams have numerous impacts on physical, hydrological, and habitat characteristics of the middle and lower reaches of mainstem rivers in this region. Dams also create and maintain favorable habitat conditions for several species of non-native fishes and bullfrogs that may affect one or more life-history stages of *O. mykiss* either directly (*e.g.,* predation) or indirectly (*e.g.,* competition for food). Non-native fishes, crayfish, and/or amphibians occur in the mainstems of the Los Angeles River, San Gabriel River, and Santa Ana River, as well as in most or all of the major tributaries. Water management practices and facilities have significantly altered natural sediment and hydrological processes in these watersheds. Widespread pumping of groundwater from aquifers throughout the region routinely eliminates surface flows in portions of most of these drainages. The magnitude of such losses of surface flows is greater during years of below-average precipitation. Another major indirect impact of dam construction and operation on the mainstem of the San Gabriel River is the periodic sluicing of sediments accumulated behind these dams, which severely degrades instream and riparian habitat quality for downstream of these structures.

Figure 11-2. Photographs of Mojave Rim BPG region.

East Fork San Gabriel River

Morris Dam – San Gabriel River

Santa Ana River Estuary

Table 11-2. Threat source rankings in the Mojave Rim BPG (see CAP Workbooks for individual watersheds for details).

Mojave Rim BPG Component Watersheds								
Threat Sources	Los Angeles River mainstem	Arroyo Seco	San Gabriel River mainstem	West Fork San Gabriel River	East Fork San Gabriel River	Santa Ana River mainstem	Lytle Creek	Mill Creek
Dams and Surface Water Diversions								
Flood Control								
Groundwater Extraction								
Levees and Channelization								
Urban Development								
Recreational Facilities								
Other Passage Barriers								
Agricultural Development								
Non-Point Pollution								
Wildfires*								

Key: Threat cell colors represent threat rating from CAP Workbook: Red = Very High threat; Light green = Medium threat; Yellow = High threat; Dark green = Low threat

** Wildfires as a source of threats to steelhead habitat is not reflected in the top five threat sources in the CAP summary for these watersheds (see CAP workbooks), but is included here because of the extent and severity of recent (2005-2007) wildfires in this region.*

11.5 SUMMARY

Dams and water diversions (including groundwater extraction) along with flood control structures on the major rivers of the Mojave Rim BPG (Los Angeles River, San Gabriel River, and Santa Ana River) have had the most serve impacts on the anadromous *O. mykiss* populations in this BPG region by cutting off access to upstream spawning and rearing habitats and altering the magnitude, duration, and timing of flows necessary for immigration of adults and emigration of juveniles. Dams and surface water diversions in this BPG region have been constructed to serve mostly urban purposes. This BPG region encompasses the second-largest metropolitan area in the United States and human population density here is the highest of any of the five BPG regions. Such widespread urbanization has created a number of severe stressors for steelhead. Table 11-3 summarizes the critical recovery actions needed within the Core 1 populations of this BPG.

Table 11-3. Critical recovery actions for Core 1 populations within the Mojave Rim BPG.

POPULATION	CRITICAL RECOVERY ACTION
San Gabriel River	Implement operating criteria to ensure the pattern and magnitude of water releases from Morris, San Gabriel, and Cogswell dams comport with the natural or pre-dam pattern and magnitude of streamflow in downstream reaches. Physically modify Morris, San Gabriel, Cogswell, and Santa Fe dams, and road, highway, and railway crossings to allow unimpeded volitional migration of steelhead to upstream spawning and rearing habitats. Identify, protect, and where necessary, restore estuarine and freshwater rearing habitats.

Restoring conditions for anadromous *O. mykiss* passage, spawning, and rearing in the Mojave Rim BPG region will require multiple, long-term, measures related to water management, recreation, and urban development. A fish passage barrier inventory and assessment should be conducted for each of the major watersheds. Impediments to fish passage stemming from the construction and operation of dams, groundwater extraction, and channel modification, and the loss of instream and adjacent riparian habitats by flood control measures need to be further evaluated for this BPG region. Additionally, the loss of estuarine functions caused by filling and pollution from point and non-point agricultural and urban waste discharges need to be addressed further in this region.

Threat sources discussed in this section should be the focus of a variety of recovery actions to address specific stresses on anadromous *O. mykiss* viability. Spatial and temporal data acquired on specific indicators associated with threat sources such as water temperature, pH, nutrients, *etc.*, are generally inadequate to be the target of specific recovery actions. This type of data acquisition should be the subject of site-specific investigations in order to refine the primary recovery actions or to target additional recovery actions as part of any recovery strategy for the Mojave Rim BPG. Tables 11-4 through 11-6 below rank and describe proposed recovery actions for each sub-watershed in the Mojave Rim BPG including the estimated cost for implementing such actions over the first five fiscal years.

Table 11-4. Southern California Steelhead DPS Recovery Action Matrix for the Los Angeles River Watershed (Mojave Rim BPG).

Action #	Recovery Action Description	Responsible Parties	Threat Source	Listing Factors (1 - 5)	Action Rank (1A, 1B, 2A, 2B, 3A, 3B)	Task Duration	Fiscal Year Costs ($K)				
							FY1	FY2	FY3	FY4	FY5
Los Angeles River Mainstem											
	Conduct a watershed-wide fish passage barrier assessment		Culverts and Road Crossings (Passage Barriers)	1, 4	2B						
	Physically modify or remove all fish passage barriers identified in the Los Angeles River Watershed to allow unimpeded volitional migration of steelhead to upstream spawning and rearing habitats		Culverts and Road Crossings (Passage Barriers)	1, 4	2B						
	Develop and implement an integrated wildland fire and hazardous fuels management plan, including monitoring, remediation and adaptive management, to reduce potentially catastrophic wildland fire effects to steelhead and their habitat and preserve natural ecosystem processes (including sediment deposition)		Wildfires	1, 4, 5	2B						
	Develop and implement a watershed-wide sediment management plan		Agricultural Development	1, 4	3B						
	Develop and implement a water management plan		Dams and Surface Water Diversions	1, 3, 4	3B						
	Develop an operational plan for releases from all dams (e.g., Whittier Narrows, Sepulveda, and Lower San Fernando dams)		Dams and Surface Water Diversions	1, 3, 4	3B						
	Develop and implement a plan to minimize disturbance of instream habitats and riparian vegetation		Flood Control	1, 4	3B						
	Conduct hydrological analysis (groundwater)		Groundwater Extraction	1, 4	3B						
	Develop and implement a groundwater monitoring program		Groundwater Extraction	1, 4	3B						
	Develop and implement a flood control maintenance program		Levees and Channelization	1, 4	3B						

Action #	Recovery Action Description	Responsible Parties	Threat Source	Listing Factors (1 - 5)	Action Rank (1A, 1B, 2A, 2B, 3A, 3B)	Task Duration	Fiscal Year Costs ($K)				
							FY1	FY2	FY3	FY4	FY5
	Develop and implement a plan to vegetate levees and minimize herbicide use near levees		Levees and Channelization	1, 4	3B						
	Develop and implement a plan to restore natural channel features where feasible		Levees and Channelization	1, 4	3B						
	Develop and implement a non-native species monitoring program		Non-Native Species	1, 3, 5	3B						
	Develop and implement a public educational program on non-native species impacts		Non-Native Species	1, 3, 5	3B						
	Develop and implement a plan to assess the impacts of non-native species and develop control measures		Non-Native Species	1, 3, 5	3B						
	Review Los Angeles River Revitalization Master Plan and modify to provide for the protection and restoration of the Los Angeles River Watershed and riparian/floodplain areas		Recreational Facilities	1, 2, 3, 4, 5	3B						
	Develop and implement a public educational program		Recreational Facilities	1,3,5	3B						
	Review U.S. Forest Service Angeles National Forest Land Management Plan (Southern California National Forest Vision, Forest Strategy, and Design Criteria)		Recreational Facilities	1, 2, 3, 4, 5	3B						
	Develop, adopt, and implement urban land-use planning policies and standards		Urban Development	1, 4	3B						
	Retrofit storm drains in developed areas		Urban Development	1, 4	3B						
	Develop and implement a riparian restoration plan that focuses on replacing artificial bank stabilization structures wherever feasible		Urban Development	1, 4	3B						
	Review California Regional Water Quality Control Board Los Angeles Region Watershed Plans and modify applicable stormwater permits		Urban Effluents	1, 4	3B						

Action #	Recovery Action Description	Responsible Parties	Threat Source	Listing Factors (1 - 5)	Action Rank (1A, 1B, 2A, 2B, 3A, 3B)	Task Duration	Fiscal Year Costs ($K)				
							FY1	FY2	FY3	FY4	FY5
	Review, assess and modify if necessary all NPDES wastewater discharge permits (e.g., Whittier Narrows Water Reclamation Facility, D.C. Tillman Water Reclamation Facility and Hyperion Wastewater Treatment Facility)		Urban Effluents	1, 4	3B						
	Review and modify applicable County and/or City Local Coastal Plans		Other Recovery Actions	1, 2, 3, 4, 5							
Arroyo Seco River											
	Conduct a watershed-wide fish passage barrier assessment		Culverts and Road Crossings (Passage Barriers)	1, 4	2B						
	Physically modify or remove all fish passage barriers identified in the Los Angeles River Watershed to allow unimpeded volitional migration of steelhead to upstream spawning and rearing habitats		Culverts and Road Crossings (Passage Barriers)	1, 4	2B						
	Develop and implement an integrated wildland fire and hazardous fuels management plan, including monitoring, remediation and adaptive management, to reduce potentially catastrophic wildland fire effects to steelhead and their habitat and preserve natural ecosystem processes (including sediment deposition)		Wildfires	1, 4, 5	2B						
	Develop and implement a watershed-wide sediment management plan		Agricultural Development	1, 4	3B						
	Develop, adopt, and implement agricultural land-use planning policies and standards		Agricultural Development	1, 4	3B						
	Relocate livestock grazing and water sources		Agricultural Development	1, 4	3B						
	Relocate agricultural development and restore riparian zone		Agricultural Development	1, 4	3B						
	Develop and implement a water management plan		Dams and Surface Water Diversions	1, 3, 4	3B						

Action #	Recovery Action Description	Responsible Parties	Threat Source	Listing Factors (1 - 5)	Action Rank (1A, 1B, 2A, 2B, 3A, 3B)	Task Duration	Fiscal Year Costs ($K)				
							FY1	FY2	FY3	FY4	FY5
	Develop and implement a plan to minimize disturbance of instream habitats and riparian vegetation		Flood Control	1, 4	3B						
	Conduct hydrological analysis (groundwater)		Groundwater Extraction	1, 4	3B						
	Develop and implement a groundwater monitoring program		Groundwater Extraction	1, 4	3B						
	Develop and implement a flood control maintenance program		Levees and Channelization	1, 4	3B						
	Develop and implement a plan to vegetate levees and minimize herbicide use near levees		Levees and Channelization	1, 4	3B						
	Develop and implement a plan to restore natural channel features where feasible		Levees and Channelization	1, 4	3B						
	Develop and implement a non-native species monitoring program		Non-Native Species	1, 3, 5	3B						
	Develop and implement a public educational program on non-native species impacts		Non-Native Species	1, 3, 5	3B						
	Develop and implement a plan to assess the impacts of non-native species and develop control measures		Non-Native Species	1, 3, 5	3B						
	Review Arroyo Seco Master Plans (Hahanonga Watershed Park Master Plan, Central Arroyo Master Plan, Lower Arroyo Master Plan, Design Guidelines for the Arroyo Seco) and modify to provide for the protection and restoration of the Arroyo Seco River Watershed and riparian/floodplain areas		Recreational Facilities	1, 2, 3, 4, 5	3B						
	Review U.S. Forest Service Angeles National Forest Land Management Plan (Southern California National Forest Vision, Forest Strategy, and Design Criteria)		Recreational Facilities	1, 2, 3, 4, 5	3B						

Action #	Recovery Action Description	Responsible Parties	Threat Source	Listing Factors (1 - 5)	Action Rank (1A, 1B, 2A, 2B, 3A, 3B)	Task Duration	Fiscal Year Costs ($K)				
							FY1	FY2	FY3	FY4	FY5
	Develop, adopt, and implement urban land-use planning policies and standards		Urban Development	1, 4	3B						
	Retrofit storm drains in developed areas		Urban Development	1, 4	3B						
	Develop and implement a riparian restoration plan that focuses on replacing artificial bank stabilization structures wherever feasible		Urban Development	1, 4	3B						
	Review California Regional Water Quality Control Board Los Angeles Region Watershed Plans and modify applicable stormwater permits		Urban Effluents	1, 4	3B						
	Review, assess and modify if necessary all NPDES wastewater discharge permits		Urban Effluents	1, 4	3B						
	Develop and implement a public educational program		Recreational Facilities	1,3,5							

Table 11-5. Southern California Steelhead DPS Recovery Action Matrix for the San Gabriel River Watershed (Mojave Rim BPG).

Action #	Recovery Action Description	Responsible Parties	Threat Source	Listing Factors (1 - 5)	Action Rank (1A, 1B, 2A, 2B, 3A, 3B)	Task Duration	Fiscal Year Costs ($K)				
							FY1	FY2	FY3	FY4	FY5
San Gabriel River Mainstem											
	Conduct a watershed-wide fish passage barrier assessment		Culverts and Road Crossings (Passage Barriers)	1, 4	1A						
	Physically modify or remove all fish passage barriers identified in the San Gabriel River Watershed to allow unimpeded volitional migration of steelhead to upstream spawning and rearing habitats		Culverts and Road Crossings (Passage Barriers)	1, 4	1A						
	Develop and implement a plan to minimize disturbance of instream habitats and riparian vegetation		Flood Control	1, 4	2B						
	Develop and implement an integrated wildland fire and hazardous fuels management plan, including monitoring, remediation and adaptive management, to reduce potentially catastrophic wildland fire effects to steelhead and their habitat and preserve natural ecosystem processes (including sediment deposition)		Wildfires	1, 4, 5	2B						
	Develop and implement a watershed-wide sediment management plan		Agricultural Development	1, 4	3B						
	Relocate livestock grazing and water sources		Agricultural Development	1, 4	3B						
	Relocate agricultural development and restore riparian zone		Agricultural Development	1, 4	3B						
	Develop and implement a water management plan		Dams and Surface Water Diversions	1, 3, 4	3B						
	Develop and implement operating criteria to ensure the pattern and magnitude of water releases from Santa Fe, Morris, and San Gabriel dams comport with the natural or pre-dam pattern and magnitude of streamflow in downstream reaches		Dams and Surface Water Diversions	1, 3, 4	3B						

Action #	Recovery Action Description	Responsible Parties	Threat Source	Listing Factors (1 - 5)	Action Rank (1A, 1B, 2A, 2B, 3A, 3B)	Task Duration	Fiscal Year Costs ($K)				
							FY1	FY2	FY3	FY4	FY5
	Physically modify Santa Fe, Morris, and San Gabriel dams to allow unimpeded volitional migration of steelhead to upstream spawning and rearing habitats		Dams and Surface Water Diversions	1, 3, 4	3B						
	Conduct hydrological analysis (groundwater)		Groundwater Extraction	1, 4	3B						
	Develop and implement a groundwater monitoring program		Groundwater Extraction	1, 4	3B						
	Develop and implement a flood control maintenance program		Levees and Channelization	1, 4	3B						
	Develop and implement a plan to vegetate levees and minimize herbicide use near levees		Levees and Channelization	1, 4	3B						
	Develop and implement a plan to restore natural channel features where feasible		Levees and Channelization	1, 4	3B						
	Develop and implement a non-native species monitoring program		Non-Native Species	1, 3, 5	3B						
	Develop and implement a public educational program on non-native species impacts		Non-Native Species	1, 3, 5	3B						
	Develop and implement a plan to assess the impacts of non-native species and develop control measures		Non-Native Species	1, 3, 5	3B						
	Develop and implement a restoration and management plan for the San Gabriel estuary		Other Recovery Actions	1, 2, 3, 4, 5	3B						
	Review and modify applicable County and/or City Local Coastal Plans		Other Recovery Actions	1, 2, 3, 4, 5	3B						
	Review San Gabriel River Corridor Plan and modify to provide for the protection and restoration of the San Gabriel River Watershed and riparian/floodplain areas		Recreational Facilities	1, 2, 3, 4, 5	3B						
	Develop and implement a public educational program		Recreational Facilities	1,3,5	3B						

Action #	Recovery Action Description	Responsible Parties	Threat Source	Listing Factors (1 - 5)	Action Rank (1A, 1B, 2A, 2B, 3A, 3B)	Task Duration	Fiscal Year Costs ($K)				
							FY1	FY2	FY3	FY4	FY5
	Review U.S. Forest Service Angeles National Forest Land Management Plan (Southern California National Forest Vision, Forest Strategy, and Design Criteria)		Recreational Facilities	1, 2, 3, 4, 5	3B						
	Develop, adopt, and implement urban land-use planning policies and standards		Urban Development	1, 4	3B						
	Retrofit storm drains in developed areas		Urban Development	1, 4	3B						
	Develop and implement a riparian restoration plan that focuses on replacing artificial bank stabilization structures wherever feasible		Urban Development	1, 4	3B						
	Review California Regional Water Quality Control Board Los Angeles Region Watershed Plans and modify applicable stormwater permits		Urban Effluents	1, 4	3B						
	Review, assess and modify if necessary all NPDES wastewater discharge permits		Urban Effluents	1, 4	3B						
West Fork San Gabriel River											
	Conduct a watershed-wide fish passage barrier assessment		Culverts and Road Crossings (Passage Barriers)	1, 4	1A						
	Physically modify or remove all fish passage barriers identified in the West Fork San Gabriel River Watershed to allow unimpeded volitional migration of steelhead to upstream spawning and rearing habitats		Culverts and Road Crossings (Passage Barriers)	1, 4	1A						
	Develop and implement an integrated wildland fire and hazardous fuels management plan, including monitoring, remediation and adaptive management, to reduce potentially catastrophic wildland fire effects to steelhead and their habitat and preserve natural ecosystem processes (including sediment deposition)		Wildfires	1, 4, 5	1B						

Action #	Recovery Action Description	Responsible Parties	Threat Source	Listing Factors (1 - 5)	Action Rank (1A, 1B, 2A, 2B, 3A, 3B)	Task Duration	Fiscal Year Costs ($K)				
							FY1	FY2	FY3	FY4	FY5
	Develop and implement a watershed-wide sediment management plan		Agricultural Development	1, 4	3B						
	Relocate livestock grazing and water sources		Agricultural Development	1, 4	3B						
	Develop, adopt, and implement agricultural land-use planning policies and standards		Agricultural Development	1, 4	3B						
	Relocate agricultural development and restore riparian zone		Agricultural Development	1, 4	3B						
	Develop and implement a water management plan		Dams and Surface Water Diversions	1, 3, 4	3B						
	Develop and implement an operational plan for all dams (e.g., Cogswell Dam) in the West Fork of the San Gabriel River		Dams and Surface Water Diversions	1, 3, 4	3B						
	Provide fish passage around dams or diversions		Dams and Surface Water Diversions	1, 3, 4	3B						
	Conduct hydrological analysis (groundwater)		Groundwater Extraction	1, 4	3B						
	Develop and implement a groundwater monitoring program		Groundwater Extraction	1, 4	3B						
	Develop and implement a non-native species monitoring program		Non-Native Species	1, 3, 5	3B						
	Develop and implement a public educational program on non-native species impacts		Non-Native Species	1, 3, 5	3B						
	Develop and implement a plan to assess the impacts of non-native species and develop control measures		Non-Native Species	1, 3, 5	3B						
	Develop and implement a public educational program		Recreational Facilities	1,3,5	3B						
	Review U.S. Forest Service Angeles National Forest Land Management Plan (Southern California National Forest Vision, Forest Strategy, and Design Criteria)		Recreational Facilities	1, 2, 3, 4, 5	3B						

Action #	Recovery Action Description	Responsible Parties	Threat Source	Listing Factors (1 - 5)	Action Rank (1A, 1B, 2A, 2B, 3A, 3B)	Task Duration	Fiscal Year Costs ($K)				
							FY1	FY2	FY3	FY4	FY5
	Review California Regional Water Quality Control Board Los Angeles Region Watershed Plans and modify applicable stormwater permits		Urban Effluents	1, 4	3B						
	Review, assess and modify if necessary all NPDES wastewater discharge permits		Urban Effluents	1, 4							
East Fork San Gabriel River											
	Conduct a watershed-wide fish passage barrier assessment		Culverts and Road Crossings (Passage Barriers)	1, 4	1A						
	Physically modify or remove all fish passage barriers identified in the East Fork San Gabriel River Watershed to allow unimpeded volitional migration of steelhead to upstream spawning and rearing habitats		Culverts and Road Crossings (Passage Barriers)	1, 4	1A						
	Develop and implement an integrated wildland fire and hazardous fuels management plan, including monitoring, remediation and adaptive management, to reduce potentially catastrophic wildland fire effects to steelhead and their habitat and preserve natural ecosystem processes (including sediment deposition)		Wildfires	1, 4, 5	1B						
	Develop and implement a watershed-wide sediment management plan		Agricultural Development	1, 4	3B						
	Relocate livestock grazing and water sources		Agricultural Development	1, 4	3B						
	Develop and implement a water management plan		Dams and Surface Water Diversions	1, 3, 4	3B						
	Develop and implement a plan to minimize disturbance of instream habitats and riparian vegetation		Flood Control	1, 4	3B						
	Conduct hydrological analysis (groundwater)		Groundwater Extraction	1, 4	3B						
	Develop and implement a groundwater monitoring program		Groundwater Extraction	1, 4	3B						

Action #	Recovery Action Description	Responsible Parties	Threat Source	Listing Factors (1 - 5)	Action Rank (1A, 1B, 2A, 2B, 3A, 3B)	Task Duration	Fiscal Year Costs ($K)				
							FY1	FY2	FY3	FY4	FY5
	Develop and implement a non-native species monitoring program		Non-Native Species	1, 3, 5	3B						
	Develop and implement a public educational program on non-native species impacts		Non-Native Species	1, 3, 5	3B						
	Develop and implement a plan to assess the impacts of non-native species and develop control measures		Non-Native Species	1, 3, 5	3B						
	Develop and implement a public educational program		Recreational Facilities	1,3,5	3B						
	Review U.S. Forest San Bernardino National Forest Land Management Plan (Southern California National Forest Vision, Forest Strategy, and Design Criteria)		Recreational Facilities	1, 2, 3, 4, 5	3B						
	Review California Regional Water Quality Control Board Los Angeles Region Watershed Plans and modify applicable stormwater permits		Urban Effluents	1, 4	3B						
	Review, assess and modify if necessary all NPDES wastewater discharge permits		Urban Effluents	1, 4	3B						

Table 11-6. Southern California Steelhead DPS Recovery Action Matrix for the Santa Ana River Watershed (Mojave Rim BPG).

Action #	Recovery Action Description	Responsible Parties	Threat Source	Listing Factors (1 - 5)	Action Rank (1A, 1B, 2A, 2B, 3A, 3B)	Task Duration	Fiscal Year Costs ($K)				
							FY1	FY2	FY3	FY4	FY5
Santa Ana River Mainstem											
	Conduct a watershed-wide fish passage barrier assessment		Culverts and Road Crossings (Passage Barriers)	1, 4	1A						
	Physically modify or remove all fish passage barriers identified in the Santa Ana River Watershed to allow unimpeded volitional migration of steelhead to upstream spawning and rearing habitats		Culverts and Road Crossings (Passage Barriers)	1, 4	1A						
	Develop and implement an integrated wildland fire and hazardous fuels management plan, including monitoring, remediation and adaptive management, to reduce potentially catastrophic wildland fire effects to steelhead and their habitat and preserve natural ecosystem processes (including sediment deposition)		Wildfires	1, 4, 5	1B						
	Relocate livestock grazing and water sources		Agricultural Development	1, 4	3B						
	Relocate agricultural development and restore riparian zone		Agricultural Development	1, 4	3B						
	Develop and implement a water management plan		Dams and Surface Water Diversions	1, 3, 4	3B						
	Develop and implement an operational plan for all dams (e.g., Prado Dam) in the mainstem of the Santa Ana River		Dams and Surface Water Diversions	1, 3, 4	3B						
	Physically modify Prado Dam to allow unimpeded volitional migration of steelhead to upstream spawning and rearing habitats		Dams and Surface Water Diversions	1, 3, 4	3B						
	Develop and implement a plan to minimize disturbance of instream habitats and riparian vegetation		Flood Control	1, 4	3B						
	Conduct hydrological analysis (groundwater)		Groundwater Extraction	1, 4	3B						

Action #	Recovery Action Description	Responsible Parties	Threat Source	Listing Factors (1 - 5)	Action Rank (1A, 1B, 2A, 2B, 3A, 3B)	Task Duration	Fiscal Year Costs ($K)				
							FY1	FY2	FY3	FY4	FY5
	Develop and implement a groundwater monitoring program		Groundwater Extraction	1, 4	3B						
	Develop and implement a flood control maintenance program		Levees and Channelization	1, 4	3B						
	Develop and implement a plan to vegetate levees and minimize herbicide use near levees		Levees and Channelization	1, 4	3B						
	Develop and implement a plan to restore natural channel features where feasible		Levees and Channelization	1, 4	3B						
	Develop and implement a non-native species monitoring program		Non-Native Species	1, 3, 5	3B						
	Develop and implement a public educational program on non-native species impacts		Non-Native Species	1, 3, 5	3B						
	Develop and implement a plan to assess the impacts of non-native species and develop control measures		Non-Native Species	1, 3, 5	3B						
	Develop and implement a restoration and management plan for the Santa Ana River estuary		Other Recovery Actions	1, 2, 3, 4, 5	3B						
	Review San Bernardino National Recreational Trail Master Plan and modify to provide for the protection and restoration of the Santa Ana River Watershed and riparian/floodplain areas		Recreational Facilities	1, 2, 3, 4, 5	3B						
	Develop and implement a public educational program		Recreational Facilities	1,3,5	3B						
	Review U.S. Forest San Bernardino National Forest Land Management Plan (Southern California National Forest Vision, Forest Strategy, and Design Criteria)		Recreational Facilities	1, 2, 3, 4, 5	3B						
	Develop, adopt, and implement urban land-use planning policies and standards		Urban Development	1, 4	3B						
	Retrofit storm drains in developed areas		Urban Development	1, 4	3B						

Action #	Recovery Action Description	Responsible Parties	Threat Source	Listing Factors (1 - 5)	Action Rank (1A, 1B, 2A, 2B, 3A, 3B)	Task Duration	Fiscal Year Costs ($K)				
							FY1	FY2	FY3	FY4	FY5
	Develop and implement a riparian restoration plan that focuses on replacing artificial bank stabilization structures wherever feasible		Urban Development	1, 4	3B						
Lytle Creek											
	Develop and implement an integrated wildland fire and hazardous fuels management plan, including monitoring, remediation and adaptive management, to reduce potentially catastrophic wildland fire effects to steelhead and their habitat and preserve natural ecosystem processes (including sediment deposition)		Wildfires	1, 4, 5	1B						
	Relocate livestock grazing and water sources		Agricultural Development	1, 4	3B						
	Relocate agricultural development and restore riparian zone		Agricultural Development	1, 4	3B						
	Conduct a watershed-wide fish passage barrier assessment		Culverts and Road Crossings (Passage Barriers)	1, 4	3B						
	Physically modify or remove all fish passage barriers identified in the Lytle Creek Watershed to allow unimpeded volitional migration of steelhead to upstream spawning and rearing habitats		Culverts and Road Crossings (Passage Barriers)	1, 4	3B						
	Develop and implement a water management plan		Dams and Surface Water Diversions	1, 3, 4	3B						
	Conduct hydrological analysis (groundwater)		Groundwater Extraction	1, 4	3B						
	Develop and implement a groundwater monitoring program		Groundwater Extraction	1, 4	3B						
	Develop and implement a non-native species monitoring program		Non-Native Species	1, 3, 5	3B						
	Develop and implement a public educational program on non-native species impacts		Non-Native Species	1, 3, 5	3B						

Action #	Recovery Action Description	Responsible Parties	Threat Source	Listing Factors (1 - 5)	Action Rank (1A, 1B, 2A, 2B, 3A, 3B)	Task Duration	Fiscal Year Costs ($K)				
							FY1	FY2	FY3	FY4	FY5
	Develop and implement a plan to assess the impacts of non-native species and develop control measures		Non-Native Species	1, 3, 5	3B						
	Review and modify applicable County and/or City Local Coastal Plans		Other Recovery Actions	1, 2, 3, 4, 5	3B						
	Develop and implement a public educational program		Recreational Facilities	1,3,5	3B						
	Review U.S. Forest San Bernardino National Forest Land Management Plan (Southern California National Forest Vision, Forest Strategy, and Design Criteria)		Recreational Facilities	1, 2, 3, 4, 5	3B						
	Review California Regional Water Quality Control Board Santa Ana Region Watershed Plans and modify applicable stormwater permits		Urban Effluents	1, 4	3B						
	Review, assess and modify if necessary all NPDES wastewater discharge permits		Urban Effluents	1, 4	3B						
Mill Creek											
	Develop and implement an integrated wildland fire and hazardous fuels management plan, including monitoring, remediation and adaptive management, to reduce potentially catastrophic wildland fire effects to steelhead and their habitat and preserve natural ecosystem processes (including sediment deposition)		Wildfires	1, 4, 5	1B						
	Relocate livestock grazing and water sources		Agricultural Development	1, 4	3B						
	Conduct a watershed-wide fish passage barrier assessment		Culverts and Road Crossings (Passage Barriers)	1, 4	3B						
	Physically modify or remove all fish passage barriers identified in the Mill Creek Watershed to allow unimpeded volitional migration of steelhead to upstream spawning and rearing habitats		Culverts and Road Crossings (Passage Barriers)	1, 4	3B						

Action #	Recovery Action Description	Responsible Parties	Threat Source	Listing Factors (1 - 5)	Action Rank (1A, 1B, 2A, 2B, 3A, 3B)	Task Duration	Fiscal Year Costs ($K)				
							FY1	FY2	FY3	FY4	FY5
	Develop and implement a water management plan		Dams and Surface Water Diversions	1, 3, 4	3B						
	Conduct hydrological analysis (groundwater)		Groundwater Extraction	1, 4	3B						
	Develop and implement a groundwater monitoring program		Groundwater Extraction	1, 4	3B						
	Develop and implement a non-native species monitoring program		Non-Native Species	1, 3, 5	3B						
	Develop and implement a public educational program on non-native species impacts		Non-Native Species	1, 3, 5	3B						
	Develop and implement a plan to assess the impacts of non-native species and develop control measures		Non-Native Species	1, 3, 5	3B						
	Develop and implement a public educational program		Recreational Facilities	1,3,5	3B						
	Review U.S. Forest San Bernardino National Forest Land Management Plan (Southern California National Forest Vision, Forest Strategy, and Design Criteria)		Recreational Facilities	1, 2, 3, 4, 5	3B						
	Review California Regional Water Quality Control Board Santa Ana Region Watershed Plans and modify applicable stormwater permits		Urban Effluents	1, 4	3B						
	Review, assess and modify if necessary all NPDES wastewater discharge permits		Urban Effluents	1, 4	3B						

12. Santa Catalina Gulf Coast Biogeographic Population Group

"Assessment at the group level indicates a priority for securing inland populations in southern Coast Ranges and Transverse Ranges, and a need to maintain not just the fluvial-anadromous life-history form, but also lagoon-anadromous and freshwater-resident forms in each population."

NOAA Fisheries Technical Recovery Team, Viability Criteria for the South-Central and Southern California, 2007

12.1 LOCATION AND PHYSICAL CHARACTERISTICS

The Santa Catalina Gulf Coast BPG region encompasses ten coastal watersheds of moderate size that drain the western slopes of the Santa Ana Mountains and Peninsular Range in southwestern Orange and Riverside counties southward through San Diego County to the United States-Mexico border (Figure 12-1). The upper portions of almost all of these watersheds include steep, mountainous regions and the lower watersheds cut across coastal terraces. Two watersheds, the Sweetwater River and Otay River, drain into San Diego Bay; the other eight watersheds drain directly into the Pacific Ocean. The component watersheds vary greatly in size (*e.g.*, the San Luis Rey River watershed is twelve times the size of the San Onofre Creek watershed).

Average annual precipitation in this region is relatively low and is spatially variable (Table 12-1). The coastal terrace portion of each of these watersheds receives significantly less rainfall that the interior montane portions. For example, the average annual total precipitation for the City of San Diego is about 9.9 inches; approximately half the average for the San Diego River watershed as a whole. Because of low rainfall, many of the drainages in this BPG are naturally seasonal or have extensive dry reaches during years of below-average precipitation. Stream length increases substantially in the interior portions of these watersheds because of the highly dissected terrain. Numerous tributaries contribute to the large total stream length for this region (4,235 miles).

12.2 LAND USE

Table 12-1 summarizes land use and human population density in this region. Population density varies widely between the component watersheds, but overall population density is the

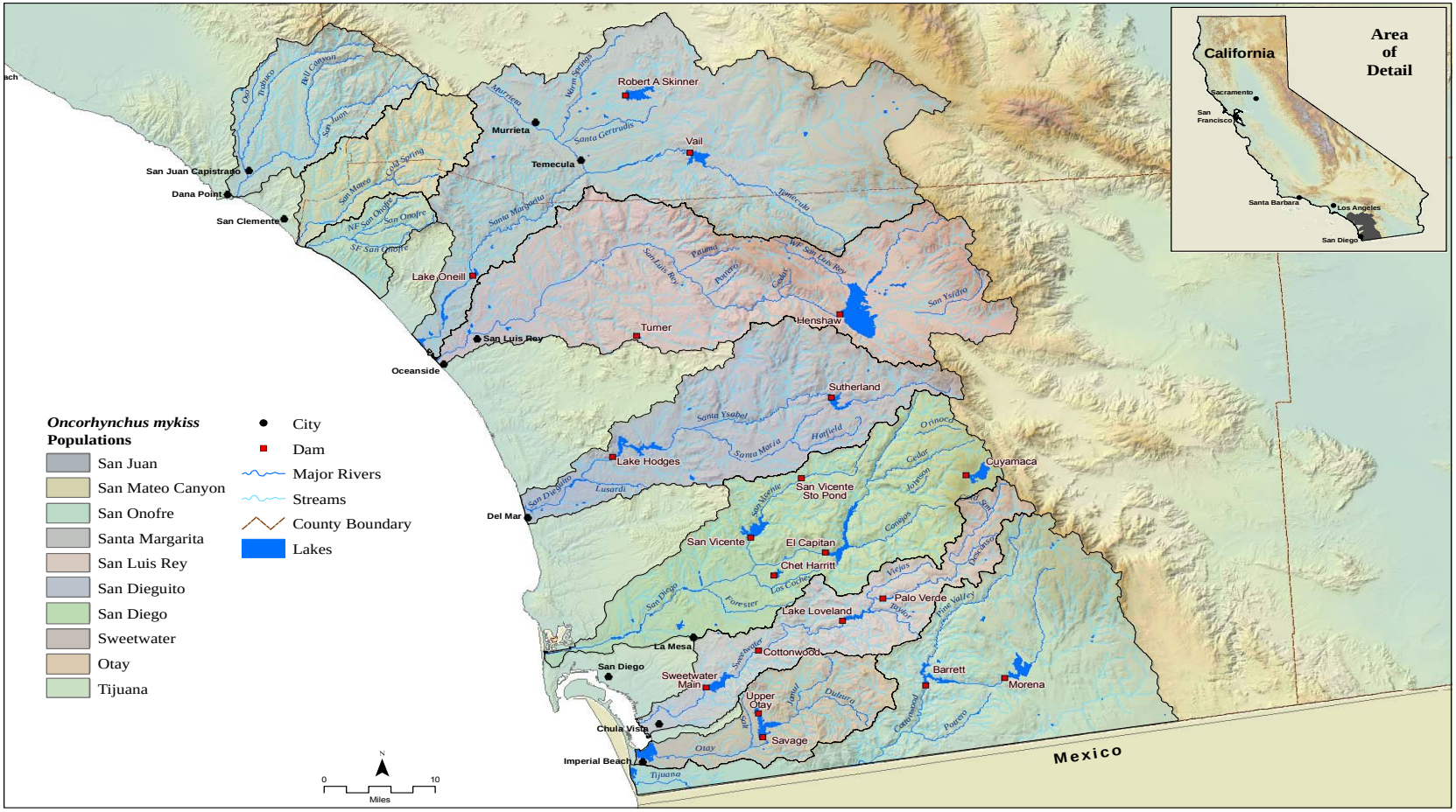

Figure 12-1. The Santa Catalina Gulf Coast BPG region. Ten steelhead populations/watersheds were analyzed in this region.

Table 12-1. Physical and Land Use Characteristics of Watersheds in the Santa Catalina Gulf Coast BPG region.

PHYSICAL CHARACTERISTICS						LAND USE			
WATERSHEDS (north to south)	**Area** (acres)[1]	**Area** (sq. miles)[1]	**Stream Length**[2] (miles)	**Ave. Ann. Rainfall**[3] (inches)	**Total Human Population**	**Public Ownership***	**Urban Area**[5]	**Agriculture/ Barren**[5]	**Open Space**[5]
San Juan River	113,977	178	280	12.5	191,997	37%	23%	7%	70%
San Mateo Creek	85,964	134	200	13.3	4,011	48%	3%	2%	95%
San Onofre Creek	37,617	59	86	14.0	4,981	---	6%	< 1%	94%
Santa Margarita River	472,633	738	949	15.6	181,376	10%	10%	13%	77%
San Luis Rey River	367,329	574	749	17.8	147,782	11%	8%	19%	73%
San Dieguito River	223,155	349	432	18.3	129,475	11%	18%	10%	72%
San Diego River	281,059	439	537	18.0	500,469	17%	26%	2%	72%
Sweetwater River	142,511	223	271	17.7	249,589	15%	27%	1%	72%
Otay River	93,504	146	256	16.7	122,342	---	16%	9%	75%
Tijuana River	301,649	471	475	17.3	75,117	38%	5%	2%	93%
TOTAL or AVERAGE	**2,119,398**	**3,311**	**4,235**	**16.1**	**1,607,140**	**---**	**14%**	**7%**	**79%**

[1] From: CDFFP CalWater 2.2 Watershed delineation, 1999 (www.ca.nrcs.usda.gov/features/calwater/)
[2] From: CDFG 1:1,000,000 Routed stream network, 2003 (www.calfish.org/)
[3] From: USGS Hydrologic landscape regions of the U.S., 2003 (1 km grid cells)
[4] From: CDFFP Census 2000 block data (migrated), 2003
[5] From: CDFFP Multi-source land cover data (v02_2), 2002 (100 m grid cells) (http://frap.cdf.ca.gov/data/frapgisdata/select.asp)
** Includes National Forest Lands only; does not include State or County Parks or Military Reservations (from: http://old.casil.ucdavis.edu/casil/gis.ca.gov/teale/govtowna/)*

second highest among the five BPG regions, averaging 485 persons per square mile. Population centers are concentrated on the coastal terrace portion of these watersheds, especially around San Diego Bay, which comprises one of the largest urban areas in the United States. Comparatively, the San Mateo Creek and portions of the Santa Margarita River and San Onofre Creek watersheds have very low population densities compared to the other watersheds (averaging less than 30 and 84 persons per square mile, respectively). Average population densities in the San Diego River and Sweetwater River watersheds, which encompass the greater San Diego urban area, average over 1,100 persons per square mile.

In most of these watersheds, the first land use changes involved row-crop agriculture (primarily orchard crops), and was followed by increasing urbanization, particularly on the coastal terraces. More recently, the upper watersheds of the Santa Margarita River and the San Luis Rey River have experienced rapid urban growth. Semi-developed rural land and orchards cover extensive portions of the coastal and middle portions of these watersheds. Public ownership of land (mostly in Cleveland National Forest lands) is largely concentrated in the interior, higher-elevation portions of these watersheds and includes several federally designated wilderness areas: the Agua Tibia, San Mateo, Pine Creek, and Hauser Wilderness Areas. Portions of several watersheds have also been evaluated for inclusion in the Federal system of Wild and Scenic Rivers: upper San Luis Rey River; Cottonwood Creek (tributary to the Tijuana River), upper San Mateo Creek, and Devil's Canyon (tributary to San Mateo Creek). The San Juan River/Trabuco Creek watershed contains large county parks (*e.g.*, Caspers Regional Park) that cover much of the upper watersheds of these drainages. The U.S. Marine Corps Base Camp Pendleton covers the coastal and middle portions of the San Mateo Creek, San Onofre Creek, and Santa Margarita River watersheds. However, public ownership constitutes a minority of overall land ownership in this BPG region, especially in the coastal and middle portions of these watersheds.

Agriculture (row crop and orchard cultivation and livestock ranching), are important land uses that directly or indirectly impact watershed processes throughout these watersheds. A major consequence of agricultural and urban growth in this region is reservoir development. There are at least 20 major dams in this region that are large enough to be regulated by the California Department of Water Resources and/or the Department of Defense (Figure 4-13). These dams are owned and operated by federal, state, public utility, local government, or private interests for irrigation, flood control and storm water management, recreation, municipal water supply, fire protection, farm ponds, or a combination of these purposes. Two of these dams create enlarged natural lakes: Lake Henshaw in the San Luis Rey River watershed and Vail Lake in the Santa Margarita River watershed. None of these facilities have incorporated fish passage provisions, including downstream flow provisions, into their operation. Most of the reservoirs and lakes in this region receive high recreational use and many are sources of non-native crayfish, fishes, and bullfrogs, and other non-native species that prey on or compete with *O. mykiss* for food and habitat.

12.3 CURRENT WATERSHED CONDITIONS

Watershed conditions were assessed for the 10 watersheds and sub-watersheds in the Santa Catalina Gulf Coast BPG region. In general, instream, riparian, and floodplain conditions for anadromous *O. mykiss* in this BPG region are rated as "Poor" to "Very Poor", reflecting pervasive

agricultural and urban land uses, particularly along the middle and coastal reaches. In contrast, the upper watersheds of many of these drainages are in relatively good condition (exceptions are the upper watersheds of the Santa Margarita River and San Luis Rey River). Relatively few indicators were rated as "Good" or "Very Good." Several photographs of the Santa Catalina Gulf Coast BPG region are provided in Figure 8.2.

Urban and agricultural conversion of coastal and middle reaches of these watersheds has created a number of severe stressors for anadromous *O. mykiss* in this BPG region. High road density increases sediment and pollutant inputs to these streams and their estuaries, degrading rearing and spawning habitat and increasing mortality of one or more life stages. In many urban and agricultural areas, channelization, levee construction, and other flood control activities have completely removed instream and riparian habitat or reduced instream refugia and structural complexity to a minimum. Flood control structures are widespread along the lower portions of drainages that pass through large urban areas, such as San Juan Creek, San Luis Rey River, San Dieguito River, San Diego River, Sweetwater River, and the Otay River.

At least 20 major dams and surface water diversions without provisions for fish passage have been constructed to serve agricultural, urban, and recreational purposes. These structures and water management practices have significantly altered natural sediment and hydrological processes in these watersheds. Dams also create and maintain favorable habitat conditions for several species of non-native fishes and bullfrogs that may affect one or more life-history stages of *O. mykiss* either directly (*e.g.,* predation) or indirectly (*e.g.,* competition for food). Non-native crayfish, fishes, and bullfrogs occur in all of the drainages in this BPG region, but are particularly abundant in the San Mateo Creek, San Onofre Creek, and Santa Margarita River watersheds. Widespread pumping of groundwater routinely eliminates surface flows in portions of most of these drainages, particularly during years of below-average precipitation.

Severe loss of estuary habitat has occurred throughout the Santa Catalina Gulf Coast BPG region. Only the San Mateo Creek estuary was rated as "Good" (based on remaining acreage), with 76% of the historic estuary intact. Between 48% and 95% of estuary areas in the other watersheds in the BPG region have been lost. Development of recreational facilities within the floodplain and/or mouths of the San Mateo Creek, San Onofre Creek, Santa Margarita River, and Tijuana River watersheds are sources of estuarine, riparian, and instream habitat degradation and loss. Loss of estuarine habitat as a result of recreational development is most pronounced around the mouths of the San Juan Creek, San Dieguito Creek, San Diego River, Sweetwater River, and Otay River. Significant portions of the Santa Margarita River estuarine complex have been isolated from regular freshwater inflow as a result of the construction of the Interstate Highway 5. Off-road vehicle activity is common in the middle and upper portions of several of these watersheds (*e.g.*, upper Santa Margarita and San Luis Rey watersheds). The remaining estuarine habitats are subject to constriction and isolation from urban, agricultural, and/or recreational development, as well as degradation of water quality from surface runoff from roads, wastewater treatment effluents, and losses of upstream surface flows.

Fires have burned between 22% (San Mateo Creek) and 74% (San Diego River) of the watersheds in this BPG region in the past 25 years (including significant coastal portions of watersheds in southern Orange and northern and central San Diego counties in 2007). Increased fire frequency

can increase erosion and sediment input to streams, resulting in long-term changes to substrate composition and embeddedness, water quality (*e.g.*, turbidity), and water temperature (loss of riparian canopy cover). Anadromous *O. mykiss* in each of the watersheds in the BPG region have been subjected to these secondary effects of fire.

Despite widespread and varied habitat degradation to the coastal and middle portions, native non-anadromous *O. mykiss* populations still inhabit the relatively high-quality habitat that remains upstream of most of the dams in this region (*e.g.*, Pine Valley Creek in the Tijuana River watershed), and small numbers of anadromous *O. mykiss* attempt to enter and spawn in each of the watersheds of the Santa Catalina Gulf Coast BPG when flow conditions are suitable.

12.4 THREATS AND THREAT SOURCES

Varying numbers and intensity of habitat impairment (threats) were identified in the CAP Workbooks analyses, ranging from 11 in the San Onofre Creek watershed to 17 in the Santa Margarita River and San Luis Rey River watersheds. NMFS notes that portions of the San Luis Rey River run through tribal lands and additional information is needed to assess the conditions of those portions of the river. Most of the habitat impairments across the BPG were rated as "Severe" to "Very Severe" in all but the San Mateo Creek and San Onofre Creek watersheds, and are related to high human population densities and urban and agricultural conversion of watershed lands. The relatively good habitat quality in San Mateo and San Onofre creeks, and, to a lesser degree in the Santa Margarita River, is due to the presence of the Camp Pendleton Marine Corps Base, which covers substantial portions of the coastal and middle reaches of these watersheds. The upper watersheds, above dams and reservoirs, mostly are in public ownership within Cleveland National Forest. These reaches provide relatively good habitat conditions for anadromous *O. mykiss* and support reproducing populations of non-anadromous *O. mykiss*.

Twelve anthropogenic activities ranked as the top five sources of stress to steelhead in the Santa Catalina Gulf Coast BPG (Table 12-2). The most significant feature of this ranking is that each of the top five threats are rated as "Severe" or "Very Severe" and that groundwater extraction, dams and/or surface water diversions are pervasive threat sources in each of the watersheds. Although open space is the dominant land use in this BPG region, urban and agricultural conversion of the coastal and middle portions of these watersheds, especially within the floodplains of these drainages, has disproportionately degraded habitat conditions for anadromous *O. mykiss*.

Water management activities associated with urban and agricultural conversion of watershed lands are the most pervasive threat sources in this BPG region. Climatically, the Santa Catalina Gulf Coast BPG region is classified as semi-arid, and anadromous *O. mykiss* must compete for water with urban and agricultural interests throughout these watersheds. Widespread pumping of groundwater routinely eliminates surface flows in portions of most of these drainages. The magnitude of such losses of surface flows is greater during years of below-average precipitation. High road density and associated stream crossings (culverts, bridges, *etc.*) in most of the urbanized portions of these watersheds are also a common source of passage impediments for anadromous *O. mykiss*. As a result of the widespread construction of dams in the lower and middle reaches of these watersheds, non-anadromous *O. mykiss* populations are now isolated in

the upper watersheds where higher-quality instream and riparian habitat still exists above reservoirs.

Figure 12-2. Photographs of Santa Catalina Gulf Coast BPG region.

Arroyo Trabuco Creek

San Luis Rey River

San Mateo Creek

Cottonwood Creek

***O. mykiss* – Cottonwood Creek**

Table 12-2. Threat source rankings in watersheds of the Santa Catalina Gulf Coast BPG (see CAP Workbooks for details).

Santa Catalina Gulf Coast Component Watersheds (north to south)										
Threat Sources	San Juan Creek	San Mateo Creek	San Onofre Creek	Santa Margarita River	San Luis Rey River	San Dieguito River	San Diego River	Sweetwater River	Otay River	Tijuana River
Groundwater Extraction										
Dams and Surface Water Diversions										
Urban Development										
Agricultural Development										
Levees and Channelization										
Other Passage Barriers										
Recreational Facilities										
Non-Native Species										
Roads										
Flood Control										
Non-Point Pollution										
Agricultural Effluents										
Wildfires*										

Key: Threat cell colors represent threat rating from CAP Workbook: Red = Very High threat; Light green = Medium threat; Yellow = High threat; Dark green = Low threat

** Wildfires were not recognized during the CAP Workbook analyses as one of the top five threats in these watersheds, but recent fires in coastal watersheds of southern Orange and northern and central San Diego counties in Fall, 2007 could result in significant, long-term impacts to steelhead habitat.*

12.5 SUMMARY

Dams and water diversions (including groundwater extraction) along with flood control structures on the major rivers of the Catalina Gulf Coast BPG region (Santa Margarita River, San Luis Rey River, San Dieguito River, San Diego River, Sweetwater River, Otay River and Tijuana River) have had the most serve impacts on the anadromous *O. mykiss* populations in this BPG by cutting off access to upstream spawning and rearing habitats and altering the magnitude, duration, and timing of flows necessary for immigration of adults and emigration of juveniles. Table 12-3 summarizes the critical recovery actions needed within the Core 1 populations of this BPG.

Table 12-3. Critical recovery actions for Core 1 populations within the Santa Catalina Gulf Coast BPG.

POPULATION	CRITICAL RECOVERY ACTION
San Juan Creek	Physically modify road crossings, highways, and railways to allow unimpeded volitional migration of steelhead to upstream spawning and rearing habitats. Identify, protect, and where necessary, restore estuarine and freshwater rearing habitats.
San Luis Rey River	Implement operating criteria to ensure the pattern and magnitude of water releases from Pilgram, Turner, Lower and Upper Stehly, Aqua Tibia, Henshaw, and Eagles Nest dams comport with the natural or pre-dam pattern and magnitude of streamflow in downstream reaches. Physically modify all dams, and road, highway, and railway crossings to allow unimpeded volitional migration of steelhead to upstream spawning and rearing habitats. Identify, protect, and where necessary, restore estuarine and freshwater rearing habitats.

Restoring conditions for anadromous *O. mykiss* passage, spawning, and rearing in the Santa Catalina Gulf Coast BPG region will require multiple, long-term, measures related to water management, recreation, and urban development. A fish-passage barrier inventory and assessment should be conducted for each of the major watersheds. Impediments to fish passage stemming from the construction and operation of dams, groundwater extraction, and channel modification, and the loss of instream and adjacent riparian habitats by flood control measures need to be further evaluated for this BPG region. Additionally, the loss of estuarine functions caused by filling and pollution from point and non-point agricultural and urban waste discharges need to be addressed further in this region.

Threat sources discussed in this section should be the focus of a variety of recovery actions to address specific stresses on anadromous *O. mykiss* viability. Spatial and temporal data acquired on specific indicators associated with threat sources such as water temperature, pH, nutrients, *etc.*, are generally inadequate to be the target of specific recovery actions. This type of data acquisition should be the subject of site-specific investigations in order to refine the primary recovery actions or to target additional recovery actions as part of any recovery strategy for the Santa Catalina Gulf Coast BPG. Tables 12-4 through 12-8 below rank and describe proposed recovery actions for each sub-watershed in the Santa Catalina Gulf Coast BPG including the estimated cost for implementing such actions over the first five fiscal years.

Table 12-4. Southern California Steelhead DPS Recovery Action Matrix for the San Juan River/Trabuco Creek Watershed (Santa Catalina Gulf Coast BPG).

Action #	Recovery Action Description	Responsible Parties	Threat Source	Listing Factors (1 - 5)	Action Rank (1A, 1B, 2A, 2B, 3A, 3B)	Task Duration	Fiscal Year Costs ($K)				
							FY1	FY2	FY3	FY4	FY5
	Conduct a watershed-wide fish passage barrier assessment		Culverts and Road Crossings (Passage Barriers)	1, 4	1A						
	Physically modify road crossings, highways, and other passage barriers to allow unimpeded volitional migration of steelhead to upstream spawning and rearing habitat		Culverts and Road Crossings (Passage Barriers)	1, 4	1A						
	Develop and implement a plan to minimize disturbance of instream habitats and riparian vegetation		Flood Control	1, 4	1B						
	Develop and implement a flood control maintenance program		Levees and Channelization	1, 4	1B						
	Develop and implement a plan to restore natural channel features where feasible		Levees and Channelization	1, 4	1B						
	Develop and implement a restoration and management plan for the San Juan Creek Estuary		Other Recovery Actions	1, 2, 3, 4, 5	1B						
	Review and modify applicable County and/or City Local Coastal Plans		Other Recovery Actions	1, 2, 3, 4, 5	1B						
	Review California Regional Water Quality Control Board San Diego Region Watershed Plans and modify applicable stormwater permits		Urban Effluents	1, 4	1B						
	Retrofit storm drains in developed areas		Urban Effluents	1, 4	1B						
	Develop and implement an integrated wildland fire and hazardous fuels management plan, including monitoring, remediation and adaptive management, to reduce potentially catastrophic wildland fire effects to steelhead and their habitat and preserve natural ecosystem processes (including sediment deposition)		Wildfires	1, 4, 5	1B						

Action #	Recovery Action Description	Responsible Parties	Threat Source	Listing Factors (1 - 5)	Action Rank (1A, 1B, 2A, 2B, 3A, 3B)	Task Duration	Fiscal Year Costs ($K)				
							FY1	FY2	FY3	FY4	FY5
	Develop and implement water management plan		Dams and Surface Water Diversions	1, 3, 4	2A						
	Develop and implement a plan to minimize runoff from agricultural activities		Agricultural Effluents	1, 4	2B						
	Conduct hydrological analysis (groundwater)		Groundwater Extraction	1, 4	2B						
	Develop and implement a groundwater monitoring program		Groundwater Extraction	1, 4	2B						
	Develop and implement a watershed-wide plan to assess the impacts of non-native species and develop control measures		Non-Native Species	1, 3, 5	2B						
	Develop and implement a non-native species monitoring program		Non-Native Species	1, 3, 5	2B						
	Develop and implement a public educational program on non-native species impacts		Non-Native Species	1, 3, 5	2B						
	Review and modify San Juan Creek Trail Plan, Trabuco Creek Nature Trail Plan, and Descanso Park Plan		Recreational Facilities	1, 2, 3, 4, 5	2B						
	Develop and implement a plan to re-configure or relocate the existing Doheny State Beach parking lot to provide a minimum 100-foot wide buffer around the estuary; restore and vegetate buffer area with native, locally occurring species.		Recreational Facilities	1, 2, 3, 4, 5	2B						
	Review U.S. Forest Service Cleveland National Forest Land Management Plan (Southern California National Forest Vision, Forest Strategy, and Design Criteria)		Recreational Facilities	1, 2, 3, 4, 5	2B						
	Develop and implement a public educational program on watershed processes		Recreational Facilities	1, 2, 3, 4, 5	2B						
	Relocate roadways outside of riparian corridor and restore abandoned roadways		Roads	1, 4	2B						

Action #	Recovery Action Description	Responsible Parties	Threat Source	Listing Factors (1 - 5)	Action Rank (1A, 1B, 2A, 2B, 3A, 3B)	Task Duration	Fiscal Year Costs ($K)				
							FY1	FY2	FY3	FY4	FY5
	Develop and implement a plan to remove or reduce approach-fill for Interstate 5 bridge		Roads	1, 4	2B						
	Retrofit storm drains to filter runoff from roadways		Roads	1, 4	2B						
	Develop, adopt, and implement urban land-use planning policies and standards		Urban Development	1, 4	2B						
	Review, assess and modify if necessary all NPDES wastewater discharge permits		Urban Effluents	1, 4	2B						
	Develop and implement a watershed-wide sediment management plan		Agricultural Development	1, 4	3B						
	Develop, adopt, and implement agricultural land-use planning policies and standards		Agricultural Development	1, 4,	3B						
	Relocate agricultural development and restore riparian zone		Agricultural Development	1, 4,	3B						

Table 12-5. Southern California Steelhead DPS Recovery Action Matrix for the San Mateo Creek Watershed (Santa Catalina Gulf Coast BPG).

Action #	Recovery Action Description	Responsible Parties	Threat Source	Listing Factors (1 - 5)	Action Rank (1A, 1B, 2A, 2B, 3A, 3B)	Task Duration	Fiscal Year Costs ($K)				
							FY1	FY2	FY3	FY4	FY5
	Conduct a watershed-wide fish passage barrier assessment		Culverts and Road Crossings (Passage Barriers)	1, 4	1A						
	Physically modify road crossings, highways, and other passage barriers to allow unimpeded volitional migration of steelhead to upstream spawning and rearing habitat		Culverts and Road Crossings (Passage Barriers)	1, 4	1A						
	Develop and implement a watershed-wide plan to assess the impacts of non-native species and develop control measures		Non-Native Species	1, 3, 5	1A						
	Develop and implement a non-native species monitoring program		Non-Native Species	1, 3, 5	1A						
	Develop and implement a public educational program on non-native species impacts		Non-Native Species	1, 3, 5	1A						
	Develop and implement a plan to minimize disturbance of instream habitats and riparian vegetation		Flood Control	1, 4	1B						
	Conduct hydrological analysis (groundwater)		Groundwater Extraction	1, 4	1B						
	Develop and implement a groundwater monitoring program		Groundwater Extraction	1, 4	1B						
	Develop and implement a flood control maintenance program		Levees and Channelization	1, 4	1B						
	Develop and implement a restoration and management plan for the San Mateo Creek Estuary		Other Recovery Actions	1, 2, 3, 4, 5	1B						
	Review and modify applicable County and/or City Local Coastal Plans		Other Recovery Actions	1, 2, 3, 4, 5	1B						

Action #	Recovery Action Description	Responsible Parties	Threat Source	Listing Factors (1 - 5)	Action Rank (1A, 1B, 2A, 2B, 3A, 3B)	Task Duration	Fiscal Year Costs ($K)				
							FY1	FY2	FY3	FY4	FY5
	Review California Regional Water Quality Control Board San Diego Region Watershed Plans and modify applicable stormwater permits		Urban Effluents	1, 4	1B						
	Retrofit storm drains in developed areas		Urban Effluents	1, 4	1B						
	Develop and implement an integrated wildland fire and hazardous fuels management plan, including monitoring, remediation and adaptive management, to reduce potentially catastrophic wildland fire effects to steelhead and their habitat and preserve natural ecosystem processes (including sediment deposition)		Wildfires	1, 4, 5	1B						
	Develop and implement water management plan		Dams and Surface Water Diversions	1, 3, 4	2A						
	Develop and implement a watershed-wide sediment management plan		Agricultural Development	1, 4	2B						
	Develop, adopt, and implement agricultural land-use planning policies and standards		Agricultural Development	1, 4,	2B						
	Relocate agricultural development and restore riparian zone		Agricultural Development	1, 4,	2B						
	Develop and implement a plan to minimize runoff from agricultural activities		Agricultural Effluents	1, 4	2B						
	Review and modify San Onofre State Park Plan and San Diego Regional Trails Plan		Recreational Facilities	1, 2, 3, 4, 5	2B						
	Develop and implement a plan to modify the existing day-use parking lot to provide a minimum 100-foot wide buffer around the estuary; restore and vegetate buffer area with native, locally occurring species.		Recreational Facilities	1, 2, 3, 4, 5	2B						
	Review U.S. Marine Corps Camp Pendleton Integrated Natural Resources Management Plan		Recreational Facilities	1, 2, 3, 4, 5	2B						
	Relocate roadways outside of riparian corridor and restore abandoned roadways		Roads	1, 4	2B						

Action #	Recovery Action Description	Responsible Parties	Threat Source	Listing Factors (1 - 5)	Action Rank (1A, 1B, 2A, 2B, 3A, 3B)	Task Duration	Fiscal Year Costs ($K)				
							FY1	FY2	FY3	FY4	FY5
	Develop and implement a plan to remove or reduce approach-fill for Interstate 5 bridge		Roads	1, 4	2B						
	Retrofit storm drains to filter runoff from roadways		Roads	1, 4	2B						
	Develop, adopt, and implement urban land-use planning policies and standards		Urban Development	1, 4	2B						
	Review, assess and modify if necessary all NPDES wastewater discharge permits (e.g., U.S. Marine Corps Camp Pendleton Wastewater Treatment Facility)		Urban Effluents	1, 4	2B						
	Develop and implement a public educational program on watershed processes		Recreational Facilities	1, 2, 3, 4, 5							

Table 12-6. Southern California Steelhead DPS Recovery Action Matrix for the San Onofre Creek Watershed (Santa Catalina Gulf Coast BPG).

Action #	Recovery Action Description	Responsible Parties	Threat Source	Listing Factors (1 - 5)	Action Rank (1A, 1B, 2A, 2B, 3A, 3B)	Task Duration	Fiscal Year Costs ($K)				
							FY1	FY2	FY3	FY4	FY5
	Develop and implement a restoration and management plan for the San Onofre Creek Estuary		Other Recovery Actions	1, 2, 3, 4, 5	1B						
	Review and modify applicable County and/or City Local Coastal Plans		Other Recovery Actions	1, 2, 3, 4, 5	1B						
	Review California Regional Water Quality Control Board San Diego Region Watershed Plans and modify applicable stormwater permits		Urban Effluents	1, 4	1B						
	Develop and implement water management plan		Dams and Surface Water Diversions	1, 3, 4	2A						
	Conduct a watershed-wide fish passage barrier assessment		Culverts and Road Crossings (Passage Barriers)	1, 4	2B						
	Physically modify road crossings, highways, and other passage barriers to allow unimpeded volitional migration of steelhead to upstream spawning and rearing habitat		Culverts and Road Crossings (Passage Barriers)	1, 4	2B						
	Develop and implement a plan to minimize disturbance of instream habitats and riparian vegetation		Flood Control	1, 4	2B						
	Conduct hydrological analysis (groundwater)		Groundwater Extraction	1, 4	2B						
	Develop and implement a groundwater monitoring program		Groundwater Extraction	1, 4	2B						
	Develop and implement a watershed-wide plan to assess the impacts of non-native species and develop control measures		Non-Native Species	1, 3, 5	2B						
	Develop and implement a non-native species monitoring program		Non-Native Species	1, 3, 5	2B						

Action #	Recovery Action Description	Responsible Parties	Threat Source	Listing Factors (1 - 5)	Action Rank (1A, 1B, 2A, 2B, 3A, 3B)	Task Duration	Fiscal Year Costs ($K)				
							FY1	FY2	FY3	FY4	FY5
	Develop and implement a public educational program on non-native species impacts		Non-Native Species	1, 3, 5	2B						
	Review and modify San Onofre State Park Plan and San Diego Regional Trails Plan		Recreational Facilities	1, 2, 3, 4, 5	2B						
	Develop and implement a plan to modify the existing day-use parking lot to provide a minimum 100-foot wide buffer around the estuary; restore and vegetate buffer area with native, locally occurring species.		Recreational Facilities	1, 2, 3, 4, 5	2B						
	Review U.S. Marine Corps Camp Pendleton Integrated Natural Resources Management Plan		Recreational Facilities	1, 2, 3, 4, 5	2B						
	Develop and implement a public educational program on watershed processes		Recreational Facilities	1, 2, 3, 4, 5	2B						
	Develop and implement a plan to remove or reduce approach-fill for Interstate 5 bridge		Roads	1, 4	2B						
	Review, assess and modify if necessary all NPDES wastewater discharge permits		Urban Effluents	1, 4	2B						
	Retrofit storm drains in developed areas		Urban Effluents	1, 4	2B						
	Develop and implement an integrated wildland fire and hazardous fuels management plan, including monitoring, remediation and adaptive management, to reduce potentially catastrophic wildland fire effects to steelhead and their habitat and preserve natural ecosystem processes (including sediment deposition)		Wildfires	1, 4, 5	2B						
	Develop and implement a watershed-wide sediment management plan		Agricultural Development	1, 4	3B						
	Develop and implement a plan to minimize runoff from agricultural activities		Agricultural Effluents	1, 4	3B						
	Develop and implement a flood control maintenance program		Levees and Channelization	1, 4	3B						

Action #	Recovery Action Description	Responsible Parties	Threat Source	Listing Factors (1 - 5)	Action Rank (1A, 1B, 2A, 2B, 3A, 3B)	Task Duration	Fiscal Year Costs ($K)				
							FY1	FY2	FY3	FY4	FY5
	Relocate roadways outside of riparian corridor and restore abandoned roadways		Roads	1, 4	3B						
	Retrofit storm drains to filter runoff from roadways		Roads	1, 4	3B						
	Develop, adopt, and implement urban land-use planning policies and standards		Urban Development	1, 4	3B						

Table 12-7. Southern California Steelhead DPS Recovery Action Matrix for the Santa Margarita River Watershed (Santa Catalina Gulf Coast BPG).

Action #	Recovery Action Description	Responsible Parties	Threat Source	Listing Factors (1 - 5)	Action Rank (1A, 1B, 2A, 2B, 3A, 3B)	Task Duration	Fiscal Year Costs ($K)				
							FY1	FY2	FY3	FY4	FY5
	Conduct a watershed-wide fish passage barrier assessment		Culverts and Road Crossings (Passage Barriers)	1, 4	1A						
	Physically modify road crossings, highways, and other passage barriers to allow unimpeded volitional migration of steelhead to upstream spawning and rearing habitat		Culverts and Road Crossings (Passage Barriers)	1, 4	1A						
	Develop and implement a restoration and management plan for the Santa Margarita River Estuary		Other Recovery Actions	1, 2, 3, 4, 5	1B						
	Review and modify applicable County and/or City Local Coastal Plans		Other Recovery Actions	1, 2, 3, 4, 5	1B						
	Review California Regional Water Quality Control Board San Diego Region Watershed Plans and modify applicable stormwater permits		Urban Effluents	1, 4	1B						
	Develop an operational plan for releases from all dams (e.g., Lake O'Neill Dam, Vail Dam, Robert A. Skinner Dam)		Dams and Surface Water Diversions	1, 3, 4	2A						
	Develop and implement water management plan		Dams and Surface Water Diversions	1, 3, 4	2B						
	Develop and implement a plan to minimize disturbance of instream habitats and riparian vegetation		Flood Control	1, 4	2B						
	Conduct hydrological analysis (groundwater)		Groundwater Extraction	1, 4	2B						
	Develop and implement a groundwater monitoring program		Groundwater Extraction	1, 4	2B						
	Develop and implement a watershed-wide plan to assess the impacts of non-native species and develop control measures		Non-Native Species	1, 3, 5	2B						

Action #	Recovery Action Description	Responsible Parties	Threat Source	Listing Factors (1 - 5)	Action Rank (1A, 1B, 2A, 2B, 3A, 3B)	Task Duration	Fiscal Year Costs ($K)				
							FY1	FY2	FY3	FY4	FY5
	Develop and implement a non-native species monitoring program		Non-Native Species	1, 3, 5	2B						
	Develop and implement a public educational program on non-native species impacts		Non-Native Species	1, 3, 5	2B						
	Review and modify Santa Margarita River Watershed Management Plan and San Diego Regional Trails Plan		Recreational Facilities	1, 2, 3, 4, 5	2B						
	Review U.S. Forest Service Cleveland National Forest Land Management Plan (Southern California National Forest Vision, Forest Strategy, and Design Criteria)		Recreational Facilities	1, 2, 3, 4, 5	2B						
	Develop and implement a public educational program on watershed processes		Recreational Facilities	1, 2, 3, 4, 5	2B						
	Develop and implement a plan to remove or reduce approach-fill for Interstate 5 bridge		Roads	1, 4	2B						
	Review, assess and modify if necessary all NPDES wastewater discharge permits (e.g., Fallbrook Public Utility District Wastewater Treatment Facility)		Urban Effluents	1, 4	2B						
	Retrofit storm drains in developed areas		Urban Effluents	1, 4	2B						
	Develop and implement an integrated wildland fire and hazardous fuels management plan, including monitoring, remediation and adaptive management, to reduce potentially catastrophic wildland fire effects to steelhead and their habitat and preserve natural ecosystem processes (including sediment deposition)		Wildfires	1, 4, 5	2B						
	Develop and implement a watershed-wide sediment management plan		Agricultural Development	1, 4	3B						
	Develop, adopt, and implement agricultural land-use planning policies and standards		Agricultural Development	1, 4,	3B						

Action #	Recovery Action Description	Responsible Parties	Threat Source	Listing Factors (1 - 5)	Action Rank (1A, 1B, 2A, 2B, 3A, 3B)	Task Duration	Fiscal Year Costs ($K)				
							FY1	FY2	FY3	FY4	FY5
	Relocate agricultural development and restore riparian zone		Agricultural Development	1, 4,	3B						
	Develop and implement a plan to minimize runoff from agricultural activities		Agricultural Effluents	1, 4	3B						
	Develop and implement a flood control maintenance program		Levees and Channelization	1, 4	3B						
	Relocate roadways outside of riparian corridor and restore abandoned roadways		Roads	1, 4	3B						
	Retrofit storm drains to filter runoff from roadways		Roads	1, 4	3B						
	Develop, adopt, and implement urban land-use planning policies and standards		Urban Development	1, 4	3B						

Table 12-8. Southern California Steelhead DPS Recovery Action Matrix for the San Luis Rey River Watershed (Santa Catalina Gulf Coast BPG).

Action #	Recovery Action Description	Responsible Parties	Threat Source	Listing Factors (1 - 5)	Action Rank (1A, 1B, 2A, 2B, 3A, 3B)	Task Duration	Fiscal Year Costs ($K)				
							FY1	FY2	FY3	FY4	FY5
	Conduct a watershed-wide fish passage barrier assessment		Culverts and Road Crossings (Passage Barriers)	1, 4	1A						
	Physically modify road crossings, highways, and other passage barriers to allow unimpeded volitional migration of steelhead to upstream spawning and rearing habitat		Culverts and Road Crossings (Passage Barriers)	1, 4	1A						
	Review and modify aggregate mining operations		Mining and Quarrying	1, 4	1B						
	Develop and implement a restoration and management plan for the San Luis Rey River Estuary		Other Recovery Actions	1, 2, 3, 4, 5	1B						
	Review and modify applicable County and/or City Local Coastal Plans		Other Recovery Actions	1, 2, 3, 4, 5	1B						
	Develop and implement operating criteria to ensure the pattern and magnitude of water releases from Pilgram, Turner, Lower and Upper Stehly, Aqua Tibia, Henshaw, and Eagles Nest dams comport with the natural or pre-dam pattern and magnitude of streamflow in downstream reaches		Dams and Surface Water Diversions	1, 3, 4	2A						
	Develop and implement a watershed-wide sediment management plan		Agricultural Development	1, 4	2B						
	Develop, adopt, and implement agricultural land-use planning policies and standards		Agricultural Development	1, 4,	2B						
	Relocate livestock grazing and water sources		Agricultural Development	1, 4,	2B						
	Relocate agricultural development and restore riparian zone		Agricultural Development	1, 4,	2B						
	Develop and implement a plan to minimize runoff from agricultural activities		Agricultural Effluents	1, 4	2B						

Action #	Recovery Action Description	Responsible Parties	Threat Source	Listing Factors (1 - 5)	Action Rank (1A, 1B, 2A, 2B, 3A, 3B)	Task Duration	Fiscal Year Costs ($K)				
							FY1	FY2	FY3	FY4	FY5
	Develop and implement water management plan		Dams and Surface Water Diversions	1, 3, 4	2B						
	Conduct hydrological analysis (groundwater)		Groundwater Extraction	1, 4	2B						
	Develop and implement a groundwater monitoring program		Groundwater Extraction	1, 4	2B						
	Develop and implement a flood control maintenance program		Levees and Channelization	1, 4	2B						
	Develop and implement a plan to restore natural channel features where feasible		Levees and Channelization	1, 4	2B						
	Develop and implement a plan to vegetate levees and minimize herbicide use near levees		Levees and Channelization	1, 4	2B						
	Develop and implement a non-native species monitoring program		Non-Native Species	1, 3, 5	2B						
	Develop and implement a public educational program on non-native species impacts		Non-Native Species	1, 3, 5	2B						
	Review and modify San Luis Rey River Park Master Plan and San Diego Regional Trails Plan		Recreational Facilities	1, 2, 3, 4, 5	2B						
	Review U.S. Forest Service Cleveland National Forest Land Management Plan (Southern California National Forest Vision, Forest Strategy, and Design Criteria)		Recreational Facilities	1, 2, 3, 4, 5	2B						
	Develop and implement a public educational program on watershed processes		Recreational Facilities	1, 2, 3, 4, 5	2B						
	Develop and implement a plan to remove or reduce approach-fill for Interstate 5 bridge		Roads	1, 4	2B						
	Review, assess and modify if necessary all NPDES wastewater discharge permits (e.g., Buena Sanitary District Wastewater Treatment Facility and Oceanside Wastewater Treatment Facility)		Urban Effluents	1, 4	2B						

Action #	Recovery Action Description	Responsible Parties	Threat Source	Listing Factors (1 - 5)	Action Rank (1A, 1B, 2A, 2B, 3A, 3B)	Task Duration	Fiscal Year Costs ($K)				
							FY1	FY2	FY3	FY4	FY5
	Review California Regional Water Quality Control Board San Diego Region Watershed Plans and modify applicable stormwater permits		Urban Effluents	1, 4	2B						
	Retrofit storm drains in developed areas		Urban Effluents	1, 4	2B						
	Develop and implement an integrated wildland fire and hazardous fuels management plan, including monitoring, remediation and adaptive management, to reduce potentially catastrophic wildland fire effects to steelhead and their habitat and preserve natural ecosystem processes (including sediment deposition)		Wildfires	1, 4, 5	2B						
	Develop and implement a watershed-wide plan to assess the impacts of non-native species and develop control measures		Non-Native Species	1, 3, 5	3B						
	Relocate roadways outside of riparian corridor and restore abandoned roadways		Roads	1, 4	3B						
	Retrofit storm drains to filter runoff from roadways		Roads	1, 4	3B						
	Develop, adopt, and implement urban land-use planning policies and standards		Urban Development	1, 4	3B						

Table 12-9. Southern California Steelhead DPS Recovery Action Matrix for the San Dieguito River Watershed (Santa Catalina Gulf Coast BPG).

Action #	Recovery Action Description	Responsible Parties	Threat Source	Listing Factors (1 - 5)	Action Rank (1A, 1B, 2A, 2B, 3A, 3B)	Task Duration	Fiscal Year Costs ($K)				
							FY1	FY2	FY3	FY4	FY5
	Conduct a watershed-wide fish passage barrier assessment		Culverts and Road Crossings (Passage Barriers)	1, 4	1A						
	Physically modify road crossings, highways, and other passage barriers to allow unimpeded volitional migration of steelhead to upstream spawning and rearing habitat		Culverts and Road Crossings (Passage Barriers)	1, 4	1A						
	Develop and implement a restoration and management plan for the San Dieguito River Estuary		Other Recovery Actions	1, 2, 3, 4, 5	1B						
	Review and modify applicable County and/or City Local Coastal Plans		Other Recovery Actions	1, 2, 3, 4, 5	1B						
	Review California Regional Water Quality Control Board San Diego Region Watershed Plans and modify applicable stormwater permits		Urban Effluents	1, 4	1B						
	Develop and implement water management plan		Dams and Surface Water Diversions	1, 3, 4	2A						
	Develop an operational plan for releases Fairbanks, Upper and Lower 4 S, 4 S Ranch, Lake Hodges, and Sutherland dams		Dams and Surface Water Diversions	1, 3, 4	2A						
	Develop and implement a watershed-wide sediment management plan		Agricultural Development	1, 4	2B						
	Develop, adopt, and implement agricultural land-use planning policies and standards		Agricultural Development	1, 4,	2B						
	Relocate agricultural development and restore riparian zone		Agricultural Development	1, 4,	2B						
	Develop and implement a plan to minimize disturbance of instream habitats and riparian vegetation		Flood Control	1, 4	2B						

Action #	Recovery Action Description	Responsible Parties	Threat Source	Listing Factors (1 - 5)	Action Rank (1A, 1B, 2A, 2B, 3A, 3B)	Task Duration	Fiscal Year Costs ($K)				
							FY1	FY2	FY3	FY4	FY5
	Conduct hydrological analysis (groundwater)		Groundwater Extraction	1, 4	2B						
	Develop and implement a groundwater monitoring program		Groundwater Extraction	1, 4	2B						
	Review and modify aggregate mining operations		Mining and Quarrying	1, 4	2B						
	Develop and implement a non-native species monitoring program		Non-Native Species	1, 3, 5	2B						
	Develop and implement a public educational program on non-native species impacts		Non-Native Species	1, 3, 5	2B						
	Review and modify San Dieguito River Park Concept Plan and San Diego Regional Trails Plan		Recreational Facilities	1, 2, 3, 4, 5	2B						
	Review U.S. Forest Service Cleveland National Forest Land Management Plan (Southern California National Forest Vision, Forest Strategy, and Design Criteria)		Recreational Facilities	1, 2, 3, 4, 5	2B						
	Develop and implement a public educational program on watershed processes		Recreational Facilities	1, 2, 3, 4, 5	2B						
	Develop and implement a plan to remove or reduce approach-fill for Interstate 5 bridge		Roads	1, 4	2B						
	Review, assess and modify if necessary all NPDES wastewater discharge permits		Urban Effluents	1, 4	2B						
	Retrofit storm drains in developed areas		Urban Effluents	1, 4	2B						
	Develop and implement an integrated wildland fire and hazardous fuels management plan, including monitoring, remediation and adaptive management, to reduce potentially catastrophic wildland fire effects to steelhead and their habitat and preserve natural ecosystem processes (including sediment deposition)		Wildfires	1, 4, 5	2B						

Action #	Recovery Action Description	Responsible Parties	Threat Source	Listing Factors (1 - 5)	Action Rank (1A, 1B, 2A, 2B, 3A, 3B)	Task Duration	Fiscal Year Costs ($K)				
							FY1	FY2	FY3	FY4	FY5
	Develop and implement a plan to minimize runoff from agricultural activities		Agricultural Effluents	1, 4	3B						
	Develop and implement a flood control maintenance program		Levees and Channelization	1, 4	3B						
	Develop and implement a plan to restore natural channel features where feasible		Levees and Channelization	1, 4	3B						
	Develop and implement a plan to vegetate levees and minimize herbicide use near levees		Levees and Channelization	1, 4	3B						
	Develop and implement a watershed-wide plan to assess the impacts of non-native species and develop control measures		Non-Native Species	1, 3, 5	3B						
	Relocate roadways outside of riparian corridor and restore abandoned roadways		Roads	1, 4	3B						
	Retrofit storm drains to filter runoff from roadways		Roads	1, 4	3B						
	Develop, adopt, and implement urban land-use planning policies and standards		Urban Development	1, 4	3B						

Table 12-10. Southern California Steelhead DPS Recovery Action Matrix for the San Diego River Watershed (Santa Catalina Gulf Coast BPG).

Action #	Recovery Action Description	Responsible Parties	Threat Source	Listing Factors (1 - 5)	Action Rank (1A, 1B, 2A, 2B, 3A, 3B)	Task Duration	Fiscal Year Costs ($K)				
							FY1	FY2	FY3	FY4	FY5
	Conduct a watershed-wide fish passage barrier assessment		Culverts and Road Crossings (Passage Barriers)	1, 4	1A						
	Physically modify road crossings, highways, and other passage barriers to allow unimpeded volitional migration of steelhead to upstream spawning and rearing habitat		Culverts and Road Crossings (Passage Barriers)	1, 4	1A						
	Develop and implement a restoration and management plan for the San Diego River Estuary		Other Recovery Actions	1, 2, 3, 4, 5	1B						
	Review, assess and modify if necessary all NPDES wastewater discharge permits (e.g., Padre Dam Water Reclamation Facility)		Urban Effluents	1, 4	1B						
	Review California Regional Water Quality Control Board San Diego Region Watershed Plans and modify applicable stormwater permits		Urban Effluents	1, 4	1B						
	Develop and implement water management plan		Dams and Surface Water Diversions	1, 3, 4	2A						
	Develop an operational plan for releases Murray, San Vicente, El Capitan, and Cuyamaca dams		Dams and Surface Water Diversions	1, 3, 4	2A						
	Develop and implement a plan to minimize disturbance of instream habitats and riparian vegetation		Flood Control	1, 4	2B						
	Conduct hydrological analysis (groundwater)		Groundwater Extraction	1, 4	2B						
	Develop and implement a groundwater monitoring program		Groundwater Extraction	1, 4	2B						
	Develop and implement a non-native species monitoring program		Non-Native Species	1, 3, 5	2B						

Action #	Recovery Action Description	Responsible Parties	Threat Source	Listing Factors (1 - 5)	Action Rank (1A, 1B, 2A, 2B, 3A, 3B)	Task Duration	Fiscal Year Costs ($K)				
							FY1	FY2	FY3	FY4	FY5
	Develop and implement a public educational program on non-native species impacts		Non-Native Species	1, 3, 5	2B						
	Review and modify applicable County and/or City Local Coastal Plans		Other Recovery Actions	1, 2, 3, 4, 5	2B						
	Review U.S. Forest Service Cleveland National Forest Land Management Plan (Southern California National Forest Vision, Forest Strategy, and Design Criteria)		Recreational Facilities	1, 2, 3, 4, 5	2B						
	Develop and implement a public educational program on watershed processes		Recreational Facilities	1, 2, 3, 4, 5	2B						
	Develop and implement a plan to remove or reduce approach-fill for Interstate 5 bridge		Roads	1, 4	2B						
	Retrofit storm drains in developed areas		Urban Effluents	1, 4	2B						
	Develop and implement an integrated wildland fire and hazardous fuels management plan, including monitoring, remediation and adaptive management, to reduce potentially catastrophic wildland fire effects to steelhead and their habitat and preserve natural ecosystem processes (including sediment deposition)		Wildfires	1, 4, 5	2B						
	Develop and implement a watershed-wide sediment management plan		Agricultural Development	1, 4	3B						
	Develop, adopt, and implement agricultural land-use planning policies and standards		Agricultural Development	1, 4,	3B						
	Relocate agricultural development and restore riparian zone		Agricultural Development	1, 4,	3B						
	Develop and implement a plan to minimize runoff from agricultural activities		Agricultural Effluents	1, 4	3B						
	Develop and implement a flood control maintenance program		Levees and Channelization	1, 4	3B						
	Develop and implement a plan to restore natural channel features where feasible		Levees and Channelization	1, 4	3B						

Action #	Recovery Action Description	Responsible Parties	Threat Source	Listing Factors (1 - 5)	Action Rank (1A, 1B, 2A, 2B, 3A, 3B)	Task Duration	Fiscal Year Costs ($K)				
							FY1	FY2	FY3	FY4	FY5
	Develop and implement a plan to vegetate levees and minimize herbicide use near levees		Levees and Channelization	1, 4	3B						
	Develop and implement a watershed-wide plan to assess the impacts of non-native species and develop control measures		Non-Native Species	1, 3, 5	3B						
	Relocate roadways outside of riparian corridor and restore abandoned roadways		Roads	1, 4	3B						
	Retrofit storm drains to filter runoff from roadways		Roads	1, 4	3B						
	Develop, adopt, and implement urban land-use planning policies and standards		Urban Development	1, 4	3B						
	Review and modify San Diego River Park Master Plan, San Diego Regional Trails Plan, and San Diego River Watershed Management Plan		Recreational Facilities	1, 2, 3, 4, 5							

Table 12-11. Southern California Steelhead DPS Recovery Action Matrix for the Sweetwater River Watershed (Santa Catalina Gulf Coast BPG).

Action #	Recovery Action Description	Responsible Parties	Threat Source	Listing Factors (1 - 5)	Action Rank (1A, 1B, 2A, 2B, 3A, 3B)	Task Duration	Fiscal Year Costs ($K)				
							FY1	FY2	FY3	FY4	FY5
	Conduct a watershed-wide fish passage barrier assessment		Culverts and Road Crossings (Passage Barriers)	1, 4	1A						
	Physically modify road crossings, highways, and other passage barriers to allow unimpeded volitional migration of steelhead to upstream spawning and rearing habitat		Culverts and Road Crossings (Passage Barriers)	1, 4	1A						
	Develop and implement a restoration and management plan for the Sweetwater River Estuary		Other Recovery Actions	1, 2, 3, 4, 5	1B						
	Review and modify applicable County and/or City Local Coastal Plans		Other Recovery Actions	1, 2, 3, 4, 5	1B						
	Review California Regional Water Quality Control Board San Diego Region Watershed Plans and modify applicable stormwater permits		Urban Effluents	1, 4	1B						
	Develop an operational plan for releases from Sweetwater Main, Willow Tree, Loveland, and Palo Verde dams		Dams and Surface Water Diversions	1, 3, 4	2A						
	Develop and implement a watershed-wide sediment management plan		Agricultural Development	1, 4	2B						
	Develop, adopt, and implement agricultural land-use planning policies and standards		Agricultural Development	1, 4,	2B						
	Relocate livestock grazing and water sources		Agricultural Development	1, 4,	2B						
	Relocate agricultural development and restore riparian zone		Agricultural Development	1, 4,	2B						
	Develop and implement water management plan		Dams and Surface Water Diversions	1, 3, 4	2B						

Action #	Recovery Action Description	Responsible Parties	Threat Source	Listing Factors (1 - 5)	Action Rank (1A, 1B, 2A, 2B, 3A, 3B)	Task Duration	Fiscal Year Costs ($K)				
							FY1	FY2	FY3	FY4	FY5
	Develop and implement a plan to minimize disturbance of instream habitats and riparian vegetation		Flood Control	1, 4	2B						
	Conduct hydrological analysis (groundwater)		Groundwater Extraction	1, 4	2B						
	Develop and implement a groundwater monitoring program		Groundwater Extraction	1, 4	2B						
	Develop and implement a non-native species monitoring program		Non-Native Species	1, 3, 5	2B						
	Develop and implement a public educational program on non-native species impacts		Non-Native Species	1, 3, 5	2B						
	Review and modify Sweetwater River Watershed Management Plan and Sweetwater Marsh National Wildlife Management Plan		Recreational Facilities	1, 2, 3, 4, 5	2B						
	Review U.S. Forest Service Cleveland National Forest Land Management Plan (Southern California National Forest Vision, Forest Strategy, and Design Criteria)		Recreational Facilities	1, 2, 3, 4, 5	2B						
	Develop and implement a public educational program on watershed processes		Recreational Facilities	1, 2, 3, 4, 5	2B						
	Develop and implement a plan to remove or reduce approach-fill for Interstate 5 bridge		Roads	1, 4	2B						
	Review, assess and modify if necessary all NPDES wastewater discharge permits (e.g., San Diego City Point Loma Wastewater Treatment Facility)		Urban Effluents	1, 4	2B						
	Retrofit storm drains in developed areas		Urban Effluents	1, 4	2B						
	Develop and implement an integrated wildland fire and hazardous fuels management plan, including monitoring, remediation and adaptive management, to reduce potentially catastrophic wildland fire effects to steelhead and their habitat and		Wildfires	1, 4, 5	2B						

Action #	Recovery Action Description	Responsible Parties	Threat Source	Listing Factors (1 - 5)	Action Rank (1A, 1B, 2A, 2B, 3A, 3B)	Task Duration	Fiscal Year Costs ($K)				
							FY1	FY2	FY3	FY4	FY5
	preserve natural ecosystem processes (including sediment deposition)										
	Develop and implement a plan to minimize runoff from agricultural activities		Agricultural Effluents	1, 4	3B						
	Develop and implement a flood control maintenance program		Levees and Channelization	1, 4	3B						
	Develop and implement a plan to restore natural channel features where feasible		Levees and Channelization	1, 4	3B						
	Develop and implement a plan to vegetate levees and minimize herbicide use near levees		Levees and Channelization	1, 4	3B						
	Develop and implement a watershed-wide plan to assess the impacts of non-native species and develop control measures		Non-Native Species	1, 3, 5	3B						
	Relocate roadways outside of riparian corridor and restore abandoned roadways		Roads	1, 4	3B						
	Retrofit storm drains to filter runoff from roadways		Roads	1, 4	3B						
	Develop, adopt, and implement urban land-use planning policies and standards		Urban Development	1, 4	3B						

Table 12-12. Southern California Steelhead DPS Recovery Action Matrix for the Otay River Watershed (Santa Catalina Gulf Coast BPG).

Action #	Recovery Action Description	Responsible Parties	Threat Source	Listing Factors (1 - 5)	Action Rank (1A, 1B, 2A, 2B, 3A, 3B)	Task Duration	Fiscal Year Costs ($K)				
							FY1	FY2	FY3	FY4	FY5
	Develop and implement a non-native species monitoring program		Non-Native Species	1, 3, 5	2B						
	Develop and implement a public educational program on non-native species impacts		Non-Native Species	1, 3, 5	2B						
	Retrofit storm drains in developed areas		Urban Effluents	1, 4	2B						
	Conduct a watershed-wide fish passage barrier assessment		Culverts and Road Crossings (Passage Barriers)	1, 4	3A						
	Physically modify road crossings, highways, and other passage barriers to allow unimpeded volitional migration of steelhead to upstream spawning and rearing habitat		Culverts and Road Crossings (Passage Barriers)	1, 4	3A						
	Develop and implement a watershed-wide sediment management plan		Agricultural Development	1, 4	3B						
	Develop, adopt, and implement agricultural land-use planning policies and standards		Agricultural Development	1, 4,	3B						
	Relocate livestock grazing and water sources		Agricultural Development	1, 4,	3B						
	Relocate agricultural development and restore riparian zone		Agricultural Development	1, 4,	3B						
	Develop and implement a plan to minimize runoff from agricultural activities		Agricultural Effluents	1, 4	3B						
	Develop and implement water management plan		Dams and Surface Water Diversions	1, 3, 4	3B						
	Develop an operational plan for releases from Salvage and Upper Otay dams		Dams and Surface Water Diversions	1, 3, 4	3B						
	Develop and implement a plan to minimize disturbance of instream habitats and riparian vegetation		Flood Control	1, 4	3B						

Action #	Recovery Action Description	Responsible Parties	Threat Source	Listing Factors (1 - 5)	Action Rank (1A, 1B, 2A, 2B, 3A, 3B)	Task Duration	Fiscal Year Costs ($K)				
							FY1	FY2	FY3	FY4	FY5
	Conduct hydrological analysis (groundwater)		Groundwater Extraction	1, 4	3B						
	Develop and implement a groundwater monitoring program		Groundwater Extraction	1, 4	3B						
	Develop and implement a flood control maintenance program		Levees and Channelization	1, 4	3B						
	Develop and implement a plan to restore natural channel features where feasible		Levees and Channelization	1, 4	3B						
	Develop and implement a plan to vegetate levees and minimize herbicide use near levees		Levees and Channelization	1, 4	3B						
	Develop and implement a watershed-wide plan to assess the impacts of non-native species and develop control measures		Non-Native Species	1, 3, 5	3B						
	Develop and implement a restoration and management plan for the Otay River Estuary		Other Recovery Actions	1, 2, 3, 4, 5	3B						
	Review and modify applicable County and/or City Local Coastal Plans		Other Recovery Actions	1, 2, 3, 4, 5	3B						
	Review and modify Otay River Watershed Management Plan and Otay Valley Regional Park Management Plan		Recreational Facilities	1, 2, 3, 4, 5	3B						
	Review U.S. Forest Service Cleveland National Forest Land Management Plan (Southern California National Forest Vision, Forest Strategy, and Design Criteria)		Recreational Facilities	1, 2, 3, 4, 5	3B						
	Develop and implement a public educational program on watershed processes		Recreational Facilities	1, 2, 3, 4, 5	3B						
	Relocate roadways outside of riparian corridor and restore abandoned roadways		Roads	1, 4	3B						
	Develop and implement a plan to remove or reduce approach-fill for Interstate 5 bridge		Roads	1, 4	3B						

Action #	Recovery Action Description	Responsible Parties	Threat Source	Listing Factors (1 - 5)	Action Rank (1A, 1B, 2A, 2B, 3A, 3B)	Task Duration	Fiscal Year Costs ($K)				
							FY1	FY2	FY3	FY4	FY5
	Retrofit storm drains to filter runoff from roadways		Roads	1, 4	3B						
	Develop, adopt, and implement urban land-use planning policies and standards		Urban Development	1, 4	3B						
	Review, assess and modify if necessary all NPDES wastewater discharge permits		Urban Effluents	1, 4	3B						
	Develop and implement an integrated wildland fire and hazardous fuels management plan, including monitoring, remediation and adaptive management, to reduce potentially catastrophic wildland fire effects to steelhead and their habitat and preserve natural ecosystem processes (including sediment deposition)		Wildfires	1, 4, 5	3B						

Table 12-13. Southern California Steelhead DPS Recovery Action Matrix for the Tijuana River Watershed (Santa Catalina Gulf Coast BPG).

Action #	Recovery Action Description	Responsible Parties	Threat Source	Listing Factors (1 - 5)	Action Rank (1A, 1B, 2A, 2B, 3A, 3B)	Task Duration	Fiscal Year Costs ($K)				
							FY1	FY2	FY3	FY4	FY5
	Conduct a watershed-wide fish passage barrier assessment		Culverts and Road Crossings (Passage Barriers)	1, 4	1A						
	Physically modify road crossings, highways, and other passage barriers to allow unimpeded volitional migration of steelhead to upstream spawning and rearing habitat		Culverts and Road Crossings (Passage Barriers)	1, 4	1A						
	Develop and implement a restoration and management plan for the Tijuana River Estuary		Other Recovery Actions	1, 2, 3, 4, 5	1B						
	Review and modify applicable County and/or City Local Coastal Plans		Other Recovery Actions	1, 2, 3, 4, 5	1B						
	Review, assess and modify if necessary all NPDES wastewater discharge permits (e.g., South Bay International Wastewater Treatment Facility and South Bay Water Reclamation Facility)		Urban Effluents	1, 4	1B						
	Review California Regional Water Quality Control Board San Diego Region Watershed Plans and modify applicable stormwater permits		Urban Effluents	1, 4	1B						
	Develop and implement water management plan		Dams and Surface Water Diversions	1, 3, 4	2B						
	Develop an operational plan for releases from all dams (e.g., Barrett Dam, Henry Jr. Dam, Campo Lake Dam, Morena Dam, Corte Madera Dam, Thin Valley Dam)		Dams and Surface Water Diversions	1, 3, 4	2B						
	Conduct hydrological analysis (groundwater)		Groundwater Extraction	1, 4	2B						
	Develop and implement a groundwater monitoring program		Groundwater Extraction	1, 4	2B						

Action #	Recovery Action Description	Responsible Parties	Threat Source	Listing Factors (1 - 5)	Action Rank (1A, 1B, 2A, 2B, 3A, 3B)	Task Duration	Fiscal Year Costs ($K)				
							FY1	FY2	FY3	FY4	FY5
	Develop and implement a non-native species monitoring program		Non-Native Species	1, 3, 5	2B						
	Develop and implement a public educational program on non-native species impacts		Non-Native Species	1, 3, 5	2B						
	Review and modify Tijuana River Watershed Management Plan, Tijuana River Valley Regional Park Management Plan, Border Field State Park Management Plan, and Tijuana River National Estuarine Research Reserve Plan		Recreational Facilities	1, 2, 3, 4, 5	2B						
	Review U.S. Forest Service Cleveland National Forest Land Management Plan (Southern California National Forest Vision, Forest Strategy, and Design Criteria)		Recreational Facilities	1, 2, 3, 4, 5	2B						
	Develop and implement a public educational program on watershed processes		Recreational Facilities	1, 2, 3, 4, 5	2B						
	Retrofit storm drains in developed areas		Urban Effluents	1, 4	2B						
	Develop and implement an integrated wildland fire and hazardous fuels management plan, including monitoring, remediation and adaptive management, to reduce potentially catastrophic wildland fire effects to steelhead and their habitat and preserve natural ecosystem processes (including sediment deposition)		Wildfires	1, 4, 5	2B						
	Develop and implement a plan to minimize runoff from agricultural activities		Agricultural Effluents	1, 4	3B						
	Develop and implement a plan to minimize disturbance of instream habitats and riparian vegetation		Flood Control	1, 4	3B						
	Develop and implement a flood control maintenance program		Levees and Channelization	1, 4	3B						
	Develop and implement a plan to restore natural channel features where feasible		Levees and Channelization	1, 4	3B						

Action #	Recovery Action Description	Responsible Parties	Threat Source	Listing Factors (1 - 5)	Action Rank (1A, 1B, 2A, 2B, 3A, 3B)	Task Duration	Fiscal Year Costs ($K)				
							FY1	FY2	FY3	FY4	FY5
	Develop and implement a plan to vegetate levees and minimize herbicide use near levees		Levees and Channelization	1, 4	3B						
	Develop and implement a watershed-wide plan to assess the impacts of non-native species and develop control measures		Non-Native Species	1, 3, 5	3B						
	Develop, adopt, and implement urban land-use planning policies and standards		Urban Development	1, 4	3B						
	Develop and implement a watershed-wide sediment management plan		Agricultural Development	1, 4							
	Develop, adopt, and implement agricultural land-use planning policies and standards		Agricultural Development	1, 4,							
	Relocate agricultural development and restore riparian zone		Agricultural Development	1, 4,							

13. Southern California Steelhead Research, Monitoring and Adaptive Management

"The analytic tools to evaluate species health have been greatly developed in recent years. The emergence of extinction theory from population genetics and ecology, the combination of demography and genetics in population viability analysis and the extension of risk analyses into the realm of biological conservation promises to lead us to wiser allocations of effort in the future."

Science and the Endangered Species Act, National Research Council, 1995

13.1 INTRODUCTION

Recovery of southern California steelhead will require a better understanding of the biology of the species, a method of monitoring the status of individual populations and the DPS, and a plan for tracking the effectiveness of the recovery actions and adjusting the recovery actions, as well as the over-all recovery strategy.

13.1.1 Southern California Steelhead Research

In 2002 the National Marine Fisheries Service (NMFS) convened a team of scientific specialists, know as the Technical Recovery Team (TRT), whose mission was to survey existing scientific information on steelhead ecology, and formulate a biological framework for a recovery plan for Southern California steelhead (Boughton and Fish 2003; Boughton *et al.*, 2005; Boughton and Goslin 2006; Boughton *et al.*, 2006, 2007).

The current state of knowledge of steelhead ecology is largely descriptive and qualitative. This has led to important uncertainties in the viability framework, which involved quantitative goals for distribution and abundance of steelhead trout and general strategies for how to achieve these goals. In general, the TRT approached uncertainty about recovery goals with a risk-averse, or precautionary, stance, consistent with accepted practice in conservation biology (McElhany *et al.*, 2000).

The TRT recognized early on that some key uncertainties involved in recovery planning arose from the qualitative nature of the current understanding, and could be improved by a carefully conceived and planned program of scientific research and monitoring. The benefits of pursuing such a program would be a more effective, and more-cost efficient, recovery effort for steelhead.

The over-riding need is for the scientific framework to become *quantitative* about certain aspects of southern California steelhead populations—especially their annual run size, along with year-to-year variability over the long term; and the quantitative response of steelhead runs to specific recovery actions. These are related to the two over-arcing questions of steelhead recovery in this region: how do we improve the distribution, abundance, and resilience of steelhead trout populations, and how much do we need to improve it for steelhead to be considered viable and eligible for delisting? The following sub-sections focus on the viability criteria developed by the TRT, and a series of related research questions grouped into three areas: enhancing anadromy, clarifying the population structure of *O. mykiss*, and planning for climate change.

13.2 VIABILITY CRITERIA

The viability criteria address two levels of organization, population and the Evolutionarily Significant Unit (ESU) which includes all life-history forms. The *O. mykiss* ESUs in this recovery planning area are composed of both anadromous and nonanadromous fish, but only the latter is on the endangered species list, under the "Distinct Population Segment" provision of the Federal Endangered Species Act. One of the principal uncertainties hindering and confusing the recovery effort is the relationship between the anadromous and non-anadromous (or "freshwater-resident") forms of the species. Following convention, the term "steelhead trout" is used for the anadromous fish, "rainbow trout" for non-anadromous fish, and "*O. mykiss*" when referring to both or either. The goal of the recovery plan is to ensure the continued persistence of steelhead trout in the region over the long term (Boughton *et al.*, 2007), but it is likely that rainbow trout have some role in securing this future, and thus the viability criteria have provisions for both forms of the species.

13.2.1 Population-Level Criteria

The TRT considered *O. mykiss* in the region to be grouped into demographically independent populations. Generally, each discrete coastal watershed in the region was assumed to have historically supported one demographically independent population of *O. mykiss. I*f migratory steelhead frequently move from one watershed to another, the one-watershed-one-population assumption may have some important exceptions, with implications for recovery planning, and this is one of the key uncertainties about population structure discussed in the next section.

The TRT proposed population-level viability criteria for determining whether a demographically independent population of *O. mykiss* should be considered viable for the purpose of steelhead recovery. The TRT identified two choices for meeting the viability criteria. The first was to meet a set of criteria: a population must exhibit a mean annual run size of at least 4,150 steelhead trout, including during periods of poor ocean conditions (such as occurred from the late 1970s through early 1990s). Additionally, the spawner densities in the river systems needed to meet a minimum density threshold (fish per km. of stream channel), a quantitative criterion yet to be determined.

The second choice was to meet a performance-based criterion, demonstrating that the extinction risk for steelhead trout is less than 5% over 100 years, using commonly accepted quantitative methods from conservation biology, demographic data from the population in question, and passing an independent scientific review.

The performance-based criteria cannot be applied in a meaningful way until an effort to monitor steelhead run sizes has been in place for a decade or more. The reason is that extinction risk is very sensitive to not just run size, but also its year-to-year variability and it will be necessary to monitor steelhead runs for at least a decade, more likely two, before this key quantity can be estimated with reasonable accuracy and precision. In the meantime, the prescriptive criteria ensures that year-to-year variability in run size, whatever its probable magnitude, is unlikely to pose a significant extinction risk.

If year-to-year variability turns out to be relatively modest, a mean run size smaller than 4,150 steelhead would perhaps be sufficient to ensure a low extinction risk. This was one of the reasons for including the option for performance-based viability criteria, as a mechanism for refining the viability criteria as more is learned over time.

Extinction risk for individual steelhead runs may also be sensitive to the influence of rainbow trout, if the trout tend to stabilize or augment those runs through the mechanism of rainbow trout regularly having anadromous steelhead amongst their progeny. This phenomenon is referred to as "life-history crossovers," but it is not yet known whether such crossovers occur frequently enough to stabilize steelhead runs. This is another key uncertainty that, if resolved, might allow the run-size criterion of 4,150 spawners per year to be adjusted. In this case, the adjustment would be that only a fraction of the 4,150 spawners would need to exhibit the anadromous life history.

In the absence of specific information about the role of life-history crossovers, the TRT took a precautionary approach (i.e., it was assumed there was not any beneficial effect of crossovers). This meant that the 4,150 spawners per year required for viability must be composed entirely of steelhead trout, rather than a mixture of rainbow and steelhead to ensure viability. However, the TRT also believed that the criteria should cover the possibility that the beneficial effect not only exists, but is necessary for viability. This led to additional criteria that the anadromous and freshwater resident life-history types should both be expressed in populations for them to be considered viable.

It would be useful to learn whether rainbow trout significantly enhance or stabilize steelhead runs. If rainbow trout turn out to have a beneficial effect on steelhead runs, and its magnitude can be quantified, such knowledge could be used to revise the criteria for anadromous fraction, or it could incorporated into a performance-based assessment of risk that might have different requirements for run size and anadromous fraction. Research into these topics could potentially provide flexibility in the recovery process while maintaining acceptably low extinction risk.

13.2.2 ESU/DPS-Level Criteria

The TRT outlined a set of ESU/DPS-level criteria, which if met would indicate that a steelhead Distinct Population Segment has been successfully recovered. Satisfying the ESU/DPS-level criteria requires a set of *O. mykiss* populations in which:

- Each population satisfies the population-level criteria described above, and
- The set of populations as a whole satisfies requirements for ecological representation and redundancy, and
- The set of populations as a whole exhibit all three life-history types (fluvial-anadromous, lagoon-anadromous, freshwater resident)

The criteria for representation and redundancy have two purposes. First, to protect the genetic and ecological diversity that ensures the long-term viability of the species under changing conditions, the set of populations should *represent* the entire range of ecological and genetic conditions originally present in the ESU/DPS. Second, to protect against catastrophic loss of entire populations due to disease, forest fires, drought, *etc.*, the set of populations should exhibit *redundancy* with respect to the range of ecological and genetic conditions originally present in the ESU. This ensures that if entire populations are lost from a particular ecotype, for example, there will be at least one other population in that ecotype that survives, and can serve as a reservoir of individuals retaining the genetic and phenotypic adaptations necessary for inhabiting that ecotype. Ultimately such individuals would be necessary for recolonizing the watersheds of the populations that were lost.

The TRT developed criteria for representation and redundancy by grouping the region's populations of *O. mykiss* into biogeographic groups, and specifying a minimum level of redundancy (number of viable populations) within each group. In addition, the TRT recommended that the core populations should inhabit watersheds with drought refugia, should be separated from one another by at least 68km if possible, and should exhibit three life-history types—the rainbow trout form described previously, and two forms of steelhead trout, the lagoon-anadromous form and the fluvial-anadromous form, that is described more fully below.

The biogeographic groups were delineated on the basis of geographic proximity, broadly similar climate, and aspects of physiography that are relevant to the fish (see Table 5 and Figure 5 in Boughton *et al.*, 2007). Summer air temperatures, which strongly influence whether summer stream temperatures are cool enough for the fish, were a key consideration. The most important split was between coastal groups of populations, in which cool mesoclimates are maintained by proximity to the ocean, and interior groups of populations, where cool mesoclimates are primarily confined to mountain ranges, and are maintained by the temperature lapse rate (i.e. the reduction in temperature with increased elevation).

The criteria for redundancy within each biogeographic group were based on an assessment of catastrophic risks posed by wildfires and debris flows. However, the assessment was based on historical pattern and did not include considerations of climate change, which is likely going to have a large impact on the region (see discussion below).

The TRT also considered the catastrophic risk posed by drought, but could not incorporate it into the criteria due to insufficient information. The broad spatial extent of the typical drought in the region indicated that simple redundancy was not a suitable strategy for protecting the species from its effects. What is needed is information for identifying watersheds having potential as drought refugia—stream systems that maintain suitable summer baseflows and water temperatures during severe multi-year droughts.

The broad-scale climatic factors that control the distribution of *O. mykiss* in the region appear to be summer air temperatures, annual precipitation, and the severity of winter storms, the latter having its effect by determining the power of high flow events that organize the distribution and extent of in-stream steelhead habitat. All of these factors are likely to undergo a permanent shift as part of CO_2-induced climate change. In addition, the region's frequent wildfires strongly influence the sediment budgets of streams, and thus the distribution of steelhead habitat. The overall wildfire regime is also likely to undergo a permanent shift in response to climate change. The magnitudes of these shifts and the magnitude of their direct and interaction effects on stream habitat is not yet clear. Thus a key uncertainty is how to plan for climate change at the level of the ESU, and also at the level of individual stream watersheds.

13.3 RESEARCH FOCUS: ANADROMY, POPULATION STRUCTURE, AND CLIMATE CHANGE

The natural dynamics of watersheds and stream systems maintain steelhead habitat in the recovery planning area in a stochastic, dynamic equilibrium, though this equilibrium can involve dramatic processes such as floods and forest fires that disrupt habitat in the short term (but ensure its continued existence over the long term). Other processes that circumscribe the productivity of freshwater steelhead habitat, such as the severity of the dry season or the pattern of high-flow events during the wet season may affect reproductive success. These ecological constraints are generally understood at a qualitative level, but this level of knowledge is in some cases too vague to provide specific guidance for setting goals and choosing specific recovery actions. The research program supporting steelhead recovery in this region should focus on quantitative studies that 1) identify ecological factors that promote anadromy; 2) clarify key aspects of population structure; and 3) support planning for climate change.

13.3.1 Ecological Factors that Promote Anadromy

The focus of recovery is to recover and secure the anadromous form of *O. mykiss*, and that involves restoring ecological conditions that specifically promote the abundance of the anadromous form. While it is necessary to have migration corridors for steelhead to reach a spawning area, at present it is not clear what ecological conditions specifically promote the sea-going form, over the resident form, though there are some important clues. These clues present a prime opportunity for research that would lead to more effective recovery actions.

The most settled question is the definite fecundity advantage of sea-going females. As shown in Figure 13-1, an adult female's egg production scales exponentially to its body length, and adult *O. mykiss* are generally able to attain much larger sizes in the ocean than in freshwater.

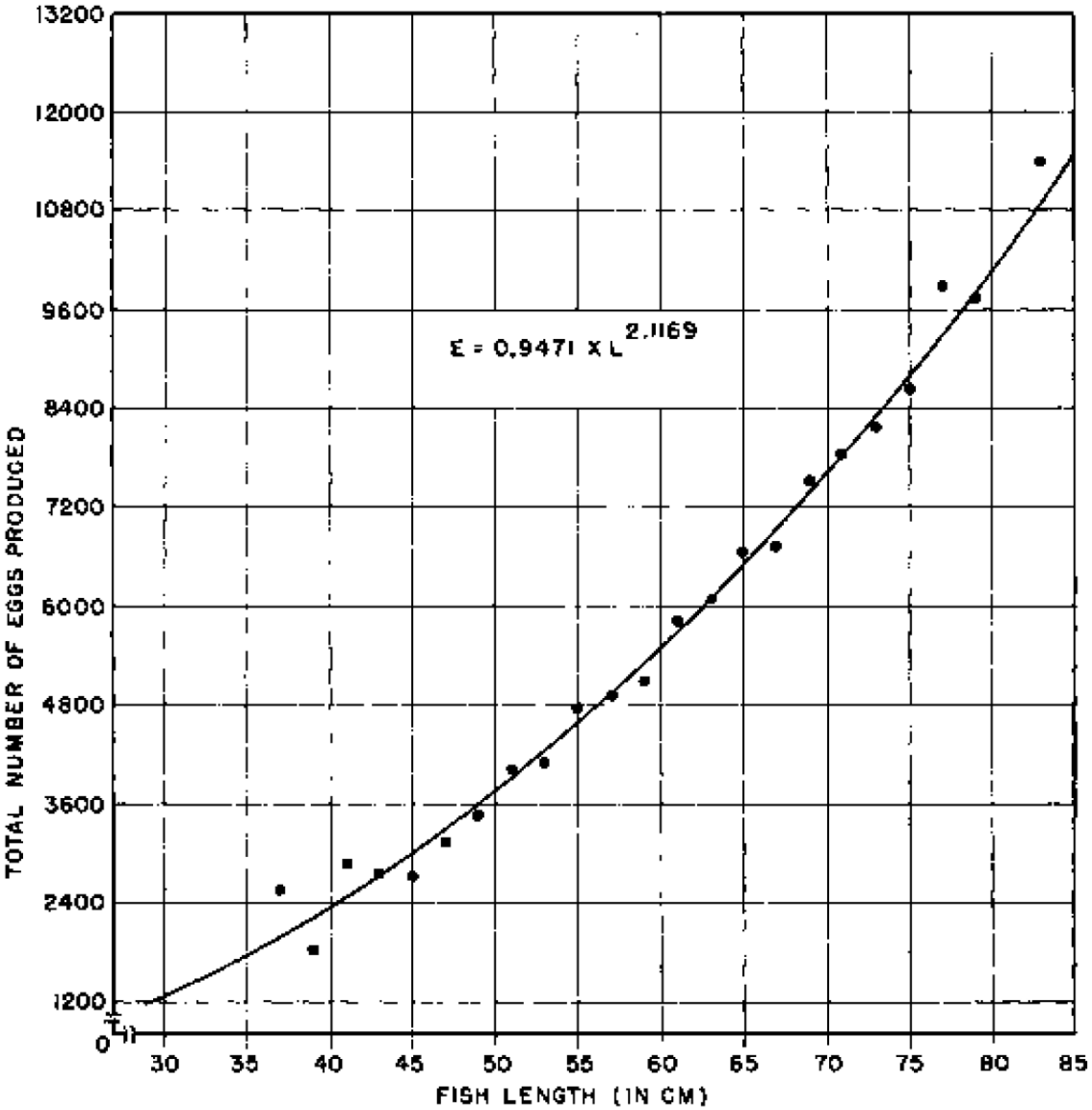

Figure 13-1. Fecundity as a function of body size for female steelhead sampled from Scott Creek in Santa Cruz County. Reproduced from Shapovalov and Taft (1954).

Thus, a typical female rainbow trout might attain a length of 35 cm, enabling her to produce 1800 eggs annually, whereas a medium sized steelhead female at 60 cm could produce over 3.5 times that number. This factor alone gives the sea-going form a distinct advantage and, all else being equal (and assuming the two forms breed true), over time the sea-going form should come to dominate any stream system with migration connectivity to the ocean. The resident forms would become confined to streams that lack migration connectivity. This pattern has been observed, for example, in the Deschutes River in Oregon (Zimmerman and Reeves, 2000).

In southern California, three ecological factors could potentially counteract this size advantage, so that the resident form is sometimes favored in anadromous waters. First, the migration corridor could be unreliable. Second, mortality may sometimes be much higher in the ocean than in freshwater, counter-acting the potential size advantage of sea-going fish. Third, juveniles of the freshwater form may survive better or compete better in freshwater than juveniles of the sea-going form, which could also counteract the natural size/fecundity advantage of the sea-going form. Of these three possibilities, the first two are supported by various lines of evidence, and the third has some suggestive evidence. The need is to move beyond existing evidence to a quantitative understanding of ecological mechanism, so that specific recovery strategies can be linked to desired outcomes.

13.3.2 Reliability of Migration Corridors

Question: What is the relationship between reliability of migration corridors, and anadromous fraction? Migration corridors in this arid region are clearly unreliable, but it is not clear precisely how reliable they must be for the anadromous form to persist over the long term, nor how to best characterize reliability.

Recommendation: The relationship between flow patterns in managed rivers, the reliability of migration opportunities, and the long term persistence of steelhead runs is likely to be watershed specific, but could be characterized through the establishment of a long-term monitoring effort that tracks abundance and timing of steelhead runs, and the timing of smolt runs, in specific watersheds of interest. This would provide a framework by which management actions, in the form of managed flow regimes, could be related to outcomes, in the form of migrant abundance and timing. However, answers would probably emerge only over the long term, and numerous confounding factors would also need to be taken into account by the monitoring framework.

13.3.3 Steelhead-Promoting Nursery Habitats

Question: What nursery habitats promote rapid growth rates of juveniles and therefore larger size at the time smolts emigrate to the ocean?

Another factor that might counter-act the fecundity advantage of steelhead over rainbow trout is low marine survival, which if small enough could cancel-out or even outweigh the fecundity advantage. For example, with a steelhead female produces about 3.5 times more eggs than a rainbow trout female, if mortality during the first year in the ocean is 3.5 times greater than the mortality of trout staying in freshwater, the fecundity advantage of the steelhead would, on average, be erased. Mortality that is higher—say, 10 times higher than in freshwater—would favor the freshwater form outright. In reality, the fact that the freshwater-resident and the ocean-going forms both occur in the region suggests that conditions sometimes favor one phenotype, and at other times favor the other.

Ocean survival varies among salmonids, ranging from 25% to below 1% (Logerwell *et al*., 2003; Peterson and Schwing, 2003; Ward 2000; Welch *et al.,* 2009). It would seem that improving the marine survival rate of steelhead would be beyond the scope of most management strategies, since steelhead are rarely fished and other sources of ocean mortality are largely uncontrollable.

However, mortality rates of many marine fishes are strongly size dependent. Consistent with this general pattern, young steelhead migrating to the sea tend to survive much better if they have a larger size at ocean entry (Ward *et al*., 1989; Bond, 2006). Thus their growth opportunities in freshwater may influence their subsequent marine survival.

The most complete data on this phenomenon are from the Keough River steelhead population in British Columbia (Ward, 2000; Ward *et al*., 1989), reproduced here in Figure 13-2. According to Figure 13-2, an outgoing smolt that has a fork length of 14 cm has about a 3% chance of surviving to spawn, but a 16.5 cm smolt's chances are at least 3½ times better (*c.* 10%), and a 22 cm smolt's chances are an order of magnitude better (37%). Thus, mortality effects of size at ocean entry can be of the same order as the aforementioned fecundity advantages of migrating to the ocean in the first place.

A similar relationship between survival and size at ocean entry was observed by Bond (2006) in Scott Creek in Santa Cruz County, which is much closer geographically to southern California. However, the average marine survival was observed to be lower, on the order of 3% rather than the 10% to 20% observed in the Keogh River population. Thus the line in Figure 13-2 would presumably have a similar slope, but be displaced significantly downward. In any case, size at ocean entry appears to be at least as important as final spawning size in modulating the relative abundances of the freshwater and ocean-going forms of *O. mykiss.* [3]

Overall, this suggests that the recovery prospects for steelhead runs would be significantly improved by identifying, restoring, and protecting those freshwater habitats that tend to produce large smolts. These areas would qualify as steelhead "nursery habitats," defined as juvenile habitats that produce adult recruits out of proportion to their spatial extent relative to other habitats (Beck *et al.,* 2001).

To produce rapidly growing juvenile fish, a habitat must produce abundant food. Although young steelhead feed mostly on invertebrates, food productivity ultimately traces down the food chain to the primary productivity of plants, which require sunlight and nutrients. Sunlight can also heat up streams rapidly, and in southern California the streams cool enough for steelhead are mostly well-shaded, which precludes high levels of primary productivity (but can also result in increased allochthonous carbon inputs, including invertebrate food items, associated with riparian vegetation). One would expect that where steelhead nursery habitats exist, they embody some mechanism that allows cool water temperatures and high primary productivity to co-exist during the summer growing season. This appears to be the case of the Scott Creek population, in which the seasonal lagoon at the creek's confluence with the ocean serves as steelhead nursery habitat (Bond, 2006).

[3] Its importance can vary over time, however. Ward 2000 observed that after 1989, marine survival drastically declined in the Keogh River population, and the relationship disappeared between marine survival and size at ocean entry. This was attributed to a change in ocean conditions, and indicates that the survival advantage of being a large smolt varies over time.

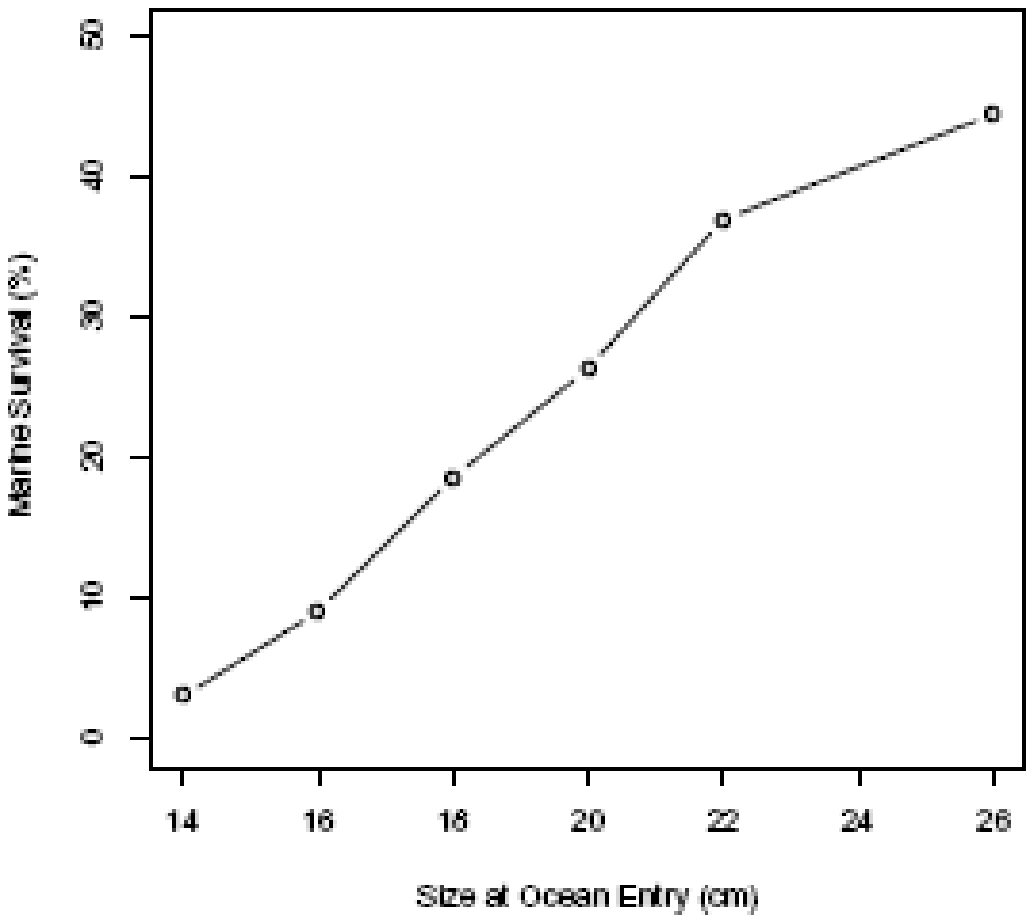

Figure 13-2. Marine survival of steelhead as a function of body size at ocean entry, in the Keogh River steelhead population described by Ward et al. (1989). Shown are the average survival to spawning of smolts emigrating in years 1977 - 1982.

Alternatively, steelhead nursery habitats might develop where cool-water habitats receive large terrestrial inputs of food items. Terrestrial insects often fall in the water (Douglas *et al.*, 1994; Harvey *et al.*, 2002), and can provide a significant component of the diet of young steelhead (Rundio and Lindley, 2008). The study by Rundio and Lindley (2008) in the Big Sur area found terrestrial insects were a sporadic occurrence in the diet of *O. mykiss*, but each item had large mass and thus was highly profitable to the fish. Habitats with more frequent inputs of terrestrial insects might offer large growth opportunities.

Finally, some habitats might produce rapid growth if there is a mechanism to keep juvenile densities low, so that individuals have expanded feeding opportunities. For example, it might be the case that intermittent streams provide expanded feeding opportunities during their wet season, because their dry season prevents the establishment of a large permanent population of resident rainbow trout.

Recommendation: The identification and restoration of steelhead nursery habitats is a prime research opportunity with large potential enhancing for steelhead recovery efforts. Nursery habitats would likely be estuarine or freshwater habitats that support rapid growth of young fish during the first or possibly second year of life, since large body size of migrants at ocean entry substantially improves their subsequent survival in the ocean. The simplest type of study to identify such habitats would be to use mark-recapture techniques to track growth and survival of juveniles as a function of habitat use. A more complete study would also track the consequences for marine survival.

13.3.4 Comparative Evaluation of Seasonal Lagoons

Question: What role do seasonal lagoons play in the life history of steelhead, and in particular, to what extent are seasonal lagoons used as nursery areas and promote the growth of juveniles prior to emigration to the ocean as smolts? What specific ecological factors contribute to lagoon quality (survival, growth) for steelhead rearing? What ecological factors contribute to lagoon reliability?

One type of steelhead nursery habitat is the freshwater lagoons that form in the estuaries of many stream systems during the dry season. In some of these seasonal lagoons, juvenile steelhead can grow very quickly and enter the ocean at larger sizes, where they survive relatively well and thus contribute disproportionately to returning runs of spawners (Bond, 2006). Smith (1990), however, has observed that some lagoons can be quite vulnerable to rapid degradation in quality, and others may never be suitable, due to local environmental factors that can produce anoxic conditions or poor feeding opportunities. The existing information on the role of lagoons mostly comes from Santa Cruz County, focusing on a few systems. As described above, this work suggests that lagoons can comprise steelhead nursery habitat, but can also be vulnerable to various natural and anthropogenic disturbances (Smith, 1990). So there is a need to determine which lagoons have the potential to play a positive role in anadromy-targeted recovery efforts.

Seasonal lagoons are a specific kind of estuary, and in general estuaries are highly dynamic interfaces between two other much larger ecosystems: freshwater stream networks on the terrestrial side, and the ocean ecosystem on the marine side. This accounts for estuaries' dynamism, complexity, and sensitivity to external influences, but also for much of their productivity (Hofmann, 2000; Jay *et al.*, 2000). Although there appears to be a general unity in function of many of the small estuaries in our region (due to the general similarity of climate, terrestrial watershed conditions, and the raised coast), there is also much variation and one would expect that small differences in, say, watershed condition or coastal wind and current patterns would sometimes translate into large differences in the suitability of lagoons as steelhead nursery habitat (Rich and Keller 2009).

Recommendation: Comparative studies on the environmental controls for productivity and reliability of lagoon habitat (including how to restore it if necessary) would aid in identifying those estuaries capable of serving as reliable steelhead nursery habitat. Such studies should focus on factors enabling rapid growth of juvenile steelhead, and factors conferring resiliency against catastrophic failure of habitat quality (anoxia, premature breaching, *etc.*).

13.3.5 Potential Nursery Role of Mainstem Habitats

Question: What role do mainstem habitats play in the life history of steelhead, and in particular, to what extent are they used as nursery areas and promote the growth of juveniles prior to emigration to the ocean as smolts? What specific ecological factors contribute to mainstem quality (survival, growth) for steelhead rearing? What ecological factors contribute to mainstem reliability?

There may be other freshwater habitats that support high survival and robust growth of juveniles, and so constitute nursery habitat specifically for the anadromous form of the species. Low-gradient mainstem habitats, such as the trunks of the Santa Ynez, Ventura, Santa Clara, and Pajaro Rivers, may also have once supported rapid growth of juveniles, particularly if reaches received enough sunlight to support primary productivity, but artesian flows or other groundwater inputs kept water cool in the summer (C. Swift, personal communication). Most mainstem habitats have now been highly altered by agricultural clearing and groundwater pumping, so an effort to determine their upside potential for steelhead recovery would require some effort.

Recommendation: The potential nursery role of mainstem habitat is much more speculative than the nursery role of lagoons. Initial assessment of the potential nursery role could take the form of 1) empirical study of mainstem habitat use by juvenile steelhead, at broad and fine scales; and 2) water-temperature modeling that accounts for effects of climate, insolation, and groundwater interaction on mainstem water temperatures, especially during the summer. The empirical work would be most useful if it applied mark-recapture techniques to assess growth and survival as a function of habitat use, and in managed rivers, as a function of the flow regime.

13.3.6 Potential Positive Roles of Intermittent Creeks

Question: Do intermittent creeks serve as steelhead nursery habitat, positively influence the anadromous fraction of *O. mykiss* populations, or otherwise enhance viability of the anadromous form of the species?

Juvenile *O. mykiss* are common in intermittent creeks (Boughton 2008), but it is unclear whether these simply function as sink habitat (a net drain on productivity) or play a more positive role in population viability. Boughton (2008) observed that, during the early summer in a moderately wet year, densities of young-of-the-year *O. mykiss* were nearly identical in the perennial and intermittent creeks of the Arroyo Seco watershed in Monterey County. Much of the intermittent creeks dried up and killed juveniles later in the summer, and indeed such mortality has been observed in the region for many years (Shapovalov, 1944), although it is also common to find scattered residual pools or reaches packed with fish in late summer. For example, Spina *et al.*, 2005 observed fish in San Luis Obispo creek moving into sections of the stream network retaining perennial flow as other streams dried out over the summer months. The important issue is identifying the potential positive, rather than negative, roles of intermittent creeks in sustaining the viability of steelhead populations.

- The most obvious positive role is that intermittent creeks provide migration corridors to perennial creeks during the wet season. Perennial reaches often occur in low-order

streams upstream of intermittent sections, so the corridor role increases the amount of accessible perennial habitat, and thus the size of the steelhead population that can be supported. In dry years, the corridor function would fail in some areas.

- Boughton (2008) found that most spawning habitat in the Arroyo Seco system tended to occur in intermittent streams, and argued that hydrologic and geomorphic processes would tend to produce such a pattern in general. This suggests a second positive function of intermittent streams—significantly expanding the amount of spawning habitat beyond what is available in perennial streams—but it also suggests a need for an additional corridor function. In this case, the corridor function is for young-of-the-year to emigrate to perennial reaches before the summer dry season traps and kills them.

- It is possible that intermittent streams enable a high-risk, high-reward strategy on the part of young steelhead. Many individuals may be killed during the summer drying season, but those surviving in the residual pools may benefit from enhanced growth. One mechanism for enhanced growth may be cannibalism of trapped cohorts. Another mechanism for rapid growth may be rapid recolonization of the dried stream channels as flows become re-established with cooler, wet weather in the fall.[4] Such would find few competitors, and perhaps even an enhanced opportunity to feed on eggs and fry of the following winter's spawners (Ebersole *et al.*, 2006). In this manner, intermittent creeks could serve as steelhead nursery habitat

- In wet years, the seasonal drying may be substantially reduced, increasing summer survival and allowing large pulses of juveniles to be recruited to the subpopulation of adult steelhead in the ocean. Under some scenarios, such as a highly plastic life-history strategy (see next section), it is possible that such pulses would be the primary mode of production for anadromous individuals, and sustain the anadromous form of the species over the long term.

Recommendation: Intermittent creeks comprise a large proportion of freshwater *O. mykiss* habitat in the region. Despite an obvious negative role in the species ecology, they may have important positive roles as well. These potentially positive roles have the status of hypotheses with general implications for recovery strategies and viability targets, and should be tested.

[4] Fall rains can re-establish flows, but flows may also be re-established by cooler fall weather, which presumably lowers transpiration demands of riparian vegetation, leaving more groundwater to maintain base flows in stream channels.

13.3.7 Spawner Density as an Indicator of Viability

Question: At what density can a spawning habitat be considered saturated?

This question directly addresses one of the viability criteria—spawner density—that was thought necessary to achieve resilient populations, but that has not been characterized for steelhead in general or southern steelhead in particular.

Recommendation: Monitor a select number of core and non core populations to determine the numbers of spawners using both mainstem and tributary spawning habitats. However, answers would probably emerge only over the long term, and numerous confounding factors would also need to be taken into account by the monitoring framework.

13.3.8 Uncertainty about Population Structure

Population structure concerns the ecological and biological factors that cause fish to naturally group into functional units known as independent populations. Independent populations are defined as "a collection of one or more local breeding units whose population dynamics or extinction risk over a 100-year time period is not substantially altered by exchanges of individuals with other populations" (McElhany *et al*., 2000).

If groups of fish regularly exchange individuals, they are members of the same population, whereas if exchange is rare or does not significantly affect population dynamics, they are members of separate populations. This definition of "separateness between, exchange within" means that the proper context of most management strategies is the independent population: a strategy that directly affects only a portion of a population will soon have significant indirect effects on the rest of the population, but few immediate effects on other populations. [5]

The independent population is also the fundamental functional unit of species persistence, and hence viability. As a result, many of the viability criteria described by Boughton *et al.* (2007) were defined in terms of population traits such as anadromous fraction and mean spawner abundance over time. The collections of fish to which these criteria should be applied are a function of what is known about the patterns of exchange of fish among breeding biological units. Open questions about such exchange result in uncertainty about how to apply the criteria.

Thus, an analysis of a simple quantitative model led Boughton *et al*. (2007) to conclude that an annual adult abundance of 4,150 fish were necessary for an independent population to be considered viable. But it was unclear, due to questions of exchange patterns, whether the criteria should be applied to:

- anadromous fish in a particular watershed, or
- the sum of anadromous fish across several watersheds, or
- the sum of anadromous and freshwater-resident fish in a particular watershed, or

[5] Over the longer term, a permanent change in population dynamics *would* be expected to trickle out to other independent populations, due to occasional exchanges of individuals. Occasional exchanges are expected to drive important processes such as gene exchange and recolonization of stream systems following a drought.

- the sum of anadromous and freshwater-resident fish across several watersheds

The answer has implications for the scope and scale of recovery efforts. The answer depends on the level of exchange of fish across separate coastal watersheds, and on the level of exchange between the anadromous and resident forms of the species within a particular watershed—termed 'life-history crossovers". A life-history crossover is a freshwater parent that has anadromous fish among its progeny, and/or vice versa. Questions about inter-watershed exchanges and life-history crossovers, and the implications for viability criteria, are key issues addressed in this section.

13.3.9 Partial Migration and Life-History Crossovers

Partial migration is the phenomenon in which a population consists of both migratory and resident individuals (Jonsson and Jonsson, 1993), implying the regular or at least occasional occurrence of life-history crossovers. A diversity of crossover patterns have been observed in the small number of studies conducted on *O. mykiss* to date. Zimmerman and Reeves (2000) observed no crossovers in resident and anadromous *O. mykiss* of the Deschutes River in Oregon, implying two demographically distinct (independent) populations. For one natural and eight hatchery populations in California, Donohoe *et al.* (2008) found that anadromous females sometimes produced resident progeny, but resident females did not produce anadromous progeny, suggesting a one-way flow of crossovers away from the anadromous form.

The Babine River *O. mykiss* in British Columbia apparently exhibit modest levels of crossover (*c.* 9%) in both directions (Zimmerman and Reeves, 2000), suggesting a single population that is partially subdivided, whereas J.R. Ruzycki (personal communication in Donohoe *et al.* 2008, p. 1072) reports a high level of bidirectional crossover in various tributaries of the Grande Ronde River in Oregon (0% to 33% of anadromous adults were progeny of resident females, and 44% of resident adults were progeny of anadromous females), indicating a fully integrated population in which the two life-history forms functionally co-exist.

This continuum has significant implications for viability criteria. Are the populations in southern California fully integrated, or does each form more or less breed true, implying demographically independent populations that share stream systems but play no role in supporting one another, and perhaps even compete? Boughton *et al.* (2007) made recommendations that embodied these two possibilities (actually two endpoints of a continuum). On the one hand, one should specify criteria that would secure the ocean-going fish if they turn out to comprise a demographically independent population. On the other hand, one should specify criteria that secure the ocean-going fish if they turn out to depend on the resident form with which they coexist. However, it is possible that resolution of the uncertainty would eliminate some of the need for hedging and thus lead to a more efficient and effective recovery plan. Resolution would involve two fundamental questions:

Question 1: What is the mechanism for, and frequency of, life-history crossovers in southern California?

Question 2: How does crossover affect the persistence of the anadromous form?

Answering the first question will take an extended research effort. Currently, S. Sogard (NOAA Fisheries) and M. Mangel (UC Santa Cruz) are leading a research effort to better understand life-history crossovers in California steelhead; Mangel and Satterthwaite (2008) give an overview of the framework being used. The hypothesis being examined is that the anadromy/residency life-history crossover made by individual *O. mykiss* is cued by the environment, using a mechanism similar to what has been observed in Atlantic salmon (*Salmo salar)*, a better-studied species that also exhibits variation in the timing of the smolting decision during life history. Specifically, the hypothesis is that the smolting/residency life-history crossover is made by individual fish during a sensitive period some months before the actual process of smolting is observed, and that the cues for the crossover are the fish's size and growth rate during the sensitive period. This might be expected because size and growth in the freshwater habitat integrate information about the quality of that habitat, as well as about the expected survival and fecundity in the marine environment versus the freshwater environment. What is hypothesized is a physiological (and perhaps hormonal) process that processes information from the environment to produce an adaptive life-history crossover.

Though the research effort of Sogard and Mangel is important progress on the anadromy/residency life-history crossover phenomenon in steelhead recovery planning, it has important limitations at this time. First, it has the status of a hypothesis and at this writing no one has actually experimentally induced life-history crossovers in *O. mykiss* by manipulating size or growth rates or any other environmental factor. Second, even if the Atlantic salmon model is useful for understanding life-history plasticity in *O. mykiss*, there are almost certain to be important differences and indeed surprises in the *O. mykiss* story. It would be surprising if there were no surprises. Finally, the existence of a plastic life-history strategy does not preclude the possibility of important genetic constraints. For example, one might expect that even if the model is broadly correct, the specific timing of sensitive periods, and the thresholds for the size and growth cues, would probably vary quite markedly among populations of steelhead due to genetic differences. In short, the responses to environmental cues would likely have a heritable component, and this component would likely exhibit local adaptation to specific conditions. A response that is adaptive in one watershed may be selected against in another watershed, depending on environmental factors such as those discussed in the previous section.

Recommendation: It is essential for the research effort on the mechanisms of life-history plasticity in *O. mykiss* to pursue a rigorous research effort, for it is difficult to envision a successful recovery effort without a better understanding of the functional relationship between resident and anadromous fish. The current effort of Sogard, Mangel, and coworkers should yield useful information over time, but it focuses on two systems outside southern California: Soquel Creek in Santa Cruz County (a coastal redwood forest system), and the American River near Sacramento (a large Central Valley River system). One should expect local adaptation of steelhead populations in the southern California.

Because of local adaptation, it might be useful and practical to address some related questions about the frequency of life-history crossovers and their implications for recovery planning in the southern California. In particular:

- Identify environmental factors that specifically promote anadromy (discussed in the previous section). It is clear that the abundance of anadromous fish needs to be increased, and identifying relevant environmental factors would usefully inform this goal. The principal uncertainty is how much the abundance of anadromous fish needs to be increased, a separate question that depends on the frequency of life-history crossovers and the mechanisms underlying them. This question can be addressed over the longer term as more is learned about the mechanism, and used to refine the viability criteria described by Boughton *et al.* (2007).

- Estimate the frequency of life-history crossovers in populations of interest, to determine whether it even occurs with any regularity. The most practical method for doing so is by analyzing otolith microchemistry of juvenile *O. mykiss* (see Donohoe *et al.,* 2008), but unfortunately this requires lethal sampling of juveniles. Modest lethal sampling of juveniles (as opposed to adults) is likely to pose only a negligible increase extinction risk, due to the low reproductive value of juveniles (most sampled juveniles would die in nature before reaching reproductive age).

- Determine how life-history crossover affects the persistence of the anadromous form. This could be done using existing frameworks in population modeling, such as individually-based models or integral projection models, but would require assumptions about typical mortality and growth rates in freshwater and marine environments, as well as about frequency of life-history crossovers. However, it might produce important insights. For example, persistence of anadromous runs could be strongly affected by the difference between complete lack of crossovers and a modest rate, such as 5%. However, effects would be much smaller between a 10% rate versus a 50% rate. It would be useful to more rigorously evaluate the validity and relevance of these levels of life-history crossovers.

13.3.10 Rates of Inter-Watershed Exchange

Question: How common is inter-watershed exchange, and how does it relate to population structure, especially in small coastal watersheds?

Just as life-history crossovers may knit resident and anadromous *O. mykiss* into integrated populations, frequent movement of anadromous fish through the ocean to neighboring watersheds may knit neighboring *O. mykiss* into integrated "trans-watershed" populations. If inter-watershed exchange is common, the most effective recovery strategies might be those that emphasize integration of recovery efforts across a set of linked Watersheds. If inter-watershed exchange is rare, the most effective strategies would be those that identify watersheds having stable conditions that protect small, inherently vulnerable populations.

The places where the implications of the single-watershed versus trans-watershed scenarios are most distinct are those areas along the coast where numerous small coastal watersheds occur in close proximity. These areas are the Big Sur Coast, the coast of San Luis Obispo County, the south coast of Santa Barbara County, and the small watersheds draining the Santa Monica Mountains just north of Los Angeles.

Recommendation: Answering this research question will involve tracking the populations from multiple watersheds, including groupings of small, closely spaced watersheds as well as groupings involving large and small watersheds more spatially dispersed. However, it is not clear at this time what is the most practical and effective way to try to estimate exchange rates in the recovery planning area. Genetic tags and ecological traps may have potential to effectively address this question and should be explored.

13.3.11 Revision of Population Viability Targets

In the framework described by Boughton *et al.* (2007), the key criteria for establishing population viability was that a population be demonstrated to sustain a long-term mean run size of at least 4,150 anadromous spawners per watershed per year. However, the authors noted that the criteria were chosen to be precautionary due to scientific uncertainty about key issues, and that better information might allow the criteria to be revised without increasing the risk of extinction. There were three types of information that seemed most likely to lead to useful revisions of the viability criteria:

1. The threshold run size might be able to be revised downward from 4,150 spawners per year if it was determined that year-to-year variation in run size was modest enough to be consistent with a lower threshold. The necessary information—annual estimates of run size over several decades—would come from the types of monitoring programs described below.

2. Data on the frequency of life-history crossovers might justify that the 4,150 threshold could include some fraction of adult resident fish, rather than the 100% anadromous fraction currently recommended (*i.e.* because the resident and anadromous forms are shown to comprise functionally integrated populations). The necessary information would come from successfully implementing the recommendations identified above.

3. Data on inter-basin exchanges might justify that the 4,150 threshold include spawners from neighboring watersheds (*i.e.* because inter-watershed exchanges is sufficiently high that the fish in neighboring watersheds comprise a single, trans-watershed population). The necessary information would come from successfully implementing the recommendations identified above.

It should be noted that data for item 1 would arise over time as a byproduct of a comprehensive monitoring program, which is necessary to assess risk in any case. The priority item, however, is probably item 2, since the integration of the resident and anadromous forms is not well understood, but has profound implications for a very diverse set of management issues beyond just revision of recovery criteria.

13.3.12 Planning for Climate Change

The addition of CO_2 and other greenhouse gasses to the atmosphere over the past two centuries, as a side effect of industrialization and changes in land use, has substantially altered the radiative balance of the Earth. Less of the energy entering the Earth's atmosphere as sunlight is being re-

radiated to space, with the effect that the planet is currently heating up at a pace not seen in human history, and perhaps for millions of years. Regional climate projections for the south-central and southern California coast ranges suggest a future of longer, hotter summers, more extreme heat waves and droughts, perhaps drier rainy seasons, and perhaps more intense precipitation events in some areas (Snyder *et al.*, 2002; Bell *et al.*, 2004; Bell and Sloan, 2006; Snyder *et al.*, 2004; Snyder and Sloan, 2005; Karl, *et al.* 2009). Regarding the marine environment, the California Current ecosystem is likely to respond by warmer conditions and a delayed upwelling season, which would likely have detrimental effects on steelhead, but a more intense pattern of upwelling during the summer which would potentially have beneficial effects on feeding opportunities. (Schwing *et al.*, 2009).

A review of existing studies indicates that regional changes in the physical setting will almost certainly drive ecosystem changes in a diverse and intricate ways (Schwing *et al.* 2009). The ability to model and forecast the effects of such changes on steelhead populations is likely to be quite limited due to well known limitations on the predictability of behavior of non-linear causal networks. (Schindler *et al.*, 2008). This problem is common to many threatened species, but is especially exacerbated for Pacific salmonids due to their requirements for a succession of different habitats over the course of their life history. However, the environmental changes expected for southern steelhead are not as profound as elsewhere such as Central Valley, where populations dependent on snowmelt-fed river systems are facing a type–conversion to rain-fed system, or coastal coho populations which have a fixed life-history strategy that may be less adaptable to environmental changes than steelhead (Moyle, *et al.*, 2008). The changes in the physical setting in southern California are expected to mainly intensify patterns that are already typical (drought, intense cyclonic rainstorms, dry, hot summers), and to which the local populations of steelhead appear to have already evolved a flexible, opportunistic strategy for survival.

While some physical parameters of climate change are likely to be predictable, the response of ecosystems and hence the future conditions of steelhead habitats are must less predicable. This suggest that he over-arching strategy for dealing with climate changes will be to enhance the resilience of the steelhead metapopulations to respond to ecosystem changes in genera., through forecasting and managing the physical habitat envelope of the species according to a few core principles (see Boughton *et al.*, 2009 for a discussion of these principles):

- Widen opportunities for fish to be opportunistic (*i.e.*, exploit a variety of habitat types)
- Maximize connectivity of habitats (*i.e.*, within and between habitats)
- Promote the evolvability of populations and metapopulations (*i.e.*, the ability of a population to generate novel functions, through genetic change and natural selection, that help individuals of a population survive and reproduce)
- Maintain the management capacity to detect and response appropriately ecosystem changes as they occur

For recovery efforts to succeed in the long term, they will need to focus on watersheds that will be suitable for steelhead populations under the new, future climate. Some of the issues and research needs involved in identifying those watersheds expected to be suitable for steelhead populations in the future are discussed below.

13.3.12.1 Viability Criteria and Climate Change

The viability framework (Boughton *et al.,* 2007) laid out a set of criteria for ensuring representation and redundancy of viable steelhead populations across a set of biogeographic regions in the study area. This was based on two kinds of information:

1. Information on the historical occurrence of steelhead populations in watersheds, based mainly on records of the species' occurrence from the latter half of the 20th Century, and

2. Information on the extent of potential summer habitat, modeled from basic topographic and hydrographic data on the region's stream networks, recent hydrological data, and the climate of the period 1960 - 1990.

The purpose of viability criteria at this regional level is to ensure persistence of steelhead at a timescale of thousands of years. However, the criteria did not explicitly incorporate the implications of climate change, which has the potential to render some watersheds unsuitable for steelhead. Rather, the criteria focused on risks stemming from three sorts of natural catastrophic events or processes, all of which can be significantly affected by climate change:

Wildfires. The level of redundancy in the criteria was intended to protect against catastrophic loss of steelhead populations from the effects of wildfires to ensure that at least one population would survive an extreme year of wildfires in any biogeographic region. The level of redundancy chosen was based on the historical pattern of wildfires in the region, but was also based on conservative ("worst-case") assumptions about the short-term negative effects of wildfires on steelhead populations. This protects against our current lack of understanding about such effects, but also may perhaps tend to protect against future changes in the wildfire regime due to climate change. However, if wildfire frequency increases too much, it is likely to lead to wholesale conversion of chaparral ecosystems into grassland ecosystems, with implications for steelhead populations that are not accounted for in the current viability framework. Some of these implications may be positive: grassland conversion has been proposed to concurrently convert intermittent streams into perennial streams (Keeley, 2002). Other implications are negative: for example, if increased frequency of wildfires is coupled with periods of drought and heat, or if winter storms become more intense, exacerbating the sedimentation problems unleashed by wildfires. Also, with respect to wildfire risk, the criteria treated watersheds as exchangeable within biogeographic groups—no stream system was considered to be more buffered or resistant to the detrimental effects of wildfire compared to any other. If wholesale change in the fire regime occurs under climate change, it might be necessary to change the focus from achieving simple redundancy to identifying any stream systems that are inherently buffered against the effects of climate change on wildfire (as with the case of drought; see below).

Landslides. Existing evidence suggests that the most extreme episodes of land sliding tend to occur in recently burned watersheds. The TRT thus concluded that a level of redundancy that protects against extreme wildfire years would also protect against extreme land sliding events. There does not appear to be any obvious way in which climate change would change the extreme episodes of land sliding through a pathway other than the wildfire regime. One additional possible mechanism is an increase in the maximum intensity of storm systems, though existing

regional climate projections are equivocal about this possibility (Bell *et al.*, 2004; Bell and Sloan, 2006). However, land sliding is only one particularly catastrophic element in the overall sediment dynamics of the stream networks of our area, and there are many ways in which climate change may impact the sediment regime, either to the detriment or the benefit of steelhead populations. Again, rather than treating all watersheds as having exchangeable risks, an attempt could be made to identify those in which climate change will have either neutral or beneficial effects on the sediment regime, as judged by changes in the extent, reliability, and connectivity of steelhead habitat.

Droughts. The viability report (Boughton *et al.*, 2007) indicates that redundancy in and of itself is not a useful strategy for dealing with the catastrophic risks posed by drought. The reason is that the spatial extent of the typical drought exceeds the geographic range of the steelhead DPS southern in southern California, so all steelhead populations will be exposed to drought under a typical scenario. Thus, the research need stated in the report was to identify watersheds that are resistant to the negative effects of drought on steelhead habitat. In view of projected climate change, this research should be expanded to identify possible watersheds that are expected to be resistant to the negative effects of drought under the new climate regime.

The common thread is a need to focus on the heterogeneity in various watersheds' responses to climate change, and identify if possible those watersheds that are most likely to be suitable for steelhead in the future climate. In addition to wildfires, landslides, and droughts, climate change is likely to influence habitat suitability for steelhead through a variety of other pathways as well. Extremes of summertime air temperatures will increase, in some areas more than others. Extremes of winter streamflows and stream power will change, with implications for channel structure and the distribution of spawning areas. The climate trajectory may drive changes in wildfire and vegetation that influence patterns of stream shading and, via plant water use, the water available for summer base flows (*e.g.*, Tague *et al.*, 2009). In addition, there will be gradual sea level rise that inundates estuaries, and possible effects on marine upwelling patterns (Snyder *et al.*, 2003; Diffenbaugh *et al.*, 2004).

13.3.12.2 Extending a Coastwide Climate Assessment Effort

There is currently a coastwide effort to assess and rank the responses of salmon and steelhead populations to climate change, which is consistent with the need just identified, to focus on the heterogeneity of watershed response in our particular region. The effort is being conducted by a set of working groups at the National Center for Ecological Analysis and Synthesis in Santa Barbara, and is known as the Prediction of Responses of Wild Pacific Salmon to Climate Change.

When the working Groups completes their tasks as described above, the results will be useful for refining the recovery priorities of steelhead trout in southern and south-central California. However, since the groups' effort is coast-wide, its findings for southern California may be too coarse to identify the greatest opportunities for effective recovery actions. This is because such opportunities may often be in watersheds whose response to global warming is exceptionally benign to steelhead, rather than typical. In a broad scale assessment, it is the typical response of watersheds that will most likely be characterized, whereas for the actual situation it may be necessary to identify specific idiosyncratic or unusual departures from the norm in order to effectively protect steelhead. For example, Bean (2007) has found that the juxtaposition of two

particular rock types in the Santa Ynez Mountains, with faulting parallel to the general courses of coastal streams, is responsible for maintaining suitably reliable and cold base flows in many streams. This sort of region-specific pattern would easily be overlooked in a coast-wide assessment of climate impacts, but would be critical at a local scale.

As a result, there will likely be necessary to extend the results of the working groups, when they are completed. The following questions of particular importance have already been identified by the TRT:

- How will the climate trends alter the wildfire regime, and thus alter sedimentological and hydrological processes that effect the distribution of steelhead habitat?

- Will different watersheds develop distinctly different wildfire regimes, with implications for habitat dynamics, carrying capacity, and viability?

- What environmental factors maintain suitable creek temperatures during the summer, and will they moderate the response of stream temperatures to climate change?

- Are there natural freshwater refugia that sustain *O. mykiss* during droughts longer than the generation time of the fish?

- How are patterns of intermittency likely to respond to climate change, and where are suitable flows likely to intersect with suitable water temperatures under scenarios of climate change?

- Flood and drought regimes have been highly episodic, were even more so in the 19th Century, and may become even more so under future climate patterns. What are the implications for steelhead population viability?

The following table provides a summary of the various processes and features of freshwater habitat which have the potential to be affected by global climate change.

Table 13-1. Levels of Organization in Freshwater Steelhead Habitat Response to Climate Change

Global Climate
New regional means in temperature, rainfall
Rainfall intensity
Drought occurrence

Regional Climate
Interactions with landforms
Effects of ocean, upwelling
Fine-resolution temperature, rainfall, intensity

Watershed Response

Vegetation evapotranspiration and CO2 enrichment
Long-term response of vegetation structure
Runoff and groundwater recharge
Erosion, sediment delivery to channels
Wildfire regime, affects on runoff and erosion

Fluvial Hydrology/Geomorphology
Peak flows and stream power
Distribution of spawning gravels
Distribution of pools, roughness elements
Distribution of perennial streams
Riparian vegetation: structure, transpiration
Dry-season baseflows
Summer water temperatures
Migration opportunities
Inundation/aggradation of lagoons
Changes to lagoon barring and mixing patterns

Ecosystem Response
Macro invertebrate production
Invasion by predatory fish
Invasion by exotic competitors, predators, pathogens
Riparian shading
Terrestrial inputs of macroinvertebrates

13.4 MONITORING PROGRESS TOWARD RECOVERY GOALS

Monitoring should be conducted for each BPG, with monitoring initially focused on Core 1 populations. As described by Boughton *et al.* (2007), the general goal of recovery is to establish a diverse and geographically distributed set of populations, each of which meets viability criteria over the long term. These viability criteria are expressed in terms of mean annual runs size, persistence over time, spawner density, anadromous fraction, as well as the continued expression of life-history diversity, and the spatial structure of the population. Strategies for monitoring these properties of steelhead populations over the long term are essential for assessing the attainment of recovery goals.

13.4.1 Strategy for Monitoring Steelhead in Southern California

Southern California steelhead habitats exhibit characteristics that must be considered in formulating a monitoring plan. These characteristics include differences in geology, climate, and hydrology as well as the fact that other species of anadromous salmonids are absent. The differences in the geology, climate, and hydrology are described in Boughton *et al.* (2006). The strategy described below considers these factors, as well as the spatial and temporal distribution of southern California steelhead. The basic components of the southern California steelhead monitoring strategy include:

1. Reconnaissance surveys and assessments of steelhead populations.

2. Reconnaissance surveys and assessments of riverine and estuarine habitat conditions.
3. Counting stations stratified at both the BPG and population levels.
4. Life-cycle stations (LCS) stratified at both the BPG and population levels.

Currently there is no current comprehensive assessment of the condition and distribution of steelhead populations and habitats in southern California that use standard population and habitat assessment protocols. The monitoring strategy includes an, initial assessment both of the fish populations and habitat condition. Assessments should initially focus on Core 1 populations in each BPG, ultimately include all populations which are necessary for full recovery of the species. Stream habitat assessments should be conducted using the protocol in the California Department of Fish and Game's California Salmonid Stream Habitat Restoration Manual (California Department of Fish and Game 2009).

Counting stations comprised of fixed structure utilizing technologies such as DIDSON cameras, are the most effective means of establishing abundance and trends of adult anadromous runs of steelhead and juvenile out migration. County stations should initially be located in Core 1 populations in each BPG.

Life-cycle monitoring can be co-located with county stations, but may also be conducted in one or more of the non-core populations which support smaller but less impacted populations. LCSs monitoring efforts provide the foundation for evaluating the relationship of fish habitat use and habitat condition over time and should focus on:

1. Estimation of marine and freshwater survival
2. Spawning success (spawning ground distribution, redd to adult ratio)
3. Juvenile rearing success (over-summering and winter growth)
4. Major life-history traits (anadromy/resident relationships, sex ratio, age and size structure, habitat utilization patterns, emigration age and timing, maturation patterns, run-timing, and physiological tolerances)

These LCSs could also be used in evaluating nutritional needs, predation, disease, and other environmental factors relevant to assessing the status of individual populations. Where permanent LCSs are not established, temporary stations should be deployed to maximize the development of populational information in Core 1, 2, and 3 watersheds.

Table 13-2 lists the preliminary sites where counting stats and LCSs should be established. LCS sites should be sited based on two criteria: their relation to the BPG and whether they are necessary to represent the full range of watershed types for each BPG.

Table 13-2. Potential Southern California Steelhead Life-Cycle Monitoring Stations (alternative populations are listed in parentheses).

Life-Cycle Monitoring Station	Population	Potential Location
1	Santa Maria River	Below Sisquoc
2	Santa Ynez River	Bradbury Dam
3	Ventura River	Robles Diversion
4	Santa Clara River	Vern Freeman Diversion
5	Mission Creek (Arroyo Hondo Creek)	Below Rocky Nook Park
6	Carpinteria Creek	Above Highway 101
7	Rincon Creek	Above U.S. Highway 101
8	Malibu Creek (Arroyo Sequit, Topanga Creek)	Below Rindge Dam
9	San Gabriel River	Below Morris Dam
10	San Juan Creek	Below Metro-link Crossing
11	San Mateo Creek	Above Highway 1
12	San Luis Rey River	Below Bonsall

To the maximum extent possible, monitoring the status and trends of steelhead populations should be undertaken simultaneously with restoration efforts. Watersheds where restoration has or is occurring should be considered be considered a high priority for monitoring. Monitoring stations, whether counting or life-cycle stations, should serve as a magnet for research efforts depending on fish and fish related field data.

13.4.2 Monitoring Protocols

Below is a brief summary of potential methods to monitor run-size of steelhead (number of anadromous spawners per year per population).

13.4.2.1 Counting at Fish Ladders

Fish ladders can provide important opportunities to count upstream migrants, assuming the fish passage facilities themselves provide effective unimpeded fish passage opportunities. There are a number of technical challenges in operating fish detection and counting devises in extremely flashy systems characteristic of southern California (see discussion below). Additionally, this method is only relevant to watersheds that have fish ladders, and cannot quantify the portion of the run that spawns below the fish ladder. Depending on the location of the ladder and the amount and type of habitat downstream of the ladder, the spawners below the ladder can be an important component of the run.

13.4.2.2 Redd Counts

Gallagher and Gallagher (2005) have shown that salmon and steelhead runs can be estimated using redd counts. A summary of their method and is provided below:

To estimate Chinook salmon *Oncorhynchus tshawytscha*, coho salmon *O. kisutch*, and steelhead *O. mykiss* escapement in several coastal streams in northern California a stratified index redd method was developed, based on the assumption that redd size is related to the number of redds a female builds. Due to temporal overlap in the spawning of these species in coastal northern California sources of error in redd counts were identified, through the use of logistic regression to classify redd species. Redd area escapement estimates were compared with estimates from more conventional methods and releases above a counting structure. Reduction of counting errors and uncertainty in redd identification, biweekly surveys throughout the spawning period, and the use of redd areas in a stratified index sampling design produced precise, reliable, and cost-effective escapement estimates for Chinook salmon, coho salmon, and steelhead.

This method has considerable promise, but has not been tried in the southern California setting, where stream turbidity and channel geomorphology may make redds difficult to detect in difficult wintertime conditions. The method has high personnel requirements, because it requires the survey reaches to be visited biweekly throughout the spawning season. On the other hand, it is simple, requires only modest training in field personnel, and has modest costs other than the hiring of personnel.

13.4.2.3 Monitoring runs using the DIDSON Acoustic Camera

Dual-frequency identification sonar (DIDSON) is an off-the-shelf device that uses high frequency sound waves to produce near video-quality images of underwater objects. It can potentially be used to identify and count all migrating steelhead at some survey point in a stream system, for the entire spawning season. Its advantages are similar to those of using a weir to make counts, but has several additional advantages that are key: 1) There is no need for a weir or other device that impedes flow, and so fouling, destruction by high-flow events, etc., are not a major constraint; 2) It can see through turbid waters (unlike a regular video camera). These two traits appear well suited to the flashy, turbid conditions typical of southern California streams.

DIDSON has been successfully used to estimate adult salmon escapement in high-abundance rivers in Alaska, Idaho, and British Columbia. In principle it should be suitable for low-abundance creeks, such as those in southern California. Currently, staff at the NOAA's' Southwest Fisheries Science Center are evaluating field methods for using the device to monitor steelhead runs in southern California streams.

The principal disadvantages are: 1) the cost of the device, and 2) deployment constraints for getting good images. These constraints have to do with maintaining a good "insonified region" of the channel being monitored for migrants. Some channel shapes are better than others, and there also need to be a strategies for maintaining a completely insonified cross section during the advance and retreat of high flow events. In addition, there is a need to learn how to interpret poor images when they occur. However, the method has the promise to solve some of the intractable problems of monitoring steelhead in southern California, including counting very small numbers of migrants in very turbid waters during and after very flashy high-flow events.

13.4.2.4 Tagging Juveniles and Monitoring Migrants (T-JAMM design)

Steelhead runs can potentially be estimated by tagging juveniles with Radio Frequency Identification (RFID) tags during their freshwater phase, and subsequently monitoring migrants using in-stream tag readers. The design has promise for monitoring runs of steelhead for which many other methods are problematic. In unpublished simulations, Boughton has found that the precision of run size estimates is primarily controlled by the number of tagged spawners that ultimately return and get detected. The number required is modest: around 30 to 90 tagged spawners are necessary to obtain 50% confidence intervals that stay below one-third of the estimated of run size. However, with marine survival typically falling between 0.3% and 3%, the required tagging effort would usually be between 3,400 and 45,000 juvenile fish tagged per generation per population to achieve this modest number of tagged spawners. Other considerations in using implanted tags are the mortality/fitness risks and the permitting requirements to allow some level of take of the species. The tagging effort could perhaps be spread across a set of populations if one were willing to assume uniform marine survival across the populations.

The estimation method is robust to imperfect detection of tagged fish by the instream tag readers, as long as there are at least two readers that independently scan for tags. Reach-sampling allows the entire run to be estimated using fish from a sample of reaches. In the simulations, the number of reaches needed for acceptable precision could be as low as 30-40 under scenarios of high

marine survival, a sampling fraction of around 2% in large watersheds, such as the Arroyo Seco watershed used in the simulations.

Under low marine survival, the necessary sampling fraction was around 10% in the simulations. A side-benefit of this method is that one would obtain very good estimates of ocean survival. This is useful because it allows the overall trajectory of steelhead runs to be decomposed into marine and freshwater components. This, in turn, will deliver greater statistical power for analyzing patterns in the freshwater component. In short, one would have greater statistical power for determining if recovery actions on the freshwater side are actually having the desired effect.

Boughton has written software to estimate run size from data produced by tagging juveniles and monitoring migrants. It is written in the R computer language, a freely-available statistical programming environment that is widely used in the scientific world. Currently the work is in manuscript form. Williams, Rundio, and Lindley of the Science Center are currently tagging juveniles and monitoring migrants in a case study of Big Creek steelhead population, a member of the Big Sur Coast BPG within the South-Central California Steelhead DPS.

13.4.2.5 Sampling Young-of-the-Year Otoliths (YOYO design)

This method is similar to tagging juveniles and monitoring migrants, but instead of tracking the fate of captured juveniles to estimate run size, one would collect some fraction of the juveniles, and examine their otoliths and genetic relatedness. From this, one could estimate the number of anadromous mothers (and as a byproduct, non-anadromous mothers) for each annual cohort of young-of-the year fish. This should be suitable for estimating annual run size, at least of female fish.

This method would dispense with the need to implant RFID tags in fish, and the need to maintain instream tag readers during difficult winter conditions. All field work would consist of eletrofishing juveniles at randomly-sampled stream reaches each summer. However, the method would require the time and expense of otolith analysis, and it would require collecting (*i.e.* killing) some fraction of the juveniles that are electrofished during the summer field season.

Not much work has been done on this method yet, but it has promise as a relatively simple and efficient way to estimate run sizes using established and familiar field methods. A big drawback is the need to kill juveniles to get their otoliths. However, a small amount of take of juvenile fish would be expected to have negligible effects on viability, because young-of-the-year fish have very low reproductive value, i.e., most of them are going to die before they reach reproductive - perhaps only 0.1% or less will reproduce - so that sampling them will have negligible effects on viability, especially if the sampling is done before the density-regulation that appears to occur during each summer low-flow season. The key unknown at this point is how many fish would have to be sampled to get a reasonable estimate of the number of anadromous mothers, and whether the sampling does in fact pose a negligible increase in risk.

13.5 ADAPTIVE MANAGEMENT: LEARNING FROM RECOVERY EFFORTS

Adaptive management is a systematic process that uses scientific methods for monitoring, testing, and adjusting resource management policies, practices, and decisions, based on specifically defined objectives and goals. Adaptive management is predicated on the recognition that natural resources systems are naturally variable, and that knowledge of natural resource systems is often uncertain. Further, the response of natural resources systems to restoration and management actions is complex, and frequently difficult to predict with precision. Hence the need to adapt resource management policies, practices and decisions to changing circumstances or a better understanding of natural resource systems and their responses.

Adaptive management can be applied at two basic levels: the overall goals of the recovery effort, or the individual recovery or management actions undertaken in pursuit of overall goals. The research sections above are intended to address the first application. The following discussion is focused on the second application of the concept of adaptive management.

13.5.1 Elements of an Adaptive Management Program

There is no uniformly applicable model for an adaptive management program, and key elements must be identified and tailored to recovery action-specific, site-specific, and impacts-specific concerns. However, six such elements associated with adaptive management have been identified (Panel on Adaptive Management for Resource Stewardship 2004):

1st Element – Recovery Action Objectives are Regularly Revisited and Revised – Key recovery action objectives (and related questions) should be regularly reviewed in an iterative process to help stakeholders maintain a focus on objectives and appropriate revisions to them. The recovery goals, objectives, and criteria in Chapter 5 should provide a basic framework, and the recovery actions identified for each BPG should be a starting point for the adjustment of recovery action objectives. The mandatory five-year review process can serve as a means of conveying any needed modification to the overall recovery goals, as well as individual recovery actions.

2nd Element – Model(s) of the System Being Managed – Four types of models have been have been identified in the use of adaptive management program to test hypothesis regarding the effectiveness of recovery actions (Thomas, *et al.*, 2001):

Conceptual Model:	Synthesis of current scientific understanding, field observation and professional judgment concerning the species, or ecological system
Diagrammatic model:	Explicitly indicates interrelationships between structural components, environmental attributes and ecological processes
Mathematical model:	Quantifies relationships by applying coefficients of change, formulae of correlation/causation
Computational Model:	Aids in exploring or solving the mathematical relationships by analyzing the formulae on computers.

As noted in the discussion above regarding recovery goals, viability criteria are based on a combination of a synthesis of current scientific information and a simplified model not based on data specific to the southern California Recovery Planning Area. Additional quantifiable data is necessary to refine the viability population and DPS models which form the basis of the provisional recovery goals, objectives and criteria. Modification of the model could result in modification of the priorities assigned to the individual recovery action in individual populations or BPGs.

3rd Element – A Range of Management Choices – Even when a recovery action objective is agreed upon, uncertainties about the ability of possible recovery or management actions to achieve that objective are common. The range of possible recovery or management choices should be considered at the outset. This evaluation addresses the likelihood of achieving management objectives and the extent to which each alternative will generate new information or foreclose future choices. A range of recovery actions and management measures should be considered, either through a planning process or the environmental review process prior to permitting the individual recovery action.

4th Element – Monitoring and Evaluation of Outcomes – Gathering and evaluation of data allow for the testing of alternative hypotheses, and are central to improving knowledge of ecological and other systems. Monitoring should focus on significant and detectable indicators of progress toward meeting recovery objectives. Monitoring programs and results should be designed to improve understanding of environmental systems and models, to evaluate the outcomes of recovery actions, and to provide a basis for better decision making. It is critical that "thresholds" for interpreting the monitoring results are identified during the planning of a monitoring program. This element of adaptive management will require a design based upon scientific knowledge and principles. Practical questions to be addressed include what indicators to monitor, and when and where to monitor. Guidance on a number of these issues is provided in the sections above regarding research and monitoring.

5th Element – A Mechanism for Incorporating Learning Into Future Decisions – This element recognizes the need for means to disseminate information to a wide variety of stake-holders, and a decision process for adjusting various management measures in view of the monitoring findings. Periodic evaluations of the proposed recovery action, the monitoring data and other related information, and decision-making should be an iterative process in which management objectives are regularly revisited and revised accordingly. A public outreach (including web-based programs) should be actively pursued. Additionally, the mandatory five-year review process can serve as a means of conveying any needed modification to the recovery plan, and well as individual recovery actions.

6th Element – A Collaborative Structure for Stakeholder Participation and Learning – This element includes information dissemination to a variety of stakeholders, as well as a proactive program focused on soliciting decision-related inputs from a variety of stakeholder groups. Inevitably, some of the onus for adaptive management goes beyond managers, decision makers, and scientists, and rests upon interest groups and even the general public. However, despite the existence of varying viewpoints, NMFS has an obligation to fulfill its mission and statutory responsibilities.

13.5.2 Conservation Hatcheries

One adaptive management strategy involves the use of conservation hatcheries to preserve eminently threatened populations, or to accelerate restoration of steelhead runs by temporarily supplementing natural production. While a conservation hatchery program[6] can complement the overall recovery effort, the role of such a program cannot be reasonably expected to substitute for the extensive restoration of habitat function, value, and connectivity that is required to abate threats to southern California steelhead. Rather, the role of the conservation hatchery would be to preserve the genetic and phenotypic characteristics that promote life-history variability through captive broodstock, supplementation, and gene-bank programs, and to reduce the short-term or immediate risk of extinction. An important consideration within the overall planning for recovery of endangered steelhead involves knowing when to start a conservation hatchery.

13.5.2.1 Considerations for Starting a Conservation Hatchery

The appropriate use for a conservation hatchery should be guided by several considerations: (1) the biological significance of the subject population; (2) genetic diversity; (3) population viability; and (4) the potential loss of populations exhibiting any of the first three characteristics. Each of these is described below.

1. The biological significance of a population is expressed in the innate genetic and phenotypic characteristics, and other novel biological and ecological attributes, particularly those attributes that are not observed in other conspecific populations. With regard to the endangered Southern California steelhead DPS, the characterization of the historical steelhead population developed by the TRT provides evidence that certain watershed-specific populations possess a high likelihood of producing steelhead with genetic and phenotypic characteristics that favor survival in a spatially and temporally variable environment. Because many of the inland populations (e.g., Santa Maria River, Santa Ynez River, Ventura River, Santa Clara River, San Gabriel River, San Luis Rey River) extend over a broad geographic and physicochemical diverse area, these populations are able to withstand environmental stochasticity and possess ecologically significant attributes not found in most other populations.

2. The amount of genetic variation within and among individuals (i.e., genetic diversity) provides the foundation for a population to adapt to fluctuating environmental conditions, and contributes to its continued evolvability in response to longer-term changes such as projected climate changes. Generally, high genetic diversity favors growth and survival of individual populations. Genetic diversity of a population is usually estimated quantitatively based on genetic parameters, such as effective population size (N_e). The abundance of a population that falls below a specified N_e may be at risk of losing the necessary amount of genetic diversity that should be maintained over time, which does not favor survival in a stochastic environment. General guidelines or numerical values for N_e are specified in the literature for maintaining minimum N_e for

[6] A conservation hatchery is a "facility" that propagates indigenous steelhead taken from the wild that will be returned to reproduce naturally in their native habitats.

individual populations, but may require further research specifically for populations of southern California steelhead.

3. Whether a population is likely to be viable is another key considering in determining the proper timing of a conservation hatchery. In particular, information about population size, population growth rate, spatial structure, and diversity provide an indication of the sort of extinction risk a species faces. Generally, small populations have a higher risk of extinction than larger populations. With regard to the endangered Southern California Steelhead DPS, evidence indicates the populations are at high risk of extinction and are not currently viable. A numerical population viability threshold of 4,150 steelhead (adults) per year has been estimated, yet the available information suggests the actual number of adults in the population is considerably lower than the viability threshold.

4. Finally, a population exhibiting any of the characteristics noted above that is threatened with imminent extirpation as a result of anthropogenic activities, natural catastrophic events such as wildfire or massive sedimentation, or a combination of the two, may be preserved by the temporary placement of representatives of such a population in a conservation hatchery, or other secure location.

13.5.3 Numerical Thresholds

Thresholds of numerical abundance have been proposed as a means for preventing population and genetic extinction (including the potential loss of genetic diversity due to small population size) and, in turn, for knowing when a conservation hatchery should be started. Although a detailed review of the methods for arriving at an appropriate numerical threshold is beyond the scope of this section, the numerical thresholds are generally based on estimates for maintaining N_e, and the computation takes into account the average effective breeders per year and the generation time or average age of spawners. It is also suggested that consideration be given to the number of individuals that would be removed from the population for propagation in the conservation hatchery (i.e., the numerical effects of removing fish from the wild for propagation). Generally, populations with a number of breeders that exceeds the estimated N_e are suggested to be able to maintain equilibrium levels of genetic diversity through the minimization of losses due to genetic drift. By contrast, a population with a number of breeders that is less than N_e suggests that artificial propagation be considered.

13.5.4 Assessing Cost Effectiveness of Recovery Actions

To recover an endangered population of steelhead trout, one must somehow allocate scarce dollars (or other resources) to this array of habitats and stressors. This requires a common currency by which to compare various options, both prospectively and retrospectively.

The most pressing recovery need is to improve the population growth rate. Mean growth rate is the average number of adults per adult in the previous generation. A useful common currency for comparing recovery actions is their cost-efficiency with respect to growth rate. This is defined as the improvement in growth rate per unit of recovery expenditure, and can be parsed into three separate components (Baxter *et al*., 2006): 1) the cost of a recovery action—for example, the cost of

restoring 2 km of juvenile creek habitat; 2) some measure of the quantity or quality of habitat - typically this improvement should be measurable as some form of change in the physical structure or dynamics of habitat, such as a change in mean August streamflow or as additional kilometers of stream accessible to migrating fish; and 3) a vital rate—survival, fecundity—of a particular steelhead life stage. Thus, to get an idea of the effectiveness of a recovery action, one must monitor the vital rates of the steelhead life stages affected by the recovery action. The *responsiveness* of population growth rate to a given improvement in survival or fecundity is also called sensitivity in the literature, and is important because responsiveness can differ strikingly across different life stages, so that a similar improvement in survival of two different life stages can have rather different effects on population growth. Estimating the responsiveness requires long-term tracking of annual run size.

13.5.4.1 Marginal Cost

The marginal cost is the unit cost of a achieving some desired change in habitat condition, or some other desired trait of the environment or management regime. In general this component is already being actively estimated in much of California, under the labels of effectiveness monitoring and validation monitoring. However, to adapt the results of this monitoring to estimating the cost efficiency in terms of the fish, the change-in-condition terms (quality or quantity of habitat) must translate—that is they must have comparable interpretation in the effectiveness monitoring and in the experiments (described below) that would be used to estimate effectiveness of the action.

13.5.4.2 Effectiveness

Effectiveness is the response of a vital rate (usually survival) to a change in habitat condition, removal of a stressor, or some other physical change produced by a recovery action. Generally, effectiveness would need to be estimated by experiments—either by controlled, stand-alone field experiments; or by incorporating habitat-specific monitoring into a general monitoring program, in such a way that one can estimate the difference in vital rates in and out of a restored area or a management regime. An example of the latter can be found in Wilson (2003) who, in the context of a sensitivity analysis, compared the effectiveness of smolt migration through Columbia River dams, vs. artificially transporting the smolts using trucks (See also Kareiva *et al*., 2000).

In practice, experiments are expensive and one cannot conduct them for all improvements of habitat that might be proposed. It is sensible to set priorities. This is straightforward, once one has enough monitoring data to estimate the responsiveness of the population to each life-history stage. For example, if it was found that population growth responds more strongly to an improvement in the survival of smolts (downstream migrants), compared to survival of fry (newly hatched juveniles), then you might decide to prioritize experiments that test ways to improve the survival of smolts.

13.5.4.3 Responsiveness

Responsiveness (change in mean growth rate as a function of a change in survival or fecundity) is generally approximated as the partial derivative known as *sensitivity* in the scientific literature. There is a large literature on estimating sensitivity, and the related quantity known as elasticity; a useful entry to the literature is de Kroon *et al*. (2000). Some key points are:

- The method requires estimates for the mean vital rates for each life stage (survival, fecundity, smolting probability, and spawning probability), and these must be assembled into a matrix model that describes the life cycle of the fish. Estimating the vital rates requires monitoring data—for at least a sufficient number of years to obtain credible estimates of mean rates.

- A vital rate may have high responsiveness but little room for improvement—for example growth rate may be responsive to adult survival, but adult survival might already be, say, 90% and thus offer little room for improvement (but great scope for deterioration, with large effects on growth). In such cases recovery actions would have to focus on life stages of lower responsiveness but greater scope for improvement.

- The substitution of the partial derivative for the difference operator ($X_{before} - X_{after}$) involves a linear approximation of a non-linear response. In practice this appears to be a reasonable assumption when comparing individual actions (each impacting a single life stage) (de Kroon *et al.*, 2000). However, a more sophisticated goal is to assemble an array of actions (impacting an array of life stages) in order to achieve a particular level of improved population growth. In such cases the non-linearities may become more pronounced (Hodgson and Townley, 2004), and indeed one could view these non-linearities as synergies (non-additive effects) that can be optimized in some sense. In this case, robust control theory can be applied to the problem; an entry to the literature is Hodgson and Townley (2004).

- The most common methods ignore the variation of, and density dependence in, the vital rates. They are thus approximations of the true sensitivities.

13.5.4.4 Omissions

The focus so far has been on improving the mean growth rate of a population. This should reduce extinction risk by increasing both the population's size and its resiliency. A third way to reduce risk, not yet addressed, is to reduce the variation that the growth rate exhibits over time. In principle the concepts of responsiveness, effectiveness and cost efficiency can be applied to variation in growth rates as well as to its long-term mean. In practice, the quantitative tools have not been developed yet (but see Fujiwara, 2007).

A qualitative solution is to implement recovery actions that promote life-history diversity and habitat diversity. The risk of focusing exclusively on growth-efficiency is that certain habitat/life-stage combinations may promote sustained population growth in most years but also be vulnerable to occasional catastrophic failures. An example of such a combination is the use of lagoon habitat by young-of-year steelhead. Evidence suggests that lagoon-reared steelhead usually contribute disproportionately to adult runs, compared to stream-reared steelhead (Bond, 2006), but observation also suggests that occasionally a year class experiences complete mortality due to lagoon breaching. A complete focus on growth-efficiency would probably identify the importance of lagoon-reared fish but not their vulnerability, and thus not the stabilizing influence of stream reared fish.

13.5.4.5 Summary

A common currency for comparing recovery activities is a salmon population's growth-efficiency under various recovery scenarios. Growth efficiency is the change in population growth rate per unit expenditure for a specific recovery activity. The net growth efficiency of a combination of activities can also be estimated, but requires advanced techniques. Using growth efficiency for decision-making entails four key concepts: Sensitivity of population growth to a given vital rate of the fish; the scope for improvement in a vital rate; the efficacy of a given environmental change in improving the vital rate; and finally, the implementation cost of changing the environment. Two other key ingredients are 1) population monitoring data sufficient to estimate the sensitivities and experiments to determine the efficacy of recovery actions. The overall approach described here focuses on increasing the population growth rate, but another worthy goal is to decrease the variation in the growth rate over time. Scientific tools for achieving efficiency in this second-order goal are only partially developed, but qualitative approaches—in which one secures alternative life-history pathways—will frequently be sufficient.

14. Implementation by NMFS

"You are capable of more than you know. Choose a goal that seems right for you and strive to be the best, however hard the path. Aim high. Behave honorably. Prepare to be alone at times, and to endure failure. Persist! The world needs all you can give."

Edward O. Wilson

14.1 INTEGRATION OF RECOVERY INTO NMFS ACTIONS

NMFS must formally incorporate the recovery plans within its daily tasks and decision-making, including the actions identified in the DPS-wide Recovery Action narratives and the Recovery Action summaries for each BPG. All of NMMS' missions can be accomplished with due consideration to the needs of listed salmon and steelhead. If NMFS is to promote species and ecosystem conservation (and meet its own obligations under section 7(a)(1) of the ESA), then means of incorporating recovery goals and actions must be incorporated into all of the programs and actions we administer and implement. This includes, for example, listing reviews and critical habitat designations under ESA section 4, ESA consultations under section 7, and permit actions under ESA section 10.

Implementation of the recovery plan by NMFS will take many forms and is generally and specifically described in the NMFS PRD Strategic Plan 2006 (Appendix E). The Recovery Planning Guidance (NMFS 2006) also outlines how NMFS shall cooperate with other agencies regarding plan implementation. These documents, in addition to the ESA, shall be used by NMFS to set the framework and environment for plan implementation. The PRD Strategic Plan asserts that species conservation (in implementing recovery plans) by NMFS will be more strategic and proactive, rather than reactive. To maximize existing resources with workload issues and limited budgets, the PRD Strategic Plan champions organizational changes and shifts in workload priorities to focus efforts towards "those activities or areas that have biologically significant beneficial or adverse impacts on species and ecosystem recovery" (NMFS 2006). The resultant shift will reduce NMFS engagement on those activities or projects not significant to species and ecosystem recovery.

NMFS actions to promote and implement recovery planning shall include:

1. Formalizing recovery planning goals on a program-wide basis to prioritize work load allocation and decision-making (to include developing the mechanisms to make implementation, *e.g.*, restoration, possible).
2. Conducting an aggressive outreach and education program.

3. Facilitating a consistent framework for research, monitoring, and adaptive management that can directly inform recovery objectives and goals.

4. Establishing an implementation tracking system that is adaptive and pertinent to annual reporting for the Government Performance and Results Act, Bi-Annual Recovery Reports to Congress and 5-Year Reviews of each species listing status.

14.1.1 Work with Constituents

Successful implementation of recovery plans will require the efforts and resources of many entities, from federal agencies to the individual contributions of members of the public. NMFS commits to working cooperatively with other individuals and agencies on implementation of recovery actions and to encourage other federal agencies to implement the actions for which they have responsibility or authority. The benefits of a successful plan to the species and the currently regulated communities are immense, but the costs can be counted in time, money, and changed behaviors. NMFS is committed to using recovery plans as the guiding mechanism for its daily endeavors and can directly implement some of the actions called for in the plans. However, our primary role in plan implementation will be to champion the recovery strategy and provide the needed technical information and expertise to other entities implementing the plan or contemplating actions that may impact the species' chances of recovery.

NMFS is engaged in outreach to various constituencies where we provide technical assistance regarding listed salmon, their habitat needs, and various life-history requirements. Developing partnerships through providing technical assistance will be critical for recovery. Our outreach efforts will need to increase both towards those constituencies with which we already engage and to expanded sets of constituencies including communities, resource groups, and Federal and State legislative representatives. Through this role NMFS shall focus efforts in key areas critical for recovery through the following actions:

- ❑ Work to assure funding and staff for full enforcement of laws, codes, regulations and ordinances across the Southern California steelhead DPS.

- ❑ Develop outreach and educational materials to change attitudes and action of the general public to provide recovery benefits.

14.1.2 Coordination with other NMFS Divisions

Other divisions within NOAA can contribute significantly to recovery. NMFS PRD staff will coordinate closely with the SWFSC, Habitat Conservation Division, and NOAA Restoration Center to assist in the development, review and funding of restoration projects in primary areas.

14.2 ONGOING REGULATORY PRACTICES

The ESA provides NMFS various tools for first protecting and then recovering listed species. The ESA focuses on first identifying species and ecosystems in danger of immediate or foreseeable extinction or destruction and protecting them as their condition warrants. Then, the ESA focuses on the prevention of further declines in their condition through the consultation provisions of

section 7(a)(2), habitat protection and enhancement provisions of sections 4 and 5, take prohibitions through sections 4(d) and 9, cooperation with the state(s) in which these species are found (section 6) and needed research and enhancement as well as conservation of species taken by non-federal actions through section 10. Ultimately, the ESA focuses on the conservation (commonly equated with the term recovery) of these species and ecosystems through the recovery planning provisions of section 4, cooperation with States in section 6, and direction to all federal agencies to conserve species in section 7(a)(1).

In the case of listed salmon and steelhead in California, NMFS has already used the listing and designation of critical habitat provisions to protect the current populations of these species. For the past two decades, NMFS has also worked closely with federal agencies and private landowners pursuant to sections 7(a)(2) and 10(a)(1) of the ESA to avoid and minimize additional harm to these species during the course of land and water-use activities. Significant benefits have already accrued to these listed species from changes in land and water-use practices. Unfortunately, in many areas, salmon and steelhead populations continue to decline. The development and implementation of recovery plans has a greater scope and objective than the project-by-project focus of most section 7 and 10 efforts, however. NMFS intends to use this broader perspective to effect more significant and focused beneficial change for salmon and steelhead. In addition, NMFS commits to implement every action within this recovery plan for which it has authority.

The following sections describe the methods NMFS intends to use when implementing various sections of the ESA. These methods are intended to institutionalize the recovery plans in the daily efforts and decision-making at NMFS in the Southwest Region. Of necessity, some of these methods address the urgent issues of staffing and workload that NMFS faces. As a result, our commitment to implementing recovery plans extends to the ways in which we prioritize the many requests for consultations and permits we receive.

14.2.1 ESA Section 4

Section 4 provides the mechanisms to list new species as threatened or endangered, designate critical habitat, develop protective regulations for threatened species, and to develop recovery plans. NMFS intends on using our recovery strategy, recovery criteria and recommended recovery actions to revise the Southern California steelhead DPS critical habitat designation as needed.

14.2.2 ESA Section 5

Section 5 is a program that applies to land acquisition with respect to the National Forest System. Four National Forests (Los Padres, Angeles, Cleveland and San Bernardino) are present within the range of Southern California steelhead. As funds are available, section 5 could be used to acquire important habitat areas for the purpose of protecting habitat features and functions needed to support the expression of diversity and spatial structure in the species.

14.2.3 ESA Section 6

Section 6 describes protocols for consultation and agreements between NMFS and the states for the purpose of conserving threatened or endangered species. California does not currently have a section 6 agreement with NMFS.

As another means of providing funding to the states, Congress established the Pacific Coastal Salmon Recovery Fund (PCSRF) to contribute to the restoration and conservation of Pacific salmon and steelhead populations and their habitats. The states of Washington, Oregon, California, Idaho, and Alaska, and the Pacific Coastal and Columbia River tribes receive PCSRF appropriations from NMFS each year. The fund supplements existing state, tribal, and local programs to foster development of Federal-state-tribal-local partnerships in salmon and steelhead recovery and conservation. NMFS has established memoranda of understanding (MOU) with the states of Washington, Oregon, California, Idaho, and Alaska, and with three tribal commissions on behalf of 28 Indian tribes. The MOUs establish criteria and processes for funding priority PCSRF projects.

For as long as these funds are available to the State of California, NMFS intends on working with the State to ensure the Southern California steelhead recovery strategy and priorities are included in the considerations of funding for projects. NMFS also intends on using PCSRF reports as a mechanism to highlight those areas and actions where PCSRF funds have been used to implement needed recovery actions that might not otherwise occur in the absence of PCSRF funds.

14.2.4 ESA Section 7

14.2.4.1 Section 7(a) (1)

Section 7(a)(1) provides that all Federal agencies shall "…in consultation with and with the assistance of the Secretary, utilize their authorities in furtherance of the purposes of this Act by carrying out programs for the conservation of endangered species…". Section 7(a)(1) provides that Federal agencies give the conservation of endangered species a high priority. To date, most Federal agencies have not complied with the section 7(a)(1) requirement to develop conservation programs for Southern California steelhead. To prompt Federal agencies to develop conservation programs, NMFS shall:

- ❑ Prepare, and send after recovery plan approval, a letter to all other appropriate Federal agencies outlining section 7(a)(1) obligations and meet with these agencies to discuss listed steelhead conservation and recovery priorities.
- ❑ Incorporate recovery actions in formal consultations as Conservation Recommendations.
- ❑ Encourage meaningful and focused mitigation, in alignment with recovery goals for restoration and threat abatement, for all actions that incidentally take steelhead or affect their habitat.
- ❑ Encourage Federal partners to include recovery actions in project proposals.

14.2.4.2 Section 7(a) (2)

The purpose of section 7(a)(2) is to "insure that any action authorized, funded, or carried out by [a Federal agency] is not likely to jeopardize the continued existence of any [listed species] or result in the destruction or adverse modification of [a listed species' critical habitat]." Federal agencies request interagency consultation with NMFS when they determine an action may affect a listed species or its critical habitat. NMFS then conducts an analysis of potential effects of the action. In the process of consultation, NMFS currently expends considerable effort to assist agencies in avoiding and minimizing the potential effects of proposed actions, and to ensure agency actions do not jeopardize a species or destroy or degrade habitat. Whether the action has a negative effect on the likelihood of the species recovering is considered as part of the analysis; the action may not preclude recovery, but the action is not required to contribute to recovering the species, although it may contribute to recovery. As a result, these consultations have helped avoid and minimize direct take but have done little to contribute to recovery of Southern California steelhead DPS.

Because section 7(a)(2) applies only to Federal actions, its applications are limited only to those areas and actions with federal ownership, oversight, or funding. In the Southern California steelhead DPS land ownership varies across the watersheds from areas with significant levels of public ownership to areas almost entirely privately owned. Most of the land use practices on private ownership do not trigger interagency consultation.

Currently, NMFS expends most of its staff time and resources on conducting section 7 consultations. Implementation of the Recovery Plan will require improvements to the process and application of section 7(a)(2) consultation requirements across the DPS. In order to devote more resources towards recovery action implementation and to ensure section 7(a)(2) consultations are effective, NMFS will utilize its authorities to:

- ❑ Use recovery criteria, objectives, and ongoing monitoring efforts as a reference point to determine effects of proposed actions on the likelihood of species' recovery.
- ❑ Utilize information on threats to species recovery and needed actions to address such threats when evaluating the impacts of proposed Federal actions on Southern California steelhead.
- ❑ Place high priority on consultations for actions that implement the recovery strategy or specific recovery actions.
- ❑ Develop and maintain databases to track the amount of incidental take authorized and effectiveness of conservation and mitigation measures.
- ❑ Incorporate recovery actions in formal consultations as Reasonable and Prudent Measures, Reasonable and Prudent Alternatives, and Conservation Recommendations.
- ❑ Focus staff priorities towards section 7 compliance in watersheds designated as a primary focus for recovery and direct efforts to recovery implementation.
- ❑ Streamline consultations for those actions with little or no effect on recovery areas or priorities. Develop streamlined programmatic approaches for those actions that do not pose a threat to the survival and recovery of the species.

- Apply the VSP framework and recovery priorities to evaluate population and area importance in jeopardy and adverse modification analysis.

Within this framework NMFS will utilize its authorities to encourage:

- The Federal Emergency Management Agency (FEMA) to fund upgrades for flood-damaged facilities to meet the requirements of the ESA and facilitate recovery.
- The Environmental Protection Agency (EPA) to prioritize actions on pesticides known to be toxic to fish and/or are likely to be found in fish habitat; and to take protective actions, such as restrictions on pesticide use near water.
- Development of section 7 Conservation Recommendations to help prioritize Federal funding towards recovery actions (NFMS, USFWS, NRCS, EPA, *etc.*) during formal consultations.
- All Federal agencies who designate a non-Federal representative to conduct informal consultation or prepare a biological assessment to ensure the associated documentation comports to 50 CFR 402.14(c) prior to initiating consultations with NMFS. Compliance with these requirements is expected to increase consultation effectiveness and timeliness.
- All Federal agencies, or their designated representatives, to field review projects and actions upon project completion to determine whether or not the projects were implemented as planned and approved. Encourage all Federal agencies, or their designated representatives to report the initial findings of field review to NMFS.
- Federal agencies to coordinate and develop programmatic incidental take authorization for activities that contribute to the recovery of Southern California steelhead, to streamline their permitting processes.

14.2.5 ESA Section 9

Section 9 prohibits any person from harming members of listed species including direct forms of harm such as killing an individual, or indirect forms such as destruction of habitat where individuals rear or spawn. The recovery plan will assist NMFS' Enforcement personnel by targeting focus watersheds essential for species recovery. NMFS PRD staff will work closely with NMFS Enforcement regarding the identification of threats and other activities believed to place steelhead at high risk of take. Actions will include the following:

- NMFS will conduct outreach and will provide Enforcement a summary of the recovery priorities and threats.
- NMFS will prioritize those actions and areas deemed of greatest threat or importance for focused efforts to halt illegal take of listed species.
- NMFS will develop a plan to outline responsibilities and priorities between PRD and Enforcement to ensure activities by NMFS staff, when supporting Enforcement, are focused on the highest recovery priorities.
- When take has occurred in a primary focus area, NMFS PRD will work with NMFS Enforcement, to the extent feasible, with the development of a take statement.

14.2.6 ESA Section 10

Section 10(a)(1)(A) provides permits for the authorization of take of listed species for scientific research purposes, or to enhance the propagation or survival of listed species. Typically NMFS has authorized conservation hatcheries and research activities under section 10(a)(1)(A). Section 10(a)(1)(B) provides permits for otherwise lawful activities that incidentally take listed species. Habitat conservation plans minimizing and mitigating the incidental take of listed species from non-federal activities are prepared under section 10(a)(1)(B). Currently, both processes take a long time to implement and recovery plans have not been available to guide priorities for permit issuance. To improve the section 10 authorization process, NMFS will utilize its authorities in the following ways:

14.2.6.1 Section 10(a) (1) (A) Research Permits

- ❑ Prioritize permit applications that address identified research and monitoring needs in the recovery plan. Develop streamlined approaches to permitting similar types of research or research programs in primary focus areas.
- ❑ Evaluate all proposed activities against the identified threats, recovery strategy, and recovery actions identified in the plan.
- ❑ Develop and maintain databases to track the amount of take authorized and the effectiveness of conservation and mitigation measures.

14.2.6.2 Section 10(a) (1) (B) Habitat Conservation Plans

- ❑ Place the highest priority on cooperation and assistance to landowners proposing activities or programs designed to achieve recovery objectives.
- ❑ Prioritize those areas and actions where threats abatement has the potential to provide the most significant contribution to species recovery based on the threats assessment developed and updated as part of the Recovery Plan.
- ❑ Standardize monitoring methods in HCPs to identified monitoring and effectiveness needs identified by the TRT and Recovery Plan. Consistent data collection techniques and the ability to compare similar data sets over space and time will set the framework for tracking recovery progress and conducting 5-year status reviews.

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APPENDIX A

Glossary And Abbreviations

Anadromous Fraction. The proportion of an *O. mykiss* population that exhibit the anadromous life history, as opposed to the freshwater-resident life history.

Life-History Crossover. Anadromous *O. mykiss* among the progeny of freshwater-resident *O. mykiss*, and/or vice versa.

Life-History Polymorphism. Co-occurrence of the anadromous and resident forms.

Phenotypic Plasticity. The ability of an individual fish to adopt either the anadromous or freshwater-resident life history, depending on environmental cues or influences.

Steelhead Nursery Habitat. Freshwater habitat that disproportionately generates recruits to the anadromous adult component of the species.

Rainbow Trout Nursery Habitat. Freshwater habitat that disproportionately generates recruits to the freshwater-resident adult component of the species.

Estuary. The aquatic interface between a freshwater stream system and the ocean.

Seasonal Lagoon. An estuary that becomes separated from the ocean by a sandbar barrier for part of the year.

Ephemeral Streams. Streams that flow briefly after rainstorms.

Intermittent Streams. Streams that flow for some, but not all, of the year in question.

Sub-Perennial Streams. Streams that flowed all of the year in question; but not necessarily all year, every year.

Perennial Streams. Streams that flow all year, every year.

Perennial Reaches. Individual reaches that flow all of the year in question, perhaps embedded within an intermittent stream.

AFRP	Anadromous Fish Restoration Program
CAMP	Comprehensive Assessment and Monitoring Program
CDFG	California Department of Fish and Game
CESA	California Endangered Species Act
CMARP	Comprehensive Monitoring Assessment and Research Program
cm	centimeters
cm/sec	centimeters per second
CWT	Coded Wire Tag
DPS	Distinct Population Segment
DWR	Department of Water Resources
ESA	Federal Endangered Species Act
ESU	Evolutionarily Significant Unit
FL	fork length
ft/sec	feet per second
HCP	Habitat Conservation Plan
m	meters
mi^2	square miles
m/sec	millimeters per second
mm	millimeters
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
PCSRF	Pacific Coastal Salmon Recovery Fund
PVA	Population Viability Analyses
RWQC	Regional Water Quality Control
BOR	Bureau of Reclamation
RM	River Mile
RST	Rotary Screw Trap
SWP	State Water Project
TRT	Technical Recovery Team
USFWS	U.S. Fish and Wildlife Service
VSP	Viable Salmonid Population

APPENDIX B

Watershed rankings in the Southern California Steelhead DPS.[1] The ranking is based on the amount of potential habitat as in indicator for potential viability. (See Boughton *et al*. 2006).

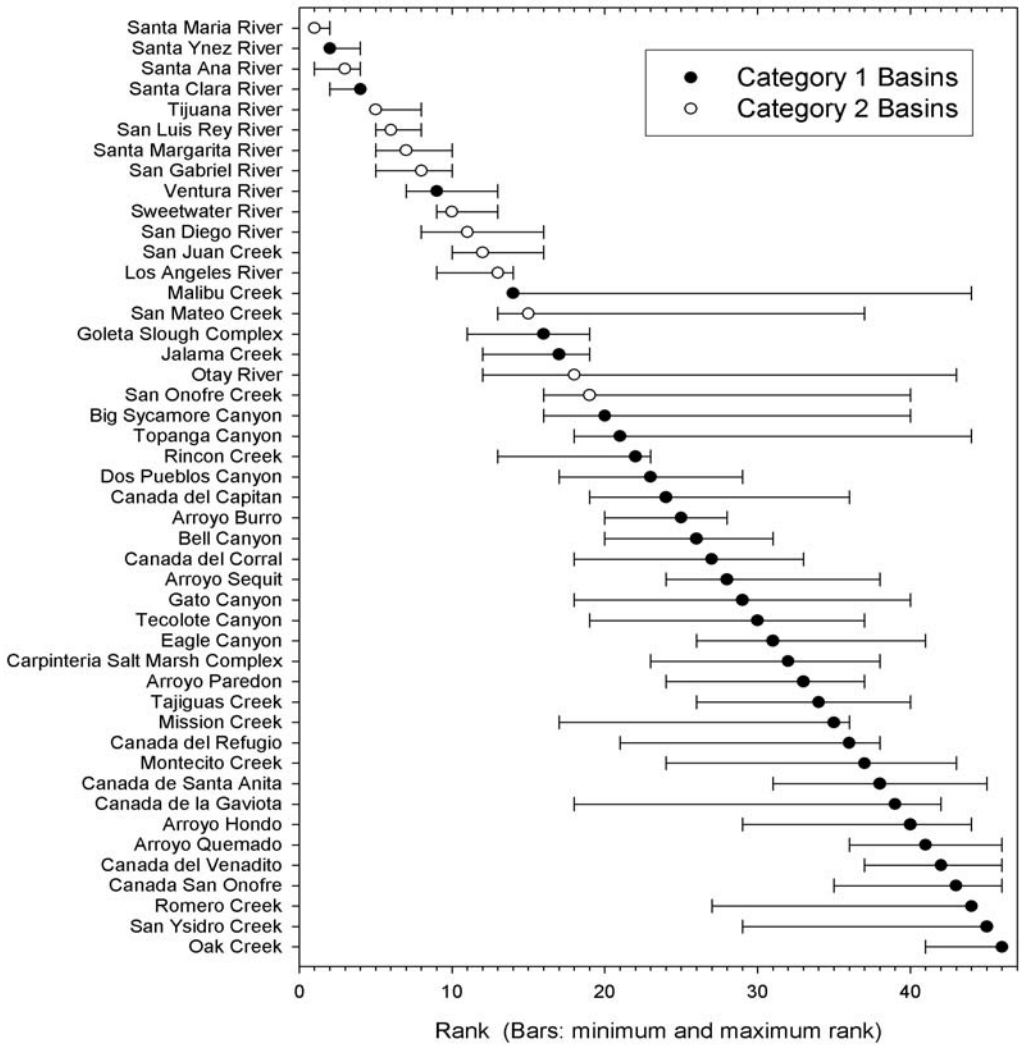

[1] *Category 1 Watersheds are Watersheds which experience regular winter flows to the ocean and therefore provide access to freshwater spawning areas. Category 2 Watersheds (*i.e.*, all large Watersheds within the southern portion of the Southern California Steelhead DPS, and the Santa Maria River) experience irregular winter flows to the ocean, even in an unimpaired state. Bars indicate the range of ranks (minimum and maximum) for 48 variant models. (See Boughton* et al*. 2006).*

APPENDIX C

COMPOSITION OF SOUTHERN CALIFORNIA COAST STEELHEAD BPGs

(See Boughton *et al*. 2006)

Biogeographic Group	Member Populations (ordered north to south)
Monte Arido Highlands	Santa Maria River, Santa Ynez River, Ventura River, Santa Clara River.
Conception Coast[1]	Jalama Creek, Cañada de Santa Anita, Cañada de la Gaviota, Cañada San Onofre, Arroyo Hondo, Arroyo Quemado, Tajiguas Creek, Cañada del Refugio, Cañada del Venadito, Cañada del Corral, Cañada del Capitan, Gato Canyon, Dos Pueblos Canyon, Eagle Canyon, Tecolote Canyon, Bell Canyon, Goleta Slough Complex, Arroyo Burro, Mission Creek, Montecito Creek, Oak Creek, San Ysidro Creek, Romero Creek, Arroyo Paredon, Carpinteria Salt Marsh Complex, Carpinteria Creek, Rincon Creek.
Santa Monica Mtns[1]	Big Sycamore Canyon, Arroyo Sequit, Malibu Creek, Topanga Canyon.
Mojave Rim	Los Angeles River, San Gabriel River, Santa Ana River (multiple subpopulations).
Santa Catalina Gulf Coast	San Juan Creek, San Mateo Creek, San Onofre Creek, Santa Margarita River, San Luis Rey River, San Diego River, Sweetwater River, Otay River, Tijuana River.

[1] *Population delineation in these groups may be split too finely if there is significant dispersal of fish among neighboring coastal Watersheds. For discussion see Boughton et al. (2006).*

APPENDIX D

SOUTHERN CALIFORNIA STEELHEAD RECOVERY PLANNING AREA THREATS ASSESSMENT (CAP WORKBOOK) METHODOLOGY

Introduction

The Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service (NMFS) contracted with Hunt & Associates Biological Consulting Services to provide technical support in developing Recovery Plans for *Oncorhynchus mykiss* populations in the Southern California Coast Steelhead Recovery Planning Area. Hunt & Associates was tasked with reviewing existing information on *O. mykiss* habitat conditions, assessing the magnitude and extent of threats to *O. mykiss* and their habitats, and developing recovery actions across the Southern California Coast Recover Planning Area. This document summarizes the methodology used to assess *O. mykiss* threats and sources of threats in Southern California coastal watersheds from the Santa Maria watershed of Santa Barbara County southward to the Tijuana River watershed in San Diego County. Specifically, this document details the use of modified Conservation Action Planning Workbooks to assess watershed and life-stage specific threats and threat sources for Southern California Coast *O. mykiss*. CAP workbooks have been developed previously for salmonid threat assessment and recovery planning for southern Oregon and northern California coast coho salmon as well as south-central and southern California steelhead. However, previous *O. mykiss* threat assessment workbooks, described in Kier Associates and National Marine Fisheries Service (2008), were not inclusive of all watersheds within the Southern California Coast Recovery Planning Area or all available environmental data and information. The CAP workbook analysis results presented in this recovery plan, therefore, builds on information in these earlier versions.

Methods

The Conservation Action Planning (CAP) Workbook is a database tool developed by The Nature Conservancy to identify conservation targets, assess existing habitat conditions, and identify management issues for target populations. CAP is an Microsoft Excel-based tool that facilitates the assessment of aquatic habitat quality and human-caused threats to that habitat. Once data are entered, the CAP workbook then links the observed aquatic habitat conditions to watershed conditions, provides a prioritized list of threats, and provides a summary of overall watershed health. The CAP Workbooks can be used to organize and evaluate large amounts of information on current *O. mykiss* habitat conditions and threats in selected watersheds. The CAP Workbook methodology provides a number of useful features in assessing the magnitude and extent of threats to *O. mykiss* and their habitats in that it:

- Incorporates both quantitative and qualitative (*e.g.*, professional judgment) measures of existing habitat conditions;
- Is an objective, consistent tool for tracking changes in the status of each conservation target (i.e., *O. mykiss* life-history stage) over time and between watersheds;
- Provides an overall assessment of a watershed's "health" or viability and objective comparisons to other watersheds;

- Focuses recovery actions by identifying past, current, and potential threats to *O. mykiss* and their habitats;
- Becomes a central repository for documenting and updating knowledge and assumptions about existing conditions; and
- Creates a foundation upon which recovery actions can be tracked and up-dated, based on changing current conditions.

Twenty-two coastal watersheds, encompassing 46 drainages were identified as supporting historical and extant *O. mykiss* populations within the SCS Recovery Area by Boughton *et al.* (2006), and were selected for threats assessment analysis. A separate CAP Workbook was created for each of the 46 component drainages (Table D-1). Information on existing *O. mykiss* habitat conditions in each watershed was gathered from a broad range of published and un-published materials, including, peer-reviewed scientific publications, technical reports, federal, state, and local planning documents, EIS/EIRs, management plans, passage barrier assessments, habitat evaluations, and field surveys, as well as information provided by NOAA-NMFS staff, and stakeholders and other interested parties at a series of public workshops held in 2007. These sources are listed in the bibliography at the end of this document.

The CAP Workbook process uses available information in an explicit, consistent, and transparent way, to assess current habitat conditions. The CAP Workbook allows the user to input quantitative as well as qualitative (including best professional judgment) information in order to determine what existing conditions are and what healthy targets should look like. The Workbook is iterative and should be updated as additional information becomes available.

Conservation Targets: Specific "conservation targets" for analysis within a CAP workbook must be identified by the user. The conservation targets in this case were *O. mykiss* life-history stages: egg, fry, smolt, and adult. A more general conservation target, "Multiple Life Stages", was also established to allow landscape-scale land use and habitat assessment, based on information derived from GIS-based analysis of entire watersheds.

Key Ecological Attributes (KEAs): Assessing the "viability" or "health" of a particular conservation target (i.e., life-history stage) required identifying "Key Ecological Attributes" (KEA) for each target. Specific KEAs are aspects of the conservation target's biology or ecology such that if missing or severely degraded, would result in loss of that target over time. KEAs, such as substrate quality, non-native species, food availability, water quality, *etc.*, were identified for each target and measurable indicators, such as turbidity, water temperature, aquatic invertebrate species richness, presence or absence of non-native predators, miles of road/square mile of watershed, *etc.*, were identified in order to characterize existing conditions in the component watersheds. All KEAs were grouped into three categories:

- *Size*: target abundance (*e.g.*, number of adult *O. mykiss*);
- *Condition*: a measure of the biological composition, structure, and biotic interactions that characterize the target's occurrence (i.e., generally a local measure of habitat quality or composition), and;

Table D-1. Southern California Steelhead Recovery Planning Area Component Biogeographic Population Groups, Watersheds, and Corresponding CAP Workbooks.

BPG	Watershed	CAP Workbook
Monte Arido Highlands	Santa Maria River	Mainstem Santa Maria River
		Cuyama River
		Sisquoc River
	Santa Ynez River	Mainstem Santa Ynez River (lower, middle, and upper)
	Ventura River	Mainstem Ventura River
		Coyote Creek
		Mainstem Matilija Creek
		North Fork Matilija Creek
		San Antonio Creek
	Santa Clara River	Mainstem Santa Clara River
		Santa Paula Creek
		Sespe Creek
		Piru Creek
Conception Coast	Jalama Creek	Jalama Creek
	Canada de Santa Anita	Canada de Santa Anita
	Gaviota Creek	Gaviota Creek
	Arroyo Hondo Creek	Arroyo Hondo Creek
	Tecolote Creek	Tecolote Creek
	Goleta Slough	San Jose, Atascadero, San Pedro & Maria Ygnacio creeks
	Mission Creek	Mission Creek
	Montecito Creek	Montecito Creek
	Carpinteria Creek	Carpinteria Creek
	Rincon Creek	Rincon Creek
Santa Monica Mountains	Big Sycamore Canyon Creek	Big Sycamore Canyon Creek
	Arroyo Sequit	Arroyo Sequit
	Malibu Creek	Malibu Creek
	Las Flores Canyon Creek	Las Flores Canyon Creek
	Topanga Canyon Creek	Topanga Canyon Creek
Mojave Rim	Los Angeles River	Mainstem Los Angeles River
		Arroyo Seco
	San Gabriel River	Mainstem San Gabriel River
		East Fork San Gabriel River
		West Fork San Gabriel River
	Santa Ana River	Mainstem Santa Ana River
		Lytle Creek
		Mill Creek
Santa Catalina Gulf Coast	San Juan River	San Juan River/Trabuco Creek
	San Mateo Creek	San Mateo Creek
	San Onofre Creek	San Onofre Creek
	Santa Margarita River	Santa Margarita River
	San Luis Rey River	San Luis Rey River
	San Dieguito River	San Dieguito River
	San Diego River	San Diego River
	Sweetwater River	Sweetwater River
	Otay River	Otay River
	Tijuana River	Tijuana River

- *Landscape Context*: an assessment of the target's environment (*i.e.*, landscape-scale processes, such as connectivity, accessibility of spawning habitat; hydrology).

Current Indicators: The range of variation found for each indicator was then subdivided into four somewhat subjective, but discrete, categories: "Poor", "Fair", "Good", or "Very Good". The current condition of a specific indicator, taken from a field measurement, literature source, or professional judgment, is assigned to one of these four discrete rating categories. A description of indicators used in the CAP steelhead analyses and the rationale for these indicators is available in Kier Associates and National Marine Fisheries Service (2008). Functionally; however, we assumed that there are essentially two states for an indicator as it relates to the target: 1) "poor-fair", in which the indicator exceeds or minimally meets the requirements for species survival and the population is in danger of extirpation, and 2) "good-very good", where habitat conditions are favorable for species persistence.

The CAP Workbook can use indicators at a local, regional, and landscape-scale. For example, land use indicators, such as density of roads per square mile of watershed, has been widely employed as a landscape-scale metric of watershed "health" for salmonids throughout the western United States (see Kier Associates and NMFS, 2008). These landscape-scale metrics were used in this threat assessment to overcome logistical and analytical problems inherent in local-scale metrics of *O. mykiss* habitat quality (*e.g.*, water temperature), that exhibit extreme spatial and temporal variation, which can lead to misinterpretations.

The goal of establishing measurable indicators in a number of instances was not possible with the current knowledge of existing habitat conditions in the component watersheds. For example, turbidity is known to be an important habitat indicator for *O. mykiss*. For the *O. mykiss* fry life stage, turbidity was defined as the "number of days turbidity exceeded 25 NTUs". Currently, there is little or no systematic and widespread collection of turbidity data in most of the subject watersheds drainages to permit a quantative assessment of this indicator. In these instances, subjective information, such as observations of mass wasting of slopes, descriptions of point and non-point sediment inputs, *etc.*, were used to qualitatively assess a current condition and rating for this indicator. Because the CAP Workbook analysis is iterative, results can be improved as better quantitative information becomes available.

Stresses and Sources of Stress (Threats): An important step in the CAP Workbook assessment, and the purpose of these analyses, is identification of a series of stresses to each *O. mykiss* life-history stage. These stresses are basically altered KEAs and directly affect the life-stage, *e.g.*, degraded hydrologic function, increased turbidity, presence of non-native predators, increased substrate embeddedness). Because of the lack of field derived information on specific habitat requirements (i.e., tolerances) and specific habitat conditions, the GIS-based surrogate variables used for the "Multiple Life Stages" conservation target actually are sources of stress, not direct stressors on *O. mykiss* life stages (*e.g.*, increased road density (a source of stress) contributes indirectly to increased turbidity (a direct stressor). The severity (very high, high, medium, or low) and geographic scope (very high, high, medium, and low) of each stress was determined through a review of existing information. The CAP Workbook then assigns an overall stress rank (very high, high, medium, or low) to that stress.

The CAP Workbook automatically inputs the overall rank of each stress into a table that relates the stress to a series of anthropogenic sources of stress (also called Threats) that have been identified by the user as relevant to that watershed (*e.g.*, roads, grazing practices, logging, recreational facilities, agricultural conversion of watershed lands, dams, groundwater extraction, in-channel mining, *etc.*). Each threat is ranked on the basis of its relative "contribution" (very high, high, medium, or low) and "irreversibility" (very high, high, medium, or low) to each stress (*e.g.*, increased turbidity). The CAP Workbook then ranks the threat (source of stress) as "Very High', "High", "Medium", or "Low" and inputs that rank into the next step of the assessment. This process is repeated for each conservation target (egg, fry, juvenile, smolt, and adult), as well as the "Multiple Life Stages" conservation target.

Summary of Threats: The CAP Workbook ranks the threat sources for each conservation target (*i.e.,* life-history stage) from the previous analysis into a "Summary of Threats" table that lists all the threat sources for all life-history stages and assigns a composite "Overall Threat Rank" to each threat source (*e.g.,* dams and surface water diversions), as well as an overall threat rank to that watershed for all threat sources combined. The Workbook derives a second table ("Stress Matrix") that shows the rank of each stress on each life-history stage. The final step in the steelhead CAP assessment is the derivation of a third table entitled, "Overall Viability Summary", that ranks the viability of each life-history stage and KEA category (size, condition, and landscape context) by calculating a composite rank of the current habitat indicators from the "Viability" table of the workbook, as well as an overall "Project Biodiversity Health Rank", which is a measure of watershed "health" based on current habitat conditions. The first and third summary tables proved the most useful in analyzing stresses and sources of stress to *O. mykiss* in the Southern California Coast Steelhead Recovery Planning Area.

*Data Gaps. T*he tables in the CAP Workbooks for the present study have numerous blank cells. Blank cells indicate a lack of available information. Watersheds that have been intensively studied have fewer blank cells than watersheds with few studies. In general, the level of available information on current watersheds conditions relevant to *O. mykiss*, with a few notable exceptions, decreased dramatically south of the Santa Monica Mountains (*e.g.,* the Mojave Rim Biogeographic Population Group watersheds and most of the Orange and San Diego county watersheds). However, an important feature of the CAP Workbook methodology is the ability to update the assessment as information becomes available.

The CAP Workbook analysis of Southern California *O. mykiss* prepared by Hunt & Associates was intended to build on those prepared previously by Kier Associates. Hunt & Associates' workbooks are based on review of a large number and broad range of ground-based *O. mykiss* surveys, habitat and barrier assessments, and other fieldwork, as well as the GIS-based indicators for the "Multiple Life History" target category developed by Kier Associates. Hunt & Associates developed CAP Workbooks for each of the 46 watersheds in the Southern California Coast Steelhead Recovery Planning Area. Kier Associates analyzed 31 of these watersheds, using the GIS-based regional indicators and a small number of point-data measurements (e.g., dissolved oxygen, water temperature, *etc.*). Kier Associates' workbooks are provided in a separate document (Kier Associates and NMFS, 2008).

Table D-2 compares the results of the two documents for watersheds in the Southern California Coast Steelhead Recovery Planning Area. It should be noted that the difference between a "poor" and "fair" habitat rating or a "good" and "very good" rating was often a matter of professional judgment and may not always represent ecologically important differences in habitat quality. Table 1 explains discrepancies between "poor-fair" and "good-very good" categories between the Hunt & Associates and Kier Associates CAP Workbook analyses.

Discrepancies typically could be explained by the type (point-data measurements) and the number of indicators used in the analysis by Kier Associates versus Hunt &Associates. As the number of indicators decreases, the relative weight given to each indicator in the analysis correspondingly increases, and if these indicators are based on point-data measurements, such as water temperature or dissolved oxygen, that exhibit extreme spatial and temporal variation, then different results can be obtained. Aside from these relatively few specific differences, the results of the two assessments closely agree.

Further refinement of individual threat severity and threat sources in specific watersheds was conducted for these threat assessments by using information from NOAA staff familiar with these watersheds to override certain final assessments.

Table D-2. Assessment of Overall Habitat Conditions for Steelhead in Component Watersheds in the Southern California Coast Steelhead Recovery Planning Area Between Two CAP Workbook Analyses*

WATERSHED	Steelhead Habitat Rating		Reasons for Discrepancy**
	Hunt & Associates	Kier Associates	
Santa Maria River			N/A
Santa Ynez River			fewer number of indicators used in the latter analyses
Ventura River			fewer number of indicators used in the latter analyses
Santa Clara River			N/A
Gaviota Creek			fewer number of indicators used in the latter analyses
Arroyo Hondo			Hunt & Associates rates passage barrier at Highway 101 as severe, but being re-designed for fish passage. Override function used to rate this relatively undisturbed watershed as "good"
Tecolote Creek			fewer number of indicators used in the latter analyses
Goleta Slough			fewer number of indicators used in the latter analyses
Mission Creek			fewer number of indicators used in the latter analyses
Montecito Creek			fewer number of indicators used in the latter analyses
Carpinteria Creek			fewer number of indicators used in the latter analyses
Rincon Creek			fewer number of indicators used in the latter analyses
Big Sycamore Creek			fewer number of indicators used in the latter analyses
Arroyo Sequit			fewer number of indicators used in the latter analyses
Malibu Creek			N/A
Las Flores Canyon Creek			N/A

Topanga Canyon Creek			N/A
Los Angeles River			N/A
San Gabriel River			N/A
Santa Ana River			N/A
San Juan/Trabuco Creek			N/A
San Mateo Creek			fewer number of indicators used in the latter analyses
San Onofre Creek			fewer number of indicators used in the latter analyses
Santa Margarita River			fewer number of indicators used in the latter analyses
San Luis Rey River			fewer number of indicators used in the latter analyses
San Dieguito River			fewer number of indicators used in the latter analyses
San Diego River			fewer number of indicators used in the latter analyses
Sweetwater River			fewer number of indicators used in the latter analyses
Otay River			fewer number of indicators used in the latter analyses
Tijuana River			fewer number of indicators used in the latter analyses

** Overall habitat condition rating taken from "Project Biodiversity Health Rank" rating in "Overall Viability Summary" table in Summary section of individual CAP Workbooks (composite rating of habitat conditions for all steelhead life-history stages combined). Watersheds analyzed only by Hunt & Associates are not shown.*

*** Pervasive discrepancies between Hunt * Associates vs. Kier Associates "poor" and "fair" categories here are due to fewer number of indicators used in the latter analyses.*

Key: dark green = very good conditions; light green = good conditions; yellow = fair conditions; red = poor conditions.

APPENDIX E

HABITAT RESTORATION COST REFERENCES FOR SALMON RECOVERY PLANNING

021296

NOAA Technical Memorandum NMFS

APRIL 2008

HABITAT RESTORATION COST REFERENCES FOR SALMON RECOVERY PLANNING

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NOAA-TM-NMFS-SWFSC-425

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
Southwest Fisheries Science Center

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HABITAT RESTORATION COST REFERENCES FOR SALMON RECOVERY PLANNING

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Introduction

The Endangered Species (ESA) requires that recovery plans for listed species include "estimates of the time required and the cost to carry out those measures needed to achieve the plan's goal and to achieve intermediate steps toward that goal" (ESA Section 4(f)(1)(B)(iiii)). The purpose of this report is to facilitate recovery planning for ESA-listed salmonid stocks in California by providing information on costs associated with habitat restoration activities relevant to their recovery.

Data from publicly available sources were used to obtain estimates of restoration cost. Ideally these estimates would be identifiable to a specific restoration activity (e.g., fish screen, culvert replacement), include life cycle project costs (e.g., planning, design, permitting, construction, monitoring, maintenance), and be relatable to the scale, scope and location of the project. However, sources vary in terms of the extent to which they provide such details. Most cost estimates originate from sources generally intended for purposes other than recovery planning (e.g., contract administration). Thus reported costs may be incomplete if, for instance, some aspects of restoration are not covered by the contract or if the work involves a match from another funding source. For projects involving multiple restoration activities, costs are more typically broken down by input (e.g., labor, materials) than by activity. Given the diverse factors that affect restoration costs (see Allen *et al.* 2004) and the lack of standardization in available project and cost data, a meta-analysis of project costs as they relate to project characteristics was not possible. However, some of the sources do provide insights into factors affecting costs; to the extent that such information is available, it is briefly summarized in the tables below.

Many of the projects discussed in this report were funded by the California Department of Fish and Game (CDFG) as part of the Fisheries Restoration Grants Program and (to a lesser extent) the Klamath River Restoration Grant Program. The report is thus approximately organized according to the restoration categories used by these two programs. Restoration activities covered by this report are as follows:

- Fish ladders (FL)
- Fish passage at stream crossings (FP) - culvert replacement/improvement
- Fish screening of diversions (SC)
- Instream barrier modification (HB) - modification of fish passage barriers in the stream channel and along the streambank (tidegates, sandbars, dams, other non-culvert barriers)
- Instream habitat restoration (HI) - enhancement of stream channel and streambank habitat (instream structures, spawning gravel supplementation, floodplain tributary reconnection, side channel reconnection, wetland/floodplain restoration, levee evaluation/repair/setback)
- Riparian restoration - restoration of area, including fencing, between the fence and middle of stream (e.g., livestock exclusion, revegetation)

- Streambank stabilization (HS) - stabilization of eroding, collapsing of otherwise de-stabilized banks
- Upland watershed restoration (HU) - largely pertains to upslope erosion control (e.g., road decommissioning/upgrade, landslide/gully stabilization, upslope planting)
- Tailwater management (TM)
- Water conservation (WC) - e.g., ditch lining, piping
- Water purchase/lease (WP)
- Habitat acquisition and conservation easement (HA)
- Monitoring status and trends (MD) - monitoring of baseline conditions and status/trends in habitat, watershed processes and/or populations.
- Monitoring watershed restoration (MO) - monitoring to determine if project treatments were constructed correctly and as planned, effectiveness monitoring to determine if restoration has produced desired habitat conditions and/or watershed processes, and validation monitoring to determine if hypothesized responses of habitat, watershed processes and/or populations to restoration were correct
- Watershed evaluation, assessment and planning (PL) - developing watershed plans with site-specific, prioritized recommendations for restoration of salmon/steelhead habitat. Includes partial assessments (e.g., road erosion surveys, stream surveys).
- Watershed organizational support and assistance (OR) - organizational support to local watershed groups and development/maintenance of databases that facilitate organizational aspects of restoration
- Cooperative fish rearing (RE)
- Water measuring devices (WD) - e.g., head gate
- Wildlife management (WM) - e.g., control of exotic species such as pike minnow
- Research (RES) - general research on productivity (e.g., life cycle monitoring/analysis), spatial structure (fish distribution surveys), genetic diversity (laboratory analysis of tissue samples), and estimation of abundance.

Restoration cost estimates were obtained by searching the published and gray literature, including the following:

- reports that provide actual or estimated costs associated with specific projects (e.g., grant proposals, contract reports),
- reports that provide average costs for multiple projects involving the same restoration activity,
- reports that describe “typical” costs associated with a particular restoration activity,
- cost guidelines associated with environmental improvement programs sponsored by entities such as the Natural Resources Conservation Service (NRCS),
- reports that use regression and other methods to relate project costs to selected project characteristics, and
- environmental impact statements that provide cost estimates for each of the restoration alternatives considered.

Only restoration cost estimates that met at least one of the following criteria are included in this report:

- Top priority for inclusion are cost estimates pertaining to restoration activities in California. However, examples from other states are also included (as available) for those activities where California examples are limited. A notable exception: Cost estimates developed by Evergreen Funding Consultants for restoration in Puget Sound (Evergreen 2003) are particularly instructive, as they cover a wide range of restoration activities, provide life cycle estimates of project costs, and demonstrate how costs vary with project characteristics. Thus all of Evergreen's cost estimates are included in this report - even when they pertain to activities where a fairly large number of California examples are also available.

- Cost estimates are generally more useful for recovery planning when related to the scale of restoration. Thus only cost estimates that are accompanied by a relevant measure of project scale (e.g., stream miles, acres of land) are included in this report.

- For most projects involving multiple types of restoration activities, data sources typically do not provide a cost breakdown by activity. Given the focus of this report on activity-specific costs, most of the cost estimates were by necessity obtained from single-activity projects. However, to ensure some representation of multi-activity projects, some projects involving several closely related activities (e.g., fencing + stockwater system, fish ladder + screen) conducted at the same site are included in this report. Also, cost summaries provided by the Pacific States Marine Fisheries Commission for projects sponsored by CalFED's Ecosystem Restoration Program (Holycross *et al.* 2007) include some estimates of cost per activity for multi-activity projects.

- To help ensure that cost estimates reflect fairly recent restoration technology, the report focuses largely on projects that have occurred since 1998. However, in cases where project data for a particular restoration activity are sparse, pre-1998 project data are also provided, as available.

All costs described in this report pertain to direct expenditures on restoration and do not include economic opportunity costs (e.g., foregone profits associated with restrictions on livestock grazing, timber harvest and other activities). It is important to note the following:

- Even the direct costs described in this report are not necessarily comparable across projects, as some cost estimates are more inclusive than others. Some data sources - e.g., Evergreen Funding Consultants (2003), Neal (2004), Steere (2004) - provide cost estimates that include pre- and post-construction requirements as well as construction itself. In other cases, cost estimates are largely limited to engineering and/or implementation aspects of the project (e.g., CDFG's Fisheries Restoration Grants

Program, NRCS Environmental Quality Improvement Program) and do not include agency involvement in planning, design, management, maintenance and monitoring. In still other cases, documentation is not adequate to determine exactly what is included and excluded from the cost estimates.

- For most projects involving capital construction (e.g., bridges, fish screens), costs are not amortized but rather provided as a lump sum. One notable exception is the Independent Economic Analysis Board's (2002) estimates of amortized capital construction costs for Columbia River hatcheries.

For each restoration activity, one or more tables are provided that include cost estimates for that activity - by location, year, project scale, cost per scale unit, and data source.

- Depending on available information, each project example is variously identified by stream/creek/river, watershed, county, recovery domain,[1] or state.

- Depending on the source of a cost estimate, year may pertain to the year of a funding proposal or contract. In cases where a document includes cost estimates for projects conducted in years prior to publication of the document, the project year is used when available; otherwise the publication year is used.

- The metric used for project scale varies, depending on the nature of the restoration activity. Thus for instance, design approach velocity (cubic feet per second, cfs) is used for fish screens; linear feet for levee work, fencing, bank stabilization; acres for revegetation, wetland restoration, land purchase/easement; and miles for road decommissioning/upgrade.

- As indicated above, this report focuses largely on 1998-2006 projects. Cost estimates for these projects are provided in current dollars (uncorrected for inflation). In situations where paucity of 1998-2006 data warranted inclusion of pre-1998 projects, costs of pre-1998 projects were corrected to 2006 dollars. In some cases, the data sources themselves provide inflation-corrected cost estimates. The base year for these estimates is documented in this report, along with the year(s) when the restoration actually occurred (e.g., Hildner/Thomson's (2007a) results are denoted "98-05" and "2003$" to reflect the fact that their cost estimates are based on 1998-2005 project data and have been corrected to 2003 dollars).

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[1] The recovery domains include: Southern Oregon/Northern California Coast (SONC), North/Central California Coast (NOCECA), Central Valley, and South Central California Coast (SCACO). There is an area of geographic overlap between the SONC and NOCECA, which is referenced in this report as NOCECA-SONC.

- The nature of the cost estimates vary somewhat, depending on the data source: (i) In cases where cost is reported for a specific project, total project cost, project scale, and average cost per scale unit are provided, as available. (ii) In cases where cost is reported as an average value across multiple projects, the sample size and range of project costs (as available) are reported along with average cost. (iii) In cases where a "typical" cost is reported, the "typical" cost and the range of "typical" costs (as available) are provided. (iv) In cases where cost is estimated from a regression equation, the equation itself is provided as well as a range of fitted values associated with the regression parameters.

- In cases where management/administrative costs are reported for a multi-activity project and the cost estimate in the table pertains to one activity, management/administrative costs (which are not solely attributable to that one activity) are provided separately and not included in the calculation of cost per scale unit.

- Data sources are identified in the tables by last name or initials of author(s) and table and/or page numbers as appropriate. In cases where the data sources were grant proposals submitted to CDFG's Fisheries Restoration Grants Program (FRGP) or Klamath River Restoration Grant Program (KRRGP), those sources are identified in the tables by the fiscal year in which the proposal was submitted (01-02 through 06-07) and the project ID number (CDFG-xxx for the FRGP, Kxxx for the KRRGP). In cases where the data sources are projects sponsored by CALFED's Ecosystem Restoration Program (ERP), the projects are identified by the year of the proposal and the project ID (ERP-xx-xxx). In cases where costs associated with an ERP project could be broken down by activity, that project ID appears multiple times in the tables. All data sources are fully documented in the "References" section at the end of this report.

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FL - FISH LADDER.

Table FL-1 provides estimates of fish ladder costs. CDFG's Coho Recovery Strategy (CDFG'04, p1.14) assumed $500K/ladder on tributaries and $900K/ladder on streams. This cost range pertains to central/northern CA coastal streams and is not necessarily applicable to projects outside that geographic range. However, most of the projects in Table FL-1 do fall within that range. Notable exceptions (exceeding $2M/ladder) include a project in the South Central California Coast (SCACO) recovery domain (HT07a-T61, p121) and several Central Valley projects (HT07a-T61, p121, ERP-99-B03) . Note: Some of the projects pertain to ladders only, others to ladder/screen combinations.

Table FL-1. Fish Ladder ($/project)

Location	Year	Units	Cost Per Unit	Source
CA	2004	typical	Small waterway (tributary): $500K/ladder Large waterway (stream): $900K/ladder	CDFG'04, p1.14
Young'sDam	03-04	1ladder	$494K - sloping plate, selfclean, excluding design	CDFG-057
SONC CentralVly SCACO	98-05 2003$	1site 1site 1site	$530.1K $2.1M $2.1M	HT07a-T61, p121
Gorrill Dam/Butte Creek	1997	2ladder	$660K ($330/ladder) +$12.8K project mgmt + $58.8K construction mgmt - construct ladder and screen	ERP-97-M03
Adams Dam/Butte Creek	1997	1ladder	$298.7K (+$6.3K project mgmt + $3K project coordination) - construct ladder and screen	ERP-97-M04
Battle/Soap/ Ripley Creeks	1999	3projs	$2.7M ($902.7K/project) - decommission several PG&E dams, provide ladders/ screens for remaining dams	ERP-99-B01
Sacramento River	1999	2 projs	$4.56M ($2.28M/project) + $130K project mgmt - Anderson-Cottonwood Irrig Dist	ERP-99-B03
Battle Creek	1999	1 proj	$731K +$105.3K project mgmt - improve CNFH fish ladder & barrier weir	ERP-99-B08

FP - FISH PASSAGE AT STREAM CROSSINGS.

Tables FP-1 and FP-2 pertain to culvert replacement, Table FP-3 to culvert replacement with a bridge, and Table FP-4 to culvert improvement.

Table FP-1 describes Evergreen's estimates of culvert replacement costs, while Table FP-2 provides similar estimates from other data sources. Evergreen's estimates include not only construction but also design, permitting, monitoring, maintenance and management, and are much more inclusive than the estimates in Table FP-2. Most of the latter examples are derived from grant proposals submitted to CDFG's Fisheries Restoration Grants Program - with costs largely limited to engineering/construction aspects of the project. The Table FP-2 estimates generally fall within the range of $100K-$400K/culvert, although there are some projects that cost in the $10,000s (e.g., Dupont-T10, p66; HT07a-T60, p118; HT07a-T61, p121) and one very costly project ($4.1M, CntySBPublicWrks) in Santa Barbara. Culvert type is reported here when available from the data source.

Evergreen's estimates show typical culvert replacement costs for Puget Sound by road type and size of waterway.Like Evergreen, Hildner/Thomson show cost per culvert being lower for rural roads than major highways (HT07b-T42, p61) and increasing with stream order (HT07b-T44, p62). Excluding 4+ lane highways (which are not covered by Hildner/Thomson), the estimates obtained by HT from restoration contractors fall within Evergreen's cost ranges. E.g., forest roads - Evergreen: $15K-$150K, HT: $23.4K; minor 2 lane road - Evergreen: $50K-$280K, HT: $227K; major 2 lane road - Evergreen: $100K-$450K, HT: $420K. Small waterway - Evergreen: $15K-$200K, HT: $70K; medium waterway - Evergreen: $50K-$350K, HT: $175K; large waterway - Evergreen: $80K-$450K, HT: $286K.

Table FP-1. Culvert Replacement - $/project (Source: Evergreen 2003, p. 21)
Cost estimates pertain to Puget Sound. Estimates include construction, design, permitting, basic monitoring & routine maintenance (2 yrs), reestablishing site to prior conditions, project management

Size of Waterway	Road Type			
	Forest Road	Minor 2 Lane	Major 2 Lane	Hwy 4+ Lane
Small 0-10'	$15K-40K	$50K-100K	$100K-200K	$200K-350K
Med 10-20'	$50K-100K	$140K-240K	$200K-350K	$300K-450K
Large 20-30'	$80K-150K	$180K-280K	$250K-450K	$600K-800K

Table FP-2. Culvert Replacement - $/project				
Location	Year	Units	Cost Per Unit	Source
AlbionR/Marsh Crk-MendcnoCnty	01-02	3culvrt	$180.5K ($60.2K/culvert)	CDFG-007
PeacockCrk-DelNorteCnty		1culvrt	$295.0K - open bottom	CDFG-009
JohnsonCrk-MendcnoCnty		1culvrt	$100.9K - bottomless pipe arch	CDFG-009
DeerCrk-MendcnoCnty		1culvrt	$97.5K - bottomless pipe arch	CDFG-010
JordanCrk-DelNorteCnty		1culvrt	$246.3K - box culvert	CDFG-059
RyanCrk-MendcnoCnty		1culvrt	$151.5K - bottomless pipe arch	CDFG-068
PorterCrk-RussianR	02-03	2 culvrt	$266,250 ($133.1K/culvert)	CDFG-028
StansberryCrk-MattoleR		1culvrt	$197.5K	CDFG-265
GibsonCrk-MattoleR		1culvrt	$213.1K	CDFG-266
StanleyCrk-MattoleR		1culvrt	$239.4K	CDFG-267
SaundersCrk-MattoleR		1culvrt	$269.5K	CDFG-268
IndianCrk-MattoleR		1culvrt	$55.0K	CDFG-270
DarkGulch-MndocnoCnty		1culvrt	$202.1K	CDFG-305

AlbionR/Marsh Crk-MendcnoCnty RyanCrk-MendocnoCnty JohnsonCrk-BigR-MendocnoCnty YonkersCrk-DelNorteCnty GrahamGulch-HumboldtCnty PainterCrk-MattoleR-HumboldtCnty SoldierCrk-TrinityR-TrinityCnty	03-04	2culvrt 1culvrt 1culvrt 1culvrt 1culvrt 1culvrt 2culvrt	$299,592 ($149.8K/culvert) - natural bottom pipe arch $278.8K - natural bottom pipe arch $128.1K - natural bottom pipe arch $242.6K - bottomless arch $245.8K - bottomless multiplate arch $246.2K - bottomless multiplate arch $305.3K ($152.7K/culvert)	CDFG-098 CDFG-099 CDFG-104 CDFG-149 CDFG-165 CDFG-166 CDFG-236
BatesCanyonCrk-MarinCnty WarrenCrk-MadR-HumboldtCnty	04-05	1culvrt 1culvrt	$208.4K $326.3K - bottomless multiplate arch	CDFG-026 CDFG-233
WardenCrk-EelR-HumboldtCnty RockyGulch-HumboldtCnty	05-06	1culvrt 2culvrt	$44.5K - bottomless arch $381.6K ($190.8K/culvert) - embedded structural plate metal box culvert	CDFG-062 CDFG-137
CA	98-05 2003 $	3culvrt	$13.3K ($1.9K-$24.2K)	HT07a-T60, p118
SONC SONC-NOCECA SCACO	98-05 2003 $	1culvrt 1culvrt 1culvrt	$1.9K $13.9K $24.2K	HT07a-T61, p121
CA CA CA	02-04	27clvrt 13clvrt 1culvrt	<u>Road Type:</u> ForestRoad: $23.4K ($379-$217.9K) Minor2Lane: $227.1K ($5.1K-$412.8K) Major2Lane: $420.4K	HT07b-T42, p61,contrctr
CA CA CA	02-04	30clvrt 8clvrt 1culvrt	<u>Stream Order:</u> 1st order: $70.4K ($970-$420.4K) 2nd order: $175.4K ($851-$412.8K 3rd order+: $285.5K	HT07b-T44, p62,contrctr

CA CA	02-04	7culvrt 11clvrt	Culvert Type: Open-btm arch:$262.8K ($124K-$401K) Pipe: $7.4K ($970-$17.2K)	HT07b-T49, p71,contrctr
Sta Ynez	07-12	2culvrt	$8.11M ($4.1M/culvert, reinforced concrete box culvert)	CntySB PublicWrks
Idaho		1culvrt	$15K-$25K - bottomless arch, 30-60 yrs $8K-$20K - buried culvert, 20-50 yrs $500-$5K - ford	Dupont-T10, p66

Costs of culvert replacement with bridge described in Table FP-3 generally range from $100K to $500K/bridge. A few projects cost <$50K (e.g., 02-03 CDFG-065; 03-04 CDFG-201 & CDFG-311; 05-06 CDFG-077; Dupont-T9, p65). Projects that cost >$650K all occurred in southern or south-central California (04-05 CDFG-031 & CDFG-241; 06-07 CDFG-090). Information on bridge type - which is reported here when available from the data source - suggests that prefabricated bridges fall toward the lower end of the cost spectrum. Dupont provides information on expected lifetime of various types of bridges, although his information pertains to Idaho rather than California.

Table FP-3. Culvert Replacement with Bridge ($/project)

Location	Year	Units	Cost Per Unit	Source
JohnSmithCrk-MendcnoCnty HayworthCrk-MendocnoCnty	01-02	1bridge 2bridge	$189.5K - flat car bridge $89,711 ($44.9K/bridge)	CDFG-043 CDFG-060
ApanolioCyn-SanMateoCnty OldCreekRd-VenturaR SoFork CottanevaCrk-MendcnoCnty TrinityR KellyGulch-SiskiyouCnty	02-03	1bridge	$250K - 3sided bridge $111.5K $22.6K $500K $163.2K	CDFG-015 CDFG-038 CDFG-065 CDFG-119 CDFG-284

FrenchmansCrk-SanMateoCnty FrykmanGulch-BigR-MendcnoCnty IndianCrk-HumboldtCnty LindsayCrk-MadR QuarryBridge-GualalaR	03-04	1bridge	$130.2K - clear span bridge $77.6K $437.3K $26.0K - manufactured $46.0K - 45' modular	CDFG-028 CDFG-052 CDFG-168 CDFG-201 CDFG-311
ArroyoSecoR-MontereyCnty CampCrk-NavarroR-MendcnoCnty O'NeilCrk-KlamathR-SiskiyouCnty SolsticeCrk-LA	04-05	1bridge	$1.5M $234.6K - includes rock weirs $100K - concrete, single span $653.3K - precast open bottom	CDFG-031 CDFG-041 CDFG-064 CDFG-241
LindsayCrk-MadR-HumboldtCnty CedarCrk-SmithR-DelNorteCnty	05-06	1bridge	$54K $347.9K	CDFG-077 CDFG-269
StaRosaCrk-SanLuisObispo SoquelCrk-StaCruzCnty	06-07	1bridge	$746.3K $409.6K	CDFG-090 CDFG-195
HorseCrk-Klamath	06-07	1bridge	$230.5K	K002
Idaho	2000	typical	<u>Bridge Type:</u> Wood stringer, 25-50yr lifetime: $10-$20K Prefab concrete, 40-60yr lifetime: $15K-$25K Railroad, 40-60yr lifetime: $15K-$30K Steel/concrete, 50-75yr lifetime: $30K-$50K	Dupont-T9, p65
SONC	98-05 2003$	1site	$109.6K	HT07a-T61, p121

CA	02-04	6sites	$217.9K ($23K-$420.4K)	HT07b-T49, p71,contrctr
CA	98-05 2003$	2sites	$261.3K ($22.7K-$500K)	HT07b-T41, p59,CHRPD
CA	FY07	typical	Bridge Size: >40ft: $100K <40 ft, flatbed railroad: $50K	NRCS

Most of the culvert improvement costs described in Table FP-4 range from about $5K to $65K. The two notable exceptions are $463.1K (03-04 CDFG-320) and $485K (05-06 CDFG-162) - both of which seemed to also involve substantial habitat work around the culvert. The NRCS examples pertain to culvert removal rather than improvement, but are included here in case such actions are considered for farmland in recovery planning.

Table FP-4. Existing Culvert Improvement - $/project

Location	Year	Units	Cost Per Unit	Source
JollyGiantCrk -Arcata	01-02	1culvrt	$10.2K	CDFG-124
SoForkBigR-MendcnoCnty	02-03	1culvrt	$23.3K	CDFG-286
ElCapitanCrk -StaBarbCnty	03-04	1culvrt	$463.1K - baffles, replace culvert floor, construct pools	CDFG-320
BrownsCrk-PajaroR-StaCruzCnty	04-05	1culvrt	$65.5K - replace floor, add weirs	CDFG-068
ChaddCrk-EelR-HmboldtCnty	05-06	1culvrt	$485K - 9.5 ft dia steel plate culvert, retrofit w/baffles & jump pools	CDFG-162
Idaho	2000	1culvrt	Culvert Type: Angle iron fish ladder: $1,185 Chimney block fish ladder - $375 Baffles - $2,530 Downstream drop structure - $1,180	 Dupont-T1, p59 Dupont-T2, p60 Dupont-T3, p60 Dupont-T4, p61
NOCECA	98-05 2003$	1site	$4.7K/baffle	HT07a-T61,p121

CA	02-04	1culvrt	Culvert Type: Boulder weir: $13.3K Baffles: $17.9K Other: $575	HT07b-T50, p74,contrctr
CA	98-05 2003$	2culvrt	$9.4K ($4.7K/culvert) - baffle	HT07b-T51, p74,CHRPD
Sonoma Crk	2000	1culvrt	$21.6K	ERP-00-E04

SC - FISH SCREENING OF DIVERSIONS

Table SC-1 provides cost estimates for fish screens relative to the design approach velocity of the screen (cubic feet per second, cfs). Cost of screens produced by the CDFG screen shop range from $2K to $10K/cfs (BM, p. J-3). Most of the other cost estimates in the table fall within this range. Some notable exceptions include projects on the Klamath River (e.g., 05-06 CDFG-200) and in the Central Valley (e.g., ERP-00-B02, ERP-95-M05, ERP-96-07, ERP-97-C01, ERP-97-M07).

Table SC-1. Fish Screen - $/cfs, $/screen

Location	Year	Units	Cost Per Unit	Source
CA	2005	typical	$2K-$10K/cfs (CDFG screen shop)	BM, pJ-3
KlamathR KlamathR KlamathR	05-06	15.3cfs 3.51cfs 1.2cfs	$99,173/screen ($6.5K/cfs) - self clean $39,758/screen ($11.3K/cfs) $29,961/screen ($25K/cfs) - design/install preexisting tube screen	CDFG-049 CDFG-173 CDFG-200
CA	2004	typical	Type of Waterway: Small tributary: $10K/screen Large stream: $40K/screen	CDFG'04, p1.15
CalFED	2000	4scrns 1scrn	Flow Range: 350-800cfs: $8.5K-$15K/cfs 15-20cfs: $100K ($3.3K-$5K/cfs)	Hayes-Fig2,p174 Hayes-p183

WA	2000	Sample of 1-15cfs screens Sample of 1-58cfs screens Sample of 1-210cfs screens	***Figure 2: C=6060.4 cfs ^1.2405*** 2cfs: $14,320/screen ($7.2K/cfs) 4cfs: $33,834/screen ($8.5K/cfs) 6cfs: $55,950/screen ($9.3K/cfs) 8cfs: $79,944/screen ($10K/cfs) 10cfs: $105,439/screen ($10.5K/cfs) 12cfs: $132,198/screen ($11K/cfs) 14cfs: $160,056/screen ($11.4K/cfs) ***Figure 3: C=8221.2 cfs ^ 1.0108*** 10cfs: $84,282/screen ($8.4K/cfs) 20cfs: $169,831/screen ($8.5K/cfs) 30cfs: $255,864/screen ($9K/cfs) 40cfs: $342,214/screen ($8.6K/cfs) 50cfs: $428,799/screen ($8.6K/cfs) 60cfs: $515,573/screen ($8.6K/cfs) ***Figure 4: C=11083 cfs ^ 0.9025*** 50cfs: $344,279/screen ($6.9K/cfs) 100cfs: $643,561/screen ($6.4K/cfs) 150cfs: $927,923/screen ($6.2K/cfs) 200cfs: $1,203.010/screen ($6K/cfs)	Hudson-p192 Hudson-p192 Hudson-p193
OR	2000	12scrns 4scrns 3scrns 3scrns 2scrns 10scrns 10scrns	<u>Screen Type, Flow Range*:</u> Rotary drum, 0.4-25 cfs: $1.3K-$11.3K/cfs Rotary drum prefab, 0.8-2cfs: $3.9K-$9.4K/cfs Belt, 10cfs: $2.3K-$3.2K/cfs Panel, 12-30cfs: $2.8-$3.1K/cfs Pump, low veloc, 0.5-1.8cfs: $0.8K-$1.9K/cfs Pump, Clemons, 0.6-4.2cfs: $0.5K-$2.2K/cfs Pump, SureFlo, 0.5-6cfs: $0.5K-$2.5K/cfs	Kepshire-T1, p207
* Engineering costs incurred only for screens >25 cfs.				
CA farmland	FY07	typical	<u>Flow Range*:</u> <1cfs: $2K/screen ($2K/.5cfs=$4K/cfs) 1-5cfs: $6K/screen ($6K/2.5cfs=$2.4K/cfs) 5.1-10cfs: $14K/scrn ($14K/7.5cfs=$1.9K/cfs) >10cfs: $20K/screen (<$2K/cfs) * $/cfs estimated using midpoint of cfs range	NRCS CA

WA	1999$	16scrns 19scrns 5scrns 7scrns 5scrns	Flow Range: 1-10cfs: $3.6K-$17.8K/cfs 10-50cfs: $4.5K-$16.6K/cfs 50-100cfs: $4.5K-$9.8K/cfs 100-1000cfs: $2.4K-$7.0K/cfs >1000cfs: $2.0K-$7.0K/cfs	WDFW
Sacrmnto River	2000	1 scrn	$435.4K (44.6 cfs screen, $10K/cfs) - Pump Station #1	ERP-00-B01
Sacrmnto River	2000	1 scrn	$303K +5K project mgmt + $2.5K project coordination + $59.6K engineering design (20 cfs screen, $15K/cfs) Tuttle Pump Relocation Project	ERP-00-B02
Amer/Sacramento R	2001	2 projcts	$40.4M + $750K project mgmt + $3.1M construction mgmt ($20.2M/screen) - replace intake SacR Water Treatment Plant, replace screen EA Fairbairn Water Treatment Plant.	ERP-01-N51
Sacrmnto River	2001	10scrns 8-39cfs	$1.1M + $521.7K program admin/mgmt/ coordination ($111.7K/screen)	ERP-01-N52
Sacrmnto River	1995	1 projct 150 cfs	$3.2M + $100K project mgmt + $173K construction mgmt ($21.3K/cfs) - decommission old diversion at M&T Ranches' Parrot-Phelan Pumping Station, relocate/construct/screen new diversion	ERP-95-M05
Suisun Marsh	1995	5 screens	$765.3K ($153.1K/screen) Phase 1 - diversion evaluation & selection	ERP-95-M07
Sacrmnto River	1996	1 projct 600 cfs	$9.4M + $698.3K project coordination ($15.7K/cfs) - consolidate 3 diversions into 1 new diversion, Princeton-Codora-Glenn Irrig Dist & Provident Irrig District	ERP-96-07
Yuba River	1996	1 projct 65 cfs	$202K ($3.1K/cfs) - Browns Valley Irrig District	ERP-96-M17
Sacrmnto River	1997	1 projct 700 cfs	$10.4M ($14.0K/cfs) - Reclamation District 108's diversion structure at Wilkins Slough	ERP-97-C01
Butte Creek	1997	1 projct 162 cfs	$660.3K + $12.8K project mgmt + $58.8K construction mgmt ($4.1K/cfs) - Gorrill Dam	ERP-97-M03

Butte Creek	1997	1 projct 135 cfs	$515.9K + $6.3K project mgmt + $3K project coordination ($3.8K/cfs) - Adams Dam	ERP-97-M04
San Joaquin R	1997	1 projct 250 cfs	$7.6M + $62K project mgmt + $411K construction mgmt + $154K post-construction services ($30.4K/cfs) - vertical V fish screen, Banta-Carbona Irrig District	ERP-97-M07
Sacrmnto River	1998	1 projct 22 cfs	$270.5K ($12.3K/cfs) - Boeger Family Farm Fish Screen Phase II: Construction	ERP-98-B26
Lindsay Slough/ Cache Slough	1998	1 projct 53 cfs	$416K ($7.8K/cfs) - Hastings Tract Fish Screen Phase II: Construction	ERP-98-B27
Battle/ Soap/ Ripley Creeks	1999	1 projct	$1.06M (3 screens - 55 cfs, 70 cfs, 220 cfs; $3.1K/cfs) - decommission several PG&E diversion dams, provide ladders/screens for those that remain	ERP-99-B01
Sacrmnto River	1999	1 projct 450 cfs	$4.56M + $130K project mgmt ($10.1K/cfs) - ACID Fish Screen Phase III: Construction	ERP-99-B03
Sacrmnto River	1999	1 projct 960 cfs	$6.222M ($6.5K/cfs) - Tisdale Positive Barrier Phase IV: Construction/Performance Eval	ERP-02D-P70

HB - INSTREAM BARRIER MODIFICATION FOR FISH PASSAGE

This section covers modification of non-culvert fish passage barriers in the stream channel and along the stream bank. Table HB-1 focuses on tide gates, Table HB-2 on sandbars, Table HB-3 on dam,, and Table HB-4 on other barriers.

Based on a limited number of examples, the replacement cost of a tide gate is ~$105K; retrofit cost is $26K.

Table HB-1. Tide Gates - $/unit				
Location	Year	Units	Cost Per Unit	Source
HumboldtBay	03-04	3 tidegates	$317,148 ($105.7K/tidegate) - replace 2 tidegates & add 3rd	CDFG-143
HumboldtBay	2005	1 tidegate	Retrofit: $26K	MA, p2

Based on a single example, cost of sandbar breaching is $13K/breaching.

Table HB-2. Sandbar Breaching - $/unit				
Location	Year	Units	Cost Per Unit	Source
Estero de San Antonio (MarinCnty)	1993	1breaching	$10K/breaching *(2006$: $13.1K)* - incl equip rental	WC, p19

Based on a single example, cost of dam decommission is $1.5M.

Table HB-3. Dam Decommission/Removal - $/unit				
Location	Year	Units	Cost Per Unit	Source
BattleCrk/SoapCrk/ RipleyCrk	1999	5 dams	$7.53M ($1.5M/decommission)	ERP-99-B01

Barrier modification projects identified in Table HB-4 typically involve weirs, head gates, fish screens and/or measuring structures. Most of the modifications cost $30K-$170K, with the exception of two $1M+ barrier removal/fish screen projects on the Shasta River (06-07 K010 & K011). A single estimate of weir repair cost is provided: $10.8K/weir (06-07 K034).

Table HB-4. Other Non-Culvert Barrier Modification - $/unit

Location	Year	Units	Cost Per Unit	Source
EastForkScott/French Crk/ShacklefordCrk// ScottR-KlamathRiver	06-07	13 barriers	$962.9K ($74.1K/barrier) - remove seasonal barriers/install head gate to measure diversion volume	K025
ShastaR-Klamath	06-07	1 barrier	$1356.5K - remove barrier/install fish screen	K010
ShastaR-Klamath	06-07	1 barrier	$981.9K - remove barrier/install fish screen	K011
ColdCrk-KlamathR	06-07	1 barrier	$65.1K - replace diversion w/fish passable weir, update screen	K014
ShastaR-Klamath	06-07	4 barriers	$120.9K ($30.2K/barrier) - replace 2 barriers w/boulder weirs; install head gate/fish screen/measuring weir on 2 unscreened diversions	K023
Scott-KlamathR	06-07	1 barrier	$170K - replace barrier with boulder weirs/head gate/ measuring structure	K032
FrenchCrk/MinersCrk/ PattersonCrk/ ShackefordCrk-KlamathR	06-07	6 weirs	$65K (10.8K/weir) - repair storm-damaged secondary weirs in 6 locations	K034
Guadalupe River (So SanFran Bay)	1998	2 passage structures	$147.9K ($74K/structure)	ERP-98-B23
Carriger Creek (Sonoma Creek)	2001	1 barrier	$67.6K - boulder weir ladder	ERP-01-N27

HI - INSTREAM HABITAT RESTORATION

This section covers restoration of instream habitat. Tables HI-1 & HI-2 pertain to instream structures such as wood/boulder structures and large woody debris, Table HI-3 to spawning gravel supplementation, Table HI-4 to floodplain tributary reconnection, Tables HI-5 and HI-6 to channel restoration, and Table HI-7 to wetland/floodplain restoration.

Evergreen (Table HI-1) estimates restoration costs for small/medium streams with small/medium transportation & material requirements on a per-mile basis, and estimates costs for large streams with medium/high transportation & material requirements on a per-structure basis. The examples in Table HI-2 also represent a mixture of per-mile and per-structure estimates; however, the units of measure in Table HI-2 were not based on any systematic criterion (as per Evergreen) but rather reflect whatever units were available from each data source. Cost-per-mile tends to be lower using Evergreen's estimates ($10K-$50K/mile) than the Table HI-2 estimates, which ranged from ~$25K to $500K/mile (with the exception of a $1.4M/mile project (01-02 CDFG-156) where cost per mile was derived by expanding the cost of that 40' project to an entire mile). Conversely cost-per-structure tends to be higher using Evergreen's estimates ($10K-$80K/structure) than the Table HI-2 estimates (~$500-$11K/structure). These results are not surprising, given that Evergreen systematically applied cost-per-mile to lower-cost projects and cost-per-structure to higher-cost projects.

Table HI-1. Engineered Logjams and Large Woody Debris - $/structure, $/stream mile (Source: Evergreen 2003, p. 25)

Cost estimates pertain to Puget Sound. Estimates include construction, design, permitting, basic monitoring & routine maintenance (2 yrs), reestablishing site to prior conditions, project management costs. All estimates assume purchased materials.

Stream Size (cfs)	Transportation & Material Requirements		
	Low Cost	Medium Cost	High Cost
Small 1-100 cfs	$10K-30K*	$20K-50K*	$20K-40K
Med 100-2000 cfs	$20K-50K*	$15K-45K	$40K-70K
Lge 2000+ cfs	$10K-20K	$40K-60K	$60K-80K

* Cost per stream mile, assuming 100-400 pieces per stream mile. Estimates in all other cells measured as cost per structure.

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Table HI-2. Instream Structures - $/mile, $/structure				
Location	Year	Units	Cost Per Unit	Source
WindR-WA	2000	typical 1 project 1 project	Channel rehab: $86K ($41K-$137K)/mi Onsite material: $65K/mi Imported material: $140K-$160K/mi	Bair-pp107-108
UpperMattoleR-HumboldtCnty EelR LowerSodaCrk-EelR-MndcnoCnty	01-02	12 strctrs 40' 640'	$23,507 ($1959/structure) - log $10,979 ($1.4M/mi) $54,329 ($448.8K/mi)	CDFG-048 CDFG-156 CDFG-258
FelizCrk-RussianRiver MoonCrk-KlamathR-DelNorteCnty	02-03	1300' 15 strctrs	$20,580 ($83.7K/mi) $40,600 ($2707/structure)	CDFG-011 CDFG-127
HayworthCrk/NFNoyoR-MendcnoCnty UpperMattole-HumboldtCnty	03-04	55 strctrs 14 strctrs	$30,422 ($553/structure) $36,510($2608/structure) - wood/boulder	CDFG-216 CDFG-233
SultanCrk-SmithR-DelNorteCnty WilsonCrk-DelNorteCnty RedwoodCrk-RussianR-SonomaCnty	04-05	10 strctrs 10 strctrs 1.08 mi	$20,497 ($2050/structure) $25,998 ($2600/structure) $60,419 ($55.9K/mi)	CDFG-143 CDFG-145 CDFG-247
EelR DelNorteCnty	06-07	4.5 mi 10 strctrs	$112,437 ($25K/mi) $46,753 ($4675/struc) - +1000 native conifers to replenish wood instream	CDFG-056 CDFG-110

CA	2004	typical	Distance from Road: 0.25-0.5mi: $26K/mi 1-2mi: $27K/mi 2-3mi: $28K/mi >3mi: $29K/mi	CDFG'04 p1.24
TectahCrk-KlamathR	06–07	5 mi	$275.4K ($55.1K/mi) - LWD construction/placement with helicopter	K003
ScottR-Klamath	06-07	6-8 major structures	$65.8K ($8.2K-$11K/structure)	K037
CA		37projcts	20 struc/mi: $25.3K ($5.6K-$70.8K)/mi, $1762/structure)	Hampton-T1, pp122-123
CA		37projcts	***$/mile=24,482+427*#structures/mi*** 20 struc/mi: $33.0K/mi 50 struc/mi: $45.8K/mi 100 struc/mi: $67.2K/mi 200 struc/mi: $109.9K/mi 300 struc/mi: $152.6K/mi 400 struc/mi: $195.3K/mi	Hampton-p124
CA	98-05 2003$	24 sites 5 sites	$2.5K ($214-$11.3K)/structure $364.5K ($220.5K-$552.1K)/mi	HT07a-T60, p118
SONC SONC-NOCECA NOCECA NOCECA SCACO SCACO	98-05 2003$	3 sites 5 sites 1 site 15 sites 4 sites 1 site	$1.3K ($214-$2.1K)/structure $3K ($2.4K-$3.5K)/structure $534.1K/mi $2K ($680-$4.1K)/structure $322K ($220.5-$552.1K)/mi $11.3K/structure	HT07a-T61, p121
CA	02-04	58 sites	$12,375 ($250-$175K)/structure	HT07b-T53, p74,contrctr
CA	02-04	45 sites	$2.2M ($4K-$46.8M)/mi	HT07b-T54, p75,contrctr
OR-priv forest OR-state forest OR-USFS	2000	typical	Assume 120 trees/mile: $77.6K/mi - non-contract $82.4K/mi - contract $47.6K/mi - LWD-helicopter	Lacy-p139 Lacy-p139 Lacy-p140
King County, WA		600'	$113.5K ($99.8K/mi)	Neal-T4, p163

Table HI-3 pertains to spawning gravel supplementation. The WDFW example (WDFW-T3, p14), which is actually based on a British Columbia data source, estimates cost of spawning gravel supplementation at $20-$40/cubic yard. With the notable exception of the Stanislaus River project (ERP-97-N21) - where costs include evaluation as well as gravel treatment - the Central Valley examples indicate a range of costs ($11-$36/cubic yard) similar to WDFW's.

Table HI-3. Spawning Gravel Supplementation - $/cubic yard (cy)				
Location	Year	Units	Cost Per Unit	Source
WA	2004	typical	Gravel placement: $50-$70/m^3* Sorted gravel: $20-$40/cubic yard	WDFW-T3, p14
* Gravel placement - sorted gravel supplied, limited delivery distance, machine placed, does not include control structures.				
Tuolumne River	2002	10K cy	$3.59M + $50K project mgmt/admin ($36/cy)	ERP-02-P29
Sacramento River	1995	4964 cy	$52.5K ($11/cy)	ERP-95-M04
Tuolumne River	1997	6632 cy	$191.2K ($20/cy)	ERP-97-C11
Stanislaus River	1997	9220 cy	$667.9K ($72/cy) - Knights Ferry, incl evaluation of effects of diff size/sources of gravel on habitat utilization	ERP-97-N21

Tables HI-4 and HI-5 describe Evergreen's cost estimates for floodplain tributary reconnection (which vary with material and earthmoving requirements) and sidechannel reconnection (which vary with earthmoving requirements and energy of waterway).

Table HI-4. Floodplain Tributary Reconnection - $/acre (Source: Evergreen 2003, p. 39)

Cost estimates pertain to Puget Sound. Estimates include construction, design, permitting, basic monitoring & routine maintenance (2 yrs), reestablishing site to prior conditions, project management.

Materials	Extent of Earthmoving		
	Minimal	Moderate	Substantial
Minimal	$5K-10K	$10K-20K	$30K-40K
Moderate	$10K-20K	$20K-30K	$40K-60K
Substantial	$30K-40K	$40K-60K	$60K-80K

Table HI-5. Side Channel Reconnection - $/acre (Source: Evergreen 2003, p. 41)

Cost estimates pertain to Puget Sound. Estimates include construction, design, permitting, basic monitoring & routine maintenance (2 yrs), reestablishing site to prior conditions, project management.

Extent of Earthmoving	Energy of Waterway		
	Low	Medium	High
Minimal/Near	$20K-40K	$40K-70K	$60K-90K
Moderate/Avg Distance	$40K-60K	$70K-100K	$100K-200K
Substantial/Far	$60K-100K	$130K-200K	$200K-300K

Table HI-6 provides cost estimates for channel restoration projects. All estimates pertain to Central Valley rivers and range from $1.2M/mile (ERP-99-B01) to $8.7M/mile (ERP-97-M08).

Table HI-6. Channel Restoration - $/mile				
Location	Year	Unit	Cost per Unit	Source
Merced River	1999	2.19 mi	$2.635M ($1.2M/mi) - large-scale reach restoration-channel realignment/floodplain creation	ERP-99-B01
Tuolumne River	2002	1.2 mi	$8.29M + $74.1K construction mgmt ($6.9M/mile) - large-scale reach restoration-channel realignment/floodplain creation	ERP-02-P19-D
Tuolumne River	1997	0.23 mi	$2.011M + $174K construction/proj mgmt ($8.7M/mile) - restore natural channel morphology	ERP-97-M08
Tuolumne River	1997	2.6 mi	$5.054M + $284 construction mgmt ($1.9M/mile) - restore natural channel morphology	ERP-97-M09
Tuolumne River	1998	2.2 mi	$5.054M ($2.3M/mile) - restore natural channel processes & habitats	ERP-98-F06
Merced River	1998	2.2 mi	$3.635M ($1.7M/mile) - restore natural channel processes & habitats	ERP-98-F11

Most of the wetland restoration cost estimates in Table HI-7 pertain to San Francisco Bay/Estuary; several estimates of annual operations & maintenance (O&M) and monitoring costs are included. Steere's information is notable in that he provides estimates by wetland type. The NRCS estimates indicate much lower wetland restoration costs for farmland ($75-$375/acre); these projects are likely much more modest in scale than the types of projects that occur in San Francisco Bay.

Table HI-7. Wetland Restoration - $/acre				
Location	Year	Units	Cost per Unit	Source
Topanga Crk-LA	05-06	12acres	$249.8K ($20.8K/acre) - remove 26Ktons of lead contaminated fill matl	CDFG-029
SF Bay/ Estuary	1995	typical	$20K-$30K/acre, up to $80K/acre *(2006$: $25K-$38K/acre, up to $101K/acre)*	Anon '95

SF Bay/ Estuary	2000	typical	Wetland Type: Tidal wetland: $5K-$100K/acre Seasonal wetland: $9K/acre (large-scale project) Wetland enhancement: $1K/acre (reveg, exotic species removal, limited irrig, modest mgmt) Monitoring: $500/acre for 5 yrs	Steere, pp231-233
SF Bay/ Estuary	1999	5 sites	(1) 500 acre wetland: $14K/acre/yr for 5 yrs, $35K/yr thereafter (land acquisition =$5M, planning/permitting=$250K, construction=$1.3M,monitoring=$25K/yr for 5 yrs, O&M=$35K/yr) (2) $1K/acre (restore tidal action to salt pond) (3) $18K/acre (seasonal/tidal wetland) (4) $27K/acre (levee construction/repair, extensive dredging) (5) $56K/acre (highly engineered, large soil volume, channel excavation, low berms)	USEPA '99, p170 USEPA '99, p172 " " "
CA farmland	FY07	typical	Light: $75/acre Moderate: $187.50/acre Intensive: $375/acre	NRCS

HR - RIPARIAN RESTORATION

This section covers restoration of erosion-prone banks adjacent to the stream and within the riparian corridor. Riparian area is defined as the area, including any necessary fencing, between the fence and the middle of the stream. Table HR-1 pertains to fencing/livestock exclusion, Table HR-2 to fence maintenance, Tables HR-3 and HR-4 to riparian planting, Table HR-5 to irrigation, and Table HR-6 to invasive/noxious weed control.

As indicated in Table HR-1, Evergreen (Evergrn p11) estimates fence construction costs at $1-$12/foot, with an "overall average" of $3-12/foot. CDFG's Coho Recovery Strategy (CDFG'04, p1.20) uses the midpoint of this latter range ($8/foot). Cost of all individual fencing projects (CDFG-xxx, HT07a, HT07b, NRCS CA) are expressed in $ per foot, even for projects that also include components other than fencing (e.g., revegetation, irrigation, stock water systems). For most of these projects (even those with added components), costs generally fall within the $1-$12/foot range indicated by Evergreen.

Table HR-1. Fencing/Livestock Exclusion - $/foot

Location	Year	Units	Cost Per Unit	Source
Puget Snd	2003	typical	Fence Material: Simple: $1-$4/ft Average: $5-$8/ft Complex: $9-$12/ft Overall Average: $3-$12/ft	Evergrn p11
CA	2004	typical	$8/ft	CDFG'04, p1.20
ShastaR	01-02	7800'	$56.6K ($7.26/ft, 7800' fence, 6 stockwater areas)	CDFG-065
EelR EelR EelR SLO Cnty TrinityCnty ShastaR ShastaR	02-03	1.1 mi 2 mi 3.5 mi 7600' 1 mi 1250' 850'	$40,800 ($7.02/ft) $19,993 ($1.89/ft) $28,664 ($1.55/ft) $56.4K ($7.42/ft; fencing, alternative water sources for cattle, riparian planting, temporary irrigation) $31,138 ($5.90/ft) $7,032 ($5.63/ft, +10yr maint & grazing exclusion) $4963 ($5.84/ft, +10yr maint & grazing exclusion)	CDFG-026 CDFG-116 CDFG-193 CDFG-243 CDFG-251 CDFG-324 CDFG-342
SmithR (dairy) RussianR	03-04	2K' 800'	$32,890 ($16.45/ft, incl riparian plant) $6.7K ($8.40/ft; fencing, water pump in stream to provide water for livestock)	CDFG-131 CDFG-195
ShastaR ShastaR ShastaR	04-05	13,500' 25,000' 3200'	$91,944 ($6.81/ft,native plants 1,685') $116,674 ($4.70/ft) $61,604 ($19.25/ft)	CDFG-194 CDFG-231 CDFG-243
SmithR KlamathR KlamathR	05-06	3000' 2600' 3600'	$21,259 ($7.09/ft, native trees) $17,494 ($6.73/ft, trees 3 acres) $25,850 ($7.18/ft)	CDFG-046 CDFG-188 CDFG-266

ShastaR	06-07	3500'	$28,213 ($8.06/ft, riparian veg)	CDFG-078
CA	98-05 2003$	10 sites	$7 ($2.43-$22.07)/ft - $37K/mi	HT07a-T60, p118
SONC SONC-NOCECA SCACO	98-05 2003$	6 sites 3 sites 1 site	$9 ($4.58-$22.07)/ft - $48.1K/mi $3.39 ($2.43-$4.89)/ft - $7.9K/mi $5.15/ft - $27.2K/mi	HT07a-T61, p121
CA	02-04	 2 sites 7 sites 2 sites	<u>Fence Material:</u> Simple: $1.89 ($0.79-$3.00)/ft Avg: $4.32 ($2.00-$7.00)/ft Complex: $4.72 ($3.44-$6.00)/ft	HT07b-T13, p34,contrctr
CA	98-05 2003$	9 sites	$7.24 ($2.43-$22.07)/ft	HT07b-T12, p33, CHRPD
CA	FY07	typical	<u>Fence Material:</u> Conventional: $3/ft Conventional extreme terrain: $8/ft Electric: $2/ft Woven: $6/ft	NRCS CA

OR	1993	typical	<u>System Type:</u> Access ramp: $600+fence ($100/yr maint) *(2006$: $788, $131/yr maint)* Nose/stream powered pump (surf/grndwtr): $350-$450/pump+fence ($50/yr maint) *(2006$: $460-$591, $66/yr maint)* Stream-powered pump w/flow&elev needs: $500-$1000/pump+fence ($50/yr maint) *(2006$: $657-$1314, $66/yr maint)* Plastic pipe (grndwtr): $1-$2/pipeline ft +troughs ($50/yr maint) *(2006$: $1.31-$2.63/ft, $66/yr maint)* Solar powered pump (grndwtr): $2K-$6K for solar equip, tank, fence, pad *(2006$: $2628-$7884)* Spring development (grndwtr): $700+fence+trough ($50/yr maint) *(2006$: $920, $66/yr maint)*	TSWCD, p6

Fence maintenance costs described in Table HR-2 range from $0.09 to $0.26/foot/year, depending on the fencing material. It should be noted that these estimates pertain to Iowa, not California.

Table HR-2. Fence Maintenance - $/foot

Location	Year	Units	Cost Per Unit	Source
Iowa	2005	1330'	<u>Fence Material:</u> Woven wire: $0.26/ft/yr Barbed wire: $0.21/ft/yr Hi-tensile, non-elec: $0.15/ft/yr Hi-tensile, elec: $0.09/ft/yr	MO-T6

Table HR-3 describes Evergreen's estimates of riparian planting cost, while Table HR-4 describes estimates from other data sources. Evergreen's estimates are $5K-135K/acre, and vary with the level of site preparation and material/site accessibility. The estimates used for CDFG's Coho Recovery Strategy (CDFG-04, p1.17) are $30K-60K/acre and were selected to fall within the range of Evergreen's estimates. Project costs reported in HT07a and HT07b are ~ $100K-$120K/acre (with the notable exception of a $434.8K/acre project). The NRCS estimates are at the low end of this range: ~$100-$1800/acre - depending on what is planted (trees or plants) and planting requirements (e.g., protected, shelters, wire cages, native species). An NRCS estimate of landing clearing costs is also included to address situations where clearing is a prerequisite for planting. The Bair example - $110/acre, pertaining to riparian reforestation - was also at the lower end of Evergreen's range .

For the examples from CDFG and Hampton, costs could be calculated on a per-mile but not a per-acre basis. Costs vary widely ($1K to > $200K/mile); some of this difference may be due to variations in the width of the buffer being planted (which is not clear from the data sources). Evergreen uses the following conversion from miles to acres (with acreage doubled when planting on both sides of the stream).
1 mile x 50 foot buffer = 6 acres (100% planted)
1 mile x 50 foot buffer = 1.8 acres (30% planted)
1 mile x 150 foot buffer = 18.2 acres (100% planted)
1 mile x 150 foot buffer = 5.5 acres (30% planted).

Table HR-3. Riparian Planting Projects - $/acre (Source: Evergreen 2003, p. 16)
Cost estimates pertain to Puget Sound. Estimates include construction, design, permitting, basic monitoring & routine maintenance (2 yrs), reestablishing site to prior conditions, project management.

Materials/Site Accessibility	Level of Site Preparation		
	Flat/Light Clearing	Avg Slope/Avg Clearing	Steep/Heavy Clearing
Low Cost	$5K-25K	$20K-50K	$60K-100K
Medium Cost	$10K-35K	$45K-65K	$70K-120K
High Cost	$30K-50K	$55K-80K	$100K-135K

Table HR-4. Planting - $/acre, $/stream length For entries involving multiple projects, cost reported as mean or mean (range) as avail.				
Location	Year	Units	Cost Per Unit	Source
CA	2004	typical	Distance from Road (assuming 50' buffer along streams): <0.25 mi: $30K/acre 0.25-0.5mi: $35K/acre 0.5-1mi: $45K/acre 1-2mi: $50K/acre 2-3mi: $55K/acre >3mi: $60K/acre	CDFG-04 p1.17
SONC SONC NOCECA NOCECA CentralVly SCACO	98-05 2003$	1 site(10ac) 2 sites(4mi) 4sites(128ac) 7 sites(3mi) 4sites(610ac) 1 site(28ac)	$1.8K/acre $30.8K ($8.8K-$52.9K)/mi $8K ($1.8K-$13.5K)/acre $95K ($3.7K-$436.6K)/mi $4.8K ($2K-$7.8K)/acre $23.6K ($495-$63.1K)/acre	HT07a-T61, pp121-125
CA	02-04	18 sites 14 sites 10 sites	Site Accessibility: Easy:$55.8K ($600-$434.8K)/acre (median=$8.9K/acre) Average: $9.1K ($40-$87.5K)/acre (median=$1.3K/acre) Difficult: $4K ($910-$15.1K)/acre (median=$2.3K/acre)	HT07b-T21, p 43.contrctr
CA	02-04	19 sites 11 sites	Prevailing Wages Required: No: $1.8K ($40-$8.5K)/acre Yes: $77.1K ($1.8K-$434.8K)/acre	HT07b-T30, p50,contrctr

CA	02-04	2 sites 8 sites 8 sites 22 sites	Irrigation Type Dri-water: $46.1K ($8.5K-$83.7K)/acre Drip irrig: $33.0K ($163-$120.5K)/acre Hand irrig: $26.2K ($414-$100K)/acre None: $27.1K ($40-$434.8K)/acre	HT07b-T34, p54,contrctr
CA farmland	FY07	typical	170-259 trees/acre: $109/acre 260-300 trees/acre: $154/acre 301-435 trees/acre: $182/acre 436-681 trees/acre: $240/acre 110 trees/acre (protected): $770/acre 300 trees/acre (protected: $2000/acre 170-260 trees/acre (shelters): $130/acre 261-325 trees/acre (shelters): $175/acre 326-434 trees/acre (shelters): $200/acre >435 trees/acre (shelters): $260/acre 95-150 plants/acre (wire cages):$225/acre 151-200 plnts/acre (wire cages):$320/acre 201-325 plnts/acre (wire cages):$470/acre 95-150 plants/acre (native spp): $735/acre 150-200 plnts/acre(native spp):$1050/acre 200-260 plnts/acre(native spp):$1380/acre 261-325 plnts/acre(native spp):$1755/acre Land clearing: $400/acre	NRCS CA
WindR-WA	2000	mile	$5K ($4K-$8K)/mi; $110/acre - riparian reforestation	Bair-p107
MaacamaCrk-SonomaCty	01-02	300'	$12,790 ($225K/mi) - willow walls	CDFG-186

KlamathR WilsonCrk ShastaR	02-03	2600' 1 mi 2 mi	$27.6K ($52.8K/mi) $18.1K/mi $109,934 ($55K/mi)	CDFG-170 CDFG-208 CDFG-296
GarciaR-MendcnoCnty LowerTerwer Crk-KlamathR-DelNorteCnty	03-04	1600' 1600'	$67,695 ($223K/mi) - bioengineer $39,671 ($131K/mi) - willows, native	CDFG-117 CDFG-223
Klamath ShastaR	04-05	1600' 7000'	$55,868 ($184K/mi) - willow/native trees/bioengineer/removal of exotics $79,573 ($60K/mi)	CDFG-122 CDFG-172
CA	2000	11 projects	$13.7K ($1.0K-$47.5K)/mi	Hampton-T3, p125
CA		12 projects	$8 ($0.17-$23)/ft or $42.2K ($898-$121K)/mi	Hampton-T4, p125

Some of the projects in Table HR-4 above included irrigation in combination with revegetation. Table HR-5 provides estimates of irrigation costs only (NRCS CA) that range from $800 to $3K/acre and vary by irrigation method and habitat type. An example of capital cost (irrigation pumps, CDFG-279) is also provided.

Table HR-5. Irrigation - $/acre, $/project

Location	Year	Units	Cost Per Unit	Source
CA farmland	FY07	typical	Irrig system, surf & subsurface: $3K/acre Micro-irrig, hillside: $1.5K/acre Micro-irrig, wildlife-upland habitat: $800/acre Sprinkler irrig, hillside/sloping: $2.5K/acre	NRCS CA
Eel R	04-05		$17.3K - solar powered irrigation pumps to ensure seedling survival until natural roots grow	CDFG-279

Information on invasive weed control is limited: $5K-$12K/acre for projects on the Napa and Smith Rivers (04-05 CDFG-072 & CDFG-077). NRCS cost estimates for farmland are much lower ($10-$375/acre) and vary, depending on eradication method (e.g., mechanical/chemical, mechanical/chemical/handtool), land type (e.g., upland, wetland), and vegetation type (e.g., woody, herbaceous). A Russian River project (02-03 CDFG-325) can be costed on a per-mile basis but cost per acre is not known.

Table HR-6. Invasive/Noxious Weed Control - $/acre, $/mile

Location	Year	Units	Cost Per Unit	Source
RussianR	02-03	2.5mi	$30.2K ($12.1K/mi,broom,native reveg)	CDFG-325
NapaR SmithR	04-05	22,865yd^2 (4.7acres) 10acres	$55.7K ($11.9K/acre, arundo erad) $49.5K($5K/acre,Eng ivy, plantseedlng)	CDFG-072 CDFG-077

CA farmland	FY07	typical	***Exotic Vegetation Management*** Woody veg, mech/chem/handtool Light: $18.75/acre Moderate: $37.50/acre Intensive: $75/acre Mechanical/chemical, upland Light: $10/acre Moderate: $20/acre Intensive: $50/acre Woody veg (early successional), mech/chem/handtool Intensive: $50/acre Herbaceous veg, early successional, mech/chem/handtool Moderate: $25/acre Mult applic/yr, wetland, mech/chem/ handtool Light: $75/acre Moderate: $187.5/acre Intensive: $375/acre ***Competing Vegetation Management*** Conservation cover General: $50/acre Riparian herbaceous: $50/acre Forest stand improvement Mastication: $920/acre Hand, 0-15%slope, 20-40%cover:$600/acre Hand, 15-30%slope, 40-60%cover:$900/acre Hand, 30-50%slope, 60-90%cover:$1200/acre Brush rake: $379/acre Chemical: $150/acre	NRCS CA

HS - BANK STABILIZATION

This section covers stabilization of eroding, collapsing or otherwise de-stabilized bank.s. Table HS-1 provides Evergreen's cost estimates for streambank stabilization, Table HS-2 provides similar estimates from other data sources, and Table HS-3 focuses on levee restoration.

Evergreen's estimates ($30-$1000/foot) vary by extent of excavation and waterway size. Cost estimates used in CDFG's Coho Recovery Strategy (CDFG'04, p1.19) were $250-$350/foot and fall within the range of Evergreen's estimates for small/medium waterways. Generally speaking, other project costs in Table HR-2 also fall within Evergreen's range of estimates.

The higher cost projects appear to involve stabilization work other than just revegetation and/or work on steep terrain (e.g.,03-04 CDFG-285, 04-05 CDFG-263). For those projects that are identifiable to location, costs also appear to be higher in urban areas - e.g., southern California (05-06 CDFG-065, 069, 097) and King County, WA (Neal-T2, p159 & Neal-T3, p161). By contrast, cost in the rural Wind River watershed ($9-$42/ft, Bair-p107) falls toward the low end of Evergreen's range.

Table HS-1. Streambank Improvements - $/lineal foot (Source: Evergreen 2003, p. 30)
Cost estimates pertain to Puget Sound. Estimates include construction, design, permitting, basic monitoring & routine maintenance (2 yrs), reestablishing site to prior conditions, project management.

Extent of Excavation	Size of Waterway		
	Small	Medium	Large
Minimal	$30-60	$60-150	$150-400
Moderate	$60-100	$150-250	$400-700
Substantial	$100-200	$250-500	$700-1000

Table HS-2. Bank Stabilization - $/foot

Location	Year	Units	Cost Per Unit	Source
CA	2004	typical	Distance from Road: 0.25-0.5mi: $250/ft 0.5-1mi: $275/ft 1-2mi: $300/ft 2-3mi: $325/ft >3mi: $350/ft	CDFG'04, p1.19
GualalaR	01-02	3200'	$91,850 ($29/ft)	CDFG-196
NF MattoleR EelR BearR-HmbldtCnty	02-03	1500' 4915' 260'	$46,806 ($31/ft) $157.3K ($32/ft) $37,962 ($146/ft)	CDFG-096 CDFG-134 CDFG-181
StaRosaCrk-SonomaCnty	03-04	350' long x 30' high creekbank	$124,201 ($355/ft) - stabilize/ construct/revegetate)	CDFG-285

SalmonCrk RussianR VanDuzenR StaYnezR	04-05	150' 150' 1500' 520'	$15,187 ($101/ft) - bioengineer $18,774 ($125/ft) - bioengineer $75,065 ($50/ft) - boulder, bioengineer $296,692 ($571/ft) - stabilize/ construct/revegetate	CDFG-030 CDFG-069 CDFG-158 CDFG-263
VenturaR StaYnezR StaMonicaBy KlamathR EelR	05-06	300' 1600' 300' 950' 3080'	$62,571 ($209/ft) $264,605 (165/ft) $110,894 ($370/ft) $86,609 ($91/ft) $92,241 ($30/ft) - incl riparian tree planting	CDFG-065 CDFG-069 CDFG-097 CDFG-118 CDFG-279
SONC NOSECA/ SONC SCACO	98-05	1 site(0.2mi) 1 site(0.03mi) 1 site(2.0mi)	$163.9K/mi ($31/ft) $181.9K/mi ($34/ft) $510K/mi ($97/ft)	HT07a-T61, pp121-124
CA	98-05 2003$	3 projects	$54 ($31-$97)/ft	HT07b-T63, p 90,CHRPD
CA	02-04	 10 projects 25 projects 18 projects	<u>Material Complexity:</u> Minimal:$30 ($5-$59)/ft Moderate:$120 ($4-$750)/ft Substantial:$181 ($6-$895)/ft	HT07b-T69, p 96,contrctr
Sacrmnto/San JoaquinDelta	2002	3.72 mi	$1.5M ($76/ft) - bioengineering, planting/baffling	ERP-02-P12
WindR-WA	2000	typical	$9-$42/ft	Bair-p107
King County, WA	1995 1997	1400' 100'	$444K ($317/ft) - instream/ floodplain)* *(2006$: $560K/project, $400/ft)* $93K ($930/ft) - LWD/bank stabilization* *(2006$: $113K/project, $1133/ft)*	Neal-T2, p159 Neal-T3, p161
* Includes design, land/easements, permits, SEPA and construction. For 1995 project, replanting, irrigation and 5 year plant maintenance also included.				

Table HS-3 provides levee-related cost estimates for several Central Valley rivers, the Pajaro and San Lorenzo Rivers (in Santa Cruz/Monterey counties), and Green River (in Washington). Comparison of estimates from different time periods suggests that levee repair costs have increased significantly (beyond the rate of inflation) - perhaps reflecting major change in levee demand and/or input supply conditions in recent years.
<u>Central Valley:</u> A single example of levee evaluation costs was found ($11/foot; Harder 06, p21). Levee repair costs from the 1980s and early 1990s were ~$500-$1000/foot (after correcting for inflation). More recent cost estimates are ~$5K-$6K/foot. Although per-foot cost estimates were not available for the Yuba/Feather River project (EPS '06, Tables B1&B2), levee improvement: environmental mitigation cost ratios from that project (25:1 for the Yuba, 8:1 for the Feather) are provided here, as they may also be useful for recovery planning.
<u>Pajaro/San Lorenzo River:</u> The 1989 cost estimates were ~$200-$500/foot (after correcting for inflation). The more recent estimates (developed by USACOE to evaluate various alternatives for Pajaro River flood protection) are ~$1.5K to $5K/foot.
<u>Green River:</u> Suggests the wide range of costs possible for levee repair.

Table HS-3. Levee Evaluation/Repair/Setback/Habitat Enhancement ($/foot)

Location	Year	Units	Cost per Unit	Source
CentralValley	2006	typical	$60K/mi (11/ft) - structural re-evaluation	Harder 06, p.21
SacrR	2006	29 sites, 30K ft	$172.5M ($5750/ft) - emergency erosion repair	DWR 06
SacrR	1980s 2005	typical typical	$300/ft - repair *(2006$: $500/ft)* Up to $5K/ft - repair	DWR 05, p.5
Bear River	2007	10K ft	$51M ($5.1K/ft) - setback	GEI 07
Twitchell Island, SanJoaqR	early 90s	3K ft	$2.5M/mi ($473/ft) - setback *(2006$: $636/ft)* $3.5-$4M/mi ($663-$758/ft) - setback+planting *(2006$: $891-$1019/ft)*	Nuedeck 00
Yuba R Plain FeatherRPlain	2006		Levee improve$:envir mitigatn$ $40.5M:$1.6M=25:1 $191.6M/$23.4M=8:1	EPS 06, Tables B-1 & B-2
SanLorenzoR PajaroR	1989	5.2K ft 12K ft	$1.75M ($337/ft)-rebuild levee *(2006$: $499/ft)* $1.84M ($153/ft)-repair *(2006$: $226/ft)*	McDonnell '92

Pajaro River mainstem	2002	11.4mi* 60,192'	Alt 1-$145.8M ($2422/ft), floodwall/levee raise Alt 2-$175.4M (2914/ft), 100'setback Alt 3-$177.3M ($2946/ft), 100'-225' setback Alt 4-$322.2M ($5353/ft), floodwall	USACOE '02
Pajaro River tributaries (Salsipuedes &Corralitos Creeks)	2002	4.4mi* 23,232'	Alt T1-$35.1M ($1511/ft), levee raise Alt T2-$38.8M (1670/ft), setback Alt T3-$34.7M ($1494/ft), hybrid raise/setback	USACOE '02
Pajaro River mainstem (MS) & tributaries (T)	2003	15.8mi* 83,424'	Alts 2A&T4-$217.7M ($2610/ft), 100' setback Alts 3&T3-$218.3M ($2617/ft), 225' setback Alts 2A&T3-$215.3M ($2581/ft), 100' MS, 225' T Alts 3&T4-$220.7M ($2646/ft); 225' MS, 100' T	USACOE '03
* Info on project size obtained from MIG Inc (2001), p. 14. Mainstem includes river reaches 1-4; tributaries include river reaches 5-6.				
Green River, Seattle	2007	typical	$1K-$15K/ft, repair	Johnson 07

HU - WATERSHED RESTORATION (UPSLOPE)

This section covers upslope restoration to reduce stream sedimentation. Table HU-1 pertains to road decommissioning, Table HU-2 to road upgrade, Table HU-3 to landslide/gully stabilization and Table HU-4 to planting in upland areas (as distinct from riparian planting described in Table HR-4).

According to Weaver/Hagans (WH-T7, p100), road decommissioning costs generally range from $2K-$35K/mile but may go as high as $51K/mile for moderately difficult roads. Most of the other examples fall within Weaver/Hagans' range. CDFG's Coho Recovery Strategy (CDFG '04, p1.28) assumes $9K/mile, which is toward the lower end of the Weaver/Hagans' range.

Table HU-1. Road Decommissioning - $/mile				
Location	Year	Units	Cost Per Unit	Source
CA	2000	typical	Moderately difficult roads: $51K/mi Range of roads: $2K-$35K/mi	WH-T7, p100
CA	2004	typical	$9K/mi	CDFG'04 p1.28
KlamathR Mendcno Klamath	02-03	9 mi 3.5 mi 34.3 mi	$32,029 ($3.6K/mi) - timber road $105,025 ($30K/mi) $348,407 ($10.2K/mi) - forest road	CDFG-214 CDFG-233 CDFG-331
TrinityR NoyoR	03-04	3.6 mi 8.5 mi	$43,690 ($12.1K/mi) $137,495 ($16.2K/mi)	CDFG-197 CDFG-267
SalmonR KlamathR TrinityR	04-05	5.9 mi 4.5 mi 1.4 mi	$259,087 ($43.9K/mi) $257,787 ($57.3K/mi) $130,567 ($93.3K/mi)	CDFG-004 CDFG-006 CDFG-251
TrinityR VanDuzenR HumboldtBy HumboldtBy	05-06	5 mi 2.25 mi 3 mi 9.7 mi	$320,866 ($64.2K/mi) $188,560 ($83.8K/mi) $333,736 ($111.2K/mi) $411,567 ($42.4K/mi)	CDFG-015 CDFG-119 CDFG-120 CDFG-121
Klamath-FS TrinityR	06-07	13.3 mi 2.33 mi	$392,797 ($29.5K/mi) $25,000 ($10.7K/mi)	CDFG-169 CDFG-104
SONC	98-05 2003$	2 sites	$121.6K ($8.2K-$235K)/mi	HT07a-T61, p121
CA	02-04	39 sites	$34,090 ($4K-$200K)/mi	HT07b-T76, p101.contrctr
CA	98-05 2003$	3 sites	$285.2K ($164K-$510K)/mi	HT07b-T77, p102,CHRPD
WA- ForestSvc	2000	6 sites	$6,522 ($1,8K-$15K)/km, or $4.1K ($1.1K-$9.3K)/mi	Coffin-T1, p53

According to Weaver/Hagans (WH-T7, p100), road upgrade costs are generally $10K-$35K/mile but may go higher than $45K/mile for difficult or high-density sites. CDFG's Coho Recovery Strategy (CDFG '04, p1.27) assumes $15.9K/mile, which is toward the lower end of the Weaver/Hagans' range (~$23K/mile). Most of the other examples fall within Weaver/Hagans' range.

Table HU-2. Road Upgrade - $/mile

Location	Year	Units	Cost Per Unit	Source
CA	2000	typical	Upgrade Type: Difficult, 100 yr design: $42.5K/mi Mod-diff, hi-site density: $45.5K/mi Watershed-wide, low/high priority, 100 yr design: $25K-$35K/mi Watershed-wide avg, 100 yr design: $10K-$35K/mi	WH-T7, p100
CA	2004	typical	$15.9K/mi	CDFG'04 p1.27
MendcnoCnty SiskiyouCnty	01-02	1.1 mi 17.6 mi	$32,963 ($30K/mi) $741,656 ($42.1K/mi)	CDFG-159 CDFG-165
KlamathR SalmonR SalmonR	02-03	22.2 mi 16.7 mi 16.7 mi	$558,016 ($25.1K/mi) $698,384 ($41.8K/mi) $492,376 ($29.5K/mi)	CDFG-017 CDFG-018 CDFG-019
SmithR MndocinoCnty	03-04	10.9 mi 6 mi	$509,363 ($46.7K/mi) $173.3 ($28.9K/mi)	CDFG-007 CDFG-037
EelR RussianR GarciaR EelR RussianR MattoleR	04-05	12.1 mi 11.7 mi 5.25 mi 23.1 mi 11 mi 2 mi	$176,718 ($14.6K/mi) $560,476 ($47.9K/mi) $155,382 ($29.6K/mi) $299,076 ($12.9K/mi) $427,212 ($38.8K/mi) $59,706 ($29.9K/mi)	CDFG-027 CDFG-111 CDFG-195 CDFG-225 CDFG-268 CDFG-285
EelR	06-07	8 mi	$389,486 ($48.7K/mi)	CDFG-009
CA	98-05 2003$	12 sites	$18K ($1.9K-$52K)/mi	HT07a-T60, p118

SONC NOCECA-SONC NOCECA	98-05 2003$	3 sites 2 sites 7 sites	$12.3K ($2.1K-$32.1K)/mi $12.7K ($3.3K-$22.1K)/mi $22K ($1.9K-$52K)/mi	HT07a-T61, p121
CA	02-04	43 sites	$169K ($1K-$3.5M)/mi	HT07b-T86, p123,contrctr

Limited information contained in Table HU-3 (mostly from the Eel River) shows landslide repair costs ~ $1K-$3.5K/site.

Table HU-3. Landslide and Gully Stabilization - $/acre				
Location	Year	Units	Cost Per Unit	Source
EelR EelR MarinCnty EelR	04-05	34 sites 54 sites 80 sites 30 sites	$115.9K ($3410/site) $86.5K ($1601/site) $279.8K ($3497/site) $29.7K ($990/site)	CDFG-156 CDFG-160 CDFG-174 CDFG-213

The estimate of <u>upland</u> planting cost in Table HU-4 falls toward the lower end of <u>riparian</u> planting costs previously described in Table HR-4; however, it is difficult to generalize from a single example.

Table HU-4. Planting - $/acre				
Location	Year	Units	Cost Per Unit	Source
TrinityCnty	02-03	100 acres	$194,468 ($1945/acre)	CDFG-254

TW - TAILWATER MANAGEMENT

Cost of tailwater management is represented in Table TW-1 in terms of acres of farmland irrigated by tailwater. Costs are ~$20-$400/acre. The NRCS example suggests that cost per acre declines as total acreage increases.

Table TW-1. Tailwater Management System - $/acre				
Location	Year	Units	Cost Per Unit	Source
SiskiyouCnty	01-02	540 ac	$220.2K ($408/acre, collect, hold and return water to high end of unit for re-use)	CDFG-049
CA	1987	typical	$125/acre *(2006$: $198/acre)*	USEPA p13
CA-rice	1990	typical	<u>System Type:</u> Static irrig system*:$95/acre (6-10 acre basin) *(2006$: $135/acre)* Recirculating system: $20/acre (1000 acre system) to $150/acre (80 acre system) *(2006$: $28-$214/acre)*	Hill 4/7 Hill 3/7
* Static irrigation consists of a ditch and flashgated pipe system that limit inflow into basin to amount required to replenish water lost to evapotranspiration and percolation. This recent innovation in rice irrigation eliminates possibility of tailwater spillage into public drains.				
CA	FY07	typical	***Size of Area Covered by System:*** 1-50 acres: $10K, $400/acre(=$10K/25ac) 51-100 acres: $20K, $267/acre 101-200 acres: $30K, $200/acre 201-300 acres: $40K, $160/acre 301-400 acres: $60K, $171/acre 401-500 acres: $80K, $178/acre	NRCS CA
CA-cotton	2000	typical	Furrow irrig+tailwater system: $60-$80/acre	Sanden
Colorado	1998	typical	$150-$225/acre (earthwork, pipeline install, pump assembly)	Broner

WC - WATER CONSERVATION MEASURES

This sections cpertains to methods of providing more efficient use of water extracted from stream systems. Table WC-1 pertains to ditch lining and Table WC-2 to piping.

Canal lining costs described in Table WC–1 are ~ $15-$96/foot. Such projects often involve installation of related equipment such as control structures. For large projects, the cost of planning/environmental/administrative aspects can comprise a substantial portion of total project costs (e.g., 62% of total costs for the ACID project). Project life ranges from 20-50 years. In cases where proponents provided estimates of project benefits (in terms of value of conserved water), benefits were estimated using water prices of $25-$75/acre foot.

Table WC-1. Ditch Lining - $/ditch length, $/acre farmland treated

Location	Year	Units	Cost Per Unit	Source
Anderson	01-03	2 mi	Cost Breakdown: Planning/environ/admin: ~$4M Control struc, measurement flumes, SCADA systems@13 sites: $1.494M ($114.9K/site) Concrete anal lining: $1M ($96/ft) Project life=30yrs Value conserved water=$50/af	ACID
MercedCnty	01-03	25K' 600 ac	$2M ($79/ft, $3.4K/acre) Includes 50 control structures Project life=50yrs Value conserved water=$25/af	MCWD
CA	FY07	typical	Liner Type: Plain concrete: $20/ft Flexible membrane: $15/ft Galvanized steel: $20/ft	NRCS CA
CA	01-03	13.5K’	$251K ($19/ft) - concrete Project life=20yrs Value conserved water=$75/af	OWID
CA	2001	8K’	$242K ($30/ft) - concrete Project life=20yrs	OWID ‘01

PlacerCnty	01-02	3 mi	Cost Breakdown: Planning/environ/admin: $81K 12 remote flow monitoring stns:$450K ($37.5K/stn) Canal lining: $794K ($50/ft) - concrete Project life=25 yrs Value conserved water=$40/af	PCWA

As indicated in Table WC-2, the only piping example found was $16/foot.

Table WC-2. Piping - $/pipe length				
Location	Year	Units	Cost Per Unit	Source
CA farmland	FY07	typical	$16/ft - irrig water conveyance, aluminum pipeline	NRCS CA

WD - WATER MEASURING DEVICES

This section pertains to instream and water diversion measuring devices to track mainstem/tributary flows. Table HB-4 above provides cost estimates for instream projects that involve use of head gates with other devices. Table WD-1 pertains to head gates alone. The limited examples provided indicate head gate costs of $2.8K-$10K.

Table WD-1. Head Gate - $/project				
Location	Year	Units	Cost Per Unit	Source
SiskiyouCnty	01-02	123 diversions	$350K ($2.8K/diversion) - lockable head gate & flow measuring device	CDFG-056
ScottR-Klamath	06-07	14 diversions	$142K ($10.1K/diversion) - head gate & flow measuring device	K033
CA farmland	FY07	typical	Headgate <3cfs: $5K Headgate >3cfs: $10K	NRCS CA

WP - WATER PURCHASE/LEASE

Table WP-1 pertains to purchase/lease/acquisition of short- or long-term water rights to improve water quality and/or quantity. The DWR sources indicate Central Valley water transfer prices of $43 - $246/acre foot/year. CDFG's Coho Recovery Strategy (CDFG'04, p1.43) assumes $100/af/yr - a value within the range of the DWR data. The water prices in Table WC-2 (previously presented in section "WC-Water Conservation Measures") are considerably higher than the prices imputed to water conserved in estimating value of water conserved by ditch lining in Table WC-2. A major distinction between the two is that Table WC-2 pertains to conserved water valued at the existing price being paid by the water user, while the Table WP-1 prices are transfer prices.

Table WP-1. Purchase/Lease of Water Right - $/acre foot (af)

Location	Year	Units	Cost Per Unit	Source
CA	2004	typical	$100/af/yr	CDFG'04 p1.43
Central Valley	01-02		***Upstream of Delta***	DWR
		135K af	State-YubaCntyWater Agency: $10.1M ($75/af/yr)	
		7.1K af	Fed-SacmntoGrndwtrAgency: $535.7K ($75/af/yr)	
			South of Delta	
		36.8K af	State-KernCntyWtrAgency: $6.7M ($181/af/yr)	
		60.6K af	Fed-KernCntyWaterAgency: $11M ($181/af/yr)	
Central Valley	02-03		***Upstream of Delta***	DWR
		4.9K af	State-OrovilleWyandotteIrrigDist: $386.6K ($75/af/yr)	
		65K af	State-YubaCntyWaterAgency: $5.5M ($85/af/yr)	
			South of Delta	
		125K af	State-KernCntyWaterAgency: $21.3M ($170/af/yr)	
		20K af	Fed-StaClaraVlyWaterDist: $3.2M ($162/af/yr)	
Central Valley	03-04		***Upstream of Delta***	DWR
		100K af	State-YubaCntyWaterAgency: $8.8M ($88/af/yr)	
		20K af	State-PlacerCntyWaterAgency: $1.7M ($83/af/yr)	
			South of Delta	
		35K af	State-KernCntyWaterAgency: $8.6M ($246/af/yr)	

Central Valley	04-05	4.6K af 89.7K af 8.8K af	***Upstream of Delta*** State-YubaCntyWaterAgency: $200K ($43/af/yr) ***South of Delta*** State-KernCntyWaterAgency: $15.8M ($177/af/yr) State-StaClaraVlyWaterDist: $1.6M ($184/af/yr)	DWR

HA - HABITAT ACQUISITIONS/LEASES/CONSERVATION EASEMENTS ($/ACRE)

Tables HA-1 and HA-2 respectively describe Evergreen's cost estimates for undevelopable land and parcels with medium-high development potential. Table HA-3 describes costs of easements and land purchases administered by California's Wildlife Conservation Board (WCB). Tables HA-4 and HA-5 respectively describe land acquisition and easement costs from a variety of other sources. Evergreen's estimates are inclusive of transaction and management costs as well as land acquisition price, while WCB's estimates include only acquisition price. The other data sources likely also include only acquisition price.

Evergreen's prices are $700-$4800/acre for undevelopable land (Table HA-1. For parcels with medium/high development potential and low to high amenity value, prices are $5K-$300K/acre for rural residential land, $60K-$600K/acre for suburban residential land, and $300K-$1.2M/acre for urban land; prices of parcels with very high amenity value are unpredictable (Table HA-2).

Table HA-1. Cost of Undevelopable Land - $/acre (Source: Evergreen 2003, p. 7)
Cost estimates pertain to Puget Sound. Estimates include appraisal, closing, commission, surveying, legal, project management costs.

Proximity to Urban Area	Zoning	
	Forest	Agricultural
Far 41+ mi	$700-1800	$1800-2400
Medium 21-40 mi	$1800-2400	$2400-3600
Near 0-20 mi	$2400-4800	$3600-4800

Table HA-2. Cost of Parcels with Medium-High Development Potential - $/acre (Source: Evergreen 2003, p. 6) Cost estimates pertain to Puget Sound. Estimates include appraisal, closing, commission, surveying, legal, project management costs.				
Zoning	Amenity Value			
	Low	Medium	High	Very High
Rural Residential	$5K-35K	$24K-60K	$60K-300K	$300K-1.2M
Suburban Residtl	$60K-120K	$120K-240K	$300K-600K	Unpredictable
Urban	$300K-600K	$600K-1.2M	Unpredictable	Unpredictable

The prices in Table HA-3 were derived by dividing WCB's expenditures for purchase/easement in each county by the number of acres subject to purchase/easement. These derived prices are $42 -$104.7K/acre for easements, and $267-$45.5K/acre for acquisitions. The acquisition prices are on the low side relative to Evergreen's estimates of $5K-$300K/acre for rural land and $300K-$1.2M/acre for urban land, (Table HA-2) and likely underestimate actual costs, as WCB's wildlife habitat acquisitions are often done on a cost-share basis.

Table HA-3. WCB Actions in 2000-2004: Total Acreage and $/Acre, by County (Source: Wildlife Conservation Board, 2005)				
	Conservation Easement		Fee Title	
County	Acres	$/Acre	Acres	$/Acre
Alameda			16,500	$4,485
Alpine				
Butte	10,369	$866	4,557	$726
Calaveras	3,669	$395		
Colusa	13,131	$128		
Contra Costa			3,808	$843
Del Norte			25,675	$812
El Dorado	1,178	$501	1,295	$4,239
Fresno			1,310	$7,291

Glenn			24,158	$568
Humboldt	3,640	$253	5,905	$5,184
Imperial				
Inyo			218	$4,394
Kern			4,743	$1,093
Lake			269	$968
Lassen			278	$1,079
Los Angeles			4,178	$43,083
Madera	443.5	$1636	1,140	$15,380
Marin			737	$7,017
Mariposa	6,801	$487		
Mendocino	560	$6607	39,704	$267
Merced	15,620.9	$893	4,359	$818
Modoc			2,080	$640
Mono	6,350	$506		
Monterey	27,715	$241	14,598	$1,408
Napa	17	$104,706	12,817	$546
Nevada			494	$1,387
Orange			6,508	$12,782
Placer			155	$1,131
Plumas	21,137	$140	279	$1,935
Riverside	1,324	$591	60,926	$1,871
Sacramento	5,526	$577	4,819	$1,159
San Bernardino			572	$6,324
San Diego			54,871	$2,135
San Francisco				
San Joaquin	3,515	$545		

San Luis Obispo	82,106	$420	32,551	$1,045
San Mateo	1,000	0	6,020	$2,495
Santa Barbara	1,406	$2,156	948	$15,651
Santa Clara			5,205	$1,822
Santa Cruz	18	$167	464	$12,349
Shasta	3,784	$158	1,524	$2,949
Sierra	500	$620	2,147	$12,809
Siskiyou	2,479	$42	118	$1,102
Solano	535	$1,903	5,536	$701
Sonoma	165	$10,333	5,484	$2,279
Stanislaus				
Sutter				
Tehama	21,557	$116	8	$44,063
Tulare	722	$176	2,667	$413
Tuolumne			333	$302
Ventura			3,018	$45,518
Yolo	6,983	$351	21,106	$865
Yuba	2,115	$56	2,153	$2,152
Total				

Tables HA-4 and HA-5 include information on habitat type, when available. Several projects involved expenditures on both acquisition and easement where it was not possible to determine how much was spent on each. Such projects were placed in Table HA-4 if most of the acreage involved acquisition and in Table HA-5 if most of the acreage involved easement; cost per acre was estimated by dividing total cost by total acreage (acquisition + easement).

Land acquisition values used by NMFS for the Columbia River Estuary Recovery Plan were $5K/acre for rural land and $100K/acre for urban land (Table HA-4, NOAA p5-46). These values are as low or lower than Evergreen's lowest prices for rural and urban land ($5K/acre and $300K/acre respectively, Table HA-2). For most other acquisitions described in Table HA-4, prices are ~ $200-$20K/acre, with the notable exception of several multi-million-dollar-per-

acre purchases in north/central California and southern California - both highly urbanized areas (Table HA-4: HT07a-T61, p121, NOCECA and SCACO). Prices of conservation easements (Table HA-5) are ~$300-$5.7K/acre - with the notable exception of a $65K/acre easement in Santa Barbara (CntySBPublicWrks).

Table HA-4. Land Acquisition - $/acre				
Location	Year	Units	Cost Per Unit	Source
ColR	2006	typical	Rural: $5K/acre Urban: $100K/acre	NOAA, p5-46
Mill/RockCrks-SmithR-DelNorteCnty	01-02	24,580 ac	$5M ($203/acre)	CDFG-034
SLOCreek	02-03	80 acres	$100K ($1250/acre)	CDFG-218
SONC SONC-NOCECA NOCECA CentralValley SCACO	98-05 2003$	16 sites 16 sites 51 sites 67 sites 87 sites	$12.1K ($157-$37.3K)/acre $10K ($316-$53.7K)/acre $295.6K ($138-$1.8M)/acre $5.9K ($195-$32.6K)/acre $87.3K ($387-$1.7M)/acre	HT07a-T61, p121
SanFranBay	1999	typical	$6K-$15K/acre (South Bay) $2K-3K/acre (North Bay)	USEPA ’99, p171
Badger Creek (Cosumnes River)	1996	4300 acres	$12.0M ($2.8K/acre) - wetland/ forest/vernal pool, Valensin Ranch	ERP-96-M06
Cache Slough (SacrmntoR/ SanJoaquinDelta)	1997	4760 acres	$8.747M ($1.8K/acre) - tidal wetland/ riparian corridor/upland, Liberty Island	ERP-97-B03
San Joaquin River	1997	6288 acres	$20.5M ($3.3K/acre) -floodplain, USFWS SanJoaq Natl Wildlife Refuge 4324 acr fee, 1964 acr easement	ERP-97-B04
Sacramento River	1997	1880 acres	$8.705M ($4.6K/acre) - seasonal wetland/riparian/riverine/aquatic	ERP-97-N02
Sacramento River	1997	95 acres	$838.7K ($8.9K/acre)	ERP-97-N04
Butte Creek	1997	93 acres	$151K ($1.6K/acre) - partial funding only	ERP-97-N06

Cosumnes River	1997	1655 acres	$5.210M ($3.1K/acre) - agricultural/dairy/woodland/ grassland/seasonal wetlands, incl cleanup/repair	ERP–97-N14
Napa River	1998	68 acres	$910K ($13.4K/acre) - marsh wetland, incl restoration	ERP-98-B13
Merced River, Tuolumne River	1998	360 acres	$830.5K ($2.3K/acre) -riparian/ wetland/riverine, Basso Bridge Ecological Reserve & Merced River ranch land	ERP-98-CO4/CO5
Butte Creek	1998	93 acres	$160.4K ($1.7K/acre) - riparian/ wet meadow/grassland/woodland	ERP-98-F03
Sacramento River	1998	537 acres	$2.123M ($4.0/acre) - aquatic/ wetland/riparian, Stones Lake NWR	ERP-98-F12
Petaluma River	1998	181 acres	$255K ($1.4K/acre) - Petaluma Marsh	ERP-98-F13
San Joaquin River	1998	224 acres	$1.1M ($4.9K/acre) - riparian wetland, San Joaquin NWR	ERP-98-F21
Napa River Marsh	1998	453 acres	$1.976M ($4.4K/acre) - South Napa R Tidal Slough	ERP-98-F23
Cosumnes River	1999	1512 acres	$5.2M ($3.4K/acre) - farmland/ riparian, McCormack-Williamson Tract	ERP-99-F04
Tuolumne River	2000	303 acres	$1.386M ($4.6K/acre) - Bobcat Flat Floodplain Acquis	ERP-00-F01
Cosumnes/ Mokelumne Rivers	2001	771 acres	$2.843M + $12.1K project mgmt ($3.7K/acre) - agricultural/ seasonalwetlands/upland/vineyard	ERP-01-N10
Stanislaus River	2001	371 acres	$2.613M ($7K/acre) - riparian/ agricultural land	ERP-01-N11
Sacrmnto/San Joaquin Delta	2001	9269 acres	$12.659M + $87.5K program mgmt ($1.4K/acre) -agricultural/ marsh/riparian/riverine land, Staten Island	ERP-01-N23

Sacrmnto/San Joaquin Delta	2002	1166 acres	$23M ($19.7K/acre) - wetland/ upland, Dutch Slough	ERP-02-C07-D
Tuolumne River	2002	198 acres	$706.6K($3.6K/acre) - floodplain/ riparian habitat, Big Bend 66 acres fee, 132 acres easement	ERP-02-D01
Stanislaus River	2002	184 acres	$2.4M + $357K project mgmt & admin ($13.2K/acre)	ERP-02D-C11
PetalumaRivDelta, SanPabloBay	2002	631 acres	$2.0M ($3.2K/acre) - tidal wetland/adjacent upland, Bahia site	ERP-02-P14
BigChicoCreek/ MudCreek/ SacrmntoRiver	2002	146 acres	$2.278M + $59.5K project mgmt & admin ($15.6K/acre) - irrigated cropland	ERP-02-P16-D
Crevis Creek (Deer Creek, Cosumnes River)	2002	294 acres	$823.2K ($2.8K/acre)	ERP-02-P49

Table HA-5. Conservation Easement - $/acre

Location	Year	Units	Cost Per Unit	Source
CA	03-04	typical	$209-$730/acre - rangeland	Anon'06,p4
Wolverton Gulch-Van DuzenR-HmboldtCnty	04-05	48 acres	$30K ($625/acre)	CDFG-128
ArroyoSeco R-MntereyCnty		100 acres	$300K ($3K/acre)	CDFG-259
SouthCoast StaBarbCnty	07-12	5 acres	$3.525M ($65K/acre)	CntySB PublicWrks
San Joaquin River	2001	362 acres	$2.075M ($5.7K/acre) - riparian/seasonal wetland	ERP-01-N08
Battle Creek	2001	2499 acres	$851.6K ($341/acre)	ERP-01-N24

NorthFork Cosumnes R	2002	2162 acres	$2.0M ($925/acre) - riparian/upslope 1814 acres easement, 348 acres fee	ERP-02-P02
Mill Creek/ Deer Creek	2002	23,846 acres	$4.470K ($187/acre - agricultural land	ERP-02-P26
Tuolumne River	1998	140 acres	$687.0K ($4.9K/acre) - permanent easement, Grayson Riv Ranch	ERP-98-F07
San Joaquin River Delta	1998	168 acres	$425K ($2.5K/acre) - permanent easement, Fern Headreach Island complex	ERP-98-F16
Deer Crk/Mill Crk - Sacr R	1998	166 acres	$688K ($4.2K/acre) - orchards/row crop agriculture/lowlands	ERP-98-F20
Sacrmnto River	1999	1512 acres	$2.0M ($1.3K/acre) - riparian/riverine	ERP-99-B12
LwrTuolumne /San Joaquin	1999	1073 acres	$1.4M ($1.3K/acre) - floodplain	ERP-99-R01
Battle Creek	1999	6851 acres	$2.048M ($299/acre) - 3 ranches, woodland/riparian/grassland/chaparral	IMM-02-I01

MD - MONITORING STATUS AND TRENDS (includes monitoring of baseline, status and trends in habitat, watershed processes and/or populations)

Table MD-1 includes monitoring projects funded by CDFG's Fisheries Restoration Grants Program over the past three fiscal years. Information on the nature of monitoring is provided, as available. Most of the projects focus on life history, migration, distribution, and abundance of particular species on particular streams. Costs are ~$12K-$300K/project. Most of the >$200K projects (e.g., 04-05 CDFG-054, CDFG-208, CDFG-260, CDFG-261; 05-06 CDFG-158 and CDFG-159) appear to have a strong analytical as well as monitoring component.

Table MD-1. Physical/Project-Scale Monitoring - $/project			
Location	Year	Cost Per Unit	Source
TopangaCrk	04-05	$98.3K-relate rainfall to recruitment/survival	CDFG-009
StaMonicaBay		$152.9K-steelhead abund/distribution	CDFG-010
MillCrk		$156.9K-life history, pop size	CDFG-012
SproulCrk(EelR)		$45.9K-production, run timing & size	CDFG-040
HumboldtBay		$216.2K-estuary use/residence time	CDFG-048
UpprRedwdCrk		$65.1K-juvenile migration, biometric data	CDFG-051
LowrRedwdCrk		$62.3K-juvenile migration, biometric data	CDFG-052
MendocnoCnty		$281.2K-life history in 6 streams, eval potential biases in spawning surveys	CDFG-054
ScottCrk		$192K-life history, support artificial propag programs to maintain ESA-listed pops	CDFG-153
SoCenCA		$82.4K-baseline data on spawning/rearing habitat conditions in 8 watersheds	CDFG-196
ScottR		$67K-data on watershed condition/stock status	CDFG-200
ScottR		$77.8K-outmigrant trapping	CDFG-202
ScottR		$45.9K-streamflow/precip gauging for Water Balance Model	CDFG-205
PrairieCrk-Hmbldt		$211.2K-validate monitoring protocols for watershed restoration	CDFG-208
Scott/ShastaR		$169.4K-juvenile migration	CDFG-224
DelNorte/Hmbldt		$307.1K-juvenile sal abundance for 2 regional watersheds, validate effectiveness of juvenile abundance trends as indic of adult pop conds	CDFG-260
SLO		$238.3K-distribution/habitat use; quantify linkages among stream physical habitat, water quality, macroinverts, land use & fish	CDFG-261
CanoeCrk-Hmbldt		$65.8K-effect of wildfire on habitat & aquatic ecosystem processes	CDFG-071

Mattole	05-06	$11.5K-life stage monitoring, smolt prod est	CDFG-082
Eel/Salinas,SLrnzo		$78.2K-historical baseline for genetic monitoring	CDFG-089
McGarveyCrk(KlamathRiver)		$141.9K-life history, pop status	CDFG-116
MendocnoCnty		$183.8K-life history 3 streams, evaluate potential biases in spawning surveys	CDFG-158
FreshwaterCrk		$264.8K-life history, eval potential biases in spawning surveys	CDFG-159
UpperRdwoodCrk		$48K-estimate smolt pop using mark-recapture	CDFG-164
LowerRdwoodCrk		$53.9K-estimate smolt pop using mark-recapture	CDFG-166
TomalesBay		$149.5K-life history	CDFG-245
Scott/ShastaR		$170.4K-juvenile migration	CDFG-252
MatilijaCrk		$140K-steelhead assessment	CDFG-277
MattoleR	06-07	$15.6K-downstream migrant monitoring, abundance estimate for chinoook/coho	CDFG-207
MattoleR		$17K-smolt production monitoring	CDFG-208
UpprRedwoodCrk		$48.4K-smolt abundance estimation	CDFG-064
LowrRedwoodCrk		$54.4K-smolt abundance estimation	CDFG-066
Scott/ShastaR		$170K-juvenile emigration monitoring	CDFG-127
MattoleR		$30K-escapement monitoring	CDFG-204
HumboldtBay		$168K-estuary use/residence time by juv sal	CDFG-062
TopangaCyn		$55.3K-steelhead distribution/abundance	CDFG-027
VenturaR		$76.6K-juvenile stlhead distribution/abundance	CDFG-034

MO - MONITORING WATERSHED RESTORATION

Table MO-1 pertains to implementation monitoring to determine if project treatments were constructed correctly and as planned, effectiveness monitoring to determine if restoration has produced desired habitat conditions and/or watershed processes, validation monitoring to determine if hypothesized responses of habitat, watershed processes and/or populations to restoration were correct.

The descriptions in Table MO-1 pertain to the type of restoration activity being monitored, with the cost estimates pertaining only to the monitoring component. The highest cost ($221.7K, ERP-97-N13) was for a bank stabilization project involving large-scale monitoring of many variables. Costs associated with monitoring of other individual projects ranged from $7K (for revegetation project ERP-97-N08) to $90K (for fish screen evaluation project ERP-97-C02). Several other estimates ($87.4K for 04-05 CDFG-036, $142K for 05-06 CDFG-171) involved monitoring of multiple projects funded by CDFG's Fisheries Restoration Grants Program.

Table MO-1. Implementation, Efectiveness and Validation Monitoring - $/project			
Location	Year	Cost Per Unit	Source
CA CanoeCrk-Hmbldt ShastaR Mattole	04-05	$87.4K - monitor pending/completed Fisheries Restoration Grants projects $65.8K - effect of wildfire on habitat&aquatic ecosystem processes $61.4K - monitor restoration sites for project effectiveness (habitat and fish) $65.1K - evaluate effectiveness of watershed rehab project	CDFG-036 CDFG-071 CDFG-273 CDFG-284
CA	05-06	$142K-monitor pending/completed Fisheries Restoration Grants projects	CDFG-171
Sacramento River	1997	$90K-screen evaluation project at Princeton Pumping Plant Fish Screen Facility	ERP-97-C02
Tuolumne River	1997	$47.6K - spawning gravel introduction (11K tons)	ERP-97-C11
Sacramento River	1997	$34K - restoration of 200 acres agricultural land to native riparian forest	ERP-97-N03a
Sacramento River	1997	$102.5K - restoration of 93 acres agricultural land to native riparian forest	ERP-97-N03b
Mill Creek/ Sacramento River	1997	$7.0K - restoration of native riparian vegetation for anadromous fish	ERP-97-N08
Barker/Lindsay/ Cache Sloughs-Sacr/SanJoaqDelta	1997	$29.8K - vegetative restoration	ERP-97-N10
Barker/Lindsay/ Cache Sloughs-Sacr/SanJoaqDelta	1997	$48.7K - exotic species removal	ERP-97-N10
Georgiana Slough/ NoMokelumne R-Sacr/SanJoaqDelta	1997	$221.7K - evaluation of alternative vegetative/ biotechnical techniques for stabilizing bank erosion/restoring levees	ERP-97-N13
Tolay Creek-San Pablo Bay	1997	$60K - 435 acre wetland restoration	ERP-97-N19

Prospect Island/ Cache Slough-SacramentoRiver	1998	$2.353M - levee repair and pump out; large scale monitoring of fish/wildlife/water quality/ phytoplankton/zooplankton/vegetation/benthic/ bathymetry/organic carbon	ERP-98-A01
SacramentoRiver	1998	$49K - fish screen construction	ERP-98-B26
Sacramento River	2000	$10.8K - fish screen installation on intake structure at Pump Station #1	ERP-00-B01
SanJoaquinRiver	2001	$233.4K - riparian/wetland restoration	ERP-01-N08
Sacramento River	2001	$86.3 ($8.6K/screen) 10 vertical screens <40 cfs	ERP-01-N52
Tuolumne River	2002	$203K - riparian floodplain/riverine habitat	ERP-02-P19-D
Mokelumne River	2002	$224.9K - songbird response to riparian restoration	ERP-02-P20

PL - WATERSHED EVALUATION, ASSESSMENT AND PLANNING

Table PL-1 provides examples of watershed evaluations/assessments, including partial assessments such as road erosion surveys and stream surveys. Almost all of the examples in the table come from CDFG's Fisheries Restoration GrantsProgram. Information on the nature of the assessment is provided, as available. Included are road inventory/sediment assessments (costed at $/mile), stream crossing assessments (costed at $/crossing), and watershed/estuary plans (costed at $/acre). According to Weaver/Hagans (WH-p91), the Grants Program allows up to $1.2K/mile for road assessments; just about all the road assessment examples in Table PL-1 meet this criterion. Stream crossing assessments cost $650-$1365/crossing. Most of the watershed plans cost $8-$13/acre and appeared to pertain mostly to erosion control. Several exceptions include a project on the Klamath River to address riparian/channel problems ($76/acre, 05-06 CDFG-115) and two projects involving Humboldt Bay ($853 and $3157/acre, 02-03 CDFG-169 & 227). CDFG's Coho Recovery Strategy (CDFG'04, p1.34) uses a planning cost estimate that is not scaled to the size of the plan ($200K/ planning exercise).

Table PL-1. Watershed Evaluation, Assessment and Planning - $/acre, $/mile, $/crossing				
Location	Year	Units	Cost Per Unit	Source
CA	2000	mile	$1.2K (max allowed by CDFG FRGP for full inventory/assessment/erosion control plan for roads)	WH-p91
HumboldtCnty	01-02	6063 ac	$48,080 ($8/acre) - erosion/hab rest	CDFG-106
DelNorteCnty		8718 ac	$83,959 ($10/acre) - erosion/hab rest	CDFG-107
EelR		45 mi	$20,338 ($452/mi) - road inventory	CDFG-136
HumboldtCnty		7 mi	$2011 ($287/mi) - road inventory	CDFG-140
HumboldtCnty		10.3 mi	$11,387 ($1106/mi) - road inventory	CDFG-141
RussianR	02-03	20 mi	$16.1K ($805/mi) - road inventory	CDFG-046
EelR		100 mi	$60K ($600/mi) - sediment assess	CDFG-077
EelR		8 mi	$2.7K ($333/mi)	CDFG-106
EelR		9 mi	$3.0K ($329/mi)	CDFG-125
HumboldtBay		35 acres	$29.9K ($853/acre) - estuary rehab plan	CDFG-169
HumboldtCnty		76.9 acres	$242,785 ($3157/acre) - erosion/hab rest	CDFG-227
SanFranCnty		66 mi	$70,786 ($1072/mi)	CDFG-279
StaCruz		153 mi	$142,812 ($933/mi) - erosion	CDFG-332
Dnorte/Humb/ MendoCnties		65 stream crossings	$42,246 ($650/crossing)	CDFG-327
EelR	03-04	50 mi	$38.1K ($763/mi) - sediment assess	CDFG-266
SalmonCrk	04-05	50 mi	$48,621 ($972/mi) - road inventory	CDFG-047
MattoleR		40 mi	$23,128 ($578/mi) - road inventory	CDFG-062
GualalaR		22 mi	$16,756 ($762/mi) - road inventory	CDFG-112
MendocinoCty		140 mi	$145,175 ($1037/mi) - sediment assess	CDFG-197
SLO Cty		130 mi	$124,269 $956/mi) - sediment assess	CDFG-210
EelR		110 mi	$131,023 ($1191/mi) - sediment assess	CDFG-238
MadR		49.1 sqmi (31424 ac)	$329,810 ($11/acre)	CDFG-255
SmithR		6.7 sqmi (4288 ac)	$55,828 ($13/acre)	CDFG-256
NavarroR		22 mi	$22,771 ($1035/mi, sediment assess	CDFG-271

CottonevaCrk MendcnoCnty MendcnoCnty MontereyCnty KlamathR MendcnoCnty HumboldtBay	05-06	110 mi 165 mi 80 crossng 14 mi 383 acres 50 mi 1.75 mi	$107,637 ($979/mi) - sediment assess $163,001 ($988/mi) - sediment assess $64.4K ($805/crossing) -inventory/assess $23,549 ($1682/mi) - sediment assess $29,240 ($76/acre) - ripar/chnnel dysfunc $55,514 ($1110/mi) $47,338 ($27.1K/mi) - estuary rehab	CDFG-040 CDFG-078 CDFG-101 CDFG-109 CDFG-115 CDFG-130 CDFG-276
RussianR Eel-SmithR	06-07	10 mi 50 crossng	$15,606 ($1560/mi) - sediment assess $68.2K ($1364/crossing)	CDFG-051 CDFG-084
CA	2004	typical	$200K/planning exercise	CDFG'04 p1.34

WATERSHED ORGANIZATION SUPPORT AND ASSISTANCE (OR)

Table OR-1 includes organizational support projects funded by CDFG's Fisheries Restoration Grant Program during the three most recent fiscal years. These can be roughly divided into two categories:
(1) database maintenance, costed at $135K-$152K/project/year. Data requiring maintenance include the California Habitat Restoration Project Database (CHRPD)(04-05 CDFG-033 & 05-06 CDFG-023), passage assessment data (04-05 CDFG-039 & 05-06 CDFG -031), and stream inventory reports (05-06 CDFG-033);
(2) watershed coordination/outreach, costed at $24K-$259K/project . The low end of this range range ($24K, 04-05 CDFG-219) pertains to support of a part-time watershed coordinator, while the high end ($259.1K, 05-06 CDFG-076) pertains to organizational work by a southern California non-profit. CDFG's Coho Recovery Strategy assumes $60K per educational/ technical assistance program (CDFG'04, p.1.35).

Table OR-1. Organizational Support and Assistance - $/project

Location	Year	Units	Cost Per Unit	Source
CA CA SmithR HumboldtCnty LindsayCrk ShastaValley	04-05	1 project 1 project 1 project 1 project 1 project 1 project	$134.3K - maintenance of CHRPD $196.7K - passage assessment database $52.0K - watershed coordinator $95.9K - RCD org support to landowners $24.1K - parttime watershed coordinator $137.3K - RCD outreach coordinator	CDFG-033 CDFG-039 CDFG-120 CDFG-211 CDFG-219 CDFG-230

CA CA CA StaBarb/ Ventura SmithR SalmonR AptosCrk to ORborder	05-06	1 project 1 project 1 project 1 project 1 project 1 project 1 project 1 project	$151K - maintain CHRPD $116.9K - passage assessment database $151.5K - consolidate stream inventory reports into CalFish $259.1K - organizational support by Community Environmental Council $103.8K - WatershedCoordinator $54.2K - org support by Restoration Council $141.3K - develop sampling frame for salmon monitoring	CDFG-023 CDFG-031 CDFG-033 CDFG-076 CDFG-098 CDFG-256 CDFG-268
CA	2004	typical	$60K per education/tech assist program	CDFG'04 p1.35

PM - PROJECT MAINTENANCE FOLLOWING PROJECT IMPLEMENTATION

Weaver/Hagans suggest $275/mile/year for culvert maintenance. Dupont estimates culvert life of 10-30 years, although his estimates pertain to Idaho (not California).

Table PM-1. Culvert maintenance - $/culvert/year

Location	Year	Units	Cost Per Unit	Source
CA	2004	typical	Routine culvert replacement/cleaning/fill slope excavation: $275/mile/year	WH, p101
Idaho	2004	typical	<u>Culvert Type:</u> Iron fish ladder - $10/yr (30 yrs) Block fish ladder - $10/yr (10 yrs) Baffled culvert - $20/yr (30 yrs) Drop structure - $40/yr (30 yrs)	Dupont-T5 (p62), T6 (p63)

Maintenance of 50 screens on Scott River cost $1.4K/screen/year. These are probably fairly small screens. Maintenance costs may be higher for larger screens.

Table PM-2. Fish Screen Maintenance - $/screen/year

Location	Year	Units	Cost Per Unit	Source
ScottR	01-02	50 screens	$68,896 ($1378/screen/year)	CDFG-034

Weaver/Hagans suggest $25/mile/year for maintenance of forest roads. Estimates for other types of roads could not be found.

Table PM-3. Road Maintenance - $/mile/year				
Location	Year	Units	Cost Per Unit	Source
CA	2000	typical	Maintenance inspection forest roads: $25/mi/yr	WH, p101

The only plant thinning example found was specific to farmland. Costs were contingent on the method of thinning (mechanical, hand, chemical).

Table PM-4. Upslope/Riparian Plant Thinnings - $/project				
Location	Year	Units	Cost Per Unit	Source
CA farmland	FY07	typical	Forest Stand Improvement-Thinning Mechanical: $850/acre Hand,15-30%slope,40-60%cover: $900/acre Hand,30-50%slope,60-90%cover: $1200/acre Chemical: $150/acre	NRCS CA

RE - COOPERATIVE FISH REARING

Flagg and Nash (1999) make a number of recommendations regarding operation of conservation hatcheries - e.g., select broodstock using appropriate genetic protocols, maintain broodstock on natural photoperiod and water temperatures, provide incubation and rearing environments that mimic conditions in the wild (e.g., overhead cover, instream structures/substrates), reduce rearing densities, vary water-flow velocities, provide "natural" diet composition and feeding rates, provide bottom feed delivery systems, rear fish in water from the intended return location, release hatchery smolts at sizes similar to wild smolts, provide for volitional releases that do not exceed carrying capacity, have multiple broodstock facilities to protect against local disasters (e.g., equipment failure), establish appropriate monitoring and evaluation strategies. They conclude that "Implementation of such [conservation hatchery] programs would require significant capital expenditure, with increased hatchery operating costs and reduced fish production. Some increased costs would be offset by conservation hatcheries releasing smaller numbers of highly adaptable fish."

Construction and operational costs of a conservation hatchery depend on a variety of factors - e.g., whether the hatchery is newly constructed or a modification of an existing hatchery, which of the Flagg/Nash recommendations are implemented at the hatchery and the particular facilities and protocols needed for such implementation, scale of hatchery production, the particular species at the hatchery (since rearing time varies among species).

The Kingfisher Flat Hatchery on Big Creek operates an artificial propagation program to supplement depressed wild coho runs. The hatchery receives about $95K/year from the CDFG Fisheries Restoration Grants Program (Table RE-1). The extent to which the $95K reflects the cost of the hatchery's coho conservation program is difficult to determine, given that (1) the hatchery engages in other activities as well (e.g., chinook rearing), (2) the hatchery relies heavily on volunteer labor and also receives funding from other sources, (3) the SWFSC Santa Cruz's captive broodstock program provides gametes to the Kingfisher facility to increase coho genetic diversity (at no cost to the hatchery).

Table RE-2 describes capital and operating costs for a number of Columbia River hatcheries that are larger than Kingfisher Flat. While some of these hatcheries engage in some conservation activities, they are largely production hatcheries. Information provided in Table RE-2 is intended to give a very rough idea of hatchery costs.

Table RE-1. Hatchery Operation

Location	Year	Cost	Production	Source
Kingfisher Flat Hatchery	04-05	$94.3K/year	~240K chinook smolts, 45K steelhead smolts,100s coho smolts	CDFG-281
Kingfisher Flat Hatchery	05-06	$99K/year	~240K chinook smolts, 45K steelhead smolts,100s coho smolts	CDFG-276

Table RE-2. Columbia River Hatcheries (Source: IEAB 2002)			
Name/ Operator	Cost		
	Annual Cost: Annualized Capital (Cap)*, O&M, M&E	$/Released Fish	Production Goal
Spring Creek/ USFWS	$2.07M=$1.17M (Cap) +$900K (O&M)	$0.14	15M sub-yearling tule fall chinook
Clatsop Econ Development Council/ ClatsopCnty	AcclimationCosts: FallChin - $41.8K SprChin - $242K Coho - $98.4K FullCycleCosts: Coho - $124.2K	 $0.23 $0.28 $0.04 $0.18	 180K fall chinook smolts 850K spring chinook smolts 3.4M coho smolts
NezPerce/ tribe	$5.3M=$1.2M (Cap)+$2M (O&M)+$2.1M(M&E)	$2.60	1.4M fall chinook smolts 625K spring chinook smolts
Yakima/tribe	$4.7M=$1.5M (Cap) +$3.2M (O&M)	research facility	810K spring chinook smolts 700K coho smolts
Leavenworth/ USFWS	O&M by Facility: Leavenworth-$863K Entiat-$329K Winthrop-$430K (Built 1939-40, no capital cost, fully depreciated)	By Facility: $0.33 $0.46 $0.47	3M spring chinook smolts 200K summer steelhead smolts
PriestRapids/ WDFW	$527K=$210K (Cap) +$317K (O&M)	$0.08	3.7M fall chinook smolts
Irrigon/ ODFW	$1.95M=$794K (Cap) +$1.156K (O&M)	$1.30	1.7M summer steelhead smolts
McCall/ Idaho DFW	$899K=$418K (Cap) +$481K (O&M)	$1.09	8K adult summer chinook
* Annual capital costs, calculated as the original construction cost amortized over 50 years at 3%.			

WILDLIFE MANAGEMENT

The average cost per pikeminnow harvested in the Columbia River bounty program is $6.05/fish. Whether this cost estimate would be similarly applicable to a California eradication program would depend on the nature and scale of the program and the extent of angler interest and success in harvesting pikeminnow.

Table WM-1. Invasive Aquatic Species (e.g., pike minnow eradication)			
Location	Year	Cost Per Unit	Source
ColR	2005	Annual program cost (rewards+tags): $1,546,232 Avg $6.05/fish (=$1,460,724 total rewards/241,357 total fish harvested)	Porter, p41

RES - RESEARCH - productivity research (life cycle monitoring/analysis), spatial structure (fish distribution surveys), genetic diversity (laboratory analysis of tissue samples), and abundance estimates

Columns 2-3 of Table RES-1 describe start-up and annual costs of monitoring activities identified by CDFG/NMFS in several recent workshops. Several caveats in interpreting the cost estimates: (1) The estimates pertain only to coastal salmonids (i.e., exclude Central Valley), (2) the estimates are incremental in that they represent what is needed over and above what is currently being spent for coastal salmonid monitoring, and (3) the estimates assume that all labor is paid (no volunteers).

Monitoring costs are provided here because monitoring data are essential to conducting research on VSP (viable salmon population) attributes. Columns 4-7 of Table RES-1 identify which types of data are relevant to evaluating which VSP attribute. Because some of the data requirements relate to multiple VSP attributes, it is impractical to devise separate costs for each attribute.

As reflected in Table RES-1, the monitoring program is intended to follow different strategies in northern and southern areas. The northern area is defined as the Oregon border to Aptos Creek (five ESUs); the southern area is defined as the Pajara River southward (two ESUs). The boundaries of the two monitoring areas do not coincide with the boundaries of the recovery domains. However, it may be possible to allocate monitoring costs among domains (e.g., on the basis of proportion of total salmonid stream miles within each domain).

The costs noted in Table RES-1 are incomplete with regard to overall coastal salmonid research needs. Other activities mentioned in Boydstun and McDonald (2005) include: (1) habitat condition monitoring, (2) augmented samples for genetic monitoring, (3) other biological monitoring (e.g., otoliths, adult gender, length-weight samples), and (4) laboratory and computer analysis of data.

Table RES-1. Monitoring Activities and Costs as They Relate to Specific VSP Attributes Source: Boydstun & McDonald 2005 - pp 54-55 & Table8/p 58.

Monitoring Activity	Estimated Cost		VSP Attribute			
	Startup	Annual	Abundance	Distri-bution	Genetic Diversity	Producti-vity
Northern spawner survey (OR border-Aptos Creek)	$566K	$2,545K	X	X	W/additnal sampling	X
Southern steelhead monitoring (PajaroR southward)	$65K	$541K	X			X
Life cycle monitoring stations (2 stns per coastal recovery domain)	$1,036K	$1,370K				X
Juvenile salmonid surveys	$177K	$1,307K	Cutthroat only*	X	W/additnal sampling	Cutthroat only*
25% hatchery fish marking (additional marking needed @ Iron Gate & Rowdy Creek only)	$0	$69K				X
Angler creel survey SmithR-SLO Creek, except Klamath/Trinity chinook/coho (already monitored by CDFG)	$14K	$369K				X
Administrative/ special studies	$36K	$789K				

* Assume monitoring from Eel River to Smith River and 30 miles inland.

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STATE OF CALIFORNIA

STATE WATER RESOURCES CONTROL BOARD

ORDER WQ 2009-0008

In the Matter of the Petition of

COUNTY OF LOS ANGELES AND LOS ANGELES COUNTY FLOOD CONTROL DISTRICT

Waste Discharge Requirements Order No. R4-2006-0074
Issued by the
California Regional Water Quality Control Board,
Los Angeles Region

SWRCB/OCC FILE A-1780

BY THE BOARD:

In 2001, the Los Angeles Regional Water Quality Control Board (Los Angeles Water Board) adopted Waste Discharge Requirements Order No. 01-182 (the permit), a national pollutant discharge elimination system (NPDES) municipal storm water permit. The permit authorizes storm water discharges from municipalities throughout the County of Los Angeles.[1] In 2002, the Los Angeles Water Board established a total maximum daily load (TMDL) for bacteria at Santa Monica Bay beaches during dry weather (the TMDL). The TMDL includes a waste load allocation for municipal storm water discharges. On September 14, 2006, the Los Angeles Water Board modified the permit by adopting Waste Discharge Requirements Order No. R4-2006-0074 (the Permit modification). The Los Angeles Water Board crafted the Permit modification to implement the summer dry weather waste load allocations in the TMDL.

On October 16, 2006, the County of Los Angeles and the Los Angeles County Flood Control District (Petitioners) filed a petition with the State Water Resources Control Board (State Water Board), challenging the Permit modification. The Petitioners asked that the petition be placed in abeyance. Two years later, in September 2008, the Petitioners activated

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[1] The City of Long Beach is subject to a separate municipal storm water permit. (Los Angeles Water Board Order 99-060 [NPDES No. CAS004002].)

the petition. In this Order, the State Water Board concludes that the Los Angeles Water Board's implementation of the TMDL through the Permit modification was appropriate and proper.[2]

I. BACKGROUND

A. Regulatory Background

The Petitioners contend the Los Angeles Water Board improperly translated the provisions of an existing TMDL into a municipal storm water permit. In this section, we provide a brief overview of relevant portions of the regulatory frameworks for TMDLs and for storm water regulation.

1. TMDLs

In State Water Board Order WQ 2001-06 (*Tosco*), this Board provided a detailed background of TMDLs. As we explained in the *Tosco* order, water quality standards provide the foundation for identifying impaired waters that require a TMDL. Clean Water Act section 303(c) requires the states to adopt water quality standards that protect the public health or welfare, enhance the quality of water, and serve the purposes of the Clean Water Act. Water quality standards consist of the beneficial uses of a water body and the criteria to protect those uses. For waters subject to the Clean Water Act, California's water quality standards are typically found in regional water quality control plans (basin plans) and in statewide plans.

Clean Water Act section 303(d) requires states to identify waters of the United States for which technology-based effluent limitations are not stringent enough to implement water quality standards. We refer to those waters that are not attaining water quality standards as impaired waters, and identify the impaired waters on the state's 303(d) list of water quality limited segments.

For the pollutants causing impairment of waters of the United States, Clean Water Act section 303(d) requires states to establish TMDLs. "A TMDL defines the specified maximum amount of a pollutant which can be discharged or 'loaded' into [impaired waters] from all combined sources."[3] A TMDL is the sum of the individual wasteload allocations assigned to point sources, load allocations for nonpoint sources, and other elements designed to achieve

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[2] To the extent Petitioners raised issues not discussed in this order, such issues are hereby dismissed as not substantial or appropriate for review by the State Water Board. (See *People v. Barry* (1987) 194 Cal.App.3d 158, 175-177; *Johnson v. State Water Resources Control Board* (2004) 123 Cal.App.4th 1107; Cal. Code Regs., tit. 23, § 2052, subd. (a)(1).)

[3] *Dioxin/Organochlorine Center v. Clarke* (9th Cir. 1995) 57 F.3d 1517, 1520.

water quality standards.[4] Regional water quality control boards typically adopt TMDLs as part of each region's basin plan[5] and therefore include programs for implementation.[6] In essence, TMDLs serve as a backstop provision of the Clean Water Act designed to implement water quality standards when other provisions have failed to achieve water quality standards.

TMDLs are not self-executing, but instead, rely upon further orders or actions to adjust pollutant restrictions on individual dischargers.[7] Federal regulations state that water quality based effluent limitations in NPDES permits must be consistent with the assumptions and requirements of the wasteload allocations in the TMDL, if the TMDL has been approved by the United States Environmental Protection Agency (U.S. EPA).[8]

The State Water Board estimates that statewide over 580 TMDLs will be needed for the current impaired waters list of 2,238 pollutant/water body combinations. Over 115 TMDLs are currently under development.

2. Municipal Storm Water Regulation

This Board has discussed the regulatory requirements for municipal storm water discharges in prior orders.[9] Section 402(p) of the Clean Water Act prohibits the discharge of pollutants from specified municipal separate storm sewer systems (MS4s) to waters of the United States except as authorized by an NPDES permit. Section 402(p) contains two substantive standards applicable to municipal storm water permits: MS4 permits (1) "shall include a requirement to effectively prohibit non-stormwater discharges into the storm sewers;"[10] and (2) "shall require controls to reduce the discharge of pollutants to the maximum extent practicable, including management practices, control techniques and system, design and engineering methods, and such other provisions as the Administrator or the State determines appropriate for the control of such pollutants."[11]

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[4] 40 C.F.R. § 130.3(i).

[5] See 40 C.F.R. §§ 130.6(c)(1) & 130.7.

[6] Wat. Code, §§ 13050, subd. (j), & 13242.

[7] *City of Arcadia v. EPA* (N.D.Cal. 2003) 265 F.Supp.2d 1142, 1144-1145; see also, e.g., State Water Board Resolution 2002-0149, ¶ 9 (approving Santa Monica Beaches Dry Weather Bacteria TMDL and noting that numeric targets and wasteload allocations are not directly enforceable and will need to be translated into individual permit requirements during a subsequent permitting action).

[8] 40 C.F.R. § 122.44(d)(1)(vii)(B).

[9] See, e.g., State Water Board Orders WQ 91-03 (*Communities for a Better Environment*), WQ 96-13 (*Save San Francisco Bay Ass'n*), WQ 2000-11 (*Cities of Bellflower et al.*), and WQ 2001-15 (*BIA*).

[10] 33 U.S.C., § 1342(p)(3)(B)(ii).

[11] *Id.*, § 1342(p)(3)(B)(iii).

U.S. EPA promulgated regulations establishing minimum requirements for all MS4 permits. The regulations generally focus on requirements that MS4s implement programs to reduce the amount of pollutants found in storm water discharges to the maximum extent practicable. The regulations also require the MS4's program to include an element to detect and remove illicit discharges and improper disposal into the storm sewer.[12] U.S. EPA added the illicit discharge program requirement with the stated intent of implementing the Clean Water Act provision requiring permits to "effectively prohibit non-storm water discharges."[13] Neither the Clean Water Act nor the federal storm water regulations define "non-storm water." "Illicit discharge" is defined as any discharge to an MS4 "not composed entirely of storm water."[14] Thus, "illicit discharge" is the most nearly applicable definition of "non-storm water" found in federal law and is often used interchangeably with that term.

B. Procedural Background

In 1998, the State Water Board added 44 Santa Monica Bay beaches to its 303(d) list due to bacteria impairments. As required by the Clean Water Act, the Los Angeles Water Board adopted a TMDL entitled *Dry Weather TMDL for Bacteria at Santa Monica Bay Beaches* (the TMDL) on January 24, 2002. The State Water Board approved the TMDL on September 19, 2002. The California Office of Administrative Law and U.S. EPA subsequently approved the TMDL, and the TMDL became effective on July 15, 2003.

The Los Angeles Water Board established the TMDL to protect swimmers and other recreational users of Santa Monica Bay beaches when there are dry weather conditions and the beaches are most heavily used. Dry weather is defined in the TMDL to mean those days with less than 0.1 inches of rain and days at least three days after a day with 0.1 inches of rain or more. The TMDL recognizes that, under certain conditions, even undeveloped watersheds may have exceedances of bacteria water quality standards. As a result, the TMDL differentiates between summer dry weather (April 1 to October 31) and winter dry weather (November 1 to March 31). In summer dry weather, a reference beach in an undeveloped watershed had no exceedances of bacteria water quality standards. The resulting summer dry weather wasteload allocations in the TMDL are, therefore, zero days of exceedance of the bacteria water quality standards at a particular beach. In winter dry weather, the reference

[12] 40 C.F.R. § 122.26(d)(2)(iv)(B).

[13] National Pollutant Discharge Elimination System Permit Application Regulations for Storm Water Discharges; Final Rule (hereafter Phase I preamble), 55 Fed. Reg. 47990, 47995 (Nov. 16, 1990).

[14] 40 C.F.R. § 122.26(b)(2). The definition of "illicit discharge" does provide exceptions for discharges pursuant to a separate NPDES permit and for discharges resulting from fire fighting activities. (*Ibid.*)

beach had three exceedances of the bacteria water quality standards. The resulting winter dry weather wasteload allocations allowed no more than three days of exceedance of the bacteria water quality standards at a particular beach.[15]

The TMDL includes wasteload allocations for municipal storm water discharges. Recognizing the different challenges associated with achieving the summer and winter dry weather wasteload allocations, as well as the higher summertime use of the beaches, the Los Angeles Water Board's implementation plan for the TMDL established a shorter schedule for achieving the summer dry weather wasteload allocations. The basin plan amendment establishing the TMDL included an implementation plan with a final compliance date of July 15, 2006 for summer dry weather. The final date for winter dry weather is July 15, 2009. By those dates, the TMDL's implementation plan anticipated there were to be no more discharges from MS4s that cause or contribute to exceedances of bacteria water quality standards on summer dry weather days.

The TMDL applies to Santa Monica Bay beaches along 55 miles of coastline, from Leo Carillo State Beach in the north to Outer Cabrillo beach in the south. Together, the beaches host an average of 55 million visitors per year, who add approximately $1.7 billion dollars to the local economy.

In May 2006, the Los Angeles Water Board's staff provided notice of its proposal to reopen and modify the permit in order to establish permit requirements consistent with the TMDL and its implementation plan. The proposed modification would make the TMDL's wasteload allocations enforceable, and be consistent with U.S. EPA's regulation requiring that effluent limitations in NPDES permits be consistent with the assumptions and requirements of the wasteload allocations in the TMDL.[16] The Los Angeles Water Board solicited and received two rounds of comments on the proposed permit revisions, held a public workshop to solicit oral and written comments, and issued two sets of responses to comments. During the comment period, the Los Angeles Water Board received many comment letters, including letters of support from Governor Schwarzenegger and other public officials. On September 14, 2006, the Los Angeles Water Board held a public hearing and adopted a permit modification that included requirements to implement the TMDL's summer dry weather wasteload allocations.

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[15] Relying on antidegradation principles, the TMDL established winter dry weather wasteload allocations of zero, one, two, or three days of bacteria exceedances based on a particular beach's historical water quality.

[16] 40 C.F.R. §122.44(d)(1)(vii)(B).

The modification prohibits discharges that cause or contribute to exceedances of bacteria water quality standards at Santa Monica Bay beaches on summer dry weather days. The Permit modification added Part 2.5 to the Receiving Water Limitations. Part 2.5 states:

> During Summer Dry Weather there shall be no discharges of bacteria from MS4s into the Santa Monica Bay that cause or contribute to exceedances in the Wave Wash, of the applicable bacteria objectives. The applicable bacteria objectives include both the single sample and geometric mean bacteria objectives set to protect the Water Contact Recreation (REC-1) beneficial use, as set forth in the Basin Plan.

The Permit modification also added a discharge prohibition. Discharge Prohibition 1.B states: "Discharges of Summer Dry Weather flows from MS4s into Santa Monica Bay that cause or contribute to exceedances of the bacteria Receiving Water Limitations in Part 2.5 below are prohibited." Neither the discharge prohibition nor the receiving water limitations includes an iterative process towards compliance.

Petitioners submitted a timely joint petition to the State Water Board on October 16, 2006. Pursuant to State Water Board regulations,[17] the petition was held in abeyance for nearly two years before Petitioners activated it on September 18, 2008. On that date, Petitioners also submitted a supplemental statement of points and authorities, which the State Water Board hereby adds to the administrative record. Petitioners, the Los Angeles Water Board, and a group of three environmental organizations sought leave to make additional submissions and to add evidence to the administrative record.[18] Those requests are hereby denied.[19]

II. ISSUES AND FINDINGS

Contention: The discharge prohibition and receiving water limitations added by the Permit modification are ambiguous and should be clarified.

Finding: The contested provisions are sufficiently clear and were properly adopted. We conclude that no changes are necessary and reject this contention. Petitioners claim that the discharge prohibition and receiving water limitations added by the Permit modification could be construed to prohibit storm water discharges containing bacteria, despite the Los Angeles Water Board's stated intention to limit those provisions to non-storm

[17] See Cal. Code Regs., tit. 23, § 2050.5, subd. (d).

[18] The filings include Petitioners' request to file a reply pleading, and various requests for administrative notice and to submit additional evidence.

[19] See Cal. Code Regs., tit. 23, §§ 2050.5, subd. (a), & 2050.6.

water discharges. In Petitioners' view, the words "non-storm water" should be added to Part 2.5 of the permit's receiving water limitations to match that intent and to clarify that Part 2.5 does not apply to storm water discharges.

Part 2.5 of the permit reads: "During Summer Dry Weather there shall be no discharges of bacteria from MS4s into the Santa Monica Bay that cause or contribute to [bacteria] exceedances…." The permit defines dry weather as "days with less than 0.1 inch of rainfall and occurring more than three days after a rain day."[20] "Summer Dry Weather" is a dry weather day occurring from April 1 to October 31 of each year.[21]

Petitioners' proposed revision to Part 2.5 would read: "During Summer Dry Weather there shall be no *non-storm water* discharges of bacteria from MS4s . . . ." (Italics added.) They argue that, without the change, Part 2.5 may apply to "storm water" because that term is defined in federal regulations to include "surface run-off and drainage." Petitioners imply that the federal reference to "surface run-off and drainage" includes run-off and drainage discharges that occur during dry weather periods of the summer.

We decline to accept Petitioners' proposed language, including their similar proposal for Discharge Prohibition 1.B, because the language chosen by the Los Angeles Water Board is clear and appropriate. The challenged permit provisions do not apply to storm water flows. U.S. EPA has previously rejected the notion that "storm water," as defined at 40 Code of Federal Regulations section 122.26(b)(13), includes dry weather flows. In U.S. EPA's preamble to the storm water regulations, U.S. EPA rejected an attempt to define storm water to include categories of discharges "not in any way related to precipitation events."[22] The Los Angeles Water Board's permit language follows U.S. EPA's approach. The new Permit provisions specifically regulate dry weather discharges, which are defined to exclude discharges occurring during or immediately following a reportable precipitation event. Any discharges during such dry weather days would not be precipitation-related. No liability will attach under these provisions for discharges during, or as the result of, a rainfall event exceeding 0.1 inches.

In any event, Petitioners' proposed language deviates from that of the underlying wasteload allocation. That wasteload allocation defines "dry weather" and "summer dry weather" with language identical to that used in the challenged provisions.[23] The discharges

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[20] Permit, Part 5, Definitions.

[21] *Ibid*.

[22] 55 Fed. Reg. 47990, 47995.

[23] See Basin Plan, Tables 7-4.1, 7-4.2a.

regulated by the wasteload allocation are not qualified by the modifier "non-storm water," or any other term. Because 40 Code of Federal Regulations section 122.44(d)(1)(vii) requires effluent limitations to be consistent with the assumptions and requirements of the underlying wasteload allocation, we refuse to unnecessarily add language that, if anything, could cause confusion and threaten compliance with U.S. EPA's regulation.

Contention: The receiving water limitations and discharge prohibition are numeric effluent limitations and, therefore, do not follow the accepted approach for controlling municipal storm water discharges.

Finding: The contested provisions are appropriate and proper. The summer dry weather discharges, as defined by the Permit and the TMDL, are more appropriately regarded as non-storm water discharges, which the Clean Water Act requires to be effectively prohibited.

Petitioners liken the challenged provisions to numeric effluent limitations, and then cite various state and federal sources to argue that using numeric effluent limitations to implement a TMDL in a storm water permit is inappropriate. Petitioners point to State Water Board Order WQ 2001-15 (*BIA*), where we stated that, for municipal storm water permits, "we will generally not require 'strict compliance' with water quality standards through numeric effluent limitations," and instead "we will continue to follow an iterative approach, which seeks compliance over time" with water quality standards.[24] They also point to a U.S. EPA guidance document entitled *Establishing Total Maximum Daily Load (TMDL) Wasteload Allocations (WLAs) for Storm Water Sources and NPDES Permit Requirements Based on Those WLAs* (the U.S. EPA guidance document).[25] Petitioners cite a provision therein that reads, "because storm water discharges are due to storm events that are highly variable in frequency and duration and are not easily characterized, only in rare cases will it be feasible or appropriate to establish numeric limits for municipal and small construction discharges."[26]

The references relied upon by Petitioners are inapposite, and do not support invalidating the Los Angeles Water Board's requirements. Instead, the Petitioners' references are directed at the regulation of storm water discharges. The Permit modification is limited to non-storm water discharges which occur during summer dry weather. The U.S. EPA guidance document is limited to wasteload allocations "for storm water discharges" and permit limitations

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[24] *BIA*, *supra*, at p. 8.

[25] U.S. EPA, *Establishing Total Maximum Daily Load (TMDL) Wasteload Allocations (WLAs) for Storm Water Sources and NPDES Permit Requirements Based on Those WLAs*, Memorandum from U.S. EPA Director, Office of Wetlands, Oceans and Watersheds Robert H. Wayland, III and Director, Office of Wastewater Management James Hanlon to Water Division Directors, Regions 1-10, Nov. 22, 2002 (hereafter U.S. EPA guidance document).

[26] *Id.*, at p. 4.

and conditions "based on the [wasteload allocations] for storm water discharges."[27] Furthermore, the Clean Water Act and the federal storm water regulations assign different performance requirements for storm water and non-storm water discharges. These distinctions in the guidance document, the Clean Water Act, and the storm water regulations make it clear that a regulatory approach for storm water - such as the iterative approach we have previously endorsed - is not necessarily appropriate for non-storm water.

We instead look to directly relevant authorities. Federal law requires municipal storm water permit limitations to be consistent with applicable wasteload allocations.[28] The Clean Water Act requires MS4 permit requirements to effectively prohibit non-storm water discharges.[29] Similarly, California law requires NPDES permits to apply "any more stringent effluent standards or limitations necessary to implement water quality control plans...."[30]

The basin plan established a compliance deadline of July 15, 2006, for achieving final compliance with the summer dry weather wasteload allocations for bacteria. The TMDL, which is a component of the Los Angeles Water Board's basin plan, assigns a wasteload allocation to certain "local agencies that are permittees or co-permittees on a municipal storm water permit."[31] The basin plan further establishes that these agencies are responsible for complying with the summer dry weather wasteload allocation. The summer dry weather wasteload allocation prohibits the exceedance of bacteria water quality objectives on summer dry weather days at specified locations.[32] The Permit modification is consistent with the wasteload allocation and other basin plan provisions.

The Permit modification is also consistent with the federal framework for non-storm water discharges. 40 Code of Federal Regulations section 122.26(d)(2)(iv)(B), which implements the Clean Water Act's requirement for the effective prohibition of non-storm water discharges, requires municipal storm water permittees to detect and remove all categories of non-storm water discharges to the MS4, or to require the non-storm water discharger to obtain a separate NPDES permit. While MS4 permits generally contain exceptions for some non-storm water discharges, these exceptions do not extend to non-storm water discharges identified as a

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[27] U.S. EPA guidance document, *supra*, at p. 1.

[28] 40 C.F.R. § 122.44(d)(1)(vii)(B).

[29] 33 U.S.C. § 1342(p)(3)(B)(ii).

[30] Wat. Code, § 13377.

[31] Basin Plan, Table 7-4.1, fn. 3.

[32] *Id.*, Table 7-4.1.

source of pollutants.[33] In adopting the TMDL, the Los Angeles Water Board identified summer dry weather discharges as a source of water quality exceedances for bacteria. Prohibiting summer dry weather bacteria exceedances caused or contributed to by MS4s is therefore consistent with the federal framework for non-storm water discharges.

Moreover, the references Petitioners' rely upon to challenge the prohibitions and receiving water limitations as strict, numeric effluent limitations are not relevant to this petition. The contested provisions are receiving water limitations, not numeric effluent limitations. The contested provisions do not impose a numeric limitation measured at a point source outfall. Instead, compliance with the limitations is measured in the receiving water, and more specifically, at the "wave wash" for the individual beaches. The TMDL defines the wave wash "as the point at which the storm drain or creek empties and the effluent from the storm drain initially mixes with the receiving ocean water."[34] The provisions are directed at the quality of the receiving water, as affected by the discharge. They do not establish numeric effluent limitations for the discharge to the receiving water.[35],[36]

While the issue before us only concerns permit requirements to implement summer dry weather wasteload allocations and therefore non-storm water discharges, the result would not necessarily be different for municipal *storm water* discharges subject to a TMDL. TMDLs, which take significant resources to develop and finalize, are devised with specific implementation plans and compliance dates designed to bring impaired waters into compliance with water quality standards. It is our intent that federally mandated TMDLs be given substantive effect. Doing so can improve the efficacy of California's NPDES storm water permits. This is not to say that a wasteload allocation will result in numeric effluent limitations for municipal storm water discharges. But, when an approved TMDL is in place, the water boards will give substantive effect to the TMDL and allow it to become much more than an academic exercise. Whether a future municipal storm water permit requirement appropriately implements a storm water wasteload allocation will need to be decided based on the regional

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[33] See 40 C.F.R. § 122.26(d)(2)(iv)(B)(1). The exempted categories include, but are not limited to, water line flushing, rising ground waters, landscape irrigation, and street wash water.

[34] Basin Plan, Table 7-4.1, fn. 1.

[35] See, e.g., *BIA*, *supra*; State Water Board Order WQ 99-05 (*Environmental Health Coalition*). Those Orders endorsed receiving water limitations modified by an iterative process. The absence of an accompanying iterative process does not convert receiving water limitations into numeric effluent limitations.

[36] For the purposes of state enforcement under the Porter-Cologne Act's mandatory minimum penalties law, California distinguishes numeric restrictions on discharged effluent from receiving water limitations. (Wat. Code, § 13385.1, subd. (c).)

water quality control board's findings supporting either the numeric or non-numeric effluent limitations contained in the permit.

III. ORDER

IT IS HEREBY ORDERED THAT the petition of the County of Los Angeles and Los Angeles County Flood Control District is denied.

CERTIFICATION

The undersigned, Clerk to the Board, does hereby certify that the foregoing is a full, true, and correct copy of an order duly and regularly adopted at a meeting of the State Water Resources Control Board held on August 4, 2009.

AYE: Chairman Charles R. Hoppin
Vice Chair Frances Spivy-Weber
Board Member Arthur G. Baggett, Jr.
Board Member Tam M. Doduc

NAY: None

ABSENT: None

ABSTAIN: None

Jeanine Townsend

Jeanine Townsend
Clerk to the Board

Model Water Efficient Landscape Ordinance

California Code of Regulations
Title 23. Waters
Division 2. Department of Water Resources
Chapter 2.7. Model Water Efficient Landscape Ordinance

§ 490. Purpose.
(a) The State Legislature has found:
(1) that the waters of the state are of limited supply and are subject to ever increasing demands;
(2) that the continuation of California's economic prosperity is dependent on the availability of adequate supplies of water for future uses;
(3) that it is the policy of the State to promote the conservation and efficient use of water and to prevent the waste of this valuable resource;
(4) that landscapes are essential to the quality of life in California by providing areas for active and passive recreation and as an enhancement to the environment by cleaning air and water, preventing erosion, offering fire protection, and replacing ecosystems lost to development; and
(5) that landscape design, installation, maintenance and management can and should be water efficient; and
(6) that Section 2 of Article X of the California Constitution specifies that the right to use water is limited to the amount reasonably required for the beneficial use to be served and the right does not and shall not extend to waste or unreasonable method of use.
(b) Consistent with these legislative findings, the purpose of this model ordinance is to:
(1) promote the values and benefits of landscapes while recognizing the need to invest water and other resources as efficiently as possible;
(2) establish a structure for planning, designing, installing, maintaining and managing water efficient landscapes in new construction and rehabilitated projects;
(3) establish provisions for water management practices and water waste prevention for existing landscapes;
(4) use water efficiently without waste by setting a Maximum Applied Water Allowance as an upper limit for water use and reduce water use to the lowest practical amount;
(5) promote the benefits of consistent landscape ordinances with neighboring local and regional agencies;
(6) encourage local agencies and water purveyors to use economic incentives that promote the efficient use of water, such as implementing a tiered-rate structure; and
(7) encourage local agencies to designate the necessary authority that implements and enforces the provisions of the Model Water Efficient Landscape Ordinance or its local landscape ordinance.

Note: Authority cited: Section 65593, Government Code. Reference: Sections 65591, 65593, 65596, Government Code.

§ 490.1 Applicability
(a) After January 1, 2010, this ordinance shall apply to all of the following landscape projects:
(1) new construction and rehabilitated landscapes for public agency projects and private development projects with a landscape area equal to or greater than 2,500 square feet requiring a building or landscape permit, plan check or design review;
(2) new construction and rehabilitated landscapes which are developer-installed in single-family and multi-family projects with a landscape area equal to or greater than 2,500 square feet requiring a building or landscape permit, plan check, or design review;
(3) new construction landscapes which are homeowner-provided and/or homeowner-hired in single-family and multi-family residential projects with a total project landscape area equal to or greater than 5,000 square feet requiring a building or landscape permit, plan check or design review;

(4) existing landscapes limited to Sections 493, 493.1 and 493.2; and
(5) cemeteries. Recognizing the special landscape management needs of cemeteries, new and rehabilitated cemeteries are limited to Sections 492.4, 492.11 and 492.12; and existing cemeteries are limited to Sections 493, 493.1 and 493.2.
(b) This ordinance does not apply to:
(1) registered local, state or federal historical sites;
(2) ecological restoration projects that do not require a permanent irrigation system;
(3) mined-land reclamation projects that do not require a permanent irrigation system; or
(4) plant collections, as part of botanical gardens and arboretums open to the public.

Note: Authority Cited: Section 65595, Government Code. Reference: Section 65596, Government Code.

§ 491. Definitions.
The terms used in this ordinance have the meaning set forth below:
(a) "applied water" means the portion of water supplied by the irrigation system to the landscape.
(b) "automatic irrigation controller" means an automatic timing device used to remotely control valves that operate an irrigation system. Automatic irrigation controllers schedule irrigation events using either evapotranspiration (weather-based) or soil moisture data.
(c) "backflow prevention device" means a safety device used to prevent pollution or contamination of the water supply due to the reverse flow of water from the irrigation system.
(d) "Certificate of Completion" means the document required under Section 492.9.
(e) "certified irrigation designer" means a person certified to design irrigation systems by an accredited academic institution a professional trade organization or other program such as the US Environmental Protection Agency's WaterSense irrigation designer certification program and Irrigation Association's Certified Irrigation Designer program.
(f) "certified landscape irrigation auditor" means a person certified to perform landscape irrigation audits by an accredited academic institution, a professional trade organization or other program such as the US Environmental Protection Agency's WaterSense irrigation auditor certification program and Irrigation Association's Certified Landscape Irrigation Auditor program.
(g) "check valve" or "anti-drain valve" means a valve located under a sprinkler head, or other location in the irrigation system, to hold water in the system to prevent drainage from sprinkler heads when the sprinkler is off.
(h) "common interest developments" means community apartment projects, condominium projects, planned developments, and stock cooperatives per Civil Code Section 1351.
(i) "conversion factor (0.62)" means the number that converts acre-inches per acre per year to gallons per square foot per year
(j) "drip irrigation" means any non-spray low volume irrigation system utilizing emission devices with a flow rate measured in gallons per hour. Low volume irrigation systems are specifically designed to apply small volumes of water slowly at or near the root zone of plants.
(k) "ecological restoration project" means a project where the site is intentionally altered to establish a defined, indigenous, historic ecosystem.
(l)"effective precipitation" or "usable rainfall" (Eppt) means the portion of total precipitation which becomes available for plant growth.
(m) "emitter" means a drip irrigation emission device that delivers water slowly from the system to the soil.
(n) "established landscape" means the point at which plants in the landscape have developed significant root growth into the soil. Typically, most plants are established after one or two years of growth.
(o) "establishment period of the plants" means the first year after installing the plant in the landscape or the first two years if irrigation will be terminated after establishment. Typically, most plants are established after one or two years of growth.

(p) “Estimated Total Water Use” (ETWU) means the total water used for the landscape as described in Section 492.4.

(q) “ET adjustment factor” (ETAF) means a factor of 0.7, that, when applied to reference evapotranspiration, adjusts for plant factors and irrigation efficiency, two major influences upon the amount of water that needs to be applied to the landscape.

A combined plant mix with a site-wide average of 0.5 is the basis of the plant factor portion of this calculation. For purposes of the ETAF, the average irrigation efficiency is 0.71. Therefore, the ET Adjustment Factor is (0.7)=(0.5/0.71). ETAF for a Special Landscape Area shall not exceed 1.0. ETAF for existing non-rehabilitated landscapes is 0.8.

(r) “evapotranspiration rate” means the quantity of water evaporated from adjacent soil and other surfaces and transpired by plants during a specified time.

(s) “flow rate” means the rate at which water flows through pipes, valves and emission devices, measured in gallons per minute, gallons per hour, or cubic feet per second.

(t) “hardscapes” means any durable material (pervious and non-pervious).

(u) “homeowner-provided landscaping” means any landscaping either installed by a private individual for a single family residence or installed by a licensed contractor hired by a homeowner. A homeowner, for purposes of this ordinance, is a person who occupies the dwelling he or she owns. This excludes speculative homes, which are not owner-occupied dwellings.

(v) “hydrozone” means a portion of the landscaped area having plants with similar water needs. A hydrozone may be irrigated or non-irrigated.

(w) “infiltration rate” means the rate of water entry into the soil expressed as a depth of water per unit of time (e.g., inches per hour).

(x)“invasive plant species” means species of plants not historically found in California that spread outside cultivated areas and can damage environmental or economic resources. Invasive species may be regulated by county agricultural agencies as noxious species. “Noxious weeds” means any weed designated by the Weed Control Regulations in the Weed Control Act and identified on a Regional District noxious weed control list. Lists of invasive plants are maintained at the California Invasive Plant Inventory and USDA invasive and noxious weeds database.

(y) “irrigation audit” means an in-depth evaluation of the performance of an irrigation system conducted by a Certified Landscape Irrigation Auditor. An irrigation audit includes, but is not limited to: inspection, system tune-up, system test with distribution uniformity or emission uniformity, reporting overspray or runoff that causes overland flow, and preparation of an irrigation schedule.

(z) “irrigation efficiency” (IE) means the measurement of the amount of water beneficially used divided by the amount of water applied. Irrigation efficiency is derived from measurements and estimates of irrigation system characteristics and management practices. The minimum average irrigation efficiency for purposes of this ordinance is 0.71. Greater irrigation efficiency can be expected from well designed and maintained systems.

(aa) “irrigation survey” means an evaluation of an irrigation system that is less detailed than an irrigation audit. An irrigation survey includes, but is not limited to: inspection, system test, and written recommendations to improve performance of the irrigation system.

(bb) “irrigation water use analysis” means an analysis of water use data based on meter readings and billing data.

(cc) “landscape architect” means a person who holds a license to practice landscape architecture in the state of California Business and Professions Code, Section 5615.

(dd) “landscape area” means all the planting areas, turf areas, and water features in a landscape design plan subject to the Maximum Applied Water Allowance calculation. The landscape area does not include footprints of buildings or structures, sidewalks, driveways, parking lots, decks, patios, gravel or stone walks, other pervious or non-pervious hardscapes, and other non-irrigated areas designated for non-development (e.g., open spaces and existing native vegetation).

(ee) “landscape contractor” means a person licensed by the state of California to construct, maintain, repair, install, or subcontract the development of landscape systems.
(ff) “Landscape Documentation Package” means the documents required under Section 492.3.
(gg) “landscape project” means total area of landscape in a project as defined in “landscape area” for the purposes of this ordinance, meeting requirements under Section 490.1.
(hh) “lateral line” means the water delivery pipeline that supplies water to the emitters or sprinklers from the valve.
(ii) “local agency” means a city or county, including a charter city or charter county, that is responsible for adopting and implementing the ordinance. The local agency is also responsible for the enforcement of this ordinance, including but not limited to, approval of a permit and plan check or design review of a project.
(jj) “local water purveyor” means any entity, including a public agency, city, county, or private water company that provides retail water service.
(kk) “low volume irrigation” means the application of irrigation water at low pressure through a system of tubing or lateral lines and low-volume emitters such as drip, drip lines, and bubblers. Low volume irrigation systems are specifically designed to apply small volumes of water slowly at or near the root zone of plants.
(ll) “main line” means the pressurized pipeline that delivers water from the water source to the valve or outlet.
(mm) “Maximum Applied Water Allowance” (MAWA) means the upper limit of annual applied water for the established landscaped area as specified in Section 492.4. It is based upon the area’s reference evapotranspiration, the ET Adjustment Factor, and the size of the landscape area. The Estimated Total Water Use shall not exceed the Maximum Applied Water Allowance. Special Landscape Areas, including recreation areas, areas permanently and solely dedicated to edible plants such as orchards and vegetable gardens, and areas irrigated with recycled water are subject to the MAWA with an ETAF not to exceed 1.0.
(nn) “microclimate” means the climate of a small, specific area that may contrast with the climate of the overall landscape area due to factors such as wind, sun exposure, plant density, or proximity to reflective surfaces.
(oo) “mined-land reclamation projects” means any surface mining operation with a reclamation plan approved in accordance with the Surface Mining and Reclamation Act of 1975.
(pp) “mulch” means any organic material such as leaves, bark, straw, compost, or inorganic mineral materials such as rocks, gravel, and decomposed granite left loose and applied to the soil surface for the beneficial purposes of reducing evaporation, suppressing weeds, moderating soil temperature, and preventing soil erosion.
(qq) “new construction” means, for the purposes of this ordinance, a new building with a landscape or other new landscape, such as a park, playground, or greenbelt without an associated building.
(rr) “operating pressure” means the pressure at which the parts of an irrigation system are designed by the manufacturer to operate.
(ss) “overhead sprinkler irrigation systems” means systems that deliver water through the air (e.g., spray heads and rotors).
(tt) “overspray” means the irrigation water which is delivered beyond the target area.
(uu) “permit” means an authorizing document issued by local agencies for new construction or rehabilitated landscapes.
(vv) “pervious” means any surface or material that allows the passage of water through the material and into the underlying soil.
(ww) “plant factor” or “plant water use factor” is a factor , when multiplied by ETo, estimates the amount of water needed by plants. For purposes of this ordinance, the plant factor range for low water use plants is 0 to 0.3, the plant factor range for moderate water use plants is 0.4 to 0.6, and the plant

factor range for high water use plants is 0.7 to 1.0. Plant factors cited in this ordinance are derived from the Department of Water Resources 2000 publication "Water Use Classification of Landscape Species".
(xx) "precipitation rate" means the rate of application of water measured in inches per hour.
(yy) "project applicant" means the individual or entity submitting a Landscape Documentation Package required under Section 492.3, to request a permit, plan check, or design review from the local agency. A project applicant may be the property owner or his or her designee.
(zz) "rain sensor" or "rain sensing shutoff device" means a component which automatically suspends an irrigation event when it rains.
(aaa) "record drawing" or "as-builts" means a set of reproducible drawings which show significant changes in the work made during construction and which are usually based on drawings marked up in the field and other data furnished by the contractor.
(bbb) "recreational area" means areas dedicated to active play such as parks, sports fields, and golf courses where turf provides a playing surface.
(ccc) "recycled water", "reclaimed water", or "treated sewage effluent water" means treated or recycled waste water of a quality suitable for non-potable uses such as landscape irrigation and water features. This water is not intended for human consumption.
(ddd) "reference evapotranspiration" or "ETo" means a standard measurement of environmental parameters which affect the water use of plants. ETo is expressed in inches per day, month, or year as represented in Section 495.1, and is an estimate of the evapotranspiration of a large field of four- to seven-inch tall, cool-season grass that is well watered. Reference evapotranspiration is used as the basis of determining the Maximum Applied Water Allowance so that regional differences in climate can be accommodated.
(eee) "rehabilitated landscape" means any re-landscaping project that requires a permit , plan check, or design review, meets the requirements of Section 490.1, and the modified landscape area is equal to or greater than 2,500 square feet, is 50% of the total landscape area, and the modifications are completed within one year.
(fff) "runoff" means water which is not absorbed by the soil or landscape to which it is applied and flows from the landscape area. For example, runoff may result from water that is applied at too great a rate (application rate exceeds infiltration rate) or when there is a slope.
(ggg) "soil moisture sensing device" or "soil moisture sensor" means a device that measures the amount of water in the soil. The device may also suspend or initiate an irrigation event.
(hhh) "soil texture" means the classification of soil based on its percentage of sand, silt, and clay.
(iii)"Special Landscape Area" (SLA) means an area of the landscape dedicated solely to edible plants, areas irrigated with recycled water, water features using recycled water and areas dedicated to active play such as parks, sports fields, golf courses, and where turf provides a playing surface.
(jjj) "sprinkler head" means a device which delivers water through a nozzle.
(kkk) "static water pressure" means the pipeline or municipal water supply pressure when water is not flowing.
(lll) "station" means an area served by one valve or by a set of valves that operate simultaneously.
(mmm) "swing joint" means an irrigation component that provides a flexible, leak-free connection between the emission device and lateral pipeline to allow movement in any direction and to prevent equipment damage.
(nnn) "turf" means a ground cover surface of mowed grass. Annual bluegrass, Kentucky bluegrass, Perennial ryegrass, Red fescue, and Tall fescue are cool-season grasses. Bermudagrass, Kikuyugrass, Seashore Paspalum, St. Augustinegrass, Zoysiagrass, and Buffalo grass are warm-season grasses.
(ooo) "valve" means a device used to control the flow of water in the irrigation system.
(ppp) "water conserving plant species" means a plant species identified as having a low plant factor.
(qqq) "water feature" means a design element where open water performs an aesthetic or recreational function. Water features include ponds, lakes, waterfalls, fountains, artificial streams, spas, and swimming pools (where water is artificially supplied). The surface area of water features is included in

the high water use hydrozone of the landscape area. Constructed wetlands used for on-site wastewater treatment or stormwater best management practices that are not irrigated and used solely for water treatment or stormwater retention are not water features and, therefore, are not subject to the water budget calculation.
(rrr) "watering window" means the time of day irrigation is allowed.
(sss) "WUCOLS" means the Water Use Classification of Landscape Species published by the University of California Cooperative Extension, the Department of Water Resources and the Bureau of Reclamation, 2000.

Note: Authority Cited: Section 65595, Government Code. Reference: Sections 65592, 65596, Government Code.

§ 492. Provisions for New Construction or Rehabilitated Landscapes.
(a) A local agency may designate another agency, such as a water purveyor, to implement some or all of the requirements contained in this ordinance. Local agencies may collaborate with water purveyors to define each entity's specific responsibilities relating to this ordinance.

Note: Authority Cited: Section 65595, Government Code. Reference: Section 65596, Government Code.

§ 492.1 Compliance with Landscape Documentation Package.
(a) Prior to construction, the local agency shall:
(1) provide the project applicant with the ordinance and procedures for permits, plan checks, or design reviews;
(2) review the Landscape Documentation Package submitted by the project applicant;
(3) approve or deny the Landscape Documentation Package;
(4) issue a permit or approve the plan check or design review for the project applicant; and
(5) upon approval of the Landscape Documentation Package, submit a copy of the Water Efficient Landscape Worksheet to the local water purveyor.
(b) Prior to construction, the project applicant shall:
(1) submit a Landscape Documentation Package to the local agency.
(c) Upon approval of the Landscape Documentation Package by the local agency, the project applicant shall:
(1) receive a permit or approval of the plan check or design review and record the date of the permit in the Certificate of Completion;
(2) submit a copy of the approved Landscape Documentation Package along with the record drawings, and any other information to the property owner or his/her designee; and
(3) submit a copy of the Water Efficient Landscape Worksheet to the local water purveyor.

Note: Authority Cited: Section 65595, Government Code. Reference: Section 65596, Government Code.

§ 492.2 Penalties.
(a) A local agency may establish and administer penalties to the project applicant for non-compliance with the ordinance to the extent permitted by law.

Note: Authority Cited: Section 65595, Government Code. Reference: Section 65596, Government Code.

§ 492.3 Elements of the Landscape Documentation Package.
(a) The Landscape Documentation Package shall include the following six (6) elements:
(1) project information;
(A) date
(B) project applicant
(C) project address (if available, parcel and/or lot number(s))
(D) total landscape area (square feet)
(E) project type (e.g., new, rehabilitated, public, private, cemetery, homeowner-installed)
(F) water supply type (e.g., potable, recycled, well) and identify the local retail water purveyor if the applicant is not served by a private well
(G) checklist of all documents in Landscape Documentation Package
(H) project contacts to include contact information for the project applicant and property owner
(I) applicant signature and date with statement, "I agree to comply with the requirements of the water efficient landscape ordinance and submit a complete Landscape Documentation Package".
(2) Water Efficient Landscape Worksheet;
(A) hydrozone information table
(B) water budget calculations
1. Maximum Applied Water Allowance (MAWA)
2. Estimated Total Water Use (ETWU)
(3) soil management report;
(4) landscape design plan;
(5) irrigation design plan; and
(6) grading design plan.

Note: Authority Cited: Section 65595, Government Code. Reference: Section 65596, Government Code.

§ 492.4 Water Efficient Landscape Worksheet.
(a) A project applicant shall complete the Water Efficient Landscape Worksheet which contains two sections (see sample worksheet in Appendix B):
(1) a hydrozone information table (see Appendix B, Section A) for the landscape project; and
(2) a water budget calculation (see Appendix B, Section B) for the landscape project. For the calculation of the Maximum Applied Water Allowance and Estimated Total Water Use, a project applicant shall use the ETo values from the Reference Evapotranspiration Table in Appendix A. For geographic areas not covered in Appendix A, use data from other cities located nearby in the same reference evapotranspiration zone, as found in the CIMIS Reference Evapotranspiration Zones Map, Department of Water Resources, 1999.
(b) Water budget calculations shall adhere to the following requirements:
(1) The plant factor used shall be from WUCOLS. The plant factor ranges from 0 to 0.3 for low water use plants, from 0.4 to 0.6 for moderate water use plants, and from 0.7 to 1.0 for high water use plants.
(2) All water features shall be included in the high water use hydrozone and temporarily irrigated areas shall be included in the low water use hydrozone.
(3) All Special Landscape Areas shall be identified and their water use calculated as described below.
(4) ETAF for Special Landscape Areas shall not exceed 1.0.
(c) Maximum Applied Water Allowance
The Maximum Applied Water Allowance shall be calculated using the equation:

$$MAWA = (ETo)\ (0.62)\ [(0.7 \times LA) + (0.3 \times SLA)]$$

The example calculations below are hypothetical to demonstrate proper use of the equations and do not represent an existing and/or planned landscape project. The ETo values used in these calculations are from the Reference Evapotranspiration Table in Appendix A, for planning purposes only. For actual irrigation scheduling, automatic irrigation controllers are required and shall use current reference evapotranspiration data, such as from the California Irrigation Management Information System (CIMIS), other equivalent data, or soil moisture sensor data.

(1) Example MAWA calculation: a hypothetical landscape project in Fresno, CA with an irrigated landscape area of 50,000 square feet without any Special Landscape Area (SLA= 0, no edible plants, recreational areas, or use of recycled water). To calculate MAWA, the annual reference evapotranspiration value for Fresno is 51.1 inches as listed in the Reference Evapotranspiration Table in Appendix A.

MAWA = (ETo) (0.62) [(0.7 x LA) + (0.3 x SLA)]
MAWA = Maximum Applied Water Allowance (gallons per year)
ETo = Reference Evapotranspiration (inches per year)
0.62 = Conversion Factor (to gallons)
0.7 = ET Adjustment Factor (ETAF)
LA = Landscape Area including SLA (square feet)
0.3 = Additional Water Allowance for SLA
SLA = Special Landscape Area (square feet)
MAWA = (51.1 inches) (0.62) [(0.7 x 50,000 square feet) + (0.3 x 0)]
= 1,108,870 gallons per year
To convert from gallons per year to hundred-cubic-feet per year:
= 1,108,870/748 = 1,482 hundred-cubic-feet per year
(100 cubic feet = 748 gallons)

(2) In this next hypothetical example, the landscape project in Fresno, CA has the same ETo value of 51.1 inches and a total landscape area of 50,000 square feet. Within the 50,000 square foot project, there is now a 2,000 square foot area planted with edible plants. This 2,000 square foot area is considered to be a Special Landscape Area.

MAWA = (ETo) (0.62) [(0.7 x LA) + (0.3 x SLA)]
MAWA = (51.1 inches) (0.62) [(0.7 x 50,000 square feet) + (0.3 x 2,000 square feet)]
= 31.68 x [35,000 + 600] gallons per year
= 31.68 x 35,600 gallons per year
=1,127,808 gallons per year or 1,508 hundred-cubic-feet per year

(d) Estimated Total Water Use.

The Estimated Total Water Use shall be calculated using the equation below. The sum of the Estimated Total Water Use calculated for all hydrozones shall not exceed MAWA.

$$ETWU = (ETo)(0.62)\left(\frac{PF\ x\ HA}{IE} + SLA\right)$$

Where:

ETWU = Estimated Total Water Use per year (gallons)
ETo = Reference Evapotranspiration (inches)
PF = Plant Factor from WUCOLS (see Section 491)
HA = Hydrozone Area [high, medium, and low water use areas] (square feet)
SLA = Special Landscape Area (square feet)
0.62 = Conversion Factor
IE = Irrigation Efficiency (minimum 0.71)

(1) Example ETWU calculation: landscape area is 50,000 square feet; plant water use type, plant factor, and hydrozone area are shown in the table below. The ETo value is 51.1 inches per year. There are no Special Landscape Areas (recreational area, area permanently and solely dedicated to edible plants, and area irrigated with recycled water) in this example.

Hydrozone	Plant Water Use Type(s)	Plant Factor (PF)*	Hydrozone Area (HA) (square feet)	PF x HA (square feet)
1	High	0.8	7,000	5,600
2	High	0.7	10,000	7,000
3	Medium	0.5	16,000	8,000
4	Low	0.3	7,000	2,100
5	Low	0.2	10,000	2,000
			Sum	24,700

*Plant Factor from WUCOLS

$$ETWU = (51.1)(0.62)\left(\frac{24{,}700}{0.71} + 0\right)$$

= 1,102,116 gallons per year

Compare ETWU with MAWA: For this example MAWA = (51.1) (0.62) [(0.7 x 50,000) + (0.3 x 0)] = 1,108,870 gallons per year. The ETWU (1,102,116 gallons per year) is less than MAWA (1,108,870 gallons per year). In this example, the water budget complies with the MAWA.

(2) Example ETWU calculation: total landscape area is 50,000 square feet, 2,000 square feet of which is planted with edible plants. The edible plant area is considered a Special Landscape Area (SLA). The reference evapotranspiration value is 51.1 inches per year. The plant type, plant factor, and hydrozone area are shown in the table below.

Hydrozone	Plant Water Use Type(s)	Plant Factor (PF)*	Hydrozone Area (HA) (square feet)	PF x HA (square feet)
1	High	0.8	7,000	5,600
2	High	0.7	9,000	6,300
3	Medium	0.5	15,000	7,500
4	Low	0.3	7,000	2,100
5	Low	0.2	10,000	2,000
			Sum	23,500
6	SLA	1.0	2,000	2,000

*Plant Factor from WUCOLS

$$ETWU = (51.1)(0.62)\left(\frac{23{,}500}{0.71} + 2{,}000\right)$$

= (31.68) (33,099 + 2,000)

= 1,111,936 gallons per year

Compare ETWU with MAWA. For this example:
MAWA = (51.1) (0.62) [(0.7 x 50,000) + (0.3 x 2,000)]
= 31.68 x [35,000 + 600]
= 31.68 x 35,600
=1,127,808 gallons per year

The ETWU (1,111,936 gallons per year) is less than MAWA (1,127,808 gallons per year). For this example, the water budget complies with the MAWA.

Note: Authority Cited: Section 65595, Government Code. Reference: Section 65596, Government Code.

§ 492.5 Soil Management Report.
(a) In order to reduce runoff and encourage healthy plant growth, a soil management report shall be completed by the project applicant, or his/her designee, as follows:
(1) Submit soil samples to a laboratory for analysis and recommendations.
(A) Soil sampling shall be conducted in accordance with laboratory protocol, including protocols regarding adequate sampling depth for the intended plants.
(B) The soil analysis may include:
1. soil texture;
2. infiltration rate determined by laboratory test or soil texture infiltration rate table;
3. pH;
4. total soluble salts;
5. sodium;
6. percent organic matter; and
7. recommendations.
(2) The project applicant, or his/her designee, shall comply with one of the following:
(A) If significant mass grading is not planned, the soil analysis report shall be submitted to the local agency as part of the Landscape Documentation Package; or
(B) If significant mass grading is planned, the soil analysis report shall be submitted to the local agency as part of the Certificate of Completion.
(3) The soil analysis report shall be made available, in a timely manner, to the professionals preparing the landscape design plans and irrigation design plans to make any necessary adjustments to the design plans.
(4) The project applicant, or his/her designee, shall submit documentation verifying implementation of soil analysis report recommendations to the local agency with Certificate of Completion.

Note: Authority Cited: Section 65595, Government Code. Reference: Section 65596, Government Code.

§ 492.6 Landscape Design Plan.
(a) For the efficient use of water, a landscape shall be carefully designed and planned for the intended function of the project. A landscape design plan meeting the following design criteria shall be submitted as part of the Landscape Documentation Package.
(1) Plant Material
(A) Any plant may be selected for the landscape, providing the Estimated Total Water Use in the landscape area does not exceed the Maximum Applied Water Allowance. To encourage the efficient use of water, the following is highly recommended:
1. protection and preservation of native species and natural vegetation;
2. selection of water-conserving plant and turf species;

3. selection of plants based on disease and pest resistance;
4. selection of trees based on applicable local tree ordinances or tree shading guidelines; and
5. selection of plants from local and regional landscape program plant lists.
(B) Each hydrozone shall have plant materials with similar water use, with the exception of hydrozones with plants of mixed water use, as specified in Section 492.7(a)(2)(D).
(C) Plants shall be selected and planted appropriately based upon their adaptability to the climatic, geologic, and topographical conditions of the project site. To encourage the efficient use of water, the following is highly recommended:
1. use the Sunset Western Climate Zone System which takes into account temperature, humidity, elevation, terrain, latitude, and varying degrees of continental and marine influence on local climate;
2. recognize the horticultural attributes of plants (i.e., mature plant size, invasive surface roots) to minimize damage to property or infrastructure [e.g., buildings, sidewalks, power lines]; and
3. consider the solar orientation for plant placement to maximize summer shade and winter solar gain.
(D) Turf is not allowed on slopes greater than 25% where the toe of the slope is adjacent to an impermeable hardscape and where 25% means 1 foot of vertical elevation change for every 4 feet of horizontal length (rise divided by run x 100 = slope percent).
(E) A landscape design plan for projects in fire-prone areas shall address fire safety and prevention. A defensible space or zone around a building or structure is required per Public Resources Code Section 4291(a) and (b). Avoid fire-prone plant materials and highly flammable mulches.
(F) The use of invasive and/or noxious plant species is strongly discouraged.
(G) The architectural guidelines of a common interest development, which include community apartment projects, condominiums, planned developments, and stock cooperatives, shall not prohibit or include conditions that have the effect of prohibiting the use of low-water use plants as a group.
(2) Water Features
(A) Recirculating water systems shall be used for water features.
(B) Where available, recycled water shall be used as a source for decorative water features.
(C) Surface area of a water feature shall be included in the high water use hydrozone area of the water budget calculation.
(D) Pool and spa covers are highly recommended.
(3) Mulch and Amendments
(A) A minimum two inch (2″) layer of mulch shall be applied on all exposed soil surfaces of planting areas except in turf areas, creeping or rooting groundcovers, or direct seeding applications where mulch is contraindicated.
(B) Stabilizing mulching products shall be used on slopes.
(C) The mulching portion of the seed/mulch slurry in hydro-seeded applications shall meet the mulching requirement.
(D) Soil amendments shall be incorporated according to recommendations of the soil report and what is appropriate for the plants selected (see Section 492.5).
(b) The landscape design plan, at a minimum, shall:
(1) delineate and label each hydrozone by number, letter, or other method;
(2) identify each hydrozone as low, moderate, high water, or mixed water use. Temporarily irrigated areas of the landscape shall be included in the low water use hydrozone for the water budget calculation;
(3) identify recreational areas;
(4) identify areas permanently and solely dedicated to edible plants;
(5) identify areas irrigated with recycled water;
(6) identify type of mulch and application depth;
(7) identify soil amendments, type, and quantity;
(8) identify type and surface area of water features;
(9) identify hardscapes (pervious and non-pervious);

(10) identify location and installation details of any applicable stormwater best management practices that encourage on-site retention and infiltration of stormwater. Stormwater best management practices are encouraged in the landscape design plan and examples include, but are not limited to:
(A) infiltration beds, swales, and basins that allow water to collect and soak into the ground;
(B) constructed wetlands and retention ponds that retain water, handle excess flow, and filter pollutants; and
(C) pervious or porous surfaces (e.g., permeable pavers or blocks, pervious or porous concrete, etc.) that minimize runoff.
(11) identify any applicable rain harvesting or catchment technologies (e.g., rain gardens, cisterns, etc.);
(12) contain the following statement: "I have complied with the criteria of the ordinance and applied them for the efficient use of water in the landscape design plan"; and
(13) bear the signature of a licensed landscape architect, licensed landscape contractor, or any other person authorized to design a landscape. (See Sections 5500.1, 5615, 5641, 5641.1, 5641.2, 5641.3, 5641.4, 5641.5, 5641.6, 6701, 7027.5 of the Business and Professions Code, Section 832.27 of Title16 of the California Code of Regulations, and Section 6721 of the Food and Agriculture Code.)

Note: Authority Cited: Section 65595, Government Code. Reference: Section 65596, Government Code and Section 1351, Civil Code.

§ 492.7 Irrigation Design Plan.
(a) For the efficient use of water, an irrigation system shall meet all the requirements listed in this section and the manufacturers' recommendations. The irrigation system and its related components shall be planned and designed to allow for proper installation, management, and maintenance. An irrigation design plan meeting the following design criteria shall be submitted as part of the Landscape Documentation Package.
(1) System
(A) Dedicated landscape water meters are highly recommended on landscape areas smaller than 5,000 square feet to facilitate water management.
(B) Automatic irrigation controllers utilizing either evapotranspiration or soil moisture sensor data shall be required for irrigation scheduling in all irrigation systems.
(C) The irrigation system shall be designed to ensure that the dynamic pressure at each emission device is within the manufacturer's recommended pressure range for optimal performance.
1. If the static pressure is above or below the required dynamic pressure of the irrigation system, pressure-regulating devices such as inline pressure regulators, booster pumps, or other devices shall be installed to meet the required dynamic pressure of the irrigation system.
2. Static water pressure, dynamic or operating pressure. and flow reading of the water supply shall be measured at the point of connection. These pressure and flow measurements shall be conducted at the design stage. If the measurements are not available at the design stage, the measurements shall be conducted at installation.
(D) Sensors (rain, freeze, wind, etc.), either integral or auxiliary, that suspend or alter irrigation operation during unfavorable weather conditions shall be required on all irrigation systems, as appropriate for local climatic conditions. Irrigation should be avoided during windy or freezing weather or during rain.
(E) Manual shut-off valves (such as a gate valve, ball valve, or butterfly valve) shall be required, as close as possible to the point of connection of the water supply, to minimize water loss in case of an emergency (such as a main line break) or routine repair.

(F) Backflow prevention devices shall be required to protect the water supply from contamination by the irrigation system. A project applicant shall refer to the applicable local agency code (i.e., public health) for additional backflow prevention requirements.
(G) High flow sensors that detect and report high flow conditions created by system damage or malfunction are recommended.
(H) The irrigation system shall be designed to prevent runoff, low head drainage, overspray, or other similar conditions where irrigation water flows onto non-targeted areas, such as adjacent property, non-irrigated areas, hardscapes, roadways, or structures.
(I) Relevant information from the soil management plan, such as soil type and infiltration rate, shall be utilized when designing irrigation systems.
(J) The design of the irrigation system shall conform to the hydrozones of the landscape design plan.
(K) The irrigation system must be designed and installed to meet, at a minimum, the irrigation efficiency criteria as described in Section 492.4 regarding the Maximum Applied Water Allowance.
(L) It is highly recommended that the project applicant or local agency inquire with the local water purveyor about peak water operating demands (on the water supply system) or water restrictions that may impact the effectiveness of the irrigation system.
(M) In mulched planting areas, the use of low volume irrigation is required to maximize water infiltration into the root zone.
(N) Sprinkler heads and other emission devices shall have matched precipitation rates, unless otherwise directed by the manufacturer's recommendations.
(O) Head to head coverage is recommended. However, sprinkler spacing shall be designed to achieve the highest possible distribution uniformity using the manufacturer's recommendations.
(P) Swing joints or other riser-protection components are required on all risers subject to damage that are adjacent to high traffic areas.
(Q) Check valves or anti-drain valves are required for all irrigation systems.
(R) Narrow or irregularly shaped areas, including turf, less than eight (8) feet in width in any direction shall be irrigated with subsurface irrigation or low volume irrigation system.
(S) Overhead irrigation shall not be permitted within 24 inches of any non-permeable surface. Allowable irrigation within the setback from non-permeable surfaces may include drip, drip line, or other low flow non-spray technology. The setback area may be planted or unplanted. The surfacing of the setback may be mulch, gravel, or other porous material. These restrictions may be modified if:
1. the landscape area is adjacent to permeable surfacing and no runoff occurs; or
2. the adjacent non-permeable surfaces are designed and constructed to drain entirely to landscaping; or
3. the irrigation designer specifies an alternative design or technology, as part of the Landscape Documentation Package and clearly demonstrates strict adherence to irrigation system design criteria in Section 492.7 (a)(1)(H). Prevention of overspray and runoff must be confirmed during the irrigation audit.
(T) Slopes greater than 25% shall not be irrigated with an irrigation system with a precipitation rate exceeding 0.75 inches per hour. This restriction may be modified if the landscape designer specifies an alternative design or technology, as part of the Landscape Documentation Package, and clearly demonstrates no runoff or erosion will occur. Prevention of runoff and erosion must be confirmed during the irrigation audit.
(2) Hydrozone
(A) Each valve shall irrigate a hydrozone with similar site, slope, sun exposure, soil conditions, and plant materials with similar water use.
(B) Sprinkler heads and other emission devices shall be selected based on what is appropriate for the plant type within that hydrozone.
(C) Where feasible, trees shall be placed on separate valves from shrubs, groundcovers, and turf.
(D) Individual hydrozones that mix plants of moderate and low water use, or moderate and high water use, may be allowed if:

1. plant factor calculation is based on the proportions of the respective plant water uses and their plant factor; or
2. the plant factor of the higher water using plant is used for calculations.
(E) Individual hydrozones that mix high and low water use plants shall not be permitted.
(F) On the landscape design plan and irrigation design plan, hydrozone areas shall be designated by number, letter, or other designation. On the irrigation design plan, designate the areas irrigated by each valve, and assign a number to each valve. Use this valve number in the Hydrozone Information Table (see Appendix B Section A). This table can also assist with the irrigation audit and programming the controller.
(b) The irrigation design plan, at a minimum, shall contain:
(1) location and size of separate water meters for landscape;
(2) location, type and size of all components of the irrigation system, including controllers, main and lateral lines, valves, sprinkler heads, moisture sensing devices, rain switches, quick couplers, pressure regulators, and backflow prevention devices;
(3) static water pressure at the point of connection to the public water supply;
(4) flow rate (gallons per minute), application rate (inches per hour), and design operating pressure (pressure per square inch) for each station;
(5) recycled water irrigation systems as specified in Section 492.14;
(6) the following statement: "I have complied with the criteria of the ordinance and applied them accordingly for the efficient use of water in the irrigation design plan"; and
(7) the signature of a licensed landscape architect, certified irrigation designer, licensed landscape contractor, or any other person authorized to design an irrigation system. (See Sections 5500.1, 5615, 5641, 5641.1, 5641.2, 5641.3, 5641.4, 5641.5, 5641.6, 6701, 7027.5 of the Business and Professions Code, Section 832.27 of Title 16 of the California Code of Regulations, and Section 6721 of the Food and Agricultural Code.)

Note: Authority Cited: Section 65595, Government Code. Reference: Section 65596, Government Code.

§ 492.8 Grading Design Plan.
(a) For the efficient use of water, grading of a project site shall be designed to minimize soil erosion, runoff, and water waste. A grading plan shall be submitted as part of the Landscape Documentation Package. A comprehensive grading plan prepared by a civil engineer for other local agency permits satisfies this requirement.
(1) The project applicant shall submit a landscape grading plan that indicates finished configurations and elevations of the landscape area including:
(A) height of graded slopes;
(B) drainage patterns;
(C) pad elevations;
(D) finish grade; and
(E) stormwater retention improvements, if applicable.
(2) To prevent excessive erosion and runoff, it is highly recommended that project applicants:
(A) grade so that all irrigation and normal rainfall remains within property lines and does not drain on to non-permeable hardscapes;
(B) avoid disruption of natural drainage patterns and undisturbed soil; and
(C) avoid soil compaction in landscape areas.
(3) The grading design plan shall contain the following statement: "I have complied with the criteria of the ordinance and applied them accordingly for the efficient use of water in the grading design plan" and shall bear the signature of a licensed professional as authorized by law.

Note: Authority Cited: Section 65595, Government Code. Reference: Section 65596, Government Code.

§ 492.9 Certificate of Completion.

(a) The Certificate of Completion (see Appendix C for a sample certificate) shall include the following six (6) elements:
(1) project information sheet that contains:
(A) date;
(B) project name;
(C) project applicant name, telephone, and mailing address;
(D) project address and location; and
(E) property owner name, telephone, and mailing address;
(2) certification by either the signer of the landscape design plan, the signer of the irrigation design plan, or the licensed landscape contractor that the landscape project has been installed per the approved Landscape Documentation Package;
(A) where there have been significant changes made in the field during construction, these "as-built" or record drawings shall be included with the certification;
(3) irrigation scheduling parameters used to set the controller (see Section 492.10);
(4) landscape and irrigation maintenance schedule (see Section 492.11);
(5) irrigation audit report (see Section 492.12); and
(6) soil analysis report, if not submitted with Landscape Documentation Package, and documentation verifying implementation of soil report recommendations (see Section 492.5).
(b) The project applicant shall:
(1) submit the signed Certificate of Completion to the local agency for review;
(2) ensure that copies of the approved Certificate of Completion are submitted to the local water purveyor and property owner or his or her designee.
(c) The local agency shall:
(1) receive the signed Certificate of Completion from the project applicant;
(2) approve or deny the Certificate of Completion. If the Certificate of Completion is denied, the local agency shall provide information to the project applicant regarding reapplication, appeal, or other assistance.

Note: Authority Cited: Section 65595, Government Code. Reference: Section 65596, Government Code.

§ 492.10 Irrigation Scheduling.

(a) For the efficient use of water, all irrigation schedules shall be developed, managed, and evaluated to utilize the minimum amount of water required to maintain plant health. Irrigation schedules shall meet the following criteria:
(1) Irrigation scheduling shall be regulated by automatic irrigation controllers.
(2) Overhead irrigation shall be scheduled between 8:00 p.m. and 10:00 a.m. unless weather conditions prevent it. If allowable hours of irrigation differ from the local water purveyor, the stricter of the two shall apply. Operation of the irrigation system outside the normal watering window is allowed for auditing and system maintenance.
(3) For implementation of the irrigation schedule, particular attention must be paid to irrigation run times, emission device, flow rate, and current reference evapotranspiration, so that applied water meets the Estimated Total Water Use. Total annual applied water shall be less than or equal to Maximum Applied Water Allowance (MAWA). Actual irrigation schedules shall be regulated by automatic irrigation controllers using current reference evapotranspiration data (e.g., CIMIS) or soil moisture sensor data.
(4) Parameters used to set the automatic controller shall be developed and submitted for each of the following:
(A) the plant establishment period;

(B) the established landscape; and
(C) temporarily irrigated areas.
(5) Each irrigation schedule shall consider for each station all of the following that apply:
(A) irrigation interval (days between irrigation);
(B) irrigation run times (hours or minutes per irrigation event to avoid runoff);
(C) number of cycle starts required for each irrigation event to avoid runoff;
(D) amount of applied water scheduled to be applied on a monthly basis;
(E) application rate setting;
(F) root depth setting;
(G) plant type setting;
(H) soil type;
(I) slope factor setting;
(J) shade factor setting; and
(K) irrigation uniformity or efficiency setting.

Note: Authority Cited: Section 65595, Government Code. Reference: Section 65596, Government Code.

§ 492.11 Landscape and Irrigation Maintenance Schedule.
(a) Landscapes shall be maintained to ensure water use efficiency. A regular maintenance schedule shall be submitted with the Certificate of Completion.
(b) A regular maintenance schedule shall include, but not be limited to, routine inspection; adjustment and repair of the irrigation system and its components; aerating and dethatching turf areas; replenishing mulch; fertilizing; pruning; weeding in all landscape areas, and removing and obstruction to emission devices. Operation of the irrigation system outside the normal watering window is allowed for auditing and system maintenance.
(c) Repair of all irrigation equipment shall be done with the originally installed components or their equivalents.
(d) A project applicant is encouraged to implement sustainable or environmentally-friendly practices for overall landscape maintenance.

Note: Authority Cited: Section 65595, Government Code. Reference: Section 65596, Government Code.

§ 492.12 Irrigation Audit, Irrigation Survey, and Irrigation Water Use Analysis.
(a) All landscape irrigation audits shall be conducted by a certified landscape irrigation auditor.
(b) For new construction and rehabilitated landscape projects installed after January 1, 2010, as described in Section 490.1:
(1) the project applicant shall submit an irrigation audit report with the Certificate of Completion to the local agency that may include, but is not limited to: inspection, system tune-up, system test with distribution uniformity, reporting overspray or run off that causes overland flow, and preparation of an irrigation schedule;
(2) the local agency shall administer programs that may include, but not be limited to, irrigation water use analysis, irrigation audits, and irrigation surveys for compliance with the Maximum Applied Water Allowance.

Note: Authority Cited: Section 65595, Government Code. Reference: Section 65596, Government Code.

§ 492.13 Irrigation Efficiency.
(a) For the purpose of determining Maximum Applied Water Allowance, average irrigation efficiency is assumed to be 0.71. Irrigation systems shall be designed, maintained, and managed to meet or exceed an average landscape irrigation efficiency of 0.71.

Note: Authority Cited: Section 65595, Government Code. Reference: Section 65596, Government Code.

§ 492.14 Recycled Water.
(a) The installation of recycled water irrigation systems shall allow for the current and future use of recycled water, unless a written exemption has been granted as described in Section 492.14(b).
(b) Irrigation systems and decorative water features shall use recycled water unless a written exemption has been granted by the local water purveyor stating that recycled water meeting all public health codes and standards is not available and will not be available for the foreseeable future.
(c) All recycled water irrigation systems shall be designed and operated in accordance with all applicable local and State laws.
(d) Landscapes using recycled water are considered Special Landscape Areas. The ET Adjustment Factor for Special Landscape Areas shall not exceed 1.0.

Note: Authority Cited: Section 65595, Government Code. Reference: Section 65596, Government Code.

§ 492.15 Stormwater Management.
(a) Stormwater management practices minimize runoff and increase infiltration which recharges groundwater and improves water quality. Implementing stormwater best management practices into the landscape and grading design plans to minimize runoff and to increase on-site retention and infiltration are encouraged.
(b) Project applicants shall refer to the local agency or Regional Water Quality Control Board for information on any applicable stormwater ordinances and stormwater management plans.
(c) Rain gardens, cisterns, and other landscapes features and practices that increase rainwater capture and create opportunities for infiltration and/or onsite storage are recommended.

Note: Authority Cited: Section 65595, Government Code. Reference: Section 65596, Government Code.

§ 492.16 Public Education.
(a) Publications. Education is a critical component to promote the efficient use of water in landscapes. The use of appropriate principles of design, installation, management and maintenance that save water is encouraged in the community.
(1) A local agency shall provide information to owners of new, single-family residential homes regarding the design, installation, management, and maintenance of water efficient landscapes.
(b) Model Homes. All model homes that are landscaped shall use signs and written information to demonstrate the principles of water efficient landscapes described in this ordinance.
(1) Signs shall be used to identify the model as an example of a water efficient landscape featuring elements such as hydrozones, irrigation equipment, and others that contribute to the overall water efficient theme.
(2) Information shall be provided about designing, installing, managing, and maintaining water efficient landscapes.

Note: Authority Cited: Section 65595, Government Code. Reference: Section 65596, Government Code.

§ 492.17 Environmental Review.
(a) The local agency must comply with the California Environmental Quality Act (CEQA), as appropriate.

Note: Authority cited: Section 21082, Public Resources Code. Reference: Sections 21080, 21082, Public Resources Code.

§ 493. Provisions for Existing Landscapes.
(a) A local agency may designate another agency, such as a water purveyor, to implement some or all of the requirements contained in this ordinance. Local agencies may collaborate with water purveyors to define each entity's specific responsibilities relating to this ordinance.

Note: Authority Cited: Section 65595, Government Code. Reference: Section 65596, Government Code.

§ 493.1 Irrigation Audit, Irrigation Survey, and Irrigation Water Use Analysis.
(a) This section, 493.1, shall apply to all existing landscapes that were installed before January 1, 2010 and are over one acre in size.
(1) For all landscapes in 493.1(a) that have a water meter, the local agency shall administer programs that may include, but not be limited to, irrigation water use analyses, irrigation surveys, and irrigation audits to evaluate water use and provide recommendations as necessary to reduce landscape water use to a level that does not exceed the Maximum Applied Water Allowance for existing landscapes. The Maximum Applied Water Allowance for existing landscapes shall be calculated as: MAWA = (0.8)(ETo)(LA)(0.62).
(2) For all landscapes in 493.1(a), that do not have a meter, the local agency shall administer programs that may include, but not be limited to, irrigation surveys and irrigation audits to evaluate water use and provide recommendations as necessary in order to prevent water waste.
(b) All landscape irrigation audits shall be conducted by a certified landscape irrigation auditor.

Note: Authority Cited: Section 65595, Government Code. Reference: Section 65596, Government Code.

§ 493.2 Water Waste Prevention.
(a) Local agencies shall prevent water waste resulting from inefficient landscape irrigation by prohibiting runoff from leaving the target landscape due to low head drainage, overspray, or other similar conditions where water flows onto adjacent property, non-irrigated areas, walks, roadways, parking lots, or structures. Penalties for violation of these prohibitions shall be established locally.
(b) Restrictions regarding overspray and runoff may be modified if:
(1) the landscape area is adjacent to permeable surfacing and no runoff occurs; or
(2) the adjacent non-permeable surfaces are designed and constructed to drain entirely to landscaping.

Note: Authority cited: Section 65594, Government Code. Reference: Section 65596, Government Code.

§ 494. Effective Precipitation.
(a) A local agency may consider Effective Precipitation (25% of annual precipitation) in tracking water use and may use the following equation to calculate Maximum Applied Water Allowance:
MAWA= (ETo - Eppt) (0.62) [(0.7 x LA) + (0.3 x SLA)].

Note: Authority Cited: Section 65595, Government Code. Reference: Section 65596, Government Code.

Appendices.

Appendix A. Reference Evapotranspiration (ETo) Table.

Appendix A - Reference Evapotranspiration (ETo) Table*													
County and City	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Annual ETo**
ALAMEDA													
Fremont	1.5	1.9	3.4	4.7	5.4	6.3	6.7	6.0	4.5	3.4	1.8	1.5	47.0
Livermore	1.2	1.5	2.9	4.4	5.9	6.6	7.4	6.4	5.3	3.2	1.5	0.9	47.2
Oakland	1.5	1.5	2.8	3.9	5.1	5.3	6.0	5.5	4.8	3.1	1.4	0.9	41.8
Oakland Foothills	1.1	1.4	2.7	3.7	5.1	6.4	5.8	4.9	3.6	2.6	1.4	1.0	39.6
Pleasanton	0.8	1.5	2.9	4.4	5.6	6.7	7.4	6.4	4.7	3.3	1.5	1.0	46.2
Union City	1.4	1.8	3.1	4.2	5.4	5.9	6.4	5.7	4.4	3.1	1.5	1.2	44.2
ALPINE													
Markleeville	0.7	0.9	2.0	3.5	5.0	6.1	7.3	6.4	4.4	2.6	1.2	0.5	40.6
AMADOR													
Jackson	1.2	1.5	2.8	4.4	6.0	7.2	7.9	7.2	5.3	3.2	1.4	0.9	48.9
Shanandoah Valley	1.0	1.7	2.9	4.4	5.6	6.8	7.9	7.1	5.2	3.6	1.7	1.0	48.8
BUTTE													
Chico	1.2	1.8	2.9	4.7	6.1	7.4	8.5	7.3	5.4	3.7	1.7	1.0	51.7
Durham	1.1	1.8	3.2	5.0	6.5	7.4	7.8	6.9	5.3	3.6	1.7	1.0	51.1
Gridley	1.2	1.8	3.0	4.7	6.1	7.7	8.5	7.1	5.4	3.7	1.7	1.0	51.9
Oroville	1.2	1.7	2.8	4.7	6.1	7.6	8.5	7.3	5.3	3.7	1.7	1.0	51.5
CALAVERAS													
San Andreas	1.2	1.5	2.8	4.4	6.0	7.3	7.9	7.0	5.3	3.2	1.4	0.7	48.8
COLUSA													
Colusa	1.0	1.7	3.4	5.0	6.4	7.6	8.3	7.2	5.4	3.8	1.8	1.1	52.8
Williams	1.2	1.7	2.9	4.5	6.1	7.2	8.5	7.3	5.3	3.4	1.6	1.0	50.8
CONTRA COSTA													
Benicia	1.3	1.4	2.7	3.8	4.9	5.0	6.4	5.5	4.4	2.9	1.2	0.7	40.3
Brentwood	1.0	1.5	2.9	4.5	6.1	7.1	7.9	6.7	5.2	3.2	1.4	0.7	48.3
Concord	1.1	1.4	2.4	4.0	5.5	5.9	7.0	6.0	4.8	3.2	1.3	0.7	43.4
Courtland	0.9	1.5	2.9	4.4	6.1	6.9	7.9	6.7	5.3	3.2	1.4	0.7	48.0
Martinez	1.2	1.4	2.4	3.9	5.3	5.6	6.7	5.6	4.7	3.1	1.2	0.7	41.8
Moraga	1.2	1.5	3.4	4.2	5.5	6.1	6.7	5.9	4.6	3.2	1.6	1.0	44.9
Pittsburg	1.0	1.5	2.8	4.1	5.6	6.4	7.4	6.4	5.0	3.2	1.3	0.7	45.4
Walnut Creek	0.8	1.5	2.9	4.4	5.6	6.7	7.4	6.4	4.7	3.3	1.5	1.0	46.2
DEL NORTE													
Crescent City	0.5	0.9	2.0	3.0	3.7	3.5	4.3	3.7	3.0	2.0	0.9	0.5	27.7
EL DORADO													
Camino	0.9	1.7	2.5	3.9	5.9	7.2	7.8	6.8	5.1	3.1	1.5	0.9	47.3
FRESNO													
Clovis	1.0	1.5	3.2	4.8	6.4	7.7	8.5	7.3	5.3	3.4	1.4	0.7	51.4
Coalinga	1.2	1.7	3.1	4.6	6.2	7.2	8.5	7.3	5.3	3.4	1.6	0.7	50.9
Firebaugh	1.0	1.8	3.7	5.7	7.3	8.1	8.2	7.2	5.5	3.9	2.0	1.1	55.4
FivePoints	1.3	2.0	4.0	6.1	7.7	8.5	8.7	8.0	6.2	4.5	2.4	1.2	60.4
FRESNO													
Fresno	0.9	1.7	3.3	4.8	6.7	7.8	8.4	7.1	5.2	3.2	1.4	0.6	51.1
Fresno State	0.9	1.6	3.2	5.2	7.0	8.0	8.7	7.6	5.4	3.6	1.7	0.9	53.7
Friant	1.2	1.5	3.1	4.7	6.4	7.7	8.5	7.3	5.3	3.4	1.4	0.7	51.3
Kerman	0.9	1.5	3.2	4.8	6.6	7.7	8.4	7.2	5.3	3.4	1.4	0.7	51.2
Kingsburg	1.0	1.5	3.4	4.8	6.6	7.7	8.4	7.2	5.3	3.4	1.4	0.7	51.6
Mendota	1.5	2.5	4.6	6.2	7.9	8.6	8.8	7.5	5.9	4.5	2.4	1.5	61.7
Orange Cove	1.2	1.9	3.5	4.7	7.4	8.5	8.9	7.9	5.9	3.7	1.8	1.2	56.7
Panoche	1.1	2.0	4.0	5.6	7.8	8.5	8.3	7.3	5.6	3.9	1.8	1.2	57.2
Parlier	1.0	1.9	3.6	5.2	6.8	7.6	8.1	7.0	5.1	3.4	1.7	0.9	52.0
Reedley	1.1	1.5	3.2	4.7	6.4	7.7	8.5	7.3	5.3	3.4	1.4	0.7	51.3
Westlands	0.9	1.7	3.8	6.3	8.0	8.6	8.6	7.8	5.9	4.3	2.1	1.1	58.8

Appendix A - Reference Evapotranspiration (ETo) Table*													
County and City	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Annual ETo**
GLENN													
Orland	1.1	1.8	3.4	5.0	6.4	7.5	7.9	6.7	5.3	3.9	1.8	1.4	52.1
Willows	1.2	1.7	2.9	4.7	6.1	7.2	8.5	7.3	5.3	3.6	1.7	1.0	51.3
HUMBOLDT													
Eureka	0.5	1.1	2.0	3.0	3.7	3.7	3.7	3.7	3.0	2.0	0.9	0.5	27.5
Ferndale	0.5	1.1	2.0	3.0	3.7	3.7	3.7	3.7	3.0	2.0	0.9	0.5	27.5
Garberville	0.6	1.2	2.2	3.1	4.5	5.0	5.5	4.9	3.8	2.4	1.0	0.7	34.9
Hoopa	0.5	1.1	2.1	3.0	4.4	5.4	6.1	5.1	3.8	2.4	0.9	0.7	35.6
IMPERIAL													
Brawley	2.8	3.8	5.9	8.0	10.4	11.5	11.7	10.0	8.4	6.2	3.5	2.1	84.2
Calipatria/Mulberry	2.4	3.2	5.1	6.8	8.6	9.2	9.2	8.6	7.0	5.2	3.1	2.3	70.7
El Centro	2.7	3.5	5.6	7.9	10.1	11.1	11.6	9.5	8.3	6.1	3.3	2.0	81.7
Holtville	2.8	3.8	5.9	7.9	10.4	11.6	12.0	10.0	8.6	6.2	3.5	2.1	84.7
Meloland	2.5	3.2	5.5	7.5	8.9	9.2	9.0	8.5	6.8	5.3	3.1	2.2	71.6
Palo Verde II	2.5	3.3	5.7	6.9	8.5	8.9	8.6	7.9	6.2	4.5	2.9	2.3	68.2
Seeley	2.7	3.5	5.9	7.7	9.7	10.1	9.3	8.3	6.9	5.5	3.4	2.2	75.4
Westmoreland	2.4	3.3	5.3	6.9	8.7	9.6	9.6	8.7	6.9	5.0	3.0	2.2	71.4
Yuma	2.5	3.4	5.3	6.9	8.7	9.6	9.6	8.7	6.9	5.0	3.0	2.2	71.6
INYO													
Bishop	1.7	2.7	4.8	6.7	8.2	10.9	7.4	9.6	7.4	4.8	2.5	1.6	68.3
Death Valley Jct	2.2	3.3	5.4	7.7	9.8	11.1	11.4	10.1	8.3	5.4	2.9	1.7	79.1
Independence	1.7	2.7	3.4	6.6	8.5	9.5	9.8	8.5	7.1	3.9	2.0	1.5	65.2
Lower Haiwee Res.	1.8	2.7	4.4	7.1	8.5	9.5	9.8	8.5	7.1	4.2	2.6	1.5	67.6
Oasis	2.7	2.8	5.9	8.0	10.4	11.7	11.6	10.0	8.4	6.2	3.4	2.1	83.1
KERN													
Arvin	1.2	1.8	3.5	4.7	6.6	7.4	8.1	7.3	5.3	3.4	1.7	1.0	51.9
Bakersfield	1.0	1.8	3.5	4.7	6.6	7.7	8.5	7.3	5.3	3.5	1.6	0.9	52.4
Bakersfield/Bonanza	1.2	2.2	3.7	5.7	7.4	8.2	8.7	7.8	5.7	4.0	2.1	1.2	57.9
Bakersfield/Greenlee	1.2	2.2	3.7	5.7	7.4	8.2	8.7	7.8	5.7	4.0	2.1	1.2	57.9
KERN													
Belridge	1.4	2.2	4.1	5.5	7.7	8.5	8.6	7.8	6.0	3.8	2.0	1.5	59.2
Blackwells Corner	1.4	2.1	3.8	5.4	7.0	7.8	8.5	7.7	5.8	3.9	1.9	1.2	56.6
Buttonwillow	1.0	1.8	3.2	4.7	6.6	7.7	8.5	7.3	5.4	3.4	1.5	0.9	52.0
China Lake	2.1	3.2	5.3	7.7	9.2	10.0	11.0	9.8	7.3	4.9	2.7	1.7	74.8
Delano	0.9	1.8	3.4	4.7	6.6	7.7	8.5	7.3	5.4	3.4	1.4	0.7	52.0
Famoso	1.3	1.9	3.5	4.8	6.7	7.6	8.0	7.3	5.5	3.5	1.7	1.3	53.1
Grapevine	1.3	1.8	3.1	4.4	5.6	6.8	7.6	6.8	5.9	3.4	1.9	1.0	49.5
Inyokern	2.0	3.1	4.9	7.3	8.5	9.7	11.0	9.4	7.1	5.1	2.6	1.7	72.4
Isabella Dam	1.2	1.4	2.8	4.4	5.8	7.3	7.9	7.0	5.0	3.2	1.7	0.9	48.4
Lamont	1.3	2.4	4.4	4.6	6.5	7.0	8.8	7.6	5.7	3.7	1.6	0.8	54.4
Lost Hills	1.6	2.2	3.7	5.1	6.8	7.8	8.7	7.8	5.7	4.0	2.1	1.6	57.1
McFarland/Kern	1.2	2.1	3.7	5.6	7.3	8.0	8.3	7.4	5.6	4.1	2.0	1.2	56.5
Shafter	1.0	1.7	3.4	5.0	6.6	7.7	8.3	7.3	5.4	3.4	1.5	0.9	52.1
Taft	1.3	1.8	3.1	4.3	6.2	7.3	8.5	7.3	5.4	3.4	1.7	1.0	51.2
Tehachapi	1.4	1.8	3.2	5.0	6.1	7.7	7.9	7.3	5.9	3.4	2.1	1.2	52.9
KINGS													
Caruthers	1.6	2.5	4.0	5.7	7.8	8.7	9.3	8.4	6.3	4.4	2.4	1.6	62.7
Corcoran	1.6	2.2	3.7	5.1	6.8	7.8	8.7	7.8	5.7	4.0	2.1	1.6	57.1
Hanford	0.9	1.5	3.4	5.0	6.6	7.7	8.3	7.2	5.4	3.4	1.4	0.7	51.5
Kettleman	1.1	2.0	4.0	6.0	7.5	8.5	9.1	8.2	6.1	4.5	2.2	1.1	60.2
Lemoore	0.9	1.5	3.4	5.0	6.6	7.7	8.3	7.3	5.4	3.4	1.4	0.7	51.7
Stratford	0.9	1.9	3.9	6.1	7.8	8.6	8.8	7.7	5.9	4.1	2.1	1.0	58.7

Appendix A - Reference Evapotranspiration (ETo) Table*													
County and City	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Annual ETo**
LAKE													
Lakeport	1.1	1.3	2.6	3.5	5.1	6.0	7.3	6.1	4.7	2.9	1.2	0.9	42.8
Lower Lake	1.2	1.4	2.7	4.5	5.3	6.3	7.4	6.4	5.0	3.1	1.3	0.9	45.4
LASSEN													
Buntingville	1.0	1.7	3.5	4.9	6.2	7.3	8.4	7.5	5.4	3.4	1.5	0.9	51.8
Ravendale	0.6	1.1	2.3	4.1	5.6	6.7	7.9	7.3	4.7	2.8	1.2	0.5	44.9
Susanville	0.7	1.0	2.2	4.1	5.6	6.5	7.8	7.0	4.6	2.8	1.2	0.5	44.0
LOS ANGELES													
Burbank	2.1	2.8	3.7	4.7	5.1	6.0	6.6	6.7	5.4	4.0	2.6	2.0	51.7
Claremont	2.0	2.3	3.4	4.6	5.0	6.0	7.0	7.0	5.3	4.0	2.7	2.1	51.3
El Dorado	1.7	2.2	3.6	4.8	5.1	5.7	5.9	5.9	4.4	3.2	2.2	1.7	46.3
Glendale	2.0	2.2	3.3	3.8	4.7	4.8	5.7	5.6	4.3	3.3	2.2	1.8	43.7
Glendora	2.0	2.5	3.6	4.9	5.4	6.1	7.3	6.8	5.7	4.2	2.6	2.0	53.1
Gorman	1.6	2.2	3.4	4.6	5.5	7.4	7.7	7.1	5.9	3.6	2.4	1.1	52.4
Hollywood Hills	2.1	2.2	3.8	5.4	6.0	6.5	6.7	6.4	5.2	3.7	2.8	2.1	52.8
Lancaster	2.1	3.0	4.6	5.9	8.5	9.7	11.0	9.8	7.3	4.6	2.8	1.7	71.1
Long Beach	1.8	2.1	3.3	3.9	4.5	4.3	5.3	4.7	3.7	2.8	1.8	1.5	39.7
Los Angeles	2.2	2.7	3.7	4.7	5.5	5.8	6.2	5.9	5.0	3.9	2.6	1.9	50.1
LOS ANGELES													
Monrovia	2.2	2.3	3.8	4.3	5.5	5.9	6.9	6.4	5.1	3.2	2.5	2.0	50.2
Palmdale	2.0	2.6	4.6	6.2	7.3	8.9	9.8	9.0	6.5	4.7	2.7	2.1	66.2
Pasadena	2.1	2.7	3.7	4.7	5.1	6.0	7.1	6.7	5.6	4.2	2.6	2.0	52.3
Pearblossom	1.7	2.4	3.7	4.7	7.3	7.7	9.9	7.9	6.4	4.0	2.6	1.6	59.9
Pomona	1.7	2.0	3.4	4.5	5.0	5.8	6.5	6.4	4.7	3.5	2.3	1.7	47.5
Redondo Beach	2.2	2.4	3.3	3.8	4.5	4.7	5.4	4.8	4.4	2.8	2.4	2.0	42.6
San Fernando	2.0	2.7	3.5	4.6	5.5	5.9	7.3	6.7	5.3	3.9	2.6	2.0	52.0
Santa Clarita	2.8	2.8	4.1	5.6	6.0	6.8	7.6	7.8	5.8	5.2	3.7	3.2	61.5
Santa Monica	1.8	2.1	3.3	4.5	4.7	5.0	5.4	5.4	3.9	3.4	2.4	2.2	44.2
MADERA													
Chowchilla	1.0	1.4	3.2	4.7	6.6	7.8	8.5	7.3	5.3	3.4	1.4	0.7	51.4
Madera	0.9	1.4	3.2	4.8	6.6	7.8	8.5	7.3	5.3	3.4	1.4	0.7	51.5
Raymond	1.2	1.5	3.0	4.6	6.1	7.6	8.4	7.3	5.2	3.4	1.4	0.7	50.5
MARIN													
Black Point	1.1	1.7	3.0	4.2	5.2	6.2	6.6	5.8	4.3	2.8	1.3	0.9	43.0
Novato	1.3	1.5	2.4	3.5	4.4	6.0	5.9	5.4	4.4	2.8	1.4	0.7	39.8
Point San Pedro	1.1	1.7	3.0	4.2	5.2	6.2	6.6	5.8	4.3	2.8	1.3	0.9	43.0
San Rafael	1.2	1.3	2.4	3.3	4.0	4.8	4.8	4.9	4.3	2.7	1.3	0.7	35.8
MARIPOSA													
Coulterville	1.1	1.5	2.8	4.4	5.9	7.3	8.1	7.0	5.3	3.4	1.4	0.7	48.8
Mariposa	1.1	1.5	2.8	4.4	5.9	7.4	8.2	7.1	5.0	3.4	1.4	0.7	49.0
Yosemite Village	0.7	1.0	2.3	3.7	5.1	6.5	7.1	6.1	4.4	2.9	1.1	0.6	41.4
MENDOCINO													
Fort Bragg	0.9	1.3	2.2	3.0	3.7	3.5	3.7	3.7	3.0	2.3	1.2	0.7	29.0
Hopland	1.1	1.3	2.6	3.4	5.0	5.9	6.5	5.7	4.5	2.8	1.3	0.7	40.9
Point Arena	1.0	1.3	2.3	3.0	3.7	3.9	3.7	3.7	3.0	2.3	1.2	0.7	29.6
Sanel Valley	1.0	1.6	3.0	4.6	6.0	7.0	8.0	7.0	5.2	3.4	1.4	0.9	49.1
Ukiah	1.0	1.3	2.6	3.3	5.0	5.8	6.7	5.9	4.5	2.8	1.3	0.7	40.9
MERCED													
Kesterson	0.9	1.7	3.4	5.5	7.3	8.2	8.6	7.4	5.5	3.8	1.8	0.9	55.1
Los Banos	1.0	1.5	3.2	4.7	6.1	7.4	8.2	7.0	5.3	3.4	1.4	0.7	50.0
Merced	1.0	1.5	3.2	4.7	6.6	7.9	8.5	7.2	5.3	3.4	1.4	0.7	51.5

Appendix A - Reference Evapotranspiration (ETo) Table*													
County and City	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Annual ETo**
MODOC													
Modoc/Alturas	0.9	1.4	2.8	3.7	5.1	6.2	7.5	6.6	4.6	2.8	1.2	0.7	43.2
MONO													
Bridgeport	0.7	0.9	2.2	3.8	5.5	6.6	7.4	6.7	4.7	2.7	1.2	0.5	43.0
MONTEREY													
Arroyo Seco	1.5	2.0	3.7	5.4	6.3	7.3	7.2	6.7	5.0	3.9	2.0	1.6	52.6
Castroville	1.4	1.7	3.0	4.2	4.6	4.8	4.0	3.8	3.0	2.6	1.6	1.4	36.2
Gonzales	1.3	1.7	3.4	4.7	5.4	6.3	6.3	5.9	4.4	3.4	1.9	1.3	45.7
MONTEREY													
Greenfield	1.8	2.2	3.4	4.8	5.6	6.3	6.5	6.2	4.8	3.7	2.4	1.8	49.5
King City	1.7	2.0	3.4	4.4	4.4	5.6	6.1	6.7	6.5	5.2	2.2	1.3	49.6
King City-Oasis Rd.	1.4	1.9	3.6	5.3	6.5	7.3	7.4	6.8	5.1	4.0	2.0	1.5	52.7
Long Valley	1.5	1.9	3.2	4.1	5.8	6.5	7.3	6.7	5.3	3.6	2.0	1.2	49.1
Monterey	1.7	1.8	2.7	3.5	4.0	4.1	4.3	4.2	3.5	2.8	1.9	1.5	36.0
Pajaro	1.8	2.2	3.7	4.8	5.3	5.7	5.6	5.3	4.3	3.4	2.4	1.8	46.1
Salinas	1.6	1.9	2.7	3.8	4.8	4.7	5.0	4.5	4.0	2.9	1.9	1.3	39.1
Salinas North	1.2	1.5	2.9	4.1	4.6	5.2	4.5	4.3	3.2	2.8	1.5	1.2	36.9
San Ardo	1.0	1.7	3.1	4.5	5.9	7.2	8.1	7.1	5.1	3.1	1.5	1.0	49.0
San Juan	1.8	2.1	3.4	4.6	5.3	5.7	5.5	4.9	3.8	3.2	2.2	1.9	44.2
Soledad	1.7	2.0	3.4	4.4	5.5	5.4	6.5	6.2	5.2	3.7	2.2	1.5	47.7
NAPA													
Angwin	1.8	1.9	3.2	4.7	5.8	7.3	8.1	7.1	5.5	4.5	2.9	2.1	54.9
Carneros	0.8	1.5	3.1	4.6	5.5	6.6	6.9	6.2	4.7	3.5	1.4	1.0	45.8
Oakville	1.0	1.5	2.9	4.7	5.8	6.9	7.2	6.4	4.9	3.5	1.6	1.2	47.7
St Helena	1.2	1.5	2.8	3.9	5.1	6.1	7.0	6.2	4.8	3.1	1.4	0.9	44.1
Yountville	1.3	1.7	2.8	3.9	5.1	6.0	7.1	6.1	4.8	3.1	1.5	0.9	44.3
NEVADA													
Grass Valley	1.1	1.5	2.6	4.0	5.7	7.1	7.9	7.1	5.3	3.2	1.5	0.9	48.0
Nevada City	1.1	1.5	2.6	3.9	5.8	6.9	7.9	7.0	5.3	3.2	1.4	0.9	47.4
ORANGE													
Irvine	2.2	2.5	3.7	4.7	5.2	5.9	6.3	6.2	4.6	3.7	2.6	2.3	49.6
Laguna Beach	2.2	2.7	3.4	3.8	4.6	4.6	4.9	4.9	4.4	3.4	2.4	2.0	43.2
Santa Ana	2.2	2.7	3.7	4.5	4.6	5.4	6.2	6.1	4.7	3.7	2.5	2.0	48.2
PLACER													
Auburn	1.2	1.7	2.8	4.4	6.1	7.4	8.3	7.3	5.4	3.4	1.6	1.0	50.6
Blue Canyon	0.7	1.1	2.1	3.4	4.8	6.0	7.2	6.1	4.6	2.9	0.9	0.6	40.5
Colfax	1.1	1.5	2.6	4.0	5.8	7.1	7.9	7.0	5.3	3.2	1.4	0.9	47.9
Roseville	1.1	1.7	3.1	4.7	6.2	7.7	8.5	7.3	5.6	3.7	1.7	1.0	52.2
Soda Springs	0.7	0.7	1.8	3.0	4.3	5.3	6.2	5.5	4.1	2.5	0.7	0.7	35.4
Tahoe City	0.7	0.7	1.7	3.0	4.3	5.4	6.1	5.6	4.1	2.4	0.8	0.6	35.5
Truckee	0.7	0.7	1.7	3.2	4.4	5.4	6.4	5.7	4.1	2.4	0.8	0.6	36.2
PLUMAS													
Portola	0.7	0.9	1.9	3.5	4.9	5.9	7.3	5.9	4.3	2.7	0.9	0.5	39.4
Quincy	0.7	0.9	2.2	3.5	4.9	5.9	7.3	5.9	4.4	2.8	1.2	0.5	40.2
RIVERSIDE													
Beaumont	2.0	2.3	3.4	4.4	6.1	7.1	7.6	7.9	6.0	3.9	2.6	1.7	55.0
Blythe	2.4	3.3	5.3	6.9	8.7	9.6	9.6	8.7	6.9	5.0	3.0	2.2	71.4
Cathedral City	1.6	2.2	3.7	5.1	6.8	7.8	8.7	7.8	5.7	4.0	2.1	1.6	57.1
Coachella	2.9	4.4	6.2	8.4	10.5	11.9	12.3	10.1	8.9	6.2	3.8	2.4	88.1

Appendix A - Reference Evapotranspiration (ETo) Table*													
County and City	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Annual ETo**
RIVERSIDE													
Desert Center	2.9	4.1	6.4	8.5	11.0	12.1	12.2	11.1	9.0	6.4	3.9	2.6	90.0
Elsinore	2.1	2.8	3.9	4.4	5.9	7.1	7.6	7.0	5.8	3.9	2.6	1.9	55.0
Indio	**3.1**	3.6	6.5	8.3	10.5	11.0	10.8	9.7	8.3	5.9	3.7	2.7	83.9
La Quinta	2.4	2.8	5.2	6.5	8.3	8.7	8.5	7.9	6.5	4.5	2.7	2.2	66.2
Mecca	2.6	3.3	5.7	7.2	8.6	9.0	8.8	8.2	6.8	5.0	3.2	2.4	70.8
Oasis	2.9	3.3	5.3	6.1	8.5	8.9	8.7	7.9	6.9	4.8	2.9	2.3	68.4
Palm Deser	2.5	3.4	5.3	6.9	8.7	9.6	9.6	8.7	6.9	5.0	3.0	2.2	71.6
Palm Springs	2.0	2.9	4.9	7.2	8.3	8.5	11.6	8.3	7.2	5.9	2.7	1.7	71.1
Rancho California	1.8	2.2	3.4	4.8	5.6	6.3	6.5	6.2	4.8	3.7	2.4	1.8	49.5
Rancho Mirage	2.4	3.3	5.3	6.9	8.7	9.6	9.6	8.7	6.9	5.0	3.0	2.2	71.4
Ripley	2.7	3.3	5.6	7.2	8.7	8.7	8.4	7.6	6.2	4.6	2.8	2.2	67.8
Salton Sea North	2.5	3.3	5.5	7.2	8.8	9.3	9.2	8.5	6.8	5.2	3.1	2.3	71.7
Temecula East II	2.3	2.4	4.1	4.9	6.4	7.0	7.8	7.4	5.7	4.1	2.6	2.2	56.7
Thermal	2.4	3.3	5.5	7.6	9.1	9.6	9.3	8.6	7.1	5.2	3.1	2.1	72.8
Riverside UC	2.5	2.9	4.2	5.3	5.9	6.6	7.2	6.9	5.4	4.1	2.9	2.6	56.4
Winchester	2.3	2.4	4.1	4.9	6.4	6.9	7.7	7.5	6.0	3.9	2.6	2.1	56.8
SACRAMENTO													
Fair Oaks	1.0	1.6	3.4	4.1	6.5	7.5	8.1	7.1	5.2	3.4	1.5	1.0	50.5
Sacramento	1.0	1.8	3.2	4.7	6.4	7.7	8.4	7.2	5.4	3.7	1.7	0.9	51.9
Twitchell Island	1.2	1.8	3.9	5.3	7.4	8.8	9.1	7.8	5.9	3.8	1.7	1.2	57.9
SAN BENITO													
Hollister	1.5	1.8	3.1	4.3	5.5	5.7	6.4	5.9	5.0	3.5	1.7	1.1	45.1
San Benito	1.2	1.6	3.1	4.6	5.6	6.4	6.9	6.5	4.8	3.7	1.7	1.2	47.2
San Juan Valley	1.4	1.8	3.4	4.5	6.0	6.7	7.1	6.4	5.0	3.5	1.8	1.4	49.1
SAN BERNARDINO													
Baker	2.7	3.9	6.1	8.3	10.4	11.8	12.2	11.0	8.9	6.1	3.3	2.1	86.6
Barstow NE	2.2	2.9	5.3	6.9	9.0	10.1	9.9	8.9	6.8	4.8	2.7	2.1	71.7
Big Bear Lake	1.8	2.6	4.6	6.0	7.0	7.6	8.1	7.4	5.4	4.1	2.4	1.8	58.6
Chino	2.1	2.9	3.9	4.5	5.7	6.5	7.3	7.1	5.9	4.2	2.6	2.0	54.6
Crestline	1.5	1.9	3.3	4.4	5.5	6.6	7.8	7.1	5.4	3.5	2.2	1.6	50.8
Lake Arrowhead	1.8	2.6	4.6	6.0	7.0	7.6	8.1	7.4	5.4	4.1	2.4	1.8	58.6
Lucerne Valley	2.2	2.9	5.1	6.5	9.1	11.0	11.4	9.9	7.4	5.0	3.0	1.8	75.3
Needles	3.2	4.2	6.6	8.9	11.0	12.4	12.8	11.0	8.9	6.6	4.0	2.7	92.1
Newberry Springs	2.1	2.9	5.3	8.4	9.8	10.9	11.1	9.9	7.6	5.2	3.1	2.0	78.2
San Bernardino	2.0	2.7	3.8	4.6	5.7	6.9	7.9	7.4	5.9	4.2	2.6	2.0	55.6
Twentynine Palms	2.6	3.6	5.9	7.9	10.1	11.2	11.2	10.3	8.6	5.9	3.4	2.2	82.9
Victorville	2.0	2.6	4.6	6.2	7.3	8.9	9.8	9.0	6.5	4.7	2.7	2.1	66.2
SAN DIEGO													
Chula Vista	2.2	2.7	3.4	3.8	4.9	4.7	5.5	4.9	4.5	3.4	2.4	2.0	44.2
Escondido SPV	2.4	2.6	3.9	4.7	5.9	6.5	7.1	6.7	5.3	3.9	2.8	2.3	54.2
SAN DIEGO													
Miramar	2.3	2.5	3.7	4.1	5.1	5.4	6.1	5.8	4.5	3.3	2.4	2.1	47.1
Oceanside	2.2	2.7	3.4	3.7	4.9	4.6	4.6	5.1	4.1	3.3	2.4	2.0	42.9
Otay Lake	2.3	2.7	3.9	4.6	5.6	5.9	6.2	6.1	4.8	3.7	2.6	2.2	50.4
Pine Valley	1.5	2.4	3.8	5.1	6.0	7.0	7.8	7.3	6.0	4.0	2.2	1.7	54.8
Ramona	2.1	2.1	3.4	4.6	5.2	6.3	6.7	6.8	5.3	4.1	2.8	2.1	51.6
San Diego	2.1	2.4	3.4	4.6	5.1	5.3	5.7	5.6	4.3	3.6	2.4	2.0	46.5
Santee	2.1	2.7	3.7	4.5	5.5	6.1	6.6	6.2	5.4	3.8	2.6	2.0	51.1
Torrey Pines	2.2	2.3	3.4	3.9	4.0	4.1	4.6	4.7	3.8	2.8	2.0	2.0	39.8
Warner Springs	1.6	2.7	3.7	4.7	5.7	7.6	8.3	7.7	6.3	4.0	2.5	1.3	56.0

Appendix A - Reference Evapotranspiration (ETo) Table*													
County and City	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Annual ETo**
SAN FRANCISCO													
San Francisco	1.5	1.3	2.4	3.0	3.7	4.6	4.9	4.8	4.1	2.8	1.3	0.7	35.1
SAN JOAQUIN													
Farmington	1.5	1.5	2.9	4.7	6.2	7.6	8.1	6.8	5.3	3.3	1.4	0.7	50.0
Lodi West	1.0	1.6	3.3	4.3	6.3	6.9	7.3	6.4	4.5	3.0	1.4	0.8	46.7
Manteca	0.9	1.7	3.4	5.0	6.5	7.5	8.0	7.1	5.2	3.3	1.6	0.9	51.2
Stockton	0.8	1.5	2.9	4.7	6.2	7.4	8.1	6.8	5.3	3.2	1.4	0.6	49.1
Tracy	1.0	1.5	2.9	4.5	6.1	7.3	7.9	6.7	5.3	3.2	1.3	0.7	48.5
SAN LUIS OBISPO													
Arroyo Grande	2.0	2.2	3.2	3.8	4.3	4.7	4.3	4.6	3.8	3.2	2.4	1.7	40.0
Atascadero	1.2	1.5	2.8	3.9	4.5	6.0	6.7	6.2	5.0	3.2	1.7	1.0	43.7
Morro Bay	2.0	2.2	3.1	3.5	4.3	4.5	4.6	4.6	3.8	3.5	2.1	1.7	39.9
Nipomo	2.2	2.5	3.8	5.1	5.7	6.2	6.4	6.1	4.9	4.1	2.9	2.3	52.1
Paso Robles	1.6	2.0	3.2	4.3	5.5	6.3	7.3	6.7	5.1	3.7	2.1	1.4	49.0
San Luis Obispo	2.0	2.2	3.2	4.1	4.9	5.3	4.6	5.5	4.4	3.5	2.4	1.7	43.8
San Miguel	1.6	2.0	3.2	4.3	5.0	6.4	7.4	6.8	5.1	3.7	2.1	1.4	49.0
San Simeon	2.0	2.0	2.9	3.5	4.2	4.4	4.6	4.3	3.5	3.1	2.0	1.7	38.1
SAN MATEO													
Hal Moon Bay	1.5	1.7	2.4	3.0	3.9	4.3	4.3	4.2	3.5	2.8	1.3	1.0	33.7
Redwood City	1.5	1.8	2.9	3.8	5.2	5.3	6.2	5.6	4.8	3.1	1.7	1.0	42.8
Woodside	1.8	2.2	3.4	4.8	5.6	6.3	6.5	6.2	4.8	3.7	2.4	1.8	49.5
SANTA BARBARA													
Betteravia	2.1	2.6	4.0	5.2	6.0	5.9	5.8	5.4	4.1	3.3	2.7	2.1	49.1
Carpenteria	2.0	2.4	3.2	3.9	4.8	5.2	5.5	5.7	4.5	3.4	2.4	2.0	44.9
Cuyama	2.1	2.4	3.8	5.4	6.9	7.9	8.5	7.7	5.9	4.5	2.6	2.0	59.7
Goleta	2.1	2.5	3.9	5.1	5.7	5.7	5.4	5.4	4.2	3.2	2.8	2.2	48.1
Goleta Foothills	2.3	2.6	3.7	5.4	5.3	5.6	5.5	5.7	4.5	3.9	2.8	2.3	49.6
Guadalupe	2.0	2.2	3.2	3.7	4.9	4.6	4.5	4.6	4.1	3.3	2.4	1.7	41.1
Lompoc	2.0	2.2	3.2	3.7	4.8	4.6	4.9	4.8	3.9	3.2	2.4	1.7	41.1
Los Alamos	1.8	2.0	3.2	4.1	4.9	5.3	5.7	5.5	4.4	3.7	2.4	1.6	44.6
Santa Barbara	2.0	2.5	3.2	3.8	4.6	5.1	5.5	4.5	3.4	2.4	1.8	1.8	40.6
SANTA BARBARA													
Santa Maria	1.8	2.3	3.7	5.1	5.7	5.8	5.6	5.3	4.2	3.5	2.4	1.9	47.4
Santa Ynez	1.7	2.2	3.5	5.0	5.8	6.2	6.4	6.0	4.5	3.6	2.2	1.7	48.7
Sisquoc	2.1	2.5	3.8	4.1	6.1	6.3	6.4	5.8	4.7	3.4	2.3	1.8	49.2
Solvang	2.0	2.0	3.3	4.3	5.0	5.6	6.1	5.6	4.4	3.7	2.2	1.6	45.6
SANTA CLARA													
Gilroy	1.3	1.8	3.1	4.1	5.3	5.6	6.1	5.5	4.7	3.4	1.7	1.1	43.6
Los Gatos	1.5	1.8	2.8	3.9	5.0	5.6	6.2	5.5	4.7	3.2	1.7	1.1	42.9
Morgan Hill	1.5	1.8	3.4	4.2	6.3	7.0	7.1	6.0	5.1	3.7	1.9	1.4	49.5
Palo Alto	1.5	1.8	2.8	3.8	5.2	5.3	6.2	5.6	5.0	3.2	1.7	1.0	43.0
San Jose	1.5	1.8	3.1	4.1	5.5	5.8	6.5	5.9	5.2	3.3	1.8	1.0	45.3
SANTA CRUZ													
De Laveaga	1.4	1.9	3.3	4.7	4.9	5.3	5.0	4.8	3.6	3.0	1.6	1.3	40.8
Green Valley Rd	1.2	1.8	3.2	4.5	4.6	5.4	5.2	5.0	3.7	3.1	1.6	1.3	40.6
Santa Cruz	1.5	1.8	2.6	3.5	4.3	4.4	4.8	4.4	3.8	2.8	1.7	1.2	36.6
Watsonville	1.5	1.8	2.7	3.7	4.6	4.5	4.9	4.2	4.0	2.9	1.8	1.2	37.7
Webb	1.8	2.2	3.7	4.8	5.3	5.7	5.6	5.3	4.3	3.4	2.4	1.8	46.2

Appendix A - Reference Evapotranspiration (ETo) Table*													
County and City	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Annual ETo**
SHASTA													
Burney	0.7	1.0	2.1	3.5	4.9	5.9	7.4	6.4	4.4	2.9	0.9	0.6	40.9
Fall River Mills	0.6	1.0	2.1	3.7	5.0	6.1	7.8	6.7	4.6	2.8	0.9	0.5	41.8
Glenburn	0.6	1.0	2.1	3.7	5.0	6.3	7.8	6.7	4.7	2.8	0.9	0.6	42.1
McArthur	0.7	1.4	2.9	4.2	5.6	6.9	8.2	7.2	5.0	3.0	1.1	0.6	46.8
Redding	1.2	1.4	2.6	4.1	5.6	7.1	8.5	7.3	5.3	3.2	1.4	0.9	48.8
SIERRA													
Downieville	0.7	1.0	2.3	3.5	5.0	6.0	7.4	6.2	4.7	2.8	0.9	0.6	41.3
Sierraville	0.7	1.1	2.2	3.2	4.5	5.9	7.3	6.4	4.3	2.6	0.9	0.5	39.6
SISKIYOU													
Happy Camp	0.5	0.9	2.0	3.0	4.3	5.2	6.1	5.3	4.1	2.4	0.9	0.5	35.1
MacDoel	1.0	1.7	3.1	4.5	5.9	7.2	8.1	7.1	5.1	3.1	1.5	1.0	49.0
Mt Shasta	0.5	0.9	2.0	3.0	4.5	5.3	6.7	5.7	4.0	2.2	0.7	0.5	36.0
Tule lake FS	0.7	1.3	2.7	4.0	5.4	6.3	7.1	6.4	4.7	2.8	1.0	0.6	42.9
Weed	0.5	0.9	2.0	2.5	4.5	5.3	6.7	5.5	3.7	2.0	0.9	0.5	34.9
Yreka	0.6	0.9	2.1	3.0	4.9	5.8	7.3	6.5	4.3	2.5	0.9	0.5	39.2
SOLANO													
Dixon	0.7	1.4	3.2	5.2	6.3	7.6	8.2	7.2	5.5	4.3	1.6	1.1	52.1
Fairfield	1.1	1.7	2.8	4.0	5.5	6.1	7.8	6.0	4.8	3.1	1.4	0.9	45.2
Hastings Tract	1.6	2.2	3.7	5.1	6.8	7.8	8.7	7.8	5.7	4.0	2.1	1.6	57.1
Putah Creek	1.0	1.6	3.2	4.9	6.1	7.3	7.9	7.0	5.3	3.8	1.8	1.2	51.0
Rio Vista	0.9	1.7	2.8	4.4	5.9	6.7	7.9	6.5	5.1	3.2	1.3	0.7	47.0
Suisun Valley	0.6	1.3	3.0	4.7	5.8	7.0	7.7	6.8	5.3	3.8	1.4	0.9	48.3
Winters	0.9	1.7	3.3	5.0	6.4	7.5	7.9	7.0	5.2	3.5	1.6	1.0	51.0
SONOMA													
Bennett Valley	1.1	1.7	3.2	4.1	5.5	6.5	6.6	5.7	4.5	3.1	1.5	0.9	44.4
Cloverdale	1.1	1.4	2.6	3.4	5.0	5.9	6.2	5.6	4.5	2.8	1.4	0.7	40.7
Fort Ross	1.2	1.4	2.2	3.0	3.7	4.5	4.2	4.3	3.4	2.4	1.2	0.5	31.9
Healdsburg	1.2	1.5	2.4	3.5	5.0	5.9	6.1	5.6	4.5	2.8	1.4	0.7	40.8
Lincoln	1.2	1.7	2.8	4.7	6.1	7.4	8.4	7.3	5.4	3.7	1.9	1.2	51.9
Petaluma	1.2	1.5	2.8	3.7	4.6	5.6	4.6	5.7	4.5	2.9	1.4	0.9	39.6
Santa Rosa	1.2	1.7	2.8	3.7	5.0	6.0	6.1	5.9	4.5	2.9	1.5	0.7	42.0
Valley of the Moon	1.0	1.6	3.0	4.5	5.6	6.6	7.1	6.3	4.7	3.3	1.5	1.0	46.1
Windsor	0.9	1.6	3.0	4.5	5.5	6.5	6.5	5.9	4.4	3.2	1.4	1.0	44.2
Denair	1.0	1.9	3.6	4.7	7.0	7.9	8.0	6.1	5.3	3.4	1.5	1.0	51.4
La Grange	1.2	1.5	3.1	4.7	6.2	7.7	8.5	7.3	5.3	3.4	1.4	0.7	51.2
Modesto	0.9	1.4	3.2	4.7	6.4	7.7	8.1	6.8	5.0	3.4	1.4	0.7	49.7
Newman	1.0	1.5	3.2	4.6	6.2	7.4	8.1	6.7	5.0	3.4	1.4	0.7	49.3
STANISLAUS													
Oakdale	1.2	1.5	3.2	4.7	6.2	7.7	8.1	7.1	5.1	3.4	1.4	0.7	50.3
Patterson	1.3	2.1	4.2	5.4	7.9	8.6	8.2	6.6	5.8	4.0	1.9	1.3	57.3
Turlock	0.9	1.5	3.2	4.7	6.5	7.7	8.2	7.0	5.1	3.4	1.4	0.7	50.2
SUTTER													
Nicolaus	0.9	1.6	3.2	4.9	6.3	7.5	8.0	6.9	5.2	3.4	1.5	0.9	50.2
Yuba City	1.3	2.1	2.8	4.4	5.7	7.2	7.1	6.1	4.7	3.2	1.2	0.9	46.7
TEHAMA													
Corning	1.2	1.8	2.9	4.5	6.1	7.3	8.1	7.2	5.3	3.7	1.7	1.1	50.7
Gerber	1.0	1.8	3.5	5.0	6.6	7.9	8.7	7.4	5.8	4.1	1.8	1.1	54.7
Gerber Dryland	0.9	1.6	3.2	4.7	6.7	8.4	9.0	7.9	6.0	4.2	2.0	1.0	55.5
Red Bluff	1.2	1.8	2.9	4.4	5.9	7.4	8.5	7.3	5.4	3.5	1.7	1.0	51.1

Appendix A - Reference Evapotranspiration (ETo) Table*													
County and City	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Annual ETo**
TRINITY													
Hay Fork	0.5	1.1	2.3	3.5	4.9	5.9	7.0	6.0	4.5	2.8	0.9	0.7	40.1
Weaverville	0.6	1.1	2.2	3.3	4.9	5.9	7.3	6.0	4.4	2.7	0.9	0.7	40.0
TULARE													
Alpaugh	0.9	1.7	3.4	4.8	6.6	7.7	8.2	7.3	5.4	3.4	1.4	0.7	51.6
Badger	1.0	1.3	2.7	4.1	6.0	7.3	7.7	7.0	4.8	3.3	1.4	0.7	47.3
Delano	1.1	1.9	4.0	4.9	7.2	7.9	8.1	7.3	5.4	3.2	1.5	1.2	53.6
Dinuba	1.1	1.5	3.2	4.7	6.2	7.7	8.5	7.3	5.3	3.4	1.4	0.7	51.2
Lindcove	0.9	1.6	3.0	4.8	6.5	7.6	8.1	7.2	5.2	3.4	1.6	0.9	50.6
Porterville	1.2	1.8	3.4	4.7	6.6	7.7	8.5	7.3	5.3	3.4	1.4	0.7	52.1
Visalia	0.9	1.7	3.3	5.1	6.8	7.7	7.9	6.9	4.9	3.2	1.5	0.8	50.7
TUOLUMNE													
Groveland	1.1	1.5	2.8	4.1	5.7	7.2	7.9	6.6	5.1	3.3	1.4	0.7	47.5
Sonora	1.1	1.5	2.8	4.1	5.8	7.2	7.9	6.7	5.1	3.2	1.4	0.7	47.6
VENTURA													
Camarillo	2.2	2.5	3.7	4.3	5.0	5.2	5.9	5.4	4.2	3.0	2.5	2.1	46.1
Oxnard	2.2	2.5	3.2	3.7	4.4	4.6	5.4	4.8	4.0	3.3	2.4	2.0	42.3
Piru	2.8	2.8	4.1	5.6	6.0	6.8	7.6	7.8	5.8	5.2	3.7	3.2	61.5
Port Hueneme	2.0	2.3	3.3	4.6	4.9	4.9	4.9	5.0	3.7	3.2	2.5	2.2	43.5
Thousand Oaks	2.2	2.6	3.4	4.5	5.4	5.9	6.7	6.4	5.4	3.9	2.6	2.0	51.0
Ventura	2.2	2.6	3.2	3.8	4.6	4.7	5.5	4.9	4.1	3.4	2.5	2.0	43.5
YOLO													
Bryte	0.9	1.7	3.3	5.0	6.4	7.5	7.9	7.0	5.2	3.5	1.6	1.0	51.0
Davis	1.0	1.9	3.3	5.0	6.4	7.6	8.2	7.1	5.4	4.0	1.8	1.0	52.5
Esparto	1.0	1.7	3.4	5.5	6.9	8.1	8.5	7.5	5.8	4.2	2.0	1.2	55.8
Winters	1.7	1.7	2.9	4.4	5.8	7.1	7.9	6.7	5.3	3.3	1.6	1.0	49.4
Woodland	1.0	1.8	3.2	4.7	6.1	7.7	8.2	7.2	5.4	3.7	1.7	1.0	51.6
Zamora	1.1	1.9	3.5	5.2	6.4	7.4	7.8	7.0	5.5	4.0	1.9	1.2	52.8
YUBA													
Browns Valley	1.0	1.7	3.1	4.7	6.1	7.5	8.5	7.6	5.7	4.1	2.0	1.1	52.9
Brownsville	1.1	1.4	2.6	4.0	5.7	6.8	7.9	6.8	5.3	3.4	1.5	0.9	47.4

* The values in this table were derived from:
1) California Irrigation Management Information System (CIMIS);
2) Reference EvapoTranspiration Zones Map, UC Dept. of Land, Air & Water Resources and California Dept of Water Resources 1999; and
3) Reference Evapotranspiration for California, University of California, Department of Agriculture and Natural Resources (1987) Bulletin 1922 4) Determining Daily Reference Evapotranspiration, Cooperative Extension UC Division of Agriculture and Natural Resources (1987), Publication Leaflet 21426

Appendix B – Sample Water Efficient Landscape Worksheet.

WATER EFFICIENT LANDSCAPE WORKSHEET

This worksheet is filled out by the project applicant and it is a required element of the Landscape Documentation Package.
Please complete all sections (A and B) of the worksheet.

SECTION A. HYDROZONE INFORMATION TABLE

Please complete the hydrozone table(s) for each hydrozone. Use as many tables as necessary to provide the square footage of landscape area per hydrozone.

Hydrozone*	Zone or Valve	Irrigation Method**	Area (Sq. Ft.)	% of Landscape Area
	Total			**100%**

**** Hydrozone***
HW = High Water Use Plants
MW = Moderate Water Use Plants
LW = Low Water Use Plants

*****Irrigation Method***
MS = Micro-spray
S = Spray
R = Rotor
B= Bubbler
D= Drip
O = Other

SECTION B. WATER BUDGET CALCULATIONS

Section B1. Maximum Applied Water Allowance (MAWA)

The project's Maximum Applied Water Allowance shall be calculated using this equation:

MAWA = (ETo) (0.62) [(0.7 x LA) + (0.3 x SLA)]

where:

MAWA = Maximum Applied Water Allowance (gallons per year)
ETo = Reference Evapotranspiration from Appendix A (inches per year)
0.7 = ET Adjustment Factor (ETAF)
LA = Landscaped Area includes Special Landscape Area (square feet)
0.62 = Conversion factor (to gallons per square foot)
SLA = Portion of the landscape area identified as Special Landscape Area (square feet)
0.3 = the additional ET Adjustment Factor for Special Landscape Area (1.0 - 0.7 = 0.3)

Maximum Applied Water Allowance = _____gallons per year

Show calculations.

Effective Precipitation (Eppt)

If considering Effective Precipitation, use 25% of annual precipitation. Use the following equation to calculate Maximum Applied Water Allowance:

MAWA= (ETo – Eppt) (0.62) [(0.7 x LA) + (0.3 x SLA)]

Maximum Applied Water Allowance = _____gallons per year

Show calculations.

Section B2. Estimated Total Water Use (ETWU)

The project's Estimated Total Water Use is calculated using the following formula:

$$ETWU = (ETo)(0.62)\left(\frac{PF\,x\,HA}{IE} + SLA\right)$$

where:

ETWU = Estimated total water use per year (gallons per year)
ETo = Reference Evapotranspiration (inches per year)
PF = Plant Factor from WUCOLS (see Definitions)
HA = Hydrozone Area [high, medium, and low water use areas] (square feet)
SLA = Special Landscape Area (square feet)
0.62 = Conversion Factor (to gallons per square foot)
IE = Irrigation Efficiency (minimum 0.71)

Hydrozone Table for Calculating ETWU

Please complete the hydrozone table(s). Use as many tables as necessary.

Hydrozone	Plant Water Use Type(s)	Plant Factor (PF)	Area (HA) (square feet)	PF x HA (square feet)
			Sum	
	SLA			

Estimated Total Water Use = **_____gallons**

Show calculations.

Appendix C – Sample Certificate of Completion.

CERTIFICATE OF COMPLETION

This certificate is filled out by the project applicant upon completion of the landscape project.

PART 1. PROJECT INFORMATION SHEET

Date		
Project Name		
Name of Project Applicant	Telephone No.	
	Fax No.	
Title	Email Address	
Company	Street Address	
City	State	Zip Code

Project Address and Location:

Street Address		Parcel, tract or lot number, if available.
City		Latitude/Longitude (optional)
State	Zip Code	

Property Owner or his/her designee:

Name	Telephone No.	
	Fax No.	
Title	Email Address	
Company	Street Address	
City	State	Zip Code

Property Owner

"I/we certify that I/we have received copies of all the documents within the Landscape Documentation Package and the Certificate of Completion and that it is our responsibility to see that the project is maintained in accordance with the Landscape and Irrigation Maintenance Schedule."

_____

Property Owner Signature Date

Please answer the questions below:

1. Date the Landscape Documentation Package was submitted to the local agency_____
2. Date the Landscape Documentation Package was approved by the local agency_____
3. Date that a copy of the Water Efficient Landscape Worksheet (including the Water Budget Calculation) was submitted to the local water purveyor_____

PART 2. CERTIFICATION OF INSTALLATION ACCORDING TO THE LANDSCAPE DOCUMENTATION PACKAGE

"I/we certify that based upon periodic site observations, the work has been substantially completed in accordance with the ordinance and that the landscape planting and irrigation installation conform with the criteria and specifications of the approved Landscape Documentation Package."

Signature*	Date	
Name (print)	Telephone No.	
	Fax No.	
Title	Email Address	
License No. or Certification No.		
Company	Street Address	
City	State	Zip Code

*Signer of the landscape design plan, signer of the irrigation plan, or a licensed landscape contractor.

PART 3. IRRIGATION SCHEDULING

Attach parameters for setting the irrigation schedule on controller per ordinance Section 492.10.

PART 4. SCHEDULE OF LANDSCAPE AND IRRIGATION MAINTENANCE

Attach schedule of Landscape and Irrigation Maintenance per ordinance Section 492.11.

PART 5. LANDSCAPE IRRIGATION AUDIT REPORT

Attach Landscape Irrigation Audit Report per ordinance Section 492.12.

PART 6. SOIL MANAGEMENT REPORT

Attach soil analysis report, if not previously submitted with the Landscape Documentation Package per ordinance Section 492.5.

Attach documentation verifying implementation of recommendations from soil analysis report per ordinance Section 492.5.

Linda S. Adams
Secretary for Environmental Protection

021419

State Water Resources Control Board

Arnold Schwarzenegger
Governor

Division of Water Quality
1001 I Street • Sacramento, California 95814 • (916) 341-5455
Mailing Address: P.O. Box 100 • Sacramento, California • 95812-0100
Fax (916) 341-5463 • http://www.waterboards.ca.gov

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)
GENERAL PERMIT FOR
STORM WATER DISCHARGES
ASSOCIATED WITH CONSTRUCTION AND LAND DISTURBANCE
ACTIVITIES

ORDER NO. 2009-0009-DWQ
NPDES NO**. CAS000002**

This Order was adopted by the State Water Resources Control Board on:	**September 2, 2009**
This Order shall become effective on:	**July 1, 2010**
This Order shall expire on:	**September 2, 2014**

IT IS HEREBY ORDERED, that this Order supersedes Order No. 99-08-DWQ except for enforcement purposes. The Discharger shall comply with the requirements in this Order to meet the provisions contained in Division 7 of the California Water Code (commencing with section 13000) and regulations adopted thereunder, and the provisions of the federal Clean Water Act and regulations and guidelines adopted thereunder.

I, Jeanine Townsend, Clerk to the Board, do hereby certify that this Order with all attachments is a full, true, and correct copy of an Order adopted by the State Water Resources Control Board, on September 2, 2009.

AYE: Vice Chair Frances Spivy-Weber
Board Member Arthur G. Baggett, Jr.
Board Member Tam M. Doduc

NAY: Chairman Charles R. Hoppin

ABSENT: None

ABSTAIN: None

Jeanine Townsend

Jeanine Townsend
Clerk to the Board

List of Documents included in this single file saved in pdf format on September 22, 2009:

- Fact Sheet
- Order
- Attachment A – Linear Underground/Overhead Requirements
- Attachment A.1 – LUP Project Type Determination
- Attachment A.2 – LUP Permit Registration Documents
- Attachment B – Permit Registration Documents
- Attachment C – Risk Level 1 Requirements
- Attachment D – Risk Level 2 Requirements
- Attachment E – Risk Level 3 Requirements
- Attachment F – Active Treatment System Requirements
- Appendix 1 – Risk Determination Worksheet and Sediment-related 303d List
- Appendix 2 – Post-Construction Water Balance
- Appendix 2.1 – Post-Construction Water Balance Calculator
- Appendix 3 - Bioassessment Monitoring Guidelines
- Appendix 4 – Adopted/Implemented Sediment and Non-sediment TMDLs
- Appendix 5 – Glossary
- Appendix 6 - Acronym List
- Appendix 7 – State and Regional Water Board Contacts

Linda S. Adams
Secretary for
Environmental Protection

State Water Resources Control Board

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Arnold Schwarzenegger
Governor

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I. BACKGROUND

A. History

In 1972, the Federal Water Pollution Control Act (also referred to as the Clean Water Act [CWA]) was amended to provide that the discharge of pollutants to waters of the United States from any point source is unlawful unless the discharge is in compliance with a National Pollutant Discharge Elimination System (NPDES) permit. The 1987 amendments to the CWA added Section 402(p), which establishes a framework for regulating municipal and industrial storm water discharges under the NPDES Program. On November 16, 1990, the U.S. Environmental Protection Agency (USEPA) published final regulations that established storm water permit application requirements for specified categories of industries. The regulations provide that discharges of storm water to waters of the United States from construction projects that encompass five or more acres of soil disturbance are effectively prohibited unless the discharge is in compliance with an NPDES Permit. Regulations (Phase II Rule) that became final on December 8, 1999 lowered the permitting threshold from five acres to one acre.

While federal regulations allow two permitting options for storm water discharges (Individual Permits and General Permits), the State Water Board has elected to adopt only one statewide General Permit at this time that will apply to most storm water discharges associated with construction activity.

On August 19, 1999, the State Water Board reissued the General Construction Storm Water Permit (Water Quality Order 99-08-DWQ). On December 8, 1999 the State Water Board amended Order 99-08-DWQ to apply to sites as small as one acre.

The General Permit accompanying this fact sheet regulates storm water runoff from construction sites. Regulating many storm water discharges under one permit will greatly reduce the administrative burden associated with permitting individual storm water discharges. To obtain coverage under this General Permit, dischargers shall electronically file the Permit Registration Documents (PRDs), which includes a Notice of Intent (NOI), Storm Water Pollution Prevention Plan (SWPPP), and other compliance related documents required by this General Permit and mail the appropriate permit fee to the State Water Board. It is expected that as the storm water program develops, the Regional Water Quality Control Boards (Regional Water Boards) may issue General Permits or Individual Permits containing more specific permit provisions. When this occurs, this General Permit will no longer regulate those dischargers.

B. Legal Challenges and Court Decisions

1. Early Court Decisions

Shortly after the passage of the CWA, the USEPA promulgated regulations exempting most storm water discharges from the NPDES permit requirements. (See 40 C.F.R. § 125.4 (1975); see also *Natural Resources Defense Council v. Costle* (D.C. Cir. 1977) 568 F.2d 1369, 1372 (*Costle*); *Defenders of Wildlife v. Browner* (9th Cir. 1999) 191 F.3d 1159, 1163 (*Defenders of Wildlife*).) When environmental groups challenged this exemption in federal court, the District of Columbia Court of Appeals invalidated the regulation, holding that the USEPA "does not have authority to exempt categories of point sources from the permit requirements of [CWA] § 402." (*Costle*, 568 F.2d at 1377.) The *Costle* court rejected the USEPA's argument that effluent-based storm sewer regulation was administratively infeasible because of the variable nature of storm water pollution and the number of affected storm sewers throughout the country. (*Id.* at 1377-82.) Although the court acknowledged the practical problems relating to storm sewer regulation, the court found the USEPA had the flexibility under the CWA to design regulations that would overcome these problems. (*Id.* at 1379-83.) In particular, the court pointed to general permits and permits based on requiring best management practices (BMPs).

During the next 15 years, the USEPA made numerous attempts to reconcile the statutory requirement of point source regulation with the practical problem of regulating possibly millions of diverse point source discharges of storm water. (See *Defenders of Wildlife*, 191 F.3d at 1163; see also Gallagher, Clean Water Act in Environmental Law Handbook (Sullivan, edit., 2003)
p. 300 (Environmental Law Handbook); Eisen, *Toward a Sustainable Urbanism: Lessons from Federal Regulation of Urban Storm Water Runoff* (1995) 48 Wash. U.J. Urb. & Contemp. L.1, 40-41 [Regulation of Urban Storm Water Runoff].)

In 1987, Congress amended the CWA to require NPDES permits for storm water discharges. (See CWA § 402(p), 33 U.S.C. § 1342(p); *Defenders of Wildlife,* 191 F.3d at 1163; *Natural Resources Defense Council v. USEPA* (9th Cir. 1992) 966 F.2d 1292, 1296.) In these amendments, enacted as part of the Water Quality Act of 1987, Congress distinguished between industrial and municipal storm water discharges. With respect to industrial storm water discharges, Congress provided that NPDES permits "shall meet all applicable provisions of this section and section 1311 [requiring the USEPA to establish effluent limitations under specific timetables]." (CWA § 402(p)(3)(A), 33 U.S.C. § 1342(p)(3)(A); see also *Defenders of Wildlife,* 191 F.3d at 1163-64.)

In 1990, USEPA adopted regulations specifying what activities were considered "industrial" and thus required discharges of storm water associated with those activities to obtain coverage under NPDES permits. (55 Fed. Reg. 47,990 (1990); 40 C.F.R. § 122.26(b)(14).) Construction activities, deemed a subset of the industrial activities category, must also be regulated by an NPDES permit. (40 C.F.R. § 122.26(b)(14)(x)). In 1999, USEPA issued regulations for "Phase II" of storm water regulation, which required most small construction sites (1-5 acres) to be regulated under the NPDES program. (64 Fed. Reg. 68,722; 40 C.F.R. § 122.26(b)(15)(i).)

2. Court Decisions on Public Participation

Two recent federal court opinions have vacated USEPA rules that denied meaningful public review of NPDES permit conditions. On January 14, 2003, the Ninth Circuit Court of Appeals held that certain aspects of USEPA's Phase II regulations governing MS4s were invalid primarily because the general permit did not contain express requirements for public participation. (*Environmental Defense Center v. USEPA* (9th Cir. 2003) 344 F.3d 832.) Specifically, the court determined that applications for general permit coverage (including the Notice of Intent (NOI) and Storm Water Management Program (SWMP)) must be made available to the public, the applications must be reviewed and determined to meet the applicable standard by the permitting authority before coverage commences, and there must be a process to accommodate public hearings. (*Id.* at 852-54.) Similarly, on February 28, 2005, the Second Circuit Court of Appeals held that the USEPA's confined animal feeding operation (CAFO) rule violated the CWA because it allowed dischargers to write their own nutrient management plans without public review. (*Waterkeeper Alliance v. USEPA* (2d Cir. 2005) 399 F.3d 486.) Although neither decision involved the issuance of construction storm water permits, the State Water Board's Office of Chief Counsel has recommended that the new General Permit address the courts' rulings where feasible[1].

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[1] In *Texas Independent Producers and Royalty Owners Assn. v. USEPA* (7th Cir. 2005) 410 F.3d 964, the Seventh Circuit Court of Appeals held that the USEPA's construction general permit was not required to provide the public with the opportunity for a public hearing on the Notice of Intent or Storm Water Pollution Prevention Plan. The Seventh Circuit briefly discussed why it agreed with the Ninth Circuit's dissent in *Environmental Defense Center*, but generally did not discuss the substantive holdings in *Environmental Defense Center* and *Waterkeeper Alliance*, because neither court addressed the initial question of whether the plaintiffs had standing to challenge the permits at issue. However, notwithstanding the Seventh Circuit's decision, it is not binding or controlling on the State Water Board because California is located within the Ninth Circuit.

The CWA and the USEPA's regulations provide states with the discretion to formulate permit terms, including specifying best management practices (BMPs), to achieve strict compliance with federal technology-based and water quality-based standards. (*Natural Resources Defense Council v. USEPA* (9th Cir. 1992) 966 F.2d 1292, 1308.) Accordingly, this General Permit has developed specific BMPs as well as numeric action levels (NALs) and numeric effluent limitations (NELs) in order to achieve these minimum federal standards. In addition, the General Permit requires a SWPPP and REAP (another dynamic, site-specific plan) to be developed but has removed all language requiring the discharger to implement these plans – instead, the discharger is required to comply with specific requirements. By requiring the dischargers to implement these specific BMPs, NALs, and NELs, this General Permit ensures that the dischargers do not "write their own permits." As a result this General Permit does not require each discharger's SWPPP and REAP to be reviewed and approved by the Regional Water Boards.

This General Permit also requires dischargers to electronically file all permit-related compliance documents. These documents include, but are not limited to, NOIs, SWPPPs, annual reports, Notice of Terminations (NOTs), and numeric action level (NAL) exceedance reports. Electronically submitted compliance information is immediately available to the public, as well as the Regional Water Quality Control Board (Regional Water Board) offices, via the Internet. In addition, this General Permit enables public review and hearings on permit applications when appropriate. Under this General Permit, the public clearly has a meaningful opportunity to participate in the permitting process.

C. Blue Ribbon Panel of Experts and Feasibility of Numeric Effluent Limitations

In 2005 and 2006, the State Water Board convened an expert panel (panel) to address the feasibility of numeric effluent limitations (NELs) in California's storm water permits. Specifically, the panel was asked to address:

"Is it technically feasible to establish numeric effluent limitations, or some other quantifiable limit, for inclusion in storm water permits? How would such limitations or criteria be established, and what information and data would be required?"

"The answers should address industrial general permits, construction general permits, and area-wide municipal permits. The answers should also address both technology-based limitations or criteria and water quality-based limitations or criteria. In evaluating establishment of any objective criteria, the panel should address all of the following:

The ability of the State Water Board to establish appropriate objective limitations or criteria;

How compliance determinations would be made;

The ability of dischargers and inspectors to monitor for compliance; and

The technical and financial ability of dischargers to comply with the limitations or criteria."

Through a series of public participation processes (State Water Board meetings, State Water Board workshops, and the solicitation of written comments), a number of water quality, public process and overall program effectiveness problems were identified. Some of these problems are addressed through this General Permit.

D. Summary of Panel Findings on Construction Activities

The panel's final report can be downloaded and viewed through links at www.waterboards.ca.gov or by clicking here[2].

The panel made the following observations:

"Limited field studies indicate that traditional erosion and sediment controls are highly variable in performance, resulting in highly variable turbidity levels in the site discharge."

"Site-to-site variability in runoff turbidity from undeveloped sites can also be quite large in many areas of California, particularly in more arid regions with less natural vegetative cover and steep slopes."

"Active treatment technologies involving the use of polymers with relatively large storage systems now exist that can provide much more consistent and very low discharge turbidity. However, these technologies have as yet only been applied to larger construction sites, generally five acres or greater. Furthermore, toxicity has been observed at some locations, although at the vast majority of sites, toxicity has not occurred. There is also the potential for an accidental large release of such chemicals with their use."

"To date most of the construction permits have focused on TSS and turbidity, but have not addressed other, potentially significant pollutants such as phosphorus and an assortment of chemicals used at construction sites."

"Currently, there is no required training or certification program for contractors, preparers of soil erosion and sediment control Storm Water Pollution Prevention Plans, or field inspectors."

"The quality of storm water discharges from construction sites that effectively employ BMPs likely varies due to site conditions such as climate, soil, and topography."

"The States of Oregon and Washington have recently adopted similar concepts to the Action Levels described earlier."

In addition, the panel made the following conclusions:

"It is the consensus of the Panel that active treatment technologies make Numeric Limits technically feasible for pollutants commonly associated with storm water discharges from construction sites (e.g. TSS and turbidity) for larger construction sites. Technical practicalities and cost-effectiveness may make these technologies less feasible for smaller sites, including small drainages within a larger site, as these technologies have seen limited use at small construction sites. If chemical addition is not permitted, then Numeric Limits are not likely feasible."

"The Board should consider Numeric Limits or Action Levels for other pollutants of relevance to construction sites, but in particular pH. It is of particular concern where fresh concrete or wash water from cement mixers/equipment is exposed to storm water."

"The Board should consider the phased implementation of Numeric Limits and Action Levels, commensurate with the capacity of the dischargers and support industry to respond."

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[2] http://www.waterboards.ca.gov/stormwtr/docs/numeric/swpanel_final_report.pdf

E. How the Panel's Findings are Used in this General Permit

The State Water Board carefully considered the findings of the panel and related public comments. The State Water Board also reviewed and considered the comments regarding statewide storm water policy and the reissuance of the Industrial General Permit. From the input received the State Water Board identified some permit and program performance gaps that are addressed in this General Permit. The Summary of Significant Changes (below) in this General Permit are a direct result of this process.

F. Summary of Significant Changes in This General Permit

The State Water Board has significant changes to Order 99-08-DWQ. This General Permit differs from Order 99-08-DWQ in the following significant ways:

Rainfall Erosivity Waiver: this General Permit includes the option allowing a small construction site (>1 and <5 acres) to self-certify if the rainfall erosivity value (R value) for their site's given location and time frame compute to be less than or equal to 5.

Technology-Based Numeric Action Levels: this General Permit includes NALs for pH and turbidity.

Technology-Based Numeric Effluent Limitations: this General Permit contains daily average NELs for pH during any construction phase where there is a high risk of pH discharge and daily average NELs turbidity for all discharges in Risk Level 3. The daily average NEL for turbidity is set at 500 NTU to represent the minimum technology that sites need to employ (to meet the traditional Best Available Technology Economically Achievable (BAT)/ Best Conventional Pollutant Control Technology (BCT) standard) and the traditional, numeric receiving water limitations for turbidity.

Risk-Based Permitting Approach: this General Permit establishes three levels of risk possible for a construction site. Risk is calculated in two parts: 1) Project Sediment Risk, and 2) Receiving Water Risk.

Minimum Requirements Specified: this General Permit imposes more minimum BMPs and requirements that were previously only required as elements of the SWPPP or were suggested by guidance.

Project Site Soil Characteristics Monitoring and Reporting: this General Permit provides the option for dischargers to monitor and report the soil characteristics at their project location. The primary purpose of this requirement is to provide better risk determination and eventually better program evaluation.

Effluent Monitoring and Reporting: this General Permit requires effluent monitoring and reporting for pH and turbidity in storm water discharges. The purpose of this monitoring is to determine compliance with the NELs and evaluate whether NALs included in this General Permit are exceeded.

Receiving Water Monitoring and Reporting: this General Permit requires some Risk Level 3 dischargers to monitor receiving waters and conduct bioassessments.

Post-Construction Storm Water Performance Standards: this General Permit specifies runoff reduction requirements for all sites not covered by a Phase I or Phase II MS4 NPDES permit, to avoid, minimize and/or mitigate post-construction storm water runoff impacts.

Rain Event Action Plan: this General Permit requires certain sites to develop and implement a Rain Event Action Plan (REAP) that must be designed to protect all exposed portions of the site within 48 hours prior to any likely precipitation event.

Annual Reporting: this General Permit requires all projects that are enrolled for more than one continuous three-month period to submit information and annually certify that their site is in compliance

with these requirements. The primary purpose of this requirement is to provide information needed for overall program evaluation and pubic information.

Certification/Training Requirements for Key Project Personnel: this General Permit requires that key personnel (e.g., SWPPP preparers, inspectors, etc.) have specific training or certifications to ensure their level of knowledge and skills are adequate to ensure their ability to design and evaluate project specifications that will comply with General Permit requirements.

Linear Underground/Overhead Projects: this General Permit includes requirements for all Linear Underground/Overhead Projects (LUPs).

II. RATIONALE

A. General Permit Approach

A general permit for construction activities is an appropriate permitting approach for the following reasons:

1. A general permit is an efficient method to establish the essential regulatory requirements for a broad range of construction activities under differing site conditions;

2. A general permit is the most efficient method to handle the large number of construction storm water permit applications;

3. The application process for coverage under a general permit is far less onerous than that for individual permit and hence more cost effective;

4. A general permit is consistent with USEPA's four-tier permitting strategy, the purpose of which is to use the flexibility provided by the CWA in designing a workable and efficient permitting system; and

5. A general permit is designed to provide coverage for a group of related facilities or operations of a specific industry type or group of industries. It is appropriate when the discharge characteristics are sufficiently similar, and a standard set of permit requirements can effectively provide environmental protection and comply with water quality standards for discharges. In most cases, the general permit will provide sufficient and appropriate management requirements to protect the quality of receiving waters from discharges of storm water from construction sites.

There may be instances where a general permit is not appropriate for a specific construction project. A Regional Water Board may require any discharger otherwise covered under the General Permit to apply for and obtain an Individual Permit or apply for coverage under a more specific General Permit. The Regional Water Board must determine that this General Permit does not provide adequate assurance that water quality will be protected, or that there is a site-specific reason why an individual permit should be required.

B. Construction Activities Covered

1. **Construction activity subject to this General Permit:**

Any construction or demolition activity, including, but not limited to, clearing, grading, grubbing, or excavation, or any other activity that results in a land disturbance of equal to or greater than one acre.

Construction activity that results in land surface disturbances of less than one acre if the construction activity is part of a larger common plan of development or sale of one or more acres of disturbed land surface.

Construction activity related to residential, commercial, or industrial development on lands currently used for agriculture including, but not limited to, the construction of buildings related to agriculture that are considered industrial pursuant to USEPA regulations, such as dairy barns or food processing facilities.

Construction activity associated with LUPs including, but not limited to, those activities necessary for the installation of underground and overhead linear facilities (e.g., conduits, substructures, pipelines, towers, poles, cables, wires, connectors, switching, regulating and transforming equipment and associated ancillary facilities) and include, but are not limited to, underground utility mark-out, potholing, concrete

and asphalt cutting and removal, trenching, excavation, boring and drilling, access road and pole/tower pad and cable/wire pull station, substation construction, substructure installation, construction of tower footings and/or foundations, pole and tower installations, pipeline installations, welding, concrete and/or pavement repair or replacement, and stockpile/borrow locations.

Discharges of sediment from construction activities associated with oil and gas exploration, production, processing, or treatment operations or transmission facilities.[3]

Storm water discharges from dredge spoil placement that occur outside of U.S. Army Corps of Engineers jurisdiction[4] (upland sites) and that disturb one or more acres of land surface from construction activity are covered by this General Permit. Construction projects that intend to disturb one or more acres of land within the jurisdictional boundaries of a CWA § 404 permit should contact the appropriate Regional Water Board to determine whether this permit applies to the project.

2. Linear Underground/Overhead Projects (LUPs) subject to this General Permit:

Underground/overhead facilities typically constructed as LUPs include, but are not limited to, any conveyance, pipe, or pipeline for the transportation of any gaseous, liquid (including water, wastewater for domestic municipal services), liquescent, or slurry substance; any cable line or wire for the transmission of electrical energy; any cable line or wire for communications (e.g., telephone, telegraph, radio or television messages); and associated ancillary facilities. Construction activities associated with LUPs include, but are not limited to, those activities necessary for the installation of underground and overhead linear facilities (e.g., conduits, substructures, pipelines, towers, poles, cables, wires, connectors, switching, regulating and transforming equipment and associated ancillary facilities) and include, but are not limited to, underground utility mark-out, potholing, concrete and asphalt cutting and removal, trenching, excavation, boring and drilling, access road and pole/tower pad and cable/wire pull station, substation construction, substructure installation, construction of tower footings and/or foundations, pole and tower installations, pipeline installations, welding, concrete and/or pavement repair or replacement, and stockpile/borrow locations.

Water Quality Order 2003-0007-DWQ regulated construction activities associated with small LUPs that resulted in land disturbances greater than one acre, but less than five acres. These projects were considered non-traditional construction projects. Attachment A of this Order now regulates all construction activities from LUPs resulting in land disturbances greater than one acre.

3. Common Plan of Development or Sale

USEPA regulations include the term “common plan of development or sale” to ensure that acreage within a common project does not artificially escape the permit requirements because construction activities are phased, split among smaller parcels, or completed by different owners/developers. In the absence of an exact definition of “common plan of development or sale,” the State Water Board is required to exercise its regulatory discretion in providing a common sense interpretation of the term as it applies to construction projects and permit coverage. An overbroad interpretation of the term would render meaningless the clear “one acre” federal permitting threshold and would potentially trigger permitting of

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[3] Pursuant to the Ninth Circuit Court of Appeals’ decision in *NRDC v. EPA* (9th Cir. 2008) 526 F.3d 591, and subsequent denial of the USEPA’s petition for reconsideration in November 2008, oil and gas construction activities discharging storm water contaminated only with sediment are no longer exempt from the NPDES program.

[4] A construction site that includes a dredge and/or fill discharge to any water of the United States (e.g., wetland, channel, pond, or marine water) requires a CWA Section 404 permit from the U.S. Army Corps of Engineers and a CWA Section 401 Water Quality Certification from the Regional Water Board or State Water Board.

almost any construction activity that occurs within an area that had previously received area-wide utility or road improvements.

Construction projects generally receive grading and/or building permits (Local Permits) from local authorities prior to initiating construction activity. These Local Permits spell out the scope of the project, the parcels involved, the type of construction approved, etc. Referring to the Local Permit helps define "common plan of development or sale." In cases such as tract home development, a Local Permit will include all phases of the construction project including rough grading, utility and road installation, and vertical construction. All construction activities approved in the Local Permit are part of the common plan and must remain under the General Permit until construction is completed. For custom home construction, Local Permits typically only approve vertical construction as the rough grading, utilities, and road improvements were already independently completed under the a previous Local Permit. In the case of a custom home site, the homeowner must submit plans and obtain a distinct and separate Local Permit from the local authority in order to proceed. It is not the intent of the State Water Board to require permitting for an individual homeowner building a custom home on a private lot of less than one acre if it is subject to a separate Local Permit. Similarly, the installation of a swimming pool, deck, or landscaping that disturbs less than one acre that was not part of any previous Local Permit are not required to be permitted.

The following are several examples of construction activity of less than one acre that would require permit coverage:

a. A landowner receives a building permit(s) to build tract homes on a 100-acre site split into 200 one-third acre parcels, (the remaining acreage consists of streets and parkways) which are sold to individual homeowners as they are completed. The landowner completes and sells all the parcels except for two. Although the remaining two parcels combined are less than one acre, the landowner must continue permit coverage for the two parcels.

b. One of the parcels discussed above is sold to another owner who intends to complete the construction as already approved in the Local Permit. The new landowner must file Permit Registration Documents (PRDs) to complete the construction even if the new landowner is required to obtain a separate Local Permit.

c. Landowner in (1) above purchases 50 additional one half-acre parcels adjacent to the original 200-acre project. The landowner seeks a Local Permit (or amendment to existing Local permit) to build on 20 parcels while leaving the remaining 30 parcels for future development. The landowner must amend PRDs to include the 20 parcels 14 days prior to commencement of construction activity on those parcels.

C. Construction Activities Not Covered

1. Traditional Construction Projects Not Covered

This General Permit does not apply to the following construction activity:

a. Routine maintenance to maintain original line and grade, hydraulic capacity, or original purpose of the facility.

b. Disturbances to land surfaces solely related to agricultural operations such as disking, harrowing, terracing and leveling, and soil preparation.

c. Discharges of storm water from areas on tribal lands; construction on tribal lands is regulated by a federal permit.

d. Discharges of storm water within the Lake Tahoe Hydrologic Unit. The Lahontan Regional Water Board has adopted its own permit to regulate storm water discharges from construction activity in the Lake Tahoe Hydrologic Unit (Regional Water Board 6SLT). Owners of construction projects in this watershed must apply for the Lahontan Regional Water Board permit rather than the statewide Construction General Permit. Construction projects within the Lahontan region must also comply with the Lahontan Region Project Guideline for Erosion Control (R6T-2005-0007 Section), which can be found at **http://www.waterboards.ca.gov/lahontan/Adopted_Orders/2005/r6t_2005_0007.pdf**

e. Construction activity that disturbs less than one acre of land surface, unless part of a larger common plan of development or the sale of one or more acres of disturbed land surface.

f. Construction activity covered by an individual NPDES Permit for storm water discharges.

g. Landfill construction activity that is subject to the Industrial General Permit.

h. Construction activity that discharges to Combined Sewer Systems.

i. Conveyances that discharge storm water runoff combined with municipal sewage.

j. Discharges of storm water identified in CWA § 402(*l*)(2), 33 U.S.C. § 1342(*l*)(2).

2. **Linear Projects Not Covered**

a. LUP construction activity does not include linear routine maintenance projects. Routine maintenance projects are projects associated with operations and maintenance activities that are conducted on existing lines and facilities and within existing right-of-way, easements, franchise agreements, or other legally binding agreements of the discharger. Routine maintenance projects include, but are not limited to projects that are conducted to:

i. Maintain the original purpose of the facility or hydraulic capacity.

ii. Update existing lines[5] and facilities to comply with applicable codes, standards, and regulations regardless if such projects result in increased capacity.

iii. Repairing leaks.

Routine maintenance does not include construction of new[6] lines or facilities resulting from compliance with applicable codes, standards, and regulations.

Routine maintenance projects do not include those areas of maintenance projects that are outside of an existing right-of-way, franchise, easements, or agreements. When a project must secure new areas,

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[5]Update existing lines includes replacing existing lines with new materials or pipes.
[6]New lines are those that are not associated with existing facilities and are not part of a project to update or replace existing lines.

those areas may be subject to this General Permit based on the area of disturbed land outside the original right-of-way, easement, or agreement.

b. LUP construction activity does not include field activities associated with the planning and design of a project (e.g., activities associated with route selection).

c. Tie-ins conducted immediately adjacent to "energized" or "pressurized" facilities by the discharger are not considered construction activities where all other LUP construction activities associated with the tie-in are covered by an NOI and SWPPP of a third party or municipal agency.

3. **EPA's Small Construction Rainfall Erosivity Waiver**

EPA's Storm Water Phase II Final Rule provides the option for a Small Construction Rainfall Erosivity Waiver. This waiver applies to small construction sites between 1 and 5 acres, and allows permitting authorities to waive those sites that do not have adverse water quality impacts.

Dischargers eligible for this waiver are exempt from Construction General Permit Coverage. In order to obtain the waiver, the discharger must certify to the State Water Board that small construction activity will occur only when the rainfall erosivity factor is less than 5 ("R" in the Revised Universal Soil Loss Equation). The period of construction activity begins at initial earth disturbance and ends with final stabilization. Where vegetation will be used for final stabilization, the date of installation of a practice that provides interim non-vegetative stabilization can be used for the end of the construction period. The operator must agree (as a condition waiver eligibility) to periodically inspect and properly maintain the area until the criteria for final stabilization as defined in the General Permit have been met. If use of this interim stabilization eligibility condition was relied on to qualify for the waiver, signature on the waiver with a certification statement constitutes acceptance of and commitment to complete the final stabilization process. The discharger must submit a waiver certification to the State Board prior to commencing construction activities.

USEPA funded a cooperative agreement with Texas A&M University to develop an online rainfall erosivity calculator. Dischargers can access the calculator from EPA's website at: www.epa.gov/npdes/stormwater/cgp. Use of the calculator allows the discharger to determine potential eligibility for the rainfall erosivity waiver. It may also be useful in determining the time periods during which construction activity could be waived from permit coverage.

D. Obtaining and Terminating Permit Coverage

The Legally Responsible Person (LRP) must obtain coverage under this General Permit, except in two limited circumstances. First, where the construction of pipelines, utility lines, fiber-optic cables, or other linear underground/overhead projects will occur across several properties, the utility company, municipality, or other public or private company or agency that owns or operates the linear underground/overhead project is responsible for obtaining coverage under the General Permit. Second, where there is a lease of a mineral estate (oil, gas, geothermal, aggregate, precious metals, and/or industrial metals), the lessee is responsible for obtaining coverage under the General Permit. To obtain coverage, the LRP or other entity described above must file Permit Registration Documents (PRDs) prior to the commencement of construction activity. Failure to obtain coverage under this General Permit for storm water discharges to waters of the United States is a violation of the CWA and the California Water Code.

To obtain coverage under this General Permit, LRPs must electronically file the PRDs, which include a Notice of Intent (NOI), Storm Water Pollution Prevention Plan (SWPPP), and other documents required by this General Permit, and mail the appropriate permit fee to the State Water Board. It is expected that as the storm water program develops, the Regional Water Boards may issue General Permits or

Individual Permits that contain more specific permit provisions. When this occurs, this General Permit will no longer regulate those dischargers that obtain coverage under Individual Permits.

Any information provided to the Regional Water Board shall comply with the Homeland Security Act and any other federal law that concerns security in the United States; any information that does not comply should not be submitted.

The application requirements of the General Permit establish a mechanism to clearly identify the responsible parties, locations, and scope of operations of dischargers covered by the General Permit and to document the discharger's knowledge of the General Permit's requirements.

This General Permit provides a grandfathering exception to existing dischargers subject to Water Quality Order No. 99-08-DWQ. Construction projects covered under Water Quality Order No. 99-08-DWQ shall obtain permit coverage at Risk Level 1. LUP projects covered under Water Quality Order No. 2003-0007-DWQ shall obtain permit coverage at LUP Type 1. The Regional Water Boards have the authority to require Risk Determination to be performed on projects currently covered under Water Quality Order No. 99-08-DWQ and 2003-0007-DWQ where they deem necessary.

LRPs must file a Notice of Termination (NOT) with the Regional Water Board when construction is complete and final stabilization has been reached or ownership has been transferred. The discharger must certify that all State and local requirements have been met in accordance with this General Permit. In order for construction to be found complete, the discharger must install post-construction storm water management measures and establish a long-term maintenance plan. This requirement is intended to ensure that the post-construction conditions at the project site do not cause or contribute to direct or indirect water quality impacts (i.e., pollution and/or hydromodification) upstream and downstream. Specifically, the discharger must demonstrate compliance with the post-construction standards set forth in this General Permit (Section XIII). The discharger is responsible for all compliance issues including all annual fees until the NOT has been filed and approved by the local Regional Water Board.

E. Discharge Prohibitions

This General Permit authorizes the discharge of storm water to surface waters from construction activities that result in the disturbance of one or more acres of land, provided that the discharger satisfies all permit conditions set forth in the Order. This General Permit prohibits the discharge of pollutants other than storm water and non-storm water discharges authorized by this General Permit or another NPDES permit. This General Permit also prohibits all discharges which contain a hazardous substance in excess of reportable quantities established in 40 C.F.R. §§ 117.3 and 302.4, unless a separate NPDES Permit has been issued to regulate those discharges. In addition, this General Permit incorporates discharge prohibitions contained in water quality control plans, as implemented by the nine Regional Water Boards. Discharges to Areas of Special Biological Significance (ASBS) are prohibited unless covered by an exception that the State Water Board has approved.

Non-storm water discharges include a wide variety of sources, including improper dumping, spills, or leakage from storage tanks or transfer areas. Non-storm water discharges may contribute significant pollutant loads to receiving waters. Measures to control spills, leakage, and dumping, and to prevent illicit connections during construction must be addressed through structural as well as non-structural BMPs. The State Water Board recognizes, however, that certain non-storm water discharges may be necessary for the completion of construction projects. Authorized non-storm water discharges may include those from de-chlorinated potable water sources such as: fire hydrant flushing, irrigation of vegetative erosion control measures, pipe flushing and testing, water to control dust, uncontaminated ground water dewatering, and other discharges not subject to a separate general NPDES permit adopted by a region. Therefore this General Permit authorizes such discharges provided they meet the following conditions.

These authorized non-storm water discharges must:

1. be infeasible to eliminate;
2. comply with BMPs as described in the SWPPP;
3. filter or treat, using appropriate technology, all dewatering discharges from sedimentation basins;
4. meet the NELs and NALs for pH and turbidity; and
5. not cause or contribute to a violation of water quality standards.

Additionally, authorized non-storm water discharges must not be used to clean up failed or inadequate construction or post-construction BMPs designed to keep materials onsite. Authorized non-storm water dewatering discharges may require a permit because some Regional Water Boards have adopted General Permits for dewatering discharges.

This General Permit prohibits the discharge of storm water that causes or threatens to cause pollution, contamination, or nuisance.

F. Effluent Standards for All Types of Discharges

1. Technology-Based Effluent Limitations

Permits for storm water discharges associated with construction activity must meet all applicable provisions of Sections 301 and 402 of the CWA. These provisions require controls of pollutant discharges that utilize best available technology economically achievable (BAT) for toxic pollutants and non conventional pollutants and best conventional pollutant control technology (BCT) for conventional pollutants. Additionally, these provisions require controls of pollutant discharges to reduce pollutants and any more stringent controls necessary to meet water quality standards. The USEPA has already established such limitations, known as effluent limitation guidelines (ELGs), for some industrial categories. This is not the case with construction discharges. In instances where there are no ELGs the permit writer is to use best professional judgment (BPJ) to establish requirements that the discharger must meet using BAT/BCT technology. This General Permit contains both narrative effluent limitations and new numeric effluent limitations for pH and turbidity, set using the best professional judgment (BPJ) equivalent to BAT and BCT (respectively).

BAT/BCT technologies not only include passive systems such as conventional runoff and sediment control, but also treatment systems such as coagulation/flocculation using sand filtration, when appropriate. Such technologies allow for effective treatment of soil particles less 0.02 mm (medium silt) in diameter. The discharger must install structural controls, as necessary, such as erosion and sediment controls that meet BAT and BCT to achieve compliance with water quality standards. The narrative effluent limitations constitute compliance with the requirements of the CWA.

The numeric effluent limitations for pH and turbidity are based upon BPJ, which authorizes the State Water Board to issue a permit containing “such conditions as the Administrator determines are necessary to carry out the provisions of this Chapter” (CWA § 402(a)(1), 33 U.S.C. § 1342(a)(1).) Because the USEPA has not yet issued an effluent limit guideline for storm water, the State Water Board must use BPJ to consider the appropriate technology for the category or class of point sources, based upon all available information and any unique factors relating to the sources. In addition, the permitting authority must consider a number of factors including the cost of achieving effluent reductions in relation to the effluent reduction benefits, the age of the equipment and facilities, the processes employed and any required process changes, engineering aspects of the control technologies, non-water quality environmental impacts (including energy requirements), and other such other factors as the State Water Board deems appropriate (CWA 304(b)(1)(B)).

Because the permit is an NPDES permit, there is no legal requirement to address the factors set forth in Water Code sections 13241 and 13263, unless the permit is more stringent than what federal law requires. (See *City of Burbank v. State Water Resources Control Bd.* (2005) 35 Cal.4th 613, 618, 627.) None of the requirements in this permit are more stringent than the minimum federal requirements, which include technology-based requirements achieving BAT/BCT and strict compliance with water quality standards. The inclusion of numeric effluent limitations (NELs) in the permit do not cause the permit to be more stringent than current federal law. NELs and best management practices are simply two different methods of achieving the same federal requirement: strict compliance with state water quality standards. Federal law authorizes both narrative and numeric effluent limitations to meet state water quality standards. The use of NELs to achieve compliance with water quality standards is not a more stringent requirement than the use of BMPs. (State Water Board Order No. WQ 2006-0012 (*Boeing*).) Accordingly, the State Water Board does not need to take into account the factors in Water Code sections 13241 and 13263.

The State Water Board has concluded that the establishment of BAT/BCT will not create or aggravate other environmental problems through increases in air pollution, solid waste generation, or energy consumption. While there may be a slight increase in non-water quality impacts due to the implementation of additional monitoring or the construction of additional BMPs, these impacts will be negligible in comparison with the construction activities taking place on site and would be justified by the water quality benefits associated with compliance.

Considerations related to the processes employed and the changes necessitated by the adoption of the BAT/BCT effluent limits have been assessed throughout the stakeholder process (e.g., the Blue Ribbon Panel and the March 2007 preliminary draft) and are discussed in detail in Section I.C of this Fact Sheet. The following sections set forth the engineering aspects of the control technologies and the rationale for the determination of the numeric effluents for pH and turbidity.

In consideration of the costs for the establishment of BAT and BCT limits for pH and turbidity, existing requirements for the control of storm water pollution from construction sites have been established by USEPA and the previous Construction General Permit (State Water Board Order No. 99-08-DWQ) issued by the State Water Board. The General Permit establishes one, consistent set of performance standards for all levels and types of discharges (i.e., risk, linear utility, and ATS).The only difference is that for each level or type of discharge there may be more or less specific effluent limitations (e.g., the addition of numeric effluent limitations for turbidity applies to level/type 3 discharges). And the numeric effluent limitations themselves represent a minimum technology standard. In other words, the additional numeric effluent limitations, compared to the existing permit's narrative effluent limitations, do not increase compliance requirements; rather, they simply represent a point where one can quantitatively measure compliance with the lower end of the range of required technologies. Therefore, the compliance costs associated with the BAT/BCT numeric effluent limitations in this permit only differ by the costs required to measure compliance with the NELs when compared to the baseline compliance costs to comply with the limitations already established through EPA regulations and the existing Construction General Permit.

The State Water Board estimates these measurement costs to be approximately $1000 per construction site for the duration of the project. This represents the estimated cost of purchasing (or renting) monitoring equipment, in this case a turbidimeter (~$600) and a pH meter (~$400). In some cases the costs may be higher or lower. Costs could be lower if the discharger chooses to design and implement the project in a manner where effluent monitoring is likely to be avoided (e.g., no exposure during wet weather seasons, no discharge due to containment, etc.). Costs could be more if the project is subject to many effluent monitoring events or if the discharger exceeds NALs and/or NELs, resulting in additional monitoring requirements.

i. *pH NEL*

Given the potential contaminants, the minimum standard method for control of pH in runoff requires the use of preventive measures such as avoiding concrete pours during rainy weather, covering concrete and directing flow away from fresh concrete if a pour occurs during rain, covering scrap drywall and stucco

materials when stored outside and potentially exposed to rain, and other housekeeping measures. If necessary, pH-impaired storm water from construction sites can be treated in a filter or settling pond or basin, with additional natural or chemical treatment required to meet pH limits set forth in this permit. The basin or pond acts as a collection point and holds storm water for a sufficient period for the contaminants to be settled out, either naturally or artificially, and allows any additional treatment to take place. The State Water Board considers these techniques to be equivalent to BCT. In determining the pH concentration limit for discharges, the State Water Board used BPJ to set these limitations.

The chosen limits were established by calculating three standard deviations above and below the mean pH of runoff from highway construction sites[7] in California. Proper implementation of BMPs should result in discharges that are within the range of 6.0 to 9.0 pH Units.

ii. ***Turbidity NEL***

The Turbidity NEL of 500 NTU is a technology-based numeric effluent limitation and was developed using three different analyses aimed at finding the appropriate threshold to set the technology-based limit to ensure environmental protection, effluent quality and cost-effectiveness. The analyses fell into three, main types: (1) an ecoregion-specific dataset developed by Simon et. al. (2004) [8]; (2) Statewide Regional Water Quality Control Board enforcement data; and (3) published, peer-reviewed studies and reports on in-situ performance of best management practices in terms of erosion and sediment control on active construction sites.

A 1:3 relationship between turbidity (expressed as NTU) and suspended sediment concentration (expressed as mg/L) is assumed based on a review of suspended sediment and turbidity data from three gages used in the USGS National Water Quality Assessment Program:

USGS 11074000 SANTA ANA R BL PRADO DAM CA
USGS 11447650 SACRAMENTO R A FREEPORT CA
USGS 11303500 SAN JOAQUIN R NR VERNALIS CA

The turbidity NEL represents a feasible and cost effective performance standard that is demonstrated to be achievable. Although data has been collected to demonstrate that lower effluent levels may be achievable at some sites, staff cannot conclude at this time that a lower NEL is achievable within all the ecoregions of the state. The NEL represents staff determination that the NEL is the most practicable based on available data. The turbidity NEL represents a bridge between the narrative effluent limitations and receiving water limitations. The NEL limit may be considered an interim performance standard as additional data becomes available for evaluation during the next permit cycle. To support this NEL, State Water Board staff analyzed construction site discharge information (monitoring data, estimates) and receiving water monitoring information.

Since the turbidity NEL represents an appropriate threshold level expected at a site, compliance with this value does not necessarily represent compliance with either the narrative effluent limitations (as enforced through the BAT/BCT standard) or the receiving water limitations. In the San Diego region, some inland surface waters have a receiving water objective for turbidity equal to 20 NTU. Obviously a discharge up to, but not exceeding, the turbidity NEL of 500 NTU may still cause or contribute to the exceedance of the 20 NTU standard. Most of the waters of the State are protected by turbidity objectives based on background conditions**.**

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[7] Caltrans Construction Sites Runoff Characterization Study, 2002. Available at: http://www.dot.ca.gov/hq/env/stormwater/pdf/CTSW-RT-02-055.pdf.
[8] Simon, A., W.D. Dickerson, and A. Heins. 2004. Suspended-sediment transport rates at the 1.5-year recurrence interval for ecoregions of the United States: transport conditions at the bankfull and effective discharge. Geomorphology 58: pp. 243-262.

Table 1 - Regional Water Board Basin Plans, Water Quality Objectives for Turbidity

REGIONAL WATER BOARD	WQ Objective	Background/Natural Turbidity	Maximum Increase
1 Based	on background	All levels	20%
2 Based	on background	> 50 NTU	10%
3 Based	on background	0-50 JTU 50-100 JTU > 100 JTU	20% 10 NTU 10%
4 Based	on background	0-50 NTU > 50 NTU	20% 10%
5 Based	on background	0-5 NTU 5-50 NTU 50-100 NTU >100 NTU	1 NTU 20% 10 NTU 10%
6 Based	on background	All levels	10%
7 Based	on background	N/A N/A	
8 Based	on background	0-50 NTU 50-100 NTU >100 NTU	20% 10 NTU 10%
9 Inland	Surface Waters, 20 NTU All others, based on background	0-50 NTU 50-100 NTU >100 NTU	20% 10 NTU 10%

Table 2 shows the suspended sediment concentrations at the 1.5 year flow recurrence interval for the 12 ecoregions in California from Simon et. al (2004).

Table 2 - Results of Ecoregion Analysis

Ecoregion	Percent of California Land Area	Median Suspended Sediment Concentration (mg/L)
1 9.1		874
4 0.2		120
5 8.8		35.6
6 20.7		1530
7 7.7		122
8 3.0		47.4
9 9.4		284
13 5.2		143
14 21.7		5150
78 8.1		581
80 2.4		199
81 3.7		503
Area-weighted average		1633

If a 1:3 relationship between turbidity and suspended sediment is assumed, the median turbidity is 544 NTU.

The following table is composed of turbidity readings measured in NTUs from administrative civil liberty (ACL) actions for construction sites from 2003 - 2009. This data was derived from the complete listing of construction-related ACLs for the six year period. All ACLs were reviewed and those that included turbidimeter readings at the point of storm water discharge were selected for this dataset.

Table 3 – ACL Sampling Data taken by Regional Water Board Staff

WDID#	Region	Discharger	Turbidity (NTU)
5S34C331884	5S Bradshaw	Interceptor Section 6B	1800
5S05C325110	5S Bridalwood	Subdivision	1670
5S48C336297	5S Cheyenne	at Browns Valley	1629
5R32C314271	5R Grizzly	Ranch Construction	1400
6A090406008	6T	El Dorado County Department of Transportation, Angora Creek	97.4
5S03C346861	5S	TML Development, LLC	1600
6A31C325917	6T	Northstar Village	See Subdata Set

Subdata Set - Turbidity for point of storm water runoff discharge at Northstar Village

Date	Turbidity (NTU)	Location
10/5/2006	900	Middle Martis Creek
11/2/2006	190	Middle Martis Creek
01/04/2007	36	West Fork, West Martis Creek
02/08/2007	180	Middle Martis Creek
02/09/2007	130	Middle Martis Creek
02/09/2007	290	Middle Martis Creek
02/09/2007	100	West Fork, West Martis Creek
02/10/2007	28	Middle Martis Creek
02/10/2007	23	Middle Martis Creek
02/10/2007	32	Middle Martis Creek
02/10/2007	12	Middle Martis Creek
02/10/2007	60	West Fork, West Martis Creek
02/10/2007	34	West Fork, West Martis Creek

A 95% confidence interval for mean turbidity in an ACL order was constructed. The data set used was a small sample size, so the 500 NTU (the value derived as the NEL for this General Permit) needed to be verified as a possible population mean. In this case, the population refers to a hypothetical population of turbidity measurements of which our sample of 20 represents. A t-distribution was assumed due to the small sample size:

Mean: 512.23 NTU
Standard Deviation: 686.85
Margin of Error: 321.45
Confidence Interval: 190.78 NTU (Low)
833.68 NTU (High)

Based on a constructed 95% confidence interval, an ACL order turbidity measurement will be between 190.78 – 833.68 NTU. 500 NTU falls within this range. Using the same data set, a small-sample hypothesis test was also performed to test if the ACL turbidity data set contains enough information to cast doubt on choosing a 500 NTU as a mean. 500 NTU was again chosen due to its proposed use as an acceptable NEL value. The test was carried out using a 95% confidence interval. Results indicated that the ACL turbidity data set *does not* contain significant sample evidence to reject the claim of 500 NTU as an acceptable mean for the ACL turbidity population.

There are not many published, peer-reviewed studies and reports on in-situ performance of best management practices in terms of erosion and sediment control on active construction sites. The most often cited study is a report titled, "Improving the Cost Effectiveness of Highway Construction Site Erosion and Pollution Control" (Horner, Guedry, and Kortenhof 1990, http://www.wsdot.wa.gov/Research/Reports/200/200.1.htm). In a comment letter summarizing this report sent to the State Water Board, the primary author, Dr. Horner, states:

"The most effective erosion control product was wood fiber mulch applied at two different rates along with a bonding agent and grass seed in sufficient time before the tests to achieve germination. Plots treated in this way reduced influent turbidity by more than 97 percent and discharged effluent exhibiting mean and maximum turbidity values of 21 and 73 NTU, respectively. Some other mulch and blanket materials performed nearly as well. These tests demonstrated the control ability of widely available BMPs over a very broad range of erosion potential."

Other technologies studied in this report produced effluent quality at or near 100 NTU. It is the BPJ of the State Water Board staff that erosion control, while preferred, is not always an option on construction sites and that technology performance in a controlled study showing effluent quality directly leaving a BMP is always easier and cheaper to control than effluent being discharged from the project (edge of property, etc.). As a result, it is the BPJ of the State Water Board staff that it is not cost effective or feasible, at this time, for all risk level and type 3 sites in California to achieve effluent discharges with turbidity values that are less than 100 NTU.

To summarize, the analysis showed that: (1) results of the Simon et. al dataset reveals turbidity values in background receiving water in California's ecoregions range from 16 NTU to 1716 NTU (with a mean of 544 NTU); (2) based on a constructed 95% confidence interval, construction sites will be subject to administrative civil liability (ACL) when their turbidity measurement falls between 190.78 – 833.68 NTU; and (3) sites with highly controlled discharges employing and maintaining good erosion control practices can discharge effluent from the BMP with turbidity values less than 100 NTU. Therefore, the appropriate threshold to set the technology-based limit to ensure environmental protection, effluent quality, and cost-effectiveness ranges from 100 NTU to over 1700 NTU. To keep this parameter and the costs of compliance as low as possible, State Water Board staff has determined, using its BPJ, that it is most cost effective to set the numeric effluent limitation for turbidity at 500 NTU.

a. Compliance Storm Event

In response to public comments on the last draft and the recommendations of the expert panel, this General Permit contains "compliance storm event" exceptions from the technology-based NELs. The rationale is that technology-based requirements are developed assuming a certain design storm (defined as the storm producing a rainfall amount for a specified BMPs capacity). Compliance thresholds are needed for storm events above and beyond the design storms assumed to determine the technology-based NELs. For Risk Level 3 project sites applicable to NELs, this General Permit establishes a compliance storm event as the equivalent rainfall in a 5-year, 24-hour storm. This compliance storm was

chosen due to its relative infrequent occurrence and the fact that the runoff volume associated with it is not as large as a 10-year, 24-hour storm event. The discharger shall determine this value using Western Regional Climate Center Precipitation Frequency Maps[9] for 5-year 24-hour storm events in Northern and Southern California (note that these are expressed in tenths of inches – divide by 10 to get inches).

b. TMDLs and Waste Load Allocations

Dischargers located within the watershed of a CWA § 303(d) impaired water body, for which a TMDL for sediment has been adopted by the Regional Water Board or USEPA, must comply with the approved TMDL if it identifies "construction activity" or land disturbance as a source of sediment. If it does, the TMDL should include a specific waste load allocation for this activity/source. The discharger, in this case, may be required by a separate Regional Water Board order to implement additional BMPs, conduct additional monitoring activities, and/or comply with an applicable waste load allocation and implementation schedule. If a specific waste load allocation has been established that would apply to a specific discharge, the Regional Water Board may adopt an order requiring specific implementation actions necessary to meet that allocation. In the instance where an approved TMDL has specified a general waste load allocation to construction storm water discharges, but no specific requirements for construction sites have been identified in the TMDL, dischargers must consult with the state TMDL authority[10] to confirm that adherence to a SWPPP that meets the requirements of the General Permit will be consistent with the approved TMDL.

2. Determining Compliance with Effluent Standards

a. Technology-Based Numeric Action Levels (NALs)

This General Permit contains technology-based NALs for pH and turbidity, and requirements for effluent monitoring at all Risk level 2 & 3, and LUP Type 2 & 3 sites. Numeric action levels are essentially numeric benchmark values for certain parameters that, if exceeded in effluent sampling, trigger the discharger to take actions. Exceedance of an NAL does not itself constitute a violation of the General Permit. If the discharger fails to take the corrective action required by the General Permit, though, that may consititute a violation.

The primary purpose of NALs is to assist dischargers in evaluating the effectiveness of their on-site measures. Construction sites need to employ many different systems that must work together to achieve compliance with the permit's requirements. The NALs chosen should indicate whether the systems are working as intended.

Another purpose of NALs is to provide information regarding construction activities and water quality impacts. This data will provide the State and Regional Water Boards and the rest of the storm water community with more information about levels and types of pollutants present in runoff and how effective the dischargers BMPs are at reducing pollutants in effluent. The State Water Board also hopes to learn more about the linkage between effluent and receiving water quality. In addition, these requirements will provide information on the mechanics needed to establish compliance monitoring programs at construction sites in future permit deliberations.

i. *pH*

[9] http://www.wrcc.dri.edu/pcpnfreq/nca5y24.gif & http://www.wrcc.dri.edu/pcpnfreq/sca5y24.gif .
[10] http://www.waterboards.ca.gov/tmdl/tmdl.html.

The chosen limits were established by calculating one standard deviation above and below the mean pH of runoff from highway construction sites[11] in California. Proper implementation of BMPs should result in discharges that are within the range of 6.5 to 8.5 pH Units.

The Caltrans study included 33 highway construction sites throughout California over a period of four years, which included 120 storm events. All of these sites had BMPs in place that would be generally implemented at all types of construction sites in California.

ii. *Turbidity*

BPJ was used to develop an NAL that can be used as a learning tool to help dischargers improve their site controls, and to provide meaningful information on the effectiveness of storm water controls. A statewide turbidity NAL has been set at 250 NTU.

G. Receiving Water Limitations

Construction-related activities that cause or contribute to an exceedance of water quality standards must be addressed. The dynamic nature of construction activity gives the discharger the ability to quickly identify and monitor the source of the exceedances. This is because when storm water mobilizes sediment, it provides visual cues as to where corrective actions should take place and how effective they are once implemented.

This General Permit requires that storm water discharges and authorized non-storm water discharges must not contain pollutants that cause or contribute to an exceedance of any applicable water quality objective or water quality standards. The monitoring requirements in this General Permit for sampling and analysis procedures will help determine whether BMPs installed and maintained are preventing pollutants in discharges from the construction site that may cause or contribute to an exceedance of water quality standards.

Water quality standards consist of designated beneficial uses of surface waters and the adoption of ambient criteria necessary to protect those uses. When adopted by the State Water Board or a Regional Water Board, the ambient criteria are termed “water quality objectives.” If storm water runoff from construction sites contains pollutants, there is a risk that those pollutants could enter surface waters and cause or contribute to an exceedance of water quality standards. For that reason, dischargers should be aware of the applicable water quality standards in their receiving waters. (The best method to ensure compliance with receiving water limitations is to implement BMPs that prevent pollutants from contact with storm water or from leaving the construction site in runoff.)

In California, water quality standards are published in the Basin Plans adopted by each Regional Water Board, the California Toxics Rule (CTR), the National Toxics Rule (NTR), and the Ocean Plan.

Dischargers can determine the applicable water quality standards by contacting Regional Water Board staff or by consulting one of the following sources. The actual Basin Plans that contain the water quality standards can be viewed at the website of the appropriate Regional Water Board. (http://www.waterboards.ca.gov/regions.html), the State Water Board site for statewide plans (http://www.waterboards.ca.gov/plnspols/index.html), or the USEPA regulations for the NTR and CTR (40 C.F.R. §§ 131.36-38). Basin Plans and statewide plans are also available by mail from the appropriate Regional Water Board or the State Water Board. The USEPA regulations are available at http://www.epa.gov/. Additional information concerning water quality standards can be accessed through http://www.waterboards.ca.gov/stormwtr/gen_const.html.

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[11] Caltrans Construction Sites Runoff Characterization Study, 2002. Available at: http://www.dot.ca.gov/hq/env/stormwater/pdf/CTSW-RT-02-055.pdf.

H. Training Qualifications and Requirements

The Blue Ribbon Panel (BRP) made the following observation about the lack of industry-specific training requirements:

"Currently, there is no required training or certification program for contractors, preparers of soil erosion and sediment control Storm Water Pollution Prevention Plans, or field inspectors."

Order 99-08-DWQ required that all dischargers train their employees on how to comply with the permit, but it did not specificy a curriculum or certification program. This has resulted in inconsistent implementation by all affected parties - the dischargers, the local governments where the construction activity occurs, and the regulators required to enforce 99-08-DWQ. This General Permit requires Qualified SWPPP Developers and practitioners to obtain appropriate training, and makes this curriculum mandatory two years after adoption, to allow time for course completion. The State and Regional Water Board are working with many stakeholders to develop the curriculum and mechanisms needed to develop and deliver the courses.

To ensure that the preparation, implementation, and oversight of the SWPPP is sufficient for effective pollution prevention, the Qualified SWPPP Developer and Qualified SWPPP Practitioners responsible for creating, revising, overseeing, and implementing the SWPPP must attend a State Water Board-sponsored or approved Qualified SWPPP Developer and Qualified SWPPP Practitioner training course.

I. Sampling, Monitoring, Reporting and Record Keeping

1. Traditional Construction Monitoring Requirements

This General Permit requires visual monitoring at all sites, and effluent water quality at all Risk Level 2 & 3 sites. It requires receiving water monitoring at some Risk Level 3 sites. All sites are required to submit annual reports, which contain various types of information, depending on the site characteristics and events. A summary of the monitoring and reporting requirements is found in Table 4.

Table 4 - Required Monitoring Elements for Risk Levels

	Visual	Non-visible Pollutant	Effluent	Receiving Water
Risk Level 1	three types required for all Risk Levels: non-storm water, pre-rain and post-rain	As needed for all Risk Levels (see below)	where applicable	not required
Risk Level 2			pH, turbidity	not required
Risk Level 3			(if NEL exceeded) pH, turbidity and SSC	(if NEL exceeded) pH, turbidity and SSC. Bioassessment for sites 30 acres or larger.

a. Visual

All dischargers are required to conduct quarterly, non-storm water visual inspections. For these inspections, the discharger must visually observe each drainage area for the presence of (or indications of prior) unauthorized and authorized non-storm water discharges and their sources. For storm-related inspections, dischargers must visually observe storm water discharges at all discharge locations within two business days after a qualifying event. For this requirement, a qualifying rain event is one producing precipitation of ½ inch or more of discharge. Dischargers must conduct a post-storm event inspection to

(1) identify whether BMPs were adequately designed, implemented, and effective, and (2) identify any additional BMPs necessary and revise the SWPPP accordingly. Dischargers must maintain on-site records of all visual observations, personnel performing the observations, observation dates, weather conditions, locations observed, and corrective actions taken in response to the observations.

b. Non-Visible Pollutant Monitoring

This General Permit requires that all dischargers develop a sampling and analysis strategy for monitoring pollutants that are not visually detectable in storm water. Monitoring for non-visible pollutants must be required at any construction site when the exposure of construction materials occurs and where a discharge can cause or contribute to an exceedance of a water quality objective.

Of significant concern for construction discharges are the pollutants found in materials used in large quantities at construction sites throughout California and exposed throughout the rainy season, such as cement, flyash, and other recycled materials or by-products of combustion. The water quality standards that apply to these materials will depend on their composition. Some of the more common storm water pollutants from construction activity are not CTR pollutants. Examples of non-visible pollutants include glyphosate (herbicides), diazinon and chlorpyrifos (pesticides), nutrients (fertilizers), and molybdenum (lubricants). The use of diazinon and chlorpyrifos is a common practice among landscaping professionals and may trigger sampling and analysis requirements if these materials come into contact with storm water. High pH values from cement and gypsum, high pH and SSC from wash waters, and chemical/fecal contamination from portable toilets, also are not CTR pollutants. Although some of these constituents do have numeric water quality objectives in individual Basin Plans, many do not and are subject only to narrative water quality standards (i.e. not causing toxicity). Dischargers are encouraged to discuss these issues with Regional Water Board staff and other storm water quality professionals.

The most effective way to avoid the sampling and analysis requirements, and to ensure permit compliance, is to avoid the exposure of construction materials to precipitation and storm water runoff. Materials that are not exposed do not have the potential to enter storm water runoff, and therefore receiving waters sampling is not required. Preventing contact between storm water and construction materials is one of the most important BMPs at any construction site.

Preventing or eliminating the exposure of pollutants at construction sites is not always possible. Some materials, such as soil amendments, are designed to be used in a manner that will result in exposure to storm water. In these cases, it is important to make sure that these materials are applied according to the manufacturer's instructions and at a time when they are unlikely to be washed away. Other construction materials can be exposed when storage, waste disposal or the application of the material is done in a manner not protective of water quality. For these situations, sampling is required unless there is capture and containment of all storm water that has been exposed. In cases where construction materials may be exposed to storm water, but the storm water is contained and is not allowed to run off the site, sampling will only be required when inspections show that the containment failed or is breached, resulting in potential exposure or discharge to receiving waters.

The discharger must develop a list of potential pollutants based on a review of potential sources, which will include construction materials soil amendments, soil treatments, and historic contamination at the site. The discharger must review existing environmental and real estate documentation to determine the potential for pollutants that could be present on the construction site as a result of past land use activities.

Good sources of information on previously existing pollution and past land uses include:

i. Environmental Assessments;

ii. Initial Studies;

iii. Phase 1 Assessments prepared for property transfers; and

iv. Environmental Impact Reports or Environmental Impact Statements prepared under the requirements of the National Environmental Policy Act or the California Environmental Quality Act.

In some instances, the results of soil chemical analyses may be available and can provide additional information on potential contamination.

The potential pollutant list must include all non-visible pollutants that are known or should be known to occur on the construction site including, but not limited to, materials that:

i. are being used in construction activities;

ii. are stored on the construction site;

iii. were spilled during construction operations and not cleaned up;

iv. were stored (or used) in a manner that created the potential for a release of the materials during past land use activities;

v. were spilled during previous land use activities and not cleaned up; or

vi. were applied to the soil as part of past land use activities.

C. Effluent Monitoring

Federal regulations[12] require effluent monitoring for discharges subject to NALs and NELs. Subsequently, all Risk Level 2 and 3 dischargers must perform sampling and analysis of effluent discharges to characterize discharges associated with construction activity from the entire area disturbed by the project. Dischargers must collect samples of stored or contained storm water that is discharged subsequent to a storm event producing precipitation of ½ inch or more at the time of discharge.

Table 5 - Storm Water Effluent Monitoring Requirements by Risk Level

	Frequency	Effluent Monitoring (Section E, below)
Risk Level 1	when applicable	non-visible pollutant parameters (if applicable)
Risk Level 2	Minimum of 3 samples per day during qualifying rain event characterizing discharges associated with construction activity from the entire project disturbed area.	pH, turbidity, and non-visible pollutant parameters (if applicable)
Risk Level 3	Minimum of 3 samples per day during qualifying rain event characterizing discharges associated with construction activity from the entire project disturbed area.	If NEL exceeded: pH, turbidity and suspended sediment concentration (SSC)., Plus non-visible pollutant parameters if applicable

Risk Level 1 dischargers must analyze samples for:

[12] 40 C.F.R. § 122.44.

i. any parameters indicating the presence of pollutants identified in the pollutant source assessment required in Attachment C contained in the General Permit.

Risk Level 2 dischargers must analyze samples for:

i. pH and turbidity;

ii. any parameters indicating the presence of pollutants identified in the pollutant source assessment required in Attachment D contained in the General Permit, and

iii. any additional parameters for which monitoring is required by the Regional Water Board.

Risk Level 3 dischargers must analyze samples for:

i. pH, turbidity and SSC;

ii. any parameters indicating the presence of pollutants identified in the pollutant source assessment required in Attachment E contained in the General Permit, and

iii. any additional parameters for which monitoring is required by the Regional Water Board.

2. **Linear Monitoring and Sampling Requirements**

Attachment A, establishes minimum monitoring and reporting requirements for all LUPs. It establishes different monitoring requirements depending on project complexity and risk to water quality. The monitoring requirements for Type 1 LUPs are less than Type 2 & 3 projects because Type 1 projects have a lower potential to impact water quality.

A discharger shall prepare a monitoring program prior to the start of construction and immediately implement the program at the start of construction for LUPs. The monitoring program must be implemented at the appropriate level to protect water quality at all times throughout the life of the project.

a. **Type 1 LUP Monitoring Requirements**

A discharger must conduct daily visual inspections of Type 1 LUPs during working hours while construction activities are occurring. Inspections are to be conducted by qualified personnel and can be conducted in conjunction with other daily activities. Inspections will be conducted to ensure the BMPs are adequate, maintained, and in place at the end of the construction day. The discharger will revise the SWPPP, as appropriate, based on the results of the daily inspections. Inspections can be discontinued in non-active construction areas where soil disturbing activities have been completed and final stabilization has been achieved (e.g., trench has been paved, substructures have been installed, and successful final vegetative cover or other stabilization criteria have been met).

A discharger shall implement the monitoring program for inspecting Type 1 LUPs. This program requires temporary and permanent stabilization BMPs after active construction is completed. Inspection activities will continue until adequate permanent stabilization has been established and will continue in areas where re-vegetation is chosen until minimum vegetative coverage has been established. Photographs shall be taken during site inspections and submitted to the State Water Board.

b. Type 2 & 3 LUP Monitoring Requirements

A discharger must conduct daily visual inspections of Type 2 & 3 LUPs during working hours while construction activities are occurring. Inspections are to be conducted by qualified personnel and can be in conjunction with other daily activities.

All dischargers of Type 2 & 3 LUPs are required to conduct inspections by qualified personnel of the construction site during normal working hours prior to all anticipated storm events and after actual storm events. During extended storm events, the discharger shall conduct inspections during normal working hours for each 24-hour period. Inspections can be discontinued in non-active construction areas where soil disturbing activities have been completed and final stabilization has been achieved (e.g., trench has been paved, substructures installed, and successful vegetative cover or other stabilization criteria have been met).

The goals of these inspections are (1) to identify areas contributing to a storm water discharge; (2) to evaluate whether measures to reduce pollutant loadings identified in the SWPPP are adequate and properly installed and functioning in accordance with the terms of the General Permit; and (3) to determine whether additional control practices or corrective maintenance activities are needed. Equipment, materials, and workers must be available for rapid response to failures and emergencies. All corrective maintenance to BMPs shall be performed as soon as possible, depending upon worker safety.

All dischargers shall develop and implement a monitoring program for inspecting Type 2 & 3 LUPs that require temporary and permanent stabilization BMPs after active construction is completed. Inspections will be conducted to ensure the BMPs are adequate and maintained. Inspection activities will continue until adequate permanent stabilization has been established and will continue in areas where revegetation is chosen until minimum vegetative coverage has been established.

A log of inspections conducted before, during, and after the storm events must be maintained in the SWPPP. The log will provide the date and time of the inspection and who conducted the inspection. Photographs must be taken during site inspections and submitted to the State Water Board.

c. Sampling Requirements for all LUP Project Types

LUPs are also subject to sampling and analysis requirements for visible pollutants (i.e., sedimentation/siltation, turbidity) and for non-visible pollutants.

Sampling for visible pollutants is required for Type 2 & 3 LUPs.

Non-visible pollutant monitoring is required for pollutants associated with construction sites and activities that (1) are not visually detectable in storm water discharges, and (2) are known or should be known to occur on the construction site, and (3) could cause or contribute to an exceedance of water quality objectives in the receiving waters. Sample collection for non-visible pollutants must only be required (1) during a storm event when pollutants associated with construction activities may be discharged with storm water runoff due to a spill, or in the event there was a breach, malfunction, failure, and/or leak of any BMP, and (2) when the discharger has failed to adequately clean the area of material and pollutants. Failure to implement appropriate BMPs will trigger the same sampling requirements as those required for a breach, malfunction and/or leak, or when the discharger has failed to implement appropriate BMPs prior to the next storm event.

Additional monitoring parameters may be required by the Regional Water Boards.

It is not anticipated that many LUPs will be required to collect samples for pollutants not visually detected in runoff due to the nature and character of the construction site and activities as previously described in this fact sheet. Most LUPs are constructed in urban areas with public access (e.g., existing roadways, road shoulders, parking areas, etc.). This raises a concern regarding the potential contribution of pollutants from vehicle use and/or from normal activities of the public (e.g., vehicle washing, landscape fertilization, pest spraying, etc.) in runoff from the project site. Since the dischargers are not the land

owners of the project area and are not able to control the presence of these pollutants in the storm water that runs through their projects, it is not the intent of this General Permit to require dischargers to sample for these pollutants. This General Permit does not require the discharger to sample for these types of pollutants except where the discharger has brought materials onsite that contain these pollutants and when a condition (e.g., breach, failure, etc.) described above occurs.

3. Receiving Water Monitoring

In order to ensure that receiving water limitations are met, discharges subject to numeric effluent limitations (i.e., Risk Level 3, LUP Type 3, and ATS with direct discharges into receiving waters) must also monitor the downstream receiving water(s) for turbidity, SSC, and pH (if applicable) when an NEL is exceeded.

a. Bioassessment Monitoring

This General Permit requires a bioassessment of receiving waters for dischargers of Risk Level 3 or LUP Type 3 construction projects equal to or larger than 30 acres with direct discharges into receiving waters. Benthic macroinvertebrate samples will be taken upstream and downstream of the site's discharge point in the receiving water. Bioassessments measure the quality of the stream by analyzing the aquatic life present. Higher levels of appropriate aquatic species tend to indicate a healthy stream; whereas low levels of organisms can indicate stream degradation. Active construction sites have the potential to discharge large amounts of sediment and pollutants into receiving waters. Requiring a bioassessment for large project sites, with the most potential to impact water quality, provides a snapshot of the health of the receiving water prior to initiation of construction activities. This snapshot can be used in comparison to the health of the receiving water after construction has commenced.

Each ecoregion (biologically and geographically related area) in the State has a specific yearly peak time where stream biota is in a stable and abundant state. This time of year is called an Index Period. The bioassessment requirements in this General Permit, requires benthic macroinvertebrate sampling within a sites index period. The State Water Board has developed a map designating index periods for the ecoregions in the State (see State Water Board Website).

This General Permit requires the bioassessment methods to be in accordance with the Surface Water Ambient Monitoring Program (SWAMP) in order to provide data consistency within the state as well as generate useable biological stream data.

Table 6 - Receiving Water Monitoring Requirements

	Receiving Water Monitoring Parameters
Risk Level 1 /LUP Type 1	not required
Risk Level 2 / LUP Type 2	not required
Risk Level 3 / LUP Type 3	If NEL exceeded: pH (if applicable), turbidity, and SSC. Bioassessment for sites 30 acres or larger.

4. Reporting Requirements

a. NEL Violation Report

All Risk Level 3 and LUP Type 3 dischargers must electronically submit all storm event sampling results to the State and Regional Water Boards, via SMARTS, no later than 5 days after the conclusion of the storm event. The purpose of the electronic filing of the NEL Violation Report is to 1) inform stakeholder agencies and organizations and the general public, and 2) notify the State and Regional Water Boards of

the exceedance so that they can determine whether any follow-up (e.g., inspection, enforcement, etc.) is necessary to bring the site into compliance.

In the event that an applicable NEL has been exceeded during a storm event equal to or larger than the Compliance Storm Event, Risk level 3/LUP Type 3 dischargers shall report the on-site rain gauge reading and nearby governmental rain gauge readings for verification. Specifically, the NEL Exceedance Report is required to contain:

- the analytical method(s), method reporting unit(s), and method detection limit(s) of each analytical parameter (analytical results that are less than the method detection limit are to be reported as "less than the method detection limit or <MDL");
- the date, place, and time of sampling;
- any visual observation (inspections);
- any measurements, including precipitation; and
- a description of the current BMPs associated with the effluent sample that exceeded the NEL and any proposed corrective actions taken.

b. **NAL Exceedance Report**

All Risk Level 3 and LUP Type 3 dischargers must electronically submit all storm event sampling results to the State and Regional Water Boards, via the electronic data system, no later than 5 days after the conclusion of the storm event. In the event that any effluent sample exceeds an applicable NAL, all Risk Level 2 and LUP Type 2 dischargers must electronically submit all storm event sampling results to the State and Regional Water Boards no later than 10 days after the conclusion of the storm event. The Regional Water Boards have the authority to require the submittal of an NAL Exceedance Report.

Specifically, the NAL Exceedance Report is required to contain:

- the analytical method(s), method reporting unit(s), and method detection limit(s) of each analytical parameter (analytical results that are less than the method detection limit are to be reported as "less than the method detection limit or <MDL");
- the date, place, and time of sampling;
- any visual observation (inspections);
- any measurements, including precipitation; and
- a description of the current BMPs associated with the effluent sample that exceeded the NAL and any proposed corrective actions taken.

c. **Annual Report**

All dischargers must prepare and electronically submit an annual report no later than September 1 of each year using the Storm water Multi-Application Reporting and Tracking System (SMARTS). The Annual Report must include a summary and evaluation of all sampling and analysis results, original laboratory reports, chain of custody forms, a summary of all corrective actions taken during the compliance year, and identification of any compliance activities or corrective actions that were not implemented.

5. Record Keeping

According to 40 C.F.R. Parts 122.21(p) and 122.41(j), the discharger is required to retain paper or electronic copies of all records required by this General Permit for a period of at least three years from the date generated or the date submitted to the State Water Board or Regional Water Boards. A discharger must retain records for a period beyond three years as directed by Regional Water Board.

J. Risk Determination

1. Traditional Projects

a. Overall Risk Determination

There are two major requirements related to site planning and risk determination in this General Permit. The project's overall risk is broken up into two elements – (1) project sediment risk (the relative amount of sediment that can be discharged, given the project and location details) and (2) receiving water risk (the risk sediment discharges pose to the receiving waters).

Project Sediment Risk:
Project Sediment Risk is determined by multiplying the R, K, and LS factors from the Revised Universal Soil Loss Equation (RUSLE) to obtain an estimate of project-related bare ground soil loss expressed in tons/acre. The RUSLE equation is as follows:

A = (R)(K)(LS)(C)(P)

Where: A = the rate of sheet and rill erosion
R = rainfall-runoff erosivity factor
K = soil erodibility factor
LS = length-slope factor
C = cover factor (erosion controls)
P = management operations and support practices (sediment controls)

The C and P factors are given values of 1.0 to simulate bare ground conditions.

There is a map option and a manual calculation option for determining soil loss. For the map option, the R factor for the project is calculated using the online calculator at http://cfpub.epa.gov/npdes/stormwater/LEW/lewCalculator.cfm. The product of K and LS are shown on Figure 1. To determine soil loss in tons per acre, the discharger multiplies the R factor times the value for K times LS from the map.

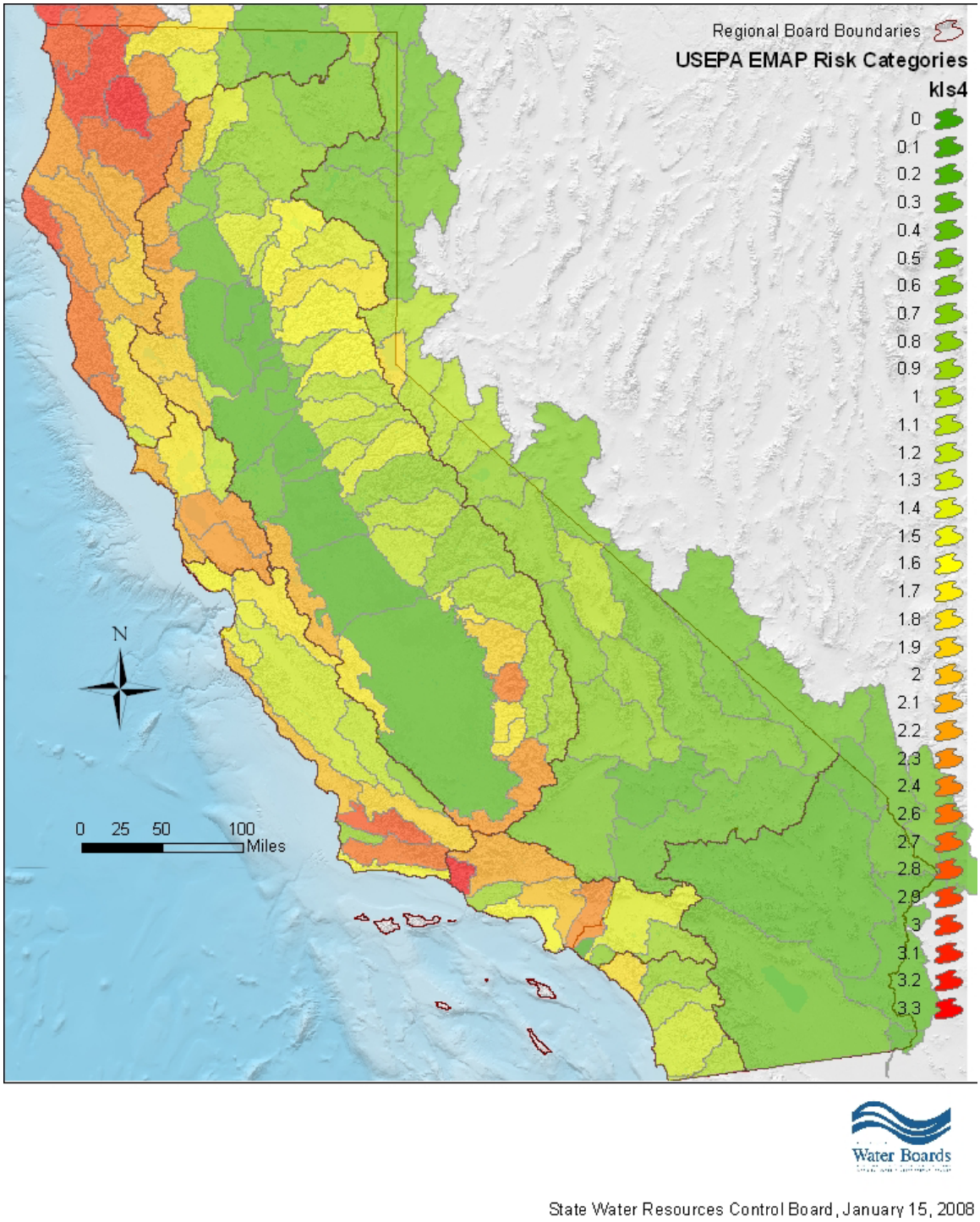

Figure 1 -Statewide Map of K * LS

For the manual calculation option, the R factor for the project is calculated using the online calculator at http://cfpub.epa.gov/npdes/stormwater/LEW/lewCalculator.cfm. The K and LS factors are determined using Appendix 1.

Soil loss of less than 15 tons/acre is considered **low** sediment risk.
Soil loss between 15 and 75 tons/acre is **medium** sediment risk.
Soil loss over 75 tons/acre is considered **high** sediment risk.

The soil loss values and risk categories were obtained from mean and standard deviation RKLS values from the USEPA EMAP program. High risk is the mean RKLS value plus two standard deviations. Low risk is the mean RKLS value minus two standard deviations.

Receiving Water Risk:
Receiving water risk is based on whether a project drains to a sediment-sensitive waterbody. A sediment-sensitive waterbody is either

on the most recent 303d list for waterbodies impaired for sediment;
has a USEPA-approved Total Maximum Daily Load implementation plan for sediment; **or**
has the beneficial uses of COLD, SPAWN, and MIGRATORY.

A project that meets at least one of the three criteria has a high receiving water risk. A list of sediment-sensitive waterbodies will be posted on the State Water Board's website. It is anticipated that an interactive map of sediment sensitive water bodies in California will be available in the future.

The Risk Levels have been altered by eliminating the possibility of a Risk Level 4, and expanding the constraints for Risk Levels 1, 2, and 3. Therefore, projects with high receiving water risk and high sediment risk will be considered a Risk Level 3 risk to water quality.

In response to public comments, the Risk Level requirements have also been changed such that Risk Level 1 projects will be subject to minimum BMP and visual monitoring requirements, Risk Level 2 projects will be subject to NALs and some additional monitoring requirements, and Risk Level 3 projects will be subject to NELs, and more rigorous monitoring requirements such as receiving water monitoring and in some cases bioassessment.

Table 7 - Combined Risk Level Matrix

Combined Risk Level Matrix				
Receiving Water Risk		Sediment Risk		
		Low Medium		High
	Low	Level 1	Level 2	
	High	Level 2		Level 3

b. Effluent Standards

All dischargers are subject to the narrative effluent limitations specified in the General Permit. The narrative effluent limitations require storm water discharges associated with construction activity to meet all applicable provisions of Sections 301 and 402 of the CWA. These provisions require controls of pollutant discharges that utilize BAT and BCT to reduce pollutants and any more stringent controls necessary to meet water quality standards.

Risk Level 2, and 3 dischargers are subject to numeric effluent standards comparable to the project's risk to water quality. Risk Level 2 dischargers that pose a medium risk to water quality are subject to technology-based NALs for pH and turbidity. Risk Level 3 dischargers that pose a high risk to water quality are subject to technology-based NALs and technology-based NELs for pH and turbidity.

c. Good Housekeeping

Proper handling and managing of construction materials can help minimize threats to water quality. The discharger must consider good housekeeping measures for: construction materials, waste management, vehicle storage & maintenance, landscape materials, and potential pollutant sources. Examples include; conducting an inventory of products used, implementing proper storage & containment, and properly cleaning all leaks from equipment and vehicles.

d. Non-Storm Water Management

Non-storm water discharges directly connected to receiving waters or the storm drain system have the potential to negatively impact water quality. The discharger must implement measures to control all non-storm water discharges during construction, and from dewatering activities associated with construction. Examples include; properly washing vehicles in contained areas, cleaning streets, and minimizing irrigation runoff.

e. Erosion Control

The best way to minimize the risk of creating erosion and sedimentation problems during construction is to disturb as little of the land surface as possible by fitting the development to the terrain. When development is tailored to the natural contours of the land, little grading is necessary and, consequently, erosion potential is lower.[14] Other effective erosion control measures include: preserving existing vegetation where feasible, limiting disturbance, and stabilizing and re-vegetating disturbed areas as soon as possible after grading or construction activities. Particular attention must be paid to large, mass-graded sites where the potential for soil exposure to the erosive effects of rainfall and wind is great and where there is potential for significant sediment discharge from the site to surface waters. Until permanent vegetation is established, soil cover is the most cost-effective and expeditious method to protect soil particles from detachment and transport by rainfall. Temporary soil stabilization can be the single most important factor in reducing erosion at construction sites. The discharger is required to consider measures such as: covering disturbed areas with mulch, temporary seeding, soil stabilizers, binders, fiber rolls or blankets, temporary vegetation, and permanent seeding. These erosion control measures are only examples of what should be considered and should not preclude new or innovative approaches currently available or being developed. Erosion control BMPs should be the primary means of preventing storm water contamination, and sediment control techniques should be used to capture any soil that becomes eroded.[13]

Risk Level 3 dischargers pose a higher risk to water quality and are therefore additionally required to ensure that post-construction soil loss is equivalent to or less than the pre-construction levels.

f. Sediment Control

Sediment control BMPs should be the secondary means of preventing storm water contamination. When erosion control techniques are ineffective, sediment control techniques should be used to capture any soil that becomes eroded. The discharger is required to consider perimeter control measures such as: installing silt fences or placing straw wattles below slopes. These sediment control measures are only examples of what should be considered and should not preclude new or innovative approaches currently available or being developed.

Because Risk Level 2 and 3 dischargers pose a higher risk to water quality, additional requirements for the application of sediment controls are imposed on these projects. This General Permit also authorizes the Regional Water Boards to require Risk Level 3 dischargers to implement additional site-specific

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[13] U.S. Environmental Protection Agency. 2007. Developing Your Storm Water Pollution Prevention Plan: A Guide for Construction Sites.

sediment control requirements if the implementation of other erosion or sediment controls are not adequately protecting the receiving waters.

g. Run-on and Runoff Control

Inappropriate management of run-on and runoff can result in excessive physical impacts to receiving waters from sediment and increased flows. The discharger is required to manage all run-on and runoff from a project site. Examples include: installing berms and other temporary run-on and runoff diversions.

Risk Level 1 dischargers with lower risks to impact water quality are not subject to the run-on and runoff control requirements unless an evaluation deems them necessary or visual inspections show that such controls are required.

h. Inspection, Maintenance and Repair

All measures must be periodically inspected, maintained and repaired to ensure that receiving water quality is protected. Frequent inspections coupled with thorough documentation and timely repair is necessary to ensure that all measures are functioning as intended.

i. Rain Event Action Plan (REAP)

A Rain Event Action Plan (REAP) is a written document, specific for each rain event. A REAP should be designed that when implemented it protects all exposed portions of the site within 48 hours of any likely precipitation event forecast of 50% or greater probability.

This General Permit requires Risk Level 2 and 3 dischargers to develop and implement a REAP designed to protect all exposed portions of their sites within 48 hours prior to any likely precipitation event. The REAP requirement is designed to ensure that the discharger has adequate materials, staff, and time to implement erosion and sediment control measures that are intended to reduce the amount of sediment and other pollutants generated from the active site. A REAP must be developed when there is likely a forecast of 50% or greater probability of precipitation in the project area. (The National Oceanic and Atmospheric Administration (NOAA) defines a chance of precipitation as a probability of precipitation of 30% to 50% chance of producing precipitation in the project area.[14] NOAA defines the probability of precipitation (PoP) as the likelihood of occurrence (expressed as a percent) of a measurable amount (0.01 inch or more) of liquid precipitation (or the water equivalent of frozen precipitation) during a specified period of time at any given point in the forecast area.) Forecasts are normally issued for 12-hour time periods. Descriptive terms for uncertainty and aerial coverage are used as follows:

Table 8 -National Oceanic and Atmospheric Administration (NOAA) Definition of Probability of Precipitation (PoP)

PoP	Expressions of Uncertainty	Aerial Coverage
0%	none used	none used
10%	none used	isolated
20%	slight chance	isolated
30-50%	chance	scattered

[14] http://www.crh.noaa.gov/lot/severe/wxterms.php.

60-70%	likely	numerous
80-100%	none used	none used

The discharger must obtain the precipitation forecast information from the National Weather Service Forecast Office (http://www.srh.noaa.gov/).

2. Linear Projects

a. Linear Risk Determination

LUPs vary in complexity and water quality concerns based on the type of project. This General Permit has varying application requirements based on the project's risk to water quality. Factors that lead to the characterization of the project include location, sediment risk, and receiving water risk.

Based on the location and complexity of a project area or project section area, LUPs are separated into project types. As described below, LUPs have been categorized into three project types.

i. *Type 1 LUPs*

Type 1 LUPs are those construction projects where:

(1) 70 percent or more of the construction activity occurs on a paved surface and where areas disturbed during construction will be returned to preconstruction conditions or equivalent protection established at the end of the construction activities for the day, or

(2) greater than 30 percent of construction activities occur within the non-paved shoulders or land immediately adjacent to paved surfaces, or where construction occurs on unpaved improved roads, including their shoulders or land immediately adjacent to them where:

Areas disturbed during construction will be returned to pre-construction conditions or equivalent protection established at the end of the construction activities for the day to minimize the potential for erosion and sediment deposition, and

Areas where established vegetation was disturbed during construction will be stabilized and re-vegetated by the end of project. When required, adequate temporary stabilization Best Management Practices (BMPs) will be installed and maintained until vegetation is established to meet minimum cover requirements established in this General Permit for final stabilization.

Type 1 LUPs typically do not have a high potential to impact storm water quality because (1) these construction activities are not typically conducted during a rain event, (2) these projects are normally constructed over a short period of time[15], minimizing the duration that pollutants could potentially be exposed to rainfall; and (3) disturbed soils such as those from trench excavation are required to be hauled away, backfilled into the trench, and/or covered (e.g., metal plates, pavement, plastic covers over spoil piles) at the end of the construction day.

[15] Short period of time refers to a project duration of weeks to months, but typically less than one year in duration.

Type 1 LUPs are determined during the risk assessment found in Attachment A.1 to be 1) low sediment risk and low receiving water risk; 2) low sediment risk and medium receiving water risk; and 3) medium sediment risk and low receiving water risk.

This General Permit requires the discharger to ensure a SWPPP is developed for these construction activities that is specific to project type, location and characteristics.

ii. ***Type 2 LUPs:***

Type 2 projects are determined to have a combination of High, Medium, and Low project sediment risk along with High, Medium, and Low receiving water risk. Like Type 1 projects, Type 2 projects are typically constructed over a short period of time. However, these projects have a higher potential to impact water quality because they:

(1) typically occur outside the more urban/developed areas;

(2) have larger areas of soil disturbance that are not closed or restored at the end of the day;

(3) may have onsite stockpiles of soil, spoil and other materials;

(4) cross or occur in close proximity to a wide variety of sensitive resources that may include, but are not limited to, steep topography and/or water bodies; and

(5) have larger areas of disturbed soils that may be exposed for a longer time interval before final stabilization, cleanup and/or reclamation occurs.

This General Permit requires the discharger to develop and implement a SWPPP for these construction activities that are specific for project type, location and characteristics.

iii. ***Type 3 LUPs:***

Type 3 projects are determined to have a combination of High and Medium project sediment risk along with High and Medium receiving water risk. Similar to Type 2 projects, Type 3 projects have a higher potential to impact water quality because they:

(1) typically occur outside of the more urban/developed areas;

(2) have larger areas of soil disturbance that are not closed or restored at the end of the day;

(3) may have onsite stockpiles of soil, spoil and other materials;

(4) cross or occur in close proximity to a wide variety of sensitive resources that may include, but are not limited to, steep topography and/or water bodies; and

(5) have larger areas of disturbed soils that may be exposed for a longer time interval before final stabilization, cleanup and/or reclamation occurs.

This General Permit requires the discharger to develop and implement a SWPPP for these construction activities that are specific for project type, location, and characteristics.

b. **Linear Effluent Standards**

All LUPs are subject to the narrative effluent limitations specified in the General Permit.

Type 2 and 3 LUPs are subject to NELs comparable to the project type's risk to water quality. Type 2 projects that pose an intermediate risk to water quality are subject to technology-based NALs for pH and turbidity. Type 3 projects posing a high risk to water quality are subject to technology-based NALs and NELs for pH and turbidity.

c. Linear Good Housekeeping

Improper use and handling of construction materials could potentially cause a threat to water quality. In order to ensure proper site management of these construction materials, all LUP dischargers must comply with a minimum set of Good Housekeeping measures specified in Attachment A of this General Permit.

d. Linear Non-Storm Water Management

In order to ensure control of all non-storm water discharges during construction, all LUP dischargers must comply with the Non-Storm Water Management measures specified in Attachment A of this General Permit.

e. Linear Erosion Control

This General Permit requires all LUP dischargers to implement effective wind erosion control measures, and soil cover for inactive areas. Type 3 LUPs posing a higher risk to water quality are additionally required to ensure the post-construction soil loss is equivalent to or less than the pre-construction levels.

f. Linear Sediment Control

In order to ensure control and containment of all sediment discharges, all LUP dischargers must comply with the general Sediment Control measures specified in Attachment A or this General Permit. Additional requirements for sediment controls are imposed on Type 2 & 3 LUPs due to their higher risk to water quality.

g. Linear Run-on and Runoff Control

Discharges originating outside of a project's perimeter and flowing onto the property can adversely affect the quantity and quality of discharges originating from a project site. In order to ensure proper management of run-on and runoff, all LUPs must comply with the run-on and runoff control measures specified in Attachment A of this General Permit. Due to the lower risk of impacting water quality, Type 1 LUPs are not required to implement run-on and runoff controls unless deemed necessary by the discharger.

h. Linear Inspection, Maintenance and Repair

Proper inspection, maintenance, and repair activities are important to ensure the effectiveness of on-site measures to control water quality. In order to ensure that inspection, maintenance, and repair activities are adequately performed, the all LUP dischargers a re required to comply with the Inspection, Maintenance, and Repair requirements specified in Attachment A of this General Permit.

K. ATS[16] Requirements

There are instances on construction sites where traditional erosion and sediment controls do not effectively control accelerated erosion. Under such circumstances, or under circumstances where storm water discharges leaving the site may cause or contribute to an exceedance of a water quality standard, the use of an Active Treatment System (ATS) may be necessary. Additionally, it may be appropriate to use an ATS when site constraints inhibit the ability to construct a correctly sized sediment basin, when clay and/or highly erosive soils are present, or when the site has very steep or long slope lengths.[17]

Although treatment systems have been in use in some form since the mid-1990s, the ATS industry in California is relatively young, and detailed regulatory standards have not yet been developed. Many developers are using these systems to treat storm water discharges from their construction sites. The new ATS requirements set forth in this General Permit are based on those in place for small wastewater treatment systems, ATS regulations from the Central Valley Regional Water Quality Control Board (September 2005 memorandum "2005/2006 Rainy Season – Monitoring Requirements for Storm Water Treatment Systems that Utilize Chemical Additives to Enhance Sedimentation"), the Construction Storm Water Program at the State of Washington's Department of Ecology, as well as recent advances in technology and knowledge of coagulant performance and aquatic safety.

The effective design of an ATS requires a detailed survey and analysis of site conditions. With proper planning, ATS performance can provide exceptional water quality discharge and prevent significant impacts to surface water quality, even under extreme environmental conditions.

These systems can be very effective in reducing the sediment in storm water runoff, but the systems that use additives/polymers to enhance sedimentation also pose a potential risk to water quality (e.g., operational failure, equipment failure, additive/polymer release, etc.). The State Water Board is concerned about the potential acute and chronic impacts that the polymers and other chemical additives may have on fish and aquatic organisms if released in sufficient quantities or concentrations. In addition to anecdotal evidence of polymer releases causing aquatic toxicity in California, the literature supports this concern.[18] For example, cationic polymers have been shown to bind with the negatively charged gills of fish, resulting in mechanical suffocation.[19] Due to the potential toxicity impacts, which may be caused by the release of additives/polymers into receiving waters, this General Permit establishes residual polymer monitoring and toxicity testing requirements have been established in this General Permit for discharges from construction sites that utilize an ATS in order to protect receiving water quality and beneficial uses.

The primary treatment process in an ATS is coagulation/flocculation. ATS's operate on the principle that the added coagulant is bound to suspended sediment, forming floc, which is gravitationally settled in tanks or a basin, or removed by sand filters. A typical installation utilizes an injection pump upstream from the clarifier tank, basin, or sand filters, which is electronically metered to both flow rate and suspended solids level of the influent, assuring a constant dose. The coagulant mixes and reacts with the influent, forming a dense floc. The floc may be removed by gravitational setting in a clarifier tank or basin, or by filtration. Water from the clarifier tank, basin, or sand filters may be routed through cartridge(s) and/or bag filters for final polishing. Vendor-specific systems use various methods of dose control, sediment/floc removal, filtration, etc., that are detailed in project-specific documentation. The

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[16] An ATS is a treatment system that employs chemical coagulation, chemical flocculation, or electrocoagulation in order to reduce turbidity caused by fine suspended sediment.
[17] Pitt, R., S. Clark, and D. Lake. 2006. Construction Site Erosion and Sediment Controls: Planning, Design, and Performance. DEStech Publications. Lancaster, PA. 370pp.
[18] RomØen, K., B. Thu, and Ø. Evensen. 2002. Immersion delivery of plasmid DNA II. A study of the potentials of a chitosan based delivery system in rainbow trout (*Oncorhynchus mykiss*) fry. *Journal of Controlled Release* **85**: 215-225.
[19] Bullock, G., V. Blazer, S. Tsukuda, and S. Summerfelt. 2000. Toxicity of acidified chitosan for cultured rainbow trout (*Oncorhynchus mykiss*). *Aquaculture* **185**:273-280.

particular coagulant/flocculant to be used for a given project is determined based on the water chemistry of the site because the coagulants are specific in their reactions with various types of sediments. Appropriate selection of dosage must be carefully matched to the characteristics of each site.

ATS's are operated in two differing modes, either Batch or Flow-Through. Batch treatment can be defined as Pump-Treat-Hold-Test-Release. In Batch treatment, water is held in a basin or tank, and is not discharged until treatment is complete. Batch treatment involves holding or recirculating the treated water in a holding basin or tank(s) until treatment is complete or the basin or storage tank(s) is full. In Flow-Through treatment, water is pumped into the ATS directly from the runoff collection system or storm water holding pond, where it is treated and filtered as it flows through the system, and is then directly discharged. "Flow-Through Treatment" is also referred to as "Continuous Treatment."

1. Effluent Standards

This General Permit establishes NELs for discharges from construction sites that utilize an ATS. These systems lend themselves to NELs for turbidity and pH because of their known reliable treatment. Advanced systems have been in use in some form since the mid-1990s. An ATS is considered reliable, can consistently produce a discharge of less than 10 NTU, and has been used successfully at many sites in several states since 1995 to reduce turbidity to very low levels.[20]

This General Permit contains "compliance storm event" exceptions from the technology-based NELs for ATS discharges. The rationale is that technology-based requirements are developed assuming a certain design storm. In the case of ATS the industry-standard design storm is 10-year, 24-hour (as stated in Attachment F of this General Permit), so the compliance storm event has been established as the 10-year 24-hour event as well to provide consistency.

2. Training

Operator training is critical to the safe and efficient operation and maintenance of the ATS, and to ensure that all State Water Board monitoring and sampling requirements are met. The General Permit requires that all ATS operators have training specific to using ATS's liquid coagulants.

L. Post-Construction Requirements

Under past practices, new and redevelopment construction activities have resulted in modified natural watershed and stream processes. This is caused by altering the terrain, modifying the vegetation and soil characteristics, introducing impervious surfaces such as pavement and buildings, increasing drainage density through pipes and channels, and altering the condition of stream channels through straightening, deepening, and armoring. These changes result in a drainage system where sediment transport capacity is increased and sediment supply is decreased. A receiving channel's response is dependent on dominant channel materials and its stage of adjustment.

Construction activity can lead to impairment of beneficial uses in two main ways. First, during the actual construction process, storm water discharges can negatively affect the chemical, biological, and physical properties of downstream receiving waters. Due to the disturbance of the landscape, the most likely pollutant is sediment, however pH and other non-visible pollutants are also of great concern. Second, after most construction activities are completed at a construction site, the finished project may result in significant modification of the site's response to precipitation. New development and redevelopment

[20] Currier, B., G. Minton, R. Pitt, L. Roesner, K. Schiff, M. Stenstrom, E. Strassler, and E. Strecker. 2006. The Feasibility of Numeric Effluent Limits Applicable to Discharges of Storm Water Associated with Municipal, Industrial and Construction Activities.

projects have almost always resulted in permanent post-construction water quality impacts because more precipitation ends up as runoff and less precipitation is intercepted, evapotranspired, and infiltrated.

General Permit 99-08-DWQ required the SWPPP to include a description of all post-construction BMPs on a site and a maintenance schedule. An effective storm water management strategy must address the full suite of storm events (water quality, channel protection, overbank flood protection, extreme flood protection) (Figure 2).

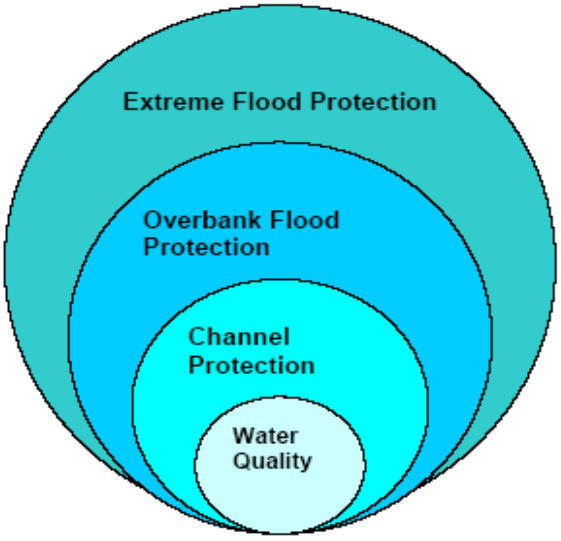

Figure 2 - Suite of Storm Events

The post-construction storm water performance standards in this General Permit specifically address water quality and channel protection events. Overbank flood protection and extreme flood protection events are traditionally dealt with in local drainage and flood protection ordinances. However, measures in this General Permit to address water quality and channel protection also reduce overbank and extreme flooding impacts. This General Permit aims to match post-construction runoff to pre-construction runoff for the 85th percentile storm event, which not only reduces the risk of impact to the receiving water's channel morphology but also provides some protection of water quality.

This General Permit clarifies that its runoff reduction requirements only apply to projects that lie outside of jurisdictions covered by a Standard Urban Storm water Management Plan (SUSMP) (or other more protective) post-construction requirements in either Phase I or Phase II permits.

Figures 3 and 4, below, show the General Permit enrollees (to Order 99-08-DWQ, as of March 10, 2008) overlaid upon a map with SUSMP (or more protective) areas in blue and purple. Areas without blue or purple indicate where the General Permit's runoff reduction requirements would actually apply.

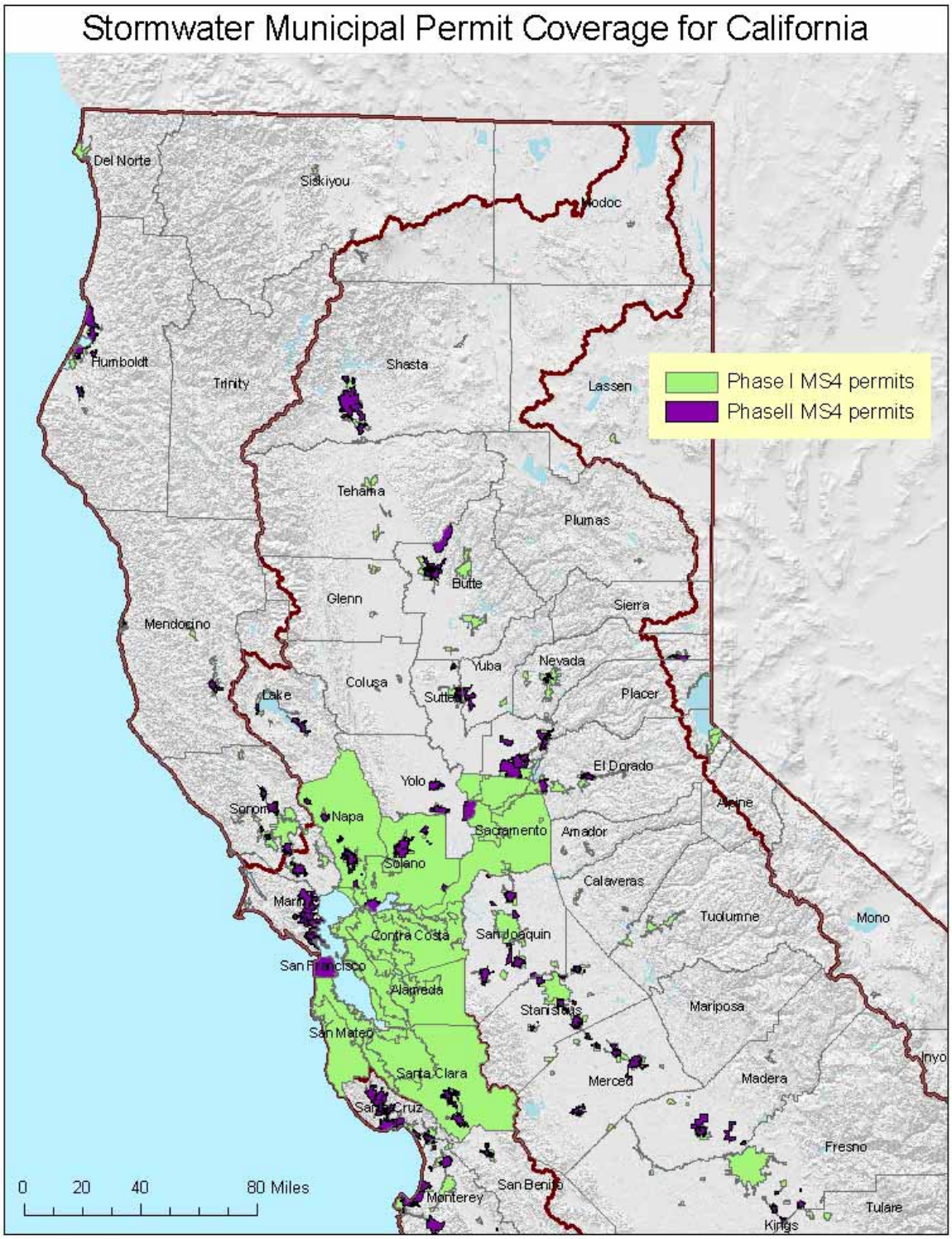

Figure 3 - Northern CA (2009) Counties / Cities With SUSMP-Plus Coverage

Figure 4 - Southern CA (2009) Counties / Cities With SUSMP-Plus Coverage

Water Quality:
This General Permit requires dischargers to replicate the pre-project runoff water balance (defined as the amount of rainfall that ends up as runoff) for the smallest storms up to the 85th percentile storm event, or the smallest storm event that generates runoff, whichever is larger. Contemporary storm water management generally routes these flows directly to the drainage system, increasing pollutant loads and potentially causing adverse effects on receiving waters. These smaller water quality events happen much more frequently than larger events and generate much higher pollutant loads on an annual basis. There are other adverse hydrological impacts that result from not designing according to the site's pre-construction water balance. In Maryland, Klein[21] noted that baseflow decreases as the extent of urbanization increases. Ferguson and Suckling[22] noted a similar relation in watersheds in Georgia. On Long Island, Spinello and Simmons[23] noted substantial decreases in base flow in intensely urbanized watersheds.

The permit emphasizes runoff reduction through on-site storm water reuse, interception, evapo-transpiration and infiltration through non-structural controls and conservation design measures (e.g., downspout disconnection, soil quality preservation/enhancement, interceptor trees). Employing these measures close to the source of runoff generation is the easiest and most cost-effective way to comply with the pre-construction water balance standard. Using low-tech runoff reduction techniques close to the source is consistent with a number of recommendations in the literature.[24] In many cases, BMPs implemented close to the source of runoff generation cost less than end-of the pipe measures.[25] Dischargers are given the option of using Appendix 2 to calculate the required runoff volume or a watershed process-based, continuous simulation model such as the EPA's Storm Water Management Model (SWMMM) or Hydrologic Simulation Program Fortran (HSPF). Such methods used by the discharger will be reviewed by the Regional Water Board upon NOT application.

Channel Protection:
In order to address channel protection, a basic understanding of fluvial geomorphic concepts is necessary. A dominant paradigm in fluvial geomorphology holds that streams adjust their channel dimensions (width and depth) in response to long-term changes in sediment supply and bankfull discharge (1.5 to 2 year recurrence interval). The bankfull stage corresponds to the discharge at which channel maintenance is the most effective, that is, the discharge at which the moving sediment, forming or removing bars, forming or changing bends and meanders, and generally doing work that results in the average morphologic characteristics of channels.[26] Lane (1955 as cited in Rosgen 1996[27]) showed the generalized relationship between sediment load, sediment size, stream discharge and stream slope in Figure 5. A change in any one of these variables sets up a series of mutual adjustments in the companion variables with a resulting direct change in the physical characteristics of the stream channel.

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[21] Klein 1979 as cited in Delaware Department of Natural Resources (DDNR). 2004. Green Technology: The Delaware Urban Runoff Management Approach. Dover, DE. 117 pp.
[22] Ferguson and Suckling 1990 as cited Delaware Department of Natural Resources (DDNR). 2004. Green Technology: The Delaware Urban Runoff Management Approach. Dover, DE. 117 pp.
[23] Center for Watershed Protection (CWP). 2000. The Practice of Watershed Protection: Techniques for protecting our nation's streams, lakes, rivers, and estuaries. Ellicott City, MD. 741 pp.
[24] Bay Area Storm Water Management Agencies Association (BASMAA). 1997. Start at the Source: Residential Site Planning and Design Guidance Manual for Storm Water Quality Protection. Palo Alto, CA;
McCuen, R.H. 2003 Smart Growth: hydrologic perspective. Journal of Professional Issues in Engineering Education and Practice. Vol (129), pp.151-154;
Moglen, G.E. and S. Kim. 2007. Impervious imperviousness-are threshold based policies a good idea? Journal of the American Planning Association, Vol 73 No. 2. pp 161-171.
[25] Delaware Department of natural Resources (DDNR). 2004. Green technology: The Delaware urban Runoff Management Approcah. Dover, DE. 117 pp.
[26] Dunne, T and L.B. Leopold. 1978. Water in Environmental Planning. San Francisco W.H. Freeman and Company
[27] Rosgen. D.L. 1996. Applied River Morphology. Pagosa Springs. Wildland Hydrology

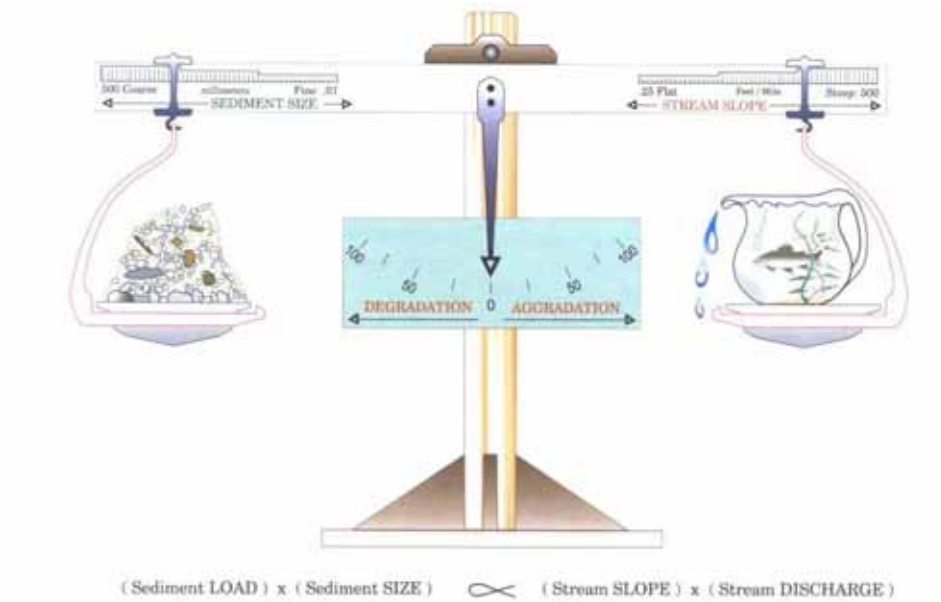

Figure 5 - Schematic of the Lane Relationship

After Lane (1955) as cited in Rosgen (1996)

Stream slope multiplied by stream discharge (the right side of the scale) is essentially an approximation of stream power, a unifying concept in fluvial geomorphology (Bledsoe 1999). Urbanization generally increases stream power and affects the resisting forces in a channel (sediment load and sediment size represented on the left side of the scale).

During construction, sediment loads can increase from 2 to 40,000 times over pre-construction levels.[28] Most of this sediment is delivered to stream channels during large, episodic rain events.[29] This increased sediment load leads to an initial aggradation phase where stream depths may decrease as sediment fills the channel, leading to a decrease in channel capacity and increase in flooding and overbank deposition. A degradation phase initiates after construction is completed.

Schumm et. al (1984) developed a channel evolution model that describes the series of adjustments from initial downcutting, to widening, to establishing new floodplains at lower elevations (Figure 6).

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[28] Goldman S.J., K. Jackson, and T.A. Bursztynsky. 1986. Erosion and Sediment Control Handbook. McGraw Hill. San Francisco.
[29] Wolman 1967 as cited in Paul, M.P. and J.L. Meyer. 2001. Streams in the Urban Landscape. *Annu. Rev.Ecol. Syst.* 32: 333-365.

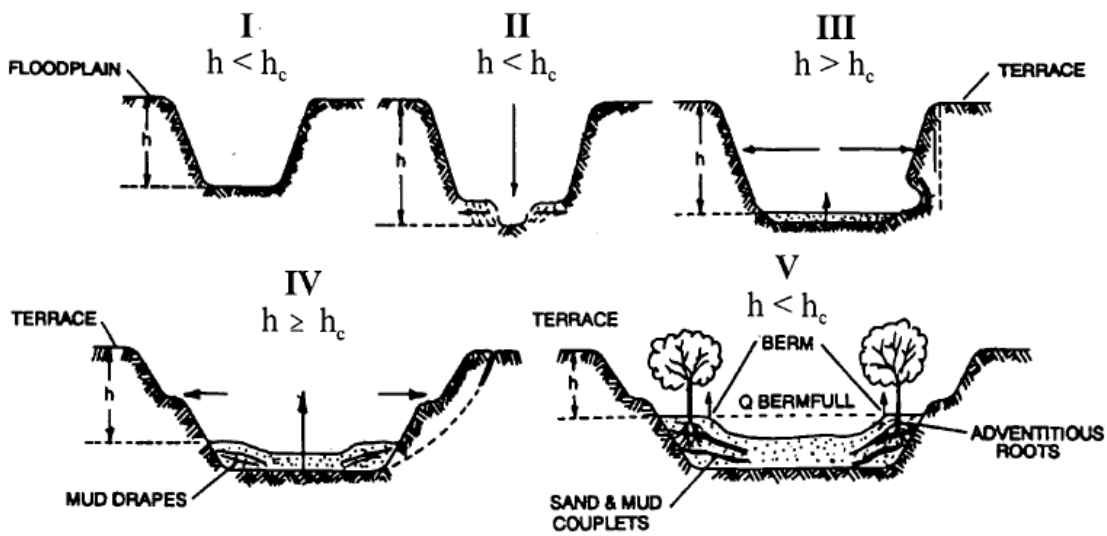

Figure 6 - Channel Changes Associated with Urbanization

After Incised Channel Evolution Sequence in Schumm et. al 1984

Channel incision (Stage II) and widening (Stages III and to a lesser degree, Stage IV) are due to a number of fundamental changes on the landscape. Connected impervious area and compaction of pervious surfaces increase the frequency and volume of bankfull discharges.[30] Increased drainage density (miles of stream length per square mile of watershed) also negatively impacts receiving stream channels.[31] Increased drainage density and hydraulic efficiency leads to an increase in the frequency and volume of bankfull discharges because the time of concentration is shortened. Flows from engineered pipes and channels are also often “sediment starved” and seek to replenish their sediment supply from the channel.

Encroachment of stream channels can also lead to an increase in stream slope, which leads to an increase in stream power. In addition, watershed sediment loads and sediment size (with size generally represented as the median bed and bank particle size, or d_{50}) decrease during urbanization.[32] This means that even if pre- and post-development stream power are the same, more erosion will occur in the post-development stage because the smaller particles are less resistant (provided they are non-cohesive).

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[30] Booth, D. B. and C. R. Jackson. 1997. Urbanization of Aquatic Systems: Degradation Thresholds, Storm Water Detection, and the Limits of Mitigation. Journal of the American Water Resources Association Vol. 33, No.5, pp. 1077-1089.

[31] May, C.W. 1998. Cumulative effects of urbanization on small streams in the Puget Sound Lowland ecoregion. Conference proceedings from Puget Sound Research '98 held March 12, 13 1998 in Seattle, WA;
Santa Clara Valley Urban Runoff Pollution Prevention Program. 2002. Hydromodification Management Plan Literature Review. 80 pp.

[32] Finkenbine, J.K., D.S. Atwater, and D.S. Mavinic. 2000. Stream health after urbanization. *J. Am. Water Resour. Assoc.* 36:1149-60;
Pizzuto, J.E. W.S. Hession, and M. McBride. 2000. Comparing gravel-bed rivers in paired urban and rural catchments of southeastern Pennsylvania. *Geology* 28:79-82.

As shown in Stages II and III, the channel deepens and widens to accommodate the increased stream power [33]and decrease in sediment load and sediment size. Channels may actually narrow as entrained sediment from incision is deposited laterally in the channel. After incised channels begin to migrate laterally (Stage III), bank erosion begins, which leads to general channel widening.[34] At this point, a majority of the sediment that leaves a drainage area comes from within the channel, as opposed to the background and construction related hillslope contribution. Stage IV is characterized by more aggradation and localized bank instability. Stage V represents a new quasi-equilibrium channel morphology in balance with the new flow and sediment supply regime. In other words, stream power is in balance with sediment load and sediment size.

The magnitude of the channel morphology changes discussed above varies along a stream network as well as with the age of development, slope, geology (sand-bedded channels may cycle through the evolution sequence in a matter of decades whereas clay-dominated channels may take much longer), watershed sediment load and size, type of urbanization, and land use history. It is also dependent on a channel's stage in the channel evolution sequence when urbanization occurs. Management strategies must take into account a channel's stage of adjustment and account for future changes in the evolution of channel form (Stein and Zaleski 2005). [35]

Traditional structural water quality BMPs (e.g. detention basins and other devices used to store volumes of runoff) unless they are highly engineered to provide adequate flow duration control, do not adequately protect receiving waters from accelerated channel bed and bank erosion, do not address post-development increases in runoff volume, and do not mitigate the decline in benthic macroinvertebrate communities in the receiving waters[36] suggest that structural BMPs are not as effective in protecting aquatic communities as a continuous riparian buffer of native vegetation. This is supported by the findings of Zucker and White[37], where instream biological metrics were correlated with the extent of forested buffers.

This General Permit requires dischargers to maintain pre-development drainage densities and times of concentration in order to protect channels and encourages dischargers to implement setbacks to reduce channel slope and velocity changes that can lead to aquatic habitat degradation.

There are a number of other approaches for modeling fluvial systems, including statistical and physical models and simpler stream power models.[38] The use of these models in California is described in Stein and Zaleski (2005).[39] Rather than prescribe a specific one-size-fits-all modeling method in this permit, the State Water Board intends to develop a stream power and channel evolution model-based framework to assess channels and develop a hierarchy of suitable analysis methods and management strategies. In time, this framework may become a State Water Board water quality control policy.

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[33] Hammer 1973 as cited in Delaware Department of Natural Resources (DDNR). 2004. Green Technology: The Delaware Urban Runoff Management Approach. Dover, DE. 117 pp;
Booth, D.B. 1990. Stream Channel Incision Following Drainage Basin Urbanization. *Water Resour. Bull.* 26:407-417.
[34] Trimble, S.W. 1997. Contribution of Stream Channel Erosion to Sediment Yield from an Urbanizing Watershed. *Science*: Vol. 278 (21), pp. 1442-1444.
[35] Stein, E.S. and S. Zaleski. 2005.Managing runoff to protect natural stream: the latest developments on investigation and management of hydromodification in California. Southern California Coastal Water Research Project Technical Report 475. 26 pp.
[36] Horner, R.R. 2006. Investigation of the Feasibility and Benefits of Low-Impact Site Design Practices (LID) for the San Diego Region. Available at: http://www.projectcleanwater.org/pdf/permit/case-study_lid.pdf.
[37] Delaware Department of Natural Resources (DDNR). 2004. Green Technology: The Delaware Urban Runoff Management Approach. Dover, DE. 117 pp.
[38] Finlayson, D.P. and D.R. Montgomery. 2003. Modeling large-scale fluvial erosion in geographic information systems. Geomorphology (53), pp. 147-164).
[39] Stein, E.S. and S. Zaleski. 2005.Managing runoff to protect natural stream: the latest developments on investigation and management of hydromodification in California. Southern California Coastal Water Research Project Technical Report 475. 26 pp.

Permit Linkage to Overbank and Extreme Flood Protection
Site design BMPs (e.g. rooftop and impervious disconnection, vegetated swales, setbacks and buffers) filter and settle out pollutants and provide for more infiltration than is possible for traditional centralized structural BMPs placed at the lowest point in a site. They provide source control for runoff and lead to a reduction in pollutant loads. When implemented, they also help reduce the magnitude and volume of larger, less frequent storm events (e.g., 10-yr, 24-hour storm and larger), thereby reducing the need for expensive flood control infrastructure. Nonstructural BMPs can also be a landscape amenity, instead of a large isolated structure requiring substantial area for ancillary access, buffering, screening and maintenance facilities.[25] The multiple benefits of using non-structural benefits will be critically important as the state's population increases and imposes strains upon our existing water resources.

Maintaining predevelopment drainage densities and times of concentration will help reduce post-development peak flows and volumes in areas not covered under a municipal permit. The most effective way to preserve drainage areas and maximize time of concentration is to implement landform grading, incorporate site design BMPs and implement distributed structural BMPs (e.g., bioretention cells, rain gardens, rain cisterns).

M. Storm Water Pollution Prevention Plans

USEPA's Construction General Permit requires that qualified personnel conduct inspections. USEPA defines qualified personnel as "a person knowledgeable in the principles and practice of erosion and sediment controls who possesses the skills to assess conditions at the construction site that could impact storm water quality and to assess the effectiveness of any sediment and erosion control measures selected to control the quality of storm water discharges from the construction activity."[40] USEPA also suggests that qualified personnel prepare SWPPPs and points to numerous states that require certified professionals to be on construction sites at all times. States that currently have certification programs are Washington, Georgia, Florida, Delaware, Maryland, and New Jersey. The Permit 99-08-DWQ did not require that qualified personnel prepare SWPPPs or conduct inspections. However, to ensure that water quality is being protected, this General Permit requires that all SWPPPs be written, amended, and certified by a Qualified SWPPP Developer. A Qualified SWPPP Developer must possess one of the eight certifications and or registrations specified in this General Permit and effective two years after the adoption date of this General Permit, must have attended a State Water Board-sponsored or approved Qualified SWPPP Developer training course. Table 9 provides an overview of the criteria used in determining qualified certification titles for a QSD and QSP.

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40 US Environmental Protection Agency. Stormwater Pollution Prevention Plans for Construction Activities. <http://cfpub.epa.gov/npdes/stormwater/swppp.cfm> and <http://www.epa.gov/npdes/pubs/sw_swppp_guide.pdf>.

Table 9 - Qualified SWPPP Developer/ Qualified SWPPP Practitioner Certification Criteria

Certification/ Title	Registered By	QSD/QSP	Certification Criteria
Professional Civil Engineer	California	Both	1. Approval Process 2. Code of Ethics 3. Accountability 4. Pre-requisites
Professional Geologist or Engineering Geologist	California	Both	1. Approval Process 2. Code of Ethics 3. Accountability 4. Pre-requisites
Landscape Architect	California	Both	1. Approval Process 2. Code of Ethics 3. Accountability 4. Pre-requisites
Professional Hydrologist	American Institute of Hydrology	Both	1. Approval Process 2. Code of Ethics 3. Accountability 4. Pre-requisites
Certified Professional in Erosion and Sediment Control™ (CPESC)	Enviro Cert International Inc.	Both	1. Approval Process 2. Code of Ethics 3. Accountability 4. Pre-requisites 5. Continuing Education
Certified Inspector of Sediment and Erosion Control™ (CISEC)	Certified Inspector of Sediment and Erosion Control, Inc.	QSP	1. Approval Process 2. Code of Ethics 3. Accountability 4. Pre-requisites 5. Continuing Education
Certified Erosion, Sediment and Storm Water Inspector™ (CESSWI)	Enviro Cert International Inc.	QSP	1. Approval Process 2. Code of Ethics 3. Accountability 4. Pre-requisites 5. Continuing Education
Certified Professional in Storm Water Quality™ (CPSWQ)	Enviro Cert International Inc.	Both	1. Approval Process 2. Code of Ethics 3. Accountability 4. Pre-requisites 5. Continuing Education

The previous versions of the General Permit required development and implementation of a SWPPP as the primary compliance mechanism. The SWPPP has two major objectives: (1) to help identify the sources of sediment and other pollutants that affect the quality of storm water discharges; and (2) to describe and ensure the implementation of BMPs to reduce or eliminate sediment and other pollutants in storm water and non-storm water discharges. The SWPPP must include BMPs that address source control, BMPs that address pollutant control, and BMPs that address treatment control.

This General Permit shifts some of the measures that were covered by this general requirement to specific permit requirements, each individually enforceable as a permit term. This General Permit emphasizes the use of appropriately selected, correctly installed and maintained pollution reduction BMPs. This approach provides the flexibility necessary to establish BMPs that can effectively address source control of pollutants during changing construction activities. These specific requirements also improve both the clarity and the enforceability of the General Permit so that the dischargers understand, and the public can determine whether the discharges are in compliance with, permit requirements.

The SWPPP must be implemented at the appropriate level to protect water quality at all times throughout the life of the project. The SWPPP must remain on the site during construction activities, commencing with the initial mobilization and ending with the termination of coverage under the General Permit. For LUPs the discharger shall make the SWPPP available at the construction site during working hours while construction is occurring and shall be made available upon request by a State or Municipal inspector. When the original SWPPP is retained by a crewmember in a construction vehicle and is not currently at the construction site, current copies of the BMPs and map/drawing will be left with the field crew and the original SWPPP shall be made available via a request by radio or telephone. Once construction activities are complete, until stabilization is achieved, the SWPPP shall be available from the SWPPP contact listed in the PRDs

A SWPPP must be appropriate for the type and complexity of a project and will be developed and implemented to address project specific conditions. Some projects may have similarities or complexities, yet each project is unique in its progressive state that requires specific description and selection of BMPs needed to address all possible generated pollutants

N. Regional Water Board Authorities

Because this General Permit will be issued to thousands of construction sites across the State, the Regional Water Boards retain discretionary authority over certain issues that may arise from the discharges in their respective regions. This General Permit does not grant the Regional Water Boards any authority they do not otherwise have; rather, it merely emphasizes that the Regional Water Boards can take specific actions related to this General Permit. For example, the Regional Water Boards will be enforcing this General Permit and may need to adjust some requirements for a discharger based on the discharger's compliance history.

Linda S. Adams
Secretary for Environmental Protection

021470

State Water Resources Control Board

Arnold Schwarzenegger
Governor

Division of Water Quality
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NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)
GENERAL PERMIT FOR
STORM WATER DISCHARGES
ASSOCIATED WITH CONSTRUCTION AND LAND DISTURBANCE
ACTIVITIES

ORDER NO. 2009-0009-DWQ
NPDES NO**. CAS000002**

This Order was adopted by the State Water Resources Control Board on:	**September 2, 2009**
This Order shall become effective on:	**July 1, 2010**
This Order shall expire on:	**September 2, 2014**

IT IS HEREBY ORDERED, that this Order supersedes Order No. 99-08-DWQ except for enforcement purposes. The Discharger shall comply with the requirements in this Order to meet the provisions contained in Division 7 of the California Water Code (commencing with section 13000) and regulations adopted thereunder, and the provisions of the federal Clean Water Act and regulations and guidelines adopted thereunder.

I, Jeanine Townsend, Clerk to the Board, do hereby certify that this Order with all attachments is a full, true, and correct copy of an Order adopted by the State Water Resources Control Board, on September 2, 2009.

AYE: Vice Chair Frances Spivy-Weber
Board Member Arthur G. Baggett, Jr.
Board Member Tam M. Doduc

NAY: Chairman Charles R. Hoppin

ABSENT: None

ABSTAIN: None

Jeanine Townsend

Jeanine Townsend
Clerk to the Board

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STATE WATER RESOURCES CONTROL BOARD
ORDER NO. 2009-0009-DWQ
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM
GENERAL PERMIT NO. CAS000002

WASTE DISCHARGE REQUIREMENTS
FOR
DISCHARGES OF STORM WATER RUNOFF ASSOCIATED WITH CONSTRUCTION AND LAND DISTURBANCE ACTIVITIES

I. FINDINGS

A. General Findings

The State Water Resources Control Board (State Water Board) finds that:

1. The federal Clean Water Act (CWA) prohibits certain discharges of storm water containing pollutants except in compliance with a National Pollutant Discharge Elimination System (NPDES) permit (Title 33 United States Code (U.S.C.) §§ 1311 and 1342(p); also referred to as Clean Water Act (CWA) §§ 301 and 402(p)). The U.S. Environmental Protection Agency (U.S. EPA) promulgates federal regulations to implement the CWA's mandate to control pollutants in storm water runoff discharges. (Title 40 Code of Federal Regulations (C.F.R.) Parts 122, 123, and 124). The federal statutes and regulations require discharges to surface waters comprised of storm water associated with construction activity, including demolition, clearing, grading, and excavation, and other land disturbance activities (except operations that result in disturbance of less than one acre of total land area and which are not part of a larger common plan of development or sale), to obtain coverage under an NPDES permit. The NPDES permit must require implementation of Best Available Technology Economically Achievable (BAT) and Best Conventional Pollutant Control Technology (BCT) to reduce or eliminate pollutants in storm water runoff. The NPDES permit must also include additional requirements necessary to implement applicable water quality standards.

2. This General Permit authorizes discharges of storm water associated with construction activity so long as the dischargers comply with all requirements, provisions, limitations and prohibitions in the permit. In addition, this General Permit regulates the discharges of storm water associated with construction activities from all Linear Underground/Overhead Projects resulting in the disturbance of greater than or equal to one acre (Attachment A).

3. This General Permit regulates discharges of pollutants in storm water associated with construction activity (storm water discharges) to waters of the United States from construction sites that disturb one or more acres of land surface, or that are part of a common plan of development or sale that disturbs more than one acre of land surface.

4. This General Permit does not preempt or supersede the authority of local storm water management agencies to prohibit, restrict, or control storm water discharges to municipal separate storm sewer systems or other watercourses within their jurisdictions.

5. This action to adopt a general NPDES permit is exempt from the provisions of Chapter 3 of the California Environmental Quality Act (CEQA) (Public Resources Code Section 21100, et seq.), pursuant to Section 13389 of the California Water Code.

6. Pursuant to 40 C.F.R. § 131.12 and State Water Board Resolution No. 68-16,[1] which incorporates the requirements of § 131.12 where applicable, the State Water Board finds that discharges in compliance with this General Permit will not result in the lowering of water quality standards, and are therefore consistent with those provisions. Compliance with this General Permit will result in improvements in water quality.

7. This General Permit serves as an NPDES permit in compliance with CWA § 402 and will take effect on July 1, 2010 by the State Water Board provided the Regional Administrator of the U.S. EPA has no objection. If the U.S. EPA Regional Administrator objects to its issuance, the General Permit will not become effective until such objection is withdrawn.

8. Following adoption and upon the effective date of this General Permit, the Regional Water Quality Control Boards (Regional Water Boards) shall enforce the provisions herein.

9. Regional Water Boards establish water quality standards in Basin Plans. The State Water Board establishes water quality standards in various statewide plans, including the California Ocean Plan. U.S. EPA establishes water quality standards in the National Toxic Rule (NTR) and the California Toxic Rule (CTR).

[1] Resolution No. 68-16 generally requires that existing water quality be maintained unless degradation is justified based on specific findings.

10. This General Permit does not authorize discharges of fill or dredged material regulated by the U.S. Army Corps of Engineers under CWA § 404 and does not constitute a waiver of water quality certification under CWA § 401.

11. The primary storm water pollutant at construction sites is excess sediment. Excess sediment can cloud the water, which reduces the amount of sunlight reaching aquatic plants, clog fish gills, smother aquatic habitat and spawning areas, and impede navigation in our waterways. Sediment also transports other pollutants such as nutrients, metals, and oils and greases.

12. Construction activities can impact a construction site's runoff sediment supply and transport characteristics. These modifications, which can occur both during and after the construction phase, are a significant cause of degradation of the beneficial uses established for water bodies in California. Dischargers can avoid these effects through better construction site design and activity practices.

13. This General Permit recognizes four distinct phases of construction activities. The phases are Grading and Land Development Phase, Streets and Utilities Phase, Vertical Construction Phase, and Final Landscaping and Site Stabilization Phase. Each phase has activities that can result in different water quality effects from different water quality pollutants. This General Permit also recognizes inactive construction as a category of construction site type.

14. Compliance with any specific limits or requirements contained in this General Permit does not constitute compliance with any other applicable requirements.

15. Following public notice in accordance with State and Federal laws and regulations, the State Water Board heard and considered all comments and testimony in a public hearing on 06/03/2009. The State Water Board has prepared written responses to all significant comments.

16. Construction activities obtaining coverage under the General Permit may have multiple discharges subject to requirements that are specific to general, linear, and/or active treatment system discharge types.

17. The State Water Board may reopen the permit if the U.S. EPA adopts a final effluent limitation guideline for construction activities.

B. Activities Covered Under the General Permit

18. Any construction or demolition activity, including, but not limited to, clearing, grading, grubbing, or excavation, or any other activity that results in a land disturbance of equal to or greater than one acre.

19. Construction activity that results in land surface disturbances of less than one acre if the construction activity is part of a larger common plan of development or the sale of one or more acres of disturbed land surface.

20. Construction activity related to residential, commercial, or industrial development on lands currently used for agriculture including, but not limited to, the construction of buildings related to agriculture that are considered industrial pursuant to U.S. EPA regulations, such as dairy barns or food processing facilities.

21. Construction activity associated with Linear Underground/Overhead Utility Projects (LUPs) including, but not limited to, those activities necessary for the installation of underground and overhead linear facilities (e.g., conduits, substructures, pipelines, towers, poles, cables, wires, connectors, switching, regulating and transforming equipment and associated ancillary facilities) and include, but are not limited to, underground utility mark-out, potholing, concrete and asphalt cutting and removal, trenching, excavation, boring and drilling, access road and pole/tower pad and cable/wire pull station, substation construction, substructure installation, construction of tower footings and/or foundations, pole and tower installations, pipeline installations, welding, concrete and/or pavement repair or replacement, and stockpile/borrow locations.

22. Discharges of sediment from construction activities associated with oil and gas exploration, production, processing, or treatment operations or transmission facilities.[2]

23. Storm water discharges from dredge spoil placement that occur outside of U.S. Army Corps of Engineers jurisdiction (upland sites) and that disturb one or more acres of land surface from construction activity are covered by this General Permit. Construction sites that intend to disturb one or more acres of land within the jurisdictional boundaries of a CWA § 404 permit should contact the appropriate Regional Water Board to determine whether this permit applies to the site.

[2] Pursuant to the Ninth Circuit Court of Appeals' decision in *NRDC v. EPA* (9th Cir. 2008) 526 F.3d 591, and subsequent denial of the U.S. EPA's petition for reconsideration in November 2008, oil and gas construction activities discharging storm water contaminated only with sediment are no longer exempt from the NPDES program.

C. Activities Not Covered Under the General Permit

24. Routine maintenance to maintain original line and grade, hydraulic capacity, or original purpose of the facility.

25. Disturbances to land surfaces solely related to agricultural operations such as disking, harrowing, terracing and leveling, and soil preparation.

26. Discharges of storm water from areas on tribal lands; construction on tribal lands is regulated by a federal permit.

27. Construction activity and land disturbance involving discharges of storm water within the Lake Tahoe Hydrologic Unit. The Lahontan Regional Water Board has adopted its own permit to regulate storm water discharges from construction activity in the Lake Tahoe Hydrologic Unit (Regional Water Board 6SLT). Owners of construction sites in this watershed must apply for the Lahontan Regional Water Board permit rather than the statewide Construction General Permit.

28. Construction activity that disturbs less than one acre of land surface, and that is not part of a larger common plan of development or the sale of one or more acres of disturbed land surface.

29. Construction activity covered by an individual NPDES Permit for storm water discharges.

30. Discharges from small (1 to 5 acre) construction activities with an approved Rainfall Erosivity Waiver authorized by U.S. EPA Phase II regulations certifying to the State Board that small construction activity will occur only when the Rainfall Erosivity Factor is less than 5 (“R” in the Revised Universal Soil Loss Equation).

31. Landfill construction activity that is subject to the Industrial General Permit.

32. Construction activity that discharges to Combined Sewer Systems.

33. Conveyances that discharge storm water runoff combined with municipal sewage.

34. Discharges of storm water identified in CWA § 402(*l*)(2), 33 U.S.C. § 1342(*l*)(2).

35. Discharges occurring in basins that are not tributary or hydrologically connected to waters of the United States (for more information contact your Regional Water Board).

D. Obtaining and Modifying General Permit Coverage

36. This General Permit requires all dischargers to electronically file all Permit Registration Documents (PRDs), Notices of Termination (NOT), changes of information, annual reporting, and other compliance documents required by this General Permit through the State Water Board's Storm water Multi-Application and Report Tracking System (SMARTS) website.

37. Any information provided to the Regional Water Board shall comply with the Homeland Security Act and any other federal law that concerns security in the United States; any information that does not comply should not be submitted.

38. This General Permit grants an exception from the Risk Determination requirements for existing sites covered under Water Quality Orders No. 99-08-DWQ, and No. 2003-0007-DWQ. For certain sites, adding additional requirements may not be cost effective. Construction sites covered under Water Quality Order No. 99-08-DWQ shall obtain permit coverage at the Risk Level 1. LUPs covered under Water Quality Order No. 2003-0007-DWQ shall obtain permit coverage as a Type 1 LUP. The Regional Water Boards have the authority to require Risk Determination to be performed on sites currently covered under Water Quality Orders No. 99-08-DWQ and No. 2003-0007-DWQ where they deem it necessary. The State Water Board finds that there are two circumstances when it may be appropriate for the Regional Water Boards to require a discharger that had filed an NOI under State Water Board Order No. 99-08-DWQ to recalculate the site's risk level. These circumstances are: (1) when the discharger has a demonstrated history of noncompliance with State Water Board Order No. 99-08-DWQ or; (2) when the discharger's site poses a significant risk of causing or contributing to an exceedance of a water quality standard without the implementation of the additional Risk Level 2 or 3 requirements.

E. Prohibitions

39. All discharges are prohibited except for the storm water and non-storm water discharges specifically authorized by this General Permit or another NPDES permit. Non-storm water discharges include a wide variety of sources, including improper dumping, spills, or leakage from storage tanks or transfer areas. Non-storm water discharges may

contribute significant pollutant loads to receiving waters. Measures to control spills, leakage, and dumping, and to prevent illicit connections during construction must be addressed through structural as well as non-structural Best Management Practices (BMPs)[3]. The State Water Board recognizes, however, that certain non-storm water discharges may be necessary for the completion of construction.

40. This General Permit prohibits all discharges which contain a hazardous substance in excess of reportable quantities established in 40 C.F.R. §§ 117.3 and 302.4, unless a separate NPDES Permit has been issued to regulate those discharges.

41. This General Permit incorporates discharge prohibitions contained in water quality control plans, as implemented by the State Water Board and the nine Regional Water Boards.

42. Pursuant to the Ocean Plan, discharges to Areas of Special Biological Significance (ASBS) are prohibited unless covered by an exception that the State Water Board has approved.

43. This General Permit prohibits the discharge of any debris[4] from construction sites. Plastic and other trash materials can cause negative impacts to receiving water beneficial uses. The State Water Board encourages the use of more environmentally safe, biodegradable materials on construction sites to minimize the potential risk to water quality.

F. Training

44. In order to improve compliance with and to maintain consistent enforcement of this General Permit, all dischargers are required to appoint two positions - the Qualified SWPPP Developer (QSD) and the Qualified SWPPP Practitioner (QSP) - who must obtain appropriate training. Together with the key stakeholders, the State and Regional Water Boards are leading the development of this curriculum through a collaborative organization called The Construction General Permit (CGP) Training Team.

45. The Professional Engineers Act (Bus. & Prof. Code section 6700, et seq.) requires that all engineering work must be performed by a California licensed engineer.

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[3] BMPs are scheduling of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the discharge of pollutants to waters of the United States. BMPs also include treatment requirements, operating procedures, and practice to control site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage.

[4] Litter, rubble, discarded refuse, and remains of destroyed inorganic anthropogenic waste.

G. Determining and Reducing Risk

46. The risk of accelerated erosion and sedimentation from wind and water depends on a number of factors, including proximity to receiving water bodies, climate, topography, and soil type.

47. This General Permit requires dischargers to assess the risk level of a site based on both sediment transport and receiving water risk. This General Permit contains requirements for Risk Levels 1, 2 and 3, and LUP Risk Type 1, 2, and 3 (Attachment A). Risk levels are established by determining two factors: first, calculating the site's sediment risk; and second, receiving water risk during periods of soil exposure (i.e. grading and site stabilization). Both factors are used to determine the site-specific Risk Level(s). LUPs can be determined to be Type 1 based on the flowchart in Attachment A.1.

48. Although this General Permit does not mandate specific setback distances, dischargers are encouraged to set back their construction activities from streams and wetlands whenever feasible to reduce the risk of impacting water quality (e.g., natural stream stability and habitat function). Because there is a reduced risk to receiving waters when setbacks are used, this General Permit gives credit to setbacks in the risk determination and post-construction storm water performance standards. The risk calculation and runoff reduction mechanisms in this General Permit are expected to facilitate compliance with any Regional Water Board and local agency setback requirements, and to encourage voluntary setbacks wherever practicable.

49. Rain events can occur at any time of the year in California. Therefore, a Rain Event Action Plan (REAP) is necessary for Risk Level 2 and 3 traditional construction projects (LUPs exempt) to ensure that active construction sites have adequate erosion and sediment controls implemented prior to the onset of a storm event, even if construction is planned only during the dry season.

50. Soil particles smaller than 0.02 millimeters (mm) (i.e., finer than medium silt) do not settle easily using conventional measures for sediment control (i.e., sediment basins). Given their long settling time, dislodging these soils results in a significant risk that fine particles will be released into surface waters and cause unacceptable downstream impacts. If operated correctly, an Active Treatment System (ATS[5]) can prevent or reduce the release of fine particles from construction sites.

[5] An ATS is a treatment system that employs chemical coagulation, chemical flocculation, or electro coagulation in order to reduce turbidity caused by fine suspended sediment.

Use of an ATS can effectively reduce a site's risk of impacting receiving waters.

51. Dischargers located in a watershed area where a Total Maximum Daily Load (TMDL) has been adopted or approved by the Regional Water Board or U.S. EPA may be required by a separate Regional Water Board action to implement additional BMPs, conduct additional monitoring activities, and/or comply with an applicable waste load allocation and implementation schedule. Such dischargers may also be required to obtain an individual Regional Water Board permit specific to the area.

H. Effluent Standards

52. The State Water Board convened a blue ribbon panel of storm water experts that submitted a report entitled, “The Feasibility of Numeric Effluent Limits Applicable to Discharges of Storm Water Associated with Municipal, Industrial and Construction Activities,” dated June 19, 2006. The panel concluded that numeric limits or action levels are technically feasible to control construction storm water discharges, provided that certain conditions are considered. The panel also concluded that numeric effluent limitations (NELs) are feasible for discharges from construction sites that utilize an ATS. The State Water Board has incorporated the expert panel’s suggestions into this General Permit, which includes both numeric action levels (NALs) and NELs for pH and turbidity, and special numeric limits for ATS discharges.

Numeric Effluent Limitations

53. Discharges of storm water from construction activities may become contaminated from alkaline construction materials resulting in high pH (greater than pH 7). Alkaline construction materials include, but are not limited to, hydrated lime, concrete, mortar, cement kiln dust (CKD), Portland cement treated base (CTB), fly ash, recycled concrete, and masonry work. This General Permit includes an NEL for pH (6.0-9.0) that applies only at sites that exhibit a "high risk of high pH discharge." A "high risk of high pH discharge" can occur during the complete utilities phase, the complete vertical build phase, and any portion of any phase where significant amounts of materials are placed directly on the land at the site in a manner that could result in significant alterations to the background pH of any discharges.

54. For Risk Level 3 discharges, this General Permit establishes technology-based, numeric effluent limitations (NELs) for turbidity of 500 NTU. Exceedances of the turbidity NEL constitutes a violation of this General Permit.

55. This General Permit establishes a 5 year, 24 hour (expressed in inches of rainfall) Compliance Storm Event exemption from the technology-based NELs for Risk Level 3 dischargers.

Determining Compliance with Numeric Limitations

56. This General Permit sets a pH NAL of 6.5 to 8.5, and a turbidity NAL of 250 NTU. The purpose of the NAL and its associated monitoring requirement is to provide operational information regarding the performance of the measures used at the site to minimize the discharge of pollutants and to protect beneficial uses and receiving waters from the adverse effects of construction-related storm water discharges. The NALs in this General Permit for pH and turbidity are not directly enforceable and do not constitute NELs.

57. This General Permit requires dischargers with NAL exceedances to immediately implement additional BMPs and revise their Storm Water Pollution Prevention Plans (SWPPPs) accordingly to either prevent pollutants and authorized non-storm water discharges from contaminating storm water, or to substantially reduce the pollutants to levels consistently below the NALs. NAL exceedances are reported in the State Water Boards SMARTS system, and the discharger is required to provide an NAL Exceedance Report when requested by a Regional Water Board.

58. If run-on is caused by a forest fire or any other natural disaster, then NELs do not apply.

59. Exceedances of the NELs are a violation of this Permit. This General Permit requires dischargers with NEL exceedances to implement additional monitoring, BMPs, and revise their SWPPPs accordingly. Dischargers are required to notify the State and Regional Water Boards of the violation through the State Water Boards SMARTs system, and provide an NEL Violation Report sharing additional information concerning the NEL exceedance.

I. Receiving Water Limitations

60. This General Permit requires all enrolled dischargers to determine the receiving waters potentially affected by their discharges and to comply with all applicable water quality standards, including any more stringent standards applicable to a water body.

J. Sampling, Monitoring, Reporting and Record Keeping

61. Visual monitoring of storm water and non-storm water discharges is required for all sites subject to this General Permit.

62. Records of all visual monitoring inspections are required to remain on-site during the construction period and for a minimum of three years.

63. For all Risk Level 3 and Risk Level 2 sites, this General Permit requires effluent monitoring for pH and turbidity. Sampling, analysis and monitoring requirements for effluent monitoring for pH and turbidity are contained in this General Permit.

64. Risk Level 3 sites in violation of the Numeric Effluent Limitations contained in this General Permit and with direct discharges to receiving water are required to conduct receiving water monitoring.

65. For Risk Level 3 sites larger than 30 acres and with direct discharges to receiving waters, this General Permit requires bioassessment sampling before and after site completion to determine if significant degradation to the receiving water's biota has occurred. Bioassessment sampling guidelines are contained in this General Permit.

66. A summary and evaluation of the sampling and analysis results will be submitted in the Annual Reports.

67. This General Permit contains sampling, analysis and monitoring requirements for non-visible pollutants at all sites subject to this General Permit.

68. Compliance with the General Permit relies upon dischargers to electronically self-report any discharge violations and to comply with any Regional Water Board enforcement actions.

69. This General Permit requires that all dischargers maintain a paper or electronic copy of all required records for three years from the date generated or date submitted, whichever is last. These records must be available at the construction site until construction is completed. For LUPs, these documents may be retained in a crew member's vehicle and made available upon request.

K. Active Treatment System (ATS) Requirements

70. Active treatment systems add chemicals to facilitate flocculation, coagulation and filtration of suspended sediment particles. The uncontrolled release of these chemicals to the environment can negatively affect the beneficial uses of receiving waters and/or degrade water quality (e.g., acute and chronic toxicity). Additionally, the batch storage and treatment of storm water through an ATS' can potentially

cause physical impacts on receiving waters if storage volume is inadequate or due to sudden releases of the ATS batches and improperly designed outfalls.

71. If designed, operated and maintained properly an ATS can achieve very high removal rates of suspended sediment (measured as turbidity), albeit at sometimes significantly higher costs than traditional erosion/sediment control practices. As a result, this General Permit establishes NELs consistent with the expected level of typical ATS performance.

72. This General Permit requires discharges of storm water associated with construction activity that undergo active treatment to comply with special operational and effluent limitations to ensure that these discharges do not adversely affect the beneficial uses of the receiving waters or cause degradation of their water quality.

73. For ATS discharges, this General Permit establishes technology-based NELs for turbidity.

74. This General Permit establishes a 10 year, 24 hour (expressed in inches of rainfall) Compliance Storm Event exemption from the technology-based numeric effluent limitations for ATS discharges. Exceedances of the ATS turbidity NEL constitutes a violation of this General Permit.

L. Post-Construction Requirements

75. This General Permit includes performance standards for post-construction that are consistent with State Water Board Resolution No. 2005-0006, "Resolution Adopting the Concept of Sustainability as a Core Value for State Water Board Programs and Directing Its Incorporation," and 2008-0030, “Requiring Sustainable Water Resources Management.“ The requirement for all construction sites to match pre-project hydrology will help ensure that the physical and biological integrity of aquatic ecosystems are sustained. This “runoff reduction” approach is analogous in principle to Low Impact Development (LID) and will serve to protect related watersheds and waterbodies from both hydrologic-based and pollution impacts associated with the post-construction landscape.

76. LUP projects are not subject to post-construction requirements due to the nature of their construction to return project sites to pre-construction conditions.

M. Storm Water Pollution Prevention Plan Requirements

77. This General Permit requires the development of a site-specific SWPPP. The SWPPP must include the information needed to demonstrate compliance with all requirements of this General Permit, and must be kept on the construction site and be available for review. The discharger shall ensure that a QSD develops the SWPPP.

78. To ensure proper site oversight, this General Permit requires a Qualified SWPPP Practitioner to oversee implementation of the BMPs required to comply with this General Permit.

N. Regional Water Board Authorities

79. Regional Water Boards are responsible for implementation and enforcement of this General Permit. A general approach to permitting is not always suitable for every construction site and environmental circumstances. Therefore, this General Permit recognizes that Regional Water Boards must have some flexibility and authority to alter, approve, exempt, or rescind permit authority granted under this General Permit in order to protect the beneficial uses of our receiving waters and prevent degradation of water quality.

IT IS HEREBY ORDERED that all dischargers subject to this General Permit shall comply with the following conditions and requirements (including all conditions and requirements as set forth in Attachments A, B, C, D, E and F)[6]:

II. CONDITIONS FOR PERMIT COVERAGE

A. Linear Underground/Overhead Projects (LUPs)

1. Linear Underground/Overhead Projects (LUPs) include, but are not limited to, any conveyance, pipe, or pipeline for the transportation of any gaseous, liquid (including water and wastewater for domestic municipal services), liquescent, or slurry substance; any cable line or wire for the transmission of electrical energy; any cable line or wire for communications (e.g. telephone, telegraph, radio or television messages); and associated ancillary facilities. Construction activities associated with LUPs include, but are not limited to, (a) those activities necessary for the installation of underground and overhead linear facilities (e.g., conduits, substructures, pipelines, towers, poles, cables, wires, connectors, switching, regulating and transforming equipment, and associated ancillary facilities); and include, but are not limited to, (b) underground utility mark-out, potholing, concrete and asphalt cutting and removal, trenching, excavation, boring and drilling, access road and pole/tower pad and cable/wire pull station, substation construction, substructure installation, construction of tower footings and/or foundations, pole and tower installations, pipeline installations, welding, concrete and/ or pavement repair or replacement, and stockpile/borrow locations.

2. The utility company, municipality, or other public or private company or agency that owns or operates the linear underground/overhead project is responsible for obtaining coverage under the General Permit where the construction of pipelines, utility lines, fiber-optic cables, or other linear underground/overhead projects will occur across several properties unless the LUP construction activities are covered under another construction storm water permit.

3. Only LUPs shall comply with the conditions and requirements in Attachment A, A.1 & A.2 of this Order. The balance of this Order is not applicable to LUPs except as indicated in Attachment A.

B. Obtaining Permit Coverage Traditional Construction Sites

[6] These attachments are part of the General Permit itself and are not separate documents that are capable of being updated independently by the State Water Board.

1. The Legally Responsible Person (LRP) (see Special Provisions, Electronic Signature and Certification Requirements, Section IV.I.1) must obtain coverage under this General Permit.

2. To obtain coverage, the LRP must electronically file Permit Registration Documents (PRDs) prior to the commencement of construction activity. Failure to obtain coverage under this General Permit for storm water discharges to waters of the United States is a violation of the CWA and the California Water Code.

3. PRDs shall consist of:

   a. Notice of Intent (NOI)
   b. Risk Assessment (Section VIII)
   c. Site Map
   d. Storm Water Pollution Prevention Plan (Section XIV)
   e. Annual Fee
   f. Signed Certification Statement

   Any information provided to the Regional Water Board shall comply with the Homeland Security Act and any other federal law that concerns security in the United States; any information that does not comply should not be submitted.

   Attachment B contains additional PRD information. Dischargers must electronically file the PRDs, and mail the appropriate annual fee to the State Water Board.

4. This permit is effective on July 1, 2010.

   a. **Dischargers Obtaining Coverage On or After July 1, 2010:** All dischargers requiring coverage on or after July 1, 2010, shall electronically file their PRDs prior to the commencement of construction activities, and mail the appropriate annual fee no later than seven days prior to the commencement of construction activities. Permit coverage shall not commence until the PRDs and the annual fee are received by the State Water Board, and a WDID number is assigned and sent by SMARTS.

   b. **Dischargers Covered Under 99-08-DWQ and 2003-0007-DWQ:** Existing dischargers subject to State Water Board Order No. 99-08-DWQ (existing dischargers) will continue coverage under 99-08-DWQ until July 1, 2010. After July 1, 2010, all NOIs subject to State Water Board Order No. 99-08-DWQ will be terminated. Existing dischargers shall electronically file their PRDs no later than

July 1, 2010. If an existing discharger's site acreage subject to the annual fee has changed, it shall mail a revised annual fee no less than seven days after receiving the revised annual fee notification, **or else lose permit coverage**. All existing dischargers shall be exempt from the risk determination requirements in Section VIII of this General Permit until two years after permit adoption. All existing dischargers are therefore subject to Risk Level 1 requirements regardless of their site's sediment and receiving water risks. However, a Regional Board retains the authority to require an existing discharger to comply with the Section VIII risk determination requirements.

5. The discharger is only considered covered by this General Permit upon receipt of a Waste Discharger Identification (WDID) number assigned and sent by the State Water Board Storm water Multi-Application and Report Tracking System (SMARTS). In order to demonstrate compliance with this General Permit, the discharger must obtain a WDID number and must present documentation of a valid WDID upon demand.

6. During the period this permit is subject to review by the U.S. EPA, the prior permit (State Water Board Order No. 99-08-DWQ) remains in effect. Existing dischargers under the prior permit will continue to have coverage under State Water Board Order No. 99-08-DWQ until this General Permit takes effect on July 1, 2010. Dischargers who complete their projects and electronically file an NOT prior to July 1, 2010, are not required to obtain coverage under this General Permit.

7. Small Construction Rainfall Erosivity Waiver

   EPA's Small Construction Erosivity Waiver applies to sites between one and five acres demonstrating that there are no adverse water quality impacts.

   Dischargers eligible for a Rainfall Erosivity Waiver based on low erosivity potential shall complete the electronic Notice of Intent (NOI) and Sediment Risk form through the State Water Board's SMARTS system, certifying that the construction activity will take place during a period when the value of the rainfall erosivity factor is less than five. Where the LRP changes or another LRP is added during construction, the new LRP must also submit a waiver certification through the SMARTS system.

   If a small construction site continues beyond the projected completion date given on the waiver certification, the LRP shall recalculate the rainfall erosivity factor for the new project duration and submit this

information through the SMARTS system. If the new R factor is below five (5), the discharger shall update through SMARTS all applicable information on the waiver certification and retain a copy of the revised waiver onsite. The LRP shall submit the new waiver certification 30 days prior to the projected completion date listed on the original waiver form to assure exemption from permitting requirements is uninterrupted. If the new R factor is five (5) or above, the LRP shall be required to apply for coverage under this Order.

8. In the case of a public emergency that requires immediate construction activities, a discharger shall submit a brief description of the emergency construction activity within five days of the onset of construction, and then shall submit all PRDs within thirty days.

C. Revising Permit Coverage for Change of Acreage or New Ownership

1. The discharger may reduce or increase the total acreage covered under this General Permit when a portion of the site is complete and/or conditions for termination of coverage have been met (See Section II.D Conditions for Termination of Coverage); when ownership of a portion of the site is sold to a different entity; or when new acreage, subject to this General Permit, is added to the site.

2. Within 30 days of a reduction or increase in total disturbed acreage, the discharger shall electronically file revisions to the PRDs that include:

   a. A revised NOI indicating the new project size;

   b. A revised site map showing the acreage of the site completed, acreage currently under construction, acreage sold/transferred or added, and acreage currently stabilized in accordance with the Conditions for Termination of Coverage in Section II.D below.

   c. SWPPP revisions, as appropriate; and

   d. Certification that any new landowners have been notified of applicable requirements to obtain General Permit coverage. The certification shall include the name, address, telephone number, and e-mail address of the new landowner.

   e. If the project acreage has increased, dischargers shall mail payment of revised annual fees within 14 days of receiving the revised annual fee notification.

3. The discharger shall continue coverage under the General Permit for any parcel that has not achieved "Final Stabilization" as defined in Section II.D.

4. When an LRP owns property with active General Permit coverage, and the LRP sells the property, or a parcel thereof, to another person, that person shall become an LRP with respect to whatever parcel was sold. The existing LRP shall inform the new LRP of the General Permit's requirements. In order for the new LRP to continue the construction activity on its parcel of property, the new LRP, or the new LRP's approved signatory, must submit PRDs in accordance with this General Permit's requirements.

D. Conditions for Termination of Coverage

1. Within 90 days of when construction is complete or ownership has been transferred, the discharger shall electronically file a Notice of Termination (NOT), a final site map, and photos through the State Water Boards SMARTS system. Filing a NOT certifies that all General Permit requirements have been met. The Regional Water Board will consider a construction site complete only when all portions of the site have been transferred to a new owner, or all of the following conditions have been met:

   a. For purposes of "final stabilization," the site will not pose any additional sediment discharge risk than it did prior to the commencement of construction activity;

   b. There is no potential for construction-related storm water pollutants to be discharged into site runoff;

   c. Final stabilization has been reached;

   d. Construction materials and wastes have been disposed of properly;

   e. Compliance with the Post-Construction Standards in Section XIII of this General Permit has been demonstrated;

   f. Post-construction storm water management measures have been installed and a long-term maintenance plan[7] has been established; and

[7] For the purposes of this requirement a long-term maintenance plan will be designed for a minimum of five years, and will describe the procedures to ensure that the post-construction storm water management measures are adequately maintained.

g. All construction-related equipment, materials and any temporary BMPs no longer needed are removed from the site.

2. The discharger shall certify that final stabilization conditions are satisfied in their NOT. Failure to certify shall result in continuation of permit coverage and annual billing.

3. The NOT must demonstrate through photos, RUSLE or RUSLE2, or results of testing and analysis that the site meets all of the conditions above (Section II.D.1) and the final stabilization condition (Section II.D.1.a) is attained by one of the following methods:

   a. "70% final cover method," no computational proof required

      OR:

   b. "RUSLE or RUSLE2 method," computational proof required

      OR:

   c. "Custom method", the discharger shall demonstrate in some other manner than a or b, above, that the site complies with the "final stabilization" requirement in Section II.D.1.a.

III. DISCHARGE PROHIBITIONS

A. Dischargers shall not violate any discharge prohibitions contained in applicable Basin Plans or statewide water quality control plans. Waste discharges to Areas of Special Biological Significance (ASBS) are prohibited by the California Ocean Plan, unless granted an exception issued by the State Water Board.

B. All discharges are prohibited except for the storm water and non-storm water discharges specifically authorized by this General Permit or another NPDES permit.

C. Authorized non-storm water discharges may include those from de-chlorinated potable water sources such as: fire hydrant flushing, irrigation of vegetative erosion control measures, pipe flushing and testing, water to control dust, uncontaminated ground water from dewatering, and other discharges not subject to a separate general NPDES permit adopted by a Regional Water Board. The discharge of non-storm water is authorized under the following conditions:

1. The discharge does not cause or contribute to a violation of any water quality standard;

2. The discharge does not violate any other provision of this General Permit;

3. The discharge is not prohibited by the applicable Basin Plan;

4. The discharger has included and implemented specific BMPs required by this General Permit to prevent or reduce the contact of the non-storm water discharge with construction materials or equipment.

5. The discharge does not contain toxic constituents in toxic amounts or (other) significant quantities of pollutants;

6. The discharge is monitored and meets the applicable NALs and NELs; and

7. The discharger reports the sampling information in the Annual Report.

If any of the above conditions are not satisfied, the discharge is not authorized by this General Permit. The discharger shall notify the Regional Water Board of any anticipated non-storm water discharges not already authorized by this General Permit or another NPDES permit, to determine whether a separate NPDES permit is necessary.

D. Debris resulting from construction activities are prohibited from being discharged from construction sites.

E. When soil contamination is found or suspected and a responsible party is not identified, or the responsible party fails to promptly take the appropriate action, the discharger shall have those soils sampled and tested to ensure proper handling and public safety measures are implemented. The discharger shall notify the appropriate local, State, and federal agency(ies) when contaminated soil is found at a construction site, and will notify the appropriate Regional Water Board.

IV. SPECIAL PROVISIONS

A. Duty to Comply

1. The discharger shall comply with all of the conditions of this General Permit. Any permit noncompliance constitutes a violation of the Clean Water Act (CWA) and the Porter-Cologne Water Quality Control Act and is grounds for enforcement action and/or removal from General Permit coverage.

2. The discharger shall comply with effluent standards or prohibitions established under Section 307(a) of the CWA for toxic pollutants within the time provided in the regulations that establish these standards or prohibitions, even if this General Permit has not yet been modified to incorporate the requirement.

B. General Permit Actions

1. This General Permit may be modified, revoked and reissued, or terminated for cause. The filing of a request by the discharger for a General Permit modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance does not annul any General Permit condition.

2. If any toxic effluent standard or prohibition (including any schedule of compliance specified in such effluent standard or prohibition) is promulgated under Section 307(a) of the CWA for a toxic pollutant which is present in the discharge and that standard or prohibition is more stringent than any limitation on the pollutant in this General Permit, this General Permit shall be modified or revoked and reissued to conform to the toxic effluent standard or prohibition and the dischargers so notified.

C. Need to Halt or Reduce Activity Not a Defense

It shall not be a defense for a discharger in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this General Permit.

D. Duty to Mitigate

The discharger shall take all responsible steps to minimize or prevent any discharge in violation of this General Permit, which has a reasonable likelihood of adversely affecting human health or the environment.

E. Proper Operation and Maintenance

The discharger shall at all times properly operate and maintain any facilities and systems of treatment and control (and related appurtenances) which are installed or used by the discharger to achieve compliance with the conditions of this General Permit. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures. Proper operation and maintenance may require the operation of backup or auxiliary facilities or similar systems installed by a discharger when necessary to achieve compliance with the conditions of this General Permit.

F. Property Rights

This General Permit does not convey any property rights of any sort or any exclusive privileges, nor does it authorize any injury to private property or any invasion of personal rights, nor does it authorize any infringement of Federal, State, or local laws or regulations.

G. Duty to Maintain Records and Provide Information

1. The discharger shall maintain a paper or electronic copy of all required records, including a copy of this General Permit, for three years from the date generated or date submitted, whichever is last. These records shall be available at the construction site until construction is completed.

2. The discharger shall furnish the Regional Water Board, State Water Board, or U.S. EPA, within a reasonable time, any requested information to determine compliance with this General Permit. The discharger shall also furnish, upon request, copies of records that are required to be kept by this General Permit.

H. Inspection and Entry

The discharger shall allow the Regional Water Board, State Water Board, U.S. EPA, and/or, in the case of construction sites which discharge through a municipal separate storm sewer, an authorized representative of the municipal operator of the separate storm sewer system receiving the discharge, upon the presentation of credentials and other documents as may be required by law, to:

1. Enter upon the discharger's premises at reasonable times where a regulated construction activity is being conducted or where records must be kept under the conditions of this General Permit;

2. Access and copy at reasonable times any records that must be kept under the conditions of this General Permit;

3. Inspect at reasonable times the complete construction site, including any off-site staging areas or material storage areas, and the erosion/sediment controls; and

4. Sample or monitor at reasonable times for the purpose of ensuring General Permit compliance.

I. Electronic Signature and Certification Requirements

1. All Permit Registration Documents (PRDs) and Notice of Terminations (NOTs) shall be electronically signed, certified, and submitted via SMARTS to the State Water Board. Either the Legally Responsible Person (LRP) or a person legally authorized to sign and certify PRDs and NOTs on behalf of the LRP (the LRP's Approved Signatory) must submit all information electronically via SMARTS.

   a. The LRP's Approved Signatory must be one of the following:

      i. For a corporation: a responsible corporate officer. For the purpose of this section, a responsible corporate officer means: (a) a president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy or decision-making functions for the corporation; or (b) the manager of the facility if authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures;

      ii. For a partnership or sole proprietorship: a general partner or the proprietor, respectively;

      iii. For a municipality, State, Federal, or other public agency: either a principal executive officer or ranking elected official. The principal executive officer of a Federal agency includes the chief executive officer of the agency or the senior executive officer having responsibility for the overall operations of a principal geographic unit of the agency (e.g., Regional Administrators of U.S. EPA);

      iv. For the military: Any military officer who has been designated.

      v. For a public university: An authorized university official

b. Changes to Authorization. If an approved signatory's authorization is no longer accurate, a new authorization satisfying the requirements of paragraph (a) of this section must be submitted via SMARTS prior to or together with any reports, information or applications to be signed by an approved signatory.

2. All Annual Reports, or other information required by the General Permit (other than PRDs and NOTs) or requested by the Regional Water Board, State Water Board, U.S. EPA, or local storm water management agency shall be certified and submitted by the LRP or the LRP's approved signatory as described above.

J. Certification

Any person signing documents under Section IV.I above, shall make the following certification:

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, to the best of my knowledge and belief, the information submitted is, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

K. Anticipated Noncompliance

The discharger shall give advance notice to the Regional Water Board and local storm water management agency of any planned changes in the construction activity, which may result in noncompliance with General Permit requirements.

L. Bypass

Bypass[8] is prohibited. The Regional Water Board may take enforcement action against the discharger for bypass unless:

1. Bypass was unavoidable to prevent loss of life, personal injury or severe property damage;[9]

[8] The intentional diversion of waste streams from any portion of a treatment facility
[9] Severe property damage means substantial physical damage to property, damage to the treatment facilities that causes them to become inoperable, or substantial and permanent loss of natural resources that can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production.

2. There were no feasible alternatives to bypass, such as the use of auxiliary treatment facilities, retention of untreated waste, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate back-up equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass that could occur during normal periods of equipment downtime or preventative maintenance;

3. The discharger submitted a notice at least ten days in advance of the need for a bypass to the Regional Water Board; or

4. The discharger may allow a bypass to occur that does not cause effluent limitations to be exceeded, but only if it is for essential maintenance to assure efficient operation. In such a case, the above bypass conditions are not applicable. The discharger shall submit notice of an unanticipated bypass as required.

M. Upset

1. A discharger that wishes to establish the affirmative defense of an upset[10] in an action brought for noncompliance shall demonstrate, through properly signed, contemporaneous operating logs, or other relevant evidence that:

   a. An upset occurred and that the discharger can identify the cause(s) of the upset

   b. The treatment facility was being properly operated by the time of the upset

   c. The discharger submitted notice of the upset as required; and

   d. The discharger complied with any remedial measures required

2. No determination made before an action of noncompliance occurs, such as during administrative review of claims that noncompliance was caused by an upset, is final administrative action subject to judicial review.

3. In any enforcement proceeding, the discharger seeking to establish the occurrence of an upset has the burden of proof

[10] An exceptional incident in which there is unintentional and temporary noncompliance the technology based numeric effluent limitations because of factors beyond the reasonable control of the discharger. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventative maintenance, or careless or improper operation.

N. Penalties for Falsification of Reports

Section 309(c)(4) of the CWA provides that any person who knowingly makes any false material statement, representation, or certification in any record or other document submitted or required to be maintained under this General Permit, including reports of compliance or noncompliance shall upon conviction, be punished by a fine of not more than $10,000 or by imprisonment for not more than two years or by both.

O. Oil and Hazardous Substance Liability

Nothing in this General Permit shall be construed to preclude the institution of any legal action or relieve the discharger from any responsibilities, liabilities, or penalties to which the discharger is or may be subject to under Section 311 of the CWA.

P. Severability

The provisions of this General Permit are severable; and, if any provision of this General Permit or the application of any provision of this General Permit to any circumstance is held invalid, the application of such provision to other circumstances and the remainder of this General Permit shall not be affected thereby.

Q. Reopener Clause

This General Permit may be modified, revoked and reissued, or terminated for cause due to promulgation of amended regulations, receipt of U.S. EPA guidance concerning regulated activities, judicial decision, or in accordance with 40 Code of Federal Regulations (CFR) 122.62, 122.63, 122.64, and 124.5.

R. Penalties for Violations of Permit Conditions

1. Section 309 of the CWA provides significant penalties for any person who violates a permit condition implementing Sections 301, 302, 306, 307, 308, 318, or 405 of the CWA or any permit condition or limitation implementing any such section in a permit issued under Section 402. Any person who violates any permit condition of this General Permit is subject to a civil penalty not to exceed $37,500[11] per calendar day of such violation, as well as any other appropriate sanction provided by Section 309 of the CWA.

[11] May be further adjusted in accordance with the Federal Civil Penalties Inflation Adjustment Act.

2. The Porter-Cologne Water Quality Control Act also provides for civil and criminal penalties, which in some cases are greater than those under the CWA.

S. Transfers

This General Permit is not transferable.

T. Continuation of Expired Permit

This General Permit continues in force and effect until a new General Permit is issued or the SWRCB rescinds this General Permit. Only those dischargers authorized to discharge under the expiring General Permit are covered by the continued General Permit.

V. EFFLUENT STANDARDS

A. Narrative Effluent Limitations

1. Storm water discharges and authorized non-storm water discharges regulated by this General Permit shall not contain a hazardous substance equal to or in excess of reportable quantities established in 40 C.F.R. §§ 117.3 and 302.4, unless a separate NPDES Permit has been issued to regulate those discharges.

2. Dischargers shall minimize or prevent pollutants in storm water discharges and authorized non-storm water discharges through the use of controls, structures, and management practices that achieve BAT for toxic and non-conventional pollutants and BCT for conventional pollutants.

B. Numeric Effluent Limitations (NELs)

Table 1- Numeric Effluent Limitations, Numeric Action Levels, Test Methods, Detection Limits, and Reporting Units

Parameter	Test Method	Discharge Type	Min. Detection Limit	Units	Numeric Action Level	Numeric Effluent Limitation
pH	Field test with calibrated portable instrument	Risk Level 2	0.2	pH units	lower NAL = 6.5 upper NAL = 8.5	N/A
		Risk Level 3			lower NAL = 6.5 upper NAL = 8.5	lower NEL = 6.0 upper NEL = 9.0
Turbidity	EPA 0180.1 and/or field test with calibrated portable instrument	Risk Level 2	1	NTU	250 NTU	N/A
		Risk Level 3			250 NTU	500 NTU

1. Numeric Effluent Limitations (NELs):

   a. **Storm Event, Daily Average pH Limits –** For Risk Level 3 dischargers, the pH of storm water and non-storm water discharges

shall be within the ranges specified in Table 1 during any site phase where there is a "high risk of pH discharge."[12]

b. **Storm Event Daily Average Turbidity Limit –** For Risk Level 3 dischargers, the turbidity of storm water and non-storm water discharges shall not exceed 500 NTU.

2. If daily average sampling results are outside the range of pH NELs (i.e., is below the lower NEL for pH or exceeds the upper NEL for pH) or exceeds the turbidity NEL (as listed in Table 1), the discharger is in violation of this General Permit and shall electronically file monitoring results in violation within 5 business days of obtaining the results.

3. **Compliance Storm Event**:

   Discharges of storm water from Risk Level 3 sites shall comply with applicable NELs (above) unless the storm event causing the discharges is determined after the fact to be equal to or larger than the Compliance Storm Event (expressed in inches of rainfall). The Compliance Storm Event for Risk Level 3 discharges is the 5 year, 24 hour storm (expressed in tenths of an inch of rainfall), as determined by using these maps:

   http://www.wrcc.dri.edu/pcpnfreq/nca5y24.gif
   http://www.wrcc.dri.edu/pcpnfreq/sca5y24.gif

   Compliance storm event verification shall be done by reporting on-site rain gauge readings as well as nearby governmental rain gauge readings.

4. Dischargers shall not be required to comply with NELs if the site receives run-on from a forest fire or any other natural disaster.

C. Numeric Action Levels (NALs)

1. For Risk Level 2 and 3 dischargers, the lower storm event average NAL for pH is 6.5 pH units and the upper storm event average NAL for pH is 8.5 pH units. The discharger shall take actions as described below if the discharge is outside of this range of pH values.

[12] A period of high risk of pH discharge is defined as a project's complete utilities phase, complete vertical build phase, and any portion of any phase where significant amounts of materials are placed directly on the land at the site in a manner that could result in significant alterations of the background pH of the discharges.

2. For Risk Level 2 and 3 dischargers, the NAL storm event daily average for turbidity is 250 NTU. The discharger shall take actions as described below if the discharge is outside of this range of turbidity values.

3. Whenever the results from a storm event daily average indicate that the discharge is below the lower NAL for pH, exceeds the upper NAL for pH, or exceeds the turbidity NAL (as listed in Table 1), the discharger shall conduct a construction site and run-on evaluation to determine whether pollutant source(s) associated with the site's construction activity may have caused or contributed to the NAL exceedance and shall immediately implement corrective actions if they are needed.

4. The site evaluation shall be documented in the SWPPP and specifically address whether the source(s) of the pollutants causing the exceedance of the NAL:

    a. Are related to the construction activities and whether additional BMPs are required to (1) meet BAT/BCT requirements; (2) reduce or prevent pollutants in storm water discharges from causing exceedances of receiving water objectives; and (3) determine what corrective action(s) were taken or will be taken and with a description of the schedule for completion.

        AND/OR:

    b. Are related to the run-on associated with the construction site location and whether additional BMPs measures are required to (1) meet BAT/BCT requirements; (2) reduce or prevent pollutants in storm water discharges from causing exceedances of receiving water objectives; and (3) what corrective action(s) were taken or will be taken with a description of the schedule for completion.

VI. RECEIVING WATER LIMITATIONS

A. The discharger shall ensure that storm water discharges and authorized non-storm water discharges to any surface or ground water will not adversely affect human health or the environment.

B. The discharger shall ensure that storm water discharges and authorized non-storm water discharges will not contain pollutants in quantities that threaten to cause pollution or a public nuisance.

C. The discharger shall ensure that storm water discharges and authorized non-storm water discharges will not contain pollutants that cause or contribute to an exceedance of any applicable water quality objectives or water quality standards (collectively, WQS) contained in a Statewide Water Quality Control Plan, the California Toxics Rule, the National Toxics Rule, or the applicable Regional Water Board's Water Quality Control Plan (Basin Plan).

D. Dischargers located within the watershed of a CWA § 303(d) impaired water body, for which a TMDL has been approved by the U.S. EPA, shall comply with the approved TMDL if it identifies "construction activity" or land disturbance as a source of the pollution.

VII. TRAINING QUALIFICATIONS AND CERTIFICATION REQUIREMENTS

A. General

The discharger shall ensure that all persons responsible for implementing requirements of this General Permit shall be appropriately trained in accordance with this Section. Training should be both formal and informal, occur on an ongoing basis, and should include training offered by recognized governmental agencies or professional organizations. Those responsible for preparing and amending SWPPPs shall comply with the requirements in this Section VII.

The discharger shall provide documentation of all training for persons responsible for implementing the requirements of this General Permit in the Annual Reports.

B. SWPPP Certification Requirements

1. **Qualified SWPPP Developer:** The discharger shall ensure that SWPPPs are written, amended and certified by a Qualified SWPPP Developer (QSD). A QSD shall have one of the following registrations or certifications, and appropriate experience, as required for:

   a. A California registered professional civil engineer;

   b. A California registered professional geologist or engineering geologist;

   c. A California registered landscape architect;

   d. A professional hydrologist registered through the American Institute of Hydrology;

   e. A Certified Professional in Erosion and Sediment Control (CPESC) ™ registered through Enviro Cert International, Inc.;

   f. A Certified Professional in Storm Water Quality (CPSWQ) ™ registered through Enviro Cert International, Inc.; or

   g. A professional in erosion and sediment control registered through the National Institute for Certification in Engineering Technologies (NICET);

Effective two years after the adoption date of this General Permit, a QSD shall have attended a State Water Board-sponsored or approved QSD training course.

2. The discharger shall list the name and telephone number of the currently designated Qualified SWPPP Developer(s) in the SWPPP.

3. **Qualified SWPPP Practitioner:** The discharger shall ensure that all BMPs required by this General Permit are implemented by a Qualified SWPPP Practitioner (QSP). A QSP is a person responsible for non-storm water and storm water visual observations, sampling and analysis. Effective two years from the date of adoption of this General Permit, a QSP shall be either a QSD or have one of the following certifications:

   a. A certified erosion, sediment and storm water inspector registered through Enviro Cert International, Inc.; or

   b. A certified inspector of sediment and erosion control registered through Certified Inspector of Sediment and Erosion Control, Inc.

   Effective two years after the adoption date of this General Permit, a QSP shall have attended a State Water Board-sponsored or approved QSP training course.

4. The LRP shall list in the SWPPP, the name of any Approved Signatory, and provide a copy of the written agreement or other mechanism that provides this authority from the LRP in the SWPPP.

5. The discharger shall include, in the SWPPP, a list of names of all contractors, subcontractors, and individuals who will be directed by the Qualified SWPPP Practitioner. This list shall include telephone numbers and work addresses. Specific areas of responsibility of each subcontractor and emergency contact numbers shall also be included.

6. The discharger shall ensure that the SWPPP and each amendment will be signed by the Qualified SWPPP Developer. The discharger shall include a listing of the date of initial preparation and the date of each amendment in the SWPPP.

VIII. RISK DETERMINATION

The discharger shall calculate the site's sediment risk and receiving water risk during periods of soil exposure (i.e. grading and site stabilization) and use the calculated risks to determine a Risk Level(s) using the methodology in

Appendix 1. For any site that spans two or more planning watersheds,[13] the discharger shall calculate a separate Risk Level for each planning watershed. The discharger shall notify the State Water Board of the site's Risk Level determination(s) and shall include this determination as a part of submitting the PRDs. If a discharger ends up with more than one Risk Level determination, the Regional Water Board may choose to break the project into separate levels of implementation.

IX. RISK LEVEL 1 REQUIREMENTS

Risk Level 1 Dischargers shall comply with the requirements included in Attachment C of this General Permit.

X. RISK LEVEL 2 REQUIREMENTS

Risk Level 2 Dischargers shall comply with the requirements included in Attachment D of this General Permit.

XI. RISK LEVEL 3 REQUIREMENTS

Risk Level 3 Dischargers shall comply with the requirements included in Attachment E of this General Permit.

XII. ACTIVE TREATMENT SYSTEMS (ATS)

Dischargers choosing to implement an ATS on their site shall comply with all of the requirements in Attachment F of this General Permit.

[13] Planning watershed: defined by the Calwater Watershed documents as a watershed that ranges in size from approximately 3,000 to 10,000 acres http://cain.ice.ucdavis.edu/calwater/calwfaq.html, http://gis.ca.gov/catalog/BrowseRecord.epl?id=22175 .

XIII. POST-CONSTRUCTION STANDARDS

A. All dischargers shall comply with the following runoff reduction requirements unless they are located within an area subject to post-construction standards of an active Phase I or II municipal separate storm sewer system (MS4) permit that has an approved Storm Water Management Plan.

1. This provision shall take effect three years from the adoption date of this permit, or later at the discretion of the Executive Officer of the Regional Board.

2. The discharger shall demonstrate compliance with the requirements of this section by submitting with their NOI a map and worksheets in accordance with the instructions in Appendix 2. The discharger shall use non-structural controls unless the discharger demonstrates that non-structural controls are infeasible or that structural controls will produce greater reduction in water quality impacts.

3. The discharger shall, through the use of non-structural and structural measures as described in Appendix 2, replicate the pre-project water balance (for this permit, defined as the volume of rainfall that ends up as runoff) for the smallest storms up to the 85th percentile storm event (or the smallest storm event that generates runoff, whichever is larger). Dischargers shall inform Regional Water Board staff at least 30 days prior to the use of any structural control measure used to comply with this requirement. Volume that cannot be addressed using non-structural practices shall be captured in structural practices and approved by the Regional Water Board. When seeking Regional Board approval for the use of structural practices, dischargers shall document the infeasibility of using non-structural practices on the project site, or document that there will be fewer water quality impacts through the use of structural practices.

4. For sites whose disturbed area exceeds two acres, the discharger shall preserve the pre-construction drainage density (miles of stream length per square mile of drainage area) for all drainage areas within the area serving a first order stream[14] or larger stream and ensure that post-project time of runoff concentration is equal or greater than pre-project time of concentration.

[14] A first order stream is defined as a stream with no tributaries.

B. All dischargers shall implement BMPs to reduce pollutants in storm water discharges that are reasonably foreseeable after all construction phases have been completed at the site (Post-construction BMPs).

XIV. SWPPP REQUIREMENTS

A. The discharger shall ensure that the Storm Water Pollution Prevention Plans (SWPPPs) for all traditional project sites are developed and amended or revised by a QSD. The SWPPP shall be designed to address the following objectives:

1. All pollutants and their sources, including sources of sediment associated with construction, construction site erosion and all other activities associated with construction activity are controlled;

2. Where not otherwise required to be under a Regional Water Board permit, all non-storm water discharges are identified and either eliminated, controlled, or treated;

3. Site BMPs are effective and result in the reduction or elimination of pollutants in storm water discharges and authorized non-storm water discharges from construction activity to the BAT/BCT standard;

4. Calculations and design details as well as BMP controls for site run-on are complete and correct, and

5. Stabilization BMPs installed to reduce or eliminate pollutants after construction are completed.

B. To demonstrate compliance with requirements of this General Permit, the QSD shall include information in the SWPPP that supports the conclusions, selections, use, and maintenance of BMPs.

C. The discharger shall make the SWPPP available at the construction site during working hours while construction is occurring and shall be made available upon request by a State or Municipal inspector. When the original SWPPP is retained by a crewmember in a construction vehicle and is not currently at the construction site, current copies of the BMPs and map/drawing will be left with the field crew and the original SWPPP shall be made available via a request by radio/telephone.

XV. REGIONAL WATER BOARD AUTHORITIES

A. In the case where the Regional Water Board does not agree with the discharger's self-reported risk level (e.g., they determine themselves to be a Level 1 Risk when they are actually a Level 2 Risk site), Regional Water Boards may either direct the discharger to reevaluate the Risk Level(s) for their site or terminate coverage under this General Permit.

B. Regional Water Boards may terminate coverage under this General Permit for dischargers who fail to comply with its requirements or where they determine that an individual NPDES permit is appropriate.

C. Regional Water Boards may require dischargers to submit a Report of Waste Discharge / NPDES permit application for Regional Water Board consideration of individual requirements.

D. Regional Water Boards may require additional Monitoring and Reporting Program Requirements, including sampling and analysis of discharges to sediment-impaired water bodies.

E. Regional Water Boards may require dischargers to retain records for more than the three years required by this General Permit.

XVI. ANNUAL REPORTING REQUIREMENTS

A. All dischargers shall prepare and electronically submit an Annual Report no later than September 1 of each year.

B. The discharger shall certify each Annual Report in accordance with the Special Provisions.

C. The discharger shall retain an electronic or paper copy of each Annual Report for a minimum of three years after the date the annual report is filed.

D. The discharger shall include storm water monitoring information in the Annual Report consisting of:

1. a summary and evaluation of all sampling and analysis results, including copies of laboratory reports;

2. the analytical method(s), method reporting unit(s), and method detection limit(s) of each analytical parameter (analytical results that are less than the method detection limit shall be reported as "less than the method detection limit");

3. a summary of all corrective actions taken during the compliance year;

4. identification of any compliance activities or corrective actions that were not implemented;

5. a summary of all violations of the General Permit;

6. the names of individual(s) who performed the facility inspections, sampling, visual observation (inspections), and/or measurements;

7. the date, place, time of facility inspections, sampling, visual observation (inspections), and/or measurements, including precipitation (rain gauge); and

8. the visual observation and sample collection exception records and reports specified in Attachments C, D, and E.

E. The discharger shall provide training information in the Annual Report consisting of:

1. documentation of all training for individuals responsible for all activities associated with compliance with this General Permit;

2. documentation of all training for individuals responsible for BMP installation, inspection, maintenance, and repair; and

3. documentation of all training for individuals responsible for overseeing, revising, and amending the SWPPP.

ATTACHMENT A
Linear Underground/ Overhead Requirements

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All Linear Underground/Overhead project dischargers who submit permit registration documents (PRDs) indicating their intention to be regulated under the provisions of this General Permit shall comply with the following:

A. DEFINITION OF LINEAR UNDERGROUND/OVERHEAD PROJECTS

1. Linear Underground/Overhead Projects (LUPs) include, but are not limited to, any conveyance, pipe, or pipeline for the transportation of any gaseous, liquid (including water and wastewater for domestic municipal services), liquiescent, or slurry substance; any cable line or wire for the transmission of electrical energy; any cable line or wire for communications (e.g., telephone, telegraph, radio, or television messages); and associated ancillary facilities. Construction activities associated with LUPs include, but are not limited to, (a) those activities necessary for the installation of underground and overhead linear facilities (e.g., conduits, substructures, pipelines, towers, poles, cables, wires, connectors, switching, regulating and transforming equipment, and associated ancillary facilities); and include, but are not limited to, (b) underground utility mark-out, potholing, concrete and asphalt cutting and removal, trenching, excavation, boring and drilling, access road and pole/tower pad and cable/wire pull station, substation construction, substructure installation, construction of tower footings and/or foundations, pole and tower installations, pipeline installations, welding, concrete and/ or pavement repair or replacement, and stockpile/borrow locations.

2. LUP evaluation shall consist of two tasks:

a. Confirm that the project or project section(s) qualifies as an LUP. The State Water Board website contains a project determination guidance flowchart. http://www.waterboards.ca.gov/water_issues/programs/stormwater/constpermits.shtml

b. Identify which Type(s) (1, 2 or 3 described in Section I below) are applicable to the project or project sections based on project sediment and receiving water risk. (See Attachment A.1)

3. A Legally Responsible Person (LRP) for a Linear Underground/Overhead project is required to obtain CGP coverage under one or more permit registration document (PRD) electronic submittals to the State Water Board's Storm Water Multi-Application and Report Tracking (SMARTs) system. Attachment A.1 contains a flow chart to be used when determining if a linear project qualifies for coverage and to determine LUP Types. Since a LUP may be constructed within both developed and undeveloped locations and portions of LUPs may be constructed by different contractors, LUPs may be broken into logical permit sections. Sections may be determined based on portions of a project conducted by one contractor. Other situations may also occur, such as the time period in which the sections of a project will be constructed (e.g. project phases), for which separate permit coverage is possible. For projects that are broken into separate sections, a description of how each section relates to the overall project and the definition of the boundaries between sections shall be clearly stated.

4. Where construction activities transverse or enter into different Regional Water Board jurisdictions, LRPs shall obtain permit coverage for each Regional Water Board area involved prior to the commencement of construction activities.

5. Small Construction Rainfall Erosivity Waiver

EPA's Small Construction Erosivity Waiver applies to sites between one and five acres demonstrating that there are no adverse water quality impacts.

Dischargers eligible for a Rainfall Erosivity Waiver based on low erosivity potential shall complete the electronic Notice of Intent (NOI) and Sediment Risk form through the State Water Board's SMARTS system, certifying that the construction activity will take place during a period when the value of the rainfall erosivity factor is less than five. Where the LRP changes or another LRP is added during construction, the new LRP must also submit a waiver certification through the SMARTS system.

If a small linear construction site continues beyond the projected completion date given on the waiver certification, the LRP shall recalculate the rainfall erosivity factor for the new project duration and submit this information through the SMARTS system. If the new R factor is below five (5), the discharger shall update through SMARTS all applicable information on the waiver certification and retain a copy of the revised waiver onsite. The LRP shall submit the new waiver certification 30 days prior to the projected completion date listed on the original waiver form to assure exemption from permitting requirements is uninterrupted. If the new R factor is five (5) or above, the LRP shall be required to apply for coverage under this Order.

B. LINEAR PROJECT PERMIT REGISTRATION DOCUMENTS (PRDs)

Any information provided to the Regional Water Board shall comply with the Homeland Security Act and any other federal law that concerns security in the United States; any information that does not comply should not be submitted. PRDs shall consist of the following:

1. Notice of Intent (NOI)

Prior to construction activities, the LRP of a proposed linear underground/overhead project shall utilize the processes and methods provided in Attachment A.2, Permit Registration Documents (PRDs) – General Instructions for Linear Underground/Overhead Projects to comply with the Construction General Permit.

2. Site Maps

LRPs submitting PRDs shall include at least 3 maps. The first map will be a zoomed[1] 1000-1500 ft vicinity map that shows the starting point of the project. The second will be a zoomed map of 1000-1500 ft showing the ending location of the project. The third will be a larger view vicinity map, 1000 ft to 2000 ft, displaying the entire project location depending on the project size, and indicating the LUP type (1, 2 or 3) areas within the total project footprint.

3. Drawings

LRPs submitting PRDs shall include a construction drawing(s) or other appropriate drawing(s) or map(s) that shows the locations of storm drain

[1] An image with a close-up/enhanced detailed view of site features that show minute details such as streets and neighboring structures.
Or: An image with a close-up/enhanced detailed view of the site's surrounding infrastructure.
Or: An image with a close up detailed view of the project and its surroundings.

inlets and waterbodies[2] that may receive discharges from the construction activities and that shows the locations of BMPs to be installed for all those BMPs that can be illustrated on the revisable drawing(s) or map(s). If storm drain inlets, waterbodies, and/or BMPs cannot be adequately shown on the drawing(s) or map(s) they should be described in detail within the SWPPP.

4. Storm Water Pollution Prevention Plan (SWPPP)

LUP dischargers shall comply with the SWPPP Preparation, Implementation, and Oversight requirements in Section K of this Attachment.

5. Contact information

LUP dischargers shall include contact information for all contractors (or subcontractors) responsible for each area of an LUP project. This should include the names, telephone numbers, and addresses of contact personnel. Specific areas of responsibility of each contact, and emergency contact numbers should also be included.

6. In the case of a public emergency that requires immediate construction activities, a discharger shall submit a brief description of the emergency construction activity within five days of the onset of construction, and then shall submit all PRDs within thirty days.

C. LINEAR PROJECT TERMINATION OF COVERAGE REQUIREMENTS

The LRP may terminate coverage of an LUP when construction activities are completed by submitting an electronic notice of termination (NOT) through the State Water Board's SMARTS system. Termination requirements are different depending on the complexity of the LUP. An LUP is considered complete when: (a) there is no potential for construction-related storm water pollution; (b) all elements of the SWPPP have been completed; (c) construction materials and waste have been disposed of properly; (d) the site is in compliance with all local storm water management requirements; and (e) the LRP submits a notice of termination (NOT) and has received approval for termination from the appropriate Regional Water Board office.

1. LUP Stabilization Requirements

The LUP discharger shall ensure that all disturbed areas of the construction site are stabilized prior to termination of coverage under this General Permit. Final stabilization for the purposes of submitting an NOT

[2] Includes basin(s) that the MS4 storm sewer systems may drain to for Hydromodification or Hydrological Conditional of Concerns under the MS4 permits.

is satisfied when all soil disturbing activities are completed and one of the following criteria is met:

a. In disturbed areas that were vegetated prior to construction activities of the LUP, the area disturbed must be re-established to a uniform vegetative cover equivalent to 70 percent coverage of the preconstruction vegetative conditions. Where preconstruction vegetation covers less than 100 percent of the surface, such as in arid areas, the 70 percent coverage criteria is adjusted as follows: if the preconstruction vegetation covers 50 percent of the ground surface, 70 percent of 50 percent (.70 X .50=.35) would require 35 percent total uniform surface coverage; or

b. Where no vegetation is present prior to construction, the site is returned to its original line and grade and/or compacted to achieve stabilization; or

c. Equiva lent stabilization measures have been employed. These measures include, but are not limited to, the use of such BMPs as blankets, reinforced channel liners, soil cement, fiber matrices, geotextiles, or other erosion resistant soil coverings or treatments.

2. LUP Termination of Coverage Requirements

The LRP shall file an NOT through the State Water Board's SMARTS system. By submitting an NOT, the LRP is certifying that construction activities for an LUP are complete and that the project is in full compliance with requirements of this General Permit and that it is now compliant with soil stabilization requirements where appropriate. Upon approval by the appropriate Regional Water Board office, permit coverage will be terminated.

3. Revising Coverage for Change of Acreage

When the LRP of a portion of an LUP construction project changes, or when a phase within a multi-phase project is completed, the LRP may reduce the total acreage covered by this General Permit. In reducing the acreage covered by this General Permit, the LRP shall electronically file revisions to the PRDs that include:

a. a revised NOI indicating the new project size;

b. a revised site map showing the acreage of the project completed, acreage currently under construction, acreage sold, transferred or added, and acreage currently stabilized.

c. SWPPP revisions, as appropriate; and

d. certification that any new LRPs have been notified of applicable requirements to obtain General Permit coverage. The certification shall include the name, address, telephone number, and e-mail address (if known) of the new LRP.

If the project acreage has increased, dischargers shall mail payment of revised annual fees within 14 days of receiving the revised annual fee notification.

D. DISCHARGE PROHIBITIONS

1. LUP dischargers shall not violate any discharge prohibitions contained in applicable Basin Plans or statewide water quality control plans. Waste discharges to Areas of Special Biological Significance (ASBS) are prohibited by the California Ocean Plan, unless granted an exception issued by the State Water Board.

2. LUP dischargers are prohibited from discharging non-storm water that is not otherwise authorized by this General Permit. Non-storm water discharges authorized by this General Permit[3] may include, fire hydrant flushing, irrigation of vegetative erosion control measures, pipe flushing and testing, water to control dust, street cleaning, dewatering,[4] uncontaminated groundwater from dewatering, and other discharges not subject to a separate general NPDES permit adopted by a Regional Water Board. Such discharges are allowed by this General Permit provided they are not relied upon to clean up failed or inadequate construction or post-construction BMPs designed to keep materials on site. These authorized non-storm water discharges:

[3] Dischargers must identify all authorized non-storm water discharges in the LUP's SWPPP and identify BMPs that will be implemented to either eliminate or reduce pollutants in non-storm water discharges. Regional Water Boards may direct the discharger to discontinue discharging such non-storm water discharges if determined that such discharges discharge significant pollutants or threaten water quality.
[4] Dewatering activities may be prohibited or need coverage under a separate permit issued by the Regional Water Boards. Dischargers shall check with the appropriate Regional Water Boards for any required permit or basin plan conditions prior to initial dewatering activities to land, storm drains, or waterbodies.

a. Shall not cause or contribute to a violation of any water quality standard;

b. Shall not violate any other provision of this General Permit;

c. Shall not violate any applicable Basin Plan;

d. Shall comply with BMPs as described in the SWPPP;

e. Shall not contain toxic constituents in toxic amounts or (other) significant quantities of pollutants;

f. Shall be monitored and meets the applicable NALs and NELs; and

g. Shall be reported by the discharger in the Annual Report.

If any of the above conditions are not satisfied, the discharge is not authorized by this General Permit. The discharger shall notify the Regional Water Board of any anticipated non-storm water discharges not authorized by this General Permit to determine the need for a separate NPDES permit.

Additionally, some LUP dischargers may be required to obtain a separate permit if the applicable Regional Water Board has adopted a General Permit for dewatering discharges. Wherever feasible, alternatives, that do not result in the discharge of non-storm water, shall be implemented in accordance with this Attachment's Section K.2 - SWPPP Implementation Schedule.

3. LUP dischargers shall ensure that trench spoils or any other soils disturbed during construction activities that are contaminated[5] are not discharged with storm water or non-storm water discharges into any storm drain or water body except pursuant to an NPDES permit.

When soil contamination is found or suspected and a responsible party is not identified, or the responsible party fails to promptly take the appropriate action, the LUP discharger shall have those soils sampled and tested to ensure that proper handling and public safety measures are

[5] Contaminated soil contains pollutants in concentrations that exceed the appropriate thresholds that various regulatory agencies set for those substances. Preliminary testing of potentially contaminated soils will be based on odor, soil discoloration, or prior history of the site's chemical use and storage and other similar factors. When soil contamination is found or suspected and a responsible party is not identified, or the responsible party fails to promptly take the appropriate action, the discharger shall have those soils sampled and tested to ensure proper handling and public safety measures are implemented. The legally responsible person will notify the appropriate local, State, or federal agency(ies) when contaminated soil is found at a construction site, and will notify the Regional Water Board by submitting an NOT at the completion of the project.

implemented. The LUP discharger shall notify the appropriate local, State, and federal agency(ies) when contaminated soil is found at a construction site, and will notify the appropriate Regional Water Board.

4. Discharging any pollutant-laden water that will cause or contribute to an exceedance of the applicable Regional Water Board's Basin Plan from a dewatering site or sediment basin into any receiving water or storm drain is prohibited.

5. Debris[6] resulting from construction activities are prohibited from being discharged from construction project sites.

E. SPECIAL PROVISIONS

1. Duty to Comply

a. The LUP discharger must comply with all of the conditions of this General Permit. Any permit noncompliance constitutes a violation of the Clean Water Act (CWA) and the Porter-Cologne Water Quality Control Act and is grounds for enforcement action and/or removal from General Permit coverage.

b. The LUP discharger shall comply with effluent standards or prohibitions established under Section 307(a) of the CWA for toxic pollutants within the time provided in the regulations that establish these standards or prohibitions, even if this General Permit has not yet been modified to incorporate the requirement.

2. General Permit Actions

a. This General Permit may be modified, revoked and reissued, or terminated for cause. The filing of a request by the discharger for a General Permit modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance does not annul any General Permit condition.

[6] Litter, rubble, discarded refuse, and remains of something destroyed.

b. If any toxic effluent standard or prohibition (including any schedule of compliance specified in such effluent standard or prohibition) is promulgated under Section 307(a) of the CWA for a toxic pollutant which is present in the discharge and that standard or prohibition is more stringent than any limitation on the pollutant in this General Permit, this General Permit shall be modified or revoked and reissued to conform to the toxic effluent standard or prohibition and the dischargers so notified.

3. Need to Halt or Reduce Activity Not a Defense

It shall not be a defense for an LUP discharger in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this General Permit.

4. Duty to Mitigate

The LUP discharger shall take all responsible steps to minimize or prevent any discharge in violation of this General Permit, which has a reasonable likelihood of adversely affecting human health or the environment.

5. Proper Operation and Maintenance

The LUP discharger shall at all times properly operate and maintain any facilities and systems of treatment and control (and related appurtenances) which are installed or used by the discharger to achieve compliance with the conditions of this General Permit and with the requirements of the Storm Water Pollution Prevention Plan (SWPPP). Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures. Proper operation and maintenance may require the operation of backup or auxiliary facilities or similar systems installed by a discharger when necessary to achieve compliance with the conditions of this General Permit.

6. Property Rights

This General Permit does not convey any property rights of any sort or any exclusive privileges, nor does it authorize any injury to private property or any invasion of personal rights, nor does it authorize any infringement of Federal, State, or local laws or regulations.

7. Duty to Maintain Records and Provide Information

a. The LUP discharger shall maintain a paper or electronic copy of all required records, including a copy of this General Permit, for three years from the date generated or date submitted, whichever is last. These records shall be kept at the construction site or in a crew

member's vehicle until construction is completed, and shall be made available upon request.

b. The LUP discharger shall furnish the Regional Water Board, State Water Board, or USEPA, within a reasonable time, any requested information to determine compliance with this General Permit. The LUP discharger shall also furnish, upon request, copies of records that are required to be kept by this General Permit.

8. Inspection and Entry

The LUP discharger shall allow the Regional Water Board, State Water Board, USEPA, and/or, in the case of construction sites which discharge through a municipal separate storm sewer, an authorized representative of the municipal operator of the separate storm sewer system receiving the discharge, upon the presentation of credentials and other documents as may be required by law, to:

a. Enter upon the discharger's premises at reasonable times where a regulated construction activity is being conducted or where records must be kept under the conditions of this General Permit;

b. Access and copy at reasonable times any records that must be kept under the conditions of this General Permit;

c. Inspect at reasonable times the complete construction site, including any off-site staging areas or material storage areas, and the erosion/sediment controls; and

d. Sample or monitor at reasonable times for the purpose of ensuring General Permit compliance.

9. Electronic Signature and Certification Requirements

a. All Permit Registration Documents (PRDs) and Notices of Termination (NOTs) shall be electronically signed, certified, and submitted via SMARTS to the State Water Board. Either the Legally Responsible Person (LRP) or a person legally authorized to sign and certify PRDs and NOTs on behalf of the LRP (the LRP's Approved Signatory) must submit all information electronically via SMARTS. For Linear Underground/Overhead projects, the Legally Responsible Person is the person in charge of the utility company, municipality, or other public or private company or agency that owns or operates the LUP. The LRP's Approved Signatory must be one of the following:

i For a corporation: a responsible corporate officer. For the purpose of this section, a responsible corporate officer means:

(1) a president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy or decision-making functions for the corporation; or

(2) the manager of the facility if authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures;

ii For a partnership or sole proprietorship: a general partner or the proprietor, respectively; or

iii For a municipality, State, Federal, or other public agency: either a principal executive officer or ranking elected official. The principal executive officer of a Federal agency includes the chief executive officer of the agency or the senior executive officer having responsibility for the overall operations of a principal geographic unit of the agency (e.g., Regional Administrators of U.S. EPA).

b. Changes to Authorization. If an approved signatory's authorization is no longer accurate, a new authorization satisfying the requirements of paragraph (a) of this section must be submitted via SMARTS prior to or together with any reports, information or applications to be signed by an approved signatory.

c. All SWPPP revisions, annual reports, or other information required by the General Permit (other than PRDs and NOTs) or requested by the Regional Water Board, State Water Board, USEPA, or local storm water management agency shall be certified and submitted by the LRP or the LRP's approved signatory as described above.

10. Certification

Any person signing documents under Section E.9 above, shall make the following certification:

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, to the best of my knowledge and belief, the information submitted is, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

11. Anticipated Noncompliance

The LUP discharger shall give advance notice to the Regional Water Board and local storm water management agency of any planned changes in the construction activity, which may result in noncompliance with General Permit requirements.

12. Penalties for Falsification of Reports

Section 309(c)(4) of the CWA provides that any person who knowingly makes any false material statement, representation, or certification in any record or other document submitted or required to be maintained under this General Permit, including reports of compliance or noncompliance shall upon conviction, be punished by a fine of not more than $10,000 or by imprisonment for not more than two years or by both.

13. Oil and Hazardous Substance Liability

Nothing in this General Permit shall be construed to preclude the institution of any legal action or relieve the discharger from any responsibilities, liabilities, or penalties to which the LUP discharger is or may be subject to under Section 311 of the CWA.

14. Severability

The provisions of this General Permit are severable; and, if any provision of this General Permit or the application of any provision of this General Permit to any circumstance is held invalid, the application of such provision to other circumstances and the remainder of this General Permit shall not be affected thereby.

15. Reopener Clause

This General Permit may be modified, revoked and reissued, or terminated for cause due to promulgation of amended regulations, receipt of USEPA guidance concerning regulated activities, judicial decision, or in accordance with 40 Code of Federal Regulations (CFR) 122.62, 122.63, 122.64, and 124.5.

16. Penalties for Violations of Permit Conditions

a. Section 309 of the CWA provides significant penalties for any person who violates a permit condition implementing Sections 301, 302, 306, 307, 308, 318, or 405 of the CWA or any permit condition or limitation implementing any such section in a permit issued under Section 402. Any person who violates any permit condition of this General Permit is

subject to a civil penalty not to exceed $37,500[7] per calendar day of such violation, as well as any other appropriate sanction provided by Section 309 of the CWA.

b. The Porter-Cologne Water Quality Control Act also provides for civil and criminal penalties, which in some cases are greater than those under the CWA.

17. Transfers

This General Permit is not transferable. A new LRP of an ongoing construction activity must submit PRDs in accordance with the requirements of this General Permit to be authorized to discharge under this General Permit. An LRP who is a property owner with active General Permit coverage who sells a fraction or all the land shall inform the new property owner(s) of the requirements of this General Permit.

18. Continuation of Expired Permit

This General Permit continues in force and effect until a new General Permit is issued or the SWRCB rescinds this General Permit. Only those dischargers authorized to discharge under the expiring General Permit are covered by the continued General Permit.

F. EFFLUENT STANDARDS

1. Narrative Effluent Limitations

a. LUP dischargers shall ensure that storm water discharges and authorized non-storm water discharges regulated by this General Permit do not contain a hazardous substance equal to or in excess of reportable quantities established in 40 C.F.R. §§ 117.3 and 302.4, unless a separate NPDES Permit has been issued to regulate those discharges.

b. LUP dischargers shall minimize or prevent pollutants in storm water discharges and authorized non-storm water discharges through the use of structural or non-structural controls, structures, and management practices that achieve BAT for toxic and non-conventional pollutants and BCT for conventional pollutants.

[7] May be further adjusted in accordance with the Federal Civil Penalties Inflation Adjustment Act

2. Numeric Effluent Limitations (NELs)

Table 1. Numeric Effluent Limitations, Numeric Action Levels, Test Methods, Detection Limits, and Reporting Units

Parameter	Test Method	Discharge Type	Min. Detection Limit	Units	Numeric Action Level	Numeric Effluent Limitation
pH	Field test with calibrated portable instrument	LUP Type 2	0.2	pH units	lower NAL = 6.5 upper NAL = 8.5	N/A
		LUP Type 3			lower NAL = 6.5 upper NAL = 8.5	lower NEL = 6.0 upper NEL = 9.0
Turbidity	EPA 0180.1 and/or field test with calibrated portable instrument	LUP Type 2	1 NTU		250 NTU	N/A
		LUP Type 3			250 NTU	500 NTU

a. Numeric Effluent Limitations (NELs):

i **Storm Event, Daily Average pH Limits –** For LUP Type 3 dischargers, the daily average pH of storm water and non-storm water discharges shall be within the ranges specified in Table 1 during any project phase where there is a "high risk of pH discharge."[8]

ii **Storm Event Daily Average Turbidity Limit –** For LUP Type 3 dischargers, the daily average turbidity of storm water and non-storm water discharges shall not exceed 500 NTU.

[8] A period of high risk of pH discharge is defined as a project's complete utilities phase, complete vertical build phase, and any portion of any phase where significant amounts of materials are placed directly on the land at the site in a manner that could result in significant alterations of the background pH of the discharges.

b. If a daily average sample result is outside the range of pH NELs (i.e., is below the lower NEL for pH or exceeds the upper NEL for pH) or exceeds the turbidity NEL (as listed in Table 1), the discharger is in violation of this General Permit and shall electronically file the results in violation within 5 business days of obtaining the results.

c. Compliance Storm Event:

Discharges of storm water from LUP Type 3 sites shall comply with applicable NELs (above) unless the storm event causing the discharges is determined after the fact to be equal to or larger than the Compliance Storm Event (expressed in inches of rainfall). The Compliance Storm Event for LUP Type 3 discharges is the 5-year, 24-hour storm (expressed in tenths of an inch of rainfall), as determined by using these maps:

http://www.wrcc.dri.edu/pcpnfreq/nca5y24.gif
http://www.wrcc.dri.edu/pcpnfreq/sca5y24.gif

Compliance storm event verification shall be done by reporting on-site rain gauge readings as well as nearby governmental rain gauge readings.

d. Dischargers shall not be required to comply with NELs if the site receives run-on from a forest fire or any other natural disaster.

3. Numeric Action Levels (NALs)

a. For LUP Type 2 and 3 dischargers, the lower storm event daily average NAL for pH is 6.5 pH units and the upper storm event daily average NAL for pH is 8.5 pH units. The LUP discharger shall take actions as described below if the storm event daily average discharge is outside of this range of pH values.

b. For LUP Type 2 and 3 dischargers, the storm event daily average NAL for turbidity is 250 NTU. The discharger shall take actions as described below if the storm event daily average discharge is outside of this range of turbidity values.

c. Whenever daily average analytical effluent monitoring results indicate that the discharge is below the lower NAL for pH, exceeds the upper NAL for pH, or exceeds the turbidity NAL (as listed in Table 1), the LUP discharger shall conduct a construction site and run-on evaluation to determine whether pollutant source(s) associated with the site's construction activity may have caused or contributed to the NAL

exceedance and shall immediately implement corrective actions if they are needed.

d. The site evaluation will be documented in the SWPPP and specifically address whether the source(s) of the pollutants causing the exceedance of the NAL:

i Are related to the construction activities and whether additional BMPs or SWPPP implementation measures are required to (1) meet BAT/BCT requirements; (2) reduce or prevent pollutants in storm water discharges from causing exceedances of receiving water objectives; and (3) determine what corrective action(s) were taken or will be taken and with a description of the schedule for completion.

AND/OR:

ii Are related to the run-on associated with the construction site location and whether additional BMPs or SWPPP implementation measures are required to (1) meet BAT/BCT requirements; (2) reduce or prevent pollutants in storm water discharges from causing exceedances of receiving water objectives; and (3) decide what corrective action(s) were taken or will be taken, including a description of the schedule for completion.

G. RECEIVING WATER LIMITATIONS

1. LUP dischargers shall ensure that storm water discharges and authorized non-storm water discharges to any surface or ground water will not adversely affect human health or the environment.

2. LUP dischargers shall ensure that storm water discharges and authorized non-storm water discharges will not contain pollutants in quantities that threaten to cause pollution or a public nuisance.

3. LUP dischargers shall ensure that storm water discharges and authorized non-storm water discharges will not contain pollutants that cause or contribute to an exceedance of any applicable water quality objectives or water quality standards (collectively, WQS) contained in a Statewide Water Quality Control Plan, the California Toxics Rule, the National Toxics Rule, or the applicable Regional Water Board's Water Quality Control Plan (Basin Plan).

H. TRAINING QUALIFICATIONS

1. General

All persons responsible for implementing requirements of this General Permit shall be appropriately trained. Training should be both formal and informal, occur on an ongoing basis, and should include training offered by recognized governmental agencies or professional organizations. Persons responsible for preparing, amending and certifying SWPPPs shall comply with the requirements in this Section H.

2. SWPPP Certification Requirements

a. **Qualified SWPPP Developer:** The LUP discharger shall ensure that all SWPPPs be written, amended and certified by a Qualified SWPPP Developer (QSD). A QSD shall have one of the following registrations or certifications, and appropriate experience, as required for:

i A California registered professional civil engineer;

ii A California registered professional geologist or engineering geologist;

iii A California registered landscape architect;

iv A professional hydrologist registered through the American Institute of Hydrology;

v A certified professional in erosion and sediment control (CPESC) ™ registered through Enviro Cert International, Inc;

vi A certified professional in storm water quality (CPSWQ)™ registered through Enviro Cert International, Inc.; or

vii A certified professional in erosion and sediment control registered through the National Institute for Certification in Engineering Technologies (NICET).

Effective two years after the adoption date of this General Permit, a QSD shall have attended a State Water Board-sponsored or approved QSD training course.

b. The LUP discharger shall ensure that the SWPPP is written and amended, as needed, to address the specific circumstances for each construction site covered by this General Permit prior to commencement of construction activity for any stage.

c. The LUP discharger shall list the name and telephone number of the currently designated Qualified SWPPP Developer(s) in the SWPPP.

d. **Qualified SWPPP Practitioner:** The LUP discharger shall ensure that all elements of any SWPPP for each project will be implemented by a Qualified SWPPP Practitioner (QSP). A QSP is a person responsible for non-storm water and storm water visual observations, sampling and analysis, and for ensuring full compliance with the permit and implementation of all elements of the SWPPP. Effective two years from the date of adoption of this General Permit, a QSP shall be either a QSD or have one of the following certifications:

   i A certified erosion, sediment and storm water inspector registered through Certified Professional in Erosion and Sediment Control, Inc.; or

   ii A certified inspector of sediment and erosion control registered through Certified Inspector of Sediment and Erosion Control, Inc.

   Effective two years after the adoption date of this General Permit, a QSP shall have attended a State Water Board-sponsored or approved QSP training course.

e. The LUP discharger shall ensure that the SWPPP include a list of names of all contractors, subcontractors, and individuals who will be directed by the Qualified SWPPP Practitioner, and who is ultimately responsible for implementation of the SWPPP. This list shall include telephone numbers and work addresses. Specific areas of responsibility of each subcontractor and emergency contact numbers shall also be included.

f. The LUP discharger shall ensure that the SWPPP and each amendment be signed by the Qualified SWPPP Developer. The LUP discharger shall include a listing of the date of initial preparation and the dates of each amendment in the SWPPP.

I. TYPES OF LINEAR PROJECTS

This attachment establishes three types (Type 1, 2 & 3) of complexity for areas within an LUP or project section based on threat to water quality. Project area Types are determined through Attachment A.1.

The Type 1 requirements below establish the baseline requirements for all LUPs subject to this General Permit. Additional requirements for Type 2 and Type 3 LUPs are labeled.

1. Type 1 LUPs*:*

LUP dischargers with areas of a LUP designated as Type 1 shall comply with the requirements in this Attachment. Type 1 LUPs are:

a. Those construction areas where 70 percent or more of the construction activity occurs on a paved surface and where areas disturbed during construction will be returned to preconstruction conditions or equivalent protection established at the end of the construction activities for the day; or

b. Where greater than 30 percent of construction activities occur within the non-paved shoulders or land immediately adjacent to paved surfaces, or where construction occurs on unpaved improved roads, including their shoulders or land immediately adjacent to them where:

   i Areas disturbed during construction will be returned to preconstruction conditions or equivalent protection is established at the end of the construction activities for the day to minimize the potential for erosion and sediment deposition, and

   ii Areas where established vegetation was disturbed during construction will be stabilized and re-vegetated by the end of project. When required, adequate temporary stabilization BMPs will be installed and maintained until vegetation is established to meet minimum cover requirements established in this General Permit for final stabilization.

c. Where the risk determination is as follows:

   i Low sediment risk, low receiving water risk, or

   ii Low sediment risk, medium receiving water risk, or

   iii Medium sediment risk, low receiving water risk

2. **Type 2 LUPs**:

   Type 2 LUPs are determined by the Combined Risk Matrix in Attachment A.1. Type 2 LUPs have the specified combination of risk:

   d. High sediment risk, low receiving water risk, or

   e. Medium sediment risk, medium receiving water risk, or

   f. Low sediment risk, high receiving water risk

   Receiving water risk is either considered "Low" for those areas of the project that are not in close proximity to a sensitive receiving watershed, "Medium" for those areas of the project within a sensitive receiving watershed yet outside of the flood plain of a sensitive receiving water body, and "High" where the soil disturbance is within close proximity to a sensitive receiving water body. Project sediment risk is calculated based on the Risk Factor Worksheet in Attachment C of this General Permit.

3. **Type 3 LUPs:**

   Type 3 LUPs are determined by the Combined Risk Matrix in Attachment A.1. Type 3 LUPs have the specified combination of risk:

   a. High sediment risk, high receiving water risk, or

   b. High sediment risk, medium receiving water risk, or

   c. Medium sediment risk, high receiving water risk

   Receiving water risk is either considered "Medium" for those areas of the project within a sensitive receiving watershed yet outside of the flood plain of a sensitive receiving water body, or "High" where the soil disturbance is within close proximity to a sensitive receiving water body. Project sediment risk is calculated based on the Risk Factor Worksheet in Attachment C.

J. LUP TYPE-SPECIFIC REQUIREMENTS

1. Effluent Standards

a. Narrative – LUP dischargers shall comply with the narrative effluent standards below.

i Storm water discharges and authorized non-storm water discharges regulated by this General Permit shall not contain a hazardous substance equal to or in excess of reportable quantities established in 40 C.F.R. §§ 117.3 and 302.4, unless a separate NPDES Permit has been issued to regulate those discharges.

ii LUP dischargers shall minimize or prevent pollutants in storm water discharges and authorized non-storm water discharges through the use of controls, structures, and management practices that achieve BAT for toxic and non-conventional pollutants and BCT for conventional pollutants.

b. Numeric – LUP Type 1 dischargers are not subject to a numeric effluent standard

c. Numeric –LUP Type 2 dischargers are subject to a pH NAL of 6.5-8.5, and a turbidity NAL of 250 NTU.

d. Numeric – LUP Type 3 dischargers are subject to a pH NAL of 6.5-8.5, and a turbidity NAL of 250 NTU. In addition, LUP Type 3 dischargers are subject to a pH NEL of 6.0-9.0 and a turbidity NEL of 500 NTU.

2. Good Site Management "Housekeeping"

a. LUP dischargers shall implement good site management (i.e., "housekeeping") measures for construction materials that could potentially be a threat to water quality if discharged. At a minimum, the good housekeeping measures shall consist of the following:

i Identify the products used and/or expected to be used and the end products that are produced and/or expected to be produced. This does not include materials and equipment that are designed to be outdoors and exposed to environmental conditions (i.e. poles, equipment pads, cabinets, conductors, insulators, bricks, etc.).

ii Cover and berm loose stockpiled construction materials that are not actively being used (i.e. soil, spoils, aggregate, fly-ash, stucco, hydrated lime, etc.).

iii Store chemicals in watertight containers (with appropriate secondary containment to prevent any spillage or leakage) or in a storage shed (completely enclosed).

iv Minimize exposure of construction materials to precipitation (not applicable to materials designed to be outdoors and exposed to the environment).

v Implement BMPs to control the off-site tracking of loose construction and landscape materials.

b. LUP dischargers shall implement good housekeeping measures for waste management, which, at a minimum, shall consist of the following:

i Prevent disposal of any rinse or wash waters or materials on impervious or pervious site surfaces or into the storm drain system.

ii Ensure the containment of sanitation facilities (e.g., portable toilets) to prevent discharges of pollutants to the storm water drainage system or receiving water.

iii Clean or replace sanitation facilities and inspecting them regularly for leaks and spills.

iv Cover waste disposal containers at the end of every business day and during a rain event.

v Prevent discharges from waste disposal containers to the storm water drainage system or receiving water.

vi Contain and securely protect stockpiled waste material from wind and rain at all times unless actively being used.

vii Implement procedures that effectively address hazardous and non-hazardous spills.

viii Develop a spill response and implementation element of the SWPPP prior to commencement of construction activities. The SWPPP shall require that:

(1) Equipment and materials for cleanup of spills shall be available on site and that spills and leaks shall be cleaned up immediately and disposed of properly; and

(2) Appropriate spill response personnel are assigned and trained.

ix Ensure the containment of concrete washout areas and other washout areas that may contain additional pollutants so there is no discharge into the underlying soil and onto the surrounding areas.

c. LUP dischargers shall implement good housekeeping for vehicle storage and maintenance, which, at a minimum, shall consist of the following:

   i Prevent oil, grease, or fuel from leaking into the ground, storm drains or surface waters.

   ii Implement appropriate BMPs whenever equipment or vehicles are fueled, maintained or stored.

   iii Clean leaks immediately and disposing of leaked materials properly.

d. LUP dischargers shall implement good housekeeping for landscape materials, which, at a minimum, shall consist of the following:

   i Contain stockpiled materials such as mulches and topsoil when they are not actively being used.

   ii Contain fertilizers and other landscape materials when they are not actively being used.

   iii Discontinue the application of any erodible landscape material at least 2 days before a forecasted rain event[9] or during periods of precipitation.

   iv Applying erodible landscape material at quantities and application rates according to manufacture recommendations or based on written specifications by knowledgeable and experienced field personnel.

   v Stacking erodible landscape material on pallets and covering or storing such materials when not being used or applied.

e. LUP dischargers shall conduct an assessment and create a list of potential pollutant sources and identify any areas of the site where additional BMPs are necessary to reduce or prevent pollutants in storm water discharges and authorized non-storm water discharges. This potential pollutant list shall be kept with the SWPPP and shall identify all non-visible pollutants which are known, or should be known, to occur on the construction site. At a minimum, when developing BMPs, LUP dischargers shall do the following:

[9] 50% or greater chance of producing precipitation.

i Consider the quantity, physical characteristics (e.g., liquid, powder, solid), and locations of each potential pollutant source handled, produced, stored, recycled, or disposed of at the site.

ii Consider the degree to which pollutants associated with those materials may be exposed to and mobilized by contact with storm water.

iii Consider the direct and indirect pathways that pollutants may be exposed to storm water or authorized non-storm water discharges. This shall include an assessment of past spills or leaks, non-storm water discharges, and discharges from adjoining areas.

iv Ensure retention of sampling, visual observation, and inspection records.

v Ensure effectiveness of existing BMPs to reduce or prevent pollutants in storm water discharges and authorized non-storm water discharges.

f. LUP dischargers shall implement good housekeeping measures on the construction site to control the air deposition of site materials and from site operations.

3. Non-Storm Water Management

a. LUP dischargers shall implement measures to control all non-storm water discharges during construction.

b. LUP dischargers shall wash vehicles in such a manner as to prevent non-storm water discharges to surface waters or MS4 drainage systems.

c. LUP dischargers shall clean streets in such a manner as to prevent unauthorized non-storm water discharges from reaching surface water or MS4 drainage systems.

4. Erosion Control

a. LUP dischargers shall implement effective wind erosion control.

b. LUP dischargers shall provide effective soil cover for inactive[10] areas and all finished slopes, and utility backfill.

[10] Areas of construction activity that have been disturbed and are not scheduled to be re-disturbed for at least 14 days

c. LUP dischargers shall limit the use of plastic materials when more sustainable, environmentally friendly alternatives exist. Where plastic materials are deemed necessary, the discharger shall consider the use of plastic materials resistant to solar degradation.

5. Sediment Controls

a. LUP dischargers shall establish and maintain effective perimeter controls as needed, and implement effective BMPs for all construction entrances and exits to sufficiently control erosion and sediment discharges from the site.

b. On sites where sediment basins are to be used, LUP dischargers shall, at minimum, design sediment basins according to the guidance provided in CASQA's Construction BMP Handbook.

c. **Additional LUP Type 2 & 3 Requirement:** LUP Type 2 & 3 dischargers shall apply linear sediment controls along the toe of the slope, face of the slope, and at the grade breaks of exposed slopes to comply with sheet flow lengths[11] in accordance with Table 2 below.

Table 2 – Critical Slope/Sheet Flow Length Combinations

Slope Percentage	Sheet flow length not to exceed
0-25% 20	feet
25-50% 15	feet
Over 50%	10 feet

d. **Additional LUP Type 2 & 3 Requirement:** LUP Type 2 & 3 dischargers shall ensure that construction activity traffic to and from the project is limited to entrances and exits that employ effective controls to prevent off-site tracking of sediment.

e. **Additional LUP Type 2 & 3 Requirement:** LUP Type 2 & 3 dischargers shall ensure that all storm drain inlets and perimeter controls, runoff control BMPs, and pollutant controls at entrances and exits (e.g. tire washoff locations) are maintained and protected from activities that reduce their effectiveness.

f. **Additional LUP Type 2 & 3 Requirement:** LUP Type 2 & 3 dischargers shall inspect all immediate access roads. At a minimum daily and prior to any rain event, the discharger shall remove any

[11] Sheet flow length is the length that shallow, low velocity flow travels across a site.

sediment or other construction activity-related materials that are deposited on the roads (by vacuuming or sweeping).

g. **Additional LUP Type 3 Requirement:** The Regional Water Board may require LUP Type 3 dischargers to implement additional site-specific sediment control requirements if the implementation of the other requirements in this section are not adequately protecting the receiving waters.

6. Run-on and Run-off Controls

a. LUP dischargers shall effectively manage all run-on, all runoff within the site and all runoff that discharges off the site. Run-on from off site-shall be directed away from all disturbed areas or shall collectively be in compliance with the effluent limitations in this Attachment.

b. Run-on and runoff controls are not required for Type 1 LUPs unless the evaluation of quantity and quality of run-on and runoff deems them necessary or visual inspections show that the site requires such controls.

7. Inspection, Maintenance and Repair

a. All inspection, maintenance repair and sampling activities at the discharger's LUP location shall be performed or supervised by a QSP representing the discharger. The QSP may delegate any or all of these activities to an employee trained to do the task(s) appropriately, but shall ensure adequate deployment.

b. LUP dischargers shall conduct visual inspections and observations daily during working hours (not recorded). At least once each 24-hour period during extended storm events, **LUP Type 2 & 3 dischargers** shall conduct visual inspections to identify and record BMPs that need maintenance to operate effectively, that have failed, or that could fail to operate as intended. Inspectors shall be the QSP or be trained by the QSP.

c. Upon identifying failures or other shortcomings, as directed by the QSP, LUP dischargers shall begin implementing repairs or design changes to BMPs within 72 hours of identification and complete the changes as soon as possible.

d. For each pre- and post-rain event inspection required, LUP dischargers shall complete an inspection checklist, using a form provided by the State Water Board or Regional Water Board or in an alternative format that includes the information described below.

e. The LUP discharger shall ensure that the checklist remains on-site or with the SWPPP. At a minimum, an inspection checklist should include:

   i Inspection date and date the inspection report was written.

   ii Weather information, including presence or absence of precipitation, estimate of beginning of qualifying storm event, duration of event, time elapsed since last storm, and approximate amount of rainfall in inches.

   iii Site information, including stage of construction, activities completed, and approximate area of the site exposed.

   iv A description of any BMPs evaluated and any deficiencies noted.

   v If the construction site is safely accessible during inclement weather, list the observations of all BMPs: erosion controls, sediment controls, chemical and waste controls, and non-storm water controls. Otherwise, list the results of visual inspections at all relevant outfalls, discharge points, downstream locations and any projected maintenance activities.

   vi Report the presence of noticeable odors or of any visible sheen on the surface of any discharges.

   vii Any corrective actions required, including any necessary changes to the SWPPP and the associated implementation dates.

   viii Photographs taken during the inspection, if any.

   ix Inspector's name, title, and signature.

K. STORM WATER POLLUTION PREVENTION PLAN (SWPPP) REQUIREMENTS

1. Objectives

SWPPPs for all LUPs shall be developed and amended or revised by a QSD. The SWPPP shall be designed to address the following objectives:

a. All pollutants and their sources, including sources of sediment, associated with construction activities associated with LUP activity are controlled;

b. All non-storm water discharges are identified and either eliminated, controlled, or treated;

c. BMPs are effective and result in the reduction or elimination of pollutants in storm water discharges and authorized non-storm water discharges from LUPs during construction; and

d. Stabilization BMPs installed to reduce or eliminate pollutants after construction is completed are effective and maintained.

2. SWPPP Implementation Schedule

a. LUPs for which PRDs have been submitted to the State Water Board shall develop a site/project location SWPPP prior to the start of land-disturbing activity in accordance with this Section and shall implement the SWPPP concurrently with commencement of soil-disturbing activities.

b. For an ongoing LUP involving a change in the LRP, the new LRP shall review the existing SWPPP and amend it, if necessary, or develop a new SWPPP within 15 calendar days to conform to the requirements set forth in this General Permit.

3. Availability

The SWPPP shall be available at the construction site during working hours while construction is occurring and shall be made available upon request by a State or Municipal inspector. When the original SWPPP is retained by a crewmember in a construction vehicle and is not currently at the construction site, copies of the BMPs and map/drawing will be left with the field crew and the original SWPPP shall be made available via a request by radio/telephone.

L. REGIONAL WATER BOARD AUTHORITIES

1. Regional Water Boards shall administer the provisions of this General Permit. Administration of this General Permit may include, but is not limited to, requesting the submittal of SWPPPs, reviewing SWPPPs, reviewing monitoring and sampling and analysis reports, conducting compliance inspections, gathering site information by any medium including sampling, photo and video documentation, and taking enforcement actions.

2. Regional Water Boards may terminate coverage under this General Permit for dischargers who fail to comply with its requirements or where they determine that an individual NPDES permit is appropriate.

3. Regional Water Boards may issue separate permits for discharges of storm water associated with construction activity to individual dischargers, categories of dischargers, or dischargers in a geographic area. Upon issuance of such permits by a Regional Water Board, dischargers subject to those permits shall no longer be regulated by this General Permit.

4. Regional Water Boards may direct the discharger to reevaluate the LUP Type(s) for the project (or elements/areas of the project) and impose the appropriate level of requirements.

5. Regional Water Boards may terminate coverage under this General Permit for dischargers who negligently or with willful intent incorrectly determine or report their LUP Type (e.g., they determine themselves to be a LUP Type 1 when they are actually a Type 2).

6. Regional Water Boards may review PRDs and reject or accept applications for permit coverage or may require dischargers to submit a Report of Waste Discharge / NPDES permit application for Regional Water Board consideration of individual requirements.

7. Regional Water Boards may impose additional requirements on dischargers to satisfy TMDL implementation requirements or to satisfy provisions in their Basin Plans.

8. Regional Water Boards may require additional Monitoring and Reporting Program Requirements, including sampling and analysis of discharges to sediment-impaired water bodies.

9. Regional Water Boards may require dischargers to retain records for more than the three years required by this General Permit.

10. Based on an LUP's threat to water quality and complexity, the Regional Water Board may determine on a case-by-case basis that an LUP, or a portion of an LUP, is not eligible for the linear project requirements contained in this Attachment, and require that the discharger comply with all standard requirements in this General Permit.

11. The Regional Water Board may require additional monitoring and reporting program requirements including sampling and analysis of discharges to CWA § 303(d)-listed water bodies. Additional requirements imposed by the Regional Water Board shall be consistent with the overall monitoring effort in the receiving waters.

M. MONITORING AND REPORTING REQUIREMENTS

Table 3. LUP Summary of Monitoring Requirements

LUP Type	Visual Inspections				Sample Collection		
	Daily Site BMP	Pre-storm Event / Baseline	Daily Storm BMP	Post Storm	Storm Water Discharge	Receiving Water	Non-Visible (when applicable)
1	X						x
2	X	X	X	X	X		x
3	X	X	X	X	X	X	x

1. Objectives

LUP dischargers shall prepare a monitoring and reporting program (M&RP) prior to the start of construction and immediately implement the program at the start of construction for LUPs. The monitoring program must be implemented at the appropriate level to protect water quality at all times throughout the life of the project. The M&RP must be a part of the SWPPP, included as an appendix or separate SWPPP chapter.

2. M&RP Implementation Schedule

a. LUP dischargers shall implement the requirements of this Section at the time of commencement of construction activity. LUP dischargers are responsible for implementing these requirements until construction activity is complete and the site is stabilized.

b. LUP dischargers shall revise the M&RP when:

i Site conditions or construction activities change such that a change in monitoring is required to comply with the requirements and intent of this General Permit.

ii The Regional Water Board requires the discharger to revise its M&RP based on its review of the document. Revisions may include, but not be limited to, conducting additional site inspections, submitting reports, and certifications. Revisions shall be submitted via postal mail or electronic e-mail.

iii The Regional Water Board may require additional monitoring and reporting program requirements including sampling and analysis of discharges to CWA § 303(d)-listed water bodies. Additional requirements imposed by the Regional Water Board shall be consistent with the overall monitoring effort in the receiving waters.

3. LUP Type 1 Monitoring and Reporting Requirements

a. LUP Type 1 Inspection Requirements

i LUP Type 1 dischargers shall ensure that all inspections are conducted by trained personnel. The name(s) and contact number(s) of the assigned inspection personnel should be listed in the SWPPP.

ii LUP Type 1 dischargers shall ensure that all visual inspections are conducted daily during working hours and in conjunction with other daily activities in areas where active construction is occurring.

iii LUP Type 1 dischargers shall ensure that photographs of the site taken before, during, and after storm events are taken during inspections, and submitted through the State Water Board's SMARTS website once every three rain events.

iv LUP Type 1 dischargers shall conduct daily visual inspections to verify that:

(1) Appropriate BMPs for storm water and non-storm water are being implemented in areas where active construction is occurring (including staging areas);

(2) Project excavations are closed, with properly protected spoils, and that road surfaces are cleaned of excavated material and construction materials such as chemicals by either removing or storing the material in protective storage containers at the end of every construction day;

(3) Land areas disturbed during construction are returned to pre-construction conditions or an equivalent protection is used at the end of each workday to eliminate or minimize erosion and the possible discharge of sediment or other pollutants during a rain event.

v Inspections may be discontinued in non-active construction areas where soil-disturbing activities are completed and final soil stabilization is achieved (e.g., paving is completed, substructures

are installed, vegetation meets minimum cover requirements for final stabilization, or other stabilization requirements are met).

vi Inspection programs are required for LUP Type 1 projects where temporary and permanent stabilization BMPs are installed and are to be monitored after active construction is completed. Inspection activities shall continue until adequate permanent stabilization is established and, in areas where re-vegetation is chosen, until minimum vegetative coverage is established in accordance with Section C.1 of this Attachment.

b. LUP Type 1 Monitoring Requirements for Non-Visible Pollutants

LUP Type 1 dischargers shall implement sampling and analysis requirements to monitor non-visible pollutants associated with (1) construction sites; (2) activities producing pollutants that are not visually detectable in storm water discharges; and (3) activities which could cause or contribute to an exceedance of water quality objectives in the receiving waters.

i Sampling and analysis for non-visible pollutants is only required where the LUP Type 1 discharger believes pollutants associated with construction activities have the potential to be discharged with storm water runoff due to a spill or in the event there was a breach, malfunction, failure and/or leak of any BMP. Also, failure to implement BMPs may require sample collection.

(1) Visual observations made during the monitoring program described above will help the LUP Type 1 discharger determine when to collect samples.

(2) The LUP Type 1 discharger is not required to sample if one of the conditions described above (e.g., breach or spill) occurs and the site is cleaned of material and pollutants and/or BMPs are implemented prior to the next storm event.

ii LUP Type 1 dischargers shall collect samples down-gradient from all discharge locations where the visual observations were made triggering the monitoring, and which can be safely accessed. For sites where sampling and analysis is required, personnel trained in water quality sampling procedures shall collect storm water samples.

iii If sampling for non-visible pollutant parameters is required, LUP Type 1 dischargers shall ensure that samples be analyzed for parameters indicating the presence of pollutants identified in the pollutant source assessment required in Section J.2.a.i.

iv LUP Type 1 dischargers shall collect samples during the first two hours of discharge from rain events that occur during business hours and which generate runoff.

v LUP Type 1 dischargers shall ensure that a sufficiently large sample of storm water that has not come into contact with the disturbed soil or the materials stored or used on-site (uncontaminated sample[12]) will be collected for comparison with the discharge sample. Samples shall be collected during the first two hours of discharge from rain events that occur during daylight hours and which generate runoff.

vi LUP Type 1 dischargers shall compare the uncontaminated sample to the samples of discharge using field analysis or through laboratory analysis. Analyses may include, but are not limited to, indicator parameters such as: pH, specific conductance, dissolved oxygen, conductivity, salinity, and Total Dissolved Solids (TDS).

vii For laboratory analyses, all sampling, sample preservation, and other analyses must be conducted according to test procedures pursuant to 40 C.F.R. Part 136. LUP Type 1 dischargers shall ensure that field samples are collected and analyzed according to manufacturer specifications of the sampling devices employed. Portable meters shall be calibrated according to manufacturer's specification.

viii LUP Type 1 dischargers shall ensure that all field and/or analytical data are kept in the SWPPP document.

c. <u>LUP Type 1 Visual Observation Exceptions</u>

i LUP Type 1 dischargers shall be prepared to collect samples and conduct visual observation (inspections) to meet the minimum visual observation requirements of this Attachment. The Type 1 LUP discharger is not required to physically collect samples or conduct visual observation (inspections) under the following conditions:

(1) During dangerous weather conditions such as flooding and electrical storms;

(2) Outside of scheduled site business hours.

(3) When access to the site is unsafe due to storm events.

[12] Sample collected at a location unaffected by contruction activities.

ii If the LUP Type 1 discharger does not collect the required samples or visual observation (inspections) due to these exceptions, an explanation why the sampling or visual observation (inspections) were not conducted shall be included in both the SWPPP and the Annual Report.

d. Particle Size Analysis for Risk Justification

LUP Type 1 dischargers utilizing justifying an alternative project risk shall report a soil particle size analysis used to determine the RUSLE K-Factor. ASTM D-422 (Standard Test Method for Particle-Size Analysis of Soils), as revised, shall be used to determine the percentages of sand, very fine sand, silt, and clay on the site.

4. LUP Type 2 & 3 Monitoring and Reporting Requirements

a. LUP Type 2 & 3 Inspection Requirements

i LUP Type 2 & 3 dischargers shall ensure that all inspections are conducted by trained personnel. The name(s) and contact number(s) of the assigned inspection personnel should be listed in the SWPPP.

ii LUP Type 2 & 3 dischargers shall ensure that all visual inspections are conducted daily during working hours and in conjunction with other daily activities in areas where active construction is occurring.

iii LUP Type 2 & 3 dischargers shall ensure that photographs of the site taken before, during, and after storm events are taken during inspections, and submitted through the State Water Board's SMARTS website once every three rain events.

iv LUP Type 2 & 3 dischargers shall conduct daily visual inspections to verify that appropriate BMPs for storm water and non-storm water are being implemented and in place in areas where active construction is occurring (including staging areas).

v LUP Type 2 & 3 dischargers shall conduct inspections of the construction site prior to anticipated storm events, during extended storm events, and after actual storm events to identify areas contributing to a discharge of storm water associated with construction activity. Pre-storm inspections are to ensure that BMPs are properly installed and maintained; post-storm inspections are to assure that BMPs have functioned adequately. During

extended storm events, inspections shall be required during normal working hours for each 24-hour period.

vi Inspections may be discontinued in non-active construction areas where soil-disturbing activities are completed and final soil stabilization is achieved (e.g., paving is completed, substructures are installed, vegetation meets minimum cover requirements for final stabilization, or other stabilization requirements are met).

vii LUP Type 2 & 3 dischargers shall implement a monitoring program for inspecting projects that require temporary and permanent stabilization BMPs after active construction is complete. Inspections shall ensure that the BMPs are adequate and maintained. Inspection activities shall continue until adequate permanent stabilization is established and, in vegetated areas, until minimum vegetative coverage is established in accordance with Section C.1 of this Attachment.

viii If possible, LUP Type 2 & 3 dischargers shall install a rain gauge on-site at an accessible and secure location with readings made during all storm event inspections. When readings are unavailable, data from the closest rain gauge with publically available data may be used.

ix LUP Type 2 & 3 dischargers shall Include and maintain a log of the inspections conducted in the SWPPP. The log will provide the date and time of the inspection and who conducted the inspection.

b. <u>LUP Type 2 & 3 Storm Water Effluent Monitoring Requirements</u>

Table 4. LUP Type 2 & 3 Effluent Monitoring Requirements

LUP Type	Frequency	Effluent Monitoring
2	Minimum of 3 samples per day characterizing discharges associated with construction activity from the project active areas of construction.	Turbidity, pH, and non-visible pollutant parameters (if applicable)
3	Minimum of 3 samples per day characterizing discharges associated with construction activity from the project active areas of construction.	turbidity, pH, suspended sediment concentrations (SSC)[13] (only if turbidity NEL exceeded), plus non-visible pollutant parameters (if applicable)

i LUP Type 2 & 3 dischargers shall collect storm water grab samples from sampling locations characterizing discharges associated with

[13] Suspended Sediment Concentration monitoring is required for any Type 3 area that exceeds its turbidity NEL.

activity from the LUP active areas of construction. At a minimum, 3 samples shall be collected per day of discharge.

ii LUP Type 2 & 3 dischargers shall collect samples of stored or contained storm water that is discharged subsequent to a storm event producing precipitation of ½ inch or more at the time of discharge.

iii LUP Type 2 & 3 dischargers shall ensure that storm water grab sample(s) obtained be representative of the flow and characteristics of the discharge.

iv LUP Type 2 & 3 dischargers shall analyze their effluent samples for:

(1) pH and turbidity
(2) Any additional parameter for which monitoring is required by the Regional Water Board.

v LUP Type 3 dischargers that have violated the turbidity daily average NEL shall analyze subsequent effluent samples for turbidity and SSC.

c. <u>LUP Type 2 & 3 Storm Water Effluent Sampling Locations</u>

i LUP Type 2 & 3 dischargers shall perform sampling and analysis of storm water discharges to characterize discharges associated with construction activity from the entire disturbed project or area.

ii LUP Type 2 & 3 dischargers may monitor and report run-on from surrounding areas if there is reason to believe run-on may contribute to exceedance of NALs or NELs (applicable to Type 3).

iii LUP Type 2 & 3 dischargers shall select analytical test methods from the list provided in Table 5 below.

iv LUP Type 2 & 3 dischargers shall ensure that all storm water sample collection preservation and handling shall be conducted in accordance with the “Storm Water Sample Collection and Handling Instructions” below.

d. <u>LUP Type 3 Receiving Water Monitoring Requirements</u>

i In the event that an LUP Type 3 discharger violates an applicable NEL contained in this General Permit and has a direct discharge to receiving waters, the LUP discharger shall subsequently sample Receiving Waters (RWs) for turbidity, pH (if applicable) and SSC.

ii LUP Type 3 dischargers that meet the project criteria in Appendix 3 of this General Permit and have more than 30 acres of soil disturbance in the project area or project section area designated as Type 3, shall comply with the Bioassessment requirements prior to commencement of construction activity.

iii LUP Type 3 dischargers shall obtain RW samples in accordance with the requirements of the Receiving Water Sampling Locations section (Section M.4.d of this Attachment).

e. LUP Type 3 Receiving Water Sampling Locations

i **Upstream/up-gradient RW samples**: LUP Type 3 dischargers shall obtain any required upstream/up-gradient receiving water samples from a representative and accessible location as close as possible to and upstream from the effluent discharge point.

ii **Downstream/down-gradient RW samples**: LUP Type 3 dischargers shall obtain any required downstream/down-gradient receiving water samples from a representative and accessible location as close as possible to and downstream from the effluent discharge point.

iii If two or more discharge locations discharge to the same receiving water, LUP Type 3 dischargers may sample the receiving water at a single upstream and downstream location.

f. LUP Type 2 & 3 Monitoring Requirements for Non-Visible Pollutants

LUP Type 2 & 3 dischargers shall implement sampling and analysis requirements to monitor non-visible pollutants associated with (1) construction sites; (2) activities producing pollutants that are not visually detectable in storm water discharges; and (3) activities which could cause or contribute to an exceedance of water quality objectives in the receiving waters.

i Sampling and analysis for non-visible pollutants is only required where LUP Type 2 & 3 dischargers believe pollutants associated with construction activities have the potential to be discharged with storm water runoff due to a spill or in the event there was a breach, malfunction, failure and/or leak of any BMP. Also, failure to implement BMPs may require sample collection.

(1) Visual observations made during the monitoring program described above will help LUP Type 2 & 3 dischargers determine when to collect samples.

(2) LUP Type 2 & 3 dischargers are not required to sample if one of the conditions described above (e.g., breach or spill) occurs and the site is cleaned of material and pollutants and/or BMPs are implemented prior to the next storm event.

ii LUP Type 2 & 3 dischargers shall collect samples down-gradient from the discharge locations where the visual observations were made triggering the monitoring and which can be safely accessed. For sites where sampling and analysis is required, personnel trained in water quality sampling procedures shall collect storm water samples.

iii If sampling for non-visible pollutant parameters is required, LUP Type 2 & 3 dischargers shall ensure that samples be analyzed for parameters indicating the presence of pollutants identified in the pollutant source assessment required in Section J.2.a.i.

iv LUP Type 2 & 3 dischargers shall collect samples during the first two hours of discharge from rain events that occur during business hours and which generate runoff.

v LUP Type 2 & 3 dischargers shall ensure that a sufficiently large sample of storm water that has not come into contact with the disturbed soil or the materials stored or used on-site (uncontaminated sample[14]) will be collected for comparison with the discharge sample. Samples shall be collected during the first two hours of discharge from rain events that occur during daylight hours and which generate runoff.

vi LUP Type 2 & 3 dischargers shall compare the uncontaminated sample to the samples of discharge using field analysis or through laboratory analysis. Analyses may include, but are not limited to, indicator parameters such as: pH, specific conductance, dissolved oxygen, conductivity, salinity, and Total Dissolved Solids (TDS).

vii For laboratory analyses, all sampling, sample preservation, and other analyses must be conducted according to test procedures pursuant to 40 C.F.R. Part 136. LUP Type 2 & 3 dischargers shall ensure that field samples are collected and analyzed according to manufacturer specifications of the sampling devices employed. Portable meters shall be calibrated according to manufacturer's specification.

viii LUP Type 2 & 3 dischargers shall ensure that all field and/or analytical data are kept in the SWPPP document.

[14] Sample collected at a location unaffected by construction activities

g. LUP Type 2 & 3 Visual Observation and Sample Collection Exceptions

i LUP Type 2 & 3 dischargers shall be prepared to collect samples and conduct visual observation (inspections) to meet the minimum visual observation requirements of this Attachment. Type 2 & 3 LUP dischargers are not required to physically collect samples or conduct visual observation (inspections) under the following conditions:

(1) During dangerous weather conditions such as flooding and electrical storms;

(2) Outside of scheduled site business hours.

(3) When access to the site is unsafe due to storm events.

ii If the LUP Type 2 or 3 discharger does not collect the required samples or visual observation (inspections) due to these exceptions, an explanation why the sampling or visual observation (inspections) were not conducted shall be included in both the SWPPP and the Annual Report.

h. LUP Type 2 & 3 Storm Water Sample Collection and Handling Instructions

LUP Type 2 & 3 dischargers shall refer to Table 5 below for test Methods, detection Limits, and reporting Units. During storm water sample collection and handling, the LUP Type 2 & 3 discharger shall:

i Identify the parameters required for testing and the number of storm water discharge points that will be sampled. Request the laboratory to provide the appropriate number of sample containers, types of containers, sample container labels, blank chain of custody forms, and sample preservation instructions.

ii Determine how to ship the samples to the laboratory. The testing laboratory should receive samples within 48 hours of the physical sampling (unless otherwise required by the laboratory). The options are to either deliver the samples to the laboratory, arrange to have the laboratory pick them up, or ship them overnight to the laboratory.

iii Use only the sample containers provided by the laboratory to collect and store samples. Use of any other type of containers could contaminate your samples.

iv Prevent sample contamination, by not touching, or putting anything into the sample containers before collecting storm water samples.

v Not overfilling sample containers. Overfilling can change the analytical results.

vi Tightly screw the cap of each sample container without stripping the threads of the cap.

vii Complete and attach a label to each sample container. The label shall identify the date and time of sample collection, the person taking the sample, and the sample collection location or discharge point. The label should also identify any sample containers that have been preserved.

viii Carefully pack sample containers into an ice chest or refrigerator to prevent breakage and maintain temperature during shipment. Remember to place frozen ice packs into the shipping container. Samples should be kept as close to 4° C (39° F) as possible until arriving at the laboratory. Do not freeze samples.

ix Complete a Chain of Custody form for each set of samples. The Chain of Custody form shall include the discharger's name, address, and phone number, identification of each sample container and sample collection point, person collecting the samples, the date and time each sample container was filled, and the analysis that is required for each sample container.

x Upon shipping/delivering the sample containers, obtain both the signatures of the persons relinquishing and receiving the sample containers.

xi Designate and train personnel to collect, maintain, and ship samples in accordance with the above sample protocols and good laboratory practices.

xii Refer to the Surface Water Ambient Monitoring Program's (SWAMP) Quality Assurance Management Plan (QAMP) for more information on sampling collection and analysis. See http://www.waterboards.ca.gov/water_issues/programs/swamp/[15] QAMP Link: http://www.waterboards.ca.gov/water_issues/programs/swamp/qamp.shtml

[15] Additional information regarding QAMP can be found at http://mpsl.mlml.calstate.edu/swqacompare.htm.

Table 5. Test Methods, Detection Limits, Reporting Units and Applicable NALs/NELs

Parameter	Test Method	Discharge Type	Min. Detection Limit	Reporting Units	Numeric Action Levels	Numeric Effluent Limitation (LUP Type 3)
pH	Field test with calibrated portable instrument	Type 2 & 3	0.2	pH units	Lower = 6.5 upper = 8.5	Lower = 6.0 upper = 9.0
Turbidity	EPA 0180.1 and/or field test with calibrated portable instrument	Type 2 & 3	1	NTU	250 NTU	500 NTU
SSC	ASTM Method D 3977-97[16]	Type 3 if NEL is exceeded	5 Mg/L		N/A	N/A
Bioassessment	(STE) Level I of (SAFIT),[17] fixed-count of 600 org/sample	Type 3 LUPs > 30 acres	N/A N/A		N/A	N/A

i. <u>LUP Type 2 & 3 Monitoring Methods</u>

i The LUP Type 2 or 3 discharger's project M&RP shall include a description of the following items:

(1) Visual observation locations, visual observation procedures, and visual observation follow-up and tracking procedures.

(2) Sampling locations, and sample collection and handling procedures. This shall include detailed procedures for sample collection, storage, preservation, and shipping to the testing lab to assure that consistent quality control and quality assurance is maintained. Dischargers shall attach to the monitoring program a copy of the Chain of Custody form used when handling and shipping samples.

[16] ASTM, 1999, Standard Test Method for Determining Sediment Concentration in Water Samples: American Society of Testing and Materials, D 3977-97, Vol. 11.02, pp. 389-394

[17] The current SAFIT STEs (28 November 2006) list requirements for both the Level I and Level II taxonomic effort, and are located at: http://www.swrcb.ca.gov/swamp/docs/safit/ste_list.pdf. When new editions are published by SAFIT, they will supersede all previous editions. All editions will be posted at the State Water Board's SWAMP website.

(3) Identification of the analytical methods and related method detection limits (if applicable) for each parameter required in Section M.4.f above.

ii LUP Type 2 & 3 dischargers shall ensure that all sampling and sample preservation be in accordance with the current edition of "Standard Methods for the Examination of Water and Wastewater" (American Public Health Association). All monitoring instruments and equipment (including a discharger's own field instruments for measuring pH and turbidity) shall be calibrated and maintained in accordance with manufacturers' specifications to ensure accurate measurements. All laboratory analyses shall be conducted according to test procedures under 40 CFR Part 136, unless other test procedures have been specified in this General Permit or by the Regional Water Board. With the exception of field analysis conducted by the discharger for turbidity and pH, all analyses shall be sent to and conducted at a laboratory certified for such analyses by the State Department of Health Services (SSC exception). The LUP discharger shall conduct its own field analysis of pH and may conduct its own field analysis of turbidity if the discharger has sufficient capability (qualified and trained employees, properly calibrated and maintained field instruments, etc.) to adequately perform the field analysis.

j. <u>LUP Type 2 & 3 Analytical Methods</u>

LUP Type 2 & 3 dischargers shall refer to Table 5 above for test Methods, detection Limits, and reporting Units.

i **pH**: LUP Type 2 & 3 dischargers shall perform pH analysis on-site with a calibrated pH meter or pH test kit. The LUP discharger shall record pH monitoring results on paper and retain these records in accordance with Section M.4.o, below.

ii **Turbidity**: LUP Type 2 & 3 dischargers shall perform turbidity analysis using a calibrated turbidity meter (turbidimeter), either on-site or at an accredited lab. Acceptable test methods include Standard Method 2130 or USEPA Method 180.1. The results shall be recorded in the site log book in Nephelometric Turbidity Units (NTU).

iii **Suspended sediment concentration (SSC)**: LUP Type 3 dischargers exceeding their NEL, shall perform SSC analysis using ASTM Method D3977-97.

iv **Bioassessment**: LUP Type 3 dischargers shall perform bioassessment sampling and analysis according to Appendix 3 of this General Permit.

k. Watershed Monitoring Option

If an LUP Type 2 or 3 discharger is part of a qualified regional watershed-based monitoring program the LUP Type 2 or 3 discharger may be eligible for relief from the monitoring requirements in this Attachment. The Regional Water Board may approve proposals to substitute an acceptable watershed-based monitoring program if it determines that the watershed-based monitoring program will provide information to determine each discharger's compliance with the requirements of this General Permit.

l. Particle Size Analysis for Risk Justification

LUP Type 2 & 3 dischargers justifying an alternative project risk shall report a soil particle size analysis used to determine the RUSLE K-Factor. ASTM D-422 (Standard Test Method for Particle-Size Analysis of Soils), as revised, shall be used to determine the percentages of sand, very fine sand, silt, and clay on the site.

m. NAL Exceedance Report

i In the event that any effluent sample exceeds an applicable NAL, the Regional Water Boards may require LUP Type 2 & 3 dischargers to submit NAL Exceedance Reports.

ii LUP Type 2 & 3 dischargers shall certify each NAL Exceedance Report in accordance with the Special Provisions for Construction Activity.

iii LUP Type 2 & 3 dischargers shall retain an electronic or paper copy of each NAL Exceedance Report for a minimum of three years after the date the exceedance report is filed.

iv LUP Type 2 & 3 dischargers shall include in the NAL Exceedance Report:

(1) the analytical method(s), method reporting unit(s), and method detection limit(s) of each analytical parameter (analytical results that are less than the method detection limit shall be reported as "less than the method detection limit"); and
(2) the date, place, time of sampling, visual observation (inspections), and/or measurements, including precipitation.

(3) Description of the current BMPs associated with the effluent sample that exceeded the NAL and the proposed corrective actions taken.

n. NEL Violation Report

i All LUP Type 3 dischargers shall electronically submit all storm event sampling results to the State Water Board no later than 5 days after the conclusion of the storm event.

ii In the event that a LUP Type 3 discharger has violated an applicable NEL, the discharger shall submit an NEL Violation Report to the State Water Board no later than 24 hours after the NEL exceedance has been identified.

iii The LUP Type 3 discharger shall certify each NEL Violation Report in accordance with the Special Provisions for Construction Activity.

iv The LUP Type 3 discharger shall retain an electronic or paper copy of each NEL Violation Report for a minimum of three years after the date the violation report is filed.

v The LUP Type 3 discharger shall include in the NEL Violation Report:

(1) the analytical method(s), method reporting unit(s), and method detection limit(s) of each analytical parameter (analytical results that are less than the method detection limit shall be reported as "less than the method detection limit"); and
(2) the date, place, time of sampling, visual observation (inspections), and/or measurements, including precipitation.
(3) Description of the current on-site BMPs, and the proposed corrective actions taken to manage the NEL exceedance.

vi Compliance Storm Exemption:
In the event that an applicable NEL has been exceeded during a storm event equal to or larger than the Compliance Storm Event (see Section F.2.c of this Attachment), the LUP Type 3 discharger shall report the on-site rain gauge and nearby governmental rain gauge readings for verification.

o. Monitoring Records

LUP Type 2 & 3 dischargers shall ensure that records of all storm water monitoring information and copies of all reports (including Annual Reports) required by this General Permit be retained for a period of at least three years. LUP Type 2 & 3 dischargers may retain records off-

site and make them available upon request. These records shall include:

i The date, place, time of facility inspections, sampling, visual observation (inspections), and/or measurements, including precipitation (rain gauge);

ii The individual(s) who performed the facility inspections, sampling, visual observation (inspections), and or measurements;

iii The date and approximate time of analyses;

iv The individual(s) who performed the analyses;

v A summary of all analytical results from the last three years, the method detection limits and reporting units, the analytical techniques or methods used, and all chain of custody forms;

vi Quality assurance/quality control records and results;

vii Non-storm water discharge inspections and visual observation (inspections) and storm water discharge visual observation records (see Section M.4.a above);

viii Visual observation and sample collection exception records (see Section M.4.g above); and

ix The records of any corrective actions and follow-up activities that resulted from analytical results, visual observation (inspections), or inspections.

ATTACHMENT A.1
LUP Project Area or Project Section Area Type Determination

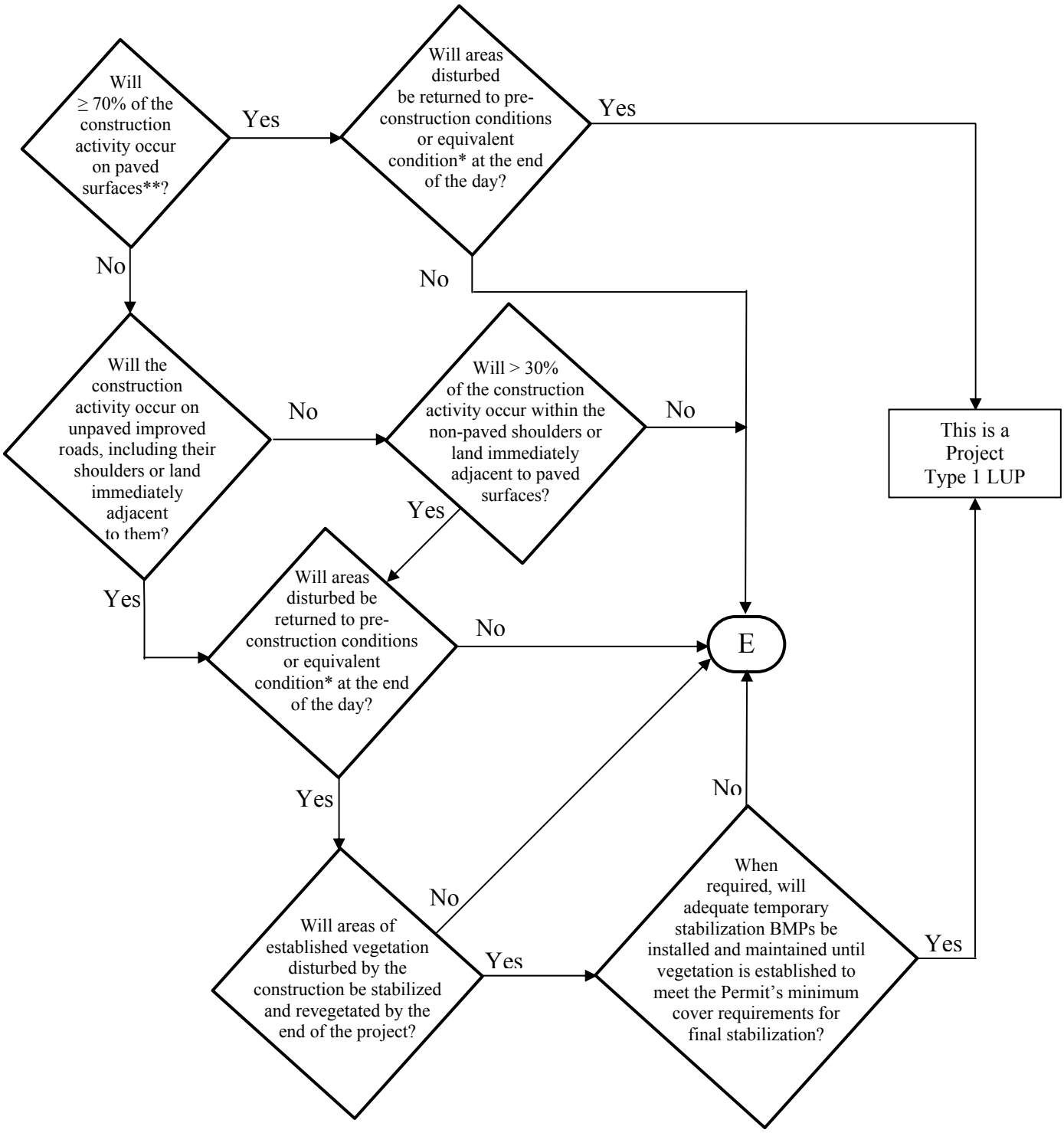

*See Definition of Terms
** Or: "Will < 30% of the soil disturbance occur on unpaved surfaces?

ATTACHMENT A.1
LUP Project Area or Project Section Area Type Determination

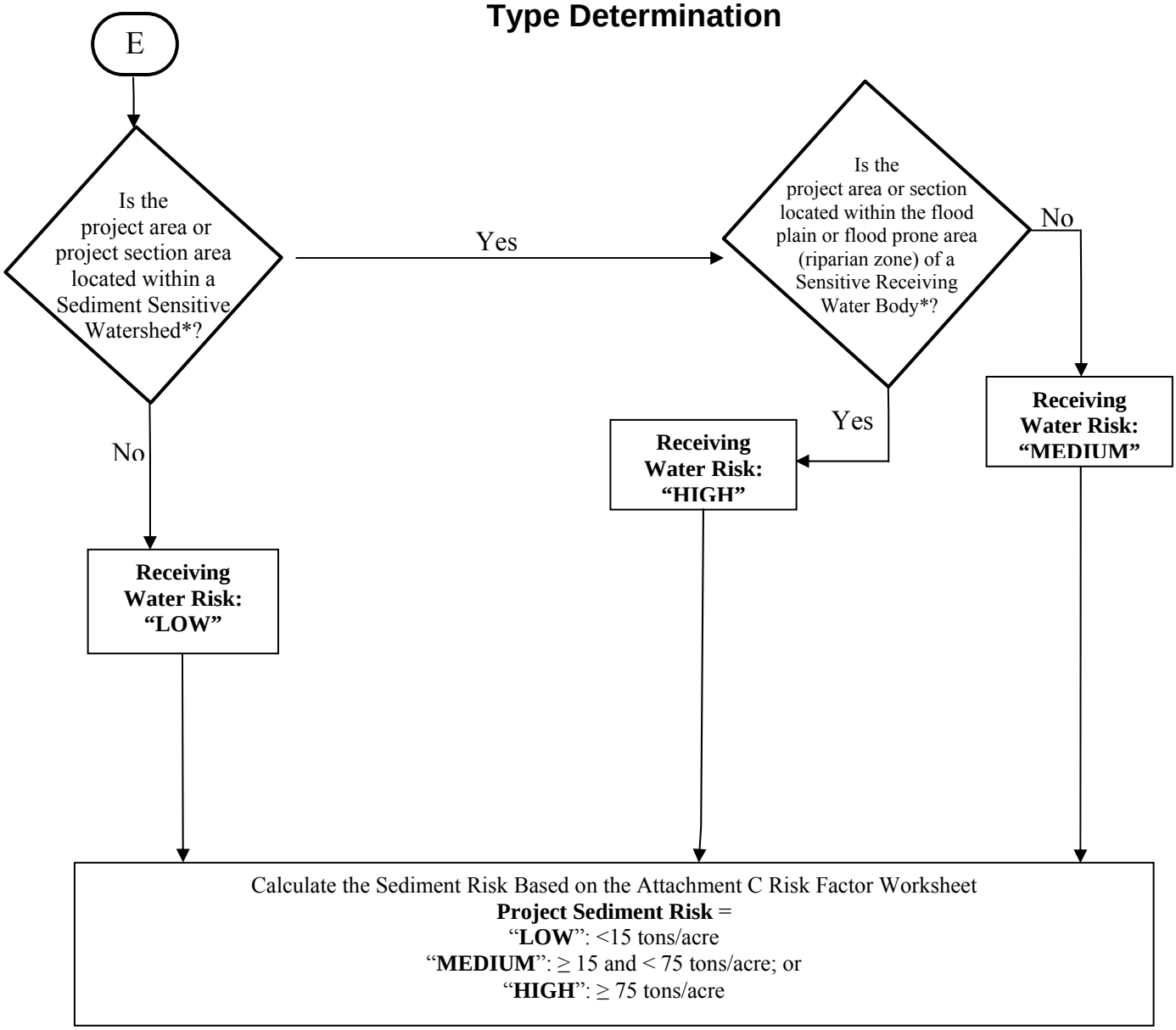

* See Definition of Terms

PROJECT SEDIMENT RISK

RECEIVING WATER RISK	**LOW**	**MEDIUM**	**HIGH**
LOW	Type 1	Type 1	Type 2
MEDIUM	Type 1	Type 2	Type 3
HIGH	Type 2	Type 3	Type 3

ATTACHMENT A.1
Definition of Terms

1. **Equivalent Condition** – Means disturbed soils such as those from trench excavation are required to be hauled away, backfilled into the trench, and/or covered (e.g., metal plates, pavement, plastic covers over spoil piles) at the end of the construction day.
2. **Linear Construction Activity** – Linear construction activity consists of underground/ overhead facilities that typically include, but are not limited to, any conveyance, pipe or pipeline for the transportation of any gaseous, liquid (including water, wastewater for domestic municipal services), liquescent, or slurry substance; any cable line or wire for the transmission of electrical energy; any cable line or wire for communications (e.g., telephone, telegraph, radio or television messages); and associated ancillary facilities. Construction activities associated with LUPs include, but are not limited to those activities necessary for the installation of underground and overhead linear facilities (e.g., conduits, substructures, pipelines, towers, poles, cables, wires, connectors, switching, regulating and transforming equipment and associated ancillary facilities) and include, but are not limited to, underground utility mark-out, potholing, concrete and asphalt cutting and removal, trenching, excavation, boring and drilling, access road and pole/ tower pad and cable/ wire pull station, substation construction, substructure installation, construction of tower footings and/or foundations, pole and tower installations, pipeline installations, welding, concrete and/or pavement repair or replacement, and stockpile/ borrow locations.
3. **Sediment Sensitive Receiving Water Body –** Defined as a water body segment that is listed on EPA's approved CWA 303(d) list for sedimentation/siltation, turbidity, or is designated with beneficial uses of SPAWN, MIGRATORY, and COLD.
4. **Sediment Sensitive Watershed –** Defined as a watershed draining into a receiving water body listed on EPA's approved CWA 303(d) list for sedimentation/siltation, turbidity, or a water body designated with beneficial uses of SPAWN, MIGRATORY, and COLD.

ATTACHMENT A.2
PERMIT REGISTRATION DOCUMENTS (PRDs)
GENERAL INSTRUCTIONS FOR LINEAR UNDERGROUND/OVERHEAD PROJECTS TO COMPLY WITH THE CONSTRUCTION GENERAL PERMIT

GENERAL INSTRUCTIONS

Who Must Submit

This permit is effective on July 1, 2010.

The Legally Responsible Person (LRP) for construction activities associated with linear underground/overhead project (LUP) must electronically apply for coverage under this General Permit on or after July 1, 2010. If it is determined that the LUP construction activities require an NPDES permit, the Legally Responsible Person[1] (LRP) shall submit PRDs for this General Permit in accordance with the following:

LUPs associated with Private or Municipal Development Projects

1. For LUPs associated with pre-development and pre-redevelopment construction activities:

   The LRP must obtain coverage[2] under this General Permit for its pre-development and pre-redevelopment construction activities where the total disturbed land area of these construction activities is greater than 1 acre.

2. For LUPs associated with new development and redevelopment construction projects:

   The LRP must obtain coverage under this General Permit for LUP construction activities associated with new development and redevelopment projects where the total disturbed land area of the LUP is greater than 1 acre. Coverage under this permit is not required where the same LUP construction activities are covered by another NPDES permit.

LUPs not associated with private or municipal new development or redevelopment projects:

The LRP must obtain coverage under this General Permit on or after July 1, 2010 for its LUP construction activities where the total disturbed land area is greater than 1 acre.

PRD Submittal Requirements

Prior to the start of construction activities a LRP must submit PRDs and fees to the State Water Board for each LUP.

New and Ongoing LUPs

Dischargers of new LUPs that commence construction activities after the adoption date of this General Permit shall file PRDs prior to the commencement of construction and implement the SWPPP upon the start of construction.

[1] person possessing the title of the land on which the construction activities will occur for the regulated site
[2] obtain coverage means filing PRDs for the project.

PERMIT REGISTRATION DOCUMENTS (PRDs)
GENERAL INSTRUCTIONS (CONTINUED)

Dischargers of ongoing LUPs that are currently covered under State Water Board Order No. 2003-0007 (Small LUP General Permit) shall electronically file Permit Registration Documents no later than July 1, 2010. After July 1, 2010, all NOIs subject to State Water Board Order No. 2003-0007-DWQ will be terminated. All existing dischargers shall be exempt from the risk determination requirements in Attachment A. All existing dischargers are therefore subject to LUP Type 1 requirements regardless of their project's sediment and receiving water risks. However, a Regional Board retains the authority to require an existing discharger to comply with the risk determination requirements in Attachment A.

Where to Apply

The Permit Registration Documents (PRDs) can be found at www.waterboards.ca.gov/water_issues/programs/stormwater/

Fees

The annual fee for storm water permits are established through the State of California Code of Regulations.

When Permit Coverage Commences

To obtain coverage under the General Permit, the LRP must include the complete PRDs and the annual fee. All PRDs deemed incomplete will be rejected with an explanation as to what is required to complete submittal. Upon receipt of complete PRDs and associated fee, each discharger will be sent a waste discharger's identification (WDID) number.

Projects and Activities Not Defined As Construction Activity

1. LUP construction activity does not include routine maintenance projects to maintain original line and grade, hydraulic capacity, or original purpose of the facility. Routine maintenance projects are projects associated with operations and maintenance activities that are conducted on existing lines and facilities and within existing right-of-way, easements, franchise agreements or other legally binding agreements of the discharger. Routine maintenance projects include, but are not limited to projects that are conducted to:

- Maintain the original purpose of the facility, or hydraulic capacity.
- Update existing lines[3] and facilities to comply with applicable codes, standards and regulations regardless if such projects result in increased capacity.
- Repairing leaks.

Routine maintenance does not include construction of new[4] lines or facilities resulting from compliance with applicable codes, standards and regulations.

[3] Update existing lines includes replacing existing lines with new materials or pipes.
[4] New lines are those that are not associated with existing facilities and are not part of a project to update or replace existing lines.

PERMIT REGISTRATION DOCUMENTS (PRDs)
GENERAL INSTRUCTIONS (CONTINUED)

Routine maintenance projects do not include those areas of maintenance projects that are outside of an existing right-of-way, franchise, easements, or agreements. When a project must acquire new areas, those areas may be subject to this General Permit based on the area of disturbed land outside the original right-of-way, easement or agreement.

2. LUP construction activity does not include field activities associated with the planning and design of a project (e.g., activities associated with route selection).

3. Tie-ins conducted immediately adjacent to "energized" or "pressurized" facilities by the discharger are not considered small construction activities where all other LUP construction activities associated with the tie-in are covered by a NOI and SWPPP of a third party or municipal agency.

Calculating Land Disturbance Areas of LUPs

The total land area disturbed for LUPs is the sum of the:

- Surface areas of trenches, laterals and ancillary facilities, plus
- Area of the base of stockpiles on unpaved surfaces, plus
- Surface area of the borrow area, plus
- Areas of paved surfaces constructed for the project, plus
- Areas of new roads constructed or areas of major reconstruction to existing roads (e.g. improvements to two-track surfaces or road widening) for the sole purpose of accessing construction activities or as part of the final project, plus
- Equipment and material storage, staging, and preparation areas (laydown areas) not on paved surfaces, plus
- Soil areas outside the surface area of trenches, laterals and ancillary facilities that will be graded, and/or disturbed by the use of construction equipment, vehicles and machinery during construction activities.

Stockpiling Areas

Stockpiling areas, borrow areas and the removal of soils from a construction site may or may not be included when calculating the area of disturbed soil for a site depending on the following conditions:

- For stockpiling of soils onsite or immediately adjacent to a LUP site and the stockpile is not on a paved surface, the area of the base of the stockpile is to be included in the disturbed area calculation.

- The surface area of borrow areas that are onsite or immediately adjacent to a project site are to be included in the disturbed area calculation.

- For soil that is hauled offsite to a location owned or operated by the discharger that is not a paved surface, the area of the base of the stockpile is to be included in the disturbed area calculation except when the offsite location is already subject to a separate storm water permit.

PERMIT REGISTRATION DOCUMENTS (PRDs)
GENERAL INSTRUCTIONS (CONTINUED)

- For soil that is brought to the project from an off-site location owned or operated by the discharger the surface area of the borrow pit is to be included in the disturbed area calculation except when the offsite location is already subject to a separate storm water permit.

- Trench spoils on a paved surface that are either returned to the trench or excavation or hauled away from the project daily for disposal or reuse will not be included in the disturbed area calculation.

If you have any questions concerning submittal of PRDs, please call the State Water Board at (866) 563-3107.

ATTACHMENT B
PERMIT REGISTRATION DOCUMENTS (PRDs) TO COMPLY WITH THE TERMS OF THE GENERAL PERMIT TO DISCHARGE STORM WATER ASSOCIATED WITH CONSTRUCTION ACTIVITY

GENERAL INSTRUCTIONS

A. All Linear Construction Projects shall comply with the PRD requirements in Attachment A.2 of this Order.

B. Who Must Submit

Discharges of storm water associated with construction that results in the disturbance of one acre or more of land must apply for coverage under the General Construction Storm Water Permit (General Permit). Any construction activity that is a part of a larger common plan of development or sale must also be permitted, regardless of size. (For example, if 0.5 acre of a 20-acre subdivision is disturbed by the construction activities of discharger A and the remaining 19.5 acres is to be developed by discharger B, discharger A must obtain a General Storm Water Permit for the 0.5 acre project).

Other discharges from construction activities that are covered under this General Permit can be found in the General Permit Section II.B.

It is the LRP's responsibility to obtain coverage under this General Permit by electronically submitting complete PRDs (Permit Registration Documents).

In all cases, the proper procedures for submitting the PRDs must be completed before construction can commence.

C. Construction Activity Not Covered By This General Permit

Discharges from construction that are not covered under this General Permit can be found in the General Permit Sections II.A &B..

D. Annual Fees and Fee Calculation

Annual fees are calculated based upon the total area of land to be disturbed not the total size of the acreage owned. However, the calculation includes all acres to be disturbed during the duration of the project. For example, if 10 acres are scheduled to be disturbed the first year and 10 in each subsequent year for 5 years, the annual fees would be based upon 50 acres of disturbance. The State Water Board will evaluate adding acreage to an existing Permit Waste Discharge Identification (WDID) number on a case-by-case basis. In general, any acreage to be considered must be contiguous to the permitted land area and the existing

SWPPP must be appropriate for the construction activity and topography of the acreage under consideration. As acreage is built out and stabilized or sold, the Change of Information (COI) form enables the applicant to remove those acres from inclusion in the annual fee calculation. Checks should be made payable to: State Water Board.

The Annual fees are established through regulations adopted by the State Water Board. The total annual fee is the current base fee plus applicable surcharges for all construction sites submitting an NOI, based on the total acreage to be disturbed during the life of the project. Annual fees are subject to change by regulation.

Dischargers that apply for and satisfy the Small Construction Erosivity Wavier requirements shall pay a fee of $200.00 plus an applicable surcharge, see the General Permit Section II.B.7.

E. When to Apply

LRP's proposing to conduct construction activities subject to this General Permit must submit their PRDs prior to the commencement of construction activity.

F. Requirements for Completing Permit Registration Documents (PRDs)

All dischargers required to comply with this General Permit shall electronically submit the required PRDs for their type of construction as defined below.

G. Standard PRD Requirements (All Dischargers)

1. Notice of Intent
2. Risk Assessment (Standard or Site-Specific)
3. Site Map
4. SWPPP
5. Annual Fee
6. Certification

H. Additional PRD Requirements Related to Construction Type

1. Discharger in unincorporated areas of the State (not covered under an adopted Phase I or II SUSMP requirements) and that are not a linear project shall also submit a completed:
   a. Post-Construction Water Balance Calculator (Appendix 2).

2. Dischargers who are proposing to implement ATS shall submit:
   a. Complete ATS Plan in accordance with Attachment F at least 14 days prior to the planned operation of the ATS and a paper copy shall be available onsite during ATS operation.

b. Certification proof that design done by a professional in accordance with Attachment F.

3. Dischargers who are proposing an alternate Risk Justification:
   a. Particle Size Analysis.

I. Exceptions to Standard PRD Requirements

Construction sites with an R value less than 5 as determined in the Risk Assessment are not required to submit a SWPPP.

J. Description of PRDs

1. Notice of Intent (NOI)

2. Site Map(s) Includes:
   a. The project's surrounding area (vicinity)
   b. Site layout
   c. Construction site boundaries
   d. Drainage areas
   e. Discharge locations
   f. Sampling locations
   g. Areas of soil disturbance (temporary or permanent)
   h. Active areas of soil disturbance (cut or fill)
   i. Locations of all runoff BMPs
   j. Locations of all erosion control BMPs
   k. Locations of all sediment control BMPs
   l. ATS location (if applicable)
   m. Locations of sensitive habitats, watercourses, or other features which are not to be disturbed
   n. Locations of all post-construction BMPs
   o. Locations of storage areas for waste, vehicles, service, loading/unloading of materials, access (entrance/exits) points to construction site, fueling, and water storage, water transfer for dust control and compaction practices

3. **SWPPPs**
   A site-specific SWPPP shall be developed by each discharger and shall be submitted with the PRDs.

4. **Risk Assessment**
   All dischargers shall use the Risk Assessment procedure as describe in the General Permit Appendix 1.

   a. The Standard Risk Assessment includes utilization of the following:
      i. Receiving water Risk Assessment interactive map

ii. EPA Rainfall Erosivity Factor Calculator Website
iii. Sediment Risk interactive map
iv. Sediment sensitive water bodies list

b. The Site-Specific Risk Assessment includes the completion of the hand calculated R value Risk Calculator

5. **Post-Construction Water Balance Calculator**
All dischargers subject to this requirement shall complete the Water Balance Calculator (in Appendix 2) in accordance with the instructions.

6. **ATS Design Document and Certification**
All dischargers using ATS must submit electronically their system design (as well as any supporting documentation) and proof that the system was designed by a qualified ATS design professional (See Attachment F).

To obtain coverage under the General Permit PRDs must be included and completed. If any of the required items are missing, the PRD submittal is considered incomplete and will be rejected. Upon receipt of a complete PRD submittal, the State Water Board will process the application package in the order received and assign a (WDID) number.

Questions?

If you have any questions on completing the PRDs please email stormwater@waterboards.ca.gov or call (866) 563-3107.

ATTACHMENT C
RISK LEVEL 1 REQUIREMENTS

A. Effluent Standards

[These requirements are the same as those in the General Permit order.]

1. Narrative – Risk Level 1 dischargers shall comply with the narrative effluent standards listed below:

   a. Storm water discharges and authorized non-storm water discharges regulated by this General Permit shall not contain a hazardous substance equal to or in excess of reportable quantities established in 40 C.F.R. §§ 117.3 and 302.4, unless a separate NPDES Permit has been issued to regulate those discharges.

   b. Dischargers shall minimize or prevent pollutants in storm water discharges and authorized non-storm water discharges through the use of controls, structures, and management practices that achieve BAT for toxic and non-conventional pollutants and BCT for conventional pollutants.

2. Numeric – Risk Level 1 dischargers are not subject to a numeric effluent standard.

B. Good Site Management "Housekeeping"

1. Risk Level 1 dischargers shall implement good site management (i.e., "housekeeping") measures for construction materials that could potentially be a threat to water quality if discharged. At a minimum, Risk Level 1 dischargers shall implement the following good housekeeping measures:

   a. Conduct an inventory of the products used and/or expected to be used and the end products that are produced and/or expected to be produced. This does not include materials and equipment that are designed to be outdoors and exposed to environmental conditions (i.e. poles, equipment pads, cabinets, conductors, insulators, bricks, etc.).

   b. Cover and berm loose stockpiled construction materials that are not actively being used (i.e. soil, spoils, aggregate, fly-ash, stucco, hydrated lime, etc.).

c. Store chemicals in watertight containers (with appropriate secondary containment to prevent any spillage or leakage) or in a storage shed (completely enclosed).

d. Minimize exposure of construction materials to precipitation. This does not include materials and equipment that are designed to be outdoors and exposed to environmental conditions (i.e. poles, equipment pads, cabinets, conductors, insulators, bricks, etc.).

e. Implement BMPs to prevent the off-site tracking of loose construction and landscape materials.

2. Risk Level 1 dischargers shall implement good housekeeping measures for waste management, which, at a minimum, shall consist of the following:

a. Prevent disposal of any rinse or wash waters or materials on impervious or pervious site surfaces or into the storm drain system.

b. Ensure the containment of sanitation facilities (e.g., portable toilets) to prevent discharges of pollutants to the storm water drainage system or receiving water.

c. Clean or replace sanitation facilities and inspecting them regularly for leaks and spills.

d. Cover waste disposal containers at the end of every business day and during a rain event.

e. Prevent discharges from waste disposal containers to the storm water drainage system or receiving water.

f. Contain and securely protect stockpiled waste material from wind and rain at all times unless actively being used.

g. Implement procedures that effectively address hazardous and non-hazardous spills.

h. Develop a spill response and implementation element of the SWPPP prior to commencement of construction activities. The SWPPP shall require that:

i. Equipment and materials for cleanup of spills shall be available on site and that spills and leaks shall be cleaned up immediately and disposed of properly; and

ii. Appropriate spill response personnel are assigned and trained.

i. Ensure the containment of concrete washout areas and other washout areas that may contain additional pollutants so there is no discharge into the underlying soil and onto the surrounding areas.

3. Risk Level 1 dischargers shall implement good housekeeping for vehicle storage and maintenance, which, at a minimum, shall consist of the following:

   a. Prevent oil, grease, or fuel to leak in to the ground, storm drains or surface waters.

   b. Place all equipment or vehicles, which are to be fueled, maintained and stored in a designated area fitted with appropriate BMPs.

   c. Clean leaks immediately and disposing of leaked materials properly.

4. Risk Level 1 dischargers shall implement good housekeeping for landscape materials, which, at a minimum, shall consist of the following:

   a. Contain stockpiled materials such as mulches and topsoil when they are not actively being used.

   b. Contain fertilizers and other landscape materials when they are not actively being used.

   c. Discontinue the application of any erodible landscape material within 2 days before a forecasted rain event or during periods of precipitation.

   d. Apply erodible landscape material at quantities and application rates according to manufacture recommendations or based on written specifications by knowledgeable and experienced field personnel.

   e. Stack erodible landscape material on pallets and covering or storing such materials when not being used or applied.

5. Risk Level 1 dischargers shall conduct an assessment and create a list of potential pollutant sources and identify any areas of the site where additional BMPs are necessary to reduce or prevent pollutants in storm water discharges and authorized non-storm water discharges. This potential pollutant list shall be kept with the SWPPP and shall identify

all non-visible pollutants which are known, or should be known, to occur on the construction site. At a minimum, when developing BMPs, Risk Level 1 dischargers shall do the following:

a. Consider the quantity, physical characteristics (e.g., liquid, powder, solid), and locations of each potential pollutant source handled, produced, stored, recycled, or disposed of at the site.

b. Consider the degree to which pollutants associated with those materials may be exposed to and mobilized by contact with storm water.

c. Consider the direct and indirect pathways that pollutants may be exposed to storm water or authorized non-storm water discharges. This shall include an assessment of past spills or leaks, non-storm water discharges, and discharges from adjoining areas.

d. Ensure retention of sampling, visual observation, and inspection records.

e. Ensure effectiveness of existing BMPs to reduce or prevent pollutants in storm water discharges and authorized non-storm water discharges.

6. Risk Level 1 dischargers shall implement good housekeeping measures on the construction site to control the air deposition of site materials and from site operations. Such particulates can include, but are not limited to, sediment, nutrients, trash, metals, bacteria, oil and grease and organics.

C. Non-Storm Water Management

1. Risk Level 1 dischargers shall implement measures to control all non-storm water discharges during construction.

2. Risk Level 1 dischargers shall wash vehicles in such a manner as to prevent non-storm water discharges to surface waters or MS4 drainage systems.

3. Risk Level 1 dischargers shall clean streets in such a manner as to prevent unauthorized non-storm water discharges from reaching surface water or MS4 drainage systems.

D. Erosion Control

1. Risk Level 1 dischargers shall implement effective wind erosion control.

2. Risk Level 1 dischargers shall provide effective soil cover for inactive[1] areas and all finished slopes, open space, utility backfill, and completed lots.

3. Risk Level 1 dischargers shall limit the use of plastic materials when more sustainable, environmentally friendly alternatives exist. Where plastic materials are deemed necessary, the discharger shall consider the use of plastic materials resistant to solar degradation.

E. Sediment Controls

1. Risk Level 1 dischargers shall establish and maintain effective perimeter controls and stabilize all construction entrances and exits to sufficiently control erosion and sediment discharges from the site.

2. On sites where sediment basins are to be used, Risk Level 1 dischargers shall, at minimum, design sediment basins according to the method provided in CASQA's Construction BMP Guidance Handbook.

F. Run-on and Runoff Controls

Risk Level 1 dischargers shall effectively manage all run-on, all runoff within the site and all runoff that discharges off the site. Run-on from off site shall be directed away from all disturbed areas or shall collectively be in compliance with the effluent limitations in this General Permit.

G. Inspection, Maintenance and Repair

1. Risk Level 1 dischargers shall ensure that all inspection, maintenance repair and sampling activities at the project location shall be performed or supervised by a Qualified SWPPP Practitioner (QSP) representing the discharger. The QSP may delegate any or all of these activities to an employee trained to do the task(s) appropriately, but shall ensure adequate deployment.

2. Risk Level 1 dischargers shall perform weekly inspections and observations, and at least once each 24-hour period during extended

[1] Inactive areas of construction are areas of construction activity that have been disturbed and are not scheduled to be re-disturbed for at least 14 days.

storm events, to identify and record BMPs that need maintenance to operate effectively, that have failed, or that could fail to operate as intended. Inspectors shall be the QSP or be trained by the QSP.

3. Upon identifying failures or other shortcomings, as directed by the QSP, Risk Level 1 dischargers shall begin implementing repairs or design changes to BMPs within 72 hours of identification and complete the changes as soon as possible.

4. For each inspection required, Risk Level 1 dischargers shall complete an inspection checklist, using a form provided by the State Water Board or Regional Water Board or in an alternative format.

5. Risk Level 1 dischargers shall ensure that checklists shall remain onsite with the SWPPP and at a minimum, shall include:

    a. Inspection date and date the inspection report was written.

    b. Weather information, including presence or absence of precipitation, estimate of beginning of qualifying storm event, duration of event, time elapsed since last storm, and approximate amount of rainfall in inches.

    c. Site information, including stage of construction, activities completed, and approximate area of the site exposed.

    d. A description of any BMPs evaluated and any deficiencies noted.

    e. If the construction site is safely accessible during inclement weather, list the observations of all BMPs: erosion controls, sediment controls, chemical and waste controls, and non-storm water controls. Otherwise, list the results of visual inspections at all relevant outfalls, discharge points, downstream locations and any projected maintenance activities.

    f. Report the presence of noticeable odors or of any visible sheen on the surface of any discharges.

    g. Any corrective actions required, including any necessary changes to the SWPPP and the associated implementation dates.

    h. Photographs taken during the inspection, if any.

    i. Inspector's name, title, and signature.

H. Rain Event Action Plan

Not required for Risk Level 1 dischargers.

I. Risk Level 1 Monitoring and Reporting Requirements

Table 1- Summary of Monitoring Requirements

Risk Level	Visual Inspections					Sample Collection	
	Quarterly Non-storm Water Discharge	Pre-storm Event		Daily Storm BMP	Post Storm	Storm Water Discharge	Receiving Water
		Baseline	REAP				
1	X	X		X	X		

1. **Construction Site Monitoring Program Requirements**

   a. Pursuant to Water Code Sections 13383 and 13267, all dischargers subject to this General Permit shall develop and implement a written site-specific Construction Site Monitoring Program (CSMP) in accordance with the requirements of this Section. The CSMP shall include all monitoring procedures and instructions, location maps, forms, and checklists as required in this section. The CSMP shall be developed prior to the commencement of construction activities, and revised as necessary to reflect project revisions. The CSMP shall be a part of the Storm Water Pollution Prevention Plan (SWPPP), included as an appendix or separate SWPPP chapter.

   b. Existing dischargers registered under the State Water Board Order No. 99-08-DWQ shall make and implement necessary revisions to their Monitoring Programs to reflect the changes in this General Permit in a timely manner, but no later than July 1, 2010. Existing dischargers shall continue to implement their existing Monitoring Programs in compliance with State Water Board Order No. 99-08-DWQ until the necessary revisions are completed according to the schedule above.

   c. When a change of ownership occurs for all or any portion of the construction site prior to completion or final stabilization, the new discharger shall comply with these requirements as of the date the ownership change occurs.

2. **Objectives**

   The CSMP shall be developed and implemented to address the following objectives:

   a. To demonstrate that the site is in compliance with the Discharge Prohibitions;

b. To determine whether non-visible pollutants are present at the construction site and are causing or contributing to exceedances of water quality objectives;

c. To determine whether immediate corrective actions, additional Best Management Practice (BMP) implementation, or SWPPP revisions are necessary to reduce pollutants in storm water discharges and authorized non-storm water discharges; and

d. To determine whether BMPs included in the SWPPP are effective in preventing or reducing pollutants in storm water discharges and authorized non-storm water discharges.

3. **Risk Level 1 - Visual Monitoring (Inspection) Requirements for Qualifying Rain Events**

a. Risk Level 1 dischargers shall visually observe (inspect) storm water discharges at all discharge locations within two business days (48 hours) after each qualifying rain event.

b. Risk Level 1 dischargers shall visually observe (inspect) the discharge of stored or contained storm water that is derived from and discharged subsequent to a qualifying rain event producing precipitation of ½ inch or more at the time of discharge. Stored or contained storm water that will likely discharge after operating hours due to anticipated precipitation shall be observed prior to the discharge during operating hours.

c. Risk Level 1 dischargers shall conduct visual observations (inspections) during business hours only.

d. Risk Level 1 dischargers shall record the time, date and rain gauge reading of all qualifying rain events.

e. Within 2 business days (48 hours) prior to each qualifying rain event, Risk Level 1 dischargers shall visually observe (inspect):

i. All storm water drainage areas to identify any spills, leaks, or uncontrolled pollutant sources. If needed, the discharger shall implement appropriate corrective actions.

ii. All BMPs to identify whether they have been properly implemented in accordance with the SWPPP. If needed, the discharger shall implement appropriate corrective actions.

iii. Any storm water storage and containment areas to detect leaks and ensure maintenance of adequate freeboard.

f. For the visual observations (inspections) described in e.i and e.iii above, Risk Level 1 dischargers shall observe the presence or absence of floating and suspended materials, a sheen on the surface, discolorations, turbidity, odors, and source(s) of any observed pollutants.

g. Within two business days (48 hours) after each qualifying rain event, Risk Level 1 dischargers shall conduct post rain event visual observations (inspections) to (1) identify whether BMPs were adequately designed, implemented, and effective, and (2) identify additional BMPs and revise the SWPPP accordingly.

h. Risk Level 1 dischargers shall maintain on-site records of all visual observations (inspections), personnel performing the observations, observation dates, weather conditions, locations observed, and corrective actions taken in response to the observations.

4. **Risk Level 1 – Visual Observation Exemptions**

a. Risk Level 1 dischargers shall be prepared to conduct visual observation (inspections) until the minimum requirements of Section I.3 above are completed. Risk Level 1 dischargers are not required to conduct visual observation (inspections) under the following conditions:

i. During dangerous weather conditions such as flooding and electrical storms.

ii. Outside of scheduled site business hours.

b. If no required visual observations (inspections) are collected due to these exceptions, Risk Level 1 dischargers shall include an explanation in their SWPPP and in the Annual Report documenting why the visual observations (inspections) were not conducted.

5. **Risk Level 1 – Monitoring Methods**

Risk Level 1 dischargers shall include a description of the visual observation locations, visual observation procedures, and visual observation follow-up and tracking procedures in the CSMP.

6. **Risk Level 1 – Non-Storm Water Discharge Monitoring Requirements**

a. Visual Monitoring Requirements:

   i. Risk Level 1 dischargers shall visually observe (inspect) each drainage area for the presence of (or indications of prior) unauthorized and authorized non-storm water discharges and their sources.

   ii. Risk Level 1 dischargers shall conduct one visual observation (inspection) quarterly in each of the following periods: January-March, April-June, July-September, and October-December. Visual observation (inspections) are only required during daylight hours (sunrise to sunset).

   iii. Risk Level 1 dischargers shall ensure that visual observations (inspections) document the presence or evidence of any non-storm water discharge (authorized or unauthorized), pollutant characteristics (floating and suspended material, sheen, discoloration, turbidity, odor, etc.), and source. Risk Level 1 dischargers shall maintain on-site records indicating the personnel performing the visual observation (inspections), the dates and approximate time each drainage area and non-storm water discharge was observed, and the response taken to eliminate unauthorized non-storm water discharges and to reduce or prevent pollutants from contacting non-storm water discharges.

7. **Risk Level 1 – Non-Visible Pollutant Monitoring Requirements**

   a. Risk Level 1 dischargers shall collect one or more samples during any breach, malfunction, leakage, or spill observed during a visual inspection which could result in the discharge of pollutants to surface waters that would not be visually detectable in storm water.

   b. Risk Level 1 dischargers shall ensure that water samples are large enough to characterize the site conditions.

   c. Risk Level 1 dischargers shall collect samples at all discharge locations that can be safely accessed.

   d. Risk Level 1 dischargers shall collect samples during the first two hours of discharge from rain events that occur during business hours and which generate runoff.

   e. Risk Level 1 dischargers shall analyze samples for all non-visible pollutant parameters (if applicable) - parameters indicating the

presence of pollutants identified in the pollutant source assessment required (Risk Level 1 dischargers shall modify their CSMPs to address these additional parameters in accordance with any updated SWPPP pollutant source assessment).

f. Risk Level 1 dischargers shall collect a sample of storm water that has not come in contact with the disturbed soil or the materials stored or used on-site (uncontaminated sample) for comparison with the discharge sample.

g. Risk Level 1 dischargers shall compare the uncontaminated sample to the samples of discharge using field analysis or through laboratory analysis.[2]

h. Risk Level 1 dischargers shall keep all field /or analytical data in the SWPPP document.

8. **Risk Level 1 – Particle Size Analysis for Project Risk Justification**

Risk Level 1 dischargers justifying an alternative project risk shall report a soil particle size analysis used to determine the RUSLE K-Factor. ASTM D-422 (Standard Test Method for Particle-Size Analysis of Soils), as revised, shall be used to determine the percentages of sand, very fine sand, silt, and clay on the site.

9. **Risk Level 1 – Records**

Risk Level 1 dischargers shall retain records of all storm water monitoring information and copies of all reports (including Annual Reports) for a period of at least three years. Risk Level 1 dischargers shall retain all records on-site while construction is ongoing. These records include:

a. The date, place, time of facility inspections, sampling, visual observation (inspections), and/or measurements, including precipitation.

b. The individual(s) who performed the facility inspections, sampling, visual observation (inspections), and or measurements.

c. The date and approximate time of analyses.

d. The individual(s) who performed the analyses.

[2] For laboratory analysis, all sampling, sample preservation, and analyses must be conducted according to test procedures under 40 CFR Part 136. Field discharge samples shall be collected and analyzed according to the specifications of the manufacturer of the sampling devices employed.

e. A summary of all analytical results from the last three years, the method detection limits and reporting units, and the analytical techniques or methods used.

f. Rain gauge readings from site inspections.

g. Quality assurance/quality control records and results.

h. Non-storm water discharge inspections and visual observation (inspections) and storm water discharge visual observation records (see Sections I.3 and I.6 above).

i. Visual observation and sample collection exception records (see Section I.4 above).

j. The records of any corrective actions and follow-up activities that resulted from analytical results, visual observation (inspections), or inspections.

ATTACHMENT D
RISK LEVEL 2 REQUIREMENTS

A. Effluent Standards

[These requirements are the same as those in the General Permit order.]

1. Narrative – Risk Level 2 dischargers shall comply with the narrative effluent standards listed below:

   a. Storm water discharges and authorized non-storm water discharges regulated by this General Permit shall not contain a hazardous substance equal to or in excess of reportable quantities established in 40 C.F.R. §§ 117.3 and 302.4, unless a separate NPDES Permit has been issued to regulate those discharges.

   b. Dischargers shall minimize or prevent pollutants in storm water discharges and authorized non-storm water discharges through the use of controls, structures, and management practices that achieve BAT for toxic and non-conventional pollutants and BCT for conventional pollutants.

2. Numeric – Risk level 2 dischargers are subject to a pH NAL of 6.5-8.5, and a turbidity NAL of 250 NTU.

B. Good Site Management "Housekeeping"

1. Risk Level 2 dischargers shall implement good site management (i.e., "housekeeping") measures for construction materials that could potentially be a threat to water quality if discharged. At a minimum, Risk Level 2 dischargers shall implement the following good housekeeping measures:

   a. Conduct an inventory of the products used and/or expected to be used and the end products that are produced and/or expected to be produced. This does not include materials and equipment that are designed to be outdoors and exposed to environmental conditions (i.e. poles, equipment pads, cabinets, conductors, insulators, bricks, etc.).

   b. Cover and berm loose stockpiled construction materials that are not actively being used (i.e. soil, spoils, aggregate, fly-ash, stucco, hydrated lime, etc.).

c. Store chemicals in watertight containers (with appropriate secondary containment to prevent any spillage or leakage) or in a storage shed (completely enclosed).

d. Minimize exposure of construction materials to precipitation. This does not include materials and equipment that are designed to be outdoors and exposed to environmental conditions (i.e. poles, equipment pads, cabinets, conductors, insulators, bricks, etc.).

e. Implement BMPs to prevent the off-site tracking of loose construction and landscape materials.

2. Risk Level 2 dischargers shall implement good housekeeping measures for waste management, which, at a minimum, shall consist of the following:

a. Prevent disposal of any rinse or wash waters or materials on impervious or pervious site surfaces or into the storm drain system.

b. Ensure the containment of sanitation facilities (e.g., portable toilets) to prevent discharges of pollutants to the storm water drainage system or receiving water.

c. Clean or replace sanitation facilities and inspecting them regularly for leaks and spills.

d. Cover waste disposal containers at the end of every business day and during a rain event.

e. Prevent discharges from waste disposal containers to the storm water drainage system or receiving water.

f. Contain and securely protect stockpiled waste material from wind and rain at all times unless actively being used.

g. Implement procedures that effectively address hazardous and non-hazardous spills.

h. Develop a spill response and implementation element of the SWPPP prior to commencement of construction activities. The SWPPP shall require:

i. Equipment and materials for cleanup of spills shall be available on site and that spills and leaks shall be cleaned up immediately and disposed of properly.

ii. Appropriate spill response personnel are assigned and trained.

i. Ensure the containment of concrete washout areas and other washout areas that may contain additional pollutants so there is no discharge into the underlying soil and onto the surrounding areas.

3. Risk Level 2 dischargers shall implement good housekeeping for vehicle storage and maintenance, which, at a minimum, shall consist of the following:

   a. Prevent oil, grease, or fuel to leak in to the ground, storm drains or surface waters.

   b. Place all equipment or vehicles, which are to be fueled, maintained and stored in a designated area fitted with appropriate BMPs.

   c. Clean leaks immediately and disposing of leaked materials properly.

4. Risk Level 2 dischargers shall implement good housekeeping for landscape materials, which, at a minimum, shall consist of the following:

   a. Contain stockpiled materials such as mulches and topsoil when they are not actively being used.

   b. Contain all fertilizers and other landscape materials when they are not actively being used.

   c. Discontinue the application of any erodible landscape material within 2 days before a forecasted rain event or during periods of precipitation.

   d. Apply erodible landscape material at quantities and application rates according to manufacture recommendations or based on written specifications by knowledgeable and experienced field personnel.

   e. Stack erodible landscape material on pallets and covering or storing such materials when not being used or applied.

5. Risk Level 2 dischargers shall conduct an assessment and create a list of potential pollutant sources and identify any areas of the site where additional BMPs are necessary to reduce or prevent pollutants in storm water discharges and authorized non-storm water discharges. This potential pollutant list shall be kept with the SWPPP and shall identify

all non-visible pollutants which are known, or should be known, to occur on the construction site. At a minimum, when developing BMPs, Risk Level 2 dischargers shall do the following:

a. Consider the quantity, physical characteristics (e.g., liquid, powder, solid), and locations of each potential pollutant source handled, produced, stored, recycled, or disposed of at the site.

b. Consider the degree to which pollutants associated with those materials may be exposed to and mobilized by contact with storm water.

c. Consider the direct and indirect pathways that pollutants may be exposed to storm water or authorized non-storm water discharges. This shall include an assessment of past spills or leaks, non-storm water discharges, and discharges from adjoining areas.

d. Ensure retention of sampling, visual observation, and inspection records.

e. Ensure effectiveness of existing BMPs to reduce or prevent pollutants in storm water discharges and authorized non-storm water discharges.

6. Risk Level 2 dischargers shall implement good housekeeping measures on the construction site to control the air deposition of site materials and from site operations. Such particulates can include, but are not limited to, sediment, nutrients, trash, metals, bacteria, oil and grease and organics.

7. **Additional Risk Level 2 Requirement:** Risk Level 2 dischargers shall document all housekeeping BMPs in the SWPPP and REAP(s) in accordance with the nature and phase of the construction project. Construction phases at traditional land development projects include Grading and Land Development Phase, Streets and Utilities, or Vertical Construction for traditional land development projects.

C. Non-Storm Water Management

1. Risk Level 2 dischargers shall implement measures to control all non-storm water discharges during construction.

2. Risk Level 2 dischargers shall wash vehicles in such a manner as to prevent non-storm water discharges to surface waters or MS4 drainage systems.

3. Risk Level 2 dischargers shall clean streets in such a manner as to prevent unauthorized non-storm water discharges from reaching surface water or MS4 drainage systems.

D. Erosion Control

1. Risk Level 2 dischargers shall implement effective wind erosion control.

2. Risk Level 2 dischargers shall provide effective soil cover for inactive[1] areas and all finished slopes, open space, utility backfill, and completed lots.

3. Risk Level 2 dischargers shall limit the use of plastic materials when more sustainable, environmentally friendly alternatives exist. Where plastic materials are deemed necessary, the discharger shall consider the use of plastic materials resistant to solar degradation.

E. Sediment Controls

1. Risk Level 2 dischargers shall establish and maintain effective perimeter controls and stabilize all construction entrances and exits to sufficiently control erosion and sediment discharges from the site.

2. On sites where sediment basins are to be used, Risk Level 2 dischargers shall, at minimum, design sediment basins according to the method provided in CASQA's Construction BMP Guidance Handbook.

3. **Additional Risk Level 2 Requirement:** Risk Level 2 dischargers shall implement appropriate erosion control BMPs (runoff control and soil stabilization) in conjunction with sediment control BMPs for areas under active[2] construction.

4. **Additional Risk Level 2 Requirement:** Risk Level 2 dischargers shall apply linear sediment controls along the toe of the slope, face of the slope, and at the grade breaks of exposed slopes to comply with sheet flow lengths[3] in accordance with Table 1.

Table 1 - Critical Slope/Sheet Flow Length Combinations

Slope Percentage	Sheet flow length not

[1] Inactive areas of construction are areas of construction activity that have been disturbed and are not scheduled to be re-disturbed for at least 14 days.
[2] Active areas of construction are areas undergoing land surface disturbance. This includes construction activity during the preliminary stage, mass grading stage, streets and utilities stage and the vertical construction stage.
[3] Sheet flow length is the length that shallow, low velocity flow travels across a site.

	to exceed
0-25% 20	feet
25-50% 15	feet
Over 50%	10 feet

5. **Additional Risk Level 2 Requirement:** Risk Level 2 dischargers shall ensure that construction activity traffic to and from the project is limited to entrances and exits that employ effective controls to prevent offsite tracking of sediment.

6. **Additional Risk Level 2 Requirement:** Risk Level 2 dischargers shall ensure that all storm drain inlets and perimeter controls, runoff control BMPs, and pollutant controls at entrances and exits (e.g. tire washoff locations) are maintained and protected from activities that reduce their effectiveness.

7. **Additional Risk Level 2 Requirement:** Risk Level 2 dischargers shall inspect on a daily basis all immediate access roads daily. At a minimum daily (when necessary) and prior to any rain event, the discharger shall remove any sediment or other construction activity-related materials that are deposited on the roads (by vacuuming or sweeping).

F. Run-on and Run-off Controls

Risk Level 2 dischargers shall effectively manage all run-on, all runoff within the site and all runoff that discharges off the site. Run-on from off site shall be directed away from all disturbed areas or shall collectively be in compliance with the effluent limitations in this General Permit.

G. Inspection, Maintenance and Repair

1. Risk Level 2 dischargers shall ensure that all inspection, maintenance repair and sampling activities at the project location shall be performed or supervised by a Qualified SWPPP Practitioner (QSP) representing the discharger. The QSP may delegate any or all of these activities to an employee appropriately trained to do the task(s).

2. Risk Level 2 dischargers shall perform weekly inspections and observations, and at least once each 24-hour period during extended storm events, to identify and record BMPs that need maintenance to operate effectively, that have failed, or that could fail to operate as intended. Inspectors shall be the QSP or be trained by the QSP.

3. Upon identifying failures or other shortcomings, as directed by the QSP, Risk Level 2 dischargers shall begin implementing repairs or

design changes to BMPs within 72 hours of identification and complete the changes as soon as possible.

4. For each inspection required, Risk Level 2 dischargers shall complete an inspection checklist, using a form provided by the State Water Board or Regional Water Board or in an alternative format.

5. Risk Level 2 dischargers shall ensure that checklists shall remain onsite with the SWPPP and at a minimum, shall include:

   a. Inspection date and date the inspection report was written.

   b. Weather information, including presence or absence of precipitation, estimate of beginning of qualifying storm event, duration of event, time elapsed since last storm, and approximate amount of rainfall in inches.

   c. Site information, including stage of construction, activities completed, and approximate area of the site exposed.

   d. A description of any BMPs evaluated and any deficiencies noted.

   e. If the construction site is safely accessible during inclement weather, list the observations of all BMPs: erosion controls, sediment controls, chemical and waste controls, and non-storm water controls. Otherwise, list the results of visual inspections at all relevant outfalls, discharge points, downstream locations and any projected maintenance activities.

   f. Report the presence of noticeable odors or of any visible sheen on the surface of any discharges.

   g. Any corrective actions required, including any necessary changes to the SWPPP and the associated implementation dates.

   h. Photographs taken during the inspection, if any.

   i. Inspector's name, title, and signature.

H. Rain Event Action Plan

1. **Additional Risk Level 2 Requirement:** The discharger shall ensure a QSP develop a Rain Event Action Plan (REAP) 48 hours prior to any likely precipitation event. A likely precipitation event is any weather pattern that is forecast to have a 50% or greater probability of producing precipitation in the project area. The discharger shall

ensure a QSP obtain a printed copy of precipitation forecast information from the National Weather Service Forecast Office (e.g., by entering the zip code of the project's location at http://www.srh.noaa.gov/forecast).

2. **Additional Risk Level 2 Requirement:** The discharger shall ensure a QSP develop the REAPs for all phases of construction (i.e., Grading and Land Development, Streets and Utilities, Vertical Construction, Final Landscaping and Site Stabilization).

3. **Additional Risk Level 2 Requirement:** The discharger shall ensure a QSP ensure that the REAP include, at a minimum, the following site information:

   a. Site Address
   b. Calculated Risk Level (2 or 3)
   c. Site Storm Water Manager Information including the name, company, and 24-hour emergency telephone number
   d. Erosion and Sediment Control Provider information including the name, company, and 24-hour emergency telephone number
   e. Storm Water Sampling Agent information including the name, company, and 24-hour emergency telephone number

4. **Additional Risk Level 2 Requirement:** The discharger shall ensure a QSP include in the REAP, at a minimum, the following project phase information:

   a. Activities associated with each construction phase
   b. Trades active on the construction site during each construction phase
   c. Trade contractor information
   d. Suggested actions for each project phase

5. **Additional Risk Level 2 Requirement:** The discharger shall ensure a QSP develop additional REAPs for project sites where construction activities are indefinitely halted or postponed (Inactive Construction). At a minimum, Inactive Construction REAPs must include:

   a. Site Address
   b. Calculated Risk Level (2 or 3)
   c. Site Storm Water Manager Information including the name, company, and 24-hour emergency telephone number
   d. Erosion and Sediment Control Provider information including the name, company, and 24-hour emergency telephone number
   e. Storm Water Sampling Agent information including the name, company, and 24-hour emergency telephone number

f. Trades active on site during Inactive Construction
g. Trade contractor information
h. Suggested actions for inactive construction sites

6. **Additional Risk Level 2 Requirement:** The discharger shall ensure a QSP begin implementation and make the REAP available onsite no later than 24 hours prior to the likely precipitation event.

7. **Additional Risk Level 2 Requirement:** The discharger shall ensure a QSP maintain onsite a paper copy of each REAP onsite in compliance with the record retention requirements of the Special Provisions in this General Permit.

I. Risk Level 2 Monitoring and Reporting Requirements

Table 2- Summary of Monitoring Requirements

Risk Level	Visual Inspections					Sample Collection	
	Quarterly Non-storm Water Discharge	Pre-storm Event		Daily Storm BMP	Post Storm	Storm Water Discharge	Receiving Water
		Baseline	REAP				
2	X	X	X	X	X	X	

1. Construction Site Monitoring Program Requirements

   a. Pursuant to Water Code Sections 13383 and 13267, all dischargers subject to this General Permit shall develop and implement a written site-specific Construction Site Monitoring Program (CSMP) in accordance with the requirements of this Section. The CSMP shall include all monitoring procedures and instructions, location maps, forms, and checklists as required in this section. The CSMP shall be developed prior to the commencement of construction activities, and revised as necessary to reflect project revisions. The CSMP shall be a part of the Storm Water Pollution Prevention Plan (SWPPP), included as an appendix or separate SWPPP chapter.

   b. Existing dischargers registered under the State Water Board Order No. 99-08-DWQ shall make and implement necessary revisions to their Monitoring Program to reflect the changes in this General Permit in a timely manner, but no later than July 1, 2010. Existing dischargers shall continue to implement their existing Monitoring Programs in compliance with State Water Board Order No. 99-08-DWQ until the necessary revisions are completed according to the schedule above.

   c. When a change of ownership occurs for all or any portion of the construction site prior to completion or final stabilization, the new discharger shall comply with these requirements as of the date the ownership change occurs.

2. **Objectives**

   The CSMP shall be developed and implemented to address the following objectives:

a. To demonstrate that the site is in compliance with the Discharge Prohibitions and applicable Numeric Action Levels (NALs)/Numeric Effluent Limitations (NELs) of this General Permit.

b. To determine whether non-visible pollutants are present at the construction site and are causing or contributing to exceedances of water quality objectives.

c. To determine whether immediate corrective actions, additional Best Management Practice (BMP) implementation, or SWPPP revisions are necessary to reduce pollutants in storm water discharges and authorized non-storm water discharges.

d. To determine whether BMPs included in the SWPPP/Rain Event Action Plan (REAP) are effective in preventing or reducing pollutants in storm water discharges and authorized non-storm water discharges.

3. **Risk Level 2 – Visual Monitoring (Inspection) Requirements for Qualifying Rain Events**

a. Risk Level 2 dischargers shall visually observe (inspect) storm water discharges at all discharge locations within two business days (48 hours) after each qualifying rain event.

b. Risk Level 2 dischargers shall visually observe (inspect) the discharge of stored or contained storm water that is derived from and discharged subsequent to a qualifying rain event producing precipitation of ½ inch or more at the time of discharge. Stored or contained storm water that will likely discharge after operating hours due to anticipated precipitation shall be observed prior to the discharge during operating hours.

c. Risk Level 2 dischargers shall conduct visual observations (inspections) during business hours only.

d. Risk Level 2 dischargers shall record the time, date and rain gauge reading of all qualifying rain events.

e. Within 2 business days (48 hours) prior to each qualifying rain event, Risk Level 2 dischargers shall visually observe (inspect):

i. all storm water drainage areas to identify any spills, leaks, or uncontrolled pollutant sources. If needed, the discharger shall implement appropriate corrective actions.

ii. all BMPs to identify whether they have been properly implemented in accordance with the SWPPP/REAP. If needed, the discharger shall implement appropriate corrective actions.

iii. any storm water storage and containment areas to detect leaks and ensure maintenance of adequate freeboard.

f. For the visual observations (inspections) described in c.i and c.iii above, Risk Level 2 dischargers shall observe the presence or absence of floating and suspended materials, a sheen on the surface, discolorations, turbidity, odors, and source(s) of any observed pollutants.

g. Within two business days (48 hours) after each qualifying rain event, Risk Level 2 dischargers shall conduct post rain event visual observations (inspections) to (1) identify whether BMPs were adequately designed, implemented, and effective, and (2) identify additional BMPs and revise the SWPPP accordingly.

h. Risk Level 2 dischargers shall maintain on-site records of all visual observations (inspections), personnel performing the observations, observation dates, weather conditions, locations observed, and corrective actions taken in response to the observations.

4. **Risk Level 2 – Water Quality Sampling and Analysis**

a. Risk Level 2 dischargers shall collect storm water grab samples from sampling locations, as defined in Section I.5. The storm water grab sample(s) obtained shall be representative of the flow and characteristics of the discharge.

b. At minimum, Risk Level 2 dischargers shall collect 3 samples per day of the qualifying event.

c. Risk Level 2 dischargers shall ensure that the grab samples collected of stored or contained storm water are from discharges subsequent to a qualifying rain event (producing precipitation of ½ inch or more at the time of discharge).

<u>Storm Water Effluent Monitoring Requirements</u>

d. Risk Level 2 dischargers shall analyze their effluent samples for:

i. pH and turbidity.

ii. Any additional parameters for which monitoring is required by the Regional Water Board.

5. **Risk Level 2 – Storm Water Discharge Water Quality Sampling Locations**

Effluent Sampling Locations

a. Risk Level 2 dischargers shall perform sampling and analysis of storm water discharges to characterize discharges associated with construction activity from the entire project disturbed area.

b. Risk Level 2 dischargers shall collect effluent samples at all discharge points where storm water is discharged off-site.

c. Risk Level 2 dischargers shall ensure that storm water discharge collected and observed represent[4] the effluent in each drainage area based on visual observation of the water and upstream conditions.

d. Risk Level 2 dischargers shall monitor and report site run-on from surrounding areas if there is reason to believe run-on may contribute to an exceedance of NALs or NELs.

e. Risk Level 2 dischargers who deploy an ATS on their site, or a portion on their site, shall collect ATS effluent samples and measurements from the discharge pipe or another location representative of the nature of the discharge.

f. Risk Level 2 dischargers shall select analytical test methods from the list provided in Table 3 below.

g. All storm water sample collection preservation and handling shall be conducted in accordance with Section I.7 “Storm Water Sample Collection and Handling Instructions” below.

6. **Risk Level 2 – Visual Observation and Sample Collection Exemptions**

a. Risk Level 2 dischargers shall be prepared to collect samples and conduct visual observation (inspections) until the minimum requirements of Sections I.3 and I.4 above are completed. Risk

[4] For example, if there has been concrete work recently in an area, or drywall scrap is exposed to the rain, a pH sample shall be taken of drainage from the relevant work area. Similarly, if sediment laden water is flowing through some parts of a silt fence, samples shall be taken of the sediment-laden water even if most water flowing through the fence is clear.

Level 2 dischargers are not required to physically collect samples or conduct visual observation (inspections) under the following conditions:

i. During dangerous weather conditions such as flooding and electrical storms.

ii. Outside of scheduled site business hours.

b. If no required samples or visual observation (inspections) are collected due to these exceptions, Risk Level 2 dischargers shall include an explanation in their SWPPP and in the Annual Report documenting why the sampling or visual observation (inspections) were not conducted.

7. **Risk Level 2 – Storm Water Sample Collection and Handling Instructions**

a. Risk Level 2 dischargers shall refer to Table 3 below for test methods, detection limits, and reporting units.

b. Risk Level 2 dischargers shall ensure that testing laboratories will receive samples within 48 hours of the physical sampling (unless otherwise required by the laboratory), and shall use only the sample containers provided by the laboratory to collect and store samples.

c. Risk Level 2 dischargers shall designate and train personnel to collect, maintain, and ship samples in accordance with the Surface Water Ambient Monitoring Program's (SWAMP) 2008 Quality Assurance Program Plan (QAPrP).[5]

8. **Risk Level 2 – Monitoring Methods**

a. Risk Level 2 dischargers shall include a description of the following items in the CSMP:

i. Visual observation locations, visual observation procedures, and visual observation follow-up and tracking procedures.

ii. Sampling locations, and sample collection and handling procedures. This shall include detailed procedures for sample

[5] Additional information regarding SWAMP's QAPrP and QAMP can be found at http://www.waterboards.ca.gov/water_issues/programs/swamp/.
QAPrP:http://www.waterboards.ca.gov/water_issues/programs/swamp/docs/qapp/swamp_qapp_master090108a.pdf.
QAMP: http://www.waterboards.ca.gov/water_issues/programs/swamp/qamp.shtml.

collection, storage, preservation, and shipping to the testing lab to assure that consistent quality control and quality assurance is maintained. Dischargers shall attach to the monitoring program an example Chain of Custody form used when handling and shipping samples.

iii. Identification of the analytical methods and related method detection limits (if applicable) for each parameter required in Section I.4 above.

b. Risk Level 2 dischargers shall ensure that all sampling and sample preservation are in accordance with the current edition of "Standard Methods for the Examination of Water and Wastewater" (American Public Health Association). All monitoring instruments and equipment (including a discharger's own field instruments for measuring pH and turbidity) should be calibrated and maintained in accordance with manufacturers' specifications to ensure accurate measurements. Risk Level 2 dischargers shall ensure that all laboratory analyses are conducted according to test procedures under 40 CFR Part 136, unless other test procedures have been specified in this General Permit or by the Regional Water Board. With the exception of field analysis conducted by the discharger for turbidity and pH, all analyses should be sent to and conducted at a laboratory certified for such analyses by the State Department of Health Services. Risk Level 2 dischargers shall conduct their own field analysis of pH and may conduct their own field analysis of turbidity if the discharger has sufficient capability (qualified and trained employees, properly calibrated and maintained field instruments, etc.) to adequately perform the field analysis.

9. **Risk Level 2 – Analytical Methods**

a. Risk Level 2 dischargers shall refer to Table 3 below for test methods, detection limits, and reporting units.

b. **pH**: Risk Level 2 dischargers shall perform pH analysis on-site with a calibrated pH meter or a pH test kit. Risk Level 2 dischargers shall record pH monitoring results on paper and retain these records in accordance with Section I.14, below.

c. **Turbidity**: Risk Level 2 dischargers shall perform turbidity analysis using a calibrated turbidity meter (turbidimeter), either on-site or at an accredited lab. Acceptable test methods include Standard Method 2130 or USEPA Method 180.1. The results will be recorded in the site log book in Nephelometric Turbidity Units (NTU).

10. **Risk Level 2 - Non-Storm Water Discharge Monitoring Requirements**

    a. Visual Monitoring Requirements:

        i. Risk Level 2 dischargers shall visually observe (inspect) each drainage area for the presence of (or indications of prior) unauthorized and authorized non-storm water discharges and their sources.

        ii. Risk Level 2 dischargers shall conduct one visual observation (inspection) quarterly in each of the following periods: January-March, April-June, July-September, and October-December. Visual observation (inspections) are only required during daylight hours (sunrise to sunset).

        iii. Risk Level 2 dischargers shall ensure that visual observations (inspections) document the presence or evidence of any non-storm water discharge (authorized or unauthorized), pollutant characteristics (floating and suspended material, sheen, discoloration, turbidity, odor, etc.), and source. Risk Level 2 dischargers shall maintain on-site records indicating the personnel performing the visual observation (inspections), the dates and approximate time each drainage area and non-storm water discharge was observed, and the response taken to eliminate unauthorized non-storm water discharges and to reduce or prevent pollutants from contacting non-storm water discharges.

    b. Effluent Sampling Locations:

        i. Risk Level 2 dischargers shall sample effluent at all discharge points where non-storm water and/or authorized non-storm water is discharged off-site.

        ii. Risk Level 2 dischargers shall send all non-storm water sample analyses to a laboratory certified for such analyses by the State Department of Health Services.

        iii. Risk Level 2 dischargers shall monitor and report run-on from surrounding areas if there is reason to believe run-on may contribute to an exceedance of NALs.

11. **Risk Level 2 – Non-Visible Pollutant Monitoring Requirements**

a. Risk Level 2 dischargers shall collect one or more samples during any breach, malfunction, leakage, or spill observed during a visual inspection which could result in the discharge of pollutants to surface waters that would not be visually detectable in storm water.

b. Risk Level 2 dischargers shall ensure that water samples are large enough to characterize the site conditions.

c. Risk Level 2 dischargers shall collect samples at all discharge locations that can be safely accessed.

d. Risk Level 2 dischargers shall collect samples during the first two hours of discharge from rain events that occur during business hours and which generate runoff.

e. Risk Level 2 dischargers shall analyze samples for all non-visible pollutant parameters (if applicable) - parameters indicating the presence of pollutants identified in the pollutant source assessment required (Risk Level 2 dischargers shall modify their CSMPs to address these additional parameters in accordance with any updated SWPPP pollutant source assessment).

f. Risk Level 2 dischargers shall collect a sample of storm water that has not come in contact with the disturbed soil or the materials stored or used on-site (uncontaminated sample) for comparison with the discharge sample.

g. Risk Level 2 dischargers shall compare the uncontaminated sample to the samples of discharge using field analysis or through laboratory analysis.[6]

h. Risk Level 2 dischargers shall keep all field /or analytical data in the SWPPP document.

12. **Risk Level 2 – Watershed Monitoring Option**

Risk Level 2 dischargers who are part of a qualified regional watershed-based monitoring program may be eligible for relief from the requirements in Sections I.5. The Regional Water Board may approve proposals to substitute an acceptable watershed-based monitoring program by determining if the watershed-based monitoring program

[6] For laboratory analysis, all sampling, sample preservation, and analyses must be conducted according to test procedures under 40 CFR Part 136. Field discharge samples shall be collected and analyzed according to the specifications of the manufacturer of the sampling devices employed.

will provide substantially similar monitoring information in evaluating discharger compliance with the requirements of this General Permit.

13. **Risk Level 2 – Particle Size Analysis for Project Risk Justification**

Risk Level 2 dischargers justifying an alternative project risk shall report a soil particle size analysis used to determine the RUSLE K-Factor. ASTM D-422 (Standard Test Method for Particle-Size Analysis of Soils), as revised, shall be used to determine the percentages of sand, very fine sand, silt, and clay on the site.

14. **Risk Level 2 – Records**

Risk Level 2 dischargers shall retain records of all storm water monitoring information and copies of all reports (including Annual Reports) for a period of at least three years. Risk Level 2 dischargers shall retain all records on-site while construction is ongoing. These records include:

a. The date, place, time of facility inspections, sampling, visual observation (inspections), and/or measurements, including precipitation.

b. The individual(s) who performed the facility inspections, sampling, visual observation (inspections), and or measurements.

c. The date and approximate time of analyses.

d. The individual(s) who performed the analyses.

e. A summary of all analytical results from the last three years, the method detection limits and reporting units, the analytical techniques or methods used, and the chain of custody forms.

f. Rain gauge readings from site inspections;

g. Quality assurance/quality control records and results.

h. Non-storm water discharge inspections and visual observation (inspections) and storm water discharge visual observation records (see Sections I.3 and I.10 above).

i. Visual observation and sample collection exception records (see Section I.6 above).

j. The records of any corrective actions and follow-up activities that resulted from analytical results, visual observation (inspections), or inspections.

15. **Risk Level 2 – NAL Exceedance Report**

a. In the event that any effluent sample exceeds an applicable NAL, Risk Level 2 dischargers shall electronically submit all storm event sampling results to the State Water Board no later than 10 days after the conclusion of the storm event. The Regional Boards have the authority to require the submittal of an NAL Exceedance Report.

b. Risk Level 2 dischargers shall certify each NAL Exceedance Report in accordance with the Special Provisions for Construction Activity.

c. Risk Level 2 dischargers shall retain an electronic or paper copy of each NAL Exceedance Report for a minimum of three years after the date the annual report is filed.

d. Risk Level 2 dischargers shall include in the NAL Exceedance Report:

i. The analytical method(s), method reporting unit(s), and method detection limit(s) of each analytical parameter (analytical results that are less than the method detection limit shall be reported as “less than the method detection limit”).

ii. The date, place, time of sampling, visual observation (inspections), and/or measurements, including precipitation.

iii. A description of the current BMPs associated with the effluent sample that exceeded the NAL and the proposed corrective actions taken.

Table 3 – Risk Level 2 Test Methods, Detection Limits, Reporting Units and Applicable NALs/NELs

Parameter	Test Method / Protocol	Discharge Type	Min. Detection Limit	Reporting Units	Numeric Action Level
pH	Field test with calibrated portable instrument	Risk Level 2 Discharges	0.2 pH	units	lower NAL = 6.5 upper NAL = 8.5
Turbidity EPA	0180.1 and/or field test with calibrated portable instrument	Risk Level 2 Discharges other than ATS	1 NTU		250 NTU
		For ATS discharges	1 NTU		N/A

ATTACHMENT E
RISK LEVEL 3 REQUIREMENTS

A. Effluent Standards

[These requirements are the same as those in the General Permit order.]

1. Narrative – Risk Level 3 dischargers shall comply with the narrative effluent standards listed below:

   a. Storm water discharges and authorized non-storm water discharges regulated by this General Permit shall not contain a hazardous substance equal to or in excess of reportable quantities established in 40 C.F.R. §§ 117.3 and 302.4, unless a separate NPDES Permit has been issued to regulate those discharges.

   b. Dischargers shall minimize or prevent pollutants in storm water discharges and authorized non-storm water discharges through the use of controls, structures, and management practices that achieve BAT for toxic and non-conventional pollutants and BCT for conventional pollutants.

2. Numeric –Risk Level 3 dischargers are subject to a pH NAL of 6.5-8.5, and a turbidity NAL of 250 NTU. In addition, Risk Level 3 dischargers are subject to a pH NEL of 6.0-9.0 and a turbidity NEL of 500 NTU.

B. Good Site Management "Housekeeping"

1. Risk Level 3 dischargers shall implement good site management (i.e., "housekeeping") measures for construction materials that could potentially be a threat to water quality if discharged. At a minimum, Risk Level 3 dischargers shall implement the following good housekeeping measures:

   a. Conduct an inventory of the products used and/or expected to be used and the end products that are produced and/or expected to be produced. This does not include materials and equipment that are designed to be outdoors and exposed to environmental conditions (i.e. poles, equipment pads, cabinets, conductors, insulators, bricks, etc.).

   b. Cover and berm loose stockpiled construction materials that are not actively being used (i.e. soil, spoils, aggregate, fly-ash, stucco, hydrated lime, etc.).

c. Store chemicals in watertight containers (with appropriate secondary containment to prevent any spillage or leakage) or in a storage shed (completely enclosed).

d. Minimize exposure of construction materials to precipitation. This does not include materials and equipment that are designed to be outdoors and exposed to environmental conditions (i.e. poles, equipment pads, cabinets, conductors, insulators, bricks, etc.).

e. Implement BMPs to prevent the off-site tracking of loose construction and landscape materials.

2. Risk Level 3 dischargers shall implement good housekeeping measures for waste management, which, at a minimum, shall consist of the following:

a. Prevent disposal of any rinse or wash waters or materials on impervious or pervious site surfaces or into the storm drain system.

b. Ensure the containment of sanitation facilities (e.g., portable toilets) to prevent discharges of pollutants to the storm water drainage system or receiving water.

c. Clean or replace sanitation facilities and inspecting them regularly for leaks and spills.

d. Cover waste disposal containers at the end of every business day and during a rain event.

e. Prevent discharges from waste disposal containers to the storm water drainage system or receiving water.

f. Contain and securely protecting stockpiled waste material from wind and rain at all times unless actively being used.

g. Implement procedures that effectively address hazardous and non-hazardous spills.

h. Develop a spill response and implementation element of the SWPPP prior to commencement of construction activities. The SWPPP shall require that:

i. Equipment and materials for cleanup of spills shall be available on site and that spills and leaks shall be cleaned up immediately and disposed of properly; and

ii. Appropriate spill response personnel are assigned and trained.

i. Ensure the containment of concrete washout areas and other washout areas that may contain additional pollutants so there is no discharge into the underlying soil and onto the surrounding areas.

3. Risk Level 3 dischargers shall implement good housekeeping for vehicle storage and maintenance, which, at a minimum, shall consist of the following:

   a. Prevent oil, grease, or fuel to leak in to the ground, storm drains or surface waters.

   b. Place all equipment or vehicles, which are to be fueled, maintained and stored in a designated area fitted with appropriate BMPs.

   c. Clean leaks immediately and disposing of leaked materials properly.

4. Risk Level 3 dischargers shall implement good housekeeping for landscape materials, which, at a minimum, shall consist of the following:

   a. Contain stockpiled materials such as mulches and topsoil when they are not actively being used.

   b. Contain fertilizers and other landscape materials when they are not actively being used.

   c. Discontinuing the application of any erodible landscape material within 2 days before a forecasted rain event or during periods of precipitation.

   d. Applying erodible landscape material at quantities and application rates according to manufacture recommendations or based on written specifications by knowledgeable and experienced field personnel.

   e. Stacking erodible landscape material on pallets and covering or storing such materials when not being used or applied.

5. Risk Level 3 dischargers shall conduct an assessment and create a list of potential pollutant sources and identify any areas of the site where additional BMPs are necessary to reduce or prevent pollutants in storm water discharges and authorized non-storm water discharges. This potential pollutant list shall be kept with the SWPPP and shall identify

all non-visible pollutants which are known, or should be known, to occur on the construction site. At a minimum, when developing BMPs, Risk Level 3 dischargers shall do the following:

a. Consider the quantity, physical characteristics (e.g., liquid, powder, solid), and locations of each potential pollutant source handled, produced, stored, recycled, or disposed of at the site.

b. Consider the degree to which pollutants associated with those materials may be exposed to and mobilized by contact with storm water.

c. Consider the direct and indirect pathways that pollutants may be exposed to storm water or authorized non-storm water discharges. This shall include an assessment of past spills or leaks, non-storm water discharges, and discharges from adjoining areas.

d. Ensure retention of sampling, visual observation, and inspection records.

e. Ensure effectiveness of existing BMPs to reduce or prevent pollutants in storm water discharges and authorized non-storm water discharges.

6. Risk Level 3 dischargers shall implement good housekeeping measures on the construction site to control the air deposition of site materials and from site operations. Such particulates can include, but are not limited to, sediment, nutrients, trash, metals, bacteria, oil and grease and organics.

7. **Additional Risk Level 3 Requirement:** Risk Level 3 dischargers shall document all housekeeping BMPs in the SWPPP and REAP(s) in accordance with the nature and phase of the construction project. Construction phases at traditional land development projects include Grading and Land Development Phase, Streets and Utilities, or Vertical Construction for traditional land development projects.

C. Non-Storm Water Management

1. Risk Level 3 dischargers shall implement measures to control all non-storm water discharges during construction.

2. Risk Level 3 dischargers shall wash vehicles in such a manner as to prevent non-storm water discharges to surface waters or MS4 drainage systems.

3. Risk Level 3 dischargers shall clean streets in such a manner as to prevent unauthorized non-storm water discharges from reaching surface water or MS4 drainage systems.

D. Erosion Control

1. Risk Level 3 dischargers shall implement effective wind erosion control.

2. Risk Level 3 dischargers shall provide effective soil cover for inactive[1] areas and all finished slopes, open space, utility backfill, and completed lots.

3. Dischargers shall limit the use of plastic materials when more sustainable, environmentally friendly alternatives exist. Where plastic materials are deemed necessary, the discharger shall consider the use of plastic materials resistant to solar degradation.

E. Sediment Controls

1. Risk Level 3 dischargers shall establish and maintain effective perimeter controls and stabilize all construction entrances and exits to sufficiently control erosion and sediment discharges from the site.

2. On sites where sediment basins are to be used, Risk Level 3 dischargers shall, at minimum, design sediment basins according to the method provided in CASQA's Construction BMP Guidance Handbook.

3. **Additional Risk Level 3 Requirement:** Risk Level 3 dischargers shall implement appropriate erosion control BMPs (runoff control and soil stabilization) in conjunction with sediment control BMPs for areas under active[2] construction.

4. **Additional Risk Level 3 Requirement:** Risk Level 3 dischargers shall apply linear sediment controls along the toe of the slope, face of the slope, and at the grade breaks of exposed slopes to comply with sheet flow lengths[3] in accordance with Table 1.

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[1] Inactive areas of construction are areas of construction activity that have been disturbed and are not scheduled to be re-disturbed for at least 14 days.
[2] Active areas of construction are areas undergoing land surface disturbance. This includes construction activity during the preliminary stage, mass grading stage, streets and utilities stage and the vertical construction stage
[3] Sheet flow length is the length that shallow, low velocity flow travels across a site.

Table 1 - Critical Slope/Sheet Flow Length Combinations

Slope Percentage	Sheet flow length not to exceed
0-25% 20	feet
25-50% 15	feet
Over 50%	10 feet

5. **Additional Risk Level 3 Requirement:** Risk Level 3 dischargers shall ensure that construction activity traffic to and from the project is limited to entrances and exits that employ effective controls to prevent offsite tracking of sediment.

6. **Additional Risk Level 3 Requirement:** Risk Level 3 dischargers shall ensure that all storm drain inlets and perimeter controls, runoff control BMPs, and pollutant controls at entrances and exits (e.g. tire washoff locations) are maintained and protected from activities that reduce their effectiveness.

7. **Additional Risk Level 3 Requirement:** Risk Level 3 dischargers shall inspect on a daily basis all immediate access roads daily. At a minimum daily (when necessary) and prior to any rain event, the discharger shall remove any sediment or other construction activity-related materials that are deposited on the roads (by vacuuming or sweeping).

8. **Additional Risk Level 3 Requirement:** The Regional Water Board may require Risk Level 3 dischargers to implement additional site-specific sediment control requirements if the implementation of the other requirements in this section are not adequately protecting the receiving waters.

F. Run-on and Run-off Controls

Risk Level 3 dischargers shall effectively manage all run-on, all runoff within the site and all runoff that discharges off the site. Run-on from off site shall be directed away from all disturbed areas or shall collectively be in compliance with the effluent limitations in this General Permit.

G. Inspection, Maintenance and Repair

1. Risk Level 3 dischargers shall ensure that all inspection, maintenance repair and sampling activities at the project location shall be performed or supervised by a Qualified SWPPP Practitioner (QSP) representing the discharger. The QSP may delegate any or all of these activities to an employee appropriately trained to do the task(s).

2. Risk Level 3 dischargers shall perform weekly inspections and observations, and at least once each 24-hour period during extended storm events, to identify and record BMPs that need maintenance to operate effectively, that have failed, or that could fail to operate as intended. Inspectors shall be the QSP or be trained by the QSP.

3. Upon identifying failures or other shortcomings, as directed by the QSP, Risk Level 3 dischargers shall begin implementing repairs or design changes to BMPs within 72 hours of identification and complete the changes as soon as possible.

4. For each inspection required, Risk Level 3 dischargers shall complete an inspection checklist, using a form provided by the State Water Board or Regional Water Board or in an alternative format.

5. Risk Level 3 dischargers shall ensure that checklists shall remain onsite with the SWPPP and at a minimum, shall include:

    a. Inspection date and date the inspection report was written.

    b. Weather information, including presence or absence of precipitation, estimate of beginning of qualifying storm event, duration of event, time elapsed since last storm, and approximate amount of rainfall in inches.

    c. Site information, including stage of construction, activities completed, and approximate area of the site exposed.

    d. A description of any BMPs evaluated and any deficiencies noted.

    e. If the construction site is safely accessible during inclement weather, list the observations of all BMPs: erosion controls, sediment controls, chemical and waste controls, and non-storm water controls. Otherwise, list the results of visual inspections at all relevant outfalls, discharge points, downstream locations and any projected maintenance activities.

    f. Report the presence of noticeable odors or of any visible sheen on the surface of any discharges.

    g. Any corrective actions required, including any necessary changes to the SWPPP and the associated implementation dates.

    h. Photographs taken during the inspection, if any.

i. Inspector's name, title, and signature.

H. Rain Event Action Plan

1. **Additional Risk Level 3 Requirement:** The discharger shall ensure a QSP develop a Rain Event Action Plan (REAP) 48 hours prior to any likely precipitation event. A likely precipitation event is any weather pattern that is forecast to have a 50% or greater probability of producing precipitation in the project area. The QSP shall obtain a printed copy of precipitation forecast information from the National Weather Service Forecast Office (e.g., by entering the zip code of the project's location at http://www.srh.noaa.gov/forecast).

2. **Additional Risk Level 3 Requirement:** The discharger shall ensure a QSP develop the REAPs for all phases of construction (i.e., Grading and Land Development, Streets and Utilities, Vertical Construction, Final Landscaping and Site Stabilization).

3. **Additional Risk Level 3 Requirement:** The discharger shall ensure a QSP ensure that the REAP include, at a minimum, the following site information:

   a. Site Address.
   b. Calculated Risk Level (2 or 3).
   c. Site Storm Water Manager Information including the name, company, and 24-hour emergency telephone number.
   d. Erosion and Sediment Control Provider information including the name, company, and 24-hour emergency telephone number.
   e. Storm Water Sampling Agent information including the name, company, and 24-hour emergency telephone number.

4. **Additional Risk Level 3 Requirement:** The QSP shall include in the REAP, at a minimum, the following project phase information:

   a. Activities associated with each construction phase.
   b. Trades active on the construction site during each construction phase.
   c. Trade contractor information.
   d. Suggested actions for each project phase.

5. **Additional Risk Level 3 Requirement:** The QSP shall develop additional REAPs for project sites where construction activities are indefinitely halted or postponed (Inactive Construction). At a minimum, Inactive Construction REAPs must include:

a. Site Address.
b. Calculated Risk Level (2 or 3).
c. Site Storm Water Manager Information including the name, company, and 24-hour emergency telephone number.
d. Erosion and Sediment Control Provider information including the name, company, and 24-hour emergency telephone number.
e. Storm Water Sampling Agent information including the name, company, and 24-hour emergency telephone number.
f. Trades active on site during Inactive Construction.
g. Trade contractor information.
h. Suggested actions for inactive construction sites.

6. **Additional Risk Level 3 Requirement:** The discharger shall ensure a QSP begin implementation and make the REAP available onsite no later than 24 hours prior to the likely precipitation event.

7. **Additional Risk Level 3 Requirement:** The discharger shall ensure a QSP maintain onsite a paper copy of each REAP onsite in compliance with the record retention requirements of the Special Provisions in this General Permit.

I. Risk Level 3 Monitoring and Reporting Requirements

Table 2- Summary of Monitoring Requirements

Risk Level	Visual Inspections					Sample Collection	
	Quarterly Non-storm Water Discharge	Pre-storm Event		Daily Storm BMP	Post Storm	Storm Water Discharge	Receiving Water
		Baseline	REAP				
3	X	X	X	X	X	X	X[4]

1. Construction Site Monitoring Program Requirements

   a. Pursuant to Water Code Sections 13383 and 13267, all dischargers subject to this General Permit shall develop and implement a written site-specific Construction Site Monitoring Program (CSMP) in accordance with the requirements of this Section. The CSMP shall include all monitoring procedures and instructions, location maps, forms, and checklists as required in this section. The CSMP shall be developed prior to the commencement of construction activities, and revised as necessary to reflect project revisions. The CSMP shall be a part of the Storm Water Pollution Prevention Plan (SWPPP), included as an appendix or separate SWPPP chapter.

   b. Existing dischargers registered under the State Water Board Order No. 99-08-DWQ shall make and implement necessary revisions to their Monitoring Program to reflect the changes in this General Permit in a timely manner, but no later than July 1, 2010. Existing dischargers shall continue to implement their existing Monitoring Program in compliance with State Water Board Order No. 99-08-DWQ until the necessary revisions are completed according to the schedule above.

   c. When a change of ownership occurs for all or any portion of the construction site prior to completion or final stabilization, the new discharger shall comply with these requirements as of the date the ownership change occurs.

2. **Objectives**

   The CSMP shall be developed and implemented to address the following objectives:

[4] When NEL exceeded

a. To demonstrate that the site is in compliance with the Discharge Prohibitions and applicable Numeric Action Levels (NALs)/Numeric Effluent Limitations (NELs) of this General Permit.

b. To determine whether non-visible pollutants are present at the construction site and are causing or contributing to exceedances of water quality objectives.

c. To determine whether immediate corrective actions, additional Best Management Practice (BMP) implementation, or SWPPP revisions are necessary to reduce pollutants in storm water discharges and authorized non-storm water discharges.

d. To determine whether BMPs included in the SWPPP/Rain Event Action Plan (REAP) are effective in preventing or reducing pollutants in storm water discharges and authorized non-storm water discharges.

3. **Risk Level 3 – Visual Monitoring (Inspection) Requirements for Qualifying Rain Events**

a. Risk Level 3 dischargers shall visually observe (inspect) storm water discharges at all discharge locations within two business days (48 hours) after each qualifying rain event.

b. Risk Level 3 dischargers shall visually observe (inspect) the discharge of stored or contained storm water that is derived from and discharged subsequent to a qualifying rain event producing precipitation of ½ inch or more at the time of discharge. Stored or contained storm water that will likely discharge after operating hours due to anticipated precipitation shall be observed prior to the discharge during operating hours.

c. Risk Level 3 dischargers shall conduct visual observations (inspections) during business hours only.

d. Risk Level 3 dischargers shall record the time, date and rain gauge reading of all qualifying rain events.

e. Within 2 business days (48 hours) prior to each qualifying rain event, Risk Level 3 dischargers shall visually observe (inspect):

i. all storm water drainage areas to identify any spills, leaks, or uncontrolled pollutant sources. If needed, the discharger shall implement appropriate corrective actions.

ii. all BMPs to identify whether they have been properly implemented in accordance with the SWPPP/REAP. If needed, the discharger shall implement appropriate corrective actions.

iii. any storm water storage and containment areas to detect leaks and ensure maintenance of adequate freeboard.

f. For the visual observations (inspections) described in c.i. and c.iii above, Risk Level 3 dischargers shall observe the presence or absence of floating and suspended materials, a sheen on the surface, discolorations, turbidity, odors, and source(s) of any observed pollutants.

g. Within two business days (48 hours) after each qualifying rain event, Risk Level 3 dischargers shall conduct post rain event visual observations (inspections) to (1) identify whether BMPs were adequately designed, implemented, and effective, and (2) identify additional BMPs and revise the SWPPP accordingly.

h. Risk Level 3 dischargers shall maintain on-site records of all visual observations (inspections), personnel performing the observations, observation dates, weather conditions, locations observed, and corrective actions taken in response to the observations.

4. **Risk Level 3 – Water Quality Sampling and Analysis**

a. Risk Level 3 dischargers shall collect storm water grab samples from sampling locations, as defined in Section I.5. The storm water grab sample(s) obtained shall be representative of the flow and characteristics of the discharge.

b. At minimum, Risk Level 3 dischargers shall collect 3 samples per day of the qualifying event.

c. Risk Level 3 dischargers shall ensure that the grab samples collected of stored or contained storm water are from discharges subsequent to a qualifying rain event (producing precipitation of ½ inch or more at the time of discharge).

<u>Storm Water Effluent Monitoring Requirements</u>

d. Risk Level 3 dischargers shall analyze their effluent samples for:

i. pH and turbidity.

ii. Any additional parameters for which monitoring is required by the Regional Water Board.

e. Risk 3 dischargers shall electronically submit all storm event sampling results to the State Water Board no later than 5 days after the conclusion of the storm event.

f. Risk Level 3 discharger sites that have violated the turbidity daily average NEL shall analyze subsequent effluent samples for all the parameters specified in Section I.4.e, above, and Suspended Sediment Concentration (SSC).

Receiving Water Monitoring Requirements

g. In the event that a Risk Level 3 discharger violates an NEL contained in this General Permit and has a direct discharge into receiving waters, the Risk Level 3 discharger shall subsequently sample receiving waters (RWs) for all parameter(s) required in Section I.4.e above for the duration of coverage under this General Permit.

h. Risk Level 3 dischargers disturbing 30 acres or more of the landscape and with direct discharges into receiving waters shall conduct or participate in benthic macroinvertebrate bioassessment of RWs prior to commencement of construction activity (See Appendix 3).

i. Risk Level 3 dischargers shall obtain RW samples in accordance with the Receiving Water sampling location section (Section I.5), below.

5. **Risk Level 3 – Storm Water Discharge Water Quality Sampling Locations**

Effluent Sampling Locations

a. Risk Level 3 dischargers shall perform sampling and analysis of storm water discharges to characterize discharges associated with construction activity from the entire project disturbed area.

b. Risk Level 3 dischargers shall collect effluent samples at all discharge points where storm water is discharged off-site.

c. Risk Level 3 dischargers shall ensure that storm water discharge collected and observed represent[5] the effluent in each drainage area based on visual observation of the water and upstream conditions.

d. Risk Level 3 dischargers shall monitor and report site run-on from surrounding areas if there is reason to believe run-on may contribute to an exceedance of NALs or NELs.

e. Risk Level 3 dischargers who deploy an ATS on their site, or a portion on their site, shall collect ATS effluent samples and measurements from the discharge pipe or another location representative of the nature of the discharge.

f. Risk Level 3 dischargers shall select analytical test methods from the list provided in Table 3 below.

g. All storm water sample collection preservation and handling shall be conducted in accordance with Section I.7 "Storm Water Sample Collection and Handling Instructions" below.

Receiving Water Sampling Locations

h. **Upstream/up-gradient RW samples**: Risk Level 3 dischargers shall obtain any required upstream/up-gradient receiving water samples from a representative and accessible location as close as possible and upstream from the effluent discharge point.

i. **Downstream/down-gradient RW samples**: Risk Level 3 dischargers shall obtain any required downstream/down-gradient receiving water samples from a representative and accessible location as close as possible and downstream from the effluent discharge point.

j. If two or more discharge locations discharge to the same receiving water, Risk Level 3 dischargers may sample the receiving water at a single upstream and downstream location.

[5] For example, if there has been concrete work recently in an area, or drywall scrap is exposed to the rain, a pH sample shall be taken of drainage from the relevant work area. Similarly, if sediment-laden water is flowing through some parts of a silt fence, samples shall be taken of the sediment laden water even if most water flowing through the fence is clear.

6. **Risk Level 3 – Visual Observation and Sample Collection Exemptions**

   a. Risk Level 3 dischargers shall be prepared to collect samples and conduct visual observation (inspections) until the minimum requirements of Sections I.3 and I.4 above are completed. Risk Level 3 dischargers are not required to physically collect samples or conduct visual observation (inspections) under the following conditions:

      i. During dangerous weather conditions such as flooding and electrical storms.

      ii. Outside of scheduled site business hours.

   b. If no required samples or visual observation (inspections) are collected due to these exceptions, Risk Level 3 dischargers shall include an explanation in their SWPPP and in the Annual Report documenting why the sampling or visual observation (inspections) were not conducted.

7. **Risk Level 3 – Storm Water Sample Collection and Handling Instructions**

   a. Risk Level 3 dischargers shall refer to Table 3 below for test methods, detection limits, and reporting units.

   b. Risk Level 3 dischargers shall ensure that testing laboratories will receive samples within 48 hours of the physical sampling (unless otherwise required by the laboratory), and shall use only the sample containers provided by the laboratory to collect and store samples.

   c. Risk Level 3 dischargers shall designate and train personnel to collect, maintain, and ship samples in accordance with the Surface Water Ambient Monitoring Program's (SWAMP) 2008 Quality Assurance Program Plan (QAPrP).[6]

[6] Additional information regarding SWAMP's QAPrP and QAMP can be found at http://www.waterboards.ca.gov/water_issues/programs/swamp/.
QAPrP:http://www.waterboards.ca.gov/water_issues/programs/swamp/docs/qapp/swamp_qapp_master090108a.pdf
QAMP: http://www.waterboards.ca.gov/water_issues/programs/swamp/qamp.shtml

8. **Risk Level 3 – Monitoring Methods**

   a. Risk Level 3 dischargers shall include a description of the following items in the CSMP:

      i. Visual observation locations, visual observation procedures, and visual observation follow-up and tracking procedures.

      ii. Sampling locations, and sample collection and handling procedures. This shall include detailed procedures for sample collection, storage, preservation, and shipping to the testing lab to assure that consistent quality control and quality assurance is maintained. Dischargers shall attach to the monitoring program an example Chain of Custody form used when handling and shipping samples.

      iii. Identification of the analytical methods and related method detection limits (if applicable) for each parameter required in Section I.4 above.

   b. Risk Level 3 dischargers shall ensure that all sampling and sample preservation are in accordance with the current edition of "Standard Methods for the Examination of Water and Wastewater" (American Public Health Association). All monitoring instruments and equipment (including a discharger's own field instruments for measuring pH and turbidity) should be calibrated and maintained in accordance with manufacturers' specifications to ensure accurate measurements. Risk Level 3 dischargers shall ensure that all laboratory analyses are conducted according to test procedures under 40 CFR Part 136, unless other test procedures have been specified in this General Permit or by the Regional Water Board. With the exception of field analysis conducted by the discharger for turbidity and pH, all analyses should be sent to and conducted at a laboratory certified for such analyses by the State Department of Health Services (SSC exception). Risk Level 3 dischargers shall conduct their own field analysis of pH and may conduct their own field analysis of turbidity if the discharger has sufficient capability (qualified and trained employees, properly calibrated and maintained field instruments, etc.) to adequately perform the field analysis.

9. **Risk Level 3 – Analytical Methods**

   a. Risk Level 3 dischargers shall refer to Table 3 below for test methods, detection limits, and reporting units.

b. **pH**: Risk Level 3 dischargers shall perform pH analysis on-site with a calibrated pH meter or a pH test kit. Risk Level 3 dischargers shall record pH monitoring results on paper and retain these records in accordance with Section I.14, below.

c. **Turbidity**: Risk Level 3 dischargers shall perform turbidity analysis using a calibrated turbidity meter (turbidimeter), either on-site or at an accredited lab. Acceptable test methods include Standard Method 2130 or USEPA Method 180.1. The results will be recorded in the site log book in Nephelometric Turbidity Units (NTU).

d. **Suspended sediment concentration (SSC)**: Risk Level 3 dischargers shall perform SSC analysis using ASTM Method D3977-97.

e. **Bioassessment**: Risk Level 3 dischargers shall perform bioassessment sampling and analysis according to Appendix 3 of this General Permit.

10. **Risk Level 3 - Non-Storm Water Discharge Monitoring Requirements**

a. Visual Monitoring Requirements:

i. Risk Level 3 dischargers shall visually observe (inspect) each drainage area for the presence of (or indications of prior) unauthorized and authorized non-storm water discharges and their sources.

ii. Risk Level 3 dischargers shall conduct one visual observation (inspection) quarterly in each of the following periods: January-March, April-June, July-September, and October-December. Visual observation (inspections) are only required during daylight hours (sunrise to sunset).

iii. Risk Level 3 dischargers shall ensure that visual observations (inspections) document the presence or evidence of any non-storm water discharge (authorized or unauthorized), pollutant characteristics (floating and suspended material, sheen, discoloration, turbidity, odor, etc.), and source. Risk Level 3 dischargers shall maintain on-site records indicating the personnel performing the visual observation (inspections), the dates and approximate time each drainage area and non-storm water discharge was observed, and the response taken to eliminate unauthorized non-storm water discharges and to

reduce or prevent pollutants from contacting non-storm water discharges.

b. Effluent Sampling Locations:

i. Risk Level 3 dischargers shall sample effluent at all discharge points where non-storm water and/or authorized non-storm water is discharged off-site.

ii. Risk Level 3 dischargers shall send all non-storm water sample analyses to a laboratory certified for such analyses by the State Department of Health Services.

iii. Risk Level 3 dischargers shall monitor and report run-on from surrounding areas if there is reason to believe run-on may contribute to an exceedance of NALs or NELs.

11. **Risk Level 3 – Non-Visible Pollutant Monitoring Requirements**

a. Risk Level 3 dischargers shall collect one or more samples during any breach, malfunction, leakage, or spill observed during a visual inspection which could result in the discharge of pollutants to surface waters that would not be visually detectable in storm water.

b. Risk Level 3 dischargers shall ensure that water samples are large enough to characterize the site conditions.

c. Risk Level 3 dischargers shall collect samples at all discharge locations that can be safely accessed.

d. Risk Level 3 dischargers shall collect samples during the first two hours of discharge from rain events that occur during business hours and which generate runoff.

e. Risk Level 3 dischargers shall analyze samples for all non-visible pollutant parameters (if applicable) - parameters indicating the presence of pollutants identified in the pollutant source assessment required (Risk Level 3 dischargers shall modify their CSMPs to address these additional parameters in accordance with any updated SWPPP pollutant source assessment).

f. Risk Level 3 dischargers shall collect a sample of storm water that has not come in contact with the disturbed soil or the materials stored or used on-site (uncontaminated sample) for comparison with the discharge sample.

g. Risk Level 3 dischargers shall compare the uncontaminated sample to the samples of discharge using field analysis or through laboratory analysis.[7]

h. Risk Level 3 dischargers shall keep all field /or analytical data in the SWPPP document.

12. **Risk Level 3 – Watershed Monitoring Option**

Risk Level 3 dischargers who are part of a qualified regional watershed-based monitoring program may be eligible for relief from the requirements in Sections I.5. The Regional Water Board may approve proposals to substitute an acceptable watershed-based monitoring program by determining if the watershed-based monitoring program will provide substantially similar monitoring information in evaluating discharger compliance with the requirements of this General Permit.

13. **Risk Level 3 – Particle Size Analysis for Project Risk Justification**

Risk Level 3 dischargers justifying an alternative project risk shall report a soil particle size analysis used to determine the RUSLE K-Factor. ASTM D-422 (Standard Test Method for Particle-Size Analysis of Soils), as revised, shall be used to determine the percentages of sand, very fine sand, silt, and clay on the site.

14. **Risk Level 3 – Records**

Risk Level 3 dischargers shall retain records of all storm water monitoring information and copies of all reports (including Annual Reports) for a period of at least three years. Risk Level 3 dischargers shall retain all records on-site while construction is ongoing. These records include:

a. The date, place, time of facility inspections, sampling, visual observation (inspections), and/or measurements, including precipitation.

b. The individual(s) who performed the facility inspections, sampling, visual observation (inspections), and or measurements.

c. The date and approximate time of analyses.

[7] For laboratory analysis, all sampling, sample preservation, and analyses must be conducted according to test procedures under 40 CFR Part 136. Field discharge samples shall be collected and analyzed according to the specifications of the manufacturer of the sampling devices employed.

d. The individual(s) who performed the analyses.

e. A summary of all analytical results from the last three years, the method detection limits and reporting units, the analytical techniques or methods used, and the chain of custody forms.

f. Rain gauge readings from site inspections.

g. Quality assurance/quality control records and results.

h. Non-storm water discharge inspections and visual observation (inspections) and storm water discharge visual observation records (see Sections I.3 and I.10 above).

i. Visual observation and sample collection exception records (see Section I.6 above).

j. The records of any corrective actions and follow-up activities that resulted from analytical results, visual observation (inspections), or inspections.

15. **Risk Level 3 – NAL Exceedance Report**

a. In the event that any effluent sample exceeds an applicable NAL, Risk Level 3 dischargers shall electronically submit all storm event sampling results to the State Water Board no later than 10 days after the conclusion of the storm event. The Regional Boards have the authority to require the submittal of an NAL Exceedance Report.

b. Risk Level 3 dischargers shall certify each NAL Exceedance Report in accordance with the Special Provisions for Construction Activity In this General Permit.

c. Risk Level 3 dischargers shall retain an electronic or paper copy of each NAL Exceedance Report for a minimum of three years after the date the annual report is filed.

d. Risk Level 3 dischargers shall include in the NAL Exceedance Report:

i. The analytical method(s), method reporting unit(s), and method detection limit(s) of each analytical parameter (analytical results that are less than the method detection limit shall be reported as “less than the method detection limit”).

ii. The date, place, time of sampling, visual observation (inspections), and/or measurements, including precipitation.

iii. A description of the current BMPs associated with the effluent sample that exceeded the NAL and the proposed corrective actions taken.

16. **Risk Level 3 – NEL Violation Report**

a. Risk Level 3 dischargers shall electronically submit all storm event sampling results to the State Water Board no later than 5 days after the conclusion of the storm event.

b. In the event that a discharger has violated an applicable NEL, Risk Level 3 dischargers shall submit an NEL Violation Report to the State Water Board within 24 hours after the NEL exceedance has been identified.

c. Risk Level 3 dischargers shall certify each NEL Violation Report in accordance with the Special Provisions for Construction Activity in this General Permit.

d. Risk Level 3 dischargers shall retain an electronic or paper copy of each NEL Violation Report for a minimum of three years after the date the annual report is filed.

e. Risk Level 3 dischargers shall include in the NEL Violation Report:

i. The analytical method(s), method reporting unit(s), and method detection limit(s) of each analytical parameter (analytical results that are less than the method detection limit shall be reported as “less than the method detection limit”);

ii. The date, place, time of sampling, visual observation (inspections), and/or measurements, including precipitation; and

iii. A Description of the current onsite BMPs, and the proposed corrective actions taken to manage the NEL exceedance.

f. Compliance Storm Exemption - In the event that an applicable NEL has been exceeded during a storm event equal to or larger than the Compliance Storm Event, Risk level 3 discharger shall report the on-site rain gauge reading and nearby governmental rain gauge readings for verification.

17. **Risk Level 3 – Bioassessment**

a. Risk Level 3 dischargers with a total project-related ground disturbance exceeding 30 acres shall:

i. Conduct bioassessment monitoring, as described in Appendix 3.

ii. Include the collection and reporting of specified in stream biological data and physical habitat.

iii. Use the bioassessment sample collection and Quality Assurance & Quality Control (QA/QC) protocols developed by the State of California's Surface Water Ambient Monitoring Program (SWAMP).[8]

b. Risk Level 3 dischargers qualifying for bioassessment, where construction commences out of an index period for the site location shall:

i. Receive Regional Board approval for the sampling exception.

ii. Conduct bioassessment monitoring, as described in Appendix 3.

iii. Include the collection and reporting of specified instream biological data and physical habitat.

iv. Use the bioassessment sample collection and Quality Assurance & Quality Control (QA/QC) protocols developed by the State of California's Surface Water Ambient Monitoring Program (SWAMP).

OR

v. Make a check payable to: Cal State Chico Foundation (SWAMP Bank Account) or San Jose State Foundation (SWAMP Bank Account) and include the WDID# on the check for the amount calculated for the exempted project.

vi. Send a copy of the check to the Regional Water Board office for the site's region.

vii. Invest $**7,500.00 X The number of samples required** into the SWAMP program as compensation (upon regional board approval).

[8] http://www.waterboards.ca.gov/water_issues/programs/swamp/.

Table 3 – Risk Level 3 Test Methods, Detection Limits, Reporting Units and Applicable NALs/NELs

Parameter	Test Method / Protocol	Discharge Type	Min. Detection Limit	Reporting Units	Numeric Action Level	Numeric Effluent Limitation
pH	Field test with calibrated portable instrument	Risk Level 3 Discharges	0.2 pH	units	lower NAL = 6.5 upper NAL = 8.5	lower NEL = 6.0 upper NEL = 9.0
Turbidity EPA	0180.1 and/or field test with calibrated portable instrument	Risk Level 3 Discharges other than ATS	1	NTU	250 NTU	500 NTU
		For ATS discharges	1 NTU		N/A	10 NTU for Daily Weighted Average & 20 NTU for Any Single Sample
SSC ASTM	Method D 3977-97[9]	Risk Level 3 (if NEL exceeded)	5 mg/L		N/A	N/A
Bioassessment	(STE) Level I of (SAFIT),[10] fixed-count of 600 org/sample	Risk Level 3 projects> 30 acres	N/A N/A		N/A	N/A

[9] ASTM, 1999, Standard Test Method for Determining Sediment Concentration in Water Samples: American Society of Testing and Materials, D 3977-97, Vol. 11.02, pp. 389-394.

[10] The current SAFIT STEs (28 November 2006) list requirements for both the Level I and Level II taxonomic effort, and are located at: http://www.swrcb.ca.gov/swamp/docs/safit/ste_list.pdf. When new editions are published by SAFIT, they will supersede all previous editions. All editions will be posted at the State Water Board's SWAMP website.

ATTACHMENT F:
Active Treatment System (ATS) Requirements

Table 1 – Numeric Effluent Limitations, Numeric Action Levels, Test Methods, Detection Limits, and Reporting Units

Parameter	Test Method	Discharge Type	Min. Detection Limit	Units	Numeric Action Level	Numeric Effluent Limitation
Turbidity	EPA 0180.1 and/or field test with a calibrated portable instrument	For ATS discharges	1 NTU		N/A	10 NTU for Daily Flow-Weighted Average & 20 NTU for Any Single Sample

A. Dischargers choosing to implement an Active Treatment System (ATS) on their site shall comply with all of the requirements in this Attachment.

B. The discharger shall maintain a paper copy of each ATS specification onsite in compliance with the record retention requirements in the Special Provisions of this General Permit.

C. ATS Design, Operation and Submittals

1. The ATS shall be designed and approved by a Certified Professional in Erosion and Sediment Control (CPESC), a Certified Professional in Storm Water Quality (CPSWQ); a California registered civil engineer; or any other California registered engineer.

2. The discharger shall ensure that the ATS is designed in a manner to preclude the accidental discharge of settled floc[1] during floc pumping or related operations.

3. The discharger shall design outlets to dissipate energy from concentrated flows.

4. The discharger shall install and operate an ATS by assigning a lead person (or project manager) who has either a minimum of five years construction storm

[1] Floc is defined as a clump of solids formed by the chemical action in ATS systems.

water experience or who is a licensed contractors specifically holding a California Class A Contractors license.[2]

5. The discharger shall prepare an ATS Plan that combines the site-specific data and treatment system information required to safely and efficiently operate an ATS. The ATS Plan shall be electronically submitted to the State Water Board at least 14 days prior to the planned operation of the ATS and a paper copy shall be available onsite during ATS operation. At a minimum, the ATS Plan shall include:

   a. ATS Operation and Maintenance Manual for All Equipment.

   b. ATS Monitoring, Sampling & Reporting Plan, including Quality Assurance/Quality Control (QA/QC).

   c. ATS Health and Safety Plan.

   d. ATS Spill Prevention Plan.

6. The ATS shall be designed to capture and treat (within a 72-hour period) a volume equivalent to the runoff from a 10-year, 24-hour storm event using a watershed runoff coefficient of 1.0.

D. Treatment – Chemical Coagulation/Flocculation

1. Jar tests shall be conducted using water samples selected to represent typical site conditions and in accordance with ASTM D2035-08 (2003).

2. The discharger shall conduct, at minimum, six site-specific jar tests (per polymer with one test serving as a control) for each project to determine the proper polymer and dosage levels for their ATS.

3. Single field jar tests may also be conducted during a project if conditions warrant, for example if construction activities disturb changing types of soils, which consequently cause change in storm water and runoff characteristics.

E. Residual Chemical and Toxicity Requirements

1. The discharger shall utilize a residual chemical test method that has a method detection limit (MDL) of 10% or less than the maximum allowable threshold

[2] Business and Professions Code Division 3, Chapter 9, Article 4, Class A Contractor: A general engineering contractor is a contractor whose principal contracting business is in connection with fixed works requiring specialized engineering knowledge and skill. [http://www.cslb.ca.gov/General-Information/library/licensing-classifications.asp].

concentration[3] (MATC) for the specific coagulant in use and for the most sensitive species of the chemical used.

2. The discharger shall utilize a residual chemical test method that produces a result within one hour of sampling.

3. The discharger shall have a California State certified laboratory validate the selected residual chemical test. Specifically the lab will review the test protocol, test parameters, and the detection limit of the coagulant. The discharger shall electronically submit this documentation as part of the ATS Plan.

4. If the discharger cannot utilize a residual chemical test method that meets the requirements above, the discharger shall operate the ATS in Batch Treatment[4] mode.

5. A discharger planning to operate in Batch Treatment mode shall perform toxicity testing in accordance with the following:

   a. The discharger shall initiate acute toxicity testing on effluent samples representing effluent from each batch prior to discharge[5]. All bioassays shall be sent to a laboratory certified by the Department of Health Services (DHS) Environmental Laboratory Accreditation Program (ELAP). The required field of testing number for Whole Effluent Toxicity (WET) testing is E113.[6]

   b. Acute toxicity tests shall be conducted with the following species and protocols. The methods to be used in the acute toxicity testing shall be those outlined for a 96-hour acute test in "Methods for Measuring the Acute Toxicity of Effluents and Receiving Water to Freshwater and Marine Organisms, USEPA-841-R-02-012" for Fathead minnow, *Pimephales promelas* (fathead minnow). Acute toxicity for *Oncorhynchus mykiss* (Rainbow Trout) may be used as a substitute for testing fathead minnows.

   c. All toxicity tests shall meet quality assurance criteria and test acceptability criteria in the most recent versions of the EPA test method for WET testing.

   d. The discharger shall electronically report all acute toxicity testing.

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[3] The Maximum Allowable Threshold Concentration (MATC) is the allowable concentration of residual, or dissolved, coagulant/flocculant in effluent. The MATC shall be coagulant/flocculant-specific, and based on toxicity testing conducted by an independent, third-party laboratory. A typical MATC would be:
The MATC is equal to the geometric mean of the NOEC (No Observed Effect Concentration) and LOEC (Lowest Observed Effect Concentration) Acute and Chronic toxicity results for most sensitive species determined for the specific coagulant. The most sensitive species test shall be used to determine the MATC.
[4] Batch Treatment mode is defined as holding or recirculating the treated water in a holding basin or tank(s) until treatment is complete or the basin or storage tank(s) is full.
[5] This requirement only requires that the test be initiated prior to discharge.
[6] http://www.dhs.ca.gov/ps/ls/elap/pdf/FOT_Desc.pdf.

F. Filtration

1. The ATS shall include a filtration step between the coagulant treatment train and the effluent discharge. This is commonly provided by sand, bag, or cartridge filters, which are sized to capture suspended material that might pass through the clarifier tanks.

2. Differential pressure measurements shall be taken to monitor filter loading and confirm that the final filter stage is functioning properly.

G. Residuals Management

1. Sediment shall be removed from the storage or treatment cells as necessary to ensure that the cells maintain their required water storage (i.e., volume) capability.

2. Handling and disposal of all solids generated during ATS operations shall be done in accordance with all local, state, and federal laws and regulations.

H. ATS Instrumentation

1. The ATS shall be equipped with instrumentation that automatically measures and records effluent water quality data and flow rate.

2. The minimum data recorded shall be consistent with the Monitoring and Reporting requirements below, and shall include:

   a. Influent Turbidity

   b. Effluent Turbidity

   c. Influent pH

   d. Effluent pH

   e. Residual Chemical

   f. Effluent Flow rate

   g. Effluent Flow volume

3. Systems shall be equipped with a data recording system, such as data loggers or webserver-based systems, which records each measurement on a frequency no longer than once every 15 minutes.

4. Cumulative flow volume shall be recorded daily. The data recording system shall have the capacity to record a minimum of seven days continuous data.

5. Instrumentation systems shall be interfaced with system control to provide auto shutoff or recirculation in the event that effluent measurements exceed turbidity or pH.

6. The system shall also assure that upon system upset, power failure, or other catastrophic event, the ATS will default to a recirculation mode or safe shut down.

7. Instrumentation (flow meters, probes, valves, streaming current detectors, controlling computers, etc.) shall be installed and maintained per manufacturer's recommendations, which shall be included in the QA/QC plan.

8. The QA/QC plan shall also specify calibration procedures and frequencies, instrument method detection limit or sensitivity verification, laboratory duplicate procedures, and other pertinent procedures.

9. The instrumentation system shall include a method for controlling coagulant dose, to prevent potential overdosing. Available technologies include flow/turbidity proportional metering, periodic jar testing and metering pump adjustment, and ionic charge measurement controlling the metering pump.

I. ATS Effluent Discharge

1. ATS effluent shall comply with all provisions and prohibitions in this General Permit, specifically the NELs.

2. NELs for discharges from an ATS:

   a. Turbidity of all ATS discharges shall be less than 10 NTU for daily flow-weighted average of all samples and 20 NTU for any single sample.

   b. Residual Chemical shall be < 10% of MATC[7] for the most sensitive species of the chemical used.

3. If an analytical effluent sampling result is outside the range of pH NELs (i.e., is below the lower NEL for pH or exceeds the upper NEL for pH) or exceeds the turbidity NEL (as listed in Table 1), the discharger is in violation of this General

[7] The Maximum Allowable Threshold Concentration (MATC) is the allowable concentration of residual, or dissolved, coagulant/flocculant in effluent. The MATC shall be coagulant/flocculant-specific, and based on toxicity testing conducted by an independent, third-party laboratory. The MATC is equal to the geometric mean of the NOEC (No Observed Effect Concentration) and LOEC (Lowest Observed Effect Concentration) Acute and Chronic toxicity results for most sensitive species determined for the specific coagulant. The most sensitive species test shall be used to determine the MATC.

Permit and shall electronically file the results in violation within 24-hours of obtaining the results.

4. If ATS effluent is authorized to discharge into a sanitary sewer system, the discharger shall comply with any pre-treatment requirements applicable for that system. The discharger shall include any specific criteria required by the municipality in the ATS Plan.

5. Compliance Storm Event:

   Discharges of storm water from ATS shall comply with applicable NELs (above) unless the storm event causing the discharges is determined after the fact to be equal to or larger than the Compliance Storm Event (expressed in inches of rainfall). The Compliance Storm Event for ATS discharges is the 10 year, 24 hour storm, as determined using these maps:

   http://www.wrcc.dri.edu/pcpnfreq/nca10y24.gif
   http://www.wrcc.dri.edu/pcpnfreq/sca10y24.gif

   This exemption is dependent on the submission of rain gauge data verifying the storm event is equal to or larger than the Compliance Storm.

J. Operation and Maintenance Plan

1. Each Project shall have a site-specific Operation and Maintenance (O&M) Manual covering the procedures required to install, operate and maintain the ATS.[8]

2. The O&M Manual shall only be used in conjunction with appropriate project-specific design specifications that describe the system configuration and operating parameters.

3. The O&M Manual shall have operating manuals for specific pumps, generators, control systems,and other equipment.

K. Sampling and Reporting Quality Assurance/ Quality Check (QA/QC) Plan

4. A project-specific QA/QC Plan shall be developed for each project. The QA/QC Plan shall include at a minimum:

   a. Calibration – Calibration methods and frequencies for all system and field instruments shall be specified.

   b. Method Detection Limits (MDLs) – The methods for determining MDLs shall be specified for each residual coagulant measurement method. Acceptable

[8] The manual is typically in a modular format covering generalized procedures for each component that is utilized in a particular system.

minimum MDLs for each method, specific to individual coagulants, shall be specified.

c. Laboratory Duplicates – Requirements for monthly laboratory duplicates for residual coagulant analysis shall be specified.

L. Personnel Training

1. Operators shall have training specific to using an ATS and liquid coagulants for storm water discharges in California.

2. The training shall be in the form of a formal class with a certificate and requirements for testing and certificate renewal.

3. Training shall include a minimum of eight hours classroom and 32 hours field training. The course shall cover the following topics:

   a. Coagulation Basics –Chemistry and physical processes

   b. ATS System Design and Operating Principles

   c. ATS Control Systems

   d. Coagulant Selection – Jar testing, dose determination, etc.

   e. Aquatic Safety/Toxicity of Coagulants, proper handling and safety

   f. Monitoring, Sampling, and Analysis

   g. Reporting and Recordkeeping

   h. Emergency Response

M. Active Treatment System (ATS) Monitoring Requirements

Any discharger who deploys an ATS on their site shall conduct the following:

1. Visual Monitoring

   a. A designated responsible person shall be on site daily at all times during treatment operations.

   b. Daily on-site visual monitoring of the system for proper performance shall be conducted and recorded in the project data log.

i. The log shall include the name and phone number of the person responsible for system operation and monitoring.

ii. The log shall include documentation of the responsible person's training.

2. Operational and Compliance Monitoring

a. Flow shall be continuously monitored and recorded at not greater than 15-minute intervals for total volume treated and discharged.

b. Influent and effluent pH must be continuously monitored and recorded at not greater than 15-minute intervals.

c. Influent and effluent turbidity (expressed in NTU) must be continuously monitored and recorded at not greater than 15-minute intervals.

d. The type and amount of chemical used for pH adjustment, if any, shall be monitored and recorded.

e. Dose rate of chemical used in the ATS system (expressed in mg/L) shall be monitored and reported 15-minutes after startup and every 8 hours of operation.

f. Laboratory duplicates – monthly laboratory duplicates for residual coagulant analysis must be performed and records shall be maintained onsite.

g. Effluent shall be monitored and recorded for residual chemical/additive levels.

h. If a residual chemical/additive test does not exist and the ATS is operating in a batch treatment mode of operation refer to the toxicity monitoring requirements below.

3. Toxicity Monitoring

A discharger operating in batch treatment mode shall perform toxicity testing in accordance with the following:

a. The discharger shall initiate acute toxicity testing on effluent samples representing effluent from each batch prior to discharge.[9] All bioassays shall be sent to a laboratory certified by the Department of Health Services (DHS) Environmental Laboratory Accreditation Program (ELAP). The required field of testing number for Whole Effluent Toxicity (WET) testing is E113.[10]

[9] This requirement only requires that the test be initiated prior to discharge.
[10] http://www.dhs.ca.gov/ps/ls/elap/pdf/FOT_Desc.pdf.

b. Acute toxicity tests shall be conducted with the following species and protocols. The methods to be used in the acute toxicity testing shall be those outlined for a 96-hour acute test in "Methods for Measuring the Acute Toxicity of Effluents and Receiving Water to Freshwater and Marine Organisms, USEPA-841-R-02-012" for Fathead minnow, *Pimephales promelas or* Rainbow trout *Oncorhynchus mykiss* may be used as a substitute for fathead minnow.

c. All toxicity tests shall meet quality assurance criteria and test acceptability criteria in the most recent versions of the EPA test method for WET testing.[11]

4. Reporting and Recordkeeping

At a minimum, every 30 days a LRP representing the discharger shall access the State Water Boards Storm Water Mulit-Application and Report Tracking system (SMARTS) and electronically upload field data from the ATS. Records must be kept for three years after the project is completed .

5. Non-compliance Reporting

a. Any indications of toxicity or other violations of water quality objectives shall be reported to the appropriate regulatory agency as required by this General Permit.

b. Upon any measurements that exceed water quality standards, the system operator shall immediately notify his supervisor or other responsible parties, who shall notify the Regional Water Board.

c. If any monitoring data exceeds any applicable NEL in this General Permit, the discharger shall electronically submit a NEL Violation Report to the State Water Board within 24 hours after the NEL exceedance has been identified.

i. ATS dischargers shall certify each NEL Violation Report in accordance with the Special Provisions for Construction Activity in this General Permit.

ii. ATS dischargers shall retain an electronic or paper copy of each NEL Violation Report for a minimum of three years after the date the annual report is filed.

iii. ATS dischargers shall include in the NEL Violation Report:

(1) The analytical method(s), method reporting unit(s), and method detection limit(s) of each analytical parameter (analytical results that are less than the method detection limit shall be reported as "less than the method detection limit");

[11] http://www.epa.gov/waterscience/methods/wet/.

(2) The date, place, time of sampling, visual observation (inspections), and/or measurements, including precipitation; and

(3) A description of the current onsite BMPs, and the proposed corrective actions taken to manage the NEL exceedance.

iv. Compliance Storm Exemption - In the event that an applicable NEL has been exceeded during a storm event equal to or larger than the Compliance Storm Event, ATS dischargers shall report the on-site rain gauge reading and nearby governmental rain gauge readings for verification.

Risk Determination Worksheet

Step 1 Determine Sediment Risk via one of the options listed:

1. GIS Map Method - EPA Rainfall Erosivity Calculator & GIS map
2. Individual Method - EPA Rainfall Erosivity Calculator & Individual Data

Step 2 Determine Receiving Water Risk via one of the options listed:

1. GIS map of Sediment Sensitive Watersheds provided (in development)
2. List of Sediment Sensitive Watersheds provided

Step 3 Determine Combined Risk Level

Sediment Risk Factor Worksheet	Entry
A) R Factor	
Analyses of data indicated that when factors other than rainfall are held constant, soil loss is directly proportional to a rainfall factor composed of total storm kinetic energy (E) times the maximum 30-min intensity (I30) (Wischmeier and Smith, 1958). The numerical value of R is the average annual sum of EI30 for storm events during a rainfall record of at least 22 years. "Isoerodent" maps were developed based on R values calculated for more than 1000 locations in the Western U.S. Refer to the link below to determine the R factor for the project site. http://cfpub.epa.gov/npdes/stormwater/LEW/lewCalculator.cfm	
R Factor Value	0
B) K Factor (weighted average, by area, for all site soils)	
The soil-erodibility factor K represents: (1) susceptibility of soil or surface material to erosion, (2) transportability of the sediment, and (3) the amount and rate of runoff given a particular rainfall input, as measured under a standard condition. Fine-textured soils that are high in clay have low K values (about 0.05 to 0.15) because the particles are resistant to detachment. Coarse-textured soils, such as sandy soils, also have low K values (about 0.05 to 0.2) because of high infiltration resulting in low runoff even though these particles are easily detached. Medium-textured soils, such as a silt loam, have moderate K values (about 0.25 to 0.45) because they are moderately susceptible to particle detachment and they produce runoff at moderate rates. Soils having a high silt content are especially susceptible to erosion and have high K values, which can exceed 0.45 and can be as large as 0.65. Silt-size particles are easily detached and tend to crust, producing high rates and large volumes of runoff. Use Site-specific data must be submitted. Site-specific K factor guidance	
K Factor Value	0
C) LS Factor (weighted average, by area, for all slopes)	
The effect of topography on erosion is accounted for by the LS factor, which combines the effects of a hillslope-length factor, L, and a hillslope-gradient factor, S. Generally speaking, as hillslope length and/or hillslope gradient increase, soil loss increases. As hillslope length increases, total soil loss and soil loss per unit area increase due to the progressive accumulation of runoff in the downslope direction. As the hillslope gradient increases, the velocity and erosivity of runoff increases. Use the LS table located in separate tab of this spreadsheet to determine LS factors. Estimate the weighted LS for the site prior to construction. LS Table	
LS Factor Value	0
Watershed Erosion Estimate (=RxKxLS) in tons/acre	0
Site Sediment Risk Factor Low Sediment Risk: < 15 tons/acre Medium Sediment Risk: >=15 and <75 tons/acre High Sediment Risk: >= 75 tons/acre	**Low**

For the GIS Map Method, the R factor for the project is calculated using the online calculator at (see cell to right). The product of K and LS are shown on the figure below. To determine soil loss in tons per acre, multiply the R factor times the value for K times LS from the map.
http://cfpub.epa.gov/npdes/stormwater/LEW/lewCalculator.cfm

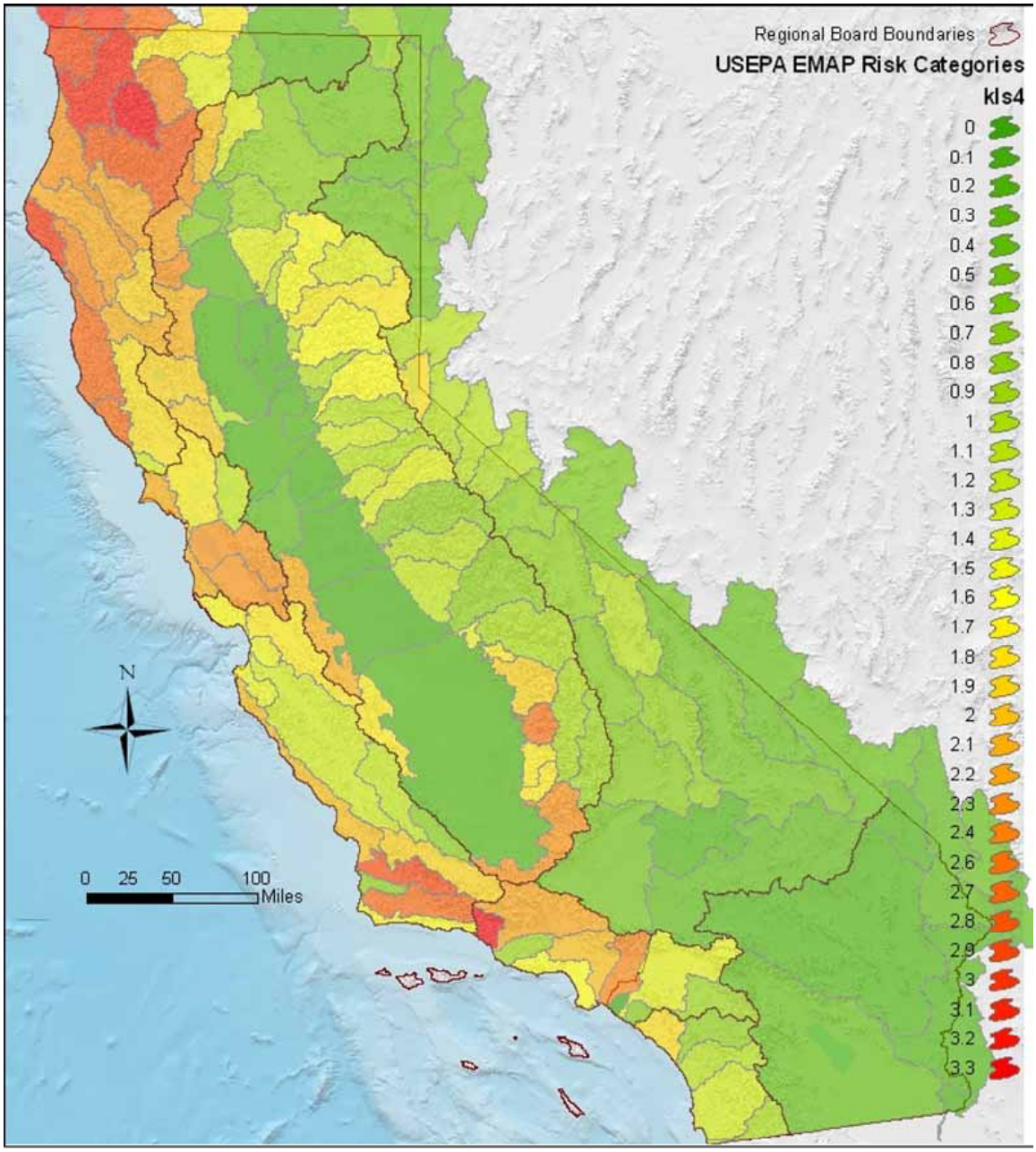

Water Boards

State Water Resources Control Board, January 15, 2008

Receiving Water (RW) Risk Factor Worksheet	Entry	Score
A. Watershed Characteristics	**yes/no**	
A.1. Does the disturbed area discharge (either directly or indirectly) to a **303(d)-listed waterbody impaired by sediment**? (For help with impaired waterbodies please check the attached worksheet or visit the link below) or has a **USEPA approved TMDL implementation plan for sediment**?: 2006 Approved Sediment-impared WBs Worksheet http://www.waterboards.ca.gov/water_issues/programs/tmdl/303d_lists2006_epa.shtml **OR**	**Yes**	**High**
A.2. Does the disturbed area discharge to a waterbody with designated beneficial uses of SPAWN & COLD & MIGRATORY? http://www.ice.ucdavis.edu/geowbs/asp/wbquse.asp		

Combined Risk Level Matrix

Receiving Water Risk	Sediment Risk: Low	Sediment Risk: Medium	Sediment Risk: High
Low	Level 1	Level 2	
High	Level 2		Level 3

Project Sediment Risk: Low

Project RW Risk: High

Project Combined Risk: Level 2

Soil Erodibility Factor (K)

The K factor can be determined by using the nomograph method, which requires that a particle size analysis (ASTM D-422) be done to determine the percentages of sand, very fine sand, silt and clay. Use the figure below to determine appropriate K value.

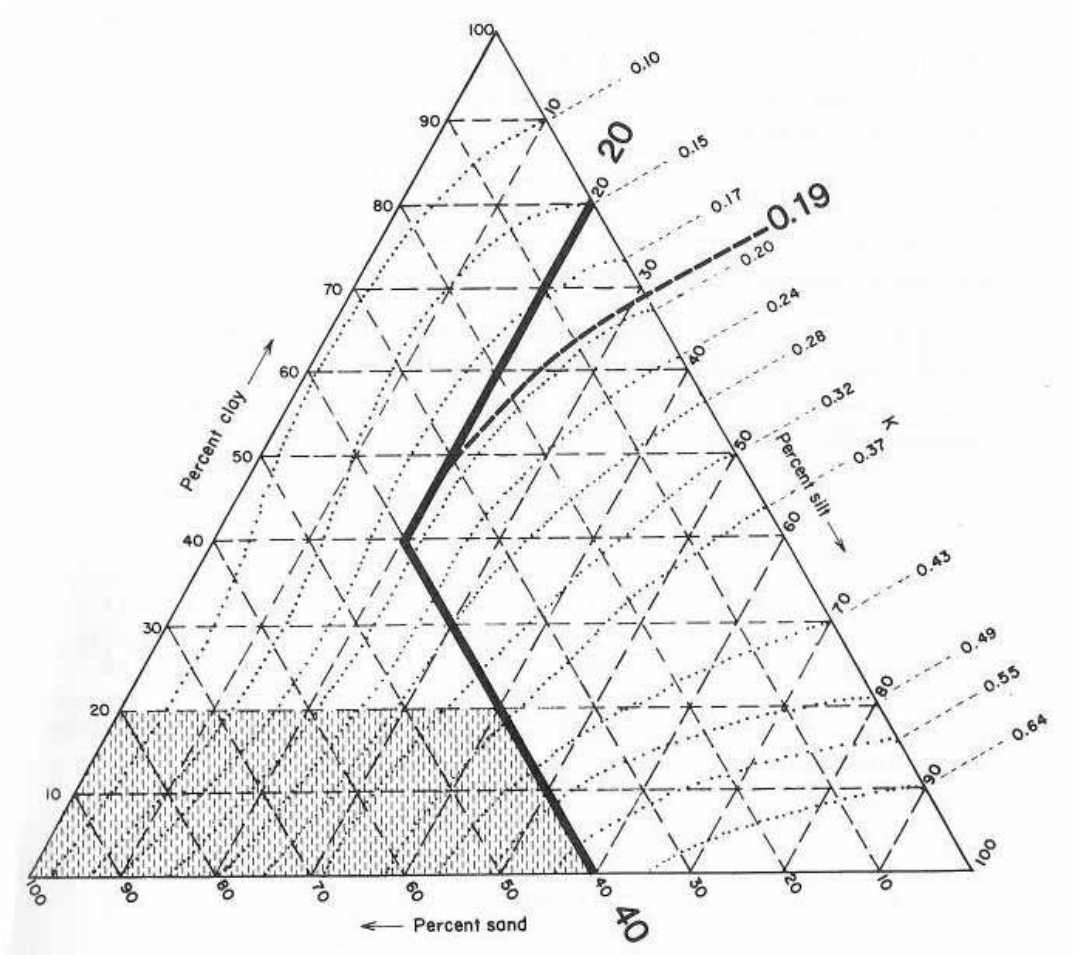

Erickson triangular nomograph used to estimate soil erodibility (K) factor.
The figure above is the USDA nomograph used to determine the K factor for a soil, based on its texture (% silt plus very fine sand, % sand, % organic matter, soil structure, and permeability).
Nomograph from Erickson 1977 as referenced in Goldman et. al., 1986.

Average Watershed Slope (%)

Sheet Flow Length (ft)	**0.2**	**0.5**	**1.0**	**2.0**	**3.0**	**4.0**	**5.0**	**6.0**	**8.0**	**10.0**	**12.0**	**14.0**	**16.0**	**20.0**	
<3	0.05	0.07	0.09	0.13	0.17	0.20	0.23	0.26	0.32	0.35	0.36	0.38	0.39	0.41	
6	0.05	0.07	0.09	0.13	0.17	0.20	0.23	0.26	0.32	0.37	0.41	0.45	0.49	0.56	
9	0.05	0.07	0.09	0.13	0.17	0.20	0.23	0.26	0.32	0.38	0.45	0.51	0.56	0.67	
12	0.05	0.07	0.09	0.13	0.17	0.20	0.23	0.26	0.32	0.39	0.47	0.55	0.62	0.76	
15	0.05	0.07	0.09	0.13	0.17	0.20	0.23	0.26	0.32	0.40	0.49	0.58	0.67	0.84	
25	0.05	0.07	0.10	0.16	0.21	0.26	0.31	0.36	0.45	0.57	0.71	0.85	0.98	1.24	
50	0.05	0.08	0.13	0.21	0.30	0.38	0.46	0.54	0.70	0.91	1.15	1.40	1.64	2.10	
75	0.05	0.08	0.14	0.25	0.36	0.47	0.58	0.69	0.91	1.20	1.54	1.87	2.21	2.86	
100	0.05	0.09	0.15	0.28	0.41	0.55	0.68	0.82	1.10	1.46	1.88	2.31	2.73	3.57	
150	0.05	0.09	0.17	0.33	0.50	0.68	0.86	1.05	1.43	1.92	2.51	3.09	3.68	4.85	
200	0.06	0.10	0.18	0.37	0.57	0.79	1.02	1.25	1.72	2.34	3.07	3.81	4.56	6.04	
250	0.06	0.10	0.19	0.40	0.64	0.89	1.16	1.43	1.99	2.72	3.60	4.48	5.37	7.16	
300	0.06	0.10	0.20	0.43	0.69	0.98	1.28	1.60	2.24	3.09	4.09	5.11	6.15	8.23	1
400	0.06	0.11	0.22	0.48	0.80	1.14	1.51	1.90	2.70	3.75	5.01	6.30	7.60	10.24	1
600	0.06	0.12	0.24	0.56	0.96	1.42	1.91	2.43	3.52	4.95	6.67	8.45	10.26	13.94	1
800	0.06	0.12	0.26	0.63	1.10	1.65	2.25	2.89	4.24	6.03	8.17	10.40	12.69	17.35	2
1000	0.06	0.13	0.27	0.69	1.23	1.86	2.55	3.30	4.91	7.02	9.57	12.23	14.96	20.57	2

LS Factors for Construction Sites. *Table from Renard et. al., 1997.*

WBID	REGION NUMBER	REGION NAME	WATER BODY TYPE ABBR	WATER BODY TYPE	WATER BODY NAME	CALWATER WATERSHED	ESTIMATED SIZE AFFECTED	UNIT ABBR	UNIT	POLLUTANT CODE	POLLUTANT	SOURCE CODE	POTENTIAL SOURCES	PROPOSED TMDL COMPLETION	COMMENTS
CAE115301	1	North Coast	E	Estuaries	Bodega HU, Estero Americano HA, estuary	11530012	199	A	Acres	1100	Sedimentation/Siltation	1510	Range Grazing-Riparian	2019	Water Quality Attainment strategy is attempting to increase voluntary measures for attainment of standards & objectives, as was done in the Estero de San Antonio/Stemple Creek T Water Quality Attainment Strategy, adopted by NCRWQCB in Dec, 97.
CAE115301	1	North Coast	E	Estuaries	Bodega HU, Estero Americano HA, estuary	11530012	199	A	Acres	1100	Sedimentation/Siltation	7000	Hydromodification	2019	Water Quality Attainment strategy is attempting to increase voluntary measures for attainment of standards & objectives, as was done in the Estero de San Antonio/Stemple Creek T Water Quality Attainment Strategy, adopted by NCRWQCB in Dec, 97.
CAE115301	1	North Coast	E	Estuaries	Bodega HU, Estero Americano HA, estuary	11530012	199	A	Acres	1100	Sedimentation/Siltation	7600	Removal of Riparian Vegetation	2019	Water Quality Attainment strategy is attempting to increase voluntary measures for attainment of standards & objectives, as was done in the Estero de San Antonio/Stemple Creek T Water Quality Attainment Strategy, adopted by NCRWQCB in Dec, 97.
CAE115301	1	North Coast	E	Estuaries	Bodega HU, Estero Americano HA, estuary	11530012	199	A	Acres	1100	Sedimentation/Siltation	7700	Streambank Modification/Destabilization	2019	Water Quality Attainment strategy is attempting to increase voluntary measures for attainment of standards & objectives, as was done in the Estero de San Antonio/Stemple Creek T Water Quality Attainment Strategy, adopted by NCRWQCB in Dec, 97.
CAE115301	1	North Coast	E	Estuaries	Bodega HU, Estero Americano HA, estuary	11530012	199	A	Acres	1100	Sedimentation/Siltation	7820	Erosion/Siltation	2019	Water Quality Attainment strategy is attempting to increase voluntary measures for attainment of standards & objectives, as was done in the Estero de San Antonio/Stemple Creek T Water Quality Attainment Strategy, adopted by NCRWQCB in Dec, 97.
CAE115301	1	North Coast	E	Estuaries	Bodega HU, Estero Americano HA, estuary	11530012	199	A	Acres	1100	Sedimentation/Siltation	9100	Nonpoint Source	2019	Water Quality Attainment strategy is attempting to increase voluntary measures for attainment of standards & objectives, as was done in the Estero de San Antonio/Stemple Creek T Water Quality Attainment Strategy, adopted by NCRWQCB in Dec, 97.
CAR111111	1	North Coast	R	Rivers/Streams	Eel River HU, Lower Eel River HA, Eel River Delta	11110000	426	M	Miles	1100	Sedimentation/Siltation	1500	Range Grazing-Riparian and/or Upland	2019	
CAR111111	1	North Coast	R	Rivers/Streams	Eel River HU, Lower Eel River HA, Eel River Delta	11110000	426	M	Miles	1100	Sedimentation/Siltation	2000	Silviculture	2019	
CAR111111	1	North Coast	R	Rivers/Streams	Eel River HU, Lower Eel River HA, Eel River Delta	11110000	426	M	Miles	1100	Sedimentation/Siltation	9100	Nonpoint Source	2019	
CAR111411	1	North Coast	R	Rivers/Streams	Eel River HU, Middle Main HA	11140000	674	M	Miles	1100	Sedimentation/Siltation	1510	Range Grazing-Riparian	2004	
CAR111411	1	North Coast	R	Rivers/Streams	Eel River HU, Middle Main HA	11140000	674	M	Miles	1100	Sedimentation/Siltation	1520	Range Grazing-Upland	2004	
CAR111411	1	North Coast	R	Rivers/Streams	Eel River HU, Middle Main HA	11140000	674	M	Miles	1100	Sedimentation/Siltation	2000	Silviculture	2004	
CAR111411	1	North Coast	R	Rivers/Streams	Eel River HU, Middle Main HA	11140000	674	M	Miles	1100	Sedimentation/Siltation	2100	Harvesting, Restoration, Residue Management	2004	
CAR111411	1	North Coast	R	Rivers/Streams	Eel River HU, Middle Main HA	11140000	674	M	Miles	1100	Sedimentation/Siltation	2300	Logging Road Construction/Maintenance	2004	
CAR111411	1	North Coast	R	Rivers/Streams	Eel River HU, Middle Main HA	11140000	674	M	Miles	1100	Sedimentation/Siltation	3000	Construction/Land Development	2004	
CAR111411	1	North Coast	R	Rivers/Streams	Eel River HU, Middle Main HA	11140000	674	M	Miles	1100	Sedimentation/Siltation	3200	Land Development	2004	
CAR111411	1	North Coast	R	Rivers/Streams	Eel River HU, Middle Main HA	11140000	674	M	Miles	1100	Sedimentation/Siltation	7000	Hydromodification	2004	
CAR111411	1	North Coast	R	Rivers/Streams	Eel River HU, Middle Main HA	11140000	674	M	Miles	1100	Sedimentation/Siltation	7550	Habitat Modification	2004	
CAR111411	1	North Coast	R	Rivers/Streams	Eel River HU, Middle Main HA	11140000	674	M	Miles	1100	Sedimentation/Siltation	7600	Removal of Riparian Vegetation	2004	
CAR111411	1	North Coast	R	Rivers/Streams	Eel River HU, Middle Main HA	11140000	674	M	Miles	1100	Sedimentation/Siltation	7700	Streambank Modification/Destabilization	2004	
CAR111411	1	North Coast	R	Rivers/Streams	Eel River HU, Middle Main HA	11140000	674	M	Miles	1100	Sedimentation/Siltation	7820	Erosion/Siltation	2004	
CAR111621	1	North Coast	R	Rivers/Streams	Eel River HU, Upper Main HA (Includes Tomki Creek)	11160000	1141	M	Miles	1100	Sedimentation/Siltation	1935	Agriculture-grazing	2019	USEPA will develop a TMDL for Eel River, Upper Main Fork.
CAR111621	1	North Coast	R	Rivers/Streams	Eel River HU, Upper Main HA (Includes Tomki Creek)	11160000	1141	M	Miles	1100	Sedimentation/Siltation	2000	Silviculture	2019	USEPA will develop a TMDL for Eel River, Upper Main Fork.
CAR111621	1	North Coast	R	Rivers/Streams	Eel River HU, Upper Main HA (Includes Tomki Creek)	11160000	1141	M	Miles	1100	Sedimentation/Siltation	2100	Harvesting, Restoration, Residue Management	2019	USEPA will develop a TMDL for Eel River, Upper Main Fork.
CAR111621	1	North Coast	R	Rivers/Streams	Eel River HU, Upper Main HA (Includes Tomki Creek)	11160000	1141	M	Miles	1100	Sedimentation/Siltation	2300	Logging Road Construction/Maintenance	2019	USEPA will develop a TMDL for Eel River, Upper Main Fork.
CAR111621	1	North Coast	R	Rivers/Streams	Eel River HU, Upper Main HA (Includes Tomki Creek)	11160000	1141	M	Miles	1100	Sedimentation/Siltation	2400	Silvicultural Point Sources	2019	USEPA will develop a TMDL for Eel River, Upper Main Fork.
CAR111621	1	North Coast	R	Rivers/Streams	Eel River HU, Upper Main HA (Includes Tomki Creek)	11160000	1141	M	Miles	1100	Sedimentation/Siltation	3000	Construction/Land Development	2019	USEPA will develop a TMDL for Eel River, Upper Main Fork.
CAR111621	1	North Coast	R	Rivers/Streams	Eel River HU, Upper Main HA (Includes Tomki Creek)	11160000	1141	M	Miles	1100	Sedimentation/Siltation	3100	Highway/Road/Bridge Construction	2019	USEPA will develop a TMDL for Eel River, Upper Main Fork.
CAR111621	1	North Coast	R	Rivers/Streams	Eel River HU, Upper Main HA (Includes Tomki Creek)	11160000	1141	M	Miles	1100	Sedimentation/Siltation	7600	Removal of Riparian Vegetation	2019	USEPA will develop a TMDL for Eel River, Upper Main Fork.
CAR111621	1	North Coast	R	Rivers/Streams	Eel River HU, Upper Main HA (Includes Tomki Creek)	11160000	1141	M	Miles	1100	Sedimentation/Siltation	7700	Streambank Modification/Destabilization	2019	USEPA will develop a TMDL for Eel River, Upper Main Fork.
CAR111621	1	North Coast	R	Rivers/Streams	Eel River HU, Upper Main HA (Includes Tomki Creek)	11160000	1141	M	Miles	1100	Sedimentation/Siltation	7820	Erosion/Siltation	2019	USEPA will develop a TMDL for Eel River, Upper Main Fork.
CAR110001	1	North Coast	R	Rivers/Streams	Eureka Plain HU, Elk River	11000000	88	M	Miles	1100	Sedimentation/Siltation	2000	Silviculture	2019	The Eureka Plain HU, Elk River, includes the following Calwater Planning Watersheds (PWS): 110.00021, 110.00030, 110.00032, and 110.00042. Sedimentation, threat sedimentation, impaired irrigation water quality, impaired domestic supply water quality, impaired spawning habitat, increased rate and depth of flooding due to sediment, property damage. NCRWQCB and California Department of forestry staff are involved in ongoing efforts to attain adherance to Forest Practice Rules.
CAR110001	1	North Coast	R	Rivers/Streams	Eureka Plain HU, Elk River	11000000	88	M	Miles	1100	Sedimentation/Siltation	2100	Harvesting, Restoration, Residue Management	2019	The Eureka Plain HU, Elk River, includes the following Calwater Planning Watersheds (PWS): 110.00021, 110.00030, 110.00032, and 110.00042. Sedimentation, threat sedimentation, impaired irrigation water quality, impaired domestic supply water quality, impaired spawning habitat, increased rate and depth of flooding due to sediment, property damage. NCRWQCB and California Department of forestry staff are involved in ongoing efforts to attain adherance to Forest Practice Rules.
CAR110001	1	North Coast	R	Rivers/Streams	Eureka Plain HU, Elk River	11000000	88	M	Miles	1100	Sedimentation/Siltation	2300	Logging Road Construction/Maintenance	2019	The Eureka Plain HU, Elk River, includes the following Calwater Planning Watersheds (PWS): 110.00021, 110.00030, 110.00032, and 110.00042. Sedimentation, threat sedimentation, impaired irrigation water quality, impaired domestic supply water quality, impaired spawning habitat, increased rate and depth of flooding due to sediment, property damage. NCRWQCB and California Department of forestry staff are involved in ongoing efforts to attain adherance to Forest Practice Rules.
CAR110001	1	North Coast	R	Rivers/Streams	Eureka Plain HU, Elk River	11000000	88	M	Miles	1100	Sedimentation/Siltation	7600	Removal of Riparian Vegetation	2019	The Eureka Plain HU, Elk River, includes the following Calwater Planning Watersheds (PWS): 110.00021, 110.00030, 110.00032, and 110.00042. Sedimentation, threat sedimentation, impaired irrigation water quality, impaired domestic supply water quality, impaired spawning habitat, increased rate and depth of flooding due to sediment, property damage. NCRWQCB and California Department of forestry staff are involved in ongoing efforts to attain adherance to Forest Practice Rules.
CAR110001	1	North Coast	R	Rivers/Streams	Eureka Plain HU, Elk River	11000000	88	M	Miles	1100	Sedimentation/Siltation	7700	Streambank Modification/Destabilization	2019	The Eureka Plain HU, Elk River, includes the following Calwater Planning Watersheds (PWS): 110.00021, 110.00030, 110.00032, and 110.00042. Sedimentation, threat sedimentation, impaired irrigation water quality, impaired domestic supply water quality, impaired spawning habitat, increased rate and depth of flooding due to sediment, property damage. NCRWQCB and California Department of forestry staff are involved in ongoing efforts to attain adherance to Forest Practice Rules.
CAR110001	1	North Coast	R	Rivers/Streams	Eureka Plain HU, Elk River	11000000	88	M	Miles	1100	Sedimentation/Siltation	7820	Erosion/Siltation	2019	The Eureka Plain HU, Elk River, includes the following Calwater Planning Watersheds (PWS): 110.00021, 110.00030, 110.00032, and 110.00042. Sedimentation, threat sedimentation, impaired irrigation water quality, impaired domestic supply water quality, impaired spawning habitat, increased rate and depth of flooding due to sediment, property damage. NCRWQCB and California Department of forestry staff are involved in ongoing efforts to attain adherance to Forest Practice Rules.
CAR110001	1	North Coast	R	Rivers/Streams	Eureka Plain HU, Elk River	11000000	88	M	Miles	1100	Sedimentation/Siltation	8600	Natural Sources	2019	The Eureka Plain HU, Elk River, includes the following Calwater Planning Watersheds (PWS): 110.00021, 110.00030, 110.00032, and 110.00042. Sedimentation, threat sedimentation, impaired irrigation water quality, impaired domestic supply water quality, impaired spawning habitat, increased rate and depth of flooding due to sediment, property damage. NCRWQCB and California Department of forestry staff are involved in ongoing efforts to attain adherance to Forest Practice Rules.
CAR110001	1	North Coast	R	Rivers/Streams	Eureka Plain HU, Elk River	11000000	88	M	Miles	1100	Sedimentation/Siltation	9100	Nonpoint Source	2019	The Eureka Plain HU, Elk River, includes the following Calwater Planning Watersheds (PWS): 110.00021, 110.00030, 110.00032, and 110.00042. Sedimentation, threat sedimentation, impaired irrigation water quality, impaired domestic supply water quality, impaired spawning habitat, increased rate and depth of flooding due to sediment, property damage. NCRWQCB and California Department of forestry staff are involved in ongoing efforts to attain adherance to Forest Practice Rules.
CAR110001	1	North Coast	R	Rivers/Streams	Eureka Plain HU, Freshwater Creek	11000000	84	M	Miles	1100	Sedimentation/Siltation	2000	Silviculture	2019	The Eureka Plain HU, Freshwater Creek, includes the following Calwater Planning Watersheds (PWS): 110.00011, 110.00012, 110.00014, 110.00040, and 110.00050. Sedimentation, threat of sedimentation, impaired irrigation water quality, impaired domestic supply water quality, impaired spawning habitat, increased rate and depth of flooding due to sediment, property damage. NCRWQCB and California Department of forestry staff are involved in ongoing efforts to attain adherance to Forest Practice Rules.
CAR110001	1	North Coast	R	Rivers/Streams	Eureka Plain HU, Freshwater Creek	11000000	84	M	Miles	1100	Sedimentation/Siltation	2100	Harvesting, Restoration, Residue Management	2019	The Eureka Plain HU, Freshwater Creek, includes the following Calwater Planning Watersheds (PWS): 110.00011, 110.00012, 110.00014, 110.00040, and 110.00050. Sedimentation, threat of sedimentation, impaired irrigation water quality, impaired domestic supply water quality, impaired spawning habitat, increased rate and depth of flooding due to sediment, property damage. NCRWQCB and California Department of forestry staff are involved in ongoing efforts to attain adherance to Forest Practice Rules.
CAR110001	1	North Coast	R	Rivers/Streams	Eureka Plain HU, Freshwater Creek	11000000	84	M	Miles	1100	Sedimentation/Siltation	2300	Logging Road Construction/Maintenance	2019	The Eureka Plain HU, Freshwater Creek, includes the following Calwater Planning Watersheds (PWS): 110.00011, 110.00012, 110.00014, 110.00040, and 110.00050. Sedimentation, threat of sedimentation, impaired irrigation water quality, impaired domestic supply water quality, impaired spawning habitat, increased rate and depth of flooding due to sediment, property damage. NCRWQCB and California Department of forestry staff are involved in ongoing efforts to attain adherance to Forest Practice Rules.

WBID	REGION NUMBER	REGION NAME	WATER BODY TYPE ABBR	WATER BODY TYPE	WATER BODY NAME	CALWATER WATERSHED	ESTIMATED SIZE AFFECTED	UNIT ABBR	UNIT	POLLUTANT CODE	POLLUTANT	SOURCE CODE	POTENTIAL SOURCES	PROPOSED TMDL COMPLETION	COMMENTS
CAR11000	1	North Coast	R	Rivers/Streams	Eureka Plain HU, Freshwater Creek	11000000	84	M	Miles	1100	Sedimentation/Siltation	7600	Removal of Riparian Vegetation	2019	The Eureka Plain HU, Freshwater Creek, includes the following Calwater Planning Watersheds (PWS): 110.00011, 110.00012, 110.00014, 110.00040, and 110.00050. Sedimentation, threat of sedimentation, impaired irrigation water quality, impaired domestic supply water quality, impaired spawning habitat, increased rate and depth of flooding due to sediment, property damage. NCRWQCB and California Department of forestry staff are involved in ongoing efforts to attain adherance to Forest Practice Rules.
CAR11000	1	North Coast	R	Rivers/Streams	Eureka Plain HU, Freshwater Creek	11000000	84	M	Miles	1100	Sedimentation/Siltation	7700	Streambank Modification/Destabilization	2019	The Eureka Plain HU, Freshwater Creek, includes the following Calwater Planning Watersheds (PWS): 110.00011, 110.00012, 110.00014, 110.00040, and 110.00050. Sedimentation, threat of sedimentation, impaired irrigation water quality, impaired domestic supply water quality, impaired spawning habitat, increased rate and depth of flooding due to sediment, property damage. NCRWQCB and California Department of forestry staff are involved in ongoing efforts to attain adherance to Forest Practice Rules.
CAR11000	1	North Coast	R	Rivers/Streams	Eureka Plain HU, Freshwater Creek	11000000	84	M	Miles	1100	Sedimentation/Siltation	7820	Erosion/Siltation	2019	The Eureka Plain HU, Freshwater Creek, includes the following Calwater Planning Watersheds (PWS): 110.00011, 110.00012, 110.00014, 110.00040, and 110.00050. Sedimentation, threat of sedimentation, impaired irrigation water quality, impaired domestic supply water quality, impaired spawning habitat, increased rate and depth of flooding due to sediment, property damage. NCRWQCB and California Department of forestry staff are involved in ongoing efforts to attain adherance to Forest Practice Rules.
CAR11000	1	North Coast	R	Rivers/Streams	Eureka Plain HU, Freshwater Creek	11000000	84	M	Miles	1100	Sedimentation/Siltation	8600	Natural Sources	2019	The Eureka Plain HU, Freshwater Creek, includes the following Calwater Planning Watersheds (PWS): 110.00011, 110.00012, 110.00014, 110.00040, and 110.00050. Sedimentation, threat of sedimentation, impaired irrigation water quality, impaired domestic supply water quality, impaired spawning habitat, increased rate and depth of flooding due to sediment, property damage. NCRWQCB and California Department of forestry staff are involved in ongoing efforts to attain adherance to Forest Practice Rules.
CAR11000	1	North Coast	R	Rivers/Streams	Eureka Plain HU, Freshwater Creek	11000000	84	M	Miles	1100	Sedimentation/Siltation	9100	Nonpoint Source	2019	The Eureka Plain HU, Freshwater Creek, includes the following Calwater Planning Watersheds (PWS): 110.00011, 110.00012, 110.00014, 110.00040, and 110.00050. Sedimentation, threat of sedimentation, impaired irrigation water quality, impaired domestic supply water quality, impaired spawning habitat, increased rate and depth of flooding due to sediment, property damage. NCRWQCB and California Department of forestry staff are involved in ongoing efforts to attain adherance to Forest Practice Rules.
CAR10511	1	North Coast	R	Rivers/Streams	Klamath River HU, Lower HA, Klamath Glen HSA	10511000	609	M	Miles	1100	Sedimentation/Siltation	9000	Source Unknown	2019	If this listing is determined to be on tribal lands, USEPA should place this water body and pollutant on the section 303d list for the tribal lands. It is not the State Water Board's inten this listing affect other actions related to decommissioning and removal of dams on the Klamath River
CAR10910	1	North Coast	R	Rivers/Streams	Mad River HU, Mad River	10900000	654	M	Miles	1100	Sedimentation/Siltation	2000	Silviculture	2019	USEPA will develop TMDL for the Mad River. Sediment TMDLS will be developed for the area tributary to and including: (1) the Mad River (North Fork), (2) the mad River (Upper), (3) the Mad River (Middle).
CAR10910	1	North Coast	R	Rivers/Streams	Mad River HU, Mad River	10900000	654	M	Miles	1100	Sedimentation/Siltation	5000	Resource Extraction	2019	USEPA will develop TMDL for the Mad River. Sediment TMDLS will be developed for the area tributary to and including: (1) the Mad River (North Fork), (2) the mad River (Upper), (3) the Mad River (Middle).
CAR10910	1	North Coast	R	Rivers/Streams	Mad River HU, Mad River	10900000	654	M	Miles	1100	Sedimentation/Siltation	9100	Nonpoint Source	2019	USEPA will develop TMDL for the Mad River. Sediment TMDLS will be developed for the area tributary to and including: (1) the Mad River (North Fork), (2) the mad River (Upper), (3) the Mad River (Middle).
CAR11412	1	North Coast	R	Rivers/Streams	Russian River HU, Lower Russian River HA, Austin Creek HSA	11412000	81	M	Miles	1100	Sedimentation/Siltation	2000	Silviculture	2019	Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment.
CAR11412	1	North Coast	R	Rivers/Streams	Russian River HU, Lower Russian River HA, Austin Creek HSA	11412000	81	M	Miles	1100	Sedimentation/Siltation	3000	Construction/Land Development	2019	Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment.
CAR11412	1	North Coast	R	Rivers/Streams	Russian River HU, Lower Russian River HA, Austin Creek HSA	11412000	81	M	Miles	1100	Sedimentation/Siltation	3215	Disturbed Sites (Land Develop.)	2019	Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment.
CAR11412	1	North Coast	R	Rivers/Streams	Russian River HU, Lower Russian River HA, Austin Creek HSA	11412000	81	M	Miles	1100	Sedimentation/Siltation	7300	Dam Construction	2019	Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment.
CAR11412	1	North Coast	R	Rivers/Streams	Russian River HU, Lower Russian River HA, Austin Creek HSA	11412000	81	M	Miles	1100	Sedimentation/Siltation	7400	Flow Regulation/Modification	2019	Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment.
CAR11412	1	North Coast	R	Rivers/Streams	Russian River HU, Lower Russian River HA, Austin Creek HSA	11412000	81	M	Miles	1100	Sedimentation/Siltation	7820	Erosion/Siltation	2019	Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment.
CAR11411	1	North Coast	R	Rivers/Streams	Russian River HU, Lower Russian River HA, Guerneville HSA	11411000	195	M	Miles	1100	Sedimentation/Siltation	1000	Agriculture	2019	Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment .
CAR11411	1	North Coast	R	Rivers/Streams	Russian River HU, Lower Russian River HA, Guerneville HSA	11411000	195	M	Miles	1100	Sedimentation/Siltation	1200	Irrigated Crop Production	2019	Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment .
CAR11411	1	North Coast	R	Rivers/Streams	Russian River HU, Lower Russian River HA, Guerneville HSA	11411000	195	M	Miles	1100	Sedimentation/Siltation	1300	Specialty Crop Production	2019	Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment .
CAR11411	1	North Coast	R	Rivers/Streams	Russian River HU, Lower Russian River HA, Guerneville HSA	11411000	195	M	Miles	1100	Sedimentation/Siltation	1915	Agriculture-storm runoff	2019	Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment .
CAR11411	1	North Coast	R	Rivers/Streams	Russian River HU, Lower Russian River HA, Guerneville HSA	11411000	195	M	Miles	1100	Sedimentation/Siltation	1935	Agriculture-grazing	2019	Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment .
CAR11411	1	North Coast	R	Rivers/Streams	Russian River HU, Lower Russian River HA, Guerneville HSA	11411000	195	M	Miles	1100	Sedimentation/Siltation	2000	Silviculture	2019	Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment .
CAR11411	1	North Coast	R	Rivers/Streams	Russian River HU, Lower Russian River HA, Guerneville HSA	11411000	195	M	Miles	1100	Sedimentation/Siltation	3000	Construction/Land Development	2019	Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment .
CAR11411	1	North Coast	R	Rivers/Streams	Russian River HU, Lower Russian River HA, Guerneville HSA	11411000	195	M	Miles	1100	Sedimentation/Siltation	3100	Highway/Road/Bridge Construction	2019	Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment .
CAR11411	1	North Coast	R	Rivers/Streams	Russian River HU, Lower Russian River HA, Guerneville HSA	11411000	195	M	Miles	1100	Sedimentation/Siltation	3200	Land Development	2019	Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment .
CAR11411	1	North Coast	R	Rivers/Streams	Russian River HU, Lower Russian River HA, Guerneville HSA	11411000	195	M	Miles	1100	Sedimentation/Siltation	7000	Hydromodification	2019	Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment .
CAR11411	1	North Coast	R	Rivers/Streams	Russian River HU, Lower Russian River HA, Guerneville HSA	11411000	195	M	Miles	1100	Sedimentation/Siltation	7100	Channelization	2019	Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment .
CAR11411	1	North Coast	R	Rivers/Streams	Russian River HU, Lower Russian River HA, Guerneville HSA	11411000	195	M	Miles	1100	Sedimentation/Siltation	7300	Dam Construction	2019	Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment .
CAR11411	1	North Coast	R	Rivers/Streams	Russian River HU, Lower Russian River HA, Guerneville HSA	11411000	195	M	Miles	1100	Sedimentation/Siltation	7350	Upstream Impoundment	2019	Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment .
CAR11411	1	North Coast	R	Rivers/Streams	Russian River HU, Lower Russian River HA, Guerneville HSA	11411000	195	M	Miles	1100	Sedimentation/Siltation	7400	Flow Regulation/Modification	2019	Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment .
CAR11411	1	North Coast	R	Rivers/Streams	Russian River HU, Lower Russian River HA, Guerneville HSA	11411000	195	M	Miles	1100	Sedimentation/Siltation	7550	Habitat Modification	2019	Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment .
CAR11411	1	North Coast	R	Rivers/Streams	Russian River HU, Lower Russian River HA, Guerneville HSA	11411000	195	M	Miles	1100	Sedimentation/Siltation	7600	Removal of Riparian Vegetation	2019	Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment .
CAR11411	1	North Coast	R	Rivers/Streams	Russian River HU, Lower Russian River HA, Guerneville HSA	11411000	195	M	Miles	1100	Sedimentation/Siltation	7700	Streambank Modification/Destabilization	2019	Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment .
CAR11411	1	North Coast	R	Rivers/Streams	Russian River HU, Lower Russian River HA, Guerneville HSA	11411000	195	M	Miles	1100	Sedimentation/Siltation	7800	Drainage/Filling Of Wetlands	2019	Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment .
CAR11411	1	North Coast	R	Rivers/Streams	Russian River HU, Lower Russian River HA, Guerneville HSA	11411000	195	M	Miles	1100	Sedimentation/Siltation	7810	Channel Erosion	2019	Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment .
CAR11411	1	North Coast	R	Rivers/Streams	Russian River HU, Lower Russian River HA, Guerneville HSA	11411000	195	M	Miles	1100	Sedimentation/Siltation	7820	Erosion/Siltation	2019	Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment .
CAR11426	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Big Sulphur Creek HSA	11426000	85	M	Miles	1100	Sedimentation/Siltation	3210	Geothermal Development	2019	Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment .
CAR11426	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Big Sulphur Creek HSA	11426000	85	M	Miles	1100	Sedimentation/Siltation	7820	Erosion/Siltation	2019	Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment .
CAR11426	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Big Sulphur Creek HSA	11426000	85	M	Miles	1100	Sedimentation/Siltation	9100	Nonpoint Source	2019	Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment .

WBID	REGION NUMBER	REGION NAME	WATER BODY TYPE ABBR	WATER BODY TYPE	WATER BODY NAME	CALWATER WATERSHED	ESTIMATED SIZE AFFECTED	UNIT ABBR	UNIT	POLLUTANT CODE	POLLUTANT	SOURCE CODE	POTENTIAL SOURCES	PROPOSED TMDL COMPLETION	COMMENTS
CAR11425	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Geyserville HSA	11425000	242	M	Miles	1100	Sedimentation/Siltation	1000	Agriculture	2019	Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment TMDL.
CAR11425	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Geyserville HSA	11425000	242	M	Miles	1100	Sedimentation/Siltation	1100	Nonirrigated Crop Production	2019	Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment TMDL.
CAR11425	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Geyserville HSA	11425000	242	M	Miles	1100	Sedimentation/Siltation	1200	Irrigated Crop Production	2019	Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment TMDL.
CAR11425	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Geyserville HSA	11425000	242	M	Miles	1100	Sedimentation/Siltation	1300	Specialty Crop Production	2019	Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment TMDL.
CAR11425	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Geyserville HSA	11425000	242	M	Miles	1100	Sedimentation/Siltation	1510	Range Grazing-Riparian	2019	Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment TMDL.
CAR11425	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Geyserville HSA	11425000	242	M	Miles	1100	Sedimentation/Siltation	1520	Range Grazing-Upland	2019	Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment TMDL.
CAR11425	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Geyserville HSA	11425000	242	M	Miles	1100	Sedimentation/Siltation	1915	Agriculture-storm runoff	2019	Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment TMDL.
CAR11425	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Geyserville HSA	11425000	242	M	Miles	1100	Sedimentation/Siltation	1935	Agriculture-grazing	2019	Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment TMDL.
CAR11425	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Geyserville HSA	11425000	242	M	Miles	1100	Sedimentation/Siltation	2000	Silviculture	2019	Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment TMDL.
CAR11425	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Geyserville HSA	11425000	242	M	Miles	1100	Sedimentation/Siltation	3000	Construction/Land Development	2019	Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment TMDL.
CAR11425	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Geyserville HSA	11425000	242	M	Miles	1100	Sedimentation/Siltation	3210	Geothermal Development	2019	Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment TMDL.
CAR11425	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Geyserville HSA	11425000	242	M	Miles	1100	Sedimentation/Siltation	3215	Disturbed Sites (Land Develop.)	2019	Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment TMDL.
CAR11425	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Geyserville HSA	11425000	242	M	Miles	1100	Sedimentation/Siltation	4501	Surface Runoff	2019	Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment TMDL.
CAR11425	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Geyserville HSA	11425000	242	M	Miles	1100	Sedimentation/Siltation	5000	Resource Extraction	2019	Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment TMDL.
CAR11425	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Geyserville HSA	11425000	242	M	Miles	1100	Sedimentation/Siltation	7100	Channelization	2019	Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment TMDL.
CAR11425	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Geyserville HSA	11425000	242	M	Miles	1100	Sedimentation/Siltation	7500	Bridge Construction	2019	Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment TMDL.
CAR11425	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Geyserville HSA	11425000	242	M	Miles	1100	Sedimentation/Siltation	7600	Removal of Riparian Vegetation	2019	Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment TMDL.
CAR11425	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Geyserville HSA	11425000	242	M	Miles	1100	Sedimentation/Siltation	7700	Streambank Modification/Destabilization	2019	Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment TMDL.
CAR11425	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Geyserville HSA	11425000	242	M	Miles	1100	Sedimentation/Siltation	7800	Drainage/Filling Of Wetlands	2019	Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment TMDL.
CAR11425	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Geyserville HSA	11425000	242	M	Miles	1100	Sedimentation/Siltation	7810	Channel Erosion	2019	Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment TMDL.
CAR11425	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Geyserville HSA	11425000	242	M	Miles	1100	Sedimentation/Siltation	7820	Erosion/Siltation	2019	Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment TMDL.
CAR11425	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Geyserville HSA	11425000	242	M	Miles	1100	Sedimentation/Siltation	8600	Natural Sources	2019	Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment TMDL.
CAR11425	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Geyserville HSA	11425000	242	M	Miles	1100	Sedimentation/Siltation	9100	Nonpoint Source	2019	Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment TMDL.
CAR11421	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Laguna de Santa Rosa	11421000	96	M	Miles	1100	Sedimentation/Siltation	3110	Road Construction	2019	Entire Russian River watershed (including Laguna de Santa Rosa) is listed for sedimentation.
CAR11421	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Laguna de Santa Rosa	11421000	96	M	Miles	1100	Sedimentation/Siltation	3200	Land Development	2019	Entire Russian River watershed (including Laguna de Santa Rosa) is listed for sedimentation.
CAR11421	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Laguna de Santa Rosa	11421000	96	M	Miles	1100	Sedimentation/Siltation	3215	Disturbed Sites (Land Develop.)	2019	Entire Russian River watershed (including Laguna de Santa Rosa) is listed for sedimentation.
CAR11421	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Laguna de Santa Rosa	11421000	96	M	Miles	1100	Sedimentation/Siltation	4000	Urban Runoff/Storm Sewers	2019	Entire Russian River watershed (including Laguna de Santa Rosa) is listed for sedimentation.
CAR11423	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Mark West Creek HSA	11423000	99	M	Miles	1100	Sedimentation/Siltation	1000	Agriculture	2019	Russian River Watershed tributary sediment impairments led to listing of entire watershed for sediment .
CAR11423	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Mark West Creek HSA	11423000	99	M	Miles	1100	Sedimentation/Siltation	1200	Irrigated Crop Production	2019	Russian River Watershed tributary sediment impairments led to listing of entire watershed for sediment .
CAR11423	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Mark West Creek HSA	11423000	99	M	Miles	1100	Sedimentation/Siltation	1300	Specialty Crop Production	2019	Russian River Watershed tributary sediment impairments led to listing of entire watershed for sediment .
CAR11423	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Mark West Creek HSA	11423000	99	M	Miles	1100	Sedimentation/Siltation	1500	Range Grazing-Riparian and/or Upland	2019	Russian River Watershed tributary sediment impairments led to listing of entire watershed for sediment .
CAR11423	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Mark West Creek HSA	11423000	99	M	Miles	1100	Sedimentation/Siltation	1510	Range Grazing-Riparian	2019	Russian River Watershed tributary sediment impairments led to listing of entire watershed for sediment .
CAR11423	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Mark West Creek HSA	11423000	99	M	Miles	1100	Sedimentation/Siltation	1600	Intensive Animal Feeding Operations	2019	Russian River Watershed tributary sediment impairments led to listing of entire watershed for sediment .
CAR11423	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Mark West Creek HSA	11423000	99	M	Miles	1100	Sedimentation/Siltation	1915	Agriculture-storm runoff	2019	Russian River Watershed tributary sediment impairments led to listing of entire watershed for sediment .
CAR11423	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Mark West Creek HSA	11423000	99	M	Miles	1100	Sedimentation/Siltation	1935	Agriculture-grazing	2019	Russian River Watershed tributary sediment impairments led to listing of entire watershed for sediment .
CAR11423	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Mark West Creek HSA	11423000	99	M	Miles	1100	Sedimentation/Siltation	2000	Silviculture	2019	Russian River Watershed tributary sediment impairments led to listing of entire watershed for sediment .
CAR11423	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Mark West Creek HSA	11423000	99	M	Miles	1100	Sedimentation/Siltation	2100	Harvesting, Restoration, Residue Management	2019	Russian River Watershed tributary sediment impairments led to listing of entire watershed for sediment .
CAR11423	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Mark West Creek HSA	11423000	99	M	Miles	1100	Sedimentation/Siltation	3000	Construction/Land Development	2019	Russian River Watershed tributary sediment impairments led to listing of entire watershed for sediment .
CAR11423	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Mark West Creek HSA	11423000	99	M	Miles	1100	Sedimentation/Siltation	3100	Highway/Road/Bridge Construction	2019	Russian River Watershed tributary sediment impairments led to listing of entire watershed for sediment .
CAR11423	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Mark West Creek HSA	11423000	99	M	Miles	1100	Sedimentation/Siltation	3200	Land Development	2019	Russian River Watershed tributary sediment impairments led to listing of entire watershed for sediment .
CAR11423	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Mark West Creek HSA	11423000	99	M	Miles	1100	Sedimentation/Siltation	3215	Disturbed Sites (Land Develop.)	2019	Russian River Watershed tributary sediment impairments led to listing of entire watershed for sediment .
CAR11423	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Mark West Creek HSA	11423000	99	M	Miles	1100	Sedimentation/Siltation	4300	Other Urban Runoff	2019	Russian River Watershed tributary sediment impairments led to listing of entire watershed for sediment .
CAR11423	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Mark West Creek HSA	11423000	99	M	Miles	1100	Sedimentation/Siltation	4501	Surface Runoff	2019	Russian River Watershed tributary sediment impairments led to listing of entire watershed for sediment .

WBID	REGION NUMBER	REGION NAME	WATER BODY TYPE ABBR	WATER BODY TYPE	WATER BODY NAME	CALWATER WATERSHED	ESTIMATED SIZE AFFECTED	UNIT ABBR	UNIT	POLLUTANT CODE	POLLUTANT	SOURCE CODE	POTENTIAL SOURCES	PROPOSED TMDL COMPLETION	COMMENTS
CAR11423	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Mark West Creek HSA	11423000	99	M	Miles	1100	Sedimentation/Siltation	7600	Removal of Riparian Vegetation	2019	Russian River Watershed tributary sediment impairments led to listing of entire watershed for sediment .
CAR11423	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Mark West Creek HSA	11423000	99	M	Miles	1100	Sedimentation/Siltation	7700	Streambank Modification/Destabilization	2019	Russian River Watershed tributary sediment impairments led to listing of entire watershed for sediment .
CAR11423	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Mark West Creek HSA	11423000	99	M	Miles	1100	Sedimentation/Siltation	7800	Drainage/Filling Of Wetlands	2019	Russian River Watershed tributary sediment impairments led to listing of entire watershed for sediment .
CAR11423	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Mark West Creek HSA	11423000	99	M	Miles	1100	Sedimentation/Siltation	7810	Channel Erosion	2019	Russian River Watershed tributary sediment impairments led to listing of entire watershed for sediment .
CAR11421	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Laguna de Santa Rosa	11421000	96	M	Miles	1100	Sedimentation/Siltation	4300	Other Urban Runoff	2019	Entire Russian River watershed (including Laguna de Santa Rosa) is listed for sedimentation.
CAR11421	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Laguna de Santa Rosa	11421000	96	M	Miles	1100	Sedimentation/Siltation	4500	Highway/Road/Bridge Runoff	2019	Entire Russian River watershed (including Laguna de Santa Rosa) is listed for sedimentation.
CAR11421	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Laguna de Santa Rosa	11421000	96	M	Miles	1100	Sedimentation/Siltation	7000	Hydromodification	2019	Entire Russian River watershed (including Laguna de Santa Rosa) is listed for sedimentation.
CAR11421	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Laguna de Santa Rosa	11421000	96	M	Miles	1100	Sedimentation/Siltation	7100	Channelization	2019	Entire Russian River watershed (including Laguna de Santa Rosa) is listed for sedimentation.
CAR11421	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Laguna de Santa Rosa	11421000	96	M	Miles	1100	Sedimentation/Siltation	7600	Removal of Riparian Vegetation	2019	Entire Russian River watershed (including Laguna de Santa Rosa) is listed for sedimentation.
CAR11421	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Laguna de Santa Rosa	11421000	96	M	Miles	1100	Sedimentation/Siltation	7700	Streambank Modification/Destabilization	2019	Entire Russian River watershed (including Laguna de Santa Rosa) is listed for sedimentation.
CAR11421	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Laguna de Santa Rosa	11421000	96	M	Miles	1100	Sedimentation/Siltation	7800	Drainage/Filling Of Wetlands	2019	Entire Russian River watershed (including Laguna de Santa Rosa) is listed for sedimentation.
CAR11421	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Laguna de Santa Rosa	11421000	96	M	Miles	1100	Sedimentation/Siltation	7810	Channel Erosion	2019	Entire Russian River watershed (including Laguna de Santa Rosa) is listed for sedimentation.
CAR11421	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Laguna de Santa Rosa	11421000	96	M	Miles	1100	Sedimentation/Siltation	7820	Erosion/Siltation	2019	Entire Russian River watershed (including Laguna de Santa Rosa) is listed for sedimentation.
CAR11421	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Laguna de Santa Rosa	11421000	96	M	Miles	1100	Sedimentation/Siltation	8050	Erosion From Derelict Land	2019	Entire Russian River watershed (including Laguna de Santa Rosa) is listed for sedimentation.
CAR11421	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Laguna de Santa Rosa	11421000	96	M	Miles	1100	Sedimentation/Siltation	8300	Highway Maintenance and Runoff	2019	Entire Russian River watershed (including Laguna de Santa Rosa) is listed for sedimentation.
CAR11421	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Laguna de Santa Rosa	11421000	96	M	Miles	1100	Sedimentation/Siltation	9100	Nonpoint Source	2019	Entire Russian River watershed (including Laguna de Santa Rosa) is listed for sedimentation.
CAR30411	3	Central Coast	R	Rivers/Streams	San Vicente Creek	30411023	9.11953	M	Miles	1100	Sedimentation/Siltation	2000	Silviculture	2019	
CAR31410	3	Central Coast	R	Rivers/Streams	Santa Ynez River (below city of Lompoc to Ocean)	31410040	3.8	M	Miles	1100	Sedimentation/Siltation	1000	Agriculture	2019	
CAR31410	3	Central Coast	R	Rivers/Streams	Santa Ynez River (below city of Lompoc to Ocean)	31410040	3.8	M	Miles	1100	Sedimentation/Siltation	4000	Urban Runoff/Storm Sewers	2019	
CAR31410	3	Central Coast	R	Rivers/Streams	Santa Ynez River (below city of Lompoc to Ocean)	31410040	3.8	M	Miles	1100	Sedimentation/Siltation	5000	Resource Extraction	2019	
CAR31410	3	Central Coast	R	Rivers/Streams	Santa Ynez River (Cachuma Lake to below city o Lompoc)	31440050	43	M	Miles	1100	Sedimentation/Siltation	1000	Agriculture	2019	
CAR31410	3	Central Coast	R	Rivers/Streams	Santa Ynez River (Cachuma Lake to below city o Lompoc)	31440050	43	M	Miles	1100	Sedimentation/Siltation	4000	Urban Runoff/Storm Sewers	2019	
CAR31410	3	Central Coast	R	Rivers/Streams	Santa Ynez River (Cachuma Lake to below city o Lompoc)	31440050	43	M	Miles	1100	Sedimentation/Siltation	5000	Resource Extraction	2019	
CAR31300	3	Central Coast	R	Rivers/Streams	Shuman Canyon Creek	31300041	8.5496	M	Miles	1100	Sedimentation/Siltation	9000	Source Unknown	2019	
CAR30413	3	Central Coast	R	Rivers/Streams	Valencia Creek	30413023	6.19	M	Miles	1100	Sedimentation/Siltation	1000	Agriculture	2008	
CAR30413	3	Central Coast	R	Rivers/Streams	Valencia Creek	30413023	6.19	M	Miles	1100	Sedimentation/Siltation	3000	Construction/Land Development	2008	
CAR30412	3	Central Coast	R	Rivers/Streams	Zayante Creek	30412040	9.20875	M	Miles	1100	Sedimentation/Siltation	1000	Agriculture	2019	
CAR30412	3	Central Coast	R	Rivers/Streams	Zayante Creek	30412040	9.20875	M	Miles	1100	Sedimentation/Siltation	2000	Silviculture	2019	
CAR30412	3	Central Coast	R	Rivers/Streams	Zayante Creek	30412040	9.20875	M	Miles	1100	Sedimentation/Siltation	3110	Road Construction	2019	
CAR30412	3	Central Coast	R	Rivers/Streams	Zayante Creek	30412040	9.20875	M	Miles	1100	Sedimentation/Siltation	3215	Disturbed Sites (Land Develop.)	2019	
CAR30412	3	Central Coast	R	Rivers/Streams	Zayante Creek	30412040	9.20875	M	Miles	1100	Sedimentation/Siltation	7820	Erosion/Siltation	2019	
CAR30412	3	Central Coast	R	Rivers/Streams	Zayante Creek	30412040	9.20875	M	Miles	1100	Sedimentation/Siltation	9100	Nonpoint Source	2019	
CAR11423	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Mark West Creek HSA	11423000	99	M	Miles	1100	Sedimentation/Siltation	7820	Erosion/Siltation	2019	Russian River Watershed tributary sediment impairments led to listing of entire watershed for sediment .
CAR11422	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Santa Rosa Creek	11422000	87	M	Miles	1100	Sedimentation/Siltation	1000	Agriculture	2019	Entire Russian River watershed (including Santa Rosa Creek) is listed for sedimentation.
CAR11422	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Santa Rosa Creek	11422000	87	M	Miles	1100	Sedimentation/Siltation	1100	Nonirrigated Crop Production	2019	Entire Russian River watershed (including Santa Rosa Creek) is listed for sedimentation.
CAR11422	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Santa Rosa Creek	11422000	87	M	Miles	1100	Sedimentation/Siltation	1200	Irrigated Crop Production	2019	Entire Russian River watershed (including Santa Rosa Creek) is listed for sedimentation.
CAR11422	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Santa Rosa Creek	11422000	87	M	Miles	1100	Sedimentation/Siltation	1300	Specialty Crop Production	2019	Entire Russian River watershed (including Santa Rosa Creek) is listed for sedimentation.
CAR11422	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Santa Rosa Creek	11422000	87	M	Miles	1100	Sedimentation/Siltation	1400	Pasture Grazing-Riparian and/or Upland	2019	Entire Russian River watershed (including Santa Rosa Creek) is listed for sedimentation.
CAR11422	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Santa Rosa Creek	11422000	87	M	Miles	1100	Sedimentation/Siltation	1510	Range Grazing-Riparian	2019	Entire Russian River watershed (including Santa Rosa Creek) is listed for sedimentation.
CAR11422	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Santa Rosa Creek	11422000	87	M	Miles	1100	Sedimentation/Siltation	1520	Range Grazing-Upland	2019	Entire Russian River watershed (including Santa Rosa Creek) is listed for sedimentation.
CAR11422	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Santa Rosa Creek	11422000	87	M	Miles	1100	Sedimentation/Siltation	1940	Dairies	2019	Entire Russian River watershed (including Santa Rosa Creek) is listed for sedimentation.
CAR11422	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Santa Rosa Creek	11422000	87	M	Miles	1100	Sedimentation/Siltation	3000	Construction/Land Development	2019	Entire Russian River watershed (including Santa Rosa Creek) is listed for sedimentation.
CAR11422	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Santa Rosa Creek	11422000	87	M	Miles	1100	Sedimentation/Siltation	3100	Highway/Road/Bridge Construction	2019	Entire Russian River watershed (including Santa Rosa Creek) is listed for sedimentation.
CAR11422	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Santa Rosa Creek	11422000	87	M	Miles	1100	Sedimentation/Siltation	3200	Land Development	2019	Entire Russian River watershed (including Santa Rosa Creek) is listed for sedimentation.
CAR11422	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Santa Rosa Creek	11422000	87	M	Miles	1100	Sedimentation/Siltation	4000	Urban Runoff/Storm Sewers	2019	Entire Russian River watershed (including Santa Rosa Creek) is listed for sedimentation.
CAR11422	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Santa Rosa Creek	11422000	87	M	Miles	1100	Sedimentation/Siltation	4100	Urban Runoff--Non-industrial Permitted	2019	Entire Russian River watershed (including Santa Rosa Creek) is listed for sedimentation.
CAR11422	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Santa Rosa Creek	11422000	87	M	Miles	1100	Sedimentation/Siltation	4300	Other Urban Runoff	2019	Entire Russian River watershed (including Santa Rosa Creek) is listed for sedimentation.
CAR11422	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Santa Rosa Creek	11422000	87	M	Miles	1100	Sedimentation/Siltation	4501	Surface Runoff	2019	Entire Russian River watershed (including Santa Rosa Creek) is listed for sedimentation.

WBID	REGION NUMBER	REGION NAME	WATER BODY TYPE ABBR	WATER BODY TYPE	WATER BODY NAME	CALWATER WATERSHED	ESTIMATED SIZE AFFECTED	UNIT ABBR	UNIT	POLLUTANT CODE	POLLUTANT	SOURCE CODE	POTENTIAL SOURCES	PROPOSED TMDL COMPLETION	COMMENTS
CAR11422	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Santa Rosa Creek	11422000	87	M	Miles	1100	Sedimentation/Siltation	7000	Hydromodification	2019	Entire Russian River watershed (including Santa Rosa Creek) is listed for sedimentation.
CAR11422	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Santa Rosa Creek	11422000	87	M	Miles	1100	Sedimentation/Siltation	7100	Channelization	2019	Entire Russian River watershed (including Santa Rosa Creek) is listed for sedimentation.
CAR11422	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Santa Rosa Creek	11422000	87	M	Miles	1100	Sedimentation/Siltation	7500	Bridge Construction	2019	Entire Russian River watershed (including Santa Rosa Creek) is listed for sedimentation.
CAR11422	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Santa Rosa Creek	11422000	87	M	Miles	1100	Sedimentation/Siltation	7550	Habitat Modification	2019	Entire Russian River watershed (including Santa Rosa Creek) is listed for sedimentation.
CAR11422	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Santa Rosa Creek	11422000	87	M	Miles	1100	Sedimentation/Siltation	7600	Removal of Riparian Vegetation	2019	Entire Russian River watershed (including Santa Rosa Creek) is listed for sedimentation.
CAR11422	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Santa Rosa Creek	11422000	87	M	Miles	1100	Sedimentation/Siltation	7700	Streambank Modification/Destabilization	2019	Entire Russian River watershed (including Santa Rosa Creek) is listed for sedimentation.
CAR11422	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Santa Rosa Creek	11422000	87	M	Miles	1100	Sedimentation/Siltation	7800	Drainage/Filling Of Wetlands	2019	Entire Russian River watershed (including Santa Rosa Creek) is listed for sedimentation.
CAR11422	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Santa Rosa Creek	11422000	87	M	Miles	1100	Sedimentation/Siltation	7810	Channel Erosion	2019	Entire Russian River watershed (including Santa Rosa Creek) is listed for sedimentation.
CAR11422	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Santa Rosa Creek	11422000	87	M	Miles	1100	Sedimentation/Siltation	7820	Erosion/Siltation	2019	Entire Russian River watershed (including Santa Rosa Creek) is listed for sedimentation.
CAR11422	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Santa Rosa Creek	11422000	87	M	Miles	1100	Sedimentation/Siltation	8600	Natural Sources	2019	Entire Russian River watershed (including Santa Rosa Creek) is listed for sedimentation.
CAR11422	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Santa Rosa Creek	11422000	87	M	Miles	1100	Sedimentation/Siltation	9100	Nonpoint Source	2019	Entire Russian River watershed (including Santa Rosa Creek) is listed for sedimentation.
CAR11424	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Warm Springs HSA	11424000	255	M	Miles	1100	Sedimentation/Siltation	1000	Agriculture	2019	Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment .
CAR11424	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Warm Springs HSA	11424000	255	M	Miles	1100	Sedimentation/Siltation	1915	Agriculture-storm runoff	2019	Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment .
CAR11424	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Warm Springs HSA	11424000	255	M	Miles	1100	Sedimentation/Siltation	2000	Silviculture	2019	Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment .
CAR11424	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Warm Springs HSA	11424000	255	M	Miles	1100	Sedimentation/Siltation	2300	Logging Road Construction/Maintenance	2019	Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment .
CAR11424	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Warm Springs HSA	11424000	255	M	Miles	1100	Sedimentation/Siltation	3000	Construction/Land Development	2019	Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment .
CAR11424	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Warm Springs HSA	11424000	255	M	Miles	1100	Sedimentation/Siltation	3100	Highway/Road/Bridge Construction	2019	Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment .
CAR11424	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Warm Springs HSA	11424000	255	M	Miles	1100	Sedimentation/Siltation	3215	Disturbed Sites (Land Develop.)	2019	Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment .
CAR11424	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Warm Springs HSA	11424000	255	M	Miles	1100	Sedimentation/Siltation	7000	Hydromodification	2019	Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment .
CAR11424	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Warm Springs HSA	11424000	255	M	Miles	1100	Sedimentation/Siltation	7100	Channelization	2019	Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment .
CAR11424	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Warm Springs HSA	11424000	255	M	Miles	1100	Sedimentation/Siltation	7300	Dam Construction	2019	Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment .
CAR11424	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Warm Springs HSA	11424000	255	M	Miles	1100	Sedimentation/Siltation	7350	Upstream Impoundment	2019	Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment .
CAR11424	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Warm Springs HSA	11424000	255	M	Miles	1100	Sedimentation/Siltation	7400	Flow Regulation/Modification	2019	Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment .
CAR11424	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Warm Springs HSA	11424000	255	M	Miles	1100	Sedimentation/Siltation	7550	Habitat Modification	2019	Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment .
CAR11424	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Warm Springs HSA	11424000	255	M	Miles	1100	Sedimentation/Siltation	7600	Removal of Riparian Vegetation	2019	Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment .
CAR11424	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Warm Springs HSA	11424000	255	M	Miles	1100	Sedimentation/Siltation	7700	Streambank Modification/Destabilization	2019	Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment .
CAR11424	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Warm Springs HSA	11424000	255	M	Miles	1100	Sedimentation/Siltation	7800	Drainage/Filling Of Wetlands	2019	Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment .
CAR11424	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Warm Springs HSA	11424000	255	M	Miles	1100	Sedimentation/Siltation	7810	Channel Erosion	2019	Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment .
CAR11424	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Warm Springs HSA	11424000	255	M	Miles	1100	Sedimentation/Siltation	7820	Erosion/Siltation	2019	Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment .
CAR11424	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Warm Springs HSA	11424000	255	M	Miles	1100	Sedimentation/Siltation	9100	Nonpoint Source	2019	Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment .
CAR11432	1	North Coast	R	Rivers/Streams	Russian River HU, Upper Russian River HA, Coyote Valley HSA	11432000	171	M	Miles	1100	Sedimentation/Siltation	1000	Agriculture	2019	Russian River Watershed tributary sediment impairments led to listing of entire watershed for sediment .
CAR11432	1	North Coast	R	Rivers/Streams	Russian River HU, Upper Russian River HA, Coyote Valley HSA	11432000	171	M	Miles	1100	Sedimentation/Siltation	2000	Silviculture	2019	Russian River Watershed tributary sediment impairments led to listing of entire watershed for sediment .
CAR11432	1	North Coast	R	Rivers/Streams	Russian River HU, Upper Russian River HA, Coyote Valley HSA	11432000	171	M	Miles	1100	Sedimentation/Siltation	3000	Construction/Land Development	2019	Russian River Watershed tributary sediment impairments led to listing of entire watershed for sediment .
CAR11432	1	North Coast	R	Rivers/Streams	Russian River HU, Upper Russian River HA, Coyote Valley HSA	11432000	171	M	Miles	1100	Sedimentation/Siltation	7000	Hydromodification	2019	Russian River Watershed tributary sediment impairments led to listing of entire watershed for sediment .
CAR11432	1	North Coast	R	Rivers/Streams	Russian River HU, Upper Russian River HA, Coyote Valley HSA	11432000	171	M	Miles	1100	Sedimentation/Siltation	7100	Channelization	2019	Russian River Watershed tributary sediment impairments led to listing of entire watershed for sediment .
CAR11432	1	North Coast	R	Rivers/Streams	Russian River HU, Upper Russian River HA, Coyote Valley HSA	11432000	171	M	Miles	1100	Sedimentation/Siltation	7300	Dam Construction	2019	Russian River Watershed tributary sediment impairments led to listing of entire watershed for sediment .
CAR11432	1	North Coast	R	Rivers/Streams	Russian River HU, Upper Russian River HA, Coyote Valley HSA	11432000	171	M	Miles	1100	Sedimentation/Siltation	7400	Flow Regulation/Modification	2019	Russian River Watershed tributary sediment impairments led to listing of entire watershed for sediment .
CAR11432	1	North Coast	R	Rivers/Streams	Russian River HU, Upper Russian River HA, Coyote Valley HSA	11432000	171	M	Miles	1100	Sedimentation/Siltation	7500	Bridge Construction	2019	Russian River Watershed tributary sediment impairments led to listing of entire watershed for sediment .
CAR11432	1	North Coast	R	Rivers/Streams	Russian River HU, Upper Russian River HA, Coyote Valley HSA	11432000	171	M	Miles	1100	Sedimentation/Siltation	7550	Habitat Modification	2019	Russian River Watershed tributary sediment impairments led to listing of entire watershed for sediment .
CAR11432	1	North Coast	R	Rivers/Streams	Russian River HU, Upper Russian River HA, Coyote Valley HSA	11432000	171	M	Miles	1100	Sedimentation/Siltation	7600	Removal of Riparian Vegetation	2019	Russian River Watershed tributary sediment impairments led to listing of entire watershed for sediment .
CAR11432	1	North Coast	R	Rivers/Streams	Russian River HU, Upper Russian River HA, Coyote Valley HSA	11432000	171	M	Miles	1100	Sedimentation/Siltation	7700	Streambank Modification/Destabilization	2019	Russian River Watershed tributary sediment impairments led to listing of entire watershed for sediment .
CAR11432	1	North Coast	R	Rivers/Streams	Russian River HU, Upper Russian River HA, Coyote Valley HSA	11432000	171	M	Miles	1100	Sedimentation/Siltation	7800	Drainage/Filling Of Wetlands	2019	Russian River Watershed tributary sediment impairments led to listing of entire watershed for sediment .
CAR11432	1	North Coast	R	Rivers/Streams	Russian River HU, Upper Russian River HA, Coyote Valley HSA	11432000	171	M	Miles	1100	Sedimentation/Siltation	7810	Channel Erosion	2019	Russian River Watershed tributary sediment impairments led to listing of entire watershed for sediment .

WBID	REGION NUMBER	REGION NAME	WATER BODY TYPE ABBR	WATER BODY TYPE	WATER BODY NAME	CALWATER WATERSHED	ESTIMATED SIZE AFFECTED	UNIT ABBR	UNIT	POLLUTANT CODE	POLLUTANT	SOURCE CODE	POTENTIAL SOURCES	PROPOSED TMDL COMPLETION	COMMENTS
CAR11432	1	North Coast	R	Rivers/Streams	Russian River HU, Upper Russian River HA, Coyote Valley HSA	11432000	171	M	Miles	1100	Sedimentation/Siltation	7820	Erosion/Siltation	2019	Russian River Watershed tributary sediment impairments led to listing of entire watershed for sediment .
CAR11433	1	North Coast	R	Rivers/Streams	Russian River HU, Upper Russian River HA, Forsythe Creek HSA	11433000	122	M	Miles	1100	Sedimentation/Siltation	7820	Erosion/Siltation	2019	Russian River Watershed tributary sediment impairments led to listing of entire watershed for sediment .
CAR11433	1	North Coast	R	Rivers/Streams	Russian River HU, Upper Russian River HA, Forsythe Creek HSA	11433000	122	M	Miles	1100	Sedimentation/Siltation	9100	Nonpoint Source	2019	Russian River Watershed tributary sediment impairments led to listing of entire watershed for sediment .
CAR11431	1	North Coast	R	Rivers/Streams	Russian River HU, Upper Russian River HA, Ukiah HSA	11431000	460	M	Miles	1100	Sedimentation/Siltation	1000	Agriculture	2019	Russian River Watershed tributary sediment impairments led to listing of entire watershed for sediment .
CAR11431	1	North Coast	R	Rivers/Streams	Russian River HU, Upper Russian River HA, Ukiah HSA	11431000	460	M	Miles	1100	Sedimentation/Siltation	2000	Silviculture	2019	Russian River Watershed tributary sediment impairments led to listing of entire watershed for sediment .
CAR11431	1	North Coast	R	Rivers/Streams	Russian River HU, Upper Russian River HA, Ukiah HSA	11431000	460	M	Miles	1100	Sedimentation/Siltation	3000	Construction/Land Development	2019	Russian River Watershed tributary sediment impairments led to listing of entire watershed for sediment .
CAR11431	1	North Coast	R	Rivers/Streams	Russian River HU, Upper Russian River HA, Ukiah HSA	11431000	460	M	Miles	1100	Sedimentation/Siltation	5000	Resource Extraction	2019	Russian River Watershed tributary sediment impairments led to listing of entire watershed for sediment .
CAR11431	1	North Coast	R	Rivers/Streams	Russian River HU, Upper Russian River HA, Ukiah HSA	11431000	460	M	Miles	1100	Sedimentation/Siltation	7550	Habitat Modification	2019	Russian River Watershed tributary sediment impairments led to listing of entire watershed for sediment .
CAR11431	1	North Coast	R	Rivers/Streams	Russian River HU, Upper Russian River HA, Ukiah HSA	11431000	460	M	Miles	1100	Sedimentation/Siltation	7600	Removal of Riparian Vegetation	2019	Russian River Watershed tributary sediment impairments led to listing of entire watershed for sediment .
CAR11431	1	North Coast	R	Rivers/Streams	Russian River HU, Upper Russian River HA, Ukiah HSA	11431000	460	M	Miles	1100	Sedimentation/Siltation	7700	Streambank Modification/Destabilization	2019	Russian River Watershed tributary sediment impairments led to listing of entire watershed for sediment .
CAR11431	1	North Coast	R	Rivers/Streams	Russian River HU, Upper Russian River HA, Ukiah HSA	11431000	460	M	Miles	1100	Sedimentation/Siltation	7800	Drainage/Filling Of Wetlands	2019	Russian River Watershed tributary sediment impairments led to listing of entire watershed for sediment .
CAR11431	1	North Coast	R	Rivers/Streams	Russian River HU, Upper Russian River HA, Ukiah HSA	11431000	460	M	Miles	1100	Sedimentation/Siltation	7810	Channel Erosion	2019	Russian River Watershed tributary sediment impairments led to listing of entire watershed for sediment .
CAR11431	1	North Coast	R	Rivers/Streams	Russian River HU, Upper Russian River HA, Ukiah HSA	11431000	460	M	Miles	1100	Sedimentation/Siltation	7820	Erosion/Siltation	2019	Russian River Watershed tributary sediment impairments led to listing of entire watershed for sediment .
CAR11431	1	North Coast	R	Rivers/Streams	Russian River HU, Upper Russian River HA, Ukiah HSA	11431000	460	M	Miles	1100	Sedimentation/Siltation	8300	Highway Maintenance and Runoff	2019	Russian River Watershed tributary sediment impairments led to listing of entire watershed for sediment .
CAR11431	1	North Coast	R	Rivers/Streams	Russian River HU, Upper Russian River HA, Ukiah HSA	11431000	460	M	Miles	1100	Sedimentation/Siltation	8600	Natural Sources	2019	Russian River Watershed tributary sediment impairments led to listing of entire watershed for sediment .
CAB20114	2	San Francisco Bay	B	Bays and Harbors	Tomales Bay	20114033	8545.46	A	Acres	1100	Sedimentation/Siltation	1000	Agriculture	2008	TMDL will be developed as part of ongoing watershed management effort. Tributary streams, Lagunitas Creek and Walker Creek, must be managed first. Additional monitoring assessment needed.
CAB20114	2	San Francisco Bay	B	Bays and Harbors	Tomales Bay	20114033	8545.46	A	Acres	1100	Sedimentation/Siltation	7350	Upstream Impoundment	2008	TMDL will be developed as part of ongoing watershed management effort. Tributary streams, Lagunitas Creek and Walker Creek, must be managed first. Additional monitoring assessment needed.
CAR20240	2	San Francisco Bay	R	Rivers/Streams	Butano Creek	20240031	3.62774	M	Miles	1100	Sedimentation/Siltation	9100	Nonpoint Source	2019	Impairment to steelhead habita
CAR20113	2	San Francisco Bay	R	Rivers/Streams	Lagunitas Creek	20113020	16.75	M	Miles	1100	Sedimentation/Siltation	1000	Agriculture	2009	Tributary to Tomales Bay. TMDLs will be developed as part of evolving watershed management effort. Additional monitoring and assessment nee
CAR20113	2	San Francisco Bay	R	Rivers/Streams	Lagunitas Creek	20113020	16.75	M	Miles	1100	Sedimentation/Siltation	4000	Urban Runoff/Storm Sewers	2009	Tributary to Tomales Bay. TMDLs will be developed as part of evolving watershed management effort. Additional monitoring and assessment nee
CAR20650	2	San Francisco Bay	R	Rivers/Streams	Napa River	20650010	65.33	M	Miles	1100	Sedimentation/Siltation	1000	Agriculture	2006	TMDL will be developed as part of ongoing watershed management effort. Additional monitoring and assessment nee
CAR20650	2	San Francisco Bay	R	Rivers/Streams	Napa River	20650010	65.33	M	Miles	1100	Sedimentation/Siltation	3000	Construction/Land Development	2006	TMDL will be developed as part of ongoing watershed management effort. Additional monitoring and assessment nee
CAR20650	2	San Francisco Bay	R	Rivers/Streams	Napa River	20650010	65.33	M	Miles	1100	Sedimentation/Siltation	3200	Land Development	2006	TMDL will be developed as part of ongoing watershed management effort. Additional monitoring and assessment nee
CAR20650	2	San Francisco Bay	R	Rivers/Streams	Napa River	20650010	65.33	M	Miles	1100	Sedimentation/Siltation	4000	Urban Runoff/Storm Sewers	2006	TMDL will be developed as part of ongoing watershed management effort. Additional monitoring and assessment nee
CAR20240	2	San Francisco Bay	R	Rivers/Streams	Pescadero Creek	20240013	26.03	M	Miles	1100	Sedimentation/Siltation	9100	Nonpoint Source	2019	If California Department of Fish and Game and the National Marine Fisheries Service find that for this water body fish populations are not impacted, the State Water Board supp removing this water body and pollutant from the list.
CAR20630	2	San Francisco Bay	R	Rivers/Streams	Petaluma River	20630020	21.566	M	Miles	1100	Sedimentation/Siltation	1000	Agriculture	2019	
CAR20630	2	San Francisco Bay	R	Rivers/Streams	Petaluma River	20630020	21.566	M	Miles	1100	Sedimentation/Siltation	3000	Construction/Land Development	2019	
CAR20630	2	San Francisco Bay	R	Rivers/Streams	Petaluma River	20630020	21.566	M	Miles	1100	Sedimentation/Siltation	4000	Urban Runoff/Storm Sewers	2019	
CAR20550	2	San Francisco Bay	R	Rivers/Streams	San Francisquito Creek	20550040	12.05	M	Miles	1100	Sedimentation/Siltation	9100	Nonpoint Source	2008	Impairment to steelhead habita
CAR20230	2	San Francisco Bay	R	Rivers/Streams	San Gregorio Creek	20230014	11.14	M	Miles	1100	Sedimentation/Siltation	9100	Nonpoint Source	2019	Impairment to steelhead habita
CAR20640	2	San Francisco Bay	R	Rivers/Streams	Sonoma Creek	20640050	30.23	M	Miles	1100	Sedimentation/Siltation	1000	Agriculture	2008	TMDL will be developed as part of ongoing watershed management effort. Additional monitoring and assessment nee
CAR20640	2	San Francisco Bay	R	Rivers/Streams	Sonoma Creek	20640050	30.23	M	Miles	1100	Sedimentation/Siltation	3000	Construction/Land Development	2008	TMDL will be developed as part of ongoing watershed management effort. Additional monitoring and assessment nee
CAR20640	2	San Francisco Bay	R	Rivers/Streams	Sonoma Creek	20640050	30.23	M	Miles	1100	Sedimentation/Siltation	3200	Land Development	2008	TMDL will be developed as part of ongoing watershed management effort. Additional monitoring and assessment nee
CAR20640	2	San Francisco Bay	R	Rivers/Streams	Sonoma Creek	20640050	30.23	M	Miles	1100	Sedimentation/Siltation	4000	Urban Runoff/Storm Sewers	2008	TMDL will be developed as part of ongoing watershed management effort. Additional monitoring and assessment nee
CAR20112	2	San Francisco Bay	R	Rivers/Streams	Walker Creek	20112013	15.8352	M	Miles	1100	Sedimentation/Siltation	1000	Agriculture	2009	Tributary to Tomales Bay. TMDLs will be developed as part of evolving watershed management effort. Additional monitoring and assessment nee
CAB30600	3	Central Coast	B	Bays and Harbors	Moss Landing Harbor	30600014	79.2726	A	Acres	1100	Sedimentation/Siltation	1000	Agriculture	2019	
CAB30600	3	Central Coast	B	Bays and Harbors	Moss Landing Harbor	30600014	79.2726	A	Acres	1100	Sedimentation/Siltation	1200	Irrigated Crop Production	2019	
CAB30600	3	Central Coast	B	Bays and Harbors	Moss Landing Harbor	30600014	79.2726	A	Acres	1100	Sedimentation/Siltation	1915	Agriculture-storm runoff	2019	
CAB30600	3	Central Coast	B	Bays and Harbors	Moss Landing Harbor	30600014	79.2726	A	Acres	1100	Sedimentation/Siltation	7000	Hydromodification	2019	
CAB30600	3	Central Coast	B	Bays and Harbors	Moss Landing Harbor	30600014	79.2726	A	Acres	1100	Sedimentation/Siltation	7200	Dredging	2019	
CAB30600	3	Central Coast	B	Bays and Harbors	Moss Landing Harbor	30600014	79.2726	A	Acres	1100	Sedimentation/Siltation	7810	Channel Erosion	2019	
CAB30600	3	Central Coast	B	Bays and Harbors	Moss Landing Harbor	30600014	79.2726	A	Acres	1100	Sedimentation/Siltation	7820	Erosion/Siltation	2019	
CAB30600	3	Central Coast	B	Bays and Harbors	Moss Landing Harbor	30600014	79.2726	A	Acres	1100	Sedimentation/Siltation	9100	Nonpoint Source	2019	
CAE30600	3	Central Coast	E	Estuaries	Elkhorn Slough	30600014	2033.73	A	Acres	1100	Sedimentation/Siltation	1000	Agriculture	2015	
CAE30600	3	Central Coast	E	Estuaries	Elkhorn Slough	30600014	2033.73	A	Acres	1100	Sedimentation/Siltation	1200	Irrigated Crop Production	2015	
CAE30600	3	Central Coast	E	Estuaries	Elkhorn Slough	30600014	2033.73	A	Acres	1100	Sedimentation/Siltation	1915	Agriculture-storm runoff	2015	
CAE30600	3	Central Coast	E	Estuaries	Elkhorn Slough	30600014	2033.73	A	Acres	1100	Sedimentation/Siltation	7810	Channel Erosion	2015	
CAE30600	3	Central Coast	E	Estuaries	Elkhorn Slough	30600014	2033.73	A	Acres	1100	Sedimentation/Siltation	9100	Nonpoint Source	2015	
CAE30600	3	Central Coast	E	Estuaries	Moro Cojo Slough	30913011	62.4949	A	Acres	1100	Sedimentation/Siltation	1000	Agriculture	2019	
CAE30600	3	Central Coast	E	Estuaries	Moro Cojo Slough	30913011	62.4949	A	Acres	1100	Sedimentation/Siltation	1200	Irrigated Crop Production	2019	
CAE30600	3	Central Coast	E	Estuaries	Moro Cojo Slough	30913011	62.4949	A	Acres	1100	Sedimentation/Siltation	1915	Agriculture-storm runoff	2019	
CAE30600	3	Central Coast	E	Estuaries	Moro Cojo Slough	30913011	62.4949	A	Acres	1100	Sedimentation/Siltation	3000	Construction/Land Development	2019	
CAE30600	3	Central Coast	E	Estuaries	Moro Cojo Slough	30913011	62.4949	A	Acres	1100	Sedimentation/Siltation	9100	Nonpoint Source	2019	
CAE30413	3	Central Coast	E	Estuaries	Soquel Lagoon	30413014	1.15873	A	Acres	1100	Sedimentation/Siltation	3000	Construction/Land Development	2011	
CAR30413	3	Central Coast	R	Rivers/Streams	Aptos Creek	30413023	8.40589	M	Miles	1100	Sedimentation/Siltation	3215	Disturbed Sites (Land Develop.)	2008	
CAR30413	3	Central Coast	R	Rivers/Streams	Aptos Creek	30413023	8.40589	M	Miles	1100	Sedimentation/Siltation	7810	Channel Erosion	2008	
CAR30412	3	Central Coast	R	Rivers/Streams	Bean Creek	30412041	8.90707	M	Miles	1100	Sedimentation/Siltation	3110	Road Construction	2019	
CAR30412	3	Central Coast	R	Rivers/Streams	Bean Creek	30412041	8.90707	M	Miles	1100	Sedimentation/Siltation	3215	Disturbed Sites (Land Develop.)	2019	
CAR30412	3	Central Coast	R	Rivers/Streams	Bean Creek	30412041	8.90707	M	Miles	1100	Sedimentation/Siltation	5000	Resource Extraction	2019	
CAR30412	3	Central Coast	R	Rivers/Streams	Bean Creek	30412041	8.90707	M	Miles	1100	Sedimentation/Siltation	7820	Erosion/Siltation	2019	
CAR30412	3	Central Coast	R	Rivers/Streams	Bean Creek	30412041	8.90707	M	Miles	1100	Sedimentation/Siltation	9100	Nonpoint Source	2019	
CAR30412	3	Central Coast	R	Rivers/Streams	Bear Creek(Santa Cruz County	30412030	6.31531	M	Miles	1100	Sedimentation/Siltation	2000	Silviculture	2019	
CAR30412	3	Central Coast	R	Rivers/Streams	Bear Creek(Santa Cruz County	30412030	6.31531	M	Miles	1100	Sedimentation/Siltation	3110	Road Construction	2019	
CAR30412	3	Central Coast	R	Rivers/Streams	Bear Creek(Santa Cruz County	30412030	6.31531	M	Miles	1100	Sedimentation/Siltation	3215	Disturbed Sites (Land Develop.)	2019	
CAR30412	3	Central Coast	R	Rivers/Streams	Bear Creek(Santa Cruz County	30412030	6.31531	M	Miles	1100	Sedimentation/Siltation	7820	Erosion/Siltation	2019	
CAR30412	3	Central Coast	R	Rivers/Streams	Bear Creek(Santa Cruz County	30412030	6.31531	M	Miles	1100	Sedimentation/Siltation	9100	Nonpoint Source	2019	
CAR30412	3	Central Coast	R	Rivers/Streams	Boulder Creek	30412020	7.55958	M	Miles	1100	Sedimentation/Siltation	1300	Specialty Crop Production	2019	
CAR30412	3	Central Coast	R	Rivers/Streams	Boulder Creek	30412020	7.55958	M	Miles	1100	Sedimentation/Siltation	2000	Silviculture	2019	

WBID	REGION NUMBER	REGION NAME	WATER BODY TYPE ABBR	WATER BODY TYPE	WATER BODY NAME	CALWATER WATERSHED	ESTIMATED SIZE AFFECTED	UNIT ABBR	UNIT	POLLUTANT CODE	POLLUTANT	SOURCE CODE	POTENTIAL SOURCES	PROPOSED TMDL COMPLETION	COMMENTS
CAR304123	3	Central Coast	R	Rivers/Streams	Boulder Creek	30412020	7.55958	M	Miles	1100	Sedimentation/Siltation	3110	Road Construction	2019	
CAR304123	3	Central Coast	R	Rivers/Streams	Boulder Creek	30412020	7.55958	M	Miles	1100	Sedimentation/Siltation	3215	Disturbed Sites (Land Develop.)	2019	
CAR304123	3	Central Coast	R	Rivers/Streams	Boulder Creek	30412020	7.55958	M	Miles	1100	Sedimentation/Siltation	7820	Erosion/Siltation	2019	
CAR304123	3	Central Coast	R	Rivers/Streams	Boulder Creek	30412020	7.55958	M	Miles	1100	Sedimentation/Siltation	9100	Nonpoint Source	2019	
CAR304123	3	Central Coast	R	Rivers/Streams	Branciforte Creek	30412051	5.78	M	Miles	1100	Sedimentation/Siltation	2000	Silviculture	2019	
CAR304123	3	Central Coast	R	Rivers/Streams	Branciforte Creek	30412051	5.78	M	Miles	1100	Sedimentation/Siltation	3110	Road Construction	2019	
CAR304123	3	Central Coast	R	Rivers/Streams	Branciforte Creek	30412051	5.78	M	Miles	1100	Sedimentation/Siltation	9100	Nonpoint Source	2019	
CAR313003	3	Central Coast	R	Rivers/Streams	Casmalia Canyon Creek	31300040	4.96262	M	Miles	1100	Sedimentation/Siltation	9000	Source Unknown	2019	
CAR304123	3	Central Coast	R	Rivers/Streams	Fall Creek	30412022	5.07242	M	Miles	1100	Sedimentation/Siltation	3110	Road Construction	2019	
CAR304123	3	Central Coast	R	Rivers/Streams	Fall Creek	30412022	5.07242	M	Miles	1100	Sedimentation/Siltation	7550	Habitat Modification	2019	
CAR304123	3	Central Coast	R	Rivers/Streams	Fall Creek	30412022	5.07242	M	Miles	1100	Sedimentation/Siltation	7820	Erosion/Siltation	2019	
CAR304123	3	Central Coast	R	Rivers/Streams	Fall Creek	30412022	5.07242	M	Miles	1100	Sedimentation/Siltation	9100	Nonpoint Source	2019	
CAR304123	3	Central Coast	R	Rivers/Streams	Kings Creek	30412011	4.36837	M	Miles	1100	Sedimentation/Siltation	2000	Silviculture	2019	
CAR304123	3	Central Coast	R	Rivers/Streams	Kings Creek	30412011	4.36837	M	Miles	1100	Sedimentation/Siltation	3110	Road Construction	2019	
CAR304123	3	Central Coast	R	Rivers/Streams	Kings Creek	30412011	4.36837	M	Miles	1100	Sedimentation/Siltation	3215	Disturbed Sites (Land Develop.)	2019	
CAR304123	3	Central Coast	R	Rivers/Streams	Kings Creek	30412011	4.36837	M	Miles	1100	Sedimentation/Siltation	7820	Erosion/Siltation	2019	
CAR304123	3	Central Coast	R	Rivers/Streams	Kings Creek	30412011	4.36837	M	Miles	1100	Sedimentation/Siltation	9100	Nonpoint Source	2019	
CAR304123	3	Central Coast	R	Rivers/Streams	Love Creek	30412021	3.78816	M	Miles	1100	Sedimentation/Siltation	1000	Agriculture	2019	
CAR304123	3	Central Coast	R	Rivers/Streams	Love Creek	30412021	3.78816	M	Miles	1100	Sedimentation/Siltation	2000	Silviculture	2019	
CAR304123	3	Central Coast	R	Rivers/Streams	Love Creek	30412021	3.78816	M	Miles	1100	Sedimentation/Siltation	3110	Road Construction	2019	
CAR304123	3	Central Coast	R	Rivers/Streams	Love Creek	30412021	3.78816	M	Miles	1100	Sedimentation/Siltation	3215	Disturbed Sites (Land Develop.)	2019	
CAR304123	3	Central Coast	R	Rivers/Streams	Love Creek	30412021	3.78816	M	Miles	1100	Sedimentation/Siltation	7820	Erosion/Siltation	2019	
CAR304123	3	Central Coast	R	Rivers/Streams	Love Creek	30412021	3.78816	M	Miles	1100	Sedimentation/Siltation	9100	Nonpoint Source	2019	
CAR304123	3	Central Coast	R	Rivers/Streams	Mountain Charlie Gulch	30412040	3.92844	M	Miles	1100	Sedimentation/Siltation	2000	Silviculture	2019	
CAR304123	3	Central Coast	R	Rivers/Streams	Mountain Charlie Gulch	30412040	3.92844	M	Miles	1100	Sedimentation/Siltation	3110	Road Construction	2019	
CAR304123	3	Central Coast	R	Rivers/Streams	Mountain Charlie Gulch	30412040	3.92844	M	Miles	1100	Sedimentation/Siltation	7820	Erosion/Siltation	2019	
CAR304123	3	Central Coast	R	Rivers/Streams	Mountain Charlie Gulch	30412040	3.92844	M	Miles	1100	Sedimentation/Siltation	9100	Nonpoint Source	2019	
CAR304123	3	Central Coast	R	Rivers/Streams	Newell Creek (Upper	30412031	3.50199	M	Miles	1100	Sedimentation/Siltation	1000	Agriculture	2019	
CAR304123	3	Central Coast	R	Rivers/Streams	Newell Creek (Upper	30412031	3.50199	M	Miles	1100	Sedimentation/Siltation	2000	Silviculture	2019	
CAR304123	3	Central Coast	R	Rivers/Streams	Newell Creek (Upper	30412031	3.50199	M	Miles	1100	Sedimentation/Siltation	3110	Road Construction	2019	
CAR304123	3	Central Coast	R	Rivers/Streams	Newell Creek (Upper	30412031	3.50199	M	Miles	1100	Sedimentation/Siltation	3215	Disturbed Sites (Land Develop.)	2019	
CAR304123	3	Central Coast	R	Rivers/Streams	Newell Creek (Upper	30412031	3.50199	M	Miles	1100	Sedimentation/Siltation	7810	Channel Erosion	2019	
CAR304123	3	Central Coast	R	Rivers/Streams	Newell Creek (Upper	30412031	3.50199	M	Miles	1100	Sedimentation/Siltation	7820	Erosion/Siltation	2019	
CAR304123	3	Central Coast	R	Rivers/Streams	Newell Creek (Upper	30412031	3.50199	M	Miles	1100	Sedimentation/Siltation	9100	Nonpoint Source	2019	
CAR404224	4	Los Angeles	R	Rivers/Streams	Las Virgenes Creek	40422010	11.62	M	Miles	1100	Sedimentation/Siltation	9000	Source Unknown	2019	
CAR404214	4	Los Angeles	R	Rivers/Streams	Malibu Creek	40421000	10.85	M	Miles	1100	Sedimentation/Siltation	9000	Source Unknown	2019	
CAR404244	4	Los Angeles	R	Rivers/Streams	Medea Creek Reach 1 (Lake to Confl. with Lindero)	40424000	2.57	M	Miles	1100	Sedimentation/Siltation	9000	Source Unknown	2019	
CAR403124	4	Los Angeles	R	Rivers/Streams	Calleguas Creek Reach 2 (estuary to Potrero Rd was Calleguas Creek Reaches 1 and 2 on 1998 303d list)	40312000	4.31213	M	Miles	1100	Sedimentation/Siltation	1000	Agriculture	2005	For 2006, sedimentation/siltation was moved by USEPA from the being addressed list back to the 303(d) list pending completion and USEPA approval of a TMDL.
CAR403124	4	Los Angeles	R	Rivers/Streams	Calleguas Creek Reach 2 (estuary to Potrero Rd was Calleguas Creek Reaches 1 and 2 on 1998 303d list)	40312000	4.31213	M	Miles	1100	Sedimentation/Siltation	8600	Natural Sources	2005	For 2006, sedimentation/siltation was moved by USEPA from the being addressed list back to the 303(d) list pending completion and USEPA approval of a TMDL.
CAR403124	4	Los Angeles	R	Rivers/Streams	Calleguas Creek Reach 3 (Potrero Road upstream to confluence with Conejo Creek on 1998 303d list)	40312000	3.46697	M	Miles	1100	Sedimentation/Siltation	1000	Agriculture	2005	For 2006, sedimentation/siltation was moved by USEPA from the being addressed list back to the 303(d) list pending completion and USEPA approval of a TMDL.
CAR403124	4	Los Angeles	R	Rivers/Streams	Calleguas Creek Reach 3 (Potrero Road upstream to confluence with Conejo Creek on 1998 303d list)	40312000	3.46697	M	Miles	1100	Sedimentation/Siltation	8600	Natural Sources	2005	For 2006, sedimentation/siltation was moved by USEPA from the being addressed list back to the 303(d) list pending completion and USEPA approval of a TMDL.
CAR403114	4	Los Angeles	R	Rivers/Streams	Calleguas Creek Reach 4 (was Revolon Slough Main Branch: Mugu Lagoon to Central Avenue on 1998 303d list)	40311000	7.18751	M	Miles	1100	Sedimentation/Siltation	1000	Agriculture	2005	For 2006, sedimentation/siltation was moved by USEPA from the being addressed list back to the 303(d) list pending completion and USEPA approval of a TMDL.
CAR403114	4	Los Angeles	R	Rivers/Streams	Calleguas Creek Reach 4 (was Revolon Slough Main Branch: Mugu Lagoon to Central Avenue on 1998 303d list)	40311000	7.18751	M	Miles	1100	Sedimentation/Siltation	8600	Natural Sources	2005	For 2006, sedimentation/siltation was moved by USEPA from the being addressed list back to the 303(d) list pending completion and USEPA approval of a TMDL.
CAR403614	4	Los Angeles	R	Rivers/Streams	Calleguas Creek Reach 5 (was Beardsley Channe on 1998 303d list)	40311000	4.34088	M	Miles	1100	Sedimentation/Siltation	1000	Agriculture	2005	For 2006, sedimentation/siltation was moved by USEPA from the being addressed list back to the 303(d) list pending completion and USEPA approval of a TMDL.
CAR403614	4	Los Angeles	R	Rivers/Streams	Calleguas Creek Reach 5 (was Beardsley Channe on 1998 303d list)	40311000	4.34088	M	Miles	1100	Sedimentation/Siltation	8600	Natural Sources	2005	For 2006, sedimentation/siltation was moved by USEPA from the being addressed list back to the 303(d) list pending completion and USEPA approval of a TMDL.
CAR403624	4	Los Angeles	R	Rivers/Streams	Calleguas Creek Reach 6 (was Arroyo Las Posas Reaches 1 and 2 on 1998 303d list)	40362000	15.2966	M	Miles	1100	Sedimentation/Siltation	1000	Agriculture	2005	For 2006, sedimentation/siltation was moved by USEPA from the being addressed list back to the 303(d) list pending completion and USEPA approval of a TMDL.
CAR403624	4	Los Angeles	R	Rivers/Streams	Calleguas Creek Reach 6 (was Arroyo Las Posas Reaches 1 and 2 on 1998 303d list)	40362000	15.2966	M	Miles	1100	Sedimentation/Siltation	8600	Natural Sources	2005	For 2006, sedimentation/siltation was moved by USEPA from the being addressed list back to the 303(d) list pending completion and USEPA approval of a TMDL.
CAR403624	4	Los Angeles	R	Rivers/Streams	Calleguas Creek Reach 7 (was Arroyo Simi Reaches 1 and 2 on 1998 303d list)	40367000	13.9129	M	Miles	1100	Sedimentation/Siltation	1000	Agriculture	2005	For 2006, sedimentation/siltation was moved by USEPA from the being addressed list back to the 303(d) list pending completion and USEPA approval of a TMDL.
CAR403624	4	Los Angeles	R	Rivers/Streams	Calleguas Creek Reach 7 (was Arroyo Simi Reaches 1 and 2 on 1998 303d list)	40367000	13.9129	M	Miles	1100	Sedimentation/Siltation	8600	Natural Sources	2005	For 2006, sedimentation/siltation was moved by USEPA from the being addressed list back to the 303(d) list pending completion and USEPA approval of a TMDL.
CAR403674	4	Los Angeles	R	Rivers/Streams	Calleguas Creek Reach 8 (was Tapo Canyon Reach 1)	40366000	7.18869	M	Miles	1100	Sedimentation/Siltation	9100	Nonpoint Source	2005	For 2006, sedimentation/siltation was moved by USEPA from the being addressed list back to the 303(d) list pending completion and USEPA approval of a TMDL.
CAR403644	4	Los Angeles	R	Rivers/Streams	Calleguas Creek Reach 11 (Arroyo Santa Rosa was part of Conejo Creek Reach 3 on 1998 303d list)	40365000	8.68888	M	Miles	1100	Sedimentation/Siltation	1000	Agriculture	2005	For 2006, sedimentation/siltation was moved by USEPA from the being addressed list back to the 303(d) list pending completion and USEPA approval of a TMDL.
CAR403644	4	Los Angeles	R	Rivers/Streams	Calleguas Creek Reach 11 (Arroyo Santa Rosa was part of Conejo Creek Reach 3 on 1998 303d list)	40365000	8.68888	M	Miles	1100	Sedimentation/Siltation	8600	Natural Sources	2005	For 2006, sedimentation/siltation was moved by USEPA from the being addressed list back to the 303(d) list pending completion and USEPA approval of a TMDL.
CAR404234	4	Los Angeles	R	Rivers/Streams	Medea Creek Reach 2 (Abv Confl. with Lindero	40423000	5.41	M	Miles	1100	Sedimentation/Siltation	9000	Source Unknown	2019	
CAR404244	4	Los Angeles	R	Rivers/Streams	Triunfo Canyon Creek Reach 1	40424000	2.51	M	Miles	1100	Sedimentation/Siltation	9000	Source Unknown	2019	
CAR404244	4	Los Angeles	R	Rivers/Streams	Triunfo Canyon Creek Reach 2	40424000	3.32	M	Miles	1100	Sedimentation/Siltation	9000	Source Unknown	2019	
CAR526415	5	Central Valley	R	Rivers/Streams	Fall River (Pit)	52641031	8.61219	M	Miles	1100	Sedimentation/Siltation	2105	Historical Land Management Activities	2016	The sedimentation is accumulated sand size sediment in the upper Fall River. The historic land management activities include logging, grazing, channelization, roads, and railroads.
CAR517325	5	Central Valley	R	Rivers/Streams	Humbug Creek	51732030	2.20272	M	Miles	1100	Sedimentation/Siltation	5000	Resource Extraction	2012	All resource extraction sources are abandoned mine
CAR559115	5	Central Valley	R	Rivers/Streams	Panoche Creek (Silver Creek to Belmont Avenue)	55112000	17.6357	M	Miles	1100	Sedimentation/Siltation	1000	Agriculture	2007	
CAR559115	5	Central Valley	R	Rivers/Streams	Panoche Creek (Silver Creek to Belmont Avenue)	55112000	17.6357	M	Miles	1100	Sedimentation/Siltation	1935	Agriculture-grazing	2007	

WBID	REGION NUMBER	REGION NAME	WATER BODY TYPE ABBR	WATER BODY TYPE	WATER BODY NAME	CALWATER WATERSHED	ESTIMATED SIZE AFFECTED	UNIT ABBR	UNIT	POLLUTANT CODE	POLLUTANT	SOURCE CODE	POTENTIAL SOURCES	PROPOSED TMDL COMPLETION	COMMENTS
CAR55911 5		Central Valley	R	Rivers/Streams	Panoche Creek (Silver Creek to Belmont Avenue)	55112000	17.6357	M	Miles	1100	Sedimentation/Siltation	3100	Highway/Road/Bridge Construction	2007	
CAL63030(6		Lahontan	L	Lakes/Reservoirs	Bridgeport Reservoi	63030050	2614.34	A	Acres	1100	Sedimentation/Siltation	1350	Grazing-Related Sources	2006	
CAL63030(6		Lahontan	L	Lakes/Reservoirs	Bridgeport Reservoi	63030050	2614.34	A	Acres	1100	Sedimentation/Siltation	7700	Streambank Modification/Destabilization	2006	
CAL63030(6		Lahontan	L	Lakes/Reservoirs	Bridgeport Reservoi	63030050	2614.34	A	Acres	1100	Sedimentation/Siltation	7820	Erosion/Siltation	2006	
CAL63030(6		Lahontan	L	Lakes/Reservoirs	Bridgeport Reservoi	63030050	2614.34	A	Acres	1100	Sedimentation/Siltation	8540	Sediment Resuspension	2006	
CAL63430(6		Lahontan	L	Lakes/Reservoirs	Tahoe, Lake	63430010	85364.1	A	Acres	1100	Sedimentation/Siltation	1350	Grazing-Related Sources	2007	
CAL63430(6		Lahontan	L	Lakes/Reservoirs	Tahoe, Lake	63430010	85364.1	A	Acres	1100	Sedimentation/Siltation	2000	Silviculture	2007	
CAL63430(6		Lahontan	L	Lakes/Reservoirs	Tahoe, Lake	63430010	85364.1	A	Acres	1100	Sedimentation/Siltation	3100	Highway/Road/Bridge Construction	2007	
CAL63430(6		Lahontan	L	Lakes/Reservoirs	Tahoe, Lake	63430010	85364.1	A	Acres	1100	Sedimentation/Siltation	3200	Land Development	2007	
CAL63430(6		Lahontan	L	Lakes/Reservoirs	Tahoe, Lake	63430010	85364.1	A	Acres	1100	Sedimentation/Siltation	4000	Urban Runoff/Storm Sewers	2007	
CAL63430(6		Lahontan	L	Lakes/Reservoirs	Tahoe, Lake	63430010	85364.1	A	Acres	1100	Sedimentation/Siltation	4300	Other Urban Runoff	2007	
CAL63430(6		Lahontan	L	Lakes/Reservoirs	Tahoe, Lake	63430010	85364.1	A	Acres	1100	Sedimentation/Siltation	4500	Highway/Road/Bridge Runoff	2007	
CAL63430(6		Lahontan	L	Lakes/Reservoirs	Tahoe, Lake	63430010	85364.1	A	Acres	1100	Sedimentation/Siltation	4600	Urban Runoff--Erosion and Sedimentation	2007	
CAL63430(6		Lahontan	L	Lakes/Reservoirs	Tahoe, Lake	63430010	85364.1	A	Acres	1100	Sedimentation/Siltation	7000	Hydromodification	2007	
CAL63430(6		Lahontan	L	Lakes/Reservoirs	Tahoe, Lake	63430010	85364.1	A	Acres	1100	Sedimentation/Siltation	7100	Channelization	2007	
CAL63430(6		Lahontan	L	Lakes/Reservoirs	Tahoe, Lake	63430010	85364.1	A	Acres	1100	Sedimentation/Siltation	7600	Removal of Riparian Vegetation	2007	
CAL63430(6		Lahontan	L	Lakes/Reservoirs	Tahoe, Lake	63430010	85364.1	A	Acres	1100	Sedimentation/Siltation	7700	Streambank Modification/Destabilization	2007	
CAL63430(6		Lahontan	L	Lakes/Reservoirs	Tahoe, Lake	63430010	85364.1	A	Acres	1100	Sedimentation/Siltation	7810	Channel Erosion	2007	
CAL63430(6		Lahontan	L	Lakes/Reservoirs	Tahoe, Lake	63430010	85364.1	A	Acres	1100	Sedimentation/Siltation	7820	Erosion/Siltation	2007	
CAL63430(6		Lahontan	L	Lakes/Reservoirs	Tahoe, Lake	63430010	85364.1	A	Acres	1100	Sedimentation/Siltation	8100	Atmospheric Deposition	2007	
CAL63430(6		Lahontan	L	Lakes/Reservoirs	Tahoe, Lake	63430010	85364.1	A	Acres	1100	Sedimentation/Siltation	8540	Sediment Resuspension	2007	
CAL63430(6		Lahontan	L	Lakes/Reservoirs	Tahoe, Lake	63430010	85364.1	A	Acres	1100	Sedimentation/Siltation	8600	Natural Sources	2007	
CAL63430(6		Lahontan	L	Lakes/Reservoirs	Tahoe, Lake	63430010	85364.1	A	Acres	1100	Sedimentation/Siltation	8700	Recreational and Tourism Activities (non-boating)	2007	
CAL63430(6		Lahontan	L	Lakes/Reservoirs	Tahoe, Lake	63430010	85364.1	A	Acres	1100	Sedimentation/Siltation	9100	Nonpoint Source	2007	
CAR63420 6		Lahontan	R	Rivers/Streams	Blackwood Creek	63420021	5.87001	M	Miles	1100	Sedimentation/Siltation	1500	Range Grazing-Riparian and/or Upland	2008	Creek affected by past gravel quarry operations and other watershed disturbance including grazing and timber harv
CAR63420 6		Lahontan	R	Rivers/Streams	Blackwood Creek	63420021	5.87001	M	Miles	1100	Sedimentation/Siltation	2000	Silviculture	2008	Creek affected by past gravel quarry operations and other watershed disturbance including grazing and timber harv
CAR63420 6		Lahontan	R	Rivers/Streams	Blackwood Creek	63420021	5.87001	M	Miles	1100	Sedimentation/Siltation	3000	Construction/Land Development	2008	Creek affected by past gravel quarry operations and other watershed disturbance including grazing and timber harv
CAR63420 6		Lahontan	R	Rivers/Streams	Blackwood Creek	63420021	5.87001	M	Miles	1100	Sedimentation/Siltation	4501	Surface Runoff	2008	Creek affected by past gravel quarry operations and other watershed disturbance including grazing and timber harv
CAR63420 6		Lahontan	R	Rivers/Streams	Blackwood Creek	63420021	5.87001	M	Miles	1100	Sedimentation/Siltation	5000	Resource Extraction	2008	Creek affected by past gravel quarry operations and other watershed disturbance including grazing and timber harv
CAR63420 6		Lahontan	R	Rivers/Streams	Blackwood Creek	63420021	5.87001	M	Miles	1100	Sedimentation/Siltation	7000	Hydromodification	2008	Creek affected by past gravel quarry operations and other watershed disturbance including grazing and timber harv
CAR63420 6		Lahontan	R	Rivers/Streams	Blackwood Creek	63420021	5.87001	M	Miles	1100	Sedimentation/Siltation	7700	Streambank Modification/Destabilization	2008	Creek affected by past gravel quarry operations and other watershed disturbance including grazing and timber harv
CAR63420 6		Lahontan	R	Rivers/Streams	Blackwood Creek	63420021	5.87001	M	Miles	1100	Sedimentation/Siltation	7820	Erosion/Siltation	2008	Creek affected by past gravel quarry operations and other watershed disturbance including grazing and timber harv
CAR63420 6		Lahontan	R	Rivers/Streams	Blackwood Creek	63420021	5.87001	M	Miles	1100	Sedimentation/Siltation	8100	Atmospheric Deposition	2008	Creek affected by past gravel quarry operations and other watershed disturbance including grazing and timber harv
CAR63420 6		Lahontan	R	Rivers/Streams	Blackwood Creek	63420021	5.87001	M	Miles	1100	Sedimentation/Siltation	8600	Natural Sources	2008	Creek affected by past gravel quarry operations and other watershed disturbance including grazing and timber harv
CAR63420 6		Lahontan	R	Rivers/Streams	Blackwood Creek	63420021	5.87001	M	Miles	1100	Sedimentation/Siltation	8700	Recreational and Tourism Activities (non-boating)	2008	Creek affected by past gravel quarry operations and other watershed disturbance including grazing and timber harv
CAR63420 6		Lahontan	R	Rivers/Streams	Blackwood Creek	63420021	5.87001	M	Miles	1100	Sedimentation/Siltation	9100	Nonpoint Source	2008	Creek affected by past gravel quarry operations and other watershed disturbance including grazing and timber harv
CAR63520 6		Lahontan	R	Rivers/Streams	Bronco Creek	63520053	1.34403	M	Miles	1100	Sedimentation/Siltation	2000	Silviculture	2006	Watershed disturbance in naturally highly erosive watershe
CAR63520 6		Lahontan	R	Rivers/Streams	Bronco Creek	63520053	1.34403	M	Miles	1100	Sedimentation/Siltation	8600	Natural Sources	2006	Watershed disturbance in naturally highly erosive watershe
CAR63520 6		Lahontan	R	Rivers/Streams	Bronco Creek	63520053	1.34403	M	Miles	1100	Sedimentation/Siltation	9100	Nonpoint Source	2006	Watershed disturbance in naturally highly erosive watershe
CAR63040 6		Lahontan	R	Rivers/Streams	Clearwater Creek	63040051	12.4874	M	Miles	1100	Sedimentation/Siltation	1500	Range Grazing-Riparian and/or Upland	2006	Listed on basis of limited information; additional monitoring may support delisti
CAR63040 6		Lahontan	R	Rivers/Streams	Clearwater Creek	63040051	12.4874	M	Miles	1100	Sedimentation/Siltation	3000	Construction/Land Development	2006	Listed on basis of limited information; additional monitoring may support delisti
CAR63040 6		Lahontan	R	Rivers/Streams	Clearwater Creek	63040051	12.4874	M	Miles	1100	Sedimentation/Siltation	8300	Highway Maintenance and Runoff	2006	Listed on basis of limited information; additional monitoring may support delisti
CAR63010 6		Lahontan	R	Rivers/Streams	East Walker River, below Bridgeport Reservo	63030050	8.00973	M	Miles	1100	Sedimentation/Siltation	1350	Grazing-Related Sources	2019	
CAR63010 6		Lahontan	R	Rivers/Streams	East Walker River, below Bridgeport Reservo	63030050	8.00973	M	Miles	1100	Sedimentation/Siltation	4500	Highway/Road/Bridge Runoff	2019	
CAR63010 6		Lahontan	R	Rivers/Streams	East Walker River, below Bridgeport Reservo	63030050	8.00973	M	Miles	1100	Sedimentation/Siltation	4600	Urban Runoff--Erosion and Sedimentation	2019	
CAR63010 6		Lahontan	R	Rivers/Streams	East Walker River, below Bridgeport Reservo	63030050	8.00973	M	Miles	1100	Sedimentation/Siltation	7350	Upstream Impoundment	2019	
CAR63010 6		Lahontan	R	Rivers/Streams	East Walker River, below Bridgeport Reservo	63030050	8.00973	M	Miles	1100	Sedimentation/Siltation	7820	Erosion/Siltation	2019	
CAR63520 6		Lahontan	R	Rivers/Streams	Gray Creek (Nevada County	63520052	2.8033	M	Miles	1100	Sedimentation/Siltation	2000	Silviculture	2006	Sediment from disturbance of naturally highly erosive watershe
CAR63520 6		Lahontan	R	Rivers/Streams	Gray Creek (Nevada County	63520052	2.8033	M	Miles	1100	Sedimentation/Siltation	8600	Natural Sources	2006	Sediment from disturbance of naturally highly erosive watershe
CAR63520 6		Lahontan	R	Rivers/Streams	Gray Creek (Nevada County	63520052	2.8033	M	Miles	1100	Sedimentation/Siltation	9100	Nonpoint Source	2006	Sediment from disturbance of naturally highly erosive watershe
CAR63410 6		Lahontan	R	Rivers/Streams	Heavenly Valley Creek (USFS boundary to Trout Creek)	63410031	1.44732	M	Miles	1100	Sedimentation/Siltation	3000	Construction/Land Development	2019	
CAR63410 6		Lahontan	R	Rivers/Streams	Heavenly Valley Creek (USFS boundary to Trout Creek)	63410031	1.44732	M	Miles	1100	Sedimentation/Siltation	3200	Land Development	2019	
CAR63410 6		Lahontan	R	Rivers/Streams	Heavenly Valley Creek (USFS boundary to Trout Creek)	63410031	1.44732	M	Miles	1100	Sedimentation/Siltation	7000	Hydromodification	2019	
CAR63410 6		Lahontan	R	Rivers/Streams	Heavenly Valley Creek (USFS boundary to Trout Creek)	63410031	1.44732	M	Miles	1100	Sedimentation/Siltation	7550	Habitat Modification	2019	
CAR63410 6		Lahontan	R	Rivers/Streams	Heavenly Valley Creek (USFS boundary to Trout Creek)	63410031	1.44732	M	Miles	1100	Sedimentation/Siltation	8700	Recreational and Tourism Activities (non-boating)	2019	
CAR63410 6		Lahontan	R	Rivers/Streams	Heavenly Valley Creek (USFS boundary to Trout Creek)	63410031	1.44732	M	Miles	1100	Sedimentation/Siltation	9100	Nonpoint Source	2019	
CAR63030 6		Lahontan	R	Rivers/Streams	Hot Springs Canyon Creek	63030042	2.8612	M	Miles	1100	Sedimentation/Siltation	1500	Range Grazing-Riparian and/or Upland	2008	Listed on basis of limited data; further monitoring may support delistir
CAR63520 6		Lahontan	R	Rivers/Streams	Squaw Creek	63520011	5.8	M	Miles	1100	Sedimentation/Siltation	3000	Construction/Land Development	2006	
CAR63520 6		Lahontan	R	Rivers/Streams	Squaw Creek	63520011	5.8	M	Miles	1100	Sedimentation/Siltation	4300	Other Urban Runoff	2006	
CAR63520 6		Lahontan	R	Rivers/Streams	Squaw Creek	63520011	5.8	M	Miles	1100	Sedimentation/Siltation	7000	Hydromodification	2006	
CAR63520 6		Lahontan	R	Rivers/Streams	Squaw Creek	63520011	5.8	M	Miles	1100	Sedimentation/Siltation	7800	Drainage/Filling Of Wetlands	2006	
CAR63520 6		Lahontan	R	Rivers/Streams	Squaw Creek	63520011	5.8	M	Miles	1100	Sedimentation/Siltation	8300	Highway Maintenance and Runoff	2006	
CAR63520 6		Lahontan	R	Rivers/Streams	Squaw Creek	63520011	5.8	M	Miles	1100	Sedimentation/Siltation	8600	Natural Sources	2006	
CAR63520 6		Lahontan	R	Rivers/Streams	Squaw Creek	63520011	5.8	M	Miles	1100	Sedimentation/Siltation	8700	Recreational and Tourism Activities (non-boating)	2006	
CAR63520 6		Lahontan	R	Rivers/Streams	Squaw Creek	63520011	5.8	M	Miles	1100	Sedimentation/Siltation	9100	Nonpoint Source	2006	
CAR63510 6		Lahontan	R	Rivers/Streams	Truckee River	63510010	39.1307	M	Miles	1100	Sedimentation/Siltation	1500	Range Grazing-Riparian and/or Upland	2006	Watershed disturbance including ski resorts, silvicultural activities, urban development, reservoir construction and management; highly erosive subwatersh
CAR63510 6		Lahontan	R	Rivers/Streams	Truckee River	63510010	39.1307	M	Miles	1100	Sedimentation/Siltation	2000	Silviculture	2006	Watershed disturbance including ski resorts, silvicultural activities, urban development, reservoir construction and management; highly erosive subwatersh
CAR63510 6		Lahontan	R	Rivers/Streams	Truckee River	63510010	39.1307	M	Miles	1100	Sedimentation/Siltation	3000	Construction/Land Development	2006	Watershed disturbance including ski resorts, silvicultural activities, urban development, reservoir construction and management; highly erosive subwatersh
CAR63510 6		Lahontan	R	Rivers/Streams	Truckee River	63510010	39.1307	M	Miles	1100	Sedimentation/Siltation	3100	Highway/Road/Bridge Construction	2006	Watershed disturbance including ski resorts, silvicultural activities, urban development, reservoir construction and management; highly erosive subwatersh
CAR63510 6		Lahontan	R	Rivers/Streams	Truckee River	63510010	39.1307	M	Miles	1100	Sedimentation/Siltation	7700	Streambank Modification/Destabilization	2006	Watershed disturbance including ski resorts, silvicultural activities, urban development, reservoir construction and management; highly erosive subwatersh
CAR63510 6		Lahontan	R	Rivers/Streams	Truckee River	63510010	39.1307	M	Miles	1100	Sedimentation/Siltation	7810	Channel Erosion	2006	Watershed disturbance including ski resorts, silvicultural activities, urban development, reservoir construction and management; highly erosive subwatersh
CAR63510 6		Lahontan	R	Rivers/Streams	Truckee River	63510010	39.1307	M	Miles	1100	Sedimentation/Siltation	7820	Erosion/Siltation	2006	Watershed disturbance including ski resorts, silvicultural activities, urban development, reservoir construction and management; highly erosive subwatersh
CAR63510 6		Lahontan	R	Rivers/Streams	Truckee River	63510010	39.1307	M	Miles	1100	Sedimentation/Siltation	8600	Natural Sources	2006	Watershed disturbance including ski resorts, silvicultural activities, urban development, reservoir construction and management; highly erosive subwatersh
CAR63510 6		Lahontan	R	Rivers/Streams	Truckee River	63510010	39.1307	M	Miles	1100	Sedimentation/Siltation	8700	Recreational and Tourism Activities (non-boating)	2006	Watershed disturbance including ski resorts, silvicultural activities, urban development, reservoir construction and management; highly erosive subwatersh
CAR63510 6		Lahontan	R	Rivers/Streams	Truckee River	63510010	39.1307	M	Miles	1100	Sedimentation/Siltation	8710	Snow skiing activities	2006	Watershed disturbance including ski resorts, silvicultural activities, urban development, reservoir construction and management; highly erosive subwatersh
CAR63510 6		Lahontan	R	Rivers/Streams	Truckee River	63510010	39.1307	M	Miles	1100	Sedimentation/Siltation	9100	Nonpoint Source	2006	Watershed disturbance including ski resorts, silvicultural activities, urban development, reservoir construction and management; highly erosive subwatersh
CAR63420 6		Lahontan	R	Rivers/Streams	Ward Creek	63420020	5.675	M	Miles	1100	Sedimentation/Siltation	2000	Silviculture	2008	
CAR63420 6		Lahontan	R	Rivers/Streams	Ward Creek	63420020	5.675	M	Miles	1100	Sedimentation/Siltation	3200	Land Development	2008	
CAR63420 6		Lahontan	R	Rivers/Streams	Ward Creek	63420020	5.675	M	Miles	1100	Sedimentation/Siltation	4000	Urban Runoff/Storm Sewers	2008	

WBID	REGION NUMBER	REGION NAME	WATER BODY TYPE ABBR	WATER BODY TYPE	WATER BODY NAME	CALWATER WATERSHED	ESTIMATED SIZE AFFECTED	UNIT ABBR	UNIT	POLLUTANT CODE	POLLUTANT	SOURCE CODE	POTENTIAL SOURCES	PROPOSED TMDL COMPLETION	COMMENTS
CAR634206		Lahontan	R	Rivers/Streams	Ward Creek	63420020	5.675	M	Miles	1100	Sedimentation/Siltation	4500	Highway/Road/Bridge Runoff	2008	
CAR634206		Lahontan	R	Rivers/Streams	Ward Creek	63420020	5.675	M	Miles	1100	Sedimentation/Siltation	7810	Channel Erosion	2008	
CAR634206		Lahontan	R	Rivers/Streams	Ward Creek	63420020	5.675	M	Miles	1100	Sedimentation/Siltation	9100	Nonpoint Source	2008	
CAR632106		Lahontan	R	Rivers/Streams	Wolf Creek (Alpine County)	63210031	11.8207	M	Miles	1100	Sedimentation/Siltation	1500	Range Grazing-Riparian and/or Upland	2019	
CAR632106		Lahontan	R	Rivers/Streams	Wolf Creek (Alpine County)	63210031	11.8207	M	Miles	1100	Sedimentation/Siltation	2000	Silviculture	2019	
CAR632106		Lahontan	R	Rivers/Streams	Wolf Creek (Alpine County)	63210031	11.8207	M	Miles	1100	Sedimentation/Siltation	9100	Nonpoint Source	2019	
CAL801718		Santa Ana	L	Lakes/Reservoirs	Big Bear Lake	80171000	2865.01	A	Acres	1100	Sedimentation/Siltation	3000	Construction/Land Development	2006	
CAL801718		Santa Ana	L	Lakes/Reservoirs	Big Bear Lake	80171000	2865.01	A	Acres	1100	Sedimentation/Siltation	8710	Snow skiing activities	2006	
CAL801718		Santa Ana	L	Lakes/Reservoirs	Big Bear Lake	80171000	2865.01	A	Acres	1100	Sedimentation/Siltation	9105	Unknown Nonpoint Source	2006	
CAR801718		Santa Ana	R	Rivers/Streams	Rathbone (Rathbun) Creek	80171000	4.68	M	Miles	1100	Sedimentation/Siltation	8710	Snow skiing activities	2006	
CAR801718		Santa Ana	R	Rivers/Streams	Rathbone (Rathbun) Creek	80171000	4.68	M	Miles	1100	Sedimentation/Siltation	9105	Unknown Nonpoint Source	2006	
CAE904319		San Diego	E	Estuaries	Agua Hedionda Lagoon	90431000	6.83187	A	Acres	1100	Sedimentation/Siltation	9201	Nonpoint/Point Source	2019	
CAE904219		San Diego	E	Estuaries	Buena Vista Lagoon	90421000	202.298	A	Acres	1100	Sedimentation/Siltation	9201	Nonpoint/Point Source	2019	
CAE906109		San Diego	E	Estuaries	Los Penasquitos Lagoon	90610000	468.918	A	Acres	1100	Sedimentation/Siltation	9201	Nonpoint/Point Source	2019	
CAE904619		San Diego	E	Estuaries	San Elijo Lagoon	90461000	565.804	A	Acres	1100	Sedimentation/Siltation	9201	Nonpoint/Point Source	2019	Estimated size of impairment is 150 acres

Post-Construction Water Balance Calculator

3	User may make changes from any cell that is orange or brown in color (similar to the cells to the immediate right). Cells in green are calculated for you.		(Step 1a) If you know the 85th percentile storm event for your location enter it in the box below	(Step 1b) If you can not answer 1a then select the county where the project is located (click on the cell to the right for drop-down): This will determine the average 85th percentile 24 hr. storm event for your site, which will appear under precipitation to left.	***SACRAMENTO***
4				(Step 1c) If you would like a more percise value select the location closest to your site. If you do not recgonize any of these locations, leave this drop-down menu at location. The average value for the County will be used.	**SACRAMENTO FAA ARPT**
5	***Project Information***			***Runoff Calculations***	
6	***Project Name:***	***Optional***		(Step 2) Indicate the Soil Type (dropdown menu to right):	***Group C Soils*** / **Low infiltration. Sandy clay loam. Infiltration rate 0.05 to 0.15 inch/hr when wet.**
7	***Waste Discharge Identification (WDID):***	***Optional***		(Step 3) Indicate the existing **dominant** non-built land Use Type (dropdown menu to right):	***Wood & Grass: <50% ground cover***
8	***Date:***	***Optional***		(Step 4) Indicate the proposed **dominant** non-built land Use Type (dropdown menu to right):	***Lawn, Grass, or Pasture covering more than 75% of the open space***
9	***Sub Drainage Area Name (from map):***	***Optional***			**Complete Either**
10	***Runoff Curve Numbers***				**Sq Ft** / **Acres** / **Acres**
11	**Existing Pervious Runoff Curve Number**		**82**	*(Step 5) Total Project Site Area:*	**5.00** / **5.00**
12	**Proposed Development Pervious Runoff Curve Number**		**74**	*(Step 6) Sub-watershed Area:*	**5.00** / **5.00**
13	***Design Storm***			*Percent of total project :*	**100%**
14	Based on the County you indicated above, we have included the 85 percentile average 24 hr event - P85 (in)^ for your area.	**0.62**	**in**		
15	The Amount of rainfall needed for runoff to occur (Existing runoff curve number -P from existing RCN (in)^)	**0.44**	**In**	***(Step 7) Sub-watershed Conditions***	**Complete Either** / **Calculated Acres**
16	P used for calculations (in) (the greater of the above two criteria)	**0.62**	**In**	Sub-watershed Area (acres)	**Sq Ft** / **Acres** / **5.00**
17	^Available at www.cabmphandbooks.com			Existing Rooftop Impervious Coverage	**0** / **0.00**
18				Existing Non-Rooftop Impervious Coverage	**0** / **0.00**
19				Proposed Rooftop Impervious Coverage	**0** / **0.00**
20				Proposed Non-Rooftop Impervious Coverage	**0** / **0.00**
21					
22				***Credits***	**Acres** / **Square Feet**
23				Porous Pavement	**0.00** / **0**
24				Tree Planting	**0.00** / **0**
25	**Pre-Project Runoff Volume (cu ft)**	**247**	**Cu.Ft.**	Downspout Disconnection	**0.00** / **0**
26	**Project-Related Runoff Volume Increase w/o credits (cu ft)**	**0**	**Cu.Ft.**	Impervious Area Disconnection	**0.00** / **0**
27				Green Roof	**0.00** / **0**
28				Stream Buffer	**0.00** / **0**
29				Vegetated Swales	**0.00** / **0**
30	**Project-Related Volume Increase with Credits (cu ft)**	**0**	**Cu.Ft.**	**Subtotal**	**0.00** / **0**
31				**Subtotal Runoff Volume Reduction Credit**	**0 Cu. Ft.**
32	You have achieved your minimum requirements				
33				***(Step 9) Impervious Volume Reduction Credits***	**Volume (cubic feet)**
34				Rain Barrels/Cisterns	**0 Cu. Ft.**
35				Soil Quality	**0 Cu. Ft.**
36				**Subtotal Runoff Volume Reduction**	**0 Cu. Ft.**
37				**Total Runoff Volume Reduction Credit**	**0 Cu. Ft.**
38					
39					

Porous Pavement Credit Worksheet

Please fill out a porous pavement credit worksheet for each project sub-watershed.

For the PROPOSED Development:

Proposed Porous Pavement	Runoff Reduction*	Fill in either Acres or SqFt In SqFt.	In Acres	Equivalent Acres
Area of **Brick without Grout** on less than 12 inches of base with at least 20% void space over soil	0.45			0.00
Area of **Brick without Grout** on more than 12 inches of base with at least 20% void space over soil	0.90			0.00
Area of **Cobbles** less than 12 inches deep and over soil	0.30			0.00
Area of **Cobbles** less than 12 inches deep and over soil	0.60			0.00
Area of **Reinforced Grass Pavement** on less than 12 inches of base with at least 20% void space over soil	0.45			0.00
Area of **Reinforced Grass Pavement** on at least 12 inches of base with at least 20% void space over soil	0.90			0.00
Area of **Porous Gravel Pavement** on less than 12 inches of base with at least 20% void space over soil	0.38			0.00
Area of **Porous Gravel Pavement** on at least 12 inches of base with at least 20% void space over soil	0.75			0.00
Area of **Poured Porous Concrete or Asphalt Pavement** with less than 4 inches of gravel base (washed stone)	0.40			0.00
Area of **Poured Porous Concrete or Asphalt Pavement** with 4 to 8 inches of gravel base (washed stone)	0.60			0.00
Area of **Poured Porous Concrete or Asphalt Pavement** with 8 to 12 inches of gravel base (washed stone)	0.80			0.00
Area of **Poured Porous Concrete or Asphalt Pavement** with 12 or more inches of gravel base (washed stone)	1.00			0.00

*=1-Rv**

Return to Calculator

**Using Site Design Techniques to meet Development Standards for Stormwater Quality (BASMAA 2003)

**NCDENR Stormwater BMP Manual (2007)

Tree Planting Credit Worksheet

Please fill out a tree canopy credit worksheet for each project sub-watershed.

Tree Canopy Credit Criteria	Number of Trees Planted	Credit (acres)
Number of proposed evergreen trees to be planted (credit = number of trees x 0.005)*	0	0.00
Number of proposed deciduous trees to be planted (credit = number of trees x 0.0025)*		0.00
	Square feet Under Canopy	
Square feet under an existing tree canopy, that will remain on the property, with an average diameter at 4.5 ft above grade (i.e., diameter at breast height or DBH) is LESS than 12 in diameter.		0.00
Square feet under an existing tree canopy that will remain on the property, with an average diameter at 4.5 ft above grade (i.e., diameter at breast height or DBH) is 12 in diameter or GREATER.		0.00
Please describe below how the project will ensure that these trees will be maintained.		

0

Return to Calculator

* credit amount based on credits from Stormwater Quality Design Manual for the Sacramento and South Placer Regions

Downspout Disconnection Credit Worksheet
Please fill out a downspout disconnection credit worksheet for each project subwatershed. If you answer yes to all questions, all rooftop area draining to each downspout will be subtracted from your proposed rooftop impervious coverage.

Downspout Disconnection Credit Criteria					
Do downspouts and any extensions extend at least six feet from a basement and two feet from a crawl space or concrete slab?				○ Yes	◉ No
Is the area of rooftop connecting to each disconnected downspout 600 square feet or less?				○ Yes	◉ No
Is the roof runoff from the design storm event fully contained in a raised bed or planter box or does it drain as sheet flow to a landscaped area large enough to contain the roof runoff from the design storm event?				○ Yes	◉ No
The Stream Buffer and/or Vegetated Swale credits **will not** be taken in this sub-watershed area?				○ Yes	◉ No
Percentage of existing	0.00	Acres	of rooftop surface has disconnected downspouts		
Percentage of the proposed	0.00	Acres	of rooftop surface has disconnected downspouts	50	
				Return to Calculator	

Impervious Area Disconnection Credit Worksheet

Please fill out an impervious area disconnection credit worksheet for each project sub-watershed. If you answer yes to all questions, all non-rooftop impervious surface area will be subtracted from your proposed non-rooftop impervious coverage.

Non-Rooftop Disconnection Credit Criteria	Response
Is the maximum contributing impervious flow path length less than 75 feet or, if equal or greater than 75 feet, is a storage device (e.g. French drain, bioretention area, gravel trench) implemented to achieve the required disconnection length?	◉ Yes ○ No
Is the impervious area to any one discharge location less than 5,000 square feet?	◉ Yes ○ No
The Stream Buffer credit **will not** be taken in this sub-watershed area?	◉ Yes ○ No

Percentage of existing	0.00	Acres non-rooftop surface area disconnected	
Percentage of the proposed	0.00	Acres non-rooftop surface area disconnected	70

Return to Calculator

Green Roof Credit Worksheet

Please fill out a greenroof credit worksheet for each project sub-watershed. If you answer yes to all questions, 70% of the greenroof area will be subtracted from your proposed rooftop impervious coverage.

Green Roof Credit Criteria	Response
Is the roof slope less than 15% or does it have a grid to hold the substrate in place until it forms a thick vegetation mat?	◉ Yes ○ No
Has a professional engineer assessed the necessary load reserves and designed a roof structure to meet state and local codes?	◉ Yes ○ No
Is the irrigation needed for plant establishment and/or to sustain the green roof during extended dry periods, is the source from stored, recycled, reclaimed, or reused water?	◉ Yes ○ No
Percentage of existing 0.00 Acres rooftop surface area in greenroof	
Percentage of the proposed 0.00 Acres rooftop surface area in greenroof	

Return to Calculator

Stream Buffer Credit Worksheet

Please fill out a stream buffer credit worksheet for each project sub-watershed. If you answer yes to all questions, you may subtract all impervious surface draining to each stream buffer that has not been addressed using the Downspout and/or Impervious Area Disconnection credits.

Stream Buffer Credit Criteria				Response
Does runoff enter the floodprone width* or within 500 feet (whichever is larger) of a stream channel as sheet flow**?				○ Yes ◉ No
Is the contributing overland slope 5% or less, or if greater than 5%, is a level spreader used?				○ Yes ◉ No
Is the buffer area protected from vehicle or other traffic barriers to reduce compaction?				○ Yes ◉ No
Will the stream buffer be maintained in an ungraded and uncompacted condition and will the vegetation be maintained in a natural condition?				○ Yes ◉ No
Percentage of existing	0.00	Acres	impervious surface area draining into a stream buffer:	
Percentage of the proposed	0.00	Acres	impervious surface area that will drain into a stream buffer:	
Please describe below how the project will ensure that the buffer areas will remain in ungraded and uncompacted condition and that the vegetation will be maintained in a natural condition.				

Return to Calculator

* floodprone width is the width at twice the bankfull depth.
** the maximum contributing length shall be 75 feet for impervious area

Vegetated Swale Credit Worksheet

Please fill out a vegetated swale worksheet for each project subwatershed. If you answer yes to all questions, you may subtract all impervious surface draining to each stream buffer that has not been addressed using the Downspout Disconnection credit.

Vegetated Swale Credit Criteria

Have all vegetated swales been designed in accordance with Treatment Control BMP 30 (TC-30 - Vegetated Swale) from the California Stormwater BMP Handbook, New Development and Redevelopment (available at www.cabmphandbooks.com)?	○ Yes ◉ No
Is the maximum flow velocity for runoff from the design storm event less than or equal to 1.0 foot per second?	○ Yes ◉ No

Percentage of existing	0.00	Acres of impervious area draining to a vegetated swale	
Percentage of the proposed	0.00	Acres of impervious area draining to a vegetated swale	

Return to Calculator

Rain Barrel/Cistern Credit Worksheet

Please fill out a rain barrel/cistern worksheet for each project sub-watershed.

Rain Barrel/Cistern Credit Criteria	Response
Total number of rain barrel(s)/cisterns	
Average capacity of rain barrel(s)/cistern(s) (in gallons)	
Total capacity rain barrel(s)/cistern(s) (in cu ft) [1]	0

[1] accounts for 10% loss

Return to Calculator

Please fill out a soil quality worksheet for each project sub-watershed.

	Response
Will the landscaped area be lined with an impervious membrane?	
Will the soils used for landscaping meet the ideal bulk densities listed in Table 1 below? [1]	○ Yes ◉ No
If you answered yes to the question above, and you know the area-weighted bulk density within the top 12 inches for soils used for landscaping (in g/cm^3)* , fill in the cell to the right and skip to cell G11. If not select from the drop-down menu in G10.	1.3
If you answered yes to the question above, but you do not know the exact bulk density, which of the soil types in the drop down menu to the right best describes the top 12 inches for soils used for landscaping (in g/cm^3).	Sandy loams, loams
What is the average depth of your landscaped soil media meeting the above criteria (inches)?	12
What is the total area of the landscaped areas meeting the above criteria (in acres)?	2.97

Return to Calculator

Table 1

Sands, loamy sands	<1.6
Sandy loams, loams	<1.4
Sandy clay loams, loams, clay loams	<1.4
Silts, silt loams	<1.3
Silt loams, silty clay loams	<1.1
Sandy clays, silty clays, some clay loams (35-45% clay)	<1.1
Clays (>45% clay)	<1.1

[1] USDA NRCS. "Soil Quality Urban Technical Note No.2-Urban Soil Compaction". March 2000.
http://soils.usda.gov/sqi/management/files/sq_utn_2.pdf

* To determine how to calculate density see:
http://www.globe.gov/tctg/bulkden.pdf?sectionID=94

Porosity (%) 50.94%

Mineral grains in many soils are mainly quartz and feldspar, so 2.65 a good average for particle density. To determine percent porosity, use the formula: Porosity (%) = (1-Bulk Density/2.65) X 100

APPENDIX 2:
Post-Construction Water Balance Performance Standard Spreadsheet

The discharger shall submit with their Notice of Intent (NOI) the following information to demonstrate compliance with the New and Re-Development Water Balance Performance Standard.

Map Instructions

The discharger must submit a small-scale topographic map of the site to show the existing contour elevations, pre- and post-construction drainage divides, and the total length of stream in each watershed area. Recommended scales include 1 in. = 20 ft., 1 in. = 30 ft., 1 in. = 40 ft., or 1 in = 50 ft. The suggested contour interval is usually 1 to 5 feet, depending upon the slope of the terrain. The contour interval may be increased on steep slopes. Other contour intervals and scales may be appropriate given the magnitude of land disturbance.

Spreadsheet Instructions

The intent of the spreadsheet is to help dischargers calculate the project-related increase in runoff volume and select impervious area and runoff reduction credits to reduce the project-related increase in runoff volume to pre-project levels.

The discharger has the option of using the spreadsheet (**Appendix 2.1)** or a more sophisticated, watershed process-based model (e.g. Storm Water Management Model, Hydrological Simulation Program Fortran) to determine the project-related increase in runoff volume.

In* Appendix 4.1**, ***you must complete the worksheet for each land use/soil type combination for each project sub-watershed.

Steps 1 through 9 pertain specifically to the Runoff Volume Calculator:

Step 1: Enter the county where the project is located in cell H3.

Step 2: Enter the soil type in cell H6.

Step 3: Enter the existing pervious (dominant) land use type in cell H7.

Step 4: Enter the proposed pervious (dominant) land use type in cell H8.

Step 5: Enter the total project site area in cell H11 or J11.

Step 6: Enter the sub-watershed area in cell H12 or J12.

Step 7: Enter the existing rooftop area in cell H17 or J17, the existing non-rooftop impervious area in cell H18 or J18, the proposed rooftop area in cell H19 or J19, and the proposed non-rooftop impervious area in cell H20 or J20

Step 8: Work through each of the impervious area reduction credits and claim credits where applicable. Volume that cannot be addressed using non-structural practices must be captured in structural practices and approved by the Regional Water Board.

Step 9: Work through each of the impervious volume reduction credits and claim credits where applicable. Volume that cannot be addressed using non-structural practices must be captured in structural practices and approved by the Regional Water Board.

Non-structural Practices Available for Crediting

- ***Porous Pavement***
- ***Tree Planting***
- ***Downspout Disconnection***
- ***Impervious Area Disconnection***
- ***Green Roof***
- ***Stream Buffer***
- ***Vegetated Swales***
- ***Rain Barrels and Cisterns***
- ***Landscaping Soil Quality***

APPENDIX 3
Bioassessment Monitoring Guidelines

Bioassessment monitoring is required for projects that meet all of the following criteria:

1. The project is rated Risk Level 3 or LUP Type 3
2. The project directly discharges runoff to a freshwater wadeable stream (or streams) that is either: (a) listed by the State Water Board or USEPA as impaired due to sediment, and/or (b) tributary to any downstream water body that is listed for sediment; and/or have the beneficial use SPAWN & COLD & MIGRATORY
3. Total project-related ground disturbance exceeds 30 acres.

For all such projects, the discharger shall conduct bioassessment monitoring, as described in this section, to assess the effect of the project on the biological integrity of receiving waters.
Bioassessment shall include:

1. The collection and reporting of specified instream biological data
2. The collection and reporting of specified instream physical habitat data

<u>Bioassessment Exception</u>
If a site qualifies for bioassessment, but construction commences out of an index period for the site location, the discharger shall:

1. Receive Regional Water Board approval for the sampling exception
2. Make a check payable to: Cal State Chico Foundation (SWAMP Bank Account) or San Jose State Foundation (SWAMP Bank Account) and include the WDID# on the check for the amount calculated for the exempted project.
3. Send a copy of the check to the Regional Water Board office for the site's region
4. Invest **7,500.00 X The number of samples required** into the SWAMP program as compensation (upon Regional Water Board approval).
5. Conduct bioassessment monitoring, as described in Appendix 4
6. Include the collection and reporting of specified instream biological data and physical habitat
7. Use the bioassessment sample collection and Quality Assurance & Quality Control (QA/QC) protocols developed by the State of California's Surface Water Ambient Monitoring Program (SWAMP)

<u>Site Locations and Frequency</u>
Macroinvertebrate samples shall be collected both before ground disturbance is initiated and after the project is completed. The "after" sample(s) shall be collected after at least one winter season resulting in surface runoff has transpired after project-related ground disturbance has ceased. "Before" and "after" samples shall be collected both upstream and downstream of the project's

discharge. Upstream samples should be taken immediately before the sites outfall and downstream samples should be taken immediately after the outfall (when safe to collect the samples). Samples should be collected for each freshwater wadeable stream that is listed as impaired due to sediment, or tributary to a water body that is listed for sediment. Habitat assessment data shall be collected concurrently with all required macroinvertebrate samples.

Index Period (Timing of Sample Collection)
Macroinvertebrate sampling shall be conducted during the time of year (i.e., the "index period") most appropriate for bioassessment sampling, depending on ecoregion. This map is posted on the State Water Board's Website: http://www.waterboards.ca.gov/water_issues/programs/stormwater/construction.shtml

Field Methods for Macroinvertebrate Collections
In collecting macroinvertebrate samples, the discharger shall use the "Reachwide Benthos (Multi-habitat) Procedure" specified in *Standard Operating Procedures for Collecting Benthic Macroinvertebrate Samples and Associated Physical and Chemical Data for Ambient Bioassessments in California* (Ode 2007).[1]

Physical - Habitat Assessment Methods
The discharger shall conduct, concurrently with all required macroinvertebrate collections, the "Full" suite of physical habitat characterization measurements as specified in *Standard Operating Procedures for Collecting Benthic Macroinvertebrate Samples and Associated Physical and Chemical Data for Ambient Bioassessments in California* (Ode 2007), and as summarized in the Surface Water Ambient Monitoring Program's *Stream Habitat Characterization Form — Full Version*.

Laboratory Methods
Macroinvertebrates shall be identified and classified according to the Standard Taxonomic Effort (STE) Level I of the Southwestern Association of Freshwater Invertebrate Taxonomists (SAFIT),[2] and using a fixed-count of 600 organisms per sample.

Quality Assurance
The discharger or its consultant(s) shall have and follow a quality assurance (QA) plan that covers the required bioassessment monitoring. The QA plan shall include, or be supplemented to include, a specific requirement for external QA checks (i.e., verification of taxonomic identifications and correction of data where errors are identified). External QA checks shall be performed on one of the

[1] This document is available on the Internet at: http://www.swrcb.ca.gov/swamp/docs/phab_sopr6.pdf.
[2] The current SAFIT STEs (28 November 2006) list requirements for both the Level I and Level II taxonomic effort, and are located at: http://www.swrcb.ca.gov/swamp/docs/safit/ste_list.pdf. When new editions are published by SAFIT, they will supersede all previous editions. All editions will be posted at the State Water Board's SWAMP website.

discharger's macroinvertebrate samples collected per calendar year, or ten percent of the samples per year (whichever is greater). QA samples shall be randomly selected. The external QA checks shall be paid for by the discharger, and performed by the California Department of Fish and Game's Aquatic Bioassessment Laboratory. An alternate laboratory with equivalent or better expertise and performance may be used if approved in writing by State Water Board staff.

Sample Preservation and Archiving

The original sample material shall be stored in 70 percent ethanol and retained by the discharger until: 1) all QA analyses specified herein and in the relevant QA plan are completed; and 2) any data corrections and/or re-analyses recommended by the external QA laboratory have been implemented. The remaining subsampled material shall be stored in 70 percent ethanol and retained until completeness checks have been performed according to the relevant QA plan. The identified organisms shall be stored in 70 percent ethanol, in separate glass vials for each final ID taxon. (For example, a sample with 45 identified taxa would be archived in a minimum of 45 vials, each containing all individuals of the identified taxon.) Each of the vials containing identified organisms shall be labeled with taxonomic information (i.e., taxon name, organism count) and collection information (i.e., site name/site code, waterbody name, date collected, method of collection). The identified organisms shall be archived (i.e., retained) by the discharger for a period of not less than three years from the date that all QA steps are completed, and shall be checked at least once per year and "topped off" with ethanol to prevent desiccation. The identified organisms shall be relinquished to the State Water Board upon request by any State Water Board staff.

Data Submittal

The macroinvertebrate results (i.e., taxonomic identifications consistent with the specified SAFIT STEs, and number of organisms within each taxa) shall be submitted to the State Water Board in electronic format. The State Water Board's Surface Water Ambient Monitoring Program (SWAMP) is currently developing standardized formats for reporting bioassessment data. All bioassessment data collected after those formats become available shall be submitted using the SWAMP formats. Until those formats are available, the biological data shall be submitted in MS-Excel (or equivalent) format.[3]

The physical/habitat data shall be reported using the standard format titled *SWAMP Stream Habitat Characterization Form — Full Version*.[4]

[3] Any version of Excel, 2000 or later, may be used.
[4] Available at: http://www.waterboards.ca.gov/water_issues/programs/swamp/docs/reports/fieldforms_fullversion052908.pdf

Invasive Species Prevention

In conducting the required bioassessment monitoring, the discharger and its consultants shall take precautions to prevent the introduction or spread of aquatic invasive species. At minimum, the discharger and its consultants shall follow the recommendations of the California Department of Fish and Game to minimize the introduction or spread of the New Zealand mudsnail.[5]

[5] Instructions for controlling the spread of NZ mudsnails, including decontamination methods, can be found at: http://www.dfg.ca.gov/invasives/mudsnail/
More information on AIS More information on AIS
http://www.waterboards.ca.gov/water_issues/programs/swamp/ais/

Appendix 4 Sediment TMDLs

Implemented Sediment TMDLs in California. Construction was listed as a source in all fo these TMDLs in relation to road construction. Although construction was mentioned as a source, it was not given a specific allocation amount. The closest allocation amount would be for the road activity management WLA. **Implementation Phase** – Adoption process by the Regional Board, the State Water Resources Control Board, the Office of Administrative Law, and the US Environmental Protection Agency completed and TMDL being implemented.

A. Region	**Type**	**Name**	**Pollutant Stressor**	**Potential Sources**	**TMDL Completion Date**	**Watershed Acres**	**WLA** tons mi^2 yr
1 R1.epa.albionfinaltmdl	R	Albion River	Sedimentation	Road Construction	2001	43 acres	See A (table 6)

B Region	**Type**	**Name**	**Pollutant Stressor**	**Potential Sources**	**TMDL Completion Date**	**Watershed Acres**	**WLA** tons mi^2 yr
1 R1.epa.EelR-middle.mainSed.temp	R	Middle Main Eel River and Tributaries (from Dos Rios to the South Fork)	Sedimentation Road	Construction	2005-2006 521	mi^2	100

C Region	**Type**	**Name**	**Pollutant Stressor**	**Potential Sources**	**TMDL Completion Date**	**Watershed Acres**	**WLA** tons mi^2 yr
1 R1.epa.EelRsouth.sed.temp	R	South Fork Eel River	Sedimentation	Road Construction	12 1999	See chart	473

D Region	**Type**	**Name**	**Pollutant Stressor**	**Potential Sources**	**TMDL Completion Date**	**Watershed Acres**	**WLA** tons mi^2 yr
1 R1.epa.bigfinaltmdl	R Big	River	Sedimentation	Road Construction	12 2001	181 mi^2 watershed drainage	TMDL = loading capacity = nonpoint sources + background =

							393 t mi2 yr

E Region	Type	Name	Pollutant Stressor	Potential Sources	TMDL Completion Date	Watershed Acres	WLA tons mi^2 yr
1 R1.epa.EelR-lower.Sed.temp-121807-signed	R	Lower Eel River	Sedimentation	Road Construction	12 2007	300 square-mile watershed	898

F Region	Type	Name	Pollutant Stressor	Potential Sources	TMDL Completion Date	Watershed Acres	WLA tons mi^2 yr
1 R1.epa.EelR-middle.Sed.temp-	R	Middle Fork Eel River	Sedimentation	Road Construction	12 2003	753 mi^2 (approx. 482,000 acres)	82

G Region	Type	Name	Pollutant Stressor	Potential Sources	TMDL Completion Date	Watershed Acres Mi^2	WLA tons mi^2 yr
1 R1.epa.EelRnorth-Sed.temp.final-121807-signed	R	North Fork Eel River	Sedimentation	Road Construction	12 30 2002	289 (180,020 acres)	20

H Region	Type	Name	Pollutant Stressor	Potential Sources	TMDL Completion Date	Watershed Acres Mi^2	WLA tons mi^2 yr
1 R1.epa.EelR-upper.mainSed.temp-	R	Upper Main Eel River and Tributaries (including Tomki Creek, Outlet Creek and Lake Pillsbury)	Sedimentation	Road Construction	12 29 2004	688 (approx. 440,384 acres)	14

I Region	Type	Name	Pollutant Stressor	Potential Sources	TMDL Completion Date	Watershed Acres	WLA tons mi^2 yr
1 R1.epa.gualalafinaltmdl	R	Gualala River	Sedimentation	Road Construction	Not sure	300 (191,145 acres)	7

J Region	Type	Name	Pollutant Stressor	Potential Sources	TMDL Completion Date	Watershed Acres mi^2	WLA tons mi^2 yr
1 R1.epa.Mad-sed.turbidity	R	Mad River	Sedimentation	Road Construction	12 21 2007	480	174

K Region	Type	Name	Pollutant Stressor	Potential Sources	TMDL Completion Date	Watershed Acres mi^2	WLA tons mi^2 yr
1 R1.epa.mattole.sediment	R	Mattole River	Sedimentation	Road Construction	12 30 2003	296	27 or 520+27 = 547

L Region	Type	Name	Pollutant Stressor	Potential Sources	TMDL Completion Date	Watershed Acres mi^2	WLA tons mi^2 yr
1 R1.epa.navarro.sed.temp	R	Navarro River	Sedimentation	Road Construction	Not sure	315 (201,600 acres).	50

M Region	Type	Name	Pollutant Stressor	Potential Sources	TMDL Completion Date	Watershed Acres mi^2	WLA tons mi^2 yr
1 R1.epa.noyo.sediment	R	Noyo River	Sedimentation	Road Construction	12 16 1999	113 (72,323 acres)	68 (three areas measured) Table 16 in the TMDL

N Region	Type	Name	Pollutant Stressor	Potential Sources	TMDL Completion Date	Watershed Acres mi^2	WLA tons mi^2 yr
1 R1.epa.RedwoodCk.sed	Cr	Redwood Creek	Sedimentation	Road Construction	12 30 1998	278	1900 Total allocation

O Region	Type	Name	Pollutant Stressor	Potential Sources	TMDL Completion Date	Watershed Acres mi^2	WLA – Roads tons mi^2 yr
1 R1.epa.tenmile.sed	R	Ten Mile River	Sedimentation	Road Construction	2000	120	9

P Region	Type	Name	Pollutant Stressor	Potential Sources	TMDL Completion Date	Watershed Acres mi^2	WLA management tons mi^2 yr
1 R1.epa.trinity.sed	R	Trinity River	Sedimentation	Road Construction	12 20 2001	2000 of 3000 covered in this TMDL	See rows below
1	Cr	Horse Linto Creek	Sedimentation	Road Construction	12 20 2001	64	528
1	Cr	Mill creek and Tish Tang	Sedimentation	Road Construction	12 20 2001	39	210
1	Cr	Willow Creek	Sedimentation	Road Construction	12 20 2001	43	94
1	Cr	Campbell Creek and Supply Creek	Sedimentation	Road Construction	12 20 2001	11	1961
1	Cr	Lower Mainstem and Coon Creek	Sedimentation	Road Construction	12 20 2001	32	63
1 R		Reference Subwatershed [1]	Sedimentation	Road Construction	12 20 2001	434	24
1	Cr	Canyon Creek	Sedimentation	Road	12 20 2001	64	326

				Construction			
1 R		Upper Tributaries[2]	Sedimentation	Road Construction	12 20 2001	72	67
1 R		Middle Tributaries[3]	Sedimentation	Road Construction	12 20 2001	54	53
1 R		Lower Tributaries[4]	Sedimentation	Road Construction	12 20 2001	96	55
1	Cr	Weaver and Rush Creeks	Sedimentation	Road Construction	12 20 2001	72	169
1 Cr		Deadwood Creek Hoadley Gulch Poker Bar	Sedimentation	Road Construction	12 20 2001	47	68
1	L	Lewiston Lake	Sedimentation	Road Construction	12 20 2001	25	49
1 Cr		Grassvalley Creek	Sedimentation	Road Construction	12 20 2001	37	44
1	Cr	Indian Creek	Sedimentation	Road Construction	12 20 2001	34	81
1	Cr	Reading and Browns Creek	Sedimentation	Road Construction	12 20 2001	104	66
1 Cr		Reference Subwatersheds[5]	Sedimentation	Road Construction	12 20 2001	235	281
1	L, Cr	Westside tributaries[6]	Sedimentation	Road Construction	12 20 2001	93	105
1 R,	Cr, G	Upper trinity[7]	Sedimentation	Road Construction	12 20 2001	161	690
1 R,	Cr, G	East Fork Tributaries[8]	Sedimentation	Road Construction	12 20 2001	115	65
1	R, L	Eastside Tributaries[9]	Sedimentation	Road Construction	12 20 2001	89	60

1 New River, Big French, Manzanita, North Fork, East Fork, North Fork
2 Dutch, Soldier, Oregon gulch, Conner Creek
3 Big Bar, Prairie Creek, Little French Creek
4 Swede, Italian, Canadian, Cedar Flat, Mill, McDonald, Hennessy, Quimby, Hawkins, Sharber
5 Stuarts Fork, Swift Creek, Coffee Creek
6 Stuart Arm, Stoney Creek, Mule Creek, East Fork, Stuart Fork, West Side Trinity Lake, Hatchet Creek, Buckeye Creek,
7 Upper Trinity River, Tangle Blue, Sunflower, Graves, Bear Upper Trinity Mainstream, Ramshorn Creek, Ripple Creek, Minnehaha Creek, Snowslide Gulch, Scorpion Creek
8 East Fork Trinity, Cedar Creek, Squirrel Gulch

9 East Side Tributaries, Trinity Lake

Q Region	**Type**	**Name**	**Pollutant Stressor**	**Potential Sources**	**TMDL Completion Date**	**Watershed Acres** mi^2	**WLA** tons mi^2 yr
1 R1.epa.trinity.so.sed	R, Cr	South Fork Trinity River and Hayfork Creek	Sedimentation	Road Construction	12 1998	Not given, 19 miles long	33 (road total)

R Region	**Type**	**Name**	**Pollutant Stressor**	**Potential Sources**	**TMDL Completion Date**	**Watershed Acres** mi^2	**WLA** tons mi^2 yr
1 R1.epa.vanduzen.sed	R, Cr	Van Duzen River and Yager Creek	Sedimentation	Various	12 16 1999	429	1353 total allocation
1		Upper Basin	Sedimentation	Road Construction			7
1		Middle Basin	Sedimentation	Road Construction			22
1		Lower Basin	Sedimentation	Road Construction			20

S Region	**Type**	**Name**	**Pollutant Stressor**	**Potential Sources**	**TMDL Completion Date**	**Watershed Acres** mi^2	**WLA** tons mi^2 yr
6 R6.blackwood.sed Cr		Blackwood Creek (Placer County)	Bedded Sediment	Various	9 2007	11	17272 total

T Region	**Type**	**Name**	**Pollutant Stressor**	**Potential Sources**	**TMDL Completion Date**	**Watershed Acres** mi^2	**WLA** tons mi^2 yr
6 R6.SquawCk.sed R		Squaw Creek (Placer County)	Sedimentation /controllable sources	Various – basin plan amendment	4 13 2006	8.2	10,900

Adopted TMDLs for Construction Sediment Sources

Region	Type	Name	Pollutant Stressor	Potential Sources	**TMDL Completion Date**	**Watershed Area** mi^2	Waste load Allocation tons mi^2 yr
8 R		Newport Bay San Diego Creek Watershed	Sedimentation	Construction Land Development	1999 2.24	(1432 acres)	125,000 tons per Year (no more than 13,000 tons per year from construction sites)

Appendix 4 Non Sediment TMDLs

Region 1 Lost River-DIN and CBOD

Region 1 Source: Cal Trans Construction TMDL Completion Date: 12 30 2008 TMDL Type: River, Lake Watershed Area= 2996 mi^2	**Pollutant Stressors/WLA**	
	Dissolved inorganic nitrogen (DIN) (metric tons/yr)	**Carbonaceous biochemical oxygen demand (CBOD) (metric tons/yr)**
Lost River from the Oregon border to Tule Lake	.1 .2	
Tule Lake Refuge	.1	.2
Lower Klamath Refuge	.1	.2

Region 2 San Francisco Bay-Mercury

Region 2 Source:Non-Urban Stormwater Runoff TMDL Type: Bay	**Name**	**Pollutant Stressor/WLA**	**TMDL Completion Date**
	San Francisco Bay	Mercury 25 kg/year	08 09 2006

Region 4 Machado Lake Nutrients - Resolution No. 2008-006
(Effective Date - March 11, 2009)

General Construction Stormwater Permit WLAs	Years After Effective Date	Total Phosphorus (mg/L)	Total Nitrogen (TKN + NO3-N + NO2-N) (mg/L)
Interim WLAs[1]	At Effective Date	1.25	3.50
Interim WLAs[2] 5	years	1.25	2.45
Final WLAs[2]	9.5 years	0.10	1.00

[1] The compliance points for effective date interim WLAs are measured in the lake.
[2] No compliance points are specified for general construction stormwater permits for the year 5 interim WLAs and final WLAs

Region 4 Ballona Creek-Metals and Selenium – Resolution No. 2007-015
(Effective Date October 29, 2008)

Wet Weather WLAs

Region 4 Source: NPDES General Construction TMDL Completion Date: 10 29 2008 TMDL Type: Creek	Copper (Cu)		Lead (Pb)		Selenium (Se)		Zinc (Zn)	
	g/day	g/day/acre	g/day	g/day/acre	g/day	g/day/acre	g/day	g/day/acre
Ballona Creek	4.94E-07 x Daily storm volume (L)	2.20E-10 x Daily storm volume (L)	1.62E-06 x Daily storm volume (L)	7.20E-10 x Daily storm volume (L)	1.37E-07 x Daily storm volume (L)	6.10E-11 x Daily storm volume (L)	3.27E-06 x Daily storm volume (L)	1.45E-09 x Daily storm volume (L)

Wet-weather WLA Implementation

- Within seven years of the effective date of the TMDL, the construction industry will submit the results of BMP effectiveness studies to determine BMPs that will achieve compliance with the final waste load allocations assigned to construction storm water permittees.
- Regional Board staff will bring the recommended BMPs before the Regional Board for consideration within eight years of the effective date of the TMDL.
- General construction storm water permittees will be considered in compliance with final waste load allocations if they implement these Regional Board approved BMPs. All permittees must implement the approved BMPs within nine years of the effective date of the TMDL. If no effectiveness studies are conducted and no BMPs are approved by the Regional Board within eight years of the effective date of the TMDL, each general construction storm water permit holder will be subject to site-specific BMPs and monitoring requirements to demonstrate compliance with final waste load allocations.

Dry-weather WLAs

A waste load allocation of zero is assigned to all general construction storm water permits during dry weather.

Dry-weather WLA Implementation

Non-storm water flows authorized by the General Permit for Storm Water Discharges Associated with Construction Activity (Water Quality Order No. 99-08 DWQ), or any successor order, are exempt from the dry-weather waste load allocation equal to zero as long as they comply with the provisions of sections C.3 and A.9 of the Order No. 99-08 DWQ, which state that these authorized non-storm discharges shall be:

(1) infeasible to eliminate
(2) comply with BMPs as described in the Storm Water Pollution Prevention Plan prepared by the permittee, and
(3) not cause or contribute to a violation of water quality standards, or comparable provisions in any successor order.

Unauthorized non-storm water flows are already prohibited by Order No. 99-08 DWQ.

Region 4 Los Angeles River and Tributaries-Metals– Resolution No. 2007-014
(Effective Date October 29, 2008)

Wet Weather WLAs

	Cadmium (Cd)		**Copper (Cu)**		**Lead (Pb)**		**Zinc (Zn)**	
	kg/day g/day/acre		kg/day g/day/acre		kg/day g/day/acre		kg/day g/day/acre	
5.9x10	$^{-11}$ x Daily storm volume (L)	7.6×10^{-12} x Daily storm volume (L)	3.2×10^{-10} x Daily storm volume (L)	4.2×10^{-11} x Daily storm volume (L)	1.2×10^{-9} x Daily storm volume (L)	1.5×10^{-10} x Daily storm volume (L)	3.01×10^{-9} x Daily storm volume (L)	3.9×10^{-10} x Daily storm volume (L)

Wet-weather WLA Implementation

- Within seven years of the effective date of the TMDL, the construction industry will submit the results of BMP effectiveness studies to determine BMPs that will achieve compliance with the final waste load allocations assigned to construction storm water permittees.
- Regional Board staff will bring the recommended BMPs before the Regional Board for consideration within eight years of the effective date of the TMDL.
- General construction storm water permittees will be considered in compliance with final waste load allocations if they implement these Regional Board approved BMPs. All permittees must implement the approved BMPs within nine years of the effective date of the TMDL. If no effectiveness studies are conducted and no BMPs are approved by the Regional Board within eight years of the effective date of the TMDL, each general construction storm water permit holder will be subject to site-specific BMPs and monitoring requirements to demonstrate compliance with final waste load allocations.

Dry-weather WLAs

A waste load allocation of zero is assigned to all general construction storm water permits during dry weather.

Dry-weather WLA Implementation

Non-storm water flows authorized by the General Permit for Storm Water Discharges Associated with Construction Activity (Water Quality Order No. 99-08 DWQ), or any successor order, are exempt from the dry-weather waste load allocation equal to zero as

long as they comply with the provisions of sections C.3 and A.9 of the Order No. 99-08 DWQ, which state that these authorized non-storm discharges shall be:

(1) infeasible to eliminate
(2) comply with BMPs as described in the Storm Water Pollution Prevention Plan prepared by the permittee, and
(3) not cause or contribute to a violation of water quality standards, or comparable provisions in any successor order.

Unauthorized non-storm water flows are already prohibited by Order No. 99-08 DWQ.

Region 4 Calleguas Creek Metals TMDL – Resolution No. 2006-012 (Effective Date - March 26, 2007)

Interim Limits and Final WLAs for Total Recoverable Copper, Nickel, and Selenium

Interim limits and waste load allocations are applied to receiving water.

A. Interim Limits

Constituents	Calleguas and Conejo Creek			Revolon Slough		
	Dry CMC (ug/L)	Dry CCC (ug/L)	Wet CMC (ug/L)	Dry CMC (ug/L)	Dry CCC (ug/L)	Wet CMC (ug/L)
Copper*	23	19	204	23	19	204
Nickel	15	13	(a)	15	13	(a)
Selenium	(b)	(b)	(b)	14	13	(a)

(a) The current loads do not exceed the TMDL under wet conditions; interim limits are not required.
(b) Selenium allocations have not been developed for this reach as it is not on the 303(d) list.
(c) Attainment of interim limits will be evaluated in consideration of background loading data, if available.

B. Final WLAs for Total Recoverable Copper, Nickel, and Selenium

Dry-Weather WLAs in Water Column

Flow Range	Calleguas and Conejo Creek			Revolon Slough		
	Low Flow	Average Flow	Elevated Flow	Low Flow	Average Flow	Elevated Flow
Copper1 (lbs/day)	0.04*WER - 0.02	0.12*WER - 0.02	0.18*WER - 0.03	0.03*WER - 0.01	0.06*WER - 0.03	0.13*WER - 0.02
Nickel (lbs/day)	0.100	0.120	0.440	0.050	0.069	0.116
Selenium (lbs/day)	(a)	(a)	(a)	0.004	0.003	0.004

[1] If site-specific WERs are approved by the Regional Board, TMDL waste load allocations shall be implemented in accordance with the approved WERs using the equations set forth above. Regardless of the final WERs, total copper loading shall not exceed current loading.

(a) Selenium allocations have not been developed for this reach as it is not on the 303(d) list.

Wet-Weather WLAs in Water Column

Constituent	Calleguas Creek	Revolon Slough
Copper[1] (lbs/day)	(0.00054*Q^2*0.032*Q - 0.17)*WER - 0.06	(0.0002*Q2+0.0005*Q)*WER
Nickel[2] (lbs/day)	0.014*Q^2+0.82*Q	0.027*Q^2+0.47*Q
Selenium[2] (lbs/day)	(a)	0.027*Q^2+0.47*Q

[1] If site-specific WERs are approved by the Regional Board, TMDL waste load allocations shall be implemented in accordance with the approved WERs using the equations set forth above. Regardless of the final WERs, total copper loading shall not exceed current loading.

[2] Current loads do not exceed loading capacity during wet weather. Sum of all loads cannot exceed loads presented in the table

(a) Selenium allocations have not been developed for this reach as it is not on the 303(d) list.

Q: Daily storm volume.

Interim Limits and Final WLAs for Mercury in Suspended Sediment

Flow Range	Calleguas Creek		Revolon Slough	
	Interim (lbs/yr)	Final (lbs/yr)	Interim (lbs/yr)	Final (lbs/yr)
0-15,000 MGY	3.3	0.4	1.7	0.1
15,000-25,000 MGY	10.5	1.6	4	0.7
Above 25,000 MGY	64.6	9.3	10.2	1.8

MGY: million gallons per year.

In accordance with current practice, a group concentration-based WLA has been developed for all permitted stormwater discharges, including municipal separate storm sewer systems (MS4s), Caltrans, general industrial and construction stormwater permits, and Naval Air Weapons Station Point Mugu. Dischargers will have a required 25%, 50% and 100% reduction in the difference between the current loadings and the load allocations at 5, 10 and 15 years after the effective date, respectively. Achievement of required reductions will be evaluated based on progress towards BMP implementation as outlined in the urban water quality management plans (UWQMPs). If the interim reductions are not met, the dischargers will submit a report to the Executive Officer detailing why the reductions were not met and the steps that will be taken to meet the required reductions.

Region 4 Calleguas Creek-OC Pesticides, PCBs, and Siltation (Resolution 2005-010)
Effective Date - March 24, 2006

Interim Requirements

Region 4 Calleguas Creek Source: Minor NPDES point sources/WDRs TMDL Completion Date: 3 24 2006 TMDL Type:Creek	**Pollutant Stressor**	**WLA Daily Max (µg/L)**	**WLA Monthly Ave (µg/L)**
	Chlordane 1.2		0.59
	4,4-DDD 1.7		0.84
	4,4-DDE 1.2		0.59
	4,4-DDT 1.2		0.59
	Dieldrin 0.28		0.14
	PCB's 0.34		0.17
	Toxaphene 0.33		0.16

Region 4 Calleguas Creek-Calleguas Creek Toxicicity (Resolution 2005-009)
Effective Date - March 24, 2006

Minor sources include NPDES permittees other than POTWs and MS4s, discharging to the Calleguas Creek Watershed. A wasteload of 1.0 TUc is allocated to the minor point sources discharging to the Calleguas Creek Watershed. Additionally, the following wasteloads for chlorpyrifos and diazinon are established. Final WLAs apply as of March 24, 2006.

Chlorpyrifos WLAs, ug/L
Final WLA
(4 day)
0.014
Diazinon WLAs, ug/L
Final WLA
Acute and Chronic
0.10

Region 4 Calleguas Creek-Salts (Resolution 2007-016)
Effective Date – December 2, 2008

Final Dry Weather Pollutant WLA (mg/L)					
Region 4 Calleaguas Creek Source Permitted Stormwater Dischargers TMDL Completion Date: 12 2 2008 TMDL Type:Creek	**Critical Condition Flow Rate (mgd)**	**Chloride (lb/day)**	**TDS (lb/day)**	**Sulfate (lb/day)**	**Boron (lb/day)**
Simi	1.39	1738 9849 2897 12			
Las Posas	0.13	157 887 261 N/A			
Conejo	1.26	1576 8931 2627 N/A			
Camarillo	0.06	72	406 119 N/A		
Pleasant Valley (Calleguas)	0.12	150 850 250 N/A			
Pleasant Valley (Revolon)	0.25	314	1778	523	2
Dry Weather Interim Pollutant WLA (mg/L)					
	Chloride (mg/L)	**TDS (mg/L)**	**Sulfate (mg/L)**	**Boron (mg/L)**	

Simi 230.0		1720.0	1289.0	1.3
Las Posas	230	1720	1289	1.3
Conejo 230		1720	1289	1.3
Camarillo 230		1720	1289	1.3
Pleasant Valley (Calleguas)	230	1720	1289	1.3
Pleasant Valley (Revolon)	230	1720	1289	1.3

- Dry- weather waste load allocations apply in the receiving water at the base of each subwatershed. Dry weather allocations apply when instream flow rates are below the 86th percentile flow and there has been no measurable precipitation in the previous 24 hours.
- Because wet weather flows transport a large mass of salts at low concentrations, these dischargers meet water quality objectives during wet weather. No wet weather allocations are assigned.

Ballona Creek Toxic Pollutants (Resolution No. 2005-008)
Effective Date - January 11, 2006

Each storm water permittee enrolled under the general construction or industrial storm water permits will receive an individual waste load allocation on a per acre basis, based on the acreage of their facility.

Metals per Acre WLAs for Individual General Construction or Industrial Storm Water Permittees (g/yr/ac)

Cadmium	Copper	Lead	Silver	Zinc
0.1	3 4 0.1			13

Organics per Acre WLAs for Individual General Construction or Industrial Storm Water Permittees (mg/yr/ac)

Chlordane	DDTs	Total PCBs	Total PAHs
0.04	0.14	2	350

Waste load allocations will be incorporated into the State Board general permit upon renewal or into a watershed specific general construction storm water permit developed by the Regional Board.

Within seven years of the effective date of the TMDL, the construction industry will submit the results of BMP effectiveness studies to determine BMPs that will achieve compliance with the waste load allocations assigned to construction storm water permittees. Regional Board staff will bring the recommended BMPs before the Regional Board for consideration within eight years of the

effective date of the TMDL. General construction storm water permittees will be considered in compliance with waste load allocations if they implement these Regional Board approved BMPs.

All general construction permittees must implement the approved BMPs within nine years of the effective date of the TMDL. If no effectiveness studies are conducted and no BMPs are approved by the Regional Board within eight years of the effective date of the TMDL, each general construction storm water permit holder will be subject to site-specific BMPs and monitoring requirements to demonstrate compliance with waste load allocations.

Region 4 Marina Del Rey Harbor Toxic Pollutants TMDL (Resolution No. 2005-012)
Effective Date March 22, 2006

Each storm water permittee enrolled under the general construction or industrial storm water permits will receive an individual waste load allocation on a per acre basis, based on the acreage of their facility.

Metals per Acre WLAs for Individual General Construction or Industrial Storm Water Permittees (g/yr/ac)

Copper	Lead	Zinc
2.3	3.1	10

Organics per acre WLAs for Individual General Construction or Industrial Storm Water Permittees (mg/yr/ac)

Chlordane	Total PCBs
0.03	1.5

Waste load allocations will be incorporated into the State Board general permit upon renewal or into a watershed specific general construction storm water permit developed by the Regional Board.

Within seven years of the effective date of the TMDL, the construction industry will submit the results of BMP effectiveness studies to determine BMPs that will achieve compliance with the waste load allocations assigned to construction storm water permittees. Regional Board staff will bring the recommended BMPs before the Regional Board for consideration within eight years of the effective date of the TMDL. General construction storm water permittees will be considered in compliance with waste load allocations if they implement these Regional Board approved BMPs.

All general construction permittees must implement the approved BMPs within nine years of the effective date of the TMDL. If no effectiveness studies are conducted and no BMPs are approved by the Regional Board within eight years of the effective date of

the TMDL, each general construction storm water permit holder will be subject to site-specific BMPs and monitoring requirements to demonstrate compliance with waste load allocations.

Region 4 San Gabriel River and Tributaries-Metals and Selenium (EPA-established TMDL – Effective date: 3/26/07)

Wet-weather allocations

Waterbody	Copper	Lead	Zinc
San Gabriel River Reach 2*		0.8 kg/d	
Coyote Creek**	0.513 kg/d	2.07 kg/d	3.0 kg/d

*Mass-based allocations are based on a flow of 260 cfs (daily storm volume = 6.4×10^8 liters)

**Mass-based allocations are based on a flow of 156 cfs (daily storm volume = 3.8×10^8 liters)

Dry-weather allocations

The dry-weather copper waste load allocation for general construction storm water permittees that discharge to San Gabriel Reach 1, Coyote Creek, and the Estuary is zero.

The dry-weather selenium allocation for general construction storm water permittees that discharge to San Jose Creek Reach 1 and Reach 2 is 5 µg/L (total recoverable metals).

Region 4 Upper Santa Clara River Chloride TMDL Adopted by Resolution No 2006-016 Effective Date June 12, 2008

“Other NPDES dischargers” have a chloride WLA equal to 100 mg/L.

This TMDL was revised by Resolution No 2008-012, which, when it becomes effective, includes the following conditional WLAs for “Other minor NPDES discharges”:

Reach	Concentration-based Conditional WLA for Chloride (mg/L)*
6	150 (12-month Average), 230 (Daily Maximum)
5	150 (12-month Average), 230 (Daily Maximum)
4B	117 (3-month Average), 230 (Daily Maximum)

*The conditional WLAs for chloride for all point sources shall apply only when chloride load reductions and/or chloride export projects are in operation by the Santa Clarita Valley Sanitation District according to the implementation plan for the TMDL. If these conditions are not met, WLAs shall be based on existing water quality objectives for chloride of 100 mg/L.

Region 4 The Harbor Beaches of Ventura County-Bacteria (Adopted by Resolution No. 2007-017)
Effective Date – December 18, 2008

Current and future enrollees in the Statewide Construction Activity Storm Water General Permit in the Channel Islands Harbor subwatershed are assigned WLAs of zero (0) days of allowable exceedances of the single sample limits and the rolling 30-day geometric mean limits.

Single Sample Limits are:
a. Total coliform density shall not exceed 10,000/100 ml.
b. Fecal coliform density shall not exceed 400/100 ml.
c. Enterococcus density shall not exceed 104/100 ml.
d. Total coliform density shall not exceed 1,000/100 ml, if the ratio of fecal-to-total coliform exceeds 0.1.

Rolling 30-day Geometric Mean Limits are:
a. Total coliform density shall not exceed 1,000/100 ml.
b. Fecal coliform density shall not exceed 200/100 ml.
c. Enterococcus density shall not exceed 35/100 ml.

Los Angeles Harbor Bacteria TMDL (Adopted by Resolution No. 2004-001)
Effective Date – March 10, 2005

Current and future enrollees in the Statewide Construction Activity Storm Water General Permit in the watershed are assigned WLAs of zero (0) days of allowable exceedances of the single sample limits and the rolling 30-day geometric mean.

Single Sample Limits are:
a. Total coliform density shall not exceed 10,000/100 ml.
b. Fecal coliform density shall not exceed 400/100 ml.
c. Enterococcus density shall not exceed 104/100 ml.
d. Total coliform density shall not exceed 1,000/100 ml, if the ratio of fecal-to-total coliform exceeds 0.1.

Rolling 30-day Geometric Mean Limits are:
a. Total coliform density shall not exceed 1,000/100 ml.
b. Fecal coliform density shall not exceed 200/100 ml.
c. Enterococcus density shall not exceed 35/100 ml.

Ballona Creek Bacteria TMDL (Adopted by Resolution No. 2006-011)
Effective Date – April 27, 2007

Current and future enrollees in the Statewide Construction Activity Storm Water General Permit in the watershed are assigned WLAs of zero (0) days of allowable exceedances of the single sample limits and the rolling 30-day geometric mean.

Single Sample Limits are:
a. Total coliform density shall not exceed 10,000/100 ml.
b. Fecal coliform density shall not exceed 400/100 ml.
c. Enterococcus density shall not exceed 104/100 ml.
d. Total coliform density shall not exceed 1,000/100 ml, if the ratio of fecal-to-total coliform exceeds 0.1.

Rolling 30-day Geometric Mean Limits are:
a. Total coliform density shall not exceed 1,000/100 ml.
b. Fecal coliform density shall not exceed 200/100 ml.
c. Enterococcus density shall not exceed 35/100 ml.

Region 4 Resolution No. 03-009 Los Angeles River and Tributaries-Nutrients

Minor Point Sources
Waste loads are allocated to minor point sources enrolled under NPDES or WDR permits including but not limited to Tapia WRP, Whittier Narrows WRP, Los Angeles Zoo WRP, industrial and construction stormwater, and municipal storm water and urban runoff from municipal separate storm sewer systems (MS4s)

Region 4 Minor Point Sources for NPDES/WDR Permits TMDL Effective Date: 3 23 2004 TMDL Type: River	Pollutant Stressor/WLA				
	Total Ammonia (NH_3)		**Nitrate-nitrogen (NO_3-N)**	**Nitrite-nitrogen (NO_2-N)**	**NO_3-N + NO_3-N**
	1 Hr Ave mg/l	30 Day Ave mg/l	30 Day Ave mg/l		30 Day Ave mg/l
LA River Above Los Angeles-Glendale WRP (LAG)	4.7 1.6 8.0			1.0	8.0
LA River Below LAG	8.7	2.4	8.0	1.0	8.0
Los Angeles Tributaries 10.1		2.3	8.0	1.0	8.0

Malibu Creek Attachment A to Resolution No. 2004-019R-Bacteria

Effective date: 1 24 2006. The WLAs for permittees under the NPDES General Stormwater Construction Permit are zero (0) days of allowable exceedances for the single sample limits and the rolling 30-day geometric mean.

Single Sample Limits are:
a. Total coliform density shall not exceed 10,000/100 ml.
b. Fecal coliform density shall not exceed 400/100 ml.
c. Enterococcus density shall not exceed 104/100 ml.
d. Total coliform density shall not exceed 1,000/100 ml, if the ratio of fecal-to-total coliform exceeds 0.1.

Rolling 30-day Geometric Mean Limits are:
a. Total coliform density shall not exceed 1,000/100 ml.
b. Fecal coliform density shall not exceed 200/100 ml.
c. Enterococcus density shall not exceed 35/100 ml.

Region 4 Marina del Rey Harbor, Mothers' Beach and Back Basins
Attachment A to Resolution No. 2003-012-Bacteria

Effective date: 3 18 2004. Discharges from general construction storm water permits are not expected to be a significant source of bacteria. Therefore, the WLAs for these discharges are zero (0) days of allowable exceedances for the single sample limits and the rolling 30-day geometric mean. Any future enrollees under a general NPDES permit, general industrial storm water permit or general construction storm water permit within the MdR Watershed will also be subject to a WLA of zero days of allowable exceedances.

Single Sample Limits are:
a. Total coliform density shall not exceed 10,000/100 ml.
b. Fecal coliform density shall not exceed 400/100 ml.
c. Enterococcus density shall not exceed 104/100 ml.
d. Total coliform density shall not exceed 1,000/100 ml, if the ratio of fecal-to-total coliform exceeds 0.1.

Rolling 30-day Geometric Mean Limits are:
a. Total coliform density shall not exceed 1,000/100 ml.
b. Fecal coliform density shall not exceed 200/100 ml.
c. Enterococcus density shall not exceed 35/100 ml.

Santa Clara River Nutrients TMDL (Adopted by Resolution No. 2003-011
Effective Date - March 23, 2004

Concentration-based wasteloads are allocated to municipal, industrial and construction stormwater sources regulated under NPDES permits. For stormwater permittees discharging into Reach 7, the thirty-day WLA for ammonia as nitrogen is 1.75 mg/L and the one-hour WLA for ammonia as nitrogen is 5.2 mg/L; the thirty-day average WLA for nitrate plus nitrite as nitrogen is 6.8 mg/L. For stormwater permittees discharging into Reach 3, the thirty-day WLA for ammonia as nitrogen is 2.0 mg/L and the one-hour WLA for ammonia as nitrogen is 4.2 mg/L; the thirty-day average WLA for nitrate plus nitrite nitrogen is 8.1 mg/L.

Region 8 RESOLUTION NO. R8-2007- 0024

Total Maximum Daily Loads (TMDLs) for San Diego Creek,
Upper and Lower Newport Bay, Orange County, California

Region 8 NPDES Construction Permit TMDL Completion Date: 1 24 1995 TMDL Type: River. Cr, Bay	Organochlorine Compounds							
	Total DDT		**Chlordane**		**Total PCBs**		**Toxaphene**	
	g/day	g/yr	g/day	g/yr	g/day	g/yr	g/day	g/yr
San Diego Creek	.27	99.8	**.18***	**64.3***	**.09***	**31.5***	.004	1.5
Upper Newport Bay	.11	40.3	.06	23.4	.06	23.2	**X**	**X**
Lower Newport Bay	.04	14.9	.02	8.6	.17	60.7	**X**	**X**

*Red= Informational WLA only, not for enforcement purposes

Organochlorine Compounds TMDLs Implementation Tasks and Schedule

Regional Board staff shall develop a SWPPP Improvement Program that identifies the Regional Board's expectations with respect to the content of SWPPPs, including documentation regarding the selection and implementation of BMPs, and a sampling and analysis plan. The Improvement Program shall include specific guidance regarding the development and implementation of monitoring plans, including the constituents to be monitored, sampling frequency and analytical protocols. The SWPPP Improvement Program shall be completed by (*the date of OAL approval of this BPA*). ***No later than two months*** from completion of the Improvement Program, Board staff shall assure that the requirements of the Program are communicated to interested parties, including dischargers with existing authorizations under the General Construction Permit. Existing, authorized dischargers shall revise their project SWPPPs as needed to address the Program requirements as soon as possible but ***no later than (three months of completion of the SWPPP Improvement Program)***. Applicable SWPPPs that do not adequately address the Program requirements shall be considered inadequate and enforcement by the Regional Board shall proceed accordingly. The Caltrans and Orange County MS4 permits shall be revised as needed to assure that the permittees communicate the Regional Board's SWPPP expectations, based on the SWPPP Improvement Program, with the Standard Conditions of Approval.

APPENDIX 5:
Glossary

Active Areas of Construction
All areas subject to land surface disturbance activities related to the project including, but not limited to, project staging areas, immediate access areas and storage areas. All previously active areas are still considered active areas until final stabilization is complete. [The construction activity Phases used in this General Permit are the Preliminary Phase, Grading and Land Development Phase, Streets and Utilities Phase, and the Vertical Construction Phase.]

Active Treatment System (ATS)
A treatment system that employs chemical coagulation, chemical flocculation, or electrocoagulation to aid in the reduction of turbidity caused by fine suspended sediment.

Acute Toxicity Test
A chemical stimulus severe enough to rapidly induce a negative effect; in aquatic toxicity tests, an effect observed within 96 hours or less is considered acute.

Air Deposition
Airborne particulates from construction activities. .

Approved Signatory
A person who has legal authority to sign, certify, and electronically submit Permit Registration Documents and Notices of Termination on behalf of the Legally Responsible Person.

Beneficial Uses
As defined in the California Water Code, beneficial uses of the waters of the state that may be protected against quality degradation include, but are not limited to, domestic, municipal, agricultural and industrial supply; power generation; recreation; aesthetic enjoyment; navigation; and preservation and enhancement of fish, wildlife, and other aquatic resources or preserves.

Best Available Technology Economically Achievable (BAT)
As defined by USEPA, BAT is a technology-based standard established by the Clean Water Act (CWA) as the most appropriate means available on a national basis for controlling the direct discharge of toxic and nonconventional pollutants to navigable waters. The BAT effluent limitations guidelines, in general, represent the best existing performance of treatment technologies that are economically achievable within an industrial point source category or subcategory.

Best Conventional Pollutant Control Technology (BCT)

As defined by USEPA, BCT is a technology-based standard for the discharge from existing industrial point sources of conventional pollutants including biochemical oxygen demand (BOD), total suspended sediment (TSS), fecal coliform, pH, oil and grease.

Best Professional Judgment (BPJ)
The method used by permit writers to develop technology-based NPDES permit conditions on a case-by-case basis using all reasonably available and relevant data.

Best Management Practices (BMPs)
BMPs are scheduling of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the discharge of pollutants. BMPs also include treatment requirements, operating procedures, and practices to control site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage.

Chain of Custody (COC)
Form used to track sample handling as samples progress from sample collection to the analytical laboratory. The COC is then used to track the resulting analytical data from the laboratory to the client. COC forms can be obtained from an analytical laboratory upon request.

Coagulation
The clumping of particles in a discharge to settle out impurities, often induced by chemicals such as lime, alum, and iron salts.

Common Plan of Development
Generally a contiguous area where multiple, distinct construction activities may be taking place at different times under one plan. A plan is generally defined as any piece of documentation or physical demarcation that indicates that construction activities may occur on a common plot. Such documentation could consist of a tract map, parcel map, demolition plans, grading plans or contract documents. Any of these documents could delineate the boundaries of a common plan area. However, broad planning documents, such as land use master plans, conceptual master plans, or broad-based CEQA or NEPA documents that identify potential projects for an agency or facility are not considered common plans of development.

Daily Average Discharge
The discharge of a pollutant measured during any 24-hour period that reasonably represents a calendar day for purposes of sampling. For pollutants with limitations expressed in units of mass, the daily discharge is calculated as the total mass of the pollutant discharged during the day. For pollutants with limitations expressed in other units of measurement (e.g., concentration) the daily discharge is calculated as the average measurement of the pollutant

throughout the day (40 CFR 122.2). In the case of pH, the pH must first be converted from a log scale.

Debris
Litter, rubble, discarded refuse, and remains of destroyed inorganic anthropogenic waste.

Direct Discharge
A discharge that is routed directly to waters of the United States by means of a pipe, channel, or ditch (including a municipal storm sewer system), or through surface runoff.

Discharger
The Legally Responsible Person (see definition) or entity subject to this General Permit.

Dose Rate (for ATS)
In exposure assessment, dose (e.g. of a chemical) per time unit (e.g. mg/day), sometimes also called dosage.

Drainage Area
The area of land that drains water, sediment, pollutants, and dissolved materials to a common outlet.

Effluent
Any discharge of water by a discharger either to the receiving water or beyond the property boundary controlled by the discharger.

Effluent Limitation
Any numeric or narrative restriction imposed on quantities, discharge rates, and concentrations of pollutants which are discharged from point sources into waters of the United States, the waters of the contiguous zone, or the ocean.

Erosion
The process, by which soil particles are detached and transported by the actions of wind, water, or gravity.

Erosion Control BMPs
Vegetation, such as grasses and wildflowers, and other materials, such as straw, fiber, stabilizing emulsion, protective blankets, etc., placed to stabilize areas of disturbed soils, reduce loss of soil due to the action of water or wind, and prevent water pollution.

Field Measurements
Testing procedures performed in the field with portable field-testing kits or meters.

Final Stabilization
All soil disturbing activities at each individual parcel within the site have been completed in a manner consistent with the requirements in this General Permit.

First Order Stream
Stream with no tributaries.

Flocculants
Substances that interact with suspended particles and bind them together to form flocs.

Good Housekeeping BMPs
BMPs designed to reduce or eliminate the addition of pollutants to construction site runoff through analysis of pollutant sources, implementation of proper handling/disposal practices, employee education, and other actions.

Grading Phase (part of the Grading and Land Development Phase)
Includes reconfiguring the topography and slope including; alluvium removals; canyon cleanouts; rock undercuts; keyway excavations; land form grading; and stockpiling of select material for capping operations.

Hydromodification
Hydromodification is the alteration of the hydrologic characteristics of coastal and non-coastal waters, which in turn could cause degradation of water resources. Hydromodification can cause excessive erosion and/or sedimentation rates, causing excessive turbidity, channel aggradation and/or degradation.

Identified Organisms
Organisms within a sub-sample that is specifically identified and counted.

Inactive Areas of Construction
Areas of construction activity that are not active and those that have been active and are not scheduled to be re-disturbed for at least 14 days.

Index Period
The period of time during which bioassessment samples must be collected to produce results suitable for assessing the biological integrity of streams and rivers. Instream communities naturally vary over the course of a year,and sampling during the index period ensures that samples are collected during a time frame when communities are stable so that year-to-year consistency is obtained. The index period approach provides a cost-effective alternative to year-round sampling. Furthermore, sampling within the appropriate index period will yield results that are comparable to the assessment thresholds or criteria for a given region, which are established for the same index period. Because index

periods differ for different parts of the state, it is essential to know the index period for your area.

K Factor
The soil erodibility factor used in the Revised Universal Soil Loss Equation (RUSLE). It represents the combination of detachability of the soil, runoff potential of the soil, and the transportability of the sediment eroded from the soil.

Legally Responsible Person
The person who possesses the title of the land or the leasehold interest of a mineral estate upon which the construction activities will occur for the regulated site. For linear underground/overhead projects, it is in the person in charge of the utility company, municipality, or other public or private company or agency that owns or operates the LUP.

Likely Precipitation Event
Any weather pattern that is forecasted to have a 50% or greater chance of producing precipitation in the project area. The discharger shall obtain likely precipitation forecast information from the National Weather Service Forecast Office (e.g., by entering the zip code of the project's location at http://www.srh.noaa.gov/forecast).

Maximum Allowable Threshold Concentration (MATC)
The allowable concentration of residual, or dissolved, coagulant/flocculant in effluent. The MATC shall be coagulant/flocculant-specific, and based on toxicity testing conducted by an independent, third-party laboratory. A typical MATC would be:

The MATC is equal to the geometric mean of the NOEC (No Observed Effect Concentration) and LOEC (Lowest Observed Effect Concentration) Acute and Chronic toxicity results for most sensitive species determined for the specific coagulant. The most sensitive species test shall be used to determine the MATC.

Natural Channel Evolution
The physical trend in channel adjustments following a disturbance that causes the river to have more energy and degrade or aggrade more sediment. Channels have been observed to pass through 5 to 9 evolution types. Once they pass though the suite of evolution stages, they will rest in a new state of equilibrium.

Non-Storm Water Discharges
Discharges are discharges that do not originate from precipitation events. They can include, but are not limited to, discharges of process water, air conditioner condensate, non-contact cooling water, vehicle wash water, sanitary wastes, concrete washout water, paint wash water, irrigation water, or pipe testing water.

Non-Visible Pollutants

Pollutants associated with a specific site or activity that can have a negative impact on water quality, but cannot be seen though observation (ex: chlorine). Such pollutants being discharged are not authorized.

Numeric Action Level (NAL)
Level is used as a warning to evaluate if best management practices are effective and take necessary corrective actions. Not an effluent limit.

Original Sample Material
The material (i.e., macroinvertebrates, organic material, gravel, etc.) remaining after the subsample has been removed for identification.

pH
Unit universally used to express the intensity of the acid or alkaline condition of a water sample. The pH of natural waters tends to range between 6 and 9, with neutral being 7. Extremes of pH can have deleterious effects on aquatic systems.

Post-Construction BMPs
Structural and non-structural controls which detain, retain, or filter the release of pollutants to receiving waters after final stabilization is attained.

Preliminary Phase (Pre-Construction Phase - Part of the Grading and Land Development Phase)
Construction stage including rough grading and/or disking, clearing and grubbing operations, or any soil disturbance prior to mass grading.

Project

Qualified SWPPP Developer
Individual who is authorized to develop and revise SWPPPs.

Qualified SWPPP Practitioner
Individual assigned responsibility for non-storm water and storm water visual observations, sampling and analysis, and responsibility to ensure full compliance with the permit and implementation of all elements of the SWPPP, including the preparation of the annual compliance evaluation and the elimination of all unauthorized discharges.

Qualifying Rain Event
Any event that produces 0.5 inches or more precipitation with a 48 hour or greater period between rain events.

R Factor
Erosivity factor used in the Revised Universal Soil Loss Equation (RUSLE). The R factor represents the erosivity of the climate at a particular location. An

average annual value of R is determined from historical weather records using erosivity values determined for individual storms. The erosivity of an individual storm is computed as the product of the storm's total energy, which is closely related to storm amount, and the storm's maximum 30-minute intensity.

Rain Event Action Plan (REAP)
Written document, specific for each rain event, that when implemented is designed to protect all exposed portions of the site within 48 hours of any likely precipitation event.

Remaining Sub sampled Material
The material (e.g., organic material, gravel, etc.) that remains after the organisms to be identified have been removed from the subsample for identification. (Generally, no macroinvertebrates are present in the remaining subsampled material, but the sample needs to be checked and verified using a complete Quality Assurance (QA) plan)

Routine Maintenance
Activities intended to maintain the original line and grade, hydraulic capacity, or original purpose of a facility.

Runoff Control BMPs
Measures used to divert runon from offsite and runoff within the site.

Run-on
Discharges that originate offsite and flow onto the property of a separate project site.

Revised Universal Soil Loss Equation (RUSLE)
Empirical model that calculates average annual soil loss as a function of rainfall and runoff erosivity, soil erodibility, topography, erosion controls, and sediment controls.

Sampling and Analysis Plan
Document that describes how the samples will be collected, under what conditions, where and when the samples will be collected, what the sample will be tested for, what test methods and detection limits will be used, and what methods/procedures will be maintained to ensure the integrity of the sample during collection, storage, shipping and testing (i.e., quality assurance/quality control protocols).

Sediment
Solid particulate matter, both mineral and organic, that is in suspension, is being transported, or has been moved from its site of origin by air, water, gravity, or ice and has come to rest on the earth's surface either above or below sea level.

Sedimentation
Process of deposition of suspended matter carried by water, wastewater, or other liquids, by gravity. It is usually accomplished by reducing the velocity of the liquid below the point at which it can transport the suspended material.

Sediment Control BMPs
Practices that trap soil particles after they have been eroded by rain, flowing water, or wind. They include those practices that intercept and slow or detain the flow of storm water to allow sediment to settle and be trapped (e.g., silt fence, sediment basin, fiber rolls, etc.).

Settleable Solids (SS)
Solid material that can be settled within a water column during a specified time frame. It is typically tested by placing a water sample into an Imhoff settling cone and then allowing the solids to settle by gravity for a given length of time. Results are reported either as a volume (mL/L) or a mass (mg/L) concentration.

Sheet Flow
Flow of water that occurs overland in areas where there are no defined channels where the water spreads out over a large area at a uniform depth.

Site

Soil Amendment
Any material that is added to the soil to change its chemical properties, engineering properties, or erosion resistance that could become mobilized by storm water.

Streets and Utilities Phase
Construction stage including excavation and street paving, lot grading, curbs, gutters and sidewalks, public utilities, public water facilities including fire hydrants, public sanitary sewer systems, storm sewer system and/or other drainage improvements.

Structural Controls
Any structural facility designed and constructed to mitigate the adverse impacts of storm water and urban runoff pollution

Suspended Sediment Concentration (SSC)
The measure of the concentration of suspended solid material in a water sample by measuring the dry weight of all of the solid material from a known volume of a collected water sample. Results are reported in mg/L.

Total Suspended Solids (TSS)
The measure of the suspended solids in a water sample includes inorganic substances, such as soil particles and organic substances, such as algae,

aquatic plant/animal waste, particles related to industrial/sewage waste, etc. The TSS test measures the concentration of suspended solids in water by measuring the dry weight of a solid material contained in a known volume of a sub-sample of a collected water sample. Results are reported in mg/L.

Toxicity
The adverse response(s) of organisms to chemicals or physical agents ranging from mortality to physiological responses such as impaired reproduction or growth anomalies.

Turbidity
The cloudiness of water quantified by the degree to which light traveling through a water column is scattered by the suspended organic and inorganic particles it contains. The turbidity test is reported in Nephelometric Turbidity Units (NTU) or Jackson Turbidity Units (JTU).

Vertical Construction Phase
The Build out of structures from foundations to roofing, including rough landscaping.

Waters of the United States
Generally refers to surface waters, as defined by the federal Environmental Protection Agency in 40 C.F.R. § 122.2.[1]

Water Quality Objectives (WQO)
Water quality objectives are defined in the California Water Code as limits or levels of water quality constituents or characteristics, which are established for the reasonable protection of beneficial uses of water or the prevention of nuisance within a specific area.

[1] The application of the definition of "waters of the United States" may be difficult to determine; there are currently several judicial decisions that create some confusion. If a landowner is unsure whether the discharge must be covered by this General Permit, the landowner may wish to seek legal advice.

APPENDIX 6:
Acronym List

ASBS	Areas of Special Biological Significance
ASTM	American Society of Testing and Materials; Standard Test Method for Particle-Size Analysis of Soils
ATS	Active Treatment System
BASMAA	Bay Area Storm water Management Agencies Association
BAT	Best Available Technology Economically Achievable
BCT	Best Conventional Pollutant Control Technology
BMP	Best Management Practices
BOD	Biochemical Oxygen Demand
BPJ	Best Professional Judgment
CAFO	Confined Animal Feeding Operation
CCR	California Code of Regulations
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
CGP	NPDES General Permit for Storm Water Discharges Associated with Construction Activities
CIWQS	California Integrated Water Quality System
CKD	Cement Kiln Dust
COC	Chain of Custody
CPESC	Certified Professional in Erosion and Sediment Control
CPSWQ	Certified Professional in Storm Water Quality
CSMP	Construction Site Monitoring Program
CTB	Cement Treated Base
CTR	California Toxics Rule
CWA	Clean Water Act
CWC	California Water Code
CWP	Center for Watershed Protection
DADMAC	Diallyldimethyl-ammonium chloride
DDNR	Delaware Department of Natural Resources
DFG	Department of Fish and Game
DHS	Department of Health Services
DWQ	Division of Water Quality
EC	Electrical Conductivity
ELAP	Environmental Laboratory Accreditation Program
EPA	Environmental Protection Agency
ESA	Environmentally Sensitive Area
ESC	Erosion and Sediment Control
HSPF	Hydrologic Simulation Program Fortran
JTU	Jackson Turbidity Units
LID	Low Impact Development
LOEC	Lowest Observed Effect Concentration
LRP	Legally Responsible Person
LUP	Linear Underground/Overhead Projects

MATC	Maximum Allowable Threshold Concentration
MDL	Method Detection Limits
MRR	Monitoring and Reporting Requirements
MS4	Municipal Separate Storm Sewer System
MUSLE	Modified Universal Soil Loss Equation
NAL	Numeric Action Level
NEL	Numeric Effluent Limitation
NICET	National Institute for Certification in Engineering Technologies
NOAA	National Oceanic and Atmospheric Administration
NOEC	No Observed Effect Concentration
NOI	Notice of Intent
NOT	Notice of Termination
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
NTR	National Toxics Rule
NTU	Nephelometric Turbidity Units
O&M	Operation and Maintenance
PAC	Polyaluminum chloride
PAM	Polyacrylamide
PASS	Polyaluminum chloride Silica/sulfate
POC	Pollutants of Concern
PoP	Probability of Precipitation
POTW	Publicly Owned Treatment Works
PRDs	Permit Registration Documents
PWS	Planning Watershed
QAMP	Quality Assurance Management Plan
QA/QC	Quality Assurance/Quality Control
REAP	Rain Event Action Plan
Regional Board	Regional Water Quality Control Board
ROWD	Report of Waste Discharge
RUSLE	Revised Universal Soil Loss Equation
RW	Receiving Water
SMARTS	Storm water Multi Application Reporting and Tracking System
SS	Settleable Solids
SSC	Suspended Sediment Concentration
SUSMP	Standard Urban Storm Water Mitigation Plan
SW	Storm Water
SWARM	Storm Water Annual Report Module
SWAMP	Surface Water Ambient Monitoring Program
SWMM	Storm Water Management Model
SWMP	Storm Water Management Program
SWPPP	Storm Water Pollution Prevention Plan
TC	Treatment Control
TDS	Total Dissolved Solids

TMDL	Total Maximum Daily Load
TSS	Total Suspended Solids
USACOE	U.S. Army Corps of Engineers
USC	United States Code
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
WDID	Waste Discharge Identification Number
WDR	Waste Discharge Requirements
WLA	Waste Load Allocation
WET	Whole Effluent Toxicity
WRCC	Western Regional Climate Center
WQBEL	Water Quality Based Effluent Limitation
WQO	Water Quality Objective
WQS	Water Quality Standard

APPENDIX 7:
State and Regional Water Resources Control Board Contacts

NORTH COAST REGION (1)
5550 Skylane Blvd, Ste. A
Santa Rose, CA 95403
(707) 576-2220 FAX: (707)523-0135

SAN FRANCISCO BAY REGION (2)
1515 Clay Street, Ste. 1400
Oakland, CA 94612
(510) 622-2300 FAX: (510) 622-2640

CENTRAL COAST REGION (3)
895 Aerovista Place, Ste 101
San Luis Obispo, CA 93401
(805) 549-3147 FAX: (805) 543-0397

LOS ANGELES REGION (4)
320 W. 4th Street, Ste. 200
Los Angeles, CA 90013
(213) 576-6600 FAX: (213) 576-6640

CENTRAL VALLEY REGION (5S)
11020 Sun Center Dr., #200
Rancho Cordova, CA 95670-6114
(916) 464-3291 FAX: (916) 464-4645

FRESNO BRANCH OFFICE (5F)
1685 E St.
Fresno, CA 93706
(559) 445-5116 FAX: (559) 445-5910

REDDING BRANCH OFFICE (5R)
415 Knollcrest Drive, Ste. 100
Redding, CA 96002
(530) 224-4845 FAX: (530) 224-4857

LAHONTAN REGION (6 SLT)
2501 Lake Tahoe Blvd.
South Lake Tahoe, CA 96150
(530) 542-5400 FAX: (530) 544-2271

VICTORVILLE OFFICE (6V)
14440 Civic Drive, Ste. 200
Victorville, CA 92392-2383
(760) 241-6583 FAX: (760) 241-7308

COLORADO RIVER BASIN REGION (7)
73-720 Fred Waring Dr., Ste. 100
Palm Desert, CA 92260
(760) 346-7491 FAX: (760) 341-6820

SANTA ANA REGION (8)
3737 Main Street, Ste. 500
Riverside, CA 92501-3339
Phone (951) 782-4130 FAX: (951) 781-6288

SAN DIEGO REGION (9)
9174 Sky Park Court, Ste. 100
San Diego, CA 92123-4340
(858) 467-2952 FAX: (858) 571-6972

STATE WATER BOARD
PO Box 1977
Sacramento, CA 95812-1977
stormwater@waterboards.ca.gov

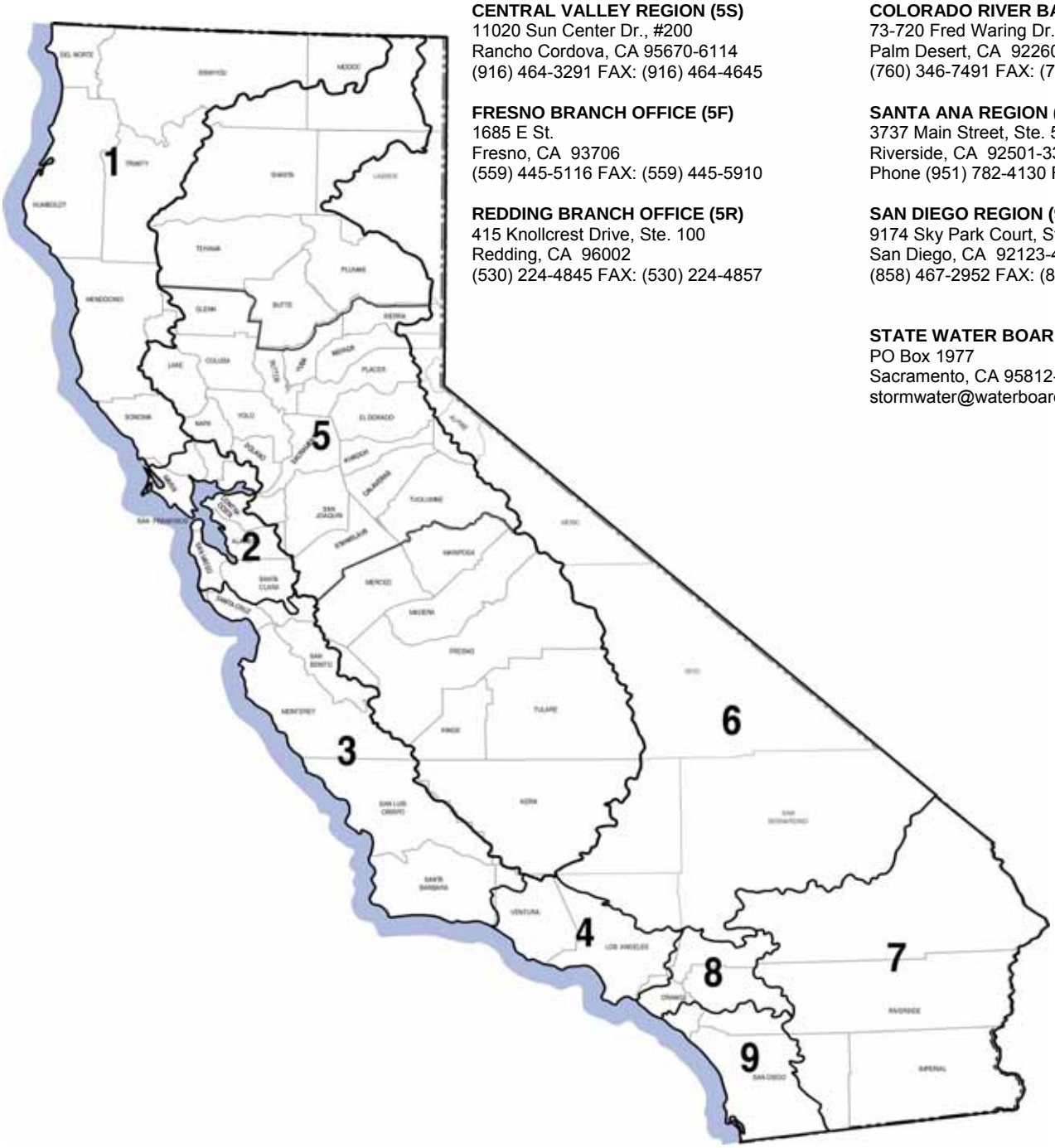

December 16, 2009

SAN DIEGO REGIONAL WATER QUALITY CONTROL BOARD

CLEAN WATER ACT SECTIONS 305(b) AND 303(d) INTEGRATED REPORT FOR THE SAN DIEGO REGION

STAFF REPORT

December 2009

CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY

021705

December 16, 2009

State of California
Arnold Schwarzenegger, Governor

California Environmental Protection Agency
Linda S. Adams, Secretary for Environmental Protection

REGIONAL WATER QUALITY CONTROL BOARD
SAN DIEGO REGION

Richard Wright, Chair
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CLEAN WATER ACT SECTIONS 305(b) AND 303(d) INTEGRATED REPORT FOR THE SAN DIEGO REGION

Staff Report, December 2009

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EXECUTIVE SUMMARY

This Integrated Report includes the California Regional Water Quality Control Board, San Diego Region (San Diego Water Board) recommendations for changes to both the Clean Water Act (CWA) Section 303(d) List of Water Quality Limited Waterbodies, and CWA Section 305(b) report on the water quality of waterbodies within the San Diego Region.

The Introduction provides the context and purpose of this report, and an overview of the approach used to determine the status of each waterbody. In addition, it describes the public process that will be used to finalize the Integrated Report, including adoption of the proposed changes to the 303(d) list. The remainder of the report describes data sources used, the water quality objectives and criteria against which data were compared, the methodology used to compare the available data and applicable criteria to assess the water body's attainment of water quality standards and determine potential 303(d) listings, and the methodology used to categorize waterbody segments according to their ability to support the designated beneficial use(s). Following descriptions of the methodologies, the results are briefly summarized and discussed in the text, with detailed results reported in the appendices. Appendix A includes proposed changes to the 303(d) list. Appendix B includes a summary of all decisions for all assessed water bodies. Appendices C through H provide lists of waterbodies in each beneficial use support category identified by the Integrated Report. Appendix I presents "fact sheets" for each waterbody-pollutant combination that was analyzed for the proposed 303(d) listing decisions. These fact sheets include a proposed listing decision and at least one "Line of Evidence" (LOE) describing the data and information used as a basis for each proposed decision. Appendix J describes other miscellaneous changes to the 303(d) list. Appendix K provides citations for all of the references used in developing this Integrated Report.

Water quality data were submitted by dischargers regulated by the San Diego Water Board and by outside agencies resulted in significantly more information than was available during the previous updates of the 303d List. The number of new, original, and revised decisions in the database is 2,599. There are a total of proposed 1,637 decisions on waterbody-pollutant combinations in 2008. These proposed decisions include 345 listing 303(d) listing decisions and 134 proposed de-listings. The large number of revised listings is likely due to the large volume of new water quality data that was available since the most recent (2006) 303(d) list update, the protective water quality standards applicable to these

waterbodies, and the requirements of the Listing Policy[1] to evaluate all readily available data. Therefore, the number of proposed revised listings does not necessarily reflect an overall decrease in water quality since the previous (2006) listing cycle and, but rather, reflects an increase in the amount and better organized water quality data available for consideration.

For the current version of the Integrated Report, **274 waterbody segments** were placed into one of five beneficial use support categories based on the evaluation of the available water quality data. The categories and numbers of waterbodies in each category are listed below.

1. All core beneficial uses are supported (no waterbody segments);
2. At least one core beneficial use is supported (**87 waterbody segments**);
3. Insufficient information to determine if beneficial use is supported (**25 waterbody segments**);
4. At least one beneficial use is not supported but a TMDL is not needed (**6 waterbody segments**)
5. At least one beneficial use is not supported and a TMDL is needed (**156 waterbody segments**).

The Integrated Report categorizes water bodies according to their ability to support core beneficial uses, including municipal and domestic drinking water supply, aquatic life, fish consumption, shell fish harvesting, contact recreation, and non-contact recreation.

The Draft Integrated Report was posted in the San Diego Water Board's website on August 31, 2009, and is available for public review and comment. A public notice for the availability of the Draft Integrated Report was also published in the following newspapers: San Diego Union Tribune, Press-Enterprise, and The Orange County Register on September 1, and North County Times on September 3, 2009. The public comment period occurred from the date of public notice of September 1, 2009. The San Diego Water Board staff provided written responses to written public comments received within the extended written comment period ending on October 26, 2009. The San Diego Water Board circulated a draft Integrated Report for public review and comment from August 31, 2009 to November 18, 2009, and convened a public hearing during the San Diego Water Board meeting on November 18. 2009, to discuss the Draft Final Integrated Report. A revised Draft Final Integrated Report, incorporating public

[1] State Water Board, Water Quality Control Policy for Developing California's Clean Water Act Section 303(d) List, dated September 30, 2004.

comments, will be considered for adoption by the San Diego Water Board during the next available board meeting.

The San Diego Water Board circulated a draft Integrated Report for public review and comment from August 2009 to October 2009, and convened a public hearing during the San Diego Water Board meeting in October 2009 to discuss the Draft Final Integrated Report. The Regional Board received many public comments during the public workshop October 12, 2009, and subsequent written comments in 33 letters containing over 450 separate comments. Responses to written public comments received within the comment period are included in Appendix L. These public comments resulted in several changes to the updates of the 303(d) list, as proposed in the Draft Integrated Report. The Draft Final Integrated Report, including revisions to the proposed updates to the 303(d) list, was is scheduled to be considered heard for adoption by the San Diego Water Board members on December 16, 2009.

Changes to the 303(d) list for the San Diego Region must be considered for approval by the San Diego Water Board during a public meeting and after consideration of public comments. The updated 303(d) list must be approved by the State Water Resources Control Board as well as the U. S. EPA before becoming final.

A copy of this draft Integrated Report and all the supporting appendices is available from the San Diego Water Board web site at:
http://www.waterboards.ca.gov/sandiego/water_issues/programs/303d_list/index.shtml

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List of Abbreviations

Basin Plan	Regional Water Quality Control Plan
BPTCP	Bay Protection and Toxic Cleanup Program
CalEPA	California Environmental Protection Agency
CCAMP	Central Coast Ambient Monitoring Program
CCC	Criteria Continuous Concentration
CCR	California Code of Regulations
CDF	California Department of Forestry and Fire Protection
CFCP	Coastal Fish Contamination Program
CFR	Code of Federal Regulations
CMC	Criteria Maximum Concentration
CSTF	Contaminated Sediment Task Force
CTR	California Toxics Rule
CWA	Clean Water Act
C	degrees Celsius
F	degrees Fahrenheit
DDE	Dichlorodiphenyldichloroethylene
DDT	Dichlorodiphenyltrichloroethane
DFG	California Department of Fish and Game
DHS	California Department of Health Services
DO	Dissolved oxygen
dw	dry weight
EDL	Elevated Data Level
ERM	Effects Range Median
HCH	Hexachlorocyclohexane
HSA	Hydrologic Sub Area
HU	Hydrologic Unit
IR	Integrated Report
kg	kilogram(s)
Listing Policy	Water Quality Control Policy for Developing California's Section 303(d) List
LOE	Line of Evidence
MCL	Maximum Contaminant Level
MDL	Method Detection Limit
mg/kg	milligrams per kilogram (parts per million)
mg/L	milligrams per liter (parts per million)
µg/g	micrograms per gram (parts per million)
µg/L	micrograms per liter (parts per billion)
MPN	Most Probable Number
MTBE	Methyl tertiary-butyl ether
MTRL	Maximum Tissue Residue Level

NAS	National Academy of Sciences
ng/g	nanograms per gram (parts per billion)
ng/L	nanograms per liter (parts per trillion)
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
NPS	Nonpoint Source
NTU	Nephelometric Turbidity Unit
oc	organic carbon
OEHHA	Office of Environmental Health Hazard Assessment
PAH	Polynuclear aromatic hydrocarbon
PBDE	Polybrominated diphenyl ethers
PCB	Polychlorinated biphenyl
PEL	Probable Effects Level
pg/L	picograms per liter
POTW	Publicly Owned Treatment Works
QA	Quality Assurance
QAPP	Quality Assurance Project Plan
QC	Quality Control
RBI	Relative Benthic Index
RL	Reporting Level
RWQCB	Regional Water Quality Control Board
SFEI	San Francisco Estuary Institute
SMWP	State Mussel Watch Program
SQG	Sediment quality guideline
SWAMP	Surface Water Ambient Monitoring Program
SWRCB	State Water Resources Control Board
TDS	Total Dissolved Solids
TIE	Toxicity Identification Evaluation
TMDL	Total Maximum Daily Load
TSMP	Toxic Substance Monitoring Program
TSS	Total Suspended Solids
UAA	Use Attainability Analysis
USBR	U.S. Bureau of Reclamation
U. S. EPA	U.S. Environmental Protection Agency
USGS	U.S. Geological Survey
WDR	Waste Discharge Requirement
WQO	Water quality objective
WQS	Water quality standard
ww	wet weight
WWTP	Waste water treatment plant

INTRODUCTION

The federal Clean Water Act (CWA) gives states the primary responsibility for protecting and restoring water quality. In California, the State Water Resources Control Board and nine Regional Water Quality Control Boards (Water Boards) are the agencies with the primary responsibility for implementing federal Clean Water Act requirements, including developing and implementing programs to achieve water quality standards. Water quality standards include designated beneficial uses of waterbodies, criteria or objectives (numeric or narrative) which are protective of those beneficial uses, and policies to limit the degradation of water bodies. The water quality standards for waterbodies in the San Diego Region are primarily[2] contained in the Water Quality Control Plan (Basin Plan) for San Diego Region Basin.

Clean Water Act Section 305(b) requires each state to report biennially to the United States Environmental Protection Agency (U. S. EPA) on the water quality condition of its waters. CWA Section 303(d) requires each State to develop, update, and submit biennially to the U. S. EPA a list of waterbodies or segments that are "impaired or threatened" which either do not meet, or not expected to meet, water quality standards. Impaired waterbodies or segments on the 303(d) list must be addressed through the development of TMDLs or by other means as described in the State's Water Quality Control Policy of Addressing Impaired Waters (SWRCB, 2005).

In conformance with U. S. EPA guidance (U. S. EPA, 2005), the Water Boards are preparing a single state-wide Integrated Report that meets the reporting requirements of CWA sections 303(d) and 305(b). The proposed changes to the 303(d) list (see Appendix A) were developed by the San Diego Water Board staff in conformance with the Water Quality Control Policy for Developing California's Clean Water Act Section 303(d) List (Listing Policy, SWRCB, 2004), which describes the requirements for developing the 303(d) List in California. Not all of the Listing Policy requirements are reiterated in this report, but key requirements are mentioned in the context of explaining the methodologies used.

In order to meet CWA Section 305(b) requirements of reporting on the water quality condition of waters, each waterbody segment was assigned to one of five non-overlapping, overall beneficial use-support categories based on the assessment of the available water quality data. For each waterbody segment assessed, a beneficial use support rating of fully supporting, not supporting, or insufficient information is determined for each of six "core" beneficial uses: drinking water supply, aquatic life, fish consumption, shell fishing, contact recreation, and non-contact recreation. Each waterbody segment is then assigned to one of the Integrated Report beneficial use categories below. These categories are based on the U. S. EPA guidance (U. S. EPA, 2005), but contain some modifications based on California's 303(d) Listing Policy:

[2] Additional water quality standards applicable to the surface waters in the San Diego Region are contained in the State Board's Ocean Plan and Thermal Plan, as well as federally promulgated California Toxics Rule (CTR) (U. S. EPA, 2003).

Category	Description
1	Evidence shows all beneficial uses supported.
2	Evidence shows that at least one beneficial use is supported and available information either does not show impairment or is insufficient to determine impairment of other uses.
3	Evidence is insufficient to make use support determinations.
4A.	Evidence shows at least one use not supported (but a Total Maximum Daily Load (TMDL) is not needed). A TMDL has been developed and approved by U. S. EPA and is expected to result in the attainment of the water quality standard within a reasonable, specified time frame.
4B.	Evidence shows at least one use not supported (but a Total Maximum Daily Load (TMDL) is not needed). An existing regulatory program is expected to result in the attainment of the water quality standard within a reasonable, specified time frame.
4C.	Evidence shows at least one use not supported (but a Total Maximum Daily Load (TMDL) is not needed). Impairment caused by non-pollutant sources. No provision for this exists in California.
5	Evidence shows at least one use not supported (and a TMDL is needed).

Category lists 4 and 5 include the 303(d) list of impaired or threatened waterbody segments in the San Diego region, and thus require public review and approval by the San Diego Water Board. Once the changes to the 303(d) list of impaired or threatened waterbody segments in the San Diego Region are approved by the San Diego Water Board, the Integrated Report for the San Diego Region, including proposed changes to the 303(d) list will be submitted to the State Water Resources Control Board (SWRCB). The SWRCB will review and approve changes to the 303(d) list for all Regions and produce a California Integrated Report to be submitted to the U. S. EPA for final approval. California's current 303(d) list was adopted by the SWRCB and the U. S. EPA in 2006.

Assessment Process

The water quality assessment process for 305(b) and 303(d) begins with the evaluation of data collected from the monitoring activities in the region. The monitoring information is critical to understand and protect beneficial uses of water, develop water quality standards, and determine the effect of pollution and pollution prevention programs. Determining the exceedances of water quality standards, objectives, criteria, and guidelines (protective limits) forms the basis of water quality assessment for 303(d) and 305(b). Whether or not these protective limits are exceeded determines a water segment's ability to support its assigned beneficial uses and also determines whether to list, or not list, the pollutant exceeding its protective limits.

DATA AND INFORMATION USED FOR THE ASSESSMENT

The State Water Board solicited data from the public by issuing a formal solicitation notification on December 4, 2006, and again on January 30, 2007. Data were received through December 2007. In addition to the data received during solicitation, other readily available data from numerous other sources were assessed for the preparation of this Integrated Report, including the following:

- Data and information supporting the 2006 California CWA Section 303(d) list;
- National Pollutant Discharge Elimination System (NPDES) Program, including storm-water permit monitoring
- Surface Water Ambient Monitoring Program (SWAMP)[3]
- San Diego Water Board TMDL Program monitoring
- San Diego County Beach monitoring
- Orange County Beach monitoring
- Regional Harbor Monitoring Program Pilot Project 2005-06 and 2006-07
- Cities of Orange County, 2008, Orange County Storm water Program 2004-2007
- City of Dana Point Public Works Department, 2007, Ocean Bacteriological Data Evaluation for Dana Point HAS
- City of Laguna Beach, 2008, Supporting Data for the Ocean Bacteriological Data Evaluation for City of Laguna Beach, 1999 through 2006
- City of San Diego, 2009, Semi-Annual Report: Addressing Floating Material in Chollas and Paleta Creeks
- County of Orange, 2007, The National Pollutant Discharge Elimination System (NPDES) Municipal Storm water Permit, Coastal Storm Drain Outfall Program
- County of Orange, 2007, Annual Ocean and Bay Water Quality Report, 2006
- County of San Diego, 2008, Department of Environmental Health, Ocean & Bay Recreational Water Quality Program, 2007, AB 411 monitoring data 1999 – 2007
- County of San Diego Department of Environmental Health. 2007. Department of Environmental Health, Land and Water Quality Division. San Diego County Beach Closure and Advisory Report
- Department of Fish and Game, 2008, Fish and Game IBI Data
- Department of Fish and Game, 2008, Post Fire Study IBI Data
- Orange County Ocean Water Protection Program. 2008. Orange County. 2007.

[3] More detail on the SWAMP water monitoring studies is available on the San Diego Water Board SWAMP website at: http://www.waterboards.ca.gov/sabdiego/

- Historical Bacteriological Water Quality Data, Riverside County, 2008, Santa Margarita Region Monitoring Annual Report Fiscal Year 2006-2007, Stream Bioassessment Data.
- San Diego County, 2008, Stream Bioassessment Data 2002-2007
- San Diego Regional Water Quality Control Board, 2008, SDRWQCB Bioassessment data 2007
- Weston Solution, Inc., 2008, Rapid Stream Bioassessment Field Sampling
- Others

Data that were considered to be a priority for 303(d) listing review included: indicator bacteria for beaches, the Surface Water Ambient Monitoring Program (SWAMP) data, NPDES storm water program data, and reservoir drinking water assessment data. Staff also reviewed the macroinvertebrate community structure data from streams collected by SWAMP, California Department of Fish and Game, and others. The SWRCB prioritized the SWAMP and beach data. The San Diego Water Board management requested that the other three datasets be made a priority.

Water quality data developed from internal regulatory programs and provided by outside agencies resulted in significantly more information than was available during previous 303(d) list updates. The individual "fact sheets" (described below) for each assessed waterbody segment-pollutant combination contain specific references to the data upon which each proposed 303(d) listing decision is based. The electronic versions of these fact sheets[4] also contain Internet links to the files and documents containing the actual data and information used.

Data Processing and Analysis

This section provides a description of the process for development of Lines of Evidence (LOEs), the contents of the LOEs, and the standards and evaluation guidelines used to determine the categories of water segments.

Data Processing

All readily available data and information in the administrative record was considered in the development of the 2008 Integrated Report. Four San Diego Water Board staff developed LOEs in the State's California Water Quality Assessment (CalWQA) database that summarized the available data and information, and used these LOEs to make 303(d) listing decisions and overall beneficial use support ratings.

Contents of the LOEs

LOEs contain an assessment of available data. An assessment can either be of numeric or narrative data. LOEs are entered into the CalWQA database and contain specific information that is used to determine if water quality standards for that water segment-pollutant combination are being met. This specific information includes the beneficial use(s) impacted; the pol-

[4] See Appendix H of this Integrated Report.

lutant name(s) pertaining to that water segment and data; the water quality objective (WQO), criterion (WQC) or guideline used to assess the data; detailed information specific to that data; how the data were assessed including the type of data, the total number of samples assessed and those samples that exceeded the WQO, WQC or guideline; where and when the monitoring occurred; and references on the sources of the data.

Analysis

Analysis begins when the pollutant sampling results, described in the LOE, are compared with the pollutant's water quality standards, criteria, objectives and guidelines that were developed to protect water quality. Results of this comparison, in terms of numbers of exceedances, and beneficial use being evaluated in this comparison, are recorded in the LOE.

Standards Used in the Analysis

Standards used include applicable water quality objectives or water quality criteria; and, for interpretation of narrative water quality objectives, the evaluation guidelines are identified and used in data analysis.

WATER QUALITY OBJECTIVES, CRITERIA AND GUIDELINES USED TO ASSESS ATTAINMENT OF WATER QUALITY STANDARDS

The development of the 303(d)/305(b) Integrated Report, includes readily available water quality data compared to water quality objectives established in federal and state legal documents, including the following:

- Water Quality Control Plan for the San Diego Basin (Basin Plan)
- Maximum Contaminant Levels (MCLs) promulgated by the California Department of Public Health or US EPA, whichever is more stringent
- California Toxics Rule (CTR) Criteria
- California State Water Resources Control Board, 2006, Water Quality Control Plan Ocean Waters of California (Ocean Plan)

For pollutants without numeric water quality objectives, MCLs or CTR Criteria, "evaluation guidelines" were used to interpret the Basin Plan's narrative objectives in accordance with Section 6.1.3 of the Listing Policy, which states:

> *"Narrative water quality objectives shall be evaluated using evaluation guidelines. When evaluating narrative water quality objectives or beneficial use protection, RWQCBs and SWRCB shall identify evaluation guidelines*… (that) …*may be used if it can be demonstrated that the evaluation guideline is:*
>
> - *Applicable to the beneficial use*
> - *Protective of the beneficial use*

- *Linked to the pollutant under consideration*
- *Scientifically-based and peer reviewed*
- *Well described*
- *Identifies a range above which impacts occur and below which no or few impacts are predicted. For non-threshold chemicals, risk levels shall be consistent with comparable water quality objectives or water quality criteria.*

RWQCBs shall assess the appropriateness of the guideline in the hydrographic unit. Justification for the alternate evaluation guidelines shall be referenced in the waterbody fact sheet" (SWRCB, 2004).

For screening and assessing data for potential 303(d) list changes, evaluation guidelines were selected that provide adequate protection to the most sensitive designated beneficial use, which is consistent with the Listing Policy. The evaluation guidelines used include the following:

- U. S. EPA's Ambient Water Quality Criteria for Bacteria (U. S. EPA, 1986)
- OEHHA fish contaminant guidelines (OEHHA 1998, OEHHA 2008)
- For ammonia, the U. S. EPA ambient freshwater aquatic life criteria were used.
- For salt, the low-end value (900 uS/cm) of the Secondary Drinking Water MCL range (900 uS/cm – 1600 uS/cm) was used.
- For temperature, sections 3.2 and 6.1.5.9 of the Listing Policy were followed. Temperature criteria developed by U. S. EPA Region10, Guidance for Pacific Northwest State and Tribal Temperature Water Quality Standards (U. S. EPA, 2003), were used as evaluation guidelines. Information available on current water temperature conditions and information on historic use of the waters by salmon and steelhead were used to develop proposed 303(d) list changes.
- For bacteria, section 3.3 of the Listing Policy was followed. Water quality criteria for bacteria were from the California Ocean Plan (SWRCB, 2005); they are expressed in two forms: Single Sample Maximum and Geometric Mean. Three indicator bacteria (Total Coliform, Fecal Coliform and Enterococcus) were evaluated for beneficial uses of Shellfish Harvesting, Contact Water Recreation, and Non-contact Water Recreation.
- U.S. EPA, 2002. Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms. Fourth Edition, October 2002
- United State Environmental Protection Agency, 2006, Fact Sheet: Final Recommended Aquatic Life Ambient Water Quality Criteria for Diazinon
- Long, E.R., D.D. MacDonald, S.L. Smith, and F.D. Calder. 1995. Incidence of Adverse Biological Effects Within Ranges of Chemical Concentrations in Marine and Estuarine Sediments

- Peter R. Ode, Andrew C. Rehn, and Jason T May. 2005. Environmental Management Volume 35, No. 1, pp. 1-13. A Quantitative Tool for Assessing the Integrity of Southern Coastal California Streams.
- Toxicity – SWAMP data was evaluated according to SWAMP toxicity guidelines. Other toxicity data evaluated with guidelines in the Waste Discharge Requirements for Discharges of Urban Runoff from the Municipal Separate Storm Sewer Systems Draining the Watersheds of the County of San Diego, the Incorporated Cities of San Diego, the San Diego Unified Port District, and the San Diego County Regional Airport. Order No. R9-2007-0001.

DEVELOPMENT OF THE PROPOSED 303(D) LIST CHANGES

Pollutant water segment listing decisions and beneficial use support ratings are determined and developed in the CalWQA database. These decisions are created by summarizing all relevant LOEs for a water segment pollutant combination and, based on the Listing Policy, determine if the number of exceedances constitute listings.

2008 303(d) Listing Decisions in the San Diego Region

Available data were evaluated for quality control and suitability for use. Data of acceptable quality were used to assess water quality in associated waterbodies, and waterbody-pollutant combinations were developed to determine “list” or “de-list” status. Detailed assessments were documented in the “fact sheets” and each source of available data and information was considered as one line of evidence (LOE) in the fact sheets.

All of the fact sheet information and beneficial use support ratings for assessed California waterbodies are stored in the Water Boards’ California Water Quality Assessment (CalWQA) database. The CalWQA database was developed to store detailed water quality assessment information and to help produce the Integrated Report. The database is designed so that this information can be exported to the U. S. EPA’s Assessment Database at the end of each assessment cycle. The assessment fact sheets (contained in Appendix H), as well as the lists of waterbody segments in each Integrated Report category (contained in Appendices C through G), were produced directly from the report functions of the CalWQA database. The electronic versions of the CalWQA fact sheets contain Internet links to the water quality objectives and evaluation guideline documents, and to the documents containing the water quality data and information for each assessed waterbody segment.

For the purposes of meeting SWAMP program goals, all available SWAMP data were evaluated by San Diego Water Board staff. Fact sheets were developed for contaminants that had adequate data and established water quality objectives. The bioassessment data were used in evaluating waterbodies for biodiversity impacts. These lines of evidence were associated with pollutant lines of evidence in order to meet the Listing Policy guidelines section 3.9 and 6.1.5.8.

In a letter dated January 31, 2006, the San Diego Water Board suggested revising the delisting recommendation for Mission Bay because individual shoreline segments in Mission Bay should be listing or delisted based on sampling results from those areas rather than clumping all the data together and considering the Bay as a whole. Due to different tidal flushing effect through out the Bay, some shoreline segments consistently meet water quality objective, while other areas are routinely in violation of water quality objectives. The State Board agreed to this approach, but did not have the time or resources to make the changes in 2006. Mission Bay and other coastal segments were separated individually according to sampling stations for bacteria assessment. In the 2008 303(d) listing cycle, previously defined shorelines have been split into smaller coastal segments. These segments are now represented as an estimated size of 50 yards (25 yards either side of the sample station location). The 50 yard representation is based on recommendations from the Beach Water Quality Workgroup and are estimates that can be modified if additional monitoring or TMDL work identify more or less of an impacted area. This approach is consistent with what other coastal Regions are doing with their shoreline segments. Additional explanation of the modifications to the shoreline segments can be found in Appendix J.

Data were aggregated by waterbody segment following the requirements of Section 6.1.5.4 of the Listing Policy, and assessments were performed on the individual segments. Waterbodies were segmented to account for hydrologic features, such as major tributaries, and for land use. The segmentation included, at a minimum, the reaches listed in the Basin Plan. Many small waterbodies were not divided into multiple segments.

In most instances, data were assessed using the binomial methodology contained in the Listing Policy (sections 3.1, 3.2, 4.1 and 4.2) to determine the frequency of water quality objective exceedances that would support listing or de-listing decision for an impaired water body segment. In cases where Basin Plan objective, CTR criterion, or other water quality criteria contained an explicit maximum exceedance frequency, these exceedance frequencies were used in addition to the Listing Policy's binomial methodology to assess potential impairments, under Sections 3.11 and 4.11, Situation-Specific Weight of Evidence Listing/ Delisting Factors of the Listing Policy. Evaluations of bioassessment data used Listing Policy sections 3.2, 3.9, and 6.1.5.8.

Spatial and temporal representation of data was assessed using the requirements and guidance of the Listing Policy. The available data were used to represent concentrations during the averaging period, as required by Section 6.1.5.6 of the Listing Policy. For example, if only one data point were available during a 4-day period, it was used to represent the four-day average concentration for that period.

Proposed 303(d) List Additions and Deletions

Appendix A shows the proposed new and revised changes to the 303d list. All decisions for all waterbodies can be found in Appendix B. The rationale for all 303(d) listing/de-listing decisions are documented in "fact sheets" in Appendix I. The proposed changes to the 303(d) list also include changes to show that TMDLs have been completed since the 303(d) list was last updated in 2006. In addition to the changes discussed above and shown in Appendix A, some

waterbody segments' geographic delineations or names have been revised, as documented in the "Miscellaneous Changes" fact sheets in Appendix J.

For Biodiversity Impacts, sections 3.2, 3.9, and 6.1.5.8 of the Listing Policy were abided. A San Diego Basin Plan objective states that: All waters shall be maintained free of toxic substances in concentrations that are toxic to, or that produce detrimental physiological responses in human, plant, animal, or aquatic life. Compliance with this objective will be determined by use of indicator organisms, analyses of species diversity, population density, growth anomalies, bioassays of appropriate duration, or other appropriate methods as specified by the San Diego Water Board (San Diego Basin Plan). Biodiversity impacts are measured by the Index of Biological Integrity (IBI). The IBI is an analytical tool that assesses the biological and physical condition of streams and rivers using a scoring range from zero to one hundred, as follows: Very Poor 0- 19, Poor 20- 39, Fair 40- 59, Good 60- 79, Very Good 80-100. An IBI score of 39 was set as an impairment threshold because it is a statistical criterion of two standard deviations below the mean reference site score which defines the boundary between 'fair' and 'poor' IBI creek conditions (Ode, 2005). An IBI score of 39 or less was considered impaired and counted as an exceedance in CalWQA. This IBI criteria is used as an evaluation guideline to develop proposed 303(d) list changes. Revised listings on the 2008 303(d) list for waterbody-pollutant combinations associated with biodiversity impacts are consolidated in a table in the "Miscellaneous Changes" in Appendix J.

TMDL Scheduling

For waterbodies on the 303(d) list identified as needing Total Maximum Daily Loads (TMDLs), completion dates for the TMDLs are proposed and indicated in Appendix A. The proposed TMDL completion date is the year that the TMDL is expected to be brought before the San Diego Water Board for potential adoption. TMDLs with completion dates prior to 2011 already have resources allocated.[5] Changes to the section 303(d) list in the future could result in substantial changes of the completion dates scheduled later than 2011. TMDLs for listings on the current (2006) 303(d) list are scheduled to be completed no later than 2019. TMDLs for proposed new listings are tentatively scheduled to be completed no later than 2021.

The proposed TMDL completion schedule was developed in compliance with federal law and regulation based on consideration of the criteria in Section 5 of the Listing Policy:

- "Water segment significance (such as importance and extent of beneficial uses, threatened and endangered species concerns, and size of water segment);
- Degree that water quality objectives are not met or beneficial uses are not attained or threatened (such as the severity of the pollution or number of pollutants/stressors of concern) [40 CFR 130.7(b)(4)];
- Degree of impairment;
- Potential threat to human health and the environment;

[5] Schedule may be impacted by resource and funding allocation priorities dictated by the State budget and timely allocation of financial resources and approval of contract resources by U.S. EPA.

- Water quality benefits of activities ongoing in the watershed;
- Potential for beneficial use protection and recovery;
- Degree of public concern;
- Availability of funding; and
- Availability of data and information to address the water quality problem."

DETERMINATION OF BENEFICIAL USE SUPPORT AND INTEGRATED REPORT WATERBODY CATEGORIES

To meet CWA Section 305(b) requirements of reporting on water quality conditions, the Integrated Report places each assessed water segment into one of five non-overlapping categories of water bodies based on the overall beneficial use support of the water segment. These Integrated Report categories below are based on the U. S. EPA guidance for states Integrated Reports, but contain some modifications based on California's 303(d) Listing Policy.
For consistency with other Regions in California and other States, water segments are evaluated for at least one of six "core" beneficial uses. Most of the designated beneficial uses in the Basin Plan fit within these six "core" beneficial uses, which include:

1. Drinking Water Supply,
2. Aquatic Life Support,
3. Fish Consumption,
4. Shellfish harvesting,
5. Contact Recreation, and
6. Non-Contact Recreation

For each core beneficial use associated with each waterbody segment, a rating of fully supporting, not supporting, or insufficient information was assigned based on the readily available data and on proposed 303(d) listing decisions. The Integrated Report categories, below, are based on the use support ratings for all assessed core beneficial uses.

Category	Description
1.	Evidence shows all core uses supported.
2.	Evidence shows that at least one core use is supported and available information either does not show impairment or is insufficient to determine impairment of other uses.
3.	Evidence is insufficient to make use support determinations.
4A.	Evidence shows at least one use not supported (but a Total Maximum Daily Load (TMDL) is not needed). A TMDL has been developed and approved by U. S. EPA and is expected to result in the attainment of the water quality standard within a reasonable, specified time frame.
4B.	Evidence shows at least one use not supported (but a Total Maximum Daily Load (TMDL) is not needed). An existing regulatory program is expected to result in the attainment of the water quality standard within a reasonable, specified time frame.
4C.	Evidence shows at least one use not supported (but a Total Maximum Daily Load (TMDL) is not needed). Impairment caused by non-pollutant sources. No provision for this exists in California.
5.	Evidence shows at least one use not supported (and a TMDL is needed). Waterbody segments in this category are included on the 303(d) list submitted to U.S. EPA.

If a waterbody segment is currently or proposed to be listed on the 303(d) list, then the beneficial use(s) impacted by exceedance of water quality standards are considered not fully attained, and the waterbody is put into either Category 5 requiring TMDL(s), or Categories 4A, 4B, or 4C, where TMDLs have been developed or are not required. Categories 1, 2, or 3 contain waterbody segments that are not listed or are not proposed for listing for impairment under 303(d). Relatively few water bodies were identified as fully supporting all beneficial uses because there was insufficient information to evaluate attainment of all beneficial uses for most water bodies. This conservative approach prevents waterbodies with insufficient data from being classified as fully attaining standards, thus providing a more accurate baseline for future assessments.

Based on the approach described above, the number of San Diego Region waterbody segments in each beneficial use support category are summarized as follows:

Table 1. Number of Waterbody Segments per Support Category.

BU Support Category	Description	Number of Waterbody Segments
1	All core uses supported	0
2	No documented impairment and at least one core beneficial use is attained	87
3	Waterbody impaired, but lacked adequate data to determine full attainment of one or more beneficial uses	25
4A	Waterbody listed as impaired, but already have TMDLs	1
4B	Existing regulatory program reasonably expected to result in attainment of water quality standard	1
4C	Impairment caused by non-pollutant sources.	4
5	At least one BU not supported and requires TMDL	156

The 2008 303(d) listing cycle is the first time that the Water Boards have prepared an Integrated 303(d)/305(b) Report under the current Listing Policy and U. S. EPA Integrated Report Guidance. Combining the 303(d) list update with the 305(b) Report adds efficiency and supports consistency, but provides challenges in terms of workload, project management, and level of detail. The readily available data are also often biased towards areas with more potential discharges of wastes, since these areas are where the bulk of the monitoring activity takes place. For these reasons, the number of waterbody segments in each Integrated Report category is not necessarily a representative sampling of all the waterbodies within the San Diego Region. Despite the limitations discussed above, this Integrated Report provides the most complete 305(b) report to date for the San Diego Region. The Water Boards' approach will continue to be refined in future Integrated Reports.

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For a complete list of references used in all the assessment fact sheets, see Appendix J.

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Water Quality Control Plan

FOR THE SAN DIEGO BASIN

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN DIEGO REGION

WATER QUALITY CONTROL PLAN
FOR THE SAN DIEGO BASIN (9)

SEPTEMBER 8, 1994

(with amendments effective on or before May 17, 2016)

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD

SAN DIEGO REGION

WATER QUALITY CONTROL PLAN FOR THE SAN DIEGO BASIN (9)

Adopted by the
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San Diego Region
on September 8, 1994

Approved by the
State Water Resources Control Board
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Office of Administrative Law
on April 26, 1995

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FOREWORD

The most basic goal of the California Regional Water Quality Control Board, San Diego Region (Regional Board) is to preserve and enhance the quality of water resources in the San Diego Region for the benefit of present and future generations. The federal Clean Water Act and the California Porter-Cologne Water Quality Control Act require that the Regional Board adopt a water quality control plan to guide and coordinate the management of water quality in the Region. The purpose of the plan is to: (1) designate beneficial uses of the Region's surface and ground waters; (2) designate water quality objectives for the reasonable protection of those uses; and (3) establish an implementation plan to achieve the objectives. In conformance with this legislative mandate, the Regional Board adopted the *Comprehensive Water Quality Control Plan for the San Diego Basin* (Basin Plan) in 1975. The Regional Board subsequently adopted numerous amendments modifying specific Basin Plan water quality standards and policies to reflect current water quality conditions and priorities.

Over twenty years have passed since the Basin Plan was published in 1975. In the ensuing years the San Diego Region population has continued to grow and approaches to water quality management have changed. Water quality management has become a complex mix of public input, environmental legislation and regulations, regulatory programs, research, and litigation. Pollution from point source discharges such as sewage treatment plants and industry has largely been controlled through stringent pollution control laws and the efforts of the Regional Board and other agencies. The focus of the Regional Board's regulatory efforts in the coming years will be surface water bottom sediment contamination, ground water contamination and nonpoint sources of pollution. These concerns are the greatest remaining threats to water quality. To address these remaining challenges, pollution prevention needs to be emphasized and the cumulative effects of pollution on entire watersheds must be considered. These changes in the complexity and emphasis of the Regional Board's water quality program have resulted in the need for a major update and rewrite of the 1975 Basin Plan.

This Basin Plan, the *Water Quality Control Plan for the San Diego Basin* (9) was adopted by the Regional Board on September 8, 1994. It supersedes the previous 1975 Basin Plan and its amendments. Public involvement was extensive in the development and adoption of this Basin Plan. The Regional Board held several public hearings and workshops to allow interested persons, organizations, and governmental agencies an opportunity to comment on the content and adequacy of the Basin Plan prior to its adoption. All comments were responded to in writing and the Regional Board carefully considered them in developing the final Basin Plan. The Regional Board appreciates the efforts of all those who contributed a substantial amount of time and effort in commenting on the earlier administrative drafts.

The six chapters of this Basin Plan together comprise the "*blueprint*" plan the Regional Board will use for water quality management and control in the San Diego Region. Chapter 1 provides a summary overview of the physical features of the San Diego Region, the functions of the State and Regional Board, and the legal basis and authority for the Basin Plan. Chapter 2 designates the beneficial uses of surface and ground waters to be protected. Chapter 3 designates the water quality objectives necessary to ensure the reasonable protection of the beneficial uses. Chapter 4 describes the implementation plan for achieving and maintaining the beneficial uses and water quality objectives. The implementation plan describes the key Regional Board regulatory programs and policies the Board uses to manage and control water quality. The implementation plan also designates certain conditions and areas where waste discharges are prohibited. Chapter 5 describes applicable statewide water quality policies and plans developed by the State Water Resources Control Board. Finally, Chapter 6 provides a summary description of the Regional Board water quality monitoring and surveillance program.

This Basin Plan is a dynamic rather than fixed document and is always subject to modification based on changing needs and circumstances. Accordingly, the Regional Board will periodically consider changes to this Basin Plan as necessary and at a minimum of every three years. The Regional Board will continue to place a high priority on keeping the Basin Plan current with respect to applicable laws, policies, technologies, water quality conditions, and priorities in the Region.

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1. INTRODUCTION

INTRODUCTION

In California, the regulation, protection and administration of water quality are carried out by the State Water Resources Control Board (State Board) and nine California Regional Water Quality Control Boards. The State Board consists of five full-time members appointed by the Governor for four year terms. In general, the State Board has overall responsibility for setting statewide policy on the administration of water rights and water quality control in California. The work of the State Board is carried out by a technical, legal, and administrative staff supervised by an executive director.

In recognition of the regional differences in water quality and quantity, the State is divided into nine regions (see Figure 1-1) for the purposes of regional administration of California's water quality control program. Each of the nine regions has a California Regional Water Quality Control Board (Regional Board) comprised of nine part-time members who are appointed by the Governor for four year terms. The regional boards are responsible for adoption and implementation of water quality control plans, issuance of waste discharge requirements, and performing other functions concerning water quality control within their respective regions, subject to State Board review or approval. The work of each regional board is carried out by a technical and administrative staff supervised by an executive officer.

Each of the nine regional boards is required to adopt a Water Quality Control Plan, or Basin Plan, which recognizes and reflects regional differences in existing water quality, the beneficial uses of the Region's ground and surface waters, and local water quality conditions and problems. This document is called the *Water Quality Control Plan for the San Diego Basin (9)*. (The terms Water Quality Control Plan and Basin Plan are used interchangeably throughout this document.)

There are two types of Water Quality Control Plans, Regional Board Basin Plans such as this document and statewide Water Quality Control Plans such as the *Ocean Plan* and *Thermal Plan*. Statewide plans are discussed in Chapter 5, *Plans and Policies*. Key terms and abbreviations used throughout this Basin Plan are included as a glossary and acronyms respectively, in Appendix A.

FUNCTION OF THE BASIN PLAN

The San Diego Regional Board's Basin Plan is designed to preserve and enhance water quality and protect the beneficial uses of all regional waters. Specifically, the Basin Plan: (1) designates beneficial uses for surface and ground waters; (2) sets narrative and numerical objectives that must be attained or maintained to protect the designated beneficial uses and conform to the state's antidegradation policy; (3) describes implementation programs to protect the beneficial uses of all waters in the Region; and (4) describes surveillance and monitoring activities to evaluate the effectiveness of the Basin Plan [California Water Code sections 13240 thru 13244, and section 13050(j)]. Additionally, the Basin Plan incorporates by reference all applicable State and Regional Board plans and policies.

The goal of the Regional Board is to achieve a balance between the competing needs of mankind for water of varying quality. Often times the constituents and quality of water needed to protect various beneficial uses will be different. The Basin Plan is the Regional Board's plan for achieving the balance between competing uses of surface and ground waters in the San Diego Region. Accordingly, this Basin Plan establishes or designates beneficial uses and water quality objectives for all the ground and surface waters of the Region. Beneficial uses are the uses of water necessary for the survival and well being of man, plants and wildlife. These uses of water serve to promote the tangible and intangible economic, social, and environmental goals of mankind. Water quality objectives are the levels of water quality constituents or characteristics which must be met to protect the beneficial uses. This Basin Plan also establishes an implementation program describing the actions by the Regional Board and others that are necessary to achieve and maintain the designated beneficial uses and water quality objectives of the Region's waters.

The Regional Board regulates waste discharge and reclaimed water use to minimize and control adverse effects on the quality and beneficial uses of the Region's ground and surface waters.

VICINITY MAP, BASIN PLANNING AREAS

Figure 1 - 1.

The Regional Board issues permits, called *"waste discharge requirements"* and "*master reclamation permits*" which require that waste and reclaimed water not be discharged in a manner that would cause an exceedance of applicable water quality objectives or adversely affect beneficial uses designated in the Basin Plan. The Regional Boards enforce these permits through a variety of administrative means.

GEOGRAPHICAL SETTING

The geographical setting of the San Diego Region results in a number of physiographic and environmental characteristics. A discussion of each of the major elements is presented in the following subsections.

PHYSIOGRAPHY

The San Diego Region occurs within the Peninsula Range Physiographic Province of California. One of the most prominent physical features in the region is the northwest-trending Peninsula Range which includes from north to south, the Santa Ana, Agua Tibia, Palomar, Volcan, Cuyamaca and Laguna mountains. The region exhibits a gently sloping dissected western surface and a steep eastern slope and is separated from the West Colorado River area (Region 7A) by abrupt fault scarps of marked relief.

The San Diego Region is divided into a coastal plain area, a central mountain-valley area, and an eastern mountain valley area. The coastal plain area comprises a series of wave cut benches covered by thin terrace deposits. This terraced surface has been deeply dissected by streams draining to the sea, and has been smoothed and rounded by local erosion. The surface of this area ranges from sea level to about 1,200 feet (ft) and extends from the coast inland in a band of about 10 miles in width. The central mountain-valley area is characterized by ridges and intermontane basins which extend from the coastal plain, northeastward to the Elsinore fault zone. The basins or valleys range in elevation from 500 to about 5,000 ft and are generally of fault block origin modified by erosion. The floors of the intermontane valleys are generally underlain by moderate thicknesses of alluvium and residuum; notable examples occur near El Cajon, Escondido and Ramona which range in elevation from about 500 to 1,500 ft above sea level. At higher elevations plateau surfaces have been developed in the central mountain-valley area. These surfaces are probably also of erosional origin; they occur at elevations ranging from 2,000 to 6,000 ft near the Laguna mountains, Santa Ysabel and Valley Center.

To the northeast of the Elsinore fault zone, the region has been designated as the eastern mountain-valley area. The area contains broad, relatively flat valleys which are structurally of block fault origin. Locally, the grabens contain thick sections of alluvial deposits. These valleys generally rise to the southeast from about 1,000 ft elevations near Temecula to the rolling plateaus of Glenoak, Lewis and Reed valleys which range from 3,000 to 3,500 ft in elevation. Surrounding mountains including Red mountain, Cahuilla mountain and Bachelor mountain, attain elevations ranging from 4,000 to 7,500 ft.

CLIMATE

The San Diego Region's coastal climate is generally mild. Temperatures average about 65 degrees Fahrenheit (° F) and precipitation averages 10 to 13 inches. Proceeding inland, as elevations increase, average temperatures decline to 57° F in the Laguna mountain area and precipitation increases to more than 45 inches in the Palomar mountain area. Most of the precipitation falls during November through February. Temperature and rainfall intensity variations are larger in the inland portions. The maximum rainfall intensity was recorded as 11.5 inches in 90 minutes, at Campo on August 12, 1891. Precipitation occurs principally as rain, with snow common only in the high mountains. Runoff in the Region results mainly from rainfall. The melting of snowpack and surfacing ground water springs also contribute small additional amounts of runoff. The flow of surface and ground waters in the Region is in an east to west direction toward the Pacific Ocean.

LAND USE / POPULATION

Land use within the Region varies considerably. The regional growth forecast for various land uses within the Region, for the San Diego Association of Governments', and for the Southern California Association of Governments' sphere of influence are shown in Appendix B-1 and B-2, respectively. The San Diego Association of Governments' regional growth forecast by hydrologic unit (HU) is shown in Appendix B-3.

The Region is experiencing and is expected to continue to experience population growth. Table 1-1 shows population projections for San Diego, Riverside, and Orange counties.

REGIONAL BOUNDARIES

Shorebirds at Tijuana Estuary shoreline

The San Diego Region forms the southwest corner of California and occupies approximately 3,900 square miles of surface area. The western boundary of the Region consists of the Pacific Ocean coastline which extends approximately 85 miles north from the United States and Mexico border. The northern boundary of the Region is formed by the hydrologic divide starting near Laguna Beach and extending inland through El Toro and easterly along the ridge of the Elsinore Mountains into the Cleveland National Forest. The eastern boundary of the Region is formed by the Laguna Mountains and other lesser known mountains located in the Cleveland National Forest. The southern boundary of the Region is formed by the United States and Mexico border.

The San Diego Region encompasses most of San Diego county, parts of southwestern Riverside county and southwestern Orange county. The Region is divided into 11 major hydrologic units (HUs),[1] 54 hydrologic areas (HAs),[2] and 147 hydrologic subareas (HSAs).[3] The geographic boundaries and names of these HUs are shown in Table 1-2 and Figure 1-2.[4] A larger scale map of these HAs is contained in the rear pocket of this Basin Plan. The boundaries were initially designated by the State Department of Water Resources (DWR) and described in the report Names and Areal Code Numbers of Hydrologic areas in the Southern District which was published in April, 1964. The HUs, HAs and HSAs were subsequently enumerated by the State Board in the early 1970's. In accordance with the early DWR definitions, HUs are the entire watershed of one or more streams; HAs are major tributaries and/or major groundwater basins within the HU; and HSAs are major subdivisions of HAs including both water-bearing and nonwater-bearing formations.

San Juan Hydrologic Unit (1.00)

The San Juan HU is a generally trapezoid-shaped area of 500 square miles. Laguna Beach, San Juan Capistrano, Dana Point, and San Clemente are other major population centers. Several smaller towns are scattered along the coast.

The two major natural surface water bodies of the unit are San Juan Creek and San Mateo Creek. San Juan Creek divides the unincorporated communities of Dana Point and Capistrano Beach in Orange county, and enters the Pacific Ocean at Doheny Beach State Park. The mouth of the creek is normally open to the ocean. Usually, the water at the mouth of the creek is essentially the same as that of the adjacent coastal waters. The mouth of San Mateo Creek forms a salt water tidal marsh and is entirely within the Camp Pendleton Naval Reservation.

The San Juan HU is comprised of the following five HAs; the Laguna, Mission Viejo, San Clemente, San Mateo, and San Onofre HAs.

TABLE 1-1. POPULATION PROJECTIONS FOR THE STATE OF CALIFORNIA AND SAN DIEGO, RIVERSIDE, AND ORANGE COUNTIES

Location	Year 1990	1995	2000	2005	2010	2015
San Diego County	2,421,233	2,677,058	2,915,692	3,143,155	3,373,422	3,618,554
Riverside County	1,195,400	1,493,558	1,771,276	2,076,538	2,402,889	2,759,172
Orange County	2,415,269	2,667,706	2,862,106	2,992,855	3,099,374	3,193,64
Total for California	29,777,448	32,958,921	36,214,623	39,194,880	42,178,903	45,344,961

TABLE 1 –2. HYDROLOGIC UNITS, AREAS AND SUBAREAS OF THE SAN DIEGO REGION

BASIN NUMBER	HYDROLOGIC BASIN	
1.00	SAN JUAN HYDROLOGIC UNIT	
1.10	Laguna	HA
1.11	San Joaquin Hills	HSA
1.12	Laguna Beach	HSA
1.13	Aliso	HSA
1.14	Dana Point	HSA
1.20	Mission Viejo	HA
1.21	Oso	HSA
1.22	Upper Trabuco	HSA
1.23	Middle Trabuco	HSA
1.24	Gobernadora	HSA
1.25	Upper San Juan	HSA
1.26	Middle San Juan	HSA
1.27	Lower San Juan	HSA
1.28	Ortega	HSA
1.30	San Clemente	HA
1.31	Prima Deshecha	HSA
1.32	Segunda Deshecha	HSA
1.40	San Mateo Canyon	HA
1.50	San Onofre	HA
1.51	San Onofre Valley	HSA
1.52	Las Pulgas	HSA
1.53	Stuart	HSA
2.00	SANTA MARGARITA HYDROLOGIC UNIT	
2.10	Ysidora	HA
2.11	Lower Ysidora	HSA
2.12	Chappo	HSA
2.13	Upper Ysidora	HSA
2.20	DeLuz	HA
2.21	DeLuz Creek	HSA
2.22	Gavilan	HSA
2.23	Vallecitos	HSA
2.30	Murrieta	HA
2.31	Wildomar	HSA
2.32	Murrieta	HSA
2.33	French	HSA
2.34	Lower Domenigoni	HSA
2.35	Domenigoni	HSA
2.36	Diamond	HSA
2.40	Auld	HA
2.41	Bachelor Mountain	HSA
2.42	Gertrudis	HSA
2.43	Lower Tucalota	HSA
2.44	Tucalota	HSA
2.50	Pechanga	HA
2.51	Pauba	HSA
2.52	Wolf	HSA
2.60	Wilson	HA
2.61	Lancaster Valley	HSA
2.62	Lewis	HSA
2.63	Reed Valley	HSA
2.70	Cave Rocks	HA
2.71	Lower Coahuila	HSA
2.72	Upper Coahuila	HSA
2.73	Anza	HSA
2.74	Burnt	HSA
2.80	Aguanga	HA
2.81	Vail	HSA
2.82	Devils Hole	HSA
2.83	Redec	HSA
2.84	Tule Creek	HSA
2.90	Oakgrove	HA
2.91	Lower Culp	HSA
2.92	Previtt Canyon	HSA
2.93	Dodge	HSA
2.94	Chihuahua	HSA
3.00	SAN LUIS REY HYDROLOGIC UNIT	
3.10	Lower San Luis	HA
3.11	Mission	HSA
3.12	Bonsall	HSA
3.13	Moosa	HSA
3.14	Valley Center	HSA
3.15	Woods	HSA
3.16	Rincon	HSA
3.20	Monserate	HA
3.21	Pala	HSA
3.22	Pauma	HSA
3.23	La Jolla Amago	HSA
3.30	Warner Valley	HA
3.31	Warner	HSA
3.32	Combs	HSA
4.00	CARLSBAD HYDROLOGIC UNIT	
4.10	Loma Alta	HA
4.20	Buena Vista Creek	HA
4.21	El Salto	HSA
4.22	Vista	HSA
4.30	Agua Hedionda	HA
4.31	Los Monos	HSA
4.32	Buena	HSA
4.40	Encinas	HA
4.50	San Marcos	HA
4.51	Batiquitos	HSA
4.52	Richland	HSA
4.53	Twin Oaks	HSA
4.60	Escondido Creek	HA
4.61	San Elijo	HSA
4.62	Escondido	HSA
4.63	Lake Wohlford	HSA
5.00	SAN DIEGUITO HYDROLOGIC UNIT	
5.10	Solana Beach	HA
5.11	Rancho Santa Fe	HSA
5.12	La Jolla	HSA
5.20	Hodges	HA
5.21	Del Dios	HSA
5.22	Green	HSA
5.23	Felicita	HSA
5.24	Bear	HSA

TABLE 1 –2. HYDROLOGIC UNITS, AREAS AND SUBAREAS OF THE SAN DIEGO REGION

BASIN NUMBER	HYDROLOGIC BASIN	
5.30	San Pasqual	HA
5.31	Highland	HSA
5.32	Las Lomas Muertas	HSA
5.33	Reed	HSA
5.34	Hidden	HSA
5.35	Guejito	HSA
5.36	Vineyard	HSA
5.40	Santa Maria Valley	HA
5.41	Ramona	HSA
5.42	Lower Hatfield	HSA
5.43	Wash Hollow	HSA
5.44	Upper Hatfield	HSA
5.45	Ballena	HSA
5.46	East Santa Teresa	HSA
5.47	West Santa Teresa	HSA
5.50	Santa Ysabel	HA
5.51	Boden	HSA
5.52	Pamo	HSA
5.53	Sutherland	HSA
5.54	Witch Creek	HSA
6.00	PENASQUITOS HYDROLOGIC UNIT	
6.10	Miramar Reservoir	HA
6.20	Poway	HA
6.30	Scripps	HA
6.40	Miramar	HA
6.50	Tecolote	HA
7.00	SAN DIEGO HYDROLOGIC UNIT	
7.10	Lower San Diego	HA
7.11	Mission San Diego	HSA
7.12	Santee	HSA
7.13	El Cajon	HSA
7.14	Coches	HSA
7.15	El Monte	HSA
7.20	San Vicente	HA
7.21	Fernbrook	HSA
7.22	Kimball	HSA
7.23	Gower	HSA
7.24	Barona	HSA
7.30	El Capitan	HA
7.31	Conejos Creek	HSA
7.32	Glen Oaks	HSA
7.33	Alpine	HSA
7.40	Boulder Creek	HA
7.41	Inaja	HSA
7.42	Spencer	HSA
7.43	Cuyamaca	HSA
8.00	PUEBLO SAN DIEGO HYDROLOGIC UNIT	
8.10	Point Loma	HA
8.20	San Diego Mesa	HA
8.21	Lindbergh	HSA
8.22	Chollas	HSA
8.30	National City	HA
8.31	El Toyan	HSA
8.32	Paradise	HSA
9.00	SWEETWATER HYDROLOGIC UNIT	
9.10	Lower Sweetwater	HA
9.11	Telegraph	HSA
9.12	La Nacion	HSA
9.20	Middle Sweetwater	HA
9.21	Jamacha	HSA
9.22	Hillsdale	HSA
9.23	Dehesa	HSA
9.24	Galloway	HSA
9.25	Sequan	HSA
9.26	Alpine Heights	HSA
9.30	Upper Sweetwater	HA
9.31	Loveland	HSA
9.32	Japatul	HSA
9.33	Viejas	HSA
9.34	Descanso	HSA
9.35	Garnet	HSA
10.00	OTAY HYDROLOGIC UNIT	
10.10	Coronado	HA
10.20	Otay Valley	HA
10.30	Dulzura	HA
10.31	Savage	HSA
10.32	Proctor	HSA
10.33	Jamul	HSA
10.34	Lee	HSA
10.35	Lyon	HSA
10.36	Hollenbeck	HSA
10.37	Engineer Springs	HSA
11.00	TIJUANA HYDROLOGIC UNIT	
11.10	Tijuana Valley	HA
11.11	San Ysidro	HSA
11.12	Water Tanks	HSA
11.20	Potrero	HA
11.21	Marron	HSA
11.22	Bee Canyon	HSA
11.23	Barrett	HSA
11.24	Round Potrero	HSA
11.25	Long Potrero	HSA
11.30	Barrett Lake	HA
11.40	Monument	HA
11.41	Pine	HSA
11.42	Mount Laguna	HSA
11.50	Morena	HA
11.60	Cottonwood	HA
11.70	Cameron	HA
11.80	Campo	HA
11.81	Tecate	HSA
11.82	Canyon City	HSA
11.83	Clover Flat	HSA
11.84	Hill	HSA
11.85	Hipass	HSA

Figure 1-2. San Diego Region Hydrologic Units, Areas and Subareas.

0 4 8 16 Miles

1:760,000

Derived from an edited version of Calwater 2.21 to comply with the 1994 Basin Plan
Map created October 2004
State Water Resources Control Board

Santa Margarita Hydrologic Unit (2.00)

Arroyo chub at Rainbow Creek

The Santa Margarita HU is a rectangular area of about 750 square miles. Included in it are portions of Camp Pendleton as well as the civilian population centers of Murrieta, Temecula and part of Fallbrook.

The unit is drained largely by the Santa Margarita River, Murrieta Creek and Temecula River. The only coastal lagoon of the unit is the Santa Margarita Lagoon which lies totally within the Camp Pendleton Naval Reservation of the U.S. Marine Corps. The slough at the mouth of the river is normally closed off from the ocean by a sandbar.

The major surface water storage areas are Vail Lake and O'Neill Lake. Annual precipitation ranges from less than 12 inches near the coast to more than 45 inches inland near Palomar mountain.

The San Margarita HU is comprised of the following nine HAs; the Ysidora, Deluz, Murrieta, Auld, Pechanga, Wilson, Cave Rocks, Aguanga, and Oak Grove HAs.

San Luis Rey Hydrologic Unit (3.00)

San Luis Rey HU is a rectangular area of about 565 square miles, and includes the population centers of Oceanside, and Valley Center, and portions of Fallbrook and Camp Pendleton. In addition there are several Indian reservations in the unit. The major stream system, the San Luis Rey River, is interrupted by Lake Henshaw, one of the largest water storage areas in the San Diego Region. Annual precipitation is heavier than in other units, ranging from less than 12 inches near the ocean to 45 inches near Palomar mountain.

The San Luis Rey Unit contains two coastal lagoon areas, the mouth of the San Luis Rey River and Loma Alta Slough. The mouth of the San Luis Rey River is entirely within the city of Oceanside and is adjacent to the city's northern boundary. The slough area at the mouth of the river is contiguous with Oceanside Harbor. Loma Alta Slough is entirely within the city of Oceanside and is the mouth of Loma Alta Creek. The slough is normally blocked off from the ocean by a sandbar.

The San Luis Rey HU is comprised of the following three HAs; the Lower San Luis, Monserate and Warner Valley Hydrologic areas.

Carlsbad Hydrologic Unit (4.00)

Shore crab at
Scripps Coastal Reserve

Carlsbad HU is a roughly triangular-shaped area of about 210 square miles, extending from Lake Wohlford on the east to the Pacific ocean on the west, and from Vista on the north to Cardiff-by-the-Sea on the south. The unit includes the cities of Oceanside, Carlsbad, Leucadia, Encinitas, Cardiff-by-the-Sea, Vista, and Escondido. The area is drained by Buena Vista, Agua Hedionda, San Marcos and Escondido creeks.

The Carlsbad HU contains four major coastal lagoons; Buena Vista, Agua Hedionda, Batiquitos and San Elijo. Buena Vista lies between the cities of Carlsbad and Oceanside, and is partially within each city. A sandbar occasionally forms across the mouth forming an ocean beach. The water level in the lagoon is maintained by an inflow of rising groundwater and return irrigation water from the area upstream on Vista Creek. A portion of the lagoon has been designated as a bird sanctuary.

Agua Hedionda Lagoon, at the mouth of Agua Hedionda Creek, is within the city of Carlsbad. The lagoon is routinely dredged to keep it open to the ocean. The lagoon serves as an integral part of a utility's power plant cooling water intake system and also provides a reserve cooling water supply. The easterly portion of the lagoon is used for water oriented recreation.

Batiquitos Lagoon, at the mouth of San Marcos Creek, enters the Pacific Ocean between the city of Carlsbad and the unincorporated community of Leucadia. San Elijo Lagoon is the tidal marsh at the mouth of Escondido Creek. The marsh is normally closed off from the ocean but is subject to tidal fluctuations.

The Carlsbad HU is comprised of the following six HAs; the Loma Alta, Buena Vista Creek,

Agua Hedionda, Encinas, San Marcos and Escondido Creek HAs.

San Dieguito Hydrologic Unit (5.00)

San Dieguito HU is a rectangular-shaped area of about 350 square miles. It includes the San Dieguito River and its tributaries, along with Santa Ysabel and Santa Maria creeks.

The unit contains two major reservoirs - Lake Hodges and Sutherland, and a smaller facility, the San Dieguito Reservoir.

The unit contains one coastal lagoon, the San Dieguito Slough, located at the mouth of the San Dieguito River, which forms the northerly edge of the city of Del Mar. The lagoon is normally closed off from the ocean by a sandbar.

The San Dieguito HU is divided into five HAs; the Solana Beach, Hodges, San Pasqual, Santa Maria Valley and Santa Ysabel HAs.

Penasquitos Hydrologic Unit (6.00)

Penasquitos HU is a triangular-shaped area of about 170 square miles, extending from Poway on the east to La Jolla on the west. There are no major streams in this unit although it is drained by numerous creeks. Miramar Reservoir, a major storage facility, contains imported Colorado River water.

The unit contains two coastal lagoons, Sorrento Lagoon and Mission Bay. Sorrento Lagoon is the mouth of Penasquitos Creek and empties into the ocean near the northerly boundary of the city of San Diego. Mission Bay and the mouth of the San Diego River form a 4,000 acre aquatic park. Water quality within Mission Bay generally is lower than that of the coastal ocean water due to the poor flushing characteristics of the bay and the input of nutrient material from storm runoff. Sludge from the city of San Diego's Point Loma plant is piped to an island in Mission Bay (Fiesta Island) for use as a soil conditioner and fertilizer.

Annual precipitation in the unit ranges from less than 8 inches along the ocean to 18 inches inland. Poway, and La Jolla are the major population centers.

The Penasquitos HU is comprised of the following five HAs; the Miramar Reservoir, Poway, Scripps, Miramar, and Tecolote HAs.

Grunion spawning at Ocean Beach

San Diego Hydrologic Unit (7.00)

San Diego HU is a long, triangular-shaped area of about 440 square miles drained by the San Diego River. El Capitan, San Vicente, Cuyamaca, Jennings, and Murray reservoirs are the major storage facilities. San Vicente Reservoir, Murray Reservoir, Jennings, and Murray Reservoir store mainly Colorado River water, whereas, El Capitan mainly stores local runoff and some Colorado River water. Cuyamaca Reservoir stores only local runoff.

Much of the impounded water is used to serve major population centers, including a portion of the San Diego metropolitan area and the communities of El Cajon, Santee, Lakeside, Alpine and Julian. Annual precipitation ranges from less than 11 inches at the coast to about 35 inches around Cuyamaca and El Capitan Reservoir. The San Diego HU is comprised of the following four HAs; Lower San Diego, San Vicente, El Capitan and Boulder Creek HAs.

Pueblo San Diego Hydrologic Unit (8.00)

Pueblo San Diego HU is a triangular-shaped area of about 60 square miles with no major stream system. It is bordered to the north, by the watershed of the San Diego River and on the south, in part, by that of the Sweetwater River. The major population center is the city of San Diego. The unit is relatively dry with an annual precipitation of less than 11 inches to 13 inches. The Pueblo San Diego HU is comprised of the following three HAs; the Point Loma, San Diego Mesa and National City HAs.

San Diego Bay lies offshore of this unit. The bay is approximately 13 miles long and varies from ½ to 1½ miles in width.

Sweetwater Hydrologic Unit (9.00)

Sweetwater HU is an elongated northeasterly trending strip with an area of about 230 square miles. It is traversed along its length by the Sweetwater River. The annual precipitation varies from less than 11 inches at the coast to about 35 inches inland.

The Sweetwater HU is comprised of the following three HAs; the Lower Sweetwater, Middle Sweetwater, and Upper Sweetwater HAs.

Otay Hydrologic Unit (10.00)

Otay HU is a club-shaped area of about 160 square miles. The major stream system traversing the area is the Otay River and its tributaries. The Lower Otay Reservoir is the terminus of the second San Diego Aqueduct. Major population centers include the communities of Imperial Beach in the coastal area and Dulzura inland. The annual precipitation generally increases landward from the coast and varies from less than 11 to 19 inches.

The Coronado, Otay, and Dulzura HAs comprise the Otay HU. The Coronado HA is composed of the North Island Naval Air Station, the city of Coronado and the Silver Strand.

Tijuana Hydrologic Unit (11.00)

Tijuana HU is a triangular-shaped area that is drained by Cottonwood and Campo creeks, which are tributaries to the Tijuana River. It covers an area of about 470 square miles and lies mainly in the mountain-valley section.

The unit's only coastal lagoon is the Tijuana Estuary which occupies approximately 2,000 acres and is generally open to the ocean. Most of the area can be classified as a salt water marsh with a number of arms of open water. Water quality is generally the same as that of the sea water except during periods of runoff when a variety of wastes, which originate in Mexico, are carried into the lagoon from the surface flow in the Tijuana River.

Willet at Tijuana Estuary shoreline

The unit is sparsely populated with the major population centers at San Ysidro and Campo. Annual precipitation varies from less than 11 inches near the coast to more than 25 inches farther inland near Laguna mountain. Runoff is captured by Morena Reservoir and Barrett Lake on Cottonwood Creek.

The Tijuana HU is comprised of the following eight HAs; the Tijuana Valley, Potrero, Barrett Lake, Monument, Morena, Cottonwood, Cameron and Campo HAs. The Tijuana Valley Hydrologic Area (HA) is arbitrarily divided by the United States - Mexico boundary. Surface water quality has been adversely affected by runoff coming across the border from Mexico. Ground water quality has been affected by seawater intrusion and waste discharges in both the United States and Mexico.

WATER RESOURCES

The water resources in the San Diego Region are classified as coastal waters, surface waters, ground waters, imported surface waters, and reclaimed water. Fresh water supplied within the Region is obtained from local surface and ground water development projects and imported surface water programs.

Gray whale

COASTAL WATERS

Coastal waters in the Region include bays, harbors, estuaries, beaches, and open ocean. Deep draft commercial harbors include San Diego Bay and Oceanside Harbor. Shallower small craft harbors include Mission Bay and Dana Point Harbor. Important estuaries are represented by coastal lagoons such as Tijuana Estuary, Sweetwater Marsh, San Diego River flood control channel, Kendall-Frost wildlife reserve, San Dieguito River Estuary, San Elijo Lagoon, Batiquitos Lagoon, Agua Hedionda Lagoon, Buena Vista Lagoon, San Luis Rey River Estuary, and Santa Margarita River Estuary.

SURFACE WATERS

The San Diego Region has thirteen principal stream systems originating in the western highlands which flow to the Pacific Ocean. From north to south these stream systems are Aliso Creek, San Juan Creek, San Mateo Creek,

San Onofre Creek, Santa Margarita River, San Luis Rey River, San Marcos Creek, Escondido Creek, San Dieguito River, San Diego River, Sweetwater River, Otay River, and the Tijuana River. Most of the streams of the San Diego Region are interrupted in character having both perennial and ephemeral components due to the rainfall pattern and the development of surface water impoundments. Surface water impoundments capture flow from nearly all the Region's major surface water streams. Many of the major surface water impoundments are a blend of natural runoff and imported water.

GROUND WATERS

All major drainage basins in the San Diego Region contain ground water basins. The basins are relatively small in area and usually shallow. Although these ground water basins are limited in size, the ground water yield from the basins has been historically important to the development of the Region. A number of the larger ground water basins can be of future significance in the Region for storage of both imported waters and reclaimed wastewaters. Nearly all of the local ground waters of the Region have been intensively developed for municipal and agricultural supply purposes.

IMPORTED SURFACE WATERS

The San Diego Region receives all of its imported water supplies from the Metropolitan Water District of Southern California (MWD). The MWD was created by the California State Legislature as a special district in 1928. MWD distributes wholesale water through 27 member agencies (cities and water districts) in portions of Los Angeles, Orange, Riverside, San Bernardino, San Diego and Ventura Counties. The MWD serves more than one-half of the drinking water supply used by 16 million persons in the coastal plain of Southern California.

The MWD supplies water to the following five member agencies in the San Diego Region: (1) Coastal Municipal Water District, (2) Municipal Water District of Orange County, (3) Western Municipal Water District of Riverside County, (4) Eastern Municipal Water District and (5) San Diego County Water Authority. The San Diego County Water Authority, the largest purveyor of MWD water in the San Diego Region, allocates water supplies to member agencies in San Diego County. The MWD obtains its water supplies from the Colorado River Aqueduct and the State Water Project.

The Colorado River Aqueduct is owned and operated by the MWD. Construction of the aqueduct began in 1931 and the first deliveries of imported water to member agencies took place in 1941. This aqueduct transports water from Lake Havasu on the Colorado River, 242 miles to its terminus at Lake Matthews in Riverside County. The aqueduct has an annual maximum capacity of 1.3 million acre-feet.

In 1964, the United States Supreme Court limited California's annual diversions from the Colorado River on a dependable basis to 4.4 million acre-feet in the case Arizona vs. California. As a result of the Supreme Court's decision, MWD's annual diversions from the Colorado River were limited to approximately 550,000 acre-feet. The United States Department of the Interior has the discretion to allow California to use any water that Arizona and Nevada have available from the Colorado River, but do not use. During declarations of surplus, MWD has the highest priority of any California contractor to divert surplus waters from the Colorado River.

MWD's other primary source of water is the State Water Project (SWP). The SWP is owned by the State of California and operated by the California Department of Water Resources. SWP water originates from Lake Oroville on the Feather River and surplus flows in the Sacramento - San Joaquin Delta in northern California. The project transports water from the Sacramento-San Joaquin Delta via the 444-mile long California Aqueduct to 29 contract agencies in the State.

The MWD has an annual entitlement to SWP water of 2,011,500 acre-feet out of a total maximum contractual entitlement of 4.2 million acre-feet for the 29 contractors. The current firm yield of the SWP, 2.4 million acre-feet, falls below the total SWP contractor requests of approximately 3.6 million acre-feet. The current firm yield of the SWP is based on the average annual water supplies available if the hydrologic conditions during the years 1928 - 1934 reoccurred. The firm yield of the SWP can supply only about one-half of the contract entitlement due to the lack of sufficient SWP water conveyance facilities. The demand for SWP water is expected

to increase to 4.2 million acre-feet by the year 2010. MWD water supply from the SWP will be subject to limitations unless SWP supplies are increased.

Steadily increasing demands for water have led to the need to import water from the Colorado River and the State Water Project. In November 1947, construction was completed on the first pipeline of the San Diego Aqueduct to deliver Colorado River water into the Region. The pipeline was constructed by the U.S. Navy to meet the increased demand for water caused by accelerated population and industrial growth during the World War II years of 1941 - 1945. Additional pipelines to convey imported water were constructed in subsequent years. Beginning in 1978, State Water Project water from Lake Oroville on the Feather River and surplus flows in the Sacramento - San Joaquin Delta in northern California were blended with the Colorado River water.

In the recent past the MWD water supplies consisted of approximately seventy percent from the Colorado River and thirty percent from the State Water Project. In 1993, the drought reduced the availability of State Water Project waters during the year and MWD water supplies consisted of approximately ninety-three percent from the Colorado River and seven percent from the State Water Project. The San Diego Region is highly dependent upon imported water supplies to meet the residential, industrial, commercial, agricultural, and public water demand. Imported water (i.e., Colorado River and State Water Project) supplies about ninety percent of the demand; surface runoff into local reservoirs and local ground water supplies the remaining ten percent.

The delivery of the maximum amount of SWP water benefits the Region in the following ways:

- SWP water improves the potential for conjunctive uses of water resources.
- SWP water enhances and maintains designated beneficial uses of the Region's surface and ground waters;
- SWP water improves the potential for attainment of water quality objectives;
- SWP water improves the viability of recharge of ground water basins;
- SWP water increases the potential for water reclamation.

The effective implementation of water reclamation in the Region is contingent on the availability of supply waters with relatively low salinity, or total dissolved solids (TDS) concentration. The Colorado River has a high TDS concentration of 600 - 750 milligrams per liter (mg/l). When this water is used for urban needs the TDS increases by about 300 mg/l to 900 -1050 mg/l. This quality of water is, at best, marginal for agricultural and ground water recharge uses of reclaimed water. In contrast, TDS concentrations in State Water Project waters are approximately 250 mg/l except during drought periods. The lower TDS concentrations found in State Water Project waters enables water supply agencies to blend SWP waters with Colorado River water supplies to meet drinking water quality standards and reclaimed water discharge limitations.

Water supply demand is expected to continue to increase as a result of population growth in the Region. To meet the projected water demand, water supply agencies are working to increase both the capacity and flexibility of conveyance systems and to intensify development of local water supplies through wastewater reclamation, ground water management, and desalination of seawater. The increased use of local supplies is expected to meet eighteen percent of the total water supply needed by the year 2010. The remaining eighty-two percent of the demand will have to be met by imported water.

RECLAIMED WATER

Reclaimed water is an important and growing component of the Region's water supply. Reclaimed water is obtained through extensive treatment of municipal wastewater to produce a safe and reliable water supply for non-potable uses. Reclaimed water is used to irrigate parks, agriculture, planned community greenbelt areas, golf courses and freeway landscaping. Reclaimed water use to the maximum extent feasible is important because it reduces dependence on imported water supply and leaves the Region less vulnerable to imported water supply shortages. The use of reclaimed water in the Region is expanding. For example, the San Diego County Water Authority reported that in Fiscal Year 1993, the total volume of reclaimed water used in the Authority's service area was

9,713 acre-feet; this represented a 24 percent increase in reclaimed water use over the previous year. The Authority estimates that the total reclaimed water use volume in their service area will increase to 50,000 acre-feet per year when currently planned water reclamation projects are completed in the year 2010.

REGIONAL BOARD WATER QUALITY MANAGEMENT POLICY

The five policy statements in this section form the Regional Board's Water Quality Management Policy for the San Diego Region. Following each principle policy statement are interpretations and examples of applications of the policy. In certain instances the Regional Board may find it necessary to exercise discretion in applying these policies within the interpretations presented.

POLICY ONE

Water quality objectives, beneficial uses, and water quality control plans and policies adopted by the State Water Resources Control Board and the Regional Water Quality Control Board shall be an integral part of the basis for water quality management.

★ Whenever the existing water quality exceeds the water quality objectives contained in the *Water Quality Control Plan for the San Diego Basin (9),* such existing high quality shall be maintained until it has been demonstrated to the Regional Board that any change will be consistent with maximum benefit to the people of the State, will not unreasonably affect present and anticipated beneficial uses of such water, and will not result in water quality less than that described in the *Water Quality Control Plan for the San Diego Basin (9).*[5]

★ Any waste discharged to existing high quality water will be required to meet waste discharge requirements that will result in the best practicable treatment or control of the discharge necessary to assure that pollution will not occur and the highest water quality consistent with maximum benefit to the people of the State will be maintained.[5]

POLICY TWO

Water shall be reclaimed and reused to the maximum extent feasible.

★ The Regional Board will encourage and recommend funding for water reclamation projects that meet the following conditions and that do not adversely affect vested water rights, unreasonably impair instream beneficial uses, or place an unreasonable burden on present water supply systems: [6]

- √ Beneficial uses will be made of wastewater that would otherwise be discharged to marine or brackish receiving water or evapotranspiration ponds.
- √ Reclaimed water will be used to replace or supplement the use of fresh water or better quality water.
- √ Reclaimed water will be used to preserve, restore, or enhance instream beneficial uses that include but are not limited to, fish, wildlife, recreation, and aesthetics associated with any surface water body or wetlands.

★ The Regional Board will encourage and promote water reclamation while taking into consideration the Regional Board's responsibility of protecting and enhancing beneficial uses and recognizing the need to protect the public health and environment.

★ The Regional Board will require wastewater treatment facilities to provide for appropriate disposal or storage of surplus reclaimed water.

POLICY THREE

Point sources and nonpoint sources of pollution shall be controlled to protect designated beneficial uses of water.[7]

★ Treatment levels at least as stringent as those defined in the federal Clean Water Act will be required of municipal and industrial point sources which are subject to regulation under the Clean Water Act.[8]

★ Sewage collection agencies shall implement a comprehensive pretreatment program

including industrial waste ordinances to control the quality and quantity of pollutants which may adversely affect the operation of a municipal wastewater treatment facility, or which may cause the effluent limitations for the facility to be exceeded, or which may pass through the treatment works or will otherwise be incompatible with such works.

★ Nonpoint sources will be controlled in conformance with the Clean Water Act and the Coastal Zone Act Reauthorization Amendments. Nonpoint source control programs will generally be the responsibility of federal, state, and local agencies, and individuals having land management responsibilities. Such controls will be implemented preferably through best management practices,[9] (BMPs). If BMPs fail, controls will be implemented through waste discharge requirements or other regulatory actions.[7]

POLICY FOUR

Instream beneficial uses shall be maintained, and when practical, restored, and enhanced.

★ Coordination shall be encouraged among local agencies with regard to all aspects of planning and land use control.

★ Plans for future development and management of the State's water resource must assure adequate protection of existing instream beneficial uses, and where feasible, include measures to enhance these uses.

★ Instream uses for recreation, fish, wildlife, and related purposes shall be balanced with other uses.

★ The need for water to be impounded must be demonstrated, taking full account of instream values.

★ Reservoir operations shall involve careful consideration of instream uses, even where such uses satisfy altered or enhanced instream values.

POLICY FIVE

A detailed and comprehensive knowledge of the beneficial uses, water quality and activities affecting water quality throughout the Region shall be maintained.

★ The development of a modern comprehensive information gathering, storing, and retrieval system to effectively aid in evaluating water quality throughout the Region shall be encouraged.

LEGAL BASIS AND AUTHORITY

Federal and state laws have been enacted which establish the requirements for adequate planning, implementation, management and enforcement, for the control of water quality. The principal federal and state laws pertaining to the regulation of water quality are known respectively as, the 1972 Federal Water Pollution Control Act (also known as the Clean Water Act) and Division 7 of the 1969 California Water Code (also known as the Porter-Cologne Water Quality Control Act). The laws are similar in many ways. The fundamental purpose of both laws is to protect the beneficial uses of water. An important distinction between the two is that the Porter-Cologne Water Quality Control Act addresses both ground and surface waters while the Clean Water Act addresses surface water only.

In addition, federal and state regulations and policies have been developed to augment and clarify the laws and to provide detail not included in the law.

FEDERAL LAWS AND REGULATIONS

The basic federal law dealing with surface water quality control is the Federal Water Pollution Control Act of 1972 (Clean Water Act). Certain statutory provisions in two other federal laws, the National Environmental Policy Act of 1969 and the Endangered Species Act, supplement the Clean Water Act. Federal regulations implementing the Clean Water Act provisions for water quality planning and management are contained in 40 CFR 130, *EPA Requirements for Water Quality Planning and Management* and 40 CFR 131, *EPA Procedures for Approving State Water Quality Standards*.

FEDERAL WATER POLLUTION CONTROL ACT

The Federal Water Pollution Control Act was amended in 1972 and is commonly referred to as the Clean Water Act. The objective of the Clean Water Act is to "*restore and maintain the chemical, physical and biological integrity of the Nation's waters*" to make all surface waters "*fishable*" and "*swimmable*". The seven goals set forth in the law to achieve this objective are to:

(1) Eliminate the discharge of pollutants to navigable waters by 1985;

(2) Provide water quality which protects and fosters propagation of fish, shellfish and wildlife and allows recreation in and on the water by 1983;

(3) Prohibit discharge of toxic pollutants in toxic amounts;

(4) Provide financial assistance to construct publicly owned treatment systems;

(5) Develop and implement areawide waste treatment management plans;

(6) Develop technology necessary to carry out these goals; and

(7) Develop and implement programs for control of nonpoint sources of pollution.

In 1972, five titles were added as amendments to the Clean Water Act. Title 1 provides for research and related programs, Title 2 provides grants for construction of treatment works, Title 3 provides for standards and enforcement, Title 4 provides for permits and licenses, and Title 5 provides for general provisions.

Clean Water Act sections 106, 205(j), 205(g), 208, 303 and 305 establish requirements for state water quality planning, management, and implementation in regard to surface waters. The Clean Water Act requires that states adopt water quality standards to protect public health or welfare, enhance the quality of water, and serve the purposes of the Clean Water Act. "*Serve the purposes of the Act*" (as defined in sections 101(a), 101(a)(2), and 303(c) of the Act) means that water quality standards:

- Include provisions for restoring and maintaining the chemical, physical, and biological integrity of state waters;
- Whenever attainable, achieve a level of water quality that provides for the protection and propagation of fish, shellfish, and wildlife, and recreation in and on the water ("*fishable*" and "*swimmable*"); and
- Consider the use and value of state waters for public water supplies, propagation of fish and wildlife, recreation, agriculture and industrial purposes, and navigation.

The states are also required to have a continuing planning process called the Triennial Review process, which includes public hearings at least once every three years to review the water quality standards and revise them if necessary.

NATIONAL ENVIRONMENTAL POLICY ACT OF 1969

The National Environmental Policy Act (NEPA) declares a national environmental policy and its goals. The overall objectives of NEPA are: (1) to ensure that environmental factors are considered in the decision making process of any federal action and (2) to provide full public disclosure of any federal action. Accordingly, NEPA requires that an Environmental Impact Statement (EIS) shall be "*included in every recommendation or report on proposals for legislation and other major federal actions significantly affecting the quality of the human environment*". Federal actions include the operation of programs; the construction of facilities; the provision of funding to others; and a federal agency's decision on whether to grant its required permission for activities of others, such as private businesses or state or local governments.

NEPA establishes a continuing policy for all levels of government and concerned public and private organizations to create and maintain conditions under which man and nature can exist in productive harmony and fulfill the social, economic and other requirements of present and future generations. NEPA directs an interdisciplinary approach to ensure integrated use of all talents in planning and decision making having impact on the environment (section 102). Each report or recommendation must be

accompanied by a detailed statement prepared by the responsible official on:

- The environmental impact of the proposed action;
- Any adverse environmental effects which cannot be avoided if the action is taken;
- Alternatives to the action;
- Relationship between local short-term uses of the environment, and maintenance and enhancement of long-term productivity; and
- Any irreversible and irretrievable commitments of resources if the proposed action is taken.

Appropriate alternatives to proposed actions must be studied and developed when conflicts in use of available resources are encountered.

NEPA directs the preservation of acceptable environments and the restoration of those that have been degraded. The spirit of the Act is also carried into the State reviews of proposed actions upon the environment. (See discussion on the California Environmental Quality Act later in this chapter).

ENDANGERED SPECIES ACT

The federal Endangered Species Act (ESA) establishes federal policy regarding protection of endangered and threatened species. The ESA is directed specifically at projects subject to the NEPA which may adversely affect endangered and threatened species. Section 7 of the federal ESA requires all federal agencies, in consultation with the Fish and Wildlife Service and the National Marine Fisheries Service, ensure that their actions do not jeopardize the existence of threatened or endangered species or result in the destruction or adverse modification of critical habitat. The definition of a federal action is very broad and covers almost every water program administered by the United States Environmental Protection Agency (USEPA). All aspects of the USEPA's surface water quality criteria and standards adoption and implementation process are subject to the consultation process. The overriding goal of the consultation process is to provide for the protection and recovery of threatened and endangered species and the ecosystems on which they depend.

APPLICABLE FEDERAL REGULATIONS

The federal regulations, promulgated by the USEPA to implement the Clean Water Act provisions for water quality planning and management, are contained in 40 CFR 130, EPA Requirements for Water Quality Planning and Management and 40 CFR 131, EPA Procedures for Approving State Water Quality Standards. The regulations contained in 40 CFR 131 require states to:

- Designate appropriate beneficial uses for surface waters;
- Establish narrative and numeric criteria to protect beneficial uses;
- Establish an antidegradation policy to protect and maintain existing beneficial uses and the water quality necessary to protect those uses; and
- Hold a public hearing to review surface water quality standards at least once every three years and revise them if appropriate.

The regulations contained in 40 CFR 130 require states to also develop and follow a water quality planning and management system consisting of the following elements:

- Monitoring methods and procedures to compile and analyze data on surface waters;
- Identification of surface waters that are "*water quality limited*" or not meeting water quality standards;
- A ranking of surface water bodies based on severity of pollution and beneficial uses of the waters. The surface water body ranking must also include a determination of how best to utilize available resources to solve the water quality problems; and
- Pollutant loading allocations to ensure that water quality standards are not exceeded.

These regulations are discussed in detail in Chapters 2 and 3.

CALIFORNIA LAWS AND REGULATIONS

State of California laws that directly affect water resources planning are contained principally in the California Water Code. Certain statutory provisions in the Water Resources Code, Health and Safety Code, Public Resources Code, Fish and Game Code, Food and Agriculture Code, Government Code, Harbors and Navigation Code, California Environmental Quality Act, and the California Endangered Species Act supplement the water quality provisions of the California Water Code. The chief state regulations in the CCR pertaining to water quality are contained in Title 22 and Title 23.

CALIFORNIA WATER CODE

The California Water Code contains provisions which control almost every consideration of water and its use. Division 2 of the Water Code provides that the State Board shall consider and act upon all applications for permits to appropriate waters. The State Board's authority includes water quality considerations in granting a water right. Division 3 deals with dams and reservoirs; Division 5 pertains to flood control; Division 6 controls conservation, development and utilization of the state water resources; Division 7, covers water quality protection and management; and Divisions 11 through 21 provide for the organization, operation, and financing of municipal, county and local, water-oriented agencies.

ADJUDICATIONS TO PROTECT THE QUALITY OF GROUND WATER (DIVISION 2 OF THE CALIFORNIA WATER CODE)

California Water Code section 2100 provides that the State Board may make a formal determination or judgment in order to protect ground water quality. Thus, the State Board, upon a finding of existing or threatened irreparable damage, may file an action in the Superior Court to restrict pumping or to impose physical solutions, or both, to the extent necessary to prevent destruction of, or irreparable injury to, the quality of ground water. The State Board may take such action only if an affected local agency charged with this responsibility fails to take appropriate action.

PORTER-COLOGNE WATER QUALITY CONTROL ACT

Division 7 of the California Water Code is the basic water quality control law for California. This law is titled the Porter-Cologne Water Quality Control Act (Porter-Cologne Act). The Porter-Cologne Act establishes a regulatory program to protect water quality and to protect beneficial uses of the state waters.

The Porter-Cologne Act section 13000 provides that:

- The quality of all waters of the state shall be protected for the use and enjoyment by the people of the state; and
- Activities and factors which may affect the quality of the waters of the state shall be regulated to attain the highest water quality that is reasonable, considering all demands being made or to be made and the total values involved, beneficial and detrimental, economic and social, tangible and intangible.

The Porter-Cologne Act establishes the State Board and the regional boards as the principle state agencies responsible for control of water quality. The State Board is responsible for:

- Issuing rights for the appropriation of surface water;
- Preventing waste and unreasonable use of water;
- Adjudicating water rights at the request of water users or the courts;
- Adopting state-wide water quality control policy;
- Reviewing actions of regional boards;
- Implementing the federal Clean Water Act; and
- Operation of a grants and loan program for the construction of sewage treatment plants.

The regional boards are responsible for:

- Issuance of waste discharge requirements to regulate the discharge of waste to surface and ground waters;

- Enforcement of the waste discharge requirements by the issuance of cease and desist orders, cleanup and abatement orders, administrative civil liability orders, and court action;

- Water quality control planning within their region; and

- Surveillance and monitoring to detect new sources of pollution and to ensure that ongoing discharges are in compliance with waste discharge requirements.

The Porter-Cologne Act empowers the regional boards to formulate and adopt, for all areas within the regions, a Water Quality Control Plan (Basin Plan) which designates beneficial uses and establishes such water quality objectives as in its judgment will ensure reasonable protection of beneficial uses. Each regional board establishes water quality objectives that will insure the reasonable protection of beneficial uses and the prevention of nuisance. The California Water Code provides flexibility for some change in water quality provided that beneficial uses are not adversely affected. The factors which are to be considered by the Regional Board in establishing water quality objectives are described in Chapter 3, Water Quality Objectives, (page 3-1).

The State Board may adopt water quality control plans for surface waters that overlap Regional Board boundaries, are statewide in scope, or are otherwise considered significant. Statewide plans supersede Regional Water Quality Control Plans where conflict occurs. The Regional Water Quality Control Plans are required to conform with policies of the State Board.

The California Water Code also requires that each regional board include an implementation plan in the Basin Plan. Implementation plans must include as a minimum:

- A description of the nature of the actions necessary to achieve the water quality objectives, including recommendations for appropriate actions by any entity, public or private;

- A time schedule for the actions to be taken; and

- A description of the surveillance to be undertaken to determine compliance with the water quality objectives.

CALIFORNIA ENVIRONMENTAL QUALITY ACT OF 1973

The California Environmental Quality Act (CEQA) is a very important and expansive environmental protection law in California. It was enacted by the state legislature in 1973 and is contained in the Public Resources Code sections 21000 through 21177. CEQA is the state-level equivalent of the federal NEPA.

The overall objectives of both laws, NEPA and CEQA, are to provide full public disclosure of a project and to ensure that environmental factors are considered in the decision making process. CEQA requires all state agencies, boards and commissions to include in any report on any project having significant effect on the environment an Environmental Impact Report (EIR). The EIR records the scope of the applicant's proposal and analyzes all its known environmental effects. The EIR must discuss any significant environmental effects which cannot be avoided if the proposal is implemented, proposed mitigative measures to minimize the impact of the project and alternatives to the project. Also the EIR must discuss the relationship between local short-term uses of the environment and the maintenance and enhancement of long-term productivity and the growth-inducing impacts of the proposed project. The EIR is circulated to interested agencies and members of the public who request a copy. The public has a 45 day period for review during which comments on the EIR are accepted.

State agencies cannot approve a project for which alternatives or mitigation measures exist which would significantly reduce the environmental impacts, unless overriding social and/or economic considerations apply.

Activities of the State and Regional Boards subject to CEQA include adoption of Basin Plans and amendments thereto, issuance of National Pollutant Discharge Elimination System

(NPDES) permits, and Waste Discharge Requirements (WDRs). The basin planning process however, has been certified by the Secretary of Resources as being exempt from CEQA's requirement for preparation of an EIR or negative declaration and initial study CCR Title 14, section 15251). Under the basin planning process, a plan amendment, as well as a technical report and backup materials, serve as a functional equivalent to an EIR or negative declaration and initial study. The CEQA Notice of Filing, Environmental Checklist Form, and Notice of Decision must be filed to comply with CEQA.

CALIFORNIA ENDANGERED SPECIES ACT

The California Endangered Species Act (CESA) as amended in 1987 (California Fish and Game Code, sections 2050 thru 2098) establishes state policy regarding protection of endangered and threatened species. CESA is directed specifically at projects subject to the CEQA which may adversely affect endangered and threatened species.

Pursuant to CESA, the Regional Board must consult with the California Department of Fish and Game (DFG) to determine if the Basin Plan would jeopardize the continued existence of any endangered or threatened species or adversely affect the habitat of the species. CESA requires the DFG to issue written findings regarding whether or not Regional Board adoption of the Basin Plan will cause jeopardy to endangered or threatened species.

CESA policy requires that the Regional Board not approve a Basin Plan, which in DFG's opinion, would jeopardize endangered or threatened species. CESA also requires the Regional Board to adopt reasonable and prudent alternatives in the Basin Plan which would minimize any adverse effects identified by DFG to endangered or threatened species. If the alternatives are infeasible, the Regional Board is required to adopt reasonable mitigation and enhancement measures in the Basin Plan.

OTHER STATE STATUTES

Certain statutory provisions contained in the Health and Safety Code, Fish and Game Code, Harbors and Navigation Code, and the Food and Agriculture Code, supplement the water quality provisions of the California Water Code. The Health and Safety Code has statutory provisions providing for the regulation of hazardous waste, hazardous materials, surface impoundments containing hazardous waste, underground and aboveground storage of hazardous substances, and underground injection of toxic substances and the discharge of cancer causing chemicals to sources of drinking water. The Harbors and Navigation Code has statutory provisions to prevent the unauthorized discharges of waste from vessels to surface waters. The Food and Agriculture Code has statutory provisions providing for the prevention of pollution of ground water which may be used for drinking water supplies. The Fish and Game Code has statutory provisions to prevent unauthorized diversions of any surface water body as well as waste discharges deleterious to fish, plant, animal, or bird life. The Government Code requires the Governor to establish a state oil spill and toxic disaster contingency plans.

CALIFORNIA CODE OF REGULATIONS

The administrative procedures of the State Board and regional boards and regulations relating to many facets of water rights and water quality are contained in Title 23, (WATERS) Division 3, (Water Resources Control Board) Chapters 3, 4, 15, and 16 California Code of Regulations (CCR). Requirements for quality of water for domestic uses, wastewater reclamation criteria, and hazardous waste management are contained in Title 22, Division 4 (Environmental Health).

HISTORY OF BASIN PLANNING IN THE SAN DIEGO REGION

The Dickey Act, enacted by the State of California in 1949, established nine Regional Water Pollution Control Boards in California. Regional Water Pollution Control Boards were directed to establish water quality objectives in order to protect the quality of receiving waters from adverse impacts of discharges. During the first few years, the San Diego Regional Water Pollution Control Board only established narrative objectives for discharges. By 1952, the San Diego Regional Water Pollution Control Board began including numerical limits in requirements for discharges and adopting water quality objectives for receiving waters.

In the late 1960's the San Diego Regional Board conducted an extensive investigation to define water quality objectives for the entire San Diego

Region. A report was prepared for each major hydrologic unit of the Region. These reports described the following topics for each hydrologic unit:

- Geology and land use;
- Precipitation and runoff;
- Water quality;
- Surface and ground water use;
- Imported water use;
- Waste disposal;
- Beneficial uses;
- Water quality objectives; and
- The water quality implementation program.

These early reports led to the definition and designation of beneficial uses for the surface and ground waters of the Region. The beneficial uses defined in the early reports have remained intact, for the most part, to the present day.

With the enactment of the Porter-Cologne Water Quality Act in 1969, the names of the Regional Water Pollution Control Boards were changed to Regional Water Quality Control Boards, and their authority was broadened. Furthermore, the Act required the Regional Water Quality Control Boards to initiate development of comprehensive regional Water Quality Control Plans.

In 1971, the San Diego Regional Board adopted an Interim Water Quality Control Plan (Interim Plan) which expanded the number of beneficial uses designated for inland surface waters, and coastal waters subject to tidal action. The Interim Plan was prepared to satisfy state and federal requirements for grant programs for sewage treatment plant construction. In addition, the Interim Plan satisfied the Porter-Cologne Act requirements that each regional board adopt a Water Quality Control Plan. As the term "*interim*" implies, the document was adopted as the first step towards development of a comprehensive fully developed Water Quality Control Plan. The Interim Plan was amended in 1972 to designate a beneficial use for clamming and shellfish harvesting at various locations in coastal waters.

In 1975, the San Diego Regional Board adopted the Comprehensive Water Quality Control Plan Report for the San Diego Region that compiled all of the existing beneficial uses, water quality objectives, and policies into one document and rescinded all individually-adopted objectives and policies. The 1975 Basin Plan was amended by the Regional Board on numerous occasions since 1975. A summary of Basin Plan amendments adopted by the Regional Board between 1979 and 2005 and approved by the State Board, Office of Administrative Law, and USEPA is presented in Chapter 5 (Plans and Policies) of this Basin Plan.

Since 1975, progress has been made toward the control of a number of water quality problems identified in the 1975 Basin Plan, including the control of point source discharges and the development of new programs to address nonpoint source pollution issues in the Region. At the same time, many new issues and areas of concern have arisen as health scientists have identified increasingly lower concentrations of toxic substances as health risks. Furthermore, advancing analytical technology enables detection of contaminants at increasingly lower concentrations. The State and Regional Board's Continuing Planning Process, based on the latest scientific information, addresses both "*old*" and "*new*" water quality issues.

CONTINUING PLANNING PROCESS

As part of the State's continuing planning process, components of the Basin Plan are reviewed as new data and information become available or as specific needs arise. Comprehensive updates of the Basin Plan occur in response to state and federal legislative requirements and as funding becomes available. In addition, State Board and other governmental entities' (federal, state, and local) plans, which can affect water quality, are incorporated into the planning process. The Basin Plan provides consistent long-term standards and program guidance for the Region.

BASIN PLAN REVIEW AND AMENDMENT PROCESS

The following discussion applies to the review and amendment process for any Water Quality Control Plan, (i.e., a Statewide Plan or a Regional Board Basin Plan).

TRIENNIAL REVIEW

Statewide plans and Regional Board Basin Plans are flexible documents which must be reviewed and revised regularly to adapt to changing conditions. A major review of both types of Plans is performed every three years as part of the update process for the "*Triennial Review*". The Triennial Review is required by the federal Clean Water Act [section 303(c)(1)]. In addition, state law requires that water quality control plans be reviewed periodically (California Water Code section 13240), and that the State Board review statewide plans at least every three years (California Water Code sections 13170 and 13170.2). These reviews are comprehensive and include a public scoping hearing to identify the issues and water quality standards to be addressed. The review identifies standards which are appropriate and, therefore, require no revisions. Information on new or existing water quality objectives comes from monitoring data, compliance inspections, discharger reports, and public complaints. Monitoring data provides information on background conditions which are used to set water quality objectives.

The State or Regional Board evaluates all available information and determines whether revisions to water quality standards are needed and the nature of any necessary revisions. A work plan is prepared which identifies appropriate revisions. These revisions, and a time schedule for implementation, are then incorporated into the Statewide Plan or Regional Board Basin Plan by way of the amendment process discussed below.

BASIN PLAN AMENDMENT PROCESS

Whenever a Statewide Plan or Regional Board Basin Plan for surface waters is to be revised, public participation requirements must be met, as called for in 40 CFR Part 25 (Public Participation in Programs Under the Resource Conservation and Recovery Act and the Clean Water Act). When water quality standards are changed, a public hearing must be held. Notice for the public hearing generally must be given 45 days prior to the hearing, and the documents to be considered at the hearing must be available to the public 30 days prior to the hearing. After the hearing, a summary of comments received and responses to those comments must be prepared before action is taken.

For Regional Board adoption of a Basin Plan amendment, a quorum of Board members must be present (five of the nine members). For State Board approval of a proposed Regional Board amendment, a quorum must also be present (three of the five members). In both cases the vote of a majority of the quorum is required to take action. If a State Board hearing is being held regarding a Statewide Plan or to review an amendment proposed by a Regional Board, one or more members of the State Board may conduct the hearing upon authorization of the State Board. In cases where such a hearing is conducted, any final action must be taken by a majority of all members of the State Board (i.e., 3 votes). Usually State Board hearings are of a controversial nature and most, if not all, Board members elect to attend. The State Board may approve a Basin Plan amendment proposed by a Regional Board or return it to the Regional Board for further consideration. Upon resubmission, the State Board may either approve or, after a public hearing in the affected region, revise and approve such plan (California Water Code section 13245).

Basin planning is also influenced by several federal administrative guidance documents, such as USEPA's Technical Support Document for Water Quality-Based Toxics Control, the Water Quality Standards Handbook, and "*Gold Book*" Quality Criteria for Water, 1986 and waste load allocation manuals.

Basin Plan amendments are generally initiated by the appropriate Regional Board, and Statewide Plan amendments are initiated by the State Board. Amendments may also be initiated by any other interested parties. In this case, the proposed amendment submitted by the interested party is reviewed by Regional Board to determine if the information is adequate to support the requested change to the Basin Plan. The Regional Board will review the technical information and may either accept it as complete or reject it as incomplete. Whenever new or revised water quality standards are proposed in a Regional Board Basin Plan amendment, the standards must be approved by the State Board before the amendment becomes effective. A proposed standard revision to a statewide plan or Regional Board Basin Plan takes effect upon approval by the Office of Administrative Law (OAL). A standard contained in a Regional Basin Plan amendment which relates to surface waters

or a standard in a statewide plan must be submitted to the United States Environmental Protection Agency (USEPA) for approval [40 CFR section 131.20 (c)] following State Board review. If the standard revision is disapproved by the USEPA, the original standard remains in effect until revised by the basin planning process, or the USEPA promulgates its own rule which supersedes the standard revision [40 CFR section 131.21 (c)].

BASIN PLAN AMENDMENT PROCEDURES

(1) Advance notice of plan amendments is required (California Water Code §13244) and must be advertised for hearings. For amendments that include a prohibition, a public notice must be published for three consecutive days in a newspaper of wide circulation in the area of the prohibition. For other actions, notice must be published for one day in a newspaper of wide circulation. Usually, the hearing notice must be published at least 45 days prior to the hearing (40 CFR section 25.5).

A CEQA Notice of Filing must be circulated at least 45 days prior to State and Regional Board action on a proposed amendment. Where the hearing(s) process is completed and adoption is scheduled for a regularly scheduled State or Regional Board Meeting, a ten-day notice requirement for agenda items applies (Government Code section 11125).

(2) For controversial and/or complex amendments, comments should be requested from interested persons prior to drafting an amendment. This step would be informal by written correspondence or in a workshop session (the public can attend such workshops, which are not "*public hearings*" and would precede the hearing notice in number 3 below). Comments received would be considered in the initial draft of the amendment and the alternatives.

(3) The hearing notice must be specific enough to allow an effective opportunity for public participation. Although it is preferable to include the draft plan amendment and technical report with the hearing notice, as indicated above, these documents can be made available at a later date that is at least 30 days before the hearing (40 CFR section 25.5). The notice should include:

(a) The general area to be regulated;
(b) The specific proposed plan amendment and a statement of the availability of a technical report and backup material;
(c) Either of the following,
  (i) Alternatives to the proposal or
  (ii) A statement that additional rules, consistent with the general purpose of the plan amendment and complementary to the specific proposed rules, are under consideration.
(d) A statement as to whether action on the amendment will be taken immediately at the close of the hearing.

(4) A copy of the hearing notice should be sent to:

(a) Those who normally receive notices of plan review or those who, in the judgment of staff, would be interested in the proposed amendment(s).
(b) Those who have commented on the plan review or amendment.
(c) Those federal, state and local agencies who have jurisdiction by law or who have expertise with respect to the subject(s) of the proposed amendment(s).
(d) Specific interested parties affected by the proposed action.

(5) The State or Regional Board(s) may require that written testimony or other evidence be submitted in advance of the public hearing (Title 23 CCR section 649.4). If this option is chosen, the hearing notice should specify the details. Charts, graphs, and other testimony which are presented as evidence must be left with the State or Regional Board(s) in order to be considered as part of the record.

(6) The hearing notice can state that more than one hearing is scheduled and list the dates for each in order to save processing time. Alternatively, the notice may state that action on the amendment could take place following the close of the hearing. Some delays may also be avoided by

having special hearings on dates other than regularly scheduled State or Regional Board meetings.

(7) The State or Regional Board(s) must prepare written responses to comments received at least 15 days before the State or Regional Board intends to take action. Copies of responses will be available at the State or Regional Board meeting for any person to review. Late comments should be responded to at the State or Regional Board meeting. If appropriate, the Environmental Checklist Form may be revised based on a review of comments received.

(8) The State or Regional Board(s) must prepare a summary report including:
   (a) A brief description of the proposed activity;
   (b) Reasonable alternatives to the proposed activity; and
   (c) Mitigation measures to minimize any potential significant adverse environmental impacts of the proposed activity identified in the Environmental Checklist Form. Conclusions must be made as to what, if any, potential significant adverse impacts, feasible alternatives, and feasible mitigation measures exist. These conclusions must be accompanied by a statement of supporting facts. In adopting proposed amendments, the State or Regional Board must mandate those feasible alternatives or feasible mitigation measures which are within its jurisdiction. The State or Regional Board cannot approve the proposed amendment if there are feasible alternatives or feasible mitigation measures which would substantially lessen the potential significant adverse environmental impacts (Public Resource Code section 21080.5).

(9) The hearing must, at a minimum, be recorded electronically (Title 23 CCR section 647.4). Controversial matters usually are recorded by a stenographic reporter.

(10) At the hearing, all interested persons are given an opportunity to be heard. Reasonable limitations on public participation are appropriate and may be indicated in an opening statement (i.e., impose time limits on testimony, encourage groups to designate a spokesperson, and require witnesses to summarize written testimony). There is no right to cross-examination at the hearings. Persons wishing clarification of prior evidence or comments may request the same from the State or Regional Board.

Cross-examination must be allowed when an amendment takes on quasi-judicial features; for example, when considering a prohibition against increasing existing discharges from a relatively small number of dischargers. Cross-examination may also be allowed at the discretion of the Chairperson, if it appears that the cross-examination will assist the State or Regional Board in its deliberations.

(11) At the close of the hearing, it may be desirable to leave the record open to provide interested persons an additional opportunity to submit written comments. If the record is left open, all interested persons will be told at the hearing that they may review and respond to written comments received during the time that the record is left open. For example, the record could be left open ten days for written submittals and an additional five days for written comments in response to these submittals. Once the record is closed, no additional evidence will be received at the State or Regional Board meeting to consider adoption of the amendment; however, brief comments on the proposal will be allowed.

(12) After the close of the hearing and any comment period, the amendment may be adopted as proposed. If the draft amendment is to be modified, based on the hearing, and the notice is adequate as outlined in number 3 above, a final plan amendment may be adopted when the product is a logical outgrowth of the draft amendment or a statement in the notice. Where changes in the final draft are not a logical outgrowth of the original proposal, an additional notice, hearing, and opportunity to comment will be provided. When changes are proposed by the State or Regional Board, the procedure is:

(a) For each proposed change, consideration is given as to whether the change is a logical outgrowth of the original proposal. If the change was (1) not contemplated in the technical report, notice, or draft amendment and (2) not discussed during the hearing(s) or in written comments received, it is not a logical outgrowth of the original proposal; and an additional notice and comment period will be provided. When the issues are complex, controversial, or confusing, an additional comment period on a new draft amendment is often allowed (even if it can be argued that the changes are a logical outgrowth of the original proposal).

(b) If the change is a logical outgrowth of the original draft amendment, it may be voted upon without an additional notice and comment period. If the vote on the amendment is delayed so that the full amendment can be retyped, etc., normal meeting notice requirements may be followed (Title 23 CCR section 647.2).

(c) If the change is not a logical growth, a motion may be made to incorporate it into the draft amendment. If this motion passes, consideration of the amendment should be continued so that the revisions can be circulated for comments as provided in number 4 above.

(13) Revisions to plan amendments are based on the evidence developed at the hearing. This requirement does not preclude the State or Regional Board(s) from adopting an amendment immediately after the hearing if all evidence has been considered.

(14) If a Basin Plan amendment is quasi-judicial (focused on the rights and duties of a limited number of individuals such as in a small isolated prohibition area), the State or Regional Board resolution adopting the plan amendment will contain findings that are adequate to enable another interested person to "*bridge the analytical gap*" between the evidence the amendment itself.

(15) When a Regional Board amendment is adopted, it must then be forwarded to the State Board for approval. The State Board will review the proposed amendment with extensive evaluation of technical, policy, and legal consistency considerations. The State Board is required to act upon submission of a water quality control plan or revision within 60 days after the Regional Board has submitted the plan, or 90 days after resubmission of the plan (California Water Code section 13246). A Basin Plan revision adopted by a Regional Board is not effective until it is approved by State Board (California Water Code section 13245) and the Office of Administrative Law. An amendment package to be processed for approval must include all of the following:

(a) A memorandum of transmittal including a list of all material that was part of the Regional Board record, staff contact person, and request date for State Board action. If expeditious treatment is requested, the reason for this request should be stated.

(b) A copy of the certified Regional Board resolution including adopted amendments as it will be incorporated into the appropriate Basin Plan and a copy of all documents which were considered by the Regional Board prior to adoption of the Basin Plan amendment.

(c) The Regional Board technical report with detailed rationale for changes, any technical support documentation or background information, and information regarding any relevant State Board or Regional Board actions.

(d) An environmental document and any related CEQA documents.

(e) Copies of written public comments and written Regional Board responses.

(f) A responsiveness summary of any verbal responses to comments received after written comment deadline.

(g) A tape recording or transcript of the public hearing.

(h) Two sets of interested persons mailing lists, typed on self-adhesive address labels or pre-addressed envelopes, plus a typed interested persons list for State Board files.

(16) State Board review of a proposed plan amendment may result in approval or return to the Regional Board for consideration and resubmission. Upon resubmission, the State Board may approve, or, after a public hearing in the affected region, revise and approve the proposed plan amendment (California Water Code section 13245).

(17) Following State Board approval of the plan amendment, there is a 30-working day review period by the Office of Administrative Law. The Regional Board is responsible for preparing the administrative record (Items 15 b, c, d, e, f, and g above), a clear and concise summary, and a summary of necessity for review by the Office of Administrative Law. The summary of necessity is normally contained in the technical report. The Office of Chief Counsel at the State Board prepares a certification that the action was taken in compliance with all applicable requirements of Porter-Cologne.

(18) When the proposed Regional Board amendment has been approved by the Office of Administrative Law, the Regional Board must post a CEQA Notice of Decision with the Secretary of Resources for at least 30 days following Office of Administrative Law approval. When the State Board adopts a Statewide Plan amendment, the State Board must post the 30-day Notice of Decision.

(19) If water quality standards for surface waters are revised in the plan update, the revised plan must be submitted to the USEPA for approval, pending an USEPA determination that the standards meet the requirements of the Clean Water Act (40 CFR 130.10). The amendments must be forwarded to USEPA within 30 days of adoption by the State Board.

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Governor's Office of Planning and Research. 1992. CEQA California Environmental Quality Act Statutes and Guidelines 1992. Sacramento, California. 256 pp.

Planning and Conservation League Foundation. June 1985. Citizen's Guide to the California Environmental Quality Act. 14 pp.

San Diego County Water Authority. 1993. Forty-Seventh Annual Report of Authority Operations for Fiscal Year Ending June 30, 1993. San Diego, California. 161 pp.

San Diego County Water Authority. November, 1993. Water Resources Plan, Urban Water Management Plan. San Diego, California. 83 pp.

ENDNOTES

1. Hydrologic Unit - A classification embracing one of the following features which are defined by surface drainage divides: (1) In general, the total watershed area, including water- bearing and non - water bearing formations, such as the total drainage area of the San Diego River Valley; and (2) in coastal areas, two or more small contiguous watersheds having similar hydrologic characteristics, each watershed being directly tributary to the ocean and all watersheds emanating from one mountain body located immediately adjacent to the ocean.

2. Hydrologic Area - A major logical subdivision of a hydrologic unit which includes both water- bearing and nonwater - bearing formations. It is best typified by a major tributary of a stream, a major valley, or a plain along a stream containing one or more ground water basins and having closely related geologic, hydrologic, and topographic characteristics. Area boundaries are based primarily on surface drainage boundaries. However, where strong subsurface evidence indicates that a division of ground water exists, the area boundary may be based on subsurface characteristics.

3. Hydrologic Subarea - A major logical subdivision of a hydrologic area which includes both water- bearing and nonwater - bearing formations.

4. On February 10, 1994 the Regional Board adopted Resolution No. 94-25, A Resolution Adopting Amendments to the Comprehensive Water Quality Control Plan for the San Diego Region for the Laguna (1.10), Mission Viejo (1.20), and San Clemente (1.30), Hydrologic Areas. These hydrologic subareas are: Oso (1.21), Upper Trabuco (1.22), Middle Trabuco (1.23), Upper San Juan (1.25), Middle San Juan (1.26), Lower San Juan (1.27) and Ortega (1.28). The San Clemente Hydrologic Area (1.30) is broken into two hydrologic subareas: Prima Deshecha (1.31) and Segunda Deshecha (1.32).

5. State Water Resources Control Board Resolution No. 68-16, Statement of Policy with Respect to Maintaining High Quality of Waters in California.

6. State Water Resources Control Board Resolution No. 77-1, Policy with Respect to Water Reclamation in California.

7. Point sources of pollution refer to pollutants discharged to water through any discernible, confined, and discrete conveyance. Nonpoint sources of pollution refer to pollutants from diffuse sources that reach water through means other than a discernable, confined, and discrete conveyance.

8. State Board Policy for Regulating Point and Nonpoint Sources of Pollution in Accordance with the Federal Water Pollution Control Act.

9. Best Management Practices are defined as the practice, or combination of practices, that are determined to be the most effective, practicable means of preventing or reducing the amount of pollution generated by nonpoint sources to a level compatible with water quality goals (including technological, economic, and institutional consideration.

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2. BENEFICIAL USES

INTRODUCTION

The purpose of this chapter is to designate the beneficial uses for all surface and ground waters in the San Diego Region. Beneficial uses form the cornerstone of water quality protection under the Basin Plan. Once beneficial uses are designated, appropriate water quality objectives can be established and programs that maintain or enhance water quality can be implemented to ensure the protection of beneficial uses.

Beneficial uses are defined as the uses of water necessary for the survival or well being of man, plants and wildlife. These uses of water serve to promote the tangible and intangible economic, social and environmental goals of mankind. Examples include drinking, swimming, industrial and agricultural water supply, and the support of fresh and saline aquatic habitats.

Section 303 of the federal Clean Water Act (33 U.S.C. section1313) defines the term water quality standards as both the uses of the surface (navigable) waters and the water quality criteria which are applied to protect those uses. A water quality standard defines the water quality goals for a water body by designating the use or uses to be made of the water body, by setting criteria to protect the uses, and by protecting water quality through antidegradation provisions. Under the Porter-Cologne Water Quality Control Act (California Water Code, Division 7, Chapter 2 section13050), these concepts are defined separately as beneficial uses and water quality objectives. Beneficial uses and water quality objectives are required to be established for all waters of the State, both surface and ground waters. Beneficial uses of the surface and ground waters of the San Diego Region are discussed in this chapter; water quality objectives and water quality criteria are discussed in Chapter 3. Numerous key terms used throughout this chapter are defined in the Glossary which is included as Appendix A of this Basin Plan.

BENEFICIAL USES

The designation of beneficial uses must satisfy all of the applicable requirements of the California Water Code, Division 7 and the federal Clean Water Act. California Water Code, Division 7 is also known as the Porter-Cologne Water Quality Control Act. These two names are used interchangeably.

The designation of beneficial uses for the waters of the State by the Regional Board is mandated under California Water Code section 13240. The Clean Water Act, section 303 requires that the State adopt designated beneficial uses for surface waters. The requirements of both Acts applicable to the designation of beneficial uses are summarized below.

BENEFICIAL USE DESIGNATION UNDER THE PORTER-COLOGNE WATER QUALITY CONTROL ACT

The Porter-Cologne Act establishes a comprehensive program for the protection of beneficial uses of the waters of the state. California Water Code section 13050(f) describes the beneficial uses of surface and ground waters that may be designated by the State or Regional Board for protection as follows:

"*Beneficial uses of the waters of the state that may be protected against quality degradation include, but are not necessarily limited to, domestic, municipal, agricultural and industrial supply; power generation; recreation; aesthetic enjoyment; navigation; and preservation and enhancement of fish, wildlife, and other aquatic resources or preserves.*"

Significant points regarding the designation of beneficial uses are:

(1) Fish, plants, and other wildlife, as well as humans, use water beneficially. Designation of beneficial uses often includes subcategories of the above beneficial uses cited in California Water Code section 13050(f).

(2) Waste transport or waste assimilation in the state's surface and ground waters may not be designated as beneficial uses under the Porter-Cologne Act. The direction of the Act is to protect surface and ground waters against the adverse effects of waste constituents. (California Water Code section 13000, section 13241, and section

13263). Surface or ground waters may be used for waste disposal or waste assimilation if designated beneficial uses are protected. In authorizing the discharge of waste, the Regional Board need not authorize utilization of the full waste assimilation capacities of the receiving waters [California Water Code section 13263(d)]. All discharges of waste into waters of the state are privileges not rights [California Water Code section 13263(g)].

(3) Designated beneficial uses may include potential beneficial uses if existing water quality will support the use or if the necessary level of water quality can reasonably be achieved. [Water Code section13241 (a) and (c)]. Potential and existing uses are defined later in this chapter.

(4) An existing beneficial use ordinarily must be designated for protection unless another beneficial use requiring more stringent objectives is designated. The existing beneficial use designation is necessary to comply with the statutory policy in California Water Code section 13000, which provides in part that "*...the quality of all waters in the state shall be protected for use and enjoyment by the people of the state.*"

(5) California Water Code section 13000 provides in part that: "*The Legislature ...finds and declares that activities and factors which may affect the quality of the waters of the state shall be regulated to attain the highest possible water quality that is reasonable, considering all demands being made and to be made on those waters and the total values involved, beneficial and detrimental, economic and social, tangible and intangible.*" This policy establishes a general principal of nondegradation, with flexibility to allow some change in water quality which is in the best interests of the state. Changes in water quality are allowed only where beneficial uses are not unreasonably affected.

(6) The designation of beneficial uses must take into account the constitutional prohibition of waste and unreasonable waste of water. Designation of a beneficial use for protection should not require a waste of water pursuant to the California Constitution, article X, section 2.

(7) The protection and enhancement of beneficial uses require that certain quality and quantity objectives be met for surface and ground waters.

BENEFICIAL USE DESIGNATION UNDER THE CLEAN WATER ACT

Beneficial uses for surface waters are designated under the Clean Water Act section 303 in accordance with regulations contained in 40 CFR 131. The State is required to specify appropriate water uses to be achieved and protected. The beneficial use designation of surface waters of the state must take into consideration the use and value of water for public water supplies, protection and propagation of fish, shellfish and wildlife, recreation in and on the water, agricultural, industrial and other purposes including navigation.

Significant points regarding the designation of beneficial uses under the Clean Water Act are:

(1) Existing beneficial uses are those uses actually attained in the water body on or after November 28, 1975 [40 CFR 131.3(e)].

(2) States are prohibited from adopting waste transport or waste assimilation as a designated use for surface waters [40 CFR 131.10(a)].

(3) The water quality standards of downstream waters must be considered and maintained [40 CFR 131.10(b)].

(4) States may adopt sub-categories of a use and set the appropriate criteria to reflect the varying needs of such sub-categories of uses. For example criteria should be set to differentiate between cold water and warm water fisheries [40 CFR 131.10(c)].

(5) At a minimum, uses are deemed attainable if they can be achieved by the imposition of effluent limits required under Clean Water Act, sections 301(b) and 306 and cost effective and reasonable best management practices for nonpoint source control [40 CFR 131.10(d)].

(6) States may adopt seasonal uses as an alternative to redesignation of the beneficial uses of a water body to uses requiring less stringent water quality criteria [40 CFR 131.10(f)].

(7) States may remove a designated beneficial use or substitute sub-categories of a use only if (a) the use is not an existing use and (b) the state can demonstrate that attaining the designated use is not feasible for one of the following reasons [40 CFR 131.10(g)]:

- naturally occurring pollutant concentrations prevent the attainment of the use; or
- natural, ephemeral, intermittent or low flow conditions or water levels prevent the attainment of the use; or
- human caused conditions or sources of pollution prevent the attainment of the use and cannot be remedied or would cause more environmental damage to correct than to leave in place; or
- dams, diversions, or other types of hydrologic modifications preclude the attainment of the use, and it is not feasible to restore the water body to its original condition or to operate such modification in a way that would result in the attainment of the use; or
- physical conditions related to the natural features of the water body, such as the lack of a proper substrate, cover, flow, depth, pools, riffles, and the like, unrelated to water quality, preclude attainment of aquatic life protection uses; or
- controls more stringent than the controls for effluent limitations in Clean Water Act sections 301 (b) and 306 would result in substantial and widespread economic and social impact.

(8) States may not remove designated uses if (a) they are existing uses, unless a use requiring more stringent criteria is added, or (b) such uses will be attained by implementing effluent limits under Clean Water Act sections 301 (b) and 306 and by implementing best management practices for nonpoint source control [40 CFR 131.10(h)].

(9) If existing uses are higher than those specified in water quality standards, a state must revise its standards to reflect the uses actually being attained [40 CFR 131.10(i)].

(10) If the designated uses do not include the uses specified in section 101(a) (2) of the Clean Water Act, or if the state wants to remove a use specified in section 101 (a) (2), the state must conduct a "*use attainability analysis*" [40 CFR 131.10(j)]. A use attainability analysis is defined in 40 CFR 131.3(g) as a "*structured scientific assessment of the factors affecting the attainment of the use which may include physical, chemical, biological, and economic factors.*" The uses listed in section 101 (a)(2) are protection and propagation of fish, shellfish, and wildlife, and recreation (i.e., fishable/ swimmable uses).

BENEFICIAL USE DEFINITIONS

In 1972, the State Board adopted a uniform list and description of beneficial uses to be applied throughout all basins of the State. During the 1994 Basin Plan update, beneficial use definitions were revised and some new beneficial uses were added. Overall, the following twenty-three beneficial uses are now defined statewide and are designated within the San Diego Region:

Municipal and Domestic Supply (MUN) - Includes uses of water for community, military, or individual water supply systems including, but not limited to, drinking water supply.

Agricultural Supply (AGR) - Includes uses of water for farming, horticulture, or ranching including, but not limited to, irrigation, stock watering, or support of vegetation for range grazing.

Industrial Process Supply (PROC) - Includes uses of water for industrial activities that depend primarily on water quality.

Industrial Service Supply (IND) - Includes uses of water for industrial activities that do not depend primarily on water quality including, but not limited to, mining, cooling water supply, hydraulic conveyance, gravel washing, fire protection, or oil well re-pressurization.

Ground Water Recharge (GWR) - Includes uses of water for natural or artificial recharge of ground water for purposes of future extraction, maintenance of water quality, or halting of saltwater intrusion into freshwater aquifers.

Freshwater Replenishment (FRSH) - Includes uses of water for natural or artificial maintenance of surface water quantity or quality (e.g., salinity).

Navigation (NAV) - Includes uses of water for shipping, travel, or other transportation by private, military, or commercial vessels.

Hydropower Generation (POW) - Includes uses of water for hydropower generation.

Beachgoers at La Jolla Shores

Contact Water Recreation (REC-1) - Includes uses of water for recreational activities involving body contact with water, where ingestion of water is reasonably possible. These uses include, but are not limited to, swimming, wading, water-skiing, skin and SCUBA diving, surfing, white water activities, fishing, or use of natural hot springs.

Non-contact Water Recreation (REC-2) - Includes the uses of water for recreational activities involving proximity to water, but not normally involving body contact with water, where ingestion of water is reasonably possible. These uses include, but are not limited to, picnicking, sunbathing, hiking, beachcombing, camping, boating, tidepool and marine life study, hunting, sightseeing, or aesthetic enjoyment in conjunction with the above activities.

Commercial and Sport Fishing (COMM) - Includes the uses of water for commercial or recreational collection of fish, shellfish, or other organisms including, but not limited to, uses involving organisms intended for human consumption or bait purposes.

Aquaculture (AQUA) - Includes the uses of water for aquaculture or mariculture operations including, but not limited to, propagation, cultivation, maintenance, or harvesting of aquatic plants and animals for human consumption or bait purposes.

Warm Freshwater Habitat (WARM) - Includes uses of water that support warm water ecosystems including, but not limited to, preservation or enhancement of aquatic habitats, vegetation, fish or wildlife, including invertebrates.

Cold Freshwater Habitat (COLD) - Includes uses of water that support cold water ecosystems including, but not limited to, preservation or enhancement of aquatic habitats, vegetation, fish or wildlife, including invertebrates.

Inland Saline Water Habitat (SAL) - Includes uses of water that support inland saline water ecosystems including, but not limited to, preservation or enhancement of aquatic saline habitats, vegetation, fish, or wildlife, including invertebrates.

Estuarine Habitat (EST) - Includes uses of water that support estuarine ecosystems including, but not limited to, preservation or enhancement of estuarine habitats, vegetation, fish, shellfish, or wildlife (e.g., estuarine mammals, waterfowl, shorebirds).

Los Penasquitos Lagoon

Marine Habitat (MAR) - Includes uses of water that support marine ecosystems including, but not limited to, preservation or enhancement of marine habitats, vegetation such as kelp, fish, shellfish, or wildlife (e.g., marine mammals, shorebirds).

Wildlife Habitat (WILD) - Includes uses of water that support terrestrial ecosystems including, but not limited to, preservation and enhancement of terrestrial habitats, vegetation, wildlife (e.g., mammals, birds, reptiles, amphibians, invertebrates), or wildlife water and food sources.

Kelp on beach at
San Diego – La Jolla Ecological Reserve

Preservation of Biological Habitats of Special Significance (BIOL) - Includes uses of water that support designated areas or habitats, such as established refuges, parks, sanctuaries, ecological reserves, or Areas of Special Biological Significance (ASBS), where the preservation or enhancement of natural resources requires special protection.

The following coastal waters have been designated as ASBS and State Water Quality Protection Areas (SWQPAs) in the San Diego Region. SWQPAs are a nonterrestrial marine or estuarine area designed to protect marine species or biological communities from an undesirable alteration in natural water quality, including, but not limited to, ASBS that have been designated by the State Water Resources Control Board through its water quality planning process. ASBS are a subset of State Water Quality Protection Areas (SWQPAs). For detailed descriptions of the boundaries of SWQPAs/ASBS, see the discussion on SWQPAs/ASBS in Chapter 5, Plans and Policies:

- Irvine Coast, Orange County
- Heisler Park, Orange County
- La Jolla, San Diego County
- San Diego-Scripps, San Diego County

The following areas are designated Marine Life Refuges. A legal description of the boundaries of each marine life refuge is contained in the Fish and Game Code of California, Division 7 (Refuges), Chapter 2 (Specific Refuge Boundaries), Article 6 (Marine Life Refuge):

- Irvine Coast Marine Life Refuge, Orange County
- Laguna Beach Marine Life Refuge, Orange County
- South Laguna Beach Marine Life Refuge, Orange County
- Niguel Marine Life Refuge, Orange County
- Dana Point Marine Life Refuge, Orange County
- Doheny Beach Marine Life Refuge, Orange County
- City of Encinitas Marine Life Refuge, San Diego County
- San Diego Marine Life Refuge, San Diego County

The following coastal waters have been designated by the California legislature as Marine Protected Areas. Marine Protected Areas are named discrete geographic areas designated to protect and conserve marine life and habitat. All State Marine Parks, State Marine Reserves, and/or State Marine Conservation Areas are classified as Marine Protected Areas. A coastal water may be designated with more than one classification. A legal description of the boundaries of each Marine Protected Area can be found at California Department of Fish and Game, Marine Region, 20 Lower Ragsdale Drive, Suite 100, Monterey, CA 93940.

The following areas are designated State Marine Parks:

- Irvine Coast State Marine Park, Orange County
- Laguna Beach State Marine Park, Orange County
- South Laguna Beach State Marine Park, Orange County
- Niguel State Marine Park, Orange County
- Dana Point State Marine Park, Orange County
- Doheny Beach State Marine Park, Orange County
- Buena Vista Lagoon State Marine Park, San Diego County
- Batiquitos Lagoon State Marine Park, San Diego County
- San Elijo Lagoon State Marine Park, San Diego County
- San Dieguito Lagoon State Marine Park, San Diego County

The following areas are designated State Marine Reserves:

- Heisler Park State Marine Reserve, Orange County
- Agua Hedionda Lagoon State Marine Reserve, San Diego County

The following areas are designated State Marine Conservation Areas:

- Crystal Cove State Marine Conservation Area, Orange County
- Doheny State Marine Conservation Area, Orange County
- Encinitas State Marine Conservation Area, San Diego County
- Cardiff and San Elijo State Marine Conservation Area, San Diego County
- San Diego – Scripps State Marine Conservation Area, San Diego County
- La Jolla State Marine Conservation Area, San Diego County
- Mia J. Tegner State Marine Conservation Area, San Diego County

The following areas are designated Ecological Reserves by the Fish and Game Commission (California Code of Regulations, Title 14, section 630). A legal description of the boundaries of each ecological reserve is on file at the California Department of Fish and Game headquarters, 1416 Ninth Street, Sacramento, CA 95814, and at California Department of Fish and Game, Lands and Facilities Branch, 1812 Ninth Street, Sacramento, CA 95814:

- Agua Hedionda Lagoon Ecological Reserve, San Diego County
- Batiquitos Lagoon Ecological Reserve, San Diego County
- Blue Sky Ecological Reserve, San Diego County
- Boden Canyon Ecological Reserve, San Diego County
- Boulder Creek/Rutherford Ranch, San Diego County
- Buena Vista Lagoon Ecological Reserve, San Diego County
- Carlsbad Highlands Ecological Reserve, San Diego County
- Crestridge Ecological Reserve, San Diego County
- Dairy Mart Ponds Ecological Reserve, San Diego County
- Del Mar Mesa/ Lopez Ridge Ecological Reserve, San Diego County
- Heisler Park Ecological Reserve, Orange County
- Laguna Laurel Ecological Reserve, Orange County
- Lake Hodges Ecological Reserve, San Diego County
- McGinty Mountain Ecological Reserve, San Diego County
- Meadowbrook Ecological Reserve, San Diego County
- Otay Mountain Ecological Reserve, San Diego County
- Pilgrim Creek Ecological Reserve, San Diego County
- Plaisted Creek Ecological Reserve, San Diego County
- Rancho Jamul Ecological Reserve, including the Headquarters Unit, San Diego County
- San Diego - La Jolla Ecological Reserve, San Diego County
- San Diego River Ecological Reserve, San Diego County
- San Dieguito Lagoon Ecological Reserve, San Diego County
- San Elijo Lagoon Ecological Reserve, San Diego County
- San Luis Rey River Ecological Reserve, San Diego County
- Santa Rosa Plateau Ecological Reserve, Riverside County
- Sycuan Peak Ecological Reserve, San Diego County

The following area is designated a Wildlife Area by the Fish and Game Commission (California Code of Regulations, Title 14, section 630). A legal description of the boundaries of the wildlife area is on file at the California Department of Fish and Game headquarters, 1416 Ninth Street, Sacramento 95814, and at California Department of Fish and Game, Lands and Facilities Branch, 1812 Ninth Street, Sacramento, CA 95814:

- Hollenbeck Canyon Wildlife Area, San Diego County

The following areas are designated Natural Preserves by the State Park and Recreation Commission (Public Resources Code, Division 5, Chapter 1, Article 1.7 section 5019.71). A legal description of each natural preserve is on file at the California Department of Parks and Recreation headquarters, 1416 Ninth Street, Sacramento, CA 95814:

- Trestles Wetlands Natural Preserve, San Diego County
- Los Penasquitos Marsh Natural Preserve, San Diego County
- Ellen Browning Scripps Natural Preserve, San Diego County
- Silver Strand Natural Preserve, San Diego County
- Tijuana Estuary Natural Preserve, San Diego County

The following area is designated a National Estuarine Research Reserve by the National Oceanic and Atmospheric Administration (NOAA) (Coastal Zone Management Act of 1972 as amended section 315, 16 USC 1461). A legal description of the boundaries of the national estuarine research reserve is on file at the NOAA headquarters, Office of Ocean and Coastal Resource Management, NOAA, Washington, D.C., 20235:

- Tijuana River National Estuarine Research Reserve, San Diego County

Tijuana River mouth
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California Coastal Records Project, www.californiacoastline.org

The following areas are managed by the U.S. Fish and Wildlife Service as part of the National Wildlife Refuge System A legal description of the boundaries of each National Wildlife Refuge is on file at the San Diego National Wildlife Refuge Complex, 6010 Hidden Valley Road, Carlsbad, CA 92011:

- San Diego National Wildlife Refuge, San Diego County
  - Otay – Sweetwater Unit
  - Vernal Pool Unit
- San Diego Bay National Wildlife Refuge, San Diego County
  - South San Diego Bay Unit
  - Sweetwater Marsh Unit
- Tijuana Slough National Wildlife Refuge, San Diego County

Rare, Threatened, or Endangered Species (RARE) - Includes uses of water that support habitats necessary, at least in part, for the survival and successful maintenance of plant or animal species established under state or federal law as rare, threatened or endangered.

Migration of Aquatic Organisms (MIGR) - Includes uses of water that support habitats necessary for migration, acclimatization between fresh and salt water, or other temporary activities by aquatic organisms, such as anadromous fish.

Spawning, Reproduction, and/or Early Development (SPWN) - Includes uses of water that support high quality habitats suitable for reproduction, early development and sustenance of marine fish and/or cold freshwater fish.

Shellfish Harvesting (SHELL) - Includes uses of water that support habitats suitable for the collection of filter-feeding shellfish (e.g., clams, oysters and mussels) for human consumption, commercial, or sport purposes.

EXISTING AND POTENTIAL BENEFICIAL USES

The water resources of the San Diego Region have been extensively developed over the years and today's existing beneficial uses will probably continue into the future. Since the adoption of the Basin Plan in 1975, changes in land use patterns and resultant changes in water quality have led to some subsequent modifications of beneficial use designations. Minor modifications have also been also made to clarify the definition of some of the beneficial use designations.

The beneficial use designations described in this chapter are categorized as "*existing*" or "*potential*" beneficial uses. An existing beneficial use can be established by demonstrating that:

- Fishing, swimming, or other uses have actually occurred since November 28, 1975; or
- The water quality and quantity is suitable to allow the use to be attained.

Existing beneficial uses were originally determined as part of a use survey of water resources in the Region described in Chapter 1, *History of Basin Planning in the San Diego Region.* Beneficial use designations have also been determined using additional information gathered since 1975. Beneficial uses are

designated as "*potential*" for a variety of reasons, including:

- Plans are proposed to put the water to a future use;
- Potential exists to put the water to a future use;
- The public desires to put the water to future use;
- The water is potentially suitable for municipal or domestic water supply under the terms of the *Sources of Drinking Water* Policy (State Board Resolution No. 88-63); or
- The Regional Board has designated a beneficial use as a regional water quality goal.

BENEFICIAL USES FOR SPECIFIC WATER BODIES

Designated beneficial uses are summarized in the tables at the end of this chapter as follows:

Table 2-2 Inland Surface Waters,

Table 2-3 Coastal Waters,

Table 2-4 Reservoirs and Lakes, and

Table 2-5 Ground Water.

In the tables, a "●" indicates an existing beneficial use that was actually attained in the surface or ground water on or after November 28, 1975. A "O" indicates a potential beneficial use that may develop in future years. A "+" indicates that the water body has been exempted by the Regional Board from the municipal use designation under the terms and conditions of State Board Resolution No. 88-63, *Sources of Drinking Water* Policy.

Designated beneficial uses are generally, but not always, present throughout the entire reach of a particular hydrologic unit, area, subarea, or water body. Designated beneficial uses may not be present throughout the year. Specific beneficial uses near or below discharges will be carefully evaluated by the Regional Board during the development of waste discharge requirements or enforcement orders.

Beneficial uses are designated for (a) native waters and (b) imported waters stored in a reservoir. They do not represent the use of water directly imported into the hydrologic basin, unless storage of the imported water occurs within the basin. The lack of a beneficial use listed for any given area does not rule out the possibility of existing or future beneficial uses. Existing beneficial uses which have not been formally designated in this Basin Plan are protected as well as designated uses.

DESIGNATION OF RARE BENEFICIAL USE

The RARE beneficial use designation was based, in large part, on the information contained within RareFind. RareFind is the personal computer application of the California Department of Fish and Game's (DFG's) Natural Diversity Data Base (NDDB). The NDDB tracks the location and condition of California's rare, threatened, endangered, and sensitive plants, animals and natural communities. The NDDB is the most complete single source of information on California's rare, endangered, threatened and sensitive species, and natural communities. However, the absence of a special animal, plant or natural community from the RareFind report does not necessarily mean that they are absent from the area in question, only that no occurrence data are currently entered in the NDDB inventory.

Under the Fish and Game Code, as well as the California Environmental Quality Act, a state lead agency is required to consult with the Department of Fish and Game (DFG) to determine whether a project under consideration (e.g., the Basin Plan or a permitting process) will adversely affect any threatened or endangered species. The consultation process is important in identifying bodies of water that support threatened or endangered species. During the Basin Plan consultation process in 1994, the DFG provided recent sightings of the bald eagle (*Haliaeetus leucocephalus*). The U.S. Fish and Wildlife Service provided recent surveys for the least Bell's vireo (*Vireo belli pusillus*) and southwestern willow flycatcher (*Empidonax trailli extimus*). These and other information sources are listed in the references for this chapter.

To ensure the applicability of the RareFind information, only current sightings (i.e., those sightings since November 28, 1975) were used. In addition, consideration was given to the frequency, abundance, and occurrence history

for each sighting(s), and how recent the sighting was. The RARE designation has been added where there is substantial evidence that the water body supports threatened or endangered species. By definition, water bodies with a RARE designation support habitats necessary, at least in part, for the survival and successful maintenance of plant or animal species established under state or federal law as rare, threatened or endangered. Those plant or animal species which were used in the designation of specific water bodies with the RARE beneficial use are shown in Table 2-1. The Regional Board can provide specific information about the sighting(s) used to designate the RARE beneficial use. However, it is the responsibility of the lead agency or project sponsor to provide adequate information as to whether a proposed project will affect fish and wildlife (including plants) and their habitats.

The RARE beneficial use is generally, but not always, present throughout the entire reach of a particular waterbody. Also, the RARE beneficial use may not be present throughout the year. The RARE designation is placed on bodies of water where the protection of a threatened or endangered species depends on the water either directly, or to support its habitat. The purpose of the RARE designation for a particular water body is to highlight the existence of the threatened or endangered species. This will ensure that, absent extraordinary circumstances, they are not placed in jeopardy by the quality of the discharges to those water bodies.

Recognition that a water body is used by threatened or endangered species (RARE designation) does not necessarily mean that any particular suite of water quality objectives will be applied to the water body. In the absence of species specific or site specific objectives, the Regional Board would rely on objectives for WARM and COLD to implement the RARE designation. The existing WARM and COLD beneficial use designations are believed to be stringent enough to protect threatened or endangered species. If these issues arise in the future, they will be decided on a case-by-case basis, considering the most recent scientific data, site-specific factors, and other beneficial uses.

DESIGNATION OF COLD FRESHWATER HABITAT BENEFICIAL USE

Water bodies with a "*Cold Freshwater Habitat*" (COLD) beneficial use designation support cold freshwater ecosystems including, but not limited to, preservation or enhancement of aquatic habitats, vegetation, fish, or wildlife, including invertebrates.

In the San Diego Region, the cold freshwater fish used for the COLD designation is the rainbow trout. The rainbow trout, *Oncorhynchus mykiss*, is native to the Region. Rainbow trout which migrate from fresh water to the ocean are known as steelhead and those which remain in fresh water are known as a resident population. In addition, hatchery stocked rainbow trout have been planted throughout the Region since the 1880's. Some of these hatchery stocked trout have developed wild populations, and some have hybridized with native trout populations. Other species of trout may have been stocked from time to time, by various mechanisms into the Region's water bodies. (One of these trout is the European brown trout, *Salmo trutta*. At the present time, the brown trout is no longer stocked due to concern for its impacts on fishery resources and the fact that it is picivorous.)

Cold fresh water bodies are usually below 70° F, contain well-oxygenated water, and contain cold freshwater aquatic habitat suitable for cold freshwater fish. Optimum temperatures for growth and for most life stages of rainbow trout are 56 to 70° F (Moyle, 1976). The temperature tolerance for rainbow trout is reported to be from about 32° F to the mid-80's depending on the oxygen content of the water, size of fish, and the degree of acclimation. To survive at the higher water temperatures, trout require a gradual acclimation and water that is saturated with oxygen. Also, smaller trout may withstand the higher temperatures better than the larger fish.

Rainbow trout prefer well-oxygenated water but can survive at very low oxygen levels, the level tending to be less at lower temperatures and longer periods of acclimation. For example, mean lethal oxygen concentrations range from 1.05 part per million (ppm) at 52° F to 1.51 ppm at 68° F for rainbow trout averaging 3.8 inches in length (McAfee, 1966).

Rainbow trout do well in waters of pH from 7 to 8 and have adapted to waters of varying pH, ranging from at least 5.8 to 9.6 (Sigler, 1987).

Table 2 - 1. Water - Dependent Threatened or Endangered Species Which Were Considered in the RARE Beneficial Use Designation

NAME	STATUS*	TYPE	HABITAT REMARKS
Blue whale *Balaenoptera musculus*	FE	Mammal	Ocean
Western snowy plover *Charadrius alexandrinus nivosus* (breeding)	FE, CSC	Shore bird	Beaches, Estuarine Salt Ponds
Pacific green sea turtle *Chelonia mydas*	FE	Reptile	Marine
Salt-marsh bird's beak *Cordylanthus maritimus* ssp. *maritimus*	SE, FE	Plant	Salt Marsh
Southwestern willow flycatcher *Empidonax traillii extimus*	SE, Proposed FE	Bird	Riparian Woodland Habitat
Tidewater goby *Eucyclogobius newberryi* (Girard)	FE	Fish	Shallow Marine Waters, and in the Lower Reaches of Streams
Bald eagle *Haliaeetus leucocephalus*	SE, FT, CP	Bird	Lake
Humpback whale *Megaptera novaeangliae*	FE	Mammal	Ocean
Willowy monardella *Monardella linoides* ssp. *viminea*	SE, C2	Plant	Riparian Scrub Habitat
Belding's savannah sparrow *Passerculus sandwichensis beldingi*	SE, C2	Bird	Coastal Wetlands
California brown pelican *Pelecanus occidentalis californicus*	SE, FE	Bird	Estuarine, Marine, Subtidal, and Marine Pelagic Waters
Light-footed clapper rail *Rallus longirostris levipes*	FE, CP	Bird	Coastal Marshes, Mudflats
California least tern *Sterna antillarum browni*	SE, FE	Bird	Marine, Coastal Area Waters
Least Bell's vireo *Vireo bellii pusillus*	SE, FE	Bird	Riparian Woodland Habitat

Status *

Federally threatened (FT) or endangered (FE) species are defined under section 3 of the federal Endangered Species Act of 1973 (50 CFR 17). An endangered species is any species, including subspecies and varieties, "*in danger of extinction throughout all or a significant portion of its range*." A threatened species is any species "*likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range*." Threatened and endangered species have been the subject of a proposed and final rule (or regulation) published in the Federal Register. Thus, these species are also referred to as listed species. Proposed species are species proposed for listing as a threatened or endangered species for which a proposed rule, but not a final rule, has been published in the Federal Register.

Proposed species are granted limited protection under the federal Endangered Species Act. These species must be addressed by federal agencies in biological assessments (section 7), and are given special management consideration by regulatory agencies. Candidate species are species under consideration for listing, but have not been subject to a proposed rule. Categories for candidate species relate solely to the level of biological information available and not to the degree of threat. Candidate species are not protected under the federal Endangered Species Act.

Candidate species however, are afforded special management consideration due to their status and sensitivity. The U.S. Fish and Wildlife Service provides technical assistance to Federal, State and local agencies on the conservation and management of candidate species. Candidate species in category 1 (C1) are those taxa that seem to conform to the State definition of threatened or endangered species and should be added to the offical list. Candidate species in category 2 (C2) are those taxa that have populations that are low, scattered, or highly localized. Their populations have declined in abundance in recent years and so require management to prevent them from becoming threatened species.

The definitions of state threatened (ST) or endangered (SE) species under the California Endangered Species Act are the same as under the federal Endangered Species Act. Under the State Act, all animals previously listed as Rare have been "*grandfathered*" into the State Act as threatened. All plants previously listed as Rare have been kept as Rare. All plants now listed under the State Act are listed as threatened or endangered.

California Species of Special Concern (CSC) are animal species that have no specific status as a state listed species, but which appear to be vulnerable to extinction because of declining populations, limited ranges, or rarity. CSC meet the criteria for state listing and are commonly addressed under the California Environmental Quality Act. The category of California Fully Protected Species (CP) was established by the California legislature and prohibits the possession or taking of sensitive animals, or parts thereof (sections 3511, 4700, 5050, and 5515, Fish and Game Code).

In cold fresh water bodies, where the water body is free-flowing, such as in a river, stream or creek, the habitat usually supports a diversity of aquatic insects, including those aquatic insects which require a high quality of water. Typically, there is overhanging cover and shade, provided by a variety of aquatic plants, terrestrial plants, and trees. Another characteristic is that the bottom substrate usually contains structure, provided by tree root wads, logs, boulders, or gravel.

DESIGNATION OF SPAWNING, REPRODUCTION, AND/ OR EARLY DEVELOPMENT BENEFICIAL USE

In the San Diego Region, the 'spawning, reproduction and/or early development' (SPWN) beneficial use designation is assigned only to water bodies with MAR and/ or COLD beneficial uses. The marine fish used for the SPWN designation includes any marine fish. The cold freshwater fish used for the SPWN designation is the rainbow trout. Rainbow trout usually spawn in the Spring, and require spawning areas with gravel and cool, free-flowing, well-oxygenated water. Rainbow trout prefer to spawn in rivers, streams and creeks with a moderate gradient and containing riffles, however some populations of rainbow trout are also known to successfully spawn in lake inlets and outlets. The fry of rainbow trout need suitable nurseries, which allow protection from predators, such as the slow, shallow areas adjacent to riffles, with shade from bank vegetation. The fry also require an abundance of aquatic insects for forage.

SOURCES OF DRINKING WATER POLICY

Clouds

In November 1986, the Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65) was approved by the California voters. Proposition 65 prohibits the discharge of toxic substances into "*sources of drinking water*". The State Board has defined the term "*sources of drinking water*" in Resolution No. 88-63, *Sources of Drinking Water* Policy. This policy specifies that, except under specifically defined conditions, all surface and ground waters of the state are to be protected as existing or potential sources of municipal and domestic water supply. The exceptions include where:

- The total dissolved solids concentration of surface and ground waters exceed 3,000 milligrams per liter (mg/l);
- The water source has a low sustainable yield of less than 200 gallons per day for a single well;
- There is contamination that cannot reasonably be treated for domestic use with either best management practices or best economically available treatment practices;
- The surface waters are in particular municipal, industrial, and agricultural conveyance and holding facilities; and
- The ground waters are regulated geothermal energy ground waters.

Resolution No. 88-63 provides that any water body designated with an existing or potential municipal and domestic supply (MUN) beneficial use is also defined as a suitable or potentially suitable source of drinking water. The policy also allows a water body to retain beneficial use designations assigned prior to the State Board's adoption of the "*Sources of Drinking Water*" Policy.

EXCEPTIONS TO THE "SOURCES OF DRINKING WATER" POLICY

In 1989 the Regional Board adopted Resolution No. 89-33, *'Incorporation of "Sources of Drinking Water"* Policy into the Water Quality Control Plan (Basin Plan) of the San Diego Region'. Resolution No. 89-33 incorporates the State Board's "*Sources of Drinking Water*" Policy into the Basin Plan. Resolution No. 89-33 also provides an initial list of surface and ground water hydrologic units (HUs), areas (HAs), and subareas (HSAs) which the Regional Board has previously determined do not support the MUN or "*Sources of Drinking Water*" designation. Since 1989, additional areas have also been identified as exceptions to the "*Sources of Drinking Water*" Policy. These ground and surface water HUs, HAs, and HSAs are identified in Tables 2-2 and 2-5 with a "+" indicating that the water body has been exempted by the Regional Board from the municipal use designation under the terms and conditions of State Board Resolution No. 88-63, "*Sources of Drinking Water*" Policy.

Arroyo chub

INLAND SURFACE WATERS

Inland surface waters consist of all waters in the Region exclusive of the waters of the Pacific Ocean, enclosed bays and estuaries, coastal lagoons, and ground waters. The existing and potential beneficial uses of inland surface waters and their tributaries in the Region are presented in Table 2-2. Hydrologic unit, area, and subarea numbers are noted in Table 2-2 as a cross reference to the classification system developed by the California Department of Water Resources. For those surface water bodies that cross into other hydrologic units, such water bodies appear more than once in a table. In Table 2-2, starting from the north and proceeding towards the south within the Region, watersheds are listed by the direction of flow from the headwaters downstream to the outlet. Within a particular watershed, the mainstream water body is listed first and is placed flush left in the table, the upstream tributaries are listed below the mainstream water body and placed to the right. In most instances, surface waters are subdivided into reaches at hydrologic subarea boundaries. Those waters not specifically listed (generally smaller tributaries) are designated with the same beneficial uses as the streams, lakes, or reservoirs to which they are tributary.

Although most free flowing streams in the Region are essentially interrupted in character having both perennial and ephemeral components, several beneficial uses, including aesthetic enjoyment and habitats for fish and wildlife, are made of these surface waters. Beneficial uses of inland surface waters generally include REC-1 (swimmable) and WARM or COLD. Additionally, inland waters are usually designated as IND, PRO, REC-2, WILD, and are sometimes designated as BIOL and RARE. Inland surface waters that meet the criteria mandated by the *Sources of Drinking Water* Policy are designated MUN. Unless otherwise designated by the Regional Board, all inland surface waters in the Region are considered suitable or potentially suitable as a municipal and domestic water supply.

COASTAL WATERS

Coastal waters discussed in this section may be defined as waters subject to tidal action and include the water bodies defined below. Beneficial uses of coastal waters in the region generally include REC-1, REC-2, EST, WILD, RARE, and MAR. The Pacific Ocean and San Diego Bay also include NAV.

- ***Ocean Waters***

Ocean Waters are the territorial marine waters of the Region as defined by California law to the extent these waters are outside of enclosed bays, estuaries, and coastal lagoons.

- ***Enclosed Bays***

Enclosed bays are indentations along the coast which enclose an area of oceanic water within distinct headlands or harbor works. Enclosed bays includes all bays where the narrowest difference between the headlands or outermost harbor works is less than 75% of the greatest dimension of the enclosed portion of the bay. Enclosed bays do not include inland surface waters or ocean waters.

- ***Estuaries***

Estuaries means waters, including coastal lagoons, located at the mouths of streams which serve as areas of mixing for fresh and ocean waters. Coastal lagoons and mouths of streams which are temporarily separated from the ocean by sandbars are considered estuaries. Estuarine waters are considered to extend from a bay or the open ocean to a point upstream where there is no significant mixing of fresh water and sea water. Estuaries do not include inland surface waters or ocean waters.

Beneficial uses for these coastal waters provide habitat for marine life and are used extensively for recreation, boating, shipping, and commercial and sport fishing. Coastal waters in the San Diego Region have as many as fourteen designated beneficial uses.

All coastal lagoons of the Region are included in the category "*Coastal Waters*". The mouths of most of the rivers and creeks are continually

affected by tidal action and present a relatively stable environment for wildlife and vegetation. Other coastal lagoons may be separated from tidal action by earthen deposits and thus present an environment with major seasonal variations. Such conditions result in the development of a unique biologic community highly specific to that area. Occasionally, the mouths of these coastal lagoons are opened, subjecting the lagoons to tidal flushing to enhance their value for recreational use. This action would not alter the categories of beneficial uses of the coastal lagoons.

A listing of coastal waters in the San Diego Region and the existing and potential beneficial uses of each are summarized in Table 2-3.

Lower Otay Reservoir

RESERVOIRS AND LAKES

The water resources with the greatest diversity of beneficial uses in the Region are the man-made water storage reservoirs and lakes. Located in nearly all of the Region's hydrologic units, these reservoirs and lakes intercept surface runoff and store imported water supplies. As such, the storage reservoirs serve as: (1) sources of supply for municipalities, agricultural areas, and industrial operations; (2) recreational bodies; and (3) habitats for fish and wildlife. In a few cases, such as reservoirs used primarily for drinking water, REC-1 uses can be restricted or prohibited by the entities that manage these waters. Many of these reservoirs, however, are designated as potential for REC-1, reflecting federal Clean Water Act goals.

A listing of existing and potential beneficial uses of major reservoirs and lakes in the San Diego Region is given in Table 2-4.

GROUND WATERS

Ground water is defined as subsurface water that occurs beneath the water table in soils and geologic formations that are fully saturated. Ground water bearing formations sufficiently permeable to transmit and yield significant quantities of water are called aquifers (Bouwer, 1978). A ground water basin is defined as a hydrogeologic unit containing one large aquifer or several connected and interrelated aquifers (Todd, 1980).

The principal ground water basins in the San Diego Region are small and shallow. Only a small portion of the Region is underlain by permeable geologic formations that can accept, transmit and yield appreciable quantities of ground water. In many parts of the Region, usable ground water occurs outside of the principal ground water basins. There are ground water bearing geologic formations in the Region that do not meet the definition of an aquifer. Accordingly, the term "*ground water*" for basin planning and regulatory purposes, includes all subsurface waters that occur in fully saturated zones within soils, and other geologic formations. Subsurface waters are considered ground water even if the waters do not occur in an aquifer or an identified ground water basin.

Ground waters in the San Diego Region can have as many as six designated beneficial uses including: (1) municipal and domestic; (2) agricultural; (3) industrial service supply; (4) industrial process supply; (5) ground water recharge; and (6) freshwater replenishment. Nearly all of the ground water development in the Region has been for the purpose of municipal and agricultural supply. Ground water uses in some hydrologic units have been expanded to include industrial uses, especially gravel and sand washing. The fresh water replenishment designation has been assigned to ground water basins that are utilized for supplying water to a lake or stream. The ground water recharge designation has been applied to ground water hydrologic units which are used to recharge another hydrologic unit.

Most of the ground waters in the Region have been extensively developed; the availability of potential future uses of ground water resources is limited. Further development of ground water resources would probably necessitate ground

water recharge programs to maintain adequate ground water table elevations.

Ground waters that meet the criteria mandated by the *Sources of Drinking Water* Policy are designated MUN. Unless otherwise designated by the Regional Board all ground waters in the Region are considered suitable or potentially suitable as sources of drinking water.

The Regional Board has deleted beneficial use designations in portions of certain hydrologic ground water units, areas or subareas. Available information indicated that the beneficial uses in portions of these hydrologic ground water basins did not occur and were not likely to occur in the future. The Regional Board will issue waste discharge requirements and enforcement orders in these basins in conformance with the terms and conditions of State Board Resolution No. 68-16, *Statement of Policy With Respect to Maintaining High Quality of Waters in California*. It is the Regional Board's intent that water quality be maintained in conformance with the terms and conditions of Resolution No. 68-16.

A listing of the beneficial uses of the ground waters in the Region is presented in Table 2-5.

BENEFICIAL USE TABLES

Designated beneficial uses are summarized in the tables at the end of this chapter as follows:

Table 2-2 Inland Surface Waters;
Table 2-3 Coastal Waters;
Table 2-4 Reservoirs and Lakes; and
Table 2-5 Ground Water.

In the tables, a "●" indicates an existing beneficial use that was actually attained in the surface or ground water on or after November 28, 1975. A "○" indicates a potential beneficial use that will probably develop in future years through the implementation of various control measures. Potential uses also include uses that have been developed in the past but have been abandoned for reasons other than water quality. A "+" indicates that the water body has been exempted by the Regional Board from the municipal use designation under the terms and conditions of State Board Resolution No. 88-63, *Sources of Drinking Water* Policy.

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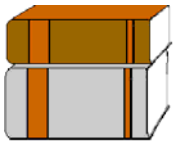

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Table 2-2. BENEFICIAL USES OF INLAND SURFACE WATERS

Inland Surface Waters [1, 2]	Hydrologic Unit Basin Number	BENEFICIAL USE														
		MUN	AGR	IND	PROC	GWR	FRSH	POW	REC1	REC2	BIOL	WARM	COLD	WILD	RARE	SPWN
Orange County Coastal Streams																
Moro Canyon	1.11	+	●						○	●		●		●		
unnamed intermittent coastal streams	1.11	+	●						○	●		●		●		
Emerald Canyon	1.11	+	●						○	●		●		●		
Boat Canyon	1.11	+	●						○	●	●	●		●		
Laguna Canyon	1.12	+	●						○	●		●		●		
Blue Bird Canyon	1.12	+	●						○	●		●		●		
Rim Rock Canyon	1.12	+	●						○	●		●		●		
unnamed intermittent coastal streams	1.13	+	●						○	●		●		●		
Hobo Canyon	1.13	+	●						○	●		●		●		
Aliso Creek Watershed																
Aliso Creek [3]	1.13	+	●						○	●		●		●		
English Canyon	1.13	+	●						○	●		●		●		
Sulphur Creek	1.13	+	●						○	●		●		●		
Wood Canyon	1.13	+	●						○	●		●		●		
Aliso Creek Mouth	1.13	See Coastal Waters – Table 2-3														

● Existing Beneficial Use

○ Potential Beneficial Use

\+ Excepted from MUN (See Text)

[1] Waterbodies are listed multiple times if they cross hydrologic area or sub area boundaries.

[2] Beneficial use designations apply to all tributaries to the indicated waterbody, if not listed separately.

[3] Aliso Creek, San Juan Creek, Tecolote Creek, Forrester Creek, San Diego River (lower), and Chollas Creek are designated as water quality limited segments for indicator bacteria pursuant to Clean Water Act section 303(d). Total Maximum Daily Loads have been adopted to address these impairments. See Chapter 3, *Water Quality Objectives,* Bacteria –Total Coliform, Fecal Coliform, *E. Coli*, and Enterococci, and Chapter 7, *Revised Total Maximum Daily Loads for Indicator Bacteria, Project I – Twenty Beaches and Creeks in the San Diego Region (Including Tecolote Creek)*.

Table 2-2. BENEFICIAL USES OF INLAND SURFACE WATERS

Inland Surface Waters [1, 2]	Hydrologic Unit Basin Number	BENEFICIAL USE														
		MUN	AGR	IND	PROC	GWR	FRSH	POW	REC1	REC2	BIOL	WARM	COLD	WILD	RARE	SPWN
Dana Point Watershed																
unnamed intermittent coastal streams	1.14	+	●						○	●		●		●		
Salt Creek	1.14	+	●						○	●		●		●		
San Juan Canyon	1.14	+	●						○	●		●		●		
Arroyo Salada	1.14	+	●						○	●		●		●		
San Juan Creek Watershed																
San Juan Creek [3]	1.25	+	●	●					●	●		●	●	●		
Morrell Canyon	1.25	+	●	●					●	●		●	●	●		
Decker Canyon	1.25	+	●	●					●	●		●	●	●		
Long Canyon	1.25	+	●	●					●	●		●	●	●		
Lion Canyon	1.25	+	●	●					●	●		●	●	●		●
Hot Spring Canyon	1.25	+	●	●					●	●		●	●	●		●
Cold Spring Canyon	1.25	+	●	●					●	●		●	●	●		
Lucas Canyon	1.25	+	●	●					●	●		●	●	●		
Aliso Canyon	1.25	+	●	●					●	●		●	●	●		
Verdugo Canyon	1.25	+	●	●					●	●		●	●	●		
Bell Canyon	1.25	+	●	●					●	●		●	●	●		
Fox Canyon	1.25	+	●	●					●	●		●	●	●		

● Existing Beneficial Use

○ Potential Beneficial Use

\+ Excepted from MUN (See Text)

[1] Waterbodies are listed multiple times if they cross hydrologic area or sub area boundaries.

[2] Beneficial use designations apply to all tributaries to the indicated waterbody, if not listed separately.

[3] Aliso Creek, San Juan Creek, Tecolote Creek, Forrester Creek, San Diego River (lower), and Chollas Creek are designated as water quality limited segments for indicator bacteria pursuant to Clean Water Act section 303(d). Total Maximum Daily Loads have been adopted to address these impairments. See Chapter 3, *Water Quality Objectives,* Bacteria -Total Coliform, Fecal Coliform, *E. Coli*, and Enterococci, and Chapter 7, *Revised Total Maximum Daily Loads for Indicator Bacteria, Project I – Twenty Beaches and Creeks in the San Diego Region (Including Tecolote Creek)*.

Table 2-2. BENEFICIAL USES OF INLAND SURFACE WATERS

Inland Surface Waters [1, 2]	Hydrologic Unit Basin Number	BENEFICIAL USE														
		MUN	AGR	IND	PROC	GWR	FRSH	POW	REC1	REC2	BIOL	WARM	COLD	WILD	RARE	SPWN
San Juan Creek Watershed – continued																
Dove Canyon	1.24	+	●	●					●	●		●	●	●		
Crow Canyon	1.25	+	●	●					●	●		●	●	●		
San Juan Creek	1.26	+	●	●					●	●		●	●	●		
Trampas Canyon	1.26	+	●	●					●	●		●	●	●		
Canada Gobernadora	1.24	+	●	●					●	●		●	●	●		
Canada Chiquita	1.24	+	●	●					●	●		●	●	●		
San Juan Creek	1.28	+	●	●					●	●		●	●	●		
San Juan Creek	1.27	+	●	●					●	●		●	●	●		
Horno Creek	1.27	+	●	●					●	●		●	●	●		
Arroyo Trabuco Creek	1.22	+	●	●					●	●		●	●	●		●
Holy Jim Canyon	1.22	+	●	●					●	●		●	●	●		●
Falls Canyon	1.22	+	●	●					●	●		●	●	●		
Rose Canyon	1.22	+	●	●					●	●		●	●	●		
Hickey Canyon	1.22	+	●	●					●	●		●	●	●		
Live Oak Canyon	1.22	+	●	●					●	●		●	●	●		
Arroyo Trabuco Creek	1.23	+	●	●					●	●		●	●	●		
Tijeras Canyon	1.23	+	●	●					●	●		●	●	●		

● Existing Beneficial Use

+ Excepted from MUN (See Text)

[1] Waterbodies are listed multiple times if they cross hydrologic area or sub area boundaries.

[2] Beneficial use designations apply to all tributaries to the indicated waterbody, if not listed separately.

Table 2-2. BENEFICIAL USES OF INLAND SURFACE WATERS

Inland Surface Waters [1, 2]	Hydrologic Unit Basin Number	BENEFICIAL USE														
		MUN	AGR	IND	PROC	GWR	FRSH	POW	REC1	REC2	BIOL	WARM	COLD	WILD	RARE	SPWN
San Juan Creek Watershed – continued																
Arroyo Trabuco Creek	1.27	+	●	●					●	●		●	●	●		
Oso Creek	1.21	+	●	●					●	●		●	●	●		
La Paz Creek	1.21	+	●	●					●	●		●	●	●		
San Juan Creek Mouth	1.27	See Coastal Waters – Table 2-3														
Orange County Coastal Streams																
Prima Deshecha Canada	1.31	+	●						○	●		●		●		
unnamed intermittent coastal streams	1.30	+	●						○	●		●		●		
Segunda Deshecha Canada	1.32	+	●						○	●		●		●		
San Mateo Creek Watershed																
San Mateo Creek	1.40	+							○	●		●	●	●	●	●
Devil Canyon Creek	1.40	+							○	●		●	●	●		●
Cold Spring Canyon	1.40	+							○	●		●	●	●		
San Mateo Canyon	1.40	+							○	●		●	●	●	●	●
Los Alamos Canyon	1.40	+							○	●		●	●	●		●
Wildhorse Canyon	1.40	+							○	●		●	●	●		
Tenaja Canyon	1.40	+							○	●		●	●	●		●
Bluewater Canyon	1.40	+							○	●		●	●	●		

● Existing Beneficial Use

○ Potential Beneficial Use

\+ Excepted from MUN (See Text)

[1] Waterbodies are listed multiple times if they cross hydrologic area or sub area boundaries.

[2] Beneficial use designations apply to all tributaries to the indicated waterbody, if not listed separately.

Table 2-2. BENEFICIAL USES OF INLAND SURFACE WATERS

Inland Surface Waters [1, 2]	Hydrologic Unit Basin Number	BENEFICIAL USE														
		MUN	AGR	IND	PROC	GWR	FRSH	POW	REC1	REC2	BIOL	WARM	COLD	WILD	RARE	SPWN
San Mateo Creek Watershed – continued																
Nickel Canyon	1.40	+							○	●		●	●	●		
Christianitos Creek	1.40	+							○	●		●	●	●		
Gabino Canyon	1.40	+							○	●		●	●	●		
La Paz Canyon	1.40	+							○	●		●	●	●		
Blind Canyon	1.40	+							○	●		●	●	●		
Talega Canyon	1.40	+							○	●		●	●	●		
San Mateo Creek Mouth	1.40	See Coastal Waters – Table 2-3														
San Onofre Creek Watershed																
San Onofre Creek	1.51	+	●						●	●		●	●	●		●
San Onofre Canyon North Fork	1.51	+	●						●	●		●	●	●		●
Jardine Canyon	1.51	+	●						●	●		●	●	●		
San Onofre Canyon	1.51	+	●						●	●		●	●	●		●
San Onofre Canyon South Fork	1.51	+	●						●	●		●	●	●	●	
San Onofre Creek Mouth	1.51	See Coastal Waters – Table 2-3														
unnamed intermittent coastal streams	1.51	+	●						●	●		●		●		
Foley Canyon	1.51	+	●						●	●		●		●		
Horno Canyon	1.51	+	●						●	●		●		●		

● Existing Beneficial Use

○ Potential Beneficial Use

\+ Excepted from MUN (See Text)

[1] Waterbodies are listed multiple times if they cross hydrologic area or sub area boundaries.

[2] Beneficial use designations apply to all tributaries to the indicated waterbody, if not listed separately.

Table 2-2. BENEFICIAL USES OF INLAND SURFACE WATERS

Inland Surface Waters [1, 2]	Hydrologic Unit Basin Number	BENEFICIAL USE														
		MUN	AGR	IND	PROC	GWR	FRSH	POW	REC1	REC2	BIOL	WARM	COLD	WILD	RARE	SPWN
San Onofre Creek Watershed – continued																
Las Flores Creek	1.52	+	●						●	●		●	●	●	●	
Piedra de Lumbre Canyon	1.52	+	●						●	●		●	●	●	●	
unnamed intermittent coastal streams	1.52	+	●						●	●		●		●		
Aliso Canyon	1.53	+	●						●	●		●	●	●	●	
French Canyon	1.53	+	●						●	●		●		●	●	
Cockleburr Canyon	1.53	+	●						●	●		●		●		
Santa Margarita River Watershed																
Santa Margarita River	2.22	●	●	●					●	●		●	●	●	●	
Murrieta Creek	2.31	●	●	●	●				○	●		●		●		
Bundy Canyon	2.31	●	●	●	●				○	●		●		●		
Slaughterhouse Canyon	2.31	●	●	●	●				○	●		●		●		
Murrieta Creek	2.32	●	●	●	●				○	●		●		●		
Murrieta Creek	2.52	●	●	●	●	●			○	●		●		●		
Cole Canyon	2.32	●	●	●	●				○	●	●	●		●		
Miller Canyon	2.32	●	●	●	●				○	●		●		●		
Warm Springs Creek	2.36	●	●	●	●				○	●		●		●		
Diamond Valley	2.36	●	●	●	●				○	●		●		●		

● Existing Beneficial Use

○ Potential Beneficial Use

+ Excepted from MUN (See Text)

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[2] Beneficial use designations apply to all tributaries to the indicated waterbody, if not listed separately.

Table 2-2. BENEFICIAL USES OF INLAND SURFACE WATERS

Inland Surface Waters [1, 2]	Hydrologic Unit Basin Number	BENEFICIAL USE														
		MUN	AGR	IND	PROC	GWR	FRSH	POW	REC1	REC2	BIOL	WARM	COLD	WILD	RARE	SPWN
Santa Margarita River Watershed - continued																
Goodhart Canyon	2.36	●	●	●	●				○	●		●		●		
Pixley Canyon	2.36	●	●	●	●				○	●		●		●		
Warm Springs Creek	2.35	●	●	●	●				○	●		●		●		
Domenigoni Valley	2.35	●	●	●	●				○	●		●		●		
Warm Springs Creek	2.34	●	●	●	●				○	●		●		●		
Warm Springs Creek	2.33	●	●	●	●				○	●		●		●		
French Valley	2.33	●	●	●	●				○	●		●		●		
Santa Gertrudis Creek	2.42	●	●	●	●	○			●	●		●		●		
Long Valley	2.42	●	●	●	●	○			●	●		●		●		
Glenoak Valley	2.42	●	●	●	●	○			●	●		●	●	●		
Tucalota Creek	2.43	●	●	●	●	○			●	●		●	●	●		
Willow Canyon	2.44	●	●	●	●	○			●	●		●	●	●		
Lake Skinner	2.41	See Reservoirs & Lakes – Table 2-4														
Tucalota Creek	2.41	●	●	●	●	○			●	●		●		●		
Crown Valley	2.41	●	●	●	●	○			●	●		●	●	●		
Rawson Canyon	2.41	●	●	●	●	○			●	●		●	●	●		
Tucalota Creek	2.42	●	●	●	●	○			●	●		●		●		

● Existing Beneficial Use

○ Potential Beneficial Use

[1] Waterbodies are listed multiple times if they cross hydrologic area or sub area boundaries.

[2] Beneficial use designations apply to all tributaries to the indicated waterbody, if not listed separately.

Table 2-2. BENEFICIAL USES OF INLAND SURFACE WATERS

Inland Surface Waters [1, 2]	Hydrologic Unit Basin Number	BENEFICIAL USE														
		MUN	AGR	IND	PROC	GWR	FRSH	POW	REC1	REC2	BIOL	WARM	COLD	WILD	RARE	SPWN
Santa Margarita River Watershed - continued																
Santa Gertrudis Creek	2.32	●	●	●	●				○	●		●		●		
Long Canyon	2.32	●	●	●	●				○	●		●		●		
Temecula Creek	2.93	●	●	●	●	●			○	●		●		●		
Kohler Canyon	2.93	●	●	●	●	●			○	●		●	●	●		
Rattlesnake Creek	2.93	●	●	●	●	●			○	●		●	●	●		
Temecula Creek	2.92	●	●	●	●	●			○	●		●		●		
Chihuahua Creek	2.94	●	●	●	●	●			○	●		●		●		
Chihuahua Creek	2.92	●	●	●	●	●			○	●		●		●		
Cooper Canyon	2.92	●	●	●	●	●			○	●		●		●		
Iron Spring Canyon	2.92	●	●	●	●	●			○	●		●		●		
Temecula Creek	2.91	●	●	●	●	●			○	●		●		●		
Culp Valley	2.91	●	●	●	●	●			○	●		●		●		
Temecula Creek	2.84	●	●	●	●	●			●	●		●	●	●		●
Tule Creek	2.84	●	●	●	●	●			●	●		●	●	●		
Million Dollar Canyon	2.84	●	●	●	●	●			●	●		●	●	●		
Cottonwood Creek	2.84	●	●	●	●	●			●	●		●	●	●		●
Temecula Creek	2.83	●	●	●	●	●			●	●		●	●	●		●

● Existing Beneficial Use

○ Potential Beneficial Use

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[2] Beneficial use designations apply to all tributaries to the indicated waterbody, if not listed separately.

Table 2-2. BENEFICIAL USES OF INLAND SURFACE WATERS

Inland Surface Waters [1, 2]	Hydrologic Unit Basin Number	BENEFICIAL USE														
		MUN	AGR	IND	PROC	GWR	FRSH	POW	REC1	REC2	BIOL	WARM	COLD	WILD	RARE	SPWN
Santa Margarita River Watershed - continued																
Long Canyon	2.83	●	●	●	●	●			●	●		●	●	●		●
Vail Lake	2.81	See Reservoirs & Lakes – Table 2-4														
Wilson Creek	2.63	●	●	●	●	●			○	●		●		●		
Wilson Creek	2.61	●	●	●	●	●			○	●		●		●		
Cahuilla Creek	2.73	●	●	●	●	●			○	●		●		●		
Hamilton Creek	2.74	●	●	●	●	●			○	●		●		●		
Hamilton Creek	2.73	●	●	●	●	●			○	●		●		●		
Cahuilla Creek	2.72	●	●	●	●	●			○	●		●		●		
Cahuilla Creek	2.71	●	●	●	●	●			○	●		●		●		
Elder Creek	2.71	●	●	●	●	●			○	●		●		●		
Cahuilla Creek	2.61	●	●	●	●	●			○	●		●		●		
Wilson Creek	2.81	●	●	●	●	●			●	●		●	●	●		
Lewis Valley	2.62	●	●	●	●	●			○	●		●		●		
Arroyo Seco Creek	2.81	●	●	●	●	●			●	●		●	●	●		
Arroyo Seco Creek	2.82	●	●	●	●	●			●	●		●	●	●		●
Kolb Creek	2.81	●	●	●	●	●			●	●		●	●	●		
Temecula Creek	2.81	●	●	●	●	●			●	●		●	●	●		●

● Existing Beneficial Use

○ Potential Beneficial Use

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Table 2-2. BENEFICIAL USES OF INLAND SURFACE WATERS

Inland Surface Waters [1, 2]	Hydrologic Unit Basin Number	BENEFICIAL USE														
		MUN	AGR	IND	PROC	GWR	FRSH	POW	REC1	REC2	BIOL	WARM	COLD	WILD	RARE	SPWN
Santa Margarita River Watershed - continued																
Temecula Creek	2.51	●	●	●	●	●			○	●		●		●		
Temecula Creek	2.52	●	●	●	●	●			○	●		●		●		
Pechanga Creek	2.52	●	●	●	●	●			○	●		●		●		
Rainbow Creek[3]	2.23	●	●	●					●	●		●	●	●		●
Rainbow Creek[3]	2.22	●	●	●					●	●		●	●	●		●
Sandia Canyon	2.22	●	●	●					●	●		●	●	●		●
Walker Basin	2.22	●	●	●					●	●		●	●	●		
Santa Margarita River	2.21	●	●	●					●	●		●	●	●	●	
DeLuz Creek	2.21	●	●	●					●	●		●	●	●	●	●
Cottonwood Creek	2.21	●	●	●					●	●		●	●	●		
Camps Creek	2.21	●	●	●					●	●		●	●	●		●
Fern Creek	2.21	●	●	●					●	●		●	●	●		●
Roblar Creek	2.21	●	●	●					●	●		●	●	●		
O'Neill Lake	2.13	See Reservoirs & Lakes – Table 2-4														
Santa Margarita River	2.13	●	●	●	●				●	●		●	●	●	●	
Wood Canyon	2.13	●	●	●	●				●	●		●		●		
Santa Margarita River	2.12	●	●	●	●				●	●		●	●	●	●	

● Existing Beneficial Use

○ Potential Beneficial Use

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[2] Beneficial use designations apply to all tributaries to the indicated waterbody, if not listed separately.

[3] Rainbow Creek is designated as an impaired water body for total nitrogen and total phosphorus pursuant to Clean Water Act section 303(d). Total Maximum Daily Loads (TMDLs) have been adopted to address these impairments. See Chapter 3, Water Quality Objectives for Biostimulatory Substances and Chapter 7, Total Maximum Daily Loads.

Table 2-2. BENEFICIAL USES OF INLAND SURFACE WATERS

Inland Surface Waters [1, 2]	Hydrologic Unit Basin Number	BENEFICIAL USE														
		MUN	AGR	IND	PROC	GWR	FRSH	POW	REC1	REC2	BIOL	WARM	COLD	WILD	RARE	SPWN
Santa Margarita River Watershed - continued																
Santa Margarita River	2.11	●	●	●	●				●	●		●	●	●	●	
Pueblitos Canyon	2.11	●	●	●	●				●	●		●		●	●	
Newton Canyon	2.11	●	●	●	●				●	●		●		●		
Santa Margarita Lagoon	2.11	See Coastal Waters – Table 2-3														
San Luis Rey River Watershed																
San Luis Rey River	3.32	●	●	●			●	●	●	●		●	●	●		
Johnson Canyon	3.32	●	●	●			●	●	●	●		●	●	●		
San Luis Rey River	3.31	●	●	●			●	●	●	●		●	●	●		
Canada Aguanga	3.31	●	●	●			●	●	●	●		●	●	●		
Dark Canyon	3.31	●	●	●			●	●	●	●		●	●	●		
Bear Canyon	3.31	●	●	●			●	●	●	●		●	●	●		
Cow Canyon	3.31	●	●	●			●	●	●	●		●	●	●		
Blue Canyon	3.31	●	●	●			●	●	●	●		●	●	●		
Rock Canyon	3.31	●	●	●			●	●	●	●		●	●	●		
Agua Caliente Creek	3.31	●	●	●			●	●	●	●		●	●	●		
unnamed Tributary	3.31	●	●	●			●	●	●	●		●	●	●		●
Canada Agua Caliente	3.31	●	●	●			●	●	●	●		●	●	●		

● Existing Beneficial Use

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Table 2-2. BENEFICIAL USES OF INLAND SURFACE WATERS

Inland Surface Waters [1, 2]	Hydrologic Unit Basin Number	BENEFICIAL USE														
		MUN	AGR	IND	PROC	GWR	FRSH	POW	REC1	REC2	BIOL	WARM	COLD	WILD	RARE	SPWN
San Luis Rey River Watershed- continued																
Canada Verde	3.31	●	●	●			●	●	●	●		●	●	●		
Ward Canyon	3.31	●	●	●			●	●	●	●		●	●	●		
Lake Henshaw	3.31	See Reservoirs & Lakes – Table 2-4														
West Fork San Luis Rey River	3.31	●	●	●			●	●	●	●		●	●	●		●
Fry Creek	3.31	●	●	●			●	●	●	●		●	●	●		
Iron Springs Creek	3.31	●	●	●			●	●	●	●		●	●	●		●
Buena Vista Creek	3.31	●	●	●			●	●	●	●		●	●	●		
Cherry Canyon	3.31	●	●	●			●	●	●	●		●		●		
Bertha Canyon	3.31	●	●	●			●	●	●	●		●		●		
Hoover Canyon	3.31	●	●	●			●	●	●	●		●		●		
Buck Canyon	3.31	●	●	●			●	●	●	●		●		●		
Bergstrom Canyon	3.31	●	●	●			●	●	●	●		●		●		
San Ysidro Creek	3.31	●	●	●			●	●	●	●		●		●		
Matagual Creek	3.31	●	●	●			●	●	●	●		●	●	●		
Carrizo Creek	3.31	●	●	●			●	●	●	●		●	●	●		
Carrista Creek	3.31	●	●	●			●	●	●	●		●		●		
Kumpohui Creek	3.31	●	●	●			●	●	●	●		●		●		

● Existing Beneficial Use

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Table 2-2. BENEFICIAL USES OF INLAND SURFACE WATERS

Inland Surface Waters [1, 2]	Hydrologic Unit Basin Number	BENEFICIAL USE														
		MUN	AGR	IND	PROC	GWR	FRSH	POW	REC1	REC2	BIOL	WARM	COLD	WILD	RARE	SPWN
San Luis Rey River Watershed - continued																
San Luis Rey River	3.31	●	●	●			●	●	●	●		●	●	●		
San Luis Rey River	3.23	●	●	●				●	●	●		●	●	●		●
Wigham Creek	3.23	●	●	●				●	●	●		●	●	●		
Prisoner Creek	3.23	●	●	●				●	●	●		●	●	●		
Lusardi Canyon	3.23	●	●	●				●	●	●		●	●	●		
Cedar Creek	3.23	●	●	●				●	●	●		●	●	●		
San Luis Rey River	3.22	●	●	●				●	●	●		●	●	●		
Bee Canyon	3.22	●	●	●				●	●	●		●	●	●		
Paradise Creek	3.22	●	●	●				●	●	●		●	●	●		
Hell Creek	3.22	●	●	●				●	●	●		●	●	●		
Horsethief Canyon	3.22	●	●	●				●	●	●		●	●	●		
Potrero Creek	3.22	●	●	●				●	●	●		●	●	●		
Plaisted Creek	3.22	●	●	●				●	●	●	●	●	●	●		
Yuima Creek	3.22	●	●	●				●	●	●		●	●	●		
Sycamore Canyon	3.22	●	●	●				●	●	●		●	●	●		
Pauma Creek	3.22	●	●	●				●	●	●		●	●	●		●
Doane Creek	3.22	●	●	●				●	●	●		●	●	●		●

● Existing Beneficial Use

[1] Waterbodies are listed multiple times if they cross hydrologic area or sub area boundaries.

[2] Beneficial use designations apply to all tributaries to the indicated waterbody, if not listed separately.

Table 2-2. BENEFICIAL USES OF INLAND SURFACE WATERS

Inland Surface Waters [1, 2]	Hydrologic Unit Basin Number	BENEFICIAL USE														
		MUN	AGR	IND	PROC	GWR	FRSH	POW	REC1	REC2	BIOL	WARM	COLD	WILD	RARE	SPWN
San Luis Rey River Watershed - continued																
Chimney Creek	3.22	●	●	●				●	●	●		●	●	●		
French Creek	3.22	●	●	●				●	●	●		●	●	●		●
Lion Creek	3.22	●	●	●				●	●	●		●	●	●		●
Harrison Canyon	3.22	●	●	●				●	●	●		●	●	●		
Jaybird Creek	3.22	●	●	●				●	●	●		●	●	●		
Frey Creek	3.22	●	●	●				●	●	●		●	●	●		
Agua Tibia Creek	3.22	●	●	●				●	●	●		●	●	●		●
San Luis Rey River	3.21	●	●	●					●	●		●	●	●		
Marion Canyon	3.21	●	●	●					●	●		●	●	●		
Magee Creek	3.21	●	●	●					●	●		●	●	●		
Castro Canyon	3.21	●	●	●					●	●		●	●	●		
Trujillo Creek	3.21	●	●	●					●	●		●	●	●		
Pala Creek	3.21	●	●	●					●	●		●	●	●		●
Gomez Creek	3.21	●	●	●					●	●		●	●	●		
Couser Canyon	3.21	●	●	●					●	●		●	●	●		
Double Canyon	3.21	●	●	●					●	●		●	●	●		
Rice Canyon	3.21	●	●	●					●	●		●	●	●		

● Existing Beneficial Use

[1] Waterbodies are listed multiple times if they cross hydrologic area or sub area boundaries.

[2] Beneficial use designations apply to all tributaries to the indicated waterbody, if not listed separately.

Table 2-2. BENEFICIAL USES OF INLAND SURFACE WATERS

Inland Surface Waters [1, 2]	Hydrologic Unit Basin Number	BENEFICIAL USE														
		MUN	AGR	IND	PROC	GWR	FRSH	POW	REC1	REC2	BIOL	WARM	COLD	WILD	RARE	SPWN
San Luis Rey River Watershed – continued																
San Luis Rey River	3.12	+	●	●					●	●	●	●		●	●	
Live Oak Creek	3.12	+	●	●					●	●		●		●	●	
Keys Creek	3.12	+	●	●					●	●		●		●		
Moosa Canyon	3.15	+	●	●					●	●		●		●		
unnamed intermittent streams	3.16	+	●	●					●	●		●		●		
Moosa Canyon	3.14	+	●	●					●	●		●		●		
Moosa Canyon	3.13	+	●	●					●	●		●		●		
Turner Lake	3.13	See Reservoirs & Lakes – Table 2-4														
South Fork Moosa Canyon	3.13	+	●	●					●	●		●		●		
Moosa Canyon	3.12	+	●	●					●	●		●		●		
Gopher Canyon	3.12	+	●	●					●	●		●		●		
South Fork Gopher Canyon	3.12	+	●	●					●	●		●		●		
San Luis Rey River	3.11	+	●	●					●	●		●		●	●	
Pilgrim Creek	3.11	+	●	●					●	●	●	●	●	●	●	
Windmill Canyon	3.11	+	●	●					●	●		●	●	●		
Tuley Canyon	3.11	+	●	●					●	●		●		●		
Lawerence Canyon	3.11	+	●	●					●	●		●		●		
Mouth of San Luis Rey River	3.11	See Coastal Waters – Table 2-3														

● Existing Beneficial Use

+ Excepted from MUN (See Text)

[1] Waterbodies are listed multiple times if they cross hydrologic area or sub area boundaries.

[2] Beneficial use designations apply to all tributaries to the indicated waterbody, if not listed separately.

Table 2-2. BENEFICIAL USES OF INLAND SURFACE WATERS

Inland Surface Waters [1, 2]	Hydrologic Unit Basin Number	BENEFICIAL USE														
		MUN	AGR	IND	PROC	GWR	FRSH	POW	REC1	REC2	BIOL	WARM	COLD	WILD	RARE	SPWN
San Diego County Coastal Streams																
Loma Alta Creek	4.10	+							○	●		●		●		
Loma Alta Slough	4.10	See Coastal Waters – Table 2-3														
Buena Vista Lagoon	4.21	See Coastal Waters – Table 2-3														
Buena Vista Creek	4.22	+	●	●					●	●		●		●		
Buena Vista Creek	4.21	+	●	●					●	●		●		●	●	
Agua Hedionda	4.31	See Coastal Waters – Table 2-3														
Agua Hedionda Creek	4.32	●	●	●					●	●		●		●		
Buena Creek	4.32	●	●	●					●	●		●		●		
Agua Hedionda Creek	4.31	●	●	●					●	●	●	●		●		
Letterbox canyon	4.31	●	●	●					●	●		●		●		
Canyon de las Encinas	4.40	+							○	●		●		●		
Cottonwood Creek	4.51	+	●						●	●		●		●		
Moonlight Creek	4.51	+	●						●	●		●		●		

● Existing Beneficial Use

○ Potential Beneficial Use

\+ Excepted from MUN (See Text)

[1] Waterbodies are listed multiple times if they cross hydrologic area or sub area boundaries.

[2] Beneficial use designations apply to all tributaries to the indicated waterbody, if not listed separately.

Table 2-2. BENEFICIAL USES OF INLAND SURFACE WATERS

Inland Surface Waters [1, 2]	Hydrologic Unit Basin Number	BENEFICIAL USE														
		MUN	AGR	IND	PROC	GWR	FRSH	POW	REC1	REC2	BIOL	WARM	COLD	WILD	RARE	SPWN
San Marcos Creek Watershed																
Batiquitos Lagoon	4.51	See Coastal Waters – Table 2-3														
San Marcos Creek	4.52	+	●						●	●		●		●		
unnamed intermittent streams	4.53	+	●						●	●		●		●		
San Marcos Creek	4.51	+	●						●	●		●		●		
Encinitas Creek	4.51	+	●						●	●		●		●		
Escondido Creek Watershed																
San Elijo Lagoon	4.61	See Coastal Waters – Table 2-3														
Escondido Creek	4.63	●	●	○				●	●	●		●	●	●		
Lake Wohlford	4.63	See Reservoirs & Lakes – Table 2-4														
Lake Dixon	4.62	See Reservoirs & Lakes – Table 2-4														
Escondido Creek	4.62	●	●	○					●	●		●	●	●		
Reidy Canyon	4.62	●	●	○					●	●		●	●	●		
Escondido Creek	4.61	●	●	○					●	●	●	●	●	●		

● Existing Beneficial Use

○ Potential Beneficial Use

\+ Excepted from MUN (See Text)

[1] Waterbodies are listed multiple times if they cross hydrologic area or sub area boundaries.

[2] Beneficial use designations apply to all tributaries to the indicated waterbody, if not listed separately.

Table 2-2. BENEFICIAL USES OF INLAND SURFACE WATERS

Inland Surface Waters [1, 2]	Hydrologic Unit Basin Number	BENEFICIAL USE														
		MUN	AGR	IND	PROC	GWR	FRSH	POW	REC1	REC2	BIOL	WARM	COLD	WILD	RARE	SPWN
San Dieguito Creek Watershed																
Santa Ysabel Creek	5.54	●	●	●	●				●	●		●	●	●		●
Dan Price Creek	5.54	●	●	●	●				●	●		●	●	●		
Santa Ysabel Creek	5.53	●	●	●	●				●	●		●	●	●		
Witch Creek	5.53	●	●	●	●				●	●		●	●	●		●
Sutherland Lake	5.53	See Reservoirs & Lakes – Table 2-4														
Bloomdale Creek	5.53	●	●	●	●				●	●		●	●	●		
Santa Ysabel Creek	5.52	●	●	●	●				●	●		●	●	●	●	
Lake Poway	5.52	See Reservoirs & Lakes – Table 2-4														
Black Canyon	5.52	●	●	●	●				●	●		●	●	●		●
Scholder Creek	5.52	●	●	●	●				●	●		●	●	●		
Temescal Creek	5.52	●	●	●	●				●	●		●	●	●		
Bear Creek	5.52	●	●	●	●				●	●		●	●	●		
Quail Canyon	5.52	●	●	●	●				●	●		●	●	●		
Carney Canyon	5.52	●	●	●	●				●	●		●	●	●		
Santa Ysabel Creek	5.51	●	●	●	●				●	●	●	●	●	●		
Boden Canyon	5.51	●	●	●	●				●	●	●	●	●	●		
Clevenger Canyon	5.51	●	●	●	●				●	●	●	●	●	●		

● Existing Beneficial Use

○ Potential Beneficial Use

[1] Waterbodies are listed multiple times if they cross hydrologic area or sub area boundaries.

[2] Beneficial use designations apply to all tributaries to the indicated waterbody, if not listed separately.

Table 2-2. BENEFICIAL USES OF INLAND SURFACE WATERS

Inland Surface Waters [1, 2]	Hydrologic Unit Basin Number	BENEFICIAL USE														
		MUN	AGR	IND	PROC	GWR	FRSH	POW	REC1	REC2	BIOL	WARM	COLD	WILD	RARE	SPWN
San Dieguito River Watershed – continued																
Santa Ysabel Creek	5.32	●	●	●	●				○	●		●		●	●	
Tims Canyon	5.32	●	●	●	●				○	●		●		●		
Schoolhouse Canyon	5.32	●	●	●	●				○	●		●		●		
Rockwood Canyon	5.35	●	●	●	●				○	●		●		●		
Guejito Creek	5.35	●	●	●	●				○	●		●		●		
unnamed intermittent streams	5.36	●	●	●	●				○	●		●		●		
Rockwood Canyon	5.32	●	●	●	●				○	●		●		●		
Santa Maria Creek	5.41	●	●	●	●				●	●		●		●		
Hatfield Creek	5.45	●	●	●	●				●	●		●		●		
Hatfield Creek	5.44	●	●	●	●				●	●		●		●		
Wash Hollow Creek	5.43	●	●	●	●				●	●		●		●		
Wash Hollow Creek	5.44	●	●	●	●				●	●		●		●		
Hatfield Creek	5.42	●	●	●	●				●	●		●		●		
Santa Teresa Valley	5.46	●	●	●	●				●	●		●		●		
unnamed intermittent streams	5.47	●	●	●	●				●	●		●		●		
Hatfield Creek	5.41	●	●	●	●				●	●		●		●		

● Existing Beneficial Use

○ Potential Beneficial Use

[1] Waterbodies are listed multiple times if they cross hydrologic area or sub area boundaries.

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Table 2-2. BENEFICIAL USES OF INLAND SURFACE WATERS

Inland Surface Waters [1, 2]	Hydrologic Unit Basin Number	BENEFICIAL USE														
		MUN	AGR	IND	PROC	GWR	FRSH	POW	REC1	REC2	BIOL	WARM	COLD	WILD	RARE	SPWN
San Dieguito River Watershed – continued																
Santa Maria Creek	5.32	●	●	●	●				○	●		●		●		
unnamed intermittent streams	5.33	●	●	●	●				○	●		●		●		
unnamed intermittent streams	5.34	●	●	●	●				○	●		●		●		
San Dieguito River	5.32	●	●	●	●				○	●		●		●	●	
Cloverdale Creek	5.32	●	●	●	●				○	●		●		●	●	
San Dieguito River	5.21	●	●	●	●				●	●	●	●	●	●	●	
Highland Valley	5.31	●	●	●	●				○	●		●		●		
Lake Hodges	5.21	See Reservoirs & Lakes – Table 2-4														
Kit Carson Creek	5.21	●	●	●	●	○			●	●		●		●	●	
West Branch Kit Carson Creek	5.24	●	●	●	●	○			●	●		●		●		
East Branch Kit Carson Creek	5.24	●	●	●	●	○			●	●		●		●		
Green Valley Creek	5.21	●	●	●	●	○			●	●		●		●		
Green Valley Creek	5.22	●	●	●	●	○			●	●		●		●		
Felicita Creek	5.23	●	●	●	●	○			●	●		●		●		
West Fork Felicita Creek	5.23	●	●	●	●	○			●	●		●		●		
East Fork Felicita Creek	5.23	●	●	●	●	○			●	●		●		●		

● Existing Beneficial Use

○ Potential Beneficial Use

[1] Waterbodies are listed multiple times if they cross hydrologic area or sub area boundaries.

[2] Beneficial use designations apply to all tributaries to the indicated waterbody, if not listed separately.

Table 2-2. BENEFICIAL USES OF INLAND SURFACE WATERS

Inland Surface Waters [1, 2]	Hydrologic Unit Basin Number	BENEFICIAL USE														
		MUN	AGR	IND	PROC	GWR	FRSH	POW	REC1	REC2	BIOL	WARM	COLD	WILD	RARE	SPWN
San Dieguito River Watershed - continued																
San Dieguito Reservoir	5.21	See Reservoirs & Lakes – Table 2-4														
Warren Canyon	5.21	●	●	●	●				●	●	●	●	●	●		
San Bernardo Valley	5.21	●	●	●	●				●	●		●		●	●	
unnamed intermittent streams	5.24	●	●	●	●				●	●		●		●		
unnamed intermittent streams	5.23	●	●	●	●				●	●		●		●		
unnamed intermittent streams	5.22	●	●	●	●				●	●		●		●		
San Dieguito River	5.11	+	○	○					●	●		●	●	●		●
Lusardi Creek	5.12	+	○	○					●	●		●		●		
Lusardi Creek	5.11	+	○	○					●	●		●		●		
La Zanja Canyon	5.11	+	○	○					●	●		●		●		
Gonzales Canyon	5.11	+	○	○					●	●		●		●		
San Dieguito Lagoon	5.11	See Coastal Waters – Table 2-3														
Los Penasquitos Creek Watershed																
Los Penasquitos Lagoon	6.10	See Coastal Waters – Table 2-3														
Soledad Canyon	6.10	+	●	●					○	●		●	●	●		
Carol Canyon	6.10	+	●	●					○	●		●	●	●	●	

● Existing Beneficial Use

○ Potential Beneficial Use

+ Excepted from MUN (See Text)

[1] Waterbodies are listed multiple times if they cross hydrologic area or sub area boundaries.

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Table 2-2. BENEFICIAL USES OF INLAND SURFACE WATERS

Inland Surface Waters [1, 2]	Hydrologic Unit Basin Number	BENEFICIAL USE														
		MUN	AGR	IND	PROC	GWR	FRSH	POW	REC1	REC2	BIOL	WARM	COLD	WILD	RARE	SPWN
Los Penasquitos Creek Watershed – continued																
Miramar Reservoir	6.10	See Reservoirs & Lakes – Table 2-4														
Los Penasquitos Creek	6.20	+	●	○					●	●		●	●	●		
Rattlesnake Creek	6.20	+	●	○					●	●		●	●	●		
Poway Creek	6.20	+	●	○					●	●		●		●		
Beeler Creek	6.20	+	●	○					●	●		●		●		
Chicarita Creek	6.20	+	●	○					●	●		●		●		
Cypress Canyon	6.20	+	●	○					●	●		●		●		
Los Penasquitos Creek	6.10	+	●	●					○	●	●	●		●		
unnamed tributary	6.10	+	●	●					○	●		●		●	●	
Carmel Valley	6.10	+	●	●					○	●		●		●		
Deer Canyon	6.10	+	●	●					○	●		●		●		
McGonigle Canyon	6.10	+	●	●					○	●		●		●		
Bell Valley	6.10	+	●	●					○	●		●		●		
Shaw Valley	6.10	+	●	●					○	●		●		●		
San Diego County Coastal Streams																
unnamed intermittent coastal streams	6.30	+							○	●		●		●		

● Existing Beneficial Use

○ Potential Beneficial Use

\+ Excepted from MUN (See Text)

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[2] Beneficial use designations apply to all tributaries to the indicated waterbody, if not listed separately.

Table 2-2. BENEFICIAL USES OF INLAND SURFACE WATERS

Inland Surface Waters [1, 2]	Hydrologic Unit Basin Number	BENEFICIAL USE														
		MUN	AGR	IND	PROC	GWR	FRSH	POW	REC1	REC2	BIOL	WARM	COLD	WILD	RARE	SPWN
Rose Canyon Watershed																
Rose Canyon	6.40	+		○					●	●		●		●		
San Clemente Canyon	6.40	+		○					●	●		●	●	●	●	●
Tecolote Creek Watershed																
Tecolote Creek [3]	6.50	+							○	●		●		●		
San Diego River Watershed																
San Diego River	7.41	●	●	●	●				●	●		●	●	●		
Coleman Creek	7.42	●	●	●	●				●	●		●	●	●		
Eastwood Creek	7.42	●	●	●	●				●	●		●	●	●		
Jim Green Creek	7.42	●	●	●	●				●	●		●	●	●		
Mariette Creek	7.42	●	●	●	●				●	●		●	●	●		
Boring Creek	7.42	●	●	●	●				●	●		●	●	●		
Bailey Creek	7.42	●	●	●	●				●	●		●	●	●		
Coleman Creek	7.41	●	●	●	●				●	●		●	●	●		
Setenec Creek	7.42	●	●	●	●				●	●		●	●	●		
Setenec Creek	7.41	●	●	●	●				●	●		●	●	●		
Temescal Creek	7.41	●	●	●	●				●	●		●	●	●		
Paine Bottom	7.41	●	●	●	●				●	●		●	●	●		

● Existing Beneficial Use

○ Potential Beneficial Use

\+ Excepted from MUN (See Text)

[1] Waterbodies are listed multiple times if they cross hydrologic area or sub area boundaries.

[2] Beneficial use designations apply to all tributaries to the indicated waterbody, if not listed separately.

[3] Aliso Creek, San Juan Creek, Tecolote Creek, Forrester Creek, San Diego River (lower), and Chollas Creek are designated as water quality limited segments for indicator bacteria pursuant to Clean Water Act section 303(d). Total Maximum Daily Loads have been adopted to address these impairments. See Chapter 3, *Water Quality Objectives*, Bacteria -Total Coliform, Fecal Coliform, *E. Coli*, and Enterococci, and Chapter 7, *Revised Total Maximum Daily Loads for Indicator Bacteria, Project I – Twenty Beaches and Creeks in the San Diego Region (Including Tecolote Creek)*.

Table 2-2. BENEFICIAL USES OF INLAND SURFACE WATERS

Inland Surface Waters [1, 2]	Hydrologic Unit Basin Number	BENEFICIAL USE														
		MUN	AGR	IND	PROC	GWR	FRSH	POW	REC1	REC2	BIOL	WARM	COLD	WILD	RARE	SPWN
San Diego River Watershed – continued																
Orinoco Creek	7.41	●	●	●	●				●	●		●	●	●		
Iron Springs Canyon	7.41	●	●	●	●				●	●		●	●	●		
Dye Canyon	7.41	●	●	●	●				●	●		●	●	●		
Richie Creek	7.41	●	●	●	●				●	●		●	●	●		
Cedar Creek	7.41	●	●	●	●				●	●		●	●	●		●
Sandy Creek	7.41	●	●	●	●				●	●		●	●	●		
Dehr Creek	7.41	●	●	●	●				●	●		●	●	●		●
Kelly Creek	7.41	●	●	●	●				●	●		●	●	●		
Cuyamaca Reservoir	7.43	See Reservoirs & Lakes – Table 2-4														
Little Stonewall Creek	7.43	●	●	●	●				●	●		●	●	●		●
Boulder Creek	7.41	●	●	●	●				●	●		●	●	●		●
Azalea Creek	7.41	●	●	●	●				●	●		●	●	●		
Johnson Creek	7.41	●	●	●	●				●	●		●	●	●		
Sheep Camp Creek	7.41	●	●	●	●				●	●		●	●	●		
San Diego River	7.31	●	●	●	●				●	●		●	●	●		
El Capitan Reservoir	7.31	See Reservoirs & Lakes – Table 2-4														
Isham Creek	7.31	●	●	●	●				●	●		●	●	●		

● Existing Beneficial Use

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Table 2-2. BENEFICIAL USES OF INLAND SURFACE WATERS

Inland Surface Waters [1, 2]	Hydrologic Unit Basin Number	BENEFICIAL USE														
		MUN	AGR	IND	PROC	GWR	FRSH	POW	REC1	REC2	BIOL	WARM	COLD	WILD	RARE	SPWN
San Diego River Watershed – continued																
Sand Creek	7.31	●	●	●	●				●	●		●	●	●		
Conejos Creek	7.31	●	●	●	●				●	●		●	●	●		●
King Creek	7.31	●	●	●	●				●	●		●	●	●		
West Fork King Creek	7.31	●	●	●	●				●	●		●	●	●		
Echo Valley	7.31	●	●	●	●				●	●		●	●	●		
Peutz Valley	7.31	●	●	●	●				●	●		●	●	●		
Chocolate Canyon	7.32	●	●	●	●				●	●		●	●	●		
Alpine Creek	7.33	●	●	●	●				●	●		●	●	●		
Chocolate Canyon	7.31	●	●	●	●				●	●		●	●	●		
San Diego River	7.15	○		●					●	●		●		●	●	
San Diego River	7.12	○		●					●	●		●		●	●	
Lake Jennings	7.12	See Reservoirs & Lakes – Table 2-4														
Quail Canyon	7.12	○		●					●	●		●		●		
Wildcat Canyon	7.12	○		●					●	●		●		●		
San Vicente Creek	7.23	●	●	●	●				●	●		●		●		
Swartz Canyon	7.23	●	●	●	●				●	●		●		●		
Klondike Creek	7.23	●	●	●	●				●	●		●		●		

● Existing Beneficial Use

○ Potential Beneficial Use

[1] Waterbodies are listed multiple times if they cross hydrologic area or sub area boundaries.

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Table 2-2. BENEFICIAL USES OF INLAND SURFACE WATERS

Inland Surface Waters [1, 2]	Hydrologic Unit Basin Number	BENEFICIAL USE														
		MUN	AGR	IND	PROC	GWR	FRSH	POW	REC1	REC2	BIOL	WARM	COLD	WILD	RARE	SPWN
San Diego River Watershed – continued																
San Vicente Creek	7.22	●	●	●	●				●	●		●		●		
Darney Canyon	7.22	●	●	●	●				●	●		●		●		
Longs Gulch	7.22	●	●	●	●				●	●		●		●		
San Vicente Reservoir	7.21	See Reservoirs & Lakes – Table 2-4														
West Branch San Vicente Creek	7.21	●	●	●	●				●	●		●		●		
Aqueduct Arm Creek	7.21	●	●	●	●	○			●	●		●		●		
Padre Barona Creek	7.24	●	●	●	●				●	●		●		●		
Wright Canyon	7.24	●	●	●	●				●	●		●		●		
Featherstone Canyon	7.24	●	●	●	●				●	●		●		●		
Padre Barona Creek	7.12	○		●					●	●		●		●		
Foster Canyon	7.21	●	●	●	●				●	●		●		●		
San Vicente Creek	7.12	○		●					●	●		●		●		
Slaughterhouse Canyon	7.12	○		●					●	●		●		●		
Los Coches Creek	7.14	○		●					●	●		●		●		
Rios Canyon	7.14	○		●					●	●	●	●		●		
Los Coches Creek	7.12	○		●					●	●		●		●		
Forrester Creek [3]	7.13	○		●					●	●		●		●		

● Existing Beneficial Use

○ Potential Beneficial Use

\+ Excepted from MUN (See Text)

[1] Waterbodies are listed multiple times if they cross hydrologic area or sub area boundaries.

[2] Beneficial use designations apply to all tributaries to the indicated waterbody, if not listed separately.

[3] Aliso Creek, San Juan Creek, Tecolote Creek, Forrester Creek, San Diego River (lower), and Chollas Creek are designated as water quality limited segments for indicator bacteria pursuant to Clean Water Act section 303(d). Total Maximum Daily Loads have been adopted to address these impairments. See Chapter 3, *Water Quality Objectives*, Bacteria -Total Coliform, Fecal Coliform, *E. Coli*, and Enterococci, and Chapter 7, *Revised Total Maximum Daily Loads for Indicator Bacteria, Project I – Twenty Beaches and Creeks in the San Diego Region (Including Tecolote Creek)*.

Table 2-2. BENEFICIAL USES OF INLAND SURFACE WATERS

Inland Surface Waters [1, 2]	Hydrologic Unit Basin Number	BENEFICIAL USE														
		MUN	AGR	IND	PROC	GWR	FRSH	POW	REC1	REC2	BIOL	WARM	COLD	WILD	RARE	SPWN
San Diego River Watershed - continued																
Forrester Creek [3]	7.12	○		●					●	●		●		●		
Sycamore Canyon	7.12	+	●	●					●	●		●		●	●	
unnamed tributary	7.12	+	●	●					●	●		●		●	●	
Clark Canyon	7.12	+	●	●					●	●		●		●	●	
West Sycamore Canyon	7.12	+	●	●					●	●		●		●		
Quail Canyon	7.12	+	●	●					●	●		●		●		
Little Sycamore Canyon	7.12	+	●	●					●	●		●		●		
Spring Canyon	7.12	+	●	●					●	●		●		●	●	
Oak Canyon	7.12	+	●	●					●	●		●		●		
San Diego River [3]	7.11	+	●	●					●	●	●	●		●	●	
unnamed tributary	7.11	+	●	●					●	●		●		●	●	
Alvarado Canyon	7.11	+	●	●					●	●		●		●		
Lake Murray	7.11	See Reservoirs & Lakes – Table 2-4														
Murphy Canyon	7.11	+	●	●					●	●		●		●	●	
Shepherd Canyon	7.11	+	●	●					●	●		●		●		
Murray Canyon	7.11	+	●	●					●	●		●		●		
Mouth of San Diego River	7.11	See Coastal Waters – Table 2-3														

● Existing Beneficial Use

○ Potential Beneficial Use

\+ Excepted from MUN (See Text)

[1] Waterbodies are listed multiple times if they cross hydrologic area or sub area boundaries.

[2] Beneficial use designations apply to all tributaries to the indicated waterbody, if not listed separately.

[3] Aliso Creek, San Juan Creek, Tecolote Creek, Forrester Creek, San Diego River (lower), and Chollas Creek are designated as water quality limited segments for indicator bacteria pursuant to Clean Water Act section 303(d). Total Maximum Daily Loads have been adopted to address these impairments. See Chapter 3, *Water Quality Objectives*, Bacteria -Total Coliform, Fecal Coliform, *E. Coli*, and Enterococci, and Chapter 7, *Revised Total Maximum Daily Loads for Indicator Bacteria, Project I – Twenty Beaches and Creeks in the San Diego Region (Including Tecolote Creek)*.

Table 2-2. BENEFICIAL USES OF INLAND SURFACE WATERS

Inland Surface Waters [1, 2]	Hydrologic Unit Basin Number	BENEFICIAL USE														
		MUN	AGR	IND	PROC	GWR	FRSH	POW	REC1	REC2	BIOL	WARM	COLD	WILD	RARE	SPWN
Pueblo San Diego Watershed																
unnamed intermittent coastal streams	8.10	+							○	●		●		●		
Powerhouse Canyon	8.21	+							○	●		●		●		
Chollas Creek [3,4]	8.22	+							○	●		●		●		
South Chollas Valley	8.22	+							○	●		●		●		
unnamed intermittent streams	8.31	+							○	●		●		●		
Paradise Creek	8.32	+							○	●		●		●		
Paradise Valley	8.32	+							○	●		●		●		
Sweetwater River Watershed																
Sweetwater River	9.35	●	●	●	●				●	●		●	●	●		●
Stonewall Creek	9.35	●	●	●	●				●	●		●	●	●		●
Harper Creek	9.35	●	●	●	●				●	●		●	●	●		●
Cold Stream	9.35	●	●	●	●				●	●		●	●	●		●
Japacha Creek	9.35	●	●	●	●				●	●		●	●	●		●
Juaquapin Creek	9.35	●	●	●	●				●	●		●	●	●		●
Arroyo Seco	9.35	●	●	●	●				●	●		●	●	●		
Sweetwater River	9.34	●	●	●	●				●	●		●	●	●		●

● Existing Beneficial Use

○ Potential Beneficial Use

\+ Excepted from MUN (See Text)

[1] Waterbodies are listed multiple times if they cross hydrologic area or sub area boundaries.

[2] Beneficial use designations apply to all tributaries to the indicated waterbody, if not listed separately.

[3] Chollas Creek is designated as an impaired water body for copper, lead and zinc pursuant to Clean Water Act Section 303(d). A Total Maximum Daily Load (TMDL) has been adopted to address this impairment. See Chapter 3, Water Quality Objectives for Toxicity and Toxic Pollutants and Chapter 7, Total Maximum Daily Loads

[4] Aliso Creek, San Juan Creek, Tecolote Creek, Forrester Creek, San Diego River (lower), and Chollas Creek are designated as water quality limited segments for indicator bacteria pursuant to Clean Water Act section 303(d). Total Maximum Daily Loads have been adopted to address these impairments. See Chapter 3, *Water Quality Objectives*, Bacteria -Total Coliform, Fecal Coliform, *E. Coli*, and Enterococci, and Chapter 7, *Revised Total Maximum Daily Loads for Indicator Bacteria, Project I – Twenty Beaches and Creeks in the San Diego Region (Including Tecolote Creek)*.

Table 2-2. BENEFICIAL USES OF INLAND SURFACE WATERS

Inland Surface Waters [1, 2]	Hydrologic Unit Basin Number	BENEFICIAL USE														
		MUN	AGR	IND	PROC	GWR	FRSH	POW	REC1	REC2	BIOL	WARM	COLD	WILD	RARE	SPWN
Sweetwater River Watershed - continued																
Descanso Creek	9.34	●	●	●	●				●	●		●	●	●		
Samagatuma Creek	9.34	●	●	●	●				●	●		●	●	●		
Sweetwater River	9.31	●	●	●	●				●	●		●	●	●		●
Viejas Creek	9.33	●	●	●	●				●	●		●	●	●		
Viejas Creek	9.31	●	●	●	●				●	●		●	●	●		
Loveland Reservoir	9.31	See Reservoirs & Lakes – Table 2-4														
Taylor Creek	9.31	●	●	●	●				●	●		●		●		
Japatul Valley	9.32	●	●	●	●				●	●		●		●		
Sweetwater River	9.21	●	●	●	●				●	●	●	●		●	●	
unnamed tributary	9.21	●	●	●	●				●	●	●	●		●	●	
Lawson Creek	9.21	●	●	●	●				●	●	●	●		●		
Beaver Canyon	9.21	●	●	●	●				●	●		●		●		
Wood Valley	9.21	●	●	●	●				●	●		●		●		
Sycuan Creek	9.25	●	●	●	●				●	●		●		●		
North Fork Sycuan Creek	9.26	●	●	●	●				●	●		●		●		
North Fork Sycuan Creek	9.25	●	●	●	●				●	●		●		●		
Dehesa Valley	9.23	●	●	●	●				●	●		●		●		
Harbison Canyon	9.23	●	●	●	●				●	●		●		●		

● Existing Beneficial Use

[1] Waterbodies are listed multiple times if they cross hydrologic area or sub area boundaries.

[2] Beneficial use designations apply to all tributaries to the indicated waterbody, if not listed separately.

Table 2-2. BENEFICIAL USES OF INLAND SURFACE WATERS

Inland Surface Waters [1, 2]	Hydrologic Unit Basin Number	BENEFICIAL USE														
		MUN	AGR	IND	PROC	GWR	FRSH	POW	REC1	REC2	BIOL	WARM	COLD	WILD	RARE	SPWN
Sweetwater River Watershed - continued																
Galloway Valley	9.24	●	●	●	●				●	●		●		●		
Mexican Canyon	9.21	●	●	●	●				●	●		●		●		
unnamed intermittent streams	9.22	●	●	●	●				●	●		●		●		
Steel Canyon	9.21	●	●	●	●				●	●		●		●		
Sweetwater Reservoir	9.21	See Reservoirs & Lakes – Table 2-4														
Coon Canyon	9.21	●	●	●	●				●	●		●		●		
Sweetwater River	9.12	+		●					○	●		●		●		
Spring Valley	9.12	+		●					○	●		●		●		
Wild Mans Canyon	9.12	+		●					○	●		●		●		
Long Canyon	9.12	+		●					○	●		●		●		
Rice Canyon	9.12	+		●					○	●		●		●		
Telegraph Canyon	9.11	+		●					○	●		●		●		
San Diego County Coastal Streams																
unnamed intermittent coastal streams	10.10	+							○			●				

● Existing Beneficial Use

○ Potential Beneficial Use

+ Excepted from MUN (See Text)

[1] Waterbodies are listed multiple times if they cross hydrologic area or sub area boundaries.

[2] Beneficial use designations apply to all tributaries to the indicated waterbody, if not listed separately.

Table 2-2. BENEFICIAL USES OF INLAND SURFACE WATERS

Inland Surface Waters [1, 2]	Hydrologic Unit Basin Number	BENEFICIAL USE														
		MUN	AGR	IND	PROC	GWR	FRSH	POW	REC1	REC2	BIOL	WARM	COLD	WILD	RARE	SPWN
Otay River Watershed																
Jamul Creek	10.34	●	●	●	●				●	●		●		●		
Jamul Creek	10.33	●	●	●	●				●	●	●	●		●		
Jamul Creek	10.36	●	●	●	●				●	●	●	●		●		
Dulzura Creek	10.37	●	●	●	●				●	●		●		●		
Dulzura Creek	10.36	●	●	●	●				●	●	●	●		●	●	
Dutchman Canyon	10.36	●	●	●	●				●	●		●		●		
Pringle Canyon	10.36	●	●	●	●				●	●		●		●		
Sycamore Canyon	10.36	●	●	●	●				●	●	●	●		●		
Hollenbeck Canyon	10.36	●	●	●	●				●	●	●	●		●		
Lyons Valley	10.35	●	●	●	●				●	●		●		●		
Cedar Canyon	10.36	●	●	●	●				●	●	●	●	●	●		●
Little Cedar Canyon	10.36	●	●	●	●				●	●	●	●	●	●		
Jamul Creek	10.31	●	●	●	●				●	●		●		●	●	
Lower Otay Reservoir	10.31	See Reservoirs & Lakes – Table 2-4														
unnamed tributary	10.31	●	●	●	●				●	●	●	●		●	●	
Upper Otay Reservoir	10.32	See Reservoirs & Lakes – Table 2-4														
Proctor Valley	10.32	●	●	●	●				●	●	●	●		●		

● Existing Beneficial Use

[1] Waterbodies are listed multiple times if they cross hydrologic area or sub area boundaries.

[2] Beneficial use designations apply to all tributaries to the indicated waterbody, if not listed separately.

Table 2-2. BENEFICIAL USES OF INLAND SURFACE WATERS

Inland Surface Waters [1, 2]	Hydrologic Unit Basin Number	BENEFICIAL USE														
		MUN	AGR	IND	PROC	GWR	FRSH	POW	REC1	REC2	BIOL	WARM	COLD	WILD	RARE	SPWN
Otay River Watershed – continued																
Otay River	10.20	+	●	○					○	●		●		●	●	
O'Neal Canyon	10.20	+	●	○					○	●		●		●		
Salt Creek	10.20	+	●	○					○	●		●		●		
Johnson Canyon	10.20	+	●	○					○	●		●		●		
Wolf Canyon	10.20	+	●	○					○	●		●		●		
Dennery Canyon	10.20	+	●	○					○	●		●		●		
Poggi Canyon	10.20	+	●	○					○	●		●		●		
Tijuana River Watershed																
Tijuana River	11.11	+		○					○	●	●	●		●	●	
Moody Canyon	11.11	+		○					○	●		●		●		
Smugglers Gulch	11.11	+		○					○	●		●		●		
Goat Canyon	11.11	+		○					○	●		●		●		
Tijuana River Estuary	11.11	See Coastal Waters – Table 2-3														
Spring Canyon	11.12	+	●	○					○	●		●		●		
Dillon Canyon	11.12	+	●	○					○	●		●		●		
Finger Canyon	11.12	+	●	○					○	●		●		●		
Wruck Canyon	11.12	+	●	○					○	●		●		●		

● Existing Beneficial Use

○ Potential Beneficial Use

\+ Excepted from MUN (See Text)

[1] Waterbodies are listed multiple times if they cross hydrologic area or sub area boundaries.

[2] Beneficial use designations apply to all tributaries to the indicated waterbody, if not listed separately.

Table 2-2. BENEFICIAL USES OF INLAND SURFACE WATERS

Inland Surface Waters [1, 2]	Hydrologic Unit Basin Number	BENEFICIAL USE														
		MUN	AGR	IND	PROC	GWR	FRSH	POW	REC1	REC2	BIOL	WARM	COLD	WILD	RARE	SPWN
Tijuana River Watershed - continued																
unnamed intermittent streams	11.12	+	●	○					○	●		●		●		
unnamed intermittent streams	11.21	+							●	●		●		●		
Tijuana River	11.21	+							●	●		●		●		
Tecate Creek	11.23	+							●	●		●		●		
Cottonwood Creek	11.60	●	●	●	●		●		○	●		●	●	●	●	
Kitchen Creek	11.60	●	●	●	●		●		○	●		●	●	●		●
Long Canyon	11.60	●	●	●	●		●		○	●		●	●	●		●
Troy Canyon	11.60	●	●	●	●		●		○	●		●	●	●		●
Fred Canyon	11.60	●	●	●	●		●		○	●		●	●	●		
Horse Canyon	11.60	●	●	●	●		●		○	●		●	●	●		
La Posta Creek	11.70	●	●	●	●		●		●	●		●	●	●		
Simmons Canyon	11.70	●	●	●	●		●		●	●		●	●	●		
La Posta Creek	11.60	●	●	●	●		●		○	●		●	●	●		
Morena Reservoir	11.50	See Reservoirs & Lakes – Table 2-4														
Morena Creek	11.50	●	●	●	●		●		●	●		●	●	●		●
Long Valley	11.50	●	●	●	●		●		●	●		●	●	●		
Bear Valley	11.50	●	●	●	●		●		●	●		●		●		

● Existing Beneficial Use

○ Potential Beneficial Use

\+ Excepted from MUN (See Text)

[1] Waterbodies are listed multiple times if they cross hydrologic area or sub area boundaries.

[2] Beneficial use designations apply to all tributaries to the indicated waterbody, if not listed separately.

Table 2-2. BENEFICIAL USES OF INLAND SURFACE WATERS

Inland Surface Waters [1, 2]	Hydrologic Unit Basin Number	BENEFICIAL USE														
		MUN	AGR	IND	PROC	GWR	FRSH	POW	REC1	REC2	BIOL	WARM	COLD	WILD	RARE	SPWN
Tijuana River Watershed - continued																
Cottonwood Creek	11.30	●	●	●	●		●		●	●		●	●	●	●	●
Hauser Creek	11.30	●	●	●	●		●		●	●		●	●	●		●
Salazar Canyon	11.30	●	●	●	●		●		●	●		●	●	●		
Barrett Lake	11.30	See Reservoirs & Lakes – Table 2-4														
Boneyard Canyon	11.30	●	●	●	●		●		●	●		●	●	●		
Skye Valley	11.30	●	●	●	●		●		●	●		●	●	●		
Pine Valley Creek	11.41	●	●	●	●		●		●	●		●	●	●		●
Indian Creek	11.41	●	●	●	●		●		●	●		●	●	●		
Lucas Creek	11.41	●	●	●	●		●		●	●		●	●	●		
Noble Canyon	11.41	●	●	●	●		●		●	●		●	●	●		●
Los Rasalies Ravine	11.42	●	●	●	●		●		●	●		●	●	●		
Paloma Ravine	11.42	●	●	●	●		●		●	●		●	●	●		
Bonita Ravine	11.42	●	●	●	●		●		●	●		●	●	●		
Chico Ravine	11.42	●	●	●	●		●		●	●		●	●	●		
Madero Ravine	11.42	●	●	●	●		●		●	●		●	●	●		
Los Gatos Ravine	11.42	●	●	●	●		●		●	●		●	●	●		
Boiling Spring Ravine	11.42	●	●	●	●		●		●	●		●	●	●		

● Existing Beneficial Use

[1] Waterbodies are listed multiple times if they cross hydrologic area or sub area boundaries.

[2] Beneficial use designations apply to all tributaries to the indicated waterbody, if not listed separately.

Table 2-2. BENEFICIAL USES OF INLAND SURFACE WATERS

Inland Surface Waters [1, 2]	Hydrologic Unit Basin Number	BENEFICIAL USE														
		MUN	AGR	IND	PROC	GWR	FRSH	POW	REC1	REC2	BIOL	WARM	COLD	WILD	RARE	SPWN
Tijuana River Watershed - continued																
Agua Dulce Ravine	11.42	●	●	●	●		●		●	●		●	●	●		
Escondido Ravine	11.42	●	●	●	●		●		●	●		●	●	●		
Scove Canyon	11.41	●	●	●	●		●		●	●		●	●	●		
Pine Valley Creek	11.30	●	●	●	●		●		●	●		●	●	●		●
Oak Valley	11.30	●	●	●	●		●		●	●		●	●	●		●
Nelson Canyon	11.30	●	●	●	●		●		●	●		●	●	●		
Secret Canyon	11.30	●	●	●	●		●		●	●		●	●	●		
Horsethief Canyon	11.30	●	●	●	●		●		●	●		●	●	●		
Espinosa Creek	11.30	●	●	●	●		●		●	●		●	●	●		
Wilson Creek	11.30	●	●	●	●		●		●	●		●	●	●		●
Pats Canyon	11.30	●	●	●	●		●		●	●		●	●	●		
Cottonwood Creek	11.23	+							●	●		●		●		
Dry Valley	11.23	+							●	●		●		●		
Bob Owens Canyon	11.23	+							●	●		●		●		
McAlmond Canyon	11.24	+							●	●		●		●		
McAlmond Canyon	11.23	+							●	●		●		●		

● Existing Beneficial Use

+ Excepted from MUN (See Text)

[1] Waterbodies are listed multiple times if they cross hydrologic area or sub area boundaries.

[2] Beneficial use designations apply to all tributaries to the indicated waterbody, if not listed separately.

Table 2-2. BENEFICIAL USES OF INLAND SURFACE WATERS

Inland Surface Waters [1, 2]	Hydrologic Unit Basin Number	BENEFICIAL USE														
		MUN	AGR	IND	PROC	GWR	FRSH	POW	REC1	REC2	BIOL	WARM	COLD	WILD	RARE	SPWN
Tijuana River Watershed - continued																
Rattlesnake Canyon	11.23	+							●	●		●		●		
Potrero Creek	11.25	+							●	●		●		●		
Little Potrero Creek	11.25	+							●	●		●		●		
Potrero Creek	11.23	+							●	●		●		●		
Grapevine Creek	11.23	+							●	●		●		●		
Bee Canyon	11.22	+							●	●		●		●		
Bee Creek	11.23	+							●	●		●		●		
Mine Canyon	11.21	+							●	●		●		●		
unnamed intermittent streams	11.81	+							●	●		●		●		
unnamed intermittent streams	11.82	+							●	●		●		●		
Campo Creek	11.84	+							●	●		●	●	●		
Diablo Canyon	11.84	+							●	●		●		●		
Campo Creek	11.83	+							●	●		●		●		
Miller Creek	11.83	+							●	●		●		●		
Campo Creek	11.82	+							●	●		●		●		
Smith Canyon	11.82	+							●	●		●		●		
unnamed intermittent streams	11.85	+							●	●		●		●		

● Existing Beneficial Use

\+ Excepted from MUN (See Text)

[1] Waterbodies are listed multiple times if they cross hydrologic area or sub area boundaries.

[2] Beneficial use designations apply to all tributaries to the indicated waterbody, if not listed separately.

Table 2-3. BENEFICIAL USES OF COASTAL WATERS

Coastal Waters	Hydrologic Unit Basin Number	BENEFICIAL USE														
		IND	NAV	REC1	REC2	COMM	BIOL	EST	WILD	RARE	MAR	AQUA	MIGR	SPWN	WARM	SHELL
Pacific Ocean[1]		●	●	●	●	●	●		●	●	●	●	●	●		●
Dana Point Harbor[2]		●	●	●	●	●			●	●	●		●	●		●
Del Mar Boat Basin		●	●	●	●	●			●	●	●		●	●		●
Mission Bay		●		●	●	●		●	●	●	●		●	●		●
Oceanside Harbor		●	●	●	●	●			●	●	●		●	●		●
San Diego Bay [3,4,5]		●	●	●	●	●	●	●	●	●	●		●	●		●

[1] Certain Pacific Ocean shoreline segments of the following Hydrological Units, Areas, and Subareas are designated as water quality limited segments for indicator bacteria pursuant to Clean Water Act section 303(d): San Joaquin Hills HSA 901.11 and Laguna Beach HAS 901.12, Aliso Creek HSA 901.13, Dana Point HSA 901.14, Lower San Juan HSA 901.27, San Clemente HA 901.30, San Luis Rey HU 903.00, San Marcos HA 904.50, San Dieguito HU 905.00, Miramar Reservoir HA 906.10, Scripps HA 906.30, and Mission San Diego HSA 907.11 and Santee HSA 907.12. Total Maximum Daily Loads have been adopted to address these impairments. See Chapter 3, *Water Quality Objectives*, Bacteria - Total Coliform, Fecal Coliform, *E. Coli* and Enterococci, and Chapter 7, *Revised Total Maximum Daily Loads for Indicator Bacteria, Project I – Twenty Beaches and Creeks in the San Diego Region (Including Tecolote Creek)*.

[2] The shoreline segment along Baby Beach within Dana Point Harbor is designated as a water quality limited segment for indicator bacteria pursuant to Clean Water Act section 303(d). Total Maximum Daily Loads have been adopted to address these impairments. See Chapter 7, *Total Maximum Daily Loads for Indicator Bacteria, Baby Beach in Dana Point Harbor and Shelter Island Shoreline Park in San Diego Bay*.

[3] Includes the tidal prisms of the Otay and Sweetwater Rivers.

[4] The Shelter Island Yacht Basin portion of San Diego Bay is designated as an impaired water body for dissolved copper pursuant to Clean Water Act section 303(d). A Total Maximum Daily Load (TMDL) has been adopted to address this impairment. See Chapter 3, Water Quality Objectives for Pesticides, Toxicity and Toxic Pollutants and Chapter 7, Total Maximum Daily Loads.

[5] The shoreline segment along Shelter Island Shoreline Park within San Diego Bay is designated as a water quality limited segment for indicator bacteria pursuant to Clean Water Act section 303(d). Total Maximum Daily Loads have been adopted to address these impairments. See Chapter 7, *Total Maximum Daily Loads for Indicator Bacteria, Baby Beach in Dana Point Harbor and Shelter Island Shoreline Park in San Diego Bay*.

● Existing Beneficial Use

Table 2-3. BENEFICIAL USES OF COASTAL WATERS

Coastal Waters	Hydrologic Unit Basin Number	BENEFICIAL USE														
		IND	NAV	REC1	REC2	COMM	BIOL	EST	WILD	RARE	MAR	AQUA	MIGR	SPWN	WARM	SHELL
Coastal Lagoons																
Tijuana River Estuary	11.11			●	●	●	●	●	●	●	●		●	●		●
Mouth of San Diego River[6]	7.11			●	●	●		●	●	●	●		●	●		●
Famosa Slough and Channel	7.11			●	●	●		●	●	●	●		●	●		●
Los Penasquitos Lagoon [7]	6.10			●	●		●	●	●	●	●		●	●		●
San Dieguito Lagoon	5.11			●	●		●	●	●	●	●		●	●		
Batiquitos Lagoon	4.51			●	●		●	●	●	●	●		●	●		
San Elijo Lagoon	4.61			●	●		●	●	●	●	●		●	●		
Agua Hedionda Lagoon	4.31	●		●	●	●	●	●	●	●	●	●	●	●		●

[6] The mouth of San Diego River is designated as a water quality limited segment for indicator bacteria pursuant to Clean Water Act section 303(d). Total Maximum Daily Loads have been adopted to address these impairments. See Chapter 3, *Water Quality Objectives*, Bacteria - Total Coliform, Fecal Coliform, *E. Coli*, and Enterococci, and Chapter 7, *Revised Total Maximum Daily Loads for Indicator Bacteria, Project I – Twenty Beaches and Creeks in the San Diego Region (Including Tecolote Creek)*.

[7] Fishing from shore or boat permitted, but other water contact recreational (REC-1) uses are prohibited.

● Existing Beneficial Use

○ Potential Beneficial Use

Table 2-3. BENEFICIAL USES OF COASTAL WATERS

Coastal Waters	Hydrologic Unit Basin Number	BENEFICIAL USE														
		IND	NAV	REC1	REC2	COMM	BIOL	EST	WILD	RARE	MAR	AQUA	MIGR	SPWN	WARM	SHELL
Coastal Lagoons – continued																
Buena Vista Lagoon[8]	4.21			●	●		●	○	●	●	●				●	
Loma Alta Slough	4.10			●	●			●	●	●	●					
Mouth of San Luis Rey River[9]	3.11			●	●				●	●	●		●			
Santa Margarita Lagoon	2.11			●	●			●	●	●	●		●	●		

[8] Fishing from shore or boat permitted, but other water contact recreational (REC-1) uses are prohibited.

[9] The mouth of San Luis Rey River is designated as a water quality limited segment for indicator bacteria pursuant to Clean Water Act section 303(d). Total Maximum Daily Loads have been adopted to address these impairments. See Chapter 3, *Water Quality Objectives*, Bacteria - Total Coliform, Fecal Coliform, *E. Coli*, and Enterococci, and Chapter 7, *Revised Total Maximum Daily Loads for Indicator Bacteria, Project I – Twenty Beaches and Creeks in the San Diego Region (Including Tecolote Creek).*

● Existing Beneficial Use

○ Potential Beneficial Use

Table 2-3. BENEFICIAL USES OF COASTAL WATERS

Coastal Waters	Hydrologic Unit Basin Number	BENEFICIAL USE														
		IND	NAV	REC1	REC2	COMM	BIOL	EST	WILD	RARE	MAR	AQUA	MIGR	SPWN	WARM	SHELL
Coastal Lagoons – continued																
Aliso Creek Mouth[10]	1.13			●	●				●	●	●					
San Juan Creek Mouth[11]	1.27			●	●				●	●	●		●			●
San Mateo Creek Mouth	1.40			●	●		●		●	●	●		●	●		
San Onofre Creek Mouth	1.51			●	●				●	●	●		●	●		

[10] The mouth of Aliso Creek is designated as a water quality limited segment for indicator bacteria pursuant to Clean Water Act section 303(d). Total Maximum Daily Loads have been adopted to address these impairments. See Chapter 3, *Water Quality Objectives*, Bacteria - Total Coliform, Fecal Coliform, *E. Coli*, and Enterococci, and Chapter 7, *Revised Total Maximum Daily Loads for Indicator Bacteria, Project I – Twenty Beaches and Creeks in the San Diego Region (Including Tecolote Creek).*

[11] The mouth of San Juan Creek is designated as a water quality limited segment for indicator bacteria pursuant to Clean Water Act section 303(d). Total Maximum Daily Loads have been adopted to address these impairments. See Chapter 3, *Water Quality Objectives*, Bacteria - Total Coliform, Fecal Coliform, *E. Coli*, and Enterococci, and Chapter 7, *Revised Total Maximum Daily Loads for Indicator Bacteria, Project I – Twenty Beaches and Creeks in the San Diego Region (Including Tecolote Creek).*

● Existing Beneficial Use

○ Potential Beneficial Use

Table 2-4. BENEFICIAL USES OF RESERVOIRS AND LAKES

Reservoirs & Lakes	Hydrologic Unit Basin Number	BENEFICIAL USE												
		MUN	AGR	IND	PROC	GWR	FRSH	REC1	REC2	WARM	COLD	WILD	RARE	POW
O'Neill Lake	2.13	●	●	●	●			●	●	●	●	●	●	
Diamond Valley Lake	2.35 & 2.36	●	●	●	●	●		●[1]	●	●	●	●		●
Lake Skinner	2.42	●	●	●	●	○		●[1]	●	●		●		
Vail Lake	2.81	●	●	●	●	●		●[1]	●	●		●		
Turner Lake	3.13	●	●	●				○	●	●				
Lake Henshaw	3.31	●	●	●	●		●	●[1]	●	●		●	●	●
Olivenhain Reservoir	5.21	●		●				●[1]	●	●	●	●		●
San Dieguito Reservoir	5.21	●	●	○				●	●	●	●	●		
Lake Dixon	4.62	●	●	○				●[1]	●	●	●	●		
Lake Wohlford	4.63	●	●	○				●[1]	●	●	●	●		●
Lake Hodges	5.21	●	●	●	●			●[1]	●	●	●	●	●	
Lake Poway	5.52	●	●	●	●			●[1]	●	●	●	●		
Sutherland Lake	5.53	●	●	●	●			●[1]	●	●	●	●	●	
Miramar Reservoir	6.10	●		●				●[1]	●	●		●		●
Lake Murray	7.11	●		●				●[1]	●	●	●	●		●
Lake Jennings	7.12	●		●				●	●	●	●	●		

[1] Fishing from shore or boat permitted, but other water contact recreational (REC-1) uses are prohibited.

● Existing Beneficial Use

○ Potential Beneficial Use

Table 2-4. BENEFICIAL USES OF RESERVOIRS AND LAKES

Reservoirs & Lakes	Hydrologic Unit Basin Number	BENEFICIAL USE												
		MUN	AGR	IND	PROC	GWR	FRSH	REC1	REC2	WARM	COLD	WILD	RARE	POW
San Vicente Reservoir	7.21	●	●	●	●			●[1]	●	●	●	●		
El Capitan Reservoir	7.31	●	●	●	●			●[1]	●	●	●	●	●	
Cuyamaca Reservoir	7.43	●	●	●	●			●[1]	●	●	●	●	●	
Sweetwater Reservoir	9.21	●	●	●	●			●	●	●		●		
Loveland Reservoir	9.31	●	●	●	●			●	●	●	●	●		
Lower Otay Reservoir	10.31	●	●	●	●			●[1]	●	●	●	●		
Upper Otay Reservoir	10.32	●	●	●	●			●	●	●	●	●		
Lake Barrett	11.30	●	●	●	●		●	●	●	●	●	●	●	
Morena Reservoir	11.50	●	●	●	●		●	●[1]	●	●	●	●	●	

[1] Fishing from shore or boat permitted, but other water contact recreational (REC-1) uses are prohibited.

● Existing Beneficial Use

Table 2-5. BENEFICIAL USES OF GROUND WATERS

Ground Water		Hydrologic Unit Basin Number	BENEFICIAL USE					
			MUN	AGR	IND	PROC	FRSH	GWR
SAN JUAN HYDROLOGIC UNIT		1.00						
Laguna	HA	1.10						
San Joaquin Hills	HSA [1]	1.11	●	●				
Laguna Beach	HSA [1]	1.12	●	●				
Aliso	HSA [2]	1.13	●	●				
Dana Point	HSA [1]	1.14	+	●				
Mission Viejo	HA	1.20						
Oso	HSA	1.21	●	●	●			
Upper Trabuco	HSA	1.22	●	●	●			
Middle Trabuco	HSA	1.23	●	●	●			
Gobernadora	HSA	1.24	●	●	●			
Upper San Juan	HSA	1.25	●	●	●			
Middle San Juan	HSA	1.26	●	●	●			

1 These beneficial uses do not apply to all lands on the coastal side of the inland boundary of the right-of-way of Pacific Coast Highway 1, and this area is excepted from the sources of drinking water policy. The beneficial uses for the remainder of HA 1.10 are as shown.

2 These beneficial uses do not apply westerly of the right-of-way of Interstate 5 and this area is excepted from the sources of drinking water policy. The beneficial uses for the remainder of the hydrologic area are as shown.

● Existing Beneficial Use

+ Excepted from MUN (see text)

Table 2-5. BENEFICIAL USES OF GROUND WATERS

Ground Water			Hydrologic Unit Basin Number	BENEFICIAL USE					
				MUN	AGR	IND	PROC	FRSH	GWR
SAN JUAN HYDROLOGIC UNIT - continued			1.00						
Lower San Juan	HSA	3	1.27	●	●	●			
Ortega	HSA		1.28	●	●	●			
San Clemente	HA		1.30						
Prima Deshecha	HSA	2	1.31	●	●				
Segunda Deshecha	HSA		1.32	+					
San Mateo Canyon	HA	2	1.40	●	●	●			
San Onofre	HA	2	1.50	●	●				

2 These beneficial uses do not apply westerly of the easterly boundary of the right-of-way of Interstate 5 and this area is excepted from the sources of drinking water policy. The beneficial uses for the remainder of the hydrologic area are as shown.

3 These beneficial uses do not apply to all lands on the coastal side of the inland boundary of the right-of-way of Pacific Coast Highway 1 west of the San Juan Creek channel and this area is excepted from the sources of drinking water policy. The beneficial uses for the remainder of HA 1.20 are as shown.

● Existing Beneficial Use

\+ Excepted from MUN (see text)

Table 2-5. BENEFICIAL USES OF GROUND WATERS

Ground Water		Hydrologic Unit Basin Number	BENEFICIAL USE					
			MUN	AGR	IND	PROC	FRSH	GWR
SANTA MARGARITA HYDROLOGIC UNIT		2.00						
Ysidora	HA [2]	2.10	●	●	●	●		
DeLuz	HA	2.20	●	●	●			
Murrieta	HA	2.30	●	●	●	●		
Auld	HA	2.40	●	●	●			
Pechanga	HA	2.50	●	●	●			
Wilson	HA	2.60	●	●	○			
Cave Rocks	HA	2.70	●	●				
Aguanga	HA	2.80	●	●	●			
Oakgrove	HA	2.90	●	●				

2 These beneficial uses do not apply westerly of the right-of-way of Interstate 5 and this area is excepted from the sources of drinking water policy. The beneficial uses for the remainder of the hydrologic area are as shown.

● Existing Beneficial Use

○ Potential Beneficial Use

Table 2-5. BENEFICIAL USES OF GROUND WATERS

Ground Water		Hydrologic Unit Basin Number	BENEFICIAL USE					
			MUN	AGR	IND	PROC	FRSH	GWR
SAN LUIS REY HYDROLOGIC UNIT		3.00						
Lower San Luis	HA [2]	3.10	●	●	●			
Monserate	HA	3.20						
Pala	HSA	3.21	●	●	●			
Pauma	HSA	3.22	●	●	●			
La Jolla Amago	HSA	3.23	●	●	●	●		
Warner Valley	HA	3.30						
Warner	HSA	3.31	●	●	●		●	
Combs	HSA	3.32	●	●	●			

2 These beneficial uses do not apply westerly of the right-of-way of Interstate 5 and this area is excepted from the sources of drinking water policy. The beneficial uses for the remainder of the hydrologic area are as shown.

● Existing Beneficial Use

Table 2-5. BENEFICIAL USES OF GROUND WATERS

Ground Water			Hydrologic Unit Basin Number	BENEFICIAL USE					
				MUN	AGR	IND	PROC	FRSH	GWR
CARLSBAD HYDROLOGIC UNIT			4.00						
Loma Alta	HA	2	4.10	+		●			
Buena Vista Creek	HA		4.20						
El Salto	HSA	2	4.21	●	●	○			
Vista	HSA		4.22	●	●	●			
Agua Hedionda	HA		4.30						
Los Monos	HSA	2	4.31	●	●	●			
Los Monos	HSA	5	4.31	○	○	○			
Los Monos	HSA	6	4.31	○	●	○			
Buena	HSA		4.32	●	●	●			

2 These beneficial uses do not apply westerly of the easterly boundary of the right-of-way of Interstate 5 and this area is excepted from the sources of drinking water policy. The beneficial uses for the remainder of the hydrologic area are as shown.

5 These beneficial uses designations apply to the portion of HSA 4.31 bounded on the west by the easterly boundary of Interstate Highway 5 right-of-way; on the east by the easterly boundary of El Camino Real; and on the north by a line extending along the southerly edge of Agua Hedionda Lagoon to the easterly end of the lagoon, thence in an easterly direction to Evans Point, thence easterly to El Camino Real along the ridge lines separating Letterbox Canyon and the area draining to the Marcario Canyon.

6 These beneficial uses apply to the portion of HSA 4.31 tributary to Agua Hedionda Creek downstream from the El Camino Real crossing, except lands tributary to Marcario Canyon (located directly southerly of Evans Point, land directly south of Agua Hedionda Lagoon, and areas west of Interstate Highway 5.

● Existing Beneficial Use

○ Potential Beneficial Use

+ Excepted from MUN (see text)

Table 2-5. BENEFICIAL USES OF GROUND WATERS

Ground Water			Hydrologic Unit Basin Number	BENEFICIAL USE					
				MUN	AGR	IND	PROC	FRSH	GWR
CARLSBAD HYDROLOGIC UNIT - continued			4.00						
Encinas	HA		4.40	+					
San Marcos	HA		4.50						
Batiquitos	HSA	2,7	4.51	●	●	●			
Batiquitos	HSA	8	4.51	○	○	○			
Richland	HSA	2,7	4.52	●	●	●			
Twin Oaks	HSA	2,7	4.53	●	●	●			
Escondido	HA		4.60						
San Elijo	HSA	2	4.61	○	●	●			
Escondido	HSA		4.62	●	●	●			
Lake Wohlford	HSA		4.63	●	●	●			

2 These beneficial uses do not apply westerly of easterly boundary of the right-of-way of Interstate 5 and this area is excepted from the sources of drinking water policy. The beneficial uses for the remainder of the hydrologic area are as shown.

7 These beneficial uses do not apply to HSA 4.51 and HSA 4.52 between Highway 78 and El Camino Real and to all lands which drain to Moonlight Creek, Cottonwood Creek and to Encinitas Creek and this area is excepted from the sources of drinking water policy. The beneficial uses for the remainder of the subarea are as shown.

8 These beneficial uses apply to the portion of HSA 4.51 bounded on the south by the north shore of Batiquitos Lagoon, on the west by the easterly boundary of the Interstate Highway 5 right-of-way, on the north by the subarea boundary and on the east by the easterly boundary of El Camino Real.

● Existing Beneficial Use

○ Potential Beneficial Use

+ Excepted from MUN (see text)

Table 2-5. BENEFICIAL USES OF GROUND WATERS

Ground Water		Hydrologic Unit Basin Number	BENEFICIAL USE					
			MUN	AGR	IND	PROC	FRSH	GWR
SAN DIEGUITO HYDROLOGIC UNIT		5.00						
Solana Beach	HA [2]	5.10	●	●	●			
Hodges	HA	5.20	●	●	●			
San Pasqual	HA	5.30	●	●	●			
Santa Maria Valley	HA	5.40						
Ramona	HSA	5.41	●	●	●	●		
Lower Hatfield	HSA	5.42	●	●	●			
Wash Hallow	HSA	5.43	●	●	●			
Upper Hatfield	HSA	5.44	●	●	●			
Ballena	HSA	5.45	●	●	●			
East Santa Teresa	HSA	5.46	●	●	●			
West Santa Teresa	HSA	5.47	●	●	●			
Santa Ysabel	HA	5.50	●	●				

2 These beneficial uses do not apply westerly of the easterly boundary of the right-of-way of Interstate Highway 5 and this area is excepted from the sources of drinking water policy. The beneficial uses for the remainder of the hydrologic area are as shown.

● Existing Beneficial Use

Table 2-5. BENEFICIAL USES OF GROUND WATERS

Ground Water			Hydrologic Unit Basin Number	BENEFICIAL USE					
				MUN	AGR	IND	PROC	FRSH	GWR
PENASQUITOS HYDROLOGIC UNIT			6.00						
Miramar Reservoir	HA	2, 9	6.10	●	●	●			
Poway	HA		6.20	●	●	○			
Scripps	HA		6.30	+					
Miramar	HA	10	6.40	+		○			
Tecolote	HA		6.50	+					

2 These beneficial uses do not apply westerly of the easterly boundary of the right-of-way of Interstate Highway 5 and this area is excepted from the sources of drinking water policy. The beneficial uses for the remainder of the hydrologic area are as shown.

9 These beneficial uses do not apply to all lands which drain to Los Penasquitos Canyon from 1.5 miles west of Interstate Highway 15 and this area is excepted from the sources of drinking water policy. The beneficial uses for the remainder of the hydrologic area are as shown.

10 These beneficial uses do not apply west of Interstate Highway 15. The beneficial uses for the remainder of the hydrologic area are as shown.

● Existing Beneficial Use

○ Potential Beneficial Use

+ Excepted from MUN (see text)

Table 2-5. BENEFICIAL USES OF GROUND WATERS

Ground Water		Hydrologic Unit Basin Number	BENEFICIAL USE					
			MUN	AGR	IND	PROC	FRSH	GWR
SAN DIEGO HYDROLOGIC UNIT		7.00						
Lower San Diego	HA	7.10						
Mission San Diego	HSA [2]	7.11	○	●	●	●		
Santee	HSA	7.12	●	●	●	●		
El Cajon	HSA	7.13	●	●	○	○		
Coches	HSA	7.14	●	●	●	○		
El Monte	HSA	7.15	●	●	●	○		
San Vicente	HA	7.20	●	●				
El Capitan	HA	7.30	●	●				
Boulder Creek	HA	7.40	●	●				

2 These beneficial uses do not apply westerly of the easterly boundary of the right-of-way of Interstate 5 and this area is excepted from the sources of drinking water policy. The beneficial uses for the remainder of the hydrologic area are as shown.

● Existing Beneficial Use

○ Potential Beneficial Use

Table 2-5. BENEFICIAL USES OF GROUND WATERS

Ground Water		Hydrologic Unit Basin Number	BENEFICIAL USE					
			MUN	AGR	IND	PROC	FRSH	GWR
PUEBLO SAN DIEGO HYDROLOGIC UNIT		8.00						
Point Loma	HA	8.10	+					
San Diego Mesa	HA	8.20	+					
National City	HA [2]	8.30	●					
SWEETWATER HYDROLOGIC UNIT		9.00						
Lower Sweetwater	HA	9.10						
Telegraph	HSA	9.11	○	●	○			
La Nacion	HSA	9.12	●	●	●			
Middle Sweetwater	HA	9.20	●	●	●			
Upper Sweetwater	HA	9.30	●	●				

2 These beneficial uses do not apply westerly of the easterly boundary of the right-of-way of Interstate 5 and this area is excepted from the sources of drinking water policy. The beneficial uses for the remainder of the hydrologic area are as shown.

● Existing Beneficial Use

○ Potential Beneficial Use

+ Excepted from MUN (see text)

Table 2-5. BENEFICIAL USES OF GROUND WATERS

Ground Water		Hydrologic Unit Basin Number	BENEFICIAL USE					
			MUN	AGR	IND	PROC	FRSH	GWR
OTAY HYDROLOGIC UNIT		10.00						
Coronado	HA	10.10	+					
Otay Valley	HA	10.20	●	●	●			
Otay Valley	HA [11]	10.20	+		●			
Dulzura	HA	10.30	●	●	●			

11 This beneficial use designation applies to the portion of Otay HA (10.20), limited to lands within and tributary to Salt Creek on the east and Poggi Canyon on the west and including the several smaller drainage courses between these tributaries of the Otay River.

● Existing Beneficial Use

\+ Excepted from MUN (see text)

Table 2-5. BENEFICIAL USES OF GROUND WATERS

Ground Water		Hydrologic Unit Basin Number	BENEFICIAL USE					
			MUN	AGR	IND	PROC	FRSH	GWR
TIJUANA HYDROLOGIC UNIT		11.00						
Tijuana Valley	HA	11.10						
San Ysidro	HSA [12]	11.11	●	●	●			
Water Tanks	HSA	11.12	○	○	○			
Potrero	HA	11.20	●	●	●			
Barrett Lake	HA	11.30	●	●				
Monument	HA	11.40	●	●				
Morena	HA	11.50	●	●				
Cottonwood	HA	11.60	●	●				
Cameron	HA	11.70	●	●				
Campo	HA	11.80	●	●	●			

12 These beneficial uses do not apply west of Hollister Street and this area is excepted from the sources of drinking water policy. The beneficial uses for the remainder of the hydrologic area are as shown.

● Existing Beneficial Use

○ Potential Beneficial Use

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3. WATER QUALITY OBJECTIVES

INTRODUCTION

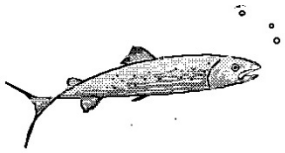

The purpose of this chapter is to designate the water quality objectives for all surface and ground waters in the Region. These water quality objectives are necessary to protect the beneficial uses designated in Chapter 2.

California Water Code (Water Code) section 13050(h) defines "water quality objectives" as follows:

"*The limits or levels of water quality constituents or characteristics which are established for the reasonable protection of beneficial uses of water or the prevention of nuisance within a specific area."*

By definition, water quality objectives must protect the most sensitive of the beneficial uses which have been designated for a water body. Water quality objectives may be numerical values for water quality constituents or narrative descriptions. Water quality objectives must be based upon sound scientific water quality criteria needed to protect the most sensitive of the beneficial uses which have been designated for a water body. Water quality objectives must be as stringent or more stringent than water quality criteria. Numerous key terms used throughout this chapter are defined in the Glossary which is included as Appendix A of this Basin Plan.

WATER QUALITY OBJECTIVES

Like the designation of beneficial uses, the designation of water quality objectives must satisfy all of the applicable requirements of the Water Code, Division 7 (Porter-Cologne Act) and the Clean Water Act. Water Code section 13241 provides that each Regional Water Quality Control Board shall establish water quality objectives for the waters of the state (i.e. ground and surface waters) which, in the Regional Board's judgment, are necessary for the reasonable protection of beneficial uses and for the prevention of nuisance. The Clean Water Act section 303 requires that the State adopt water quality objectives (called water quality criteria) for surface waters. The requirements of both Acts applicable to the designation of water quality objectives are summarized below.

WATER QUALITY OBJECTIVE DESIGNATION UNDER THE PORTER-COLOGNE WATER QUALITY CONTROL ACT

Significant points regarding the designation of water quality objectives for waters of the state under the Porter-Cologne Act are:

- Water quality objectives must ensure the reasonable protection of beneficial uses and the prevention of nuisance, recognizing that it may be possible for the quality of the water to be changed to some degree without unreasonably affecting beneficial uses. (Water Code section 13241)

- Protection of beneficial uses may not require that water quality objectives protect the existing quality of water. However, water quality objectives cannot be set at a level that would permit water quality to change to such a degree that the beneficial uses designated for protection are unreasonably affected. (Water Code section 13241)

- Water quality objectives must ensure that the water will be suitable for the beneficial uses which have been designated for protection. (Water Code section 13241)

- In establishing water quality objectives, the Regional Board must provide for the reasonable protection of all beneficial uses which are designated for protection, taking into account existing water quality, environmental and economic considerations. Water Code section 13241 provides that the Regional Board shall consider, but is not limited to, the following factors in establishing water quality objectives:

- Past, present, and probable future beneficial uses of water;
- Environmental characteristics of the hydrographic unit under consideration, including the quality of water available thereto;
- Water quality conditions that could reasonably be achieved through the coordinated control of all factors which affect water quality in the area;
- Economic considerations;
- The need for developing housing within the region; and
- The need to develop and use recycled water.

WATER QUALITY OBJECTIVE DESIGNATION UNDER THE CLEAN WATER ACT

Section 303 of the Clean Water Act requires the State to submit to the U.S. Environmental Protection Agency (USEPA) for approval, all new or revised water quality standards which are established for surface and ocean waters. Under federal terminology, water quality standards consist of the beneficial uses enumerated in Chapter 2 and the water quality objectives contained in this chapter. Significant points regarding the designation of water quality objectives for surface waters pursuant to the Clean Water Act are:

- Water quality objectives are called water quality criteria in the Clean Water Act.
- Water quality criteria (i.e., water quality objectives) are defined as constituent concentrations, levels, or narrative statements, representing a quality of water that supports a particular surface water use. Water quality criteria are qualitative or quantitative estimates of the concentration of a water constituent which, when not exceeded, will ensure water quality sufficient to protect a designated beneficial use. Water quality criteria should reflect the latest scientific knowledge on the identifiable effects of pollutants on public health and welfare, aquatic life, and recreation [40 CFR 131.3(b)].
- States must adopt water quality criteria (i.e., water quality objectives) that protect designated surface water beneficial uses. For surface waters with multiple beneficial use designations, the water quality criteria shall support the most sensitive beneficial use [40 CFR 131.11(a)(1)].
- States must adopt water quality criteria (i.e., water quality objectives) for surface waters which are based upon USEPA guidance documents or other scientifically defensible methods. Economics are not considered in the development of water quality criteria for surface waters under the Clean Water Act [40 CFR 131.11(b)].
- Water quality criteria (i.e., water quality objectives) for surface waters can be either numeric or narrative specifications for water quality based on physical, chemical and toxicological data, and scientific judgment. Where numerical specifications cannot be established, narrative criteria must be established based upon biomonitoring methods [40 CFR 131.11(b)].
- The term *"water quality criteria*" has two meanings under the federal Clean Water Act. In one context, water quality criteria is equivalent to water quality objectives. In other words, water quality criteria is the standard that a state must impose to protect a surface water beneficial use. In another context, the term *"water quality criteria*" refers to scientific information USEPA has developed on the relationship that the effect of a constituent concentration has on human health, aquatic life, or other uses of water. USEPA has published information in documents such as the "*Gold Book*" (USEPA, 1986) and in various individual criteria documents.

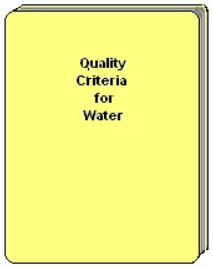

STATE AND FEDERAL ANTIDEGRADATION POLICIES

Water quality objectives must also conform to USEPA regulations covering antidegradation [40 CFR section 131.12] and State Board Resolution No. 68-16, *Statement of Policy with Respect to Maintaining High Quality of Waters in California*. Application of the antidegradation provisions to the standard setting process requires supporting documentation and appropriate findings whenever a standard (water quality objective or beneficial use) is made less restrictive to accommodate the discharge of pollutants or other activities of man

FEDERAL ANTIDEGRADATION POLICY

Elegant tern

USEPA water quality standards regulations mandated under the Clean Water Act require that each state have an *"antidegradation*" policy for surface waters [40 CFR 131.6(d)]. Each state's policy must, at a minimum, be consistent with the following three principles (hereinafter referred to as the "*federal antidegradation policy*") set forth in 40 CFR 131.12(a):

(1) The first principle requires that all existing instream water uses shall be maintained and protected.

(2) The second principle protects waters whose quality exceeds levels necessary to support propagation of fish, shellfish, and wildlife and recreation in and on the water. For these waters, limited water quality degradation may be allowed if necessary to accommodate important economic or social development in the area in which the waters are located and if the water quality is adequate to protect existing uses fully.

(3) The third principle requires maintenance and protection of all high quality waters which constitute an outstanding national resource.

The federal antidegradation policy serves as a "*catchall*" water quality standard, to be applied where other water quality standards are not specific enough for a particular water body or where other water quality standards do not address a particular pollutant. The policy also serves to provide guidance for standard setting and for other regulatory decisions, to determine when additional control measures should be required to maintain instream beneficial uses or to maintain high quality surface waters. The federal antidegradation policy is not an absolute bar to reductions in surface water quality. Rather, the policy requires that reductions in water quality be justified as necessary to accommodate important social and economic development.

STATE ANTIDEGRADATION POLICY

Water quality objectives for waters of the state must conform to State Board Resolution No. 68-16, *Statement of Policy with Respect to Maintaining High Quality of Waters in California*. Under State Board Resolution No. 68-16, which applies to all waters of the State, the Regional Board and the State Board must have sufficient grounds to adopt findings which demonstrate that any water quality degradation will:

(1) Be consistent with the maximum benefit to the people of the State;

(2) Not unreasonably affect existing and potential beneficial uses of such water; and

(3) Not result in water quality less than described in the Basin Plan.

Resolution No. 68-16 establishes a general principle of nondegradation, with flexibility to allow some changes in water quality which is in the best interests of the State. Changes in water quality are allowed only where it is in the public interest and beneficial uses are not unreasonably affected. The State Board has interpreted Resolution No. 68-16 as incorporating the three part principles set forth in the federal antidegradation policy. The terms and conditions of Resolution No. 68-16 serve as a general narrative water quality objective in all state water quality control plans. A reprint of Resolution No. 68-16 is provided in the back of this Chapter on page 3-36.

DESIGNATED WATER QUALITY OBJECTIVES

The water quality objectives designated for the waters of the San Diego Region are listed below. These water quality objectives are necessary to protect existing and potential beneficial uses described in Chapter 2 and to protect existing high quality waters of the State.

The water quality objectives will be achieved primarily through the establishment of waste discharge requirements, and through the implementation of this water quality control plan.

The Regional Board, in establishing waste discharge requirements, will consider potential effects on beneficial uses within the area of influence of the discharge, the existing quality of receiving waters, and the appropriate water quality objectives. The Regional Board will make a finding as to the beneficial uses to be protected within the area of influence of the discharge and establish waste discharge requirements to protect those uses and to meet water quality objectives.

The water quality objectives are stated in italics and arranged first by the water body type to which they apply (e.g., all waters; all ocean waters; and all inland surface, enclosed bay and estuaries, coastal lagoons, and ground waters). Within each water body type, the water quality objectives are alphabetized by constituent.

In most cases the water quality objective is preceded by a general description of the constituent limited by the objective. The objectives vary in applicability and scope, reflecting the variety of beneficial uses of water which have been identified. Where numerical limits are specified, they represent the maximum levels of constituents that will allow the beneficial use to continue unimpaired. In other cases, an objective may tolerate natural or "*background*" levels of certain substances or characteristics but no increases over those values, or may express a limit in terms of not adversely affecting beneficial uses. An adverse effect or impact on a beneficial use occurs where there is an actual or threatened loss or impairment of that beneficial use.

GENERAL ANTIDEGRADATION OBJECTIVE

The following objective shall apply to all waters of the State within the Region.

General Antidegradation Water Quality Objective

Wherever the existing quality of water is better than the quality of water established herein as objectives, such existing quality shall be maintained unless otherwise provided by the provisions of the State Water Resources Control Board Resolution No. 68-16, "Statement of Policy with Respect to Maintaining High Quality of Waters in California," including any revisions thereto, or the federal Antidegradation Policy, 40 CFR 131.12 (for surface waters only).

Pacific bonito

OCEAN WATERS

The following objectives shall apply to all ocean waters of the State within the Region.

OCEAN PLAN AND THERMAL PLAN

Ocean Plan and Thermal Plan Water Quality Objective

The terms and conditions of the State Board's "Water Quality Control Plan for Ocean Waters of California" (Ocean Plan), "Water Quality Control Plan for Control of Temperature in the Coastal and Interstate Waters and Enclosed Bays and Estuaries of California" (Thermal Plan), and any revisions thereto are incorporated into this Basin Plan by reference. The terms and conditions of the Ocean Plan and Thermal Plan apply to the ocean waters within this Region.

The shoreline segment along Baby Beach within Dana Point Harbor is designated as a water quality limited segment for indicator bacteria pursuant to Clean Water Act section 303(d). Total Maximum Daily Loads have been adopted to address these impairments. See Chapter 2, Table 2-3, *Beneficial Uses of Coastal Waters*, Footnote 2, and Chapter 7, *Total Maximum Daily Loads for Indicator Bacteria, Baby Beach in Dana Point Harbor and Shelter Island Shoreline Park in San Diego Bay*.

Certain Pacific Ocean shoreline segments of the following Hydrological Units, Areas, and Subareas are designated as water quality limited segments for indicator bacteria pursuant to Clean Water Act section 303(d): San Joaquin Hills HSA 901.11 and Laguna Beach HAS 901.12, Aliso Creek HSA 901.13, Dana Point HSA 901.14, Lower San Juan HSA 901.27, San Clemente HA 901.30, San Luis Rey HU 903.00, San Marcos HA 904.50, San Dieguito HU 905.00, Miramar Reservoir HA 906.10, Scripps HA 906.30, and Mission San Diego HSA 907.11 and Santee HSA 907.12. Total Maximum Daily Loads have been adopted to address these impairments. See Chapter 2, Table 2-3, *Beneficial uses of Coastal Waters*, Footnotes 1, 6, 9, 10, and 11, and Chapter 7, *Revised Total Maximum Daily Loads for Indicator Bacteria, Project I – Twenty Beaches and Creeks in the San Diego Region (Including Tecolote Creek).*

Total Maximum Daily Load (TMDL) Implementation Provisions

For the purposes of a TMDL, the water quality objectives for total coliform, fecal coliform, and/or enterococcus bacteria in ocean waters designated for contact recreation may be implemented using a reference system and antidegradation approach or natural sources exclusion approach.

See Chapter 4 (Implementation) for further discussion of this implementation provision.

DISSOLVED OXYGEN

Adequate dissolved oxygen is vital for aquatic life. Depression of dissolved oxygen levels can lead to fish kills and odors resulting from anaerobic decomposition. Dissolved oxygen content in water is a function of water temperature and salinity.

Water Quality Objective for Dissolved Oxygen

The dissolved oxygen concentration in ocean waters shall not at any time be depressed more than 10 percent from that which occurs naturally, as the result of the discharge of oxygen demanding waste materials.

HYDROGEN ION CONCENTRATION (pH)

The hydrogen ion concentration of water is called "*pH*". The acidity or alkalinity of water is measured by the pH factor. The pH scale ranges from 1 to 14, with 1 to 6.9 being acid, 7.1 to 14 being alkaline, and 7.0 being neutral. Ranges (pH) of 6.5 to 9.0 are considered harmless. A change of one point on this scale represents a ten-fold increase in acidity or alkalinity. Many pollutants can alter the pH, raising or lowering it excessively. In some cases even small changes in pH can harm aquatic biota. The pH changes can alter the chemical form of certain constituents, thereby increasing their bioavailability and toxicity. For example a decrease in pH can result in an increase in dissolved metal concentrations. Ammonia, which is a major component of sewage discharges, can be completely safe at pH 7.0 and extremely toxic to fish at pH 8.5 for the same total ammonia concentration.

Water Quality Objective for pH

The pH value shall not be changed at any time more than 0.2 pH units from that which occurs naturally.

INLAND SURFACE WATERS, ENCLOSED BAYS AND ESTUARIES, COASTAL LAGOONS AND GROUND WATERS

The following objectives apply to all inland surface waters, enclosed bays and estuaries, coastal lagoons, and ground waters of the Region as specified below.

THERMAL PLAN

Thermal Plan Water Quality Objective

The terms and conditions of the State Board's "Water Quality Control Plan for Control of Temperature in the Coastal and Interstate Waters and Enclosed Bays and Estuaries of California" (Thermal Plan) and any revisions thereto are incorporated into this Basin Plan by reference. The terms and conditions of the Thermal Plan apply to the Inland Surface Waters, Enclosed Bays and Estuaries, and Coastal Lagoons within this Region.

AGRICULTURAL SUPPLY BENEFICIAL USE

Water Quality Objective for Agricultural Supply

Waters designated for use as agricultural supply (AGR) shall not contain concentrations of chemical constituents in amounts that adversely affect such beneficial use.

AMMONIA, UN-IONIZED

Ammonia is a pungent, colorless, gaseous alkaline compound of nitrogen and hydrogen that is highly soluble in water. Un-ionized ammonia (NH_3) is toxic to fish and other aquatic organisms. In water, NH_3 exists in equilibrium with ammonium (NH_{4+}) and hydroxide (OH-) ions. The proportions of each change as the temperature, pH, and salinity of the water change.

Water Quality Objective for Un-ionized Ammonia

The discharge of wastes shall not cause concentrations of un-ionized ammonia (NH_3) to exceed 0.025 mg/l (as N) in inland surface waters, enclosed bays and estuaries and coastal lagoons.

BACTERIA - TOTAL COLIFORM, FECAL COLIFORM, E.COLI, AND ENTEROCOCCI

Total coliform, fecal coliform, *Escherichia coli (E. coli*), and enterococci bacteria are used to indicate the likelihood of pathogens of fecal origin in surface waters. Fecal bacteria (e.g., fecal coliform, *E. coli*, and enterococci) are part of the intestinal biota of warm-blooded animals. Their presence in surface waters is an indicator of potential pollution. Total coliform numbers can include non-fecal bacteria, so additional testing is often done to confirm the presence and numbers of fecal bacteria. Water quality objectives for numbers of total coliform, fecal coliform, *E.coli*, and enterococci vary with the beneficial uses of the water, as described below. The water quality objectives for bacteria are expressed in units of organisms per 100 milliliters of water.

The shoreline segment along Shelter Island Shoreline Park within San Diego Bay is designated as a water quality limited segment for indicator bacteria pursuant to Clean Water Act section 303(d). Total Maximum Daily Loads have been adopted to address these impairments. See Chapter 2, Table 2-3, *Beneficial Uses of Coastal Waters*, Footnote 5, and Chapter 7, *Total Maximum Daily Loads for Indicator Bacteria, Baby Beach in Dana Point Harbor and Shelter Island Shoreline Park in San Diego Bay*.

Aliso Creek, San Juan Creek, Tecolote Creek, Forrester Creek, San Diego River (lower), and Chollas Creek are designated as water quality limited segments for indicator bacteria pursuant to Clean Water Act section 303(d). Total Maximum Daily Loads have been adopted to address these impairments. See Chapter 2, Table 2-2, *Beneficial Uses of Inland Surface Waters*, Footnote 3 and Chapter 7, *Revised Total Maximum Daily Loads for Indicator Bacteria, Project I – Twenty Beaches and Creeks in the San Diego Region (Including Tecolote Creek).*

(1) Waters Designated for Contact Recreation (REC-1) Beneficial Use

Fecal Coliform Water Quality Objective for Contact Recreation

The fecal coliform concentration, based on a minimum of not less than five samples for any 30-day period, shall not exceed a log mean of 200 organisms per 100 ml.

In addition, the fecal coliform concentration shall not exceed 400 organisms per 100 ml for more than 10 percent of the total samples during any 30-day period.

Surfer at Ocean Beach, San Diego County

Enterococci and E. Coli Water Quality Objectives for Contact Recreation

The USEPA published E. coli and enterococci bacteriological criteria applicable to waters designated for contact recreation (REC-1) in the Federal Register, Vol. 51, No. 45, Friday, March 7, 1986, 8012-8016.

USEPA BACTERIOLOGICAL CRITERIA FOR WATER CONTACT RECREATION [1,2]
(in colonies per 100 ml)

	Freshwater		*Saltwater*
	Enterococci	*E.coli*	*Enterococci*
Steady State			
All Areas	*33*	*126*	*35*
Maximum			
Designated Beach	*61*	*235*	*104*
Moderately or Lightly Used Area	*108*	*406*	*276*
Infrequently Used Area	*151*	*576*	*500*

Total Coliform Water Quality Objective for Contact Recreation for Bays and Estuaries

In bays and estuaries, the most probable number of total coliform organisms in the upper 60 feet of the water column shall be less than 1,000 organisms per 100 ml (10 organisms per ml); provided that not more than 20 percent of the samples at any sampling station, in any 30-day period, may exceed 1,000 organisms per 100 ml (10 per ml); and provided further that no single sample as described below is exceeded.

The most probable number of total coliform organisms in the upper 60 feet of the water column in no single sample when verified by a repeat sample taken within 48 hours shall exceed 10,000 organisms per 100 ml (100 organisms per ml).

---

[1] *The criteria were published in the Federal Register, Vol. 51, No. 45/Friday, March 7, 1986/8012-8016. The criteria are based on:*

Cabelli, V. J. 1983. Health Effects Criteria for Marine Recreational Waters. U.S. Environmental Protection Agency, EPA 600/1-80-031, Cincinnati, Ohio.

Dufour, A. P. 1984. Health Effects Criteria for Fresh Recreational Waters. U.S. Environmental Protection Agency, EPA 600/1-84-004, Cincinnati, Ohio.

[2] *The EPA criteria apply to water contact recreation only. The criteria provide for a level of protection based on the frequency of usage of a given water contact recreation area. The criteria may be employed in special studies within this Region to differentiate between pollution sources or to supplement the current coliform objectives for water contact recreation.*

(2) Waters Designated for Non-Contact Recreation (REC-2) Beneficial Use

Fecal Coliform Water Quality Objective for Non-contact Recreation

In waters designated for non-contact recreation (REC-2) and not designated for contact recreation (REC-1), the average fecal coliform concentrations for any 30-day period, shall not exceed 2,000 organisms per 100 ml nor shall more than 10 percent of samples collected during any 30-day period exceed 4,000 organisms per 100 ml.

(3) Waters Where Shellfish May Be Harvested for Human Consumption (SHELL and COMM) Beneficial Use

Total Coliform Water Quality Objective for Shellfish Harvesting

In waters where shellfish harvesting for human consumption, commercial or sports purposes is designated (SHELL and COMM), the median total coliform concentration throughout the water column for any 30-day period shall not exceed 70 organisms per 100 ml nor shall more than 10 percent of the samples collected during any 30-day period exceed 230 organisms per 100 ml for a five-tube decimal dilution test or 330 organisms per 100 ml when a three-tube decimal dilution test is used.

(4) San Diego Bay Waters Used for Whole Fish Handling

E. Coli Water Quality Objective for Whole Fish Handling for San Diego Bay

In San Diego Bay where bay waters are used for whole fish handling, the density of E. coli shall not exceed 7 organisms per ml in more than 20 percent of any 20 daily consecutive samples of bay water.

(5) Total Maximum Daily Load (TMDL) Implementation Provisions

For the purposes of a TMDL, the following provisions may be used to implement bacteria water quality objectives:

The water quality objectives for fecal coliform bacteria for contact recreation may be implemented using a reference system and antidegradation approach or natural sources exclusion approach.

The water quality objectives for enterococci and/or *E. coli* in freshwater and/or saltwater may be implemented using a reference system and antidegradation approach or natural sources exclusion approach.

The water quality objectives for coliform organisms in bays and estuaries may be implemented using a reference system and antidegradation approach or natural sources exclusion approach.

The water quality objectives for fecal coliform bacteria for non-contact recreation may be implemented using a reference system and antidegradation approach or natural sources exclusion approach.

See Chapter 4 (Implementation) for a further discussion of this implementation provision.

BIOSTIMULATORY SUBSTANCES

Excessive growth of algae and/or other aquatic plants can degrade water quality. Algal blooms sometimes occur naturally; however, they are often the result of waste discharges or nonpoint source pollutants. Algal blooms depress the dissolved oxygen content of water and can result in fish kills. Algal blooms can also lead to problems with taste, odors, color, and increased turbidity. Floating algal scum and algal mats are also an aesthetically unpleasant nuisance. This general condition is known as eutrophication.

Water Quality Objectives for Biostimulatory Substances

Inland surface waters, bays and estuaries and coastal lagoon waters shall not contain biostimulatory substances in concentrations that promote aquatic growth to the extent that such growths cause nuisance or adversely affect beneficial uses.

Concentrations of nitrogen and phosphorus, by themselves or in combination with other nutrients, shall be maintained at levels below those which stimulate algae and emergent plant growth. Threshold total phosphorus (P) concentrations shall not exceed 0.05 milligrams per liter (mg/l) in any stream at the point where it enters any standing body of water, nor 0.025 mg/l in any standing body of water. A desired goal in order to prevent plant nuisance in streams and other flowing waters appears to be 0.1 mg/l total P. These values are not to be exceeded more than 10% of the time unless studies of the specific water body in question clearly show that water quality objective changes are permissible and changes are approved by the Regional Board. Analogous threshold values have not been set for nitrogen compounds; however, natural ratios of nitrogen to phosphorus are to be determined by surveillance and monitoring and upheld. If data are lacking, a ratio of N:P = 10:1 , on a weight to weight basis shall be used.

Inland surface waters shall not contain biostimulatory substances in concentrations in excess of the numerical objectives described in Table 3-2.

Rainbow Creek is designated as an impaired water body for total nitrogen and total phosphorus pursuant to Clean Water Act section 303(d). Total Maximum Daily Loads (TMDLs) have been adopted to address these impairments. See Chapter 2, *Beneficial Uses* Table 2-2. *Beneficial Uses of Inland Surface Waters*, Santa Margarita River Watershed, Rainbow Creek, Hydrologic Unit Basin Numbers 2.23 and 2.22, Footnote 3 and Chapter 7*, Total Maximum Daily Loads*.

Note - Certain exceptions to the above water quality objectives are described in Chapter 4 in the sections titled *Discharges to Coastal Lagoons from Pilot Water Reclamation Projects* and *Discharges to Inland Surface Waters*.

BORON

Boron occurs as sodium borate (borax) or as calcium borate (colemanite) in mineral deposits and natural waters of southern California. Boron is not considered harmful in drinking waters in concentrations up to 30 mg/l. Boron is an essential element for the growth of plants but there is no evidence that it is required by animals. Naturally occurring concentrations of boron should have no effect on aquatic life. Concentrations of boron in irrigation waters in excess of 0.75 mg/l may be deleterious to sensitive plants such as citrus. The maximum safe concentration of boron for even the most tolerant plants is about 4.0 mg/l. The United States Environmental Protection Agency (USEPA) has established a water quality criterion for boron of 0.75 mg/l for long term-term irrigation on sensitive crops. This criterion is found in *Quality Criteria for Water, 1986 - the "Gold Book".* Additional information regarding boron concentrations in irrigation waters is presented in Table 3-1.

Oranges

Water Quality Objectives for Boron

Inland surface waters shall not contain boron in concentrations in excess of the numerical objectives described in Table 3-2.

Ground waters shall not contain boron in concentrations in excess of the numerical objectives described in Table 3-3.

Table 3-1. Guidelines for Interpretation of Water Quality for Irrigation[a]

Potential Irrigation Problem	Units	Degree or Restriction on use		
		None	Slight to Moderate	Severe
Salinity (affects crop water availability)				
Electrical Conductivity (EC_W[b])	ds/m or mmho/cm	< 0.7	0.7 - 3.0	> 3.0
TDS	mg/l	< 450	450 – 2,000	> 2,000
Permeability (affects infiltration rate of water into soil. Evaluate using EC_W and Sodium Adsorption Ratio (SAR) together) [c, d]				
SAR =			**and EC_W =**	
0 - 3		> 0.7	0.7 - 0.2	< 0.2
3 - 6		> 1.2	1.2 - 0.3	< 0.3
6 - 12		> 1.9	1.9 - 0.5	< 0.5
12 - 20		> 2.9	2.9 - 1.3	< 1.3
20 - 40		> 5.0	5.0 - 2.9	< 2.9
Specified ion toxicity (affects sensitive crops)				
Sodium (Na) [e,f]				
surface irrigation	SAR	< 3	3 - 9	> 9
sprinkler irrigation	mg/l	< 70	> 70	-----
Chloride (Cl) [e,f]				
surface irrigation	mg/l	< 140	140 - 350	> 350
sprinkler irrigation	mg/l	< 100	> 100	-----
Boron (B)	mg/l	< 0.7	0.7 - 3.0	> 3.0
Miscellaneous effects (affects susceptible crops)				
Nitrogen (Total-N) [g]	mg/l	< 5	5 - 30	> 30
Bicarbonate (HCO_3) overhead sprinkler only)	mg/l	< 90	90 - 500	> 500
pH	normal range		6.5 - 8.4	
Residual chlorine (overhead sprinkler only)	mg/l	< 1.0	1.0 - 5.0	> 5.0

Endnotes for Table 3-1

a. Interpretations are based on possible effects of constituents on crops and/or soils. Guidelines are flexible and should be modified when warranted by local experience or special conditions of crop, soil, and method of irrigation. Table 3-1 is based on Table 3-4 contained in "*Irrigation with Reclaimed Municipal Wastewater, A Guidance Manual,*" California State Water Resources Control Board, Report Number 84-1, July 1984.

b. EC_w means electrical conductivity of the irrigation water, reported in mmho/cm or ds/m. TDS means total dissolved solids, reported in mg/l.

c. SAR means sodium adsorption ratio. SAR is sometimes reported as R_{Na}. At a given SAR, infiltration rate increases as salinity (EC_w) increases. Evaluate the potential permeability problem by SAR and EC_w in combination.

$$SAR = \frac{Na}{\sqrt{\frac{(Ca + Mg)}{2}}}$$

Where *Na, Ca,* and *Mg* are in milliequivalents per liter.

d. For wastewaters, it is recommended that the SAR be adjusted to include a more correct estimate of calcium in the soil water following an irrigation. The adjusted sodium adsorption ratio (adj RNa) calculated by this product is to be substituted for the SAR value.

$$SAR = \frac{Na}{\sqrt{\frac{(Ca_x + Mg)}{2}}}$$

Where *Na, Ca,* and *Mg* are in milliequivalents per liter.

Ca_x is a modified Ca value calculated using Table 3-2, contained in "*Irrigation with Reclaimed Municipal Wastewater, A Guidance Manual.*"

e. Most tree crops and woody ornamentals are sensitive to sodium and chloride; use the values shown. Most annual crops are not sensitive; use the salinity tolerance tables. For boron sensitivity, refer to boron tolerance tables.

f. With overhead sprinkler irrigation and low humidity (<30%), sodium or chloride greater than 70 or 100 mg/l, respectively, have resulted in excessive leaf absorption and crop damage to sensitive crops.

g. Total nitrogen should include nitrate-nitrogen, ammonia-nitrogen, and organic-nitrogen. Although forms of nitrogen in wastewater vary, the plant responds to the total nitrogen.

Table 3-2. Water Quality Objectives

Concentrations not to be exceeded more than 10% of the time during any one year period.

Inland Surface Waters			Hydrologic Unit Basin Number	Constituent (mg/L or as noted)												
				TDS	Cl	SO_4	%Na	N&P	Fe	Mn	MBAS	B	ODOR	Turb NTU	Color Units	F
SAN JUAN HYDROLOGIC UNIT			**901.00**													
Laguna	HA		1.10	1,000	400	500	60	a	0.3	0.05	0.5	0.75	none	20	20	1.0
Mission Viejo	HA		1.20	500	250	250	60	a	0.3	0.05	0.5	0.75	none	20	20	1.0
San Clemente	HA		1.30	500	250	250	60	a	0.3	0.05	0.5	0.75	none	20	20	1.0
San Mateo Canyon	HA		1.40	500	250	250	60	a	0.3	0.05	0.5	0.75	none	20	20	1.0
San Onofre	HA		1.50	500	250	250	60	a	0.3	0.05	0.5	0.75	none	20	20	1.0
SANTA MARGARITA HYDROLOGIC UNIT			**902.00**													
Ysidora	HA		2.10	750	300	300	60	a	0.3	0.05	0.5	0.75	none	20	20	1.0
Deluz	HA		2.20	500	250	250	60	a	0.3	0.05	0.5	0.75	none	20	20	1.0
Deluz Creek	HSA	b	2.21	750	250	250	60	a	0.3	0.05	0.5	0.75	none	20	20	1.0
Gavilan	HSA	b	2.22	750	250	250	60	a	0.3	0.05	0.5	0.75	none	20	20	1.0
Murrieta	HA		2.30	750	300	300	60	a	0.3	0.05	0.5	0.75	none	20	20	1.0
Auld	HA		2.40	500	250	250	60	a	0.3	0.05	0.5	0.75	none	20	20	1.0
Pechanga	HA		2.50	500	250	250	60	a	0.3	0.05	0.5	0.75	none	20	20	1.0
Wolf	HSA	b	2.52	750	250	250	60	a	0.3	0.05	0.5	0.75	none	20	20	1.0
Wilson	HA		2.60	500	250	250	60	a	0.3	0.05	0.5	0.75	none	20	20	1.0
Cave Rocks	HA		2.70	750	300	300	60	a	0.3	0.05	0.5	0.75	none	20	20	1.0
Aguanga	HA		2.80	750	300	300	60	a	0.3	0.05	0.5	0.75	none	20	20	1.0
Oakgrove	HA		2.90	750	300	300	60	a	0.3	0.05	0.5	0.75	none	20	20	1.0

HA - Hydrologic Area
HAS - Hydrologic Sub-Area (Lower case letters indicate endnotes following the table)

Table 3-2. Water Quality Objectives (continued)

Concentrations not to be exceeded more than 10% of the time during any one year period.

Inland Surface Waters		Hydrologic Unit Basin Number	Constituent (mg/L or as noted)												
			TDS	Cl	SO_4	%Na	N&P	Fe	Mn	MBAS	B	ODOR	Turb NTU	Color Units	F
SAN LUIS REY HYDROLOGIC UNIT		**903.00**													
Lower San Luis	HA	3.10	500	250	250	60	a	0.3	0.05	0.5	0.75	none	20	20	1.0
Monserat	HA	3.20	500	250	250	60	a	0.3	0.05	0.5	0.75	none	20	20	1.0
Warner Valley	HA	3.30	500	250	250	60	a	0.3	0.05	0.5	0.75	none	20	20	1.0
CARLSBAD HYDROLOGIC UNIT		**904.00**													
Loma Alta	HA	4.10	-	-	-	-	-	-	-	-	-	none	20	20	1.0
Buena Vista Creek	HA	4.20	500	250	250	60	a	0.3	0.05	0.5	0.75	none	20	20	1.0
Agua Hedionda	HA	4.30	500	250	250	60	a	0.3	0.05	0.5	0.75	none	20	20	1.0
Encinas	HA	4.40	-	-	-	-	-	-	-	-	-	none	20	20	1.0
San Marcos	HA	4.50	500	250	250	60	a	0.3	0.05	0.5	0.75	none	20	20	1.0
Escondido Creek	HA	4.60	500	250	250	60	a	0.3	0.05	0.5	0.75	none	20	20	1.0
SAN DIEGUITO HYDROLOGIC UNIT		**905.00**													
Solana Beach	HA	5.10	500	250	250	60	a	0.3	0.05	0.5	0.75	none	20	20	1.0
Hodges	HA	5.20	500	250	250	60	a	0.3	0.05	0.5	0.75	none	20	20	1.0
San Pasqual	HA	5.30	500	250	250	60	a	0.3	0.05	0.5	0.75	none	20	20	1.0
Santa Maria Valley	HA	5.40	500	250	250	60	a	0.3	0.05	0.5	0.75	none	20	20	1.0
Santa Ysabel	HA	5.50	500	250	250	60	a	0.3	0.05	0.5	0.75	none	20	20	1.0

HA - Hydrologic Area
HAS - Hydrologic Sub-Area (Lower case letters indicate endnotes following the table)

Table 3-2. Water Quality Objectives (continued)

Concentrations not to be exceeded more than 10% of the time during any one year period.

Inland Surface Waters		Hydrologic Unit Basin Number	Constituent (mg/L or as noted)												
			TDS	Cl	SO_4	%Na	N&P	Fe	Mn	MBAS	B	ODOR	Turb NTU	Color Units	F
PENASQUITOS HYDROLOGIC UNIT		**906.00**													
Miramar Reservoir	HA	6.10	500	250	250	60	a	0.3	0.05	0.5	0.75	none	20	20	1.0
Poway	HA	6.20	500	250	250	60	a	0.3	0.05	0.5	0.75	none	20	20	1.0
Scripps	HA	6.30	-	-	-	-	a	-	-	-	-	none	20	20	-
Miramar	HA	6.40	500	250	250	60	a	0.3	0.05	0.5	0.75	none	20	20	1.0
Tecolote	HA	6.50	-	-	-	-	a	-	-	-	-	none	20	20	-
SAN DIEGO HYDROLOGIC UNIT		**907.00**													
Lower San Diego	HA	7.10	1,000	400	500	60	a	0.3	0.05	0.5	1.0	none	20	20	-
Mission San Diego	HSA	7.11	1,500	400	500	60	a	1.0	1.00	0.5	1.0	none	20	20	-
Santee	HSA c,	7.12	1,000	400	500	60	a	1.0	1.00	0.5	1.0	none	20	20	-
Santee	HSA d	7.12	1,500	400	500	60	a	1.0	1.00	0.5	1.0	none	20	20	-
San Vicente	HA	7.20	300	50	65	60	a	0.3	0.05	0.5	1.0	none	20	20	1.0
El Capitan	HA	7.30	300	50	65	60	a	0.3	0.05	0.5	1.0	none	20	20	1.0
Boulder Creek	HA	7.40	300	50	65	60	a	0.3	0.05	0.5	1.0	none	20	20	1.0
PUEBLO SAN DIEGO HYDROLOGIC UNIT		**908.00**													
Point Loma	HA	8.10	-	-	-	-	-	-	-	-	-	none	20	20	-
San Diego Mesa	HA	8.20	-	-	-	-	-	-	-	-	-	none	20	20	-
National City	HA	8.30	-	-	-	-	-	-	-	-	-	none	20	20	-

HA - Hydrologic Area
HAS - Hydrologic Sub-Area (Lower case letters indicate endnotes following the table)

Table 3-2. Water Quality Objectives (continued)

Concentrations not to be exceeded more than 10% of the time during any one year period.

Inland Surface Waters			Hydrologic Unit Basin Number	Constituent (mg/L or as noted)												
				TDS	Cl	SO_4	%Na	N&P	Fe	Mn	MBAS	B	ODOR	Turb NTU	Color Units	F
SWEETWATER HYDROLOGIC UNIT			**909.00**													
Lower Sweetwater	HA		9.10	1,500	500	500	60	a	0.3	0.05	0.5	0.75	none	20	20	-
Middle Sweetwater	HA		9.20	500	250	250	60	a	0.3	0.05	0.5	0.75	none	20	20	1.0
Upper Sweetwater	HA		9.30	500	250	250	60	a	0.3	0.05	0.5	0.75	none	20	20	1.0
OTAY HYDROLOGIC UNIT			**910.00**													
Coronado	HA		10.10	-	-	-	-	-	-	-	-	-	-	-	-	-
Otay Valley	HA		10.20	1,000	400	500	60	a	0.3	0.05	0.5	0.75	none	20	20	1.0
Dulzura	HA		10.30	500	250	250	60	a	0.3	0.05	0.5	0.75	none	20	20	1.0
TIJUANA HYDROLOGIC UNIT			**911.00**													
Tijuana Valley	HA		11.10	-	-	-	-	-	-	-	-	-	-	-	-	-
San Ysidro	HSA		11.11	2,100	-	-	-	a	-	-	-	-	none	20	20	-
Potrero	HA		11.20	500	250	250	60	a	0.3	0.05	0.5	1.0	none	20	20	1.0
Barrett Lake	HA		11.30	500	250	250	60	a	0.3	0.05	0.5	1.0	none	20	20	1.0
Monument	HA		11.40	500	250	250	60	a	0.3	0.05	0.5	1.0	none	20	20	1.0
Morena	HA		11.50	500	250	250	60	a	0.3	0.05	0.5	1.0	none	20	20	1.0
Cottonwood	HA		11.60	500	250	250	60	a	0.3	0.05	0.5	1.0	none	20	20	1.0
Cameron	HA		11.70	500	250	250	60	a	0.3	0.05	0.5	1.0	none	20	20	1.0
Campo	HA		11.80	500	250	250	60	a	0.3	0.05	0.5	1.0	none	20	20	1.0

HA - Hydrologic Area
HAS - Hydrologic Sub-Area (Lower case letters indicate endnotes following the table)

Endnotes for Table 3-2

a. Concentrations of nitrogen and phosphorus, by themselves or in combination with other nutrients, shall be maintained at levels below those which stimulate algae and emergent plant growth. Threshold total Phosphorus (P) concentrations shall not exceed 0.05 mg/l in any stream at the point where it enters any standing body of water, nor 0.025 mg/l in any standing body of water. A desired goal in order to prevent plant nuisances in streams and other flowing waters appears to be 0.1 mg/l total P. These values are not to be exceeded more than 10% of the time unless studies of the specific body in question clearly show that water quality objective changes are permissible and changes are approved by the Regional Board. Analogous threshold values have not been set for nitrogen compounds; however, natural ratios of nitrogen to phosphorus are to be determined by surveillance and monitoring and upheld. If data are lacking, a ratio of N: P=10:1 shall be used. Note - Certain exceptions to the above water quality objectives are described in Chapter 4 in the sections titled Discharges to Coastal Lagoons from Pilot Water Reclamation Projects and Discharges to Surface Waters.

b. These objectives apply to the lower portion of Murrieta Creek in the Wolf HSA (2.52) and the Santa Margarita River from it's beginning at the confluence of Murrieta and Temecula Creeks, through the Gavilan HSA (2.22) and DeLuz HSA (2.21), to where it enters the Upper Ysidora HSA (2.13).

c. Sycamore Canyon Subarea, a portion of the Santee Hydrologic Subarea, includes the watersheds of the following north-south trending canyons: Oak Creek, Spring Canyon, Little Sycamore Canyon, Quail Canyon, and Sycamore Canyon. The Sycamore Canyon subarea extends eastward from the Mission San Diego HSA to the confluence of the San Diego River and Forester Creek, immediately south of the Santee Lakes.

d. These objectives apply to the Lower Sycamore Canyon portion of the Santee Hydrologic Subarea described as all of the Sycamore Canyon watershed except that part which drains north of the boundary between sections 28 and 33, Township 14 South, Range 1 West.

Table 3-3. Water Quality Objectives

Concentrations not to be exceeded more than 10% of the time during any one year period.

Ground Water		Hydrologic Basin Unit Number	Constituent (mg/L or as noted)												
			TDS	Cl	SO_4	%Na	NO_3	Fe	Mn	MBAS	B	ODOR	Turb NTU	Color Units	F
SAN JUAN HYDROLOGIC UNIT		**901.00**													
Laguna	HA	1.10													
San Joaquin Hills	HSA	1.11	1,200	400	500	60	45	0.3	0.05	0.5	0.75	none	5	15	1.0
Laguna Beach	HSA	1.12	1,200	400	500	60	45	0.3	0.05	0.5	0.75	none	5	15	1.0
Aliso	HSA	1.13	1,200	400	500	60	45	0.3	0.05	0.5	0.75	none	5	15	1.0
Dana Point	HSA	1.14	1,200	400	500	60	45	0.3	0.05	0.5	0.75	none	5	15	1.0
Mission Viejo	HA	1.20													
Oso	HSA	1.21	1,200	400	500	60	45	0.3	0.05	0.5	0.75	none	5	15	1.0
Upper Trabuco	HSA	1.22	500	250	250	60	45	0.3	0.05	0.5	0.75	none	5	15	1.0
Middle Trabuco	HSA	1.23	750	375	375	60	45	0.3	0.05	0.5	0.75	none	5	15	1.0
Gobernadora	HSA	1.24	1,200	400	500	60	45	0.3	0.05	0.5	0.75	none	5	15	1.0
Upper San Juan	HSA	1.25	500	250	250	60	45	0.3	0.05	0.5	0.75	none	5	15	1.0
Middle San Juan	HSA	1.26	750	375	375	60	45	0.3	0.05	0.5	0.75	none	5	15	1.0
Lower San Juan	HSA	1.27	1,200	400	500	60	45	0.3	0.05	0.5	0.75	none	5	15	1.0
Ortega	HSA	1.28	1,100	375	450	60	45	0.3	0.05	0.5	0.75	none	5	15	1.0
San Clemente	HA	1.30													
Prima Deshecha	HSA	1.31	1,200	400	500	60	45	0.3	0.05	0.5	0.75	none	5	15	1.0
Segunda Deshecha	HSA	1.32	1,200	400	500	60	45	0.3	0.05	0.5	0.75	none	5	15	1.0
San Mateo Canyon	HA [a]	1.40	500 [b]	250	250 [b]	60	45 [b]	0.3 [b]	0.05 [b]	0.5	0.75 [b]	none	5	15	1.0
San Onofre	HA [a]	1.50	500 [b]	250	250 [b]	60	45 [b]	0.3 [b]	0.05 [b]	0.5	0.75 [b]	none	5	15	1.0

HA - Hydrologic Area
HAS - Hydrologic Sub-Area (Lower case letters indicate endnotes following the table)

Table 3-3. Water Quality Objectives (continued)

Concentrations not to be exceeded more than 10% of the time during any one year period.

Ground Water			Hydrologic Basin Unit Number	Constituent (mg/L or as noted)												
				TDS	Cl	SO4	%Na	NO3	Fe	Mn	MBAS	B	ODOR	Turb NTU	Color Units	F
SANTA MARGARITA HYDROLOGIC UNIT			**902.00**													
Ysidora	HA	a	2.10	750 [c]	300 [c]	300 [c]	60	45 [c]	0.3 [c]	0.05 [c]	0.5	0.75 [c]	none	5	15	1.0
Deluz	HA		2.20	500	250	250	60	45	0.3	0.05	0.5	0.75	none	5	15	1.0
Deluz Creek	HSA	m	2.21	750	250	250	60	45	0.3	0.05	0.5	0.75	none	5	15	1.0
Gavilan	HSA	m	2.22	750	250	250	60	45	0.3	0.05	0.5	0.75	none	5	15	1.0
Murrieta	HA		2.30	750 [c]	300 [c]	300 [c]	60	45 [c]	0.3 [c]	0.05 [c]	0.5	0.75 [c]	none	5	15	1.0
Domenigoni	HSA		2.35	2,000	-	-	-		-	-	-	-	-	-	-	-
Auld	HA		2.40	500	250	250	60	45	0.3	0.05	0.5	0.75	none	5	15	1.0
Pechanga	HA		2.50	500	250	250	60	45	0.3	0.05	0.5	0.75	none	5	15	1.0
Pauba	HSA	o	2.51	750	250	250	60	45	0.3	0.05	0.5	0.75	none	5	15	1.0
Wolf	HSA	p	2.52	750	250	250	60	45	0.3	0.05	0.5	0.75	none	5	15	1.0
Wilson	HA		2.60	500	250	250	60	45	0.3	0.05	0.5	0.75	none	5	15	1.0
Cave Rocks	HA		2.70	500	250	250	60	45	0.3	0.05	0.5	0.75	none	5	15	1.0
Aguanga	HA		2.80	500	250	250	60	45	0.3	0.05	0.5	0.75	none	5	15	1.0
Oakgrove	HA		2.90	500	250	250	60	45	0.3	0.05	0.5	0.75	none	5	15	1.0
SAN LUIS REY HYDROLOGIC UNIT			**903.00**													
Lower San Luis	HA		3.10	800 [r]	300	400	60	45	0.3	0.05	0.5	0.75	none	5	15	1.0
Mission	HSA	a	3.11	1,500 [cd]	500 [cd]	500 [cd]	60	45 [cd]	0.85 [cd]	0.15 [cd]	0.5 [d]	0.75 [cd]	none	5	15 [d]	1.0 [d]
Bonsall	HSA		3.12	1,500 [cd]	500 [cd]	500 [cd]	60	45 [cd]	0.85 [cd]	0.15 [cd]	0.5 [d]	0.75 [cd]	none	5	15 [d]	1.0 [d]
Moosa	HSA		3.13	1,200 [r]	300	400	60	45	0.3	0.05	0.5	0.75	none	5	15	1.0
Valley Center	HSA		3.14	1,100 [r]	300	400	60	45	0.3	0.05	0.5	0.75	none	5	15	1.0

HA - Hydrologic Area
HAS - Hydrologic Sub-Area (Lower case letters indicate endnotes following the table)

Table 3-3. Water Quality Objectives (continued)

Concentrations not to be exceeded more than 10% of the time during any one year period.

Ground Water		Hydrologic Basin Unit Number	Constituent (mg/L or as noted)												
			TDS	Cl	SO_4	%Na	NO_3	Fe	Mn	MBAS	B	ODOR	Turb NTU	Color Units	F
SAN LUIS REY HYDROLOGIC UNIT (continued)		**903.00**													
Monserate	HA	3.20													
Pala	HSA	3.21	900 [c]	300 [c]	500 [c]	60	45 [c]	0.3 [c]	0.05 [c]	0.5	0.75	none	5	15	1.0
Pauma	HSA	3.22	800 [c]	300 [c]	400 [c]	60	45 [c]	0.3 [c]	0.05 [c]	0.5	0.75	none	5	15	1.0
La Jolla Amago	HSA	3.23	500	250	250	60	45	0.3	0.05	0.5	0.75	none	5	15	1.0
Warner Valley	HA	3.30	500	250	250	60	5	0.3	0.05	0.5	0.75	none	5	15	1.0
CARLSBAD HYDROLOGIC UNIT		**904.00**													
Loma Alta	HA	4.10	-	-	-	-	-	-	-	-	-	-	-	-	-
Buena Vista Creek	HA	4.20													
El Salto	HSA [a]	4.21	3,500	800	500	60	45	0.3	0.05	0.5	2.0	none	5	15	1.0
Vista	HSA [a]	4.22	1,000 [b]	400 [b]	500 [b]	60	45 [b]	0.3 [b]	0.05 [b]	0.5	0.75 [b]	none	5	15	1.0
Agua Hedionda	HA [a]	4.30	1,200	500	500	60	45	0.3	0.05	0.5	0.75	none	5	15	1.0
Los Monos	HSA [a j]	4.31	3,500	800	500	60	45	0.3	0.05	0.5	2.0	none	5	15	1.0
Encinas	HA [a]	4.40	3,500 [b]	800 [b]	500 [b]	60	45 [b]	0.3 [b]	0.05 [b]	0.5	2.0 [b]	none	5	15	1.0
San Marcos	HA [a e]	4.50	1,000	400	500	60	45	0.3	0.05	0.5	0.75	none	5	15	1.0
Batiquitos	HSA [a e k]	4.51	3,500	800	500	60	45	0.3	0.05	0.5	2.0	none	5	15	1.0
Escondido Creek	HA [a]	4.60	750	300	300	60	45	0.3	0.05	0.5	0.75	none	5	15	1.0
San Elijo	HSA [a]	4.61	2,800	700	600	60	45	0.3	0.05	0.5	1.0	none	5	15	1.0
Escondido	HSA	4.62	1,000	300	400	60	45	0.3	0.05	0.5	0.75	none	5	15	1.0

HA - Hydrologic Area
HAS - Hydrologic Sub-Area (Lower case letters indicate endnotes following the table)

Table 3-3. Water Quality Objectives (continued)

Concentrations not to be exceeded more than 10% of the time during any one year period.

Ground Water			Hydrologic Basin Unit Number	Constituent (mg/L or as noted)												
				TDS	Cl	SO_4	%Na	NO_3	Fe	Mn	MBAS	B	ODOR	Turb NTU	Color Units	F
SAN DIEGUITO HYDROLOGIC UNIT			**905.00**													
Solana Beach	HA	a	5.10	1,500 [b]	500 [b]	500 [b]	60	45 [b]	0.85 [b]	0.15 [b]	0.5	0.75 [b]	none	5	15	1.0
Hodges	HA		5.20	1,000 [b]	400 [b]	500 [b]	60	45 [b]	0.3 [b]	0.05 [b]	0.5	0.75 [b]	none	5	15	1.0
San Pasqual	HA		5.30	1,000 [b]	400 [b]	500 [b]	60	45 [b]	0.3 [b]	0.05 [b]	0.5	0.75 [b]	none	5	15	1.0
Santa Maria Valley	HA		5.40	1,000	400	500	60	45	0.3	0.05	0.5	0.75	none	5	15	1.0
Santa Ysabel	HA		5.50	500	250	250	60	45	0.3	0.05	0.5	0.75	none	5	15	1.0
PENASQUITOS HYDROLOGIC UNIT			**906.00**													
Miramar Reservoir	HA	a f	6.10	1,200	500	500	60	45	0.3	0.05	0.5	0.75	none	5	15	1.0
Poway	HA		6.20	750 [q]	300	300	60	45	0.3	0.05	0.5	0.75	none	5	15	1.0
Scripps	HA		6.30	-	-	-	-	-	-	-	-	-	-	-	-	-
Miramar	HA	g	6.40	750	300	300	60	45	0.3	0.05	0.5	0.75	none	5	15	1.0
Tecolote	HA		6.50	-	-	-	-	-	-	-	-	-	-	-	-	-
SAN DIEGO HYDROLOGIC UNIT			**907.00**													
Lower San Diego	HA		7.10													
Mission San Diego	HSA	a	7.11	3,000 [b]	800 [b]	600 [b]	60	45 [b]	0.3 [b]	0.05 [b]	0.5	2.0 [b]	none	5	15	1.0
Santee	HSA		7.12	1,000 [b]	400 [b]	500 [b]	60	45 [b]	0.3 [b]	0.05 [b]	0.5	0.75 [b]	none	5	15	1.0
Santee (alluvial aquifer for lower Sycamore Canyon)	HSA	n	7.12	2,000 [b]	800 [b]	600 [b]	60	45 [b]	0.3 [b]	0.05 [b]	0.5	2.0 [b]	none	5	15	1.0
El Cajon	HSA		7.13	1,200 [b]	250 [b]	500 [b]	60	45 [b]	0.3 [b]	0.05 [b]	0.5	0.75 [b]	none	5	15	1.0
Coches	HSA		7.14	600 [b]	250 [b]	250 [b]	60	45 [b]	0.3 [b]	0.05 [b]	0.5	0.75 [b]	none	5	15	1.0
El Monte	HSA		7.15	600 [b]	250 [b]	250 [b]	60	45 [b]	0.3 [b]	0.05 [b]	0.5	0.75 [b]	none	5	15	1.0

HA - Hydrologic Area
HAS - Hydrologic Sub-Area (Lower case letters indicate endnotes following the table)

Table 3-3. Water Quality Objectives (continued)

Concentrations not to be exceeded more than 10% of the time during any one year period.

Ground Water		Hydrologic Basin Unit Number	Constituent (mg/L or as noted)												
			TDS	Cl	SO_4	%Na	NO_3	Fe	Mn	MBAS	B	ODOR	Turb NTU	Color Units	F
SAN DIEGO HYDROLOGIC UNIT (continued)		**907.00**													
San Vicente	HA	7.20	600	250	250	60	45	0.3	0.05	0.5	0.75	none	5	15	1.0
El Capitan	HA	7.30	1,000	400	500	60	45	0.3	0.05	0.5	0.75	none	5	15	1.0
Conejos Creek	HSA	7.31	350	60	60	60	45	0.3	0.05	0.5	0.75	none	5	15	1.0
Boulder Creek	HA	7.40	350	60	60	60	45	0.3	0.05	0.5	0.75	none	5	15	1.0
PUEBLO SAN DIEGO HYDROLOGIC UNIT		**908.0**													
Point Loma	HA [i]	8.10	-	-	-	-	-	-	-	-	-	-	-	-	-
San Diego Mesa	HA [i]	8.20	-	-	-	-	-	-	-	-	-	-	-	-	-
National City	HA [i]	8.30	750	250	250	60	45	0.3	0.05	0.5	0.75	none	5	15	1.0
SWEETWATER HYDROLOGIC UNIT		**909.00**													
Lower Sweetwater	HA	9.10													
Telegraph	HSA	9.11	3,000 [b]	750 [b]	500 [b]	60	45 [b]	0.3 [b]	0.05 [b]	0.5	2.0 [b]	none	5	15	1.0
La Nacion	HSA	9.12	1,500 [b]	500 [b]	500 [b]	60	45 [b]	0.3 [b]	0.15 [b]	0.5	0.75 [b]	none	5	15	1.0
Middle Sweetwater	HA	9.20	1,000	400	500	60	45	0.3	0.05	0.5	0.75	none	5	15	1.0
Upper Sweetwater	HA	9.30	500	250	250	60	45	0.3	0.05	0.5	0.75	none	5	15	1.0
OTAY HYDROLOGIC UNIT		**910.00**													
Coronado	HA	10.10	-	-	-	-	-	-	-	-	-	-	-	-	-
Otay Valley	HA	10.20	1,500 [b]	500 [b]	500 [b]	60	45 [b]	0.3 [b]	0.05 [b]	0.5	0.75 [b]	none	5	15	1.0
Otay Valley	HA [l]	10.20	-	-	-	-	-	-	-	-	-	none	-	-	-
Dulzura	HA	10.30	1,000	400	500	60	45	0.3	0.05	0.5	0.75	none	5	15	1.0

HA - Hydrologic Area
HAS - Hydrologic Sub-Area (Lower case letters indicate endnotes following the table)

Table 3-3. Water Quality Objectives (continued)

Concentrations not to be exceeded more than 10% of the time during any one year period.

Ground Water		Hydrologic Basin Unit Number	Constituent (mg/L or as noted)												
			TDS	Cl	SO_4	%Na	NO_3	Fe	Mn	MBAS	B	ODOR	Turb NTU	Color Units	F
TIJUANA HYDROLOGIC UNIT		**911.00**													
Tijuana Valley	HA [h]	11.10	2,500 [b]	550 [b]	900 [b]	70	-	-	-	-	2.0 [b]	none	-	-	-
Potrero	HA	11.20	500	250	250	60	45	0.3	0.05	0.5	1.0	none	5	15	1.0
Barrett Lake	HA	11.30	500	250	250	60	45	0.3	0.05	0.5	1.0	none	5	15	1.0
Monument	HA	11.40	500	250	250	60	45	0.3	0.05	0.5	1.0	none	5	15	1.0
Morena	HA	11.50	500	250	250	60	45	0.3	0.05	0.5	1.0	none	5	15	1.0
Cottonwood	HA	11.60	500	250	250	60	45	0.3	0.05	0.5	1.0	none	5	15	1.0
Cameron	HA	11.70	500	250	250	60	45	0.3	0.05	0.5	1.0	none	5	15	1.0
Campo	HA	11.80	500	250	250	60	45	0.3	0.05	0.5	1.0	none	5	15	1.0

HA - Hydrologic Area
HAS - Hydrologic Sub-Area (Lower case letters indicate endnotes following the table)

Endnotes for Table 3-3

a. The water quality objectives do not apply westerly of the easterly boundary of Interstate Highway 5. The objectives for the remainder of the Hydrologic Area (Subarea) are as shown.

b. Detailed salt balance studies are recommended for this area to determine limiting mineral concentration levels for discharge. On the basis on existing data, the tabulated objectives would probably be maintained in most areas. Upon completion of the salt balance studies, significant water quality objective revisions may be necessary. In the interim period of time, projects of ground water recharge with water quality inferior to the tabulated numerical values may be permitted following individual review and approval by the Regional Board if such projects do not degrade existing ground water quality to the aquifers affected by the recharge.

c. The recommended plan would allow for measurable degradation of ground water in this basin to permit continued agricultural land use. Point sources, however, would be controlled to achieve effluent quality corresponding to the tabulated numerical values. In future years demineralization may be used to treat ground water to the desired quality prior to use.

Endnotes for Table 3-3 (continued)

d. A portion of the Upper Mission Basin is being considered as an underground potable water storage reservoir for treated imported water. The area is located north of Highway 76 an the boundary of hydrologic subareas 3.11 and 3.12. If this program is adopted, local objectives approaching the quality of the imported water would be set and rigorously pursued.

e. The water quality objectives do not apply to hydrologic subareas 4.51 and 4.52 between Highway 78 and El Camino Real and to all lands which drain to Moonlight Creek, Cottonwood Creek and Encinitas Creek. The objectives for the remainder of the Hydrologic Area are as shown.

f. The water quality objectives do not apply to all lands which drain to Los Penasquitos Canyon from 1.5 miles west of Interstate Highway 15. The objectives for the remainder of the Hydrologic Area are as shown.

g. The water quality objectives do not apply west of Interstate Highway 15. The objectives for the remainder of the Hydrologic Area are as shown.

h. The water quality objectives do not apply west of Hollister Street. The objectives for the remainder of the Hydrologic Area are as shown.

i. No significant amount of ground water in this unit.

j. The water quality objectives apply to the portion of Subarea 4.31 bounded on the west by the easterly boundary of the Interstate 5 right-of-way and on the east by the easterly boundary of El Camino Real.

k. The water quality objectives apply to the portion of Subarea 4.51 bounded on the south by the north shore of Batiquitos Lagoon, on the west by the easterly boundary of the Interstate 5 right-of-way and on the east by the easterly boundary of El Camino Real.

l. The water quality objectives apply to the portion of the Otay HA 10.20 limited to lands within and tributary to Salt Creek on the east and Poggi Canyon on the west and including the several smaller drainage courses between these tributaries of the Otay River.

m. These objectives apply to the alluvial ground water beneath the Santa Margarita River from the confluence of Murrieta and Temecula Creeks through the Gavilan and DeLuz HSAs to a depth of 100 feet and a lateral distance equal to the area of the floodplain covered by a 10 year flood event. These objectives do not apply to ground water in any of the basins beneath DeLuz, Sandia, and Rainbow Creeks and other unnamed creeks, which are tributaries of the Santa Margarita River.

n. These objectives apply for only the alluvial aquifer in the Lower Sycamore Canyon portion of the Santee Hydrologic Subarea described as all of the Sycamore Canyon watershed except that part which drains north of the boundary between sections 28 and 33, Township 14 South, Range 1 West.

Endnotes for Table 3-3 (continued)

o. These objectives apply to ground waters within 250 feet of the surface for the most downstream 4,200 acres of the Pauba HSA (2.51) which drain directly to the most downstream 2.7 mile segment of Temecula Creek. Excluded from this area are all lands upgradient from a point 0.5 miles east of the intersection of Butterfield Stage Road and Highway 79.

p. These objectives apply to ground waters within 250 feet of the surface for the most downstream 2,800 acres of the Wolf HSA (2.52) including those portions of the HSA which drain directly to the most downstream 1.5 mile segment of Pechanga Creek. Excluded from this area are all lands of HSA 2.52 which are upgradient of the intersection of Pala Road and Via Eduardo.

q. These objectives apply to ground waters of the Poway HSA (6.2) that lie east of the San Diego County Water Authority's (SDCWA) First Aqueduct. Ground water quality objectives west of the SDCWA First Aqueduct are 1,000 mg/l.

r. The total dissolved solids (TDS) objective for the alluvial aquifer in the Moosa Hydrologic Subarea (903.13) is 1,200 mg/l. The TDS objective for the alluvial aquifer in the Valley Center Hydrologic Subarea (903.14) is 1,100 mg/l.

CHLORIDES

Most waters contain chlorides because they are present in many rock types and are very soluble in water. Chlorides may be of natural mineral origin or derived from (a) seawater intrusion of ground water supplies, (b) salts spread on fields for agricultural purposes, (c) human or animal sewage or (d) industrial wastes. Chlorides may impart a salty taste to drinking water in concentrations between 100-700 mg/l. The secondary drinking water standard for chlorides is 500 mg/l. Elevated chloride concentrations in waters used for industrial process and supply can significantly increase the corrosion rate of steel and aluminum. High chloride concentrations can be toxic to plant life. A safe concentration of chloride for irrigation water is considered to be in the range of 100-140 mg/l. Irrigation with water containing 140-350 mg/l of chloride may cause slight to moderate plant injury. Additional information regarding chloride concentrations in irrigation waters is presented in Table 3-1.

Water Quality Objectives for Chlorides

Inland surface waters shall not contain chlorides in concentrations in excess of the numerical objectives described in Table 3-2.

Ground waters shall not contain chlorides in concentrations in excess of the numerical objectives described in Table 3-3.

COLOR

Color in water may arise naturally, such as from minerals, plant matter, or algae, or may be caused by industrial pollutants. Color is primarily an aesthetic consideration, although it can discolor clothes and food. The secondary drinking water standard for color is 15 color units.

Water Quality Objectives for Color

Waters shall be free of coloration that causes nuisance or adversely affects beneficial uses.

The natural color of fish, shellfish or other resources in inland surface waters, coastal lagoon or bay and estuary shall not be impaired.

Inland surface waters shall not contain color in concentrations in excess of the numerical objectives described in Table 3-2.

Ground waters shall not contain color in concentrations in excess of the numerical objectives described in Table 3-3.

DISSOLVED OXYGEN

Adequate dissolved oxygen levels are vital for aquatic life. Depression of dissolved oxygen levels can lead to fish kills and odors resulting from anaerobic decomposition. Dissolved oxygen content in water is a function of water temperature and salinity.

Water Quality Objective for Dissolved Oxygen

Dissolved oxygen levels shall not be less than 5.0 mg/l in inland surface waters with designated MAR or WARM beneficial uses or less than 6.0 mg/l in waters with designated COLD beneficial uses. The annual mean dissolved oxygen concentration shall not be less than 7 mg/l more than 10% of the time.

FLOATING MATERIAL

Floating material is an aesthetic nuisance as well as a substrate for algae and insect vectors.

Water Quality Objective for Floating Material

Waters shall not contain floating material, including solids, liquids, foams, and scum in concentrations which cause nuisance or adversely affect beneficial uses.

FLUORIDE

Fluoride does not naturally occur in high concentrations in surface waters, but may occur in detrimental concentrations in ground waters. Fluoride, in sufficient quantities, can adversely affect waters used as industrial process or supply in food, beverages, and pharmaceutical industries. The presence of optimal concentrations of fluoride in drinking water supplies can reduce dental decay, especially among children.

However, fluoride concentrations in excess of approximately 1.0 mg/l can increase the risk of mottled enamel in children and dental fluorosis in adults.

Water Quality Objectives for Fluoride

Inland surface waters shall not contain fluoride in concentrations in excess of the numerical objectives described in Table 3-2.

Ground waters shall not contain fluoride in concentrations in excess of the numerical objectives described in Table 3-3.

HYDROGEN ION CONCENTRATION (pH)

The hydrogen ion concentration of water is called "pH". The acidity or alkalinity of water is measured by the pH factor. The pH scale ranges from 1 to 14, with 1 to 6.9 being acid, 7.1 to 14 being alkaline, and 7.0 being neutral. Ranges (pH) of 6.5 to 9.0 are considered harmless. A change of one point on this scale represents a ten-fold increase in acidity or alkalinity. Many pollutants can alter the pH, raising or lowering it excessively. In some cases even small changes in pH can harm aquatic biota. The pH changes can alter the chemical form of certain constituents, thereby increasing their bioavailability and toxicity. For example, a decrease in pH can result in an increase in dissolved metal concentrations. Ammonia, which is a major component of sewage discharges, can be completely safe at pH 7.0 and extremely toxic to fish at pH 8.5 for the same total ammonia concentration.

Water Quality Objectives for pH

Changes in normal ambient pH levels shall not exceed 0.2 units in waters with designated marine (MAR), or estuarine (EST), or saline (SAL) beneficial uses. Changes in normal ambient pH levels shall not exceed 0.5 units in fresh waters with designated cold freshwater habitat (COLD) or warm freshwater habitat (WARM) beneficial uses.

In bays and estuaries the pH shall not be depressed below 7.0 nor raised above 9.0.

In inland surface waters the pH shall not be depressed below 6.5 nor raised above 8.5.

INORGANIC CHEMICALS - PRIMARY STANDARDS

Water Quality Objective for Domestic or Municipal Supply

Waters designated for use as domestic or municipal supply (MUN) shall not contain concentrations of inorganic chemicals in excess of the maximum contaminant levels set forth in California Code of Regulations, Title 22, Table 64431-A of section 64431 (Inorganic Chemicals) which is incorporated by reference into this plan. This incorporation by reference is prospective including future changes to the incorporated provisions as the changes take effect. (See Table 3-4).

Table 3-4. Maximum Contaminant Levels for Inorganic Chemicals specified in Table 64431-A of section 64431 of Title 22 of the California Code of Regulations as amended June 12, 2003.

Chemical	Maximum Contaminant Level, mg/l
Aluminum	1.
Antimony	0.006
Arsenic	0.05
Asbestos	7 MFL*
Barium	1.
Beryllium	0.004
Cadmium	0.005
Chromium	0.05
Cyanide	0.15
Fluoride	2.0
Mercury	0.002
Nickel	0.1
Nitrate (as NO_3)	45.
Nitrate + Nitrite (sum as nitrogen)	10.
Nitrite (as nitrogen)	1.
Selenium	0.05
Thallium	0.002

*MFL = million fibers per liter, MCL for fibers exceeding 10 um in length.

IRON

Iron may be present in water due to natural origin, corrosion of metallic iron and its alloys by water in the presence of oxygen, and industrial waste discharges containing iron. Iron is undesirable in domestic water supplies because it causes unpleasant tastes, deposits on food during cooking, stains and discolors laundry and plumbing fixtures. The secondary drinking water standard for iron is 0.3 mg/l.

Water Quality Objectives for Iron

Inland surface waters shall not contain iron in concentrations in excess of the numerical objectives described in Table 3-2.

Ground waters shall not contain iron in concentrations in excess of the numerical objectives described in Table 3-3.

MANGANESE

Manganese is undesirable in domestic water supplies because it causes unpleasant tastes, deposits on food during cooking, stains and discolors laundry and plumbing fixtures, and fosters the growth of some microorganisms in reservoirs, filters, and distribution systems. The secondary drinking water standard for manganese is 0.05 mg/l.

Water Quality Objectives for Manganese

Inland surface waters shall not contain manganese in concentrations in excess of the numerical objectives described in Table 3-2.

Ground waters shall not contain manganese in concentrations in excess of the numerical objectives described in Table 3-3.

METHYLENE BLUE - ACTIVATED SUBSTANCES (MBAS)

The methylene blue-activated substances (MBAS) test measures the presence of anionic surfactant (commercial detergent) in water. Positive test results can be used to indicate the presence of domestic wastewater. The secondary drinking water standard for MBAS is 0.5 mg/l.

Water Quality Objectives for MBAS

Inland surface waters shall not contain MBAS in concentrations in excess of the numerical objectives described in Table 3-2.

Ground waters shall not contain MBAS in concentrations in excess of the numerical objectives described in Table 3-3.

NITRATE

High nitrate (NO_3) concentrations in domestic water supplies can be toxic to human life. Infants are particularly susceptible and may develop methemoglobinemia (blue baby syndrome). The primary drinking water standard for nitrate as NO_3 is 45 mg/l.

Water Quality Objectives for Nitrate

Inland surface waters shall not contain nitrate (as NO_3) in concentrations in excess of the numerical objectives described in Table 3-2.

Ground waters shall not contain nitrate (as NO_3) in concentrations in excess of the numerical objectives described in Table 3-3.

OIL AND GREASE

Oil and grease can be present in water as a result of the discharge of treated wastes and the accidental or intentional dumping of wastes into sinks and storm drains. Oils and related materials have a high surface tension and are not soluble in water, therefore forming a film on the water's surface. This film can result in nuisance conditions because of offensive odors and visual impacts. Oil and grease can coat birds and aquatic organisms, adversely affecting respiration and/or thermoregulation.

Water Quality Objective for Oils, Grease, Waxes or other Materials

Waters shall not contain oils, greases, waxes, or other materials in concentrations which result in a visible film or coating on the surface of the water or on objects in the water, or which cause nuisance or which otherwise adversely affect beneficial uses.

ORGANIC CHEMICALS - PRIMARY STANDARDS

Water Quality Objectives:

Water designated for use as domestic or municipal supply (MUN) shall not contain concentrations of chemical constituents in excess of the maximum contaminant levels specified in California Code of Regulations, Title 22, Table 64444-A of section 64444 (Organic Chemicals) which is incorporated by reference into this plan. This incorporation by reference is prospective including future changes to the incorporated provisions as the changes take effect. (See Table 3-5).

Table 3-5. Maximum Contaminant Levels for Organic Chemicals specified in Table 64444-A of section 64444 of Title 22 of the California Code of Regulations as amended June 12, 2003.

Chemical	Maximum Contaminant Level, mg/l
(a) Volatile Organic Chemicals (VOCs)	
Benzene	0.001
Carbon Tetrachloride	0.0005
1,2-Dichlorobenzene	0.6
1,4-Dichlorobenzene	0.005
1,1-Dichloroethane	0.005
1,2-Dichloroethane	0.0005
1,1-Dichloroethylne	0.006
cis-1,2-Dichloroethylene	0.006
trans-1,2-Dichloroethylene	0.01
Dichloromethane	0.005
1,2-Dichloropropane	0.005
1,3-Dichloropropene	0.0005
Ethylbenzene	0.3
Methyl-*tert*-butyl ether	0.013
Monochlorobenzene	0.07
Styrene	0.1
1,1,2,2-Tetrachloroethane	0.001
Tetrachloroethylene	0.005
Toluene	0.15
1,2,4-Trichlorobenzene	0.005
1,1,1-Trichloroethane	0.200
1,1,2-Trichloroethane	0.005
Trichloroethylene	0.005
Trichlorofluoromethane	0.15
1,1,2-Trichloro-1,2,2-Trifluoroethane	1.2
Vinyl Chloride	0.0005
Xylenes	1.750*

Chemical	Maximum Contaminant Level, mg/l
(b) Non-Volatile Synthetic Organic Chemicals (SOCs)	
Alachlor	0.002
Atrazine	0.001
Bentazon	0.018
Benzo(a)pyrene	0.0002
Carbofuran	0.018
Chlordane	0.0001
2,4-D	0.07
Dalapon	0.2
Dibromochloropropane	0.0002
Di(2-ethylhexyl)adipate	0.4
Di(2-ethylhexyl)phthalate	0.004
Dinoseb	0.007
Diquat	0.02
Endothall	0.1
Endrin	0.002
Ethylene Dibromide	0.00005
Glyphosate	0.7
Heptachlor	0.00001
Heptachlor Epoxide	0.00001
Hexachlorobenezene	0.001
Hexachlorocyclopentadiene	0.05
Lindane	0.0002
Methoxychlor	0.03
Molinate	0.02
Oxamyl	0.05
Pentachlorophenol	0.001
Picloram	0.5
Polychlorinated Biphenyls	0.0005
Simazine	0.004
Thiobencarb	0.07
Toxaphene	0.003
2,3,7,8-TCDD (Dioxin)	3×10^{-8}
2,3,5-TP (Silvex)	0.05

* MCL is for either a single isomer or the sum of the isomers.

PERCENT SODIUM AND ADJUSTED SODIUM ADSORPTION RATIO

Excess concentrations of sodium in irrigation water reduce soil permeability to water and air. The deterioration of sodium in irrigation water is cumulative and is accelerated by poor drainage.

Table 3-1 shows concentration guidelines for sodium, boron, chloride and other chemical constituents present in irrigation waters.

The specific water quality objective for sodium in the Basin Plan is expressed as percent sodium. Percent sodium is calculated as follows:

$$\% Na = \frac{Na}{Na + Ca + Mg + K} \text{ x } 100\ \%$$

where sodium (*Na*), Calcium (*Ca*), Magnesium (*Mg*), and Potassium (*K*) are expressed in milliequivalent per liter (me/l).

The percent sodium objective was developed for the protection of agricultural uses from the potential hazard due to sodium in irrigation waters. The value of 60% sodium is based upon *Water Quality Criteria*, by McKee and Wolf, 1963.

McKee and Wolf note that because of all the variables involved, the classification of waters for irrigation use must be somewhat arbitrary and the limits set cannot be too rigid. The three general classifications of irrigation waters are:

CLASS	%SODIUM	DESCRIPTION
I	<30 - 60%	Excellent to good, or suitable for most plants under most conditions.
II	30 - 75%	Good to injurious, harmful to some plants under conditions of soil, climate and practices.
III	70 - 75%	Injurious to unsatisfactory, unsuitable under most conditions.

Since the publication of the percent sodium criteria, technical research has resulted in the development of more applicable criteria for addressing the potential sodium hazard in irrigation water.

The sodium adsorption ratio (*SAR*) and adjusted sodium adsorption ratios (*Adj. SAR*) are measures of the potential hazard in soils due to sodium. *SAR* and *Adj. SAR* are similar to percent sodium in that their calculated values provide an indication of a soil's potential for permeability and potential aeration problems. However, by taking into consideration the soil's sodicity and the exchange phases between *Ca*, *Na* and *Mg*, the *SAR* and *Adj. SAR* predict potential sodium build up in soils. The *Adj. SAR* calculation further takes into account the effects of carbonate and bicarbonate ion concentrations of a soil. *Adj. SAR* is the most common method for determining sodium hazard in irrigation water at the present time.

The calculation for *SAR* is as follows:

$$SAR = \frac{Na}{\sqrt{\frac{(Ca + Mg)}{2}}}$$

where *Na*, *Ca* and *Mg* are in me/l. The calculation for *Adj. SAR* is as follows:

$$Adj.\ SAR = \frac{Na}{\sqrt{\frac{(Ca_x + Mg)}{2}}}$$

where *Na* and *Mg* are in me/l.

Ca_x is a modified *Ca* value, calculated using the Suarez table (Table 3-3, contained in *Irrigation with Reclaimed Municipal Wastewater, A Guidance Manual,* California State Water Resources Control Board, Report Number 84-1, July 1984). Ca_x takes into account salinity (EC_w), the HCO_3/CO_3 ratio (me/l) and the estimated partial pressure of CO_2 in the top few millimeters of the soil ($P_{CO_2} = 0.0007$ atmospheres).

Water Quality Objectives for Sodium

Inland surface waters shall not contain percent sodium in excess of the numerical objectives described in Table 3-2.

Ground waters shall not contain percent sodium in excess of the numerical objectives described in Table 3-3.

In some cases, adjusted sodium adsorption ratio may be a better indicator of the potential sodium hazard in irrigation water than percent sodium. The Regional Board Executive Officer may authorize the use of adjusted sodium absorption ratio instead of percent sodium to indicate the potential sodium hazard. In such cases, the adjusted sodium adsorption ratio shall not exceed the slight to moderate range of values referenced in Table 3-1 "Guidelines for Interpretation of Water Quality for Irrigation".

PESTICIDES

Pesticides can enter surface and ground waters directly through industrial process discharges, agricultural discharge, spillage and illegal dumping. Pesticides can also enter surface and ground waters indirectly by drifting away from areas where pesticides are being sprayed, through surface runoff from treated fields, and by leaching or return flows from irrigation. Pesticides can concentrate in plant or animal tissues and many are considered to be carcinogenic to humans. Although many pesticides are designed to deteriorate rapidly when exposed to sunlight and air, they may persist for months or years in water.

California Code of Regulations, Title 22, Table 64444-A of section 64444 (Organic Chemicals) establishes maximum contaminant levels for pesticides in drinking water. (See water quality objective for Organic Chemicals).

Water Quality Objectives for Pesticides

No individual pesticide or combination of pesticides shall be present in the water column, sediments or biota at concentration(s) that adversely affect beneficial uses. Pesticides shall not be present at levels which will bioaccumulate in aquatic organisms to levels which are harmful to human health, wildlife or aquatic organisms.

Water designated for use as domestic or municipal supply (MUN) shall not contain concentrations of pesticides in excess of the maximum contaminant levels specified in California Code of Regulations, Title 22, Table 64444-A of section 64444 (Organic Chemicals) which is incorporated by reference into this plan. This incorporation by reference is prospective including future changes to the incorporated provisions as the changes take effect. (See Table 3-5).

The Shelter Island Yacht Basin portion of San Diego Bay is designated as an impaired water body for dissolved copper pursuant to Clean Water Act section 303(d). A Total Maximum Daily Load (TMDL) has been adopted to address this impairment. See Chapters 2, Table 2-3, Beneficial Uses of Coastal Waters, San Diego Bay, footnote 3 and Chapter 7, Total Maximum Daily Loads.

PHENOLIC COMPOUNDS

Phenolic compounds are in widespread use as industrial and agricultural chemical intermediates for the preparation of other chemicals. These organic compounds are byproducts of petroleum refining, tanning, and textile, dye, and resin manufacturing. Low concentrations cause taste and odor problems in water, higher concentrations can kill aquatic life and humans. Phenol is occasionally referred to as "carbolic acid".

Water Quality Objectives for Phenolic Compounds

Water designated for use as domestic or municipal supply (MUN) shall not contain concentrations of phenolics in excess of 1.0 ug/l.

Should there be any conflict between this limit and those described under the Organic Chemicals objective the more stringent standards shall apply at all times.

RADIOACTIVITY

Water Quality Objective for Radioactivity

Radionuclides shall not be present in concentrations that are deleterious to human, plant, animal, or aquatic life nor that result in the accumulation of radionuclides in the food web to an extent that presents a hazard to human, plant, animal or aquatic life.

Water Quality Objective for Radionuclides

Waters designated for use as domestic or municipal supply (MUN) shall not contain concentrations of radionuclides in excess of the levels specified in section 64441 of Title 22 of the California Code of Regulations (Natural Radioactivity) which is incorporated by reference into this plan. This incorporation by reference is prospective including future changes to the incorporated provisions as the changes take effect.

SECONDARY DRINKING WATER STANDARDS

Water Quality Objective for Domestic or Municipal Supply Water

Water designated for use as domestic or municipal supply (MUN) shall not contain concentrations of chemical constituents in excess of the maximum contaminant levels specified in Table 64449-A of section 64449 of Title 22 of the California Code of Regulations (Secondary Maximum Contaminant Levels, Consumer Acceptance Limits) which is incorporated by reference into this plan. This incorporation by reference is prospective including future changes to the incorporated provisions as the changes take effect. (See Table 3-6).

Table 3-6. Secondary Maximum Contaminant Levels for Consumer Acceptance Limits specified in Table 64449-A of section 64449 of Title 22 of the California Code of Regulations as amended January 7, 1999.

Constituent	Maximum Contaminant Levels
Aluminum	0.2 mg/l
Color	15 units
Copper	1.0 mg/l
Corrosivity	Noncorrosive
Foaming Agents (MBAS)	0.5 mg/l
Iron	0.3 mg/l
Manganese	0.05 mg/l
Methyl-*tert*-butyl ether (MTBE)	0.005 mg/l
Odor Threshold	3 units
Silver	0.1 mg/l
Thiobencarb	0.001 mg/l
Turbidity	5 units
Zinc	5.0 mg/l

SEDIMENT

Suspended sediment in surface waters can cause harm to aquatic organisms by abrasion of surface membranes, interference with respiration, and sensory perception in aquatic fauna. Suspended sediment can reduce photosynthesis in and survival of aquatic flora by limiting the transmittance of light.

Water Quality Objective for Sediment

The suspended sediment load and suspended sediment discharge rate of surface waters shall not be altered in such a manner as to cause nuisance or adversely affect beneficial uses.

SUSPENDED AND SETTLEABLE SOLIDS

Suspended and settleable solids are deleterious to benthic organisms and may cause the formation of anaerobic conditions. They can clog fish gills and interfere with respiration in aquatic fauna. They also screen out light, hindering photosynthesis and normal aquatic plant growth and development.

Water Quality Objective for Suspended and Settleable Solids

Waters shall not contain suspended and settleable solids in concentrations of solids that cause nuisance or adversely affect beneficial uses.

SULFATE

The most important sources of sulfate in native waters of the San Diego Region are the gypsiferous deposits and sulfide minerals associated with crystalline rocks. Excessive sulfate concentrations in drinking water can cause laxative effects to new users of the water supply. The recommended secondary drinking water standard for sulfate is 250 mg/l with a upper limit of 500 mg/l.

Water Quality Objectives for Sulfate

Inland surface waters shall not contain sulfate in concentrations in excess of the numerical objectives described in Table 3-2.

Ground waters shall not contain sulfate in concentrations in excess of the numerical objectives described in Table 3-3.

TASTES AND ODORS

Undesirable tastes and odors in water may be a nuisance and may indicate the presence of pollutants. The secondary drinking water standard for odor (threshold) is 3 odor units.

Water Quality Objectives for Taste and Odor

Waters shall not contain taste or odor producing substances at concentrations which cause a nuisance or adversely affect beneficial uses.

The natural taste and odor of fish, shellfish or other Regional water resources used for human consumption shall not be impaired in inland surface waters and bays and estuaries.

Inland surface waters shall not contain odors in concentrations in excess of the numerical objectives described in Table 3-2.

Ground waters shall not contain odors in concentrations in excess of the numerical objectives described in Table 3-3.

TEMPERATURE

Waste discharges can cause temperature changes in the receiving waters which adversely affect the aquatic biota. Discharges most likely to cause these temperature effects are cooling water discharges from power plants.

Water Quality Objectives for Temperature

The natural receiving water temperature of intrastate waters shall not be altered unless it can be demonstrated to the satisfaction of the Regional Board that such alteration in temperature does not adversely affect beneficial uses.

At no time or place shall the temperature of any COLD water be increased more than 5°F above the natural receiving water temperature.

TOTAL DISSOLVED SOLIDS

Dissolved solids in natural waters may consist of carbonates, bicarbonates, chlorides, sulfates, phosphates, nitrates, magnesium, sodium, iron, manganese and other substances. The recommended secondary drinking water standard for total dissolved solids is 500 mg/l with a upper limit of 1000 mg/l due to taste considerations. High total dissolved solids concentrations in irrigation waters can be deleterious to plants directly, or indirectly through adverse effects on soil permeability. A classification of irrigation waters with respect to total dissolved solids concentration is described in Table 3-1.

Water Quality Objectives for Total Dissolved Solids

Inland surface waters shall not contain total dissolved solids in concentrations in excess of the numerical objectives described in Table 3-2.

Ground waters shall not contain total dissolved solids in concentrations in excess of the numerical objectives described in Table 3-3.

TOXICITY

Toxicity is the adverse response of organisms to chemicals or physical agents.

Water Quality Objectives for Toxicity

All waters shall be maintained free of toxic substances in concentrations that are toxic to, or that produce detrimental physiological responses in human, plant, animal, or aquatic life. Compliance with this objective will be determined by use of indicator organisms, analyses of species diversity, population density, growth anomalies, bioassays of appropriate duration, or other appropriate methods as specified by the Regional Board.

The survival of aquatic life in surface waters subjected to a waste discharge or other controllable water quality factors, shall not be less than that for the same water body in areas unaffected by the waste discharge or, when necessary, for other control water that is consistent with requirements specified in USEPA, State Water Resources Control Board or other protocol authorized by the Regional Board. As a minimum, compliance with this objective as stated in the previous sentence shall be evaluated with a 96-hour acute bioassay.

In addition, effluent limits based upon acute bioassays of effluents will be prescribed where appropriate, additional numerical receiving water objectives for specific toxicants will be established as sufficient data become available, and source control of toxic substances will be encouraged.

The Shelter Island Yacht Basin portion of San Diego Bay is designated as an impaired water body for dissolved copper pursuant to Clean Water Act section 303(d). A Total Maximum Daily Load (TMDL) has been adopted to address this impairment. See Chapters 2, Table 2-3, Beneficial Uses of Coastal Waters, San Diego Bay, footnote 3 and Chapter 7, Total Maximum Daily Loads.

Chollas Creek is designated as a water quality limited segment for dissolved copper, lead, and zinc pursuant to Clean Water Act section 303(d). Total Maximum Daily Loads have been adopted to address these impairments. See Chapters 2, Table 2-2, Beneficial Uses of Inland Surface Waters, Footnote 3 and Chapter 7, Total Maximum Daily Loads.

TOXIC POLLUTANTS

The USEPA promulgated a final rule prescribing water quality criteria for toxic pollutants in inland surface waters, enclosed bays, and estuaries in California on May 18, 2000 (The California Toxics Rule or “CTR;” [40 CFR 131.38]). CTR criteria constitute applicable water quality criteria in California. In addition to the CTR, certain criteria for toxic pollutants in the National Toxics Rule [40 CFR 131.36] constitute applicable water quality criteria in California as well.

The Shelter Island Yacht Basin portion of San Diego Bay is designated as an impaired water body for dissolved copper pursuant to Clean Water Act section 303(d). A Total Maximum Daily Load (TMDL) has been adopted to address this impairment. See Chapters 2, Table 2-3, Beneficial Uses of Coastal Waters, San Diego Bay, footnote 3 and Chapter 7, Total Maximum Daily Loads.

Chollas Creek is designated as a water quality limited segment for dissolved copper, lead, and zinc pursuant to Clean Water Act section 303(d). Total Maximum Daily Loads have been adopted to address these impairments. See Chapters 2, Table 2-2, Beneficial Uses of Inland Surface Waters, Footnote 3 and Chapter 7, Total Maximum Daily Loads.

TRIHALOMETHANES

Chlorine is the dominant chemical agent used to disinfect treated water and wastewater. Trihalomethanes are formed when chlorine reacts with aquatic organic material found in water and wastewater. Trihalomethanes are a group of light weight chlorinated hydrocarbons which are suspected carcinogens. The USEPA has established a maximum contaminant level for total trihalomethanes of 0.1 mg/l in Title 40, Code of Federal Regulations, Part 141.12, (40 CFR 141.12), EPA National Primary Drinking Water Regulations (§141.12 revised at 57 FR 31838, July 17, 1992). Total trihalomethanes are the sum of the concentrations of bromodichloromethane, dibromochloromethane, tribromomethane (bromoform) and trichloromethane (chloroform). The federal regulations on trihalomethanes are incorporated by reference into CCR, Title 22, Chapter 15, Articles 4.5, sections 64439.

Water Quality Objective for Trihalomethanes

Waters designated for use as domestic or municipal supply (MUN) shall not contain concentrations of trihalomethanes in excess of the criteria set forth in California Code of Regulations, Title 22, section 64439 which is incorporated by reference into this plan. This incorporation by reference is prospective including future changes to section 64439 as the changes take effect.

TURBIDITY

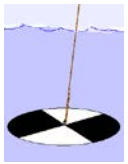

The turbidity of water is attributable to suspended and colloidal matter, the effect of which is to disturb clearness and diminish the penetration of light. High turbidity levels can adversely affect the use of water for drinking. By interfering with the penetration of light, turbidity can adversely affect photosynthesis which aquatic organisms depend upon for survival. High concentrations of particulate matter that produce turbidity can be directly lethal to aquatic life.

Water Quality Objectives for Turbidity

Waters shall be free of changes in turbidity that cause nuisance or adversely affect beneficial uses.

Inland surface waters shall not contain turbidity in excess of the numerical objectives described in Table 3-2.

Ground waters shall not contain turbidity in excess of the numerical objectives described in Table 3-3.

The transparency of waters in lagoons and estuaries shall not be less than 50% of the depth at locations where measurement is made by means of a standard Secchi disk, except where lesser transparency is caused by rainfall runoff from undisturbed natural areas and dredging projects conducted in conformance with waste discharge requirements of the Regional Board. With these two exceptions, increases in turbidity attributable to controllable water quality factors shall not exceed the following limits:

Natural Turbidity	Maximum Increase
0-50 NTU	20% over natural turbidity level
50-100 NTU	10 NTU
Greater than 100 NTU	10% over natural turbidity level

In addition, within San Diego Bay, the transparency of bay waters, insofar as it may be influenced by any controllable factor, either directly or through induced conditions, shall not be less than 8 feet in more than 20 percent of the readings in any zone, as measured by a standard Secchi disk. Wherever the water is less than 10 feet deep, the Secchi disk reading shall not be less than 80 percent of the depth in more than 20 percent of the readings in any zone.

WATER QUALITY OBJECTIVES OF INLAND SURFACE WATERS

Specific numerical water quality objectives for inland surface waters are presented by hydrologic area and subarea and watershed in Table 3-2.

The water quality objectives for inland surface water designations described in this table correspond with the beneficial use designations previously described in Chapter 2. Water Quality Objective variations occur in some of the hydrologic areas, subareas and stream reaches. Water quality variations from the objectives may also occur within a given hydrologic area subarea or stream reach. Such local variations will be evaluated when waste discharge requirements, NPDES permits, Cleanup and Abatement Orders, and Cease and Desist Orders are being developed for a given discharger.

The omission of mineral objectives for some areas corresponds to the lack of beneficial uses (AGR, MUN, IND) requiring such objectives.

WATER QUALITY OBJECTIVES OF GROUND WATERS

Specific numerical water quality objectives for ground waters are presented by hydrologic area and subarea in Table 3-3.

A footnote for some ground water basins is listed to show that some water quality objectives are considered tentative until detailed salt balance studies are conducted.

In 1978 the Regional Board, in Resolution No. 78-6, deleted water quality objectives and beneficial uses for certain portions of basins 1.10, 1.20, 1.30, 1.40, 1.50, 2.10, 3.10, 4.10, 4.20, 4.30, 4.40, 4.50, 4.60, 5.10, 6.10, 7.10, and 11.10. Table footnotes are included to identify these basins. The Regional Board elected to delete beneficial uses in portions of these basins, where the uses of ground water were marginal or nonexistent, to promote wastewater reclamation by sewage treatment plants. The deletion of beneficial uses in these areas was based upon a determination that the loss of ground water supplies was outweighed by the long-term increase in wastewater reclamation made possible by allowing reclaimed water discharges which are high in total dissolved solids. It is the Regional Board's intent to protect the water quality in these basins under the terms of State Board Resolution No. 68-16.

For purposes of intrusion barrier formation or ground water recharge, the water quality objective qualifications footnoted in Table 3-3 allow, with approval of the Regional Board, discharge of reclaimed water in areas of equal or poorer ground water quality. Relatively poor quality water could also be used for intrusion barrier formation along the coast.

WATER QUALITY CRITERIA

The literature contains many different water quality criteria designed to protect specific beneficial uses of water. A summary of the specific numerical water quality criteria considered by the Regional Board for designation as water quality objectives is described in Appendix C. The water quality criteria described in Appendix C are not enforceable water quality objectives. The purpose of presenting the information summarized in these tables is to allow interested persons to compare available water quality criteria to the specific water quality objectives designated by the Regional Board described earlier in this Chapter.

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REPRINT OF RESOLUTION NO. 68-16

STATE WATER RESOURCES CONTROL BOARD
RESOLUTION NO. 68-16

STATEMENT OF POLICY WITH RESPECT TO MAINTAINING HIGH QUALITY OF WATERS IN CALIFORNIA

WHEREAS the California Legislature has declared that it is the policy of the State that the granting of permits and licenses for unappropriated water and the disposal of wastes into the waters of the State shall be so regulated as to achieve highest water quality consistent with maximum benefit to the people of the State and shall be controlled so as to promote the peace, health, safety and welfare of the people of the State; and

WHEREAS water quality control policies have been and are being adopted for waters of the State; and

WHEREAS the quality of some waters of the State is higher than that established by the adopted policies and it is the intent and purpose of this Board that such higher quality shall be maintained to the maximum extent possible consistent with the declaration of the Legislature;

NOW, THEREFORE, BE IT RESOLVED:

1. Whenever the existing quality of water is better than the quality established in policies as of the date on which such policies become effective, such existing high quality will be maintained until it has been demonstrated to the State that any change will be consistent with maximum benefit to the people of the State, will not unreasonably affect present and anticipated beneficial use of such water and will not result in water quality less than that prescribed in the policies.

2. Any activity which produces or may produce a waste or increased volume or concentration of waste and which discharges or proposes to discharge to existing high quality waters will be required to meet waste discharge requirements which will result in the best practicable treatment or control of the discharge necessary to assure that (a) a pollution or nuisance will not occur and (b) the highest water quality consistent with maximum benefit to the people of the State will be maintained.

3. In implementing this policy, the Secretary of the Interior will be kept advised and will be provided with such information as he will need to discharge his responsibilities under the Federal Water Pollution Control Act.

BE IT FURTHER RESOLVED that a copy of this resolution be forwarded to the Secretary of the Interior as part of California's water quality control policy submission.

CERTIFICATION

The undersigned, Executive Officer of the State Water Resources Control Board, does hereby certify that the foregoing is a full, true, and correct copy of a resolution duly and regularly adopted at a meeting of the State Water Resources Control Board held on October 24, 1968.

Dated: October 28, 1968
Original signed by
Kerry W. Mulligan, Executive Officer
State Water Resources Control Board

CHAPTER 4

IMPLEMENTATION

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Underground Storage Tank. Photo by Division of Water Rights, State Water Resources Control Board 101

4. IMPLEMENTATION

INTRODUCTION

Elegant tern

The purpose of this chapter is to describe actions that are necessary to protect the beneficial uses described in Chapter 2 and achieve the water quality objectives specified in Chapter 3. One of the elements in a Water Quality Control Plan as defined in California Water Code (Water Code) section 13050(j) is the implementation program for achieving water quality objectives. This chapter describes the Regional Board's implementation program.

Water Code section 13242 requires that the implementation program have the following elements:

- A description of the actions which are necessary to achieve water quality objectives. (This may include recommendations for appropriate action directed to any entity, public or private);
- A time schedule for the actions to be taken; and
- A description of surveillance to be undertaken to determine compliance with the water quality objectives.

The Regional Board's mission is to achieve and maintain water quality objectives that are necessary to protect all beneficial uses of the waters in the Region. Depending on the nature of the water quality problem, several different strategies, as outlined below, are employed to accomplish this mission.

This Chapter is divided into four sections, Control of Point Source Pollutants, Control of Nonpoint Source Pollutants, Remediation of Pollution, and Other Programs as shown below. Areas of overlap between the point and nonpoint source categories are described later in this Chapter.

★ *Control of Point Source Pollutants*

Pollutants from point sources are discharged to waterbodies from discrete conveyance systems (e.g., pipes and channels) in controlled flows at well-defined locations. Examples of point sources include waste discharges from municipal and industrial wastewater treatment facilities.

Programs that protect water quality from point source pollutants are primarily regulatory in nature. Waste discharge permitting programs such as California's Waste Discharge Requirements (WDRs) and the federal National Pollutant Discharge Elimination System (NPDES) are examples of key regulatory point source control programs. Significant progress toward the control of point source pollutants has been made through these permitting programs.

★ *Control of Nonpoint Source Pollutants*

Pollutants from nonpoint sources are diffuse, both in terms of their origin and mode of transport to surface and ground waters. Unlike pollutants from point sources, nonpoint source pollutants often enter waters in sudden episodic surges and large quantities. This occurs as rain, irrigation, and other types of runoff mobilizes and transports contaminants into surface and ground waters. Nationwide, pollutants from nonpoint sources represent the greatest threat to water quality. Examples of nonpoint sources in southern California include lawn and garden chemicals transported by storm water or water from irrigation sprinklers; household and automotive care products dumped or drained on streets and into storm drains; fertilizers and pesticides washed from agricultural fields by rain or irrigation waters; sediment that erodes from construction sites; and various pollutants deposited by atmospheric deposition.

Nonpoint source pollutants are more difficult to control than point source pollutants, and require different control strategies. For example, traditional permitting programs are neither a practical nor effective means of water quality protection from lawn and garden chemicals. Accordingly, the Regional Board integrates non-regulatory programs with

regulatory programs in order to control pollutants from nonpoint sources. Through public outreach (an example of a non-regulatory program), residents are informed of threats to the quality of the waters in their communities and are encouraged to voluntarily implement Best Management Practices (BMPs) that eliminate or reduce nonpoint sources of pollution. Emphasis is placed on pollution prevention though careful management of resources, as opposed to cleaning up the waterbody after the fact. Local governments play a key role in the control of nonpoint sources by adopting and enforcing ordinances and by supplementing the Regional Board's public outreach efforts. This flexible approach can be an effective means of controlling pollutants from many nonpoint sources.

★ *Remediation of Pollution*

The Regional Board oversees remediation of both ground and surface waters through the investigation of polluted waters and enforcement of corrective actions needed to restore water quality. These activities are managed through the following programs, namely: Underground Storage Tanks; Site Cleanup Program (which includes above ground petroleum storage tanks); NPDES Program; Land Disposal and Waste Discharge Requirements (WDR) Regulatory Programs; and U.S. Department of Defense (DOD) and Department of Energy (DOE) Sites.

These programs are designed to return polluted sites to productive use by identifying and eliminating the sources of pollutants, preventing the spread of pollution, and restoring water quality.

★ *Other Programs*

The Regional Board is involved with the investigation, assessment and protection of water quality through other programs which are discussed in this Basin Plan. These include California's Clean Water Act section 303(d) process and California's water quality assessment program.

CONTROL OF POINT SOURCE POLLUTANTS

DEFINITION OF POINT SOURCE

Waste loads from point sources are those that are generally associated with pollutant discharges from an identifiable location to waters of the state. A point source is any discernable, confined, and discrete conveyance, including but not limited to, any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, landfill leachate collection system, vessel or other floating craft from which pollutants are or may be discharged. Point source wastes can be generated by residential, commercial, industrial, agricultural, certain recreational and solid waste disposal activities and/or practices. Other wastes are considered under the category of nonpoint source waste loads and are discussed in appropriate sections of this chapter. Many of the water quality problems in the San Diego region have been attributable to point source discharges.

The Regional Board regulates most point source discharges of waste through the issuance of waste discharge requirements and NPDES permits. Certain surface water discharges of waste described in 40 Code of Federal Regulations (CFR) 122.3 do not require NPDES permits. The need to obtain waste discharge requirements for certain categories of waste discharges to land may be waived by the Regional Board where such waiver is not against the public interest. The waste discharge requirements and the NPDES permits establish terms and conditions such as effluent limitations to ensure that point source waste discharges comply with applicable water quality objectives and ensure protection of beneficial uses.

EFFLUENT LIMITATIONS

Effluent limitations for discharge of treated point source wastes are developed for individual point sources and are included in the waste discharge requirements or NPDES permits. The effluent limitations are placed on the quality and quantity of the waste discharge or effluent and can be either numeric and/or narrative limitations. Effluent limitations are based on applicable water quality objectives, United States Environmental Protection Agency (USEPA) effluent guidelines and standards, beneficial uses for the area of effluent disposal, and applicable state and federal regulations and policies.

POINT SOURCE CONTROL CATEGORIES

Waste discharge requirements for waste discharges to land are issued for reclaimed water discharges, sanitary landfills, subsurface waste disposal by septic tank systems, dredge spoil disposal projects, sewage treatment plants and a variety of other activities which can affect ground water quality. NPDES permits are issued for waste discharges to surface waters from facilities such as power plants, sewage treatment plants, shipyards, boatyards, dewatering operations, ground water cleanups and a variety of other activities which can affect surface water quality.

Table 4-1(a) contains a summary listing of facility types regulated under NPDES permits as of July 1994. Table 4-1(b) contains a summary listing of facility types regulated under waste discharge requirements as of November 2014.

Table 4-2 contains examples of pollutants found in industrial and municipal point source discharges to surface and ground waters.

REGIONAL BOARD PERMITTING PROGRAMS

The Regional Board's primary means of protecting the Region's water resources is through the issuance of WDRs, Water Reclamation Requirements (WRRs), and Master Reclamation Permits (MRPs) for each individual discharger. The WDRs impose conditions which protect water quality, implement the Water Quality Control Plan, and when the discharge is to waters of the United States, meet the requirements of the Clean Water Act. The WDRs impose limits on the quality and quantity of waste discharges and specify conditions to be maintained in the receiving waters. WRRs impose conditions for all reuses of treated wastewater. In addition, because the USEPA has delegated responsibility to the State and regional boards for implementation of the federal NPDES program, WDRs for discharges to surface waters also serve as NPDES permits. These programs are the legal means to regulate controllable discharges. It is illegal to discharge wastes into any waters of the State and to reuse treated wastewater without obtaining appropriate WDRs, WRRs, or NPDES permits.

Any person who discharges or proposes to discharge wastes to waters in the Region (other than into a community sanitary sewage system) must describe the quantity and nature of the proposed discharge in a report of waste discharge (RWD) or an NPDES permit application. The RWD must contain information required by the Regional Board. The filing of the RWD with the Regional Board is mandatory unless waived by the Board on the grounds that the waiver is not against the public interest. Such waivers are conditional and can be revoked by the Regional Board at any time. Upon review of the RWD or NPDES permit application and all other pertinent information (including comments received at a public hearing), the Regional Board will hold a public hearing to consider issuance of WDRs containing appropriate measures and limitations to protect public health and water quality. The basic elements of WDRs or NPDES permits include:

Table 4-1(a). National Pollutant Discharge Elimination System Permitted Facilities In the San Diego Region (as of July 28, 1994)[1]

Facility Type	Number Regulated
Above Ground Tanks	2
Boatyards	7
Ground Water Cleanup	7
Ground Water Dewatering	9
Industrial	8
Military	13
Power Plants	7
Sewage Treatment Plants	24
Shipyards	4
Storm Water (Construction)	542
Storm Water (Industrial)	619
Storm Water (Municipal)	34
Water Softener / Brine Treatment	6
Total	**1283**

Table 4-1(b). Waste Discharge Requirement Permitted Facilities in the San Diego Region (as of November 2014)[2]

Facility Type	Number Regulated
Campgrounds	59
Dairy	4
Dredging	5
Ground Water Cleanup	3
Industrial	4
Landfills	51
Miscellaneous	5
Nursery	1
Private Sewage Treatment Plants	7
Sand and Gravel	14
Sewage Treatment Plants	42
Sludge Treatment	1
Water Reclamation Requirements	22
Water Softener / Brine Treatment	1
Winery	3
Total	**227**

[1] The list of regulated facilities under NPDES permits is updated periodically and is available at the Regional Board office.
[2] The list of regulated facilities under WDR permits is updated periodically and is available at the Regional Board office.

Table 4-2. Examples of Industrial and Municipal Point Source Discharges to Surface and Ground Waters.

Discrete Discharge	Examples of Pollutants	Examples of Affected Waterbodies
Municipal wastewater treatment plants	Biological oxygen demand (BOD), chemical oxygen demand (COD), TDS, chlorides, sulfates, nutrients, ammonia (NH_3), residual chlorine, metals, organic chemicals	Most inland waters, Pacific Ocean, various ground water basins
Power generation plants	Temperature, chemical additives, minerals	San Diego Bay, Pacific Ocean
Waste water discharge from remediation or construction de-watering projects	TDS; chlorides; sulfates; volatile organic chemicals (VOCs); BTEX (e.g., benzene, toulene, ethylbenzene, xylene) and other petroleum hydrocarbons	Surface waters region-wide
Underground Storage Tanks	TDS; chlorides; sulfates; VOC's; BTEX and other petroleum hydrocarbons	Ground waters region-wide
Shipyard, boatyard wastes	Oil and grease, metals [lead (Pb), chromium (Cr), copper (Cu) and zinc (Zn)], suspended solids, settleable solids, tributyltin (TBT), temperature, chemical additives	San Diego Bay, Mission Bay, Dana Point, Oceanside Harbor
Sand and gravel	TDS, turbidity, sedimentation	San Diego River, Otay River, San Luis Rey River, Temecula Creek, San Dieguito River, Aliso Creek, San Clemente Canyon Creek, San Vicente Creek, Trabuco Canyon Creek, El Toro Creek, Carroll Canyon Creek or their tributaries.
Dairies	BOD, TDS, bacteria, nutrients	Various ground water basins
Dredging	Suspended solids, turbidity	San Diego Bay, Mission Bay, Oceanside Harbor, Dana Point
Landfills	Metals; TDS; chlorides; sulfates; VOC's; BTEX and other petroleum hydrocarbons	Various ground water basins
Recreational Vehicle (RV) Campgrounds	Formaldehyde, phenols, zinc, chlorides, aluminum sulfates	Various ground water basins

- Effluent limitations on the quality and quantity of the waste discharge. The effluent standards or limitations are designed to implement water quality control plans, protect beneficial uses, and prevent nuisance;

- Standard terms and conditions and discharge prohibitions to ensure compliance with applicable provisions of state and federal law; and

- A monitoring and reporting program requiring the discharger to collect and analyze samples and submit monitoring reports to the Regional Board on a prescribed schedule.

Water Code section 13263 provides that in prescribing WDRs the Regional Board need not authorize the utilization of the waste assimilation capacities of the receiving waters. No discharge of waste into waters of the state creates a vested right to continue the discharge. All discharges of waste into waters of the state are privileges, not rights.

Waste discharges are categorized according to their threat to water quality and operational complexity (Table 4-3). Additionally, discharges to surface waters are categorized as major or minor discharges. Filing and annual fees are based on these categories. WDRs or WRRs do not have an expiration date but are reviewed periodically on a schedule based on the level of threat to water quality. NPDES permits are adopted for a five-year period.

Most WDRs and NPDES permits establish conditions tailored to specific discharges. In some cases, discharges can be regulated under general WDRs or NPDES permits (General Permits) which simplify the permit process for certain types of discharges. These General Permits are issued administratively to the discharger after a completed Notice of Intent or appropriate application has been filed and, if necessary, the Regional Board Executive Officer has determined that the discharger meets the conditions specified in the General Permit. The Regional Board plans to increase the use of General Permits for regulating similar categories of waste discharges in the future. The use of General Permits is a step towards permit streamlining and the reduction of permitting delays. The Regional Board will use the following principles in issuing or reviewing General Permits:

- The General Permit will have a streamlined process for obtaining coverage with adequate protective measures to assure compliance.

- The General Permit will focus on constituents of environmental concern for which there is a reasonable likelihood the constituent is, or may be, present in the discharge.

- The General Permits should be flexible to the extent practicable, and should allow for different testing, monitoring, and reporting requirements recognizing various significance levels of discharges.

- Duration, volume, and dilution of discharge should be considered in determining the significance of a discharge.

WASTE DISCHARGE REQUIREMENTS

WDRs are permits for waste discharges to land which could primarily affect ground water quality and beneficial uses. All waste discharges, whether to land or water, are subject to Water Code section 13263. Furthermore unless exempt, discharges to land (e.g., landfills) are also subject to requirements of California Code of Regulations (CCR) Title 27 and Title 23, Chapter 15. Examples of such waste discharges include:

- Sewage treatment plants with discharges to land;

- On-site wastewater treatment systems, or “OWTS” (septic tanks and advanced treatment systems);

- Class III (nonhazardous waste) and Class I (hazardous waste) landfills;

- Industrial discharges;

- Land treatment units (bioremediation);

Table 4-3. "Threat to Water Quality" and "Complexity" Definition.

CATEGORY & THREAT TO WATER QUALITY	DEFINITION	EXAMPLE
Category I (Major threat)	Those discharges which could cause the long-term loss of a designated beneficial use of the receiving water, render unusable a ground water or surface water resource used as a significant drinking water supply, require closure to an area used for contact recreation, result in long-term deleterious effects on shellfish spawning or growth areas of aquatic resources, or directly expose the public to toxic substances.	Loss of a drinking water supply
Category II (Moderate threat)	Those discharges of waste which could cause short-term violations of water quality objective, cause secondary drinking water standards to be violated, or cause a nuisance. The discharge could have a major adverse impact on receiving biota, cause aesthetic impairment to a significant human population, or render unusable a potential domestic or municipal supply.	Aesthetic impairment from nuisance from a waste treatment facility.
Category III (Minor threat)	Those discharges of waste which could degrade water quality without violating water quality objectives, or cause a minor impairment of designated beneficial uses compared with Category I and Category II.	Small pulses of water from low volume discharges.
COMPLEXITY		
Category "a"	Any major NPDES discharger, and any discharge of toxic wastes; any small volume discharge containing toxic waste or having numerous discharge points or ground water monitoring; any Class I waste management unit.	Small volume complex discharger with numerous discharge points, leak detection systems or ground water monitoring wells.
Category "b"	Any discharger not include above which has a physical, chemical, or biological treatment system (except for septic systems with subsurface disposal), or any Class II or Class III waste management unit.	Marinas with petroleum products, solid wastes or sewage pump-out facilities.
Category "c"	Any discharger for whom WDRs have been or would be prescribed pursuant to section 13263 of the Water Code not included as a Category "a" or Category "b" as described above.	Discharges having no waste treatment systems or that must comply with BMPs, discharges having passive treatment and disposal systems, or discharges having waste storage system with land disposal such as dairy waste ponds.
NPDES		
Major	Publicly owned treatment works with a yearly average flow of over 0.5 million gallons per day (MGD) or an industrial source with a yearly average flow of over 0.1 MGD and those with lesser flows but with acute or potential adverse environmental impacts.	
Minor	All other dischargers that are not categorized as a major.	

- Dairies; and
- A variety of other activities which can affect ground water quality.

Some types of dredging operations in surface waters are also regulated under WDRs. WDRs may also protect surface waters in those instances where surfacing ground water may adversely affect surface water quality or beneficial uses. As discussed in the following subsection, operations that contribute nitrate loading to ground water are of particular concern for interconnected surface water. This is because the water quality objective for nitrate in ground water is an order of magnitude higher than the biostimulatory substances water quality objective for total nitrogen in surface water.

A standard WDR permit typically includes the following elements:

Findings
Official description of the facility, processes, type and quantity of wastes, existing WDRs, enforcement actions, public notice and applicable Water Quality Control Plans, beneficial uses and water quality objectives;

Effluent Limitations
Narrative and numerical limits for effluent and discharge prohibitions;

Receiving Water Limitations
Narrative and numerical objectives for the receiving waters;

Provisions
Standard provisions required by the Regional Board and by state and federal law;

Compliance Schedules
Time schedules for completion of activities to achieve compliance with permit conditions;

Sludge Requirements
Sludge monitoring and control requirements, if necessary; and a

Monitoring and Reporting Program
Specific locations of monitoring stations and sampling frequency for all constituents limited in the permit, including flow, and other constituents that may be required by the Board.

Any person proposing to discharge waste, other than to a community sanitary sewage system, must file a report of waste discharge (application) to obtain WDRs at least 120-days prior to commencing the discharge.

The Water Code, Division 7, Chapter 4, Article 4 authorizes the Regional Board to issue WDRs, review self-monitoring reports submitted by the discharger, and perform independent compliance checking. The Regional Board is authorized to take a variety of enforcement actions to obtain compliance with WDRs. Enforcement of WDRs is done through the issuance of cleanup and abatement orders, cease and desist orders, administrative civil liability orders and court action. The Regional Board is also authorized to update and review WDRs periodically.

NITROGEN IN INTERCONNECTED GROUND WATERS AND SURFACE WATERS

Ground water and surface waters interact with one another, thus, discharges to one may result in impacts to the other (USGS, 1998). Understanding this interaction is important in establishing appropriate discharge specifications for total nitrogen in WDRs because ground water can be a significant source of the total nitrogen load in interconnected surface water bodies. High total nitrogen loads in surface water bodies can cause nuisance algal blooms and low dissolved oxygen leading to fish kills.

Nitrogen is not present in waste streams in its elemental form. It typically occurs in one or more of the following compounds: nitrate (NO_3), nitrite (NO_2), ammonia (NH_3), ammonium (NH_4), and organic nitrogen.

The term “total nitrogen” refers to the sum of all forms of nitrogen compounds. The majority of the total nitrogen load in both surface waters and ground waters is in the form of nitrate (NO_3).

The USGS (2010) concluded that, nationwide 66 percent of streams evaluated had more than 37 percent of their total nitrate load contributed by base flow from ground water seepage (Figure 4-1). The USGS report also stated that the proportion of the nitrate load in streams attributed to nitrate in base flow was significantly higher in areas with permeable soils or bedrock similar to conditions found in the San Diego Region.

For discharges of waste with significant total nitrogen loads, the biostimulatory substances surface water quality objective may limit the discharge specification for total nitrogen in WDRs for projects or facilities that discharge to land near surface water bodies. Discharges with significant total nitrogen loads include:

- Discharges to land from Onsite Wastewater Treatment Systems (OWTS) and wastewater treatment plants.
- Deep percolation of rainfall or irrigation water from agricultural and nursery operations where nitrogen fertilizers have been applied.
- Deep percolation of rainfall or irrigation water from urban landscapes where nitrogen fertilizers have been applied.
- Deep percolation of recycled water applied for irrigation of agricultural and nursery lands, and urban landscapes.

Natural processes, including physical, chemical, and biological, can affect nitrogen exchanges between ground water and surface water bodies. Total nitrogen concentrations in effluent plumes discharged from OWTS will lose strength through dispersion and dilution as the plumes migrate along ground-water flow paths through an aquifer. In stream settings containing organic-rich sediments and low dissolved-oxygen concentrations, bacteria convert dissolved nitrate in ground water to innocuous nitrogen gas through the process of denitrification and reduce the total nitrogen load entering the stream. Nitrate can also be removed from the ground water as it moves through streamside riparian zones. Nitrate can be removed from stream water that flows through sediments in the streambed. Vegetation in riparian buffer zones can also take up nitrate. All of these processes could be very effective at reducing total nitrogen concentrations in some settings and not in others.

Figure 4-1. Interconnected Surface and Groundwater

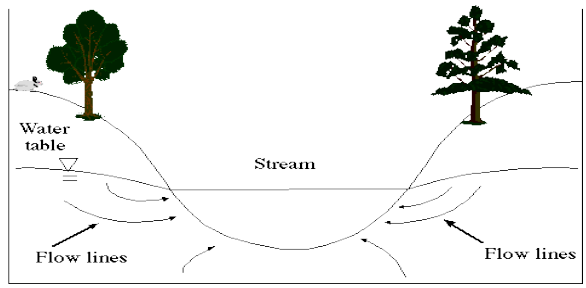

Loading of nitrogen through the groundwater pathway includes transport through the unsaturated (or vadose) zone, into a shallow water table and through a deeper saturated zone, which may include confined and unconfined aquifer systems.

Discharges of wastes with significant total nitrogen loads to ground waters that are located in proximity to surface waters, or where ground water is connected to surface waters require additional evaluation to ensure the protection of water quality and beneficial uses.

Where potential discharges of total nitrogen to surface waters are determined to exist via the ground water pathway, the Regional Board may and most likely will adopt WDRs that require a reduced concentration in the proposed discharge effluents, reduction in total nitrogen loads, and or compliance with more stringent water quality objectives in receiving surface waters for the protection of beneficial uses of water resources.

Discharges to Land from Wastewater Treatment Systems

Discharges from wastewater treatment systems that are located in ground water basins interconnected with surface waters could adversely affect surface water quality. The State *Water Quality Control Policy for Siting, Design, and Maintenance of Onsite Wastewater Treatment Systems* (OWTS Policy) includes a waiver of WDRs for smaller systems that meet design and siting conditions specified in the Policy. The OWTS Policy includes setback distances that are to be maintained from various types of surface water bodies. Setbacks allow for diffusion, dilution, and dispersion of an effluent plume before the affected ground water discharges to a surface stream. Denitrification of the effluent plume can also occur along the flow path between the wastewater treatment system disposal area to the surface-water body. Denitrification can occur due to site specific processes including: plant uptake of nutrients within the dispersal area, denitrification in the soil column as the effluent percolates to the water table, and denitrification in the riparian zone bordering the surface-water body.

Systems that do not qualify for the waiver must be regulated with WDRs. These systems are typically located at rural parks, schools, campgrounds, mobile home parks, roadside rest stops, small commercial or residential subdivisions, restaurants, resort hotels/lodges, small correctional facilities, temporary fire-fighting camps, and recreational vehicle (RV) dump locations, including RV parks. WDRs for these systems require some combination of setbacks from surface waters, higher levels of treatment, or dispersal systems with nitrogen uptake to protect interconnected surface water quality.

For systems that pose a potential threat to surface water quality due to their size or proximity to a surface water body, the Regional Board can and most likely will require the Report of Waste Discharge (RWD) to include a nitrate study. The purpose of the nitrate study is to provide the Regional Board with the information needed to establish discharge specifications for total nitrogen in effluent that will not cause the water quality objective for total nitrogen to be exceeded in any surface water body interconnected with receiving ground water. The nitrate study must utilize an acceptable mass balance method to evaluate if the proposed discharge will cause the water quality objectives for nitrate to be exceeded in ground water, and determine if the proposed discharge will adversely affect surface water quality. The nitrate study may also include, but not be limited to, an evaluation of following nitrogen fate and transport factors.

- Nitrogen uptake, if any, in the discharge area.
- Denitrification in the soil column of the discharge area.
- Concentration of nitrogen in the effluent when it reaches the ground water table.
- Effects of dilution of the effluent along the flow path to the surface water body.
- Effects of diffusion of the effluent along the flow path to the surface water body.
- Effects of nitrogen uptake/reduction by vegetation (e.g., within the root zone and by riparian vegetation) along the flow path to the surface water body.
- Travel time and distance from the point of discharge to the surface water body and riparian zone.
- Assimilative capacity, if any, in the ground water and surface water body.

Discharges to Ground Water from Agricultural and Nursery Operations

Use of fertilizer at agricultural operations can be a significant contributor of total nitrogen to surface waters via both shallow and deep groundwater pathways. The State Water Board convened an Agricultural Expert Panel to assess agricultural nitrate control programs and develop recommendations for its Irrigated Lands Regulatory Program to ensure protection of ground water quality. The Agricultural Expert Panel proposed a comprehensive regulatory program that focuses on minimizing loads of nitrates to ground water (ITRC, 2014). Key elements of the Agricultural Expert Panel's recommendations include: creation and

implementation of customized nitrogen/water management plans; trend monitoring of ground water nitrate concentrations; and development of a comprehensive educational and outreach program for different audiences (such as individuals who may need certification, managers of irrigation/nutrient plans, irrigators, and farmers/managers, etc).

WDRs for agricultural and nursery operations in the San Diego Region should require dischargers to implement appropriate management measures to ensure that their operations do not adversely affect ground water or surface water quality. Management measures may include but are not limited to the following:

- Develop and implement an effective irrigation water and nitrogen management plan that includes: an estimate of nitrogen required, agronomic rate of fertilizer application considering soil properties and crops nutrient requirements, estimate of nitrogen uptake/removal, the distribution and uniformity of the irrigation system, volume of water infiltration in a field, and actions taken to periodically assess and improve performance of the system. Increasing the water use efficiency will typically reduce the discharge volume and the total pollutant discharge loading to ground water. Discharges need to regularly inspect irrigation systems for leaks to ensure that excessive infiltration of runoff is not occurring.

- Convert paved or bare soil areas to vegetation that will retard runoff and increase storm water infiltration (wherever possible). The increased infiltration will help dilute total nitrogen concentrations in ground water.

- Group plants with similar water needs together to improve irrigation efficiency.

- Establish plant buffer zones between production areas and surface water bodies to effectively reduce nitrate in interconnected surface water.

- Install and use moisture sensors and automatic sprinklers for more accurate scheduling of irrigation.

- Improve efficiency of irrigation return flow conveyance systems and prevent leaks.

- Train employees on management measures, stormwater discharge prohibitions, WDR requirements, and appropriate irrigation and fertilizer application practices.

Discharges to Ground Water from Animal Feeding Operations

Discharges from animal feeding operations contain nitrogen compounds and other pollutants that can percolate to ground water and affect interconnected surface waters. Discharges from animal feeding operations may include wash water and waste from animal activities, and storm water runoff which can also transport pollutants from animal operations to ground water.

There are statewide minimum standards for discharges of animal wastes established in the California Code of Regulations[3]. These minimum standards are included in waivers and WDRs for animal feeding operation. If needed, the Regional Board will also prescribe more stringent requirements in individual WDRs for discharges from animal feeding operations that potentially pose a higher threat to surface water quality.

Landscape Irrigation with Recycled Water

Irrigating landscapes with recycled water is critical to developing a local, sustainable water supply for the Region. Recycled water that percolates past the landscape root zone, however, can be a source of nitrate to ground water and interconnected surface water. Applying recycled water and fertilizer in amounts and at rates needed by the landscape in end use areas will protect groundwater and interconnected surface water from excessive nitrogen loading.

Permits issued by the Regional Board for projects that include landscape irrigation with recycled water typically require the recycled water producer to develop rules and

[3] Title 27, Division 2, Subdivision 1, Chapter 7, Subchapter 2, Article 1.

regulations that must be implemented in the end use areas for the protection of public health and the environment. The permits also stipulate minimum requirements for the rules and regulations. Practices to ensure that recycled water and fertilizer are applied at agronomic rates in end use areas should be included in these minimum requirements for the rules and regulations. Below are some example practices that lead to the application of recycled water and fertilizer at agronomic rates.

- Monitor nutrient levels in recycled water supplies and notify end users of the nutrient value of recycled water.
- Use fertilizers appropriately taking into account the nutrient levels in the recycled water.
- Avoid overwatering of landscapes and runoff.
- Educate and train site supervisors on how to (1) minimize the potential for runoff or over-irrigation; and (2) take into account the nutrient value of the recycled water.
- Conduct periodic inspections of end use areas.

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM

Waste Discharge Requirements that implement federal National Pollutant Discharge Elimination System (NPDES) regulations ("NPDES requirements" or "NPDES permits") are issued to regulate discharges of "pollutants" from point sources to "waters of the United States" to ensure that the quality and quantity of such discharges does not adversely affect surface water quality or beneficial uses. The phrase "waters of the United States" is defined in Title 40, CFR, Parts 122.2, 230.3 and 232.3. The definition of "waters of the United States" emphasizes protection of a broad range of surface waters, including interstate and intrastate lakes, creeks, streams, wetlands, rivers, bays, and ocean waters. Ephemeral creeks, and streams are considered to be "waters of the United States" for the purpose of issuing NPDES permits. In this Basin Plan the term "waters of the United States" is used interchangeably with the term "surface waters".

NPDES permits are authorized by section 402 of the Clean Water Act and section 13370 of the Water Code. Permit conditions and the issuance process are described in Title 40, CFR, Part 122 (40 CFR 122) and CCR, Title 23, Chapters 3 and 4. The responsibility for issuing NPDES permits in California has been delegated to the regional boards, subject to review and approval by the Regional Administrator (USEPA Region IX, San Francisco). NPDES permits issued by the Regional Board are also "waste discharge requirements" issued under the authority of the Water Code, Chapter 5.5.

A standard NPDES permit typically includes the following elements:

Findings
Official description of the facility, processes, type and quantity of wastes, existing NPDES permits, enforcement actions, public notice and applicable USEPA effluent guidelines and standards, Water Quality Control Plans, beneficial uses and water quality objectives;

Effluent Limitations
Narrative and numerical limits for effluent and discharge prohibitions;

Receiving Water Limitations
Narrative and numerical objectives for the receiving waters;

Provisions
Standard provisions required by the Regional Board and by state and federal law, expiration date of permit;

Compliance Schedules
Time schedules for completion of activities to achieve compliance with permit conditions;

Pretreatment Requirements
Standard pretreatment requirements for municipal facilities (see below);

Sludge Requirements
Sludge monitoring and control requirements, if necessary; and a

Monitoring and Reporting Program
Specific locations of monitoring stations and sampling frequency for all constituents limited in the permit, including flow, and other constituents that may be required by the Regional Board.

The NPDES permit regulates discharges of wastes for the purpose of limiting the quantity of pollutants and volume of waste discharged to surface waters. NPDES permits contain prerequisite conditions which must be met by dischargers to ensure protection of beneficial uses of the receiving water as described in the Regional Board's Water Quality Control Plan, Statewide Water Quality Control Plans, and other water quality control policies.

Any person proposing to discharge pollutants into surface waters must submit a report of waste discharge in application for an NPDES permit at least 180-days in advance of the date on which it is desired to commence the proposed discharge. Certain discharges do not require an NPDES permit. The following discharges are exempt from the requirements for NPDES coverage pursuant to 40 CFR 122.3:

- Any discharge of sewage from vessels, effluent from properly functioning marine engines, laundry, shower, and galley sink wastes, or any other discharge incidental to the normal operation of a vessel;

- Discharges of dredged or fill material into waters of the United States which are regulated under the Clean Water Act, section 404;

- The introduction of sewage, industrial wastes, or other pollutants into publicly owned treatment, any discharge in compliance with the instructions of an On-Scene Coordinator pursuant to 40 CFR 300 (The National Oil and Hazardous Substances Pollution Contingency Plan) or 33 CFR 153.10(e) (Pollution by Oil and Hazardous Substances);

- Any introduction of pollutants from nonpoint source agricultural and silvicultural activities, including storm water runoff from orchards, cultivated crops, pastures, range lands, and forest lands;

- Return flows from irrigated agriculture; and

- Discharges into a privately owned treatment works.

NPDES permits are issued for a term of five years or less. The terms and conditions of the permit are regularly updated as necessary. NPDES permits can be revoked for cause by the Regional Board.

The Water Code, Division 7, Chapter 5.5, Article 6 authorizes the Regional Board to issue NPDES permits, review self-monitoring reports submitted by the discharger, and perform independent compliance checking. The Regional Board is authorized to take a variety of enforcement actions to obtain compliance with an NPDES permit. Enforcement of NPDES permits is done through the issuance of cleanup and abatement orders, cease and desist orders, administrative civil liability orders, and court action.

The Regional Board will consider the establishment of mixing zones for inland surface waters and enclosed bays and estuaries on a case-by-case basis. Criteria to be established for mixing zones will be specified in the waste discharge requirements established for the discharge.

In addition to regulating discharges of wastewater to surface waters, NPDES permits also require municipal sewage treatment plants having a design capacity greater than 5 MGD to conduct pretreatment programs. Smaller municipal treatment systems may be required to conduct pretreatment programs if there are significant industrial users of their systems. Pretreatment is discussed in more detail later in this chapter.

COMPLIANCE TIME SCHEDULES

The Regional Board may establish compliance time schedules in NPDES requirements where the Regional Board determines that, for an existing discharger[4], achieving immediate compliance in a discharge with new or more stringent water quality based effluent limitations or receiving water limitations that implement new, revised, or newly interpreted water quality objectives[5], and/or that resulted from new knowledge on the characteristics and impacts of the discharge is infeasible[6]. New knowledge about the characteristics and impacts of the discharge that can result in new or more stringent WQBELs or receiving water limitations include, but are not limited to, the following situations:

- Pollutants previously unregulated in an existing discharge are newly regulated because the new information indicates a reasonable potential for the discharge to exceed an applicable water quality objective in the receiving water;
- Pollutants are newly detected in an existing discharge due to improved analytical techniques;
- The point of compliance for a receiving water limitation is changed; and
- The dilution allowance for an existing discharge is changed.

Compliance time schedules are authorized by this provision only for new or more stringent effluent and/or receiving water limitations that implement water quality objectives issued, revised, or newly interpreted after November 9, 2005, or that resulted from new knowledge on the characteristics and impacts of the discharge for any pollutant for which a water quality objective was issued, revised, or newly interpreted after July 1, 1977.

The compliance time schedule shall include a time schedule for completing or achieving specific actions (including interim effluent limitations) that demonstrate reasonable progress toward compliance with water quality based effluent limitations or receiving water limitations and, thereby, attainment of water quality objectives. The compliance time schedule shall contain a final compliance date, based on the shortest practicable time (determined by the Regional Board at a public hearing after considering the factors identified below) required to achieve compliance. In addition, in all cases, the findings of the NPDES requirements shall specify the final effluent limitations.

Compliance time schedules in NPDES requirements shall be as short as practicable but in no case exceed five years from the date of order issuance, reissuance, or modification. The Regional Board may grant an additional extension of up to five years, but only where the discharger has demonstrated satisfactory progress toward achieving compliance with applicable water quality based effluent limitations and receiving water limitations and the Regional Board concurs with the demonstration. In no case, shall a compliance time schedule for these discharges exceed ten years from the date of adoption, revision, or interpretation of the applicable water quality objective, whichever is the shorter period of time.

Nothing in this provision limits the Regional Board's authority (1) to develop alternate implementation provisions for water quality objectives adopted or revised in the future, or (2) to rely on alternate implementation provisions authorized pursuant to State Board policies for water quality control, State

[4] "Existing discharger" means any discharger that is not a new discharger. An existing discharger includes an increasing discharger (i.e., an existing facility with treatment systems in place for its current discharge that is or will be expanding, upgrading, or modifying its existing permitted discharge after a new, revised, or newly interpreted water quality objective becomes applicable). A "new discharger" is defined as any building, structure, facility or installation from which there is or may be a "discharge of pollutants" (as defined in 40 CFR section 122.2) to surface water of the San Diego Region, the construction of which commences after a new, revised, or newly interpreted water quality objective becomes applicable.

[5] "New, revised, or newly interpreted water quality objectives" means objectives as defined in section 13050(h) of Porter-Cologne, issued, revised or newly interpreted after November 9, 2005. Objectives may be narrative or numeric.

[6] "Infeasible" means that discharger compliance cannot be accomplished in a successful manner within a reasonable period of time, taking into account economic, environmental, legal, social and technological factors.

regulations, or federal regulations. Compliance time schedules to meet WQBELs and receiving water limitations that implement California Toxics Rule criteria will be limited by the provisions of the State Board "*Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California*."

To document the need for and justify the duration of any such compliance time schedule, a discharger must submit the following information, at a minimum: (1) the results of a diligent effort to quantify pollutant levels in the discharge and the sources of the pollutant(s) in the waste stream; (2) identification of the sources of the pollutant in the waste stream, documentation of source control efforts currently underway or completed, including compliance with any pollution prevention programs that have been established, and a proposed schedule for additional source control measures or waste treatment needed to meet the WQBELs and/or receiving water limitations; (3) evidence that the discharge quality is the highest that can reasonably be achieved until final compliance is attained; and (4) a demonstration that the proposed schedule is as short as practicable, taking into account economic, technical and other relevant factors. The need for additional information and analyses will be determined by the Regional Board on a case-by-case basis. The need for and justification of the duration of any such compliance time schedule will be subject to Regional Board review and approval.

CONDITIONAL WAIVERS OF WASTE DISCHARGE REQUIREMENTS

The Regional Board may waive issuance of waste discharge requirements and/or the requirement to file reports of waste discharge for a specific discharge or specific types of discharge pursuant to Water Code section 13269 if such waiver is determined to be consistent with the Basin Plan and in the public interest.

The waiver of adoption of waste discharge requirements is not applicable to discharges subject to federal NPDES regulations. The federal Clean Water Act does not provide for a waiver of the need to obtain an NPDES permit for point source discharges of pollutants to surface waters.

Amendments to Water Code section 13269, effective January 1, 2003 provided that waivers may not exceed five years duration and must be conditional. Under these amendments the Regional Boards were required to:

- Renew waivers every five years;
- Review the terms, conditions, and effectiveness of each waiver at a public hearing;
- Determine if general or individual waste discharge requirements should be issued for ongoing discharges where waivers have been terminated; and
- Require compliance with waiver conditions.

A waiver of waste discharge requirements is conditional and may be terminated at any time by the Regional Board for any specific discharge or any specific type of discharge. A conditional waiver is not required to be used by the Regional Board. Even if a discharger complies with all the conditions of a conditional waiver, the Regional Board may still choose to regulate any specific discharge with waste discharge requirements.

The Regional Board has determined that a waiver of adoption of waste discharge requirements for a specific type of discharge would not be against the public interest under one or more of the following circumstances:

- The type of discharge is effectively regulated by other public agencies; or
- The type of discharge does not adversely affect the quality or the beneficial uses of the waters of the state; or

- The type of discharge is not readily amenable to regulation through adoption of waste discharge requirements but warrants Regional Board oversight to insure compliance with mandated conditions.

The Regional Board conditionally waives the adoption of waste discharge requirements for certain specific types of discharges through the issuance of an Order. The Waiver Order describes the specific types of discharges subject to a waiver, and the conditions the discharge must meet to be eligible for the waiver. The Regional Board's current Waiver Order may be viewed or downloaded by visiting the conditional waiver website (http://www.waterboards.ca.gov/sandiego/), or contacting Regional Board Staff.

In general the discharges eligible for a waiver must comply with the following conditions:

- The discharge shall not create a nuisance or pollution as defined in the Water Code; and

- The discharge shall not cause a violation of any applicable water quality standard for the receiving waters adopted by the Regional Board, or the State Water Resources Control Board, as required by the Clean Water Act; and

- The discharge of any substance in concentrations toxic to animal or plant life is prohibited.

In addition, the discharges must satisfy the general and specific conditions described in each conditional waiver.

WATER RECLAMATION REQUIREMENTS

Reclaimed water is water that, as a result of treatment, is suitable for a direct beneficial use or a controlled use that would otherwise not occur. Reclaimed water uses in the Region include, but are not limited to, landscape irrigation, crop irrigation, freeway landscape irrigation, ground water recharge, soil compaction at construction sites, and for recreational lakes.

The Regional Board may prescribe water reclamation requirements to reclaimed water producers and those governing the use of reclaimed water, which the Regional Board has determined are necessary to protect public health, safety, and welfare pursuant to Water Code, Division 7, Chapter 7, sections 13500-13556 "Water Reclamation Law". Water Reclamation Law provides that no person shall reclaim water or use reclaimed water for any purpose subject to Title 22 criteria until water reclamation requirements have been established or the Regional Board determines no requirements are necessary. The Regional Board may not deny issuance of water reclamation requirements to a project which violates only a salinity standard in the Basin Plan.

In lieu of issuing water reclamation requirements pursuant to Water Code, section 13523, for each user of reclaimed water, the Regional Board establishes master reclamation requirements as part of the waste discharge requirements which are issued to a supplier or distributor, or both, of reclaimed water. Reclamation requirements must include the following components:

- A requirement that the permittee comply with the uniform statewide reclamation criteria established pursuant to section 13521. Permit conditions for a use of reclaimed water not addressed by the uniform statewide reclamation criteria shall be considered on a case-by-case basis;

- A requirement that the permittee establish and enforce rules or regulations for reclaimed water users, governing the design and construction of reclaimed water use facilities and the use of reclaimed water, in accordance with the uniform statewide reclamation criteria established pursuant to section 13521;

- A requirement that the permittee submit a quarterly report summarizing reclaimed water use, including the total amount of reclaimed water supplied, the total number of reclaimed water use sites, and the locations of those sites, including the names of the hydrologic areas underlying the reclaimed water use sites;

- A requirement that the permittee conduct periodic inspections of the facilities of the reclaimed water users to monitor compliance by users with the uniform statewide reclamation criteria and the requirements of the master reclamation permit; and

- Any other requirements determined to be appropriate by the Regional Board.

The "Rules and Regulations for Reclaimed Water Users" that must be issued and enforced by the permittee govern the design and construction of reclaimed water use facilities and the use of reclaimed water. The rules and regulations must have the following elements:

- Provisions implementing Title 22, Division 4, Chapter 3, Wastewater Reclamation Criteria; and Title 17, Division 1, Chapter 5, Group 4, Articles 1 & 2, of the CCR;

- Provisions implementing the State Board Division of Drinking Water (State Board DDW) "Guidelines For Use of Reclaimed Water and Guidelines for Use of Reclaimed Water for Construction Purposes" and measures that are deemed necessary for protection of public health, such as the "American Water Works Association (AWWA) California/Nevada Section, Guidelines for the Distribution of Non-Potable Water" or alternate measures, acceptable to State Board DDW, providing equivalent protection of public health;

- Provisions authorizing the Regional Board, the discharger/producer, or an authorized representative of these parties, upon presentation of proper credentials, to inspect the facilities of any reclaimed water user to ascertain whether the user is complying with the discharger/producer's rules and regulations;

- Provision for written notification, in a timely manner, to the discharger/producer by the reclaimed water user of any material change or proposed change in the character of the use of reclaimed water;

- Provision for submission of a preconstruction report to the discharger/producer by the reclaimed water user in order to enable the discharger/producer to determine whether the user will be in compliance with the discharger/producer's rules and regulations;

- Provision requiring reclaimed water users to designate a reclaimed water supervisor responsible for the reclaimed water system at each use area under the user's control. Reclaimed water supervisors should be responsible for the installation, operation, and maintenance of the irrigation system, enforcement of the discharger/producer's reclaimed water user rules and regulations, prevention of potential hazards, and maintenance of the reclaimed water distribution system plans in "as built" form;

- Provision authorizing the discharger/producer to cease supplying reclaimed water to any person who uses, transports, or stores such water in violation of the discharger/producer's rules and regulations;

- Provision requiring notification and concurrence of the State Board DDW and the local county health department for new reclaimed water users. The notification of the county health department shall include a site distribution plan for new and retrofit facilities and a cross-connection control inspection plan for sites containing both potable and reclaimed water distribution lines;

- Provision requiring all windblown spray and surface runoff of reclaimed water applied for irrigation onto property not owned or controlled by the discharger or reclaimed water user to be prevented by implementation of BMPs;

- Provision requiring all reclaimed water storage facilities owned and/or operated by reclaimed water users to be protected against erosion, overland runoff, and other impacts resulting from a 100-year frequency storm, 24 hour storm. This requirement may be waived if the discharger submits information demonstrating that releases from the storage facilities caused by storm events of less than 100-year frequency will not cause violation of the Basin Plan water quality standards;

- Provision requiring all reclaimed water storage facilities owned and/or operated by reclaimed water users to be protected against 100-year frequency peak stream flows as defined by the local flood control agency. However, if information is made available to the Regional Board which shows that a reclaimed water storage facility presents no potential impairment to the beneficial uses, the Regional Board may exempt requirements for 100-year flood protection on a case-by-case basis;

- Provision for notification to reclaimed water users that the Regional Board may initiate enforcement action against any reclaimed water user who discharges reclaimed water in violation of any applicable discharge prohibitions prescribed by the Regional Board or in a manner which creates, or threatens to create conditions of pollution, contamination, or nuisance, as defined in Water Code section 13050; and

- Provision for notification to reclaimed water users that the Regional Board may initiate enforcement action against the discharger/producer, which may result in the termination of the reclaimed water supply, if any person uses, transports, or stores such water in violation of the discharger/ producer's rules and regulations or in a manner which creates, or threatens to create conditions of pollution, contamination, or nuisance, as defined in Water Code section 13050.

WASTE DISCHARGE PROHIBITIONS

Water Code section 13243 provides that a Regional Board, in a water quality control plan, may specify certain conditions or areas where the discharge of waste, or certain types of waste is not permitted. The following discharge prohibitions are applicable to any person, as defined by section 13050(c) of the Water Code, who is a citizen, domiciliary, or political agency or entity of California whose activities in California could affect the quality of waters of the state within the boundaries of the San Diego Region.

(1) The discharge of waste to waters of the state in a manner causing, or threatening to cause a condition of pollution, contamination or nuisance as defined in Water Code section 13050, is prohibited.

(2) The discharge of waste to land, except as authorized by WDRs or the terms described in Water Code section 13264 is prohibited.

(3) The discharge of pollutants or dredged or fill material to waters of the United States except as authorized by an NPDES permit or a dredged or fill material permit (subject to the exemption described in Water Code section 13376) is prohibited.

(4) Discharges of recycled water to lakes or reservoirs used for municipal water supply or to inland surface water tributaries thereto are prohibited, unless this Regional Board issues a NPDES permit authorizing such a discharge; the proposed discharge has been approved by the State Board DDW and the operating agency of the impacted reservoir; and the discharger has an approved fail-safe long-term disposal alternative.

(5) The discharge of waste to inland surface waters, except in cases where the quality of the discharge complies with applicable receiving water quality objectives, is prohibited. Allowances for dilution may be made at the discretion of the Regional Board. Consideration would include streamflow data, the degree of treatment provided and safety measures to ensure reliability of facility performance. As an example, discharge of secondary effluent would probably be permitted if streamflow provided 100:1 dilution capability.

(6) The discharge of waste in a manner causing flow, ponding, or surfacing on lands not owned or under the control of the discharger is prohibited, unless the discharge is authorized by the Regional Board.

(7) The dumping, deposition, or discharge of waste directly into waters of the state, or adjacent to such waters in any manner which may permit its being transported into the waters, is prohibited unless authorized by the Regional Board.

(8) Any discharge to a storm water conveyance system that is not composed entirely of "storm water" is prohibited unless authorized by the Regional Board. [The federal regulations, 40 CFR 122.26 (b) (13), define storm water as storm water runoff, snow melt runoff, and surface runoff and drainage. 40 CFR 122.26 (b) (2) defines an illicit discharge as any discharge to a storm water conveyance system that is not composed entirely of storm water except discharges pursuant to a NPDES permit and discharges resulting from fire fighting activities.] [Section 122.26 amended at 56 FR 56553, November 5, 1991; 57 FR 11412, April 2, 1992].

(9) The unauthorized discharge of treated or untreated sewage to waters of the state or to a storm water conveyance system is prohibited.

(10) The discharge of industrial wastes to conventional septic tank/subsurface disposal systems, except as authorized by the terms described in Water Code section 13264, is prohibited.

(11) The discharge of radioactive wastes amenable to alternative methods of disposal into the waters of the state is prohibited.

(12) The discharge of any radiological, chemical, or biological warfare agent into waters of the state is prohibited.

(13) The discharge of waste into a natural or excavated site below historic water levels is prohibited unless the discharge is authorized by the Regional Board.

(14) The discharge of sand, silt, clay, or other earthen materials from any activity, including land grading and construction, in quantities which cause deleterious bottom deposits, turbidity or discoloration in waters of the state or which unreasonably affect, or threaten to affect, beneficial uses of such waters is prohibited.

(15) The discharge of treated or untreated sewage from vessels to Mission Bay, Oceanside Harbor, Dana Point Harbor, or other small boat harbors is prohibited.

(16) The discharge of untreated sewage from vessels to San Diego Bay is prohibited.

(17) The discharge of treated sewage from vessels to portions of San Diego Bay that are less than 30 feet deep at MLLW is prohibited.

(18) The discharge of treated sewage from vessels, which do not have a properly functioning USCG certified Type I or Type II marine sanitation device, to portions of San Diego Bay that are greater than 30 feet deep at MLLW is prohibited.

WATER QUALITY CERTIFICATION (SECTION 401)

In addition to the issuance of NPDES permits or WDRs, the Regional Board acts to protect the quality of surface waters through water quality certification pursuant to section 401 of the Clean Water Act. Section 401 requires that any person applying for a federal permit or license which may result in a discharge of pollutants into waters of the United States, must obtain a state water quality certification that the activity complies with all applicable water quality standards, limitations, and restrictions.

No license or permit may be issued by a federal agency until certification required by section 401 has been granted or waived by the state. Further, no license or permit may be issued if certification has been denied by the state. The activity must also meet the requirements of the Coastal Nonpoint Pollution Control Program required under the Coastal Zone Act Reauthorization Amendments (CZARA).

The following permits or licenses are subject to section 401 of the Clean Water Act:

- NPDES permits issued by the USEPA under section 402 of the Clean Water Act;
- Clean Water Act, section 404 permits issued by the United States Army Corps of Engineers (USACOE);
- Permits issued under sections 9 and 10 of the Rivers and Harbors Act (for activities which may affect navigation);
- Licenses for hydroelectric power plants issued by the federal Energy Regulatory Commission under the Federal Power Act; and
- Licenses issued by the Nuclear Regulatory Commission.

The Regional Board's water quality certification activities have focused on applications for permits for the discharge of dredged or fill material to surface waters. These permits are issued by the USACOE (Clean Water Act, section 404 permits) subject to any conditions imposed by the Regional Board pursuant to section 401.

The section 404 program is administered at the federal level by the USACOE and the USEPA. The US Fish and Wildlife Service and the National Marine Fisheries Service have important advisory roles. The USACOE has the primary responsibility for the permit program and is authorized, after notice and opportunity for a public hearing, to issue permits for the discharge of dredged or fill material. USEPA develops the regulations under which permits may be granted.

The Regional Board evaluates the projects for which section 404 permits are requested and determines whether to deny water quality certification, issue a certification with or without conditions, or waive the certification pursuant to regulations in Article 4, Title 23. Regional Board certification is dependent upon assurance that the project will not reduce water quality below applicable standards as defined in the Clean Water Act (i.e., the water quality objectives established and the beneficial uses which have been designated for the surface waters). A certification is usually denied if the proposed activity does not meet water quality standards. If the activity may violate standards, a conditional certification is given. If the activity does not violate any standards, a section 401 waiver may be given. The Executive Director of the State Board may issue a water quality certification after review of the application, all relevant data, and taking into consideration any recommendations from the Regional Board.

SELF MONITORING, COMPLIANCE MONITORING, AND INSPECTIONS

Compliance with NPDES permits and WDRs is generally self-monitored by each individual discharger, with oversight by the Regional Board. Dischargers are required to report and take necessary corrective actions when they discover that they are not in compliance with the permit effluent limits. The Regional Board conducts periodic inspections and compliance monitoring and, as necessary, will take enforcement actions to ensure compliance.

Self Monitoring Program

WDRs and NPDES permits issued by the Regional Board include requirements for the discharger to collect samples of the waste discharge. In some cases, the receiving waters must also be monitored by the dischargers. The results of the "self monitoring" programs are reported to the Board and are used to determine compliance with the WDRs. (Additional information on this topic is presented in Chapter 6, Surveillance and Monitoring).

Compliance Monitoring and Inspections

Regional Board staff can conduct unannounced inspections (including collection of samples) to determine the status of compliance with NPDES permit or WDRs / WRRs requirements. All major dischargers are inspected at least once a year. (Additional information on this topic is presented in Chapter 6, Surveillance and Monitoring).

ENFORCEMENT

The Regional Board is committed to the maintenance of a strong and uniform enforcement program. Appropriate and timely response to instances of noncompliance with Regional Board NPDES permits, WDRs, waste discharge prohibitions and enforcement orders is necessary to ensure protection of the quality of surface and ground waters in the Region.

Regional Board response to noncompliance incidents include the establishment of a specific time frame for compliance and or correction. All dischargers are expected to correct violations in the shortest time frame possible. With the exception of special circumstances, failure to terminate, comply, or complete corrective actions on a noncompliance incident in a specified time frame will result in the escalation of the matter to a higher level enforcement action.

Regional Board responses to instances of violation correspond to the following enforcement action level sequence, unless circumstances warrant a more expeditious escalation to a higher level.

LEVEL A ENFORCEMENT ACTION

In this action level the Regional Board staff requests the discharger, by telephone or letter, to correct the problem and prevent recurrence. Regional Board staff may also request the discharger to correct the problem during routine compliance inspections.

LEVEL B ENFORCEMENT ACTION

In this action level the Regional Board Executive Officer issues a notice of violation to the discharger for failure to comply with a compliance schedule for corrective action.

LEVEL C ENFORCEMENT ACTION

In this action level the Regional Board may take a variety of formal higher level enforcement actions. The Water Code provides the Regional Board with a number of enforcement remedies for violations of requirements. These remedies include time schedules, cease and desist orders, cleanup and abatement orders, and administrative civil liability orders.

Time Schedule Orders

When a discharge is taking place or threatening to occur that will cause a violation of a Regional or State Board requirement, a discharger may be required to submit a detailed list of specific actions the discharger will take to correct or prevent the violation. (Water Code section 13300). These schedules may also be required when the waste collection, treatment, or disposal facility of a discharger are approaching capacity. Time schedule orders are adopted by the Board after a public hearing or issued by the Executive Officer pursuant to authority delegated by the Regional Board.

Cleanup and Abatement Orders

The Regional Board may issue a cleanup and abatement order to any person who has discharged, is discharging or is threatening to discharge wastes that will result in a violation of WDRs or other order or prohibition of the State or Regional Board. The Regional Board may also issue a cleanup and abatement order to any person who discharges or has discharged waste to waters of the state and causes, or threatens to cause, a condition of pollution or nuisance. The cleanup and abatement order may require the waste discharger(s) to cleanup and abate the effects of the discharge or to take other appropriate remedial action (Water Code section 13304). A cleanup and abatement order is issued if a pollutant can actually be cleaned up or the pollutant effects abated. The Regional Board has delegated issuance of these orders to the Executive Officer. Cleanup and abatement orders do not require Board adoption, but may be brought before the Regional Board for consideration at the request of the discharger.

Cease and Desist Orders

If discharge prohibitions or requirements of the State Board or Regional Board are violated or threatened, the Regional Board may adopt a cease and desist order (Water Code section 13301) requiring the discharger to comply forthwith, to comply in accordance with a time schedule, or if the violation is threatened, to take appropriate remedial or preventive action. Cease and desist orders may restrict or prohibit the volume, type or concentration of waste added to community sewer systems, if existing or threatened violations of waste discharge requirements occur. Cease and desist orders may specify interim time schedules as well as limitations that must be complied with until full compliance is achieved. Cease and desist orders are adopted by the Regional Board after a public hearing.

Administrative Civil Liability

Administrative civil liability complaints and orders may be issued by the Regional Board for certain categories of violations. In this process the Regional Board may impose monetary penalties on dischargers. The Regional Board (or the Executive Officer) may issue Administrative Civil Liability complaints (ACLs) to persons who intentionally or negligently violate enforcement orders of the Board, or who intentionally or negligently discharge wastes in violation of any order, prohibition, or requirement of the Board where the discharge causes conditions of pollution or nuisance (Water Code section 13350). ACLs may also be issued in cases where a person fails to submit reports requested by the Board (Water Code sections 13261 and 13268) or when a person discharges waste without first having filed the appropriate RWD (Water Code section 13265). ACLs may be issued pursuant to Water Code section 13385 for violations of any Regional Board prohibition or requirement implementing specified sections of the Clean Water Act, or any requirement in an approved pretreatment program. Amounts of administrative civil liability that the Board can impose range up to $10,000 per day of violation. The Water Code also provides that a superior court may impose civil liability assessments in substantially higher amounts. The Regional Board may conduct a hearing if a discharger contests the imposition of the Administrative Civil Liability.

LEVEL D ENFORCEMENT ACTION

Referral to the Attorney General or District Attorney

Judicial Civil Liability
The Water Code provides that a Regional Board may request the State Attorney General to petition a superior court to enforce orders and complaints issued by the Board and impose civil monetary remedies. The monetary remedies may be in excess of the administrative civil liability penalties that the Regional Board is authorized to impose. The court imposed fines and or imprisonment vary depending upon the seriousness of the violation.

Injunctive Relief
The Regional Board may also request that the Attorney General seek injunctive relief in specific situations, such as violations of cease and desist orders or discharges which cause or threaten to cause a nuisance or pollution that could result in a public health emergency (Water Code section 13331 and section 13340).

Criminal Penalties
The Regional Board may also refer violations to the District Attorney to seek criminal penalties by judicial action in the county where the discharge occurred. The court imposed fines and or imprisonment vary depending upon the seriousness of the violation.

SELECTION OF APPROPRIATE ENFORCEMENT ACTION

The following criteria are considered by the Regional Board in selecting the appropriate enforcement action in response to an incident of noncompliance:

- Degree of water quality impairment and/or threat to the public health including the degree of toxicity of the discharge;
- Past history of discharge violations;
- Degree of cooperation or recalcitrance shown by the discharger;
- Culpability of the discharger;
- Financial resources of the discharger;
- Whether the circumstances leading to the noncompliance have been corrected;
- Whether the discharge violations are likely to continue in the future;
- Whether the discharge can be cleaned up;
- The need to take immediate cleanup action;
- Any economic benefit realized by the discharger as a result of the noncompliance; and
- Other actions as justice may require.

STATE WATER RESOURCES CONTROL BOARD PLANS AND POLICIES

The State Water Resources Control Board (State Board) has adopted a number of plans and policies for statewide water quality management. The Regional Board implements these plans through WDRs, NPDES permits, and any necessary enforcement actions. These policies are explained in more detail in Chapter 5, Plans and Policies.

HAZARDOUS WASTE SOURCE REDUCTION

The Department of Toxic Substance Control (DTSC) has adopted regulations regarding hazardous waste source reduction pursuant to the Hazardous Waste Source Reduction and Management Review Act of 1989 (Article 11.9, starting with section 25244.12 of the Health and Safety Code). These regulations are contained in sections 67100.1 through sections 67100.14 of Title 22 of the CCR. These regulations require that each generator of hazardous or extremely hazardous waste within the limits set by the regulations conduct a source reduction evaluation review and plan, plan summary, hazardous waste management performance report, and report summary on or before September 1, 1991 and every four

years thereafter. Every generator is required to retain a copy of the current review and plan, plan summary, report, report summary, progress report, and compliance checklist at each site, at a public library, or at a local governmental agency. The Regional Board supports these efforts of hazardous waste source reduction because any successes achieved will mean less hazardous waste which could pollute California's waters.

MUNICIPAL AND DOMESTIC WASTEWATER

Municipal wastewater in the San Diego Region consists primarily of domestic sewage and minor quantities of industrial wastes in some of the more highly urbanized and industrialized areas. Facilities to control municipal wastewater include wastewater collection systems, pumping stations, transport pipelines, treatment plants, storage ponds and ocean outfalls. These facilities are sometimes collectively referred to by the term Publicly Owned Treatment Works (POTW).

Municipal wastewater treatment in the San Diego Region is generally at the secondary treatment level. Secondary treatment results in the removal of more than 85 percent of the biochemical oxygen demand and suspended solids found in municipal wastewater. Tertiary (advanced) wastewater treatment is used at some treatment plants for additional removal of pollutants to reclaim wastewater for beneficial reuse. Effluent from the wastewater treatment plants is disposed of by various means including:

- Discharge to the Pacific Ocean via long deep ocean outfalls;
- Percolation into the soil; and
- Reclamation and reuse in conformance with uniform reclamation criteria (CCR, Title 22, Division 4, Chapter 3).

Sludge disposal at most major municipal wastewater treatment plants in the Region consists of aerobic or anaerobic digestion and land disposal. Dried sludge is either disposed of at landfills or made available to the public as a soil conditioner. Some treatment plants, located upstream of major regional wastewater treatment plants discharge sludge to the sewage collection system for treatment at a "downstream" regional wastewater plant. The term municipal sewage treatment plant and Publicly Owned Treatment Works are used interchangeably in the Basin Plan.

The Regional Board regulates wastewater discharges from municipal wastewater treatment plants through either the issuance of NPDES permits where the discharge is to surface waters or through WDRs where the discharge is to land.

Discharges of wastewater to surface water must meet the effluent limitations prescribed in the NPDES permit issued by the Regional Board. Effluent limitations are based on the following criteria:

- Secondary treatment effluent limitations defined by USEPA contained in 40 CFR 133, unless a waiver to the secondary treatment standards is obtained (more stringent effluent limitations than secondary treatment may be imposed by the Regional Board if necessary);
- Applicable water quality objectives and beneficial uses contained in the Basin Plan and State Board Water Quality Control Plans;
- Applicable public health protection standards for total and fecal coliform;
- Assimilative capacity of the receiving water;
- The terms and conditions of the federal Antidegradation Policy (40 CFR 131.12) and the State Antidegradation Policy (Resolution No. 68-16) (See Chapter 3);
- Anti-backsliding provisions described in Clean Water Act section 404; and
- Land disposal or recycling of sludge as a soil amendment.

Discharges of wastewater onto land must meet the effluent limitations in the waste discharge requirements prescribed by the Regional Board through the issuance of WDRs. The WDRs contain effluent limitations based on the following criteria:

- The treatment capability of the treatment process employed by the dischargers;
- Applicable water quality objectives and beneficial uses contained in the Basin Plan;
- Applicable public health protection standards for total and fecal coliform;
- Assimilative capacity of the receiving water;
- The terms and conditions of the State Antidegradation Policy - Resolution No. 68-16 (See Chapter 3); and
- Land disposal or recycling of sludge as a soil amendment.

CLEAN WATER GRANTS AND LOANS

From 1972 until 1988 the State Board assisted the USEPA in administering the multibillion dollar Clean Water Grants Program in California to finance the construction of municipal wastewater treatment facilities. This program ended in 1988. The Clean Water Act provides for the creation of a State Revolving Fund (SRF) Loan Program capitalized in part by federal funds. The Clean Water Act authorizes loan funding for construction of Publicly Owned Treatment Works (POTWs), for implementation of a nonpoint source pollution control management program, and for the development and implementation of an estuary conservation and management program. The State Board converted the Clean Water Grant Program to a Grants and Loans program on October 1, 1988, and ultimately replaced this completely with the State Revolving Fund Loan Program on June 30, 1989.

ONSITE WASTEWATER TREATMENT SYSTEMS

Some areas in the Region rely on onsite wastewater treatment systems (OWTS) for subsurface disposal of domestic sewage. OWTS are used to treat domestic wastewater from residences and commercial and industrial establishments that are not connected to community sewer systems or municipal wastewater treatment plants. Although, OWTS typically serve individual residences, larger systems are suitable for commercial facilities or communities. When properly designed, sited, operated, and maintained, OWTS treat domestic wastewater to reduce its polluting impacts on the environment and to protect public health. The most common type of OWTS is the septic tank-leach field disposal system. Seepage pits are sometimes used when site conditions are not suitable for leachfields.

The purpose of a septic tank system is to treat household wastes so that the treated effluent will readily percolate into the soil for final treatment. Treatment of the waste is initially achieved by the removal of solids through settling and decomposition of some of the soluble organic chemicals in the tank portion of the system. Further treatment of organic chemicals, nutrients, and bacteria occurs as the effluent released from the tank percolates through the soil. Proper construction of septic systems is imperative. Poorly designed and constructed septic systems will not function properly and can result in pollution of surface or ground waters. Septic tank systems used in undersized lots or unsuitable soils are subject to failure, and can lead to untreated or poorly treated sewage surfacing into yards, roadside ditches, and surface waters, or seeping into ground water, thus creating a public nuisance and health hazard. Even well-functioning septic systems can pollute ground water under adverse conditions.

Conventional septic tank-leach field or seepage pit systems may be infeasible in some sites due to unfavorable site-specific soil or ground water conditions, such as, shallow soils, high ground water elevation, steep slopes, rocky soils, etc. In such instances, advanced or alternative OWTS may be appropriate. Examples of advanced or

alternative OWTS include mound systems, evapotranspiration systems, evapotranspiration/infiltration systems, small in-house package treatment facilities, media filters, aerobic treatment units, disinfection units, and other innovative approaches.

Advanced or alternative OWTS provide additional removal of pollutants such as pathogens, organics, suspended solids, oil and grease, and nitrogen found in wastewater. Several of these treatment systems have been certified by the National Science Foundation as being able to achieve federal treatment standards for removal of biodegradable organics and total suspended solids. Some have also been certified to achieve at least a fifty percent removal rate for nitrogen. Subsurface drip dispersal systems are often used for dispersal of effluent from advanced or alternative OWTS. Subsurface drip dispersal systems are a pressure-dosed method of effluent dispersal capable of delivering small, precise volumes of wastewater effluent to the soil. The drip lines are normally flexible polyethylene tubes that are about one-half inch in diameter. The drip lines are typically installed in shallow trenches about 2 feet apart and buried 6-12 inches beneath the soil. Because of the unique construction of subsurface drip dispersal systems, they may cause less site disruption during installation, and are adaptable to irregularly shaped lots, or lots with other difficult site constraints. Subsurface drip dispersal systems apply wastewater at the root zone of the soil, which allows for maximum uptake of nutrients in the treated wastewater by vegetation in the disposal area.

Nitrogen compounds, which are typically present in treated effluent from septic systems, are highly soluble and stable in aqueous environments. When not denitrified by bacteria or assimilated into organic growth in the unsaturated zone, these nitrogen compounds are easily transported to ground water. Although there is controversy about the possible health effects of nitrate on adults, it has been shown that high levels of nitrate cause methemoglobinemia (blue-baby syndrome) in infants. Both the federal drinking water standard of 10 mg/l nitrogen (or nitrate + nitrite) and the equivalent state drinking water standard of 45 mg/l nitrate (expressed as NO_3) is based on this relationship.

Management Principles for OWTS

The following management principles are designed to ensure that the goals of the Basin Plan are implemented.

- OWTS must be designed, constructed, and installed so as to be capable of preventing pollution or contamination of the waters of the State or creating nuisance for the duration of the development.

- OWTS must be operated, maintained and monitored so as to continually prevent pollution or contamination of the waters of the State and the creation of a nuisance.

- The responsibility for both of the above must be clearly and legally assumed by an entity with the financial and legal capability to assure that the system provides protection to the quality of the waters of the State for the duration of the development.

Guidelines for New or Replacement OWTS

The purpose of the guidelines below is to provide guidance to proponents of projects involving new discharges of waste from community or individual OWTS. However, the Regional Board may exercise discretion and approve exceptions to these guidelines if it is demonstrated that conformance with the above principles will be achieved. The Regional Board recognizes that there are certain actions which are best undertaken by local agencies to minimize the potential water quality problems resulting from new OWTS. The guidelines are based on the assumption that it is desirable that local agencies:

- Prohibit the use of new community and individual OWTS where existing community sewerage collection systems are reasonably available. The determination of whether or not existing systems are reasonably available should be the responsibility of the local agency or agencies having jurisdiction over the project.

- Prohibit the use of new individual OWTS for any subdivision of land unless the governing body having jurisdiction determines that the use of individual disposal systems will be in the best public interest.

- Assure that individual OWTS are maintained to the satisfaction of the responsible health officer. This could be accomplished through establishment of special maintenance districts, by the amendment of existing ordinances to assure adequate maintenance documented through periodic inspections, or other alternatives as deemed appropriate by the local health officer.

- Consider the cumulative impacts of individual OWTS discharges as a part of the approval process for development.

Community Sewerage Systems

The Regional Board will regulate all discharges of wastes from community sewerage systems. The Regional Board will require a RWD to be filed for all proposed waste discharges which involve the use of new community sewerage systems.

The RWD must include the following:

- A final Environmental Impact Report or Negative Declaration covering the total project, unless categorically exempt, prepared and approved by the local lead agency pursuant to the California Environmental Quality Act (CEQA) of 1970 (as amended) and Chapter 3, Division 6, Title 14, of the CCR (as amended). In the approval process the Environmental Impact Report or Negative Declaration must be circulated through the State Clearinghouse; and

- Operation, maintenance, revenue and contingency plans for the wastewater treatment and disposal facilities or a commitment by the project proponent to prepare such plans and submit them to the Regional Board at least 60-days prior to the initiation of discharge.

The Regional Board strongly prefers that a public entity assume legal authority and responsibility for the ownership, operation, and maintenance of the proposed wastewater treatment and disposal system. This is because public entities provide permanency, expertise, and financial solvency.

In the absence of a satisfactory RWD, the discharge will be prohibited.

State OWTS Policy

The purpose of the State Water Quality Control Policy for Siting, Design, and Maintenance of Onsite Wastewater Treatment Systems[7] (OWTS Policy) is to allow the continued use of OWTS, while protecting water quality and public health. The State Board adopted the OWTS Policy on June 19, 2012. The OWTS Policy recognizes that responsible local agencies can provide the most effective means to routinely manage OWTS. Therefore, it is the intent of the OWTS Policy to efficiently utilize and improve upon where necessary existing local programs through coordination between the State and local agencies. For this purpose, the OWTS Policy establishes a statewide, risk-based, tiered approach for the regulation and management of OWTS installations and replacements, and establishes the level of performance and protection expected from OWTS.

Waiver of Waste Discharge Requirements for Qualifying OWTS

The OWTS Policy also waives the Water Code requirement that dischargers obtain Waste Discharge Requirements (WDRs) for OWTS that meet requirements specified in the OWTS Policy.

The Policy organizes OWTS into five separate implementation tiers (as outlined below). An OWTS that meets the criteria of one of the five tiers is eligible for the conditional waiver of WDRs, with regulation of the qualifying OWTS deferred to the approved local agency. In addition, to qualify for the waiver, owners of OWTS must comply with conditions specified in Section 12.0 of the OWTS Policy.

[7] The OWTS Policy can be found at http://www.waterboards.ca.gov/

Tier 0

This tier applies to existing OWTS that are functioning as designed without surfacing effluent, and not located near surface water bodies known to be impaired for nitrogen or pathogens. These OWTS are automatically included in Tier 0, provided they meet requirements specified in Section 6.0 of the OWTS Policy. No action is required on the part of the owner, except maintaining the OWTS in good operating condition. An OWTS must have a projected flow of 10,000 gallons per day (gpd) or less to be included in Tier 0 of the OWTS Policy.

Tier 1

This tier applies to new and replacement OWTS that meet the siting and design criteria specified in Sections 7.0 and 8.0 of the OWTS Policy. An OWTS must have a projected flow of 3,500 gpd or less to be included in Tier 1.

Tier 2

This tier applies to new and replacement OWTS operating under an approved Local Agency Management Plan (LAMP). LAMPs allow local agencies to establish jurisdiction specific requirements and alternative design and siting criteria that may differ from those specified in the Tier 1 section of the OWTS Policy, and manage the installation of new and replacement OWTS under the LAMP. The alternative criteria can include local modifications of: system design requirements, siting controls such as system density and setback requirements, additional monitoring and maintenance requirements, design criteria for use of alternative or advanced OWTS, etc. Local agencies must consider the factors listed in Section 9.1 of the Policy in developing their LAMPs. OWTS meeting the requirements of a LAMP need not be regulated under WDRs issued by the Regional Board.

The OWTS Policy identifies the Regional Board designated to review and approve LAMPs for each County in the State, and requires the designated Regional Board to coordinate with other Regional Boards that have overlapping jurisdiction within the County[8]. San Diego County falls within the jurisdiction of both the San Diego Regional Board (Region 9) and the Colorado River Basin Regional Water Board (Region 7). The OWTS Policy designates the San Diego Regional Board as being responsible for review and approval of the LAMP for San Diego County. Riverside County falls within the jurisdiction of the San Diego (Region 9), Colorado River Basin (Region 7), and Santa Ana (Region 8) Regional Boards, while Orange County falls within the jurisdiction of the San Diego and Santa Ana Regional Boards. The OWTS Policy designates the Colorado River Basin and the Santa Ana Regional Boards as the lead Regional Water Boards responsible for review and approval of the LAMPs for Riverside and Orange Counties, respectively.

The San Diego Water Board authorizes the Executive Officer to review and administratively approve future modifications to the San Diego Department of Environmental Health (DEH) LAMP or decide to schedule an agenda item for further consideration of the San Diego DEH LAMP by the San Diego Water Board.

Tier 3

This tier applies to existing, new, and replacement OWTS located within 600 feet of surface water bodies identified as impaired for nitrogen or pathogens due to possible contributions from OWTS discharges. The specific impaired water bodies are identified in Attachment 2 of the OWTS Policy. New or replacement OWTS near impaired water bodies must comply with any applicable TMDL or special provisions identified in a LAMP. New or replacement OWTS not located within 600 feet of water bodies listed in the OWTS Policy must meet the standards for supplemental treatment and other requirements specified in Tier 3. The OWTS Policy does not identify any qualifying impaired water bodies in the San Diego Region.

[8] See Attachment 3 of the OWTS Policy.

Tier 4

This tier applies to any OWTS that require corrective action. OWTS included under Tier 4 are failing systems with:

- Surfacing effluent, failing septic tank systems or structural failure of septic tank leading to infiltrating ground water or exfiltrating wastewater; and

- Any OWTS that has affected or affects surface or ground water to a degree that creates a condition of pollution, makes surface or ground water unfit for drinking or other beneficial uses, or creates a condition of public nuisance.

These OWTS are required to be replaced or repaired to bring them under compliance with the OWTS Policy in a timely manner.

Report of Waste Discharge Submission for OWTS not Meeting Waiver Conditions

The Regional Board will review specific proposals for OWTS that do not meet waiver conditions specified in the OWTS Policy or conditions specified in the applicable LAMP at the request of the appropriate local agency. For such proposals, a RWD must be filed with the Regional Board and WDRs must be obtained or waived by the Regional Board prior to recordation of the final map and/or issuance of a building permit. Before the Regional Board considers the RWD to be complete, the following technical information must be submitted:

- A hydrogeologic study which will, using accepted ground water hydrologic techniques and practices, assess the probable rise in the water table associated with the project, including effects of OWTS recharge, landscape irrigation, and ground water pumpage. The study will additionally address the impact of the projected water table rise or fall on the operation of new and existing septic systems.

- A nitrate study which will, using an acceptable mass balance method, demonstrate that the proposed project will not cause the concentrations of wastewater constituents in ground water to exceed applicable ground water quality objectives, particularly for nitrate. The study must also show that the project will not cause wastewater constituents in interconnected surface water to exceed applicable surface water quality objectives, particularly for total nitrogen.

In addition to the technical information submitted, the following conditions must be met:

- In most instances a public entity must assume legal authority and responsibility for the operation and maintenance of the proposed individual wastewater treatment and disposal systems;

- In some instances, such as commercial/industrial establishments, or projects involving only a single homesite, or special extenuating circumstances, the public entity condition may be set aside;

- A final Environmental Impact Report or Negative Declaration must be included covering the total project, unless categorically exempt, prepared and approved by the local lead agency pursuant to the California Environmental Quality Act of 1970 (as amended) and Chapter 3, Division 6, Title 14, of the California Administrative Code (as amended). In the approval process the Environmental Impact Report or Negative Declaration must be circulated through the State Clearinghouse;

- Operation, maintenance, revenue, and contingency plans must be submitted for the wastewater treatment and disposal facilities or a commitment must be made by the public entity to prepare such plans and submit them to the Regional Board at least 60-days prior to the initiation of discharge; and

- In the absence of a satisfactory Report of Waste Discharge, the discharge will be prohibited without prejudice.

WATER RECLAMATION AND REUSE

Water reclamation is a process consisting of the following elements:

- Treatment of wastewater to a level of quality suitable for reuse;
- Transportation of reclaimed water to reuse areas; and
- Application of reclaimed water to an actual use.

Reclaimed water use typically falls into the following seven broad categories:

- Agricultural irrigation;
- Landscape irrigation (including highway landscape and golf courses);
- Impoundments for landscape, recreational or wildlife uses, wetland and wildlife enhancement;
- Industrial and Construction processes (e.g., cooling water, process water, washdown water or for dust control);
- Ground water recharge;
- Flushing of toilet and urinals in non-residential buildings; and
- Stream enhancement.

The State of California has a strong interest in promoting the conservation and efficient use of water through water reclamation. The California Constitution, Article X, section 2 provides that:

> "...Water resources of the state be put to beneficial use to the fullest extent of which they are capable, and that waste or unreasonable use of water be prevented, and that conservation of such waters is to be exercised with a view to the reasonable and beneficial use thereof in the interest of the people and for the public welfare..."

The State interest in the conservation and efficient use of its waters is further emphasized by Water Code section 13510 which deals specifically with water reclamation. Section 13510 provides that:

> "It is hereby declared that the people of the state have a primary interest in the development of facilities to reclaim water containing waste to supplement existing surface water and underground water supplies and to assist in meeting the future water requirements of the state."

In addition, Water Code section 13241 provides that the Regional Board consider the need to develop and use reclaimed water when establishing water quality objectives.

The State Board adopted the "*Policy with Respect to Water Reclamation In California*" and the related "*Action Plan for Water Reclamation in California*" in 1977 (State Board Resolution No. 77-1). The policy directs the State Board and Regional Boards to encourage reclamation and reuse of water, and to promote water reclamation projects which preserve, restore, or enhance instream beneficial uses. The policy also states that the State and Regional Boards recognize the need to protect public health and the environment in the implementation of reclamation projects.

The Porter-Cologne Water Quality Control Act also requires the State Board DDW to establish statewide reclamation criteria (see Table 4-4) for each type of reclaimed water use to protect public health. Any person proposing to discharge reclaimed water must file a report of waste discharge containing appropriate information related to the discharge with the Regional Board. The Regional Board, after consultation with State Board DDW, may adopt waste discharge requirements for the reclaimed water discharge.

Table 4 - 4. Permitted Uses and California Title 22 Health Requirements for Reclaimed Water.

Permitted Use of Reclaimed Water	Summary of Title 22 (sections 60303 et. seq.) Health Requirements
Spray irrigation of food crops	Reclaimed water used for spray irrigation of food crops shall be at all times adequately disinfected, oxidized, coagulated, clarified, filtered wastewater. The wastewater shall be considered adequately disinfected if at some location in the treatment process, the median number of coliform organisms does not exceed 23 per 100 milliliters (ml) in more than one sample within any 30-day period. The median value shall be determined from the bacteriological results of the last 7 days for which analyses have been completed.
Surface irrigation of food crops	Reclaimed water used for surface irrigation of food crops shall be at all times an adequately disinfected, oxidized wastewater. The wastewater shall be considered adequately disinfected if at some location in the treatment process, the median number of coliform organisms does not exceed 2.2 per 100 ml as determined from the bacteriological results of the last 7-days for which analyses have been completed. Orchards and vineyards may be surface irrigated with reclaimed water that has the quality at least equivalent to that of primary effluent provided that no fruit is harvested that has come in contact with the irrigating water or the ground. Exceptions to the quality requirements for reclaimed water used for irrigation of food crops may be considered by the State Department of Health on an individual basis where the reclaimed water is to be used to irrigate a food crop which must undergo extensive commercial, physical or chemical processing sufficient to destroy pathogenic agents before it is suitable for human consumption.
Irrigation of fodder, fiber and seed crops	Reclaimed water used for the surface or spray irrigation of fodder, fiber, and seed crops shall have a level of quality no less than that of primary effluent.
Irrigation of pasture for milking animals	Reclaimed water used for the irrigation of pasture to which milking cows or goats have access shall be at all times an adequately disinfected, oxidized wastewater. The wastewater shall be considered adequately disinfected if at some location in the treatment process the median number of coliform organisms does not exceed 23 per 100 ml, as determined from the bacteriological results of the last 7-days for which analyses have been completed.
Landscape irrigation of golf courses, cemeteries, freeway landscapes and similar areas	Reclaimed water used for the irrigation of golf courses, cemeteries, freeway landscapes, and landscapes in other areas where the public has similar access or exposure shall be at all times adequately disinfected oxidized wastewater. The wastewater shall be considered adequately disinfected if the median number of coliform organisms in the effluent does not exceed 23 per 100 ml as determined from the bacteriological results of the last 7-days for which analyses have been completed, and the number of coliform organisms does not exceed 240 per 100 ml in any two consecutive samples.
Permitted Use of Reclaimed Water	Summary of Title 22 (sections 60303 et. seq.) Health Requirements

Table 4 - 4 (continued). Permitted Uses and California Title 22 Health Requirements for Reclaimed Water.

Permitted Use of Reclaimed Water	Summary of Title 22 (sections 60303 et. seq.) Health Requirements
Irrigation of parks, playgrounds, schoolyards and similar areas	Reclaimed water used for irrigation of parks, playgrounds, schoolyards, and other areas where the public has similar access or exposure shall be at all times adequately disinfected, oxidized, coagulated, clarified, filtered wastewater or a wastewater treated by sequence of unit processes that will assure an equivalent degree of treatment and reliability. The wastewater shall be considered adequately disinfected if the median number of coliform organisms in the effluent does not exceed 2.2 per 100 ml, as determined from the bacteriological results of the last 7-days for which analyses have been completed.
Nonrestricted recreational impoundment (no limitations are imposed on body-contact sport activities)	Reclaimed water used as a source of supply in a nonrestricted recreational impoundment shall be at all times adequately disinfected, oxidized, coagulated, clarified, filtered wastewater. The wastewater shall be considered adequately disinfected if at some location in the treatment process, the median number of coliform organisms in the effluent does not exceed 23 per 100 ml in more than one sample within any 30 day period. The median value shall be determined from the bacteriological results of the last 7-days for which analyses have been completed.
Restricted recreation impoundment (recreation is limited to fishing, boating, and other non-body-contact water recreation activities)	Reclaimed water used as a source of supply in a restricted recreational impoundment shall be at all times an adequately disinfected, oxidized wastewater. The wastewater shall be considered adequately disinfected if at some location in the treatment process the median number of coliform organisms does not exceed 23 per 100 ml, as determined from the bacteriological results of the last 7-days for which analyses have been completed.
Landscape impoundment (aesthetic enjoyment or other function but no body-contact is allowed)	Reclaimed water used as a source of supply in a landscape impoundment shall be at all times an adequately disinfected, oxidized wastewater The wastewater shall be considered adequately disinfected if at some location in the treatment process the median number of coliform organisms does not exceed 23 per 100 ml, as determined from the bacteriological results of the last 7-days for which analyses have been completed.
Ground water recharge of domestic water supply aquifers	Recharge water requirements are made on a case-by-case basis to ensure that the water is of such quality that fully protects public health at all times. Factors considered include treatment provided, effluent quality and quantity, spreading operations, soil characteristics, hydrogeology, residence time, receiving water quality and distance to withdrawal.
Other uses (toilet flush, industrial cooling water, process water, seawater intrusion barrier)	User must demonstrate that methods of treatment and reliability features will assure an equal degree of treatment and reliability.

When reviewing potential reclamation projects, the Regional Board must also consider potential impacts from reclamation on ground and surface water quality. It is common for the use of reclaimed water to cause an increase in total dissolved solids concentration in the receiving ground waters due to the effects of evapotranspiration. A variety of techniques can be employed to protect the beneficial uses of the receiving waters. Where well controlled irrigation is practiced, nitrate problems in the dry season will be controlled. Vegetative uptake will utilize soluble nitrates which could otherwise migrate into ground water. Demineralization techniques or source control of total dissolved solids may be necessary in some inland areas where ground waters have been or may be degraded. Presence of excessive salts, boron, or sodium could be the basis for rejection of proposals to irrigate cropland with effluent.

WATER RECLAMATION PROJECTS IN THE SAN DIEGO REGION

The water supply in the San Diego Region is largely dependent upon water imported from northern California and the Colorado River. Future increases from these sources may be limited due to environmental concerns, contractual agreements, and over all capital costs. In light of the limited possibilities for future water sources, the need to develop water supply alternatives is important. For many water uses, reclaimed water is a viable alternative water supply.

The status of water reclamation projects in the San Diego Region during March 1993 is shown is shown in Table 4-5. For each water reclamation agency and/or facility in the San Diego Region, the table shows the permitted flow in MGD, the average effluent flow (in MGD), the average effluent flow reused (in MGD), the annual volume reused in million of gallons (MG) and acre-feet (AC-FT), the treatment process and disposal method, the type of use for the reclaimed water, the reclaimed water user and the status of the project. In the San Diego Region, a total of about 175 MGD of reclaimed water flow is permitted. About 16 MGD is reused from an average effluent flow of about 79 MGD. The annual volume reused is about 5,859 MG (18,597 AC-FT).

REGIONAL BOARD ACTION PLAN ON WATER RECLAMATION

The Regional Board supports water reclamation and reuse to the maximum extent feasible to help meet the growing water needs of the Region. It has long been a policy of the Regional Board to encourage and promote water reclamation while taking into consideration the need to protect beneficial uses of surface and ground waters and protect the public health.

On March 24, 1986 the Regional Board adopted Resolution No. 86-06 which amended the Basin Plan to include an action plan for water reclamation. The policy described below updates and supersedes Resolution No. 86-06:

(1) The Regional Board will consider special amendments to the Basin Plan to encourage water reclamation.

(2) The Regional Board will consider comprehensive water quality monitoring programs for confirmation of original hydrogeological predictions, and an accurate measure of adverse ground water quality effects. These monitoring programs will be considered where water reclamation is not expected to result in adverse ground water quality impacts, and where ground water quality impacts are very difficult to predict.

(3) The Regional Board will consider projects involving stream and lagoon replenishment with reclaimed water where, as a minimum, a water quality management plan would be implemented and conformance with the State Board DDW wastewater reclamation criteria for nonrestricted recreational use would be achieved.

(4) The Regional Board will encourage use of ephemeral streams that are not used for domestic water supply, for the conveyance of reclaimed water for beneficial uses during periods of need.

Table 4-5. Water Reclamation Projects as of March 1993.

Name of Agency/ Facility	Hydro-logic Unit	Permit Flow MGD	Average Effluent Flow MGD	Average Effluent Flow Reused MGD	Annual Volume Reused MG	Annual Volume Reused AC-FT	Treatment Process and Disposal	Type of Use	Reclaimed Water User	Status
ORANGE COUNTY										
Joplin Youth Center	1.20	0.0075	0.0067	0.0067	2.45	7.50	AS, PB	Landscape Irrigation, Ground Water Recharge		Operating
San Clemente, City of San Clemente WRP	1.20 1.30	7.00	3.996	0.610	222.65	683.28	AS, PB, CH, SF, OF	Golf Course Irrigation, Construction	Municipal GC, Arvida Co, Talega, Pacific GC	Operating
SOUTH ORANGE COUNTY RECLAMATION AUTHORITY SERVICE AREA										
El Toro WD	1.13	5.50	0.000	0.000	0.00	0.00	AS, OF	Landscape Irrigation		Proposed
Los Alisos WD	1.13	5.50	0.000	0.000	0.00	0.00	AS, OF	Landscape Irrigation		Proposed
Moulton Niguel WD Plant 3A STP	1.20	2.40	0.484	0.484	176.66	542.15	AS, CH	Golf Course & Landscape Irrigation	Mission Viejo Country Club	Operating
Laguna Niguel (AWMA/MNWD) Joint Regional WRF	1.13 1.14	12.00	5.191	0.278	100.67	308.93	AS, F, CL, OF	Landscape Irrigation	El Niguel Country Club	Operating
Santa Margarita WD Oso Creek STP	1.13 1.20	3.00	1.693	1.693	617.95	1896.39	AT, F, CH, Of	Landscape Irrigation	Oso Valley Asn. CALTRANS	Operating
Nichols Institute	1.20	0.04	0.032	0.025	9.13	28.00		Property landscaping	Nichols Inst.	Operating
Chiquita WRF	1.20 1.30	3.50	2.103	0.016	5.92	18.18	CH,F	Nursery, Construction, Dust Control	SeaTree Nursery Los Flores Dev. Desecha Landfill	Operating
South Coast County WD	1.12 1.13 1.14	2.61	0.738	0.738	269.19	826.10	AS, F, CH, OF	Irrigation of parks, greenbelt, golf course	AVCO Community De Ben Brown GC Orange County Parks	Operating
Trabuco Canyon WD Trabuco WRP	1.13 1.20	0.25	0.459	0.561	204.77	628.40	OD, F, CH, PB	Golf Course Irrigation	Dove Canyon GC	Operating
RIVERSIDE COUNTY										
Eastern Municipal WD Rancho Calif. STP	2.51	5.00	4.800	1.210	441.65	1355.4	AS, PB	Irrigation Sod Farm	Ralph Daily Sod Farm	Operating
Rancho California WD Joaquin Ranch STP	2.31	0.60	0.575	0.376	137.24	421.2	OD, F, CH, PB	Golf Course Irrigation	Bear Creek Golf Course	Operating
Santa Rosa SBR WRF	2.51	1.00	0.345	0.345	125.93	386.4	F, CH	Ground Water Recharge		Operating

TREATMENT PROCESS: AQ=aquaculture, AS=activated sludge, CH=chlorination, EA=extended aeration, F=filtration, MS=microscreen, OD=oxidation ditch, OF=ocean outfall, OP=oxidation pond, PB=percolation pond or bed, PS=primary sedimentation, RBC=rotating biological contactor, RO=reverse osmosis, TF=trickling filter

Table 4-5 (continued). Water Reclamation Projects as of March 1993.

Name of Agency/ Facility	Hydro-logic Unit	Permit Flow MGD	Average Effluent Flow MGD	Reused MGD	Annual Volume Reused MG	AC-FT	Treatment Process and Disposal	Type of Use	Reclaimed Water User	Status
SAN DIEGO COUNTY										
Buena Sanitation Dist. Shadow Ridge WRP	4.32	1.10	0.809	0.062	22.63	69.4	MS, RBC, F, RO, CH, OF	Irrigation	Shadow Ridge Golf Course	Operating
Encina	4.40	22.50	19.000	0.001	0.37	1.1	AS, CH, OP	Landscape Irrigation	Caltrans	Operating
Escondido WRP	4.52 5.21	5.00	0.003	0.003	1.10	3.4	AS, CH	Internal Use, Landscape Irrigation, Golf Course	Escondido San Marcos	Operating
Fairbanks Ranch WRP	5.12	0.28	0.180	0.180	65.70	201.6	EA, PB	Ground Water Recharge		Operating
Fallbrook WD Plants 1 & 2	2.13	3.10	1.720	0.160	58.40	179.2	PS, EA, CH, OF	Landscape Irrigation (I-5 Freeway)	Caltrans Nurseries	Operating
4-S Ranch 4-S Ranch WRP	9.31	0.60	0.062	0.038	13.69	42.0	CH	Compaction Irrigation	Construction Pasture	Operating
Leucadia Water Dist. F.R. Gafner WRF	4.51	0.75	0.000	0.000	0.00	0.0	TF, PS, CH, OF	Aviara and La Costa Country Club Irrigation	La Costa & Aviara Country Clubs	Operating
Oceanside, City of N. San Luis Rey STP	3.12	10.50	8.700	0.020	7.30	22.4	AS, CL, OF, PB	Golf Course Irrigation, Ground Water Recharge	Oceanside Golf Course	Operating
La Salina	4.10	0.50	0.000	0.000	0.00	0.00	EA, AS, CH	Landscape Irrigation	Oceanside	Operating
Otay Municipal WD Ralph W Chapman WRF	9.21	1.30	0.900	0.900	328.50	1008.1	EA, F, RO, CH, OF	Landscape Irrigation	Eastlake Development	Operating
Otay Estates Hidden Valley Estates	9.11	0.15	0.000	0.000	0.00	0.0	AS, CH	Landscape Irrigation		Operating
Padre Dam Municipal WD Water Reclamation Pl	7.12	1.00	0.521	0.521	190.17	583.6	AS, PS, OP, CH, OF	Recreational Lakes & Park Irrigation	Santee Lakes	Operating
Pauma Valley	4.63	0.00	0.000	0.000	0.00	0.0	EA, CH	Ground Water Recharge		Proposed
Ramona Municipal WD Santa Maria WWTP	5.41	1.00	0.600	0.600	219.00	672.1	EA, PB	Irrigation, Pasture Ground Water Recharge	Ramona WD site	Operating
San Vicente STP	7.23	0.60	0.541	0.541	197.47	606.0	OD, CH, F, RO, PB	Avocado Grove Irrig. Ground Water Recharge	Solk Ranch	Operating
Rancho Santa Fe	4.61	0.45	0.220	0.220	80.30	246.4	AS, EA, CH, PB	Golf Course Irrigation	Rancho Santa Fe Golf Course	Operating
San Diego, County of Descanso STP	9.31	0.04	0.026	0.026	9.56	29.3	AS, PB	Landscape Irrigation	Descanso Facil.	Operating
Julian	7.43	0.04	0.035	0.035	12.78	39.20	OP	Irrigation (cattle feed)		Operating
Mount Woodson SD	5.11	0.08	0.000	0.000	0.00	0.0	CH	Irrigation	Golf Course	Operating
Rancho Cielo SD	5.11	0.20	0.000	0.000	0.00	0.0		Landscape Irrigation		Operating
Whispering Palms CSD	5.11	0.40	0.175	0.175	63.88	196.0	EA, CH, PB	Ground Water Recharge	Del Rayo Prop.	Operating
San Diego, City of Water Utilities Dept San Pasqual WAP STP	5.31	1.00	0.0190	0.0190	6.94	21.3	AS, CH, PB	Irrigation & Animal Stock Watering	Wild Animal Park	Operating

TREATMENT PROCESS: AQ=aquaculture, AS=activated sludge, CH=chlorination, EA=extended aeration, F=filtration, MS=microscreen, OD=oxidation ditch, OF=ocean outfall, OP=oxidation pond, PB=percolation pond or bed, PS=primary sedimentation, RBC=rotating biological contactor, RO=reverse osmosis, TF=trickling filter

Table 4-5 (continued). Water Reclamation Projects as of March 1993.

Name of Agency/ Facility	Hydro-logic Unit	Permit Flow MGD	Average Effluent Flow MGD	Reused MGD	Annual Volume Reused MG	AC-FT	Treatment Process and Disposal	Type of Use	Reclaimed Water User	Status
SAN DIEGO COUNTY CONTINUED										
Mission Valley Pilot Aquaculture Project	7.11	1.00	0.026	0.025	9.13	28.0	AQ, QF	Freeway Landscaping (I-15 & I-8)	Caltrans	Operating
North City	6.10	30.00	0.000	0.000	0.00	0.0		Landscape Irrigation	Caltrans	Operating
San Elijo JPA	4.51	3.68	0.000	0.000	0.00	0.0	CH, AS	Landscape Irrigation	Encinitas, Del Mar	Operating
US Marine Corps Base, Camp Pendleton Plant No. 1	2.13	1.50	0.429	0.687	247.54	759.7	TF, CH, PB	Ground Water Recharge	Camp Pendleton	Operating
Plant No. 2	2.11	0.92	0.309	0.694	253.13	776.8	TF, CH, PB	Golf Course Irrigation	Camp Pendleton	Operating
Plant No. 3	2.12	1.10	0.492	0.753	274.66	842.9	TF, CH, PB	Ground Water Recharge	Camp Pendleton	Operating
Plant No. 8	1.51	0.59	0.074	0.296	107.86	331.0	TF, CH, PB	Ground Water Recharge	Camp Pendleton	Operating
Plant No. 9	1.52	1.10	0.142	0.357	130.34	400.0	TF, CH, PB	Ground Water Recharge	Camp Pendleton	Operating
Plant No. 10	1.51	0.85	0.325	0.378	138.08	423.7	TF, CH, PB	Ground Water Recharge	Camp Pendleton	Operating
Plant No. 11	1.51	0.85	0.836	1.088	397.01	1218.4	TF, CH, PB	Ground Water Recharge	Camp Pendleton	Operating
Plant No.12	1.40	0.85	0.142	0.420	153.37	470.7	TF, CH, PB	Ground Water Recharge	Camp Pendleton	Operating
Plant No. 13	2.11	2.50	1.397	1.225	447.16	1372.3	TF, CH, PB	Ground Water Recharge	Camp Pendleton	Operating
Plant No. 16	1.53	0.03	0.008	0.008	2.74	8.4	EA, PB	Ground Water Recharge	Camp Pendleton	Operating
Vallecitos WD Meadowlark WRP	4.51	2.00	0.995	0.525	191.63	588.1	MS, RBC, F, CH, OF	Golf Course Irrigation	La Costa GC Carlsbad City	Operating
Valley Center MWD Lower Moosa Canyon WRP	3.13	0.50	0.250	0.250	91.25	280.0	AS, CH, PB	Golf Course Irrigation Ground Water Recharge	Circle R GC Valley Center MWD	Operating

TREATMENT PROCESS: AQ=aquaculture, AS=activated sludge, CH=chlorination, EA=extended aeration, F=filtration, MS=microscreen, OD=oxidation ditch, OF=ocean outfall, OP=oxidation pond, PB=percolation pond or bed, PS=primary sedimentation, RBC=rotating biological contactor, RO=reverse osmosis, TF=trickling filter

Summary of San Diego Region Water Reclamation Projects as of March 1993

COUNTY SUBTOTALS	PERMIT FLOW (MGD)	AVERAGE EFFLUENT FLOW GENERATED (MGD)	AVERAGE EFFLUENT FLOW REUSED (MGD)	ANNUAL VOLUME REUSED (MG)	ANNUAL VOLUME REUSED (AC-FT)
Orange	41.81	14.70	4.41	1,609.37	4,938.94
Riverside	35.20	25.532	1.997	728.91	2,236.9
San Diego	98.05	38.94	10.20	3,721.65	11,421.24
REGION TOTALS	175.06	79.171	16.603	6,059.9	18,597

(5) The Regional Board will consider the possibilities for the buyout of a beneficial use that is only minimally realized, and that if protected, would stand in the way of a water reclamation project.

(6) The Regional Board will continue efforts to seek the most recent and accurate environmental and technical information for the purpose of reviewing Basin Plan standards pertaining to the discharge of reclaimed water.

(7) The Regional Board will require all ocean and inland dischargers, having the potential to produce reclaimed water, to develop water reclamation plans.

(8) The Regional Board will encourage economic incentives for using reclaimed water, such as rebates by the San Diego County Water Authority and the Metropolitan Water District of Southern California to water suppliers engaged in water reclamation.

(9) The Regional Board will seek funding for studies to evaluate the potential of water reclamation in various areas of the Region including streams and coastal lagoons.

(10) The Regional Board will take appropriate actions, recommend legislation, and recommend actions by other planning agencies (county, federal, etc.) in the areas of (1) planning, (2) project funding, (3) regulation and enforcement, (4) research and demonstration, and (5) public involvement and information.

(11) The Regional Board will encourage and support measures which conserve the water resources of the San Diego Region.

(12) The Regional Board will encourage other agencies to assist in implementing this policy.

(13) As mitigation against potential nuisance odors and health hazards resulting from reclaimed water use, the Regional Board will continue to adopt and enforce waste discharge requirements containing prohibitions against nuisance odors and implementing the State Board DDW Wastewater Reclamation Criteria.

(14) The Regional Board will prepare Basin Plan amendments necessary for implementation of water reclamation projects in compliance with state policy for water quality control and, to the extent surface waters will be affected, with Environmental Protection Agency water quality standards regulations. Site specific environmental impacts will be evaluated in conformance with the California Environmental Quality Act (CEQA) for specific Basin Plan amendments.

FACTORING WATER SUPPLY CONSIDERATIONS INTO THE REGIONAL BOARD REGULATION OF WATER RECLAMATION PROJECTS

Conventional reclamation facilities are not designed to reduce mineral constituents. Consequently, the mineral effluent quality is dependent on the composition of the water supply plus the mineral pickup during its use. Historically, water supply TDS concentrations have varied significantly. For example, concentrations of TDS of the blended water stored in Lake Skinner ranged from below 400 milligrams per liter (mg/l) to above 700 mg/l between 1985 and 1995.

Residential wastewater discharges will typically be 250 to 300 mg/l higher in TDS than their water supply source. Self-regenerating water softeners, brine from industrial dischargers, and ground water infiltration can further increase TDS concentrations in wastewater effluent. Many wastewater management agencies within the region are implementing programs to minimize the incremental pickup of minerals from these sources. These programs have had varying degrees of success.

Effective water conservation measures that are being implemented within the region may result in higher mineral and other constituent concentrations in wastewater effluent. Although the volume of wastewater is reduced by water conservation, the mineral and organic loading from its use remains nearly constant. As a result, the strength of the wastewater influent becomes stronger. In some cases, the characteristics of the wastewater influent may range briefly above the design parameters of the treatment plant.

In recognition of the variables in wastewater quality that are beyond the control of the discharger, the Regional Board authorizes the Executive Officer to suspend formal enforcement action, when a discharger submits an initial technical report with subsequent quarterly updates, that demonstrate to the satisfaction of the Executive Officer, compliance with the following conditions:

(1) The discharge is not subject to regulation by means of a NPDES Permit; and

(2) The enforcement action is only for violations of discharge specifications for mineral constituents, total suspended solids (TSS), biological oxygen demand (BOD) or carbonaceous biological oxygen demand (CBOD); and

(3) The effluent violations are due solely to changes in the quality of the imported water supply and/or to water conservation measures being implemented within the service area tributary to the treatment plant; and

(4) The discharge does not result in a mass loading of TSS, BOD and CBOD that exceeds the loading prior to implementation of water conservation measures; and

(5) The discharge will not cause Basin Plan water quality objectives to be exceeded, in the long term; and

(6) The discharge will not cause a violation of any applicable section from Title 22 of the CCR or any requirement specified by either the State Board DDW or the appropriate county health officer for the protection of public health; and

(7) The discharge does not contain a concentration of TDS exceeding 1,500 mg/l, or the concentration in the water supply plus 500 mg/l, whichever is less, with comparable adjustments for other mineral constituents; and

(8) The discharger implements a program to identify major sources of the mineral constituents of concern in the discharge, including but not limited to water softener regeneration brine; and to determine the average contribution of each major source and the best available options for reducing levels in the discharge; and to identify any negative effects on the potential for water reclamation caused by the failure to control the constituents of concern in the discharge. The program should include a time schedule to reduce mineral constituents in the discharge as necessary to assure that the potential for water reclamation will be realized to the maximum extent practicable.

RECLAIMED WATER CONFORMANCE WITH WATER QUALITY OBJECTIVES

The Regional Board has established various policies concerning the compliance of reclaimed water discharges with applicable Basin Plan water quality objectives. These policies are described below.

DISCHARGES TO COASTAL LAGOONS FROM PILOT WATER RECLAMATION PROJECTS

The Regional Board may grant an exception to the "Biostimulatory Substances" water quality objective described in Chapter 3 to provide for discharges to coastal lagoons from pilot water reclamation projects. The project proponent must demonstrate that the pilot water reclamation project is consistent with the conditions described in the Principles of the State Water Resources Control Board's Policy and Action Plan for Water Reclamation in California. The Policy and Action Plan for Water Reclamation in California was adopted by the State Board in January 1977 and is summarized below. In addition, the proponent must demonstrate that the threat of eutrophication as a result of the addition of nitrogen and/or phosphorus is reduced as a consequence of one or more of the following factors:

- Waters of the coastal lagoon are highly laden with natural silts or colors which reduce the penetration of sunlight needed for photosynthesis;

- The coastal lagoon is characterized by morphometric features of steep banks, great depths, and substantial flows which have contributed to a history of no plant problems;

- The coastal lagoon is managed primarily for waterfowl or other wildlife;

- An identified element other than nitrogen or phosphorus is limiting to plant growth in the coastal lagoon, and the level and nature of the limiting element would not be expected to increase to an extent that would influence eutrophication; or

- Control of nitrogen and/or phosphorus in the coastal lagoon cannot be sufficiently effective under present technology to make phosphorus or nitrogen the limiting nutrient.

The Principles of the Policy and Action Plan for Water Reclamation in California provide, in part, that water reclamation projects shall be encouraged which do not adversely impact vested water rights or unreasonably impair instream beneficial uses or place an unreasonable burden on present water supply systems, and which meet the following additional conditions:

- Beneficial use will be made of wastewaters that would otherwise be discharged to marine or brackish receiving waters or evaporation ponds;

- Reclaimed water will replace or supplement the use of fresh water or better quality water; or

- Reclaimed water will be used to preserve, restore, or enhance instream beneficial uses which include, but are not limited to, fish, wildlife, recreation, and aesthetics associated with any surface water or wetlands.

Exceptions to the numerical water quality objectives will be made only when a pilot reclamation project meets the following criteria:

- Need for the reclaimed water is demonstrated;

- Alternative disposal facilities are available in the event discharge to a coastal lagoon proves unfeasible;

- Conformance with the State Board's Water Quality Control Policy for the Enclosed Bays and Estuaries of California is demonstrated;

- Data will be generated that will be useful and timely for Regional Board review of water quality objectives for nutrients; and

- The project will include a lagoon management plan addressing the proposed methods of identifying and eliminating any pollution, contamination, or nuisance problems resulting from the proposed discharge and clearly identifying management responsibilities and capabilities.

DISCHARGES TO INLAND SURFACE WATERS

Regional Board Resolutions Nos. 90-53 and 91-23 established an alternate method of conformance with the biostimulatory substances water quality objectives for portions of the San Diego River and Santa Margarita River. The Policy presented below supersedes Resolutions Nos. 90-53 and 91-23 and is applicable to all inland surface waters of the San Diego Region at a point downstream of lakes or reservoirs used for municipal water supply.

The Regional Board has developed an alternate method of showing compliance with the biostimulatory substances water quality objective contained in Chapter 3 to:

- Promote water reclamation;

- Enhance opportunities for reclaimed water discharges to inland surface waters; and

- Protect and enhance existing inland surface water beneficial uses through the greater use of reclaimed water.

The alternate method of compliance described below is applicable to reclaimed water discharges to inland surface waters at a point downstream of lakes or reservoirs used for municipal water supply. The alternate method of compliance is meant to encourage reclaimed water discharges into inland surface waters without degradation of the ambient water quality or adverse effects on beneficial uses.

Compliance Methods

The Regional Board will establish appropriate effluent limitations for nitrogen and phosphorus in waste discharge requirements for discharges of reclaimed water to surface waters using one of the following methodologies:

- The Regional Board may use the goal for phosphorus concentration in flowing water contained in the Biostimulatory Substances objective as guidance in establishing appropriate effluent limitations; or

- Alternatively, the Regional Board may determine compliance with the narrative objective based upon the following four factors:

  - ✓ Measurement of ambient concentrations of nitrogen and phosphorus;

  - ✓ The dissolved oxygen requirements of downstream beneficial uses;

  - ✓ Use of best available technology (BAT) economically feasible for the removal of nutrients; and

  - ✓ The development and implementation of a watercourse monitoring and management plan.

Best available technology for the removal of nutrients includes biological and chemical removal. The extent to which the Regional Board may require additional removal of nutrients through chemical addition processes will be based upon an evaluation of the economic feasibility of this additional treatment in concert with an evaluation of the effectiveness of the watercourse monitoring management plan.

The watercourse monitoring and management plan shall include:

- A comprehensive program for chemical monitoring in receiving waters and effluent that will generate adequate data on ammonia nitrogen, nitrate nitrogen, nitrite nitrogen, organic nitrogen, total phosphate, ortho phosphate, dissolved oxygen (including vertical and diurnal dissolved oxygen profiles), pH, turbidity, biochemical oxygen demand (BOD) and other appropriate constituents and properties which may contribute to, or result from, nutrient related problems and impact beneficial uses.

- A comprehensive program for physical and biological monitoring in the receiving waters that will generate adequate data on chlorophyll 'a', corrected chlorophyll 'a', pheophyton 'a'; temperature (including diurnal and vertical temperature profiles); acute and chronic toxicity; the diversity and numbers of microinvertebrates, macroinvertebrates, and fish; the dynamics of the aquatic flora (macroalgae, phytoplankton, and emergent vegetation) and the related dissolved oxygen regime; substrate composition; frequency of nuisance conditions; flow rate; and other appropriate constituents and properties which may contribute to nutrient related problems and impact beneficial uses.

- A comprehensive program for physical and biological monitoring of the effluent that will generate adequate data on flow, temperature, chronic and acute toxicity, and other appropriate constituents which may contribute to nutrient related problems and impact beneficial uses.

- A procedure for evaluating the data collected under items (1), (2), and (3) above and determining the potential for nutrient related problems that may impact beneficial uses.

- Development and implementation of preventive and corrective actions that will ensure that a discharge containing nutrients will not adversely impact beneficial uses. These preventative and corrective actions may include, but are not limited to, the following:

  - ✓ Achievement of more stringent effluent limits for nutrient constituents discharged to the watercourse, through additional chemical treatment methods at the treatment facility, to further reduce nutrient loading to the river;

  - ✓ Maintenance of minimum reclaimed water flows discharged to the watercourse to prevent stagnant areas subject to nutrient related problems and to maintain the aquatic and riparian habitat beneficial uses that have been enhanced and/or created by such a discharge;

  - ✓ Effective measures for the instream chemical treatment of surface waters to prevent nutrient and stagnant water related nuisance problems that can adversely impact aquatic habitat beneficial uses, where this instream treatment will not adversely impact beneficial uses;

  - ✓ Effective measures for the physical management of the watercourse channel and vegetation;

  - ✓ Effective source control measures to reduce the amount of nutrient constituents in the reclaimed water; and

  - ✓ Other measures deemed appropriate and necessary by the Regional Board to ensure compliance with the Basin Plan narrative objective for nutrients and for the protection of beneficial uses.

Additional Mitigation

As mitigation against adverse impacts of nuisance odors and health hazards resulting from use of reclaimed water, the Regional Board will continue to adopt and enforce waste discharge requirements containing prohibitions against creation of nuisance odors and implementing the State Board DDW Water Reclamation Criteria.

Additionally, as mitigation measures against degradation of ground and surface water quality resulting from an inland reclaimed water discharge, the Regional Board will require well head treatment or treatment at the point of use, or other appropriate measures acceptable to the Board, adequate to maintain the existing quality of ground and surface waters and the beneficial uses for all ground and surface waters adversely impacted by a discharge. The Regional Board will require monitoring of all ground water wells and legal direct diversions of surface water prior to permitting a discharge in order to establish the baseline quality that must be maintained.

As mitigation against any adverse effects to instream or downstream surface or ground water quality and the environment resulting from the discharge of reclaimed water, the Regional Board will require the discharger to establish and implement a comprehensive river monitoring and management program. The implementation of the watercourse monitoring and management plan will often require close coordination between many different public and private entities. The Regional Board shall recognize an agency to implement the watercourse monitoring and management plan and such recognition shall be made part of the provisions of appropriate waste discharge requirements for the discharge.

The watercourse monitoring and management plan, and all the associated requirements, shall apply to all downstream waters, including rivers, lagoons, estuaries, and bays, which may be impacted by the reclaimed water discharge. The Regional Board will regulate the volume of reclaimed water discharged into all inland surface waters to those levels which do not significantly and adversely alter the salinity regimes of downstream lagoons, estuaries, or bays. This regulation of flows will include a prohibition of fresh water flows that could result in the conversion of a lagoon, estuary, or bay from a saline environment to a fresh water environment. Salt marsh habitats are to be considered an integral part of the lagoon, estuary, or bay to which they are associated, and therefore shall be fully protected from conversion.

Implementation of Ground Water Quality Objectives for Reclaimed Water Discharges

In order to facilitate water reclamation in the Region, the Regional Board, adopted Resolution No. 90-61 on November 5, 1990. Resolution No. 90-61 established a methodology for determining reclaimed water effluent limits. The policy described below updates and supersedes Resolution No. 90 61.

The Regional Board shall regulate discharges of reclaimed water by establishing effluent limitations designed to protect beneficial uses and ensure compliance with State Board Resolution No. 68-16. Use of adequately treated reclaimed water for irrigation or ground water recharge shall be encouraged in basins where reuse is clearly beneficial. Regulation of discharges of reclaimed water, where the reclaimed water displaces the use of imported water, or ground water having a quality exceeding the ground water quality objective, shall be in the following manner:

- For discharges upgradient of municipal water supply reservoirs the Regional Board shall adopt numerical effluent limitations for constituents at levels no lower than the quality of the basin's water supply but no higher than the Basin Plan ground water quality objective.

- In ground water basins not upgradient of municipal water supply reservoirs the Regional Board shall adopt numerical effluent limitations for constituents at levels no lower than the quality of the basin's water supply concentration plus an incremental increase equal to the typical incremental increase added to the water supply as a result of domestic use. The effluent limitations shall be no higher than the Basin Plan ground water quality objective.

- For discharges where the discharger has demonstrated sufficient assimilative capacity exists and ground water quality objectives will not be exceeded, the Regional Board may consider adoption of numerical effluent limitations for constituents based on the discharge quality and assimilative capacity analysis results.

- The Regional Board shall also require the implementation of effective salinity source control measures to ensure a reclaimed water quality that is suitable for long-term agricultural and landscape irrigation.

WATER RECLAMATION UNDER RESOLUTION NO. 81-16

On March 23, 1981, the Regional Board adopted Resolution No. 81-16 which modified the water quality standards by relaxing the ground water objectives and modifying the beneficial use designations for portions of the Aliso Hydrologic Subarea (HSA) 901.13, Carlsbad HSA 904.21, Agua Hedionda HSA 904.31, Batiquitos HSA 904.51, and Telegraph HSA 909.11. These areas are described in Table 3-3. The terms and conditions of Resolution No. 81-16 are incorporated in this Basin Plan; accordingly Resolution No. 81-16 is superseded. The use of reclaimed water in these areas is subject to the following provisions:

- Notwithstanding the water quality objectives, the Regional Board will regulate waste discharges in the affected portions of Hydrologic Subareas 904.21 and 904.31 in a manner that will protect the waters produced by the existing operating wells. A presently existing ground water use will be considered terminated when the well has been abandoned pursuant to County of San Diego Water Well Standards.

- In applying the modified standards, the Regional Board will condition waste discharge requirements for discharges of domestic and municipal wastewater to require that the wastewater be reclaimed and reused in a manner that will displace the need for approximately equal volumes of imported potable water.

WATER RECLAMATION AS AN ALTERNATIVE TO OCEAN DISPOSAL

The State Board in Order No. WQ 84-7 concluded that water reclamation should be carefully considered by persons proposing to discharge substantial quantities of once-used wastewater to the ocean particularly in a water short area where water is imported. Order No. WQ 84-7 directs the regional boards to require persons applying for permits to discharge once-used wastewater to the ocean in water-short areas to justify as part of each report of waste discharge why the wastewater is not being reclaimed.

The San Diego Region water supply is primarily imported water and the Region is clearly a water short area. Pursuant to State Board Order No. 84 7, the Regional Board will require persons proposing a discharge of once-used wastewater into the ocean to:

- Carefully analyze as an alternative, or partial alternative, the feasibility of reclaiming the wastewater for a beneficial use in lieu of ocean disposal.

- Submit, with the report of waste discharge in application for waste discharge requirements, sufficient information to justify why any wastewater proposed for discharge to the ocean after a single use is not being reclaimed for a beneficial use.

Reports of waste discharge which do not contain the water reclamation feasibility analysis described above, to the satisfaction of the Regional Board Executive Officer, will be considered incomplete and the Regional Board will not issue waste discharge requirements for the proposed discharge.

RECLAIMED WATER STORAGE REQUIREMENTS

During the winter season, wet weather, and other periods when there is little or no demand, treatment plants continue to operate at normal flows and the excess treated effluent must either be: (1) discharged to storage facilities until such time as the irrigation demand requires the use of the stored water; (2) discharged through a fail-safe land outfall connection to an ocean outfall under the terms of an NPDES permit; or (3) discharged to inland surface waters for ground water recharge and/or stream replenishment under the terms of an NPDES permit. Theoretical water balance calculations for disposal of reclaimed water at golf courses and other reuse sites in the Region indicate that storage facilities should be sized for 84-days of storage. (1975 Comprehensive Water Quality Control Plan Report, Page II-16-32). In situations where reclaimed water storage ponds are necessary, the Regional Board will require reclaimed water producers to:

- Provide 84-days of storage capacity; or

Provide storage capacity based upon water balance calculation procedures such as described in:

- USEPA. 1981. Process Design Manual for Land Treatment of Municipal Wastewater. Center for Environmental Research Information. Cincinnati, OH. EPA 625/1-81-013 (COE EM1110-1-501).

INDUSTRIAL WASTE

PRETREATMENT PROGRAM FOR INDUSTRIES

It is generally recognized that the discharge of industrial pollutants can be controlled most economically at their source. This is particularly true for industries discharging waste to municipal wastewater treatment plants (commonly called "POTWs" for "publicly owned treatment works"). On that basis USEPA has developed pretreatment requirements (40 CFR 403) for many industries and has developed minimum standards for POTW pretreatment programs. A POTW is required to implement a pretreatment program as a condition of its NPDES permit if its design flow is greater than five MGD or there are significant industrial users discharging to the POTW. POTWs with design flows less than 5 MGD may also be required to establish a pretreatment program if nondomestic waste causes upsets, sludge contamination, or violations of NPDES permit conditions, or if industrial users are subject to national pretreatment standards.

The goal of the USEPA's National Pretreatment Program is to protect municipal treatment plants and the environment from the adverse impact that may occur when hazardous or toxic wastes are discharged into a sewer system. This protection is achieved mainly by regulating nondomestic users of POTWs that discharge toxic wastes or unusually strong conventional wastes. Local pretreatment programs are required to fulfill the following objectives:

- Prevent the introduction of pollutants into POTWs which will interfere with the operation of a POTW, including interference with its use or disposal of municipal sludge;

- Prevent the introduction of pollutants into POTWs which will pass through the treatment works or otherwise be incompatible with such works;

- Improve opportunities to recycle and reclaim municipal and industrial wastewaters and sludges; and

- Prevent exposure of POTW personnel from chemical hazards and poisonous gases.

The general pretreatment regulations establish industrial pretreatment standards to control industrial pollutant discharges into wastewater collection systems and treatment plants. The discharge standards apply to all industrial and commercial establishments discharging waste to wastewater collection systems tributary to POTWs. The standards prohibit the discharge of pollutants that may damage the POTW's facilities, disrupt operations or expose workers

to hazards. Categorical pretreatment standards are numerical effluent limits which apply to industrial and commercial discharges in 25 specific industrial categories determined to be the most significant sources of toxic pollutants. All firms regulated by a particular pretreatment standard are required to comply with these standards. One hundred and twenty-six toxic pollutants are regulated in the 25 categorical standards. Prohibited discharges into POTW plants, besides toxic substances, include:

- Substances that create a fire or explosion hazard in the plant or sewer system;
- Discharges that are corrosive (have a pH < 5.0);
- Discharges that obstruct flow in the sewer system or interfere with plant operation;
- Discharges that upset the treatment process or cause a violation of the POTW's permit;
- Discharges that increase the temperature of the wastewater entering the treatment plant to above 104º F (40º C);
- Oil based products in amounts that will cause interference or pass through;
- Substances which cause toxic gases, vapors or fumes in a quantity which may cause worker health or safety problem(s); and
- Trucked or hauled pollutants, except at discharge points designated by the POTW.

Municipalities are required to use and enforce these standards as well as locally developed standards, to control nondomestic users discharging to their wastewater collection and treatment systems. The federal regulations require all states that administer NPDES programs to POTW operators to develop local pretreatment programs. The California pretreatment program includes the same general elements which parallel the pretreatment compliance schedule activities specified in most POTWs' NPDES permits. Pretreatment programs are required to contain the following elements:

- Identification and evaluation of the nondomestic discharges to a treatment system.
- The POTW must operate under a legal authority that will enable it to apply and enforce the requirements of pretreatment regulations and other state and local rules needed to control nondomestic discharges.
- The POTW must establish local industrial effluent limits to protect treatment plant operation, receiving water quality and sludge quality.
- The POTW must develop procedures for monitoring its industrial users to determine compliance and non-compliance.
- The POTW must develop administrative procedures to implement its pretreatment program.
- The POTW must have sufficient resources (funds, equipment, personnel) to operate an effective and ongoing program.

STEAM ELECTRIC POWER PLANTS

The Region has five steam electric power plants, four are operated by San Diego Gas and Electric Company (SDG&E) and one by Southern California Edison (SCE). Each of the SDG&E plants has one cooling water intake and one outfall structure. A separate NPDES permit has been issued for each SDG&E plant. The SCE plant, called the San Onofre Nuclear Generation Station (SONGS) has three power generating units, each with its own cooling water intake and outfall structure, and a separate NPDES permit has been issued for each of the three power generating units. All of these plants obtain cooling water from the ocean or San Diego Bay.

The SDG&E power plants are conventional fossil-fuel burning electrical generating facilities. The SDG&E plants are located in San Diego County, three of them are adjacent to San Diego Bay and one is adjacent to the Pacific Ocean. The San Onofre Nuclear Generating Station is located adjacent to the

Pacific Ocean in northern San Diego County and consists of three nuclear fueled electrical generating units.

The cooling water discharges from the power plants are regulated under the provisions of the Thermal Plan, which incorporates provisions of Section 316(a) of the Clean Water Act. All of the plants employ a once-through cooling water system. Seawater is pumped into the facility and used to cool the condensers, which results in an increase in the cooling water temperature of approximately 20 degrees Fahrenheit above the ambient seawater temperature. The cooling water is then discharged to marine waters, where the heat accumulated in the cooling water is dissipated.

The power plant NPDES permits establish effluent limitations for the discharge of cooling water and other wastes generated at the facilities. The effluent limitations are based upon applicable state water quality objectives and USEPA effluent guidelines and standards for steam electric power plants contained in 40 CFR 423. Each facility has a unique arrangement and thus a unique set of waste streams. Other wastewater discharges regulated by power plant NPDES permits, in addition to the cooling water discharge, include boiler blowdown, evaporator blowdown, floor drain discharges, chemical cleaning wastes and boiler wash.

Each power plant is required under the terms and conditions of its NPDES permit to comply with federal Clean Water Act sections 316 (a) and (b). Section 316(a) addresses the control of the thermal component of a discharge and its effects on fish population and wildlife. Section 316(b) requires that the location, design, construction, and capacity of cooling water intake structures reflect the best available technology for minimizing adverse impacts to the environment.

SUBSURFACE DISPOSAL FROM CAMPGROUNDS AND RECREATIONAL VEHICLE PARKS

Since the early 1970's, the Regional Board has been issuing waste discharge requirements to campgrounds and/or recreational vehicle (RV) parks that discharge wastewater to subsurface disposal systems. Chemical preservatives in RV holding tanks increase the threat to ground water quality from these facilities. At one time, the WDRs specified that wastes other than domestic sewage shall be excluded from the discharge. Consequently, the requirements prohibited the discharge of water softener regeneration brine and RV holding tank waste to the septic tank and leach line systems and required the discharger to provide impervious storage tanks for RV holding tank wastes. In order to comply with the WDRs adopted by the Regional Board prior to 1978, the RV campground managers required RVs to empty their holding tank wastes into the campground's dump station if the RV would be provided with sewer hookups. WDRs adopted after 1978 do not require the installation of impervious holding tanks at RV parks nor are RVs required to dispose of RV holding tank wastes to impervious tanks. Currently, most campgrounds and/or RV parks in the Region do not have impervious storage tanks for RV holding tank wastes.

In 1978, the Regional Board adopted Resolution No. 78-24, suspending all ground water monitoring requirements at the campgrounds until such time as a study by the State Board on RV waste disposal was completed and reviewed by the Regional Board staff. In June 1980, the Sanitary Engineering Research Laboratory at University of California, Berkeley published a report for the State Board entitled, "*Recreational Vehicle Waste Disposal in Roadside Rest Septic Tank Systems*". This report however, did not address the requirements for ground water monitoring.

A common problem with community systems is that individual property owners and homeowners associations often deny responsibility for system failure and necessary repairs. Additional problems result when private entities operate community systems and do not have sufficient funds available to correct problems. Consequently, prior to approval of projects proposing community subsurface disposal systems, the Regional Board requires as part of the Report of Waste Discharge, documentation from the proponent that demonstrates that adequate funding is available to operate and maintain the disposal systems.

VESSELS (RECREATIONAL, COMMERCIAL, AND NAVAL) AND MARINAS

Vessels of all types and sizes including recreational, commercial, and Naval craft, and the marinas (or other facilities) in which they berth can have serious impacts on water quality. This section will describe the most important waste categories, pollutants, and other water quality problems associated with vessels and marinas. A description of BMPs and applicable regulations is also included. Although presented below, it should be noted that vessels and marinas are typically considered a nonpoint source category.

San Diego Bay sailboat

VESSELS AND MARINAS IN THE SAN DIEGO REGION

There are approximately 8,400 boat slips in San Diego Bay, 2,400 in Mission Bay, over 1,000 in Oceanside Harbor, and over 1,500 in Dana Point Harbor. In addition to boats with assigned slips, there are several hundred additional boats moored at a variety of "free" anchorages. In San Diego Bay, the San Diego Unified Port District has organized two of its free anchorages into formal anchorages which have shoreside showers, rest rooms, and docking facilities. Boat owners are required to pay fees for these services.

In 1986, the San Diego Unified Port District was granted permission by the Coast Guard to establish additional formal anchorages in San Diego Bay. Because of the reluctance of some boat owners to pay fees for mooring in the bay, many have elected to move their boats to new free anchorages. Such anchorages can be especially important sources of human pathogens from vessel sewage releases. In addition to the vessels normally maintained in the water, there are several thousand additional "trailer" boats using San Diego's boat harbors. In total, approximately 55,000 vessels are registered in San Diego County.

NAVY VESSELS IN THE SAN DIEGO REGION

Home port to approximately one hundred US Navy vessels, San Diego Bay is one of the largest Naval ports on the west coast of the United States. As described above, Navy vessels are responsible for the same types of water quality impacts as other vessels. They are also subject to the same regulations and requirements as other vessels except that discharges from Naval vessels under certain circumstances are not subject to NPDES permits. A description of this exclusion (as found in Title 40, CFR, Part 122.3) was discussed earlier in this Chapter.

If enforcement action is necessary, operators of Naval vessels are subject to all of the same enforcement mechanisms outlined previously in this Chapter with one exception; the Navy is not subject to Administrative Civil Liability.

VESSEL WASTES

The most significant waste categories associated with vessels include:

- Hull maintenance related wastes;
- Sewage;
- Marine engine related wastes; and
- Trash.

Of these categories, hull maintenance related wastes, and particularly antifouling paint, is believed to pose the greatest potential threat to water quality. This is because of its high degree of toxicity. Antifouling paint, which is applied to vessel hulls, is specifically designed to prevent the growth and attachment of marine organisms by continuously releasing toxic substances into the surrounding water. Cuprous oxide and tributyltin fluoride or tributyltin oxide are the principal toxicants in copper-based and organotin-based paints, respectively. Although the use of TBT is now significantly limited, leaching pollutants from antifouling paints remains a widespread and serious concern especially in areas of high vessel density and low hydrologic flushing.

Antifouling paint may pose an even greater water quality threat during and after its removal from vessel hulls since the pollutants in the paint chip wastes may continue to leach into receiving waters. In most cases, because paint removal activities on ships are conducted in ship repair yards, responsibility for the paint chip wastes is transferred from the vessel owner to the shipyard. (See shipyards and boatyards discussion). The same is generally true for recreational craft serviced at boatyards. However, small craft can also obtain some hull maintenance services directly in the water by underwater hull cleaners. In addition to paint, other examples of hull maintenance wastes include strippers, cleaners, and cathodic protection products. Although a variety of pollutants can be released during hull maintenance activities, metals are the pollutants of greatest concern.

Sewage is often intentionally discharged directly into receiving waters due to the lack of pumpout stations, inconvenience or inoperation of pumpout stations, or the irresponsibility or ignorance of vessel operators. Human pathogens present in sewage include a variety of fecal bacteria and viruses. Today sewage discharges in recreational marinas are believed to be more significant than at Naval berthing areas. This is because all US Navy vessels are currently equipped to connect to pumpout facilities while in port.

Marine engine related wastes such as fuels, oils, lubricants, antifreeze, solvents, and polluted bilge water are commonly released from vessels into receiving waters. The pollutants of greatest concern for marine engine wastes are metals and petroleum hydrocarbons. PAHs are a particular concern because they tend to accumulate and persist in aquatic sediments for years, poisoning benthic organisms. Garbage and trash are also discharged from vessels.

Each of the above waste categories can be, and frequently are, washed, spilled, scraped, dumped, and pumped directly into receiving waters. As a result, each of the wastes can take a major toll on water quality and beneficial uses. The marine habitat and shellfish harvesting beneficial uses are particularly sensitive to vessel wastes.

Furthermore, each of the waste categories is relevant to all vessel types and sizes including recreational boats as well as commercial and Naval ships. However, because of a ship's greater size and corresponding greater magnitude, variety, and toxicity of wastes generated, ships (particularly Navy ships) are generally believed to pose a greater threat to water quality than boats. For example, Navy vessels are typically drydocked for hull maintenance only once every five or more years and spend more time in port or at anchor than underway. Fouling organisms attach more readily when a ship is stationary. For these reasons, Navy coating systems are required to be effective for longer periods of time than those applied to commercial and recreational vessels. Accordingly, Navy vessels are blasted to "white metal" meaning all paint is removed to bare metal and the surface is abraded in preparation for adherence of a complete new coating system. Additionally antifouling paints used on Navy vessels contain higher levels of toxicants than those used on commercial and recreational vessels.

Nevertheless there is a formidable set of water quality impacts associated with small craft and small craft marinas as described below.

MARINAS

Marinas and other boat berthing facilities typically have high boat densities and low hydrologic flushing. As a consequence of these characteristics, the following significant water quality problems often result within marinas:

- Increased pollutants in the water column;
- Decreased dissolved oxygen in the water column;
- Increased pollutants in aquatic sediment;
- Increased toxicity in the water column and sediments;
- Increased pollutants in the tissues of aquatic organisms; and
- Physical alteration or destruction of aquatic habitat.

The physical disruption, or destruction of wetlands, sediment, and other aquatic habitat is an especially troublesome impact. It is a result of both the original construction of the marina, ramps, and related facilities, as well as their ongoing use, operation, and maintenance.

Although most of the water quality problems listed above arise from the direct discharge of wastes by vessels, pollutants can also be transported into marina waters by way of storm water runoff from parking lots, docks, and other impervious surfaces.

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CZARA(G) GUIDANCE FOR MARINAS

Most of the impacts listed above can be mitigated by utilizing best possible siting and design criteria for each marina. Construction and operation and maintenance practices are also crucial to protecting water quality. Recognizing the importance of this, USEPA developed fifteen specific management measures (BMPs) to protect coastal waters from nonpoint pollution from marinas and recreational boating.

The management measures for marinas which are grouped into two broad headings, (1) siting and design; and (2) operation and maintenance, were developed pursuant to section 6217 of the Coastal Zone Act Reauthorization Amendments (CZARA) of 1990 and are incorporated into the (g) guidance. As with all nonpoint source pollution protection measures, the key to protecting water quality in marinas is pollution prevention.

REGULATION OF VESSELS AND MARINAS

Management measures related to preventing pollutants, such as sewage, fuel and oil leaks, toxics, fish wastes, and hull scrapings from entering coastal waters are primarily the responsibility of the Regional Board. The Regional Board prohibits the discharge of these wastes through a variety of Basin Plan discharge prohibitions. The Board also encourages and participates in public education/awareness campaigns. The Harbors and Navigation Code section 151 prohibits the intentional or negligent discharge of oil to the waters of the state. Penal Code section 374(e) as amended in 1970 provides that any person who litters or places waste matter into any bay, lagoon, channel, river, creek, slough, canal or reservoir or body of water is guilty of a misdemeanor.

Local governments have significant authority to carry out these CZARA management measures through their zoning ordinances, and by using their police, fire, or building departments to ensure implementation.

The California Department of Pesticide Regulation regulates the application of antifouling paints. Regulations for organotin-based paints have been established which limit the TBT release rate, require application by certified commercial applicators, and allow application only on vessels at least 25 meters in length and/or aluminum hulls and parts. As described earlier, tributyltin fluoride or tributyltin oxide are the principal toxicants in organotin-based paints.

The Health and Safety Code section 4425 prohibits a vessel with a toilet from operating upon the waters of any lake, reservoir, or fresh water impoundment of this State unless the toilet is designed so that no human sewage can be discharged in such waters. This code section does not apply to rivers, estuaries or saltwater areas of California. Section 312 of the Clean Water Act provides that marine sanitation devices on board new or existing vessels must be designed to prevent the discharge of untreated or inadequately treated sewage into or upon the navigable waters of the United States (see discussion below on "No Discharge Zone"). The Marine Sanitation (section 775) of the Harbors and Navigation Code declares that every vessel terminal shall be equipped with vessel pumpout facilities for the transfer and disposal of sewage from marine sanitation devices in order to protect water quality.

NO DISCHARGE ZONE

Division 7 of the Water Code authorizes the Regional Board to regulate any discharge of waste, including sewage, to waters of the state. The federal Clean Water Act however partially preempts the state's authority to regulate vessel sewage discharges. Section 312 of the Clean Water Act provides that no state or local entity may adopt or enforce any laws regarding the design, manufacture, installation or use of marine sanitation devices (MSDs). Instead, USEPA must adopt federal standards of performance for MSDs which must be enforced and implemented through regulations adopted by the United States Coast Guard (USCG).

Marine sanitation devices either retain sewage or discharge treated sewage. If sewage is discharged, the effluent must meet USCG specified effluent standards described in 33 CFR 159, Coast Guard Regulations on Marine Sanitation Devices. Types I and II MSDs are flow-through systems which treat and discharge sewage. Type I MSDs produce an effluent having a fecal coliform bacteria count not greater than 1,000 per 100 ml and no visible floating solids. Type II MSDs produce an effluent having a fecal coliform bacteria count not greater than 200 per 100 ml and suspended solids not greater than 150 mg/l. Type III MSDs are holding tanks only and prevent the overboard discharge of treated or untreated sewage.

There is one significant exception to the federal preemption of a state's regulation of vessel sewage discharges. Clean Water Act section 312 (f) allows states to completely prohibit vessel sewage discharges into waters requiring greater water quality protection, provided that USEPA determines that adequate vessel sewage pumpout facilities are available for these waters.

In 1976 the State of California petitioned USEPA, pursuant to section 312 (f)(3) of the Clean Water Act, for a determination that adequate pump-out facilities were reasonably available for that portion of San Diego Bay that is less than 30 feet deep at MLLW; and for all of Mission Bay, Oceanside Harbor, and Dana Point Harbor (41 Federal Register 21516 May 26, 1976). On August 6, 1976, USEPA made the requested determination (41 Federal Register 34453 August 6, 1976).

As a result, the discharge of all sewage, treated or untreated, from all vessels is completely prohibited in all portions of Mission Bay, Oceanside Harbor, and Dana Point Harbor (regardless of vessel size or water depth). Mission Bay, Oceanside Harbor, and Dana Point Harbor are, in their entirety, "No Discharge Zones". (Note that this prohibition includes discharges from a properly functioning USCG certified MSD).

The discharge of all sewage, treated or untreated, from all vessels is completely prohibited in all portions of San Diego Bay that are less than 30 feet deep at MLLW. The No Discharge Zone in San Diego Bay is defined as all portions of the bay having a depth of less than 30 feet MLLW. In the absence of the no discharge zone (i.e., in those portions of San Diego Bay having a depth of 30 feet or greater), discharge of treated sewage through a properly functioning USCG certified Type I or II marine sanitation device is allowed. (USCG certification provides that the specified effluent limitations will be met). The discharge of untreated sewage from a Type III holding tank is not allowed under any condition in any portion of San Diego Bay (regardless of depth).

Because of dilution and circulation in San Diego Bay, it is assumed that the discharge of treated sewage into waters deeper than 30 feet from a properly functioning USCG certified Type I or II MSD will not degrade the bay's beneficial uses. Additionally, with the exception of a few recent uses (such as jet skiing and sail boarding), the REC I designated beneficial use occurs in shallow waters (i.e., in waters less than 30 feet). This supports the need for a complete prohibition in such shallow waters.

Furthermore, as a practical matter, it is not possible to regulate sewage discharges from all vessels in San Diego Bay. For example, some foreign vessels may not be equipped to use the existing pump-out facilities. Since the no discharge designation is conditioned upon the existence of adequate pump-out facilities, it was necessary to make an allowance in the prohibition for such vessels. These vessels require berthing accommodations outside of the designated area. (All US Navy vessels are equipped to connect to pump-out barges or pier-side sewage facilities).

Most small pleasure craft are equipped with either a Type I or II flow-through treatment device or a Type III holding tank, but rarely both. Those vessels equipped with only a flow-through treatment device must secure their device while in a No Discharge Zone in order to prevent overboard sewage discharges. Those vessels equipped with only a holding tank are required to utilize pump-out facilities at all times and may not discharge into any portion of any bay. In other words, a vessel in San Diego Bay with a holding tank may not move into water greater than 30 feet and discharge sewage from its holding tank.

A study of the levels of coliform and Enterococcus bacteria caused by vessel discharges is needed to allow the Regional Board to make decisions based on measured levels. The Regional Board could then advise the county health officer, the Port District, and the Coast Guard so appropriate actions could be taken to abate the effects of sewage discharges from vessels.

SHIPYARDS

This section contains a general discussion of shipyards, their threat to water quality, and regulatory complexity. A discussion specific to San Diego Bay shipyards is included near the end of this section.

Shipyard activities may result in the discharge of wastes to receiving waters. The presence of elevated concentrations of pollutants, primarily heavy metals, in the sediment adjacent to shipyards nationwide is well documented in the literature (see references). Although there are numerous other potential threats, the single most significant threat to water quality posed by shipyards is the potential discharge of abrasive blast waste to receiving waters.

SHIPYARD THREAT TO WATER QUALITY

From the perspective of protecting beneficial uses, a discharger's threat to water quality is critically important and plays a role in virtually all regulatory decisions. By definition, the basis of a discharger's threat to water quality is the effect the discharger would have on the receiving water if discharges occurred in violation of its NPDES permit. In other words, a discharger's threat to water quality is its potential for degrading water quality. The following six characteristics are relevant in evaluating a shipyard's threat to water quality: (1) primary activities; (2) facilities; (3) industrial processes; (4) materials used; (5) wastes generated; and (6) waste discharges to receiving waters (actual and potential). A discussion of each follows.

PRIMARY ACTIVITIES AT SHIPYARDS

The shipbuilding and repair industry is engaged in the construction, conversion, alteration, repair, and maintenance of all types of military and commercial ships and vessels. Shipbuilding and repair encompasses a large number and variety of activities and industrial processes including, but not limited to, formation and assembly of steel hulls; application of paint (coating) systems; installation and repair of a large variety of mechanical, electrical, and hydraulic systems and equipment; repair of damaged vessels; removal and replacement of expended or failed paint (coating) systems; and provision of entire utility/support systems to ships (and crew) during repair.

The list of occupations required to conduct these activities is also extensive, including sandblasters, painters, shipfitters, machinists, metalsmiths, welders/burners, blacksmiths, boilermakers, chemists, carpenters, coppersmiths, electricians, electronic technicians, joiners and patternmakers, laborers, riggers, pipefitters, and foundrymen. Not all occupations are present at all shipyards.

SHIPYARD FACILITIES

There are four major types of building/repair facilities at shipyards, which together with cranes, enable ships to be assembled, launched, or repaired. These facilities are graving docks/shipbuilding ways, floating drydocks, marine railways, and berths/piers. With the exception of berths and piers, the basic purpose of each facility is to separate the vessel from the bay and provide access to parts of the ship normally underwater.

Each facility type presents its own unique set of environmental concerns. Depending on size and capabilities, a single shipyard will generally have a combination of two or more of these facilities.

In addition to these facilities, shipyards must also conduct the wide range of support or complementary activities previously described. Many of these activities require their own facility, space, or shop; for example concrete platens (for steel fabrication), machine shop, pipe shop, electroplating shop, weld shop, sheet metal shop, electrical shop, coppersmith shop, blacksmith shop, carpentry shop, and boiler shop, etc. Not all facilities are present at all shipyards.

SHIPYARD INDUSTRIAL PROCESSES

The primary activities described above involve a multitude of industrial processes, many of which must be conducted over water or very close to the waterfront. Because they typically represent the greatest threat to water quality, the following discussion will focus primarily on the industrial processes conducted inside graving docks or floating drydocks.

Surface Preparation and Paint Removal

Methods of surface preparation and paint removal include dry abrasive blasting, wet abrasive or slurry blasting, hydroblasting, and chemical paint stripping. Each paint removal method has a unique purpose and poses its own set of water quality risks.

Dry abrasive blasting is the preferred method of preparing steel surfaces for application of a new paint (coating) system for saltwater immersion. It is used for most exterior hull work and virtually all interior tank work (e.g., fuel, bilge, ballast tanks etc). Dry abrasive blasting is the process in which blasting abrasive is conveyed in a medium of high pressure air, through a nozzle at velocities up to 450 feet per second resulting in very large quantities of solid waste and airborne particulates (dust). Although the most efficient of the paint removal methods, dry blasting produces the largest quantity of airborne particulates.

Wet abrasive or slurry blasting is the process in which water replaces air as the abrasive propellant. The use of water significantly reduces airborne particulate emissions but generates large quantities of wet residue and wastewater.

Hydroblasting is a process in which water under very high pressure is used instead of abrasive. Hydroblasting produces large amounts of wastewater and is primarily used at shipyards to remove marine growth, not to remove existing coatings. Chemical paint stripping is uncommon in drydocks and used primarily for removable parts.

Paint (coating) Application

After preparation, surfaces are painted. Most painting occurring in a drydock involves the ship hull and internal tanks. Painting is also conducted in other locations throughout a shipyard including piers and berths. Paint application is accomplished by way of air or airless spraying equipment.

Tank Cleaning

Tank cleaning operations utilize steam to remove dirt and sludge from internal tanks, particularly fuel tanks and bilges. Detergents, cleaners, and hot water may be injected into the steam supply hoses. Wastewater is generated.

Other Industrial Processes (graving docks/drydocks)

Other industrial processes conducted inside graving docks or floating drydocks include mechanical repair, maintenance, installation; structural repair, alteration, assembly; and integrity/ hydrostatic testing. Hydrostatic or strength testing (flushing) is conducted on hull, tanks, or pipe repairs and on new systems during ship construction phases. Hydrostatic testing generates significant water flow.

Other Industrial Processes (elsewhere)

Numerous other industrial processes take place at numerous other locations throughout a typical shipyard, including activities at a variety of repair and specialty shops. Examples include paint equipment cleaning; engine repair/ maintenance/ installation; pipe fitting; steel fabrication and machining; electrical repair/ maintenance/ installation; hydraulic repair/ maintenance/ installation; tank emptying; fueling; pattern making; shipfitting; boiler cleaning; carpentry; refurbishing/ modernization/ cleaning; air conditioning/ refrigeration repair; sheet metal fabrication; fiberglass repair; electroplating/ metal finishing; blacksmithing; zinc primer application; printing; and photo processing. As a result of these processes, an assortment of wastes are generated, many of which are hazardous.

MATERIALS USED AT SHIPYARDS

Materials commonly used at shipyards are described below beginning with those utilized during graving dock or floating drydock operations.

Abrasive Grit

Abrasive grit is typically slag from the smelting of copper ore and consists principally of iron. Trace elements such as copper, zinc and titanium may also be present in the slag. Sand, cast iron, or steel shot are also used as abrasives. Very large amounts of abrasive are needed to remove paint to bare metal. For example, removing paint from a 15,000 square foot hull can take up to 6-days and consume 87 tons of grit. Grit is needed in all dry and wet (slurry) abrasive blasting.

Fresh Paints

Fresh paints contain copper, zinc, chromium, and lead (all priority pollutants) as well as numerous hydrocarbons. The two major types of paints used on ship hulls are anticorrosive paints and antifouling paints. Anticorrosive paint (primers) include vinyl, vinyl-lead, or epoxy based coatings. Others contain zinc chromate and lead oxide. (Although newer paint formulations no longer include chromium and lead, such constituents may be present in shipyard wastes due to the removal of older coating systems).

Antifouling paints are designed to prevent growth and attachment of marine organisms by continuously releasing toxic substances into the water. Cuprous oxide and tributyltin fluoride or tributyltin oxide are the principal toxicants in copper-based and organotin-based paints, respectively.

Other Materials

Other materials used include oils (engine, cutting, and hydraulic); lubricants, grease; fuels; weld rod; detergents, cleaners; rust inhibitors; paint thinners; hydrocarbon and chlorinated solvents; degreasers; acids; caustics; resins; adhesives/ cement/ sealants; cyanide; zinc (e.g., zinc dust); chlorine; and mercury.

WASTES GENERATED AT SHIPYARDS

The major categories of wastes commonly generated by shipyard industrial processes are discussed below. Wastes resulting from graving or floating drydock operations are presented first.

Abrasive Blast Waste

Abrasive blast waste, consisting of spent grit, spent paint, marine organisms, and rust is generated in very large quantities during all dry or wet abrasive blasting procedures. The constituent of greatest concern with regard to toxicity is the spent paint, particularly the copper and tributyltin antifouling components, which are designed to be toxic and designed to continuously leach into the water column. Other priority pollutants in paint include zinc, chromium, and lead. Although the grit itself is not highly toxic, it is a major component in the large solid waste load and is settleable. As a result, its deposition can degrade the benthic community and increase the need for dredging. Abrasive blast waste can be conveyed by water flows, become airborne (especially during dry blasting), or fall directly into receiving waters. Wet abrasive blasting of a Naval DDG class destroyer (437-536 feet long; 47-67 feet wide; 15-20 feet draft) can generate up to 180 tons of solid wet abrasive waste.

Paint Losses

Paint losses, or paint which ends up somewhere other than its intended location (e.g., drydock floor, bay, worker's clothing), results from spills, drips, and overspray. Typical overspray losses are estimated at approximately 5% for air spraying and 1-2% for airless spraying.

Bilge Waste/Other Oily Wastewater

This is generated during tank emptying, leakages, and cleaning operations (bilge, ballast, fuel tanks). In addition to petroleum products (fuel, oil), tank washwater may also contain detergents or cleaners (nitrogen and phosphorus compounds) and can be generated in large quantities.

Blast Wastewater

Wet abrasive (slurry) blasting and hyrdoblasting generates large quantities of wastewater. Wet abrasive blasting of a Naval DDG class destroyer can generate up to 500,000 gallons of contaminated water. In addition to suspended and settleable solids (spent abrasive, paint, rust, and marine organisms) and water, blast wastewater may also contain rust inhibitors such as diammonium phosphate and sodium nitrite.

Other Wastes

These include oils (engine, cutting, and hydraulic); lubricants, grease; fuels; waste paints/ sludge/ solvents/ thinners; construction/ repair wastes and trash; asbestos (from ship refurbishing/ modernization); sewage (black and grey water from vessels or docks); boiler blowdown, condensate, discard; spent hydrocarbon or chlorinated solvents; electroplating/ metal finishing wastes; acid wastes; caustic wastes; and aqueous wastes (with and without metals).

SHIPYARD WASTE DISCHARGES TO RECEIVING WATERS

Actual and potential waste discharges to receiving waters from typical shipyard operations are discussed below. Most are either the direct result of an industrial process (drydock, marine railway, or berth operations) or, more commonly, the result of water coming into contact with wastes, typically spent abrasive blast waste. There are numerous sources of water at a shipyard including: industrial processes; building or repair facilities (e.g., drydock); vessels under repair (e.g., cooling water); bay water (e.g., due to tidal influence or wave action); storm water; or other sources.

Actual and potential waste discharges to receiving waters include: floating drydock deballasting (tanks); floating drydock submergence/ emergence (platform); floating drydock operations; graving dock dewatering; gate leakage; hydrostatic relief flows; shipbuilding ways dewatering/ gate leakage/ relief flows; marine railway operations; berth and pier operations; storm water; integrity/ hydrostatic testing discharge (new vessels); boiler and cogeneration feedwater; fire protection system discharge; cooling water; and miscellaneous water flows.

SHIPYARD COMPLEXITY

From a regulatory and environmental control standpoint, shipyards present a unique and difficult problem. Traditional NPDES dischargers generate or intake wastewater, treat it to specified effluent limits, and discharge treated effluent, often by way of a single pipe. Unlike traditional dischargers, shipyards are significantly more complex in all respects: numerous and diverse industrial processes; numerous discharge mechanisms, waste streams, and discharge points; and Best Management Practices Plan based permits. Each is discussed below.

Numerous and Diverse Industrial Processes

As described previously, shipyards conduct a large number and broad range of industrial processes which require a wide range of facilities and substantial workforce.

Numerous Discharge Mechanisms, Waste Streams, and Discharge Points

Shipyards are complex to regulate because they have numerous discharge mechanisms, discharge points, and waste streams. A less complex discharger will typically have a single or small number of each. A discussion of abrasive blast waste with respect to discharge mechanisms, discharge points, and waste streams follows. Abrasive blast waste is discharged primarily as a result of graving dock flooding, drydock immersion, drainage, or runoff. In other words, at shipyards, the principle mechanism by which wastes are conveyed to receiving waters is via the contact of wastes with water, both of which occur in large quantities. For this reason, storm water and storm drain inlets are of particular concern at shipyards. Abrasive blast waste can also become subject to tidal or wave action. Airborne releases represent another important discharge mechanism. Because abrasive blast waste is generated in part as airborne particulates, such releases to receiving waters pose a significant threat to water quality. Furthermore, and because of their proximity to receiving waters, a third discharge mechanism exits at shipyards. Direct discharges from shipyards occur when wastes are allowed to fall directly into receiving waters (off the end drydock, edge of pier, between gratings, etc).

In summary, because abrasive blast waste can be washed, hosed, pushed, blown, become subject to tidal/wave action, and be directly or otherwise discharged, the potential for abrasive blast waste from shipyards to enter receiving waters is great. In addition to multiple discharge mechanisms, numerous waste streams, and discharge points also exist at shipyards. The discharges described above can potentially enter receiving waters from numerous shipyard worksites including graving docks, drydocks, marine railways, piers, repair/ specialty shops, as well as via storm drains and sheet flow runoff.

Best Management Practices Based Permits

Unlike traditional NPDES discharges which are regulated by numerical effluent limits, the control of waste discharges from shipyards is accomplished by the implementation of BMP plans. The purpose of a BMP plan is to prevent, reduce, or eliminate the spillage or illicit discharge of pollutants into receiving waters and can include any number of preventive controls or measures. Due to the types of activities and multiple discharge pathways, numerical effluent limitations are not practical at shipyards. The evaluation of the effectiveness of BMP Plans from a regulatory standpoint is more complicated and resource intensive than comparison of end-of-pipe monitoring results to numerical effluent limitations.

LONG-TERM EFFECTS OF SHIPYARD DISCHARGES ON WATER QUALITY AND BENEFICIAL USES

Unlike short lived pollutants (e.g., BOD and bacteria) the type of pollutants present in shipyard discharges are typically long-lasting. Shipyard pollutants, such as heavy metals and PAHs are persistent in the marine environment, in part, because they can become attached to sediment particles and can accumulate to high concentrations in both sediments and in marine organisms. Once incorporated into sediment and tissues, these pollutants are very difficult to remove and may recycle in the marine system indefinitely. Because sediment cleanup projects are difficult, expensive, and lengthy, contaminated sediment can remain in place, adversely affecting beneficial uses and water quality, for many years.

SAN DIEGO BAY SHIPYARDS

The following discussion is specific to San Diego Bay shipyards.

NPDES Permits

There are currently four commercial shipyards in the San Diego Region, all of which are located adjacent to San Diego Bay. All of the shipyards are currently regulated under individual NPDES permits which are BMP based, rather than based on effluent limits. The shipyard permits also include standard receiving water limitations and discharge prohibitions. Additionally, all of the shipyards are also subject to the statewide General Industrial Storm Water Permit.

Threat to Water Quality and Best Management Practices

Although the discussion above was intended as a general description of the shipyard industry as a whole, the majority of the information is applicable to the San Diego Bay shipyards. One notable exception is that wet abrasive or slurry blasting and chemical paint stripping are currently not conducted at San Diego Bay shipyards.

By definition a discharger's threat to water quality is its potential to cause damage to water quality and beneficial uses under worst case conditions, i.e., assuming all BMPs and treatment measures fail. For this reason, the general shipyard discussion on threat to water quality focuses on potential risks rather than on BMPs. As described, a shipyard's potential risks to water quality are significant in many respects. BMPs are specifically designed to reduce those risks and are therefore extremely important for shipyards. Hence, the second reason to focus on potential risks is to emphasize the need for effective BMPs at shipyards.

San Diego shipyards report strict adherence to a large number of BMPs to control water and airborne wastes during a variety of industrial processes. Such BMPs include physical and procedural controls. Physical controls isolate runoff pathways from contact with abrasive blast wastes through the use of shrouding, sealing of drains, and diversion of sump discharge pathways. Procedural control methods include dock sweeping and elimination of sources of runoff during blasting operations. The shipyards also report the effective management of their wastes including treatment, recycling, and disposal in compliance with the San Diego County Hazardous Materials Management Division, their San Diego Metropolitan Industrial Waste Program permits, and the San Diego County Air Pollution Control District.

Contaminated San Diego Bay Sediment and Mussels

Regional Board staff has reviewed the results of sediment samples collected adjacent to the shipyards in San Diego Bay. Elevated concentrations of copper, tributyltin, and zinc exist in these sediments. Copper, tributyltin and zinc are contained in both the materials used by San Diego Bay shipyards as well as in the wastes which they generate. Furthermore elevated concentrations of copper, tributyltin, and zinc have also been measured in the tissues of mussels collected from stations located adjacent to San Diego Bay shipyards.

Although this data may suggest that the BMPs employed by San Diego Bay shipyards are not effective, it may also represent historical discharges which occurred at a time when BMPs were not carefully implemented. Regional Board staff plans to investigate the matter further. The existence of contaminated sediment adjacent to the shipyards serves to further underscore the importance of shipyard BMPs.

SHIPYARDS – GENERAL CONCLUSIONS

In summary, shipyards typically pose a significant threat to water quality for the following reasons. Relative to other regulated dischargers, shipyards conduct a large number and wide variety of activities and industrial processes. The conduct of these industrial processes requires numerous physical facilities and a large number, amount, and variety of materials. As a result, a large number, amount, and variety of wastes are generated and are, or may be, discharged to receiving waters. Shipyard discharges have the potential to cause the long-term loss of a designated beneficial use in receiving waters.

From a regulatory perspective, shipyards are complex. Toxic pollutants are, or could be, present in wastes discharged to receiving waters from shipyards. They have numerous discharge points and are regulated by permits which do not contain numeric effluent limits. Shipyards are typically "major" NPDES dischargers and require a high level of regulatory effort.

In conclusion, because shipyards pose a significant threat to water quality and are complex to regulate, the BMPs which they employ (to reduce or eliminate the discharge of wastes to receiving waters) are extremely important. It is critical that shipyard BMPs are effective and diligently implemented.

BOATYARDS

There are currently 12 boat building and boat repair facilities (commonly called boatyards) adjacent to receiving waters in the San Diego Region. Most of the boatyards are located adjacent to San Diego Bay, while Mission Bay, Oceanside Harbor, and Dana Point Harbor are serviced each by a single boatyard. Additional boatyards are located in inland areas of the Region. Seven of the boatyards located adjacent to receiving waters are currently regulated under an individual NPDES permit. Eventually all of the waterfront boatyards will be regulated under an individual NPDES permit. Additionally, all of the boatyards in the Region are currently subject to the statewide General Industrial Storm Water Permit. Like the shipyard permits, boatyard permits do not contain numeric effluent limits but are based instead on BMPs.

The most significant waste categories associated with boatyards include hull maintenance related wastes and marine engine related wastes. Hull maintenance related wastes, and particularly antifouling paints, are believed to pose the greatest threat to water quality from boatyard operations. Cuprous oxide (copper) and TBT fluoride or TBT oxide are the principle toxicants in antifouling paint used at boatyards. Marine engine related wastes include fuels, oils, lubricants, antifreeze, solvents, and bilge water. The pollutants of concern from marine engine wastes are metals and petroleum hydrocarbons. PAHs are of particular concern because they persist in the marine environment. Implementation of BMPs is the key to controlling boatyard waste discharges to receiving waters.

GROUND WATER DEWATERING

A number of dewatering operations are associated with construction projects for foundations, bridges, roads, etc. Other dewatering operations are ground water remediation projects which are required under Cleanup and Abatement Orders issued by the Regional Board. Many of the proposed dewatering operations are located where petroleum or other pollutants plumes exist. Petroleum or other pollutants may be pumped from the ground water and discharged to a storm drain and subsequently to a water of the United States.

Since the mid-1980's, the Regional Board has regulated dewatering operations under the NPDES permit process. Two general NPDES permits have been adopted by the Regional Board which regulate discharges from ground water remediation projects and discharges from ground water dewatering operations to surface waters of the United States.

The first permit, Order No. 2000-90, NPDES No. CAG919001 regulates temporary ground water extraction and similar waste discharges to San Diego Bay and storm drains or other conveyance systems tributary thereto. This Order prohibits ground water extraction waste discharges to San Diego Bay from new permanent ground water extraction operations.

The second permit, Order No. 2001-96, NPDES No. CAG919002 regulates ground water extraction waste discharges from construction, remediation, and permanent ground water extraction projects to surface waters within the San Diego Region except for San Diego Bay.

In addition, the Waiver Order described earlier in this Chapter waives WDRs for short-term construction dewatering operations where there is no discharge to surface waters.

DREDGING AND DISPOSAL OF DREDGE SPOIL

REGULATORY FRAMEWORK FOR DREDGED MATERIAL DISPOSAL

FEDERAL STATUTES AND REGULATION

The regulation of dredged material disposal in waters of the United States (US) on a federal level is a responsibility shared by the USEPA and the USACOE. The Marine Protection, Research and Sanctuaries Act, also called the Ocean Dumping Act, is the primary federal environmental statute governing the discharge of dredged material to the ocean. The Clean Water Act is the primary federal statute governing the discharge of dredged and/or fill material into US waters. Material dredged from waters of the US and disposed in the territorial sea is evaluated under the Marine Protection, Research and Sanctuaries Act unless the material discharged is for the primary purpose of fill (e.g., beach replenishment, island creation, or underwater berms), in which case the disposal is evaluated under the Clean Water Act [33 CFR 336.0(b)]. Other applicable federal statutes and regulations include the following.

The Rivers and Harbors Act of 1899

The Rivers and Harbors Act of 1899 (33 USC 401 et. seq.) requires a USACOE permit for any work or structure, including fill material discharges, in navigable waters of the United States. The primary purpose of section 10 of this act is to ensure that structures (i.e., disposal berms, piers, pipelines, bridges, wharfs) constructed in navigable waters do not adversely affect federal interstate navigation.

The Fish and Wildlife Coordination Act of 1958

The Fish and Wildlife Coordination Act requires that, for any proposed federal project or permit that may affect a stream or other body of water, the USACOE must first consult with federal and state fish and wildlife agencies. This consultation addresses the prevention of damages to wildlife resources and provides for the development and improvement of wildlife resources.

The Endangered Species Act of 1973

Section 7(a)(2) of the Endangered Species Act (ESA), as amended (16 USC 1531 et. seq.) requires federal agencies, in consultation with the Secretaries of Interior (represented by the US Fish and Wildlife Service) and Commerce (represented by the National Marine Fisheries Service), to insure that any action authorized, funded, or carried out by such agency is not likely to jeopardize the continued existence of any endangered or threatened species, or result in the destruction or adverse modification of the critical habitat of such species.

The Coastal Zone Management Act of 1972

The Coastal Zone Management Act (16 United States Code (USC) 1451 et. seq.) authorizes a federal program for the effective management, beneficial use, protection and development of the coastal zone. The act requires the USACOE to coordinate permit review and federal projects with all state level coastal zone review agencies. Under this act, coastal states are required to formulate a management program for the land and water resources of its coastal zone, which extends out to the seaward limit of the territorial sea, and submit it for approval to the Secretary of Commerce. In 1977, the California Coastal Management Program was approved.

Overview of the Clean Water Act

California tree frog

Section 404 of the Clean Water Act requires the USEPA, in conjunction with the USACOE, to promulgate guidelines for the discharge of dredged or other fill material to ensure that such proposed discharge will not result in unacceptable adverse environmental impacts to waters of the United States. Section 404 assigns to the USACOE the responsibility for authorizing all such proposed discharges, and requires application of the guidelines in assessing the environmental acceptability of the proposed action. The USACOE and the USEPA also have authority under section 230.80 to specify, in advance, sites that are either suitable or unsuitable for the discharge of dredged or fill material in US waters. In addition, Clean Water Act section 401 provides the States a certification role as to project compliance with applicable water quality standards.

Clean Water Act, Section 401 Certification State of California

The Clean Water Act, section 401 gives the states authority to grant, deny, or waive certification for a federally permitted or licensed activity that may result in a discharge to waters of the United States. Any applicant for a federal permit which conducts any activity which may result in any discharge into the navigable waters of the State must present to the permitting agency a certification (or waiver of certification) from the State that any such discharge will comply with the applicable Clean Water Act provisions of section 301, 302, 303, 306, and 307. The certification issued by the State should establish relevant effluent limitations, monitoring requirements, and standards or performance which become conditions of the federal permit. In California, the responsibility for section 401 certification is assigned to the State Board and regional boards. After review of data submitted by an applicant, and any other information available as to whether the proposed activity will comply with all applicable water quality standards, limitations and restrictions, the Regional Board may:

- Waive water quality certification;
- Issue waste discharge requirements; or,
- Recommend approval with or without conditions, or denial of water quality certification, to the State Board.

In order to grant section 401 certification, the State Board must certify that the proposed discharge will not result in unacceptable adverse environmental impacts to waters of the United States.

For a project to proceed, a waiver of certification or waste discharge requirements must be obtained from the Regional Board or a certification with or without conditions must be obtained from the State Board, indicating the Board's concurrence with the decision that the proposed action is not expected to cause a violation of the State's water quality standards.

STATE STATUTES AND REGULATIONS

The State of California has several programs that parallel or overlap many of the listed federal Acts. Relevant state statutes and regulations include the following:

- Water Code, Division 7 (Porter-Cologne Water Quality Control Act);
- State Board and Regional Water Quality Control Board Plans and Policies;
- Water Code, Division 4 (California Bay Protection and Toxic Cleanup Act);
- California Fish and Game Code;
- California Environmental Quality Act; and
- California Coastal Zone Management Act.

The primary statutory state law pertaining to the regulation of water quality and sediment control issues is the Porter-Cologne Water Quality Control Act which is contained in Division 7 of the Water Code.

California Water Code, Division 7 (Porter-Cologne Water Quality Control Act)

Dredging and dredged material disposal is an ongoing activity at harbors within the San Diego Region. The discharge of dredged or fill material which comes within the purview of section 404 of the federal Clean Water Act is not subject to regulation under the NPDES permit program (Clean Water Act section 402). However, if the project involves the discharge or potential discharge of waste (e.g. dredge spoils, dredge spoil return water, etc.) which may adversely impact water quality, then the discharge may be regulated through the issuance of WDRs. WDRs are issued by the Regional Board pursuant to the Porter-Cologne Water Quality Control Act.

The Regional Board is concerned with turbidity, dissolved oxygen depletion, and other physical, chemical, and biological parameters in the receiving waters which are impacted by dredge/fill projects. In recent years, there has also been concern about the concentrations of chemicals in the material to be dredged. Harbor areas may contain high levels of contaminants in bottom sediments due to navigational use, and due to wastes from urban, industrial, and riverine sources. For projects involving dredging the proponent is required to submit a Report of Waste Discharge (RWD) in application for WDRs. The RWD must include a characterization of the material to be removed to determine whether the proposed project is expected to meet all applicable water quality standards, limitations, restrictions and discharge prohibitions. The decision to issue or waive WDRs for dredging projects is made on a case-by-case basis regardless of dredge spoil volume. Disposal of dredge material at authorized open-ocean disposal sites (e.g., LA-5 Ocean Dredged Material Disposal Site) fall under the jurisdiction of the USEPA and the USACOE. However, because of the potential threat to water quality due to dredging operations, the Regional Board may still issue a WDR for the actual dredging portion of the project.

Adopted WDRs typically require monitoring for dissolved oxygen, turbidity and, where concentrations of chemicals in the sediments are high, monitoring for chemical constituents. Monitoring may be required of the receiving water at the dredge site or at the disposal site(s), and of the dredge spoil return water if applicable.

Enforcement Process for Contaminated Sediment

Dredging is often part of the remediation process for contaminated sediments in marine waters. The Regional Board under the authority of the Water Code section 13304 may issue a cleanup and abatement order to require an identified responsible party which caused the discharge of chemical constituent(s) present in a contaminated sediment to remediate or effect cleanup of the contaminated sediment.

Specific directives of cleanup and abatement orders issued for remediation or cleanup of contaminated sediments typically direct the responsible party to:

- Quantify the lateral and vertical extent of the contaminated sediment;
- Examine the engineering feasibility of the following alternative sediment cleanup/ remediation strategies;
  - ✓ Complete removal of all contaminated sediment;
  - ✓ Removal or remediation of contaminated sediment to a level that will conform with water quality objectives and protect/ restore beneficial uses; and
  - ✓ No action alternative level - The "no action" alternative level involves reliance upon natural processes for the remediation of contaminated sediment sites;
- Examine the cost of sediment cleanup/ remediation to various cleanup/ remediation levels; and
- Examine the environmental consequences of sediment cleanup/ remediation to various cleanup/remediation levels.

State Water Resources Control Board and Regional Water Resources Control Board Plans and Policies

State plans and policies which affect dredging and disposal of dredge spoil include the Ocean Plan, the (Resolution No. 74-43), the Basin Plan, and any other applicable plans or policies.

Ocean Plan

The Ocean Plan establishes general requirements for waste discharges which could affect state ocean waters. For dredge/fill projects, this may include discharges associated with dredging operations, dredge spoils disposal including beach replenishment, or discharge of dredge spoil return water. The Ocean Plan requirements are incorporated into WDRs issued by the Regional Board for dredge/fill projects.

Water Quality Control Policy for the Enclosed Bays and Estuaries of California

This policy requires that dredge spoils to be disposed of in bay and estuarine waters must comply with federal criteria for determining the acceptability of dredged spoils to marine waters, and must be certified by the State Board or Regional Board as in compliance with state plans and policies. Dredging must also comply with applicable discharge prohibitions contained in the policy (i.e., the policy prohibits the direct or indirect discharge of silt, sand, soil, clay, or other earthen materials from onshore operations including mining, construction, agriculture, and lumbering, in quantities which unreasonably affect or threaten to affect beneficial uses).

California Bay Protection and Toxic Cleanup Act

The California Bay Protection and Toxic Cleanup Act (Water Code, Division 4, Chapter 5.6, sections 13390-13396) requires the Regional Board to identify and characterize toxic hot spots in bays and estuaries and ocean waters of the state and plan for cleanup or remediation of the sites. Furthermore, CWC section 13396 states that no person shall dredge or otherwise disturb a toxic hot spot without first obtaining Clean Water Act section 401 certification or WDRs. Dredging projects involving removal or disturbances of sediments at toxic hot spots must meet the following conditions to the satisfaction of the Regional Board:

- The polluted sediment will be removed in a manner that prevents or minimizes water quality degradation.
- Polluted dredge spoils will not be deposited in a location that may cause significant adverse effects to aquatic life, fish, shellfish, or wildlife or may harm the beneficial uses of the receiving waters, or does not create maximum benefit to the people of the state.

- The project or activity will not cause significant adverse impacts upon a federal sanctuary, recreational area, or other waters of significant national importance.

California Coastal Zone Management Act

The California Coastal Zone Management Act requires that the dredging of coastal waters and estuaries be limited where feasible to maintaining navigational depths [section 30233(a)(2)]. Section 30233(b) further encourages the transportation of dredged material so generated and determined to be suitable for beach replenishment to appropriate beaches or into suitable long shore current systems.

California Fish and Game Code

Dredging operations and the disposal of dredge spoil and dredge spoil return water are subject to applicable sections of the California Fish and Game Code, especially those pertaining to:

- Water pollution (Division 6, Chapter 2, section 5650);
- Endangered species (Division 3, Chapter 1.5, sections 2050 - 2098); and/ or the
- Alteration of any river, stream or lake (Division 2, Chapter 6, section 1601 and section 1603).

California Environmental Quality Act of 1973

The Regional Board may not adopt WDRs for a dredge/fill project until the California Environmental Quality Act (CEQA; P.R.C. 21000-21177) requirements have been satisfied. CEQA requires full public disclosure of a project and the assurance that environmental factors are considered in the decision making process. CEQA requires one of the following:

- An Environmental Impact Report;
- A Categorical Exemption; or
- A Negative Declaration.

HISTORY OF DREDGE AND FILL PROJECTS

SAN DIEGO BAY

San Diego Bay Bridge

Dredging of San Diego Bay has occurred for a variety of reasons. San Diego Bay is a major port for commercial and military vessels. In order to provide adequate water depths for navigation and berthing of vessels, dredging projects are required from time-to-time to maintain existing water depths or to increase depths to accommodate these vessels. Significant dredging first occurred within San Diego Bay in the early 1900's.

The volume of material dredged from San Diego Bay over the years is estimated to be between 180 and 190 million cubic yards (mcy) (Smith, 1977 from US Navy, Sept. 1992). About 5 to 8 mcy was disposed at ocean dumping sites, about 35 mcy was placed along Silver Strand beach, and about 147 mcy was used around the Bay as fill. Most of this material was placed prior to 1970. During 1992 and 1993, there were a total of fifteen recent, ongoing, and future dredge and fill projects in San Diego Bay for a total volume of about 3.7 mcy. The US Navy anticipates dredging an additional 13 mcy through 1998.

OTHER AREAS

There is on-going maintenance dredging in other areas throughout the San Diego region.

These areas include:

- Agua Hedionda Lagoon;
- Mission Bay; and
- Oceanside Harbor.

Mission Bay and San Diego River
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California Coastal Records Project www.californiacoastline.org

Additional areas which have dredging projects scheduled include the following:

- Batiquitos Lagoon;
- Murrieta Creek;
- San Marcos Creek; and
- Santa Margarita River.

DISPOSAL OF DREDGED MATERIAL

Disposal of dredged material is a necessity whenever a dredging project is undertaken. There are alternatives for disposal available within the San Diego Region, including several which can yield significant environmental benefits. However, disposal of dredged material can be a significant problem when there is toxic contamination of the dredged materials. Prior to dredging, physical, chemical, and biological testing of the sediment have been required in order to determine the appropriate alternative for disposal of the dredged material. Potential alternatives for the disposal of dredged material from San Diego Bay include:

- Beach replenishment;
- Habitat restoration/ enhancement;
- Ocean disposal;
- Incineration;
- Upland disposal without treatment;
- Upland disposal with treatment;
- Confined aquatic disposal; and
- Reuse sites such as capping.

Physical Characteristics of Dredged Material

Evaluation of the physical characteristics of sediments proposed for discharge is necessary to determine potential environmental impacts of disposal, the need for additional chemical or biological testing, as well as potential beneficial use of the dredged material. The physical characteristics of the dredged material include: particle-size distribution, water content or percent solids, specific gravity of solids, and plasticity characteristics. The sediment physical characteristics should also be evaluated from the standpoint of compatibility with different kinds of biological communities likely to develop for the disposal environments under consideration.

Chemical Characteristics of Dredged Material

The initial screening for contamination is designed to determine, based on available information, if the sediments to be dredged contain any contaminants in forms and concentrations that are likely to cause unacceptable impacts to the environment. During this screening procedure, specific contaminants of concern are identified in a site-specific sediment so that any subsequent evaluation is focused on the most pertinent contaminants.

Physical behavior of the material at the disposal site

Physical testing and assessment should focus on both the short-term and long-term physical behavior of the material. For open-water alternatives, these assessments might include an analysis of water-column dispersion, mound development, and long-term mound stability or dispersion. For confined alternatives, these assessments might include an analysis of solids retention and storage requirements during disposal and long-term consolidation behavior in the confined disposal facility.

Any contaminant testing should focus on those contaminant pathways where contaminants may be of environmental concern, and the testing should be tailored to the available disposal site. For open-water alternatives, contaminant problems may be related to either the water column or benthic environment, and the appropriate testing and assessments would include required Clean Water Act or MPRSA testing. For confined sites, potential contaminant problems may be either water quality related (return water effluent, surface runoff, and ground water leachate), contaminant uptake related (plant or animal), or air related (gaseous release).

Traditional locations for disposal of non-contaminated dredged material have included nearshore ocean waters along Silver Strand, in-bay waters of the Naval Amphibious Base Coronado, and the LA-5 Ocean Dredged Material Disposal Site (LA-5).

Dredging permits issued during the past twenty years have allowed about 10 mcy of material to be disposed either on Silver Strand beaches or LA-5. Chemical testing data for projected future US Navy projects suggest that 92 percent of the material planned to be dredged from San Diego Bay will qualify for placement at either habitat enhancement sites, Silver Strand beaches or at LA-5.

Material which is not physically compatible with the receiving disposal site may qualify to be disposed of at LA-5. Material which cannot meet either the 404(b)(1) Guidelines or the USEPA ocean dumping criteria must be disposed in a different manner.

Beach Replenishment

Shore erosion is a major concern along the coast of the San Diego Region. Beach replenishment is usually accomplished by dredging sand from inshore or offshore locations and transporting the sand by truck, by split-hull hopper dredge, or by hydraulic pipeline to an eroding beach (e.g., Silver Strand beach). These operations may result in displacement of the substrate, changes in the topography or bathymetry of the borrow and replenishment areas, and destruction of nonmotile benthic communities. However, a well-planned beach nourishment operation can minimize these effects by taking advantage of the resiliency of the beach and nearshore environment and its associated biota, and by avoiding sensitive resources. When dredged material is used for beach replenishment it should closely match the sediment composition of the eroding beach and be low in fine sediments, organic material, and pollutants. The USACOE requires that dredged sediments proposed for placement on a beach must be:

- Particles mostly greater than 74 microns (i.e., sand, gravel or rock);
- Compatible with sediments on the receiving beach; and
- Substantially the same as the disposal site.

Generally, the disposal of clean, sandy material on beaches poses no present problem in terms of sediment quality, quantity, or feasibility. In fact, to be consistent with the California Coastal Management Plan, every effort must be made to beneficially use sandy material for beach nourishment or habitat restoration/ enhancement.

Habitat Restoration/ Enhancement

Restoration/ enhancement of wetlands is an alternative that can benefit the environment. In general, restoration of a former wetland is more likely to be successful than creation of a new wetland where none had existed previously. In selecting a site, alteration of substrate and changes in circulation and sedimentation patterns should be considered. In general, the material used for wetland restoration should remain water-saturated, reduced, and near neutral in pH. These characteristics have a great influence on the environmental activity of any chemical contaminants which may be present.

Ocean Disposal

The ocean water disposal technique involves placing the dredged sediment in open ocean waters at an USEPA approved site. The suitability of dredged sediment for open-water disposal is evaluated by effects-based testing as there are no sediment criteria.

In situations where the contaminated sediment will not meet USEPA's or the Corps of Engineers' criteria for ocean disposal, the sediment must be treated to meet those criteria by physical, chemical, biological, or thermal treatment methods.

LA-5 Ocean Dredged Material Disposal Site

LA-5 received final designation from the USEPA in 1991. This site has been used for the disposal of dredged material since the 1970's and has no capacity or dumping rate restrictions. About 4 mcy were disposed there by the USACOE between 1977 and 1987. About 2.5 mcy were deposited by the US Navy, the National Steel and Shipbuilding Corporation, and Southwest Marine, Inc. during that same period (USEPA, 1988). The LA-5 site is a non-dispersive open water disposal site. Most of the material placed here is intended to remain on the bottom following placement. This site is located 11 km (5.4 nm) southwest of Point Loma on the continental shelf in 147 to 200 m (80 to 110 fm) of water. The center coordinates of the site are 32º 36' 83" North latitude and 117º 20' 67" West longitude, with a radius of 910 m (1,000 yd).

Upland (Landfill) Disposal without Treatment

Upland disposal is the process of placing dredged material into or onto a properly permitted solid waste disposal facility or landfill, or into a structure specifically designed to accept dredged material. This upland disposal alternative is used when the dredged material does not qualify for any aquatic disposal alternative.

Upland (Landfill) Disposal with Treatment

The landfill disposal with treatment technique refers to situations where the contaminated sediment will not meet state criteria for landfill disposal without the employment of physical, chemical, biological or thermal treatment methods.

Confined Disposal

Confined disposal is placement of dredged material within diked nearshore or upland confined disposal facilities via pipeline or other means. Confined disposal facilities are designed and operated to provide adequate storage capacity for meeting dredging requirements and to maximize efficiency in retaining the solids. If contaminants are present in the dredged material, then control of contaminant releases is important in the design and operation of the confined disposal facility. In most cases confined disposal facilities must be used over a period of many years, storing material dredged periodically over the design life. Long-term storage capacity of these confined disposal facilities is therefore a major factor in design and management. Once water is drained from the confined disposal facility following active disposal operations, natural drying forces begin to dewater the dredged material, adding additional storage capacity.

Reuse Sites – Capping

Capping can be done in place or through the controlled accurate placement of contaminated material at an open water disposal site. Capping in place is a type of non-removal action and refers to the placement of a clean cover material over the contaminated sediment. Capping can also be done by the accurate placement of contaminated material at an open water disposal site followed by a covering or cap of clean isolating material.

In both cases, the purpose of the cover material is to minimize or prevent the migration of contaminants from the sediment to the water column. In remedial actions involving capping, monitoring is needed to ensure that the integrity of the cap is maintained. The key elements of the monitoring program may include the monitoring of:

- Changes in cap thickness;
- Erosion around cap boundaries; and/ or
- Possible leakage of contaminants from the cap.

PROBLEMS POSED BY DREDGING SEDIMENT / CONTAMINATED SEDIMENT

Many chemical substances discharged into marine waters tend to become attached to sediment particles and thus accumulate to high concentrations in benthic sediments. The dredging process can disturb bottom sediments leading to the release of pollutants into the water column by resuspension of contaminated sediment particles; dispersal of interstitial water in the sediment pores; and desorption of chemicals from the contaminated sediment. Common toxic constituents of many sediments include ammonia, low dissolved oxygen and hydrogen sulfide.

ENVIRONMENTAL THREAT ASSOCIATED WITH CONTAMINATED SEDIMENTS

Benthic marine sediments support biological communities which reside there (e.g., clams, worms, bottom feeding fish), and provide spawning habitat for many pelagic species (e.g., invertebrates and fish). Elevated concentrations of chemicals in the sediment may cause acute mortality or affect the reproductive behavior, egg hatching characteristics, and early life development of these organisms. In addition to causing acute mortality and abnormal development, contaminated sediments can also lead to the accumulation of contaminants in organisms due to the effects of bioaccumulation. In addition, biomagnification of the contaminants can occur in the food chain when small contaminated organisms are consumed by higher trophic level species including man.

The threat to the public health from contaminated sediments centers around three principal pathways of exposure:

- Consumption of fish and shellfish contaminated by chemicals in the sediment through the processes of bioaccumulation and biomagnification;
- Direct contact with contaminated sediments by people; and
- Incidental ingestion of contaminated sediment or associated waters by people.

DISPOSAL OF CONTAMINATED MATERIAL AND DREDGE SPOIL RETURN WATER

After removal of the contaminated material from the water, the contaminated material must be separated from the slurry to attain two distinct waste streams, the concentrated contaminated material and the dredge spoil return water. The methods for separating the material solids from the water include the use of settling basins, clarifiers, impoundment basins, screens and cyclones. The dredge spoil return water consists of a substantially liquid waste stream that may need to be subsequently treated by physical, chemical or biological methods for removal of dissolved and suspended pollutants.

DISCHARGES OF WASTE TO LAND

Discharges of solid, semi-solid, and liquid wastes to landfills, waste piles, surface impoundments, pits, trenches, tailings ponds, natural depressions and land treatment facilities (collectively called "waste management units") have the potential to create significant pollution sources affecting water quality. Unlike surface waters, which often have the capacity to assimilate discharges of wastes, ground waters have little or no assimilative capacity. This is due to slow contaminant migration rates, lack of aeration, minimal biological activity, and laminar flow patterns. Waste containing elevated pollutant concentrations can require containment in waste management units or active treatment for extended periods to prevent waste migration and impairment of the underlying ground water quality. The pollutants may continue to affect water quality long after the

discharge has ceased, either because of continued leachate or gas discharges from the unit, or because pollutants have accumulated in underlying soils from which they are gradually released to ground water.

Landfills for disposal of municipal or industrial solid waste (solid waste disposal sites) are the major categories of waste management units in the Region. Surface impoundments are also used for storage or evaporative treatment of liquid wastes, waste piles for the storage of solid wastes, and land treatment units for the biological treatment of semi-solid sludge from wastewater treatment facilities. Sumps, trenches, and soil depressions have also been used in the past for liquid waste disposal. The Regional Board issues waste discharge requirements to ensure that these discharges are properly contained to protect the Region's water resources from degradation, and to ensure that dischargers implement effective monitoring to verify continued compliance with all applicable requirements.

Waste Management Units may be subject to concurrent regulation by other state and local agencies responsible for land use planning, solid waste management, and hazardous waste management. "Local enforcement agencies" (LEAs) implement the State's solid waste management laws and local ordinances governing the siting and operation of solid waste disposal facilities (usually landfills) with the concurrence of the California Department of Resources Recycling and Recovery (CalRecycle). CalRecycle also has direct responsibility for review and approval of plans for closure and post-closure maintenance of nonhazardous solid waste landfills. The Department of Toxic Substances Control (DTSC) issues permits for all hazardous waste management treatment, storage, and disposal facilities (which include incinerators, tanks, and warehouses where hazardous wastes are stored in drums as well as landfills, waste piles and surface impoundments). The State Board, Regional Boards, CalRecycle, and DTSC have entered into a Memorandum of Understanding to coordinate their respective roles in the concurrent regulation of these discharges.

The laws and regulations governing discharges of hazardous and non-hazardous wastes have been revised and strengthened over the past decade. The discharge of municipal solid wastes to land are closely regulated and monitored; however, some water quality problems have been detected and are being addressed. Past monitoring efforts under the State and Regional Boards' Land Disposal and SWAT programs revealed that discharges of municipal solid wastes to unlined landfills have resulted in ground water degradation and pollution by volatile organic constituents (VOCs) and other waste constituents. VOCs are components of many household hazardous wastes and certain industrial wastes that are present within municipal solid waste streams. VOCs can easily migrate from landfills either in leachate or by vapor-phase transport. Clay liners and natural clay formations between discharged wastes and ground waters are largely ineffective in preventing water quality impacts from municipal solid waste constituents. In a recently adopted policy for water quality control, the State Board found that "research on liner systems for landfills indicates that (a) single clay liners will only delay, rather than preclude, the onset of leachate leakage, and (b) the use of composite liners represents the most effective approach for reliably containing leachate and landfill gas" (State Board Resolution No. 93-62, Policy for Regulation of Discharges of Municipal Solid Waste).

The USEPA adopted federal regulations under Subtitle D of the Resource Conservation and Recovery Act (RCRA) which require the containment of municipal solid wastes by composite liners and leachate collection systems. Composite liners consist of a flexible synthetic membrane component placed above and in intimate contact with a compacted low-permeability soil component. This liner system enhances the effectiveness of the leachate collection and removal system and provides a barrier to vapor-phase transport of VOCs from the unit. Regional Boards and CalRecycle are implementing these new regulations in California under a policy described in State Board Resolution No. 93-62. The State Board developed revised regulations under

CCR, Division 2, Title 27, Solid Waste, to fully implement water quality-related portions of the RCRA Subtitle D federal regulations. While a single composite liner of the type that can be approved under RCRA Subtitle D regulations is a significant improvement over past municipal solid waste containment systems, it should be noted that single composite liners will not necessarily provide complete protection for ground water resources.

CALIFORNIA CODE OF REGULATIONS TITLE 27 AND TITLE 23, CHAPTER 15

Discharges of wastes to land include treatment, storage, or disposal:

- The regulations governing discharges of non-hazardous wastes to land in California Code of Regulations (CCR) Title 27, Division 2 cover landfills, surface impoundments, waste piles, land treatment units, mining waste management units and confined animal facilities.

- The regulations governing discharges of hazardous wastes to land in CCR, Title 23, Division 3, Chapter 15 cover landfills, surface impoundments, and waste piles.

In addition, actions to clean up and abate conditions of pollution or nuisance at contaminated sites[9] are covered by relevant portions of the regulations where contaminated materials are taken off-site for treatment, storage, or disposal and, as feasible, where wastes are contained or remain on-site at the completion of cleanup actions. The regulations classify wastes according to their threat to water quality, classify waste management units according to the degree of protection that they provide for water quality, and provide siting, construction, monitoring, corrective action, closure and post closure maintenance criteria. The applicable regulatory requirements are minimum standards for proper management of each waste category. These regulations require the complete containment of wastes which, if discharged to land for treatment, storage or disposal, have the potential to degrade the quality of water resources. The Regional Board may impose more stringent requirements to accommodate regional and site-specific conditions.

The applicable regulations define waste types including hazardous wastes, designated wastes,[10] nonhazardous wastes and inert wastes as shown in Table 4-6.

Chapter 15 required the review and update of waste discharge requirements for all nonhazardous waste treatment, storage, and disposal sites by July 1, 1994. As of 2014, the San Diego Region has two hazardous waste disposal sites (Class I), which are the Otay Class I Landfill and former Omar Rendering Class I Landfill. Designated wastes (Class II), nonhazardous solid wastes (Class III) and the management of inert wastes are regulated by the Regional Board.

The regulation of nonhazardous solid waste disposal sites (Class III) has been ongoing by the Regional Board since the early 1960's. Many of the small older sites have closed, and waste is now being disposed at large regional sanitary landfills. The Regional Board's main actions at nonhazardous solid waste facilities are review of Joint Technical Documents (JTDs) for the review and revision of waste discharge requirements for the active sites to assure consistency with the current regulations. These actions include review of proposed engineering design and construction plans for liner systems, leachate collection and removal systems, storm water conveyance systems, etc. and construction quality assurance (CQA) documents for new expansions of operating waste containment units and landfill cover systems at closing units; defining the levels of designated wastes, the upgrading of water quality monitoring systems to determine if water quality protection standards are violated; establishing corrective action programs where standards are violated; and review and oversight of the development and implementation of facility closure plans.

[9] Also see State Water Board Policy Resolution No. 92-49 (Chapter 5)

[10] Also see Water Code section 13173

Table 4 – 6. Landfill Classifications

Disposal Site Classification	Definitions of Waste Types (California Code of Regulations, Title 27, Division 2, section 20220 et. seq.)	Examples
Class I Hazardous Waste	(a) Hazardous waste is any waste which, under Division 4.5 of Title 22, is required to be managed according to Division 4.5 of Title 22. (b) Hazardous waste shall be discharged only at Class I waste management units which comply with the applicable provisions unless wastes qualify for a variance under section 25143 of the Health and Safety Code. (c) Waste which have been designated as restricted wastes by DTSC pursuant to section 66268.29, of Title 22 shall not be discharged to waste management units after the restriction dates established by Article 2, Chapter 18, Division 4.5 of Title 22 unless: (1) Such discharge is for retrievable storage; and (2) DTSC has granted a variance from restrictions against land disposal of the waste under section 66268.29 of Title 22.	Materials that contain high concentrations of pesticides, certain solvents, and PCBs are examples of hazardous wastes.
Class II Designated Waste	(a) Designated waste is defined as: (1) Nonhazardous waste which consists of or contains pollutants which, under ambient environmental conditions at the waste management unit, could be released at concentrations in excess of applicable water quality objectives, or which could cause degradation of waters of the state. (2) Hazardous waste which has been granted a variance from hazardous waste management requirements pursuant to section 25143 of the Health and Safety Code. (b) Wastes in this category shall be discharged only at Class I waste management units in compliance with Chapter 15 or at Class II waste management units which comply with the applicable provisions of Title 27 and have been approved for containment of the particular kind of waste to be discharged. Decomposable wastes in this category may be discharged to Class I or II land treatment waste management units.	Materials with high concentrations of biological oxygen demand (BOD), hardness, or chloride. Inorganic salts and heavy metals are "manageable" hazardous wastes.
Class III Nonhazardous Solid Waste	(a) Nonhazardous solid waste means all putrescible and nonputrescible solid, semi-solid, and liquid wastes, including garbage, trash, refuse, paper, rubbish, ashes, industrial wastes, demolition and construction wastes, abandoned vehicles and parts thereof, discarded home and industrial appliances, manure, vegetable or animal solid and semi-solid wastes and other discarded solid or semi-solid waste: provided that such wastes do not contain wastes which must be managed as hazardous wastes, or wastes which contain soluble pollutants in concentrations which exceed applicable water quality objectives, or could cause degradation of waters of the state (i.e., designated waste).	Garbage, trash, refuse, paper, demolition and construction wastes, manure, vegetable or animal solid and semisolid wastes.

Table 4 – 6 (continued). Landfill Classifications

Disposal Site Classification	Definitions of Waste Types (California Code of Regulations, Title 27, Division 2, section 20220 et. seq.)	Examples
Class III Nonhazardous Solid Waste (continued)	(b) Except as provided in section 20220(b) of Title 27, nonhazardous solid waste may be discarded at any classified landfill which is authorized to accent such waste, provided that: (1) The discharger shall demonstrate that co-disposal of nonhazardous solid waste with other waste shall not create conditions which could impair the integrity of containment features and shall not render designated waste hazardous (e.g., by mobilizing hazardous constituents); (2) A periodic load-checking program approved by CalRecycle or Solid Waste LEA and Regional Boards shall be implemented to ensure that hazardous materials are not discharged at Class III landfills. (c) Dewatered sewage or water treatment sludge may be discharged at a Class III landfill under the following conditions, unless DTSC determines that the waste must be managed as a hazardous waste: (1) The landfill is equipped with a leachate collection and removal system; (2) The sludge contains at least 20 percent solids by weight if primary sludge, or at least 15 percent solids if secondary sludge, mixtures of primary and secondary sludges, or water treatment sludge; and (3) A minimum solids-to-liquid ration of 5:1 by weight shall be maintained to ensure that the co-disposal will not exceed the initial moisture-holding capacity of the nonhazardous solid wastes. The actual ratio required by the Regional Board shall be based on site-specific conditions. (d) Incinerator ash may be discharged at Class III landfill unless DTSC determines that the waste must be managed as hazardous waste.	Garbage, trash, refuse, paper, demolition and construction wastes, manure, vegetable or animal solid and semisolid wastes.
Unclassified/ Inert Waste	(a) Inert waste does not contain hazardous waste or soluble pollutants at concentrations in excess of applicable water quality objectives. It does not contain significant quantities of decomposable waste. (b) Inert waste do not need to be discharged to classified management units. (c) Regional Boards may prescribe individual or general waste discharge requirements for discharges of inert wastes.	Concrete, rock, asphalt, plaster, brick, vehicle tires, uncontaminated soils.

The criteria for classifying a nonhazardous waste as a designated waste are based on water quality objectives in the vicinity of the site, the containment features of the solid waste facility, and the solubility/mobility of the waste constituents. Therefore, all owners andoperators of active nonhazardous municipal solid waste facilities in the San Diego Region who wish to receive wastes other than municipal solid waste or inert waste must propose waste constituent concentration criteria above which wastes will be considered designated waste and therefore, not suitable for disposal at their site.

In addition, the Regional Board may revise waste discharge requirements to incorporate reclassification and retrofitting requirements and a revised monitoring program. Closed, abandoned and inactive landfills and other nonhazardous solid waste disposal sites are also subject to the provisions of either Title 27 (section 20080(g) for nonhazardous wastes) or Chapter 15 (for hazardous wastes).

Persons responsible for such sites may be required to develop and implement monitoring, to comply with closure and post-closure maintenance requirements, and to comply with reporting, notification, financial assurances, and record keeping requirements.

Waste Classification

Contaminated soil and other material must be treated or properly disposed in order to minimize the threat to the quality of surface or ground waters.

Waste is classified in California by two separate California Environmental Protection Agency (Cal-EPA) agencies with separate regulatory authority. The California Department of Toxic Substances Control (DTSC) classifies waste as hazardous or non-hazardous based on the threat to public health. The State Board, together with the Regional Boards, classifies non-hazardous waste as "designated", "nonhazardous", or "inert" based on the threat that each poses to the beneficial uses of ground and surface waters, as required by the Porter-Cologne Water Quality Control Act and regulations, water quality control plans and policies set forth by the Regional Board.

As shown in Figure 4-2, the applicable regulations divide waste into four categories which in turn, determine the classes of waste management units to which their discharge is permitted for treatment, storage or disposal. Detailed criteria are contained in Title 22 of the CCR, Division 4.5, for determining whether a waste falls into the hazardous category. These criteria fall under the headings of toxicity, ignitability, reactivity, corrosivity, and listing under the Resource Conservation and Recovery Act (RCRA). Hazardous waste may be discharged only to Class I waste management units which provide both natural geologic and engineered containment features to isolate the wastes from the environment, unless a specific variance has been granted by DTSC from California's hazardous waste management requirements.

"Nonhazardous solid waste" (see Title 27, section 20220, Table 4-6) is the regulatory term for "municipal solid waste" or "refuse" and is characterized as having a significant proportion of putrescible (degradable) matter, stringent moisture limitations, and prohibitions against inclusion of "designated" or "hazardous" wastes. "Nonhazardous solid waste" may be discharged to Class III landfills that protect beneficial uses of nearby waters, but do not provide complete waste containment. The only threat to water quality posed by wastes in the "inert" category is siltation. Paving fragments and non-degradable construction debris are examples of "inert waste". Wastes in this category may be discharged to unclassified waste management units that are located and managed to keep the wastes from entering surface waters or drainage courses.

"Designated waste" is defined in the California Water Code section 13173 and Title 27, section 20210 regulations, and is described in Table 4-6. The second part of the definition refers to those wastes granted a variance by DTSC from Class I disposal.

Dischargers are required to submit an initial analysis of the material by a state-certified laboratory. If the material is deemed hazardous, the discharger is referred to the California Department of Toxic Substances Control. For non-hazardous materials, general WDRs can be issued on a case-by-case basis.

Figure 4-2. Waste Classification Process

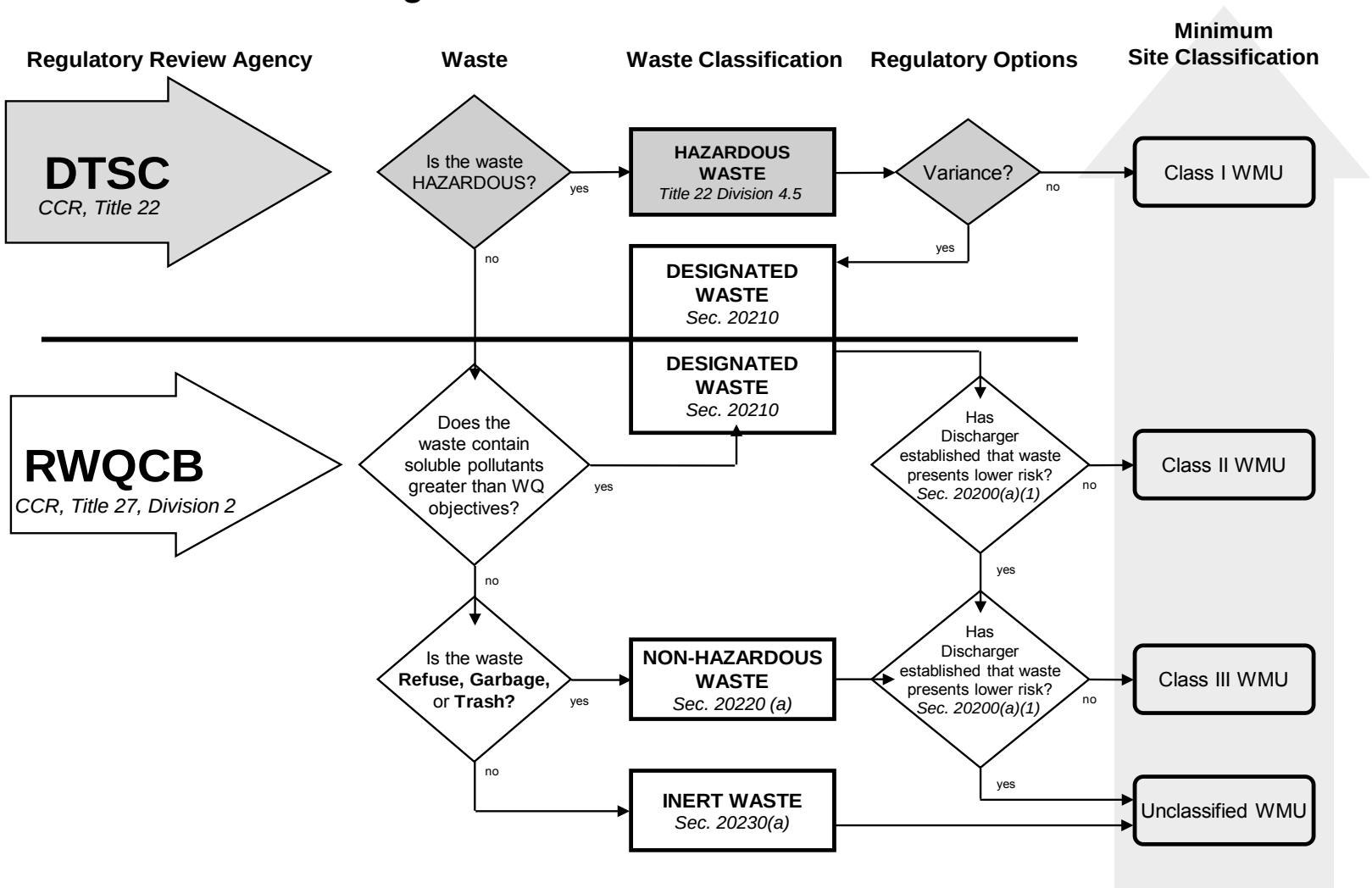

All permitted treatment or disposal includes monitoring and reporting requirements.

Remediation treatment includes biodegradation (by a land treatment process) for hydrocarbon contaminated soil found on a site and a fixation process for metals contaminated soils. In-situ disposal (without treatment) can be allowed, on a case-by-case basis, for material that is not considered to be a threat to surface or ground water.

RESOURCE CONSERVATION AND RECOVERY ACT OF 1976

The Resource Conservation and Recovery Act (RCRA) is the federal law regarding the treatment, storage and disposal of waste to land. The State implements RCRA's Subtitle C (management of hazardous wastes) through the Department of Toxic Substance Control (DTSC) and the Regional Boards. In August 1992, the USEPA formally delegated RCRA Subtitle C program implementation authority to DTSC. As described above, regulation of hazardous waste discharges is also included in Chapter 15. Monitoring requirements were amended in 1991 to make Chapter 15 equivalent to RCRA requirements. Those RCRA equivalent monitoring requirements also carried over into Title 27 in 1997. These monitoring requirements are implemented through the adoption of WDRs for hazardous waste sites covered by RCRA. The discharge requirements are then a part of a state RCRA permit issued by DTSC.

Federal regulations required by the RCRA's Subtitle D (nonhazardous wastes) were adopted for municipal solid waste landfills (40 CFR Parts 257 & 258). The California Department of Resources Recycling and Recovery (CalRecycle) and the State Board are jointly responsible for implementation of Subtitle D in California. The State Board also has the responsibility to implement Subtitle I (Underground Storage Tanks).

SOLID WASTE ASSESSMENT TEST (SWAT)

The Regional Board administers the Solid Waste Assessment Test (SWAT) Program in the Region. The SWAT program requires owners of active or inactive non-hazardous solid waste disposal sites to evaluate the possible migration of hazardous waste or leachate to waters of the state. The SWAT program was initiated with the enactment of Water Code section 13273 in 1985. In addition to requiring site evaluations, the SWAT program also:

- Provides deadlines for implementation of water quality monitoring systems at active solid waste disposal sites;
- Requires the State Board to develop a ranked list of all solid waste disposal sites, on the basis of the threat which they may pose to water quality; and
- Requires operators of active and inactive solid waste disposal sites to implement a water quality monitoring system to verify that the solid waste disposal site has not been affected by leakage, and if there is leakage to take remedial actions under the Land Disposal program.

Program funding was eliminated in 1991, reducing Regional Board review to SWAT sites under regulation due to higher priority work in other Regional Board programs. All sites eventually will be required to complete a SWAT and more sites will be reviewed if more program funding becomes available.

SLUDGE USE AND DISPOSAL

Sludge is a residual by-product of sewage treatment, water treatment, and certain industrial processes. The higher the degree of wastewater treatment, the larger the residue of sludge that must be handled. The treatment and disposal of sludge can be the single most complex and costly operation in a municipal wastewater treatment system. The sludge is

made of materials settled from the wastewater- such as rags, sticks, and organic solids - and of solids generated in the wastewater treatment processes - such as the excess activated sludge created by aeration or the chemical sludge created by a tertiary treatment process.

The quantities of sludge involved are significant. For primary treatment the quantities of sludge may be 2,500 to 3,500 gallons per MG of wastewater treated. When treatment is upgraded to activated sludge, the quantities increase by 15,000 to 20,000 gallons per MG of wastewater treated. Use of chemicals can add another 10,000 gallons. For a typical activated sludge municipal wastewater treatment plant, the amount of sludge to be disposed of is typically about one ton per MG or about 20 pounds per month per home.

Raw sludge usually contains 93 to 99.5 percent water before it is treated further or dewatered. It contains organic solids and dissolved nutrients (e.g., nitrogen and phosphorus), making it useful as a supplement to chemical fertilizers and soil conditioners. Other typical constituents are inorganic ions, such as iron and zinc. While trace amounts of these inorganic ions are used by plants and organisms, some heavy metals that may be present in sewage sludge from household or commercial and industrial sources can be toxic to plants, animals, and humans. Untreated sludge also contains disease-causing organisms (e.g., bacteria, viruses, protozoa, and eggs of parasitic worms). In addition, sewage sludge may contain toxic chemicals from household, commercial, and manufacturing activities that use the sewer system to dispose of these liquid wastes.

Most wastewater treatment plants treat the sludge prior to ultimate use or disposal. Normally this treatment consists of some combination of the following processes:

Conditioning
Treatment of the sludge with chemicals or heat so that the water may be readily separated.

Thickening
Separation of as much water as possible by gravity or flotation process by subjecting the sludge to vacuum pressure, or other drying processes.

Stabilization
Stabilization of the organic solids so that they may be handled or used as soil conditioners without causing a nuisance or health hazard through processes referred to as "digestion".

Reduction
Reduction of solids to a stable form by wet oxidation processes or incineration.

The disposal point alternatives for municipal wastewater sludge in the San Diego Region are limited. Since treated and untreated sludge can contain high concentrations of toxic metals and significant amounts of toxic organic pollutants and pathogens, the USEPA and the Regional Board do not allow the direct discharge of sludge to the ocean or any other surface waters. Air pollution regulations have strict requirements on sludge incineration processes. Sludge disposal to land must be carefully controlled because of potential impacts on ground and surface water quality.

Sludge handling and disposal is regulated under 40 CFR Part 503 as a self-implementing program enforced by USEPA; the State does not have delegated authority for implementing the sludge program. Uses of sludge or sludge by-products and sludge disposal in the Region include:

- Sludge digester methane gas as fuel in gas boilers to generate electricity;
- Sludge as a soil amendment: composting dewatered sludge (pathogens are killed at composting temperatures);
- Sludge as a nutrient source for non-edible crops: direct application to agricultural crops not meant for direct human consumption (mixing, tilling, or injecting sludge into soil);

- Sludge disposal directly in certain landfills;
- Sludge disposal in-situ; and
- Incineration.

Prior to disposal of sludge, an initial analysis by a state certified laboratory is required to determine if there are any hazardous substances in the sludge. Nonhazardous sludge can be disposed of in the above ways, usually under WDRs. Disposal of nonhazardous sludge at Class III landfills is regulated under WDRs and must meet criteria listed in Table 4-6. Landfills are required to report the quantity and chemical composition of all accepted sludge as part of their individual WDRs.

Currently, the Regional Board can regulate handling and disposal of sludge pursuant to Title 27 and DTSC standards. The USEPA has promulgated a policy of promoting those municipal sludge management practices that provide for the beneficial use of sludge while maintaining or improving environmental quality and protecting public health. USEPA is currently developing sludge use and disposal criteria. The USEPA has also proposed a rule which requires states to develop a program to assure compliance with the Federal criteria. The State Board will be developing a state sludge management program consistent with the USEPA policy and criteria.

AUTO SHREDDER WASTE

According to CalRecycle, autoshredder waste is one of the top three materials used for alternative daily cover at nonhazardous waste landfills in California. There is a significant volume of auto shredder waste generated in California every year. CalRecycle reports that approximately 500,000 tons of autoshredder wastes were used as alternative daily cover in 2004, 2008 and 2012. Auto shredder waste is the material that remains after articles such as auto bodies, appliances and sheet metal are shredded and have had their metals removed. The majority of auto shredder waste is being treated to nonhazardous levels, but a significant portion of the waste must be disposed of in a hazardous waste landfill. Eight metal compounds, which include cadmium, total and hexavalent chromium, lead, copper, mercury, nickel and zinc, plus PCBs may cause auto shredder waste to be classified as hazardous. Senate Bill 976 was passed in 1985 which required Regional Boards to prepare a list of Class III, nonhazardous waste landfills as authorized to accept and dispose of auto shredder waste.

POLICY ON DISPOSAL OF SHREDDER WASTE

The State Board Policy on the Disposal of Shredder Wastes (Shredder Waste Disposal Policy Order 87-22) was adopted on March 19, 1987. The Regional Board adopted Resolution No. 88-06 on February 8, 1988 to incorporate that policy into the Basin Plan and enforce the statewide policy (Resolution 87-22). This policy designates West Miramar Landfill, Otay Annex Landfill, and Prima Deshecha Landfills as facilities that are authorized to receive shredder wastes. The policy also permits the disposal of shredded wastes produced by the mechanical destruction of car bodies, old appliances and similar castoffs, into certain landfills under specific conditions designated and enforced by the Regional Boards. Hazardous and nonhazardous shredder waste may be disposed of in appropriate Class III landfills where doing so would not cause water quality impairment. The policy specifies the shredder waste must not exceed PCB levels of 50 milligrams per kilogram (mg/kg). Also, the shredder waste must be disposed on the last and highest lift in a closed disposal cell or in an isolated cell solely designated for the disposal of shredder waste.

CONTROL OF NONPOINT SOURCE POLLUTION

CHRONOLOGY OF NONPOINT SOURCE POLLUTION CONTROL MEASURES

To implement nonpoint source pollution control, several regulatory measures have been taken by federal, state, regional and local government. The following chronology shows the applicable regulatory measure, responsible governmental agency, and year when each measure was enacted or adopted. These regulatory measures will be discussed in the pages that follow.

Regulatory Measure	Responsible Agency	Year
RB Resolution No. 79-25	RB	1979
RB Resolution No. 87-91	RB	1987
CWA, section 201(g)(1)(b)	USEPA	1987
CWA, section 205(j)(5)	USEPA	1987
CWA, section 319(h)	USEPA	1987
CWA, section 402(p)	USEPA	1987
CWA, section 603(c)(2)	USEPA	1987
CZARA, section 6217	USEPA	1990
RB Resolution No. 92-21	RB	1992

THE NEED FOR NONPOINT SOURCE POLLUTION CONTROL

Efforts to improve water quality under the NPDES program have traditionally focused on reducing pollutants from the major point sources, namely municipal sewage and industrial process wastewater. Point sources are defined as discrete conveyances, from which pollutants are, or may be discharged. These point sources received early emphasis because they were obvious sources of pollution and easily linked to degraded water quality conditions. However, as the permitting effort proceeded and control measures for municipal sewage and industrial wastewater were implemented, it became increasingly clear that control and reduction of nonpoint source pollution was also needed in order to restore and protect the nation's waters.

DEFINITION OF NONPOINT SOURCE POLLUTION

In contrast to point sources, nonpoint sources of water pollution are generally defined as sources which are diffuse in nature, usually associated with man's uses of land, and are not subject to the federal NPDES permitting program. Diffuse sources originate over a wide area rather than from a definable point. They often enter receiving waters in the form of surface runoff but are not conveyed by way of pipes or discrete conveyances. By definition, nonpoint sources (like discharges to ground water) are exempt from the federal NPDES permitting program which regulates point sources to surface waters.

CATEGORIES OF NONPOINT SOURCE POLLUTION

Nonpoint source pollution is primarily the result of man's uses of land such as urbanization, roads and highways, vehicles, agriculture, construction, industry, mineral extraction, physical habitat alteration (dredging/ filling),

hydromodification (diversion, impoundment, channelization), silviculture (logging), and other activities which disturb land. Additional categories of nonpoint sources include agricultural return water, marinas and recreational boating, confined animal facilities, resource extraction, channel erosion, resuspension of pollutants from contaminated aquatic sediments, waste disposal sites, septic systems (onsite or subsurface disposal), atmospheric deposition, acid precipitation, seawater intrusion, and geothermal development.

OVERLAPS BETWEEN NONPOINT & POINT SOURCES

The distinction between point source and nonpoint sources is not always clear. As a result, there have always been overlaps and ambiguities between programs designed to control nonpoint sources and those designed to control point sources of pollution. The most important example of such an overlap involves urban runoff and storm water which are clearly diffuse and nonpoint in origin, but become channelized and are ultimately discharged through discrete point source conveyance systems to receiving waters. Because it becomes channelized, urban runoff is legally considered a point source discharge. However, because it originates as nonpoint source, urban runoff and storm water are discussed in the Nonpoint Source section.

SEVERITY OF NONPOINT SOURCE PROBLEM

According to the 1988 National Water Quality Inventory, nonpoint source pollution has become the largest single factor preventing the attainment of water quality standards. The inventory reported over 40% of the nation's rivers and streams are impaired due to siltation and 25% are impaired due to nutrients (such as phosphorus and nitrogen) from nonpoint sources. Agricultural runoff was reported as the major nonpoint pollution source affecting over 50% of impaired rivers. Also, over half of the states reported threats to ground water from nonpoint pollution sources.

NONPOINT SOURCE FUNDING

Innovative ways of financing and implementing nonpoint source projects have been developed. Prior to the 1987 amendments to the Clean Water Act, states used section 106 and 205(j) monies to fund limited nonpoint source activities. The primary federal funding for current nonpoint source program development and implementation includes section 104(b)(3), 205(j)(5), 319(h), 201(g)(1)(b), 603(c)(2), and 604(b) monies as described below.

Section 104(b)(3)

This section established grants for state water pollution control agencies and others for the purpose of conducting and promoting research and investigations related to the causes, effects, extent, prevention, reduction, and elimination of pollution. Such research and investigations are to be carried out in cooperation with federal, state, and local agencies.

Section 205(j)(5)

This section established a set-aside of construction grants for the purposes of carrying out activities under section 319, including program development and the preparation of state assessment reports and management plans. These funds were used for assessment and development activities for California's program through fiscal year 1989.

Section 319(h)

Grant funds authorized by this section can be used for the implementation of nonpoint source management programs but cannot be used for assessment activities. States must have an USEPA approved Assessment and Management Plan before qualifying for these monies. This grant program funds both State and Regional Board programs and provides competitive grants for other agencies to use in implementing nonpoint source measures around the state. These grants include a "non-federal" match of 40 percent which illustrates the intent of Congress and USEPA to have the states make a financial commitment to implementing nonpoint source programs.

Section 201(g)(1)(b)

The 1987 amendments to the Clean Water Act added this section that established a new purpose for which 201 funds could be used, "*...any purpose for which a grant can be made under section 310(h) and (i)*". These funds can be used for either nonpoint source development or implementation projects.

Section 603(c)(2)

The 1987 amendments added Title VI to the Clean Water Act establishing a State Water Pollution Control Revolving Fund Program (SRF). This program provides funding in the form of loans, refinancing, and bond insurance which can be used for (1) construction of publicly owned treatment works, (2) the implementation of state nonpoint source management programs, and (3) the development and implementation of state estuary conservation and management plans. The State and Regional Boards encourage local agencies to apply for these low-interest loans to implement nonpoint source demonstration projects and programs in the Region.

Section 604(b)

States must set aside one percent of their Title VI allotments or $100,000, whichever is greater, to carry out planning programs under 205(j) and 303(e) of the Clean Water Act. These funds can be used under 205(j) planning for nonpoint source related activities. This can become an important source of funding for nonpoint source planning and assessment tasks since these types of activities cannot be carried out under section 319.

SECTION 319 NONPOINT SOURCE MANAGEMENT PROGRAM

To address the nonpoint source pollution problem, Congress added section 319 to the Clean Water Act in 1987. Section 319 requires each state to develop and implement a Nonpoint Source Management Program and to conduct an inventory of the waterbodies in the State which are impaired due to nonpoint source pollution. To fulfill these requirements, the State Board adopted the Nonpoint Source Management Plan (NPSMP) in 1988 which is discussed in Chapter 5 and the Water Quality Assessment in 1990 which is discussed later in this chapter.

The NPSMP established a statewide policy for managing nonpoint source inputs to California's waters and is incorporated by reference into this Basin Plan. The objective of the Nonpoint Source Management Program in California is to measurably improve water quality through the implementation of various BMPs.

Unlike end of pipe treatment for point sources (which is impractical and cost prohibitive for nonpoint sources), the key to managing nonpoint source pollution is pollution prevention. Pollution prevention means stopping the generation of pollution at its source by reducing the use of products containing pollutants. Once pollutants have been generated, pollution control BMPs must be employed to prevent the existing pollution from coming into contact with the waters of the State. BMPs are defined as the schedules of activities, prohibitions, procedures, or other management practices designed to prevent or reduce the discharge of pollutants into receiving waters.

The State and Regional Board(s) believe that the voluntary and widespread application of BMPs is the most effective means by which nonpoint source pollution can be reduced. Accordingly the following three general management options are adopted in the

Nonpoint Source Management Plan to address nonpoint source problems. In general, the least stringent option that successfully protects or restores water quality is employed. More stringent options are only required if water quality improvements are not achieved.

Voluntary Implementation of BMPs

Voluntary implementation of BMPs is encouraged through financial assistance, education, training, technical assistance, and demonstration projects. Grants and loans provide incentives.

Regulatory Based Encouragement of BMPs

Regional Boards require waste discharge requirements for nonpoint sources but waive the requirement if BMPS are effectively implemented. Regional Boards can also enter into Management Agency Agreements (MAAs) with other agencies which specify acceptable BMPs and their implementation. The MAAs are referenced in Regional Board basin plans and become the primary basis for evaluation of compliance. The State Board has existing MAAs with the US Forest Service, the California Board of Forestry and Department of Forestry.

In either case, the Regional Board will generally refrain from imposing effluent requirements on dischargers who are implementing BMPs in accordance with a waiver of waste discharge requirements or an approved management agency agreement. In both cases, the BMPs become the primary mechanism for meeting water quality standards.

Issuance of Permits

Adopt and enforce waste discharge requirements which set effluent limits on the discharge of specific pollutants.

The State Board has also established four program objectives for its Nonpoint Source Management Program, each of which are being implemented in the San Diego Region as follows:

(1) **Implementation of Nonpoint Source Management Plan.** This includes integration of the Coastal Nonpoint Pollution Control Program (which is required under the CZARA and is described below) into the NPSMP.

(2) **Outreach Activities.** Regional Board outreach activities primarily center around the industrial, construction, and municipal participants in the NPDES Storm Water Permit Program (described in a later section). Other activities include participation in Resource Conservation District, technical advisory and planning committee, and lagoon foundation meetings.

(3) **Watershed Assessment Projects.** San Diego's target watershed is Escondido Creek and San Elijo Lagoon.

(4) **Project Tracking and Participation.** The Regional Board has two nonpoint source program contracts. The first contract is entitled the Chollas Creek Watershed Protection Plan project. The Chollas Creek contract has been completed. However, the watershed remains a high priority for the toxic substances monitoring program and for chronic and acute toxicity monitoring. These monitoring programs may identify changes in the water quality due to the education program funded by this contract. The second project involves a nitrate contamination project in the Rainbow Creek watershed. Although the USEPA funded study has not been formally initiated, the Flynn-Rainbow Nursery has converted to a complete tailwater recovery and reuse system. This conversion resulted in a reduction of nitrate loads to the creek. The Rainbow Creek contract will be modified to study other nurseries and sources of nutrients.

ALL NONPOINT SOURCE DISCHARGES ARE CURRENTLY REGULATED

Despite the overlaps between point and nonpoint sources, all nonpoint source discharges are currently regulated under one of two relatively new statutory requirements. These requirements are the NPDES Storm Water Permitting Program required under section 402(p) of the Clean Water Act and the Coastal Nonpoint Pollution Control Program required under section 6217 of the CZARA.

Although the two programs are complementary and exclusive of each other (i.e., one program applies to any discharge that the other does not), their recent implementation has heightened the confusion about point source verses nonpoint source program applicability.

Both the programs are fully discussed in later sections, and a brief overview is included here. In its simplest form, the Clean Water Act section 402(p) program, which is an NPDES permitting program, is designed to regulate storm water and urban runoff (i.e., the nonpoint source discharges that become point sources). Virtually all other nonpoint sources are subject to the Coastal Nonpoint Pollution Control Program under CZARA. Although there are a few minor complications which are also discussed later, the essential concept is that all nonpoint source discharges are currently subject to regulation under either the NPDES Storm Water Program or the Coastal Nonpoint Pollution Control Program.

NPDES STORM WATER PROGRAM

CLEAN WATER ACT SECTION 402(P)

Pursuant to the federal Clean Water Act, many municipalities and most industries in the United States are now required to obtain coverage under an NPDES permit for discharges of storm water runoff. NPDES storm water permits authorize only the discharge of storm water into storm water conveyance systems and prohibit all non-storm water discharges.

DEFINITION OF STORM WATER

The federal regulations (40 CFR 122, 123, 124, November 1990) define storm water as surface runoff from rain or snow melt, including sheet flow. This is a narrow definition which is meant to include the runoff of precipitation only. Storm water does not include water which originates from any source other than precipitation such as process wastewater, cooling waters, and wash waters. These are examples of non-storm water discharges and are not allowed in the storm water conveyance system. A non-storm water discharge is any discharge that is not composed entirely of storm water. Also unacceptable for discharge into the storm water conveyance system is precipitation runoff which has come in contact with pollutants.

THE PROBLEM

Although storm water runoff is part of the natural hydrologic cycle, human activities, particularly urbanization, can result in significant and problematic changes to the natural hydrology of an area. Under conditions of minimal urbanization, water is percolated through pervious surfaces in which soil filtration and biological action remove pollutants. During urbanization, pervious surfaces (i.e., vegetated and natural ground cover) are converted to impervious surfaces (i.e., rooftops and roads) decreasing the infiltration capacity of the soil for both water and pollutants.

As a result, when rain falls on and drains through urban freeways, industries, construction sites, and neighborhoods it picks up a multitude of pollutants. The pollutants can be dissolved in the runoff and quickly transported by gravity flow through a vast network of concrete channels and underground pipes referred to as storm water conveyance systems.

Such systems ultimately discharge the polluted runoff, without treatment, into the nation's creeks, rivers, estuaries, bays, and oceans. In short, urbanization results in a dramatic increase in the volume, velocity, and especially in the pollutant load carried by storm water runoff to receiving waters.

Pollutants typically found in urban runoff include sediment, nutrients (e.g., fertilizers), oxygen-demanding substances (e.g., decaying vegetation), bacteria, viruses, heavy metals, synthetic organics (e.g., fuels, oils, solvents, lubricants), pesticides, and other toxics. These pollutants severely degrade the beneficial uses of surface waters, and threaten the health of both humans and aquatic organisms.

In addition to the pollutants contributed by precipitation runoff, dry weather flows also cause serious degradation of receiving water quality. Dry weather flows, which can be substantial, consist of flows from illicit connections and illegal discharges to the storm water conveyance system. Common examples of the latter include illegally disposed used motor oil and antifreeze.

Studies, most notably the Nationwide Urban Runoff Program (NURP), found pollutants in urban runoff to be similar to those found in sewage and industrial wastewater discharges. Similar concentrations were also observed. Thirty-eight states report urban runoff as a major cause of impaired water quality. Locally, the closure of Southern California beaches following major storm events due to high bacteriological levels in ocean waters is a common occurrence. Clearly urban runoff is a significant water quality problem which deserves attention.

STATUTORY AUTHORITY

To address the storm water/urban runoff problem, Congress added section 402(p) to the Clean Water Act in 1987. This section, and the federal regulations which implement it (40 CFR 122, 123, and 124; November 1990) require NPDES permits for storm water/ urban runoff discharges from municipalities and industries, including construction.

The distinction between point source and nonpoint sources of pollution begins to fade with the requirement for NPDES permits for storm water discharges. Although storm water is clearly diffuse and nonpoint source in origin, it is quickly channelized and ultimately discharged through discrete point source conveyance systems to receiving waters. Because of this, storm water is legally considered a point source discharge and as such is subject to the NPDES permitting program under section 402(p).

MUNICIPAL, INDUSTRIAL, AND CONSTRUCTION PERMITS - COMMON CHARACTERISTICS

As a result of the 1987 Clean Water Act amendments, there are currently three types of storm water permits in California: municipal, industrial, and construction. The municipal permits are areawide permits which were issued by the Regional Board. The industrial and construction permits are statewide general permits which were issued by the State Board. There are three important characteristics which all storm water permits have in common.

Permit Objective

The overall objective of the entire storm water program and all three types of permits is to reduce or eliminate the discharge of pollutants into the storm water conveyance system. Section 402(p) of the Clean Water Act does however establish different performance standards for municipal and industrial discharges. Municipalities must reduce pollutant discharges to the maximum extent practicable, or MEP (see discussion below). Industries (including construction) must implement Best Available Technology (BAT) and Best Conventional Pollutant Control Technology (BCT) to reduce pollutants.

Pollution Prevention

Best Management Practices

The permit objective is achieved by way of pollution prevention. To eliminate pollutants in storm water, one can either clean it up by removing pollutants or prevent it from becoming polluted in the first place. Because of the overwhelming volume of storm water and the enormous costs associated with pollutant removal, pollution prevention is the only approach that makes sense.

Pollution prevention which means stopping the generation of pollution at its source by reducing the use of products containing pollutants, is in fact, the basis of the entire storm water program. Once pollutants have been generated, pollution control best management practices (BMPs) must be employed to prevent the existing pollution from coming into contact with the water of the State. It is important to point out that this approach is distinctly different from the conventional end-of-pipe treatment approach commonly used in water quality regulation.

Pollution prevention is accomplished by way of BMPs which are defined as schedules of activities, prohibitions, procedures, or other management practices designed to prevent or reduce the discharge of pollutants to storm water.

Source control BMPs include practices that eliminate or reduce pollutants at their point of generation, or source, so that they cannot come into contact with storm water. Source controls are non-structural, inexpensive, and can be extremely effective. Because source control BMPs are site specific, they vary widely depending on the application. For example, regulatory powers and land use planning are important BMPs for municipalities. Berming and covering storage areas are excellent BMPs at industrial facilities; reduced vegetation removal and phased development planning are effective at construction sites.

Two source control BMPs are common to all three applications (municipalities, industries, and construction), namely good housekeeping practices (cleaning up and immediately disposing of wastes properly) and most importantly, education (employee and public). Education, which ultimately results in a change in behavior and increased public awareness, is the key to pollution prevention. Many people think that street gutters are plumbed to the sanitary sewage treatment plant and do not realize that they flow instead directly to the bays and ocean without treatment. Education should be conducted in two directions: (1) prevent the discharge of pollutants and (2) reduce the use of materials which are the sources of pollution.

No Numeric Effluent Limits

None of the three types of storm water permits contain numeric effluent limits at this time. The permits are intended to be BMP based and instead contain narrative receiving water limitations.

AREAWIDE MUNICIPAL STORM WATER PERMITS

Under section 402(p) of the Clean Water Act and the federal regulations implementing it, operators of large and medium sized municipal storm water conveyance systems are required to obtain NPDES permits for their storm water conveyance systems at this time. Large and medium sized municipal storm water conveyance systems are defined as those serving populations greater than 250,000 and 100,000, respectively. Smaller municipalities (those under serving populations less than 100,000) have until late 1994 to obtain coverage but may be required to do so earlier if it is determined that (1) they are significant contributors of pollutants to receiving waters or (2) if their storm water conveyance systems are "interrelated" to larger municipal systems. In the municipal permits the Regional Board made a finding that all of the smaller municipalities in the San Diego Region meet both of these criteria (Order No. 90-42). All the municipalities contribute to the condition of water quality impairment (see Table 4-7) and the storm water discharges are "interrelated" in that they jointly and cumulatively contribute significant pollutants to the near coastal waters of San Diego County. Consequently, in July 1990, the Regional Board adopted an areawide Municipal Storm Water Permit for each of the three counties in the Region, San Diego, Riverside, and Orange as follows:

(1) Order No. 90-42 (NPDES Permit No. CA 0108758), Waste Discharge Requirements for Storm Water and Urban Runoff from the County of San Diego and Incorporated Cities of San Diego County and the San Diego Unified Port District.

Table 4 - 7. Receiving Waters Impacted by Pollution from Storm Water and Urban Runoff (Order No. 90-42)

IMPACTED RECEIVING WATER	REFERENCES	PARAMETERS	MUNICIPALITIES / JURISDICTION
San Diego Bay	WQLS, NPSI	PET, TRA, SYN, COL, DEB, MET	City of San Diego, Coronado, National City, Chula Vista, Imperial Beach, La Mesa, Lemon Grove, County of San Diego, San Diego Unified Port District
Mission Bay	WQLS, NPSI	COL, MET	City of San Diego
Santa Margarita Lagoon	WQLS, NPSI	NUT	Camp Pendleton, County of San Diego, County of Riverside, Temecula
Oceanside Harbor	NPSI	TRA, SYN	Camp Pendleton, Oceanside
Buena Vista Lagoon	NPSI	NUT, SED	Oceanside, Vista, Carlsbad, County of San Diego
Agua Hedionda Lagoon	SDHSR	COL	Carlsbad, San Marcos
Batiquitos Lagoon	WQLS, NPSI	NUT, SED	Carlsbad, Encinitas, San Marcos, County of San Diego
San Elijo Lagoon	WQLS, NPSI	NUT, SED	Encinitas, Escondido, Solana Beach, County of San Diego
San Dieguito Lagoon	NPSI, TSMP	SED, TRA	City of San Diego, Del Mar, Solana Beach, County of San Diego, Escondido
Los Penasquitos Lagoon	WQLS, NPSI	NUT, SED	City of San Diego, Del Mar, Poway, County of San Diego
Tijuana River Estuary	WQLS, NPSI	TRA, SYN, DOX, NUT	Tijuana, Mexico, City of San Diego, Imperial Beach
San Diego River	NPSI	SYN, PES, SED	City of San Diego, La Mesa, El Cajon, Santee, County of San Diego
Forester Creek	NPSI	TRA	El Cajon, Santee
Tijuana River	WQLS, NPSI	NUT, DEB, COL, DOX, SYN, PES, TRA	Tijuana, City of San Diego
Lake Hodges	NPSI	NUT, DIS	City of San Diego, Escondido, Poway

*** Abbreviations for Table 4-7:**

REFERENCES

- **WQLS** Water Quality Limited Segment
- **NPSI** Nonpoint Source Inventory Report
- **SDHSR** State DHS Report on Shellfish Contamination in Agua Hedionda Lagoon
- **TSMP** Toxic Substances Monitoring Program elevated values

PARAMETERS

- **COL** Coliform bacteria or other microbes
- **DEB** Debris
- **DIS** Dissolved Solids
- **DOX** Low dissolved oxygen, except when associated with algal blooms caused by nutrients
- **MET** Metals, except trace elements
- **NUT** Nutrients, macro- and micro-nutrients, including algal bloom-low dissolved oxygen syndrome
- **PES** Pesticides, except trace elements, including insecticides, nematocides, herbicides, and fungicides
- **PET** Petroleum distillates
- **SED** Sedimentation/turbidity, including habitat alteration due to sedimentation
- **SYN** Synthetic organics, except herbicides and pesticides
- **TRA** Trace elements: aluminum, beryllium, cadmium, chromium, copper, lead, mercury, manganese, molybdenum, nickel, selenium, silver, titanium, and zinc

(2) Order No. 90-46 (NPDES Permit No. CA 0108766), Waste Discharge Requirements for Storm Water and Urban Runoff from the Riverside County Flood Control and Water Conservation District, the County of Riverside and the Incorporated Cities of Riverside County within the San Diego Region.

(3) Order No. 90-38 (NPDES Permit No. CA 0108740), Waste Discharge Requirements for Storm Water and Urban Runoff from the County of Orange, the Orange County Flood Control District and the Incorporated Cities of Orange County within the San Diego Region.

Included as co-permittees in the above permits are all of the land use regulatory agencies; the county, all incorporated cities within the county, and special districts. For this reason, the municipal permits are referred to as "areawide" permits. As it moves from inland to coastal areas, storm water does not recognize jurisdictional boundaries. Since all municipalities contribute to the cumulative storm water pollution problem, a coordinated, "areawide" approach to managing it is essential, more effective, and far less expensive than numerous individual efforts.

Objective

The objective of an areawide municipal storm water permit is to reduce pollutants in storm water discharges to the maximum extent practicable (MEP). This is a standard used by USEPA for municipal discharges of storm water. Although not specifically defined in the federal regulations, the intent of MEP is to reduce as much as possible the discharge of pollutants. Thus, the municipal dischargers are required to employ whatever BMPs are feasible (i.e., are likely to be effective and are not cost prohibitive). Where a choice is made between two BMPs which provide generally comparative effectiveness, the discharger may choose the least expensive alternative and exclude the more expensive BMP. However, it would not be acceptable either to reject all BMPs which address a pollutant source or to pick a BMP based solely on cost, which would be clearly less effective. In order to reduce pollutants to the MEP many factors including technical feasibility and effectiveness, as well as economic factors, must be taken into consideration.

Permit Requirements

Municipal Storm Water Permits contain the following two major requirements:

(1) Prohibit non-storm water discharges; and

(2) Develop/implement a comprehensive storm water management program. The comprehensive storm water management program must include the following five components:

- BMP program;
- Monitoring and reporting program;
- Illicit connection/ illegal discharge detection program;
- Storm water ordinance or code; and
- A funding source.

Ultimate Responsibility for Quality of Storm Water Discharges (Municipal Regulation of Industry)

Under an areawide municipal storm water permit, municipalities are ultimately held responsible for the quality of discharges from their storm water conveyance systems, including contributions from industrial and construction activities. This provides important incentive for municipalities to regulate these activities occurring within their jurisdiction.

As called for in the federal storm water regulations, the regulation of industrial storm water discharges (including construction) into municipal storm water conveyance systems should be accomplished by a cooperative effort between the Regional Board and the local municipality.

Under a municipal storm water permit, municipalities are required to adopt and enforce ordinances (including ordinances for erosion control) which prohibit the discharge of pollutants to storm water conveyance systems. In order for the municipalities to be in compliance with their municipal permit, it is essential that the municipalities rigorously enforce their ordinances and grading permits and conduct inspections for compliance with both. They are further authorized to impose additional requirements on industry as necessary to ensure compliance with their municipal permit.

GENERAL INDUSTRIAL STORM WATER PERMIT

To reduce the administrative burden of issuing individual permits to the overwhelming number of industries now subject to NPDES storm water permitting, USEPA has initiated a four-tiered strategy for regulating industries. The first tier involves the use of a small number of "general" permits. A general permit is a single permit under which many facilities can obtain coverage (for example, all of the industries in a given type). Under the tiered strategy, the permitting process begins general and becomes increasingly more specific and rigorous over time. Subsequent tiers target specific watersheds, industry types, and finally individual facilities.

Consistent with the tiered approach, the statewide General Industrial Storm Water Permit entitled, "*Waste Discharge Requirement (WDR) for Discharges of Storm Water Associated with Industrial Activities excluding Construction Activities, Order No 91-13 (General Permit No. CAS 000001)*" was adopted by the State Board on November 19, 1991.

Industries Requiring Coverage

As shown below, the federal regulations identify eleven categories of industrial facilities which are required to obtain coverage under an NPDES storm water permit. Ten of the eleven categories are covered under the statewide General Industrial Storm Water Permit. Category x, construction activities, is covered under a separate permit, which will be discussed in a later section. Categories i through ix are considered "mandatory industries" and are required to obtain coverage under the General Industrial Storm Water Permit whether or not they have materials and activities exposed to storm water. Category xi, "*conditional industries*," are only required to obtain coverage under the general permit if they have materials, equipment, or activities exposed to storm water. Six of the categories are defined by narrative descriptions of the industrial activity. The remaining five categories are defined by Standard Industrial Classification (SIC) codes.

(i)	Facilities Listed Under 40 CFR Subchapter N
(ii)	(Heavy) Manufacturing Facilities
(iii)	Oil and Gas/ Mining Facilities
(iv)	Hazardous Waste Treatment, Storage, or Disposal Facilities
(v)	Landfill, Land Application Sites and Open Dumps
(vi)	Recycling Facilities
(vii)	Steam Electric Power Generation Facilities
(viii)	Transportation Facilities
(ix)	Sewage or Wastewater Treatment Works
(x)	Construction Activities
(xi)	(Light) Manufacturing Facilities (with exposure)

In addition to private industry, industrial facilities owned or operated by governmental entities (including federal, state, and municipal facilities) are also required to obtain permit coverage.

When Is Coverage Not Needed

If a facility discharges all of its storm water to a municipal sanitary sewer system or to evaporation ponds, percolation ponds, or dry wells, and if there is no discharge to surface water under any circumstances, coverage under the general permit may not be required.

Permit Requirements

The General Industrial Storm Water Permit and General Construction Storm Water Permit both contain the following three major requirements:

(1) Eliminate non-storm water discharges;

(2) Develop and implement a Storm Water Pollution Prevention Plan. A Storm Water Pollution Prevention Plan (SWPPP) is a site specific plan consisting of all BMPs which will be implemented at a facility to reduce or eliminate the discharge of pollutants to storm water. (It is the most important requirement and the key to source controls); and

(3) Develop and implement Monitoring and Reporting program in accordance with the general permit.

GENERAL CONSTRUCTION STORM WATER PERMIT

Although it is one of eleven industrial categories specified in the federal regulations, construction activities are regulated under a separate general permit in California. The statewide General Construction Storm Water Permit entitled, "*Waste Discharge Requirements (WDRs) for Discharges of Storm Water Runoff Associated with Construction Activity, Order No. 92-08-DWQ (General Permit No. CAS 000002),*" was adopted by the State Board on August 20, 1992.

Definition of Construction

Construction activity includes, but is not limited to clearing, grading, and excavation, as well as building and reconstruction. Construction activity does not include routine maintenance to maintain original line and grade, hydraulic capacity, or original purpose of the facility.

Who Needs Coverage?

In California at this time, discharges of storm water associated with construction activities that result in the disturbance of five acres or more of total land are required to obtain coverage under the general permit. Construction activities disturbing less than five acres are also required to obtain coverage under the permit if they are part of a larger common plan of development or sale. Because of a recent court ruling, it is important to note that the current five acre exemption is subject to change.

Erosion - The Major Construction Concern

Natural erosion processes are greatly accelerated when protective ground cover is removed during construction activities. Studies reveal that the rate of erosion on land where construction activities are occurring is approximately 2,000 times greater than on timber land that has not been logged.

Erosion results in not only the loss of productive soil, which is essentially irreplaceable, but also in severe impacts to water quality. Twenty-one states, including California, report construction site runoff as a major cause of water quality impairment. "Clean sediment" alone is by definition, a pollutant because of its ability to degrade water quality. Although there are many water quality impacts associated with clean sediment, the two most important ones include: (1) increased turbidity and corresponding decreased light transmittance (resulting in reduced biological productivity and adverse effects on aesthetic value); and (2) direct suffocation of benthic (bottom dwelling) communities due to excessive sediment deposition. In addition to these problems, sediment also provides a major transport mechanism for countless other pollutants. First priority should be placed on soil stabilization and erosion prevention, not sediment interception.

Permit Requirements

The General Construction Storm Water Permit contains the same three requirements as the General Industrial Storm Water Permit (see discussion above).

Industries/Construction Are Subject To Municipal Regulation

There is a "double" system of regulation for industrial storm water which is discharged through municipal conveyance systems. Such discharges are regulated by both the statewide general permit (industrial or construction) issued to the discharger and by the municipality subject to the areawide Municipal Storm Water Permit. It is the Regional Board's responsibility to enforce the general permits and the areawide Municipal Storm Water Permit. It is the responsibility of the municipality to enforce its own ordinances. The statewide general permits (industrial and construction) specifically require dischargers to comply with the lawful requirements of local agencies regarding discharges to storm water conveyance systems within their jurisdiction.

HIGHWAY RUNOFF CONTROL PROGRAM

Cars, trucks, and other vehicles are the major contributors to highway runoff pollution. Landscaping, highway maintenance, and highway construction also contribute to highway runoff pollution (see Table 4-8). An essential component of the NPDES storm water program is the implementation of practices for maintaining public highways that reduce impacts on receiving waters from highway runoff.

Highway

However, cities and counties (permittees) do not have jurisdiction over public highways controlled by the California Department of Transportation (Caltrans). To comply with the requirements of the NPDES storm water program, Caltrans must either actively participate as an entity in the Area Wide storm water program, or obtain a separate NPDES permit for storm water discharges for highways under its jurisdiction. Such a program for Caltrans shall include a Storm Water Management Plan which addresses the design, construction, and maintenance of highway facilities relative to reducing pollutants in highway discharges to the maximum extent practicable. The Plan shall include:

- A characterization of Caltrans highway systems, including pollutants, highway layout, and drainage control system in the area;
- A description of existing highway runoff control measures;
- A description of additional highway runoff control measures to enhance pollutant removal; and
- A plan for monitoring the effectiveness of control measures and highway runoff water quality and pollutant loads.

The highway runoff management plan shall specifically address litter control, proper pesticide/ herbicide management, reduction of direct discharges, reduction of runoff velocity, landscape over-watering, use of grassed channels, curb elimination, catch basin maintenance, appropriate street cleaning, establishing and maintaining vegetation, infiltration practices, and detention/ retention practices. Caltrans shall coordinate its urban runoff program with local agencies and existing programs related to the reduction of pollutants in highway runoff.

Table 4-8. Highway Runoff Constituents and their Primary Sources

CONSTITUENT	PRIMARY SOURCES
Particulates	Pavement wear, vehicles, maintenance
Nitrogen, Phosphorus	Atmosphere, roadside fertilizer application
Lead	Tire wear (lead oxide filler material, lubricating oil and grease, bearing wear)
Zinc	Tire wear (filler material), motor oil (stabilizing additive), grease
Iron	Auto body rust, steel highway structures (guard rails, bridges, etc.), moving engine parts
Copper	Metal plating, bearing and bushing wear, moving engine parts, brake lining wear, fungicides and insecticides
Cadmium	Tire wear (filler material), insecticide application
Chromium	Metal plating, moving engine parts, brake lining wear
Nickel	Diesel fuel and gasoline (exhaust), lubricating oil, metal plating, bushing wear, brake lining wear, asphalt paving
Manganese	Moving engine parts
Cyanide	Anticake compound used to keep deicing salt granular (ferric ferrocyanide, sodium ferrocyanide, yellow prussiate of soda)
Sodium, Calcium, Chloride	Deicing salts
Sulfate	Roadway beds, fuel, deicing salts
Petroleum	Spills, leaks or blow-by of motor lubricants, antifreeze and hydraulic fluids, asphalt surface leachate

COASTAL NONPOINT POLLUTION CONTROL PROGRAM

COASTAL ZONE ACT REAUTHORIZATION AMENDMENTS

Imperial Beach

In 1990, Congress amended the Coastal Zone Management Act (CZMA). The amendments are referred to as the Coastal Zone Act Reauthorization Amendments (CZARA). Section 6217, "Protecting Coastal Waters", of CZARA established the Coastal Nonpoint Pollution Control Program. Section 6217 of CZARA requires USEPA to develop, and states to implement, enforceable "management measures" (i.e., BMPs) to control nonpoint source pollution in coastal waters. The definition of the "coastal zone" in California was expanded to encompass the entire state.

Like the NPDES storm water permitting program, implementation of the Coastal Nonpoint Pollution Control Program is still evolving. As of the 1994 Basin Plan update, USEPA has published management measures, which are collectively referred to as the "(g) guidance", pursuant to section 6217(g) of the CZARA. There are six major categories of nonpoint sources addressed by the (g) guidance, including: agriculture sources, forestry, urban areas, marinas, hydromodification projects and wetlands.

The storm water NPDES permitting program under the Clean Water Act and the Coastal Nonpoint Pollution Control Program section under CZARA are intended to be complimentary but exclusive of each other. In other words, the Coastal Nonpoint Pollution Control Program applies only to nonpoint sources that are not currently regulated under an NPDES storm water permit. This includes all of the traditional non-urban nonpoint sources such as agriculture and silviculture and those urban sources which are not currently subject to the NPDES storm water permitting program. Examples of the latter in 1994 include some municipalities with populations under 100,000; construction sites disturbing less than 5 acres; and storm water discharges from wholesale, retail, service, or commercial activities.

The key concept is that all nonpoint pollution sources, both urban and non-urban (including those that become point sources), are currently subject to regulation under either the NPDES Storm Water Permitting Program required under section 402 (p) of the Clean Water Act or the Coastal Nonpoint Pollution Control Program required under section 6217 of the CZARA.

AGRICULTURE

In the San Diego Region, agriculture ranks as the fourth largest industry in the economy and accounts for 1.7 percent of the Region's economy. The coastal and inland valley areas of the county possess a moderate and virtually frost-free climate able to support a variety of sub-tropical crops, making the San Diego area a unique agricultural region. The primary crops being grown for the national and international markets are avocados, citrus, cut flowers, and nursery products. To a lesser extent, local fresh market crops and livestock are produced in the area.

The San Diego County Water Authority (Authority) is the largest agricultural water consuming agency within Metropolitan Water District (MWD), requiring approximately 50 percent of MWD's total agricultural water supply each year. Agricultural water use within the Authority is concentrated mainly in north county agencies such as Rainbow MWD, Valley Center MWD, Fallbrook PUD and Yuima MWD.

Pursuant to the CZARA section 6217 (g), USEPA has identified management measures to protect coastal waters from sources of nonpoint pollution from agriculture. Specifically, the (g) Guidance for agriculture contains management measures to address erosion from cropland, applying nutrients to cropland, applying pesticides to cropland,

confined animal facilities, land used for grazing, and cropland irrigation. The three most significant water quality impacts from agriculture in the San Diego Region are:

- Erosion of agricultural soils;
- Agricultural irrigation return water (salt loading and applied chemicals); and
- Confined animal facilities.

Basic information on each impact is summarized below.

EROSION CONTROL

Erosion is a problem, not only in terms of the loss of agricultural production, but also because it degrades important aquatic habitat. Eroded soils can bury benthic communities, cover spawning grounds, destabilize channel banks and fill sensitive wetland areas. Furthermore, other pollutants are often bound to eroded soils. Under certain conditions, these pollutants may be remobilized into the water column causing problems for human health, wildlife, and aquatic resources.

The State and Regional Boards have adopted narrative standards that prohibit the impairment of aquatic habitat from erosion. However, no specific numeric standard limiting sediment loads has been established. Implementation of effective management practices to control erosion is typically accomplished through the combined efforts of several agencies working with landowners. Local Resource Conservation Districts, with technical assistance from the U.S. Soil Conservation Service, help landowners prevent erosion problems. The University of California, Agricultural Extension Service also assists in developing management practices and informing growers of optimum strategies for soil fertility and stabilization. Additionally, the U.S. Agricultural Stabilization and Conservation Service provides grants and low interest loans to farmers for improvements which retain valuable topsoil in cultivated areas.

AGRICULTURAL IRRIGATION RETURN WATER

Agricultural irrigation return water is the wastewater which runs off or leaches through an irrigated area. The two major concerns with agricultural irrigation return water are salt loading and the release of applied chemicals.

SALT LOADING

Since the water supply in the San Diego Region is generally quite high in salts and the climate is dry, irrigation with this relatively saline water causes salt accumulation in the soil. Crop roots absorb only essentially pure water while leaving dissolved salts behind. If these salts are not leached out by regularly applying more irrigation water than is needed for evapotranspiration, salts accumulate in the root zone and the land eventually becomes too salty for agriculture. However, the saline soils may be reclaimed by leaching. The percolation of the water used to leach salts from the soil can be a serious source of ground water degradation.

The actual effect of irrigation return water on ground water quality in the Region is difficult to determine without further study. The construction of irrigation return water drain tiles to collect and transport return flows is a possible remedial measure that could be implemented in certain portions of the Region. This has not been considered necessary to date and no plans for such construction are presently pending.

APPLIED CHEMICALS

Modern agriculture is based on the extensive use of applied chemicals such as fertilizers, pesticides, and herbicides to obtain high crop yields. The improper use of these applied chemicals may lead to serious degradation of both ground water and surface water quality. Some of the chemicals applied to farm land move down with deep-percolation water from crop root zones and can contaminate underlying ground water. Surface waters are primarily contaminated by the runoff of irrigated agriculture containing sediments, nutrients such as phosphorus and nitrogen, pesticides, and other pollutants.

The release of applied chemicals, into surface and ground waters can have adverse effects on the quality of those waters and the beneficial uses supported by them. Aquatic toxicity, as measured by toxicity bioassay tests, has been found in many waters within the State. The application of agricultural chemicals, in some cases, has been linked directly to this toxicity and is suspect in many other impaired waterbodies. In addition to degradation of the aquatic environment, the contamination of ground and surface waters by pesticides and fertilizers is believed to also pose a threat to human health. Pesticides for example are known to bioaccumulate.

The Basin Plan contains a water quality objective requiring that all waters be maintained free of toxic substances in concentrations that are toxic to human, plant, animal, or aquatic life. The Basin Plan also contains a water quality objective for pesticides requiring that no individual pesticide or combination of pesticides be present in the water column, sediments, or biota at concentrations that adversely affect beneficial uses.

Although the Department of Pesticide Regulation (DPR) controls the application and use of agricultural pesticides, regulation of the quality of agricultural runoff waters is the responsibility of the State and regional boards. The regional boards have adopted water quality standards that apply to all surface waters of the State. Although standards for certain metals and some older pesticides have been adopted, standards for the majority of currently used agricultural chemicals do not exist. Generally, narrative standards which prohibit toxicity and degradation of waterbodies apply to agricultural discharges as do specific toxicity standards. To implement these standards, the regional boards have relied on a number of voluntary efforts and a concerted effort to educate growers on the need to protect waterbodies from the adverse effects of farm chemicals. The State Board also uses grant funds to support implementation of projects which demonstrate improved management practices.

In coordination with DPR, the regional boards have begun to put restrictions on the use of certain agricultural chemicals to address water quality problems. DPR has the responsibility to condition the use of any agricultural chemical to ensure its safe use. Where DPR has been convinced of the significant potential to cause environmental problems, it has established restrictions on the application, release, or timing of pesticide applications. DPR also encourages changes in formulations or in the combinations of pesticides applied in order to minimize water quality problems. An overall integrated pest management program for each agricultural site, rather than sole reliance on pesticides is needed.

There are other reasons to be concerned with the judicious use of agricultural chemicals (in addition to environmental issues). These interests are often concerned with questions of production and profit. To the extent that the application of agricultural chemicals are limited for cost control reasons, these concerns often result in benefits for water quality as well.

The narrative and/or numeric nutrient objectives presented in this Basin Plan are also applicable to irrigation return water. The State Board may require the use of pollutant control techniques to implement irrigation water management in its water rights permits or through Nonpoint Source Management Plan.

Irrigation water management may be implemented through reducing the use of fertilizers and pesticides to levels which minimize their presence in irrigation return water, as well as through the implementation of irrigation systems which reduce the volume of return water.

IRRIGATION WATER

In 1992, two laws were passed which require agricultural water suppliers delivering more than 50,000 AF/Y to prepare water management plans (CWC, sections 10800 and 10904). The plans are to focus on water conservation measures, improved irrigation efficiency, and environmental enhancement. The Department of Water Resources has established an advisory committee to review and study irrigation practices for these purposes. The implementation of conservation plans will likely have a side benefit of reduced erosion as irrigation efficiency improves.

DAIRIES – CONFINED ANIMAL FACILITIES

Dairy

Problems associated with dairy operations in the San Diego Region include ground water mineralization, the addition of nitrates to ground water, surface runoff of biodegradable and suspended material, nuisance odors, the addition of nutrients to adjacent surface water streams and other miscellaneous problems. All dairies in the Region are regulated under waste discharge requirements. These waste discharge requirements implement the regulations for confined animal facilities contained in CCR, Title 27, Division 2, Article 1, sections 22560-22565.

The major requirements contained in waste discharge requirements for dairies are as follows:

(1) Dairies must be designed and constructed to retain all facility wastewater generated, together with all precipitation on, and drainage through manured areas during a 25-year, 24-hour storm.

(2) All precipitation and surface drainage outside of manured areas, including that collected from roofed areas, and runoff from tributary areas during the storm events described in subsection (1) of this section, shall be diverted away from manured areas, unless such drainage is fully retained.

(3) Retention ponds and manured areas at dairies must be protected from inundation or washout by overflow from any stream channel during 20 year peak stream flows. Existing facilities that are protected against 100-year peak stream flows must continue to provide such protection.

(4) New facilities shall be protected against 100 year peak stream flows.

(5) Retention ponds shall be lined with or underlain by soils which contain at least 10 percent clay and not more than 10 percent gravel or artificial materials of equivalent impermeability.

(6) Facility wastewater, collected precipitation and drainage may be discharged to properly operated use or disposal fields or to wastewater treatment facilities approved by the Regional Board.

Regional Board Dairy Waste Management Policy (Resolution No. 87-71)

The Regional Board adopted Resolution No. 87-71, "*A Resolution Adopting Amendments to the Comprehensive Water Quality Control Plan for the San Diego Region*" (Regional Board Dairy Waste Management Policy) on November 16, 1987. On March 17, 1988, the State Board adopted Resolution No. 88-35 approving the Regional Board Dairy Waste Management Policy with a few minor changes.

The Regional Board Dairy policy contained in Resolution No. 87-71 is incorporated below; accordingly Resolution No. 87-71 is superseded.

The Regional Board regulatory program on dairy waste disposal is designed to be a part of the Basin Plan. The program is based upon the following principles to ensure that the goals of the Basin Plan are implemented:

(1) The Regional Board is committed to the reasonable protection of present and future beneficial uses of ground water.

(2) Coordination among state, federal, and local agricultural and regulatory agencies, the dairy industry, local planning and land-use agencies is necessary to resolve potential water quality problems associated with dairies.

(3) Cooperation between this Regional Board and the dairy industry is required when developing and implementing measures to achieve conformance with the Basin Plan ground water objectives.

(4) Comprehensive assessments of salt loading on the ground water basins in the San Diego Region are necessary to develop reasonable and cost effective water quality protection measures for all nonpoint and point sources of waste.

(5) An interim dairy wasteload regulatory program is necessary until the assessment studies noted in Principle 4 are completed. The interim program should provide a simple, region-wide approach to controlling dairy wasteloads, that may be reviewed on a case-by-case basis if necessary. The program should be easy to understand, easy to implement and enforce and provide greater protection of water quality than present practices.

As part of an overall program of dairy waste management, the following measures shall be implemented:

(1) The Regional Board shall continue to enforce all State and Federal water quality laws, and regulations regarding dairy waste treatment and disposal, including CCR Title 27 and USEPA Effluent Guidelines and Standards for feedlots point source category (40 CFR 412).

(2) The Regional Board shall continue to seek funding to conduct the necessary studies and develop computer models to provide an accurate assessment of existing and projected wasteloads in the various ground water basins.

(3) Based upon the results of the studies described in item 2, the Regional Board will revise Basin Plan ground water objectives if warranted and specify or revise wasteload limits that will be appropriate for the point and nonpoint sources of waste, including dairies if necessary.

(4) For an interim period, until the necessary ground water assimilative capacity and wasteload assessment studies are completed, the Regional Board shall limit the disposal of corral manure to dairy disposal land to no more than 3 tons dry weight or 10 cubic yards per acre per year, and to cropland where crops are grown and harvested twice annually, to no more than 12 tons dry weight per acre per year. The Regional Board shall consider manure application higher than the 12 tons per acre per year limit upon demonstration that the crops require the increased manure loadings.

(5) The U.S. Department of Agriculture, Soil Conservation Service, University of California at Riverside, the State and County Departments of Agriculture and other governmental and educational institutions are encouraged to provide dairy operators with the latest technical information regarding waste disposal practices that would result in additional water quality protection.

(6) The local land use and planning agencies are encouraged to conduct long-term planning for addressing water quality issues of new and expanded dairies in the region. The dairy industry is encouraged to provide accurate five-year projections of dairy herds at existing dairies and potential locations for new dairies to the planning agencies and to the Regional Board, so that the Board may include the required Basin Plan studies as part of the Board's triennial review process.

(7) The Regional Board will continue to obtain and review technical information regarding the hydrologic basins and to recommend the update of Basin Plan standards if warranted.

(8) The Regional Board encourages the implementation of water conservation measures at dairies, and the beneficial reuse of dairy farm wastewater that would replace the use of imported water.

EROSION AND SEDIMENT CONTROL

Currently erosion and sediment control is accomplished primarily by way of the municipal and construction storm water permits (see previous discussion).

In 1987, the San Diego Regional Water Quality Control Board implemented a policy for the control of human induced erosion and sedimentation. This policy is presented below. The Regional Board deferred the implementation of regulatory programs for erosion and sedimentation control to local government agencies. The local Resource Conservation Districts have agreements with the Regional Board regarding erosion and sediment control.

Santa Margarita River

Soil erosion resulting from a wide variety of causes, including construction, hillside cultivation and other agricultural activities, non-maintained roads, and off road vehicles may result in serious water quality impacts. The goal of the policy is the protection of water quality through the reduction and prevention of accelerated (man-caused) erosion to the level necessary to restore and protect beneficial uses of receiving waters now significantly impaired or threatened by impairment due to sedimentation through the implementation of the Best Soil Management Practices (BMPs). Construction sites can contribute runoff into storm drains at rates 100 to 2,000 times greater than non-developed sites, due to the large amounts of soil that are usually uncovered. Property owners are held responsible for all activities and practices that may cause an adverse impact on water quality due to waste discharges and surface runoff from their lands.

Sediment and erosion control is particularly important in areas with, or that drain into, delicate habitats such as lagoons, floodplains and some waterways. Lagoons are particularly sensitive to influx of silts and nutrients, which may cause severe turbidity and eutrophication problems. Severe amounts of silt may cause a lagoon to eventually become infilled. Siltation also damages tributaries and riparian corridors leading to the lagoons.

Poor agricultural grading practices may cause significant erosion of the soil, causing heavy sediment, nutrient and possibly herbicide and pesticide runoff loads to be discharged into nearby surface waters.

In most cases, the adverse results of man's activities can be reduced and in some instances eliminated through the use of both structural and non-structural measures of various types that are properly employed at the appropriate time. The high cost of lost resources, resource replenishment and after-the-fact repair and maintenance make both pre-project erosion control planning and preventive maintenance necessary.

EROSION AND SEDIMENT CONTROL PROGRAM (RESOLUTION NO. 87-91)

Regional Board Resolution No. 87-91 entitled, "A Resolution Adopting Amendments to the Comprehensive Water Quality Control Plan for the San Diego Region" (Erosion and Sediment Control Program) was adopted on December 21, 1987. The Regional Board Erosion and Sediment Control Program contained in Resolution No. 87-91 is incorporated below; accordingly Resolution No. 87-91 is superseded.

GOAL OF PROGRAM

The goal of the Regional Board's erosion control program is the protection of water quality through the reduction and prevention of accelerated (man-caused) erosion to the level necessary to restore and protect beneficial uses of receiving waters now significantly impaired, or threatened by impairment, by sediment.

MANAGEMENT PRINCIPLES

(1) Property owners are considered ultimately responsible for all activities and practices that could result in adverse effects on water quality from waste discharges and from surface runoff.

(2) Local units of government should have the lead role in controlling land use and construction activities that cause erosion and may, as necessary, impose further conditions, restrictions, or limitations on waste disposal and other activities that might degrade the quality of waters of the State.

(3) BMPs should be implemented to reduce erosion and sedimentation and minimize adverse effects on water quality.

REGIONAL BOARD IMPLEMENTATION MEASURES

(1) Local governments shall be encouraged to develop effective erosion and sedimentation control ordinances and regulatory programs that are at least equivalent to the model ordinance in the "*Erosion and Sediment Control Handbook*" published by the California Department of Conservation, May 1981.

(2) If necessary, a Memorandum of Understanding (MOU) or Management Agreement could be adopted to more clearly define the cooperative roles between the local units of government and the Regional Board.

(3) The Regional Board may participate with other concerned agencies such as the California Department of Fish and Game, the Resource Conservation Districts, the various lagoon foundations, etc., to identify watersheds, coastal lagoons and estuaries with critical erosion and sediment problems. The Regional Board may assist in the assessment of such problems and causes, and assist in the development of alternative measures to prevent future problems.

(4) As time and resources permit, the Regional Board will review existing local grading ordinances to determine the adequacy of the ordinances to provide effective erosion control. The Regional Board may then recommend specific improvements to the ordinances for consideration by the local agencies. If necessary, the Regional Board may request a report on the implementation of the Board's recommendation.

(5) If necessary, the Regional Board may request periodic status reports of construction and grading activities from local agencies to determine the effectiveness and potential problems with the implementation of local erosion and sediment control program.

(6) The Regional Board shall encourage the Resource Conservation Districts to review and update if necessary, their erosion control ordinances in order to develop more effective programs for erosion and sediment control for agricultural activities. Local units of government are encouraged to take a more active role in addressing erosion problems from agricultural activities.

THE ELSINORE-MURRIETA-ANZA RESOURCE CONSERVATION DISTRICT SEDIMENT CONTROL ORDINANCE (RESOLUTION NO. 79-25) AND THE RESOURCE CONSERVATION DISTRICTS OF SAN DIEGO COUNTY EROSION AND SEDIMENT CONTROL POLICY (RESOLUTION NO. 92-21)

The Elsinore-Murrieta-Anza Resource Conservation District and the Resource Conservation Districts (RCDs) of San Diego County were established to provide for the conservation of soil and water resources and for the prevention and control of soil erosion and sediment damage due to agricultural and other land use activities.

The RCDs establish guidelines for land management programs by adopting BMPs such as those presented in the Soil Conservation Service Technical Guide covering San Diego County. Currently, farmers and other land owners contact the RCDs on a voluntary basis for assistance in developing individual erosion and sediment control programs which conform to the BMPs.

In order to assure that all farmers and other land owners operate under the Resource Conservation Districts BMP guidelines, and to better address the existing and potential water pollution problems caused by agriculture and other land uses, the RCDs have adopted sediment control ordinances and policies (e.g., Elsinore-Murrieta-Anza Resource Conservation District Sediment Control Ordinance and the Resource Conservation Districts of San Diego County Erosion and Sediment Control Policy). These documents formally adopt the Soil Conservation Service's BMPs and define the existing and expanded functions and responsibilities of the RCDs. These documents also suggest means by which the California Regional Water Quality Control Board, San Diego Region, can assist the RCDs in implementation of the policy.

The Resource Conservation District Sediment Control Ordinance, and the Erosion and Sediment Control Policy establish the duties of the Regional Board and the RCD's as outlined below. The Resource Conservation Districts will implement these documents as follows:

(1) Continue to assist farmers and other land owners in establishing management programs which comply with BMPs.

(2) Authorize any of its directors to file a formal complaint against any person who is causing or permitting any accelerated erosion and sediment damage.

(3) Take action against any person causing or permitting any accelerated erosion and sediment damage.

A. Receive complaints from RCD directors, land occupiers, or city, state and county officials responsible for the maintenance of water quality in the jurisdictions.

B. Conduct hearings of the Resource Conservation District Board of Directors on complaints. If the complaint is valid, the "land disturber" is allowed two months to develop and implement a voluntary conservation plan.

C. Request action by the Regional Board if compliance schedules are not followed or if further noncompliance occurs, when such noncompliance results in the intentional or negligent discharge or deposition of any waste where it is, or probably will be discharged into the waters of the state or creates or threatens to create a condition of pollution or nuisance.

The Regional Board will assist the Resource Conservation Districts in implementing the Erosion and Sediment Control Policy by doing the following:

(1) Inform the appropriate RCD of instances when the staff of the Regional Board finds that accelerated erosion damage has occurred or is likely to occur as a result of violations of the BMP guidelines.

(2) Receive requests for action on complaints from the RCDs when compliance schedules have not been met or when further noncompliance has occurred, and consider appropriate enforcement action pursuant to section 13304 (a) of the Porter-Cologne Water Quality Control Act.

RESOURCE EXTRACTION

SAND, GRAVEL AND OTHER MINERAL RESOURCE EXTRACTION OPERATIONS

The sand and gravel related processing industry represents one of the largest single classes of industry in the San Diego Region. Construction activities in the Region will require a continuing need for sand and gravel products. The industry can generally be classified as follows:

- Sand and gravel processing (including rock crushing);
- Concrete batching;
- Asphalt batching;
- Asphalt product manufacturing;
- Concrete product manufacturing; and
- Clay and clay product processing.

The largest volume of waste from sand and gravel processing operations results from product washing. Many of the sedimentary deposits mined for sand and gravel in the San Diego Region contain a high percentage of silt and clay. Extensive washing is required to remove the fine material. Other waste includes cement truck wash water, sediment separated from the wash water, and rejected product (broken brick, block, pipe etc.).

Recycled wash waters are discharged to storage ponds and can contain high concentrations of total dissolved solids because of evaporation and leaching from product materials. The percolation of these recycled waters can adversely affect ground water quality. It is recognized that the permeability of the ponds receiving the wash waters is low because of the sealing effects of silts and clay sediments in the wash water. Sediment and wash water discharged to surface waters can adversely affect aquatic life through sediment deposition and increases in turbidity.

Many sand and gravel operations are regulated with waste discharge requirements (WDR). The waste discharge requirements prohibit the discharge of sand and gravel wash water to surface waters. The requirements also require that waste holding ponds have 100-year frequency flood protection. Mining Operations may also be subject to “Mining Waste Management” requirements in CCR Title 27 (sections 22470 to 22510). Sand and gravel mining operations are subject to regulation under section 404 of the Clean Water Act. Before a section 404 permit can be obtained, the discharger must obtain water quality certification pursuant to section 401 of the Clean Water Act. See previous discussion of Water Quality Certification (section 401).

Many mining operations are subject to California's Surface Mining and Reclamation Act (SMARA) of 1975 and the federal Surface Mining Control and Reclamation Act (SMCRA) of 1977. These laws, which have similar provisions, require reclamation of mined lands in order to protect public health and safety and to prevent or minimize adverse environmental effects such as water quality degradation, flooding, erosion, and sedimentation. Additionally, SMCRA requires mine operators to establish baseline hydrologic conditions; in the event that adjacent waters are contaminated, diminished, or interrupted, SMCRA further requires mine operators to replace the water supply.

Under SMARA regulations (California Public Resources Code (section 3505, Article 1), mining operators must:

- Control soil erosion by minimizing removal of vegetation and overburden, managing stockpiles, and constructing erosion control facilities;
- Control water quality by constructing settling ponds and basins and conducting operations in such a way as to prevent siltation of ground water recharge areas;
- Protect fish and wildlife habitat by taking "reasonable measures";
- Protect natural drainage ways by proper placement and control of mine waste rock and overburden piles or dumps; and
- Control erosion and drainage by grading and revegetation, and construction of basins to impound surface runoff, and protection of spillways from erosion.

FLOOD CONTROL

In a natural setting, the dynamic nature of water creates an ever changing stream channel within the floodplain. In the San Diego Region, where rainfall is extremely variable, flood plains which appear to be dry one year, may contain tremendous torrents the following year. Sometimes the dry appearance of the flood plain has made people mistakenly think flood waters do not occur there. The dry appearance of a portion of the flood plain is deceptive. Floods are a natural part of any flood plain. Flood plains cannot be fully protected against floods.

In the past, developments clustered near or within the flood plain. Flood control channels were constructed to protect these properties. Flood control channels were built to constrict the flood plain and to allow maximum development on adjacent lands. These developments increased the amount of impervious area (roads, buildings, parking lots and other structures) and increased local storm runoff. Storm water, which prior to development would have been absorbed into the soil, instead filled local storm drains. Thus, the precipitation which might at one time have caused local flooding caused intensified downstream flooding.

Today, many flood plains have been channelized to protect property. There are a variety of channel designs which have been built. Channel designs vary in range from completely natural to entirely concrete lined with concrete bottoms. Other channel types include natural channels modified to contain a low-flow channel with or without side filling or riprap or concrete; and with or without encroachment by agriculture and/or urban areas.

Rose Canyon Creek

IMPACTS OF CHANNELIZATION

To the degree that a natural watercourse is channelized, the negative impacts to the watershed are increased. The following impacts occur with channelization:

(1) Channel modification and channelization of streams induces changes in land use practices. The resulting change in land use practices often results in detrimental changes to surface water quality.

(2) With future increases in the urbanization of an area, the impervious area increases, contributing additional storm water runoff. Flood channels were built to contain a certain design flow and the design flow can be exceeded by additional storm water runoff.

(3) As the flood plain is constricted and confined within a channel, the potential damage from storm runoff is increased.

(4) Channelization reduces ground water recharge.

(5) Impervious channels designed to remove the runoff quickly also transport pollutants down the flood control system just as quickly. Most of the surface water runoff from urban areas flows into flood control channels without any mechanism to control the input of toxics.

(6) Channelization results in the direct loss of instream habitat. Fish and other aquatic life are totally dependent upon the surface waters within floodplains.

(7) Channelization results in the loss of riparian habitat.

(8) Channelization causes an increase in ambient stream temperatures within and downstream from the channelized section. The rise in stream temperature may degrade the habitat for aquatic life.

(9) The loss of riparian areas through channelization results in the loss of wildlife. Riparian areas are the most important habitat for the majority of western wildlife species, and are essential for many wildlife species.

(10) Loss of riparian areas results in a loss of the buffering capacity of the riparian vegetation to moderate flows.

(11) Loss of the riparian areas results in a loss of the natural filtering capacity that these areas provide. The natural filtering capacity of riparian areas reduces the concentration of potentially toxic constituents in storm water runoff. Riparian areas provide an improvement in the quality of water produced from the watershed.

(12) Stream and riparian habitats are needed to provide corridors for fish and wildlife resources. A highly modified concrete channel may not allow for fish or wildlife passage. Even a limited section of concrete channel can disconnect habitats. The separation of habitats reduces the viability of fish and wildlife populations.

CONCLUSION

Channel modifications need to be evaluated for their ultimate consequences for the watershed. In California's past there was inadequate consideration towards the retention of wetlands, riparian systems, and natural flood plains. The economic assessment of flood control alternatives should consider any proposed project in its entirety. Wetlands, riparian systems and natural flood plains accommodate natural stream meandering, aggradation, degradation and overbank flow better than those lands directly encroached upon by development.

Consideration and utilization of methods to reduce storm water runoff and allow infiltration and percolation of storm waters are needed. Methods should include minimizing the further construction of flood control channels, particularly concrete channels, and the retention of riparian areas within floodplains. Riparian areas within flood plains need to be protected in order to allow the natural filtering capacity of the riparian area to improve the quality of storm water produced from the watershed; and to preserve alluvial percolation capacity and aquatic habitat values. When possible riparian areas need to be restored.

Riparian and stream habitats provide natural beauty which is appreciated and valued by people. Riparian and stream habitats, especially in urban areas, are vital to enhancing our quality of life. People are far more likely to respect and be stewards of "natural" reaches of streams than channelized or artificially modified reaches. Riparian lands represent a significant value to society.

Noble Canyon Creek

FUTURE DIRECTION: WATERSHED-BASED WATER QUALITY CONTROL

The concept of comprehensive watershed level management of water resources is currently being incorporated into various elements of the State's Nonpoint Source Management Program. The watershed protection approach is an integrated strategy for more effectively protecting and restoring beneficial uses of state waters. By looking at an entire watershed, one can more clearly identify critical areas and practices which need to be targeted for pollution prevention and corrective actions. This approach not only addresses the waterbody itself, but the geographic area which drains to the watercourse. This strategy also integrates both surface and ground waters, inland and coastal waters, and point and nonpoint sources of pollution. Point sources have received most of the regulatory attention in the past, however, significant improvements in point sources,

coupled with continued water quality impairments, have necessitated that the water resources community look at a more integrated approach which considers impacts from both point and nonpoint sources of pollutants.

The Watershed Protection Approach is built on the following three main principles:

- The target watersheds should be those where pollution poses the greatest risk to human health, ecological resources, desirable uses of the water, or a combination of these;
- All parties with a stake in the specific local situation should participate in the analysis of the problems and the creation of solutions; and
- The actions undertaken should draw on the full range of methods and tools available, integrating them into a coordinated, multi-organizational attack on the problems.

Many agencies and organizations concerned with water resources have come to recognize that this type of approach can be very effective in realistically assessing cumulative impacts and formulating workable mitigation strategies. The CZARA, USEPA guidance, and various legislative proposals clearly state the need to consider the implications of land use on water quality. USEPA program managers are re-thinking their approach to the allocation of resources (especially within the Nonpoint Source Program) and will be primarily funding studies that are part of a watershed planning and implementation effort.

The traditional approach to managing pollutant discharges into streams, lakes, and the ocean has evolved over time, often with separate programs to address various aspects of the total water quality problem. Some of these programs have different, overlapping, or conflicting priorities. Moving from the more facility-specific controls of the past to management of water quality on a watershed basis, will entail some growing pains. Many of the programs at our disposal will need to be reshaped and integrated at the watershed level. Some programs will need to be reoriented and integrated, while other programs may not be amenable to the watershed approach. Nonetheless, public agencies and private organizations concerned with water resources have come to recognize that a comprehensive evaluation of pollutant contributions on a watershed scale is the only way to realistically assess cumulative impacts and formulate workable strategies to truly protect our water resources. Both water pollution and habitat degradation problems can best be solved by following a basin-wide approach.

REMEDIATION OF POLLUTION

The Regional Board allocates substantial resources to the investigation of polluted waters and enforcement of corrective actions needed to restore water quality. Specific remediation programs include:

- Underground Storage Tanks Program including the Local Oversight Program;
- Site Cleanup Program;
- Aboveground Petroleum Storage Tank Program; and
- DOD Site Investigations.

Naval Base Point Loma (submarine facility)
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The Regional Board sets cleanup goals based on the State's Antidegradation Policy set forth in State Board Resolution No. 68-16 and Resolution No. 92-49 Policies and Procedures for Investigation and Cleanup and Abatement of Discharges Under Water Code section 13304 and the Cleanup and Abatement Policy discussed later in this chapter. Under these policies, whenever the existing quality of water is better than that needed to protect present and potential beneficial uses, such existing quality will be maintained, with certain exceptions (as described in Chapter 5, Plans and Policies). Accordingly, the Regional Board prescribes cleanup goals that are based upon background concentrations. For those cases where dischargers have demonstrated that cleanup goals based on background concentrations cannot be attained due to technological and economic limitations, the Antidegradation Policy sets forth policy for cleanup and abatement based on the protection of beneficial uses. The Regional Board can, on a case-by-case basis, set cleanup goals as close to background as technologically and economically feasible. Such goals must at a minimum, restore and protect all designated beneficial uses of the waters.

Furthermore, such cleanup levels cannot result in water quality less than that prescribed in the Basin Plan and policies adopted by the State and Regional Board, and must be consistent with maximum benefit to the people of the State.

UNDERGROUND STORAGE TANKS

Underground storage tank

The Underground Storage Tank Program was enacted in 1983 and took effect January 1, 1984. The authority for the program is found in the Health and Safety Code, Division 20, Chapter 6.7, and the regulations for the program are found in the CCR, Title 23, Division 3, Chapter 16. The regulations are designed to ensure the integrity of all underground storage tanks (UST), and to detect any leaks.

There are approximately 2,000 known cases of leaking underground storage tanks in the Region. Approximately 35 percent of the cases involve instances where only soil contamination is present, 35 percent involve instances where ground water contamination has been confirmed, and the remaining 30 percent are cases which have been closed. The majority of the releases from these underground storage tanks are gasoline and the constituent of most concern is benzene, a known carcinogen. A smaller percentage of the underground storage tank releases involve chlorinated industrial solvents, which are suspected carcinogens. As anticipated, the majority of the sites where these releases have occurred are automotive service stations. Tanks from industrial facilities contribute a smaller but significant minority. To date, these ground water impacts have affected only a few drinking water supply wells. The Regional Board maintains and regularly updates the Leaking Underground Storage Tank Information System (LUSTIS) database, which identifies all known underground storage tank release sites in the Region.

Implementation of the underground storage tank program includes direct Regional Board oversight of leaking underground storage tank cleanups. It also involves coordination of oversight activities with local agencies under contract with the State Board through the Local Oversight Program. Local agencies have the authority, pursuant to section 25297.1 of the Health and Safety Code to act on behalf of the Regional Board in requiring investigations and cleanup of underground tank cases. The local agencies also implement the permitting, construction, inspections and monitoring portion of the Underground Tank Regulations. The Orange County Health Care Agency, the County of Riverside Department of Environmental Health and San Diego County Department of Health Services, Environmental Health Services handle the vast majority of the active cases in the Region.

Title 23, Division 3, Chapter 16, Article 11 provides that corrective action of releases from underground storage tanks includes one or more of the following phases:

Preliminary Site Assessment Phase
This includes, at a minimum, initial site investigation, initial abatement actions and initial site characterization.

Soil and Water Investigation Phase
This includes the collection and analysis of data necessary to assess the nature and vertical and lateral extent of the unauthorized release to determine a cost-effective method of cleanup.

Corrective Action Plan Implementation Phase
This consists of carrying out the cost-effective alternative selected during the Soil and Water Investigation Phase for remediation or mitigation of the actual or potential adverse effects of the unauthorized release.

Verification Monitoring Phase
This includes all activities required to verify implementation of the Corrective Action Plan and evaluate its effectiveness.

Cleanup levels for soil and ground water pollution resulting from leaking underground storage tanks will be established based on the Cleanup and Abatement Policy described later in this chapter.

UNDERGROUND STORAGE TANK CLEANUP FUND

The State Board, Division of Clean Water Programs, administers the Underground Storage Tank Cleanup Fund. The Cleanup Fund can be used as a mechanism to satisfy federal financial responsibility requirements and pay for corrective action and third party liability costs resulting from a leaking petroleum underground storage tank. The Fund can also pay for direct cleanup (by local agency or regional board) of underground storage tank sites requiring emergency and prompt action on abandoned or recalcitrant sites. This Fund, collected by the Board of Equalization, is supported by a 0.6 cent per gallon fee for gasoline. The Fund has been established to provide reimbursement to tank owners or operators for costs of cleanup of the effects of unauthorized releases of petroleum. Up to 1.5 million dollars ($1,500,000) can be provided per site, with the first ten thousand dollars ($10,000) being provided by the claimant. With certain qualifications, expenditures made to remediate an unauthorized petroleum release since January 1, 1988, can be reimbursed and letters of credit can be issued for the funding of ongoing remediation activities.

Owners/operators of petroleum USTs as defined in section 25281(x) of the California Health and Safety Code and owners of petroleum USTs located on residential property who meet the following requirements are eligible for the fund:

- There has been an unauthorized release of petroleum from the UST reported to and confirmed by the regulatory agency.
- As a result of this unauthorized release, the owner/operator must take corrective action as required by a regulatory agency.
- The owner/operator must be in compliance with any applicable financial responsibility requirements and any UST requirements.

Regional boards provide technical support to both applicants who file claims against the underground storage tank Cleanup Fund and State Board staff members who verify the corrective action work that the claims cover. For claims that involve future work, the Regional Board will oversee site investigation and cleanup on cases for which they are the lead agency.

SITE CLEANUP

Reports of unauthorized discharges, such as spills and leaks from above ground storage tanks are investigated through the Regional Board's Site Cleanup Program. This program is not restricted to particular pollutants or environments; rather, the program covers all types of pollutants (such as solvents, petroleum fuels, and heavy metals) and all environments (including surface and ground water, and the vadose zone). Upon confirming that an unauthorized discharge is polluting or threatens to pollute regional waterbodies, the

Regional Board oversees site investigation and corrective action. Statutory authority for the program is derived from the Water Code, Division 7, section 13304. Guidelines for site investigation and remediation are promulgated in State Board Resolution No. 92-49 as amended on April 21, 1994 entitled "*Policies and Procedures For Investigation and Cleanup and Abatement of Discharges Under Water Code Section 13304*".

Cleanup levels for soil and ground water pollution resulting from sites investigated through the SLIC Program will be established based on the Cleanup and Abatement Policy described later in this chapter.

ABOVEGROUND PETROLEUM STORAGE TANKS

In order to prevent unauthorized discharges from aboveground petroleum storage tanks, the State of California has enacted legislation designed to lower the risk of spills and leaks. The state's Aboveground Petroleum Storage Act was enacted in 1989 and amended in 1991. The Act became effective on January 1, 1990 (Health and Safety Code, Chapter 6.67, section 25270 et. seq.) The Act requires owners or operators of above ground petroleum storage tanks to file a storage statement with the State Board and implement spill prevention measures. Examples of such measures include daily visual inspections of any storage tanks containing crude oil or its fractions, the installation of secondary containment for all tanks with sufficient capacity to hold the contents of the largest tank at the facility plus sufficient volume for rainfall to avoid the overflow, and development of a "Spill Prevention Control and Countermeasure Plan." In the event of an unauthorized release, the owner or operator must notify the Regional Board officials and undertake appropriate monitoring and corrective action. Additionally, annual fees are levied on tank owners. These fees are used to fund aboveground petroleum tank inspections and enforcement.

DEPARTMENT OF DEFENSE FACILITIES

There are twenty-two major Department of Defense (DOD) facilities in the San Diego Region. The following is a list of DOD facilities and the corresponding lead agency for the facility in the Region.

Department of Defense Facility	Lead Agency
United States Marine Corps Base, Camp Pendleton	USEPA
Coronado Navy Amphibious Base	DTSC
Imperial Beach Auxiliary Landing Field	DTSC
Naval Air Station Miramar	DTSC
North Island Naval Aviation Depot	DTSC
Naval Air Station North Island	DTSC
San Diego Fleet Anti-Submarine Warfare Training Center	DTSC
San Diego Fleet Combat Training Center	DTSC
Marine Corp Recruit Depot, San Diego	DTSC
Naval Command, Control and Ocean Surveillance Center	DTSC
San Diego Naval Computer and Telecommunications Station	DTSC
San Diego Naval Electronics Systems Engineering Center	DTSC
San Diego Naval Hospital	DTSC
32 Street Naval Station, San Diego	DTSC
Naval Submarine Base, San Diego	DTSC
Fleet Industrial Supply Center	DTSC
San Diego Naval Training Center	DTSC
San Diego Public Works Center	DTSC
San Diego Shore Intermediate Maintenance Activity	DTSC
Air Force Plant # 19, San Diego	DTSC
Fallbrook Naval Weapons Station	DTSC
Search, Evade, Resist, Escape Camp, Warner Springs	DTSC

Significant ground water contamination has been detected at a number of these facilities. Contamination is severe enough at one of these facilities to have it placed on USEPA's National Priorities List (NPL) for remediation under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA, commonly referred to as Superfund).

For the National Priority List facility (Camp Pendleton), the USEPA is the lead environmental regulatory agency for oversight of investigation and cleanup. CERCLA requires USEPA to consider applicable or relevant and appropriate state laws and regulations when establishing cleanup standards for remedial activities. To ensure that the state's concerns are properly addressed, two Cal-EPA agencies, the Regional Board and the Department of Toxic Substances Control (DTSC), also perform a significant oversight role in the investigations and cleanup of these facilities.

The USEPA, DOD, DTSC and the Regional Board have signed Federal Facility Agreements (FFA) for the National Priorities List facility. The intent of the FFA is to ensure that:

(1) Environmental impacts are investigated;

(2) Remedial actions are defined;

(3) Procedural framework or schedules are established;

(4) Cooperation among agencies is facilitated;

(5) Adequate assessment is performed; and

(6) Compromise is reached.

The USEPA is not involved in the investigation and cleanup of DOD facilities that are not on the National Priority List (DOD facilities other than Camp Pendleton). However, many of the facilities potentially have significant contamination. In these cases, the Regional Board and DTSC enter into Federal Facility Site Remediation Agreements (FFSRA) with DOD. Federal Facility Site Remediation Agreements are very similar to the above-mentioned Federal Facility Agreements, with the exception that USEPA is not a party.

In the table above showing the DOD facilities in the San Diego Region, the DTSC has been identified as the "lead" agency, and the Regional Board is the "support" agency. A Memorandum of Understanding has been signed by the State Board and DTSC which describes the roles of each agency. The Regional Board's oversight role is with regard to the investigation and cleanup of water resources that have been impacted, or are threatened, by waste discharges from the facilities. The Regional Board's responsibility also extends to source areas (landfills, contaminated soil, etc.) that currently, or may in the future, pose a threat to water quality. DTSC's role is to address all other environmental aspects including health risk assessment, air emissions, community relations, etc.

The State Board and DTSC have entered into a two-year cooperative agreement with the DOD for cleanup and oversight reimbursement. All work performed by the State agencies with regard to the investigation and cleanup of environmental problems at these facilities is fully reimbursed by DOD.

Cleanup levels for soil and ground water pollution resulting from DOD facilities will be established based on the Cleanup and Abatement Policy described later in this chapter.

CLEANUP AND ABATEMENT POLICY

I. CONTAMINATED SOIL AND GROUND WATER

The Regional Board has identified numerous sites where unauthorized waste discharges have resulted in soil and ground water pollution. The majority of these sites have been identified as a result of the Regional Board's implementation of the remediation programs described previously in this Chapter.

The unauthorized waste discharges at many of these sites have resulted in adverse effects on water quality and beneficial uses. In some cases the polluted sites pose a threat to the public health. It is the responsibility of the Regional Board to establish cleanup and abatement goals and objectives for the protection of water quality and the beneficial uses of waters of the state in this Region which are consistent with applicable state and federal statutes and regulations.

Water Code section 13304 authorizes the Regional Board to require cleanup and abatement of soil and ground water pollution. The Cleanup and Abatement Policy described below shall apply to all types of discharges subject to Water Code section 13304.

II. PURPOSE OF POLICY

The purpose of this Cleanup and Abatement Policy is to provide:

A. Guidance to dischargers involved in the investigation, cleanup and abatement of soil and ground water pollution sites to ensure these activities are in conformance with applicable state and federal laws, regulations and policies;

B. Guidance to dischargers on Regional Board methodology for determining cleanup levels at soil and ground water pollution sites; and

C. Consistency and uniformity in Regional Board requirements for investigation, cleanup and abatement of analogous discharges that involve similar wastes, site characteristics, and water quality considerations.

III. CLEANUP AND ABATEMENT PRINCIPLES

A. The Cleanup and Abatement Policy is guided on the following principles, which are based on Water Code sections 13000 and 13304, CCR, Title 23, Division 3, Chapter 15 (hereinafter Chapter 15), CCR, Title 23, Division 3, Chapter 16 (hereinafter Chapter 16), and applicable State Board policies. The Regional Board shall require:

1. Cleanup and abatement actions to conform with the provisions of State Board Resolution No. 68-16 (Statement of Policy with Respect to Maintaining High Quality Waters in California) provided that under no circumstances shall these provisions be interpreted to require cleanup and abatement which achieves water quality conditions that are better than "natural" background conditions;

2. Cleanup and abatement actions to conform with the provisions of State Board Resolution No. 92-49, Policies and Procedures for Investigation and Cleanup and Abatement of Discharges under Water Code section 13304;

3. Cleanup and abatement actions to conform with applicable or relevant provisions of Chapter 15 to the extent feasible;

4. Cleanup and abatement actions to implement the applicable provisions of Chapter 16 for investigations and cleanup of hazardous substances from underground storage tanks; and

5. Dischargers to cleanup and abate the effects of discharges in a manner that promotes attainment of either background water quality, or the best water quality which is reasonable if background levels of water quality cannot be restored, considering all demands being made and to be made on those waters and the total values involved, beneficial and detrimental, economic and social, tangible and intangible. Any alternative cleanup levels less stringent than background shall apply section 2550.4 of Chapter 15, or, for cleanup and abatement associated with underground storage tanks, apply section 2725 of Chapter 16, provided that the Regional Board considers the conditions set forth in section 2550.4 of Chapter 15 in setting alternative cleanup levels pursuant to section 2725 of Chapter 16. Any such alternative cleanup level shall:

a. Be consistent with maximum benefit to the people of the State;

b. Not unreasonably affect present and anticipated beneficial use of such water; and

c. Not result in water quality less than prescribed in the Water Quality Control Plans and Policies adopted by the State and this Regional Board.

IV. CLEANUP AND ABATEMENT INVESTIGATIONS

A. The Regional Board shall apply the guidelines described in IV.B. below in overseeing investigations to determine the nature and extent of a discharge and appropriate cleanup and abatement measures. The level and complexity of the investigations, assessments, and feasibility studies of cleanup and abatement alternatives required below shall be determined by the discharge type, the extent of pollution, and any other applicable site-specific characteristic(s).

B. The Regional Board shall require dischargers to:

1. Investigate the nature and extent of the discharge or threatened discharge to ensure that adequate cleanup plans are proposed. The goal of the investigation shall be to adequately characterize the pollutants in the discharge and determine the vertical and horizontal extent of pollution in soil and ground water. The investigation shall determine where concentrations of pollutants reach background levels.The investigation shall extend off-site to any location necessary to determine the source and assess the vertical and horizontal extent of the discharge.

2. Take immediate action to remove, treat, or contain pollution source(s) to the maximum extent practicable. Sources of pollution may include:

   a. Ongoing sources of discharge from storage or distribution systems for wastes or hazardous materials;

   b. Soils or ground water which are polluted with mobile or immobile concentrations of non-aqueous phase liquids (NAPLs);

   c. Soils which are polluted with leachable concentrations of soluble pollutants;

   d. Polluted soils which are eroded and transported to storm drains, abandoned or active wells, surface waters, or lands beyond the control of the discharger.

3. Submit the following information for consideration in establishing cleanup levels in accordance with the conditions set forth in Chapter 15, section 2550.4:

   a. An assessment of the adverse effects on ground water quality and beneficial uses;

   b. A risk assessment to determine impacts and threats to human health and the environment; and

   c. A feasibility study of cleanup alternatives which compares effectiveness, relative cost, and time to attain the following alternative cleanup levels:

(1) Background levels;

(2) Levels which meet all applicable water quality objectives and do not pose significant risks to health or the environment; and

(3) An alternate cleanup level in between the cleanup levels described in (1) and (2) above which meets the requirements as specified in section III.A.5. of this Cleanup and Abatement Policy.

4. Provide documentation that plans and reports are prepared by professionals qualified to prepare such reports, and that all investigative, and cleanup and abatement activities are conducted under the direction of appropriately qualified professionals. Professionals should be qualified, licensed where applicable, and competent and proficient in the fields pertinent to the required activities. A statement of qualifications of the responsible lead professionals shall be included in all plans and reports submitted by the discharger.

V. APPROVAL of CLEANUP LEVELS

A. The Regional Board shall approve soil and ground water cleanup levels through the adoption or affirmation of cleanup and abatement orders; or

B. The Executive Officer or a local agency may approve cleanup levels as appropriately delegated by the Regional Board.

VI. GROUND WATER CLEANUP LEVELS

A. Ground water cleanup levels shall be based on:

1. The provisions of State Board Resolution No. 68-16, Statement of Policy with Respect to Maintaining High Quality of Waters in California, State Board Resolution No. 88-63, Sources of Drinking Water, and State Board Resolution No. 92-49, Policies and Procedures for Investigation and Cleanup and Abatement of Discharges under Water Code section 13304.

2. Applicable narrative and numerical water quality objectives and beneficial uses described in Chapters 2 and 3 of this Basin Plan.

3. Pollutant concentrations which do not pose a significant threat to human health or the environment. Threat to human health and the environment shall be determined through a risk assessment:

a. The Regional Board is not the lead agency for specifying risk assessment procedures. The risk assessment shall be conducted using the most current procedures authorized by the DTSC, Office of Environmental Health Hazard Assessment or the USEPA. The Regional Board will assist the discharger, as necessary, in obtaining the appropriate, most current, procedures from these agencies.

b. In the absence of scientifically valid data to the contrary, theoretical risks from chemical constituents shall be considered additive across all media of exposure, and shall be considered additive for all chemicals having similar toxicological effects or having carcinogenic effects.

c. The Regional Board is not the lead agency for reviewing risk assessments. The Regional Board will rely on the California Department of Toxic Substances Control, Office of Environmental Health Hazard Assessment, or appropriately designated regulatory local health agencies to review and evaluate the adequacy of risk assessments.

d. The discharger shall submit the risk assessment to the Regional Board in accordance with section IV.B.3.b. of this policy. The Regional Board will coordinate the review of the risk assessment in accordance with the following hierarchy:

(1) The Regional Board will first seek the assistance of any appropriate supporting health agency currently involved with the cleanup of the site.

(2) If unsuccessful, the Regional Board will seek the assistance of previously uninvolved appropriate health agencies.

(3) If unsuccessful, the Regional Board will seek the assistance of the DTSC in accordance with the terms and conditions of the *Memorandum of Understanding Between the Department of Health Services and the State Water Resources Control Board, the Regional Water Quality Control Boards for the Cleanup of Hazardous Waste Sites August 1, 1990*.

4. Applicable state and federal statutes and regulations.

5. Relevant standards, criteria, and advisories adopted by other state and federal agencies.

6. Technical and economic feasibility of attaining background concentrations and of attaining concentrations lower than defined by 2 and 3 above. Technical and economic feasibility shall be determined in accordance with the following criteria:

a. Technical feasibility shall be determined by assessing the availability of technologies which have been shown to be effective in reducing the pollutant concentrations to the established cleanup levels. Bench-scale and/or pilot-scale studies may be necessary to make this feasibility assessment.

b. Economic feasibility refers to the objective balancing of the incremental benefit of attaining more stringent cleanup levels compared with the incremental cost of achieving those levels. Economic feasibility does not refer to the subjective measurement of the discharger's ability to pay the costs of cleanup.

c. Applicable factors to be considered in the establishment of cleanup levels greater than background are listed in Chapter 15, section 2550.4.

d. The discharger's ability to pay is one factor to be considered in determining whether the cleanup level is reasonable. However, availability of economic resources to the discharger is primarily considered in establishing reasonable schedules for compliance with cleanup levels.

B. The Regional Board shall set ground water cleanup levels to attain background water quality, unless the discharger demonstrates that it is either technically or economically infeasible to attain background water quality. If the discharger makes such a demonstration to the satisfaction of the Regional Board, cleanup levels are set between background water quality concentrations and concentrations that meet all criteria in items A.2 and A.3 above. Within this concentration range, cleanup levels will be set at the lowest concentrations that are technically and economically feasible to achieve. In no case will cleanup levels be established below natural background conditions.

C. Compliance with cleanup levels must occur at all points throughout the plume or area of contamination to protect potential beneficial uses of water resources as required by Water Code sections 13000 and 13244 and Health and Safety Code section 25356.1 (c).

D. The Regional Board may consider relaxing ground water cleanup levels that were previously established at levels more stringent than applicable water quality objectives, only when a final remedial action plan has been pursued in good faith and all of the following conditions are met:

1. Modified cleanup levels meet the conditions listed in VI.A.1., VI.A.2., and VI.A.3. above; and

2. An approved cleanup program has been fully implemented and operated for a period of time which is adequate to understand the hydrogeology of the site, pollutant dynamics, and the effectiveness of available cleanup technologies; and

3. Adequate source removal and/or isolation is undertaken to eliminate or significantly reduce future migration of pollutants to ground water; and

4. The discharger has demonstrated that no significant pollutant migration will occur to other underlying or adjacent aquifers; and

5. Ground water pollutant concentrations have reached asymptotic levels (i.e., pollutant concentration reductions are no longer significant) using appropriate technology; and

6. Alternative remediation techniques for achieving cleanup levels have been evaluated and are inappropriate or not economically feasible.

VII. SOIL CLEANUP LEVELS

A. Soil pollution can present a health risk and a threat to water quality. The Regional Board designates soil cleanup levels for the unsaturated zone based upon threat to water quality and risk to human health or the environment. Guidance from the USEPA, DTSC, or the Office of Health Hazard Assessment is considered in determining health and environmental risks. Cleanup levels for contaminated soils which threaten water quality, shall be established in accordance with the following criteria:

1. Concentrations of the residual leachable/mobile pollutants shall be equal to background concentrations unless background levels are technically or economically infeasible to achieve.

2. Where background levels are technically or economically infeasible to achieve, soil cleanup levels shall be established to ensure that residual leachable/mobile pollutants will not cause, or threaten to cause, exceedances of applicable ground water cleanup levels or water quality objectives, and do not pose significant risks to health or the environment.

3. Soil cleanup levels less stringent than background may be based on site specific technical evaluations of pollutant fate and transport processes, human health and environmental risk assessment methods as long as such methods are based on site specific field data, technically sound principles, and the criteria described in VII.A.2 above.

B. Where residual leachable/mobile soil pollutants which threaten water quality remain on site the discharger shall:

1. Implement measures as necessary to ensure that soils with residual pollutants are covered or otherwise managed to minimize pollution of surface waters or exposure to the public; and

2. Implement the applicable provisions of Chapter 15 to the extent that it is technologically or economically feasible to do so as described in State Board Resolution No. 92 - 49. This may include, but is not limited to, subsurface barriers or other containment systems, pollutant immobilization, toxicity reduction, and financial assurances.

C. The Regional Board shall generally require sampling to verify soil cleanup and may also require follow-up ground water monitoring. The degree of monitoring will reflect the amount of uncertainty associated with the soil cleanup level selection process. Follow-up ground water monitoring may be limited where residual concentrations of leachable/mobile pollutants in soils are not expected to adversely affect ground water quality.

VIII. TIME SCHEDULES

The Regional Board shall determine schedules for investigation, and cleanup and abatement, taking into account the following factors:

A. The degree of threat or impact of the discharge on water quality and beneficial uses;

B. The obligation to achieve timely compliance with cleanup and abatement goals and objectives that implement the applicable Water Quality Control Plans and Policies adopted by the State and Regional Board;

C. The financial and technical resources available to the discharger; and

D. Minimizing the likelihood of imposing a burden on the people of the state with the expense of cleanup and abatement, where feasible.

TOTAL MAXIMUM DAILY LOADS

A total maximum daily load (TMDL) is the amount of a pollutant that can be discharged into a waterbody and still maintain its water quality standards (i.e., the designated beneficial uses and the adopted water quality objectives that support the beneficial uses). A TMDL must account for seasonal variations and include a margin of safety (MOS) to account for any lack of knowledge concerning the relationship between pollutant loadings and receiving water quality.

Pollutant loadings in excess of the TMDL are expected to have an adverse effect on water quality by causing exceedances of the applicable water quality standards. Allowable pollutant loadings are calculated and assigned to all point source and nonpoint source discharges to ensure that the applicable water quality standards are not exceeded in the receiving water.

A portion of the TMDL may be held explicitly in reserve as the MOS (e.g., MOS = 10 percent of TMDL), or the MOS may be implicitly included (i.e., MOS = 0) by incorporating conservative assumptions in the calculation of the TMDL (i.e., assumptions result in a lower calculated TMDL). The portion of the TMDL not in the MOS is assigned to point sources and nonpoint sources.

Point sources are assigned wasteload allocations (WLAs) and nonpoint sources (including natural and background sources) are assigned load allocations (LAs). The WLAs and LAs may differ for each pollutant source, but the TMDL and MOS do not change. The TMDL for a pollutant in the receiving water, and the WLAs and LAs for a pollutant discharged from different sources into a waterbody are calculated at levels that, when each are met, are expected to result in the attainment of the associated water quality objectives for the pollutant and protection of the applicable beneficial uses in the receiving water.

Establishing TMDLs for waters is required under section 303(d) of the Clean Water Act. Clean Water Act section 303(d) requires that the State establish a priority ranking of waters that do not meet water quality standards after application of technology based controls. The USEPA strongly encourages states to include the priority ranking as part of the Biennial Clean Water Act Sections 303(d), 305(b) and 314 Integrated Report, which is discussed in more detail in Chapter 6.

Waters identified under section 303(d) (a.k.a. the 303(d) List) are designated as Water Quality Limited Segments (WQLSs). In accordance with the priority ranking, TMDLs must be established for pollutants suitable for such calculations. For the purpose of developing information for all waters not identified as WQLSs, states are also required to estimate the TMDLs with seasonal variations and margin of safety.

One or more numeric targets are typically required to calculate TMDLs at levels necessary to attain and maintain applicable narrative and numerical water quality standards in WQLSs. Numeric targets interpret the existing water quality standards (i.e., beneficial uses and the water quality objectives established at levels sufficient to support those uses). After identifying the impaired beneficial uses of a waterbody, the numeric targets are often based on the water quality objectives in Chapter 3. Chapter 3 contains numeric and narrative water quality objectives. If applicable water quality objectives are numeric, the numeric water quality objectives can serve as the basis for the numeric targets. If applicable water quality objectives are narrative, one or more quantifiable target values or measurable indicators must be selected to measure progress and evaluate final attainment and maintenance of the narrative water quality objectives. In WQLSs, when numeric targets are met in the waterbody, the water quality standards should be attained and restored. While numeric targets and TMDLs interpret water quality standards, *numeric targets and TMDLs are not water quality standards.*

TMDLs are not self-implementing or directly enforceable for sources in the watershed. Instead, TMDLs must be implemented through the programs or authorities of the San Diego Water Board and/or other entities to compel dischargers responsible for controllable sources to achieve the pollutant load reductions identified by a TMDL analysis to attain the water quality objectives that will support the designated beneficial uses of a waterbody.

The authorities that are available to the San Diego Water Board to implement TMDLs are given under the Porter-Cologne Water Quality Control Act (Division 7 of the Water Code). The available regulatory authorities include incorporating discharge prohibitions in to the Basin Plan, issuing individual or general waste discharge requirements (WDRs), or issuing individual or general conditional waivers of WDRs. The San Diego Water Board has the authority to enforce Basin Plan prohibitions, WDRs, or conditional waivers of WDRs through the issuance of enforcements actions (e.g., time schedule orders, cleanup and abatement orders, cease and desist orders, administrative civil liabilities). The San Diego Water Board also has the authority to require monitoring and/or technical reports from dischargers, which may be used to support the development, refinement, and/or implementation of TMDLs, WLAs, and/or LAs.

Additionally, the USEPA has delegated responsibility to the State and Regional Boards for implementation of the federal National Pollutant Discharge Elimination System (NPDES) program, which specifically regulates discharges of "pollutants" from point sources to "waters of the United States." The San Diego Water Board regulates discharges from point sources to surface waters with WDRs that implement federal NPDES regulations (NPDES requirements). Federal regulations

require that NPDES requirements incorporate water quality based effluent limitations (WQBELs) that must be consistent with the requirements and assumptions of any available WLAs. WQBELs may be expressed as numeric effluent limitations, when feasible, and/or as a best management practice (BMP) program of expanded or better-tailored BMPs.

Upon establishment of TMDLs by the state or U.S. Environmental Protection Agency (USEPA), the state is required to incorporate TMDLs into the state water quality management plan. This Basin Plan and applicable statewide plans serve as the water quality management plan for the watersheds under the jurisdiction of the Regional Board. TMDLs are programs for the implementation of existing water quality standards, and are established in the Basin Plan subject to the requirements of Water Code section 13242. TMDLs incorporated into the Basin Plan, therefore, are required to include 1) a description of the actions (i.e., programs or authorities) of the Regional Board and/or other entities necessary to achieve the TMDLs, 2) a compliance time schedule by which the TMDLs, and thereby the restoration of the beneficial uses in the receiving waters, are to be achieved, and 3) a description of the monitoring program that is required to determine compliance with TMDLs, WLAs, and LAs in the receiving waters. These elements are referred to as the TMDL Implementation Plan.

TMDLs that have been established for the San Diego Region are provided in Chapter 7.

IMPLEMENTATION PROVISIONS FOR INDICATOR BACTERIA WATER QUALITY OBJECTIVES IN THE CONTEXT OF A TMDL

Water quality objectives for indicator bacteria shall be strictly applied except when otherwise provided for in a TMDL. Within the context of a TMDL, the Regional Board may implement the indicator bacteria water quality objectives by using a “reference system and antidegradation approach” or a “natural sources exclusion approach,” as described in Chapter 3 (Water Quality Objectives).

There are natural sources of bacteria which may cause or contribute to exceedances of water quality objectives for indicator bacteria. It is not the intent of the Regional Board to require treatment or diversion of natural water bodies or to require treatment of natural sources of bacteria. Such requirements, if imposed by the Regional Board, could adversely affect valuable aquatic life and wildlife beneficial uses supported by water bodies in the Region.

Implementation of indicator bacteria water quality objectives using the reference system and antidegradation approach requires control of indicator bacteria from anthropogenic sources so that bacteriological water quality in the targeted waterbody is consistent with that of a reference system. The reference system and antidegradation approach also requires that no degradation of existing bacteriological water quality in the targeted water body occurs when the existing bacteriological water quality is better than that of a water body in a reference system. A reference system is a watershed and the beach to which the watershed discharges that is minimally impacted by anthropogenic activities that can affect bacterial densities in the water body. Under the reference system and antidegradation approach, a certain frequency of exceedances of the indicator bacteria water quality objectives is allowed. The allowed frequencies of exceedances are either the observed frequency of exceedances in the selected reference system or the targeted water body, whichever is less.

Under the natural sources exclusion approach, dischargers must demonstrate they have implemented all appropriate best management practices to control all anthropogenic sources of indicator bacteria to the target water body such that they do not cause or contribute to exceedances of the indicator bacteria water quality objectives. The requirement to control all sources of anthropogenic indicator bacteria does not mean the complete elimination of all anthropogenic sources of bacteria as this is both impractical as well as impossible. Dischargers must also demonstrate that the residual indicator bacteria densities are not indicative of a human health risk. After all anthropogenic sources of indicator bacteria have been controlled such that they do not cause exceedances of the indicator bacteria

water quality objectives, and natural sources have been identified and quantified, exceedances of the indicator bacteria water quality objectives may be allowed based on the residual exceedances in the target water body. The residual exceedances shall define the background level of exceedance due to natural sources.

The Regional Board will evaluate the appropriateness of these approaches and the specific exceedances or exceedance frequencies to be allowed under each within the context of TMDL development or recalculation for a specific water body. If appropriate, the Regional Board may select to use one or both of these approaches during initial TMDL calculation or during subsequent recalculation following TMDL implementation.

These implementation provisions may only be used within the context of a TMDL addressing municipal storm water (including discharges regulated under statewide municipal NPDES waste discharge requirements), discharges from concentrated animal feeding operations, and discharges from non-point sources. These implementation provisions shall not be applied within the context of a TMDL addressing individual industrial storm water discharges, or general industrial and construction storm water discharges.

OTHER PROGRAMS

GROUND WATER MANAGEMENT

Ground water management programs can both enhance water quality and protect beneficial uses of ground water in the larger basins of the San Diego Region. These management programs consist of measures for the periodic monitoring and assessment of ground water levels and quality; the planned extraction and export of poor quality ground water with recharge of better quality water from an outside source; controls established on the use of ground water within the basin; and controls on inflow of poor quality water from outside the basin.

Because of the limited amount of natural recharge, the use of reclaimed water for ground water recharge must be considered in any effective ground water management program in the San Diego Region. For this reason, agencies involved in wastewater disposal play a vital role in the development of these programs. Several local and state agencies, as well as some private consultants have been studying ways to encourage this approach for protecting the Region's ground water basins. Proponents have noted that there are many advantages in storing water and reclaimed water in ground water aquifers as opposed to surface water reservoirs. Underground facilities are less costly than surface storage facilities and they are less land intensive than surface water reservoirs. Also, the ground water aquifers can serve as distribution systems, minimizing the need for surface water transport facilities. In addition, reclaimed water stored in ground water aquifers are not subject to evaporative losses.

Filtration through the soils in the basin can provide additional treatment of the reclaimed water, and injection of reclaimed water along the coastal strip can be used to help combat seawater intrusion.

Ninety percent of the potable water supply for the San Diego Region comes from two major sources of imported water. Water from the Colorado River is imported through the Colorado River Aqueduct and water from northern California is imported through the State Water Project. Both sources are blended to form San Diego Region's water supply. Additionally, approximately ten percent of the water supply comes from local reservoirs. The quality of the imported water has been showing increases in mineral content, particularly boron, percent sodium and TDS. Direct use of this supply reflects the mineral content of Colorado River water. Each additional use of the water (reclaimed from this supply) for irrigation and ground water recharge incrementally increases the dissolved mineral content.

Water reclamation activities should, then, be focused on local benefits and impacts on ground water quality. Proposed projects should be examined in terms of:

- Areas with high reclaimed water demands;
- Constituent concentrations in relation to basin plan objectives;
- Assimilative capacity of receiving basins; and
- Potential for improving ground water quality in near-surface and deep aquifers.

The major basins in San Diego County that have been studied for the implementation of a ground water management plan are the San Juan Creek, Upper Santa Margarita River Basin, Lower San Luis Rey Valley, Lower San Dieguito River Valley, San Pasqual Valley, Santee, Lower Sweetwater River Basin, and the Lower Tijuana River Basin. A goal of these management plans is to rejuvenate the quality of the ground water in these basins to meet basin objectives. The general plan is to pump the poor quality ground water from these basins to the ocean, and recharge the basins with reclaimed and natural run off waters, which will then be extracted for beneficial use when water quality objectives are met. The following is a description of the proposed programs.

SAN JUAN CREEK

In Orange County, a management plan is underway in the San Juan Creek Basin. Ground water supplies are limited in this basin due to low recharge and poor quality. The capacity of the San Juan Creek Basin is approximately 90,000 acre-feet. With proper management of the ground water basin, approximately 50,000 AF/Y could be utilized. The basin currently provides approximately 5,000 AF/Y of usable ground water - less than 2,000 AF/Y is used for urban supply and approximately 3,000 AF/Y is used for agricultural and irrigation purposes. The only ground water that meets drinking water standards and most agricultural requirements is found in the highlands of the northeasternmost portion of the basin. Ground water quality data indicate that the TDS concentration ranges from 300 mg/l (in the northeasternmost portion of the basin) to 1,850 mg/l (in the lower and western portion of the basin). Approximately 3.0 MGD of treated wastewater is being reclaimed for irrigation of a golf course, park, greenbelt and landscaping. In addition, reuse is proposed for effluent from Moulton-Niguel Water District's Water Reclamation Plant 3A, which has been expanded from a capacity of 0.5 MGD to 2.4 MGD, and for effluent from Trabuco Canyon Water District's Robinson Ranch Wastewater Reclamation Plant, which has a capacity of 0.25 MGD. The TDS concentration in secondary effluent in the basin ranges from 500 to 900 mg/l. Reclaimed water could be used to enhance surface water flows and quality or to improve ground water quality in the lower and western parts of the basin. The use of reclaimed water for urban or agricultural irrigation could help reduce demands for ground and imported water. A ground water monitoring plan for the San Juan Creek Basin has been proposed by the Department of Water Resources which would identify any basinwide changes that may occur in water quality that could affect current and potential beneficial uses. This program would provide an early warning that ground water supplies may be endangered.

UPPER SANTA MARGARITA RIVER BASIN

In Riverside County, the upper Santa Margarita River Basin contains several million acre-feet of high quality ground water in the Pauba/ Temecula aquifer system. The Rancho California Water District is considering a plan that will implement the use of reclaimed water for beneficial uses and for ground water recharge. Some changes in basin plan water quality objectives are needed to develop this project. The Santa Rosa SBR Water Reclamation Facility, near Temecula, percolates reclaimed waters through highly permeable alluvium, which recharge and mix with ground water in an upper aquifer. A tentative projection calls for 5 MGD of reclaimed water production by the year 2000.

LOWER SAN LUIS REY VALLEY

Imported water comprises almost the entire supply for this basin. Ground water use is limited due to deteriorated water quality. There are four operating wastewater treatment facilities in this basin that could supply over 12,000 acre-feet per year (AF/Y) of treated wastewater that could be used for ground water recharge or other beneficial uses. At the present time reclaimed water is only being used for freeway landscape irrigation. Many springs and wells that used to be ephemeral, now flow all year long with imported irrigation return water. In many areas of this basin, reclaimed water is of higher quality than the existing ground water quality. Use of reclaimed water can be utilized to improve the conditions of the ground water quality.

LOWER SAN DIEGUITO RIVER VALLEY

The San Dieguito ground water management plan includes the utilization of approximately 2,000 to 4,000 AF/Y of recharge of reclaimed water. The reclaimed water will initially be used for irrigation, rejuvenation of non-potable ground water resources and for creating a fresh water barrier near Interstate 5. Water from the City of Escondido's Hale Avenue Reclamation Facility will be treated to tertiary treatment standards and pumped to the reclamation area in the San Dieguito Valley, where it will undergo recharge to replace poor quality water pumped to the ocean or desalted and treated to potable water standards. This reclaimed water will be used for agriculture and landscape irrigation. As the ground water quality improves, this basin could supply water to areas outside the basin, such as La Jolla Valley and North City West for landscape irrigation. The San Dieguito Basin lacks a centralized wastewater collection system. Water services are provided by four different governmental agencies, and sewer service is provided by eight governmental agencies. There are plans to interconnect the existing and proposed treatment facilities into an integrated system which can supply reclaimed water throughout the basin. The benefits of a ground water management plan in this basin include inexpensive storage and distribution of excess reclaimed water flows available during low irrigation months. This ground water management plan will result in improved ground water quality and will provide an efficient use of available water resources.

SAN PASQUAL VALLEY

The San Pasqual ground water management plan would utilize between 5,000 and 8,000 AF/Y of reclaimed water for agricultural irrigation and ground water recharge, thus reducing the need for this amount of imported water. The reclaimed water is available from the City of Escondido Hale Avenue Wastewater treatment plant, which presently discharges directly to the ocean. The City of San Diego owns 7,436 acres of land in the San Pasqual Valley which has been set aside as an agricultural preserve. There is 38,000 acre-feet of usable ground water in the valley. The western portion of the valley has degraded ground water quality, and has been designated as the reclamation basin. There is a plan to pump this poor quality ground water to the ocean and recharge the basin with reclaimed water of higher quality, to provide a positive salt balance. When the ground water quality improves, it will be used for irrigation of parks and golf courses, the Wild Animal Park and for landscape and freeway irrigation. There is a large and continued demand for irrigation water in the area. The eastern portion of the basin is designated as potable, and efforts will be made to keep the quality of the ground water from degrading. A third part of the basin, called the Narrows, is located between the San Pasqual reclamation basin and the Hodges basin. It has a very small capacity and will be used to prevent surface and ground water flows of reclaimed water from entering Lake Hodges Reservoir, a potable storage reservoir for the City of San Diego.

SANTEE

The Padre Dam Municipal Water District is reviewing the feasibility of a comprehensive ground water management plan for Santee basin. Ground water from the eastern part of the basin is used for domestic, agricultural and stock watering purposes, and generally has TDS concentrations of 260-1,310 mg/l. The ground water in the main portion of the Santee basin has TDS concentrations of up to 2,990 mg/l. In times of drought, this water

could supplement imported water supplies. At the present time, reclaimed water is used only for recreational purposes at Santee Lakes Campground, and Park. The Padre Dam Municipal Water Districts 1.0 MGD tertiary and 2.0 MGD secondary capacity treatment facility provides 1,200 AC/Y of reclaimed water which is used for the Santee Lakes. Water from Lake No. 1 is used to irrigate the landscaping of the surrounding the lakes. Currently only 1 MGD of the plant's capacity is being utilized. All flows over 1 MGD are sent to the Metropolitan Sewer System. Future water reuse projects include another 1,200 AF/Y projected need for the Santee Town Center and city park and approximately 1,400 AF/Y for industrial use. High quality reclaimed water could provide a potential source for recharging the ground water basin and improve existing water quality. Careful management of the basin could mitigate impacts of a high water table to prevent resurfacing of reclaimed water.

LOWER SWEETWATER RIVER BASIN

The Sweetwater Authority completed initial ground water basin studies of the Lower Sweetwater River Basin in June, 1993. As part of the agency's water resources program, the Sweetwater Authority is reviewing the feasibility of using ground water from the Lower Sweetwater Basin to augment its potable water supply.

The Lower Sweetwater Basin extends along the Sweetwater River from the Sweetwater Reservoir Dam approximately eight miles to San Diego Bay. It consists of an alluvial aquifer and the underlying San Diego Formation aquifer. Current use of ground water within the basin is limited, with turf irrigation the predominate use. The Basin is recharged from natural runoff and water from the upstream urban runoff diversion system which, in part, surrounds the Sweetwater Reservoir and spills over the Sweetwater Dam. Water quality data indicate that the ground water is moderately saline with TDS concentrations averaging 1,400 mg/l.

The Sweetwater Authority is currently evaluating the feasibility of constructing ground water extraction wells, a water treatment facility, a brackish water pipeline from each well to the treatment facility, a product water delivery pipeline and pump station, and a brine disposal pipeline. Preliminary findings indicate that extraction and treatment (to potable water standards) of 1,600 to 3,600 AF/Y of ground water from the Lower Sweetwater River Basin is feasible. Some additional production and/or ground water storage may be available in the San Diego Formation aquifer. San Diego Formation hydrogeological studies are ongoing; however preliminary findings indicate that the managed storage potential in the aquifer may be significant.

LOWER TIJUANA RIVER BASIN

The Tijuana Valley County Water District adopted a Resolution of Intention to prepare a Ground Water Management Plan in accordance with Water Code sections 10750 - 10755 in February, 1993. The stated goals of the District are summarized as follows:

- Protect ground water quality and quantity in the Tijuana River Basin for existing and future property owners, agricultural and recreational users;
- Develop the ground water basin into a sub-regional water supply reservoir;
- Provide water to Valley customers and sell excess ground water to customers outside the Basin;
- Implement measures for ground water recharge with surface floodwater containment and runoff control facilities, and reclaimed water, if available; and
- Work with the City and County of San Diego and appropriate state and federal agencies, to propose a workable international floodwater and wastewater control solution for the Valley.

The District's current plans include development of ground water management alternatives for the production and treatment of approximately 2,500 AF/Y of potable ground water.

SALT BALANCE

Salt balance is a theoretical concept where the total mass of dissolved minerals entering a ground water basin system from all sources is equal to the total mass of dissolved minerals leaving the system, either through extraction or natural outflow. It is preferable to have a balance of the salt inflows and outflows to maintain water quality in a basin.

Utilizing the following management measures would enhance the prospects for salt balance for ground water basins in the Region. These measures include:

- Limiting ground water extractions from basins to perennial-yield levels;
- Increasing the efficiency of irrigation practices;
- Reducing fertilizer application;
- Improving the quality of imported water used for irrigation;
- Use storm water runoff for ground water recharge, since storm water is low in TDS;
- Extract and demineralize poor quality ground water when this option becomes economically feasible; and
- Utilize intrusion barriers and regulate ground water pumpage to prevent and reverse problems of salt water intrusion.

SOLE SOURCE AQUIFER PROGRAM

The Safe Drinking Water Act of 1974 provides for a sole source aquifer program. Under this program, USEPA may designate an aquifer as a sole source if it provides more than half of the drinking water for a given area, and no other affordable sources of drinking water exist. The Act provides that, when certain criteria are met, a group may petition the USEPA to designate a sole source aquifer. Thus, in May of 1993, a local citizens' group, Backcountry Against Dumps petitioned the USEPA to designate the Campo/ Cottonwood Creek aquifer as the sole source of drinking water in a 400 square-mile area. The Campo/Cottonwood aquifer is bordered by Mexico to the south, and includes within its borders reservations for the Campo, La Posta, Manzanita, and Cuyapaipe Indian tribes. The aquifer lies about 20 miles east of El Cajon, California. This designation means the USEPA may review proposed projects in the aquifer area which receive partial federal funding and which could contaminate the aquifer or endanger public health. Examples of projects potentially subject to review include construction or renovation of housing projects, airports, and highways. Projects that do not receive some federal funds would not be reviewed.

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CHAPTER 5

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5. PLANS AND POLICIES

INTRODUCTION

The State Board has adopted several statewide Water Quality Control Plans that are incorporated by reference into the Regional Board Basin Plan. Additionally, both the State and Regional Boards adopt policies, separate from the plans, that provide detailed direction on the implementation of certain plan provisions. In the event that inconsistencies exist among various plans and policies, the more stringent provisions apply.

This update of the San Diego Region's Basin Plan has been revised to be consistent with all State and Regional Board plans and policies adopted to date. All of the Regional Board plans and policies which implement, interpret, or make specific the Basin Plan and which are listed later in this chapter have been incorporated in this Basin Plan and are superseded. Following are summaries of these plans and policies.

STATE BOARD PLANS AND POLICIES

ANTIDEGRADATION POLICY (RESOLUTION NO. 68-16)

One of the most significant water quality control policies with respect to the protection of water quality is the *Statement of Policy with Respect to Maintaining High Quality of Waters in California* (State Board Resolution No. 68-16), also known as the State Antidegradation Policy. This policy was adopted on October 28, 1968. It satisfies the federal Clean Water Act antidegradation policy requirement (40 Code of Federal Regulations (CFR) 131.12). The State Antidegradation Policy requires that high quality waters of the state are maintained to the maximum extent possible, even where that quality is better than needed to protect beneficial uses. Specific findings must be made in order to allow any changes in water quality. Changes in water quality are allowed only if the change is consistent with maximum benefit to the people of the State, does not unreasonably affect present and anticipated beneficial uses, and does not result in water quality less than that prescribed in water quality control plans or policies.

Actions which may adversely affect surface water quality must satisfy both Resolution No. 68-16 and the federal antidegradation policy (40 CFR 131.12). The requirements of the two policies are similar: the federal policy requires that existing instream uses and the level of water quality necessary to protect them must be maintained and protected. In addition, a reduction in water quality can be allowed only if there is a demonstration that such a reduction is necessary to accommodate important economic or social development.

STATE POLICY FOR WATER QUALITY CONTROL

The *State Policy for Water Quality Control* serves as the general basis for water quality control policies and was adopted by the State Board on July 6, 1972. The policy declares the State Board's intent to protect water quality through the implementation of water resources management programs.

The policy provides that water quality control plans adopted by the State Board will include minimum requirements for effluent quality. Water quality control plans will also specifically define the maximum constituent levels acceptable for discharge to various waters of the State. However, the policy allows discretion in the application of the latest available technology for the design and operation of wastewater treatment systems. The policy states that secondary treatment systems are the minimum acceptable level of treatment and that advanced treatment systems will be required where necessary to meet water quality objectives.

The policy contains twelve general principles to implement the provisions and intent of the Porter-Cologne Act. These principles are listed below:

(1) Water rights and quality control decisions must assure protection of available fresh water and marine water resources for maximum beneficial use.

(2) Municipal, agricultural, and industrial wastewaters must be considered as a potential integral part of the total available fresh water resource.

(3) Coordinated management of water supplies and wastewaters on a regional basis must be promoted to achieve efficient utilization of water.

(4) Efficient wastewater management is dependent upon a balanced program of source control of environmentally hazardous substances, treatment of wastewaters, reuse of reclaimed water, and proper disposal of effluents and residuals.

(5) Substances not amenable to removal by treatment systems presently available or planned for the immediate future must be prevented from entering sewer systems in quantities which would be harmful to the aquatic environment, adversely affect beneficial uses of water, or affect treatment plant operation. Persons responsible for the management of waste collection, treatment, and disposal systems must actively pursue the implementation of their objective of source control for environmentally hazardous substances. Such substances must be disposed of such that environmental damage does not result.

(6) Wastewater treatment systems must provide sufficient removal of environmentally hazardous substances which cannot be controlled at the source to assure against adverse effects on beneficial uses and aquatic communities.

(7) Wastewater collection and treatment facilities must be consolidated in all cases where feasible and desirable to implement sound water quality management programs based upon long-range economic and water quality benefits to an entire basin.

(8) Institutional and financial programs for implementation of consolidated wastewater management systems must be tailored to serve each particular area in an equitable manner.

(9) Wastewater reclamation and reuse systems which assure maximum benefit from available fresh water resources shall be encouraged. Reclamation systems must be an appropriate integral part of the long-range solution to the water resource needs of an area and incorporate provisions for salinity control and disposal of non-reclaimable residues.

(10) Wastewater management systems must be designed and operated to achieve maximum long-term benefit from the funds expended.

(11) Water quality control must be based on the latest scientific findings. Criteria must be continually refined as additional knowledge becomes available.

(12) Monitoring programs must be provided to determine the effects of discharges on all beneficial water uses including effects on aquatic life and its diversity and seasonal fluctuations.

AREAS OF SPECIAL BIOLOGICAL SIGNIFICANCE AND STATE WATER QUALITY PROTECTION AREAS (RESOLUTION NO. 74-28)

The Regional Boards were required to select areas in coastal waters which contain "*biological communities of such extraordinary, even though unquantifiable, value that no acceptable risk of change in their environments as a result of man's activities can be entertained."* These areas are known as 'Areas of Special Biological Significance' (ASBS).

ASBS are those areas designated by the State Water Board as ocean areas requiring protection of species or biological communities to the extent that alteration of natural water quality is undesirable. All ASBS are also classified as subset of State Water Quality Protection Areas (SWQPAs).

SWQPAs are defined in Public Resources Code, section 36700(f) as "a non-terrestrial marine or estuarine area designated to protect marine species or biological communities from an undesirable alteration in natural water quality, including, but not limited to, areas of special biological significance that have been designated by the State Water Resources Control Board through its water quality control planning process."

In the San Diego Region, Areas of Special Biological Significance ASBS/SWQPAs include the following:

Irvine Coast, Orange County

Ocean waters within that portion of California state tide and submerged lands adjoining the Newport Beach Marine Life Refuge bounded by a line beginning at the intersection of the southwesterly extension of Lot 141, Tract No. 3357, as shown on a map recorded in Book 107, Page 1 of Miscellaneous Maps on file in the office of the County Recorder, Orange County and the line of ordinary high tide; thence, southeasterly along the line of ordinary high tide approximately 20,000 feet to its intersection with the southwesterly extension of the northwesterly boundary line of the City of Laguna Beach; thence, southwesterly along such southwesterly extension 1,000 feet or to the 100-foot isobath, whichever distance from shore is greater; thence northwesterly along a line parallel to and 1,000 feet or to the 100-foot isobath, whichever distance from shore is greater southwesterly of the line of ordinary high tide to the southwesterly extension of said Lot 141; thence northeasterly along such southwesterly extension to the point of beginning.

Heisler Park, Orange County

Ocean waters within a line beginning at the intersection of the line of mean high tide with the westerly boundary line of Heisler Park, as described in a deed to the City of Laguna Beach, recorded in book 1666, page 144, Official Records Orange County, California; thence south 16o 21' west 800 feet more or less to the line of the Laguna Beach Marine Life Refuge, as per Division 7, Chapter 1, Article 2, section 10904, State of California Fish and Game Code; thence along said marine life refuge south 73o 39' east, 2,400 feet more or less to the easterly boundary of said refuge; thence along said easterly boundary north 14o 58' west, 700 feet more or less to the line of mean high tide in a westerly direction to the point of beginning.

San Diego - Scripps, San Diego County

Ocean waters within that portion of Fish and Game District 19 consisting of that certain strip of land lying between the westerly edge of Pueblo Lot No. 1298 of the Pueblo Lands of the City of San Diego, according to the official map of said pueblo lands as made by James Pascoe, and filed in the office of the County Recorder of said County of San Diego, and the mean high tide line opposite to and west of said pueblo lot, which said strip of land is bounded on the north by the northerly boundary line of said pueblo lot extended westerly and on the south by the southerly boundary line of said pueblo lot extended westerly; together with the state waters of the

State of California adjacent thereto, being those state waters which lie between said extended northerly and southerly boundaries of said pueblo lot and extend westerly from said mean high tide line for a distance of 1,000 feet.

La Jolla, San Diego County

Ocean waters within the boundaries of the City of San Diego, County of San Diego, State of California, as follows: beginning at the most northerly point of Goldfish Point as shown on La Jolla Park Map No. 352 filed in the office of the County Recorder of said county, thence in a northerly direction to a point being the intersection of longitude 117o 16' 15" west with the easterly prolongation of the southerly line of Pueblo Lot 1298 as shown on the map of Pueblo Lands of San Diego made by James Pascoe known as miscellaneous map No. 36 filed in the office of the County Recorder as said county, thence easterly along said prolongation of the southerly line of Pueblo Lot 1298 to the intersection with the mean high tide line, thence in a generally southerly direction along said mean high tide line to the point of beginning.

The impact of the adoption of ASBS and SWQPAs on the Basin Plan is that discharges of wastewaters and/or heat must be sufficiently removed spatially from these areas to assure the maintenance of natural water quality conditions in these areas. Existing wastewater and/or heat discharges which influence the natural water quality in these areas shall be prohibited and phased out as promptly as possible, or limited by the imposition of special conditions in accordance with the Porter-Cologne Water Quality Control Act and implementing regulations, including, but not limited to the California Ocean Plan and the California Thermal Plan.

ENCLOSED BAYS AND ESTUARIES POLICY (RESOLUTION NO. 74-43)

San Diego Bay

The *Water Quality Control Policy for Enclosed Bays and Estuaries of California* (Enclosed Bays and Estuaries Policy) was adopted by State Board Resolution No. 74-43 on May 16, 1974. This policy is designed to prevent water quality degradation and protect beneficial uses in enclosed bays and estuaries. The policy outlines water quality principles and guidelines to achieve these objectives. Decisions by the Regional Board must be consistent with the provisions designed to prevent water quality degradation.

The policy lists principles of management that include the State Board's desire to phase out all discharges of municipal wastewaters and industrial process waters (exclusive of cooling waters) to enclosed bays and estuaries as soon as practicable. Exceptions to this provision may be granted by a Regional Board only when the Regional Board finds that the wastewater in question would consistently be treated and discharged in such a manner that it would enhance the quality of the receiving waters above that which would occur in the absence of the discharge. Discharge prohibitions are placed on the following:

- New discharges of municipal wastewaters and industrial process waters (exclusive of cooling water, treated ballast water and innocuous non-municipal wastewater discharges, such as clear brines, wash water and pool drains) which are not consistently treated and discharged in a manner that would enhance the quality of the receiving waters as defined in the Policy;

- Municipal and industrial waste sludge and untreated sludge digester supernatant, centrate, or filtrate;

- Rubbish or refuse into surface waters or at any place where they would be eventually transported to enclosed bays and estuaries;

- Silt, sand, soil, clay, or other earthen materials from onshore operations including mining, construction, and lumbering in quantities which unreasonably affect or threaten to affect beneficial uses;

- Materials of petroleum origin in sufficient quantities to be visible or in violation of waste discharge requirements (except for scientific purposes);

- Radiological, chemical, or biological warfare agent or high-level radioactive waste; and

- Discharge or by-pass of untreated waste.

POLICY ON THE USE AND DISPOSAL OF INLAND WATERS USED FOR POWERPLANT COOLING (RESOLUTION NO. 75 58)

The *Water Quality Control Policy on the Use and Disposal of Inland Waters Used for Powerplant Cooling* (Policy on the Use and Disposal of Inland Waters Used for Powerplant Cooling) was adopted by State Board Resolution No. 75-58 on June 19, 1975. The purpose of the policy is to provide consistent statewide water quality principles and guidance for adoption of discharge requirements, and implementation actions for powerplants which depend upon inland waters for cooling. In addition, this policy is intended to protect the beneficial uses of the State's water resources by keeping the consumptive use of freshwater for powerplant cooling to a minimum. The Regional Board is responsible for the enforcement of this policy.

The policy is based on the seven principles listed below:

(1) It is the State Board's position that from a water quantity and quality standpoint the source of powerplant cooling water should come from the following sources in this order of priority depending on site specifics such as environmental, technical, and economic feasibility consideration:

  - Wastewater being discharged to the ocean;

  - Ocean;

  - Brackish water from natural sources or irrigation return flow;

  - Inland wastewaters of low TDS; and

  - Other inland waters.

(2) Where the State Board has jurisdiction, use of fresh inland waters for powerplant cooling will be approved by the Board only when it is demonstrated that the use of other water supply sources or other methods of cooling would be environmentally undesirable or economically unsound.

(3) In considering issuance of a permit or license to appropriate water for powerplant cooling, the Board will consider the reasonableness of the proposed water use when compared with other present and future needs for the water source and when viewed in the context of alternative water sources that could be used for the purpose. The Board will give great weight to the results of studies made pursuant to the Warren-Alquist State Energy Resources Conservation and Development Act and carefully evaluate studies by the Department of Water Resources made pursuant to sections 237 and 462, Division 1 of the California Water Code.

(4) The discharge of blowdown water from cooling towers or return flows from once-through cooling shall not cause a violation of water quality objectives or waste discharge requirements established by the Regional Boards.

(5) The use of unlined evaporation ponds to concentrate salts from blowdown waters will be permitted only at salt sinks approved by the Regional and State Boards. Proposals to utilize unlined evaporation ponds for final disposal of blowdown waters must include studies of alternative methods of disposal. These studies must show that the geologic strata underlying the proposed ponds or salt sink will protect usable groundwater.

(6) Studies of availability of inland waters for use in powerplant cooling facilities to be constructed in Central Valley basins, the South Coastal Basins or other areas which receive supplemental water from Central Valley streams as for all major new uses must include an analysis of the impact of such use on Delta outflow and Delta water quality objectives. The studies associated with powerplants should include an analysis of the cost and water use associated with the use of alternative cooling facilities employing dry, or wet/dry modes of operation.

(7) The State Board encourages water supply agencies and power generating utilities and agencies to study the feasibility of using wastewater for powerplant cooling. The State Board encourages the use of wastewater for powerplant cooling where it is appropriate. Furthermore, section 25601(d) of the Warren-Alquist Energy Resources Conservation and Development Act directs the water and other advances in powerplant cooling and section 462 of the Waste Water Reuse Law directs the Department of Water Resources to "...*conduct studies and investigations on the availability and quality of waste water and uses of reclaimed waste water for beneficial purposes including, but not limited to ... and cooling for thermal electric powerplants.*"

In addition, the policy contains three discharge prohibitions. The prohibitions are listed below:

(1) The discharge to land disposal sites of blowdown waters from inland powerplant cooling facilities shall be prohibited except to salt sinks or to lined facilities approved by the Regional and State Boards for the reception of such wastes.

(2) The discharge of wastewaters from once-through inland powerplant cooling facilities shall be prohibited unless the discharger can show that such a practice will maintain the existing water quality and aquatic environments of the State's water resources.

(3) The Regional Boards may grant exceptions to these discharge prohibitions on a case-by-case basis in accordance with exception procedures included in the *Water Quality Control Plan for Control of Temperature In the Coastal and Interstate Waters and Enclosed Bays and Estuaries of California.*

THERMAL PLAN (RESOLUTION NO. 75-89)

The *Water Quality Control Plan for the Control of Temperature in the Coastal and Interstate Waters and Enclosed Bays and Estuaries of California* (Thermal Plan) was adopted by the State Board in 1971, revised in 1972 and revised again on September 18, 1975. The Thermal Plan specifies water quality objectives and general water quality provisions for new and existing discharges into enclosed bays, estuaries, cold interstate waters, warm interstate waters and coastal waters. The State and Regional Boards administer the plan by establishing waste discharge requirements for elevated temperature wastes. Existing and future dischargers of thermal waste are required to conduct studies to define the effect of the discharge on beneficial uses and, for existing discharges, determine design and operating changes which would be necessary to achieve compliance with the provisions of the Thermal Plan.

Existing waste discharge requirements are required to be reviewed to determine any necessary revisions, changes in monitoring programs and the need for studies of the effect of the thermal discharge on beneficial uses. Proposed thermal dischargers may be required to submit studies prior to the establishment of WDRs. Appropriate post discharge studies are also required by the Regional Board. The Thermal Plan specifies that the Regional Board shall outline the scope and design of any necessary studies to include the following as applicable:

(1) Existing conditions in the aquatic environment;

(2) Effects of the existing discharge on beneficial uses;

(3) Predicted conditions in the aquatic environment with waste discharge facilities designed and operated in compliance with the provisions of the plan;

(4) Predicted effects of the proposed discharge on beneficial uses;

(5) An analysis of costs and benefits of various design alternatives; and

(6) The extent to which intake and outfall structures are located and designed so that the intake of planktonic organisms is at a minimum, waste plumes are prevented from touching the ocean substrate or shorelines, and the waste is dispersed into an area of pronounced along-shore or offshore currents.

The Thermal Plan further specifies that WDRs adopted for discharges of thermal wastes shall be monitored in order to determine compliance with effluent or receiving water temperature requirements. For significant thermal discharges, the State or Regional Boards shall require expanded monitoring programs to assess whether the thermal discharge continues to provide adequate protection to the beneficial uses of the water. The State or Regional Board may require the discharger(s) to pay a public agency or other appropriate person an amount sufficient to carry out the expanded monitoring program if:

(1) The discharger has previously failed to carry out a monitoring program satisfactory to the State or Regional Board; or

(2) More than a single facility, under separate ownerships, may significantly affect the thermal characteristics of the body of water, and the owners of such facilities are unable to reach agreement on a cooperative program within a reasonable time period specified by the State or Regional Board.

POLICY WITH RESPECT TO WATER RECLAMATION IN CALIFORNIA (RESOLUTION NO. 77 1)

The *Policy with Respect to Water Reclamation in California* (Reclamation Policy) was adopted by the State Board on January 6, 1977. The Reclamation Policy provides that the water resources of the State be put to beneficial use to the fullest extent of which they are capable. The policy provides that water resources shall not be wasted, nor be put to an unreasonable use, nor be used in an unreasonable method.

This policy commits both the State and Regional Board to support reclamation and to undertake all possible steps to encourage the development of water reclamation facilities to reclaim water to supplement existing surface and ground water supplies. It requires the Regional Board to conduct reclamation surveys and specifies actions to be implemented by the State and Regional Board and other agencies.

The State Board adopted the four following principles in order to implement the Reclamation Policy. These principles are listed below:

(1) The State and Regional Boards shall encourage, and consider or recommend for funding, water reclamation projects which meet the conditions below and which do not adversely impact vested water rights or unreasonably impair instream beneficial uses or place a unreasonable burden on present water supply systems:

A. Beneficial use will be made of wastewaters that would otherwise be discharged to marine or brackish receiving waters or evaporation ponds;

B. Reclaimed water will replace or supplement the use of fresh water or better quality water;

C. Reclaimed water will be used to preserve, restore, or enhance instream beneficial uses which include, but are not limited to, fish, wildlife, recreation, and aesthetics associated with any surface water or wetlands.

(2) The State and Regional Boards shall encourage reclamation and reuse of water in water-short areas of the State, encourage water conservation measures which further extend the water resources of the State, and encourage other agencies, in particular the Department of Water Resources, to assist in implementing this policy.

(3) The State and Regional Boards recognize the need to protect the public health including potential vector problems and the environment in the implementation of reclamation projects.

(4) In implementing these principles, the State and/or Regional Board shall take appropriate actions, recommend legislation, and recommend actions by other agencies in the areas of planning, project funding, water rights, regulation and enforcement, research and demonstration, and public involvement and information.

This resolution has been reprinted at the end of this Chapter.

POLICY ON THE DISPOSAL OF SHREDDER WASTE (RESOLUTION NO. 88-06)

The *Policy on the Disposal of Shredder Wastes* (Shredder Waste Disposal Policy) was adopted on February 8, 1988. This policy permits the disposal of shredded wastes produced by the mechanical destruction of car bodies, old appliances and similar castoffs, into certain landfills under specific conditions designated and enforced by the Regional Boards. Hazardous and nonhazardous shredder waste may be disposed of in appropriate Class III landfills where doing so would not cause water quality impairment. The policy specifies the shredder waste must not exceed PCB levels of 50 milligrams per kilogram (mg/kg). Also, the shredder waste must be disposed in an isolated cell solely designated for the disposal of shredder waste.

SOURCES OF DRINKING WATER POLICY (RESOLUTION NO. 88 63)

Drinking Water

The *Sources of Drinking Water Policy* was adopted by the State Board on May 19, 1988. The policy provides that all surface and ground waters of the State are considered to be suitable or potentially suitable for municipal or domestic water supply and should be so designated by the Regional Boards. Those waters excepted under the policy include the following:

(1) Surface or ground waters where the total dissolved solids exceed 3,000 milligrams per liter (mg/l) and it is not reasonably expected by the Regional Boards to supply a public water system;

(2) Surface or ground waters which have been contaminated and cannot be reasonably treated for domestic use using either Best Management Practices or best economically achievable treatment practices;

(3) Surface or ground waters which do not provide sufficient water for extraction of 200 gallons per day;

(4) Surface waters which are in systems designed or modified to carry municipal, industrial, agricultural or mining wastewaters, or storm water runoff;

(5) Surface waters in systems designed or modified for the primary purpose of conveying or holding agricultural drainage waters, provided that the discharge from such systems is monitored to assure compliance with all relevant water quality objectives as required by the Regional Boards; and

(6) Ground waters where the aquifer is regulated as a geothermal energy producing source or has been exempted administratively pursuant to 40 CFR, section 146.4 for the purpose of underground injection of fluids associated with the production of hydrocarbon or geothermal energy, provided that these fluids do not constitute a hazardous waste under 40 CFR, section 261.3. This resolution has been reprinted at the end of this Chapter.

NONPOINT SOURCE MANAGEMENT PLAN (RESOLUTION NO. 88-123)

The *Nonpoint Source Management Plan* was adopted by the State Board on November 15, 1988, pursuant to section 319 of the federal Clean Water Act. Section 319 requires each state to prepare a Nonpoint Source Management Plan and to conduct an assessment of the impact nonpoint sources have on the state's waterbodies. In response to these requirements, the State Board adopted the Nonpoint Source Management Plan (NPSMP) in 1988 and the Water Quality Assessment in 1990. The NPSMP established a statewide policy for managing polluted runoff in California. The plan identifies three management approaches which are used by the State and Regional Boards to address nonpoint source problems:

(1) Voluntary implementation of best management practices;

(2) Regulatory-based encouragement of best management practices; and

(3) Effluent requirements.

The primary goal of the program is to measurably improve water quality and/or implementation of Best Management Practices by meeting several objectives specified in the plan.

The Nonpoint Source Management Plan outlines steps to initiate systematic management of nonpoint sources in California. These steps include:

(1) An explicit long-term commitment by the State and Regional Board;

(2) More effective coordination of existing State and Regional Board nonpoint-source related programs;

(3) Greater use of Regional Board regulatory authorities coupled with non-regulatory programs;

(4) Stronger links between the local, State and Federal agencies which have powers that can be used to manage nonpoint sources;

(5) Development of new funding sources; and

(6) Implementation of the requirements of the 1990 Reauthorization of the Coastal Zone Management Act (CZMA) which requires the State Board and the California Coastal Commission to develop and implement an enforceable nonpoint source program in the coastal zone.

The reauthorization of the CZMA, together with specific guidance from the USEPA and the National Oceanic & Atmospheric Administration (NOAA), requires coastal states to develop coastal nonpoint pollution control programs. These programs are to implement management measures for the control of land uses which contribute nonpoint source pollution to coastal waters. Management measures, which include specific measures for mitigating water quality impacts, are specified for the following land uses: agriculture; grazing; confined animal facilities; forestry; urban development; roads; marinas and recreational boating; hydromodification; and mines. The state's coastal program is to be considered for approval by the USEPA and NOAA in July 1995.

Revision of the State Nonpoint Source Management Plan (NPSMP) has been initiated. The State Board intends to consider the requirements of the Coastal Zone Act Reauthorization Amendments (CZARA) during the review and revision of the NPSMP. There will also be more of an emphasis placed on watershed based nonpoint source controls in the revised NPSMP. To develop these management measures, the State Board is forming Task Force Committees composed of experts in the various nonpoint source categories. The management measures developed by the Task Force Committees will be reviewed by an Oversight Committee made up of State and Regional Board staff prior to inclusion in the revised NPSMP. The anticipated date of completion of the revised NPSMP is in 1995.

The plan describes an implementation project entitled the "Southern California Coastal Lagoon Urban Runoff Management." This project requires land developers to incorporate low flow sand filters into project designs and to implement street sweeping programs. The performance of the filters and programs are monitored to incorporate design modifications as needed to improve performance.

Other implementation actions specified in the plan for Region 9 include the following regulatory and non-regulatory program(s).

REGULATORY PROGRAMS

Dairies

The Regional Board issues Waste Discharge Requirements which limit the amount of manure that can be applied per acre to agricultural land.

Erosion Control

The Regional Board implements policies requiring cities and counties to adopt erosion control ordinances. Thus, the Regional Board adopted Resolution No. 92-21, *A Resolution Concerning the Agreement Between the California Regional Water Quality Control Board, San Diego Region, and the Resource Conservation Districts of San Diego County Regarding the Erosion and Sediment Control Policy* (Resource Conservation Districts of San Diego County Erosion and Sediment Control Policy. In addition, staff reviews ordinances and assists with enforcement.

Subsurface Disposal Policy

Regional Board staff will develop criteria for minimum lot sizes for septic systems.

NON-REGULATORY PROGRAM

San Diego Bay Study

The Regional Board will continue a five year study to identify the sources and extent of water quality pollution in San Diego Bay. Possible nonpoint sources such as storm water runoff and past point source pollutants now bound to bottom sediments will be investigated.

CALIFORNIA OCEAN PLAN (RESOLUTION NO. 90-27)

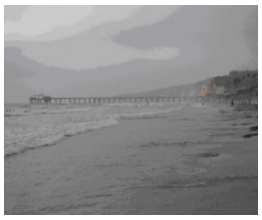

Pacific Ocean, Scripps Pier

The *Water Quality Control Plan for Ocean Waters of California* (California Ocean Plan) was adopted by the State Board in 1972, and later revised in 1978, 1983, 1988 and 1990. The revision in effect at the time of this writing is Resolution No. 90 27, which was adopted by the State Board on March 22, 1990. The California Ocean Plan is applicable to all point source discharges to the ocean.

The California Ocean Plan is designed to protect the quality of the ocean waters for use and enjoyment by the people through the control of waste discharges to the ocean. The plan sets forth water quality objectives for ocean waters which impose limits on bacteriological, physical, chemical, biological, toxic, and radioactive characteristics for ocean waters in numerical and descriptive terms to ensure the reasonable protection of beneficial uses and the prevention of nuisance. Also, the plan describes requirements for management and design of systems discharging wastewaters to the ocean and effluent quality requirements for discharges. Systems must be designed and operated in a manner that will maintain the indigenous marine life and a healthy and diverse marine community. In addition, discharge prohibitions are placed on hazardous substances, warfare agents and high level radioactive wastes, sludge and digester supernatant, and bypassed untreated waste discharges. Furthermore, the plan states that "*Areas of Special Biological Significance*" shall be designated by the State Board. In these areas, the maintenance of natural water quality conditions must be assured. Waste discharges to ASBS are prohibited unless the State Board finds that there would be no adverse impact to beneficial uses. Lastly, discharge requirements within the California Ocean Plan include the maximum allowable monthly mass emission rates for each effluent quality constituent included therein.

The California Ocean Plan declares the State Board's intent to require continual monitoring of the marine environment to assure that the California Ocean Plan reflects the latest available data and that the water quality objectives are adequate to fully protect indigenous marine species and to protect human health.

CALIFORNIA WETLANDS CONSERVATION POLICY

The California Wetlands Conservation Policy was established by the Governor on August 23, 1993. The goal of the California Wetlands Conservation Policy is to establish a policy framework and strategy that will:

- Ensure no overall net loss and achieve a long-term net gain in the quantity, quality, and permanence of wetlands acreage and values in California in a manner that fosters creativity, stewardship, and respect for private property;

- Reduce procedural complexity in the administration of State and Federal wetlands conservation programs; and

- Encourage partnerships to make landowner incentive programs and cooperative planning efforts the primary focus of wetlands conservation and restoration.

Three measures are identified to achieve these objectives, these include: (1) statewide policy initiatives; (2) regional strategies; and an (3) interagency wetlands task force.

Statewide Policy Initiative

These policy initiatives include a statewide wetlands inventory, support for wetlands planning, improved administration of existing wetland's regulatory programs, development and adoption of a consistent wetlands definition for state regulatory programs, development and adoption of a state policy regarding Army Corps of Engineers nationwide permits, development and adoption of consistent wetlands standards and guidelines, enhancing efficiency of and coordination in the wetland permitting process, encouragement of

regulatory flexibility in situations in which wetlands are created unintentionally or incidentally to other activities, encouragement of regulatory flexibility to allow public agencies and water districts to create wetlands but later remove them if the wetlands are found to conflict with the primary purpose to which the property is devoted, strengthened landowner incentives to protect wetlands, support for mitigation banking, development and expansion of other wetlands programs, and integration of wetlands policy and planning with other environmental and land use processes.

Regional Strategies

These include three geographically based regional strategies in which wetlands programs can be implemented, refined, and combined in unique ways to achieve the goals and objectives of the wetlands policy. These three strategies are to be implemented in the Central Valley, the San Francisco Bay area, and Southern California. For Southern California, the regional strategy is to initiate better coordination and communication among diverse interests in southern California by establishing a "*Southern California Wetlands Joint Venture.*" This group would set long-term goals and priorities for the conservation of wetlands and develop a policy to achieve those goals, and would encourage a variety of demonstration projects designed to enhance the State's ability to constructively address regional wetlands issues.

Interagency Wetlands Task Force

This task force is to be created to direct and coordinate administration and implementation of the Wetlands Policy. This task force will be advisory to the Governor and help resolve inter-agency conflicts on wetlands. The task force will appoint an advisory committee of stakeholders and may seek additional technical advice as necessary.

CLEANUP AND ABATEMENT POLICIES AND PROCEDURES (RESOLUTION NO. 92-49)

The *Policies and Procedures for Investigation and Cleanup and Abatement of Discharges Under Water Code section 13304* (Cleanup and Abatement Policies and Procedures) was adopted by State Board Resolution No. 92-49 on June 18, 1992, and amended on April 21, 1994. The Policy describes the procedures the State Board and the Regional Board follow in making decisions on investigations to determine the vertical and horizontal extent of a discharge, and the appropriate cleanup and abatement methods. The Policy applies to all investigations and cleanup and abatement activities, for all types of discharges subject to California Water Code (Water Code) section 13304.

Section 13304 applies to any person who discharges or who has discharged waste into waters of the State in violation of any waste discharge requirement or other order or prohibition issued by a Regional Board or the State Board, or who has caused or permitted, causes or permits, or threatens to cause or permit any waste to be discharged or deposited where it is, or probably will be, discharged into the waters of the State and creates, or threatens to create, a condition of pollution or nuisance. Section 13304 authorizes the Regional Board to require complete cleanup of all waste discharged and to require restoration of affected water to background conditions (i.e., the water quality that existed before the discharge). The Policy requires dischargers to clean up and abate the effects of discharges in a manner that promotes attainment of either background water quality, or the best water quality which is reasonable, if background levels of water quality cannot be restored. Cleanup levels prescribed by the State Board or Regional Boards must:

- Be consistent with maximum benefit to the people of the State; and
- Be established in a manner consistent with CCR, Title 23, Chapter 15 regulations.

Dischargers are required to carry out a phased investigation to determine the nature and extent of soil and ground water pollution at a site. The Policy describes various procedures to ensure that dischargers have the opportunity to select cost-effective methods, for detecting discharges, and for cleanup and abatement. The Policy also contains criteria for development of reasonable schedules for investigation and cleanup and abatement, or other remedial action at a site.

For further details about the Policy, the reader should refer to State Board Resolution No. 92 49.

WATER QUALITY ENFORCEMENT POLICY

The *Water Quality Enforcement Policy* became effective on May 20, 2010. This Policy addresses the enforcement component (i.e. actions that take place in response to a violation) of the Regional and State Boards' regulatory framework, which is a critical element of a successful regulatory program. Without a strong enforcement program to follow through on non-compliance, the entire regulatory framework would be in jeopardy. Enforcement is a critical ingredient in creating the deterrence needed to encourage the regulated community to anticipate, identify, and correct violations. The Policy includes a process for ranking of enforcement priorities, a methodology for calculating civil liability, and requires recording and reporting of enforcement data to the public and regulated community.

POLICY ON SUPPLEMENTAL ENVIRONMENTAL PROJECTS

The *Policy on Supplemental Environmental Projects* became effective on February 3, 2009. This Policy guides the process of the Regional or State Board accepting a Supplemental Environmental Project (SEP) that may allow a discharger to satisfy part of the monetary assessment imposed in an administrative civil liability (ACL). California Water Code section 13385(i) allows limited use of SEPs associated with mandatory minimum penalties and provides criteria and reporting requirements for qualifying SEPs.

ONSITE WASTEWATER TREATMENT SYSTEMS POLICY (RESOLUTION NO. 2012-0032)

The purpose of the *Water Quality Control Policy for Siting, Design, and Maintenance of Onsite Wastewater Treatment Systems*[1] (OWTS Policy) is to allow the continued use of OWTS, while protecting water quality and public health. The OWTS Policy was adopted by the State Board on June 19, 2012. The OWTS Policy recognizes that responsible local agencies can provide the most effective means to manage OWTS on a routine basis. It is the intent of the OWTS Policy to efficiently utilize and improve coordination between the State and local agencies to improve the implementation of the OWTS Policy for the protection of water quality. To accomplish this purpose, the OWTS Policy establishes a statewide, risk-based, tiered approach for the regulation and management of OWTS installations and replacements, and sets the level of performance and protection expected from OWTS. The OWTS Policy also allows Regional Boards to conditionally waive issuing Waste Discharge Requirements (WDRs) for OWTS that meet requirements specified in the Policy.

The regulation of OWTS is organized into five separate implementation tiers (tiers outlined in Chapter 4). An OWTS that meets the criteria of one of the five tiers is eligible for the conditional waiver of WDRs, with regulation of the qualifying OWTS deferred to the appropriate local agency.

[1]OWTS Policy can be found online at http://www.waterboards.ca.gov/

RECYCLED WATER POLICY (RESOLUTION NO. 2009-0011)

The main goals of the Recycled Water Policy are to provide direction to the Regional Boards, proponents of recycled water projects, and the public regarding the appropriate criteria to be used in issuing permits for recycled water projects; increase the use of recycled water from municipal wastewater sources; and streamline and expedite permitting of recycled water projects by the Regional Boards. These goals will help promote long-term protection of regional groundwater supplies. The Recycled Water Policy[2] was adopted by the State Board on February 9, 2009 and amended on January 22, 2013.

The Policy requires that by May 2014 individual salt and nutrient management plans (SNMPs) be developed for every groundwater basin in California. The SNMPs required by the Recycled Water Policy are to be developed by local stakeholder driven processes led mainly local water purveyors and wastewater agencies. The development of SNMPs allows for a more comprehensive approach to management of all contributors of salt and nutrient loading to groundwater on a basin-wide or watershed-basis; and in a manner that ensures attainment of water quality objectives and protection of beneficial uses.

The Recycled Water Policy specifies permitting criteria for landscape irrigation and groundwater recharge projects, and includes criteria for streamlined permitting. Irrigation projects that meet criteria specified in the Recycled Water Policy are entitled to a streamlined permitting process. The Recycled Water Policy also establishes a program to evaluate the risks of constituents of emerging concern to public health and the environment; and promotes incentives to encourage and facilitate recycled water use.

[2] Recycled Water Policy can be found online at: http://www.waterboards.ca.gov/

REGIONAL BOARD RESOLUTIONS

The San Diego Regional Board has adopted many resolutions which, in addition to the State Board Resolutions described previously, are important to the Regional Board's implementation of the Basin Plan. The Regional Board Resolutions that implement, interpret, or make specific the Basin Plan are incorporated into the Basin Plan are listed below.

Resolution No. 78-6
Adopted February 27 1978. *A Resolution Adopting Amendments to the Comprehensive Water Quality Control Plan for the San Diego Region.* This resolution deleted water quality objectives and beneficial uses for certain portions of basins 1.10, 1.20, 1.30, 1.40, 1.50, 2.10, 3.10, 4.10, 4.20, 4.30, 4.40, 4.50, 4.60, 5.10, 6.10, 7.10, and 11.10.

Resolution No. 79-25
Adopted March 26, 1979. *A Resolution Concerning the 'Agreement Between the California Regional Water Quality Control Board, San Diego Region and the Elsinore-Murrieta-Anza Resource Conservation District Regarding the Sediment Control Ordinance*.'

Resolution No. 79-44
Adopted June 25, 1979. *A Resolution Concerning 'Guidelines for New Community and Individual Sewerage Facilities.'*

Resolution No. 80-48
Adopted September 22, 1980. *A Resolution Concerning the San Diego County Department of Health Services Minimum Criteria for the Design and Construction of Evapotranspiration and Evapotranspiration-Infiltration Systems.*

Resolution No. 81-16
Adopted March 23, 1981. *A Resolution Adopting Amendments to the Comprehensive Water Quality Control Plan for the San Diego Region.* This resolution amended the beneficial uses and water quality objectives for the Aliso, Carlsbad, Agua Hedionda, Batiquitos and Telegraph hydrographic subareas.

Resolution No. 83-04
Adopted January 24, 1983. *A Resolution Adopting an Amendment to the Comprehensive Water Quality Control Plan for the San Diego Region.* This resolution amended the water quality objectives for nutrients in coastal lagoons.

Resolution No. 83-27
Adopted October 3, 1983. *A Resolution Adopting Amendments to the Comprehensive Water Quality Control Plan for the San Diego Region, San Elijo Hydrographic Subarea.*

Resolution No. 83-28
Adopted August 29, 1983. *A Resolution Supporting the County of San Diego's Moratorium on Subsurface Disposal Systems in the Valley Center Area.*

Resolution No. 84-20
Adopted August 27, 1984. *A Resolution Adopting Amendments to the Comprehensive Water Quality Control Plan for the San Diego Region, Mission San Diego Hydrographic Subarea.*

Resolution No. 85-89
Adopted December 16, 1985. *A Resolution Adopting Amendments to the Comprehensive Water Quality Control Plan for the San Diego Region, Mission San Diego Hydrographic Subarea and Sycamore Canyon Subarea, and a portion of the Santee Hydrographic Subarea.*

Resolution No. 85-92
Adopted December 16, 1985. *Designation of Class III Landfills Within the San Diego Region to Accept Shredder Wastes as Required by Section 25143.6 of the Health and Safety Code.*

Resolution No. 86-06
Adopted March 24, 1986. *A Resolution Adopting Amendments to the Comprehensive Water Quality Control Plan for the San Diego Region.* This resolution established a goal and action plan for encouraging and promoting water reclamation.

Resolution No. 87-71
Adopted November 16, 1987. *A Resolution Adopting Amendments to the Comprehensive Water Quality Control Plan for the San Diego Region.* This resolution established a policy on dairy waste management.

Resolution No. 87-91
Adopted December 21, 1987. *A Resolution Adopting Amendments to the Comprehensive Water Quality Control Plan for the San Diego Region.* This resolution established a policy on erosion and sediment control.

Resolution No. 88-06
Adopted February 8, 1988. *Policy on the Disposal of Shredder Waste*. The policy specifies the shredder waste must not exceed PCB levels of 50 milligrams per kilogram (mg/kg). Also, the shredder waste must be disposed on the last and highest lift in a closed disposal cell or in an isolated cell solely designated for the disposal of shredder waste.

Resolution No. 88-25
Adopted March 14, 1988. *A Resolution Regarding the Proposed State Water Resources Control Board Policy for Water Quality Control Defining 'Sources of Drinking Water' for the Purposes of Discharge Prohibitions.*

Resolution No. 88-49
Adopted April 25, 1988. *A Resolution Adopting Amendments to the Comprehensive Water Quality Control Plan for the San Diego Region for a Portion of the Otay Hydrographic Subunit.*

Resolution No. 88-97
Adopted October 3, 1988. *A Resolution Supporting the Proposed Interim Solution to the Tijuana Sewage Problem Consisting of a Sewage Treatment Plant Within the United States and an Ocean Outfall.*

Resolution No. 89-33.
Adopted April 10, 1989. *Incorporation of 'Sources of Drinking Water' Policy into the Water Quality Control Plan (Basin Plan) of the San Diego Region.*

Resolution No. 89-53
Adopted July 10, 1989. *Addition of Portions of the Otay Valley Hydrologic Area to the List of Waters Excepted From the 'Sources of Drinking Water' Policy.*

Resolution No. 90-27
Adopted April 23, 1990. *A Resolution Adopting Amendments to the Comprehensive Water Quality Control Plan for the San Diego Region, for the Mission San Diego and a Portion of the Santee Hydrologic Subareas.* This resolution establishes a biostimulatory substances water quality compliance methodology for part of the San Diego River.

Resolution No. 90-28
Adopted March 12, 1990. *A Resolution Adopting Amendments to the Comprehensive Water Quality Control Plan for the San Diego Region, for a Portion of the San Clemente Hydrologic Subunit.*

Resolution No. 90-53
Adopted September 24, 1990. *A Resolution Adopting Amendments to the Comprehensive Water Quality Control Plan for Portions of the Santa Margarita Hydrologic Unit (2.00), San Diego Region.* This resolution establishes a biostimulatory substances water quality compliance methodology for part of the Santa Margarita River.

Resolution No. 90-61
Adopted November 5, 1990. *A Resolution Amending Resolution No. 90-40, A Regionwide Groundwater Amendment to the Comprehensive Water quality Control Plan for the San Diego Region.* This resolution revised the language regarding use of reclaimed water contained in Resolution No. 90-40, *A Resolution Reconsidering and Amending Resolution No. 90-26, 'A Regionwide Groundwater Amendment to the Comprehensive Water Quality Control Plan for the San Diego Region'*, and Resolution No. 90-26, *A Resolution Adopting A Regionwide Groundwater Amendment to the Comprehensive Water Quality Control Plan for the San Diego Region.*

Resolution No. 91-23
Adopted March 11, 1991. *A Resolution Amending Resolution No. 90-27, 'A Resolution Adopting Amendments to the Comprehensive Water Quality Control Plan for the San Diego Region, for the Mission San Diego and a Portion of the Santee Hydrologic Subareas.'*

Resolution No. 91-46
Adopted May 20, 1991. *A Resolution Rescinding and Replacing Resolution No. 88-91 and Addenda, and Establishing a Regional Board Drought Policy.*

Resolution No. 91-79
Adopted December 9, 1991. *A Resolution Amending Resolution No. 90-55, 'Adopting Amendments to the Comprehensive Water Quality Control Plan for the San Diego Region.'* This resolution establishes revised Basin Plan chapters for beneficial uses and water quality objectives.

Resolution No. 92-21
Adopted April 6, 1992. *A Resolution Concerning the Agreement Between the California Regional Water Quality Control Board, San Diego Region, and the Resource Conservation Districts of San Diego County Regarding the Erosion and Sediment Control Policy.*

Resolution No. 93-02
Adopted February 1, 1993. *A Resolution Adopting Amendments to the Comprehensive Water Quality Control Plan for the San Diego Region for the Escondido Hydrologic Subarea (4.62).*

Resolution No. 94-09
Adopted February 10, 1994. *A Resolution Adopting Amendments to the Comprehensive Water Quality Control Plan for the San Diego Region, Portions of the Pauba (2.51) and Wolf (2.52) Hydrologic Subareas.*

Resolution No. 94-10
Adopted September 8, 1994. *A Resolution Adopting an Update to the Water Quality Control Plan for the San Diego Basin.*

Resolution No. 94-25
Adopted February 10, 1994. *A Resolution Adopting Amendments to the Comprehensive Water Quality Control Plan for the San Diego Region for the Laguna (1.10), Mission Viejo (1.20), and San Clemente (1.30) Hydrologic Areas.*

Resolution No. 94-139
Adopted October 13, 1994. *A Resolution Adopting Amendments to the Water Quality Control Plan for a portion of the Poway Hydrologic Area (6.20).*

Resolution No. 95-48
Adopted May 16, 1995. *A Resolution Adopting Amendments to the Water Quality Control Plan for the Alluvial Aquifer of the Moosa (903.13) and the Valley Center (903.14) Hydrologic Subareas.*

Resolution No. 95-115
Adopted October 12, 1995. *A Resolution Adopting Amendments to the Water Quality Control Plan for the San Diego Basin (9), Table 4-4. Types of Discharges Identified for Conditional Waiver of Waste Discharge Requirements.*

Resolution No. 96-30
Adopted May 9, 1996*. A Resolution Adopting an Amendment to the Water Quality Control Plan for the San Diego Region.* This resolution provides an Exception to the Prohibition of Discharges of Recycled Wastewater to Surface Water Bodies Used for Municipal Water Supply.

Resolution No. 96-34
Adopted August 8, 1996. *A Resolution Adopting an Amendment to the Water Quality Control Plan for the San Diego Region, Table 4-4, Item 24, Composting and Processing, Mulching, or Grinding Waste Management Units.*

Resolution No. 97-04
Adopted March 12, 1997. *A Resolution Adopting Amendments to the Water Quality Control Plan for the San Diego Basin for the Designation of COLD and SPWN Beneficial Uses.*

Resolution No. R9-2002-0123
Adopted August 14, 2002. *Total Maximum Daily Load (TMDL) for Diazinon in Chollas Creek Watershed, San Diego County.*

Resolution No. R9-2005-0019
Adopted February 9, 2005. *Total Maximum Daily Load for Dissolved Copper in the Shelter Island Yacht Basin, San Diego Bay*.

Resolution No. R9-2005-0036
Adopted February 9, 2005. *A Resolution Adopting an Amendment to the Water Quality Control Plan for the San Diego Region (9) to Incorporate Total Maximum Daily Loads (TMDLs) for Total Nitrogen and Total Phosphorus in the Rainbow Creek Watershed, San Diego County.*

Resolution No. R9-2005-0238
Adopted November 9, 2005. *Resolution Amending the Water Quality Control Plan for the San Diego Basin (9) to Incorporate Authorization for Compliance Time Schedules in National Pollutant Discharge Elimination System Requirements (Basin Plan Issue No. 6).*

Resolution No. R9-2005-0239
Adopted November 9, 2005. *A Resolution Amending the Water Quality Control Plan for the San Diego Basin (9) to Add Unnamed or Unidentified Waterbodies to the Beneficial Use Tables and Make Water Quality Objective Table Corrections (Basin Plan Issue No. 3).*

Resolution No. R9-2006-0029
Adopted April 12, 2006. *Resolution Amending the Water Quality Control Plan for the San Diego Basin (9) to Edit and Reformat Text, and Update Graphics; and Reinstating Text on "Controllable Water Quality Factors" (Basin Plan Issue No. 1)*

Resolution No. R9-2007-0043
Adopted June 13, 2007. *A Resolution Adopting an Amendment to the Water Quality Control Plan for the San Diego Basin (9) to Incorporate Total Maximum Daily Loads for Dissolved Copper, Lead and Zinc in Chollas Creek, Tributary to San Diego Bay, and to Revise the Toxic Pollutants Section of Chapter 3 to Reference the California Toxics Rule.*

Resolution No. R9-2008-0027
Adopted June 11, 2008. *A Resolution to Adopt an Amendment to the Water Quality Control Plan for the San Diego Basin (9) to Incorporate Total Maximum Daily Loads for Indicator Bacteria, Baby Beach in Dana Point Harbor and Shelter Island Shoreline Park in San Diego Bay.*

Resolution No. R9-2008-0028.
Adopted May 14, 2008. *A Resolution Amending the Water Quality Control Plan for the San Diego Basin (9) to Incorporate Implementation Provisions for Indicator Bacteria Water Quality Objectives to Account for Loading from Natural Uncontrollable Sources within the Context of a Total Maximum Daily Load.*

Resolution No. R9-2010-0001
Adopted February 10, 2010. *A Resolution Amending the Water Quality Control Plan for the San Diego Basin (9) to Incorporate Revised Total Maximum Daily Loads for Indicator Bacteria, Project I – Twenty Beaches and Creeks in the San Diego Region (Including Tecolote Creek).*

Resolution No. R9-2012-0033
Adopted June 13, 2012. *A Resolution Amending the Water Quality Control Plan for the San Diego Basin (9) to Incorporate the Total Maximum Daily Load for Sedimentation in Los Peñasquitos Lagoon.*

REPRINT OF RESOLUTION NO. 77-1

STATE WATER RESOURCES CONTROL BOARD

RESOLUTION NO. 77-1

POLICY WITH RESPECT TO WATER RECLAMATION IN CALIFORNIA

WHEREAS:

1. The California Constitution provides that the water resources of the State be put to beneficial use to the fullest extent of which they are capable, and that waste or unreasonable use or unreasonable method of use of water be prevented, and that conservation of such waters is to be exercised with a view to the reasonable and beneficial use thereof in the interest of the people and for the public welfare;

2. The California Legislature has declared that the State Water Resources Control Board and each Regional Water Quality Control Board shall be the principal state agencies with primary responsibility for the coordination and control of water quality;

3. The California Legislature has declared that the people of the State have a primary interest in the development of facilities to reclaim water containing waste to supplement existing surface and underground water supplies;

4. The California Legislature has declared that the State shall undertake all possible steps to encourage the development of water reclamation facilities so that reclaimed water may be made available to help meet the growing water requirements of the State;

5. The Board has reviewed the document entitled "*Policy and Action Plan for Water Reclamation in California*," dated December 1976. This document recommends a variety of actions to encourage the development of water reclamation facilities and the use of reclaimed water. Some of these actions require direct implementation by the Board; others require implementation by the Executive Officer and the Regional Boards. In addition, this document recognizes that action by many other state, local, and federal agencies and the California State Legislature would also encourage construction of water reclamation facilities and the use of reclaimed water. Accordingly, the Board recommends for its consideration a number of actions intended to coordinate with the program of this Board;

6. The Board must concentrate its efforts to encourage and promote reclamation in water-short areas of the State where reclaimed water can supplement or replace other water supplies without interfering with water rights or instream beneficial uses or placing an unreasonable burden on present water supply systems; and

7. In order to coordinate the development of reclamation potential in California, the Board must develop a data collection, research, planning, and implementation Program for water reclamation and reclaimed water uses.

THEREFORE, BE IT RESOLVED:

1. That the State Board adopts the following Principles:

    I. The State Board and the Regional Boards shall encourage, and consider or recommend for funding, water reclamation projects which meet Condition 1, 2, or 3 below and which do not adversely impact vested water rights or unreasonably impair instream beneficial uses or place an unreasonable burden on present water supply systems;

(1) Beneficial use will be made of wastewaters that would otherwise be discharged to marine or brackish receiving waters or evaporation ponds,

(2) Reclaimed water will replace or supplement the use of fresh water or better quality water,

(3) Reclaimed water will be used to preserve, restore, or enhance instream beneficial uses which include, but are not limited to, fish, wildlife, recreation and esthetics associated with any surface water or wetlands.

II. The State Board and the Regional Boards shall (1) encourage reclamation and reuse of water in water-short areas of the State, (2) encourage water conservation measures which further extend the water resources of the State, and (3) encourage other agencies, in particular the Department of Water Resources, to assist in implementing this policy.

III. The State Board and the Regional Boards recognize the need to protect the public health including potential vector problems and the environment in the implementation of reclamation projects.

IV. In implementing the foregoing Principles, the State Board or the Regional Boards, as the case may be, shall take appropriate actions, recommend legislation, and recommend actions by other agencies in the areas of (1) planning, (2) project funding, (3) water rights, (4) regulation and enforcement, (5) research and demonstration, and (6) public involvement and information.

2. That, in order to implement the foregoing Principles, the State Board:

(a) Approves Planning Program Guidance Memorandum No. 9, "*PLANNING FOR WASTEWATER RECLAMATION*,"

(b) Adopts amendments and additions to Title 23, California Administrative Code sections 654.4, 761, 764.9, 783, 2101, 2102, 2107, 2109, 2109.1, 2109.2, 2119, 2121, 2133(b)(2), and 2133(b)(3),

(c) Approves Grants Management Memorandum No. 9.01, "*WASTEWATER RECLAMATION*,"

(d) Approves the Division of Planning and Research, Procedures and Criteria for the Selection of Wastewater Reclamation Research and Demonstration Project,

(e) Approves "*GUIDELINES FOR REGULATION OF WATER RECLAMATION*,"

(f) Approves the Plan of Action contained in Part III of the document identified in Finding Five above,

(g) Directs the Executive Officer to establish an Interagency Water Reclamation Policy Advisory Committee. Such Committee shall examine trends, analyze implementation problems, and report annually to the Board the results of the implementation of this policy, and

(h) Authorizes the Chairperson of the Board and directs the Executive Officer to implement the foregoing Principles and the Plan of Action contained in Part III of the document identified in Finding Five above, as appropriate.

3. That not later than July 1, 1978, the Board shall review this policy and actions taken to implement it, along with the report prepared by the Interagency Water Reclamation Policy Advisory Committee, to determine whether modifications to this policy are appropriate to more effectively encourage water reclamation in California.

4. That the Chairperson of the Board shall transmit to the California Legislature a complete copy of the "*Policy and Action Plan for Water Reclamation in California*."

CERTIFICATION

The undersigned, Executive Officer of the State Water Resources Control Board, does hereby certify that the foregoing is a full, true, and correct copy of a resolution duly and regularly adopted at a special meeting of the State Water Resources Control Board held on January 6, 1977.

Original signed by

Bill B. Dendy

Executive Officer

State Water Resources Control Board

REPRINT OF RESOLUTION NO. 88-63

STATE WATER RESOURCES CONTROL BOARD

RESOLUTION NO. 88-63

ADOPTION OF POLICY ENTITLED "*SOURCES OF DRINKING WATER*"

WHEREAS:

1. California Water Code section 13140 provides that the State Board shall formulate and adopt State Policy for Water Quality Control; and,

2. California Water Code section 13240 provides that Water Quality Control Plans "*shall conform*" to any State Policy for Water Quality Control; and,

3. The Regional Boards can conform the Water Quality Control Plans to this policy by amending the plans to incorporate the policy; and,

4. The State Board must approve any conforming amendments pursuant to Water Code section 13245; and,

5. "*Sources of drinking water*" shall be defined in Water Quality Control Plans as those water bodies with beneficial uses designated as suitable, or potentially suitable, for municipal or domestic water supply (MUN); and,

6. The Water Quality Control Plans do not provide sufficient detail in the description of water bodies designated MUN to judge clearly what is, or is not, a source of drinking water for various purposes.

THEREFORE BE IT RESOLVED:

All surface and ground waters of the state are considered to be suitable, or potentially suitable, for municipal or domestic water supply and should be so designated by the Regional Boards 1 with the exception of:

1. <u>Surface and ground waters where</u>:

   a. The total dissolved solids (TDS) exceed 3,000 mg/l (5,000 µS/cm, electrical conductivity) and it is not reasonably expected by Regional Boards to supply a public water system, or

   b. There is contamination, either by natural processes or by human activity (unrelated to a specific pollution incident), that cannot reasonably be treated for domestic use using either Best Management Practices or best economically achievable treatment practices, or

   c. The water source does not provide sufficient water to supply a single well capable of producing an average sustained yield of 200 gallons per day.

2. <u>Surface waters where</u>:

   a. The water is in systems designed or modified to collect or treat municipal or industrial wastewaters, process waters, mining wastewaters, or storm water runoff, provided that the discharge from such systems is monitored to assure compliance with all relevant water quality objectives as required by the Regional Boards; or,

b. The water is in systems designed or modified for the primary purpose of conveying or holding agricultural drainage waters, provided that the discharge from such systems is monitored to assure compliance with all relevant water quality objectives as required by the Regional Boards.

3. Ground water where:

The aquifer is regulated as a geothermal energy producing source or has been exempted administratively pursuant to 40 CFR, section 146.4 for the purpose of underground injection of fluids associated with the production of hydrocarbon or geothermal energy, provided that these fluids do not constitute a hazardous waste under 40 CFR, section 261.3.

4. Regional Board Authority to Amend Use Designations:

Any body of water which has a current specific designation previously assigned to it by a Regional Board in Water Quality Control Plans may retain that designation at the Regional Board's discretion. Where a body of water is not currently designated as MUN but, in the opinion of a Regional Board, is presently or potentially suitable for MUN, the Regional Board shall include MUN in the beneficial use designation.

The Regional Boards shall also assure that the beneficial uses of municipal and domestic supply are designated for protection wherever those uses are presently being attained, and assure that any changes in beneficial use designations for waters of the State are consistent with all applicable regulations adopted by the Environmental Protection Agency.

The Regional Boards shall review and revise the Water Quality Control Plans to incorporate this policy.

CERTIFICATION

The undersigned, Administrative Assistant to the Board, does hereby certify that the foregoing is a full, true, and correct copy of a policy duly and regularly adopted at a meeting of the State Water Resources Control Board held on May 19, 1988.

Original signed by

Maureen Marche

Administrative Assistant to the Board

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[1] This policy does not affect any determination of what is a potential source of drinking water for the limited purposes of maintaining a surface impoundment after June 30, 1988, pursuant to section 25208.4 of the Health and Safety Code.

CHAPTER 6
SURVEILLANCE, MONITORING AND ASSESSMENT

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6. SURVEILLANCE, MONITORING AND ASSESSMENT

INTRODUCTION

Laboratory

California's well-being is linked to the health of its water. To protect and preserve this basic resource, the State Board and the Regional Board closely monitor water quality throughout the state. A comprehensive surveillance and monitoring program provides basic information needed to evaluate the effectiveness of California's water quality control program.

Historically, a wide variety of interested state, federal, and local agencies have sampled, analyzed, and tracked water quality. The State Board monitoring program coordinates existing information, and supplements it where necessary to meet data needs.

The Porter-Cologne Water Quality Control Act delegates primary responsibility for coordination and control of water quality in California to the State Board. Section 13163 of the Act states that in conducting this mission, the State Board shall coordinate water quality investigations, recognizing that other state agencies may have primary statutory responsibility for such investigations, and shall consult with the concerned Regional Boards in implementing this section.

Pursuant to these mandates, the State Board in 1976 established a coordinated Primary Water Quality Monitoring Network for California. Participants in the coordinated Primary Network included the California Departments of Fish and Game (DFG), Water Resources (DWR), and Health Services (DHS) as well as the Federal Bureau of Reclamation, United States Geologic Survey (USGS), and the United States Environmental Protection Agency (USEPA).

The goal of the Primary Network has been to provide an overall, continuous assessment of water quality in the State. This goal is to be achieved by statewide monitoring of water quality parameters that can affect beneficial uses of state waters.

This chapter contains a discussion of the objectives and various elements of the State and Regional Board's surveillance and monitoring programs. Not all of these programs are currently active in the San Diego Region, as many are unfunded at this time.

STATE SURVEILLANCE AND MONITORING PROGRAMS

The State's surveillance and monitoring programs are designed to assure the collection of data necessary to:

- Establish and review water quality standards, goals, and objectives;
- Determine maximum daily loadings, waste load allocations, and effluent limitations;
- Perform segment classifications and ranking; and
- Establish the relationship between water quality and individual point and nonpoint sources of pollutants.

These data must be verified and properly interpreted to evaluate water quality trends and to make the necessary changes in the enforcement and/or planning programs to carry out program objectives. Output based upon data obtained from this program is used to prepare reports satisfying the requirements of federal Clean Water Act, sections 104, 106, 208, 301, 303, 304, 305, 307, 308, 314, 402, and the applicable portions of the State's Porter-Cologne Water Quality Control Act.

The overall objectives of the State's surveillance and monitoring program are:

- To measure the achievement of water quality goals and objectives specified in the Basin Plan;
- To measure specific effects of water quality changes on the established beneficial uses;

- To measure background conditions of water quality and determine long-term trends in water quality;

- To locate and identify sources of water pollution that pose an acute, accumulative, and/or chronic threat to the environment;

- To provide information needed to relate receiving water quality to mass emissions of pollutants by waste dischargers;

- To provide data for determining compliance with permit conditions;

- To provide the documentation necessary to support the enforcement of permit conditions and waste discharge requirements;

- To measure waste loads discharged to receiving waters and to identify the limits of their effects, and in water quality limited segments, to prepare waste load allocations necessary to achieve water quality control;

- To provide data needed to carry on the continuing planning process;

- To provide a clearinghouse for the collection and dissemination of water quality data gathered by other agencies and private parties cooperating in the program;

- To measure the effects of water rights decisions on water quality and to guide the State Board in its responsibility to regulate unappropriated water for the control of quality; and

- To prepare reports on water quality conditions as required by federal and state regulations and other users requesting water quality data.

The surveillance and monitoring program is designed to meet the objectives set forth above. An optimum surveillance and monitoring program requires flexibility and must be able to respond to needs specified in the Basin Plan as it is implemented and revised. To ensure that the surveillance and monitoring program is flexible and adapts to change, statewide water quality assessments are performed every two years to provide a timely cycle to evaluate the program's effectiveness and make appropriate changes.

The surveillance and monitoring program provides for collection and analysis of samples and the reporting of water quality data. It includes laboratory support and quality assurance, storage of data for rapid and systematic retrieval, and preparation of reports and data summaries. Most importantly, it includes interpretation and evaluation of data leading to recommendations for action.

Surveillance and monitoring at the State level is made up of three programs. These are the Toxic Substance Monitoring, State Mussel Watch and Bay Protection and Toxic Cleanup Programs.

San Mateo Creek steelhead trout

TOXIC SUBSTANCE MONITORING PROGRAM

One method of monitoring for toxic substances (toxic elements and organic compounds) is to collect and analyze water samples. A major problem with this approach is that toxic discharges are likely to occur in an intermittent fashion and thus are likely to be missed with "*grab*" sampling of the water. Another limitation to analyzing water samples is that generally, harmful toxicants are present in low concentrations in the water. Toxicants are concentrated through the aquatic food chain through the process of bioaccumulation. Thus, in the Toxic Substances Monitoring Program, the flesh of fish and other aquatic organisms is analyzed for toxic metals and synthetic organic compounds.

Streams and lakes in the region are sampled according to their importance to the State in terms of water quality. Priority is given to waters where contaminants are suspected and/or to waters where no other source of water quality information is available. Routine chemical and biological water monitoring is performed by the DWR and/or USGS; and toxic substances monitoring of resident organisms is performed by the DFG.

The objectives of the Toxic Substance Monitoring program are:

- To develop statewide baseline data and to demonstrate trends in the occurrence of toxic elements and organic substances in the aquatic biota;
- To assess impacts of accumulated toxicant upon the usability of State waters by man;
- To assess impacts of accumulated toxicant upon the aquatic biota; and
- Where problem concentrations of toxicant are detected, to attempt to identify sources of toxicant and to relate concentrations found in the biota to concentrations found in the water.

The samples collected in the Toxic Substance Monitoring program are benthic invertebrates and fish. The flesh of bivalve mollusks or crayfish tailflesh and fish livers are analyzed for important metals, including arsenic, cadmium, chromium, copper, lead, nickel, silver, and zinc; fish flesh is analyzed for mercury. In addition, both invertebrate and fish flesh samples are analyzed for 55 synthetic organic compounds, most of which are pesticides. Toxic Substance Monitoring reports have been published annually since 1977.

STATE MUSSEL WATCH PROGRAM

The State Mussel Watch (Mussel Watch) program provides documentation of the quality of coastal marine and estuarine waters. The Mussel Watch program fulfills the goal of providing the state with long-term trends in the quality of these waters. Mussels were chosen as the indicator organism for trace metals and synthetic organic compounds in the coastal and estuarine waters. Although the mussel populations of bays and estuaries are of a different species than those found in the open coast; their suitability as sentinels for monitoring the presence of toxic pollutants stems from several factors including: (1) their ubiquity along the California coast; (2) their ability to concentrate pollutants above ambient sea water levels and to provide a time-averaged sample; and (3) their non-motile nature which permits a localized measurement of water quality. The trace metals analyzed for in mussel tissues include aluminum, cadmium, chromium, copper, lead, manganese, mercury, nickel, silver, and zinc. Synthetic organic compounds analyzed for are summarized in Table 6-1.

TABLE 6 - 1. SYNTHETIC ORGANIC COMPOUNDS ANALYZED IN THE STATE MUSSEL WATCH AND TOXIC SUBSTANCES MONITORING PROGRAMS

Aldrin	P, P'- DDE	Endosulfan [2]	Methyl Parathion
Chlorbenside	O, P'- DDE	Endosulfan Sulfate	Oxadiazon [2]
alpha Chlordane	P, P'- DDD	Total Endosulfan	PCB 1248
gamma Chlordane	O, P'- DDD	Ethyl Parathion	PCB 1254
cis Chlordane	P, P'- DDMS	Heptachlor	PCB 1260
trans Chlordane	P, P'- DDMU	Heptachlor Epoxide	Total PCB
Oxychlordane	O, P'- DDT	Heptachlorobenzene	Pentachlorophenol [1]
Total Chlordane	P, P'- DDT	alpha Lindane	Phenol [1]
cis Nonachlor	Total DDT	beta Lindane	Ronnel [1]
trans Nonachlor	Diazinon	gamma Lindane	Tetrachlorphenol [1]
Chlorpyrifos	Dieldrin	delta Lindane	Tetradifon [1]
Dacthal	Endrin	Total Lindane [2]	Toxaphene
Dicofol [2]	Endosulfan [1]	Methoxychlor	Tributylin [1]

[1] These constituents only sampled in the State Mussel Watch Program.
[2] These constituents only sampled in the Toxic Substances Monitoring Program.

When compared with alternative sampling designs such as seawater and sediment sampling, the Mussel Watch program is a more cost effective program. Mussel Watch reports have been published annually since 1978.

During the 1977 and 1978 sampling periods, the focus of the Mussel Watch program was, for the most part, on open coast monitoring of sites outside the vicinity of known pollutant sources. Monitoring of water quality in the State Board's designated Areas of Special Biological Significance (ASBS), to establish baseline conditions relating to the range of typical conditions in water, sediment and biota, was given prime importance in the early years of the program.

Based on the identification of "*hot spot*" areas during 1977 and 1978, intensive sampling of these areas was implemented in 1979. Such a sampling strategy was intended to confirm previous findings, establish the magnitude of the potential problem and identify pollutant sources. The program has since evolved to include transplanting *Mytilus californianus* mussels into select California bays and estuaries at selected sites to confirm potential toxic substance pollution (i.e., in the vicinity of dischargers).

San Diego Bay

BAY PROTECTION AND TOXIC CLEANUP PROGRAM

California Water Code, Division 7, Chapter 5.6 established a comprehensive program within the State Board to protect the existing and future beneficial uses of California's bays and estuaries. The Bay Protection and Toxic Cleanup Program (BPTCP) provides focus on the State Board and regional boards efforts to control pollution of the State's bays and estuaries. The BPTCP also establishes a program to identify toxic hot spots and plan for their cleanup. Chapter 5.6, sections 13390 through 13396.5 were added to Division 7 of the California Water Code by SB 475 (Stats. 1989, Chapter 269), SB 1845 (Stats. 1990, Chapter 1294), and AB 41 (Stats. 1989, Chapter 1032). New legislation (SB 1084 Calderon; Stats. 1993, Chapter 1157) extends program funding through 1998. The BPTCP is a statewide program which is coordinated with the DFG and California Environmental Protection Agency's (Cal-EPA's) Office of Environmental Health Hazard Assessment. The program was established: (1) to provide protection for existing and future beneficial uses of bay and estuarine waters; (2) to provide a plan for remedial action at toxic hot spots; (3) to further compliance with federal law pertaining to the identification of waters where the protection and propagation of shellfish, fish, and wildlife are threatened by toxic pollutants and contribute to the development of effective strategies to control these pollutants; and (4) to allow these programs to be structured and maintained in a manner which allows the State and Regional Boards to make maximum use of any federal funds which may be available for the program. To attain the goals of the program, the State and Regional Boards are required to do the following:

- Develop and maintain a program to identify toxic hot spots, plan for their cleanup or mitigation, and amend water quality control plans and policies to abate toxic hot spots;
- Formulate and adopt a water quality control plan for enclosed bays and estuaries;
- Review and, if necessary, revise waste discharge requirements to conform to the plan;
- Develop a database of toxic hot spots;
- Develop an ongoing monitoring and surveillance program;
- Develop sediment quality objectives;
- Develop criteria for the assessment and priority ranking of toxic hot spots; and
- Fund the program through fees on point and nonpoint dischargers (Title 17 California Code of Regulations section 2236).

Program accomplishments include:

- Adoption of an approach for establishing sediment quality objectives;
- Installation of a computer system for a consolidated database of information being collected to identify toxic hot spots;

- Implementation of regional monitoring program;

- Development of draft site ranking criteria to be used for priority ranking of toxic hot spots; and

- Implementation of a fee system supporting the program.

The development of regional and statewide cleanup plans is ongoing. For the period July, 1992 through June, 1994 there are two main sediment sampling and analysis efforts for the BPTCP. The first includes toxicity screening where the primary goal is to determine bioassay protocols, establish reference sites and a consolidated database. The second is measurement of the bioeffects associated with toxicants. This includes a survey of sediment contamination and toxicity; two independent toxicity tests including ten-day solid phase amphipod survival, and pore-water test of sea urchin egg fertilization; chemical analyses of sediment samples including trace metals, pesticides, hydrocarbons, tributyltin, acid volatile sulfides and selected normalizers (such as grain size and total organics). Surveillance and monitoring sites in this region are located in the Pacific Ocean, Tijuana River, San Diego Bay, and Mission Bay.

In addition, the San Diego Region BPTCP includes an Underwater Hull Cleaning (UHC) study and a water circulation study for San Diego Bay. The components of the UHC study includes surveys, water sampling and recommendations. The results of the UHC study should assist the Regional Board to determine appropriate regulations for underwater hull cleaners.

REGIONAL SURVEILLANCE AND MONITORING PROGRAMS

The Regional Board participates in the implementation of the following surveillance and monitoring programs:

- Compliance Inspections and Monitoring;
- Complaint Investigation;
- Intensive Surveys;
- Municipal Storm Water Monitoring;
- Water Quality Assessment Activities; and
- Quality Assurance and Quality Control.

COMPLIANCE INSPECTIONS AND MONITORING

The Regional Board ensures compliance with the Water Quality Control Plan, NPDES permits and WDRs through implementation of a comprehensive self monitoring program and compliance inspection program.

COMPLIANCE MONITORING

Compliance monitoring provides data which is used to determine compliance with discharge requirements and receiving water standards and to support enforcement actions. Data are collected from self monitoring reports generated by waste dischargers.

Self monitoring reports submitted to the Regional Board are reviewed, and if violations are noted, appropriate action is taken, ranging from administrative enforcement to judicial abatement depending on the circumstances. Self monitoring data have also been used to develop pollutant loadings and to indicate the general improvement noted in the receiving water.

Self monitoring report requirements are dependent on the type and quantity of effluent discharged. For example, the City of San Diego, Water Utilities Department, conducts an Ocean Monitoring Program as part of the environmental monitoring requirements for the Point Loma Sewage Outfall. The program includes chemical and biological testing of ocean waters, sediments, fish, and benthic infauna. Most of the monitoring stations are in close vicinity to the Point Loma Sewage Outfall; however, stations range geographically from the shoreline to six miles offshore and from La Jolla to the Mexican border.

COMPLIANCE INSPECTIONS

Regional Board staff periodically conducts inspections of all dischargers regulated under an NPDES permit or waste discharge requirements. Treatment, storage, and discharge facilities are inspected to determine compliance with the permit. Compliance inspection reports are written

based on staff inspections of a particular site and include observations made by staff and/or results of analyses performed on samples collected by staff. During the inspections facts and information are gathered to assess the degree of compliance with the following NPDES permit or WDR provisions:

- Effluent and receiving water limitations;
- Self-monitoring reports;
- Record keeping and reporting;
- Compliance time schedules, if applicable;
- Best management plans, if applicable; and
- Other conditions, provisions and prohibitions.

During some inspections, samples are collected to further determine compliance. Inspections can be either announced or unannounced. Announced inspections facilitate direct communication with the discharger to review procedures and operations. Unannounced inspections have the advantage that staff can witness normal day-to-day operations without giving the discharger the opportunity to prepare for the visit. Upon discovery of a noncompliance the procedures discussed in the enforcement section of Chapter 4 are followed to gain correction.

COMPLAINT INVESTIGATIONS

This task involves investigation of complaints of citizens and public or governmental agencies on the discharge of pollutants or creation of nuisance conditions. It is a Regional Board responsibility to prepare reports or letters and follow-up actions to document observed conditions and to institute appropriate corrective actions. In instances where the Regional Board cannot respond to a complaint because of resource limitations, the Regional Board notifies other agencies if it falls within their jurisdiction.

The Regional Board strives to ensure that responses to complaints involving threats to water quality be made in an expedient manner, as resources allow. For the purpose of this policy, response includes the following three components: (1) Thorough documentation of complaints; (2) Appropriate follow-up including site inspections, referral to, or notification of, other regulatory agencies, corrective actions, enforcement actions, etc.; and (3) Notification to complainant, as appropriate, of findings and subsequent actions.

DEFINITION OF ACTIVITIES

Complaint activities include all activities necessary to respond to a complaint or incident including the following: (1) Receiving and documenting complaints/incidents (e.g., spills); (2) Any follow-up activities to gather additional information (e.g., research, telephone contacts, coordination with other agencies, etc.); (3) Preparation for any field inspections necessary to investigate a complaint/incident; (4) Field inspections, including travel; (5) Sampling of spill and/or receiving waters for documentation, if appropriate; and (6) Documenting findings and responding to complainant.

NOTIFICATION TO OTHER AGENCIES

The Regional Board notifies other responsible regulatory agencies (e.g., Public Health, DHS, DFG, Department of Food and Agriculture, Integrated Solid Waste Management Board) of the content of a complaint if it falls within said agency's jurisdiction.

Except for a discharge in compliance with waste discharge requirements, any person who causes or permits any reportable quantity of hazardous substance or sewage to be discharged in or on any waters of the State, or discharged or deposited where it is or probably will be discharged in or on any waters of the State, shall, as soon as possible, notify the Office of Emergency Services of the discharge in accordance with the spill reporting provision of the State toxic disaster contingency plan. The person shall also immediately notify the State Board or appropriate Regional Board of the discharge (Water Code section 13271).

Similarly, any person who discharges any oil or petroleum product under the above-stated conditions shall, as soon as possible, notify the Office of Emergency Services of the discharge in accordance with the spill reporting provision of the State oil spill contingency plan. Immediate notification of an appropriate agency of the federal government, or of the appropriate Regional Board (in accordance with the reporting requirements set under Water Code section 13267 or 13383) shall satisfy the oil spill notification requirements of this paragraph (Water Code section 13272).

REPORTABLE QUANTITIES OF HAZARDOUS WASTE AND SEWAGE DISCHARGES

Water Code section 13271 requires that the State Board and the DHS adopt regulations establishing reportable quantities for substances listed as hazardous wastes or hazardous materials pursuant to section 25140 of the Health and Safety Code. Reportable quantities are those which should be reported because they may pose a risk to public health or the environment if discharged to ground or surface water.

Similarly, the State Board was required to adopt regulations establishing reportable quantities for sewage. These regulations for sewage and hazardous materials discharge do not supercede waste discharge requirements or water quality objectives.

The State Board adopted regulations for reportable quantities are included in subchapter 9.2 of the California Code of Regulations.

INSPECTION IN RESPONSE TO COMPLAINTS

The Regional or State Board may inspect the facilities of any discharger at any time pursuant to Water Code, section 13267. Such inspections should normally be conducted with consent of the occupant and/or owner of the facilities. If an inspection request is refused by any occupant of the premises, an effort to gain access should be made with the owner of the premises. The Clean Water Act and California Water Code provide that a credentialed inspector must be allowed entry to the facilities subject to regulation under these laws. Regional Board staff do not inspect sites which pose a threat to their health or safety. For sites which could involve toxic and hazardous materials field work, a Health Evaluation Plan (HEP) is completed.

If all attempts to obtain consent fail, the inspection may be made pursuant to a warrant in accordance with the procedure set forth in Title 13, section 13267(c). In all cases where an inspection warrant is required, staff of the State Board's Office of Chief Counsel is consulted relative to procedures.

An inspection is permitted without consent and without a warrant when there is an emergency which affects the public health or safety. Advice from the State Board's Office of Chief Counsel is sought before making such an inspection.

When an inspection is done in response to a complaint, and the inspector may be entering an *"unknown"* situation, every safety precaution is taken. Again, in no instance does staff make an inspection of a site which may pose a threat to their health and safety. Thorough notes and documentation are made during the inspection, including photographs, if appropriate. After an inspection is completed, an inspection report is prepared describing what was found.

FINDINGS OF NONCOMPLIANCE

If during the course of a complaint investigation, a noncompliance is discovered, procedures as outlined in the enforcement section of Chapter 4 (Implementation chapter) are followed.

INTENSIVE SURVEYS

Intensive monitoring surveys provide detailed water quality data to locate and evaluate violations of receiving water standards, to develop waste load allocations and to assess the water quality condition.

They usually involve localized, intermittent sampling at a higher than normal frequency. Intensive surveys should be repeated at appropriate intervals depending on the parameters involved, the variability of conditions, and changes in hydrologic or effluent regimes.

MUNICIPAL STORM WATER MONITORING

The storm water permitting program has been established to protect water quality of the water bodies which receive storm water runoff. (For a complete description of this program, refer to Chapter 4, Implementation chapter). Sampling of storm water runoff has indicated that storm water discharges contain significant amounts of pollutants. Therefore, the Region's municipal storm water permits requires the permittee to develop comprehensive management and monitoring programs. Because each permit generally covers a large number of water bodies, the required monitoring program is in two phases.

Phase I requires the discharger to sample storm water discharges and to sample those receiving waters where the beneficial uses are threatened or impaired due to runoff of storm water and urban nuisance water. Phase I requires both a dry and wet weather monitoring program. San Diego copermittees are required to sample two major types of runoff stations: (1) mass loading; and (2) land use stations. The dry weather monitoring program requires periodic colorimetric field tests and visual inspections of the storm water conveyance system to detect non-storm water flows. Under Phase II the dischargers will be required to develop storm water management and monitoring programs for the remaining water bodies included under the permit.

Storm water discharges from urbanized areas consist mainly of surface runoff emanating from residential, commercial, and industrial areas. In addition, there are storm water discharges from agricultural and other land uses. The constituents of concern in these discharges include: total and fecal coliform, *enterococcus*, total suspended solids, biochemical oxygen demand, chemical oxygen demand, total organic carbon, oil and grease, heavy metals, nutrients, base/neutral and acid extractables, pesticides, herbicides, petroleum hydrocarbon products, and/or those causing extremely high or low pH.

The objectives of the storm water monitoring program are to: (1) define the type, magnitude, and sources of pollutants in the storm water discharges within the permittee's jurisdiction so that appropriate pollution prevention and correction measures can be identified; (2) evaluate the effectiveness of pollution prevention and correction measures; and (3) evaluate compliance with water quality objectives established for the storm water system or its components.

Sampling biota

BIENNIAL CLEAN WATER ACT SECTIONS 303(D), 305(B), AND 314 INTEGRATED REPORT

Every two years states are required to provide an assessment of the quality of all their waters and a list of those waters that are impaired or threatened, in accordance with the following sections of the Clean Water Act:

Section 303(d): Requires states to identify waters for which technology based effluent limitation are not stringent enough to meet applicable water quality standards. States must establish a priority ranking for such waters and must establish TMDLs for all such waters in accordance with the priority ranking. Waters identified and prioritized for TMDL development under section 303(d) (a.k.a. the 303(d) List) are designated as Water Quality Limited Segments (WQLSs).

Section 305(b): Requires states to prepare a description of the water quality of all navigable waters of the state; an analysis of the extent to which navigable waters provide protection and propagation of a balanced population of shellfish, fish, and wildlife and allow recreational activities in and on the water; an analysis of the extent to which elimination of the discharge of pollutants has been achieved; an estimate of the environmental impact, the economic, and social costs necessary to achieve the objective of the Clean Water Act, the economic and social benefits of the achievement, and the date of such achievement; and, a description of the nature and the extent of nonpoint sources of pollutants and recommendations as to the programs which must be taken to control them, with estimates of cost.

Section 314: Requires states to identify and classify all publicly owned lakes in the state according to eutrophic condition. States must list and describe those publicly owned lakes known to be impaired and assess the status and trends of water quality. This information is required to be submitted as part of the section 305(b) report.

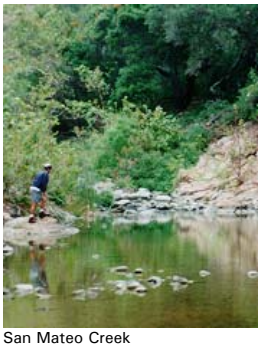
San Mateo Creek

The USEPA strongly encourages states to submit a single Integrated Report that satisfies the reporting requirements for each of these sections. Each Regional Board prepares an Integrated Report for its Region, using data collected by regional planning, permitting, surveillance, and enforcement programs. The regional Integrated Reports contain inventories of the major water bodies in the region, including

rivers and streams, lakes and reservoirs, bays and harbors, estuaries, coastal waters, wetlands, and ground water.

The regional Integrated Report presents the results of the assessment of the waterbodies in the Region, and the waters are categorized as one or more of the following:

Category 1: All designated uses are supported, no use is threatened.

Category 2: Available data and/or information indicate that some, but not all of the designated uses are supported.

Category 3: There are insufficient available data and/or information to make a use support determination.

Category 4: Available data and/or information indicate that at least one designated use is not being supported or is threatened, but a TMDL is not needed.

Category 5: Available data and/or information indicate that at least one designated use is not being supported or is threatened and a TMDL is needed.

Upon adoption of the regional Integrated Reports by respective Regional Boards, the reports are compiled into a statewide report. Upon adoption of this statewide report by the State Board, the report is submitted to the USEPA to satisfy the reporting requirements of Clean Water Act sections 303(d), 305(b) and 314. Subsequently, the USEPA submits the Integrated Reports from the states to the United States Congress, which serves as the primary vehicle for informing Congress and the public about general water quality conditions in the United States.

CLEAN WATER STRATEGY

The Clean Water Strategy (CWS) is a process that the State Board implemented to assure that staff and fiscal resources are directed at the highest priority water quality issues throughout California. The primary objective of the CWS is to more effectively define and respond to priorities as revealed by the best available water quality information.

The CWS relies on the Water Quality Assessment condition ratings to provide the technical information necessary to identify water bodies needing protection or prevention actions, additional assessment, or cleanup activities. In addition to the Water Quality Assessment, the regions determined the relative resource value of their water bodies to recognize the relative importance of individual waters when compared to each other. The regions developed priority water body lists which are based upon the severity of their water quality problems or needs and relative resource values, from which the State Board assembled a statewide priority list based upon the same criteria.

There are six phases involved in implementing the Clean Water Strategy. As of this date, phase 1 and 2 have been completed. The State Board has begun a pilot study to determine the feasibility of phases 3 through 6.

Phase 1: Obtain the best information;

Phase 2: Compare and prioritize water body concerns;

Phase 3: Prioritize actions to address concerns;

Phase 4: Allocate new resources;

Phase 5: Implement strategy goals; and

Phase 6: Review results.

QUALITY ASSURANCE AND QUALITY CONTROL

The statewide Quality Assurance (QA) program was developed to ensure that data generated from environmental studies are technically sound, scientifically valid, and legally defensible. A federal regulation (USEPA Order 5360.1) requiring the State to develop and implement a Quality Assurance Program Plan (QAPP) was adopted in April 1993. The program mandate is identified in 40 CFR 30.503 (July 1, 1987).

The State Board has appointed a QA Program manager to direct, coordinate, and administer the State QAPP. Independently, each Regional Board has appointed a QA officer to administer its Regional responsibilities. The State and Regional Boards jointly administer the program, however the State Board has lead responsibility for managing the overall program and reporting to the USEPA. The duties of the Regional Board QA officer include overseeing and implementing QA procedures conducted in the Regional Board laboratory, interacting with project managers on the required preparation of QA Project Plans, and evaluating compliance inspection data on all major dischargers.

OTHER MONITORING PROGRAMS

In addition to the State's surveillance and monitoring program, several other agencies monitor water quality, complementing the State's efforts. These agencies are usually local health departments or water supply agencies.

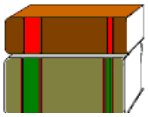

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APPENDIX A

GLOSSARY

Areas of Special Biological Significance (ASBS) - ASBS are those areas designated by the State Board as ocean areas requiring protection of species or biological communities to the extent that alteration of natural water quality is undesirable. All Areas of Special Biological Significance are also classified as a subset of State Water Quality Protection Areas.

Basin Plan - The plan for the protection of water quality prepared by the Regional Water Quality Control Board in response to the Porter-Cologne Water Quality Control Act. The Basin Plan for the San Diego Region is also known as the Water Quality Control Plan for the San Diego Basin (9) and contains Water Quality Standards for the federal Clean Water Act.

Beneficial Uses - The uses of water necessary for the survival or well being of man, plants, and wildlife. These uses of water serve to promote the tangible and intangible economic, social, and environmental goals "Beneficial Uses" of the waters of the State that may be protected against include, but are not limited to, domestic, municipal, agricultural and industrial supply; power generation; recreation; aesthetic enjoyment; navigation; and preservation and enhancement of fish, wildlife, and other aquatic resources or preserves. Existing beneficial uses are uses that were attained in the surface or ground water on or after November 28, 1975; and potential beneficial uses are uses that would probably develop in future years through the implementation of various control measures. "Beneficial Uses" are equivalent to "Designated Uses" under federal law. [California Water Code section 13050(f)].

Best Management Practices (BMPs) - The practice or combination of practices that are determined to be the most effective, practicable means of preventing or reducing the amount of pollution generated by nonpoint sources to a level compatible with water quality goals (including technological, economic, and institutional considerations).

Bioaccumulation - The accumulation of contaminants in the tissues of organisms through any route, including respiration, ingestion, or direct contact with contaminated water, sediment, food, or dredged material.

California Water Code, Division 7 - a.k.a. Porter Cologne Water Quality Control Act.

Capping - The controlled, accurate placement of contaminated material at an open-water site, followed by a covering or cap of clean isolating material.

CEQA - California Environmental Quality Act of 1970.

Clean Water Act - a.k.a. Federal Water Pollution Control Act.

Confined Disposal - Placement of dredged material within dikes nearshore or upland confined disposal facilities that enclose the disposal area above any adjacent water surface, isolating the dredged material from adjacent waters during placement. Confined disposal does not refer to subaqueous capping or contained aquatic disposal.

Contaminant - A chemical or biological substance in a form that can be incorporated into, onto, or be ingested by and that harms aquatic organisms, consumers of aquatic organisms, or users of the aquatic environment.

GLOSSARY (continued)

Contaminated Sediment or Contaminated Dredged Material - Contaminated sediments or contaminated dredged materials are defined as those that have been demonstrated to cause an unacceptable adverse effect on human health or the environment

Contamination – This means an impairment of the quality of the waters of the state by waste to a degree which creates a hazard to the public health through poisoning or through the spread of disease. "Contamination" includes any equivalent effect resulting from the disposal of waste, whether or not waters of the state are affected.

Dredged Material - Material excavated from waters of the United States or ocean waters. The term dredged material refers to material which has been dredged from a water body, while the term sediment refers to material in a water body prior to the dredging process.

Dredged Material Discharge - The term dredged material discharge means any addition of dredged material into waters of the United States or ocean waters. The term includes open-water discharges; discharges resulting from unconfined disposal operations (such as beach nourishment or other beneficial uses); discharges from confined disposal facilities that enter waters of the United States (such as effluent, surface runoff, or leachate); and overflow from dredge hoppers, scows, or other transport vessels.

Effluent Limitations - Limitations on the volume of each waste discharge, and the quantity and concentrations of pollutants in the discharge. The limitations are designed to ensure that the discharge does not cause water quality objectives to be exceeded in the receiving water and does not adversely affect beneficial uses.

Ephemeral - Water bodies, or segments thereof, that contain water only for a short period following precipitation events.

Hydrologic Area - A major logical subdivision of a hydrologic unit which includes both water-bearing and nonwater-bearing formations. It is best typified by a major tributary of a stream, a major valley, or a plain along a stream containing one or more ground water basins and having closely related geologic, hydrologic, and topographic characteristics. Area boundaries are based primarily on surface drainage boundaries. However, where strong subsurface evidence indicates that a division of ground water exists, the area boundary may be based on subsurface characteristics.

Hydrologic Subarea - A major logical subdivision of a hydrologic area which includes both water-bearing and nonwater-bearing formations.

Hydrologic Unit - A classification embracing one of the following features which are defined by surface drainage divides: (1) in general, the total watershed area, including water-bearing and nonwater-bearing formations, such as the total drainage area of the San Diego River Valley; and (2) in coastal areas, two or more small contiguous watersheds having similar hydrologic characteristics, each watershed being directly tributary to the ocean and all watersheds emanating from one mountain body located immediately adjacent to the ocean.

Implementation Plan - Basin Plan chapter which describes the actions by the Regional Board and others that are necessary to achieve and maintain the designated beneficial uses and water quality objectives of the Region's waters.

Intermittent - Water bodies, or segments thereof, that contain water for extended periods during the year, but not at all times.

Interrupted - Water bodies or streams that contain perennial segments or pools, with intervening intermittent or ephemeral segments.

GLOSSARY (continued)

Leachate - Water or any other liquid that may contain dissolved (leached) soluble materials, such as organic salts and mineral salts, derived from a solid material. For example, rainwater that percolates through a confined disposal facility and picks up dissolved contaminants is considered leachate.

Major Federal Action - Includes actions with effects that may be major and that are potentially subject to federal control and responsibility. Major refers to the context (meaning that the action must be analyzed in several contexts, such as the effects on the environment, society, regions, interests, and locality) and intensity (meaning the severity of the impact). It can include (a) new and continuing activities, projects, and programs entirely or partly financed, assisted, conducted, regulated, or approved by federal agencies; (b) new or revised agency rules, regulations, plans, policies, or procedures; and (c) legislative proposals. Action does not include funding assistance solely in the form of general revenue-sharing funds where there is no federal agency control over the subsequent use of such funds. Action does not include judicial or administrative civil or criminal enforcement action.

National Pollution Discharge Elimination System (NPDES) - These permits pertain to the discharge of waste to surface waters only. All State and Federal NPDES permits are also WDRs.

Nonpoint Sources - This refers to pollutants from diffuse sources that reach water through means other than a discernable, confined, and discrete conveyance.

Non-Storm Water Discharge - Any discharge to a storm water conveyance system that is not composed entirely of storm water.

Nuisance - Means anything which meets all of the following requirements: (1) Is injurious to health, or is indecent or offensive to the senses, or an obstruction to the free use of property, so as to interfere with the comfortable enjoyment of life or property; (2) Affects at the same time an entire community or neighborhood, or any considerable number of persons, although the extent of the annoyance or damage inflicted upon individuals may be unequal; and (3) Occurs during or as a result of the treatment or disposal of waste.

Open-Water Disposal - Placement of dredged material in rivers, lakes, estuaries, or oceans via pipeline or surface release from hopper dredges or barges.

Person - Also includes any city, county, district, the state or any department or agency thereof. "Person" includes the United States, to the extent authorized by federal law.

pH - Term used to refer to the hydrogen ion concentration of water. The acidity or alkalinity of water is measured by the pH factor.

Point Sources - This refers to pollutants discharged to water through any discernable, confined, and discrete conveyance.

Pollution - Means an alteration of the quality of the waters of the state by wastes to a degree which unreasonably affects either of the following: (1) The waters for beneficial uses, or (2) Facilities which serve those beneficial uses. "Pollution" may include "contamination."

Porter-Cologne Water Quality Control Act (Porter-Cologne Act) - This is also known as the California Water Code.

Quality of the Water – "Quality of the water(s)" refers to chemical, physical, biological, bacteriological, radiological, and other properties and characteristics of water which affect its use.

GLOSSARY (continued)

Reclaimed water – a.k.a. "recycled water" means water which, as a result of treatment of waste, is suitable for a direct beneficial use or a controlled use that would not otherwise occur and is therefore considered a valuable resource.

Regional Board - a.k.a. California Regional Water Quality Control Board.

Region - a.k.a., San Diego Basin (9).

Sewage, Domestic - Waste and wastewater from humans or household operations that is discharged to or otherwise enters a treatment works. [40 CFR 503.9(g)]

Sewage Sludge - A solid, semi-solid, or liquid residue generated during the treatment of domestic sewage in a treatment works. Sewage sludge includes, but is not limited to, domestic septage; scum or solids removed in primary, secondary, or advanced wastewater treatment processes; and a material derived from sewage sludge. Sewage sludge does not include ash generated during the firing of sewage sludge in a sewage incinerator or grit and screenings generated during preliminary treatment of domestic sewage in a treatment works [40 CFR 503.9(w)].

State Board - a.k.a. State Water Resources Control Board.

State Water Quality Protection Areas (SWQPAs) – These are nonterrestrial marine or estuarine areas designated to protect marine species or biological communities from an undesirable alteration in natural water quality. All Areas of Special Biological Significance (ASBS) that were previously designated by the State Board in Resolutions No. 74-28, 74-32, and 75-61 are also classified as a subset of State Water Quality Protection Areas and require special protections afforded by this Plan.

Statewide Plan - A water quality control plan adopted by the State Water Resources Control Board in accordance with the provisions of Water Code sections 13240 through 13244, for waters where water quality standards are required by the Federal Water Pollution Control Act. Such plans supersede regional water quality control plans for the same waters to the extent of a conflict [California Water Code section 13170].

Triennial Review - Review of the Basin Plan which is required to be done every three years by the federal Clean Water Act [section 303(c)(1)].

Waste - Includes sewage and any and all other waste substances, liquid, solid, gaseous, or radioactive, associated with human habitation, or of human or animal origin, or from any producing, manufacturing, or processing operation of whatever nature, including waste placed within containers of whatever nature prior to, and for purposes of, disposal.

Waste Discharge Requirements (WDRs) - The name of permits issued by the Regional Board for the discharge of waste to land. The discharge of waste to land may potentially impact ground water quality. These permits require that waste not be discharged in a manner that would cause an exceedance of applicable water quality objectives or adversely affect beneficial uses designated in the Basin Plan.

Water Quality Criteria - Numerical or narrative limits for constituents or characteristics of water designed to protect specific designated uses of the water. When criteria are met, water quality will generally protect the designated use [40 CFR section 131.3(b)]. This term is also used to describe scientific information on the relationship that the effect of a constituent concentration has on human health, aquatic life, or other uses of water, such as the criteria in the USEPA "Gold Book". California's water quality criteria are called "water quality objectives". See "water quality standard".

GLOSSARY (continued)

Water Quality Control - Means the regulation of any activity or factor which may affect the quality of the water of the state and includes the prevention and correction of water pollution and nuisance.

Water Quality Control Plans - There are two types of water quality control plans - Basin Plans and Statewide Plans. Regional Boards adopt Basin Plans for each region based upon surface water hydrologic basin boundaries. The Regional Basin Plans designates or describes (1) existing and potential beneficial uses of ground and surface water; (2) water quality objectives to protect the beneficial uses; (3) implementation programs to achieve these objectives; and (4) surveillance and monitoring activities to evaluate the effectiveness of the water quality control plan. The Statewide Plans address water quality concerns for surface waters that overlap Regional Board boundaries, are statewide in scope, or are otherwise considered significant and contain the same four elements. Statewide Water Quality Control Plans include the Ocean Plan, the Enclosed Bays and Estuaries Plan, the Inland Surface Waters Plan, and the Thermal Plan. A water quality control plan consists of a designation or establishment for the waters within a specified area of (1) beneficial uses to be protected, (2) water quality objectives, and (3) a program of implementation needed for achieving water quality objectives [California Water Code section 13050(j)].

Water Quality Goal - The most stringent, applicable, numerical water quality limit for a constituent or parameter of concern in a specific body of ground or surface water at a specific site that is chosen to protect either (1) existing water quality or (2) beneficial uses of water. In the first case, the water quality goal is set equal to the background level in the body of water. In the second case, the water quality goal is set at the less stringent of either (a) the numerical limit which implements all applicable water quality objectives or (b) the background level.

Water Quality Objectives - Numerical or narrative limits on constituents or characteristics of water designed to protect designated beneficial uses of the water. [California Water Code section 13050(h)]. California's water quality objectives are established by the State and Regional Water Boards in the Water Quality Control Plans. See "water quality standards".

Water Quality Standards - Provisions of State or federal law which consist of a designated use or uses for waters of the United States and water quality criteria for such waters based upon such uses. Water quality standards are to protect the public health or welfare, enhance the quality of water and serve the purposes of the Act [40 CFR section 131.3(i)]. A water quality standard under the Federal Clean Water Act is equivalent to a beneficial use designation plus a water quality objective. n California, water quality standards are promulgated by the State and Regional Water Boards in Water Quality Control Plans. Water quality standards are enforceable limits for the bodies of surface or ground waters for which they are established.

Waters of the State - Any water, surface or underground, including saline waters within the boundaries of the State [California Water Code section 13050(e)].

ACRONYMS

ACL.....Administrative Civil Liability

Adj. SAR .....adjusted sodium adsorption ratio

AF .....acre-foot (acre-feet)

af/y .....acre-foot (acre-feet) per year

AG.....attorney general

AGR .....beneficial use of agricultural supply

AQUA .....beneficial use of aquaculture

ASBS .....beneficial use of Area of Special Biological Significance

BAT .....Best Available Technology

BCT .....Best Control Technology

BEP .....Bays and Estuaries Plan

BIOL .....beneficial use of preservation of biological habitats of special significance

BMP .....Best Management Practice

BOD .....Biological Oxygen Demand

BPTCP .....Bay Protection and Toxic Cleanup Program

º C .....degrees Centigrade

Ca .....Calcium

Cal-EPA's .....California Environmental Protection Agency

CAOs .....Cleanup and Abatement Orders

CBOD.. .....carbonaceous biochemical oxygen demand

CCR .....California Code of Regulations

CDFFP .....California Department of Forestry and Fire Protection, Rainbow Conservation Camp

CDOs.....Cease and Desist Orders

CEQA .....California Environmental Quality Act

CERCLA .....Comprehensive, Environmental Response, Compensation, and Liability Act, commonly referred to as Superfund

CFR .....Code of Federal Regulations

CIWMB .....California Integrated Waste Management Board

COLD .....Beneficial use of cold freshwater habitat

COMM.....Beneficial use of commercial and sport fishing

CTR.....California Toxics Rule

Cu .....copper

CWA .....federal Clean Water Act

CWS .....Clean Water Strategy

CZARA.....Coastal Zone Act Reauthorization Amendments

DA .....district attorney

DDE Dichlorodiphenyldichloroethylene

DDT.....Dichlorodiphenyltrichloroethane

DFG .....Department of Fish and Game

DoD .....Department of Defense

DHS .....Department of Health Services

DPR .....Department of Pesticide Regulation

DTSC .....Department of Toxic Substance Control

DWR .....Department of Water Resources

E. coli .....*Escherichia coli*

EIR .....Environmental Impact Report

EIS .....Environmental Impact Statement

EST .....beneficial use of estuarine habitat

ACRONYMS (continued)

ET ..... evapotranspiration

ETI ..... evapotranspiration-infiltration

^{o}F ..... degrees Fahrenheit

FFA ..... Federal Facility Agreement

FRSH ..... beneficial use of freshwater replenishment

ft ..... foot (feet)

GIS ..... geographic information system

Gold Book ..... Quality Criteria for Water, 1986

GWR ..... beneficial use of ground water recharge

HA ..... hydrologic area

HCO_3 ..... bicarbonate

HEP ..... Health Evaluation Plan

HSA ..... hydrologic subarea

HU ..... hydrologic unit

IND ..... beneficial use of industrial service supply

ISWP ..... Inland Surface Waters Plan

K ..... potassium

kg/yr..... kilogram per year

kg N/yr ..... kilogram nitrogen per year

kg P/yr ..... kilogram phosphorus per year

L ..... liter

LA ..... Load Allocation

m ..... meter(s)

mg ..... milligram

MAA ..... Management Agency Agreement

MAR ..... beneficial use of marine habitat

MBAS ..... Methylene Blue-Activated Substances

MEP ..... Maximum Extent Practicable

mg ..... milligram(s)

Mg ..... magnesium

mg/L ..... milligram(s) per liter

mg N/L ..... milligram(s) nitrogen per liter

mg P/L..... milligram(s) phosphorus per liter

MGD ..... Million Gallons per Day

MIGR ..... beneficial use of migration of aquatic organisms

MPRSA ..... Marine Protection, Research and Sanctuaries Act of 1972

ml ..... milliliter(s)

MLLW ..... Mean Lower Low Water

MMs ..... Management Measures

MOS..... Margin of Safety

MOU ..... Memorandum of Understanding

MPs..... Management Practices

MRCD ..... Mission Resource Conservation District

MS4..... Municipal Separate Storm Sewer System

MSD ..... Marine Sanitation Device

MUN ..... beneficial use of municipal and domestic supply

Mussel Watch .... State Mussel Watch

MWD ..... Metropolitan Water District of Southern California

NASSCO..... National Steel and Shipbuilding Company

Na ..... sodium

NAV ..... beneficial use of navigation

ND ..... Negative Declaration

NEPA ..... National Environmental Policy Act of 1969

ng/l ..... nanograms per liter

No ..... number(s)

NO_3 ..... nitrate

NPDES ..... National Pollutant Discharge Elimination System

ACRONYMS (continued)

NPSMP ..... Nonpoint Source Management Plan

NRCS ..... Natural Resources Conservation Service

NRMP..... Nutrient Reduction and Management Plan

NOV ..... Notice of Violation

NTO ..... Notice to Comply

NTU ..... turbidity unit

O,P'-DDD ..... O,P'-Dichlorodiphenyldichloroethane

O,P'-DDE ..... O,P'-Dichlorodiphenyldichloroethylene

OWTS ..... onsite wastewater treatment system(s)

P,P'-DDD ..... P,P'-Dichlorodiphenyldichloroethane

P,P'-DDE ..... P,P'-Dichlorodiphenyldichloroethylene

P,P'-DDMS ..... P,P'-Dichloroiphenylmonochlorosaturatedethan

PAH ..... polyaromatic hydrocarbon

PCB ..... polychlorinated biphenyl

pH ..... hydrogen ion concentration

POTW ..... Publicly Owned Treatment Works

POW ..... beneficial use of hydropower generation

ppb ..... part(s) per billion (ng/g)

ppm ..... part(s) per million (ug/g)

Primary Network.. Primary Water Quality Monitoring Network

PROC ..... beneficial use of industrial process supply

QA ..... Quality Assurance

QAPP ..... Quality Assurance Program Plan

RARE ..... beneficial use of rare, threatened, or endangered species

RCD ..... Resource Conservation District

RCRA ..... Resource Conservation and Recovery Act of 1976

REC-1 ..... beneficial use of contact water recreation

REC-2 ..... beneficial use of non-contact water recreation

ROWD ..... Report of Waste Discharge

RV ..... Recreational Vehicle

SAL ..... beneficial use of inland saline water habitat

SANDAG..... San Diego Association of Governments

SAR ..... sodium adsorbtion ratio

SCE ..... Southern California Edison

SDG&E ..... San Diego Gas and Electric Company

SHELL ..... beneficial use of shellfish harvesting

SIYB..... Shelter Island Yacht Basin

SOCs ..... synthetic organic chemicals

SONGS ..... San Onofre Nuclear Generating Station

SPWN ..... beneficial use of spawning, reproduction, and/or early development

SRF ..... State Revolving Fund

SWAT ..... Solid Waste Assessment Test

SWP ..... State Water Project

SWRCB ..... California State Water Resources Control Board

TBT ..... tributyl tin

TDS ..... total dissolved solids

TKN..... total Kjeldahl nitrogen

TMDL ..... Total Maximum Daily Load

TSM ..... Toxic Substances Monitoring

TSO..... time schedules

TSS ..... total suspended solids

ACRONYMS (continued)

UCCE ..... University of California Cooperative Extension

µg ..... microgram(s)

µg/l ..... micrograms per liter

UHC ..... underwater hull cleaning

USCG ..... United States Coast Guard

USEPA ..... United States Environmental Protection Agency

USGS ..... United States Geologic Survey

UST ..... underground storage tank

WARM ..... beneficial use of warm freshwater habitat

WDR ..... Waste Discharge Requirement

WILD ..... beneficial use of wildlife habitat

WLA ..... Waste Load Allocation

WQA ..... Water Quality Assessment

WQLS ..... Water Quality Limited Segment

WQLZ ..... Water Quality Limited Zone

WRR ..... Water Reclamation Requirement

APPENDIX B

REGIONAL GROWTH FORECASTS

APPENDIX B - 1. SUMMARY OF THE REGIONAL GROWTH FORECAST FOR VARIOUS LAND USES WITHIN THESAN DIEGO ASSOCIATION OF GOVERNMENTS' (SANDAG) SPHERE OF INFLUENCE FOR THE SAN DIEGO REGION.

HU 901 - 911	Year 1990	Year 2000	Year 2010	Year 2015
TOTAL ACRES	1,895,749	1,895,749	1,895,749	1,895,749
Developed Acres	395,746	428,622	539,895	660,646
Low Density Single Family	52,556	61,663	127,357	227,763
Single Family	141,512	159,132	194,286	207,021
Multiple Family	24,068	26,288	31,139	33,564
Mobile Homes	5,344	5,127	4,774	4,468
Other Residential	1,095	1,095	1,095	1,095
Industrial	35,043	36,167	38,790	40,034
Retail	24,850	25,733	27,238	28,084
Office	2,642	2,756	3,135	3,327
Schools	10,309	10,624	11,130	11,359
Agriculture	3,544	3,546	3,546	3,546
Parks	83,119	83,119	83,119	83,119
Roads & Freeways	11,665	13,372	14,288	17,267

APPENDIX B - 2. SUMMARY OF THE REGIONAL GROWTH FORECAST FOR VARIOUS LAND USES WITHIN THE SOUTHERN CALIFORNIA ASSOCIATION OF GOVERNMENTS' SPHERE OF INFLUENCE.

HU 901 - 911	Year 1994
TOTAL ACRES	460,572
Developed Acres	121,766
Low Density Single Family	3,793
Single Family	24,395
Multiple Family	6,388
Mobile Homes	1,045
Other Residential	9,484
Industrial	3,087
Retail	20,060
Office	1,262
Schools	1,291
Agriculture	46,887
Parks	2,523
Roads & Freeways	1,551

APPENDIX B - 3. REGIONAL GROWTH FORECAST FOR VARIOUS LAND USES WITHIN SANDAG'S SPHERE OF INFLUENCE BY HYDROLOGIC UNITS.

*San Juan Hydrologic Unit (Hydrologic Unit Basin 901)**

HU 901	Year 1990	Year 2000	Year 2010	Year 2015
TOTAL ACRES	100,823	100,823	100,823	100,823
Developed Acres	6,137	6,137	6,137	6,137
Low Density Single Family	0	0	0	0
Single Family	152	152	152	152
Multiple Family	100	100	100	100
Mobile Homes	142	142	142	142
Other Residential	27	27	27	27
Industrial	2,816	2,816	2,816	2,816
Retail	0	0	0	0
Office	0	0	0	0
Schools	8	8	8	8
Agriculture	0	0	0	0
Parks	2,487	2,487	2,487	2,487
Roads & Freeways	405	405	405	405

*Santa Margarita Hydrologic Unit (Hydrologic Unit Basin 902)**

HU 902	Year 1990	Year 2000	Year 2010	Year 2015
TOTAL ACRES	122,902	122,902	122,902	122,902
Developed Acres	8,600	9,011	11,957	13,362
Low Density Single Family	2,090	2,340	5,137	5,965
Single Family	727	879	1,013	1,548
Multiple Family	459	460	464	470
Mobile Homes	61	61	61	61
Other Residential	11	11	11	11
Industrial	4,573	4,580	4,585	4,588
Retail	330	332	337	340
Office	0	0	0	0
Schools	50	50	50	50
Agriculture	0	0	0	0
Parks	148	148	148	148
Roads & Freeways	151	151	151	182

* This is the Regional Growth Forecast for the area within SANDAG's Sphere of Influence only; that portion covered within SCAG's Sphere of Influence is not shown.

APPENDIX B - 3 (continued)

San Luis Rey Hydrologic Unit (Hydrologic Unit Basin 903)

HU 903	Year 1990	Year 2000	Year 2010	Year 2015
TOTAL ACRES	351,640	351,640	351,640	351,640
Developed Acres	37,262	42,289	60,999	79,877
Low Density Single Family	14,985	16,599	29,134	44,539
Single Family	5,019	8,196	13,963	17,066
Multiple Family	1,722	1,889	2,057	2,077
Mobile Homes	620	392	391	391
Other Residential	86	86	86	86
Industrial	1,531	1,543	1,634	1,653
Retail	1,068	1,144	1,295	1,364
Office	60	66	78	75
Schools	360	369	374	384
Agriculture	161	161	161	161
Parks	11,005	11,005	11,005	11,005
Roads & Freeways	646	786	825	1,052

Carlsbad Hydrologic Unit (Hydrologic Unit Basin 904)

HU 904	Year 1990	Year 2000	Year 2010	Year 2015
TOTAL ACRES	132,554	132,554	132,554	132,554
Developed Acres	56,749	64,927	79,666	92,898
Low Density Single Family	6,834	8,348	12,617	19,299
Single Family	27,365	32,713	40,582	46,007
Multiple Family	5,385	5,863	7,097	7,181
Mobile Homes	1,715	1,715	1,448	1,389
Other Residential	103	103	103	103
Industrial	4,133	4,330	5,059	5,483
Retail	4,274	4,496	4,944	5,183
Office	376	420	556	612
Schools	1,517	1,568	1,759	1,841
Agriculture	274	274	274	274
Parks	3,387	3,387	3,387	3,387
Roads & Freeways	1,386	1,710	1,840	2,140

APPENDIX B - 3 (continued)

San Dieguito Hydrologic Unit (Hydrologic Unit Basin 905)

HU 905	Year 1990	Year 2000	Year 2010	Year 2015
TOTAL ACRES	217,586	217,586	217,586	217,586
Developed Acres	38,210	42,855	62,662	83,105
Low Density Single Family	9,559	12,482	24,900	42,295
Single Family	14,271	15,802	22,695	24,991
Multiple Family	1,146	1,220	1,379	1,492
Mobile Homes	140	140	140	140
Other Residential	8	8	8	8
Industrial	904	941	1,066	1,098
Retail	2,385	2,413	2,468	2,493
Office	142	147	218	269
Schools	442	466	481	488
Agriculture	770	772	772	772
Parks	8,011	8,011	8,011	8,011
Roads & Freeways	432	453	526	1,049

Penasquitos Hydrologic Unit (Hydrologic Unit Basin 906)

HU 906	Year 1990	Year 2000	Year 2010	Year 2015
TOTAL ACRES	92,823	92,823	92,823	92,823
Developed Acres	47,609	50,663	56,484	61,032
Low Density Single Family	988	1,071	2,110	4,910
Single Family	20,740	22,441	25,240	25,484
Multiple Family	4,081	4,532	5,313	5,786
Mobile Homes	322	333	273	210
Other Residential	67	67	67	67
Industrial	4,736	4,954	5,701	6,051
Retail	3,641	3,882	4,107	4,243
Office	714	726	766	783
Schools	2,628	2,715	2,835	2,888
Agriculture	745	745	745	745
Parks	7,353	7,353	7,353	7,353
Roads & Freeways	1,595	1,844	1,974	2,515

APPENDIX B - 3 (continued)

San Diego Hydrologic Unit (Hydrologic Unit Basin 907)

HU 907	Year 1990	Year 2000	Year 2010	Year 2015
TOTAL ACRES	289,243	289,243	289,243	289,243
Developed Acres	82,095	84,372	99,269	118,659
Low Density Single Family	8,802	9,399	18,364	36,328
Single Family	27,121	26,068	33,000	33,468
Multiple Family	4,187	4,342	4,688	4,959
Mobile Homes	1,178	1,178	1,178	1,170
Other Residential	96	96	96	96
Industrial	5,524	5,524	5,823	6,001
Retail	5,079	5,168	5,347	5,408
Office	713	749	831	877
Schools	2,098	2,124	2,157	2,188
Agriculture	216	216	216	216
Parks	24,521	24,521	24,521	24,521
Roads & Freeways	2,590	2,936	3,049	3,427

Pueblo San Diego Hydrologic Unit (Hydrologic Unit Basin 908)

HU 908	Year 1990	Year 2000	Year 2010	Year 2015
TOTAL ACRES	44,368	44,368	44,368	44,368
Developed Acres	33,226	33,402	34,177	34,374
Low Density Single Family	0	0	0	0
Single Family	15,950	15,902	15,780	15,548
Multiple Family	3,817	3,967	4,797	5,233
Mobile Homes	151	151	133	102
Other Residential	162	162	162	162
Industrial	4,340	4,373	4,394	4,399
Retail	4,235	4,251	4,289	4,296
Office	415	416	419	421
Schools	1,178	1,179	1,194	1,196
Agriculture	0	0	0	0
Parks	1,641	1,641	1,641	1,641
Roads & Freeways	1,337	1,361	1,368	1,376

APPENDIX B - 3 (continued)

Sweetwater Hydrologic Unit (Hydrologic Unit Basin 909)

HU 909	Year 1990	Year 2000	Year 2010	Year 2015
TOTAL ACRES	147,593	147,593	147,593	147,593
Developed Acres	56,400	59,870	73,470	90,120
Low Density Single Family	5,686	6,262	16,882	32,718
Single Family	22,859	25,084	27,149	27,329
Multiple Family	2,004	2,273	2,686	2,962
Mobile Homes	443	443	436	436
Other Residential	90	90	90	90
Industrial	1,229	1,302	1,364	1,380
Retail	2,380	2,500	2,644	2,712
Office	141	152	174	182
Schools	1,262	1,278	1,356	1,388
Agriculture	164	164	164	164
Parks	19,036	19,036	19,036	19,036
Roads & Freeways	1,104	1,285	1,490	1,723

Otay Hydrologic Unit (Hydrologic Unit Basin 910)

HU 910	Year 1990	Year 2000	Year 2010	Year 2015
TOTAL ACRES	100,465	100,465	100,465	100,465
Developed Acres	15,762	19,416	30,411	45,290
Low Density Single Family	2,198	2,818	8,514	21,814
Single Family	4,729	6,785	11,040	11,628
Multiple Family	799	1,152	1,849	2,418
Mobile Homes	466	466	466	377
Other Residential	338	338	338	338
Industrial	3,664	3,737	3,897	3,964
Retail	1,044	1,106	1,239	1,354
Office	17	17	32	40
Schools	429	498	523	537
Agriculture	1,155	1,155	1,155	1,155
Parks	665	665	665	665
Roads & Freeways	257	679	692	998

APPENDIX B - 3 (continued)

Tijuana Hydrologic Unit (Hydrologic Unit Basin 911)

HU 911	Year 1990	Year 2000	Year 2010	Year 2015
TOTAL ACRES	295,751	295,751	295,751	295,751
Developed Acres	13,695	15,731	24,661	35,792
Low Density Single Family	1,411	2,344	9,700	19,895
Single Family	2,578	3,109	3,672	3,801
Multiple Family	398	489	710	885
Mobile Homes	108	108	108	51
Other Residential	107	107	107	107
Industrial	1,593	2,016	2,450	2,602
Retail	414	440	569	671
Office	62	63	63	64
Schools	339	370	393	393
Agriculture	57	57	57	57
Parks	4,866	4,866	4,866	4,866
Roads & Freeways	1,763	1,763	1,967	2,399

APPENDIX C

WATER QUALITY CRITERIA

The literature contains many different water quality criteria designed to protect specific beneficial uses of water. A summary of the specific numerical water quality criteria considered by the Regional Board for designation as water quality objectives is described in Table C-1, Water Quality Criteria - Inorganic Constituents; and Table C-2, Water Quality Criteria - Organic Constituents. The water quality criteria summarized in Tables C-1 and C-2 provided the basis for the Regional Board's designation of many of the specific numerical water quality objectives described earlier in this Chapter.

The water quality criteria presented in Tables C-1 and C-2 are not enforceable water quality objectives. The purpose of presenting the information summarized in these tables is to allow interested persons to compare available water quality criteria to the specific water quality objectives designated by the Regional Board described in Chapter 3.

A summary of the available types of numerical water quality criteria considered by the Regional Board for designation as numerical water quality objectives are summarized below.

- ***Maximum Contaminant Levels (MCLs):***

MCLs are part of the drinking water standards adopted both by the California Department of Health Services (DHS), Office of Drinking Water in Title 22 of the California Code of Regulations (CCR), Division 4, Chapter 15, "*Domestic Water Quality and Monitoring*" and by the USEPA under the Safe Drinking Water Act. The State MCL drinking water standards must be at least as stringent as those adopted by USEPA. Primary MCLs are derived from the one in a million incremental cancer risk estimate for carcinogens and from threshold toxicity levels for non-carcinogens. Secondary MCLs are derived from human welfare considerations (e.g., taste or odor).

- ***Maximum Contaminant Level Goals (MCL Goals):***

MCL Goals are promulgated by USEPA under the National Primary Drinking Water Regulations as the first step in establishing MCLs. MCL Goals are set at levels which represent no adverse health risks.

- ***State "Action" Levels:***

Action levels are published by the DHS's Office of Drinking Water and are based mainly on health effects. The 10-6 incremental cancer risk estimates are used for carcinogens and threshold toxicity limits are used for other constituents.

- ***Proposition 65 Regulatory Limits:***

Proposition 65 limits are established under the California Safe Drinking Water and Toxic Enforcement Act of 1986 for known human carcinogens and reproductive toxins. For carcinogens the No-Significant-Risk-Levels are set at the one-in-100,000 incremental cancer risk level. 1/1000 of the No-Observable-Effect Level (NOEL) is used for reproductive toxicants.

- ***National Ambient Water Quality Criteria:***

These criteria are published by USEPA under the federal Clean Water Act to protect human health and welfare and freshwater and marine aquatic life. These criteria are found in: *Quality Criteria for Water, 1986* - the "*Gold Book*"; the Ambient Water Quality Criteria volumes (1980, 1984, 1986, 1987, and 1989); Quality Criteria for Water (1976) - the "*Red Book*"; and Water Quality Criteria, 1972 - the "*Blue Book*".

- ***Health Advisories and Water Quality Advisories:***

These advisories are published by USEPA's Office of Water. Short-term (10 days or less), long-term (7 years or less), and lifetime exposure health advisories for non-carcinogens and suspected human health carcinogens are included where sufficient data exist.

- ***Suggested No-Adverse-Response Levels (SNARLS):***

These human health-related criteria are published by the National Academy of Sciences in the Drinking Water and Health Volumes. Incremental cancer risk estimates are presented separately for carcinogens.

- ***Water Quality for Agriculture:***

Water Quality for Agriculture was published by the Food and Agriculture Organization of the United Nations in 1985, which contains criteria protective of agricultural uses of water.

- ***Water Quality Criteria:***

Water Quality Criteria was written by McKee and Wolf and published by the State Water Resources Control Board in 1963 and 1978. It contains criteria for human health and welfare, aquatic life, agricultural use, industrial use, and various other beneficial uses.

Table C-1. WATER QUALITY CRITERIA - INORGANIC CONSTITUENTS

Inorganic Constituent	BASIN PLAN				Drinking Water Standards (California & Federal) Maximum Contaminant Levels (MCLs)		
	Ocean Waters (1) "‡" = carcinogen	Bays and Estuaries	Inland Surface Waters	Ground Water	California Dept.of Health Services Primary MCL	California Dept.of Health Services Secondary MCL	USEPA Primary MCL
Ammonia	600 (2)	NH_3 not > 0.025 mg/l	NH_3 not > 0025 mg/l				
Antimony	1,200						6 (8)
Arsenic	8				50		50
Beryllium	0.033 ‡						4 (8)
Boron			0.5 mg/l or as noted in Table 3-1	0.5 mg/l or as noted in Table 3-2			
Bromide							
Cadmium	1				10		5
Chloride			250 mg/l or as noted in Table 3-1	60 mg/l or as noted in Table 3-2		250,000 (7)	
Chlorine	2 (3)						
Chromium (III)	190,000						
Chromium (VI)	2 (4)						
Chromium (total)	2 (4)				50		100
Color			20 units or as noted in Table 3-1	15 units or as noted in Table 3-2		15 units	
Copper	3					1,000	1,300 (9)
Cyanide	1						200 (8)
Fluoride			1.0 mg/l or as noted in Table 3-1	1.0 mg/l or as noted in Table 3-2	1,400 to 2,400 (5)		4,000
Iron			0.3 mg/l or as noted in Table 3-1	0.3 mg/l or as noted in Table 3-2		300	
Lead	2				50		15 (9)
Manganese			0.05 mg/l or as noted in Table 3-1	0.05 mg/l or as noted in Table 3-2		50	
Mercury (inorganic)	0.04				2		2
Nickel	5						100 (8)
Nitrate			5 mg/l or as noted in Table 3-1	5 mg/l or as noted in Table 3-2	45,000 (6)		10,000 (10)
Oxygen, dissolved	Shall not be depressed >10%	Shall not be less than 5.0 mg/l with designated MAR. The annual mean DO shall not be less than 7 mg/l more than 10% of the time.	Shall not be less than 5.0 mg/l in inland surface waters with WARM or less than 6.0 m/l in waters with COLD beneficial use The annual mean D.O. conc. shall not be less than 7 mg/l more than 10% of the time.				

Table C-1 -- Values are in ug/l (ppb) unless otherwise indicated. Numbers in parenthesis indicate endnotes following the tables.

Table C-1. WATER QUALITY CRITERIA - INORGANIC CONSTITUENTS

Inorganic Constituent	BASIN PLAN				Drinking Water Standards (California & Federal) Maximum Contaminant Levels (MCLs)		
	Ocean Waters (1) "‡" = carcinogen	Bays and Estuaries	Inland Surface Waters	Ground Water	California Dept.of Health Services Primary MCL	California Dept.of Health Services Secondary MCL	USEPA Primary MCL
pH	Shall not be +/- 0.2 units of natural pH	Shall not be depressed below 7.0; nor raised above 9.0. Changes in normal ambient pH shall not exceed 0.2 units.	Shall not be depressed below 6.5 nor raised above 8.5. Changes in normal ambient pH levels shall not exceed 0.5 units in fresh waters with designated COLD or WARM beneficial uses.				
Phosphorus			Shall not exceed 0.05 mg/l in any steam at the point where it enters any standing body of water, nor 0.025 mg/l in any standing body of water; for flowing waters, shall not exceed 0.1 mgl total P. These values not to be exceeded more than 10% of the time.				
Radioactivity, Gross Alpha					15 pCi/l		15 pCi/l (12)
Radioactivity, Gross Beta					50 pCi/l		4 mrem/yr
Radium 226 + 228					5 pCi/l		5 pCi/l / 20 pCi/l (13)
Selenium	15				10		50
Settleable solids			Shall not contain suspended and settleable solids in concentrations that result in the deposition of solids that cause nuisance or adversely affect beneficial uses.				
Silver	0.7				50		100
Sodium			60% Na; or as noted in Table 3-1	60% Na; or as noted in Table 3-2			
Strontium-90					8 pCi/l		
Sulfate			65 mg/l; or as noted in Table 3-1	60 mg/l; or as noted in Table 3-2		250,000 (7)	400,000 - 500,000 (13)
Total dissolved solids (TDS)			300 mg/l; or as noted in Table 3-1	350 mg/l; or as noted in Table 3-2		500,000 (11)	
Thallium	14						2 (8)
Tritium					20,000 pCi/l		
Turbidity		Shall not be less than 50% of the depth at locations where measurement is made by means of a standard Secchi disk, or as noted in Chapter 3 page 30.	20 NTU; or as noted in Table 3-1. Waters shall be free of changes in turbidity that cause nuisance or adversely affect beneficial uses.	5 NTU; or as noted in Table 3-2. Waters shall be free of changes in turbidity that cause nuisance or adversely affect beneficial uses.		5 units	1 to 5 units
Uranium					20 pCi/l		20 μg/l = 30 pCi/l (13)
Zinc	20					5,000	

Table C-1 -- Values are in ug/l (ppb) unless otherwise indicated. Numbers in parenthesis indicate endnotes following the tables.

Table C-1. WATER QUALITY CRITERIA - INORGANIC CONSTITUENTS

Inorganic Constituent	Drinking Water Standards (Federal) Maximum Contaminant Levels		California Recommended Public Health Level (RPHL)	Health Advisories or Suggested No-Adverse-Response Levels (SNARLs) for toxicity other than cancer risk		US EPA Integrated Risk Information System (IRIS) Reference Dose as a Water Quality Criterion (16)	One-in-a-Million Incremental Cancer Risk Estimates for Drinking Water			California Proposition 65 Regulatory Level as a Water Quality Criterion (19)	Agricultural Water Quality Goals (21)
	USEPA		Department of Health Services	USEPA	National Academy of Sciences (NAS)		Cal/EPA Cancer Potency Factor as a Water Quality Criterion (17)	USEPA Integrated Risk Information System (IRIS)	USEPA Health Advisory or SNARL		
	Secondary MCL	MCL Goal									
Ammonia				30,000 (14)					(D)		
Antimony		6 (8)		3		2.8			(D)		
Arsenic								0.02	0.02 (A,14)	5	100
Beryllium		4 (8)		4,000 / 20,000 (7-yr,14,15)				0.008	0.008 (B,14)	(18)	100
Boron				600 (14)		630			(D)		750 (22) /700
Bromide					2,300						
Cadmium		5		5	5	3.5	(18)		(D)	(18)	10
Chloride	250,000										106,000
Chlorine						1,050			(D)		
Chromium (III)											
Chromium (VI)							0.083		(A)	(18)	100
Chromium (total)		100		100		35			(D)		
Color	15 units										
Copper	1,000	1,300							(D)		200
Cyanide		200 (8)		200		150			(D)		
Fluoride	2,000	4,000				840			(D)		1,000
Iron	300										5,000
Lead		zero							(B)	0.25 (20)	5,000
Manganese	50					980					200
Mercury (inorganic)		2	2 (13)	2		2.1			(D)		
Nickel		100 (8)		100		140	(18)		(D)	(18)	200
Nitrate		10,000 (2)		10,000 (2)		11,000 (2)			(D)		
Oxygen, dissolved											

Table C-1 -- Values are in ug/l (ppb) unless otherwise indicated. Numbers in parenthesis indicate endnotes following the tables.

Table C-1. WATER QUALITY CRITERIA - INORGANIC CONSTITUENTS

Inorganic Constituent	Drinking Water Standards (Federal) Maximum Contaminant Levels		California Recommended Public Health Level (RPHL)	Health Advisories or Suggested No-Adverse-Response Levels (SNARLs) for toxicity other than cancer risk		US EPA Integrated Risk Information System (IRIS) Reference Dose as a Water Quality Criterion (16)	One-in-a-Million Incremental Cancer Risk Estimates for Drinking Water			California Proposition 65 Regulatory Level as a Water Quality Criterion (19)	Agricultural Water Quality Goals (21)
	USEPA		Department of Health Services	USEPA	National Academy of Sciences (NAS)		Cal/EPA Cancer Potency Factor as a Water Quality Criterion (17)	USEPA Integrated Risk Information System (IRIS)	USEPA Health Advisory or SNARL		
	Secondary MCL	MCL Goal									
pH	6.5 to 8.5 unts										
Phosphorus				0.1 (23)					(D)		
Radioactivity, Gross Alpha		zero							(A)		
Radioactivity, Gross Beta		zero							0.04 mrem/yr (A,14)		
Radium 226 + 228		zero (13)							0.22–0.26 pCi/l (A,14)		
Selenium		50				35					20
Settleable solids											
Silver				100 (14)		35			(D)		
Sodium				2,000 (24)							
Strontium-90									(A)		
Sulfate	250,000	400,000 - 500,000 (13)									
Total dissolved solids (TDS)	500,000										450,000
Thallium		0.5 (8)		0.4		0.5					
Tritium									(A)		
Turbidity											
Uranium		zero (13)			35				1.7 pCi/l (A)		
Zinc	5,000			2,000		2,100			(D)		2,000

Table C-1 -- Values are in ug/l (ppb) unless otherwise indicated. Numbers in parenthesis indicate endnotes following the tables.

Table C-1. WATER QUALITY CRITERIA - INORGANIC CONSTITUENTS

Inorganic Constituent	USEPA National Ambient Water Quality Criteria									
	Health and Welfare Protection			Freshwater Aquatic Life Protection						
				Recommended Criteria				Additional Toxicity Information		
	Non-Cancer Public Health Effects	One-in-a-Million Incremental Cancer Risk Estimate	Taste & Odor or Welfare	Continuous Concentration (4-day Average)	24-hour Average	Maximum Concentration (1-hour Average)	Maximum (Instantaneous)	Acute	Chronic	Other
Ammonia				(26)		(26)				
Antimony	14 / 4300 (25)			30 (13,27)		88 (13,27)		9,000	1,600	610 (42)
Arsenic		0.018 / 0.14 (25)		190 (27)		360 (27)		850 (41)		48 (43)
Beryllium								130	5.3	
Boron										
Bromide										
Cadmium				0.55 (28,29)		1.4 (28,36)				
Chloride	250,000			230,000 (30)		860,000 (30)				
Chlorine				11 (31)		19 (31)				
Chromium (III)				98 (28,32)		820 (28,37)				
Chromium (VI)				11		16				
Chromium (total)										
Color										
Copper			1000	5.4 (28,33)		7.5 (28,38)				
Cyanide	700 / 220,000 (25)			5.2		22				
Fluoride										
Iron			300				1000			
Lead				0.99 (28,34)		25 (28,39)				
Manganese			50							
Mercury (inorganic)	0.14 / 0.15 (25)			0.012		2.4				
Nickel	610 / 4600 (25)			73 (28,35)		653 (28,40)				
Nitrate	10,000 (2)									
Oxygen, dissolved				(22)	(22)					

Table C-1 -- Values are in ug/l (ppb) unless otherwise indicated. Numbers in parenthesis indicate endnotes following the tables.

Table C-1. WATER QUALITY CRITERIA - INORGANIC CONSTITUENTS

Inorganic Constituent	USEPA National Ambient Water Quality Criteria									
	Health and Welfare Protection			Freshwater Aquatic Life Protection						
				Recommended Criteria				Additional Toxicity Information		
	Non-Cancer Public Health Effects	One-in-a-Million Incremental Cancer Risk Estimate	Taste & Odor or Welfare	Continuous Concentration (4-day Average)	24-hour Average	Maximum Concentration (1-hour Average)	Maximum (Instantaneous)	Acute	Chronic	Other
pH			5 to 9 units				6.5 to 9.0 units			
Phosphorus										
Radioactivity, Gross Alpha										
Radioactivity, Gross Beta										
Radium 226 + 228										
Selenium				5		20				
Settleable solids										
Silver				0.12 (13)		0.84 (28,44)			0.12	
Sodium										
Strontium-90										
Sulfate			250,000							
Total dissolved solids (TDS)										
Thallium	1.7 / 6.3 (25)							1,400	40	20 (46)
Tritium										
Turbidity										
Uranium										
Zinc						54 (28,45)				

Table C-1 -- Values are in ug/l (ppb) unless otherwise indicated. Numbers in parenthesis indicate endnotes following the tables.

Table C-1. WATER QUALITY CRITERIA - INORGANIC CONSTITUENTS

Inorganic Constituent	USEPA National Ambient Water Quality Criteria Saltwater Aquatic Life Protection						California Ocean Plan Numerical Water Quality Objectives					
	Recommended Criteria			Additional Toxicity Information			Human Health Protection	Marine Aquatic Life Protection				
	Continuous Concentration (4-day Average)	Maximum Concentration (1-hour)	Maximum (Instantaneous)	Acute	Chronic	Other	(30-day Average) "‡" = carcinogen	6-month Median	30-day Average	7-day Average	Daily Maximum	Instantaneous Maximum
Ammonia	35 (47)	233 (47)						600 (2)			2,400 (2)	6,000 (2)
Antimony	500 (13,27)	1,500 (13,27)					1,200					
Arsenic	36 (27)	69 (27)		2,319 (41)		13 (43)		8			32	80
Beryllium							0.033 ‡					
Boron												
Bromide												
Cadmium	9.3	43						1			4	10
Chloride												
Chlorine	7.5 (48)	13 (48)						2 (3)			8 (3)	60 (3)
Chromium (III)				10,300 (49)			190,000					
Chromium (VI)	50	1,100						2 (4)			8 (4)	20 (4)
Chromium (total)								2 (4)			8 (4)	20 (4)
Color												
Copper	2.9	2.9						3			12	30
Cyanide	1	1						1			4	10
Fluoride												
Iron												
Lead	5.6	140						2			8	20
Manganese			100									
Mercury (inorganic)	0.025	2.1						0.04			0.16	0.4
Nickel	8.3	75						5			20	50
Nitrate												
Oxygen, dissolved												

Table C-1 -- Values are in ug/l (ppb) unless otherwise indicated. Numbers in parenthesis indicate endnotes following the tables.

Table C-1. WATER QUALITY CRITERIA - INORGANIC CONSTITUENTS

Inorganic Constituent	USEPA National Ambient Water Quality Criteria Saltwater Aquatic Life Protection						California Ocean Plan Numerical Water Quality Objectives					
	Recommended Criteria			Additional Toxicity Information			Human Health Protection	Marine Aquatic Life Protection				
	Continuous Concentration (4-day Average)	Maximum Concentration (1-hour)	Maximum (Instantaneous)	Acute	Chronic	Other	(30-day Average) "‡" = carcinogen	6-month Median	30-day Average	7-day Average	Daily Maximum	Instantaneous Maximum
pH			6.5 to 8.5 units									6.0 to 9.0 units
Phosphorus			0.1 (50)									
Radioactivity, Gross Alpha												15 pCi/l (12)
Radioactivity, Gross Beta												50 pCI/l
Radium 226 + 228												5 pCi/l
Selenium	71	300						15			60	150
Settleable solids									1,000	1,500		3,000
Silver	0.92 (13)	2.3						0.7			2.8	7
Sodium												
Strontium-90												8 pCi/l
Sulfate												
Total dissolved solids (TDS)												
Thallium				2,130			14					
Tritium												20,000 pCi/l
Turbidity									75 NTU	100 NTU		225 NTU
Uranium												20 pCi/l
Zinc	86	95						20			80	200

Table C-1 -- Values are in ug/l (ppb) unless otherwise indicated. Numbers in parenthesis indicate endnotes following the tables.

ENDNOTES FOR TABLE C-1 - INORGANICS

(7-day) For exposure of 7 days or less.
(10-day) For exposure of 10 days or less.
(24-hr) For exposure of 24 hours or less.
(7-yr) For "longer-term" exposure (7 years or less, EPA).
(A) Known human carcinogen; sufficient epidemiologic evidence in humans.
(B) Probable human carcinogen; sufficient evidence from animal studies; no or inadequate human data.
(C) Possible human carcinogen; limited evidence from animal studies; no human data.
(D) Not classified as to human carcinogenicity; no data or inadequate evidence.
(E) Evidence of non-carcinogenicity for humans.
(1) Or as noted in the California Ocean Plan (Reference 28)
(2) Expressed as nitrogen.
(3) For total chlorine residual; for intermittent chlorine sources see Reference 26, Chapter IV, Table B.
(4) Value developed for chromium VI; may be applied to total chromium if valence unknown.
(5) MCL varies with air temperature; 2.4 mg/l (S 53.7 °F); 2.2 mg/l (53.8 – 58.3 °F); 2.0 mg/l (58.4 – 63.8 °F); 1.8 mg/l (63.9 – 70.6 °F); 1.6 mg/l (70.0 – 79.2 °F); 1.4 mg/l (79.3 – 90.5 °F).
(6) As NO_3.
(7) Recommended level; Upper level = 500 mg/l; Short-term level = 600 mg/l.
(8) Effective 17 January 1994.
(9) MCL includes this "Action level", to be exceeded in no more than 10 percent of samples.
(10) As nitrogen; in addition, MCL for total nitrate and nitrite = 10,000 µg/l (as N).
(11) Recommended level; Upper level = 1,000; Short-term level = 1,500 mg/l.
(12) Includes Radium 226 but excludes Radon and Uranium.
(13) Proposed.
(14) Draft / tentative / provisional.
(15) Calculated for child / for adult
(16) Assumes 70 kg body weight, 2 liters/day water consumption, and 20% relative source contribution. An additional uncertainty factor of 10 is used for Class C carcinogens.
(17) Assumes 70 kg body weight and 2 liters/day water consumption.
(18) Determined not to pose a risk of cancer through ingestion (Title 22, CCR, Division 2).
(19) Regulatory dose level divided by 2 liters per day average consumption; represents a 1-in-100,000 incremental cancer risk estimate unless otherwise noted.
(20) Based on reproductive toxicity
(21) Reference 19 unless noted otherwise.
(22) See Reference 16.
(23) For white phosphorus.
(24) Guidance level (Reference 3) assumes relative source contribution of 10% from drinking water.
(25) For consumption of water and aquatic organisms / for consumption of aquatic organisms only.
(26) Varies with pH and temperature.
(27) For the trivalent form.
(28) Value based on hardness of 40 mg/l; value increases with increasing hardness.
(29) For hardness in mg/l as CaCO3, criterion = e(0.7852 [ln (hardness)] –3.490) µg/l.
(30) For dissolved chloride associated with sodium; criterion probably will not be adequately protective when chloride is associated with potassium, calcium, or magnesium, rather than sodium.
(31) For total residual chlorine.
(32) For hardness in mg/l as CaCO3, criterion = e(0.8190 [ln (hardness)] + 1.561) µg/l.
(33) For hardness in mg/l as CaCO3, criterion = e(0.8545 [ln (hardness)] – 1.465) µg/l.
(34) For hardness in mg/l as CaCO3, criterion = e(1.273 [ln (hardness)] – 4.705) µg/l.
(35) For hardness in mg/l as CaCO3, criterion = e(0.8460 [ln (hardness)] + 1.1645) µg/l.
(36) For hardness in mg/l as CaCO3, criterion = e(1.128 [ln (hardness)] – 3.828) µg/l.
(37) For hardness in mg/l as CaCO3, criterion = e(0.8190 [ln (hardness)] + 3.688) µg/l.
(38) For hardness in mg/l as CaCO3, criterion = e(0.9422 [ln (hardness)] – 1.464) µg/l.
(39) For hardness in mg/l as CaCO3, criterion = e(1.273 [ln (hardness)] – 1.460) µg/l.
(40) For hardness in mg/l as CaCO3, criterion = e(0.8460 [ln (hardness)] + 3.3612) µg/l.
(41) For the pentavalent form.
(42) Toxicity to algae occurs.
(43) Based on reproductive toxicity.
(44) For hardness in mg/l as $CaCO_3$, criterion = e(1.72 [ln (hardness)] –6.52) µg/l.
(45) For hardness in mg/l as $CaCO_3$, criterion = e(0.8473 [ln (hardness)] + 0.8604) µg/l.
(46) Toxicity to one species of fish after 2,600 hours of exposure.
(47) Unionized ammonia concentrations.
(48) For sum of chlorine-produced oxidants.
(49) EC50 for eastern oyster embryos.
(50) For elemental phosphorus; marine or estuarine.

Table C-2. WATER QUALITY CRITERIA - ORGANIC CONSTITUENTS

Organic Constituent	BASIN PLAN				Drinking Water Standards (California & Federal) Maximum Contaminant Levels (MCLs)					California Recommended Public Health Level (RPHL) Department of Health Services	California State Action Levels Department of Health Services		Other Taste and Odor Thresholds	Health Advisories or Suggested No-Adverse Response Levels (SNARLS) for toxicity other than cancer risk	
	Ocean Waters (1) ‡ = carcinogen	Bays and Estuaries	Inland Surface Waters and Ground Waters		California Dept. of Health Services		US Environmental Protection Agency							USEPA	National Academy of Sciences
			Primary MCL	Secondary MCL	Primary MCL	Secondary MCL	Primary MCL	Secondary MCL	MCL Goal		Toxicity	Taste & Odor			
Acenaphthylene	0.0088 ‡ (2)														
Acenaphthylene	220														
Acrylonitrile	0.10 ‡													1 / 4 (7-yr,13,14)	
Aldrin	0.000022 ‡										0.05 (LOQ)			0.3 (10-day,14)	
Anthracene	0.0088 ‡ (2)														
Atrazine			3		3		3		3	3 (11)				3	150
Bentazon			18		18					18 (11)				20	
Benz(a)anthracene	0.0088 ‡ (2)						0.1 (11)		zero (11)						
Benzene	5.9 ‡		1		1		5		zero	0.35 (11)				200 (10-day)	
Benzidine	0.000069 ‡														
Benzo(b)fluoranthene	0.0088 ‡ (2)						0.2 (11)		zero (11)						
Benzo(k)fluoranthene	0.0088 ‡ (2)						0.2 (11)		zero (11)						
Benzo(g,h,i)perylene	0.0088 ‡ (2)														
Benzo(a)pyrene	0.0088 ‡ (2)						0.2 (12)		zero (12)						
alpha-BHC	0.008 (3)										0.7				500 (7-day,3)
beta-BHC	0.008 (3)										0.3				500 (7-day,3)
Gamma-BHC (Lindane)	0.008 (3)		4		4		0.2		0.2					0.2	500 (7-day,3)
delta-BHC	0.008 (3)														500 (7-day,3)
technical-BHC	0.008 (3)														500 (7-day)
Bis(2-chloroethoxy) methane	4.4														
Bis(2-chloroethyl) ether	0.045 ‡														
Bis(2-chloroisopropyl) ether	1200													300	
Bromodichloromethane	130 ‡ (4)		100 (10)		100 (10)		100 (10)							400 / 1,300 (7-yr,13,14)	
Bromoform	130 ‡ (4)		100 (10)		100 (10)		100 (10)							2,000 (10-day)	
Bromomethane	130 ‡ (4)													10	
Carbofuran			18		18		40		40	18 (11)				40	
Carbon tetrachloride	0.90 ‡		0.5		0.5		5		zero	0.5 (11)				200 (10-day)	200 (7-day)
Catechol	30 (5)														2,200 (24-hr)
Chlordane	0.000023 ‡ (6)		0.1		0.1		2		zero	0.03 (11)				60 (10-day)	
Chlorobenzene	570		30		30		100		100	30 (11)				100	
4-Chloro-m-cresol	1 (7)														
4-Chloro-o-cresol	1 (7)														
6-Chloro-m-cresol	1 (7)														
Chloroform	130 ‡		100 (10)		100 (10)		100 (10)							4,000 (10-day)	
Chloromethane	130 ‡ (4)													3	
2-Chlorophenol	1 (7)													40 (14)	
3-Chlorophenol	1 (7)														
4-Chlorophenol	1 (7)														
Chrysene	0.0088 ‡ (2)						0.2 (11)		zero (11)						
2,4-D			100		100		70		70					70	87.5
DBCP			0.2		0.2		0.2		zero	0.002 (11)				50 (10-day)	
DDD	0.00017 ‡ (8)														
DDE	0.00017 ‡ (8)														
DDT	0.00017 ‡ (8)														
Dibenz(a,h)anthracene	0.0088 ‡ (2)						0.3 (11)		zero (11)						
Dibromochloromethane	130 ‡ (4)		100 (10)		100 (10)		100 (10)							60 (14)	18,000 (24-hr)
Dibutyl phthalate	3,500														770
1,2-Dichlorobenzene	5,100 (9)						600	10 (11)	600		130 (9)	10		600	300 (15)
1,3-Dichlorobenzene	5,100 (9)						600		600		130 (9)	20		600	

Table C-2. WATER QUALITY CRITERIA - ORGANIC CONSTITUENTS

Organic Constituent	BASIN PLAN				Drinking Water Standards (California & Federal) Maximum Contaminant Levels (MCLs)					California Recommended Public Health Level (RPHL) Department of Health Services	California State Action Levels Department of Health Services		Other Taste and Odor Thresholds	Health Advisories or Suggested No-Adverse Response Levels (SNARLS) for toxicity other than cancer risk	
	Ocean Waters (1) ‡ = carcinogen	Bays and Estuaries	Inland Surface Waters and Ground Waters		California Dept. of Health Services		US Environmental Protection Agency							USEPA	National Academy of Sciences
			Primary MCL	Secondary MCL	Primary MCL	Secondary MCL	Primary MCL	Secondary MCL	MCL Goal		Toxicity	Taste & Odor			
1,4-Dichlorobenzene	18 ‡		5		5		75	5 (11)	75	5 (11)				75	94 (15)
3,3'-Dichlorobenzidine	0.0081 ‡														
1,1-Dichloroethane			5		5					5 (11)					
1,2-Dichloroethane	130 ‡		0.5		0.5		5		zero	0.3 (11)				700 (10-day)	
1,1-Dichloroethylene	7,100		6		6		7		7	6 (11)				7	100
cis-1,2-Dichloroethylene			6		6		70		70	6 (11)				70	
trans-1,2-Dichloroethylene			10		10		100		100	10 (11)				100	
Dichloromethane	450 ‡						5 (12)		zero (12)		40			2,000 (10-day)	5000 (7-day)
2,3-Dichlorophenol	1 (7)														
2,4-Dichlorophenol	1 (7)													20	2000 / 7000 (13)
2,5-Dichlorophenol	1 (7)														
2,6-Dichlorophenol	1 (7)														
3,4-Dichlorophenol	1 (7)														
1,2-Dichloropropane			5		5		5		zero	5 (11)				90 (10-day)	
1,3-Dichloropropene	8.9 ‡		0.5		0.5					0.2 (11)				30 (10-day)	
Dieldrin	0.000040 ‡										0.05 (LOQ)			0.5 (10-day)	
Di(2-ethylhexyl)phthalate	3.5 ‡		4		4		6 (12)		zero (12)	4 (11)					4,200
Diethyl phthalate	33,000								5,000 (11)					5,000	
2,4-Dimethylphenol	30 (5)											400			
Dimethyl phthalate	820,000														
4,6-Dinitro-o-cresol	30 (5)														
Dinitrophenol															110
2,4-Dinitrophenol	4														110
2,4-Dinitrotoluene	2.6 ‡													500 (10-day)	
1,2-Diphenylhydrazine	0.16 ‡														
Endosulfan	9 (16)														
Endosulfan sulfate	9 (16)														
Endrin	0.002		0.2		0.2		2 (12) / 0.2		2 (12)					2	
Ethylbenzene	4,100		680		680		700	30 (11)	700	680 (11)			29 (18)	700	
Ethylene dibromide (EDB)			0.02		0.02		0.05		zero	0.01 (11)				8 (10-day)	
Fluoranthene	15														
Fluorene	0.0088 ‡ (2)														
Glyphosate			700		700		700 (12)		700 (12)	700 (11)				700	
Heptachlor	0.00072 ‡ (17)		0.01		0.01		0.4		zero	0.01 (11)				10 (10-day)	
Heptachlor epoxide	0.00072 ‡ (17)		0.01		0.01		0.2		zero	0.007 (11)				0.1 (7-yr)	
Hexachlorobenzene	0.00021 ‡						1 (12)		zero (12)					50 (10-day)	30 (7-day)
Hexachlorobutadiene	14 ‡													1	
Hexachlorocyclopentadiene	58						50 (12)	8 (11)	50 (12)						
Hexachloroethane	2.5 ‡													1	
Indeno(1,2,3-c,d)pyrene	0.0088 ‡ (2)						0.4 (11)		zero (11)						
Isophorone	150,000													100	
Methanes, halo-	130 ‡ (4)						100 (10)								
Methoxychlor			100		100		40		40					40	700
Molinate			20		20					20 (11)					
Nitrobenzene	4.9														5 (7-day)
2-Nitrophenol	30 (5)														290 (7-day,19)
Nitrophenol	30 (5)														290 (7-day)
4-Nitrophenol	30 (5)													60 (14)	290 (7-day,19)

Table C-2. WATER QUALITY CRITERIA - ORGANIC CONSTITUENTS

Organic Constituent	BASIN PLAN				Drinking Water Standards (California & Federal) Maximum Contaminant Levels (MCLs)					California Recommended Public Health Level (RPHL) Department of Health Services	California State Action Levels Department of Health Services		Other Taste and Odor Thresholds	Health Advisories or Suggested No-Adverse Response Levels (SNARLS) for toxicity other than cancer risk	
	Ocean Waters (1) ‡ = carcinogen	Bays and Estuaries	Inland Surface Waters and Ground Waters		California Dept. of Health Services		US Environmental Protection Agency							USEPA	National Academy of Sciences
			Primary MCL	Secondary MCL	Primary MCL	Secondary MCL	Primary MCL	Secondary MCL	MCL Goal		Toxicity	Taste & Odor			
N-Nitrosodimethylamine	7.3 ‡														
N-Nitrosodiphenylamine	2.5 ‡														
trans-Nonachlor	0.000023 ‡ (6)														
Oil & grease	25,000														
Oxychlordane	0.000023 ‡ (6)														
PAHs	0.0088 ‡ (2)						see individual chemicals		see individual chemicals					see individual chemicals	
Pentachlorophenol	1 (7)						1		zero		30			300 (10-day)	6 / 21 (13)
Phenanthrene	0.0088 ‡ (2)														
Phenol	30 (5)											5.0 (22)		4000	
Phenols, chlorinated	1														
Phenols, nitro-	30 (5)														
Phenols, non-chlorinated	30														
Phthalate esters			see individual chemicals		see individual chemicals		see individual chemicals		see individual chemicals					see individual chemicals	see individual chemicals
Phenanthrene	0.0088 ‡ (2)		1												
Phenazopyridine			1												
Phenazopyridine hydrochloride			1												
Phenesterin			1												
Phenobarbital			1												
Phenol	30 (5)		1									5.0 (22)		4,000	
Phenols, chlorinated	1		1												
Phenols, nitro-	30 (5)		1												
Phenols, non-chlorinated	30		1												
Phenoxybenzamine			1												
Phenoxybenzamine hydrochloride			1												
Phenyl glycidyl ether			1												
o-Phenylphenate, sodium			1												
Polychlorinated biphenyls	0.000019 ‡						0.5 (21)		zero (21)						50 (7-day)
Pyrene	0.0088 ‡ (2)														
Resorcinol	30 (5)														500 (7-day)
Simazine			10		10		4 (12)		4 (12)					4	1,505
2,3,7,8-TCDD (Dioxin)	0.0000000039 ‡ (20)						0.00003 (12)		zero (12)					0.0001 (10-day)	0.0007
1,1,2,2-Tetrachloroethane	1,200		1		1					1 (11)					
Tetrachloroethylene (PCE)	99 ‡		5		5		5		zero	0.7 (11)				2,000 (10-day)	
2,3,4,6-Tetrachlorophenol	1 (7)														
2,3,5,6-Tetrachlorophenol	1 (7)														
Thiobencarb			70	1	70	1				70 (11)					
Toluene	85,000						1,000	40 (11)	1,000		100		42 (18)	1,000	340
Toxaphene	0.00021 ‡		5		5		3		zero					40 (10-day)	8.75
2,4,5-TP (Silvex)			10		10		50		50					50	5.25
Tributyltin	0.0014														
1,1,1-Trichloroethane	540,000		200		200		200		200	200 (11)				200	3800
1,1,2-Trichloroethane	43,000		32		32		5 (12)		3 (12)					3	
Trichloroethylene (TCE)	27 ‡		5		5		5		zero	2.5 (11)					
Trichlorofluoromethane			150		150					150 (11)				2,000	8,000 (7-day)
2,4,5-Trichlorophenol	1 (7)														
2,4,6-Trichlorophenol	0.29 ‡														2,500 (7-day)
1,1,2-Trichloro-1,2,2-trifluoroethane			1,200		1,200					1,200 (11)					
Trinitrophenol	30 (5)														200 (7-day)
Vinyl chloride	36 ‡		0.5		0.5		2		zero	0.15 (11)				3,000 (10-day)	
Xylene(s)			1,750		1,750		10,000	20 (11)	10,000	1,750 (11)			17 (18)	10,000	

Table C-2. WATER QUALITY CRITERIA - ORGANIC CONSTITUENTS

Organic Constituent	USEPA Integrated Risk Information System (IRIS) Reference Dose as a Water Quality Criterion (23)	One-in-a-Million Incremental Cancer Risk Estimates for Drinking Water				California Proposition 65 Regulatory Level as a Water Quality Criterion	Agricultural Water Quality Goals (28)	USEPA National Ambient Water Quality Criteria					
								Health and Welfare Protection			Freshwater Aquatic Life Protection Recommended Criteria		
		Cal/EPA Cancer Potency Factor as a Water Quality Criterion (23)	USEPA Integrated Risk Information System (IRIS)	USEPA Health Advisory or SNARL	National Academy of Sciences (NAS) Drinking Water and Health			Non-Cancer Public Health Effects	One-in-a-Million Incremental Cancer Risk Estimate	Taste and Odor or Welfare	Continuous Concentration (4-day Average)	24-hour Average	Maximum Concentration (1-hour Average)
Acenaphthylene													
Acenaphthylene				(C)				320 / 780 (29)					
Acrylonitrile		0.035	0.07	0.07 (B1)	0.38	0.35			0.059 / 0.66 (29)				
Aldrin		0.0021	0.002	0.002 (B2,14)	0.003	0.02			0.00013 / 0.00014 (29)				
Anthracene	2,100			(D)				9,600 / 110,000 (29)					
Atrazine	3.5		0.14	(C)				25 (30)					
Bentazon	18			(D)									
Benz(a)anthracene				(B2)					0.0028 / 0.031 (32)				
Benzene		0.35	1	1.0 (A)		3.5			1.2 / 71 (29)				
Benzidine		0.00007		(A)		0.0005			0.00012 / 0.00054 (29)				
Benzo(b)fluoranthene				(B2)					0.0028 / 0.031 (32)				
Benzo(k)fluoranthene				(B2)					0.0028 / 0.31 (32)				
Benzo(g,h,i)perylene				(D)									
Benzo(a)pyrene		0.0029	0.003	(B2)		0.03			0.0028 / 0.031 (32)				
alpha-BHC					0.33	0.15			0.0039 / 0.013 (29)				
beta-BHC					0.12	0.25			0.014 / 0.046 (29)				
Gamma-BHC (Lindane)	0.2	0.032		0.03 (C)	0.054	0.3			0.019 / 0.063 (29)			0.08	
delta-BHC													
technical-BHC		0.0088				0.1			0.0123				
Bis(2-chloroethoxy) methane													
Bis(2-chloroethyl) ether		0.014			0.42	0.15			0.031 / 1.4 (29)				
Bis(2-chloroisopropyl) ether	280			(D)				1,400 / 170,000 (29)					
Bromodichloromethane		0.27	1.4	0.6 (B2,14)		2.5			0.27 / 22 (29)				
Bromoform			4	4 (B2,14)					4.3 / 360 (29)				
Bromomethane	7			(D)				48 / 4,000 (29)					
Carbofuran	35			(E)									
Carbon tetrachloride		0.23	0.3	0.3 (B2)	4.5	2.5			0.25 / 4.4 (29)				
Catechol													
Chlordane		0.029 / 0.027	0.03	0.03 (B2)	0.028	0.25			0.00057 / 0.00059 (29)			0.0043	
Chlorobenzene	140			(D)	2.3 (25)			680 / 21,000 (29)		20			
4-Chloro-m-cresol										3,000			
4-Chloro-o-cresol										1,800			
6-Chloro-m-cresol										20			
Chloroform		1.1 / 0.43	6	6.0 (B2,14)	0.26 / 5.6 (26)	10			5.7 / 470 (29)				
Chloromethane	2.8			(C)									
2-Chlorophenol	35			(D)						0.1			
3-Chlorophenol										0.1			
4-Chlorophenol										0.1			
Chrysene				(B2)					0.0028 / 0.31 (32)				
2,4-D	70			(D)				100					
DBCP		0.005	0.03	0.03 (B2)	0.051	0.05			0.025				
DDD		0.15				1 (8)			0.00083 / 0.00084 (29)				
DDE		0.1				1 (8)			0.00059 / 0.00059 (29)				
DDT		0.1	0.1	(B2)	0.042	1 (8)			0.00059 / 0.00059 (29)			0.0010	
Dibenz(a,h)anthracene				(B2)		0.1			0.0028 / 0.031 (32)				
Dibromochloromethane	14			(C)	0.6	3.5			0.41 / 34 (29)				
Dibutyl phthalate	700			(D)				2700 / 12,000 (29)					
1,2-Dichlorobenzene	620			(D)				2700 / 17,000 (29)					
1,3-Dichlorobenzene	620			(D)				400 / 2,600 (31)					

Table C-2. WATER QUALITY CRITERIA - ORGANIC CONSTITUENTS

Organic Constituent	USEPA Integrated Risk Information System (IRIS) Reference Dose as a Water Quality Criterion (23)	One-in-a-Million Incremental Cancer Risk Estimates for Drinking Water				California Proposition 65 Regulatory Level as a Water Quality Criterion	Agricultural Water Quality Goals (28)	USEPA National Ambient Water Quality Criteria					
								Health and Welfare Protection			Freshwater Aquatic Life Protection Recommended Criteria		
		Cal/EPA Cancer Potency Factor as a Water Quality Criterion (23)	USEPA Integrated Risk Information System (IRIS)	USEPA Health Advisory or SNARL	National Academy of Sciences (NAS) Drinking Water and Health			Non-Cancer Public Health Effects	One-in-a-Million Incremental Cancer Risk Estimate	Taste and Odor or Welfare	Continuous Concentration (4-day Average)	24-hour Average	Maximum Concentration (1-hour Average)
1,4-Dichlorobenzene	70	0.88		(C)		10		400 / 2,600 (31)					
3,3'-Dichlorobenzidine		0.029				0.3			0.04 / 0.077 (29)				
1,1-Dichloroethane						50							
1,2-Dichloroethane		0.5	0.4	0.4 (B2)	0.71	5			0.38 / 99 (29)				
1,1-Dichloroethylene	6.3		0.06	0.06 (C)					0.057 / 3.2 (29)				
cis-1,2-Dichloroethylene	70			(D)									
trans-1,2-Dichloroethylene	140			(D)									
Dichloromethane		2.5	5	5 (B2)		25			4.7 / 1,600 (29)				
2,3-Dichlorophenol										0.04			
2,4-Dichlorophenol	21			(D)				93 / 790 (29)		0.3			
2,5-Dichlorophenol										0.5			
2,6-Dichlorophenol										0.2			
3,4-Dichlorophenol										0.3			
1,2-Dichloropropane		0.56	0.5	0.5 (B2)									
1,3-Dichloropropene		0.19	0.2	0.2 (B2)	0.45			10 / 1,700 (29)					
Dieldrin		0.0022	0.002	0.002 (B2)	0.0019	0.02			0.00014 / 0.00014 (29)			0.0019	
Di(2-ethylhexyl)phthalate		4.2	3	3 (B2)	2.4	40			1.8 / 5.9 (29)		360 (11)		400 (11)
Diethyl phthalate	5,600			(D)				23,000 / 120,000 (29)					
2,4-Dimethylphenol	140									400			
Dimethyl phthalate				(D)				313,000 / 2,900,000(29)					
4,6-Dinitro-o-cresol								13.4 / 765 (29)					
Dinitrophenol								70					
2,4-Dinitrophenol								70 / 14,000 (29)					
2,4-Dinitrotoluene		0.11	50	0.05 (B2)		1			0.11 / 9.1 (29)				
1,2-Diphenylhydrazine						0.4			0.040 / 0.54 (29)				
Endosulfan								0.93 / 2.0 (29)				0.056	
Endosulfan sulfate								0.93 / 2.0 (29)				0.056 (35)	
Endrin	2.1			(D)				0.76 / 0.81 (33,29)				0.0023	
Ethylbenzene	700			(D)				3,100 / 29,000 (29)					
Ethylene dibromide (EDB)		0.0097	0.0004	0.0004 (B2)	0.055	0.1							
Fluoranthene				(D)				300 / 370 (29)					
Fluorene	280			(D)				1,300 / 14,000 (29)					
Glyphosate	700			(D)									
Heptachlor		0.0061 / 0.0078	0.008	0.008 (B2)	0.012	0.1			0.00021 / 0.00021 (29)			0.0038	
Heptachlor epoxide		0.0027 / 0.0038	0.004	0.004 (B2)		0.04			0.00010 / 0.00011 (29)			0.0038	
Hexachlorobenzene		0.019		0.02 (B2)	0.017	0.2			0.00075 / 0.00077 (29)		3.68 (11)		6 (11)
Hexachlorobutadiene	1.4			(C)					0.44 / 50 (29)				
Hexachlorocyclopentadiene	49			(D)				240 / 17,000 (29)		1			
Hexachloroethane				(C)		10			1.9 / 8.9 (29)				
Indeno(1,2,3-c,d)pyrene				(B2)					0.0028 / 0.031 (32,29)				
Isophorone	140			40 (C)					8.4 / 600 (29)				
Methanes, halo-													
Methoxychlor	35			(D)				100					
Molinate	14												
Nitrobenzene								17 / 1,900 (29)		30			
2-Nitrophenol													
Nitrophenol													
4-Nitrophenol				(D)									

Table C-2. WATER QUALITY CRITERIA - ORGANIC CONSTITUENTS

Organic Constituent	USEPA Integrated Risk Information System (IRIS) Reference Dose as a Water Quality Criterion (23)	One-in-a-Million Incremental Cancer Risk Estimates for Drinking Water				California Proposition 65 Regulatory Level as a Water Quality Criterion	Agricultural Water Quality Goals (28)	USEPA National Ambient Water Quality Criteria					
								Health and Welfare Protection			Freshwater Aquatic Life Protection Recommended Criteria		
		Cal/EPA Cancer Potency Factor as a Water Quality Criterion (23)	USEPA Integrated Risk Information System (IRIS)	USEPA Health Advisory or SNARL	National Academy of Sciences (NAS) Drinking Water and Health			Non-Cancer Public Health Effects	One-in-a-Million Incremental Cancer Risk Estimate	Taste and Odor or Welfare	Continuous Concentration (4-day Average)	24-hour Average	Maximum Concentration (1-hour Average)
N-Nitrosodimethylamine		0.0022				0.02			0.00069 / 8.1 (29)				
N-Nitrosodiphenylamine		3.9				40			5.0 / 16 (29)				
trans-Nonachlor													
Oil & grease													
Oxychlordane													
PAHs									0.0028 / 0.31 (29)				
Pentachlorophenol		1.9	0.3	0.3 (B2)		20			0.28 / 8.2 (29)	30	(34)		(36)
Phenanthrene											6.3 (11)		30 (11)
Phenol	4,200			(D)				21,000 / 4,600,000 (29)		300			
Phenols, chlorinated													
Phenols, nitro-													
Phenols, non-chlorinated													
Phthalate esters				see individual chemicals		see individual chemicals		see individual chemicals					
Phenanthrene											6.3 (11)		30 (11)
Phenazopyridine						2							
Phenazopyridine hydrochloride						2.5							
Phenesterin						0.0025							
Phenobarbital						1							
Phenol	4,200			(D)				21,000 / 4,600,000 (29)		300			
Phenols, chlorinated													
Phenols, nitro-													
Phenols, non-chlorinated													
Phenoxybenzamine						0.1							
Phenoxybenzamine hydrochloride						0.15							
Phenyl glycidyl ether						2.5 (11)							
o-Phenylphenate, sodium						100							
Polychlorinated biphenyls		0.0045	0.005	0.005 (B2)	0.16 (37)	0.045			0.000044/0.000045(29)			0.014	
Pyrene	210 (14)			(D)				960 / 11,000 (29)					
Resorcinol													
Simazine	3.5			(C)									
2,3,7,8-TCDD (Dioxin)		0.00000027	0.0000002	0.0000002 (B2)		0.0000025			1.3E−8 / 1.4E−8 (29)				
1,1,2,2-Tetrachloroethane				(C)		1.5			0.17 / 11 (29)				
Tetrachloroethylene (PCE)		0.69	0.7	0.7 (B2)	3.6	7			0.8 / 8.85 (29)				
2,3,4,6-Tetrachlorophenol										1			
2,3,5,6-Tetrachlorophenol													
Thiobencarb													
Toluene	1,400			(D)		3,500 (38)		6,800 / 200,000 (29)					
Toxaphene		0.029	0.03	0.03 (B2)		0.3			0.00073 / 0.00075 (29)		0.0002		0.73
2,4,5-TP (Silvex)	53			(D)				10					
Tributyltin													
1,1,1-Trichloroethane	250			(D)	17 (25)								
1,1,2-Trichloroethane	2.8		0.6	0.6 (C)		5			0.60 / 42 (29)				
Trichloroethylene (TCE)		2.3 (11)	3	3 (B2)	1.5 (25)	25			2.7 / 81 (29)				
Trichlorofluoromethane	2,100			(D)					0.19				
2,4,5-Trichlorophenol								2,600		1	63 (100)		100 (11)
2,4,6-Trichlorophenol		0.5	3	3 (B2,14)		5			2.1 / 6.5 (29)	2			
1,1,2-Trichloro-1,2,2-trifluoroethane													
Trinitrophenol													
Vinyl chloride		0.13	0.015	0.015 (A)	1.1	1.5			2 / 525 (29)				
Xylene(s)	14,000			(D)									

Table C-2. WATER QUALITY CRITERIA - ORGANIC CONSTITUENTS

Organic Constituent	USEPA Ambient Water Quality Criteria (cont.) Freshwater Aquatic Life Protection (cont.) Recommended Criteria (cont.)				California Ocean Plan Numerical Water Quality Objectives						USEPA National Ambient Water Quality Criteria Saltwater Aquatic Life Protection Recommended Criteria						
	Maximum (Instantaneous)	Additional Toxicity Information			Human Health Protection (30-day Average)	Marine Aquatic Life Protection					Continuous Concentration (4-day Average)	24-hour Average	Maximum Concentration (1-hour Average)	Maximum (Instantaneous)	Additional Toxicity Information		
		Acute	Chronic	Other	"‡" = carcinogen	6-month Median	30-day Average	7-day Average	Daily Maximum	Instantaneous Maximum					Acute	Chronic	Other
Acenaphthylene					0.0088 ‡ (2)										300 (32)		
Acenaphthylene		68	21		220										55		
Acrylonitrile		7,550		2,600 (44)	0.10 ‡												
Aldrin	3				0.000022 ‡									1.3			
Anthracene					0.0088 ‡ (2)										300 (32)		
Atrazine	1.0 (30)																
Bentazon																	
Benz(a)anthracene					0.0088 ‡ (2)										300 (32)		
Benzene		5,300			5.9 ‡										5,100		700 (47)
Benzidine		2,500			0.000069 ‡												
Benzo(b)fluoranthene					0.0088 ‡ (2)										300 (32)		
Benzo(k)fluoranthene					0.0088 ‡ (2)										300 (32)		
Benzo(g,h,i)perylene					0.0088 ‡ (2)										300 (32)		
Benzo(a)pyrene					0.0088 ‡ (2)										300 (32)		
alpha-BHC						0.004 (3)			0.008 (3)	0.012 (3)							
beta-BHC						0.004 (3)			0.008 (3)	0.012 (3)							
Gamma-BHC (Lindane)	2.0					0.004 (3)			0.008 (3)	0.012 (3)				0.16			
delta-BHC						0.004 (3)			0.008 (3)	0.012 (3)							
technical-BHC		100				0.004 (3)			0.008 (3)	0.012 (3)					0.34		
Bis(2-chloroethoxy) methane					4.4												
Bis(2-chloroethyl) ether		238,000 (39)	122 (43)		0.045 ‡												
Bis(2-chloroisopropyl) ether		238,000 (39)	122 (43)		1200												
Bromodichloromethane		11,000 (40)			130 ‡ (4)										12,000 (40)	6,400 (40)	11,500 (40,48)
Bromoform		11,000 (40)			130 ‡ (4)										12,000 (40)	6,400 (40)	11,500 (40,48)
Bromomethane		11,000 (40)			130 ‡ (4)										12,000 (40)	6,400 (40)	11,500 (40,48)
Carbofuran																	
Carbon tetrachloride		35,200			0.90 ‡										50,000	6,400 (40)	11,500 (40,48)
Catechol						30 (5)			120 (5)	300 (5)							
Chlordane	2.4				0.000023 ‡ (6)							0.004		0.09			
Chlorobenzene		250 (41)		50 (41,45)	570										160 (41)	129 (41)	
4-Chloro-m-cresol		30				1 (7)			4 (7)	10 (7)							
4-Chloro-o-cresol						1 (7)			4 (7)	10 (7)							
6-Chloro-m-cresol						1 (7)			4 (7)	10 (7)							
Chloroform		28,900	1,240		130 ‡										12,000 (40)	6,400 (40)	11,500 (40,48)
Chloromethane		11,000 (40)			130 ‡ (4)										12,000 (40)	6,400 (40)	11,500 (40,48)
2-Chlorophenol		4,380		2,000 (46)		1 (7)			4 (7)	10 (7)							
3-Chlorophenol						1 (7)			4 (7)	10 (7)							
4-Chlorophenol						1 (7)			4 (7)	10 (7)					29,700		
Chrysene					0.0088 ‡ (2)										300 (32)		
2,4-D																	
DBCP																	
DDD		0.6			0.00017 ‡ (8)										3.6		
DDE		1,050			0.00017 ‡ (8)										14		
DDT	1.1				0.00017 ‡ (8)							0.001		0.13			
Dibenz(a,h)anthracene					0.0088 ‡ (2)										300 (32)		
Dibromochloromethane		11,000 (40)			130 ‡ (4)										12,000 (40)	6,400 (40)	11,500 (40,48)
Dibutyl phthalate		940 (42)	3 (42)		3,500										2,944 (42)		3.4 (49,42)
1,2-Dichlorobenzene		1,120 (31)	763 (31)		5,100 (9)										1,970 (31)	129 (41)	
1,3-Dichlorobenzene		1,120 (31)	763 (31)		5,100 (9)										1,970 (31)	129 (41)	

Table C-2. WATER QUALITY CRITERIA - ORGANIC CONSTITUENTS

Organic Constituent	USEPA Ambient Water Quality Criteria (cont.) Freshwater Aquatic Life Protection (cont.) Recommended Criteria (cont.)				California Ocean Plan Numerical Water Quality Objectives						USEPA National Ambient Water Quality Criteria Saltwater Aquatic Life Protection Recommended Criteria						
	Maximum (Instantaneous)	Additional Toxicity Information			Human Health Protection (30-day Average)	Marine Aquatic Life Protection					Continuous Concentration (4-day Average)	24-hour Average	Maximum Concentration (1-hour Average)	Maximum (Instantaneous)	Additional Toxicity Information		
		Acute	Chronic	Other	"‡" = carcinogen	6-month Median	30-day Average	7-day Average	Daily Maximum	Instantaneous Maximum					Acute	Chronic	Other
1,4-Dichlorobenzene		1,120 (31)	763 (31)		18 ‡										1,970 (31)	129 (41)	
3,3'-Dichlorobenzidine					0.0081 ‡												
1,1-Dichloroethane																	
1,2-Dichloroethane		118,000	20,000		130 ‡										113,000		
1,1-Dichloroethylene		11,600 (50)			7100										224,000 (50)		
cis-1,2-Dichloroethylene		11,600 (50)													224,000 (50)		
trans-1,2-Dichloroethylene		11,600 (50)													224,000 (50)		
Dichloromethane		11,600 (50)			450 ‡										12,000 (40)	6,400 (40)	11,500 (40,48)
2,3-Dichlorophenol						1 (7)			4 (7)	10 (7)							
2,4-Dichlorophenol		2,020	365	70 (56)		1 (7)			4 (7)	10 (7)							
2,5-Dichlorophenol						1 (7)			4 (7)	10 (7)							
2,6-Dichlorophenol						1 (7)			4 (7)	10 (7)							
3,4-Dichlorophenol						1 (7)			4 (7)	10 (7)							
1,2-Dichloropropane		23,000 (51)	5,700 (51)												10,300 (51)	3,040 (51)	
1,3-Dichloropropene		6,060 (52)	244 (52)		8.9 ‡										790 (52)		
Dieldrin	2.5				0.000040 ‡							0.0019		0.71			
Di(2-ethylhexyl)phthalate		940 (42)	3 (42)		3.5 ‡						360 (11)		400 (11)		2,944 (42)		3.4 (49,42)
Diethyl phthalate		940 (42)	3 (42)		33,000										2,944 (42)		3.4 (49,42)
2,4-Dimethylphenol		2120				30 (5)			120 (5)	300 (5)							
Dimethyl phthalate		940 (42)	3 (42)		820,000										2,944 (42)		3.4 (49,42)
4,6-Dinitro-o-cresol		230 (53)		150 (49,53)	220	30 (5)			120 (5)	300 (5)					4,850 (53)		
Dinitrophenol		230 (53)		150 (49,53)		30 (5)			120 (5)	300 (5)					4,850 (53)		
2,4-Dinitrophenol		230 (53)		150 (49,53)	4	30 (5)			120 (5)	300 (5)					4,850 (53)		
2,4-Dinitrotoluene		330 (54)	230 (54)		2.6 ‡										590 (54)		370 (54,48)
1,2-Diphenylhydrazine		270 (9)			0.16 ‡												
Endosulfan	0.22					9 (16)			18 (16)	27 (16)		0.0087		0.034			
Endosulfan sulfate						9 (16)			18 (16)	27 (16)		0.0087 (35)					
Endrin	0.18					0.002			0.004	0.006		0.0023		0.037			
Ethylbenzene		32,000			4100										430		
Ethylene dibromide (EDB)																	
Fluoranthene		3,980			15										40	16	
Fluorene					0.0088 ‡ (2)										300 (32)		
Glyphosate																	
Heptachlor	0.52				0.00072 ‡ (17)							0.0036		0.053			
Heptachlor epoxide	0.52				0.00072 ‡ (17)							0.0036		0.053			
Hexachlorobenzene		250 (41)		50 (41,45)	0.00021 ‡										160 (41)	129 (41)	
Hexachlorobutadiene		90	9.3		14 ‡										32		
Hexachlorocyclopentadiene		7.0	5.2		58										7		
Hexachloroethane		980	540		2.5 ‡										940		
Indeno(1,2,3-c,d)pyrene					0.0088 ‡ (2)										300 (32)		
Isophorone		117,000			150,000										12,900		
Methanes, halo-		11,000			130 ‡ (4)										12,000	6,400	11,500 (48)
Methoxychlor	0.03													0.03			
Molinate																	
Nitrobenzene		27,000			4.9										6,680		
2-Nitrophenol		230 (53)		150 (49,53)		30 (5)			120 (5)	300 (5)					4,850 (53)		
Nitrophenol		230 (53)		150 (49,53)		30 (5)			120 (5)	300 (5)					4,850 (53)		
4-Nitrophenol		230 (53)		150 (49,53)		30 (5)			120 (5)	300 (5)					4,850 (53)		

Table C-2. WATER QUALITY CRITERIA - ORGANIC CONSTITUENTS

Organic Constituent	USEPA Ambient Water Quality Criteria (cont.) Freshwater Aquatic Life Protection (cont.) Recommended Criteria (cont.)				California Ocean Plan Numerical Water Quality Objectives						USEPA National Ambient Water Quality Criteria Saltwater Aquatic Life Protection Recommended Criteria						
	Maximum (Instantaneous)	Additional Toxicity Information			Human Health Protection (30-day Average)	Marine Aquatic Life Protection					Continuous Concentration (4-day Average)	24-hour Average	Maximum Concentration (1-hour Average)	Maximum (Instantaneous)	Additional Toxicity Information		
		Acute	Chronic	Other	"‡" = carcinogen	6-month Median	30-day Average	7-day Average	Daily Maximum	Instantaneous Maximum					Acute	Chronic	Other
N-Nitrosodimethylamine		5,850 (55)			7.3 ‡										3,300,000 (55)		
N-Nitrosodiphenylamine		5,850 (55)			2.5 ‡										3,300,000 (55)		
trans-Nonachlor					0.000023 ‡ (6)												
Oil & grease							25,000	40,000		75,000							
Oxychlordane					0.000023 ‡ (6)												
PAHs					0.0088 ‡ (2)										300		
Pentachlorophenol				1.74 (57)		1 (7)			4 (7)	10 (7)	7.9		13				
Phenanthrene					0.0088 ‡ (2)						4.6 (11)		7.7 (11)		300 (32)		
Phenol		10,200	2,560			30 (5)			120 (5)	300 (5)					5,800		
Phenols, chlorinated						1			4	10							
Phenols, nitro-		230		150 (49)		30 (5)			120 (5)	300 (5)					4,850		
Phenols, non-chlorinated						30			120	300							
Phthalate esters		940	3												2,944		3.4 (49,42)
Phenanthrene					0.0088 ‡ (2)						4.6 (11)		7.7 (11)		300 (32)		
Phenazopyridine																	
Phenazopyridine hydrochloride																	
Phenesterin																	
Phenobarbital																	
Phenol		10,200	2,560			30 (5)			120 (5)	300 (5)					5,800		
Phenols, chlorinated						1			4	10							
Phenols, nitro-		230		150 (49)		30 (5)			120 (5)	300 (5)					4,850		
Phenols, non-chlorinated						30			120	300							
Phenoxybenzamine																	
Phenoxybenzamine hydrochloride																	
Phenyl glycidyl ether																	
o-Phenylphenate, sodium																	
Polychlorinated biphenyls		> 2			0.000019 ‡							0.03			>10		
Pyrene					0.0088 ‡ (2)										300 (32)		
Resorcinol						30 (5)			120 (5)	300 (5)							
Simazine	10 (58)																
2,3,7,8-TCDD (Dioxin)					0.0000000039 ‡ (20)												
1,1,2,2-Tetrachloroethane		9,320 (59)	2,400		1,200										9,020		
Tetrachloroethylene (PCE)		5,280	840		99 ‡										10,200	450	
2,3,4,6-Tetrachlorophenol						1 (7)			4 (7)	10 (7)							
2,3,5,6-Tetrachlorophenol						1 (7)			4 (7)	10 (7)					440		
Thiobencarb																	
Toluene		17,000			85,000										6,300	5,000	
Toxaphene					0.00021 ‡						0.0002		0.21				
2,4,5-TP (Silvex)																	
Tributyltin	0.026 (30)				0.0014									0.010 (30)			
1,1,1-Trichloroethane		18,000		200 (60)	540,000										31,200		
1,1,2-Trichloroethane		18,000	9,400		43,000												
Trichloroethylene (TCE)		45,000		21,900 (61)	27 ‡										2,000		
Trichlorofluoromethane		11,000 (40)													12,000 (40)	6,400 (40)	11,500 (40,48)
2,4,5-Trichlorophenol						1 (7)			4 (7)	10 (7)	11 (11)		240 (11)				
2,4,6-Trichlorophenol			970		0.29 ‡	1 (7)			4 (7)	10 (7)							
1,1,2-Trichloro-1,2,2-trifluoroethane																	
Trinitrophenol		230 (53)		150 (49,53)		30 (5)			120 (5)	300 (5)					4,850 (53)		
Vinyl chloride					36 ‡												
Xylene(s)																	

ENDNOTES FOR TABLE C-2 – ORGANICS

(7-day) For exposure of 7 days or less.
(10-day) For exposure of 10 days or less.
(24-hr) For exposure of 24 hours or less.
(7-yr) For "longer-term" exposure (7 years or less, EPA).
(A) Known human carcinogen; sufficient epidemiologic evidence in humans.
(B) Probable human carcinogen; sufficient evidence from animal studies; no or inadequate human data.
(C) Possible human carcinogen; limited evidence from animal studies; no human data.
(D) Not classified as to human carcinogenicity; no data or inadequate evidence.
(E) Evidence of non-carcinogenicity for humans.
(1) For hardness in mg/l as $CaCO_3$, criterion = e(0.8473[ln(hardness)] + 0.8604) µg/l.
(2) For sum of acenaphthylene, anthrancene, benz(a)anthrancene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(g,h,i)perylene, benzo(a)pyrene, chrysene, dibenz(a,h)anthracene, fluorene, indeno(1,2,3-c,d)pyrene, phenanthrene, and pyrene.
(3) For hardness in mg/l as $CaCO_3$, criterion = e(1.273[ln(hardness)] – 1.460) µg/l.
(4) For sum of bromoform, bromomethane, chloromethane, dibromochloromethane, and bromodichloromethane.
(5) For sum of nonchlorinated phenolic compounds.
(6) For the sum of oxychlordane and alpha and gamma isomers of chlordane, chlordene and nonachlor.
(7) For sum of chlorinated phenolic compounds.
(8) Instantaneous maximum.
(9) For sum of 1,2- and 1-3-dichlorobenzenes.
(10) From Reference 30.
(11) Proposed.
(12) Effective 17 January 1994.
(13) For hardness in mg/l as $CaCO_3$, criterion = e(0.8473[ln(hardness)] + 0.7614) µg/l.
(14) MCL varies with air temperature; 2.4 mg/l (Š 53.7°F); 2.2 mg/l (53.8 – 58.3 °F); 2.0 mg/l (58.4 – 63.8°F); 1.8 mg/l (63.9 – 70.6 °F); 1.6 mg/l (70.0 – 79.2°F); 1.4 mg/l (79.3 – 90.5 °F).
(15) Based on organoleptic considerations (taste, odor, color, laundry staining, etc.)
(16) For hardness in mg/l as CaCO3, criterion = e(1.273[ln(hardness)] – 4.705) µg/l.
(17) As $CaCO_3$; minimum concentration except where natural concentrations are less.
(18) Toxicity to algae occurs.
(19) For hardness in mg/l as $CaCO_3$, criterion = e(0.8190[ln(hardness)] + 1.561) µg/l.
(20) For "TCDD equivalents" calculated as the sum of 2,3,7,8-chlorinated dibenzodioxin and dibenzofuran concentrations multiplied by their respective USEPA Toxicity Equivalency Factors.
(21) Expressed as decachlorobiphenyl.
(22) For hardness in mg/l as $CaCO_3$, criterion = e(0.8190 [ln(hardness)] + 3.688) µg/l.
(23) Assumes 70 kg body weight, 2 liters/day water consumption, and 20% relative source contribution. An additional uncertainty factor of 10 is used for Class C carcinogens.
(24) Assumes 70 kg body weight and 2 liters/day water consumption.
(25) For sum of dichloropropanes.
(26) Draft / tentative / provisional.
(27) For sum of halomethanes.
(28) Reference 19 unless noted otherwise.
(29) For the sum of oxychlordane and alpha and gamma isomers of chlordane, chlordene and nonachlor.
(30) For hardness in mg/l as $CaCO_3$, criterion = e(0.7852[ln(hardness)] – 3.490) µg/l.
(31) For hardness in mg/l as $CaCO_3$, criterion = e(1.128[ln(hardness)] – 3.828) µg/l.
(32) For hardness in mg/l as $CaCO_3$, criterion = e(0.9422[ln(hardness)] – 1.464) µg/l.
(33) For sum of dichlorobenzenes.
(34) For total trihalomethanes (sum of bromoform, bromodichloromethane, chloroform and dibromochloromethane); based largely on technology and economics.
(35) Based on endosulfan; USEPA Water Quality Advisory (Reference 13).
(36) Determined not to pose a risk of cancer through ingestion (Title 22, CCR, Division 2).
(37) Includes Radium 226 but excludes Radon and Uranium.
(38) Pentavalent arsenic [As(V)] effects on plants.
(39) Recommended level; Upper level = 500 mg/l; Short-term level = 600 mg/l.
(40) For sum of dichloroethylenes.
(41) For sum of dichloropropenes.
(42) As NO_3.
(43) Effective 17 January 1994.
(44) Toxicity to a fish species exposed for 7.5 days.
(45) Adverse behavioral effects occur to one species.
(46) For hardness in mg/l as $CaCO_3$, criterion = e(1.72 [ln(hardness)] – 6.52) µg/l.
(47) Adverse effects on a fish species exposed for 168 days.
(48) A decrease in the number of algal cells occurs.
(49) Guidance level (Reference 3) assumes reletive source contribution of 10% from drinking water.
(50) For chlorinated systems.
(51) For white phosphorus.
(52) For sum of carcinogenic polynuclear aromatic hydrocarbons.
(53) For sum of nitrophenols.
(54) For hardness in mg/l as $CaCO_3$, criterion = e(0.8460[ln(hardness)] + 3.3612) µg/l.
(55) For total chlorine residual; for intermittent chlorine sources see Reference 26, Chapter IV, Table B.
(56) For consumption of water and aquatic organisms / for consumption of aquatic organisms only.
(57) MCL includes this "Action level," to be exceeded in no more than 10 percent of samples.
(58) For sum of nonchlorinated phenolic compounds.
(59) Recommended level; Upper level = 1,000; Short-term level = 1,500 mg/l.
(60) For sum of tetrachloroethanes.
(61) Calculated from corn oil gavage animal study / from drinking water animal study.

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022101

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11.85	Hipass HSA

NOTE:

1. *The names and areas shown on this map are the same as used by the Department of Water Resources (DWR) in their Bulletin 130 Series.*
2. *The numbering system used on this map is an adaption of the numbering system used in the 130 Series.*
3. *The 1986 updated names and boundaries shown on the map are in accordance with an agreement with DWR and US Geological Survey.*
4. *The 1995 revision of this map includes newly recognized hydrologic subareas within the Mission Viejo HA (901.20). Notes 1 & 3 do not apply to these subareas.*

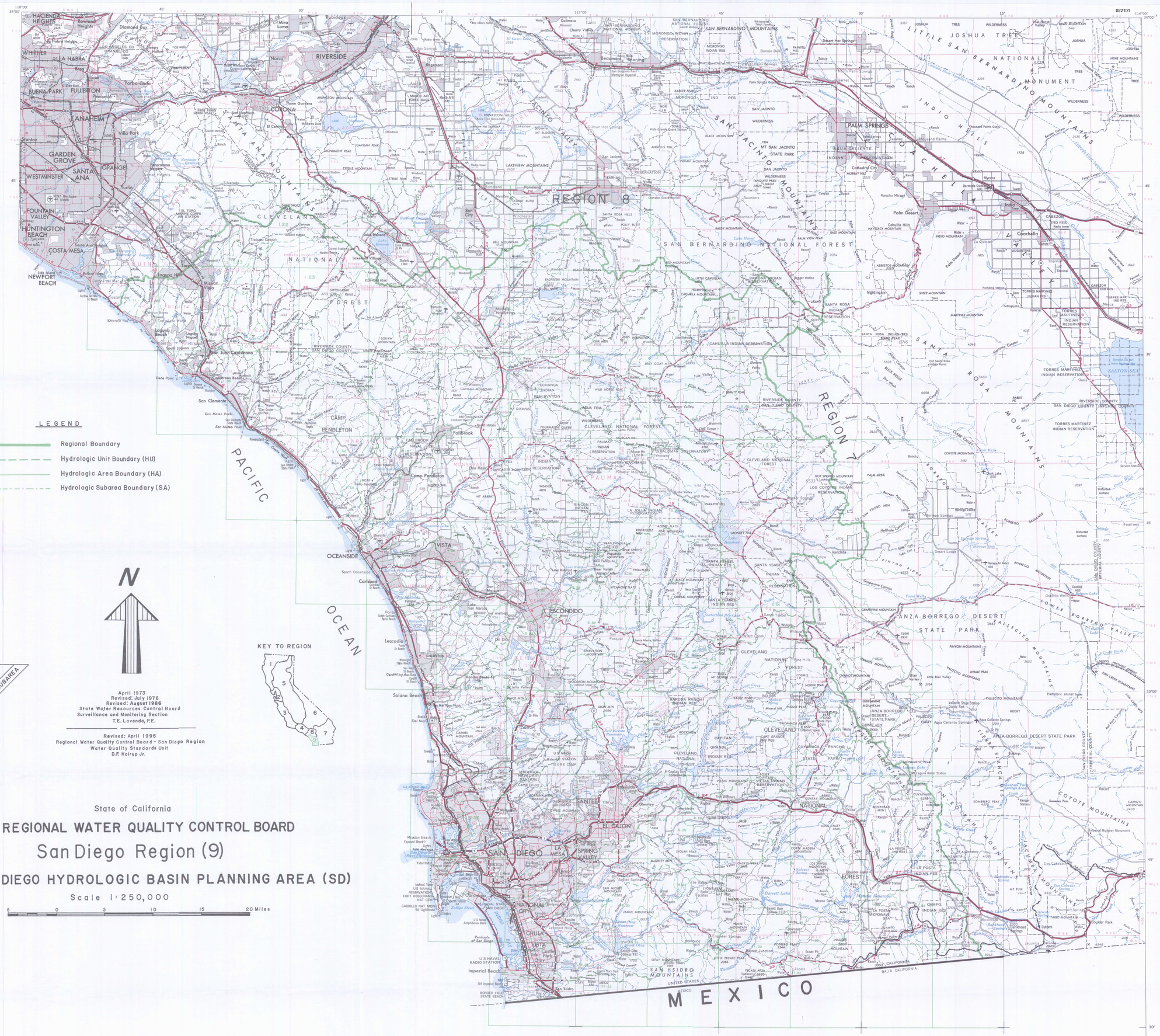

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Regional Water Quality Control Board - San Diego Region
Water Quality Standards Unit
D.F. Hoirup Jr.

State of California

REGIONAL WATER QUALITY CONTROL BOARD

San Diego Region (9)

SAN DIEGO HYDROLOGIC BASIN PLANNING AREA (SD)

Scale 1:250,000

5 0 5 10 15 20 Miles

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San Diego Region - Basin Plan Amendments

Introduction

HOT ITEM: Public - Hearing for Proposed Basin Plan Amendment

Basin Plan amendments generally are developed to address issues identified during the Basin Plan Review or to incorporate Total Maximum Daily Loads (TMDLs), which address impaired waters on the Clean Water Act, Section 303(d) List of Water Quality Limited Segments.

Current Projects

- Tentative Basin Plan Amendments
  - Site-Specific Water Effect Ratios for Chollas Creek Copper and Zinc Total Maximum Daily Loads

Approved Amendments (ADDED TO THE BASIN PLAN DOCUMENT SINCE THE 1994 UPDATE)

- **Basin Plan Review Issues**
  - Implementation Provisions for Indicator Bacteria Water Quality Objectives to Account for Loading from Natural Uncontrollable Sources within the Context of a Total Maximum Daily Load (also known as the Reference System and Antidegradation Approach / Natural Sources Exclusion Approach Basin Plan Amendment) (Resolution No. R9-2008-0028) (2004 Review Issue No. 7)
  - Update of Basin Plan (2004 Review Issue No. 1) (Resolution No. R9-2006-0029)
  - Unnamed waterbodies and other corrections (2004 Review Issue No. 3) (Resolution R9-2005-0239)
  - Compliance time schedule authorization (2004 Review Issue No. 6) (Resolution R9-2005-0238)
- **TMDLs**
  - Los Penasquitos Lagoon Sediment TMDL (Resolution No. R9-2012-0033)
  - Revised Project I - Twenty Beaches and Creeks in the San Diego Region (including Tecolote Creek) Indicator Bacteria TMDLs (Resolution No. R9-2010-0001)
  - Baby Beach in Dana Point Harbor and Shelter Island Shoreline Park in San Diego Bay Indicator Bacteria TMDLs (Resolution No. R9-2008-0027)
  - Chollas Creek Copper, Lead, and Zinc TMDLs (Resolution No. R9-2007-0043)
  - Rainbow Creek Nitrogen and Phosphorus TMDLs (Resolution No. R9-2005-0036)
  - Shelter Island Yacht Basin Dissolved Copper TMDL (Resolution No. R9-2005-0019)
  - Chollas Creek Diazinon TMDL (Resolution No. R9-2002-0123)
- **Others**
  - Water Quality Objective in Groundwater for Nitrate and Incorporation of State Board's Onsite Wastewater Treatment Systems Policy (Resolution No. R9-2015-0008)

Water Boards

- Designation of COLD and SPWN Beneficial Uses (Resolution No. 97-04) 022103
- Conditional Waiver of Waste Discharge Requirements for Composting and Processing, Mulching, or Grinding Waste Management Units (Resolution No. 96-34) (superseded by Resolution No. R9-2002-0186)
- An Exception to the Prohibition of Discharges of Recycled Wastewater to Surface Water Bodies Used for Municipal Water Supply (Resolution No. 96-30)
- Conditional Waiver of Waste Discharge Requirements for Short-term and Permanent Reclaimed Water Projects (Resolution No. 95-95) (superseded by Resolution No. R9-2002-0186)
- Ground Water Quality Objectives for the Alluvial Aquifer in the Moosa (903.13) and Valley Center (903.14) Hydrologic Subareas (Resolution No. No. 95-48)
- Update of Basin Plan (Resolution No. 94-10)

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The California Water Boards include the State Water Resources Control Board and nine Regional Boards
The State Water Board is one of five environmental entities operating under
the authority of the California Environmental Protection Agency
Cal/EPA | ARB | CalRecycle | DPR | DTSC | OEHHA | **SWRCB**

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§ 124.55 Effect of State certification.

(a) When certification is required under CWA section 401(a)(1) no final permit shall be issued:

(1) If certification is denied, or

(2) Unless the final permit incorporates the requirements specified in the certification under § 124.53(e).

(b) If there is a change in the State law or regulation upon which a certification is based, or if a court of competent jurisdiction or appropriate State board or agency stays, vacates, or remands a certification, a State which has issued a certification under § 124.53 may issue a modified certification or notice of waiver and forward it to EPA. If the modified certification is received before final agency action on the permit, the permit shall be consistent with the more stringent conditions which are based upon State law identified in such certification. If the certification or notice of waiver is received after final agency action on the permit, the Regional Administrator may modify the permit on request of the permittee only to the extent necessary to delete any conditions based on a condition in a certification invalidated by a court of competent jurisdiction or by an appropriate State board or agency.

(c) A State may not condition or deny a certification on the grounds that State law allows a less stringent permit condition. The Regional Administrator shall disregard any such certification conditions, and shall consider those conditions or denials as waivers of certification.

(d) A condition in a draft permit may be changed during agency review in any manner consistent with a certification meeting the requirements of § 124.53(e). No such changes shall require EPA to submit the permit to the State for recertification.

(e) Review and appeals of limitations and conditions attributable to State certification shall be made through the applicable procedures of the State and may not be made through the procedures in this part.

(f) Nothing in this section shall affect EPA's obligation to comply with § 122.47. See CWA section 301(b)(1)(C).

[48 FR 14264, Apr. 1, 1983, as amended at 65 FR 30912, May 15, 2000]

§ 124.56 Fact sheets.

(*Applicable to State programs, see § 123.25 (NPDES).*) In addition to meeting the requirements of § 124.8, NPDES fact sheets shall contain the following:

(a) Any calculations or other necessary explanation of the derivation of specific effluent limitations and conditions or standards for sewage sludge use or disposal, including a citation to the applicable effluent limitation guideline, performance standard, or standard for sewage sludge use or disposal as required by § 122.44 and reasons why they are applicable or an explanation of how the alternate effluent limitations were developed.

(b)(1) When the draft permit contains any of the following conditions, an explanation of the reasons that such conditions are applicable:

(i) Limitations to control toxic pollutants under § 122.44(e) of this chapter;

(ii) Limitations on internal waste streams under § 122.45(i) of this chapter;

(iii) Limitations on indicator pollutants under § 125.3(g) of this chapter;

(iv) Limitations set on a case-by-case basis under § 125.3 (c)(2) or (c)(3) of this chapter, or pursuant to Section 405(d)(4) of the CWA;

(v) Limitations to meet the criteria for permit issuance under § 122.4(i) of this chapter, or

(vi) Waivers from monitoring requirements granted under § 122.44(a) of this chapter.

(2) For every permit to be issued to a treatment works owned by a person other than a State or municipality, an explanation of the Director's decision on regulation of users under § 122.44(m).

(c) When appropriate, a sketch or detailed description of the location of the discharge or regulated activity described in the application; and

(d) For EPA-issued NPDES permits, the requirements of any State certification under § 124.53.

(e) For permits that include a sewage sludge land application plan under 40 CFR 501.15(a)(2)(ix), a brief description of how each of the required elements of

the land application plan are addressed in the permit.

[48 FR 14264, Apr. 1, 1983, as amended at 49 FR 38051, Sept. 26, 1984; 54 FR 18786, May 2, 1989; 65 FR 30912, May 15, 2000]

§ 124.57 Public notice.

(a) *Section 316(a) requests (applicable to State programs, see § 123.25).* In addition to the information required under § 124.10(d)(1), public notice of an NPDES draft permit for a discharge where a CWA section 316(a) request has been filed under § 122.21(l) shall include:

(1) A statement that the thermal component of the discharge is subject to effluent limitations under CWA section 301 or 306 and a brief description, including a quantitative statement, of the thermal effluent limitations proposed under section 301 or 306;

(2) A statement that a section 316(a) request has been filed and that alternative less stringent effluent limitations may be imposed on the thermal component of the discharge under section 316(a) and a brief description, including a quantitative statement, of the alternative effluent limitations, if any, included in the request; and

(3) If the applicant has filed an early screening request under § 125.72 for a section 316(a) variance, a statement that the applicant has submitted such a plan.

(b) [Reserved]

[48 FR 14264, Apr. 1, 1983; 50 FR 6941, Feb. 19, 1985, as amended at 65 FR 30912, May 15, 2000]

§ 124.58 [Reserved]

§ 124.59 Conditions requested by the Corps of Engineers and other government agencies.

(*Applicable to State programs, see § 123.25* (*NPDES*).)

(a) If during the comment period for an NPDES draft permit, the District Engineer advises the Director in writing that anchorage and navigation of any of the waters of the United States would be substantially impaired by the granting of a permit, the permit shall be denied and the applicant so notified. If the District Engineer advised the Director that imposing specified conditions upon the permit is necessary to avoid any substantial impairment of anchorage or navigation, then the Director shall include the specified conditions in the permit. Review or appeal of denial of a permit or of conditions specified by the District Engineer shall be made through the applicable procedures of the Corps of Engineers, and may not be made through the procedures provided in this part. If the conditions are stayed by a court of competent jurisdiction or by applicable procedures of the Corps of Engineers, those conditions shall be considered stayed in the NPDES permit for the duration of that stay.

(b) If during the comment period the U.S. Fish and Wildlife Service, the National Marine Fisheries Service, or any other State or Federal agency with jurisdiction over fish, wildlife, or public health advises the Director in writing that the imposition of specified conditions upon the permit is necessary to avoid substantial impairment of fish, shellfish, or wildlife resources, the Director may include the specified conditions in the permit to the extent they are determined necessary to carry out the provisions of § 122.49 and of the CWA.

(c) In appropriate cases the Director may consult with one or more of the agencies referred to in this section before issuing a draft permit and may reflect their views in the statement of basis, the fact sheet, or the draft permit.

[48 FR 14264, Apr. 1, 1983, as amended at 54 FR 258, Jan. 4, 1989]

§ 124.60 Issuance and effective date and stays of NPDES permits.

In addition to the requirements of §§ 124.15, 124.16, and 124.19, the following provisions apply to NPDES permits:

(a) Notwithstanding the provisions of § 124.16(a)(1), if, for any offshore or coastal mobile exploratory drilling rig or coastal mobile developmental drilling rig which has never received a final effective permit to discharge at a ''site,'' but which is not a ''new discharger'' or a ''new source,'' the Regional Administrator finds that compliance with certain permit conditions may be necessary to avoid irreparable environmental harm during the administrative review, he or she may specify in the statement of basis or fact sheet

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and 122.44, including when applicable any conditions certified by a State agency under § 124.55, and all variances that are to be included under § 124.63.

(e) (*Applicable to State programs, see §§ 123.25 (NPDES), 145.11 (UIC), 233.26 (404), and 271.14 (RCRA).*) All draft permits prepared by EPA under this section shall be accompanied by a statement of basis (§ 124.7) or fact sheet (§ 124.8), and shall be based on the administrative record (§ 124.9), publicly noticed (§ 124.10) and made available for public comment (§ 124.11). The Regional Administrator shall give notice of opportunity for a public hearing (§ 124.12), issue a final decision (§ 124.15) and respond to comments (§ 124.17). For RCRA, UIC or PSD permits, an appeal may be taken under § 124.19 and, for NPDES permits, an appeal may be taken under § 124.74. Draft permits prepared by a State shall be accompanied by a fact sheet if required under § 124.8.

[48 FR 14264, Apr. 1, 1983, as amended at 54 FR 18785, May 2, 1989; 65 FR 30910, May 15, 2000]

§ 124.7 Statement of basis.

EPA shall prepare a statement of basis for every draft permit for which a fact sheet under § 124.8 is not prepared. The statement of basis shall briefly describe the derivation of the conditions of the draft permit and the reasons for them or, in the case of notices of intent to deny or terminate, reasons supporting the tentative decision. The statement of basis shall be sent to the applicant and, on request, to any other person.

§ 124.8 Fact sheet.

(*Applicable to State programs, see §§ 123.25 (NPDES), 145.11 (UIC), 233.26 (404), and 271.14 (RCRA).*)

(a) A fact sheet shall be prepared for every draft permit for a major HWM, UIC, 404, or NPDES facility or activity, for every Class I sludge management facility, for every 404 and NPDES general permit (§§ 237.37 and 122.28), for every NPDES draft permit that incorporates a variance or requires an explanation under § 124.56(b), for every draft permit that includes a sewage sludge land application plan under 40 CFR 501.15(a)(2)(ix), and for every draft permit which the Director finds is the subject of wide-spread public interest or raises major issues. The fact sheet shall briefly set forth the principal facts and the significant factual, legal, methodological and policy questions considered in preparing the draft permit. The Director shall send this fact sheet to the applicant and, on request, to any other person.

(b) The fact sheet shall include, when applicable:

(1) A brief description of the type of facility or activity which is the subject of the draft permit;

(2) The type and quantity of wastes, fluids, or pollutants which are proposed to be or are being treated, stored, disposed of, injected, emitted, or discharged.

(3) For a PSD permit, the degree of increment consumption expected to result from operation of the facility or activity.

(4) A brief summary of the basis for the draft permit conditions including references to applicable statutory or regulatory provisions and appropriate supporting references to the administrative record required by § 124.9 (for EPA-issued permits);

(5) Reasons why any requested variances or alternatives to required standards do or do not appear justified;

(6) A description of the procedures for reaching a final decision on the draft permit including:

(i) The beginning and ending dates of the comment period under § 124.10 and the address where comments will be received;

(ii) Procedures for requesting a hearing and the nature of that hearing; and

(iii) Any other procedures by which the public may participate in the final decision.

(7) Name and telephone number of a person to contact for additional information.

(8) For NPDES permits, provisions satisfying the requirements of § 124.56.

(9) Justification for waiver of any application requirements under § 122.21(j) or (q) of this chapter.

[48 FR 14264, Apr. 1, 1983, as amended at 54 FR 18786, May 2, 1989; 64 FR 42470, Aug. 4, 1999]

STATE OF CALIFORNIA
CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SANTA ANA REGION

ORDER NO. R8-2010-0033
NPDES NO. CAS 618033

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) PERMIT AND WASTE DISCHARGE REQUIREMENTS FOR THE RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT, THE COUNTY OF RIVERSIDE, AND THE INCORPORATED CITIES OF RIVERSIDE COUNTY WITHIN THE SANTA ANA REGION

AREA-WIDE URBAN RUNOFF MANAGEMENT PROGRAM

The following Discharger(s) are subject to waste discharge requirements as set forth in this Order:

Table 1. Municipal Permittees (Dischargers)

Principal Permittee	Riverside County Flood Control and Water Conservation District (RCFC&WCD)*	
Co–Permittees	1. Beaumont	9. Moreno Valley
	2. Calimesa	10. Murrieta
	3. Canyon Lake	11. Norco
	4. Corona	12. Perris
	5. County of Riverside (County)	13. Riverside
	6. Hemet	14. San Jacinto
	7. Lake Elsinore	15. Wildomar
	8. Menifee	

The Principal Permittee and the Co-Permittees are collectively referred to as the Permittees or the Dischargers.

Table 2. - Administrative Information

This Order was adopted by the Regional Water Board on:	**January 29, 2010**
This Order will become effective on:	**January 29, 2010**
This Order will expire on:	**January 29, 2015**
The U.S. Environmental Protection Agency (USEPA) and the California Regional Water Quality Control Board have classified this discharge as a major discharge.	
The Discharger must file a Report of Waste Discharge in accordance with Title 23, California Code of Regulations, as application for issuance of new waste discharge requirements no later than 180 days in advance of the Order expiration date.	

IT IS HEREBY ORDERED, that this Order supersedes Order No. R8-2002-0011 except for enforcement purposes, and, in order to meet the provisions contained in Division 7 of the California Water Code (CWC) and regulations adopted there under, and the provisions of the federal Clean Water Act (CWA), and regulations and guidelines adopted there under, the Permittees must comply with the requirements in this Order.

I, Gerard J. Thibeault, Executive Officer, do hereby certify that this Order No. R8-2010-0033 with all attachments is a full, true, and correct copy of an Order adopted by the California Regional Water Quality Control Board, Santa Ana Region, on January 29, 2010.

Gerard J. Thibeault, Executive Officer

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I. FACILITY INFORMATION

A. Each of the municipalities listed in Table 1, above, hereinafter called Permittees, owns and/or operates portions of the municipal separate storm sewer system (MS4[1]), through which Urban Runoff is discharged into Waters of the United States (Waters of the US) that are located within the jurisdiction of the Santa Ana Regional Water Quality Control Board (Santa Ana Region). The MS4 falls into one or more of the following categories: (1) a medium or large MS4 that services a population of greater than 100,000 or 250,000 respectively; or (2) an MS4 which contributes to a violation of a Water Quality Standard; or (3) an MS4 which is a significant contributor of Pollutants to Waters of the US; or (4) an MS4 owned and/or operated by a small municipality that is interrelated to a medium or large municipality. Section 402(p) of the CWA requires that discharges of Urban Runoff from MS4 be regulated under a National Pollutant Discharge Elimination System (NPDES) permit.

B. This Order regulates the discharge of Pollutants in Urban Runoff from non-agricultural Anthropogenic sources from the MS4 that is owned and/or operated by the Permittees. The Permittees lack legal jurisdiction over discharges into their MS4 facilities from agricultural activities, State and federal facilities, public schools and hospitals, utilities, railroads, and special districts, Native American tribal lands, wastewater management agencies and other point and non-point source discharges otherwise permitted by the Regional Board. The Regional Board recognizes that the Permittees should not be held responsible for discharges from such facilities or Pollutants in those discharges. However, to the extent that the Permittees authorize the connection of these discharges into their MS4s, this Order requires the Permittees to provide written notification of Water Quality Management Plan (WQMP) requirements for post-construction best management practices (BMPs) and/or other applicable requirements of this Order. A WQMP approved by the Permittee who owns the MS4 may constitute compliance with the General Construction Permit post construction Standards[2] for the Permit Area.

C. The Co-Permittees have established legal authority to control discharges into the MS4 facilities that they own and/or operate. As owners and/or operators of the MS4, the Permittees are responsible for discharges into their MS4 facilities to the extent of their legal authority. The discharge of Pollutants into the MS4 may cause or contribute to, or threaten to cause or contribute to, a condition of Pollution in Receiving Waters. Federal regulations, 40 CFR 122.26(d)(2)(i), require the Permittees to control the discharge of Pollutants into the MS4 to the maximum extent practicable (MEP).

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1 Note: Acronyms and capitalized terms used in this document are defined in Appendix 4.
[2] The State General Construction Permit Section Order No. 2009-0009-DWQ XIII

Certain activities and sources that generate Pollutants present in Urban Runoff may be beyond the ability of Permittees to prevent or eliminate. Examples of these activities and sources include, but are not limited to: emissions from internal combustion engines, brake pad wear and tear, atmospheric deposition, bacteria and wildlife (including feral cats and dogs) and leaching of naturally occurring nutrients and minerals from local soils. This Order is not intended to address background or naturally occurring Pollutants or flows.

D. The Permittees have identified Major Outfalls and have submitted maps of existing MS4 facilities. The Co-Permittees reported having approximately 269 miles of underground storm drains, and 95 miles of channels[3]. The RCFC&WCD reported having 75 miles in underground storm drains and 59 miles of channels in the Permit Area.

E. On February 5, 2008 Wildomar residents voted for cityhood and the city incorporated on July 1, 2008. Menifee residents voted for cityhood on June 3, 2008 and the city incorporated on October 1, 2008. Both cities in letters dated May 5 and May 6, 2009, respectively, have expressed their intent to be a Co-Permittee in this Order and for the purposes of this Order shall be considered as such. Urban Runoff from the cities of Menifee, Murrieta and Wildomar discharges into watersheds within the Santa Ana Regional Board and the San Diego Regional Board jurisdictions. Therefore, these cities are regulated by MS4 permits issued by both Regional Boards. Urban Runoff from the County of Riverside and RCFC&WCD discharge into watersheds within the Santa Ana, San Diego and Colorado River Region Regional Board jurisdictions. Therefore, these entities are regulated by MS4 permits issued by three Regional Boards.

F. The Permit Area contains 1,396 square miles or 19.1% of the 7,300 square miles within Riverside County and includes 15 of the 26 municipalities within Riverside County. The more densely populated areas of Riverside County are located within the Santa Ana Regional Board's jurisdiction. The population of the Permit Area was estimated at 1,237,388 as of January 1, 2006[4]. The California Department of Finance estimates that as of January 1, 2009, the population of Riverside County was 2,107,653[5]. Other portions of Riverside County are regulated by the San Diego and the Colorado River Basin Regional Boards.

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[3] 2008-2009 Permittee Santa Ana NPDES MS4 Annual Report.
[4] Section 3.3.1 of the 2007 ROWD (Western Riverside Council of Governments (WRCOG), Sub-regional Growth Forecast, Riverside County Projection (Revised Draft), November 22, 2006.)
[5] E-1 report dated April 30, 2009 (http://www.dof.ca.gov/research/demographic/reports/estimates/e-1/2008-09/documents/E-1_2009%20Press%20Release.pdf).

II. FINDINGS

The California Regional Water Quality Control Board, Santa Ana Region (hereinafter the "Regional Board") finds that:

A. BACKGROUND

1. The Co-Permittees own and operate flood control facilities. Some of the natural channels, streambeds and other drainage facilities that are generally considered as Waters of the U.S. have been converted to flood control facilities. In such cases, where a natural streambed is modified to convey storm water flows, the conveyance system becomes both a MS4 and a Water of the US.

2. The Permittees are currently discharging from the MS4 pursuant to Order No. R8-2002-0011, NPDES Permit No. CAS 618033. This Order renews Order No. R8-2002-0011 and regulates discharges of Urban Runoff from the MS4 within Riverside County.

3. On April 27, 2007, the RCFC&WCD, in cooperation with the County of Riverside, (the "County") and the incorporated cities of Beaumont, Calimesa, Canyon Lake, Corona, Hemet, Lake Elsinore, Moreno Valley, Murrieta, Norco, Perris, Riverside, and San Jacinto, jointly submitted a permit renewal application, a Report of Waste Discharge (the "2007 ROWD"), to renew the NPDES permit for discharges of Urban Runoff from the MS4 in the Permit Area. Subsequently, the cities of Menifee and Wildomar also signed letters of intent to include discharges from their MS4 facilities under this MS4 Permit. The County and incorporated cities are hereinafter the "Co-Permittees", and collectively with the Principal Permittee referred to as the "Permittees". The Permit Area is shown in Appendix 1 and includes the urban areas and those portions of agriculture and open space as shown on Appendix 1 that may convert to industrial, commercial, or residential use during the term of this Order.

4. To more effectively carry out the requirements of this Order, the Permittees have agreed that the RCFC&WCD will continue as the Principal Permittee and the County and the incorporated cities within the Permit Area will continue as the Co-Permittees.

5. The Permittees submitted a revised Drainage Area Management Plan ("2007 DAMP") as contained in Appendix B of the 2007 ROWD. The proposed DAMP identifies programs and policies, including best management practices (BMPs), to achieve Water Quality Standards in the Receiving Waters. These BMPs can be organized into two categories: BMPs for existing facilities and BMPs for New Development and Significant Redevelopment. Both categories include regulatory activities, public education programs, waste management, and operations and

maintenance activities. The Permittees currently implement the 2006 DAMP. With the adoption of this Order, the Permittees are required to implement the 2007 DAMP. The DAMP is a dynamic document that defines the MEP standard (see discussion of this term in the Glossary, Appendix 4) for the Permittee activities and is incorporated by reference as an enforceable element of this Order.

6. This Order requires the Permittees to revise the DAMP and associated documents to incorporate new MS4 Permit requirements which include recommendations from the 2007 ROWD. Future modifications of the DAMP, once approved by the Regional Board Executive Officer[6], are also enforceable elements of this Order.

7. During the Third Term Permit, Regional Board staff conducted an evaluation of each of the Permittees' Urban Runoff programs. This evaluation indicated that most of the Permittees lacked proper documentation of procedures and policies for implementation of various elements of their Urban Runoff program. This Order requires each Permittee to develop a Local Implementation Plan (LIP) that documents its internal procedures for implementation of the various program elements described in the DAMP and this Order.

8. On July 13, 1990, the Regional Board adopted the first term Riverside County MS4 permit, Order No. 90-104 (NPDES No. CA 8000192). On March 8, 1996, the Regional Board renewed Order No. 90-104 by adopting the second term Riverside County MS4 permit, Order No. 96-30 (NPDES No. CAS618033). On October 25, 2002, the Regional Board renewed Order No. 96-30 by adopting the third term MS4 permit, Order No. R8-2002-0011(NPDES No. CAS618033).

9. This Order renews Order No. R8-2002-0011 (NPDES No. CAS618033), and regulates discharges of Urban Runoff from the MS4 within the Permit Area in Riverside County. This Order is the fourth term permit and is intended to regulate the discharge of Pollutants in Urban Runoff from non-agricultural Anthropogenic activities and sources under the jurisdiction of and/or maintenance responsibility of the Permittees and is not intended to address background or naturally occurring Pollutants or flows.

10. The Santa Ana River Basin is the major watershed within the Santa Ana Region. The Regional Board and the Permittees recognize the importance of watershed

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[6] The Executive Officer shall provide members of the public with notice and at least a 30-day comment opportunity for all documents submitted in accordance with this Order. If the Executive Officer, after considering timely submitted comments, concludes that the document is adequate or adequate with specified changes, the Executive Officer may approve the document or present it to the Board for its consideration at a regularly scheduled and noticed meeting. If there are significant issues that cannot be resolved by the Executive Officer, the document will be presented to the Board for its consideration at a regularly scheduled meeting.

management initiatives and regional planning and coordination in the development and implementation of programs and policies related to water quality protection.

11. It is recognized that in some cases MS4 facilities are used to convey Urban Runoff to sub-regional or regional Treatment Control BMPs or may incorporate regional BMPs directly. The Regional Board recognizes this appropriate strategy for treatment provided that Waters of the US are not used to convey Pollutants. Further, such BMPs are not considered MS4 or Waters of the US.

12. A number of regional and watershed-wide efforts are underway in which the Permittees are active participants. The Regional Board also recognizes that, in certain cases, diversion of funds targeted for certain monitoring programs to regional monitoring programs may be necessary. The Executive Officer is authorized to approve, after proper public notification and consideration of all comments received, reallocation of resources to the watershed management initiatives and regional planning and coordination programs and regional monitoring programs.

13. The Permittees are required to submit all documents, where appropriate, to the Regional Board in an electronic format. All such documents will be posted at the Regional Board's website and all interested parties will be notified. In addition, the website will include the administrative and civil procedures for appealing any decision made by the Executive Officer. Some Urban Runoff issues, such as monitoring, public education, and training can be more effectively addressed on a regional or statewide basis thereby increasing program consistency and efficiency. This Order encourages continued participation in such programs and policies.

B. LEGAL AUTHORITIES

1. This Order Is issued pursuant to Section 402 of the CWA, the Porter-Cologne Water Quality Control Act (Division 7 of the Water Code, commencing with Section 13000), applicable State and federal regulations, all applicable provisions of statewide Water Quality Control Plans and Policies adopted by the State Water Resources Control Board (State Board), the Water Quality Control Plan for the Santa Ana River Basin adopted by the Regional Board (Basin Plan), the California Toxics Rule (CTR), and the California Toxics Rule Implementation Plan. This Order also serves as Waste Discharge Requirements (WDRs) pursuant to Article 4, Chapter 4, Division 7 of the Water Code (commencing with Section 13260).

2. This Order is consistent with the following precedential Orders adopted by the State Board addressing municipal storm water NPDES Permits: Order 99-05-DWQ (Petition of Environmental Health Coalition/Receiving Water Limitation Language for Municipal Storm Water Permits), Order WQ-2000-11 (Petitions Bellflower, City of Arcadia, Western States Petroleum Association, Review of RWQCB and Its

Executive Officer Pursuant to Order 96-054, Permit for Municipal Storm Water and Urban Run-Off Discharges within Los Angeles County), Order WQ 2001-15 (In the Matter of the Petitions of Building Industry Association of San Diego County and Western States Petroleum Association), and Order WQO 2002-0014 (Petitions of Aliso Viejo, et al/Order to stay provision F.5.f of the permit and part of last sentence of Finding 26, permit issued by San Diego Regional Water Quality Control Board).

3. Consistent with the State Board's orders, this Order requires the Permittees to comply with the applicable Water Quality Standards, which is to be achieved through an iterative approach requiring the implementation of increasingly more effective BMPs until Water Quality Standards are not impaired by Urban Runoff. All MS4 permits issued in California specify certain minimum BMPs and incorporate an iterative process that requires increasingly more effective BMPs if the Water Quality Standards are not met.

4. The federal Clean Water Act established a national policy designed to help maintain and restore the physical, chemical and biological integrity of the nation's waters. In 1972, the CWA established the NPDES permit program to regulate the discharge of Pollutants from Point Sources to Receiving Waters. From 1972 to 1987, the main focus of the NPDES program was to regulate conventional Pollutant sources such as sewage treatment plants and industrial facilities. As a result, on a nationwide basis, non-point sources, including agricultural runoff and Urban Runoff, now contribute a larger portion of many kinds of Pollutants than the more thoroughly regulated sewage treatment plants and industrial facilities.

5. Studies conducted by the USEPA, the states, counties, cities, flood control districts and other entities dealing with Urban Runoff indicate that the following are major sources of Urban Runoff Pollution nationwide:

   a. Industrial Facilities where appropriate Pollution Prevention and BMPs are not implemented;

   b. Construction Sites where erosion and sediment controls and BMPs are not implemented; and,

   c. Runoff from urbanized areas.

6. The 1987 amendments to the CWA added Section 402(p) that required the USEPA to develop permitting regulations for storm water discharges from MS4 and from Industrial Facilities, including construction sites. The USEPA promulgated the final Phase I storm water regulations on November 16, 1990. Neither the 1987 amendments to the CWA nor the Phase I storm water regulations (40 CFR Part 122) have been amended since their effective dates.

7. Prior to the USEPA's promulgation of the final storm water regulations, three counties (Orange, Riverside, and San Bernardino) and their incorporated cities located within the Regional Board's jurisdiction requested area-wide NPDES MS4 permits. These area-wide MS4 NPDES permits are:

   a. Orange County, NPDES No. CAS 618030

   b. Riverside County, NPDES No. CAS 618033

   c. San Bernardino County, NPDES No. CAS 618036

8. Consistent with the CWA and the USEPA regulations promulgated pursuant thereto, the State Board and the Regional Board have adopted a number of permits to address Pollution from the sources identified in Finding 5, above. Industrial activities (as defined in 40 CFR 122.26(b)(14)) including construction activities on one or more acres are to be covered under one of the following permits and those individuals or entities that engage in such activities are required to secure permission to engage in such identified activities pursuant to the provisions of one of the following permits:

   a. State Board Order No. 97-03-DWQ, for storm water runoff from industrial activities (NPDES No. CAS000001), (the "General Industrial Activities Storm Water Permit").

   b. State Board Order No. 99-08-DWQ, for storm water runoff from construction activities (NPDES No. CAS000002), (the "General Construction Activity Storm Water Permit"). Order No. 99-08- DWQ was amended by State Board Resolution No. 2001-046 on April 26, 2001, to incorporate monitoring provisions as directed by the Superior Court, County of Sacramento. This Order was renewed on September 2, 2009 by State Board Order No. 2009-0009-DWQ. The requirements of Order No. 2009-0009-DWQ will be effective July 1, 2010.

   c. State Board Order No. 99-06-DWQ (NPDES No. CAS000003) for storm water runoff from facilities (including freeways and highways) owned and/or operated by the California Department of Transportation ("Caltrans").

   d. State Board Order No. 2003-0007-DWQ, for discharges of storm water runoff associated with small linear underground/overhead construction projects (NPDES No. CAS000005), (the "General Permit-Small Linear Underground Projects). After July 1, 2010, most linear construction projects will be regulated under State Board Order No. 2009-0009-DWQ.

   e. The Regional Board also issues individual storm water NPDES permits for certain Industrial Facilities within the Santa Ana River watershed. Currently

there is only one individual storm water NPDES permit that has been issued by the Regional Board for an Industrial Facility (March Air Reserve Base) located within the Permit Area. Additionally, the Regional Board has issued NPDES permits for a number of facilities that discharge process wastewater and storm water; storm water discharge requirements are included in such a facility's NPDES permit.

9. Section 402(p) of the CWA establishes two different performance standards for storm water discharges. NPDES MS4 permits require controls to reduce the discharge of Pollutants to the MEP. NPDES permits issued for industrial storm water discharges (including construction activities) must meet Best Available Technology (BAT) and Best Conventional Pollutant Control Technology (BCT) standards. The CWA and the USEPA regulations allow each state the flexibility to decide what constitutes the MEP.

10. This Order does not constitute an unfunded mandate subject to subvention under Article XIII.B, Section (6) of the California Constitution for several reasons, including the following:

    a. This Order implements federally mandated requirements under CWA Section 402(p)(3)(B). (33 USC § 1342(p)(3)(B)).

    b. The Permittees' obligation under this order are similar to, and in many respects less stringent than, the obligations of non-governmental dischargers who are issued NPDES permits for storm water discharges.

    c. The Permittees have the authority to levy service charges, fees, or assessments to pay for compliance with this Order[7].

    d. The Permittees requested permit coverage in lieu of compliance with the complete prohibition against the discharge of Pollutants contained in federal Clean Water Act Section 301, subdivision (a). (33 USC § 1311(a)).

11. Section 13225 of the CWC identifies the Regional Board as being the enforcement authority for NPDES permits, including the Industrial General Permit, and the Construction General Permit which are collectively referred to as the "General Stormwater Permits." However, in many areas, the Industrial Facilities and Construction Sites discharge directly into MS4 facilities owned and operated by the Permittees. These Industrial Facilities and Construction Sites are also regulated under local ordinances and regulations. The Permittees and Regional Board staff work together to avoid duplicative efforts in regulating these facilities. As part of

[7] Voter approval may be required for new tax levies.

this coordination, the Permittees have been notifying Regional Board staff when they observe, during their routine activities, conditions that result in a threat or potential threat to water quality, or when a required Industrial Facility or Construction Site fails to obtain coverage under the appropriate General Stormwater Permit.

12. This Order does not authorize any act that results in the taking of a threatened or endangered species or any act that is now prohibited, or becomes prohibited in the future, under either the California Endangered Species Act (Fish and Game Code Sections 2050 to 2097) or the Federal Endangered Species Act (16 U.S.C.A. Sections 1531 to 1544). This Order requires compliance with Effluent Limits, Receiving Water Limits, and other requirements to protect the Beneficial Uses of Waters of the US. The Permittees are responsible for meeting all requirements of the applicable Endangered Species Act.

13. The Permittees may petition the Regional Board to issue a separate NPDES permit to any discharger of Non-storm Water into MS4 facilities that they own or operate.

14. The Regional Board has considered anti-degradation requirements, pursuant to 40 CFR 131.12 and State Board Resolution No. 68-16, for this discharge. The Regional Board finds that the Urban Runoff regulated under this Order is consistent with the federal and state anti-degradation requirements and a complete anti-degradation analysis is not necessary. This Order requires the continued implementation of programs and policies to reduce the discharge of Pollutants in Urban Runoff. This Order includes additional requirements to control the discharge of Pollutants in Urban Runoff from “Significant Redevelopment,” and “New Development,” as defined in Finding II.G. and Section XII of this Order.

C. RATIONALE FOR REQUIREMENTS

1. The Regional Board developed the requirements in this Order based on information submitted as part of the 2007 ROWD (including the 2007 DAMP), monitoring and reporting data, program audits, and other available information and consistent with the CWA, CWC and regulations adopted thereunder.

2. The Fact Sheet (Appendix 6) which contains additional background information and rationale for requirements specified in this Order is hereby incorporated into this Order and constitutes part of the Findings for this Order. Appendices 1 through 5 and 7 are also incorporated into this Order.

D. CALIFORNIA ENVIRONMENTAL QUALITY ACT (CEQA)

1. Under Water Code Section 13389, this action to adopt an NPDES permit is exempt from the provisions of CEQA, Public Resources Code Sections 21100 -21177 (*County of Los Angeles v. California State Water Resources Control Board* [2006] 142 Cal Appl. 4th 985, mod. [Nov. 6, 2006, B184034] 50 Cal. Rptr 3rd 619, 632-636). This action also involves the re-issuance of WDRs for existing facilities and as such, is exempt from the provisions of CEQA (commencing with Section 21100) in that the activity is exempt pursuant to Title 14 of the California Code of Regulations Section 15301.

2. Compliance with this Order and the DAMP does not necessarily constitute mitigation that is sufficiently specific to satisfy the requirements of CEQA with regards to projects. The intent of the DAMP, WQMP, Storm Water Pollution Prevention Plan (SWPPP) and other programs and policies incorporated into this order is to minimize the impacts from a specific project to a level that is below significance as defined in CEQA.

E. DISCHARGE CHARACTERISTICS

1. This Order regulates Urban Runoff from areas under the jurisdiction of the Permittees. The term Urban Runoff as used in this Order includes storm water runoff, snowmelt runoff and surface runoff and drainage as defined in Appendix 4.
2. Pollutants in Urban Runoff can threaten and adversely affect human health and the environment. Human illnesses have been clearly linked to recreating near storm drains flowing into coastal waters[8]. Also, Pollutants in Urban Runoff can bioaccumulate in receiving waters in the tissues of invertebrates and fish and eventually consumed by humans and other animals.
3. Urban Runoff can carry Pollutants described in the Fact Sheet to rivers, streams, and lakes within the Permit Area (collectively the "Receiving Waters"). In addition, although infrequently, Urban Runoff from the Permit Area can carry these Pollutants to other receiving waters such as the Pacific Ocean.
4. Management of Dry Weather discharges resulting from urbanization provides an opportunity to promote water conservation as well as address water quality.
5. The Co-Permittees discharge Urban Runoff into lakes, drinking water reservoirs, rivers, streams, creeks, and tributaries thereto within the Upper Santa Ana River, Middle Santa Ana River, and San Jacinto hydrologic units within the Santa Ana Region, as shown in Tables 3a and 3b. Some of the Receiving Waters have been designated as Impaired by the Regional Board and the USEPA pursuant to CWA Section 303(d).

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[8] The Santa Monica Bay Restoration Project, Epidemiology Study, 1996.

Table 3a – Receiving Waterbodies and Municipal Dischargers:

	Upper Santa Ana									San Jacinto								
Municipality	**Mill Creek Prado Area**	**Chino Creek, Reach 1A**	**Chino Creek, Reach 1B**	**Temescal Creek**	**San Timoteo Wash**	**Little San Gorgonio**	**Santa Ana River, Reach 3**	**Santa Ana River, Reach 4**	**Cucamonga Creek**	**San Jacinto River reaches 1-4**	**Lake Elsinore**	**Canyon Lake**	**Strawberry Creek**	**Lake Hemet**	**Salt Creek**	**Poppet Creek**	**Indian Creek**	**Bautista Creek**
RCFC&WCD				◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
Beaumont					◆	◆	⌘	⌘		◆	⌘		◆					
Calimesa					◆	⌘	⌘	⌘		◆	⌘	◆	◆					
Canyon Lake				⌘			⌘			⌘	⌘	◆						
Corona				◆			⌘											
County of Riverside (County)	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
Hemet				⌘			⌘			⌘	⌘	⌘			⌘			
Lake Elsinore				◆			⌘			⌘	◆							
Menifee				⌘			⌘			⌘	⌘	⌘			⌘			
Moreno Valley				⌘			⌘			⌘	⌘	⌘						
Murrieta				⌘			⌘				⌘							
Norco				⌘			◆											
Perris				⌘			⌘			◆	⌘	⌘			⌘			
Riverside				⌘			◆	◆			⌘							
San Jacinto										◆	⌘	⌘						
Wildomar				⌘			⌘				⌘							

◆ Direct Discharge of MS4 to Receiving Water
⌘ Tributary to Receiving Water

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Table 3b. Beneficial Uses and 2006 CWA Section 303(d) Impaired Waters

Watershed Management Areas in Riverside County	Hydraulic Unit	Beneficial Uses
Upper Santa Ana River		
Santa Ana River, Reach 3,	801.21, 801.25, 801.27,	AGR, GWR, REC1, REC2, WARM, WILD, RARE, SPWN
Santa Ana River, Reach 4	801.27, 801.44	GWR, REC1, REC2, WARM, WILD, SPWN
Temescal Creek – Reach 1	801.25	REC1, REC2, WARM, WILD
Temescal Creek – Reach 2	801.32, 801.25	INTERMITTENT - AGR, IND, GWR, REC1, REC2, LWARM
Temescal Creek – Reach 3 **See Lee Lake**		
Temescal Creek – Reach 4	801.34	RARE, INTERMITTENT - AGR, GWR, REC1, REC2, WARM, WILD
Temescal Creek – Reach 5	801.35	AGR, GWR, REC1, REC2, WARM, WILD, RARE
Temescal Creek – Reach 6	801.35	INTERMITTENT - GWR, REC1, REC2, WARM, WILD
Coldwater Canyon Creek	801.32	MUN, AGR, GWR, REC1, REC2, WARM, WILD
Bedford Canyon Creek	801.32	INTERMITTENT - GWR, REC1, REC2, WARM, WILD
Dawson Canyon Creek	801.32	MUN, GWR, REC1, REC2, WARM, WILD
Day Creek	801.21	MUN,PROC, GWR, REC1, REC2, COLD, WILD
San Sevaine Creek	801.21	INTERMITTENT - MUN, GWR, REC1, REC2, COLD, WILD
San Timoteo Wash Reach 3	801.62	IGWR, REC1, REC2, WARM, WILD, RARE
Little San Gorgonio Creek & Tributaries	801.62, 801.63, 801.69	MUN, GWR, REC1, REC2, COLD, WILD
Sunnyslope Channel	801.27,	MUN, REC1, REC2, WARM, WILD, SPWN
Tequesquite Arroyo (Sycamore Creek)	801.27,	GWR, REC1, REC2, WARM, WILD, SPWN
Chino Basin/ Middle Santa Ana		
Chino Creek, Reach 1A	801.21	REC1, REC2, WARM, WILD, RARE
Chino Creek, Reach 1B	801.21	REC1, REC2, WARM, WILD, RARE
Mill Creek (Prado Area)	801.25	REC1, REC2, WARM, WILD, RARE
Cucamonga Creek – Reach 1	801.21	GWR, REC1, REC2, LWARM, WILD

Watershed Management Areas in Riverside County	**Hydraulic Unit**	**Beneficial Uses**
San Jacinto San Jacinto River reaches 1 and 6	802.31, 802.32 & 802.21	INTERMITTENT - MUN, AGR, GWR, REC1, REC2, WARM, WILD
San Jacinto San Jacinto River reaches 3-5	802.11, 802.14, 802.21,	INTERMITTENT - AGR, GWR, REC1, REC2, WARM, WILD
San Jacinto San Jacinto River reach 2 **See Canyon Lake**		
San Jacinto San Jacinto River reach 7	802.21	MUN, AGR, GWR, REC1, REC2, COLD, WILD
- Bautista Creek	802.21, 802.23	MUN, AGR, GWR, REC1, REC2, COLD, WILD
Strawberry Creek	802.21	MUN, AGR, GWR, REC1, REC2, COLD, WILD
Fuller Mill Creek	802.22	MUN, AGR, GWR, REC1, REC2, COLD, WILD
Stone Creek	802.21	MUN, AGR, GWR, REC1, REC2, COLD, W ILD
Salt Creek	802.12	INTERMITTENT - REC1, REC2, WARM, WILD
Logan, Black Mtn, Juaro Canyon, Indian, Hurkey, Poppet and Protrero Creeks, and other Tributaries to these Creeks	802.21, 802.22	INTERMITTENT - MUN, AGR, GWR, REC1, REC2, WARM, WILD
Lakes		
Lake Elsinore	802.31	REC1, REC2, WARM, WILD
Canyon Lake	802.11	MUN, AGR, GWR, REC1, REC2, WARM, WILD
Lake Hemet	802.22	MUN, AGR, GWR, POW, REC1, REC2, WARM, COLD, WILD, SPWN
Lake Fulmor	802.21	MUN, AGR, REC1, REC2, WARM, COLD, WILD
Lake Perris	802.11	MUN, AGR, IND, PROC, GWR, REC1, REC2, COMM, WARM, COLD, WILD
Lake Evans	801.27	REC1, REC2, WARM, COLD, WILD
Lake Mathews	801.33	MUN, AGR, IND, PROC, GWR, REC1, REC2, WARM, WILD, RARE
Lee Lake	801.34	AGR, IND, GWR, REC1, REC2, WARM, WILD
Mockingbird Reservoir	801.26	AGR, REC1, REC2, WARM, WILD

AGR: Agricultural Supply; MUN: Municipal and Domestic Supply; GWR: Groundwater Recharge; IND – Industrial Service Supply, POW – Hydropower generation, REC1: Water Contact Recreation; REC2: Non-Contact Water Recreation; WARM: Warm Freshwater Habitat; LWARM: Limited Warm Freshwater Habitat, COLD - Cold freshwater habitat, WILD: Wildlife Habitat, RARE – Rare threatened or endangered species. SPWN – Spawning, reproduction and development waters.

6. Urban Runoff is defined in the Glossary (Appendix 4). It includes those discharges from residential, commercial, industrial, and construction areas within the Permit Area and excludes discharges from Open Space[9], feedlots, dairies, farms and agricultural fields. Urban Runoff consists of storm water and "authorized non-storm water" (see Section VI) surface runoff from drainage sub-areas with various, often mixed, land uses within all of the hydrologic drainage areas that discharge into the Receiving Waters. In addition to Urban Runoff, the MS4 regulated by this Order receives flows from Open Space, agricultural activities, state and federal properties and other non-urban land uses not under the control of the Permittees. The quality of the discharges from the MS4 varies considerably and is affected by, among other things, past and present land use activities, basin hydrology, geography and geology, season, the frequency and duration of storm events, and the presence of past or present illegal and allowed disposal practices and Illicit Connections.

7. Pathogens (from sanitary sewer overflows, septic system leaks, and spills and leaks from portable toilets, pets, wildlife, and human activities) can impact water contact recreation and non-contact water recreation. Floatables (from trash) are an aesthetic nuisance and can be a substrate for algae and insect vectors. Oil and grease can coat birds and aquatic organisms, adversely affecting respiration and/or thermoregulation. Other petroleum hydrocarbon components may cause Toxicity to aquatic organisms and may impact human health. Suspended and settleable solids (from sediment, trash, and industrial activities) may be deleterious to benthic organisms and may cause anaerobic conditions to form. Sediments and other suspended particulates may cause turbidity, clog fish gills and interfere with respiration in aquatic fauna. They may also screen out light, hindering photosynthesis and normal aquatic plant growth and development. However, it is recognized that storm flows from non-urbanized areas such as national forest, state parks, wilderness, and agriculture, as shown on Appendix 1, naturally exhibit high levels of suspended solids due to climate, hydrology, geology and geography.[10] Toxic Substances from pesticides, petroleum products, metals, and industrial wastes can cause acute and/or chronic Toxicity, and can bioaccumulate in organisms to levels that may be harmful to human health. Nutrients (from fertilizer use, fire fighting chemicals, decaying plants, confined animal facilities, pets, and wildlife) may cause excessive algal blooms. These blooms may lead to problems with taste, odor, color and increased turbidity, and may depress the dissolved oxygen content, leading to fish kills.

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[9] Only includes Open Space in strictly unurbanized areas. See Glossary definition of Urban Runoff.
[10] Riverside County Flood Control and Water Conservation District's "Hydrology Manual," dated April 1978 and page II-4 of "Santa Ana River, Design Memorandum No. 1, Phase II GDM on the Santa Ana River Mainstem, including Santiago Creek, Volume 2, Prado Dam." dated August 1988 and D.I. Inman & S.A. Jenkins "Climate Change and the Episodicity of Sediment Flux in Small California Rivers," Journal of Geology, Volume 107, pp. 251-270, 1999.

8. Bacteria and nutrients are the Pollutants of Concern for a majority of the inland waters that are listed under the 303(d) list of Impaired Waterbodies or an adopted Total Maximum Daily Load (TMDL). This Order requires the Permittees to identify sources of bacteria and nutrients in Urban Runoff to their MS4 and to control those Pollutant sources.

9. Recent information[11] shows that plastic wastes and materials released to surface water bodies can harm aquatic species by entanglement or ingestion. This Order requires the Permittees to consider facilities that handle nurdles[12] as a high priority site for inspection, and outreach. Nurdles are a major contributor to marine debris. During a three month study of Orange County researchers found them to be the most common beach contaminant[13]. Nurdles comprised roughly 98% of the beach debris collected in a 2001 Orange County study.

10. The Permittees' water quality monitoring data submitted to date document a number of exceedances of Water Quality Objectives for various Urban Runoff-related Pollutants (fecal coliform bacteria, nutrients, total suspended solids, turbidity, metals, etc.) at various watershed monitoring stations.

11. This Order includes requirements for control of Dry Weather flows from Permittee activities that may cause an exceedance of Water Quality Objectives in Receiving Waters for Total Dissolved Solids (TDS) or total inorganic nitrogen (TIN). Storm water was considered to be an insignificant source for nitrogen/TDS in groundwater.

12. The Permittees' 2003-2004, 2004-2005, 2005-2006, 2006-2007 and 2007-2008 Annual Reports indicate exceedances of Water Quality Objectives for each core MS4 monitoring station discussed in a through g, below. The Permittees have identified nutrients and bacteria as priority constituents for initial corrective actions.

    a. Corona Storm Drain (40) - Six samples were collected and analyzed for fecal coliforms. Three samples were collected in the Dry Season and three during Wet Weather events. All samples analyzed exceeded bacteria (as fecal coliform) Water Quality Objectives with a maximum value of 160,000 MPN fecal coliforms. Boron analyses exceeded Water Quality Objectives of 0.75 mg/L in

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[11] http://www.bestlifeonline.com/cms/publish/health-fitness/Our_oceans_are_turning_into_plastic_are_we_2_printer.shtml, (alternative reference: http://rstb.royalsocietypublishing.org/search?fulltext=entanglement+and+ingestion&sortspec=date&submit=Submit&andorexactfulltext=phrase)

[12] A nurdle is a plastic pellet, also known as pre-production plastic pellet or plastic resin pellet.

[13] Moore, Charles (2002). "A comparison of neustonic plastic and zooplankton abundance in Southern California's coastal waters and elsewhere in the North Pacific". *Algalita Marine Research Foundation*. http://www.mindfully.org/Plastic/Ocean/Marine-Debris-Panel30oct02.htm.

one out of eighteen samples collected (0.78 mg/L). Six samples were collected and analyzed for Total Dissolved Solids (TDS) in 2003-2004. All samples were below the Temescal Creek and Santa Ana River Reach 3 Water Quality Objectives of 800 mg/L/700 mg/L TDS (respectively) and only one (11 mg/L) of ten samples (2005-2008) exceeded the 10 mg/L total nitrogen objective.

b. Sunnymead Channel (316) - Three samples were collected during Wet Weather events and analyzed for fecal coliforms in this time frame. All samples were greater than 5000 MPN and exceeded bacteria Water Quality Objectives of 200 or 400 MPN fecal coliforms. Two samples were collected during Wet Weather events and analyzed for TDS and were below the Water Quality Objective of 700 mg/L for Canyon Lake. Total nitrogen values in all ten samples collected during Wet Weather events were below the Water Quality Objective of 8 mg/L.

c. Hemet Channel (318) - All four Wet Weather samples were detected at greater than 7000 MPN and exceeded the bacteria Water Quality Objective of 200 or 400 MPN for fecal coliforms. As Salt Creek does not have numeric objectives for TDS, the Receiving Water for Salt Creek is Canyon Lake with an objective of 700 mg/L TDS. All eighteen samples collected during Wet Weather events and analyzed for TDS were below the Canyon Lake Water Quality Objective. Total nitrogen values in all nine samples collected during Wet Weather events were below the Water Quality Objective of 8 mg/L.

d. Magnolia Center (364) – Eleven out of thirteen samples (3-Wet Weather samples [>160000 MPN maximum concentration] and 10 dry [5000 MPN maximum]) collected exceeded the Water Quality Objective for fecal coliform (200 or 400 MPN MPN). Two (both collected during Wet Weather events) out of thirty-four samples identified total nitrogen concentrations in excess of the 10 mg/L Water Quality Objective. The maximum concentration measured was 13 mg/L. Water Quality Objective of 700 mg/L TDS were exceeded in three out of eight samples analyzed. The maximum TDS concentration was 930 mg/L TDS.

e. University Wash Channel (702) – All three samples were detected at greater than 5000 MPN concentration and exceeded the fecal coliform Water Quality Objectives of 200 or 400 MPN. The maximum concentration was 13,000 MPN. One (11 mg/L) out of sixteen samples analyzed for total nitrogen was above the Santa Ana River Reach 4 Water Quality Objective of 10 mg/L. Ten samples analyzed for TDS were below Water Quality Objective of 550 mg/L.

f. North Norco Channel (707) – Three out of four samples (>16000 MPN maximum) analyzed for fecal coliform exceeded bacteria Water Quality Objective of 200 or 400 MPN fecal coliform. Three (1300 mg/L maximum concentration dry, 900 mg/L wet) out of four samples analyzed for TDS were above the Santa Ana River-Reach 3 Water Quality Objective of 700 mg/L. Two

samples were Dry Weather and two samples were Wet Weather. One out of ten samples analyzed for total nitrogen exceeded the Water Quality Objective of 10 mg/L for total nitrogen.

g. Perris Line J Channel (752) – All four Wet Weather samples analyzed exceeded bacterial indicator Water Quality Objective the highest value was 13,000 MPN fecal coliform. Two of four samples analyzed for TDS exceeded the Water Quality Objective of 700 mg/L for Canyon Lake. One out of twelve samples analyzed exceeded the Water Quality Objective of 8 mg/L for total nitrogen.

13. The Permittees are participating in several studies in conjunction with the Storm Water Monitoring Coalition (SMC), Storm Water Quality Standards Task Force, the Lake Elsinore and Canyon Lake TMDL Task Force, the Middle Santa Ana River TMDL Task Force and Southern California Coastal Water Research Project (SCCWRP) to address the elevated fecal bacterial indicator levels. Also, the Permittees are anticipating that the use of fecal bacterial indicator will be changed to E. coli and the reclassification of REC uses for several MS4 facilities in the near future. However, E. coli data still indicates Water Quality Objective exceedances that will need to be addressed as part of the TMDL.

14. The above monitoring results, the 303(d) list of Impaired Waterbodies and the approved TMDLs indicate that bacterial contamination is one of the persistent problems in Urban Runoff. TMDL Implementation Plans including Urban Runoff Waste Load Allocations (WLAs) have been adopted by the Regional Board for the Middle Santa Ana River to address this problem. It should be noted, however, that the work of the Storm Water Quality Standards Task Force is likely to result in changes to Recreational Water Quality Objectives and implementation measures, including the suspension of recreational standards during high flow events. Further, some MS4 facilities may be recategorized as REC 2 or REC X (REC 1 nor REC 2) pursuant to Use Attainability Analyses (UAAs). These changes will likely allow the Permittees to focus their TMDL compliance resources on bacterial contamination that is affecting recreational swimming areas used during the Dry Season as the highest priority.

15. The Santa Ana River is the major Receiving Water in the Permit Area. During non-storm periods the flow in the River is dominated by effluent from POTW discharges. POTW discharges are regulated under NPDES permits issued by the Regional Board. In addition, the quality of the Santa Ana River within the Upper Santa Ana sub-watershed is greatly influenced by runoff from agricultural activities. Urban Runoff from the Permit Area constitutes a minor component of the Dry Weather flow in the Upper Santa Ana and San Jacinto sub-watersheds of the Santa Ana River. However, Urban Runoff may be more polluted than POTW discharges and therefore a more significant concern based on monitoring results identified in the Annual Reports.

F. CWA SECTION 303(D) LISTED WATERBODIES AND TMDLS (ALSO SEE SECTION K)

1. Water quality assessment conducted by Regional Board staff has identified a number of Beneficial Use Impairments due, in part, to Urban Runoff. Section 305(b) of the CWA requires the USEPA and each state that has been delegated NPDES permitting authority to routinely monitor and assess the quality of waters of their respective regions. If this assessment indicates that Beneficial Uses are not met, then that waterbody must be listed under Section 303(d) of the CWA as an Impaired Waterbody.
2. Based on the Regional Board's 2006[14] water quality assessment a number of water bodies within the Permit Area are listed (see Table 4, below) as Impaired pursuant to Section 303(d).

Table 4 - Impaired Waterbodies

Waterbody	Pollutant	Potential Sources	Proposed TMDL Completion
Santa Ana River, Reach 3,	Pathogens	Dairies	Approved 2007
Canyon Lake	Nutrients	Non-point Source	Approved 2005
	Pathogens	Non-point Source	Listing under evaluation
Lake Elsinore	Nutrients	Non-point Source	Approved 2005
	Unknown Toxicity PCBs	Unknown Unknown Non-point Source	2021 2019
Lake Fulmor	Pathogens	Unknown Non-point Source	2019
Santa Ana River, Reach 4	Pathogens	Non-point Source	2019

3. Federal regulations require that a total maximum daily load (TMDL) be established for each 303(d) listed waterbody for each of the Pollutants causing Impairment. The TMDL is the total amount of a Pollutant that can be discharged to a subject waterbody, while still enabling the waterbody to attain Water Quality Standards in

[14] On April 24, 2009, the Regional Board adopted Resolution No. R8-2009-0032 approving the CWA Section 305(b) Integrated Report/CWA Section 303(d) List of Impaired Waterbodies. Minor additional modifications were approved by the Regional Board on October 23, 2009. When the revised list is approved by the State Board and the USEPA, the 2006 list will be updated.

the receiving water. Attaining Water Quality Standards means that the receiving waterbody's Water Quality Objectives are met and its Beneficial Uses are protected. The TMDL is the sum of the individual WLAs for point source inputs, Load Allocations (LAs) for Non-Point Source inputs and natural background, and a margin of safety. The TMDLs are one of the bases for limitations established in Waste Discharge Requirements.

4. The Basin Plan amendment incorporating the Middle Santa Ana River Watershed Bacterial Indicator TMDLs (MSAR TMDL) was approved by the Regional Board on August 26, 2005 (Resolution No. R8-2005-0001), by the State Board on May 15, 2006, by the state's Office of Administrative Law on September 1, 2006, and by the USEPA on May 16, 2007.

5. The MSAR TMDL established limits for Bacterial source Indicators for Santa Ana River (Reach 3), Chino Creek (Reaches 1 and 2), Prado Park Lake, Mill Creek (Prado Area), and Cucamonga Creek (Reach 1). The MSAR TMDLs Implementation Plan identifies three sub-watersheds in Riverside County that drain to the Santa Ana River, Reach 3: 1) Riverside Watershed - Contributes surface drainage generally westward from the City of Riverside to the Santa Ana River; 2) Temescal Canyon watershed - Contributes surface drainage generally northward to Temescal Creek and then to the Santa Ana River; and 3) Chino Basin - The southeastern portion of the Chino Basin drains generally south to the Santa Ana River in Riverside County.

6. The MSAR TMDLs specifies WLAs for Urban Runoff, and discharges from concentrated animal feeding operations. LAs are specified for runoff from other types of agriculture and from natural sources (open space/undeveloped forest land). WLAs and LAs are specified for both Dry Season discharges and Wet Season discharges, with separate compliance dates. To protect REC1 Beneficial uses, the TMDL has WLAs for fecal coliform and *E. coli*. The Basin Plan currently does not have an established Water Quality Objective for *E. coli*. Stakeholders in the Santa Ana Region have formed the Storm Water Quality Standards Task Force (SWQSTF) to evaluate USEPA's bacterial indicator recommendations and appropriate recreational beneficial use designations for waterbodies throughout the Region. The SWQSTF is expected to make recommendations for the adoption of alternative bacterial indicators such as *E.coli,* based on USEPA's "Ambient Water Quality Criteria for Bacteria - 1986". These and other recommendations of the SWQSTF are likely to result in changes to recreational Water Quality Objectives.

7. The MSAR TMDL Implementation Plan assigns responsibilities to specific MS4 dischargers to identify sources of impairment, to propose BMPs to address those sources, and to monitor, evaluate, and revise BMPs as needed, based on the effectiveness of the BMP implementation program. These are generally considered as the short-term solutions. The MSAR Permittees are required to develop and

implement a long-term solution (a Comprehensive Bacteria Reduction Plan (CBRP)) designed to achieve compliance with the WLAs by the dates specified in the TMDLs. Specific Implementation Plan tasks are described in Chapter 5 of the Basin Plan and are assigned to one or more of the Permittees. Requirements of the TMDL Implementation Plan tasks are incorporated into this Order. A number of these Implementation Plan tasks are also jointly assigned to non-Permittee stakeholders. The stakeholders have established TMDL task forces to jointly implement and coordinate the TMDL Implementation Plan tasks.

8. The MSAR TMDL Task Force members are listed in Table 5.

Table 5 - Middle Santa Ana River Bacterial Indicator TMDL Task Force

MS4 Permittees	Non-MS4 Permittees
Corona, City of	Santa Ana Watershed Project Authority
Norco, City of	US Department of Agriculture, Forest Service
Riverside, City of	Ag Pool, Milk Producers Council
Riverside, County of	Region 4 MS4 Permittees - Claremont and Pomona (pending formal agreement)
RCFC&WCD	Regional Board
San Bernardino County Flood Control District (representing the County of San Bernardino and the municipalities named in the TMDL)[(San Bernardino County, and the Cities of Chino, Chino Hills, Fontana, Montclair, Ontario, Rancho Cucamonga, Rialto and Upland)]	

9. Pursuant to Task 3 of the MSAR TMDL, on June 29, 2007, the Regional Board approved the monitoring program (Resolution No. R8-2007-0046) proposed by the TMDL Task Force. Pursuant to Task 4 of the MSAR TMDL, on April 18, 2008, the Regional Board approved the Urban Source Evaluation Plan (USEP) that included a BMP effectiveness study (Resolution No. R8-2008-0044) proposed by the TMDL Task Force. This Order requires the Permittees on the Task Force to continue to implement the approved monitoring program and the USEP.

10. A BMP effectiveness study was completed as part of the MSAR Watershed–Wide and BMP effectiveness components of the Middle Santa Ana River Water Quality Monitoring Plan (dated April 3, 2008). The results of this study will be incorporated into a BMP selection criteria that will be used as a guide to address bacterial indicator sources within the MSAR watershed. The Principal Permittee plans to conduct a phase 2 study at its Low Impact Development (LID) testing facility to evaluate the effectiveness of several LID-based BMPs, which will further guide BMP selection in the MSAR watershed.

11. As part of Task 4.1, the MSAR Permittees completed the first phase of the approved USEP (Resolution No. R8-2008-0044) and the report is currently under review by Regional Board staff. Several discrete sources of bacterial indicator were identified, controlled, or eliminated as a result of this effort. Based on the outfall monitoring data collected to date, additional sites are identified, monitored and prioritized yearly for further evaluation in the next phases of the USEP. The next phase of the USEP that will focus on an implementation plan to retrofit BMPs to address elevated bacterial indicators from urban drainage areas flowing into Mill Creek and Cucamonga Creek in San Bernardino County is currently being evaluated.

12. Consistent with Task 4.3, this Order requires the Permittees to revise the DAMP to incorporate the results of the USEP and/or other studies. The DAMP revisions shall include schedules for meeting the bacterial indicator WLAs based on the schedule established in the MSAR TMDLs and the results of the USEP and/or other studies. These revisions shall also provide a proposal and schedule for 1) evaluating the effectiveness of BMPs and other control actions implemented and 2) evaluating compliance with the bacterial indicator WLAs for Urban Runoff by initiating a WLA pre-compliance evaluation monitoring program[15].

13. Pursuant to Task 4.5, the Permittees are required to revise the Water Quality Management Plan to incorporate BMPs as per the USEP, Task 4.1, for New Development and Significant Redevelopment Projects.

14. The Permittees are required to develop a CBRP to achieve compliance with the WLAs by the compliance dates. Periodic evaluation and update of the CBRP may be necessary based on a BMP effectiveness analysis to ensure compliance with the WLAs by the compliance dates.

15. Within the Permit Area, there are two watershed-wide MSAR TMDL monitoring stations (WW-S1 Santa Ana River Reach 3 at MWD Crossing and WW-S4 Santa Ana River Reach 3 at Pedley Avenue). The MSAR Permittees are required to comply with the numeric Bacterial Indicator targets at these monitoring locations by December 31, 2015 for the Dry Weather conditions (April 1 through October 31, as defined in the TMDL) and by December 31, 2025 for the Wet Weather conditions (November 1 through March 31, as defined by the TMDL).

16. In the absence of an approved CBRP, the WLAs become the final numeric WQBEL that must be achieved by the compliance dates.

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[15] Pre-compliance evaluation monitoring is monitoring conducted prior to the TMDL compliance date to assess the effectiveness of BMPs implemented in reducing pollutant(s) of concern by the compliance date.

17. On December 20, 2004, the Regional Board adopted Resolution R8-2004-0037 amending the Basin Plan to incorporate the Lake Elsinore and Canyon Lake Nutrient TMDLs. These TMDLs were subsequently approved by the State Board on May 19, 2005, by the Office of Administrative Law on July 26, 2005 and by the USEPA on September 30, 2005. These TMDLs include urban WLAs that are now incorporated into Chapter 5 of the Basin Plan. For both Canyon Lake and Lake Elsinore, the TMDLs specify causal numeric targets (nitrogen and phosphorus) and response numeric targets (chlorophyll *a*, dissolved oxygen and un-ionized ammonia). The TMDLs also specify nitrogen and phosphorus WLAs (point source discharges) and LAs (nonpoint source discharges) for each lake. Compliance with interim dissolved oxygen and chlorophyll a numeric targets is to be achieved by December 31, 2015. Compliance with the final numeric targets and WLAs and LAs is to be achieved by December 31, 2020. The LAs and WLAs are specified as 10-year running average.

18. The nitrogen and phosphorus WLAs and LAs for Canyon Lake are applicable to those discharges tributary to Canyon Lake. The nitrogen and phosphorus WLAs and LAs for Lake Elsinore apply to those areas downstream of Canyon Lake and to overflows from Canyon Lake.

19. TMDL Implementation Plans for each TMDL assign responsibilities to specific MS4 dischargers/stakeholders to identify sources of Impairment, to propose BMPs to address those sources, and to monitor, evaluate and revise BMPs based on monitoring results. Specific TMDL Implementation Plan tasks associated with Urban Runoff are described in Chapter 5 of the Basin Plan and are assigned to one or more of the Permittees. Requirements of the TMDL implementation plan tasks are incorporated into this Order and were proposed for inclusion in Chapter 13 of the DAMP (see 2007 ROWD). Several of these tasks are also jointly assigned to non-Permittee stakeholders. The Permittees have established TMDL Task Forces to jointly implement and coordinate those tasks.

20. To evaluate compliance with TMDL WLAs as per the Implementation Plans, the Permittees proposed to submit a Comprehensive Nutrient Reduction Plan to:

    a. Evaluate the effectiveness of BMPs and other control actions implemented; and

    b. Evaluate the progress towards compliance with the nutrient WLA for Urban Runoff.

21. The Canyon Lake and Lake Elsinore Nutrient TMDL Task Force (also referred to as the San Jacinto Watershed Urban Dischargers) members are tabulated below:

Table 6 - Canyon Lake and Lake Elsinore Nutrient TMDL Task Force

Riverside MS4 Permittees	Non-Permittees
Beaumont, City of	California Department of Fish and Game
Canyon Lake, City of	California Department of Transportation (Caltrans),
Hemet, City of	Eastern Municipal Water District
Lake Elsinore, City of	Elsinore Valley Municipal Water District
Moreno Valley, City of	U.S. Air Force (March Air Reserve Base), March Joint Powers Authority,
Murrieta, City of	U.S. Forest Service
Perris, City of	Western Riverside County Agricultural Coalition
San Jacinto, City of	
Riverside, City of	
Riverside, County of	
RCFC&WCD	

22. The cities of Menifee and Wildomar were recently incorporated and are responsible for compliance with the Canyon Lake and Lake Elsinore Nutrient TMDL requirements. They have the option to participate in the TMDL Task Force or comply with the TMDL requirements on their own.

23. Interim compliance (compliance determination prior to the final WLA compliance dates) determination with the WLAs in the TMDLs will be based on the Lake Elsinore and Canyon Lake (LE/CL) Permittees progress towards implementing the various TMDL Implementation Plan tasks as per the resultant studies and plans approved by the Regional Board. The CL/LE Permittees are required to develop a Comprehensive Nutrient Reduction Plan (CNRP) designed to achieve compliance with the WLAs by the final compliance date for approval of the Regional Board. In the absence of an approved CNRP, the WLAs specified in the approved Canyon Lake/Lake Elsinore Nutrient TMDL will constitute the final numeric WQBELs.

G. NEW DEVELOPMENT/SIGNIFICANT REDEVELOPMENT – WQMP /LID

1. The California Constitution and Government Code provide the Co-Permittees planning policy powers that mandate that the Co-Permittees review and condition New Development consistent with the Subdivision Map Act, CEQA, and their respective general plans, ordinances, and resolutions to ensure the general public's health and safety. If these constitutional and statutory mandates are not properly implemented and local ordinances and resolutions are not properly enforced, there is a creditable potential that New Development could result in the discharge of Pollutants via Urban Runoff to the Waters of the U.S within the Permit Area.

2. Significant development has taken place in Riverside County in the last decade. These developments have resulted in the urbanization of many areas. Urbanization generally increases Urban Runoff volume and velocity of runoff and the amount of Pollutants in the runoff. As development occurs, natural vegetated

pervious ground cover is converted to impervious surfaces such as highways, streets, rooftops and parking lots. Natural vegetated soil can both absorb rainwater and remove Pollutants providing an effective natural purification process. In contrast, impervious surfaces can neither absorb water nor remove Pollutants, and the natural purification characteristics are lost. Additionally, urban development can significantly increase Pollutant loads as the increased population density causes proportionately higher levels of vehicle emissions, vehicle maintenance wastes, municipal sewage wastes, pesticide, household hazardous wastes, pet wastes, trash, and other Anthropogenic Pollutants.

3. Urbanization can especially threaten environmentally sensitive areas (ESAs) and stream geomorphology. ESAs typically have a much lower capacity to withstand Pollutant loads. In essence, development that is ordinarily insignificant in its impact on the environment may in a particular sensitive environment become significant. Designated ESAs are defined in the Glossary (Appendix 4).

4. Unmitigated high volumes and velocities of discharges from MS4 facilities associated with new development (which may include non-Urban Runoff) into natural watercourses can alter the natural rate of change of a stream and adversely impact aquatic ecosystems and stream habitat and cause stream bank erosion and physical modifications. These changes are the result of Hydromodification. Typically, Hydromodification especially impacts those natural streams in the developing foothills and in other urbanizing fringe portions of the Permit Area.

5. On October 5, 2000, the State Board adopted Order No. WQ-2000-11, which is a precedential order. Order No. WQ-2000-11 required that Urban Runoff generated by 85th percentile storm events from specific types of development categories be infiltrated, filtered or treated. The essential elements of this precedential order were incorporated into the 2002 MS4 Permit and are incorporated herein. In accordance with the requirements specified in the 2002 MS4 Permit, the Permittees developed a model WQMP and Template.

6. The WQMP and Template provide a framework to incorporate some of the watershed protection principles into the Co-Permittees' planning, construction and post-construction phases of New Development and Significant Redevelopment projects. The WQMP includes site design (including, where feasible, LID principles), Source Control and Treatment Control elements to reduce the discharge of Pollutants in Urban Runoff. On September 17, 2004, the Regional Board approved the WQMP. The Co-Permittees are requiring proponents of New Developments and Significant Redevelopments to develop and implement site-specific WQMPs. This Order requires Co-Permittees to continue requiring preliminary project-specific WQMPs as early as possible during the environmental review or planning phase (land use entitlement) and to review and approve final project-specific WQMP that is in substantial conformance with the preliminary

project-specific WQMP prior to the issuance of any building or grading permit. This Order also requires Co-Permittees to verify functionality of post-construction BMPs prior to issuance of certificate of occupancy and to track and ensure long term operation and maintenance of those BMPs as per the approved project-specific WQMPs.

7. An audit of each of the Pemittees' Urban Runoff management programs during the term of the 2002 MS4 Permit indicated no clear nexus between the watershed protection principles, including LID techniques specified in the WQMP and the Permittees' General Plan or related documents such as Development Standards, Zoning Codes, Conditions of Approval and Project Development Guidance. Existing procedures, ordinances, local codes, and development standards may be barriers to implementation of LID practices. This Order requires the Permittees to evaluate their General Plans, comprehensive or master plans, zoning codes, subdivision ordinances, project development standards, conditions of approval or related documents to determine whether the removal of any barriers, within their control, is feasible for implementation of LID techniques and other requirements of this Order. Where feasible, the Co-Permittees will make appropriate changes to remove barriers to implement LID techniques and other requirements of this Order.

8. This Order also requires the Permittees to review and enforce covenants, conditions and restrictions (CC&R) or develop other mechanisms to ensure proper long term operation and maintenance of post-construction BMPs.

9. In addition to addressing post-development water quality, the WQMP includes requirements to protect ESAs and address potential Hydromodification issues. Section 4.4 of the WQMP requires identification of Hydrologic Conditions of Concern (HCOC). An HCOC exists when a site's hydrologic regime is altered and there are significant impacts on downstream channels and aquatic habitats, alone or in conjunction with impacts of other projects. Currently, New Development and Significant Re-development projects are required to perform this assessment and incorporate appropriate BMPs to ensure existing hydrologic conditions are maintained. This Order requires the Permittees to implement LID techniques to minimize HCOC.

10. Management of the impacts of urbanization on water quality and stream stability in the Permit Area is more effective if the techniques are implemented at the project site, within the neighborhood and within each Co-Permittee's jurisdiction based on an overall watershed plan. The Permittees have identified Major Outfalls and have submitted maps of existing MS4 facilities. This Order requires the Permittees to expand upon the existing maps to include a map of its lined and unlined channels and streams within the Permit Area with the goal of identifying, prioritizing, and developing specific action plans for protecting those segments of streams that are vulnerable to development impacts.

11. This Order further requires the Permittees to develop a Watershed Action Plan that would address TMDL Implementation Plan BMP strategies and provide regional tools to address Hydromodification. The Permittees may choose to implement a single Watershed Action Plan for the entire Permit Area, or subdivide the Permit Area into sub-watersheds as appropriate to cost-effectively address TMDL requirements. The Watershed Action Plan integrates existing watershed based planning efforts and incorporates watershed tools to manage cumulative impacts of development on vulnerable streams, preserve structure and function of streams, and protect source, surface and groundwater quality and water supply in the permitted area. The Watershed Action Plan should integrate Hydromodification and water quality management strategies with land use planning policies, ordinances, and plans within each jurisdiction. Existing Permittee watershed planning efforts include the Western Riverside County Multiple Species Habitat Conservation Plan, Special Area Management Plan, Santa Ana and San Jacinto Integrated Regional Watershed Management Plans, Lake Elsinore and Canyon Lake and Middle Santa Ana River TMDL Task Forces, SCCWRP Hydromodification sensitivity mapping project, and various regional BMP evaluations being conducted by the Principal Permittee in conjunction with various water districts should be evaluated and incorporated into the Watershed Action Plan as necessary to address TMDL Implementation Plan requirements and Hydromodification. The regional efforts should be evaluated, and if necessary, enhanced to provide Permittees with the tools to integrate Hydromodification and TMDL management strategies with Permittee MS4 Permit compliance programs and land use planning policies, ordinances, and plans within appropriate Permittee jurisdictions within the Permit Area.

12. Pending completion of a Watershed Action Plan and implementing tools, management of the impacts of urbanization shall be accomplished on a per project and per jurisdiction basis through jurisdictional implementation of the watershed tools incorporated into the local general plans, ordinances and other requirements and the project-specific WQMPs.

13. The SMC in collaboration with SCCWRP and the California Storm Water Quality Association (CASQA) with funding from the State Water Resources Control Board and CASQA is developing a LID manual for Southern California. This manual will be incorporated into the CASQA BMP Handbooks. The Permittees are encouraged to utilize the LID manual as a resource to implement LID techniques once completed.

14. This Order requires the project proponents to first consider preventative and conservation techniques (e.g., preserve and protect natural features to the MEP) prior to considering mitigative techniques (Structural BMPs such as infiltration systems, or other Treatment Control BMPs). The mitigative measures should be

prioritized with the highest priority for BMPs that remove Pollutants in Urban Runoff and reduce the volume of Urban Runoff, such as infiltration, then other BMPs, such as harvesting and use, evapotranspiration and bio-treatment should be considered. Consistent with the MEP standard, these LID BMPs must be implemented at the project site. Consideration of "highest and best use" of the discharge should also be considered. For example, Lake Elsinore is evaporating faster than runoff from natural precipitation can recharge it. Requiring infiltration of 85% of runoff events for projects tributary to Lake Elsinore would only exacerbate current water quality problems associated with Pollutant concentration due to lake water evaporation. In cases where rainfall events have low potential to recharge Lake Elsinore (i.e. no hydraulic connection between groundwater to Lake Elsinore, or other factors), requiring infiltration of Urban Runoff from projects is counterproductive to the overall watershed goals. Project proponents, in these cases, would be allowed to discharge Urban Runoff, provided they used equally effective filtration-based BMPs. The Regional Board also recognizes that site conditions, including site soils, contaminant plumes, high groundwater levels, etc., could limit the applicability of infiltration and other LID BMPs at certain project sites. Where LID BMPs are not feasible or appropriate at the project site, more traditional, but equally effective BMPs (proprietary or non-proprietary) should be implemented. This Order provides for alternatives and in-lieu programs where preferred LID BMPs are infeasible or inappropriate. In addition, extra diligence should also be performed when proposing infiltration BMPs in areas where the proposed land use is often associated with soil and groundwater contamination. Pre-treatment of the water prior to infiltration is necessary in most cases. Proprietary treatment devices may be utilized when it is demonstrated that they meet or exceed the MEP standard.

15. The USEPA has determined that LID/green infrastructure can be a cost-effective and environmentally preferable approach for the control of storm water pollution and to minimize downstream impacts by mimicking pre-development hydrology. LID techniques promote the reduction of impervious areas which may achieve multiple environmental and economic benefits in addition to enhanced water quality and supply, stream and habitat protection, cleaner air, reduced urban temperature, increased energy efficiency and other community benefits such as aesthetics recreation, and wildlife areas. This Order incorporates a volume capture metric based on the design volume specified in the WQMP.

16. If not properly designed and maintained, Treatment Control BMPs could create a nuisance and/or habitat for vectors[16] (e.g., mosquitoes and rodents). The 2002 MS4 Permit required the Permittees to closely collaborate with the local vector

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[16] Managing Mosquitoes in Storm water Treatment Devices, Marco E. Metzger, University of California Davis, Division of Agriculture and Natural Resources, Publication 8125.

control agencies during the development and implementation of such Treatment Control BMPs. The Permittees should continue these collaborative efforts with the vector control agencies to ensure that Treatment Control BMPs do not become a Nuisance or a potential source of Pollutants. The requirements specified in this Order include identification of responsible agencies for maintaining the Treatment Control BMPs and for providing funding for operation and maintenance.

17. If not properly designed and maintained, groundwater infiltration systems may adversely impact groundwater quality. Restrictions placed on Urban Runoff infiltration in this Order (Section XI.D.8) are based on recommendations provided by the USEPA Risk Reduction Laboratory. The Permittees should work closely with the water districts and water conservation districts to insure groundwater protection.

18. This Order incorporates new project categories and revised thresholds for several categories of new development and redevelopment projects that trigger the requirement for a WQMP. The 2008 National Research Council (NRC) report[17] indicates that roads and parking lots constitute as much as 70% of total impervious cover in ultra-urban landscape, and as much as 80% of the directly connected impervious cover. Roads tend to capture and export more storm water Pollutants than other impervious covers. As such, roads are included as a priority development category for which WQMPs are required. Private New Development and Significant Redevelopment projects incorporating roads typically allow road runoff to be addressed as part of the overall water quality strategy for the larger common plans of development. Permittee streets, roads and highways capital projects have special limitations. For example, the footprint of street, road and highway capital projects is often limited and may have hydraulic constraints due to lack of underground storm drain systems that would otherwise be necessary to hydraulically facilitate treatment of runoff. There are also limitations specified in state and federal design and code specifications that may limit or prohibit certain BMPs. Permittees may also be subject to flow diversion liability and limited road maintenance budgets and equipment. Street, road and highway projects that function as part of the MS4 also receive runoff and associated Pollutants from both existing urban areas and other external sources, including-adjacent land use activities, aerial deposition, brake pad and tire wear and other sources that may be outside the Co-Permittee's authority to regulate and/or economic or technological ability to control. These offsite flows can overwhelm Treatment Control BMPs designed to address the footprint (consistent with the typical requirements for a WQMP) of street, road or highway capital projects incorporating curb and gutter as part of its storm water conveyance function. Despite these limitations, the Regional Board finds that Permittee construction of streets, roads and highway capital

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[17] National Research Council Report (2008), http://www.nap.edu/catalog.php?record_id=12465

projects may provide an opportunity to address Pollutant loads from existing urban areas. However, due to the nature of the facilities and projects, it would be unduly burdensome for the Co-Permittees to maintain WQMP documents for transportation projects (in addition to Facility Pollution Prevention Plans and other overlapping requirements of this Order). The Permittees are therefore not required to prepare WQMP documents for street, road and highway capital projects, but instead are required to develop functionally equivalent documents that include site specific consideration utilizing BMP guidance to address street, roads and highway capital project runoff to the MEP.

19. The NRC report also indicates that there is a direct relationship between impervious cover and the biological condition of downstream receiving waters. The Permittees are required to address HCOC from New Development and Significant Redevelopment projects to minimize downstream impacts.

H. CO-PERMITTEE INSPECTION PROGRAMS

1. Each Co-Permittee conducts inspections of those Construction Sites for which it has issued either a grading or building permit to determine compliance with its ordinances, regulations, and codes, including its Storm Water Ordinance. Each Co-Permittee, consistent with its ordinances, rules and regulations, inspects each site for compliance with the conditions of approval governing the grading or building permit. These inspections have been expanded by the Co-Permittees to determine that sites requiring coverage under the General Construction Activity Storm Water Permit have obtained permit coverage by verifying that a Waste Discharge Identification (WDID) number has been issued by the State Board..

2. The DAMP addresses compliance strategies with regard to industrial and commercial facilities. As part of their Urban Runoff management activities, the Principal Permittee and the County entered into an agreement, dated August 10, 1999 by which they have developed and funded, in cooperation with the Riverside County Environmental Health Department, the "Compliance Assistance Program" (CAP) which includes a storm water survey component as part of existing inspections of hazardous material handlers and retail food service activities. The CAP consists of educational outreach to the inspected facilities and detailed storm water compliance surveys for each facility that must secure a hazardous materials permit for either storing, handling or generating such materials (there are approximately 5,500 facilities of which approximately 2,300 are inspected annually, and all facilities are inspected at least once during a two year cycle) and retail food facilities (there are approximately 6,750 facilities, all of which are inspected 1 to 3 times annually). Storm Water Compliance Surveys are conducted with each inspection of hazardous materials facilities, and at least once during the MS4 Permit term for restaurants. Restaurant inspectors are authorized to conduct

additional surveys if they observe an IC/ID or ordinance violation. The type of industrial/commercial establishment that is inspected includes, but is not limited to, automobile mechanical repair, maintenance, fueling, or cleaning operation, automobile or other vehicle body repair or painting operations, and painting or coating operations. Completed surveys that indicate non-compliance are forwarded to the appropriate Co-Permittee's enforcement division for follow up action. In addition, the cities of Corona and Riverside, which operate publicly owned treatment works (POTW), conduct annually on average, approximately 4,400 wastewater pre-treatment inspections, on a variety of industrial and commercial establishments within their respective jurisdictions, including, but not limited to, retail food establishments, car washes, and carpet, drape & furniture cleaning establishments. The Permittees have agreed to notify Regional Board staff when conditions are observed during such inspections that appear to be in violation of either the Storm Water General Permits or a permit issued by the Regional Board.

3. An evaluation of the Permittees' inspection programs during the 2002 MS4 Permit indicated a wide range of compliance and non-compliance with the Construction Cite and Industrial and Commercial Facilities inspection requirements. In many instances, the Construction Site and Facilities' return to compliance was not properly documented. This Order includes requirements for a more effective inspection program and includes a performance measure, time to return to compliance, as a metric for program effectiveness.

I. ILLICIT CONNECTIONS/ ILLEGAL DISCHARGES (IC/ID)

1. Illegal Discharges to the MS4 can contribute to contamination of Urban Runoff and other surface waters. During the term of the 1990 MS4 Permit, the underground MS4 facilities were inspected and only one Illicit Connection was identified. Open channels and other aboveground elements of the MS4 are inspected for evidence of Illegal Discharges as an element of routine maintenance by the Permittees. The Permittees also developed a program to prohibit IC/IDs to their MS4 facilities. Continued surveillance and enforcement of these programs are required to eliminate IC/IDs. The Permittees have a number of procedures in place to eliminate IC/IDs to the MS4, including Construction Site and Commercial, and Industrial Facility inspections, MS4 facility inspections, water quality monitoring and reporting programs, and public education.

2. The Permittees have the authority to control Pollutants in Urban Runoff, to prohibit IC/ID, to control spills, and to require compliance and carry out inspections of the MS4 facilities within their respective jurisdictions. The Co-Permittees have been extended necessary legal authority through California

statutes and local charters. Consistent with this statutory authority, each of the Co-Permittees have adopted their respective Storm Water Ordinances.

3. Even though the Permittees have established the authority and the procedures to detect and eliminate IC/IDs, audits conducted during the term of the 2002 MS4 Permit indicated that this program element is generally carried out passively through complaint response. IC/IDs are also detected through inspection programs and maintenance activities. Reports from maintenance inspectors are also typically logged as complaints. This Order requires each Permittee to revise this program element based on the Center for Watershed Protection's Illegal Discharge Detection and Elimination: A Guidance Manual for Program Development and Technical Assessments, or equivalent program.

J. TECHNOLOGY-BASED EFFLUENT LIMITATIONS (Not Applicable)

K. WATER QUALITY-BASED EFFLUENT LIMITATIONS (WQBELs) AND TMDL WLA

1. 40 CFR 122.44(d) requires that NPDES permits include WQBELs to attain and maintain applicable numeric and narrative water quality criteria to protect the Beneficial Uses of the Receiving Water. Where numeric water quality criteria have not been established, 40 CFR 122.44(d) specifies that WQBELs may be established using USEPA criteria guidance under CWA section 304(a), proposed State criteria or a State policy interpreting narrative criteria supplemented with other relevant information, or an indicator parameter. In *Defenders of Wildlife, et al* v. *Browner,* No. 98–71080 (9th Cir, October 1999), the Court held that the CWA does not require strict compliance with State Water Quality Standards for MS4 permits under section 301(b)(1)(C), but that at the same time, the CWA does give the permitting authority the discretion to incorporate appropriate WQBEL under another provision, CWA Section 402(p)(3)(B)(iii). The use of BMPs to control or abate the discharge of Pollutants is allowed by 40 CFR 122.44(k)(3) when Numeric Effluent Limitations are infeasible or when practices are reasonably necessary to achieve Effluent Limitations and standards or to carry out the purposes and intent of the CWA. The legislative history and the preamble to the federal storm water regulations indicate that the Congress and the USEPA were aware of the difficulties in regulating Urban Runoff solely through traditional end-of-pipe treatment. It is the Regional Board's intent to require the Permittees to implement BMPs consistent with the MEP standard in order to support attainment of Water Quality Standards. This Order includes Receiving Water Limitations based on Water Quality Objectives; it prohibits the creation of Nuisance and requires the reduction of Water Quality Standards Impairment in Receiving Waters. The Permit includes a procedure for determining whether Urban Runoff is causing or contributing to exceedances of Receiving Water Limitations and for evaluating whether the DAMP must be revised to include additional or more effective BMPs designed to meet

Water Quality Standards. The Order establishes an iterative process to determine compliance with the Receiving Water Limitations.

2. To support attainment of Water Quality Standards, consistent with the MEP standards, this Order aims to reduce the discharge of Pollutants in Urban Runoff from the MS4 by requiring Permittees to:
   a. Implement BMPs at Permittee facilities and activities,
   b. Require BMPs, including where appropriate, LID techniques, to be implemented at New Development and Significant Redevelopment project sites prior to accepting discharges into their MS4 facilities, where feasible,
   c. Implement and annually evaluate the DAMP and each Permittee's LIP for effectiveness in reducing Pollutants in Urban Runoff, and
   d. Determine if Urban Runoff is contributing to exceedances of Water Quality Objectives or Beneficial Uses in Receiving Waters by comparing outfall and receiving water monitoring results to: (1) Water Quality Objectives (WQOs), (2) California Toxic Rule (CTR), (3) USEPA Multi-Sector Permit Parameter Benchmark Values and (4) other appropriate data identified by the Permittees. The Permittees should also evaluate the Regional Monitoring reports prepared by SCCWRP to assess trends in Urban Runoff and Receiving Water quality within the Permit Area.
3. Federal regulations (40 CFR 122.44(d)(1)(vii)(B) require inclusion of Effluent Limits that are "consistent with the assumptions and requirements of any available WLA for the discharge prepared by the State and approved by USEPA." Consistent with this requirement, this Order includes interim effluent limits and a process for developing a BMP-based approach which, if adopted by the Regional Board prior to the compliance dates(s) specified in the associated comprehensive plan, shall become the final WQBEL(s). The Permittees are required to submit a comprehensive plan describing the proposed BMPs and the documentation demonstrating that the BMPs are expected to attain the WLAs by the compliance dates when implemented. If the Regional Board approves this comprehensive plan, this Order will be amended to include the comprehensive plan as the final WQBEL(s). If the Regional Board does not approve the comprehensive plan prior to the compliance date; the WLAs will become the final WQBEL(s) on the applicable compliance date and will remain in effect until a comprehensive plan is approved by the Regional Board. The comprehensive plan will be updated, as necessary, to reflect evaluations of the effectiveness of the BMPs, including evaluations presented in the annual reports.

4. These WQBELs are consistent with the assumptions and requirements identified in the TMDL Implementation Plans adopted with the TMDLs because the WQBELs are expected to be sufficient to meet the WLAs by the compliance dates. The

TMDLs within the Permit Area are described in Section F, above. These include the following:

a. MSAR Bacterial Indicator TMDL

i. The TMDL relies on this Order to implement the WLAs for Urban Runoff from the MSAR Permittees.

ii. This Order requires the MSAR Permittees to fully comply with the TMDL Implementation Plan. The TMDL Implementation Plan includes requirements for monitoring, and submittal of plans and schedules to implement short term solutions and develop long-term solutions to achieve TMDL compliance by the specified compliance dates.

iii. There are two components in the MSAR TMDL (fecal coliform and *E. coli*). The Basin Plan currently does not have an established objective for *E. coli*. The work that is currently being done by SWQSTF is expected to make recommendations for the adoption of *E. coli* objectives and revised WLAs based on *E.coli*. This Order incorporates the current WLAs as WQBELs. If the WLAs are revised, this Order will be reopened to incorporate the new WLAs.

iv. Upon adoption of this Order, the tasks identified in the MSAR TMDL Implementation Plan that have been developed by the MSAR Permittees and approved by the Regional Board become the interim Effluent Limits.

v. The MSAR Permittees are required to develop a Comprehensive Bacteria Reduction Plan(CBRP) designed to achieve WLAs by the compliance date. Once approved by the Regional Board, the CBRP becomes the final Effluent Limit. In the absence of an approved CBRP, the WLAs become the final numeric WQBEL by the compliance date specified in the TMDL.

b. Canyon Lake and Lake Elsinore Nutrient TMDLs

i. This Order is consistent with the Urban WLAs specified in the Canyon Lake and Lake Elsinore Nutrient TMDLs.

ii. Consistent with the TMDL Implementation Plan, this Order requires the LE/CL Permittees to identify sources of Impairment, propose BMPs to address those sources, and to monitor, evaluate and revise BMPs based on the monitoring results. Specific TMDL Implementation Plan tasks are described in Chapter 5 of the Basin Plan and are assigned to one or more of

the Permittees. Requirements of the TMDL Implementation Plan tasks are incorporated into this Order and Chapter 13 of the 2007 DAMP.

iii. In Chapter 13 of the 2007 DAMP submitted with the ROWD, the LE/CL Permittees have proposed BMP programs, consistent with the aforementioned TMDL Implementation Plan tasks.

iv. This Order also requires the LE/CL Permittees to monitor at representative Urban Runoff monitoring locations defined in the Consolidated Program for Water Quality Monitoring (CMP), (Phase 2 TMDL Monitoring is specified in the Lake Elsinore and Canyon Lake Nutrient TMDL Monitoring Plan dated February 15, 2006) and TMDL Implementation Plan and to evaluate the effectiveness of BMPs implemented in the Permit Area in reducing Pollutants of Concern in Urban Runoff to determine progress towards attainment of WLAs by the specified compliance date.

v. The Regional Board recognizes that additional research is needed to determine the most appropriate control mechanism to attain Water Quality Standards for nutrients in these two lakes. This Order provides the LE/CL Permittees the flexibility to meet the WLAs through a variety of techniques. Even though, the WLAs for the Canyon Lake and Lake Elsinore Nutrient TMDLs are expressed as WQBELs, if Water Quality Standards in the Lakes are met through biological or other in-Lake control mechanisms, the LE/CL Permittees' obligation to meet the WLAs is satisfied. as the impairment for which the TMDLs were developed would not exist anymore. The Permittees in the affected watersheds are required to develop a CNRP designed to achieve the WLAs by the compliance dates specified in the TMDL. In the absence of an approved CNRP, the WLAs become the final numeric WQBELs for nutrients.

L. WATER QUALITY CONTROL PLAN (BASIN PLAN)

1. The Regional Board adopted a revised Water Quality Control Plan for the Santa Ana River Basin (hereinafter Basin Plan) that became effective on January 24, 1995. The Basin Plan designates Beneficial Uses, establishes Water Quality Objectives, and contains implementation programs and policies to achieve those Water Quality Objectives for all waters in the Santa Ana Region addressed through the Basin Plan.

2. More recently, the Basin Plan was significantly amended to incorporate revised boundaries for groundwater subbasins, now termed "management zones", new nitrate-nitrogen and TDS objectives for the new management zones, and new nitrogen and TDS management strategies applicable to both surface and ground

waters. This Basin Plan Amendment was adopted by the Regional Board on January 22, 2004. The State Board and the Office of Administrative Law (OAL) approved the amendment on September 30, 2004 and December 23, 2004, respectively. The USEPA approved the surface water standard and related provisions of the amendment on June 20, 2007.

3. TDS and TIN limitations in Table 4-1 of the Basin Plan are specified in this Order for Permittees' discharges subject to the De Minimus Permit. Where Dry Season flows are identified as part of the IC/ID program element, this Order also requires Permittees to establish their baseline discharge concentration for Dry Season conditions.

4. As discussed in Section K, WQBELs, and TMDL WLA, the Basin Plan has been amended to incorporate several TMDLs and TMDL Implementation Plans adopted for waterbodies within the Permit Area. In addition, the Basin Plan implements State Board Resolution 88-63, which established a state policy that all waters, with certain exceptions, are suitable or potentially suitable for municipal or domestic water supply. Thus, as discussed in detail in the Fact Sheet, Beneficial Uses recognized in the Basin Plan for Receiving Waters in the Permit Area are as follows:

   a. Municipal and Domestic Supply,
   b. Agricultural Supply,
   c. Industrial Service Supply,
   d. Industrial Process Supply,
   e. Groundwater Recharge,
   f. Hydropower Generation,
   g. Water Contact Recreation,
   h. Non-contact Water Recreation,
   i. Warm Freshwater Habitat,
   j. Limited Warm Freshwater Habitat,
   k. Cold Freshwater Habitat,
   l. Preservation of Biological Habitats of Special Significance,
   m. Wildlife Habitat,
   n. Rare, Threatened or Endangered Species, and
   o. Spawning, Reproduction, and Development

5. The existing and potential Beneficial Uses of groundwater that could be impaired by the discharge of Urban Runoff within the Permit Area include one or more of the following:

   a. Municipal and Domestic Supply,
   b. Agricultural Supply,
   c. Industrial Service Supply, and

d. Industrial Process Supply

6. The Basin Plan also incorporates by reference all State Board water quality control plans and policies including the 1990 Water Quality Control Plan for Ocean Waters of California (Ocean Plan) and the 1974 Water Quality Control Policy for Enclosed Bays and Estuaries of California (Enclosed Bays and Estuaries Policy). Water Quality Objectives specified in the Basin Plan are local numeric and narrative objectives that may be more stringent than the national or statewide water quality criteria.

M. NATIONAL TOXICS RULE (NTR) AND CALIFORNIA TOXICS RULE (CTR)

NTR and CTR are blanket water quality criteria that apply to all surface water discharges. However, the *Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California* states that the Policy does not apply to regulation of storm water discharges. Regional Board believes that compliance with Water Quality Standards through implementation of BMPs is appropriate for regulating Urban Runoff. The USEPA articulated this position on the use of BMPs in storm water permits in the policy memorandum entitled, ‘‘Interim Permitting Approach for Water Quality-Based Effluent Limitations in Storm Water Permits’’ (61 FR 43761, August 9, 1996).[18]

N. STATE IMPLEMENTATION POLICY (SIP)

See Section M, above.

O. COMPLIANCE SCHEDULES AND INTERIM REQUIREMENTS

The Basin Plan contains schedules for achieving compliance with WLAs for Bacterial Indicators in the MSAR watershed and nutrients in the San Jacinto watershed (Canyon Lake/Lake Elsinore). It is appropriate to require the CL/LE Permittees to comply with those time schedules for various deliverables as specified in the approved TMDL Implementation Plans. Consistent with the State Board’s Compliance Schedule Policy (Resolution No. 2008-0025), this Order incorporates interim and final Effluent Limits, where applicable. Additionally, since the TMDL compliance dates are outside the term of this MS4 Permit, it is also appropriate to require the Permittees to monitor and report the effectiveness of BMPs implemented in the Permit Area to evaluate progress towards attainment of WLAs by the time schedules specified in the adopted TMDLs. This Order includes the schedules for deliverables as part of the TMDL Implementation Plans as well as a requirement to monitor the effectiveness of BMPs in the Permit

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[18] See discussions on Wet Weather Flows in the Federal Register/Vol. 65, No. 97/Thursday, May 18, 2000/Rules and Regulations

Area in reducing Pollutant discharges and to report progress towards compliance with the TMDL WLAs by the compliance dates.

P. ANTIDEGRADATION POLICY

40 CFR 131.12 requires that State Water Quality Standards include an antidegradation policy consistent with the federal policy. The State Board established California's antidegradation policy in Resolution No. 68-16. Resolution No. 68-16 incorporates the federal antidegradation policy where the federal policy applies under federal law. Resolution No. 68-16 requires that existing quality of waters be maintained unless degradation is justified based on specific findings. The Regional Board's Basin Plan implements, and incorporates by reference, both the State and federal antidegradation policies. As discussed in detail in the Fact Sheet (see sections IV and V), the permitted discharges are consistent with the antidegradation provisions of 40 CFR 131.12 and State Board Resolution No. 68-16.

Q. ANTI-BACKSLIDING

Sections 402(o)(2) and 303(d)(4) of the CWA and federal regulations at 40 CFR 122.44(l) prohibit backsliding in NPDES permits. These anti-backsliding provisions require Effluent Limitations in a reissued NPDES permit to be as stringent as those in the previous permit, with some exceptions where Effluent Limitations may be relaxed. All Effluent Limitations in this Order are at least as stringent as the Effluent Limitations in the 2002 Order.

R. PUBLIC EDUCATION/PARTICIPATION

1. Public participation during the development of Urban Runoff management programs and implementation plans is necessary to ensure that all stakeholder interests and a variety of creative solutions are considered. In addition, the federal storm water regulations require public participation in the development and implementation of the Urban Runoff management program. As such, the Permittees are required to solicit and consider all comments received from the public and submit copies of the comments to the Executive Officer of the Regional Board with the Annual Reports. In response to public comments, the Permittees may modify reports, plans, or schedules prior to submittal to the Executive Officer.

2. There are Pollutants in Urban Runoff from privately owned and operated facilities such as residences, businesses and commercial establishments and public and private institutions. A successful NPDES MS4 permit program should include the participation and cooperation of public entities, private businesses, and public and private institutions. Therefore, public education is a critical element of the DAMP. As the population increases in the Permit Area, it will be even more important to

continue to educate the public regarding the impact of human activities on the quality of Urban Runoff.

3. In addition to the Regional Board, a number of other stakeholders are involved in the management of the water resources of the Region. These include, but are not limited to, the incorporated cities in the Region, POTWs, the three counties, and the Santa Ana Watershed Project Authority and its member agencies. The entities listed in Appendix 2 are considered as potential dischargers of Urban Runoff in the Permit Area. It is expected that these entities will also work cooperatively with the Permittees to manage Urban Runoff. The Regional Board, pursuant to 40 CFR 122.26(a), has the discretion and authority to require non-cooperating entities to participate in this Order or to issue individual MS4 permits. The Permittees may request the Regional Board to issue a separate NPDES Permit to any discharger into MS4 facilities they own or operate.

4. Cooperation and coordination among the stakeholders (regulators, Permittees, the public, and other entities) are critical to optimize the use of finite public resources and ensure economical management of water quality in the Region. Recognizing this fact, this Order focuses on integrated watershed management and seeks to integrate the programs of the stakeholders, especially the holders of the three MS4 permits within the Regional Board's jurisdiction.

5. Education is an important aspect of every effective Urban Runoff management program and the basis for changes in behavior at a societal level. Education of municipal planning, inspection, and maintenance department staff is especially critical to ensure that in-house staff understand how their activities impact water quality, how to accomplish their jobs while protecting water quality, and their specific roles and responsibilities for compliance with this Order. Public education, designed to target various urban land users and other audiences, is also essential to inform the public of how individual actions affect Receiving Water quality and how adverse effects can be minimized.

6. Some Urban Runoff issues, such as public education and training, can be effectively addressed on a regional or statewide basis. Regional approaches to Urban Runoff management can improve program consistency and promote sharing of resources, which can result in implementation of more efficient programs. In particular the counties of San Bernardino and Riverside and their collective municipalities are encouraged to cooperatively work together and generate a unified education and training program.

S. PERMITTEE FACILITIES AND ACTIVITIES

1. The Permittees own/operate facilities where industrial or related activities take place that may have an impact on Urban Runoff quality. Some of the Permittees

enter into contracts with outside parties to carry out activities that may also have an impact on Urban Runoff quality. These facilities and related activities include, but are not limited to, street sweeping, catch basin cleaning, maintenance yards, vehicle and equipment maintenance areas, waste transfer stations, corporation and storage yards, parks and recreational facilities, landscape and swimming pool maintenance activities, MS4 maintenance activities and the application of herbicides, algaecides and pesticides.

2. This Order requires continued implementation of BMPs intended to reduce Pollutant discharges from those Permittee activities/facilities that are found to be significant sources of Pollutants in Urban Runoff. This Order prohibits non-storm water discharges from facilities owned or operated by the Permittees unless the discharges are exempt under Section VI of this Order or are permitted by the Regional Board under an individual NPDES permit.

3. Program evaluations conducted during the term of the 2002 MS4 Permit indicated varying degrees of compliance/noncompliance at Permittee facilities and activities. This Order requires each Permittee to review its inventory of fixed facilities, field operations and drainage facilities to ensure that Permittee facilities do not cause or contribute to a Pollution or Nuisance in Receiving Waters. Permittee fixed public facilities and field operations are to be inspected annually.

T. MUNICIPAL CONSTRUCTION PROJECTS

1. The 2002 MS4 Permit authorized the discharge of storm water from construction activities on an acre or more, that are under ownership or direct responsibility of the Permittees. Permittees were required to notify the Regional Board prior to commencement of construction activities, and to comply with the latest Statewide General Construction Permit. Permittees were also required to develop a SWPPP and monitoring program specific to the Construction Site. Program evaluations conducted during the term of the 2002 MS4 Permit indicated that some Permittees were not submitting or were not aware of the requirement to submit a NOI and subsequent Notice of Termination (NOT) for Permittee Construction Sites. This Order continues the notification requirement.
2. This Order builds upon the requirement of the 2002 MS4 Permit by requiring Permittees to include post-construction BMP information for Permittee Construction Sites meeting WQMP and General Construction Permit criteria along with the NOT submitted to the Executive Officer upon completion of the construction activity. The NOT must include photographs of the completed project, a site map including structural post-construction BMP locations, long term operation and maintenance responsibility information, field verification report and copies of the final field verification reports required under Section XII.I. Permittees are required to develop

a database of post-construction BMPs per Section XII.K.4. for which they are responsible and reference this database in the LIPs.

3. Emergency Permittee public works projects required to protect public health and safety are exempted from these requirements, until the emergency ends, at which time they need to comply with the requirements.

U. MONITORING AND REPORTING

1. 40 CFR 122.48 requires that all NPDES permits specify requirements for monitoring and reporting. Sections 13267 and 13383 of the CWC authorize the Regional Board to require technical and monitoring reports. The Monitoring and Reporting Program, Attachment 3, establishes monitoring and reporting requirements to implement federal and State requirements.

2. An effective monitoring program characterizes Urban Runoff, identifies problem areas, and determines the impact of Urban Runoff on receiving waters and the effectiveness of BMPs. The Principal Permittee administers the CMP for the Permittees. The CMP includes Wet and Dry Season monitoring of MS4 Outfalls and Receiving Waters throughout Riverside County.

3. The Regional Board recognizes the importance of watershed management efforts and regional planning and coordination in the development and implementation of programs and policies related to Receiving Water quality protection, including the Urban Runoff program and TMDL processes. In light of recent TMDLs that have been developed and the expectation of future TMDLs, this Order allows the Permittees to develop a Coordinated Watershed Monitoring Plan that shows the nexus among various Urban Runoff related monitoring programs that the Permittees are participating and the MS4 permit requirements including but not limited to WLA pre-compliance, BMP effectiveness, urban source and trend evaluation, Receiving Water quality and Hydromodification effects monitoring as part of the requirements of the Monitoring and Reporting Program.

4. Multiple entities, such as POTWs, MS4, CAFOs, and other permitted and non-permitted dischargers, discharge into the same water bodies. The discharges from these various sources could potentially affect the water quality of these water bodies even when these dischargers are complying with their discharge permits. Monitoring the Receiving Waters where these multiple types of discharges take place is necessary to determine these water bodies' compliance with Water Quality Objectives and their attainment of Beneficial Uses.

5. In the past, multiple entities have individually monitored the water bodies receiving their discharges to determine impacts to these waters from their discharges. The

monitoring has resulted in fragmented data that is inconsistent in quality, and that has potentially resulted in duplication of resources.

6. The SMC's "Model Monitoring Program for Municipal Separate Storm Sewer Systems in Southern California", August 2004 Technical Report #419 indicated that "…the lack of mass emissions stations in the inland counties hampers their ability to estimate the proportional contribution of these inland areas to cumulative loads downstream." The SMC consists of representatives from the Counties of Ventura, Los Angeles, Orange, San Bernardino, Riverside, and San Diego and the City of Long Beach. Consistent with this coordinated effort, this Order includes requirements for mass emissions monitoring.
7. Every two years, the Regional Board will assess readily available data to determine if the water bodies within its jurisdiction comply with the Water Quality Objectives and attain the assigned Beneficial Uses. The data reviewed for the assessment comes from sources such as municipalities, POTWs, individual public submittals, TMDL monitoring, and special studies. The data necessary for the assessment is of known and documented quality and generated under the auspices of a Quality Assurance Project Plan (QAPP). The data also is required to be statistically sufficient to assess if the water body is meeting Water Quality Objectives and to determine if water quality is declining over time.
8. A coordinated monitoring effort is needed for each sub-watershed in the Santa Ana Region that will provide statistically sufficient data. These data should be collected with appropriate quality control and quality assurance programs and should be made available in an electronic format to meet assessment objectives.
9. The Regional Board has identified sub-watersheds in the Santa Ana Region where potential duplication of effort is taking place. These sub-watersheds include: the Upper Santa Ana River watershed, MSAR watershed, Lower Santa Ana River watershed, and the San Jacinto River watershed.
10. Regional Board staff proposes to require the various entities discharging into the waterbodies in these sub-watersheds to coordinate monitoring efforts, prepare, submit for approval, and implement a watershed monitoring plan; a QAPP, and a data management, validation, verification mechanism in order to meet the assessment objectives.
11. Under the direction of the MS4 permittees, SCCWRP is coordinating a watershed monitoring effort in Southern California. The Santa Ana Region is included in their monitoring effort. This effort will potentially produce data that will meet the needs of the Regional Board in assessing water quality. This Order requires the Permittees to continue their participation in this regional effort.

V. STANDARD AND SPECIAL PROVISIONS

The dischargers must comply with all standard provisions and with those additional conditions that are applicable under Federal NPDES Regulations 40 CFR122.41 and 40 CFR 122.42.

W. NOTIFICATION OF INTERESTED PARTIES

The Regional Board has notified the dischargers and interested agencies and persons of its intent to prescribe WDRs for the discharge and has provided them with an opportunity to submit their written comments and recommendations. Details of notification are provided in the Fact Sheet for this Order.

X. CONSIDERATION OF PUBLIC COMMENT

The Regional Board has notified the Permittees, all known interested parties, and the public of its intent to issue WDRs for this discharge and has provided them with an opportunity to submit their written views and recommendations.

The Regional Board, in a public meeting, heard and considered all comments pertaining to the discharge and the requirements of this Order. Details of the Public Hearing are provided in the Fact Sheet for this Order.

Y. ALASKA RULE

On March 30, 2000, USEPA revised its regulation that specifies when new and revised State and Tribal Water Quality Standards become effective for CWA purposes (40 CFR 131.21, 65 FR 24641, April 27, 2000). Under the revised regulation (also known as the Alaska rule), USEPA must approve new and revised Water Quality Standards submitted to USEPA after May 30, 2000 before being used for CWA purposes. The final rule also provides that standards already in effect and submitted to USEPA by May 30, 2000 may be used for CWA purposes, whether or not approved by USEPA.

Z. COMPLIANCE WITH CZARA

The Coastal Zone Act Reauthorization Amendments of 1990 (CZARA), Section 6217(g), requires coastal states with approved coastal zone management programs to address Non-Point Source Pollution impacting or threatening coastal water quality. The CZARA addresses five sources of non-point pollution: agriculture, silviculture, urban, marinas, and Hydromodification. This Order addresses the management measures required for the urban category. Compliance with requirements specified in this Order relieves the Permittees for developing a Non-Point Source Plan, for the urban category, under CZARA.

AA. NON-POINT SOURCE DISCHARGES

Consistent with the State Board's 2004 "Policy for the Implementation and

Enforcement of the Nonpoint Source Pollution Control Program," the Regional Board may issue WDRs for Non-Point Source (NPS) Pollutant discharges, such as agricultural irrigation runoff or return flows that are not subject to NPDES requirements, if identified as a significant source of Pollutants. In addition, if the water quality significance of Non-Point Source discharges is not clearly understood, the Regional Board may issue conditional waivers of WDRs to Non-Point Source dischargers, and require monitoring to gather the information necessary to effectively manage these discharges.

BB. STRINGENCY REQUIREMENTS FOR INDIVIDUAL POLLUTANTS. (N/A)

CC. FISCAL RESOURCES

California is experiencing a fiscal crisis unprecedented since the Great Depression. The November 2009 unemployment rate is 12.2 percent in California and 14.7 percent in Riverside County.[19] The seasonally adjusted national unemployment rate in November 2009 is at a 26-year high of 10.2 percent. The Federal Reserve projected that the national unemployment rate, currently at a 26-year high of 9.4 percent, will pass 10 percent by the end of the year. Most federal policymakers said it could take "five or six years" for the economy and the labor market to get back on a path of long-term health.[20] State and local governments are experiencing significant budgetary shortfalls and are reducing staffing and programs across the board. Given this economic environment, priority will be given to preserving the most essential elements of existing Urban Runoff programs and identifying and implementing strategies to improve the efficiency of existing programs in protecting Receiving Waters.

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[19] Employment Development Department, State of California, December 18, 2009. http://www.calmis.ca.gov/file/lfmonth/rive$pds.pdf
[20] http://www.msnbc.msn.com/id/31963779/ns/business-stocks_and_economy/

PERMIT REQUIREMENTS:

IT IS HEREBY ORDERED that the Riverside County Flood Control and Water Conservation District, the County of Riverside, and the incorporated cities of Beaumont, Calimesa, Canyon Lake, Corona, Hemet, Lake Elsinore, Menifee, Moreno Valley, Murrieta, Norco, Perris, Riverside, San Jacinto, and Wildomar, in order to meet the provisions contained in Division 7 of the Water Code and regulations adopted thereunder, and the provisions of the CWA, as amended, and the regulations and guidelines adopted there under, must comply with the following:

III. PERMITTEE RESPONSIBILITIES:

A. RESPONSIBILITIES OF THE PRINCIPAL PERMITTEE:

1. The Principal Permittee shall be responsible for managing the overall Urban Runoff program and shall:

    a. Coordinate revisions to the DAMP.

    b. Implement area-wide management programs, monitoring and reporting programs, and related plans as required by this Order.

    c. Coordinate chemical and biological water quality monitoring and any other monitoring as required by the Executive Officer.

    d. Prepare, coordinate the preparation of, and submit to the Executive Officer, those reports and programs necessary to comply with this Order.

    e. Provide staff support to the Management Steering Committee (Appendix 4, Glossary) to address Urban Runoff management policies for the Permit Area and coordinate the review, and necessary revisions to the DAMP and Implementation Agreement. The Management Steering Committee will continue to meet consistent with the requirements of Section XVII.D of this Order.

    f. Coordinate and conduct Technical Committee (Appendix 4) meetings consistent with the requirements of Section XVII.D of this Order. The Technical Committee will continue to direct the development of the DAMP and coordinate the implementation of the overall Urban Runoff program.

    g. Take the lead role in initiating and developing area-wide programs and activities necessary to comply with this Order.

h. Coordinate activities and participate in committees/subcommittees formed to comply with this Order.

i. Coordinate the implementation of this Order with the Regional Board and Co-Permittees, including the submittal of joint reports, plans, and programs as required under this Order.

j. Provide technical and administrative support to the Co-Permittees, including informing them of the status of known pertinent municipal programs, pilot projects, and research studies.

k. Coordinate with the Co-Permittees the implementation and necessary updates to Urban Runoff quality management programs, monitoring and reporting programs, implementation plans, public education, other Pollution Prevention measures, household Hazardous Waste collection, and BMPs outlined in the DAMP and take other actions consistent with the MEP standard.

l. Gather and disseminate information on the status of statewide Urban Runoff programs and evaluate the information for potential use in the execution of this Order. Hold workshops focused on Urban Runoff regulatory requirements, BMPs, and other related topics.

m. Compile information provided by the Co-Permittees and determine the effectiveness of the overall Urban Runoff program in attaining Receiving Water Quality Standards. This determination must include a comparative analysis of monitoring data to the applicable Water Quality Objectives for Receiving Waters as specified in Chapter 4 of the Basin Plan.

n. Solicit and coordinate public input for major changes to the Urban Runoff management programs and the implementation thereof.

o. Coordinate the development and implementation of procedures and performance standards, to assist in the consistent implementation of BMPs consistent with the MEP standard, as well as Urban Runoff management programs, among the Co-Permittees.

p. Participate in watershed management programs and regional and/or statewide monitoring and reporting programs.

q. In collaboration with the Co-Permittees, other MS4 Programs and/or CASQA, develop guidelines for defining expertise and competencies of storm water program managers and inspectors and develop and submit for approval a training program for various positions in accordance with these guidelines and Section XV of this Order.

r. Within 6 months of adoption of this Order, the Principal Permittee shall develop a library of BMP performance reports, and revise the library annually thereafter. At a minimum, obsolete performance reports should be removed and updated reports from the Permittees, CalTrans, CASQA, American Society of Civil Engineers or other appropriate sources that include more effective and proven BMPs should be added. The library may use national, statewide or regional reports. The purpose of this library is to facilitate the Permittees approval of BMPs, review and approval of WQMPs, etc.

s. Within 6 months of adoption of this Order, the Principal Permittee shall coordinate a review of the DAMP with the Co-Permittees to determine the need for update or revisions to ensure compliance with the requirements of this Order and establish a schedule for those revisions.

2. The activities of the Principal Permittee shall also include, but not be limited to, the following for MS4 owned or operated by the Principal Permittee:

   a. To cause appropriate enforcement actions as necessary against IC/IDs to its MS4 to ensure compliance with Urban Runoff management programs, ordinances and implementation plans, including physical removal of Illicit Connections and prohibition of Illegal Discharges.

   b. Ensure that applicants for encroachment permits for permanent connection to its MS4 facilities are notified in writing of their obligations to comply with Storm Water Ordinances, WQMP, and General Stormwater Permit requirements. The Principal Permittee shall make sure that encroachment activities within the limits of its rights-of-way comply with the General Construction Permit post construction standards. An encroachment project with a WQMP reviewed and approved by the Co-Permittee with jurisdictional authority may constitute compliance with the General Construction Permit post construction standards[21].

   c. Conduct inspections and maintain the MS4 facilities over which it has jurisdiction.

   d. Review and revise, if necessary, those agreements to which it is a party and those regulations and policies it deems necessary to provide adequate legal authority to maintain the MS4 facilities for which it has jurisdiction and to take those actions required of it by this Order and the federal Storm Water Regulations (see Section VIII);

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[21] The State General Construction Permit Order No. 2009-0009-DWQ, Section XII

e. Monitor, document, and report that appropriate enforcement actions against Illegal Discharges to the MS4 facilities for which it has jurisdiction are taken and pursued as necessary to ensure compliance with Urban Runoff management programs, implementation plans, and regulations and policies, including physical elimination of IC/IDs (see Section IX);

f. Continue to respond or cause the appropriate entity or agency to respond to emergency situations such as accidental spills, leaks, and IC/IDs to prevent or reduce the discharge of Pollutants to its MS4 facilities and to the Receiving Waters (see Section XVI).

g. Track, monitor, and keep training records of all personnel involved in the implementation of the Principal Permittee's Urban Runoff management program.

B. RESPONSIBILITIES OF THE CO-PERMITTEES:

1. Each Co-Permittee shall complete a LIP, in conformance with Section IV of this Order and the approved LIP template.

2. Each Co-Permittee shall be responsible for managing the Urban Runoff program within its jurisdiction and shall:

   a. Maintain adequate legal authority to control the contribution of Pollutants to the MS4 and enforce those authorities.

   b. Conduct inspections of and maintain its MS4 facilities in accordance with the criteria developed pursuant to Section XIV.

   c. Continue to implement management programs, monitoring and reporting programs, appropriate BMPs listed in the DAMP and LIP, and related plans as required by this Order and take such other actions consistent with the MEP standard.

   d. Continue to seek sufficient funding for the area-wide Urban Runoff management plan, local Urban Runoff program management, Urban Runoff enforcement, public outreach and education activities and other Urban Runoff related program implementation.

   e. Continue to coordinate with other public agencies as appropriate, to facilitate the implementation of this Order and the DAMP/LIP.

   f. Ensure that applicants for encroachment permits for permanent connection to Permittee MS4 facilities are notified of their obligations to comply with Storm

Water Ordinances, WQMP, and the State General Construction Permit post construction standards. The Permittees shall enforce their Storm Water Ordinances to the extent of their legal authority. An encroachment project with a WQMP reviewed and approved by the Co-Permittee who owns the MS4 may constitute compliance with the General Construction Permit post construction standards[22].

g. Maintain up-to-date MS4 facility maps. Annually review these maps and if necessary, submit revised maps to the Principal Permittee with the information required for preparation of the Annual Report.

h. Prepare and submit to the Principal Permittee in a timely manner specific reports/information, related to the Co-Permittees' Urban Runoff management program, necessary to develop an Annual Report for submittal to the Executive Officer.

3. The Co-Permittees' activities shall include, but not be limited to, the following:

a. Participate in the Management Steering Committee and the Technical Committee meetings consistent with the requirements of Section XVII.D of this Order.

b. Conduct and coordinate with the Principal Permittee surveys and monitoring needed to identify Pollutant sources and drainage area characteristics within its jurisdiction. Where an Illegal Discharge crosses jurisdictional boundaries, to the extent feasible coordinate with neighboring jurisdictions to locate and end the Illegal Discharge.

c. Prepare and submit reports to the Principal Permittee to facilitate compilation of joint reports to the Regional Board in compliance with submittal deadlines.

d. Participate in the development and implementation of plans, strategies, management programs, monitoring and reporting programs that are proposed by the Principal Permittee, Technical Committee, or the Management Steering Committee to comply with this Order.

e. Participate in subcommittees formed by the Principal Permittee, Technical Committee, or the Management Steering Committee to comply with this Order.

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[22] The State General Construction Permit Section XIII

f. Respond to or arrange for the appropriate entity or agency to respond to Emergency Situations such as accidental spills, leaks, IC/IDs, etc., to prevent or reduce the discharge of Pollutants to their MS4 facilities and the Receiving Waters.

g. Continue to pursue enforcement actions as necessary within its jurisdiction for violations of Storm Water Ordinances, and other elements of its Urban Runoff management program.

C. IMPLEMENTATION AGREEMENT

The Permittees shall allow any cities that were not signatories to the original Implementation Agreement but have been subsequently added to this Order to participate in the Implementation Agreement. The Permittees must annually review their Implementation Agreement and determine the need, if any, for additional revision. Beginning with the first Annual Report after adoption of this Order the Permittees must include the findings of this review and a schedule for any necessary revision(s) to the Implementation Agreement, if any. A copy of the signature page and any revisions to the Agreement shall be included in the Annual Report.

IV. LOCAL IMPLEMENTATION PLAN:

A. Within 6 months of adoption of this Order, the Permittees shall develop and submit for approval of the Executive Officer a LIP template. The LIP template shall be amended as the provisions of the DAMP are amended to address the requirements of this Order. The LIP template shall facilitate a description of the Co-Permittee's individual programs to implement the DAMP, including the organizational units responsible for implementation and identify positions responsible for Urban Runoff program implementation. The description shall specifically address:

1. Overall program management, including internal reporting requirements and procedures for communication and accountability;

   a. Interagency or interdepartmental agreements necessary to implement the Permittee's Urban Runoff program

   b. A summary of fiscal resources available to implement the Urban Runoff program;

   c. The ordinances, agreements, plans, policies, procedures and tools (e.g. checklists, forms, educational materials, etc.) used to execute the DAMP, including legal authorities and enforcement tools.

   d. Summarize procedures for maintaining databases required by the Permit;

   e. Describe internal procedures to ensure and promote accountability;

2. WQBELs to implement the TMDLs (Section VI.D);
3. Receiving Water Limitations (Section VII.D).
4. Legal authority/enforcement (Section VIII)
   a. Identify enforcement procedures, and
   b. Identify actions and procedures for tracking return to compliance;
5. Illicit Connections/Illegal Discharges (IC/ID); Litter, Debris and Trash Control (Section IX).

   The procedures and the staff positions responsible for different components of their IC/ID and Illegal Discharge Detection and Elimination (IDDE) Programs.
6. Sewage Spills, Infiltration into the MS4 Systems from Leaking Sanitary Sewer Lines, Septic System Failures, and Portable Toilet Discharges (Section X)

   A description of the interagency or interdepartmental sewer spill response coordination within each Permittee's jurisdiction.
7. Co-Permittee inspection programs(Section XI),
   a. Maintenance of Construction, Industrial, Commercial, and Post-Construction BMP databases;
   b. Procedures for incorporating erosion and sediment control BMPs into the permitting of Construction Sites (Section XI.B)
   c. Implementation of the Residential Program (Section XI.E.)
   d. Specify the verification procedure(s) and any tools utilized to verify that coverage under the General Construction Permit;
8. New Development (Including Significant Redevelopment) (Section XII)
   a. A list of discretionary maps and permits over which the Permittee has the authority to require WQMPs;
   b. Permittee procedures to implement the Hydromodification Management Plan.
   c. Permittee procedures and tools to implement the WQMP.(Sections XII.H, XII.I & XII.K)
   d. Permittee procedures for Municipal Road Projects (Section XII.F).
   e. A description of the credits programs or other in-lieu programs implemented (Section XII.G).
9. Public education and outreach (Section XIII)
10. Permittee Facilities and Activities (Section XIV)
    a. A description of the Permittee's MS4 facilities;
    b. At a minimum a list of facilities that include the following:

i. Parking facilities;

ii. Fire fighting training facilities;

iii. Facilities and activities discharging directly to environmentally sensitive areas such as 303(d) listed waterbodies or those with a RARE beneficial use designation;

iv. POTWs (including water and wastewater treatment plants) and sanitary sewage collection systems;

v. Solid waste transfer facilities;

vi. Land application sites;

vii. Corporate yards including maintenance and storage yards for materials, waste, equipment and vehicles;

viii. Household hazardous waste collection facilities;

ix. Municipal airfields;

x. Maintenance Facilities serving parks and recreation facilities;

xi. Special event venues following special events (festivals, sporting events);

xii. Other municipal areas and activities that the Permittee determines to be a potential source of Pollutants.

11. Compliance of Permittee Facilities and Activities with the General Construction Permit and De-Minimus Permit (Section XIV.G).

12. Training Program for Storm Water Managers, Planners, Inspectors and Municipal Contractors (Section XV);

    a. Training log forms

    b. Identify departments and positions requiring training

B. Within 12 months of approval of the LIP template, and amendments thereof, by the Executive Officer, each Permittee shall complete a LIP[23], in conformance with the LIP template. The LIP shall be signed by the principal executive officer or ranking elected official or their duly authorized representative pursuant to Section XX.M of this Order.

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[23] As the Principal Permittee is not a general purpose government, some portions of the NPDES MS4 Program may not be applicable to it. The Principal Permittee should identify the basis for its exclusion from the applicable program elements in the appropriate LIP section.

C. Each Permittee shall annually review and evaluate the effectiveness of its Urban Runoff programs to determine the need for revisions to its LIP as necessary in compliance with Section VIII.H of this Order, and document revisions in the Annual Report.

V. DISCHARGE PROHIBITIONS:

A. In accordance with the requirements of 40 CFR 122.26(d)(2)(i)B) and 40 CFR 122.26(d)(2)(i)(F), the Permittees shall prohibit IC/IDs (see Appendix 4) from entering the MS4.

B. The discharge of Urban Runoff from the MS4 to Receiving Waters containing Pollutants, including trash and debris, that have not been reduced consistent with the MEP standard is prohibited.

C. Non-storm Water discharges from public agency activities into Waters of the US are prohibited unless the Non-storm Water discharges are permitted by a NPDES permit, granted a waiver, or as otherwise specified in Section VI, below.

D. Discharges from the MS4 shall be in compliance with the discharge prohibitions contained in Chapter 5 of the Basin Plan.

E. Discharges of Urban Runoff from the Permittee's MS4 shall not cause or contribute to a condition of Pollution, Contamination, or Nuisance (as defined in CWC Section 13050).

F. The discharge of any substances in concentrations toxic to animal or plant life is prohibited.

VI. EFFLUENT LIMITATIONS, DISCHARGE SPECIFICATIONS AND OTHER TMDL RELATED REQUIREMENTS

For purposes of this Order, a discharge may include storm water or other types of discharges identified below.

A. ALLOWED DISCHARGES:

The discharges identified need not be prohibited by the Permittees unless identified by the Permittees or the Executive Officer as a significant source of Pollutants. The DAMP shall include public education and outreach activities directed at reducing these discharges even if they are not substantial contributors of Pollutants to the MS4.

1. Discharges composed entirely of storm water;

2. Air conditioning condensate;
3. Irrigation water from agricultural sources ;
4. Discharges covered by a NPDES Permit, WDRs, or waivers issued by the Regional Board or State Board.
5. Discharges from landscape irrigation, lawn/garden watering and other irrigation waters. These shall be minimized through public education and water conservation efforts, as prescribed under this Order Section XI.E. Residential Program.
6. Passive foundation drains[24];
7. Passive footing drains[25];
8. Water from crawl space pumps[26];
9. Non-commercial vehicle washing,(e.g. residential car washing (excluding engine degreasing) and car washing fundraisers by non-profit organization);
10. Dechlorinated swimming pool discharges (cleaning wastewater and filter backwash shall not be discharged into the MS4 or to Waters of the US)
11. Diverted stream flows[27];
12. Rising ground waters[28] and natural springs;
13. Uncontaminated ground water infiltration as defined in 40 CFR 35.2005 (20) and uncontaminated pumped groundwater (as defined in Appendix 4, glossary),
14. Flows from riparian habitats and wetlands;
15. Emergency fire fighting flows (i.e., flows necessary for the protection of life and property do not require BMPs and need not be prohibited. However, appropriate BMPs to reduce the discharge of Pollutants to the MEP must be implemented when they do not interfere with health and safety issues [see also Appendix K of the DAMP]).
16. Waters not otherwise containing Wastes as defined in California Water Code Section 13050 (d), and
17. Other types of discharges identified and recommended by the Permittees and approved by the Regional Board.

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[24] Allowed discharges only if the source water drained from the foundation is storm water or uncontaminated groundwater. Discharges from contaminated groundwater may require coverage under the De Minimus Permit (Order No. R8-2009-0003, NPDES No. CAG998001) or General Groundwater Cleanup Permit (Order No. R8-2007-0008, NPDES Permit No CAG918001) or its latest version.

[25] See footnote 24, above.

[26] Allowed discharges only if the discharge is uncontaminated, otherwise permit coverage under the De Minimus Permit or Order No. 2006-0008-DWQ (NPDES No. CAG990002), General NPDES Permit for Discharges from Utility Vaults and Underground Structures to Surface Waters (General Permit-Utility Vaults).

[27] Diversion of stream flows that encroach into Waters of the US requires a 404 permit from the US Army Corps of Engineers and a 401 Water Quality Certification from the Regional Board. Stream diversion that requires active pumping also requires coverage under the De Minimus Permit, Order No. R8-2009-0003.

[28] Discharge of rising ground water and natural springs into surface water is only allowed if groundwater is uncontaminated. Otherwise, coverage under the General Groundwater Cleanup Permit, Order No. R8-2007-0008 may be required.

When types of discharges listed above are identified as a significant source of Pollutants to Waters of the US, a Permittee must either: prohibit the discharge category from entering the MS4 or ensure that Source Control BMPs and Treatment Control BMPs are implemented to reduce or eliminate Pollutants resulting from the discharge. The Permittees shall evaluate the permitted discharges, as listed above to determine if any are a significant source of Pollutants to the MS4 and notify the Executive Officer if any are a significant source of Pollutants to the MS4.

B. DISCHARGE SPECIFICATIONS FOR DISCHARGES FROM PERMITTEE OWNED AND/OR OPERATED FACILITIES AND ACTIVITIES - DE-MINIMUS DISCHARGES[29] :

The following types of discharges from Permittee owned and/or operated facilities and activities are authorized by this Order provided they are in compliance with the terms and conditions of the General De Minimus Permit except that separate coverage under that permit is not required.

1. *Discharges from potable water sources, including water line flushing, superchlorinated water line flushing, fire hydrant system flushing, and hydrostatic test water from pipelines, tanks and vessels*: These discharges shall be dechlorinated to a concentration of 0.1 ppm[30] or less, pH adjusted if necessary, and volumetrically and velocity controlled to prevent re-suspension of sediments.

2. *Discharges from lawn, greenbelt and median watering and other irrigation runoff[31] from non-agricultural operations*: These discharges shall be minimized through requirements consistent with Section 5.3 of the DAMP and Section XIV of this Order.

3. *Dechlorinated swimming pool discharges:* Dechlorinated to a concentration of 0.1 ppm[32] or less, pH adjusted and reoxygenated if necessary, and volumetrically and velocity controlled to prevent resuspension of sediments. Swimming pool cleaning wastewater and filter backwash shall not be discharged to the MS4.

4. *Discharges from facilities that extract, treat and discharge water diverted from Waters of the US*: These discharges shall meet the following conditions:

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[29] General De Minimus Permit for Discharges to Surface Waters, Order NO. R8-2009-0003, NPDES No. CAG 998001 (General De Minimus Permit).

[30] Total residual chlorine = 0.1 mg/l or parts per million (ppm) or less; compliance determination shall be at a point before the discharge mixes with any Receiving Water.

[31] Non-agricultural irrigation using recycled water must comply with the statewide permit for Landscape Irrigation Using Recycled Water and the State Department Health guidelines.

[32] See footnote 30.

a. The discharges to Waters of the US must not contain Pollutants added by the treatment process or Pollutants in greater concentration than the influent;

b. The discharge must not cause or contribute to a condition of erosion;

c. Be in compliance with Section 401 of the CWA; and

d. Conduct monitoring in accordance with Section XIX of this Order.

5. *Construction dewatering wastes:* The maximum daily concentration limit for Total Suspended Solids (TSS) shall not exceed 75 mg/L; sulfides shall not exceed 0.4 mg/L; total petroleum hydrocarbons shall not exceed 0.1 mg/L; and oil and grease shall not exceed 15 mg/L.

6. *For all de-minimus type of discharges:* The pH of the discharge shall be within 6.5 to 8.5 pH units and there shall be no visible oil and grease in the discharge.

7. Table 4-1 of the Basin Plan incorporates TDS/TIN objectives for groundwater and surface waters within the Santa Ana Region. Permittees discharging to those Receiving Waters shall ensure compliance with the following for Dry Season conditions:

   a. For discharges to surface waters where groundwater will not be affected by the discharge, the maximum daily concentration (mg/L) of TDS and/or TIN of the effluent shall not exceed the Water Quality Objectives for the Receiving Water where the effluent is discharged, as specified in Table 4-1 of the Basin Plan[33].

   b. For discharges to surface waters where the groundwater will be affected by the discharge, the TDS and/or TIN concentrations of the effluent shall not exceed the Water Quality Objectives for the surface water where the effluent is discharged and the affected groundwater management zone, as specified in Table 4-1 of the Basin Plan. The more restrictive Water Quality Objectives shall govern. However, treated effluent exceeding the groundwater management zone Water Quality Objectives may be returned to the same management zone from which it was extracted without reduction of the TDS or TIN concentrations so long as the concentrations of those constituents are no greater than when the groundwater was first extracted. Incidental increases in the TDS and TIN concentrations (such as may occur during air stripping) of treated effluent will not be considered increases for the purposes of determining compliance with this discharge specification.

8. The Regional Board may add categories of Non-storm Water discharges that are not significant sources of Pollutants or remove categories of Non-storm Water discharges

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[33] Resolution No. R8-2004-0001

listed above based upon a finding that the discharges are a significant source of Pollutants.

C. NON-POINT SOURCE (NPS) DISCHARGES:

The NPS discharges are being addressed through the Non-Point Source Program.

D. WATER QUALITY BASED EFFLUENT LIMITATIONS TO IMPLEMENT THE TOTAL MAXIMUM DAILY LOADS (TMDLs)

1. The MIDDLE SANTA ANA RIVER (MSAR) WATERSHED BACTERIA INDICATOR TMDL

Interim WQBELs (effective upon adoption of this Order)

a. The MSAR Permittees[34] as part of the MSAR Task Force (Table 5) shall:

i. Continue to implement the watershed-wide water quality monitoring program (including any future amendments thereto) approved by the Regional Board (Resolution No. R8-2007-0046) as per Task 3 of the MSAR TMDL Implementation Plan.

ii. Submit reports summarizing all relevant data from the MSAR watershed-wide water quality monitoring program. Beginning in 2010, the cool (or wet) season report is due to the Executive Officer by May 31st of each year (for monitoring conducted from November 1st through March 31st) and the warm (dry) season report is due to the Executive Officer by December 31st of each year (for monitoring conducted from April 1st through October 31st).

iii. Submit comprehensive reports every three years summarizing the data collected for the preceding 3 year period and evaluating progress towards achieving the Urban WLA by the dates specified in the TMDL. The first report is due to the Executive Officer on February 15, 2010.

iv. Continue to implement the approved (Regional Board Resolution No. R8-2008-0044) USEP developed as per Task 4.1 of the MSAR TMDL Implementation Plan. The USEP must describe the specific methods that will be used to identify urban sources, strategies, and BMPs to address

[34] Riverside County MS4 Permittees in the MSAR watershed (County of Riverside, and the Cities of Corona, Norco, Riverside are collectively referred to as the "MSAR Permittees")

those sources. Submit semi-annual reports on January 31st and July 31st of each year as required under the approved USEP, and any amendments thereto. In years where the comprehensive report referenced in VI.D.1.a.iii above is due on February 15, the comprehensive report, Dry Season report (Due December 31st) and the January 31st USEP reports may be combined into a single submittal due February 15th

v. Revise the DAMP as specified in Task 4.3 of the MSAR-TMDL Implementation Plan. Summarize any such revisions in the annual report due to the Executive Officer by November 30 of each year.

vi. Revise the WQMP as specified in Task 4.5 of the MSAR TMDL Implementation Plan. Summarize any such revisions in the Annual Report due to the Executive Officer by November 30 of each year.

vii. Amend the LIP to be consistent with the revised DAMP and WQMPs within 90 days after said revisions are approved by the Regional Board. Summarize any such LIP amendments in the Annual Report due to the Executive Officer by November 30 of each year.

Final WQBELs for MSAR Bacterial Indicator TMDL under Dry Season Conditions

b. The final WQBELs for Bacterial Indicators during the Dry Season shall be achieved by December 31, 2015. These final Effluent Limits shall be considered effective for enforcement purposes on January 1, 2016.

c. The Final WQBELs for MSAR Bacterial Indicator TMDL during the Dry Season shall be developed and implemented in the following manner:

i. The MSAR Permittees shall prepare for approval by the Regional Board a Comprehensive Bacteria Reduction Plan (CBRP) describing, in detail, the specific actions that have been taken or will be taken to achieve compliance with the Urban WLA during the Dry Season (April 1st through October 31st) by December 31, 2015. The CBRP must include:

(1) The specific ordinance(s) adopted to reduce the concentration of Bacterial Indicator in urban sources.

(2) The specific BMPs implemented to reduce the concentration of Bacterial Indicator from urban sources and the water quality improvements expected to result from these BMPs.

(3) The specific inspection criteria used to identify and manage the urban sources most likely causing exceedances of Water Quality Objectives for Bacterial Indicators.

(4) The specific regional treatment facilities and the locations where such facilities will be built to reduce the levels of Bacterial Indicator discharged from urban sources and the expected water quality improvements to result when the facilities are complete.

(5) The scientific and technical documentation used to conclude that the CBRP, once fully implemented, is expected to achieve compliance with the Urban WLA for Bacterial Indicator by December 31, 2015.

(6) A detailed schedule for implementing the CBRP. The schedule must identify discrete milestones to assess satisfactory progress toward meeting the Urban WLA during the Dry Season by December 31, 2015. The schedule must also indicate which agency or agencies are responsible for meeting each milestone.

(7) The specific metric(s) that will be established to demonstrate the effectiveness of the CBRP and acceptable progress toward meeting the Urban WLA for Bacterial Indicator by December 31, 2015.

(8) The DAMP, WQMP and LIPs shall be revised consistent with the CBRP no more than 180 days after the CBRP is approved by the Regional Board.

(9) Detailed descriptions of any additional BMPs planned, and the time required to implement those BMPs, in the event that data from the watershed-wide water quality monitoring program indicate that Water Quality Objectives for Bacterial Indicator are still being exceeded after the CBRP is fully implemented.

(10) A schedule for developing a CBRP needed to comply with the Urban WLA for Bacterial Indicator during the Wet Season (November 1st thru March 31st) to achieve compliance by December 31, 2025.

ii. The draft CBRP must be submitted to the Regional Board by December 31, 2010. The Permittees may submit the plan individually, jointly or through a collaborative effort with other urban dischargers such as the existing MSAR-TMDL Task Force. Regional Board staff will review the draft CBRP and recommend necessary revisions no more than 90 days after receiving the draft CBRP. The MSAR Permittees must submit the final version of the CBRP no more than 90 days after receiving the comments from Regional

Board staff. The Regional Board will schedule a public hearing to consider approving the CBRP, as a final WQBEL for the Dry Season Urban WLA, no more than 120 days after the final plan is submitted by the MSAR Permittees. In approving the CBRP as the final WQBELs, the Regional Board shall find that the CBRP, when fully implemented, shall achieve the Urban WLA for Bacterial Indicator by December 31, 2015.

iii. Once approved by the Regional Board, the CBRP shall be incorporated into this Order as the final WQBELs for Bacterial Indicator for the Dry Season. Based on BMP effectiveness analysis, the CBRP shall be updated, if necessary. The updated CBRP shall be implemented upon approval by the Regional Board.

d. Should the process set forth in Section VI.D.1.c, above not be completed by January 1, 2016, then the Urban WLA for the Dry Season specified in the MSAR-TMDL shall become the final numeric WQBELs for Bacterial Indicator in the Dry Season as follows:

i. WLA for Fecal Coliform from Urban Sources for the Dry Season (April 1st through October 31st)[35]
5-sample/30-day logarithmic mean less than 180 organisms/100mL and not more than 10% of the samples exceed 360 organisms/100mL for any 30-day period.

ii. WLA for *E. Coli* from Urban Sources for the Dry Season (April 1st through October 31st)[36]
5-sample/30-day logarithmic mean less than 113 organisms/100 mL and not more than 10% of the samples exceed 212 organisms/100mL for any 30-day period.

<u>Final WQBELs for Bacterial Indicator during the Wet Season (effective Jan. 1, 2026)</u>

In the event this Order is still in effect on December 31, 2025, and the Regional Board has not adopted alternative final WQBEL during the Wet Season by that date, then the Urban WLAs specified in the MSAR TMDL for the Wet Season

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[35] 5-sample/30-day logarithmic mean less than 180 organisms/100mL and not more than 10% of the samples exceed 360 organisms/100mL for any 30-day period.

[36] 5-sample/30-day logarithmic mean less than 113 organisms/100 mL and not more than 10% of the samples exceed 212 organisms/100mL for any 30-day period.

(November 1st through March 31st) will automatically become the final numeric WQBEL for the MSAR Permittees on January 1, 2026.

2. **LAKE ELSINORE/CANYON LAKE (SAN JACINTO WATERSHED) NUTRIENT TMDLS**

Interim WQBELS:

a. *Lake Elsinore In-Lake Sediment Nutrient Reduction Plan:* Pursuant to Resolution No. R8-2007-0083, or as amended by subsequent adopted Regional Board resolutions, each LE/CL Permittee shall continue to implement the approved strategy for reducing in-lake sediment nutrient loads as summarized in Table 7, below:

Table 7 - Lake Elsinore In-lake Sediment Nutrient Reduction Strategy

Lake Elsinore In-lake Sediment Reduction Strategy Task	Due Date
Submit Phase 2 Alternatives	December 31, 2010*
Submit O&M Agreement for Fishery Management Program	December 31, 2010*
Submit O&M Agreement for Aeration and Mixing Systems	December 31, 2010*
Submit Phase 2 Projects Plans	June 30, 2011*
Complete Phase 2 Project Implementation	December 31, 2014
Implement in-lake and watershed monitoring programs	Annual reports due August 31 every year.

*Within 60 days of receipt of comments from Regional Board staff, Permittees shall submit a final revised plan that will be acceptable for adoption by the Regional Board, unless otherwise directed by the Executive Officer.

b. Lake Elsinore/Canyon Lake Model Update Plan*:* Pursuant to Resolution No. R8-2007-0083, or as amended by subsequent adopted Regional Board resolutions, each LE/CL Permittee shall continue to implement the Model Update Plan as per the schedule summarized Table 8 below: The Model Update Plan shall specify how the Permittees will determine compliance with the WLAs.

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Table 8 - Lake Elsinore/Canyon Lake Model Update Plan

Model Update Task	Due Date
Linkage Analysis Study	August 31, 2010
Watershed Source Loading Study	August 31, 2010
Model Evaluation	December 31, 2010
Construct/Calibrate Model	June 30, 2011
Conduct Model Scenarios	August 31, 2011
Model Update Final Report	November 30, 2011

c. Revise the DAMP, WQMP and LIPs as necessary to implement the interim WQBEL compliance plans submitted pursuant to paragraph a and b of this section and summarize all such revisions in the Annual Report.

Final WQBELs (Effective December 31, 2020)

d. To achieve compliance with TMDL WLAs as per the TMDL Implementation Plans, the LE/CL Permittees shall submit a Comprehensive Nutrient Reduction Plan (CNRP) by December 31, 2011 describing, in detail, the specific actions that have been taken or will be taken to achieve compliance with the urban WLA by December 31, 2020. The CNRP must include the following:

i. Evaluation of the effectiveness of BMPs and other control actions implemented. This evaluation shall include the following:

(a) The specific ordinance(s) adopted or proposed for adoption to reduce the concentration of nutrient in urban sources.

(b) The specific BMPs implemented to reduce the concentration of urban nutrient sources and the water quality improvements expected to result from these BMPs.

(c) The specific inspection criteria used to identify and manage the urban sources most likely causing exceedances of water quality objectives for nutrients.

(d) The specific regional treatment facilities and the locations where such facilities will be built to reduce the concentration of nutrient discharged from urban sources and the expected water quality improvements to result when the facilities are complete.

and

ii. Proposed method for evaluating progress towards compliance with the nutrient WLA for Urban Runoff. The progress evaluation shall include:

(a) The scientific and technical documentation used to conclude that the CNRP, once fully implemented, is expected to achieve compliance with the urban waste load allocation for nutrient by December 31, 2020.

(b) A detailed schedule for implementing the CNRP. The schedule must identify discrete milestones decision points and alternative analyses necessary to assess satisfactory progress toward meeting the urban waste load allocations for nutrient by December 31, 2020. The schedule must also indicate which agency or agencies are responsible for meeting each milestone.

(c) The specific metric(s) that will be established to demonstrate the effectiveness of the CNRP and acceptable progress toward meeting the urban waste load allocations for nutrient by December 31, 2020.

(d) The DAMP, WQMP and LIPs shall be revised consistent with the CNRP no more than 180 days after the CNRP is approved by the Regional Board.

(e) Detailed descriptions of any additional BMPs planned, and the time required to implement those BMPs, in the event that data from the watershed-wide water quality monitoring program indicate that water quality objectives for nutrient are still being exceeded after the CNRP is fully implemented.

e. The draft CNRP must be submitted to the Regional Board by December 31, 2011. The LE/CL Permittees may submit the plan individually, jointly or through a collaborative effort with other urban dischargers such as the existing LE/CLTMDL Task Force. Regional Board staff will review the document and recommend necessary revisions no more than 90 days after receiving the draft plan. The LE/CL Permittees must submit the final version of the plan no more than 90 days after receiving the comments from Regional Board staff. The Regional Board will schedule a public hearing to consider approving the CNRP, as a final water quality-based effluent limitation for the Nutrient WLA, no more than 90 days after the final plan is submitted by the LE/CL Permittees. In approving the CNRP as the final WQBELs, the Regional Board shall make a finding that the CNRP, when fully implemented, shall achieve the urban WLA for nutrient by December 31, 2020; and,

f. Once approved by the Regional Board, the CNRP shall be incorporated into this Order as the final WQBELs for LE/CL Nutrient TMDL. Based on BMP effectiveness analysis, the CNRP shall be updated, if necessary. The updated CNRP shall be implemented upon approval by the Regional Board.

g. Compliance with the WLA is based on a 10-year running average. Hence, data collection consistent with the approved Phase 2 LE/CL TMDL monitoring program required in the Monitoring and Reporting Program must commence by December 31, 2010[37].

h. A summary of all relevant data from water quality monitoring programs shall be submitted in the Annual Report. This will include an evaluation of compliance with the LE/CL TMDL by reporting the effectiveness of the BMPs implemented in the watershed to control nutrient inputs into the lake from Urban Runoff pursuant to Regional Board Resolution No. R8-2006-0031 and R8-2007-0083, or as amended by subsequent Regional Board adopted resolutions.

i. The DAMP, WQMP and LIPs shall be revised as necessary to implement the plans submitted pursuant to paragraph a through h of this section and summarize all such revisions in the Annual Report.

j. In the event that the Regional Board has not adopted alternative final WQBELs, in accordance with Section VI.D.2.d., above, by December 31, 2020, the Urban WLAs specified in Tables 9 and 10, below, shall automatically become the final numeric WQBELs for the LE/CL Permittees to be achieved by December 31, 2020. These final Effluent Limits shall be considered effective for enforcement purposes on January 1, 2021.

Table 9 - Canyon Lake Nitrogen and Phosphorus Waste Load and Load Allocations[a]

Canyon Lake Nutrient TMDL	Final Total Phosphorus Waste Load Allocation (kg/yr)[b, c]	Final TN Waste Load Allocation (kg/yr) [b, c]
Urban	306 (675 lbs/yr)	3,974 (8763 lbs/yr)
Septic systems	139 (306 lbs/yr)	4,850 (10692 lbs/yr)

[a] The WLAs for Canyon Lake apply to those land uses located upstream of Canyon Lake.
[b] Final WLA compliance to be achieved by December 31, 2020.
[c] TMDL and WLA specified as 10-year running average.

Table 10 - Lake Elsinore Nitrogen and Phosphorus Waste Load and Load Allocations[a]

[37] Resolution No. R8-2004-0037 requires initiation of the Phase 2 watershed-wide Wet Season monitoring upon completion of the Phase 1 in-lake monitoring program. Regional Board staff is currently in discussion with LE/CL TMDL Task Force regarding this transition and are expected to identify reductions in Phase 1 monitoring program that will offset the costs of the enhanced Phase 2 program.

Lake Elsinore Nutrient TMDL	Final Total Phosphorus WLA (kg/yr)[b, c]	Final TN WLA (kg/yr)[c, d]
Urban	124 (273.3 lbs/yr)	349 (769.4 lbs/yr)
Septic systems	69 (152 lbs/yr)	608 (1340 lbs/yr)

[a] The Lake Elsinore TMDL WLAs for septic systems only apply to those land uses located downstream of Canyon Lake.

[b] Final compliance to be achieved by December 31, 2020.

[c] TMDL and WLA specified as 10-year running average.

[d] WLA for supplemental water should be met as a 5 year running average by December 31, 2020.

[e] WLA for Canyon Lake overflows

k. The LE/CL Permittees may demonstrate compliance with the WLAs using either of the following two methods:

   i. Directly, using relevant monitoring data and approved and approved modeling procedures to estimate actual nitrogen and phosphorus loads being discharged to the lakes, or,

   ii. Indirectly, using water quality monitoring data and other biological metrics approved by the Regional Board, to show Water Quality Standards are being consistently attained (as measured by the response targets identified in the LE/CL TMDL).

l. The TMDLs explicitly support the trading of pollutant allocations among sources to the extent that such allocation tradeoffs optimize point and non-point source control strategies to achieve the WQBELs in the most efficient manner.

VII. RECEIVING WATER LIMITATIONS

A. Urban Runoff discharges from the Permittees' MS4 shall not cause or contribute to exceedances of Receiving Water Quality Standards (as defined by Beneficial Uses and Water Quality Objectives in Chapter 4 of the Basin Plan) for surface waters or ground waters.

B. The DAMP and its components, including the LIPs, must be designed to achieve compliance with Receiving Water Limitations associated with discharges of Urban Runoff to the MEP. It is expected that compliance with Receiving Water Limitations will be achieved through an iterative process and the application of increasingly more effective BMPs.

C. The Permittees shall comply with Section V.B and VII.A of this Order, through timely implementation of control measures and other actions to reduce Pollutants in Urban Runoff in accordance with the DAMP and other requirements of this Order, including modifications thereto.

D. If exceedances of Water Quality Standards persist notwithstanding implementation of the DAMP and other requirements of this Order, the Permittees shall assure compliance with Sections V.B and VII.A of this Order, by complying with the following procedure:

1. Upon a determination by either the Permittees or the Executive Officer that the discharges from the MS4 are causing or contributing to an exceedance of an applicable Water Quality Standard, the Permittees shall:

    a. Promptly, within two (2) working days, provide oral or e-mail and thereafter submit a report to the Executive Officer that describes the BMPs that are currently being implemented and the additional BMPs that will be implemented to prevent or reduce those Pollutants that are causing or contributing to the exceedance of the applicable Receiving Water Quality Standards.

    b. The report may be incorporated in the annual update to the DAMP, unless the Executive Officer directs an earlier submittal.

    c. The report shall include an implementation schedule.

    d. The Executive Officer may require modifications to the report.

    e. Submit any modifications to the report required by the Executive Officer within 30 days of notification;

2. Within 30 days following approval by the Executive Officer of the report described above, the Permittees shall revise the DAMP, applicable LIPs, and monitoring program to incorporate the approved modified BMPs that have been and will be implemented, the implementation schedule, and any additional monitoring required;

3. Implement the revised DAMP, applicable LIPs and monitoring program in accordance with the approved schedule.

4. If the exceedance is solely due to discharges to the MS4 from activities or areas outside the Permittees jurisdiction or control, the Permittees must, within two (2) working days of becoming aware of the situation, provide oral or e-mail notice to the Executive Officer of the determination of the exceedance and provide written documentation of these discharges to the Executive Officer within ten (10) calendar days of becoming aware of the situation.

5. So long as the Permittees have complied with the procedures set forth above and are implementing the revised LIP, DAMP, and monitoring program, the Permittees do not have to repeat the same procedure for continuing or recurring exceedances of the same Receiving Water Limitation unless the Executive Officer determines it is necessary to develop additional BMPs

6. Nothing in Section VII.D prevents the Regional Board from enforcing any provision of this Order while the Permittee prepares and implements the above report.

VIII. LEGAL AUTHORITY/ENFORCEMENT

A. The Permittees shall maintain adequate legal authority to control the discharge of Pollutants to the MS4 from Urban Runoff and enforce those authorities. This may be accomplished through ordinance, statute, permit, contract or similar means. Such legal authority must address all IC/IDs into the MS4, including those from residential, commercial, industrial and construction sites. The Permittees shall use the enforcement guidelines developed in Section 3.4 and 4.5 of the DAMP or develop their own enforcement program and shall incorporate the enforcement program into their LIP. Such legal authority must also at a minimum include and authorize the Permittees to:

1. Carry out all inspections, surveillance, and monitoring necessary to determine compliance and noncompliance with their ordinances and permits. The Permittee must have authority, to the extent permitted by California and federal Law and subject to the limitations on municipal action under the constitutions of California and the United States, to enter, monitor, inspect, and gather evidence (pictures, videos, samples, documents, etc.) from residential, industrial, commercial, and construction sites discharging into the MS4 within the limits of its statutory authority. The Permittees shall progressively and decisively take enforcement actions against any violators of the Storm Water Ordinance. These enforcement actions must, at minimum, meet the guidelines and procedures listed in Sections 3.4 and 4.5 of the DAMP.

2. Control the contribution of Pollutants to the MS4;

3. Stop Pollutant discharge or threat of discharge if a discharger is unable or unwilling to correct significant non-compliance where there is a serious threat to public health or the environment;

4. Require the use of BMPs to prevent or reduce the discharge of Pollutants into MS4 consistent with the MEP standard.

5. Require documentation on the effectiveness of BMPs implemented to reduce the discharge of Pollutants to the MS4; and

6. The Co-Permittees' Storm Water Ordinances or other local regulatory mechanisms shall include sanctions to ensure compliance. Sanctions shall include but are not limited to: oral and/or written warnings, notice of violation or non-compliance, administrative compliance orders, stop work or cease and desist order, a civil citation or injunction, the imposition of monetary penalties or criminal prosecution (infraction or misdemeanor). These sanctions shall be issued in a decisive manner within a predetermined timeframe, from the time of the violation's occurrence and/or follow-up inspection.

B. The Co-Permittees shall take progressive and decisive enforcement actions against violators of their Storm Water Codes and Ordinances, in accordance with the federal storm water regulations (40CFR, Part 122.26(d)(2)(I)(A-F)), and adopted/established guidelines and procedures as described in Section 3.4 of the DAMP. The Co-Permittees shall consider the time to return to compliance as one measure of effectiveness of their Storm Water Ordinances or enforcement response procedure. The Co-Permittees shall document these actions in their records (including electronic databases as outlined in the DAMP) and Annual Reports. The Co-Permittees shall use their authority to bring dischargers into immediate compliance with enforcement actions.

C. Within three (3) years of adoption of this Order, the Co-Permittees shall promulgate and implement ordinances that would control known pathogen or Bacterial Indicator sources such as animal wastes, if necessary.

D. The Co-Permittees shall continue to provide notification to the Executive Officer of storm water related information obtained during site inspections of construction and industrial sites regulated by the General Storm Water Permits and of sites that should be regulated under the General Storm Water Permits. The notification should include perceived violations of the General Storm Water Permits or local requirements, prior history of violations of the Permittee's Storm Water Ordinance, enforcement actions related to the Storm Water Ordinance taken by the Permittee, and other relevant information. In addition, Sections XVI.B of this Order addresses additional notification requirements for construction, industrial and commercial sites not covered under the General Storm Water Permits. Notification shall not prevent or delay the Co-Permittees from independently taking appropriate actions to bring Construction Sites and Industrial Facilities into compliance with their local ordinances, rules, regulations and WQMP.

E. The Permittees are encouraged to enter into interagency agreements with owners of other MS4, such as CalTrans, school and college districts, universities, Department of Defense, Native American Tribes, etc., to control the contribution of Pollutants into their

MS4 from the non-Permittee MS4. The Regional Board will continue to notify the owner/operator of the MS4 systems and the Permittee if the Board issues a permit for discharges into the MS4.

F. The Co-Permittees shall annually review their Storm Water Ordinances and provide findings within the Annual Report on the effectiveness of these ordinances and enforcement programs in prohibiting the following types of discharges to the MS4 (the Co-Permittees may propose appropriate BMPs in lieu of prohibiting these discharges, where the Co-Permittees are responsible for ensuring that dischargers adequately maintain those BMPs):

1. Sewage, where a Co-Permittee operates the sewage collection system (also prohibited under the Statewide SSO Order[38]);
2. Wash water resulting from the hosing or cleaning of gas stations, auto repair garages, and other types of automobile service stations;
3. Discharges resulting from the cleaning, repair, or maintenance of any type of equipment, machinery, or facility, including motor vehicles, concrete mixing equipment, portable toilet servicing, etc.;
4. Wash water from mobile auto detailing and washing, steam and pressure cleaning, carpet/upholstery cleaning, pool cleaning and other such mobile commercial and industrial activities;
5. Water from cleaning of municipal, industrial, and commercial sites, including parking lots, streets, sidewalks, driveways, patios, plazas, work yards and outdoor eating or drinking areas, etc.;
6. Runoff from material storage areas or uncovered receptacles that contain chemicals, fuels, grease, oil, or other Hazardous Materials[39];
7. Discharges of runoff from the washing of hazardous material from paved or unpaved areas;
8. Discharges of pool or fountain water containing chlorine, biocides, or other chemicals; pool filter backwash containing debris and chlorine;
9. Pet waste, yard waste, litter, debris, sediment, etc.; and,
10. Restaurant or food processing facility wastes such as grease, floor mat and trash bin wash water, food waste, etc.

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[38] State Board WQO No. 2006-0003.
[39] Hazardous material is defined as any substrate that poses a threat to human health or the environment due to its toxicity, corrosiveness, ignitability, explosive nature or chemical reactivity. These also include materials named by EPA to be reported if a designed quantity of the material is spilled into the waters of the United States or emitted into the environment.

G. Within 24 months after Order adoption, each Co-Permittee shall submit a certification statement, signed by its legal counsel, that the Co-Permittee has obtained all necessary legal authority in accordance with 40 CFR 122.26(d)(2)(i) (A-F) and to comply with this Order through adoption of ordinances and/or municipal code modifications. A copy of the certification shall also be placed in the LIP.

H. Annually thereafter, Permittees shall evaluate the effectiveness of implementation and enforcement response procedures with respect to the above items. The findings of these reviews, along with recommended corrective actions, where appropriate, and schedules shall be submitted as part of the Annual Report for the corresponding reporting period. The LIP shall be updated accordingly.

IX. ILLICIT CONNECTIONS/ILLEGAL DISCHARGES (IC/ID); LITTER, DEBRIS AND TRASH CONTROL

A. Consistent with each Co-Permittees statutory authority, the Co-Permittees have adopted Storm Water Ordinances. The Co-Permittees must continue to prohibit IC/IDs to the MS4 through their Storm Water Ordinances and the Principal Permittee must do so through its statutory authority. In addition, the Permittees must continue to implement and improve routine inspection and monitoring and reporting programs for their MS4 facilities. If routine inspections or Dry Season monitoring indicate IC/IDs, they must be investigated and eliminated or permitted within sixty (60) calendar days of receipt of notice by its staff or from a third party.

B. The Permittees upon being put on notice by staff or a third party must immediately (within 24 hours of receipt of notice by its staff or from a third Party) investigate all spills, leaks, and/or other illegal discharges to the MS4. Based upon their assessment and as specified below, the Permittees must provide notifications and reporting as described in Section 4 of the DAMP and Section XVI of this Order.

C. The Permittees shall control Illegal Dumping that may result in a discharge of Pollutants to the MS4 to the MEP. The Permittees shall describe their procedures and authorities for managing Illegal Dumping in their LIP.

D. Within 18 months of adoption of this Order, the Permittees shall review and revise their IC/ID program to include a pro-active IDDE using the Guidance Manual for Illicit Discharge, Detection, and Elimination by the Center for Watershed Protection[40] or any

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[40] USEPA (Illicit Discharge Detection and Elimination - A Guidance Manual for Program Development and Technical Assessments) by the Center for Watershed Protection and Robert Pitt, University of Alabama, October 2004, updated 2005).

other equivalent program consistent with Section IX.E below. The result of this review shall be reported in the Annual Report and include a description of the Permittees' revised pro-active program, procedures and schedules. The LIP shall be updated accordingly.

E. The Permittees' revised IC/ID programs shall specify an IDDE program for each Co-Permittee to individually, or in combination:

   a. Develop an inventory and map of Permittee MS4 facilities and Outfalls to Receiving Waters.

   b. Develop a schedule to be submitted within 18 months to conduct and implement systematic investigations of MS4 open channels and Major Outfalls.

   c. Use field indicators to identify potential Illegal Discharges, if applicable;

   d. Track Illegal Discharges to their sources[41] where feasible; and

   e. Educate the public about Illegal Discharges and Pollution Prevention where problems are found.

F. The Permittees shall continue to integrate IC/ID detection and elimination into their inspection programs, training of Permittee staff, and monitoring data collection and other indicator data.

G. The Permittees shall annually review and evaluate their IC/ID program, including litter/trash BMPs, to determine if the program needs to be adjusted. Findings of the review and evaluation shall be submitted with the Annual Report.

H. The Permittees shall maintain a database summarizing IC/ID incident response (including IC/IDs detected as part of field monitoring activities). This information shall be updated on an ongoing basis and submitted with the Annual Report.

I. The Permittees shall control, consistent with the MEP standard, Illegal Discharges (including the discharge of spills, leaks, or dumping of any materials other than storm water and authorized non-storm water) into the MS4. All reports of Illegal Discharge shall be promptly investigated and reported as specified in Section XVI (Notification Requirements).

J. In the 2004-2005 Annual Report, the Permittees characterized trash, determined its main source(s) and developed and implemented appropriate BMPs to reduce and/or to eliminate the discharge of trash and debris to Waters of the US to the MEP. The BMPs should be continued and their effectiveness must be reported in the Annual Report.

K. Where non-jurisdictional IC/IDs within a Permittees jurisdiction are identified, the Permittees will notify the responsible party and the Executive Officer of the discharge.

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[41] Table 2: Land uses, Generating Sites and Activities that Produce Indirect Discharges from IDDE, A Guidance Manual for Program Development and Technical Assessments, October 2004 CWP.

X. SEWAGE SPILLS, INFILTRATION INTO THE MS4 SYSTEMS FROM LEAKING SANITARY SEWER LINES, SEPTIC SYSTEM FAILURES, AND PORTABLE TOILET DISCHARGES

A. The Permittees shall continue to provide local sanitation districts 24-hour access to the MS4 to address sewage spills. The Permittees shall continue to work cooperatively with the local sewer agencies to determine and control the impact of infiltration from leaking sanitary sewer systems on Urban Runoff quality. Each Permittee shall implement control measures necessary to minimize infiltration of seepage from sanitary sewers to the MS4 through routine preventative maintenance of the MS4.

B. Each Permittee shall continue to cooperate and coordinate with the sewage collection/treatment agencies as described in Appendix I of the DAMP to swiftly respond to and contain sewage spills that may discharge into its MS4. Management and/or preventive measures shall continue to be implemented for sources including portable toilets, failing septic systems, and failing private laterals that may cause or contribute to Urban Runoff Pollution problems in Permittee jurisdictions.

C. Permittees who are regulated under the SSO Order No. 2006-0003-DWQ, shall continue to comply with that Order to control sanitary system overflows.

D. Permittees with septic systems in their jurisdiction shall maintain the inventory of septic systems within its jurisdiction completed in 2008. Updates to the inventory will be maintained by County Environmental Health via a database of new septic systems approved since 2008.

XI. CO-PERMITTEE INSPECTION PROGRAMS

The Permittee inspection programs are outlined in Sections 7 and 8 of the DAMP and describe some of the minimum inspection and enforcement procedures utilizing existing inspection programs, provides criteria for characterizing the significance of violations, criteria for prioritizing violations, appropriate response actions corresponding to the priority of violations and identifies the hierarchy of enforcement/compliance responses. Section 3.4 of the DAMP provides a framework to standardize the implementation and enforcement by the Co-Permittees of their respective Storm Water Ordinances. The Co-Permittees shall continue to enforce their respective Storm Water Ordinances consistent with the DAMP and this Order.

A. GENERAL REQUIREMENTS

1. The Co-Permittees shall continue to maintain and update a database inventory of all active Construction Sites, and Industrial and Commercial Facilities within their jurisdiction consistent with the database requirements of Section 7 and 8 of the DAMP. Construction Sites and Industrial and Commercial Facilities shall be

included in the database inventories regardless of whether the Construction Sites or Commercial and Industrial Facilities are subject to the General Construction Permit or the General Industrial Permit or other individual NPDES permit or WDRs.

2. The Co-Permittee inspection database inventory described in Section XI.A.1 shall be maintained in an electronic database format that may be made available to the Regional Board upon request (e.g. request via phone call, e-mail, letter, etc,). The database inventory must be consistent with the requirements of Sections 7 and 8 of the DAMP. Supporting paper (or electronic) files shall also be maintained and made available upon Regional Board request. Supporting files should include a record of inspection dates, the results of each inspection, photographs (if any), video (if any) and a summary of any enforcement actions taken. The inventory databases shall be updated on an annual basis and an electronic copy shall be provided with each Annual Report.
3. The Co-Permittee shall not issue an occupancy permit to an Industrial Facility or other license authorizing the facility to operate, unless the applicant is informed of the General Industrial Permit and that it may have to secure coverage under the General Industrial Permit. The Co-Permittees shall verify during Industrial Facility inspections whether a site has obtained necessary permit coverage under the General Industrial Permit.
4. If the Industrial Facility's SIC code falls under the mandatory category the Co-Permittee shall notify the Regional Board and the applicant that they may be required to obtain coverage under the General Industrial Permit.
5. Permits for Construction Sites shall not be granted until appropriate coverage under the General Construction Permit (s) is verified.
6. Perceived Non-filers for the General Storm Water Permits shall be reported consistent with Section XVI.E.
7. If a Co-Permittee receives notice by its staff or from a third party of a non-Emergency Situation representing a possible violation of the General Storm Water Permit or other permit issued by the State or Regional Board to an Industrial Facility or Construction Site, the Co-Permittee shall, within two (2) working days, provide oral or e-mail notice to Regional Board staff of the location within its jurisdiction where the incident occurred and describe the nature of the incident. After notifying the Regional Board, no further action is necessary regarding the General Storm Water Permits. However, each Co-Permittee shall take appropriate actions to bring an Industrial Facility or Construction Site into compliance with its Storm Water Ordinances.
8. The Co-Permittees need not inspect facilities already inspected by Regional Board staff if the inspection was conducted within the specified time period. Regional

Board staff inspection information is available at www.ciwqs.ca.gov[42].

9. Each Co-Permittee shall respond to complaints received from third parties regarding Construction Sites and Industrial and Commercial Facilities in a timely manner to ensure that the sites are not a source of Pollutants to the MS4 and the Receiving Waters.
10. The Co-Permittees shall enforce their Storm Water Ordinances and permits at all Construction Sites and Industrial, and Commercial Facilities in a fair, firm and consistent manner. Sanctions for non-compliance as required under Section VIII (Legal Authority/Enforcement) shall be deemed adequate to bring the site into compliance with their Storm Water Ordinances and permits.
11. Each Co-Permittee shall document, evaluate and annually report the effectiveness of its enforcement procedures in achieving prompt and timely compliance with inspection programs. Sanctions for non-compliance shall be adequate to bring the site into compliance and to stop the Pollutant discharge consistent with the requirements of Section VIII of this Order.
12. The Principal Permittee and the County have implemented the CAP. Through the Riverside County Department of Environmental Health, the CAP addresses storm water compliance issues at restaurant facilities and businesses that must have a hazardous material permit for either storing, handling or generating hazardous materials. As described in Section 8 of the DAMP, the Permittees must either participate in the CAP or implement an equivalent inspection program. The cities of Corona and Riverside maintain such programs through their respective POTW pre-treatment programs that may be supplemented by the activities of the Department of Environmental Health during routine inspections. The County is establishing a stand-alone NPDES Storm water Compliance Inspection and Enforcement Program (CIEP) for Industrial and Commercial Facilities in the unincorporated areas of the County.
13. Where inspections and/or enforcement required by this Order are carried out on behalf of the Co-Permittee by other agencies or departments such as the County Department of Environmental Health, county and local fire departments, hazardous materials programs, code enforcement, industrial pretreatment, and building and safety, the Co-Permittee shall monitor and annually evaluate and report adequacy of program coverage and enforcement response in complying with this Order.
14. All inspectors shall be trained in accordance with Section XV.

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[42] To obtain access to the State database, registration at the following link is necessary: http://www.waterboards.ca.gov/water_issues/programs/ciwqs/chc_npdes.shtml. Contact information is available at http://www.waterboards.ca.gov/water_issues/programs/ciwqs/contactus.shtml.

B. CONSTRUCTION SITES

1. Each Co-Permittee shall include in the electronic database identified in Section XI.A.2 an inventory of all Construction Sites within its jurisdiction for which building or grading permits have been issued and activities at the site include: soil movement; uncovered storage of materials or wastes, such as dirt, sand or fertilizer; or exterior mixing of cementaceous products, such as concrete, mortar or stucco.

2. Each Permittee shall continue to prioritize Construction Sites within its jurisdiction as a high, medium or low threat to water quality. Evaluation of construction sites shall be based on factors, which shall include but not be limited to: soil erosion potential, project size, proximity and sensitivity of Receiving Waters and any other relevant factors. At a minimum, high priority Construction Sites shall include: sites disturbing 50 acres and greater; sites disturbing over 1 acre with Direct Discharge to Receiving Waters with CWA Section 303(d) listed waters for sediment or turbidity impairments; site specific characteristics[43] ; and any other relevant factor. At a minimum, medium priority construction sites shall include: sites disturbing between 10 to less than 50 acres of disturbed soil.

3. Each Permittee shall conduct Construction Site inspections for compliance with its ordinances (grading, WQMPs, etc.) and local permits (building, grading, etc.). The Permittees shall develop a checklist for conducting Construction Site inspections. Inspections of Construction Sites shall include, but not be limited to:

    a. Verification of coverage under the General Construction Permit (PRDs or Waste Discharge Identification Number [WDID]) during the initial inspection. As Permittees become aware of changes in ownership, they shall notify Regional Board staff.
    b. Ensure that the BMPs implemented on-site are effective for the appropriate phase of construction (preliminary stage, mass grading stage, streets and utilities stage etc.).
    c. Visual observations for Illegal Discharges, potential Illicit Connections, and potential Pollutant sources.
    d. Implementation and maintenance of BMPs required under local requirements.
    e. An assessment of the effectiveness of BMPs implemented at the site and the need for any additional BMPs.

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[43] The recently adopted General Construction Permit Order No. 2009-0009-DWQ includes risk-based characterization of construction sites based on site-specific conditions.

4. At a minimum, the inspection frequency shall include the following:
   a. During the Wet Season (October 1 through May 31 of each year), all high priority Construction Sites are to be inspected, in their entirety, once a month. All medium priority Construction Sites are to be inspected at least twice during the Wet Season. All low priority Construction Sites are to be inspected at least once during the Wet Season. Construction Sites that disturb less than one acre may be inspected on an as needed basis. When BMPs or BMP maintenance is deemed inadequate or out of compliance, an inspection frequency of at least once per week should be maintained until BMPs and BMP maintenance are brought into compliance.
   b. During the Dry Season (June 1 through September 30 of each year), all Construction Sites shall be inspected at a frequency sufficient to ensure that sediment and other Pollutants are properly controlled and that unauthorized, Non-storm Water discharges are prevented.

C. INDUSTRIAL FACILITIES

1. To establish priorities for inspection, the Permittees shall continue to prioritize Industrial Facilities within their jurisdiction as a high, medium, or low threat to water quality. Continual evaluation of these Industrial Facilities should be based on such factors as type of industrial activities (i.e., SIC codes), materials or wastes used or stored outside, Pollutant discharge potential, compliance history, facility size, proximity and sensitivity of Receiving Waters and any other relevant factors described in Section 8 of the DAMP. At a minimum, a high priority shall be assigned to: Industrial Facilities subject to section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA); Industrial Facilities that handle or generate Pollutants for which the receiving water is impaired, facilities that have a significant potential to release pre-production plastics or nurdles into the environment, and Industrial Facilities with a high potential for or history of unauthorized, Non-storm Water discharges.
2. Each Co-Permittee shall conduct Industrial Facility inspections for compliance with its ordinances, permits and this Order. Industrial Facility inspections shall be consistent with Section 8 of the DAMP. If an inspection indicates the need for follow-up, Co-Permittee follow-up inspections shall include a review of the Industrial Facility's material and waste handling and storage practices, written documentation of Pollutant control BMP implementation and maintenance procedures, digital photographic documentation of water quality violations as well as evidence of past or present unauthorized, Non-storm Water discharges and enforcement actions issued at the time of the Co-Permittee inspection. Report of inspections shall be included in the Annual Report and shall provide the basis for downgrading or upgrading priority ranking of Industrial Facilities.

3. All high priority Industrial Facilities are to be inspected at least once a year; all medium priority Industrial Facilities are to be inspected at least once every two years; and all low priority Industrial Facilities are to be inspected at least once during the term of this Order. In the event that inappropriate material or waste handling or storage practices are observed, or unauthorized, non-storm water discharges are observed, an enforcement order shall be issued and a re-inspection frequency adequate to bring the Industrial Facility into compliance must be maintained (at a minimum, once a month or within the compliance schedule prescribed by the Co-Permittee in a written notice to the discharger). Once compliance is achieved, a minimum inspection frequency of once every six months should be maintained for the annual reporting period.
4. Each Co-Permittee shall continually identify undocumented Industrial Facilities within its jurisdiction and shall add them to the database, as identified in Section XI.A.2. Additionally, each Industrial Facility shall be listed as per the criteria in specified in Section XI.C.1 within 15 days from the initial date of discovery of the Industrial Facility.
5. Each Permittee shall require Industrial Facilities to implement source control and pollution prevention measures consistent with the requirements of Section 8.of the DAMP.

D. COMMERCIAL FACILITIES

1. Each Permittee shall continue to implement the CAP or equivalent, pursuant to Section 8. of the DAMP and Section XI.A.9 (complaints) of this Order; Section 8 shall be modified to clarify the types of facilities specifically addressed by the CAP. Within 18 months, the Co-Permittees shall also identify any facilities that transport, store or transfer pre-production plastic pellets and managed turf facilities (e.g. private golf courses, athletic fields, cemeteries, and private parks) within their jurisdiction and determine if these facilities warrant additional inspection to protect water quality.
2. The Permittees shall continue to develop BMPs applicable for each of the Commercial Facilities described in Section 8 of the DAMP.
3. The Co-Permittees shall continue to prioritize Commercial Facilities within their jurisdiction as a high, medium, or low threat to water quality based on such factors as the type, magnitude, and location of the commercial activity, proximity and sensitivity of Receiving Waters, potential for discharge of Pollutants to the MS4, Commercial Facilities that handle or generate Pollutants for which the Receiving Water is Impaired, frequency of inspections and facilities with a high potential for or history of unauthorized, Non-storm Water discharges.
4. All high priority Commercial Facilities shall be inspected at least once per year; all medium priority Commercial Facilities shall be inspected at least every two years; and all low priority Commercial Facilities shall be inspected at least once during the

term of this Order. At a minimum, each Commercial Facility shall be required to implement source control and pollution prevention BMPs consistent with the requirements of Section 8 of the DAMP. Co-Permittee follow-up inspections should include a review of BMPs implemented, their effectiveness and maintenance; written and photographic documentation of materials and waste handling and storage practices; evidence of past or present unauthorized, Non-storm Water discharges; and an assessment of management/employees awareness of storm water pollution prevention measures.

5. In the event that inappropriate material or waste handling or storage practices are observed, or there is evidence of past or present unauthorized, Non-storm Water discharges, a written enforcement order shall be issued at the time of the initial inspection for CAP equivalent inspection programs or at the time of the CAP follow-up inspection, to bring the Commercial Facility into compliance.
6. Within 18 months of adoption of this Order, the Co-Permittee shall notify all mobile businesses based within their jurisdiction concerning the minimum Source Control and Pollution Prevention BMPs that they must develop and implement. For purposes of this Order, mobile businesses include: mobile auto washing/detailing; equipment washing/cleaning; carpet, drape, furniture cleaning; and mobile high pressure or steam cleaning activities that are based out of a Co-Permittee's jurisdiction. The mobile businesses shall be required to implement appropriate BMPs within 3 months of being notified by the Co-Permittees. The Co-Permittees shall also notify mobile businesses discovered operating within their jurisdiction.
7. Within 24 months of adoption of this Order, the Co-Permittees shall develop an enforcement strategy to address mobile businesses.
8. The Co-Permittees should continue to maintain the CAP restaurant inspection program, or equivalent. Inspections for Commercial Facilities with restaurants shall, at a minimum, address:
    a. Oil and grease disposal to verify that these wastes are not poured onto a parking lots, streets or adjacent catch basins;
    b. Trash bin areas, to verify that these areas are clean, the bin lids are closed, the bins are not used for liquid waste disposal and wash water from the bins is not disposed of into the MS4;
    c. Parking lot, alley, sidewalk and street areas to verify that floor mats, filters and garbage containers are not washed in those areas and that no wash water is disposed of in those areas;
    d. Parking lot areas to verify that they are cleaned by sweeping, not by hosing down, and that the facility operator uses dry methods for spill cleanup; and,
    e. Violations of the Storm Water Ordinance shall be enforced by the jurisdictional Co-Permittee.

E. RESIDENTIAL PROGRAM

1. Within 18 months of adoption of this Order, each Co-Permittee shall develop and implement a residential program consistent with these requirements to reduce the discharge of Pollutants from residential activities to the MS4, consistent with the MEP standard.
2. The Co-Permittees shall identify residential activities that are potential sources of Pollutants and develop and/or enhance Fact Sheets/BMPs as appropriate. At a minimum, this should include: residential auto washing and maintenance activities; use and disposal of pesticides, herbicides, fertilizers and household cleaners; and collection and disposal of pet wastes. The Permittees shall distribute the Fact Sheets/BMPs and appropriate information from organizations such as the Riverside-Corona Resource Conservation District[44] and USDA's Backyard Conservation Program[45] to the residents to ensure that discharges from the residential areas are not causing or contributing to a violation of Water Quality Standards in the Receiving Waters.
3. The Co-Permittees, collectively or individually, shall facilitate the proper collection and management of used oil, toxic and hazardous materials, and other household wastes. The Permittees should continue distribution of information regarding the dates and locations of temporary and permanent household hazardous waste and antifreeze, oil, battery and paint collection events and facilities, and financial support of household hazardous waste and antifreeze, oil, battery and paint collection facilities and events or curbside or special collection sites managed by the Co-Permittees or private entities, such as solid waste haulers.
4. The Regional Board recommends continuation of Co-Permittee efforts to coordinate with local water purveyors and other stakeholders to encourage efficient irrigation and minimize runoff from residential areas.
5. The Co-Permittees shall enforce their Storm Water Ordinance as appropriate to control the discharge of Pollutants associated with residential activities.
6. Each Co-Permittee shall include an evaluation of its residential program in the Annual Report starting with the second Annual Report after adoption of this Order.

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[44] The Riverside-Corona Resource Conservation District (RCRCD) provides gardening and horticulture information appropriate for the area including native plant selection, backyard management, alternatives to pesticide, irrigation scheduling and composting. The RCRCD is sponsored by the cities and county of Riverside Only Rain Down the Storm Drain Pollution Prevention Program.

[45] Backyard Conservation, Bringing Conservation from the Countryside to Your Backyard, USDA Natural Resources Conservation Service, National Association of Conservation Districts, Wildlife Habitat Council and National Audubon Society.

XII. NEW DEVELOPMENT (INCLUDING SIGNIFICANT REDEVELOPMENT)

A. GENERAL REQUIREMENTS:

1. Each Co-Permittee, consistent with the DAMP, and requirements of this Order, when considering any map or permit for a New Development or Significant Redevelopment project for which discretionary approval is sought, must continue to require such map or permit to obtain coverage under the General Construction Permit, where applicable, prior to the issuance of grading or construction permits. Each Co-Permittee shall specify its verification procedure and any tools utilized for this purpose in its LIP.

2. Each Co-Permittee must continue to implement those BMPs identified in Section 7.1 of the DAMP. Each Permittee shall ensure that the erosion and sediment control plans it approves include appropriate erosion and sediment control BMPs (i.e., erosion measures for slopes greater than a certain length or hill-side developments, ingress/egress controls, perimeter controls, run-on diversion, if significant) such that a distinct and effective combination of BMPs consistent with site risk is implemented through all phases of construction.

3. The land use approval process of each Co-Permittee must continue to require post-construction BMPs, Source Control BMPs and Treatment Control BMPs and identify their locations and long-term maintenance responsibilities consistent with the requirements of this Order.

4. Each Permittee shall ensure, consistent with the MEP standard and within the limits of its legal authority, that runoff from New Development and Significant Redevelopment projects not regulated under this Order but that require encroachment permits for connections to the MS4 regulated under this Order are consistent with the requirements of this Order including the model WQMP for the Permit Area.
5. Each Permittee shall ensure that appropriate BMPs to reduce erosion and mitigate Hydromodification are included in the design for replacement of existing culverts or construction of new culverts and/or bridge crossings to the MEP[46].
6. Each Permittee shall ensure, consistent with the MEP standard, that runoff from development projects it approves, does not cause nuisance to adjoining downstream properties and stream channels.
7. Each Permittee shall ensure to the MEP that MS4s[47] are appropriately maintained consistent with Section XIV of this Order or are adequately maintained by a legally responsible party.

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[46] This type of project may require a CWA Section 404 Permit.

8. Each Permittee shall require applicants to minimize the short and long-term adverse impacts on Receiving Water quality from New Development and Significant Redevelopment maps or permits where discretionary approval is sought, as required in Section XII.D below, by: (1) continuing to review, approve, and verify implementation of project-specific WQMPs, implementation of LID principles, where feasible; (2) addressing HCOCs; and (3) ensuring that long term BMP operation and maintenance mechanisms are in place prior to project closure or issuance of certificates of occupancy.

9. The requirements of Section XII.D below shall apply to Permittee projects that meet the New Development and Significant Redevelopment criteria.

10. Each Permittee shall participate in the development of a Watershed Action Plan, described in Section XII.B, below, to integrate water quality, stream protection and storm water management and use within the Permit Area with land use planning policies, ordinances, and plans.

B. WATERSHED ACTION PLAN

1. An integrated watershed management approach may facilitate integration of planning and project approval processes with water quality and quantity control measures. Management of the impacts of Permit Area urbanization on water quality and stream stability is more effectively done on a per-site, neighborhood and municipal basis based on an overall watershed plan. Pending completion of the Watershed Action Plan consistent with this section, management of the impacts of urbanization shall be accomplished using existing programs. The Permittees shall develop a Watershed Action Plan to address the entire Permit Area. The Permittees may choose to develop sub-watershed action plans based on the overall Watershed Action Plan in the future based on new 303(d) impairments, TMDL requirements, or other factors.

2. The Permittees shall develop and submit to the Executive Officer for approval a Watershed Action Plan that describes and implements the Permittees' approach to coordinated watershed management. The objective of the Watershed Action Plan is to address watershed scale water quality impacts of urbanization in the Permit Area associated with Urban TMDL WLAs, stream system vulnerability to Hydromodification from Urban Runoff, cumulative impacts of development on

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[47] Urban runoff conveyance systems created or resulting from development projects approved by Permittees.

vulnerable streams, preservation of Beneficial Uses of streams in the Permit Area, and protection of water resources, including groundwater recharge areas.

3. Within three years of Permit adoption, the Co-Permittees shall develop the Watershed Action Plan and implementation tools to address impacts of urbanization in a holistic manner. At a minimum, the Watershed Action Plan shall include the following:
   a. Describe proposed Regional BMP approaches that will be used to address Urban TMDL WLAs.
   b. Develop recommendations for specific retrofit studies of MS4, parks and recreational areas that incorporate opportunities for addressing TMDL Implementation Plans, Hydromodification from Urban Runoff and LID implementation.
   c. Description of regional efforts that benefit water quality (e.g. Western Riverside County Multiple Species Habitat Conservation Plan, TMDL Task Forces, Water Conservation Task Forces, Integrated Regional Watershed Management Plans) and their role in the Watershed Action Plan. The Permittees shall describe how these efforts link to their Urban Runoff Programs and identify any further coordination that should be promoted to address Urban WLA or Hydromodification from Urban Runoff to the MEP.
4. Within two years of adoption of this Order, the Permittees shall delineate existing unarmored or soft-armored stream channels in the Permit Area that are vulnerable to Hydromodification from New Development and Significant Redevelopment projects.
5. Within two years of completion of the delineation in Section XII,B.4 above, develop a Hydromodification management plan (HMP) describing how the delineation will be used on a per project, sub-watershed, and watershed basis to manage Hydromodification caused by urban runoff. The HMP shall prioritize actions based on drainage feature/susceptibility/risk assessments and opportunities for restoration.
   a. The HMP shall identify potential causes of identified stream degradation including a consideration of sediment yield and balance on a watershed or sub-watershed basis.
   b. Develop and implement a HMP to evaluate Hydromodification impacts for the drainage channels deemed most susceptible to degradation. The HMP will identify sites to be monitored, include an assessment methodology, and required follow-up actions based on monitoring results. Where applicable, monitoring sites may be used to evaluate the effectiveness of BMPs in preventing or reducing impacts from Hydromodification.

6. Identify Impaired Waters [CWA § 303(d) listed] with identified Urban Runoff Pollutant sources causing impairment, existing monitoring programs addressing those Pollutants, any BMPs that the Permittees are currently implementing, and any BMPs the Permittees are proposing to implement consistent with the other requirements of this Order. Upon completion of XII.B.4, develop a schedule to implement an integrated, world-wide-web available, regional geodatabase of the impaired waters [CWA § 303(d) listed], MS4 facilities, critical habitat preserves defined in the Multiple Species Habitat Conservation Plan and stream channels in the Permit Area that are vulnerable to Hydromodification from Urban Runoff.

7. Develop a schedule to maintain the geodatabase required in Section XII.B.4 and other available and relevant regulatory and technical documents associated with the Watershed Action Plan.

8. Within three years of adoption of this Order, the Watershed Action Plan shall be submitted to the Executive Officer for approval and incorporation into the DAMP. Within six months of approval, each Permittee shall implement applicable provisions of the approved revised DAMP and incorporate applicable provisions of the revised DAMP into the LIPs for watershed wide coordination of the Watershed Action Plan.

9. The Permittees shall also incorporate Watershed Action Plan training, as appropriate, including training for upper-level managers and directors into the training programs described in Section XV. The Co-Permittees shall also provide outreach and education to the development community regarding the availability and function of appropriate web-enabled components of the Watershed Action Plan.

10. Invite participation and comments from resource conservation districts, water and utility agencies, state and federal agencies, non-governmental agencies and other interested parties in the development and use of the Watershed Geodatabase;

C. INCORPORATION OF WATERSHED PROTECTION PRINCIPLES INTO PLANNING PROCESSES

1. Within 24 months of adoption of this Order, each Co-Permittee shall review its General Plan and related documents including, but not limited to its development standards, zoning codes, conditions of approval and development project guidance to eliminate any barriers to implementation of the LID principles and HCOC discussed in Section XII.E of this Order. The results of this review along with any proposed action plans and schedules shall be reported in the Annual Report for the corresponding reporting year. Any changes to the project approval process or procedures shall be reflected in the LIP.

2. The Co-Permittees shall continue to ensure that their General Plan and related land use ordinances and land use approval processes (including, but not limited to, its approved development standards, zoning ordinances, standard conditions of approval, or project development guidelines) ensure the principles and policies enumerated below are properly considered and are incorporated, as appropriate, into the land use approval process to the MEP:
   a. Limit disturbance of natural water bodies and drainage systems; conserve natural areas; protect slopes and channels; minimize significant adverse impacts from Urban Runoff on the biological integrity of natural drainage systems and water bodies;
   b. Minimize changes in hydrology and Pollutant loading; require incorporation of controls including Source Control and Treatment Control BMPs to mitigate any projected increases in Pollutant loads and flows; ensure that post-development runoff rates and velocities from a site do not adversely impact downstream erosion and stream habitat; minimize the quantity of Urban Runoff directed to impermeable surfaces and the MS4; and maximize the percentage of permeable surfaces to allow more percolation of Urban Runoff into the ground;
   c. Preserve wetlands, riparian corridors, and buffer zones that provide important water quality benefits; establish reasonable limits on the clearing of vegetation from the project site;
   d. Encourage the use of BMPs to manage Urban Runoff quantity and quality, consistent with XII.C.1 above;
   e. Provide for appropriate permanent measures to reduce Pollutant loads in Urban Runoff from the development site; and
   f. Establish development guidelines for areas particularly susceptible to erosion and sediment loss.

3. The Co-Permittees, when acting as a CEQA Lead Agency for a project requiring a CEQA document, must identify at the earliest possible time in the CEQA process resources under the jurisdiction by law of the Regional Board which may be affected by the project. The preliminary WQMP should identify the need for any CWA Section 401 certification. The Co-Permitees should coordinate project review with Regional Board staff pursuant to the requirements of CEQA. Upon request by Regional Board staff, this coordination shall include the timely provision of the discharger's identity and their contact information and the facilitation of early-consultation meetings.

4. The following potential impacts shall be considered during CEQA review:
   a. Potential impact of project construction on Urban Runoff.
   b. Potential impact of project's post-construction activity on Urban Runoff.

c. Potential for discharge of Pollutants from areas of material storage, vehicle or equipment fueling, vehicle or equipment maintenance (including washing), waste handling, hazardous materials handling or storage, delivery areas or loading docks, or other outdoor areas.

d. Potential for discharge of Urban Runoff to affect Beneficial Uses of the Receiving Waters.

e. Potential for significant changes in the flow velocity and/or volume of Urban Runoff that could cause environmental harm.

f. Potential for significant increases in erosion of the project site or surrounding areas.

5. Each Permittee shall provide the Regional Board with the draft amendment or revision when a pertinent General Plan element or the General Plan is noticed for comment in accordance with Govt. Code § 65350 et seq.

D. WATER QUALITY MANAGEMENT PLAN (WQMP) FOR URBAN RUNOFF (FOR NEW DEVELOPMENT/ SIGNIFICANT REDEVELOPMENT):

1. Each Permittee shall continue to require project-specific WQMPs for those maps and permits described below for which discretionary approval is sought and as further described in Section 6 and Appendix O of the DAMP. Within 18 months of adoption of this Order, the Permittees shall submit a revised WQMP to incorporate new elements required in this Order. The primary objective of the WQMP, by addressing Site Design, Source Control and Treatment Control BMPs applied on a regional, sub-regional or site specific basis, is to ensure that the land use approval process of each Co-Permittee will minimize Pollutant loads in Urban Runoff from maps or permits for which discretionary approval is given.

2. Each Co-Permittee shall ensure that an appropriate WQMP is prepared for the following categories of New Development and Significant Redevelopment projects for which a map or permit for discretionary approval is sought:

   a. *All significant re-development projects:* Significant re-development is defined as the addition or replacement of 5,000 or more square feet of impervious surface on an already developed site. Significant Redevelopment does not include routine maintenance activities that are conducted to maintain original line and grade, hydraulic capacity, original purpose of the facility, or emergency redevelopment activity required to protect public health and safety. Where redevelopment results in an increase of less than fifty percent of the impervious surfaces of a previously existing developed site, and the existing development was not subject to WQMP requirements, the numeric sizing criteria discussed below applies only to the addition or replacement, and not to the entire developed site.

Where redevelopment results in an increase of fifty percent or more of the impervious surfaces of a previously existing developed site, the numeric sizing criteria applies to the entire development.

b. For purposes of this Order, the categories of development identified below, shall be collectively referred to as "New Development".

   i. New developments that create 10,000 square feet or more of impervious surface (collectively over the entire project site) including commercial and industrial projects and residential housing subdivisions requiring a Final Map. (i.e., detached single family home subdivisions, multi-family attached subdivisions, condominiums, apartments, etc.); mixed use and public projects (excluding Permittee road projects). This category includes development projects on public and private land, which fall under the planning and building authority of the Co-Permittees.

   ii. Automotive repair shops (with SIC codes 5013, 5014, 5541, 7532-7534, 7536-7539).

   iii. Restaurants (with SIC code 5812) where the land area of development is 5,000 square feet or more.

   iv. Hillside developments disturbing 5,000 square feet or more which are located on areas with known erosive soil conditions or where the natural slope is twenty-five percent or more.

   v. Developments of 2,500 square feet of impervious surface or more adjacent to (within 200 feet) or discharging directly into ESAs.

   vi. Parking lots of 5,000 square feet or more exposed to storm water. Parking lot is defined as land area or facility for the temporary parking or storage of motor vehicles.

   vii. Retail Gasoline Outlets (RGOs) that are either 5,000 square feet or more with a projected average daily traffic of 100 or more vehicles per day.

   viii. Emergency public safety projects in any of the above-listed categories may be excluded if the delay caused due the requirement for a WQMP compromises public safety, public health and/or environmental protection.

3. WQMPs shall include BMPs (on-site and/or watershed-based), for the discharge of any urban sourced 303(d) listed Pollutant to an Impaired Waterbody on the 303(d) list such that the discharge shall not cause or contribute to an exceedance of Receiving Water Quality Objectives.

4. Treatment Control BMPs shall be in accordance with the approved WQMP and must be sized to comply with one of the following numeric sizing criteria:

a. VOLUME - Volume–based Treatment Control BMPs shall be designed to infiltrate, filter, or treat either:

   i. The volume of runoff produced from a 24-hour, 85th percentile storm event, as determined from the County of Riverside's 85th Percentile Precipitation Isopluvial Map; or,

   ii. The volume of annual runoff produced by the 85th percentile, 24-hour rainfall event determined as the maximized capture storm water volume for the area, from the formula recommended in Urban Runoff Quality Management, WEF Manual of Practice No. 23/ASCE Manual of Practice No. 87 (1998); or,

   iii. The volume of annual runoff based on unit basin storage volume, to achieve 80% or more volume treatment by the method recommended in California Storm Water Best Management Practices Handbook – Industrial/Commercial (1993); or,

   iv. The volume of runoff, as determined from the local historical rainfall record, that achieves approximately the same reduction in Pollutant loads and flows as achieved by mitigation of the 85th percentile, 24-hour runoff event;

   OR

b. FLOW - Flow-based BMPs shall be designed to infiltrate, filter, or treat either:

   i. The maximum flow rate of runoff produced from a rainfall intensity of 0.2 inch of rainfall per hour; or,

   ii. The maximum flow rate of runoff produced by the 85th percentile hourly rainfall intensity, as determined from the local historical rainfall record, multiplied by a factor of two; or,

   iii. The maximum flow rate of runoff, as determined from the local historical rainfall record that achieves approximately the same reduction in Pollutant loads and flows as achieved by mitigation of the 85th percentile hourly rainfall intensity multiplied by a factor of two.

5. Within 24 months of adoption of this Order, the Permittees shall develop a procedure for streamlining regulatory agency approval of regional Treatment Control BMPs. The recommendations should include information needed to be submitted to Regional Board for consideration of regional Treatment Control BMPs. At a minimum, it should include: BMP location; type and effectiveness in removing Pollutants of Concern; projects tributary to the regional treatment system; engineering design details; funding sources for construction, operation and maintenance; and parties responsible for monitoring effectiveness, operation and maintenance.

6. The Permittees shall continue to require other development projects for which a map or permit for discretionary approval is sought (projects that are not New Developments or Significant Re-developments required to develop project-specific

WQMPs) to incorporate conditions of approval, to require appropriate Site Design, Source Control and any other BMPs which may or may not include Treatment Control BMPs.

7. The Permittees shall ensure that the revised WQMP addresses:
   a. A review and update of Source Control BMPs required for New Development and Significant Redevelopment.
   b. Update of the list of Treatment Control BMPs, including an evaluation of their effectiveness based on national, statewide or regional studies.
8. Groundwater Protection:

   Treatment Control BMPs utilizing infiltration [exclusive of incidental infiltration and BMPs not designed to primarily function as infiltration devices (such as grassy swales, detention basins, vegetated buffer strips, constructed wetlands, etc.)] must comply with the following minimum requirements to protect groundwater:

   a. Use of structural infiltration Treatment Control BMPs shall not cause or contribute to an exceedance of groundwater Water Quality Objectives.
   b. Use of structural infiltration Treatment Control BMPs shall not cause a Nuisance or pollution as defined in Water Code Section 13050.
   c. Use of structural infiltration Treatment Control BMPs shall not be used in areas of known soil or groundwater contamination[48], without written authorization from the Regional Board Executive Officer.
   d. Located at least 100 feet horizontally from any water supply well.
   e. The vertical distance from the bottom of any infiltration structural Treatment Control BMP to the historic high groundwater mark shall be at least 10 feet. Where the groundwater basins do not support Beneficial Uses, this vertical distance criteria may be reduced, provided groundwater quality is maintained.
   f. Source Control and Pollution Prevention BMPs shall be implemented to protect groundwater quality.
   g. Adequate pretreatment of runoff prior to infiltration shall be required in gas stations and large commercial parking lots.
   h. Unless adequate pre-treatment of runoff is provided prior to infiltration, structural infiltration Treatment Control BMPs must not be used for areas of industrial or light industrial activity, such as: areas subject to high vehicular traffic (25,000 or more daily traffic), car washes; nurseries; or any other high threat to water quality land uses or activities.

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[48] Extra diligence should also be performed when proposing infiltration BMPs in areas where the proposed land use is often associated with soil and groundwater contamination.

i. Class V injection wells or dry wells must not be placed in areas subject to vehicular[49] repair or maintenance activities[50], such as an auto body repair shop, automotive repair shop, new and used car dealership, specialty repair shop (e.g., transmission and muffler repair shop), or any facility that does any vehicular repair work.

E. LOW IMPACT DEVELOPMENT (LID) AND HYDROMODIFICATION MANAGEMENT TO MINIMIZE IMPACTS FROM NEW DEVELOPMENT/SIGNIFICANT REDEVELOPMENT PROJECTS:

1. Within 18 months of adoption of this Order, the Permittees shall update the WQMP to address LID principles and HCOC consistent with the MEP standard. A copy of the updated WQMP shall be submitted to the Executive Officer for approval. Within six months of approval, each Permittee shall implement the updated WQMP. Onsite LID principles as close to Pollution sources as possible shall be given preference, however, project site, sub-regional or regional LID principles may also be applied.

2. The Permittees shall require those projects identified in Section XII.D.2. to infiltrate, harvest and use, evapotranspire and/or bio-treat[51] the 85th percentile storm event ("Design Capture Volume"). The Design Capture Volume should be calculated as specified in Section XII.D.4.a, above. It is recognized that LID principles are not universally applicable and they are dependent on factors such as: soil conditions including soil compaction and permeability, groundwater levels, soil contaminants (Brownfield development), space restrictions (in-fill projects, redevelopment projects, high density development, transit-oriented developments), highest and best use of Urban Runoff (to support downstream uses), etc. Any portion of this volume that is not infiltrated, harvested and used, evapotranspired, and/or bio-treated shall be treated and discharged in accordance with the requirements set forth in Section XII.G, below.

3. The Permittees shall incorporate LID site design principles into the revised WQMP to reduce runoff to a level consistent with the MEP standard. The Co-Permittees

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[49] Vehicles include automobiles; motor vehicles include trucks, trains, boats, motor cycles, farm machineries, airplanes, and recreation vehicles such as snow mobiles, all terrain vehicles, and jet skis.
[50] United States Environmental Protection Agency, Office of Water, EPA 816-R-00-008, September 2000 *State Implementation Guidance - Revisions to the UIC Regulations for Class V Injection Wells and* "Class V Rule" (*Revisions to the Underground Injection Control Regulations for Class V Injection Wells*, 64 FR 68546) *indicate that these activities are prohibited from Class V injection wells.*

[51] A properly engineered and maintained bio-treatment system may be considered only if infiltration, harvesting and use and evapotranspiration cannot be feasibly implemented at a project site (feasibility criteria will be established in the WQMP [Section XII.G.1]. Specific design, operation and maintenance criteria for bio-treatment systems shall be part of the WQMP that will be produced by the Permittees.

shall require that New Development and Significant Redevelopment projects include Site Design BMPs during the development of the project-specific WQMP. The design goal shall be to maintain or replicate the pre-development hydrologic regime through the use of design techniques that create a functionally equivalent post-development hydrologic regime through site preservation techniques and the use of integrated and distributed infiltration, retention, detention, evapotranspiration, filtration and treatment systems. The revised WQMP should continue to consider Site Design BMPs described in Appendix O of the DAMP and LID principles described in the pending Southern California Stormwater Monitoring Coalition/CASQA *LID Guidance Manual for Southern California*.

4. Within 18 months of adoption of this Order, each Permittee shall revise, where feasible its ordinances, codes, building and landscape design standards to promote green infrastructure/LID techniques including, but not limited to, the following:

   a. Landscaping designs that promote longer water retention and evapotranspiration such as 1 foot depth of compost/top soil in commercial and residential areas on top of 1 foot of non-compacted subsoil, concave landscape grading to allow runoff from impervious surfaces, and water conservation by selection of water efficient native plants, weather-based irrigation controllers, etc.

   b. Allow permeable surface designs in low traffic roads and parking lots. This may require land use/building code amendment.

   c. Allow natural drainage systems for street construction and catchments (with no drainage pipes) and allow vegetated ditches and swales where feasible.

   d. Require landscape in parking lots to provide treatment, retention or infiltration.

   e. Reduce curb requirements where adequate drainage, conveyance, treatment and storage are available.

   f. Amend land use/building codes to allow no curbs, curb cuts and/or stop blocks in parking areas and residential streets with low traffic.

   g. Use of green roof, rain garden, and other green infrastructure in urban/suburban area.

   h. Allow rainwater harvesting and use.

   i. Narrow streets provide alternatives to minimum parking requirements, etc. to facilitate LID where acceptable to public safety departments.

j. Consider vegetated landscape for storm water treatment as an integral element of streets, parking lots, playground and buildings.

k. Consider and facilitate application of landform grading techniques[52] and revegetation as an alternative to traditional approaches, particularly in areas susceptible to erosion and sediment loss such as hillside development projects,

l. Other site design BMPs identified in the WQMP not included above.

5. Consistent with the requirements of AB 1881, each Co-Permittee is mandated to update its landscape ordinance. The bill requires the local agencies to adopt the State Model Water Efficient Landscape Ordinance[53] or prepare one that is "at least as effective" as the State Model by January 2010. The proposed state model ordinance applies to landscape requiring a building or landscape permit, plan check or design review. Each Permittee shall provide the Regional Board a copy of its report to Department of Water Resources (DWR).

6. Each Permittee shall implement effective education programs to educate property owners to use Pollution Prevention BMPs and to maintain on-site hydrologically functional landscape controls.

7. To reduce Pollutants in Urban Runoff, address Hydromodification, and manage Urban Runoff as a resource to the MEP, the revised WQMP shall specify preferential use of Site Design BMPs that incorporate LID techniques, where feasible, in the following manner (from highest to the lowest priority):

   a. Preventative measures (these are mostly non-structural measures, e.g., preservation of natural features to a level consistent with the MEP standard; minimization of Urban Runoff through clustering, reducing impervious areas, etc.) and

   b. Mitigation measures (these are structural measures, such as, infiltration, harvesting and use, bio-treatment, etc.).

8. The mitigation or structural Site Design BMPs shall also be prioritized (from highest to lowest priority):

   a. Infiltration BMPs (examples include permeable pavement with infiltration beds, dry wells, infiltration trenches, surface and sub-surface infiltration basins. The Permittees should work with local groundwater management agencies to ensure that infiltration Treatment Control BMPs are designed appropriately;

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[52] http://www.epa.gov/Region3/mtntop/pdf/appendices/d/aquatic-ecosystem-enhanc-symp/symposiumfinal.pdf

[53] http://www.owue.water.ca.gov/docs/final_reg_text.pdf

b. BMPs that harvest and use (e.g., cisterns and rain barrels); and

c. Vegetated BMPs that promote infiltration and evapotranspiration including bioretention, biofiltration and bio-treatment. Upon the Permittees' determination of LID infeasibility per Section XII.G, design capture volume specified in Section XII.D.4, that is not addressed by onsite or offsite LID *Site Design BMPs* as listed above shall be treated using *Treatment Control BMPs* as described in Section XII.G.

9. Hydrologic Condition of Concern (HCOC):

a. The Permittees shall continue to ensure, consistent with the MEP standard, through their review and approval of project-specific WQMPs that New Development and Significant Redevelopment projects do not pose a HCOC due to increased runoff volumes and velocities.

b. A New Development and Significant Redevelopment project does not cause a HCOC if any one of the following conditions is met:

i) The project disturbs less than one acre and is not part of a common plan of development.

ii) The volume and the time of concentration[54] of storm water runoff for the post-development condition is not significantly different from pre-development condition for a 2-year return frequency storms (a difference of 5% or less is considered insignificant). This may be achieved through Site Design and Treatment Control BMPs.

iii) All downstream conveyance channels to an adequate sump (e.g. Prado Dam, Lake Elsinore, Canyon Lake, Santa Ana River or other lake, reservoir or natural resistant feature) that will receive runoff from the project are engineered and regularly maintained to ensure design flow capacity, and no sensitive stream habitat areas will be affected; or not identified in the Permittees Hydromodification sensitivity maps required in Section XII.B.3, and no sensitive stream habitat areas will be affected.

iv) The Permittees may request a variance from these criteria based on studies conducted by the Southern California SMC, SCCWRP, CASQA, or other regional studies. Requests for consideration of any variances should be submitted to the Executive Officer.

c. If a HCOC exists, the WQMP shall include an evaluation of whether the project will adversely impact downstream erosion, sedimentation or stream habitat. This evaluation should include consideration of pre- and post-development hydrograph volumes, time of concentration and peak discharge velocities for a

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[54] Time of concentration is defined as the time after the beginning of rainfall when all portions of the drainage basin are contributing simultaneously to flow at the outlet.

2-year storm event, construction of sediment budgets, and a sediment transport analysis. If the evaluation determines adverse impacts are likely to occur, the project proponent shall implement additional Site Design BMPs, on-site BMPs, Treatment Control BMPs and/or in-stream BMPs[55] to mitigate the impacts. The project proponent should first consider Site Design BMPs and on-site BMPs prior to proposing in-stream BMPs; in-stream BMPs must not adversely impact Beneficial Uses or result in sustained degradation of Receiving Water quality and shall require all necessary regulatory approvals[56]:

d. HCOC are considered mitigated if they meet one of the following conditions:

   i. Require additional onsite or offsite mitigation to address potential erosion or habitat impact using LID BMPs.

   ii. The project is developed consistent with an approved Watershed Action Plan that addresses HCOC for the downstream Receiving Waters.

   iii. Mimicking the pre-development hydrograph with the post-development hydrograph, for a 2-year return frequency storm. Generally, the hydrologic conditions of concern are not significant, if the post-development hydrograph is no more than 10% greater than pre-development hydrograph. In cases where excess volume cannot be infiltrated or captured and reused, discharge from the site must be limited to a flow rate no greater than 110% of the pre-development 2-year peak flow.

e. If site conditions do not permit items i, through iv, above, the alternatives and in-lieu programs discussed under Section XII.G, below, may be considered.

F. ROAD PROJECTS

1. Within 24 months of adoption of this Order, the Co-Permittees shall develop standard design and post-development BMP guidance to be incorporated into projects for streets, roads, highways, and freeway improvements, under the jurisdiction of the Co-Permittees to reduce the discharge of Pollutants from the projects to the MEP. The draft guidance shall be submitted to the Executive Officer for review and approval and shall meet the performance standards for site design/LID BMPs, Source Control and Treatment Control BMPs as well as the

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[55] In-stream measures involve modifying the receiving stream channel slope and geometry so that the stream can convey the new flow regime without increasing the potential for erosion and aggradation. In-stream measures are intended to improve long-term channel stability and prevent erosion by reducing the erosive forces imposed on the channel boundary.

[56] In-stream control projects require a Stream Alteration Agreement from the California Department of Fish & Game, a CWA section 404 permit from the U.S. Army Corps of Engineers, and a section 401 certification from the Water Board. Early discussions with these agencies on the acceptability of an in-stream modification are necessary to avoid project delays or redesign.

HCOC criteria. The guidance and BMPs shall address streets, roads or highways under the jurisdiction of the Co-Permittees used for transportation of automobiles, trucks, motorcycles, and other vehicles, and excludes routine road maintenance activities where the surface footprint is not increased. The guidance shall incorporate principles contained in the USEPA guidance, "Managing Wet Weather with Green Infrastructure: Green Streets" to the MEP and at a minimum shall include the following:

a. Guidance specific to new road projects;

b. Guidance specific to projects for existing roads;

c. Size or impervious area criteria that trigger project coverage;

d. Preference for green infrastructure approaches wherever feasible;

e. Criteria for design and BMP feasibility analyses on a project-specific basis.

2. Within six months of approval by the Executive Officer, the Permittees shall implement the standard design and post-development BMP guidance for all road projects. Pending approval of the standard design and post-development BMP guidance, site specific WQMPs for streets road and highway projects shall be required pursuant to Section XII.D.2.

G. ALTERNATIVES AND IN-LIEU PROGRAMS

1. Within 18 months of adoption of this Order, the Permittees shall develop technically-based feasibility criteria for project evaluation to determine the feasibility of implementing LID BMPs which may include factors such as a groundwater protection assessment to determine if infiltration BMPs are appropriate for the site[57]. These criteria shall be submitted to the Executive Officer for approval. Only those projects that have completed a feasibility analysis as per the approved criteria should be considered for alternatives and in-lieu programs. If a particular BMP is not technically feasible, other BMPs should be implemented to achieve the same level of compliance, or if the cost of BMP implementation greatly outweighs the Pollution control benefits, the Co-Permittees may grant a waiver of the BMPs. All waivers, along with waiver justification documentation, must be submitted to the Executive Officer for approval in writing within 30 days prior to Permittee approval.

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[57] Such feasibility determinations may be based on regional analyses conducted by the Permittees (see finding G-14) or on site specific conditions. Site specific determinations shall be certified by a Professional Civil Engineer registered in the State of California, and will be documented in the project WQMP, which shall be approved by the Permittee prior to submittal to the Executive Officer. Within 30 days of submittal to the Executive Officer, the Permittee will be notified if the Executive Officer intends to take any action.

If a waiver is granted, the Permittees shall ensure that project proponents participate in one of the in-lieu programs discussed in this section.

2. The Permittees may collectively or individually propose to establish an Urban Runoff fund to be used for urban water quality improvement projects within the same watershed that is funded by contributions from developers granted waivers. The contributions should be at least equivalent to the cost savings for waived projects and the urban runoff funds shall be expended for projects that provide at least an equivalent amount of water quality improvement (there shall be no net impact on water quality due to a waived project). If a waiver is granted and an Urban Runoff fund is established, the Annual Report for the year should include:
   a. Total amount deposited into the funds; and
   b. The party responsible for managing the Urban Runoff fund;
   c. Projects funded or proposed to be funded with monies from the urban runoff fund with details on expected water quality improvement;
   d. Party or parties responsible for designing, construction, operation and maintenance of urban runoff funded projects, and
   e. Current status and a schedule for project completion.

3. The obligation to install Treatment Control BMPs at a New Development or Significant Redevelopment project is met if, for a common plan of development, BMPs are constructed with the requisite capacity to serve the entire common project, even if certain phases of the common project may not have BMP capacity located on that phase in accordance with the requirements specified above. The goal of the WQMP is to develop and implement practicable programs and policies to minimize the effects of urbanization on site hydrology, Urban Runoff flow rates, velocities, duration and time of concentration and Pollutant loads. This goal may be achieved through watershed-based Treatment Control BMPs, in combination with site-specific BMPs. All Treatment Control BMPs should be located as close as possible to the Pollutant sources, should not be located within Waters of the US, and Pollutant removal should be accomplished prior to discharge to Waters of the US. Regional Treatment Control BMPs shall be operational prior to occupation of any of the New Development or Significant Redevelopment project sites tributary to the regional Treatment Control BMP.

4. The Permittees may establish, where feasible and practicable, a water quality credit system for alternatives to infiltration, harvesting and use, evapotranspiration and other LID and Hydromodification requirements specified above. The following types of projects may be included in this credit system:
   a. Redevelopment projects that reduces the overall impervious area
   b. Brownfield redevelopment

c. High density developments (>7 units per acre)
d. Mixed use and transit-oriented development (within ½ mile of transit)
e. Dedication of undeveloped portions of the project site to parks, preservation areas and other pervious uses
f. Regional treatment systems with a capacity to treat flows from all upstream developments
g. Offsite mitigation or dedicated mitigation areas within the same watershed
h. Highly urbanized areas such as city center area
i. Historic Districts and Historic Preservation areas
j. Live-work developments
k. In-fill projects
l. Projects that enhance the transport of coarse sediment to the coast for beach replenishment.

5. The water quality credit system should not result in a net impact on water quality.

6. A summary of waivers of LID (along with a short description of the Section XII.G.2 through XII.G4 In-Lieu program selected), Hydromodification and Treatment Control BMPs along with any water quality credit granted, in-lieu projects, or urban runoff fund contribution required by each Co-Permittee shall be included in the Annual Report.

H. APPROVAL OF WQMP

Within 18 months of adoption of this Order, each Permittee shall develop and implement standard procedures and tools and include in its LIP the following:

1. The Permittees shall utilize a mechanism for review and approval of WQMPs, including a checklist that incorporates the minimum requirements of the model WQMP. The process for review and approval shall be described in the Permittees LIP.
2. The Co-Permittees shall maintain a database to track structural post-construction BMPs (consistent with XII.K.4 below).
3. Continue to ensure that the entity(ies) responsible for BMP maintenance and the mechanism for BMP funding is identified prior to WQMP approval.
4. The Permittees shall train those involved with WQMP reviews in accordance with Section XV, Training Requirements.

I. FIELD VERIFICATION OF BMPS

1. The Co-Permittees' permit close-out procedures shall include field verification that structural Site Design, Source Control and Treatment Control BMPs are designed, constructed and functional in accordance with the approved WQMP.
2. Prior to occupancy, the Co-Permittees shall verify through visual observation that the BMPs are working and functional.
3. The Co-Permittees may accept self-certification or third-party certification of BMPs from State-licensed professional engineers.

J. CHANGE OF OWNERSHIP AND RECORDATION

The Co-Permittees shall establish a mechanism to ensure that appropriate easements and ownerships are properly recorded in public records at the County and/or the city and the information is conveyed to all appropriate parties when there is a change in project or site ownership.

K. OPERATION AND MAINTENANCE OF POST-CONSTRUCTION BMPS

1. The Co-Permittees shall ensure that structural post construction BMPs are designed and implemented with control measures necessary to effectively minimize the creation of Nuisance or Pollution associated with vectors, such as mosquitoes, rodents, flies, etc. The Co-Permittee should work with the local vector agencies to ensure that structural post construction BMPs are designed to minimize the potential for vector breeding during operation and maintenance.
2. The Co-Permittees shall specify conditions of approval and as built inspections ensure that require proper maintenance and operation of any structural post construction BMPs including requirements for vector control.
3. The parties responsible for the maintenance and operation of the structural post construction BMPs, and a funding mechanism for operation and maintenance of structural post construction BMPs for the life of the project shall be identified prior to issuance of occupancy permits. Design of these structures shall allow adequate access for maintenance.
4. Each Co-Permittee shall maintain a database to track the operation and maintenance of the structural post construction BMPs installed after adoption of this Order. The database shall include: type of BMP; watershed where it is located; date of certification; party responsible for maintenance and any problems identified during inspection including any vector or nuisance problems.
5. Within 18 months of adoption of this order and annually thereafter, all Permittee-owned structural post construction BMPs installed after the date of this Order shall be inspected prior to the Rainy Season. The Co-Permittees shall also develop an

inspection frequency for New Development and Significant Redevelopment projects, based on the project type and the type of structural post construction BMPs deployed. Pursuant to XII.K.4, all New Development and Significant Redevelopment, structural post construction BMPs shall be inspected within the five-year Permit Term. The Co-Permittees shall ensure that the BMPs are operating and are maintained properly and all BMPs are working effectively to remove Pollutants in runoff from the site. If vector problems are identified, the Co-Permittees should work with the vector control agencies to remedy vector control problems. All inspections shall be documented and kept as Permittee record. The Co-Permittees may accept inspection reports conducted and certified by state licensed professional engineers in lieu of Co-Permittee inspections.

6. The Annual Report shall include a list of all structural post construction BMPs approved contained in the database required in XII.K.4 above.

L. PRE-APPROVED PROJECTS

The above provisions for LID and HCOC are not applicable to projects that have an approved WQMP as of the date of approval of the revised WQMP. The above provisions shall be implemented in a manner consistent with the MEP standard for all other projects 45 days from the date of approval of the revised WQMP. The Regional Board recognizes that full implementation may not be feasible for certain projects which have received tentative tract or parcel map or other discretionary approvals.

XIII. PUBLIC EDUCATION AND OUTREACH

A. The Permittees shall continue to implement the public education efforts already underway and shall continue to promote the most effective elements of the comprehensive public and business education strategy contained in the ROWD and Section 10 of the DAMP. As part of the Annual Report, the Permittees shall review their public education and outreach efforts and revise their activities to adapt to the needs identified in the annual reassessment of program priorities with particular emphasis on addressing the Pollutants of Concern. Results of this review shall direct the focus of its public education effort and cause recommendations for any changes to the public and business education program including: (1) how to make the multimedia efforts more effective; (2) a reevaluation of audiences and key messages for targeted behaviors; and (3) opportunities for participation in regional and statewide public education efforts. The goal of the public and business education program shall be to target 100% of the residents, including businesses, commercial and industrial establishments.

B. A status report on the requirements of this section and any changes to the on-going public education program shall be described in the Annual Report.

C. The Permittees shall implement an assessment program to measurably increase public knowledge of its communities regarding MS4 and impacts of Urban Runoff on Receiving Waters. The Permittees shall implement programs that can measure the change in behavior of its target communities to reduce Pollutant releases to the MS4 and the environment. A description of the program tasks, schedule and measurable goals shall be included in the first Annual Report due after adoption of this Order.

D. When feasible, the Permittees shall participate in joint outreach programs with other agencies including, but not limited to, the Santa Ana Watershed Project Authority, Caltrans, and other county and municipal storm water programs to ensure that a consistent message on storm water pollution prevention is disseminated to the public.

E. The Permittees shall continue to ensure that appropriate outreach materials are available for construction, industrial and commercial inspection programs. Outreach materials should be provided to Permittee inspectors for distribution to inspected facilities.

F. Within 18 months from the date of adoption of this Order, the Permittees shall ensure that they have developed, maintained and distributed BMP guidance for the control of those potentially polluting activities identified during the term of the 2002 MS4 Permit, which are not otherwise regulated by any agency, including guidelines for the household use of fertilizers, pesticides, herbicides and other chemicals, and guidance for mobile vehicle maintenance, carpet cleaners, commercial landscape maintenance, and pavement cutting. These guidance documents shall be distributed to the public, trade associations, etc., through participation in community events, trade association meetings and/or by mail.

G. The Permittees shall ensure that appropriate educational materials, including the BMP brochures, are provided to all new industrial and commercial enterprises within their jurisdiction at the time appropriate permits (e.g. business licenses or occupancy permits) are issued.

H. The Permittees shall continue to maintain, and if necessary enhance, public education materials to encourage the public to report: Illegal Dumping and unauthorized, non-storm water discharges from residential, industrial, construction and commercial sites into public streets, storm drains and to surface waterbodies and their tributaries; clogged storm drains; and faded stencils or missing catch basin markers. The Principal Permittee's hotline and web site shall provide guidance regarding where to locate information regarding general Urban Runoff pollution control measures. The hotline and website information shall be included in outreach materials and shall be listed in the governmental pages of prominent regional phone books and on the Co-Permittees' website.

I. The Permittees shall maintain a Public Education Committee to provide oversight and guidance for the implementation of the public education program. The Permittees shall

continue to participate in the Public Education Committee to review and update existing guidance for the implementation of the public education program. One of the functions of the Public Education Committee shall be to review outreach materials for construction, industrial and commercial inspection programs and residential outreach to ensure they appropriately address common violations observed during inspections. Once deficiencies are identified, alternative text to address the deficiency shall be developed within 6 months and reported in the Annual Report. The Public Education Committee shall meet at least twice per year.

J. The Permittees shall continue to sponsor or staff a table or booth at community, regional, and/or countywide events to distribute public education materials related to Urban Runoff pollution prevention to the public. Each Permittee shall participate in at least one event per year.

K. Successful implementation of the provisions and limitations in this Order will require the cooperation of all the public agency organizations within Riverside County having programs/activities that have an impact on Urban Runoff quality. This may include, but not be limited to, those listed in Appendix 2. As such, the Permittees should coordinate their efforts with those organizations where feasible and appropriate to ensure participation in implementing the requirements of this Order. The Permittees should notify the Regional Board where assistance is needed improving local cooperation.

L. Within 18 months of adoption of this Order, each Permittee shall develop BMP Fact Sheets for mobile businesses for distribution consistent with the requirements of Section XI.D.6. At a minimum, the mobile business Fact Sheets/training program should include: laws and regulations dealing with Urban Runoff and discharges to MS4; appropriate BMPs and proper procedures for disposing of Wastes generated from each mobile business category.

M. The Principal Permittee shall continue to develop and distribute BMP guidance for Permittee and contract field operations and maintenance staff to provide guidance in appropriate Pollution Prevention measures, how to respond to spills and reports of Illegal Discharges, etc.

XIV. PERMITTEE FACILITIES AND ACTIVITIES

A. Each Permittee shall continue to implement measures to ensure that their facilities and activities do not cause or contribute to a Pollution or Nuisance in Receiving Waters, as defined in Section 13050 of the Water Code. The Permittees must annually review their activities and facilities to determine the need for revisions to Section 5 of the DAMP and to their LIP. The Annual Report shall include the findings of this review and a schedule for any needed revisions. The Permittees should continue to use Facility Pollution Prevention Plans as noted in Chapter 5 of the DAMP to ensure that the Permittee facilities are not sources of Pollutants to the Waters of the US to the MEP.

B. Within 12 months of adoption of this Order, each Permittee shall review its inventory of fixed facilities listed in the DAMP, its field operations and MS4 facilities to ensure that Permittee facilities and activities are addressed by Facility Pollution Prevention Plans consistent with Chapter 5 of the DAMP and do not cause or contribute to a Pollution or Nuisance in Receiving Waters. Existing Facility Pollution Prevention Plans shall be reviewed to insure proper BMPs for these facilities. For Permittee facilities and/or activities tributary to CWA Section 303(d) Impaired Water Bodies that generate Pollutants for which the water body is Impaired, additional Pollutant-specific Source Control BMPs to target that Pollutant shall be identified and implemented in the Facility Pollution Prevention Plan to the MEP.

C. Each Permittee shall conduct inspections of its fixed facilities and field operations identified in Chapter 5 of the DAMP annually to ensure that they do not contribute Pollutants to Receiving Waters. The Permittees shall record the findings in the inspection forms developed by the Permittees. Each Permittee shall implement BMPs to manage the application, storage, and disposal of pesticides, herbicides, and fertilizers associated with their facilities and activities. At a minimum, the Facility Pollution Prevention Plans for these facilities and activities shall:

1. Ensure that Permittee applicators (including contractors) and distributors have appropriate training, permits, and certifications;
2. Utilize integrated pest management measures that rely on non-chemical solutions, to the extent practicable;
3. Promote the use of native vegetation into facility landscaping;
4. Include schedules for irrigation and chemical application to the extent feasible; and
5. Collect and properly dispose of unused pesticides, herbicides, and fertilizers.
6. The following BMP fact sheets are identified as minimum BMPs::
   i. SC-35/SC-61, Safer Alternative Products
   ii. SC-41, Building & Grounds Maintenance
   iii. SC-60, Housekeeping Practices
   iv. SC-73, Landscape Maintenance

D. Each Permittee shall review, update, and implement the individual clean out schedules and frequency for its MS4, including open channels, catch basins, retention/detention facilities and wetlands created for Urban Runoff treatment during the Wet and Dry Season to protect Receiving Water quality consistent with the MEP standard. The inspection and cleaning frequency for all portions of the specified MS4 shall be included in each Permittee's LIP and shall be evaluated annually to determine the need for adjusting the inspection and cleaning frequency. Each Permittee must clean those MS4 facilities where there is evidence of Illegal Discharge. In addition, each Permittee must clean those retention/detention basins and MS4 where the inspection reveals that the storage

volume is about 25% full or if accumulated sediment or debris impairs the hydraulic capacity of the facility.

E. Unless otherwise supported by field information, each Permittee shall at a minimum inspect, clean, and maintain at least 80% of its open channels, catch basins, retention/detention basins, and wetlands created for Urban Runoff treatment on an annual basis, with 100% of the facilities in a two year period. The MS4 clean out schedule shall continue to be included in the Annual Report.

F. Each Permittee shall examine opportunities to retrofit existing MS4 facilities with water quality protection measures, where feasible.

G. PERMITTEE COMPLIANCE WITH GENERAL PERMITS

1. GENERAL CONSTRUCTION PERMIT

a. All Permittee Construction Sites shall be in compliance with the latest adopted version of the General Construction Permit.

b. This Order authorizes the discharge of storm water runoff from Permittee Construction Sites that may result in land disturbance consistent with the acreage criteria of the General Construction Permit.

c. Prior to commencement of construction activities, the Permittees shall notify the Executive Officer of the proposed Construction Site by submitting a NOI, or Permit Registration Documents (PRDs) as provided in Attachment 5, and a location map depicting the Construction Site location. The filing fees for these NOIs/PRDs are waived for the Permittees.

d. Upon completion of the construction project, the Executive Officer shall be notified of the completion of the project by submitting (1) A Notice of Termination (NOT), provided in Attachment 5. (2) Photographs of the completed project; (3) A site map (depicting the project location and the locations of structural post-construction BMPs, including the latitude and longitude if appropriate); and (4) copies of the final field verification reports required under Section XII.I.

e. The Permittees shall develop, approve, and implement a WQMP for Permittee projects that meet the requirements of Section XII.D. of this Order.

f. The Permittees shall develop and implement a SWPPP and the monitoring and reporting program for their construction projects that meet the requirements of the latest version of the General Construction Permit. The Permittee must review and approve SWPPPs prepared by their contractors.

g. The Permittees shall give advance notice to the Executive Officer of planned changes in the construction activity, which may result in non-compliance with the latest version of the General Construction Permit.

h. Emergency Permittee projects required to protect public health and safety are exempted from compliance with the requirements of this subsection until the emergency ends, at which time they need to comply with the requirements of this section.

2. GENERAL DE-MINIMUS PERMIT DISCHARGES

a. The Permittees are authorized to discharge de-minimus types of discharges listed under the latest adopted version of the Regional Board's General De Minimus Discharge Permit, currently Order No. R8-2009-0003. The de-minimus discharges from Permittee owned and/or operated facilities and/or activities shall be in compliance with Order No. R8-2009-0003 except that the Permittees need not pay the filing fee.

b. The Permittees shall notify the Executive Officer of the proposed discharge at least 15 days prior to start of the discharge, by submitting a NOI and supporting documents, as provided in Attachment 7.

c. For existing Permittee Dischargers (authorized to discharge under Order No. R8-2009-003 prior to the adoption date of this Order), discharges will continue to be regulated under the terms and conditions of Order No. R8-2003-0003 until a new discharge authorization is issued, provided that the Discharger submits, by June 10, 2010, an updated NOI, a copy of the current Monitoring & Reporting Program previously issued to the Discharger, and proposed treatment modifications (if any). If no application for continued discharges are submitted by that date, the Discharger shall do one of the following:

i. Cease discharge and submit a letter informing the Regional Board that coverage under Order R8-2009-003 is no longer needed; or

ii. Apply for new discharge authorization as a new de-minimus discharge, under this Order.

XV. TRAINING PROGRAM FOR STORM WATER MANAGERS, PLANNERS, INSPECTORS AND MUNICIPAL CONTRACTORS

A. Within 24 months of adoption of this Order, the DAMP and each Permittee's LIP shall be updated to include a program to provide formal and where necessary, informal training to Permittee staff that implement the provisions of this Order. Formal training must be implemented as described herein and may consist of regional training provided by the Permittees or individual Co-Permittee training provided in-lieu of Principal Permittee training. Informal training (i.e. tailgate training) shall be implemented by each Permittee on an as-needed basis to supplement the formal

training. Each Permittee shall maintain a written and/or electronic record of stormwater training provided to its storm water and related program staff.

B. The training programs should be coordinated with the local Vector Control District to ensure that vector control issues related to post-construction BMPs maintenance and operation are incorporated into the training curriculum.

C. **Formal Training**: The formal training programs shall educate Permittee employees responsible for implementing requirements of this Order, by providing training on the following Permittee activities: construction site inspection, WQMP review, residential/industrial/commercial site inspection, and Permittee facility maintenance. Formal training may be conducted in classrooms or using videos, DVDs or other multimedia. The program shall consider all applicable Permittee staff such as storm water program managers, construction/industrial/ commercial/residential inspectors, planners, engineers, public works crew, etc. and shall: define the required knowledge and competencies for each Permittee compliance activity, outline the curriculum, include testing or other procedures to determine that the trainees have acquired the requisite knowledge to carry out their duties, and provide proof of completion of training such as Certificate of Completion, and/or attendance sheets. The formal training curriculum shall:

1. Highlight the potential effects that Permittee or Public activities related to their job duties can have on water quality.
2. Overview the principal applicable water quality laws and regulations that are the basis for the requirements in the DAMP.
3. Discuss the provisions of the DAMP that relate to the duties of the target audience, including but not limited to:
   a. The requirements of the DAMP regarding Storm Water Ordinances, resolutions, codes, and standards that relate to the duties of the target audience, including enforcement thereof;
   b. Overview of CEQA requirements contained in Section XII.C of this Order.
   c. Implementation and assessment of SWPPPs and Facility Pollution Prevention Plans relative to the duties of the target audience;
   d. Selection, implementation and maintenance of appropriate BMPs relative to the duties of the target audience;
   e. Tools, checklists and procedures included in the DAMP to assist in implementing the requirements of this Order relative to the duties of the target audience.

D. **Informal Training:** The informal training shall ensure that staff have the requisite knowledge to implement the applicable provisions in the Permittee's LIP, such as (but not limited to):

1. The requirements of local Storm Water Ordinances, resolutions, codes, and standards that relate to the duties of the target audience;
2. Local tools, checklists and/or procedures to implement the requirements of this Order relative to the duties of the target audience.
3. The proper use and maintenance of erosion and sediment controls;
4. Vector control issues related to storm water pollution control BMPs.

E. **Reporting**: Formal training shall be summarized and documented in the Annual Reports.

F. **Schedule**: At a minimum, the training schedule should include the following:

1. New Permittee employees responsible for implementing requirements of this Order must receive informal training within six months of hire and formal training within one year of hire.
2. Permittee facility maintenance staff must receive formal training at least once every two years.
3. Permittee inspection and code enforcement (if applicable) employees must receive formal or informal refresher training focused on appropriate BMP implementation at least once a year prior to the rainy season.
4. Other existing Permittee employees responsible for implementing the requirements of this Order must receive formal training at least once during the term of this Order.
5. The start date for training programs described in this Section shall be included in the schedule required in Section III.A.1.q, but shall be no later than six months after Executive Officer approval of DAMP updates applicable to the Permittee activities described in Section XIV.

G. The Permittees shall require verification of BMP training from contract staff where applicable.

H. The Permittee(s) shall include designated Regional Board staff on training notification e-mails announcing upcoming formal training sessions.

XVI. NOTIFICATION REQUIREMENTS

A. Within 24 hours of discovery, the Permittees shall provide oral or email notification to Regional Board staff of events within its jurisdiction that are determined to be an Emergency Situation. Following oral notification, a written report must be submitted within 10 days of receipt of notice of the Emergency Situation, detailing the nature of the non-compliance, any corrective action taken by the site/facility owner, other relevant information (e.g., past history of the Emergency Situation, environmental damage resulting from the Emergency Situation, site/facility owner responsiveness) and the type of enforcement, consistent with Section 4 of the DAMP, that will be carried out by the Co-Permittee. Further, incidences of noncompliance shall be

recorded along with the information noted in the written report and the final outcome/enforcement for the incident in the databases for Construction Sites, and Industrial or Commercial Facility inspections, as appropriate.

B. Notification requirements for non-Emergency Situations that are discovered during the course of Construction Site and Industrial Facility inspections that may be a violation of the General Stormwater Permits are addressed in Sections XI.A.7 of this Order.

C. Sewage spill notification shall be consistent with the timelines specified in the Statewide General Waste Discharge Requirements for Sanitary Sewer Systems, Water Quality Order No. 2006-0003-DWQ.

D. All reportable quantities of Hazardous Waste spills as per 40CFR 117 and 302 shall be reported within 24 hours. All spill incidents shall be also included in the Annual Report. These requirements are consistent with the Notification requirements for IC/IDs that are addressed in Section IX.B of this Order.

E. Enforcement requirements for Construction Sites and Industrial Facilities operating without an applicable General Stormwater Permit are specified in Section XI.A.7. These Sites and Facilities shall be reported within 14 calendar days to Regional Board staff by electronic mail or other written means. Permittees' notifications of facilities' failure to obtain required coverage under the General Construction Permit, or General Industrial Permit, including requirements to file PRDs. A PRD, NOI, No Exposure Certification, Notice of Non-applicability, and/or 401 Certification must include, at a minimum, the following documentation:

   1. Name of the Site or Facility
   2. Operator of the Site or Facility
   3. Owner of the Site or Facility
   4. Construction or Commercial/Industrial activity being conducted at the Site or Facility that is subject to the General Construction Permit, General Industrial Permit or 401 Certification
   5. Records of communication with the facility operator regarding the violation, which must include at least an inspection report.

F. The Permittees shall report to the Executive Officer:

   1. Any enforcement actions and known discharges of Urban Runoff to MS4 facilities, known to the Permittees, which may have an impact on human health or the environment consistent with Sections XI.A and XI.B above; if the discharge is to Canyon Lake or any tributary to Canyon Lake, Elsinore Valley Municipal Water District shall also be notified immediately; and
   2. Any suspected or reported activities on federal, state, or other entity's land or facilities, where the Permittees do not have any jurisdiction, and where the suspected or reported activities may be contributing Pollutants to Waters of the US

XVII. PROGRAM MANAGEMENT ASSESSMENT/DAMP REVIEW

A. By November 30 of each year, the Permittees shall evaluate the effectiveness of the Urban Runoff management program described in the DAMP to determine the need for any revisions in order to reduce Pollutants in MS4 discharges consistent with the MEP standard consistent with the reporting requirements in Appendix 3, Section IV.B. In addition, the first Annual Report (November 2010) after adoption of this Order shall include the following:

1. Review of the formal training needs of Permittee employees.
2. Review of coordination meeting/training for the designated NPDES inspectors.
3. Proposal for assessment of Urban Runoff management program effectiveness on an area wide as well as jurisdiction-specific basis. Permittees shall utilize the CASQA Guidance[58] for developing these assessment measures at the six outcome levels. The assessment measures must target both water quality outcomes and the results of municipal enforcement activities consistent with the requirements of Appendix 3, Section IV.B.

B. The Annual Report shall include the findings of this review and a schedule to address necessary revisions, or a copy of the amended DAMP with the proposed changes. Replacement pages are acceptable if modifications are not extensive. Annual Reports shall also be submitted in electronic format.

C. Upon the effective date of this Order, the Permittees shall implement the 2007 DAMP and modify it to be consistent with the requirements of this Order and the schedules contained herein.

D. Each Permittee shall designate at least one representative to the Management Steering Committee and Technical Committee. The Principal Permittee shall be notified immediately, in writing, of changes to the designated representative to either Committee. The designated representative for each Committee shall attend that Committee's meeting as follows: at least one (1) out of two (2) Management Steering Committee meetings and eight (8) out of ten (10) Technical Committee meetings per year to discuss issues related to permit implementation and regional and statewide issues.

E. The Permittees shall continue to implement all elements of the approved DAMP. Program elements revised in compliance with the requirements of this Order must be implemented in conformance with the schedules specified in this Order following approval of the Executive Officer.

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[58] CASQA, May 2007. Municipal Storm Water Program Effectiveness Assessment Guidance.

XVIII. FISCAL RESOURCES

A. Each Permittee shall exercise its full authority to secure the resources necessary to meet the requirements of this Order. This Order may be revised to adjust time schedules to accommodate prioritization of available resources.

B. The Permittees shall prepare and submit a financial summary to the Executive Officer. The financial summary shall be submitted with the Annual Report each year and shall, at a minimum, include the following:

1. Each Permittee's MS4 Permit compliance expenditures for the previous fiscal year;
2. Fiscal developments that may impact availability of funding for MS4 Permit compliance program implementation and to achieve the required implementation schedule;
3. Each Permittee's MS4 Permit compliance program budget for the current fiscal year;
4. A description of the source of funds to implement the MS4 Permit compliance program, and;
5. Each Permittee's estimated budget to implement the MS4 Permit compliance program for the next fiscal year.

XIX. MONITORING AND REPORTING PROGRAM

The Permittees must comply with Monitoring and Reporting Program No. R8-2010-0033, Appendix 3, and any revisions thereto, which are hereby made a part of this Order. The Executive Officer is hereby authorized to revise the Monitoring and Reporting Program in a manner consistent with this Order to allow the Permittees to participate in regional, statewide, national or other monitoring and reporting programs in lieu of or in addition to Monitoring and Reporting Program No. R8-2010-0033. In addition, dates for completion and implementation of certain program elements and reporting requirements are outlined in the Monitoring and Reporting Program.

XX. PROVISIONS

A. All reports submitted by the Permittees as per the requirements in this Order for the approval of the Executive Officer shall be publicly noticed and made available on the Regional Board's website, or through other means, for public review and comments. The Executive Officer shall consider all comments received prior to approval of the reports. Any unresolved significant issues shall be scheduled for a public hearing at a Regional Board meeting prior to approval by the Executive Officer.

B. Permittees shall demonstrate compliance with all the requirements in this Order and shall implement the DAMP and any modifications, revisions, or amendments thereto, which are developed pursuant to this Order or determined by the Permittees to be necessary to

meet the requirements of this Order. The DAMP, including any approved amendments thereto is hereby made an enforceable component of this Order.

C. The Permittees shall implement all elements of the DAMP and its components. Where the dates in the DAMP are different from the corresponding dates in this Order, the dates in this Order shall prevail. Any proposed revisions to the DAMP shall be submitted with the Annual Report for review and approval by the Executive Officer. All approved revisions to the DAMP shall be implemented as per the time schedules approved by the Executive Officer. In addition to those specific controls and actions required by: (1) the terms of this Order and (2) the DAMP and its components, each Permittee shall implement additional controls, if any are necessary, to reduce the discharge of Pollutants in Urban Runoff consistent with the MEP standard.

D. Certain BMPs implemented or required by the Permittees for Urban Runoff management may create habitat for vectors (e.g., mosquitoes and rodents) if not properly designed and maintained. Close collaboration and cooperative effort between the Permittees and local vector control agencies and the State Department of Health Services are necessary to minimize potential vector habitat and public health impacts resulting from vector breeding. Nothing in this Order is intended to prohibit inspection or abatement of vectors by the State or local vector control agencies in accordance with the respective Health and Safety Code.

E. Upon approval by the Executive Officer all plans, reports and subsequent amendments required by this Order shall be implemented and shall become an enforceable part of this Order. Prior to approval by the Executive Officer, these plans, reports and amendments shall not be considered as an enforceable part of this Order.

F. The MS4 permit application and special NPDES program requirements are contained in 40 CFR 122.21 (a), (b), (d)(2), (f), (p); 122.41 (a), (b), (c), (d), (e), (f), (g), (h), (i), (j), (k), (l); and 122.42 (c), and are incorporated into this Order by reference.

G. The Permittees must comply with all terms, requirements, and conditions of this Order. Any violation of this Order constitutes a violation of the CWA, its regulations and the California Water Code, and is grounds for enforcement action, Order termination, Order revocation and re-issuance, denial of an application for re-issuance, Order revisions, or a combination thereof.

H. Permittees must continue to take reasonable steps to minimize or prevent any discharge to the MS4 that has a reasonable likelihood of adversely affecting human health or the environment.

I. Regional Board staff, USEPA, and other authorized representatives must be allowed to:

1. Inspect Permittee records associated with compliance of this Order.

2. Access and copy records that are kept under the conditions of this Order.

3. Photograph and inspect any facilities or equipment (including monitoring and control equipment) that are related to or may impact storm water discharge or authorized Non-storm Water discharge.

4. Conduct sampling, and monitoring activities for the purpose of assuring compliance with this Order, or as otherwise authorized by the CWA and/or the Water Code.

5. Review the Permittee's programs and request the Regional Board to authorize modification to Permittee programs to comply with the requirements of this Order.

6. Request copies of data, monitoring reports, and sampling data and copies of the Permittee's conclusions and evaluations of the data.

J. This Order does not convey any property rights or any exclusive privileges.

K. The issuance of this Order does not authorize any injury to persons or property or invasion of other private rights, or any infringement of State or local law or regulations.

L. When Permittees become aware that it failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application or in any report to the Regional Water Board, State Board, or USEPA, the Permitttees must promptly submit such facts or information.

M. All applications, reports, or information submitted to the Regional Board, State Board, and/or USEPA are to be signed and certified by either:

1. A principal executive officer or ranking elected official. For purposes of this provision, a principal executive officer of a federal agency includes: (i) the chief executive officer of the agency, or (ii) a senior executive officer having responsibility for the overall operations of a principal geographic unit of the agency (e.g., Regional Administrators of USEPA)

2. A duly authorized representative of the person in 1, above. A person is a duly authorized representative only if the authorization is made in writing by a person described above;

3. The authorization specified either an individual or a position having responsibility for the overall operation of the regulated facility or activity such as the position of plant manager, operator of a well or a well field, superintendent, position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters for the company (A duly authorized representative may thus be either a named individual or any individual occupying a named position.); and

4. The written authorization is submitted to the Executive Officer.

5. If an authorization described above is no longer accurate because a different individual or position has responsibility for the overall operation of the facility, a new authorization must be submitted to the Executive Officer prior to or together with any reports, information, or applications, to be signed by an authorized representative.

6. Any person signing a document described above must make the following certification:

   "I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations".

XXI. PERMIT MODIFICATION

A. Following appropriate public notice, and in accordance with 40 CFR 122.41(f), this Order may be modified, revoked or reissued prior to its expiration date for the following reasons:
   1. To address significant changes in conditions identified in the technical reports required by the Regional Board which were unknown at the time of the issuance of this Order;
   2. To incorporate applicable requirements of statewide water quality control plans adopted by the State Water Resources Control Board or any amendments to the Basin Plan (including TMDLS) approved by the Regional Board, the State Board and, if necessary, by the Office of Administrative Law and the USEPA;
   3. To comply with any applicable requirements, guidelines, or regulations issued or approved under the Clean Water Act, if the requirements, guidelines, or regulations contain different conditions or additional requirements than those included in this Order; or,
   4. To incorporate new or revised program elements and compliance schedule(s) necessary to comply with this Order;

B. The filing of a request by the Permittees for modification, revocation and re-issuance, or termination or a notification of planned changes or anticipated noncompliance does not stay any conditions of this Order.

C. Pursuant to Section 13228 of the Water Code, the Regional Board may exercise its option for allowing the portion of the City of Murrieta located within the Santa Ana Region to be regulated by the San Diego Regional Water Quality Control Board under its Riverside County MS4 Permit. Similarly, if the San Diego Regional Water Quality Control Board authorizes this Regional Board to exercise authority over the City of Menifee within the

portions of the City regulated by the San Diego Regional Water Quality Control Board, this Regional Board will exercise its authority under this Order in those Regions.

XXII. PERMIT EXPIRATION AND RENEWAL

A. This Order expires on January 29, 2015, and the Permittees must file a ROWD no later than 180 days in advance of such expiration date as application for issuance of new waste discharge requirements. The ROWD shall, at a minimum, include the following:

1. Names and mailing address(es) of the primary administrative and technical contacts for the Permittees that operate the MS4;
2. Any revisions to the DAMP including, but not limited to, all the activities the Permittees propose to undertake during the next permit term, goals and objectives of such activities, an evaluation of the need for additional source control and/or structural BMPs, any proposed pilot studies, etc.;
3. Changes in land use and/or population including map updates;
4. Any significant changes to the MS4 including map updates of the MS4; and
5. An assessment of the overall Urban Runoff management program and its effectiveness in meeting Water Quality Standards. If Water Quality Standards are not being met, the ROWD shall include new or revised program elements and compliance schedule(s) necessary to comply with Section VI of this Order.

B. The ROWD, Annual Reports and other information submitted under this Order shall be signed by either a principal executive officer or a ranking elected official (40 CFR 122.22(a)(3)) or a duly authorized representative as per 40 CFR 122.22(b).

C. This Order shall serve as an NPDES Permit pursuant to Section 402(p) of the Clean Water Act, or amendments thereto, and shall become effective ten days after the date of its adoption provided the Regional Administrator of the USEPA has no objections. If the Regional Administrator objects to its issuance, the Permit shall not become effective until such objection is withdrawn.

D. The Regional Board is authorized to enforce the terms of this permit under several provisions of the CWC, including, but not limited to, sections 13385, 13386, and 13387.

E. Order No. R8-2002-0011 is hereby rescinded.

I, Gerard J. Thibeault, Executive Officer, do hereby certify that the foregoing is a full, true, and correct copy of an Order adopted by the California Regional Water Quality Control Board, Santa Ana Region, on January 29, 2010**.**

Gerard J. Thibeault
Executive Officer

APPENDIX 1

PERMIT AREA

ORDER NO. R8-2010-0033

ORDER NO. R8-2010-0033 (NPDES NO. CAS618003)
RIVERSIDE COUNTY AREA-WIDE URBAN RUNOFF MANAGEMENT PLAN

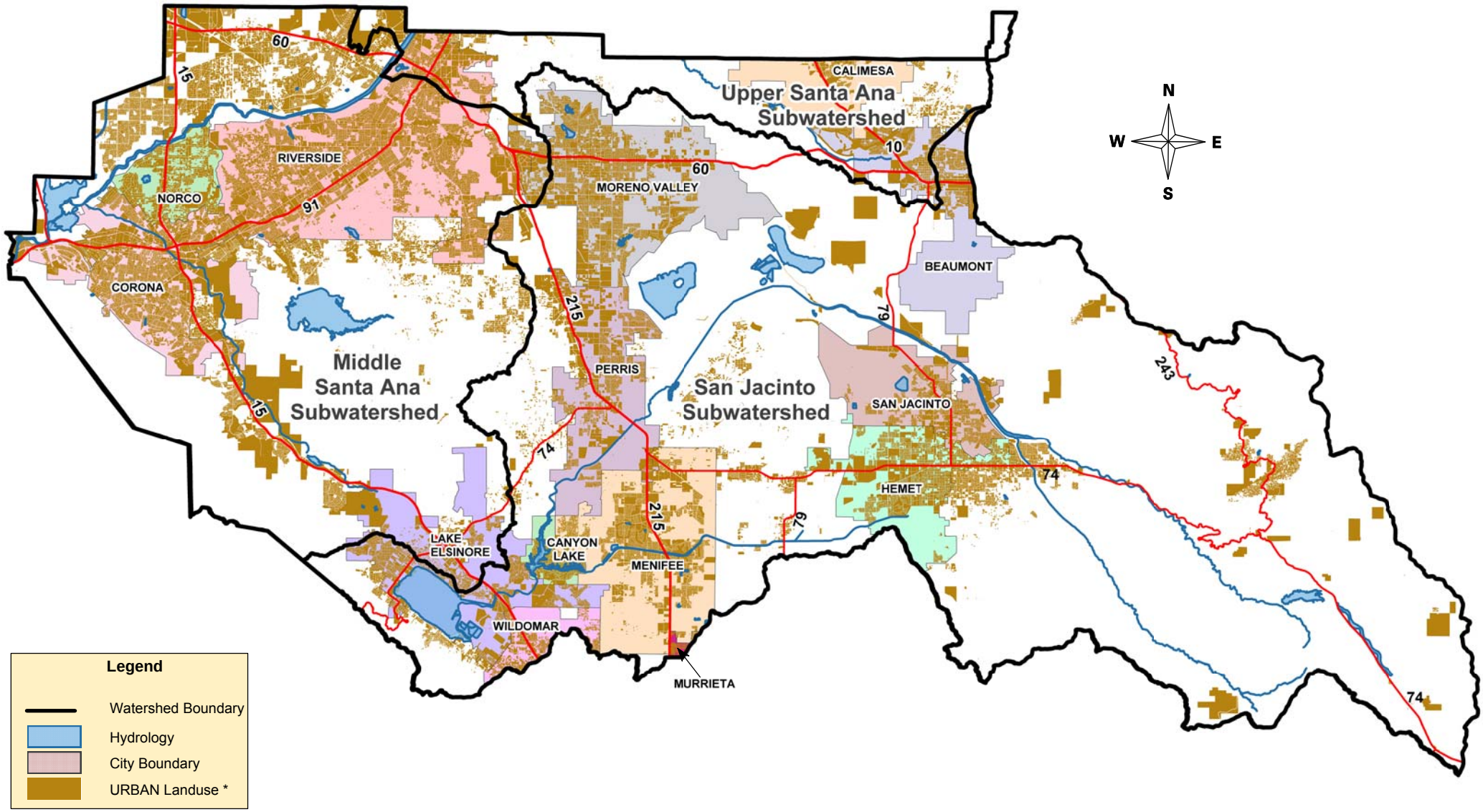

*** Areas not in URBAN: Agricultural, State, Federal, Tribal, Preserves & Open Space, Rural-Residential, Highways/Freeways**

APPENDIX 1

APPENDIX 2

OTHER ENTITIES THAT MAY DISCHARGE POLLUTANTS TO THE MS4

ORDER NO. R8-2010-0033

Appendix 2

OTHER POTENTIAL DISCHARGERS TO THE MS4s

Government Agencies

Department of the Air Force,
March Air Force Base – Special Districts (regulated under an individual NPDES permit)
State Parks
U.S. Army Corps of Engineers
Caltrans (regulated under a state-wide NPDES permit)
Department of Corrections
U.S. Forest Service
U.S. Department of the Interior – Bureau of Land Management

Hospitals

Corona Community Hospital
Hemet Valley Medical Center
Kaiser Foundation Hospital – Riverside
Loma Linda Hospital (Sun City)
Parkview Memorial Hospital
Riverside Community Hospital
Riverside County Regional Medical Center
Riverside General Hospital

Railroads

AT&SF Railway Company
Burlington Northern Railroad Company
Southern Pacific Railroad Company
Union Pacific Railroad

Special Districts/ Wastewater Agencies

Edgemont Community Services District
Jurupa Community Services District
Santa Ana Watershed Project Authority
Rubidoux Community Services District
Valley Wide Park and Recreation District

School Districts

Alvord Unified School District
Corona – Norco Unified School District
Hemet Unified School District
Lake Elsinore Unified School District
Menifee Union School District
Moreno Valley Unified School District
Nuview Union School District
Perris Elementary School District
Perris Union High School District
Riverside Unified School District
Romoland School District
San Jacinto Unified School District
Val Verde School District

Universities and Colleges

California Baptist University
La Sierra University
Mt. San Jacinto College
Riverside Community College
University of California, Riverside
California School for the Deaf, Riverside

Water Districts

Eastern Municipal Water District
Elsinore Valley Municipal Water District
Lake Hemet Municipal Water District
Lee Lake Water District
Metropolitan Water District
Western Municipal Water District

Tribal Lands

Soboba Band of Luiseno Indians
Morongo Band of Mission Indians

APPENDIX 3

MONITORING AND REPORTING PROGRAM

ORDER NO. R8-2010-0033

State of California
California Regional Water Quality Control Board
Santa Ana Region

Monitoring and Reporting Program No. R8-2010-0033
NPDES No. CAS618033

for
Riverside County Flood Control and Water Conservation District,
The County of Riverside and the Cities of Riverside County
Within the Santa Ana Region
AREA-WIDE URBAN STORM WATER RUNOFF MANAGEMENT PROGRAM

I. OBJECTIVES

The overall goal of the Urban Runoff monitoring program is to support the development of an effective Urban Runoff management program. The following are the major objectives:

A. To identify those Receiving Waters, which, without additional action to control pollution from urban storm water runoff, cannot reasonably be expected to achieve or maintain applicable Water Quality Standards required to sustain the designated beneficial uses, the goals, and the objectives of the Basin Plan.

B. To develop and support an effective Urban Runoff management program.

C. To identify significant water quality problems, related to discharges of Urban Runoff within the Permit Area.

D. To determine water quality status, trends, and Pollutants of concern associated with Urban Runoff and their impact on the Beneficial Uses of the Receiving Waters.

E. To analyze and interpret the collected data to determine the impact of Urban Runoff and/or validate relevant water quality models.

F. To characterize Pollutants associated with Urban Runoff, and to assess the influence of urban land uses on Receiving Water quality and associated Beneficial Uses.

G. To identify other sources of Pollutants in Urban Run off to the maximum extent possible (e.g., including, but not limited to, atmospheric deposition, contaminated sediments, other non-point sources, etc.)

H. To identify and permit or prohibit Illicit Connections.

I. To identify, verify and prohibit Illegal Discharges.

J. To verify and to identify sources of Pollutants in Urban Runoff.

K. To evaluate the effectiveness of the DAMP and WQMPs, including an estimate of Pollutant reductions achieved by the Site Design (Low Impact Development [LID], Treatment Control and Source Control BMPs implemented by the Permittees.

L. To evaluate the effectiveness of proposed Urban Runoff management programs to protect Receiving Water quality.

II. GENERAL MONITORING PROVISIONS

A. Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity [40 CFR 122.41(j)].

1. This includes any unusual discharge or discharge condition, including bypasses, upsets, and maintenance-related conditions affecting effluent quality in the case of storm channels and flow quality in the case of streams and lakes

2. All sample collection, handling, storage, and analysis shall be in accordance with test procedures under 40 CFR Part 136 (latest edition) "*Guidelines Establishing Test Procedures for the Analysis of Pollutants*," promulgated by the USEPA, the guidance being developed by the State Board pursuant to Water Code Section 13383.5, or other methods which are more sensitive than those specified in 40 CFR 136 and approved by the Executive Officer.

3. For priority Toxic Pollutants that are identified in the California Toxics Rule (CTR) (65 Fed. Reg. 31682), the Minimum Levels (MLs) published in Appendix 4 of the Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California (SIP) shall be used for all analyses, unless otherwise specified.

4. For priority Toxic Pollutants, if the Permittee can demonstrate that a particular ML is not attainable, in accordance with procedures set forth in 40 CFR 136, the lowest quantifiable concentration of the lowest calibration standard analyzed by a specific analytical procedure (assuming that all the method specified sample weights, volumes, and processing steps have been followed) may be used instead of the ML listed in Appendix 4 of the SIP. The Principal Permittee must submit documentation from the laboratory to the Regional Board Executive Officer for approval prior to raising the ML for any constituent.

B. All chemical, bacteriological, and Toxicity analyses shall be conducted at a laboratory certified for such analyses by an appropriate governmental regulatory agency.

C. Analytical methods, target reporting limits and data reporting formats shall be compatible with California's Surface Water Ambient Monitoring Program (SWAMP) Quality Assurance Management Plan and with SWAMP's Procedures for Conducting Routine Field Measurement unless otherwise specified in this Monitoring and Reporting Program (MRP).

D. Revisions of this MRP are appropriate to ensure that the Permittees are in compliance with requirements and provisions contained in this Order. Revisions may be made under the direction of the Executive Officer at any time during the term of the Order, and may include redistribution of monitoring resources to address TMDL needs, a reduction or increase in the number of parameters to be monitored, the frequency of monitoring, or the number and size of samples collected.

E. The Executive Officer is authorized to allow the Permittees to participate in regional, statewide, national, or other monitoring programs in addition to or as part of this Urban Runoff monitoring program. Also, the Permittees are authorized to complement their Urban Runoff monitoring data with data from other monitoring sources, provided the monitoring conditions and sources are similar to those in the Santa Ana River watershed.

F. The CWA provides that any person who falsifies, tampers with, or knowingly renders inaccurate any monitoring device or method required to be maintained under this Order shall, upon conviction, be punished by a fine of not more than $10,000, or by imprisonment for not more than two years, or both. If a conviction of a person is for a violation committed after a first conviction of such person under this paragraph, punishment is a fine of not more than $20,000 per day of violation, or by imprisonment of not more than four years, or both [40 CFR 122.41(j)(5)].

III. MONITORING PROGRAM

A. The Principal Permittee has been monitoring Urban Runoff and Receiving Waters since the first MS4 permit term. The Principal Permittee currently implements the Consolidated Monitoring Program (CMP) and participates in a number of other storm water or TMDL related monitoring programs such as: TMDL Bacterial and Nutrient Monitoring, WLA Compliance, BMP Effectiveness, Urban Source and Trend Evaluation, Receiving Water Quality, Hydromodification and Bioassessment. The Principal Permittee shall continue to implement the CMP and continue to participate in other related monitoring programs.

B. The Principal Permittee, on behalf of the Co-Permittees, participates (through a memorandum of understanding and cooperative agreements) with the 16 member agencies of the Storm Water Monitoring Coalition (SMC). The Permittees shall continue to cooperate with other MS4 permittees (including

Orange County and San Bernardino County), Southern California Coastal Water Research Project (SCCWRP), POTW operators, the dairy industry, the Santa Ana Watershed Project Authority (SAWPA), and other public and private organizations in the watershed to develop coordinated surface water quality monitoring programs, databases, and special studies as appropriate. The Regional Board supports continued coordination with SCCWRP and the SMC to facilitate and implement coordinated watershed based monitoring programs. The Permittees may use coordinated monitoring efforts such as the Middle Santa Ana River (MSAR) and Lake Elsinore/Canyon Lake (LE/CL) TMDL Task Forces, SCCWRP and SMC regional monitoring programs to address partially, or in full, the requirements of this MRP. A proposed coordinated monitoring program shall result in the development and implementation of a monitoring plan that:

1. Fully addresses the requirements of this MRP;

2. Describes how the external monitoring programs address the requirements of the MRP;

3. Include a quality assurance plan, including data management, validation, verification mechanism for the portions of the monitoring directly conducted by the Permittees;

4. Reference the locations of the quality assurance plans for regional components; and

5. Result in a coordinated Annual Report summarizing the pertinent Urban Runoff data from the coordinated programs necessary to address this MRP.

C. Within 12 months of adoption of this Order, the Permittees shall review the CMP, Regional and TMDL related monitoring programs that they conduct or participate to determine their effectiveness in achieving the Urban Runoff assessment requirements contained in Section IV.B, below. If this review indicates any data gaps, the Principal Permittee shall submit a revised CMP, or coordinate revisions to other regional programs for approval of the Executive Officer to ensure that the combined efforts adequately address the requirements of Section IV.B. The revised CMP, including a description of how other regional efforts combine with the CMP to address requirements of Section IV.B shall be submitted within 16 months of adoption of this Order and shall be implemented within six months of its approval by the Executive Officer. Pending approval of the revised CMP, current monitoring efforts will continue to be implemented.

D. <u>TMDL/303(d) Listed Waterbody Monitoring</u>: The Permittees identified as dischargers in adopted TMDLs shall continue to participate in TMDL monitoring programs as required by TMDL Implementation Plans. The compliance schedules for the two approved TMDLs within the Permit Area are beyond the five year MS4 Permit term. This Order requires Permittees identified as

dischargers in their respective TDMLs to conduct monitoring required by the TMDL Implementation Plans to determine the effectiveness of the BMPs implemented in reducing Pollutant loads and eventually to attain WLA by the deadlines specified in the respective TMDL Implementation Plans.

1. MSAR Bacteria WLA TMDL USEP monitoring

    a. On June 14, 2007, the TMDL task force members submitted a source evaluation plan and a monitoring plan. The Regional Board approved these plans on June 29, 2007, Resolution No. R8-2007-0046. A revised monitoring plan and an urban Bacterial Indicator source evaluation plan were approved by the Regional Board on April 18, 2008, Resolution No. R8-2008-0044. The MSAR Permittees within the MSAR watershed shall continue to conduct monitoring and source evaluations in accordance with the approved plans and report the findings in accordance with the schedules specified in the approved plans or as updated by subsequent Regional Board approved revisions.

    b. In conformance with Task 3 of the TMDL Implementation Plan contained in Resolution R8-2005-0001, the Permittees shall individually, or in conjunction with the MSAR TMDL Task Force, prepare a triennial report summarizing the data collected for the preceding 3 year period and evaluating compliance with the WLAs. The first report shall be due February 15, 2010.

    c. The Permittees shall conduct monitoring and reporting consistent with Section VI.D. of this Order to evaluate the effectiveness of the BMPs implemented in the watershed and determine their progress towards attaining compliance with the interim WQBELs, and final BMP-based WQBELS, if approved, or the final numeric WQBELS/WLAs.

2. Lake Elsinore/Canyon Lake Nutrient TMDL

    a. Monitor and report the effectiveness of the BMPs implemented in the watershed to control nutrient inputs into the lakes from Urban Runoff. Submit an Annual Report summarizing all relevant data from water quality monitoring programs and evaluating compliance with the LE/CL TMDL by reporting the effectiveness of the BMPs implemented in the watershed to control nutrient inputs into the lake from Urban Runoff pursuant to Regional Board Resolution No. R8-2006-0031 and R8-2007-0083, or as amended by subsequent Regional Board adopted resolutions.

    b. The Permittees shall conduct monitoring and reporting consistent with Section VI.D. of this Order to evaluate the effectiveness of the BMPs implemented in the watershed and determine their progress towards attaining compliance with the interim WQBELs, and final BMP-based WQBELS, if approved, or the final numeric WQBELS/WLAs.

E. In addition, any requirements developed by the State Board in accordance with Water Code Section 13383.5 shall be considered during any revision of the CMP. The revised CMP shall, at a minimum, include the following:

1. Mass Emissions Monitoring – Core Stations:

a. An estimate of flow in cubic feet per second (cfs) from the Outfall/stream at the time of sampling.

b. Monitor mass emissions in Urban Runoff to:

i) Estimate the total mass emissions from the MS4s to Receiving Waters.

ii) Assess trends in mass emissions associated with specific urban storm water discharges from the MS4 over time.

iii) Determine if Urban Runoff may be contributing to exceedances of Water Quality Objectives or Beneficial Uses in Receiving Waters by comparing water quality data from Outfall and Receiving Water results to: (1) Water quality Objectives (WQOs); (2) California Toxic Rule (CTR) (3) USEPA Multi-Sector Permit Parameter Benchmark Values and (4) other MS4 discharger's monitoring data or other appropriate data identified by the Permittees. The Permittees should also evaluate the Regional Monitoring reports prepared by SCCWRP to assess trends in Urban Runoff and Receiving Water quality within the Permit Area.

iv) Representative samples from the first sampleable storm event (based on mobilization criteria to be established in the CMP) of the Wet Season (October 1 to May 31) and two more storm events shall be collected during the Wet Season. A minimum of two Dry Weather samples shall also be collected. Samples from the first sampleable storm event each year shall be analyzed for constituents according to the list provided in the 2007-2008 Santa Ana Region Monitoring Annual Report, Attachment A. This list includes 40 CFR 122 Appendix D Tables II and III, and Tables IV and V if expected to be present, and additional constituents. All samples shall be analyzed for *E. coli*, nutrients (Nitrates + Nitrites, potassium, and phosphorous), hardness[1], metals, pH, TSS, TOC, pesticides/herbicides, and Pollutants/stressors for 303(d) listed Receiving Waters. Dry Weather samples should also include analyses for TPH (8015M – direct injection) and oil and grease. The analyte list will be reviewed annually. Constituents may be added to the list for a selected monitoring station if they are expected to be present, and removed from the list if three consecutive samples from the station have not had detectable concentrations of the constituent.

[1] Hardness is necessary to evaluate some metal Water Quality Objectives in receiving waters.

v) Monitoring locations shall be integrated into a GIS database system. All monitoring data shall continue to be placed in an electronic database.

2. Water Column Toxicity Monitoring: Analyses for Toxicity to aquatic species shall be performed on receiving water samples to determine if there may be impacts of Urban Runoff on Toxicity of Receiving Waters. The *Ceriodaphnia dubia* survival (acute), Fathead Minnow larval survival (acute), and Selenastrum Capricornutum growth (chronic) tests shall be used to evaluate Toxicity on the sample from the first sampleable storm event, plus one other Wet Season storm event sample. Where applicable, two Dry Weather samples shall also be collected or equivalent procedures shall be proposed in the CMP. In addition, criteria shall be identified which will trigger the initiation of Toxicity Identification Evaluations (TIEs) and Toxicity Reduction Evaluations (TREs).

   To the extent that the Toxicity testing developed as part of the Regional Bioassessment Monitoring described in item 5 and Section D below, or other standardized Toxicity testing protocols developed by the State Board, Regional Board, SMC or SCCWRP, satisfies the objective of determining the impact of Urban Runoff on Toxicity of Receiving Waters, the Permittees may satisfy this requirement by participating in the regional bioassessment effort or conducting Toxicity testing consistent with the standardized protocols.

3. Illicit Connection/Illegal Discharge (IC/ID) Monitoring: The Permittees shall review and update their Dry Weather and Wet Weather reconnaissance strategies to identify and eliminate IC/IDs using the Guidance Manual for Illicit Discharge, Detection, and Elimination developed by the Center for Watershed Protection[2] or any other equivalent program. Where possible, the use of GIS to identify geographic areas with a high density of industries associated with gross Pollution (e.g. electroplating industries, auto dismantlers) and/or locations subject to maximum sediment loss (e.g. New Development) may be used to determine areas for intensive monitoring efforts. The Dry Weather monitoring for nitrogen and total dissolved solids shall be used to establish a baseline dry weather flow concentration for TDS and TIN at each Core monitoring location.

4. Sources of Data: Where possible and applicable, water quality data shall be obtained from monitoring efforts of other public or private agencies/entities (e.g., Caltrans).

5. Bioassessment: In lieu of developing an independent bioassessment program as required in the prior term permit, the Principal Permittee, on behalf of the Co-Permittees, participates (through a memorandum of understanding and cooperative agreements) with the 16 member agencies of the SMC. The SMC's Bioassessment Working Group conducts bioassessments on a regional basis. The Principal Permittee in coordination with SCCWRP shall ensure that

[2] USEPA (Illicit Discharge Detection and Elimination - A Guidance Manual for Program Development and Technical Assessments) by the Center for Watershed Protection and Robert Pitt, University of Alabama, October 2004, updated 2005).

a sufficient number of monitoring stations are selected for this program from locations within the Permit Area.

a. The Principal Permittee, in collaboration with the SMC, shall conduct sampling, analysis, and reporting of specified in-stream biological and habitat data within the 5-year permit cycle according to the protocols specified in the SCCWRP Tech Report No. 539.

b. Within Riverside County, the bioassessment project area consists of the lower half of the MSAR watershed, the San Jacinto watershed, and the northern Santa Margarita watershed (northern San Diego) for a total of 1.5 watershed units, a minimum of 9 samples shall be collected per year[3]. Within Riverside County's Santa Ana and San Jacinto Watersheds, which are in the Permit Area, the Permittees shall sample 5 sites per year. SWAMP samples 2 sites per year.

c. For long-term trend monitoring, the Principal Permittee shall collect a minimum of 1 sample per year during the dry weather index period, as noted in the SCCWRP Tech Report No. 539. Additional samples may be collected to improve data quality for trend analysis. At a minimum, chemistry and aquatic Toxicity should be used as indicators for trend analysis.

d. Any baseline and historic information on stream geomorphology and ecological health, including aquatic habitats, in the Receiving Waters and the findings from the trend analysis shall be used to evaluate the effectiveness of Urban Runoff management program, including the requirements specified in the Order.

6. A Quality Assurance Program Plan (QAPP) within the CMP that describes how data will be collected and analyzed to ensure that data is consistent with State and Regional Board monitoring programs and is of high quality. Dischargers shall develop a QAPP that is compatible with the State's Surface Water Ambient Monitoring Program (SWAMP) QAPP and approved by the Regional Board's Quality Assurance Officer. A QAPP template is available, upon request, through the State Board's SWAMP website (http://www.waterboards.ca.gov/water_issues/programs/swamp/qapp.shtml). All analytical methods, target reporting limits, and data reporting formats should be SWAMP compatible unless otherwise specified in this MRP. The QAPP will include location of sample site(s), description of analytical techniques, data quality objectives, and other standard quality assurance information.

[3] See Table 4 page 15 of Technical Report No.539.

7. A procedure for the collection, analysis, and interpretation of existing data from local, regional or national monitoring programs. These data sources may be utilized to:
   a. Characterize different sources of Pollutants discharged to the MS4;
   b. Determine pollutant generation, transport and fate;
   c. Develop a relationship between land use, development size, storm size and the event mean concentration of Pollutants;
   d. Determine spatial and temporal variances in Urban Runoff quality and seasonal and other bias in the collected data; and
   e. Identify any unique features of the permitted area.
   f. The Permittees are encouraged to use water quality data from similar studies, if available.

8. The CMP update shall include descriptions of:
   a. The number of monitoring stations;
   b. Monitoring locations within MS4s, Major Outfalls, and Receiving Waters; environmental indicators (e.g., ecosystem, flow, biological, habitat, chemical, sediment, stream health, etc.) chosen for monitoring; The initial update shall at least contain the sampling stations listed in Table 1, below:

Table 1 Current Core Monitoring Stations

Station Number	Class	Station Description	Latitude	Longitude
40	Outfall	Corona Storm Drain – Line K Harrison & Sheridan St.	33.885	-117.568611
316	Outfall	Sunnymead Chanel – Line B Alessandro & Heacock	33.917778	-117.242222
318	Outfall	Hemet Channel @ Sanderson Ave.	33.734167	-117.005556
364	Outfall	Magnolia Center – SD @ Santa Ana River	33.964722	-117.414444
702	Outfall	University Wash – Market & Bowling Green	33.9975	-117.370833
707	Outfall	North Norco Channel @ Country Club Lane	33.907778	-117.583889
752	Outfall	Perris Line J - Sunset Ave below Murrieta Rd.	33.803333	-117.2075

   c. Total number of samples to be collected from each station, frequency of sampling during Wet Weather and Dry Weather, short duration or long duration storm events, type of samples (grab, 24-hour composite, etc.), justification for composite versus discrete sampling, type of sampling equipment, quality assurance/quality control procedures followed during sampling and analysis, analysis protocols to be followed (including sample preparation and maximum reporting limits), and qualifications of laboratories performing analyses;

d. A procedure for analyzing the collected data and interpreting the results. This procedure shall include the evaluation of the effectiveness of the BMPs, a comparative analysis of the Permittees' monitoring data to the USEPA Multi-Sector Permit Parameter Benchmark Values and applicable Water Quality Objectives specified in Chapter 4 of the Basin Plan, and the need for any refinement of the WQMPs, the DAMP and or/the LIPs.

e. Parameters selected for field screening and for laboratory work; and

f. A description of the responsibilities of all the participants in this program, including cost sharing.

g. Receiving Water Monitoring:

   Permittees shall select at least one representative receiving water location within each of the San Jacinto River and Santa Ana River watersheds. These locations should be close Major Outfalls, coordinated with other regional monitoring programs to the extent feasible, include locations where chronic and/or persistent water quality problems associated with Urban Runoff have been identified, and should be selected so as to be useful to determine if Urban Runoff is causing or contributing to violations of Water Quality Standards in the Receiving Waters.

h. Monitoring within MS4s:
   Permittees shall evaluate their current CMP MS4 monitoring locations (identified in Table 1, above) to ensure that they are representative of urban runoff. The objective of this monitoring element is to determine the pollutant loads from the MS4s and to determine their trend. This monitoring requirement may be incorporated into the mass emissions monitoring described in III.E.1, above.

F. REGIONAL WATERSHED MONITORING

1. The objectives of the Regional Watershed Monitoring Program overseen by the SWAMP and the SMC and coordinated by SCCWRP are:

   a. To assess the current status of streams in Southern California.

   b. To identify major stressors to aquatic life.

   c. To monitor the trend in water quality in Southern California streams.

2. The bioassessment discussed above, should provide information about the biological, chemical and toxicological integrity of Receiving Waters. Baseline and trend monitoring information on the biotic and geomorphological condition of the Receiving Waters should be used to evaluate the effectiveness of the Urban Runoff pollution control measures.

3. The Riverside County Regional Watershed monitoring area is within the lower half of the MSAR watershed, the San Jacinto watershed, and the northern Santa Margarita watershed (northern San Diego) for a total of 1.5 watershed units[4]. Within Riverside County's Santa Ana and San Jacinto watersheds, the Permittees sample 5 sites per year. SWAMP samples 2 sites per year.

4. The sampling sites in each watershed unit were determined according to distribution or abundance of the three land uses: urban, agriculture, or open. The sampling grid includes 15 watershed units located from Ventura to San Diego and as far east as San Bernardino and Riverside Counties. A total of 450 samples in the 15 watershed units will be collected within a five year period to assess the spatial extent of impacts to streams within the area. Samples will be collected at sites representing each of the three land use types. Each site will be sampled only once during an index period and not all sites need to be sampled during the same year. One-fifth of the samples (90 samples) will be collected each year for the 15 watersheds. Sampling events shall be conducted between 4 to 12 weeks following the last significant rainfall. No sampling shall occur within 72 hours of any measurable rainfall. The default index period will be from May 15 to July 15. The specifics and details of the Regional Watershed Program are discussed in "The Regional Monitoring of Southern California's Watershed SMC Bioassessment Working Group", SCCWRP, Technical Report No. 539, December 2007 (The Tech Report).

5. Any baseline and historic information on stream geomorphology and ecological health, including aquatic habitats, in the Receiving Waters and the findings from the trend analysis shall be used to evaluate the effectiveness of Urban Runoff management program, including the requirements specified in the Order.

G. HYDROMODIFICATION MONITORING PROGRAM

This Order requires development and implementation of a Hydromodification Monitoring Plan as part of the Watershed Action Plan (WAP) to evaluate the effectiveness of hydromodification controls implemented within the Permit Area (Some or all of the following requirements may be satisfied by the Permittees participation in the "Development of Tools for Hydromodification Assessment and Management' Project" undertaken by the SMC and coordinated by SCCWRP and follow on efforts to develop Hydromodification monitoring guidance).

1. The Order requires the Permittees to revise the DAMP to incorporate Watershed Action Plan principles within three years of adoption of the Order. The hydromodification requirements require the Permittees to identify

[4] See Table 4 page 15 of Technical Report No.539.

vulnerable streams and possible BMPs to minimize HCOCs and tools to measure any impacts on geomorphology and aquatic resources.

2. The Hydromodification monitoring program shall:

   a. Assess the effectiveness of Hydromodification management within the Permit Area.

   b. Predict the effects of urbanization on stream stability within the Permit Area.

H. LOW IMPACT DEVELOPMENT BMP MONITORING

The Principal Permittee shall continue to participate in data collection and monitoring to assess the effectiveness of LID techniques in semi-arid climate as part of the SMC project titled, "Quantifying the Effectiveness of Site Design/ Low Impact Development Best Management Practices in Southern California". The Principal Permittee is also developing a regional LID BMP testing and demonstration facility at the main office that meets the intent of this requirement (currently the facility data is intended to be integrated into the SMC project).

IV. RECORD KEEPING REQUIREMENTS

A. All monitoring activities shall meet the following requirements:

1. The Permittees shall retain records of all monitoring information, including all calibration and maintenance of monitoring instrumentation, copies of all reports prepared as per this MRP and records of all data used to complete the Report of Waste Discharge and Annual Reports for a period of at least five years from the date of the sample, measurement, report, or application. This period may be extended by request of the Regional Board or USEPA at any time and shall be extended during the course of any unresolved litigation regarding this discharge [40 CFR 122.41(j)(2), CWC section 13383(a)].

2. Records of monitoring information shall include [40 CFR 122.41(j)(3)]:

   a. The date, exact place, and time of sampling or measurements;

   b. The individual(s) who performed the sampling or measurements;

   c. The date(s) analyses were performed;

   d. The individual(s) who performed the analyses;

   e. The analytical techniques or methods used; and

   f. The results of such analyses.

3. Calculations for all Effluent Limitations which require averaging of measurements shall utilize an arithmetic mean unless otherwise specified in this MRP [40 CFR 122.41(l)(4)(iii)].

B. PROGRAM EFFECTIVENESS ASSESSMENT AND REPORTING

1. All progress reports and proposed strategies and plans required by this Order shall be signed by the Principal Permittee, and copies shall be submitted to the Executive Officer under penalty of perjury.

2. The Permittees shall submit an Annual Report to the Executive Officer and to the Regional Administrator of the USEPA, Region 9, no later than November 30th, of each year. This progress report shall also be submitted in a mutually agreeable electronic format that is text searchable. Any monitoring data shall also be submitted electronically in the form outlined in Section IV.B.4 of this MRP. At a minimum, the Annual Report shall include the following:

   a. A review of the status of program implementation and compliance (or non-compliance) with the schedules contained in this Order;

   b. An assessment of the effectiveness of BMPs established under the IC/ID program and the DAMP. The effectiveness may be measured in terms of how successful the program has been in eliminating IC/IDs and/or reducing pollutant loads in urban storm water runoff, including summaries of Permittee actions to investigate and eliminate or permit IC/IDs and measures to reduce and/or eliminate the discharge of Pollutants, including trash and debris

   c. As assessment of BMPs and their effectiveness in addressing Pollutants causing or contributing to an exceedance of water quality objectives in Receiving Waters that are on the 303(d) list of impaired waters. The effectiveness evaluation shall consider changes in land use and population on the quality of Receiving Waters and the impact of development on sediment loading within sediment impaired Receiving Waters and recommend necessary changes to program implementation and monitoring needs.

   d. An assessment of the Permittees compliance status with the Receiving Waters Limitations, Section VII of this Order, including any proposed modifications to the DAMP if the Receiving Water Limitations are not fully achieved.

   e. An overall program assessment. The Permittees are encouraged to use the program assessment methodology described in the 2007 ROWD. The Permittees should determine, to the extent practicable, water quality

improvements and Pollutant load reductions resulting from implementation of various program elements. The Permittees may also use the "Municipal Storm Water Program Effectiveness Assessment Guidance" developed by CASQA in May 2007 as guidance for assessing program effectiveness at various outcome levels. The assessment should include each program element required under this Order, the expected outcome and the measures used to assess the outcome. The Permittees may propose any other methodology for program assessment using measurable targeted outcomes.

f. Description of program modifications and improvements identified during the program assessment above along with implementation schedule for incorporation of revisions into the Local Implementation Plans (LIPs).

g. An assessment of any modifications to the WQMPs, or the DAMP made to comply with CWA requirements to reduce the discharge of Pollutants to the MEP;

h. A summary, evaluation, and discussion of monitoring results from the previous year and any changes to the monitoring program to be made the following year;

i. A fiscal resources analysis progress report as described in Section XVIII.B of Order No. R8-2010-0033 including:

   i. Each Permittee's expenditures for the previous fiscal year;

   ii. Each Permittee's budget for the current fiscal year; and

   iii. A description of the source of funds.

j. A draft work plan that describes the proposed implementation of the LIPs and DAMP for next fiscal year. The work plan shall include clearly defined tasks, responsibilities, and schedules for implementation of the storm water program and each Permittee's actions for the next fiscal year;

k. Major changes in any previously submitted plans/policies;

l. If the Implementation Agreement is revised, a copy of the signature page and revisions to the Implementation Agreement.

m. A review of each Permittee's Storm Water Ordinances and their enforcement practices to assess their effectiveness in prohibiting non-exempt, Non-storm Water discharges to the MS4 (The Permittees may propose appropriate BMPs in lieu of prohibiting these discharges, where the Permittees are responsible for ensuring that dischargers adequately maintain those BMPs).

3. The Co-Permittees shall be responsible for the submittal of all required information/materials needed to comply with this order in a timely manner to the Principal Permittee. A duly authorized representative of the Co-Permittee shall sign all such submittals under penalty of perjury.

4. The monitoring data transmittals to the Regional Board shall be in the form developed by the SMC and approved by the State Board in the document entitled "Standardized Data Exchange Formats". This document was developed in order to provide a standard format for all data transfers so that data can be universally shared and evaluated from various programs.

V. REPORTING SCHEDULE

All reports required by this Order shall be submitted to the Executive Officer in accordance with the following schedule:

Reference		Item	Completion Time after Permit Adoption or Frequency	Report Due Date
Permit	**DAMP[(a)]**			
III.A.1.e III.B.3.a,d,e & XVII.D.		Management Steering Committee meetings to discuss MS4 Permit implementation	Held at least twice per year.	Annual Report
III.A.1.f III.B.3.a,d,e & XVII.D.		Permittee Technical Committee meetings to discuss permit implementation	Held at least 10 times each year	Annual Report
III.B.3.a,d,e & XVII.D.		Co-Permittees participate in Management Steering and Technical Committee meetings to discuss MS4 Permit implementation	Attend at least 1 out of 2 Management and 8 out of 10 Technical meetings each year	Annual Report
III.A.1.r		The Principal Permittee shall develop a library of BMP performance reports, and revise the BMP performance report annually thereafter.	Within 6 months of permit adoption	
III.A.1.s		The Principal Permittee shall coordinate a review of the DAMP with the Co-Permittees to determine the need for update or revisions and establish a schedule for those revisions.	Within 6 months of permit adoption	
III.B.2.g		Submit up-to-date MS4 facility maps	Annually to Principal Permittee	Annual Report

Reference		Item	Completion Time after Permit Adoption or Frequency	Report Due Date
Permit	**DAMP[(a)]**			
III.B.2.h		Submit reports & information for Annual Report	Annually to Principal Permittee	Annual Report
III.C.		Evaluate Implementation Agreement annually to determine need for revision.	Annually	Report findings and schedule for revisions to the Implementation Agreement in 2009-2010 Annual Report.
III.C.		Allow new permittees to join MS4 permit	Per schedule required in Section III.A.1.s	Report findings and schedule for revisions to the Implementation Agreement in 2009-2010 Annual report.
IV.A.		Permittees shall develop and submit for approval a LIP Template	Within 6 months of adoption of Order	
IV.B.		Complete a Co-Permittee specific LIP	Within 12 months of approval of the Template	Within 12 months of approval of the Template
VI.D.1.a.ii		Submit reports summarizing all relevant data from the watershed-wide water quality monitoring program.	Beginning in 2010 Cool (or wet) weather Warm (or dry) weather	 May 31st December 31st.
VI.D.1.a.iii		Submit comprehensive reports every three years summarizing the data collected for the preceding 3 year period and evaluating progress towards achieving the urban waste load allocation by the dates specified in the TMDL.	Beginning in 2010 every three years	February 15, 2010.
VI.D.1.a.iv		Submit semi-annual reports each year as required under the approved USEP, and any amendments thereto.	The Dec 31st report (VI.D.1.a.ii) and the Jan 31st report (VI.D.1.a.iv) may be incorporated into the (VI.D.1.a.ii) report for the years the tri-annual report is generated.	Semi-annually on January 31st and July 31st

Reference		Item	Completion Time after Permit Adoption or Frequency	Report Due Date
Permit	**DAMP[(a)]**			
VI.D.1.a.v		Revise the DAMP as specified in Task 4.2 of the MSAR-TMDL Implementation Plan.	Sumarize data in Annual Report.	Annual Report
VI.D.1.a.vi		Revise the Water Quality Management Plan (WQMP)	As specified in Task 4.4 of the MSAR-TMDL Implementation Plan.	Annual Report
VI.D.1.a.vii		Amend the Local Implementation Plans (LIP) to be consistent with the revised DAMP and WQMPs within 90 days after said revisions are approved by the Regional Board. Summarize any such LIP amendments in the annual report		Annual Report
VI.D.1.b. & VI.D.1.c.		The MSAR Permittees shall submit a Comprehensive Bacteria Reduction Plan (CBRP) to achieve the final WQBELs for bacterial indicators during the Dry Season by December 31, 2015. Enforcement starts no sooner than January 1, 2016		Draft by December 31, 2010 Final by Dec 31, 2015.
VI.D.1.c.i.(8)		Revise the DAMP, WQMP, & LIPs	Within 180 days of CBRP approval.	
VI.D.2.a.		Submit Phase 2 Alternatives	December 31, 2010	
		Submit O&M for Agreement for Fishery Management Program	December 31, 2010	
		Submit O&M for Agreement for Aeration and Mixing Systems	December 31, 2010	
		Submit Phase 2 Projects Plans	June 30, 2011	
		Complete Phase 2 Project Implementation	December 31, 2014	
		Implement in-lake and watershed monitoring programs	Annual Reports due August 31 every year.	
VI.D.2.b.		Linkage Analysis Study	August 31, 2010	
		Watershed Source Loading Study	August 31, 2010	

Reference		Item	Completion Time after Permit Adoption or Frequency	Report Due Date
Permit	**DAMP[a]**			
		Model Evaluation	December 31, 2010	
		Construct/Calibrate Model	June 30, 2011	
		Conduct Model Scenarios	August 31, 2011	
		Model Update Final Report	November 30, 2011	
VI.D.2.c.		Revise DAMP, WQMP, & LIPs to incorporate the compliance plans required above.		Annual Report
VI.D.2.h.		Summarize all relevant data from water quality monitoring programs and evaluate compliance with the LE/CL TMDL	Annually	Annual Report
VI.D.2. d. & VI.D.2. e.		Submit CNRP	December 31, 2011	December 31, 2020.
VI.D.2.a.		Initiate Phase 2 LE/CL TMDL data collection.	December 31, 2010	
VI.D.2.j.		Tables 9 & 10 become WQBELs if CNRP is not adopted by Regional Board	December 31, 2020	
VII.D.1		Report upon determination that discharges from the MS4 are causing or contributing to an exceedance of an applicable WQS	Within two (2) working days	Within Annual update of DAMP
VII.D.2		Modify DAMP, LIP, and MRP to address Receiving Water Limit Violations and implementation schedule.	---	30 days after approval of Subsection VI.D. report by Executive Officer
VII.D.4		Report any exceedance solely due to discharges outside the Permittees jurisdiction.		Within two (2) working days of becoming aware of the situation, provide oral or e-mail notice and provide written documentation within ten (10) calendar days of becoming aware of the situation.
VIII.C.		Promulgate ordinances that would control for known pathogen or Bacterial Indicator sources	Within 3 years of adoption	Annual Report

Reference		Item	Completion Time after Permit Adoption or Frequency	Report Due Date
Permit	**DAMP[(a)]**			
VIII.F.		Review Storm Water Ordinances for effectiveness in prohibiting discharges to the MS4	Annual Report	
VIII. G.		Certification statement, signed by the Chief legal counsel, that the Permittee has obtained all necessary legal authority	Within 24 months of Order adoption.	Annual Report
VIII.H.		Permittees shall effectiveness of, implementation and enforcement response procedures.	Annually	Annual Report
IX. A.		Eliminate or permit IC/IDs		60 calendar days from receipt of notice from a third party.
IX.D.		Review and revise IC/ID program	18 months after Order adoption	Annual Report
IX.G.		Annually review and evaluate their IC/ID or IDDE program to determine if the program needs to be adjusted.	Annually	Annually
IX.H.		Maintain database summarizing IC/ID incident response	Annually	Annual Report
X.D.		Maintain inventory of septic systems within its jurisdiction completed in 2008.	Ongoing	Annual Report.
XI.A.11.		Each Permittee shall document, evaluate and annually report the effectiveness of its enforcement procedures in achieving prompt and timely compliance.	Annually	Annual Report
XI.A.13.		Permittees to evaluate and report adequacy of inspection programs conducted by other agencies on behalf of Permittee.	Annually	Annual Report

Reference		Item	Completion Time after Permit Adoption or Frequency	Report Due Date
Permit	**DAMP[(a)]**			
XI.B.4.		An inventory and inspection frequency of: Wet Season(Oct 1 – May 31): High = 1/mo., Med = 2/season, low = 1/season Dry Season: All construction sites shall be inspected at a frequency sufficient to ensure that sediment and other Pollutants are properly controlled and that unauthorized, Non-Storm Water discharges are prevented		Annual Report
XI.C.3		All high priority industrial facilities are to be inspected at least once a year; all medium priority sites are to be inspected at least once every two years; and all low priority sites are to be inspected at least once per permit cycle.		Annual Report
XI.D.4		All high priority sites shall be inspected at least once a year; all medium priority sites shall be inspected at least every two years; and all low priority sites shall be inspected at least once per MS4 Permit cycle.		Annual Report
XI.D.6		Notify all mobile businesses operating within the County concerning the minimum source control and pollution prevention measures that they must develop and implement.	Within 18 months of adoption of this Order	Annually
XI.D.7		The Principal Permittee shall develop an enforcement strategy to address mobile businesses.	Within 24 months of adoption of this Order	Annually

Reference		Item	Completion Time after Permit Adoption or Frequency	Report Due Date
Permit	**DAMP[(a)]**			
XI.E.1		Each Permittee shall develop and implement a residential program to reduce the discharge of Pollutants from residences to the MS4s to the MEP.	Within 18 months of adoption of this Order	Annually
XI.E.6.		Co-Permittees to provide an evaluation of its residential program	Annually starting with the second Annual Report following MS4 Permit adoption	Annually starting with the third Annual Report following MS4 Permit adoption
XII.B.3 & B8.		The Co-Permittees shall submit to the Regional Board a Watershed Action Plan	Within three years of adoption of MS4 Permit.	Annual Report
XII.B.5		Develop HMP	Submit within 4 years of adoption	
XII.C.1.		Each Permittee shall review the watershed protection principles and policies in its General Plan and related documents to eliminate barriers to LID.	Within 24 months of adoption of this Order	Annually
XII.D.1.		Each Permittee to submit a revised WQMP to incorporate new elements required in the Order	Within 18 months of adoption of this Order	Annual Report
XII.D.5.		Principal Permittee to develop recommendations for streamlining regulatory agency approval of regional Treatment Control BMPs.	Within 24 months of adoption of this Order	Annually
XII.E.1		Permittees shall update the WQMP to incorporate LID principles,	18 months of Order adoption	
XII.E.4.		Revise Ordinances to promote Green Infilstructure	18 months of Order adoption. Implement within 6 months of EO approval.	
XII.E.5.		Each Permittee to update its landscape ordinance consistent with requirements of AB 1881 and annually evaluate effectiveness with respect to water efficiency and water conservation goals	January 31, 2010	2011-2012 Annual Report

Reference		Item	Completion Time after Permit Adoption or Frequency	Report Due Date
Permit	**DAMP[(a)]**			
XII. F.		Develop standard design and post-development BMP guidance for streets, roads etc. projects.	Within 24 months of adoption of this Order, Implement within 6 months of EO approval.	
XII.G1.		Permittees shall establish technically-based feasibility criteria for project evaluation to determine feasibility of implementing LID	Within 18 months of MS4 Permit adoption	No reporting specified
XII.H.		Each Permittee shall develop and implement standard procedures and tools, and include in its LIP.	Within 18 months of adoption of this Order	Annually
XII.K.4.		The Permittees shall maintain a database to track operation and maintenance of post-construction BMPs.		Annually
XII.K.5		Public Agency Treatment Control BMPs, shall be inspected prior to the Wet Season.	Within18 months of Order adoption and within the 5 year permit term.	Annually
		New Development (Redevelopment) Treatment Control BMPs, shall be inspected prior to the Wet Season.	Based on schedule submitted but at least once within the 5 year permit term.	Annually
XII.K.6.		Provide list of all post-construction Treatment Control BMPs approved, constructed and/or operating	Annually	Annual Report
XII.L.		Provisions for LID and HCOC included in WQMP.	Within 45 days of approval of WQMP.	
XIII.A.		Review public education and outreach efforts and revise their activities to adapt to the needs identified in the annual reassessment.		Annual Report
XIII.B.		Status report on Public Education and Outreach requirements and changes to the ongoing program	Annually	Annual Report

Reference		Item	Completion Time after Permit Adoption or Frequency	Report Due Date
Permit	**DAMP[(a)]**			
XIII.C.		Implement assessment program to measure increases in public knowledge of impacts of Urban Runoff on Receiving Waters	First Annual Report following MS4 Permit adoption	
XIII.F.		The Permittees shall develop, maintain and distribute BMP guidance for the control of those potentially polluting activities identified during the previous permit cycle, which are not otherwise regulated by any agency, including guidelines for the household use of fertilizers, pesticides, herbicides and other chemicals, and guidance for mobile vehicle maintenance, carpet cleaners, commercial landscape maintenance, and pavement cutting.	Within 18 months of adoption of this Order	Annual Report
XIII.I.		The Public Education Committee shall meet at least twice per year.		Annual Report
XIII.J.		Sponsor or staff an Urban Runoff table or booth at community, regional, and/or countywide events to distribute public education materials to the public.	Each Permittee shall participate in at least one event per year.	Annually
XIII.K.		Involve public agency organizations, listed in Appendix 2, in Urban Runoff program. Notify the Regional Board where assistance is needed in improving local cooperation.		Annual Report
XIII.L		Develop and distribute BMP Fact Sheets for mobile businesses	Within 18 months of adoption of this Order	
XIV.A.		Review activities and facilities to determine the need for revisions to Section 5 of the DAMP and LIP.	Annually	Annual Report

Reference		Item	Completion Time after Permit Adoption or Frequency	Report Due Date
Permit	**DAMP[(a)]**			
XIV.B.		Each Permittee shall review its inventory of fixed facilities listed in the DAMP, its field operations and MS4 facilities to ensure that public agency facilities and activities do not cause or contribute to a Pollution or nuisance in Receiving Waters.	Within 12 months of adoption of this Order	Annual Report
XIV.C.		Conduct inspections of its fixed facilities and field operations.	Annually	Annual Report
XIV. D.		Evaluate cleaning schedule.	Annually	Annual Report
XIV.E.		Unless otherwise determined, each Permittee shall inspect, clean & maintain at least 80% of it's open channels, catch basins, retention/detention basins, and wetlands created for Urban Runoff treatment.	Annually	Annual Report
XIV.G1.c.		Notify the Executive Officer of the proposed construction project by electronically submitting Permit Registration Documents (PRDs).	Prior to commencement of each construction project.	
XIV.G1.d.		the Executive Officer shall be notified of the completion of the project by submitting a Notice of Termination (NOT).	Upon completion of each construction project.	
XIV.G2.b.		Notify the Executive Officer of each proposed deminimus discharge at least 15 days prior to start of the discharge	At least 15 days prior to discharge.	At least 15 days prior to discharge.
XV.A		DAMP and each Permittee's LIP shall be updated to include a program to provide formal and where necessary, informal training to Permittee staff that implement the provisions of this Order	Within 24 months of adoption of Order	DAMP will be updated within 24 months of adoption of Order. LIP will be updated within 12 months of approval of LIP template by EO

Reference		Item	Completion Time after Permit Adoption or Frequency	Report Due Date
Permit	**DAMP[(a)]**			
XV.A., XV.E. .		Each Permitee's LIP shall describe a program to provide formal and informal training to Permittee staff and contractors that implement the provisions of this Order. Provide the specified training.	Within 24 months of adoption of this Order and annually thereafter.	LIP will be updated within 24 months of order adoption.
XV.F.		Principal Permittee shall provide and document training to applicable Permittee staff on area wide procedures such as the DAMP, and any other applicable guidance and procedures developed by the Permittees to address activities in fixed facilities as well as field operations, including MS4 maintenance.	Within 12 months of adoption of this Order, within 12 months of hire and every two years, thereafter.	Bi-annually
XV.H*		Principal Permittee shall notify Regional Board staff		When notifying Permittees of training session.
XVI.A.		Notify of emergency events..		Within 24 hours of discovery
XVI.C		Sewage spill notification shall be consistent with the timelines specified in the Statewide General Waste Discharge Requirements for Sanitary Sewer Systems, Water Quality Order No. 2006-0003-DWQ.		Consistent with 2006-003-DWQ.
XVI.D.		Hazardous Waste Spills	Notify within 24 hours.	
XVI.E.		Facilities operating without an applicable General permit.		Reported within 14 calendar days
XVII.A.		Evaluate the effectiveness of the Urban Runoff management program.	By November 30 of each year.	Annually by November 30.
XVII.B.		Amended DAMP pages.		Annual Report
XVIII.B.		Financial analysis report		Annual Report
XXII.A.		Report of Waste Discharge	180 days before permit expires	Jan 29, 2015

Reference		Item	Completion Time after Permit Adoption or Frequency	Report Due Date
Permit	**DAMP[a]**			
Appendix 3, III.C.		Review CMP to determine their effectiveness in Urban Runoff program assessment	Within 12 months of adoption of this Order	N/A
		Submit Revised CMP	Within 16 months of adoption of this Order and implement within 6 months of approval.	
Appendix 3, III.D.1.b.		Prepare a triennial report summarizing the data collected for the preceding 3 year period and evaluating compliance with the WLAs.	Every three years	The first report shall be due February 15, 2010.
Appendix 3, III.D.2		Submit an annual report summarizing all relevant data from water quality monitoring programs and evaluating compliance with the LE/CL TMDL by reporting the effectiveness of the BMPs implemented in the watershed to control nutrient inputs into the lake from Urban Runoff pursuant to Regional Board Resolution No. R8-2006-0031 and R8-2007-0083, or as amended by subsequent Regional Board adopted resolutions.	Annually	Annual Report
Appendix 3, IV.B.2.		Annual Report	Annually	November 30th

(a) This column to be completed by Permittees.

Date: 1-29-10

Ordered by

Gerard J. Thibeault
Executive Officer

APPENDIX 4

GLOSSARY

ORDER NO. R8-2010-0033

Appendix 4, GLOSSARY

40 CFR – Code of Federal Regulations Title 40: Protection of the Environment.

Annual Report – Report summarizing compliance information required to be submitted annually to the Regional Board on or before each November 30th.

Anthropogenic – Generated from human activities

APN – Assessor's parcel number

Basin Plan – Water Quality Control Plan developed by the Regional Board for the Santa Ana River watershed.

BAT [Best Available Technology] – Technology-based standard established by Congress in CWA Section 402(p)(3)(A) for industrial dischargers of storm water. Technology-based standards establish the level of Pollutant reductions that dischargers must achieve, typically by treatment or by a combination of Source Controls and Structural BMPs. BAT generally emphasizes treatment methods first and Pollution Prevention and Source Control BMPs secondarily. The best economically achievable technology that will result in reasonable further progress toward the national goal of eliminating the discharge of all Pollutants is determined in accordance with regulations issued by the USEPA Administrator. Factors relating to the assessment of BAT shall take into account the age of equipment and facilities involved, the process employed, the engineering aspects of the application of various types of control techniques, process changes, the cost of achieving such effluent reduction, non-water quality environmental impact (including energy requirements), and such other factors as the permitting authority deems appropriate.

BCT [Best Conventional Technology] – Treatment techniques, processes, and procedure innovations, and operating methods that eliminate or reduce chemical, physical, and biological Pollutant constituents.

Beneficial Use – Uses of water necessary for the survival or well being of man, plants, and wildlife. These uses of water serve to promote the tangible and intangible economic, social, and environmental goals. “Beneficial Uses” that may be protected include, but are not limited to: domestic, municipal, agricultural and industrial supply; power generation; recreation; aesthetic enjoyment; navigation; and preservation and enhancement of fish, wildlife, and other aquatic resources or preserves. Existing Beneficial Uses are those that were attained in the surface or ground water on or after November 28, 1975; and potential Beneficial Uses are those that would probably develop in future years through the implementation of various control measures. “Beneficial Uses” are equivalent to “Designated Uses” under federal law. [California

Water Code Section 13050(f)] Beneficial Uses for the Receiving Waters are identified in the Basin Plan.

Biological Integrity – Defined in Karr J.R. and D.R. Dudley. 1981. Ecological perspective on water quality goals. Environmental Management 5:55-68 as: "A balanced, integrated, adaptive community of organisms having a species composition, diversity, and functional organization comparable to that of natural habitat of the region." Also referred to as ecosystem health.

BMP [Best Management Practices] – Defined in 40 CFR 122.2 as schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the Pollution of Waters of the U.S. BMPs also include treatment requirements, operating procedures and practices to control plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage. In the case of MS4 permits, BMPs are typically used in place of Numeric Effluent Limits.

CAFO – Concentrated animal feeding operation.

Caltrans – California Department of Transportation.

CAP – The Commercial and Industrial Compliance Assistance Program is a Riverside County Environmental Health Department program that includes a storm water survey and educational outreach as part of existing inspections of Hazardous Material handlers and retail food service activities. Hazardous Waste handling facilities are inspected at least once during a two-year cycle. Restaurants are inspected at least once during the MS4 Permit cycle. Any completed surveys that indicate non-compliance are forwarded to the appropriate jurisdiction's code enforcement division. The Permittees notify Regional Board staff when conditions are observed during such inspections that appear to violate the General Storm Water Permits or a permit issued by the Regional Board.

CEQA – California Environmental Quality Act (Section 21000 et seq. of the California Public Resources Code).

CIEP – Compliance Inspection and Enforcement Program

Cleaning – Removal of litter or debris that can impact Receiving Waters.

CMP – Consolidated Program for Water Quality Monitoring, Riverside County Flood Control and Water Conservation District, October 2008.

Commercial Facilities – Businesses that have the potential to discharge Pollutants to the MS4 not otherwise covered by the General Industrial Permit that are described in Section 8.1 of the DAMP. These businesses are inspected as part of the CAP or equivalent as described in Section 8.1 of the DAMP. Commercial Facilities include businesses based in a Permittee's jurisdiction that perform mobile carpet, drape or

furniture cleaning; mobile automobile or other vehicle washing and mobile high pressure or steam cleaning.

Comprehensive TMDL Plan – A plan presenting a long-term solution designed to achieve compliance with the WLAs by the dates specified in the TMDLs. This plan includes a description of the proposed BMPs and the documentation demonstrating that the BMPs are expected to attain the WLAs by the compliance dates when implemented.

Conditions of Concern – Scour, erosion (sheet, rill and/or gully), aggradation (raising of a streambed from sediment deposition), and changes in fluvial geomorphology, hydrology or the aquatic ecosystem.

Construction Site – A site with activities for which building or grading permits have been issued and activities at the site include: soil movement; uncovered storage of materials or wastes, such as dirt, sand or fertilizer; or exterior mixing of cementaceous products, such as concrete, mortar or stucco.

Contamination – As defined in the Porter-Cologne Water Quality Control Act, contamination is "an Impairment of the quality of waters of the State by Waste to a degree which creates a hazard to the public health through poisoning or through the spread of disease." Contamination includes any equivalent effect resulting from the disposal of Waste whether or not Waters of the U.S. are affected.

Co-Permittees – County of Riverside and the cities of Beaumont, Calimesa, Canyon Lake, Corona, Hemet, Lake Elsinore, Menifee, Murrieta, Moreno Valley, Norco, Perris, Riverside, San Jacinto and Wildomar.

County – County of Riverside, a legal subdivision of the State of California.

CSA 152 – County Service Area 152

CWA – Federal Clean Water Act

CZARA – Coastal Zone Act Reauthorization Amendments of 1990

DAMP [Drainage Area Management Plan] – The DAMP is a programmatic document developed by the Permittees and approved by the Executive Officer that outlines the major programs and policies that the Permittees individually and/or collectively implement to manage Urban Runoff in the Permit Area.

DDT – Dichlorodiphenyltrichloroethane – An insecticide first used in 1939. Most uses of DDT were banned in 1972, with limited exception for public health purposes.

De Minimus Permit – General De Minimus Permit for Discharges to Surface Waters, Order NO. R8-2009-0003, NPDES No. CAG 998001

Design Capture Volume – (See Permit, XII.E.2)

Discretionary Project – Per Section 15357 of the Guidelines for CEQA "Discretionary Project" means a project which requires the exercise of judgment or deliberation when the public agency or body decides to approve or disapprove a particular activity, as distinguished from situations where the public agency or body merely has to determine whether there has been conformity with applicable statutes, ordinances, or regulations. A timber harvesting plan submitted to the State Forester for approval under the requirements of the Z'berg-Nejedly Forest Practice Act of 1973 (Pub. Res. Code Sections 4511 et seq.) constitutes a discretionary project within the meaning of the California Environmental Quality Act. Section 21065(c).

Direct Discharge (Table 3a) – A discharge directly from an MS4 to a receiving water such that the MS4 discharge does not first co-mingle with waters from another receiving water or conveyance.

Dry Season/Dry Weather - The season excluding the Wet Season. Generally it will be June 1 through September 30 of each year, unless specifically defined otherwise in a applicable TMDL Implementation Plan.

Effective Impervious Area (EIA) – EIA is the portion of the total impervious area that is directly connected to the drainage collection system. EIA includes street surfaces, paved driveways connecting to the street, rooftops which are hydraulically connected to the curb or storm sewer system, and paved parking lots that drain to a storm sewer system.

Impervious area such as rooftops, streets, sidewalks, and parking areas do not allow water to drain into the soil. Impervious area that collects and drains the water directly to a stream or wetland system via pipes or sheet flow is considered “effective impervious area” because it effectively drains the landscape. Impervious area that drains to landscaped areas, swales, parks and other impervious areas is considered “ineffective” because the water is allowed to infiltrate through the soil and into ground water, without a direct connection to the stream or wetland.

Reducing effective impervious area is defined as disconnecting impervious surfaces such as sidewalks, rooftops, parking areas, and streets, from the drainage system so that runoff percolates into the soil and does not flow directly to streams. Disconnecting the stormwater system allows the watersheds’ hydrologic cycle to respond in a manner that more closely reflects pre-disturbed conditions. EIA reduction can occur as part of new development, redevelopment, or be part of a retrofit design. The level of benefit is determined by how well the practices minimize runoff in small to mid size storm events.

Effectiveness Assessment Outcome Level 1 - Compliance with Activity-based Permit Requirements – Level 1 outcomes are those directly related to the implementation of specific activities prescribed by this Order or established pursuant to it.

Effectiveness Assessment Outcome Level 2 - Changes in Attitudes, Knowledge, and Awareness – Level 2 outcomes are measured as increases in knowledge and awareness among target audiences such as residents, businesses, and municipal employees.

Effectiveness Assessment Outcome Level 3 - Behavioral Change and BMP Implementation – Level 3 outcomes measure the effectiveness of activities in affecting behavioral change and BMP implementation.

Effectiveness Assessment Outcome Level 4 - Load Reductions – Level 4 outcomes measure load reductions which quantify changes in the amounts of pollutants associated with specific sources before and after a BMP or other control measure is employed.

Effectiveness Assessment Outcome Level 5 - Changes in Urban Runoff and Discharge Quality – Level 5 outcomes are measured as changes in one or more specific constituents or stressors in discharges into or from MS4s.

Effectiveness Assessment Outcome Level 6 - Changes in Receiving Water Quality – Level 6 outcomes measure changes to receiving water quality resulting from discharges into and from MS4s, and may be expressed through a variety of means such as compliance with water quality objectives or other regulatory benchmarks, protection of biological integrity, or beneficial use attainment.

Effluent Limitations – means any restriction on quantities, discharge rates, and concentrations of Pollutants which are discharged from Point Sources into Waters of the U.S., waters of the “contiguous zone,” or the ocean (40 CFR 122.2).

Emergency Situation – At a minimum, sewage spills that could impact water contact recreation, all sewage spills above 1,000 gallons, an oil spill that could impact wildlife, a Hazardous Material spill where residents are evacuated, all reportable quantities of Hazardous Waste spills as per 40CFR 117 and 302, and any incident reportable to the OES (1-800-852-7550).

Erosion and Sediment Control Plan (ESCP) – These are water quality protection plans that include control measures for erosion prevention and sediment controls that would minimize the mobilization of sediment from the project site.

ESA – Environmentally Sensitive Area - An area “in which plant or animal life or their habitats are either rare or especially valuable because of their special nature or role in

an ecosystem and which would be easily disturbed or degraded by human activities and developments" (Reference: California Public Resources Code § 30107.5).

ESAs subject to storm water mitigation requirements are:

1. Areas adjacent to Receiving Waters designated as "Preservation of Biological Habitats of Special Significance (BIOL)", "Spawning, Reproduction, and Development (SPWN)" or "Rare, Threatened, or Endangered Species (RARE)" Beneficial Uses in the Basin Plan;

2. Areas within the MSHCP that contain rare or especially valuable plant or animal life or their habitat. These areas are considered mitigated as the MSHCP contains substantive alternatives analysis for any proposed development that has the potential to impact resources.

3. Areas adjacent to CWA 303(d) Listed Water Bodies or adopted TMDLs with implementation plans that have yet to achieve the Urban WLA or LA goals; and

4. Any other equivalent environmentally sensitive areas which the Permittees have defined.

Executive Officer - The Executive Officer of the Regional Board.

General Construction Permit – State Board Order No. 2009-0009 DWQ (NPDES No. CAS000002) or the most recent draft of the General Construction Permit issued by the State Board subsequent to issuance of this Order.

General Dairy Permit – Regional Board Order No. R8-2007-0001 (NPDES No. CAG018001) for CAFOs.

General De Minimus Discharges Permit – Regional Board Order No. R8-2009-0003.

General Industrial Permit – State Board Order No. 97-03 DWQ (NPDES No. CAS000001) or the most recent General Permit for Storm Water Discharges Associated with Industrial Activities issued by the State Board subsequent to issuance of this Order.

General Storm Water Permits – General Industrial Permit (State Board Order No. 97-03 DWQ, NPDES No. CAS000001) and General Construction Permit (State Board Order No. 2009-0009-DWQ NPDES No. CAS000002), or the most recent applicable General Permit issued by the State Board subsequent to the issuance of this Order.

General Utility Vaults Permit-– State Board Order No. 2006-0008-DWQ, NPDES No. CAG990002.

GIS – Geographical Information System.

Green Infrastructure – Generally refers to technologically feasible and cost-effective systems and practices that use or mimic natural processes to infiltrate, evapotranspirate, or reuse stormwater or runoff on the site where it is generated. This is a concept that highlights the importance of the natural environment in decisions about land use planning. In particular there is an emphasis on the "life support" functions provided by a network of natural ecosystems, with an emphasis on connectivity to support long term sustainability. (Also see Low Impact Development.)

Hazardous Material – Any substance that poses a threat to human health or the environment due to its toxicity, corrosiveness, ignitability, explosive nature or chemical reactivity. These also include materials named by the USEPA to be reported if a designated quantity of the material is spilled into the Waters of the U.S. or emitted into the environment.

Hazardous Waste – defined as "any waste, which, under Section 600 of Title 22 of this code, is required to be managed according to Chapter 30 of Division 4.5 of Title 22 of this code." [CCR Title 22, Division 4.5, Chapter 11, Article1]

HCOC – Hydrologic Condition of Concern - An HCOC exists when a site's hydrologic regime is altered and there are significant impacts on downstream channels and aquatic habitats, alone or in conjunction with impacts of other projects.

Hydromodification - the "alteration of the hydrologic characteristics of coastal and non-coastal waters, which in turn could cause degradation of water resources."[1] (USEPA 2007)

IC/ID – Illicit Connection/Illegal Discharge

IDDE - Illicit Discharge Detection and Elimination Program

Illegal Discharge –Defined at 40 CFR 122.26(b)(2) as any discharge to the MS4 that is not composed entirely of storm water, except discharges pursuant to an NPDES permit, discharges that are identified in Section VI.A. of this Order, and discharges authorized by the Executive Officer.

Illicit Connection – Any connection to the MS4 that is prohibited under local, state, or federal statutes, ordinances, codes, or regulations. The term Illicit Connection includes all non storm-water discharges and connections except discharges pursuant to an NPDES permit, discharges that are identified in Section V, Effluent Limitations and

[1] USEPA. 2007. *National Management Measures to Control Nonpoint Source Pollution from Hydromodification.* EPA 841-B-07-002. U.S. Environmental Protection Agency, Office of Water, Washington DC

Discharge Specifications, of this Order, and discharges authorized by the Executive Officer.

Impaired – Relates to waterbodies where it is presumed Beneficial Uses are not attained.

Impaired Waterbody / **Impaired Waters** – Section 303(b) of the CWA requires each of California's Regional Water Quality Control Boards to routinely monitor and assess the quality of waters of their respective regions. If this assessment indicates that Beneficial Uses are not met, then that waterbody must be listed under Section 303(d) of the CWA as an Impaired Waterbody. The 2006 water quality assessment found a number of water bodies within the Permit Area as Impaired pursuant to Section 303(d). In the Permit Area, these include: Canyon Lake (for pathogens); Lake Elsinore (for PCBs and unknown toxicity); Lake Fulmor (for pathogens); Santa Ana River, Reach 3 (pathogens); and Santa Ana River, Reach 4 (for pathogens).

Impairment – A waterbody condition where Beneficial Uses are not attained.

Implementation Agreement – The Implementation Agreement establishes the responsibilities of each Permittee and a procedure for funding the shared costs.

Impressions – The most common measure is "gross impressions" that includes repetitions. This means if the same person sees an advertisement or hears a radio or sees a TV advertisement a thousand times, that will be counted as 1000 Impressions.

Industrial Facility – Facilities defined in Attachment 1 of the General Industrial Permit. These facilities are also addressed by the CAP or equivalent as described in Section 8.1 of the DAMP.

LA – [Load Allocations] – Distribution or assignment of TMDL Pollutant loads to entities or sources for existing and future Non-Point Sources, including background loads.

Land Disturbance – The clearing, grading, excavation, stockpiling, or other construction activity that result in the possible mobilization of soils or other Pollutants into the MS4. This specifically does not include routine maintenance activity to maintain the original line and grade, hydraulic capacity, or original purpose of the facility. This also does not include emergency construction activities required to protect public health and safety. The Permittees should first confirm with Regional Board staff if they believe that a particular routine maintenance activity is exempt under this definition from the General Construction Permit or other Orders issued by the Regional Board.

Local Implementation Plan (LIP) – Document describing an individual Permittee's procedures, ordinances, databases, plans, and reporting materials for compliance with the MS4 Permit.

Low Impact Development (LID) – Comprises a set of technologically feasible and cost-effective approaches to storm water management and land development that combines a hydrologically functional site design with Pollution Prevention measures to compensate for land development impacts on hydrology and water quality. LID techniques mimic the site's predevelopment hydrology by using site design techniques that store, infiltrate, evapotranspire, bio-treat, bio-filter, bio-retain or detain runoff close to its source.

Major Outfall – Outfalls with a pipe diameter of 36 inches or greater or drainage areas draining 50 acres or more.

Management Steering Committee – Committee to address Urban Runoff management policies for the Permit Area and coordinate the review and necessary revisions of the DAMP and Implementation Agreement. The Management Steering Committee consists of one or more city manager or equivalent representatives from each Permittee.

MEP [Maximum Extent Practicable] MEP is an acronym for "Maximum Extent Practicable" and refers to the standard for implementation of storm water management programs.
Section 402(p)(3)(B)(iii) of the Clean Water Act requires that municipal storm water permits "shall require controls to reduce the discharge of pollutants to the maximum extent practicable, including management practices, control techniques, and system design and engineering
methods, and such other provisions as the Administrator or the State determines appropriate for the control of such pollutants."

In practice, compliance with the MEP standard is evaluated by how well the Permittees implement the "minimum measures" identified by EPA, including: (1)Public education and outreach on storm water impacts; (2) Public involvement/participation; (3) Illicit discharge detection and elimination; (4) Construction site storm water runoff control; (5) Post-construction storm water management in new development and redevelopment; and (6) Pollution prevention/good housekeeping for municipal operations. Collectively, these minimum measures are often referred to as "Best Management Practices" or BMPs. The MEP standard does not require Permittees to reduce pollutant concentrations below natural background levels, nor does it require further reductions where pollutant concentrations in the receiving water already meet water quality objectives. In implementing the MEP standard, it is appropriate for Permittees to prioritize their resource allocation to address the storm water pollution problems that pose the greatest and most immediate threat to human health or the environment.

MEP is a technology-based standard established by Congress in CWA section 402(p)(3)(B)(iii) that operators of MS4s must meet. Technology-based standards establish the level of pollutant reductions that dischargers must achieve, typically by treatment or by a combination of source control and treatment control BMPs. MEP

generally emphasizes pollution prevention and source control BMPs primarily (as the first line of defense) in combination with treatment methods serving as a backup (additional line of defense). MEP considers economics and is generally, but not necessarily, less stringent than BAT. A definition for MEP is not provided either in the statute or in the regulations. Instead the definition of MEP is dynamic and will be defined by the following process over time: municipalities propose their definition of MEP by way of their urban runoff management programs. Their total collective and individual activities conducted pursuant to the urban runoff management programs becomes their proposal for MEP as it applies both to their overall effort, as well as to specific activities (e.g., MEP for street sweeping, or MEP for MS4 maintenance). In the absence of a proposal acceptable to the Regional Board, the Regional Board defines MEP.

In a memo dated February 11, 1993, entitled "Definition of Maximum Extent Practicable," Elizabeth Jennings, Senior Staff Counsel, SWRCB addressed the achievement of the MEP standard as follows:

“To achieve the MEP standard, municipalities must employ whatever Best management Practices (BMPs) are technically feasible (i.e., are likely to be effective) and are not cost prohibitive. The major emphasis is on technical feasibility. Reducing pollutants to the MEP means choosing effective BMPs, and rejecting applicable BMPS only where other effective BMPS will serve the same purpose or the BMPS would not be technically feasible, or the cost would be prohibitive. In selecting BMPS to achieve the MEP standard, the following factors may e useful to consider:

a. Effectiveness: Will the BMPS address a pollutant (or pollutant source) of concern?

b. Regulatory Compliance: Is the BMP in compliance with storm water regulations as well as other environmental regulations?

c. Public Acceptance: Does the BMP have public support?

d. Cost: Will the cost of implementing the BMP have a reasonable relationship to the pollution control benefits to be achieved?

e. Technical Feasibility: Is the BMP technically feasible considering soils, geography, water resources, etc?

The final determination regarding whether a municipality has reduced pollutants to the maximum extent practicable can only be made by the Regional or State Water Boards, and not by the municipal discharger. If a municipality reviews a lengthy menu of BMPS and chooses to select only a few of the least expensive, it is likely that MEP has not been met. On the other hand, if a municipal discharger employs all applicable BMPS except those where it can show that they are not technically feasible in the locality, or whose cost would exceed any benefit derived, it would have met the standard. Where a choice may be made between two BMPS that should provide generally comparable

effectiveness, the discharger may choose the least expensive alternative and exclude the more expensive BMP. However, it would not be acceptable either to reject all BMPS that would address a pollutant source, or to pick a BMP base solely on cost, which would be clearly less effective. In selecting BMPS the municipality must make a serious attempt to comply and practical solutions may not be lightly rejected. In any case, the burden would be on the municipal discharger to show compliance with its permit. After selecting a menu of BMPS, it is the responsibility of the discharger to ensure that all BMPS are implemented."

Ministerial – Per Section 15369 of the CEQA Guidelines, Ministerial describes a governmental decision involving little or no personal judgment by the public official as to the wisdom or manner of carrying out the project. The public official merely applies the law to the facts as presented but uses no special discretion or judgment in reaching a decision. A ministerial decision involves only the use of fixed standards or objective measurements, and the public official cannot use personal, subjective judgment in deciding whether or how the project should be carried out. Common examples of ministerial permits include automobile registrations, dog licenses, and marriage licenses. A building permit is ministerial if the ordinance requiring the permit limits the public official to determining whether the zoning allows the structure to be built in the requested location, the structure would meet the strength requirements in the Uniform Building Code, and the applicant has paid his fee.

MSAR – Middle Santa Ana River

MSHCP – Western Riverside County Multiple Species Habitat Conservation Plan

MS4 – **[Municipal Separate Storm Sewer System]** – A conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, natural drainage features or channels, modified natural channels, man-made channels, or storm drains): (i) Owned or operated by a State, city town, borough, county, parish, district, association, or other public body (created by or pursuant to State law) having jurisdiction over disposal of sewage, industrial wastes, storm water, or other wastes, including special districts under State law such as a sewer district, flood control district or drainage district, or similar entity, or an Indian tribe or an authorized Indian tribal organization, or designated and approved management agency under section 208 of the CWA that discharges to Waters of the U.S.; (ii) Designated or used for collecting of conveying storm water; (iii) Which is not a combined sewer; (iv) Which is not part of the POTW as defined at 40 CFR 122.2.

New Development – The categories of development identified in Section XI.D of this Order. New Development does not include routine maintenance to maintain original line and grade, hydraulic capacity, or original purpose of a facility, nor does it include emergency New Development required to protect public health and safety. Dischargers should confirm with Regional Board staff whether or not a particular routine maintenance activity is subject to this Order.

New Urbanism – New Urbanism refers to the use of creative strategies to develop ways that preserve natural lands and critical environmental areas, protect water and air quality, and reuse already-developed land. This is based on principles of planning and architecture that work together to create human-scale, walkable communities that preserve natural resources.

NOI [Notice of Intent] – A NOI is an application for coverage under the General Storm Water Permits.

Non-Point Source – Refers to diffuse, widespread sources of Pollution. These sources may be large or small, but are generally numerous throughout a watershed. Non-Point Sources, include but are not limited to urban, agricultural or industrial area, roads, highways, construction sites, communities served by septic systems, recreational boating activities, timber harvesting, mining, livestock grazing, as well as physical changes to stream channels, and habitat degradation. Non-Point Source Pollution can occur year round any time rainfall, snowmelt, irrigation, or any other source of water runs over land or through the ground, picks up Pollutants from these numerous, diffuse sources and deposits them into rivers, lakes and coastal waters or introduces them into groundwater.

Non-storm Water – All discharges to and from a MS4 that do not originate from precipitation events (i.e., all discharges to a MS4 other than storm water). Non-storm Water includes Illicit Discharges, non-prohibited discharges and NPDES permitted discharges.

NOT - Notice of Termination – Formal notice to the Regional Board of intent to terminate water discharge for projects covered under a General Stormwater Permit.

NPDES [National Pollutant Discharge Elimination System] – Permits issued under Section 402(p) of the CWA for regulating discharge of Pollutants to Waters of the U.S.

Nuisance – As defined in the Porter-Cologne Water Quality Control Act a Nuisance is "anything which meets all of the following requirements: 1) Is injurious to health, or is indecent, or offensive to the senses, or an obstruction to the free use of property, so as to interfere with the comfortable enjoyment of life or property. 2) Affects at the same time an entire community or neighborhood, or any considerable number of persons, although the extent of the annoyance or damage inflicted upon individuals may be unequal. 3) Occurs during, or as a result of, the treatment or disposal of Wastes."

Numeric Effluent Limitations – A quantitative limitation on Pollutant concentrations or levels to protect Beneficial Uses and Water Quality Objectives of a water body. When Numeric Effluent Limits are met at the "end-of-pipe," the effluent discharge generally will not cause Water Quality Standards to be exceeded in the receiving waters (i.e., Water Quality Standards will also be met).

Nurdles – A plastic pellet, also known as pre-production plastic pellet or plastic resin pellet.

NURP - National Urban Runoff Program

OES – The Governor's Office of Emergency Services, an agency of the State of California.

"Only Rain Down The Storm Drain" Pollution Prevention Program – County Urban Runoff public education program.

Open Space – Any parcel or area of land or water that is essentially unimproved or devoted to an open-space use for the purposes of (1) the preservation of natural resources, (2) the managed production of resources, (3) outdoor recreation, or (4) public health and safety. [Riverside County General Plan, adopted October 7, 2003. Technical Appendix A , Glossary]

Order – Order No. R8-2010-0033 (NPDES No. CAS618033)

Outfall – Means a Point Source as defined by 40 CFR 122.2 a, the point where a municipal separate storm sewer discharges to Waters of the U.S. and does not include open conveyances connecting two municipal separate storm sewers, or pipes, tunnels, or other conveyances which connect segments of the same stream or other Waters of the U.S. and are used to convey Waters of the U.S.. [40 CFR 122.26 (b)(9)]

PAHs – Polycyclic aromatic hydrocarbons. PAHs occur in oil, coal, and tar deposits, and are produced as byproducts of fuel burning (whether fossil fuel or biomass). As a Pollutant, they are of concern because some compounds have been identified as carcinogenic, mutagenic, and teratogenic. PAHs are also found in foods.

Party – Defined as an individual, association, partnership, corporation, municipality, state or federal agency, or an agent or employee thereof. [40 CFR 122.2]

PCBs – Polychlorinated biphenyls. Due to PCB's toxicity and classification as persistent organic Pollutants, PCB production was banned by the United States Congress in 1976 and by the Stockholm Convention on Persistent Organic Pollutants in 2001.

Permit Area – In the Santa Ana Region, the portion of the Santa Ana River watershed that is within the County and regulated under the MS4 Permit. The Permit Area is identified on Appendix 1 as "Permittee Urban Area" and those areas under the Permittee's jurisdictions designated as "Agriculture" and "Open Space" on Appendix 1 that will convert to Permittee Urban Area when developed to industrial, commercial, or residential use during the term of the Order.

Permittees – Co-Permittees and the Principal Permittee

Point Source – Any discernible, confined, and discrete conveyance, including, but not limited to, any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operations, landfill leachate collection systems, vessel, or other floating craft from which pollutants are or may be discharged.

Pollutant – Broadly defined as any agent that may cause or contribute to the degradation of water quality such that a condition of Pollution or Contamination is created or aggravated.

Pollutants of Concern –Pollutants expected to be present on the project site. In developing this list, consideration should be given to the chemicals and potential Pollutants available for storm water to pick-up or transport to Receiving Waters and legacy Pollutants at the project site. Pollutants of Concern for New Development and Significant Redevelopment projects are those Pollutants identified above for which a downstream water body is also listed as Impaired under the CWA Section 303(d) list or by a TMDL.

Pollution – As defined in the Porter-Cologne Water Quality Control Act, Pollution is the alteration of the quality of the Waters of the U.S. by Waste, to a degree that unreasonably affects either of the following: A) the waters for Beneficial Uses (i.e., when the Water Quality Objectives have been violated); or B) facilities that serve these Beneficial Uses. Pollution may include Contamination.

Pollution Prevention –Defined as practices and processes that reduce or eliminate the generation of Pollutants, in contrast to Source Control, Pollution Control, Treatment Control BMPs, or disposal.

Post-Construction BMPs – A subset of BMPs including Site Design, Source Control, and Treatment Control BMPs which detain, retain, filter or educate to prevent the release of Pollutants to surface waters during the final functional life of development.

POTW – [Publicly Owned Treatment Works] – Wastewater treatment facilities owned by a public agency.

Principal Permittee – Riverside County Flood Control and Water Conservation District [RCFC&WCD].

Public Education Committee – Committee established by the Permittees to provide oversight and guidance for the implementation of the public education program.

QAPP - Quality Assurance Project Plan

Rainy Season – See Wet Season.

RCFC&WCD – Riverside County Flood Control and Water Conservation District

REC – Recreational Beneficial Use.

Receiving Water(s) – Waters of the U.S.within the Permit Area.

Receiving Water Limitations – Requirements included in the Orders issued by the Regional Boards to assure that the regulated discharges do not violate Water Quality Standards established in the Basin Plan at the point of discharge to Waters of the U.S. Receiving Water Limitations are used to implement the requirement of CWA section 301(b)(1)(C) that NPDES permits must include any more stringent limitations necessary to meet Water Quality Standards.

Receiving Water Quality Objectives – Water Quality Objectives specified in the Basin Plan for Receiving Waters.

Region – The portion of the Santa Ana River watershed within Riverside County.

Regional Board – California Regional Water Quality Control Board, Santa Ana Region.

RGO – Retail gasoline outlet

Riverside County – Territory within the geographical boundaries of the County.

ROWD [Report of Waste Discharge] – Application for issuance or re-issuance of WDRs.

Sanitary Sewer Overflow (SSO) – Any overflow, spill, release, discharge or diversion of untreated or partially treated wastewater from a sanitary sewer system.

Santa Ana Region – Area under the jurisdiction of the Regional Board.

SARA – Superfund Amendments and Reauthorization Act. SARA amended the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) on October 17, 1986. SARA reflected USEPA's experience in administering the complex Superfund program during its first six years and made several important changes and additions to the program. SARA:

- stressed the importance of permanent remedies and innovative treatment technologies in cleaning up Hazardous Waste sites;
- required Superfund actions to consider the standards and requirements found in other State and Federal environmental laws and regulations;
- provided new enforcement authorities and settlement tools;

- increased State involvement in every phase of the Superfund program;
- increased the focus on human health problems posed by Hazardous Waste sites;
- encouraged greater citizen participation in making decisions on how sites should be cleaned up; and
- increased the size of the trust fund to $8.5 billion.

SARA also required USEPA to revise the Hazard Ranking System (HRS) to ensure that it accurately assessed the relative degree of risk to human health and the environment posed by uncontrolled Hazardous Waste sites that may be placed on the National Priorities List (NPL).

SAWBAA – Santa Ana Watershed Benefit Assessment Area

SCCWRP – Southern California Coastal Water Research Project

Sediment – Soil, sand, and minerals washed from land into water. Sediment resulting from anthropogenic sources (i.e. human induced land disturbance activities) is considered a Pollutant. This Order regulates only the discharges of Sediment from anthropogenic sources and does not regulate naturally occurring sources of Sediment. Sediment may destroy fish-nesting areas, clog animal habitats, and cloud waters so that sunlight does not reach aquatic plants.

SIC [Standard Industrial Classification] – Four digit industry code, as defined by the US Department of Labor, Occupational Safety and Health Administration. The SIC Code is used to identify if a facility requires coverage under the General Industrial Activities Storm Water Permit.

Significant Redevelopment – As defined in Section XI.D.3.a.

SIP - Appendix 4 of the Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California

Site Design BMPs – Any project design feature that reduces the creation or severity of potential pollutant sources or reduces the alteration of the project site's natural flow regime. Redevelopment projects that are undertaken to remove Pollutant sources (such as existing surface parking lots and other impervious surfaces) or to reduce the need for new roads and other impervious surfaces (as compared to conventional or low-density New Development) by incorporating higher densities and/or mixed land uses into the project design, are also considered site design BMPs

Smart Growth Principles – Smart Growth refers to the use of creative strategies to develop ways that preserve natural lands and critical environmental areas, protect water and air quality, and reuse already-developed land.

SMC - Storm Water Monitoring Coalition

Source Control BMPs – In general, activities or programs to educate the public or provide low cost non-physical solutions, as well as facility design or practices aimed to limit the contact between Pollutant sources and storm water or authorized Non-Storm Water. Examples include: activity schedules, prohibitions of practices, street sweeping, facility maintenance, detection and elimination of IC/IDs, and other non-structural measures. Facility design (structural) examples include providing attached lids to trash containers, canopies for fueling islands, secondary containment, or roof or awning over material and trash storage areas to prevent direct contact between water and Pollutants.

Southern California Monitoring Coalition (SMC) - A regional group working to improve monitoring program design, parameter test methods, calibrate labs, evaluate the effectiveness of BMPs, and/or advance the science and understanding of Urban Runoff impacts on Receiving Waters.

SSMP – Sewer System Management Plan

SSO Order – Statewide General Waste Discharge Requirements for Sanitary Sewer Systems, Water Quality Order No. 2006-0003-DWQ.

State Board – California State Water Resources Control Board

Storm Water – Storm water runoff and snow melt runoff from urban, open space, and agricultural areas consisting only of those discharges that originate from precipitation events. Storm water is that portion of precipitation that flows across a surface to the MS4 or receiving waters. Examples of this phenomenon include: the water that flows off a building's roof when it rains (runoff from an impervious surface); the water that flows into streams when snow on the ground begins to melt (runoff from a semi-pervious surface); and the water that flows from a vegetated surface when rainfall is in excess of the rate at which it can infiltrate into the underlying soil (runoff from a pervious surface). When all other factors are equal, runoff increases as the perviousness of a surface decreases. During precipitation events in urban areas, rain water may pick up and transports Pollutants through storm water conveyance systems, and ultimately to Waters of the U.S.

Storm Water Ordinance – The Storm Water/Urban Runoff Management and Discharge Control Ordinances and ordinances addressing grading and erosion control adopted by each of the Co-Permittees.

Structural BMPs – Physical facilities or controls that may include secondary containment, treatment measures, (e.g. first flush diversion, detention/retention basins, and oil/grease separators), run-off controls (e.g., grass swales, infiltration trenches/basins, etc.), and engineering and design modification of existing structures.

Subdivision Map Act - Section 65000 et seq. of the California Government Code

SWAMP - Surface Water Ambient Monitoring Program

SWPPP [Storm Water Pollution Prevention Plan] – Plan required by the General Construction Permit to minimize and manage Pollutants to minimize Pollution from entering the MS4, identifying all potential sources of Pollution and describing planned practices to reduce Pollutants from discharging off the site.

SWQSTF – Storm Water Quality Standards Task Force

TDS – Total dissolved solids.

Technical Committee – A committee consisting of one or more representatives from each Permittee that provides technical direction on the development of the DAMP and the implementation of the overall Urban Runoff program.

Technology-Based Effluent Limitations – A permit limit for a Pollutant that is based on the capability of a treatment method to reduce the Pollutant to a certain concentration.

TIN – Total Inorganic Nitrogen

TMDL [Total Maximum Daily Load] – Maximum amount of a Pollutant that can be discharged into a water body from all sources (point and non-point) and still maintain Water Quality Standards. Under CWA Section 303(d), TMDLs must be developed for all water bodies that do not meet Water Quality Standards after application of technology-based controls.

TMDL Implementation Plan – Component of a TMDL that describes actions, including monitoring, needed to reduce Pollutant loadings and a timeline for implementation. TMDL Implementation Plans can include a monitoring or modeling plan and milestones for measuring progress, plans for revising the TMDL if progress toward cleaning up the waters is not made, and the date by which Water Quality Standards will be met (USEPA Final TMDL Rule: Fulfilling the Goals of the CWA, EPA 841-F-00-008, July 2000).

Toxic Substance – A substance that can cause Toxicity.

Toxicity – Adverse responses of organisms to chemicals or physical agents ranging from mortality to physiological responses such as impaired reproduction or growth anomalies.

Treatment Control BMPs – Any engineered system designed and constructed to remove Pollutants from Urban Runoff. Pollutant removal is achieved by simple gravity

settling of particulate Pollutants, filtration, biological uptake, media adsorption or any other physical, biological, or chemical process.

Tributary – a stream, river, or MS4 which flows into downstream receiving water, MS4 or BMP.

TSS – Total suspended solids.

Uncontaminated Pumped Groundwater – Groundwater that meets the surface Water Quality Objectives specified in the Basin Plan to which it is proposed to be discharged.

Urban Runoff – Urban Runoff includes those discharges from residential, commercial, industrial, and construction areas within the Permit Area and excludes discharges from Open Space[2], feedlots, dairies, farms and agricultural fields. Urban Runoff discharges consist of storm water and non-storm water surface runoff from drainage sub-areas with various, often mixed, land uses within all of the hydrologic drainage areas that discharge into the Waters of the U.S. In addition to Urban Runoff, the MS4s regulated by this Order receive flows from Open Space, agricultural activities, agricultural fields state and federal properties and other non-urban land uses not under the control of the Permittees. The quality of the discharges from the MS4s varies considerably and is affected by, among other things, past and present land use activities, basin hydrology, geography and geology, season, the frequency and duration of storm events, and the presence of past or present illegal and allowed disposal practices and Illicit Connections.

The Permittees lack legal jurisdiction over storm water discharges into their respective MS4 facilities from agricultural activities, California and federal facilities, utilities and special districts, Native American tribal lands, wastewater management agencies and other point and non-point source discharges otherwise permitted by or under the jurisdiction of the Regional Board. The Regional Board recognizes that the Permittees should not be held responsible for such facilities and/or discharges. Similarly, certain activities that generate Pollutants present in Urban Runoff are beyond the ability of the Permittees to eliminate. Examples of these include operation of internal combustion engines, atmospheric deposition, brake pad wear, tire wear, residues from lawful application of pesticides, nutrient runoff from agricultural activities, leaching of naturally occurring minerals from local geography. Urban Runoff does not include background Pollutant loads or naturally occurring flows.

USEP – Urban Source Evaluation Plan for the MSAR TMDL.

USEPA – United States Environmental Protection Agency.

[2] This use of Open Space excludes Open Space integrated into urbanized areas such as pocket parks, landscaped medians, walking trails, etc. Open Space is intended to address essentially unimproved areas in strictly unurbanized settings.

Waste – As defined in Water Code Section 13050(d), "Waste includes sewage and any and all other waste substances, liquid, solid, gaseous, or radioactive, associated with human habitation, or of human or animal origin, or from any producing, manufacturing, or processing operation, including waste placed within containers of whatever nature prior to, and for purposes of, disposal." Article 2 of CCR Title 23, Chapter 15 (Chapter 15) contains a waste classification system that applies to solid and semi-solid waste that cannot be discharged directly or indirectly to waters of the state and which therefore must be discharged to land for treatment, storage, or disposal in accordance with Chapter 15. There are four classifications of waste (listed in order of highest to lowest threat to water quality): hazardous waste, designated waste, non-hazardous solid waste, and inert waste.

Waste Discharge Requirements (WDRs) – As defined in Section 13374 of the California Water Code, the term "Waste Discharge Requirements" is the equivalent of the term "permits" as used in the Federal Water Pollution Control Act, as amended. The Regional Board usually reserves reference to the term "permit" to Waste Discharge Requirements for discharges to surface Waters of the U.S.

Waste Load Allocations (WLAs)– Maximum quantity of Pollutants a discharger of waste is allowed to release into a particular waterway, as set by a regulatory authority. Discharge limits usually are required for each specific water quality criterion being, or expected to be, violated. Distribution or assignment of TMDL Pollutant loads to entities or sources for existing and future Point Sources.

WQBEL – Water Quality Based Effluent Limitations

Water Code – California Water Code

Waters of the U.S. – Waters of the U.S. can be broadly defined as navigable surface waters and all tributary surface waters to navigable surface waters. Groundwater is not considered to be a Waters of the U.S. As defined in 40 CFR 122.2, the Waters of the U.S. are defined as: (a) All waters, which are currently used, were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide; (b) All interstate waters, including interstate "wetlands;" (c) All other waters such as intrastate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, "wetlands," sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds the use, degradation or destruction of which would affect or could affect interstate or foreign commerce including any such waters: (1) Which are or could be used by interstate or foreign travelers for recreational or other purposes; (2) From which fish or shellfish are or could be taken and sold in interstate or foreign commerce; or (3) Which are used or could be used for industrial purposes by industries in interstate commerce; (d) All impoundments of waters otherwise defined as Waters of the U.S. under this definition; (e) Tributaries of waters identified in paragraphs (a) through (d) of this definition; (f) The territorial seas; and (g) "Wetlands" adjacent to waters (other than waters that are themselves wetlands) identified in paragraphs (a)

through (f) of this definition. Waters of the U.S. do not include prior converted cropland. Notwithstanding the determination of an area's status as prior converted cropland by any other federal agency, for the purposes of the CWA, the final authority regarding CWA jurisdiction remains with the USEPA.

Water Quality Objectives – Means the numeric or narrative limits or levels of water quality constituents or characteristics which are established for the reasonable protection of Beneficial Uses of water or the prevention of Nuisance within a specific area. [California Water Code Section 13050(h)]

Water Quality Standards –The water quality goals of a waterbody (or a portion of the waterbody) designating Beneficial Uses to be made of the water and the Water Quality Objectives or criteria necessary to protect those uses. These standards also include California's anti-degradation policy.

Watershed – That geographical area which drains to a specified point on a watercourse, usually a confluence of streams or rivers (also known as drainage area, catchments, or river basin).

Watershed Action Plan (WAP) – Integrated plans for managing a watershed that include consideration of water quality, Hydromodification, water supply and habitat protection. The Watershed Action Plan integrates existing watershed based planning efforts and incorporates watershed tools to manage cumulative impacts of development on vulnerable streams, preserve structure and function of streams, and protect source, surface and groundwater quality and water supply in the Permit Area. The Watershed Action Plan should integrate Hydromodification and water quality management strategies with land use planning policies, ordinances, and plans within each jurisdiction.

WDID [Waste Discharge Identification] – Identification number provided by the State when a Notice of Intent is filed.

Wet Season/Wet Weather – October 1 through May 31st of each year unless defined otherwise in the specific applicable TMDL implementation plan. The Middle Santa Ana River TMDL defines the wet season as November 1 through March 31st and the Canyon Lake/Lake Elsinore TMDL monitoring defines it as October 1st through May 31st.

WQMP – Water Quality Management Plan as discussed in Section 6 of the DAMP.

WRCOG - Western Riverside Council of Governments

APPENDIX 5

NOTICE OF INTENT AND NOTICE OF TERMINATION FOR MUNICIPAL CONSTRUCTION ACTIVITIES

ORDER NO. R8-2010-0033

022278

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD – SANTA ANA REGION

NOTICE OF INTENT

TO COMPLY WITH THE TERMS OF THE RIVERSIDE COUNTY MUNICIPAL STORMWATER PERMIT FOR STORMWATER DISCHARGES ASSOCIATED WITH CONSTRUCTION ACTIVITIES

ORDER No. R8-2010-0033 (NPDES No. CAS618033)

MARK ONLY ONE ITEM 1. ☐ New Construction/Reconstruction 2. ☐ Change of Information for WDID# _____

I. OWNER

Name	Contact Person		
Mailing Address	Title		
City	State **CA**	Zip	Phone ( ) – Fax ( ) – Email :

II. CONTRACTOR INFORMATION

Name	Contact Person		
Local Mailing Address	Title		
City	State	Zip	Phone ( ) – Fax ( ) – Email:

III. SITE INFORMATION

A. Project Title	Site Address		
City/Unincorporated Area	State **CA**	Zip	Contact Person Phone ( ) –
B. Construction commencement date: (Month / Day / Year)	C. Projected construction completion date: (Month / Day / Year)		

D. Type of Work: ☐ Utility ☐ Flood Control ☐ Transportation ☐ Other (Specify) Description of Work: _____	E. Total size of project/construction site: ____Acres Total size of area to be disturbed:_ ____Acres.

IV. RECEIVING WATER INFORMATION

A. Does the storm water runoff from the construction site discharge to (check all that apply):

1. ☐ Indirectly to Waters of the U.S.
2. ☐ MS4 Facility - Enter owner's name:_____
3. ☐ Directly to Waters of U.S. (e.g. , river, lake, creek, stream, or to a pipe/channel that flows without inflow from other sources between site and water body etc.)

V. IMPLEMENTATION OF NPDES PERMIT REQUIREMENTS

A. STORM WATER POLLUTION PREVENTION PLAN (SWPPP) (mark one) ☐ A SWPPP has been prepared for this project and is available for review ☐ A SWPPP will be prepared and ready for review by (date): ___/___/___ B. Date WQMP approved by MS4 Permittee: ___/___/___ ☐ Not Applicable.	C. MONITORING PROGRAM (MP) (mark one) ☐ A MP has been prepared for this facility and is available for review ☐ A MP will be prepared and ready for review by (date): ___/___/___

VI. CERTIFICATIONS

"I certify under penalty of law that this document and all attachments were prepared under my direction and supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine or imprisonment. In addition, I certify that Order No. R8-2010-0033; (specifically Sections XII.F., XIV, XVI, and XX), including the development and implementation of a Storm Water Pollution Prevention Plan and a Monitoring Program Plan, will be complied with."

Printed Name: _____ **Title:** _____

Signature: _____ **Date:** _____

022279

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD – SANTA ANA REGION

NOTICE OF TERMINATION

OF COVERAGE UNDER THE RIVERSIDE COUNTY MUNICIPAL STORMWATER PERMIT
FOR STORMWATER DISCHARGES ASSOCIATED WITH CONSTRUCTION ACTIVITY

ORDER No. R8-2010-0033 (NPDES No. CAS618033)

I. WDID No. _____

II. OWNER

Name	Contact Person		
Mailing Address	Title		
City	State	Zip	Phone ( ) – Fax ( ) – Email:

III. SITE INFORMATION

A. Original Project Title	Site Address			
City/Unincorporated Area	State CA	Zip	Site Contact Person	
B. Contractor Name	Phone ( ) – Fax ( ) – Email:		Title	
Local Mailing Address	City		State	Zip
Qualified SWPPP Practitioner	Phone ( ) – Fax ( ) – Email:			

IV. BASIS OF TERMINATION

___ 1. The construction project is completed and the following conditions have been met.

- ☐ All elements of the Storm Water Pollution Prevention Plan have been completed.
- ☐ Construction materials and waste have been disposed of properly.
- ☐ The site is in compliance with all local storm water management requirements.
- ☐ A post-construction storm water operation and management plan is in place (Attach a description of the post construction BMPs, the location (Latitude /Longitude), and a map of the locations of the post construction BMPs).
- ☐ Date field verification inspection performed and include a copy of the field verification report. ___/___/___

___ 2. Construction activities have been suspended; either temporarily ____ or indefinitely ___ and the following conditions have been met.

- All elements of the Storm Water Pollution Prevention Plan have been completed.
- ☐ Construction materials and waste have been disposed of properly.
- ☐ The site is permanently stabilized (greater than 3 years without maintenance).
- ☐ The site is in compliance with all local storm water management requirements.

Date of suspension ____ / ____ / ____ Expected start up date ____ / ____ / ____

V. CERTIFICATION

I certify under penalty of law that all storm water discharges associated with construction activity from the identified site that are authorized by NPDES General Permit No. CAS000002 have been eliminated or that I am no longer the owner of the site. I understand that by submitting this Notice of Termination, I am no longer authorized to discharge storm water associated with construction activity under the General Permit, and that discharging pollutants in storm water associated with construction activity to Waters of the United States is unlawful under the Clean Water Act where the discharge is not authorized by a NPDES permit. I also understand that the submittal of this Notice of Termination does not release an owner of liability for any violation of the General Permit or the Clean Water Act.

Printed Name: _____ **Title:** _____

Signature: _____ **Date:** _____

APPENDIX 6

FACT SHEET

ORDER NO. R8-2010-0033

State of California

California Regional Water Quality Control Board

Santa Ana Region

3737 Main Street, Suite 500

Riverside, CA 92501- 3348

FACT SHEET

January 29, 2010

ITEM: 09

SUBJECT: Waste Discharge Requirements for the Riverside County Flood Control and Water Conservation District, the County of Riverside, and the Incorporated Cities of Riverside County within the Santa Ana Region, Urban Runoff Management Program, Order No. R8-2010-0033 (NPDES No. CAS 618033)

I. INTRODUCTION

A. PROJECT

The attached pages contain information concerning an application for renewal of Waste Discharge Requirements and a National Pollutant Discharge Elimination System (NPDES) permit, Order No. R8-2010-0033 (Order), NPDES No. CAS 618033, which prescribes Waste Discharge Requirements for Urban Runoff (as defined in Appendix 4) from the cities and the unincorporated areas in Riverside County within the jurisdiction of the Santa Ana Regional Board Water Quality Control Board (Regional Board). This Order regulates discharges of Urban Runoff from the Permit Area, as defined in Order No. R8-2010-0033 and shown in Appendix 1.

If appropriate Pollution control measures are not implemented, Urban Runoff, (as defined in Appendix 4 – Glossary), may contain pathogens (bacteria, protozoa, viruses), sediment, trash, fertilizers (nutrients, mostly nitrogen and phosphorus compounds), oxygen-demanding substances (decaying matter), pesticides (DDT, chlordane, diazinon, chlorpyrifos), heavy metals (cadmium, chromium, copper, lead, zinc), and petroleum products (oil & grease, PAHs, petroleum hydrocarbons).

If not properly managed and controlled, urbanization may change the stream hydrology and increase Pollutant loading to Receiving Waters. As a watershed undergoes urbanization, pervious surface area decreases, runoff volume and velocity may increase, riparian habitats and wetland habitats decrease, the frequency and severity of flooding may increase, and Pollutant loading may increase. Most of these impacts occur due to human activities (Anthropogenic) that occur during and/or after urbanization. The Pollutants and hydrologic changes may

cause declines in aquatic resources, cause toxicity to aquatic organisms, and impact human health and the environment. Based on information provided in Section D of the Riverside County Flood Control and Water Conservation District's (RCFC&WCD or the Principal Permittee as context indicates) Hydrology Manual, it is feasible that, in semi-arid regions, development may result in the creation of a net increase in absorption.

Properly planned high-density development may reduce urban sprawl and problems associated with sprawl. Urban in-fill and high-density development are elements of smart growth, which creates the opportunity to maintain relatively natural open space elsewhere in the Permit Area (see Appendix 4). The goal of Low Impact Development (LID) is to mimic pre-development runoff quality and quantity.

On April 27, 2007, The RCFC&WCD in cooperation with the County of Riverside (the County) and the incorporated cities of Beaumont, Calimesa, Canyon Lake, Corona, Hemet, Lake Elsinore, Moreno Valley, Murrieta, Norco, Perris, Riverside, and San Jacinto jointly submitted a NPDES Application No. CAS 618033, a Report of Waste Discharge (the ROWD) and a revised Drainage Area Management Plan (DAMP) to renew the Municipal Separate Storm Sewer System (MS4) NPDES permit for the Santa Ana River watershed (the Permit Area) within Riverside County. This Order renews the NPDES permit authorizing Urban Runoff in the Permit Area (see Appendix 1, "urban area" includes those portions of "agriculture" and "open space" that convert to industrial, commercial, or residential use during the term of this Order). To more effectively carry out the requirements of this Order, the Permittees have agreed that the RCFC&WCD will continue as the Principal Permittee and the County and the incorporated cities will continue as the Co-Permittees.

On February 5, 2008 Wildomar residents voted for cityhood and the City incorporated on July 1, 2008. Menifee residents voted for cityhood on June 3, 2008 and the City incorporated on October 1, 2008. On May 6, 2009, the City of Menifee and on May 5, 2009, the City of Wildomar submitted Letters of Intent to be a Co-Permittee in this Order and for the purposes of this Order shall be considered as such. The cities in the Permit Area, along with the County, are collectively referred to as the Co-Permittees, and collectively, with the Principal Permittee, the Permittees.

B. PROJECT AREA

The Permit Area contains 1,396 square miles or 19.1% of the 7,300 square miles within Riverside County and includes 15 of the 26 municipalities within Riverside County. The California Department of Finance estimates that as of January 1,

2006, the population of Riverside County is 1,953,330 of which 1,237,388[1] reside within the Permit Area. The California Department of Finance estimates that as of January 1, 2009, the population of Riverside County was 2,107,653[2]. Beaumont, Calimesa, and Canyon Lake have populations of 25,000 or less. The County, Corona, Moreno Valley and Riverside have populations of 100,000 or more. The Southern California Association of Governments estimates that the County of Riverside will grow by 16% between 2006 and 2010 (2008 RTP Growth Forecast by City). The most significant percentage growth in population between 2006 and 2010 occurred in the Cities of Beaumont, Calimesa, and San Jacinto.

Land uses in Riverside County within the Santa Ana River Region include open space, residential, commercial, light industrial, heavy industrial, and agriculture. The agricultural land uses include row crops, nurseries, citrus groves and vineyards, dairies, ranches, poultry and hog farms, and other agricultural related uses with one single-family residence allowed per 10 acres (County of Riverside General Plan, Land Use Element 2003). The conversion of agricultural lands and open space to other "developed" land uses has been ongoing and will continue. Based on Riverside County Assessor's Parcel Data as of February 2006, the land use mix of the County area within the Santa Ana Region was: 29,441 acres used or zoned for commercial/industrial purposes (3.3%), 70,499 acres for residential purposes (7.9%), 11,798 acres utilized for improved streets and roads (1.3%), 9,872 acres are used for parks and recreational facilities (1.1%), 70,164 acres are used for rural residential (7.9%), 453,976 acres are utilized for open space (50.8%), and 48,627 acres are used for agricultural purposes (5.4%). The federal, state, tribal, and non-Permittee jurisdictional lands within the portion of Riverside County within the Santa Ana Region total 199,064 acres (22.3%).

Less than one fifth (1/5) of Riverside County is within the Permit Area. The Permit Area includes the "urban area" as shown in Appendix 1 and those portions of "agriculture" and "open space" as shown on Appendix 1 that do convert to industrial, commercial or residential use during the term of this Order. The Permit Area is delineated by the San Bernardino-Riverside County boundary line on the north and northwest, the Orange-Riverside County boundary line on the west, the Santa Ana-San Diego Regional Board boundary line on the south, and the Santa Ana-Colorado River Basin Regional Board boundary line on the east. Sixty-seven percent of Riverside County's population resides within the Regional Board's jurisdiction. The San Diego and the Colorado River Basin Regional Water Quality Control Boards regulate Urban Runoff from those portions of Riverside County outside of the Permit Area shown in Appendix 1.

[1] As per Section 3.3.1 of the 2007 ROWD, (Western Riverside Council of Governments (WRCOG), excluding the cities of Menifee and Wildomar

[2] E-1 report dated April 30, 2009 (http://www.dof.ca.gov/research/demographic/reports/estimates/e-1/2008-09/documents/E-1_2009%20Press%20Release.pdf).

C. CLEAN WATER ACT REQUIREMENTS

The federal Clean Water Act (the "CWA") established a national policy designed to help maintain and restore the physical, chemical and biological integrity of the nation's waters. In 1972, the CWA established the NPDES permit program to regulate the discharge of Pollutants from Point Sources to "Waters of the U.S.". From 1972 to 1987, the main focus of the NPDES program was to regulate conventional Pollutant sources such as sewage treatment plants and industrial facilities. As a result, on a nationwide basis, non-point sources, including agricultural runoff and Urban Runoff, now contribute a larger portion of many kinds of Pollutants than the more thoroughly regulated sewage treatment plants and industrial facilities.

The National Urban Runoff Program (NURP) final report to the Congress (USEPA, 1983) concluded that the goals of the CWA could not be achieved without addressing Urban Runoff discharges. The 1987 CWA amendments established a framework for regulating Urban Runoff. Pursuant to these amendments, the Santa Ana Regional Board began regulating discharges from MS4s in 1990.

II. REGULATORY BACKGROUND AND CLEAN WATER ACT REQUIREMENTS

As water flows over streets, parking lots, construction sites, and industrial, commercial, residential, and municipal areas, it may intercept Pollutants from these areas and transport them to Waters of the U.S.. As indicated in I.A, above, Urban Runoff may contain pathogens, sediment, trash, fertilizers, oxygen-demanding substances, pesticides, heavy metals, and petroleum products. If not properly managed and controlled, urbanization may adversely impact water quality and quantity in the receiving waters.

However, urban development projects that incorporate LID concepts may reduce the impact of urban development on runoff water quality and quantity.

Studies[3] conducted in the Southern California area have established storm water runoff from urban areas as significant sources of Pollutants in surface waters. The Santa Ana River is impacted by agricultural, other discharges and Urban Runoff as it flows through the San Bernardino County and Riverside County areas prior to flowing through Orange County and into the Pacific Ocean.

If not properly controlled, Urban Runoff could be a significant source of Pollutants in the Waters of the U.S. Table 1 includes a list of Pollutants, potential sources, and some of the adverse environmental consequences mostly resulting from urbanization.

[3] Bay, S., Jones, B. H. and Schiff, K, 1999, Study of the Impact of Stormwater Discharge on Santa Monica Bay. Sea Grant Program, University of Southern California; and Haile, R.W., et al., 1996, An Epidemiological Study of Possible Adverse Health Effects of Swimming in Santa Monica Bay. Southern California Coastal Water Research Project (1992), Surface Runoff to the Southern California Bight.

Table 1[4]
Pollutant Sources and Impacts of a Number of Pollutants On Waters of the U.S.

Pollutants	Sources	Effects and Trends
Toxins (e.g., biocides, PCBs, trace metals, heavy metals)	Industrial and municipal wastewater; runoff from farms, forests, urban areas, and landfills; erosion of contaminated soils and sediments; vessels; atmospheric deposition	Poison and cause disease and reproductive failure; fat-soluble toxins may bioconcentrate, particularly in birds and mammals, and pose human health risks. Inputs into Waters of the U.S. have declined, but remaining inputs and contaminated sediments in urban and industrial areas pose threats to living resources.
Pesticides (DDT, diazinon, chlorpyrifos)	Urban Runoff, agricultural runoff, commercial, industrial, residential and farm use	The use of legacy pesticides (DDT, chlordane, dieldrin) has been banned or restricted; still persists in the environment; some of the other pesticide uses are curtailed or restricted.
Biostimulants (organic wastes, plant nutrients)	Sewage and industrial wastes; runoff from farms and urban areas; nitrogen from combustion of fossil fuels	Organic wastes overload bottom habitats and deplete oxygen; nutrient inputs stimulate algal blooms (some harmful), which reduce water clarity, and alter food chains supporting fisheries. While organic waste loading has decreased, nutrient loading has increased (NRC, 1993a, 2000a).
Petroleum products (oil, grease, petroleum hydrocarbons, PAHs)	Urban Runoff and atmospheric deposition from land activities; accidental spills; oil & gas production activities; natural seepage; and PAHs from internal combustion engines	Petroleum hydrocarbons can affect bottom organisms and larvae; spills affect birds, mammals and aquatic life. While oil Pollution from accidental spills and production activities has decreased, diffuse inputs from land-based activities have not (NRC, 1985).
Radioactive isotopes	Atmospheric fallout, industrial and military activities	Bioaccumulation may pose human health risks where contamination is heavy.
Sediments	Erosion from farming, construction activities, forestry, mining, development; river diversions; coastal dredging and mining	Reduce water clarity and change bottom habitats; carry toxins and nutrients; clog fish gills and interfere with respiration in aquatic fauna. Sediment delivery by many rivers has decreased, but sedimentation poses problems in some areas.
Plastics and other debris	Ships, boats, fishing nets, containers, trash, Urban Runoff	Entangles aquatic life or is ingested; degrades, beaches, lake shores, near shore habitats, and wetland habitats. Floatables (from trash) are an aesthetic Nuisance and can be a substrate for algae and insect vectors.
Thermal	Cooling water from power plants and industry, urban run off from impervious surfaces	Kills some temperature-sensitive species; and displaces others. Generally, less a risk to marine life than thought 20 years ago.
Noise	Vessel propulsion, sonar, seismic prospecting, low-frequency sound used in defense and research	May disturb marine mammals and other organisms that use sound for communication.
Pathogens (bacteria, protozoa, viruses)	Sewage, Urban Runoff, livestock, wildlife, and discharges from boats and cruise ships.	Pose health risks to swimmers and consumers of aquatic life. Sanitation has improved, but standards have been raised (NRC 1999a).
Alien species	Ships and ballast water, fishery stocking, aquarists	Displace native species, introduce new diseases; growing worldwide problem (NRC 1996).

[4] Adapted from "Marine Pollution in the United States" prepared for the Pew Oceans Commission, 2001.

The CWA prohibits the discharge of any Pollutant to navigable waters from a Point Source unless an NPDES permit authorizes the discharge. Efforts to improve water quality under the NPDES program traditionally and primarily focused on reducing Pollutants in discharges of industrial process wastewater and municipal sewage. The 1987 amendments to the CWA required MS4s and industrial facilities, including construction sites, to obtain NPDES permits for storm water runoff from their facilities. On November 16, 1990, the USEPA promulgated the final NPDES Phase I storm water regulations. The storm water regulations are contained in 40 CFR Parts 122, 123 and 124.This Order does not constitute an unfunded local government mandate subject to subvention under Article XIIIB, Section (6) of the California Constitution for several reasons, including, but not limited to, the following. First, this Order implements federally mandated requirements under federal Clean Water Act section 402, subdivision (p)(3)(B). (33 U.S.C. § 1342(p)(3)(B).) This includes federal requirements to effectively prohibit non-storm water discharges, to reduce the discharge of pollutants to the maximum extent practicable, and to include such other provisions as the Administrator or the State determines appropriate for the control of such pollutants. Federal cases have held these provisions require the development of permits and permit provisions on a case-by-case basis to satisfy federal requirements. (*Natural Resources Defense Council, Inc. v. U.S.E.P.A.* (9th Cir. 1992) 966 F.2d 1292, 1308, fn.17). The authority exercised under this Order is not reserved state authority under the Clean Water Act's savings clause (*cf. Burbank v. State Water Resources Control Bd.* (2005) 35 Cal.4th 613, 627-628 [relying on 33 U.S.C. § 1370, which allows a state to develop requirements which are not "less stringent" than federal requirements]), but instead, is part of a federal mandate to develop pollutant reduction requirements for municipal separate storm sewer systems. To this extent, it is entirely federal authority that forms the legal basis to establish the permit provisions. (See, *City of Rancho Cucamonga v. Regional Water Quality Control Bd.-Santa Ana Region* (2006) 135 Cal.App.4th 1377, 1389; *Building Industry Ass'n of San Diego County v. State Water Resources Control Bd.* (2004) 124 Cal.App.4th 866, 882-883.)

Likewise, the provisions of this Order to implement total maximum daily loads (TMDLs) are federal mandates. The federal Clean Water Act requires TMDLs to be developed for water bodies that do not meet federal water quality standards. (33 U.S.C. § 1313(d).) Once the U.S. Environmental Protection Agency or a state develops a TMDL, federal law requires that permits must contain effluent limitations consistent with the assumptions of any applicable wasteload allocation. (40 C.F.R. § 122.44(d)(1)(vii)(B).)

Second, the local agency permittees' obligations under this Order are similar to, and in many respects less stringent than, the obligations of non-governmental dischargers who are issued NPDES permits for storm water discharges. With a few inapplicable exceptions, the Clean Water Act regulates the discharge of pollutants from point sources (33 U.S.C. § 1342) and the Porter-Cologne regulates the

discharge of waste (Wat. Code, § 13263), both without regard to the source of the pollutant or waste. As a result, the "costs incurred by local agencies" to protect water quality reflect an overarching regulatory scheme that places similar requirements on governmental and nongovernmental dischargers. (See *County of Los Angeles v. State of California* (1987) 43 Cal.3d 46, 57-58 [finding comprehensive workers compensation scheme did not create a cost for local agencies that was subject to state subvention].)

The Clean Water Act and the Porter-Cologne Water Quality Control Act largely regulate storm water with an even hand, but to the extent there is any relaxation of this even-handed regulation, it is in favor of the local agencies. Except for municipal separate storm sewer systems, the Clean Water Act requires point source dischargers, including discharges of storm water associated with industrial or construction activity, to comply strictly with water quality standards. (33 U.S.C. § 1311(b)(1)(C), *Defenders of Wildlife v. Browner* (1999) 191 F.3d 1159, 1164-1165 [noting that industrial storm water discharges must strictly comply with water quality standards].) As discussed in prior State Water Resources Control Board decisions, this Order does not require strict compliance with water quality standards. (SWRCB Order No. WQ 2001-15, p. 7.) The Order, therefore, regulates the discharge of waste in municipal storm water more leniently than the discharge of waste from non-governmental sources.

Third, the local agency permittees have the authority to levy service charges, fees, or assessments sufficient to pay for compliance with this Order. The fact sheet demonstrates that numerous activities contribute to the pollutant loading in the municipal separate storm sewer system. Local agencies can levy service charges, fees, or assessments on these activities, independent of real property ownership. (See, e.g., *Apartment Ass'n of Los Angeles County, Inc. v. City of Los Angeles* (2001) 24 Cal.4th 830, 842 [upholding inspection fees associated with renting property].) The ability of a local agency to defray the cost of a program without raising taxes indicates that a program does not entail a cost subject to subvention. (*County of Fresno v. State of California* (1991) 53 Cal.3d 482, 487-488.)

Fourth, the Permittees have requested permit coverage in lieu of compliance with the complete prohibition against the discharge of pollutants contained in federal Clean Water Act section 301, subdivision (a) (33 U.S.C. § 1311(a)) and in lieu of numeric restrictions on their discharges. To the extent, the local agencies have voluntarily availed themselves of the permit, the program is not a state mandate. (Accord *County of San Diego v. State of California* (1997) 15 Cal.4th 68, 107-108.) Likewise, the Permittees have voluntarily sought a program-based municipal storm water permit in lieu of a numeric limits approach. (See *City of Abilene v. U.S. E.P.A.* (5th Cir. 2003) 325 F.3d 657, 662-663 [noting that municipalities can choose between a management permit or a permit with numeric limits].) The local agencies' voluntary decision to file a report of waste discharge proposing a program-based

permit is a voluntary decision not subject to subvention. (See *Environmental Defense Center v. USEPA* (9th Cir. 2003) 344 F.3d 832, 845-848.)

Fifth, the local agencies' responsibility for preventing discharges of waste that can create conditions of pollution or nuisance from conveyances that are within their ownership or control under state law predates the enactment of Article XIIIB, Section (6) of the California Constitution.

On July 13, 1990, the Regional Board adopted the first term Riverside County Area-wide MS4 Permit, Order No. 90-104 (NPDES No. CA 8000192), for Urban Runoff from areas in Riverside County within the Permit Area. On March 8, 1996, the Regional Board renewed Order No. 90-104 by adopting the second term area-wide MS4 Permit, Order No. 96-30, (NPDES No. CAS618033). On October 25, 2002, the Regional Board renewed Order No. 96-30 by adopting the third term area-wide MS4 Permit, Order No. R8-2002-0011.

This Order renews the area-wide NPDES MS4 Permit for the Permit Area for the fourth-term, in accordance with Section 402 (p) of the CWA and all requirements applicable to an NPDES permit issued under the issuing authority's discretionary authority. The requirements included in this Order are consistent with the CWA, the federal regulations governing urban storm water discharges, the Water Quality Control Plan for the Santa Ana River Basin (Basin Plan), the California Water Code, and the State Water Resources Control Board's (State Board) Plans and Policies.

The Basin Plan is the basis for the Regional Board's regulatory programs. The Basin Plan was developed and is periodically reviewed and updated in accordance with relevant federal and state law and regulation, including the CWA and the California Water Code. As required, the Basin Plan designates the Beneficial Uses of the waters of the Region and specifies Water Quality Objectives intended to protect those uses. (Beneficial Uses and Water Quality Objectives, together with an anti-degradation policy, comprise federal "Water Quality Standard"). The Basin Plan also specifies an implementation plan, which includes certain discharge prohibitions. In general, the Basin Plan makes no distinctions between wet and dry weather conditions in designating Beneficial Uses and setting Water Quality Objectives, i.e., the Beneficial Uses, and correspondingly, the Water Quality Objectives are assumed to apply year-round. (Note: In some cases, Beneficial Uses for certain surface waters are designated as "I", or intermittent, in recognition of the fact that surface flows (and Beneficial Uses) may be present only during wet weather.) Most Beneficial Uses and Water Quality Objectives were established in the 1971, 1975, 1983, and 1995 Basin Plans. The 1995 Basin Plan was updated in February 2008[5]. Amendments to the Basin Plan included new nitrate-nitrogen and TDS objectives for specified

[5] http://www.waterboards.ca.gov/santaana/water_issues/programs/basin_plan/index.shtml

management zones, new nitrogen and TDS management strategies applicable to both surface and ground waters and various Total Maximum Daily Loads (TMDLs) and TMDL Implementation Plans that had been adopted for Impaired Waterbodies within the region.

Water Code Section 13241 requires that certain factors must be considered when Water Quality Objectives are established. These factors include economics and the need for developing housing in the Region. During the 2002 MS4 Permit development process, the Permittees raised an issue regarding compliance with Section 13241 of the California Water Code with respect to Water Quality Objectives for wet weather conditions, specifically the cost of achieving compliance during wet weather conditions and the need for developing housing within the Region and its impact on Urban Runoff. During the 2006 review of the Basin Plan, this matter was incorporated on the triennial review list. To begin addressing this issue, Regional Board staff, in collaboration with the MS4 Permittees in the Santa Ana River watershed, has organized a Storm Water Quality Standards Task Force (SWQSTF).

The SWQSTF is analyzing, monitoring and documenting actual and potential Beneficial Uses of surface waters within the Santa Ana River watershed. Based on the findings, the SWQSTF plans to recommend changes to the current Beneficial Use designations and Water Quality Objectives specified in the Basin Plan. This Order may be reopened to incorporate any changes to the Water Quality Standards. The SWQSTF is currently focusing on Recreational Beneficial Uses. In the meantime, the provisions of this Order will result in reasonable further progress towards the attainment of the existing Water Quality Objectives, in accordance with the discretion in the permitting authority recognized by the United States Court of Appeals for the Ninth Circuit in Defenders of Wildlife vs. Browner, 191 F.3d 1159, 1164 (9th Cir. 1999).

III. EXCLUSIONS TO THE PERMIT AREA

Areas of the County not addressed or which are excluded by the storm water regulations and areas not under the jurisdiction of the Permittees were excluded from the area requested for coverage under the ROWD. These include the following areas and activities:

- Federal lands and State properties, including, but not limited to, military bases, national forests, hospitals, colleges and universities, and highways;
- Native American tribal lands;
- Open space and rural (non-urbanized) areas;

- Agricultural lands (return flows from irrigated agriculture and nonpoint source agricultural activities are exempted under the CWA); and

- Utilities, railroads, and special districts (including school districts, park districts, publicly owned treatment works (POTWs) and water utilities, etc.).

These areas in the Permit Area for which coverage under a NPDES MS4 permit is excluded, are shown in Appendix 1. The Regional Board will coordinate with these entities to implement programs that are consistent with the requirements of this Order. The Regional Board, pursuant to 40 CFR 122.26(a), has the discretion and authority to require non-cooperating entities to participate in this Order. The Regional Board may also consider such facilities for coverage under its NPDES permitting scheme pursuant to USEPA Phase II stormwater regulations.

The Regional Board recognizes that the Permittees should not be held responsible for discharges from such facilities or Pollutants in those discharges. However, to the extent that the Permittees authorize the connection of the discharges from these facilities into their MS4, this Order requires the Permittees to notify these facilities, in writing, of the state and local post-construction standards and/or other applicable requirements of this Order.

IV. BENEFICIAL USES

Stormwater flows discharged to MS4s in the Permit Area are tributary to various waterbodies (inland surface streams, lakes and reservoirs) of the State. The Beneficial Uses of these waterbodies may include municipal and domestic supply, agricultural supply, industrial service and process supply, groundwater recharge, water contact recreation, non-contact water recreation, and sport fishing, warm freshwater habitat, cold freshwater habitat, preservation of biological habitats of special significance, wildlife habitat and preservation of rare, threatened or endangered species. The ultimate goal of this Order is to protect the Beneficial Uses and quality of the Receiving Waters.

To protect the Beneficial Uses of the Receiving Waters, the Pollutants from all sources, including Urban Runoff, need to be controlled. Recognizing this, and the fact that Urban Runoff contains Pollutants, an area-wide MS4 permit is the most effective way to develop and implement a comprehensive Urban Runoff management program in a timely manner. This area-wide MS4 permit contains requirements with time schedules that will allow the Permittees to continue to address water quality problems caused by Urban Runoff through their management programs to reduce Pollutants in Urban Runoff discharges consistent with the MEP standard [See Appendix 4, Glossary].

V. WATERSHED MANAGEMENT IN THE UPPER SANTA ANA RIVER BASIN

A. Management Approach

To regulate and control Urban Runoff from the Permit Area to the MS4, an area-wide approach is expected to be most effective. The entire MS4 is not controlled by a single entity; the RCFC&WCD, the County, several cities, the State Department of Transportation (Caltrans), and the U.S. Army Corps of Engineers, in addition to other smaller entities, manage portions of the MS4. In addition to the cities, the County and the RCFC&WCD, there are a number of other significant contributors of Urban Runoff to the MS4. These include: large institutions such as the State university system, prisons, schools, hospitals, etc.; federal facilities such as military sites, etc.; State agencies, such as Caltrans; water and wastewater management agencies such as Eastern and Western Municipal Water District; the National Forest Service and State parks. The State Board has issued a separate NPDES MS4 permit to Caltrans. In addition, Caltrans, and the other contributors identified, are not under the jurisdiction of the Permittees. The management and control of the entire MS4 cannot be effectively carried out without the cooperation and efforts of all these entities. Also, it would not be effective to issue a separate MS4 permit to each of the entities within the Permit Area whose land/facilities drain into the MS4 facilities operated by the Permittees and ultimately to Waters of the U.S.. The Regional Board has concluded that the best management option for the Permit Area is to issue an area-wide NPDES MS4 permit to the Permittees.

Although, the Urban Runoff from the Permit Area drains to the Prado Basin, and ultimately into Orange County, Urban Runoff from Orange County areas are regulated under NPDES No. CAS 618030. Some areas within Riverside County are within the Colorado River Basin and San Diego Regional Boards' jurisdictions. Permit requirements for Urban Runoff from the drainage areas of Riverside County within the jurisdiction of the San Diego and Colorado River Basin Regional Boards are addressed by those Regional Boards.

In developing Urban Runoff management and monitoring programs, consultation/coordination with other drainage management entities and other Regional Boards is essential. Common programs, reports, implementation schedules and efforts are desirable and will be utilized to the MEP.

Cooperation and coordination among all the stakeholders are essential for efficient and economical management of the Santa Ana River watershed. It is also critical to manage Non-point Sources at a level consistent with the management of Urban Runoff in a watershed in order to successfully prevent or remedy water quality Impairment. Regional Board staff will facilitate coordination of monitoring and management programs among the various stakeholders.

An integrated watershed management approach for Urban Runoff in the Santa Ana River watershed is consistent with the Strategic Plan (2008-2012[6]) and Initiatives for the State and Regional Boards and the draft California Water Plan Update[7]. A watershed wide approach is also necessary for implementation of the Load Allocations (LAs) and Waste Load Allocations (WLAs) developed under the TMDL process. The Permittees and all the affected entities are encouraged to participate in regional or watershed solutions, instead of project-specific and fragmented solutions.

The Pollutants in Urban Runoff originate from multiple sources and effective control of these Pollutants requires a cooperative effort of all the stakeholders and many regulatory agencies. Every stage of urbanization should be considered in developing appropriate Urban Runoff Pollution control methodologies. The program's success depends upon consideration of Pollution control techniques during planning, construction and post-construction operations. At each stage, appropriate Pollution Prevention , Site Design , Source Control, and, if necessary, Treatment Control BMPs should be considered.

B. SUB-WATERSHEDS AND MAJOR CHALLENGES

The Santa Ana River watershed is the major watershed within the Santa Ana Region. This watershed is divided into three sub-watersheds: the Lower Santa Ana, Upper Santa Ana, and San Jacinto.

1. The lower Santa Ana River sub-watershed (downstream from Prado Basin) includes the north half of Orange County. The Upper Santa Ana River sub-watershed includes the southwestern corner of San Bernardino County and the northwestern corner of Riverside County. The San Jacinto sub-watershed includes the northwest corner of Riverside County south of the Upper Santa Ana River sub-watershed within the Santa Ana Region.

   Generally, the San Bernardino County drainage areas drain to the Riverside County drainage areas, and Riverside County drainage areas discharge to Orange County through Prado Dam on the Santa Ana River. Most of the flow in the Santa Ana River is recharged into the groundwater in San Bernardino, Riverside, and Orange counties but infrequently some of the flow may be discharged to the Pacific Ocean as a result of heavy storm events.

   Water from rainfall and snow melt runoff, and surfacing ground water from various areas either discharge directly to the Santa Ana River or to watercourses tributary to the Santa Ana River. Other major rivers in the Permit Area include the San Jacinto River and Temescal Creek. The San

[6] State Water Resources Control Board, Strategic Plan Update, 2008-2012, September 2, 2008
[7] http://www.waterplan.water.ca.gov/docs/cwpu2009/1208prd/vol2/UrbanRunoff_PRD_09.pdf

Jacinto Mountain areas drain into the San Jacinto River, which discharges into Canyon Lake and then to Lake Elsinore. The San Jacinto River is ephemeral. Smaller storms tend to be fully captured by Canyon Lake, which the San Jacinto River drains into, with discharges from Canyon Lake to Lake Elsinore only occurring in larger events or wetter years. Any overflow from Lake Elsinore is tributary to Temescal Creek, which flows into the Santa Ana River at the Prado Flood Control Basin. Overflow from Lake Elsinore occurs infrequently, only once every 12 to 15 years.

2. Upper Santa Ana River Sub-watershed:

   a. Reach 3 of the Santa Ana River (Prado Dam to Mission Boulevard in Riverside): Pathogens are the Pollutant of Concern for Reach 3 based on adopted TMDLs and the 2006 303(d) list . With the adoption of the TMDL for Bacterial Indicators, the Basin Plan now contains schedules for achieving compliance with WLAs for Bacterial Indicators in the Middle Santa Ana River (MSAR) subwatershed.

   b. Reach 4 of the Santa Ana River: Reach 4 of the Santa Ana River is the portion of the River from Mission Boulevard Bridge in Riverside to the San Jacinto fault (Bunker Hill Dike) in San Bernardino. Reach 4 is also listed in the CWA Section 303(d) as an Impaired Waterbody. Most of Reach 4 of the River is in San Bernardino County. Pathogens are the Pollutant of Concern for Reach 4and a TMDL is scheduled for completion in 2019.

   c. Other water quality problems along this reach of the River include the buildup of total dissolved solids (TDS, dissolved salts or minerals) and nitrogen, largely in nitrate form. The buildup of TDS and nitrates can impact downstream Beneficial Uses, including groundwater recharge. The buildup of TDS and nitrate is mostly due to agricultural uses, including dairies and the application of fertilizers, municipal and industrial wastewater discharges, and reuse and recycling operations. A complex set of programs and policies are included in the Basin Plan to address this problem, including a water supply plan, a wastewater management plan, and a groundwater management plan. Other elements of the Basin Plan include the Non-point Source program and the storm water program. The Basin Plan identifies the Statewide General Permits and the MS4 permits as the regulatory tools for storm water management in the Basin. In light of the recently adopted Nitrogen-TDS objectives for certain management zones, this Order requires the Permittees to determine baseline concentration of these constituents in dry weather runoff, if any, from significant Outfall locations. The Order also includes Effluent Limitations for TDS and nitrates under dry weather conditions.

d. San Jacinto Sub-watershed: Canyon Lake and Lake Elsinore are in this watershed and are listed on the 2006 303(d) list for pathogens (Canyon Lake) and PCBs and unknown Toxicity (Lake Elsinore). Nutrient TMDLs have been developed for both Canyon Lake and Lake Elsinore. The Basin Plan contains schedules for achieving compliance with WLAs for nutrients in the San Jacinto sub-watershed (Canyon Lake/Lake Elsinore).

C. CWA SECTION 303(d) LIST AND TMDLS:

Pursuant to Section 303(b) of the CWA, the 2006 water quality assessment conducted by the Regional Board listed a number of waterbodies within the Region under Section 303(d) of the CWA as Impaired Waterbodies. These are waterbodies where Water Quality Objectives are being violated and it is presumed that the designated Beneficial Uses are not met. The sources of the Impairments include POTW discharges, and runoff from agricultural, open space and urban land uses. The Impaired Waterbodies in Riverside County within the Santa Ana Regional Board's jurisdiction are listed in Table 2. In addition, CWA Section 303(d) requires states to develop and submit to USEPA for approval a list of waterbodies that are not meeting Water Quality Standards and are not expected to attain these standards even with technology based controls. CWA Section 305(b) requires States to biennially prepare and submit to the USEPA for approval a report assessing statewide surface water quality.

Regional Board staff have reviewed and reevaluated all water quality monitoring and information, combined the CWA Section 305(b) Report with the Section 303(d) List of Impaired Waters and introduced the Proposed 2008 303(d)-305(b) Integrated Report that was adopted by the Regional Board on April 24, 2009. The additional Impaired Waterbodies that are on this list are also identified in Table 2. The Proposed 2008 303(d)-305(b) Integrated Report will not be effective until it has been approved by the State Board or the USEPA.

Federal regulations require that a TMDL be established for each 303(d) listed waterbody for each of the Pollutants causing Impairment. The TMDL is the total amount of the Pollutant that can be discharged without Impairing Water Quality Standards in the Receiving Water, i.e., Water Quality Objectives are met and the Beneficial Uses are protected. It is the sum of the individual WLAs for point source inputs, and LAs for Non-point Source inputs and natural background, with a margin of safety. The TMDLs are the basis for limitations established in Waste Discharge Requirements. TMDLs are being developed for all Pollutants identified in Table 2. The Permittees are required to revise their DAMP, at the direction of the Executive Officer, to incorporate TMDL Program Implementation Plans developed and approved pursuant to the process for the designation and implementation of TMDLs for Impaired Waterbodies.

For 303(d) listed waterbodies identified as potentially Impaired by Urban Runoff and without a TMDL, the Permittees are required to provide special protections such as requiring effective post-construction BMPs, enhanced training programs and developing targeted public outreach that would address the Pollutants of Concern.

This Order incorporates TMDLs that have been adopted for Bacterial Indicator in the MSAR watershed and for nutrients in the Lake Elsinore and Canyon Lake watersheds. On August 26, 2005, the Regional Board adopted Resolution No. R8-2005-001 amending the Basin Plan to incorporate Bacterial Indicator TMDL for MSAR watershed. On December 20, 2004, the Regional Board adopted resolution R8-2004-0037 amending the Basin Plan to incorporate the Lake Elsinore and Canyon Lake nutrient TMDLs. The stakeholders in these watersheds, including applicable Permittees, are collaborating in the development and implementation of the TMDLs.

This Order includes conditions necessary to implement the TMDLs already approved by the Regional Board as required by federal regulations at 40 CFR 122.44(d)(vii)(B). This Order incorporates the WLAs as Water Quality-Based Effluent Limitations (WQBEL) and requires Permittees to achieve the WLA for Urban Runoff through an iterative process of implementing BMPs. Failure to submit a TMDL Implementation Plan to the Regional Board or failure to implement the approved plan in a timely manner will be deemed to violate the conditions of this Order. The CWA requires the Permittees to have appropriate controls to reduce the discharge of Pollutants to the MEP, including management practices, control techniques and systems, design and engineering methods, and such other provisions as the Administrator or the State determines appropriate for the control of such Pollutants (33 USC 1342(p)(3)(B)). MEP is a dynamic performance standard and it evolves as the knowledge of Urban Runoff control measures increases. Permittees are required to monitor and report effectiveness of their BMPs with respect to Pollutant reduction goal(s) as one measure of progress toward reducing Pollutant loads from urban sources in accordance with the compliance schedules specified in the TMDL Implementation Plans. If on-going monitoring indicates that implemented BMPs are insufficient to assure compliance with the relevant Water Quality Standard(s), then the Permittees are required to develop and implement more effective BMPs for the controllable urban sources within their jurisdiction to the MEP. In addition, the Permittees are required to submit a revised Comprehensive TMDL Plan documenting the completion schedule for any additional and/or more effective BMPs and must execute the plan upon approval by the Executive Officer. Taken together, these permit conditions are consistent with the facts and assumptions specified in the TMDLs, including the TMDL Implementation Plans, and are expected to achieve compliance with the related WLAs.

Discharge specifications are included for de-minimus types of discharges from Permittee-owned or Permittee-operated facilities and activities and for TDS and total inorganic nitrogen for dry weather discharges.

Table 2

2006 CWA Section 303(d) Listed Waterbodies and April 24, 2009 Proposed 2008 Integrated Report of 305(b) and 303(d) List of Water Quality Limited Segments

WATERBODY	HYDRO UNIT	POLLUTANT/ STRESSOR	SOURCE	SIZE AFFECTED
Canyon Lake	802.120	Pathogens	Nonpoint Source	453 Acres
Lake Elsinore	802.310	Unknown Toxicity	Unknown Nonpoint Source	2431 Acres
		PCB's.	Unknown Nonpoint Source	2431 Acres
		Proposed for 2008 Sediment Toxicity	Unknown Point and/or Nonpoint Sources	2431 Acres
Lake Fulmor	802.210	Pathogens	Unknown Nonpoint Source	4.2 Acres
Santa Ana River, Reach 3	801.200	Pathogens	Unknownn Nonpoint Source	3 miles
		Proposed for 2008 Copper – Wet Season	Unknown Nonpoint Source	3 Miles
Temescal Creek Reach 1		Proposed for 2008 pH	Unknown	Unknown

VI. FIRST, SECOND, AND THIRD TERM PERMITS

1. STORM WATER POLLUTION CONTROL PROGRAMS AND POLICIES

1. Prior to USEPA's promulgation of the final regulations implementing the storm water requirements of the 1987 CWA amendments, the counties of Orange, Riverside and San Bernardino requested an area-wide NPDES permit for storm

water runoff for each of the county areas within the Regional Board's jurisdiction. On July 13, 1990, the Regional Board issued Order No. 90-104 to the Permittees (first term MS4 Permit). In 1996, the Regional Board adopted Order No. 96-30 for the Riverside County Permit Area (second term permit). On October 24, 2002, the Regional Board adopted Order No. R8-2002-0011 for the Riverside County Permit Area (third term MS4 Permit). These MS4 Permits included the following requirements:

a. Prohibited Non-storm Water discharges to the MS4s with certain exceptions.
b. Required the Permittees to develop and implement a DAMP to reduce Pollutants in Urban Runoff to the MEP.
c. Required the discharges from the MS4 to meet in Receiving Waters.
d. Required the Permittees to identify and eliminate IC/IDs to the MS4.
e. Required the Permittees to establish legal authority to enforce Storm Water Ordinances.
f. Required monitoring of dry weather flows, storm flows, and Receiving Water quality, and program assessment.
g. Required the Permittees to inventory, prioritize and inspect construction sites and industrial and commercial facilities based on threat to water quality.
h. Required the Permittees to develop a restaurant inspection program to address practices that may impact Urban Runoff quality such as oil and grease disposal, trash bin area management, parking lot cleaning, spill clean-up, and inspection of grease traps or interceptors to ensure adequate capacity and proper maintenance.
i. Required the Permittees to review and approve Water Quality Management Plans (WQMPs) for categories of New Development and Significant Redevelopment projects to address post-development Urban Runoff water quality and Hydromodification.
j. Required the Permittees to develop a unified response plan to respond to sewage spills that may impact Receiving Water quality.

2. During the first term MS4 Permit, the Permittees developed a DAMP that was approved by the Executive Officer on January 18, 1994. The DAMP included five BMP groups: environmental education activities, solid waste activities, road drainage system operations and maintenance, regulatory and enforcement activities, and structural controls. The DAMP was updated as part of the second and third-term MS4 Permits. The Permittees submitted a revised DAMP with the ROWD for the fourth term MS4 Permit renewal.

3. The RCFC&WCD performs water quality monitoring activities in support of three separate area-wide NPDES MS4 Permits (Santa Ana, San Diego and Colorado River Basin) under the Consolidated Monitoring Program (CMP). The CMP

contains a combined 132 historical, active, and special project sampling locations in the three MS4 Permit regions. Within the Permit Area, water column samples and/or sediment samples have been collected at a total of 93 locations over the last nineteen years. These 93 locations are comprised of 45 MS4 outfalls, 43 Receiving Water, 8 sediment, and 2 special interest sampling locations. In addition, the Permittees participate in a number of sub-regional and regional monitoring programs and special studies.

4. During the third term MS4 Permit, the Executive Officer approved the delay in implementing the bioassessment requirement to allow the development of indices of biological integrity applicable to inland waters. Subsequently, a regional bioassessment monitoring was initiated by the Surface Water Ambient Monitoring Program (SWAMP) to determine the conditions of the receiving waters in a more holistic way. The Southern California Watershed Research Project (SCCWRP), in conjunction with the southern California MS4 Permit programs, has developed a regional bioassessment monitoring program in which the Permittees participating. This Order requires the Permittees to continue to participate in the regional bioassessment monitoring program. It is expected that these regional monitoring stations combined with other Permittee and regional monitoring efforts will be used to identify water quality problem areas and to re-evaluate the monitoring program and the effectiveness of the DAMP. The future direction of some of the DAMP program elements will depend upon the results of the ongoing studies and a holistic approach to watershed management.

5. Other elements of the Urban Runoff management program included identification and elimination of IC/IDs and establishment of adequate legal authority to control Pollutants in Urban Runoff discharges. The Permittees have completed a survey of their MS4 to identify IC/IDs and have adopted appropriate ordinances to establish legal authority. Some of the more specific achievements during the second and third term MS4 Permits are as follows:

   a. During the second term MS4 Permit, the Permittees operated under an Implementation Agreement that sets forth the responsibilities of the Permittees as defined in the 1996 MS4 Permit. The Permittees update this agreement during each MS4 Permit term. The Permittees have adopted Storm Water Ordinances regarding the management of Urban Runoff. The Storm Water Ordinances provide the Permittees with the legal authority to implement the requirements of the MS4 Permit and the key regulatory requirements contained in 40 CFR Section 122.26(d)(2)(I)(A-F).

   b. Revised DAMP: Includes 28 Construction Site and 36 Municipal and Industrial Source Control BMPs that are to be implemented by the Permittees for purposes of controlling Pollutants associated with Urban Runoff to the MEP. The Permittees also strengthened enforcement and compliance elements of the DAMP. Enhanced the Construction Site

inspections, the Industrial and Commercial Facility inspections, New Development review requirements, and the Permittee facilities and activities program.

c. Cooperated in the establishment of TMDL Task Forces and workgroups for Lake Elsinore, Canyon Lake and the MSAR.

d. Assisted in development and implementation of the TMDLs for Canyon Lake, Lake Elsinore and the MSAR.

e. Developed and updated methods to track program effectiveness such as resident surveys, tracking hotline inquiries, and web counters.

f. In August 1999 the RCFC&WCD and the County's Environmental Health Department executed an agreement that provides the framework for an area-wide Commercial and Industrial Compliance Assistance Program (CAP).

g. The Permittees have participated in the CMP.

h. The Permittees administered area-wide programs including: Hazardous Materials emergency response, household hazardous waste collection, industrial/commercial CAP and public education and outreach. Some of these programs were coordinated with Caltrans and local agencies.

i. A Municipal Facilities Strategy was established then later incorporated into the DAMP, the Supplement "A" New Development Guidelines were amended to require compliance with the Riverside County WQMP for specific categories of New Development and Significant Redevelopment projects.

j. The Riverside County WQMP was developed in 2004. The Model WQMP is a post-construction planning tool to address Urban Runoff from New Development and Significant Redevelopment. The WQMP is implemented on a watershed-specific level, and provides guidance for project specific post-construction BMPs to address the quantity and quality of Urban Runoff from New Development and Significant Redevelopment projects. Any New Development or Significant Redevelopment project that requires discretionary approval must submit a project-specific WQMP to the appropriate Permittee. The project-specific WQMP ensures that management of Urban Runoff to protect Receiving Water quality is considered a priority during project design and operation.

k. Established the Management Steering Committee that brings together the city managers in the Permit Area promoting consensus and communication on a regional basis.

l. Formation of sub-committees to guide and develop specific program elements (Construction Activities, Industrial/Commercial Activities, New Development/ Significant Redevelopment, Public Education, Permittee Facilities & Activities, Monitoring, & Finance).

m. Evaluated and revised ordinances, regulations, rules, and codes to ensure appropriate level of legal authority.

n. A Technical Advisory Committee for overall program development and implementation was established.

o. Program Review: A number of existing programs were reviewed to determine their effectiveness in combating Urban Runoff Pollution and to recommend alternatives and or improvements, including Permittee activities and facilities, IC/IDs to the MS4 systems, and existing monitoring programs.

p. Enhanced Public Education program through development of new outreach materials and programs.

q. Public Education: A number of steps were taken to educate the public, businesses, industries, and commercial establishments regarding their role in implementing Urban Runoff Pollution controls. The Industrial Facility dischargers were notified of the Urban Runoff regulatory requirements. For a number of unregulated activities, BMP guidance documents were developed and a toll free hotline was established for reporting any suspected water quality problems.

r. The Permittee's website hosted by RCFC&WCD, including the "Only Rain Down the Storm Drain" public information page, was developed and is continually enhanced. It contains resources for residential facilities, businesses, developers and contractors. The website is accessible from the RCFC&WCD home page. The website offers free brochures that all web site visitors can print in quantities or can order including:

   i. *After the Storm* – a citizen's guide to understanding MS4 Pollution in your neighborhood or when performing daily activities.

   ii. *Automotive Maintenance & Car Care* – guidelines for keeping your auto shop or retail fuel facility in environmental shape.

   iii. *Outdoor Cleaning Activities* – guideline for outdoor cleaning activities and wastewater disposal.

   iv. *Pools, Spas and Fountains* –Environmental maintenance suggestions for pool, spa, and fountain owners.

   v. *What's the Scoop* – tips for a healthy pet and a healthier environment.

   vi. *Household Hazardous Waste (HHW)* – A schedule of collection locations for proper disposal of HHW.

   vii. *Storm Water Pollution Found in Your Neighborhood* – door hanger.

s. In addition to the information provided on the Only Rain Down the Storm Drain website, the Public Education and Outreach Program has:

i. Tested and/or implemented several new Public Education and Outreach Program effectiveness tracking mechanisms including call tracking, web counters, testing, and surveys.

ii. Conducted a review of the efficacy of Permittee employee training programs.

iii. Enhanced the toll free storm water Pollution reporting hot line to include public education information and support for the public and other interested stakeholders.

iv. Enhanced on-line registration access for NPDES training to help facilitate training of appropriate Permittee employees.

v. Worked with the Riverside-Corona Resource Conservation District to develop home garden workshops and presentations to elementary and middle schools and staff to raise public awareness of Urban Runoff management issues and Source Control BMPs and to encourage volunteers, partners, and groups to gather annually for a trash and debris clean-up day along the Santa Ana River.

vi. Developed special newspaper and billing inserts, fliers and advertisements to raise public awareness of Urban Runoff management issues and Source Control BMPs. A radio advertising campaign was also developed and implemented for a limited time.

vii. Developed and presented workshops regarding household hazardous waste use and proper disposal at major home improvement stores throughout Riverside County.

viii. Placed numerous advertisements in the Penny Saver and Bargain Bulletin to raise public awareness of Urban Runoff management.

ix. In cooperation with certain County Service Areas and other programs, pet waste signs with bag dispensers have been installed at various parks to help encourage the proper disposal of animal waste.

x. Coordinated with County-wide Animal Control Facilities, as well as city-owned animal control facilities and Humane Societies, to distribute specific materials to the County Agricultural inspectors as well as Regional Board inspectors for use during facility inspections.

xi. Distributed educational and outreach materials to the County Agricultural inspectors as well as Santa Ana Regional Board staff inspectors for use during facility inspections.

xii. Cooperated with the Western Riverside Council of Government (WRCOG) in the Used Oil Block Cycle Grant that decreases the amount of illegally dumped motor oil by promoting the addition of new Certified Oil Collection Centers.

xiii. Participated in WRCOG's "Cleanest County in the West" program to address issues relating to litter and illegal dumping which targeted both students and adults.

xiv. Supplemental Environmental Projects: As a result of an environmental enforcement case settlement brought by the County Department of Environmental Health, Conoco Phillips and Downs Energy developed two posters and a billboard, respectively. These items were designed to increase the awareness of appropriate BMPs for retail fuel businesses.

t. Permittee Training: Training was provided to Permittee employees to implement New Development Guidelines and Public Works BMPs. The fourth-term MS4 Permit specifies additional training requirements to focus on necessary competencies for storm water program managers, Permittee planners and inspection staff. This was added following information collected during Regional Board staff audits of Permittees' storm water management programs, which found that a number of the Permittees' staff and/or contractors were not adequately trained to properly implement the required program elements contained within the third term MS4 Permit and/or training programs were not properly documented.

u. Related Activities: Modified MS4s by channel stabilization and creation of sediment basins; eliminated or permitted and documented Illicit Connections to the MS4s.

v. Pursued and received Proposition 50 Planning Grant to develop an Integrated Regional Watershed Management Plan for the San Jacinto watershed and to facilitate implementation of the Canyon Lake/Lake Elsinore Nutrient TMDL.

w. Pursued and received two Proposition 40 Integrated Regional Watershed Management Plan implementation grants to facilitate the MSAR TMDL and LE/CL TMDLs.

x. Co-Permittees developed and maintain an inventory database (or databases) of Construction Sites 1-acre or larger for which they have issued a building or grading permit. For each Construction Site/project included in a Co-Permittee's inventory, the Co-Permittees have assigned a priority of "high," "medium," or "low" to reflect the Construction Site's potential for Impairing Receiving Water quality.

y. Created databases for the Commercial and Industrial Facilities within each jurisdiction.

z. Developed a GIS Web Browser to assist developers and Permittees in identifying pertinent water quality information for proposed New Development projects.

aa. Developed Planning Application forms for Permittee use to ensure that the need for a project-specific WQMP was properly identified for New Development and Significant Redevelopment projects early in the planning process.

bb. Developed a FAQ and watershed Impairment maps to assist Permittees and developers with preparing and reviewing project-specific WQMPs.

cc. Enhanced online watershed maps to assist developers and the public with identifying areas tributary to Impaired Waterbodies.

dd. Developed a BMP design handbook to standardize BMP selection and design in Riverside County.

ee. Initiated development of an enhanced BMP Design Handbook to provide additional guidance for LID and post-construction BMP design.

ff. Participation in the Storm Water Monitoring Coalition (SMC) efforts to evaluate LID options and establish guidance for BMP implementation for Southern California areas.

gg. Participation in SCCWRP's Hydromodification studies to develop scientifically based design guidance for Southern California.

hh. Initiated cooperative program with County Environmental Health to promote environmental enhancement projects in lieu of fines for violations of environmental laws. This initiative resulted in the billboard advertising campaign to promote appropriate BMPs for gas stations and garages.

ii. Prepared a one-year evaluation of litter management BMPs. This evaluation assessed the relative efficiency and cost effectiveness of Anthropogenic litter management BMPs including: street sweeping, catch basin cleaning, deployment of trash receptacles, public education, and MS4 maintenance. As a result, a Litter Removal Inspection Form was developed that assisted the Permittees in identifying and prioritizing areas with litter problems. The Permittees augmented the litter management programs including employee/contractor training, Industrial and Commercial Facility inspections, recycling programs including bulk-item collection, participation in watershed clean-up efforts, and illegal dumping retrieval.

jj. The RCFC&WCD coordinated GIS-based maps for Permittee MS4 facilities. The MS4 maps are updated annually with new information provided by the Permittees as part of the Annual Reporting process. The GIS layers are also now available on the RCFC&WCD's website through an internet GIS browser.

kk. Updated Model Facilities Pollution Prevention Plan for Permittee facilities not requiring coverage under the General Permit for Storm Water Discharges Associated with Industrial Activities (General Industrial Permit).

ll. The Permittees completed a MS4 assessment in 2004 to identify opportunities for incorporation of regional BMP retrofits within the limits of existing infrastructure.

mm. Pursued a Proposition 13 Grant, through the Santa Ana Watershed Project Authority, to develop a LID BMP Demonstration and Testing Facility. RCFC&WCD has continued to develop this project and plans to start construction this winter despite the current freeze on new grant projects.

B. PRIOR TERM PERMITS - WATER QUALITY IMPROVEMENTS

An accurate and quantifiable measurement of the impact of the above stated Urban Runoff management programs is difficult, due to a variety of reasons, such as the variability in chemical water quality data, the incremental nature of BMP implementation, lack of baseline monitoring data, and the existence of some of the programs and policies prior to initiation of formal Urban Runoff management programs. There are generally two accepted methodologies for assessing water quality improvements: (1) conventional monitoring such as chemical-specific water quality monitoring; and (2) non-conventional monitoring, such as monitoring of the amount of HHW collected and disposed off at appropriate disposal sites, the amount of used oil collected, and the amount of Anthropogenic debris removed from the MS4, etc.

The Permittees' water quality monitoring data submitted to date document a number of exceedances of Basin Plan Water Quality Objectives for various Urban Runoff-related Pollutants; the most notable among these excceedances was fecal coliform bacteria. Where these exceedances have resulted in the development of TMDLs for the MSAR, this Order requires the Permittees named in the TMDL: to comply with the WLAs for Bacterial Indicators consistent with the Implementation Plan requirements defined in the MSAR Bacterial Indicator TMDL.

During the prior MS4 Permit terms, there was an increased focus on watershed management initiatives and coordination among the MS4 permittees in Orange, Riverside and San Bernardino Counties. These efforts resulted in a number of regional monitoring programs and other coordinated program and policy developments. The Principal Permittee continues to be an active participant in the SWQSTF, the Canyon Lake/Lake Elsinore nutrient TMDL, the MSAR Bacterial Indicator TMDL, and the SMC studies. In addition to the TMDL implementation and monitoring activities, the Permittees participate in the Regional Integrated Freshwater Bioassessment Monitoring Program, the BMP Effectiveness Project assessing the effectiveness of LID techniques. Riverside and San Bernardino MS4 Programs are also coordinating on the development of several outreach programs.

It is anticipated that with continued implementation of the revised DAMP, the programs proposed in the ROWD incorporated into this Order and other

requirements specified in this Order, the goals and objectives of the storm water regulations will be met, including protection of the Beneficial Uses of all Receiving Waters.

VII. FUTURE DIRECTION/2007 ROWD

A. Recognizing the significant resources utilized in developing the 2002 MS4 Permit and the significant commitment the Permittees are making to address water quality Impairments, including those identified in the 2006 303(d) List as high priority for establishment of TMDLs, the Permittees proposed in the 2007 ROWD to maintain the fundamental structure and content of the 2002 MS4 Permit and the 2005 DAMP with modifications to reflect:

1. Removed descriptions of studies that have been completed;
2. Updated references to related orders by the Regional Board and State Board;
3. Adoption of TMDL requirements;
4. Evolution of compliance programs;
5. Further standardization and definition of terms;
6. Consolidation of similar compliance requirements [training requirements, reporting requirements, IC/ID requirements] to simplify the Order, increase readability and prevent the need for duplicative language;
7. Deletion of requirements in the 2002 MS4 Permit that described the development of compliance program elements which were incorporated into the 2005 DAMP;
8. Development of LIPs by the Permittees during the fourth term Order;
9. Addition of Permittee coverage under the Small Linear Underground Projects (State Board Order No. 2003-0007-DWQ, NPDES No. CAS000005) and Utility Vaults (State Board Order No. 2006-0008-DWQ, NPDES No. CAG990002) General Permits;
10. Recognition that the Municipal Facilities Strategy and Enforcement Compliance Strategies have been incorporated into the DAMP; and
11. Regional Board staff comments received by the Permittees during the third term permit, including comments received during the January 22, 2007 ROWD kick-off meeting regarding topics such as LID, Hydromodification, LIPs, etc.

B. In addition, the 2007 ROWD proposed continuing with the 2005 DAMP with some revisions. Based on an effectiveness assessment analysis, the following significant changes were incorporated into the Permittees 2007 draft DAMP compliance programs:

1. The Permittees proposed to complete preparation of LIPs within 12 months of Order adoption. The Permittees propose to develop LIPs that will:
   a. Specify how each program element of the DAMP shall be implemented;
   b. Describe the ordinances, plans, policies, procedures, and tools (e.g., checklists, forms, educational materials, etc.) used to execute the DAMP;
   c. Identify the organizational units responsible for implementation of each program element;
   d. Establish internal reporting requirements to ensure and promote accountability; and
   e. Describe an adaptive method of evaluation and assessment of program effectiveness for the purpose of identifying program improvements.

2. The final report "BMP Siting Study for the Santa Ana Permit Area" was released in May 2005. The sites identified in this study are likely to be further evaluated for opportunities to implement Regional BMPs necessary to comply with existing and future TMDLs.

3. Proposed revisions to the 2002 MS4 Permit provisions to reflect the unified IC/ID reporting procedures currently contained within the DAMP for simplicity and clarity.

C. Regional Board Approach to Consolidation of Overlapping NPDES Permit Requirements

1. During the third term MS4 Permit, the Permittees reviewed the applicability of the General Permit-Small Linear Underground Projects (State Board Order No. 2003-0007-DWQ, NPDES No. CAS000005), the General Permit-De Minimus Discharges (Order No. R8-2003-0061 as amended by Order Nos. R8-2005-0041 and R8-2006-0004), and the General Permit-Utility Vaults (Order No. 2006-0008-DWQ, NPDES No. CAG990002) to their activities such as hydrant flushing, maintenance on potable water supply system(s), construction dewatering, and the short-term and intermittent discharges from the de-watering of utility vaults and underground structures. Since the DAMP incorporates BMPs for the activities covered by these general permits, the Permittees recommended separate coverage under the Small Linear Underground Projects, De Minimus Discharges, or Utility Vaults General Permits was not necessary. This Order now includes coverage for De Minimus discharges from Permittee-owned facilities and activities specifically excluded from coverage under the General Waste Discharge Requirements for Discharges to Surface Waters that Pose an Insignificant (De Minimus) Threat to Water Quality, NPDES NO. CAG998001, Order No. R8-2009-0003. Permittees shall continue to obtain separate coverage for activities covered

by the Small Linear Underground Projects and Utility Vaults General Permits, unless these permits are incorporated into the General Construction Permit.

2. Specific identification of the types of discharges that must have coverage under the General De Minimus Permit and the General Construction Permit, is included in Section 5 of the 2007 DAMP. This Order requires the Permittees to include a description of those de minimus discharges into the Permittees' LIP, including a Regional Board notification process.
3. Prioritized inspections and monitoring based on sampling and monitoring results and other metrics to help target activities that present the highest risk to water quality.

D. During the fourth term Order, the following revisions to the Public Education and Outreach Program will be priorities:

1. Continue coordination of public education outreach with adjacent MS4s.
2. Continue to evaluate and enhance outreach materials for IC/IDs, nutrients, fertilizers, and pesticides.
3. Continue to focus the Public Education and Outreach Program on the Pollutants causing the greatest impacts to water quality, determined by the monitoring results and the list of Impaired Waterbodies [303(d) list].

The Permittees have already taken several steps in this direction. For example, the Permittees have provided spray bottles with environmentally friendly pesticide recipes printed on the side to residents at community fairs; the Permittees have developed or are in the process of developing brochures for septic system management, landscape management, and gardening; the Riverside and San Bernardino County Permittees are coordinating on a Curiosity Quest Episode (KVCR Family Show) to promote BMPs for nutrients, fertilizers and pesticides and the Permittees place information in hardware and gardening stores regarding pesticide and fertilizer management. The Permittees also incorporate other materials to address general Pollutants of Concern.

E. As a result of continued program effectiveness assessment the Permittees propose to update Annual Reporting forms to incorporate specific reporting requirements for all effectiveness assessment metrics.

F. Enhanced online watershed maps to assist developers and the public with identifying areas tributary to Impaired Waterbodies.

G. WQMP

1. The Permittees committed to maintain the "Frequently Asked Questions" information sheet for New Development and Significant Redevelopment projects to assist with the development and implementation of the revised WQMP.

2. The Permittees committed to update the Riverside County Storm Water Quality Best Management Practice Design Handbook to (1) better incorporate LID design concepts, (2) incorporate guidance to describe how developments can offset Hydromodification impacts with LID and (3) incorporate additional design guidance to ensure maintainability and functionality of BMPs, throughout the life of the development. This Order further requires the Permittees to revise the WQMP consistent with the requirements of the Order.
3. The Permittees committed to maintain the WQMP template to assist developers with developing a project-specific WQMP.
4. An audit of each of the Permittees' Urban Runoff management programs during the third term MS4 Permit indicated no clear nexus between the watershed protection principles, including LID techniques, specified in the WQMP and the Permittees' General Plan or related documents such as Development Standards, Zoning Codes, Conditions of Approval, Project Development Guidance, etc.. It appears that many of the existing procedures, Development Standards, Ordinances and Municipal Codes may be barriers to implement LID BMPs. This Order requires the Permittees to facilitate LID techniques specified in this Order.

H. The Regional Board has proposed a revised Notice of Intent and Notice of Termination for Permittee construction projects to assist Regional Board staff with identifying locations and owners of Permittee projects.

I. The Permittees have committed to annual updates to Sanitary Sewer Overflow Procedures to ensure proper contact information for Permittee and outside agencies.

J. WATERSHED APPROACH

1. TMDL for Bacterial Indicator in the MSAR subwatershed and nutrients in the Canyon Lake and Lake Elsinore subwatershed are incorporated into this Order (See Section V.C). The Permittees support TMDL implementation and agreed to participate in a comprehensive water quality monitoring program to ensure that Urban Runoff meets the Water Quality Objectives identified in the Basin Plan and are consistent with the WLAs specified in the TMDLs. This Order requires that, consistent with the requirements of the respective TMDL Implementation Plans, the Permittees use the water quality monitoring of Urban Runoff to evaluate the effectiveness of the BMP programs.

2. The USEPA has recommended a shift to watershed-based NPDES permitting[8] and watershed approach[9] to CWA programs, including NPDES programs. The Permittees and the Regional Board also recognize that a watershed-based approach is expected to be effective in controlling Pollutants in Urban Runoff. Consistent with this approach, this Order requires the Permittees to develop and implement programs that integrate Hydromodification and water quality management strategies with land use planning policies, ordinances, and plans within each jurisdiction. A *watershed approach* considers the diverse Pollutant sources and stressors and watershed goals within a defined geographic area (i.e., watershed boundaries). A watershed approach has three basic components:

   a. *Geographic Focus*: Watersheds are nature's boundaries. They are the land areas that drain to surface waterbodies, and they generally include lakes, rivers, estuaries, wetlands, streams, and the surrounding landscape. Groundwater recharge areas are also considered.

   b. *Sound Management Techniques Based on Strong Science and Data*: Sound scientific data, tools, and techniques are critical to evaluate the process. Actions taken include characterizing priority watershed water quality problems and solutions, developing and implementing action plans, and evaluating their effectiveness within the watershed.

   c. *Partnerships/Stakeholder Involvement*: Watersheds transcend political, social, and economic boundaries. Therefore, it is important to involve all the affected interests in designing and implementing goals for the watershed. Watershed teams may include representatives from all levels of government, public interest groups, industry, academic institutions, private landowners, concerned citizens, and others.

There are two major sub-watersheds in Riverside County within the Permit Area – the MSAR subwatershed, consisting of the portions of the Permit Area that drain to Reaches 3 and 4 of the Santa Ana River, and the San Jacinto River sub-watershed, which consists of the portions of the Permit Area that drain to Lake Elsinore. The Permittees participate in the MSAR TMDL Task Force and the Lake Elsinore and Canyon Lake TMDL Task Forces, which are stakeholder driven, watershed-based efforts to address Pollutants of Concern in the respective sub-watersheds. The Permittees have also implemented several stakeholder driven, watershed-based conservation programs such as the Special Area Management

[8] USEPA: Watershed-based NPDES permitting is a process that emphasizes addressing all stressors within a hydrologically-defined drainage basin, rather than addressing individual Pollutant sources on a discharge-by-discharge basis.

[9] USEPA (1996a): "The watershed approach is a coordinating framework for environmental management that focuses public and private sector efforts to address the highest priority problems within hydrologically defined geographic areas, taking into consideration both ground and surface water flow."

Plan, the Western Riverside County Multiple Species Conservation Plan, the San Jacinto River Integrated Watershed Management Plan and the Santa Ana Watershed Project Authority One Water One Watershed Plan.

These efforts are also addressed and discussed in the DAMP, which integrates these efforts into a coherent and uniform compliance program to protect Receiving Waters. Due to economies of scale and the fact that many of the Permittees have jurisdiction in both sub-watersheds, the Permittees have opted to continue to implement uniform MS4 Permit compliance programs across the entire Permit Area (for example Permittee training programs educate inspectors about the impacts and sources of pathogens and nutrients as opposed to offering separate sub-watershed specific training programs for the San Jacinto and MSAR sub-watersheds). The Permittees have indicated that as source assessments and monitoring data results from the aforementioned watershed efforts produce findings regarding potential urban sources of Pollutants of Concern that they may opt, in the future, to develop specific action plans for the MSAR and San Jacinto River sub-watersheds, or potentially even tributaries there-of. If so, the DAMP will be appropriately modified to clarify the sub-watershed specific components.

The Permittees also currently implement interim Hydromodification criteria and have committed to revising their Hydromodification management programs based on studies currently being conducted by the SCCWRP. This Order requires the Permittees to continue to pursue these watershed planning efforts and enhance them as appropriate to address Pollutants of Concern.

J. To promote program transparency, each Permittee proposed to develop its own LIP that:

   a. Specifies how each program element of the DAMP shall be implemented;
   b. Describes the ordinances, plans, policies, procedures, and tools (e.g., checklists, forms, educational materials, etc.) used to execute the DAMP;
   c. Identifies the organizational units responsible for implementation of each program element;
   d. Establishes internal reporting requirements to ensure and promote accountability; and
   e. Describes an adaptive method of evaluation and assessment of program effectiveness for the purpose of identifying program improvements.

K. The audits conducted by Regional Board staff have also shown a significant deficiency in measuring program effectiveness. This Order requires quantifiable measures for evaluating program effectiveness.

L. The above-mentioned strategies for the fourth-term Order build upon and continue the programs and policies developed by the Permittees during the prior MS4 Permit terms as described in Sections VI and VII above.

M. A combination of these programs and policies and the requirements specified in this Order should ensure control of Pollutants in Urban Runoff from the MS4 owned and/or controlled by the Permittees.

VIII. ORDER REQUIREMENTS AND PROVISIONS

The legislative history of storm water statutes (1987 CWA Amendments), USEPA regulations (40CFR Parts 122, 123, and 124), and clarifications issued by the State Board (State Board Orders No. WQ 91-03 and WQ 92-04) indicate that a non-traditional NPDES permitting strategy was anticipated for regulating Urban Runoff. Due to the economic and technical infeasibility of full-scale end-of-pipe treatments and the complexity of Urban Runoff quality and quantity, MS4 permits generally include narrative requirements for the implementation of BMPs in place of Numeric Effluent Limits.

The requirements included in this Order are meant to specify those management practices, control techniques and system design and engineering methods that will result in protection of the Beneficial Uses of the Receiving Waters consistent with the MEP standard. State Board (Orders No. WQ 98-01 and WQ 99-05) concluded that MS4s must meet the technology-based MEP standard and Water Quality Standards. The U.S. Court of Appeals for the Ninth Circuit subsequently held that strict compliance with Water Quality Standards in MS4 permits is at the discretion of the local permitting agency.

The ROWD included a discussion of the current status of Riverside County's Urban Runoff management program and the proposed programs and policies for the next five years (fourth-term Order). This Order incorporates these documents and specifies performance commitments for specific elements of the Permittees Urban Runoff management program.

This Order recognizes the significant progress made by the Permittees during the first three MS4 Permit terms in implementing the storm water regulations. This Order also recognizes regional and innovative solutions to such a complex problem, addresses deficiencies in the Permittees' Urban Runoff programs observed during the audits conducted by Regional Board staff, and considers comments by the USEPA on other draft MS4 Permits. This Order specifies quantifiable performance measures to determine compliance and assess the effectiveness of the Urban Runoff programs. This Order incorporates an integrated watershed approach in solving water quality and Hydromodification impacts resulting from urbanization and aims to promote LID techniques as a key element to mitigate impacts from New Development and Significant Redevelopment projects. The proposed Order also requires the Permittees

to implement TMDL WLA through iterative BMP programs as required in the respective approved TMDL Implementation Plans (See Section V.C). The goal of these programs and policies that are included in this Order is to achieve and maintain Water Quality Standards in the Receiving Waters.

The essential components of the Urban Runoff management program, as established by federal regulations [40 CFR 122.26(d)] are: (i) Adequate Legal Authority, (ii) Fiscal Resources, (iii) Storm Water Quality Management Program (SQMP) - (Public Information and Participation Program, Industrial/Commercial Facilities Program, Development Planning Program, Development Construction Program, Public Agency Activities Program, IC/IDs Elimination Program), and (iv) Monitoring and Reporting Program. The major sections of the requirements in this Order include: I. Facility Information, II. Findings, III. Permittee Responsibilities, IV. Local Implementation Plan, V. Discharge Prohibitions, VI. Effluent Limitations, Discharge Specifications and Other TMDL Related Requirements, VII. Receiving Water Limitations, VIII. Legal Authority/Enforcement, IX. Illicit Connections/Illegal Discharges; Litter, Debris and Trash Control, X. Sewage Spills, Infiltration into MS4 Systems from Leaking Sanitary Sewer Lines, Septic System Failures, and Portable Toilet Discharges, XI. Co-Permittee Inspection Programs, XII. New Development (including Significant Redevelopment), XIII. Public Education and Outreach, XIV. Permittee Facilities and Activities, XV. Training Program For Storm Water Managers, Planners, Inspectors And Municipal Contractors, XVI. Notification Requirements, XVII. Program Management/DAMP Review, XVIII. Fiscal Resources, XIX. Monitoring and Reporting Program, XX. Provisions, XXI Permit Modification, and XXII. Permit Expiration and Renewal.

These programs and policies are intended to improve Urban Runoff quality and protect the Beneficial Uses of Receiving Waters of the Permit Area.

A. RESPONSIBILITIES

The responsibilities of the Principal Permittee are to coordinate the overall Urban Runoff management program and the Co-Permittees are responsible for managing the Urban Runoff program within their jurisdictions as detailed in the ROWD and the proposed Order, Order No. R8-2010-0033.

The existing Implementation Agreement needs to be revised to include the cities that were not signatories to this Agreement. The Order requires that a copy of the signature page and any revisions to the Agreement be included in the specified Annual Report.

B. DISCHARGE PROHIBITIONS

In accordance with CWA Section 402(p)(3)(B)(ii), this Order prohibits the discharge of Non-storm Water to the MS4s, with a few exceptions. The specified exceptions are consistent with 40 CFR 122.26(d)(2)(iv)(B)(1). If the Permittees or the

Executive Officer determines that any of the exempted Non-storm Water discharges is a significant source of Pollutants, a separate NPDES permit or coverage under the Regional Board's De Minimus Permit will be required.

C. EFFLUENT LIMITATIONS AND DISCHARGE SPECIFICATIONS, INCLUDING WASTE LOAD ALLOCATIONS FOR DISCHARGES TO 303(d) LISTED WATERBODIES WITH ADOPTED TMDLS

The Order clarifies allowed discharges and those discharges (only from Permittee owned or operated facilities and activities) allowed only if certain discharge specifications are met, such as those covered under the De Minimus Permit. These discharges should be consistent with the Regional Board's General De Minimus Permit for Discharges to Surface Waters, Order No. R8-2009-0003, NPDES No. CAG 998001. Permittees' de minimus discharges covered under this Order include: 1) dewatering wastes from subterranean seepage, except for discharges from utility vaults; 2) discharges resulting from hydrostatic testing of vessels, pipelines, tanks, etc.; 3) discharges resulting from the maintenance of potable water supply pipelines, tanks, reservoirs, etc.; 4) discharges resulting from the disinfection of potable water supply pipelines, tanks, reservoirs, etc.; 5) discharges from potable water supply systems resulting from initial system startup, routine startup, sampling of influent flow, system failures, pressure releases, etc.; 6) discharges from fire hydrant testing or flushing; 7) air conditioning condensate; 8) swimming pool discharges; 9) discharges resulting from diverted stream flows; and 10) construction dewatering wastes. The DAMP and the LIP are required to be revised to incorporate information regarding Permittees' de minimus discharges.

This Order requires Permittees to implement established TMDL WLAs specified for Urban Runoff through an iterative BMP approach (see Section V.C above).

D. RECEIVING WATER LIMITATIONS

Receiving Water Limitations are included to ensure that discharges of Urban Runoff from MS4s do not cause or contribute to violations of applicable Water Quality Standards in Receiving Waters. The compliance strategy for Receiving Water Limitations is consistent with the USEPA and State Board guidance and recognizes the complexity of Urban Runoff management.

This Order requires the Permittees to meet Water Quality Standards in Receiving Waters in accordance with USEPA requirements, as specified in State Board Order No. WQ 99-05. If Water Quality Standards are not met through implementation of certain BMPs, the Permittees are required to re-evaluate the programs and policies and to propose additional BMPs. Compliance determination will be based on this iterative BMP implementation process.

E. LEGAL AUTHORITY/ENFORCEMENT

Each Permittee has adopted ordinances, municipal codes, and other regulations to establish legal authority to control discharges to the MS4s and to enforce these regulations as specified in 40 CFR 122.26(d)(2)(I)(B, C, E, and F). The Permittees are required to enforce these ordinances and to take enforcement actions against violators (40 CFR 122.26(d)(2)(iv)(A-D)).

The enforcement activities undertaken by a majority of the Permittees have consisted primarily of Notices of Violation, which act to educate the public on the environmental consequences of Illegal Discharges. In the case of the County, additional action has sometimes included recovery of investigation and clean-up costs from the responsible parties. In the event of egregious or repeated violations, the option exists for a referral to the County District Attorney for possible prosecution or to the Regional Board for enforcement under the California Water Code or the CWA. In order to eliminate unauthorized, Non-storm Water discharges, reduce the amount of Pollutants commingling with Urban Runoff and thereby protect water quality, an additional level of enforcement is required between Notices of Violation and District Attorney referrals.

The third term MS4 Permit required the Permittees to establish the authority and resources to administer either civil or criminal fines and/or penalties for violations of their Storm Water Ordinances. The Permittees now have this authority for penalties. Within the fourth term Order, Permittees are required to exercise this authority by developing an enforcement program to be administered within the industrial, commercial and construction elements of their Urban Runoff management programs. The enforcement program has been required to be included as an update to each Permittee's LIP. The effectiveness of this program must be documented in the Annual Reports submitted by the Permittees. However, it is acknowledged that once cases have been referred to the District Attorney or Environmental Crimes Task Force, etc. for prosecution, case details are confidential.

The fourth term Order further requires the Permittees to document and implement progressive and decisive enforcement actions, evaluate the effectiveness of their enforcement program and sanctions by tracking compliance and evaluating the amount of time to return to compliance.

This Order requires the Permittees to include in the LIP their legal authority and mechanisms to implement the various program elements required by this Order to properly manage, reduce, and mitigate potential Pollutant sources within each Permittee's jurisdiction. The LIP shall include citations of appropriate local ordinances, identification of departmental jurisdictions and key personnel in the implementation and enforcement of those ordinances. The LIP shall include

procedures, tools and timeframes for progressive enforcement actions and procedures for tracking compliance.

F. ILLICIT CONNECTIONS/ILLEGAL DISCHARGES; LITTER, DEBRIS AND TRASH CONTROL

Federal regulation, 40 CFR 122.26(d)(2(iv)(B), requires the Permittees to eliminate illicit discharges to the MS4s. The Permittees have completed a survey of the MS4 and eliminated or permitted all identified Illicit Connections. The Permittees have also established a program to address Illegal Discharges and a mechanism to respond to spills and leaks and other incidents of discharges to the MS4.

The Permittees currently have several programs to address IC/IDs:

1. The Permittees operate a toll free phone line, provide e-mail access for filing complaints and take direct calls regarding IC/ID reports from third parties. These reports are investigated by Permittee staff and reported in IC/ID investigation forms. All Permittee public education outreach materials promote the use of these reporting mechanisms.
2. Permittee staff receive training on identification and reporting of IC/IDs to appropriate Permittee staff. These reports are investigated and reported in IC/ID reporting forms.
3. The Permittees conduct Industrial and Commercial Facility and Construction Site inspections to identify potential IC/IDs. The outcomes of these inspections are reported in inspection reporting databases.
4. The Permittees contribute funds to the County Hazardous Materials Response Team to train and educate them to handle Illegal Discharges or accidental hazardous waste discharges so as to prevent IC/IDs. A summary of HAZMAT activities is provided in the Annual Reports.
5. The RCFC&WCD monitors Office of Emergency Service reports for potential IC/ID incidents and investigates them as appropriate. Results are reported in the RCFC&WCD complaint call database and reported to the Permittees as appropriate.
6. The RCFC&WCD has developed an online GIS tool that identifies the location of District and Permittee MS4 facilities to facilitate IC/ID investigations and response.
7. The Permittees have developed a Sanitary Sewer Overflow Procedure to limit the potential for sewage spills to the MS4.
8. RCFC&WCD, as Principal Permittee, has dedicated staff that conducts dry weather monitoring and also evaluates RCFC&WCD MS4 facilities for maintenance problems and/or IC/IDs. Detected IC/IDs from monitoring data or field inspections are reported to the District's NPDES section, logged into

RCFC&WCDs complaint database, and reported to the appropriate Permittee for follow up action.

However, with a few exceptions, program evaluations conducted during the third term MS4 Permit showed that this program element is primarily complaint driven or an incidental component of municipal inspections or MS4 inspections for a number of Permittees. This Order requires the Permittees to ensure their LIPs describe each Permittee's plan for focused, systematic IC/ID investigations, outfall reconnaissance surveys, indicator monitoring, and track their sources[10]. A proactive Illicit Discharge Detection and Elimination (IDDE) program should be integrated with other LIP program elements as appropriate including: mapping of the Permittees' MS4 to track sources, aerial photography, Permittee inspection programs for construction, industrial, commercial, MS4, Permittee facilities, etc., watershed monitoring, public education and outreach, Pollution Prevention, and rapid assessment of stream corridors to identify dry weather flows and illegal dumping.

G. SEWAGE SPILLS, INFILTRATION INTO MS4 SYSTEMS FROM LEAKING SANITARY SEWER LINES, SEPTIC SYSTEM FAILURES, AND PORTABLE TOILET DISCHARGES

Federal regulation, 40 CFR 122.26(d)(2)(iv)(B)(4), requires the Permittees to develop procedures to prevent, contain, and respond to spills that may discharge into the MS4s. The Permittees have already developed a program to address various types of spills to the MS4s. This Order requires the Permittees to continue to implement the unified sewer response plans in collaboration with the local sanitary sewer system operators. To facilitate swift response actions, the Permittees are required to provide 24-hour access to MS4s to the sanitary sewer system operators. The Permittees should also work cooperatively with the sanitary sewer system operators to determine if exfiltration from leaking sanitary sewer lines is causing or contributing to Urban Runoff Pollution problems. In addition, the Permittees are required to control infiltration or seepage from sanitary sewers to the MS4s through routine preventive maintenance of the MS4 (40 CFR 122.26(d)(2)(iv)(B)(7)). This Order also requires the Permittees to implement control measures and procedures to prevent, respond to, contain and clean up all sewage and other spills from sources such as portable toilets and septic systems.

On May 2, 2006, the State Board issued the Statewide General Waste Discharge Requirements for Sanitary Sewer Systems, Water Quality Order No. 2006-0003-DWQ (SSO Order) to address proper management and operation of sewer collection systems and to control sanitary sewer overflows. It requires dischargers/enrollees to develop and implement a written Sewer System Management Plan (SSMP) approved by the discharger's governing board and

[10] Table 2: Land uses, Generating Sites and Activities that Produce Indirect Discharges from IDDE, A Guidance Manual for Program Development and Technical Assessments, October 2004 CWP.

report sewer spills through an on-line reporting system. This Order requires the Permittees have reviewed the unified sewage spill response plan developed during the third term MS4 Permit with the local sewering agencies and determined that it is consistent with the requirements of the SSO Order. This Order also requires each Permittee to include in its LIP the interagency or interdepartmental sewer spill response coordination and responsibilities.

The MS4 program audits indicated that a majority of the Permittees with septic systems have inadequate information with regard to the number and location of those systems within their jurisdiction. This Order requires the Permittees with septic systems to develop within 2 years of adoption of this Order, an inventory of septic systems within its jurisdiction and establish a program to ensure that failure rates are minimized.

H. CO-PERMITTEE INSPECTION PROGRAM;

Federal regulations, 40 CFR 122.26(d)(2)(iv)(A-D), require the Permittees to inventory, prioritize and inspect Industrial and Commercial Facilities and Construction Sites. This Order requires the Co-Permittees to continue inspections of Industrial and Commercial Facilities and Construction Sites within their jurisdiction in order to control the Pollutants entering the MS4. The Co-Permittees will continue to maintain the inventory of Industrial and Commercial Facilities and Construction Sites in the above categories, prioritize these facilities based on threat to water quality, and perform regular inspections to insure compliance with local ordinances. While initial observations of non-compliance may result in 'educational' type enforcement, repeated non-compliance will result in more disciplinary forms of enforcement, such as monetary penalties, stop work orders or permit revocation.

An evaluation of Permittee inspection programs during the third term MS4 permit indicated certain deficiencies in the Industrial and Commercial Facility and Construction Site inspection programs of some of the Permittees. In many instances, program documentation of progressive enforcement and facilities' return to compliance were not properly documented. This Order requires Permittees to document inspections and enforcement and evaluate the effectiveness of their inspection and enforcement program by tracking the time for facilities or sites to return to compliance. The Permittees who do not have an internet accessible database are required to initiate quarterly reporting and update of the inventory, inspection and enforcement database for facilities within their jurisdiction.

In order to address discharges to the MS4 from residential sources, the fourth term MS4 Permit requires the Permittees to develop and implement a residential program to prevent residential discharges from causing or contributing to a violation of Water Quality Standards in the Receiving Waters (40 CFR 122.26(d)(2)(iv)(A)).

I. NEW DEVELOPMENT (INCLUDING SIGNIFICANT REDEVELOPMENT)

Federal regulation, 40 CFR 122.26(d)(2)(iv)(A)(2), requires the Permittees to develop a comprehensive master plan to address discharges from New Development and Significant Redevelopment projects. During the third term MS4 Permit, the Permittees revised their New Development guidelines to address water quality and Hydromodification impacts resulting from urbanization. A WQMP for Urban Runoff was approved by the Regional Board in 2004 and became effective in 2005. This Order requires the Permittees to continue to work towards the goal of restoring and preserving the natural hydrologic cycles in proposed urban developments by reviewing and approving project-specific WQMPs to address post-construction impacts. The WQMP should be designed to address water quality impacts, including Hydrologic Conditions of Concern (HCOC), from New Development and Significant Redevelopment projects through: (1) Site Design BMPs, including LID techniques; (2) Source Control BMPs; and (3) Treatment Control BMPs. This Order recognizes the importance of LID techniques to minimize the impact of urbanization on water quality. This Order requires the project proponents to infiltrate, harvest and reuse, evapotranspirate, or bio-treat the volume of runoff from a 24-hour, 85th percentile storm event where feasible. The Order also provides alternatives and in-lieu programs for project sites where infiltration, harvesting and re-use, evapotranspiration and bio-treatment are not feasible.

Program evaluations conducted during the third term MS4 Permit indicated a need for establishing a clear nexus between the watershed protection principles (including LID) and the planning and approval processes of the Permittees. This Order requires the Permittees to review and revise their Development Standards, Zoning Codes, Conditions of Approval, Development Project Guidance, ordinances, and other related documents to identify and eliminate barriers to incorporate watershed protection principles.

The SMC, including project lead agency, the San Bernardino County Flood Control District, in collaboration with SMC member, SCCWRP and the California Storm Water Quality Association (CASQA), is developing a LID Manual for Southern California with funding from the State Board, CASQA and other sources. This manual will be incorporated into the CASQA BMP Handbooks. The Permittees are encouraged to utilize the manual as a resource for proper LID design and implementation techniques.

Program evaluations have also suggested a need for improvement in the Permittees' inspection, and tracking of post-construction BMPs. This Order requires the Permittees to revise their close-out procedures to include field

verification that Site Design, Source Control and Treatment Control BMPs are operational and consistent with the approved WQMP.

This Order incorporates new project categories and revised thresholds for several categories of New Development and Significant Redevelopment projects that trigger the requirement for a WQMP. New project categories include streets, roads and highways of 5,000 square feet or more of paved surface and retail gasoline outlets (RGOs) with 5,000 square feet or more with 100 or more average daily vehicle traffic. The threshold criteria that trigger the WQMP requirement for non-residential commercial/industrial construction projects have been reduced from 100,000 square feet to 10,000 square feet or more of impervious surface. The threshold for residential subdivision projects has also been revised from 10 units or more to a threshold of 10,000 square feet or more of impervious surface.

This Order incorporates new project categories and revised thresholds for several categories of New Development and Significant Redevelopment projects that trigger the requirement for a WQMP. The 2008 National Research Council (NRC) report[11] indicates that roads and parking lots constitute as much as 70% of total impervious cover in ultra-urban landscape, and as much as 80% of the directly connected impervious cover. Roads tend to capture and export more storm water Pollutants than other impervious covers. As such, roads are included as a priority development category for which WQMPs are required. The NRC report also indicates that there is a direct relationship between impervious cover and the biological condition of downstream receiving waters. The Permittees are required to address HCOC from New Development and Significant Redevelopment projects to minimize downstream impacts. Private New Development and Significant Redevelopment projects incorporating roads typically allow road runoff to be addressed as part of the overall water quality strategy for the larger common plans of development. Permittee streets, roads and highways capital projects have special limitations. For example, the footprint of street, road and highway capital projects is often limited and may have hydraulic constraints due to lack of underground storm drain systems that would otherwise be necessary to hydraulically facilitate treatment of runoff. There are also limitations specified in state and federal design and code specifications that may limit or prohibit BMPs. Permittees may also be subject to flow diversion liability and limited road maintenance budgets and equipment. Street, road and highway projects that function as part of the MS4 also receive runoff and associated Pollutants from both existing urban areas and other external sources, including adjacent land use activities, aerial deposition, brake pad and tire wear and other sources that may be outside the Co-Permittee's authority to regulate and/or economic or technological ability to control. These offsite flows can overwhelm Treatment Control BMPs designed to address the footprint (consistent with the typical requirements for a WQMP) of street, road or highway capital projects incorporating curb and gutter as part of its stormwater conveyance function. Despite these limitations, the Regional

[11] National Research Council Report (2008), http://www.nap.edu/catalog.php?record_id=12465

Board finds that Permittee construction of streets, roads and highway capital projects may provide an opportunity to address Pollutant loads from existing urban areas. However, due to the nature of the facilities and projects, it would be unduly burdensome for the Co-Permittees to maintain WQMP documents for transportation projects (in addition to Facility Pollution Prevention Plans and other overlapping requirements of this Order). The Permittees are therefore not required to prepare WQMP documents for street, road and highway capital projects, but instead are required to develop equivalent documents that include site specific consideration utilizing BMP guidance to address street, roads and highway capital project runoff to the MEP.

As public works, streets, roads and highway projects are the only facilities typically captured by the new WQMP category, and these projects typically have unique constraints that make them difficult to address through the WQMP process, a separate set of requirements has been established for addressing this category of development. Roads that are typically constructed as part of a development are typically incorporated into the broader WQMP for the development activity, providing more options for mitigation via the WQMP process.

Consistent with a long term holistic approach to address water quality and Hydromodification impacts resulting from urbanization, this Order requires Permittees to continue to develop tools that facilitate integration, to the extent practicable, of water quality, stream protection, storm water management and re-use strategies with land use planning policies, ordinances, and plans within each jurisdiction. These tools should address cumulative impacts of development on vulnerable streams, preserve or restore, consistent with the MEP standard, the structure and function of streams, and protect surface and groundwater quality. For 303(d) listed waterbodies with Urban Runoff Pollutant sources and without a TMDL, the Permittees are required to provide special protections such as requiring more effective post-construction BMPs focus training programs and develop targeted public outreach that would address the urban source of the Pollutant of Concern. The Permittees are also required to participate in the TMDL development and implementation.

J. PUBLIC EDUCATION AND OUTREACH;

Federal regulation, 40 CFR 122.26(d)(iv), requires the Permittees to develop a comprehensive storm water management plan with public participation and 40 CFR 122.26(d)(iv)(B)(6) requires the Permittees to engage in outreach activities to facilitate the proper management of Pollutants. Public outreach is an important element of the overall urban Pollution Prevention program. The Permittees have committed to implement a strategic and comprehensive public education program to maintain the integrity of the Receiving Waters and their ability to sustain Beneficial Uses. The Principal Permittee has taken the lead role in the outreach programs and has targeted various groups including businesses, industry, development, utilities, environmental groups, institutions, homeowners, school

children, and the general public. The Permittees have developed a number of educational materials, have established a storm water Pollution Prevention hotline, started an advertising and educational campaign, and distributed public education materials at a number of public events. The Permittees are required to continue these efforts and to expand public participation and education programs.

The Permittees have already developed BMP fact sheets to address sources from residential activities such as auto washing and maintenance activities; use and disposal of pesticides, herbicides, fertilizers and household cleaners; and collection and disposal of pet wastes.

This Order requires the Permittees to annually review their public education and outreach efforts and revise their activities, if necessary, to address public outreach needs fed back from other Urban Runoff program elements. Federal regulation, 40 CFR 122.26(d)(v), requires the Permittees to conduct a program assessment to determine the reduction in Pollutant loadings due to Urban Runoff management programs. Each Permittee is required to implement an assessment program, guided by the CASQA Guidance manual or equivalent alternative, to measure the change in behavior of its target communities to reduce discharge of Pollutants to the MS4 and the environment.

K. PERMITTEE FACILITIES AND ACTIVITIES;

Federal regulation, 40 CFR 122.26(d)(iv)(A), requires the Permittees to ensure that their activities and facilities do not cause or contribute to violations of Water Quality Standards in receiving waters. Education of Permittee planning, inspection, and maintenance staff is critical to ensure that Permittee facilities and activities do not cause or contribute to an exceedance of Receiving Water Quality Standards. The 2002 MS4 Permit also specified minimum requirements for street sweeping and inspection and maintenance of drainage facilities. The Permittees were also required to develop and distribute BMP fact sheets for various Permittee activities. Permittee as well as contract staff that perform Permittee activities were required to be properly trained. The second and third term MS4 Permits required the Permittees to prepare a Municipal Facilities Strategy (MFS) to ensure that Permittee facilities and activities do not contribute Pollutants to Receiving Waters. The MFS was incorporated into Section 5 of the DAMP during the third term MS4 Permit. Each year, by August 1st, the Permittees are required to review their activities and facilities to determine the need for revisions to Section 5 of the DAMP.

This Order continues and builds upon the requirement of the third term MS4 Permit by requiring Permittees to include structural post-construction BMP information for certain Permittee projects along with the Notice of Termination submitted to the Executive Officer upon completion of the construction activity. The Notice of Termination must include photographs of the completed project, a location map, and for public works projects subject to a WQMP, structural post-

construction BMP location, field verification report and identify long term operation and maintenance responsibility. Permittees are required to develop a database of post-construction BMPs for which the Permittees are responsible and shall reference this database in the LIP.

Program evaluations conducted during the third term MS4 Permit indicated varying degrees of compliance at Permittee facilities and activities. This Order requires each Permittee to inventory its fixed facilities, field operations and MS4 facilities to ensure that Permittee facilities do not cause or contribute to a Pollution or Nuisance in Receiving Waters. These facilities and field operations are to be prioritized for inspection according to threat to water quality.

Fixed Permittee facilities and field operations include, but are not limited to fire training facilities, corporate yards, maintenance and storage yards, animal shelters, water treatment facilities, swimming pools, warehouses, and hazardous materials storage facilities, and recreation facilities. The Permittees are required to include in their LIP procedures and schedules for inspections and maintenance of Permittee facilities and activities. Urban Runoff from other Permittee facilities, such as airports, wastewater treatment plants and landfills, is regulated under the General Industrial Permit.

L. PERMITTEE CONSTRUCTION PROJECTS

The third term MS4 Permit authorized the discharge of storm water from Construction Sites on one acre or more that are under ownership or direct responsibility of the Permittees. The Permittees were required to notify the Executive Officer prior to commencement of construction activities, and to comply with the substantive requirements of the latest Statewide General Construction Activities Storm Water Permit.

Program evaluations conducted during the third term MS4 Permit indicated that some of the Permittees were not submitting or were not aware of the requirement to submit a Notice of Intent and a Notice of Completion for Permittee construction projects.

M. TRAINING PROGRAM FOR STORM WATER MANAGERS, PLANNERS, INSPECTORS AND MUNICIPAL CONTRACTORS

Education of Permittee planning, inspection, and maintenance staff is important to ensure that land use decisions, local permit approvals and Permittee facilities and activities do not cause or contribute to an exceedance of Receiving Water Quality Standards. During the term of the 2002 MS4 Permit, the Permittees attended training classes specific to major Urban Runoff program elements including New Development/Significant Redevelopment, Construction Site and Industrial Facility inspections, and Permittee activities.

This Order requires the Permittees, in conjunction with a broader array of MS4 Programs or CASQA, to define the program implementation training needs for Urban Runoff program staff, including contractors, managers and inspectors. The training curriculum must be designed for Permittee facilities and field operations staff, Permittee inspection staff, Urban Runoff program managers and those involved in the review and approval of WQMPs and CEQA documents, including Permittee contractors. The audits of the Permittees indicated the need for better inter-departmental collaboration and communication in the local Urban Runoff program implementation. This Order requires LIPs to develop and document processes and procedures for coordination between planners, plan reviewers, engineers and inspectors to ensure that appropriate post-construction BMPs are approved, installed, and are operational.

N. NOTIFICATION REQUIREMENTS

Most of the notification requirements that were spread throughout the third term MS4 Permit were consolidated into one section.

O. PROGRAM MANAGEMENT ASSESSMENT/DAMP REVIEW

The DAMP is a management document that needs to be updated with the new requirements of this Order.

P. FISCAL RESOURCES

Each Permittee is expected to exercise its full authority to secure the resources necessary to meet all requirements of this Order. See Section IX for existing funding mechanisms and potential limitations to Permittee funding.

Q. MONITORING AND REPORTING REQUIREMENTS

During the first term MS4 Permit and part of the second term MS4 Permit, the Permittees conducted monitoring of the Urban Runoff flows, Receiving Water quality, and sediment quality. The Santa Ana Phase I NPDES Monitoring Program began in November 1991 with 27 monitoring sites. The program has been reduced in phases to more specifically address Urban Runoff program needs and to redirect monitoring resources to TMDL-related activities. There was a time where samples were collected on a rotational basis with no consistent monitoring from year to year. On April 14, 2003, with the submittal of an Interim Monitoring Program, monitoring at seven core sampling locations (Sampling Stations 040, 316, 318, 364, 702, 707, and 752) was established that provided representative and consistent monitoring results for the Permit Area.

The Riverside County monitoring programs, as well as other monitoring programs nationwide, have shown that there is a high degree of uncertainty in

the quality of Urban Runoff and that there are significant variations in the quality of Urban Runoff spatially and temporally. However, most of the monitoring programs to date have indicated that there are a number of Pollutants in Urban Runoff. A link between Pollutants in Urban Runoff and Beneficial Use Impairments has been established in a few studies.

This Order requires the Permittees identified as TMDL stakeholders in an approved TMDL to continue to comply with applicable TMDL Implementation Plan requirements, including monitoring requirements, and to implement Urban TMDL WLAs through an iterative BMP approach (see Section V.C above).

Wet and Dry Seasons are defined differently by the various monitoring programs included in this Order. The Middle Santa Ana TMDL defines the Wet Season as November 1 through March 31st and the Canyon Lake/Lake Elsinore TMDL monitoring defines it as October 1st through May 31st. The Monitoring and Reporting Program for this Order generally defines the Wet Season as October 1st through May 31st. Monitoring required under this Order is expected to be conducted consistent with the applicable seasonal definitions.

The MSAR Bacterial Indicator TMDL and Canyon Lake/Lake Elsinore Nutrient TMDL requires the Permittees to comply with TMDL Implementation Plan requirements to revise the DAMP to incorporate BMPs in the Permittees Urban Runoff programs. This Order requires the Permittees to evaluate the effectiveness of the BMPs implemented as part of the DAMP in conformance with the TMDL Implementation Plan requirements.

This MS4 monitoring program includes sampling Urban Runoff at a variety of sites located throughout the Permit Area for three storm events per year. Urban Runoff samples will be collected and analyzed for a variety of constituents. In addition to these efforts, the Permittees are reevaluating their overall Urban Runoff monitoring program to determine its effectiveness in meeting the following objectives:

1. Assess rates of mass loading
2. Assess influence of land use on water quality
3. Assess compliance with Water Quality Objectives
4. Assess effectiveness of water quality controls
5. Detect IC/IDs
6. Identify problem areas and/or trends
7. Identify Pollutants of Concern
8. Identify baseline conditions
9. Establish/maintain a water quality database

To accomplish these goals, the following activities are conducted:

1. Collect water quality data
2. Collect rainfall/runoff data
3. Establish quality assurance/control procedures
4. Conduct data analysis and archiving
5. Install and maintain appropriate equipment
6. Prepare an Annual Report

RCFC&WCD, in its role as Principal Permittee, participates in the SMC and other task forces. The goal of the SMC is to develop the technical information necessary to better understand storm water mechanisms and impacts, and then develop the tools that will effectively and efficiently improve storm water decision-making. Some of the cooperative monitoring efforts conducted through the SMC and other task forces include Comparative Evaluation of Microbial Source Tracking Techniques, Model Monitoring Program Guidance, Peak Flow Study, and Laboratory Inter-Calibration Studies. Under the auspices of the SMC, SCCWRP prepared "Model Monitoring Program for Municipal Separate Storm Sewer Systems in Southern California", August 2004 Technical Report No. 419. This report noted, "...the lack of mass emissions stations in the inland counties hampers their ability to estimate the proportional contribution of these inland areas to cumulative loads downstream". The SMC consists of representatives from the Counties of Ventura, Los Angeles, Orange, San Bernardino, Riverside, and San Diego and the Cities of Long Beach, and Los Angeles, the Los Angeles, Santa Ana and San Diego Regional Boards, the State Board, SCCWRP, Caltrans, and the USEPA. This Order requires the Permittees to continue mass emissions monitoring to determine Pollutant loading.

During the second and third term MS4 Permits, there was an increased focus on watershed management initiatives and coordination among the MS4 permittees in Orange, Riverside and San Bernardino Counties. The MS4 permittees participated in a number of regional monitoring programs and other coordinated program and policy developments, such as the Regional Integrated Freshwater Bioassessment Monitoring Program, and the BMP Effectiveness Assessment. The Principal Permittee continues to be an active participant in the SWQSTF, MSAR Bacterial Indicator TMDL, Canyon Lake/Lake Elsinore (San Jacinto) Nutrient TMDL and the SMC. This Order recommends that the Permittees continue their participation in these types of watershed coordination efforts and provides them with opportunities to use these efforts to comply with applicable requirements of the Permit.

The third term MS4 Permit required the Permittees to initiate bioassessment monitoring. To allow for a holistic approach, this Order requires the Permittees to participate in the Regional Integrated Freshwater Bioassessment Monitoring

Program in lieu of a separate bioassessment monitoring program for the Permit Area.

This Order requires the Permittees to re-evaluate their CMP and submit a revised plan for approval. The revised CMP should integrate the goals and objectives of the Watershed Action Plan and rectify data gaps from previous monitoring efforts.

R. PROVISIONS – Standard Language per NPDES regulations.

S. PERMIT MODIFICATION– Standard Language per NPDES regulations.

T. PERMIT EXPIRATION AND RENEWAL– Standard Language per NPDES regulations.

IX. WATER QUALITY BENEFITS, COST ANALYSIS, AND FISCAL ANALYSIS

There are direct and indirect benefits from clean lakes and beaches, clean water, and a clean environment. It is difficult to assign a dollar value to the benefits the public derives from fishable and swimmable waters. In 1972, at the start of the NPDES program, only 1/3 of the U.S. waters were swimmable and fishable. In 2008, more than 2/3 of the U.S. waters met these criteria. In the 1999 "*Money"* magazine survey of the "Best Places to Live", clean water and air ranked as two of the most important factors in choosing a place to live. Thus environmental quality has a definite link to property values.

The true magnitude of the Urban Runoff problem is still elusive and any cost estimate for cleaning up Urban Runoff would be premature short of end-of-pipe treatments. For Urban Runoff, end-of-pipe treatments are cost prohibitive and are not generally considered as a technologically feasible option. Over the last decade, the Permittees have attempted to define the problem and implemented BMPs to the MEP to combat the problem.

The costs incurred by the Permittees in implementing these programs and policies can be divided into three broad categories:

A. Shared costs: These are costs that fund activities performed mostly by the Principal Permittee under the Implementation Agreement. These activities include overall storm water program coordination; intergovernmental agreements; representation at the SWQSTF, Regional Board/State Board meetings and other public forums; preparation and submittal of compliance reports and other reports required under the NPDES permits, responding to Water Code Section 13267 requests, budget and other program documentation; coordination of consultant studies, Co-Permittee meetings, and training seminars.

B. Individual Costs for DAMP Implementation: These are costs incurred by each Permittee for implementing the BMPs (drainage facility inspections for Illicit Connections, drain inlet/catch basin stenciling, public education, etc.) included in the DAMP. A number of programs and policies for Non-Point and Urban Runoff Pollution controls existed prior to the MS4 permit program. However, the DAMP that was developed and implemented in response to the MS4 Permits required additional programs and policies for Urban Runoff Pollution control.

C. Individual Costs of Pre-Existing Programs: These are costs incurred by each Permittee for water Pollution control measures which were already in existence prior to the MS4 permit program. These programs included recycling, litter control, street sweeping, drainage facility maintenance, and emergency spill response.

Historically, the Permittees have employed four distinct funding methods to finance their NPDES Activities. Many Permittees utilize a combination of these funding sources. The different methods include:

A. Santa Ana Watershed Benefit Assessment Area

In 1991, the RCFC&WCD established the Santa Ana Watershed Benefit Assessment Area (SAWBAA) to fund its NPDES activities. Currently, SAWBAA revenues fund both area-wide NPDES program activities and the RCFC&WCD's individual MS4 permit compliance activities.

B. County Service Area 152

In December 1991, the County of Riverside formed County Service Area 152 (CSA 152) to provide funding for compliance activities associated with its NPDES permit activities. Under the laws that govern CSAs, sub-areas may be established within the overall CSA area with different assessment rates set within each sub-area. The cities of Corona, Moreno Valley, Norco, Riverside, Lake Elsinore and San Jacinto elected to participate in CSA 152.

C. Utility Charge

The City of Hemet funds a portion of its NPDES program activities through a utility charge.

D. General Fund /Other Revenues

Permittees also utilize general fund revenue to finance their NPDES activities. Several Permittees also report using general fund and other revenue sources (e.g., gas taxes, developer fees, etc.) to fund a portion of their Urban Runoff management activities.

The Annual Report provides the most recent budgets and expenditure projections available for the costs incurred by the Permittees in implementing these programs and policies. The following information, in parenthesis, on the current economic conditions was provided by the Permittees.

{Current Economic Conditions
The following information was provided by the Permittees and does not constitute a finding by the Regional Board:

Historically, the Permittees have employed several funding methods to finance their MS4 Permit compliance activities. Unfortunately, the mortgage crisis, collapse of the housing market and the economic recession has resulted in the cessation of virtually all development activity and has significantly reduced sales tax revenue in the Santa Ana Region. Property tax revenues have been reduced by the high level of foreclosure activity and reduced property values. Property tax revenues have been further reduced by homeowner requests for reassessments to reflect the reduced property values. The impact of these economic conditions on the Permittees in the Santa Ana Region has been particularly severe. As a result, funds typically provided by these funding methods has been severely reduced, and it is anticipated that this condition will continue for an indefinite period. The funding methods historically used and the effects of the economic situation on the availability of funds through these sources are summarized as follows:

- Santa Ana Watershed Benefit Assessment Area. In 1991, the District established the Santa Ana Watershed Benefit Assessment Area to fund its MS4 Permit compliance activities. Currently, the Benefit Assessment revenues fund the District's share of the area-wide MS4 Permit program activities and the District's individual compliance activities as a Permittee. Under the Benefit Assessment each parcel is taxed based on the impervious area of each parcel at a set rate established through Proposition 218. This rate has not been increased since 1991 and increases in revenues have resulted from increases in the number of contributing parcels resulting from New Development. In 2007/08 the Santa Ana Watershed Benefit Assessment generated approximately $2,030,000 in revenue. These revenues are used to fund the District's compliance activities and the bulk of the administrative costs associated with the District's duties as Principal Permittee.

  Outlook: The District expects at best to maintain, if not see temporary reductions in Benefit Assessment revenues due to the significant number of homes that are not paying property tax due to foreclosure. An increase in the established Benefit Assessment rate to compensate for these reductions would require approval of 2/3 of the voters or 50% of the property owners and is unlikely, especially in the current economic climate. An increase in the number of contributing parcels will not occur until the development industry recovers.

- General Fund/Other Revenues. The County and the Cities utilize general fund revenue to finance most of their MS4 Permit compliance activities. General fund revenue is generated by property tax, sales tax, and auto license taxes.

  Outlook: The Permittees expect a continued reduction in the funds available through General Fund/Other Revenues through at least FY 2010/2011. Historically, the Permittees have investigated other funding sources, including a phone survey conducted by LESJWA with support from the District and the County of Riverside to evaluate the possibility of passing a new assessment to fund water quality improvements benefiting Lake Elsinore. The results of the survey found insufficient voter support for water quality-related issues to move forward with a special election. The Permittees have also formed a finance committee which has met several times to obtain information about actions that they can take to maximize revenues and potential alternative funding sources. These efforts met with some success, particularly in relation to maximizing fees for service; however significant new funding sources were not identified or available to the Permittees even during the more favorable economic conditions experienced during the term of the 2002 Riverside County MS4 Permit.

- Fees. Several Permittees charge fees for services such as inspections, plan check and other recoverable costs related to compliance with the 2002 Riverside County MS4 Permit. These fees cover both the direct and indirect costs associated with conducting these inspections/reviews including associated compliance tracking and reporting.

  Outlook: It is notable that, with the virtual collapse of the development industry in the Santa Ana Region, the fees received by the Permittees for review of New Developments and Construction Site inspections have been significantly reduced. With this reduced level of fee-based income, maintenance of the existing inspection and plan review programs will place a burden on overall funding of the compliance programs. The Permittees do not expect revenues from fees to recover until the development industry recovers. Even with recovery of the development industry, it is anticipated that revenues from fees will be reduced for the majority of the Cities within the Santa Ana Region and the County due to the reduced area remaining for development in their jurisdictions.

- Grants. The Permittees have actively pursued and, as available, used grants to fund compliance programs.

  Outlook: In December the State's budget crisis resulted in a directive to State agencies from the Department of Finance to halt projects that rely on bond funds, including those funded by Proposition 40, Proposition 50 or Proposition 84. The State of California is the primary source of grant funding for water

quality projects. Future availability of funds to resume compliance projects funded by grants is uncertain.

It is clear that the current economic climate and that of the foreseeable future is creating a significant burden upon the Permittees that will make the continuance of all existing MS4 Permit compliance programs difficult. If new funding sources or alternative combinations of funding sources cannot be identified, it is likely that compliance program funding will be further impacted.

Economic Projections

According to Chicago Title, Southwest Riverside County has experienced a very significant increase in supply of single-family residential units on the market. As a result, housing price indicators are very negative. In the majority of the Southwest Riverside submarket, the pending price is less than closing price that suggests the weakness of the market. The October 2008 count of bank owned (REO) properties for Riverside County as a whole was 12,078. The number of foreclosures was 23,480. The presence of high levels of REO properties will continue to negatively affect the price line. In addition, the level of foreclosures is increasing. At the end of January 2009, 68% of the homes listed for sale are foreclosures or short sales[12].

With regard to other sectors of the economy, Riverside County has taken a serious turn for the worse in 2008, with projections indicating that the severe downturn will continue through 2009 at the very least. The economic difficulties being faced in the Southwest Riverside submarket is the result of the dramatic downturn in the housing market in this area, the national financial turmoil, the worldwide credit crisis, and the increasing consumer debt crisis. According to Beacon Economics, a respected economics consulting firm in Los Angeles, Inland Southern California is clearly at the epicenter of this economic turmoil, with extremely high rates of unemployment at present. Unemployment rates in Inland Southern California are expected to reach 12.4% (Riverside County beat that – unemployment was 14.6% in November 2009 – California Employment Development Department) before this deep recession is over. Housing prices are expected to continue their precipitous decline from their peak levels in the two Inland Southern California counties through at least 2011. According to Dataquick, median home prices in Riverside County peaked at $415,000 in January 2007. At the end of this cycle, the median home price in Riverside County is expected to be $198,000. Figure 1 depicts the median housing price in Riverside County over the period 1990 to August 2008.

[12] Orange County Register, January 27, 2009, p. 11.

Figure 1. Riverside County Median Housing Price (1990 – August 2008)

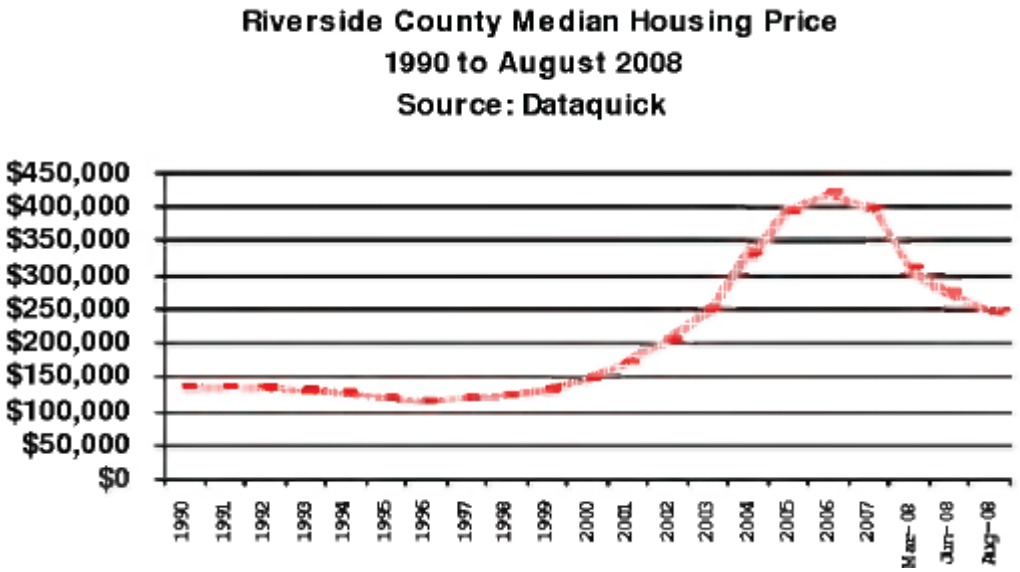

Source: Riverside County Center for Demographic Research. 2008. Riverside County Progress Report, pg 14.

Local Government sales tax revenues remained fairly stagnant through 2006 and began to decline in early 2007, according to Beacon. By the second quarter of 2008, the taxable sales in Riverside County declined by 7.7%. This will continue with taxable sales possibly bottoming out by 2010. These shocks are expected to continue and accelerate within the southwest Riverside County economy.

As a direct outcome of the current economy and the economic outlook into the term of the 2009 Riverside County MS4 Permit, the number of New Development proposals has plummeted and any significant rebound is not forecast. New and redevelopment projects will likely remain minimal. As shown in Figure 2, the number of housing units being added each year has dropped below the levels seen at any point in time during the 2002 Riverside County MS4 Permit. These numbers will likely continue to decrease for a significant portion of the new 2010 Riverside County MS4 Permit term.

Figure 2. Riverside County Housing Units Added (1990 – 2008)

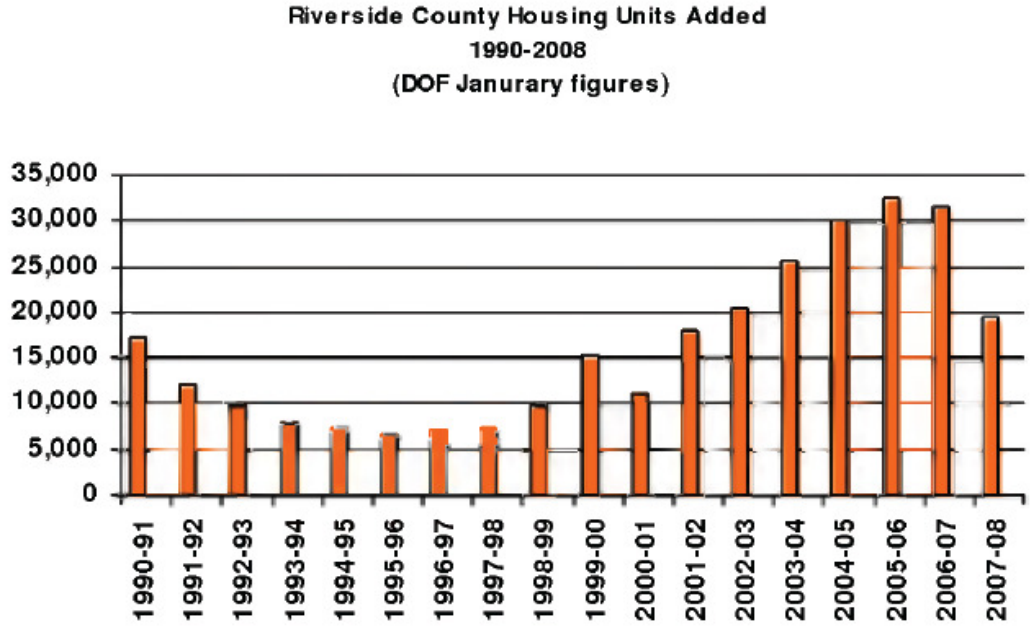

Source: Riverside County Center for Demographic Research. 2008. Riverside County Progress Report, pg 12.

These economic issues and projections directly affect and limit both:

- The need for including enhanced New Development and Significant Redevelopment requirements in the 2010 Riverside County MS4 Permit, and

- The Permittees ability to fund, and even seek new funding sources for additional MS4 Permit requirements for New Development and Significant Redevelopment projects.

Permittee specific projections are as follows:

County of Riverside

The County is operating with a structural deficit of $12 million and plans a 25% budget reduction from FY 2008/2009 through FY 2011/2012. The County's current budget of $4.7 billion represents a 5% reduction from the previous year and next year's budget is expected to be cut by 10%. These cuts are directly associated with the decline in property values caused by the high number of foreclosures. There are concerns about having to use discretionary funds to meet State mental health and social service mandates. In addition, the County is dependent on funds from Federal and State sources. If during this time of economic crisis Federal and State funding sources are reduced or eliminated, any unfunded programs will be terminated. Only core County programs will continue.

The primary source of general fund revenue is from property taxes and sales tax. With the unprecedented number of foreclosures, reduced property values, and declining sales, general fund revenue is in a downward spiral. Another source of funding is through the Solid Waste Tipping Fees paid at the County landfills. Volume is down 15% since 2006 with anticipated downward trend to 40% reduction in solid waste through 2014. Programs that are partially funded through tipping fee allotments will be impacted. Due to the declining economy the recycling market has collapsed. Virtually no recyclable materials are being shipped for reprocessing. This loss of revenue and increased disposal costs is further impacting the general fund.

Cuts of 25% for all Net County Cost general fund programs will translate into reduction of County services and elimination of unfunded State and Federal programs. Only core value programs will be provided (including public safety and fee programs).

The County has instituted a hiring freeze and required each department to create a report outlining the projected effects of the budget cuts. The County currently employs over 20,000 people, and layoffs are expected to result from the findings of these departmental reports. It is anticipated that this will impact program delivery for stormwater related activities. No County department will be able to sustain current staffing levels as they try to meet the 25% budget reduction strategy.[13] [14]

City of Menifee

The newly incorporated City of Menifee FY 2008/2009 initial budget was estimated from their comprehensive fiscal analysis that was submitted to the Local Agency Formation Commission during the incorporation process. Because of the economic uncertainty, and the fact that the City is only now beginning to staff positions, it is unknown what the immediate impact of the fiscal crisis will be. The County is responsible for assisting the City in meeting its MS4 Permit compliance requirements during the first year of incorporation which expires October 1, 2009. Currently, the level of property tax revenue that will be available to the City is uncertain. Funding for MS4 Permit compliance requirements was not explicitly budgeted. A financial hardship currently exists because of the costs associated with incorporation.

City of Murrieta

The City of Murrieta's FY 2008/2009 budget did not increase compared to FY 2007/2008. The City has identified a $3.3 million budget shortfall for the current fiscal year ending on June 30, 2009. This represents approximately 8.2% of the City's projected revenue which must be absorbed in five months.

[13] "The Realities of Recession in California: A Statewide Report by U.S. Senator Barbara Boxer, December, 2008, p. 18.
[14] Riverside County Executive Office, January, 2008.

The shortfalls are primarily due to reduced sales tax and property tax revenues. Department heads are currently working on revised budgets to adjust for the loss in revenue.

Additional, budget cuts are anticipated for FY 2009/2010 because the immediate economic outlook is not good. There have been approximately 2,000 home foreclosures within the City. Sales tax revenue is estimated to drop 12.5%, property tax revenue will drop, and the State took approximately $525,000 out of redevelopment funds. Murrieta did not receive any vehicle licensing fees from the State and it appears likely that the State will take more revenue from the cities to solve its budget problems. New NPDES requirements that increase compliance costs will create a financial hardship for the City.

City of Riverside

The City of Riverside has seen declining general fund revenue over the last two fiscal years in virtually all categories. The City's most recent projection indicates that total general fund revenues for the current fiscal year will be under $200 million, down from a budget of $215 million as adopted, and $226.5 million in the prior fiscal year. This represents a decline over two fiscal years of approximately 12%. Specifically, property tax and sales tax revenue continue their decline, which is primarily attributable to decreased residential construction activity and in the case of sales tax declining automobile sales.

The decline in revenue has resulted in a corresponding reduction to general fund expenditures. Specifically, approximately 12% of the positions authorized for the general fund have been vacated and unfunded, either through transferring staff to other funds, attrition or limited layoffs of temporary and contract staff. Additionally, the level of service provided to the community in virtually all City departments has been reduced through funding reductions to items such as street maintenance, recreation programs and libraries, though great care has been taken to minimize the impact of cuts to the public. It is anticipated that in the near term the economic situation will not improve, and staff is preparing a budget for the upcoming fiscal year that anticipates further decreases in revenue.

City of Wildomar

The newly incorporated City of Wildomar FY 2008/2009 initial budget was estimated from their comprehensive fiscal analysis that was submitted to the Local Agency Formation Commission during the incorporation process. Because of the economic uncertainty, and the fact that the City is only now beginning to staff positions, it is unknown what the immediate impact of the fiscal crisis will be. The County is responsible for assisting the City in meeting its MS4 Permit compliance requirements the first year of incorporation that expires July 1, 2009. Currently, the level of property tax revenue that will be

available to the City is uncertain. Funding for MS4 Permit compliance requirements was not explicitly budgeted. A financial hardship currently exists because of the costs associated with incorporation.}

X. ANTIDEGRADATION ANALYSIS

The Regional Board has considered whether a complete antidegradation analysis, pursuant to 40 CFR 131.12 and State Board Resolution No. 68-16, is required for these Urban Runoff discharges. The Regional Board finds that the Pollutant loading rates to the Receiving Waters will be reduced with the implementation of the requirements in this Order. As a result, the quality of Urban Runoff discharges and Receiving Waters will be improved, thereby improving protection for the Beneficial Uses of Waters of the U.S.. Since this Order will not result in a lowering of water quality, a complete antidegradation analysis is not necessary, consistent with the federal and state antidegradation requirements.

XI. ANTI-BACKSLIDING

Sections 402(o)(2) and 303(d)(4) of the CWA and federal regulations at 40 CFR 122.44(l) prohibit backsliding in NPDES permits. These anti-backsliding provisions require Effluent Limitations in a reissued NPDES permit to be as stringent as those in the previous permit, with some exceptions where Effluent Limitations may be relaxed. All Effluent Limitations in this Order are at least as stringent as the Effluent Limitations in the 2002 Order.

XII. PUBLIC WORKSHOP AND PUBLIC HEARING

Regional Board conducted a public workshop regarding the proposed Order on August 3, 2009 at the City of Loma Linda, Council Chambers, 25541 Barton Road, Loma Linda, CA. Based on the comments received, a second draft was released for public review and comments on October 22, 2009. The third draft, issued on December 15, 2009, will be considered for adoption at a public hearing as follows:

Date and time: January 29, 2010; meeting starts at 9:00 a.m.
Location: City of Loma Linda, Council Chambers
25541 Barton Road
Loma Linda, CA

A Notice of Public Hearing and Hearing Procedure is posted on the Regional Board's website indicated below. An agenda for the public hearing to consider adoption of the proposed Order will be posted on the Regional Board's website approximately 10 days prior to the meeting date at:

http://www.waterboards.ca.gov/santaana/water_issues/programs/stormwater/riverside_permit.shtml

This information may be also obtained by calling the Regional Board office at 951-782-4130.

The Regional Board recognizes the significance of Riverside County's Storm Water/Clean Water Protection Program and will conduct, participate, and/or assist with any workshop during the term of this Order to promote and discuss the requirements of this Order and the progress of the Urban Runoff management program. The details of the public workshops will be posted on the Regional Board's website indicated above. Persons wishing to be included in the mailing list for any of the items related to this permit may register their name, mailing address and phone number with the Regional Board office at the address given below.

XIII. PUBLIC HEARING

The Regional Board will hold a public hearing regarding the proposed waste discharge requirements. A Notice of Public Hearing was published in the Legal Notices section of the Press Enterprise, a local newspaper, on November 13, 2009. The public hearing on this item is scheduled as indicated above in Section XI. Additional information regarding the public hearing will also be posted on the website indicated above. Further information regarding the conduct and nature of the public hearing concerning these waste discharge requirements may be obtained by writing or visiting the Santa Ana Regional Board office, 3737 Main Street, Suite 500, Riverside, CA 92501. This and other information are also available at the website at: www.waterboards.ca.gov/santaana.

XIV. INFORMATION AND COPYING

Persons wishing further information may write to the above address or call Keith Elliott at (951) 782-4925. Copies of the application, proposed waste discharge requirements, and other documents (other than those which the Executive Officer maintains as confidential) are available at the Regional Board office for inspection and copying by appointment scheduled between the hours of 8:30 a.m. and 4:00 p.m., Monday through Friday (excluding holidays, and furlough days).

XV. REGISTER OF INTERESTED PERSONS

Any person interested in a particular application or group for applications may leave his name, address and phone number as part of the file for an application. Copies of tentative waste discharge requirements will be available on the web for all interested parties to download.

E-mail registration:
http://www.waterboards.ca.gov/resources/email_subscriptions/reg8_subscribe.shtml

XVI. RECOMMENDATION

Staff recommendation is to adopt the tentative Order, Order No. R8-2010-0033, as presented.

APPENDIX 7

NOTICE OF INTENT AND NOTICE OF TERMINATION FOR DE-MINIMUS DISCHARGES

022339

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SANTA ANA REGION
NOTICE OF INTENT
TO COMPLY WITH THE TERMS AND CONDITIONS OF THE

☐ **Riverside County MS4 Permit**
ORDER NO. R8-2010-0033
NPDES NO. CAS 618033

☐ **San Bernardino County MS4 Permit**
ORDER NO.R8-2010-0036
NPDES NO. CAS618036

GENERAL WASTE DISCHARGE REQUIREMENTS FOR DISCHARGE TO SURFACE WATERS THAT POSE INSIGNIFICANT (DE MINIMUS) THREAT TO WATER QUALITY

I. PERMITTEE (*Person/Agency Responsible for the Discharge*)
Agency/Company
Name:_____
Address/*Street* _____
City _____State _____ZIP_____ Contact Person: _____
Phone: (_____) _____; Email: _____

II. FACILITY
Name:_____
Address/Street _____
City _____State _____ZIP_____ Contact Person:_____
Phone: (_____) _____; Email: _____

a. Projected Flow Rate (gpd):_____,
b. Receiving Water (identify):_____

III. INDICATE EXISTING PERMIT NUMBER: (*if applicable*)
a. Individual Permit Order No. _____ NPDES No. _____
b. General Permit Order No. R8-2010-003-_____
c. Others (specify) _____

IV. CERTIFICATION:

I certify under penalty of law that I am an authorized representative of the permittee and that I have personally examined and am familiar with the information submitted in this application and all attachments and that, based on my inquiry of those persons immediately responsible for obtaining the information contained in the application, I believe the information is true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment. In addition, I certify that the permittee will comply with the terms and conditions stipulated in Orders No. R8-2009-0003 and (R8-2010-0033 or R8-2010-0036, as applicable) including the monitoring and reporting program issued by the Executive Officer of the Regional Board.

Name: _____Title:_____
(type or print)

Signature: _____ Date: _____

Email: _____

Remarks: If changes to facility ownership and/or treatment processes were made after the issuance of the existing permit, please provide a description of such changes on another sheet and submit it with this Notice of Intent.

V. OTHER REQUIRED INFORMATION - FOR NEW DISCHARGERS AND FOR NEW DISCHARGES AND LOCATIONS NOT PREVIOUSLY REPORTED BY EXISTING DISCHARGERS.

Please provide a COMPLETE characterization of your discharge. A complete characterization includes, but is not limited to:

a. A list of constituents and the discharge concentration of each constituent;

b. The estimated average and maximum daily flow rates at unit of gallons per day(gpd); the frequency and duration of the discharge and the date(s) when discharge will start;

c. The proposed discharge location(s) as latitude and longitude for each discharge point;

d. A description of the proposed treatment system (if appropriate);

e. The affected receiving water; the receiving water(s) shall be
   1) receiving storm drain/creek, and/or
   2) the ultimate receiving water, such as Santa Ana River, San Jacinto River, Lake Elsinore, Prado Park Lake, etc.;

f. A map showing the path from the point of initial discharge to the ultimate receiving water. Please try to limit your maps to size of 8.5” X 11”.

g. A list of known or suspected leaking underground tanks and other facilities or operations that have, or may have impacted the quality of the underlying groundwater within 200 feet of the site property lines for projects with expected discharge flow rates of less than 100,000 gallons per day and within 500 feet of the site property lines for projects with expected discharge flow rates of greater than 100,000 gallons per day.

h. Any other information deemed necessary by the Executive Officer.

VI. OTHER

Attach additional sheets to explain any responses which need clarification. List attachments with titles and dates below:

You will be notified by a representative of the RWQCB within 30 days of receipt of your application. The notice will state if your application is complete or if there is additional information you must submit to complete your application, pursuant to Division 7, Section 13260 of the California Water Code.

Urban Pesticide Monitoring in Northern and Southern California: A Regional Look at Urban Pesticides in Surface Waters

Mike Ensminger, Kevin Kelley, Frank Spurlock, Kean Goh, and Li-Ming He
California Environmental Protection Agency
Department of Pesticide Regulation
Environmental Monitoring
Surface Water Protection Program

239th Annual ACS National Meeting
San Francisco, CA
March 23, 2010

Outline

I. Objectives
   - Monitoring Areas and Sites
   - Pesticide Selection and Analysis

II. Monitoring Results

III. Summary

I. Objectives

1. What pesticides are present in urban surface waters?
2. Determine the effect of water body type
3. Determine the influence of rainfall on pesticides/concentrations
4. Compare to aquatic benchmarks

Additional information (Study 249):
http://www.cdpr.ca.gov/docs/emon/surfwtr/protocol.htm

Monitoring Areas

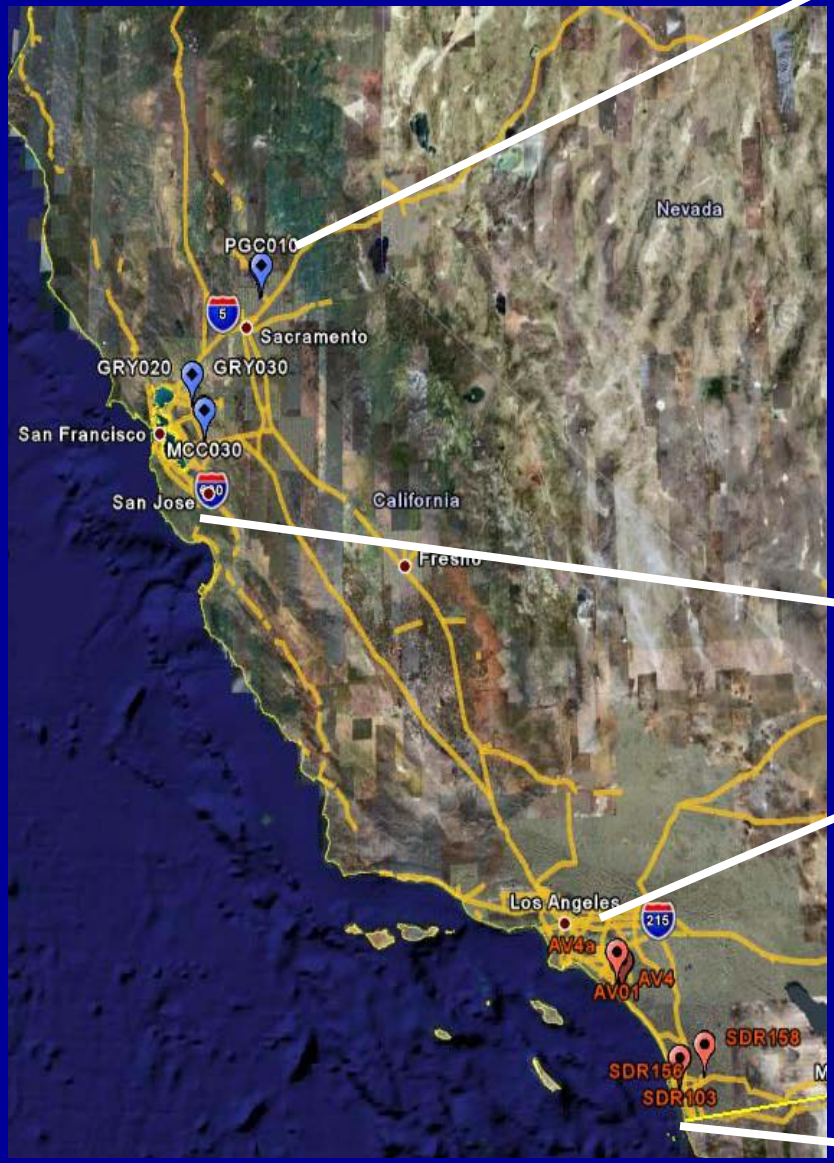

Bay Area
(7)

Sacramento
(4)

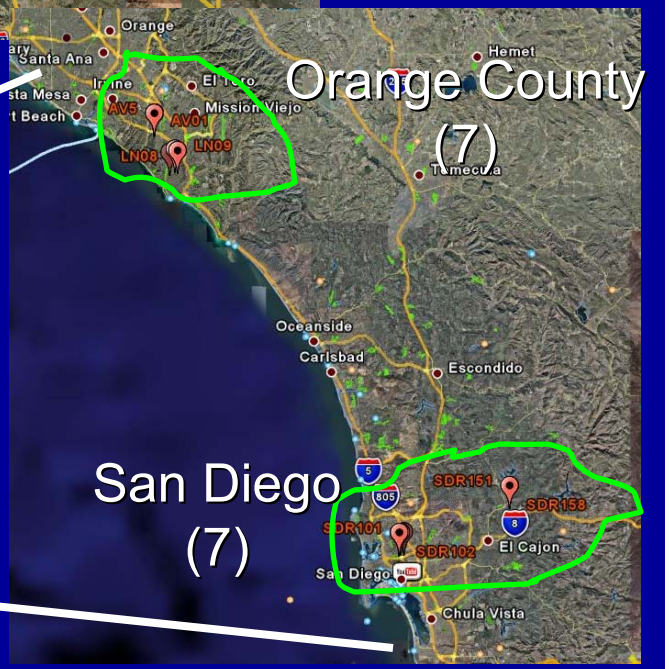

Orange County
(7)

San Diego
(7)

Stormdrain vs. Receiving Water

Receiving Water

Stormdrains

Baseflow vs. Rainstorm Sampling

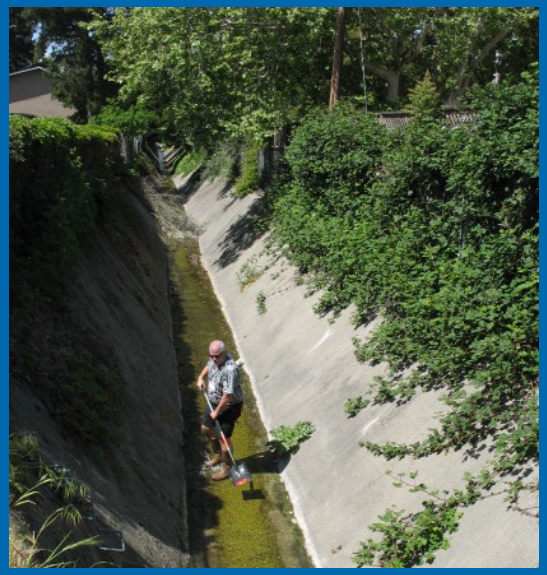

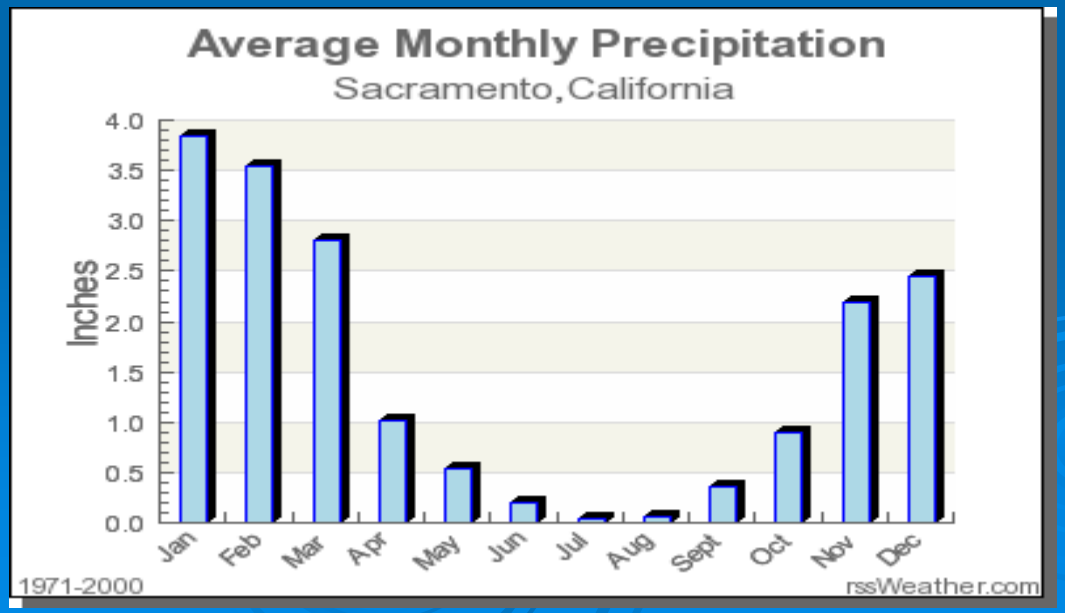

Pesticide Analysis

Pesticide Type	Analyte Group	No. Pesticides/ Degradates	Sample Matrix
Insecticide	Carbamate	9	Water
	Fipronil(s)	6	Water
	OP	15	Water/Sediment
	Pyrethroids	11	Water/Sediment
Herbicide	PS II Inhibitors	11	Water
	Dinitroanilines	6	Water
	Synthetic Auxins	4	Water
	Membrane Disr/Bleachers	2	Water
	Total	64	

Insecticide Detections - Water

Insecticide Detections - Water

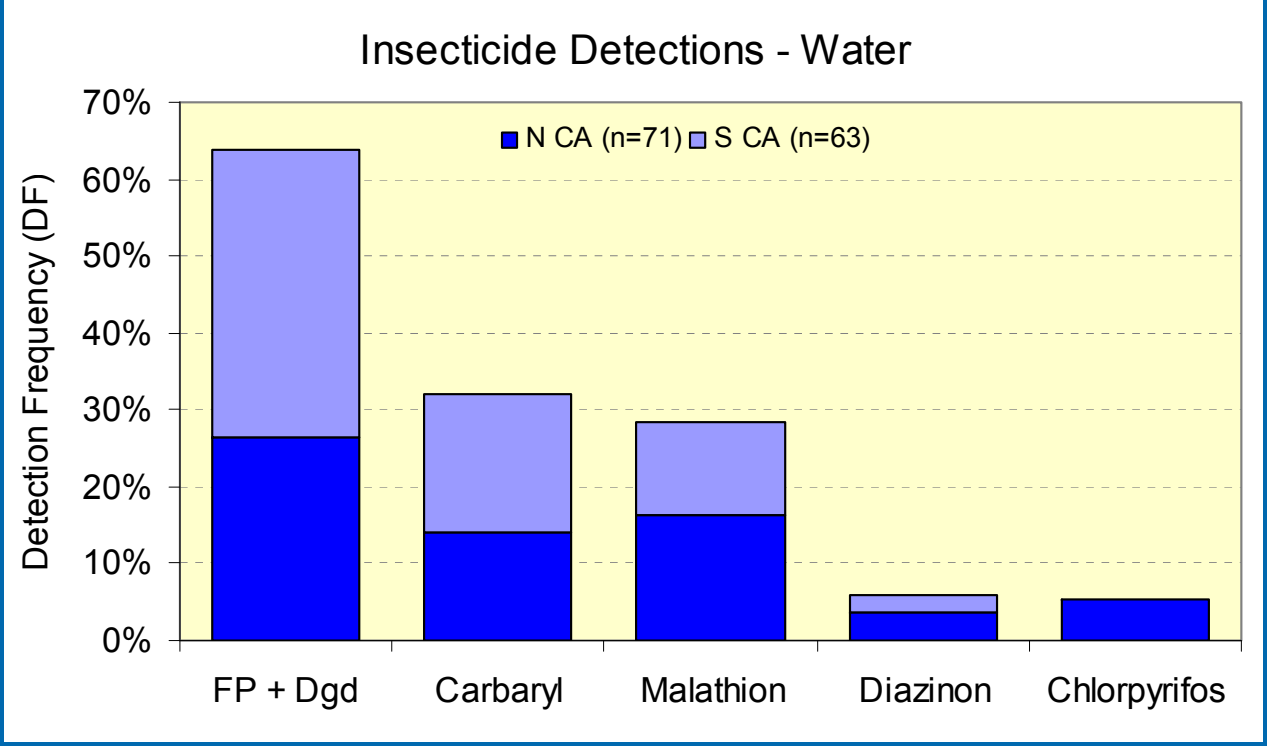

- FP: OC ~ 100% detection frequency (df)
- Carbaryl df > in OC
- Malathion, SAC > OC > SFB
- Chlorpyrifos only in N CA

Insecticide Detections - Fipronil

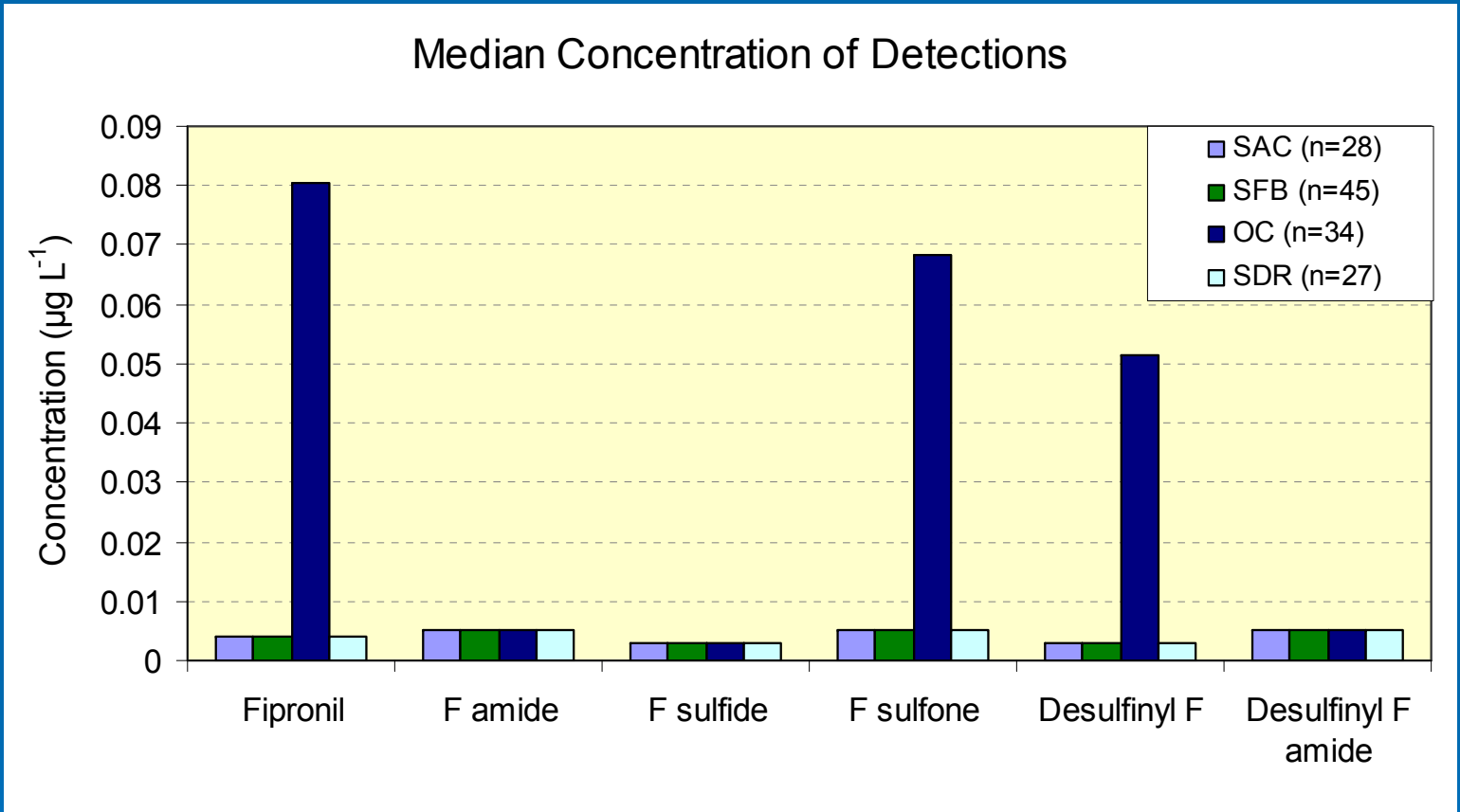

- Higher concentrations in OC
  - Fipronil, F sulfone, desulfinyl F
  - No detections > acute aquatic toxicity

Insecticide Detections – Toxicity

- Few detections > EPA OPP aquatic benchmarks
  - Malathion – "draft" benchmark (18% > benchmark)

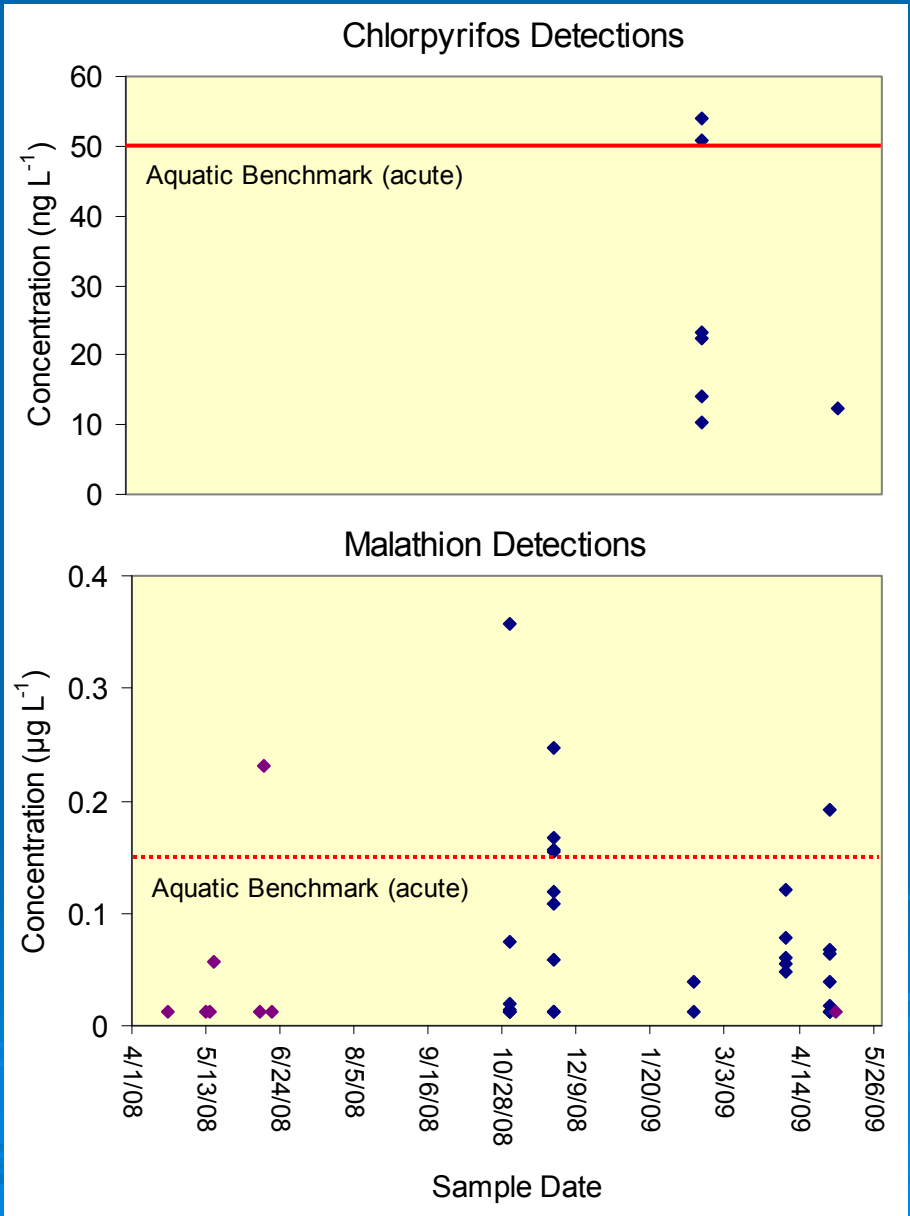

Pyrethroid Detections - Water

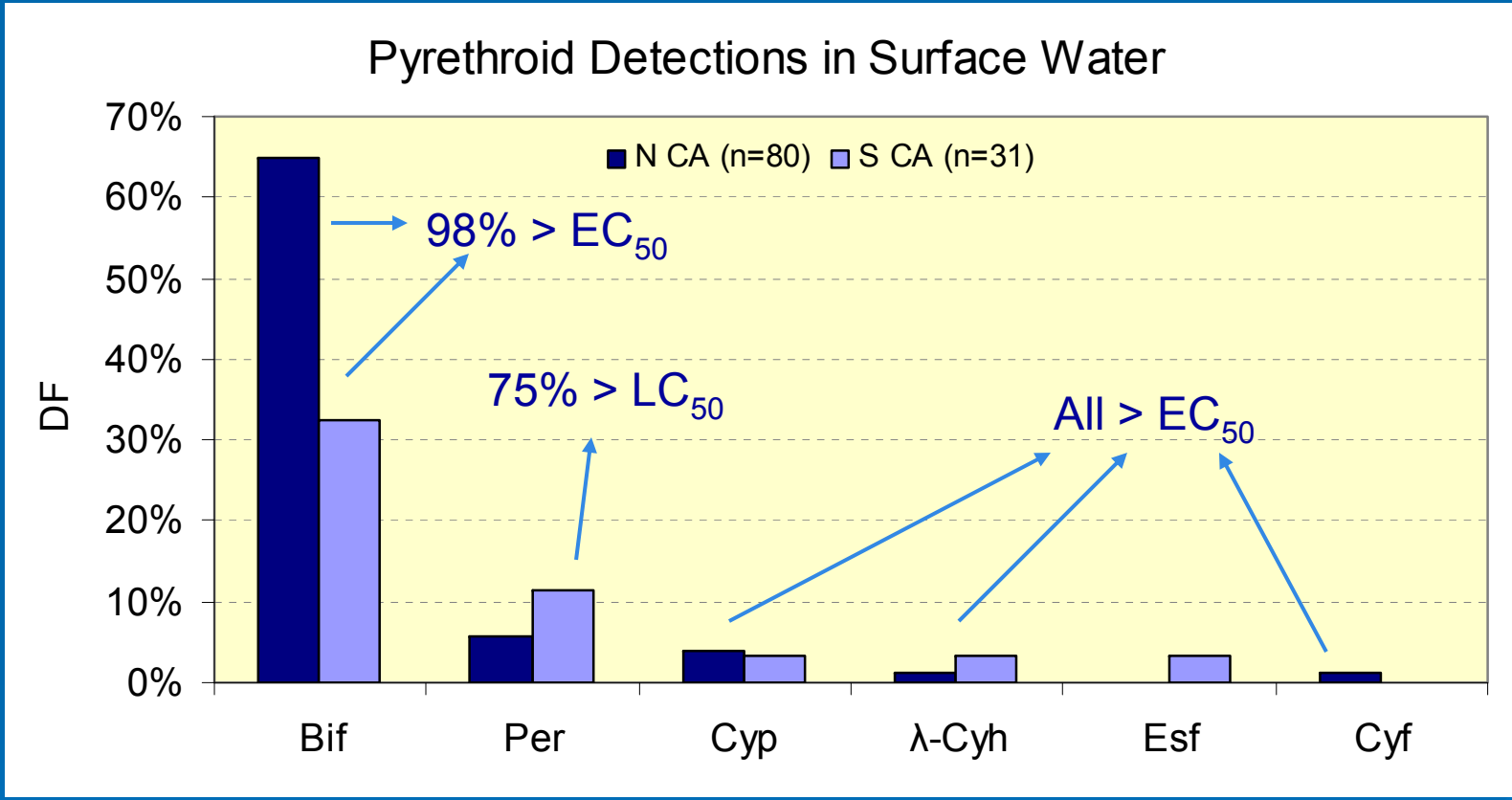

- It's a Bifenthrin world, after all!
- Pyrethroid detections usually > EC or LC_{50} (*H. azteca*)

Pyrethroid Detections - Sediment

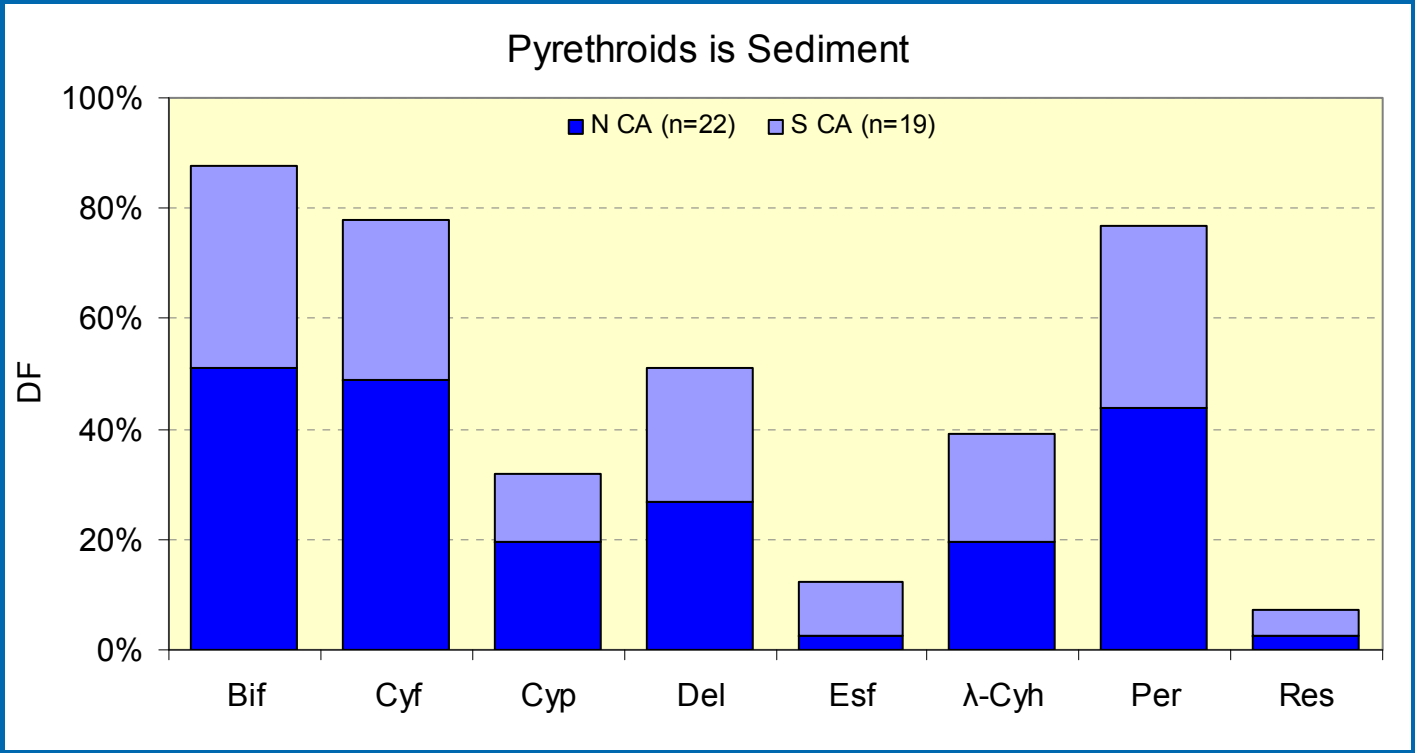

- 40 of 41 sediments contained pyrethroids
- Over half contained > 4 pyrethroids
- Overall, N CA ~ S CA
  - Bifenthrin, cyfluthrin df > N CA

Herbicide Detections

Herbicide Detections - Water

- Highest df: 2,4-D, diuron

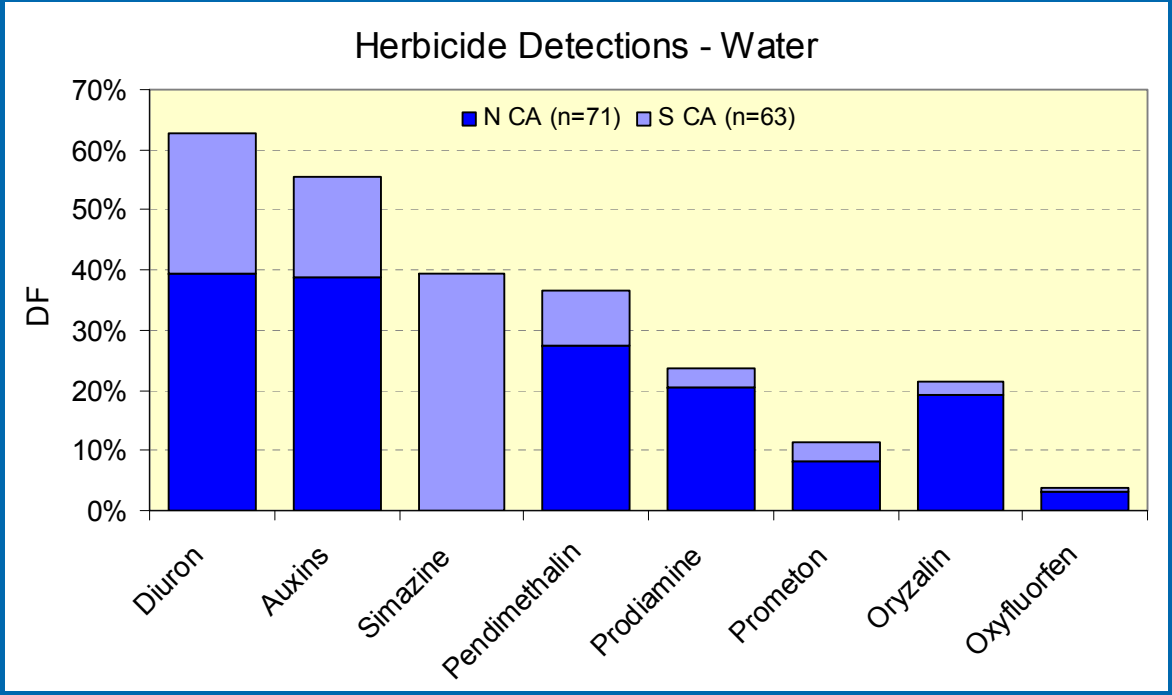

- N CA > S CA
  - Due to low SDR detection rate
  - N CA ~ OC: diuron, auxins
- Generally, concentrations of detections N CA ~ S CA
  - SAC: > pendimethalin, dicamba, 2,4-D
  - SFB: > diuron, oryzalin

Herbicide Detections – Toxicity

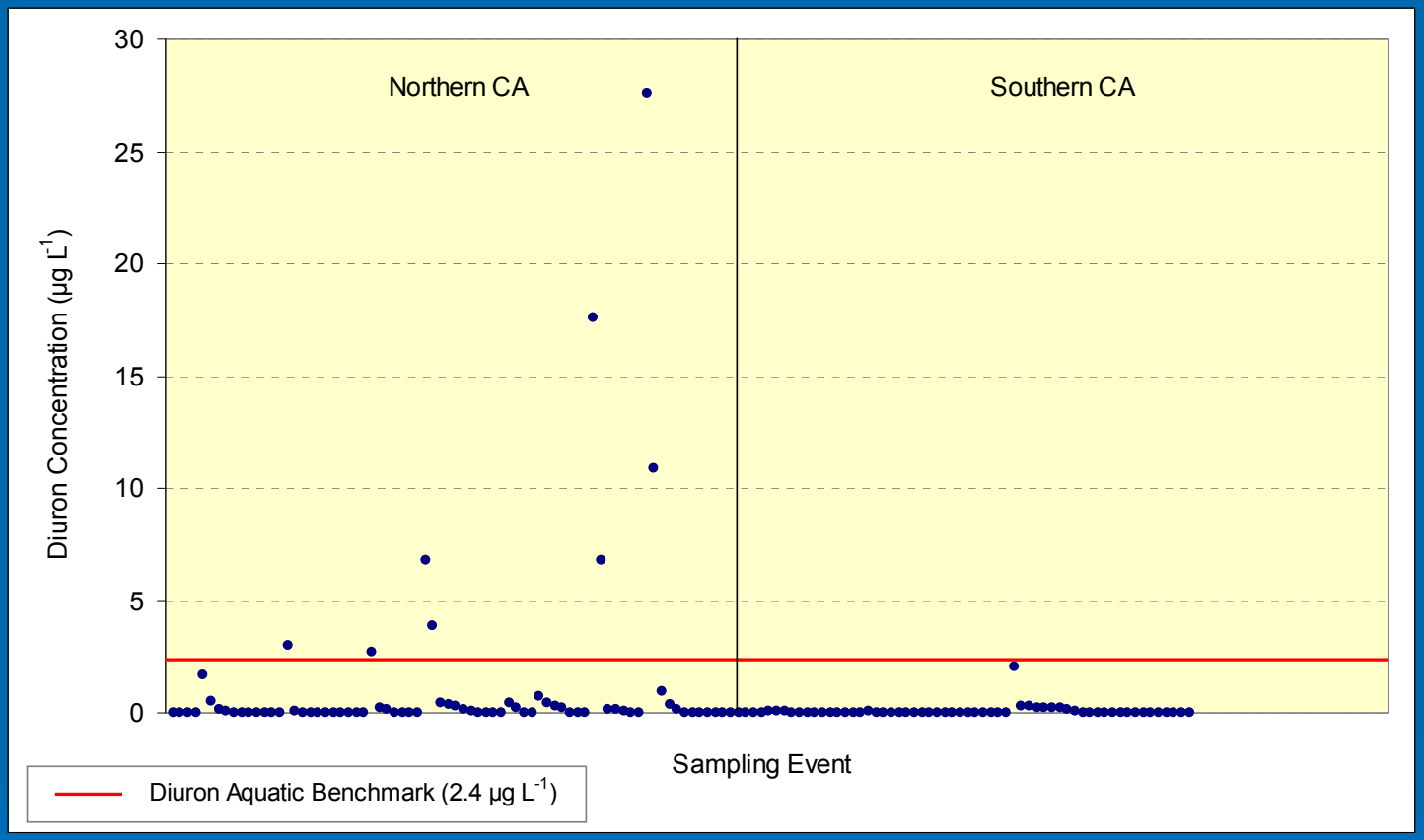

- N CA – 8 detects > benchmark
- Oxyflourfen 1 of 5 detects > aquatic toxicity

Pesticide Detections – Influence of:

- Rain
- Waterbody Type
- Waterbody Type

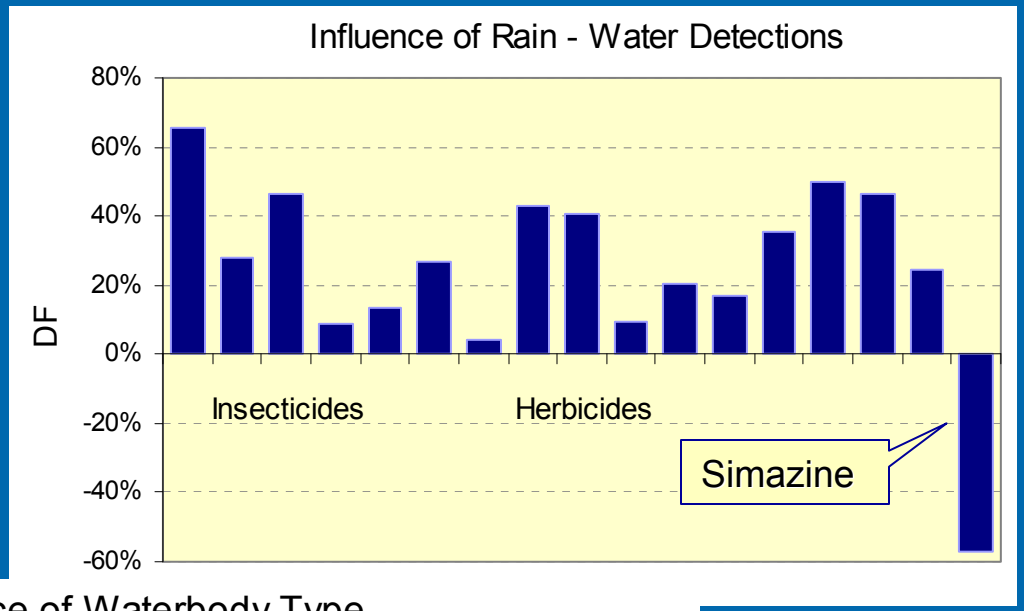

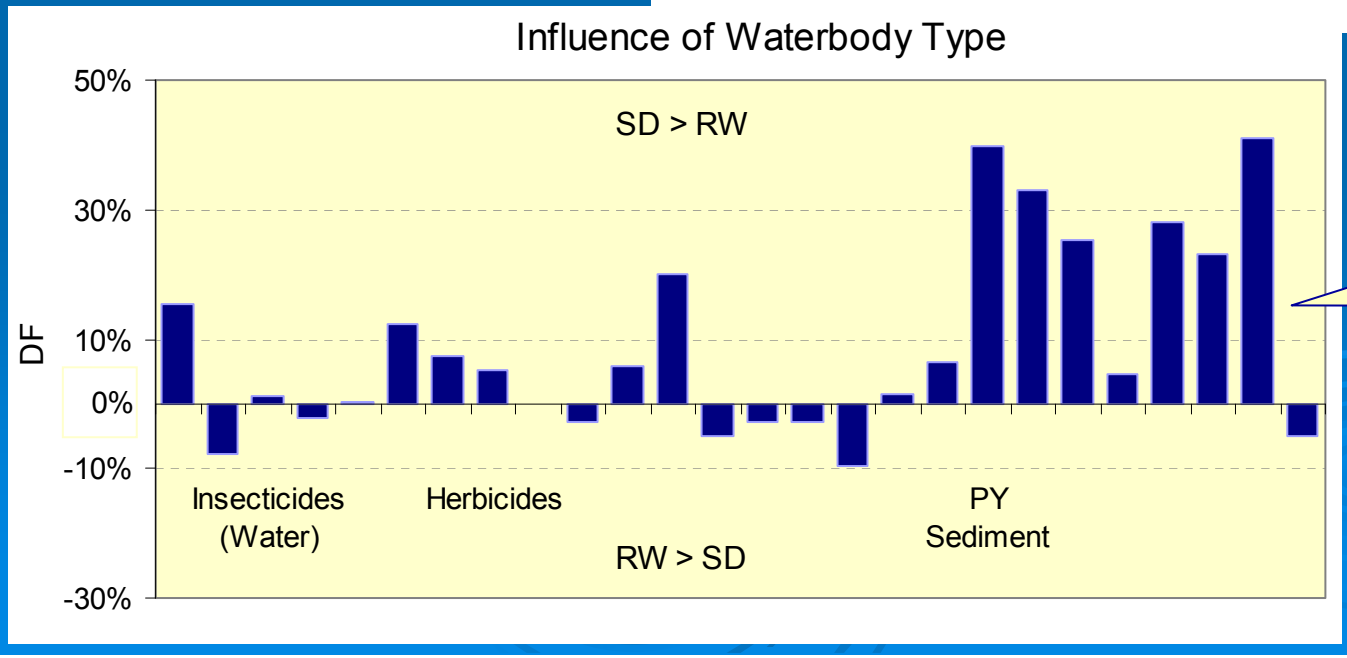

Summary

- Water & sediment monitoring, 25 sites in S and N CA
- Detected 16 insecticides (water), 11 herbicides, 8 pyrethroids (sediment)
- Insecticides (Water): Fipronil ~ Bifenthrin > Carbaryl ~ Malathion
  - Chlorpyrifos, Diazinon infrequently detected
- Pyrethroids (water) detected > EC/LC_{50}
  - Malathion > Chlorpyrifos infrequently detected above aquatic invertebrate benchmarks

Summary

- Herbicides: Synthetic Auxins, Diuron
  - Auxins: 2,4-D, Triclopyr, Dicamba
- Diuron infrequently detected above aquatic non-vascular plant benchmark
- Rain increased df
  - Simazine – dry only
- Detections in storm drains ~ receiving waters
  - In sediment, SD >> RW

Questions?
Michael Ensminger
CA Department of Pesticide Regulation
mensminger@cdpr.ca.gov
916-324-4186

State of California
The Natural Resources Agency
DEPARTMENT OF FISH AND GAME
Biogeographic Data Branch
California Natural Diversity Database

STATE & FEDERALLY LISTED ENDANGERED & THREATENED ANIMALS OF CALIFORNIA

January 2010

This is a list of animals found within California or off the coast of the State that have been classified as Endangered or Threatened by the California Fish & Game Commission (state list) or by the U.S. Secretary of the Interior or the U.S. Secretary of Commerce (federal list).

The official California listing of Endangered and Threatened animals is contained in the California Code of Regulations, Title 14, Section 670.5. The official federal listing of Endangered and Threatened animals is published in the Federal Register, 50 CFR 17.11. The California Endangered Species Act of 1970 created the categories of "Endangered" and "Rare". The California Endangered Species Act of 1984 created the categories of "Endangered" and "Threatened". On January 1, 1985, all animal species designated as "Rare" were reclassified as "Threatened".

Animals that are candidates for state listing and animals proposed for federal listing are also included on this list. A state candidate species is one that the Fish and Game commission had formally noticed as being under review by the Department for addition to the State list. A federal proposed species is one for which a proposed regulation has been published in the Federal Register.

Code Designation:	Totals as of January 2010
SE = State-listed as Endangered	45
ST = State listed as Threatened	34
SR = State listed as Rare – old designation, all animals reclassified to Threatened on 1/1/85	0
FE = Federally listed as Endangered (21.5% of all U.S. listed endangered animals as of 1/07/10)	88
FT = Federally listed as Threatened (23.6% of all U.S. listed threatened animals as of 1/07/10)	39
SCE = State candidate (Endangered)	2
SCT = State Candidate (Threatened)	1
SCD = State Candidate (Delisting)	1
FPE = Federally proposed (Endangered)	1
FPT = Federally proposed (Threatened)	1
FPD = Federally proposed (Delisting)	0
Total number of animals listed (includes subspecies & population segments)	156
Total number of candidate/proposed animals for listing	5
Number of animals State listed only	30
Number of animals Federally listed only	74
Number of animals listed under both State & Federal Acts	52

Common and scientific names are shown as they appear on the state or federal lists. If the nomenclature differs for a species that is included on both lists, the state nomenclature is given and the federal nomenclature is shown in a footnote. Synonyms, name changes, and other clarifying points are also footnoted.

Critical Habitat is defined in Section 3 of the federal Endangered Species Act as specific areas, both occupied and unoccupied, that is essential to the conservation of a listed species and that may require special management considerations or protection.

Recovery Plans are discussed in Section 4 of the federal Endangered Species Act. Each plan incorporates site-specific management actions necessary for the conservation and survival of the species.

The "List Date" for **final** federal listing and **final** Critical Habitat designation is the date the listing or designation becomes effective, this is usually <u>not</u> the date of publication of the rule in the Federal Register; it is usually about 30 days after publication, but may be longer.

If a taxa that was previously listed or proposed for listing no longer has any listing status the entry has been grayed out.

For taxa that have more than one status entry, the current status is in bold and underlined.

Changes to this update of the list are denoted by *

	LISTING STATUS				CRITICAL HABITAT		RECOVERY PLAN	
	State	List Date	Federal	Effective List Date	Designation	Effective Date	Version	Date
GASTROPODS								
Trinity bristle snail *Monadenia setosa*[1]	ST[2]	10-02-80						
Morro shoulderband (=banded dune) snail *Helminthoglypta walkeriana*			FE	1-17-95	Final	3-09-01	Final	1998
White abalone *Haliotis sorenseni*			FE	6-28-01			Final	2008
Black abalone *Haliotis cracherodii*			FE	2-13-09				
CRUSTACEANS								
Riverside fairy shrimp *Streptocephalus woottoni*			FE	8-03-93	Final[3] Proposed Final	5-12-05 4-27-04 6-29-01	Final	1998
Conservancy fairy shrimp *Branchinecta conservatio*			FE	9-19-94	Final[4] Proposed Final Proposed	2-10-06 12-28-04 8-06-03 9-24-02	Final	2005
Longhorn fairy shrimp *Branchinecta longiantenna*			FE	9-19-94	Final Proposed3 Final Proposed	2-10-06 12-28-04 8-06-03 9-24-02	Final	2005
Vernal pool fairy shrimp *Branchinecta lynchi*			FT	9-19-94	Final Proposed3 Final Proposed	2-10-06 12-28-04 8-06-03 9-24-02	Final	2005
San Diego fairy shrimp *Branchinecta sandiegoensis*			FE	2-03-97	Final Proposed[5] Final	1-11-08 4-22-03 10-23-00	Final	1998
Vernal pool tadpole shrimp *Lepidurus packardi*			FE	9-19-94	Final Proposed3 Final Proposed	2-10-06 12-28-04 8-06-03 9-24-02	Final	2005
Shasta crayfish *Pacifastacus fortis*	**SE** ST	2-26-88 10-02-80	FE	9-30-88			Final	1998
California freshwater shrimp *Syncaris pacifica*	SE	10-02-80	FE	10-31-88			Final	1998
INSECTS								
Zayante band-winged grasshopper *Trimerotropis infantilis*			FE	2-24-97	Final	3-09-01	Final	1998

[1] Current taxonomy is *Monadenia infumata setosa.*

[2] On January 1, 1985, all species designated as "rare" were reclassified as "threatened", as stipulated by the California Endangered Species Act.

[3] The Federal Circuit Court vacated critical habitat for the Riverside fairy shrimp on 10-30-02. The judge instructed the USFWS to begin the process of re-designating critical habitat for this species. New critical habitat was proposed 4-27-04 and finalized effective 5-12-05.

[4] On October 28, 2004 the courts ordered the USFWS to reconsider the areas excluded from the final critical habitat designation made August 6, 2003. The December 28 2004 proposed rule is only for lands previously excluded and does not affect the areas included in the August 6, 2003 final rule. The non-economic exclusions made to the August 6, 2003 final rule were confirmed effective March 8, 2005

[5] Due to court order the previously designated critical habitat was vacated and the USFWS was directed to re-proposed critical habitat.

	LISTING STATUS				CRITICAL HABITAT		RECOVERY PLAN	
	State	List Date	Federal	Effective List Date	Designation	Effective Date	Version	Date
Mount Hermon June beetle *Polyphylla barbata*			FE	2-24-97			Final	1998
Casey's June beetle *Dinacoma caseyi*			FPE	7-09-09	Proposed	7-09-09		
Delta green ground beetle *Elaphrus viridis*			FT	8-08-80	Final	8-08-80	Final Final	2006 1985
Valley elderberry longhorn beetle *Desmocerus californicus dimorphus*			FT	8-08-80	Final	8-08-80	Final	1984
Ohlone tiger beetle *Cicindela ohlone*			FE	10-03-01			Final	1998
Kern primrose sphinx moth *Euproserpinus euterpe*			FT	4-08-80	Proposed	7-03-78	Final	1984
Mission blue butterfly *Icaricia icarioides missionensis*[6]			FE	6-01-76	Proposed	2-08-77	Final	1984
Lotis blue butterfly *Lycaeides argyrognomon lotis*[7]			FE	6-01-76	Proposed	2-08-77	Final	1985
Palos Verdes blue butterfly *Glaucopsyche lygdamus palosverdesensis*			FE	7-02-80	Final	7-02-80	Final	1984
El Segundo blue butterfly *Euphilotes battoides allyni*			FE	6-01-76	Proposed	2-08-77	Final	1998
Smith's blue butterfly *Euphilotes enoptes smithi*			FE	6-01-76	Proposed	2-08-77	Final	1984
San Bruno elfin butterfly *Callophrys mossii bayensis*			FE	6-01-76	Proposed	2-08-77	Final	1984
Lange's metalmark butterfly *Apodemia mormo langei*			FE	6-01-76	Proposed	2-08-77	Revised	1984
Bay checkerspot butterfly *Euphydryas editha bayensis*			FT	10-18-87	Final Proposed Final	9-25-08 8-22-07 5-30-01	Final	1998
Quino checkerspot *Euphydras editha quino (=E.e.wrighti)*			FE	1-16-97	Proposed[8] Final Proposed	1-17-08 5-15-02 2-07-01	Final	2003
Carson wandering skipper *Pseudocopaeodes enus obscurus*			FE	8-07-02			Final Draft	2007 2005
Laguna Mountains skipper *Pyrgus ruralis lagunae*			FE	1-16-97	Final	1-11-07		
Callippe silverspot butterfly *Speyeria callippe callippe*			FE	12-05-97	Proposed	3-28-80		
Behren's silverspot butterfly *Speyeria zerene behrensii*			FE	12-05-97			Draft	2004
Oregon silverspot butterfly[9] *Speyeria zerene hippolyta*			FT	7-02-80	Final	7-02-80	Revised	2001
Myrtle's silverspot butterfly *Speyeria zerene myrtleae*			FE	6-22-92			Final	1998
Delhi Sands flower-loving fly *Rhaphiomidas terminatus abdominalis*			FE	9-23-93			Final	1997

[6] Current taxonomy is *Plebejus icarioides missionensis*

[7] Current taxonomy is *Plebejus idas lotis*

[8] Proposed rule is to revise designated Critical Habitat

[9] Current common name is Hippolyta frittilary

	LISTING STATUS				CRITICAL HABITAT		RECOVERY PLAN	
	State	List Date	Federal	Effective List Date	Designation	Effective Date	Version	Date
FISHES								
Green sturgeon – southern DPS *Acipenser medirostris*			FT[10]	6-06-06	Final Proposed	11-09-09 9-08-08		
Chinook salmon-Winter-run[11] *Oncorhynchus tshawytscha*	SE	9-22-89	**FE**[12] FE	8-29-05 2-03-94	Final	3-23-99	Draft	2009 1997
Chinook salmon-California coastal ESU[13] *Oncorhynchus tshawytscha*			**FT**[14] FT[15]	8-29-05 11-15-99	Final Proposed Rescinded Final	1-02-06 12-10-04 4-30-02 2-16-00		
Chinook salmon-Spring-run *Oncorhynchus tshawytscha*	ST[16]	2-05-99	**FT**[17] FT[18]	8-29-05 11-15-99	Final Proposed Rescinded Final	1-02-06 12-10-04 4-30-02 2-16-00	Draft	2009
Coho salmon-Central California Coast ESU *Oncorhynchus kisutch*	SE[19]	3-30-05	**FE**[20] FT[21]	8-29-05 12-02-96	Final	6-04-99	Final (state)	2004
Coho salmon-So. Oregon/No. Calif ESU *Oncorhynchus kisutch*	ST[22]	3-30-05	**FT**[23] FT[24]	8-29-05 6-05-97	Final	3-17-00	Final (state)	2004
Little Kern golden trout *Oncorhynchus mykiss whitei*			FT	4-13-78	Final	4-13-78	Exempt	
Lahontan cutthroat trout *Oncorhynchus clarki henshawi*			**FT** FE	7-16-75 10-13-70			Final	1995
Paiute cutthroat trout *Oncorhynchus clarki seleniris*			**FT** FE	7-16-75 3-11-67[25]			Revised Final	2004 1985
Steelhead-Northern California ESU[26] *Oncorhynchus mykiss*			**FT**[27] FT	2-06-06 8-07-00	Final Proposed	1-02-06 12-10-04		

[10] Includes all spawning populations south of the Eel River

[11] Federal: Sacramento River winter run Chinook salmon

[12] The NMFS has completed comprehensive status reviews for 27 west coast salmon & steelhead ESUs, 10 of these in California. The 29 Aug 2005 list date refers to the final designations made as a result of those status reviews.

[13] ESU = Evolutionarily Significant Unit

[14] The NMFS has completed comprehensive status reviews for 27 west coast salmon & steelhead ESUs, 10 of these in California. The 29 Aug 2005 list date refers to the final designations made as a result of those status reviews.

[15] Naturally spawned coastal spring & fall Chinook salmon between Redwood Creek in Humboldt County & the Russian River in Sonoma County.

[16] State listing is for the Sacramento River drainage.

[17] The NMFS has completed comprehensive status reviews for 27 west coast salmon & steelhead ESUs, 10 of these in California. The 29 Aug 2005 list date refers to the final designations made as a result of those status reviews.

[18] Federal: Central Valley Spring-Run ESU. Includes populations spawning in the Sacramento River & its tributaries.

[19] The Coho south of San Francisco Bay were state listed in 1995; in February 2004 the Fish and Game Commission determined that the Coho from San Francisco to Punta Gorda should also be listed as Endangered. This changed was finalized by of Office of Administrative Law on March 30, 2005.

[20] The NMFS has completed comprehensive status reviews for 27 west coast salmon & steelhead ESUs, 10 of these in California. The 29 Aug 2005 list date refers to the final designations made as a result of those status reviews.

[21] The Federal listing is limited to naturally spawning populations in streams between Punta Gorda, Humboldt County & the San Lorenzo River, Santa Cruz County.

[22] The Fish and Game Commission determined that the Coho from Punta Gorda to the Oregon border should be listed as Threatened on February 25, 2004. This determination was finalized by the Office of Administrative Law on March 30, 2005.

[23] The NMFS has completed comprehensive status reviews for 27 west coast salmon & steelhead ESUs, 10 of these in California. The 29 Aug 2005 list date refers to the final designations made as a result of those status reviews.

[24] The Federal listing is for populations between Cape Blanco, Oregon & Punta Gorda, California.

[25] All species with a list date of 03-11-67 were listed under the Endangered Species Preservation Act of Oct 15, 1966.

[26] Naturally spawned populations residing below impassable barriers in coastal basins from Redwood Creek in Humboldt County to, and including, the Gualala River in Mendocino County.

	LISTING STATUS				CRITICAL HABITAT		RECOVERY PLAN	
	State	List Date	Federal	Effective List Date	Designation	Effective Date	Version	Date
Steelhead-Central California Coast ESU[28]			**FT**[29]	2-06-06	Final	1-02-06		
Oncorhynchus mykiss			FT	10-17-97	Proposed	12-10-04		
					Rescinded	4-30-02		
					Final	3-17-00		
Steelhead-South/Central Calif Coast ESU[30]			**FT**[31]	2-06-06	Final	1-02-06		
Oncorhynchus mykiss			FT	10-17-97	Proposed	12-10-04		
					Rescinded	4-30-02		
					Final	3-17-00		
Steelhead-Southern California ESU[32]			**FE**[33]	2-06-06	Final	1-02-06	Draft	2009
Oncorhynchus mykiss			FE	10-17-97	Proposed	12-10-04		
					Rescinded	4-30-02		
					Final	3-17-00		
Steelhead-Central Valley ESU[34]			**FT**[35]	2-06-06	Final	1-02-06	Draft	2009
Oncorhynchus mykiss			FT	5-18-98	Proposed	12-10-04		
					Rescinded	4-30-02		
					Final	3-17-00		
Bull trout	SE	10-02-80	FT	12-01-99				
Salvelinus confluentus								
Delta smelt	SCE	1-16-09	FT	3-05-93	Final	12-19-94	Final	1996
Hypomesus transpacificus	**ST**	12-09-93						
Longfin smelt	**ST**[36]	3-04-09						
Spirinchus thaleichthys	SCE	2-02-08						
Eulachon – southern DPS			FPT	3-13-09				
Thaleichthys pacificus								
Mohave tui chub	SE	6-27-71	FE	10-13-70			Final	1984
Gila bicolor mohavensis								
Owens tui chub	SE	1-10-74	FE	8-05-85	Final	8-05-85	Final	1998
Gila bicolor snyderi								
Cowhead Lake tui chub			withdrawn	10-11-06				
Gila bicolor vaccaceps			FPE	3-30-98				
Tecopa pupfish (**Extinct**)	delisted	1987	delisted	1-15-82				
Cyprinodon nevadensis calidae	SE	6-27-71	FE	10-13-70				
Bonytail[37]	**SE**	1-10-74	FE	4-23-80	Final	3-21-94	Revised	2002
Gila elegans	SR	6-27-71					Revised	1990

[27] The NMFS has completed comprehensive status reviews for 27 west coast salmon & steelhead ESUs. The 6 Feb 2006 list date refers to the final designations made as a result of those status reviews. There was no change in listing status for the steelhead ESUs in California.

[28] Coastal basins from the Russian River, south to Soquel Creek, inclusive. Includes the San Francisco & San Pablo Bay basins, but excludes the Sacramento-San Joaquin River basins.

[29] The NMFS has completed comprehensive status reviews for 27 west coast salmon & steelhead ESUs. The 6 Feb 2006 list date refers to the final designations made as a result of those status reviews. There was no change in listing status for the steelhead ESUs in California.

[30] Coastal basins from the Pajaro River south to, but not including, the Santa Maria River.

[31] The NMFS has completed comprehensive status reviews for 27 west coast salmon & steelhead ESUs. The 6 Feb 2006 list date refers to the final designations made as a result of those status reviews. There was no change in listing status for the steelhead ESUs in California.

[32] Coastal basins from the Santa Maria River (inclusive), south to the U.S.-Mexico Border.

[33] The NMFS has completed comprehensive status reviews for 27 west coast salmon & steelhead ESUs. The 6 Feb 2006 list date refers to the final designations made as a result of those status reviews. There was no change in listing status for the steelhead ESUs in California.

[34] The Sacramento and San Joaquin Rivers and their tributaries.

[35] The NMFS has completed comprehensive status reviews for 27 west coast salmon & steelhead ESUs. The 6 Feb 2006 list date refers to the final designations made as a result of those status reviews. There was no change in listing status for the steelhead ESUs in California.

[36] The Fish and Game Commission made a finding that the petitioned action to list the longfin smelt as threatened is warranted. This determination still needs to be finalized the the Office of Administrative Law.

[37] Federal: Bonytail chub

	LISTING STATUS				CRITICAL HABITAT		RECOVERY PLAN	
	State	List Date	Federal	Effective List Date	Designation	Effective Date	Version	Date
Sacramento splittail *Pogonichthys macrolepidotus*			deleted[38] FT	9-22-03 3-10-99				
Colorado squawfish[39] *Ptychocheilus lucius*	SE	6-27-71	FE	3-11-67	Final	3-21-94	Revised Revised	2002 1991
Lost River sucker *Deltistes luxatus*	**SE** SR	1-10-74 6-27-67	FE	7-18-88	Proposed	12-01-94	Final	1993
Modoc sucker *Catostomus microps*	**SE** SR	10-02-80 1-10-74	FE	6-11-85	Final	6-11-85	Exempt	
Santa Ana sucker *Catostomus santaanae*			FT[40]	5-12-00	*Proposed (revised) Final	12-09-09 2-03-05		
Shortnose sucker *Chasmistes brevirostris*	**SE** SR	1-10-74 6-27-71	FE	7-18-88	Proposed	12-01-94	Final	1993
Razorback sucker *Xyrauchen texanus*	**SE** SR	1-10-74 6-27-71	FE	10-23-91	Final	3-21-94	Revised Final	2002 1998
Desert pupfish *Cyprinodon macularius*	SE	10-02-80	FE	3-31-86	Final	3-31-86	Final	1993
Cottonball Marsh pupfish *Cyprinodon salinus milleri*	ST	1-10-74						
Owens pupfish *Cyprinodon radiosus*	SE	6-27-71	FE	3-11-67			Final	1998
Thicktail chub (**Extinct**) *Gila crassicauda*	delisted SE	10-02-80 1-10-74						
Unarmored threespine stickleback *Gasterosteus aculeatus williamsoni*	SE	6-27-71	FE	10-13-70	Designation should not be made [41] Proposed	9-17-02 11-17-80	Final	1985
Tidewater goby *Eucyclogobius newberryi*			With-drawn FPD[42] **FE**	12-09-02 6-24-99 2-04-94	Final Proposed Final	3-03-08 11-28-06 11-20-00	Final	2005
Rough sculpin *Cottus asperrimus*	ST	1-10-74						
AMPHIBIANS								
California tiger salamander (central valley DPS) *Ambystoma californiense*	SCE[43]	2-10-09	FT[44]	9-03-04	Final[45] Proposed [46]	9-22-05 8-10-04		

[38] On 23 June 2000, the Federal Eastern District Court of Calif. found the final rule to be unlawful and on 22 Sept 2000 remanded the determination back to the USFWS for a reevaluation of the final decision. After a thorough review the USFWS removed the Sacramento splittail from the list of threatened species.

[39] Current nomenclature and federal listing: Colorado pikeminnow

[40] Populations in the Los Angeles, San Gabriel and Santa Ana River basins.

[41] Full explanation of this situation is given in the Federal Register notice.

[42] Proposal to delist refers to populations north of Orange County only.

[43] The state listing refers to the entire range of the species.

[44] In 2004 the California tiger salamander was listed as "threatened" statewide. The Santa Barbara County and Sonoma County Distinct Vertebrate Population Segments (DPS), formerly listed as "endangered", were reclassified to "threatened". On Aug 19 2005 U.S. District court vacated the downlisting of the Sonoma and Santa Barbara populations from "endangered" to "threatened". Therefore, the Sonoma & Santa Barbara populations are once again listed as "endangered"

	LISTING STATUS				CRITICAL HABITAT		RECOVERY PLAN	
	State	List Date	Federal	Effective List Date	Designation	Effective Date	Version	Date
California tiger salamander (Santa Barbara County DPS) *Ambystoma californiense*	(SCE)		FE [44]	9-15-00	Final[47]	11-24-04		
California tiger salamander (Sonoma County DPS) *Ambystoma californiense*	(SCE)		FE [44]	3-19-03	Proposed [48]	8-18-09 8-02-05		
Santa Cruz long-toed salamander *Ambystoma macrodactylum croceum*	SE	6-27-71	FE	3-11-67	Proposed	6-22-78	Draft	1999
Siskiyou Mountains salamander *Plethodon stormi*	SCD **ST**	9-30-05 6-27-71						
Scott Bar salamander *Plethodon asupak*	ST[49]	6-27-71						
Techachapi slender salamander *Batrachoseps stebbinsi*	ST	6-27-71						
Kern Canyon slender salamander *Batrachoseps simatus*	ST	6-27-71						
Desert slender salamander *Batrachoseps aridus*[50]	SE	6-27-71	FE	6-04-73			Final	1982
Shasta salamander *Hydromantes shastae*	ST	6-27-71						
Limestone salamander *Hydromantes brunus*	ST	6-27-71						
Black toad *Bufo exsul*[51]	ST	6-27-71						
Arroyo toad[52] *Bufo californicus*[53]			FE	1-17-95	*Proposed (Revised) Final Proposed [54] Final	10-13-05 5-13-05 2-14-05 4-27-04 3-09-01	Final	1999
California red-legged frog[55] *Rana aurora draytonii*			FT	5-20-96	Proposed [56] Final[57]	9-16-08 4-12-01	Final	2002
Mountain yellow-legged frog – Southern California DPS[58][59] *Rana muscosa*			FE	8-01-02	Final Proposed	10-16-06 9-13-05		

[45] Final rule published Aug 23, 2005 is for the central valley population only.

[46] Critical Habitat proposal published Aug 10, 2004 is for the central valley population only.

[47] Final rule published Nov 24, 2004 is for the Santa Barbara County population only.

[48] Proposed rule published Aug 2, 2005 is for the Sonoma County population only. The proposed rule published Aug 18, 2009 encompasses the same geographic area as the Aug 2, 2005 proposal.

[49] Since this newly described species was formerly considered to be a subpopulation of *Plethodon stormi*, and since *Plethodon stormi* is listed a Threatened under the California Endangered Species Act (CESA), *Plethodon asupak* retains the designation as a Threatened species under CESA.

[50] Current taxonomy: *Batrachoseps major aridus.*

[51] Current taxonomy: *Anaxyrus exsul*

[52] Former taxonomy: *Bufo microscaphus californicus.*

[53] Current taxonomy: *Anaxyrus californicus*

[54] The Federal Circuit Court vacated critical habitat for the Arroyo toad on 10-30-02. The judge instructed the USFWS to begin the process of re-designating critical habitat for this species. New critical habitat was first proposed on 4-27-04 and proposed with revisions on 2-14-05. A new final rule became effective 5-13-05.

[55] Current taxonomy: *Rana draytoni*

[56] Proposed rule is for revised Critical Habitat boundaries

[57] Due to legal action on 6 Nov 2002, most of the Critical Habitat units have been vacated. Only unit 5 (Tuolumne & Mariposa Cos) and unit 31 (Los Angeles Co) remain. The USFWS plans to propose new Critical Habitat in 2004.

	LISTING STATUS				CRITICAL HABITAT		RECOVERY PLAN	
	State	List Date	Federal	Effective List Date	Designation	Effective Date	Version	Date
REPTILES								
Desert tortoise *Gopherus agassizii*	ST	8-03-89	FT	4-02-90	Final	2-08-94	*Draft Revised Final	2008 1994
Green sea turtle *Chelonia mydas*			**FT** FE	7-28-78 10-13-70	Final	3-23-99	Revised	1998
Loggerhead sea turtle *Caretta caretta*			FT	7-28-78	Proposed	3-19-80	Revised	1998
Olive (=Pacific) Ridley sea turtle *Lepidochelys olivacea*			FT	7-28-78	Proposed	3-19-80	Revised	1998
Leatherback sea turtle *Dermochelys coriacea*			FE	6-02-70	*Proposed (Revised) Final	1-05-10 3-23-99	Revised	1998
Barefoot banded gecko[60] *Coleonyx switaki*	ST	10-02-80						
Coachella Valley fringe-toed lizard *Uma inornata*	SE	10-02-80	FT	9-25-80	Final	9-25-80	Final	1985
Blunt-nosed leopard lizard *Gambelia silus*[61]	SE	6-27-71	FE	3-11-67			Final	1998
Flat-tailed horned lizard *Phrynosoma mcallii*			Withdrawn[62] FPT[63]	6-28-06 11-29-93				
Island night lizard *Xantusia riversiana*			FT	8-11-77			Final	1984
Southern rubber boa *Charina bottae umbratica*[64]	ST	6-27-71						
Alameda whipsnake *Masticophis lateralis euryxanthus*	ST	6-27-71	FT	12-05-97	Final Proposed[65] Vacated[66] Final	11-01-06 10-18-05 5-09-03 10-03-00	Draft	2003
San Francisco garter snake *Thamnophis sirtalis tetrataenia*	SE	6-27-71	FE	3-11-67			Final	1985
Giant garter snake *Thamnophis couchi gigas*[67]	ST	6-27-71	FT	10-20-93			Draft	1999

[58] Federal listing refers to the distinct population segment (DPS) in the San Gabriel, San Jacinto & San Bernardino Mountains only.
[59] The current common name for this species is Sierra Madre yellow-legged frog.
[60] Current nomenclature: Barefoot gecko.
[61] Current taxonomy: *Gambelia sila.*is the scientific name and bluntnose leopard lizard is the common name
[62] On June 28, 2006 the USFWS determined that the posposed listing was not warranted and the proposed rule that had been reinstated on Nov 17, 2005 was withdrawn.
[63] On November 17, 2005, the U. S. District Court for the District of Arizona vacated the January 3, 2003 withdrawal of the proposed rule to list the flat-tailed horned lizard and reinstated the 1993 proposed rule.
[64] Current taxonomy: *Charina umbratica.*
[65] The proposed rule redesignates Critical Habitat that was vacated in 2003.
[66] Due to legal action on 9 May 2003, the Critical Habitat designation has been completely vacated; there is currently no Critical Habitat for Alameda whipsnake.
[67] Current taxonomy and Federal listing: *Thamnophis gigas.*

	LISTING STATUS				CRITICAL HABITAT		RECOVERY PLAN	
	State	List Date	Federal	Effective List Date	Designation	Effective Date	Version	Date
BIRDS								
Short-tailed albatross *Phoebastria albatrus*			FE	8-30-00			Final	2009
California brown pelican[68] (**Recovered**) *Pelecanus occidentalis californicus*	**delisted** SE	6-03-09 6-27-71	***delisted** FE	12-17-09 2-20-08 10-13-70			Final	1983
Aleutian Canada goose **(Recovered)** *Branta canadensis leucopareia*[69]			**delisted** FT FE	3-20-01 12-12-90 3-11-67			Final	1991
California condor *Gymnogyps californianus*	SE	6-27-71	FE	3-11-67	Final	9-22-77	Revised	1996
Bald eagle *Haliaeetus leucocephalus*	**SE**(rev) SE	10-02-80 6-27-71	**delisted**[70] FT FE(rev) FE	8-08-07 7-06-99 8-11-95 2-14-78 3-11-67			Final	1982
Swainson's hawk *Buteo swainsoni*	ST	4-17-83						
American peregrine falcon **(Recovered)** *Falco peregrinus anatum*	**delisted** SE	11-04-09 6-27-71	**delisted** FE	8-25-99 6-02-70	Final	9-22-77	Final	1982
Arctic peregrine falcon **(Recovered)** *Falco peregrinus tundrius*			**delisted** FT FE	10-05-94 3-20-84 6-02-70				
California black rail *Laterallus jamaicensis coturniculus*	ST	6-27-71						
California clapper rail *Rallus longirostris obsoletus*	SE	6-27-71	FE	10-13-70			Final	1984
Light-footed clapper rail *Rallus longirostris levipes*	SE	6-27-71	FE	10-13-70			Revised Final	1985 1979
Yuma clapper rail *Rallus longirostris yumanensis*	**ST** SE	2-22-78 6-27-71	FE	3-11-67			Final	1983
Greater sandhill crane *Grus Canadensis tabida*	ST	4-17-83					Draft (state)	
Western snowy plover[71] *Charadrius alexandrinus nivosus*			FT	4-05-93	Final Proposed Final	10-31-05 8-16-05 12-07-99[72]	Final Draft	2007 2001
California least tern *Sterna antillarum browni*	SE	6-27-71	FE	10-13-70			Revised Final	1985 1980
Marbled murrelet *Brachyramphus marmoratus*[73]	SE	3-12-92	FT	9-30-92	Proposed[74] Final	7-31-08 5-24-96	Final	1997

[68] Federal: Brown pelican, *Pelecanus occidentalis.*
[69] Current taxonomy: *Branta hutchinsii leucopareia*, and common name is now cackling goose.
[70] The Post-delisting Monitoring Plan will monitor the status of the bald eagle over a 20 year period with sampling events held once every 5 years.
[71] Federal status applies only to the Pacific coastal population.
[72] The Dec 7, 1999 designation was remanded & partially vacated by the US District Court for the District of Oregon on July 2, 2003.
[73] Federal: *Brachyramphus marmoratus marmoratus* with a proposal (7-31-08) to change the name to *Brachyramphus marmoratus*.
[74] Proposed rule to revise the previously designated Critical Habitat.

	LISTING STATUS				CRITICAL HABITAT		RECOVERY PLAN	
	State	List Date	Federal	Effective List Date	Designation	Effective Date	Version	Date
Xantus's murrelet *Synthliboramphus hypoleucus*	ST[75]	12-22-04						
Western yellow-billed cuckoo *Coccyzus americanus occidentalis*	**SE** ST	3-26-88 6-27-71						
Elf owl *Micrathene whitneyi*	SE	10-02-80						
Northern spotted owl *Strix occidentalis caurina*			FT	6-22-90	Final Proposed Final	9-12-08 6-17-07 1-15-92	*Final Draft	2008 2007
Great gray owl *Strix nebulosa*	SE	10-02-80						
Gila woodpecker *Melanerpes uropygialis*	SE	3-17-88						
Gilded northern flicker[76] *Colaptes auratus chrysoides*	SE	3-17-88						
Willow flycatcher *Empidonax traillii*	SE[77]	1-02-91						
Southwestern willow flycatcher *Empidonax traillii extimus*	(SE)		FE	3-29-95	Final Proposed Final[78]	11-18-05 10-12-04 7-22-97	Final	2002
Bank swallow *Riparia riparia*	ST	6-11-89					Final (state)	1993
Coastal California gnatcatcher *Polioptila californica californica*			FT	3-30-93	Final Proposed[79] Final	1-18-08 4-24-03 10-24-00	Exempt	
San Clemente loggerhead shrike *Lanius ludovicianus mearnsi*			FE	8-11-77			Final	1984
Arizona Bell's vireo *Vireo bellii arizonae*	SE	3-17-88						
Least Bell's vireo *Vireo bellii pusillus*	SE	10-02-80	FE	5-02-86	Final	2-02-94	Draft	1998
Inyo California towhee[80] *Pipilo crissalis eremophilus*	SE	10-02-80	FT	8-03-87	Final	8-03-87	Final	1998
San Clemente sage sparrow *Amphispiza belli clementeae*			FT	8-11-77			Final	1984
Belding's savannah sparrow *Passerculus sandwichensis beldingi*	SE	1-10-74						
Santa Barbara song sparrow **(Extinct)** *Melospiza melodia graminea*			**delisted** FE	10-12-83 6-04-73				

[75] The Fish and Game Commission determined that Xantus's murrelet should be listed as a Threatened species February 24, 2004. As part of the normal listing process, this decision was reviewed by the Office of Administrative Law. The listing became effective on Dec 22, 2004.

[76] Current taxonomy: Gilded flicker (*Colaptes chrysoides*).

[77] State listing includes all subspecies.

[78] On May 11, 2001 the 10th Circuit Court of Appeals vacated the previously designated Critical Habitat

[79] Due to court order the previously designated critical habitat was vacated and the USFWS was directed to re-propose critical habitat.

[80] Federal: Inyo California (=brown) towhee.

	LISTING STATUS				CRITICAL HABITAT		RECOVERY PLAN	
	State	List Date	Federal	Effective List Date	Designation	Effective Date	Version	Date
MAMMALS								
Buena Vista Lake shrew *Sorex ornatus relictus*			FE[81]	4-05-02	Final Proposed	2-23-05 8-19-04	Final	1998
Lesser long-nosed bat *Leptonycteris yerbabuenae*			FE	10-31-88			Final	1997
Riparian brush rabbit *Sylvilagus bachmani riparius*	SE	5-29-94	FE	3-24-00			Final	1998
Point Arena mountain beaver *Aplodontia rufa nigra*			FE	12-12-91			Final	1998
San Joaquin antelope squirrel[82] *Ammospermophilus nelsoni*	ST	10-02-80						
Mohave ground squirrel[83] *Spermophilus mohavensis*	ST	6-27-71						
Pacific pocket mouse *Perognathus longimembris pacificus*			FE	9-26-94			Final	1998
Morro Bay kangaroo rat *Dipodomys heermanni morroensis*	SE	6-27-71	FE	10-13-70	Final	8-11-77	Draft revision Final	2000 1982
Giant kangaroo rat *Dipodomys ingens*	SE	10-02-80	FE	1-05-87			Final	1998
Stephens' kangaroo rat *Dipodomys stephensi*[84]	ST	6-27-71	FE	9-30-88				
San Bernardino kangaroo rat *Dipodomys merriami parvus*			FE[85]	9-24-98	Final[86] Final	11-17-08 5-23-02		
Tipton kangaroo rat *Dipodomys nitratoides nitratoides*	SE	6-11-89	FE	7-08-88			Final	1998
Fresno kangaroo rat *Dipodomys nitratoides exilis*	**SE** SR	10-02-80 6-27-71	FE	3-01-85	Final	1-30-85	Final	1998
Salt-marsh harvest mouse *Reithrodontomys raviventris*	SE	6-27-71	FE	10-13-70			Final	1984
Amargosa vole *Microtus californicus scirpensis*	SE	10-02-80	FE	11-15-84	Final	11-15-84	Final	1997
Riparian woodrat *Neotoma fuscipes riparia*			FE[87]	3-24-00			Final	1998
Sierra Nevada red fox *Vulpes vulpes necator*	ST	10-02-80						
San Joaquin kit fox *Vulpes macrotis mutica*	ST	6-27-71	FE	3-11-67			Final	1998
Island fox *Urocyon littoralis*	ST[88]	6-27-71						
San Miguel Island Fox *Urocyon littoralis littoralis*	(ST)		FE	4-05-04	Final[89] (none) Proposed[90]	12-09-05 10-07-04		

[81] Federal: Buena Vista Lake ornate shrew
[82] Current taxonomy: Nelson's antelope squirrel
[83] Current taxonomy: Xerospermophilus mohavensis
[84] Federal: includes *Dipodomys cascus.*
[85] Federal: San Bernardino Merriam's kangaroo rat
[86] This final revised designation constitutes a reduction of approximately 25,516 acres from the 2002 designation of Critical Habitat.
[87] Federal: Riparian (=San Joaquin Valley) woodrat
[88] State listing includes all 6 subspecies on all 6 islands. Federal listing is for only 4 subspecies on 4 islands

	LISTING STATUS				CRITICAL HABITAT		RECOVERY PLAN	
	State	List Date	Federal	Effective List Date	Designation	Effective Date	Version	Date
Santa Rosa Island Fox *Urocyon littoralis santarosa*	(ST)		FE	4-05-04	Final [89] (none) Proposed [90]	12-09-05 10-07-04		
Santa Cruz Island Fox *Urocyon littoralis santacruzae*	(ST)		FE	4-05-04	Final [89] (none) Proposed [90]	12-09-05 10-07-04		
Santa Catalina Island Fox *Urocyon littoralis catalinae*	(ST)		FE	4-05-04	Final [89] (none) Proposed [90]	12-09-05 10-07-04		
Guadalupe fur seal *Arctocephalus townsendi*	ST	6-27-71	**FT** FE	1-15-86 3-11-67			Draft (revised)	2007
Stellar (=northern) sea lion *Eumetopias jubatus*			FT	4-05-90	Final	3-23-99	Revised Final	2008 1992
Wolverine *Gulo gulo*	ST	6-27-71						
Southern sea otter *Enhydra lutris nereis*			FT	1-14-77			Revised Final	2003 1981
Pacific fisher *Martes pennanti(pacifica)* DPS	SCT or SCE[91]							
Gray whale **(Recovered)** *Eschrichtius robustus*			delisted FE	6-15-94 6-02-70				
Sei whale *Balaenoptera borealis*			FE	6-02-70				
Blue whale *Balaenoptera musculus*			FE	6-02-70			Final	1998
Fin whale *Balaenoptera physalus*			FE	6-02-70			Draft	2006
Humpback whale[92] *Megaptera novaeangliae*			FE	6-02-70			Final	1991
Right whale[93] *Eubalaena japonica*[94]			FE	6-02-70			Final	1991
Sperm whale *Physeter macrocephalus*			FE	6-02-70			Draft	2006
Killer whale (Southern resident DPS) *Orcinus orca*			FE[95] FE	4-04-07 2-16-06 12-22-04			Final	2008
California (=Sierra Nevada) bighorn sheep *Ovis canadensis californiana*[96]	**SE** ST	8-27-99 6-27-71	FE	1-03-00	Final Proposed	9-04-08 7-25-07	*Final Draft	2008 2003

[89] The USFWS did not find any habitat on the 4 islands occupied by the foxes that meets the definition of Critical Habitat under the Act. Therefore, the final rule does not designate any Critical Habitat

[90] The USFWS did not find any habitat on the 4 islands occupied by the foxes that meets the definition of Critical Habitat under the Act. Therefore, the proposal is that zero Critical Habitat be designated.

[91] The Fish and Game Commission notice of finding states that the Pacific fisher is a candidate for listing as either an endangered or a threatened species.

[92] Also known as Hump-backed whale.

[93] Also known as Black right whale.

[94] The scientific name was clarified in the Federal Register Vol. 68, No. 69 April 10, 2003.

[95] The killer whale was listed as endangered by the NMFS on Feb 16, 2006 and by the USFWS on Apr 4, 2007.

[96] Current & Federal taxonomy: Sierra Nevada bighorn sheep (*Ovis canadensis sierrae)*

	LISTING STATUS				CRITICAL HABITAT		RECOVERY PLAN	
	State	List Date	Federal	Effective List Date	Designation	Effective Date	Version	Date
Peninsular bighorn sheep DPS[97] *Ovis canadensis cremnobates*	ST	6-27-71	FE	3-18-98	Final	5-14-09	Final	2000
					Proposed (Revised)	10-10-07		
					Final	3-05-01		

[97] Current taxonomy: the subspecies *O.c. cremnobates* has been synonymized with *O.c. nelsoni.* Peninsular bighorn sheep are now considered to be a Distinct Vertebrate Population Segment (DPS).

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MS4 Permit Improvement Guide

U.S. ENVIRONMENTAL PROTECTION AGENCY

OFFICE OF WATER

OFFICE OF WASTEWATER MANAGEMENT

WATER PERMITS DIVISION

APRIL 2010

EPA 833-R-10-001

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

APR 14 2010

OFFICE OF WATER

Dear NPDES Stormwater Managers,

I am pleased to announce that the Environmental Protection Agency (EPA) has completed the "Municipal Separate Storm Sewer System Permit Improvement Guide." The primary purpose of this guidance document is to assist National Pollutant Discharge Elimination System (NPDES) permit writers in strengthening municipal separate storm sewer system (MS4) permits.

This Guide contains examples of permit conditions and supporting rationale that could be used in fact sheets that accompany NPDES permits. The Guide also includes recommendations for permit writers on how to tailor the language depending on the type of permit. For example, permits covering traditional municipalities may contain different permit provisions than those covering non-traditional entities like departments of transportation, universities, and prisons.

I ask that permit writers review the permit language and corresponding discussion presented in this Guide and consider how to incorporate this, or similar, language into their MS4 permits. Some modification of the language may be necessary to make it suitable for use with specific MS4 permits, and to better tailor it to meet the needs and goals of the various permitting authorities.

The permit language suggested in this Guide is not intended to override already existing, more stringent or differently-worded provisions that are equally as protective in meeting the applicable regulations. EPA expects the permitting authority to continue to make significant progress and ensure that the intent of the regulations or more stringent requirements is captured in the permit.

In addition, EPA would like to particularly stress the following key principles:

- Permit provisions should be clear, specific, measurable, and enforceable. Permits should include specific deadlines for compliance, incorporate clear performance standards, and include measurable goals or quantifiable targets for implementation.
- Permits should contain a performance standard for post-construction that is based on the objective of maintaining or restoring stable hydrology to protect water quality of receiving waters or another mechanism as effective.

EPA has begun a rulemaking to strengthen the stormwater program. Using this Guide to improve permits represents the direction that EPA is taking to strengthen the program. This Guide is a living document that will be updated as new information for improving the stormwater program is obtained.

I appreciate your continued efforts in strengthening the NPDES municipal stormwater program. If you have any questions about this Guide or suggestions for further improvements, please contact Rachel Herbert of my staff at herbert.rachel@epa.gov or call her at 202-564-2649.

Sincerely,

Linda Y. Boornazian

Linda Y. Boornazian, Director
Water Permits Division

CC: State Stormwater Coordinators
Association of State and Interstate Water Pollution Control Administrators

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INTRODUCTION & GETTING STARTED

Purpose

The primary purpose of the MS4 Permit Improvement Guide (Guide) is to assist National Pollutant Discharge Elimination System (NPDES) permit writers in strengthening municipal separate storm sewer system (MS4) stormwater permits. The objective of the Guide is to facilitate the creation of MS4 permits which are clear, consistent with applicable regulations, and enforceable. This Guide contains examples of permit conditions and supporting rationale that could be used in fact sheets that accompany NPDES permits. Permit language should include controls that identify specific actions permittees must perform to comply with the Permit Requirements.

This Guide focuses in large part on permits for small (Phase II) MS4s. However, while the contents of the Guide are generally organized consistent with the six minimum control measures (40 CFR 123.34(b)) applicable to Phase II MS4 permits, however, permit writers may find this Guide useful for Phase I MS4 permits. In addition, the Guide specifically addresses Phase I MS4 Permit Requirements with regard to the industrial program elements set forth in the Phase I regulations at 40 CFR 122.26(d)(2)(ii) and (iv)(C). These are addressed in Chapter 7. The Guide may also be useful for "non-traditional" MS4 permittees, such as departments of transportation (DOTs), universities and prisons.

EPA has developed a Stormwater Phase II Final Rule Fact Sheet Series (www.epa.gov/npdes/stormwater/swfinal) to assist permitting authorities and permittees in understanding the Phase II regulations. Further, EPA has developed the National Menu of Stormwater Best Management Practices (www.epa.gov/npdes/stormwater/menuofbmps) which provides descriptive information in fact sheets about various best management practices associated with the Phase II six minimum control measures.

The Guide was created by reviewing numerous MS4 permits and fact sheets from around the country. Some of the example permit and fact sheet language presented in this Guide has been adapted from these permits; in those instances where existing language that meets the purpose of this document was not available, EPA has crafted new language.

Contents of this Guide

This document is divided into parts, as noted above, based largely on the six minimum control measures required in the Phase II stormwater regulations (see 40 CFR 122.34(b)). Chapters 1 -6 address development and implementation of a stormwater management program (SWMP) and the six minimum control measures that must be included in the SWMP. Chapter 7 addresses industrial facilities programs relevant for Phase I MS4 permits. Chapter 8, Overall Evaluation and Adaptive Management, discusses reporting, evaluation, and tracking requirements. This Guide does not focus on the water quality provisions of the Clean Water Act, which may require more stringent requirements than those programmatic elements specified here.

Each chapter opens with an introduction providing a brief overview of relevant regulatory requirements pertaining to the subject of the chapter. Each chapter is then divided into sections in which the following topics are addressed:

- *Example Permit Provision* – This section includes example MS4 permit language. The language has been formatted and numbered in such a way that each section corresponds directly to a permit structured in accordance with the chapter sequence of this Guide. EPA developed these examples by first surveying existing EPA and State MS4 permit language and drawing upon agency experience in implementing permits. EPA has identified the source of the language (in footnotes) if adapted from specific permits.
- *Example Permit Requirement Rationale for the Fact Sheet* – This section describes the rationale for the example permit provision. This language can assist the permit writer in developing the fact sheet, which accompanies all NPDES permits; however, it is up to the permit writer to ensure that a complete and customized version of the fact sheet accompanies the permit. Example Permit Requirement Rationale for the Fact Sheet sections often describe "requirements" or steps that "must" be taken. To the extent this language is used in these sections, it is intended to describe requirements included in the example permit provisions. It does not mean that all permits "must" include the specific "requirement" described.
- *Recommendations for the Permit Writer* (included where appropriate) – This section discusses issues the permit writer should consider in determining how to use the example permit provisions.

How to Use this Guide

This guidance includes "example" MS4 permit language for specific program elements, but is not intended to be definitive or comprehensive for all MS4 Permit Requirements.[1] EPA recommends that permit writers review the example permit language presented in this guide and consider how to incorporate this, or similar, language into MS4 permits as appropriate. Each state may have different NPDES requirements along with varied experience overseeing MS4 programs, and MS4 permittees vary widely in storm water management experience and sophistication, size, topography, precipitation patterns, land use, receiving water conditions and other factors. In most instances, EPA anticipates that permit writers will modify the language to make it suitable for specific MS4 permits, and to tailor example provisions to meet the various needs and goals that apply.

When possible, this Guide has tried to provide examples that can be used for both Phase I and Phase II permits. However, in some instances EPA has provided suggestions for how the language can be tailored to better fit within the context of a Phase I or Phase II permit. In addition, EPA acknowledges that some language presented in this Guide may be more suitable for an individual permit rather than a general permit. While EPA has presented a discussion for ways the language could be altered to fit these scenarios in Recommendations for the Permit Writer sections, it is up to the permit writer to determine the best use of the material for the permit being crafted.

[1] For example, the guide does not explicitly address provisions for compliance with CWA section 402(p)(3)(B)(ii), water quality standards, applicable wasteload allocations in TMDLs or such other conditions as the permitting authority deems necessary. For information on integrating TMDLs into stormwater permits see USEPA's DRAFT TMDLs to Stormwater Handbook (www.epa.gov/owow/tmdl/stormwater)

The example permit language in this Guide has been written as if the permit is a reissued permit and not an initial permit, since most MS4 permittees have been subject to NPDES permits for at least one permit term. Requirements to develop the initial SWMP are not included in this Guide since they would have been included in the first permit term. It is important that permit writers consider the different stages in the development and implementation of SWMPs when establishing permit conditions as well as the experience learned from other more advance programs. So, for example, this Guide includes brackets to indicate the place for an appropriate schedule or deadline rather than indicating specific timeframes in all instances. These examples are available to the permit writer, along with other resources such as the permittee's draft or existing SMWP document, annual reports, prior permit experience, receiving water quality information and the permit writer's best professional judgment, to issue permits suitable for their specific MS4s.

The permit language suggested in this Guide is not intended to override already existing, more stringent or differently-worded provisions that are equally as compliant in meeting the applicable regulations and protective of water quality standards. EPA expects the permitting authority to ensure that the intent of all applicable regulations is captured in the permit. States with more stringent permit provisions should continue to strengthen these provisions as the permits are reissued. This Guide includes suggestions on how to develop permit language for MS4 permittees. This Guide does not impose any new legally binding requirements on EPA, States, or the regulated community, and does not confer legal rights or impose legal obligations upon any member of the public. In the event of a conflict between the discussion in this Guide and any statute, regulation, or permit the statute, regulation or permit controls.

Terminology: SWMP and SWMP Document
This guide uses the term SWMP to refer to the stormwater management program that is required by the Phase I and Phase II regulations to be developed by MS4 permittees. The SWMP document is the written plan that is used to describe the various control measures and activities the permittee will undertake to implement the stormwater management program.

Preparing to Write an MS4 Permit

Most Phase II MS4 permittees are regulated under a general permit (with some exceptions where individual permits have been used for Phase II and non-traditional MS4 permittees). Phase I MS4 permittees are regulated under individual permits, and can include multiple co-permittees. EPA regulations require that initial MS4 permits (i.e. first permit term) set the foundation of the permittee's SWMP. For Phase II MS4 the focus is on the six minimum control measures in 40 C.F.R. 122.34(b), while the Phase I MS4 permittees are informed by the regulations at 40 C.F.R. 122.26(d). See Chapter 1 of this Guide.

As the permit writer prepares to reissue an MS4 permit, regardless of whether the permit is an individual or general permit, EPA recommends that the permit writer review, at a minimum, the following sources of information:

Past annual reports
For currently regulated MS4s, annual reports submitted by the permittee can include information that will help permit writers develop more specific and measurable Permit Requirements. The most recent annual report is usually the most helpful to review, but additional annual reports can be reviewed if time allows. If the permit writer is developing a general permit, a broad selection of

annual reports from various permittees should be reviewed. In particular, EPA recommends that the permit writer review, at a minimum, the following specific information:

Areas of obvious strengths or weaknesses in the SWMP

- For example, is the permittee vague about specific activities (often an indicator of a weak program area), or is the permittee clearly meeting the requirements of the permit and/or going above and beyond the minimum requirements?

Trends or common compliance problems

- For example, does the permittee analyze the data to assess the most common compliance problems, and then modify their controls/programs to address these problems? For example, do they use the common compliance issues identified to target their training and outreach/education efforts for construction operators?

Level of implementation of SWMP activities (e.g., frequency and numbers of inspections, frequency of catch basin cleaning, street sweeping)

- Does the permittee report the total universe when reporting the quantity of an activity achieved? For example, if the MS4 is required to conduct industrial inspections, does it report it did 100 inspections (which may be good or bad, depending on how many it was required to inspect), or that it did 100 out of 5,000 (only 2% of the total)?

Water quality priorities for the permittee (e.g. impaired waters, TMDLs, high quality waters)

- Does the permittee's annual report describe priority pollutants for impaired waters and other water quality programs and what was done to reduce and/or eliminate their contact with stormwater? Does the SWMP target both impaired and high quality waters?

Specific sources or pollutants of concern permittee is currently focusing on

- Does the SWMP target pollutants of concern in its activities?

Level and type of enforcement currently being used by permittee

- Does the annual report provide data and summary information on the different types of enforcement actions taken (how many verbal warnings, written notes, fines, etc)?

Any trends (i.e. water quality, compliance, control measure implementation levels) being reported by Permittees which indicate success or failure of particular SWMP components

- Does the permittee analyze the data, or just report the data in the MS4 annual report?

Types of measurable goals being applied and achieved by permittees

- Has the permittee met the measurable goals stated in the permit and SWMP?

Stormwater management program (SWMP)
Review the most current SWMP documents for potential gaps that may need to be specifically addressed in the reissued MS4 permit. EPA's *MS4 Program Evaluation Guidance* (available at www.epa.gov/npdes/pubs/ms4guide_withappendixa.pdf) can be used to assess the key elements in a SWMP.

NPDES MS4 audit reports, construction/industrial/commercial site inspection reports
Review the findings from any MS4 audits conducted during the past permit term to help identify key issues that should be addressed in the next permit. For example, if the audits identified weak or missing program elements and other controls, these should be addressed in the reissuance of the permit. Construction, industrial, and/or commercial site inspection reports for facilities within the MS4's boundary should be reviewed to determine if there are common compliance issues that should be addressed in the MS4 permit (for example, more training, more frequent inspections, more complete inventory or prioritization, etc.).

Monitoring/Information on Quality of Receiving Waters
Review any monitoring data collected by the permittee or any other entity that has collected useful monitoring data to identify potential pollutants of concern. In addition, the most recent information on impaired waters and total maximum daily loads (TMDLs) for the permit area should be reviewed. If there are waste load allocations (WLAs) applicable to the permittee, these should be addressed in the permit. If no WLA has been assigned to the MS4, the permit writer should still consider pollutants of concern identified in 303(d) lists and TMDLs when developing Permit Requirements. Such information will help identify whether more targeted permit conditions are needed to reduce the discharge of these pollutants. This Guide does not specifically address the inclusion of TMDL requirements in MS4 permits.

Permit renewal application data or past notice of intent (NOI) information
Review any permit renewal applications or NOIs submitted to establish coverage for the previous permit term. Permit writers should consider the recommendations made in the EPA "Interpretive Policy Memorandum on Reapplication Requirements for Municipal Separate Storm Sewer Systems" (www.epa.gov/npdes/pubs/owm0125.pdf) published in 1996 (40 CFR Part 122; Federal Register, Volume 61, Number 155). This document provides information which clarifies the MS4 reapplication requirements and explains that MS4 permit applicants and NPDES permit writers have discretion to customize appropriate and streamlined reapplication requirements on a case-by-case basis.

Previous MS4 permit
Finally, review any past MS4 permits to identify where permit language should be revised or completely rewritten, for example, because language was vague. This MS4 permit improvement Guide should be used help strengthen key areas in the permit.

Note that if the MS4 permit is being issued for the first time, some of the above information will not exist yet, such as past annual reports or old SWMP documents.

MS4 Permit Writing Tips

There are a few general tips to keep in mind when writing MS4 permits. First, and most importantly, permit provisions should be clear, specific, measurable, and enforceable. Permits should include specific

deadlines for compliance, incorporate clear performance standards, and include measurable goals or quantifiable targets for implementation. Doing so will allow permitting authorities to more easily assess compliance, and take enforcement actions as necessary.

For example, the following permit provision could be strengthened: "The permittee shall demonstrate compliance with this Permit through the timely implementation of control measures and other actions to reduce pollutants in discharges to the maximum extent practicable in accordance with their SWMP…" This permit provision does not define what "timely implementation" is, allowing the permittee to determine what is timely. Timely implementation could be, although it probably was not intended to be, interpreted as meaning up to five years, or it could mean that implementation must occur within six months. In addition, "other actions" are mentioned in this provision, but they are never described. If a permit requires "other actions," these actions should be specifically described in the permit. Finally, it is important to strike a balance of providing specific Permit Requirements while still allowing the permittee come up with innovative controls.

In addition, vague phrases such as "as feasible" and "as possible" should be avoided because they result in inconsistent implementation by permittees and difficulties in permit authority oversight and enforcement. The permit writer's role is to determine what is necessary to achieve in a permit term, and to develop clear, enforceable language that conforms to these determinations. Accordingly, the permit should set forth objective standards, criteria or processes, which will aid the permittee in complying with the permit, as well as the permitting authority in determining compliance in the MS4 permit.

In order for permit language to be clear, specific, measurable and enforceable, each Permit Requirement will ideally specify:

- *What* needs to happen
- *Who* needs to do it
- *How much* they need to do
- *When* they need to get it done
- *Where* it is to be done

For each Permit Requirement: "What" is usually the stormwater control measure or activity required. "Who" in most cases is implied as the permittee (although in some cases the permitting authority may need to specify who exactly will carry out the requirement if there are co-permittees). "How much" is the performance standard the permittee must meet (e.g., how many inspections). "When" is a specific time (or a set frequency) when the stormwater control measure or activity must be completed. "Where" indicates the specific location or area (if necessary). These questions will help determine compliance with the permit requirement.

The Use of Partnerships in MS4 Permits

Since the Phase II Rule applies to all small MS4s within an urbanized area regardless of political boundaries it is very likely that multiple governments and agencies within a single geographic area are subject to MS4 permitting requirements. For example, a city government that operates a small MS4 within an urbanized area may obtain permit coverage under a general Phase II permit while other MS4s in the same vicinity (such as a county, other cities, or a state DOT) may have individual Phase I MS4 permits. All permittees are responsible for permit compliance in their permitted area. Given the

potential for overlapping activities in close proximity, EPA encourages permittees in a geographic area to establish cooperative agreements in implementing their stormwater programs. Partnerships and agreements between permittees and/or other agencies can minimize unnecessarily repeating activities and result in using available resources as efficiently as possible. Using existing tools and programs instead of creating new ones can allow permittees to focus resources on high priority program components instead. In addition by forming partnerships, water quality can be examined and improved on a larger, consolidated scale rather than on a piece-meal, site-by-site basis.

In addition to requiring MS4 permittees to maintain records of program implementation such as inspection forms, monitoring data, dry weather screening reports, and notices of violation, EPA recommends that MS4 permits include requirements for permittees to summarize and analyze data and submit the analysis to the permitting authority. For example, as permittees are required to evaluate program compliance and appropriateness of best management practices, the permit could require permittees to address in annual reports questions such as:

- For illicit discharge data, what are the most prevalent sources and pollutants in the illicit discharge data, and where are these illicit discharges occurring? How many illicit discharges have been identified, and how many of those have been resolved? How many outfalls or screening points were visually screened, how many had dry weather discharges or flows, at how many were field analyses completed and for what parameters, and at how many were samples collected and analyzed? Does the permittee need to conduct more inspections in these areas, or develop more specific outreach targeting these sources and pollutants?
- For the construction data, what are the most common construction violations, and are there any trends in the data (e.g., construction operators who receive more violations than others, areas of the MS4 with more violations, need to refine guidance or standards to more clearly address common violations) How has the permittee responded to these trends? Over the last year, how many construction site SWPPP reviews were completed and approved? How many inspections were conducted, how many noncompliant sites were identified, and how many enforcement actions (and of what type) were taken?

Also, although the stormwater Phase II rule requires reports, after the first permit term, reports are required to be submitted only in years two and four of the permit term. EPA strongly encourages annual reports for all permittees. (See 40 CFR 122.34(g)(3))

CHAPTER 1: ESTABLISHMENT OF THE STORMWATER MANAGEMENT PROGRAM

Introduction

An over-arching legal authority framework must be established in order for the SWMP to be effective. Ensuring that the permittee has established the legal authority to meet the requirements of the permit, created a well described enforcement response plan (ERP), and allocated adequate resources will set a necessary foundation for the SWMP.

Included Concepts

- Requirement to develop a stormwater management program
- Necessary legal authority
- Enforcement Measures and Tracking
- Adequate resources

Legal Authority

Permittees must have the authority to carry out all aspects of their stormwater management programs, including requiring the control of pollutants flowing into the MS4 system, having access to inspect sources of pollutant discharges, and being able to compel compliance and issue citations in the event of violations. Legal authority is especially critical for construction site runoff control, post-construction/permanent runoff control, industrial and commercial inspections, and illicit discharge detection and elimination programs. (See 40 CFR 122.26(d)(2)(i) and 40 CFR 122.34(b)(3)(ii)(B), (b)(4)(ii)(A), and (b)(5)(ii)(B))

A permittee seeking permit coverage under individual permits is required to describe the legal authority it has to implement and enforce the SWMP. EPA recommends that general permits also require regulated MS4s to describe their applicable legal authority in their Notices of Intent (NOIs) (40 CFR 122.26(d)(2)(i), 122.33(b)). This legal authority is typically established through the adoption of one or more ordinances, or by modifying existing ordinances to provide the necessary authority. In some cases, a permittee might already have codified water quality provisions to address previous MS4 Permit Requirements; in this case, the permittee should be required to review existing codes and ordinances and prepare a statement detailing any necessary changes required to address the new MS4 permit requirements. Some permittees, such as, DOTs, universities, and prisons, may not have the authority to create and enforce ordinances. For these entities other mechanisms and authorities that they do possess should be utilized (e.g. DOT right-of-way permits).

Enforcement Measures and Tracking

Permittees are required by the Phase I and Phase II regulations to include in their ordinance, or other regulatory mechanism, penalty provisions to ensure compliance with construction and industrial requirements, to require the removal of illicit discharges, and to address noncompliance with post-construction requirements. In complying with these requirements, EPA recommends the use of enforcement responses that vary with the type of permit violation, and escalate if violations are repeated or not corrected. EPA recommends that the permittee be required to develop and implement an enforcement response plan (ERP), which clearly describes the action to be taken for common violations associated with the construction program, industrial and commercial program, or other SWMP programs. A well-written ERP provides guidance to inspectors on the different enforcement

responses available, actions to address general permit non-filers, when and how to refer violators to the State, and how to track enforcement actions.

Adequate Resources

Each permittee will fund its SWMP differently; therefore, in order to assess whether adequate resources have been allocated to carry out the requirements of the MS4 permit, the permitting authorities should require their permittees to submit an accounting of stormwater-related budgets, costs, and staffing resources updated annually. The fiscal analysis should document and explain changes to budgets from year to year and describe how each type of funding can and cannot be used for stormwater program activities. (See 40 CFR 122.26(d)(2)(vi)).

1.1 Requirement to Develop a Stormwater Management Program

Example Permit Provision

1.1.1 Requirement to Develop Program – The permittee must revise and update its written stormwater management program (SWMP) document and submit the SWMP to the [*insert name of Permitting Authority*] for review by [*insert deadline, e.g., within one year of permit issuance*]. The permittee must continue to implement the current SWMP until the revised SWMP is submitted. The SWMP does not contain effluent limitations; the limitations are contained in Parts [*insert relevant part of the permit*] of the permit.

1.1.2 Contents of the SWMP document – At a minimum, the permittee must include the following information in its SWMP document:

a. Ordinances, or other regulatory mechanisms, providing the legal authority necessary to implement and enforce the requirements of this permit (see Part 1.1);

b. Statement by the permittee's legal counsel certifying to adequacy of legal authority (see Part 1.2);

c. Written procedures describing how the permittee will implement provisions described in Parts 2-8.

1.1.3 Modifications to the SWMP document – The [*insert applicable name of permitting authority*]may notify the permittee of the need to modify the SWMP document to be consistent with the permit, in which case the permittee will have [*insert deadline, e.g. 90 days*] to finalize such changes to the program. The permittee is required to keep the SWMP document up to date during the term of the permit. Where the permittee determines that modifications are needed to address any procedural, protocol, or programmatic change, such changes must be made as soon as practicable, but not later than [*insert deadline, e.g. 90 days*].

Example Permit Requirement Rationale for the Fact Sheet

The permittee is required to develop a SWMP document that describes how the permittee will meet the control requirements in the permit. (See 40 CFR 122.26(d)(2)(iv), 122.34(a)). The SWMP document is a consolidation of all of the permittee's relevant ordinances or other regulatory requirements, the description of all programs and procedures (including standard forms to be used for reports and inspections) that will be implemented and enforced to comply with this permit and to document the selection, design, and installation of all stormwater control measures. The permittee is required to submit its SWMP document to the permitting authority. If modifications to the SWMP are necessary then the permitting authority will notify the permittee.

Recommendation for the Permit Writer

The permit writer should include in this section the relevant parts of the permit that require specific descriptions or justifications to be included in the SWMP document. Also, permit writers may need to include an additional requirement regarding the submittal of the SWMP document since some information contained in the SWMP document is required to be submitted prior to the permittee obtaining permit coverage. In addition, permit writers should refer to the memo entitled *Interim Guidance on Implementation of NPDES Regulations for Storm Water Phase II for Small Municipal Separate Storm Sewer Systems in Response to Recent Ninth Circuit Decision in Environmental Defense Center, et al. v. EPA, No. 00-70014 & consolidated cases (9th Cir.)* for additional guidance on the implementation of regulations for Phase II MS4s (www.epa.gov/npdes/pubs/interim_guidelines_memo_final.pdf).

1.2 Requirement to Develop Adequate Legal Authority to Implement and Enforce Stormwater Management Program

Example Permit Provision

1.2.1 Within [*insert deadline, e.g., one year from permit issuance*] the permittee must review and revise its relevant ordinances or other regulatory mechanisms, or adopt any new ordinances or other regulatory mechanisms that provide it with adequate legal authority to control pollutant discharges into and from its MS4, and to meet the requirements of this permit.

1.2.2 To be considered adequate, this legal authority must, at a minimum, address the following:

a. Authority to Prohibit Illicit Discharges – Prohibit and eliminate illicit connections and discharges to the MS4. Illicit connections include pipes, drains, open channels, or other conveyances that have the potential to allow an illicit discharge to enter the MS4. Illicit discharges include all non-stormwater discharges except fire fighting discharges, discharges from NPDES permitted industrial sources and discharges not otherwise authorized under Part 1.2.2.b. of this permit.

b. Allowable Non-Stormwater Discharges –Exceptions to the prohibition in Part 1.2.2.a. may include the following, only if they are considered non-significant contributors of pollutants: water line flushing, landscape irrigation, diverted stream flows, rising ground waters, uncontaminated ground water infiltration (as defined at 40 CFR 35.2005(20)) to separate storm sewers, uncontaminated pumped ground water, discharges from potable water sources, foundation drains, air conditioning condensation, irrigation water, springs, water from crawl space pumps, footing drains, lawn watering, individual residential car washing, flows from riparian habitats and wetlands, dechlorinated swimming pool discharges, and street wash water.

c. Authority to Prohibit Spills or Other Releases – Control the discharge of spills, and prohibit dumping or disposal of materials other than stormwater into the MS4.

d. Authority to Require Compliance – Require compliance with conditions in the permittee's ordinances, permits, contracts, or orders (i.e., hold dischargers accountable for their contributions of pollutants and flows).

e. Authority to Require Installation, Implementation, and Maintenance of Control Measures – Require owners/operators of construction sites, new or redeveloped land, and industrial and commercial facilities to minimize the discharge of pollutants to the MS4 through the installation, implementation, and maintenance of stormwater control measures consistent with [*insert references to applicable stormwater control measure manuals, guidance documents, etc.*].

f. Authority to Receive and Collect Information – The permittee must have the authority to request from operators of construction sites, new or redeveloped land, and industrial and commercial facilities information such as stormwater plans, inspection reports, and monitoring results, and other information deemed necessary to assess compliance with this permit. The permittee must also have the authority to review designs and proposals for new development and redevelopment to determine whether adequate stormwater control measures will be installed, implemented, and maintained.

g. Authority to Inspect – The permittee must have the authority to enter private property for the purpose of inspecting at reasonable times any facilities, equipment, practices, or operations related to stormwater discharges to determine whether there is compliance with local stormwater control ordinances/standards or requirements in this Permit.

h. Response to Violations – The permittee must have the ability to promptly require that violators cease and desist illicit discharges or discharges of stormwater in violation of any ordinance or standard and/or cleanup and abate such discharges, including the ability to:

    1. Effectively require the discharger to abate and clean up their discharge, spill, or pollutant release within [*insert deadline, e.g. 48 hours*] of notification; or

    2. For uncontrolled sources of pollutants that could pose an environmental threat, require abatement within [*insert timeframe, e.g. 30 days of notification*]; or,

3. Perform the clean up and abatement work and bill the responsible party, if necessary.
4. If a situation persists where pollutant-causing sources or activities are not abated, provide the option to order the cessation of activities until such problems are adequately addressed.
5. When all parties agree that clean-up activities cannot be completed within the timeframe provided, determine a new timeframe and notify the [*insert name of permitting authority*].

i. Monetary Penalties – The permittee must have the ability to:
   1. Levy citations or administrative fines against responsible parties either immediately at the site, or within a few days.
   2. Require recovery and remediation costs from responsible parties.

j. Civil/Criminal Penalties – The permittee must have the ability to impose more substantial civil or criminal sanctions (including referral to a city or district attorney) and escalate corrective response, consistent with its enforcement response plan developed pursuant to Part 1.3, for persistent non-compliance, repeat or escalating violations, or incidents of major environmental harm.

k. Interagency Agreements – Control of the contribution of pollutants from one portion of the shared MS4 to another portion of the MS4 through interagency agreements or other similar agreements with other owners of the MS4, such as [*insert other applicable permittees*].

1.2.3 The permittee must include as part of its written SWMP document a statement certified by its chief legal counsel that the permittee has taken the necessary steps to obtain and maintain full legal authority to implement and enforce each of the requirements contained in this permit. This statement must include:

a. Identification of all departments within the permittee's jurisdiction that conduct stormwater-related activities and their roles and responsibilities under this permit. Include an up-to-date organizational chart specifying these departments, key personnel, and contact information.

b. Identification of the local administrative and legal procedures and ordinances available to mandate compliance with stormwater-related ordinances and therefore with the conditions of this permit.

c. A description of how stormwater related-ordinances are implemented and appealed.

d. A description of whether the municipality can issue administrative orders and injunctions, or whether it must go through the court system for enforcement actions.

Example Permit Requirement Rationale for the Fact Sheet

Adequate legal authority is required to implement and enforce most parts of the SWMP. (See 40 CFR 122.26(d)(2)(i) and 40 CFR 122.34(b)(3)(ii)(B), (b)(4)(ii)(A), and (b)(5)(ii)(B)). Without

adequate legal authority the MS4 would be unable to perform many vital SWMP functions such as performing inspections and requiring installation of control measures. In addition, the permittee would not be able to penalize and/or attain remediation costs from violators.

Recommendations for the Permit Writer

A major difference between a traditional MS4 and a non-traditional MS4 (such as a DOT, military base, or university) is often the scope of legal authority available to the MS4. Non-traditional MS4 permittees often cannot pass "ordinances" nor do they have enforcement authority like a typical municipality, so legal authority may consist of policies, standards, or specific contract language. Non-traditional MS4 permittees also do not generally have the authority to impose a monetary penalty. Although these differences exist, just like traditional MS4s, non-traditional MS4s must have the legal authority to develop, implement, and enforce the program. Moreover, the scope of legal authority that may be exercised by MS4 operators that are municipalities may vary from state to state. Therefore, permit writers should tailor the legal authority section depending on the types of permittees covered and the scope of authority that may be exercised by the permittee. For example, non-traditional MS4 permittees often have authority over what their contracts require. Therefore, the permit could require that contracts for construction and maintenance activities include specific stormwater requirements that ensure the permittee's requirements are met. In addition, cooperative agreements could be maintained with those permittees that do possess the legal authorities to enforce stormwater measures within the permittee's MS4 boundary.

The discharge prohibitions listed in Part 1.2.2 are taken from the Phase II regulations and are the minimum requirements. Note that, unlike Phase II MS4s, Phase I MS4 permittees are required to address the sources of non-stormwater discharges in Part 1.2.2.b. when they are identified as sources of pollutants in stormwater discharges. (See 40 CFR 122.26(d)(2)(iv)(B)). The permit writer may choose to apply additional or more stringent prohibitions. For example, some states have chosen to prohibit discharges from street washing activities as they can be significant sources of pollutants such as oil and grease and heavy metals.

1.3 Enforcement Measures and Tracking

Example Permit Provision

1.3.1 The permittee must continue to implement, and revise within [*specify deadline for completion, e.g. 12 months of permit issuance*] if necessary, an enforcement response plan (ERP), which sets out the permittee's potential responses to violations and addresses repeat and continuing violations through progressively stricter responses as needed to achieve compliance. The ERP must describe how the permittee will use each of the following types of enforcement responses based on the type of violation:

a. Verbal Warnings – Verbal warnings are primarily consultative in nature. At a minimum, verbal warnings must specify the nature of the violation and required corrective action.

b. Written Notices – Written notices of violation (NOVs) must stipulate the nature of the violation and the required corrective action, with deadlines for taking such action.

c. Escalated Enforcement Measures – The Permittee must have the legal ability to employ any combination of the enforcement actions below (or their functional equivalent), and to escalate enforcement responses where necessary to address persistent non-compliance, repeat or escalating violations, or incidents of major environmental harm:

1. Citations (with Fines) – The ERP must indicate when the permittee will assess monetary fines, which may include civil and administrative penalties.
2. Stop Work Orders – The permittee must have the authority to issue stop work orders that require construction activities to be halted, except for those activities directed at cleaning up, abating discharge, and installing appropriate control measures.
3. Withholding of Plan Approvals or Other Authorizations – Where a facility is in non-compliance, the ERP must address how the permittee's own approval process affecting the facility's ability to discharge to the MS4 can be used to abate the violation.
4. Additional Measures – The permittee may also use other escalated measures provided under local legal authorities. The permittee may perform work necessary to improve erosion control measures and collect the funds from the responsible party in an appropriate manner, such as collecting against the project's bond or directly billing the responsible party to pay for work and materials.

1.3.2 Enforcement Tracking – The Permittee must track instances of non-compliance either in hard-copy files or electronically. The enforcement case documentation must include, at a minimum, the following:

a. Name of owner/operator of facility or site of violation
b. Location of stormwater source (i.e., construction project, industrial facility)
c. Description of violation
d. Required schedule for returning to compliance
e. Description of enforcement response used, including escalated responses if repeat violations occur or violations are not resolved in a timely manner
f. Accompanying documentation of enforcement response (e.g., notices of noncompliance, notices of violations)
g. Any referrals to different departments or agencies
h. Date violation was resolved.

1.3.3 Recidivism Reduction – The permittee is required to identify chronic violators of any SWMP component and reduce the rate of noncompliance recidivism. The permittee

must summarize inspection results by these chronic violators and include incentives, disincentives, or an increased inspection frequency at the operator's sites. [2]

Example Permit Requirement Rationale for the Fact Sheet

The permit requires permittees to have an established, escalating enforcement policy that clearly describes the action to be taken for common violations. The policy must describe the procedures to ensure compliance with local ordinances and standards, including the sanctions and enforcement mechanisms that will be used to ensure compliance. (See 40 CFR 122.26(d)(2)(i)). It is critical that the MS4 have the authority to initiate a range of enforcement actions to address the variability and severity of noncompliance. Enforcement responses to individual violations must consider criteria such as magnitude and duration of the violation, effect of the violation on the receiving water, compliance history of the operator, and good faith of the operator in compliance efforts. Particularly for construction sites, enforcement actions must be timely in order to be effective.

Recommendations for the Permit Writer

Typical enforcement mechanisms include verbal warnings, written NOVs, administrative fines and orders, stop work orders, and civil or criminal penalties. Some non-traditional MS4 permittees, such as DOTs and universities, may not have the authority to use the mechanisms described above. Therefore the enforcement requirements in the permit should take the permittee's enforcement limitations and abilities into consideration, allow for alternative mechanisms such as related contract obligations or right-of-way permits, and/or require entities that cannot enforce to coordinate with those entities that can. For example, if a DOT discovers an illicit discharge to the right-of-way, a mechanism should be in place for the DOT to communicate with the adjacent municipality to eliminate the discharge in a timely manner.

Some permit writers include specific language as to when permittees can refer violations of NPDES permits to the permitting authority. Because of the often similar control measures required in MS4 construction programs and NPDES CGP SWPPP requirements, permit writers want the permittee to make an honest effort at achieving compliance with their local requirements before referring a violator to the NPDES permitting authority. An example of permit language on NPDES referrals, which require the MS4 permittee to make a good faith effort at ensuring compliance by conducting at least two inspections and notices of violation, follows:

> NPDES Permit Referrals–For those construction projects or industrial facilities subject to the [*insert name of applicable NPDES general construction/industrial permit*], the permittee must:

[2] Adapted from 2009 San Francisco Bay Municipal Regional Stormwater Permit (Order No. R2-2009-0074; www.swrcb.ca.gov/sanfranciscobay/board_decisions/adopted_orders/2009/R2-2009-0074.pdf) and the Los Angeles MS4 Permit (Part 3; www.swrcb.ca.gov/rwqcb4/water_issues/programs/stormwater/municipal/ms4_permits/los_angeles/2001-2007/LA_MS4_Permit2001-2007.pdf)

a. Refer non-filers (i.e., those facilities that cannot demonstrate that they obtained permit coverage) to the [*insert name of permitting authority*] within [*insert number of days, e.g. 30 days*] of making that determination. In making such referrals, the permittee must include, at a minimum, the following documentation:

   1. Construction project or industrial facility location.
   2. Name of owner or operator.
   3. Estimated construction project size or type of industrial activity (including SIC code if known).
   4. Records of communication with the owner or operator regarding filing requirements.

b. Refer violations to the [*insert name of permitting authority*] provided that the permittee has made a good faith effort of progressive enforcement to achieve compliance with its own ordinances. At a minimum, the permittee's good faith effort must include documentation of two follow-up inspections and two warning letters or notices of violation. In making such referrals, the permittee must include, at a minimum, the following documentation:

   1. Construction project or industrial facility location
   2. Name of owner or operator
   3. Estimated construction project size or type of industrial activity (including SIC code if known)
   4. Records of communication with the owner or operator regarding the violation, including at least two follow-up inspections, two warning letters or notices of violation, and any response from the owner or operator

It is important to note that a referral to the permitting authority does not relieve the MS4 from its enforcement obligations. The MS4 must continue to work with the permitting authority, using all available enforcement authority in order to gain compliance.

1.4 Requirement to Ensure Adequate Resources to Comply with MS4 Permit

Example Permit Provision

1.4.1 Secure Resources – The permittee must secure the resources necessary to meet all requirements of this permit.

1.4.2 Annual Fiscal Analysis – The permittee must conduct an annual analysis of the capital and operation and maintenance expenditures needed, allocated, and spent as well as the necessary staff resources needed and allocated to meet the requirements of this permit, including any development, implementation, and

enforcement activities required. The analysis must include estimated expenditures for the reporting period, the preceding period, and the next reporting period and be submitted with the annual report.

a. Each analysis must include a description of the source of funds that are proposed to meet the necessary expenditures, including legal restrictions on the use of such funds.
b. Each analysis must include a narrative description of circumstances resulting in a [*insert percentage, e.g. 25 percent or greater*] annual change for any budget line items.
c. Each analysis must include a description of the staff resources necessary to meet the requirements of this permit.

Example Permit Requirement Rationale for the Fact Sheet

The annual fiscal analysis will show the allocated resources, expenditures, and staff resources necessary to comply with the permit, and implement and enforce the permittee's SWMP. (See 40 CFR 122.26(d)(2)(vi). The annual analysis is necessary to show that the permittee has adequate resources to meet all Permit Requirements. The analysis can also show year-to-year changes in funding for the stormwater program. A summary of the annual analysis must be reported in the annual report (see Section 8.4 and Appendix A). This report will help the Permitting Authority understand the resources that are dedicated to compliance with this permit, and to implementation and enforcement of the SWMP, and track how this changes over time.

Recommendations for the Permit Writer

Permit writers should be specific when requesting financial analysis information from the permittee. The Annual Report Template provided in this Guide includes basic questions that should be adequate for Phase II MS4s. However, more detailed information may be warranted from more established programs and larger Phase I MS4s.

Because stormwater is a component in many different program areas, it can often be difficult to get an accurate accounting of costs. For example, inspection staff may have multiple responsibilities in addition to stormwater inspections. Is it appropriate to count an entire inspector's time (i.e. full-time equivalent (FTE)) as a stormwater cost if the inspector is also doing building inspections? Also, some permittees count street sweeping as a stormwater compliance cost, while others consider their street sweeping costs as an aesthetic or air quality cost. Permittees should provide a detailed breakdown of costs, along with background or additional discussion so the permit writer knows what the costs include.

CHAPTER 2: PUBLIC EDUCATION AND OUTREACH/PUBLIC INVOLVEMENT

Introduction

The Phase II Regulations require MS4 permittees to develop programs to educate the public about the impact of stormwater discharges on local waterways and the steps that citizens, businesses, and other organizations can take to reduce the contamination of stormwater (40 CFR 122.34(b)(1),(2)). Phase I MS4 permittees were also required to describe their proposed public education programs as part of their initial permit application, but the regulations are not as specific as Phase II. (See 40 CFR 122.26(d)(2)(iv) (B), (D)(4) and (A)(6)).

Included Concepts

- Developing a comprehensive stormwater education/ outreach program
- Involving the public in planning and implementing the SWMP

As the public gains a greater understanding of the benefits of stormwater management, an MS4 is likely to gain more support for the SWMP (including financial support) and increased compliance with the applicable regulatory requirements as the public understands how their actions impact water quality. Education and awareness programs help change human behavior with respect to reducing the amount of pollution generated from stormwater sources within the MS4 system. In addition to education, encouraging public participation in local stormwater programs can lead to program improvement as well as enabling people to identify and report a pollution-causing activity, such as spotting an illicit discharge.

2.1 Developing a Comprehensive Stormwater Education/Outreach Program

Example Permit Provision

2.1.1 The permittee must:

a. Continue to implement, and revise if necessary within [*specify the time when the development of the program must be completed, e.g., within the first year after permit issuance*], a comprehensive stormwater education/outreach program. The program must, at a minimum:

1. Define the goals and objectives of the program based on at least three high priority, community-wide issues (e.g. reduction of nitrogen in discharges from the MS4, promoting pervious techniques used in the MS4);
2. Identify and analyze the target audience(s);
3. Create an appropriate message(s) based on at least three targeted residential issues and three targeted industrial/commercial issues from the suggested list below (or three issues deemed more appropriate to the MS4):

Residential Community

- Residential car washing and auto maintenance control measures
- Off-pavement automobile parking
- Home and garden care activities (pesticides, herbicides, and fertilizers)
- Disposal of household hazardous waste (e.g. paints, cleaning products)
- Snow removal activities
- Using techniques that keep water onsite and/or reduce imperviousness (rain barrels, rain gardens, porous pavers, permeable concrete, porous asphalt, etc.)
- Litter prevention
- Importance of native vegetation for preventing soil erosion
- Public reporting of water quality issues
- Community activities (monitoring programs, environmental protection organization activities, etc.)
- Pet and other animal wastes

Industrial/Commercial Community

- Automobile repair and maintenance Control measures
- Control measure installation and maintenance
- Lawful disposal of vacuum truck and sweeping equipment waste
- Pollution prevention and safe alternatives
- Snow removal activities
- Using techniques that keep water onsite and/or reduce imperviousness (rain barrels, rain gardens, porous pavers, permeable concrete, porous asphalt, etc.)
- Equipment and vehicle maintenance and repair
- Importance of good housekeeping (e.g. sweeping impervious surfaces instead of hosing)
- Illicit discharge detection and elimination observations and follow-up during daily work activities
- Water quality impacts associated with land development (including new construction and redevelopment)
- Water quality impacts associated with road resurfacing and repaving

4. Develop appropriate educational materials (e.g. the materials can utilize various media such as printed materials, billboard and mass transit advertisements, signage at select locations, radio advertisements, television advertisements, websites);
5. Determine methods and process of distribution;
6. Evaluate the effectiveness of the program; and
7. Utilize public input (e.g., the opportunity for public comment, or public meetings) in the development of the program.

b. During the term of the permit, the permittee must distribute the educational materials, using whichever methods and procedures determined appropriate by the permittee, in such a way that is designed to convey the program's message to [*insert percentage or other appropriate numeric threshold, e.g., 20%*] of the target audience each year.

c. Within [*insert deadline, e.g., within the permit term*], the permittee must assess changes in public awareness and behavior resulting from the implementation of the program such as using a statistically valid survey and modify the education/outreach program accordingly.

d. The permittee must assess its stormwater education/outreach program annually as specified in Part 8.3 of this permit. The permittee must adjust its educational materials and the delivery of such materials to address any shortcomings found as a result of this assessment.

e. Written procedures for implementing this program must be incorporated into the SWMP document.

Example Permit Requirement Rationale for the Fact Sheet

Without a focused and comprehensive program, outreach and education efforts will likely be poorly coordinated and possibly ineffective. The permit the permittee to develop an education/outreach program that addresses the six steps listed and also found in EPA's *Getting In Step: A Guide to Effective Outreach in Your Watershed (www.epa.gov/watertrain/gettinginstep/)*. This guide explains the steps in developing an outreach plan, presents information on creating outreach materials, and provides tips in working with the media. The permittee is encouraged to follow this guide in developing its outreach strategy.

The public education and outreach program must be tailored and targeted to specific water quality issues of concern in the relevant community. These community-wide and targeted issues must then guide the development of the comprehensive outreach program, including the creation of appropriate messages and educational materials. The permit includes a list of potential residential and commercial issues, but the permittee may also choose other issues that contribute significant pollutant loads to stormwater.

The permittee is encouraged to use existing public educational materials in its program. Examples of public educational materials for stormwater are available at EPA's *Nonpoint Source Outreach Toolbox (www.epa.gov/nps/toolbox)*. The permittee is also encouraged to leverage resources with other agencies and municipalities with similar public education goals.

Finally, the underlying principle of any public education and outreach effort is to change behaviors. The permittee must develop a process to assess how well its public education and outreach programs is changing public awareness and behaviors and to determine what changes are necessary to make its public education program more effective. This assessment of public education programs is typically conducted via phone surveys, but other assessment methods that quantify results can be used. The permittee is encouraged to use a variety of assessment methods to evaluate the effectiveness of different public education activities. The permit requires that the first evaluation assessment be conducted before the final year of the permittee's coverage under this permit, before the next permit is issued. The allows the permittee to make changes as appropriate before the next permit application is due, EPA's *Getting In Step: A Guide to Effective Outreach in Your Watershed (www.epa.gov/watertrain/gettinginstep/)* can provide useful information on setting up and conducting the evaluations.

Recommendations for the Permit Writer

EPA recommends that the requirement to identify high priority community-wide issues and targeted issues be set at least 3 to 6 months before the stormwater education/outreach program is to be implemented, so the permitting authority can review the issues and provide any feedback before the plan is completed.

The permit can be a means for increasing public awareness and understanding of stormwater impacts on local watersheds, including high quality watersheds that need protecting. EPA recommends that the permit writer consider requiring permittees to identify and describe issues, such as specific pollutants, the sources of those pollutants, impacts on biology, and the physical attributes of stormwater runoff, in their education/outreach program, which affect local watershed(s). Where applicable, the education/outreach program should identify and describe high quality watersheds in need of protection and the issues that may threaten the quality of these waters.

The list in Part 2.1.1.a(3) is not all-inclusive. Therefore, EPA recommends that the permit be written to allow the permittee to indentify priority issue(s) not listed that may contribute a significant pollutant load to stormwater. For Phase I, individual permits, it may be appropriate for the permit writer to specify the priority issues based on known issues, monitoring data, historical trends, etc. Phase II general permits will likely need to allow for more flexibility in selecting priority issues.

In addition, the permit writer will need to consider that DOTs and other “non-traditional” MS4s will likely have different priority concerns than the ones identified in the categories above. In fact, the categories (residential and commercial/industrial) may also need to be changed. In these instances, the permit writer may want to consider having the non-traditional permittees work together with any local government MS4s in their area to maximize the program and cost effectiveness of the outreach.

The permit writer may consider specifying the mechanism the permittee is required to use to measure the awareness of and behavior related to issues concerning stormwater runoff by the general public, or targeted audiences within the general public. Examples of evaluations could include:

- Direct Evaluations
- Surveys
- Tracking the number of attendees
- Interviews
- Review of media clippings
- Tracking the number of stormwater-related calls/emails/letters received

Permit writers should consider whether it is appropriate to require a baseline assessment of the public’s awareness of stormwater issues, for example in the second year of the permit term, so that comparisons may be drawn in reference to the baseline. This would likely require the permittee to conduct two assessments in the first permit term that the assessment is required.

2.2 Involving the Public in Planning and Implementing the SWMP

Example Permit Provision

2.2.1 The permittee is required to involve the public in the planning and implementation of activities related to the development and implementation of the SWMP. At a minimum, the permittee must:

a. Establish a citizen advisory group or utilize existing citizen organizations. The permittee may establish a stand-alone group or utilize an existing group or process. The advisory group must consist of a balanced representation of all affected parties, including residents, business owners, and environmental organizations in the MS4 area and/or affected watershed. The permittee must invite the citizen advisory group to participate in the development and implementation of all parts of the community's SWMP.

b. Create opportunities for citizens to participate in the implementation of stormwater controls (e.g., stream clean-ups, storm drain stenciling, volunteer monitoring, and educational activities).

c. Ensure the public can easily find information about the permittee's SWMP.

2.2.2 Written procedures for implementing this program must be incorporated into the SWMP document.

Example Permit Requirement Rationale for the Fact Sheet

Stormwater management programs can be greatly improved by involving the community throughout the entire process of developing and implementing the program. Involving the public benefits both the permittee itself as well as the community. B y listening to the public's concerns and coming up with solutions together, the permittee will gain the public's support and the community will become invested in the program. The permittees will likewise gain even more insight into the most effective ways to communicate their messages.

This permit requires the involvement of the public, which includes a citizen advisory group or process to solicit feedback on the stormwater program, and opportunities for citizens to participate in implementation of the stormwater program. The citizen advisory group should meet with the local land use planners and provide input on land use code or ordinance updates so that land use requirements incorporate provisions for better management of stormwater runoff and watershed protection. Public participation in implementation of the stormwater program can include many different activities such as stream clean-ups, storm drain markings, and volunteer monitoring.

Permittees are encouraged to work together with other entities that have an impact on stormwater (for example, schools, homeowner associations, DOTs, other MS4 permittees). Permittees are also encouraged to use existing advisory groups or processes in order to implement these public involvement requirements.

Recommendations for the Permit Writer

Especially for Phase I permittees, permit writers may consider requiring more specific information such as requiring at least one contact that the public can reach (including phone number and/or e-mail address) be clearly posted on the website. The contact may be a general contact or a specific person. The permitting authority may want the MS4 to have a mechanism for the public to comment year round, not just at public meetings. This could be facilitated by a webpage and email or a stormwater hotline.

Some Phase II permittees may find it more difficult to establish and maintain a formal citizen advisory group simply because they tend to have smaller populations. The permit writer may want to provide flexibility for the Phase II permittees to utilize the public involvement mechanism which best suits their individual community. For example, groups which are already involved with other aspects of municipal governance or established events where input could be solicited (i.e. farmers markets, festivals) may serve to meet the objective of this section.

CHAPTER 3: ILLICIT DISCHARGE DETECTION AND ELIMINATION

Introduction

Phase I (see 40 CFR 122.26 (d)(1)(v)(B) and (d)(1)(iv)(B)) and Phase II stormwater management programs (see 40 CFR 122.26(d)(2)(iv)(B)) are required to address illicit discharges into the MS4 system. An illicit discharge is defined as any discharge to a municipal separate storm sewer system that is not composed entirely of stormwater, except allowable discharges pursuant to an NPDES permit (40 CFR 122.26(b)(2)). In addition to requiring permittee to have the legal authority to prohibit non-stormwater discharges from entering storm sewers (CWA Section 402(p)(3)(B)) (see Chapter I), MS4 permits must also require the development of a comprehensive, proactive Illicit Discharge Detection Elimination (IDDE) program.

Included Concepts

- IDDE program development
- MS4 mapping
- Identification of priority areas
- Field screening
- IDDE source investigations and elimination
- Public reporting of non-stormwater discharges and spills
- Illicit discharge education and training

An effective IDDE program is more than just a program to respond to complaints about illicit discharges or spills. Permittees must proactively seek out illicit discharges, or activities that could result in discharges, such as illegal connections to the storm sewer system, improper disposal of wastes, or dumping of used motor oil or other chemicals.

In order to trace the origin of a suspected illicit discharge or connection, the permittee must have an updated map of the storm drain system and a formal plan of how to locate illicit discharges and how to respond to them once they are located or reported. The permittee must provide a mechanism for public reporting of illicit discharges and spills, as well as an effective way for staff to be alerted to such reports. Regular field screening of outfalls for non-stormwater discharges needs to occur in areas determined to have a higher likelihood for illicit discharges and illegal connections. Proper investigation and enforcement procedures must be in place to eliminate the sources of the discharges, as well. Finally, in order for the permittee to adequately detect and eliminate sources of illicit discharges, both field and office staff must be properly trained to recognize and report the discharges to the appropriate parties.

EPA recommends that permittees refer to the Center for Watershed Protection's guide on *Illicit Discharge Detection and Elimination (IDDE): A Guidance Manual for Program Development and Technical Assistance* (IDDE Manual, available at www.cwp.org) when developing an IDDE program.

3.1 IDDE Program Development

Example Permit Provision

3.1.1 The permittee must continue to implement a program to detect, investigate, and eliminate non-stormwater discharges (see Part 1.2.2), including illegal dumping, into its system. The IDDE program must include the following:

a. An up-to-date storm sewer system map (see Part 3.2).
b. Procedures for identifying priority areas within the MS4 likely to have illicit discharges, and a list of all such areas identified in the system (see Part 3.3)
c. Field screening to detect illicit discharges (see Part 3.4)
d. Procedures for tracing the source of an illicit discharge (see Part 3.5)
e. Procedures for removing the source of the discharge (see Part 3.5)
f. Procedures for program evaluation and assessment (see Part 8.3)
g. Procedures to prevent and correct any on-site sewage disposal systems that discharge into the MS4. [3]

3.1.2 In implementing the IDDE program, the permittee may conduct such investigations, contract for investigation, coordinate with storm drain investigation activities of others, or use any combination of these approaches.

3.1.3 For non-traditional MS4 permittees, if illicit connections or illicit discharges are observed related to another operator's municipal storm sewer system then the permittee must notify the other operator within [*insert applicable deadline, e.g., within 48 hours*] of discovery.

3.1.4 If another operator notifies the permittee of an illegal connection or illicit discharge to the municipal separate storm sewer system then the permittee must follow the requirements specified in Part 3.5.4.

3.1.5 Written procedures for implementing this program, including those components described in Parts 3.1 – 3.7 must be incorporated into the SWMP document.

Example Permit Requirement Rationale for the Fact Sheet

EPA stormwater regulations define "illicit discharge" as "any discharge to a municipal separate storm sewer that is not composed entirely of stormwater" except discharges resulting from fire fighting activities and discharges from NPDES permitted sources (see 122.26(b)(2)). The applicable regulations state that the following non-stormwater discharges may be allowed if they are not determined to be a significant source of pollutants to the MS4 : water line flushing, landscape irrigation, diverted stream flows, rising ground waters, uncontaminated ground water infiltration (as defined at 40 CFR 35.2005(20)), uncontaminated pumped ground water, discharges from potable water sources, foundation drains, air conditioning condensation, irrigation water, springs, water from crawl space pumps, footing drains, lawn watering, individual residential car washing, flows from riparian habitats and wetlands, dechlorinated swimming pool discharges, and street wash water. If, however, these discharges are determined to be a significant source of pollution then they are prohibited.

Examples of common sources of illicit discharges in urban areas include apartments and homes, car washes, restaurants, airports, landfills, and gas stations. These so called "generating sites" discharge sanitary wastewater, septic system effluent, vehicle wash water, washdown from

[3] Vermont Phase II General Permit (www.vtwaterquality.org/stormwater/htm/sw_ms4.htm)

grease traps, motor oil, antifreeze, gasoline and fuel spills, among other substances. Although these illicit discharges can enter the storm drain system in various ways, they generally result from either direct connections (e.g., wastewater piping either mistakenly or deliberately connected to the storm drains) or indirect connections (e.g., infiltration into the storm drain system, spills, or "midnight dumping"). Illicit discharges can be further divided into those discharging continuously and those discharging intermittently.

One way of locating these dry weather discharges is to perform field screening of outfalls. If no rain has occurred prior to the screening then it is likely that any flow observed at an outfall is either groundwater or an illicit discharge. It is important to utilize resources effectively and to target field screening activities in priority areas that are the most common sources of illicit discharges. For example, municipalities with older neighborhoods should prioritize those areas for targeted investigation due to the likelihood of cross connections with the sanitary sewer. Older parts of the storm drain system may also be deteriorating and require repair or replacement.

In addition, it is important that permittees establish clear policies and procedures for tracing and eliminating illicit discharges to ensure that individual incidents are addressed consistently. These policies should include procedures to notify neighboring localities if a discharge is discovered either originating on or discharging to the neighboring storm sewer system.

Additional information is available in the Center for Watershed Protection's *IDDE Manual.*

Recommendations for the Permit Writer

In some instances the permit writer may choose to include more specific requirements. For example, if the priority areas are already known, then Part 3.1.1.a may be more specifically worded. In addition, regulations governing Phase I MS4 permits have somewhat different requirements including specific field screening procedures (40 CFR 122.26(d)(1)(iii)(D) and 122.26(d)(2)(iii)) and a program to detect and remove illicit discharges and improper disposal into the storm sewer (40 CFR 122.26(d)(2)(iv)(B).

3.2 MS4 Mapping

Example Permit Provision

3.2.1 The permittee must maintain an up-to-date and accurate storm sewer system map.

a. The storm sewer system map must show the following, at a minimum:

1. The location of all MS4 outfalls and drainage areas contributing to those outfalls that are operated by the permittee, and that discharge within the permittee's jurisdiction to a receiving water
2. The location (and name, where known to the permittee) of all waters receiving discharges from those outfall pipes. Each mapped outfall must be given an individual alphanumeric identifier, which must be noted on the map. When possible, the outfalls must be located using a geographic

position system (GPS) and photographs should be taken to provide baseline information and track operation & maintenance needs over time.[4]

3. Priority areas identified under Part 3.3
4. Field screening stations identified under Part 3.4.2.a

b. A copy of the storm sewer system map must be available onsite for review by the permitting authority.

Example Permit Requirement Rationale for the Fact Sheet

In order to trace the origin of a suspected illicit discharge or connection, the permittee must have an up-to-date map of its storm drain system. This is critical in order to isolate the potential source of the non-stormwater discharges and the areas of potential impact. Ideally, the information would be available as a geographic information system (GIS) layer in a geo-locational database, however, paper maps are sufficient providing they have the necessary reference information.

The permit primarily requires the mapping of outfalls, drainage areas contributing to those outfalls, and receiving waters. The municipal facility inventory created to comply with the pollution prevention/good housekeeping requirements (see Part 6.1) must also be included either on this sewer system map or on a separate MS4 map.

Recommendations for the Permit Writer

Both Phase I and Phase II regulations require permittees to develop a map indicating outfalls and the waters that receive the MS4 discharges. This map is to be used to identify priority areas that have a reasonable potential for illicit discharges. The mapping requirements should be adjusted based on any existing mapping of the MS4 that has already been completed. For example, Phase I mapping should have been initiated during the initial permit application process. This map should not be static, however, since it would need to be updated as development patterns change and new collection and discharge components of the MS4 are added. The mapping requirement could be supplemented by adding a requirement to "modify existing maps to clearly identify all receiving waters."

3.3 Identification of Priority Areas

Example Permit Provision

3.3.1 The permittee must continue to identify the following as priority areas [*insert areas that may be more applicable to the jurisdiction*]:

a. Areas with older infrastructure that are more likely to have illicit connections;

[4] New Jersey Phase II General Permit (www.state.nj.us/dep/dwq/pdf/Tier_A_final.pdf), with modifications

b. Industrial, commercial, or mixed use areas;
c. Areas with a history of past illicit discharges;
d. Areas with a history of illegal dumping;
e. Areas with onsite sewage disposal systems;
f. Areas with older sewer lines or with a history of sewer overflows or cross-connections; and
g. Areas upstream of sensitive waterbodies.

3.3.2 The permittee must document the basis for its selection of each priority area and create a list of all priority areas identified in the system. This priority area list must be updated [*insert frequency, e.g., annually*] to reflect changing priorities and be available for review by the permitting authority.

Example Permit Requirement Rationale for the Fact Sheet

The permit requires an evaluation of the permittee's neighborhoods and land uses to identify areas that are more likely to have illicit discharges. These areas must be prioritized for more frequent screening and investigations. Each permittee will have a different set of priority areas: newer communities with modern infrastructure are less likely to have sewer cross-connections and illegal connections to the storm drain system, whereas towns with rural areas may place an emphasis on illegal dumping and onsite sewage disposal systems. Prioritization must be based not only on land use but also on prior history and frequency of problems.

The identification of priority areas must include "hotspots" or areas where dumping, spills, or other illicit discharges are a common occurrence. These hotspots will help identify potential field screening locations and may help target educational activities. For example, if evidence of motor oil dumping is found quite frequently and traced to the same apartment complex, information about motor oil disposal could be distributed to residents in response.

Recommendations for the Permit Writer

Phase I permittees should have been documenting information regarding high priority areas for several permit terms. In these instances the permit writer should require the permittee to continually evaluate and update the priority areas as development patterns change or new "hotspot" areas are found. If the permit writer has information regarding priority areas which are specific to the Phase I permittee (e.g. certain high priority watersheds or land use types which typically discharge a pollutant of concern) then those specific areas should be specified as high priority.

3.4 Field Screening

Example Permit Provision

3.4.1 The permittee must continue to implement and revise if necessary within [*specify deadline for completion*] a written dry weather field screening and analytical monitoring procedures to detect and eliminate illicit discharges to the MS4. These procedures must be included as part of the IDDE program, and incorporated into the permittee's SWMP document. Dry weather field screening and analytical monitoring consists of (1) field observations; (2) field screening monitoring; and (3) analytical monitoring at selected stations.

3.4.2 Conduct dry weather field screening and analytical monitoring. At a minimum, the permittee must:

a. Identify a minimum of [*specify number*] stations within the priority areas it identified in Part 3.3.1 at which field screening and analytical monitoring will take place. In addition, if the permittee is made aware of non-stormwater discharges that occur during the permit term outside of the priority areas, the permittee must include field screening stations in those areas;

b. Conduct dry weather field screening and analytical monitoring at each station identified above at least once [*insert timeframe for dry part of year, or specify annually*].

c. Sample runoff according to requirements outlined in (1) and (2) below if flow or ponded runoff is observed at a field screening station and there has been at least seventy-two (72) hours of dry weather. The permittee must also record general information such as time since last rain, quantity of last rain, site descriptions (e.g., conveyance type, dominant watershed land uses), flow estimation (e.g., width of water surface, approximate depth of water, approximate flow velocity, flow rate), and visual observations (e.g., odor, color, clarity, floatables, deposits/stains, vegetation condition, structural condition, and biology).

1. Field screening requirements: The permittee is required to conduct a field screening analysis for the following constituents. Samples must be collected and analyzed consistent with the procedures required by 40 CFR Part 136.

   [*insert specific indicator pollutants that the permittee is required to monitor for.]*

2. Analytical monitoring requirements: In addition to field screening, the permittee is required to collect samples for analytical laboratory analysis of the following constituents for a minimum of [*insert percentage*] of the samples taken. Samples must be collected and analyzed consistent with the procedures required by 40 CFR Part 136.

   [*insert specific pollutants of concern that the permittee is required to monitor for*]

3. Develop benchmark concentration levels for dry weather field screening and analytical monitoring results whereby exceedance of the benchmark will

require follow-up investigations to be conducted to identify and eliminate the source causing the exceedance of the benchmark.

d. Conduct a follow-up investigation under Part 4.5 if the benchmarks associated with the constituents listed above in Part 3.4.2.c(1) and (2) are exceeded; and

e. Make and record all applicable observations and select another station from the list of alternate stations for monitoring if, after two subsequent field screening tests have been completed, the field screening station is dry (i.e., no flowing or ponded runoff).

3.4.3 The permittee must assess its IDDE program every [*specify deadline for completion, e.g., once per permit term*] to determine if updates are needed. Where updates are found to be necessary, the permittee must make such changes [*insert deadline for finalizing changes*].

Example Permit Requirement Rationale for the Fact Sheet

The permit requires the development of a dry weather field screening and analytical monitoring program. The program must identify stations (e.g., outfalls) within the identified "priority areas" where the field screening will be conducted. At a frequency set by the permitting authority, the permittee must screen outfalls during dry weather and, if flow or ponded water is observed, collect a sample for field screening and analytical monitoring.

Visually screening outfalls during dry weather and conducting field tests, where flow is occurring, of selected chemical parameters as indicators of the discharge source will assist permittees in determining the source of illicit discharges. For example, the presence of surfactants is an indicator that sewage could be present in the discharge (e.g., soaps being discharged into sewer system as an indicator that wastewater is being discharged). Specific conductivity, fluoride and/or hardness concentration, ammonia and/or potassium concentration, surfactant and/or fluorescence concentration, chlorine concentration, pH, and other chemicals may similarly be indicative of industrial sources.

The permit requires the permittee to develop benchmarks for dry weather screening and analytical monitoring results. An exceedance of the benchmark concentration level indicates the need to conduct a follow-up investigation. The results will help the permittee narrow down the possible sources causing the benchmark to be exceeded so that they can then be eliminated. This is a common protocol to trigger additional monitoring and/or implementation of BMPs at stormwater discharges (e.g. MSGP has sector-specific benchmark monitoring requirements).

Recommendations for the Permit Writer

There are many options for field screening programs available to the permit writer that will meet the requirements of the regulations. Phase I regulations require that permittees conduct initial field screening of the entire MS4 during the permit application process as well as on-going field screening activities during the life of the permit. Based on this historical information and data, permit writers may want to specify in Phase I individual permits which priority areas must be screened. They may

also want to specify how many outfalls or what percentage of the outfalls should be inspected during the permit term.

In addition, for new Phase II permittees, permit writers may want to require screening of all priority areas during the first permit term and then require on-going screening in the areas where illicit discharges were identified.

This permit language includes analytical monitoring at dry weather field screening locations. The monitoring required during field screening (Part 3.4.2.c.1.) should include appropriate indicator pollutants, i.e. pollutants that will indicate the presence of some sort of illicit discharge. For example, Phase II NPDES regulations suggest sampling for specific conductivity, ammonia, surfactant and/or fluorescence concentration, pH and other chemicals indicative of industrial sources.

Permit writers should select the additional pollutants to be monitored based upon specific pollutants of concern for the receiving water(s) and/or specific indicator pollutants which can assist the MS4 in the location of particular discharges of concern and the potential water quality impact of the discharge. For example, the Phase I San Diego MS4 Permit requires that permittees monitor the following parameters during field screening: total hardness, oil and grease, diazinon and chlorpyrifos, cadmium (dissolved), lead (dissolved), zinc (dissolved), copper (dissolved), Enterococcus bacteria, total coliform bacteria, and fecal coliform bacteria.

Permit writers should encourage or even require permittees to use the CWP *IDDE Manual* and/ or EPA's 2008 Multi-Sector General Permit (www.epa.gov/npdes/stormwater/msgp) to develop benchmarks for each parameter.

In the *IDDE Manual* it is strongly recommended that benchmarks be developed specifically for each area. As an example, the *IDDE Manual* lists the following benchmark concentrations (Table 3-1) to identify industrial discharges:

Table 3-1. Benchmark concentrations to identify Industrial Discharges (from CWP IDDE Manual, Table 45)

Indicator Parameter	Benchmark Concentration
Ammonia	>= 50 mg/L
Color	>= 500 units
Conductivity	>= 2,000 µS/cm
Hardness	<= 10 mg/L as CaCO3 or >= 2,000 mg/L as CaCO3
pH	<= 5
Potassium	>= 20 mg/L
Turbidity	>= 1,000 NTU

For comparison purposes, the chemical fingerprint for different flow types in Alabama is presented in Table 3-2. The chemical fingerprint for each flow type can differ regionally, so permittees should develop their own "fingerprint" library by sampling each flow type.

Table 3-2. Comparative "Fingerprint" (Mean Values) of Flow Types (from CWP IDDE Manual, Table 1)

Flow Type	Hardness (mg/L as CaCO3)	NH3 (mg/L)	Potassium (mg/L)	Conductivity (µS/cm)	Fluoride (mg/L)	Detergents (mg/L)
Sewage	50 (0.26)	25 (0.53)	12 (0.21)	1215 (0.45)	0.7 (0.1)	9.7 (0.17)
Septage	57 (0.36)	87 (0.4)	19 (0.42)	502 (0.42)	0.93 (0.39)	3.3 (1.33)

Table 3-2. Comparative "Fingerprint" (Mean Values) of Flow Types (from CWP IDDE Manual, Table 1)						
Laundry Washwater	45 (0.33)	3.2 (0.89)	6.5 (0.78)	463.5 (0.88)	0.85 (0.4)	758 (0.27)
Car Washwater	71 (0.27)	0.9 (1.4)	3.6 (0.67)	274 (0.45)	1.2 (1.56)	140 (0.2)
Plating Bath (Liquid Industrial Waste)	14330 (0.32)	66 (0.66)	1009 (1.24)	10352 (0.45)	5.1 (0.47)	6.8 (0.68)
Radiator Flushing (Liquid Industrial Waste)	5.6 (1.88)	26 (0.89)	2801 (0.13)	3280 (0.21)	149 (0.16)	15 (0.11)
Tap Water	52 (0.27)	<0.06 (0.55)	1.3 (0.37)	140 (0.07)	0.94 (0.07)	0 (NA)
Groundwater	38 (0.19)	0.06 (1.35)	3.1 (0.55)	149 (0.24)	0.13 (0.93)	0 (NA)
Landscape Irrigation	53 (0.13)	1.3 (1.12)	5.6 (0.5)	180 (0.1)	0.61 (0.35)	0 (NA)
The number in parentheses after each concentration is the Coefficient of Variation. Source: Robert Pitt data from CWP IDDE Manual						

The permit writer may also want to require the permittee to analyze a certain number of discharge samples to characterize the concentration of certain pollutants in the different drainage areas. This characterization sampling would be in addition to any characterization sampling completed for the Phase I permit application. This type of sampling would not necessarily aid in the elimination of the source of the discharge, however, the data would be useful in characterizing the discharge from the MS4.

For those areas that have ponding or flow during dry weather, permit writers may consider allowing permittees the flexibility to look for indicators of an illicit discharge before conducting water quality tests due to baseline flow (e.g. baseflow, groundwater flow, irrigation return flows) in certain areas. In these cases, permit writers could require that sensory indicators (i.e. odor, color, turbidity, and floatables) be evaluated.

For additional guidance on field screening, the *IDDE Manual* describes an outfall reconnaissance inventory (ORI) to assess outfalls and conduct indicator monitoring to help identify illicit discharges.

Regardless of the field screening scheme, it is also very important to emphasize in the permit conditions that monitoring must be done in compliance with 40 CFR 136.

3.5 IDDE Source Investigation and Elimination

Example Permit Provision

3.5.1 The permittee is required to develop written procedures for conducting investigations into the source of all identified illicit discharges, including approaches to requiring such discharges to be eliminated.

3.5.2 Minimum Investigation Requirements – At a minimum, the permittee is required to conduct an investigation(s) to identify and locate the source of any continuous or

intermittent non-stormwater discharge within [*specify time period*] of becoming aware of the illicit discharge.

a. Illicit discharges suspected of being sanitary sewage and/or significantly contaminated must be investigated first.

b. Investigations of illicit discharges suspected of being cooling water, wash water, or natural flows may be delayed until after all suspected sanitary sewage and/or significantly contaminated discharges have been investigated, eliminated and/or resolved.

c. The permittee must report immediately the occurrence of any dry weather flows believed to be an immediate threat to human health or the environment to [*insert state water quality emergency contact phone number*].

d. The permittee must track all investigations to document at a minimum the date(s) the illicit discharge was observed; the results of the investigation; any follow-up of the investigation; and the date the investigation was closed.

3.5.3 Determining the Source of the Illicit Discharge –The permittee is required to determine and document through its investigations, carried out in Part 3.5.1, the source of all illicit discharges. If the source of the illicit discharge is found to be a discharge authorized under [*insert NPDES discharge permit reference*] of an NPDES permit, no further action is required.

a. If an illicit discharge is found, but within six (6) months of the beginning of the investigation neither the source nor the same non-stormwater discharge has been identified/observed, then the permittee must maintain written documentation for review by the permitting authority.

b. If the observed discharge is intermittent, the permittee must document that a minimum of three (3) separate investigations were made to observe the discharge when it was flowing. If these attempts are unsuccessful, the Permittee must maintain written documentation for review by the permitting authority. However, since this is an ongoing program, the Permittee should periodically recheck these suspected intermittent discharges.[5]

3.5.4 Corrective Action to Eliminate Illicit Discharge – Once the source of the illicit discharge has been determined, the permittee must immediately notify the responsible party of the problem, and require the responsible party to conduct all necessary corrective actions to eliminate the non-stormwater discharge within [*specify deadline*]. Upon being notified that the discharge has been eliminated, the permittee must conduct a follow-up investigation and field screening, consistent with Part 3.4, to verify that the discharge has been eliminated. The permittee is required to document its follow-up investigation. The permittee may seek recovery and remediation costs from responsible parties consistent with Part 1.2, or require compensation for the cost of field screening and investigations. Resulting enforcement actions must follow the SWMP ERP.

[5] New Jersey Phase II Permit (www.state.nj.us/dep/dwq/pdf/Tier_A_final.pdf)

Example Permit Requirement Rationale for the Fact Sheet

The Clean Water Act, section 402(p)(3)(B)(ii) requires MS4 permits to "effectively prohibit non-stormwater discharges into the storm sewers." The permit implements this requirement, in part by requiring the development of procedures to investigate and eliminate illicit discharges. The permittee must develop a clear, step-by-step procedure for conducting the investigation of illicit discharges. The procedure must include an investigation protocol that clearly defines what constitutes an illicit discharge "case" and when a case is considered "closed." In many circumstances, sources of intermittent, illicit discharges are very difficult to locate, and these cases may remain unresolved. The permit requires that each case be conducted in accordance with the SOPs developed to locate the source and conclude the investigation, after which the case may be considered closed. A standard operating procedure (SOP) document is required in order to provide investigators with guidance and any necessary forms to ensure that consistent investigations occur for every illicit discharge incident.

Physical observations and field testing can help narrow the identification of potential sources of a non-stormwater discharge; however it is unlikely that either will pinpoint the exact source. Therefore, the permittee will need to perform investigations "upstream" to identify illicit connections to systems with identified problem outfalls.

Once the source of the non-stormwater discharge is determined through investigation, corrective action is required to eliminate the problem source. Resulting enforcement actions must follow the SWMP ERP. The permittee may conduct remediation activities on its own, in which case the permittee must require compensation for any and all costs related to eliminating the non-stormwater discharge. Non-traditional MS4 permittees may be limited in their ability to seek recovery.

Recommendations for the Permit Writer

Both Phase I and Phase II regulations require permittees to develop a process to trace the source of illicit discharges and eliminate them. The regulations also state that appropriate enforcement procedures and actions must be included in this process.

3.6 Public Reporting of Non-Stormwater Discharges and Spills

Example Permit Provision

3.6.1 The permittee must promote, publicize, and facilitate public reporting of illicit discharges or water quality impacts associated with discharges into or from MS4s through a central contact point, including phone numbers for complaints and spill reporting, and publicize to both internal permittee staff and the public. If 911 is selected, the permittee must also create, maintain, and publicize a staffed, non-emergency phone number with voicemail, which is checked daily.

3.6.2 The permittee must develop a written spill/dumping response procedure, and a flow chart or phone tree, or similar list for internal use, that shows the procedures for responding to public notices of illicit discharges, the various responsible agencies

and their contacts, and who would be involved in illicit discharge incidence response, even if it is a different entity other than the permittee.

3.6.3 The permittee must conduct reactive inspections in response to complaints and follow-up inspections as needed to ensure that corrective measures have been implemented by the responsible party to achieve and maintain compliance.[6]

Example Permit Requirement Rationale for the Fact Sheet

This provision serves to implement, in part, the statutory requirement that MS4 permits effectively prohibit non-stormwater discharges. Spills, leaks, sanitary sewer overflows, and illicit dumping or discharges can introduce a range of stormwater pollutants into the storm system. Prompt response to these occurrences is the best way to prevent or reduce negative impacts to waterbodies. The permittee must develop a spill response SOP that includes an investigation procedure similar to or in conjunction with the investigation SOP developed for illicit discharges in general (see Section 3.5). Often, a different entity might be responsible for spill response in a community (i.e. fire department), therefore, it is imperative that adequate communication exists between stormwater and spill response staff to ensure that spills are documented and investigated in a timely manner.

A stormwater hotline can be used to help permittees become aware of and mitigate spills or dumping incidents. Spills can include everything from an overturned gasoline tanker to sediment leaving a construction site to a sanitary sewer overflow entering into a storm drain. Permittees must set up a hotline consisting of any of the following (or combination thereof): a dedicated or non-dedicated phone line, E-mail address, or website.

Recommendations for the Permit Writer

Spills which occur due to municipal staff activities are considered illicit discharges, but, spill prevention could also be addressed in the municipal operations/good-housekeeping portion of the permit as in this Guide (Chapter 6).

Facilitating public reporting of illicit discharges is specifically required in the Phase I regulations and as a part of the plan to detect and address illicit discharge, EPA recommends that Phase II permittees also develop a venue to promote, publicize, and facilitate public reporting of these discharges.

It is also noteworthy that smaller Phase II MS4s may utilize outside agency resources for spill response and/or they may use a neighboring locality. In this case, permittees will need to coordinate with these agencies to ensure appropriate spill response occurs and the necessary documentation is completed.

[6] San Francisco Municipal Regional Stormwater permit (www.swrcb.ca.gov/sanfranciscobay/board_decisions/adopted_orders/2009/R2-2009-0074.pdf), with modifications

3.7 Illicit Discharge Education & Training

Example Permit Requirement

*3.*7.1 The permittee must continue to implement a training program for all municipal field staff, who, as part of their normal job responsibilities, may come into contact with or otherwise observe an illicit discharge or illicit connection to the storm sewer system. Contact information, including the procedure for reporting an illicit discharge, must be included in the permittee's fleet vehicles that are used by field staff. Training program documents must be available for review by the permitting authority.

3.7.2 By no later than [*insert applicable deadline, e.g., 6 months after permit authorization*], the permittee must train all staff identified in Section 3.7.1 above on the identification of an illicit discharge or connection, and on the proper procedures for reporting and responding to the illicit discharge or connection. Follow-up training must be provided as needed to address changes in procedures, techniques, or staffing. The permittee must document and maintain records of the training provided and the staff trained. [7]

Example Permit Requirement Rationale for the Fact Sheet

The permit requires the permittee to train field staff, who may come into contact or observe illicit discharges, on the identification and proper procedures for reporting illicit discharges. Field staff to be trained may include, but are not limited to, municipal maintenance staff, inspectors, and other staff whose job responsibilities regularly take them out of the office and into areas within the MS4 area. Permittee field staff are out in the community every day and are in the best position to locate and report spills, illicit discharges, and potentially polluting activities. With proper training and information on reporting illicit discharges easily accessible, these field staff can greatly expand the reach of the IDDE program.

Recommendations for the Permit Writer

Permit writers may wish to require training of office staff (or all permittee staff), as well as field staff, as they can act as additional "eyes and ears" since they typically live in the community. The training should consist of how to identify illicit discharges and dumping, as well as the appropriate people to contact based on the type of discharge that is occurring.

Existing permittees (Phase I and Phase II) may have been training staff for several permit terms. For this reason, the permit writer may want the permittee to focus on annual "refresher" trainings for existing staff and new employees within a certain time of their hire date.

[7] Washington State Phase I Permit (www.ecy.wa.gov/programs/wq/stormwater/municipal/phaseIpermit/MODIFIEDpermitDOCS/PhaseIpermitSIGNED.pdf)

CHAPTER 4: CONSTRUCTION

Introduction

MS4 permits must address construction-related requirements (and often more specific state requirements) found in the following Federal regulations – Phase I MS4 Regulations 40 CFR 122.26(d)(2)(iv)(D) and Phase II MS4 Regulations 40 CFR 122.34(b)(4). Specific Permit Requirements should vary based on state requirements, rainfall amounts or other site-specific factors, but, in general, the requirements imposed on MS4 permittees for stormwater management of discharges associated with construction activities consist of several common requirements.

Included Concepts

- Construction requirements and control measures
- Construction site inventory
- Construction plan review procedures
- Construction site inspections and enforcement
- MS4 staff training
- Construction site operator education and public involvement

Permits must require that the permittee enact, to the extent allowed by State, Tribal or local law, an ordinance or other regulatory mechanism as part of the construction program that controls runoff from construction sites with a land disturbance of greater than or equal to one acre, including projects less than one acre that are part of a larger common plan of development or sale. As part of the ordinance or other regulatory mechanism, the permittee should provide commonly understood and legally binding definitions. These terms should be defined consistently across other related guidance and regulatory documents. Note that EPA's recommended definitions addressing this requirement are included in Appendix B.

Permits must require that MS4 permittees ensure that construction site operators select and implement appropriate erosion and sediment control measures to reduce or eliminate the impacts to receiving waters. The permit can require that permittees develop their own standards and specifications, but often it is preferable to require the permittees to utilize existing guidance that is approved by the permitting authority.

The permit must require that the permittee establish review procedures for construction site plans to determine potential water quality impacts and ensure the proposed controls are adequate. These procedures must include the review of individual pre-construction site plans to ensure consistency with local sediment and erosion control requirements. In addition, the permit must include requirements for inspection and enforcement of erosion and sediment control measures once construction begins.

Finally, Phase I MS4 permits must require the development of educational materials and training for construction site operators, and EPA recommends that training on stormwater controls for construction site operators be mandated in Phase II MS4 permits as well. Training should address site requirements for control measures, local stormwater requirements, enforcement activities, and penalties for non-compliance.

4.1 Construction Requirements and Control Measures

Example Permit Provision

4.1.1 The permittee must continue to implement a program which requires operators of public or private "construction activities" to select, install, implement, and maintain stormwater control measures that comply with [*Insert reference to documents including any and all applicable erosion and sediment control, pollution prevention, and other stormwater requirements, including applicable CGP, State, and local requirements*.] "Construction activity" for this permit includes, at a minimum, all public and private construction sites that result in a total land disturbance of [*insert disturbance threshold – either one or more acres or that result in a total land disturbance of less than one acre if part of a larger common plan or development or sale, or an alternative threshold that includes disturbances of less than one acre*]. Written procedures for implementing this program, including the components described in Parts 4.2 – 4.6, must be incorporated into the SWMP document. The permittee's construction program must ensure the following minimum requirements are effectively implemented for all construction activity discharging to its MS4:

[*Insert specific minimum requirements, such as:*

a. **Erosion and Sediment Controls**. Design, install and maintain effective erosion controls and sediment controls to minimize the discharge of pollutants. At a minimum, such controls must be designed, installed and maintained to:

(1) Control stormwater volume and velocity within the site to minimize soil erosion;

(2) Control stormwater discharges, including both peak flowrates and total stormwater volume, to minimize erosion at outlets and to minimize downstream channel and streambank erosion;

(3) Minimize the amount of soil exposed during construction activity;

(4) Minimize the disturbance of steep slopes;

(5) Minimize sediment discharges from the site. The design, installation and maintenance of erosion and sediment controls must address factors such as the amount, frequency, intensity and duration of precipitation, the nature of resulting stormwater runoff, and soil characteristics, including the range of soil particle sizes expected to be present on the site;

(6) Provide and maintain natural buffers around surface waters, direct stormwater to vegetated areas to increase sediment removal and maximize stormwater infiltration, unless infeasible; and

(7) Minimize soil compaction and, unless infeasible, preserve topsoil.

b. **Soil Stabilization**. Stabilization of disturbed areas must, at a minimum, be initiated immediately whenever any clearing, grading, excavating or other earth disturbing activities have permanently ceased on any portion of the site, or temporarily ceased on any portion of the site and will not resume for a period exceeding 14 calendar days. Stabilization must be completed within a period of

time determined by the permittee. In arid, semiarid, and drought-stricken areas where initiating vegetative stabilization measures immediately is infeasible, alternative stabilization measures must be employed as specified by the permittee.

c. **Dewatering**. Discharges from dewatering activities, including discharges from dewatering of trenches and excavations, are prohibited unless managed by appropriate controls.

d. **Pollution Prevention Measures**. Design, install, implement, and maintain effective pollution prevention measures to minimize the discharge of pollutants. At a minimum, such measures must be designed, installed, implemented and maintained to:

(1) Minimize the discharge of pollutants from equipment and vehicle washing, wheel wash water, and other wash waters. Wash waters must be treated in a sediment basin or alternative control that provides equivalent or better treatment prior to discharge;

(2) Minimize the exposure of building materials, building products, construction wastes, trash, landscape materials, fertilizers, pesticides, herbicides, detergents, sanitary waste and other materials present on the site to precipitation and to stormwater; and

(3) Minimize the discharge of pollutants from spills and leaks and implement chemical spill and leak prevention and response procedures.

e. **Prohibited Discharges**. The following discharges are prohibited:

(1) Wastewater from washout of concrete, unless managed by an appropriate control;

(2) Wastewater from washout and cleanout of stucco, paint, from release oils, curing compounds and other construction materials;

(3) Fuels, oils, or other pollutants used in vehicle and equipment operation and maintenance; and,

(4) Soaps or solvents used in vehicle and equipment washing.

f. **Surface Outlets**. When discharging from basins and impoundments, utilize outlet structures that withdraw water from the surface, unless infeasible.

Example Permit Requirement Rationale for the Fact Sheet

Stormwater discharges from construction sites generally includes sediment and other pollutants such as phosphorus and nitrogen, turbidity, pesticides, petroleum derivatives, construction chemicals, and solid wastes that may become mobilized when land surfaces are disturbed. The permit requires MS4 permittees to require construction site operators at defined sites to meet certain minimum stormwater requirements relating to erosion and sediment control and pollution prevention, and to meet other restrictions imposed on them by the State, or local regulations. These minimum requirements clearly specify the expectations for addressing

erosion control, sediment control, and pollution prevention control measures at construction sites.

EPA's Effluent Limitations Guidelines and Standards for the Construction and Development Point Source Category (74 FR 62996, December 1, 2009) require construction site owners and operators to implement a range of erosion and sediment control measures and pollution prevention practices to control pollutants in discharges from construction sites. These standards will be required in state construction general permits as they are reissued. These standards are broadly applicable to all construction activity disturbing one or more acres. They provide an objective means of describing appropriate erosion and sediment control best management practices, pollution prevention controls on construction site waste and storage of building materials and other reasonable components of the permittee's program to reduce pollutants to the maximum extent practicable in stormwater from construction sites that discharge through the MS4.

Recommendations for the Permit Writer

The Phase II stormwater regulations require permittees to develop a construction site program addressing "land disturbance of greater than or equal to one acre." However, some states may have more stringent requirements that apply to some permittees, or the permit writer may have discretion to lower the one acre threshold if this threshold is too high for particular permittees. For example, smaller, built-out cities may have many small redevelopment projects that fall below the one acre threshold. In such cases, controlling construction site stormwater entering the MS4 to the maximum extent practicable may require stormwater controls at smaller sites. Permit writers should review available construction and planning data from the MS4 to determine an appropriate project size threshold.

The example permit provision's list of minimum requirements for erosion controls, sediment controls, and pollution prevention measures is intended to establish specific requirements to implement the broader requirements in the Phase II rule (40 CFR 122.24(b)(4)). The list of minimum requirements in the example permit provision are from EPA's Construction and Development Effluent Guidelines (published December 1, 2009) which will eventually be required in all NPDES stormwater permits issued to construction site operators. At a minimum, the permit should reference the applicable state standards and, where appropriate, any local standards as well. Permit writers may wish to modify these specific requirements based on current standards or guidance on construction site stormwater controls in the State.

4.2 Construction Site Inventory

Example Permit Provision

4.2.1 The permittee must continue to maintain an inventory of all active public and private construction sites that result in a total land disturbance of [*insert disturbance threshold from Part 4.1.1.*]. The inventory must be continuously updated as new projects are permitted and projects are completed. The inventory must contain

relevant contact information for each project (e.g., name, address, phone, etc.), the size of the project and area of disturbance, whether the project has submitted for permit coverage under [*insert name of applicable NPDES general construction permit*], the date the permittee approved the [*insert name of local erosion and sediment control/stormwater plan]* in accordance with Part 4.3, and the permit tracking number issued by [*insert name of permitting authority*]. The permittee must make it available to the permitting authority upon request.

Example Permit Requirement Rationale for the Fact Sheet

To effectively conduct inspections, the permittee must know where construction activity is occurring. A construction site inventory tracks information such as project size, disturbed area, distance to any waterbody or flow channel, when the erosion and sediment control/stormwater plan was approved by the Permittee, and whether the project is covered by the permitting authority's construction general permit. This inventory will allow the permittee to track and target its inspections.

Recommendations for the Permit Writer

Because of state or local construction permitting requirements, many permittees have some system in place to track construction activity in their jurisdiction. If this is the first MS4 permit issued to the permittee, the permit writer should include a deadline for the development of the initial inventory.

Permit writers may want to request electronic copies of the inventory quarterly or yearly, if that information will be used by the State permitting or inspection staff.

4.3 Construction Plan Review Procedures

Example Permit Provision

4.3.1 The permittee must continue to require each operator of a construction activity to prepare and submit a [*insert name of local erosion and sediment control/stormwater plan*] prior to the disturbance of land for the permittee's review and written approval prior to issuance of a [*insert appropriate permit, i.e. grading or construction*]. The permittee must make it clear to operators of construction activity that they are prohibited from commencing construction activity until they receive receipt of written approval of the the plans. If the [*insert name of local erosion and sediment control/stormwater plan*] is revised, the permittee must review and approve those revisions.

4.3.2 The permittee must continue to implement site plan review procedures that meet the following minimum requirements:

a. The permittee must not approve any [*insert name of local erosion and sediment*

control/stormwater plan] unless it contains appropriate site-specific construction site control measures that meet the minimum requirements in Part 4.1.1 of this permit.

b. The stormwater pollution prevention plan (SWPPP) developed pursuant to [*insert name of applicable NPDES general construction permit*] may substitute for the [*insert name of local erosion and sediment control/stormwater plan*] for projects where a SWPPP is developed. The permittee is responsible for reviewing those portions of the SWPPP that comply with the [*insert name of local erosion and sediment control/stormwater plan*].

c. The [*insert name of local erosion and sediment control/stormwater plan*] must include the rationale used for selecting control measures, including how the control measure protects a waterway or stormwater conveyance.

d. The permittee must use qualified individuals, knowledgeable in the technical review of [*insert name of local erosion and sediment control/stormwater plan*] to conduct such reviews.

e. The permittee must document its review of each [*insert name of local erosion and sediment control/stormwater plan*] using a checklist or similar process. [8]

Example Permit Requirement Rationale for the Fact Sheet

The permit requires the review and prior approval of all local erosion and sediment control plans/stormwater plans to ensure that construction activities adhere to the permittee's minimum stormwater control requirements. Adequate review of erosion and sediment control/stormwater plans is necessary to verify compliance with all applicable requirements in the permittee's ordinance or other regulatory mechanism, as well as compliance with control measure standards and specifications. A formalized review procedure ensures consistent review of plans by specifying the requirements for plans being submitted, the schedule for review, and general conditions for approval. The site plan review process also provides a way to track construction activities and enforce standards.

A good site plan review process provides the permittee with the opportunity to comment – early and often – on a project's proposed number, type, location, and sizing of stormwater control measures that will be in place prior to, during, and at the conclusion of active construction. It is important to keep in mind that a site plan is a "living document" that may change during the life of the project; however, it is critical that the site plan be adequately reviewed and initially based on established policy, guidelines, and standards. The plan is the framework for stormwater control implementation, as well as the basis of any enforcement action on a project site.

The permit requires the permittee to review plans before construction activity begins to ensure that the plans are consistent with the standards specified in Part 4.1.1. The permit language also includes some key requirements during the plan review process:

[8] 2009 Ventura County, CA Phase I MS4 Permit (www.swrcb.ca.gov/rwqcb4/water_issues/programs/stormwater/municipal/ventura_ms4/09-0057/Transmittal%20Letter%20and%20MS4%20Permit%20Order%20No%2009%200057.pdf)

- If a SWPPP is developed for the State construction general permit, that plan may substitute for the local plan if it also includes/addresses the local requirements.
- The plan must include the rationale used for selecting or rejecting control measures (for example, why a silt fence was selected or why a sediment trap was not included).
- Finally, plan reviewers must be trained and must document their review. For example, this can be done by using a checklist or similar process.

Recommendations for the Permit Writer

Some MS4 permits include a requirement that, prior to approval of local permits, the permittee must verify that the construction site operator has existing coverage under the State's Construction General Permit, if necessary. This requirement helps to reduce the number of non-filers for the State general permit by providing a check for NPDES CGP permit coverage at the local level.

4.4 Construction Site Inspections and Enforcement

Example Permit Provision

4.4.1 The permittee must continue to implement procedures for inspecting public and private construction projects in accordance with the frequency specified in Table 4-1 below:

Table 4-1: Inspection Frequencies

Site	Inspection Frequency
a. All sites [*insert a size threshold that is considered large for the MS4 if large projects are common, e.g. 5 acres*] or larger in size	Inspection must occur within [*insert number of days/hours, e.g. 48 hours] of a [insert significant rain event size, e.g. ½ inch rain event] and no less than biweekly (every 2 weeks)*]
b. All sites one (1) acre or larger that discharge to a tributary listed by the state/tribe as an impaired water for sediment or turbidity under the CWA section 303(d)	
c. Other sites one (1) acre or more determined by the permittee or permitting authority to be a significant threat to water quality*	
d. All other construction sites with one (1) acre or more of soil disturbance not meeting the criteria specified in (A),(B), or (C) above	Inspection must occur at least monthly
e. Construction sites less than one (1) acre in size	Inspection must occur as needed based on the evaluation of the factors that are a threat to water quality*
*In evaluating the threat to water quality, the following factors must be considered: soil erosion potential; site slope; project size and type; sensitivity of receiving waterbodies; proximity to receiving waterbodies; non-stormwater discharges; past record of non-compliance by the operators of the construction site; and [*insert other factors relevant to particular MS4*].	

4.4.2 The permittee must adequately inspect all phases of construction.

a. Prior to Land Disturbance: Prior to allowing an operator to commence land disturbance, the permittee must perform an inspection to ensure all necessary erosion and sediment controls are in place.

b. During Active Construction: During active construction, the permittee is required to conduct inspections in accordance with the frequencies specified in Table 4-1 in Part 4.4.1.

c. Following Active Construction: At the conclusion of the project, the Permittee must inspect all projects to ensure that all graded areas have reached final stabilization and that all temporary control measures are removed (e.g., silt fence).

4.4.3 The permittee must have trained and qualified inspectors (See Part 4.5). The permittee must also continue to follow, and revise as necessary, written procedures outlining the inspection and enforcement procedures. Inspections of construction sites must, at a minimum:

a. Check for coverage under the [*insert name of applicable NPDES general construction permit*] by requesting a copy of any application or Notice of Intent (NOI) or other relevant application form during initial inspections.

b. Review the applicable [*insert name of local erosion and sediment control/stormwater plan*] and conduct a thorough site inspection to determine if control measures have been selected, installed, implemented, and maintained according to the plan.

c. Assess compliance with the permittee's ordinances and permits related to stormwater runoff, including the implementation and maintenance of designated minimum control measures.

d. Assess the appropriateness of planned control measures and their effectiveness.

e. Visually observe and record non-stormwater discharges, potential illicit connections, and potential discharge of pollutants in stormwater runoff.

f. Provide education and outreach on stormwater pollution prevention, as needed.

g. Provide a written or electronic inspection report generated from findings in the field

4.4.4 The permittee must track the number of inspections for the inventoried construction sites throughout the reporting period to verify that the sites are inspected at the minimum frequencies required. Inspection findings must be documented and maintained for review by the permitting authority.

4.4.5 Based on site inspection findings, the permittee must take all necessary follow-up actions (i.e., re-inspection, enforcement) to ensure compliance in accordance with the permittee's enforcement response plan required in Part 1.3. These follow-up and enforcement actions must be tracked and maintained for review by the permitting authority. [9]

[9] 2007 San Diego Phase I MS4 Permit (www.swrcb.ca.gov/rwqcb9/water_issues/programs/stormwater/docs/sd_permit/r9_2007_0001/2007_0001final.pdf)

Example Permit Requirement Rationale for the Fact Sheet

The permit requires inspections of construction sites based on a prioritized ranking of sites (see 40 CFR 122.26(d)(2)(iv)(D)(3) and 122.34(b)(4)(ii)(F)). Larger construction sites and sites that discharge to a sediment impaired waterbody are inspected more frequently than small sites. In addition to inspections at a regular interval, inspections are required within a certain timeframe after a rain event.

Inspections are required before land disturbance to ensure erosion and sediment controls are in place and a plan has been developed, during active construction, and after the site has been stabilized. The permit language also contains specific requirements on what the inspection must include (such as a comparison of control measures in the approved plan to measures installed in the field).

Without adequate implementation and maintenance, stormwater controls will not function as designed. In order to ensure proper implementation and maintenance by site operators, a rigorous inspection protocol is necessary. This protocol must include a written SOP for site inspections and enforcement to ensure inspections and enforcement actions are conducted in a consistent manner. The SOP must include steps to identify priority sites for inspection and enforcement based on the nature and extent of the construction activity, slope of the site, proximity to receiving waters, the characteristics of soils, and the water quality status of the receiving water. This will allow inspection resources and staff time to be used most effectively. Documentation of inspections is critical to track noncompliance and enforcement. Regularly scheduled inspections, as well as post-storm event inspections, are necessary to be sure that regular maintenance occurs as well as repairs after storm events.

Recommendations for the Permit Writer

Selecting an appropriate inspection frequency is, by necessity, a case-by-case exercise. Inspection frequencies for one permittee will not necessarily be appropriate for other permittees. For example, appropriate inspection frequencies may vary among different permittees depending on such factors as topography and rainfall patterns, including whether the MS4 is located in a wet or arid region and/or has distinct wet and dry seasons. Appropriate inspection frequencies may also vary seasonally or geographically within a single MS4 based on seasonal variations in rainfall or snowfall, or differing topographical or geographic conditions in different parts of the MS4 area.

For individual MS4 permits, permit writers should consider seasonal rainfall patterns, the presence and location of impaired streams or sensitive habitats, soils, topography, and other MS4-specific factors. In addition, permit writers should review current inspection frequencies, as well as inspection and enforcement records.

The permit writer should also note that the permit language will need to be modified if the permittee was not previously required to develop written procedures for the inspection and enforcement conducted at construction sites.

4.5 MS4 Staff Training

Example Permit Provision

4.5.1 The permittee must ensure that all staff whose primary job duties are related to implementing the construction stormwater program, including permitting, plan review, construction site inspections, and enforcement, are trained to conduct these activities. The training can be conducted by the permittee or outside training can be attended, however, this training must include, at a minimum:

a. Erosion and Sediment Control/Stormwater Inspectors:

1. Initial training, held within the first permit year, regarding proper control measure selection, installation, implementation, and maintenance, as well as administrative requirements such as inspection reporting/tracking and use of the permittee's enforcement responses; and
2. Annual refresher training for existing inspection staff to update them on preferred controls, regulation changes, permit updates, and policy or standards updates. Throughout the year, e-mails and/or memos must be sent out to update the inspectors as changes happen.

b. Other Construction Inspectors: Initial training must be held within the first permit year, on general stormwater issues, basic control measure implementation information, and procedures for notifying the appropriate personnel of noncompliance. Refresher training held at least once every two years.

c. Plan Reviewers:

1. Initial training, held within the first permit year, regarding control measure selection, design standards, and review procedures; and
2. Annual training regarding new control measures, innovative approaches, permit updates, regulation changes, and policy or standard updates.

d. Third-Party Inspectors and Plan Reviewers: If the permittee utilizes outside parties to conduct inspections and/or review plans, these outside staff must be trained per the requirements listed in Part 4.5.1.a (above).

Example Permit Requirement Rationale for the Fact Sheet

By setting up training for the permittee staff, the permittee can ensure that the erosion and sediment control requirements are understood and consistently applied since all staff will have been trained on the same information. The permit requires staff whose primary job duties are related to implementing the construction stormwater program to be trained. The training requirements vary by the type of staff. F or example, erosion and sediment control inspectors must be trained annually on a range of topics, while other construction inspectors (such as building inspectors) will receive more general training.

The permittee can conduct the training or the training can be provided by another entity (such as a State erosion and sediment control class). Ideally, the training should include classroom presentations, in-field training, and follow-up evaluations to determine whether the training was effective.

Also, the permittee should consider providing training to other in-field municipal staff so that problems associated with flooding and sedimentation from construction sites can be properly reported and addressed.

4.6 Construction Site Operator Education & Public Involvement

Example Permit Provision

4.6.1 Construction Operator Education. The permittee must develop and distribute educational materials to construction site operators as follows:

a. Each year, the permittee must either provide information on existing training opportunities or develop new training for construction operators on control measure selection, installation, implementation, and maintenance as well as overall program compliance.

b. The permittee must develop or utilize existing outreach tools (i.e. brochures, posters, website, plan notes, manuals etc.) aimed at educating construction operators on appropriate selection, installation, implementation, and maintenance of stormwater controls, as well as overall program compliance.

c. The permittee must make available appropriate outreach materials to all construction operators who will be disturbing land within the MS4 boundary. The permittees' contact information and website must be included in these materials.

d. The permittee must include information on appropriate selection, installation, implementation, and maintenance of controls, as well as overall program compliance, on the permittee's existing website.

4.6.2 Public Involvement.

a. The permittee must adopt and implement procedures for receipt and consideration of information submitted by the public regarding construction projects. This includes, but is not limited to, the public reporting mechanisms described in Part 3.6.

b. The permittee must hold public meetings for all public projects that have planned disturbance greater than or equal to an acre. [10]

[10] Eastern Washington MS4 Phase II Permit (Part 2 only) (www.ecy.wa.gov/programs/wq/stormwater/municipal/phaseiiEwa/MODIFIEDpermitDOCS/EWpermitMODsigned.pdf)

Example Permit Requirement Rationale for the Fact Sheet

Education of construction site operators regarding stormwater management and regulatory requirements is an essential part of controlling stormwater discharges from construction sites. Making brochures, guidance documents and trainings available will increase the knowledge of operators and compliance in the field and can help them choose the correct structural control and processes, correctly install the controls, and successfully implement control measures. The permit requires the permittee to provide appropriate outreach materials to construction site operators. These materials can be made available during the normal course of business (i.e. in BMP manuals, in plan notes, during meetings) or via brochures or websites. In addition, the permittee must either provide training or notify the operators of available training opportunities.

Public involvement requirements include the development of a hotline or other telephone number for the public to call regarding stormwater concerns at construction sites.

CHAPTER 5: POST-CONSTRUCTION OR PERMANENT/LONG-TERM STORMWATER CONTROL MEASURES

Introduction

Phase I MS4s are required to address new development and significant redevelopment in their SWMPs through controls to reduce pollutants in stormwater discharges after construction is completed. See 40 CFR 122.26(d)(2)(iv)(A)(2).

Included Concepts

- ► Post-construction stormwater management program
- ► Site performance standards
- ► Site plan review
- ► Long-term maintenance of post-construction stormwater control measures
- ► Watershed protection
- ► Tracking of post-construction stormwater control measures
- ► Inspections and enforcement
- ► Retrofit plan

The Phase II regulations require regulated small MS4 operators to develop, implement, and enforce a program to address stormwater discharges from new development and redevelopment sites that disturb greater than or equal to one acre to the MS4 (including projects that disturb less than one acre that are part of a larger common plan of development or sale). The regulations also require that the MS4 ensure that control measures are installed and implemented that prevent or minimize water quality impacts. See 40 CFR 122.34(b)(5)(i)

As part of these Phase II requirements, the MS4 must:

- Develop and implement approaches to addressing post-construction stormwater discharges that include a combination of structural and/or non-structural controls;
- Adopt adequate legal authority to enable the MS4 to address post-construction stormwater discharges from new development and redeveloped sites; and
- Ensure adequate long-term operation and maintenance of applicable post-construction control measures. See 40 CFR 122.34(b)(5)(ii).

As of April 2010, most MS4 permits only require permittees to adopt a post-construction program with enforceable requirements designed to reduce stormwater impacts from new development and redevelopment, without specifying a performance standard. To meet this requirement many MS4s have adopted criteria in ordinances or other legally enforceable mechanisms based on already promulgated flood-control based standards (i.e., focused only on discharge rates). However, performance standards can be a very useful and meaningful mechanism in the post-construction toolbox to ensure that water quality objectives are met.

The example permit provisions that follow present the current thinking on how to strengthen the effectiveness of the permittee's stormwater program by preventing the harmful effects of increased stormwater flows and pollutant loads from new development and redeveloped sites on receiving waterbodies. EPA recognizes that there are a wide variety of approaches that some states have already

taken to control discharges from new development and redeveloped sites, some of which are more stringent than the permit language recommended below. The language below includes components that EPA believes would provide focus and enforceability, and would bring about significant improvements in stormwater controls on site. However, the "maximum extent practicable" may be greater than is reflected in the example permit language below for some MS4s, and EPA encourages states, where possible, to go beyond these example provisions and to achieve even better watershed planning and water quality outcomes. For these reasons, this chapter presents the minimum permit provisions EPA currently recommends to be included in permits in order for permittees to reduce their discharges to the maximum extent practicable as well as the optional, more stringent, requirements.

5.1 Post-Construction Stormwater Management Program

Example Permit Provision

5.1.1 The permittee must continue to implement a program to control stormwater discharges from new development and redeveloped sites that disturb at least one acre (including projects that disturb less than one acre that are part of a larger common plan of development or sale) that discharge into an MS4 [*or insert smaller alternative size*]. The program must apply to private and public development sites, including roads.

5.1.2 The program must require that controls are in place that will infiltrate, evapotranspire, or harvest and use stormwater from the site to meet the performance standards in Part 5.2 to protect water quality.

5.1.3 Written procedures for implementing this program, including the components described in Parts 5.2 – 5.8, must be incorporated into the SWMP document.

Example Permit Requirement Rationale for the Fact Sheet

The stormwater regulations require that an MS4 develop and implement a program to address post-construction discharges from new development and redeveloped sites, and ensure the long-term operation and maintenance of these controls (see Part 5.4 for the maintenance requirements). (See 40 CFR 122.34(b)(5)). The permit requires the use of specific stormwater controls, i.e., those that infiltrate, evapotranspire, or harvest and use stormwater, with the aim of maintaining or restoring the pre-development stormwater runoff conditions at the site.

Many traditional stormwater management practices, and the permit language that drives them, fail to address the hydrologic modifications that increase the quantity of stormwater discharges, and cause excessive erosion and stream channel degradation. Frequently the volume, duration, and velocity of stormwater discharges cause degradation to aquatic systems. Protecting and restoring the physical, chemical and biological integrity of receiving waters must be a central issue in stormwater permits. The recent report of the National Research Council (*Urban Stormwater Management in the United States*, National Academies Press, 2008, www.epa.gov/npdes/pubs/nrc_stormwaterreport.pdf) recommends that the NPDES stormwater

program examine the impacts of stormwater flow, treat flow as a surrogate for other pollutants, and includes the necessary control requirements in stormwater permits. Specifically the report recommends that the volume retention practices of infiltration, evapotranspiration and rainwater harvesting be used as primary stormwater management mechanisms. For this reason, EPA recommends use of a permit condition that is based on maintaining or restoring predevelopment hydrology although other forms of this permit condition maybe appropriate as well.

Additional information on the development of a post-construction program for Phase II permittees can be found in the Center for Watershed Protection's *Managing Stormwater In Your Community: A Guide for Building an Effective Post-Construction Program* (available at www.cwp.org/postconstruction). Also, EPA's green infrastructure website includes information on post-construction controls and programs (see www.epa.gov/greeninfrastructure).

5.2 Site Performance Standards

Example Permit Provision

5.2.1 The permittee must establish, implement and enforce a requirement that owners or operators of new development and redeveloped sites discharging to the MS4, which disturb greater than or equal to one acre (including projects that disturb less than one acre that are part of a larger common plan of development or sale), design, install, implement, and maintain stormwater control measures that infiltrate, evapotranspire, harvest, and use stormwater discharges.

5.2.2 Within [*insert deadline, e.g., 12 months, 24 months, etc.*] the permittee must require that stormwater discharges from such new development and redevelopment sites be managed such that post-development hydrology does not exceed the pre-development hydrology at the site, in accordance with the performance standard set forth in this paragraph. The SWMP must describe the site design strategies, control measures, and other practices deemed necessary by the permittee to maintain or improve pre-development hydrology.[11] [*Insert a new development performance standard, such as one or a combination of the following:*

Basis for Performance Standard	***Description***	***Performance Standard***
Rainfall	*Minimum storm volume to be retained on site.*	*Design, construct, and maintain stormwater management practices that manage rainfall on-site, and prevent the off-site discharge of the precipitation from [insert standards, such as "the first one inch of rainfall from a 24-hour storm preceded by 48 hours of no measurable precipitation"]. Discharge volume reduction can be achieved by canopy interception, soil amendments, evaporation, rainfall harvesting, engineered infiltration, extended filtration and/or evapotranspiration and any combination of the aforementioned practices. This first one inch of rainfall*

[11] *Big Darby Creek Watershed CGP, Part III.G.2.d. (web.epa.ohio.gov/dsw/permits/DarbyStormWater_Final_GP_sep06.pdf)*

		must be 100% managed with no discharge to surface waters, except when the permittee chooses to implement the conditions in Part 5.2.5.d below.[12]
Rainfall	*Minimum storm size to be retained on site.*	*Design, construct, and maintain stormwater management practices that manage rainfall on-site, and prevent the off-site discharge of the precipitation from all rainfall events less than or equal to [insert standards, such as "the 95th percentile rainfall event"]. This objective must be accomplished by the use of practices that infiltrate, evapotranspire and/or harvest and reuse rainwater. The 95th percentile rainfall event is the event whose precipitation total is greater than or equal to 95 percent of all storm events over a given period of record.*[13]
Recharge/Runoff	*Hydrologic analysis.*	*Design, construct, and maintain stormwater management practices that preserve the pre-development runoff conditions following construction. The post-construction rate, volume, duration and temperature of discharges must not exceed the pre-development rates and the pre-development hydrograph for 1, 2, 10, 25, 50 and 100 year storms must be replicated through site design and other appropriate practices. These goals must be accomplished through the use of infiltration, evapotranspiration, and/or rainwater harvesting and reuse practices. Defensible and consistent hydrological assessments and modeling methods must be used and documented.* [14]
Recharge	*Groundwater recharge requirement.*	*Any "major development" project, which is one that disturbs [insert standards, such as at least one (1) acre of land or creates at least 0.25 acres of new or additional impervious surface], must comply with one of the following two groundwater recharge requirements:* • *Demonstrate through hydrologic and hydraulic analysis that the site and its stormwater management measures maintain 100 percent of the average annual pre-construction groundwater recharge volume for the site; or* • *Demonstrate through hydrologic and hydraulic analysis that the increase of stormwater discharges volume from pre-construction to post-construction for the two-year storm is infiltrated.*[15]
Impervious Cover	*Limiting total impermeable surface (or effective impermeable surface)*	*Minimize total impervious cover resulting from new development and redevelopment to [insert standards, such as <10% of disturbed land cover and/or limit total amount of effective impervious surface to no more than 5% of the landscape].*

[12] *West Virginia Small MS4 Permit (www.wvdep.org/Docs/17444_SW_WV%20MS4%20permit%202009.pdf)*
[13] *Section 438, Energy Independence & Security Act (EISA) Guidance (www.epa.gov/owow/NPS/lid/section438/pdf/final_sec438_eisa.pdf)*
[14] *Section 438, Energy Independence & Security Act (EISA) Guidance (www.epa.gov/owow/NPS/lid/section438/pdf/final_sec438_eisa.pdf)*
[15] *New Jersey Stormwater Management Rules, N.J.A.C. 7:8 (www.nj.gov/dep/rules/adoptions/2004_0202_njpdes.pdf)*

5.2.3 Incentives for Redeveloped Sites. When considered at the watershed scale, certain types of developed sites can either reduce existing impervious surfaces, or at least create less 'accessory' impervious surfaces. The Permittee may develop a program to allow adjustments to the performance standard for new development or redevelopment sites that qualify. A reduction of [*insert the amount of stormwater the Permittee can reduce for utilizing redevelopment principles, e.g. 0.2 inches from the one inch runoff reduction standard*] may be applied to any of the following types of development. Reductions are additive up to a maximum reduction of [*insert amount, such as 0.75 inches*] for a project that meets four or more criteria. The permittee may choose to be more restrictive and allow a reduction of less than [*insert amount, such as 0.75 inches*] if they choose. In no case will the reduction be greater than [*insert amount, such as 0.75 inches*].

1. Redeveloped sites
2. Brownfield redeveloped site
3. High density (>7 units per acre)
4. Vertical Density, (Floor to Area Ratio (FAR) of 2 or >18 units per acre)
5. Mixed use and Transit Oriented Development (within ½ mile of transit)[16]

5.2.4 Additional Requirements and Exceptions: The permittee must implement the following additional requirements where applicable:

a. A site that is a potential hot spot with the reasonable potential for contaminating underground sources of drinking water must provide treatment for associated pollutants (e.g., petroleum hydrocarbons at a vehicle fueling facility).

b. A site that discharges or proposes to discharge to any surface water or ground water that is used as a source of drinking water must comply with all applicable requirements relating to source water protection and must not cause an exceedance of drinking water standards.[17]

c. Sites may not infiltrate stormwater in areas of soil contamination.

d. For projects that cannot meet 100% of the performance standard in Part 5.2.2 on site, two alternatives are available: off-site mitigation and payment in lieu. If these alternatives are chosen, then the permittee must develop and fairly apply criteria for determining the circumstances under which these alternatives will be available and establish reasonable schedules for mitigation and require payment in lieu of prior to project inception. A determination that standards cannot be met on site must include multiple criteria that would rule out fully meeting the performance standard in Part 5.2.2, such as: too small a lot outside of the building footprint to create the necessary infiltrative capacity even with amended soils; soil instability as documented by a thorough geotechnical

[16] *West Virginia Small MS4 Permit (Section C.b.5.a.ii.A.3) (www.wvdep.org/Docs/17444_SW_WV%20MS4%20permit%202009.pdf)*
[17] *West Virginia Small MS4 Permit (Section C.b.5.a.ii.A.2) (www.wvdep.org/Docs/17444_SW_WV%20MS4%20permit%202009.pdf)*

analysis; a site use that is inconsistent with capture and reuse of stormwater; or too much shade or other physical conditions that preclude adequate use of plants. Sites must still maximize stormwater retention on-site, before applying the remaining stormwater to one of the alternatives. In instances where alternatives are chosen, technical justification as to the infeasibility of on site management is required to be documented.[18]

Example Permit Requirement Rationale for the Fact Sheet

Developed land changes the hydrology of sites, leading to higher stormwater discharge volumes and higher pollutant loads. The purpose of this standard is to maintain or restore stable hydrology in receiving waters thereby protecting water quality by having post-construction hydrology mimic the natural hydrology of the area.

A simpler, but reasonably approximate 'mimicking the natural hydrograph' approach can typically be accomplished by retaining (as opposed to detaining stormwater for later discharge) on a developed site the volume of water that was retained prior to development, through the mechanisms of infiltration, evapotranspiration, and capture and use. By significantly reducing the volume of stormwater discharges, these mechanisms significantly reduce the discharge of pollutants in stormwater, making discharge volumes the ideal all-around focus and metric for stormwater management. These provisions must be clear about the retention requirement, e.g., an underdrained rain garden likely functions more as a detention and filtration system than an infiltration system.

In Part 5.2.3, the five types of development which qualify for incentives are redevelopment, brownfield redevelopment, high density, vertical density, and mixed use with transit oriented development. Redeveloping already degraded sites can reduce regional land consumption and minimize new land disturbance. Minimizing land disturbance and impervious cover is critical to maintaining watershed health. In addition to water quality benefits, cleaning up and reinvesting in brownfield properties increases local tax bases, facilitates job growth, utilizes existing infrastructure, takes development pressures off of undeveloped, open land, and both improves and protects the environment. The effect of low-density urbanization on watersheds and the hydrologic cycle is substantial. High-density development, including vertical density, slows land consumption rates and accommodates more land uses on a smaller footprint. Finally, mixing land uses and promoting transit-oriented development can directly reduce runoff since mixed-use developments have the potential to use surface parking lots and transportation infrastructure more efficiently, requiring less pavement.[19]

In Part 5.2.4.d, the permittee must establish clear and stringent criteria for the conditions under which payment in lieu and off-site mitigation could be used. These criteria must be related to physical constraints such as a combination of soils which limit infiltration opportunities, space or light limited situations restricting the amount of vegetation that can be used, and a land use that is not conducive to capture and use of stormwater. Further, appropriate schedules for

[18] *West Virginia Small MS4 Permit (Section C.b.5.a.ii.A.4) (www.wvdep.org/Docs/17444_SW_WV%20MS4%20permit%202009.pdf)*
[19] Adapted from the WV Phase II MS4 Fact Sheet (www.dep.wv.gov/WWE/Programs/stormwater/MS4/permits/Pages/default.aspx)

payment and implementation of mitigation measures must be established to ensure stormwater impacts are addressed in a timely manner.

Recommendations for Permit Writer

Many communities have adopted criteria based on already promulgated flood-control based standards (i.e., focused only on discharge rates). This example permit language instead promotes the concept that effective standards should be based on the objective of maintaining or restoring stable hydrology to protect the quality of receiving waters by having post-construction hydrology mimic the natural hydrology of the area. The permit language provides a number of example standards that can be used to achieve this objective.

Performance standards should take into account the wide variability in hydrologic conditions in different areas. Ideally, standards should reflect the local naturally-occurring hydrology with respect to runoff, infiltration, evapotranspiration, and storage – that is, the water balance that would be present in the absence of development. Key parameters, such as rainfall patterns, soil characteristics, and topography, can be used to establish likely 'natural' hydrology. Where maintaining or reestablishing such hydrologic conditions is infeasible, off-site mitigation, payment-in-lieu, or fee programs may be used. Based on current (2010) information, EPA recommends that permits allow for a combination of techniques that utilize infiltration, capture and use, and evapotranspiration as appropriate, rather than relying only on infiltration or some other technique alone to meet performance standards.

The permit writer could include a performance standard that stipulates that predevelopment hydrographs match post-development hydrographs. In order for this type of performance standard to be effective, the permit writer should make sure that the permit clearly spells out all variables of the hydrograph (volume, rate, duration, frequency) to be matched, and not just the discharge rate. Many current pre-post hydrology standards focus only on discharge rate, which is primarily a flood control approach. In addition, a pre-development condition should also be defined, and that condition should be one that is reasonably 'natural', rather than simply the conditions (perhaps already fairly impervious) that existed immediately prior to the current developed site. A calculator tool based on key hydrologic parameters (soil, rainfall, slope, and vegetation) or an on-site rainfall retention standard that is appropriate for that area can help the permittee determine what constitutes pre-development hydrology and the means by which it may be matched.

As contemplated in the example permit provisions, permit writers may want to consider the difference between new development and redevelopment sites, as well as differences among some types of developed sites, in establishing performance standards. From the standpoint of imperviousness at a watershed scale, redeveloped sites are usually more desirable than new development sites, which replace relatively naturally functioning green spaces with impervious surfaces such as roads, and parking lots. Certain types of development generate less impervious surfaces than others. For example, typically, there is little or no increase in net stormwater discharges when redeveloping underused properties such as vacant properties, brownfield sites, or greyfield sites, since new impervious cover replaces existing impervious cover. The net discharge increase from already developed properties would likely be zero since the site was already predominately impervious cover. In many cases, redeveloped sites break up or remove some portion of the impervious cover, converting it to pervious cover and allowing for some stormwater infiltration. Redevelopment sites can produce a net improvement in regional water quality by decreasing total impervious area and its

associated stormwater discharges. Redeveloped sites can also reduce regional land consumption. By building on underused, already degraded land, the pressure to convert previously undeveloped land is reduced. Therefore differential standards for new development and redeveloped sites, as well as for different types of developed sites, may be reasonable. However, they should be crafted to minimize creation of imperviousness at the watershed scale, and still include some reasonable level of stormwater management at the site scale.

Redevelopment is the act of improving by renewing or restoring any developed property that results in the land disturbance of one acre or greater, and that has one of the following characteristics:

- Land that currently has an existing structure, such as buildings or houses, or
- Land that is currently covered with an impervious surface, such as a parking lot or roof, or
- Land that is currently degraded and is covered with sand, gravel, stones, or other non-vegetative covering.

Infiltration may not be appropriate in all cases. For example, a site that is a potential hot spot with the reasonable potential for significant pollutant loading(s) may not be appropriate for stormwater infiltration. Hot spots may include commercial, industrial, institutional, municipal, or transportation related operations that may produce higher levels of stormwater pollutants, and/or present a higher level or risk for spills, leaks, or illicit discharges such as: gas stations, petroleum wholesalers, vehicle maintenance and repair, auto recyclers, recycling centers and scrap yards, landfills, solid waste facilities, wastewater treatment plants, airports, railroad stations and associated maintenance facilities, and highway maintenance facilities.

In addition, the permit writer may want to consider what type of flexibility to afford sites where the owner/operator is not able to meet the performance standard on site. For instance, if a site is constrained by size or previous impervious surfaces, such that the use of control measures that infiltrate stormwater is severely limited, the permit could allow alternatives for meeting the performance standard in other ways such as payment in lieu and off-site mitigation within the same watershed.

Off-site mitigation and payment in lieu programs are options that can be used in these instances. Off-site mitigation generally means that control measures may be implemented at another location, in the same sewershed/watershed as the original project, and as approved by the regulatory agency. Payment in lieu programs generally mean that the developer pays a fee to the permittee which will then be applied to a stormwater control project, in lieu of installing the required control measures.

If the permit writer chooses to include an off-site mitigation or payment in lieu program in the permit, the permit writer could specify that the programs meet several criteria, for example, those described in the 2009 West Virginia Phase II General Permit Fact Sheet (www.dep.wv.gov/WWE/Programs/stormwater/MS4/permits/Pages/default.aspx):

1. The permittee must establish clear and stringent criteria for the conditions under which these options are available that must be related to real physical constraints such as a combination of soils limiting infiltration opportunities, space or light limited situations restricting the amount of vegetation that can be used, and a land use that is not conducive to capture and use of

stormwater. While one or two of these characteristics should not be adequate to qualify for the alternative, the combination of multiple constraints could;

2. A minimal requirement for at least [*0.4 inch*] of stormwater managed on-site;

3. A [*1:1.5 ratio*] of the amount of requisite stormwater not managed on site to the amount of stormwater required to be mitigated at another site, or for which in-lieu payments must be made;

4. If demonstrated to the permittee that it is completely infeasible to manage the remainder [*0.4 inches*], then the ratio for this unmanaged portion is [*1:2*].

5. The necessary tracking systems for both types of programs, including the necessary inventory of public and retrofit projects for off-site mitigation; and,

6. The establishment of a credible valuation structure for payment in lieu, i.e., what is the actual cost for the permittee to provide retrofits for the necessary amount of stormwater, not just a token payment. The purpose of these provisions is to disincentivize the use of alternatives unless really needed, but also to provide a financial foundation for implementation of public stormwater management projects, including retrofits where those needs have been identified.

Additional justification for the development types which qualify for these incentives can be seen in the West Virginia Phase II MS4 Permit Fact Sheet (www.dep.wv.gov/WWE/Programs/stormwater/MS4/permits/Pages/default.aspx).

5.3 Site Plan Review

Example Permit Provision

5.3.1 To ensure that all applicable new development and redeveloped sites conform to the performance standards required in Part 5.2, the permittee must continue to implement project review, approval, and enforcement procedures that include:

a. Procedures for the site plan review and approval process(es) that include inter-departmental consultations, as needed, and a required re-approval process when changes to an approved plan are desired; and

b. A requirement for submittal of 'as-built' certifications within 90 days of completion of a project.

5.3.2 The permittee must conduct site plan reviews, using the procedures described in Part 5.3.1, of all new development and redeveloped sites which will disturb greater than or equal to one acre [*or a smaller threshold as set by the permitting authority*] and discharge to the MS4 (including sites that disturb less than one acre that are part of a larger common plan of development or sale). The site plan review must specifically address how the project applicant meets the performance standards in Part 5.2 and how the project will ensure long-term maintenance as required in Part 5.4.

Example Permit Requirement Rationale for the Fact Sheet

Specific standards are a critical component of a stormwater management program. However, even the best requirements need to be supported by a review program to ensure that the standards are met. The example permit provision would require permittees to fully implement a comprehensive site plan review and approval program. To meet this requirement, the permittee must have the authority to withhold approvals when standards are not met.

Recommendations for the Permit Writer

The permit writer may want to consider adding a requirement for a pre-application concept plan meeting to occur (in addition to the requirement for the project applicant to submit a site plan for review). During this meeting the project land owner or developer, the project design engineer, and municipal planning staff could discuss the conceptual designs that would be used to ensure that they meet the performance standards. This meeting would ensure that stormwater and performance standards are addressed early in the development process. However, if this pre-application concept plan meeting is not consistent with local planning procedures, the permit writer could consider omitting this requirement.

5.4 Long-Term Maintenance of Post-Construction Stormwater Control Measures

Example Permit Provision

5.4.1 All structural stormwater control measures installed and implemented to meet the performance standards of Part 5.2 must be maintained in perpetuity. The permittee must ensure the long-term maintenance of structural stormwater control measures installed according to this Part through one, or both, of the following approaches:

a. Maintenance performed by the Permittee. See part 6.4.

b. Maintenance performed by the owner or operator of a new development or redeveloped site under a maintenance agreement. The permittee must require the owner or operator of any new development or redeveloped site subject to the performance standards in Part 5.2 to develop and implement a maintenance agreement addressing maintenance requirements for any structural control measures installed on site to meet the performance standards. The agreement must allow the permittee, or its designee, to conduct inspections of the structural stormwater control measures and also account for transfer of responsibility in leases and/or deeds. The agreement must also allow the permittee, or its designee, to perform necessary maintenance or corrective actions neglected by the property owner/operator, and bill or recoup costs from the property owner/operator when the owner/operator has not performed the necessary maintenance within thirty (30) days of notification by the permittee or its designee.

5.4.2 Verification of maintenance responsibilities. The permittee must require that property owners or operators of any new development or redeveloped site subject to the performance standards in Part 5.2 provide verification of maintenance for the approved structural stormwater control measures used to comply with the performance standards. Verification must include one or more of the following as applicable:

a. The owner/operator's signed statement accepting responsibility for maintenance with a provision for transferring maintenance responsibility if the property is legally transferred to another party; and/or

b. Written conditions in the sales or lease agreement that require the recipient to assume responsibility for maintenance; and/or

c. Written conditions in project conditions, covenants and restrictions for residential properties assigning maintenance responsibilities to a home owner's association, or other appropriate group, for maintenance of structural and treatment control stormwater management practices; and/or

d. Any other legally enforceable agreement that assigns permanent responsibility for maintenance of structural or treatment control stormwater management practices.

Example Permit Requirement Rationale for the Fact Sheet

Appropriate operation and maintenance are critical aspects to the function of any suite of controls. In many cases, controls may be located on private property, and it is necessary to establish some provision to assure responsibility and accountability for the operation and maintenance of these controls.

The permittee must ensure maintenance of all structural stormwater control measures. In this Guide, structural controls also include many green infrastructure practices such as rainwater harvesting, rain gardens, permeable pavement, and vegetated swales.

Recommendations for the Permit Writer

Most non-traditional MS4 permittees will probably not have the legal authority to recoup costs where the owner/operator has not completed necessary maintenance. Permit writers may want to be more specific in this requirement to include other options for non-traditional MS4 permittees.

5.5 Watershed Protection

Example Permit Provision

5.5.1 When the Permittee revises its General Plan (or equivalent) or other relevant plans (e.g. Transportation Master, or Community Plan) they must include effective water

quality and watershed protection elements that require implementation of consistent water quality protection measures for new development and redeveloped sites within [*insert deadline*]. Examples of water quality and watershed protection elements to be considered include the following: [*insert principles and/or policies which are appropriate for the watershed such as,*

- Minimize the amount of impervious surfaces (roads, parking lots, roofs, etc.) within each watershed, by minimizing the creation, extension and widening of parking lots, roads and associated development.
- Preserve, protect, create and restore ecologically sensitive areas that provide water quality benefits and serve critical watershed functions. These areas may include, but are not limited to; riparian corridors, headwaters, floodplains and wetlands.
- Implement management practices that prevent or reduce thermal impacts to streams, including requiring vegetated buffers along waterways, and disconnecting discharges to surface waters from impervious surfaces such as parking lots.
- Prevent disturbances of natural waterbodies and natural drainage systems caused by development, including roads, highways, and bridges.
- Avoid development in areas that are particularly susceptible to erosion and sediment loss.
- Implement standards to protect trees, and other vegetation with important evapotranspirative qualities.
- Implement policies to protect native soils, prevent topsoil stripping, and prevent compaction of soils.
- Implement water conservation policies that will reduce both stormwater and non- stormwater discharges via storm sewer systems.[20]
- Implement policies that encourage stormwater practices close to the source of the runoff rather than downstream and lower in the watershed.]

Example Permit Requirement Rationale for the Fact Sheet

Imperviousness has been shown to correlate with water quality impacts. In order to minimize water quality impacts, the permittee must examine their planning principles to manage the creation of impervious surfaces at the watershed level, such as reducing the footprint of streets and parking lots. Also, ecologically sensitive areas can protect water quality by acting both as filters that reduce pollutants in stormwater discharges and as sponges to reduce the impact on the ecosystem's hydrology. Thermal pollution is also a concern that can impact biota in waterways. Stormwater discharges from impervious surfaces are often characterized by higher temperatures than natural, pervious surfaces. Reducing the chances of further increasing this temperature by preserving, protecting, and restoring natural features that provide shading for the waterway can further help reduce thermal pollution. Whenever possible natural waterways

[20] *West Virginia Small MS4 Permit (www.wvdep.org/Docs/17444_SW_WV%20MS4%20permit%202009.pdf)*

must be protected and not disturbed by stormwater from developed sites. For example, areas that have a high potential for erosion must be avoided for development when possible. Protecting vegetation, native soils, and conserving water can also help ensure the hydrologic qualities of the site remain intact.

Consideration of stormwater impacts from development is critical during the planning phases of development. This not only includes planning on the site-level, but also with respect to discharges from the MS4 on the watershed level. To the extent possible, stormwater management must be an integral part of higher level planning documents that determine where and how development that will result in stormwater discharges to the MS4 should occur since these decisions affect water quality. Using land efficiently can result in better stormwater management by putting development where it is most appropriate. For example, by directing and concentrating new development in areas targeted for growth, communities can reduce or remove development pressure on undeveloped parcels and protect sensitive natural lands and recharge areas. Another strategy is redeveloping already degraded sites such as abandoned shopping centers or underutilized parking lots. In this case, the net increase in discharges from developed sites would likely be zero, and it would likely decrease, depending on the on-site infiltration practices used. Also, by allowing or encouraging denser development, less land is converted overall, and less total impervious area created.

Recommendations for the Permit Writer

Examining stormwater on a watershed basis and including watershed principles is an important part of protecting waterways in a holistic manner. Climate change may increase the size and frequency of storms in some area of the nation. Including watershed-type assessments and considerations as Permit Requirements will help the permittee better focus their efforts to ensure the best water protection outcomes for existing conditions and those anticipated future conditions. Therefore, permit writers should consider including watershed protection principles. Newer programs may not be ready for permit writers to include the exact example permit provision provided. If possible, permit writers should be as specific as possible for the needs of the watershed where the MS4 permittee is located. Permittees should be careful when installing new stormwater BMPs to ensure that there are not any negative, unintended consequences.

5.6 Tracking of Post-Construction Stormwater Control Measures

Example Permit Provision

5.6.1 Inventory of Post-Construction Stormwater Control Measures. The permittee must continue to maintain an inventory of all post-construction structural stormwater control measures installed and implemented at new development and redeveloped sites, including both public and private sector sites located within the permit area. The inventory must be searchable by property location (either on paper or electronic). New entries to the inventory must be made during the site plan review and approval process in Part 5.3.1.

5.6.2 Tracking Information. Each entry to the inventory must include basic information on each project, such as project name, owner's name and contact information, location, start/end date, etc. In addition, inventory entries must include the following for each project:

a. Short description of each stormwater control measure (type, number, design or performance specifications);
b. Latitude and longitude coordinates of each stormwater control measure;
c. Short description of maintenance requirements (frequency of required maintenance and inspections); and
d. Inspection information (date, findings, follow up activities, prioritization of follow-up activities, compliance status).

Based on inspections conducted under Part 5.7, the permittee must update the inventory as appropriate where changes occur in property ownership or the specific control measures implemented at the site. This inventory must be maintained and available for review by the permitting authority.

Example Permit Requirement Rationale for the Fact Sheet

Creating an inventory of post-construction structural stormwater control measures, including tracking of specific information, will first enable permittees to know what control measures they are responsible for. Without this information the permittee will not be protecting water quality to their full potential since inspections, maintenance, and follow-up changes cannot be performed. Tracking information such as the latitude/longitude, maintenance and inspection requirements and follow-up will allow the permittee to be able to better allocate their resources for those activities that are immediately necessary. Although not required, including photographs will help the permittee assess how the control measure has changed since it was first created and will likely aid in determining proper maintenance and/or retrofitting opportunities if the measure is no longer providing the water quality benefits it was originally designed.

Recommendations for the Permit Writer

Permit writers may wish to specifically define the types of structural controls that must be included in the inventory. For example, rain barrels may be considered a structural control, but the MS4 likely does not need latitude and longitude coordinates of the rain barrels.

5.7 Inspections and Enforcement

Example Permit Provision

5.7.1 Inspection Frequency. To ensure that all stormwater control measures are operating correctly and are being maintained as required consistent with its applicable maintenance agreement, the permittee must conduct inspections of each project site covered under Part 5.2 performance standards, [*insert inspection frequency, e.g., at least one time during the permit term, 20% of sites per year, etc.*]. The inspections must be in accordance with those specified in the [*insert State manual that describes the maintenance of control measures*]. A description of inspection procedures must be included in the SWMP document.

5.7.2 Post-Construction Inspection. Within [*insert deadline, e.g., 1 week, 2 weeks, etc.*] of completion of construction of any project required to meet the Section 5.2 performance standards, the permittee must conduct a post-construction inspection to verify that the permittee's performance standards have been met. The permittee must include in its SWMP a procedure for being notified by construction operators/owners of their completion of active construction so that the post-construction inspection may be conducted.

5.7.3 Inspection Reports. The permittee must document its inspection findings in an inspection report. Each inspection report must include:

a. Inspection date;

b. Name and signature of inspector;

c. Project location (street address, latitude/longitude, etc.) and inventory reference number (from inventory established in Section 5.6.1)

d. Current ownership information (for example, name, address, phone number, fax, and email)

e. A description of the condition of the structural stormwater control measure including the quality of: vegetation and soils; inlet and outlet channels and structures; embankments, slopes, and safety benches; catch basins; spillways, weirs, and other control structures; and sediment and debris accumulation in storage and forebay areas as well as in and around inlet and outlet structures;

f. Photographic documentation of all critical structural stormwater control measure components; and

g. Specific maintenance issues or violations found that need to be corrected by the property owner or operator along with deadlines and reinspection dates.

The permittee must document and maintain records of inspection findings and enforcement actions and make them available for review by the permitting authority.

Example Permit Requirement Rationale for the Fact Sheet

Inspection of post-construction control measures is key to ensuring the protection of water quality. If control measures are not inspected and maintained they could become sources of pollution rather than reducing pollution. By including detailed information in the inspection report, the permittee can better determine if maintenance is required and the permittee can have a snapshot of sorts to know the status of their control measures to prioritize funding.

Recommendations for the Permit Writer

Permit writers should clearly specify the requirements for inspections. Inspecting and properly maintaining structural stormwater controls to ensure they are working as designed is just as important as installing them in the first place. By having specific requirements, permittees will be reminded that they must allocate resources to ensure control measures are properly maintained and functioning. The permit writer may also want to add a prioritization scheme to the requirement to help the permittee determine what maintenance activities are priorities for protecting water quality and which ones are minor changes.

5.8 Retrofit Plan

Example Permit Provision

5.8.1 The permittee must develop a plan to retrofit existing developed sites that are impacting water quality. The retrofit plan must be developed within [*insert deadline, such as within two years of permit issuance*] and must emphasize controls that infiltrate, evapotranspire, or harvest and use stormwater discharges. The plan must include[21]:

a. An inventory of potential retrofit locations, which considers, at a minimum:

- Locations that contribute pollutants of concern to an impaired waterbody
- Locations that contribute to receiving waters that are significantly eroded
- Locations that are tributary to a sensitive ecosystem or protected area
- Locations that are tributary to areas prone to flooding

[21] Orange County Municipal Stormwater Permit (Section F.3.d) (www.waterboards.ca.gov/sandiego/water_issues/programs/stormwater/oc_stormwater.shtml)

b. An evaluation and ranking of the inventoried locations to prioritize retrofitting which includes, at a minimum:
   - Feasibility
   - Cost effectiveness
   - Pollutant removal effectiveness
   - Impervious area potentially treated
   - Maintenance requirements
   - Landowner cooperation
   - Neighborhood acceptance
   - Aesthetic qualities, and
   - Efficacy at addressing concern.

Example Permit Requirement Rationale for the Fact Sheet

It is clear that we cannot protect the nation's waters without also addressing degradation caused by stormwater discharges from existing developed sites. For that reason stormwater programs must include substantive retrofit provisions.

It is possible and reasonable to significantly improve water quality in many urban receiving waters. This requires more than just a new development and redeveloped sites program, however, which at best can only hold the line. To actually improve the quality of receiving waters it is necessary to mitigate discharges from existing developed sites, which generally means implementation of measures to bring about the retrofit the stormwater control measures at existing sites to retain most stormwater on site.

In addition, research indicates that most streambank restoration projects that actively stabilize eroding channels should not be implemented until after hydrologic retrofits have been completed that restore the hydrologic regime not concurrently with the implementation of the retrofits.

Municipal projects, such as traffic calming sites could also include stormwater retrofit components, such as curb bump outs that include bioretention features, rain gardens, and curb cuts.

Information on retrofit options and the development of a retrofit plan can be found in the Center for Watershed Protection's guidance on Urban Stormwater Retrofit Practices (available at www.cwp.org as Manual No. 3 under the Urban Subwatershed Restoration Manual Series).

Recommendations for the Permit Writer

Permittees may need a permit term or two to adequately develop and implement a retrofit plan. Some permittees may not be ready to have retrofit plans as part of their requirements. It is up to the permit writer to make this determination based on the specific information they have available on current programs. A retrofit plan should assess the areas where retrofitting is appropriate and will result in increased water quality protection and restoration. The permit writer should determine

the appropriate timeframe and language for a retrofit plan. For example, if the permittee was already required to develop a retrofit plan in a previous permit term the permit may specify a schedule for implementation rather than development.

CHAPTER 6: POLLUTION PREVENTION/GOOD HOUSEKEEPING

Introduction

Federal stormwater regulations (see 40 CFR 122.34(b)(6) and 40 CFR 122.26(d)(2)(iv)(A)) require the operator of a regulated MS4 community to develop a program to:

- Prevent or reduce the amount of stormwater pollution generated by municipal operations and conveyed into receiving waters.
- Train employees on how to incorporate pollution prevention/good housekeeping techniques into municipal operations.
- Identify appropriate control measures and measurable goals for preventing or reducing the amount of stormwater pollution generated by municipal operations.

Included Concepts

- ► Municipal facility and control inventory
- ► Facility assessment
- ► Development of facility-specific stormwater management SOPs and Implementation of facility stormwater controls
- ► Storm sewer system maintenance activities
- ► Flood management
- ► Pesticide, herbicide, and fertilizer application and management
- ► Training and education
- ► Contractor requirements and oversight

The first step for the permittee is to evaluate and assess the areas and municipal facilities that it controls in order to determine which activities may currently have a negative impact on water quality and to find solutions for these activities. The simplest solution is to limit the number of activities that are conducted outside and exposed to stormwater.

Storm sewer systems need maintenance to ensure that structures within the storm sewer that are meant to reduce pollutants do not become sources of pollution. Regularly maintaining catch basins and cleaning storm sewer pipes prevent the accumulation of pollutants that are later released during rain events as well as blockages, backups, and flooding. Most permittees have an existing program to maintain the storm sewer infrastructure. EPA notes, however, that some of these programs have tended to focus on flood avoidance and complaint response rather than reducing water quality impacts from stormwater discharges.

The MS4 permit must require that the system be maintained to prevent the discharge of pollutants into receiving waters. System mapping and a schedule of regular maintenance are key to a successful pollution prevention program. EPA recommends establishing a tiered maintenance schedule for the entire storm sewer system area, with the highest priority areas being maintained at the greatest frequency. Priorities should be driven by water quality concerns and can be based on the land use within the MS4 area, the condition of the receiving water, the amount and type of material that typically accumulates in an area, or other location-specific factors. It is also advisable to use spill and illicit discharge data to track areas that may require immediate sewer infrastructure maintenance. It is also important for material that is collected to be disposed of in a responsible manner.

The procedures for storm sewer system operation and maintenance must be documented in the permittee's SOPs or similar type of documents, which are part of the permittee's SWMP. Employee training to carry out these pollution prevention measures is a required component of the program. The pollution prevention/good housekeeping/maintenance activities should be documented and, where possible, quantified (e.g., number and location of inspections and clean-outs, type and quantity of materials removed). Having permittees characterize the quantity, location, and composition of pollutants removed from catch basins can provide useful data that can later be used to assess the program's overall effectiveness, identify illicit discharges, and help the permittee better prioritize implementation activities in the future.

Specific pollution prevention requirements related to pollutant-generating activities such as landscaping techniques (including the application of pesticides, herbicides, and fertilizer) and operating and maintaining public streets, should also be included in the permit where applicable. For example, typical pollutants associated with street repair and maintenance include heavy metals, chlorides, hydrocarbons (e.g., benzene, toluene, ethylbenzene, xylene), concrete dust, sand, deicers, sediment, and trash. The permitting authority should consider requiring alternative landscaping practices such as integrated pest management (IPM), xeriscaping, or mechanical (non-chemical) removal of unwanted plants. Other landscaping controls, such as mulch management, chemical storage, reduction of soil compaction, and erosion control, should also be considered. Training and educating municipal and contracted staff is also important to ensure that everyone is knowledgeable and proficient in the newest and most effective approaches to minimizing pollutant discharges from municipal facilities and activities.

Additionally, permits should require that water quality be considered when designing flood management projects, and that existing structural flood control devices are evaluated to determine if retrofitting the device to remove/reduce pollutants from stormwater is necessary and practicable.

6.1 Municipal Facility and Control Inventory

Example Permit Provision

6.1.1 Development of a Municipal Facility and Stormwater Control Inventory – The permittee must continue to update and maintain an inventory of municipally-owned or operated facilities and stormwater controls, including but not limited to the following:

- Composting facilities
- Equipment storage and maintenance facilities
- Fuel farms
- Hazardous waste disposal facilities
- Hazardous waste handling and transfer facilities
- Incinerators
- Landfills
- Landscape maintenance on municipal property
- Materials storage yards

- Pesticide storage facilities
- Public buildings, including schools, libraries, police stations, fire stations, municipal buildings, and similar buildings
- Public parking lots
- Public golf courses
- Public swimming pools
- Public works yards
- Recycling facilities
- Salt storage facilities
- Solid waste handling and transfer facilities
- Street repair and maintenance sites
- Vehicle storage and maintenance yards
- Municipally-owned and/or maintained structural stormwater controls

6.1.2 Documentation– The list of municipally-owned or operated facilities and stormwater controls must be maintained and available for review by the permitting authority.

6.1.3 Mapping – On a map of the area covered by the MS4 permit, the permittee must identify where the municipally-owned or operated facilities and stormwater controls are located. The map must identify the stormwater outfalls corresponding to each of the facilities as well as the receiving waters to which these facilities discharge. The permittee must also identify the manager of each facility and their contact information. The map must be maintained and updated regularly and be available for review by the permitting authority.

Example Permit Requirement Rationale for the Fact Sheet

Municipally-owned or operated facilities serve as hubs of activity for a variety of municipal staff from many different departments. Some municipalities will have one property at which all activities take place (e.g., the municipal maintenance yard), whereas others will have several specialized facilities such as those listed above. A comprehensive list and map of such facilities will help staff responsible for stormwater compliance build a better awareness of their locations within the MS4 service area and their potential to contribute stormwater pollutants. The facility inventory will also serve as a basis for setting up periodic facility assessments (see Part 6.2) and developing, where necessary, facility stormwater pollution prevention plans (see Part 6.3).

Recommendations for the Permit Writer

Permit writers should tailor the facilities listed in the assessment as best they can to include the facilities most likely to be owned or operated by the permittee. It is highly likely that some of the facilities listed in the Permit Requirement would not apply to most non-traditional and/or non-municipal MS4s.

6.2 Facility Assessment

Permit Requirement

6.2.1 Municipally-owned or operated facility assessment:

a. Comprehensive Assessment of Pollutant Discharge Potential –The permittee must review, reassess, and update the comprehensive assessment of all municipally-owned or operated facilities identified in Part 6.1 [*insert frequency, e.g., annually*] for their potential to discharge in stormwater the following typical urban pollutants: sediment, nutrients, metals, hydrocarbons (e.g., benzene, toluene, ethylbenzene and xylene), pesticides, chlorides, and trash. Other pollutants may be associated with, but not generated directly from, the municipally-owned or operated facilities, such as bacteria, chlorine, organic matter, etc. Therefore, the permittee must determine additional pollutants associated with its facilities that could be found in stormwater discharges. A description of the assessment process must be included in the SWMP document.

b. Identification of "High Priority" Facilities – Based on the Part 6.2.1.a comprehensive assessment, the permittee must identify as "high-priority" those facilities that have a high potential to generate stormwater pollutants. Among the factors that must be considered in giving a facility a high priority ranking is the amount of urban pollutants stored at the site, the identification of improperly stored materials, activities that must not be performed outside (e.g., changing automotive fluids, vehicle washing), proximity to waterbodies, poor housekeeping practices, and discharge of pollutant(s) of concern to impaired water(s). High priority facilities must include the permittee's maintenance yards, hazardous waste facilities, fuel storage locations, and any other facilities at which chemicals or other materials have a high potential to be discharged in stormwater.

c. Documentation of Comprehensive Assessment Results – The permittee must document the results of the assessments and maintain copies of all site evaluation checklists used to conduct the comprehensive assessment. The documentation must include the results of the permittee's initial assessment, any identified deficiencies and corrective actions taken, and a list of the "high priority" facilities identified per Part 6.2.1.b.

Example Permit Requirement Rationale for the Fact Sheet

The initial ("first time") comprehensive assessment is necessary to identify which of the municipality's facilities are most likely to contribute stormwater pollutants and which are in need of stormwater controls. The assessments will involve a detailed site inspection that can identify improperly stored materials, activities that should not be performed outside (e.g., changing automotive fluids, vehicle washing), and poor housekeeping practices.

Recommendations for the Permit Writer

If the permitting authority has an established site inspection protocol to be used in the comprehensive assessment, it should be included and referenced here. The list of pollutants in this section should be modified or expanded based on pollutants of concern in the permitting authority's jurisdiction.

6.3 Development of Facility-Specific Stormwater Management SOPs and Implementation of Facility Stormwater Controls

Example Permit Provision

6.3.1 Facility-specific Stormwater Management SOPs for "High Priority" Facilities:

a. For each "high priority" facility or operation identified in Part 6.2, the permittee must develop a site-specific SOP that identifies stormwater controls (i.e., structural and non-structural controls, and operational improvements) to be installed, implemented, and maintained to minimize the discharge of pollutants in stormwater. At a minimum, the facility-specific SOP must include the stormwater control measures described below in Part 6.3.2, as well as inspection and visual monitoring procedures and schedules described in Part 6.3.3.

b. A copy of the facility-specific stormwater management SOP must be maintained and be available for review by the permitting authority. The SOP must be kept on-site at each of the municipally-owned or operated facilities' offices for which it was completed. The SOP must be updated as necessary.

c. The permittee must install, implement, and maintain all stormwater controls required per Part 6.3.2 of this permit and included in the facility's site-specific SOP.

6.3.2 Stormwater Controls for "High Priority" Facilities – The following stormwater controls must be implemented at all "high priority" municipally-owned or operated facilities identified in Part 6.2. A description of any controls included in this part and any standard operating procedures developed to comply with this part must be included as part of the of each facility's SOP:

a. General good housekeeping – The following good housekeeping practices must be implemented for all facilities identified as "high priority":

1. The permittee must keep all municipally-owned or operated facilities neat and orderly, minimizing pollutant sources through good housekeeping procedures and proper storage of materials.

2. Materials exposed to stormwater must be covered where feasible (without creating additional impervious surfaces, if possible).

b. De-icing material storage – The permittee must store salt and other de-icing materials in a permanent storage structure, unless stormwater runoff from the storage piles is not discharged, or if discharges from the piles are authorized under another stormwater permit. If a permanent storage structure is required but does not exist, one must be built within [*insert timeframe*], and seasonal

tarping must be used as an interim control measure until the permanent structure is completed. If a permanent storage facility is not feasible, the permittee must provide a rationale to the permitting authority as to why and what alternate BMPs will be utilized instead.

Where a permanent storage structure is present, the permittee must perform regular maintenance and inspections of the permanent storage structure.

c. Fueling operations – The permittee must continue to implement standard operating procedures for vehicle fueling and receiving of bulk fuel deliveries at municipally-owned or operated facilities with the goal of reducing the likelihood of spills, and providing spill controls in the event that accidental spills do occur.

d. Vehicle maintenance – The permittee must continue to implement a standard operating procedure for vehicle maintenance and repair activities that occur at municipally-owned or operated facilities with the goal of reducing the likelihood of spills or releases and providing controls in the event that accidental spills do occur. The standard operating procedures must include regular inspections of all maintenance areas and activities.

e. Equipment and vehicle washing – The discharge of equipment and vehicle wash wastewater to the MS4 or directly to receiving waters from municipal facilities is prohibited. The permittee may meet this requirement by either installing a vehicle wash reclaim system, capturing and hauling the wastewater for proper disposal, connecting to sanitary sewer (where applicable and approved by local authorities), ceasing the activity, and/or applying for and obtaining a separate stormwater permit.[22]

6.3.3 Inspections and Visual Monitoring:

a. Weekly visual inspections – The permittee must perform weekly visual inspections to ensure materials and equipment are clean and orderly, and to minimize the potential for pollutant discharge. The permittee must look for evidence of spills and immediately clean them up to prevent contact with precipitation or runoff. The weekly inspections must be tracked in a log for every facility, and records kept with the SWMP document. The inspection report must also include any identified deficiencies and the corrective actions taken to fix the deficiencies.

b. Quarterly comprehensive inspections – At least once per quarter, a comprehensive inspection of "high priority" facilities, including all stormwater controls, must be performed, with specific attention paid to waste storage areas, dumpsters, vehicle and equipment maintenance/fueling areas, material handling areas, and similar potential pollutant-generating areas. The quarterly inspection results must be documented and records kept with the SOP document. This inspection must be done in accordance with the developed SOPs. The inspection report must also include any identified deficiencies and the corrective actions taken to fix the deficiencies.

[22] New Jersey Tier A Phase II MS4 Permit (NJ0141852) (www.state.nj.us/dep/dwq/pdf/Tier_A_final.pdf)

c. Quarterly visual observation of stormwater discharges – At least once per quarter, the permittee must visually observe the quality of the stormwater discharges from the "high priority" facilities (unless climate conditions preclude doing so, in which case the permittee must attempt to evaluate the discharges four times during the wet season). Any observed problems (e.g., color, foam, sheen, turbidity) that can be associated with pollutant sources or controls must be remedied within three days or before the next storm event, whichever is sooner. Visual observations must be documented, and records kept with the SOP document. This inspection must be done in accordance with the developed SOPs. The inspection report must also include any identified deficiencies and the corrective actions taken to fix the deficiencies.

Example Permit Requirement Rationale for the Fact Sheet

Each municipal facility will require a different set of control measures depending on the nature of activities that occur there and the types of materials that are stored and used. Developing and maintaining a site-specific SOP for each facility will help to ensure that employees responsible for facility operation are aware of the stormwater controls required for the site.

There are a number of storage areas and activities that are common at municipal facilities that have a high potential for polluting stormwater:

- Deicing materials, particularly road salt, are easily liberated and transported by rainfall, and constituents such as chloride are not removed by most stormwater controls.
- Fueling and vehicle maintenance and storage areas are prone to spills and drips of various automotive fluids.
- Equipment and vehicle washing areas are designed to mix water with dirt and hydrocarbons, requiring special treatment of the wastewater (including pretreatment and diversion to the sanitary sewer, if allowed) and protection of wash areas from rainfall and runoff.

The best way to avoid pollutant discharges from these sources is to keep precipitation and runoff from coming into contact with stored chemicals and activity areas that use chemicals and materials, which can become sources of stormwater pollutants. For example, the permittee must cover stockpiles, create dedicated structures for stored materials, build berms around areas of pavement to prevent clean runoff from contacting contaminated areas, and maintain a minimum distance between stockpiles and stormwater infrastructure and receiving waters. These are just a few of the ways in which these potential pollutant sources can be protected from precipitation and runoff.

The permit requires that comprehensive site inspections be conducted quarterly, which is an appropriate frequency to ensure that material stockpiles that might be moved or utilized on a seasonal basis are protected from precipitation and runoff. Also, quarterly inspections will allow inspectors to observe different types of operations that occur at different times of the year (e.g., landscape maintenance crews are less active in the winter). Quarterly visual observations are required so that inspectors can see in real time the qualitative nature of the

stormwater discharge and so that corrective action can be taken where necessary to improve on-site stormwater controls.

The permit also specifies that inspection procedures, results, and controls for each facility be documented to ensure that the site inspections are consistent and that maintenance of stormwater controls remains part of the municipality's standard operating procedures. The requirement for an inspection log will allow the permitting authority to verify that periodic site inspections have been performed.

Recommendations for the Permit Writer

Neither Phase I nor Phase II regulations specifically require that MS4 permittees develop facility-specific stormwater management SOPs. However, both Phase I and Phase II require that permittees prevent or reduce pollutant discharge in stormwater from municipal facilities and activities. Requiring permittees to assess high priority facilities and develop appropriate controls for each is an effective way of requiring permittees to address potential sources of pollutants at facilities.

When setting frequency for facility inspections (see Part 6.3.3), the permit writer should consider the number of facilities and the size/complexity of the sites to ensure that enough time is available to complete the assessments.

The list of specific stormwater controls for municipal facilities will vary from place to place based on local and watershed priorities and climate considerations. The permit writer should specify stormwater controls that are appropriate for the local conditions. For example, if a permittee uses satellite locations for temporary storage of deicing materials during snow events, the permit writer may want to consider options other than the permanent storage requirement if the permittee uses the piles within a certain time frame and the piles are covered by temporary tarping or a similar control.

6.4 Storm Sewer System Maintenance Activities

Example Permit Provision

6.4.1 MS4 catch basin maintenance

a. Assessment/prioritization of catch basins – The permittee must assign a priority to each of its catch basin inlets within its jurisdiction as one of the following:

- Priority A – Catch basins that are designated as consistently generating the highest volumes of trash and/or debris
- Priority B – Catch basins that are designated as consistently generating moderate volumes of trash and/or debris
- Priority C – Catch basins that are designated as generating low volumes of trash and/or debris

The permittee must use information compiled from citizen complaints/reports to help in the determination of the appropriate priority level. A description of

the prioritization scheme must be included in the SWMP.

b. Catch basin inspection and cleaning

1. Based on the priorities assigned in Part 6.4.1.a., the permittee must inspect and clean catch basins in accordance with the following schedule:

   - Priority A – [*Insert cleanout frequency, e.g., 3 times per year*]
   - Priority B – [*Insert cleanout frequency, e.g., 2 times per year*]
   - Priority C – [*Insert cleanout frequency, e.g., 1 time per year*]

   The permittee must develop a catch basin cleaning schedule based on the frequency specified in this permit, along with a list of each of its catch basins and the priority assigned to them per Part 6.4.1.a.

2. In addition to catch basin cleanings performed above, the permittee must ensure that any catch basin that is inspected and found to be between one third and one half full of trash and/or debris must be cleaned within [*Insert cleanout frequency e.g., 1 week of discovery*].[23] The permittee must maintain a log of all maintenance performed.

3. The permittee must document that it has performed all required catch basin cleanings in a log that is to be made available for review by the permitting authority upon request.

c. Catch basin labeling – The permittee must ensure that each catch basin includes a legible stormwater awareness message (e.g., a label, stencil, marker, or pre-cast message such as "drains to the creek" or "only rain in the drain"). Catch basins with illegible or missing labels must be recorded and re-labeled within [*insert number of days*] of inspection.

d. Maintenance of surface drainage structures – The permittee must visually monitor permittee-owned open channels and other drainage structures for debris at least [*specify frequency, e.g., once per year*] and identify and prioritize problem areas, such as those with recurrent illegal dumping, for inspection at least [*specify frequency, e.g., three times per year*]. Removal of trash and debris from open channels and other drainage structures must occur [*insert frequency of open channel/drainage structure cleaning, e.g., annually*]. The permittee must document its drainage structure maintenance in a log that is to be made available for review by the permitting authority upon request.

e. Disposal of waste materials – The permittee must develop a procedure to dewater and dispose of materials extracted from catch basins. This procedure must ensure that water removed during the catch basin cleaning process and waste material will not reenter the MS4.

6.4.2 Municipal activities and operations

a. Assessment of municipal activities and operations

[23] EPA's Office of Research and Development documented a threshold sump level of ½ as a break point where solids retainage was either erratic or negative (Catchbasin Technology Overview and Assessment #EPA-600/2-77-051 1977).

1. The permittee must maintain and revise as necessary the operation and maintenance (O&M) activity assessment. The following municipal O&M activities must be included in the assessment for their potential to discharge pollutants in stormwater:
   - Road and parking lot maintenance, including pothole repair, pavement marking, sealing, and re-paving
   - Bridge maintenance, including re-chipping, grinding, and saw cutting
   - Cold weather operations, including plowing, sanding, and application of deicing compounds and maintenance of snow disposal areas
   - Right-of-way maintenance, including mowing, herbicide and pesticide application, and planting vegetation
   - Municipally-sponsored events such as large outdoor festivals, parades, or street fairs
2. The permittee must identify all materials that could be discharged from each of these O&M activities. Typical pollutants associated with these activities include metals, chlorides, hydrocarbons (e.g. benzene, toluene, ethylbenzene, xylene), sediment, and trash.
3. The permittee must develop a set of pollution prevention measures that, when applied during municipal O&M activities, will reduce the discharge of pollutants in stormwater. These pollution prevention measures must include, at a minimum:
   - Replacing materials/chemicals with more environmentally benign materials or methods (e.g., use mechanical methods vs. herbicides, or use water-based paints or thermoplastics rather than solvent-based paints for stripping)
   - Changing operations to minimize the exposure or mobilization of pollutants (e.g., mulch, compost or landfill grass clippings) to prevent them from entering surface waters
   - Placing barriers around or conducting runoff away from deicing chemical storage areas to prevent discharge into surface waters), consistent with Part 6.3.2.b

   [*If available in your particular State or the municipality, insert relevant section of SWMP, or other relevant document, that includes specific stormwater controls that must be used*.]
4. The permittee must develop and implement a schedule for instituting the pollution prevention measures. At a minimum, with respect to all roads, highways, and parking lots with more than 5,000 square feet of pollutant-generating impervious surface area that are owned, operated, or maintained, the permittee must implement all pollution prevention measures by [*insert deadline*].
5. The results of the assessments and pollution prevention measures, including schedules for implementation, must be documented and made available for review by the permitting authority upon request.

b. Inspection of pollution prevention measures – All pollution prevention measures implemented at municipal facilities must be visually inspected [*insert frequency, e.g., monthly or quarterly*] to ensure they are working properly; a log of inspections must be maintained and made available for review by the permitting authority upon request.

6.4.3 Street Sweeping and Cleaning

a. The permittee must continue to evaluate and rate all municipally-owned streets, roads, and public parking lots within their jurisdiction. The permittee must include in the evaluation the sweeping frequency, timing, and efficiency of existing street sweeping programs. The street sweeping frequency must be based on land use, trash and stormwater pollutant levels generated. At a minimum, the following areas must be regarded as "high priority," for sweeping activities while the "medium priority" and "low priority" areas are recommended:

- High priority – Streets, road segments, and public parking lots designated as high priority include, but are not limited to, high traffic zones, commercial and industrial districts, shopping malls, large schools, high-density residential dwellings, sport and event venues, and plazas. This designation must include areas that consistently accumulate high volumes of trash, debris, and other stormwater pollutants.
- Medium priority – Streets, road segments and public parking lots designated as medium priority include, but are not limited to, medium traffic zones; warehouse districts; and light, small-scale commercial and industrial areas.
- Low priority – Streets and road segments designated as low priority include, but are not limited to, light traffic zones and residential zones.

b. The permittee must show on a map of its service area how the streets, roads, and public parking lots have been rated in accordance with Part 6.4.3.a.

c. Implementing sweeping schedules – The permittee must sweep streets/roads/public parking lots in accordance with the following frequency:

- High priority – average of at least [*insert frequency, e.g., twice per month*]
- Medium priority – average of at least [*insert frequency, e.g., once per month*]
- Low priority – [*insert frequency, e.g., twice per year*]

If a permittee's existing overall street sweeping effort provides equivalent or greater street sweeping frequency relative to the requirements above, the permittee may continue to implement its existing street sweeping program.

d. For areas where street sweeping is technically infeasible (e.g., streets without curbs), the permittee must increase implementation of other trash/litter control procedures to minimize pollutant discharges to storm drains and creeks. The permittee must show on its Part 6.4.3.b map the location of these areas.

e. Sweeping equipment selection and operation

1. When replacing existing sweeping equipment, the permittee must select and operate high-performing sweepers that are efficient in removing pollutants,

including fine particulates, from impervious surfaces.

2. The permittee must follow equipment design performance specifications to ensure that street sweeping equipment is operated at the proper equipment design speed with appropriate verification, and that it is properly maintained.
3. The permittee must operate sweepers to optimize pollutant removal by permitting sweepers access to the curb through the use of parking restrictions that clear the curb or through effective public outreach to inform citizens of sweeping days and times so that voluntary curb clearing can occur.

f. Sweeper Waste Material Disposal – The permittee must develop a procedure to dewater and dispose of street sweeper waste material. This procedure must ensure that water and material will not reenter the MS4.

g. Operator training – Street sweeper operators must be trained to enhance operations for water quality benefit.

h. The permittee must include the following in the SWMP and update as changes are made:

1. A description of the street sweeping frequency and any significant changes in the sweeping frequency map, along with the basis for those changes
2. The types of sweepers used
3. A summary of the proper sweeping operation verification results and street sweeping methods, including the way in which the permittee specifies and confirms the rate or speed at which street miles are covered by sweeper operators
4. The use of additional resources in sweeping seasonal leaves or pick-up of other material
5. A description of the methods for addressing areas identified in Part 6.4.3, considered infeasible for street sweeping

6.4.4 Maintenance of municipally-owned and/or maintained structural stormwater controls

a. The permittee must inspect at least [*insert frequency, e.g., yearly*], and maintain if necessary, all municipally-owned or maintained structural stormwater controls. The permittee must also maintain all green infrastructure practices through regularly scheduled maintenance activities.

Example Permit Requirement Rationale for the Fact Sheet

MS4 Maintenance

Traditional municipal storm drain systems were designed to quickly collect and convey runoff to receiving waters. The purpose of catch basin, inlet, and storm drain cleanouts is to prevent blockages, flooding, and reduce pollution.

Fine particles and pollutants from run-on, atmospheric deposition, vehicle emissions, breakup of street surface materials, littering, and sanding can accumulate along the curbs of roads in between rainfall events. This results in the accumulation of pollutants such as sediment, nutrients, metals, hydrocarbons, bacteria, pesticides, trash and other toxic chemicals. Storm drain maintenance is often the last opportunity to remove pollutants before they enter the storm drain system. Because they effectively trap solids, they need to be cleaned out periodically to prevent those materials from being transported by high stormwater flows. By doing so the MS4 will prevent trash and litter from ultimately becoming sources of marine debris, which is any man-made, solid material that enters waterways either directly or indirectly.

The permit includes a priority ranking approach for catch basins so that municipal resources are directed to the areas and structures that generate the most pollutants. A priority ranking system is required because some catch basins will accumulate pollutants faster than others based on the nature of the drainage area and whether controls are present upstream of the catch basin. Catch basins with the highest accumulations will need to be cleaned more often than those with low accumulations. The permit language also includes a requirement that triggers catch basin cleaning when a catch basin is one-third full.

Proper storm drain system cleanout includes vacuuming or manually removing debris from catch basins; vacuuming or flushing pipes to increase capacity and remove clogs; removing sediment, debris, and overgrown vegetation from open channels; and repairing structures to ensure the integrity of the drainage system. It is important to conduct regular inspections of all storm sewer infrastructure and perform maintenance as necessary. Though these activities are intended to ensure that the sewer system is properly maintained and that any accumulated pollutants are removed prior to discharge, if not properly executed, cleanout activities can result in pollutant discharges. In selecting maintenance practices, the permittee must carefully evaluate each with an eye towards stormwater pollution potential to minimize unintended pollutant discharges, such as the use of flushing storm drain pipes to remove debris without recapturing the debris further down the pipe.

The materials removed from catch basins may not reenter the MS4. The material must be dewatered in a contained area and the water treated with an appropriate and approved control measure or discharged to the sanitary sewer. The solid material will need to be stored and disposed of properly to avoid discharge during a storm event. Some materials removed from storm drains and open channels may require special handling and disposal, and may not be authorized to be disposed of in a landfill.

Street Sweeping and Cleaning

Street and parking lot sweeping is a practice that most municipalities initially conducted for aesthetic purposes. However, the water quality benefits are now widely recognized. Street sweeping also prevents particulate matter associated with road dust from accumulating on public streets and washing into storm drains.

The permit language addresses a number of important factors that impact the effectiveness of a street sweeping program. The first factor is the type of equipment used; the permit language stipulates that when equipment needs to be replaced, high-performance sweepers are purchased preferentially. Street sweeping has traditionally been more effective at removing large-sized particles, but new equipment has been developed to remove smaller, fine-grained particles. Mechanical sweepers (broom-type) are usually the least expensive and are better suited to pick up

large-grained sediment. Vacuum and regenerative air sweepers are better at removing fine-grained sediment particles, but they are more expensive. Removal efficiency can be improved through tandem sweeping (i.e., two sweepers sweeping the same route, with one following the other to pick up missed material), or if the street sweeper makes multiple passes on a street.

The second factor influencing street sweeping effectiveness is the way in which the equipment is operated; the permit specifies that equipment be operated according to the manufacturers' operating instructions by operators who have been trained to sweep in accordance with the Permit Requirements in order to protect water quality.

The third determining factor is the degree to which parked cars block sweeper access to the curb; one of the best ways to ensure access to the curb is to establish parking restrictions based on sweeping schedules and to inform residents of the schedule so they can voluntarily move their cars. The permit requires that the permittee institute parking restrictions and/or a public outreach campaign requesting that cars be parked elsewhere to accommodate sweeping schedules.

Because not all streets are suitable for sweeping (e.g., those that don't have a curb and gutter), source controls can be used in place of sweeping in those areas.

The permittee is required to maintain documentation of sweeping events and characterize the quantity and composition of pollutants removed from roadways. Street sweeping data are relatively easy to track and maintain, so the permit includes requirements for reporting and assessment of the effectiveness of the sweeping activities based on equipment used, miles swept, and the amount of materials collected.

The street sweeping material may not reenter the MS4. The material must be dewatered in a contained area and the water treated with an appropriate and approved control measure or discharged to the sanitary sewer. The solid material will need to be stored and disposed of properly to avoid discharge during a storm event. Some materials may require special handling and disposal, and my not be authorized to be disposed of in a landfill.

Recommendations for the Permit Writer

MS4 Maintenance

MS4s should have a specific schedule to clean out their storm drains since it will ensure that the debris that is trapped in the system will not move into waterbodies and ultimately become marine debris in the ocean. For additional information to include on marine debris go to the EPA's Marine Debris website (www.epa.gov/owow/oceans/debris).

The frequency and timing of visual assessments and cleaning of storm drains and open channels can be tailored to local climate conditions. For example, one approach would be to require that visual observations and cleanings be conducted before the start of the wet season or before spring snowmelt.

The permitting authority should review and approve dewatering and disposal methods for materials removed from catch basins.

Catch basin labeling is believed to be an effective mechanism for educating residents since it involves a direct reminder that that water or other materials which flow into storm drains is not

treated in any way, but instead drains directly to nearby waterways. There are many methods for labeling catch basins and the permit writer should work with the permittee to determine the most feasible and cost effective method of delivering the "drains to stream" message.

Street Sweeping and Cleaning

Street sweeping frequency and timing can be based on climate conditions and seasonal variation in pollution loading. For example, in cold climates where sand is used for winter road maintenance, the permit language could specify increased sweeping during the winter and prior to the spring snowmelt. In areas with a rainy season, sweeping might be timed to occur before the rainy season starts.

In the fall, sweepers can be used to pick up leaves, as they can contribute 25 percent of nutrient loadings in catch basins. If more substantial piles of leaves are found in the community during the fall, street sweeping activities should be coordinated with leaf pick-up. Equally important is an early spring sweeping before rains begin to pick up sand, de-icing material, and winter debris. More frequent sweeping may reduce the need for catch basin cleaning.

The prioritization of sweeping activities (high, medium, low) should be based on standard categories that are based on traffic frequencies and used to determine service levels for the roadways. The example provided in the permit language is based on specific information for the location.

The permitting authority should review and approve dewatering and disposal methods for street sweeping material.

6.5 Flood Management

Example Permit Provision

6.5.1 Flood Management Projects – Within [*insert deadline, such as two years*] of permit issuance, the permittee must develop and implement a process to assess the water quality impacts in the design of all new flood management projects that are associated with the permittee or that discharge to the MS4. This process must include consideration of controls that can be used to minimize the impacts to site water quality and hydrology while still meeting the project objectives. Beginning [*insert deadline, such as three years*] from date of permit issuance, the permittee must assess at least [*insert number of projects to be evaluated, such as two*] existing flood management projects per year to determine whether changes or additions should be made to improve water quality. [24] A description of this process must be included in the SWMP document.

[24] Eastern Washington Phase II MS4 Permit (www.ecy.wa.gov/programs/wq/stormwater/municipal/phaseiiEwa/MODIFIEDpermitDOCS/EWpermitMODsigned.pdf)

Example Permit Requirement Rationale for the Fact Sheet

This permit requires that existing flood management projects be prioritized and a set number be evaluated to identify opportunities for water quality retrofits. This is because the focus of stormwater management in the past had been to control flooding and mitigate property damage, with less emphasis on water quality protection. These structures may handle a significant amount of stormwater and therefore offer an opportunity to modify their design to include water quality features for less than the cost of building new controls. This requirement applies not only to new flood control projects, but also to existing structures.

6.6 Pesticide, Herbicide, and Fertilizer Application and Management

Example Permit Provision

6.6.1 Landscape maintenance

a. The permittee must evaluate the materials used and activities performed on public spaces such as parks, schools, golf courses, easements, public rights of way, and other open spaces for pollution prevention opportunities. Maintenance activities for the turf landscaped portions of these can include mowing, fertilization, pesticide application, irrigation, etc. Typical pollutants include sediment, nutrients, hydrocarbons, pesticides, herbicides and organic debris.

b. The permittee must implement the following practices to minimize landscaping-related pollutant generation:

1. Educational activities, permits, certifications, and other measures for municipal applicators and distributors.
2. Integrated pest management measures that rely on non-chemical solutions, including
   - Use of native plants, xeriscaping in arid/semi-arid regions (reduces water usage and fertilization)
   - Keeping clippings and leaves away from waterways and out of the street using mulching, composting, or landfilling
   - Limiting application of pesticides and fertilizers if precipitation is forecasted within 24 hours or as specified in label instructions
   - Limiting or replacing pesticide use (e.g., manual weed and insect removal)
   - Limiting or eliminating the use of fertilizers, or, if necessary, prohibiting application within 5 feet of pavement, 25 feet of a storm drain inlet, or 50 feet of a waterbody
   - Reducing mowing of grass to allow for greater pollutant removal, but not jeopardizing motorist safety
3. Schedules for chemical application that minimize the discharge of such constituents due to irrigation and expected precipitation.

4. The collection and proper disposal of unused pesticides, herbicides, and fertilizers.[25]

Example Permit Requirement Rationale for the Fact Sheet

The permit focuses on requiring source controls to reduce the amount of chemicals used. The permit specifies the use of integrated pest management, selection of native vegetation that is naturally adapted to local conditions and therefore requires fewer chemical and water inputs, reducing exposure of the chemicals to water by scheduling application according to weather forecasts and plant needs, and ensuring that municipal employees who are responsible for storing and handling these materials are educated about their use, disposal, and possible impacts.

Recommendations for the Permit Writer

EPA is currently developing a general permit to control discharges from the application of pesticides to or over, including near, waters of the U.S. EPA is working closely with state NPDES and pesticide control authorities, the regulated community, and environmental organizations to develop its permit that will be required for such discharges beginning in April 2011. It is important to note that some of the permit language in this section may need to be altered to be consistent with the pesticide permit once it is finalized. For up-to-date information, go to EPA's website (www.epa.gov/npdes/agriculture).

6.7 Training and Education

Example Permit Provision

6.7.1 Employee Training Requirements – Permittees must develop an annual employee training program for appropriate employees involved in implementing pollution prevention and good housekeeping practices in the preceding Parts. All new hires must receive training within the first year of their hire date. This annual training must include a general stormwater education component, any new technologies, operations, or responsibilities that arise during the year, and the Permit Requirements that apply to the staff being trained. A description of the program must be maintained for review by the permitting authority. The permittee must also identify and track all personnel requiring training and records must be maintained. Training must begin [*insert deadline*] from the effective date of permit authorization.

[25] San Diego Phase I MS4 Permit (CAS0108758) (www.swrcb.ca.gov/rwqcb9/water_issues/programs/stormwater/docs/oc_permit/updates_8_13_09/R9-2009-0002_12Aug09.pdf)

Example Permit Requirement Rationale for the Fact Sheet

The regulations found at 40 CFR 122.34(b)(6) specifically requires that the permittee develop a "training component" that trains employees "to prevent and reduce stormwater pollution from activities such as park and open space maintenance, fleet and building maintenance, new construction and land disturbances, and storm water system maintenance." This permit requires employee training for existing and new employees who are involved in performing pollution prevention and good housekeeping practices. All training must include a general stormwater educational component, including an overview of the requirements with which the municipality needs to comply. The permittee is responsible for identifying which staff must attend trainings based on the applicability of the topics listed, and they are required to conduct refresher training on an annual basis.

Recommendations for the Permit Writer

The topics included in the trainings should take into consideration the types of activities in which the municipality engages and the extent to which such activities are performed in-house or contracted.

6.8 Contractor Requirements and Oversight

Example Permit Provision

6.8.1 Requirements for Contractors:

a. Any contractors hired by the permittee to perform municipal maintenance activities must be contractually required to comply with all of the stormwater control measures, good housekeeping practices, and facility-specific stormwater management SOPs described above.

b. The permittee must provide oversight of contractor activities to ensure that contractors are using appropriate control measures and SOPs. Oversight procedures must be described in the SWMP document.

Example Permit Requirement Rationale for the Fact Sheet

Many municipalities use third-party contractors to conduct municipal maintenance activities in lieu of using municipal employees. Contractors performing activities that can affect stormwater quality must be held to the same standards as the permittee. Not only must these expectations be defined in contracts between the permittee and its contractors, but the permittee is responsible for ensuring, through contractually-required documentation or periodic site visits, that contractors are using stormwater controls and following standard operating procedures.

CHAPTER 7: INDUSTRIAL STORMWATER SOURCES

Introduction

Phase I MS4 permittees are required to develop and implement an inspection and oversight program to monitor and control pollutants in stormwater discharges to the MS4 from industrial facilities. Regulations addressing industrial stormwater management in Phase I MS4 permits is found at 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv). Requirements to regulate the stormwater discharges from commercial facilities are found at 40 CFR 122.26(d)(2)(iv)(A).

Included Concepts

- Facility inventory
- Industrial facility stormwater control measures
- Industrial and commercial facility inspections
- Staff training

This program component typically applies only to Phase I MS4 permittees as Phase II federal regulations (40 CFR 122.34(b)) do not specifically address stormwater discharges from industrial facilities and commercial businesses (other than as part of the education and outreach program). However, EPA recommends that permit writers consider including requirements pertaining to stormwater discharges to the MS4 from industrial sources in Phase II permits to further reduce stormwater pollutants from the MS4.

Phase I MS4 regulations specify that several key elements be included in Phase I MS4 stormwater management programs. These elements include: adequate legal authority to require compliance and inspect sites, inspection of priority industrial and commercial facilities, establishing control measure requirements for facilities that may pose a threat to water quality, and enforcing stormwater requirements. In order to implement these requirements, MS4 permits require the development of an inventory of facilities and prioritization protocol and adequate staff training to ensure proper inspection and enforcement of requirements.

7.1 Facility Inventory

Example Permit Provision

7.1.1 Source Identification

a. The permittee must continue to maintain an inventory of all industrial and commercial sites/sources within its jurisdiction (regardless of ownership) that could discharge pollutants in stormwater to the MS4. The inventory must be updated [*insert frequency, e.g. annually*] and available for review by the permitting authority upon request.

b. The inventory must include the following minimum information for each industrial and commercial site/source:

1. Name

2. Address
3. Physical location of storm drain receiving discharge
4. Name of receiving water
5. Pollutants potentially generated by the site/source
6. Identification of whether the site/source is (1) tributary to an impaired water body segment (i.e., whether it is listed under Section 303(d) of the Clean Water Act) and (2) whether it generates pollutants for which the water body segment is impaired
7. A narrative description including standard industrial classification (SIC) codes, which best reflects the principal products or services provided by each facility.

The use of a geolocational database system is highly recommended.

c. At a minimum, the following sites/sources must be included in the inventory:

1. Commercial Sites/Sources:

[*insert commercial sources that are a priority such as*

- Airplane repair, maintenance, fueling, or cleaning
- Animal facilities
- Automobile and other vehicle body repair or painting
- Automobile (or other vehicle) parking lots and storage facilities
- Automobile repair, maintenance, fueling, or cleaning
- Boat repair, maintenance, fueling, or cleaning
- Building material retailers and storage
- Cement mixing or cutting
- Eating or drinking establishments (e.g., restaurants), including food markets
- Equipment repair, maintenance, fueling, or cleaning
- Golf courses, parks and other recreational areas/facilities
- Landscaping
- Marinas
- Masonry
- Mobile automobile or other vehicle washing
- Mobile carpet, drape or furniture cleaning
- Nurseries and greenhouses
- Painting and coating
- Pest control services
- Pool and fountain cleaning
- Portable sanitary services

- Power washing services
- Retail or wholesale fueling]

2. Industrial Sites/Sources:
   - Industrial Facilities, as defined at 40 CFR § 122.26(b)(14), including those subject to the Multi Sector General Permit or individual NPDES permit
   - Facilities subject to Title III of the Superfund Amendments and Reauthorization Act (SARA)
   - Hazardous waste treatment, disposal, storage and recovery facilities
3. All other commercial or industrial sites/sources tributary to an impaired water body segment, where the site/source generates pollutants for which the water body segment is impaired
4. All other commercial or industrial sites/sources that the permittee determines may contribute a significant pollutant load to the MS4[26]

Example Permit Requirement Rationale for the Fact Sheet

The permit requires the permittee to develop an inventory of all potential commercial and industrial sites/sources that could contribute pollutants to the MS4. A list of specific commercial and industrial sites/sources is included in the permit, and additional sites/sources can be added if they are likely to discharge a pollutant of concern to an impaired waterbody or they are contributing a significant pollutant load to the MS4.

The inventory information will provide the permittee with information on potential pollutant sources that contribute to its MS4 system, and at what locations in the system into which they discharge. This information will also allow the permittee to prioritize inspections and tailor education and outreach efforts, which will best assist the facility in implementing appropriate pollution prevention practices or other on-site stormwater controls. In addition, the inventory data will allow the permittee to determine whether the facilities may discharge pollutants of concern into impaired waters. Finally, the information contained in the inventory will enable permittees to characterize these facilities and prioritize them based on their potential impact on stormwater quality. By prioritizing facilities in such a manner, the permittee may then establish a targeted approach towards conducting inspections (see Part 7.3 for a discussion of inspection frequency).

In addition, data from NPDES pretreatment programs within the MS4 boundary on significant industrial users (SIUs) could also be used to identify and prioritize the industrial sites in the stormwater program.

[26]San Diego MS4 Permit (www.swrcb.ca.gov/rwqcb9/water_issues/programs/stormwater/docs/sd_permit/r9_2007_0001/2007_0001final.pdf), with modifications.

Recommendations for the Permit Writer

The example permit provision lists specific commercial and industrial sources to be included in the inventory, but permit writers should customize this list to meet specific issues in their area. For example, some permittees may have large industrial areas with few commercial businesses, while others may have a large number of restaurants and retail businesses but no industrial facilities at all. Other permittees may have had past water quality problems at certain types of commercial or industrial sites, in which case such facilities should be included in their inventories.

7.2 Industrial Facility Stormwater Control Measures

Example Permit Provision

7.2.1 The permittee must require industrial and commercial facilities included in the Part 7.1 inventory to select, install, implement, and maintain stormwater control measures. At a minimum, these control measures must:

a. Minimize Exposure – Industrial/commercial facilities must minimize the exposure of manufacturing, processing, and material storage areas (including loading and unloading, storage, disposal, cleaning, maintenance, and fueling operations) to rain, snow, snowmelt, and runoff by either locating these industrial materials and activities inside or protecting them with storm resistant coverings (although significant enlargement of impervious surface area is not recommended). The facilities must consider, where appropriate:

1. Using grading, berming, or curbing to prevent runoff of contaminated flows and divert run-on away from these areas
2. Locating materials, equipment, and activities so that leaks are contained in existing containment and diversion systems (confine the storage of leaky or leak-prone vehicles and equipment awaiting maintenance to protected areas)
3. Cleaning up spills and leaks promptly using dry methods (e.g., absorbents) to prevent the discharge of pollutants
4. Using drip pans and absorbents under or around leaky vehicles and equipment or store indoors where feasible
5. Using spill/overflow protection equipment
6. Draining fluids from equipment and vehicles prior to on-site storage or disposal
7. Performing all cleaning operations indoors, under cover, or in bermed areas that prevent runoff and run-on and also that capture any overspray
8. Ensuring that all wash water drains to a proper collection system (i.e., not the stormwater drainage system)

b. Follow Good Housekeeping Practices – Industrial/commercial facilities must keep clean all exposed areas that are potential sources of pollutants, using such

measures as sweeping at regular intervals, keeping materials orderly and labeled, and storing materials in appropriate containers.

c. Conduct Maintenance – Industrial/commercial facilities must regularly inspect, test, maintain, and repair all industrial equipment and systems to avoid situations that may result in leaks, spills, and other releases of pollutants in stormwater discharged to receiving waters.

d. Implement Spill Prevention and Response Procedures – Industrial/commercial facilities must minimize the potential for leaks, spills and other releases that may be exposed to stormwater and develop plans for effective response to such spills if or when they occur. At a minimum, the facilities must implement:

    1. Procedures for plainly labeling containers (e.g., "Used Oil," "Spent Solvents," "Fertilizers and Pesticides,") that could be susceptible to spillage or leakage to encourage proper handling and facilitate rapid response if spills or leaks occur
    2. Preventative measures such as barriers between material storage and traffic areas, secondary containment provisions, and procedures for material storage and handling
    3. Procedures for expeditiously stopping, containing, and cleaning up leaks, spills, and other releases. Employees who may cause, detect, or respond to a spill or leak must be trained in these procedures and have necessary spill response equipment available.
    4. Procedures for notification of appropriate facility personnel, emergency response agencies, and regulatory agencies [*Insert appropriate contacts for reporting*]

e. Implement Erosion and Sediment Controls – Industrial/commercial facilities must stabilize exposed areas and contain runoff using structural and/or non-structural control measures to minimize onsite erosion and sedimentation, and the resulting discharge of pollutants.

f. Manage Runoff – Industrial/commercial facilities must divert, infiltrate, reuse, contain, or otherwise reduce stormwater runoff, to minimize pollutants in discharges.

g. Address Salt Storage Piles or Piles Containing Salt – Industrial/commercial facilities must enclose or cover storage piles of salt, or piles containing salt, used for deicing or other commercial or industrial purposes, including maintenance of paved surfaces. If a permanent storage structure is required but does not exist, one must be built within [*insert timeframe*], and seasonal tarping must be used as an interim control until the permanent structure is completed. Facilities must implement appropriate measures (e.g., good housekeeping, diversions, containment) to minimize exposure resulting from adding to or removing materials from the pile. Piles do not need to be enclosed or covered if stormwater runoff from the piles is not discharged or if discharges from the piles are authorized under another NPDES permit.

h. Conduct Employee Training – All facility employees who work in areas where industrial materials or activities are exposed to stormwater, or who are

responsible for implementing activities necessary to manage stormwater must be trained. Training must be conducted [*insert frequency, e.g. at least annually*].

i. Address Non-Stormwater Discharges – Industrial/commercial facilities must eliminate non-stormwater discharges not authorized by an applicable NPDES permit.

j. Control Waste, Garbage and Floatable Debris – Facilities must ensure that waste, garbage, and floatable debris are not discharged to receiving waters by keeping exposed areas free of such materials or by intercepting them before they are discharged.

k. Control Dust Generation and Vehicle Tracking of Industrial Materials – Industrial/commercial facilities must minimize generation of dust and off-site tracking of raw, final, or waste materials.[27]

7.2.2 Within the [*insert deadline, e.g. first two years of permit term*], the permittee must notify the owner/operator of each industrial and commercial site/source of the stormwater requirements for control measures in Part 7.2.1.

7.2.3 As necessary to minimize any pollutants causing the applicable receiving waterbody to be listed as impaired, the permittee must require implementation of additional controls for industrial and commercial sites/sources that are tributary to the impaired water body segments and that are likely to generate such impairment pollutants.[28]

Example Permit Requirement Rationale for the Fact Sheet

The permittee is required to ensure that the minimum control measures are implemented, as applicable, at every industrial/commercial facility included in its inventory. The minimum measures outlined, when properly selected, designed and implemented, promote prevention and source control, before treatment.

The control measures in this permit are consistent with the control measure requirements found in EPA's 2008 Multi-Sector General Permit (MSGP) for stormwater discharges from industrial activities. The permit writer should ensure that these requirements are consistent with the State's industrial stormwater permit. The control measures in this permit describe specific activities that the permittee must require industrial facilities and commercial sites to implement to minimize stormwater pollution. Another control measure is simply preventing pollutants from coming into contact with precipitation in the first place since this will ensure they are not carried into nearby waterways. General good housekeeping and maintenance procedures are also required. Additional control measures address spill prevention and response, erosion and sediment controls, managing runoff, and controlling discharges from salt storage piles.

[27] 2008 MSGP (Section 2) (www.epa.gov/npdes/pubs/msgp2008_finalpermit.pdf), with modifications
[28] San Diego MS4 Permit (www.swrcb.ca.gov/rwqcb9/water_issues/programs/stormwater/docs/sd_permit/r9_2007_0001/2007_0001final.pdf), with modifications

The control measures must also include employee training, controlling non-stormwater discharges, addressing waste, garbage and floatable debris, and addressing dust generation and vehicle tracking.[29]

The permittee is required to notify industrial and commercial sites of the control measure requirements and their responsibility to implement and comply with the requirements.

Facilities that discharge into impaired waterbodies may be required to implement additional controls as necessary to prevent the discharge of the associated pollutants of concern.

7.3 Industrial and Commercial Facility Inspections

Example Permit Provision

7.3.1 Industrial and Commercial Site Inspection Program

a. The permittee must continue to implement a program to inspect all commercial and industrial facilities included in its Part 7.1(a) inventory. The permittee must describe how this will occur in the SWMP.

b. The inspection program must:

1. Prioritize all facilities into high, medium, and low categories on the basis of the potential for water quality impact using criteria such as pollutant sources on site, pollutants of concern, proximity to a water body, and violation history of the facility. The different priority categories will be assigned different inspection frequencies, with the highest priority facilities receiving more frequent inspections. Describe the process for prioritizing inspections and frequency of inspections. If any geographical areas are to be targeted for inspections due to high potential for stormwater pollution, these areas must be listed in the Inspection Plan.

3. Explain how the priority assigned to any one facility may be modified based on the site inspection findings and the facility's potential to discharge pollutants.

7.3.2 Minimum Inspection Requirements

a. Inspection Frequency – The permittee is required to conduct inspections at the following frequencies, at a minimum:

1. Facilities with high potential for water quality impact must be inspected [*insert frequency, e.g. annually*].

2. Facilities with medium potential for water quality impact must be inspected at least [*insert frequency, e.g. once every three years*].

3. Facilities with low potential for water quality impact must be inspected at least [*insert frequency, e.g. once every 5 years*].

[29] 2008 MSGP Fact Sheet (www.epa.gov/npdes/pubs/msgp2008_finalfs.pdf), with modifications

4. Facilities with either a [*insert violation type*] written violation occurring in the previous year must be inspected at least [*insert frequency, e.g. annually*] until compliance is achieved.
5. For facilities with no exposure of commercial or industrial activities to stormwater, no inspections are required. However, the permittee must continue to track these facilities for significant change in the exposure of their operations to stormwater.

b. Scope of Inspection – Inspections must at a minimum:
1. Evaluate the facility's compliance with the Part 7.2 requirement to select, design, install, and implement stormwater control measures.
2. Conduct a visual observation for evidence of unauthorized discharges, illicit connections, and potential discharge of pollutants to stormwater.
3. Verify whether the facility is required to be authorized under the [*insert applicable NPDES general industrial stormwater permit*], and whether the facility has in fact obtained such permit coverage.[30]
4. Evaluate the facility's compliance with any other relevant local stormwater requirements.

c. Documentation Requirements – At a minimum, the permittee must document the following for each inspection:

The inspection date and time;

The name(s) and signature(s) of the inspector(s);

1. Weather information and a description of any discharges occurring at the time of the inspection;
2. Any previously unidentified discharges of pollutants from the site;
3. Any control measures needing maintenance or repairs;
4. Any failed control measures that need replacement;
5. Any incidents of noncompliance observed; and
6. Any additional control measures needed to comply with the Permit Requirements.

d. Track Inspections – Inspection findings must be tracked to ensure inspections are conducted at the frequency specified in Part 7.3.2.b., highlight and document the recidivism of noncompliant facilities, and aid follow up and enforcement activities.

7.3.3 Enforcement – The permittee must ensure that all necessary follow up and enforcement activities are conducted as necessary to require necessary implementation and maintenance of the control measures described in Part 7.2. The permittee is required to utilize the approved ERP for all enforcement actions.

[30] San Francisco Bay Region Municipal Regional Stormwater NPDES Permit (www.swrcb.ca.gov/sanfranciscobay/board_decisions/adopted_orders/2009/R2-2009-0074.pdf), with modifications

Example Permit Requirement Rationale for the Fact Sheet

The permittee must design an inspection program that facilitates more frequent inspections of the highest priority facilities. (See 40 CFR 122.26(d)(iv)(C)(1)). This will help maximize use of the permittee's existing inspection resources and ensure that the permittee inspectors are the most visible and the most familiar with the facilities with the highest potential for water quality impact.

The permittee must develop a process for prioritizing inspections and designating all facilities in the industrial and commercial inventory as either a high, medium or low priority. The designation could occur by individual facility or by facility type. The prioritization for individual facilities may be adjusted after the first, or any subsequent, inspection (for example, if a facility is a high priority facility and the inspection reveals it has little potential for stormwater pollution, then the facility could be reprioritized as a low priority facility).

It is important that inspections be conducted in a thorough and consistent manner in accordance with a formal protocol for conducting an inspection. This protocol should be the basis for inspector training as well. Inspections should include a thorough walk-through of the facility.

The documentation of inspections is very important, not only when tracking noncompliance, but also to facilitate effective enforcement action when needed. A timeline of noncompliance and subsequent enforcement action is critical when escalating measures to gain compliance. Typically, the use of inspection forms facilitates complete and consistent documentation among inspectors and over time.

Recommendations for the Permit Writer

The permit writer may choose to define what criteria the permittee will use to determine the priority of each facility on its inventory. For example, the Phase I Los Angeles County MS4 permit specifies which facilities are Tier 1 and Tier 2 and provides the required inspection frequency for each. The permit writer could also automatically designate certain sets of industries to a certain priority category (e.g., all facilities subject to the State's Industrial General Permit could be designated as high priority facilities in the permit). If the permit does not define what criteria are to be used when prioritizing facilities, the permittee should be required to develop this protocol and submit it to the permitting authority for review.

The permit writer should review available industrial and commercial inventories to determine if more specific inspection frequencies should be set. For example, an MS4 with only 10 facilities in the inventory could probably inspect those facilities annually. However, an MS4 with over 2,000 facilities in the inventory may need to set the inspection frequency at a less frequent interval.

7.4 Staff Training

Example Permit Provision

7.4.1 The permittee must ensure that all staff whose primary job duties are implementing the industrial stormwater program is trained to conduct facility inspections. The training must cover what is required under this permit in terms of stormwater control measures, the requirements of other applicable Industrial Stormwater general permits or other related local requirements, the permittee's site inspection and documentation protocols, and enforcement procedures. Follow-up training must be provided every other year to address changes in procedures, techniques, or staffing. Permittees must document and maintain records of the training provided and the staff trained.[31]

Example Permit Requirement Rationale for the Fact Sheet

Inspectors responsible for conducting inspections at industrial/commercial facilities must be trained on the applicable stormwater requirements for the different types of facilities (i.e., industrial, commercial, other). Training must include a summary of federal, state, and local stormwater regulations that may apply to industrial/commercial facilities. Inspectors must be familiar with various types of stormwater control measures commonly used at the types of facilities typically found in the MS4 area and must be able to educate facility operators about such stormwater control measures. In addition, inspectors must understand and use the permittee's established enforcement response plan (see Chapter 1 of this Guide) to gain compliance as necessary. The inspection staff must be proficient in the enforcement escalation procedure and must properly document all enforcement actions accordingly per the ERP.

[31] Western Washington Phase I MS4 Permit (www.ecy.wa.gov/programs/wq/stormwater/municipal/phaseIpermit/MODIFIEDpermitDOCS/PhaseIpermitSIGNED.pdf), with modifications

CHAPTER 8: MONITORING, EVALUATION, AND REPORTING

Introduction

Phase I MS4s are required to conduct discharge characterization, field screening and develop a monitoring program. Phase I MS4s are also required to conduct an assessment of controls. See 40 CFR 122.26(d)(1)(iii), (d)(2)(iii), and (d)(2)(v).

Phase II MS4 regulations allow, but do not specifically require, monitoring. Phase II MS4s are required to evaluate program compliance, the appropriateness of identified control measures, and progress toward achieving identified measurable goals. See 40 CFR 122.34(g).

Included Concepts

- Consolidated information tracking system
- Development of a comprehensive monitoring and assessment program
- Evaluation of overall program effectiveness
- Requirements for annual reporting of MS4 activities

There are many components involved in monitoring and evaluating the effectiveness of a municipal stormwater program. Any comprehensive monitoring program should have clear monitoring objectives to help determine compliance and water quality impacts. Each monitoring program is unique and should be customized to the specific waterbodies, impairments, and pollutant sources of the MS4.

Evaluating the overall effectiveness of the municipal stormwater program should be done using information from the monitoring program, progress toward meeting measurable goals, and other indicators. Without assessing the effectiveness of the stormwater management program the permittee will not know which parts of the program need to be modified to protect and/or improve water quality and instead will essentially be operating blindly. Establishing a comprehensive monitoring and assessment program will enable the permittee to track progress in complying with permit provisions and implementing a program to protect water quality.

8.1 Consolidated Information Tracking System

Example Permit Provision

8.1.1 Within the first [*insert time frame which corresponds to the development of the monitoring program e.g. first two years of permit*], the permittee must develop a tracking system to track the information required in the permit as well as the information required to be reported in the annual report (see Part 8.4).

Example Permit Requirement Rationale for the Fact Sheet

An important part of any municipal stormwater program is to document and track information on activities the permittee undertakes to comply with the Permit Requirements. Tracking should be integrated into each of the minimum measures. For example, tracking the location of illicit discharges may indicate that a specific area has a high incidence of motor oil being dumped into storm drains. Investigations may reveal that homeowners are changing the motor oil in their cars, but not properly disposing it. Therefore, the permittee will need to educate the homeowners in that area regarding proper disposal.

The permittee must develop a tracking system to monitor implementation of its various programs in order to document the permittee's compliance with its Permit Requirements, such as the number of construction sites and industrial facilities inspected. In addition, the tracking system will allow the permitee to monitor the compliance status of those entities within its jurisdiction, such as construction sites and industrial facilities, and to ensure compliance of municipally-owned and operated facilities.

Any tracking system should be coordinated with the monitoring and evaluation programs developed by the permittee. Ideally, a monitoring and evaluation program will link the "actions" (e.g., the inspections, maintenance, education and other activities the permittee implements) with the "results" (e.g., water quality monitoring data, improvements in environmental indicators) of the monitoring program.

In addition, adequate tracking is necessary to generate and provide reports of program progress not only to the permitting authority, but to a permittee's internal management for planning and funding purposes. Ideally, a MS4 permittee will have at least one person in charge of overall coordination, including tracking. While many departments or agencies might implement various stormwater program components, it is helpful for a single person or department to gather and analyze applicable data. This can be accomplished in a number of ways and will vary based on existing data tracking mechanisms used by a permittee, the data being captured and the reporting requirements the permittee must comply with. Ideally, the program would have a database accessible by all parties which specifies the required data. Lacking this, the permittee will need to coordinate all responsible parties. The permittee will need to ensure that responsible parties "mine" all data necessary to adequately represent the program and permit compliance, and specify adequate internal reporting deadlines to guarantee that the data is available in a timely manner for program planning, effectiveness assessments and permit reporting. Some permittees create reporting forms for program component managers to complete and submit by internal deadlines. Regardless of how the permittee coordinates the effort internally, without adequate tracking of data the permittees will not be able to submit annual reports to the permitting authority that provide the necessary information to determine permit compliance.

Recommendations for the Permit Writer

To assist the permittee in ensuring appropriate data is gathered and analyzed, the permitting authority should be very clear regarding annual reporting requirements. In addition, the text for this section should be tailored depending on the permittee. For example, some permittees may be able to develop a GIS-based system complete with the option to upload pictures and inspection reports versus a spreadsheet. In the text provided either system would meet the requirements, but more detailed information can be obtained with the GIS-based system.

8.2 Development of a Comprehensive Monitoring & Assessment Program

Example Permit Provision

8.2.1 The permittee must continue to implement, and revise as necessary, a comprehensive monitoring and assessment program. A description of this program must be included in the SWMP document. The monitoring and assessment program must be designed to meet the following objectives:

a. Assess compliance with this permit;

b. Measure the effectiveness of the permittee's stormwater management program;

c. Assess the chemical, physical, and biological impacts to receiving waters resulting from stormwater discharges;

d. Characterize stormwater discharges;

e. Identify sources of specific pollutants;

f. Detect and eliminate illicit discharges and illegal connections to the MS4; and

g. Assess the overall health and evaluate long-term trends in receiving water quality.

NOTE: Because monitoring programs and requirements are very specific to the MS4 and local water quality impairments, permit writers are directed to the "Recommendations to the Permit Writer" section below for examples of comprehensive monitoring program Permit Requirements.

Example Permit Requirement Rationale for the Fact Sheet

Without clear monitoring objectives and a detailed monitoring plan, it will be difficult for permittees and permitting authorities to evaluate the effectiveness of the municipal stormwater program.

There are numerous factors that should be examined while setting up the water quality monitoring portion of the comprehensive program. Understanding and considering climatic conditions such as precipitation patterns, temperature, and seasonal variations will ensure the study design will collect data that are representative of typical storms in the area and that sampling occurs during times of the year when it is most logical to do so. Acknowledging the different types of land uses within the area will also help the permittee to prioritize monitoring efforts based on the areas most likely to be impacted by stormwater. The type of waterbody monitored must also be considered when selecting sampling locations since pollutants behave differently depending on the environment thereby impacting sampling protocols. For example, sampling in a freshwater lake involves different protocols than monitoring in a tidally influenced river or a first order stream. Waterbody type can also influence the data results and conclusions (e.g. freshwater wetlands typically have high denitrification rates that will likely impact the results of nitrate sampling).

Selection of specific sampling locations is also very important. If particular sites are of concern, then monitoring both above and below the sites to figure out their contributions to the overall water quality issues may make sense. Also, the actual location in the waterbody is important to specify for consistency. For example, should samples be taken close to the stream bank or in the center of the waterbody, in riffles or pools? The answers to these questions, of course, depend on the goals of the monitoring and the constituents (biological, chemical, hydrological) being examined.

In addition, the number and frequency of samples collected and stream assessments performed will determine how robust the data will be (see page 287 in *National Research Council's Report Urban Stormwater Management in the United States (2009*) available at www.epa.gov/npdes/pubs/nrc_stormwaterreport.pdf). Monitoring may or may not be tied to specific wet weather events (i.e. within 72 hours after a rainfall event). A combination of specific wet weather samples and dry weather samples may be appropriate.

Establishing objectives with associated indicators (environmental or administrative) for each minimum measure can help put each component into perspective when considering the overall program. Indicators are one way to evaluate the success of the program from the overall program level. Developing standard environmental indicators is a critical step to evaluate the SWMP. Permittees need practical tools, such as these indicators, in order to determine if their stormwater programs are working, and that help elucidate where additional efforts may be most critical. Environmental indicators should be selected based on the type (estuarine/freshwater/brackish) and condition (impaired/non-impaired) of the waterbody to which stormwater is discharged as well as the intended use of the area where the stormwater is discharged (source water protection area, etc.).

In addition, permittees should document certain administrative efforts associated with developing and implementing their SWMPs. In this context 'administrative' is considered quite broad, including such things as control measures, inspection programs, policies and rules, MS4 system scope and condition, educational efforts and any other variable or outcome that could reflect on the quality of a stormwater program other than the actual environmental quality outcomes, which are covered under 'Environmental Indicators'.

Good administrative indicators are numerous, and good suites of indicators will vary from one community to another. More information can be obtained on each of the environmental and administrative indicators listed by going to the Stormwater Manager's Resource Center (www.stormwatercenter.net) and selecting "Monitor/Assess" on the left navigation bar.

Several protocols have been developed to assess the effectiveness of stormwater control measures:

- Guidance for Evaluating Emerging Stormwater Treatment Technologies, Technology Assessment Protocol - Ecology (TAPE) www.ecy.wa.gov/biblio/0210037.html . This guidance document's primary purpose is to establish a testing protocol and process for evaluating and reporting on the performance and appropriate uses of emerging stormwater treatment technologies.

- Technology Acceptance Reciprocity Partnership (TARP) Protocol for Stormwater Best Management Practice Demonstrations www.dep.state.pa.us/dep/deputate/pollprev/techservices/tarp/pdffiles/Tier2protocol.pdf . The purpose of the TARP

Protocol is to provide a uniform method for demonstrating stormwater technologies and developing test quality assurance (QA) plans for certification or verification of performance claims.

- BMP Performance Verification Checklist. This is a tool that helps permittees provide a consistent set of questions for applicants proposing to use manufactured and proprietary BMP. It is available as Tool # 8 of the Center for Watershed Protection's *Managing Stormwater in Your Community*. The checklist is accompanied by an explanation and instructions for using the checklist, technical appendices, and a matrix that compares existing verification protocols, such as TARP and TAPE.

Additional monitoring resources include:

- CWP, 2008, *Monitoring to Demonstrate Environmental Results: Guidance to Develop Local Stormwater Monitoring Studies Using Six Example Study Designs* (www.cwp.org)
- Geosyntec Consultants and Wright Water Engineers, 2009, *Urban Stormwater BMP Performance Monitoring*, (bmpdatabase.org/MonitoringEval.htm)
- CASQA, 2007, *Municipal Stormwater Program Effectiveness Assessment Guidance* (www.casqa.org)

Recommendations for the Permit Writer

Because of the site-specific nature and variability of these monitoring programs between permittees, the detailed requirements should be provided by each permit writer. For example, the Phase I regulations included specific monitoring requirements while the Phase II regulations allow, but do not specifically require monitoring. To assist permit writers, several examples of monitoring requirements from existing MS4 permits are listed below:

- Baltimore County, MD Phase I MS4 permit (issued 2005); see the watershed assessment and planning requirements (Part II.F) and assessment of controls (Part II.H) www.mde.state.md.us/assets/document/sedimentStormwater/MSSPermit/BA%20final%20permit.pdf

- Southern California Regional Bioassessment Monitoring Program (this is a regional monitoring program involving coastal counties in Southern California) www.socalsmc.org/Docs/SMC-DesignofBioassessmentRegionalMonitoringProgram.pdf

- San Diego, CA Phase I MS4 Permit (issued 2007); see Receiving Waters and Urban Runoff Monitoring and Reporting Program. www.waterboards.ca.gov/sandiego/water_issues/programs/stormwater/docs/sd_permit/r9_2007_0001/2007_0001final.pdf

The permit writer could consider the role of partnerships among the MS4s in establishing and implementing the monitoring programs so that any data collected is robust, useful, and meaningful. In addition, communities may benefit more by working with local organizations and/or neighboring communities who are already collecting similar data. By doing so resources may be used more efficiently and results of testing may be more robust.

The permit writer should also require the permittee to assess the effectiveness of the SWMP in meeting applicable Permit Requirements. The sampling protocols developed must support the goals of the monitoring program. The monitoring and assessment program must include water quality monitoring as well as an assessment of environmental and administrative indicators. Along these lines, the permit writer could also add requirements such as the ones provided below:

Water Quality Monitoring

a. *The Permittee must develop a water quality monitoring program that includes [insert specific monitoring programs and requirements, such as:*

- Ambient receiving water monitoring,
- Biological monitoring,
- Control measure performance monitoring, or
- Discharge (wet weather) monitoring

Because the detailed monitoring program requirements are very unique to each MS4, the permitting authority should insert here the specific details of the relevant monitoring program, such as monitoring type, frequency, location, etc.]

b. When determining water quality monitoring components, the permittee must examine and consider a variety of factors, including, but not limited to:

- Climatic conditions, including precipitation patterns, temperature, and seasonal variations
- Land uses in the MS4
- Waterbody type

c. The permittee must consider and address specific sampling quality assurance/quality control protocols, including, but not limited to:

- Specific chemical constituents (pollutants), biological stream indicators, and physical stream indicators that will be monitored to best achieve the purpose of the monitoring
- Sampling locations
- Number and frequency of sample collection and assessments
- Timing of sample collection

d. The permittee must determine if any similar monitoring is occurring within the MS4 and if it is logical to link efforts.

Environmental Indicators

As part of the comprehensive monitoring and assessment program, the permittee must identify and track at least [*insert number of indicators to be tracked*] environmental

indicators from each category listed below (physical and hydrologic indicators; biological indicators; water quality indicators). The indicators must be appropriate to assess if the SWMP is meeting goals and objectives:

Physical and hydrological indicators

- Stream widening/ downcutting
- Physical habitat quality
- Impacted dry weather flows
- Increased flooding frequency
- Stream temperature monitoring

Biological indicators

- Fish assemblage analysis
- Macro-invertebrate assemblage
- Single species indicator
- Composite indicators
- Other biological indicators

Water quality indicators

- Water quality pollutant constituent monitoring
- Toxicity testing
- Non-point source loadings
- Exceedance frequencies of water quality standards
- Sediment contamination
- Human health criteria

Administrative indicators

As part of the comprehensive monitoring and assessment program, the permittee must identify and track at least [*insert number of indicators to be tracked*] administrative indicator from each category listed below (social indicators; programmatic indicators; site indicators). The indicators must be appropriate to assess if the SWMP is meeting goals and objectives:

Social indicators

- Public attitude surveys
- Industrial/commercial pollution prevention
- Public involvement and monitoring
- User perception

Programmatic indicators

- Number of illicit connections identified and corrected
- Number of control measures installed, inspected, and maintained
- Permitting and compliance
- Growth and development

Site indicators

- Control measure performance monitoring
- Industrial site compliance monitoring

Performance Monitoring of Stormwater Controls

When monitoring the performance of stormwater controls, EPA recommends that percent removal efficiencies are not calculated and compared since results can be misleading because the percentages may be based on differing levels of the influent concentration (see cfpub.epa.gov/npdes/stormwater/urbanbmp/bmptopic.cfm#percentremoval for further discussion; also see *National Research Council's Report Urban Stormwater Management in the United States (2009*) available at www.epa.gov/npdes/pubs/nrc_stormwaterreport.pdf).

Modeling can also be a useful tool to quantify the impacts of municipal stormwater management. The following resources provide summaries and reviews of different types of models available to

determine existing loading from an MS4 as well as the effects expected from various stormwater controls.

1. USEPA Handbook for Developing Watershed Plans to Restore and Protect Our Waters
   www.epa.gov/nps/watershed_handbook/

   Chapter 8 of this document focuses on methods for estimating pollutant loads, including the use of watershed models. This chapter provides assistance in selecting and applying watershed models to estimate pollutant loads from existing conditions.

2. USEPA TMDL Model Evaluation and Research Needs
   www.epa.gov/nrmrl/pubs/600r05149/600r05149.htm

   This report documents the review of more than 60 available watershed and receiving water models. It discusses model selection on the basis of model capabilities and provides a series of tables rating the capabilities or applicability the models using the categories of TMDL endpoints, general land and water features, special land processes, special water processes, and application considerations including the selection of appropriate best management practices and their water quality impacts. The document also provides individual fact sheets for each reviewed model.

8.3 Evaluation of Overall Program Effectiveness

Example Permit Provision

8.3.1 *Annual Effectiveness Assessment* – The annual effectiveness assessment must:

a. Use the monitoring and assessment data described in Part 8.2 to specifically assess the effectiveness of each of the following:
   1. Each significant activity/control measures or type of activity/control measure implemented;
   2. Implementation of each major component of the Stormwater Management Program (Public Education/Involvement, Illicit Discharges, Construction, Post-Construction, Good Housekeeping); and
   3. Implementation of the Stormwater Management Program as a whole.

b. Identify and use measurable goals, assessment indicators, and assessment methods for each of the items listed in Part 8.3.1.a above.

c. Document the permittee's compliance with permit conditions.

8.3.2 Based on the results of the effectiveness assessment, the permittee must annually review its activities or control measures to identify modifications and improvements needed to maximize SWMP effectiveness, as necessary to achieve compliance with this permit. The permittee must develop and implement a plan and schedule to address the identified modifications and improvements. Municipal activities/control

measures that are ineffective or less effective than other comparable municipal activities/control measures must be replaced or improved upon by implementation of more effective municipal activities/control measures.

8.3.3 As part of its Annual Reports, the permittee must report on its SWMP effectiveness assessment as implemented under Part 8.3.1 above.

Example Permit Requirement Rationale for the Fact Sheet

A key requirement in the stormwater Phase II rule is a report (40 CFR 122.34(g)(3)) that includes "the status of compliance with permit conditions, an assessment of the appropriateness of identified [control measures] and progress towards achieving identified measurable goals for each of the minimum control measures." This assessment is critical to the stormwater program framework which uses the iterative approach of implementing controls, conducting assessments, and designating refocused controls leading toward attainment of water quality standards.

Building on the monitoring and assessment program developed in Part 8.2, the permittee must conduct an annual effectiveness assessment to assess the effectiveness of significant control measures, SWMP components, and the SWMP as a whole. The California Stormwater Quality Association's (CASQA) *Municipal Stormwater Program Effectiveness Guidance* describes strategies and methods for assessing effectiveness, including examples of effectiveness assessment for each SWMP program component. The CASQA Effectiveness Guidance is available at www.casqa.org for purchase. A two-hour EPA webcast focusing on the CASQA Guide is also available (available at www.epa.gov/npdes/training under "Assessing the Effectiveness of Your Municipal Stormwater Program"). A resources document from the webcast includes a 10 page summary of the Guide and example pages from the municipal chapter (www.epa.gov/npdes/outreach_files/webcast/jun0408/110961/municipal_resources.pdf).

The *Municipal Stormwater Program Effectiveness Assessment Guidance* synthesizes information on designing and conducting program effectiveness assessments. The document also explains how to select certain methods based on programmatic outcomes and goals. The reader is led through a series of questions and case studies to demonstrate how proper assessments are selected. Techniques are related to different level of outcomes: level one – documenting activities, level two – raising awareness, level 3 – changing behavior, level 4 – reducing loads from sources, level 5 – improving runoff quality, and level 6 – protecting receiving water quality. The Guide includes fact sheets for all six NPDES program elements, outlining methods and techniques for assessing effectiveness of each program.

Recommendations for the Permit Writer

Adaptive management is the appropriate process for assessing new opportunities for improving program effectiveness in controlling stormwater pollution. The permit writer should require the permittee to use adaptive management throughout the permit term to assess options for improving controls on stormwater discharges as compared with measurable goals and demonstrated by monitoring and assessment protocols. The permit writer should have the permittee monitor and

assess the data and analyses required under the permit as well as applicable information from other sources in the adaptive management process.

In addition, the permit writer should have the permittee assess and modify, as necessary, any or all existing SWMP components and adopt new or revised SWMP components to optimize reductions in stormwater pollutants through an iterative process. This iterative process should include routine assessment of the need to further improve water quality and protect beneficial uses, review of available technologies and practices to accomplish the needed improvement, and evaluate resources available to implement the technologies and practices.

8.4 Requirements for Annual Reporting of MS4 Activities

Example Permit Provision

8.4.1 Summary Annual Report - The Permittee must submit annual reports on or before [*specify deadline, e.g., the anniversary date of this permit*] for the reporting period [*specify the reporting period, e.g., July 1-June 30*]. The Permittee must use the Summary MS4 Annual Report template in Appendix A to document a summary of the past year activities. All of the information required on this form must be completed.

8.4.2 Detailed Annual Report - The Permittee must also submit a detailed annual report that addresses, for the activities described in the SWMP document required in Part 1.1, the following:

- A summary of past year activities, including where available, specific quantities achieved and summaries of enforcement actions. See Part 8.4.3 for required information specific to certain SWMP areas.
- A description of the effectiveness of each SWMP program component or activity (see Part 8.3); and
- Planned activities and changes for the next reporting period, for each SWMP program component or activity.
- Detailed fiscal analysis described in Part1.4.2.

8.4.3 [*Specify any additional information and/or data pertaining to implementation of priority activities the Permitting Authority would like to see in Annual Reports, e.g. a list of green roofs (with square footage) installed in the MS4, a summary of water quality monitoring data collected for a specific waterbody, etc.*]

The Annual Report must clearly refer to the Permit Requirements, and describe in quantifiable terms, the status of activities undertaken to comply with each requirement.

Example Permit Requirement Rationale for the Fact Sheet

In general, an annual report must document and summarize implementation of the SWMP during the previous year and evaluate program results and describe planned changes towards continuous improvement. The annual report also can serve as a "state of the SWMP" report for the general public or other stakeholders in the community. While records are to be kept and made available to the public, the annual report is an excellent summary document to provide as well.

Recommendations for the Permit Writer

EPA recommends using its Summary Annual Report Template (see Appendix A) in this guidance in order to obtain summary information about the status of MS4 programs. In addition to the summary annual report template, permittees must also submit a more detailed annual report.

The permit writer may determine that additional, more detailed, information is needed to determine compliance with the Permit Requirements. Even if these reporting details are not required within the permit, the permitting authority and enforcement officials can still request them at any time or during a program audit.

MS4 permits should require permittees to summarize and analyze data concerning the effectiveness of the SWMP and submit the analysis to the permitting authority. For example, the permittees should address such questions as:

- For illicit discharge data, what are the most prevalent sources and pollutants in the illicit discharge data, and where are these illicit discharges occurring? How many illicit discharges have been identified, and how many of those have been resolved? How many outfalls or screening points were visually screened, how many had dry weather discharges or flows, at how many were field analyses completed and for what parameters, and at how many were samples collected and analyzed? Does the MS4 need to conduct more inspections in these areas, or develop more specific outreach targeting these sources and pollutants?

- For the construction data, what are the most common construction violations, and are there any trends in the data (e.g., construction operators who receive more violations than others, areas of the MS4 with more violations, need to refine guidance or standards to more clearly address common violations). How has the permittee responded to these trends? Over the last year, how many construction site plan reviews were completed and approved? How many inspections were conducted, how many noncompliant sites were identified, and how many enforcement actions (and of what type) were taken?

At a minimum, the permit should require that the annual report clearly illustrate three key items for each SWMP area:

- **Summary of the Year's Activities**. The summary should describe and quantify program activities for each SWMP component. Responsible persons, agencies, departments or co-permittees should be included. Each activity should be described in relation to achievement of established goals or performance standards.

- **Description of SWMP Effectiveness**. An annual report should not only describe the previous year's activities, but should also highlight the SMWP's effectiveness (see Part 8.3) using the indicators required in Part 8.2.

- **Planned Activities and Changes**. The annual report should describe activities planned for the next year highlighting any changes made to improve control measures or program effectiveness.

Also, although the stormwater Phase II rule requires reports, after the first permit term, to be submitted in only years two and four of the permit term, EPA strongly encourages annual reports for all permittees.

APPENDIX A: SUMMARY ANNUAL REPORT TEMPLATE

National Pollutant Discharge Elimination System Stormwater Program
Small MS4 Report Form

The purpose of this report is to contribute information to an evaluation of the NPDES small municipal separate storm sewer system (MS4) permit program. Consistent with 40 CFR §122.37 the U.S. Environmental Protection Agency is assessing the status of the program nation-wide. A "no" answer to a question does not necessarily mean noncompliance with your permit or with the federal regulations. In order to establish the range of variability in the program it is necessary to ask questions along a fairly broad performance continuum. Your permitting authority may use some of this information as one component of a compliance evaluation.

1. MS4 Information

_____
Name of MS4

_____ _____ _____
Name of Contact Person (First) (Last) (Title)

_____ _____
Telephone (including area code) Email

_____
Mailing Address

_____ ____ _____
City State ZIP code

What size population does your MS4 serve? _____ NPDES number _____

What is the reporting period for this report? (mm/dd/yyyy) From _____ to _____

2. Water Quality Priorities

A. Does your MS4 discharge to waters listed as impaired on a state 303(d) list? ☐ Yes ☐ No

B. If yes, identify each impaired water, the impairment, whether a TMDL has been approved by EPA for each, and whether the TMDL assigns a wasteload allocation to your MS4. Use a new line for each impairment, and attach additional pages as necessary.

Impaired Water	Impairment	Approved TMDL		TMDL assigns WLA to MS4	
		☐ Yes	☐ No	☐ Yes	☐ No
		☐ Yes	☐ No	☐ Yes	☐ No
		☐ Yes	☐ No	☐ Yes	☐ No
		☐ Yes	☐ No	☐ Yes	☐ No
		☐ Yes	☐ No	☐ Yes	☐ No
		☐ Yes	☐ No	☐ Yes	☐ No
		☐ Yes	☐ No	☐ Yes	☐ No
		☐ Yes	☐ No	☐ Yes	☐ No

C. What specific sources contributing to the impairment(s) are you targeting in your stormwater program?

_____

D. Do you discharge to any high-quality waters (e.g., Tier 2, Tier 3, outstanding natural resource waters, or other state or federal designation)? ☐ Yes ☐ No

E. Are you implementing additional specific provisions to ensure their continued integrity? ☐ Yes ☐ No

3. Public Education and Public Participation

A. Is your public education program targeting specific pollutants and sources of those pollutants? ☐ Yes ☐ No

B. If yes, what are the specific sources and/or pollutants addressed by your public education program?

_____

C. Note specific successful outcome(s) (e.g., quantified reduction in fertilizer use; NOT tasks, events, publications) fully or partially attributable to your public education program during this reporting period.

_____

D. Do you have an advisory committee or other body comprised of the public and other stakeholders that provides regular input on your stormwater program? ☐ Yes ☐ No

4. Construction

A. Do you have an ordinance or other regulatory mechanism stipulating:

Erosion and sediment control requirements? ☐ Yes ☐ No

Other construction waste control requirements? ☐ Yes ☐ No

Requirement to submit construction plans for review? ☐ Yes ☐ No

MS4 enforcement authority? ☐ Yes ☐ No

B. Do you have written procedures for:

Reviewing construction plans? ☐ Yes ☐ No

Performing inspections? ☐ Yes ☐ No

Responding to violations? ☐ Yes ☐ No

C. Identify the number of active construction sites $\geq$ 1 acre in operation in your jurisdiction at any time during the reporting period. _____

D. How many of the sites identified in 4.C did you inspect during this reporting period? _____

E. Describe, on average, the frequency with which your program conducts construction site inspections.

_____

F. Do you prioritize certain construction sites for more frequent inspections? ☐ Yes ☐ No

If Yes, based on what criteria? _____

G. Identify which of the following types of enforcement actions you used during the reporting period for construction activities, indicate the number of actions, or note those for which you do not have authority:

☐ Yes	Notice of violation	#_____	No Authority ☐
☐ Yes	Administrative fines	#_____	No Authority ☐
☐ Yes	Stop Work Orders	#_____	No Authority ☐
☐ Yes	Civil penalties	#_____	No Authority ☐
☐ Yes	Criminal actions	#_____	No Authority ☐
☐ Yes	Administrative orders	#_____	No Authority ☐
☐ Yes	Other _____	#_____	

H. Do you use an electronic tool (e.g., GIS, data base, spreadsheet) to track the locations, inspection results, and enforcement actions of active construction sites in your jurisdiction? ☐ Yes ☐ No

I. What are the 3 most common types of violations documented during this reporting period?

_____

J. How often do municipal employees receive training on the construction program? _____

5. Illicit Discharge Elimination

A. Have you completed a map of all outfalls and receiving waters of your storm sewer system? ☐ Yes ☐ No

B. Have you completed a map of all storm drain pipes and other conveyances in the storm sewer system? ☐ Yes ☐ No

C. Identify the number of outfalls in your storm sewer system. _____

D. Do you have documented procedures, including frequency, for screening outfalls? ☐ Yes ☐ No

E. Of the outfalls identified in 5.C, how many were screened for dry weather discharges during this reporting period?

_____

F. Of the outfalls identified in 5.C, how many have been screened for dry weather discharges at any time since you obtained MS4 permit coverage? _____

G. What is your frequency for screening outfalls for illicit discharges? Describe any variation based on size/type.

_____

H. Do you have an ordinance or other regulatory mechanism that effectively prohibits illicit discharges? ☐ Yes ☐ No

I. Do you have an ordinance or other regulatory mechanism that provides authority for you to take enforcement action and/or recover costs for addressing illicit discharges? ☐ Yes ☐ No

J. During this reporting period, how many illicit discharges/illegal connections have you discovered? _____

K. Of those illicit discharges/illegal connections that have been discovered or reported, how many have been eliminated?

_____

L. How often do municipal employees receive training on the illicit discharge program? _____

6. Stormwater Management for Municipal Operations

A. Have stormwater pollution prevention plans (or an equivalent plan) been developed for:

All public parks, ball fields, other recreational facilities and other open spaces ☐ Yes ☐ No

All municipal construction activities, including those disturbing less than 1 acre ☐ Yes ☐ No

All municipal turf grass/landscape management activities ☐ Yes ☐ No

All municipal vehicle fueling, operation and maintenance activities ☐ Yes ☐ No

All municipal maintenance yards ☐ Yes ☐ No

All municipal waste handling and disposal areas ☐ Yes ☐ No

Other _____

B. Are stormwater inspections conducted at these facilities? ☐ Yes ☐ No

C. If Yes, at what frequency are inspections conducted? _____

D. List activities for which operating procedures or management practices specific to stormwater management have been developed (e.g., road repairs, catch basin cleaning).

_____

E. Do you prioritize certain municipal activities and/or facilities for more frequent inspection? ☐ Yes ☐ No

F. If Yes, which activities and/or facilities receive most frequent inspections? _____

G. Do all municipal employees and contractors overseeing planning and implementation of stormwater-related activities receive comprehensive training on stormwater management? ☐ Yes ☐ No

H. If yes, do you also provide regular updates and refreshers? ☐ Yes ☐ No

I. If so, how frequently and/or under what circumstances? _____

7. Long-term (Post-Construction) Stormwater Measures

A. Do you have an ordinance or other regulatory mechanism to require:

Site plan reviews for stormwater/water quality of all new and re-development projects? ☐ Yes ☐ No

Long-term operation and maintenance of stormwater management controls? ☐ Yes ☐ No

Retrofitting to incorporate long-term stormwater management controls? ☐ Yes ☐ No

B. If you have retrofit requirements, what are the circumstances/criteria?

_____

C. What are your criteria for determining which new/re-development stormwater plans you will review (e.g., all projects, projects disturbing greater than one acre, etc.) _____

D. Do you require water quality or quantity design standards or performance standards, either directly or by reference to a state or other standard, be met for new development and re-development? ☐ Yes ☐ No

E. Do these performance or design standards require that pre-development hydrology be met for:

Flow volumes ☐ Yes ☐ No

Peak discharge rates ☐ Yes ☐ No

Discharge frequency ☐ Yes ☐ No

Flow duration ☐ Yes ☐ No

F. Please provide the URL/reference where all post-construction stormwater management standards can be found.

_____

G. How many development and redevelopment project plans were reviewed during the reporting period to assess impacts to water quality and receiving stream protection? _____

H. How many of the plans identified in 7.G were approved? _____

I. How many privately owned permanent stormwater management practices/facilities were inspected during the reporting period? _____

J. How many of the practices/facilities identified in I were found to have inadequate maintenance? _____

K. How long do you give operators to remedy any operation and maintenance deficiencies identified during inspections?

_____

L. Do you have authority to take enforcement action for failure to properly operate and maintain stormwater practices/facilities? ☐ Yes ☐ No

M. How many formal enforcement actions (i.e., more than a verbal or written warning) were taken for failure to adequately operate and/or maintain stormwater management practices? _____

N. Do you use an electronic tool (e.g., GIS, database, spreadsheet) to track post-construction BMPs, inspections and maintenance? ☐ Yes ☐ No

O. Do all municipal departments and/or staff (as relevant) have access to this tracking system? ☐ Yes ☐ No

P. How often do municipal employees receive training on the post-construction program? _____

8. Program Resources

A. What was the annual expenditure to implement MS4 permit requirements this reporting period? _____

B. What is next year's budget for implementing the requirements of your MS4 NPDES permit? _____

C. This year what is/are your source(s) of funding for the stormwater program, and annual revenue (amount or percentage) derived from each?

Source: _____ Amount $_____ OR %_____

Source: _____ Amount $_____ OR %_____

Source: _____ Amount $_____ OR %_____

D. How many FTEs does your municipality devote to the stormwater program (specifically for implementing the stormwater program; not municipal employees with other primary responsibilities)? _____

E. Do you share program implementation responsibilities with any other entities? ☐ Yes ☐ No

Entity	Activity/Task/Responsibility	Your Oversight/Accountability Mechanism

9. Evaluating/Measuring Progress

A. What indicators do you use to evaluate the overall effectiveness of your stormwater management program, how long have you been tracking them, and at what frequency? These are not measurable goals for individual management practices or tasks, but large-scale or long-term metrics for the overall program, such as macroinvertebrate community indices, measures of effective impervious cover in the watershed, indicators of in-stream hydrologic stability, etc.

Indicator	Began Tracking (year)	Frequency	Number of Locations

B. What environmental quality trends have you documented over the duration of your stormwater program? Reports or summaries can be attached electronically, or provide the URL to where they may be found on the Web.

10. Additional Information

In the space below, please include any additional information on the performance of your MS4 program. If providing clarification to any of the questions on this form, please provide the question number (e.g., 2C) in your response.

Certification Statement and Signature

I certify that all information provided in this report is, to the best of my knowledge and belief, true, accurate and complete. ☐ Yes

Federal regulations require this application to be signed as follows: **For a municipal, State, Federal, or other public facility**: by either a principal executive or ranking elected official.

_____ _____

Name of Certifying Official, Title Date (mm/dd/yyyy)

Submit

APPENDIX B: DEFINITIONS

Commencement of Construction – the initial disturbance of soils associated with clearing, grading, or excavating activities or other construction-related activities (e.g., stockpiling of fill material). (Source: 2008 CGP)

Control Measure – any best management practice (BMP) or other method used to prevent or reduce the discharge of pollutants to waters of the United States. (Source: 2008 CGP)

Discharge – when used without qualification means the "discharge of a pollutant." (Source: 2008 CGP)

Discharge of Stormwater Associated with Construction Activity – as used in this permit, refers to a discharge of pollutants in stormwater from areas where soil disturbing activities (e.g., clearing, grading, or excavation), construction materials or equipment storage or maintenance (e.g., fill piles, borrow area, concrete truck chute washdown, fueling), or other industrial stormwater directly related to the construction process (e.g., concrete or asphalt batch plants) are located. (Source: 2008 CGP)

Illicit Discharge - any discharge to a municipal separate storm sewer that is not composed entirely of storm water except discharges pursuant to a NPDES permit (other than the NPDES permit for discharges from the municipal separate storm sewer) and discharges resulting from fire fighting activities. (Source: 40 CFR 122.26)

Large Construction Activity – is defined at 40 CFR §122.26(b)(14)(x) and incorporated here by reference. A large construction activity includes clearing, grading, and excavating resulting in a land disturbance that will disturb equal to or greater than five acres of land or will disturb less than five acres of total land area but is part of a larger common plan of development or sale that will ultimately disturb equal to or greater than five acres. Large construction activity does not include routine maintenance that is performed to maintain the original line and grade, hydraulic capacity, or original purpose of the site. (Source: 2008 CGP)

Non-Structural Controls – preventative actions that involve management and source controls. Refer also to 40 CFR 122.34(b)(5)(c)(iii). (Source: 40 CFR 122.26)

Qualified Personnel – A person knowledgeable in the principles and practice of erosion and sediment controls who possesses the skills to assess conditions at the construction site that could impact stormwater quality and to assess the effectiveness of any sediment and erosion control measures selected to control the quality of stormwater discharges from the construction activity. (Source: EPA's 2008 Construction General Permit)

Receiving Water – the "Water of the United States" as defined in 40 CFR §122.2 into which the regulated stormwater discharges. (Source: 2008 CGP)

Small Construction Activity –includes clearing, grading, and excavating resulting in a land disturbance that will disturb equal to or greater than one (1) acre and less than five (5) acres of land or will disturb

less than one (1) acre of total land area but is part of a larger common plan of development or sale that will ultimately disturb equal to or greater than one (1) acre and less than five (5) acres. Small construction activity does not include routine maintenance that is performed to maintain the original line and grade, hydraulic capacity, or original purpose of the site. (Source: 2008 CGP)

Stormwater control measure – see control measure.

Structural Control - physically designed, installed, and maintained practices used to prevent or reduce the discharge of pollutants in stormwater, to minimize erosion, and/or to minimize the impacts of stormwater on waterbodies.

Wasteload Allocation – the portion of a receiving water's loading capacity that is allocated to one of its existing or future point sources of pollution. Wasteload allocations constitute a type of water quality-based effluent limitation. (40 CFR 130.2)

UNITED STATES DISTRICT COURT
WESTERN DISTRICT OF WASHINGTON
AT TACOMA

UNITED STATES OF AMERICA, Plaintiff, v. WASHINGTON STATE DEPARTMENT OF TRANSPORTATION, Defendant.	Case No. C08-5722RJB ORDER ON MOTIONS FOR PARTIAL SUMMARY JUDGMENT

This matter comes before the court on Defendant WSDOT's Motion for Partial Summary Judgment re Liability for Stormwater Discharge (Dkt. 56) and on the United States' Cross-Motion for Partial Summary Judgment re Liability for Stormwater Discharges (Dkt. 62). The court has considered the relevant documents and the remainder of the file herein.

I. FACTUAL AND PROCEDURAL BACKGROUND

A. CERCLA STATUTORY SCHEME

The Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended ("CERCLA"), 42 U.S.C. § 9601 *et seq*., was enacted to facilitate "expeditious and efficient cleanup of hazardous waste sites." *Carson Harbor Village, Ltd. v. Unocal Corp*., 270 F.3d 863, 880 (9th Cir. 2001). Its secondary purpose is to hold responsible parties accountable for cleanup efforts. *Id*. CERCLA accomplishes these goals by imposing strict liability on owners and operators of facilities where releases of hazardous substances occur. *Id*. at 870. This liability is joint and several, subject to statutory defenses set forth in 42 U.S.C. §9607(b). *See California v.*

Montrose Chemical Corp. of California, 104 F.3d 1507, 1518 n.9 (9th Cir. 1997).

Under CERCLA, the President's authority to initiate response actions is broad and may include removal or other remedial action pursuant to 42 U.S.C. §9604(a)(1). CERCLA and the National Contingency Plan (NCP) divide response actions into two categories: removal actions and remedial actions. *U.S. v. W.R. Grace & Co.*, 429 F.3d 1224, 1237 (9th Cir. 2005). Distinguishing between removal and remedial actions is critical under CERCLA because the requirements for remedial actions are more detailed and onerous. *See, e.g., W.R. Grace & Co.*, 429 F.3d at 1226 ("For example, a remedial action requires certain analysis of the costs and effectiveness of the remediation and also requires inclusion on the National Priority List. *See* 40 C.F.R. §§300.425(b)(1), 300.430(e)(7).").

To recover its costs for engaging in response actions, the EPA must prove as follows: (1) the site at which the actual or threatened release of hazardous substances occurred constitutes a "facility" under 42 U.S.C. §9601(9); (2) there was a "release" or "threatened release" of a hazardous substance; (3) the party is within one of the four classes of persons subject to liability under 42 U.S.C. §9607(a); and (4) the EPA incurred response costs in responding to the actual or threatened release. *See U.S. v. Chapman*, 146 F.3d 1166, 1169 (9th Cir. 1998); 42 U.S.C. §9607(a)(4)(A) (defendants may be held liable for "all costs of removal or remedial action incurred by the United States Government or a State or an Indian tribe not inconsistent with the national contingency plan").

The burden then shifts to the defendant to prove that the government's action in responding was inconsistent with the NCP. *Chapman*, 146 F.3d at 1169. To prove inconsistency with the NCP, the defendant must demonstrate that the response actions were arbitrary and capricious or otherwise not in accordance with law. *See Washington State Dept. of Transp. v. Washington Natural Gas Co.*, 59 F.3d 793, 802 (9th Cir. 1995). An agency's decision is arbitrary and capricious if the agency "relied on factors which Congress has not intended it to consider, entirely failed to consider an important aspect of the problem, offered an explanation for its decision that runs counter to the evidence before the agency, or is so implausible that it could not be ascribed to a difference in view or the product of agency expertise." *Motor Vehicle Mfrs. Ass'n of*

U.S., Inc. v. State Farm Mut. Auto., 463 U.S. 29, 43 (1983).

B. BACKGROUND

The area concerned in this litigation is the Commencement Bay-Nearshore Tideflats Superfund Site ("the Site" or "CB/NT") in Tacoma, Washington. The Site consists of several identified problem areas where hazardous substances have contaminated sediment, including the Thea Foss and Wheeler Osgood waterways. Dkt. 1, at 3-4. Due to the level of contamination in the water and sediment, the Site was placed on the first official National Priorities List of hazardous waste sites pursuant to CERCLA § 105, 42 U.S.C. § 9605. Dkt. 1, at 4.

On December 2, 2008, the United States of America ("U.S.") filed a complaint against the Washington State Department of Transportation ("WSDOT") under the Comprehensive Environmental Response, Compensation, and Liability Act ("CERCLA"), 42 U.S.C. § 9601, *et seq*. Dkt. 1. The U.S. seeks to recover, pursuant to 42 U.S.C. § 9607(a), its un-reimbursed costs incurred in response to releases and threatened releases of hazardous substances at the Thea Foss and Wheeler Osgood Waterway Problem Areas within the Commencement Bay-Nearshore Tideflats Superfund Site, located in Tacoma, Washington. Dkt. 1, at 8-9.

The complaint involves claims by the United States for response costs, past and future, from WSDOT, (1) for contamination at the Tacoma Spur (I-705) construction site; and (2) for contamination as a result of highway runoff from I-5, SR 705, and SR 509 highways. Dkt. 1. In addition, the U.S. seeks a declaratory judgment under 42 U.S.C. § 9613(g)(2), that WSDOT is jointly and severally liable for any future response costs incurred by the U.S. in connection with the Site. Dkt. 1, at 9. One of the bases of liability alleged against WSDOT is the ownership and operation of I-5, SR 705, and SR 509, and their storm drains. Dkt. 1, at 7.

The complaint alleges that WSDOT owned/owns and operated/operates I-5, SR 705, and SR 509 highways; and the drainage structures designed to drain runoff away from these highways and to discharge the runoff into the Thea Foss Waterway. Dkt. 1, at 7. The United States contends that the highway runoff from I-5, SR 705, and/or SR 509 contains hazardous substances, including phthalates, heavy metals, including cadmium, lead, zinc, and nickel, and petroleum hydrocarbons. Dkt. 1, at 7. The United States alleges that highway runoff containing hazardous substances is and

has been transported from I-5, SR 705, and SR 509 by drainage structures and disposed of in the Thea Foss and/or Wheeler Osgood Waterways. Dkt. 1, at 7.

In 1989, the United States, through the Environmental Protection Agency (EPA), contacted 133 potentially responsible parties (PRPs), including WSDOT, to begin directing remedial actions and recouping response costs associated with the Site. Dkt. 1, at 7. In May of 2003, the United States entered into consent decrees with over eighty PRPs (but not WSDOT) to provide funding and remedial action to facilitate clean-up of the Site. Dkt. 1, at 5. The United States alleges that, as of June 30, 2008, it has incurred at least $6.8 million in unreimbursed response costs in association with the Thea Foss and Wheeler Osgood Waterways, and that response costs will continue to mount in the future. Dkt. 1, at 7-8.

On February 6, 2009, WSDOT filed an answer and counterclaim against the United States. Dkt. 10. The counterclaim seeks contribution from the United States, pursuant to 42 U.S.C. § 9613(b) and (f) (CERCLA § 113), contending that (1) the United States Army Corps of Engineers (USACE), an agency of the United States, dredged the bottom of the Thea Foss waterway from 1902 until 1949, and permitted public and private entities to dredge the Thea Foss waterway between 1975 and 1983 and possibly in 1912 and 1915, thereby moving hazardous substances released by others and causing additional releases to the environment near the waterways; (2) until 1924, the USACE used the dredged material, which included hazardous substances, as fill near the waterways; (3) beginning in 1924, the USACE deposited the dredged material in Commencement Bay, further spreading the contaminated materials; (4) at least until 1940, the USACE deposited the dredged materials at a location near the mouth of the Thea Foss waterway, where it could easily re-enter and re-contaminate the waterway; and (5) WSDOT incurred costs of response for the Thea Foss site. Dkt. 10 at 15-18. WSDOT further alleges that the United States is liable to WSDOT for contribution under 42 U.S.C. § 9613(f) because the USACE meets the requirements of an "operator" under 42 U.S.C. § 9607(a)(2), an "arranger" under § 9607(a)(3), and a "transporter" under 42 U.S.C. § 9607(a)(4). Dkt. 10 at 19. On September 15, 2009, the court issued an order, dismissing that portion of WSDOT's counterclaim that sought contribution from the United States for costs assessed in a state case, *PacifiCorp Envtl. Remediation Co. v. Dep't of Transp.*, No. 07-2-

10404-1 (Wash. Sup. Ct. July 31, 2009), and permitted that portion of WSDOT's counterclaim for contribution under § 9613(f)(1) for response costs the United States is seeking against WSDOT under § 9607(a), to proceed. Dkt. 47.

C. MOTIONS FOR PARTIAL SUMMARY JUDGMENT

On April 8, 2010, WSDOT filed a motion for partial summary judgment, requesting that the court dismiss the United States' claim that WSDOT is liable for response costs incurred by the United States under CERCLA that are related to discharge of stormwater runoff from state highways. Dkt. 56.

WSDOT contends that:

> (1) discharges from the state highway stormwater collection systems are exempt from CERCLA liability because they are authorized by the Clean Water Act and are therefore federally permitted releases under 42 U.S.C. § 9601(10) and 42 U.S.C. § 9607(j);
> (2) WSDOT is not liable as a former or current owner of a facility because it does not hold title to the highway property;
> (3) WSDOT is not liable as an owner or operator of a facility because there was no discharge of hazardous substances into the environment on the highway facilities;
> (4) WSDOT is not liable under CERCLA as an operator because it lacks sufficient control over any contaminants or other materials that enter the highway stormwater runoff;
> (5) WSDOT is not liable under CERCLA as one who arranged for the disposal of a hazardous substance at the Thea Foss Waterway based on its operation of a stormwater system on state highways, because it lacks sufficient control over any contaminants or other materials that enter the stormwater, and lacks intent to dispose of hazardous substances; and
> (6) WSDOT is not liable under any theory because any contaminants released into highway storm drains are caused by the actions of third parties over whom WSDOT has no control, and WSDOT handles the storm drain system with due care.

Dkt. 56, at 5-6.

U.S. responds by filing a cross motion for partial summary judgment and asserting that WSDOT has admitted to the first three elements of liability and that undisputed evidence establishes the fourth. Dkt. 62, at 16. The U.S. specifically argues that: WSDOT has admitted that the United States has incurred costs in responding to release of hazardous substances at the CB/NT Superfund Site; WSDOT is liable as a current and former owner and operator under 42 U.S.C. §9607(a)(1) and (2); WSDOT is liable as arranger under 42 U.S.C. §9607(a)(3); and WSDOT cannot establish the affirmative defenses that releases were federally permitted or that it is entitled to the third party defense. Dkt. 62.

II. DISCUSSION

A. LEGAL STANDARD

Summary judgment is proper only if the pleadings, the discovery and disclosure materials on file, and any affidavits show that there is no genuine issue as to any material fact and that the movant is entitled to judgment as a matter of law. Fed.R.Civ.P. 56(c). The moving party is entitled to judgment as a matter of law when the nonmoving party fails to make a sufficient showing on an essential element of a claim in the case on which the nonmoving party has the burden of proof. *Celotex Corp. v. Catrett*, 477 U.S. 317, 323 (1985). There is no genuine issue of fact for trial where the record, taken as a whole, could not lead a rational trier of fact to find for the non moving party. *Matsushita Elec. Indus. Co. v. Zenith Radio Corp.*, 475 U.S. 574, 586 (1986)(nonmoving party must present specific, significant probative evidence, not simply "some metaphysical doubt."). *See also* Fed.R.Civ.P. 56(e). Conversely, a genuine dispute over a material fact exists if there is sufficient evidence supporting the claimed factual dispute, requiring a judge or jury to resolve the differing versions of the truth. *Anderson v. Liberty Lobby, Inc.*, 477 .S. 242, 253 (1986); *T.W. Elec. Service Inc. v. Pacific Electrical Contractors Association*, 809 F.2d 626, 630 (9th Cir. 1987).

The determination of the existence of a material fact is often a close question. The court must consider the substantive evidentiary burden that the nonmoving party must meet at trial – e.g., a preponderance of the evidence in most civil cases. *Anderson*, 477 U.S. at 254, *T.W. Elect. Service Inc.*, 809 F.2d at 630. The court must resolve any factual issues of controversy in favor of the nonmoving party only when the facts specifically attested by that party contradict facts specifically attested by the moving party. The nonmoving party may not merely state that it will discredit the moving party's evidence at trial, in the hopes that evidence can be developed at trial to support the claim. *T.W. Elect. Service Inc.*, 809 F.2d at 630 (relying on *Anderson, supra).* Conclusory, non specific statements in affidavits are not sufficient, and "missing facts" will not be "presumed." *Lujan v. National Wildlife Federation*, 497 U.S. 871, 888-89 (1990).

B. DISCUSSION

To establish a *prima facie* case to recover its response costs under CERCLA §107, the United States must prove: (1) the site is a "facility"; (2) a "release" or "threatened release" of a

hazardous substance occurred; (3) the government incurred costs in responding to the release or threatened release; and (4) the defendant is the liable party under 42 U.S.C. §9607(a). *U.S. v. Chapman*, 146 F.3d 1166, 1169 (9th Cir. 1998); 42 U.S.C. §9607(a)(4)(A) (defendants may be held liable for "all costs of removal or remedial action incurred by the United States Government or a State or an Indian tribe not inconsistent with the national contingency plan"). 42 U.S.C. §9607(a) authorizes the United States to recover its costs from four classes of responsible parties, three of which are relevant here: (1) current owners or operators of the facility, (2) owners or operators at the time of disposal of hazardous substances at or from the facility, and (3) entities who arrange for disposal of hazardous substances. *See* 42 U.S.C. §9607(a)(1), (2), and (3). Once the government presents a *prima facie* case for response costs, the burden shifts to the defendant to prove the government's response action was not consistent with the national contingency plan. *Chapman*, 146 F.3d at 1169.

The first three elements of the four element test in *Chapman* are not contested. However, WSDOT is challenging whether it falls under one of the four classes of responsible parties enumerated in 42 U.S.C. § 9607(a). The court will deal with arrangers liability under § 9607(a)(3) first.

1. Arrangers

WSDOT contends that it may not be held liable as an arranger under CERCLA because it did not have control over the release of hazardous substances and it did not intend to dispose of hazardous substances. Dkt. 56, at 13-19. WSDOT also contends that there is no evidence that it actually disposed of waste through the highway stormwater system. Dkt. 56, at 16.

The U.S. counters by arguing that WSDOT arranged for disposal by designing, constructing, and operating drainage systems whose sole function was to collect highway runoff and dispose of it into nearby water-bodies. Dkt. 62, at 27. The U.S. states that WSDOT had actual knowledge that the runoff that it was discharging contained hazardous substances. *Id*. The U.S. further states that WSDOT has the ability to redirect, contain, and treat its contaminated runoff. *Id*. at 28.

An arranger is defined as "any person who by contract, agreement, or otherwise arranged for disposal or treatment... of hazardous substances owned or possessed by such person, by any party or

entity, at any facility... owned or operated by another party or entity and containing such hazardous substances." 42 U.S.C. § 9607(a)(3). "A party that 'arranged for disposal' of a hazardous substance under § 9607(a)(3) does not become liable under CERCLA until there is an actual or threatened release of that substance into the environment." *Pakootas v. Teck Cominco Metals, Ltd.*, 452 F.3d 1066, 1077-78 (9th Cir. 2006). "[D]isposal activities that were legal when conducted can nevertheless give rise to liability under § 9607(a)(3) if there is an actual or threatened release of such hazardous substances into the environment." *Id*. at 1078. "[A]n entity may qualify as an arranger under § 9607(a)(3) when it takes intentional steps to dispose of a hazardous substance." *Burlington Northern and Santa Fe Railway Co. v. United States*, 129 S.Ct. 1870, 1879 (2009). "[T]he word 'arrange' implies action directed to a specific purpose." *Id*.

The court is persuaded by the U.S.'s arguments. WSDOT arranged for disposal of hazardous substances. It is undisputed that WSDOT designed the drainage systems at issue. Designing is an action directed to a specific purpose. The purpose was to discharge the highway runoff into the environment. WSDOT had knowledge that the runoff contained hazardous substances and there was an actual release of the hazardous substances into the environment. WSDOT argues that it did not have control of the hazardous substances. However, it did have control over how the collected runoff was disposed of. WSDOT did design the drainage system and, as noted by the U.S., WSDOT has the ability to redirect, contain, or treat its contaminated runoff. For the foregoing reasons, WSDOT is an arranger under 42 U.S.C. § 9607(a)(3).

Since the four elements for finding liability have been satisfied, WSDOT is a liable party under CERCLA, unless released by the defenses addressed below. The court need not reach the issue of whether WSDOT is an owner or operator under 42 U.S.C. § 9607(a)(1) and (2)in light of the court's finding under § 9607(a)(3).

2. Federally Permitted Releases under 42 U.S.C. § 9607(j)

WSDOT contends that two permits exempt it from CERCLA liability. Dkt. 56, at 8, 9. The first permit was issued under the federal Clean Water Act's National Pollutant Discharge Elimination System ("NPDES") program, which is administered by the Washington State Department of Ecology. *Id.* The second permit was a Municipal Permit, which was issued to the

larger Western Washington municipalities in 1995. *Id*. WSDOT indicates that it has "operated the storm drain system in compliance with NPDES permits since 1995." Dkt 56, at 10.

The U.S. responds by arguing that WSDOT has the burden of proof in establishing the affirmative defense that its releases were federally permitted and that the mere existence of a permit does not immunize WSDOT from liability. Dkt. 62, at 30. The U.S. states that even if WSDOT meets its burden of establishing that some of its post-permit releases are federally permitted, WSDOT may still be held liable under CERCLA for any releases that were not expressly permitted, exceeded the limitations of the permit, or occurred at a time when there was no permit. *Id*. The U.S. states that where there are both permitted and unpermitted releases, recovery of response costs related to a federally permitted release is prevented only where the defendant proves that the injury is divisible. *Id*. The U.S. also states that documents identify "instances of non-compliance with WSDOT's permit." Dkt. 62, at 31.

As a preliminary matter, the U.S. moves to strike Paragraph 6 of the Declaration of Kenneth Stone in Support of WSDOT's motion for partial summary judgment because his statement regarding compliance with permits is without foundation. Dkt. 62, at 31. The court should deny the motion to strike and the statement will be considered. The motion goes to the weight to be given the declaration.

42 U.S.C. § 9607(j) states that "[r]ecovery by any person (including the United States...) for response costs or damages resulting from federally permitted release shall be pursuant to existing law in lieu of this section." Federally permitted release includes discharges in compliance with a permit under section 1342 of Title 33. 42 U.S.C. § 9607(10).

It is undisputed that the permits do exist, but there is a dispute as to whether WSDOT is in compliance with the permits. Moreover, there is a question of the scope of the permits, whether there were releases outside that scope, and whether the injury is divisible. It is imprudent to decide this issue at this stage of litigation. Therefore, WSDOT's and the U.S.'s motions for partial summary judgment as to Federally permitted releases should be denied.

3. Defenses under 42 U.S.C. § 9607(b).

WSDOT argues that contaminants in stormwater are caused by third parties over whom it has no control. Dkt. 56, at 19. WSDOT states that the contamination was not caused by it, but by individuals who use the highways, and by other sources. Dkt. 56, at 20. WSDOT also contends that CERCLA requires that a party asserting the third party defense has handled the hazardous substances with due care and that it has met that standard by seeking permits. Dkt. 56, at 19. WSDOT states that the permits require the use of "all known, available, and reasonable technology" and requires that the pollutants be reduced to the "maximum extent practicable." *Id*. Therefore, WSDOT contends, it has used due care.

The U.S. counters by asserting that WSDOT has not established that the releases were caused "solely by" a third party, and that even if WSDOT established that the releases were caused solely by a third party, WSDOT failed to exercise due care prior to the issuance of the permits. Dkt. 62, at 32. Additionally, the U.S. argues that even after the 1995 permit was issued, WSDOT did not retrofit State Route 705 to add best methods and practices for treatment of stormwater. Dkt. 62, at 33.

CERCLA contains a third party defense which states in part,

> There shall be no liability under [42 U.S.C. § 9607(a)] for a person otherwise liable who can establish by a preponderance of the evidence that the release or threat of release of a hazardous substance and the damages resulting therefrom were caused solely by... an act or omission of a third party..., if the defendant establishes by a preponderance of the evidence that (a) he exercised due care with respect to the hazardous substance concerned... and (b) he took precautions against foreseeable acts or omissions of any such third party and the consequences that could foreseeably result from such acts or omissions.

42 U.S.C. § 9607(b).

There is a question of whether WSDOT exercised due care with respect to hazardous material. WSDOT contends that it did exercise due care because it sought and complied with permits. The U.S. contends that the permits do not establish that WSDOT acted with due care and that WSDOT did not act with due care in regard to pre-permit discharges. At this stage of litigation, there is not enough information or evidence presented to establish a due care standard under CERCLA. Moreover, as noted above, the divisiblity of discharges pre and post 1995 is in question.

For the foregoing reasons, the parties' motions for partial summary judgment regarding third party defense should be denied.

4. State Sovereign

WSDOT also argues that Federal courts have refused to impose CERCLA liability on agencies exercising the state's sovereign power non-negligently and that operation of a state highway system is a sovereign function of the state government. Dkt. 56, at 20-21. The U.S. responds by arguing that nothing in CERCLA supports WSDOT's argument. Dkt. 62, at 34-35. The U.S. states that CERCLA is a strict liability statute and that CERCLA applies to states and state agencies as well as private entities. Dkt. 62, at 35. The court is persuaded by the U.S.'s arguments. WSDOT has not cited to controlling law or a provision of CERCLA which supports its assertion, and the court has found none. Therefore, WSDOT's state sovereignty defense should not be allowed, and summary judgment should be entered in favor of the U.S. on this issue.

5. Conclusion

In summary, WSDOT is a potentially responsible person as an arranger under CERCLA. WSDOT's motion for partial summary judgment in regard to this issue should be denied, and the U.S.'s motion for partial summary judgment in regard to this issue should be granted. The parties' motion for partial summary judgment in regard to federally permitted releases and the third party defense should be denied for both parties. Finally, the U.S.'s motion for partial summary judgment regarding state sovereignty should be granted, and WSDOT's motion for partial summary judgment should be denied on that issue.

ORDER

Therefore, it is hereby **ORDERED** that

(1) The U.S.'s Motion to Strike is **DENIED**;

(2) Defendant WSDOT's Motion for Partial Summary Judgment re Liability for Stormwater Discharge (Dkt. 56) is **DENIED** as stated above;

(3) Plaintiff United States' Motion for Partial Summary Judgment re Liability for Stormwater Discharge (Dkt. 62) is **GRANTED IN PART AND DENIED IN PART** as stated above; and

(4) The Clerk is directed to send uncertified copies of this Order to all counsel of record and to any party appearing *pro se* at said party's last known address.

DATED this 7th day of June, 2010.

Robert J. Bryan
United States District Judge

California Regional Water Quality Control Board
San Diego Region

Waste Discharge Requirements for Discharges from the Municipal Separate Storm Sewer Systems (MS4s) Draining the County of Riverside, the Incorporated Cities of Riverside County, and the Riverside County Flood Control and Water Conservation District within the San Diego Region

Order No. R9-2010-0016
NPDES No. CAS0108766

November 10, 2010

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To request copies of the Riverside County Municipal Storm Water Permit, please contact Ben Neill, Water Resources Control Engineer at (858) 467 – 2983, bneill@waterboards.ca.gov

Documents also are available at: http://www.waterboards.ca.gov/sandiego

Waste Discharge Requirements for Discharges from the Municipal Separate Storm Sewer Systems (MS4s) Draining the County of Riverside, the Incorporated Cities of Riverside County, and the Riverside County Flood Control and Water Conservation District within the San Diego Region

Adopted by the
California Regional Water Quality Control Board
San Diego Region
on
November 10, 2010

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California Regional Water Quality Control Board
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The California Regional Water Quality Control Board, San Diego Region (hereinafter San Diego Water Board), finds that:

A. BASIS FOR THE ORDER

1. This Order is based on the federal Clean Water Act (CWA), the Porter-Cologne Water Quality Control Act (Division 7 of the Water Code, commencing with Section 13000), applicable State and federal regulations, all applicable provisions of statewide Water Quality Control Plans and Policies adopted by the State Water Resources Control Board (State Water Board), the Water Quality Control Plan for the San Diego Basin adopted by the San Diego Water Board (Basin Plan), the California Toxics Rule, and the California Toxics Rule Implementation Plan.

2. This Order reissues National Pollutant Discharge Elimination System (NPDES) Permit No. CAS0108766, which was first adopted by the San Diego Water Board on July 16, 1990 (Order No. 90-38), and then reissued on May 13, 1998 (Order No. 98-02). On May 26, 1998, the United States Environmental Protection Agency (USEPA), Region IX, objected to Order No. 98-02 due to concerns regarding Receiving Water Limitations (RWL) language. The USEPA concluded that the RWL language in the permit did not comply with the CWA and its implementing regulations. On April 27, 1999, the USEPA reissued the MS4 permit, which the San Diego Water Board adopted as Addendum No. 1 to Order No. 98-02 on November 8, 2000. On July 14, 2004, the San Diego Water Board adopted the third term MS4 permit, Order No. R9-2004-001. On January 15, 2009, the Riverside County Flood Control and Water Conservation District (RCFCD), as the Principal Copermittee, submitted a Report of Waste Discharge (ROWD) for reissuance of the municipal separate storm sewer system (MS4) Permit.

3. This Order is consistent with the following precedential Orders adopted by the State Water Board addressing MS4 NPDES Permits: Order 99-05, Order WQ-2000-11, Order WQ 2001-15, and Order WQO 2002-0014.[1]

[1] In July 2010, the court in Los Angeles County v. State Water Resources Control Board remanded the Los Angeles Water Board's MS4 permit underlying Order WQ 2009-0008 for procedural reasons occurring during the permit adoption process. The court did not evaluate or rule upon the substantive findings and reasoning set forth in Order WQ 2009-0008. The State Water Board rescinded and voided Order WQ 2009-0008 to comply with the court's order. While the San Diego Water Board may no longer cite Order WQ 2009-0008, the San Diego Water Board has independently considered whether the requirement to eliminate non-storm water discharges is subject to the MEP standard. The San Diego Water Board concludes that the MEP standard does not apply to non-storm water discharges for the same reasons expressed by the State Water Board.

4. The Fact Sheet / Technical Report for the Order No. R9-2010-0016, NPDES No. CAS0108766, Waste Discharge Requirements for Discharges from the MS4s Draining the County of Riverside, the Incorporated Cities of Riverside County, and the Riverside County Flood Control and Water Conservation District within the San Diego Region, includes cited regulatory and legal references and additional explanatory information and data in support of the requirements of this Order. This information, including any supplements thereto, is hereby incorporated by reference into these findings.

B. REGULATED PARTIES

Each of the persons in Table 1 below, hereinafter called Copermittees or dischargers, owns or operates an MS4, through which it discharges into waters of the United States (U.S.) within the San Diego Region. These MS4s fall into one or more of the following categories: (1) a medium or large MS4 that services a population of greater than 100,000 or 250,000 respectively; or (2) a small MS4 that is "interrelated" to a medium or large MS4; or (3) an MS4 that contributes to a violation of a water quality standard; or (4) an MS4 which is a significant contributor of pollutants to waters of the U.S.

Table 1. Municipal Copermittees

1. City of Murrieta	4. County of Riverside
2. City of Temecula	5. Riverside County Flood Control and Water Conservation District
3. City of Wildomar	

The Cities of Murrieta, Menifee and Wildomar also discharge into the waters of the U.S. in the California Regional Water Quality Control Board, Santa Ana Region (Santa Ana Water Board), so are located partially within both the San Diego and Santa Ana Water Board boundaries. Water Code (WC) section 13228 provides a way to streamline the regulation of entities whose jurisdictions straddle the border of two or more Regions. WC section 13228 is implemented in this Order to ease the regulatory burden on Storm Water Agencies and Municipalities that lie in both the San Diego Water Board and the adjacent Santa Ana Water Board's jurisdiction. As allowed by California Water Code (CWC) §13228, the Cities of Murietta, Menifee, and Wildomar submitted written requests to be regulated for MS4 purposes under a permit adopted by only one Water Board. As authorized by CWC §13228 and pursuant to written agreements dated September 28, 2010 between the San Diego Water Board and the Santa Ana Water Board, the Cities of Murrieta and Wildomar are wholly regulated by the San Diego Water Board under this Order, including those portions of the Cities jurisdiction not within the San Diego Water Board's region. Similarly, the City of Menifee is wholly regulated by the Santa Ana Water Board under Order No. R8-2010-0033, including those portions of the City of Menifee within the San Diego Water Board's region.

C. DISCHARGE CHARACTERISTICS

1. Discharges from the MS4 contain waste, as defined in the CWC, and pollutants that adversely affect the quality of the waters of the State. The discharge from an MS4 is a "discharge of pollutants from a point source" into waters of the U.S. as defined in the CWA.

2. MS4 storm water and non-storm water discharges are likely to contain pollutants that cause or threaten to cause a violation of water quality standards, as outlined in the Basin Plan. Storm water and non-storm water discharges from the MS4 are subject to the conditions and requirements established in the Basin Plan for point source discharges.

3. The most common categories of pollutants in runoff include total suspended solids, sediment, pathogens (e.g., bacteria, viruses, protozoa), heavy metals (e.g., copper, lead, zinc and cadmium), petroleum products and polynuclear aromatic hydrocarbons, synthetic organics (e.g., pesticides, herbicides, and PCBs), nutrients (e.g., nitrogen and phosphorus fertilizers), oxygen-demanding substances (decaying vegetation, animal waste), detergents, and trash.

4. The discharge of pollutants and/or increased flows from MS4s may cause or threaten to cause the concentration of pollutants to exceed applicable receiving water quality objectives and/or impair or threaten to impair designated beneficial uses resulting in a condition of pollution (i.e., unreasonable impairment of water quality for designated beneficial uses), contamination, or nuisance.

5. Pollutants in runoff can threaten and adversely affect human health. Human illnesses have been clearly linked to recreating near storm drains flowing to receiving waters. Also, runoff pollutants in receiving waters can bioaccumulate in the tissues of invertebrates and fish, which may be eventually consumed by humans.

6. Runoff discharges from MS4s often contain pollutants that cause toxicity to aquatic organisms (i.e., adverse responses of organisms to chemicals or physical agents ranging from mortality to physiological responses such as impaired reproduction or growth anomalies). Toxic pollutants impact the overall quality of aquatic systems and beneficial uses of receiving waters.

7. The Copermittees discharge runoff into lakes, drinking water reservoirs, rivers, streams, creeks, bays, estuaries, coastal lagoons, the Pacific Ocean, and tributaries thereto within one of the eleven hydrologic units (Santa Margarita Hydrologic Unit) comprising the San Diego Region as shown in Table 2. Some of the receiving water bodies have been designated as impaired by the San Diego Water Board in 2009 pursuant to CWA section 303(d).

Table 2. Common Watersheds and CWA Section 303(d) Impaired Waters in the San Diego Region.

Hydrologic Area (HA) or Hydrologic Subarea (HSA) of the Santa Margarita Hydrologic Unit	Major Receiving Water Bodies	303(d) Pollutant(s)/Stressor or Water Quality Effect[2]
DeLuz Creek HSA (902.21)	De Luz Creek	Iron, Manganese, Nitrogen, Sulfates
Murrieta HSA (902.32)	Long Canyon Creek (tributary to Murrieta Creek)	Chlorpyrifos, E. Coli, Fecal Coliform, Iron, Manganese
Wolf HSA (902.52)	Murrieta Creek	Chlorpyrifos, Copper, Iron, Manganese, Nitrogen, Toxicity
Pauba HSA (902.51)	Redhawk Channel	Chlorpyrifos, Copper, Diazinon, E. Coli, Fecal Coliform, Iron, Manganese, Nitrogen, Phosphorus, Total Dissolved Solids
Gavilan HSA (902.22)	Sandia Creek	Iron, Sulfates
Gertrudis HSA (902.42)	Santa Gertrudis Creek	Chlorpyrifos, Copper, E. Coli, Fecal Coliform, Iron, Phosphorous
Lower Ysidora HSA (902.11)	Santa Margarita Lagoon	Eutrophic
Lower Ysidora HSA (902.11)	Santa Margarita River (Lower)	Enterococcus, Fecal Coliform, Phosphorus, Total Nitrogen as N
Gavilan HSA (902.22)	Santa Margarita River (Upper)	Toxicity
Pauba HSA (902.51)	Temecula Creek	Chlorpyrifos, Copper, Phosphorus, Total Dissolved Solids, Toxicity
French HSA (902.33)	Warm Springs Creek (Riverside County)	Chlorpyrifos, E. Coli, Fecal Coliform, Iron, Manganese, Phosphorus, Total Nitrogen as N

[2] The listed 303(d) pollutant(s) do not necessarily reflect impairment of the entire corresponding WMA or all corresponding major surface water bodies. The specific impaired portions of each WMA are listed in the State Water Resources Control Board's 2008 Section 303(d) List of Water Quality Limited Segments.

8. Trash is a persistent pollutant that can enter receiving waters from the MS4, accumulate, and be transported downstream into receiving waters over time. Trash poses a serious threat to the beneficial uses of the receiving waters, including, but not limited to, human health, rare and endangered species, navigation and human recreation.

9. The Copermittees' water quality monitoring data submitted to date documents persistent violations of Basin Plan water quality objectives for various runoff-related pollutants (indicator bacteria, dissolved solids, turbidity, metals, pesticides, etc.) at various watershed monitoring stations. Persistent toxicity has also been observed at some watershed monitoring stations. In addition, bioassessment data indicate that the majority of the monitored receiving waters have Poor to Very Poor Index of Biotic Integrity ratings. In sum, the above findings indicate that runoff discharges are causing or contributing to water quality impairments, and are a leading cause of such impairments in Riverside County.

10. When natural vegetated pervious ground cover is converted to impervious surfaces such as paved highways, streets, rooftops, and parking lots, the natural absorption and infiltration abilities of the land are lost. Therefore, runoff leaving a developed area is significantly greater in runoff volume, velocity, and peak flow rate than pre-development runoff from the same area. Runoff durations can also increase as a result of flood control and other efforts to control peak flow rates. Increased volume, velocity, rate, and duration of runoff, and decreased natural clean sediment loads, greatly accelerate the erosion of downstream natural channels. Significant declines in the biological integrity and physical habitat of streams and other receiving waters have been found to occur with as little as a 3-5 percent conversion from natural to impervious surfaces. The increased runoff characteristics from new development must be controlled to protect against increased erosion of channel beds and banks, sediment pollutant generation, or other impacts to beneficial uses and stream habitat due to increased erosive force.

11. Development creates new pollution sources as human population density increases and brings with it proportionately higher levels of car emissions, car maintenance wastes, municipal sewage, pesticides, household hazardous wastes, pet wastes, trash, etc. which can either be washed or directly dumped into the MS4. As a result, the runoff leaving the developed urban area is significantly greater in pollutant load than the pre-development runoff from the same area. These increased pollutant loads must be controlled to protect downstream receiving water quality.

12. Development and urbanization especially threaten environmentally sensitive areas (ESAs), such as water bodies designated as supporting a RARE beneficial use (supporting rare, threatened or endangered species) and CWA 303(d)-impaired water bodies. Such areas have a much lower capacity to withstand pollutant loads than other, more sensitive areas. In essence, development that is ordinarily insignificant in its impact on the environment may become significant in a particularly sensitive environment. Therefore, additional controls to reduce storm water pollutants from new and existing development may be necessary for areas adjacent to or discharging directly to an ESA.

13. Although dependent on several factors, the risks typically associated with properly managed infiltration of runoff (especially from residential land use areas) are not significant. The risks associated with infiltration can be managed by many techniques, including (1) designing landscape drainage features that promote infiltration of runoff, but do not "inject" runoff (injection bypasses the natural processes of filtering and transformation that occur in the soil); (2) taking reasonable steps to prevent the illegal disposal of wastes; (3) protecting footings and foundations; (4) ensuring that each drainage feature is adequately maintained in perpetuity; and (5) pretreatment.

14. Non-storm water (dry weather) discharge from the MS4 is not considered a storm water (wet weather) discharge and therefore is not subject to regulation under the Maximum Extent Practicable (MEP) standard from CWA 402(p)(3)(B)(iii), which is explicitly for "Municipal … *Stormwater Discharges* (emphasis added)" from the MS4. Rather, non-storm water discharges into the storm sewers, per CWA 402(p)(3)(B)(ii), are to be effectively prohibited. Such dry weather non-storm water discharges have been shown to contribute significant levels of pollutants and flow in arid, developed Southern California watersheds and are to be effectively prohibited under the CWA.

15. Non-storm water discharges to the MS4 granted an influent exception [i.e., which are exempt from the effective prohibition requirement set forth in CWA section 402(p)(3)(B)(ii)] under 40 CFR 122.26 are included within this Order. Any exempted discharges identified by Copermittees as a source of pollutants are subsequently required to be *addressed* (emphasis added) as illicit discharges through prohibition and incorporation into existing IC/ID programs. Furthermore, the USEPA contemplates that permitting agencies such as the San Diego Water Board may also identify exempted discharges as a source of pollutants required to be addressed as illicit discharges (See Vol. 55 Fed. Reg. 48037). The San Diego Water Board and the Copermittees have identified landscape irrigation, irrigation water and lawn water, previously exempted discharges, as a source of pollutants and conveyance of pollutants to waters of the U.S.

FINDINGS C: DISCHARGE CHARACTERISTICS

D. RUNOFF MANAGEMENT PROGRAMS

1. General

a. This Order specifies requirements necessary for the Copermittees to reduce the discharge of pollutants in storm water to the MEP. However, since MEP is a dynamic performance standard, which evolves over time as runoff management knowledge increases, the Copermittees' runoff management programs must continually be assessed and modified to incorporate improved programs, control measures, best management practices (BMPs), etc. in order to achieve the evolving MEP standard. Absent evidence to the contrary, this continual assessment, revision, and improvement of runoff management program implementation is expected to ultimately achieve compliance with water quality standards in the Region.

b. The Copermittees have generally been implementing the jurisdictional runoff management programs (JRMPs) required pursuant to Order No. R9-2004-001 since July 14, 2005. Prior to that, the Copermittees were regulated by Order No. 98-02, since May 13, 1998. MS4 discharges, however, continue to cause or contribute to violations of water quality standards as evidenced by the Copermittees' monitoring results.

c. This Order contains new or modified requirements that are necessary to improve Copermittees' efforts to reduce the discharge of pollutants in storm water runoff to the MEP and achieve water quality standards. Some of the new or modified requirements, such as the revised Watershed Water Quality Workplan (Watershed Workplan) section, are designed to specifically address high priority water quality problems. Other requirements, such as for unpaved roads, are a result of San Diego Water Board's identification of water quality problems through investigations and complaints during the previous permit period. Other new or modified requirements address program deficiencies that have been noted during audits, report reviews, and other San Diego Water Board compliance assessment activities. Additional changes in the monitoring program provide consistency with the Code of Federal Regulations, USEPA guidance, State Water Board guidance, and the Southern California Monitoring Coalition recommendations.

d. Updated individual Storm Water Management Plans (Individual SWMP or JRMP), and Watershed Stormwater Management Plans (watershed SWMPs or Watershed Workplans), which, together with references in the DAMP, describe the Copermittees' runoff management programs in their entirety, are needed to guide the Copermittees' runoff management efforts and aid the Copermittees in tracking runoff management program implementation. Hereinafter, the individual SWMP is referred to as the JRMPs and the Watershed SWMP is referred to as the Watershed Workplan. It is practicable for the Copermittees to update the

JRMPs and Watershed Workplans within the timeframe specified in this Order, since significant efforts to develop these programs have already occurred.

e. Pollutants can be effectively reduced in storm water runoff by the application of a combination of pollution prevention, source control, and treatment control BMPs. Pollution prevention is the reduction or elimination of pollutant generation at its source and is the best "first line of defense." Source control BMPs (both structural and non-structural) minimize the contact between pollutants and flows (e.g., rerouting run-on around pollutant sources or keeping pollutants on-site and out of receiving waters). Treatment control BMPs remove pollutants that have been mobilized by wet-weather or dry-weather flows.

f. Runoff needs to be addressed during the three major phases of urban development (planning, construction, and use) in order to reduce the discharge of pollutants from storm water to the MEP, effectively prohibit non-storm water discharges and protect receiving waters. Development which is not guided by water quality planning policies and principles can unnecessarily result in increased pollutant load discharges, flow rates, and flow durations which can negatively impact receiving water beneficial uses. Construction sites without adequate BMP implementation result in sediment runoff rates which greatly exceed natural erosion rates of undisturbed lands, causing siltation and impairment of receiving waters. Existing development generates substantial pollutant loads which are discharged in runoff to receiving waters.

g. Annual reporting requirements included in this Order are necessary to meet federal requirements and to evaluate the effectiveness and compliance of the Copermittees' programs.

h. This Order establishes Storm Water Action Levels (SALs) for selected pollutants based on USEPA Rain Zone 6 (arid southwest) Phase I MS4 monitoring data for pollutants in storm water. The SALs were computed as the 90th percentile of the data set, utilizing the statistical based population approach, one of three approaches recommended by the State Water Board's Storm Water Panel in its report, 'The Feasibility of Numerical Effluent Limits Applicable to Discharges of Storm Water Associated with Municipal, Industrial and Construction Activities (June 2006). SALs are identified in Section D of this Order. Copermittees must implement a timely, comprehensive, cost-effective storm water pollution control program to reduce the discharge of pollutants in storm water from the permitted areas so as not to exceed the SALs. Exceedance of SALs may indicate inadequacy of programmatic measures and BMPs required in this Order.

2. Development Planning

a. The Standard Storm Water Mitigation Plan (SSMP) requirements contained in this Order are consistent with Order WQ-2000-11 adopted by the State Water Board on October 5, 2000. In the precedential order, the State Water Board

found that the design standards, which essentially require that runoff generated by 85 percent of storm events from specific development categories be infiltrated or treated, reflect the MEP standard. The order also found that the SSMP requirements are appropriately applied to the majority of the Priority Development Project categories that are also contained in Section F.1 of this Order. The State Water Board also gave California Regional Water Quality Control Boards (Regional Water Boards) the needed discretion to include additional categories and locations, such as retail gasoline outlets (RGOs), in SSMPs.

b. Controlling runoff pollution by using a combination of onsite source control and site design BMPs augmented with treatment control BMPs before the runoff enters the MS4 is important for the following reasons: (1) Many end-of-pipe BMPs (such as diversion to the sanitary sewer) are typically ineffective during significant storm events. (2) Whereas, onsite source control BMPs can be applied during all runoff conditions end-of-pipe BMPs are often incapable of capturing and treating the wide range of pollutants which can be generated on a sub-watershed scale; (3) End-of-pipe BMPs are more effective when used as polishing BMPs, rather than the sole BMP to be implemented; (4) End-of-pipe BMPs do not protect the quality or beneficial uses of receiving waters between the pollutant source and the BMP; and (5) Offsite end-of-pipe BMPs do not aid in the effort to educate the public regarding sources of pollution and their prevention.

c. Use of Low-Impact Development (LID) site design BMPs at new development, redevelopment and retrofit projects can be an effective means for minimizing the impact of storm water runoff discharges from the development projects on receiving waters. LID is a site design strategy with a goal of maintaining or replicating the pre-development hydrologic regime through the use of design techniques. LID site design BMPs help preserve and restore the natural hydrologic cycle of the site, allowing for filtration and infiltration which can greatly reduce the volume, peak flow rate, velocity, and pollutant loads of storm water runoff. Current runoff management, knowledge, practices and technology have resulted in the use of LID BMPs as an acceptable means of meeting the storm water MEP standard.

d. RGOs are significant sources of pollutants in storm water runoff. RGOs are points of convergence for motor vehicles for automotive related services such as repair, refueling, tire inflation, and radiator fill-up and consequently produce significantly higher loadings of hydrocarbons and trace metals (including copper and zinc) than other developed areas.

e. Industrial sites are significant sources of pollutants in runoff. Pollutant concentrations and loads in runoff from industrial sites are similar or exceed pollutant concentrations and loads in runoff from other land uses, such as commercial or residential land uses. As with other land uses, LID site design,

source control, and treatment control BMPs are needed at industrial sites in order to meet the MEP standard. These BMPs are necessary where the industrial site is larger than 10,000 square feet. The 10,000 square feet threshold is appropriate, since it is consistent with requirements in other Phase I NPDES storm water regulations throughout California.

f. If not properly designed or maintained, certain BMPs implemented or required by municipalities for runoff management may create a habitat for vectors (e.g. mosquitoes and rodents). Proper BMP design and maintenance to avoid standing water, however, can prevent the creation of vector habitat. Nuisances and public health impacts resulting from vector breeding can be prevented with close collaboration and cooperative effort between municipalities, local vector control agencies, and the California Department of Public Health during the development and implementation of runoff management programs.

g. The increased volume, velocity, frequency and discharge duration of storm water runoff from developed areas has the potential to greatly accelerate downstream erosion, impair stream habitat in natural drainages, and negatively impact beneficial uses. Development and urbanization increase pollutant loads in storm water runoff and the volume of storm water runoff. Impervious surfaces can neither absorb water nor remove pollutants and thus lose the purification and infiltration provided by natural vegetated soil. Hydromodification measures for discharges to hardened channels are needed for the future restoration of the hardened channels to their natural state, thereby restoring the chemical, physical, and biological integrity and beneficial uses of local receiving waters.

3. Construction and Existing Development

a. In accordance with federal NPDES regulations and to ensure the most effective oversight of industrial and construction site discharges, discharges of runoff from industrial and construction sites are subject to dual (State and local) storm water regulation. Under this dual system, each Copermittee is responsible for enforcing its local permits, plans, and ordinances, and the San Diego Water Board is responsible for enforcing the General Construction Activities Storm Water Permit, State Water Board Order 2009-0009-DWQ, NPDES No. CAS000002 (General Construction Permit) and the General Industrial Activities Storm Water Permit, State Water Board Order 97-03 DWQ, NPDES No. CAS000001 (General Industrial Permit) and any reissuance of these permits. NPDES municipal regulations require that municipalities develop and implement measures to address runoff from industrial and construction activities. Those measures may include the implementation of other BMPs in addition to those BMPs that are required under the statewide general permits for activities subject to both State and local regulation.

b. Identification of sources of pollutants in runoff (such as municipal areas and activities, industrial and commercial sites/sources, construction sites, and residential areas), development and implementation of BMPs to address those sources, and updating ordinances and approval processes are necessary for the Copermittees to ensure that discharges of pollutants from its MS4 in storm water are reduced to the MEP and that non-storm water discharges are not occurring. Inspections and other compliance verification methods are needed to ensure minimum BMPs are implemented. Inspections are especially important at areas that are at high risk for pollutant discharges.

c. Historic and current development makes use of natural drainage patterns and features as conveyances for runoff. Urban streams used in this manner are part of the municipalities' MS4s regardless of whether they are natural, anthropogenic, or partially modified features. In these cases, the urban stream is both an MS4 and receiving water.

d. As operators of the MS4s, the Copermittees cannot passively receive and discharge pollutants from third parties. By providing free and open access to an MS4 that conveys discharges to waters of the U.S., the operator essentially accepts responsibility for discharges into the MS4 that it does not prohibit or otherwise control. These discharges may cause or contribute to a condition of contamination or a violation of water quality standards.

e. Waste and pollutants which are deposited and accumulate in MS4 drainage structures will be discharged from these structures to waters of the U.S. unless they are removed. These discharges may cause or contribute to, or threaten to cause or contribute to, a condition of pollution in receiving waters. For this reason, pollutant discharges from storm water into MS4s must be reduced using a combination of management measures, including source control and an effective MS4 maintenance program implemented by each Copermittee.

f. Enforcement of local runoff related ordinances, permits, and plans is an essential component of every runoff management program and is specifically required in the federal storm water regulations and this Order. Each Copermittee is individually responsible for adoption and enforcement of ordinances and/or policies, implementation of identified control measures/BMPs needed to prevent or reduce pollutants in storm water runoff, and for the allocation of funds for the capital, operation and maintenance, administrative, and enforcement expenditures necessary to implement and enforce such control measures/BMPs under its jurisdiction. Education is an important aspect of every effective runoff management program and the basis for changes in behavior at a societal level. Education of municipal planning, inspection, and maintenance department staffs is especially critical to ensure that in-house staffs understand how their activities impact water quality, how to accomplish their jobs while protecting water quality, and understand their specific roles and responsibilities for compliance with this

Order. Public education, designed to target various urban land users and other audiences, is also essential to inform the public of how individual actions affect receiving water quality and how adverse effects can be minimized.

g. Public participation during the development of runoff management programs is necessary to ensure that all stakeholder interests and a variety of creative solutions are considered.

h. Retrofitting existing development with storm water treatment controls, including LID, is necessary to address storm water discharges from existing development that may cause or contribute to a condition of pollution or a violation of water quality standards. Although SSMP BMPs are required for redevelopment, the current rate of redevelopment will not address water quality problems in a timely manner. Cooperation with private landowners is necessary to effectively identify, implement and maintain retrofit projects for the preservation, restoration, and enhancement of water quality.

4. Watershed Runoff Management

a. Since runoff within a watershed can flow from and through multiple land uses and political jurisdictions, watershed-based runoff management can greatly enhance the protection of receiving waters. Such management provides a means to focus on the most important water quality problems in each watershed. By focusing on the most important water quality problems, watershed efforts can maximize protection of beneficial use in an efficient manner. Effective watershed-based runoff management actively reduces pollutant discharges and abates pollutant sources causing or contributing to watershed water quality problems. Watershed-based runoff management that does not actively reduce pollutant discharges and abate pollutant sources causing or contributing to watershed water quality problems can necessitate implementation of the iterative process outlined in section A.3 of this Order. Watershed management of runoff does not require Copermittees to expend resources outside of their jurisdictions. In some cases, however, this added flexibility provides more, and possibly more effective, alternatives for minimizing waste discharges. Watershed management requires the Copermittees within a watershed to develop a watershed-based management strategy, which can then be implemented on a jurisdictional basis.

b. Some runoff issues, such as general education and training, can be effectively addressed on a regional basis. Regional approaches to runoff management can improve program consistency and promote sharing of resources, which can result in implementation of more efficient programs.

c. It is important for the Copermittees to coordinate their water quality protection and land use planning activities to achieve the greatest protection of receiving water bodies. Copermittee coordination with other watershed stakeholders, especially the State of California Department of Transportation, the U.S. federal government, sovereign American Indian tribes, and water and sewer districts, is also important.

E. STATUTE AND REGULATORY CONSIDERATIONS

1. The RWL language specified in this Order is consistent with language recommended by the USEPA and established in State Water Board Order WQ-99-05, *Own Motion Review of the Petition of Environmental Health Coalition to Review Waste Discharge Requirements Order No. 96-03, NPDES Permit No. CAS0108740*, adopted by the State Water Board on June 17, 1999. The RWL language in this Order requires compliance with water quality standards, which for storm water discharges is to be achieved through an iterative approach requiring the implementation of improved and better-tailored BMPs over time. Compliance with receiving water limits based on applicable water quality standards is necessary to ensure that MS4 discharges will not cause or contribute to violations of water quality standards and the creation of conditions of pollution, contamination, or nuisance.

2. The Basin Plan, identifies the following existing and potential beneficial uses for surface waters in Riverside County: Municipal and Domestic Supply (MUN), Agricultural Supply (AGR), Industrial Process Supply (PROC), Hydropower Generation (POW), Industrial Service Supply (IND), Ground Water Recharge (GWR), Contact Water Recreation (REC1), Non-contact Water Recreation (REC2), Warm Freshwater Habitat (WARM), Cold Freshwater Habitat (COLD), Wildlife Habitat (WILD), Rare, Threatened, or Endangered Species (RARE), Spawning, Reproduction and/or Early Development (SPWN) and Preservation of Biological Habitats of Special Significance (BIOL).

3. This Order is in conformance with State Water Board Resolution No. 68-16, *Statement of Policy with Respect to Maintaining High Quality Waters in California*, and the federal Antidegradation Policy described in 40 CFR 131.12.

4. Section 6217(g) of the Coastal Zone Act Reauthorization Amendments of 1990 (CZARA) requires coastal states with approved coastal zone management programs to address non-point pollution impacting or threatening coastal water quality. CZARA addresses five sources of non-point pollution: agriculture, silviculture, urban, marinas, and hydromodification. This NPDES permit addresses the management measures required for the urban category, with the exception of septic systems. The adoption and implementation of this NPDES permit relieves the Copermittee from developing a non-point source plan, for the urban category, under CZARA. The San Diego Water Board addresses septic systems through the administration of other programs.

5. Section 303(d)(1)(A) of the CWA requires that "Each state shall identify those waters within its boundaries for which the effluent limitations…are not stringent enough to implement any water quality standard (WQS) applicable to such waters." The CWA also requires states to establish a priority ranking of impaired water bodies known as Water Quality Limited Segments and to establish Total Maximum Daily Loads (TMDLs) for such waters. This priority list of impaired water bodies is called the Section 303(d) List. The 2006 Section 303(d) List was approved by the State Water Board on October 25, 2006. On June 28, 2007, the 2006 303(d) List for California was given final approval by the USEPA. The 303(d) List was recently updated, and on December 16, 2009, the 2008 303(d) List was approved by the San Diego Water Board. The 2008 303(d) List for the San Diego Region was approved by the State Water Board on August 4, 2010. The 2008 303(d) List is awaiting USEPA approval.

6. This Order does not constitute an unfunded local government mandate subject to subvention under Article XIIIB, Section (6) of the California Constitution for several reasons, including, but not limited to, the following. First, this Order implements federally mandated requirements under CWA §402. (33 U.S.C. § 1342(p)(3)(B).) Second, the local agency Copermittees' obligations under this Order are similar to, and in many respects less stringent than, the obligations of non-governmental and new dischargers who are issued NPDES permits for storm water and non-storm water discharges. Third, the local agency Copermittees have the authority to levy service charges, fees, or assessments sufficient to pay for compliance with this Order. Fourth, the Copermittees have requested permit coverage in lieu of compliance with the complete prohibition against the discharge of pollutants contained in CWA §301, subdivision (a) (33 U.S.C. § 1311(a)) and in lieu of numeric restrictions on their MS4 discharges (i.e. effluent limitations). Fifth, the local agencies' responsibility for preventing discharges of waste that can create conditions of pollution or nuisance from conveyances that are within their ownership or control under State law predates the enactment of Article XIIIB, Section (6) of the California Constitution. Likewise, the provisions of this Order to implement TMDLs are federal mandates. The CWA requires TMDLs to be developed for water bodies that do not meet federal water quality standards. (33 U.S.C. sec. 1313(d).) Once the USEPA or a state develops a TMDL, federal law requires that permits must contain effluent limitations consistent with the assumptions of any applicable wasteload allocation. (40 C.F.R. sec. 122.44(d)(1)(vii)(B).)

7. Runoff treatment and/or mitigation must occur prior to the discharge of runoff into receiving waters. Treatment BMPs must not be constructed in waters of the U.S. or State unless the runoff flows are sufficiently pretreated to protect the values and functions of the water body. Federal regulations at 40 CFR 131.10(a) state that in no case shall a state adopt waste transport or waste assimilation as a designated use for any waters of the U.S. Authorizing the construction of an runoff treatment facility within a water of the U.S., or using the water body itself as a treatment system or for conveyance to a treatment system, would be tantamount to accepting waste assimilation as an appropriate use for that water body. Furthermore, the

construction, operation, and maintenance of a pollution control facility in a water body can negatively impact the physical, chemical, and biological integrity, as well as the beneficial uses, of the water body. Without federal authorization (e.g., pursuant to CWA § 404), waters of the U.S. may not be converted into, or used as, waste treatment or conveyance facilities. Similarly, waste discharge requirements pursuant to CWC §13260 are required for the conversion or use of waters of the State as waste treatment or conveyance facilities. Diversion from waters of the U.S./State to treatment facilities and subsequent return to waters of the U.S. is allowable, provided that the effluent complies with applicable NPDES requirements.

8. The issuance of waste discharge requirements and an NPDES permit for the discharge of runoff from MS4s to waters of the U.S. is exempt from the requirement for preparation of environmental documents under the California Environmental Quality Act (CEQA) (Public Resources Code, Division 13, Chapter 3, section 21000 et seq.) in accordance with the CWC section 13389.

9. Storm water discharges from developed and developing areas in Riverside County are significant sources of certain pollutants that cause, may be causing, threatening to cause or contributing to water quality impairment in the waters of Riverside County. Furthermore, as delineated in the CWA section 303(d) list in Table 2, the San Diego Water Board has found that there is a reasonable potential that municipal storm water and non-storm water discharges from MS4s cause or may cause or contribute to an excursion above water quality standards for the following pollutants: Indicator Bacteria (including Fecal Coliform and E. Coli), Copper, Manganese, Iron, Chlorpyrifos, Diazinon, Sulfates, Phosphorous, Nitrogen, Total Dissolved Solids (TDS), and Toxicity. In accordance with CWA section 303(d), the San Diego Water Board is required to establish TMDLs for these pollutants to these waters to eliminate impairment and attain water quality standards. Therefore, certain early pollutant control actions and further pollutant impact assessments by the Copermittees are warranted and required pursuant to this Order.

10. This Order requires each Copermittee to effectively prohibit all types of unauthorized discharges of non-storm water into its MS4. However, historically pollutants have been identified as present in dry weather non-storm water discharges from the MS4s through 303(d) listings, monitoring conducted by the Copermittees under Order No. R9-2004-0001, and there are others expected to be present in dry weather non-storm water discharges because of the nature of these discharges. This Order includes action levels for pollutants in non-storm water, dry weather discharges from the MS4. The non-storm water action levels are designed to ensure that the Order's requirement to effectively prohibit all types of unauthorized discharges of non-storm water into the MS4 is being complied with. Non-storm water action levels in the Order are based upon numeric or narrative water quality objectives and criteria as defined in the Basin Plan, the State Water Board's Water Quality Control Plan for Ocean Waters of California (Ocean Plan), and the State Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California (State Implementation Policy or SIP). An exceedance of an action level

requires specified responsive action by the Copermittees. This Order describes what actions the Copermittees must take when an exceedance of an action level is observed. Exceedances of non-storm water action levels do not alone constitute a violation of this Order but could indicate non-compliance with the requirement to effectively prohibit all types of unauthorized non-storm water discharges into the MS4 or other prohibitions established in this Order. Failure to undertake required source investigation and elimination action following an exceedance of a non-storm water action level (NAL or action level) is a violation of this Order. The San Diego Water Board recognizes that use of action levels will not necessarily result in detection of all unauthorized sources of non-storm water discharges because there may be some discharges in which pollutants do not exceed established action levels. However, establishing NALs at levels appropriate to protect water quality standards is expected to lead to the identification of significant sources of pollutants in dry weather non-storm water discharges.

11. In addition to federal regulations cited in the Fact Sheet / Technical Report for the Order No. R9-2010-0016, monitoring and reporting required under Order No. R9-2010-0016 is required pursuant to authority under CWC section 13383.

12. With this Order, the San Diego Water Board has completed the re-issuance of the fourth iteration of the Phase I MS4 NPDES Permits for the Copermittees in the portions of San Diego County, Orange County, and Riverside County within the San Diego Region. The NPDES Permit requirements issued to the Copermittees in each county have substantially the same core requirements such as discharge prohibitions, receiving water limitations, jurisdictional components, and monitoring. In addition, the Copermittees cooperate regionally to develop monitoring with the Southern California Stormwater Monitoring Coalition and to develop program effectiveness with the California Stormwater Quality Association. Regional programs could improve the Copermittees' compliance with other permit components such as development of the Hydromodification Management Plans and Retrofitting Existing Development with more consistent implementation and cost sharing. Re-issuing the NPDES Permit requirements within five years for three counties under three different permits requires the San Diego Water Board to expend significant time and resources for issuance of the permits through three separate public proceedings, thereby greatly reducing the time and resources available to oversee compliance. Multiple permits also create confusion for determining compliance among regulated entities, especially the land development community. The San Diego Water Board recognizes that issuing a single MS4 permit for all Phase I entities in the San Diego Region will provide consistent implementation, improve communication among agencies within watersheds crossing multiple jurisdictions, and minimize staff resources spent with each permit renewal. The San Diego Water Board plans to develop a single regional MS4 permit prior to the expiration of this Order that will transfer the Copermittees' enrollment to the regional permit upon expiration of this Order.

F. PUBLIC PROCESS

1. The San Diego Water Board has notified the Copermittees, all known interested parties, and the public of its intent to consider adoption of an Order prescribing waste discharge requirements that would serve to renew an NPDES permit for the existing MS4 discharges of pollutants in waters of the U.S.

2. The San Diego Water Board has held a public hearing on November 10, 2010 and heard and considered all comments pertaining to the terms and conditions of this Order.

IT IS HEREBY ORDERED that the Copermittees, in order to meet the provisions contained in Division 7 of the CWC and regulations adopted thereunder, and the provisions of the CWA and regulations adopted thereunder, must each comply with the following:

A. PROHIBITIONS AND RECEIVING WATER LIMITATIONS

1. Discharges into and from MS4s in a manner causing, or threatening to cause, a condition of pollution, contamination, or nuisance (as defined in CWC section 13050), in receiving waters of the state are prohibited.[3]

2. Storm water discharges from MS4s containing pollutants which have not been reduced to the MEP are prohibited.[3]

3. Discharges from MS4s that cause or contribute to the violation of water quality standards (designated beneficial uses, water quality objectives developed to protect beneficial uses, and the State policy with respect to maintaining high quality waters) are prohibited.

a. Each Copermittee must comply with section A.3 and section A.4 as it applies to Prohibition 5 in Attachment A of this Order through timely implementation of control measures and other actions to reduce pollutants in storm water discharges in accordance with this Order, including any modifications. If exceedance(s) of water quality standards persist notwithstanding implementation of this Order, the Copermittee must assure compliance with section A.3 and section A.4 as it applies to Prohibition 5 in Attachment A of this Order by complying with the following procedure:

(1) Upon a determination by either the Copermittee or the San Diego Water Board that storm water MS4 discharges are causing or contributing to an exceedance of an applicable water quality standard, the Copermittee must notify the San Diego Water Board within 30 days and thereafter submit a report to the San Diego Water Board that describes best management practices (BMPs) that are currently being implemented and additional BMPs that will be implemented to prevent or reduce any pollutants that are causing or contributing to the exceedance of water quality standards. The report may be incorporated in the Annual Report unless the San Diego Water Board[4] directs an earlier submittal. The report must include an implementation

[3] This prohibition does not apply to MS4 discharges which receive subsequent treatment to reduce pollutants in storm water discharges to the MEP prior to entering receiving waters (e.g., low flow diversions to the sanitary sewer). Runoff treatment and/or mitigation must occur prior to the discharge of runoff into receiving waters per finding E.7.

[4] The San Diego Water Board by prior resolution has delegated all matters that may legally be delegated to its Executive Officer to act on its behalf pursuant to CWC §13223. Therefore, the Executive Officer is authorized to act on the San Diego Water Board's behalf on any matter within this Order unless such delegation is unlawful under CWC §13223 or this Order explicitly states otherwise.

schedule. The San Diego Water Board may require modifications to the report

(2) Submit any modifications to the report required by the San Diego Water Board within 30 days of notification;

(3) Within 30 days following acceptance of the report described above by the San Diego Water Board, the Copermittee must revise its JRMP and monitoring program to incorporate the approved modified BMPs that have been and will be implemented, the implementation schedule, and any additional monitoring required; and

(4) Implement the revised JRMP and monitoring program in accordance with the approved schedule.

b. The Copermittee must repeat the procedure set forth above to comply with the receiving water limitations for continuing or recurring exceedances of the same water quality standard(s) following implementation of scheduled actions unless directed to do otherwise by the San Diego Water Board's Executive Officer.

c. Nothing in section A.3 prevents the San Diego Water Board from enforcing any provision of this Order while the Copermittee prepares and implements the above report.

4. In addition to the above prohibitions, discharges from MS4s are subject to all Basin Plan prohibitions cited in Attachment A to this Order.

B. NON-STORM WATER DISCHARGES

1. Each Copermittee must effectively prohibit all types of non-storm water discharges into its MS4 unless such discharges are either authorized by a separate NPDES permit; or not prohibited in accordance with sections B.2 and B.3 below.

2. The following categories of non-storm water discharges are not prohibited unless a Copermittee or the San Diego Water Board identifies the discharge category as a source of pollutants to waters of the U.S. Where the Copermittee(s) have identified a category as a source of pollutants, the category must be addressed as an illicit discharge and prohibited through ordinance, order or similar means. The San Diego Water Board may identify categories of discharge that either require prohibition, or other controls for non-anthropogenic sources. For a discharge category determined to be a source of pollutants, the Copermittee, under direction of the San Diego Water Board, must either prohibit the discharge category or develop and implement appropriate control measures for non-anthropogenic sources to prevent the discharge of pollutants to the MS4 and report to the San Diego Water Board pursuant to Section K.1 and K.3 of this Order. The discharge categories are:

a. Diverted stream flows;
b. Rising ground waters;
c. Uncontaminated ground water infiltration [as defined at 40 CFR 35.2005(20)] to MS4s;
d. Uncontaminated pumped ground water[5];
e. Foundation drains[5];
f. Springs;
g. Water from crawl space pumps[5];
h. Footing drains[5];
i. Air conditioning condensation;
j. Flows from riparian habitats and wetlands;
k. Water line flushing[6,7];
l. Discharges from potable water sources not subject to NPDES Permit No. CAG679001, other than water main breaks;
m. Individual residential car washing; and
n. Dechlorinated swimming pool discharges[8].

3. Emergency fire fighting flows (i.e., flows necessary for the protection of life or property) do not require BMPs and need not be prohibited.

a. As part of the JRMP, each Copermittee must develop and implement a program to address pollutants from non-emergency fire fighting flows (i.e., flows from controlled or practice blazes and maintenance activities) identified as significant sources of pollutants to waters of the U.S.

b. Building fire suppression system maintenance discharges (e.g. sprinkler line flushing) contain waste. Therefore, such discharges are to be prohibited by the Copermittees as illicit discharges through ordinance, order, or similar means.

4. Each Copermittee must examine all dry weather effluent analytical monitoring results collected in accordance with section F.4 of this Order and Receiving Waters and MS4 Discharge Monitoring and Reporting Program No. R9-2010-0016 to identify water quality problems which may be the result of any non-prohibited discharge category(ies) identified above in section B.2. Follow-up investigations must be conducted to identify and control, pursuant to section B.2, any non-prohibited discharge category(ies) listed above.

[5] Requires enrollment under Order R9-2008-002. Discharges into the MS4 require authorization from the owner and operator of the MS4 system.
[6] This exemption does not include fire suppression sprinkler system maintenance and testing discharges. Those discharges may be regulated under Section B.3.
[7] Requires enrollment under Order R9-2002-0020.
[8] Excluding saline swimming pool discharges.

C. NON-STORM WATER DRY WEATHER ACTION LEVELS

1. Each Copermittee, beginning no later than July 1, 2012, must implement the non-storm water dry weather action level (NAL) monitoring as described in Attachment E of this Order.

2. In response to an exceedance of an NAL, the Copermittee(s) having jurisdiction must investigate and seek to identify the source of the exceedance in a timely manner. However, if any Copermittee identifies a number of NAL exceedances that prevents it from adequately conducting source investigations at all sites in a timely manner, then that Copermittee may submit a prioritization plan and timeline that identifies the timeframe and planned actions to investigate and report its findings on all of the exceedances. Depending on the source of the pollutant exceedance, the Copermittee(s) having jurisdiction must take action as follows:

a. If the Copermittee identifies the source of the exceedance as natural (non-anthropogenically influenced) in origin and in conveyance into the MS4; then the Copermittee must report its findings and documentation of its source investigation to the San Diego Water Board in its Annual Report.

b. If the Copermittee identifies the source of the exceedance as an illicit discharge or connection, then the Copermittee must eliminate the discharge to its MS4 pursuant to Section F.4.f and report the findings, including any enforcement action(s) taken, and documentation of the source investigation to the San Diego Water Board in the Annual Report. If the Copermittee is unable to eliminate the source of discharge prior to the Annual Report submittal, then the Copermittee must submit, as part of its Annual Report, its plan and timeframe to eliminate the source of the exceedance. Those dischargers seeking to continue such a discharge must become subject to a separate NPDES permit prior to continuing any such discharge.

c. If the Copermittee identifies the source of the exceedance as an exempted category of non-storm water discharge, then the Copermittees must determine if this is an isolated circumstance or if the category of discharges must be addressed through the prevention or prohibition of that category of discharge as an illicit discharge. The Copermittee must submit its findings including a description of the steps taken to address the discharge and the category of discharge, to the San Diego Water Board for review in its Annual Report. Such description must include relevant updates to or new ordinances, orders, or other legal means of addressing the category of discharge, and the anticipated schedule for doing so. The Copermittees must also submit a summary of its findings with the Report of Waste Discharge.

d. If the Copermittee identifies the source of the exceedance as a non-storm water discharge in violation or potential violation of an existing separate NPDES permit

(e.g. the groundwater dewatering permit), then the Copermittee must report, within three business days, the findings to the San Diego Water Board including all pertinent information regarding the discharger and discharge characteristics.

e. If the Copermittee is unable to identify the source of the exceedance after taking and documenting reasonable steps to do so, then the Copermittee must perform additional focused sampling. If the results of the additional sampling indicate a recurring exceedance of NALs with an unidentified source, then the Copermittee must update its programs within a year to address the common contributing sources that may be causing such an exceedance. The Copermittee's annual report must include these updates to its programs including, where applicable, updates to their watershed workplans (Section G.2), retrofitting consideration (Section F.3.d) and program effectiveness work plans (Section J.4).

f. The Copermittees, or any interested party, may evaluate existing NALs and propose revised NALs for future Board consideration.

3. NALs can help provide an assessment of the effectiveness of the prohibition of non-storm water discharges and of the appropriateness of exempted non-storm water discharges. An exceedance of an NAL does not alone constitute a violation of the provisions of this Order. An exceedance of an NAL may indicate a lack of compliance with the requirement that Copermittees effectively prohibit all types of unauthorized non-storm water discharges into the MS4 or other prohibitions set forth in Sections A and B of this Order. Failure to timely implement required actions specified in this Order following an exceedance of an NAL constitutes a violation of this Order. Neither the absence of exceedances of NALs nor compliance with required actions following observed exceedances, excuses any non-compliance with the requirement to effectively prohibit all types of unauthorized non-storm water discharges into the MS4s or any non-compliance with the prohibitions in Sections A and B of this Order. During any annual reporting period in which one or more exceedances of NALs have been documented the Copermittee must report in response to Section C.2 above, a description of whether and how the observed exceedances did or did not result in a discharge from the MS4 that caused, or threatened to cause or contribute to a condition of pollution, contamination, or nuisance in the receiving waters.

4. Monitoring of effluent will occur at the end-of-pipe prior to discharge into the receiving waters, with a focus on Major Outfalls, as defined in 40 CFR 122.26(B 5-6) and Attachment E of this Order. The Copermittees must develop their monitoring plans to sample a representative percentage of major outfalls and identified stations within each hydrologic subarea. At a minimum, outfalls that exceed any NALs once during any year must be monitored in the subsequent year. Any station that does not exceed an NAL, or only has exceedances that are identified as natural in origin and conveyance into the MS4 pursuant to Section C.2.a, for 3 successive years may be replaced with a different station.

5. Each Copermittee must monitor for the non-storm water dry weather action levels, which are incorporated into this Order as follows:

Action levels for discharges to inland surface waters:

Table 3.a: General Constituents

Parameter	Units	AMAL	MDAL	Instantaneous Maximum	Basis
Fecal Coliform	MPN/ 100 ml	200[A] 400[B]	-		BPO
Enterococci	MPN/ 100 ml	33	-	61[C]	BPO
Turbidity	NTU	-	20		BPO
pH	Units	Within limit of 6.5 to 8.5 at all times			BPO
Dissolved Oxygen	mg/L	Not less than 5.0 in WARM waters and not less than 6.0 in COLD waters			BPO
Total Nitrogen	mg/L	-	1.0	See MDAL	BPO
Total Phosphorus	mg/L	-	0.1	See MDAL	BPO
Methylene Blue Active Substances	mg/L	-	0.5	See MDAL	BPO
Iron	mg/L	-	0.3	See MDAL	BPO
Manganese	mg/L	-	0.05	See MDAL	BPO

A – Based on a minimum of not less than five samples for any 30-day period
B – No more than 10 percent of total samples may exceed 400 per 100 ml during any 30 day period
C – This Value has been set to Basin Plan Criteria for Designated Beach Areas
BPO – Basin Plan Objective
MDAL – Maximum Daily Action Level
AMAL – Average Monthly Action Level

Table 3.b: Priority Pollutants

		Freshwater (CTR)	
Parameter	Units	MDAL	AMAL
Cadmium	ug/L	**	**
Copper	ug/L	*	*
Chromium III	ug/L	**	**
Chromium VI (hexavalent)	ug/L	16	8.1
Lead	ug/L	*	*
Nickel	ug/L	**	**
Silver	ug/L	*	*
Zinc	ug/L	*	*

CTR – California Toxic Rule
*- Action Levels developed on a case-by-case basis (see below)
**- Action Levels developed on a case-by-case basis (see below), but calculated criteria are not to exceed Maximum Contaminant Levels under the California Code of Regulations[9]

[9] California Code of Regulations, Title 22, Division 4, Chapter 15, Article 4, Section 64431.

The NALs for Cadmium, Copper, Chromium (III), Lead, Nickel, Silver and Zinc will be developed on a case-by-case basis because the freshwater criteria are based on site-specific water quality data (receiving water hardness). For these priority pollutants, the following equations (40 CFR 131.38.b.2) will be required:

Cadmium (Total Recoverable) = exp(0.7852[ln(hardness)] -2.715)
Chromium III (Total Recoverable) = exp(0.8190[ln(hardness)] + .6848)
Copper (Total Recoverable) = exp(0.8545[ln(hardness)] - 1.702)
Lead (Total Recoverable) = exp(1.273[ln(hardness)] - 4.705)
Nickel (Total Recoverable) = exp(.8460[ln(hardness)] + 0.0584)
Silver (Total Recoverable) = exp(1.72[ln(hardness)] - 6.52)
Zinc (Total Recoverable) = exp(0.8473[ln(hardness)] + 0.884)

D. STORM WATER ACTION LEVELS

1. The Copermittees must implement the Wet Weather MS4 Discharge Monitoring as described in Attachment E of this Order, and beginning three years after the Order adoption date, the Copermittees must annually evaluate their data compared to the Stormwater Action Levels (SALs). At each monitoring station, a running average of twenty percent or greater of exceedances of any discharge of storm water from the MS4 to waters of the U.S. that exceed the SALs for each of the pollutants listed in Table 4 (below) requires the Copermittee(s) having jurisdiction to affirmatively augment and implement all necessary storm water controls and measures to reduce the discharge of the associated class of pollutants(s) to the MEP. The Copermittees must utilize the exceedance information when adjusting and executing annual work plans, as required by this Order. Copermittees must take the magnitude, frequency, and number of constituents exceeding the SAL(s), in addition to receiving water quality data and other information, into consideration when prioritizing and reacting to SAL exceedances in an iterative manner. Failure to appropriately consider and react to SAL exceedances in an iterative manner creates a presumption that the Copermittee(s) have not reduced pollutants in storm water discharges to the MEP.

Table 4. Storm Water Action Levels

Pollutant	Action Level
Turbidity (NTU)	126
Nitrate & Nitrite total (mg/L)	2.6
P total (mg/L)	1.46
Cd total (µg/L)	3.0
Cu total (µg/L)	127
Pb total (µg/L)	250
Zn total (µg/L)	976

2. The end-of-pipe assessment points for the determination of SAL compliance are major outfalls, as defined in 40 CFR 122.26(b)(5) and (b)(6) and Attachment E of this Order. The Copermittees must develop their monitoring plans to sample a representative percentage of the major outfalls within each hydrologic subarea. At a minimum, outfalls that exceed SALs must be monitored in the subsequent year. Any station that does not exceed an SAL for 3 successive years may be replaced with a different station. SAL samples must be 24 hour time-weighted composites.

3. The absence of SAL exceedances does not relieve the Copermittees from implementing all other required elements of this Order.

4. This Order does not regulate natural sources and conveyances into the MS4 of constituents listed in Table 5. To be relieved of the requirements to take action as described in D.1 above, the Copermittee must demonstrate that the likely and expected cause of the SAL exceedance is not anthropogenic in nature. This demonstration does not need to be repeated for subsequent exceedances of the same SAL at the same monitoring station.

5. The SALs will be reviewed and updated at the end of every permit cycle. The data collected pursuant to D.2 above and Attachment E can be used to create SALs based upon local data. The purpose of establishing the SALs is that through the iterative and MEP process, outfall storm water discharges will meet all applicable water quality standards.

E. LEGAL AUTHORITY

1. Each Copermittee must establish, maintain, and enforce adequate legal authority within its jurisdiction to control pollutant discharges into and from its MS4 through ordinance, statute, permit, contract or similar means. Nothing herein shall authorize a Copermittee or other discharger regulated under the terms of this order to divert, store or otherwise impound water if such action is reasonably anticipated to harm downstream water rights holders in the exercise of their water rights. This legal authority must, at a minimum, authorize the Copermittee to:

a. Control the contribution of pollutants in discharges of runoff associated with industrial and construction activity to its MS4 and control the quality of runoff from industrial and construction sites. This requirement applies both to industrial and construction sites which have coverage under the statewide general industrial or construction storm water permits, as well as to those sites which do not. Grading ordinances must be updated and enforced as necessary to comply with this Order;
b. Prohibit all identified illicit discharges not otherwise allowed pursuant to section B.2;
c. Prohibit and eliminate illicit connections to the MS4;

d. Control the discharge of spills, dumping, or disposal of materials other than storm water to its MS4;
e. Require compliance with conditions in Copermittee ordinances, permits, contracts or orders (i.e., hold dischargers to its MS4 accountable for their contributions of pollutants and flows);
f. Utilize enforcement mechanisms to require compliance with Copermittee storm water ordinances, permits, contracts, or orders;
g. Control the contribution of pollutants from one portion of the shared MS4 to another portion of the MS4 through interagency agreements among Copermittees;
h. Control of the contribution of pollutants from one portion of the shared MS4 to another portion of the MS4 through interagency agreements with other owners of the MS4 such as the State of California Department of Transportation, the U.S. federal government, or sovereign Native American Tribes is encouraged;
i. Carry out all inspections, surveillance, and monitoring necessary to determine compliance and noncompliance with local ordinances and permits and with this Order, including the prohibition on illicit discharges to the MS4. This means the Copermittee must have authority to enter, monitor, inspect, take measurements, review and copy records, and require regular reports from industrial facilities discharging into its MS4, including construction sites;
j. Require the use of BMPs to prevent or reduce the discharge of pollutants into MS4s from storm water to the MEP; and
k. Require documentation on the effectiveness of BMPs implemented to reduce the discharge of storm water pollutants to the MS4 to the MEP.

2. Each Copermittee must submit on or before June 30, 2012, a statement certified by its chief legal counsel that the Copermittee has taken the necessary steps to obtain and maintain full legal authority within its jurisdiction to implement and enforce each of the requirements contained in 40 CFR 122.26(d)(2)(i)(A-F) and this Order. These statements must include:

a. Citation of runoff related ordinances and the reasons they are enforceable;
b. Identification of the local administrative and legal procedures available to mandate compliance with runoff related ordinances and therefore with the conditions of this Order, and a statement as to whether enforcement actions can be completed administratively or whether they must be commenced and completed in the judicial system; and
c. A brief description of how runoff related ordinances are adopted and the process by which they may be challenged.

F. JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM (JRMP)

Each Copermittee must implement all requirements of section F of this Order no later than July 1, 2012, unless otherwise specified. Upon adoption of this Order and until an updated JRMP is developed and implemented or July 1, 2012, whichever occurs first, each Copermittee must at a minimum implement its JRMP document, as the document was developed and amended to comply with the requirements of Order No. R9-2004-001.

Each Copermittee must develop and implement an updated JRMP for its jurisdiction no later than July 1, 2012. Each updated JRMP must meet the requirements of section F of this Order, reduce the discharge of storm water pollutants from the MS4 to the MEP, effectively prohibit non-storm water discharges, and prevent runoff discharges from the MS4 from causing or contributing to a violation of water quality standards. In addition, each Copermittee's JRMP must identify all departments and positions within its jurisdiction that conduct runoff related activities, and their roles and responsibilities under this Order. This identification must include an up to date organizational chart specifying these departments and key personnel.

1. DEVELOPMENT PLANNING COMPONENT

Each Copermittee must implement a program which meets the requirements of this section and (1) reduces Development Project discharges of storm water pollutants from the MS4 to the MEP; (2) prevents Development Project discharges from the MS4 from causing or contributing to a violation of water quality standards; (3) prevents illicit discharges into the MS4; and (4) manages increases in runoff discharge rates and durations from Development Projects that are likely to cause increased erosion of stream beds and banks, silt pollutant generation, or other impacts to beneficial uses and stream habitat due to increased erosive force.

a. GENERAL PLAN

Each Copermittee must revise as needed its General Plan or equivalent plan (e.g., Comprehensive, Master, or Community Plan) to include water quality and watershed protection principles and policies that direct land-use decisions and require implementation of consistent water quality protection measures for all development, redevelopment, and retrofit projects. Examples of water quality and watershed protection principles and policies to be considered include the following:

(1) Minimize the amount of impervious surfaces and directly connected impervious surfaces in areas of new development and redevelopment and where feasible slow runoff and maximize on-site infiltration of runoff.

(2) Implement pollution prevention methods supplemented by pollutant source controls and treatment BMPs. Use small collection strategies located at, or as close as possible to, the source (i.e., the point where water initially meets the ground) to minimize the transport of urban runoff and pollutants offsite and into an MS4.

(3) Preserve, and where possible, create, or restore areas that provide important water quality benefits, such as riparian corridors, wetlands, and buffer zones. Encourage land acquisition of such areas.

(4) Limit disturbances of natural water bodies and natural drainage systems caused by development including roads, highways, and bridges.

(5) Prior to making land use decisions, utilize methods available to estimate increases in pollutant loads and flows resulting from projected future development. Require incorporation of BMPs to mitigate the projected increases in pollutant loads and flows.

(6) Avoid development of areas that are particularly susceptible to erosion and sediment loss; or establish development guidance that identifies these areas and protects them from erosion and sediment loss.

(7) Reduce pollutants associated with vehicles and increasing traffic resulting from development.

(8) Post-development runoff from a site must not contain pollutant loads that cause or contribute to an exceedance of receiving water quality objectives and which have not been reduced to the MEP.

b. **ENVIRONMENTAL REVIEW PROCESS**

Each Copermittee must revise as needed its current environmental review processes to accurately evaluate water quality impacts and cumulative impacts and identify appropriate measures to avoid, minimize, and mitigate those impacts for all Development Projects.

c. **APPROVAL PROCESS CRITERIA AND REQUIREMENTS FOR ALL DEVELOPMENT PROJECTS**

For all proposed Development Projects, each Copermittee, during the planning process, and prior to project approval and issuance of local permits, must prescribe the necessary requirements so that Development Project discharges of storm water pollutants from the MS4 will be reduced to the MEP, will not cause or

contribute to a violation of water quality standards, and will comply with the Copermittee's ordinances, permits, plans, and requirements, and with this Order.

Performance Criteria: Discharges from each approved development project must be subject to the following management measures:

(1) Source control BMPs that reduce storm water pollutants of concern in runoff; prevent illicit discharges into the MS4; prevent irrigation runoff; storm drain system stenciling or signage; properly design outdoor material storage areas; properly design outdoor work areas; and properly design trash storage areas.

(2) The following LID BMPs listed below must be implemented at all Development Projects where applicable and feasible.

(a) Conserve natural areas, including existing trees, other vegetation, and soils;
(b) Construct streets, sidewalks, or parking lot aisles to the minimum widths necessary, provided that public safety is not compromised;
(c) Minimize the impervious footprint of the project;
(d) Minimize soil compaction to landscaped areas;
(e) Minimize disturbances to natural drainages (e.g., natural swales, topographic depressions, etc.); and
(f) Disconnect impervious surfaces through distributed pervious areas.

(3) Buffer zones for natural water bodies, where technically feasible. Where buffer zones are technically infeasible, require project proponent to implement other buffers such as trees, access restrictions, etc.

(4) Other measures necessary so that grading or other construction activities meet the provisions specified in section F.2 of this Order.

(5) Submittal of documentation of a mechanism under which ongoing long-term maintenance of all structural post-construction BMPs will be conducted.

(6) Infiltration and Groundwater Protection

To protect groundwater quality, each Copermittee must apply restrictions to the use of treatment control BMPs that are designed to primarily function as large, centralized infiltration devices (such as large infiltration trenches and infiltration basins). Such restrictions must be designed so that the use of such infiltration treatment control BMPs does not cause or contribute to an exceedance of groundwater quality objectives. At a minimum, each treatment control BMP designed to primarily function as a centralized infiltration device must meet the restrictions below, unless the Development Project demonstrates to the Copermittee that a restriction is not necessary to protect groundwater quality. The Copermittees may collectively or individually

develop alternative restrictions on the use of treatment control BMPs which are designed to primarily function as centralized infiltration devices. Alternative restrictions developed by the Copermittees can partially or wholly replace the restrictions listed below. The restrictions do not apply to small infiltration systems dispersed throughout a development project.

(a) Runoff must undergo pretreatment such as sedimentation or filtration prior to infiltration;

(b) All dry weather flows containing significant pollutant loads must be diverted from infiltration devices and treated through other BMPs;

(c) Pollution prevention and source control BMPs must be implemented at a level appropriate to protect groundwater quality at sites where infiltration treatment control BMPs are to be used;

(d) Infiltration treatment control BMPs must be adequately maintained so that they remove storm water pollutants to the MEP;

(e) The vertical distance from the base of any infiltration treatment control BMP to the seasonal high groundwater mark must be at least 10 feet. Where groundwater basins do not support beneficial uses, this vertical distance criteria may be reduced, provided groundwater quality is maintained;

(f) The soil through which infiltration is to occur must have physical and chemical characteristics (such as appropriate cation exchange capacity, organic content, clay content, and infiltration rate) which are adequate for proper infiltration durations and treatment of runoff for the protection of groundwater beneficial uses;

(g) Infiltration treatment control BMPs must not be used for areas of industrial or light industrial activity; and other high threat to water quality land uses and activities as designated by each Copermittee unless first treated or filtered to remove pollutants prior to infiltration; and

(h) Infiltration treatment control BMPs must be located a minimum of 100 feet horizontally from any water supply wells.

(7) Where feasible, landscaping with native or low water species shall be preferred in areas that drain to the MS4 or to waters of the U.S.

(8) Rain water harvesting and water reuse, where feasible, must be encouraged as part of the site design and construction to reduce pollutants in storm water discharges to the MEP.

d. **STANDARD STORM WATER MITIGATION PLANS (SSMPS) – APPROVAL PROCESS CRITERIA AND REQUIREMENTS FOR PRIORITY DEVELOPMENT PROJECTS**

On or before June 30, 2012, the Copermittees must submit an updated SSMP, to the San Diego Water Board's Executive Officer for a 30 day public review and comment period. The San Diego Water Board's Executive Officer has the discretion to determine whether to hold a public hearing or to limit public input to written comments. Within 180 days of determination that the SSMP is in compliance with this Order's provisions, each Copermittee must amend its local ordinances consistent with the updated SSMP, and begin implementing the updated SSMP. Any updated local ordinances must be submitted to the San Diego Water Board with the Annual Report. The SSMP must meet the requirements of section F.1.d of this Order to (1) reduce Priority Development Project discharges of storm water pollutants from the MS4 to the MEP, and (2) prevent Priority Development Project runoff discharges from the MS4 from causing or contributing to a violation of water quality standards.[10]

(1) Definition of Priority Development Project:

Priority Development Projects are:

(a) All new Development Projects that fall under the project categories or locations listed in section F.1.d.(2), and

(b) Those redevelopment projects that create, add, or replace at least 5,000 square feet of impervious surfaces on an already developed site and the existing development and/or the redevelopment project falls under the project categories or locations listed in section F.1.d.(2). Where redevelopment results in an increase of less than fifty percent of the impervious surfaces of a previously existing development, and the existing development was not subject to SSMP requirements, the numeric sizing criteria discussed in section F.1.d.(6) applies only to the addition or replacement, and not to the entire development. Where redevelopment

[10] Updated SSMP and hydromodification requirements must apply to all priority projects or phases of priority projects which have not yet begun grading or construction activities at the time any updated SSMP or hydromodification requirement commences. If lawful prior approval of a project exists, whereby application of an updated SSMP or hydromodification requirement to the project is illegal, the updated SSMP or hydromodification requirement need not apply to the project. Updated Development Planning requirements set forth in Sections F.1. (a) through (h) of this Order must apply to all projects or phases of projects, unless, at the time any updated Development Planning requirement commences, the projects or project phases meet any one of the following conditions: (i) the project or phase has begun grading or construction activities; or (ii) a Copermittee determines that lawful prior approval rights for a project or project phase exist, whereby application of the Updated Development Planning requirement to the project is legally infeasible. Where feasible, the Permittees must utilize the SSMP and hydromodification update periods to ensure that projects undergoing approval processes include application of the updated SSMP and hydromodification requirements in its plans.

results in an increase of more than fifty percent of the impervious surfaces of a previously existing development, the numeric sizing criteria applies to the entire development.

(c) One acre threshold: In addition to the Priority Development Project Categories identified in section F.1.d.(2), Priority Development Projects must also include all other post-construction pollutant-generating new Development Projects that result in the disturbance of one acre or more of land by July 1, 2012.[11]

(2) Priority Development Project Categories

Where a new Development Project feature, such as a parking lot, falls into a Priority Development Project Category, the entire project footprint is subject to SSMP requirements.

(a) New development projects that create 10,000 square feet or more of impervious surfaces (collectively over the entire project site) including commercial, industrial, residential, mixed-use, and public projects. This category includes development projects on public or private land which fall under the planning and building authority of the Copermittees.

(b) Automotive repair shops. This category is defined as a facility that is categorized in any one of the following Standard Industrial Classification (SIC) codes: 5013, 5014, 5541, 7532-7534, or 7536-7539.

(c) Restaurants. This category is defined as a facility that sells prepared foods and drinks for consumption, including stationary lunch counters and refreshment stands selling prepared foods and drinks for immediate consumption (SIC code 5812), where the land area for development is greater than 5,000 square feet. Restaurants where land development is less than 5,000 square feet must meet all SSMP requirements except for structural treatment BMP and numeric sizing criteria requirement F.1.d.(6) and hydromodification requirement F.1.h.

(d) All hillside development greater than 5,000 square feet. This category is defined as any development which creates 5,000 square feet of impervious surface which is located in an area with known erosive soil conditions, where the development will grade on any natural slope that is twenty-five percent or greater.

(e) Environmentally Sensitive Areas (ESAs). All development located within, or directly adjacent to, or discharging directly to an ESA (where

[11] Pollutant generating Development Projects are those projects that generate pollutants at levels greater than natural background levels.

discharges from the development or redevelopment will enter receiving waters within the ESA), which either creates 2,500 square feet of impervious surface on a proposed project site or increases the area of imperviousness of a proposed project site to 10 percent or more of its naturally occurring condition. "Directly adjacent" means situated within 200 feet of the ESA. "Discharging directly to" means outflow from a drainage conveyance system that is composed entirely of flows from the subject development or redevelopment site, and not commingled with flows from adjacent lands.

(f) Impervious parking lots 5,000 square feet or more and potentially exposed to runoff. Parking lot is defined as a land area or facility for the temporary parking or storage of motor vehicles used personally, for business, or for commerce.

(g) Street, roads, highways, and freeways. This category includes any paved impervious surface that is 5,000 square feet or greater used for the transportation of automobiles, trucks, motorcycles, and other vehicles. To the extent that the Copermittees develop revised standard roadway design and post-construction BMP guidance that comply with the provisions of Section F.1 of the Order, then public works projects that implement the revised standard roadway sections do not have to develop a project specific SSMP. The standard roadway design and post-construction BMP guidance must be submitted with the Copermittee's updated SSMP.

(h) Retail Gasoline Outlets (RGOs). This category includes RGOs that meet the following criteria: (a) 5,000 square feet or more or (b) a projected Average Daily Traffic (ADT) of 100 or more vehicles per day.

(3) Pollutants of Concern

As part of its local SSMP, each Copermittee must implement an updated procedure for identifying pollutants of concern for each Priority Development Project. The procedure must address, at a minimum: (1) Receiving water quality (including pollutants for which receiving waters are listed as impaired under CWA section 303(d)); (2) Land-use type of the Development Project and pollutants associated with that land use type; and (3) Pollutants expected to be present on site.

(4) Low Impact Development BMP Requirements

Each Copermittee must require each Priority Development Project to implement LID BMPs which will collectively minimize directly connected impervious areas, limit loss of existing infiltration capacity, and protect areas that provide important water quality benefits necessary to maintain riparian and aquatic biota, and/or are particularly susceptible to erosion and sediment loss.

(a) The Copermittees must take the following measures to ensure that LID BMPs are implemented at Priority Development Projects:

(i) Each Copermittee must require LID BMPs or make a finding of technical infeasibility for each Priority Development Project in accordance with the LID waiver program in Section F.1.d.(7);

(ii) Each Copermittee must incorporate formalized consideration, such as thorough checklists, ordinances, and/or other means, of LID BMPs into the plan review process for Priority Development Projects; and

(iii) On or before July 1, 2012, each Copermittee must review its local codes, policies, and ordinances and identify barriers therein to implementation of LID BMPs. Following the identification of these barriers to LID implementation, where feasible, the Copermittee must take, by the end of the permit cycle, appropriate actions to remove such barriers. The Copermittees must include this review with the updated JRMP.

(b) The following LID BMPs must be implemented at each Priority Development Project:

(i) Maintain or restore natural storage reservoirs and drainage corridors (including depressions, areas of permeable soils, swales, and ephemeral and intermittent streams) to the extent feasible[12].

(ii) Projects with landscaped or other pervious areas must, where feasible, properly design and construct the pervious areas to effectively receive and infiltrate, retain and/or treat runoff from impervious areas, prior to discharge to the MS4. Soil compaction for these areas must be minimized. The amount of the impervious areas that are to drain to pervious areas must be based upon the total size, soil conditions, slope, and other pertinent factors.

(iii) Projects with low traffic areas and appropriate soil conditions must be constructed with permeable surfaces.

[12] Priority Development Projects proposing to dredge or fill materials in waters of the U.S. must obtain a CWA Section 401 Water Quality Certification. Priority Development Projects proposing to dredge or fill waters of the State must obtain Waste Discharge Requirements.

(c) LID BMPs sizing criteria:

(i) LID BMPs must be sized and designed to ensure onsite retention without runoff, of the volume of runoff produced from a 24-hour 85th percentile storm event[13] ("design capture volume");

(ii) If onsite retention[14] LID BMPs are technically infeasible per section F.1.d.(7)(b), other LID BMPs may treat any volume that is not retained onsite provided that the total volume of the other LID BMPs, including pore spaces and pre-filter detention volume, are sized to hold at least 0.75 times the portion of the design capture volume that is not retained onsite. The LID BMPs must be designed for an appropriate surface loading rate to prevent erosion, scour and channeling within the BMP.

(d) If it is shown to be technically infeasible per Section F.1.d.(7)(b) to retain and/or treat the remaining volume up to and including the design capture volume using LID BMPs, then the project must implement conventional treatment control BMPs in accordance with Section F.1.d.(6) below and must participate in the LID waiver program in Section F.1.d.(7).

(e) All LID BMPs must be designed and implemented with measures to avoid the creation of nuisance or pollution associated with vectors, such as mosquitoes, rodents, and flies.

(5) Source Control BMP Requirements

Each Copermittee must require each Priority Development Project to implement applicable source control BMPs. The source control BMPs to be required must:

(a) Prevent illicit discharges into the MS4;
(b) Minimize storm water pollutants of concern in runoff;
(c) Eliminate irrigation runoff;

[13] This volume is not a single volume to be applied to all of Riverside County. The size of the 85th percentile storm event is different for various parts of the County. The Copermittees are encouraged to calculate the 85th percentile storm event for each of its jurisdictions using local rain data pertinent to its particular jurisdiction (0.6 inch standard is a rough average for the County and should only be used where appropriate rain data is not available). In addition, isopluvial maps may be used to extrapolate rainfall data to areas where insufficient data exists in order to determine the volume of the local 85th percentile storm event in such areas. Where the Copermittees will use isopluvial maps to determine the 85th percentile storm event in areas lacking rain data, the Copermittees must describe their method for using isopluvial maps in its SSMPs.

[14] Infiltration LID BMPs are the preferred method for onsite retention, but does not preclude the use and implementation of all other retention LID BMPs (e.g. evapotranspiration, evaporation, and/or harvest), where technically feasible, prior to considering biofiltration LID BMPs for treatment of the design capture volume that is not otherwise retained onsite.

(d) Include storm drain system stenciling or signage;
(e) Include properly designed outdoor material storage areas;
(f) Include properly designed outdoor work areas;
(g) Include properly designed trash storage areas; and
(h) Include water quality protection requirements applicable to individual priority project categories.

(6) Treatment Control BMP Requirements

Each Copermittee must require each Priority Development Project that meets the Copermittee's technical infeasibility criteria in Section F.1.d(7) below, to implement conventional treatment control BMPs to treat the portion of the "design capture volume" that was not treated by LID BMPs per Section F.1.d(4) above. Conventional treatment control BMPs must meet the following requirements:

(a) All treatment control BMPs for a single Priority Development Project must collectively be sized to comply with the following numeric sizing criteria:

(i) Volume-based treatment control BMPs must be designed to mitigate (infiltrate, filter, or treat) the remaining portion of the design capture volume that was not retained and/or treated with LID BMPs; or

(ii) Flow-based treatment control BMPs must be designed to mitigate (filter, or treat) either: a) the maximum flow rate of runoff produced from a rainfall intensity of 0.2 inch of rainfall per hour, for each hour of a storm event; or b) the maximum flow rate of runoff produced by the 85th percentile hourly rainfall intensity (for each hour of a storm event), as determined from the local historical rainfall record, multiplied by a factor of two.

(b) All treatment control BMPs for Priority Development Projects must, at a minimum:

(i) Be ranked with high or medium pollutant removal efficiency for the project's most significant pollutants of concern, as the pollutant removal efficiencies are identified in the Copermittees' SSMP. Treatment control BMPs with a low removal efficiency ranking must only be approved by a Copermittee when a feasibility analysis has been conducted which exhibits that implementation of treatment control BMPs with high or medium removal efficiency rankings are infeasible for a Priority Development Project or portion of a Priority Development Project.
(ii) Be correctly sized and designed so as to remove storm water pollutants to the MEP.

(c) Target removal of pollutants of concern from runoff.

(d) Be implemented close to pollutant sources, and prior to discharging into waters of the U.S.

(e) Include proof of a mechanism under which ongoing long-term maintenance will be conducted to ensure proper maintenance for the life of the project. The mechanisms may be provided by the project proponent or Copermittee.

(f) Be designed and implemented with measures to avoid the creation of nuisance or pollution associated with vectors, such as mosquitoes, rodents, and flies.

(7) Low Impact Development (LID) BMP Waiver Program

The Copermittees must develop, collectively or individually, a LID waiver program for incorporation into the SSMP, which would allow a Priority Development Project to substitute implementation of all or a portion of required LID BMPs in Section F.1.d(4) with implementation of treatment control BMPs and either 1) on-site mitigation, 2) an off-site mitigation project, and/or 3) other mitigation developed by the Copermittees. The Copermittees must submit the LID waiver program as part of their updated SSMP. At a minimum, the program must meet the requirements below:

(a) Prior to implementation, the LID waiver program must clearly exhibit that it will not allow Priority Development Projects to result in a net impact (after consideration of any mitigation) from pollutant loadings over and above the impact caused by projects meeting the onsite LID retention requirements;

(b) For each Priority Development Project participating, the Copermittee must find that it is technically infeasible to implement LID BMPs that comply with the requirements of Section F.1.(d)(4). The Copermittee(s) must develop criteria to determine the technical feasibility of implementing LID BMPs . Each Priority Development Project participating must demonstrate that LID BMPs were implemented as much as feasible given the site's unique conditions. Technical infeasibility may result from conditions including, but not limited to:

(i) Locations that cannot meet the infiltration and groundwater protection requirements in section F.1.c.(6) for large, centralized infiltration BMPs. Where infiltration is technically infeasible, the project must still examine the feasibility of other onsite LID BMPs;
(ii) Insufficient demand for storm water reuse;

(iii) Smart growth and infill or redevelopment locations where the density and/or nature of the project would create significant difficulty for compliance with the LID BMP requirements; and

(iv) Other site, geologic, soil, or implementation constraints identified in the Copermittees updated SSMP document.

(c) Each Priority Development Project that participates in the LID waiver program must mitigate for the pollutant loads expected to be discharged due to not implementing the LID retention BMPs in section F.1.d.(4). The pollutant loading must be estimated for each project participating in the LID waiver program. The estimated impacts from not implementing the required LID retention BMPs in section F.1.d.(4) must be fully mitigated. Mitigation projects must be implemented within the same hydrologic unit as the Priority Development Project. Mitigation projects outside of the hydrologic subarea but within the same hydrologic unit may be approved provided that the project proponent demonstrates that mitigation projects within the same hydrologic subarea are infeasible and that the mitigation project will address similar beneficial use impacts as expected from the Priority Development Projects pollutant load. Onsite mitigation may include increasing the conventional treatment sizing factors to achieve pollutant load removal equal to or greater than the pollutant load removal expected from implementing onsite retention of the design capture volume. Offsite mitigation projects may include green streets projects, existing development retrofit projects, retrofit incentive programs, regional BMPs and/or riparian restoration projects. Project applicants seeking to utilize these alternative compliance provisions may propose other offsite mitigation projects, which the Copermittees may approve if they meet the requirements of this subpart.

(d) A Copermittee may choose to implement additional mitigation programs (e.g., pollutant credit system, mitigation fund) as part of the LID waiver program provided that the mitigation program clearly exhibits that it will not allow Priority Development Projects to result in a net impact from pollutant loadings over and above the impact caused by projects meeting LID requirements. Any additional mitigation programs that a Copermittee chooses to implement must be submitted to the San Diego Water Board Executive Officer for review and acceptance prior to implementation.

(8) <u>LID and Treatment Control BMP Standards</u>

(a) As part of the SSMP, each Copermittee must develop and require Priority Development Projects to implement siting, design, and maintenance criteria for each LID and treatment control BMP listed in the SSMP to determine feasibility and applicability and so that implemented LID and treatment control BMPs are constructed correctly and are effective at pollutant removal, runoff control, and vector minimization. Development of

BMP design worksheets which can be used by project proponents is encouraged.

(b) LID and treatment control BMPs implemented at any Priority Development Projects must mitigate (treat through infiltration, settling, filtration or other unit processes) the required volume or flow of runoff from all developed portions of the project, including landscaped areas.

(c) All LID and treatment control BMPs must be located so as to remove pollutants from runoff prior to its discharge to any receiving waters. Multiple Priority Development Projects may use shared post-construction BMPs as long as construction of any shared BMP is completed prior to the use or occupation of any Priority Development Project from which the BMP will receive runoff. Post construction BMPs must not be constructed within a waters of the U.S. or waters of the State.

(9) Implementation Process

(a) As part of its local SSMP, each Copermittee must implement a process to verify compliance with SSMP requirements. The process must identify at what point in the planning process Priority Development Projects will be required to meet SSMP requirements and at a minimum, the Priority Development Project must implement the required post-construction BMPs prior to occupancy and/or the intended use of any portion of that project. The process must also include identification of the roles and responsibilities of various municipal departments in implementing the SSMP requirements, as well as any other measures necessary for the implementation of SSMP requirements.

(b) Each Copermittee must establish a mechanism not only to track post-construction BMPs, but also to ensure that appropriate easements and ownerships are properly recorded in public records and the information is conveyed to all appropriate parties when there is a change in project or site ownership.

(10) Post-construction BMP Review

(a) The Copermittees must review and update the BMPs that are listed in their SSMP as options for treatment control. At a minimum, the update must include removal of obsolete or ineffective BMPs and addition of LID BMPs that can be used for treatment, such as bioretention cells, bioretention swales, etc. The update must also add appropriate LID BMPs to any tables or discussions in the local SSMPs addressing pollutant removal efficiencies of treatment control BMPs. In addition, the update must include review and revision where necessary of treatment control BMP pollutant removal efficiencies.

(b) The update must incorporate findings from BMP effectiveness studies conducted by the Copermittees for projects funded wholly or in part by the State Water Board or Regional Water Boards.

(c) Each Copermittee must implement a mechanism for annually incorporating findings from local treatment BMP effectiveness studies (e.g., ones conducted by, or on-behalf of, public agencies in Riverside County) into SSMP project reviews and permitting.

e. **BMP CONSTRUCTION VERIFICATION**

Prior to occupancy and/or intended use of any portion of the Priority Development Project subject to SSMP requirements, each Copermittee must inspect the constructed site design, source control, and treatment control BMPs applicable to the constructed portion of the project to verify that they have been constructed and are operating in compliance with all specifications, plans, permits, ordinances, and this Order.

f. **BMP MAINTENANCE TRACKING**

(1) Inventory of SSMP projects: Each Copermittee must develop and maintain a watershed-based database to track and inventory all projects constructed within their jurisdiction, that have a final approved SSMP (SSMP projects), and its structural post-construction BMPs implemented therein since July, 2005. LID BMPs implemented on a lot by lot basis at single family residential houses, such as rain barrels, are not required to be tracked or inventoried. At a minimum, the database must include information on BMP type(s), location, watershed, date of construction, party responsible for maintenance, dates and findings of maintenance verifications, and corrective actions, including whether the site was referred to the local vector control agency or department.

(2) Each Copermittee must verify that approved post-construction BMPs are operating effectively and have been adequately maintained by implementing the following measures:

(a) The designation of high priority SSMP Projects must consider the following:

(i) BMP size,
(ii) Recommended maintenance frequency,
(iii) Likelihood of operational and maintenance issues,
(iv) Location,

(v) Receiving water quality,
(vi) Compliance record,
(vii) Land use, and
(viii) Other pertinent factors;

At a minimum, high priority projects include those projects that generate pollutants (prior to treatment) within the tributary area of and within the same hydrologic subarea as a 303(d) listed waterbody impaired for that pollutant; or those projects generating pollutants within the tributary area for and within the same hydrologic subarea as an observed action level exceedance of that pollutant.

(b) Beginning on July 1, 2012, each Copermittee must verify that the required structural post-construction BMPs on the inventoried SSMP projects have been implemented, are maintained, and are operating effectively through inspections, self-certifications, surveys, or other equally effective approaches with the following conditions:

(i) The implementation, operation, and maintenance of all (100 percent) approved and inventoried final project public and private SSMPs (a.k.a. WQMPs) must be verified every five years;
(ii) All (100 percent) projects with BMPs that are high priority must be inspected by the Copermittee annually prior to each rainy season;
(iii) All (100 percent) Copermittee projects with BMPs must be inspected by the Copermittee annually;
(iv) At the discretion of the Copermittee, its inspections may be coordinated with the facility inspections implemented pursuant to section F.3. of this Order;
(v) For verifications performed through a means other than direct Copermittee inspection, adequate documentation must be submitted to the Copermittee to provide assurance that the required maintenance has been completed;
(vi) Appropriate follow-up measures (including re-inspections, enforcement, maintenance, etc.) must be conducted to ensure the treatment BMPs continue to reduce storm water pollutants as originally designed; and
(vii) Inspections must note observations of vector conditions, such as mosquitoes. Where conditions are identified as contributing to mosquito production, the Copermittee must notify its local vector control agency.

g. **ENFORCEMENT OF DEVELOPMENT SITES**

Each Copermittee must enforce its storm water ordinance for all development projects as necessary to maintain compliance with this Order. Copermittee ordinances or other regulatory mechanisms must include appropriate sanctions to achieve compliance. Sanctions must include the following tools or their equivalent: Non-monetary penalties, fines, bonding requirements, liens, and/or permit or occupancy denials for non-compliance.

h. **HYDROMODIFICATION – LIMITATIONS ON INCREASES OF RUNOFF DISCHARGE RATES AND DURATIONS**[15]

Each Copermittee shall collaborate with the other Copermittees to develop and implement a Hydromodification Management Plan (HMP) to manage increases in runoff discharge rates and durations from all Priority Development Projects. The HMP must be incorporated into the SSMP and implemented by each Copermittee so that estimated post-project runoff discharge rates and durations must not exceed pre-development discharge rates and durations. Where the proposed project is located on an already developed site, the pre-project discharge rate and duration must be that of the pre-developed, naturally occurring condition. The draft HMP must be submitted to the San Diego Water Board on or before June 30, 2013. The HMP will be made available for public review and comment and the San Diego Water Board Executive Officer will determine whether to hold a public hearing before the full San Diego Water Board or whether public input will be through written comments to the Executive Officer only.

(1) The HMP must:

(a) Identify a method for assessing susceptibility and geomorphic stability of channel segments which receive runoff discharges from Priority Development Projects. A performance standard must be established that ensures that the geomorphic stability within the channel will not be compromised as a result of receiving runoff discharges from Priority Development Projects.

[15] Updated SSMP and hydromodification requirements must apply to all Priority Development Projects or phases of Priority Development Projects which have not yet begun grading or construction activities at the time any updated SSMP or hydromodification requirement commences. If a Copermittee determines that lawful prior approval of a project exists, whereby application of an updated SSMP or hydromodification requirement to the project is legally infeasible, the updated SSMP or hydromodification requirement need not apply to the project. The Copermittees must utilize the SSMP and hydromodification update periods to ensure that projects undergoing approval processes include application of the updated SSMP and hydromodification requirements in its plans.

(b) Identify a range of runoff flows[16] based on continuous simulation of the entire rainfall record (or other analytical method proposed by the Copermittees and deemed acceptable by the San Diego Water Board) for which Priority Development Project post-project runoff flow rates and durations must not exceed pre-development (naturally occurring) runoff flow rates and durations by more than 10 percent, where the increased flow rates and durations will result in increased potential for erosion or other significant adverse impacts to beneficial uses. The lower boundary of the range of runoff flows identified must correspond with the critical channel flow that produces the critical shear stress that initiates channel bed movement or that erodes the toe of channel banks. The identified range of runoff flows may be different for specific watersheds, channels, or channel reaches. In the case of an artificially hardened (concrete lined, rip rap, etc.) channel, the lower boundary of the range of runoff flows identified must correspond with the critical channel flow that produces the critical shear stress that initiates channel bed movement or that erodes the toe of channel banks of a comparable natural channel (i.e. non-hardened, pre-development).

(c) Identify a method to assess and compensate for the loss of sediment supply to streams due to development. A performance and/or design standard must be created and required to be met by Priority Development Projects to ensure that the loss of sediment supply due to development does not cause or contribute to increased erosion within channel segments downstream of Priority Development Project discharge points.

(d) Designate and require Priority Development Projects to implement control measures so that (1) post-project runoff flow rates and durations do not exceed pre-development (naturally occurring) runoff flow rates and durations by more than 10 percent for the range of runoff flows identified under section F.1.h.(1)(b), where the increased flow rates and durations will result in increased potential for erosion or other significant adverse impacts to beneficial uses; (2) post-project runoff flow rates and durations do not result in channel conditions which do not meet the channel standard developed under section F.1.h.(1)(a) for channel segments downstream of Priority Development Project discharge points; and (3) the design of the project and/or control measures compensate for the loss of sediment supply due to development.

[16] The identified range of run off flows to be controlled should be expressed in terms of peak flow rates of rainfall events, such as “10% of the pre-development 2-year runoff event up to the pre-development 10-year runoff event.”

(e) Include a protocol to evaluate potential hydrograph change impacts to downstream watercourses from Priority Development Projects to meet the range of runoff flows identified under Section F.1.h.(1)(b).

(f) Include other performance criteria (numeric or otherwise) for Priority Development Projects as necessary to prevent runoff from the projects from increasing and/or continuing unnatural rates of erosion of channel beds and banks, silt pollutants generation, or other impacts to beneficial uses and stream habitat due to increased erosive force.

(g) Include a review of pertinent literature.

(h) Identify areas within the Santa Margarita Hydrologic Unit for potential opportunities to restore or rehabilitate stream channels with historic hydromodification of receiving waters that are tributary to documented low or very low Index of Biotic Integrity (IBI) scores.

(i) Include a description of how the Copermittees will incorporate the HMP requirements into their local approval processes.

(j) Include criteria on selection and design of management practices and measures (such as detention, retention, and infiltration) to control flow rates and durations and address potential hydromodification impacts.

(k) Include technical information, including references, supporting any standards and criteria proposed.

(l) Include a description of inspections and maintenance to be conducted for management practices and measures to control flow rates and durations and address potential hydromodification impacts.

(m) Include a description of monitoring and other program evaluations to be conducted to assess the effectiveness of implementation of the HMP. Monitoring and other program evaluations must include an evaluation of changes to physical (e.g., cross-section, slope, discharge rate, vegetation, pervious/impervious area) and biological (e.g., habitat quality, benthic flora and fauna, IBI scores) conditions of receiving water channels as areas with Priority Development Projects are constructed (i.e. pre- and post-project), as appropriate.

(n) Include mechanisms for assessing and addressing cumulative impacts of Priority Development Projects within a watershed on channel morphology.

(2) In addition to the control measures that must be implemented by Priority Development Projects per section F.1.h.(1)(d), the HMP must include a suite of management measures that can be used on Priority Development Projects to mitigate hydromodification impacts, protect and restore downstream beneficial uses and prevent or further prevent adverse physical changes to downstream channels. The measures must be based on a prioritized consideration of the following elements in this order:

(a) Site design control measures;
(b) On-site management measures;
(c) Regional control measures located upstream of receiving waters; and
(d) In-stream management and control measures.

Where stream channels are adjacent to, or are to be modified as part of a Priority Development Project, management measures must include buffer zones and setbacks. The suite of management measures must also include stream restoration as a viable option to achieve the channel standard in section F.1.h.(1)(a). In-stream controls used as management measures to protect and restore downstream beneficial uses and for preventing or minimizing further adverse physical changes must not include the use of non-naturally occurring hardscape materials such as concrete, riprap, gabions, etc. to reinforce stream channels.

(3) As part of the HMP, the Copermittees may develop a waiver program that allows a redevelopment Priority Development Project, as defined in Section F.1.d.(1)(b), to implement offsite mitigation measures. A waiver may be granted if onsite management and control measures are technically infeasible to fully achieve post-project runoff flow rates and durations that do not exceed the pre-development (naturally occurring) runoff flow rates and durations. Redevelopment projects that are granted a waiver under the program must not have post-project runoff flow rates and durations that exceed the pre-project runoff flow rates and durations. The estimated incremental hydromodification impacts from not achieving the pre-development (naturally occurring) runoff flow rates and durations for the project site must be fully mitigated. The offsite mitigation must be within the same stream channel system to which the project discharges. Mitigation projects not within the same stream channel system but within the same hydrologic unit may be approved provided that the project proponent demonstrates that mitigation within the same stream channel is infeasible and that the mitigation project will address similar impacts as expected from the project.

(4) Each individual Copermittee has the discretion to not require Section F.1.h. at Priority Development Projects where the project:

(a) Discharges storm water runoff into underground storm drains discharging directly to water storage reservoirs and lakes;

(b) Discharges storm water runoff into conveyance channels whose bed and bank are concrete lined all the way from the point of discharge to water storage reservoirs and lakes; or
(c) Discharges storm water runoff into other areas identified in the HMP as acceptable to not need to meet the requirements of Section F.1.h by the San Diego Water Board Executive Officer.

(5) HMP Reporting and Implementation

(a) On or before June 30, 2013, the Copermittees must submit to the San Diego Water Board a draft HMP that has been reviewed by the public, including the identification of the appropriate limiting range of flow rates per section F.1.h.(1)(b).

(b) Within 180 days of receiving San Diego Water Board comments on the draft HMP, the Copermittees must submit a final HMP that addressed the San Diego Water Board's comments.

(c) Within 90 days of receiving a determination of adequacy from the San Diego Water Board, each Copermittee must incorporate and implement the HMP for all Priority Development Projects.

(d) Prior to acceptance of the HMP by the San Diego Water Board, the early implementation measures likely to be included in the HMP must be encouraged by the Copermittees.

(6) Interim Hydromodification Criteria

Immediately following adoption of this Order and until the final HMP required by this Order has been determined by the San Diego Water Board to be adequate, each Copermittee must ensure that all Priority Development Projects are implementing the hydromodification (aka Hydrologic Condition of Concern) requirements found in Section 4.4 of the 2006 Riverside County WQMP (updated in 2009) unless one of the following conditions in lieu of those specified in the WQMP are met:

(a) Runoff from the Priority Development Project discharges (1) directly to a conveyance channel or storm drain that is concrete lined all the way from the point of discharge to the ocean, bay, lagoon, water storage reservoir or lake; and (2) the discharge is in full compliance with Copermittee requirements for connections and discharges to the MS4 (including both quality and quantity requirements); and (3) the discharge will not cause increased upstream or downstream erosion or adversely impact downstream habitat; and (4) the discharge is authorized by the Copermittee.

(b) The Priority Development Project disturbs less than one acre. The Copermittee has the discretion to require a project specific WQMP to address hydrologic condition concerns on projects less than one acre on a case by case basis. The disturbed area calculation should include all disturbances associated with larger common plans of development.

(c) The runoff flow rate, volume, velocity, and duration for the post-development condition of the Priority Development Project do not exceed the pre-development (i.e. naturally occurring) condition for the 2-year, 24-hour and 10-year, 24-hour rainfall events. This condition must be substantiated by hydrologic modeling acceptable to the Copermittee.

Once a final HMP is determined to be adequate and is required to be implemented, compliance with the final HMP is required by this Order and compliance with the 2004 WQMP (updated in 2009) or the in-lieu interim hydromodification criteria set forth above no longer satisfies the requirements of this Order.

(7) No part of section F.1.h eliminates the Copermittees' responsibilities for implementing the Low Impact Development requirements under section F.1.d.(4).

i. UNPAVED ROADS DEVELOPMENT

The Copermittees must develop, where they do not already exist, and implement or require implementation of erosion and sediment control BMPs after construction of new unpaved roads. At a minimum, the BMPs must include the following, or alternative BMPs that are equally effective:

(1) Practices to minimize road related erosion and sediment transport;
(2) Grading of unpaved roads to slope outward where consistent with road engineering safety standards;
(3) Installation of water bars as appropriate; and
(4) Unpaved roads and culvert designs that do not impact creek functions and where applicable, that maintain migratory fish passage.

2. CONSTRUCTION COMPONENT

Each Copermittee must implement a construction program which meets the requirements of this section, prevents illicit discharges into the MS4, implements and maintains structural and non-structural BMPs to reduce pollutants in storm water runoff from construction sites to the MS4, reduces construction site discharges of storm water pollutants from the MS4 to the MEP, and prevents construction site discharges from the MS4 from causing or contributing to a violation of water quality standards.

a. ORDINANCE UPDATE

By July 1, 2012, each Copermittee must review and update its grading ordinances and other ordinances as necessary to achieve full compliance with this Order, including requirements for the implementation of all designated BMPs and other measures.

b. SOURCE IDENTIFICATION

Each Copermittee must maintain an updated watershed-based inventory of all construction sites within its jurisdiction. The use of an automated database system, such as Geographical Information Systems (GIS) is strongly encouraged.

c. SITE PLANNING AND PROJECT APPROVAL PROCESS

Each Copermittee must incorporate consideration of potential water quality impacts prior to approval and issuance of construction and grading permits.

(1) Each construction and grading permit must require proposed construction sites to implement designated BMPs and other measures so that illicit discharges into the MS4 are prevented, storm water pollutants discharged from the site will be reduced to the MEP, and construction discharges from the MS4 are prevented from causing or contributing to a violation of water quality standards.

(2) Prior to permit issuance, the project proponent's runoff management plan (or equivalent construction BMP plan) must be required to comply, and reviewed to verify compliance with the local grading ordinance, other applicable local ordinances, and this Order.

(3) Prior to permit issuance, each Copermittee must verify that project proponents subject to California's statewide General NPDES Permit for Storm Water Discharges Associated With Construction Activities, (hereinafter General Construction Permit), have existing coverage under the General Construction Permit.

d. **BMP IMPLEMENTATION**

(1) Designate BMPs: Each Copermittee must designate a minimum set of BMPs and other measures to be implemented at all construction sites. The designated minimum set of BMPs must include:

(a) Management Measures:

(i) Pollution prevention, where appropriate;
(ii) Development and implementation of a runoff management plan;
(iii) Minimization of areas that are cleared and graded to only the portion of the site that is necessary for construction;
(iv) Minimization of exposure time of disturbed soil areas;
(v) Minimization of grading during the rainy season and correlation of grading with seasonal dry weather periods to the extent feasible;
(vi) Limitation of grading to a maximum disturbed area as determined by each Copermittee before either temporary or permanent erosion controls are implemented to prevent storm water pollution. The Copermittee has the option of temporarily increasing the size of disturbed soil areas by a set amount beyond the maximum, if the individual site is in compliance with applicable storm water regulations and the site has adequate control practices implemented to prevent storm water pollution;
(vii) Temporary stabilization and reseeding of disturbed soil areas as rapidly as feasible;
(viii) Wind erosion controls;
(ix) Tracking controls;
(x) Non-stormwater management measures to prevent illicit discharges and control storm water pollution sources;
(xi) Waste management measures;
(xii) Preservation of natural hydrologic features where feasible;
(xiii) Preservation of riparian buffers and corridors where feasible;
(xiv) Evaluation and maintenance of all BMPs, until removed; and
(xv) Retention, reduction, and proper management of all storm water pollutant discharges on site to the MEP standard.

(b) Erosion and Sediment Controls:

(i) Erosion prevention. Erosion prevention is to be used as the most important measure for keeping sediment on site during construction;
(ii) Sediment controls. Sediment controls are to be used as a supplement to erosion prevention for keeping sediment on-site during construction;

(iii) Slope stabilization must be used on all active slopes during rain events regardless of the season and on all inactive slopes during the rainy season and during rain events in the dry season;
(iv) Permanent revegetation or landscaping as early as feasible; and
(v) Erosion and sediment controls must be required during the construction of unpaved roads.

(2) Each Copermittee must implement, or require implementation of, enhanced[17] measures to address the threat to water quality posed by all construction sites tributary to CWA section 303(d) water body segments impaired for sediment or turbidity. Each Copermittee must also implement, or require implementation of, enhanced, measures for construction sites within, or adjacent to, or discharging directly to receiving waters within environmentally sensitive areas (as defined in Attachment C of this Order).

(3) Active/Passive Sediment Treatment (AST): Each Copermittee must require implementation of AST for sediment at construction sites (or portions thereof) that are determined by the Copermittee to be an exceptional threat to water quality. In evaluating the threat to water quality, the following factors must be considered by the Copermittee:

(a) Soil erosion potential or soil type;
(b) The site's slopes;
(c) Project size and type;
(d) Sensitivity of receiving water bodies;
(e) Proximity to receiving water bodies;
(f) Non-storm water discharges;
(g) Ineffectiveness of other BMPs;
(h) Proximity and sensitivity of aquatic threatened and endangered species of concern;
(i) Known effects of AST chemicals; and
(j) Any other relevant factors.

(4) Implement BMPs: Each Copermittee must implement, or require the implementation of, the designated minimum BMPs and any additional measures necessary to comply with this Order at each construction site within its jurisdiction year round. BMP implementation requirements, however, can vary based on wet and dry seasons. Dry season BMP implementation must plan for and address unseasonal rain events that may occur during the dry season (May 1 through September 30).

[17] Enhanced BMPs are control actions specifically targeted to the pollutant or condition of concern and of higher quality and effectiveness than the minimum control measures otherwise required. Enhanced in this Order means better, not simply more, BMPs.

e. **INSPECTION OF CONSTRUCTION SITES**

Each Copermittee must conduct construction site inspections for compliance with its ordinances (grading, storm water, etc.), permits (construction, grading, etc.), and this Order. Priorities for inspecting sites must consider the nature and size of the construction activity, topography, and the characteristics of soils and receiving water quality.

(1) During the rainy season, each Copermittee must inspect at least every two weeks, all construction sites within its jurisdiction meeting any of the following criteria:

(a) All sites 30 acres or more in size with rough grading or with active, unstabilized slopes occurring during the rainy season;

(b) All sites one acre or more, and within the same hydrologic subarea and tributary to a CWA section 303(d) water body segment impaired for sediment; or within, directly adjacent to, or discharging directly to a receiving water within an ESA; and

(c) Other sites determined by the Copermittees or the San Diego Water Board as a significant threat to water quality. In evaluating threat to water quality, the following factors must be considered: (1) soil erosion potential; (2) site slope; (3) project size and type; (4) sensitivity of receiving water bodies; (5) proximity to receiving water bodies; (6) non-storm water discharges; (7) known past record of non-compliance by the operators of the construction site; and (8) any other relevant factors.

(2) During the rainy season, each Copermittee must inspect at least monthly, all construction sites with one acre or more of soil disturbance not meeting the criteria specified above in section F.2.e.(1).

(3) During the rainy season, each Copermittee must inspect construction sites less than one acre in size as needed to ensure compliance with its ordinances and this Order.

(4) Each Copermittee must inspect all construction sites as needed during the dry season. Sites meeting the criteria in section F.2.e.(1) must be inspected at least once in August or September each year.

(5) Re-inspections: Based upon site inspection findings, each Copermittee must implement all follow-up actions (i.e., re-inspection, enforcement) necessary to comply with this Order. Reinspection frequencies must be determined by each Copermittee based upon the severity of deficiencies, the nature of the construction activity, and the characteristics of soils and receiving water quality.

(6) Inspections of construction sites must include, but not be limited to:

(a) Check for coverage under the General Construction Permit (Notice of Intent (NOI) and/or Waste Discharge Identification No.) during initial inspections;
(b) Assessment of compliance with Copermittee ordinances and permits related to runoff, including the implementation and maintenance of designated minimum BMPs;
(c) Assessment of BMP effectiveness;
(d) Visual observations for non-storm water discharges, potential illicit connections, and potential discharge of pollutants in storm water runoff;
(e) Review of site monitoring data results, if the site monitors its runoff
(f) Education and outreach on storm water pollution prevention, as needed; and
(g) Creation of a written or electronic inspection report.

(7) The Copermittees must track the number of inspections for each inventoried construction site throughout the reporting period to verify that each site is inspected at the minimum frequencies required.

f. **ENFORCEMENT OF CONSTRUCTION SITES**

(1) Each Copermittee must develop and implement an escalating enforcement process that achieves prompt corrective actions at construction sites for violations of the Copermittee's water quality protection permits, requirements, and ordinances. This enforcement process must include authorizing the Copermittee's construction site inspectors to take immediate enforcement actions when appropriate and necessary. The enforcement process must include appropriate sanctions such as stop work orders, non-monetary penalties, fines, bonding requirements, and/or permit denials for non-compliance.

(2) Each Copermittee must be able to respond to construction complaints received from third-parties and to ensure the San Diego Water Board that corrective actions have been implemented, if warranted.

g. **REPORTING OF NON-COMPLIANT SITES**

(1) In addition to the notification requirements in Attachment B, each Copermittee must notify the San Diego Water Board when the Copermittee issues high level enforcement (as defined in the Copermittee's JRMP) to a construction site that poses a significant threat to water quality in its jurisdiction as a result of violations of its storm water ordinances.

(2) Each Copermittee must annually notify the San Diego Water Board, prior to the commencement of the rainy season, of all construction sites with alleged violations that pose a significant threat to water quality. Information may be

provided as part of the JRMP annual report if submitted prior to the rainy season. Information provided must include, but not be limited to, the following:

(a) WDID number if enrolled under the General Construction Permit
(b) Site Location, including address
(c) Current violations or suspected violations

3. EXISTING DEVELOPMENT COMPONENT

a. MUNICIPAL

Each Copermittee must implement a municipal program for the Copermittee's areas and activities that meets the requirements of this section, prevents illicit discharges into the MS4, reduces municipal discharges of storm water pollutants from the MS4 to the MEP, and prevents municipal discharges from the MS4 from causing or contributing to a violation of water quality standards.

(1) Source Identification / Inventory

Each Copermittee must maintain an updated watershed-based inventory of all its municipal areas and those activities that have the potential to generate pollutants. The inventory must include the name, address (if applicable), and a description of the area/activity; which pollutants are potentially generated by the area/activity; whether the area/activity is adjacent to an ESA; and identification of whether the area/activity is tributary to and within the same hydrologic subarea as a CWA section 303(d) water body segment and generates pollutants for which the water body segment is impaired. Linear facilities, such as roads, streets, and highways, do not need to be individually inventoried. The use of an automated database system, such as Geographical Information Systems (GIS) is highly recommended.

(2) General BMP Implementation

(a) Pollution Prevention: Each Copermittee must implement pollution prevention methods in its municipal program and must require their use by appropriate departments, personnel, and contractors.

(b) Designate Minimum BMPs: Each Copermittee must designate a minimum set of BMPs for all municipal areas and those activities that have the potential to generate pollutants. The designated minimum BMPs for municipal areas and activities must be area or activity specific as appropriate.

(c) Each Copermittee must designate BMPs for special events that are expected to generate significant trash and litter. Controls to consider must include:

(i) Temporary screens on catch basins and storm drain inlets;
(ii) Temporary fencing to prevent windblown trash from entering adjacent water bodies and MS4 channels;
(iii) Proper management of trash and litter;
(iv) Catch basin cleaning following the special event and prior to an anticipated rain event;
(v) Street sweeping of roads, streets, highways and parking facilities following the special event; and
(vi) Other equivalent controls.

(d) Designate BMPs for ESAs and 303(d) Impairments: Each Copermittee must designate enhanced measures for its municipal areas and activities tributary to and within the same hydrologic subarea as CWA section 303(d) impaired water body segments when an area or those activities have the potential to generate pollutants for which the water body segment is impaired. Each Copermittee must also designate additional controls for its municipal areas and activities within or directly adjacent to or discharging directly to receiving waters within environmentally sensitive areas (as defined in Attachment C of this Order).

(e) Implement BMPs: Each Copermittee must implement, or require the implementation of, the designated minimum and enhanced BMPs and any additional measures necessary based on its inventory to comply with this Order for each of its municipal area and those activities that have the potential to discharge pollution.

(3) <u>BMP Implementation for Management of Pesticides, Herbicides, and Fertilizers</u>

Each Copermittee must implement BMPs to reduce the contribution of storm water pollutants to the MEP associated with the application, storage, and disposal of pesticides, herbicides and fertilizers from its municipal areas and activities to MS4s and receiving waters. Such BMPs must include, at a minimum:

(a) Educational activities, permits, certifications and other measures for municipal applicators and distributors;
(b) Integrated Pest Management (IPM) measures that rely on non-chemical solutions;
(c) The use of native vegetation;
(d) Schedules for irrigation and chemical application; and

(e) The collection and proper disposal of unused pesticides, herbicides, and fertilizers.

(4) BMP implementation for Flood Control Structures

(a) Each Copermittee must implement procedures to assure that flood management projects assess the impacts on the water quality of receiving water bodies.

(b) Each Copermittee must include water quality protection measures, where feasible, when retrofitting existing flood control structural devices.

(c) Each Copermittee must evaluate its existing flood control structures as part of ongoing routine maintenance, identify structures causing or contributing to a condition of pollution, implement measures to reduce or eliminate the structure's effect on pollution, and evaluate the feasibility of retrofitting the structural flood control device. The inventory and evaluation must be completed by and submitted to the San Diego Water Board in each JRMP Annual Report.

(5) BMP Implementation for Sweeping of Municipal Areas

Where municipal area sweeping is implemented as an MS4 BMP for municipal roads, streets, highways, and parking facilities, each Copermittee must design and implement the program based on the following criteria:

(a) Roads, streets, highways, and parking facilities identified as consistently generating the highest volumes of trash and/or debris must be swept at least two times per month.

(b) Roads, streets, highways, and parking facilities identified as consistently generating moderate volumes of trash and/or debris must be swept at least monthly.

(c) Roads, streets, highways, and parking facilities identified as generating low volumes of trash and/or debris must be swept as necessary, but no less than once per year.

(6) Operation and Maintenance of Municipal Separate Storm Sewer System (MS4) and Treatment Controls

(a) Treatment Controls: Each Copermittee must implement a schedule of inspection and maintenance activities to verify proper operation of all its municipal structural treatment controls designed to reduce storm water pollutant discharges to or from its MS4s and related drainage structures.

(b) MS4 and Facilities: Each Copermittee must implement a schedule of maintenance activities for its MS4 and facilities (including but not limited to catch basins, storm drain inlets, detention basins, etc). The maintenance activities must, at a minimum, include:

(i) Inspection and removal of accumulated waste at least once a year between May 1 and September 30 of each year for all MS4 facilities;
(ii) Additional facilities cleaning as necessary between October 1 and April 30 of each year;
(iii) Following two years of inspections, any MS4 facility that requires inspection and cleaning less than annually may be inspected as needed, but not less than every other year;
(iv) Open channels and basins must be cleaned of observed anthropogenic litter in a timely manner;
(v) Maintenance activities within open channels must not adversely impact beneficial uses;
(vi) Record keeping of the maintenance and cleaning activities including the overall quantity of waste removed;
(vii) Proper disposal of waste removed pursuant to applicable laws; and
(viii) Measures to eliminate waste discharges during MS4 maintenance and cleaning activities.

(7) <u>Infiltration From Sanitary Sewer to MS4/Provide Preventive Maintenance</u>

(a) Each Copermittee must implement controls and measures to prevent and eliminate infiltration of seepage from sanitary sewers to MS4s through thorough, routine preventive maintenance of the MS4. Each Copermittee that operates both a municipal sanitary sewer system and a MS4 must implement controls and measures to prevent and eliminate infiltration of seepage from the sanitary sewers to the MS4s that must include overall sanitary sewer and MS4 surveys and thorough, routine preventive maintenance of both.

(b) Each Copermittee must implement controls to limit infiltration of seepage from sanitary sewers to municipal separate storm sewer systems where necessary. Such controls must include:

(i) Adequate plan checking for construction and new development;
(ii) Incident response training for its municipal employees that identify sanitary sewer spills;
(iii) Code enforcement inspections;
(iv) MS4 maintenance and inspections;
(v) Interagency coordination with sewer agencies; and

(vi) Proper education of its municipal staff and contractors conducting field operations on the MS4 or its municipal sanitary sewer (if applicable).

(8) Inspection of Municipal Areas and Activities

(a) At a minimum, each Copermittee must inspect the following high priority municipal areas and activities annually:

(i) Roads, Streets, Highways, and Parking Facilities;
(ii) Flood Management Projects and Flood Control Devices not otherwise inspected per Section F.3.a.(6)(b);
(iii) Areas and activities tributary to and within the same hydrologic subarea as a CWA section 303(d) impaired water body segment, where an area or activity generates pollutants for which the water body segment is impaired;
(iv) Areas and activities within or adjacent to or discharging directly to receiving waters within environmentally sensitive areas (as defined in Attachment C of this Order);
(v) Municipal Facilities:
[a] Active or closed municipal landfills;
[b] Publicly owned treatment works (including water and wastewater treatment plants) and sanitary sewage collection systems;
[c] Solid waste transfer facilities;
[d] Land application sites;
[e] Corporate yards including maintenance and storage yards for materials, waste, equipment and vehicles; and
[f] Household hazardous waste collection facilities.
(vi) Municipal airfields;
(vii) Parks and recreation facilities;
(viii) Special event venues following special events (festivals, sporting events, etc.);
(ix) Power washing activities; and
(x) Other municipal areas and activities that the Copermittee determines may contribute a significant pollutant load to the MS4.

(b) Other municipal areas and activities must be inspected as needed and in response to water quality data, valid public complaints, and findings from municipal or contract staff.

(c) Based upon site inspection findings, each Copermittee must implement all follow-up actions necessary to comply with this Order.

(9) Enforcement of Municipal Areas and Activities

Each Copermittee must enforce its storm water ordinance for all its municipal areas and activities as necessary to maintain compliance with this Order.

(10) Copermittee Maintained Unpaved Roads Maintenance

(a) The Copermittees must develop, where they do not already exist, and implement or require implementation of BMPs for erosion and sediment control measures during their maintenance activities on Copermittee maintained unpaved roads, particularly in or adjacent to receiving waters.

(b) The Copermittees must develop and implement or require implementation of appropriate BMPs to minimize impacts on streams and wetlands during their unpaved road maintenance activities.

(c) The Copermittees must maintain as necessary their unpaved roads adjacent to streams and riparian habitat to reduce erosion and sediment transport;

(d) Re-grading of unpaved roads during maintenance must be sloped outward where consistent with road engineering safety standards or alternative equally effective BMPs must be implemented to minimize erosion and sedimentation from unpaved roads; and

(e) Through their maintenance of unpaved roads, the Copermittees must examine the feasibility of replacing existing culverts or design of new culverts or bridge crossings to reduce erosion and maintain natural stream geomorphology.

b. COMMERCIAL / INDUSTRIAL

Each Copermittee must implement a commercial / industrial program that meets the requirements of this section, prevents illicit discharges into the MS4, reduces commercial / industrial discharges of storm water pollutants from the MS4 to the MEP, and prevents commercial / industrial discharges from the MS4 from causing or contributing to a violation of water quality standards.

(1) Source Identification

(a) Each Copermittee must maintain an updated watershed-based inventory of all industrial and commercial sites/sources within its jurisdiction (regardless of ownership) that could contribute a significant pollutant load to the MS4. The inventory must include the following minimum

information for each industrial and commercial site/source: name; address; pollutants potentially generated by the site/source; and identification of whether the site/source is tributary to a CWA §303(d) water body segment and generates pollutants for which the water body segment is impaired; and a narrative description including SIC codes which best reflects the principal products or services provided by each facility.

At a minimum, the following sites/sources must be included in the inventory:

(i) Commercial Sites/Sources:

[a] Automobile repair, maintenance, fueling, or cleaning;
[b] Airplane repair, maintenance, fueling, or cleaning;
[c] Boat repair, maintenance, fueling, or cleaning;
[d] Equipment repair, maintenance, fueling, or cleaning;
[e] Automobile and other vehicle body repair or painting;
[f] Mobile automobile or other vehicle washing;
[g] Automobile (or other vehicle) parking lots and storage facilities;
[h] Retail or wholesale fueling;
[i] Pest control services;
[j] Eating or drinking establishments, including such retail establishments with food markets;
[k] Mobile carpet, drape or furniture cleaning;
[l] Cement mixing or cutting;
[m] Masonry;
[n] Painting and coating;
[o] Botanical or zoological gardens and exhibits;
[p] Landscaping;
[q] Nurseries and greenhouses;
[r] Golf courses, parks and other recreational areas/facilities;
[s] Cemeteries;
[t] Pool and fountain cleaning;
[u] Marinas;
[v] Portable sanitary services;
[w] Building material retailers and storage;
[x] Animal boarding facilities and kennels;
[y] Mobile pet services;
[z] Power washing services;
[aa] Plumbing services; and
[bb] Other sites and sources with a history of un-authorized discharges to the MS4.

(ii) Industrial Sites/Sources:

[a] Industrial Facilities, as defined at 40 CFR § 122.26(b)(14), including those subject to the General Industrial Permit or other individual NPDES permit;
[b] Operating and closed landfills;
[c] Facilities subject to SARA Title III; and
[d] Hazardous waste treatment, disposal, storage and recovery facilities.

(iii) ESAs and 303(d) Listed Waterbodies: All other commercial or industrial sites/sources tributary to and within the same hydrologic subarea as a CWA Section 303(d) impaired water body segment, where the site/source generates pollutants for which the water body segment is impaired. All other commercial or industrial sites/sources within or directly adjacent to or discharging directly to receiving waters within environmentally sensitive areas (as defined in Attachment C of this Order) or that generate pollutants tributary to and within the same hydrologic subarea as an observed exceedance of an action level.

(iv) All other commercial or industrial sites/sources that the Copermittee determines may contribute a significant pollutant load to the MS4.

(2) <u>General BMP Implementation</u>

(a) Pollution Prevention: Each Copermittee must require the use of pollution prevention methods by the inventoried industrial and commercial sites/sources.

(b) Designate / Update Minimum BMPs: Each Copermittee must designate a minimum set of BMPs for all inventoried industrial and commercial sites/sources. Where BMPs have already been designated, each Copermittee must review and update its existing BMPs for adequacy no later than with the submittal of the JRMP. Copermittees may continue to regularly review and update their designated BMPs for adequacy and subsequently submit any updates in their Annual Report. The designated minimum BMPs must be specific to facility types and pollutant-generating activities, as appropriate.

(c) Designate Enhanced BMPs for ESAs and 303(d) Impairments: Each Copermittee must designate enhanced measures for inventoried industrial and commercial sites/sources tributary to and within the same hydrologic subarea as CWA section 303(d) impaired water body segments (where a site/source generates pollutants for which the water body segment is

impaired). Each Copermittee must also designate additional controls for industrial and commercial sites/sources within or directly adjacent to or discharging directly to coastal lagoons, the ocean, or other receiving waters within environmentally sensitive areas (as defined in Attachment C of this Order). Copermittees may continue to regularly review and update their designated enhanced BMPs for adequacy and subsequently submit any updates in their next Annual Report.

(d) Implement BMPs: Each Copermittee must implement, or require the implementation of, the designated minimum and enhanced BMPs and any additional measures necessary based on inspections, incident responses, and water quality data to comply with this Order at each industrial and commercial site/source within its jurisdiction.

(3) Mobile Businesses Program

(a) Each Copermittee must develop and implement a program to reduce the discharge of storm water pollutants from mobile businesses to the MEP and to prohibit non-storm water discharges pursuant to Section B of this Order. Each Copermittee must keep as part of its commercial source inventory a listing of mobile businesses known to operate within its jurisdiction that conduct services listed above in section F.3.b.(1)(a). The program must include:

(i) Development and implementation of minimum standards and BMPs to be required for each of the various types of mobile businesses;
(ii) Development and implementation of an enforcement strategy which specifically addresses the unique characteristics of mobile businesses;

(iii) Notification of those mobile businesses known to operate within the Copermittee's jurisdiction of the minimum standards and BMP requirements;
(iv) Development and implementation of an outreach and education strategy; and
(v) Inspection of mobile businesses as needed to implement the program.

(b) If they choose to, the Copermittees may cooperate in developing and implementing their programs for mobile businesses, including sharing of mobile business inventories, BMP requirements, enforcement action information, and education.

(4) Inspection of Industrial and Commercial Sites/Sources

Each Copermittee must conduct industrial and commercial site inspections for compliance with its ordinances, permits, and this Order. Mobile businesses must be inspected as needed pursuant to section F.3.b.(3).

(a) Inspection Procedures: Inspections must include but not be limited to:

(i) Review of BMP implementation plans not including SSMPs required pursuant to section F.1.d, if the site uses or is required to use such a plan;
(ii) Review of facility monitoring data, if the site monitors its runoff;
(iii) Check for coverage under the General Industrial Permit (Notice of Intent (NOI) and/or Waste Discharge Identification Number), if applicable;
(iv) Assessment of compliance with Copermittee ordinances and Copermittee issued permits related to runoff;
(v) Assessment of the implementation, maintenance and effectiveness of the designated minimum and/or enhanced BMPs;
(vi) Visual observations for non-storm water discharges, potential illicit connections, and potential discharge of pollutants in storm water runoff; and
(vii) Education and training on storm water pollution prevention, as conditions warrant.

(b) Frequencies: At a minimum all sites determined to pose a high threat to water quality must be inspected each year. All inventoried sites must be inspected at least once during a five year period. In evaluating threat to water quality, each Copermittee must consider, at a minimum, the following:

(i) Type of activity (SIC code);
(ii) Materials used at the facility;
(iii) Wastes generated;
(iv) Pollutant discharge potential, including whether the facility generates a pollutant that exceeds an action level;
(v) Non-storm water discharges;
(vi) Size of facility;
(vii) Proximity to receiving water bodies;
(viii) Sensitivity of receiving water bodies;
(ix) Whether the facility is subject to the General Industrial Permit or an individual NPDES permit;
(x) Whether the facility has filed a No Exposure Certification/Notice of Non-Applicability;
(xi) Facility design;

(xii) Total area of the site, portion of the site where industrial or commercial activities occur, and area of the site exposed to rainfall and runoff;
(xiii) The facility's compliance history; and
(xiv) Any other relevant factors.

(c) Third-Party Certifications: Each Copermittee may propose to develop and implement a third party certification program subject to San Diego Water Board Executive Officer acceptance. This program would verify industrial and commercial site/source compliance with the Copermittees' ordinances, permits, and this Order. To the extent that third party certifications are conducted to fulfill the requirements of Section F.3.b.(4) above, the Copermittee retains responsibility for compliance with this Order and will be responsible for conducting and documenting quality assurance and quality control of the third-party certifications.

The Copermittee's proposed third party certification program must include the following:

(i) A description of the procedures and measures for quality assurance and quality control;
(ii) A listing of sites/sources that may and may not participate in the program;
(iii) The representative percentage of certifications that would qualify to satisfy the inspection requirements in section F.3.b(4)(c) above;
(iv) Photo documentation of potential storm water violations identified during the third party inspection;
(v) Reporting to the Copermittee of identified significant potential violations, including imminent or observed illegal discharges, within 24 hours of the third party inspection;
(vi) Reporting to the Copermittee of all findings within one week of the inspection being conducted; and
(vii) Copermittee follow-up and/or enforcement actions for identified potential storm water violations within two business days of the potential violation report receipt.

(d) Based upon site inspection findings, each Copermittee must implement all follow-up actions and enforcement necessary to comply with this Order.

(e) To the extent that the San Diego Water Board has conducted an inspection of an industrial site during a particular year, the requirement for the responsible Copermittee to inspect this facility during the same year is deemed satisfied.

(f) The Copermittees must track the number of inspections for the inventoried industrial and commercial sites/sources throughout the reporting period to verify that the sites/sources are inspected at the minimum frequencies listed in this Order.

(5) Enforcement of Industrial and Commercial Sites/Sources

Each Copermittee must enforce its storm water ordinance for all industrial and commercial sites/sources as necessary to maintain compliance with this Order. Copermittee ordinances or other regulatory mechanisms must include appropriate sanctions to achieve compliance. Sanctions must include the following tools or their equivalent: Non-monetary penalties, fines, bonding requirements, liens and/or permit denials for non-compliance.

(6) Reporting of Non-Compliant Sites

Each Copermittee must annually notify the San Diego Water Board, prior to the commencement of the wet season, of any unresolved high level enforcement action (as defined in the Copermittees' JRMP) that poses a significant threat to water quality in its jurisdiction as a result of violations of their storm water ordinances.

c. RESIDENTIAL

Each Copermittee must implement a residential program that meets the requirements of this section, prevents illicit discharges into the MS4, reduces residential discharges of storm water pollutants from the MS4 to the MEP, and prevents residential discharges from the MS4 from causing or contributing to a violation of water quality standards.

(1) Threat to Water Quality Prioritization

Each Copermittee must identify residential areas and activities that pose a high threat to water quality. At a minimum, these must include:

(a) Automobile repair, maintenance, washing, and parking;
(b) Home and garden care activities and product use (pesticides, herbicides, and fertilizers);
(c) Disposal of trash, pet waste, green waste, and household hazardous waste (e.g., paints, cleaning products);
(d) Any other residential source that the Copermittee determines may contribute a significant pollutant load to the MS4;

(e) Any residential areas tributary to and within the same hydrologic subarea as a CWA section 303(d) impaired water body, where the residence generates pollutants for which the water body is impaired; and
(f) Any residential areas within or directly adjacent to or discharging directly to receiving waters within an environmentally sensitive area (as defined in Attachment C of this Order)

(2) BMP Implementation

(a) Pollution Prevention: Each Copermittee must actively encourage the use of pollution prevention methods by residents.

(b) Designate BMPs: Each Copermittee must designate minimum BMPs for high-threat-to-water quality residential areas and activities. The designated minimum BMPs for high-threat-to-water quality residential areas and activities must be area or activity specific.

(c) Hazardous Waste BMPs: Each Copermittee must facilitate the proper management and disposal of used oil, toxic materials, and other household hazardous wastes. Such facilitation must include educational activities, public information activities, and establishment of collection sites operated individually and/or jointly by the Copermittee(s) or a private entity. Curbside collection of household hazardous wastes is encouraged.

(d) Implement BMPs: Each Copermittee must implement, or require implementation of, the designated minimum BMPs and any additional measures necessary to comply with Sections A and B of this Order.

(e) Each Copermittee must implement, or require implementation of, BMPs for residential areas and activities that have not been designated a high threat to water quality, as necessary.

(3) Enforcement of Residential Areas and Activities

Each Copermittee must enforce its storm water ordinance for all residential areas and activities as necessary to maintain compliance with this Order.

(4) Common Interest Areas (CIA) / Home Owner Association (HOA) Areas, and Mobile Home Parks

Each Copermittee must ensure that effective measures exist and are implemented or required to be implemented to ensure that runoff within and from common interest developments, including areas managed by associations and mobile home parks, and meets the objectives of this section and Order.

(a) BMP Implementation: Each Copermittee must implement or require implementation of management measures based on a review of pertinent factors, including:

(i) Maintenance duties and procedures typically used by CIA/HOA maintenance associations within its jurisdiction;
(ii) Whether streets and storm drains are publicly or privately owned within the CIA/HOA or mobile home park;
(iii) Whether the CIA/HOA area or mobile home park has been identified as a high priority residential area based on an evaluation of the site potential to generate pollutants contributing to a 303(d) listed waterbody or an observed action level exceedance; and
(iv) Other activities conducted or authorized by the HOA that may pose a significant risk to inland receiving waters.

(b) Legal Authority and Enforcement: By July 1, 2012, each Copermittee must review, and if necessary update, its Municipal Code to verify that they have the legal authority to implement and enforce its ordinances within CIA/HOA areas and mobile home parks.

d. RETROFITTING EXISTING DEVELOPMENT

Each Copermittee must develop and implement a retrofitting program that meets the requirements of this section. The goals of the existing development retrofitting program are to address the impacts of existing development through retrofit projects that reduce impacts from hydromodification, promote LID, support riparian and aquatic habitat restoration, reduce the discharges of storm water pollutants from the MS4 to the MEP, and prevent discharges from the MS4 from causing or contributing to a violation of water quality standards. Where feasible, at the discretion of the Copermittee, the existing development retrofitting program may be coordinated with flood control projects and other infrastructure improvement programs.

(1) The Copermittee(s) must identify and inventory existing areas of development (i.e. municipal, industrial, commercial, residential) as candidates for retrofitting. Potential retrofitting candidates must include but are not limited to:

(a) Areas of development that generate pollutants of concern to a TMDL or an ESA;
(b) Receiving waters that are channelized or otherwise hardened;
(c) Areas of development tributary to receiving waters that are channelized or otherwise hardened;

(d) Areas of development tributary to receiving waters that are significantly eroded; and
(e) Areas of development tributary to an ASBS or SWQPA.

(2) Each Copermittee must evaluate and rank the inventoried areas of existing developments to prioritize retrofitting. Criteria for evaluation must include but is not limited to:

(a) Feasibility;
(b) Cost effectiveness;
(c) Pollutant removal effectiveness, including reducing pollutants exceeding action level;
(d) Tributary area potentially treated;
(e) Maintenance requirements;
(f) Landowner cooperation;
(g) Neighborhood acceptance;
(h) Aesthetic qualities;
(i) Efficacy at addressing concern; and
(j) Potential improvements on public health and safety.

(3) Each Copermittee must consider the results of the evaluation in prioritizing work plans for the following year in accordance with Sections G.1 and J. Highly feasible projects expected to benefit water quality should be given a high priority to implement source control and treatment control BMPs. Where feasible, the retrofit projects may be designed in accordance with the SSMP requirements within sections F.1.d.(3) through F.1.d.(8) and the Hydromodification requirements in Section F.1.h.

(4) The Copermittees must cooperate with private landowners to encourage site specific retrofitting projects. The Copermittee must consider the following practices in cooperating and encouraging private landowners to retrofit their existing development:

(a) Demonstration retrofit projects;
(b) Retrofits on public land and easements that treat runoff from private developments;
(c) Education and outreach;
(d) Subsidies for retrofit projects;
(e) Requiring retrofit projects as enforcement, mitigation or ordinance compliance;
(f) Public and private partnerships; and
(g) Fees for existing discharges to the MS4 and reduction of fees for retrofit implementation.

(5) The known completed retrofit BMPs must be tracked in accordance with Section F.1.f. Retrofit BMPs on publicly owned properties must be inspected per section F.1.f . Privately owned retrofit BMPs must be inspected as needed.

(6) Where constraints on retrofitting preclude effective BMP deployment on existing developments at locations critical to protect receiving waters (as identified in section F.3.d.(1)), a Copermittee may propose a regional mitigation project to improve water quality. Such regional projects may include but are not limited to:

(a) Regional water quality treatment BMPs;
(b) Urban creek or wetlands restoration and preservation;
(c) Daylighting and restoring underground creeks;
(d) Localized rainfall storage and reuse to the extent such projects are fully protective of downstream water rights;
(e) Hydromodification project; and
(f) Removal of invasive plant species.

(7) A retrofit project or regional mitigation project may qualify as a Watershed Water Quality Activity provided it meets the requirements in section G. Watershed Workplan.

4. ILLICIT DISCHARGE DETECTION AND ELIMINATION

Each Copermittee must implement a program that meets the requirements of this section to actively detect and eliminate illicit discharges and disposal into the MS4. The program must address all types of illicit discharges and connections excluding those non-storm water discharges not prohibited by the Copermittee in accordance with section B of this Order.

a. PREVENT AND DETECT ILLICIT DISCHARGES AND CONNECTIONS

Each Copermittee must implement measures to prevent and detect illicit discharges to the MS4.

(1) Legal Authority: Each Copermittee must retain legal authority to prevent and eliminate illicit discharges and connections to the MS4.

(2) Inspections: Each Copermittee must include use of appropriate Copermittee personnel and contractors to assist in identifying illicit discharges and connections during their daily activities.

(a) Visual inspections for illegal discharges and connections must be conducted during routine maintenance of all MS4 facilities.

(b) Copermittee staff and contractors conducting non-MS4 field operations must be trained to report suspected illegal discharges and connections to proper Copermittee staff.

b. **MAINTAIN MS4 MAP**

Each Copermittee must maintain an updated map of its entire MS4 and the corresponding drainage areas within its jurisdiction. The use of GIS is strongly encouraged. The MS4 map must include all segments of the storm sewer system owned, operated, and maintained by the Copermittee, as well as all known locations of inlets that discharge and/or collect runoff into the Copermittee's MS4, all known locations of connections with other MS4s (e.g. Caltrans), and all known locations of all the outfalls that discharge runoff from the Copermittee's MS4. The accuracy of the MS4 map must be confirmed during dry weather field screening and analytical monitoring and must be updated at least annually. The MS4 map including any GIS layers must be submitted with the updated JRMP.

c. **FACILITATE PUBLIC REPORTING OF ILLICIT DISCHARGES AND CONNECTIONS - PUBLIC HOTLINE**

Each Copermittee must promote, publicize and facilitate public reporting of illicit discharges or water quality impacts associated with discharges into or from MS4s. Each Copermittee must facilitate public reporting through development and operation of a public hotline. Public hotlines can be Copermittee-specific or shared by Copermittees. All storm water hotlines must be capable of receiving reports in both English and Spanish 24 hours per day and seven days per week. All reported incidents, and how each was resolved, must be summarized in each Copermittee's Annual Report.

d. **DRY WEATHER FIELD SCREENING AND ANALYTICAL MONITORING**

Each Copermittee must conduct dry weather field screening and analytical monitoring of MS4 outfalls and other portions of its MS4 within its jurisdiction to detect illicit discharges and connections in accordance with Receiving Waters and MS4 Discharge Monitoring and Reporting Program No. R9-2010-0016 in Attachment E of this Order.

e. **INVESTIGATION / INSPECTION AND FOLLOW-UP**

Each Copermittee must implement procedures to investigate and inspect portions of its MS4 that, based on the results of field screening, analytical monitoring, or other appropriate information, indicate a reasonable potential of containing illicit discharges, illicit connections, or other sources of pollutants in non-storm water.

(1) Develop response criteria for data: Each Copermittee must develop, update, and use numeric criteria action levels (or other actions level criteria where appropriate) to determine when follow-up investigations will be performed in response to water quality monitoring. The criteria must include required non-storm water action levels (see Section C) and a consideration of 303(d)-listed waterbodies and environmentally sensitive areas (ESAs) as defined in Attachment C.

(2) Respond to data: Each Copermittee must investigate portions of the MS4 for which water quality data or conditions indicates a potential illegal discharge or connection.

(a) Obvious illicit discharges (i.e. color, odor, or significant exceedances of action levels) must be investigated immediately.

(b) Field screen data: Within two business days of receiving dry weather field screening results that exceed action levels, the Copermittee(s) having jurisdiction must either initiate an investigation to identify the source of the discharge or document the rationale for why the discharge does not pose a threat to water quality and does not need further investigation. This documentation must be included in the Annual Report.

(c) Analytical data: Within five business days of receiving analytical laboratory results that exceed action levels, the Copermittee(s) having jurisdiction must either initiate an investigation to identify the source of the discharge or document the rationale for why the discharge does not pose a threat to water quality and does not need further investigation. This documentation must be included in the Annual Report.

(3) Respond to notifications: Each Copermittee must respond to and resolve each reported incident (e.g., public hotline, staff notification, etc.) made to the Copermittee in a timely manner. Criteria may be developed to assess the validity of, and prioritize the response to, each report.

f. **ELIMINATION OF ILLICIT DISCHARGES AND CONNECTIONS**

Each Copermittee must take immediate action to initiate steps necessary to eliminate all detected illicit discharges, illicit discharge sources, and illicit connections after detection within its jurisdiction. Elimination measures may include an escalating series of enforcement actions for those illicit discharges that are not a serious threat to public health or the environment. Illicit discharges that pose a serious threat to the public's health or the environment must be eliminated immediately.

g. **ENFORCE ORDINANCES**

Each Copermittee must implement and enforce its ordinances, orders, or other legal authority to prevent illicit discharges and connections to its MS4 and to eliminate detected illicit discharges and connections to its MS4.

h. **PREVENT AND RESPOND TO SEWAGE SPILLS (INCLUDING FROM PRIVATE LATERALS AND FAILING SEPTIC SYSTEMS) AND OTHER SPILLS**

Each Copermittee must implement management measures and procedures (including a notification mechanism) to prevent, respond to, contain and clean up all sewage (see below) and other spills that may discharge into its MS4 from any source (including private laterals and failing septic systems). Copermittees must coordinate with spill response teams to prevent entry of spills into the MS4 and contamination of surface water, ground water and soil. Each Copermittee must coordinate spill prevention, containment and response activities throughout all appropriate Copermittee departments, programs and agencies so that maximum water quality protection is available at all times.

5. PUBLIC PARTICIPATION COMPONENT

Each Copermittee must incorporate a mechanism for public participation in the updating, development, and implementation of the JRMP.

6. EDUCATION COMPONENT

Each Copermittee must implement education programs to (1) measurably increase the knowledge regarding MS4s, impacts of runoff on receiving waters, and potential BMP solutions for the target audience; and (2) to measurably change the behavior of target communities and thereby reduce pollutants in storm water discharges and eliminate prohibited non-storm water discharges to MS4s and the environment. At a minimum, the education programs must meet the requirements of this section and address the following target communities:

- Copermittee Departments and Personnel
- New Development / Redevelopment Project Applicants, Developers, Contractors, Property Owners, and other Responsible Parties
- Construction Site Owners and Operators
- Commercial Owners and Operators
- Industrial Owners and Operators
- Residential Community and General Public

a. **GENERAL REQUIREMENTS**

(1) At a minimum, the Copermittee education programs must educate each target community on the following topics, as appropriate to the target community's potential storm water and non-storm water discharges to the MS4:

(a) Applicable water quality laws, regulations, permits, and requirements;
(b) Best management practices;
(c) General runoff concepts;
(d) Existing water quality, including local water quality conditions, impaired waterbodies and environmentally sensitive areas; and
(e) Other topics, as determined by the Copermittee(s), such as public reporting mechanisms, water conservation, low-impact development techniques, and public health and vector issues associated with runoff.

(2) Each Copermittee must implement educational activities, public information activities, and other appropriate activities to facilitate the proper management and disposal of used oil and toxic materials.

b. **SPECIFIC REQUIREMENTS**

(1) <u>Copermittee Departments and Personnel</u>

(a) Each Copermittee must implement an education program so its staff and contractors (and Planning Boards and Elected Officials, if applicable) responsible for implementing the requirements of this Order have an understanding of the following topics as applicable to their responsibilities:

(i) Applicable water quality laws and regulations;
(ii) The potential effects and impacts that Copermittee departments and personnel activities related to their job duties can have on water quality);
(iii) Plan review policies and procedures to verify consistent application;
(iv) Methods of minimizing impacts to receiving water quality resulting from development, construction, and other potential pollutant generating activities;

(v) Proper implementation of erosion and sediment control, source control, treatment control, and other BMPs to minimize the impacts to receiving water quality resulting from development, construction, and other potential pollutant generating activities;
(vi) Applicable recordkeeping and tracking mechanisms; and
(vii) Inspection and enforcement procedures, BMP implementation, and review of monitoring data.

(b) Each Copermittee must train its staff responsible for oversight and conducting storm water compliance inspections and enforcement of construction activities (e.g. construction, building, code enforcement, grading review staffs, inspectors, and other responsible construction staff) annually prior to the rainy season.

(c) Each Copermittee must train its staff responsible for conducting storm water compliance inspections and enforcement of industrial and commercial facilities at least once a year.

(2) New Development / Redevelopment and Construction Sites

As early in the planning and development process as possible and all through the permitting and construction process, each Copermittee must notify parties responsible for the project about the importance of educating all construction workers in the field about storm water issues and BMPs, in addition to the topics under Section F.6.a.(1).

(3) Commercial and Industrial Sites / Sources

At least once during the five-year period of this Order, each Copermittee must notify the owner/operator of each of its inventoried commercial and industrial site/source of the BMP requirements applicable to the site/source.

(4) Residential and General Public

Each Copermittee shall collaboratively conduct or participate in development and implementation of a program to educate residential and general public target communities. The Copermittee residential and general public education programs must address potential pollutant generating activities (e.g., car washing, mobile operations, yard maintenance) and pollutant generating products (e.g., pesticides, fertilizers, household chemicals). The target audiences of the residential and general public education programs must include underserved target audiences (e.g., disadvantaged communities), residents and managers of CIA/HOA areas, and owners and residents of mobile home parks.

G. WATERSHED WATER QUALITY WORKPLAN

Each Copermittee must collaborate with other Copermittees to develop and implement a Watershed Water Quality Workplan (Watershed Workplan) to identify, prioritize, address, and mitigate the highest priority water quality issues/pollutants in the Upper Santa Margarita Watershed.

1. Watershed Workplan Components

The work plan must, at a minimum:

a. Characterize the receiving water quality in the watershed. Characterization must include assessment and analysis of regularly collected water quality data, reports, monitoring and analysis generated in accordance with the requirements of the Receiving Waters Monitoring and Reporting Program, as well as applicable information available from other public and private organizations. This characterization must include an updated watershed map.

b. Identify and prioritize water quality problem(s) in terms of constituents by location, in the watershed's receiving waters. In identifying water quality problem(s), the Copermittees must, at a minimum, give consideration to TMDLs, receiving waters listed on the CWA section 303(d) list, waters with persistent violations of water quality standards, toxicity, or other impacts to beneficial uses, and other pertinent conditions.

c. Identify the likely sources, pollutant discharges and/or other factors causing the highest water quality problem(s) within the watershed. Efforts to determine such sources must include, but not be limited to: use of information from the construction, industrial/commercial, municipal, and residential source identification programs required within the JRMP of this Order; water quality monitoring data collected as part of the Receiving Water Monitoring and Reporting Program required by this Order, and additional focused water quality monitoring to identify specific sources within the watershed.

d. Develop a watershed BMP implementation strategy to attain receiving water quality objectives in the identified highest priority water quality problem(s) and locations. The BMP implementation strategy must include a schedule for implementation of the BMPs to abate specific receiving water quality problems and a list of criteria to be used to evaluate BMP effectiveness. Identified watershed water quality problems may be the result of jurisdictional discharges that will need to be addressed with BMPs applied in a specific jurisdiction in order to generate a benefit to the watershed. This implementation strategy must include a map of any implemented and/or proposed BMPs.

e. Develop a strategy to monitor improvements in receiving water quality directly

resulting from implementation of the BMPs described in the Watershed Workplan. The monitoring strategy must review the necessary data to report on the measured pollutant reduction that results from proper BMP implementation. Monitoring must, at a minimum, be conducted in the receiving water to demonstrate reduction in pollutant concentrations and progression towards attainment of receiving water quality objectives.

f. Establish a schedule for development and implementation of the Watershed strategy outlined in the Workplan. The schedule must, at a minimum, include forecasted dates of planned actions to address Provisions E.2(a) through E.2(e) and dates for watershed review meetings through the remaining portion of this Permit cycle. Annual watershed workplan review meetings must be open to the public and appropriately publically noticed such that interested parties may come and provide comments on the watershed program.

2. Watershed Workplan Implementation

Watershed Copermittee's must implement the Watershed Workplan within 90 days of submittal unless otherwise directed by the San Diego Water Board.

3. Copermittee Collaboration

Watershed Copermittees must collaborate to develop and implement the accepted Watershed Workplan. Watershed Copermittee collaboration must include frequent regularly scheduled meetings. The Copermittees must pursue efforts to obtain any interagency agreements, or other coordination efforts, with non-Copermittee owners of the MS4 (such as Caltrans, Native American tribes, and school districts) to control the contribution of pollutants from one portion of the shared MS4 to another portion of the shared MS4. The Copermittees must, as appropriate, participate in watershed management efforts to address water quality issues within the entire Santa Margarita Watershed (such as the County of San Diego and U.S. Marine Corps Camp Pendleton).

4. Public Participation

Watershed Copermittees must implement a watershed-specific public participation mechanism within each watershed. A required component of the watershed-specific public participation mechanism must be a minimum 30-day public review of and opportunity to comment on the Watershed Workplan prior to submittal to the San Diego Water Board. The Workplan must include a description of the public participation mechanisms to be used and identification of the persons or entities anticipated to be involved during the development and implementation of the Watershed Workplan.

5. Watershed Workplan Review and Updates

Watershed Copermittees must review and update the Watershed Workplan annually to identify needed changes to the prioritized water quality problem(s) listed in the workplan. All updates to the Watershed Workplan must be presented during an Annual Watershed Review Meeting. Annual Watershed Review Meetings must occur once every calendar year and be conducted by the Watershed Copermittees. Annual Watershed Review Meetings must be open to the public and adequately noticed. Individual Watershed Copermittees must also review and modify their jurisdictional programs and JRMP Annual Reports, as necessary, so that they are consistent with the updated Watershed Workplan.

6. Pyrethroid Toxicity Reduction Evaluation

The Watershed Copermittees must incorporate the pyrethroid pollutant reduction program[18] into the Watershed Workplan. The pyrethroid pollutant reduction program must include the following elements:

a. Pursue state and federal regulatory change;
b. Implement a set of source controls targeted specifically at urban pyrethroid use;
c. Through the annual reporting process, monitor the implementation of those controls, assess effectiveness, and identify sources or areas where additional effort is needed;
d. Implement additional controls as needed; and
e. Continue to monitor implementation, as well as conditions within the target receiving waters, assess effectiveness, and re-evaluate control programs.

H. FISCAL ANALYSIS

1. Secure Resources: Each Copermittee must exercise its full authority to secure the resources necessary to meet all requirements of this Order.

2. Annual Analysis: Each Copermittee must conduct an annual fiscal analysis of the necessary capital and operation and maintenance expenditures necessary to accomplish the activities of the programs required by this Order. The analysis must include estimated expenditures for the current reporting period, the preceding period, and the next reporting period.

a. Each analysis must include a description of the source of funds that are proposed to meet the necessary expenditures.
b. Each analysis must include a narrative description of circumstances resulting in a 25 percent or greater annual change for any budget line items.

[18] The pyrethroid pollutant reduction program is described in the "Riverside County – Santa Margarita Region Pyrethroid Source Identification Toxicity Reduction Evaluation, Final Phase II Report", January 2009 by MACTEC.

3. Annual Reporting: Each Copermittee must submit its annual fiscal analysis with the annual JRMP report.

I. TOTAL MAXIMUM DAILY LOADS

1. The waste load allocations (WLAs) of fully approved and adopted TMDLs are incorporated as Water Quality Based Effluent Limitations on a pollutant by pollutant, watershed by watershed basis. Early TMDL requirements, including monitoring, may be required and inserted into this Order pursuant to Finding E.10.

2. The Cities of Wildomar and Murrieta must comply with the requirements and WLAs assigned to the discharges from their MS4s contributing to the Lake Elsinore/Canyon Lake (San Jacinto Watershed) Nutrient TMDLs as specified in Section VI.D.2 of the Santa Ana Water Board's Order R8-2010-0033, including relevant sections of the fact sheet and findings, and subsequent revisions thereto.

J. PROGRAM EFFECTIVENESS ASSESSMENT AND REPORTING

Beginning with the Annual Report due in 2013, each Copermittee must annually assess and report upon the effectiveness of its JRMP and Watershed Workplan implementation to (1) reduce the discharge of storm water pollutants from its MS4 to the MEP; (2) prohibit non-stormwater discharges; and (3) prevent runoff discharges from the MS4 from causing or contributing to a violation of water quality standards.

1. Program Effectiveness Assessments

a. IDENTIFY EFFECTIVENESS ASSESSMENTS

With the JRMP and Watershed Workplan submittal, each Copermittee must establish assessment measures or methods for each of the six outcome levels described by CASQA[19], using data from each JRMP program component, the MRP, and the Watershed Workplan.

(1) Assessment interval: For each established assessment measure or method, an assessment interval must be established as appropriate to the measure or method.

(2) Projected Timeframe: For each established assessment measure or method, each Copermittee must identify the projected timeframe within which the associated outcome level can adequately assess change.

[19] Effectiveness assessment outcome levels as defined by CASQA are defined in Attachment C of this Order. See "*Municipal Stormwater Program Effectiveness Assessment Guidance"* (CASQA, May 2007) for guidance for assessing program activities at the various outcome levels.

b. **PERFORM ASSESSMENTS**

(1) Annually: Each year, the Copermittee must perform each applicable assessment based on the associated assessment interval, and determine whether the desired outcome has been met.

(2) With the submittal of the Report of Waste Discharge, the Copermittees must determine whether their program implementation is resulting in the protection and/or improvement of water quality through an Integrated Assessment.

2. Respond to Assessments

a. Where the assessments indicate that the desired outcome level has not been achieved at the end of the projected timeframe, the Copermittee must review its applicable activities and BMPs to identify any modifications and improvements needed to maximize effectiveness, as necessary to comply with this Order. If the Copermittee determines that the existing activities/BMPs are adequate, or that the projected timeframe should be extended, justification and an updated timeframe for attainment of the outcome level must be provided in the Annual Report.

b. Each Copermittee must develop and implement a work plan and schedule to address any program modifications and improvements in response to the findings of its assessment. The work plan and schedule must be provided and updated with the applicable Annual Report. The work plan must include, at a minimum, the following:

(1) The problems and priorities identified during the assessment;
(2) A list of priority pollutants and known or suspected sources;
(3) A brief description of the strategy employed to reduce, eliminate or mitigate the negative impacts;
(4) A description and schedule for new and/or modified BMPs. The schedule is to include dates for significant milestones;
(5) A description of how the selected activities will address an identified high priority problem. This will include a description of the expected effectiveness and benefits of the new and/or modified BMPs;
(6) A description of implementation effectiveness metrics;
(7) A description of how efficacy results will be used to modify priorities and implementation; and
(8) A review of past activities implemented, progress in meeting water quality standards, and planned program adjustments.

3. Assessment and Response Reporting

Each Copermittee must include a summary of its effectiveness assessments within each Annual Report. Beginning with the FY 2012-2013 Annual Report, the Program Effectiveness reporting must include:

a. The results of each of the effectiveness assessments performed pursuant to J.1.b, including the demonstrated CASQA effectiveness level(s);

b. Responses to effectiveness assessments: A description of any program modifications planned in accordance with section J.2, including the work plan and identified schedule for implementation. The description must include the basis for determining that each modified activity and/or BMP represents an improvement expected to result in improved water quality; and

c. A description of any steps to be implemented to improve the Copermittee's ability to assess program effectiveness.

K. REPORTING

The Copermittees may propose alternate reporting criteria and schedules, as part of their updated JRMP, for the Executive Officer's acceptance.

1. Runoff Management Plans

a. **JURISDICTIONAL RUNOFF MANAGEMENT PLANS**

(1) The written account of the overall program to be conducted by each Copermittee to meet the jurisdictional requirements of section F of this Order is referred to as the Jurisdictional Runoff Management Plan (JRMP). Each Copermittee must revise and update its existing JRMP so that it describes all activities the Copermittee will undertake to implement the requirements of this Order. Each Copermittee must submit its updated and revised JRMP to the San Diego Water Board <u>no later than June 30, 2012</u>.

(2) At a minimum, each Copermittee's JRMP must be updated and revised to demonstrate compliance with each applicable section of this Order.

b. **WATERSHED WORKPLANS**

Copermittees must update and revise the Watershed Workplan to describe any changes in water quality problems or priorities, and any necessary change to actions Copermittees will take to implement jurisdictional or watershed BMPs to address those identified. The Copermittees must assemble and submit the Watershed Workplan to the San Diego Water Board no later than June 30, 2012, and must implement the Workplan within 90 days unless otherwise directed by the San Diego Water Board.

2. Other Required Reports and Plans

a. **SSMP UPDATES**

(1) Copermittees must submit their updated SSMP in accordance with the applicable requirements of section F.1 with the JRMP by June 30, 2012.

(2) Within 180 days of determination that the SSMP is in compliance with this Order's provisions, each Copermittee must amend its ordinances consistent with the SSMP and implement the updated SSMP. Any amended or new ordinances must be submitted to the San Diego Water Board the applicable Annual Report.

b. **HMP**

(1) By June 30, 2013, the Copermittees must submit to the San Diego Water Board Executive Officer a draft HMP that has been reviewed by the public, including identification of the appropriate limiting range of flow rates in accordance with the applicable requirements of section F.1.h.

(2) Within 180 of receiving San Diego Water Board comments on the draft HMP, the Copermittees must submit a final HMP that addressed the San Diego Water Board's comments.

(3) Within 90 days of receiving a finding of adequacy from the Executive Officer each Copermittee must incorporate and implement the HMP for all Priority Development Projects.

(4) Prior to acceptance of the HMP by the San Diego Water Board, the early implementation measures likely to be included in the HMP shall be encouraged by the Copermittees.

c. **REPORT OF WASTE DISCHARGE**

The Copermittees must submit to the San Diego Water Board, no later than 180 days in advance of the expiration date of this Order, a Report of Waste Discharge (ROWD) as an application for issuance of new waste discharge requirements. The fourth annual report for this Order may supplement the ROWD, provided the ROWD contains the minimum information below.

At a minimum, the ROWD must include the following: (1) Proposed changes to the Copermittees' runoff management programs; (2) Proposed changes to monitoring programs; (3) Justification for proposed changes; (4) Name and mailing addresses of the Copermittees; (5) Names and titles of primary contacts of the Copermittees; (6) Any other information necessary for the reissuance of this Order and (7) Any other information required by federal regulations for permit reapplications.

3. Annual Reports

JURISDICTIONAL RUNOFF MANAGEMENT PROGRAM (JRMP) ANNUAL REPORTS

a. Each Copermittee must generate individual JRMP Annual Reports that cover implementation of its jurisdictional activities during the past annual reporting period. Each Annual Report must verify and document compliance with this Order as directed in this section. Each Copermittee must retain records in accordance with the Standard Provisions in Attachment B of this Order, available for review, that document compliance with each requirement of this Order. The reporting period for these annual reports must be the previous fiscal year.

b. Each Copermittee must submit its JRMP Annual Reports to the San Diego Water Board by October 31of each year, beginning on October 31, 2013.

c. Each JRMP Annual Report must contain, at a minimum, the following information, as applicable to the Copermittee:

(1) Information required to be reported annually in Section H (Fiscal Analysis) of this Order;
(2) Information required to be reported annually in Section J (Program Effectiveness) of this Order;
(3) The completed Reporting Checklist found in Attachment D; and
(4) Information for each program component as described in the following Table 5:

Table 5. Annual Reporting Requirements

Program Component	Reporting Requirement
New Development	1. All updated relevant sections of the General Plan and environmental review process and a description of any planned updates within the next annual reporting period, if applicable;
	2. All revisions to the SSMP, including where applicable: (a) Identification and summary of where the SSMP fails to meet the requirements of this Order; (b) Updated procedures for identifying pollutants of concern for each Priority Development Project; (c) Updated treatment BMP ranking matrix; (d) Updated site design and treatment control BMP design standards;
	3. Number of Priority Development Projects reviewed and approved during the reporting period. Brief description of BMPs required at approved Priority Development Projects. Verification that site design, source control, and treatment BMPs were required on all applicable Priority Development Projects;
	4. Name and location of all Priority Development Projects that were granted a waiver from implementing LID BMPs pursuant to section F.1.d.(4) during the reporting period;
	5. Updated watershed-based BMP maintenance tracking database of approved treatment control BMPs and treatment control BMP maintenance within its jurisdiction, including updates to the list of high-priority Priority Development Projects; and verification that the requirements of this Order were met during the reporting period;

Table 5. Annual Reporting Requirements (Cont'd)

Program Component	Reporting Requirement
New Development (Cont'd)	6. Name and brief description of all approved Priority Development Projects required to implement hydrologic control measures in compliance with section F.1.h including a brief description of the management measures planned to protect downstream beneficial uses and prevent adverse physical changes to downstream stream channels;
	7. Number and description of all enforcement activities applicable to the new development and redevelopment component and a summary of the effectiveness of those activities.
Construction	1. All updated relevant ordinances and description of planned ordinance updates within the next annual reporting period, if applicable;
	2. A description of any changes to procedures used for identifying priorities for inspecting sites and enforcing control measures that consider the nature of the construction activity, topography, and the characteristics of soils and receiving water quality;
	3. Any changes to the designated minimum and enhanced BMPs;
	4. Summary of the inspection program, including the following information: (a) Total number and date of inspections conducted at each facility; (b) Number, date, and types of enforcement actions by facility; (c) Brief description of each high-level enforcement actions at construction sites including the effectiveness of the enforcement. Supporting paper (or electronic) files must be maintained by the Copermittees and made available upon San Diego Water Board request. Supporting files must include a record of inspection dates, the results of each inspection, photographs (if any), and a summary of any enforcement actions taken.
Municipal	1. Updated source inventory;
	2. All changes to the designated municipal BMPs;
	3. Descriptions of any changes to procedures to assure that flood management projects assess the impacts on the water quality of receiving water bodies;
	4. Summary and assessment of BMP retrofits implemented at flood control structures, including: (a) List of projects retrofitted; (b) List and description of structures evaluated for retrofitting; (c) List of structures still needing to be evaluated and the schedule for evaluation;

Table 5. Annual Reporting Requirements (Cont'd)

Program Component	Reporting Requirement
Municipal (Cont'd)	5. Summary of the municipal structural treatment control operations and maintenance activities, including: (a) Number of inspections and types of facilities; (b) Summary of findings;
	6. Summary of the MS4 and MS4 facilities operations and maintenance activities, including: (a) Number and types of facilities maintained; (b) Amount of material removed; (c) List of facilities planned for bi-annual inspections and the justification;
	7. Summary of the municipal areas/programs inspection activities, including: (a) Number and date of inspections conducted at each facility; (b) The BMP violations identified during the inspection by facility; (c) Number, date and types of enforcement actions by facility; (d) Summary of inspection findings and follow-up activities for each facility;
	8. Description of activities implemented to address sewage infiltration into the MS4;
	9. Description of BMPs and their implementation for unpaved roads construction and maintenance.
Commercial / Industrial	1. Updated inventory of commercial / industrial sources;
	2. Summary of the inspection program, including the following information: (a) Number and date of inspections conducted at each facility or mobile business; (b) The BMP violations identified during the inspection by facility; (c) Number, date, and types of enforcement actions by facility or mobile business; (d) Brief description of each high-level enforcement actions at commercial/industrial sites including the effectiveness of the enforcement and follow-up activities for each facility;
	3. All changes to designated minimum and enhanced BMPs;
	4. A list of industrial sites, including each name, address, and SIC code, that the Copermittee suspects may require coverage under the General Industrial Permit, but has not submitted an NOI.

Table 5. Annual Reporting Requirements (Cont'd)

Program Component	Reporting Requirement
Residential	1. All updated minimum BMPs required for residential areas and activities;
	2. Quantification and summary of applicable runoff and storm water enforcement actions within residential areas and activities;
	3. Description of efforts to manage runoff and storm water pollution in common interest areas and mobile home parks.
Retrofitting Existing Development	1. Updated inventory and prioritization of existing developments identified as candidates for retrofitting;
	2. Description of efforts to retrofit existing developments during the reporting year;
	3. Description of efforts taken to encourage private landowners to retrofit existing development;
	4. A list of all retrofit projects that have been implemented, including site location, a description of the retrofit project, pollutants expected to be treated, and the tributary acreage of runoff that will be treated;
	5. Any proposed retrofit or regional mitigation projects and timelines for future implementation;
	6. Any proposed changes to the Copermittee's overall retrofitting program.
Illicit Discharge Detection and Elimination	1. Any changes to the legal authority to implement Illicit Discharge Detection and Elimination activities;
	2. Any Changes to the established investigation procedures;
	3. Any changes to public reporting mechanisms, including phone numbers and web pages;
	4. Summaries of illicit discharges (including spills and water quality data events) and how each significant case was resolved;
	5. A description of instances when field screening and analytical data exceeded action levels, including those instances for which no investigation was conducted;
	6. A description of follow-up and enforcement actions taken in response to investigations of illicit discharges and a description of the outcome of the investigation/enforcement actions.
Workplans	Updated workplans including priorities, strategy, implementation schedule and effectiveness evaluation.

d. Each JRMP Annual Report must also include the following information regarding non-storm water discharges (see Section B.2. of this Order):

(1) Identification of non-storm water discharge categories identified as a source of pollutants to waters of the U.S;
(2) A description of any updates to ordinances, orders, or similar means to prohibit non-storm water discharge categories identified under section B.2 above ;
(3) Identification of any control measures to be required and implemented for

non-storm water discharge categories identified as needing controls by the San Diego Water Board; and

(4) A description of a program to address pollutants from non-emergency fire fighting flows identified by the Copermittee to be significant sources of pollutants.

4. Interim Reporting Requirements

For the reporting periods, prior to submittal of the JRMP, each JRMP Annual Report must be submitted in accordance with the requirements and deadlines described in Order No. 2004-001.

5. Universal Reporting Requirements

All submittals must include an executive summary, introduction, conclusion, recommendations, and signed certified statement. Each Copermittee must submit a signed certified statement covering its responsibilities for each applicable submittal. The Principal Copermittee must submit a signed certified statement covering its responsibilities for each applicable submittal and the sections of the submittals for which it is responsible.

L. MODIFICATION OF PROGRAMS

Modifications of JRMPs and/or Watershed Workplan may be initiated by the Executive Officer of the San Diego Water Board or by the Copermittees. Requests by Copermittees must be made to the Executive Officer, and must be submitted during the annual review process. Requests for modifications should be incorporated, as appropriate, into the Annual Reports or other deliverables required or allowed under this Order.

1. Minor modifications to JRMPs, and/or Watershed Workplan, may be accepted by the Executive Officer where the Executive Officer finds the proposed modification complies with all discharge prohibitions, receiving water limitations, and other requirements of this Order.

2. Proposed modifications that are not minor require amendment of this Order in accordance with this Order's rules, policies, and procedures.

M. PRINCIPAL COPERMITTEE RESPONSIBILITIES

Within 180 days of adoption of this Order, the Copermittees must designate the Principal Copermittee and notify the San Diego Water Board of the name of the Principal Copermittee. The Principal Copermittee must, at a minimum:

1. Serve as liaison between the Copermittees and the San Diego Water Board on general permit issues, and when necessary and appropriate, represent the Copermittees before the San Diego Water Board.

2. Coordinate permit activities among the Copermittees and facilitate collaboration on the development and implementation of programs required under this Order.

3. Coordinate the submittal of the documents and reports as required by section K of this Order and Receiving Waters and MS4 Discharge Monitoring and Reporting Program No. R9-2010-0016 in Attachment E of this Order.

N. RECEIVING WATERS AND MS4 DISCHARGE MONITORING AND REPORTING PROGRAM

Pursuant to CWC section 13267, the Copermittees must comply with all the requirements contained in Receiving Waters and MS4 Discharge Monitoring and Reporting Program (MRP) No. R9-2010-0016 in Attachment E of this Order.

O. STANDARD PROVISIONS, REPORTING REQUIREMENTS, AND NOTIFICATIONS

1. Each Copermittee must comply with Standard Provisions, Reporting Requirements, and Notifications contained in Attachment B of this Order. This includes 24 hour/5 day reporting requirements for any instance of non-compliance with this Order as described in section 5.e of Attachment B.

2. All plans, reports and subsequent amendments submitted in compliance with this Order must be implemented immediately (or as otherwise specified). All submittals by Copermittees must be adequate to implement the requirements of this Order.

P. ADDITIONAL PROVISIONS

The Executive Officer shall meet with Camp Pendleton and other stakeholders at six (6) month intervals to identify and investigate water quality impacts, flow impacts, and impacts to water rights that may derive from the implementation of Low Impact Development BMPs required by Order R9-2010-0016 as they are developed by the storm water Copermittees. Any key issues or amendments to the Order that derive from those analyses and discussions will be promptly brought to the San Diego Water Board for their consideration.

I, David W. Gibson, Executive Officer, do hereby certify the foregoing is a full, true, and correct copy of an Order adopted by the California Regional Water Quality Control Board, San Diego Region, on November 10, 2010.

David W. Gibson
Executive Officer

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proposed project have a significant adverse effect on fish and wildlife, or on wetlands or any other wildife habitat, especially those of endangered species? How significant is this impact in relation to the local or regional critical habitat needs? Have actions to mitigate habitat destruction been incorporated into the project? Has the recipient properly consulted with appropriate State and Federal fish, game and wildlife agencies and with the U.S. Fish and Wildlife Service? What were their replies?

(13) Describe any feasible alternatives to the proposed project in terms of environmental impacts, commitment of resources, public interest and costs and why they were not proposed.

(14) Describe other measures not discussed previously that are necessary to mitigate adverse environmental impacts resulting from the implementation of the proposed project.

Subpart I—Grants for Construction of Treatment Works

AUTHORITY: Secs. 101(e), 109(b), 201 through 205, 207, 208(d), 210 through 212, 215 through 219, 304(d)(3), 313, 501, 502, 511 and 516(b) of the Clean Water Act, as amended, 33 U.S.C. 1251 *et seq*.

SOURCE: 49 FR 6234, Feb. 17, 1984, unless otherwise noted.

§ 35.2000 Purpose and policy.

(a) The primary purpose of Federal grant assistance available under this subpart is to assist municipalities in meeting enforceable requirements of the Clean Water Act, particularly, applicable National Pollutant Discharge Elimination System (NPDES) permit requirements.

(b) This subpart supplements EPA's Uniform Relocation and Real Property Acquisition Policies Act regulation (part 4 of this chapter), its National Environmental Policy Act (NEPA) regulation (part 6 of this chapter), its public participation regulation (part 25 of this chapter), its intergovernmental review regulation (part 29 of this chapter), its general grant regulation (part 30 of this chapter), its debarment regulation (part 32 of this chapter), and its procurement under assistance regulation (part 33 of this chapter), and establishes requirements for Federal grant assistance for the building of wastewater treatment works. EPA may also find it necessary to publish other requirements applicable to the construction grants program in response to Congressional action and executive orders.

(c) EPA's policy is to delegate administration of the construction grants program on individual projects to State agencies to the maximum extent possible (see subpart F). Throughout this subpart we have used the term Regional Administrator. To the extent that the Regional Administrator delegates review of projects for compliance with the requirements of this subpart to a State agency under a delegation agreement (§ 35.1030), the term Regional Administrator may be read State agency. This paragraph does not affect the rights of citizens, applicants or grantees provided in subpart F.

(d) In accordance with the Federal Grant and Cooperative Agreement Act (Pub. L. 95–224) EPA will, when substantial Federal involvement is anticipated, award assistance under cooperative agreements. Throughout this subpart we have used the terms grant and grantee but those terms may be read cooperative agreement and recipient if appropriate.

(e) From time to time EPA publishes technical and guidance materials on various topics relevant to the construction grants program. Grantees may find this information useful in meeting requirements in this subpart. These publications, including the MCD and FRD series, may be ordered from: EPA, 1200 Pennsylvania Ave., NW., room 1115 ET, WH 547, Washington, DC 20460. In order to expedite processing of requests, persons wishing to obtain these publications should request a copy of EPA form 7500–21 (the order form listing all available publications), from EPA Headquarters, Municipal Construction Division (WH–547) or from any EPA Regional Office.

§ 35.2005 Definitions.

(a) Words and terms not defined below shall have the meaning given to them in 40 CFR parts 30 and 33.

(b) As used in this subpart, the following words and terms mean:

(1) *Act*. The Clean Water Act (33 U.S.C. 1251 *et seq*., as amended).

(2) *Ad valorem tax*. A tax based upon the value of real property.

(3) *Allowance*. An amount based on a percentage of the project's allowable building cost, computed in accordance with appendix B.

(4) *Alternative technology*. Proven wastewater treatment processes and techniques which provide for the reclaiming and reuse of water, productively recycle wastewater constitutuents or otherwise eliminate the discharge of pollutants, or recover energy. Specifically, alternative technolgy includes land application of effluent and sludge; aquifer recharge; aquaculture; direct reuse (non-potable); horticulture; revegetation of disturbed land; containment ponds; sludge composting and drying prior to land application; self-sustaining incineration; and methane recovery.

(5) *Alternative to conventional treatment works for a small community*. For purposes of §§ 35.2020 and 35.2032, alternative technology used by treatment works in small communities include alternative technologies defined in paragraph (b)(4), as well as, individual and onsite systems; small diameter gravity, pressure or vacuum sewers conveying treated or partially treated wastewater. These systems can also include small diameter gravity sewers carrying raw wastewater to cluster systems.

(6) *Architectural or engineering services*. Consultation, investigations, reports, or services for design-type projects within the scope of the practice of architecture or professional engineering as defined by the laws of the State or territory in which the grantee is located.

(7) *Best Practicable Waste Treatment Technology (BPWTT)*. The cost-effective technology that can treat wastewater, combined sewer overflows and non-excessive infiltration and inflow in publicly owned or individual wastewater treatment works, to meet the applicable provisions of:

(i) 40 CFR part 133—secondary treatment of wastewater;

(ii) 40 CFR part 125, subpart G—marine discharge waivers;

(iii) 40 CFR 122.44(d)—more stringent water quality standards and State standards; or

(iv) 41 FR 6190 (February 11, 1976)—Alternative Waste Management Techniques for Best Practicable Waste Treatment (treatment and discharge, land application techniques and utilization practices, and reuse).

(8) *Building*. The erection, acquisition, alteration, remodeling, improvement or extension of treatment works.

(9) *Building completion*. The date when all but minor components of a project have been built, all equipment is operational and the project is capable of functioning as designed.

(10) *Collector sewer*. The common lateral sewers, within a publicly owned treatment system, which are primarily installed to receive wastewaters directly from facilities which convey wastewater from individual systems, or from private property, and which include service ''Y'' connections designed for connection with those facilities including:

(i) Crossover sewers connecting more than one property on one side of a major street, road, or highway to a lateral sewer on the other side when more cost effective than parallel sewers; and

(ii) Except as provided in paragraph (b)(10)(iii) of this section, pumping units and pressurized lines serving individual structures or groups of structures when such units are cost effective and are owned and maintained by the grantee.

(iii) This definition excludes other facilities which convey wastewater from individual structures, from private property to the public lateral sewer, or its equivalent and also excludes facilities associated with alternatives to conventional treatment works in small communities.

(11) *Combined sewer*. A sewer that is designed as a sanitary sewer and a storm sewer.

(12) *Complete waste treatment system*. A complete waste treatment system consists of all the treatment works necessary to meet the requirements of title III of the Act, involving: (i) The transport of wastewater from individual homes or buildings to a plant or facility where treatment of the wastewater is accomplished; (ii) the treatment of the wastewater to remove pollutants; and (iii) the ultimate disposal, including recycling or reuse, of the treated wastewater and residues which result from the treatment process.

(13) *Construction*. Any one or more of the following: Preliminary planning to determine the feasibility of treatment works, engineering, architectural, legal, fiscal, or economic investigations or studies, surveys, designs, plans, working drawings, specifications, procedures, field testing of innovative or alternative wastewater treatment processes and techniques (excluding operation and maintenance) meeting guidelines promulgated under section 304(d)(3) of the Act, or other necessary actions, erection, building, acquisition, alteration, remodeling, improvement, or extension of treatment works, or the inspection or supervision of any of the foregoing items.

(14) *Conventional technology*. Wastewater treatment processes and techniques involving the treatment of wastewater at a centralized treatment plant by means of biological or physical/chemical unit processes followed by direct point source discharge to surface waters.

(15) *Enforceable requirements of the Act*. Those conditions or limitations of section 402 or 404 permits which, if violated, could result in the issuance of a compliance order or initiation of a civil or criminal action under section 309 of the Act or applicable State laws. If a permit has not been issued, the term shall include any requirement which, in the Regional Administrator's judgment, would be included in the permit when issued. Where no permit applies, the term shall include any requirement which the Regional Administrator determines is necessary for the best practicable waste treatment technology to meet applicable criteria.

(16) *Excessive infiltration/inflow*. The quantities of infiltration/inflow which can be economically eliminated from a sewer system as determined in a cost-effectiveness analysis that compares the costs for correcting the infiltration/inflow conditions to the total costs for transportation and treatment of the infiltration/inflow. (See §§ 35.2005(b) (28) and (29) and 35.2120.)

(17) *Field testing*. Practical and generally small-scale testing of innovative or alternative technologies directed to verifying performance and/or refining design parameters not sufficiently tested to resolve technical uncertainties which prevent the funding of a promising improvement in innovative or alternative treatment technology.

(18) *Individual systems*. Privately owned alternative wastewater treatment works (including dual waterless/gray water systems) serving one or more principal residences, or small commercial establishments. Normally these are onsite systems with localized treatment and disposal of wastewater, but may be systems utilizing small diameter gravity, pressure or vacuum sewers conveying treated or partially treated wastewater. These systems can also include small diameter gravity sewers carrying raw wastewater to cluster systems.

(19) *Industrial user*. Any nongovernmental, nonresidential user of a publicly owned treatment works which is identified in the Standard Industrial Classification Manual, 1972, Office of Management and Budget, as amended and supplemented, under one of the following divisions:

Division A. Agriculture, Forestry, and Fishing
Division B. Mining
Division D. Manufacturing
Division E. Transportation, Communications, Electric, Gas, and Sanitary Services
Division I. Services

(20) *Infiltration*. Water other than wastewater that enters a sewer system (including sewer service connections and foundation drains) from the ground through such means as defective pipes, pipe joints, connections, or manholes. Infiltration does not include, and is distinguished from, inflow.

(21) *Inflow*. Water other than wastewater that enters a sewer system (including sewer service connections) from sources such as, but not limited to, roof leaders, cellar drains, yard drains, area drains, drains from springs and swampy areas, manhole covers, cross connections between storm sewers and sanitary sewers, catch basins, cooling towers, storm waters, surface runoff, street wash waters, or drainage. Inflow does not include, and is distinguished from, infiltration.

(22) *Initiation of operation*. The date specified by the grantee on which use of the project begins for the purpose for which it was planned, designed, and built.

(23) *Innovative technology*. Developed wastewater treatment processes and techniques which have not been fully proven under the circumstances of their contemplated use and which represent a significant advancement over the state of the art in terms of significant reduction in life cycle cost or significant environmental benefits through the reclaiming and reuse of water, otherwise eliminating the discharge of pollutants, utilizing recycling techniques such as land treatment, more efficient use of energy and resources, improved or new methods of waste treatment management for combined municipal and industrial systems, or the confined disposal of pollutants so that they will not migrate to cause water or other environmental pollution.

(24) *Interceptor sewer*. A sewer which is designed for one or more of the following purposes:

(i) To intercept wastewater from a final point in a collector sewer and convey such wastes directly to a treatment facility or another interceptor.

(ii) To replace an existing wastewater treatment facility and transport the wastes to an adjoining collector sewer or interceptor sewer for conveyance to a treatment plant.

(iii) To transport wastewater from one or more municipal collector sewers to another municipality or to a regional plant for treatment.

(iv) To intercept an existing major discharge of raw or inadequately treated wastewater for transport directly to another interceptor or to a treatment plant.

(25) *Interstate agency*. An agency of two or more States established under an agreement or compact approved by the Congress, or any other agency of two or more States, having substantial powers or duties pertaining to the control of water pollution.

(26) *Marine bays and estuaries*. Semienclosed coastal waters which have a free connection to the territorial sea.

(27) *Municipality*. A city, town, borough, county, parish, district, association, or other public body (including an intermunicipal agency of two or more of the foregoing entities) created under State law, or an Indian tribe or an authorized Indian tribal organization, having jurisdiction over disposal of sewage, industrial wastes, or other waste, or a designated and approved management agency under section 208 of the Act.

(i) This definition includes a special district created under State law such as a water district, sewer district, sanitary district, utility district, drainage district or similar entity or an integrated waste management facility, as defined in section 201(e) of the Act, which has as one of its principal responsibilities the treatment, transport, or disposal of domestic wastewater in a particular geographic area.

(ii) This definition excludes the following:

(A) Any revenue producing entity which has as its principal responsibility an activity other than providing wastewater treatment services to the general public, such as an airport, turnpike, port facility or other municipal utility.

(B) Any special district (such as school district or a park district) which has the responsibility to provide wastewater treatment services in support of its principal activity at specific facilities, unless the special district has the responsibility under State law to provide wastewater treatment services to the community surrounding the special district's facility and no other municipality, with concurrent jurisdiction to serve the community, serves or intends to serve the special district's facility or the surrounding community.

(28) *Nonexcessive infiltration*. The quantity of flow which is less than 120 gallons per capita per day (domestic base flow and infiltration) or the quantity of infiltration which cannot be economically and effectively eliminated from a sewer system as determined in a cost-effectiveness analysis. (See §§ 35.2005(b)(16) and 35.2120.)

(29) *Nonexcessive inflow*. The maximum total flow rate during storm events which does not result in chronic operational problems related to hydraulic overloading of the treatment works or which does not result in a total flow of more than 275 gallons per capita per day (domestic base flow plus

infiltration plus inflow). Chronic operational problems may include surcharging, backups, bypasses, and overflows. (See §§ 35.2005(b)(16) and 35.2120).

(30) *Operation and Maintenance*. Activities required to assure the dependable and economical function of treatment works.

(i) *Maintenance:* Preservation of functional integrity and efficiency of equipment and structures. This includes preventive maintenance, corrective maintenance and replacement of equipment (See § 35.2005(b)(36)) as needed.)

(ii) *Operation:* Control of the unit processes and equipment which make up the treatment works. This includes financial and personnel management; records, laboratory control, process control, safety and emergency operation planning.

(31) *Principal residence*. For the purposes of § 35.2034, the habitation of a family or household for at least 51 percent of the year. Second homes, vacation or recreation residences are not included in this definition.

(32) *Project*. The activities or tasks the Regional Administrator identifies in the grant agreement for which the grantee may expend, obligate or commit funds.

(33) *Project performance standards*. The performance and operations requirements applicable to a project including the enforceable requirements of the Act and the specifications, including the quantity of excessive infiltration and inflow proposed to be eliminated, which the project is planned and designed to meet.

(34) *Priority water quality areas*. For the purposes of § 35.2015, specific stream segments or bodies of water, as determined by the State, where municipal discharges have resulted in the impairment of a designated use or significant public health risks, and where the reduction of pollution from such discharges will substantially restore surface or groundwater uses.

(35) *Project schedule*. A timetable specifying the dates of key project events including public notices of proposed procurement actions, subagreement awards, issuance of notice to proceed with building, key milestones in the building schedule, completion of building, initiation of operation and certification of the project.

(36) *Replacement*. Obtaining and installing equipment, accessories, or appurtenances which are necessary during the design or useful life, whichever is longer, of the treatment works to maintain the capacity and performance for which such works were designed and constructed.

(37) *Sanitary sewer*. A conduit intended to carry liquid and water-carried wastes from residences, commercial buildings, industrial plants and institutions together with minor quantities of ground, storm and surface waters that are not admitted intentionally.

(38) *Services*. A contractor's labor, time or efforts which do not involve the delivery of a specific end item, other than documents (e.g., reports, design drawings, specifications). This term does not include employment agreements or collective bargaining agreements.

(39) *Small commercial establishments*. For purposes of § 35.2034 private establishments such as restaurants, hotels, stores, filling stations, or recreational facilities and private, nonprofit entities such as churches, schools, hospitals, or charitable organizations with dry weather wastewater flows less than 25,000 gallons per day.

(40) *Small Community*. For purposes of §§ 35.2020(b) and 35.2032, any municipality with a population of 3,500 or less or highly dispersed sections of larger municipalities, as determined by the Regional Administrator.

(41) *State*. A State, the District of Columbia, the Commonwealth of Puerto Rico, the Virgin Islands, Guam, American Samoa, the Trust Territory of the Pacific Islands, and the Commonwealth of the Northern Marianas. For the purposes of applying for a grant under section 201(g)(1) of the act, a State (including its agencies) is subject to the limitations on revenue producing entities and special districts contained in § 35.2005(b)(27)(ii).

(42) *State agency*. The State agency designated by the Governor having responsibility for administration of the construction grants program under section 205(g) of the Act.

(43) *Step 1*. Facilities planning.

(44) *Step 2*. Preparation of design drawings and specifications.

(45) *Step 3*. Building of a treatment works and related services and supplies.

(46) *Step 2+3*. Design and building of a treatment works and building related services and supplies.

(47) *Step 7*. Design/building of treatment works wherein a grantee awards a single contract for designing and building certain treatment works.

(48) *Storm sewer*. A sewer designed to carry only storm waters, surface runoff, street wash waters, and drainage.

(49) *Treatment works*. Any devices and systems for the storage, treatment, recycling, and reclamation of municipal sewage, domestic sewage, or liquid industrial wastes used to implement section 201 of the Act, or necessary to recycle or reuse water at the most economical cost over the design life of the works. These include intercepting sewers, outfall sewers, sewage collection systems, individual systems, pumping, power, and other equipment and their appurtenances; extensions, improvement, remodeling, additions, and alterations thereof; elements essential to provide a reliable recycled supply such as standby treatment units and clear well facilities; and any works, including acquisition of the land that will be an integral part of the treatment process or is used for ultimate disposal of residues resulting from such treatment (including land for composting sludge, temporary storage of such compost and land used for the storage of treated wastewater in land treatment systems before land application); or any other method or system for preventing, abating, reducing, storing, treating, separating, or disposing of municipal waste or industrial waste, including waste in combined storm water and sanitary sewer systems.

(50) *Treatment works phase or segment*. A treatment works phase or segment may be any substantial portion of a facility and its interceptors described in a facilities plan under § 35.2030, which can be identified as a subagreement or discrete subitem. Multiple subagreements under a project shall not be considered to be segments or phases. Completion of building of a treatment works phase or segment may, but need not in and of itself, result in an operable treatment works.

(51) *Useful life*. The period during which a treatment works operates. (Not ''design life'' which is the period during which a treatment works is planned and designed to be operated.)

(52) *User charge*. A charge levied on users of a treatment works, or that portion of the ad valorem taxes paid by a user, for the user's proportionate share of the cost of operation and maintenance (including replacement) of such works under sections 204(b)(1)(A) and 201(h)(2) of the Act and this subpart.

(53) *Value engineering*. A specialized cost control technique which uses a systematic and creative approach to identify and to focus on unnecessarily high cost in a project in order to arrive at a cost saving without sacrificing the reliability or efficiency of the project.

[49 FR 6234, Feb. 17, 1984, as amended at 50 FR 45894, Nov. 4, 1985; 55 FR 27095, June 29, 1990]

§ 35.2010 Allotment; reallotment.

(a) Allotments are made on a formula or other basis which Congress specifies for each fiscal year (FY). The allotment for each State and the availability period shall be announced each fiscal year in the FEDERAL REGISTER. This section applies only to funds allotted under section 205 of the Act.

(b) Unless otherwise provided by Congress, all sums allotted to a State under section 205 of the Act shall remain available for obligation until the end of the one year after the close of the fiscal year for which the sums were appropriated. Except as provided in § 35.2020(a), sums not obligated at the end of that period shall be subject to reallotment on the basis of the same ratio as applicable to the then-current fiscal year, adjusted for the States which failed to obligate any of the fiscal year funds being reallotted, but none of the funds reallotted shall be made available to any State which failed to obligate any of the fiscal year funds being reallotted. Any sum made available to a State by reallotment under this section shall be in addition to any funds otherwise allotted to such State for grants under this subpart

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(c) Relationship to Federal activities—Each department, agency or instrumentality of the executive, legislative and judicial branches of the Federal Government having jurisdiction over any property or facility or engaged in any activity resulting, or which may result, in the discharge or runoff of pollutants shall comply with all Federal, State, interstate and local requirements, administrative authority, and process and sanctions respecting the control and abatement of water pollution in the same manner and extent as any non-governmental entity in accordance with section 313 of the CWA.

§ 130.15 Processing application for Indian tribes.

The Regional Administrator shall process an application of an Indian Tribe submitted under § 130.6(d) in a timely manner. He shall promptly notify the Indian Tribe of receipt of the application.

[54 FR 14360, Apr. 11, 1989, as amended at 59 FR 13818, Mar. 23, 1994]

PART 131—WATER QUALITY STANDARDS

Subpart A—General Provisions

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AUTHORITY: 33 U.S.C. 1251 *et seq.*

SOURCE: 48 FR 51405, Nov. 8, 1983, unless otherwise noted.

Subpart A—General Provisions

§ 131.1 Scope.

This part describes the requirements and procedures for developing, reviewing, revising, and approving water quality standards by the States as authorized by section 303(c) of the Clean Water Act. Additional specific procedures for developing, reviewing, revising, and approving water quality standards for Great Lakes States or Great Lakes Tribes (as defined in 40 CFR 132.2) to conform to section 118 of the Clean Water Act and 40 CFR part 132, are provided in 40 CFR part 132.

[60 FR 15386, Mar. 23, 1995]

§ 131.2 Purpose.

A water quality standard defines the water quality goals of a water body, or portion thereof, by designating the use or uses to be made of the water and by setting criteria necessary to protect the uses. States adopt water quality standards to protect public health or welfare, enhance the quality of water and serve the purposes of the Clean

Water Act (the Act). ''Serve the purposes of the Act'' (as defined in sections 101(a)(2) and 303(c) of the Act) means that water quality standards should, wherever attainable, provide water quality for the protection and propagation of fish, shellfish and wildlife and for recreation in and on the water and take into consideration their use and value of public water supplies, propagation of fish, shellfish, and wildlife, recreation in and on the water, and agricultural, industrial, and other purposes including navigation.

Such standards serve the dual purposes of establishing the water quality goals for a specific water body and serve as the regulatory basis for the establishment of water-quality-based treatment controls and strategies beyond the technology-based levels of treatment required by sections 301(b) and 306 of the Act.

§ 131.3 Definitions.

(a) *The Act* means the Clean Water Act (Pub. L. 92–500, as amended (33 U.S.C. 1251 *et seq.*)).

(b) *Criteria* are elements of State water quality standards, expressed as constituent concentrations, levels, or narrative statements, representing a quality of water that supports a particular use. When criteria are met, water quality will generally protect the designated use.

(c) *Section 304(a) criteria* are developed by EPA under authority of section 304(a) of the Act based on the latest scientific information on the relationship that the effect of a constituent concentration has on particular aquatic species and/or human health. This information is issued periodically to the States as guidance for use in developing criteria.

(d) *Toxic pollutants* are those pollutants listed by the Administrator under section 307(a) of the Act.

(e) *Existing uses* are those uses actually attained in the water body on or after November 28, 1975, whether or not they are included in the water quality standards.

(f) *Designated uses* are those uses specified in water quality standards for each water body or segment whether or not they are being attained.

(g) *Use attainability analysis* is a structured scientific assessment of the factors affecting the attainment of the use which may include physical, chemical, biological, and economic factors as described in § 131.10(g).

(h) *Water quality limited segment* means any segment where it is known that water quality does not meet applicable water quality standards, and/or is not expected to meet applicable water quality standards, even after the application of the technology-bases effluent limitations required by sections 301(b) and 306 of the Act.

(i) *Water quality standards* are provisions of State or Federal law which consist of a designated use or uses for the waters of the United States and water quality criteria for such waters based upon such uses. Water quality standards are to protect the public health or welfare, enhance the quality of water and serve the purposes of the Act.

(j) *States* include: The 50 States, the District of Columbia, Guam, the Commonwealth of Puerto Rico, Virgin Islands, American Samoa, the Trust Territory of the Pacific Islands, the Commonwealth of the Northern Mariana Islands, and Indian Tribes that EPA determines to be eligible for purposes of water quality standards program.

(k) *Federal Indian Reservation*, *Indian Reservation*, or *Reservation* means all land within the limits of any Indian reservation under the jurisdiction of the United States Government, notwithstanding the issuance of any patent, and including rights-of-way running through the reservation.''

(l) *Indian Tribe* or *Tribe* means any Indian Tribe, band, group, or community recognized by the Secretary of the Interior and exercising governmental authority over a Federal Indian reservation.

[48 FR 51405, Nov. 8, 1983, as amended at 56 FR 64893, Dec. 12, 1991; 59 FR 64344, Dec. 14, 1994]

§ 131.4 State authority.

(a) States (as defined in § 131.3) are responsible for reviewing, establishing, and revising water quality standards. As recognized by section 510 of the Clean Water Act, States may develop water quality standards more stringent

than required by this regulation. Consistent with section 101(g) and 518(a) of the Clean Water Act, water quality standards shall not be construed to supersede or abrogate rights to quantities of water.

(b) States (as defined in § 131.3) may issue certifications pursuant to the requirements of Clean Water Act section 401. Revisions adopted by States shall be applicable for use in issuing State certifications consistent with the provisions of § 131.21(c).

(c) Where EPA determines that a Tribe is eligible to the same extent as a State for purposes of water quality standards, the Tribe likewise is eligible to the same extent as a State for purposes of certifications conducted under Clean Water Act section 401.

[56 FR 64893, Dec. 12, 1991, as amended at 59 FR 64344, Dec. 14, 1994]

§ 131.5 EPA authority.

(a) Under section 303(c) of the Act, EPA is to review and to approve or disapprove State-adopted water quality standards. The review involves a determination of:

(1) Whether the State has adopted water uses which are consistent with the requirements of the Clean Water Act;

(2) Whether the State has adopted criteria that protect the designated water uses;

(3) Whether the State has followed its legal procedures for revising or adopting standards;

(4) Whether the State standards which do not include the uses specified in section 101(a)(2) of the Act are based upon appropriate technical and scientific data and analyses, and

(5) Whether the State submission meets the requirements included in § 131.6 of this part and, for Great Lakes States or Great Lakes Tribes (as defined in 40 CFR 132.2) to conform to section 118 of the Act, the requirements of 40 CFR part 132.

(b) If EPA determines that the State's or Tribe's water quality standards are consistent with the factors listed in paragraphs (a)(1) through (a)(5) of this section, EPA approves the standards. EPA must disapprove the State's or Tribe's water quality standards and promulgate Federal standards under section 303(c)(4), and for Great Lakes States or Great Lakes Tribes under section 118(c)(2)(C) of the Act, if State or Tribal adopted standards are not consistent with the factors listed in paragraphs (a)(1) through (a)(5) of this section. EPA may also promulgate a new or revised standard when necessary to meet the requirements of the Act.

(c) Section 401 of the Clean Water Act authorizes EPA to issue certifications pursuant to the requirements of section 401 in any case where a State or interstate agency has no authority for issuing such certifications.

[48 FR 51405, Nov. 8, 1983, as amended at 56 FR 64894, Dec. 12, 1991; 60 FR 15387, Mar. 23, 1995]

§ 131.6 Minimum requirements for water quality standards submission.

The following elements must be included in each State's water quality standards submitted to EPA for review:

(a) Use designations consistent with the provisions of sections 101(a)(2) and 303(c)(2) of the Act.

(b) Methods used and analyses conducted to support water quality standards revisions.

(c) Water quality criteria sufficient to protect the designated uses.

(d) An antidegradation policy consistent with § 131.12.

(e) Certification by the State Attorney General or other appropriate legal authority within the State that the water quality standards were duly adopted pursuant to State law.

(f) General information which will aid the Agency in determining the adequacy of the scientific basis of the standards which do not include the uses specified in section 101(a)(2) of the Act as well as information on general policies applicable to State standards which may affect their application and implementation.

§ 131.7 Dispute resolution mechanism.

(a) Where disputes between States and Indian Tribes arise as a result of differing water quality standards on common bodies of water, the lead EPA Regional Administrator, as determined based upon OMB circular A–105, shall

be responsible for acting in accordance with the provisions of this section.

(b) The Regional Administrator shall attempt to resolve such disputes where:

(1) The difference in water quality standards results in unreasonable consequences;

(2) The dispute is between a State (as defined in §131.3(j) but exclusive of all Indian Tribes) and a Tribe which EPA has determined is eligible to the same extent as a State for purposes of water quality standards;

(3) A reasonable effort to resolve the dispute without EPA involvement has been made;

(4) The requested relief is consistent with the provisions of the Clean Water Act and other relevant law;

(5) The differing State and Tribal water quality standards have been adopted pursuant to State and Tribal law and approved by EPA; and

(6) A valid written request has been submitted by either the Tribe or the State.

(c) Either a State or a Tribe may request EPA to resolve any dispute which satisfies the criteria of paragraph (b) of this section. Written requests for EPA involvement should be submitted to the lead Regional Administrator and must include:

(1) A concise statement of the unreasonable consequences that are alleged to have arisen because of differing water quality standards;

(2) A concise description of the actions which have been taken to resolve the dispute without EPA involvement;

(3) A concise indication of the water quality standards provision which has resulted in the alleged unreasonable consequences;

(4) Factual data to support the alleged unreasonable consequences; and

(5) A statement of the relief sought from the alleged unreasonable consequences.

(d) Where, in the Regional Administrator's judgment, EPA involvement is appropriate based on the factors of paragraph (b) of this section, the Regional Administrator shall, within 30 days, notify the parties in writing that he/she is initiating an EPA dispute resolution action and solicit their written response. The Regional Administrator shall also make reasonable efforts to ensure that other interested individuals or groups have notice of this action. Such efforts shall include but not be limited to the following:

(1) Written notice to responsible Tribal and State Agencies, and other affected Federal agencies,

(2) Notice to the specific individual or entity that is alleging that an unreasonable consequence is resulting from differing standards having been adopted on a common body of water,

(3) Public notice in local newspapers, radio, and television, as appropriate,

(4) Publication in trade journal newsletters, and

(5) Other means as appropriate.

(e) If in accordance with applicable State and Tribal law an Indian Tribe and State have entered into an agreement that resolves the dispute or establishes a mechanism for resolving a dispute, EPA shall defer to this agreement where it is consistent with the Clean Water Act and where it has been approved by EPA.

(f) EPA dispute resolution actions shall be consistent with one or a combination of the following options:

(1) *Mediation*. The Regional Administrator may appoint a mediator to mediate the dispute. Mediators shall be EPA employees, employees from other Federal agencies, or other individuals with appropriate qualifications.

(i) Where the State and Tribe agree to participate in the dispute resolution process, mediation with the intent to establish Tribal-State agreements, consistent with Clean Water Act section 518(d), shall normally be pursued as a first effort.

(ii) Mediators shall act as neutral facilitators whose function is to encourage communication and negotiation between all parties to the dispute.

(iii) Mediators may establish advisory panels, to consist in part of representatives from the affected parties, to study the problem and recommend an appropriate solution.

(iv) The procedure and schedule for mediation of individual disputes shall be determined by the mediator in consultation with the parties.

(v) If formal public hearings are held in connection with the actions taken

under this paragraph, Agency requirements at 40 CFR 25.5 shall be followed.

(2) *Arbitration*. Where the parties to the dispute agree to participate in the dispute resolution process, the Regional Administrator may appoint an arbitrator or arbitration panel to arbitrate the dispute. Arbitrators and panel members shall be EPA employees, employees from other Federal agencies, or other individuals with appropriate qualifications. The Regional administrator shall select as arbitrators and arbitration panel members individuals who are agreeable to all parties, are knowledgeable concerning the requirements of the water quality standards program, have a basic understanding of the political and economic interests of Tribes and States involved, and are expected to fulfill the duties fairly and impartially.

(i) The arbitrator or arbitration panel shall conduct one or more private or public meetings with the parties and actively solicit information pertaining to the effects of differing water quality permit requirements on upstream and downstream dischargers, comparative risks to public health and the environment, economic impacts, present and historical water uses, the quality of the waters subject to such standards, and other factors relevant to the dispute, such as whether proposed water quality criteria are more stringent than necessary to support designated uses, more stringent than natural background water quality or whether designated uses are reasonable given natural background water quality.

(ii) Following consideration of relevant factors as defined in paragraph (f)(2)(i) of this section, the arbitrator or arbitration panel shall have the authority and responsibility to provide all parties and the Regional Administrator with a written recommendation for resolution of the dispute. Arbitration panel recommendations shall, in general, be reached by majority vote. However, where the parties agree to binding arbitration, or where required by the Regional Administrator, recommendations of such arbitration panels may be unanimous decisions. Where binding or non-binding arbitration panels cannot reach a unanimous recommendation after a reasonable period of time, the Regional Administrator may direct the panel to issue a non-binding decision by majority vote.

(iii) The arbitrator or arbitration panel members may consult with EPA's Office of General Counsel on legal issues, but otherwise shall have no *ex parte* communications pertaining to the dispute. Federal employees who are arbitrators or arbitration panel members shall be neutral and shall not be predisposed for or against the position of any disputing party based on any Federal Trust responsibilities which their employers may have with respect to the Tribe. In addition, arbitrators or arbitration panel members who are Federal employees shall act independently from the normal hierarchy within their agency.

(iv) The parties are not obligated to abide by the arbitrator's or arbitration panel's recommendation unless they voluntarily entered into a binding agreement to do so.

(v) If a party to the dispute believes that the arbitrator or arbitration panel has recommended an action contrary to or inconsistent with the Clean Water Act, the party may appeal the arbitrator's recommendation to the Regional Administrator. The request for appeal must be in writing and must include a description of the statutory basis for altering the arbitrator's recommendation.

(vi) The procedure and schedule for arbitration of individual disputes shall be determined by the arbitrator or arbitration panel in consultation with parties.

(vii) If formal public hearings are held in connection with the actions taken under this paragraph, Agency requirements at 40 CFR 25.5 shall be followed.

(3) *Dispute resolution default procedure*. Where one or more parties (as defined in paragraph (g) of this section) refuse to participate in either the mediation or arbitration dispute resolution processes, the Regional Administrator may appoint a single official or panel to review available information pertaining to the dispute and to issue a written recommendation for resolving the dispute. Review officials shall be EPA employees, employees from other

Federal agencies, or other individuals with appropriate qualifications. Review panels shall include appropriate members to be selected by the Regional Administrator in consultation with the participating parties. Recommendations of such review officials or panels shall, to the extent possible given the lack of participation by one or more parties, be reached in a manner identical to that for arbitration of disputes specified in paragraphs (f)(2)(i) through (f)(2)(vii) of this section.

(g) *Definitions*. For the purposes of this section:

(1) *Dispute Resolution Mechanism* means the EPA mechanism established pursuant to the requirements of Clean Water Act section 518(e) for resolving unreasonable consequences that arise as a result of differing water quality standards that may be set by States and Indian Tribes located on common bodies of water.

(2) *Parties* to a State-Tribal dispute include the State and the Tribe and may, at the discretion of the Regional Administrator, include an NPDES permittee, citizen, citizen group, or other affected entity.

[56 FR 64894, Dec. 12, 1991, as amended at 59 FR 64344, Dec. 14, 1994]

§ 131.8 Requirements for Indian Tribes to administer a water quality standards program.

(a) The Regional Administrator, as determined based on OMB Circular A–105, may accept and approve a tribal application for purposes of administering a water quality standards program if the Tribe meets the following criteria:

(1) The Indian Tribe is recognized by the Secretary of the Interior and meets the definitions in § 131.3 (k) and (l),

(2) The Indian Tribe has a governing body carrying out substantial governmental duties and powers,

(3) The water quality standards program to be administered by the Indian Tribe pertains to the management and protection of water resources which are within the borders of the Indian reservation and held by the Indian Tribe, within the borders of the Indian reservation and held by the United States in trust for Indians, within the borders of the Indian reservation and held by a member of the Indian Tribe if such property interest is subject to a trust restriction on alienation, or otherwise within the borders of the Indian reservation, and

(4) The Indian Tribe is reasonably expected to be capable, in the Regional Administrator's judgment, of carrying out the functions of an effective water quality standards program in a manner consistent with the terms and purposes of the Act and applicable regulations.

(b) Requests by Indian Tribes for administration of a water quality standards program should be submitted to the lead EPA Regional Administrator. The application shall include the following information:

(1) A statement that the Tribe is recognized by the Secretary of the Interior.

(2) A descriptive statement demonstrating that the Tribal governing body is currently carrying out substantial governmental duties and powers over a defined area. The statement should:

(i) Describe the form of the Tribal government;

(ii) Describe the types of governmental functions currently performed by the Tribal governing body such as, but not limited to, the exercise of police powers affecting (or relating to) the health, safety, and welfare of the affected population, taxation, and the exercise of the power of eminent domain; and

(iii) Identify the source of the Tribal government's authority to carry out the governmental functions currently being performed.

(3) A descriptive statement of the Indian Tribe's authority to regulate water quality. The statement should include:

(i) A map or legal description of the area over which the Indian Tribe asserts authority to regulate surface water quality;

(ii) A statement by the Tribe's legal counsel (or equivalent official) which describes the basis for the Tribes assertion of authority and which may include a copy of documents such as Tribal constitutions, by-laws, charters, executive orders, codes, ordinances, and/or resolutions which support the Tribe's assertion of authority; and

(iii) An identification of the surface waters for which the Tribe proposes to establish water quality standards.

(4) A narrative statement describing the capability of the Indian Tribe to administer an effective water quality standards program. The narrative statement should include:

(i) A description of the Indian Tribe's previous management experience which may include the administration of programs and services authorized by the Indian Self-Determination and Education Assistance Act (25 U.S.C. 450 *et seq.*), the Indian Mineral Development Act (25 U.S.C. 2101 *et seq.*), or the Indian Sanitation Facility Construction Activity Act (42 U.S.C. 2004a);

(ii) A list of existing environmental or public health programs administered by the Tribal governing body and copies of related Tribal laws, policies, and regulations;

(iii) A description of the entity (or entities) which exercise the executive, legislative, and judicial functions of the Tribal government;

(iv) A description of the existing, or proposed, agency of the Indian Tribe which will assume primary responsibility for establishing, reviewing, implementing and revising water quality standards;

(v) A description of the technical and administrative capabilities of the staff to administer and manage an effective water quality standards program or a plan which proposes how the Tribe will acquire additional administrative and technical expertise. The plan must address how the Tribe will obtain the funds to acquire the administrative and technical expertise.

(5) Additional documentation required by the Regional Administrator which, in the judgment of the Regional Administrator, is necessary to support a Tribal application.

(6) Where the Tribe has previously qualified for eligibility or ''treatment as a state'' under a Clean Water Act or Safe Drinking Water Act program, the Tribe need only provide the required information which has not been submitted in a previous application.

(c) Procedure for processing an Indian Tribe's application.

(1) The Regional Administrator shall process an application of an Indian Tribe submitted pursuant to § 131.8(b) in a timely manner. He shall promptly notify the Indian Tribe of receipt of the application.

(2) Within 30 days after receipt of the Indian Tribe's application the Regional Administrator shall provide appropriate notice. Notice shall:

(i) Include information on the substance and basis of the Tribe's assertion of authority to regulate the quality of reservation waters; and

(ii) Be provided to all appropriate governmental entities.

(3) The Regional Administrator shall provide 30 days for comments to be submitted on the Tribal application. Comments shall be limited to the Tribe's assertion of authority.

(4) If a Tribe's asserted authority is subject to a competing or conflicting claim, the Regional Administrator, after due consideration, and in consideration of other comments received, shall determine whether the Tribe has adequately demonstrated that it meets the requirements of § 131.8(a)(3).

(5) Where the Regional Administrator determines that a Tribe meets the requirements of this section, he shall promptly provide written notification to the Indian Tribe that the Tribe is authorized to administer the Water Quality Standards program.

[56 FR 64895, Dec. 12, 1991, as amended at 59 FR 64344, Dec. 14, 1994]

Subpart B—Establishment of Water Quality Standards

§ 131.10 Designation of uses.

(a) Each State must specify appropriate water uses to be achieved and protected. The classification of the waters of the State must take into consideration the use and value of water for public water supplies, protection and propagation of fish, shellfish and wildlife, recreation in and on the water, agricultural, industrial, and other purposes including navigation. In no case shall a State adopt waste transport or waste assimilation as a designated use for any waters of the United States.

(b) In designating uses of a water body and the appropriate criteria for those uses, the State shall take into

consideration the water quality standards of downstream waters and shall ensure that its water quality standards provide for the attainment and maintenance of the water quality standards of downstream waters.

(c) States may adopt sub-categories of a use and set the appropriate criteria to reflect varying needs of such sub-categories of uses, for instance, to differentiate between cold water and warm water fisheries.

(d) At a minimum, uses are deemed attainable if they can be achieved by the imposition of effluent limits required under sections 301(b) and 306 of the Act and cost-effective and reasonable best management practices for nonpoint source control.

(e) Prior to adding or removing any use, or establishing sub-categories of a use, the State shall provide notice and an opportunity for a public hearing under § 131.20(b) of this regulation.

(f) States may adopt seasonal uses as an alternative to reclassifying a water body or segment thereof to uses requiring less stringent water quality criteria. If seasonal uses are adopted, water quality criteria should be adjusted to reflect the seasonal uses, however, such criteria shall not preclude the attainment and maintenance of a more protective use in another season.

(g) States may remove a designated use which is *not* an existing use, as defined in § 131.3, or establish sub-categories of a use if the State can demonstrate that attaining the designated use is not feasible because:

(1) Naturally occurring pollutant concentrations prevent the attainment of the use; or

(2) Natural, ephemeral, intermittent or low flow conditions or water levels prevent the attainment of the use, unless these conditions may be compensated for by the discharge of sufficient volume of effluent discharges without violating State water conservation requirements to enable uses to be met; or

(3) Human caused conditions or sources of pollution prevent the attainment of the use and cannot be remedied or would cause more environmental damage to correct than to leave in place; or

(4) Dams, diversions or other types of hydrologic modifications preclude the attainment of the use, and it is not feasible to restore the water body to its original condition or to operate such modification in a way that would result in the attainment of the use; or

(5) Physical conditions related to the natural features of the water body, such as the lack of a proper substrate, cover, flow, depth, pools, riffles, and the like, unrelated to water quality, preclude attainment of aquatic life protection uses; or

(6) Controls more stringent than those required by sections 301(b) and 306 of the Act would result in substantial and widespread economic and social impact.

(h) States may not remove designated uses if:

(1) They are existing uses, as defined in § 131.3, unless a use requiring more stringent criteria is added; or

(2) Such uses will be attained by implementing effluent limits required under sections 301(b) and 306 of the Act and by implementing cost-effective and reasonable best management practices for nonpoint source control.

(i) Where existing water quality standards specify designated uses less than those which are presently being attained, the State shall revise its standards to reflect the uses actually being attained.

(j) A State must conduct a use attainability analysis as described in § 131.3(g) whenever:

(1) The State designates or has designated uses that do not include the uses specified in section 101(a)(2) of the Act, or

(2) The State wishes to remove a designated use that is specified in section 101(a)(2) of the Act or to adopt subcategories of uses specified in section 101(a)(2) of the Act which require less stringent criteria.

(k) A State is not required to conduct a use attainability analysis under this regulation whenever designating uses which include those specified in section 101(a)(2) of the Act.

§ 131.11 Criteria.

(a) *Inclusion of pollutants:* (1) States must adopt those water quality criteria that protect the designated use.

Such criteria must be based on sound scientific rationale and must contain sufficient parameters or constituents to protect the designated use. For waters with multiple use designations, the criteria shall support the most sensitive use.

(2) *Toxic pollutants*. States must review water quality data and information on discharges to identify specific water bodies where toxic pollutants may be adversely affecting water quality or the attainment of the designated water use or where the levels of toxic pollutants are at a level to warrant concern and must adopt criteria for such toxic pollutants applicable to the water body sufficient to protect the designated use. Where a State adopts narrative criteria for toxic pollutants to protect designated uses, the State must provide information identifying the method by which the State intends to regulate point source discharges of toxic pollutants on water quality limited segments based on such narrative criteria. Such information may be included as part of the standards or may be included in documents generated by the State in response to the Water Quality Planning and Management Regulations (40 CFR part 35).

(b) Form of criteria: In establishing criteria, States should:

(1) Establish numerical values based on:

(i) 304(a) Guidance; or

(ii) 304(a) Guidance modified to reflect site-specific conditions; or

(iii) Other scientifically defensible methods;

(2) Establish narrative criteria or criteria based upon biomonitoring methods where numerical criteria cannot be established or to supplement numerical criteria.

§ 131.12 Antidegradation policy.

(a) The State shall develop and adopt a statewide antidegradation policy and identify the methods for implementing such policy pursuant to this subpart. The antidegradation policy and implementation methods shall, at a minimum, be consistent with the following:

(1) Existing instream water uses and the level of water quality necessary to protect the existing uses shall be maintained and protected.

(2) Where the quality of the waters exceed levels necessary to support propagation of fish, shellfish, and wildlife and recreation in and on the water, that quality shall be maintained and protected unless the State finds, after full satisfaction of the intergovernmental coordination and public participation provisions of the State's continuing planning process, that allowing lower water quality is necessary to accommodate important economic or social development in the area in which the waters are located. In allowing such degradation or lower water quality, the State shall assure water quality adequate to protect existing uses fully. Further, the State shall assure that there shall be achieved the highest statutory and regulatory requirements for all new and existing point sources and all cost-effective and reasonable best management practices for nonpoint source control.

(3) Where high quality waters constitute an outstanding National resource, such as waters of National and State parks and wildlife refuges and waters of exceptional recreational or ecological significance, that water quality shall be maintained and protected.

(4) In those cases where potential water quality impairment associated with a thermal discharge is involved, the antidegradation policy and implementing method shall be consistent with section 316 of the Act.

§ 131.13 General policies.

States may, at their discretion, include in their State standards, policies generally affecting their application and implementation, such as mixing zones, low flows and variances. Such policies are subject to EPA review and approval.

Subpart C—Procedures for Review and Revision of Water Quality Standards

§ 131.20 State review and revision of water quality standards.

(a) *State review*. The State shall from time to time, but at least once every three years, hold public hearings for

the purpose of reviewing applicable water quality standards and, as appropriate, modifying and adopting standards. Any water body segment with water quality standards that do not include the uses specified in section 101(a)(2) of the Act shall be re-examined every three years to determine if any new information has become available. If such new information indicates that the uses specified in section 101(a)(2) of the Act are attainable, the State shall revise its standards accordingly. Procedures States establish for identifying and reviewing water bodies for review should be incorporated into their Continuing Planning Process.

(b) *Public participation.* The State shall hold a public hearing for the purpose of reviewing water quality standards, in accordance with provisions of State law, EPA's water quality management regulation (40 CFR 130.3(b)(6)) and public participation regulation (40 CFR part 25). The proposed water quality standards revision and supporting analyses shall be made available to the public prior to the hearing.

(c) *Submittal to EPA.* The State shall submit the results of the review, any supporting analysis for the use attainability analysis, the methodologies used for site-specific criteria development, any general policies applicable to water quality standards and any revisions of the standards to the Regional Administrator for review and approval, within 30 days of the final State action to adopt and certify the revised standard, or if no revisions are made as a result of the review, within 30 days of the completion of the review.

§ 131.21 EPA review and approval of water quality standards.

(a) After the State submits its officially adopted revisions, the Regional Administrator shall either:

(1) Notify the State within 60 days that the revisions are approved, or

(2) Notify the State within 90 days that the revisions are disapproved. Such notification of disapproval shall specify the changes needed to assure compliance with the requirements of the Act and this regulation, and shall explain why the State standard is not in compliance with such requirements. Any new or revised State standard must be accompanied by some type of supporting analysis.

(b) The Regional Administrator's approval or disapproval of a State water quality standard shall be based on the requirements of the Act as described in §§ 131.5 and 131.6, and, with respect to Great Lakes States or Tribes (as defined in 40 CFR 132.2), 40 CFR part 132.

(c) *How do I determine which water quality standards are applicable for purposes of the Act?* You may determine which water quality standards are applicable water quality standards for purposes of the Act from the following table:

If—	Then—	Unless or until—	In which case—
(1) A State or authorized Tribe has adopted a water quality standard that is effective under State or Tribal law and has been submitted to EPA before May 30, 2000 . . .	. . . the State or Tribe's water quality standard is the applicable water quality standard for purposes of the Act . . .	. . . EPA has promulgated a more stringent water quality standard for the State or Tribe that is in effect . . .	. . . the EPA-promulgated water quality standard is the applicable water quality standard for purposes of the Act until EPA withdraws the Federal water quality standard.
(2) A State or authorized Tribe adopts a water quality standard that goes into effect under State or Tribal law on or *after* May 30, 2000 . . .	. . . once EPA approves that water quality standard, it becomes the applicable water quality standard for purposes of the Act . . .	. . . EPA has promulgated a more stringent water quality standard for the State or Tribe that is in effect . . .	. . . the EPA promulgated water quality standard is the applicable water quality standard for purposes of the Act until EPA withdraws the Federal water quality standard.

(d) *When do I use the applicable water quality standards identified in paragraph (c) above?* Applicable water quality standards for purposes of the Act are the minimum standards which must be used when the CWA and regulations implementing the CWA refer to water

quality standards, for example, in identifying impaired waters and calculating TMDLs under section 303(d), developing NPDES permit limitations under section 301(b)(1)(C), evaluating proposed discharges of dredged or fill material under section 404, and in issuing certifications under section 401 of the Act.

(e) *For how long does an applicable water quality standard for purposes of the Act remain the applicable water quality standard for purposes of the Act?* A State or authorized Tribe's applicable water quality standard for purposes of the Act remains the applicable standard until EPA approves a change, deletion, or addition to that water quality standard, or until EPA promulgates a more stringent water quality standard.

(f) *How can I find out what the applicable standards are for purposes of the Act?* In each Regional office, EPA maintains a docket system for the States and authorized Tribes in that Region, available to the public, identifying the applicable water quality standards for purposes of the Act.

[48 FR 51405, Nov. 8, 1983, as amended at 60 FR 15387, Mar. 23, 1995; 65 FR 24653, Apr. 27, 2000]

§ 131.22 EPA promulgation of water quality standards.

(a) If the State does not adopt the changes specified by the Regional Administrator within 90 days after notification of the Regional Administrator's disapproval, the Administrator shall promptly propose and promulgate such standard.

(b) The Administrator may also propose and promulgate a regulation, applicable to one or more States, setting forth a new or revised standard upon determining such a standard is necessary to meet the requirements of the Act.

(c) In promulgating water quality standards, the Administrator is subject to the same policies, procedures, analyses, and public participation requirements established for States in these regulations.

Subpart D—Federally Promulgated Water Quality Standards

§ 131.31 Arizona.

(a) [Reserved]

(b) The following waters have, in addition to the uses designated by the State, the designated use of fish consumption as defined in R18–11–101 (which is available from the Arizona Department of Environmental Quality, Water Quality Division, 3033 North Central Ave., Phoenix, AZ 85012):

COLORADO MAIN STEM RIVER BASIN:
- Hualapai Wash

MIDDLE GILA RIVER BASIN:
- Agua Fria River (Camelback Road to Avondale WWTP)
- Galena Gulch
- Gila River (Felix Road to the Salt River)
- Queen Creek (Headwaters to the Superior WWTP)
- Queen Creek (Below Potts Canyon)

SAN PEDRO RIVER BASIN:
- Copper Creek

SANTA CRUZ RIVER BASIN:
- Agua Caliente Wash
- Nogales Wash
- Sonoita Creek (Above the town of Patagonia)
- Tanque Verde Creek
- Tinaja Wash
- Davidson Canyon

UPPER GILA RIVER BASIN
- Chase Creek

(c) To implement the requirements of R18–11–108.A.5 with respect to effects of mercury on wildlife, EPA (or the State with the approval of EPA) shall implement a monitoring program to assess attainment of the water quality standard.

(Sec. 303, Federal Water Pollution Control Act, as amended, 33 U.S.C. 1313, 86 Stat. 816 *et seq.*, Pub. L. 92–500; Clean Water Act, Pub. L. 92–500, as amended; 33 U.S.C. 1251 *et seq.)*

[41 FR 25000, June 22, 1976; 41 FR 48737, Nov. 5, 1976. Redesignated and amended at 42 FR 56740, Oct. 28, 1977. Further redesignated and amended at 48 FR 51408, Nov. 8, 1983; 61 FR 20693, May 7, 1996; 68 FR 62744, Nov. 6, 2003]

§ 131.32 [Reserved]

§ 131.33 Idaho.

(a) *Temperature criteria for bull trout.* (1) Except for those streams or portions

of streams located in Indian country, or as may be modified by the Regional Administrator, EPA Region X, pursuant to paragraph (a)(3) of this section, a temperature criterion of 10 °C, expressed as an average of daily maximum temperatures over a seven-day period, applies to the waterbodies identified in paragraph (a)(2) of this section during the months of June, July, August and September.

(2) The following waters are protected for bull trout spawning and rearing:

(i) BOISE-MORE BASIN: Devils Creek, East Fork Sheep Creek, Sheep Creek.

(ii) BROWNLEE RESERVOIR BASIN: Crooked River, Indian Creek.

(iii) CLEARWATER BASIN: Big Canyon Creek, Cougar Creek, Feather Creek, Laguna Creek, Lolo Creek, Orofino Creek, Talapus Creek, West Fork Potlatch River.

(iv) COEUR D'ALENE LAKE BASIN: Cougar Creek, Fernan Creek, Kid Creek, Mica Creek, South Fork Mica Creek, Squaw Creek, Turner Creek.

(v) HELLS CANYON BASIN: Dry Creek, East Fork Sheep Creek, Getta Creek, Granite Creek, Kurry Creek, Little Granite Creek, Sheep Creek.

(vi) LEMHI BASIN: Adams Creek, Alder Creek, Basin Creek, Bear Valley Creek, Big Eightmile Creek, Big Springs Creek, Big Timber Creek, Bray Creek, Bull Creek, Cabin Creek, Canyon Creek, Carol Creek, Chamberlain Creek, Clear Creek, Climb Creek, Cooper Creek, Dairy Creek, Deer Creek, Deer Park Creek, East Fork Hayden Creek, Eighteenmile Creek, Falls Creek, Ferry Creek, Ford Creek, Geertson Creek, Grove Creek, Hawley Creek, Hayden Creek, Kadletz Creek, Kenney Creek, Kirtley Creek, Lake Creek, Lee Creek, Lemhi River (above Big Eightmile Creek), Little Eightmile Creek, Little Mill Creek, Little Timber Creek, Middle Fork Little Timber Creek, Milk Creek, Mill Creek, Mogg Creek, North Fork Kirtley Creek, North Fork Little Timber Creek, Paradise Creek, Patterson Creek, Payne Creek, Poison Creek, Prospect Creek, Rocky Creek, Short Creek, Squaw Creek, Squirrel Creek, Tobias Creek, Trail Creek, West Fork Hayden Creek, Wright Creek.

(vii) LITTLE LOST BASIN: Badger Creek, Barney Creek, Bear Canyon, Bear Creek, Bell Mountain Creek, Big Creek, Bird Canyon, Black Creek, Buck Canyon, Bull Creek, Cedar Run Creek, Chicken Creek, Coal Creek, Corral Creek, Deep Creek, Dry Creek, Dry Creek Canal, Firbox Creek, Garfield Creek, Hawley Canyon, Hawley Creek, Horse Creek, Horse Lake Creek, Iron Creek, Jackson Creek, Little Lost River (above Badger Creek), Mahogany Creek, Main Fork Sawmill Creek, Massacre Creek, Meadow Creek, Mill Creek, Moffett Creek, Moonshine Creek, Quigley Creek, Red Rock Creek, Sands Creek, Sawmill Creek, Slide Creek, Smithie Fork, Squaw Creek, Summerhouse Canyon, Summit Creek, Timber Creek, Warm Creek, Wet Creek, Williams Creek.

(viii) LITTLE SALMON BASIN: Bascum Canyon, Boulder Creek, Brown Creek, Campbell Ditch, Castle Creek, Copper Creek, Granite Fork Lake Fork Rapid River, Hard Creek, Hazard Creek, Lake Fork Rapid River, Little Salmon River (above Hazard Creek), Paradise Creek, Pony Creek, Rapid River, Squirrel Creek, Trail Creek, West Fork Rapid River.

(ix) LOCHSA BASIN: Apgar Creek, Badger Creek, Bald Mountain Creek, Beaver Creek, Big Flat Creek, Big Stew Creek, Boulder Creek, Brushy Fork, Cabin Creek, Castle Creek, Chain Creek, Cliff Creek, Coolwater Creek, Cooperation Creek, Crab Creek, Crooked Fork Lochsa River, Dan Creek, Deadman Creek, Doe Creek, Dutch Creek, Eagle Creek, East Fork Papoose Creek, East Fork Split Creek, East Fork Squaw Creek, Eel Creek, Fern Creek, Fire Creek, Fish Creek, Fish Lake Creek, Fox Creek, Gass Creek, Gold Creek, Ham Creek, Handy Creek, Hard Creek, Haskell Creek, Heather Creek, Hellgate Creek, Holly Creek, Hopeful Creek, Hungery Creek, Indian Grave Creek, Jay Creek, Kerr Creek, Kube Creek, Lochsa River, Lone Knob Creek, Lottie Creek, Macaroni Creek, Maud Creek, Middle Fork Clearwater River, No-see-um Creek, North Fork Spruce Creek, North Fork Storm Creek, Nut Creek, Otter Slide Creek, Pack Creek, Papoose Creek, Parachute Creek, Pass Creek, Pedro Creek, Pell Creek, Pete King Creek, Placer Creek,

Polar Creek, Postoffice Creek, Queen Creek, Robin Creek, Rock Creek, Rye Patch Creek, Sardine Creek, Shoot Creek, Shotgun Creek, Skookum Creek, Snowshoe Creek, South Fork Spruce Creek, South Fork Storm Creek, Split Creek, Sponge Creek, Spring Creek, Spruce Creek, Squaw Creek, Storm Creek, Tick Creek, Tomcat Creek, Tumble Creek, Twin Creek, Wag Creek, Walde Creek, Walton Creek, Warm Springs Creek, Weir Creek, Wendover Creek, West Fork Boulder Creek, West Fork Papoose Creek, West Fork Squaw Creek, West Fork Wendover Creek, White Sands Creek, Willow Creek.

(x) LOWER CLARK FORK BASIN: Cascade Creek, East Fork, East Fork Creek, East Forkast Fork Creek, Gold Creek, Johnson Creek, Lightning Creek, Mosquito Creek, Porcupine Creek, Rattle Creek, Spring Creek, Twin Creek, Wellington Creek.

(xi) LOWER KOOTENAI BASIN: Ball Creek, Boundary Creek, Brush Creek, Cabin Creek, Caribou Creek, Cascade Creek, Cooks Creek, Cow Creek, Curley Creek, Deep Creek, Grass Creek, Jim Creek, Lime Creek, Long Canyon Creek, Mack Creek, Mission Creek, Myrtle Creek, Peak Creek, Snow Creek, Trout Creek.

(xii) LOWER MIDDLE FORK SALMON BASIN: Acorn Creek, Alpine Creek, Anvil Creek, Arrastra Creek, Bar Creek, Beagle Creek, Beaver Creek, Belvidere Creek, Big Creek, Birdseye Creek, Boulder Creek, Brush Creek, Buck Creek, Bull Creek, Cabin Creek, Camas Creek, Canyon Creek, Castle Creek, Clark Creek, Coin Creek, Corner Creek, Coxey Creek, Crooked Creek, Doe Creek, Duck Creek, East Fork Holy Terror Creek, Fawn Creek, Flume Creek, Fly Creek, Forge Creek, Furnace Creek, Garden Creek, Government Creek, Grouse Creek, Hammer Creek, Hand Creek, Holy Terror Creek, J Fell Creek, Jacobs Ladder Creek, Lewis Creek, Liberty Creek, Lick Creek, Lime Creek, Little Jacket Creek, Little Marble Creek, Little White Goat Creek, Little Woodtick Creek, Logan Creek, Lookout Creek, Loon Creek, Martindale Creek, Meadow Creek, Middle Fork Smith Creek, Monumental Creek, Moore Creek, Mulligan Creek, North Fork Smith Creek, Norton Creek, Placer Creek, Pole Creek, Rams Creek, Range Creek, Routson Creek, Rush Creek, Sawlog Creek, Sheep Creek, Sheldon Creek, Shellrock Creek, Ship Island Creek, Shovel Creek, Silver Creek, Smith Creek, Snowslide Creek, Soldier Creek, South Fork Camas Creek, South Fork Chamberlain Creek, South Fork Holy Terror Creek, South Fork Norton Creek, South Fork Rush Creek, South Fork Sheep Creek, Spider Creek, Spletts Creek, Telephone Creek, Trail Creek, Two Point Creek, West Fork Beaver Creek, West Fork Camas Creek, West Fork Monumental Creek, West Fork Rush Creek, White Goat Creek, Wilson Creek.

(xiii) LOWER NORTH FORK CLEARWATER BASIN: Adair Creek, Badger Creek, Bathtub Creek, Beaver Creek, Black Creek, Brush Creek, Buck Creek, Butte Creek, Canyon Creek, Caribou Creek, Crimper Creek, Dip Creek, Dog Creek, Elmer Creek, Falls Creek, Fern Creek, Goat Creek, Isabella Creek, John Creek, Jug Creek, Jungle Creek, Lightning Creek, Little Lost Lake Creek, Little North Fork Clearwater River, Lost Lake Creek, Lund Creek, Montana Creek, Mowitch Creek, Papoose Creek, Pitchfork Creek, Rocky Run, Rutledge Creek, Spotted Louis Creek, Triple Creek, Twin Creek, West Fork Montana Creek, Willow Creek.

(xiv) LOWER SALMON BASIN: Bear Gulch, Berg Creek, East Fork John Day Creek, Elkhorn Creek, Fiddle Creek, French Creek, Hurley Creek, John Day Creek, Kelly Creek, Klip Creek, Lake Creek, Little Slate Creek, Little Van Buren Creek, No Business Creek, North Creek, North Fork Slate Creek, North Fork White Bird Creek, Partridge Creek, Slate Creek, Slide Creek, South Fork John Day Creek, South Fork White Bird Creek, Warm Springs Creek.

(xv) LOWER SELWAY BASIN: Anderson Creek, Bailey Creek, Browns Spring Creek, Buck Lake Creek, Butte Creek, Butter Creek, Cabin Creek, Cedar Creek, Chain Creek, Chute Creek, Dent Creek, Disgrace Creek, Double Creek, East Fork Meadow Creek, East Fork Moose Creek, Elbow Creek, Fivemile Creek, Fourmile Creek, Gate Creek, Gedney Creek, Goddard Creek, Horse Creek, Indian Hill Creek, Little Boulder Creek, Little

Schwar Creek, Matteson Creek, Meadow Creek, Monument Creek, Moose Creek, Moss Creek, Newsome Creek, North Fork Moose Creek, Rhoda Creek, Saddle Creek, Schwar Creek, Shake Creek, Spook Creek, Spur Creek, Tamarack Creek, West Fork Anderson Creek, West Fork Gedney Creek, West Moose Creek, Wounded Doe Creek.

(xvi) MIDDLE FORK CLEARWATER BASIN: Baldy Creek, Big Cedar Creek, Browns Spring Creek, Clear Creek, Middle Fork Clear Creek, Pine Knob Creek, South Fork Clear Creek.

(xvii) MIDDLE FORK PAYETTE BASIN: Bull Creek, Middle Fork Payette River (above Fool Creek), Oxtail Creek, Silver Creek, Sixteen-to-one Creek.

(xviii) MIDDLE SALMON-CHAMBERLAIN BASIN: Arrow Creek, Bargamin Creek, Bat Creek, Bay Creek, Bear Creek, Bend Creek, Big Elkhorn Creek, Big Harrington Creek, Big Mallard Creek, Big Squaw Creek, Bleak Creek, Bronco Creek, Broomtail Creek, Brown Creek, Cayuse Creek, Center Creek, Chamberlain Creek, Cliff Creek, Colt Creek, Corn Creek, Crooked Creek, Deer Creek, Dennis Creek, Disappointment Creek, Dismal Creek, Dog Creek, East Fork Fall Creek, East Fork Horse Creek, East Fork Noble Creek, Fall Creek, Filly Creek, Fish Creek, Flossie Creek, Game Creek, Gap Creek, Ginger Creek, Green Creek, Grouse Creek, Guard Creek, Hamilton Creek, Horse Creek, Hot Springs Creek, Hotzel Creek, Hungry Creek, Iodine Creek, Jack Creek, Jersey Creek, Kitchen Creek, Lake Creek, Little Horse Creek, Little Lodgepole Creek, Little Mallard Creek, Lodgepole Creek, Mayflower Creek, McCalla Creek, Meadow Creek, Moose Creek, Moose Jaw Creek, Mule Creek, Mustang Creek, No Name Creek, Owl Creek, Poet Creek, Pole Creek, Porcupine Creek, Prospector Creek, Pup Creek, Queen Creek, Rainey Creek, Ranch Creek, Rattlesnake Creek, Red Top Creek, Reynolds Creek, Rim Creek, Ring Creek, Rock Creek, Root Creek, Runaway Creek, Sabe Creek, Saddle Creek, Salt Creek, Schissler Creek, Sheep Creek, Short Creek, Shovel Creek, Skull Creek, Slaughter Creek, Slide Creek, South Fork Cottonwood Creek, South Fork Chamberlain Creek, South Fork Kitchen Creek, South Fork Salmon River, Spread Creek, Spring Creek, Starvation Creek, Steamboat Creek, Steep Creek, Stud Creek, Warren Creek, Webfoot Creek, West Fork Chamberlain Creek, West Fork Rattlesnake Creek, West Horse Creek, Whimstick Creek, Wind River, Woods Fork Horse Creek.

(xix) MIDDLE SALMON-PANTHER BASIN: Allen Creek, Arnett Creek, Beaver Creek, Big Deer Creek, Blackbird Creek, Boulder Creek, Cabin Creek, Camp Creek, Carmen Creek, Clear Creek, Colson Creek, Copper Creek, Corral Creek, Cougar Creek, Cow Creek, Deadhorse Creek, Deep Creek, East Boulder Creek, Elkhorn Creek, Fawn Creek, Fourth Of July Creek, Freeman Creek, Homet Creek, Hughes Creek, Hull Creek, Indian Creek, Iron Creek, Jackass Creek, Jefferson Creek, Jesse Creek, Lake Creek, Little Deep Creek, Little Hat Creek, Little Sheep Creek, McConn Creek, McKim Creek, Mink Creek, Moccasin Creek, Moose Creek, Moyer Creek, Musgrove Creek, Napias Creek, North Fork Hughes Creek, North Fork Iron Creek, North Fork Salmon River, North Fork Williams Creek, Opal Creek, Otter Creek, Owl Creek, Panther Creek, Park Creek, Phelan Creek, Pine Creek, Pony Creek, Porphyry Creek, Pruvan Creek, Rabbit Creek, Rancherio Creek, Rapps Creek, Salt Creek, Salzer Creek, Saw Pit Creek, Sharkey Creek, Sheep Creek, South Fork Cabin Creek, South Fork Iron Creek, South Fork Moyer Creek, South Fork Phelan Creek, South Fork Sheep Creek, South Fork Williams Creek, Spring Creek, Squaw Creek, Trail Creek, Twelvemile Creek, Twin Creek, Weasel Creek, West Fork Blackbird Creek, West Fork Iron Creek, Williams Creek, Woodtick Creek.

(xx) MOYIE BASIN: Brass Creek, Bussard Creek, Copper Creek, Deer Creek, Faro Creek, Keno Creek, Kreist Creek, Line Creek, McDougal Creek, Mill Creek, Moyie River (above Skin Creek), Placer Creek, Rutledge Creek, Skin Creek, Spruce Creek, West Branch Deer Creek.

(xxi) NORTH AND MIDDLE FORK BOISE BASIN: Abby Creek, Arrastra Creek, Bald Mountain Creek, Ballentyne Creek, Banner Creek,

Bayhouse Creek, Bear Creek, Bear River, Big Gulch, Big Silver Creek, Billy Creek, Blackwarrior Creek, Bow Creek, Browns Creek, Buck Creek, Cabin Creek, Cahhah Creek, Camp Gulch, China Fork, Coma Creek, Corbus Creek, Cow Creek, Crooked River, Cub Creek, Decker Creek, Dutch Creek, Dutch Frank Creek, East Fork Roaring River, East Fork Swanholm Creek, East Fork Yuba River, Flint Creek, Flytrip Creek, Gotch Creek, Graham Creek, Granite Creek, Grays Creek, Greylock Creek, Grouse Creek, Hot Creek, Hungarian Creek, Joe Daley Creek, Johnson Creek, Kid Creek, King Creek, La Mayne Creek, Leggit Creek, Lightening Creek, Little Queens River, Little Silver Creek, Louise Creek, Lynx Creek, Mattingly Creek, McKay Creek, McLeod Creek, McPhearson Creek, Middle Fork Boise River (above Roaring River), Middle Fork Corbus Creek, Middle Fork Roaring River, Mill Creek, Misfire Creek, Montezuma Creek, North Fork Boise River (above Bear River), Phifer Creek, Pikes Fork, Quartz Gulch, Queens River, Rabbit Creek, Right Creek, Roaring River, Robin Creek, Rock Creek, Rockey Creek, Sawmill Creek, Scenic Creek, Scotch Creek, Scott Creek, Shorip Creek, Smith Creek, Snow Creek, Snowslide Creek, South Fork Corbus Creek, South Fork Cub Creek, Spout Creek, Steamboat Creek, Steel Creek, Steppe Creek, Swanholm Creek, Timpa Creek, Trail Creek, Trapper Creek, Tripod Creek, West Fork Creek, West Warrior Creek, Willow Creek, Yuba River.

(xxii) NORTH FORK PAYETTE BASIN: Gold Fork River, North Fork Gold Fork River, Pearsol Creek.

(xxiii) AHSIMEROI BASIN: Baby Creek, Bear Creek, Big Creek, Big Gulch, Burnt Creek, Christian Gulch, Dead Cat Canyon, Ditch Creek, Donkey Creek, Doublespring Creek, Dry Canyon, Dry Gulch, East Fork Burnt Creek, East Fork Morgan Creek, East Fork Pahsimeroi River, East Fork Patterson Creek, Elkhorn Creek, Falls Creek, Goldberg Creek, Hillside Creek, Inyo Creek, Long Creek, Mahogany Creek, Mill Creek, Morgan Creek, Morse Creek, Mulkey Gulch, North Fork Big Creek, North Fork Morgan Creek, Pahsimeroi River (above Big Creek), Patterson Creek, Rock Spring Canyon, Short Creek, Snowslide Creek, South Fork Big Creek, Spring Gulch, Squaw Creek, Stinking Creek, Tater Creek, West Fork Burnt Creek, West Fork North Fork Big Creek.

(xxiv) PAYETTE BASIN: Squaw Creek, Third Fork Squaw Creek.

(xxv) PEND OREILLE LAKE BASIN: Branch North Gold Creek, Cheer Creek, Chloride Gulch, Dry Gulch, Dyree Creek, Flume Creek, Gold Creek, Granite Creek, Grouse Creek, Kick Bush Gulch, North Fork Grouse Creek, North Gold Creek, Plank Creek, Rapid Lightning Creek, South Fork Grouse Creek, Strong Creek, Thor Creek, Trestle Creek, West Branch Pack River, West Gold Creek, Wylie Creek, Zuni Creek.

(xxvi) PRIEST BASIN: Abandon Creek, Athol Creek, Bath Creek, Bear Creek, Bench Creek, Blacktail Creek, Bog Creek, Boulder Creek, Bugle Creek, Canyon Creek, Caribou Creek, Cedar Creek, Chicopee Creek, Deadman Creek, East Fork Trapper Creek, East River, Fedar Creek, Floss Creek, Gold Creek, Granite Creek, Horton Creek, Hughes Fork, Indian Creek, Jackson Creek, Jost Creek, Kalispell Creek, Kent Creek, Keokee Creek, Lime Creek, Lion Creek, Lost Creek, Lucky Creek, Malcom Creek, Middle Fork East River, Muskegon Creek, North Fork Granite Creek, North Fork Indian Creek, Packer Creek, Rock Creek, Ruby Creek, South Fork Granite Creek, South Fork Indian Creek, South Fork Lion Creek, Squaw Creek, Tango Creek, Tarlac Creek, The Thorofare, Trapper Creek, Two Mouth Creek, Uleda Creek, Priest R. (above Priest Lake), Zero Creek.

(xxvii) SOUTH FORK BOISE BASIN: Badger Creek, Bear Creek, Bear Gulch, Big Smoky Creek, Big Water Gulch, Boardman Creek, Burnt Log Creek, Cayuse Creek, Corral Creek, Cow Creek, Edna Creek, Elk Creek, Emma Creek, Feather River, Fern Gulch, Grape Creek, Gunsight Creek, Haypress Creek, Heather Creek, Helen Creek, Johnson Creek, Lincoln Creek, Little Cayuse Creek, Little Rattlesnake Creek, Little Skeleton Creek, Little Smoky Creek, Loggy Creek, Mule Creek, North Fork Ross Fork, Pinto Creek, Rattlesnake Creek, Ross Fork, Russel Gulch, Salt Creek, Shake Creek,

Skeleton Creek, Slater Creek, Smokey Dome Canyon, South Fork Ross Fork, Three Forks Creek, Tipton Creek, Vienna Creek, Weeks Gulch, West Fork Big Smoky Creek, West Fork Salt Creek, West Fork Skeleton Creek, Willow Creek.

(xxviii) SOUTH FORK CLEARWATER BASIN: American River, Baker Gulch, Baldy Creek, Bear Creek, Beaver Creek, Big Canyon Creek, Big Elk Creek, Blanco Creek, Boundary Creek, Box Sing Creek, Boyer Creek, Cartwright Creek, Cole Creek, Crooked River, Dawson Creek, Deer Creek, Ditch Creek, East Fork American River, East Fork Crooked River, Elk Creek, Fivemile Creek, Flint Creek, Fourmile Creek, Fox Creek, French Gulch, Galena Creek, Gospel Creek, Hagen Creek, Hays Creek, Johns Creek, Jungle Creek, Kirks Fork American River, Little Elk Creek, Little Moose Creek, Little Siegel Creek, Loon Creek, Mackey Creek, Meadow Creek, Melton Creek, Middle Fork Red River, Mill Creek, Monroe Creek, Moores Creek, Moores Lake Creek, Moose Butte Creek, Morgan Creek, Mule Creek, Newsome Creek, Nuggett Creek, Otterson Creek, Pat Brennan Creek, Pilot Creek, Quartz Creek, Queen Creek, Rabbit Creek, Rainbow Gulch, Red River, Relief Creek, Ryan Creek, Sally Ann Creek, Sawmill Creek, Schooner Creek, Schwartz Creek, Sharmon Creek, Siegel Creek, Silver Creek, Sixmile Creek, Sixtysix Creek, Snoose Creek, Sourdough Creek, South Fork Red River, Square Mountain Creek, Swale Creek, Swift Creek, Taylor Creek, Tenmile Creek, Trail Creek, Trapper Creek, Trout Creek, Twentymile Creek, Twin Lakes Creek, Umatilla Creek, West Fork Big Elk Creek, West Fork Crooked River, West Fork Gospel Creek, West Fork Newsome Creek, West Fork Red River, West Fork Twentymile Creek, Whiskey Creek, Whitaker Creek, Williams Creek.

(xxix) SOUTH FORK PAYETTE BASIN: Archie Creek, Ash Creek, Baron Creek, Basin Creek, Bear Creek, Beaver Creek, Big Spruce Creek, Bitter Creek, Blacks Creek, Blue Jay Creek, Burn Creek, Bush Creek, Camp Creek, Canyon Creek, Casner Creek, Cat Creek, Chapman Creek, Charters Creek, Clear Creek, Coski Creek, Cup Creek, Dead Man Creek, Deadwood River, Deer Creek, East Fork Deadwood Creek, East Fork Warm Springs Creek, Eby Creek, Elkhorn Creek, Emma Creek, Fall Creek, Fence Creek, Fern Creek, Fivemile Creek, Fox Creek, Garney Creek, Gates Creek, Goat Creek, Grandjem Creek, Grouse Creek, Habit Creek, Helende Creek, Horse Creek, Huckleberry Creek, Jackson Creek, Kettle Creek, Kirkham Creek, Lake Creek, Lick Creek, Little Tenmile Creek, Logging Gulch, Long Creek, MacDonald Creek, Meadow Creek, Middle Fork Warm Springs Creek, Miller Creek, Monument Creek, Moulding Creek, Ninemile Creek, No Man Creek, No Name Creek, North Fork Baron Creek, North Fork Canyon Creek, North Fork Deer Creek, North Fork Whitehawk Creek, O'Keefe Creek, Packsaddle Creek, Park Creek, Pass Creek, Pinchot Creek, Pine Creek, Pitchfork Creek, Pole Creek, Richards Creek, Road Fork Rock Creek, Rock Creek, Rough Creek, Scott Creek, Silver Creek, Sixmile Creek, Smith Creek, Smokey Creek, South Fork Beaver Creek, South Fork Canyon Creek, South Fork Clear Creek, South Fork Payette River (above Rock Creek), South Fork Scott Creek, South Fork Warm Spring Creek, Spring Creek, Steep Creek, Stratton Creek, Topnotch Creek, Trail Creek, Wapiti Creek, Warm Spring Creek, Warm Springs Creek, Whangdoodle Creek, Whitehawk Creek, Wild Buck Creek, Wills Gulch, Wilson Creek, Wolf Creek.

(xxx) SOUTH FORK SALMON BASIN: Alez Creek, Back Creek, Bear Creek, Bishop Creek, Blackmare Creek, Blue Lake Creek, Buck Creek, Buckhorn Bar Creek, Buckhorn Creek, Burgdorf Creek, Burntlog Creek, Cabin Creek, Calf Creek, Camp Creek, Cane Creek, Caton Creek, Cinnabar Creek, Cliff Creek, Cly Creek, Cougar Creek, Cow Creek, Cox Creek, Curtis Creek, Deep Creek, Dollar Creek, Dutch Creek, East Fork South Fork Salmon River, East Fork Zena Creek, Elk Creek, Enos Creek, Falls Creek, Fernan Creek, Fiddle Creek, Fitsum Creek, Flat Creek, Fourmile Creek, Goat Creek, Grimmet Creek, Grouse Creek, Halfway Creek, Hanson Creek, Hays

Creek, Holdover Creek, Hum Creek, Indian Creek, Jeanette Creek, Johnson Creek, Josephine Creek, Jungle Creek, Knee Creek, Krassel Creek, Lake Creek, Landmark Creek, Lick Creek, Little Buckhorn Creek, Little Indian Creek, Lodgepole Creek, Loon Creek, Maverick Creek, Meadow Creek, Middle Fork Elk Creek, Missouri Creek, Moose Creek, Mormon Creek, Nasty Creek, Nethker Creek, Nick Creek, No Mans Creek, North Fork Bear Creek, North Fork Buckhorn Creek, North Fork Camp Creek, North Fork Dollar Creek, North Fork Fitsum Creek, North Fork Lake Fork, North Fork Lick Creek, North Fork Riordan Creek, North Fork Six-bit Creek, Oompaul Creek, Paradise Creek, Park Creek, Peanut Creek, Pepper Creek, Phoebe Creek, Piah Creek, Pid Creek, Pilot Creek, Pony Creek, Porcupine Creek, Porphyry Creek, Prince Creek, Profile Creek, Quartz Creek, Reeves Creek, Rice Creek, Riordan Creek, Roaring Creek, Ruby Creek, Rustican Creek, Ryan Creek, Salt Creek, Sand Creek, Secesh River, Sheep Creek, Silver Creek, Sister Creek, Six-Bit Creek, South Fork Bear Creek, South Fork Blackmare Creek, South Fork Buckhorn Creek, South Fork Cougar Creek, South Fork Elk Creek, South Fork Fitsum Creek, South Fork Fourmile Creek, South Fork Salmon River, South Fork Threemile Creek, Split Creek, Steep Creek, Sugar Creek, Summit Creek, Tamarack Creek, Teepee Creek, Threemile Creek, Trail Creek, Trapper Creek, Trout Creek, Tsum Creek, Twobit Creek, Tyndall Creek, Vein Creek, Victor Creek, Wardenhoff Creek, Warm Lake Creek, Warm Spring Creek, West Fork Buckhorn Creek, West Fork Elk Creek, West Fork Enos Creek, West Fork Zena Creek, Whangdoodle Creek, Willow Basket Creek, Willow Creek, Zena Creek.

(xxxi) ST. JOE R. BASIN: Bad Bear Creek, Bean Creek, Bear Creek, Beaver Creek, Bedrock Creek, Berge Creek, Bird Creek, Blue Grouse Creek, Boulder Creek, Broadaxe Creek, Bruin Creek, California Creek, Cherry Creek, Clear Creek, Color Creek, Copper Creek, Dolly Creek, Dump Creek, Eagle Creek, East Fork Bluff Creek, East Fork Gold Creek, Emerald Creek, Fishhook Creek, Float Creek, Fly Creek, Fuzzy Creek, Gold Creek, Heller Creek, Indian Creek, Kelley Creek, Malin Creek, Marble Creek, Medicine Creek, Mica Creek, Mill Creek, Mosquito Creek, North Fork Bean Creek, North Fork Saint Joe River, North Fork Simmons Creek, Nugget Creek, Packsaddle Creek, Periwinkle Creek, Prospector Creek, Quartz Creek, Red Cross Creek, Red Ives Creek, Ruby Creek, Saint Joe River (above Siwash Creek), Setzer Creek, Sherlock Creek, Simmons Creek, Siwash Creek, Skookum Creek, Thomas Creek, Thorn Creek, Three Lakes Creek, Timber Creek, Tinear Creek, Trout Creek, Tumbledown Creek, Wahoo Creek, Washout Creek, Wilson Creek, Yankee Bar Creek.

(xxxii) UPPER COEUR D'ALENE BASIN: Brown Creek, Falls Creek, Graham Creek.

(xxxiii) UPPER KOOTENAI BASIN: Halverson Cr, North Callahan Creek, South Callahan Creek, West Fork Keeler Creek

(xxxiv) UPPER MIDDLE FORK SALMON BASIN: Asher Creek, Automatic Creek, Ayers Creek, Baldwin Creek, Banner Creek, Bear Creek, Bear Valley Creek, Bearskin Creek, Beaver Creek, Bernard Creek, Big Chief Creek, Big Cottonwood Creek, Birch Creek, Blue Lake Creek, Blue Moon Creek, Boundary Creek, Bridge Creek, Browning Creek, Buck Creek, Burn Creek, Cabin Creek, Cache Creek, Camp Creek, Canyon Creek, Cap Creek, Cape Horn Creek, Casner Creek, Castle Fork, Casto Creek, Cat Creek, Chokebore Creek, Chuck Creek, Cliff Creek, Cold Creek, Collie Creek, Colt Creek, Cook Creek, Corley Creek, Cornish Creek, Cottonwood Creek, Cougar Creek, Crystal Creek, Cub Creek, Cultus Creek, Dagger Creek, Deer Creek, Deer Horn Creek, Doe Creek, Dry Creek, Duffield Creek, Dynamite Creek, Eagle Creek, East Fork Elk Creek, East Fork Indian Creek, East Fork Mayfield Creek, Elk Creek, Elkhorn Creek, Endoah Creek, Fall Creek, Fawn Creek, Feltham Creek, Fir Creek, Flat Creek, Float Creek, Foresight Creek, Forty-five Creek, Forty-four Creek, Fox Creek, Full Moon Creek, Fuse Creek, Grays Creek, Grenade Creek, Grouse Creek, Gun Creek, Half Moon Creek, Hogback Creek, Honeymoon Creek, Hot Creek, Ibex Creek, Indian Creek, Jose Creek,

Kelly Creek, Kerr Creek, Knapp Creek, Kwiskwis Creek, Lime Creek, Lincoln Creek, Little Beaver Creek, Little Cottonwood Creek, Little East Fork Elk Creek, Little Indian Creek, Little Loon Creek, Little Pistol Creek, Lola Creek, Loon Creek, Lucinda Creek, Lucky Creek, Luger Creek, Mace Creek, Mack Creek, Marble Creek, Marlin Creek, Marsh Creek, Mayfield Creek, McHoney Creek, McKee Creek, Merino Creek, Middle Fork Elkhorn Creek, Middle Fork Indian Creek, Middle Fork Salmon River (above Soldier Creek), Mine Creek, Mink Creek, Moonshine Creek, Mowitch Creek, Muskeg Creek, Mystery Creek, Nelson Creek, New Creek, No Name Creek, North Fork Elk Creek, North Fork Elkhorn Creek, North Fork Sheep Creek, North Fork Sulphur Creek, Papoose Creek, Parker Creek, Patrol Creek, Phillips Creek, Pierson Creek, Pinyon Creek, Pioneer Creek, Pistol Creek, Placer Creek, Poker Creek, Pole Creek, Popgun Creek, Porter Creek, Prospect Creek, Rabbit Creek, Rams Horn Creek, Range Creek, Rapid River, Rat Creek, Remington Creek, Rock Creek, Rush Creek, Sack Creek, Safety Creek, Salt Creek, Savage Creek, Scratch Creek, Seafoam Creek, Shady Creek, Shake Creek, Sheep Creek, Sheep Trail Creek, Shell Creek, Shrapnel Creek, Siah Creek, Silver Creek, Slide Creek, Snowshoe Creek, Soldier Creek, South Fork Cottonwood Creek, South Fork Sheep Creek, Spike Creek, Springfield Creek, Squaw Creek, Sulphur Creek, Sunnyside Creek, Swamp Creek, Tennessee Creek, Thatcher Creek, Thicket Creek, Thirty-two Creek, Tomahawk Creek, Trail Creek, Trapper Creek, Trigger Creek, Twenty-two Creek, Vader Creek, Vanity Creek, Velvet Creek, Walker Creek, Wampum Creek, Warm Spring Creek, West Fork Elk Creek, West Fork Little Loon Creek, West Fork Mayfield Creek, White Creek, Wickiup Creek, Winchester Creek, Winnemucca Creek, Wyoming Creek.

(xxxv) UPPER NORTH FORK CLEARWATER BASIN: Adams Creek, Avalanche Creek, Bacon Creek, Ball Creek, Barn Creek, Barnard Creek, Barren Creek, Bear Creek, Beaver Dam Creek, Bedrock Creek, Bill Creek, Bostonian Creek, Boundary Creek, Burn Creek, Butter Creek, Camp George Creek, Canyon Creek, Cayuse Creek, Chamberlain Creek, Clayton Creek, Cliff Creek, Coffee Creek, Cold Springs Creek, Collins Creek, Colt Creek, Cool Creek, Copper Creek, Corral Creek, Cougar Creek, Craig Creek, Crater Creek, Cub Creek, Davis Creek, Deadwood Creek, Deer Creek, Dill Creek, Drift Creek, Elizabeth Creek, Fall Creek, Fire Creek, Fix Creek, Flame Creek, Fly Creek, Fourth of July Creek, Fro Creek, Frog Creek, Frost Creek, Gilfillian Creek, Goose Creek, Grass Creek, Gravey Creek, Grizzly Creek, Hanson Creek, Heather Creek, Henry Creek, Hidden Creek, Howard Creek, Independence Creek, Jam Creek, Japanese Creek, Johnagan Creek, Johnny Creek, Junction Creek, Kelly Creek, Kid Lake Creek, Kodiak Creek, Lake Creek, Laundry Creek, Lightning Creek, Little Moose Creek, Little Weitas Creek, Liz Creek, Long Creek, Marten Creek, Meadow Creek, Middle Creek, Middle North Fork Kelly Creek, Mill Creek, Mire Creek, Monroe Creek, Moose Creek, Negro Creek, Nettle Creek, Niagra Gulch, North Fork Clearwater River (Fourth of July Creek), Nub Creek, Osier Creek, Perry Creek, Pete Ott Creek, Placer Creek, Polar Creek, Post Creek, Potato Creek, Quartz Creek, Rapid Creek, Rawhide Creek, Roaring Creek, Rock Creek, Rocky Ridge Creek, Ruby Creek, Saddle Creek, Salix Creek, Scurry Creek, Seat Creek, Short Creek, Shot Creek, Siam Creek, Silver Creek, Skull Creek, Slide Creek, Smith Creek, Snow Creek, South Fork Kelly Creek, Spud Creek, Spy Creek, Stolen Creek, Stove Creek, Sugar Creek, Swamp Creek, Tinear Creek, Tinkle Creek, Toboggan Creek, Trail Creek, Vanderbilt Gulch, Wall Creek, Weitas Creek, Williams Creek, Windy Creek, Wolf Creek, Young Creek.

(xxxvi) UPPER SALMON BASIN: Alder Creek, Alpine Creek, Alta Creek, Alturas Lake Creek, Anderson Creek, Aspen Creek, Basin Creek, Bayhorse Creek, Bear Creek, Beaver Creek, Big Boulder Creek, Block Creek, Blowfly Creek, Blue Creek, Boundary Creek, Bowery Creek, Broken Ridge Creek, Bruno Creek, Buckskin Creek, Cabin Creek, Camp Creek, Cash Creek, Challis Creek, Chamberlain Creek,

Champion Creek, Cherry Creek, Cinnabar Creek, Cleveland Creek, Coal Creek, Crooked Creek, Darling Creek, Deadwood Creek, Decker Creek, Deer Creek, Dry Creek, Duffy Creek, East Basin Creek, East Fork Salmon River, East Fork Valley Creek, East Pass Creek, Eddy Creek, Eightmile Creek, Elevenmile Creek, Elk Creek, Ellis Creek, Estes Creek, First Creek, Fisher Creek, Fishhook Creek, Fivemile Creek, Fourth of July Creek, Frenchman Creek, Garden Creek, Germania Creek, Goat Creek, Gold Creek, Gooseberry Creek, Greylock Creek, Hay Creek, Hell Roaring Creek, Herd Creek, Huckleberry Creek, Iron Creek, Job Creek, Jordan Creek, Juliette Creek, Kelly Creek, Kinnikinic Creek, Lick Creek, Lightning Creek, Little Basin Creek, Little Beaver Creek, Little Boulder Creek, Little West Fork Morgan Creek, Lodgepole Creek, Lone Pine Creek, Lost Creek, MacRae Creek, Martin Creek, McKay Creek, Meadow Creek, Mill Creek, Morgan Creek, Muley Creek, Ninemile Creek, Noho Creek, Pack Creek, Park Creek, Pat Hughes Creek, Pig Creek, Pole Creek, Pork Creek, Prospect Creek, Rainbow Creek, Redfish Lake Creek, Road Creek, Rough Creek, Sage Creek, Sagebrush Creek, Salmon River (Redfish Lake Creek), Sawmill Creek, Second Creek, Sevenmile Creek, Sheep Creek, Short Creek, Sixmile Creek, Slate Creek, Smiley Creek, South Fork East Fork Salmon River, Squaw Creek, Stanley Creek, Stephens Creek, Summit Creek, Sunday Creek, Swimm Creek, Taylor Creek, Tenmile Creek, Tennel Creek, Thompson Creek, Three Cabins Creek, Trail Creek, Trap Creek, Trealor Creek, Twelvemile Creek, Twin Creek, Valley Creek, Van Horn Creek, Vat Creek, Warm Spring Creek, Warm Springs Creek, Washington Creek, West Beaver Creek, West Fork Creek, West Fork East Fork Salmon River, West Fork Herd Creek, West Fork Morgan Creek, West Fork Yankee Fork, West Pass Creek, Wickiup Creek, Williams Creek, Willow Creek, Yankee Fork.

(xxxvii) UPPER SELWAY BASIN: Basin Creek, Bear Creek, Burn Creek, Camp Creek, Canyon Creek, Cliff Creek, Comb Creek, Cooper Creek, Cub Creek, Deep Creek, Eagle Creek, Elk Creek, Fall Creek, Fox Creek, Goat Creek, Gold Pan Creek, Granite Creek, Grass Gulch, Haystack Creek, Hells Half Acre Creek, Indian Creek, Kim Creek, Lake Creek, Langdon Gulch, Little Clearwater River, Lodge Creek, Lunch Creek, Mist Creek, Paloma Creek, Paradise Creek, Peach Creek, Pettibone Creek, Running Creek, Saddle Gulch, Schofield Creek, Selway River (above Pettibone Creek), South Fork Running Creek, South Fork Saddle Gulch, South Fork Surprise Creek, Spruce Creek, Squaw Creek, Stripe Creek, Surprise Creek, Set Creek, Tepee Creek, Thirteen Creek, Three Lakes Creek, Triple Creek, Wahoo Creek, White Cap Creek, Wilkerson Creek, Witter Creek.

(xxxviii) WEISER BASIN: Anderson Creek, Bull Corral Creek, Dewey Creek, East Fork Weiser River, Little Weiser River, above Anderson Creek, Sheep Creek, Wolf Creek.

(3) Procedures for site specific modification of listed waterbodies or temperature criteria for bull trout.

(i) The Regional Administrator may, in his discretion, determine that the temperature criteria in paragraph (a)(1) of this section shall not apply to a specific waterbody or portion thereof listed in paragraph (a)(2) of this section. Any such determination shall be made consistent with § 131.11 and shall be based on a finding that bull trout spawning and rearing is not an existing use in such waterbody or portion thereof.

(ii) The Regional Administrator may, in his discretion, raise the temperature criteria in paragraph (a)(1) of this section as they pertain to a specific waterbody or portion thereof listed in paragraph (a)(2) of this section. Any such determination shall be made consistent with § 131.11, and shall be based on a finding that bull trout would be fully supported at the higher temperature criteria.

(iii) For any determination made under paragraphs (a)(3)(i) or (a)(3)(ii) of this section, the Regional Administrator shall, prior to making such a determination, provide for public notice of and comment on a proposed determination. For any such proposed determination, the Regional Administrator shall prepare and make available to

the public a technical support document addressing each waterbody or portion thereof that would be deleted or modified and the justification for each proposed determination. This document shall be made available to the public not later than the date of public notice.

(iv) The Regional Administrator shall maintain and make available to the public an updated list of determinations made pursuant to paragraphs (a)(3)(i) and (a)(3)(ii) of this section as well as the technical support documents for each determination.

(v) Nothing in this paragraph (a)(3) shall limit the Administrator's authority to modify the temperature criteria in paragraph (a)(1) of this section or the list of waterbodies in paragraph (a)(2) of this section through rulemaking.

(b) [Reserved]

(c) *Excluded waters*. Lakes, ponds, pools, streams, and springs outside public lands but located wholly and entirely upon a person's land are not protected specifically or generally for any beneficial use, unless such waters are designated in Idaho 16.01.02.110. through 160., or, although not so designated, are waters of the United States as defined at 40 CFR 122.2.

[62 FR 41183, July 31, 1997, as amended at 67 FR 11248, Mar. 13, 2002; 73 FR 65739, Nov. 5, 2008]

§ 131.34 Kansas.

(a) In addition to the State-adopted use designations, the following water body segment in Kansas is designated for an expected aquatic life use:

Stream segment name	HUC8	Segment #	Designated use
Basin: Missouri			
Subbasin: Independence-Sugar			
Whiskey Creek	10240011	235	Expected Aquatic Life.

(b) In addition to the State-adopted use designations, the following water body segments and lakes in Kansas are designated for recreation uses as specified in the following table:

Stream segment name	HUC8	Segment #	Designated use
Basin: Cimarron			
Subbasin: Upper Cimarron-Bluff			
Big Sandy Creek	11040008	6	Primary Contact Recreation
Gyp Creek	11040008	25	Secondary Contact Recreation
Indian Creek	11040008	14	Secondary Contact Recreation
Kiger Creek	11040008	8	Secondary Contact Recreation
Stink Creek	11040008	17	Secondary Contact Recreation
Two Mile Creek	11040008	15	Secondary Contact Recreation
Subbasin: Lower Cimarron-Eagle Chief			
Anderson Creek	11050001	39	Primary Contact Recreation
Basin: Kansas/Lower Republican			
Subbasin: Middle Republican			
Antelope Creek	10250016	66	Secondary Contact Recreation
Ash Creek	10250016	65	Secondary Contact Recreation
Bean Creek	10250016	76	Secondary Contact Recreation
Cora Creek	10250016	51	Secondary Contact Recreation
Crow Creek (Crystal Creek)	10250016	52	Secondary Contact Recreation
Korb Creek	10250016	72	Primary Contact Recreation
Long Branch	10250016	68	Secondary Contact Recreation
Lost Creek	10250016	53	Primary Contact Recreation
Louisa Creek	10250016	61	Secondary Contact Recreation
Norway Creek	10250016	73	Secondary Contact Recreation
Oak Creek	10250016	75	Secondary Contact Recreation
Rebecca Creek	10250016	39	Secondary Contact Recreation
Spring Creek	10250016	71	Secondary Contact Recreation
Spring Creek	10250016	78	Secondary Contact Recreation

Stream segment name	HUC8	Segment #	Designated use
Taylor Creek	10250016	74	Secondary Contact Recreation
Walnut Creek	10250016	40	Primary Contact Recreation
Walnut Creek	10250016	46	Secondary Contact Recreation
White Rock Creek, North Branch	10250016	60	Secondary Contact Recreation
Wolf Creek	10250016	67	Secondary Contact Recreation
Subbasin: Lower Republican			
Cool Creek	10250017	50	Secondary Contact Recreation
Elm Creek, West Branch	10250017	59	Secondary Contact Recreation
Gar Creek	10250017	12	Primary Contact Recreation
Mud Creek	10250017	63	Secondary Contact Recreation
Turkey Creek	10250017	51	Secondary Contact Recreation
Subbasin: Upper Kansas			
Dry Creek	10270101	19	Primary Contact Recreation
Humbolt Creek	10270101	10	Primary Contact Recreation
Kitten Creek	10270101	14	Primary Contact Recreation
Little Arkansas Creek	10270101	13	Primary Contact Recreation
Little Kitten Creek	10270101	16	Primary Contact Recreation
Mulberry Creek	10270101	20	Secondary Contact Recreation
Subbasin: Middle Kansas			
Adams Creek	10270102	53	Secondary Contact Recreation
Bartlett Creek	10270102	55	Secondary Contact Recreation
Big Elm Creek	10270102	90	Secondary Contact Recreation
Blackjack Creek	10270102	64	Secondary Contact Recreation
Blacksmith Creek	10270102	102	Secondary Contact Recreation
Bourbonais Creek	10270102	63	Primary Contact Recreation
Brush Creek	10270102	57	Primary Contact Recreation
Coal Creek	10270102	46	Secondary Contact Recreation
Coryell Creek	10270102	94	Secondary Contact Recreation
Cow Creek	10270102	45	Secondary Contact Recreation
Crow Creek	10270102	86	Primary Contact Recreation
Darnells Creek	10270102	51	Secondary Contact Recreation
Dog Creek	10270102	78	Secondary Contact Recreation
Doyle Creek	10270102	69	Primary Contact Recreation
Dry Creek	10270102	79	Primary Contact Recreation
Dutch Creek	10270102	92	Secondary Contact Recreation
Elm Creek	10270102	98	Primary Contact Recreation
Elm Creek	10270102	103	Secondary Contact Recreation
Elm Slough	10270102	58	Secondary Contact Recreation
Emmons Creek	10270102	66	Secondary Contact Recreation
French Creek	10270102	19	Primary Contact Recreation
Gilson Creek	10270102	47	Secondary Contact Recreation
Hendricks Creek	10270102	73	Primary Contact Recreation
Hise Creek	10270102	43	Secondary Contact Recreation
Indian Creek	10270102	20	Secondary Contact Recreation
James Creek	10270102	87	Secondary Contact Recreation
Jim Creek	10270102	52	Secondary Contact Recreation
Johnson Creek	10270102	84	Secondary Contact Recreation
Kuenzli Creek	10270102	82	Secondary Contact Recreation
Little Cross Creek	10270102	61	Secondary Contact Recreation
Little Muddy Creek	10270102	99	Primary Contact Recreation
Loire Creek	10270102	80	Primary Contact Recreation
Lost Creek	10270102	60	Secondary Contact Recreation
Messhoss Creek	10270102	96	Primary Contact Recreation
Mud Creek	10270102	44	Secondary Contact Recreation
Mud Creek	10270102	56	Secondary Contact Recreation
Muddy Creek, West Fork	10270102	93	Secondary Contact Recreation
Mulberry Creek	10270102	42	Secondary Contact Recreation
Mulberry Creek	10270102	77	Secondary Contact Recreation
Nehring Creek	10270102	81	Primary Contact Recreation
Paw Paw Creek	10270102	75	Secondary Contact Recreation
Pleasant Hill Run Creek	10270102	23	Primary Contact Recreation
Pomeroy Creek	10270102	59	Secondary Contact Recreation
Post Creek	10270102	101	Secondary Contact Recreation
Pretty Creek	10270102	74	Secondary Contact Recreation
Rock Creek	10270102	21	Primary Contact Recreation
Rock Creek, East Fork	10270102	22	Secondary Contact Recreation
Ross Creek	10270102	35	Secondary Contact Recreation
Salt Creek	10270102	88	Secondary Contact Recreation

Stream segment name	HUC8	Segment #	Designated use
Sand Creek	10270102	65	Secondary Contact Recreation
Shunganunga Creek, South Branch	10270102	106	Primary Contact Recreation
Snake Creek	10270102	95	Secondary Contact Recreation
Snokomo Creek	10270102	85	Secondary Contact Recreation
Spring Creek	10270102	48	Secondary Contact Recreation
Spring Creek	10270102	54	Primary Contact Recreation
Spring Creek	10270102	76	Secondary Contact Recreation
Spring Creek	10270102	105	Secondary Contact Recreation
Sullivan Creek	10270102	89	Primary Contact Recreation
Tecumseh Creek	10270102	107	Secondary Contact Recreation
Turkey Creek	10270102	71	Primary Contact Recreation
Unnamed Stream	10270102	8	Secondary Contact Recreation
Vassar Creek	10270102	100	Secondary Contact Recreation
Vermillion Creek	10270102	15	Primary Contact Recreation
Walnut Creek	10270102	91	Secondary Contact Recreation
Wells Creek	10270102	68	Secondary Contact Recreation
Whetstone Creek	10270102	104	Secondary Contact Recreation
Wilson Creek	10270102	50	Primary Contact Recreation
Wolf Creek	10270102	49	Primary Contact Recreation
Subbasin: Delaware			
Banner Creek	10270103	45	Secondary Contact Recreation
Barnes Creek	10270103	39	Secondary Contact Recreation
Bills Creek	10270103	47	Secondary Contact Recreation
Brush Creek	10270103	44	Secondary Contact Recreation
Brush Creek	10270103	54	Primary Contact Recreation
Burr Oak Branch	10270103	8	Primary Contact Recreation
Catamount Creek	10270103	49	Primary Contact Recreation
Cedar Creek, North	10270103	46	Primary Contact Recreation
Claywell Creek	10270103	56	Primary Contact Recreation
Clear Creek	10270103	19	Primary Contact Recreation
Coal Creek	10270103	50	Primary Contact Recreation
Grasshopper Creek	10270103	18	Primary Contact Recreation
Grasshopper Creek	10270103	20	Primary Contact Recreation
Gregg Creek	10270103	24	Primary Contact Recreation
Honey Creek	10270103	55	Secondary Contact Recreation
Little Grasshopper Creek	10270103	16	Secondary Contact Recreation
Little Wild Horse Creek	10270103	57	Primary Contact Recreation
Mission Creek	10270103	40	Primary Contact Recreation
Nebo Creek	10270103	48	Secondary Contact Recreation
Negro Creek	10270103	43	Secondary Contact Recreation
Otter Creek	10270103	41	Secondary Contact Recreation
Plum Creek	10270103	36	Secondary Contact Recreation
Rock Creek	10270103	34	Primary Contact Recreation
Rock Creek	10270103	53	Primary Contact Recreation
Spring Creek	10270103	42	Primary Contact Recreation
Squaw Creek	10270103	38	Secondary Contact Recreation
Straight Creek	10270103	28	Secondary Contact Recreation
Tick Creek	10270103	52	Primary Contact Recreation
Unnamed Stream	10270103	31	Secondary Contact Recreation
Walnut Creek	10270103	51	Primary Contact Recreation
Wolfley Creek	10270103	27	Secondary Contact Recreation
Subbasin: Lower Kansas			
Baldwin Creek	10270104	69	Secondary Contact Recreation
Brush Creek	10270104	49	Secondary Contact Recreation
Brush Creek, West	10270104	46	Secondary Contact Recreation
Buttermilk Creek	10270104	44	Secondary Contact Recreation
Camp Creek	10270104	41	Secondary Contact Recreation
Camp Creek	10270104	74	Secondary Contact Recreation
Captain Creek	10270104	72	Primary Contact Recreation
Chicken Creek	10270104	79	Secondary Contact Recreation
Clear Creek	10270104	383	Primary Contact Recreation
Cow Creek	10270104	58	Secondary Contact Recreation
Crooked Creek	10270104	10	Primary Contact Recreation
Crooked Creek	10270104	12	Primary Contact Recreation
Dawson Creek	10270104	45	Secondary Contact Recreation
Elk Creek	10270104	68	Primary Contact Recreation
Full Creek	10270104	52	Primary Contact Recreation
Hanson Creek	10270104	437	Secondary Contact Recreation
Hog Creek	10270104	54	Secondary Contact Recreation
Howard Creek	10270104	43	Secondary Contact Recreation

Stream segment name	HUC8	Segment #	Designated use
Hulls Branch	10270104	42	Secondary Contact Recreation
Indian Creek	10270104	48	Secondary Contact Recreation
Jarbalo Creek	10270104	51	Secondary Contact Recreation
Kent Creek	10270104	73	Secondary Contact Recreation
Kill Creek	10270104	37	Primary Contact Recreation
Little Cedar Creek	10270104	76	Primary Contact Recreation
Little Mill Creek	10270104	78	Primary Contact Recreation
Little Turkey Creek	10270104	62	Primary Contact Recreation
Little Wakarusa Creek	10270104	71	Primary Contact Recreation
Mission Creek, East	10270104	61	Secondary Contact Recreation
Ninemile Creek	10270104	15	Secondary Contact Recreation
Ninemile Creek	10270104	17	Primary Contact Recreation
Oakley Creek	10270104	56	Secondary Contact Recreation
Plum Creek	10270104	50	Secondary Contact Recreation
Prairie Creek	10270104	47	Secondary Contact Recreation
Rock Creek	10270104	35	Primary Contact Recreation
Scatter Creek	10270104	13	Secondary Contact Recreation
Spoon Creek	10270104	75	Secondary Contact Recreation
Stone Horse Creek	10270104	57	Secondary Contact Recreation
Stranger Creek	10270104	7	Primary Contact Recreation
Stranger Creek	10270104	8	Primary Contact Recreation
Stranger Creek	10270104	9	Primary Contact Recreation
Tonganoxie Creek	10270104	14	Primary Contact Recreation
Tooley Creek	10270104	379	Secondary Contact Recreation
Turkey Creek	10270104	77	Primary Contact Recreation
Unnamed Stream	10270104	11	Primary Contact Recreation
Unnamed Stream	10270104	16	Secondary Contact Recreation
Wakarusa River, Middle Branch	10270104	64	Secondary Contact Recreation
Wakarusa River, South Branch	10270104	63	Primary Contact Recreation
Washington Creek	10270104	36	Primary Contact Recreation
Yankee Tank Creek	10270104	70	Primary Contact Recreation
Subbasin: Lower Big Blue			
Ackerman Creek	10270205	49	Secondary Contact Recreation
Black Vermillion River, Clear Fork	10270205	9	Primary Contact Recreation
Black Vermillion River, North Fork	10270205	15	Secondary Contact Recreation
Black Vermillion River, South Fork	10270205	12	Secondary Contact Recreation
Bluff Creek	10270205	573	Primary Contact Recreation
Bommer Creek	10270205	40	Secondary Contact Recreation
Busksnort Creek	10270205	566	Secondary Contact Recreation
Carter Creek	10270205	59	Secondary Contact Recreation
Cedar Creek	10270205	56	Secondary Contact Recreation
Corndodger Creek	10270205	52	Primary Contact Recreation
De Shazer Creek	10270205	55	Secondary Contact Recreation
Deadman Creek	10270205	60	Secondary Contact Recreation
Deer Creek	10270205	36	Secondary Contact Recreation
Dog Walk Creek	10270205	53	Secondary Contact Recreation
Dutch Creek	10270205	44	Primary Contact Recreation
Elm Creek	10270205	46	Secondary Contact Recreation
Elm Creek, North	10270205	41	Secondary Contact Recreation
Fancy Creek, North Fork	10270205	61	Secondary Contact Recreation
Fancy Creek, West	10270205	29	Primary Contact Recreation
Game Fork	10270205	54	Secondary Contact Recreation
Hop Creek	10270205	43	Secondary Contact Recreation
Indian Creek	10270205	37	Secondary Contact Recreation
Jim Creek	10270205	57	Secondary Contact Recreation
Johnson Fork	10270205	51	Secondary Contact Recreation
Kearney Branch	10270205	58	Secondary Contact Recreation
Lily Creek	10270205	39	Secondary Contact Recreation
Little Indian Creek	10270205	35	Secondary Contact Recreation
Little Timber Creek	10270205	48	Primary Contact Recreation
Meadow Creek	10270205	34	Secondary Contact Recreation
Mission Creek	10270205	22	Primary Contact Recreation
Murdock Creek	10270205	42	Secondary Contact Recreation
Otter Creek	10270205	67	Secondary Contact Recreation
Otter Creek, North	10270205	62	Primary Contact Recreation
Perkins Creek	10270205	47	Secondary Contact Recreation
Phiel Creek	10270205	68	Primary Contact Recreation
Raemer Creek	10270205	33	Primary Contact Recreation
Robidoux Creek	10270205	16	Primary Contact Recreation
Schell Creek	10270205	45	Primary Contact Recreation
School Branch	10270205	63	Secondary Contact Recreation
Scotch Creek	10270205	38	Secondary Contact Recreation

Stream segment name	HUC8	Segment #	Designated use
Spring Creek	10270205	19	Primary Contact Recreation
Spring Creek	10270205	65	Primary Contact Recreation
Timber Creek	10270205	64	Primary Contact Recreation
Weyer Creek	10270205	50	Secondary Contact Recreation
Subbasin: Upper Little Blue			
Dry Creek	10270206	41	Secondary Contact Recreation
Subbasin: Lower Little Blue			
Ash Creek	10270207	36	Secondary Contact Recreation
Beaver Creek	10270207	38	Secondary Contact Recreation
Bolling Creek	10270207	42	Secondary Contact Recreation
Bowman Creek	10270207	21	Secondary Contact Recreation
Buffalo Creek	10270207	32	Secondary Contact Recreation
Camp Creek	10270207	35	Secondary Contact Recreation
Camp Creek	10270207	44	Primary Contact Recreation
Cedar Creek	10270207	40	Secondary Contact Recreation
Cherry Creek	10270207	25	Secondary Contact Recreation
Coon Creek	10270207	23	Primary Contact Recreation
Fawn Creek	10270207	45	Secondary Contact Recreation
Gray Branch	10270207	27	Secondary Contact Recreation
Humphrey Branch	10270207	24	Secondary Contact Recreation
Iowa Creek	10270207	34	Secondary Contact Recreation
Jones Creek	10270207	29	Secondary Contact Recreation
Joy Creek	10270207	13	Secondary Contact Recreation
Lane Branch	10270207	39	Secondary Contact Recreation
Malone Creek	10270207	37	Secondary Contact Recreation
Melvin Creek	10270207	33	Secondary Contact Recreation
Mercer Creek	10270207	43	Primary Contact Recreation
Mill Creek, South Fork	10270207	31	Secondary Contact Recreation
Myer Creek	10270207	26	Secondary Contact Recreation
Riddle Creek	10270207	17	Secondary Contact Recreation
Rose Creek	10270207	12	Secondary Contact Recreation
Salt Creek	10270207	19	Primary Contact Recreation
School Creek	10270207	49	Primary Contact Recreation
Silver Creek	10270207	28	Primary Contact Recreation
Spring Creek	10270207	15	Secondary Contact Recreation
Spring Creek	10270207	30	Secondary Contact Recreation
Walnut Creek	10270207	41	Primary Contact Recreation
Basin: Lower Arkansas			
Subbasin: Rattlesnake			
Spring Creek	11030009	7	Secondary Contact Recreation
Subbasin: Gar-Peace			
Gar Creek	11030010	8	Primary Contact Recreation
Subbasin: Cow			
Blood Creek	11030011	15	Secondary Contact Recreation
Deception Creek	11030011	13	Secondary Contact Recreation
Dry Creek	11030011	22	Primary Contact Recreation
Jarvis Creek	11030011	19	Primary Contact Recreation
Little Cheyenne Creek	11030011	7	Primary Contact Recreation
Little Cow Creek	11030011	2	Primary Contact Recreation
Lost Creek	11030011	17	Secondary Contact Recreation
Owl Creek	11030011	18	Primary Contact Recreation
Plum Creek	11030011	4	Secondary Contact Recreation
Salt Creek	11030011	21	Primary Contact Recreation
Spring Creek	11030011	20	Secondary Contact Recreation
Subbasin: Little Arkansas			
Beaver Creek	11030012	26	Primary Contact Recreation
Bull Creek	11030012	24	Primary Contact Recreation
Dry Creek	11030012	22	Secondary Contact Recreation
Dry Turkey Creek	11030012	13	Primary Contact Recreation
Emma Creek	11030012	6	Primary Contact Recreation
Emma Creek	11030012	7	Primary Contact Recreation
Emma Creek, West	11030012	8	Primary Contact Recreation

Stream segment name	HUC8	Segment #	Designated use
Gooseberry Creek	11030012	17	Primary Contact Recreation
Horse Creek	11030012	19	Primary Contact Recreation
Jester Creek	11030012	2	Primary Contact Recreation
Jester Creek, East Fork	11030012	18	Primary Contact Recreation
Kisiwa Creek	11030012	15	Secondary Contact Recreation
Lone Tree Creek	11030012	20	Secondary Contact Recreation
Mud Creek	11030012	16	Primary Contact Recreation
Running Turkey Creek	11030012	25	Secondary Contact Recreation
Salt Creek	11030012	21	Primary Contact Recreation
Sun Creek	11030012	11	Primary Contact Recreation
Turkey Creek	11030012	12	Secondary Contact Recreation
Subbasin: Middle Arkansas—Slate			
Antelope Creek	11030013	25	Primary Contact Recreation
Badger Creek	11030013	31	Primary Contact Recreation
Beaver Creek	11030013	29	Primary Contact Recreation
Beaver Creek	11030013	33	Primary Contact Recreation
Big Slough	11030013	11	Primary Contact Recreation
Big Slough, South Fork	11030013	35	Primary Contact Recreation
Bitter Creek	11030013	28	Primary Contact Recreation
Dry Creek	11030013	15	Primary Contact Recreation
Dry Creek	11030013	16	Primary Contact Recreation
Gypsum Creek	11030013	5	Primary Contact Recreation
Hargis Creek	11030013	24	Primary Contact Recreation
Lost Creek	11030013	23	Primary Contact Recreation
Negro Creek	11030013	20	Primary Contact Recreation
Oak Creek	11030013	26	Secondary Contact Recreation
Salt Creek	11030013	22	Primary Contact Recreation
Spring Creek	11030013	19	Primary Contact Recreation
Spring Creek	11030013	21	Primary Contact Recreation
Spring Creek	11030013	27	Primary Contact Recreation
Spring Creek	11030013	34	Primary Contact Recreation
Spring Creek	11030013	37	Primary Contact Recreation
Winser Creek	11030013	32	Primary Contact Recreation
Subbasin: North Fork Ninnescah			
Crow Creek	11030014	11	Primary Contact Recreation
Dooleyville Creek	11030014	8	Primary Contact Recreation
Goose Creek	11030014	10	Primary Contact Recreation
Ninnescah River, North Fork	11030014	1	Primary Contact Recreation
Ninnescah River, North Fork	11030014	5	Primary Contact Recreation
Ninnescah River, North Fork	11030014	6	Primary Contact Recreation
Red Rock Creek	11030014	12	Primary Contact Recreation
Rock Creek	11030014	13	Primary Contact Recreation
Silver Creek	11030014	7	Primary Contact Recreation
Spring Creek	11030014	14	Primary Contact Recreation
Wolf Creek	11030014	9	Primary Contact Recreation
Subbasin: South Fork Ninnescah			
Coon Creek	11030015	9	Primary Contact Recreation
Coon Creek	11030015	17	Primary Contact Recreation
Hunter Creek	11030015	14	Primary Contact Recreation
Mead Creek	11030015	10	Primary Contact Recreation
Mod Creek	11030015	19	Primary Contact Recreation
Natrona Creek	11030015	K38	Primary Contact Recreation
Negro Creek	11030015	13	Primary Contact Recreation
Nester Creek	11030015	15	Primary Contact Recreation
Ninnescah River, West Branch South Fork	11030015	5	Primary Contact Recreation
Painter Creek	11030015	7	Primary Contact Recreation
Pat Creek	11030015	11	Primary Contact Recreation
Petyt Creek	11030015	12	Primary Contact Recreation
Sand Creek	11030015	18	Primary Contact Recreation
Spring Creek	11030015	8	Primary Contact Recreation
Wild Run Creek	11030015	16	Primary Contact Recreation
Subbasin: Ninnescah			
Afton Creek	11030016	5	Primary Contact Recreation
Clearwater Creek	11030016	4	Primary Contact Recreation
Clearwater Creek	11030016	7	Primary Contact Recreation
Dry Creek	11030016	16	Primary Contact Recreation
Elm Creek	11030016	10	Primary Contact Recreation

Stream segment name	HUC8	Segment #	Designated use
Garvey Creek	11030016	11	Primary Contact Recreation
Sand Creek	11030016	14	Primary Contact Recreation
Silver Creek	11030016	12	Primary Contact Recreation
Spring Creek	11030016	2	Primary Contact Recreation
Spring Creek	11030016	15	Primary Contact Recreation
Turtle Creek	11030016	13	Primary Contact Recreation
Subbasin: Kaw Lake			
Blue Branch	11060001	30	Primary Contact Recreation
Bullington Creek	11060001	28	Primary Contact Recreation
Cedar Creek	11060001	32	Primary Contact Recreation
Chilocco Creek	11060001	19	Primary Contact Recreation
Crabb Creek	11060001	29	Primary Contact Recreation
Ferguson Creek	11060001	38	Primary Contact Recreation
Franklin Creek	11060001	35	Primary Contact Recreation
Gardners Branch	11060001	39	Primary Contact Recreation
Goose Creek	11060001	34	Primary Contact Recreation
Myers Creek	11060001	24	Primary Contact Recreation
Otter Creek	11060001	20	Primary Contact Recreation
Pebble Creek	11060001	26	Primary Contact Recreation
Plum Creek	11060001	33	Primary Contact Recreation
Riley Creek	11060001	37	Primary Contact Recreation
School Creek	11060001	31	Primary Contact Recreation
Shellrock Creek	11060001	22	Primary Contact Recreation
Silver Creek	11060001	17	Primary Contact Recreation
Snake Creek	11060001	25	Primary Contact Recreation
Spring Creek	11060001	21	Primary Contact Recreation
Turkey Creek	11060001	27	Primary Contact Recreation
Wagoner Creek	11060001	36	Primary Contact Recreation
Subbasin: Upper Salt Fork Arkansas			
Ash Creek	11060002	20	Primary Contact Recreation
Big Sandy Creek	11060002	5	Primary Contact Recreation
Cave Creek	11060002	28	Primary Contact Recreation
Deadman Creek	11060002	22	Primary Contact Recreation
Dog Creek	11060002	29	Primary Contact Recreation
Hackberry Creek	11060002	23	Primary Contact Recreation
Indian Creek	11060002	9	Primary Contact Recreation
Inman Creek	11060002	21	Primary Contact Recreation
Mustang Creek	11060002	31	Primary Contact Recreation
Nescatunga Creek, East Branch	11060002	27	Primary Contact Recreation
Red Creek	11060002	16	Primary Contact Recreation
Spring Creek	11060002	24	Primary Contact Recreation
Wildcat Creek	11060002	12	Primary Contact Recreation
Yellowstone Creek	11060002	17	Primary Contact Recreation
Subbasin: Medicine Lodge			
Amber Creek	11060003	12	Primary Contact Recreation
Antelope Creek	11060003	22	Primary Contact Recreation
Bear Creek	11060003	13	Secondary Contact Recreation
Bitter Creek	11060003	18	Secondary Contact Recreation
Cedar Creek	11060003	20	Primary Contact Recreation
Cottonwood Creek	11060003	16	Primary Contact Recreation
Crooked Creek	11060003	11	Primary Contact Recreation
Litle Mule Creek	11060003	9	Primary Contact Recreation
Dry Creek	11060003	21	Secondary Contact Recreation
Elm Creek, East Branch South	11060003	10	Primary Contact Recreation
Elm Creek, North Branch	11060003	4	Primary Contact Recreation
Elm Creek, South Branch	11060003	5	Primary Contact Recreation
Little Bear Creek	11060003	19	Primary Contact Recreation
Medicine Lodge River, North Branch	11060003	24	Secondary Contact Recreation
Mulberry Creek	11060003	14	Primary Contact Recreation
Otter Creek	11060003	25	Secondary Contact Recreation
Puckett Creek	11060003	15	Primary Contact Recreation
Sand Creek	11060003	17	Primary Contact Recreation
Soldier Creek	11060003	27	Secondary Contact Recreation
Stink Creek	11060003	28	Primary Contact Recreation
Turkey Creek	11060003	7	Primary Contact Recreation
Wilson Slough	11060003	23	Primary Contact Recreation

Stream segment name	HUC8	Segment #	Designated use
Subbasin: Lower Salt Fork Arkansas			
Camp Creek	11060004	68	Primary Contact Recreation
Cooper Creek	11060004	71	Primary Contact Recreation
Crooked Creek	11060004	24	Primary Contact Recreation
Little Sandy Creek	11060004	39	Primary Contact Recreation
Little Sandy Creek, East Branch	11060004	65	Primary Contact Recreation
Osage Creek	11060004	17	Primary Contact Recreation
Plum Creek	11060004	70	Primary Contact Recreation
Pond Creek	11060004	18	Primary Contact Recreation
Rush Creek	11060004	69	Primary Contact Recreation
Salty Creek	11060004	40	Primary Contact Recreation
Sandy Creek	11060004	37	Primary Contact Recreation
Sandy Creek, West	11060004	56	Primary Contact Recreation
Spring Creek	11060004	66	Primary Contact Recreation
Unnamed Stream	11060004	25	Primary Contact Recreation
Subbasin: Chikaskia			
Allen Creek	11060005	40	Primary Contact Recreation
Baehr Creek	11060005	22	Primary Contact Recreation
Beaver Creek	11060005	28	Primary Contact Recreation
Beaver Creek	11060005	46	Primary Contact Recreation
Big Spring Creek	11060005	34	Primary Contact Recreation
Bitter Creek	11060005	4	Primary Contact Recreation
Bitter Creek, East	11060005	16	Primary Contact Recreation
Blue Stem Creek	11060005	48	Primary Contact Recreation
Chicken Creek	11060005	36	Primary Contact Recreation
Copper Creek	11060005	42	Primary Contact Recreation
Dry Creek	11060005	17	Primary Contact Recreation
Duck Creek	11060005	32	Primary Contact Recreation
Fall Creek	11060005	14	Primary Contact Recreation
Fall Creek, East Branch	11060005	27	Primary Contact Recreation
Goose Creek	11060005	38	Primary Contact Recreation
Kemp Creek	11060005	49	Primary Contact Recreation
Long Creek	11060005	529	Primary Contact Recreation
Meridian Creek	11060005	20	Primary Contact Recreation
Prairie Creek	11060005	512	Primary Contact Recreation
Prairie Creek, East	11060005	516	Primary Contact Recreation
Prairie Creek, West	11060005	527	Primary Contact Recreation
Red Creek	11060005	43	Primary Contact Recreation
Rock Creek	11060005	23	Primary Contact Recreation
Rodgers Branch	11060005	26	Primary Contact Recreation
Rose Bud Creek	11060005	44	Primary Contact Recreation
Rush Creek	11060005	45	Primary Contact Recreation
Sand Creek	11060005	11	Primary Contact Recreation
Sand Creek, East	11060005	12	Primary Contact Recreation
Sandy Creek	11060005	30	Primary Contact Recreation
Shoo Fly Creek, East	11060005	19	Secondary Contact Recreation
Shore Creek	11060005	35	Primary Contact Recreation
Silver Creek	11060005	29	Primary Contact Recreation
Skunk Creek	11060005	39	Primary Contact Recreation
Spring Branch	11060005	21	Primary Contact Recreation
Wild Horse Creek	11060005	41	Primary Contact Recreation
Wildcat Creek	11060005	24	Primary Contact Recreation
Basin: Marais Des Cygnes			
Subbasin: Upper Marais Des Cygnes			
Appanoose Creek	10290101	16	Primary Contact Recreation
Appanoose Creek, East	10290101	89	Primary Contact Recreation
Batch Creek	10290101	86	Primary Contact Recreation
Blue Creek	10290101	81	Primary Contact Recreation
Bradshaw Creek	10290101	75	Primary Contact Recreation
Cedar Creek	10290101	66	Primary Contact Recreation
Cherry Creek	10290101	74	Primary Contact Recreation
Chicken Creek	10290101	70	Primary Contact Recreation
Chicken Creek	10290101	93	Primary Contact Recreation
Coal Creek	10290101	48	Primary Contact Recreation
Dry Creek	10290101	57	Primary Contact Recreation
Dry Creek	10290101	95	Primary Contact Recreation
Duck Creek	10290101	41	Primary Contact Recreation
Eightmile Creek	10290101	13	Primary Contact Recreation
Frog Creek	10290101	42	Primary Contact Recreation

Stream segment name	HUC8	Segment #	Designated use
Hard Fish Creek	10290101	47	Primary Contact Recreation
Hickory Creek	10290101	8	Primary Contact Recreation
Hill Creek	10290101	71	Primary Contact Recreation
Iantha Creek	10290101	62	Primary Contact Recreation
Jersey Creek	10290101	76	Primary Contact Recreation
Kenoma Creek	10290101	64	Primary Contact Recreation
Little Rock Creek	10290101	73	Primary Contact Recreation
Long Creek	10290101	K36	Primary Contact Recreation
Locust Creek	10290101	69	Primary Contact Recreation
Middle Creek	10290101	50	Primary Contact Recreation
Mosquito Creek	10290101	52	Primary Contact Recreation
Mud Creek	10290101	49	Primary Contact Recreation
Mud Creek	10290101	78	Primary Contact Recreation
Mud Creek	10290101	91	Primary Contact Recreation
Mute Creek	10290101	92	Primary Contact Recreation
Ottawa Creek	10290101	K25	Primary Contact Recreation
Plum Creek	10290101	2	Primary Contact Recreation
Plum Creek	10290101	79	Primary Contact Recreation
Popcorn Creek	10290101	87	Primary Contact Recreation
Pottawatomie Creek, North Fork	10290101	65	Primary Contact Recreation
Pottawatomie Creek, South Fork	10290101	67	Primary Contact Recreation
Rock Creek	10290101	43	Primary Contact Recreation
Rock Creek	10290101	97	Primary Contact Recreation
Sac Branch, South Fork	10290101	54	Secondary Contact Recreation
Sac Creek	10290101	60	Primary Contact Recreation
Salt Creek	10290101	29	Primary Contact Recreation
Sand Creek	10290101	82	Primary Contact Recreation
Smith Creek	10290101	77	Primary Contact Recreation
Spring Creek	10290101	84	Primary Contact Recreation
Switzler Creek	10290101	80	Primary Contact Recreation
Tauy Creek	10290101	11	Primary Contact Recreation
Tauy Creek, West Fork	10290101	K26	Primary Contact Recreation
Tequa Creek	10290101	44	Primary Contact Recreation
Tequa Creek, East Branch	10290101	46	Primary Contact Recreation
Tequa Creek, South Branch	10290101	45	Primary Contact Recreation
Thomas Creek	10290101	72	Secondary Contact Recreation
Turkey Creek	10290101	4	Primary Contact Recreation
Turkey Creek	10290101	6	Primary Contact Recreation
Unnamed Stream	10290101	5	Primary Contact Recreation
Walnut Creek	10290101	90	Primary Contact Recreation
West Fork Eight Mile Creek	10290101	88	Primary Contact Recreation
Willow Creek	10290101	94	Primary Contact Recreation
Wilson Creek	10290101	83	Primary Contact Recreation
Wolf Creek	10290101	96	Primary Contact Recreation
Subbasin: Lower Marais Des Cygnes			
Buck Creek	10290102	44	Primary Contact Recreation
Bull Creek	10290102	26	Secondary Contact Recreation
Davis Creek	10290102	38	Primary Contact Recreation
Dorsey Creek	10290102	22	Primary Contact Recreation
Elm Branch	10290102	48	Primary Contact Recreation
Elm Branch	10290102	53	Primary Contact Recreation
Elm Creek	10290102	40	Primary Contact Recreation
Hushpuckney Creek	10290102	37	Primary Contact Recreation
Jake Branch	10290102	54	Secondary Contact Recreation
Jordan Branch	10290102	36	Primary Contact Recreation
Little Bull Creek	10290102	51	Primary Contact Recreation
Little Sugar Creek	10290102	33	Primary Contact Recreation
Little Sugar Creek, North Fork	10290102	43	Primary Contact Recreation
Martin Creek	10290102	26	Primary Contact Recreation
Middle Creek	10290102	13	Primary Contact Recreation
Middle Creek	10290102	30	Primary Contact Recreation
Mound Creek	10290102	35	Primary Contact Recreation
Richland Creek	10290102	41	Primary Contact Recreation
Rock Creek	10290102	27	Primary Contact Recreation
Smith Branch	10290102	47	Primary Contact Recreation
Spring Creek	10290102	50	Primary Contact Recreation
Sugar Creek	10290102	42	Primary Contact Recreation
Turkey Creek	10290102	45	Primary Contact Recreation
Walnut Creek	10290102	14	Primary Contact Recreation
Walnut Creek	10290102	34	Primary Contact Recreation
Walnut Creek	10290102	52	Primary Contact Recreation
Wea Creek, North	10290102	21	Primary Contact Recreation

Stream segment name	HUC8	Segment #	Designated use
Wea Creek, South	10290102	18	Primary Contact Recreation
Wea Creek, South	10290102	19	Primary Contact Recreation
Wea Creek, South	10290102	20	Primary Contact Recreation
Subbasin: Little Osage			
Clever Creek	10290103	7	Primary Contact Recreation
Elk Creek	10290103	11	Primary Contact Recreation
Fish Creek	10290103	8	Primary Contact Recreation
Indian Creek	10290103	12	Primary Contact Recreation
Irish Creek	10290103	9	Primary Contact Recreation
Laberdie Creek, East	10290103	13	Primary Contact Recreation
Limestone Creek	10290103	5	Primary Contact Recreation
Lost Creek	10290103	10	Primary Contact Recreation
Reagan Branch	10290103	6	Primary Contact Recreation
Subbasin: Marmaton			
Buck Run	10290104	46	Primary Contact Recreation
Bunion Creek	10290104	39	Primary Contact Recreation
Cedar Creek	10290104	41	Primary Contact Recreation
Drywood Creek, Moores Branch	10290104	17	Primary Contact Recreation
Drywood Creek, West Fork	10290104	19	Primary Contact Recreation
Elm Creek	10290104	15	Secondary Contact Recreation
Hinton Creek	10290104	38	Primary Contact Recreation
Lath Branch	10290104	42	Primary Contact Recreation
Little Mill Creek	10290104	34	Primary Contact Recreation
Mill Creek	10290104	6	Primary Contact Recreation
Owl Creek	10290104	45	Primary Contact Recreation
Paint Creek	10290104	13	Primary Contact Recreation
Paint Creek	10290104	14	Primary Contact Recreation
Prong Creek	10290104	44	Secondary Contact Recreation
Robinson Branch	10290104	40	Primary Contact Recreation
Shiloh Creek	10290104	36	Primary Contact Recreation
Sweet Branch	10290104	30	Primary Contact Recreation
Tennyson Creek	10290104	31	Primary Contact Recreation
Turkey Creek	10290104	33	Primary Contact Recreation
Walnut Creek	10290104	32	Primary Contact Recreation
Walnut Creek	10290104	47	Primary Contact Recreation
Wolfpen Creek	10290104	37	Primary Contact Recreation
Wolverine Creek	10290104	35	Primary Contact Recreation
Subbasin: South Grand			
Harless Creek	10290108	67	Primary Contact Recreation
Poney Creek	10290108	48	Primary Contact Recreation
Basin: Missouri			
Subbasin: Tarkio-Wolf			
Cold Ryan Branch	10240005	70	Primary Contact Recreation
Coon Creek	10240005	71	Primary Contact Recreation
Halling Creek	10240005	68	Primary Contact Recreation
Mill Creek	10240005	52	Primary Contact Recreation
Rittenhouse Branch	10240005	69	Primary Contact Recreation
Spring Creek	10240005	65	Primary Contact Recreation
Striker Branch	10240005	72	Primary Contact Recreation
Wolf River, Middle Fork	10240005	67	Primary Contact Recreation
Wolf River, North Fork	10240005	66	Primary Contact Recreation
Wolf River, South Fork	10240005	57	Primary Contact Recreation
Unnamed Stream	10240005	55	Primary Contact Recreation
Subbasin: South Fork Big Nemaha			
Burger Creek	10240007	24	Secondary Contact Recreation
Deer Creek	10240007	18	Primary Contact Recreation
Fisher Creek	10240007	28	Primary Contact Recreation
Illinois Creek	10240007	30	Primary Contact Recreation
Rattlesnake Creek	10240007	27	Primary Contact Recreation
Rock Creek	10240007	20	Primary Contact Recreation
Tennessee Creek	10240007	29	Primary Contact Recreation
Turkey Creek	10240007	4	Primary Contact Recreation
Turkey Creek	10240007	5	Primary Contact Recreation
Wildcat Creek	10240007	23	Primary Contact Recreation

Stream segment name	HUC8	Segment #	Designated use
Wildcat Creek	10240007	22	Primary Contact Recreation
Wolf Pen Creek	10240007	25	Primary Contact Recreation
Subbasin: Big Nemaha			
Noharts Creek	10240008	42	Primary Contact Recreation
Pedee Creek	10240008	41	Primary Contact Recreation
Pony Creek	10240008	38	Primary Contact Recreation
Roys Creek	10240008	40	Primary Contact Recreation
Subbasin: Independence—Sugar			
Brush Creek	10240011	26	Primary Contact Recreation
Deer Creek	10240011	32	Primary Contact Recreation
Fivemile Creek	10240011	35	Primary Contact Recreation
Independence Creek, North Branch	10240011	29	Primary Contact Recreation
Jordan Creek	10240011	30	Primary Contact Recreation
Owl Creek	10240011	33	Primary Contact Recreation
Rock Creek	10240011	21	Primary Contact Recreation
Salt Creek	10240011	34	Primary Contact Recreation
Smith Creek	10240011	28	Primary Contact Recreation
Three Mile Creek	10240011	36	Primary Contact Recreation
Walnut Creek	10240011	23	Primary Contact Recreation
Walnut Creek	10240011	25	Primary Contact Recreation
White Clay Creek	10240011	31	Primary Contact Recreation
White Clay Creek	10240011	9031	Primary Contact Recreation
Whiskey Creek	10240011	235	Primary Contact Recreation
Whiskey Creek	10240011	9235	Primary Contact Recreation
Subbasin: Lower Missouri—Crooked			
Brush Creek	10300101	54	Primary Contact Recreation
Camp Branch	10300101	56	Primary Contact Recreation
Coffee Creek	10300101	57	Primary Contact Recreation
Dyke Branch	10300101	55	Primary Contact Recreation
Indian Creek	10300101	32	Primary Contact Recreation
Negro Creek	10300101	58	Primary Contact Recreation
Tomahawk Creek	10300101	53	Primary Contact Recreation
Basin: Neosho			
Subbasin: Neosho Headwaters			
Allen Creek	11070201	5	Primary Contact Recreation
Badger Creek	11070201	45	Primary Contact Recreation
Big John Creek	11070201	37	Primary Contact Recreation
Bluff Creek	11070201	8	Primary Contact Recreation
Crooked Creek	11070201	35	Primary Contact Recreation
Dows Creek	11070201	3	Primary Contact Recreation
Dows Creek	11070201	4	Primary Contact Recreation
Eagle Creek	11070201	25	Primary Contact Recreation
Eagle Creek, South	11070201	47	Primary Contact Recreation
East Creek	11070201	39	Primary Contact Recreation
Elm Creek	11070201	36	Primary Contact Recreation
Fourmile Creek	11070201	24	Primary Contact Recreation
Fourmile Creek	11070201	48	Primary Contact Recreation
Haun Creek	11070201	29	Primary Contact Recreation
Horse Creek	11070201	33	Primary Contact Recreation
Kahola Creek	11070201	43	Primary Contact Recreation
Lairds Creek	11070201	30	Primary Contact Recreation
Lanos Creek	11070201	21	Primary Contact Recreation
Lebo Creek	11070201	51	Primary Contact Recreation
Munkers Creek, East Branch	11070201	31	Primary Contact Recreation
Munkers Creek, Middle Branch	11070201	32	Primary Contact Recreation
Neosho River, East Fork	11070201	18	Primary Contact Recreation
Neosho River, West Fork	11070201	28	Primary Contact Recreation
Parkers Creek	11070201	27	Primary Contact Recreation
Plum Creek	11070201	50	Primary Contact Recreation
Plumb Creek	11070201	49	Primary Contact Recreation
Rock Creek	11070201	7	Primary Contact Recreation
Rock Creek	11070201	9	Primary Contact Recreation
Rock Creek, East Branch	11070201	34	Primary Contact Recreation
Spring Creek	11070201	40	Primary Contact Recreation
Stillman Creek	11070201	44	Primary Contact Recreation
Taylor Creek	11070201	46	Primary Contact Recreation

Stream segment name	HUC8	Segment #	Designated use
Walker Branch	11070201	42	Primary Contact Recreation
Wolf Creek	11070201	41	Primary Contact Recreation
Wrights Creek	11070201	38	Primary Contact Recreation
Subbasin: Upper Cottonwood			
Antelope Creek	11070202	19	Primary Contact Recreation
Bills Creek	11070202	30	Primary Contact Recreation
Bruno Creek	11070202	27	Primary Contact Recreation
Catlin Creek	11070202	20	Primary Contact Recreation
Clear Creek	11070202	5	Primary Contact Recreation
Clear Creek, East Branch	11070202	24	Primary Contact Recreation
Coon Creek	11070202	32	Primary Contact Recreation
Cottonwood River, South	11070202	17	Primary Contact Recreation
Cottonwood River, South	11070202	18	Primary Contact Recreation
Doyle Creek	11070202	21	Primary Contact Recreation
French Creek	11070202	16	Primary Contact Recreation
Mud Creek	11070202	6	Primary Contact Recreation
Perry Creek	11070202	23	Primary Contact Recreation
Spring Branch	11070202	26	Primary Contact Recreation
Spring Creek	11070202	28	Primary Contact Recreation
Spring Creek	11070202	29	Primary Contact Recreation
Stony Brook	11070202	25	Primary Contact Recreation
Turkey Creek	11070202	31	Primary Contact Recreation
Subbasin: Lower Cottonwood			
Beaver Creek	11070203	29	Primary Contact Recreation
Bloody Creek	11070203	40	Primary Contact Recreation
Buck Creek	11070203	39	Primary Contact Recreation
Buckeye Creek	11070203	44	Primary Contact Recreation
Bull Creek	11070203	26	Primary Contact Recreation
Camp Creek	11070203	14	Primary Contact Recreation
Coal Creek	11070203	43	Primary Contact Recreation
Collett Creek	11070203	21	Primary Contact Recreation
Corn Creek	11070203	47	Primary Contact Recreation
Coyne Branch	11070203	33	Primary Contact Recreation
Crocker Creek	11070203	46	Primary Contact Recreation
Dodds Creek	11070203	15	Primary Contact Recreation
Fox Creek	11070203	19	Primary Contact Recreation
French Creek	11070203	32	Primary Contact Recreation
Gannon Creek	11070203	24	Primary Contact Recreation
Gould Creek	11070203	36	Primary Contact Recreation
Holmes Creek	11070203	35	Primary Contact Recreation
Jacob Creek	11070203	28	Primary Contact Recreation
Kirk Creek	11070203	48	Primary Contact Recreation
Little Cedar Creek	11070203	11	Primary Contact Recreation
Little Cedar Creek	11070203	45	Primary Contact Recreation
Middle Creek	11070203	5	Primary Contact Recreation
Mile-and-a-half Creek	11070203	13	Secondary Contact Recreation
Moon Creek	11070203	31	Primary Contact Recreation
Mulvane Creek	11070203	22	Primary Contact Recreation
Peyton Creek	11070203	25	Primary Contact Recreation
Phenis Creek	11070203	30	Primary Contact Recreation
Pickett Creek	11070203	18	Primary Contact Recreation
Prather Creek	11070203	23	Primary Contact Recreation
Rock Creek	11070203	37	Primary Contact Recreation
Schaffer Creek	11070203	17	Primary Contact Recreation
School Creek	11070203	16	Primary Contact Recreation
Sharpes Creek	11070203	38	Primary Contact Recreation
Silver Creek	11070203	34	Primary Contact Recreation
Spring Creek	11070203	41	Primary Contact Recreation
Stout Run	11070203	27	Primary Contact Recreation
Stribby Creek	11070203	20	Primary Contact Recreation
Subbasin: Upper Neosho			
Badger Creek	11070204	42	Primary Contact Recreation
Big Creek, North	11070204	16	Primary Contact Recreation
Big Creek, South	11070204	17	Primary Contact Recreation
Bloody Run	11070204	25	Primary Contact Recreation
Carlyle Creek	11070204	47	Primary Contact Recreation
Charles Branch	11070204	27	Primary Contact Recreation
Cherry Creek	11070204	20	Primary Contact Recreation

Stream segment name	HUC8	Segment #	Designated use
Coal Creek	11070204	4	Primary Contact Recreation
Cottonwood Creek	11070204	48	Primary Contact Recreation
Crooked Creek	11070204	44	Primary Contact Recreation
Draw Creek	11070204	34	Primary Contact Recreation
Goose Creek	11070204	29	Primary Contact Recreation
Long Creek	11070204	12	Primary Contact Recreation
Martin Creek	11070204	49	Primary Contact Recreation
Mud Creek	11070204	26	Primary Contact Recreation
Mud Creek	11070204	31	Primary Contact Recreation
Onion Creek	11070204	24	Primary Contact Recreation
Owl Creek	11070204	19	Primary Contact Recreation
Owl Creek	11070204	21	Primary Contact Recreation
Plum Creek	11070204	22	Primary Contact Recreation
Rock Creek	11070204	7	Primary Contact Recreation
Rock Creek	11070204	23	Primary Contact Recreation
Rock Creek	11070204	15	Primary Contact Recreation
School Creek	11070204	38	Primary Contact Recreation
Scott Creek	11070204	40	Primary Contact Recreation
Slack Creek	11070204	30	Primary Contact Recreation
Spring Creek	11070204	46	Primary Contact Recreation
Sutton Creek	11070204	35	Primary Contact Recreation
Turkey Branch	11070204	28	Primary Contact Recreation
Turkey Creek	11070204	18	Primary Contact Recreation
Turkey Creek	11070204	32	Primary Contact Recreation
Twiss Creek	11070204	45	Primary Contact Recreation
Varvel Creek	11070204	43	Primary Contact Recreation
Village Creek	11070204	33	Primary Contact Recreation
Wolf Creek	11070204	37	Primary Contact Recreation
Subbasin: Middle Neosho			
Bachelor Creek	11070205	40	Primary Contact Recreation
Canville Creek	11070205	16	Primary Contact Recreation
Center Creek	11070205	25	Primary Contact Recreation
Cherry Creek	11070205	4	Primary Contact Recreation
Deer Creek	11070205	27	Primary Contact Recreation
Denny Branch	11070205	31	Primary Contact Recreation
Elk Creek	11070205	19	Primary Contact Recreation
Elm Creek	11070205	43	Primary Contact Recreation
Flat Rock Creek	11070205	12	Primary Contact Recreation
Flat Rock Creek	11070205	14	Primary Contact Recreation
Fourmile Creek	11070205	49	Primary Contact Recreation
Grindstone Creek	11070205	42	Primary Contact Recreation
Hickory Creek	11070205	10	Primary Contact Recreation
Lake Creek	11070205	24	Primary Contact Recreation
Lightning Creek	11070205	6	Primary Contact Recreation
Lightning Creek	11070205	8	Primary Contact Recreation
Limestone Creek	11070205	7	Primary Contact Recreation
Little Cherry Creek	11070205	32	Primary Contact Recreation
Little Elk Creek	11070205	47	Primary Contact Recreation
Little Fly Creek	11070205	26	Secondary Contact Recreation
Little Labette Creek	11070205	23	Primary Contact Recreation
Little Walnut Creek	11070205	46	Primary Contact Recreation
Litup Creek	11070205	36	Primary Contact Recreation
Mulberry Creek	11070205	35	Primary Contact Recreation
Murphy Creek	11070205	41	Primary Contact Recreation
Ogeese Creek	11070205	38	Primary Contact Recreation
Pecan Creek	11070205	45	Primary Contact Recreation
Plum Creek	11070205	34	Primary Contact Recreation
Rock Creek	11070205	48	Primary Contact Recreation
Spring Creek	11070205	30	Primary Contact Recreation
Stink Branch	11070205	37	Primary Contact Recreation
Thunderbolt Creek	11070205	44	Primary Contact Recreation
Tolen Creek	11070205	39	Primary Contact Recreation
Town Creek	11070205	28	Primary Contact Recreation
Turkey Creek	11070205	29	Primary Contact Recreation
Walnut Creek	11070205	13	Primary Contact Recreation
Wolf Creek	11070205	33	Primary Contact Recreation
Subbasin: Lake O' the Cherokees			
Fourmile Creek	11070206	18	Primary Contact Recreation
Tar Creek	11070206	19	Primary Contact Recreation

Stream segment name	HUC8	Segment #	Designated use
Subbasin: Spring			
Little Shawnee Creek	11070207	22	Primary Contact Recreation
Long Branch	11070207	21	Primary Contact Recreation
Shawnee Creek	11070207	17	Primary Contact Recreation
Taylor Branch	11070207	25	Primary Contact Recreation
Willow Creek	11070207	20	Primary Contact Recreation
Basin: Smoky Hill/Saline			
Subbasin: Middle Smoky Hill			
Ash Creek	10260006	37	Primary Contact Recreation
Big Timber Creek	10260006	24	Primary Contact Recreation
Big Timber Creek	10260006	25	Primary Contact Recreation
Big Timber Creek	10260006	27	Primary Contact Recreation
Blood Creek	10260006	35	Secondary Contact Recreation
Buck Creek	10260006	29	Primary Contact Recreation
Buffalo Creek	10260006	6	Primary Contact Recreation
Clear Creek	10260006	42	Primary Contact Recreation
Coal Creek	10260006	34	Primary Contact Recreation
Cow Creek	10260006	38	Primary Contact Recreation
Eagle Creek	10260006	30	Primary Contact Recreation
Fossil Creek	10260006	13	Primary Contact Recreation
Goose Creek	10260006	39	Primary Contact Recreation
Landon Creek	10260006	31	Primary Contact Recreation
Loss Creek	10260006	44	Primary Contact Recreation
Mud Creek	10260006	47	Primary Contact Recreation
Oxide Creek	10260006	45	Primary Contact Recreation
Sellens Creek	10260006	32	Primary Contact Recreation
Shelter Creek	10260006	43	Primary Contact Recreation
Skunk Creek	10260006	48	Primary Contact Recreation
Spring Creek	10260006	41	Primary Contact Recreation
Timber Creek	10260006	26	Primary Contact Recreation
Turkey Creek	10260006	46	Primary Contact Recreation
Unnamed Stream	10260006	20	Primary Contact Recreation
Unnamed Stream	10260006	23	Primary Contact Recreation
Unnamed Stream	10260006	28	Primary Contact Recreation
Wilson Creek	10260006	40	Primary Contact Recreation
Wolf Creek	10260006	36	Primary Contact Recreation
Subbasin: Lower Smoky Hill			
Basket Creek	10260008	40	Primary Contact Recreation
Battle Creek	10260008	23	Primary Contact Recreation
Carry Creek	10260008	32	Primary Contact Recreation
Carry Creek	10260008	35	Primary Contact Recreation
Chapman Creek, West	10260008	5	Primary Contact Recreation
Dry Creek	10260008	36	Primary Contact Recreation
Dry Creek, East	10260008	43	Primary Contact Recreation
Hobbs Creek	10260008	48	Primary Contact Recreation
Holland Creek	10260008	25	Primary Contact Recreation
Holland Creek, East	10260008	27	Primary Contact Recreation
Holland Creek, West	10260008	26	Primary Contact Recreation
Kentucky Creek	10260008	17	Secondary Contact Recreation
Kentucky Creek, West	10260008	54	Primary Contact Recreation
Lone Tree Creek	10260008	41	Primary Contact Recreation
Lyon Creek, West Branch	10260008	34	Primary Contact Recreation
Mcallister Creek	10260008	49	Primary Contact Recreation
Middle Branch	10260008	58	Primary Contact Recreation
Mud Creek	10260008	8	Primary Contact Recreation
Otter Creek	10260008	42	Primary Contact Recreation
Paint Creek	10260008	52	Secondary Contact Recreation
Pewee Creek	10260008	56	Primary Contact Recreation
Sand Creek	10260008	46	Primary Contact Recreation
Sharps Creek	10260008	16	Secondary Contact Recreation
Spring Creek	10260008	45	Primary Contact Recreation
Stag Creek	10260008	19	Primary Contact Recreation
Turkey Creek	10260008	28	Primary Contact Recreation
Turkey Creek	10260008	30	Primary Contact Recreation
Turkey Creek, East	10260008	50	Primary Contact Recreation
Turkey Creek, West Branch	10260008	29	Primary Contact Recreation
Unnamed Stream	10260008	K3	Primary Contact Recreation
Unnamed Stream	10260008	K4	Primary Contact Recreation
Unnamed Stream	10260008	K24	Primary Contact Recreation

Stream segment name	HUC8	Segment #	Designated use
Wiley Creek	10260008	47	Primary Contact Recreation
Subbasin: Upper Saline			
Cedar Creek	10260009	30	Secondary Contact Recreation
Chalk Creek	10260009	26	Primary Contact Recreation
Coyote Creek	10260009	23	Primary Contact Recreation
Eagle Creek	10260009	6	Primary Contact Recreation
Happy Creek	10260009	25	Primary Contact Recreation
Paradise Creek	10260009	5	Primary Contact Recreation
Salt Creek	10260009	20	Primary Contact Recreation
Spring Creek, East	10260009	10	Primary Contact Recreation
Sweetwater Creek	10260009	29	Primary Contact Recreation
Trego Creek	10260009	19	Primary Contact Recreation
Unnamed Stream	10260009	13	Primary Contact Recreation
Wild Horse Creek	10260009	27	Primary Contact Recreation
Subbasin: Lower Saline			
Bacon Creek	10260010	7	Primary Contact Recreation
Blue Stem Creek	10260010	33	Primary Contact Recreation
Coon Creek	10260010	31	Primary Contact Recreation
Dry Creek	10260010	29	Secondary Contact Recreation
Eff Creek	10260010	23	Primary Contact Recreation
Elkhorn Creek	10260010	17	Primary Contact Recreation
Elkhorn Creek, West	10260010	38	Primary Contact Recreation
Fourmile Creek	10260010	30	Primary Contact Recreation
Lost Creek	10260010	34	Secondary Contact Recreation
Owl Creek	10260010	18	Primary Contact Recreation
Owl Creek	10260010	39	Primary Contact Recreation
Ralston Creek	10260010	28	Primary Contact Recreation
Shaw Creek	10260010	41	Primary Contact Recreation
Spillman Creek	10260010	6	Primary Contact Recreation
Spillman Creek, North Branch	10260010	8	Primary Contact Recreation
Spring Creek	10260010	16	Primary Contact Recreation
Spring Creek	10260010	19	Primary Contact Recreation
Spring Creek	10260010	20	Primary Contact Recreation
Spring Creek	10260010	24	Primary Contact Recreation
Spring Creek	10260010	26	Primary Contact Recreation
Spring Creek	10260010	27	Primary Contact Recreation
Table Rock Creek	10260010	40	Primary Contact Recreation
Trail Creek	10260010	32	Secondary Contact Recreation
Twelvemile Creek	10260010	36	Primary Contact Recreation
Twin Creek, West	10260010	37	Secondary Contact Recreation
West Spring Creek	10260010	25	Primary Contact Recreation
Wolf Creek	10260010	10	Primary Contact Recreation
Wolf Creek, East Fork	10260010	11	Primary Contact Recreation
Wolf Creek, West Fork	10260010	12	Primary Contact Recreation
Yauger Creek	10260010	35	Primary Contact Recreation
Basin: Solomon			
Subbasin: Upper North Fork Solomon			
Ash Creek	10260011	24	Primary Contact Recreation
Beaver Creek	10260011	23	Primary Contact Recreation
Big Timber Creek	10260011	8	Primary Contact Recreation
Bow Creek	10260011	15	Primary Contact Recreation
Cactus Creek	10260011	28	Primary Contact Recreation
Crooked Creek	10260011	6	Primary Contact Recreation
Elk Creek	10260011	12	Primary Contact Recreation
Elk Creek, East	10260011	25	Primary Contact Recreation
Game Creek	10260011	10	Primary Contact Recreation
Game Creek	10260011	27	Primary Contact Recreation
Lost Creek	10260011	20	Primary Contact Recreation
Sand Creek	10260011	26	Primary Contact Recreation
Scull Creek	10260011	21	Primary Contact Recreation
Spring Creek	10260011	19	Primary Contact Recreation
Wolf Creek	10260011	22	Primary Contact Recreation
Subbasin: Lower North Fork Solomon			
Beaver Creek	10260012	10	Primary Contact Recreation
Beaver Creek, East Branch	10260012	11	Primary Contact Recreation
Beaver Creek, Middle	10260012	12	Primary Contact Recreation

Stream segment name	HUC8	Segment #	Designated use
Beaver Creek, Middle	10260012	13	Primary Contact Recreation
Beaver Creek, West	10260012	14	Secondary Contact Recreation
Big Creek	10260012	26	Primary Contact Recreation
Boughton Creek	10260012	34	Primary Contact Recreation
Buck Creek	10260012	43	Secondary Contact Recreation
Cedar Creek	10260012	16	Primary Contact Recreation
Cedar Creek	10260012	18	Primary Contact Recreation
Cedar Creek, East	10260012	17	Primary Contact Recreation
Cedar Creek, East Middle	10260012	37	Primary Contact Recreation
Cedar Creek, Middle	10260012	19	Secondary Contact Recreation
Deer Creek	10260012	23	Primary Contact Recreation
Deer Creek	10260012	25	Primary Contact Recreation
Deer Creek	10260012	27	Primary Contact Recreation
Deer Creek	10260012	29	Primary Contact Recreation
Deer Creek	10260012	31	Primary Contact Recreation
Dry Creek	10260012	42	Primary Contact Recreation
Glen Rock Creek	10260012	41	Primary Contact Recreation
Lawrence Creek	10260012	44	Primary Contact Recreation
Lindley Creek	10260012	45	Primary Contact Recreation
Little Oak Creek	10260012	3	Primary Contact Recreation
Medicine Creek	10260012	33	Primary Contact Recreation
Oak Creek	10260012	2	Primary Contact Recreation
Oak Creek	10260012	4	Primary Contact Recreation
Oak Creek, East	10260012	40	Primary Contact Recreation
Oak Creek, West	10260012	39	Secondary Contact Recreation
Plotner Creek	10260012	30	Primary Contact Recreation
Plum Creek	10260012	20	Primary Contact Recreation
Spring Creek	10260012	8	Secondary Contact Recreation
Spring Creek	10260012	28	Secondary Contact Recreation
Starvation Creek	10260012	38	Primary Contact Recreation
Turner Creek	10260012	24	Primary Contact Recreation
Subbasin: Upper South Fork Solomon			
Spring Creek	10260013	5	Primary Contact Recreation
Subbasin: Lower South Fork Solomon			
Ash Creek	10260014	22	Primary Contact Recreation
Boxelder Creek	10260014	14	Primary Contact Recreation
Carr Creek	10260014	21	Primary Contact Recreation
Covert Creek	10260014	19	Primary Contact Recreation
Crooked Creek	10260014	27	Primary Contact Recreation
Dibble Creek	10260014	23	Primary Contact Recreation
Elm Creek	10260014	15	Primary Contact Recreation
Jim Creek	10260014	25	Primary Contact Recreation
Kill Creek	10260014	18	Primary Contact Recreation
Kill Creek, East	10260014	28	Primary Contact Recreation
Lost Creek	10260014	13	Primary Contact Recreation
Lucky Creek	10260014	26	Primary Contact Recreation
Medicine Creek	10260014	16	Primary Contact Recreation
Medicine Creek	10260014	17	Primary Contact Recreation
Robbers Roost Creek	10260014	24	Primary Contact Recreation
Twin Creek	10260014	20	Primary Contact Recreation
Twin Creek, East	10260014	29	Primary Contact Recreation
Subbasin: Solomon River			
Cow Creek	10260015	28	Primary Contact Recreation
Fifth Creek	10260015	45	Secondary Contact Recreation
Granite Creek	10260015	24	Secondary Contact Recreation
Leban Creek	10260015	41	Secondary Contact Recreation
Mill Creek	10260015	38	Secondary Contact Recreation
Mulberry Creek	10260015	36	Secondary Contact Recreation
Pipe Creek	10260015	9	Primary Contact Recreation
Walnut Creek	10260015	26	Secondary Contact Recreation
Basin: Upper Arkansas			
Subbasin: Buckner			
Buckner Creek, South Fork	11030006	6	Primary Contact Recreation
Duck Creek	11030006	8	Secondary Contact Recreation
Elm Creek	11030006	5	Primary Contact Recreation
Saw Log Creek	11030006	3	Primary Contact Recreation

Stream segment name	HUC8	Segment #	Designated use
Saw Log Creek	11030006	4	Secondary Contact Recreation
Subbasin: Lower Walnut Creek			
Alexander Dry Creek	11030008	7	Secondary Contact Recreation
Bazine Creek	11030008	9	Secondary Contact Recreation
Boot Creek	11030008	15	Secondary Contact Recreation
Dry Creek	11030008	14	Secondary Contact Recreation
Dry Walnut Creek	11030008	13	Secondary Contact Recreation
Otter Creek	11030008	12	Primary Contact Recreation
Sand Creek	11030008	3	Secondary Contact Recreation
Sandy Creek	11030008	11	Secondary Contact Recreation
Walnut Creek	11030008	1	Primary Contact Recreation
Walnut Creek	11030008	2	Primary Contact Recreation
Walnut Creek	11030008	4	Primary Contact Recreation
Basin: Upper Republican			
Subbasin: South Fork Republican			
Big Timber Creek	10250003	61	Secondary Contact Recreation
Subbasin: Beaver			
Beaver Creek	10250014	2	Secondary Contact Recreation
Basin: Verdigris			
Subbasin: Upper Verdigris			
Bachelor Creek	11070101	21	Primary Contact Recreation
Bernard Creek	11070101	24	Secondary Contact Recreation
Big Cedar Creek	11070101	39	Primary Contact Recreation
Brazil Creek	11070101	31	Primary Contact Recreation
Buffalo Creek	11070101	2	Primary Contact Recreation
Buffalo Creek, West	11070101	34	Primary Contact Recreation
Cedar Creek	11070101	32	Primary Contact Recreation
Chetopa Creek	11070101	22	Primary Contact Recreation
Crooked Creek	11070101	38	Primary Contact Recreation
Dry Creek	11070101	27	Primary Contact Recreation
Elder Branch	11070101	37	Primary Contact Recreation
Fancy Creek	11070101	28	Primary Contact Recreation
Greenhall Creek	11070101	26	Primary Contact Recreation
Holderman Creek	11070101	47	Primary Contact Recreation
Homer Creek	11070101	20	Primary Contact Recreation
Kelly Branch	11070101	42	Primary Contact Recreation
Kuntz Branch	11070101	29	Primary Contact Recreation
Little Sandy Creek	11070101	33	Primary Contact Recreation
Long Creek	11070101	45	Primary Contact Recreation
Miller Creek	11070101	30	Primary Contact Recreation
Moon Branch	11070101	43	Primary Contact Recreation
Onion Creek	11070101	23	Primary Contact Recreation
Rock Creek	11070101	14	Primary Contact Recreation
Ross Branch	11070101	35	Primary Contact Recreation
Sandy Creek	11070101	4	Primary Contact Recreation
Shaw Creek	11070101	40	Primary Contact Recreation
Slate Creek	11070101	25	Primary Contact Recreation
Snake Creek	11070101	36	Primary Contact Recreation
Tate Branch Creek	11070101	44	Primary Contact Recreation
Van Horn Creek	11070101	46	Primary Contact Recreation
Verdigris River, Bernard Branch	11070101	16	Primary Contact Recreation
Verdigris River, North Branch	11070101	13	Primary Contact Recreation
Verdigris River, North Branch	11070101	15	Primary Contact Recreation
Walnut Creek	11070101	19	Primary Contact Recreation
West Creek	11070101	17	Primary Contact Recreation
Wolf Creek	11070101	41	Primary Contact Recreation
Subbasin: Fall			
Battle Creek	11070102	18	Primary Contact Recreation
Burnt Creek	11070102	24	Primary Contact Recreation
Clear Creek	11070102	37	Primary Contact Recreation
Coon Creek	11070102	25	Primary Contact Recreation
Coon Creek	11070102	36	Primary Contact Recreation
Crain Creek	11070102	32	Primary Contact Recreation
Honey Creek	11070102	26	Primary Contact Recreation

Stream segment name	HUC8	Segment #	Designated use
Indian Creek	11070102	15	Primary Contact Recreation
Ivanpah Creek	11070102	19	Primary Contact Recreation
Kitty Creek	11070102	27	Primary Contact Recreation
Little Indian Creek	11070102	34	Primary Contact Recreation
Little Salt Creek	11070102	35	Primary Contact Recreation
Oleson Creek	11070102	21	Primary Contact Recreation
Otis Creek	11070102	20	Primary Contact Recreation
Plum Creek	11070102	30	Primary Contact Recreation
Rainbow Creek, East	11070102	17	Primary Contact Recreation
Salt Creek	11070102	14	Primary Contact Recreation
Salt Creek	11070102	38	Primary Contact Recreation
Silver Creek	11070102	33	Primary Contact Recreation
Snake Creek	11070102	31	Primary Contact Recreation
Spring Creek	11070102	12	Primary Contact Recreation
Swing Creek	11070102	989	Primary Contact Recreation
Tadpole Creek	11070102	29	Primary Contact Recreation
Watson Branch	11070102	23	Primary Contact Recreation
Subbasin: Middle Verdigris			
Big Creek	11070103	21	Primary Contact Recreation
Biscuit Creek	11070103	53	Primary Contact Recreation
Bluff Run	11070103	54	Primary Contact Recreation
Choteau Creek	11070103	63	Primary Contact Recreation
Claymore Creek	11070103	50	Primary Contact Recreation
Deadman Creek	11070103	57	Primary Contact Recreation
Deer Creek	11070103	51	Primary Contact Recreation
Drum Creek	11070103	34	Primary Contact Recreation
Dry Creek	11070103	37	Primary Contact Recreation
Fawn Creek	11070103	56	Primary Contact Recreation
Mud Creek	11070103	59	Primary Contact Recreation
Onion Creek	11070103	39	Primary Contact Recreation
Potato Creek	11070103	31	Primary Contact Recreation
Prior Creek	11070103	62	Primary Contact Recreation
Pumpkin Creek	11070103	28	Primary Contact Recreation
Richland Creek	11070103	49	Primary Contact Recreation
Rock Creek	11070103	58	Primary Contact Recreation
Rock Creek	11070103	61	Primary Contact Recreation
Snow Creek	11070103	25	Primary Contact Recreation
Spring Creek	11070103	55	Primary Contact Recreation
Sycamore Creek	11070103	52	Primary Contact Recreation
Wildcat Creek	11070103	60	Primary Contact Recreation
Subbasin: Elk			
Bachelor Creek	11070104	25	Primary Contact Recreation
Bloody Run	11070104	26	Primary Contact Recreation
Bull Creek	11070104	33	Primary Contact Recreation
Card Creek	11070104	19	Primary Contact Recreation
Chetopa Creek	11070104	18	Primary Contact Recreation
Clear Creek	11070104	30	Primary Contact Recreation
Clear Creek	11070104	32	Primary Contact Recreation
Coffey Branch	11070104	20	Primary Contact Recreation
Duck Creek	11070104	3	Primary Contact Recreation
Elk River, Mound Branch	11070104	15	Primary Contact Recreation
Elk River, South Branch	11070104	38	Primary Contact Recreation
Elk River, Rowe Branch	11070104	39	Primary Contact Recreation
Elm Branch	11070104	23	Primary Contact Recreation
Hickory Creek	11070104	28	Primary Contact Recreation
Hitchen Creek	11070104	7	Primary Contact Recreation
Hitchen Creek, East	11070104	35	Primary Contact Recreation
Little Duck Creek	11070104	24	Primary Contact Recreation
Little Hitchen Creek	11070104	37	Primary Contact Recreation
Painterhood Creek	11070104	5	Primary Contact Recreation
Painterhood Creek, East	11070104	36	Primary Contact Recreation
Pan Creek	11070104	27	Primary Contact Recreation
Pawpaw Creek	11070104	11	Primary Contact Recreation
Racket Creek	11070104	21	Primary Contact Recreation
Rock Creek	11070104	13	Primary Contact Recreation
Salt Creek	11070104	17	Primary Contact Recreation
Salt Creek, South	11070104	29	Primary Contact Recreation
Skull Creek	11070104	31	Primary Contact Recreation
Snake Creek	11070104	34	Primary Contact Recreation
Sycamore Creek	11070104	22	Primary Contact Recreation

Stream segment name	HUC8	Segment #	Designated use
Wildcat Creek	11070104	16	Primary Contact Recreation
Subbasin: Caney			
Bachelor Creek	11070106	47	Primary Contact Recreation
Bee Creek	11070106	9	Primary Contact Recreation
California Creek	11070106	48	Primary Contact Recreation
Caney Creek	11070106	12	Primary Contact Recreation
Caney River, East Fork	11070106	52	Primary Contact Recreation
Caney Creek, North	11070106	11	Primary Contact Recreation
Cedar Creek	11070106	30	Primary Contact Recreation
Cedar Creek	11070106	32	Primary Contact Recreation
Cheyenne Creek	11070106	40	Primary Contact Recreation
Coon Creek	11070106	36	Primary Contact Recreation
Corum Creek	11070106	51	Primary Contact Recreation
Cotton Creek	11070106	38	Primary Contact Recreation
Cotton Creek, North Fork	11070106	37	Primary Contact Recreation
Dry Creek	11070106	29	Primary Contact Recreation
Fly Creek	11070106	46	Primary Contact Recreation
Illinois Creek	11070106	39	Primary Contact Recreation
Jim Creek	11070106	49	Primary Contact Recreation
Lake Creek	11070106	34	Primary Contact Recreation
Otter Creek	11070106	33	Primary Contact Recreation
Pool Creek	11070106	43	Primary Contact Recreation
Possum Trot Creek	11070106	74	Primary Contact Recreation
Rock Creek	11070106	28	Primary Contact Recreation
Spring Creek	11070106	44	Primary Contact Recreation
Spring Creek	11070106	53	Primary Contact Recreation
Squaw Creek	11070106	42	Primary Contact Recreation
Sycamore Creek	11070106	31	Primary Contact Recreation
Turkey Creek	11070106	45	Primary Contact Recreation
Union Creek	11070106	41	Primary Contact Recreation
Wolf Creek	11070106	35	Primary Contact Recreation
Wolf Creek	11070106	50	Primary Contact Recreation
Basin: Walnut			
Subbasin: Upper Walnut River			
Badger Creek	11030017	36	Primary Contact Recreation
Bemis Creek	11030017	8	Primary Contact Recreation
Cole Creek	11030017	15	Primary Contact Recreation
Constant Creek	11030017	41	Primary Contact Recreation
Dry Creek	11030017	27	Primary Contact Recreation
Dry Creek	11030017	32	Primary Contact Recreation
Durechen Creek	11030017	12	Primary Contact Recreation
Elm Creek	11030017	43	Primary Contact Recreation
Fourmile Creek	11030017	20	Primary Contact Recreation
Gilmore Branch	11030017	39	Primary Contact Recreation
Gypsum Creek	11030017	30	Primary Contact Recreation
Henry Creek	11030017	33	Primary Contact Recreation
Lower Branch	11030017	42	Primary Contact Recreation
Prairie Creek	11030017	35	Primary Contact Recreation
Rock Creek	11030017	37	Primary Contact Recreation
Sand Creek	11030017	29	Primary Contact Recreation
Satchel Creek	11030017	10	Primary Contact Recreation
School Branch	11030017	45	Primary Contact Recreation
Sutton Creek	11030017	40	Primary Contact Recreation
Walnut Creek	11030017	44	Primary Contact Recreation
Whitewater Creek	11030017	34	Primary Contact Recreation
Whitewater Creek, East Branch	11030017	31	Primary Contact Recreation
Whitewater River, East Branch	11030017	22	Primary Contact Recreation
Whitewater River, West Branch	11030017	24	Primary Contact Recreation
Whitewater River, West Branch	11030017	25	Primary Contact Recreation
Wildcat Creek	11030017	26	Primary Contact Recreation
Wildcat Creek, West	11030017	28	Primary Contact Recreation
Subbasin: Lower Walnut River			
Black Crook Creek	11030018	18	Primary Contact Recreation
Cedar Creek	11030018	19	Secondary Contact Recreation
Chigger Creek	11030018	21	Primary Contact Recreation
Crooked Creek	11030018	31	Primary Contact Recreation
Durham Creek	11030018	23	Primary Contact Recreation
Dutch Creek	11030018	2	Primary Contact Recreation

Stream segment name	HUC8	Segment #	Designated use
Dutch Creek	11030018	4	Primary Contact Recreation
Eightmile Creek	11030018	30	Primary Contact Recreation
Foos Creek	11030018	26	Primary Contact Recreation
Hickory Creek	11030018	12	Primary Contact Recreation
Honey Creek	11030018	33	Primary Contact Recreation
Little Dutch Creek	11030018	27	Primary Contact Recreation
Lower Dutch Creek	11030018	20	Primary Contact Recreation
Plum Creek	11030018	36	Primary Contact Recreation
Polecat Creek	11030018	17	Primary Contact Recreation
Posey Creek	11030018	37	Primary Contact Recreation
Richland Creek	11030018	25	Primary Contact Recreation
Rock Creek, North Branch	11030018	35	Primary Contact Recreation
Sanford Creek	11030018	29	Primary Contact Recreation
Spring Branch	11030018	32	Primary Contact Recreation
Stalter Branch	11030018	24	Primary Contact Recreation
Stewart Creek	11030018	28	Primary Contact Recreation
Swisher Branch	11030018	22	Primary Contact Recreation
Total = 1186			

Lake name	County	Designated use
Basin: Cimarron		
Subbasin: Upper Cimarron (HUC 11040002)		
Moss Lake East	MORTON	Primary Contact Recreation
Moss Lake West	MORTON	Primary Contact Recreation
Subbasin: North Fork Cimarron (HUC 11040006)		
Russell Lake	STEVENS	Primary Contact Recreation
Subbasin: Upper Cimarron-Bluff (HUC 11040008)		
Clark State Fishing Lake	CLARK	Primary Contact Recreation
Saint Jacob's Well	CLARK	Primary Contact Recreation
Basin: Kansas/Lower Republican		
Subbasin: Middle Republican (HUC 10250016)		
Lake Jewell	JEWELL	Primary Contact Recreation
Subbasin: Lower Republican (HUC 10250017)		
Belleville City Lake	REPUBLIC	Primary Contact Recreation
Wakefield Lake	CLAY	Primary Contact Recreation
Subbasin: Middle Kansas (HUC 10270102)		
Alma City Reservoir	WABAUNSEE	Primary Contact Recreation
Cedar Crest Pond	SHAWNEE	Primary Contact Recreation
Central Park Lake	SHAWNEE	Primary Contact Recreation
Gage Park Lake	SHAWNEE	Primary Contact Recreation
Jeffrey Energy Center Lakes	POTTAWATOMIE	Primary Contact Recreation
Subbasin: Delaware (HUC 10270103)		
Atchison County Park Lake	ATCHISON	Primary Contact Recreation
Little Lake	BROWN	Primary Contact Recreation
Subbasin: Lower Kansas (HUC 10270104)		
Douglas County State Lake	DOUGLAS	Primary Contact Recreation
Lenexa Lake	JOHNSON	Primary Contact Recreation
Mahaffie Farmstead Pond	JOHNSON	Primary Contact Recreation
Pierson Park Lake	WYANDOTTE	Primary Contact Recreation
Waterworks Lakes	JOHNSON	Primary Contact Recreation
Subbasin: Lower Big Blue (HUC 10270205)		
Lake Idlewild	MARSHALL	Primary Contact Recreation

Lake name	County	Designated use
Subbasin: Lower Little Blue (HUC 10270207)		
Washington County State Fishing Lake	WASHINGTON	Primary Contact Recreation
Basin: Lower Arkansas		
Subbasin: Rattlesnake (HUC 11030009)		
Kiowa County State Fishing Lake	KIOWA	Primary Contact Recreation
Subbasin: Cow (HUC 11030011)		
Barton Lake	BARTON	Primary Contact Recreation
Sterling City Lake	RICE	Primary Contact Recreation
Subbasin: Little Arkansas (HUC 11030012)		
Dillon Park Lakes #1	RENO	Primary Contact Recreation
Dillon Park Lake #2	RENO	Primary Contact Recreation
Newton City Park Lake	HARVEY	Primary Contact Recreation
Subbasin: Middle Arkansas-Slate (HUC 11030013)		
Belaire Lake	SEDGWICK	Primary Contact Recreation
Buffalo Park Lake	SEDGWICK	Primary Contact Recreation
Emery Park	SEDGWICK	Primary Contact Recreation
Harrison Park Lake	SEDGWICK	Primary Contact Recreation
Riggs Park Lake	SEDGWICK	Primary Contact Recreation
Subbasin: South Fork Ninnescah (HUC 11030015)		
Lemon Park Lake	PRATT	Primary Contact Recreation
Subbasin: Medicine Lodge (HUC 11060003)		
Barber County State Fishing Lake	BARBER	Primary Contact Recreation
Subbasin: Lower Salt Fork Arkansas (HUC 11060004)		
Hargis Lake	BARBER	Primary Contact Recreation
Basin: Marais Des Cygnes		
Subbasin: Upper Marais Des Cygnes (HUC 10290101)		
Allen City Lake	LYON	Primary Contact Recreation
Cedar Creek Lake	ANDERSON	Primary Contact Recreation
Crystal Lake	ANDERSON	Primary Contact Recreation
Lyon County State Fishing Lake	LYON	Primary Contact Recreation
Osage City Reservoir	OSAGE	Primary Contact Recreation
Waterworks Impoundment	ANDERSON	Primary Contact Recreation
Subbasin: Lower Marais Des Cygnes (HUC 10290102)		
Edgerton City Lake	JOHNSON	Primary Contact Recreation
Edgerton South Lake	JOHNSON	Primary Contact Recreation
Lake LaCygne	LINN	Primary Contact Recreation
Louisburg State Fishing Lake	MIAMI	Primary Contact Recreation
Miami County State Fishing Lake	MIAMI	Primary Contact Recreation
Paola City Lake	MIAMI	Primary Contact Recreation
Pleasanton Lake #1	LINN	Primary Contact Recreation
Pleasanton Lake #2	LINN	Primary Contact Recreation
Spring Hill City Lake	JOHNSON	Primary Contact Recreation
Subbasin: Marmaton (HUC 10290104)		
Gunn Park Lake, East	BOURBON	Primary Contact Recreation
Gunn Park Lake, West	BOURBON	Primary Contact Recreation
Rock Creek Lake	BOURBON	Primary Contact Recreation
Basin: Missouri		
Subbasin: South Fork Big Nemaha (HUC 10240007)		
Pony Creek Lake	NEMAHA	Primary Contact Recreation
Sabetha City Lake	NEMAHA	Primary Contact Recreation

Lake name	County	Designated use
Subbasin: Independence-Sugar (HUC 10240011)		
Atchison City Lakes	ATCHISON	Primary Contact Recreation
Big Eleven Lake	WYANDOTTE	Primary Contact Recreation
Doniphan Fair Association Lake	DONIPHAN	Primary Contact Recreation
Jerrys Lake	LEAVENWORTH	Primary Contact Recreation
Lansing City Lake	LEAVENWORTH	Primary Contact Recreation
South Park Lake	LEAVENWORTH	Primary Contact Recreation
Subbasin: Lower Missouri-Crooked (HUC 10300101)		
Prairie View Park	JOHNSON	Primary Contact Recreation
South Park Lake	JOHNSON	Primary Contact Recreation
Stanley Rural Water District Lake #2	JOHNSON	Primary Contact Recreation
Stohl Park Lake	JOHNSON	Primary Contact Recreation
Basin: Neosho		
Subbasin: Lower Cottonwood (HUC 11070203)		
Peter Pan Pond	LYON	Primary Contact Recreation
Subbasin: Upper Neosho (HUC 11070204)		
Chanute City (Santa Fe) Lake	NEOSHO	Primary Contact Recreation
Leonard's Lake	WOODSON	Primary Contact Recreation
Subbasin: Middle Neosho (HUC 11070205)		
Altamont City Lake #1	LABETTE	Primary Contact Recreation
Bartlett City Lake	LABETTE	Primary Contact Recreation
Harmon Wildlife Area Lakes	LABETTE	Primary Contact Recreation
Mined Land Wildlife Area Lakes	CHEROKEE	Primary Contact Recreation
Timber Lake	NEOSHO	Primary Contact Recreation
Subbasin: Spring (HUC 11070207)		
Empire Lake	CHEROKEE	Primary Contact Recreation
Frontenac City Park	CRAWFORD	Primary Contact Recreation
Mined Land Wildlife Area Lakes	CRAWFORD	Primary Contact Recreation
Pittsburg College Lake	CRAWFORD	Primary Contact Recreation
Playters Lake	CRAWFORD	Primary Contact Recreation
Basin: Smoky Hill/Saline		
Subbasin: Lower Smoky Hill (HUC 10260008)		
Herington City Park Lake	DICKINSON	Primary Contact Recreation
Herington Reservoir	DICKINSON	Primary Contact Recreation
Basin: Solomon		
Subbasin: Lower North Fork Solomon (HUC 10260012)		
Francis Wachs Wildlife Area Lakes	SMITH	Primary Contact Recreation
Subbasin: Solomon River (HUC 10260015)		
Jewell County State Fishing Lake	JEWELL	Primary Contact Recreation
Ottawa County State Fishing Lake	OTTAWA	Primary Contact Recreation
Basin: Upper Arkansas		
Subbasin: Middle Arkansas-Lake McKinney (HUC 11030001)		
Lake McKinney	KEARNY	Primary Contact Recreation
Subbasin: Arkansas-Dodge City (HUC 11030003)		
Lake Charles	FORD	Primary Contact Recreation
Subbasin: Pawnee (HUC 11030005)		
Concannon State Fishing Lake	FINNEY	Primary Contact Recreation
Finney County Game Refuge Lakes	FINNEY	Primary Contact Recreation
Subbasin: Buckner (HUC 11030006)		
Ford County Lake	FORD	Primary Contact Recreation

Lake name	County	Designated use
Hain State Fishing Lake	FORD	Primary Contact Recreation
Subbasin: Upper Walnut Creek (HUC 11030007)		
Goodman State Fishing Lake	NESS	Primary Contact Recreation
Subbasin: Lower Walnut Creek (HUC 11030008)		
Memorial Park Lake	BARTON	Primary Contact Recreation
Stone Lake	BARTON	Primary Contact Recreation
Basin: Verdigris		
Subbasin: Upper Verdigris (HUC 11070101)		
Quarry Lake	WILSON	Primary Contact Recreation
Thayer New City Lake	NEOSHO	Primary Contact Recreation
Subbasin: Middle Verdigris (HUC 11070103)		
La Claire Lake	MONTGOMERY	Primary Contact Recreation
Pfister Park Lakes	MONTGOMERY	Primary Contact Recreation
Subbasin: Caney (HUC 11070106)		
Caney City Lake	CHAUTAUQUA	Primary Contact Recreation
Basin: Walnut		
Subbasin: Lower Walnut River (HUC 11030018)		
Butler County State Fishing Lake	BUTLER	Primary Contact Recreation
Winfield Park Lagoon	COWLEY	Primary Contact Recreation
Total = 100		

(c) Water quality standard variances. (1) The Regional Administrator, EPA Region 7, is authorized to grant variances from the water quality standards in paragraphs (a) and (b) of this section where the requirements of this paragraph (c) are met. A water quality standard variance applies only to the permittee requesting the variance and only to the pollutant or pollutants specified in the variance; the underlying water quality standard otherwise remains in effect.

(2) A water quality standard variance shall not be granted if:

(i) Standards will be attained by implementing effluent limitations required under sections 301(b) and 306 of the CWA and by the permittee implementing reasonable best management practices for nonpoint source control; or

(ii) The variance would likely jeopardize the continued existence of any threatened or endangered species listed under section 4 of the Endangered Species Act or result in the destruction or adverse modification of such species' critical habitat.

(3) Subject to paragraph (c)(2) of this section, a water quality standards variance may be granted if the applicant demonstrates to EPA that attaining the water quality standard is not feasible because:

(i) Naturally occurring pollutant concentrations prevent the attainment of the use; or

(ii) Natural, ephemeral, intermittent or low flow conditions or water levels prevent the attainment of the use, unless these conditions may be compensated for by the discharge of sufficient volume of effluent discharges without violating State water conservation requirements to enable uses to be met; or

(iii) Human caused conditions or sources of pollution prevent the attainment of the use and cannot be remedied or would cause more environmental damage to correct than to leave in place; or

(iv) Dams, diversions or other types of hydrologic modifications preclude the attainment of the use, and it is not feasible to restore the water body to its original condition or to operate such

modification in a way which would result in the attainment of the use; or

(v) Physical conditions related to the natural features of the water body, such as the lack of a proper substrate, cover, flow, depth, pools, riffles, and the like unrelated to water quality, preclude attainment of aquatic life protection uses; or

(vi) Controls more stringent than those required by sections 301(b) and 306 of the CWA would result in substantial and widespread economic and social impact.

(4) Procedures. An applicant for a water quality standards variance shall submit a request to the Regional Administrator of EPA Region 7. The application shall include all relevant information showing that the requirements for a variance have been satisfied. The burden is on the applicant to demonstrate to EPA's satisfaction that the designated use is unattainable for one of the reasons specified in paragraph (c)(3) of this section. If the Regional Administrator preliminarily determines that grounds exist for granting a variance, he shall provide public notice of the proposed variance and provide an opportunity for public comment. Any activities required as a condition of the Regional Administrator's granting of a variance shall be included as conditions of the NPDES permit for the applicant. These terms and conditions shall be incorporated into the applicant's NPDES permit through the permit reissuance process or through a modification of the permit pursuant to the applicable permit modification provisions of Kansas' NPDES program

(5) A variance may not exceed 3 years or the term of the NPDES permit, whichever is less. A variance may be renewed if the applicant reapplies and demonstrates that the use in question is still not attainable. Renewal of the variance may be denied if the applicant did not comply with the conditions of the original variance, or otherwise does not meet the requirements of this section.

[68 FR 40442, July 7, 2003]

§ 131.35 Colville Confederated Tribes Indian Reservation.

The water quality standards applicable to the waters within the Colville Indian Reservation, located in the State of Washington.

(a) *Background*. (1) It is the purpose of these Federal water quality standards to prescribe minimum water quality requirements for the surface waters located within the exterior boundaries of the Colville Indian Reservation to ensure compliance with section 303(c) of the Clean Water Act.

(2) The Colville Confederated Tribes have a primary interest in the protection, control, conservation, and utilization of the water resources of the Colville Indian Reservation. Water quality standards have been enacted into tribal law by the Colville Business Council of the Confederated Tribes of the Colville Reservation, as the Colville Water Quality Standards Act, CTC Title 33 (Resolution No. 1984–526 (August 6, 1984) as amended by Resolution No. 1985–20 (January 18, 1985)).

(b) *Territory covered*. The provisions of these water quality standards shall apply to all surface waters within the exterior boundaries of the Colville Indian Reservation.

(c) *Applicability, Administration and Amendment*. (1) The water quality standards in this section shall be used by the Regional Administrator for establishing any water quality based National Pollutant Discharge Elimination System Permit (NPDES) for point sources on the Colville Confederated Tribes Reservation.

(2) In conjunction with the issuance of section 402 or section 404 permits, the Regional Administrator may designate mixing zones in the waters of the United States on the reservation on a case-by-case basis. The size of such mixing zones and the in-zone water quality in such mixing zones shall be consistent with the applicable procedures and guidelines in EPA's Water Quality Standards Handbook and the Technical Support Document for Water Quality Based Toxics Control.

(3) Amendments to the section at the request of the Tribe shall proceed in the following manner.

(i) The requested amendment shall first be duly approved by the Confederated Tribes of the Colville Reservation (and so certified by the Tribes

Legal Counsel) and submitted to the Regional Administrator.

(ii) The requested amendment shall be reviewed by EPA (and by the State of Washington, if the action would affect a boundary water).

(iii) If deemed in compliance with the Clean Water Act, EPA will propose and promulgate an appropriate change to this section.

(4) Amendment of this section at EPA's initiative will follow consultation with the Tribe and other appropriate entities. Such amendments will then follow normal EPA rulemaking procedures.

(5) All other applicable provisions of this part 131 shall apply on the Colville Confederated Tribes Reservation. Special attention should be paid to §§ 131.6, 131.10, 131.11 and 131.20 for any amendment to these standards to be initiated by the Tribe.

(6) All numeric criteria contained in this section apply at all in-stream flow rates greater than or equal to the flow rate calculated as the minimum 7-consecutive day average flow with a recurrence frequency of once in ten years (7Q10); narrative criteria (§ 131.35(e)(3)) apply regardless of flow. The 7Q10 low flow shall be calculated using methods recommended by the U.S. Geological Survey.

(d) *Definitions*. (1) *Acute toxicity* means a deleterious response (e.g., mortality, disorientation, immobilization) to a stimulus observed in 96 hours or less.

(2) *Background conditions* means the biological, chemical, and physical conditions of a water body, upstream from the point or non-point source discharge under consideration. Background sampling location in an enforcement action will be upstream from the point of discharge, but not upstream from other inflows. If several discharges to any water body exist, and an enforcement action is being taken for possible violations to the standards, background sampling will be undertaken immediately upstream from each discharge.

(3) *Ceremonial and Religious water use* means activities involving traditional Native American spiritual practices which involve, among other things, primary (direct) contact with water.

(4) *Chronic toxicity* means the lowest concentration of a constituent causing observable effects (*i.e.*, considering lethality, growth, reduced reproduction, etc.) over a relatively long period of time, usually a 28-day test period for small fish test species.

(5) *Council* or *Tribal Council* means the Colville Business Council of the Colville Confederated Tribes.

(6) *Geometric mean* means the *nth* root of a product of *n* factors.

(7) *Mean retention time* means the time obtained by dividing a reservoir's mean annual minimum total storage by the non-zero 30-day, ten-year low-flow from the reservoir.

(8) *Mixing zone* or *dilution zone* means a limited area or volume of water where initial dilution of a discharge takes place; and where numeric water quality criteria can be exceeded but acutely toxic conditions are prevented from occurring.

(9) *pH* means the negative logarithm of the hydrogen ion concentration.

(10) *Primary contact recreation* means activities where a person would have direct contact with water to the point of complete submergence, including but not limited to skin diving, swimming, and water skiing.

(11) *Regional Administrator* means the Administrator of EPA's Region X.

(12) *Reservation* means all land within the limits of the Colville Indian Reservation, established on July 2, 1872 by Executive Order, presently containing 1,389,000 acres more or less, and under the jurisdiction of the United States government, notwithstanding the issuance of any patent, and including rights-of-way running through the reservation.

(13) *Secondary contact recreation* means activities where a person's water contact would be limited to the extent that bacterial infections of eyes, ears, respiratory, or digestive systems or urogenital areas would normally be avoided (such as wading or fishing).

(14) *Surface water* means all water above the surface of the ground within the exterior boundaries of the Colville Indian Reservation including but not limited to lakes, ponds, reservoirs, artificial impoundments, streams, rivers, springs, seeps and wetlands.

(15) *Temperature* means water temperature expressed in Centigrade degrees (C).

(16) *Total dissolved solids* (TDS) means the total filterable residue that passes through a standard glass fiber filter disk and remains after evaporation and drying to a constant weight at 180 degrees C. it is considered to be a measure of the dissolved salt content of the water.

(17) *Toxicity* means acute and/or chronic toxicity.

(18) *Tribe* or *Tribes* means the Colville Confederated Tribes.

(19) *Turbidity* means the clarity of water expressed as nephelometric turbidity units (NTU) and measured with a calibrated turbidimeter.

(20) *Wildlife habitat* means the waters and surrounding land areas of the Reservation used by fish, other aquatic life and wildlife at any stage of their life history or activity.

(e) *General considerations*. The following general guidelines shall apply to the water quality standards and classifications set forth in the use designation Sections.

(1) *Classification boundaries*. At the boundary between waters of different classifications, the water quality standards for the higher classification shall prevail.

(2) *Antidegradation policy*. This antidegradation policy shall be applicable to all surface waters of the Reservation.

(i) Existing in-stream water uses and the level of water quality necessary to protect the existing uses shall be maintained and protected.

(ii) Where the quality of the waters exceeds levels necessary to support propagation of fish, shellfish, and wildlife and recreation in and on the water, that quality shall be maintained and protected unless the Regional Administrator finds, after full satisfaction of the inter-governmental coordination and public participation provisions of the Tribes' continuing planning process, that allowing lower water quality is necessary to accommodate important economic or social development in the area in which the waters are located. In allowing such degradation or lower water quality, the Regional Administrator shall assure water quality adequate to protect existing uses fully. Further, the Regional Administrator shall assure that there shall be achieved the highest statutory and regulatory requirements for all new and existing point sources and all cost-effective and reasonable best management practices for nonpoint source control.

(iii) Where high quality waters are identified as constituting an outstanding national or reservation resource, such as waters within areas designated as unique water quality management areas and waters otherwise of exceptional recreational or ecological significance, and are designated as special resource waters, that water quality shall be maintained and protected.

(iv) In those cases where potential water quality impairment associated with a thermal discharge is involved, this antidegradation policy's implementing method shall be consistent with section 316 of the Clean Water Act.

(3) *Aesthetic qualities*. All waters within the Reservation, including those within mixing zones, shall be free from substances, attributable to wastewater discharges or other pollutant sources, that:

(i) Settle to form objectionable deposits;

(ii) Float as debris, scum, oil, or other matter forming nuisances;

(iii) Produce objectionable color, odor, taste, or turbidity;

(iv) Cause injury to, are toxic to, or produce adverse physiological responses in humans, animals, or plants; or

(v) produce undesirable or nuisance aquatic life.

(4) *Analytical methods*. (i) The analytical testing methods used to measure or otherwise evaluate compliance with water quality standards shall to the extent practicable, be in accordance with the ''Guidelines Establishing Test Procedures for the Analysis of Pollutants'' (40 CFR part 136). When a testing method is not available for a particular substance, the most recent edition of ''Standard Methods for the Examination of Water and Wastewater'' (published by the American Public Health Association, American Water Works

Association, and the Water Pollution Control Federation) and other or superseding methods published and/or approved by EPA shall be used.

(f) *General water use and criteria classes*. The following criteria shall apply to the various classes of surface waters on the Colville Indian Reservation:

(1) *Class I (Extraordinary)*—(i) *Designated uses*. The designated uses include, but are not limited to, the following:

(A) Water supply (domestic, industrial, agricultural).

(B) Stock watering.

(C) Fish and shellfish: Salmonid migration, rearing, spawning, and harvesting; other fish migration, rearing, spawning, and harvesting.

(D) Wildlife habitat.

(E) Ceremonial and religious water use.

(F) Recreation (primary contact recreation, sport fishing, boating and aesthetic enjoyment).

(G) Commerce and navigation.

(ii) *Water quality criteria*. (A) Bacteriological Criteria. The geometric mean of the enterococci bacteria densities in samples taken over a 30 day period shall not exceed 8 per 100 milliliters, nor shall any single sample exceed an enterococci density of 35 per 100 milliliters. These limits are calculated as the geometric mean of the collected samples approximately equally spaced over a thirty day period.

(B) Dissolved oxygen—The dissolved oxygen shall exceed 9.5 mg/l.

(C) Total dissolved gas—concentrations shall not exceed 110 percent of the saturation value for gases at the existing atmospheric and hydrostatic pressures at any point of sample collection.

(D) Temperature—shall not exceed 16.0 degrees C due to human activities. Temperature increases shall not, at any time, exceed t=23/(T+5).

(*1*) When natural conditions exceed 16.0 degrees C, no temperature increase will be allowed which will raise the receiving water by greater than 0.3 degrees C.

(*2*) For purposes hereof, ''t'' represents the permissive temperature change across the dilution zone; and ''T'' represents the highest existing temperature in this water classification outside of any dilution zone.

(*3*) Provided that temperature increase resulting from nonpoint source activities shall not exceed 2.8 degrees C, and the maximum water temperature shall not exceed 10.3 degrees C.

(E) pH shall be within the range of 6.5 to 8.5 with a human-caused variation of less than 0.2 units.

(F) Turbidity shall not exceed 5 NTU over background turbidity when the background turbidity is 50 NTU or less, or have more than a 10 percent increase in turbidity when the background turbidity is more than 50 NTU.

(G) Toxic, radioactive, nonconventional, or deleterious material concentrations shall be less than those of public health significance, or which may cause acute or chronic toxic conditions to the aquatic biota, or which may adversely affect designated water uses.

(2) *Class II (Excellent)*—(i) *Designated uses*. The designated uses include but are not limited to, the following:

(A) Water supply (domestic, industrial, agricultural).

(B) Stock watering.

(C) Fish and shellfish: Salmonid migration, rearing, spawning, and harvesting; other fish migration, rearing, spawning, and harvesting; crayfish rearing, spawning, and harvesting.

(D) Wildlife habitat.

(E) Ceremonial and religious water use.

(F) Recreation (primary contact recreation, sport fishing, boating and aesthetic enjoyment).

(G) Commerce and navigation.

(ii) *Water quality criteria*. (A) Bacteriological Criteria—The geometric mean of the enterococci bacteria densities in samples taken over a 30 day period shall not exceed 16/100 ml, nor shall any single sample exceed an enterococci density of 75 per 100 milliliters. These limits are calculated as the geometric mean of the collected samples approximately equally spaced over a thirty day period.

(B) Dissolved oxygen—The dissolved oxygen shall exceed 8.0 mg/l.

(C) Total dissolved gas—concentrations shall not exceed 110 percent of the saturation value for gases at the existing atmospheric and hydrostatic

pressures at any point of sample collection.

(D) Temperature-shall not exceed 18.0 degrees C due to human activities. Temperature increases shall not, at any time, exceed t=28/(T+7).

(*1*) When natural conditions exceed 18 degrees C no temperature increase will be allowed which will raise the receiving water temperature by greater than 0.3 degrees C.

(*2*) For purposes hereof, ''t'' represents the permissive temperature change across the dilution zone; and ''T'' represents the highest existing temperature in this water classification outside of any dilution zone.

(*3*) Provided that temperature increase resulting from non-point source activities shall not exceed 2.8 degrees C, and the maximum water temperature shall not exceed 18.3 degrees C.

(E) pH shall be within the range of 6.5 to 8.5 with a human-caused variation of less than 0.5 units.

(F) Turbidity shall not exceed 5 NTU over background turbidity when the background turbidity is 50 NTU or less, or have more than a 10 percent increase in turbidity when the background turbidity is more than 50 NTU.

(G) Toxic, radioactive, nonconventional, or deleterious material concentrations shall be less than those of public health significance, or which may cause acute or chronic toxic conditions to the aquatic biota, or which may adversely affect designated water uses.

(3) *Class III (Good)*—(i) *Designated uses*. The designated uses include but are not limited to, the following:

(A) Water supply (industrial, agricultural).

(B) Stock watering.

(C) Fish and shellfish: Salmonid migration, rearing, spawning, and harvesting; other fish migration, rearing, spawning, and harvesting; crayfish rearing, spawning, and harvesting.

(D) Wildlife habitat.

(E) Recreation (secondary contact recreation, sport fishing, boating and aesthetic enjoyment).

(F) Commerce and navigation.

(ii) *Water quality criteria*. (A) Bacteriological Criteria—The geometric mean of the enterococci bacteria densities in samples taken over a 30 day period shall not exceed 33/100 ml, nor shall any single sample exceed an enterococci density of 150 per 100 milliliters. These limits are calculated as the geometric mean of the collected samples approximately equally spaced over a thirty day period.

(B) Dissolved oxygen.

	Early life stages [1,2]	Other life stages
7 day mean	9.5 (6.5)	[3] NA
1 day minimum [4]	8.0 (5.0)	6.5

[1] These are water column concentrations recommended to achieve the required intergravel dissolved oxygen concentrations shown in parentheses. The 3 mg/L differential is discussed in the dissolved oxygen criteria document (EPA 440/5–86–003, April 1986). For species that have early life stages exposed directly to the water column, the figures in parentheses apply.

[2] Includes all embryonic and larval stages and all juvenile forms to 30-days following hatching.

[3] NA (not applicable)

[4] All minima should be considered as instantaneous concentrations to be achieved at all times.

(C) Total dissolved gas concentrations shall not exceed 110 percent of the saturation value for gases at the existing atmospheric and hydrostatic pressures at any point of sample collection.

(D) Temperature shall not exceed 21.0 degrees C due to human activities. Temperature increases shall not, at any time, exceed t=34/(T+9).

(*1*) When natural conditions exceed 21.0 degrees C no temperature increase will be allowed which will raise the receiving water temperature by greater than 0.3 degrees C.

(*2*) For purposes hereof, ''t'' represents the permissive temperature change across the dilution zone; and ''T'' represents the highest existing temperature in this water classification outside of any dilution zone.

(*3*) Provided that temperature increase resulting from nonpoint source activities shall not exceed 2.8 degrees C, and the maximum water temperature shall not exceed 21.3 degrees C.

(E) pH shall be within the range of 6.5 to 8.5 with a human-caused variation of less than 0.5 units.

(F) Turbidity shall not exceed 10 NTU over background turbidity when the background turbidity is 50 NTU or less, or have more than a 20 percent increase in turbidity when the background turbidity is more than 50 NTU.

(G) Toxic, radioactive, nonconventional, or deleterious material concentrations shall be less than those of public health significance, or which may cause acute or chronic toxic conditions to the aquatic biota, or which may adversely affect designated water uses.

(4) *Class IV (Fair)*—(i) *Designated uses.* The designated uses include but are not limited to, the following:

(A) Water supply (industrial).

(B) Stock watering.

(C) Fish (salmonid and other fish migration).

(D) Recreation (secondary contact recreation, sport fishing, boating and aesthetic enjoyment).

(E) Commerce and navigation.

(ii) *Water quality criteria.* (A) Dissolved oxygen.

	During periods of salmonid and other fish migration	During all other time periods
30 day mean	6.5	5.5
7 day mean	[1] NA	[1] NA
7 day mean minimum	5.0	4.0
1 day minimum [2]	4.0	3.0

[1] NA (not applicable).
[2] All minima should be considered as instantaneous concentrations to be achieved at all times.

(B) Total dissolved gas—concentrations shall not exceed 110 percent of the saturation value for gases at the existing atmospheric and hydrostatic pressures at any point of sample collection.

(C) Temperature shall not exceed 22.0 degrees C due to human activities. Temperature increases shall not, at any time, exceed t=20/(T+2).

(*1*) When natural conditions exceed 22.0 degrees C, no temperature increase will be allowed which will raise the receiving water temperature by greater than 0.3 degrees C.

(*2*) For purposes hereof, ''t'' represents the permissive temperature change across the dilution zone; and ''T'' represents the highest existing temperature in this water classification outside of any dilution zone.

(D) pH shall be within the range of 6.5 to 9.0 with a human-caused variation of less than 0.5 units.

(E) Turbidity shall not exceed 10 NTU over background turbidity when the background turbidity is 50 NTU or less, or have more than a 20 percent increase in turbidity when the background turbidity is more than 50 NTU.

(F) Toxic, radioactive, nonconventional, or deleterious material concentrations shall be less than those of public health significance, or which may cause acute or chronic toxic conditions to the aquatic biota, or which may adversely affect designated water uses.

(5) *Lake Class*—(i) *Designated uses.* The designated uses include but are not limited to, the following:

(A) Water supply (domestic, industrial, agricultural).

(B) Stock watering.

(C) Fish and shellfish: Salmonid migration, rearing, spawning, and harvesting; other fish migration, rearing, spawning, and harvesting; crayfish rearing, spawning, and harvesting.

(D) Wildlife habitat.

(E) Ceremonial and religious water use.

(F) Recreation (primary contact recreation, sport fishing, boating and aesthetic enjoyment).

(G) Commerce and navigation.

(ii) *Water quality criteria.* (A) Bacteriological Criteria. The geometric mean of the enterococci bacteria densities in samples taken over a 30 day period shall not exceed 33/100 ml, nor shall any single sample exceed an enterococci density of 150 per 100 milliliters. These limits are calculated as the geometric mean of the collected samples approximately equally spaced over a thirty day period.

(B) Dissolved oxygen—no measurable decrease from natural conditions.

(C) Total dissolved gas concentrations shall not exceed 110 percent of the saturation value for gases at the existing atmospheric and hydrostatic pressures at any point of sample collection.

(D) Temperature—no measurable change from natural conditions.

(E) pH—no measurable change from natural conditions.

(F) Turbidity shall not exceed 5 NTU over natural conditions.

(G) Toxic, radioactive, nonconventional, or deleterious material concentrations shall be less than those which may affect public health, the

natural aquatic environment, or the desirability of the water for any use.

(6) *Special Resource Water Class (SRW)*—(i) *General characteristics*. These are fresh or saline waters which comprise a special and unique resource to the Reservation. Water quality of this class will be varied and unique as determined by the Regional Administrator in cooperation with the Tribes.

(ii) *Designated uses*. The designated uses include, but are not limited to, the following:

(A) Wildlife habitat.

(B) Natural foodchain maintenance.

(iii) Water quality criteria.

(A) Enterococci bacteria densities shall not exceed natural conditions.

(B) Dissolved oxygen—shall not show any measurable decrease from natural conditions.

(C) Total dissolved gas shall not vary from natural conditions.

(D) Temperature—shall not show any measurable change from natural conditions.

(E) pH shall not show any measurable change from natural conditions.

(F) Settleable solids shall not show any change from natural conditions.

(G) Turbidity shall not exceed 5 NTU over natural conditions.

(H) Toxic, radioactive, or deleterious material concentrations shall not exceed those found under natural conditions.

(g) *General classifications*. General classifications applying to various surface waterbodies not specifically classified under § 131.35(h) are as follows:

(1) All surface waters that are tributaries to Class I waters are classified Class I, unless otherwise classified.

(2) Except for those specifically classified otherwise, all lakes with existing average concentrations less than 2000 mg/L TDS and their feeder streams on the Colville Indian Reservation are classified as Lake Class and Class I, respectively.

(3) All lakes on the Colville Indian Reservation with existing average concentrations of TDS equal to or exceeding 2000 mg/L and their feeder streams are classified as Lake Class and Class I respectively unless specifically classified otherwise.

(4) All reservoirs with a mean detention time of greater than 15 days are classified Lake Class.

(5) All reservoirs with a mean detention time of 15 days or less are classified the same as the river section in which they are located.

(6) All reservoirs established on preexisting lakes are classified as Lake Class.

(7) All wetlands are assigned to the Special Resource Water Class.

(8) All other waters not specifically assigned to a classification of the reservation are classified as Class II.

(h) *Specific classifications*. Specific classifications for surface waters of the Colville Indian Reservation are as follows:

(1) Streams:

Alice Creek	Class III
Anderson Creek	Class III
Armstrong Creek	Class III
Barnaby Creek	Class II
Bear Creek	Class III
Beaver Dam Creek	Class II
Bridge Creek	Class II
Brush Creek	Class III
Buckhorn Creek	Class III
Cache Creek	Class III
Canteen Creek	Class I
Capoose Creek	Class III
Cobbs Creek	Class III
Columbia River from Chief Joseph Dam to Wells Dam.	
Columbia River from northern Reservation boundary to Grand Coulee Dam (Roosevelt Lake).	
Columbia River from Grand Coulee Dam to Chief Joseph Dam.	
Cook Creek	Class I
Cooper Creek	Class III
Cornstalk Creek	Class III
Cougar Creek	Class I
Coyote Creek	Class II
Deerhorn Creek	Class III
Dick Creek	Class III
Dry Creek	Class I
Empire Creek	Class III
Faye Creek	Class I
Forty Mile Creek	Class III
Gibson Creek	Class I
Gold Creek	Class II
Granite Creek	Class II
Grizzly Creek	Class III
Haley Creek	Class III
Hall Creek	Class II
Hall Creek, West Fork	Class I
Iron Creek	Class III
Jack Creek	Class III
Jerred Creek	Class I
Joe Moses Creek	Class III
John Tom Creek	Class III
Jones Creek	Class I
Kartar Creek	Class III
Kincaid Creek	Class III
King Creek	Class III
Klondyke Creek	Class I
Lime Creek	Class III

Little Jim Creek	Class III
Little Nespelem	Class II
Louie Creek	Class III
Lynx Creek	Class II
Manila Creek	Class III
McAllister Creek	Class III
Meadow Creek	Class III
Mill Creek	Class II
Mission Creek	Class III
Nespelem River	Class II
Nez Perce Creek	Class III
Nine Mile Creek	Class II
Nineteen Mile Creek	Class III
No Name Creek	Class II
North Nanamkin Creek	Class III
North Star Creek	Class III
Okanogan River from Reservation north boundary to Columbia River.	Class II
Olds Creek	Class I
Omak Creek	Class II
Onion Creek	Class II
Parmenter Creek	Class III
Peel Creek	Class III
Peter Dan Creek	Class III
Rock Creek	Class I
San Poil River	Class I
Sanpoil, River West Fork	Class II
Seventeen Mile Creek	Class III
Silver Creek	Class III
Sitdown Creek	Class III
Six Mile Creek	Class III
South Nanamkin Creek	Class III
Spring Creek	Class III
Stapaloop Creek	Class III
Stepstone Creek	Class III
Stranger Creek	Class II
Strawberry Creek	Class III
Swimptkin Creek	Class III
Three Forks Creek	Class I
Three Mile Creek	Class III
Thirteen Mile Creek	Class II
Thirty Mile Creek	Class II
Trail Creek	Class III
Twentyfive Mile Creek	Class III
Twentyone Mile Creek	Class III
Twentythree Mile Creek	Class III
Wannacot Creek	Class III
Wells Creek	Class I
Whitelaw Creek	Class III
Wilmont Creek	Class II
(2) Lakes:	
Apex Lake	LC
Big Goose Lake	LC
Bourgeau Lake	LC
Buffalo Lake	LC
Cody Lake	LC
Crawfish Lakes	LC
Camille Lake	LC
Elbow Lake	LC
Fish Lake	LC
Gold Lake	LC
Great Western Lake	LC
Johnson Lake	LC
LaFleur Lake	LC
Little Goose Lake	LC
Little Owhi Lake	LC
McGinnis Lake	LC
Nicholas Lake	LC
Omak Lake	SRW
Owhi Lake	SRW
Penley Lake	SRW
Rebecca Lake	LC
Round Lake	LC
Simpson Lake	LC
Soap Lake	LC
Sugar Lake	LC
Summit Lake	LC
Twin Lakes	SRW

[54 FR 28625, July 6, 1989]

§ 131.36 Toxics criteria for those states not complying with Clean Water Act section 303(c)(2)(B).

(a) *Scope*. This section is not a general promulgation of the section 304(a) criteria for priority toxic pollutants but is restricted to specific pollutants in specific States.

(b)(1) EPA's Section 304(a) criteria for Priority Toxic Pollutants.

A			B Freshwater		C Saltwater		D Human Health (10^{-6} risk for carcinogens) For consumption of:	
	(#) Compound	CAS Number	Criterion Maximum Conc. [d] (µg/L) (B1)	Criterion Continuous Conc. [d] (µg/L) (B2)	Criterion Maximum Conc. [d] (µg/L) (C1)	Criterion Continuous Conc. [d] (µg/L) (C2)	Water & Organisms (µg/L) (D1)	Organisms Only (µg/L) (D2)
1	Antimony	7440360	.....	.....	.....	.....	14 a	4300 a
2	Arsenic	7440382	360 m	190 m	69 m	36 m	0.018 abc	0.14 abc
3	Beryllium	7440417	.....	.....	.....	.....	n	n
4	Cadmium	7440439	3.7 e	1.0 e	42 m	9.3 m	n	n
5a	Chromium (III)	16065831	550 e	180 e	.....	.....	n	n
b	Chromium (VI)	18540299	15 m	10 m	1100 m	50 m	n	n
6	Copper	7440508	17 e	11 e	2.4 m	2.4 m		
7	Lead	7439921	65 e	2.5 e	210 m	8.1 m	n	n
8	Mercury	7439976	2.1 m	0.012 ip	1.8 m	0.025 ip	0.14	0.15
9	Nickel	7440020	1400 e	160 e	74 m	8.2 m	610 a	4600 a
10	Selenium	7782492	20 p	5 p	290 m	71 m	n	n
11	Silver	7440224	3.4 e	.....	1.9 m			
12	Thallium	7440280	.....	.....	.....	.....	1.7 a	6.3 a
13	Zinc	7440666	110 e	100 e	90 m	81 m		
14	Cyanide	57125	22	5.2	1	1	700 a	220000 aj
15	Asbestos	1332214	.....	.....	.....	.....	7,000,000 fibers/L k	
16	2,3,7,8-TCDD (Dioxin)	1746016	.....	.....	.....	.....	0.000000013 c	0.000000014 c
17	Acrolein	107028	.....	.....	.....	.....	320	780
18	Acrylonitrile	107131	.....	.....	.....	.....	0.059 ac	0.66 ac
19	Benzene	71432	.....	.....	.....	.....	1.2 ac	71 ac
20	Bromoform	75252	.....	.....	.....	.....	4.3 ac	360 ac
21	Carbon Tetrachloride	56235	.....	.....	.....	.....	0.25 ac	4.4 ac
22	Chlorobenzene	108907	.....	.....	.....	.....	680 a	21000 aj
23	Chlorodibromomethane	124481	.....	.....	.....	.....	0.41 ac	34 ac
24	Chloroethane	75003						
25	2-Chloroethylvinyl Ether	110758						
26	Chloroform	67663	.....	.....	.....	.....	5.7 ac	470 ac
27	Dichlorobromomethane	75274	.....	.....	.....	.....	0.27 ac	22 ac
28	1,1-Dichloroethane	75343						
29	1,2-Dichloroethane	107062	.....	.....	.....	.....	0.38 ac	99 ac
30	1,1-Dichloroethylene	75354	.....	.....	.....	.....	0.057 ac	3.2 ac
31	1,2-Dichloropropane	78875						
32	1,3-Dichloropropylene	542756	.....	.....	.....	.....	10 a	1700 a
33	Ethylbenzene	100414	.....	.....	.....	.....	3100 a	29000 a
34	Methyl Bromide	74839	.....	.....	.....	.....	48 a	4000 a
35	Methyl Chloride	74873	.....	.....	.....	.....	n	n
36	Methylene Chloride	75092	.....	.....	.....	.....	4.7 ac	1600 ac
37	1,1,2,2-Tetrachloroethane	79345	.....	.....	.....	.....	0.17 ac	11 ac
38	Tetrachloroethylene	127184	.....	.....	.....	.....	0.8 c	8.85 c
39	Toluene	108883	.....	.....	.....	.....	6800 a	200000 a

40	1,2-Trans-Dichloroethylene	156605						
41	1,1,1-Trichloroethane	71556	.....	.....	.....	.....	n	n
42	1,1,2-Trichloroethane	79005	.....	.....	.....	.....	0.60 ac	42 ac
43	Trichloroethylene	79016	.....	.....	.....	.....	2.7 c	81 c
44	Vinyl Chloride	75014	.....	.....	.....	.....	2 c	525 c
45	2-Chlorophenol	95578						
46	2,4-Dichlorophenol	120832	.....	.....	.....	.....	93 a	790 aj
47	2,4-Dimethylphenol	105679						
48	2-Methyl-4,6-Dinitrophenol	534521	.....	.....	.....	.....	13.4	765
49	2,4-Dinitrophenol	51285	.....	.....	.....	.....	70 a	14000 a
50	2-Nitrophenol	88755						
51	4-Nitrophenol	100027						
52	3-Methyl-4-Chlorophenol	59507						
53	Pentachlorophenol	87865	20 f	13 f	13	7.9	0.28 ac	8.2 acj
54	Phenol	108952	.....	.....	.....	.....	21000 a	4600000 aj
55	2,4,6-Trichlorophenol	88062	.....	.....	.....	.....	2.1 ac	6.5 ac
56	Acenaphthene	83329						
57	Acenaphthylene	208968						
58	Anthracene	120127	.....	.....	.....	.....	9600 a	110000 a
59	Benzidine	92875	.....	.....	.....	.....	0.00012 ac	0.00054 ac
60	Benzo(a)Anthracene	56553	.....	.....	.....	.....	0.0028 c	0.031 c
61	Benzo(a)Pyrene	50328	.....	.....	.....	.....	0.0028 c	0.031 c
62	Benzo(b)Fluoranthene	205992	.....	.....	.....	.....	0.0028 c	0.031 c
63	Benzo(ghi)Perylene	191242						
64	Benzo(k)Fluoranthene	207089	.....	.....	.....	.....	0.0028 c	0.031 c
65	Bis(2-Chloroethoxy)Methane	111911						
66	Bis(2-Chloroethyl)Ether	111444	.....	.....	.....	.....	0.031 ac	1.4 ac
67	Bis(2-Chloroisopropyl)Ether	108601	.....	.....	.....	.....	1400 a	170000 a
68	Bis(2-Ethylhexyl)Phthalate	117817	.....	.....	.....	.....	1.8 ac	5.9 ac
69	4-Bromophenyl Phenyl Ether	101553						
70	Butylbenzyl Phthalate	85687						
71	2-Chloronaphthalene	91587						
72	4-Chlorophenyl Phenyl Ether	7005723						
73	Chrysene	218019	.....	.....	.....	.....	0.0028 c	0.031 c
74	Dibenzo(ah)Anthracene	53703	.....	.....	.....	.....	0.0028 c	0.031 c
75	1,2-Dichlorobenzene	95501	.....	.....	.....	.....	2700 a	17000 a
76	1,3-Dichlorobenzene	541731	.....	.....	.....	.....	400	2600
77	1,4-Dichlorobenzene	106467	.....	.....	.....	.....	400	2600
78	3,3′-Dichlorobenzidine	91941	.....	.....	.....	.....	0.04 ac	0.077 ac
79	Diethyl Phthalate	84662	.....	.....	.....	.....	23000 a	120000 a
80	Dimethyl Phthalate	131113	.....	.....	.....	.....	313000	2900000
81	Di-n-Butyl Phthalate	84742	.....	.....	.....	.....	2700 a	12000 a
82	2,4-Dinitrotoluene	121142	.....	.....	.....	.....	0.11 c	9.1 c
83	2,6-Dinitrotoluene	606202						
84	Di-n-Octyl Phthalate	117840						
85	1,2-Diphenylhydrazine	122667	.....	.....	.....	.....	0.040 ac	0.54 ac
86	Fluoranthene	206440	.....	.....	.....	.....	300 a	370 a
87	Fluorene	86737	.....	.....	.....	.....	1300 a	14000 a
88	Hexachlorobenzene	118741	.....	.....	.....	.....	0.00075 ac	0.00077 ac
89	Hexachlorobutadiene	87683	.....	.....	.....	.....	0.44 ac	50 ac

A			B Freshwater		C Saltwater		D Human Health (10^{-6} risk for carcinogens) For consumption of:	
	(#) Compound	CAS Number	Criterion Maximum Conc.[d] (µg/L) (B1)	Criterion Continuous Conc.[d] (µg/L) (B2)	Criterion Maximum Conc.[d] (µg/L) (C1)	Criterion Continuous Conc.[d] (µg/L) (C2)	Water & Organisms (µg/L) (D1)	Organisms Only (µg/L) (D2)
90	Hexachlorocyclopentadiene	77474					240 a	17000 aj
91	Hexachloroethane	67721					1.9 ac	8.9 ac
92	Indeno(1,2,3-cd)Pyrene	193395					0.0028 c	0.031 c
93	Isophorone	78591					8.4 ac	600 ac
94	Naphthalene	91203						
95	Nitrobenzene	98953					17 a	1900 aj
96	N-Nitrosodimethylamine	62759					0.00069 ac	8.1 ac
97	N-Nitrosodi-n-Propylamine	621647						
98	N-Nitrosodiphenylamine	86306					5.0 ac	16 ac
99	Phenanthrene	85018						
100	Pyrene	129000					960 a	11000 a
101	1,2,4-Trichlorobenzene	120821						
102	Aldrin	309002	3 g		1.3 g		0.00013 ac	0.00014 ac
103	alpha-BHC	319846					0.0039 ac	0.013 ac
104	beta-BHC	319857					0.014 ac	0.046 ac
105	gamma-BHC	58899	2 g	0.08 g	0.16 g		0.019 c	0.063 c
106	delta-BHC	319868						
107	Chlordane	57749	2.4 g	0.0043 g	0.09 g	0.004 g	0.00057 ac	0.00059 ac
108	4,4′-DDT	50293	1.1 g	0.001 g	0.13 g	0.001 g	0.00059 ac	0.00059 ac
109	4,4′-DDE	72559					0.00059 ac	0.00059 ac
110	4,4′-DDD	72548					0.00083 ac	0.00084 ac
111	Dieldrin	60571	2.5 g	0.0019 g	0.71 g	0.0019 g	0.00014 ac	0.00014 ac
112	alpha-Endosulfan	959988	0.22 g	0.056 g	0.034 g	0.0087 g	0.93 a	2.0 a
113	beta-Endosulfan	33213659	0.22 g	0.056 g	0.034 g	0.0087 g	0.93 a	2.0 a
114	Endosulfan Sulfate	1031078					0.93 a	2.0 a
115	Endrin	72208	0.18 g	0.0023 g	0.037 g	0.0023 g	0.76 a	0.81 aj
116	Endrin Aldehyde	7421934					0.76 a	0.81 aj
117	Heptachlor	76448	0.52 g	0.0038 g	0.053 g	0.0036 g	0.00021 ac	0.00021 ac
118	Heptachlor Epoxide	1024573	0.52 g	0.0038 g	0.053 g	0.0036 g	0.00010 ac	0.00011 ac
119	PCB–1242	53469219		0.014 g		0.03 g		
120	PCB–1254	11097691		0.014 g		0.03 g		
121	PCB–1221	11104282		0.014 g		0.03 g		
122	PCB–1232	11141165		0.014 g		0.03 g		
123	PCB–1248	12672296		0.014 g		0.03 g		
124	PCB–1260	11096825		0.014 g		0.03 g		
125a	PCB–1016	12674112		0.014 g		0.03 g		
125b	Polychlorinated biphenyls (PCBs)						0.00017 q	0.00017 q
126	Toxaphene	8001352	0.73	0.0002	0.21	0.0002	0.00073 ac	0.00075 ac
	Total Number of Criteria (h) =		24	29	23	27	85	84

FOOTNOTES

a. Criteria revised to reflect current agency q_1* or RfD, as contained in the Integrated Risk Information System (IRIS). The fish tissue bioconcentration factor (BCF) from the 1980 criteria documents was retained in all cases.

b. The criteria refers to the inorganic form only.

c. Criteria in the matrix based on carcinogenicity (10^{-6} risk). For a risk level of 10^{-5}, move the decimal point in the matrix value one place to the right.

d. Criteria Maximum Concentration (CMC) = the highest concentration of a pollutant to which aquatic life can be exposed for a short period of time (1-hour average) without deleterious effects. Criteria Continuous Concentration (CCC) = the highest concentration of a pollutant to which aquatic life can be exposed for an extended period of time (4 days) without deleterious effects. µg/L = micrograms per liter.

e. Freshwater aquatic life criteria for these metals are expressed as a function of total hardness (mg/L as $CaCO_3$), the pollutant's water effect ratio (WER) as defined in § 131.36(c) and multiplied by an appropriate dissolved conversion factor as defined in § 131.36(b)(2). For comparative purposes, the values displayed in this matrix are shown as dissolved metal and correspond to a total hardness of 100 mg/L and a water effect ratio of 1.0.

f. Freshwater aquatic life criteria for pentachlorophenol are expressed as a function of pH, and are calculated as follows. Values displayed above in the matrix correspond to a pH of 7.8.

$$CMC = \exp(1.005(pH) - 4.830)$$
$$CCC = \exp(1.005(pH) - 5.290)$$

g. Aquatic life criteria for these compounds were issued in 1980 utilizing the 1980 Guidelines for criteria development. The acute values shown are final acute values (FAV) which by the 1980 Guidelines are instantaneous values as contrasted with a CMC which is a one-hour average.

h. These totals simply sum the criteria in each column. For aquatic life, there are 31 priority toxic pollutants with some type of freshwater or saltwater, acute or chronic criteria. For human health, there are 85 priority toxic pollutants with either ''water + fish'' or ''fish only'' criteria. Note that these totals count chromium as one pollutant even though EPA has developed criteria based on two valence states. In the matrix, EPA has assigned numbers 5a and 5b to the criteria for chromium to reflect the fact that the list of 126 priority toxic pollutants includes only a single listing for chromium.

i. If the CCC for total mercury exceeds 0.012 µg/l more than once in a 3-year period in the ambient water, the edible portion of aquatic species of concern must be analyzed to determine whether the concentration of methyl mercury exceeds the FDA action level (1.0 mg/kg). If the FDA action level is exceeded, the State must notify the appropriate EPA Regional Administrator, initiate a revision of its mercury criterion in its water quality standards so as to protect designated uses, and take other appropriate action such as issuance of a fish consumption advisory for the affected area.

j. No criteria for protection of human health from consumption of aquatic organisms (excluding water) was presented in the 1980 criteria document or in the 1986 Quality Criteria for Water. Nevertheless, sufficient information was presented in the 1980 document to allow a calculation of a criterion, even though the results of such a calculation were not shown in the document.

k. The criterion for asbestos is the MCL (56 FR 3526, January 30, 1991).

l. [Reserved: This letter not used as a footnote.]

m. Criteria for these metals are expressed as a function of the water effect ratio, WER, as defined in 40 CFR 131.36(c).

$$CMC = \text{column B1 or C1 value} \times WER$$
$$CCC = \text{column B2 or C2 value} \times WER$$

n. EPA is not promulgating human health criteria for this contaminant. However, permit authorities should address this contaminant in NPDES permit actions using the State's existing narrative criteria for toxics.

o. [Reserved: This letter not used as a footnote.]

p. Criterion expressed as total recoverable.

q. This criterion applies to total PCBs (*e.g.*, the sum of all congener or isomer or homolog or Aroclor analyses).

GENERAL NOTES

1. This chart lists all of EPA's priority toxic pollutants whether or not criteria recommendations are available. Blank spaces indicate the absence of criteria recommendations. Because of variations in chemical nomenclature systems, this listing of toxic pollutants does not duplicate the listing in Appendix A of 40 CFR Part 423. EPA has added the Chemical Abstracts Service (CAS) registry numbers, which provide a unique identification for each chemical.

2. The following chemicals have organoleptic based criteria recommendations that are not included on this chart (for reasons which are discussed in the preamble): copper, zinc, chlorobenzene, 2-chlorophenol, 2,4-dichlorophenol, acenaphthene, 2,4-dimethylphenol, 3-methyl-4-chlorophenol, hexachlorocyclopentadiene, pentachlorophenol, phenol.

3. For purposes of this rulemaking, freshwater criteria and saltwater criteria apply as specified in 40 CFR 131.36(c).

NOTE TO PARAGRAPH (b)(1): On April 14, 1995, the Environmental Protection Agency

issued a stay of certain criteria in paragraph (b)(1) of this section as follows: the criteria in columns B and C for arsenic, cadmium, chromium (VI), copper, lead, nickel, silver, and zinc; the criteria in B1 and C1 for mercury; the criteria in column B for chromium (III); and the criteria in column C for selenium. The stay remains in effect until further notice.

(2) Factors for Calculating Hardness-Dependent, Freshwater Metals Criteria

CMC=WER exp { m_A[ln(hardness)]+b_A} × Acute Conversion Factor

CCC=WER exp { m_C[ln(hardness)]+b_C} × Chronic Conversion Factor

Final CMC and CCC values should be rounded to two significant figures.

Metal	m_A	b_A	m_C	b_C	Freshwater conversion factors	
					Acute	Chronic
Cadmium	1.128	–3.828	0.7852	–3.490	[a] 0.944	[a] 0.909
Chromium (III)	0.8190	3.688	0.8190	1.561	0.316	0.860
Copper	0.9422	–1.464	0.8545	–1.465	0.960	0.960
Lead	1.273	-1.460	1.273	–4.705	[a] 0.791	[a] 0.791
Nickel	0.8460	3.3612	0.8460	1.1645	0.998	0.997
Silver	1.72	–6.52	[b] N/A	[b] N/A	0.85	[b] N/A
Zinc	0.8473	0.8604	0.8473	0.7614	0.978	0.986

Note to table: The term ''exp'' represents the base e exponential function.

Footnotes to table:

[a] The freshwater conversion factors (CF) for cadmium and lead are hardness-dependent and can be calculated for any hardness [see limitations in § 131.36(c)(4)] using the following equations:

Cadmium
Acute: CF=1.136672—[(ln hardness)(0.041838)]
Chronic: CF=1.101672—[(ln hardness)(0.041838)]
Lead (Acute and Chronic): CF = 1.46203—[(ln hardness)(0.145712)]

[b] No chronic criteria are available for silver.

(c) *Applicability*. (1) The criteria in paragraph (b) of this section apply to the States' designated uses cited in paragraph (d) of this section and supersede any criteria adopted by the State, except when State regulations contain criteria which are more stringent for a particular use in which case the State's criteria will continue to apply.

(2) The criteria established in this section are subject to the State's general rules of applicability in the same way and to the same extent as are the other numeric toxics criteria when applied to the same use classifications including mixing zones, and low flow values below which numeric standards can be exceeded in flowing fresh waters.

(i) For all waters with mixing zone regulations or implementation procedures, the criteria apply at the appropriate locations within or at the boundary of the mixing zones; otherwise the criteria apply throughout the waterbody including at the end of any discharge pipe, canal or other discharge point.

(ii) A State shall not use a low flow value below which numeric standards can be exceeded that is less stringent than the following for waters suitable for the establishment of low flow return frequencies (*i.e.*, streams and rivers):

AQUATIC LIFE

Acute criteria (CMC)	1 Q 10 or 1 B 3
Chronic criteria (CCC)	7 Q 10 or 4 B 3

HUMAN HEALTH

Non-carcinogens	30 Q 5
Carcinogens	Harmonic mean flow

Where:

CMC—criteria maximum concentration—the water quality criteria to protect against acute effects in aquatic life and is the highest instream concentration of a priority toxic pollutant consisting of a one-hour average not to be exceeded more than once every three years on the average;

CCC—criteria continuous concentration—the water quality criteria to protect against chronic effects in aquatic life is the highest instream concentration of a priority toxic pollutant consisting of a 4-day average not to be exceeded more than once every three years on the average;

1 Q 10 is the lowest one day flow with an average recurrence frequency of once in 10 years determined hydrologically;

1 B 3 is biologically based and indicates an allowable exceedence of once every 3 years. It is determined by EPA's computerized method (DFLOW model);

7 Q 10 is the lowest average 7 consecutive day low flow with an average recurrence frequency of once in 10 years determined hydrologically;

4 B 3 is biologically based and indicates an allowable exceedence for 4 consecutive days once every 3 years. It is determined by EPA's computerized method (DFLOW model);

30 Q 5 is the lowest average 30 consecutive day low flow with an average recurrence frequency of once in 5 years determined hydrologically; and the harmonic mean

flow is a long term mean flow value calculated by dividing the number of daily flows analyzed by the sum of the reciprocals of those daily flows.

(iii) If a State does not have such a low flow value for numeric standards compliance, then none shall apply and the criteria included in paragraph (d) of this section herein apply at all flows.

(3) The aquatic life criteria in the matrix in paragraph (b) of this section apply as follows:

(i) For waters in which the salinity is equal to or less than 1 part per thousand 95% or more of the time, the applicable criteria are the freshwater criteria in Column B;

(ii) For waters in which the salinity is equal to or greater than 10 parts per thousand 95% or more of the time, the applicable criteria are the saltwater criteria in Column C; and

(iii) For waters in which the salinity is between 1 and 10 parts per thousand as defined in paragraphs (c)(3) (i) and (ii) of this section, the applicable criteria are the more stringent of the freshwater or saltwater criteria. However, the Regional Administrator may approve the use of the alternative freshwater or saltwater criteria if scientifically defensible information and data demonstrate that on a site-specific basis the biology of the waterbody is dominated by freshwater aquatic life and that freshwater criteria are more appropriate; or conversely, the biology of the waterbody is dominated by saltwater aquatic life and that saltwater criteria are more appropriate.

(4) *Application of metals criteria.* (i) For purposes of calculating freshwater aquatic life criteria for metals from the equations in paragraph (b)(2) of this section, the minimum hardness allowed for use in those equations shall not be less than 25 mg/l, as calcium carbonate, even if the actual ambient hardness is less than 25 mg/l as calcium carbonate. The maximum hardness value for use in those equations shall not exceed 400 mg/l as calcium carbonate, even if the actual ambient hardness is greater than 400 mg/l as calcium carbonate. The same provisions apply for calculating the metals criteria for the comparisons provided for in paragraph (c)(3)(iii) of this section.

(ii) The hardness values used shall be consistent with the design discharge conditions established in paragraph (c)(2) of this section for flows and mixing zones.

(iii) Except where otherwise noted, the criteria for metals (compounds #2, #4–# 11, and #13, in paragraph (b) of this section) are expressed as dissolved metal. For purposes of calculating aquatic life criteria for metals from the equations in footnote m. in the criteria matrix in paragraph (b)(1) of this section and the equations in paragraphs (b)(2) of this section, the water-effect ratio is computed as a specific pollutant's acute or chronic toxicity values measured in water from the site covered by the standard, divided by the respective acute or chronic toxicity value in laboratory dilution water.

(d) *Criteria for Specific Jurisdictions*—(1) *Rhode Island, EPA Region 1.* (i) All waters assigned to the following use classifications in the Water Quality Regulations for Water Pollution Control adopted under Chapters 46–12, 42–17.1, and 42–35 of the General Laws of Rhode Island are subject to the criteria in paragraph (d)(1)(ii) of this section, without exception:

6.21 Freshwater	6.22 Saltwater:
Class A	Class SA
Class B	Class SB
Class C	Class SC

(ii) The following criteria from the matrix in paragraph (b)(1) of this section apply to the use classifications identified in paragraph (d)(1)(i) of this section:

Use classification	Applicable criteria
Class A Class B waters where water supply use is designated	These classifications are assigned the criteria in Column D1—#2, 68
Class B waters where water supply use is not designated. Class C; Class SA; Class SB; Class SC	Each of these classifications is assigned the criteria in: Column D2—#2, 68

(iii) The human health criteria shall be applied at the 10^{-5} risk level, consistent with the State policy. To determine appropriate value for carcinogens, see footnote c in the criteria matrix in paragraph (b)(1) of this section.

(2) *Vermont, EPA Region 1.* (i) All waters assigned to the following use classifications in the Vermont Water Quality Standards adopted under the authority of the Vermont Water Pollution Control Act (10 V.S.A., Chapter 47) are subject to the criteria in paragraph (d)(2)(ii) of this section, without exception:

Class A
Class B
Class C

(ii) The following criteria from the matrix in paragraph (b)(1) of this section apply to the use classifications identified in paragraph (d)(2)(i) of this section:

Use classification	Applicable criteria
1. Classes A1, A2, B1, B2, B3	These classification are assigned the criterion in: Column B2—#105.

(iii) The human health criteria shall be applied at the State-proposed 10^{-6} risk level.

(3) *New Jersey, EPA Region 2.* (i) All waters assigned to the following use classifications in the New Jersey Administrative Code (N.J.A.C.) 7:9–4.1 et seq., Surface Water Quality Standards, are subject to the criteria in paragraph (d)(3)(ii) of this section, without exception.

N.J.A.C. 7:9–4.12(b): Class PL
N.J.A.C. 7:9–4.12(c): Class FW2
N.J.A.C. 7:9–4.12(d): Class SE1
N.J.A.C. 7:9–4.12(e): Class SE2
N.J.A.C. 7:9–4.12(f): Class SE3
N.J.A.C. 7:9–4.12(g): Class SC
N.J.A.C. 7:9–4.13(a): Delaware River Zones 1C, 1D, and 1E
N.J.A.C. 7:9–4.13(b): Delaware River Zone 2
N.J.A.C. 7:9–4.13(c): Delaware River Zone 3
N.J.A.C. 7:9–4.13(d): Delaware River Zone 4
N.J.A.C. 7:9–4.13(e): Delaware River Zone 5
N.J.A.C. 7:9–4.13(f): Delaware River Zone 6

(ii) The following criteria from the matrix in paragraph (b)(1) of this section apply to the use classifications identified in paragraph (d)(3)(i) of this section:

Use classification	Applicable criteria
1. Freshwater Pinelands, FW2	These classifications are each assigned the criteria in: i. Column B1—#2, 4, 5a, 5b, 6–11, 13. ii. Column B2—#2, 4, 5a, 5b, 6–10, 13. iii. Column D1—#125b at a 10^{-6} risk level. iv. Column D2—#125b at a 10^{-6} risk level. v. Column D2—#23, 30, 37, 42, 87, 89, 93 and 105 at a 10^{-5} risk level.
2. PL (Saline Water Pinelands), SE1, SE2, SE3, SC, Delaware Bay Zone 6.	These classifications are each assigned the criteria in: i. Column C1—#2, 4, 5b, 6–11, 13. ii. Column C2—#2, 4, 5b, 6–10, 13. iii. Column D1—#125b at a 10^{-6} risk level. iv. Column D2—#125b at a 10^{-6} risk level. v. Column D2—#23, 30, 37, 42, 87, 89, 93 and 105 at a 10^{-5} risk level.
3. Delaware River Zones 1C, 1D, 1E, 2, 3, 4, and 5	i. Column B1—none. ii. Column B2—none. iii. Column D1—none. iv. Column D2—none.
4. Delaware River Zones 3, 4, and 5	These classifications are each assigned the criteria in: i. Column C1—none. ii. Column C2—none. iii. Column D2—none.

(iii) The human health criteria shall be applied at the State-proposed 10^{-6} risk level for EPA rated Class A, B_1, and B_2 carcinogens; EPA rated Class C carcinogens shall be applied at 10^{-5} risk level. To determine appropriate value for carcinogens, see footnote c. in the matrix in paragraph (b)(1) of this section.

(4) *Puerto Rico, EPA Region 2.* (i) All waters assigned to the following use classifications in the Puerto Rico

Water Quality Standards (promulgated by Resolution Number R–83–5–2) are subject to the criteria in paragraph (d)(4)(ii) of this section, without exception.

Article 2.2.2—Class SB
Article 2.2.3—Class SC
Article 2.2.4—Class SD

(ii) The following criteria from the matrix in paragraph (b)(1) of this section apply to the use classifications identified in paragraph (d)(4)(i) of this section:

Use classification	Applicable criteria
Class SD	Column B1—# 118. Column B2—#s 8, 105, 115, 118, 119, 120, 121, 122, 123,124, 125a, 125b. Column D1—#s 12, 16, 27, 60, 61, 62, 64, 73, 74, 92, 93, 103, 104, 114, 116, 118, 119, 120, 121, 122, 123, 124, 125a, 125b.
Class SB, Class SC	Column C1—#s 5b, 112, 113, 118. Column C2—#s 5b, 8, 112, 113, 118, 119, 120, 121, 122, 123, 124, 125a, 125b. Column D2—#s 12, 16, 27, 60, 61, 62, 64, 73, 74, 87, 92, 93, 103, 104, 114, 116, 118, 119, 120, 121, 122, 123, 124, 125a, 125b.

(iii) The human health criteria shall be applied at the State-proposed 10^{-5} risk level. To determine appropriate value for carcinogens, see footnote c, in the criteria matrix in paragraph (b)(1) of this section.

(5) *District of Columbia, EPA Region 3.* (i) All waters assigned to the following use classifications in chapter 11 Title 21 DCMR, Water Quality Standards of the District of Columbia are subject to the criteria in paragraph (d)(5)(ii) of this section, without exception:

1101.2 Class C waters

(ii) The following criteria from the matrix in paragraph (b)(1) of this section apply to the use classification identified in paragraph (d)(5)(i) of this section:

Use classification	Applicable criteria
1. Class C	This classification is assigned the additional criteria in: Column B2; #10, 118, 126.

(iii) The human health criteria shall be applied at the State-adopted 10^{-6} risk level.

(6) *Florida, EPA Region 4.* (i) All waters assigned to the following use classifications in Chapter 17–301 of the Florida Administrative Code (*i.e.*, identified in Section 17–302.600) are subject to the criteria in paragraph (d)(6)(ii) of this section, without exception:

Class I
Class II
Class III

(ii) The following criteria from the matrix paragraph (b)(1) of this section apply to the use classifications identified in paragraph (d)(6)(i) of this section:

Use classification	Applicable criteria
Class I	This classification is assigned the criteria in: Column D1—#16
Class II	This classification is assigned the criteria in:
Class III (marine)	Column D2—#16
Class III (freshwater)	This classification is assigned the criteria in: Column D2—#16

(iii) The human health criteria shall be applied at the State-adopted 10^{-6} risk level.

(7)–(8) [Reserved]

(9) *Kansas, EPA Region 7.* (i) All waters assigned to the following use classification in the Kansas Department of Health and Environment regulations, K.A.R. 28–16–28b through K.A.R. 28–16–28f, are subject to the criteria in paragraph (d)(9)(ii) of this section, without exception.

Section (2)(A)—Special Aquatic Life Use Waters
Section (2)(B)—Expected Aquatic Life Use Waters
Section (2)(C)—Restricted Aquatic Life Use Waters
Section (3)—Domestic Water Supply.
Section (4)—Food Procurement Use.

(ii) The following criteria from the matrix in paragraph (b)(1) of this section apply to the use classifications identified in paragraph (d)(9)(i) of this section:

Use classification	Applicable criteria
1. Sections (2)(A), (2)(B), (2)(C), (4)	These classifications are each assigned criteria as follows: i. Column B1, #2. ii. Column D2, #12, 21, 29, 39, 46, 68, 79, 81, 86, 93, 104, 114, 118.
2. Section (3)	This classification is assigned all criteria in: Column D1, all except #1, 9, 12, 14, 15, 17, 22, 33, 36, 39, 44, 75, 77, 79, 90, 112, 113, and 115.

(iii) The human health criteria shall be applied at the State-adopted 10^{-6} risk level.

(10) *California, EPA Region 9.* (i) All waters assigned any aquatic life or human health use classifications in the Water Quality Control Plans for the various Basins of the State (''Basin Plans''), as amended, adopted by the California State Water Resources Control Board (''SWRCB''), except for ocean waters covered by the Water Quality Control Plan for Ocean Waters of California (''Ocean Plan'') adopted by the SWRCB with resolution Number 90–27 on March 22, 1990, are subject to the criteria in paragraph (d)(10)(ii) of this section, without exception. These criteria amend the portions of the existing State standards contained in the Basin Plans. More particularly these criteria amend water quality criteria contained in the Basin Plan Chapters specifying water quality objectives (the State equivalent of federal water quality criteria) for the toxic pollutants identified in paragraph (d)(10)(ii) of this section. Although the State has adopted several use designations for each of these waters, for purposes of this action, the specific standards to be applied in paragraph (d)(10)(ii) of this section are based on the presence in all waters of some aquatic life designation and the presence or absence of the MUN use designation (Municipal and domestic supply). (See Basin Plans for more detailed use definitions.)

(ii) The following criteria from the matrix in paragraph (b)(1) of this section apply to the water and use classifications defined in paragraph (d)(10)(i) of this section and identified below:

Water and use classification	Applicable criteria
Waters of the State defined as bays or estuaries except the Sacramento-San Joaquin Delta and San Francisco Bay	These waters are assigned the criteria in: Column B1—pollutants 5a and 14 Column B2—pollutants 5a and 14 Column C1—pollutant 14 Column C2—pollutant 14 Column D2—pollutants 1, 12, 17, 18, 21, 22, 29, 30, 32, 33, 37, 38, 42–44, 46, 48, 49, 54, 59, 66, 67, 68, 78–82, 85, 89, 90, 91, 93, 95, 96, 98

Water and use classification	Applicable criteria
Waters of the Sacramento—San Joaquin Delta and waters of the State defined as inland (*i.e.*, all surface waters of the State not bays or estuaries or ocean) that include a MUN use designation	These waters are assigned the criteria in: Column B1—pollutants 5a and 14 Column B2—pollutants 5a and 14 Column D1—pollutants 1, 12, 15, 17, 18, 21, 22, 29, 30, 32, 33, 37, 38, 42–48, 49, 59, 66, 67, 68, 78–82, 85, 89, 90, 91, 93, 95, 96, 98
Waters of the State defined as inland without an MUN use designation	These waters are assigned the criteria in: Column B1—pollutants 5a and 14 Column B2—pollutants 5a and 14 Column D2—pollutants 1, 12, 17, 18, 21, 22, 29, 30, 32, 33, 37, 38, 42–44, 46, 48, 49, 54, 59, 66, 67, 68, 78–82, 85, 89, 90, 91, 93, 95, 96, 98
Waters of the San Joaquin River from the mouth of the Merced River to Vernalis	In addition to the criteria assigned to these waters elsewhere in this rule, these waters are assigned the criteria in: Column B2—pollutant 10
Waters of Salt Slough, Mud Slough (north) and the San Joaquin River, Sack Dam to the mouth of the Merced River	In addition to the criteria assigned to these waters elsewhere in this rule, these waters are assigned the criteria in: Column B1—pollutant 10 Column B2—pollutant 10
Waters of San Francisco Bay upstream to and including Suisun Bay and the Sacramento-San Joaquin Delta	These waters are assigned the criteria in: Column B1—pollutants 5a, 10* and 14 Column B2—pollutants 5a, 10* and 14 Column C1—pollutant 14 Column C2—pollutant 14 Column D2—pollutants 1, 12, 17, 18, 21, 22, 29, 30, 32, 33, 37, 38, 42–44, 46, 48, 49, 54, 59, 66, 67, 68, 78–82, 85, 89, 90, 91, 93, 95, 96, 98
All inland waters of the United States or enclosed bays and estuaries that are waters of the United States that include an MUN use designation and that the State has either excluded or partially excluded from coverage under its Water Quality Control Plan for Inland Surface Waters of California, Tables 1 and 2, or its Water Quality Control Plan for Enclosed Bays and Estuaries of California, Tables 1 and 2, or has deferred applicability of those tables. (Category (a), (b), and (c) waters described on page 6 of Water Quality Control Plan for Inland Surface Waters of California or page 6 of its Water Quality Control Plan for Enclosed Bays and Estuaries of California.)	These waters are assigned the criteria for pollutants for which the State does not apply Table 1 or 2 standards. These criteria are: Column B1—all pollutants Column B2—all pollutants Column D1—all pollutants except #2

Water and use classification	Applicable criteria
All inland waters of the United States that do not include an MUN use designation and that the State has either excluded or partially excluded from coverage under its Water Quality Control Plan for Inland Surface Waters of California, Tables 1 and 2, or has deferred applicability of these tables. (Category (a), (b), and (c) waters described on page 6 of Water Quality Control Plan for Inland Surface Waters of California.)	These waters are assigned the criteria for pollutants for which the State does not apply Table 1 or 2 standards. These criteria are: Column B1—all pollutants Column B2—all pollutants Column D2—all pollutants except #2
All enclosed bays and estuaries that are waters of the United States that do not include an MUN designation and that the State has either excluded or partially excluded from coverage under its Water Quality Control Plan for Inland Surface Waters of California, Tables 1 and 2, or its Water Quality Control Plan for Enclosed Bays and Estuaries of California, Tables 1 and 2, or has deferred applicability of those tables. (Category (a), (b), and (c) waters described on page 6 of Water Quality Control Plan for Inland Surface Waters of California or page 6 of its Water Quality Control Plan for Enclosed Bays and Estuaries of California.)	These waters are assigned the criteria for pollutants for which the State does not apply Table 1 or 2 standards. These criteria are: Column B1—all pollutants Column B2—all pollutants Column C1—all pollutants Column C2—all pollutants Column D2—all pollutants except #2

*The fresh water selenium criteria are included for the San Francisco Bay estuary because high levels of bioaccumulation of selenium in the estuary indicate that the salt water criteria are underprotective for San Francisco Bay.

(iii) The human health criteria shall be applied at the State-adopted 10^{-6} risk level.

(11) *Nevada, EPA Region 9.* (i) All waters assigned the use classifications in Chapter 445 of the Nevada Administrative Code (NAC), Nevada Water Pollution Control Regulations, which are referred to in paragraph (d)(11)(ii) of this section, are subject to the criteria in paragraph (d)(11)(ii) of this section, without exception. These criteria amend the existing State standards contained in the Nevada Water Pollution Control Regulations. More particularly, these criteria amend or supplement the table of numeric standards in NAC 445.1339 for the toxic pollutants identified in paragraph (d)(11)(ii) of this section.

(ii) The following criteria from matrix in paragraph (b)(1) of this section apply to the waters defined in paragraph (d)(11)(i) of this section and identified below:

Water and use classification	Applicable criteria
Waters that the State has included in NAC 445.1339 where Municipal or domestic supply is a designated use	These waters are assigned the criteria in: Column B1—pollutant #118 Column B2—pollutant #118 Column D1—pollutants #15, 16, 18, 19, 20, 21, 23, 26, 27, 29, 30, 34, 37, 38, 42, 43, 55, 58–62, 64, 66, 73, 74, 78, 82, 85, 87–89, 91, 92, 96, 98, 100, 103, 104, 105, 114, 116, 117, 118
Waters that the State has included in NAC 445.1339 where Municipal or domestic supply is not a designated use	These waters are assigned the criteria in: Column B1—pollutant #118 Column B2—pollutant #118 Column D2—all pollutants except #2.

(iii) The human health criteria shall be applied at the 10^{-5} risk level, consistent with State policy. To determine appropriate value for carcinogens, see footnote c in the criteria matrix in paragraph (b)(1) of this section.

(12) *Alaska, EPA Region 10.* (i) All waters assigned to the following use classifications in the Alaska Administrative Code (AAC), Chapter 18 (*i.e.*, identified in 18 AAC 70.020) are subject to the criteria in paragraph (d)(12)(ii) of this section, without exception:

70.020.(1) (A) Fresh Water
70.020.(1) (A) Water Supply
(i) Drinking, culinary, and food processing,
(iii) Aquaculture;
70.020.(1) (B) Water Recreation
(i) Contact recreation,
(ii) Secondary recreation;
70.020.(1) (C) Growth and propagation of fish, shellfish, other aquatic life, and wildlife
70.020.(2) (A) Marine Water
70.020.(2) (A) Water Supply
(i) Aquaculture,
70.020.(2) (B) Water Recreation
(i) contact recreation,
(ii) secondary recreation;
70.020.(2) (C) Growth and propagation of fish, shellfish, other aquatic life, and wildlife;
70.020.(2) (D) Harvesting for consumption of raw mollusks or other raw aquatic life.

(ii) The following criteria from the matrix in paragraph (b)(1) of this section apply to the use classifications identified in paragraph (d)(12)(i) of this section:

Use classification	Applicable criteria
(1)(A)(i)	Column D1—#s 16, 18–21, 23, 26, 27, 29, 30, 32, 37, 38, 42–44, 53, 55, 59–62, 64, 66, 68, 73, 74, 78, 82, 85, 88, 89, 91–93, 96, 98, 102–105, 107–111, 117–126.
(1)(A)(iii)	Column D2—#s 14, 16, 18–21, 22, 23, 26, 27, 29, 30, 32, 37, 38, 42–44, 46, 53, 54, 55, 59–62, 64, 66, 68, 73, 74, 78, 82, 85, 88–93, 95, 96, 98, 102–105, 107–111, 115–126.
(1)(B)(i), (1)(B)(ii), (1)(C)	Column D2—#s 14, 16, 18–21, 22, 23, 26, 27, 29, 30, 32, 37, 38, 42–44, 46, 53, 54, 55, 59–62, 64, 66, 68, 73, 74, 78, 82, 85, 88–93, 95, 96, 98, 102–105, 107–111, 115–126.
(2)(A)(i), (2)(B)(i), and (2)(B)ii, (2)(C), (2)(D)	Column D2—#s 14, 16, 18–21, 22, 23, 26, 27, 29, 30, 32, 37, 38, 42–44, 46, 53, 54, 55, 59–62, 64, 66, 68, 73, 74, 78, 82, 85, 88–93, 95, 96, 98, 102–105, 107–111, 115–126.

(iii) The human health criteria shall be applied at the State-proposed risk level of 10^{-5}. To determine appropriate value for carcinogens, see footnote c in the criteria matrix in paragraph (b)(1) of this section.

(13) [Reserved]

(14) *Washington*, *EPA Region 10*. (i) All waters assigned to the following use classifications in the Washington Administrative Code (WAC), Chapter 173–201 (*i.e.*, identified in WAC 173–201–045) are subject to the criteria in paragraph (d)(14)(ii) of this section, without exception:

173–201–045
Fish and Shellfish
Fish
Water Supply (domestic)
Recreation

(ii) The following criteria from the matrix in paragraph (b)(1) of this section apply to the use classifications identified in paragraph (d)(14)(i) of this section:

Use classification	Applicable criteria
Fish and Shellfish; Fish	These classifications are assigned the criteria in: Column D2—all.
Water Supply (domestic)	These classifications are assigned the criteria in: Column D1—all.
Recreation	This classification is assigned the criteria in: Column D2—Marine waters and freshwaters not protected for domestic water supply.

(iii) The human health criteria shall be applied at the State proposed risk level of 10^{-6}.

[57 FR 60910, Dec. 22, 1992]

EDITORIAL NOTE: For FEDERAL REGISTER citations affecting § 131.36, see the List of CFR Sections Affected, which appears in the Finding Aids section of the printed volume and at www.fdsys.gov .

§ 131.37 California.

(a) *Additional criteria*. The following criteria are applicable to waters specified in the Water Quality Control Plan for Salinity for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary, adopted by the California State Water Resources Control Board in State Board Resolution No. 91–34 on May 1, 1991:

(1) *Estuarine habitat criteria*. (i) *General rule*. (A) Salinity (measured at the surface) shall not exceed 2640 micromhos/centimeter specific conductance at 25 °C (measured as a 14-day moving average) at the Confluence of the Sacramento and San Joaquin Rivers throughout the period each year from February 1 through June 30, and shall not exceed 2640 micromhos/centimeter specific conductance at 25 °C (measured as a 14-day moving average) at the specific locations noted in Table 1 near Roe Island and Chipps Island for the number of days each month in the February 1 to June 30 period computed by reference to the following formula:

Number of days required in Month X = Total number of days in Month×* $(1 - 1/(1+e^{K})$

where

K = A + (B*natural logarithm of the previous month's 8-River Index);

A and B are determined by reference to Table 1 for the Roe Island and Chipps Island locations;

x is the calendar month in the February 1 to June 30 period;

and e is the base of the natural (or Napierian) logarithm.

Where the number of days computed in this equation in paragraph (a)(1)(i)(A) of this section shall be rounded to the nearest whole number of days. When the previous month's 8-River Index is less than 500,000 acre-feet, the number of days required for the current month shall be zero.

TABLE 1. CONSTANTS APPLICABLE TO EACH OF THE MONTHLY EQUATIONS TO DETERMINE MONTHLY REQUIREMENTS DESCRIBED.

Month X	Chipps Island		Roe Island (if triggered)	
	A	B	A	B
Feb	–[1]	–[1]	–14.36	+2.068
Mar	–105.16	+15.943	–20.79	+2.741
Apr	–47.17	+6.441	–28.73	+3.783
May	–94.93	+13.662	–54.22	+6.571
June	–81.00	+9.961	–92.584	+10.699

[1] Coefficients for A and B are not provided at Chipps Island for February, because the 2640 micromhos/cm specific conductance criteria must be maintained at Chipps Island throughout February under all historical 8-River Index values for January.

(B) The Roe Island criteria apply at the salinity measuring station maintained by the U.S. Bureau of Reclamation at Port Chicago (km 64). The Chipps Island criteria apply at the Mallard Slough Monitoring Site, Station D–10 (RKI RSAC–075) maintained by the California Department of Water Resources. The Confluence criteria apply at the Collinsville Continuous Monitoring Station C–2 (RKI RSAC–081) maintained by the California Department of Water Resources.

(ii) *Exception*. The criteria at Roe Island shall be required for any given month only if the 14-day moving average salinity at Roe Island falls below 2640 micromhos/centimeter specific conductance on any of the last 14 days of the previous month.

(2) *Fish migration criteria*—(i) *General rule*—(A) *Sacramento River*. Measured Fish Migration criteria values for the Sacramento River shall be at least the following:

At temperatures less than below 61 °F: SRFMC = 1.35

At temperatures between 61 °F and 72 °F: SRFMC = 6.96–.092 * Fahrenheit temperature

At temperatures greater than 72 °F: SRFMC = 0.34

where SRFMC is the Sacramento River Fish Migration criteria value. Temperature shall be the water temperature at release of tagged salmon smolts into the Sacramento River at Miller Park.

(B) *San Joaquin River*. Measured Fish Migration criteria values on the San Joaquin River shall be at least the following:

For years in which the SJVIndex is >2.5: SJFMC = (–0.012) + 0.184*SJVIndex

In other years: SJFMC = 0.205 + 0.0975*SJVIndex

where SJFMC is the San Joaquin River Fish Migration criteria value, and SJVIndex is the San Joaquin Valley Index in million acre feet (MAF)

(ii) *Computing fish migration criteria values for Sacramento River*. In order to assess fish migration criteria values for the Sacramento River, tagged fall-run salmon smolts will be released into the Sacramento River at Miller Park and captured at Chipps Island, or alternatively released at Miller Park and Port Chicago and recovered from the ocean fishery, using the methodology described in this paragraph (a)(2)(ii). An alternative methodology for computing fish migration criteria values can be used so long as the revised methodology is calibrated with the methodology described in this paragraph (a)(2)(ii) so as to maintain the validity of the relative index values. Sufficient releases shall be made each year to provide a statistically reliable verification of compliance with the criteria. These criteria will be considered attained when the sum of the differences between the measured experimental value and the stated criteria value (i.e., measured value minus stated value) for each experimental release conducted over a three year period (the current year and the previous two years) shall be greater than or equal to zero. Fish for release are to be tagged at the hatchery with coded-wire tags, and fin clipped. Approximately 50,000 to 100,000 fish of smolt size (size greater than 75 mm) are released for each survival index estimate, depending on expected mortality. As a control for the ocean recovery survival index, one or two groups per season are released at Benecia or Pt. Chicago. From each upstream release of tagged fish, fish are to be caught over a period of one to two weeks at Chipps Island. Daylight sampling at Chipps Island with a 9.1 by 7.9 m, 3.2 mm cod end, midwater trawl is begun 2 to 3 days after release. When the first fish is caught, full-time trawling 7 days a week should begin. Each day's trawling consists of ten 20 minute tows generally made against the current, and distributed equally across the channel.

(A) The Chipps Island smolt survival index is calculated as:

$$SSI=R\div MT(0.007692)$$

where

R=number of recaptures of tagged fish
M=number of marked (tagged) fish released
T=proportion of time sampled vs total time tagged fish were passing the site (i.e. time between first and last tagged fish recovery)

Where the value 0.007692 is the proportion of the channel width fished by the trawl, and is calculated as trawl width/channel width.

(B) Recoveries of tagged fish from the ocean salmon fishery two to four years after release are also used to calculate a survival index for each release. Smolt survival indices from ocean recoveries are calculated as:

$$OSI=R_1/M_1\div R_2/M_2$$

where

R_1=number of tagged adults recovered from the upstream release
M_1=number released upstream
R_2=number of tagged adults recovered from the Port Chicago release
M_2=number released at Port Chicago

(*1*) The number of tagged adults recovered from the ocean fishery is provided by the Pacific States Marine Fisheries Commission, which maintains a port sampling program.

(*2*) [Reserved]

(iii) *Computing fish migration criteria values for San Joaquin River*. In order to assess annual fish migration criteria values for the San Joaquin River, tagged salmon smolts will be released into the San Joaquin River at Mossdale and captured at Chipps Island, or alternatively released at Mossdale and Port Chicago and recovered from the ocean fishery, using the methodology described in paragraph (a)(2)(iii). An alternative methodology for computing fish migration criteria values can be used so long as the revised methodology is calibrated with the methodology described below so as to maintain the validity of the relative index values. Sufficient releases shall be made each year to provide a statistically reliable estimate of the SJFMC for the year. These criteria will be considered attained when the sum of the differences between the measured experimental value and the stated criteria value (i.e., measured value minus stated value) for each experimental release conducted over a three year period (the current year and the previous

two years) shall be greater than or equal to zero.

(A) Fish for release are to be tagged at the hatchery with coded-wire tags, and fin clipped. Approximately 50,000 to 100,000 fish of smolt size (size greater than 75 mm) are released for each survival index estimate, depending on expected mortality. As a control for the ocean recovery survival index, one or two groups per season are released at Benicia or Pt. Chicago. From each upstream release of tagged fish, fish are to be caught over a period of one to two weeks at Chipps Island. Daylight sampling at Chipps Island with a 9.1 by 7.9 m, 3.2 mm cod end, midwater trawl is begun 2 to 3 days after release. When the first fish is caught, full-time trawling 7 days a week should begin. Each day's trawling consists of ten 20 minute tows generally made against the current, and distributed equally across the channel.

(B) The Chipps Island smolt survival index is calculated as:

$$SSI=R\div MT(0.007692)$$

where

R=number of recaptures of tagged fish
M=number of marked (tagged) fish released
T=proportion of time sampled vs total time tagged fish were passing the site (i.e. time between first and last tagged fish recovery)

Where the value 0.007692 is the proportion of the channel width fished by the trawl, and is calculated as trawl width/channel width.

(C) Recoveries of tagged fish from the ocean salmon fishery two to four years after release are also used to calculate a survival index for each release. Smolt survival indices from ocean recoveries are calculated as:

$$OSI=R_1/M_1 \div R_2/M_2$$

where

R_1=number of tagged adults recovered from the upstream release
M_1=number released upstream
R_2=number of tagged adults recovered from the Port Chicago release
M_2=number released at Port Chicago

(*1*) The number of tagged adults recovered from the ocean fishery is provided by the Pacific States Marine Fisheries Commission, which maintains a port sampling program.

(*2*) [Reserved]

(3) *Suisun marsh criteria.* (i) Water quality conditions sufficient to support a natural gradient in species composition and wildlife habitat characteristic of a brackish marsh throughout all elevations of the tidal marshes bordering Suisun Bay shall be maintained. Water quality conditions shall be maintained so that none of the following occurs: Loss of diversity; conversion of brackish marsh to salt marsh; for animals, decreased population abundance of those species vulnerable to increased mortality and loss of habitat from increased water salinity; or for plants, significant reduction in stature or percent cover from increased water or soil salinity or other water quality parameters.

(ii) [Reserved]

(b) *Revised criteria.* The following criteria are applicable to state waters specified in Table 1–1, at Section (C)(3) (''Striped Bass—Salinity : 3. Prisoners Point—Spawning) of the Water Quality Control Plan for Salinity for the San Francisco Bay—Sacramento/San Joaquin Delta Estuary, adopted by the California State Water Resources Control Board in State Board Resolution No. 91–34 on May 1, 1991:

Location	Sampling site Nos (I—A/RKI)	Parameter	Description	Index type	San Joaquin Valley Index	Dates	Values
San Joaquin River at Jersey Point, San Andreas Landing, Prisoners Point, Buckley Cove, Rough and Ready Island, Brandt Bridge, Mossdale, and Vernalis.	D15/RSAN018, C4/RSAN032, D29/RSAN038, P8/RSAN056, -/RSAN062, C6/RSAN073, C7/RSAN087, C10/RSAN112	Specific ..... Conductance. @ 25 °C ...	14-day running average of mean daily for the period not more than value shown, in mmhos.	Not Applicable.	>2.5 MAF	April 1 to May 31.	0.44 micromhos.
San Joaquin River at Jersey Point, San Andreas Landing and Prisoners Point.	D15/RSAN018, C4/RSAN032, D29/RSAN038	Specific Conductance.	14-day running average of mean daily for the period not more than value shown, in mmhos.	Not Applicable.	≤2.5 MAF	April 1 to May 31.	0.44 micromhos.

(c) *Definitions*. Terms used in paragraphs (a) and (b) of this section, shall be defined as follows:

(1) *Water year*. A water year is the twelve calendar months beginning October 1.

(2) *8-River Index*. The flow determinations are made and are published by the California Department of Water Resources in Bulletin 120. The 8-River Index shall be computed as the sum of flows at the following stations:

(i) Sacramento River at Band Bridge, near Red Bluff;

(ii) Feather River, total inflow to Oroville Reservoir;

(iii) Yuba River at Smartville;

(iv) American River, total inflow to Folsom Reservoir;

(v) Stanislaus River, total inflow to New Melones Reservoir;

(vi) Tuolumne River, total inflow to Don Pedro Reservoir;

(vii) Merced River, total inflow to Exchequer Reservoir; and

(viii) San Joaquin River, total inflow to Millerton Lake.

(3) *San Joaquin Valley Index*. (i) The San Joaquin Valley Index is computed according to the following formula:

$$I_{SJ}=0.6X+0.2Y \text{ and } 0.2Z$$

where

I_{SJ}=San Joaquin Valley Index

X=Current year's April-July San Joaquin Valley unimpaired runoff

Y=Current year's October-March San Joaquin Valley unimpaired runoff

Z=Previous year's index in MAF, not to exceed 0.9 MAF

(ii) *Measuring San Joaquin Valley unimpaired runoff*. San Joaquin Valley unimpaired runoff for the current water year is a forecast of the sum of the following locations: Stanislaus River, total flow to New Melones Reservoir; Tuolumne River, total inflow to Don Pedro Reservoir; Merced River, total flow to Exchequer Reservoir; San Joaquin River, total inflow to Millerton Lake.

(4) *Salinity*. Salinity is the total concentration of dissolved ions in water. It shall be measured by specific conductance in accordance with the procedures set forth in 40 CFR 136.3, Table 1B, Parameter 64.

[60 FR 4707, Jan. 24, 1995]

§ 131.38 Establishment of numeric criteria for priority toxic pollutants for the State of California.

(a) *Scope*. This section promulgates criteria for priority toxic pollutants in the State of California for inland surface waters and enclosed bays and estuaries. This section also contains a compliance schedule provision.

(b)(1) Criteria for Priority Toxic Pollutants in the State of California as described in the following table:

A		B Freshwater		C Saltwater		D Human Health (10^{-6} risk for carcinogens) For consumption of:	
# Compound	CAS Number	Criterion Maximum Conc. [d] B1	Criterion Continuous Conc. [d] B2	Criterion Maximum Conc. [d] C1	Criterion Continuous Conc. [d] C2	Water & Organisms (μg/L) D1	Organisms Only (μg/L) D2
1. Antimony	7440360					14 a,s	4300 a,t
2. Arsenic [b]	7440382	340 i,m,w	150 i,m,w	69 i,m	36 i,m		
3. Beryllium	7440417					n	n
4. Cadmium [b]	7440439	4.3 e,i,m,w,x	2.2 e,i,m,w	42 i,m	9.3 i,m	n	n
5a. Chromium (III)	16065831	550 e,i,m,o	180 e,i,m,o			n	n
5b. Chromium (VI) [b]	18540299	16 i,m,w	11 i,m,w	1100 i,m	50 i,m	n	n
6. Copper [b]	7440508	13 e,i,m,w,x	9.0 e,i,m,w	4.8 i,m	3.1 i,m	1300	
7. Lead [b]	7439921	65 e,i,m	2.5 e,i,m	210 i,m	8.1 i,m	n	n
8. Mercury [b]	7439976	[Reserved]	[Reserved]	[Reserved]	[Reserved]	0.050 a	0.051 a
9. Nickel [b]	7440020	470 e,i,m,w	52 e,i,m,w	74 i,m	8.2 i,m	610 a	4600 a
10. Selenium [b]	7782492	[Reserved] p	5.0 q	290 i,m	71 i,m	n	n
11. Silver [b]	7440224	3.4 e,i,m		1.9 i,m			
12. Thallium	7440280					1.7 a,s	6.3 a,t
13. Zinc [b]	7440666	120 e,i,m,w,x	120 e,i,m,w	90 i,m	81 i,m		
14. Cyanide [b]	57125	22 o	5.2 o	1 r	1 r	700 a	220,000 a,j
15. Asbestos	1332214					7,000,000 fibers/L k,s	
16. 2,3,7,8-TCDD (Dioxin)	1746016					0.000000013 c	0.000000014 c
17. Acrolein	107028					320 s	780 t
18. Acrylonitrile	107131					0.059 a,c,s	0.66 a,c,t
19. Benzene	71432					1.2 a,c	71 a,c
20. Bromoform	75252					4.3 a,c	360 a,c
21. Carbon Tetrachloride	56235					0.25 a,c,s	4.4 a,c,t
22. Chlorobenzene	108907					680 a,s	21,000 a,j,t
23. Chlorodibromomethane	124481					0.401 a,c	34 a,c
24. Chloroethane	75003						
25. 2-Chloroethylvinyl Ether	110758						

26. Chloroform	67663					[Reserved]	[Reserved]
27. Dichlorobromomethane	75274					0.56 a,c	46 a,c
28. 1,1-Dichloroethane	75343						
29. 1,2-Dichloroethane	107062					0.38 a,c,s	99 a,c,t
30. 1,1-Dichloroethylene	75354					0.057 a,c,s	3.2 a,c,t
31. 1,2-Dichloropropane	78875					0.52 a	39 a
32. 1,3-Dichloropropylene	542756					10 a,s	1,700 a,t
33. Ethylbenzene	100414					3,100 a,s	29,000 a,t
34. Methyl Bromide	74839					48 a	4,000 a
35. Methyl Chloride	74873					n	n
36. Methylene Chloride	75092					4.7 a,c	1,600 a,c
37. 1,1,2,2-Tetrachloroethane	79345					0.17 a,c,s	11 a,c,t
38. Tetrachloroethylene	127184					0.8 c,s	8.85 c,t
39. Toluene	108883					6,800 a	200,000 a
40. 1,2-Trans-Dichloroethylene	156605					700 a	140,000 a
41. 1,1,1-Trichloroethane	71556					n	n
42. 1,1,2-Trichloroethane	79005					0.60 a,c,s	42 a,c,t
43. Trichloroethylene	79016					2.7 c,s	81 c,t
44. Vinyl Chloride	75014					2 c,s	525 c,t
45. 2-Chlorophenol	95578					120 a	400 a
46. 2,4-Dichlorophenol	120832					93 a,s	790 a,t
47. 2,4-Dimethylphenol	105679					540 a	2,300 a
48. 2-Methyl-4,6-Dinitrophenol	534521					13.4 s	765 t
49. 2,4-Dinitrophenol	51285					70 a,s	14,000 a,t
50. 2-Nitrophenol	88755						
51. 4-Nitrophenol	100027						
52. 3-Methyl-4-Chlorophenol	59507						
53. Pentachlorophenol	87865	19 f,w	15 f,w	13	7.9	0.28 a,c	8.2 a,c,j
54. Phenol	108952					21,000 a	4,600,000 a,j,t
55. 2,4,6-Trichlorophenol	88062					2.1 a,c	6.5 a,c
56. Acenaphthene	83329					1,200 a	2,700 a
57. Acenaphthylene	208968						
58. Anthracene	120127					9,600 a	110,000 a

59. Benzidine	92875					0.00012 a,c,s	0.00054 a,c,t
60. Benzo(a)Anthracene	56553					0.0044 a,c	0.049 a,c
61. Benzo(a)Pyrene	50328					0.0044 a,c	0.049 a,c
62. Benzo(b)Fluoranthene	205992					0.0044 a,c	0.049 a,c
63. Benzo(ghi)Perylene	191242						
64. Benzo(k)Fluoranthene	207089					0.0044 a,c	0.049 a,c
65. Bis(2-Chloroethoxy)Methane	111911						
66. Bis(2-Chloroethyl)Ether	111444					0.031 a,c,s	1.4 a,c,t
67. Bis(2-Chloroisopropyl)Ether	39638329					1,400 a	170,000 a,t
68. Bis(2-Ethylhexyl)Phthalate	117817					1.8 a,c,s	5.9 a,c,t
69. 4-Bromophenyl Phenyl Ether	101553						
70. Butylbenzyl Phthalate	85687					3,000 a	5,200 a
71. 2-Chloronaphthalene	91587					1,700 a	4,300 a
72. 4-Chlorophenyl Phenyl Ether	7005723						
73. Chrysene	218019					0.0044 a,c	0.049 a,c
74. Dibenzo(a,h)Anthracene	53703					0.0044 a,c	0.049 a,c
75. 1,2 Dichlorobenzene	95501					2,700 a	17,000 a
76. 1,3 Dichlorobenzene	541731					400	2,600
77. 1,4 Dichlorobenzene	106467					400	2,600
78. 3,3'-Dichlorobenzidine	91941					0.04 a,c,s	0.077 a,c,t
79. Diethyl Phthalate	84662					23,000 a,s	120,000 a,t
80. Dimethyl Phthalate	131113					313,000 s	2,900,000 t
81. Di-n-Butyl Phthalate	84742					2,700 a,s	12,000 a,t
82. 2,4-Dinitrotoluene	121142					0.11 c,s	9.1 c,t
83. 2,6-Dinitrotoluene	606202						
84 Di-n-Octyl Phthalate	117840						
85. 1,2-Diphenylhydrazine	122667					0.040 a,c,s	0.54 a,c,t
86. Fluoranthene	206440					300 a	370 a
87. Fluorene	86737					1,300 a	14,000 a
88. Hexachlorobenzene	118741					0.00075 a,c	0.00077 a,c
89. Hexachlorobutadiene	87683					0.44 a,c,s	50 a,c,t
90. Hexachlorocyclopentadiene	77474					240 a,s	17,000 a,j,t
91. Hexachloroethane	67721					1.9 a,c,s	8.9 a,c,t

92. Indeno(1,2,3-cd) Pyrene	193395					0.0044 a,c	0.049 a,c
93. Isophorone	78591					8.4 c,s	600 c,t
94. Naphthalene	91203						
95. Nitrobenzene	98953					17 a,s	1,900 a,j,t
96. N-Nitrosodimethylamine	62759					0.00069 a,c,s	8.1 a,c,t
97. N-Nitrosodi-n-Propylamine	621647					0.005 a	1.4 a
98. N-Nitrosodiphenylamine	86306					5.0 a,c,s	16 a,c,t
99. Phenanthrene	85018						
100. Pyrene	129000					960 a	11,000 a
101. 1,2,4-Trichlorobenzene	120821						
102. Aldrin	309002	3 g		1.3 g		0.00013 a,c	0.00014 a,c
103. alpha-BHC	319846					0.0039 a,c	0.013 a,c
104. beta-BHC	319857					0.014 a,c	0.046 a,c
105. gamma-BHC	58899	0.95 w		0.16 g		0.019 c	0.063 c
106. delta-BHC	319868						
107. Chlordane	57749	2.4 g	0.0043 g	0.09 g	0.004 g	0.00057 a,c	0.00059 a,c
108. 4,4'-DDT	50293	1.1 g	0.001 g	0.13 g	0.001 g	0.00059 a,c	0.00059 a,c
109. 4,4'-DDE	72559					0.00059 a,c	0.00059 a,c
110. 4,4'-DDD	72548					0.00083 a,c	0.00084 a,c
111. Dieldrin	60571	0.24 w	0.056 w	0.71 g	0.0019 g	0.00014 a,c	0.00014 a,c
112. alpha-Endosulfan	959988	0.22 g	0.056 g	0.034 g	0.0087 g	110 a	240 a
113. beta-Endosulfan	33213659	0.22 g	0.056 g	0.034 g	0.0087 g	110 a	240 a
114. Endosulfan Sulfate	1031078					110 a	240 a
115. Endrin	72208	0.086 w	0.036 w	0.037 g	0.0023 g	0.76 a	0.81 a,j
116. Endrin Aldehyde	7421934					0.76 a	0.81 a,j
117. Heptachlor	76448	0.52 g	0.0038 g	0.053 g	0.0036 g	0.00021 a,c	0.00021 a,c
118. Heptachlor Epoxide	1024573	0.52 g	0.0038 g	0.053 g	0.0036 g	0.00010 a,c	0.00011 a,c
119-125. Polychlorinated biphenyls (PCBs)			0.014 u		0.03 u	0.00017 c,v	0.00017 c,v
126. Toxaphene	8001352	0.73	0.0002	0.21	0.0002	0.00073 a,c	0.00075 a,c
Total Number of Criteria [h]		22	21	22	20	92	90

FOOTNOTES TO TABLE IN PARAGRAPH (b)(1):

a. Criteria revised to reflect the Agency q1* or RfD, as contained in the Integrated Risk Information System (IRIS) as of October 1, 1996. The fish tissue bioconcentration factor (BCF) from the 1980 documents was retained in each case.

b. Criteria apply to California waters except for those waters subject to objectives in Tables III–2A and III–2B of the San Francisco Regional Water Quality Control Board's (SFRWQCB) 1986 Basin Plan that were adopted by the SFRWQCB and the State Water Resources Control Board, approved by EPA, and which continue to apply. For copper and nickel, criteria apply to California waters except for waters south of Dumbarton Bridge in San Francisco Bay that are subject to the objectives in the SFRWQCB's Basin Plan as amended by SFRWQCB Resolution R2–2002–0061, dated May 22, 2002, and approved by the State Water Resources Control Board. EPA approved the aquatic life site-specific objectives on January 21, 2003. The copper and nickel aquatic life site-specific objectives contained in the amended Basin Plan apply instead.

c. Criteria are based on carcinogenicity of 10 (-6) risk.

d. Criteria Maximum Concentration (CMC) equals the highest concentration of a pollutant to which aquatic life can be exposed for a short period of time without deleterious effects. Criteria Continuous Concentration (CCC) equals the highest concentration of a pollutant to which aquatic life can be exposed for an extended period of time (4 days) without deleterious effects. ug/L equals micrograms per liter.

e. Freshwater aquatic life criteria for metals are expressed as a function of total hardness (mg/L) in the water body. The equations are provided in matrix at paragraph (b)(2) of this section. Values displayed above in the matrix correspond to a total hardness of 100 mg/l.

f. Freshwater aquatic life criteria for pentachlorophenol are expressed as a function of pH, and are calculated as follows:

Values displayed above in the matrix correspond to a pH of 7.8. CMC = exp(1.005(pH) − 4.869). CCC = exp(1.005(pH) − 5.134).

g. This criterion is based on 304(a) aquatic life criterion issued in 1980, and was issued in one of the following documents: Aldrin/Dieldrin (EPA 440/5–80–019), Chlordane (EPA 440/5–80–027), DDT (EPA 440/5–80–038), Endosulfan (EPA 440/5–80–046), Endrin (EPA 440/5–80–047), Heptachlor (440/5–80–052), Hexachlorocyclohexane (EPA 440/5–80–054), Silver (EPA 440/5–80–071). The Minimum Data Requirements and derivation procedures were different in the 1980 Guidelines than in the 1985 Guidelines. For example, a ''CMC'' derived using the 1980 Guidelines was derived to be used as an instantaneous maximum. If assessment is to be done using an averaging period, the values given should be divided by 2 to obtain a value that is more comparable to a CMC derived using the 1985 Guidelines.

h. These totals simply sum the criteria in each column. For aquatic life, there are 23 priority toxic pollutants with some type of freshwater or saltwater, acute or chronic criteria. For human health, there are 92 priority toxic pollutants with either ''water + organism'' or ''organism only'' criteria. Note that these totals count chromium as one pollutant even though EPA has developed criteria based on two valence states. In the matrix, EPA has assigned numbers 5a and 5b to the criteria for chromium to reflect the fact that the list of 126 priority pollutants includes only a single listing for chromium.

i. Criteria for these metals are expressed as a function of the water-effect ratio, WER, as defined in paragraph (c) of this section. CMC = column B1 or C1 value×WER; CCC = column B2 or C2 value×WER.

j. No criterion for protection of human health from consumption of aquatic organisms (excluding water) was presented in the 1980 criteria document or in the 1986 Quality Criteria for Water. Nevertheless, sufficient information was presented in the 1980 document to allow a calculation of a criterion, even though the results of such a calculation were not shown in the document.

k. The CWA 304(a) criterion for asbestos is the MCL.

l. [Reserved]

m. These freshwater and saltwater criteria for metals are expressed in terms of the dissolved fraction of the metal in the water column. Criterion values were calculated by using EPA's Clean Water Act 304(a) guidance values (described in the total recoverable fraction) and then applying the conversion factors in § 131.36(b)(1) and (2).

n. EPA is not promulgating human health criteria for these contaminants. However, permit authorities should address these contaminants in NPDES permit actions using the State's existing narrative criteria for toxics.

o. These criteria were promulgated for specific waters in California in the National Toxics Rule (''NTR''), at § 131.36. The specific waters to which the NTR criteria apply include: Waters of the State defined as bays or estuaries and waters of the State defined as inland, i.e., all surface waters of the State not ocean waters. These waters specifically include the San Francisco Bay upstream to and including Suisun Bay and the Sacramento-San Joaquin Delta. This section does not apply instead of the NTR for this criterion.

p. A criterion of 20 ug/l was promulgated for specific waters in California in the NTR and was promulgated in the total recoverable form. The specific waters to which the NTR criterion applies include: Waters of the San Francisco Bay upstream to and including Suisun Bay and the Sacramento-San Joaquin Delta; and waters of Salt Slough, Mud Slough (north) and the San Joaquin River, Sack Dam to the mouth of the Merced River. This section does not apply instead of the NTR for this criterion. The State of California adopted and EPA approved a site specific criterion for the San Joaquin River, mouth of Merced to Vernalis; therefore, this section does not apply to these waters.

q. This criterion is expressed in the total recoverable form. This criterion was promulgated for specific waters in California in the NTR and was promulgated in the total recoverable form. The specific waters to which the NTR criterion applies include: Waters of the San Francisco Bay upstream to and including Suisun Bay and the Sacramento-San Joaquin Delta; and waters of Salt Slough, Mud Slough (north) and the San Joaquin River, Sack Dam to Vernalis. This criterion does not apply instead of the NTR for these waters. This criterion applies to additional waters of the United States in the State of California pursuant to 40 CFR 131.38(c). The State of California adopted and EPA approved a site-specific criterion for the Grassland Water District, San Luis National Wildlife Refuge, and the Los Banos State Wildlife Refuge; therefore, this criterion does not apply to these waters.

r. These criteria were promulgated for specific waters in California in the NTR. The specific waters to which the NTR criteria apply include: Waters of the State defined as bays or estuaries including the San Francisco Bay upstream to and including Suisun Bay and the Sacramento-San Joaquin Delta. This section does not apply instead of the NTR for these criteria.

s. These criteria were promulgated for specific waters in California in the NTR. The specific waters to which the NTR criteria apply include: Waters of the Sacramento-San Joaquin Delta and waters of the State defined as inland (*i.e.*, all surface waters of the State not bays or estuaries or ocean) that include a MUN use designation. This section

does not apply instead of the NTR for these criteria.

t. These criteria were promulgated for specific waters in California in the NTR. The specific waters to which the NTR criteria apply include: Waters of the State defined as bays and estuaries including San Francisco Bay upstream to and including Suisun Bay and the Sacramento-San Joaquin Delta; and waters of the State defined as inland (i.e., all surface waters of the State not bays or estuaries or ocean) without a MUN use designation. This section does not apply instead of the NTR for these criteria.

u. PCBs are a class of chemicals which include aroclors 1242, 1254, 1221, 1232, 1248, 1260, and 1016, CAS numbers 53469219, 11097691, 11104282, 11141165, 12672296, 11096825, and 12674112, respectively. The aquatic life criteria apply to the sum of this set of seven aroclors.

v. This criterion applies to total PCBs, e.g., the sum of all congener or isomer or homolog or aroclor analyses.

w. This criterion has been recalculated pursuant to the 1995 Updates: Water Quality Criteria Documents for the Protection of Aquatic Life in Ambient Water, Office of Water, EPA–820-B–96–001, September 1996. See also Great Lakes Water Quality Initiative Criteria Documents for the Protection of Aquatic Life in Ambient Water, Office of Water, EPA–80–B–95–004, March 1995.

x. The State of California has adopted and EPA has approved site specific criteria for the Sacramento River (and tributaries) above Hamilton City; therefore, these criteria do not apply to these waters.

GENERAL NOTES TO TABLE IN PARAGRAPH (b)(1)

1. The table in this paragraph (b)(1) lists all of EPA's priority toxic pollutants whether or not criteria guidance are available. Blank spaces indicate the absence of national section 304(a) criteria guidance. Because of variations in chemical nomenclature systems, this listing of toxic pollutants does not duplicate the listing in Appendix A to 40 CFR Part 423–126 Priority Pollutants. EPA has added the Chemical Abstracts Service (CAS) registry numbers, which provide a unique identification for each chemical.

2. The following chemicals have organoleptic-based criteria recommendations that are not included on this chart: zinc, 3-methyl-4-chlorophenol.

3. Freshwater and saltwater aquatic life criteria apply as specified in paragraph (c)(3) of this section.

(2) Factors for Calculating Metals Criteria. Final CMC and CCC values should be rounded to two significant figures.

(i) $CMC = WER \times (Acute\ Conversion\ Factor) \times (\exp\{m_A[\ln(hardness)]+b_A\})$

(ii) $CCC = WER \times (Chronic\ Conversion\ Factor) \times (\exp\{m_C[\ln(hardness)]+b_C\})$

(iii) Table 1 to paragraph (b)(2) of this section:

Metal	m_A	b_A	m_C	b_C
Cadmium	1.128	−3.6867	0.7852	−2.715
Copper	0.9422	−1.700	0.8545	−1.702
Chromium (III)	0.8190	3.688	0.8190	1.561
Lead	1.273	−1.460	1.273	−4.705
Nickel	0.8460	2.255	0.8460	0.0584
Silver	1.72	−6.52		
Zinc	0.8473	0.884	0.8473	0.884

Note to Table 1: The term "exp" represents the base e exponential function.

(iv) Table 2 to paragraph (b)(2) of this section:

Metal	Conversion factor (CF) for freshwater acute criteria	CF for freshwater chronic criteria	CF for saltwater acute criteria	CF [a] for saltwater chronic criteria
Antimony	([d])	([d])	([d])	([d])
Arsenic	1.000	1.000	1.000	1.000
Beryllium	([d])	([d])	([d])	([d])
Cadmium	[b] 0.944	[b] 0.909	0.994	0.994
Chromium (III)	0.316	0.860	([d])	([d])
Chromium (VI)	0.982	0.962	0.993	0.993
Copper	0.960	0.960	0.83	0.83
Lead	[b] 0.791	[b] 0.791	0.951	0.951
Mercury				
Nickel	0.998	0.997	0.990	0.990
Selenium		([c])	0.998	0.998

Metal	Conversion factor (CF) for freshwater acute criteria	CF for freshwater chronic criteria	CF for saltwater acute criteria	CF [a] for saltwater chronic criteria
Silver	0.85	([d])	0.85	([d])
Thallium	([d])	([d])	([d])	([d])
Zinc	0.978	0.986	0.946	0.946

FOOTNOTES TO TABLE 2 OF PARAGRAPH(b)(2):
[a] Conversion Factors for chronic marine criteria are not currently available. Conversion Factors for acute marine criteria have been used for both acute and chronic marine criteria.
[b] Conversion Factors for these pollutants in freshwater are hardness dependent. CFs are based on a hardness of 100 mg/l as calcium carbonate ($CaCO_3$). Other hardness can be used; CFs should be recalculated using the equations in table 3 to paragraph (b)(2) of this section.
[c] Bioaccumulative compound and inappropriate to adjust to percent dissolved.
[d] EPA has not published an aquatic life criterion value.

NOTE TO TABLE 2 OF PARAGRAPH (b)(2): The term ''Conversion Factor'' represents the recommended conversion factor for converting a metal criterion expressed as the total recoverable fraction in the water column to a criterion expressed as the dissolved fraction in the water column. See ''Office of Water Policy and Technical Guidance on Interpretation and Implementation of Aquatic Life Metals Criteria'', October 1, 1993, by Martha G. Prothro, Acting Assistant Administrator for Water available from Water Resource Center, USEPA, Mailcode RC4100, M Street SW, Washington, DC 20460 and the note to §131.36(b)(1).

(v) Table 3 to paragraph (b)(2) of this section:

	Acute	Chronic
Cadmium	CF=1.136672—[(ln {hardness}) (0.041838)]	CF = 1.101672—[(ln {hardness})(0.041838)]
Lead	CF=1.46203—[(ln {hardness})(0.145712)]	CF = 1.46203—[(ln {hardness})(0.145712)]

(c) *Applicability*. (1) The criteria in paragraph (b) of this section apply to the State's designated uses cited in paragraph (d) of this section and apply concurrently with any criteria adopted by the State, except when State regulations contain criteria which are more stringent for a particular parameter and use, or except as provided in footnotes p, q, and x to the table in paragraph (b)(1) of this section.

(2) The criteria established in this section are subject to the State's general rules of applicability in the same way and to the same extent as are other Federally-adopted and State-adopted numeric toxics criteria when applied to the same use classifications including mixing zones, and low flow values below which numeric standards can be exceeded in flowing fresh waters.

(i) For all waters with mixing zone regulations or implementation procedures, the criteria apply at the appropriate locations within or at the boundary of the mixing zones; otherwise the criteria apply throughout the water body including at the point of discharge into the water body.

(ii) The State shall not use a low flow value below which numeric standards can be exceeded that is less stringent than the flows in Table 4 to paragraph (c)(2) of this section for streams and rivers.

(iii) Table 4 to paragraph (c)(2) of this section:

Criteria	Design flow
Aquatic Life Acute Criteria (CMC).	1 Q 10 or 1 B 3
Aquatic Life Chronic Criteria (CCC).	7 Q 10 or 4 B 3
Human Health Criteria	Harmonic Mean Flow

NOTE TO TABLE 4 OF PARAGRAPH (c)(2): 1. CMC (Criteria Maximum Concentration) is the water quality criteria to protect against acute effects in aquatic life and is the highest instream concentration of a priority toxic pollutant consisting of a short-term average not to be exceeded more than once every three years on the average.

2. CCC (Continuous Criteria Concentration) is the water quality criteria to protect against chronic effects in aquatic life and is the highest in stream concentration of a priority toxic pollutant consisting of a 4-day average not to be exceeded more than once every three years on the average.

3. 1 Q 10 is the lowest one day flow with an average recurrence frequency of once in 10 years determined hydrologically.

4. 1 B 3 is biologically based and indicates an allowable exceedence of once every 3 years. It is determined by EPA's computerized method (DFLOW model).

5. 7 Q 10 is the lowest average 7 consecutive day low flow with an average recurrence frequency of once in 10 years determined hydrologically.

6. 4 B 3 is biologically based and indicates an allowable exceedence for 4 consecutive days once every 3 years. It is determined by EPA's computerized method (DFLOW model).

(iv) If the State does not have such a low flow value below which numeric standards do not apply, then the criteria included in paragraph (d) of this section apply at all flows.

(v) If the CMC short-term averaging period, the CCC four-day averaging period, or once in three-year frequency is inappropriate for a criterion or the site to which a criterion applies, the State may apply to EPA for approval of an alternative averaging period, frequency, and related design flow. The State must submit to EPA the bases for any alternative averaging period, frequency, and related design flow. Before approving any change, EPA will publish for public comment, a document proposing the change.

(3) The freshwater and saltwater aquatic life criteria in the matrix in paragraph (b)(1) of this section apply as follows:

(i) For waters in which the salinity is equal to or less than 1 part per thousand 95% or more of the time, the applicable criteria are the freshwater criteria in Column B;

(ii) For waters in which the salinity is equal to or greater than 10 parts per thousand 95% or more of the time, the applicable criteria are the saltwater criteria in Column C except for selenium in the San Francisco Bay estuary where the applicable criteria are the freshwater criteria in Column B (refer to footnotes p and q to the table in paragraph (b)(1) of this section); and

(iii) For waters in which the salinity is between 1 and 10 parts per thousand as defined in paragraphs (c)(3)(i) and (ii) of this section, the applicable criteria are the more stringent of the freshwater or saltwater criteria. However, the Regional Administrator may approve the use of the alternative freshwater or saltwater criteria if scientifically defensible information and data demonstrate that on a site-specific basis the biology of the water body is dominated by freshwater aquatic life and that freshwater criteria are more appropriate; or conversely, the biology of the water body is dominated by saltwater aquatic life and that saltwater criteria are more appropriate. Before approving any change, EPA will publish for public comment a document proposing the change.

(4) *Application of metals criteria*. (i) For purposes of calculating freshwater aquatic life criteria for metals from the equations in paragraph (b)(2) of this section, for waters with a hardness of 400 mg/l or less as calcium carbonate, the actual ambient hardness of the surface water shall be used in those equations. For waters with a hardness of over 400 mg/l as calcium carbonate, a hardness of 400 mg/l as calcium carbonate shall be used with a default Water-Effect Ratio (WER) of 1, or the actual hardness of the ambient surface water shall be used with a WER. The same provisions apply for calculating the metals criteria for the comparisons provided for in paragraph (c)(3)(iii) of this section.

(ii) The hardness values used shall be consistent with the design discharge conditions established in paragraph (c)(2) of this section for design flows and mixing zones.

(iii) The criteria for metals (compounds #1—#13 in the table in paragraph (b)(1) of this section) are expressed as dissolved except where otherwise noted. For purposes of calculating aquatic life criteria for metals from the equations in footnote i to the table in paragraph (b)(1) of this section and the equations in paragraph (b)(2) of this section, the water effect ratio is generally computed as a specific pollutant's acute or chronic toxicity value measured in water from the site covered by the standard, divided by the respective acute or chronic toxicity value in laboratory dilution water. To use a water effect ratio other than the default of 1, the WER must be determined as set forth in Interim Guidance on Determination and Use of Water Effect Ratios, U.S. EPA Office of Water,

EPA–823–B–94–001, February 1994, or alternatively, other scientifically defensible methods adopted by the State as part of its water quality standards program and approved by EPA. For calculation of criteria using site-specific values for both the hardness and the water effect ratio, the hardness used in the equations in paragraph (b)(2) of this section must be determined as required in paragraph (c)(4)(ii) of this section. Water hardness must be calculated from the measured calcium and magnesium ions present, and the ratio of calcium to magnesium should be approximately the same in standard laboratory toxicity testing water as in the site water.

(d)(1) Except as specified in paragraph (d)(3) of this section, all waters assigned any aquatic life or human health use classifications in the Water Quality Control Plans for the various Basins of the State (''Basin Plans'') adopted by the California State Water Resources Control Board (''SWRCB''), except for ocean waters covered by the Water Quality Control Plan for Ocean Waters of California (''Ocean Plan'') adopted by the SWRCB with resolution Number 90–27 on March 22, 1990, are subject to the criteria in paragraph (d)(2) of this section, without exception. These criteria apply to waters identified in the Basin Plans. More particularly, these criteria apply to waters identified in the Basin Plan chapters designating beneficial uses for waters within the region. Although the State has adopted several use designations for each of these waters, for purposes of this action, the specific standards to be applied in paragraph (d)(2) of this section are based on the presence in all waters of some aquatic life designation and the presence or absence of the MUN use designation (municipal and domestic supply). (See Basin Plans for more detailed use definitions.)

(2) The criteria from the table in paragraph (b)(1) of this section apply to the water and use classifications defined in paragraph (d)(1) of this section as follows:

Water and use classification	Applicable criteria
(i) All inland waters of the United States or enclosed bays and estuaries that are waters of the United States that include a MUN use designation.	(A) Columns B1 and B2—all pollutants (B) Columns C1 and C2—all pollutants (C) Column D1—all pollutants
(ii) All inland waters of the United States or enclosed bays and estuaries that are waters of the United States that do not include a MUN use designation.	(A) Columns B1 and B2—all pollutants (B) Columns C1 and C2—all pollutants (C) Column D2—all pollutants

(3) Nothing in this section is intended to apply instead of specific criteria, including specific criteria for the San Francisco Bay estuary, promulgated for California in the National Toxics Rule at § 131.36.

(4) The human health criteria shall be applied at the State-adopted 10 (−6) risk level.

(5) Nothing in this section applies to waters located in Indian Country.

(e) *Schedules of compliance.* (1) It is presumed that new and existing point source dischargers will promptly comply with any new or more restrictive water quality-based effluent limitations (''WQBELs'') based on the water quality criteria set forth in this section.

(2) When a permit issued on or after May 18, 2000 to a new discharger contains a WQBEL based on water quality criteria set forth in paragraph (b) of this section, the permittee shall comply with such WQBEL upon the commencement of the discharge. A new discharger is defined as any building, structure, facility, or installation from

which there is or may be a ''discharge of pollutants'' (as defined in 40 CFR 122.2) to the State of California's inland surface waters or enclosed bays and estuaries, the construction of which commences after May 18, 2000.

(3) Where an existing discharger reasonably believes that it will be infeasible to promptly comply with a new or more restrictive WQBEL based on the water quality criteria set forth in this section, the discharger may request approval from the permit issuing authority for a schedule of compliance.

(4) A compliance schedule shall require compliance with WQBELs based on water quality criteria set forth in paragraph (b) of this section as soon as possible, taking into account the dischargers' technical ability to achieve compliance with such WQBEL.

(5) If the schedule of compliance exceeds one year from the date of permit issuance, reissuance or modification, the schedule shall set forth interim requirements and dates for their achievement. The dates of completion between each requirement may not exceed one year. If the time necessary for completion of any requirement is more than one year and is not readily divisible into stages for completion, the permit shall require, at a minimum, specified dates for annual submission of progress reports on the status of interim requirements.

(6) In no event shall the permit issuing authority approve a schedule of compliance for a point source discharge which exceeds five years from the date of permit issuance, reissuance, or modification, whichever is sooner. Where shorter schedules of compliance are prescribed or schedules of compliance are prohibited by law, those provisions shall govern.

(7) If a schedule of compliance exceeds the term of a permit, interim permit limits effective during the permit shall be included in the permit and addressed in the permit's fact sheet or statement of basis. The administrative record for the permit shall reflect final permit limits and final compliance dates. Final compliance dates for final permit limits, which do not occur during the term of the permit, must occur within five years from the date of issuance, reissuance or modification of the permit which initiates the compliance schedule. Where shorter schedules of compliance are prescribed or schedules of compliance are prohibited by law, those provisions shall govern.

(8) The provisions in this paragraph (e), Schedules of compliance, shall expire on May 18, 2005.

[65 FR 31711, May 18, 2000, as amended at 66 FR 9961, Feb. 13, 2001; 68 FR 62747, Nov. 6, 2003]

EDITORIAL NOTE: At 66 FR 9961, Feb. 13, 2001, § 131.38 was amended in the table to paragraph (b)(1) under the column heading for ''B Freshwater'' by revising the column headings for ''Criterion Maximum Concentration'' and ''Criterion Continuous Concentration''; under the column heading for ''C Saltwater'' by revising the column headings for ''Criterion Maximum Concentration'' and ''Criterion Continuous Concentration''; and by revising entries ''23.'' and ''67.'', effective Feb. 13, 2001. However, this is a photographed table and the amendments could not be incorporated into the text. For the convenience of the user, the amended text is set forth as follows:

§ 131.38 Establishment of Numeric Criteria for priority toxic pollutants for the State of California.

* * * * *

(b)(1) * * *

A		B Freshwater		C Saltwater		D Human health (10^{-6}) risk for carcinogens) For consumption of:	
# Compound	CAS number	Criterion maximum conc. (µg/L)[d] B1	Criterion continous conc. (µg/L)[d] B2	Criterion maximum conc. (µg/L)[d] C1	Criterion continious conc. (µg/L)[d] C2	Water & organisms (µg/L) D1	Organisms only (µg/L) D2
* * *		*	*		*	*	
23. Chlorodibromomethane	124481					[a,c] 0.41	[a,c] 34
* * *		*	*		*	*	
67. Bis(2-Chloroisopropyl)Ether	108601					[a] 1,400	[a,t] 170,000
* * *		*	*		*	*	

Footnotes to table in Paragraph (b)(1):

* * * * * * *

[a] Criteria revised to reflect the Agency q1* or RfD, as contained in the Integrated Risk Information System (IRIS) as of October 1, 1996. The fish tissue bioconcentration factor (BCF) from the 1980 documents was retained in each case.

[c] Criteria are based on carcinogenicity of 10^{-6} risk.

[d] Criteria Maximum Concentration (CMC) equals the highest concentration of a pollutant to which aquatic life can be exposed for a short period of time without deleterious effects. Criteria Continuous Concentration (CCC) equals the highest concentration of a pollutant to which aquatic life can be exposed for an extended period of time (4 days) without deleterious effects. µg/L equals micrograms per liter.

* * * * * * *

[t] These criteria were promulgated for specific waters in California in the NTR. The specific waters to which the NTR criteria apply include: Waters of the State defined as bays and estuaries including San Francisco Bay upstream to and including Suisun Bay and the Sacramento-San Joaquin Delta; and waters of the State defined as inland (i.e., all surface waters of the State not bays or estuaries or ocean) without a MUN use designation. This section does not apply instead of the NTR for these criteria.

* * * * *

§ 131.40 Puerto Rico

(a) *Use designations for marine waters.* In addition to the Commonwealth's adopted use designations, the following waterbodies in Puerto Rico have the beneficial use designated in this paragraph (a) within the bays specified below, and within the Commonwealth's territorial seas, as defined in section 502(8) of the Clean Water Act, and 33 CFR 2.05–5, except such waters classified by the Commonwealth as SB.

Waterbody segment	From	To	Designated use
Coastal Waters	500m offshore	3 miles offshore	Primary Contact Recreation.
Guayanilla & Tallaboa Bays	Cayo Parguera	Punta Verraco	Primary Contact Recreation.
Mayaguez Bay	Punta Guanajibo	Punta Algarrobo	Primary Contact Recreation.
Ponce Port	Punta Carenero	Punta Cuchara	Primary Contact Recreation.
San Juan Port	mouth of Río Bayamón	Punta El Morro	Primary Contact Recreation.
Yabucoa Port	Punta Icacos	Punta Yeguas	Primary Contact Recreation.

(b) *Criteria that apply to Puerto Rico's marine waters.* In addition to all other Commonwealth criteria, the following criteria for bacteria apply to the waterbodies in paragraph (a) of this section:

Bacteria: The fecal coliform geometric mean of a series of representative samples (at least five samples) of the waters taken sequentially shall not exceed 200 colonies/100 ml, and not more than 20 percent of the samples shall exceed 400 colonies/100 ml. The enterococci density in terms of geometric mean of at least five representative samples taken sequentially shall not exceed 35/100 ml. No single sample should exceed the upper confidence limit of 75% using 0.7 as the log standard deviation until sufficient site data exist to establish a site-specific log standard deviation.

(c) *Water quality standard variances.* (1) The Regional Administrator, EPA Region 2, is authorized to grant variances from the water quality standards in paragraphs (a) and (b) of this section where the requirements of this paragraph (c) are met. A water quality standard variance applies only to the permittee requesting the variance and only to the pollutant or pollutants specified in the variance; the underlying water quality standard otherwise remains in effect.

(2) A water quality standard variance shall not be granted if:

(i) Standards will be attained by implementing effluent limitations required under sections 301(b) and 306 of the CWA and by the permittee implementing reasonable best management practices for nonpoint source control; or

(ii) The variance would likely jeopardize the continued existence of any threatened or endangered species listed under section 4 of the Endangered Species Act or result in the destruction or adverse modification of such species' critical habitat.

(3) A water quality standards variance may be granted if the applicant demonstrates to EPA that attaining the water quality standard is not feasible because:

(i) Naturally occurring pollutant concentrations prevent the attainment of the use;

(ii) Natural, ephemeral, intermittent or low flow conditions or water levels prevent the attainment of the use, unless these conditions may be compensated for by the discharge of sufficient volume of effluent discharges without violating Commonwealth water conservation requirements to enable uses to be met;

(iii) Human caused conditions or sources of pollution prevent the attainment of the use and cannot be remedied or would cause more environmental damage to correct than to leave in place;

(iv) Dams, diversions or other types of hydrologic modifications preclude the attainment of the use, and it is not feasible to restore the waterbody to its original condition or to operate such modification in a way which would result in the attainment of the use;

(v) Physical conditions related to the natural features of the waterbody, such as the lack of a proper substrate, cover, flow, depth, pools, riffles, and the like

unrelated to water quality, preclude attainment of aquatic life protection uses; or

(vi) Controls more stringent than those required by sections 301(b) and 306 of the CWA would result in substantial and widespread economic and social impact.

(4) Procedures. An applicant for a water quality standards variance shall submit a request to the Regional Administrator of EPA Region 2. The application shall include all relevant information showing that the requirements for a variance have been met. The applicant must demonstrate that the designated use is unattainable for one of the reasons specified in paragraph (c)(3) of this section. If the Regional Administrator preliminarily determines that grounds exist for granting a variance, he/she shall provide public notice of the proposed variance and provide an opportunity for public comment. Any activities required as a condition of the Regional Administrator's granting of a variance shall be included as conditions of the NPDES permit for the applicant. These terms and conditions shall be incorporated into the applicant's NPDES permit through the permit reissuance process or through a modification of the permit pursuant to the applicable permit modification provisions of Puerto Rico's NPDES program.

(5) A variance may not exceed five years or the term of the NPDES permit, whichever is less. A variance may be renewed if the applicant reapplies and demonstrates that the use in question is still not attainable. Renewal of the variance may be denied if the applicant did not comply with the conditions of the original variance, or otherwise does not meet the requirements of this section.

[69 FR 3524, Jan. 26, 2004]

§ 131.41 Bacteriological criteria for those states not complying with Clean Water Act section 303(i)(1)(A).

(a) *Scope*. This section is a promulgation of the Clean Water Act section 304(a) criteria for bacteria for coastal recreation waters in specific States. It is not a general promulgation of the Clean Water Act section 304(a) criteria for bacteria. This section also contains a compliance schedule provision.

(b) *Definitions*. (1) *Coastal Recreation Waters* are the Great Lakes and marine coastal waters (including coastal estuaries) that are designated under section 303(c) of the Clean Water Act for use for swimming, bathing, surfing, or similar water contact activities. Coastal recreation waters do not include inland waters or waters upstream from the mouth of a river or stream having an unimpaired natural connection with the open sea.

(2) *Designated bathing beach waters* are those coastal recreation waters that, during the recreation season, are heavily-used (based upon an evaluation of use within the State) and may have: a lifeguard, bathhouse facilities, or public parking for beach access. States may include any other waters in this category even if the waters do not meet these criteria.

(3) *Moderate use coastal recreation waters* are those coastal recreation waters that are not designated bathing beach waters but typically, during the recreation season, are used by at least half of the number of people as at typical designated bathing beach waters within the State. States may also include light use or infrequent use coastal recreation waters in this category.

(4) *Light use coastal recreation waters* are those coastal recreation waters that are not designated bathing beach waters but typically, during the recreation season, are used by less than half of the number of people as at typical designated bathing beach waters within the State, but are more than infrequently used. States may also include infrequent use coastal recreation waters in this category.

(5) *Infrequent use coastal recreation waters* are those coastal recreation waters that are rarely or occasionally used.

(6) *New pathogen discharger* for the purposes of this section means any building, structure, facility, or installation from which there is or may be a discharge of pathogens, the construction of which commenced on or after December 16, 2004. It does not include relocation of existing combined sewer overflow outfalls.

(7) *Existing pathogen discharger* for the purposes of this section means any discharger that is not a new pathogen discharger.

(c) *EPA's section 304(a) ambient water quality criteria for bacteria.* (1) Freshwaters:

A Indicator[d]	B Geometric mean	C Single sample maximum (per 100 ml)			
		C1 Designated bathing beach (75% confidence level)	C2 Moderate use costal recreation waters (82% confidence level)	C3 Light use coastal recreation waters (90% confidence level)	C4 Infrequent use coastal recreation waters (95% confidence level)
E. coli[e]	126/100 mil[a]	[b]235	[b]298	[b]409	[b]575
Enterococci[e]	33/100 ml[c]	[b]61	[b]78	[b]107	[b]151

Footnotes to table in paragraph (c)(1):
a. This value is for use with analytical methods 1103.1, 1603, or 1604 or any equivalent method that measures viable bacteria.
b. Calculated using the following: single sample maximum = geometric mean * 10∧(confidence level factor * log standard deviation), where the confidence level factor is: 75%: 0.68; 82%: 0.94; 90%: 1.28; 95%: 1.65. The log standard deviation from EPA's epidemiological studies is 0.4.
c. This value is for use with analytical methods 1106.1 or 1600 or any equivalent method that measures viable bacteria.
d. The State may determine which of these indicators applies to its freshwater coastal recreation waters. Until a State makes that determination, *E. coli* will be the applicable indicator.
e. These values apply to *E. coli* or enterococci regardless of origin unless a sanitary survey shows that sources of the indicator bacteria are non-human and an epidemiological study shows that the indicator densities are not indicative of a human health risk.

(2) Marine waters:

A Indicator	B Geometric mean	C Single sample maximum (per 100 ml)			
		C1 Designated bathing beach (75% confidence level)	C2 Moderate use coastal recreation waters (82% confidence level)	C3 Light use coastal recreation waters (90% confidence level)	C4 Infrequent use coastal recreation waters (95% confidence level)
Enterococci[c]	35/100 ml[a]	[b]104	[b]158	[b]276	[b]501

Footnotes to table in paragraph (c)(2):
a. This value is for use with analytical methods 1106.1 or 1600 or any equivalent method that measures viable bacteria.
b. Calculated using the following: single sample maximum = geometric mean * 10∧(confidence level factor * log standard deviation), where the confidence level factor is: 75%: 0.68; 82%: 0.94; 90%: 1.28; 95%: 1.65. The log standard deviation from EPA's epidemiological studies is 0.7.
c. These values apply to enterococci regardless of origin unless a sanitary survey shows that sources of the indicator bacteria are non-human and an epidemiological study shows that the indicator densities are not indicative of a human health risk.

(3) As an alternative to the single sample maximum in paragraph (c)(1) or (c)(2) of this section, States may use a site-specific log standard deviation to calculate a single sample maximum for individual coastal recreation waters, but must use at least 30 samples from a single recreation season to do so.

(d) *Applicability.* (1) The criteria in paragraph (c) of this section apply to the coastal recreation waters of the States identified in paragraph (e) of this section and apply concurrently with any ambient recreational water criteria adopted by the State, except for those coastal recreation waters where State regulations determined by EPA to meet the requirements of Clean Water Act section 303(i) apply, in which case the State's criteria for those coastal recreation waters will apply and not the criteria in paragraph (c) of this section.

(2) The criteria established in this section are subject to the State's general rules of applicability in the same way and to the same extent as are other Federally-adopted and State-adopted numeric criteria when applied to the same use classifications.

(e) *Applicability to specific jurisdictions.* (1) The criteria in paragraph (c)(1) of this section apply to fresh coastal recreation waters of the following States: Illinois, Minnesota, New York, Ohio, Pennsylvania, Wisconsin.

(2) The criteria in paragraph (c)(2) of this section apply to marine coastal recreation waters of the following States: Alaska, California (except for coastal recreation waters within the jurisdiction of Regional Board 4), Florida, Georgia, Hawaii (except for coastal recreation waters within 300 meters of the shoreline), Louisiana, Maine (except for SA waters and SB and SC waters with human sources of fecal contamination), Maryland, Massachusetts, Mississippi, New York, North Carolina, Oregon, Puerto Rico (except for waters classified by Puerto Rico as intensely used for primary contact recreation and for those waters included in § 131.40), Rhode Island, United States Virgin Islands.

(f) *Schedules of compliance.* (1) This paragraph (f) applies to any State that does not have a regulation in effect for Clean Water Act purposes that authorizes compliance schedules for National Pollutant Discharge Elimination System permit limitations needed to meet the criteria in paragraph (c) of this section. All dischargers shall promptly comply with any new or more restrictive water quality-based effluent limitations based on the water quality criteria set forth in this section.

(2) When a permit issued on or after December 16, 2004, to a new pathogen discharger as defined in paragraph (b) of this section contains water quality-based effluent limitations based on water quality criteria set forth in paragraph (c) of this section, the permittee shall comply with such water quality-based effluent limitations upon the commencement of the discharge.

(3) Where an existing pathogen discharger reasonably believes that it will be infeasible to comply immediately with a new or more restrictive water quality-based effluent limitations based on the water quality criteria set forth in paragraph (c) of this section, the discharger may request approval from the permit issuing authority for a schedule of compliance.

(4) A compliance schedule for an existing pathogen discharger shall require compliance with water quality-based effluent limitations based on water quality criteria set forth in paragraph (c) of this section as soon as possible, taking into account the discharger's ability to achieve compliance with such water quality-based effluent limitations.

(5) If the schedule of compliance for an existing pathogen discharger exceeds one year from the date of permit issuance, reissuance or modification, the schedule shall set forth interim requirements and dates for their achievement. The period between dates of completion for each requirement may not exceed one year.

If the time necessary for completion of any requirement is more than one year and the requirement is not readily divisible into stages for completion, the permit shall require, at a minimum, specified dates for annual submission of progress reports on the status of interim requirements.

(6) In no event shall the permit issuing authority approve a schedule of compliance for an existing pathogen discharge which exceeds five years from the date of permit issuance, reissuance, or modification, whichever is sooner.

(7) If a schedule of compliance exceeds the term of a permit, interim permit limits effective during the permit shall be included in the permit and addressed in the permit's fact sheet or statement of basis. The administrative record for the permit shall reflect final permit limits and final compliance dates. Final compliance dates for final permit limits, which do not occur during the term of the permit, must occur within five years from the date of issuance, reissuance or modification of the permit which initiates the compliance schedule.

[69 FR 67242, Nov. 16, 2004]

§ 131.42 Antidegradation Implementation Methods for the Commonwealth of Puerto Rico.

(a) *General Policy Statement.* (1) All point sources of pollution are subject to an antidegradation review.

(2) An antidegradation review shall be initiated as part of the Section 401—''Water Quality Certification Process'' of the Clean Water Act.

(3) The 401 Certification Process shall follow the procedures established by the February 2, 1989 Resolution R–89–2–2 of the Governing Board of the Puerto

Rico Environmental Quality Board (EQB).

(4) The following are not subject to an antidegradation review due to the fact that they are nondischarge systems and are managed by specific applicable Puerto Rico regulations:

(i) All nonpoint sources of pollutants.

(ii) Underground Storage Tanks.

(iii) Underground Injection Facilities.

(5) The protection of water quality shall include the maintenance, migration, protection, and propagation of desirable species, including threatened and endangered species identified in the local and federal regulations.

(b) *Definitions.* (1) All the definitions included in Article 1 of the Puerto Rico Water Quality Standards Regulation (PRWQSR), as amended, are applicable to this procedure.

(2) High Quality Waters:

(i) Are waters whose quality is better than the mandatory minimum level to support the CWA Section 101(a)(2) goals of propagation of fish, shellfish, wildlife and recreation in and on the waters. High Quality Waters are to be identified by EQB on a parameter-by-parameter basis.

(ii) [Reserved]

(3) Outstanding National Resources Waters (ONRWs):

(i) Are waters classified as SA or SE in the PRWQSR, as amended, or any other water designated by Resolution of the Governing Board of EQB. ONRWs are waters that are recreationally or ecologically important, unique or sensitive.

(ii) [Reserved]

(c) *Antidegradation Review Procedure.* (1) The antidegradation review will commence with the submission of the CWA Section 401 water quality certification request. EQB uses a parameter-by-parameter approach for the implementation of the anti-degradation policy and will review each parameter separately as it evaluates the request for certification. The 401 certification/antidegradation review shall comply with Article 4(B)(3) of the Puerto Rico Environmental Public Policy Act (Law No. 416 of September 22, 2004, as amended (12 LPRA 8001 *et seq.*)). Compliance with Article 4(B)(3) shall be conducted in accordance with the Reglamento de la Junta de Calidad Ambiental para el Proceso de Presentación, Evaluación y Trámite de Documentos Ambientales (EQB's Environmental Documents Regulation). As part of the evaluation of the Environmental Document an alternatives analysis shall be conducted (12 LPRA 8001(a)(5), EQB's Environmental Documents Regulation, e.g., Rules 211E and 253C), and a public participation period and a public hearing shall be provided (12 LPRA 8001(a), EQB's Environmental Documents Regulation, Rule 254).

(2) In conducting an antidegradation review, EQB will sequentially apply the following steps:

(i) Determine which level of antidegradation applies

(A) Tier 1—Protection of Existing and Designated Uses.

(B) Tier 2—Protection of High Quality Waters.

(C) Tier 3—Protection of ONRWs.

(ii) [Reserved]

(3) Review existing water quality data and other information submitted by the applicant. The applicant shall provide EQB with the information regarding the discharge, as required by the PRWQSR including, but not limited to the following:

(i) A description of the nature of the pollutants to be discharged.

(ii) Treatment technologies applied to the pollutants to be discharged.

(iii) Nature of the applicant's business.

(iv) Daily maximum and average flow to be discharged.

(v) Effluent characterization.

(vi) Effluent limitations requested to be applied to the discharge according to Section 6.11 of the PRWQSR.

(vii) Location of the point of discharge.

(viii) Receiving waterbody name.

(ix) Water quality data of the receiving waterbody.

(x) Receiving waterbody minimum flow (7Q2 and 7Q10) for stream waters.

(xi) Location of water intakes within the waterbody.

(xii) In the event that the proposed discharge will result in the lowering of water quality, data and information demonstrating that the discharge is necessary to accommodate important economic or social development in the

area where the receiving waters are located.

(4) Determine if additional information or assessment is necessary to make the decision.

(5) Prepare an intent to issue or deny the 401 water quality certificate and publish a notice in a newspaper of wide circulation in Puerto Rico informing the public of EQB's preliminary decision and granting a public participation period of at least thirty (30) days.

(6) Address the comments received from the interested parties and consider such comments as part of the decision making process.

(7) Make the final determination to issue or deny the requested 401 certification. Such decision is subject to the reconsideration procedure established in Law 170 of August 12, 1988, *Ley de Procedimiento Administrativo Uniforme del Estado Libre Asociado de Puerto Rico* (3 LPRA 2165).

(d) *Implementation Procedures*. (1) Activities Regulated by NPDES Permits

(i) Tier 1—Protection of Existing and Designated Uses:

(A) Tier 1 waters are:

(*1*) Those waters of Puerto Rico (except Tier 2 or Tier 3 waters) identified as impaired and that have been included on the list required by Section 303(d) of the CWA; and

(*2*) Those waters of Puerto Rico (except Tier 2 and Tier 3 waters) for which attainment of applicable water quality standards has been or is expected to be, achieved through implementation of effluent limitations more stringent than technology-based controls (Best Practicable Technology, Best Available Technology and Secondary Treatment).

(B) To implement Tier 1 antidegradation, EQB shall determine if a discharge would lower the water quality to the extent that it would no longer be sufficient to protect and maintain the existing and designated uses of that waterbody.

(C) When a waterbody has been affected by a parameter of concern causing it to be included on the 303(d) List, then EQB will not allow an increase of the concentration of the parameter of concern or pollutants affecting the parameter of concern in the waterbody. This no increase will be achieved by meeting the applicable water quality standards at the end of the pipe. Until such time that a Total Maximum Daily Load (TMDL) is developed for the parameter of concern for the waterbody, no discharge will be allowed to cause or contribute to further degradation of the waterbody.

(D) When the assimilative capacity of a waterbody is not sufficient to ensure maintenance of the water quality standard for a parameter of concern with an additional load to the waterbody, EQB will not allow an increase of the concentration of the parameter of concern or pollutants affecting the parameter of concern in the waterbody. This no increase will be achieved by meeting the applicable water quality standards at the end of the pipe. Until such time that a TMDL is developed for the parameter of concern for the waterbody, no discharge will be allowed to cause or contribute to further degradation of the waterbody.

(ii) Tier 2—Protection of High Quality Waters:

(A) To verify that a waterbody is a high quality water for a parameter of concern which initiates a Tier 2 antidegradation review, EQB shall evaluate and determine:

(*1*) The existing water quality of the waterbody;

(*2*) The projected water quality of the waterbody pursuant to the procedures established in the applicable provisions of Articles 5 and 10 of the PRWQSR including but not limited to, Sections 5.2, 5.3, 5.4, 10.2, 10.3, 10.4, 10.5, and 10.6;

(*3*) That the existing and designated uses of the waterbody will be fully maintained and protected in the event of a lowering of water quality.

In multiple discharge situations, the effects of all discharges shall be evaluated through a waste load allocation analysis in accordance with the applicable provisions of Article 10 of the PRWQSR or the applicable provisions of Article 5 regarding mixing zones.

(B) In order to allow the lowering of water quality in high quality waters, the applicant must show and justify the necessity for such lowering of water quality through compliance with the requirements of Section 6.11 of the PRWQSR. EQB will not allow the entire assimilative capacity of a

waterbody for a parameter of concern to be allocated to a discharger, if the necessity of the requested effluent limitation for the parameter of concern is not demonstrated to the full satisfaction of EQB.

(iii) Tier 3—Protection of ONRWs:

(A) EQB may designate a water as Class SA or SE (ONRWs) through a Resolution (PRWQSR Sections 2.1.1 and 2.2.1). Additionally, any interested party may nominate a specific water to be classified as an ONRW and the Governing Board of EQB will make the final determination. Classifying a water as an ONRW may result in the water being named in either Section 2.1.1 or 2.2.2 of the PRWQSR, which would require an amendment of the PRWQSR. The process for amending the PRWQSR, including public participation, is set forth in Section 8.6 of said regulation.

(B) The existing characteristics of Class SA and SE waters shall not be altered, except by natural causes, in order to preserve the existing natural phenomena.

(*1*) No point source discharge will be allowed in ONRWs.

(*2*) [Reserved]

(2) Activities Regulated by CWA Section 404 or Rivers and Harbors Action Section 10 Permits (Discharge of Dredged or Fill Material)

(i) EQB will only allow the discharge of dredged or fill material into a wetland if it can be demonstrated that such discharge will not have an unacceptable adverse impact either individually or in combination with other activities affecting the wetland of concern. The impacts to the water quality or the aquatic or other life in the wetland due to the discharge of dredged or fill material should be avoided, minimized and mitigated.

(ii) The discharge of dredged or fill material shall not be certified if there is a practicable alternative to the proposed discharge which would have less adverse impact on the recipient ecosystem, so long as the alternative does not have other more significant adverse environmental consequences. Activities which are not water dependent are presumed to have practicable alternatives, unless the applicant clearly demonstrates otherwise. No discharge of dredged and fill material shall be certified unless appropriate and practicable steps have been taken which minimize potential adverse impacts of the discharge on the recipient ecosystem. The discharge of dredged or fill material to ONRWs, however, shall be governed by paragraph (d)(1)(iii) of this section.

[72 FR 70524, Dec. 12, 2007]

§ 131.43 Florida.

(a)–(d) [Reserved]

(e) *Site-specific alternative criteria.* (1) The Regional Administrator may determine that site-specific alternative criteria shall apply to specific surface waters in lieu of the criteria established for Florida waters in this section, including criteria for lakes, criteria for streams, and criteria for springs. Any such determination shall be made consistent with § 131.11.

(2) To receive consideration from the Regional Administrator for a determination of site-specific alternative criteria, an entity shall submit a request that includes proposed alternative numeric criteria and supporting rationale suitable to meet the needs for a technical support document pursuant to paragraph (e)(3) of this section. The entity shall provide the State a copy of all materials submitted to EPA, at the time of submittal to EPA, to facilitate the State providing comments to EPA. Site-specific alternative criteria may be based on one or more of the following approaches.

(i) Replicate the process for developing the stream criteria in this section.

(ii) Replicate the process for developing the lake criteria in this section.

(iii) Conduct a biological, chemical, and physical assessment of waterbody conditions.

(iv) Use another scientifically defensible approach protective of the designated use.

(3) For any determination made under paragraph (e)(1) of this section, the Regional Administrator shall, prior to making such a determination, provide for public notice and comment on a proposed determination. For any such proposed determination, the Regional Administrator shall prepare and

make available to the public a technical support document addressing the specific surface waters affected and the justification for each proposed determination. This document shall be made available to the public no later than the date of public notice issuance.

(4) The Regional Administrator shall maintain and make available to the public an updated list of determinations made pursuant to paragraph (e)(1) of this section as well as the technical support documents for each determination.

(5) Nothing in this paragraph (e) shall limit the Administrator's authority to modify the criteria established for Florida waters in this section, including criteria for lakes, criteria for streams, and criteria for springs.

[75 FR 75805, Dec. 6, 2010]

EFFECTIVE DATE NOTE: At 75 FR 75805, Dec. 6, 2010, § 131.43 was revised, effective Mar. 6, 2012. For the convenience of the user, the revised text is set forth as follows:

§ 131.43 Florida.

(a) *Scope.* This section promulgates numeric criteria for nitrogen/phosphorus pollution for Class I and Class III waters in the State of Florida. This section also contains provisions for site-specific alternative criteria.

(b) *Definitions.*—(1) *Canal* means a trench, the bottom of which is normally covered by water with the upper edges of its two sides normally above water.

(2) *Clear, high-alkalinity lake* means a lake with long-term color less than or equal to 40 Platinum Cobalt Units (PCU) and Alkalinity greater than 20 mg/L $CaCO_3$.

(3) *Clear, low-alkalinity lake* means a lake with long-term color less than or equal to 40 PCU and alkalinity less than or equal to 20 mg/L $CaCO_3$.

(4) *Colored lake* means a lake with long-term color greater than 40 PCU.

(5) *Lake* means a slow-moving or standing body of freshwater that occupies an inland basin that is not a stream, spring, or wetland.

(6) *Lakes and flowing waters* means inland surface waters that have been classified as Class I (Potable Water Supplies) or Class III (Recreation, Propagation and Maintenance of a Healthy, Well-Balanced Population of Fish and Wildlife) water bodies pursuant to Rule 62–302.400, F.A.C., excluding wetlands, and are predominantly fresh waters.

(7) *Nutrient watershed region* means an area of the State, corresponding to drainage basins and differing geological conditions affecting nutrient levels, as delineated in Table 2.

(8) *Predominantly fresh waters* means surface waters in which the chloride concentration at the surface is less than 1,500 milligrams per liter.

(9) *South Florida Region* means those areas south of Lake Okeechobee and the Caloosahatchee River watershed to the west of Lake Okeechobee and the St. Lucie watershed to the east of Lake Okeechobee.

(10) *Spring* means a site at which ground water flows through a natural opening in the ground onto the land surface or into a body of surface water.

(11) *State* means the State of Florida, whose transactions with the U.S. EPA in matters related to 40 CFR 131.43 are administered by the Secretary, or officials delegated such responsibility, of the Florida Department of Environmental Protection (FDEP), or successor agencies.

(12) *Stream* means a free-flowing, predominantly fresh surface water in a defined channel, and includes rivers, creeks, branches, canals, freshwater sloughs, and other similar water bodies.

(13) *Surface water* means water upon the surface of the earth, whether contained in bounds created naturally or artificially or diffused. Water from natural springs shall be classified as surface water when it exits from the spring onto the Earth's surface.

(c) *Criteria for Florida waters*—(1) *Criteria for lakes.* (i) The applicable criteria for chlorophyll *a*, total nitrogen (TN), and total phosphorus (TP) for lakes within each respective lake class are shown on Table 1.

TABLE 1

A	B	C	
Lake Color[a] and Alkalinity	Chl-a (mg/L)[b,*]	TN (mg/L)	TP (mg/L)
Colored Lakes[c]	0.020	1.27 [1.27–2.23]	0.05 [0.05–0.16]
Clear Lakes, High Alkalinity[d]	0.020	1.05 [1.05–1.91]	0.03 [0.03–0.09]

TABLE 1—Continued

A	B	C	
Lake Color[a] and Alkalinity	Chl-a (mg/L)[b,*]	TN (mg/L)	TP (mg/L)
Clear Lakes, Low Alkalinity[e]	0.006	0.51 [0.51–0.93]	0.01 [0.01–0.03]

[a] Platinum Cobalt Units (PCU) assessed as true color free from turbidity.
[b] Chlorophyll *a* is defined as corrected chlorophyll, or the concentration of chlorophyll *a* remaining after the chlorophyll degradation product, phaeophytin *a,* has been subtracted from the uncorrected chlorophyll *a* measurement.
[c] Long-term Color > 40 Platinum Cobalt Units (PCU)
[d] Long-term Color ≤ 40 PCU and Alkalinity > 20 mg/L $CaCO_3$
[e] Long-term Color ≤ 40 PCU and Alkalinity ≤ 20 mg/L $CaCO_3$
* For a given waterbody, the annual geometric mean of chlorophyll *a,* TN or TP concentrations shall not exceed the applicable criterion concentration more than once in a three-year period.

(ii) Baseline criteria apply unless the State determines that modified criteria within the range indicated in Table 1 apply to a specific lake. Once established, modified criteria are the applicable criteria for all CWA purposes. The State may use this procedure one time for a specific lake in lieu of the site-specific alternative criteria procedure described in paragraph (e) of this section.

(A) The State may calculate modified criteria for TN and/or TP where the chlorophyll *a* criterion-magnitude as an annual geometric mean has not been exceeded and sufficient ambient monitoring data exist for chlorophyll *a* and TN and/or TP for at least the three immediately preceding years. Sufficient data include at least four measurements per year, with at least one measurement between May and September and one measurement between October and April each year.

(B) Modified criteria are calculated using data from years in which sufficient data are available to reflect maintenance of ambient conditions. Modified TN and/or TP criteria may not be greater than the higher value specified in the range of values in column C of Table 1 in paragraph (c)(1)(i) of this section. Modified TP and TN criteria may not exceed criteria applicable to streams to which a lake discharges.

(C) The State shall notify the public and maintain a record of these modified lake criteria, as well as a record supporting their derivation. The State shall notify EPA Region 4 and provide the supporting record within 30 days of determination of modified lake criteria.

(2) *Criteria for streams.* (i) The applicable instream protection value (IPV) criteria for total nitrogen (TN) and total phosphorus (TP) for streams within each respective nutrient watershed region are shown on Table 2.

TABLE 2

Nutrient watershed region	Instream protection value criteria	
	TN (mg/L)*	TP (mg/L)*
Panhandle West[a]	0.67	0.06
Panhandle East[b]	1.03	0.18
North Central[c]	1.87	0.30
West Central[d]	1.65	0.49
Peninsula[e]	1.54	0.12

Watersheds pertaining to each Nutrient Watershed Region (NWR) were based principally on the NOAA coastal, estuarine, and fluvial drainage areas with modifications to the NOAA drainage areas in the West Central and Peninsula Regions that account for unique watershed geologies. For more detailed information on regionalization and which WBIDs pertain to each NWR, *see* the Technical Support Document.

[a] Panhandle West region includes: Perdido Bay Watershed, Pensacola Bay Watershed, Choctawhatchee Bay Watershed, St. Andrew Bay Watershed, and Apalachicola Bay Watershed.

[b] Panhandle East region includes: Apalachee Bay Watershed, and Econfina/Steinhatchee Coastal Drainage Area.

[c] North Central region includes the Suwannee River Watershed.

[d] West Central region includes: Peace, Myakka, Hillsborough, Alafia, Manatee, Little Manatee River Watersheds, and small, direct Tampa Bay tributary watersheds south of the Hillsborough River Watershed.

[e] Peninsula region includes: Waccasassa Coastal Drainage Area, Withlacoochee Coastal Drainage Area, Crystal/Pithlachascotee Coastal Drainage Area, small, direct Tampa Bay tributary watersheds west of the Hillsborough River Watershed, Sarasota Bay Watershed, small, direct Charlotte Harbor tributary watersheds south of the Peace River Watershed, Caloosahatchee River Watershed, Estero Bay Watershed, Kissimmee River/Lake Okeechobee Drainage Area, Loxahatchee/St. Lucie Watershed, Indian River Watershed, Daytona/St. Augustine Coastal Drainage Area, St. John's River Watershed, Nassau Coastal Drainage Area, and St. Mary's River Watershed.

* For a given waterbody, the annual geometric mean of TN or TP concentrations shall not exceed the applicable criterion concentration more than once in a three-year period.

(ii) *Criteria for protection of downstream lakes.* (A) The applicable criteria for streams that flow into downstream lakes include both the instream criteria for total phosphorus (TP) and total nitrogen (TN) in Table 2 in paragraph (c)(2)(i) and the downstream protection value (DPV) for TP and TN derived pursuant to the provisions of this paragraph. A DPV for stream tributaries (up to the point of reaching water bodies that are not streams as defined by this rule) that flow

into a downstream lake is either the allowable concentration or the allowable loading of TN and/or TP applied at the point of entry into the lake. The applicable DPV for any stream shall be determined pursuant to paragraphs (c)(2)(ii)(B), (C), or (D) of this section. Contributions from stream tributaries upstream of the point of entry location must result in attainment of the DPV at the point of entry into the lake. If the DPV is not attained at the point of entry into the lake, then the collective set of streams in the upstream watershed does not attain the DPV, which is an applicable water quality criterion for the water segments in the upstream watershed. The State or EPA may establish additional DPVs at upstream tributary locations that are consistent with attaining the DPV at the point of entry into the lake. The State or EPA also have discretion to establish DPVs to account for a larger watershed area (*i.e.*, include waters beyond the point of reaching water bodies that are not streams as defined by this rule).

(B) In instances where available data and/or resources provide for use of a scientifically defensible and protective lake-specific application of the BATHTUB model, the State or EPA may derive the DPV for TN and/or TP from use of a lake-specific application of BATHTUB. The State and EPA are authorized to use a scientifically defensible technical model other than BATHTUB upon demonstration that use of another scientifically defensible technical model would protect the lake's designated uses and meet all applicable criteria for the lake. The State or EPA may designate the wasteload and/or load allocations from a TMDL established or approved by EPA as DPV(s) if the allocations from the TMDL will protect the lake's designated uses and meet all applicable criteria for the lake.

(C) When the State or EPA has not derived a DPV for a stream pursuant to paragraph (c)(2)(ii)(B) of this section, and where the downstream lake attains the applicable chlorophyll *a* criterion and the applicable TP and/or TN criteria, then the DPV for TN and/or TP is the associated ambient instream levels of TN and/or TP at the point of entry to the lake. Degradation in water quality from the DPV pursuant to this paragraph is to be considered nonattainment of the DPV, unless the DPV is adjusted pursuant to paragraph (c)(2)(ii)(B) of this section.

(D) When the State or EPA has not derived a DPV pursuant to paragraph (c)(2)(ii)(B) of this section, and where the downstream lake does not attain applicable chlorophyll *a* criterion or the applicable TN and/or TP criteria, or has not been assessed, then the DPV for TN and/or TP is the applicable TN and/or TP criteria for the downstream lake.

(E) The State and EPA shall maintain a record of DPVs they derive based on the methods described in paragraphs (c)(2)(ii)(B) and (C) of this section, as well as a record supporting their derivation, and make such records available to the public. The State and EPA shall notify one another and provide a supporting record within 30 days of derivation of DPVs pursuant to paragraphs (c)(2)(ii)(B) or (C) of this section.

(3) *Criteria for springs*. The applicable nitrate+nitrite criterion is 0.35 mg/L as an annual geometric mean, not to be exceeded more than once in a three-year period.

(d) *Applicability*. (1) The criteria in paragraphs (c)(1) through (3) of this section apply to lakes and flowing waters, excluding flowing waters in the South Florida Region, and apply concurrently with other applicable water quality criteria, except when:

(i) State water quality standards contain criteria that are more stringent for a particular parameter and use;

(ii) The Regional Administrator determines that site-specific alternative criteria apply pursuant to the procedures in paragraph (e) of this section; or

(iii) The State adopts and EPA approves a water quality standards variance to the Class I or Class III designated use pursuant to §131.13 that meets the applicable provisions of State law and the applicable Federal regulations at §131.10.

(2) The criteria established in this section are subject to the State's general rules of applicability in the same way and to the same extent as are the other Federally-adopted and State-adopted numeric criteria when applied to the same use classifications.

(e) *Site-specific alternative criteria*. (1) The Regional Administrator may determine that site-specific alternative criteria shall apply to specific surface waters in lieu of the criteria established in paragraph (c) of this section. Any such determination shall be made consistent with §131.11.

(2) To receive consideration from the Regional Administrator for a determination of site-specific alternative criteria, an entity shall submit a request that includes proposed alternative numeric criteria and supporting rationale suitable to meet the needs for a technical support document pursuant to paragraph (e)(3) of this section. The entity shall provide the State a copy of all materials submitted to EPA, at the time of submittal to EPA, to facilitate the State providing comments to EPA. Site-specific alternative criteria may be based on one or more of the following approaches.

(i) Replicate the process for developing the stream criteria in paragraph (c)(2)(i) of this section.

(ii) Replicate the process for developing the lake criteria in paragraph (c)(1) of this section.

(iii) Conduct a biological, chemical, and physical assessment of waterbody conditions.

(iv) Use another scientifically defensible approach protective of the designated use.

(3) For any determination made under paragraph (e)(1) of this section, the Regional Administrator shall, prior to making such a determination, provide for public notice and comment on a proposed determination. For any such proposed determination, the Regional Administrator shall prepare and make available to the public a technical support document addressing the specific surface waters affected and the justification for each proposed determination. This document shall be made available to the public no later than the date of public notice issuance.

(4) The Regional Administrator shall maintain and make available to the public an updated list of determinations made pursuant to paragraph (e)(1) of this section as well as the technical support documents for each determination.

(5) Nothing in this paragraph (e) shall limit the Administrator's authority to modify the criteria in paragraph (c) of this section through rulemaking.

(f) *Effective date.* This section is effective March 6, 2012, except for §131.43(e), which is effective February 4, 2011.

PART 132—WATER QUALITY GUIDANCE FOR THE GREAT LAKES SYSTEM

Sec.

132.1 Scope, purpose, and availability of documents.
132.2 Definitions.
132.3 Adoption of criteria.
132.4 State adoption and application of methodologies, policies and procedures.
132.5 Procedures for adoption and EPA review.
132.6 Application of part 132 requirements in Great Lakes States and Tribes.

TABLES TO PART 132

APPENDIX A TO PART 132—GREAT LAKES WATER QUALITY INITIATIVE METHODOLOGIES FOR DEVELOPMENT OF AQUATIC LIFE CRITERIA AND VALUES

APPENDIX B TO PART 132—GREAT LAKES WATER QUALITY INITIATIVE

APPENDIX C TO PART 132—GREAT LAKES WATER QUALITY INITIATIVE METHODOLOGIES FOR DEVELOPMENT OF HUMAN HEALTH CRITERIA AND VALUES

APPENDIX D TO PART 132—GREAT LAKES WATER QUALITY INITIATIVE METHODOLOGY FOR THE DEVELOPMENT OF WILDLIFE CRITERIA

APPENDIX E TO PART 132—GREAT LAKES WATER QUALITY INITIATIVE ANTIDEGRADATION POLICY

APPENDIX F TO PART 132—GREAT LAKES WATER QUALITY INITIATIVE IMPLEMENTATION PROCEDURES

AUTHORITY: 33 U.S.C. 1251 *et seq.*

SOURCE: 60 FR 15387, Mar. 23, 1995, unless otherwise noted.

§ 132.1 Scope, purpose, and availability of documents.

(a) This part constitutes the Water Quality Guidance for the Great Lakes System (Guidance) required by section 118(c)(2) of the Clean Water Act (33 U.S.C. 1251 *et seq.*) as amended by the Great Lakes Critical Programs Act of 1990 (Pub. L. 101–596, 104 Stat. 3000 *et seq.*). The Guidance in this part identifies minimum water quality standards, antidegradation policies, and implementation procedures for the Great Lakes System to protect human health, aquatic life, and wildlife.

(b) The U.S. Environmental Protection Agency, Great Lakes States, and Great Lakes Tribes will use the Guidance in this part to evaluate the water quality programs of the States and Tribes to assure that they are protective of water quality. State and Tribal programs do not need to be identical to the Guidance in this part, but must contain provisions that are consistent with (as protective as) the Guidance in this part. The scientific, policy and legal basis for EPA's development of each section of the final Guidance in this part is set forth in the preamble, Supplementary Information Document, Technical Support Documents, and other supporting documents in the public docket. EPA will follow the guidance set out in these documents in reviewing the State and Tribal water quality programs in the Great Lakes for consistency with this part.

(c) The Great Lakes States and Tribes must adopt provisions consistent with the Guidance in this part applicable to waters in the Great Lakes System or be subject to EPA promulgation of its terms pursuant to this part.

(d) EPA understands that the science of risk assessment is rapidly improving. Therefore, to ensure that the scientific basis for the methodologies in appendices A through D are always current and peer reviewed, EPA will review the methodologies and revise them, as appropriate, every 3 years.

(e) Certain documents referenced in the appendixes to this part with a designation of NTIS and/or ERIC are

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TITLE 33 - NAVIGATION AND NAVIGABLE WATERS
CHAPTER 26 - WATER POLLUTION PREVENTION AND CONTROL
SUBCHAPTER III - STANDARDS AND ENFORCEMENT

§ 1311. Effluent limitations

(a) Illegality of pollutant discharges except in compliance with law

Except as in compliance with this section and sections 1312, 1316, 1317, 1328, 1342, and 1344 of this title, the discharge of any pollutant by any person shall be unlawful.

(b) Timetable for achievement of objectives

In order to carry out the objective of this chapter there shall be achieved—

(1) **(A)** not later than July 1, 1977, effluent limitations for point sources, other than publicly owned treatment works,

(i) which shall require the application of the best practicable control technology currently available as defined by the Administrator pursuant to section 1314 (b) of this title, or

(ii) in the case of a discharge into a publicly owned treatment works which meets the requirements of subparagraph (B) of this paragraph, which shall require compliance with any applicable pretreatment requirements and any requirements under section 1317 of this title; and

(B) for publicly owned treatment works in existence on July 1, 1977, or approved pursuant to section 1283 of this title prior to June 30, 1974 (for which construction must be completed within four years of approval), effluent limitations based upon secondary treatment as defined by the Administrator pursuant to section 1314 (d)(1) of this title; or,

(C) not later than July 1, 1977, any more stringent limitation, including those necessary to meet water quality standards, treatment standards, or schedules of compliance, established pursuant to any State law or regulations (under authority preserved by section 1370 of this title) or any other Federal law or regulation, or required to implement any applicable water quality standard established pursuant to this chapter.

(2) **(A)** for pollutants identified in subparagraphs (C), (D), and (F) of this paragraph, effluent limitations for categories and classes of point sources, other than publicly owned treatment works, which

(i) shall require application of the best available technology economically achievable for such category or class, which will result in reasonable further progress toward the national goal of eliminating the discharge of all pollutants, as determined in accordance with regulations issued by the Administrator pursuant to section 1314 (b)(2) of this title, which such effluent limitations shall require the elimination of discharges of all pollutants if the Administrator finds, on the basis of information available to him (including information developed pursuant to section 1325 of this title), that such elimination is technologically and economically achievable for a category or class of point sources as determined in accordance with regulations issued by the Administrator pursuant to section 1314 (b)(2) of this title, or

(ii) in the case of the introduction of a pollutant into a publicly owned treatment works which meets the requirements of subparagraph (B) of this paragraph, shall require compliance with any applicable pretreatment requirements and any other requirement under section 1317 of this title;

(B) Repealed. Pub. L. 97–117, § 21(b), Dec. 29, 1981, 95 Stat. 1632.

(C) with respect to all toxic pollutants referred to in table 1 of Committee Print Numbered 95–30 of the Committee on Public Works and Transportation of the House of Representatives compliance with effluent limitations in accordance with subparagraph (A) of this paragraph as

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expeditiously as practicable but in no case later than three years after the date such limitations are promulgated under section 1314 (b) of this title, and in no case later than March 31, 1989;

(D) for all toxic pollutants listed under paragraph (1) of subsection (a) of section 1317 of this title which are not referred to in subparagraph (C) of this paragraph compliance with effluent limitations in accordance with subparagraph (A) of this paragraph as expeditiously as practicable, but in no case later than three years after the date such limitations are promulgated under section 1314 (b) of this title, and in no case later than March 31, 1989;

(E) as expeditiously as practicable but in no case later than three years after the date such limitations are promulgated under section 1314 (b) of this title, and in no case later than March 31, 1989, compliance with effluent limitations for categories and classes of point sources, other than publicly owned treatment works, which in the case of pollutants identified pursuant to section 1314 (a)(4) of this title shall require application of the best conventional pollutant control technology as determined in accordance with regulations issued by the Administrator pursuant to section 1314 (b)(4) of this title; and

(F) for all pollutants (other than those subject to subparagraphs (C), (D), or (E) of this paragraph) compliance with effluent limitations in accordance with subparagraph (A) of this paragraph as expeditiously as practicable but in no case later than 3 years after the date such limitations are established, and in no case later than March 31, 1989.

(3)

(A) for effluent limitations under paragraph (1)(A)(i) of this subsection promulgated after January 1, 1982, and requiring a level of control substantially greater or based on fundamentally different control technology than under permits for an industrial category issued before such date, compliance as expeditiously as practicable but in no case later than three years after the date such limitations are promulgated under section 1314 (b) of this title, and in no case later than March 31, 1989; and

(B) for any effluent limitation in accordance with paragraph (1)(A)(i), (2)(A)(i), or (2)(E) of this subsection established only on the basis of section 1342 (a)(1) of this title in a permit issued after February 4, 1987, compliance as expeditiously as practicable but in no case later than three years after the date such limitations are established, and in no case later than March 31, 1989.

(c) Modification of timetable

The Administrator may modify the requirements of subsection (b)(2)(A) of this section with respect to any point source for which a permit application is filed after July 1, 1977, upon a showing by the owner or operator of such point source satisfactory to the Administrator that such modified requirements

(1) will represent the maximum use of technology within the economic capability of the owner or operator; and

(2) will result in reasonable further progress toward the elimination of the discharge of pollutants.

(d) Review and revision of effluent limitations

Any effluent limitation required by paragraph (2) of subsection (b) of this section shall be reviewed at least every five years and, if appropriate, revised pursuant to the procedure established under such paragraph.

(e) All point discharge source application of effluent limitations

Effluent limitations established pursuant to this section or section 1312 of this title shall be applied to all point sources of discharge of pollutants in accordance with the provisions of this chapter.

(f) Illegality of discharge of radiological, chemical, or biological warfare agents, high-level radioactive waste, or medical waste

Notwithstanding any other provisions of this chapter it shall be unlawful to discharge any radiological, chemical, or biological warfare agent, any high-level radioactive waste, or any medical waste, into the navigable waters.

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(g) Modifications for certain nonconventional pollutants

(1) General authority

The Administrator, with the concurrence of the State, may modify the requirements of subsection (b)(2)(A) of this section with respect to the discharge from any point source of ammonia, chlorine, color, iron, and total phenols (4AAP) (when determined by the Administrator to be a pollutant covered by subsection (b)(2)(F) of this section) and any other pollutant which the Administrator lists under paragraph (4) of this subsection.

(2) Requirements for granting modifications

A modification under this subsection shall be granted only upon a showing by the owner or operator of a point source satisfactory to the Administrator that—

(A) such modified requirements will result at a minimum in compliance with the requirements of subsection (b)(1)(A) or (C) of this section, whichever is applicable;

(B) such modified requirements will not result in any additional requirements on any other point or nonpoint source; and

(C) such modification will not interfere with the attainment or maintenance of that water quality which shall assure protection of public water supplies, and the protection and propagation of a balanced population of shellfish, fish, and wildlife, and allow recreational activities, in and on the water and such modification will not result in the discharge of pollutants in quantities which may reasonably be anticipated to pose an unacceptable risk to human health or the environment because of bioaccumulation, persistency in the environment, acute toxicity, chronic toxicity (including carcinogenicity, mutagenicity or teratogenicity), or synergistic propensities.

(3) Limitation on authority to apply for subsection (c) modification

If an owner or operator of a point source applies for a modification under this subsection with respect to the discharge of any pollutant, such owner or operator shall be eligible to apply for modification under subsection (c) of this section with respect to such pollutant only during the same time period as he is eligible to apply for a modification under this subsection.

(4) Procedures for listing additional pollutants

(A) General authority

Upon petition of any person, the Administrator may add any pollutant to the list of pollutants for which modification under this section is authorized (except for pollutants identified pursuant to section 1314 (a)(4) of this title, toxic pollutants subject to section 1317 (a) of this title, and the thermal component of discharges) in accordance with the provisions of this paragraph.

(B) Requirements for listing

(i) Sufficient information

The person petitioning for listing of an additional pollutant under this subsection shall submit to the Administrator sufficient information to make the determinations required by this subparagraph.

(ii) Toxic criteria determination

The Administrator shall determine whether or not the pollutant meets the criteria for listing as a toxic pollutant under section 1317 (a) of this title.

(iii) Listing as toxic pollutant

If the Administrator determines that the pollutant meets the criteria for listing as a toxic pollutant under section 1317 (a) of this title, the Administrator shall list the pollutant as a toxic pollutant under section 1317 (a) of this title.

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(iv) Nonconventional criteria determination

If the Administrator determines that the pollutant does not meet the criteria for listing as a toxic pollutant under such section and determines that adequate test methods and sufficient data are available to make the determinations required by paragraph (2) of this subsection with respect to the pollutant, the Administrator shall add the pollutant to the list of pollutants specified in paragraph (1) of this subsection for which modifications are authorized under this subsection.

(C) Requirements for filing of petitions

A petition for listing of a pollutant under this paragraph—

(i) must be filed not later than 270 days after the date of promulgation of an applicable effluent guideline under section 1314 of this title;

(ii) may be filed before promulgation of such guideline; and

(iii) may be filed with an application for a modification under paragraph (1) with respect to the discharge of such pollutant.

(D) Deadline for approval of petition

A decision to add a pollutant to the list of pollutants for which modifications under this subsection are authorized must be made within 270 days after the date of promulgation of an applicable effluent guideline under section 1314 of this title.

(E) Burden of proof

The burden of proof for making the determinations under subparagraph (B) shall be on the petitioner.

(5) Removal of pollutants

The Administrator may remove any pollutant from the list of pollutants for which modifications are authorized under this subsection if the Administrator determines that adequate test methods and sufficient data are no longer available for determining whether or not modifications may be granted with respect to such pollutant under paragraph (2) of this subsection.

(h) Modification of secondary treatment requirements

The Administrator, with the concurrence of the State, may issue a permit under section 1342 of this title which modifies the requirements of subsection (b)(1)(B) of this section with respect to the discharge of any pollutant from a publicly owned treatment works into marine waters, if the applicant demonstrates to the satisfaction of the Administrator that—

(1) there is an applicable water quality standard specific to the pollutant for which the modification is requested, which has been identified under section 1314 (a)(6) of this title;

(2) the discharge of pollutants in accordance with such modified requirements will not interfere, alone or in combination with pollutants from other sources, with the attainment or maintenance of that water quality which assures protection of public water supplies and the protection and propagation of a balanced, indigenous population of shellfish, fish, and wildlife, and allows recreational activities, in and on the water;

(3) the applicant has established a system for monitoring the impact of such discharge on a representative sample of aquatic biota, to the extent practicable, and the scope of such monitoring is limited to include only those scientific investigations which are necessary to study the effects of the proposed discharge;

(4) such modified requirements will not result in any additional requirements on any other point or nonpoint source;

(5) all applicable pretreatment requirements for sources introducing waste into such treatment works will be enforced;

(6) in the case of any treatment works serving a population of 50,000 or more, with respect to any toxic pollutant introduced into such works by an industrial discharger for which pollutant there is no applicable pretreatment requirement in effect, sources introducing waste into such works are in compliance with all applicable pretreatment requirements, the applicant will enforce such requirements, and the applicant has in effect a pretreatment program which, in combination with the treatment of discharges from such works, removes the same amount of such pollutant as would be removed if such works were to apply secondary treatment to discharges and if such works had no pretreatment program with respect to such pollutant;

(7) to the extent practicable, the applicant has established a schedule of activities designed to eliminate the entrance of toxic pollutants from nonindustrial sources into such treatment works;

(8) there will be no new or substantially increased discharges from the point source of the pollutant to which the modification applies above that volume of discharge specified in the permit;

(9) the applicant at the time such modification becomes effective will be discharging effluent which has received at least primary or equivalent treatment and which meets the criteria established under section 1314 (a)(1) of this title after initial mixing in the waters surrounding or adjacent to the point at which such effluent is discharged.

For the purposes of this subsection the phrase "the discharge of any pollutant into marine waters" refers to a discharge into deep waters of the territorial sea or the waters of the contiguous zone, or into saline estuarine waters where there is strong tidal movement and other hydrological and geological characteristics which the Administrator determines necessary to allow compliance with paragraph (2) of this subsection, and section 1251 (a)(2) of this title. For the purposes of paragraph (9), "primary or equivalent treatment" means treatment by screening, sedimentation, and skimming adequate to remove at least 30 percent of the biological oxygen demanding material and of the suspended solids in the treatment works influent, and disinfection, where appropriate. A municipality which applies secondary treatment shall be eligible to receive a permit pursuant to this subsection which modifies the requirements of subsection (b)(1)(B) of this section with respect to the discharge of any pollutant from any treatment works owned by such municipality into marine waters. No permit issued under this subsection shall authorize the discharge of sewage sludge into marine waters. In order for a permit to be issued under this subsection for the discharge of a pollutant into marine waters, such marine waters must exhibit characteristics assuring that water providing dilution does not contain significant amounts of previously discharged effluent from such treatment works. No permit issued under this subsection shall authorize the discharge of any pollutant into saline estuarine waters which at the time of application do not support a balanced indigenous population of shellfish, fish and wildlife, or allow recreation in and on the waters or which exhibit ambient water quality below applicable water quality standards adopted for the protection of public water supplies, shellfish, fish and wildlife or recreational activities or such other standards necessary to assure support and protection of such uses. The prohibition contained in the preceding sentence shall apply without regard to the presence or absence of a causal relationship between such characteristics and the applicant's current or proposed discharge. Notwithstanding any other provisions of this subsection, no permit may be issued under this subsection for discharge of a pollutant into the New York Bight Apex consisting of the ocean waters of the Atlantic Ocean westward of 73 degrees 30 minutes west longitude and northward of 40 degrees 10 minutes north latitude.

(i) Municipal time extensions

(1) Where construction is required in order for a planned or existing publicly owned treatment works to achieve limitations under subsection (b)(1)(B) or (b)(1)(C) of this section, but

(A) construction cannot be completed within the time required in such subsection, or

(B) the United States has failed to make financial assistance under this chapter available in time to achieve such limitations by the time specified in such subsection, the owner or operator of such treatment works may request the Administrator (or if appropriate the State) to issue a permit pursuant to section 1342 of this title or to modify a permit issued pursuant to that section to extend such time for compliance. Any such request shall be filed with the Administrator

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(or if appropriate the State) within 180 days after February 4, 1987. The Administrator (or if appropriate the State) may grant such request and issue or modify such a permit, which shall contain a schedule of compliance for the publicly owned treatment works based on the earliest date by which such financial assistance will be available from the United States and construction can be completed, but in no event later than July 1, 1988, and shall contain such other terms and conditions, including those necessary to carry out subsections (b) through (g) of section 1281 of this title, section 1317 of this title, and such interim effluent limitations applicable to that treatment works as the Administrator determines are necessary to carry out the provisions of this chapter.

(2) **(A)** Where a point source (other than a publicly owned treatment works) will not achieve the requirements of subsections (b)(1)(A) and (b)(1)(C) of this section and—

(i) if a permit issued prior to July 1, 1977, to such point source is based upon a discharge into a publicly owned treatment works; or

(ii) if such point source (other than a publicly owned treatment works) had before July 1, 1977, a contract (enforceable against such point source) to discharge into a publicly owned treatment works; or

(iii) if either an application made before July 1, 1977, for a construction grant under this chapter for a publicly owned treatment works, or engineering or architectural plans or working drawings made before July 1, 1977, for a publicly owned treatment works, show that such point source was to discharge into such publicly owned treatment works,

and such publicly owned treatment works is presently unable to accept such discharge without construction, and in the case of a discharge to an existing publicly owned treatment works, such treatment works has an extension pursuant to paragraph (1) of this subsection, the owner or operator of such point source may request the Administrator (or if appropriate the State) to issue or modify such a permit pursuant to such section 1342 of this title to extend such time for compliance. Any such request shall be filed with the Administrator (or if appropriate the State) within 180 days after December 27, 1977, or the filing of a request by the appropriate publicly owned treatment works under paragraph (1) of this subsection, whichever is later. If the Administrator (or if appropriate the State) finds that the owner or operator of such point source has acted in good faith, he may grant such request and issue or modify such a permit, which shall contain a schedule of compliance for the point source to achieve the requirements of subsections (b)(1)(A) and (C) of this section and shall contain such other terms and conditions, including pretreatment and interim effluent limitations and water conservation requirements applicable to that point source, as the Administrator determines are necessary to carry out the provisions of this chapter.

(B) No time modification granted by the Administrator (or if appropriate the State) pursuant to paragraph (2)(A) of this subsection shall extend beyond the earliest date practicable for compliance or beyond the date of any extension granted to the appropriate publicly owned treatment works pursuant to paragraph (1) of this subsection, but in no event shall it extend beyond July 1, 1988; and no such time modification shall be granted unless

(i) the publicly owned treatment works will be in operation and available to the point source before July 1, 1988, and will meet the requirements of subsections (b)(1)(B) and (C) of this section after receiving the discharge from that point source; and

(ii) the point source and the publicly owned treatment works have entered into an enforceable contract requiring the point source to discharge into the publicly owned treatment works, the owner or operator of such point source to pay the costs required under section 1284 of this title, and the publicly owned treatment works to accept the discharge from the point source; and

(iii) the permit for such point source requires that point source to meet all requirements under section 1317 (a) and (b) of this title during the period of such time modification.

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(j) Modification procedures

(1) Any application filed under this section for a modification of the provisions of—

(A) subsection (b)(1)(B) of this section under subsection (h) of this section shall be filed not later that [1] the 365th day which begins after December 29, 1981, except that a publicly owned treatment works which prior to December 31, 1982, had a contractual arrangement to use a portion of the capacity of an ocean outfall operated by another publicly owned treatment works which has applied for or received modification under subsection (h) of this section, may apply for a modification of subsection (h) of this section in its own right not later than 30 days after February 4, 1987, and except as provided in paragraph (5);

(B) subsection (b)(2)(A) of this section as it applies to pollutants identified in subsection (b)(2)(F) of this section shall be filed not later than 270 days after the date of promulgation of an applicable effluent guideline under section 1314 of this title or not later than 270 days after December 27, 1977, whichever is later.

(2) Subject to paragraph (3) of this section, any application for a modification filed under subsection (g) of this section shall not operate to stay any requirement under this chapter, unless in the judgment of the Administrator such a stay or the modification sought will not result in the discharge of pollutants in quantities which may reasonably be anticipated to pose an unacceptable risk to human health or the environment because of bioaccumulation, persistency in the environment, acute toxicity, chronic toxicity (including carcinogenicity, mutagenicity, or teratogenicity), or synergistic propensities, and that there is a substantial likelihood that the applicant will succeed on the merits of such application. In the case of an application filed under subsection (g) of this section, the Administrator may condition any stay granted under this paragraph on requiring the filing of a bond or other appropriate security to assure timely compliance with the requirements from which a modification is sought.

(3) Compliance requirements under subsection (g).—

(A) Effect of filing.— An application for a modification under subsection (g) of this section and a petition for listing of a pollutant as a pollutant for which modifications are authorized under such subsection shall not stay the requirement that the person seeking such modification or listing comply with effluent limitations under this chapter for all pollutants not the subject of such application or petition.

(B) Effect of disapproval.— Disapproval of an application for a modification under subsection (g) of this section shall not stay the requirement that the person seeking such modification comply with all applicable effluent limitations under this chapter.

(4) Deadline for subsection (g) decision.—An application for a modification with respect to a pollutant filed under subsection (g) of this section must be approved or disapproved not later than 365 days after the date of such filing; except that in any case in which a petition for listing such pollutant as a pollutant for which modifications are authorized under such subsection is approved, such application must be approved or disapproved not later than 365 days after the date of approval of such petition.

(5) Extension of application deadline.—

(A) In general.— In the 180-day period beginning on October 31, 1994, the city of San Diego, California, may apply for a modification pursuant to subsection (h) of this section of the requirements of subsection (b)(1)(B) of this section with respect to biological oxygen demand and total suspended solids in the effluent discharged into marine waters.

(B) Application.— An application under this paragraph shall include a commitment by the applicant to implement a waste water reclamation program that, at a minimum, will—

(i) achieve a system capacity of 45,000,000 gallons of reclaimed waste water per day by January 1, 2010; and

(ii) result in a reduction in the quantity of suspended solids discharged by the applicant into the marine environment during the period of the modification.

(C) Additional conditions.— The Administrator may not grant a modification pursuant to an application submitted under this paragraph unless the Administrator determines that such modification will result in removal of not less than 58 percent of the biological oxygen demand (on an annual average) and not less than 80 percent of total suspended solids (on a monthly average) in the discharge to which the application applies.

(D) Preliminary decision deadline.— The Administrator shall announce a preliminary decision on an application submitted under this paragraph not later than 1 year after the date the application is submitted.

(k) Innovative technology

In the case of any facility subject to a permit under section 1342 of this title which proposes to comply with the requirements of subsection (b)(2)(A) or (b)(2)(E) of this section by replacing existing production capacity with an innovative production process which will result in an effluent reduction significantly greater than that required by the limitation otherwise applicable to such facility and moves toward the national goal of eliminating the discharge of all pollutants, or with the installation of an innovative control technique that has a substantial likelihood for enabling the facility to comply with the applicable effluent limitation by achieving a significantly greater effluent reduction than that required by the applicable effluent limitation and moves toward the national goal of eliminating the discharge of all pollutants, or by achieving the required reduction with an innovative system that has the potential for significantly lower costs than the systems which have been determined by the Administrator to be economically achievable, the Administrator (or the State with an approved program under section 1342 of this title, in consultation with the Administrator) may establish a date for compliance under subsection (b)(2)(A) or (b)(2)(E) of this section no later than two years after the date for compliance with such effluent limitation which would otherwise be applicable under such subsection, if it is also determined that such innovative system has the potential for industrywide application.

(l) Toxic pollutants

Other than as provided in subsection (n) of this section, the Administrator may not modify any requirement of this section as it applies to any specific pollutant which is on the toxic pollutant list under section 1317 (a)(1) of this title.

(m) Modification of effluent limitation requirements for point sources

(1) The Administrator, with the concurrence of the State, may issue a permit under section 1342 of this title which modifies the requirements of subsections (b)(1)(A) and (b)(2)(E) of this section, and of section 1343 of this title, with respect to effluent limitations to the extent such limitations relate to biochemical oxygen demand and pH from discharges by an industrial discharger in such State into deep waters of the territorial seas, if the applicant demonstrates and the Administrator finds that—

(A) the facility for which modification is sought is covered at the time of the enactment of this subsection by National Pollutant Discharge Elimination System permit number CA0005894 or CA0005282;

(B) the energy and environmental costs of meeting such requirements of subsections (b)(1)(A) and (b)(2)(E) of this section and section 1343 of this title exceed by an unreasonable amount the benefits to be obtained, including the objectives of this chapter;

(C) the applicant has established a system for monitoring the impact of such discharges on a representative sample of aquatic biota;

(D) such modified requirements will not result in any additional requirements on any other point or nonpoint source;

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(E) there will be no new or substantially increased discharges from the point source of the pollutant to which the modification applies above that volume of discharge specified in the permit;

(F) the discharge is into waters where there is strong tidal movement and other hydrological and geological characteristics which are necessary to allow compliance with this subsection and section 1251 (a)(2) of this title;

(G) the applicant accepts as a condition to the permit a contractural [2] obligation to use funds in the amount required (but not less than $250,000 per year for ten years) for research and development of water pollution control technology, including but not limited to closed cycle technology;

(H) the facts and circumstances present a unique situation which, if relief is granted, will not establish a precedent or the relaxation of the requirements of this chapter applicable to similarly situated discharges; and

(I) no owner or operator of a facility comparable to that of the applicant situated in the United States has demonstrated that it would be put at a competitive disadvantage to the applicant (or the parent company or any subsidiary thereof) as a result of the issuance of a permit under this subsection.

(2) The effluent limitations established under a permit issued under paragraph (1) shall be sufficient to implement the applicable State water quality standards, to assure the protection of public water supplies and protection and propagation of a balanced, indigenous population of shellfish, fish, fauna, wildlife, and other aquatic organisms, and to allow recreational activities in and on the water. In setting such limitations, the Administrator shall take into account any seasonal variations and the need for an adequate margin of safety, considering the lack of essential knowledge concerning the relationship between effluent limitations and water quality and the lack of essential knowledge of the effects of discharges on beneficial uses of the receiving waters.

(3) A permit under this subsection may be issued for a period not to exceed five years, and such a permit may be renewed for one additional period not to exceed five years upon a demonstration by the applicant and a finding by the Administrator at the time of application for any such renewal that the provisions of this subsection are met.

(4) The Administrator may terminate a permit issued under this subsection if the Administrator determines that there has been a decline in ambient water quality of the receiving waters during the period of the permit even if a direct cause and effect relationship cannot be shown: Provided, That if the effluent from a source with a permit issued under this subsection is contributing to a decline in ambient water quality of the receiving waters, the Administrator shall terminate such permit.

(n) Fundamentally different factors

(1) General rule

The Administrator, with the concurrence of the State, may establish an alternative requirement under subsection (b)(2) of this section or section 1317 (b) of this title for a facility that modifies the requirements of national effluent limitation guidelines or categorical pretreatment standards that would otherwise be applicable to such facility, if the owner or operator of such facility demonstrates to the satisfaction of the Administrator that—

(A) the facility is fundamentally different with respect to the factors (other than cost) specified in section 1314 (b) or 1314 (g) of this title and considered by the Administrator in establishing such national effluent limitation guidelines or categorical pretreatment standards;

(B) the application—

(i) is based solely on information and supporting data submitted to the Administrator during the rulemaking for establishment of the applicable national effluent limitation guidelines or categorical pretreatment standard specifically raising the factors that are fundamentally different for such facility; or

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(ii) is based on information and supporting data referred to in clause (i) and information and supporting data the applicant did not have a reasonable opportunity to submit during such rulemaking;

(C) the alternative requirement is no less stringent than justified by the fundamental difference; and

(D) the alternative requirement will not result in a non-water quality environmental impact which is markedly more adverse than the impact considered by the Administrator in establishing such national effluent limitation guideline or categorical pretreatment standard.

(2) Time limit for applications

An application for an alternative requirement which modifies the requirements of an effluent limitation or pretreatment standard under this subsection must be submitted to the Administrator within 180 days after the date on which such limitation or standard is established or revised, as the case may be.

(3) Time limit for decision

The Administrator shall approve or deny by final agency action an application submitted under this subsection within 180 days after the date such application is filed with the Administrator.

(4) Submission of information

The Administrator may allow an applicant under this subsection to submit information and supporting data until the earlier of the date the application is approved or denied or the last day that the Administrator has to approve or deny such application.

(5) Treatment of pending applications

For the purposes of this subsection, an application for an alternative requirement based on fundamentally different factors which is pending on February 4, 1987, shall be treated as having been submitted to the Administrator on the 180th day following February 4, 1987. The applicant may amend the application to take into account the provisions of this subsection.

(6) Effect of submission of application

An application for an alternative requirement under this subsection shall not stay the applicant's obligation to comply with the effluent limitation guideline or categorical pretreatment standard which is the subject of the application.

(7) Effect of denial

If an application for an alternative requirement which modifies the requirements of an effluent limitation or pretreatment standard under this subsection is denied by the Administrator, the applicant must comply with such limitation or standard as established or revised, as the case may be.

(8) Reports

By January 1, 1997, and January 1 of every odd-numbered year thereafter, the Administrator shall submit to the Committee on Environment and Public Works of the Senate and the Committee on Transportation and Infrastructure of the House of Representatives a report on the status of applications for alternative requirements which modify the requirements of effluent limitations under section 1311 or 1314 of this title or any national categorical pretreatment standard under section 1317 (b) of this title filed before, on, or after February 4, 1987.

(o) Application fees

The Administrator shall prescribe and collect from each applicant fees reflecting the reasonable administrative costs incurred in reviewing and processing applications for modifications submitted to the Administrator pursuant to subsections (c), (g), (i), (k), (m), and (n) of this section, section 1314 (d)(4) of this title, and section 1326 (a) of this title. All amounts collected by the Administrator under

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this subsection shall be deposited into a special fund of the Treasury entitled "Water Permits and Related Services" which shall thereafter be available for appropriation to carry out activities of the Environmental Protection Agency for which such fees were collected.

(p) Modified permit for coal remining operations

(1) In general

Subject to paragraphs (2) through (4) of this subsection, the Administrator, or the State in any case which the State has an approved permit program under section 1342 (b) of this title, may issue a permit under section 1342 of this title which modifies the requirements of subsection (b)(2)(A) of this section with respect to the pH level of any pre-existing discharge, and with respect to pre-existing discharges of iron and manganese from the remined area of any coal remining operation or with respect to the pH level or level of iron or manganese in any pre-existing discharge affected by the remining operation. Such modified requirements shall apply the best available technology economically achievable on a case-by-case basis, using best professional judgment, to set specific numerical effluent limitations in each permit.

(2) Limitations

The Administrator or the State may only issue a permit pursuant to paragraph (1) if the applicant demonstrates to the satisfaction of the Administrator or the State, as the case may be, that the coal remining operation will result in the potential for improved water quality from the remining operation but in no event shall such a permit allow the pH level of any discharge, and in no event shall such a permit allow the discharges of iron and manganese, to exceed the levels being discharged from the remined area before the coal remining operation begins. No discharge from, or affected by, the remining operation shall exceed State water quality standards established under section 1313 of this title.

(3) Definitions

For purposes of this subsection—

(A) Coal remining operation

The term "coal remining operation" means a coal mining operation which begins after February 4, 1987 at a site on which coal mining was conducted before August 3, 1977.

(B) Remined area

The term "remined area" means only that area of any coal remining operation on which coal mining was conducted before August 3, 1977.

(C) Pre-existing discharge

The term "pre-existing discharge" means any discharge at the time of permit application under this subsection.

(4) Applicability of strip mining laws

Nothing in this subsection shall affect the application of the Surface Mining Control and Reclamation Act of 1977 [30 U.S.C. 1201 et seq.] to any coal remining operation, including the application of such Act to suspended solids.

Footnotes

[1] So in original. Probably should be "than".

[2] So in original. Probably should be "contractual".

(June 30, 1948, ch. 758, title III, § 301, as added Pub. L. 92–500, § 2, Oct. 18, 1972, 86 Stat. 844; amended Pub. L. 95–217, §§ 42–47, 53 (c), Dec. 27, 1977, 91 Stat. 1582–1586, 1590; Pub. L. 97–117, §§ 21, 22 (a)–(d), Dec. 29, 1981, 95 Stat. 1631, 1632; Pub. L. 97–440, Jan. 8, 1983, 96 Stat. 2289; Pub. L. 100–4, title III, §§ 301(a)–(e), 302(a)–(d), 303(a), (b)(1), (c)–(f), 304(a), 305, 306(a), (b), 307, Feb. 4, 1987, 101 Stat. 29–37; Pub. L. 100–688, title III, § 3202(b), Nov. 18, 1988, 102 Stat. 4154; Pub. L.

103–431, § 2, Oct. 31, 1994, 108 Stat. 4396; Pub. L. 104–66, title II, § 2021(b), Dec. 21, 1995, 109 Stat. 727.)

References in Text

The Surface Mining Control and Reclamation Act of 1977, referred to in subsec. (p)(4), is Pub. L. 95–87, Aug. 3, 1977, 91 Stat. 445, as amended, which is classified generally to chapter 25 (§ 1201 et seq.) of Title 30, Mineral Lands and Mining. For complete classification of this Act to the Code, see Short Title note set out under section 1201 of Title 30 and Tables.

Amendments

1995—Subsec. (n)(8). Pub. L. 104–66 substituted "By January 1, 1997, and January 1 of every odd-numbered year thereafter, the Administrator shall submit to the Committee on Environment and Public Works of the Senate and the Committee on Transportation and Infrastructure" for "Every 6 months after February 4, 1987, the Administrator shall submit to the Committee on Environment and Public Works of the Senate and the Committee on Public Works and Transportation".

1994—Subsec. (j)(1)(A). Pub. L. 103–431, § 2(1), inserted before semicolon at end ", and except as provided in paragraph (5)".

Subsec. (j)(5). Pub. L. 103–431, § 2(2), added par. (5).

1988—Subsec. (f). Pub. L. 100–688 substituted ", any high-level radioactive waste, or any medical waste," for "or high-level radioactive waste".

1987—Subsec. (b)(2)(C). Pub. L. 100–4, § 301(a), struck out "not later than July 1, 1984," before "with respect" and inserted "as expeditiously as practicable but in no case later than three years after the date such limitations are promulgated under section 1314 (b) of this title, and in no case later than March 31, 1989" after "of this paragraph".

Subsec. (b)(2)(D). Pub. L. 100–4, § 301(b), substituted "as expeditiously as practicable, but in no case later than three years after the date such limitations are promulgated under section 1314 (b) of this title, and in no case later than March 31, 1989" for "not later than three years after the date such limitations are established".

Subsec. (b)(2)(E). Pub. L. 100–4, § 301(c), substituted "as expeditiously as practicable but in no case later than three years after the date such limitations are promulgated under section 1314 (b) of this title, and in no case later than March 31, 1989, compliance with" for "not later than July 1, 1984,".

Subsec. (b)(2)(F). Pub. L. 100–4, § 301(d), substituted "as expeditiously as practicable but in no case" for "not" and "and in no case later than March 31, 1989" for "or not later than July 1, 1984, whichever is later, but in no case later than July 1, 1987".

Subsec. (b)(3). Pub. L. 100–4, § 301(e), added par. (3).

Subsec. (g)(1). Pub. L. 100–4, § 302(a), substituted par. (1) for introductory provisions of former par. (1) which read as follows: "The Administrator, with the concurrence of the State, shall modify the requirements of subsection (b)(2)(A) of this section with respect to the discharge of any pollutant (other than pollutants identified pursuant to section 1314 (a)(4) of this title, toxic pollutants subject to section 1317 (a) of this title, and the thermal component of discharges) from any point source upon a showing by the owner or operator of such point source satisfactory to the Administrator that—". Subpars (A) to (C) of former par. (1) were redesignated as subpars. (A) to (C) of par. (2).

Subsec. (g)(2). Pub. L. 100–4, § 302(a), (d)(2), inserted introductory provisions of par. (2), and by so doing, redesignated subpars. (A) to (C) of former par. (1) as subpars. (A) to (C) of par. (2), realigned such subpars. with subpar. (A) of par. (4), and redesignated former par. (2) as (3).

Subsec. (g)(3). Pub. L. 100–4, § 302(a), (d)(1), redesignated former par. (2) as (3), inserted heading, and aligned par. (3) with par. (4).

Subsec. (g)(4), (5). Pub. L. 100–4, § 302(b), added pars. (4) and (5).

Subsec. (h). Pub. L. 100–4, § 303(d)(2), (e), in closing provisions, inserted provision defining "primary or equivalent treatment" for purposes of par. (9) and provisions placing limitations on issuance of permits for discharge of pollutant into marine waters and saline estuarine waters and prohibiting issuance of permit for discharge of pollutant into New York Bight Apex.

Subsec. (h)(2). Pub. L. 100–4, § 303(a), substituted "the discharge of pollutants in accordance with such modified requirements will not interfere, alone or in combination with pollutants from other sources," for "such modified requirements will not interfere".

Subsec. (h)(3). Pub. L. 100–4, § 303(b)(1), inserted “, and the scope of such monitoring is limited to include only those scientific investigations which are necessary to study the effects of the proposed discharge” before semicolon at end.

Subsec. (h)(6) to (9). Pub. L. 100–4, § 303(c), (d)(1), added par. (6), redesignated former pars. (6) and (7) as (7) and (8), respectively, substituted semicolon for period at end of par. (8), and added par. (9).

Subsec. (i)(1). Pub. L. 100–4, § 304(a), substituted “February 4, 1987” for “December 27, 1977”.

Subsec. (j)(1)(A). Pub. L. 100–4, § 303(f), inserted before semicolon at end “, except that a publicly owned treatment works which prior to December 31, 1982, had a contractual arrangement to use a portion of the capacity of an ocean outfall operated by another publicly owned treatment works which has applied for or received modification under subsection (h) of this section, may apply for a modification of subsection (h) of this section in its own right not later than 30 days after February 4, 1987”.

Subsec. (j)(2). Pub. L. 100–4, § 302(c)(1), substituted “Subject to paragraph (3) of this section, any” for “Any”.

Subsec. (j)(3), (4). Pub. L. 100–4, § 302(c)(2), added pars. (3) and (4).

Subsec. (k). Pub. L. 100–4, § 305, substituted “two years after the date for compliance with such effluent limitation which would otherwise be applicable under such subsection” for “July 1, 1987” and inserted “or (b)(2)(E)” after “(b)(2)(A)” in two places.

Subsec. (l). Pub. L. 100–4, § 306(b), substituted “Other than as provided in subsection (n) of this section, the” for “The”.

Subsecs. (n), (o). Pub. L. 100–4, § 306(a), added subsecs. (n) and (o).

Subsec. (p). Pub. L. 100–4, § 307, added subsec. (p).

1983—Subsec. (m). Pub. L. 97–440 added subsec. (m).

1981—Subsec. (b)(2)(B). Pub. L. 97–117, § 21(b), struck out subpar. (B) which required that, not later than July 1, 1983, compliance by all publicly owned treatment works with the requirements in section 1281 (g)(2)(A) of this title be achieved.

Subsec. (h). Pub. L. 97–117, § 22(a) to (c), struck out in provision preceding par. (1) “in an existing discharge” after “discharge of any pollutant”, struck out par. (8), which required the applicant to demonstrate to the satisfaction of the Administrator that any funds available to the owner of such treatment works under subchapter II of this chapter be used to achieve the degree of effluent reduction required by section 1281 (b) and (g)(2)(A) of this title or to carry out the requirements of this subsection, and inserted in provision following par. (7) a further provision that a municipality which applies secondary treatment be eligible to receive a permit which modifies the requirements of subsec. (b)(1)(B) of this section with respect to the discharge of any pollutant from any treatment works owned by such municipality into marine waters and that no permit issued under this subsection authorize the discharge of sewage sludge into marine waters.

Subsec. (i)(1), (2)(B). Pub. L. 97–117, § 21(a), substituted “July 1, 1988,” for “July 1, 1983,” wherever appearing. Par. (2)(B) contained a reference to “July 1, 1983;” which was changed to “July 1, 1988;” as the probable intent of Congress in that reference to July 1, 1983, was to the outside date for compliance for a point source other than a publicly owned treatment works and subpar. (B) allows a time extension for such a point source up to the date granted in an extension for a publicly owned treatment works, which date was extended to July 1, 1988, by Pub. L. 97–117.

Subsec. (j)(1)(A). Pub. L. 97–117, § 22(d), substituted “that the 365th day which begins after December 29, 1981” for “than 270 days after December 27, 1977”.

1977—Subsec. (b)(2)(A). Pub. L. 95–217, § 42(b), substituted “for pollutants identified in subparagraphs (C), (D), and (F) of this paragraph” for “not later than July 1, 1983”.

Subsec. (b)(2)(C) to (F). Pub. L. 95–217, § 42(a), added subpars. (C) to (F).

Subsec. (g). Pub. L. 95–217, § 43, added subsec. (g).

Subsec. (h). Pub. L. 95–217, § 44, added subsec. (h).

Subsec. (i). Pub. L. 95–217, § 45, added subsec. (i).

Subsec. (j). Pub. L. 95–217, § 46, added subsec. (j).

Subsec. (k). Pub. L. 95–217, § 47, added subsec. (k).

Subsec. (l). Pub. L. 95–217, § 53(c), added subsec. (l).

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Change of Name

Committee on Public Works and Transportation of House of Representatives treated as referring to Committee on Transportation and Infrastructure of House of Representatives by section 1(a) of Pub. L. 104–14, set out as a note preceding section 21 of Title 2, The Congress.

Effective Date of 1987 Amendment

Section 302(e) of Pub. L. 100–4 provided that:

"(1) General rule.—Except as provided in paragraph (2), the amendments made by this section [amending this section] shall apply to all requests for modifications under section 301(g) of the Federal Water Pollution Control Act [33 U.S.C. 1311 (g)] pending on the date of the enactment of this Act [Feb. 4, 1987] and shall not have the effect of extending the deadline established in section 301(j)(1)(B) of such Act.

"(2) Exception.—The amendments made by this section shall not affect any application for a modification with respect to the discharge of ammonia, chlorine, color, iron, or total phenols (4AAP) under section 301(g) of the Federal Water Pollution Control Act pending on the date of the enactment of this Act; except that the Administrator must approve or disapprove such application not later than 365 days after the date of such enactment."

Section 303(b)(2) of Pub. L. 100–4 provided that: "The amendment made by subsection (b) [amending this section] shall only apply to modifications and renewals of modifications which are tentatively or finally approved after the date of the enactment of this Act [Feb. 4, 1987]."

Section 303(g) of Pub. L. 100–4 provided that: "The amendments made by subsections (a), (c), (d), and (e) of this section [amending this section] shall not apply to an application for a permit under section 301(h) of the Federal Water Pollution Control Act [33 U.S.C. 1311 (h)] which has been tentatively or finally approved by the Administrator before the date of the enactment of this Act [Feb. 4, 1987]; except that such amendments shall apply to all renewals of such permits after such date of enactment."

Section 304(b) of Pub. L. 100–4 provided that: "The amendment made by subsection (a) [amending this section] shall not apply to those treatment works which are subject to a compliance schedule established before the date of the enactment of this Act [Feb. 4, 1987] by a court order or a final administrative order."

Effective Date of 1981 Amendment

Section 22(e) of Pub. L. 97–117 provided that: "The amendments made by this section [amending this section] shall take effect on the date of enactment of this Act [Dec. 29, 1981], except that no applicant, other than the city of Avalon, California, who applies after the date of enactment of this Act for a permit pursuant to subsection (h) of section 301 of the Federal Water Pollution Control Act [33 U.S.C. 1311 (h)] which modifies the requirements of subsection (b)(1)(B) of section 301 of such Act [33 U.S.C. 1311 (b)(1)(B)] shall receive such permit during the one-year period which begins on the date of enactment of this Act."

Regulations

Section 301(f) of Pub. L. 100–4 provided that: "The Administrator shall promulgate final regulations establishing effluent limitations in accordance with sections 301(b)(2)(A) and 307(b)(1) of the Federal Water Pollution Control Act [33 U.S.C. 1311 (b)(2)(A), 1317 (b)(1)] for all toxic pollutants referred to in table 1 of Committee Print Numbered 95–30 of the Committee on Public Works and Transportation of the House of Representatives which are discharged from the categories of point sources in accordance with the following table:

"Category	Date by which the final regulation shall be promulgated
Organic chemicals and plastics and synthetic fibers	December 31, 1986.
Pesticides	December 31, 1986."

Phosphate Fertilizer Effluent Limitation

Amendment by section 306(a), (b) of Pub. L. 100–4 not to be construed (A) to require the Administrator to permit the discharge of gypsum or gypsum waste into the navigable waters, (B) to affect the procedures and standards applicable to the Administrator in issuing permits under section 1342 (a)(1)(B) of this title, and (C) to affect the authority of any State to deny or condition certification under section 1314 of this title with respect to the issuance of permits under section 1342 (a)(1)(B) of this title, see section 306(c) of Pub. L. 100–4, set out as a note under section 1342 of this title.

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Discharges From Point Sources in United States Virgin Islands Attributable to Manufacture of Rum; Exemption From Federal Water Pollution Control Requirements; Conditions

Pub. L. 98–67, title II, § 214(g), Aug. 5, 1983, 97 Stat. 393, as amended by Pub. L. 99–514, § 2, Oct. 22, 1986, 100 Stat. 2095, provided that: "Any discharge from a point source in the United States Virgin Islands in existence on the date of the enactment of this subsection [Aug. 5, 1983] which discharge is attributable to the manufacture of rum (as defined in paragraphs (3) of section 7652(c) of the Internal Revenue Code of 1986 [formerly I.R.C. 1954]) [26 U.S.C. 7652 (c)(3)] shall not be subject to the requirements of section 301 (other than toxic pollutant discharges), section 306 or section 403 of the Federal Water Pollution Control Act [33 U.S.C. 1311, 1316, 1343] if—

"(1) such discharge occurs at least one thousand five hundred feet into the territorial sea from the line of ordinary low water from that portion of the coast which is in direct contact with the sea, and

"(2) the Governor of the United States Virgin Islands determines that such discharge will not interfere with the attainment or maintenance of that water quality which shall assure protection of public water supplies, and the protection and propagation of a balanced population of shellfish, fish, and wildlife, and allow recreational activities, in and on the water and will not result in the discharge of pollutants in quantities which may reasonably be anticipated to pose an unacceptable risk to human health or the environment because of bioaccumulation, persistency in the environment, acute toxicity, chronic toxicity (including carcinogenicity, mutagenicity, or teratogenicity), or synergistic propensities."

Certain Municipal Compliance Deadlines Unaffected; Exception

Section 21(a) of Pub. L. 97–117 provided in part that: "The amendment made by this subsection [amending this section] shall not be interpreted or applied to extend the date for compliance with section 301(b)(1)(B) or (C) of the Federal Water Pollution Control Act [33 U.S.C. 1311 (b)(1)(B), (C)] beyond schedules for compliance in effect as of the date of enactment of this Act [Dec. 29, 1981], except in cases where reductions in the amount of financial assistance under this Act [Pub. L. 97–117, see Short Title of 1981 Amendment note set out under section 1251 of this title] or changed conditions affecting the rate of construction beyond the control of the owner or operator will make it impossible to complete construction by July 1, 1983."

Territorial Sea and Contiguous Zone of United States

For extension of territorial sea and contiguous zone of United States, see Proc. No. 5928 and Proc. No. 7219, respectively, set out as notes under section 1331 of Title 43, Public Lands.

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tained (including attainment of the objective of this chapter) from achieving such limitation.

(B) Reasonable progress

The Administrator, with the concurrence of the State, may issue a permit which modifies the effluent limitations required by subsection (a) of this section for toxic pollutants for a single period not to exceed 5 years if the applicant demonstrates to the satisfaction of the Administrator that such modified requirements (i) will represent the maximum degree of control within the economic capability of the owner and operator of the source, and (ii) will result in reasonable further progress beyond the requirements of section 1311(b)(2) of this title toward the requirements of subsection (a) of this section.

(c) Delay in application of other limitations

The establishment of effluent limitations under this section shall not operate to delay the application of any effluent limitation established under section 1311 of this title.

(June 30, 1948, ch. 758, title III, § 302, as added Pub. L. 92–500, § 2, Oct. 18, 1972, 86 Stat. 846; amended Pub. L. 100–4, title III, § 308(e), Feb. 4, 1987, 101 Stat. 39.)

AMENDMENTS

1987—Subsec. (a). Pub. L. 100–4, § 308(e)(2), inserted ''or as identified under section 1314(*l*) of this title'' after ''Administrator'' and ''public health,'' after ''protection of''.

Subsec. (b). Pub. L. 100–4, § 308(e)(1), amended subsec. (b) generally. Prior to amendment, subsec. (b) read as follows:

''(1) Prior to establishment of any effluent limitation pursuant to subsection (a) of this section, the Administrator shall issue notice of intent to establish such limitation and within ninety days of such notice hold a public hearing to determine the relationship of the economic and social costs of achieving any such limitation or limitations, including any economic or social dislocation in the affected community or communities, to the social and economic benefits to be obtained (including the attainment of the objective of this chapter) and to determine whether or not such effluent limitations can be implemented with available technology or other alternative control strategies.

''(2) If a person affected by such limitation demonstrates at such hearing that (whether or not such technology or other alternative control strategies are available) there is no reasonable relationship between the economic and social costs and the benefits to be obtained (including attainment of the objective of this chapter), such limitation shall not become effective and the Administrator shall adjust such limitation as it applies to such person.''

§ 1313. Water quality standards and implementation plans

(a) Existing water quality standards

(1) In order to carry out the purpose of this chapter, any water quality standard applicable to interstate waters which was adopted by any State and submitted to, and approved by, or is awaiting approval by, the Administrator pursuant to this Act as in effect immediately prior to October 18, 1972, shall remain in effect unless the Administrator determined that such standard is not consistent with the applicable requirements of this Act as in effect immediately prior to October 18, 1972. If the Administrator makes such a determination he shall, within three months after October 18, 1972, notify the State and specify the changes needed to meet such requirements. If such changes are not adopted by the State within ninety days after the date of such notification, the Administrator shall promulgate such changes in accordance with subsection (b) of this section.

(2) Any State which, before October 18, 1972, has adopted, pursuant to its own law, water quality standards applicable to intrastate waters shall submit such standards to the Administrator within thirty days after October 18, 1972. Each such standard shall remain in effect, in the same manner and to the same extent as any other water quality standard established under this chapter unless the Administrator determines that such standard is inconsistent with the applicable requirements of this Act as in effect immediately prior to October 18, 1972. If the Administrator makes such a determination he shall not later than the one hundred and twentieth day after the date of submission of such standards, notify the State and specify the changes needed to meet such requirements. If such changes are not adopted by the State within ninety days after such notification, the Administrator shall promulgate such changes in accordance with subsection (b) of this section.

(3)(A) Any State which prior to October 18, 1972, has not adopted pursuant to its own laws water quality standards applicable to intrastate waters shall, not later than one hundred and eighty days after October 18, 1972, adopt and submit such standards to the Administrator.

(B) If the Administrator determines that any such standards are consistent with the applicable requirements of this Act as in effect immediately prior to October 18, 1972, he shall approve such standards.

(C) If the Administrator determines that any such standards are not consistent with the applicable requirements of this Act as in effect immediately prior to October 18, 1972, he shall, not later than the ninetieth day after the date of submission of such standards, notify the State and specify the changes to meet such requirements. If such changes are not adopted by the State within ninety days after the date of notification, the Administrator shall promulgate such standards pursuant to subsection (b) of this section.

(b) Proposed regulations

(1) The Administrator shall promptly prepare and publish proposed regulations setting forth water quality standards for a State in accordance with the applicable requirements of this Act as in effect immediately prior to October 18, 1972, if—

(A) the State fails to submit water quality standards within the times prescribed in subsection (a) of this section.

(B) a water quality standard submitted by such State under subsection (a) of this section is determined by the Administrator not to be consistent with the applicable requirements of subsection (a) of this section.

(2) The Administrator shall promulgate any water quality standard published in a proposed

regulation not later than one hundred and ninety days after the date he publishes any such proposed standard, unless prior to such promulgation, such State has adopted a water quality standard which the Administrator determines to be in accordance with subsection (a) of this section.

(c) Review; revised standards; publication

(1) The Governor of a State or the State water pollution control agency of such State shall from time to time (but at least once each three year period beginning with October 18, 1972) hold public hearings for the purpose of reviewing applicable water quality standards and, as appropriate, modifying and adopting standards. Results of such review shall be made available to the Administrator.

(2)(A) Whenever the State revises or adopts a new standard, such revised or new standard shall be submitted to the Administrator. Such revised or new water quality standard shall consist of the designated uses of the navigable waters involved and the water quality criteria for such waters based upon such uses. Such standards shall be such as to protect the public health or welfare, enhance the quality of water and serve the purposes of this chapter. Such standards shall be established taking into consideration their use and value for public water supplies, propagation of fish and wildlife, recreational purposes, and agricultural, industrial, and other purposes, and also taking into consideration their use and value for navigation.

(B) Whenever a State reviews water quality standards pursuant to paragraph (1) of this subsection, or revises or adopts new standards pursuant to this paragraph, such State shall adopt criteria for all toxic pollutants listed pursuant to section 1317(a)(1) of this title for which criteria have been published under section 1314(a) of this title, the discharge or presence of which in the affected waters could reasonably be expected to interfere with those designated uses adopted by the State, as necessary to support such designated uses. Such criteria shall be specific numerical criteria for such toxic pollutants. Where such numerical criteria are not available, whenever a State reviews water quality standards pursuant to paragraph (1), or revises or adopts new standards pursuant to this paragraph, such State shall adopt criteria based on biological monitoring or assessment methods consistent with information published pursuant to section 1314(a)(8) of this title. Nothing in this section shall be construed to limit or delay the use of effluent limitations or other permit conditions based on or involving biological monitoring or assessment methods or previously adopted numerical criteria.

(3) If the Administrator, within sixty days after the date of submission of the revised or new standard, determines that such standard meets the requirements of this chapter, such standard shall thereafter be the water quality standard for the applicable waters of that State. If the Administrator determines that any such revised or new standard is not consistent with the applicable requirements of this chapter, he shall not later than the ninetieth day after the date of submission of such standard notify the State and specify the changes to meet such requirements. If such changes are not adopted by the State within ninety days after the date of notification, the Administrator shall promulgate such standard pursuant to paragraph (4) of this subsection.

(4) The Administrator shall promptly prepare and publish proposed regulations setting forth a revised or new water quality standard for the navigable waters involved—

(A) if a revised or new water quality standard submitted by such State under paragraph (3) of this subsection for such waters is determined by the Administrator not to be consistent with the applicable requirements of this chapter, or

(B) in any case where the Administrator determines that a revised or new standard is necessary to meet the requirements of this chapter.

The Administrator shall promulgate any revised or new standard under this paragraph not later than ninety days after he publishes such proposed standards, unless prior to such promulgation, such State has adopted a revised or new water quality standard which the Administrator determines to be in accordance with this chapter.

(d) Identification of areas with insufficient controls; maximum daily load; certain effluent limitations revision

(1)(A) Each State shall identify those waters within its boundaries for which the effluent limitations required by section 1311(b)(1)(A) and section 1311(b)(1)(B) of this title are not stringent enough to implement any water quality standard applicable to such waters. The State shall establish a priority ranking for such waters, taking into account the severity of the pollution and the uses to be made of such waters.

(B) Each State shall identify those waters or parts thereof within its boundaries for which controls on thermal discharges under section 1311 of this title are not stringent enough to assure protection and propagation of a balanced indigenous population of shellfish, fish, and wildlife.

(C) Each State shall establish for the waters identified in paragraph (1)(A) of this subsection, and in accordance with the priority ranking, the total maximum daily load, for those pollutants which the Administrator identifies under section 1314(a)(2) of this title as suitable for such calculation. Such load shall be established at a level necessary to implement the applicable water quality standards with seasonal variations and a margin of safety which takes into account any lack of knowledge concerning the relationship between effluent limitations and water quality.

(D) Each State shall estimate for the waters identified in paragraph (1)(B) of this subsection the total maximum daily thermal load required to assure protection and propagation of a balanced, indigenous population of shellfish, fish, and wildlife. Such estimates shall take into account the normal water temperatures, flow rates, seasonal variations, existing sources of heat input, and the dissipative capacity of the identified waters or parts thereof. Such esti-

mates shall include a calculation of the maximum heat input that can be made into each such part and shall include a margin of safety which takes into account any lack of knowledge concerning the development of thermal water quality criteria for such protection and propagation in the identified waters or parts thereof.

(2) Each State shall submit to the Administrator from time to time, with the first such submission not later than one hundred and eighty days after the date of publication of the first identification of pollutants under section 1314(a)(2)(D) of this title, for his approval the waters identified and the loads established under paragraphs (1)(A), (1)(B), (1)(C), and (1)(D) of this subsection. The Administrator shall either approve or disapprove such identification and load not later than thirty days after the date of submission. If the Administrator approves such identification and load, such State shall incorporate them into its current plan under subsection (e) of this section. If the Administrator disapproves such identification and load, he shall not later than thirty days after the date of such disapproval identify such waters in such State and establish such loads for such waters as he determines necessary to implement the water quality standards applicable to such waters and upon such identification and establishment the State shall incorporate them into its current plan under subsection (e) of this section.

(3) For the specific purpose of developing information, each State shall identify all waters within its boundaries which it has not identified under paragraph (1)(A) and (1)(B) of this subsection and estimate for such waters the total maximum daily load with seasonal variations and margins of safety, for those pollutants which the Administrator identifies under section 1314(a)(2) of this title as suitable for such calculation and for thermal discharges, at a level that would assure protection and propagation of a balanced indigenous population of fish, shellfish, and wildlife.

(4) LIMITATIONS ON REVISION OF CERTAIN EFFLUENT LIMITATIONS.—

(A) STANDARD NOT ATTAINED.—For waters identified under paragraph (1)(A) where the applicable water quality standard has not yet been attained, any effluent limitation based on a total maximum daily load or other waste load allocation established under this section may be revised only if (i) the cumulative effect of all such revised effluent limitations based on such total maximum daily load or waste load allocation will assure the attainment of such water quality standard, or (ii) the designated use which is not being attained is removed in accordance with regulations established under this section.

(B) STANDARD ATTAINED.—For waters identified under paragraph (1)(A) where the quality of such waters equals or exceeds levels necessary to protect the designated use for such waters or otherwise required by applicable water quality standards, any effluent limitation based on a total maximum daily load or other waste load allocation established under this section, or any water quality standard established under this section, or any other permitting standard may be revised only if such revision is subject to and consistent with the antidegradation policy established under this section.

(e) Continuing planning process

(1) Each State shall have a continuing planning process approved under paragraph (2) of this subsection which is consistent with this chapter.

(2) Each State shall submit not later than 120 days after October 18, 1972, to the Administrator for his approval a proposed continuing planning process which is consistent with this chapter. Not later than thirty days after the date of submission of such a process the Administrator shall either approve or disapprove such process. The Administrator shall from time to time review each State's approved planning process for the purpose of insuring that such planning process is at all times consistent with this chapter. The Administrator shall not approve any State permit program under subchapter IV of this chapter for any State which does not have an approved continuing planning process under this section.

(3) The Administrator shall approve any continuing planning process submitted to him under this section which will result in plans for all navigable waters within such State, which include, but are not limited to, the following:

(A) effluent limitations and schedules of compliance at least as stringent as those required by section 1311(b)(1), section 1311(b)(2), section 1316, and section 1317 of this title, and at least as stringent as any requirements contained in any applicable water quality standard in effect under authority of this section;

(B) the incorporation of all elements of any applicable area-wide waste management plans under section 1288 of this title, and applicable basin plans under section 1289 of this title;

(C) total maximum daily load for pollutants in accordance with subsection (d) of this section;

(D) procedures for revision;

(E) adequate authority for intergovernmental cooperation;

(F) adequate implementation, including schedules of compliance, for revised or new water quality standards, under subsection (c) of this section;

(G) controls over the disposition of all residual waste from any water treatment processing;

(H) an inventory and ranking, in order of priority, of needs for construction of waste treatment works required to meet the applicable requirements of sections 1311 and 1312 of this title.

(f) Earlier compliance

Nothing in this section shall be construed to affect any effluent limitation, or schedule of compliance required by any State to be implemented prior to the dates set forth in sections 1311(b)(1) and 1311(b)(2) of this title nor to preclude any State from requiring compliance with any effluent limitation or schedule of compliance at dates earlier than such dates.

(g) Heat standards

Water quality standards relating to heat shall be consistent with the requirements of section 1326 of this title.

(h) Thermal water quality standards

For the purposes of this chapter the term ''water quality standards'' includes thermal water quality standards.

(i) Coastal recreation water quality criteria

(1) Adoption by States

(A) Initial criteria and standards

Not later than 42 months after October 10, 2000, each State having coastal recreation waters shall adopt and submit to the Administrator water quality criteria and standards for the coastal recreation waters of the State for those pathogens and pathogen indicators for which the Administrator has published criteria under section 1314(a) of this title.

(B) New or revised criteria and standards

Not later than 36 months after the date of publication by the Administrator of new or revised water quality criteria under section 1314(a)(9) of this title, each State having coastal recreation waters shall adopt and submit to the Administrator new or revised water quality standards for the coastal recreation waters of the State for all pathogens and pathogen indicators to which the new or revised water quality criteria are applicable.

(2) Failure of States to adopt

(A) In general

If a State fails to adopt water quality criteria and standards in accordance with paragraph (1)(A) that are as protective of human health as the criteria for pathogens and pathogen indicators for coastal recreation waters published by the Administrator, the Administrator shall promptly propose regulations for the State setting forth revised or new water quality standards for pathogens and pathogen indicators described in paragraph (1)(A) for coastal recreation waters of the State.

(B) Exception

If the Administrator proposes regulations for a State described in subparagraph (A) under subsection (c)(4)(B) of this section, the Administrator shall publish any revised or new standard under this subsection not later than 42 months after October 10, 2000.

(3) Applicability

Except as expressly provided by this subsection, the requirements and procedures of subsection (c) of this section apply to this subsection, including the requirement in subsection (c)(2)(A) of this section that the criteria protect public health and welfare.

(June 30, 1948, ch. 758, title III, § 303, as added Pub. L. 92–500, § 2, Oct. 18, 1972, 86 Stat. 846; amended Pub. L. 100–4, title III, § 308(d), title IV, § 404(b), Feb. 4, 1987, 101 Stat. 39, 68; Pub. L. 106–284, § 2, Oct. 10, 2000, 114 Stat. 870.)

REFERENCES IN TEXT

This Act, referred to in subsecs. (a)(1), (2), (3)(B), (C) and (b)(1), means act June 30, 1948, ch. 758, 62 Stat. 1155, prior to the supersedure and reenactment of act June 30, 1948 by act Oct. 18, 1972, Pub. L. 92–500, 86 Stat. 816. Act June 30, 1948, ch. 758, as added by act Oct. 18, 1972, Pub. L. 92–500, 86 Stat. 816, enacted this chapter.

AMENDMENTS

2000—Subsec. (i). Pub. L. 106–284 added subsec. (i).

1987—Subsec. (c)(2). Pub. L. 100–4, § 308(d), designated existing provision as subpar. (A) and added subpar. (B).

Subsec. (d)(4). Pub. L. 100–4, § 404(b), added par. (4).

§ 1313a. Revised water quality standards

The review, revision, and adoption or promulgation of revised or new water quality standards pursuant to section 303(c) of the Federal Water Pollution Control Act [33 U.S.C. 1313(c)] shall be completed by the date three years after December 29, 1981. No grant shall be made under title II of the Federal Water Pollution Control Act [33 U.S.C. 1281 et seq.] after such date until water quality standards are reviewed and revised pursuant to section 303(c), except where the State has in good faith submitted such revised water quality standards and the Administrator has not acted to approve or disapprove such submission within one hundred and twenty days of receipt.

(Pub. L. 97–117, § 24, Dec. 29, 1981, 95 Stat. 1632.)

REFERENCES IN TEXT

The Federal Water Pollution Control Act, referred to in text, is act June 30, 1948, ch. 758, as amended generally by Pub. L. 92–500, § 2, Oct. 18, 1972, 86 Stat. 816. Title II of the Act is classified generally to subchapter II (§ 1281 et seq.) of this chapter. For complete classification of this Act to the Code, see Short Title note set out under section 1251 of this title and Tables.

CODIFICATION

Section was enacted as part of the Municipal Wastewater Treatment Construction Grant Amendments of 1981, and not as part of the Federal Water Pollution Control Act which comprises this chapter.

§ 1314. Information and guidelines

(a) Criteria development and publication

(1) The Administrator, after consultation with appropriate Federal and State agencies and other interested persons, shall develop and publish, within one year after October 18, 1972 (and from time to time thereafter revise) criteria for water quality accurately reflecting the latest scientific knowledge (A) on the kind and extent of all identifiable effects on health and welfare including, but not limited to, plankton, fish, shellfish, wildlife, plant life, shorelines, beaches, esthetics, and recreation which may be expected from the presence of pollutants in any body of water, including ground water; (B) on the concentration and dispersal of pollutants, or their byproducts, through biological, physical, and chemical processes; and (C) on the effects of pollutants on biological community diversity, productivity, and stability, including information on the factors affecting rates of eutrophication and rates of organic and inorganic sedimentation for varying types of receiving waters.

(2) The Administrator, after consultation with appropriate Federal and State agencies and other interested persons, shall develop and pub-

NB: This unofficial compilation of the U.S. Code is current as of Jan. 4, 2012 (see http://www.law.cornell.edu/uscode/uscprint.html).

TITLE 33 - NAVIGATION AND NAVIGABLE WATERS
CHAPTER 26 - WATER POLLUTION PREVENTION AND CONTROL
SUBCHAPTER IV - PERMITS AND LICENSES

§ 1342. National pollutant discharge elimination system

(a) Permits for discharge of pollutants

(1) Except as provided in sections 1328 and 1344 of this title, the Administrator may, after opportunity for public hearing issue a permit for the discharge of any pollutant, or combination of pollutants, notwithstanding section 1311 (a) of this title, upon condition that such discharge will meet either

(A) all applicable requirements under sections 1311, 1312, 1316, 1317, 1318, and 1343 of this title, or

(B) prior to the taking of necessary implementing actions relating to all such requirements, such conditions as the Administrator determines are necessary to carry out the provisions of this chapter.

(2) The Administrator shall prescribe conditions for such permits to assure compliance with the requirements of paragraph (1) of this subsection, including conditions on data and information collection, reporting, and such other requirements as he deems appropriate.

(3) The permit program of the Administrator under paragraph (1) of this subsection, and permits issued thereunder, shall be subject to the same terms, conditions, and requirements as apply to a State permit program and permits issued thereunder under subsection (b) of this section.

(4) All permits for discharges into the navigable waters issued pursuant to section 407 of this title shall be deemed to be permits issued under this subchapter, and permits issued under this subchapter shall be deemed to be permits issued under section 407 of this title, and shall continue in force and effect for their term unless revoked, modified, or suspended in accordance with the provisions of this chapter.

(5) No permit for a discharge into the navigable waters shall be issued under section 407 of this title after October 18, 1972. Each application for a permit under section 407 of this title, pending on October 18, 1972, shall be deemed to be an application for a permit under this section. The Administrator shall authorize a State, which he determines has the capability of administering a permit program which will carry out the objectives of this chapter to issue permits for discharges into the navigable waters within the jurisdiction of such State. The Administrator may exercise the authority granted him by the preceding sentence only during the period which begins on October 18, 1972, and ends either on the ninetieth day after the date of the first promulgation of guidelines required by section 1314 (i)(2) of this title, or the date of approval by the Administrator of a permit program for such State under subsection (b) of this section, whichever date first occurs, and no such authorization to a State shall extend beyond the last day of such period. Each such permit shall be subject to such conditions as the Administrator determines are necessary to carry out the provisions of this chapter. No such permit shall issue if the Administrator objects to such issuance.

(b) State permit programs

At any time after the promulgation of the guidelines required by subsection (i)(2) of section 1314 of this title, the Governor of each State desiring to administer its own permit program for discharges into navigable waters within its jurisdiction may submit to the Administrator a full and complete description of the program it proposes to establish and administer under State law or under an interstate compact. In addition, such State shall submit a statement from the attorney general (or the attorney for those State water pollution control agencies which have independent legal counsel), or from the chief legal officer in the case of an interstate agency, that the laws of such State, or the interstate compact, as the case may be, provide adequate authority to carry out the described program. The Administrator shall approve each submitted program unless he determines that adequate authority does not exist:

NB: This unofficial compilation of the U.S. Code is current as of Jan. 4, 2012 (see http://www.law.cornell.edu/uscode/uscprint.html).

(1) To issue permits which—

(A) apply, and insure compliance with, any applicable requirements of sections 1311, 1312, 1316, 1317, and 1343 of this title;

(B) are for fixed terms not exceeding five years; and

(C) can be terminated or modified for cause including, but not limited to, the following:

(i) violation of any condition of the permit;

(ii) obtaining a permit by misrepresentation, or failure to disclose fully all relevant facts;

(iii) change in any condition that requires either a temporary or permanent reduction or elimination of the permitted discharge;

(D) control the disposal of pollutants into wells;

(2) **(A)** To issue permits which apply, and insure compliance with, all applicable requirements of section 1318 of this title; or

(B) To inspect, monitor, enter, and require reports to at least the same extent as required in section 1318 of this title;

(3) To insure that the public, and any other State the waters of which may be affected, receive notice of each application for a permit and to provide an opportunity for public hearing before a ruling on each such application;

(4) To insure that the Administrator receives notice of each application (including a copy thereof) for a permit;

(5) To insure that any State (other than the permitting State), whose waters may be affected by the issuance of a permit may submit written recommendations to the permitting State (and the Administrator) with respect to any permit application and, if any part of such written recommendations are not accepted by the permitting State, that the permitting State will notify such affected State (and the Administrator) in writing of its failure to so accept such recommendations together with its reasons for so doing;

(6) To insure that no permit will be issued if, in the judgment of the Secretary of the Army acting through the Chief of Engineers, after consultation with the Secretary of the department in which the Coast Guard is operating, anchorage and navigation of any of the navigable waters would be substantially impaired thereby;

(7) To abate violations of the permit or the permit program, including civil and criminal penalties and other ways and means of enforcement;

(8) To insure that any permit for a discharge from a publicly owned treatment works includes conditions to require the identification in terms of character and volume of pollutants of any significant source introducing pollutants subject to pretreatment standards under section 1317 (b) of this title into such works and a program to assure compliance with such pretreatment standards by each such source, in addition to adequate notice to the permitting agency of

(A) new introductions into such works of pollutants from any source which would be a new source as defined in section 1316 of this title if such source were discharging pollutants,

(B) new introductions of pollutants into such works from a source which would be subject to section 1311 of this title if it were discharging such pollutants, or

(C) a substantial change in volume or character of pollutants being introduced into such works by a source introducing pollutants into such works at the time of issuance of the permit. Such notice shall include information on the quality and quantity of effluent to be introduced into such treatment works and any anticipated impact of such change in the quantity or quality of effluent to be discharged from such publicly owned treatment works; and

(9) To insure that any industrial user of any publicly owned treatment works will comply with sections 1284 (b), 1317, and 1318 of this title.

NB: This unofficial compilation of the U.S. Code is current as of Jan. 4, 2012 (see http://www.law.cornell.edu/uscode/uscprint.html).

(c) Suspension of Federal program upon submission of State program; withdrawal of approval of State program; return of State program to Administrator

(1) Not later than ninety days after the date on which a State has submitted a program (or revision thereof) pursuant to subsection (b) of this section, the Administrator shall suspend the issuance of permits under subsection (a) of this section as to those discharges subject to such program unless he determines that the State permit program does not meet the requirements of subsection (b) of this section or does not conform to the guidelines issued under section 1314 (i)(2) of this title. If the Administrator so determines, he shall notify the State of any revisions or modifications necessary to conform to such requirements or guidelines.

(2) Any State permit program under this section shall at all times be in accordance with this section and guidelines promulgated pursuant to section 1314 (i)(2) of this title.

(3) Whenever the Administrator determines after public hearing that a State is not administering a program approved under this section in accordance with requirements of this section, he shall so notify the State and, if appropriate corrective action is not taken within a reasonable time, not to exceed ninety days, the Administrator shall withdraw approval of such program. The Administrator shall not withdraw approval of any such program unless he shall first have notified the State, and made public, in writing, the reasons for such withdrawal.

(4) Limitations on partial permit program returns and withdrawals.— A State may return to the Administrator administration, and the Administrator may withdraw under paragraph (3) of this subsection approval, of—

(A) a State partial permit program approved under subsection (n)(3) of this section only if the entire permit program being administered by the State department or agency at the time is returned or withdrawn; and

(B) a State partial permit program approved under subsection (n)(4) of this section only if an entire phased component of the permit program being administered by the State at the time is returned or withdrawn.

(d) Notification of Administrator

(1) Each State shall transmit to the Administrator a copy of each permit application received by such State and provide notice to the Administrator of every action related to the consideration of such permit application, including each permit proposed to be issued by such State.

(2) No permit shall issue

(A) if the Administrator within ninety days of the date of his notification under subsection (b)(5) of this section objects in writing to the issuance of such permit, or

(B) if the Administrator within ninety days of the date of transmittal of the proposed permit by the State objects in writing to the issuance of such permit as being outside the guidelines and requirements of this chapter. Whenever the Administrator objects to the issuance of a permit under this paragraph such written objection shall contain a statement of the reasons for such objection and the effluent limitations and conditions which such permit would include if it were issued by the Administrator.

(3) The Administrator may, as to any permit application, waive paragraph (2) of this subsection.

(4) In any case where, after December 27, 1977, the Administrator, pursuant to paragraph (2) of this subsection, objects to the issuance of a permit, on request of the State, a public hearing shall be held by the Administrator on such objection. If the State does not resubmit such permit revised to meet such objection within 30 days after completion of the hearing, or, if no hearing is requested within 90 days after the date of such objection, the Administrator may issue the permit pursuant to subsection (a) of this section for such source in accordance with the guidelines and requirements of this chapter.

(e) Waiver of notification requirement

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In accordance with guidelines promulgated pursuant to subsection (i)(2) of section 1314 of this title, the Administrator is authorized to waive the requirements of subsection (d) of this section at the time he approves a program pursuant to subsection (b) of this section for any category (including any class, type, or size within such category) of point sources within the State submitting such program.

(f) Point source categories

The Administrator shall promulgate regulations establishing categories of point sources which he determines shall not be subject to the requirements of subsection (d) of this section in any State with a program approved pursuant to subsection (b) of this section. The Administrator may distinguish among classes, types, and sizes within any category of point sources.

(g) Other regulations for safe transportation, handling, carriage, storage, and stowage of pollutants

Any permit issued under this section for the discharge of pollutants into the navigable waters from a vessel or other floating craft shall be subject to any applicable regulations promulgated by the Secretary of the department in which the Coast Guard is operating, establishing specifications for safe transportation, handling, carriage, storage, and stowage of pollutants.

(h) Violation of permit conditions; restriction or prohibition upon introduction of pollutant by source not previously utilizing treatment works

In the event any condition of a permit for discharges from a treatment works (as defined in section 1292 of this title) which is publicly owned is violated, a State with a program approved under subsection (b) of this section or the Administrator, where no State program is approved or where the Administrator determines pursuant to section 1319 (a) of this title that a State with an approved program has not commenced appropriate enforcement action with respect to such permit, may proceed in a court of competent jurisdiction to restrict or prohibit the introduction of any pollutant into such treatment works by a source not utilizing such treatment works prior to the finding that such condition was violated.

(i) Federal enforcement not limited

Nothing in this section shall be construed to limit the authority of the Administrator to take action pursuant to section 1319 of this title.

(j) Public information

A copy of each permit application and each permit issued under this section shall be available to the public. Such permit application or permit, or portion thereof, shall further be available on request for the purpose of reproduction.

(k) Compliance with permits

Compliance with a permit issued pursuant to this section shall be deemed compliance, for purposes of sections 1319 and 1365 of this title, with sections 1311, 1312, 1316, 1317, and 1343 of this title, except any standard imposed under section 1317 of this title for a toxic pollutant injurious to human health. Until December 31, 1974, in any case where a permit for discharge has been applied for pursuant to this section, but final administrative disposition of such application has not been made, such discharge shall not be a violation of

(1) section 1311, 1316, or 1342 of this title, or

(2) section 407 of this title, unless the Administrator or other plaintiff proves that final administrative disposition of such application has not been made because of the failure of the applicant to furnish information reasonably required or requested in order to process the application. For the 180-day period beginning on October 18, 1972, in the case of any point source discharging any pollutant or combination of pollutants immediately prior to such date which source is not subject to section 407 of this title, the discharge by such source shall not be a violation of this chapter if such a source applies for a permit for discharge pursuant to this section within such 180-day period.

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(l) Limitation on permit requirement

(1) Agricultural return flows

The Administrator shall not require a permit under this section for discharges composed entirely of return flows from irrigated agriculture, nor shall the Administrator directly or indirectly, require any State to require such a permit.

(2) Stormwater runoff from oil, gas, and mining operations

The Administrator shall not require a permit under this section, nor shall the Administrator directly or indirectly require any State to require a permit, for discharges of stormwater runoff from mining operations or oil and gas exploration, production, processing, or treatment operations or transmission facilities, composed entirely of flows which are from conveyances or systems of conveyances (including but not limited to pipes, conduits, ditches, and channels) used for collecting and conveying precipitation runoff and which are not contaminated by contact with, or do not come into contact with, any overburden, raw material, intermediate products, finished product, byproduct, or waste products located on the site of such operations.

(m) Additional pretreatment of conventional pollutants not required

To the extent a treatment works (as defined in section 1292 of this title) which is publicly owned is not meeting the requirements of a permit issued under this section for such treatment works as a result of inadequate design or operation of such treatment works, the Administrator, in issuing a permit under this section, shall not require pretreatment by a person introducing conventional pollutants identified pursuant to section 1314 (a)(4) of this title into such treatment works other than pretreatment required to assure compliance with pretreatment standards under subsection (b)(8) of this section and section 1317 (b)(1) of this title. Nothing in this subsection shall affect the Administrator's authority under sections 1317 and 1319 of this title, affect State and local authority under sections 1317 (b)(4) and 1370 of this title, relieve such treatment works of its obligations to meet requirements established under this chapter, or otherwise preclude such works from pursuing whatever feasible options are available to meet its responsibility to comply with its permit under this section.

(n) Partial permit program

(1) State submission

The Governor of a State may submit under subsection (b) of this section a permit program for a portion of the discharges into the navigable waters in such State.

(2) Minimum coverage

A partial permit program under this subsection shall cover, at a minimum, administration of a major category of the discharges into the navigable waters of the State or a major component of the permit program required by subsection (b) of this section.

(3) Approval of major category partial permit programs

The Administrator may approve a partial permit program covering administration of a major category of discharges under this subsection if—

(A) such program represents a complete permit program and covers all of the discharges under the jurisdiction of a department or agency of the State; and

(B) the Administrator determines that the partial program represents a significant and identifiable part of the State program required by subsection (b) of this section.

(4) Approval of major component partial permit programs

The Administrator may approve under this subsection a partial and phased permit program covering administration of a major component (including discharge categories) of a State permit program required by subsection (b) of this section if—

(A) the Administrator determines that the partial program represents a significant and identifiable part of the State program required by subsection (b) of this section; and

(B) the State submits, and the Administrator approves, a plan for the State to assume administration by phases of the remainder of the State program required by subsection (b) of this section by a specified date not more than 5 years after submission of the partial program under this subsection and agrees to make all reasonable efforts to assume such administration by such date.

(o) Anti-backsliding

(1) General prohibition

In the case of effluent limitations established on the basis of subsection (a)(1)(B) of this section, a permit may not be renewed, reissued, or modified on the basis of effluent guidelines promulgated under section 1314 (b) of this title subsequent to the original issuance of such permit, to contain effluent limitations which are less stringent than the comparable effluent limitations in the previous permit. In the case of effluent limitations established on the basis of section 1311 (b)(1)(C) or section 1313 (d) or (e) of this title, a permit may not be renewed, reissued, or modified to contain effluent limitations which are less stringent than the comparable effluent limitations in the previous permit except in compliance with section 1313 (d)(4) of this title.

(2) Exceptions

A permit with respect to which paragraph (1) applies may be renewed, reissued, or modified to contain a less stringent effluent limitation applicable to a pollutant if—

(A) material and substantial alterations or additions to the permitted facility occurred after permit issuance which justify the application of a less stringent effluent limitation;

(B) **(i)** information is available which was not available at the time of permit issuance (other than revised regulations, guidance, or test methods) and which would have justified the application of a less stringent effluent limitation at the time of permit issuance; or

(ii) the Administrator determines that technical mistakes or mistaken interpretations of law were made in issuing the permit under subsection (a)(1)(B) of this section;

(C) a less stringent effluent limitation is necessary because of events over which the permittee has no control and for which there is no reasonably available remedy;

(D) the permittee has received a permit modification under section 1311 (c), 1311 (g), 1311 (h), 1311 (i), 1311 (k), 1311 (n), or 1326 (a) of this title; or

(E) the permittee has installed the treatment facilities required to meet the effluent limitations in the previous permit and has properly operated and maintained the facilities but has nevertheless been unable to achieve the previous effluent limitations, in which case the limitations in the reviewed, reissued, or modified permit may reflect the level of pollutant control actually achieved (but shall not be less stringent than required by effluent guidelines in effect at the time of permit renewal, reissuance, or modification).

Subparagraph (B) shall not apply to any revised waste load allocations or any alternative grounds for translating water quality standards into effluent limitations, except where the cumulative effect of such revised allocations results in a decrease in the amount of pollutants discharged into the concerned waters, and such revised allocations are not the result of a discharger eliminating or substantially reducing its discharge of pollutants due to complying with the requirements of this chapter or for reasons otherwise unrelated to water quality.

(3) Limitations

In no event may a permit with respect to which paragraph (1) applies be renewed, reissued, or modified to contain an effluent limitation which is less stringent than required by effluent guidelines in effect at the time the permit is renewed, reissued, or modified. In no event may such a permit to discharge into waters be renewed, reissued, or modified to contain a less stringent effluent limitation if the implementation of such limitation would result in a violation of a water quality standard under section 1313 of this title applicable to such waters.

NB: This unofficial compilation of the U.S. Code is current as of Jan. 4, 2012 (see http://www.law.cornell.edu/uscode/uscprint.html).

(p) Municipal and industrial stormwater discharges

(1) General rule

Prior to October 1, 1994, the Administrator or the State (in the case of a permit program approved under this section) shall not require a permit under this section for discharges composed entirely of stormwater.

(2) Exceptions

Paragraph (1) shall not apply with respect to the following stormwater discharges:

(A) A discharge with respect to which a permit has been issued under this section before February 4, 1987.

(B) A discharge associated with industrial activity.

(C) A discharge from a municipal separate storm sewer system serving a population of 250,000 or more.

(D) A discharge from a municipal separate storm sewer system serving a population of 100,000 or more but less than 250,000.

(E) A discharge for which the Administrator or the State, as the case may be, determines that the stormwater discharge contributes to a violation of a water quality standard or is a significant contributor of pollutants to waters of the United States.

(3) Permit requirements

(A) Industrial discharges

Permits for discharges associated with industrial activity shall meet all applicable provisions of this section and section 1311 of this title.

(B) Municipal discharge

Permits for discharges from municipal storm sewers—

(i) may be issued on a system- or jurisdiction-wide basis;

(ii) shall include a requirement to effectively prohibit non-stormwater discharges into the storm sewers; and

(iii) shall require controls to reduce the discharge of pollutants to the maximum extent practicable, including management practices, control techniques and system, design and engineering methods, and such other provisions as the Administrator or the State determines appropriate for the control of such pollutants.

(4) Permit application requirements

(A) Industrial and large municipal discharges

Not later than 2 years after February 4, 1987, the Administrator shall establish regulations setting forth the permit application requirements for stormwater discharges described in paragraphs (2)(B) and (2)(C). Applications for permits for such discharges shall be filed no later than 3 years after February 4, 1987. Not later than 4 years after February 4, 1987, the Administrator or the State, as the case may be, shall issue or deny each such permit. Any such permit shall provide for compliance as expeditiously as practicable, but in no event later than 3 years after the date of issuance of such permit.

(B) Other municipal discharges

Not later than 4 years after February 4, 1987, the Administrator shall establish regulations setting forth the permit application requirements for stormwater discharges described in paragraph (2)(D). Applications for permits for such discharges shall be filed no later than 5 years after February 4, 1987. Not later than 6 years after February 4, 1987, the Administrator or the State, as the case may be, shall issue or deny each such permit. Any such permit shall

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provide for compliance as expeditiously as practicable, but in no event later than 3 years after the date of issuance of such permit.

(5) Studies

The Administrator, in consultation with the States, shall conduct a study for the purposes of—

(A) identifying those stormwater discharges or classes of stormwater discharges for which permits are not required pursuant to paragraphs (1) and (2) of this subsection;

(B) determining, to the maximum extent practicable, the nature and extent of pollutants in such discharges; and

(C) establishing procedures and methods to control stormwater discharges to the extent necessary to mitigate impacts on water quality.

Not later than October 1, 1988, the Administrator shall submit to Congress a report on the results of the study described in subparagraphs (A) and (B). Not later than October 1, 1989, the Administrator shall submit to Congress a report on the results of the study described in subparagraph (C).

(6) Regulations

Not later than October 1, 1993, the Administrator, in consultation with State and local officials, shall issue regulations (based on the results of the studies conducted under paragraph (5)) which designate stormwater discharges, other than those discharges described in paragraph (2), to be regulated to protect water quality and shall establish a comprehensive program to regulate such designated sources. The program shall, at a minimum,

(A) establish priorities,

(B) establish requirements for State stormwater management programs, and

(C) establish expeditious deadlines. The program may include performance standards, guidelines, guidance, and management practices and treatment requirements, as appropriate.

(q) Combined sewer overflows

(1) Requirement for permits, orders, and decrees

Each permit, order, or decree issued pursuant to this chapter after December 21, 2000, for a discharge from a municipal combined storm and sanitary sewer shall conform to the Combined Sewer Overflow Control Policy signed by the Administrator on April 11, 1994 (in this subsection referred to as the “CSO control policy”).

(2) Water quality and designated use review guidance

Not later than July 31, 2001, and after providing notice and opportunity for public comment, the Administrator shall issue guidance to facilitate the conduct of water quality and designated use reviews for municipal combined sewer overflow receiving waters.

(3) Report

Not later than September 1, 2001, the Administrator shall transmit to Congress a report on the progress made by the Environmental Protection Agency, States, and municipalities in implementing and enforcing the CSO control policy.

(r) Discharges incidental to the normal operation of recreational vessels

No permit shall be required under this chapter by the Administrator (or a State, in the case of a permit program approved under subsection (b)) for the discharge of any graywater, bilge water, cooling water, weather deck runoff, oil water separator effluent, or effluent from properly functioning marine engines, or any other discharge that is incidental to the normal operation of a vessel, if the discharge is from a recreational vessel.

(June 30, 1948, ch. 758, title IV, § 402, as added Pub. L. 92–500, § 2, Oct. 18, 1972, 86 Stat. 880; amended Pub. L. 95–217, §§ 33(c), 50, 54 (c)(1), 65, 66, Dec. 27, 1977, 91 Stat. 1577, 1588, 1591, 1599, 1600; Pub. L. 100–4, title IV, §§ 401–404(a), 404 (c), formerly 404(d), 405, Feb. 4, 1987, 101 Stat.

65–67, 69, renumbered § 404(c), Pub. L. 104–66, title II, § 2021(e)(2), Dec. 21, 1995, 109 Stat. 727; Pub. L. 102–580, title III, § 364, Oct. 31, 1992, 106 Stat. 4862; Pub. L. 106–554, § 1(a)(4) [div. B, title I, § 112(a)], Dec. 21, 2000, 114 Stat. 2763, 2763A–224; Pub. L. 110–288, § 2, July 29, 2008, 122 Stat. 2650.)

Amendments

2008—Subsec. (r). Pub. L. 110–288 added subsec. (r).

2000—Subsec. (q). Pub. L. 106–554 added subsec. (q).

1992—Subsec. (p)(1), (6). Pub. L. 102–580 substituted “October 1, 1994” for “October 1, 1992” in par. (1) and “October 1, 1993” for “October 1, 1992” in par. (6).

1987—Subsec. (a)(1). Pub. L. 100–4, § 404(c), inserted cl. (A) and (B) designations.

Subsec. (c)(1). Pub. L. 100–4, § 403(b)(2), substituted “as to those discharges” for “as to those navigable waters”.

Subsec. (c)(4). Pub. L. 100–4, § 403(b)(1), added par. (4).

Subsec. (l). Pub. L. 100–4, § 401, inserted “Limitation on permit requirement” as subsec. heading designated existing provisions as par. (1) and inserted par. heading, added par. (2), and aligned pars. (1) and (2).

Subsecs. (m) to (p). Pub. L. 100–4, §§ 402, 403 (a), 404 (a), 405, added subsecs. (m) to (p).

1977—Subsec. (a)(5). Pub. L. 95–217, § 50, substituted “section 1314 (i)(2)” for “section 1314 (h)(2)”.

Subsec. (b). Pub. L. 95–217, § 50, substituted in provisions preceding par. (1) “subsection (i)(2) of section 1314” for “subsection (h)(2) of section 1314”.

Subsec. (b)(8). Pub. L. 95–217, § 54(c)(1), inserted reference to identification in terms of character and volume of pollutants of any significant source introducing pollutants subject to pretreatment standards under section 1317 (b) of this title into treatment works and programs to assure compliance with pretreatment standards by each source.

Subsec. (c)(1), (2). Pub. L. 95–217, § 50, substituted “section 1314 (i)(2)” for “section 1314 (h)(2)”.

Subsec. (d)(2). Pub. L. 95–217, § 65(b), inserted provision requiring that, whenever the Administrator objects to the issuance of a permit under subsec. (d)(2) of this section, the written objection contain a statement of the reasons for the objection and the effluent limitations and conditions which the permit would include if it were issued by the Administrator.

Subsec. (d)(4). Pub. L. 95–217, § 65(a), added par. (4).

Subsec. (e). Pub. L. 95–217, § 50, substituted “subsection (i)(2) of section 1314” for “subsection (h)(2) of section 1314”.

Subsec. (h). Pub. L. 95–217, § 66, substituted “where no State program is approved or where the Administrator determines pursuant to section 1319 (a) of this title that a State with an approved program has not commenced appropriate enforcement action with respect to such permit,” for “where no State program is approved,”.

Subsec. (l). Pub. L. 95–217, § 33(c), added subsec. (l).

Transfer of Functions

For transfer of authorities, functions, personnel, and assets of the Coast Guard, including the authorities and functions of the Secretary of Transportation relating thereto, to the Department of Homeland Security, and for treatment of related references, see sections 468 (b), 551 (d), 552 (d), and 557 of Title 6, Domestic Security, and the Department of Homeland Security Reorganization Plan of November 25, 2002, as modified, set out as a note under section 542 of Title 6.

Enforcement functions of Administrator or other official of the Environmental Protection Agency under this section relating to compliance with national pollutant discharge elimination system permits with respect to pre-construction, construction, and initial operation of transportation system for Canadian and Alaskan natural gas were transferred to the Federal Inspector, Office of Federal Inspector for the Alaska Natural Gas Transportation System, until the first anniversary of the date of initial operation of the Alaska Natural Gas Transportation System, see Reorg. Plan No. 1 of 1979, §§ 102(a), 203 (a), 44 F.R. 33663, 33666, 93 Stat. 1373, 1376, effective July 1, 1979, set out in the Appendix to Title 5, Government Organization and Employees. Office of Federal Inspector for the Alaska Natural Gas Transportation System abolished and functions and authority vested in Inspector transferred to Secretary of Energy by section 3012(b) of Pub. L. 102–486, set out as an Abolition of Office of Federal Inspector note under section 719e of Title 15, Commerce and Trade. Functions and authority vested in Secretary of Energy subsequently transferred to Federal Coordinator for Alaska Natural Gas Transportation Projects by section 720d (f) of Title 15.

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Permit Requirements for Discharges From Certain Vessels

Pub. L. 110–299, §§ 1, 2, July 31, 2008, 122 Stat. 2995, as amended by Pub. L. 111–215, § 1, July 30, 2010, 124 Stat. 2347, provided that:

"SECTION 1. DEFINITIONS.

"In this Act:

"(1) Administrator.—The term 'Administrator' means the Administrator of the Environmental Protection Agency.

"(2) Covered vessel.—The term 'covered vessel' means a vessel that is—

"(A) less than 79 feet in length; or

"(B) a fishing vessel (as defined in section 2101 of title 46, United States Code), regardless of the length of the vessel.

"(3) Other terms.—The terms 'contiguous zone', 'discharge', 'ocean', and 'State' have the meanings given the terms in section 502 of the Federal Water Pollution Control Act (33 U.S.C. 1362).

"SEC. 2. DISCHARGES INCIDENTAL TO NORMAL OPERATION OF VESSELS.

"(a) No Permit Requirement.—Except as provided in subsection (b), during the period beginning on the date of the enactment of this Act [July 31, 2008] and ending on December 18, 2013, the Administrator, or a State in the case of a permit program approved under section 402 of the Federal Water Pollution Control Act (33 U.S.C. 1342), shall not require a permit under that section for a covered vessel for—

"(1) any discharge of effluent from properly functioning marine engines;

"(2) any discharge of laundry, shower, and galley sink wastes; or

"(3) any other discharge incidental to the normal operation of a covered vessel.

"(b) Exceptions.—Subsection (a) shall not apply with respect to—

"(1) rubbish, trash, garbage, or other such materials discharged overboard;

"(2) other discharges when the vessel is operating in a capacity other than as a means of transportation, such as when—

"(A) used as an energy or mining facility;

"(B) used as a storage facility or a seafood processing facility;

"(C) secured to a storage facility or a seafood processing facility; or

"(D) secured to the bed of the ocean, the contiguous zone, or waters of the United States for the purpose of mineral or oil exploration or development;

"(3) any discharge of ballast water; or

"(4) any discharge in a case in which the Administrator or State, as appropriate, determines that the discharge—

"(A) contributes to a violation of a water quality standard; or

"(B) poses an unacceptable risk to human health or the environment."

Stormwater Permit Requirements

Pub. L. 102–240, title I, § 1068, Dec. 18, 1991, 105 Stat. 2007, provided that:

"(a) General Rule.—Notwithstanding the requirements of sections 402(p)(2)(B), (C), and (D) of the Federal Water Pollution Control Act [33 U.S.C. 1342 (p)(2)(B), (C), (D)], permit application deadlines for stormwater discharges associated with industrial activities from facilities that are owned or operated by a municipality shall be established by the Administrator of the Environmental Protection Agency (hereinafter in this section referred to as the 'Administrator') pursuant to the requirements of this section.

"(b) Permit Applications.—

"(1) Individual applications.—The Administrator shall require individual permit applications for discharges described in subsection (a) on or before October 1, 1992; except that any municipality that has participated in a timely part I group application for an industrial activity discharging stormwater that is denied such participation in a group application or for which a group application is denied shall not be required to submit an individual application until the 180th day following the date on which the denial is made.

"(2) Group applications.—With respect to group applications for permits for discharges described in subsection (a), the Administrator shall require—

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"(A) part I applications on or before September 30, 1991, except that any municipality with a population of less than 250,000 shall not be required to submit a part I application before May 18, 1992; and

"(B) part II applications on or before October 1, 1992, except that any municipality with a population of less than 250,000 shall not be required to submit a part II application before May 17, 1993.

"(c) Municipalities With Less Than 100,000 Population.—The Administrator shall not require any municipality with a population of less than 100,000 to apply for or obtain a permit for any stormwater discharge associated with an industrial activity other than an airport, powerplant, or uncontrolled sanitary landfill owned or operated by such municipality before October 1, 1992, unless such permit is required by section 402(p)(2)(A) or (E) of the Federal Water Pollution Control Act [33 U.S.C. 1342 (p)(2)(A), (E)].

"(d) Uncontrolled Sanitary Landfill Defined.—For the purposes of this section, the term 'uncontrolled sanitary landfill' means a landfill or open dump, whether in operation or closed, that does not meet the requirements for run-on and run-off controls established pursuant to subtitle D of the Solid Waste Disposal Act [42 U.S.C. 6941 et seq.].

"(e) Limitation on Statutory Construction.—Nothing in this section shall be construed to affect any application or permit requirement, including any deadline, to apply for or obtain a permit for stormwater discharges subject to section 402(p)(2)(A) or (E) of the Federal Water Pollution Control Act [33 U.S.C. 1342 (p)(2)(A), (E)].

"(f) Regulations.—The Administrator shall issue final regulations with respect to general permits for stormwater discharges associated with industrial activity on or before February 1, 1992."

Phosphate Fertilizer Effluent Limitation

Section 306(c) of Pub. L. 100–4 provided that:

"(1) Issuance of permit.—As soon as possible after the date of the enactment of this Act [Feb. 4, 1987], but not later than 180 days after such date of enactment, the Administrator shall issue permits under section 402(a)(1)(B) of the Federal Water Pollution Control Act [33 U.S.C. 1342 (a)(1)(B)] with respect to facilities—

"(A) which were under construction on or before April 8, 1974, and

"(B) for which the Administrator is proposing to revise the applicability of the effluent limitation established under section 301(b) of such Act [33 U.S.C. 1311 (b)] for phosphate subcategory of the fertilizer manufacturing point source category to exclude such facilities.

"(2) Limitations on statutory construction.—Nothing in this section [amending section 1311 of this title and enacting this note] shall be construed—

"(A) to require the Administrator to permit the discharge of gypsum or gypsum waste into the navigable waters,

"(B) to affect the procedures and standards applicable to the Administrator in issuing permits under section 402(a)(1)(B) of the Federal Water Pollution Control Act [33 U.S.C. 1342 (a)(1)(B)], and

"(C) to affect the authority of any State to deny or condition certification under section 401 of such Act [33 U.S.C. 1341] with respect to the issuance of permits under section 402(a)(1)(B) of such Act."

Log Transfer Facilities

Section 407 of Pub. L. 100–4 provided that:

"(a) Agreement.—The Administrator and Secretary of the Army shall enter into an agreement regarding coordination of permitting for log transfer facilities to designate a lead agency and to process permits required under sections 402 and 404 of the Federal Water Pollution Control Act [33 U.S.C. 1342, 1344], where both such sections apply, for discharges associated with the construction and operation of log transfer facilities. The Administrator and Secretary are authorized to act in accordance with the terms of such agreement to assure that, to the maximum extent practicable, duplication, needless paperwork and delay in the issuance of permits, and inequitable enforcement between and among facilities in different States, shall be eliminated.

"(b) Applications and Permits Before October 22, 1985.—Where both of sections 402 and 404 of the Federal Water Pollution Control Act [33 U.S.C. 1342, 1344] apply, log transfer facilities which have received a permit under section 404 of such Act before October 22, 1985, shall not be required to submit a new application for a permit under section 402 of such Act. If the Administrator determines that the terms of a permit issued on or before October 22, 1985, under section 404 of such Act satisfies the applicable requirements of sections 301, 302, 306, 307, 308, and 403 of such Act [33 U.S.C. 1311, 1312, 1316, 1317, 1318, and 1343], a separate application for a permit under section 402 of such Act shall not thereafter be required. In any case where the Administrator demonstrates, after an opportunity for a hearing, that the terms of a permit issued on or before October 22, 1985, under section 404 of such Act do not satisfy the applicable requirements of sections 301, 302, 306, 307, 308, and 403 of such Act, modifications to the existing

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permit under section 404 of such Act to incorporate such applicable requirements shall be issued by the Administrator as an alternative to issuance of a separate new permit under section 402 of such Act.

"(c) Log Transfer Facility Defined.—For the purposes of this section, the term 'log transfer facility' means a facility which is constructed in whole or in part in waters of the United States and which is utilized for the purpose of transferring commercially harvested logs to or from a vessel or log raft, including the formation of a log raft."

Allowable Delay in Modifying Existing Approved State Permit Programs To Conform to 1977 Amendment

Section 54(c)(2) of Pub. L. 95–217 provided that any State permit program approved under this section before Dec. 27, 1977, which required modification to conform to the amendment made by section 54(c)(1) of Pub. L. 95–217, which amended subsec. (b)(8) of this section, not be required to be modified before the end of the one year period which began on Dec. 27, 1977, unless in order to make the required modification a State must amend or enact a law in which case such modification not be required for such State before the end of the two year period which began on Dec. 27, 1977.

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POLLUTION PREVENTION ACT OF 1990

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POLLUTION PREVENTION ACT OF 1990

(Omnibus Budget Reconciliation Act of 1990, Public Law 101–508, 104 Stat. 1388–321 et seq.)

[As Amended Through P.L. 107–377, December 31, 2002]

SEC. 6601. SHORT TITLE.

This subtitle may be cited as the "Pollution Prevention Act of 1990".

[42 U.S.C. 13101 note]

SEC. 6602. FINDINGS AND POLICY.

(a) FINDINGS.—The Congress finds that:

(1) The United States of America annually produces millions of tons of pollution and spends tens of billions of dollars per year controlling this pollution.

(2) There are significant opportunities for industry to reduce or prevent pollution at the source through cost-effective changes in production, operation, and raw materials use. Such changes offer industry substantial savings in reduced raw material, pollution control, and liability costs as well as help protect the environment and reduce risks to worker health and safety.

(3) The opportunities for source reduction are often not realized because existing regulations, and the industrial resources they require for compliance, focus upon treatment and disposal, rather than source reduction; existing regulations do not emphasize multi-media management of pollution; and businesses need information and technical assistance to overcome institutional barriers to the adoption of source reduction practices.

(4) Source reduction is fundamentally different and more desirable than waste management and pollution control. The Environmental Protection Agency needs to address the historical lack of attention to source reduction.

(5) As a first step in preventing pollution through source reduction, the Environmental Protection Agency must establish a source reduction program which collects and disseminates information, provides financial assistance to States, and implements the other activities provided for in this subtitle.

(b) POLICY.—The Congress hereby declares it to be the national policy of the United States that pollution should be prevented or reduced at the source whenever feasible; pollution that cannot be prevented should be recycled in an environmentally safe manner, whenever feasible; pollution that cannot be prevented or recycled should be treated in an environmentally safe manner whenever feasible; and disposal or other release into the environment should

be employed only as a last resort and shoud be conducted in an environmentally safe manner.

[42 U.S.C. 13101]

SEC. 6603. DEFINITIONS.

For purposes of this subtitle—

(1) The term "Administrator" means the Administrator of the Envirnmental Protection Agency.

(2) The term "Agency" means the Environmental Protection Agency.

(3) The term "toxic chemical" means any substance on the list described in section 313(c) of the Superfund Amendments and Reauthorization Act of 1986.

(4) The term "release" has the same meaning as provided by section 329(8) of the Superfund Amendments and Reauthorization Act of 1986.

(5)(A) The term "source reduction" means any practice which—

(i) reduces the amount of any hazardous substance, pollutant, or contaminant entering any waste stream or otherwise released into the environment (including fugitive emissions) prior to recycling, treatment, or disposal; and

(ii) reduces the hazards to public health and the environment associated with the release of such substances, pollutants, or contaminants.

The term includes equipment or technology modifications, process or procedure modifications, reformulation or redesign of products, substitution of raw materials, and improvements in housekeeping, maintenance, training, or inventory control.

(B) The term "source reduction" does not include any practice which alters the physical, chemical, or biological characteristics or the volume of a hazardous substance, pollutant, or contaminant through a process or activity which itself is not integral to and necessary for the production of a product or the providing of a service.

(6) The term "multi-media" means water, air, and land.

(7) The term "SIC codes" refers to the 2-digit code numbers used for classification of economic activity in the Standard Industrial Classification Manual.

[42 U.S.C. 13102]

SEC. 6604. EPA ACTIVITIES.

(a) AUTHORITIES.—The Administrator shall establish in the Agency an office to carry out the functions of the Administrator under this subtitle. The office shall be independent of the Agency's single-medium program offices but shall have the authority to review and advise such offices on their activities to promote a multimedia approach to source reduction. The office shall be under the direction of such officer of the Agency as the Administrator shall designate.

(b) FUNCTIONS.—The Administrator shall develop and implement a strategy to promote source reduction. As part of the strategy, the Administrator shall—

(1) establish standard methods of measurement of source reduction;

(2) ensure that the Agency considers the effect of its existing and proposed programs on source reduction efforts and shall review regulations of the Agency prior and subsequent to their proposal to determine their effect on source reduction;

(3) coordinate source reduction activities in each Agency Office and coordinate with appropriate offices to promote source reduction practices in other Federal agencies, and generic research and development on techniques and processes which have broad applicability;

(4) develop improved methods of coordinating, streamlining and assuring public access to data collected under Federal environmental statutes;

(5) facilitate the adoption of source reduction techniques by businesses. This strategy shall include the use of the Source Reduction Clearinghouse and State matching grants provided in this subtitle to foster the exchange of information regarding source reduction techniques, the dissemination of such information to businesses, and the provision of technical assistance to businesses. The strategy shall also consider the capabilities of various businesses to make use of source reduction techniques;

(6) identify, where appropriate, measurable goals which reflect the policy of this subtitle, the tasks necessary to achieve the goals, dates at which the principal tasks are to be accomplished, required resources, organizational responsibilities, and the means by which progress in meeting the goals will be measured;

(8)[1] establish an advisory panel of technical experts comprised of representatives from industry, the States, and public interest groups, to advise the Administrator on ways to improve collection and dissemination of data;

(9) establish a training program on source reduction opportunities, including workshops and guidance documents, for State and Federal permit issuance, enforcement, and inspection officials working within all agency program offices.[2]

(10) identify and make recommendations to Congress to eliminate barriers to source reduction including the use of incentives and disincentives;

(11) identify opportunities to use Federal procurement to encourage source reduction;

(12) develop, test and disseminate model source reduction auditing procedures designed to highlight source reduction opportunities; and

(13) establish an annual award program to recognize a company or companies which operate outstanding or innovative source reduction programs.

[42 U.S.C. 13103]

[1] So in law. Section 6604(b) was enacted without a paragraph (7).
[2] So in law. The period probably should be a semicolon.

SEC. 6605. GRANTS TO STATES FOR STATE TECHNICAL ASSISTANCE PROGRAMS.

(a) GENERAL AUTHORITY.—The Administrator shall make matching grants to States for programs to promote the use of source reduction techniques by businesses.

(b) CRITERIA.—When evaluating the requests for grants under this section, the Administrator shall consider, among other things, whether the proposed State program would accomplish the following:

(1) Make specific technical assistance available to businesses seeking information about source reduction opportunities, including funding for experts to provide onsite technical advice to business [1] seeking assistance and to assist in the development of source reduction plans.

(2) Target assistance to businesses for whom lack of information is an impediment to source reduction.

(3) Provide training in source reduction techniques. Such training may be provided through local engineering schools or any other appropriate means.

(c) MATCHING FUNDS.—Federal funds used in any State program under this section shall provide no more than 50 per centum of the funds made available to a State in each year of that State's participation in the program.

(d) EFFECTIVENESS.—The Administrator shall establish appropriate means for measuring the effectiveness of the State grants made under this section in promoting the use of source reduction techniques by businesses.

(e) INFORMATION.—States receiving grants under this section shall make information generated under the grants available to the Administrator.

[42 U.S.C. 13104]

SEC. 6606. SOURCE REDUCTION CLEARINGHOUSE.

(a) AUTHORITY.—The Administrator shall establish a Source Reduction Clearinghouse to compile information including a computer data base which contains information on management, technical, and operational approaches to source reduction. The Administrator shall use the clearinghouse to—

(1) serve as a center for source reduction technology transfer;

(2) mount active outreach and education programs by the States to further the adoption of source reduction technologies; and

(3) collect and compile information reported by States receiving grants under section 6605 on the operation and success of State source reduction programs.

(b) PUBLIC AVAILABILITY.—The Administrator shall make available to the public such information on source reduction as is gathered pursuant to this subtitle and such other pertinent information and analysis regarding source reduction as may be available to the

[1] So in law. Probably should be "businesses".

Administrator. The data base shall permit entry and retrieval of information to any person.

[42 U.S.C. 13105]

SEC. 6607. SOURCE REDUCTION AND RECYCLING DATA COLLECTION.

(a) REPORTING REQUIREMENTS.—Each owner or operator of a facility required to file an annual toxic chemical release form under section 313 of the Superfund Amendments and Reauthorization Act of 1986 ("SARA") for any toxic chemical shall include with each such annual filing a toxic chemical source reduction and recycling report for the preceeding[1] calendar year. The toxic chemical source reduction and recycling report shall cover each toxic chemical required to be reported in the annual toxic chemical release form filed by the owner or operator under section 313(c) of that Act. This section shall take effect with the annual report filed under section 313 for the first full calendar year beginning after the enactment of this subtitle.

(b) ITEMS INCLUDED IN REPORT.—The toxic chemical source reduction and recycling report required under subsection (a) shall set forth each of the following on a facility-by-facility basis for each toxic chemical:

(1) The quantity of the chemical entering any waste stream (or otherwise released into the environment) prior to recycling, treatment, or disposal during the calendar year for which the report is filed and the percentage change from the previous year. The quantity reported shall not include any amount reported under paragraph (7). When actual measurements of the quantity of a toxic chemical entering the waste streams are not readily available, reasonable estimates should be made on best engineering judgment.

(2) The amount of the chemical from the facility which is recycled (at the facility or elsewhere) during such calendar year, the percentage change from the previous year, and the process of recycling used.

(3) The source reduction practices used with respect to that chemical during such year at the facility. Such practices shall be reported in accordance with the following categories unless the Administrator finds other categories to be more appropriate.

(A) Equipment, technology, process, or procedure modifications.

(B) Reformulation or redesign of products.

(C) Substitution of raw materials.

(D) Improvement in management, training, inventory control, materials handling, or other general operational phases of industrial facilities.

(4) The amount expected to be reported under paragraph[2] (1) and (2) for the two calendar years immediately following the calendar year for which the report is filed. Such amount shall be expressed as a percentage change from the amount reported in paragraphs (1) and (2).

[1] So in law. Probably should be "preceding".
[2] So in law. Probably should be "paragraphs".

(5) A ratio of production in the reporting year to production in the previous year. The ratio should be calculated to most closely reflect all activities involving the toxic chemical. In specific industrial classifications subject to this section, where a feedstock or some variable other than production is the primary influence on waste characteristics or volumes, the report may provide an index based on that primary variable for each toxic chemical. The Administrator is encouraged to develop production indexes to accommodate individual industries for use on a voluntary basis.

(6) The techniques which were used to identify source reduction opportunities. Techniques listed should include, but are not limited to, employee recommendations, external and internal audits, participative team management, and material balance audits. Each type of source reduction listed under paragraph (3) should be associated with the techniques or multiples of techniques used to identify the source reduction technique.

(7) The amount of any toxic chemical released into the environment which resulted from a castatrophic event, remedial action, or other one-time event, and is not associated with production processess during the reporting year.

(8) The amount of the chemical from the facility which is treated (at the facility or elsewhere) during such calendar year and the percentage change from the previous year. For the first year of reporting under this subsection, comparison with the previous year is required only to the extent such information is available.

(c) SARA PROVISIONS.—The provisions of sections 322, 325(c), and 326 of the Superfund Amendments and Reauthorization Act of 1986 shall apply to the reporting requirements of this section in the same manner as to the reports required under section 313 of that Act. The Administrator may modify the form required for purposes of reporting information under section 313 of that Act to the extent he deems necessary to include the additional information required under this section.

(d) ADDITIONAL OPTIONAL INFORMATION.—Any person filing a report under this section for any year may include with the report additional information regarding source reduction, recycling, and other pollution control techniques in earlier years.

(e) AVAILABILITY OF DATA.—Subject to section 322 of the Superfund Amendments and Reauthorization Act of 1986, the Administrator shall make data collected under this section publicly available in the same manner as the data collected under section 313 of the Superfund Amendments and Reauthorization Act of 1986.

[42 U.S.C. 13107]

SEC. 6608. EPA REPORT.

(a) BIENNIAL REPORTS.—The Administrator shall provide Congress with a report within eighteen months after enactment of this subtitle and biennially thereafter, containing a detailed description of the actions taken to implement the strategy to promote source

reduction developed under section 4(b)[1] and the results of such actions. The report shall include an assessment of the effectiveness of the clearinghouse and grant program established under this subtitle in promoting the goals of the strategy, and shall evaluate data gaps and data duplication with respect to data collected under Federal environmental statutes.

(b) SUBSEQUENT REPORTS.—Each biennial report submitted under subsection (a) after the first report shall contain each of the following:

(1) An analysis of the data collected under section 6607 on an industry-by-industry basis for not less than five SIC codes or other categories as the Administrator deems appropriate. The analysis shall begin with those SIC codes or other categories of facilities which generate the largest quantities of toxic chemical waste. The analysis shall include an evaluation of trends in source reduction by industry, firm size, production, or other useful means. Each such subsequent report shall cover five SIC codes or other categories which were not covered in a prior report until all SIC codes or other categories have been covered.

(2) An analysis of the usefulness and validity of the data collected under section 6607 for measuring trends in source reduction and the adoption of source reduction by business.

(3) Identification of regulatory and nonregulatory barriers to source reduction, and of opportunities for using existing regulatory programs, and incentives and disincentives to promote and assist source reduction.

(4) Identification of industries and pollutants that require priority assistance in multi-media source reduction[2]

(5) Recommendations as to incentives needed to encourage investment and research and development in source reduction.

(6) Identification of opportunities and development of priorities for research and development in source reduction methods and techniques.

(7) An evaluation of the cost and technical feasibility, by industry and processes, of source reduction opportunities and current activities and an identification of any industries for which there are significant barriers to source reduction with an analysis of the basis of this identification.

(8) An evaluation of methods of coordinating, streamlining, and improving public access to data collected under Federal environmental statutes.

(9) An evaluation of data gaps and data duplication with respect to data collected under Federal environmental statutes.

In the report following the first biennial report provided for under this subsection, paragraphs (3) through (9) may be included at the discretion of the Administrator.

[42 U.S.C. 13107]

[1] So in law. Probably should be "6604(b)".
[2] So in law. Probably should be followed by a period.

SEC. 6609. SAVINGS PROVISIONS.

(a) Nothing in this subtitle shall be construed to modify or interfere with the implementation of title III of the Superfund Amendments and Reauthorization Act of 1986.

(b) Nothing contained in this subtitle shall be construed, interpreted or applied to supplant, displace, preempt or otherwise diminish the responsibilities and liabilities under other State or Federal law, whether statutory or common.

[42 U.S.C. 13108]

SEC. 6610. AUTHORIZATION OF APPROPRIATIONS.

There is authorized to be appropriated to the Administrator $8,000,000 for each of the fiscal years 1991, 1992, and 1993 for functions carried out under this subtitle (other than State Grants), and $8,000,000 for each of the fiscal years 1991, 1992, and 1993, for grant programs to States issued pursuant to section 6605.

[42 U.S.C. 13109]

WATER QUALITY CONTROL PLAN

OCEAN WATERS OF CALIFORNIA

2015

STATE WATER RESOURCES CONTROL BOARD

CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY

CALIFORNIA
Water Boards
STATE WATER RESOURCES CONTROL BOARD
REGIONAL WATER QUALITY CONTROL BOARDS

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State of California

STATE WATER RESOURCES CONTROL BOARD

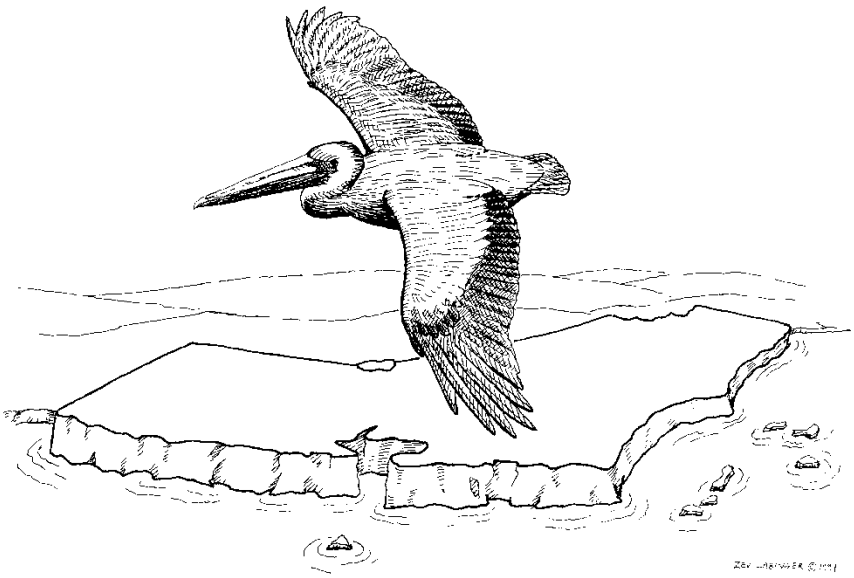

2015

CALIFORNIA OCEAN PLAN

WATER QUALITY CONTROL PLAN

OCEAN WATERS OF CALIFORNIA

Amendments to the Water Quality Control Plan for the Ocean Waters of California

Name	Date Adopted	Resolution Number	Effective Date
1. Amendment to the statewide for the Ocean Plan of California addressing desalination facility intakes, brine discharges, and to incorporate other non-substantive changes	5/06/2015	2015-0033	1/28/2016
2. Amendment to the Water Quality Control Plan for Ocean Waters of California to control trash and part 1 trash provisions of the Water Quality Control Plan for inland surface waters, enclosed bays, and estuaries in California	4/7/2015	2015-0019	1/12/2016
3. Adoption of the California Ocean Plan Amendments regarding model monitoring, vessel discharges, and non-substantive changes	10/16/2012	2012-0057	7/01/2013
4. Adopting the California Ocean Plan Amendment implementing State Water Board resolutions 2010-0057 and 2011-013 regarding State Water Quality Protection Areas and Marine Protected Areas	10/16/2012	2012-0056	7/01/2013
5. Adoption of Proposed Amendments to the California Ocean Plan regarding total recoverable metals, compliance schedules, toxicity definitions, and the list of exceptions	9/15/2009	2009-0072	3/10/2010
6. Amendment to the California Ocean Plan: (1) Reasonable Potential, Determining When California Ocean Plan Water Quality-Based Effluent Limitations are Required, and (2) Minor Changes to the Areas of Special Biological Significance, and Exception Provisions	4/21/2005	2005-0035	10/12/2005
7. Amendment to California Ocean Plan Water Contact Bacterial Standards	1/20/2005	2005-0013	10/12/2005
8. Adoption of the Proposed Amendments to the California Ocean Plan regarding Table A, chemical water quality objectives, provisions of compliance, special protection for water quality and designated uses, and administrative changes	11/16/2000	2000-108	12/03/2001
9. Adoption of an Amendment to the Water Quality Control Plan for Ocean Waters of California regarding revisions to the list of critical life stage protocols used in testing the toxicity of waste discharges	3/20/1997	97-026	7/23/1997
10. Approval of Amendment to the Water Quality Control Plan for Ocean Waters of California regarding new water quality objectives in Table B	3/22/1990	90-027	3/22/1990

11. Water Quality Control Plan for Ocean Waters of California, California Ocean Plan	9/22/1988	88-111	9/22/1988
12. Water Quality Control Plan for Ocean Waters of California	11/17/1983	83-087	11/17/1983
13. Water Quality Control Plan for Ocean Waters of California	1/19/1978	78-002	1/19/1978
14. Water Quality Control Plan for Ocean Waters of California	7/06/1972	72-045	7/06/1972

CALIFORNIA OCEAN PLAN

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CALIFORNIA OCEAN PLAN

WATER QUALITY CONTROL PLAN FOR OCEAN WATERS OF CALIFORNIA

INTRODUCTION

A. Purpose and Authority

1. In furtherance of legislative policy set forth in section 13000 of Division 7 of the California Water Code (CWC) (Stats. 1969, Chap. 482) pursuant to the authority contained in section 13170 and 13170.2 (Stats. 1971, Chap. 1288) the State Water Resources Control Board (State Water Board) hereby finds and declares that protection of the quality of the ocean* waters for use and enjoyment by the people of the State requires control of the discharge of waste* to ocean* waters and control of intake seawater* in accordance with the provisions contained herein. The Board finds further that this plan shall be reviewed at least every three years to guarantee that the current standards are adequate and are not allowing degradation* to marine species or posing a threat to public health.

B. Principles

1. Harmony Among Water Quality Control Plans and Policies.

   a. In the adoption and amendment of water quality control plans, it is the intent of this Board that each plan will provide for the attainment and maintenance of the water quality standards of downstream waters.*

   b. To the extent there is a conflict between a provision of this plan and a provision of another statewide plan or policy, or a regional water quality control plan (basin plan), the more stringent provision shall apply except where pursuant to Chap. III.J of this Plan, the State Water Board has approved an exception to the Plan requirements, and except in chapter III.M, in which the provisions of this plan shall govern.

C. Applicability

1. This plan is applicable, in its entirety, to point source discharges to the ocean.* Nonpoint sources of waste* discharges to the ocean* are subject to Chapter I Beneficial Uses, Chapter II - WATER QUALITY OBJECTIVES (wherein compliance with water quality objectives shall, in all cases, be determined by direct measurements in the receiving waters*) and Chapter III - PROGRAM OF IMPLEMENTATION Parts A.2, D, E, and I.

2. This plan is not applicable to discharges to enclosed* bays and estuaries* or inland waters or the control of dredged material.*

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* See Appendix I for definition of terms.

3. Provisions regulating the thermal aspects of waste* discharged to the ocean* are set forth in the Water Quality Control Plan for the Control of Temperature in the Coastal and Interstate Waters and Enclosed* Bays and Estuaries* of California.

4. Provisions regulating the intake of seawater* for desalination facilities* are established pursuant to the authority contained in section 13142.5 subdivision (b) of the California Water Code (Stats. 1976, Chap. 1330).

5. Within this Plan, references to the State Board or State Water Board shall mean the State Water Resources Control Board. References to a Regional Board or Regional Water Board shall mean a California Regional Water Quality Control Board. References to the Environmental Protection Agency, USEPA, or EPA shall mean the federal Environmental Protection Agency.

* See Appendix I for definition of terms.

I. BENEFICIAL USES

A. The beneficial uses of the ocean* waters of the State that shall be protected include industrial water supply; water contact and non-contact recreation, including aesthetic enjoyment; navigation; commercial and sport fishing; mariculture*; preservation and enhancement of designated Areas* of Special Biological Significance (ASBS); rare and endangered species; marine habitat; fish migration; fish spawning and shellfish* harvesting.

* See Appendix I for definition of terms.

II. WATER QUALITY OBJECTIVES

A. General Provisions

1. This chapter sets forth limits or levels of water quality characteristics for ocean* waters to ensure the reasonable protection of beneficial uses and the prevention of nuisance. The discharge of waste* shall not cause violation of these objectives.

2. The Water Quality Objectives and Effluent Limitations are defined by a statistical distribution when appropriate. This method recognizes the normally occurring variations in treatment efficiency and sampling and analytical techniques and does not condone poor operating practices.

3. Compliance with the water quality objectives of this chapter shall be determined from samples collected at stations representative of the area within the waste* field where initial* dilution is completed.

B. Bacterial Characteristics

1. Water-Contact Standards

Both the State Water Board and the California Department of Public Health (CDPH) have established standards to protect water contact recreation in coastal waters from bacterial contamination. Subsection a of this section contains bacterial objectives adopted by the State Water Board for ocean* waters used for water contact recreation. Subsection b describes the bacteriological standards adopted by CDPH for coastal waters adjacent to public beaches and public water contact sports areas in ocean waters.

a. State Water Board Water-Contact Standards

(1) Within a zone bounded by the shoreline and a distance of 1,000 feet from the shoreline or the 30-foot depth contour, whichever is further from the shoreline, and in areas outside this zone used for water contact sports, as determined by the Regional Board (i.e., waters designated as REC-1), but including all kelp beds,* the following bacterial objectives shall be maintained throughout the water column:

30-day Geometric Mean – The following standards are based on the geometric mean of the five most recent samples from each site:

i. Total coliform density shall not exceed 1,000 per 100 mL;
ii. Fecal coliform density shall not exceed 200 per 100 mL; and
iii. Enterococcus density shall not exceed 35 per 100 mL.

Single Sample Maximum:

i. Total coliform density shall not exceed 10,000 per 100 mL;
ii. Fecal coliform density shall not exceed 400 per 100 mL;
iii. Enterococcus density shall not exceed 104 per 100 mL; and

* See Appendix I for definition of terms.

iv. Total coliform density shall not exceed 1,000 per 100 mL when the fecal coliform/total coliform ratio exceeds 0.1.

(2) The "Initial Dilution* Zone" of wastewater outfalls shall be excluded from designation as kelp beds* for purposes of bacterial standards, and Regional Boards should recommend extension of such exclusion zone where warranted to the State Water Board (for consideration under chapter III. J). Adventitious assemblages of kelp on waste discharge structures (e.g.,outfall pipes and multiport diffusers*) do not constitute kelp beds* for purposes of bacterial standards.

b. CDPH Standards

CDPH has established minimum protective bacteriological standards for coastal waters adjacent to public beaches and for public water-contact sports areas in ocean* waters. These standards are found in the California Code of Regulations, title 17, section 7958, and they are identical to the objectives contained in subsection a. above. When a public beach or public water-contact sports area fails to meet these standards, CDPH or the local public health officer may post with warning signs or otherwise restrict use of the public beach or public water-contact sports area until the standards are met. The CDPH regulations impose more frequent monitoring and more stringent posting and closure requirements on certain high-use public beaches that are located adjacent to a storm drain that flows in the summer.

For beaches not covered under AB 411 regulations, CDPH imposes the same standards as contained in Title 17 and requires weekly sampling but allows the county health officer more discretion in making posting and closure decisions.

2. Shellfish* Harvesting Standards

a. At all areas where shellfish* may be harvested for human consumption, as determined by the Regional Board, the following bacterial objectives shall be maintained throughout the water column:

(1) The median total coliform density shall not exceed 70 per 100 mL, and not more than 10 percent of the samples shall exceed 230 per 100 mL.

C. Physical Characteristics

1. Floating particulates and grease and oil shall not be visible.

2. The discharge of waste* shall not cause aesthetically undesirable discoloration of the ocean* surface.

3. Natural light* shall not be significantly* reduced at any point outside the initial* dilution zone as the result of the discharge of waste.*

4. The rate of deposition of inert solids and the characteristics of inert solids in ocean* sediments shall not be changed such that benthic communities are degraded.*

* See Appendix I for definition of terms.

5. Trash* shall not be present in ocean waters, along shorelines or adjacent areas in amounts that adversely affect beneficial uses or cause nuisance.

D. Chemical Characteristics

1. The dissolved oxygen concentration shall not at any time be depressed more than 10 percent from that which occurs naturally, as the result of the discharge of oxygen demanding waste* materials.*
2. The pH shall not be changed at any time more than 0.2 units from that which occurs naturally.
3. The dissolved sulfide concentration of waters in and near sediments shall not be significantly* increased above that present under natural conditions.
4. The concentration of substances set forth in chapter II, Table 1, in marine sediments shall not be increased to levels which would degrade* indigenous biota.
5. The concentration of organic materials* in marine sediments shall not be increased to levels that would degrade* marine life.
6. Nutrient materials* shall not cause objectionable aquatic growths or degrade* indigenous biota.
7. Numerical Water Quality Objectives
   a. Table 1 water quality objectives apply to all discharges within the jurisdiction of this Plan. Unless otherwise specified, all metal concentrations are expressed as total recoverable concentrations.
   b. Table 1 Water Quality Objectives

* See Appendix I for definition of terms.

TABLE 1 (formerly TABLE B)
WATER QUALITY OBJECTIVES

	Units of Measurement	Limiting Concentrations 6-Month Median	Daily Maximum	Instantaneous Maximum
OBJECTIVES FOR PROTECTION OF MARINE AQUATIC LIFE				
Arsenic	µg/L	8.	32.	80.
Cadmium	µg/L	1.	4.	10.
Chromium (Hexavalent) (see below, a)	µg/L	2.	8.	20.
Copper	µg/L	3.	12.	30.
Lead	µg/L	2.	8.	20.
Mercury	µg/L	0.04	0.16	0.4
Nickel	µg/L	5.	20.	50.
Selenium	µg/L	15.	60.	150.
Silver	µg/L	0.7	2.8	7.
Zinc	µg/L	20.	80.	200.
Cyanide (see below, b)	µg/L	1.	4.	10.
Total Chlorine Residual (For intermittent chlorine sources see below, c)	µg/L	2.	8.	60.
Ammonia (expressed as nitrogen)	µg/L	600.	2400.	6000.
Acute* Toxicity	TUa	N/A	0.3	N/A
Chronic* Toxicity	TUc	N/A	1.	N/A
Phenolic Compounds (non-chlorinated)	µg/L	30.	120.	300.
Chlorinated Phenolics	µg/L	1.	4.	10.
Endosulfan*	µg/L	0.009	0.018	0.027
Endrin	µg/L	0.002	0.004	0.006
HCH*	µg/L	0.004	0.008	0.012
Radioactivity	Not to exceed limits specified in Title 17, Division 1, Chapter 5, Subchapter 4, Group 3, Article 3, section 30253 of the California Code of Regulations. Reference to section 30253 is prospective, including future changes to any incorporated provisions of federal law, as the changes take effect.			

* See Appendix I for definition of terms.

TABLE 1 (formerly TABLE B) Continued

Chemical	30-day Average (µg/L) Decimal Notation	Scientific Notation
OBJECTIVES FOR PROTECTION OF HUMAN HEALTH – NONCARCINOGENS		
acrolein	220.	2.2×10^{2}
antimony	1,200.	1.2×10^{3}
bis(2-chloroethoxy) methane	4.4	4.4×10^{0}
bis(2-chloroisopropyl) ether	1,200.	1.2×10^{3}
chlorobenzene	570.	5.7×10^{2}
chromium (III)	190,000.	1.9×10^{5}
di-n-butyl phthalate	3,500.	3.5×10^{3}
dichlorobenzenes*	5,100.	5.1×10^{3}
diethyl phthalate	33,000.	3.3×10^{4}
dimethyl phthalate	820,000.	8.2×10^{5}
4,6-dinitro-2-methylphenol	220.	2.2×10^{2}
2,4-dinitrophenol	4.0	4.0×10^{0}
ethylbenzene	4,100.	4.1×10^{3}
fluoranthene	15.	1.5×10^{1}
hexachlorocyclopentadiene	58.	5.8×10^{1}
nitrobenzene	4.9	4.9×10^{0}
thallium	2.	$2. \times 10^{0}$
toluene	85,000.	8.5×10^{4}
tributyltin	0.0014	1.4×10^{-3}
1,1,1-trichloroethane	540,000.	5.4×10^{5}
OBJECTIVES FOR PROTECTION OF HUMAN HEALTH – CARCINOGENS		
acrylonitrile	0.10	1.0×10^{-1}
aldrin	0.000022	2.2×10^{-5}
benzene	5.9	5.9×10^{0}
benzidine	0.000069	6.9×10^{-5}
beryllium	0.033	3.3×10^{-2}
bis(2-chloroethyl) ether	0.045	4.5×10^{-2}
bis(2-ethylhexyl) phthalate	3.5	3.5×10^{0}
carbon tetrachloride	0.90	9.0×10^{-1}
chlordane*	0.000023	2.3×10^{-5}
chlorodibromomethane	8.6	8.6×10^{0}

* See Appendix I for definition of terms.

TABLE 1 (formerly TABLE B) Continued

Chemical	30-day Average (µg/L) Decimal Notation	Scientific Notation
OBJECTIVES FOR PROTECTION OF HUMAN HEALTH – CARCINOGENS		
chloroform	130.	1.3×10^{2}
DDT*	0.00017	1.7×10^{-4}
1,4-dichlorobenzene	18.	1.8×10^{1}
3,3'-dichlorobenzidine	0.0081	8.1×10^{-3}
1,2-dichloroethane	28.	2.8×10^{1}
1,1-dichloroethylene	0.9	9×10^{-1}
dichlorobromomethane	6.2	6.2×10^{0}
dichloromethane	450.	4.5×10^{2}
1,3-dichloropropene	8.9	8.9×10^{0}
dieldrin	0.00004	4.0×10^{-5}
2,4-dinitrotoluene	2.6	2.6×10^{0}
1,2-diphenylhydrazine	0.16	1.6×10^{-1}
halomethanes*	130.	1.3×10^{2}
heptachlor	0.00005	5×10^{-5}
heptachlor epoxide	0.00002	2×10^{-5}
hexachlorobenzene	0.00021	2.1×10^{-4}
hexachlorobutadiene	14.	1.4×10^{1}
hexachloroethane	2.5	2.5×10^{0}
isophorone	730.	7.3×10^{2}
N-nitrosodimethylamine	7.3	7.3×10^{0}
N-nitrosodi-N-propylamine	0.38	3.8×10^{-1}
N-nitrosodiphenylamine	2.5	2.5×10^{0}
PAHs*	0.0088	8.8×10^{-3}
PCBs*	0.000019	1.9×10^{-5}
TCDD equivalents*	0.0000000039	3.9×10^{-9}
1,1,2,2-tetrachloroethane	2.3	2.3×10^{0}
tetrachloroethylene	2.0	2.0×10^{0}
toxaphene	0.00021	2.1×10^{-4}
trichloroethylene	27.	2.7×10^{1}
1,1,2-trichloroethane	9.4	9.4×10^{0}
2,4,6-trichlorophenol	0.29	2.9×10^{-1}
vinyl chloride	36.	3.6×10^{1}

* See Appendix I for definition of terms.

Table 1 Notes:

a) Dischargers may at their option meet this objective as a total chromium objective.

b) If a discharger can demonstrate to the satisfaction of the Regional Water Board (subject to EPA approval) that an analytical method is available to reliably distinguish between strongly and weakly complexed cyanide, effluent limitations for cyanide may be met by the combined measurement of free cyanide, simple alkali metal cyanides, and weakly complexed organometallic cyanide complexes. In order for the analytical method to be acceptable, the recovery of free cyanide from metal complexes must be comparable to that achieved by the approved method in 40 CFR PART 136, as revised May 14, 1999.

c) Water quality objectives for total chlorine residual applying to intermittent discharges not exceeding two hours, shall be determined through the use of the following equation:

$$\log y = -0.43 (\log x) + 1.8$$

where: y = the water quality objective (in µg/L) to apply when chlorine is being discharged;
x = the duration of uninterrupted chlorine discharge in minutes.

E. Biological Characteristics

1. Marine communities, including vertebrate, invertebrate, algae, and plant species, shall not be degraded.*

2. The natural taste, odor, and color of fish, shellfish,* or other marine resources used for human consumption shall not be altered.

3. The concentration of organic materials* in fish, shellfish* or other marine resources used for human consumption shall not bioaccumulate to levels that are harmful to human health.

F. Radioactivity

1. Discharge of radioactive waste* shall not degrade* marine life.

* See Appendix I for definition of terms.

III. PROGRAM OF IMPLEMENTATION

A. General Provisions

1. Effective Date

a. The *Water Quality Control Plan, Ocean Waters of California, California Ocean Plan* was adopted and has been effective since 1972. There have been multiple amendments of the Ocean Plan since its adoption.

2. General Requirements For Management Of Waste Discharge To The Ocean*

a. Waste* management systems that discharge to the ocean* must be designed and operated in a manner that will maintain the indigenous marine life and a healthy and diverse marine community.

b. Waste* discharged to the ocean* must be essentially free of:

(1) Material* that is floatable or will become floatable upon discharge.

(2) Settleable material* or substances that may form sediments which will degrade* benthic communities or other aquatic life.

(3) Substances which will accumulate to toxic levels in marine waters, sediments or biota.

(4) Substances that significantly* decrease the natural light* to benthic communities and other marine life.

(5) Materials* that result in aesthetically undesirable discoloration of the ocean* surface.

c. Waste* effluents shall be discharged in a manner which provides sufficient initial* dilution to minimize the concentrations of substances not removed in the treatment.

d. Location of waste* discharges must be determined after a detailed assessment of the oceanographic characteristics and current patterns to assure that:

(1) Pathogenic organisms and viruses are not present in areas where shellfish* are harvested for human consumption or in areas used for swimming or other body-contact sports.

(2) Natural water quality conditions are not altered in areas designated as being of special biological significance or areas that existing marine laboratories use as a source of seawater.*

(3) Maximum protection is provided to the marine environment.

* See Appendix I for definition of terms.

e. Waste* that contains pathogenic organisms or viruses should be discharged a sufficient distance from shellfishing* and water-contact sports areas to maintain applicable bacterial standards without disinfection. Where conditions are such that an adequate distance cannot be attained, reliable disinfection in conjunction with a reasonable separation of the discharge point from the area of use must be provided. Disinfection procedures that do not increase effluent toxicity and that constitute the least environmental and human hazard should be used.

3. Areas of Special Biological Significance*

   a. ASBS* shall be designated by the State Water Board following the procedures provided in Appendix IV. A list of ASBS* is available in Appendix V.

4. Combined Sewer Overflow: Not withstanding any other provisions in this plan, discharges from the City of San Francisco's combined sewer system are subject to the US EPA's Combined Sewer Overflow Policy.

B. Table 2 Effluent Limitations

TABLE 2 (formerly TABLE A)
EFFLUENT LIMITATIONS

		Limiting Concentrations		
	Unit of Measurement	Monthly (30-day Average)	Weekly (7-day Average)	Maximum at any time
Grease and Oil	mg/L	25.	40.	75.
Suspended Solids			See below +	
Settleable Solids	mL/L	1.0	1.5	3.0
Turbidity	NTU	75.	100.	225.
pH	Units		Within limit of 6.0 to 9.0 at all times	

Table 2 Notes:

\+ Suspended Solids: Dischargers shall, as a 30-day average, remove 75% of suspended solids from the influent stream before discharging wastewaters to the ocean,* except that the effluent limitation to be met shall not be lower than 60 mg/l. Regional Boards may recommend that the State Water Board (chapter III section J), with the concurrence of the Environmental Protection Agency, adjust the lower effluent concentration limit (the 60 mg/l above) to suit the environmental and effluent characteristics of the discharge. As a further consideration in making such recommendation for adjustment, Regional Water Boards should evaluate effects on existing and potential water* reclamation projects.

If the lower effluent concentration limit is adjusted, the discharger shall remove 75% of suspended solids from the influent stream at any time the influent concentration exceeds four times such adjusted effluent limit.

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1. Table 2 effluent limitations apply only to publicly owned treatment works and industrial discharges for which Effluent Limitations Guidelines have not been established pursuant to sections 301, 302, 304, or 306 of the Federal Clean Water Act.

* See Appendix I for definition of terms.

2. Table 2 effluent limitations shall apply to a discharger's total effluent, of whatever origin (i.e., gross, not net, discharge), except where otherwise specified in this Plan.

3. The State Water Board is authorized to administer and enforce effluent limitations established pursuant to the Federal Clean Water Act. Effluent limitations established under sections 301, 302, 306, 307, 316, 403, and 405 of the aforementioned Federal Act and administrative procedures pertaining thereto are included in this plan by reference. Compliance with Table 2 effluent limitations, or Environmental Protection Agency Effluent Limitations Guidelines for industrial discharges, based on Best Practicable Control Technology, shall be the minimum level* of treatment acceptable under this plan, and shall define reasonable treatment and waste* control technology.

4. Compliance with Table 2 effluent limitations for brine discharges from desalination facilities that commingle brine and wastewater prior to discharge to the ocean may be measured after the brine has been commingled with wastewater, provided that the permittee for the commingled discharge accepts responsibly for any exceedances of the Table 2 effluent limitations.

C. Implementation Provisions for Table 1

1. Effluent concentrations calculated from Table 1 water quality objectives shall apply to a discharger's total effluent, of whatever origin (i.e., gross, not net, discharge), except where otherwise specified in this Plan.

2. If the Regional Water Board determines, using the procedures in Appendix VI, that a pollutant is discharged into ocean* waters at levels which will cause, have the reasonable potential to cause, or contribute to an excursion above a Table 1 water quality objective, the Regional Water Board shall incorporate a water quality-based effluent limitation in the Waste Discharge Requirement for the discharge of that pollutant.

3. Effluent limitations shall be imposed in a manner prescribed by the State Water Board such that the concentrations set forth below as water quality objectives shall not be exceeded in the receiving water* upon completion of initial* dilution, except that objectives indicated for radioactivity shall apply directly to the undiluted waste* effluent.

4. Calculation of Effluent Limitations

a. Effluent limitations for water quality objectives listed in Table 1, with the exception of acute toxicity and radioactivity, shall be determined through the use of the following equation:

Equation 1: $Ce = Co + Dm (Co - Cs)$

where:

Ce = the effluent concentration limit, µg/L

Co = the concentration (water quality objective) to be met at the completion of initial* dilution, µg/L

Cs = background seawater* concentration (see Table 3 below, with all metals expressed as total recoverable concentrations), µg/L

Dm = minimum probable initial* dilution expressed as parts seawater* per part wastewater.

* See Appendix I for definition of terms.

TABLE 3 (formerly TABLE C) BACKGROUND SEAWATER* CONCENTRATIONS (Cs)	
Waste Constituent	Cs (µg/L)
Arsenic	3.
Copper	2.
Mercury	0.0005
Silver	0.16
Zinc	8.
For all other Table 1 parameters, Cs = 0.	

b. Determining a Mixing Zone for the Acute Toxicity* Objective

The mixing zone for the acute toxicity* objective shall be ten percent (10%) of the distance from the edge of the outfall structure to the edge of the chronic mixing zone (zone of initial dilution*). There is no vertical limitation on this zone. The effluent limitation for the acute toxicity* objective listed in Table 1 shall be determined through the use of the following equation:

Equation 2: $Ce = Ca + (0.1)\ Dm\ (Ca)$

where:

Ca = the concentration (water quality objective) to be met at the edge of the acute mixing zone.

Dm = minimum probable initial* dilution expressed as parts seawater* per part wastewater (This equation applies only when Dm > 24).

c. Toxicity Testing Requirements based on the Minimum Initial* Dilution Factor for Ocean Waste* Discharges

(1) Dischargers shall conduct acute toxicity* testing if the minimum initial* dilution of the effluent is greater than 1,000:1 at the edge of the mixing zone.

(2) Dischargers shall conduct either acute or chronic toxicity* testing if the minimum initial* dilution ranges from 350:1 to 1,000:1 depending on the specific discharge conditions. The Regional Water Board shall make this determination.

(3) Dischargers shall conduct chronic toxicity* testing for ocean waste* discharges with minimum initial* dilution factors ranging from 100:1 to 350:1. The Regional Water Board may require that acute toxicity* testing be conducted in addition to chronic as necessary for the protection of beneficial uses of ocean* waters.

(4) Dischargers shall conduct chronic toxicity* testing if the minimum initial* dilution of the effluent falls below 100:1 at the edge of the mixing zone.

* See Appendix I for definition of terms.

d. For the purpose of this Plan, minimum initial* dilution is the lowest average initial* dilution within any single month of the year. Dilution estimates shall be based on observed waste* flow characteristics, observed receiving water* density structure, and the assumption that no currents, of sufficient strength to influence the initial* dilution process, flow across the discharge structure.

e. The Executive Director of the State Water Board shall identify standard dilution models for use in determining Dm, and shall assist the Regional Board in evaluating Dm for specific waste* discharges. Dischargers may propose alternative methods of calculating Dm, and the Regional Board may accept such methods upon verification of its accuracy and applicability.

f. The six-month median shall apply as a moving median of daily values for any 180-day period in which daily values represent flow weighted average concentrations within a 24-hour period. For intermittent discharges, the daily value shall be considered to equal zero for days on which no discharge occurred.

g. The daily maximum shall apply to flow weighted 24 hour composite samples.

h. The instantaneous maximum shall apply to grab sample determinations.

i. If only one sample is collected during the time period associated with the water quality objective (e.g., 30-day average or 6-month median), the single measurement shall be used to determine compliance with the effluent limitation for the entire time period.

j. Discharge requirements shall also specify effluent limitations in terms of mass emission rate limits utilizing the general formula:

Equation 3: lbs/day = 0.00834 x Ce x Q

where:

Ce = the effluent concentration limit, µg/L

Q = flow rate, million gallons per day (MGD)

k. The six-month median limit on daily mass emissions shall be determined using the six-month median effluent concentration as Ce and the observed flow rate Q in millions of gallons per day. The daily maximum mass emission shall be determined using the daily maximum effluent concentration limit as Ce and the observed flow rate Q in millions of gallons per day.

l. Any significant* change in waste* flow shall be cause for reevaluating effluent limitations.

5. Minimum* Levels

For each numeric effluent limitation, the Regional Board must select one or more Minimum* Levels (and their associated analytical methods) for inclusion in the permit. The “reported” Minimum* Level is the Minimum* Level (and its associated analytical

* See Appendix I for definition of terms.

method) chosen by the discharger for reporting and compliance determination from the Minimum* Levels included in their permit.

a. Selection of Minimum* Levels from Appendix II

The Regional Water Board must select all Minimum* Levels from Appendix II that are below the effluent limitation. If the effluent limitation is lower than all the Minimum* Levels in Appendix II, the Regional Board must select the lowest Minimum* Level from Appendix II.

b. Deviations from Minimum* Levels in Appendix II

The Regional Board, in consultation with the State Water Board's Quality Assurance Program, must establish a Minimum* Level to be included in the permit in any of the following situations:

1. A pollutant is not listed in Appendix II.
2. The discharger agrees to use a test method that is more sensitive than those described in 40 CFR 136 (revised May 14, 1999).
3. The discharger agrees to use a Minimum* Level lower than those listed in Appendix II.
4. The discharger demonstrates that their calibration standard matrix is sufficiently different from that used to establish the Minimum* Level in Appendix II and proposes an appropriate Minimum* Level for their matrix.
5. A discharger uses an analytical method having a quantification practice that is not consistent with the definition of Minimum* Level (e.g., US EPA methods 1613, 1624, 1625).

6. Use of Minimum* Levels

a. Minimum* Levels in Appendix II represent the lowest quantifiable concentration in a sample based on the proper application of method-specific analytical procedures and the absence of matrix interferences. Minimum* Levels also represent the lowest standard concentration in the calibration curve for a specific analytical technique after the application of appropriate method-specific factors.

Common analytical practices may require different treatment of the sample relative to the calibration standard. Some examples are given below:

Substance or Grouping	Method-Specific Treatment	Most Common Factor
Volatile Organics	No differential treatment	1
Semi-Volatile Organics	Samples concentrated by extraction	1000
Metals	Samples diluted or concentrated	½ , 2 , and 4
Pesticides	Samples concentrated by extraction	100

b. Other factors may be applied to the Minimum* Level depending on the specific sample preparation steps employed. For example, the treatment typically applied when there are matrix effects is to dilute the sample or sample aliquot by a factor of ten. In such cases, this additional factor must be applied during the

* See Appendix I for definition of terms.

computation of the reporting limit. Application of such factors will alter the reported Minimum* Level.

c. Dischargers are to instruct their laboratories to establish calibration standards so that the Minimum* Level (or its equivalent if there is differential treatment of samples relative to calibration standards) is the lowest calibration standard. At no time is the discharger to use analytical data derived from *extrapolation* beyond the lowest point of the calibration curve. In accordance with section 4b, above, the discharger's laboratory may employ a calibration standard lower than the Minimum* Level in Appendix II.

7. Sample Reporting Protocols

a. Dischargers must report with each sample result the reported Minimum* Level (selected in accordance with section 4, above) and the laboratory's current MDL.*

b. Dischargers must also report the results of analytical determinations for the presence of chemical constituents in a sample using the following reporting protocols:

(1) Sample results greater than or equal to the reported Minimum* Level must be reported "as measured" by the laboratory (i.e., the measured chemical concentration in the sample).

(2) Sample results less than the reported Minimum* Level, but greater than or equal to the laboratory's MDL,* must be reported as "Detected, but Not Quantified", or DNQ. The laboratory must write the estimated chemical concentration of the sample next to DNQ as well as the words "Estimated Concentration" (may be shortened to "Est. Conc.").

(3) Sample results less than the laboratory's MDL* must be reported as "Not Detected", or ND.

8. Compliance Determination

Sufficient sampling and analysis shall be required to determine compliance with the effluent limitation.

a. Compliance with Single-Constituent Effluent Limitations

Dischargers are out of compliance with the effluent limitation if the concentration of the pollutant (see section 7c, below) in the monitoring sample is greater than the effluent limitation and greater than or equal to the reported Minimum* Level.

b. Compliance with Effluent Limitations expressed as a Sum of Several Constituents

Dischargers are out of compliance with an effluent limitation which applies to the sum of a group of chemicals (e.g., PCBs*) if the sum of the individual pollutant concentrations is greater than the effluent limitation. Individual pollutants of the group will be considered to have a concentration of zero if the constituent is reported as ND or DNQ.

* See Appendix I for definition of terms.

c. Multiple Sample Data Reduction

The concentration of the pollutant in the effluent may be estimated from the result of a single sample analysis or by a measure of central tendency (arithmetic mean, geometric mean, median, etc.) of multiple sample analyses when all sample results are quantifiable (i.e., greater than or equal to the reported Minimum* Level). When one or more sample results are reported as ND or DNQ, the central tendency concentration of the pollutant shall be the median (middle) value of the multiple samples. If, in an even number of samples, one or both of the middle values is ND or DNQ, the median will be the lower of the two middle values.

d. Powerplants and Heat Exchange Dischargers

Due to the large total volume of powerplant and other heat exchange discharges, special procedures must be applied for determining compliance with Table 1 objectives on a routine basis. Effluent concentration values (Ce) shall be determined through the use of equation 1 considering the minimal probable initial* dilution of the combined effluent (in-plant waste* streams plus cooling water flow). These concentration values shall then be converted to mass emission limitations as indicated in equation 3. The mass emission limits will then serve as requirements applied to all in-plant waste* streams taken together which discharge into the cooling water flow, except that limits for total chlorine residual, acute (if applicable per section (3)(c)) and chronic* toxicity* and instantaneous maximum concentrations in Table 1 shall apply to, and be measured in, the combined final effluent, as adjusted for dilution with ocean water. The Table 1 objective for radioactivity shall apply to the undiluted combined final effluent.

9. Pollutant Minimization Program

a. Pollutant Minimization Program Goal

The goal of the Pollutant Minimization Program is to reduce all potential sources of a pollutant through pollutant minimization (control) strategies, including pollution prevention measures, in order to maintain the effluent concentration at or below the effluent limitation.

Pollution prevention measures may be particularly appropriate for persistent bioaccumulative priority pollutants where there is evidence that beneficial uses are being impacted. The completion and implementation of a Pollution Prevention Plan, required in accordance with CA Water Code section 13263.3 (d) will fulfill the Pollution Minimization Program requirements in this section.

b. Determining the need for a Pollutant Minimization Program

1. The discharger must develop and conduct a Pollutant Minimization Program if all of the following conditions are true:

(a) The calculated effluent limitation is less than the reported Minimum Level*

(b) The concentration of the pollutant is reported as DNQ

* See Appendix I for definition of terms.

(c) There is evidence showing that the pollutant is present in the effluent above the calculated effluent limitation.

2. Alternatively, the discharger must develop and conduct a Pollutant Minimization Program if all of the following conditions are true:

   (a) The calculated effluent limitation is less than the Method Detection Limit.*

   (b) The concentration of the pollutant is reported as ND.

   (c) There is evidence showing that the pollutant is present in the effluent above the calculated effluent limitation.

c. Regional Water Boards may include special provisions in the discharge requirements to require the gathering of evidence to determine whether the pollutant is present in the effluent at levels above the calculated effluent limitation. Examples of evidence may include:

   1. health advisories for fish consumption,
   2. presence of whole effluent toxicity,
   3. results of benthic or aquatic organism tissue sampling,
   4. sample results from analytical methods more sensitive than methods included in the permit (in accordance with section 4b, above).
   5. the concentration of the pollutant is reported as DNQ and the effluent limitation is less than the MDL*

d. Elements of a Pollutant Minimization Program

   The Regional Board may consider cost-effectiveness when establishing the requirements of a Pollutant Minimization Program. The program shall include actions and submittals acceptable to the Regional Board including, but not limited to, the following:

   1. An annual review and semi-annual monitoring of potential sources of the reportable pollutant, which may include fish tissue monitoring and other bio-uptake sampling;
   2. Quarterly monitoring for the reportable pollutant in the influent to the wastewater treatment system;
   3. Submittal of a control strategy designed to proceed toward the goal of maintaining concentrations of the reportable pollutant in the effluent at or below the calculated effluent limitation;
   4. Implementation of appropriate cost-effective control measures for the pollutant, consistent with the control strategy; and,
   5. An annual status report that shall be sent to the Regional Board including:

      (a) All Pollutant Minimization Program monitoring results for the previous year;

      (b) A list of potential sources of the reportable pollutant;

      (c) A summary of all action taken in accordance with the control strategy; and,

* See Appendix I for definition of terms.

(d) A description of actions to be taken in the following year.

10. Toxicity Reduction Requirements

a. If a discharge consistently exceeds an effluent limitation based on a toxicity objective in Table 1, a toxicity reduction evaluation (TRE) is required. The TRE shall include all reasonable steps to identify the source of toxicity. Once the source(s) of toxicity is identified, the discharger shall take all reasonable steps necessary to reduce toxicity to the required level.

b. The following shall be incorporated into waste* discharge requirements: (1) a requirement to conduct a TRE if the discharge consistently exceeds its toxicity effluent limitation, and (2) a provision requiring a discharger to take all reasonable steps to reduce toxicity once the source of toxicity is identified.

D. Implementation Provisions for Bacterial Characteristics

1. Water-Contact Monitoring

a. Weekly samples shall be collected from each site. The geometric mean shall be calculated using the five most recent sample results.

b. If a single sample exceeds any of the single sample maximum (*SSM*) standards, repeat sampling at that location shall be conducted to determine the extent and persistence of the exceedance. Repeat sampling shall be conducted within 24 hours of receiving analytical results and continued until the sample result is less than the SSM standard or until a sanitary survey is conducted to determine the source of the high bacterial densities.

i) Total coliform density will not exceed 10,000 per 100 mL; or
ii) Fecal coliform density will not exceed 400 per 100 mL; or
iii) Total coliform density will not exceed 1,000 per 100 mL when the ratio of fecal/total coliform exceeds 0.1;
iv) enterococcus density will not exceed 104 per 100 mL.

When repeat sampling is required because of an exceedance of any one single sample density, values from all samples collected during that 30-day period will be used to calculate the geometric mean.

c. It is state policy that the geometric mean bacterial objectives are strongly preferred for use in water body assessment decisions, for example, in developing the Clean Water Act section 303(d) list of impaired waters, because the geometric mean objectives are a more reliable measure of long-term water body conditions. In making assessment decisions on bacterial quality, single sample maximum data must be considered together with any available geometric mean data. The use of only single sample maximum bacterial data is generally inappropriate unless there is a limited data set, the water is subject to short-term spikes in bacterial concentrations, or other circumstances justify the use of only single sample maximum data.

* See Appendix I for definition of terms.

d. For monitoring stations outside of the defined water-contact recreation zone (REC-1), samples will be analyzed for total coliform only.

E. Implementation Provisions for Marine Managed Areas*

1. Section E addresses the following Marine Managed Areas*:

(a) State Water Quality Protection Areas (SWQPAs)* consisting of:

(1) SWQPA – Areas of Special Biological Significance (ASBS)* designated by the State Water Board that require special protections as defined under section 4 below.

(2) SWQPA – General Protection (GP) designated by the State Water Board to protect water quality within Marine Protected Areas (MPAs) that require protection under the provisions described under section 5 below.

(b) Marine Protected Areas as defined in the California Public Resources Code as State Marine Reserves, State Marine Parks and State Marine Conservation Areas, established by the Fish and Game Commission, or the Parks and Recreation Commission.

2. The designation of State Marine Parks and State Marine Conservation Areas may not serve as the sole basis for new or modified limitations, substantive conditions, or prohibitions upon existing municipal point source wastewater discharge outfalls. This provision does not apply to State Marine Reserves.

3. The State Water Board may designate SWQPAs* to prevent the undesirable alteration of natural water quality within MPAs. These designations may include either SWQPA-ASBS or SWQPA-GP or in combination. In considering the designation of SWQPAs over MPAs, the State Water Board will consult with the affected Regional Water Quality Control Board, the Department of Fish and Game and the Department of Parks and Recreation, in accordance with the requirements of Appendix IV.

4. Implementation Provisions For SWQPA-ASBS*

(a) Waste* shall not be discharged to areas designated as being of special biological significance. Discharges shall be located a sufficient distance from such designated areas to assure maintenance of natural water quality conditions in these areas.

(b) Regional Water Boards may approve waste* discharge requirements or recommend certification for limited-term (i.e. weeks or months) activities in ASBS.* Limited-term activities include, but are not limited to, activities such as maintenance/repair of existing boat facilities, restoration of sea walls, repair of existing storm water pipes, and replacement/repair of existing bridges. Limited-term activities may result in temporary and short-term changes in existing water quality. Water quality degradation shall be limited to the shortest possible time. The activities must not permanently degrade* water quality or result in water quality

* See Appendix I for definition of terms.

lower than that necessary to protect existing uses, and all practical means of minimizing such degradation shall be implemented.

5. Implementation Provisions for SWQPAs-GP*

(a) Implementation provisions for existing point source wastewater discharges (NPDES)

(1) An SWQPA-GP shall not be designated over existing permitted point source wastewater outfalls or encroach upon the zone of initial dilution* associated with an existing discharge. This requirement does not apply to discharges less than one million gallons per day.

(2) Designation of an SWQPA-GP shall not include conditions to move existing point source wastewater outfalls.

(3) Where a new SWQPA-GP is established in the vicinity of existing municipal wastewater outfalls, there shall be no new or modified limiting condition or prohibitions for the SWQPA-GP relative to those wastewater outfalls.

(4) Regulatory requirements for discharges from existing treated municipal wastewater outfalls shall be derived from the Chapter II – Water Quality Objectives and Chapter III – Program of Implementation.

(b) Implementation provisions for existing seawater* intakes

(1) Existing permitted seawater* intakes other than those serving desalination facilities* must be controlled to minimize entrainment and impingement by using best technology available. Existing permitted seawater* intakes with a capacity less than one million gallons per day are excluded from this requirement.

(2) Existing permitted seawater* intakes serving desalination facilities are governed by the provisions set forth in chapter III.M of this Plan.

(c) Implementation provisions for permitted separate storm sewer system (MS4) discharges and nonpoint source discharges.

(1) Existing waste* discharges are allowed, but shall not cause an undesirable alteration in natural water quality. For purposes of SWQPA-GP, an undesirable alteration in natural water quality means that for intermittent (e.g. wet weather) discharges, Table 1 instantaneous maximum concentrations for chemical constituents, and daily maximum concentrations for chronic toxicity,* must not be exceeded in the receiving water.*

(2) An NPDES permitting authority* may authorize NPDES-permitted non-storm water discharges* to an MS4 with a direct discharge to an SWQPA-GP only to the extent the NPDES permitting authority* finds that the discharge does not cause an undesirable alteration in natural water quality in an SWQPA-GP.

(3) Non-storm water (dry weather) flows are effectively prohibited as required by the applicable permit. Where capacity and infrastructure exists, all dry weather flows

* See Appendix I for definition of terms.

shall be diverted to municipal sanitary sewer systems. The permitting authority* may allow discharges essential for emergency response purposes, structural stability, and slope stability, which may include but are not limited the following:

a. Discharges associated with emergency fire-fighting operations.
b. Foundation and footing drains
c. Water from crawl space or basement pumps.
d. Hillside dewatering.

(4) The following naturally occurring discharges are allowed:

a. Naturally occurring groundwater seepage via a storm drain
b. Non-anthropogenic flows from a naturally occurring stream via a culvert or storm drain, as long as there are no contributions of anthropogenic runoff.

(5) Existing storm water discharges into an SWQPA-GP shall be characterized and assessed to determine what effect if any these inputs are having on natural water quality in the State Water Quality Protection Area. Such assessments shall include an evaluation of cumulative impacts as well as impacts stemming from individual discharges. Information to be considered shall include:

a. Water quality;
b. Flow;
c. Watershed pollutant sources; and
d. Intertidal and/ or subtidal biological surveys.

Within each SWQPA-GP the assessment shall be used to rank these existing discharges into low, medium and high threat impact categories. Cumulative impacts will be ranked similarly as well.

(6) An initial analysis shall be performed for pre- and post-storm receiving water* quality of Table 1 constituents and chronic toxicity.* If post-storm receiving water* quality has larger concentrations of constituents relative to pre-storm, and Table 1 instantaneous maximum concentrations for chemical constituents, and daily maximum concentrations for chronic toxicity,* are exceeded, then receiving water* shall be re-analyzed along with storm runoff (end of pipe) for the constituents that are exceeded.

(7) If undesirable alterations of natural water quality and/or biological communities are identified, control strategies/measures shall be implemented for those dischargers characterized as a high threat or those contributing to higher threat cumulative impacts first.

(8) If those strategies fail, additional control strategies/measures will be implemented for dischargers characterized as medium impact dischargers. If these strategies do not result in improvement of water quality, those discharges classified as low threat shall also implement control strategies/measures.

(d) Implementation Provisions for New Discharges

* See Appendix I for definition of terms.

(1) Point Source Wastewater Outfalls
No new point source wastewater outfalls shall be established within an SWQPA-GP.

(2) Seawater* intakes
No new surface water seawater* intakes shall be established within an SWQPA-GP. This does not apply to subsurface* intakes where studies are prepared showing there is no predictable entrainment, impingement, or construction-related marine life mortality.

(3) All Other New Discharges
There shall be no increase in nonpoint sources or permitted storm drains directly into an SWQPA-GP.

6. Impaired Tributaries to MPAs, SWQPA-ASBS and SWQPA-GP

All water bodies draining to, or that are designated as, MPAs and SWQPAs that appear on the State's CWA section 303(d) list shall be given a high priority to have a TMDL developed and implemented.

F. Revision of Waste* Discharge Requirements

1. The Regional Water Boards may establish more restrictive water quality objectives and effluent limitations than those set forth in this Plan as necessary for the protection of beneficial uses of ocean* waters.

2. Regional Water Boards may impose alternative less restrictive provisions than those contained within Table 1 of the Plan, provided an applicant can demonstrate that:

   a. Reasonable control technologies (including source control, material* substitution, treatment and dispersion) will not provide for complete compliance; or

   b. Any less stringent provisions would encourage water* reclamation;

3. Provided further that:

   a. Any alternative water quality objectives shall be below the conservative estimate of chronic toxicity,* as given in Table 4 (with all metal concentrations expressed as total recoverable concentrations), and such alternative will provide for adequate protection of the marine environment;

   b. A receiving water* quality toxicity objective of 1 TUc is not exceeded; and

   c. The State Water Board grants an exception (chapter III.J) to the Table 1 limits as established in the Regional Board findings and alternative limits.

G. Compliance Schedules in National Pollutant Discharge Elimination System (NPDES) Permits

1. Compliance schedules in NPDES permits are authorized in accordance with the provisions of the State Water Board's Policy for Compliance Schedules in [NPDES] Permits (2008).

* See Appendix I for definition of terms.

TABLE 4 (formerly TABLE D)
CONSERVATIVE ESTIMATES OF CHRONIC* TOXICITY

Constituent	Estimate of Chronic* Toxicity (µg/L)
Arsenic	19.
Cadmium	8.
Hexavalent Chromium	18.
Copper	5.
Lead	22.
Mercury	0.4
Nickel	48.
Silver	3.
Zinc	51.
Cyanide	10.
Total Chlorine Residual	10.0
Ammonia	4000.0
Phenolic Compounds (non-chlorinated)	a) (see below)
Chlorinated Phenolics	a)
Chlorinated Pesticides and PCBs*	b)

Table 4 Notes:

a) There are insufficient data for phenolics to estimate chronic* toxicity levels. Requests for modification of water quality objectives for these waste* constituents must be supported by chronic* toxicity data for representative sensitive species. In such cases, applicants seeking modification of water quality objectives should consult the Regional Water Quality Control Board to determine the species and test conditions necessary to evaluate chronic effects.

b) Limitations on chlorinated pesticides and PCBs* shall not be modified so that the total of these compounds is increased above the objectives in Table 1.

H. Monitoring Program

1. The Regional Water Boards shall require dischargers to conduct self-monitoring programs and submit reports necessary to determine compliance with the waste* discharge requirements, and may require dischargers to contract with agencies or persons acceptable to the Regional Water Board to provide monitoring reports. Monitoring provisions contained in waste* discharge requirements shall be in accordance with the Monitoring Procedures provided in Appendices III and VI.

2. The Regional Water Board may require monitoring of bioaccumulation of toxicants in the discharge zone. Organisms and techniques for such monitoring shall be chosen by the Regional Water Board on the basis of demonstrated value in waste* discharge monitoring.

* See Appendix I for definition of terms.

I. Discharge Prohibitions

1. Hazardous Substances

a. The discharge of any radiological, chemical, or biological warfare agent or high-level radioactive waste* into the ocean* is prohibited.

2. Areas Designated for Special Water Quality Protection

a. Waste* shall not be discharged to designated Areas* of Special Biological Significance except as provided in chapter III.E Implementation Provisions for Marine Managed Areas.*

3. Sludge

a. Pipeline discharge of sludge to the ocean* is prohibited by federal law; the discharge of municipal and industrial waste* sludge directly to the ocean,* or into a waste* stream that discharges to the ocean,* is prohibited by this Plan. The discharge of sludge digester supernatant directly to the ocean,* or to a waste* stream that discharges to the ocean* without further treatment, is prohibited.

b. It is the policy of the State Water Board that the treatment, use and disposal of sewage sludge shall be carried out in the manner found to have the least adverse impact on the total natural and human environment. Therefore, if federal law is amended to permit such discharge, which could affect California waters, the State Water Board may consider requests for exceptions to this section under Chapter III. J of this Plan, provided further that an Environmental Impact Report on the proposed project shows clearly that any available alternative disposal method will have a greater adverse environmental impact than the proposed project.

4. By-Passing

a. The by-passing of untreated wastes* containing concentrations of pollutants in excess of those of Table 2 or Table 1 to the ocean* is prohibited.

5. Vessels

a. Discharges of hazardous waste (as defined in California Health and Safety Code § 25117 et seq. [but not including sewage]), oily bilge water,* medical waste (as defined in § 117600 et seq. of the California Health and Safety Code) dry-cleaning waste, and film-processing waste from large passenger vessels* and oceangoing vessels* are prohibited.

b. Discharges of graywater* and sewage* from large passenger vessels* are prohibited.

c. Discharges of sewage and sewage sludge from vessels are prohibited in No Discharge Zones* promulgated by U.S. EPA.

* See Appendix I for definition of terms.

6. Trash*

The discharge of Trash* to surface waters of the State or the deposition of Trash* where it may be discharged into surface waters of the State is prohibited. Compliance with this prohibition of discharge shall be achieved as follows:

a. Dischargers with NPDES permits that contain specific requirements for the control of Trash* that are consistent with these Trash Provisions* shall be determined to be in compliance with this prohibition if the dischargers are in full compliance with such requirements.

b. Dischargers with non-NPDES waste discharge requirements (WDRs) or waivers of WDRs that contain specific requirements for the control of Trash* shall be determined to be in compliance with this prohibition if the dischargers are in full compliance with such requirements.

c. Dischargers with NPDES permits, WDRs, or waivers of WDRs that do not contain specific requirements for the control of Trash* are exempt from these Trash Provisions*.

d. Dischargers without NPDES permits, WDRs, or waivers of WDRs must comply with this prohibition of discharge.

e. Chapter III.I.6.b and Chapter III.L.3 notwithstanding, this prohibition of discharge applies to the discharge of preproduction plastic* by manufacturers of preproduction plastics*, transporters of preproduction plastics*, and manufacturers that use preproduction plastics* in the manufacture of other products to surface waters of the State, or the deposition of preproduction plastic* where it may be discharged into surface waters of the State, unless the discharger is subject to a NPDES permit for discharges of storm water* associated with industrial activity.

J. State Board Exceptions to Plan Requirements

1. The State Water Board may, in compliance with the California Environmental Quality Act, subsequent to a public hearing, and with the concurrence of the Environmental Protection Agency, grant exceptions where the Board determines:

   a. The exception will not compromise protection of ocean* waters for beneficial uses, and,

   b. The public interest will be served.

2. All exceptions issued by the State Water Board and in effect at the time of the Triennial Review will be reviewed at that time. If there is sufficient cause to re-open or revoke any exception, the State Water Board may direct staff to prepare a report and to schedule a public hearing. If after the public hearing the State Water Board decides to re-open, revoke, or re-issue a particular exception, it may do so at that time.

* See Appendix I for definition of terms.

K. Implementation Provisions for Vessel Discharges

1. Vessel discharges must comply with State Lands Commission (SLC) requirements for ballast water discharges and hull fouling to control and prevent the introduction of non-indigenous species, found in the Public Resources Code sections 71200 et seq. and title 2, California Code of Regulations, section 22700 et. seq.

2. Discharges incidental to the normal operation large passenger vessels* and ocean-going vessels must be covered and comply with an individual or general NPDES permit.

3. Vessel discharges must not result in violations of water quality objectives in this plan.

4. Vessels subject to the federal NPDES Vessel General Permit (VGP) which are not large passenger vessels* must follow the best management practices for graywater* as required in the VGP, including the use of only those cleaning agents (e.g., soaps and detergents) that are phosphate-free, non-toxic, and non-bioaccumulative.

L. Implementation Provisions for Trash* [(Section L only) effective January 12, 2016]

1. Applicability

a. These Trash Provisions* shall be implemented through a prohibition of discharge (Chapter III.I.6) and through NPDES permits issued pursuant to section 402(p) of the Federal Clean Water Act, waste discharge requirements (WDRs), or waivers of WDRs (as set forth in Chapter III.L.2 and Chapter III.L.3 below).

b. These Trash Provisions* apply to all surface waters of the State, with the exception of those waters within the jurisdiction of the Los Angeles Regional Water Quality Control Board (Los Angeles Water Board) for which trash Total Maximum Daily Loads (TMDLs) are in effect prior to the effective date of these Trash Provisions*[1]; provided, however, that:

(1) Upon the effective date of these Trash Provisions*, the Los Angeles Water Board shall cease its full capture system* certification process and provide that any new full capture systems* shall be certified by the State Water Board in accordance with these Trash Provisions*.

(2) Within one year of the effective date of these Trash Provisions*, the Los Angeles Water Board shall convene a public meeting to reconsider the scope of its trash TMDLs, with the exception of those for the Los Angeles River and Ballona Creek watersheds, to particularly consider an approach

[1] In the Los Angeles Region, there are fifteen (15) trash TMDLs for the following watersheds and water bodies: Los Angeles River Watershed, Ballona Creek, Malibu Creek Watershed, Santa Monica Bay Nearshore and Offshore, San Gabriel River East Fork, Revolon Slough and Beardsley Wash, Ventura River Estuary, Machado Lake, Lake Elizabeth, Lake Hughes, Munz Lake, Peck Road Park Lake, Echo Park Lake, Lincoln Park Lake and Legg Lake. Three of these were established by the U.S. EPA: Peck Road Park Lake, Echo Park Lake and Lincoln Park Lake.

* See Appendix I for definition of terms.

that would focus MS4* permittees' trash-control efforts on high-trash generation areas within their jurisdictions.

2. Dischargers Permitted Pursuant to Federal Clean Water Act Section 402(p)

Permitting authorities* shall include the following requirements in NPDES permits issued pursuant to Federal Clean Water Act section 402(p):

a. MS4* permittees with regulatory authority over priority land uses* shall be required to comply with the prohibition of discharge in Chapter III.I.6.a herein by either of the following measures:

(1) Track 1: Install, operate, and maintain full capture systems* for all storm drains that captures runoff from the priority land uses* in their jurisdictions; or

(2) Track 2: Install, operate, and maintain any combination of full capture systems*, multi-benefit projects*, other treatment controls*, and/or institutional controls* within either the jurisdiction of the MS4* permittee or within the jurisdiction of the MS4* permittee and contiguous MS4* permittees. The MS4* permittee may determine the locations or land uses within its jurisdiction to implement any combination of controls. The MS4* permittee shall demonstrate that such combination achieves full capture system equivalency*. The MS4* permittee may determine which controls to implement to achieve compliance with full capture system equivalency*. It is, however, the State Water Board's expectation that the MS4* permittee will elect to install full capture systems* where such installation is not cost-prohibitive.

b. The California Department of Transportation (Department) shall be required to comply with the prohibition of discharge in Chapter III.I.6.a herein in all significant trash generating areas* by installing, operating, and maintaining any combination of full capture systems*, multi-benefit projects*, other treatment controls*, and/or institutional controls* for all storm drains that captures runoff from significant trash generating areas*. The Department shall demonstrate that such combination achieves full capture system equivalency*. In furtherance of this provision, the Department and MS4* permittees that are subject to the provisions of Chapter III.L.2.a herein shall coordinate their efforts to install, operate, and maintain full capture systems*, multi-benefit projects*, other treatment controls*, and/or institutional controls* in significant trash generating areas* and/or priority land uses*.

c. Dischargers that are subject to NPDES permits for discharges of storm water* associated with industrial activity (including construction activity) shall be required to comply with the prohibition of discharge in Chapter III.I.6.a herein by eliminating Trash* from all storm water* and authorized non-storm water* discharges consistent with an outright prohibition of the discharge of Trash* contained within the applicable NPDES permit regulating the industrial or construction facility. If the discharger can satisfactorily demonstrate to the permitting authority* its inability to comply with the outright prohibition of the

* See Appendix I for definition of terms.

discharge of Trash* contained within the applicable NPDES permit, then the permitting authority* may require the discharger to either:

(1) Install, operate, and maintain full capture systems* for all storm drains that captures runoff from the facility or site regulated by the NPDES permit; or,

(2) Install, operate, and maintain any combination of full capture systems*, multi-benefit projects*, other treatment controls*, and/or institutional controls* for the facility or site regulated by the NPDES permit. The discharger shall demonstrate that such combination achieves full capture system equivalency*.

Termination of permit coverage for industrial and construction storm water* dischargers shall be conditioned upon the proper operation and maintenance of all controls (e.g., full capture systems*, multi-benefit projects*, other treatment controls*, and/or institutional controls*) used at their facility(ies).

d. A permitting authority* may determine that specific land uses or locations (e.g., parks, stadia, schools, campuses, or roads leading to landfills) generate substantial amounts of Trash*. In the event that the permitting authority* makes that determination, the permitting authority* may require the MS4* to comply with Chapter III.L.2.a.1 or Chapter III.L.2.a.2, as determined by the permitting authority*, with respect to such land uses or locations.

3. Other Dischargers

A permitting authority* may require dischargers, described in Chapter III.I.6.c or Chapter III.I.6.d, that are not subject to Chapter III.L.2 herein, to implement any appropriate Trash* controls in areas or facilities that may generate Trash*. Such areas or facilities may include (but are not limited to) high usage campgrounds, picnic areas, beach recreation areas, parks not subject to an MS4* permit, or marinas.

4. Time Schedule

The permitting authority* shall modify, re-issue, or newly adopt NPDES permits issued pursuant to section 402(p) of the Federal Clean Water Act that are subject to the provisions of Chapter III.L.2 herein to include requirements consistent with these Trash Provisions*. The permitting authorities* shall abide by the following time schedules:

a. NPDES Permits Regulating MS4* Permittees that have Regulatory Authority over Priority Land Uses*.[2]

[2] The time schedule requirement in Chapter III.L.4.a.1 requiring MS4* permittees to elect Chapter III.L.2.a.1 (Track 1) or Chapter III.L.2.a.2 (Track 2) does not apply to MS4* permittees subject to the Municipal Regional Stormwater NPDES Permit (MRP) issued by the San Francisco Bay Regional Water Quality Control Board (San Francisco Bay Water Board) or the East Contra Costa Municipal Storm Water Permit issued by the Central Valley Regional Water Quality Control Board (Central Valley Water Board) because those permits already require control requirements substantially equivalent to Track 2. The time schedule requirement in Chapter III.L.4.a.1 requiring MS4* permittees to submit an implementation plan

* See Appendix I for definition of terms.

(1) Within eighteen (18) months of the effective date of these Trash Provisions*, for each permittee, each permitting authority* shall either:

A. Modify, re-issue, or adopt the applicable MS4* permit to add requirements to implement these Trash Provisions*. The implementing permit shall require written notice from each MS4* permittee stating whether it has elected to comply under Chapter III.L.2.a.1 (Track 1) or Chapter III.L.2.a.2 (Track 2) and such notice shall be submitted to the permitting authority* no later than three (3) months from the effective date of the implementing permit, or for MS4s* designated after the effective date of these Trash Provisions*, three (3) months from the effective date of that designation. The implementing permit shall also require that within eighteen (18) months of the effective date of the implementing permit or new designation, MS4* permittees that have elected to comply with Track 2 shall submit an implementation plan to the permitting authority*. The implementation plan shall describe: (i) the combination of controls selected by the MS4* permittee and the rationale for the selection, (ii) how the combination of controls is designed to achieve full capture system equivalency*, and (iii) how full capture system equivalency* will be demonstrated. The implementation plan is subject to approval by the permitting authority*.

B. Issue an order pursuant to Water Code section 13267 or 13383 requiring the MS4* permittee to submit, within three (3) months from receipt of the order, written notice to the permitting authority* stating whether such MS4* permittee will comply with the prohibition of discharge under Chapter III.L.2.a.1 (Track 1) or Chapter III.L.2.a.2 (Track 2). For MS4s* designated after the effective date of these Trash Provisions*, the order pursuant to Water Code section 13267 or 13383 shall be issued at the time of designation. Within eighteen (18) months of the receipt of the Water Code section 13267 or 13383 order, MS4* permittees that have elected to comply with Track 2 shall submit an implementation plan to the permitting authority* that describes: (i) the combination of controls selected by the MS4* permittee and the rationale for the selection, (ii) how the combination of controls is designed to achieve full capture system equivalency*, and (iii) how full capture system equivalency* will be demonstrated. The implementation plan is subject to approval by the permitting authority*.

(2) For MS4* permittees that elect to comply with Chapter III.L.2.a.1 (Track1), the implementing permit shall state that full compliance shall occur within

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does not apply to the above permittees if the pertinent permitting authority* determines that such permittee has already submitted an implementation plan prior to the effective date of the Trash Provisions* that is equivalent to the implementation plan required by Chapter III.L.4.a.1. In the aforementioned permits, the pertinent permitting authority* may establish an earlier full compliance deadline than that specified in Chapter III.L.4.a.3.

* See Appendix I for definition of terms.

ten (10) years of the effective date of the first implementing permit except as specified in Chapter III.L.4.a.5. The permit shall also require these permittees to demonstrate achievement of interim milestones such as average load reductions of ten percent (10%) per year or other progress to full implementation. In no case may the final compliance date be later than fifteen (15) years from the effective date of these Trash Provisions*.

(3) For MS4* permittees that elect to comply with Chapter III.L.2.a.2 (Track 2), the implementing permit shall state that full compliance shall occur within ten (10) years of the effective date of the first implementing permit except as specified in Chapter III.L.4.a.5. The permit shall also require these permittees to demonstrate achievement of interim milestones such as average load reductions of ten percent (10%) per year or other progress to full implementation. In no case may the final compliance date be later than fifteen (15) years from the effective date of these Trash Provisions*.

(4) The implementing permit shall state that for MS4* permittees designated after the effective date of the implementing permit, full compliance shall occur within ten (10) years of the effective date of the designation. The permit shall also require such designations to demonstrate achievement of interim milestones such as average load reductions of ten percent (10%) per year or other progress to full implementation.

(5) Where a permitting authority* makes a determination pursuant to Chapter III.L.2.d that a specific land use generates a substantial amount of Trash*, that permitting authority* has discretion to determine the time schedule for full compliance. In no case may the final compliance date be later than ten (10) years from the determination.

b. NPDES Permits Regulating the Department.

(1) Within eighteen (18) months of the effective date of these Trash Provisions*, the State Water Board shall issue an order pursuant to Water Code section 13267 or 13383 requiring the Department to submit an implementation plan to the Executive Director of the State Water Board that: (i) describes the specific locations of its significant trash generating areas*, (ii) the combination of controls selected by the Department and the rationale for the selections, and (iii) how it will demonstrate full capture system equivalency*.

(2) The Department must demonstrate full compliance with Chapter III.L.2.b herein within ten (10) years of the effective date of the first implementing NPDES permit, along with achievements of interim milestones such as average load reductions of ten percent (10%) per year. In no case may the final compliance date be later than fifteen (15) years from the effective date of these Trash Provisions*.

c. NPDES Permits Regulating the Discharges of Storm Water* Associated with Industrial Activity (Including Construction Activity). Dischargers that are subject

* See Appendix I for definition of terms.

to the provisions of Chapter III.L.2.c herein must demonstrate full compliance in accordance with the deadlines contained in the first implementing NPDES permits. Such deadlines may not exceed the terms of the first implementing permits.

5. Monitoring and Reporting

The permitting authority* must include monitoring and reporting requirements in its implementing permits. The following monitoring and reporting provisions are the minimum requirements that must be included within the implementing permits:

a. MS4* permittees that elect to comply with Chapter III.L.2.a.1 (Track 1) shall provide a report to the applicable permitting authority* demonstrating installation, operation, maintenance, and the Geographic Information System- (GIS-) mapped location and drainage area served by its full capture systems* on an annual basis.

b. MS4* permittees that elect to comply with Chapter III.L.2.b.2 (Track 2) shall develop and implement monitoring plans that demonstrate the effectiveness of the full capture systems*, multi-benefit projects*, other treatment controls*, and/or institutional controls* and compliance with full capture system equivalency*. Monitoring reports shall be provided to the applicable permitting authority* on an annual basis, and shall include GIS-mapped locations and drainage area served for each of the full capture systems*, multi-benefit projects*, other treatment controls*, and/or institutional controls* installed or utilized by the MS4* permittee. In developing the monitoring reports the MS4* permittee should consider the following questions:

(1) What type of and how many treatment controls*, institutional controls*, and/or multi-benefit projects* have been used and in what locations?

(2) How many full capture systems* have been installed (if any), in what locations have they been installed, and what is the individual and cumulative area served by them?

(3) What is the effectiveness of the total combination of treatment controls*, institutional controls*, and multi-benefit projects* employed by the MS4* permittee?

(4) Has the amount of Trash* discharged from the MS4* decreased from the previous year? If so, by how much? If not, explain why.

(5) Has the amount of Trash* in the MS4's* receiving water(s) decreased from the previous year? If so, by how much? If not, explain why.

c. The Department, as subject to the provisions of Chapter III.L.2.b, shall develop and implement monitoring plans that demonstrate the effectiveness of the controls and compliance with full capture system equivalency*. Monitoring reports shall be provided to the State Water Board on an annual basis, and shall include GIS-mapped locations and drainage area served for each of the full

* See Appendix I for definition of terms.

capture systems*, multi-benefit projects*, other treatment controls*, and/or institutional controls* installed or utilized by the Department. In developing the monitoring report, the Department should consider the following questions:

(1) What type of and how many treatment controls* institutional controls*, and/or multi-benefit projects* have been used and in what locations?

(2) How many full capture systems* have been installed (if any), in what locations have they been installed, and what is the individual and cumulative area served by them?

(3) What is the effectiveness of the total combination of treatment controls*, institutional controls*, and multi-benefit projects* employed by the Department?

(4) Has the amount of Trash* discharged from the Department's MS4* decreased from the previous year? If so, by how much? If not, explain why.

(5) Has the amount of Trash* in the receiving waters decreased from the previous year? If so, by how much? If not, explain why.

d. Dischargers that are subject to the provisions of Chapter III.L.2.c herein shall be required to report the measures used to comply with Chapter III.L.2.c.

M. Implementation Provisions for Desalination Facilities*

1. Applicability and General Provisions

a. Chapter III.M applies to desalination facilities* using seawater.* Chapter III.M.2 does not apply to desalination facilities* operated by a federal agency. Chapter III.M.2, M.3, and M.4 do not apply to portable desalination facilities* that withdraw less than 0.10 million gallons per day (MGD) of seawater* and are operated by a governmental agency. These standards do not alter or limit in any way the authority of any public agency to implement its statutory obligations. The Executive Director of the State Water Board may temporarily waive the application of chapter III.M to desalination facilities* that are operating to serve as a critical short-term water supply during a state of emergency as declared by the Governor.

b. Definitions of New, Expanded, and Existing Facilities:

(1) For purposes of chapter III.M, "existing facilities" means desalination facilities* that have been issued an NPDES permit and all building permits and other governmental approvals necessary to commence construction for which the owner or operator has relied in good faith on those previously-issued permits and approvals and commenced construction of the facility beyond site grading prior to January 28, 2016.

* See Appendix I for definition of terms.

(2) For purposes of chapter III.M, "expanded facilities" means existing facilities for which, after January 28, 2016, the owner or operator does either of the following in a manner that could increase intake or mortality of all forms of marine life * beyond that which was originally approved in any NPDES permit or Water Code section 13142.5, subdivision (b) (hereafter Water Code section 13142.5(b)) determination: 1) increases the amount of seawater* used either exclusively by the facility or used by the facility in conjunction with other facilities or uses, or 2) changes the design or operation of the facility. To the extent that the desalination facility* is co-located with another facility that withdraws water for a different purpose and that other facility reduces the volume of water withdrawn to a level less than the desalination facility's* volume of water withdrawn, the desalination facility* is considered to be an expanded facility.

(3) For purposes of chapter III.M, "new facilities" means desalination facilities* that are not existing facilities or expanded facilities.

c. Chapter III.M.2 (Water Code §13142.5(b) Determinations for New and Expanded Facilities: Site, Design, Technology, and Mitigation Measures) applies to new and expanded desalination facilities* withdrawing seawater.*

d. Chapter III.M.3 (Receiving Water Limitation for Salinity*) applies to all desalination facilities* that discharge into ocean waters* and wastewater facilities that receive brine* from seawater* desalination facilities* and discharge into ocean waters.*

e. Chapter III.M.4 (Monitoring and Reporting Programs) applies to all desalination facilities* that discharge into ocean waters.* Chapter III.M.4 shall not apply to a wastewater facility that receives brine* from a seawater* desalination facility* and discharges a positively buoyant commingled effluent through an existing wastewater outfall that is covered under an existing NPDES permit, as long as the owner or operator monitors for compliance with the receiving water limitation set forth in chapter III.M.3. For the purposes of chapter III.M.4, a positively buoyant commingled effluent shall mean that the commingled plume rises when it enters the receiving water body due to salinity* levels in the commingled discharge being lower than the natural background salinity.*

f. References to the regional water board include the regional water board acting under delegated authority. For provisions that require consultation between regional water board and State Water Board staff, the regional water board shall notify and consult with the State Water Board staff prior to making a final determination on the item requiring consultation.

g. All desalination facilities must comply with all other applicable sections of the Ocean Plan.

2. Water Code section 13142.5(b) Determinations for New and Expanded Facilities: Site, Design, Technology, and Mitigation Measures Feasibility Considerations

* See Appendix I for definition of terms.

a. General Considerations

(1) The owner or operator shall submit a request for a Water Code section 13142.5(b) determination to the appropriate regional water board as early as practicable. This request shall include sufficient information for the regional water board to conduct the analyses described below. The regional water board in consultation with the State Water Board staff may require an owner or operator to provide additional studies or information if needed, including any information necessary to identify and assess other potential sources of mortality to all forms of marine life. All studies and models are subject to the approval of the regional water board in consultation with State Water Board staff. The regional water board may require an owner or operator to hire a neutral third party entity to review studies and models and make recommendations to the regional water board.

(2) The regional water board shall conduct a Water Code section 13142.5(b) analysis of all new and expanded desalination facilities.* A Water Code section 13142.5(b) analysis may include future expansions at the facility. The regional water board shall first analyze separately as independent considerations a range of feasible* alternatives for the best available site, the best available design, the best available technology, and the best available mitigation measures to minimize intake and mortality of all forms of marine life.* Then, the regional water board shall consider all four factors collectively and determine the best combination of feasible* alternatives to minimize intake and mortality of all forms of marine life.* The best combination of alternatives may not always include the best alternative under each individual factor because some alternatives may be mutually exclusive, redundant, or not feasible* in combination.

(3) The regional water board's Water Code section 13142.5(b) analysis for expanded facilities may be limited to those expansions or other changes that result in the increased intake or mortality of all forms of marine life,* unless the regional water board determines that additional measures that minimize intake and mortality of all forms of marine life* are feasible* for the existing portions of the facility.

(4) In conducting the Water Code section 13142.5(b) determination, the regional water boards shall consult with other state agencies involved in the permitting of that facility, including, but not limited to: California Coastal Commission, California State Lands Commission, and California Department of Fish and Wildlife. The regional water board shall consider project-specific decisions made by other state agencies; however, the regional water board is not limited to project-specific requirements set forth by other agencies and may include additional requirements in a Water Code section 13142.5(b) determination.

* See Appendix I for definition of terms.

(5) A regional water board may expressly condition a Water Code section 13142.5(b) determination based on the expectation of the occurrence of a future event. Such future events may include, but are not limited to, the permanent shutdown of a co-located power plant with intake structures shared with the desalination facility,* or a reduction in the volume of wastewater available for the dilution of brine.* The regional water board must make a new Water Code section 13142.5(b) determination if the foreseeable future event occurs.

(a) The owner or operator shall provide notice to the regional water board as soon as it becomes aware that the expected future event will occur, and shall submit a new request for a Water Code section 13142.5(b) determination to the regional water board at least one year prior to the event occurring. If the owner or operator does not become aware that the event will occur at least one year prior to the event occurring, the owner or operator shall submit the request as soon as possible.

(b) The regional water board may allow up to five years from the date of the event for the owner or operator to make modifications to the facility required by a new Water Code section 13142.5(b) determination, provided that the regional water board finds that 1) any water supply interruption resulting from the facility modifications requires additional time for water users to obtain a temporary replacement supply, or 2) such a compliance period is otherwise in the public interest and reasonably required for modification of the facility to comply with the determination.

(c) If the regional water board makes a Water Code section 13142.5(b) determination for a desalination facility* that will be co-located with a power plant, the regional water board shall condition its determination on the power plant remaining in compliance with the Water Quality Control Policy on the Use of Coastal and Estuarine Waters for Power Plant Cooling.

b. Site is the general onshore and offshore location of a new or expanded facility. There may be multiple potential facility design configurations within any given site. The regional water board shall require that the owner or operator evaluate a reasonable range of nearby sites, including sites that would likely support subsurface intakes. For each potential site, in order to determine whether a proposed facility site is the best available site feasible* to minimize intake and mortality of all forms of marine life,* the regional water board shall require the owner or operator to:

(1) Consider whether subsurface intakes* are feasible.*

(2) Consider whether the identified need for desalinated* water is consistent with an applicable adopted urban water management plan

* See Appendix I for definition of terms.

prepared in accordance with Water Code section 10631, or if no urban water management plan is available, other water planning documents such as a county general plan or integrated regional water management plan.

(3) Analyze the feasibility of placing intake, discharge, and other facility infrastructure in a location that avoid impacts to sensitive habitats* and sensitive species.

(4) Analyze the direct and indirect effects on all forms of marine life* resulting from facility construction and operation, individually and in combination with potential anthropogenic effects on all forms of marine life* resulting from other past, present, and reasonably foreseeable future activities within the area affected by the facility.

(5) Analyze oceanographic geologic, hydrogeologic, and seafloor topographic conditions at the site, so that the siting of a facility, including the intakes and discharges, minimizes the intake and mortality of all forms of marine life.*

(6) Analyze the presence of existing discharge infrastructure, and the availability of wastewater to dilute the facility's brine* discharge.

(7) Ensure that the intake and discharge structures are not located within a MPA or SWQPA* with the exception of intake structures that do not have marine life mortality associated with the construction, operation, and maintenance of the intake structures (e.g. slant wells). Discharges shall be sited at a sufficient distance from a MPA or SWQPA* so that the salinity* within the boundaries of a MPA or SWQPA* does not exceed natural background salinity.* To the extent feasible,* surface intakes shall be sited so as to maximize the distance from a MPA or SWQPA.*

c. Design is the size, layout, form, and function of a facility, including the intake capacity and the configuration and type of infrastructure, including intake and outfall structures. The regional water board shall require that the owner or operator perform the following in determining whether a proposed facility design is the best available design feasible* to minimize intake and mortality of all forms of marine life:*

(1) For each potential site, analyze the potential design configurations of the intake, discharge, and other facility infrastructure to avoid impacts to sensitive habitats* and sensitive species.

(2) If the regional water board determines that subsurface intakes* are not feasible* and surface water intakes are proposed instead, analyze potential designs for those intakes in order to minimize the intake and mortality of all forms of marine life.*

* See Appendix I for definition of terms.

(3) Design the outfall so that the brine mixing zone* does not encompass or otherwise adversely affect existing sensitive habitat.*

(4) Design the outfall so that discharges do not result in dense, negatively-buoyant plumes that result in adverse effects due to elevated salinity* or hypoxic conditions occurring outside the brine mixing zone.* An owner or operator must demonstrate that the outfall meets this requirement through plume modeling and/or field studies. Modeling and field studies shall be approved by the regional water board in consultation with State Water Board staff.

(5) Design outfall structures to minimize the suspension of benthic sediments.

d. Technology is the type of equipment, materials,* and methods that are used to construct and operate the design components of the desalination facility.* The regional water board shall apply the following considerations in determining whether a proposed technology is the best available technology feasible* to minimize intake and mortality of all forms of marine life:*

(1) Considerations for Intake Technology:

(a) Subject to chapter M.2.a.(2), the regional water board in consultation with State Water Board staff shall require subsurface intakes* unless it determines that subsurface intakes* are not feasible* based upon a comparative analysis of the factors listed below for surface and subsurface intakes.* A design capacity in excess of the need for desalinated* water as identified in chapter III.M.2.b.(2) shall not be used by itself to declare subsurface intakes* as not feasible.*

i. The regional water board shall consider the following factors in determining feasibility of subsurface intakes:* geotechnical data, hydrogeology, benthic topography, oceanographic conditions, presence of sensitive habitats,* presence of sensitive species, energy use for the entire facility; design constraints (engineering, constructability), and project life cycle cost. Project life cycle cost shall be determined by evaluating the total cost of planning, design, land acquisition, construction, operations, maintenance, mitigation, equipment replacement and disposal over the lifetime of the facility, in addition to the cost of decommissioning the facility. Subsurface intakes* shall not be determined to be economically infeasible solely because subsurface intakes* may be more expensive than surface intakes. Subsurface intakes* may be determined to be economically infeasible if the additional costs or lost profitability associated with subsurface intakes,* as compared to surface intakes, would render the desalination facility* not economically viable. In

* See Appendix I for definition of terms.

addition, the regional water board may evaluate other site- and facility-specific factors.

ii. If the regional water board determines that subsurface intakes* are not feasible* for the proposed intake design capacity, it shall determine whether subsurface intakes* are feasible* for a reasonable range of alternative intake design capacities. The regional water board may find that a combination of subsurface* and surface intakes is the best feasible* alternative to minimize intake and mortality of marine life and meet the identified need for desalinated water as described in chapter III.M.2.b.(2).

(b) Installation and maintenance of a subsurface intake* shall avoid, to the maximum extent feasible,* the disturbance of sensitive habitats* and sensitive species.

(c) If subsurface intakes* are not feasible,* the regional water board may approve a surface water intake, subject to the following conditions:

i. The regional water board shall require that surface water intakes be screened. Screens must be functional while the facility is withdrawing seawater.*

ii. In order to reduce entrainment, all surface water intakes must be screened with a 1.0 mm (0.04 in) or smaller slot size screen when the desalination facility* is withdrawing seawater.*

iii. An owner or operator may use an alternative method of preventing entrainment so long as the alternative method results in intake and mortality of eggs, larvae, and juvenile organisms that is less than or equivalent to a 1.0 mm (0.04 in) slot size screen. The owner or operator must demonstrate the effectiveness of the alternative method to the regional water board. The owner or operator must conduct a study to demonstrate the effectiveness of the alternative method, and use an Empirical Transport Model* (ETM)/ Area of Production Forgone* (APF) approach* to estimate entrainment. The study period shall be at least 12 consecutive months. Sampling for environmental studies shall be designed to account for variation in oceanographic or hydrologic conditions and larval abundance and diversity such that abundance estimates are reasonably accurate. Samples must be collected using a mesh size no larger than 335 microns and individuals collected shall be identified to the lowest taxonomical level practicable. The ETM/APF analysis* shall evaluate entrainment for a broad range of species, species morphologies, and sizes under the environmental and operational conditions that are representative of the entrained species and the conditions at

* See Appendix I for definition of terms.

the full-scale desalination facility.* At their discretion, the regional water boards may permit the use of existing entrainment data to meet this requirement.

iv. In order to minimize impingement, through-screen velocity at the surface water intake shall not exceed 0.15 meters per second (0.5 feet per second).

(2) Considerations for Brine* Discharge Technology:

(a) The preferred technology for minimizing intake and mortality of all forms of marine life* resulting from brine* discharge is to commingle brine* with wastewater (e.g., agricultural, municipal, industrial, power plant cooling water, etc.) that would otherwise be discharged to the ocean. The wastewater must provide adequate dilution to ensure salinity* of the commingled discharge meets the receiving water limitation for salinity* in chapter III.M.3. Nothing in this section shall preclude future recycling of the wastewater.

(b) Multiport diffusers* are the next best method for disposing of brine* when the brine* cannot be diluted by wastewater and when there are no live organisms in the discharge. Multiport diffusers* shall be engineered to maximize dilution, minimize the size of the brine mixing zone,* minimize the suspension of benthic sediments, and minimize mortality of all forms of marine life.*

(c) Brine* discharge technologies other than wastewater dilution and multiport diffusers,* may be used if an owner or operator can demonstrate to the regional water board that the technology provides a comparable level of intake and mortality of all forms of marine life* as wastewater dilution if wastewater is available, or multiport diffusers* if wastewater is unavailable. The owner or operator must evaluate all of the individual and cumulative effects of the proposed alternative discharge method on the intake and mortality of all forms of marine life,* including (where applicable); intake-related entrainment, osmotic stress, turbulence that occurs during water conveyance and mixing, and shearing stress at the point of discharge. When determining the intake and mortality associated with a brine* discharge technology or combination of technologies, the regional water board shall require the owner or operator to use empirical studies or modeling to:

i. Estimate intake entrainment impacts using an ETM/APF approach.*

ii. Estimate degradation of all forms of marine life* from elevated salinity* within the brine mixing zone,* including osmotic stresses, the size of impacted area, and the duration that all forms of marine life* are exposed to the

* See Appendix I for definition of terms.

toxic conditions. Considerations shall be given to the most sensitive species, and community structure and function.

iii. Estimate the intake and mortality of all forms of marine life* that occurs as a result of water conveyance, in-plant turbulence or mixing, and waste* discharge.

iv. Within 18 months of beginning operation, submit to the regional water board an empirical study that evaluates intake and mortality of all forms of marine life* associated with the alternative brine* discharge technology. The study must evaluate impacts caused by any augmented intake volume, intake and pump technology, water conveyance, waste brine* mixing, and effluent discharge. Unless demonstrated otherwise, organisms entrained by the alternative brine* discharge technology are assumed to have a mortality rate of 100 percent. The study period shall be at least 12 consecutive months. If the regional water board requires a study period longer than 12 months, the final report must be submitted to the regional water board within 6 months of the completion of the empirical study.

v. If the empirical study shows that the alternative brine* discharge technology results in more intake and mortality of all forms of marine life* than a facility using wastewater dilution or multiport diffusers,* then the facility must either: (1) cease using the alternative brine* discharge technology and install and use wastewater dilution or multiport diffusers* to discharge brine* waste, or (2) re-design the alternative brine* discharge technology system to minimize intake and mortality of all forms of marine life* to a level that is comparable with wastewater dilution if wastewater is available, or multiport diffusers* if wastewater is unavailable,* subject to regional water board approval.

(d) Flow augmentation* as an alternative brine* discharge technology is prohibited with the following exceptions:

i. At facilities that use subsurface intakes* to supply augmented flow water for dilution. Facilities that use subsurface intakes* to supply augmented flow water for dilution are exempt from the requirements of chapter III.M.2.d.(2)(c) if the facility meets the receiving water limitation for salinity* in chapter III.M.3.

ii. At a facility that has received a conditional Water Code section 13142.5(b) determination and is over 80 percent constructed by January 28, 2016. If the owner or operator of the facility proposes to use flow augmentation* as an

* See Appendix I for definition of terms.

alternative brine* discharge technology, the facility must: use low turbulence intakes (e.g., screw centrifugal pumps or axial flow pumps) and conveyance pipes; convey and mix dilution water in a manner that limits thermal stress, osmotic stress, turbulent shear stress, and other factors that could cause intake and mortality of all forms of marine life*; comply with chapter III.M.2.d.(1); and not discharge through multiport diffusers.*

e. Mitigation for the purposes of this section is the replacement of all forms of marine life* or habitat that is lost due to the construction and operation of a desalination facility* after minimizing intake and mortality of all forms of marine life* through best available site, design, and technology. The regional water board shall ensure an owner or operator fully mitigates for the operational lifetime of the facility and uses the best available mitigation measures feasible* to minimize intake and mortality of all forms of marine life.* The owner or operator may choose whether to satisfy a facility's mitigation measures pursuant to chapter III.M.2.e.(3) or, if available, M.2.e.(4), or a combination of the two.

(1) *Marine Life Mortality Report.* The owner or operator of a facility shall submit a report to the regional water board estimating the marine life mortality resulting from construction and operation of the facility after implementation of the facility's required site, design, and technology measures.

(a) For operational mortality related to intakes, the report shall include a detailed entrainment study. The entrainment study period shall be at least 12 consecutive months and sampling shall be designed to account for variation in oceanographic or hydrologic conditions and larval abundance and diversity such that abundance estimates are reasonably accurate. At their discretion, the regional water boards may permit the use of existing entrainment data from the facility to meet this requirement. Samples must be collected using a mesh size no larger than 335 microns and individuals collected shall be identified to the lowest taxonomical level practicable. The ETM/APF analysis* shall be representative of the entrained species collected using the 335 micron net. The APF* shall be calculated using a one-sided, upper 95 percent confidence bound for the 95th percentile of the APF distribution. An owner or operator with subsurface intakes* is not required to do an ETM/APF analysis* for their intakes and is not required to mitigate for intake-related operational mortality. The regional water board may apply a one percent reduction to the APF* acreage calculated in the Marine Life Mortality Report to account for the reduction in entrainment of all forms of marine life* when using a 1.0 mm slot size screen.

* See Appendix I for definition of terms.

(b) For operational mortality related to discharges, the report shall estimate the area in which salinity* exceeds 2.0 parts per thousand above natural background salinity* or a facility-specific alternative receiving water limitation (see chapter III.M.3). The area in excess of the receiving water limitation for salinity* shall be determined by modeling and confirmed with monitoring. The report shall use any acceptable approach approved by the regional water board for evaluating mortality that occurs due to shearing stress resulting from the facility's discharge, including any incremental increase in mortality resulting from a commingled discharge.

(c) For construction-related mortality, the report shall use any acceptable approach approved by the regional water board for evaluating the mortality that occurs within the area disturbed by the facility's construction. The regional water board may determine that the construction-related disturbance does not require mitigation because the disturbance is temporary and the habitat is naturally restored.

(d) Upon approval of the report by the regional water board in consultation with State Water Board staff, the calculated marine life mortality shall form the basis for the mitigation provided pursuant to this section.

(2) The owner or operator shall mitigate for the mortality of all forms of marine life* determined in the report above by choosing to either complete a mitigation project as described in chapter III.M.2.e.(3) or, if an appropriate fee-based mitigation program is available, provide funding for the program as described in chapter III.M.2.e.(4). The mitigation project or the use of a fee-based mitigation program and the amount of the fee that the owner or operator must pay is subject to regional water board approval.

(3) *Mitigation Option 1: Complete a Mitigation Project.* The mitigation project must satisfy the following provisions:

(a) The owner or operator shall submit a Mitigation Plan. Mitigation Plans shall include: project objectives, site selection, site protection instrument (the legal arrangement or instrument that will be used to ensure the long-term protection of the compensatory mitigation project site), baseline site conditions, a mitigation work plan, a maintenance plan, a long-term management plan, an adaptive management plan, performance standards and success criteria, monitoring requirements, and financial assurances.

(b) The mitigation project must meet the following requirements:

i. Mitigation shall be accomplished through expansion, restoration or creation of one or more of the following:

* See Appendix I for definition of terms.

kelp beds,* estuaries,* coastal wetlands, natural reefs, MPAs, or other projects approved by the regional water board that will mitigate for intake and mortality of all forms of marine life* associated with the facility.

ii. The owner or operator shall demonstrate that the project fully mitigates for intake-related marine life mortality by including expansion, restoration, or creation of habitat based on the APF* acreage calculated in the Marine Life Mortality Report above. The owner or operator using surface water intakes shall do modeling to evaluate the areal extent of the mitigation project's production area to confirm that it overlaps the facility's source water body.* Impacts on the mitigation project due to entrainment by the facility must be offset by adding compensatory acreage to the mitigation project.

iii. The owner or operator shall demonstrate that the project also fully mitigates for the discharge-related marine life mortality projected in the Marine Life Mortality Report above.

iv. The owner or operator shall demonstrate that the project also fully mitigates for the construction-related marine life mortality identified in the Marine Life Mortality Report above.

v. The regional water board may permit out-of-kind mitigation* for mitigation of open water or soft-bottom species. In-kind mitigation* shall be done for all other species whenever feasible.*

vi. For out-of-kind mitigation,* an owner or operator shall evaluate the biological productivity of the impacted open water or soft-bottom habitat calculated in the Marine Life Mortality Report and the proposed mitigation habitat. If the mitigation habitat is a more biologically productive habitat (e.g. wetlands, estuaries,* rocky reefs, kelp beds,* eelgrass beds,* surfgrass beds*), the regional water boards may apply a mitigation ratio based on the relative biological productivity of the impacted open water or soft-bottom habitat and the mitigation habitat. The mitigation ratio shall not be less than one acre of mitigation habitat for every ten acres of impacted open water or soft-bottom habitat.

vii. For in-kind mitigation,* the mitigation ratio shall not be less than one acre of mitigation habitat for every one acre of impacted habitat.

* See Appendix I for definition of terms.

viii. For both in-kind* and out-of-kind mitigation,* the regional water boards may increase the required mitigation ratio for any species and impacted natural habitat calculated in the Marine Life Mortality Report when appropriate to account for imprecisions associated with mitigation including, but not limited to, the likelihood of success, temporal delays in productivity, and the difficulty of restoring or establishing the desired productivity functions.

ix. The rationale for the mitigation ratios must be documented in the administrative record for the permit action.

(c) The Mitigation Plan is subject to approval by the regional water board in consultation with State Water Board staff and with other agencies having authority to condition approval of the project and require mitigation.

(4) *Mitigation Option 2: Fee-based Mitigation Program*. If the regional water board determines that an appropriate fee-based mitigation program has been established by a public agency, and that payment of a fee to the mitigation program will result in the creation and ongoing implementation of a mitigation project that meets the requirements of chapter M.2.e.(3), the owner or operator may pay a fee to the mitigation program in lieu of completing a mitigation project.

(a) The agency that manages the fee-based mitigation program must have legal and budgetary authority to accept and spend mitigation funds, a history of successful mitigation projects documented by having set and met performance standards for past projects, and stable financial backing in order to manage mitigation sites for the operational life of the facility.

(b) The amount of the fee shall be based on the cost of the mitigation project, or if the project is designed to mitigate cumulative impacts from multiple desalination facilities or other development projects, the amount of the fee shall be based on the desalination facility's* fair share of the cost of the mitigation project.

(c) The manager of the fee-based mitigation program must consult with the California Department of Fish and Wildlife, Ocean Protection Council, Coastal Commission, State Lands Commission, and State and regional water boards to develop mitigation projects that will best compensate for intake and mortality of all forms of marine life* caused by the desalination facility.* Mitigation projects that increase or enhance the viability and sustainability of all forms of marine life* in Marine Protected Areas are preferred, if feasible.*

* See Appendix I for definition of terms.

(5) California Department of Fish and Wildlife, the regional water board, and State Water Board may perform audits or site inspections of any mitigation project.

(6) An owner or operator, or a manager of a fee-based mitigation program, must submit a mitigation project performance report to the regional water board 180 days prior to the expiration date of their NPDES permit.

(7) For conditionally permitted facilities or expanded facilities, the regional water boards may:

(a) Account for previously-approved mitigation projects associated with a facility when making a new Water Code section 13142.5(b) determination.

(b) Require additional mitigation when making a new Water Code section 13142.5(b) determination for any additional mortality of all forms of marine life resulting from the occurrence of the conditional event or the expansion of the facility. The additional mitigation must be to compensate for any additional construction, discharge, or other increases in intake or impacts or an increase in intake and mortality of all forms of marine life.*

3. Receiving Water Limitation for Salinity*

a. Chapter III.M.3 is applicable to all desalination facilities discharging brine* into ocean waters,* including facilities that commingle brine* and wastewater.

b. The receiving water limitation for salinity* shall be established as described below:

(1) Discharges shall not exceed a daily maximum of 2.0 parts per thousand (ppt) above natural background salinity* measured no further than 100 meters (328 ft) horizontally from each discharge point. There is no vertical limit to this zone.

(2) In determining an effluent limit necessary to meet this receiving water limitation, permit writers shall use the formula in chapter III.C.4 that has been modified for brine* discharges as follows:

Equation 1: Ce= Co + Dm(2.0 ppt)
Ce= (2.0 ppt + Cs) + Dm(2.0 ppt)

Where:

Ce= the effluent concentration limit, ppt
Co= the salinity* concentration to be met at the completion of initial* dilution= 2.0 ppt + Cs
Cs= the natural background salinity,* ppt
Dm= minimum probable initial dilution* expressed as parts

* See Appendix I for definition of terms.

seawater* per part brine* discharge

(a) The fixed distance referenced in the initial dilution* definition shall be no more than 100 meters (328 feet).

(b) In addition, the owner or operator shall develop a dilution factor (Dm) based on the distance of 100 meters (328 feet) or initial dilution,* whichever is smaller. The dilution factor (Dm) shall be developed within the brine mixing zone* using applicable water quality models that have been approved by the regional water boards in consultation with State Water Board staff.

(c) The value 2.0 ppt in Equation 1 is the maximum incremental increase above natural background salinity* (Cs) allowed at the edge of the brine mixing zone.* A regional water board may substitute an alternative numeric value for 2.0 ppt in Equation 1 based upon the results of a facility-specific alternative salinity* receiving water limitation study, as described in chapter III.M.3.c below.

c. An owner or operator may submit a proposal to the regional water board for approval of an alternative (other than 2 ppt) salinity* receiving water limitation to be met no further than 100 meters horizontally from the discharge. There is no vertical limit to this zone.

(1) To determine whether a proposed facility-specific alternative receiving water limitation is adequately protective of beneficial uses, an owner or operator shall:

(a) Establish baseline biological conditions at the discharge location and at reference locations over a 12-month period prior to commencing brine* discharge. The biologic surveys must characterize the ecologic composition of habitat and marine life using measures established by the regional water board. At their discretion, the regional water boards may permit the use of existing data to meet this requirement.

(b) Conduct at least the following chronic toxicity* Whole Effluent Toxicity (WET) tests: germination and growth for giant kelp (*Macrocystis pyrifera)*; development for red abalone (*Haliotis refescens)*; development and fertilization for purple urchin (*Strongleocentrotus purpuratus)*; development and fertilization for sand dollar (*Dendraster excentricus)*; larval growth rate for topsmelt (*Atherniops affinis)*. WET tests shall be performed by an Environmental Laboratory Accreditation Program (ELAP) certified laboratory.

* See Appendix I for definition of terms.

(c) The regional water board in consultation with State Water Board staff may require an owner or operator to do additional toxicity studies if needed.

(2) The regional water board in consultation with the State Water Board staff may require an owner or operator to provide additional studies or information in order to approve a facility-specific alternative receiving water limitation for salinity.*

(3) The facility-specific alternative receiving water limitation shall be based on the lowest observed effect concentration (LOEC)* for the most sensitive species and toxicity endpoint as determined in the chronic toxicity* studies. The regional water board in consultation with State Water Board staff has discretion to approve the proposed facility-specific alternative receiving water limitation for salinity.*

(4) The regional water board shall review a facility's monitoring data, the studies as required in chapter III.M.4 below, or any other information that the regional water board deems to be relevant to periodically assess whether the facility-specific alternative receiving water limitation for salinity* is adequately protective of beneficial uses. The regional water board may eliminate or revise a facility-specific alternative receiving water limitation for salinity* based on its assessment of the data.

d. The owner or operator of a facility that has received a conditional Water Code section 13142.5(b) determination and is over 80 percent constructed by January 28, 2016 that proposes flow augmentation* using a surface water intake may submit a proposal to the regional water board in consultation with the State Water Board staff for approval of an alternative brine mixing zone* not to exceed 200 meters laterally from the discharge point and throughout the water column. The owner or operator of such a facility must demonstrate, in accordance with chapter III.M.2.d.(2)(c), that the combination of the alternative brine mixing zone* and flow augmentation* using a surface water intake provide a comparable level of intake and mortality of all forms of marine life* as the combination of the standard brine mixing zone* and wastewater dilution if wastewater is available, or multiport diffusers* if wastewater is unavailable. In addition to the analysis of the effects required by chapter III.M.2.d.(2)(c), the owner or operator must also evaluate the individual and cumulative effects of the alternative brine mixing zone* on the intake and mortality of all forms of marine life.* In no case may the discharge result in hypoxic conditions outside of the alternative brine mixing zone.* If an alternative brine mixing zone* is approved, the alternative distance and the areal extent of the alternative brine mixing zone* shall be used in lieu of the standard brine mixing zone* for all purposes, including establishing an effluent limitation and a receiving water limitation for salinity, in chapter III.M.

e. Existing facilities that do not meet the receiving water limitation at the edge of the brine mixing zone* and throughout the water column by January 28, 2016 must either: 1) establish a facility-specific alternative receiving water limitation

* See Appendix I for definition of terms.

for salinity* as described in chapter III.M.3.c; or, 2) upgrade the facility's brine* discharge method in order to meet the receiving watr limitation in chapter III.M.3.b in accordance with the State Water Board's Compliance Schedule Policy, as set forth in chapter III.M.3.f below. An owner or operator that chooses to upgrade the facility's method of brine* discharge:

(1) Must demonstrate to the regional water board that the brine* discharge does not negatively impact sensitive habitats,* sensitive species, MPAs, or SWQPAs.*

(2) Is subject to the Considerations for Brine* Discharge Technology described in chapter III.M.2.d.(2).

f. The regional water board may grant compliance schedules for the requirements for brine* waste discharges for desalination facilities.* All compliance schedules shall be in accordance with the State Water Board's Compliance Schedule Policy, except that the salinity* receiving water limitation set forth in chapters III.M.3.b and III.M.3.c shall be considered to be a "new water quality objective" as used in the Compliance Schedule Policy.

g. The regional water board in consultation with the State Water Board staff may require an owner or operator to provide additional studies or information if needed. All studies and models are subject to the approval of the regional water board in consultation with State Water Board staff. The regional water board may require an owner or operator to hire a neutral third party entity to review studies and models and make recommendations to the regional water board.

4. Monitoring and Reporting Programs

a. The owner or operator of a desalination facility* must submit a Monitoring and Reporting Plan to the regional water board for approval. The Monitoring and Reporting Plan shall include monitoring of effluent and receiving water characteristics and impacts to all forms of marine life.* The Monitoring and Reporting Plan shall, at a minimum, include monitoring for benthic community health, aquatic life toxicity, hypoxia, and receiving water characteristics consistent with Appendix III of this Plan and for compliance with the receiving water limitation in chapter III.M.3. Receiving water monitoring for salinity* shall be conducted at times when the monitoring locations are most likely affected by the discharge. For new or expanded facilities the following additional requirements apply:

(1) An owner or operator must perform facility-specific monitoring to demonstrate compliance with the receiving water limitation for salinity,* and evaluate the potential effects of the discharge within the water column, bottom sediments, and the benthic communities. Facility-specific monitoring is required until the regional water board determines that a regional monitoring program is adequate to ensure compliance with the receiving water limitation. The monitoring and

* See Appendix I for definition of terms.

reporting plan shall be reviewed, and revised if necessary, upon NPDES permit renewal.

(2) Baseline biological conditions shall be established at the discharge location and at a reference location prior to commencement of construction. The owner or operator is required to conduct biological surveys (e.g., Before-After Control-Impact study), that will evaluate the differences between biological communities at a reference site and at the discharge location before and after the discharge commences. The regional water board will use the data and results from the surveys and any other applicable data for evaluating and renewing the requirements set forth in a facility's NPDES permit.

* See Appendix I for definition of terms.

APPENDIX I
DEFINITION OF TERMS

ACUTE TOXICITY

a. Acute Toxicity (TUa)

Expressed in Toxic Units Acute (TUa)

$$TUa = \frac{100}{96\text{-hr LC } 50\%}$$

b. Lethal Concentration 50% (LC 50)

LC 50 (percent waste giving 50% survival of test organisms) shall be determined by static or continuous flow bioassay techniques using standard marine test species as specified in Appendix III. If specific identifiable substances in wastewater can be demonstrated by the discharger as being rapidly rendered harmless upon discharge to the marine environment, but not as a result of dilution, the LC 50 may be determined after the test samples are adjusted to remove the influence of those substances.

When it is not possible to measure the 96-hour LC 50 due to greater than 50 percent survival of the test species in 100 percent waste, the toxicity concentration shall be calculated by the expression:

$$TUa = \frac{\log (100 - S)}{1.7}$$

where:

S = percentage survival in 100% waste. If S > 99, TUa shall be reported as zero.

ALL FORMS OF MARINE LIFE includes all life stages of all marine species.

AREA PRODUCTION FOREGONE (APF), also known as habitat production foregone, is an estimate of the area that is required to produce (replace) the same amount of larvae or propagules* that are removed via entrainment at a desalination facilities* intakes. APF is calculated by multiplying the proportional mortality* by the source water body,* which are both determined using an empirical transport model.*

AREAS OF SPECIAL BIOLOGICAL SIGNIFICANCE (ASBS) are those areas designated by the State Water Board as ocean areas requiring protection of species or biological communities to the extent that maintenance of natural water quality is assured. All Areas of Special Biological Significance are also classified as a subset of STATE WATER QUALITY PROTECTION AREAS.* ASBS are also referred to as State Water Quality Protection Areas* – Areas of Special Biological Significance (SWQPA-ASBS).

BRINE is the byproduct of desalinated* water having a salinity* concentration greater than a desalination facility's* intake source water.

* See Appendix I for definition of terms.

BRINE MIXING ZONE is the area where salinity* may exceed 2.0 parts per thousand above natural background salinity,* or the concentration of salinity* approved as part of an alternative receiving water limitation. The standard brine mixing zone shall not exceed 100 meters (328 feet) laterally from the points of discharge and throughout the water column. An alternative brine mixing zone, if approved as described in chapter III.M.3.d, shall not exceed 200 meters (656 feet) laterally from the points of discharge and throughout the water column. The brine mixing zone is an allocated impact zone where there may be toxic effects on marine life due to elevated salinity.

CHLORDANE shall mean the sum of chlordane-alpha, chlordane-gamma, chlordene-alpha, chlordene-gamma, nonachlor-alpha, nonachlor-gamma, and oxychlordane.

CHRONIC TOXICITY: This parameter shall be used to measure the acceptability of waters for supporting a healthy marine biota until improved methods are developed to evaluate biological response.

a. Chronic Toxicity (TUc)

Expressed as Toxic Units Chronic (TUc)

$$TUc = \frac{100}{NOEL}$$

b. No Observed Effect Level (NOEL)

The NOEL is expressed as the maximum percent effluent or receiving water* that causes no observable effect on a test organism, as determined by the result of a critical life stage toxicity test listed in Appendix III, Table III-1.

DDT shall mean the sum of 4,4'DDT, 2,4'DDT, 4,4'DDE, 2,4'DDE, 4,4'DDD, and 2,4'DDD.

DEGRADE: Degradation shall be determined by comparison of the waste field and reference site(s) for characteristic species diversity, population density, contamination, growth anomalies, debility, or supplanting of normal species by undesirable plant and animal species. Degradation occurs if there are significant* differences in any of three major biotic groups, namely, demersal fish, benthic invertebrates, or attached algae. Other groups may be evaluated where benthic species are not affected, or are not the only ones affected.

DESALINATION FACILITY is an industrial facility that processes water to remove salts and other components from the source water to produce water that is less saline than the source water.

DICHLOROBENZENES shall mean the sum of 1,2- and 1,3-dichlorobenzene.

DOWNSTREAM OCEAN WATERS shall mean waters downstream with respect to ocean currents.

DREDGED MATERIAL: Any material* excavated or dredged from the navigable waters of the United States, including material* otherwise referred to as "spoil".

EELGRASS BEDS are aggregations of the aquatic plant species of the genus *Zostera*.

* See Appendix I for definition of terms.

EMPIRICAL TRANSPORT MODEL (ETM) is a methodology for determining the spatial area known as the source water body* that contains the source water population, which are the organisms that are at risk of entrainment as determined by factors that may include but are not limited to biological, hydrodynamic, and oceanographic data. ETM can also be used to estimate proportional mortality,* P_m.

ENCLOSED BAYS are indentations along the coast which enclose an area of oceanic water within distinct headlands or harbor works. Enclosed bays include all bays where the narrowest distance between headlands or outermost harbor works is less than 75 percent of the greatest dimension of the enclosed portion of the bay. This definition includes but is not limited to: Humboldt Bay, Bodega Harbor, Tomales Bay, Drakes Estero, San Francisco Bay, Morro Bay, Los Angeles Harbor, Upper and Lower Newport Bay, Mission Bay, and San Diego Bay.

ENDOSULFAN shall mean the sum of endosulfan-alpha and -beta and endosulfan sulfate.

ESTUARIES AND COASTAL LAGOONS are waters at the mouths of streams that serve as mixing zones for fresh and ocean* waters during a major portion of the year. Mouths of streams that are temporarily separated from the ocean by sandbars shall be considered as estuaries. Estuarine waters will generally be considered to extend from a bay or the open ocean to the upstream limit of tidal action but may be considered to extend seaward if significant* mixing of fresh and salt water occurs in the open coastal waters. The waters described by this definition include but are not limited to the Sacramento-San Joaquin Delta as defined by section 12220 of the California Water Code, Suisun Bay, Carquinez Strait downstream to Carquinez Bridge, and appropriate areas of the Smith, Klamath, Mad, Eel, Noyo, and Russian Rivers.

ETM/APF APPROACH or ANALYSIS. For guidance on how to perform an ETM/APF analysis please see Appendix E of the Staff Report for Amendment to the Water Quality Control Plan For Ocean Waters of California Addressing Desalination Facility Intakes, Brine Discharges, And The Incorporation Of Other Non-substantive Changes.

FEASIBLE for the purposes of chapter III.M, shall mean capable of being accomplished in a successful manner within a reasonable period of time, taking into account economic, environmental, social, and technological factors.

FLOW AUGMENTATION is a type of in-plant dilution and occurs when a desalination facility* withdraws additional source water for the specific purpose of diluting brine* prior to discharge.

FULL CAPTURE SYSTEM is a treatment control*, or series of treatment controls*, including but not limited to, a multi-benefit project* or a low-impact development control* that traps all particles that are 5 mm or greater, and has a design treatment capacity that is either: a) of not less than the peak flow rate, Q, resulting from a one-year, one-hour, storm in the subdrainage area, or b) appropriately sized to, and designed to carry at least the same flows as, the corresponding storm drain.

[Rational equation is used to compute the peak flow rate: $Q = C \bullet I \bullet A$, where Q = design flow rate (cubic feet per second, cfs); C = runoff coefficient (dimensionless); I = design rainfall

* See Appendix I for definition of terms.

intensity (inches per hour, as determined per the rainfall isohyetal map specific to each region, and A = subdrainage area (acres).]

Prior to installation, full capture systems* must be certified by the Executive Director, or designee, of the State Water Board. Uncertified full capture systems* will not satisfy the requirements of these Trash Provisions*. To request certification, a permittee shall submit a certification request letter that includes all relevant supporting documentation to the State Water Board's Executive Director. The Executive Director, or designee, shall issue a written determination approving or denying the certification of the proposed full capture system* or conditions of approval, including a schedule to review and reconsider the certification. Full capture systems* certified by the Los Angeles Regional Water Board prior to the effective date of these Trash Provisions* and full capture systems* listed in Appendix I of the Bay Area-wide Trash Capture Demonstration Project, Final Project Report (May 8, 2014) will satisfy the requirements of these Trash Provisions*, unless the Executive Director, or designee, of the State Water Board determines otherwise.

FULL CAPTURE SYSTEM EQUIVALENCY is the Trash* load that would be reduced if full capture systems* were installed, operated, and maintained for all storm drains that capture runoff from the relevant areas of land (priority land uses*, significant trash generating areas*, facilities or sites regulated by NPDES permits for discharges of storm water* associated with industrial activity, or specific land uses or areas that generate substantial amounts of Trash*, as applicable). The full capture system equivalency* is a Trash* load reduction target that the permittee quantifies by using an approach, and technically acceptable and defensible assumptions and methods for applying the approach, subject to the approval of permitting authority*. Examples of such approaches include, but are not limited to, the following:

(1) Trash Capture Rate Approach. Directly measure or otherwise determine the amount of Trash* captured by full capture systems* for representative samples of all similar types of land uses, facilities, or areas within the relevant areas of land over time to identify specific trash capture rates. Apply each specific Trash* capture rate across all similar types of land uses, facilities, or areas to determine full capture system equivalency*. Trash* capture rates may be determined either through a pilot study or literature review. Full capture systems* selected to evaluate Trash* capture rates may cover entire types of land uses, facilities, or areas, or a representative subset of types of land uses, facilities, or areas. With this approach, full capture system equivalency* is the sum of the products of each type of land use, facility, or area multiplied by Trash* capture rates for that type of land use, facility, or area.

(2) Reference Approach. Determine the amount of Trash* in a reference receiving water in a reference watershed where full capture systems* have been installed for all storm drains that capture runoff from all relevant areas of land. The reference watershed must be comprised of similar types and extent of sources of trash* and land uses (including priority land uses* and all other land uses), facilities, or areas as the permittee's watershed. With this approach, full capture system equivalency* would be demonstrated when the amount of Trash* in the receiving water is equivalent to the amount of Trash* in the reference receiving water.

* See Appendix I for definition of terms.

GRAYWATER is drainage from galley, dishwasher, shower, laundry, bath, and lavatory wash basin sinks, and water fountains, but does not include drainage from toilets, urinals, hospitals, or cargo spaces.

HALOMETHANES shall mean the sum of bromoform, bromomethane (methyl bromide) and chloromethane (methyl chloride).

HCH shall mean the sum of the alpha, beta, gamma (lindane) and delta isomers of hexachlorocyclohexane.

INDICATOR BACTERIA includes total coliform bacteria, fecal coliform bacteria (or *E. coli*), and/or Enterococcus bacteria.

IN-KIND MITIGATION is when the habitat or species lost is the same as what is replaced through mitigation.

INSTITUTIONAL CONTROLS are non-structural best management practices (i.e., no structures are involved) that may include, but not be limited to, street sweeping, sidewalk Trash* bins, collection of the Trash*, anti-litter educational and outreach programs, producer take-back for packaging, and ordinances.

INITIAL DILUTION is the process which results in the rapid and irreversible turbulent mixing of wastewater with ocean water around the point of discharge.

For a submerged buoyant discharge, characteristic of most municipal and industrial wastes that are released from the submarine outfalls, the momentum of the discharge and its initial buoyancy act together to produce turbulent mixing. Initial dilution in this case is completed when the diluting wastewater ceases to rise in the water column and first begins to spread horizontally.

For shallow water submerged discharges, surface discharges, and nonbuoyant discharges, characteristic of cooling water wastes and some individual discharges, turbulent mixing results primarily from the momentum of discharge. Initial dilution, in these cases, is considered to be completed when the momentum induced velocity of the discharge ceases to produce significant* mixing of the waste, or the diluting plume reaches a fixed distance from the discharge to be specified by the Regional Board, whichever results in the lower estimate for initial dilution.

KELP BEDS, are aggregations of marine algae of the order Laminariales, including species in the genera *Macrocystis, Nereocystis, and Pelagophycus*. Kelp beds include the total foliage canopy throughout the water column.

LARGE PASSENGER VESSELS are vessels of 300 gross registered tons or greater engaged in carrying passengers for hire. The following vessels are not large passenger vessels:
(1) Vessels without berths or overnight accommodations for passengers;
(2) Noncommercial vessels, warships, vessels operated by nonprofit entities as determined by the Internal Revenue Service, and vessels operated by the state, the United States, or a foreign government;
(3) Oceangoing vessels,* as defined below (e.g. those used to transport cargo).

* See Appendix I for definition of terms.

LOW-IMPACT DEVELOPMENT CONTROLS are treatment controls* that employ natural and constructed features that reduce the rate of storm water* runoff, filter out pollutants, facilitate storm water* storage onsite, infiltrate storm water* into the ground to replenish groundwater supplies, or improve the quality of receiving groundwater and surface water. (See Water Code § 10564.)

LOEC is the lowest observed effect concentration or the lowest concentration of effluent that causes observable adverse effects in exposed test organisms.

MARICULTURE is the culture of algae, plants, and animals in marine waters independent of any pollution source.

MARINE MANAGED AREAS are named, discrete geographic marine or estuarine areas along the California coast designated by law or administrative action, and intended to protect, conserve, or otherwise manage a variety of resources and their uses. According to the California Public Resources Code (§§ 36600 et seq.) there are six classifications of marine managed areas, including State Marine Reserves, State Marine Parks and State Marine Conservation Areas, State Marine Cultural Preservation Areas, State Marine Recreational Management Areas, and State Water Quality Protection Areas.*

MARKET SQUID NURSURIES are comprised of numerous egg capsules, each containing approximately 200 developing embryos, attached in clusters or mops to sandy substrate with moderate water flow. Market squid (*Doryteuthis opalescens*) nurseries occur at a wide range of depths; however, mop densities are greatest in shallow, nearshore waters between ten and 100 meters (328 feet) deep.

MATERIAL: (a) In common usage: (1) the substance or substances of which a thing is made or composed (2) substantial; (b) For purposes of this Ocean Plan relating to waste disposal, dredging and the disposal of dredged material* and fill, MATERIAL means matter of any kind or description which is subject to regulation as waste, or any material dredged from the navigable waters of the United States. See also, DREDGED MATERIAL.* For the purposes of chapter III.M.2.d, materials relates to the common usage in (a).

METHOD DETECTION LIMIT (MDL) is the minimum concentration of a substance that can be measured and reported with 99% confidence that the analyte concentration is greater than zero, as defined in 40 CFR PART 136 Appendix B.

MINIMUM LEVEL (ML) is the concentrations at which the entire analytical system must give a recognizable signal and acceptable calibration point. The ML is the concentration in a sample that is equivalent to the concentration of the lowest calibration standard analyzed by a specific analytical procedure, assuming that all the method-specified sample weights, volumes and processing steps have been followed.

MULTI-BENEFIT PROJECT is a treatment control* project designed to achieve any of the benefits set forth in section 10562, subdivision (d) of the Water Code. Examples include projects designed to: infiltrate, recharge or store storm water* for beneficial reuse; develop or enhance habitat and open space through storm water* and non-storm water management; and/or reduce storm water* and non-storm water runoff volume.

* See Appendix I for definition of terms.

MULTIPORT DIFFUSERS are linear structures consisting of spaced ports or nozzles that are installed on submerged marine outfalls. For the purposes of chapter III.M, multiport diffusers discharge brine* waste into an ambient receiving water body and enable rapid mixing, dispersal, and dilution of brine* within a relatively small area.

MUNICIPAL SEPARATE STORM SEWER SYSTEM (MS4) has the same meaning set forth in 40 Code of Federal Regulations section 122.26(b)(8).

NATURAL BACKGROUND SALINITY is the salinity* at a location that results from naturally occurring processes and is without apparent human influence. For purposes of determining natural background salinity, the regional water board may approve the use of:

(1) the mean monthly natural background salinity. Mean monthly natural background salinity shall be determined by averaging 20 years of historical salinity* data in the proximity of the proposed discharge location and at the depth of the proposed discharge, when feasible.* For historical data not recorded in parts per thousand, the regional water boards may accept converted data at their discretion. When historical data are not available, natural background salinity shall be determined by measuring salinity* at depth of proposed discharge for three years, on a weekly basis prior to a desalination facility* discharging brine,* and the mean monthly natural salinity* shall be used to determine natural background salinity; or

(2) the actual salinity at a reference location, or reference locations, that is representative of natural background salinity at the discharge location. The reference locations shall be without apparent human influence, including wastewater outfalls and brine discharges.

Either method to establish natural background salinity may be used for the purpose of determining compliance with the receiving water limitation or an effluent limitation for salinity. If a reference location(s) is used for compliance monitoring, the permit should specify that historical data shall be used if reference location data becomes unavailable. An owner or operator shall submit to the regional water board all necessary information to establish natural background salinity.

NATURAL LIGHT: Reduction of natural light may be determined by the Regional Board by measurement of light transmissivity or total irradiance, or both, according to the monitoring needs of the Regional Board.

NO DISCHARGE ZONE (NDZ) is an area in which both treated and untreated sewage discharges from vessels are prohibited. Within NDZ boundaries, vessel operators are required to retain their sewage discharges onboard for disposal at sea (beyond three miles from shore) or onshore at a pump-out facility.

NON-STORM WATER DISCHARGE is any runoff that is not the result of a precipitation event. This is often referred to as “dry weather flow.”

OCEAN WATERS are the territorial marine waters of the State as defined by California law to the extent these waters are outside of enclosed bays,* estuaries, and coastal lagoons.* If a discharge outside the territorial waters of the State could affect the quality of the waters of the State, the discharge may be regulated to assure no violation of the Ocean Plan will occur in ocean waters.

* See Appendix I for definition of terms.

OCEANGOING VESSELS (i.e., oceangoing ships) means commercial vessels of 300 gross registered tons or more calling on California ports or places, excluding active military vessels.

OILY BILGE WATER includes bilge water that contains used lubrication oils, oil sludge and slops, fuel and oil sludge, used oil, used fuel and fuel filters, and oily waste.

OUT-OF-KIND MITIGATION is when the habitat or species lost is different than what is replaced through mitigation.

PAHs (polynuclear aromatic hydrocarbons) shall mean the sum of acenaphthylene, anthracene, 1,2-benzanthracene, 3,4-benzofluoranthene, benzo[k]fluoranthene, 1,12-benzoperylene, benzo[a]pyrene, chrysene, dibenzo[ah]anthracene, fluorene, indeno[1,2,3-cd]pyrene, phenanthrene and pyrene.

PCBs (polychlorinated biphenyls) shall mean the sum of chlorinated biphenyls whose analytical characteristics resemble those of Aroclor-1016, Aroclor-1221, Aroclor-1232, Aroclor-1242, Aroclor-1248, Aroclor-1254 and Aroclor-1260.

PERMITTING AUTHORITY means the State Water Board or Regional Water Board, whichever issues the permit.

PREPRODUCTION PLASTIC has the same meaning set forth in section 13367(a) of the Water Code.

PRIORITY LAND USES are those developed sites, facilities, or land uses (i.e., not simply zoned land uses) within the MS4* permittee's jurisdiction from which discharges of Trash* are regulated by this Ocean Plan as follows:

(1) **High-density residential:** all land uses with at least ten (10) developed dwelling units/acre.
(2) **Industrial**: land uses where the primary activities on the developed parcels involve product manufacture, storage, or distribution (e.g., manufacturing businesses, warehouses, equipment storage lots, junkyards, wholesale businesses, distribution centers, or building material sales yards).
(3) **Commercial**: land uses where the primary activities on the developed parcels involve the sale or transfer of goods or services to consumers (e.g., business or professional buildings, shops, restaurants, theaters, vehicle repair shops, etc.)
(4) **Mixed urban**: land uses where high-density residential, industrial, and/or commercial land uses predominate collectively (i.e., are intermixed).
(5) **Public transportation stations**: facilities or sites where public transit agencies' vehicles load or unload passengers or goods (e.g., bus stations and stops).

Equivalent alternate land uses: An MS4* permittee with regulatory authority over priority land uses* may issue a request to the applicable permitting authority* that the MS4* permittee be allowed to substitute one or more land uses identified above with alternates land use within the MS4* permittee's jurisdiction that generates rates of Trash* that are equivalent to or greater than the priority land use(s)* being substituted. The land use area

* See Appendix I for definition of terms.

requested to substitute for a priority land use* need not be an acre-for-acre substitution but may involve one or more priority land uses*, or a fraction of a priority land use*, or both, provided the total trash* generated in the equivalent alternative land use is equivalent to or greater than the total Trash* generated from the priority land use(s)* for which substitution is requested. Comparative Trash* generation rates shall be established through the reporting of quantification measures such as street sweeping and catch basin cleanup records; mapping; visual trash presence surveys, such as the "Keep America Beautiful Visible Litter Survey"; or other information as required by the permitting authority*.

PROPAGULES are structures that are capable of propagating an organism to the next stage in its life cycle via dispersal. Dispersal is the movement of individuals from their birth site to their reproductive grounds.

PROPORTIONAL MORTALITY, P_m, is percentage of larval organisms or propagules* in the source water body* that is expected to be entrained at a desalination facility's* intake. It is assumed that all entrained larvae or propagules* die as a result of entrainment.

RECEIVING WATER, for permitted storm water discharges and nonpoint sources, should be measured at the point of discharge(s), in the surf zone immediately where runoff from an outfall meets the ocean water (a.k.a., at point zero).

SALINITY is a measure of the dissolved salts in a volume of water. For the purposes of this Plan, salinity shall be measured using a standard method approved by the regional water board (e.g. Standard Method 2520 B, EPA Method 120.1, EPA Method 160.1) and reported in parts per thousand (ppt). For historical salinity data not recorded in parts per thousand, the regional water boards may accept converted data at their discretion.

SEAWATER is salt water that is in or from the ocean. For the purposes chapter III.M, seawater includes tidally influenced waters in coastal estuaries and coastal lagoons* and underground salt water beneath the seafloor, beach, or other contiguous land with hydrologic connectivity to the ocean.

SENSITIVE HABITATS, for the purposes of this Plan, are kelp beds,* rocky substrate, surfgrass beds,* eelgrass beds,* oyster beds, spawning grounds for state or federally managed species, market squid nurseries,* or other habitats in need of special protection as determined by the Water Boards.

SHELLFISH are organisms identified by the California Department of Public Health as shellfish for public health purposes (i.e., mussels, clams and oysters).

SIGNIFICANT difference is defined as a statistically significant difference in the means of two distributions of sampling results at the 95 percent confidence level.

SIGNIFICANT TRASH GENERATING AREAS means all locations or facilities within the Department's jurisdiction where Trash* accumulates in substantial amounts, such as:

(1) Highway on- and off-ramps in high density residential, commercial, and industrial land uses (as such land uses are defined under priority land uses* herein).
(2) Rest areas and park-and-rides.

* See Appendix I for definition of terms.

(3) State highways in commercial and industrial land uses (as such land uses are defined under priority land uses* herein).
(4) Mainline highway segments to be identified by the Department through pilot studies and/or surveys.

SOURCE WATER BODY is the spatial area that contains the organisms that are at risk of entrainment at a desalination facility* as determined by factors that may include, but are not limited to, biological, hydrodynamic, and oceanographic data.

STATE WATER QUALITY PROTECTION AREAS (SWQPAs) are nonterrestrial marine or estuarine areas designated to protect marine species or biological communities from an undesirable alteration in natural water quality. All Areas of Special Biological Significance (ASBS)* that were previously designated by the State Water Board in Resolutions 74-28, 74-32, and 75-61 are now also classified as a subset of State Water Quality Protection Areas and require special protections afforded by this Plan.

STATE WATER QUALITY PROTECTION AREAS – GENERAL PROTECTION (SWQPA-GP) designated by the State Water Board to protect marine species and biological communities from an undesirable alteration in natural water quality within State Marine Parks and State Marine Conservation Areas.

STORM WATER has the same meaning set forth in 40 Code of Federal Regulations section 122.26(b)(13) (Nov. 16, 1990).

SUBSURFACE INTAKE, for the purposes of chapter III.M, is an intake withdrawing seawater* from the area beneath the ocean floor or beneath the surface of the earth inland from the ocean.

SURFGRASS BEDS are aggregations of marine flowering plants of the genus *Phyllospadix*.

TCDD EQUIVALENTS shall mean the sum of the concentrations of chlorinated dibenzodioxins (2,3,7,8-CDDs) and chlorinated dibenzofurans (2,3,7,8-CDFs) multiplied by their respective toxicity factors, as shown in the table below.

* See Appendix I for definition of terms.

Isomer Group	Toxicity Equivalence Factor
2,3,7,8-tetra CDD	1.0
2,3,7,8-penta CDD	0.5
2,3,7,8-hexa CDDs	0.1
2,3,7,8-hepta CDD	0.01
octa CDD	0.001
2,3,7,8 tetra CDF	0.1
1,2,3,7,8 penta CDF	0.05
2,3,4,7,8 penta CDF	0.5
2,3,7,8 hexa CDFs	0.1
2,3,7,8 hepta CDFs	0.01
octa CDF	0.001

TRASH means all improperly discarded solid material from any production, manufacturing, or processing operation including, but not limited to, products, product packaging, or containers constructed of plastic, steel, aluminum, glass, paper, or other synthetic or natural materials.

TRASH PROVISIONS are the water quality objective for Trash*, as well as the prohibition of discharge set forth in Chapter III.I and implementation requirements set forth in Chapter III.L herein.

TREATMENT CONTROLS are structural best management practices to either (a) remove pollutants and/or solids from storm water* runoff, wastewater, or effluent, or (b) capture, infiltrate or reuse storm water* runoff, wastewater, or effluent. Treatment controls include full capture systems* and low-impact development controls*.

WASTE: As used in this Plan, waste includes a discharger's total discharge, of whatever origin, i.e., gross, not net, discharge.

WATER RECLAMATION: The treatment of wastewater to render it suitable for reuse, the transportation of treated wastewater to the place of use, and the actual use of treated wastewater for a direct beneficial use or controlled use that would not otherwise occur.

* See Appendix I for definition of terms.

APPENDIX II
MINIMUM* LEVELS

The Minimum* Levels identified in this appendix represent the lowest concentration of a pollutant that can be quantitatively measured in a sample given the current state of performance in analytical chemistry methods in California. These Minimum* Levels were derived from data provided by state-certified analytical laboratories in 1997 and 1998 for pollutants regulated by the California Ocean Plan and shall be used until new values are adopted by the State Water Board. There are four major chemical groupings: volatile chemicals, semi-volatile chemicals, inorganics, pesticides & PCBs.* "No Data" is indicated by "--".

TABLE II-1
MINIMUM* LEVELS – VOLATILE CHEMICALS

		Minimum* Level (µg/L)	
Volatile Chemicals	**CAS Number**	**GC Method [a]**	**GCMS Method [b]**
Acrolein	107028	2.	5
Acrylonitrile	107131	2.	2
Benzene	71432	0.5	2
Bromoform	75252	0.5	2
Carbon Tetrachloride	56235	0.5	2
Chlorobenzene	108907	0.5	2
Chlorodibromomethane	124481	0.5	2
Chloroform	67663	0.5	2
1,2-Dichlorobenzene (volatile)	95501	0.5	2
1,3-Dichlorobenzene (volatile)	541731	0.5	2
1,4-Dichlorobenzene (volatile)	106467	0.5	2
Dichlorobromomethane	75274	0.5	2
1,1-Dichloroethane	75343	0.5	1
1,2-Dichloroethane	107062	0.5	2
1,1-Dichloroethylene	75354	0.5	2
Dichloromethane	75092	0.5	2
1,3-Dichloropropene (volatile)	542756	0.5	2
Ethyl benzene	100414	0.5	2
Methyl Bromide	74839	1.	2
Methyl Chloride	74873	0.5	2
1,1,2,2-Tetrachloroethane	79345	0.5	2
Tetrachloroethylene	127184	0.5	2
Toluene	108883	0.5	2
1,1,1-Trichloroethane	71556	0.5	2
1,1,2-Trichloroethane	79005	0.5	2
Trichloroethylene	79016	0.5	2
Vinyl Chloride	75014	0.5	2

Table II-1 Notes

a) GC Method = Gas Chromatography
b) GCMS Method = Gas Chromatography / Mass Spectrometry
* To determine the lowest standard concentration in an instrument calibration curve for these techniques, use the given ML (see chapter III, "Use of Minimum* Levels").

* See Appendix I for definition of terms.

TABLE II-2
MINIMUM* LEVELS – SEMI VOLATILE CHEMICALS

Semi-Volatile Chemicals	CAS Number	Minimum* Level (µg/L) GC Method [a, *]	GCMS Method [b, *]	HPLC Method [c,*]	COLOR Method [d]
Acenapthylene	208968	--	10	0.2	--
Anthracene	120127	--	10	2	--
Benzidine	92875	--	5	--	--
Benzo(a)anthracene	56553	--	10	2	--
Benzo(a)pyrene	50328	--	10	2	--
Benzo(b)fluoranthene	205992	--	10	10	--
Benzo(g,h,i)perylene	191242	--	5	0.1	--
Benzo(k)floranthene	207089	--	10	2	--
Bis 2-(1-Chloroethoxy) methane	111911	--	5	--	--
Bis(2-Chloroethyl)ether	111444	10	1	--	--
Bis(2-Chloroisopropyl)ether	39638329	10	2	--	--
Bis(2-Ethylhexyl) phthalate	117817	10	5	--	--
2-Chlorophenol	95578	2	5	--	--
Chrysene	218019	--	10	5	--
Di-n-butyl phthalate	84742	--	10	--	--
Dibenzo(a,h)anthracene	53703	--	10	0.1	--
1,2-Dichlorobenzene (semivolatile)	95504	2	2	--	--
1,3-Dichlorobenzene (semivolatile)	541731	2	1	--	--
1,4-Dichlorobenzene (semivolatile)	106467	2	1	--	--
3,3-Dichlorobenzidine	91941	--	5	--	--
2,4-Dichlorophenol	120832	1	5	--	--
1,3-Dichloropropene	542756	--	5	--	
Diethyl phthalate	84662	10	2	--	--
Dimethyl phthalate	131113	10	2	--	--
2,4-Dimethylphenol	105679	1	2	--	--
2,4-Dinitrophenol	51285	5	5	--	--
2,4-Dinitrotoluene	121142	10	5	--	--
1,2-Diphenylhydrazine	122667	--	1	--	--
Fluoranthene	206440	10	1	0.05	--
Fluorene	86737	--	10	0.1	--
Hexachlorobenzene	118741	5	1	--	--
Hexachlorobutadiene	87683	5	1	--	--
Hexachlorocyclopentadiene	77474	5	5	--	--

Table II-2 continued on next page…

* See Appendix I for definition of terms.

Table II-2 (Continued)
Minimum* Levels – Semi Volatile Chemicals

Semi-Volatile Chemicals	CAS Number	Minimum* Level (µg/L) GC Method [a, *]	GCMS Method [b, *]	HPLC Method [c,*]	COLOR Method [d]
Hexachloroethane	67721	5	1	--	--
Indeno(1,2,3-cd)pyrene	193395	--	10	0.05	--
Isophorone	78591	10	1	--	--
2-methyl-4,6-dinitrophenol	534521	10	5	--	--
3-methyl-4-chlorophenol	59507	5	1	--	--
N-nitrosodi-n-propylamine	621647	10	5	--	--
N-nitrosodimethylamine	62759	10	5	--	--
N-nitrosodiphenylamine	86306	10	1	--	--
Nitrobenzene	98953	10	1	--	--
2-Nitrophenol	88755	--	10	--	--
4-Nitrophenol	100027	5	10	--	--
Pentachlorophenol	87865	1	5	--	--
Phenanthrene	85018	--	5	0.05	--
Phenol	108952	1	1	--	50
Pyrene	129000	--	10	0.05	--
2,4,6-Trichlorophenol	88062	10	10	--	--

Table II-2 Notes:

a) GC Method = Gas Chromatography
b) GCMS Method = Gas Chromatography / Mass Spectrometry
c) HPLC Method = High Pressure Liquid Chromatography
d) COLOR Method = Colorimetric

* To determine the lowest standard concentration in an instrument calibration curve for this technique, multiply the given ML* by 1000 (see chapter III, “Use of Minimum* Levels”).

* See Appendix I for definition of terms.

TABLE II-3
MINIMUM* LEVELS - INORGANICS

		Minimum* Level (µg/L)								
Inorganic Substances	**CAS Number**	**COLOR Method[a]**	**DCP Method[b]**	**FAA Method[c]**	**GFAA Method[d]**	**HYDRIDE Method[e]**	**ICP Method[f]**	**ICPMS Method[g]**	**SPGFAA Method[h]**	**CVAA Method[i]**
Antimony	7440360	--	1000.	10.	5.	0.5	50.	0.5	5.	--
Arsenic	7440382	20.	1000.	--	2.	1.	10.	2.	2.	--
Beryllium	7440417	--	1000.	20.	0.5	--	2.	0.5	1.	--
Cadmium	7440439	--	1000.	10.	0.5	--	10.	0.2	0.5	--
Chromium (total)	--	--	1000.	50.	2.	--	10.	0.5	1.	--
Chromium (VI)	18540299	10.	--	5.	--	--	--	--	--	--
Copper	7440508	--	1000.	20.	5.	--	10.	0.5	2.	--
Cyanide	57125	5.	--	--	--	--	--	--	--	--
Lead	7439921	--	10000.	20.	5.	--	5.	0.5	2.	--
Mercury	7439976	--	--	--	--	--	--	0.5	--	0.2
Nickel	7440020	--	1000.	50.	5.	--	20.	1.	5.	--
Selenium	7782492	--	1000.	--	5.	1.	10.	2.	5.	--
Silver	7440224	--	1000.	10.	1.	--	10.	0.2	2.	--
Thallium	7440280	--	1000.	10.	2.	--	10.	1.	5.	--
Zinc	7440666	--	1000.	20.	--	--	20.	1.	10.	--

Table II-3 Notes

a) COLOR Method = Colorimetric
b) DCP Method = Direct Current Plasma
c) FAA Method = Flame Atomic Absorption
d) GFAA Method = Graphite Furnace Atomic Absorption
e) HYDRIDE Method = Gaseous Hydride Atomic Absorption
f) ICP Method = Inductively Coupled Plasma
g) ICPMS Method = Inductively Coupled Plasma / Mass Spectrometry
h) SPGFAA Method = Stabilized Platform Graphite Furnace Atomic Absorption (i.e., US EPA 200.9)
i) CVAA Method = Cold Vapor Atomic Absorption

* To determine the lowest standard concentration in an instrument calibration curve for these techniques, use the given ML* (see chapter III, "Use of Minimum* Levels").

* See Appendix I for definition of terms.

TABLE II-4
MINIMUM* LEVELS – PESTICIDES AND PCBs*

Pesticides – PCBs	CAS Number	Minimum* Level (µg/L) GC Method[a,*]
Aldrin	309002	0.005
Chlordane*	57749	0.1
4,4'-DDD	72548	0.05
4,4'-DDE	72559	0.05
4,4'-DDT	50293	0.01
Dieldrin	60571	0.01
a-Endosulfan	959988	0.02
b-Endosulfan	33213659	0.01
Endosulfan Sulfate	1031078	0.05
Endrin	72208	0.01
Heptachlor	76448	0.01
Heptachlor Epoxide	1024573	0.01
a-Hexachlorocyclohexane	319846	0.01
b-Hexachlorocyclohexane	319857	0.005
d-Hexachlorocyclohexane	319868	0.005
g-Hexachlorocyclohexane (Lindane)	58899	0.02
PCB 1016	--	0.5
PCB 1221	--	0.5
PCB 1232	--	0.5
PCB 1242	--	0.5
PCB 1248	--	0.5
PCB 1254	--	0.5
PCB 1260	--	0.5
Toxaphene	8001352	0.5

Table II-4 Notes

a) GC Method = Gas Chromatography

* To determine the lowest standard concentration in an instrument calibration curve for this technique, multiply the given ML* by 100 (see chapter III, “Use of Minimum* Levels”).

* See Appendix I for definition of terms.

APPENDIX III
STANDARD MONITORING PROCEDURES

1. INTRODUCTION

The purpose of this appendix is to provide guidance to the Regional Water Boards on implementing the Ocean Plan and to ensure the reporting of useful information. Monitoring should be question driven rather than just gathering data and should be focused on assuring compliance with narrative and numeric water quality standards, the status and attainment of beneficial uses, and identifying sources of pollution.

It is not feasible to prescribe requirements in the Ocean Plan that encompass all circumstances and conditions that could be encountered by all dischargers, nor is it desirable to limit the flexibility of the Regional Water Boards in the monitoring of ocean* waters. This appendix should therefore be considered the basic framework for the design of an ocean discharger monitoring program. The Regional Water Boards are responsible for issuing monitoring and reporting programs (MRPs) that will implement this monitoring guidance. Regional Water Boards can deviate from the procedures required in the appendix only with the approval of the State Water Resources Control Board.

This monitoring guidance utilizes a model monitoring framework. The model monitoring framework has three components that comprise a range of spatial and temporal scales: (1) core monitoring, (2) regional monitoring, and (3) special studies.

1) Core monitoring consists of the basic site-specific monitoring necessary to measure compliance with individual effluent limits and/or impacts to receiving water* quality. Core monitoring is typically conducted in the immediate vicinity of the discharge by examining local scale spatial effects.

2) Regional monitoring provides information necessary to make assessments over large areas and serves to evaluate cumulative effects of all anthropogenic inputs. Regional monitoring data also assists in the interpretation of core monitoring studies. It is recommended that the Regional Water Boards require participation by the discharger in an approved regional monitoring program, if available, for the receiving water.* In the event that a regional monitoring effort takes place during a permit cycle in which the MRP does not specifically address regional monitoring, a Regional Water Board may allow relief from aspects of core monitoring components in order to encourage participation.

3) Special studies are directed monitoring efforts designed in response to specific management or research questions identified through either core or regional monitoring programs. Often they are used to help understand core or regional monitoring results, where a specific environmental process is not well understood, or to address unique issues of local importance. Regional Water Boards may require special studies as appropriate. Special studies are not addressed further in this guidance because they are beyond its scope.

The Ocean Plan does not address all site-specific monitoring issues and allows the Regional Water Boards to select alternative protocols with the approval of the State Water Board. If no direction is given in this appendix for a specific provision of the Ocean Plan, it is within the

* See Appendix I for definition of terms.

discretion of the Regional Water Boards to establish the monitoring requirements for that provision.

2. QUALITY ASSURANCE

All receiving* and ambient water monitoring conducted in compliance with MRPs must be comparable with the Quality Assurance requirements of the Surface Water Ambient Monitoring Program (SWAMP).

SWAMP comparable means all sample collection and analyses shall meet or exceed the measurement quality objectives (MQOs) – including all sample types, frequencies, control limits and holding time requirements – as specified in the SWAMP Quality Assurance Project Plan (QAPrP)

The SWAMP QAPrP is located at: http://www.waterboards.ca.gov/water_issues/programs/swamp/tools.shtml#qa.

For those measurements that do not have SWAMP MQOs available, then MQOs shall be at the discretion of the Regional Water Board. Refer to the USEPA guidance document (EPA QA/G-4) for selecting data quality objectives, located at http://www.epa.gov/quality/qs-docs/g4-final.pdf.

Water Quality data must be reported according to the California Environmental Data Exchange Network (CEDEN) "Data Template" format for all constituents that are monitored in receiving and ambient water. CEDEN Data Template are available at: http://ceden.org.

3. TYPE OF WASTE DISCHARGE SOURCES

Discharges to ocean waters* are highly diverse and variable, exhibiting a wide range of constituents, effluent quality and quantity, location and frequency of discharge. Different types of discharges will require different approaches. This Appendix provides specific direction for three broad types of discharges: (1) Point Sources, (2) Storm Water Point Sources and (3) Non-point Sources.

3.1. Point Sources

Industrial, municipal, marine laboratory and other traditional point sources of pollution that discharge wastewater directly to surface waters and are required to obtain NPDES permits.

3.2. Storm Water Point Sources

Storm Water Point Sources, hereafter referred to as Storm Water Sources, are those NPDES permitted discharges regulated by Construction or Industrial Storm Water General Permits or municipal separate storm sewer system (MS4s) Permits. MS4 Permits are further divided into Phase I and II Permits. A Phase I MS4 Permit is issued by a Regional Water Board for medium (serving between 100,000 and 250,000 people) and large (serving 250,000 or more people) municipalities. A Phase II MS4 General Permit is issued by the State Water Resources Control Board for the discharge of storm water for smaller municipalities, and includes nontraditional Small MS4s, which are governmental facilities such as military bases, public campuses, prison and hospital complexes.

* See Appendix I for definition of terms.

3.3. Non-point Sources

A Non-point Source is any source of pollutants that is not a Point Source described in section 3.1 or a Storm Water Source as described in section 3.2. Land use categories contributing to non-point sources include but are not limited to:

a. Agriculture
b. Grazing
c. Forestry/timber harvest
d. Urban not covered under an NPDES permit
e. Marinas and mooring fields
f. Golf Courses not covered under an NPDES Permit

Only agricultural and golf course related non-point source discharge monitoring is addressed in this Appendix, but Regional Water Boards may issue MRPs for other non-point sources at their discretion. Agriculture includes irrigated lands. Irrigated lands are where water is applied for the purpose of producing crops, including, but not limited to, row and field crop, orchards, vineyard, rice production, nurseries, irrigated pastures, and managed wetlands.

4. INDICATOR BACTERIA*

4.1. Point Sources

Primary questions to be addressed:

1. Does the effluent comply with the water quality standards in the receiving water*?
2. Does the sewage effluent reach water contact zones or commercial shellfish* beds?

To answer these questions, core monitoring shall be conducted in receiving water* on the shoreline for the indicator bacteria* at a minimum weekly for any point sources discharging treated sewage effluent:

a. within one nautical mile of shore, or
b. within one nautical mile of a commercial shellfish* bed, or
c. if the discharge is in excess of 10 million gallons per day (MGD).

Alternatively, these requirements may be met through participation in a regional monitoring program to assess the status of marine contact recreation water quality. If the permittee participates in a regional monitoring program, in conjunction with local health organization(s), core monitoring may be suspended for that period at the discretion of the Regional Water Board. Regional monitoring should be used to answer the above questions, and may be used to answer additional questions. These additional questions may include, but are not limited to, questions regarding the extent and magnitude of current or potential receiving water* indicator bacteria* problems, or the sources of indicator bacteria.*

4.2. Storm Water

Primary questions to be addressed:

1. Does the receiving water* comply with water quality standards?

* See Appendix I for definition of terms.

2. Is the condition of the receiving water* protective of contact recreation and shellfish* harvesting beneficial uses?
3. Are the indicator bacteria* levels in receiving water* getting better or worse?
4. What is the relative contribution of indicator bacteria* to the receiving water* from storm water runoff?

To answer these questions, core monitoring for indicator bacteria* shall be required periodically for storm water discharges representative of the area of concern. At a minimum, for municipal storm water discharges, all receiving water* at outfalls greater than 36 inches in diameter or width must be monitored (ankle depth, point zero) at the following frequencies:

a. During wet weather with a minimum of three storms per year, and
b. When non-storm water discharges* occur (flowing during dry weather), and if located at an AB 411 beach, at least weekly. (An AB 411 Beach is defined as a beach visited by more than 50,000 people annually and located on an area adjacent to a storm drain that flows in the summer. (Health & Saf. Code § 115880.)).

Regional Water Boards may waive monitoring once structural best management practices have been installed, evaluated and determined to have successfully controlled indicator bacteria.*

Alternatively, these requirements may be met through participation in a regional monitoring program to assess the status of marine contact recreation water quality. If the permittee participates in a regional monitoring program, in conjunction with local health organization(s), core monitoring may be suspended for that period at the discretion of the Regional Water Board. Regional monitoring should be used to answer the above questions, and may be used to answer additional questions. These additional questions may include, but are not limited to, questions regarding the extent and magnitude of current or potential receiving water* indicator bacteria* problems, or the sources of indicator bacteria.*

4.3. Non-point Sources

Primary questions to be addressed:

1. Does the receiving water* comply with water quality standards?
2. Do agricultural and golf course non-point source discharges reach water contact or shellfish* harvesting zones?
3. Are the indicator bacteria* levels in receiving water* getting better or worse?
4. What is the relative contribution of indicator bacteria* to the receiving water* from agricultural and golf course non-point sources?

To answer these questions, core monitoring of representative agricultural irrigation tail water and storm water runoff, at a minimum, will be conducted in receiving water* (ankle depth, point zero) for indicator bacteria*:

a. During wet weather, at a minimum of two storm events per year, and
b. When non-storm water discharges* occur (flowing during dry weather), and if located at an AB 411 beach or within one nautical mile of shellfish* bed, at least weekly.

Alternatively, these requirements may be met through participation in a regional monitoring program to assess the status of marine contact recreation water quality. If the discharger

* See Appendix I for definition of terms.

participates in a regional monitoring program, in conjunction with local health organization(s), core monitoring may be suspended for that period at the discretion of the Regional Water Board. Regional monitoring should be used to answer the above questions, and may be used to answer additional questions. These additional questions may include, but are not limited to, questions regarding the extent and magnitude of current or potential receiving water* indicator bacteria* problems, or the sources of indicator bacteria.*

5. CHEMICAL CONSTITUENTS

5.1. Point Sources

Primary questions addressed:

1. Does the effluent meet permit effluent limits thereby ensuring that water quality standards are achieved in the receiving water*?
2. What is the mass of the constituents that are discharged annually?
3. Is the effluent concentration or mass changing over time?

Consistent with Appendix VI, the core monitoring for the substances in Table 1 and Table 2 shall be required periodically. For discharges less than 10 MGD, the monitoring frequency shall be at least one complete scan of the Table 1 substances annually. Discharges greater than 10 MGD shall be required to monitor at least semiannually.

5.2. Storm Water

Primary questions addressed:

1. Does the receiving water* meet the water quality standards?
2. Are the conditions in receiving water* getting better or worse?
3. What is the relative runoff contribution to pollution in the receiving water*?

For Phase I and Phase II MS4 dischargers, core receiving water* monitoring will be required at a minimum for 10 percent of all outfalls greater than 36 inches in diameter or width once per year. If a discharger has less than five outfalls exceeding 36 inches in diameter or width, they shall conduct monitoring at a minimum of only once per outfall during a five year period. Monitoring shall be for total suspended solids, oil & grease, total organic carbon, pH, temperature, biochemical oxygen demand, turbidity, Table 1 metals, PAHs,* and pesticides determined by the Regional Water Boards. Regional Water Boards may waive monitoring once structural best management practices have been installed, evaluated and determined to have successfully controlled pollutants.

For industrial storm water discharges, runoff monitoring must be conducted at all outfalls at least two storm events per year. In addition, at least one representative receiving water* sample must be collected per industrial storm water permittee during two storm events per year. Monitoring shall be conducted for total suspended solids, oil & grease, total organic carbon, pH, temperature, biochemical oxygen demand, turbidity, and Table 1 metals and PAHs.*

The requirements for individual core monitoring for Table 1 metals, PAHs* and pesticides may be waived at the discretion of the Regional Water Board, if the permittee participates in a regional program for monitoring runoff and/or receiving water* to answer the above questions as

* See Appendix I for definition of terms.

well as additional questions. Additional questions may include, but are not limited to, questions regarding the extent and magnitude of current or potential receiving water* problems from storm water runoff, or sources of any runoff pollutants.

5.3. Non-point Sources

The primary questions are:

1. Does the agricultural or golf course runoff meet water quality standards in the receiving water*?
2. Are nutrients present that would contribute to objectionable aquatic algal blooms or degrade* indigenous biota?
3. Are the conditions in receiving water* getting better or worse?
4. What is the relative agricultural runoff or golf course contribution to pollution in the receiving water*?

To answer these questions, a statistically representative sample (determined by the Regional Water Board) of receiving water* at the sites of agricultural irrigation tail water and storm water runoff, and golf course runoff in each watershed will be monitored for Ocean Plan Table 1 metals, ammonia as N, nitrate as N, phosphate as P, and pesticides determined by the Regional Board:

a. During wet weather, at a minimum of two storm events per year, and
b. During dry weather, when flowing, at a frequency determined by the Regional Boards.

This requirement may be satisfied by core monitoring individually, or through participation in a regional program for monitoring runoff and receiving water* at the discretion of the Regional Water Board to answer the above questions as well as additional questions. Additional questions may include, but are not limited to, questions regarding the sources of agricultural pollutants.

6. SEDIMENT MONITORING

All Sources:

1. Is the dissolved sulfide concentration of waters in sediments significantly* increased above that present under natural conditions?
2. Is the concentration of substances set forth in Table 1, for protection of marine aquatic life, in marine sediments at levels which would degrade* the benthic community?
3. Is the concentration of organic pollutants in marine sediments at levels that would degrade* the benthic community?

6.1. Point Sources

For discharges greater than 10 MGD, acid volatile sulfides, OP Pesticides, Table 1 metals, ammonia N, PAHs,* and chlorinated hydrocarbons will be measured in sediments annually in a core monitoring program approved by the Regional Water Board. Sediment sample locations will be determined by the Regional Water Board. If sufficient data exists from previous water column monitoring for these parameters, the Regional Water Board at its discretion may reduce the frequency of monitoring, or may allow this requirement to be satisfied through participation in a regional monitoring program.

* See Appendix I for definition of terms.

6.2. Storm Water

For Phase I MS4 permittees, discharges greater than 72 inches in diameter or width discharging to low energy coastal environments with the likelihood of sediment deposition, acid volatile sulfides, OP Pesticides, Ocean Plan Table 1 metals, ammonia N, PAHs,* and chlorinated hydrocarbons will be measured in sediments once per permit cycle.

Regional Water Boards may waive monitoring once structural best management practices have been installed, evaluated and determined to have successfully controlled pollutants.

This requirement may be satisfied by core monitoring individually or through participation in a regional monitoring program at the discretion of the Regional Water Board. Sediment sample locations will be determined by the Regional Water Board.

7. AQUATIC LIFE TOXICITY

Toxicity tests are another method used to assess risk to aquatic life. These tests assess the overall toxicity of the effluent, including the toxicity of unmeasured constituents and/or synergistic effects of multiple constituents.

7.1. Point Sources

1. Does the effluent meet permit effluent limits for toxicity thereby ensuring that water quality standards are achieved in the receiving water*?
2. If not:
   a. Are unmeasured pollutants causing risk to aquatic life?
   b. Are pollutants in combinations causing risk to aquatic life?

Core monitoring for Table 1 effluent toxicity shall be required periodically. For discharges less than 0.1 MGD the monitoring frequency for acute and/or chronic toxicity* shall be twice per permit cycle. For discharges between 0.1 and 10 MGD, the monitoring frequency for acute and/or chronic toxicity* of the effluent should be at least annually. For discharges greater than 10 MGD, the monitoring frequency for acute and/or chronic toxicity* of the effluent should be at least semiannually.

For discharges greater than 10 MGD in a low energy coastal environment with the likelihood of sediment deposition, Core monitoring for acute sediment toxicity is required and will utilize alternative amphipod species (*Eohaustorius estuarius, Leptocheirus plumulosus, Rhepoxynius abronius*).

If an exceedance is detected, six additional toxicity tests are required within a 12-week period. If an additional exceedance is detected within the 12-week period, a toxicity reduction evaluation (TRE) is required, consistent with chapter III.C.10 that requires a TRE if a discharge consistently exceeds an effluent limitation based on a toxicity objective in Table 1.

7.2. Storm Water

1. Does the runoff meet objectives for toxicity in the receiving water*?
2. Are the conditions in receiving water* getting better or worse with regard to toxicity

* See Appendix I for definition of terms.

3. What is the relative runoff contribution to the receiving water* toxicity?
4. What are the causes of the toxicity* and the sources of the constituents responsible?

For Phase I MS4, Phase II MS4, and industrial storm water discharges, core toxicity monitoring will be required at a minimum for 10 percent of all outfalls greater than 36 inches in diameter or width at a minimum of once per year. Receiving water* monitoring shall be for Table 1 critical life stage chronic toxicity* for a minimum of one invertebrate species.

For storm water discharges greater than 72 inches in diameter or width in a low energy coastal environment with the likelihood of sediment deposition, core sediment monitoring for acute sediment toxicity is required and will utilize alternative amphipod species (*Eohaustorius estuarius, Leptocheirus plumulosus, Rhepoxynius abronius*).

Regional Water Boards may waive monitoring once structural best management practices have been installed, evaluated and determined to have successfully controlled toxicity.

If an exceedence is detected, an additional toxicity test is required during the subsequent storm event. If an additional exceedance is detected at that time, a TRE is required, consistent with chapter III.C.10 that requires a TRE if a discharge consistently exceeds an effluent limitation based on a toxicity objective in Table 1. A sufficient volume must be collected to conduct a TIE, if necessary, as a part of a TRE.

The requirement for core toxicity monitoring may be waived at the discretion of the Regional Water Board, if the permittee participates in a regional monitoring program to answer the above questions, as well as any other additional questions that may be developed by the regional monitoring program.

7.3. Non-point Sources

1. Does the agricultural and golf course runoff meet water quality standards for toxicity in the receiving water*?
2. Are the conditions in receiving water* getting better or worse with regard to toxicity?
3. What is the relative agricultural and golf course runoff contribution to receiving water* toxicity?
4. What are the causes of the toxicity, and the sources of the constituents responsible?

To answer these questions, a statistically representative sample (determined by the Regional Water Board) of receiving water* at the sites of agricultural irrigation tail water and storm water runoff, and golf course runoff, in each watershed will be monitored:

a. During wet weather, at a minimum of two storm events per year, and
b. During dry weather, when flowing, at a frequency determined by the Regional Boards.

Core receiving water* monitoring shall include Table 1 critical life stage chronic toxicity* for a minimum of one invertebrate species.

For runoff in a low energy coastal environment with the likelihood of sediment deposition, core sediment monitoring shall include acute sediment toxicity utilizing alternative amphipod species (*Eohaustorius estuarius, Leptocheirus plumulosus, Rhepoxynius abronius*) at a minimum once per year.

* See Appendix I for definition of terms.

If an exceedence is detected, an additional toxicity test is required during the subsequent storm event. If an additional exceedance is detected, a TRE is required, consistent with chapter III.C.10 that requires a TRE if a discharge consistently exceeds an effluent limitation based on a toxicity objective in Table 1. A sufficient volume must be collected to conduct a TIE, if necessary, as a part of a TRE.

The requirement for core monitoring may be waived at the discretion of the Regional Water Board, if the permittee participates in a regional monitoring program to answer the above questions, as well as any other additional questions that may be developed by the regional monitoring program.

8. BENTHIC COMMUNITY HEALTH

8.1. Point Sources

1. Are benthic communities degraded* as a result of the discharge?

To answer this question, benthic community monitoring shall be conducted

a. for all discharges greater than 10 MGD, or
b. those discharges greater than 0.1 MGD and one nautical mile or less from shore, or
c. discharges greater than 0.1 MGD and one nautical mile or less from a State Water Quality Protection Area* or a State Marine Reserve.

The minimum frequency shall be once per permit cycle, except for discharges greater than 100 MGD the minimum frequency shall be at least twice per permit cycle.

This requirement may be satisfied by core monitoring individually or through participation in a regional monitoring program at the discretion of the Regional Board.

9. BIOACCUMULATION

9.1. Point Sources

1. Does the concentration of pollutants in fish, shellfish,* or other marine resources used for human consumption bioaccumulate to levels that are harmful to human health?
2. Does the concentration of pollutants in marine life bioaccumulate to levels that degrade* marine communities?

To answer these questions, bioaccumulation monitoring shall be conducted, at a minimum, once per permit cycle for:

a. discharges greater than 10 MGD, or
b. those discharges greater than 0.1 MGD and one nautical mile or less from shore, or
c. discharges greater than 0.1 MGD and one nautical mile or less from a State Water Quality Protection Area* or a State Marine Reserve, Park or Conservation Area.

Constituents to be monitored must include pesticides (at the discretion of the Regional Board), Table 1 metals, and PAHs.* Bioaccumulation may be monitored by a mussel watch program or a fish tissue program. Resident mussels are preferred over transplanted mussels. Sand crabs

* See Appendix I for definition of terms.

and/or fish may be added or substituted for mussels at the discretion of the Regional Water Board.

This requirement may be satisfied individually as core monitoring or through participation in a regional monitoring program at the discretion of the Regional Water Board.

9.2. Storm Water

1. Does the concentration of pollutants in fish, shellfish,* or other marine resources used for human consumption bioaccumulate to levels that are harmful to human health?
2. Does the concentration of pollutants in marine life bioaccumulate to levels that degrade* marine communities?

For Phase I MS4 dischargers, bioaccumulation monitoring shall be conducted, at a minimum, once per permit cycle. Constituents to be monitored must include OP Pesticides, Ocean Plan Table 1 metals, Table 1 PAHs,* Table 1 chlorinated hydrocarbons, and pyrethroids. Bioaccumulation may be monitored by a mussel watch program or a fish tissue program. Sand crabs, fish, and/or Solid Phase Microextraction may be added or substituted for mussels at the discretion of the Regional Water Board.

This requirement may be satisfied individually as core monitoring or through participation in a regional monitoring program at the discretion of the Regional Water Board.

10. RECEIVING WATER* CHARACTERISTICS

All Sources:

1. Is natural light* significantly* reduced at any point outside the zone of initial dilution* as the result of the discharge of waste*?
2. Does the discharge of waste* cause a discoloration of the ocean surface?
3. Does the discharge of oxygen demanding waste* cause the dissolved oxygen concentration to be depressed at any time more than 10 percent from that which occurs naturally, as the result of the discharge of oxygen demanding* waste* materials*?
4. Does the discharge of waste* cause the pH to change at any time more than 0.2 units from that which occurs naturally?
5. Does the discharge of waste* cause the salinity* to become elevated in the receiving water*?
6. Do nutrients cause objectionable aquatic growth or degrade* indigenous biota?

10.1. Point Sources

For discharges greater than 10 MGD, turbidity (alternatively light transmissivity or surface water transparency), color [Chlorophyll-A and/or color dissolved organic matter (CDOM)], dissolved oxygen and pH shall be measured in the receiving water* seasonally, at a minimum, in a core monitoring program approved by the Regional Water Board. If sufficient data exists from previous water column monitoring for these parameters, the Regional Water Board, at its discretion, may reduce the frequency of water column monitoring, or may allow this requirement to be satisfied through participation in a regional monitoring program. Use of regional ocean observing programs, such as the Southern California Coastal Ocean Observing System

* See Appendix I for definition of terms.

(SCCOOS) and the Central and Northern California Ocean Observing System (CeNCCOOS) is encouraged.

Salinity* must also be monitored by all point sources discharging brine* as part of their core monitoring program. Seawater desalination facilities* discharging brine* into ocean waters* and wastewater facilities that receive brine from seawater desalination facilities and discharge into ocean waters shall monitor salinity as described in chapter III.M.4.

10.2. Storm Water

At a minimum, 10 percent of Phase I MS4 discharges greater than 36 inches, receiving water* turbidity, color, dissolved oxygen, pH, nitrate, phosphate, and ammonia shall be measured annually in a core monitoring program approved by the Regional Water Board.

Regional Water Boards may waive monitoring once structural best management practices have been installed, evaluated and determined to have successfully controlled pollutants. The Regional Water Board, at its discretion, may also allow this requirement to be satisfied through participation in a regional monitoring program.

10.3. Non-point Sources

Representative agricultural and golf course discharges shall be measured, at a minimum twice annually (during two storm season and irrigation season) for receiving water* turbidity, color, dissolved oxygen, pH, nitrate, phosphate, ammonia in a core monitoring program approved by the Regional Water Board. The Regional Water Board, at its discretion, may allow this requirement to be satisfied through participation in a regional monitoring program.

11. ANALYTICAL REQUIREMENTS

Procedures, calibration techniques, and instrument/reagent specifications shall conform to the requirements of 40 CFR PART 136. Compliance monitoring shall be determined using an US EPA approved protocol as provided in 40 CFR PART 136. All methods shall be specified in the monitoring requirement section of waste* discharge requirements.

Where methods are not available in 40 CFR PART 136, the Regional Water Boards shall specify suitable analytical methods in waste* discharge requirements. Acceptance of data should be predicated on demonstrated laboratory performance.

Laboratories analyzing monitoring data shall be certified by the California Department of Public Health, in accordance with the provisions of Water Code section 13176, and must include quality assurance quality control data with their reports.

Sample dilutions for total and fecal coliform bacterial analyses shall range from 2 to 16,000. Sample dilutions for enterococcus bacterial analyses shall range from 1 to 10,000 per 100 mL. Each test method number or name (e.g., EPA 600/4-85/076, Test Methods for *Escherichia coli* and *Enterococci* in Water by Membrane Filter Procedure) used for each analysis shall be specified and reported with the results.

* See Appendix I for definition of terms.

Test methods used for coliforms (total and fecal) shall be those presented in Table 1A of 40 CFR PART 136, unless alternate methods have been approved in advance by U.S. EPA pursuant to 40 CFR PART 136.

Test methods used for enterococcus shall be those presented in U.S. EPA publication EPA 600/4-85/076, Test Methods for *Escherichia coli* and *Enterococci* in Water by Membrane Filter Procedure or any improved method determined by the Regional Board to be appropriate. The Regional Water Board may allow analysis for *Escherichia coli* (*E. coli)* by approved test methods to be substituted for fecal coliforms if sufficient information exists to support comparability with approved methods and substitute the existing methods.

The State or Regional Water Board may, subject to U.S. EPA approval, specify test methods which are more sensitive than those specified in 40 CFR PART 136. Because storm water and non-point sources are not assigned a dilution factor, sufficient sampling and analysis shall be required to determine compliance with Table 1 Water Quality Objectives. Total chlorine residual is likely to be a method detection limit effluent limitation in many cases. The limit of detection of total chlorine residual in standard test methods is less than or equal to 20 µg/L.

Toxicity monitoring requirements in permits prepared by the Regional Water Boards shall use marine test species instead of freshwater species when measuring compliance. The Regional Water Board shall require the use of critical life stage toxicity tests specified in this Appendix to measure TUc. For Point Sources, a minimum of three test species with approved test protocols shall be used to measure compliance with the toxicity objective. If possible, the test species shall include a fish, an invertebrate, and an aquatic plant. After a screening period, monitoring can be reduced to the most sensitive species.

Dilution and control water should be obtained from an unaffected area of the receiving waters.* The sensitivity of the test organisms to a reference toxicant shall be determined concurrently with each bioassay test and reported with the test results.

Use of critical life stage bioassay testing shall be included in waste* discharge requirements as a monitoring requirement for all Point Source discharges greater than 100 MGD

Procedures and methods used to determine compliance with benthic monitoring should use the following federal guidelines when applicable: Macroinvertebrate Field and Laboratory Methods for Evaluating the Biological Integrity of Surface Waters (1990) -- EPA/600/4-90/030 (PB91-171363). This manual describes guidelines and standardized procedures for the use of macroinvertebrates in evaluating the biological integrity of surface waters.

Procedures used to determine compliance with bioaccumulation monitoring should use the U.S. EPA. Guidance for Assessing Chemical Contaminant Data for Use in Fish Advisories (November 2000, EPA 823-B-00-007), NOAA Technical Memorandum NOS ORCA 130, Sampling and Analytical Methods of the National Status and Trends Program Mussel Watch Project (1998 update), and/or State Mussel Watch Program, 1987-1993 Data Report, State Water Resources Control Board 94-1WQ.

* See Appendix I for definition of terms.

TABLE III-1
APPROVED TESTS – CHRONIC TOXICITY* (TUc)

Species	Effect	Tier	Reference
giant kelp, *Macrocystis pyrifera*	percent germination; germ tube length	1	1,3
red abalone, *Haliotis rufescens*	Abnormal shell development	1	1,3
oyster, *Crassostrea gigas*; mussels, *Mytilus spp.*	Abnormal shell development; percent survival	1	1,3
urchin, *Strongylocentrotus purpuratus*; sand dollar, *Dendraster excentricus*	Percent normal development	1	1,3
urchin, *Strongylocentrotus purpuratus*; sand dollar, *Dendraster excentricus*	Percent fertilization	1	1,3
shrimp, *Holmesimysis costata*	Percent survival; growth	1	1,3
shrimp, *Mysidopsis bahia*	Percent survival; growth; fecundity	2	2,4
topsmelt, *Atherinops affinis*	Larval growth rate; percent survival	1	1,3
Silversides, *Menidia beryllina*	Larval growth rate; percent survival	2	2,4

Table III-1 Notes

The first tier test methods are the preferred toxicity tests for compliance monitoring. A Regional Water Board can approve the use of a second tier test method for waste* discharges if first tier organisms are not available.

* See Appendix I for definition of terms.

Protocol References

1. Chapman, G.A., D.L. Denton, and J.M. Lazorchak. 1995. Short-term methods for estimating the chronic toxicity of effluents and receiving waters to west coast marine and estuarine organisms. U.S. EPA Report No. EPA/600/R-95/136.

2. Klemm, D.J., G.E. Morrison, T.J. Norberg-King, W.J. Peltier, and M.A. Heber. 1994. Short-term methods for estimating the chronic toxicity of effluents and receiving water to marine and estuarine organisms. U.S. EPA Report No. EPA-600-4-91-003.

3. SWRCB 1996. Procedures Manual for Conducting Toxicity Tests Developed by the Marine Bioassay Project. 96-1WQ.

4. Weber, C.I., W.B. Horning, I.I., D.J. Klemm, T.W. Nieheisel, P.A. Lewis, E.L. Robinson, J. Menkedick and F. Kessler (eds). 1988. Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Marine and Estuarine Organisms. EPA/600/4-87/028. National Information Service, Springfield, VA.

* See Appendix I for definition of terms.

APPENDIX IV
PROCEDURES FOR THE NOMINATION AND DESIGNATION OF STATE WATER QUALITY PROTECTION AREAS.*

1. Any person may nominate areas of ocean* waters for designation as SWQPA-ASBS or SWQPA-GP by the State Water Board. Nominations shall be made to the appropriate Regional Water Board and shall include:

   (a) Information such as maps, reports, data, statements, and photographs to show that:

      (1) Candidate areas are located in ocean* waters as defined in the "Ocean Plan".

      (2) Candidate areas are intrinsically valuable or have recognized value to man for scientific study, commercial use, recreational use, or esthetic reasons.

      (3) Candidate areas need protection beyond that offered by waste* discharge restrictions or other administrative and statutory mechanisms.

   (b) Data and information to indicate whether the proposed designation may have a significant* effect on the environment.

      (1) If the data or information indicate that the proposed designation will have a significant* effect on the environment, the nominee must submit sufficient information and data to identify feasible changes in the designation that will mitigate or avoid the significant* environmental effects.

2. The State Water Board or a Regional Water Board may also nominate areas for designation as SWQPA-ASBS or SWQPA-GP on their own motion.

3. A Regional Water Board may decide to (a) consider individual SWQPA-ASBS or SWQPA-GP nominations upon receipt, (b) consider several nominations in a consolidated proceeding, or (c) consider nominations in the triennial review of its water quality control plan (basin plan). A nomination that meets the requirements of 1. above may be considered at any time but not later than the next scheduled triennial review of the appropriate basin plan or Ocean Plan.

4. After determining that a nomination meets the requirements of paragraph 1. above, the Executive Officer of the affected Regional Water Board shall prepare a Draft Nomination Report containing the following:

   (a) The area or areas nominated for designation as SWQPA-ASBS or SWQPA-GP.

   (b) A description of each area including a map delineating the boundaries of each proposed area.

   (c) A recommendation for action on the nomination(s) and the rationale for the recommendation. If the Draft Nomination Report recommends approval of the proposed designation, the Draft Nomination Report shall comply with the CEQA documentation requirements for a water quality control plan amendment in section 3777, title 23, California Code of Regulations.

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* See Appendix I for definition of terms.

5. The Executive Officer shall, at a minimum, seek informal comment on the Draft Nomination Report from the State Water Board, Department of Fish and Game, other interested state and federal agencies, conservation groups, affected waste dischargers, and other interested parties. Upon incorporation of responses from the consulted agencies, the Draft Nomination Report shall become the Final Nomination Report.

6. (a) If the Final Nomination Report recommends approval of the proposed designation, the Executive Officer shall ensure that processing of the nomination complies with the CEQA consultation requirements in section 3778, Title 23, California Code of Regulations and proceed to step 7 below.

   (b) If the Final Nomination Report recommends against approval of the proposed designation, the Executive Officer shall notify interested parties of the decision. No further action need be taken. The nominating party may seek reconsideration of the decision by the Regional Water Board itself.

7. The Regional Water Board shall conduct a public hearing to receive testimony on the proposed designation. Notice of the hearing shall be published three times in a newspaper of general circulation in the vicinity of the proposed area or areas and shall be distributed to all known interested parties 45 days in advance of the hearing. The notice shall describe the location, boundaries, and extent of the area or areas under consideration, as well as proposed restrictions on waste* discharges within the area.

8. The Regional Water Board shall respond to comments as required in section 3779, Title 23, California Code of Regulations, and 40 C.F.R. Part 25 (July 1, 1999).

9. The Regional Water Board shall consider the nomination after completing the required public review processes required by CEQA.

   (a) If the Regional Water Board supports the recommendation for designation, the board shall forward to the State Water Board its recommendation for approving designation of the proposed area or areas and the supporting rationale. The Regional Water Board submittal shall include a copy of the staff report, hearing transcript, comments, and responses to comments.

   (b) If the Regional Water Board does not support the recommendation for designation, the Executive Officer shall notify interested parties of the decision, and no further action need be taken.

10. After considering the Regional Water Board recommendation and hearing record, the State Water Board may approve or deny the recommendation, refer the matter to the Regional Water Board for appropriate action, or conduct further hearing itself. If the State Water Board acts to approve a recommended designation, the State Water Board shall amend Appendix V, Table V-1, of this Plan. The amendment will go into effect after approval by the Office of Administrative Law and US EPA. In addition, after the effective date of a designation, the affected Regional Water Board shall revise its water quality control plan in the next triennial review to include the designation.

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* See Appendix I for definition of terms.

12. The State Water Board Executive Director shall advise other agencies to whom the list of designated areas is to be provided that the basis for an SWQPA-ASBS or SWQPA-GP designation is limited to protection of marine life from waste* discharges.

* See Appendix I for definition of terms.

APPENDIX V
STATE WATER QUALITY PROTECTION AREAS*
AREAS OF SPECIAL BIOLOGICAL SIGNIFICANCE*

TABLE V-1
STATE WATER QUALITY PROTECTION AREAS*
AREAS OF SPECIAL BIOLOGICAL SIGNIFICANCE*
(DESIGNATED OR APPROVED BY THE STATE WATER RESOURCES CONTROL BOARD)

No.	ASBS Name	Date Designated	State Water Board Resolution No.	Region No.
1.	Jughandle Cove	March 21, 1974,	74-28	1
2.	Del Mar Landing	March 21, 1974,	74-28	1
3.	Gerstle Cove	March 21, 1974,	74-28	1
4.	Bodega	March 21, 1974,	74-28	1
5.	Saunders Reef	March 21, 1974,	74-28	1
6.	Trinidad Head	March 21, 1974,	74-28	1
7.	King Range	March 21, 1974,	74-28	1
8.	Redwoods National Park	March 21, 1974,	74-28	1
9.	James V. Fitzgerald	March 21, 1974,	74-28	2
10.	Farallon Islands	March 21, 1974,	74-28	2
11.	Duxbury Reef	March 21, 1974,	74-28	2
12.	Point Reyes Headlands	March 21, 1974,	74-28	2
13.	Double Point	March 21, 1974,	74-28	2
14.	Bird Rock	March 21, 1974,	74-28	2
15.	Año Nuevo	March 21, 1974,	74-28	3
16.	Point Lobos	March 21, 1974,	74-28	3
17.	San Miguel, Santa Rosa, and Santa Cruz Islands	March 21, 1974,	74-28	3
18.	Julia Pfeiffer Burns	March 21, 1974,	74-28	3
19.	Pacific Grove	March 21, 1974,	74-28	3
20.	Salmon Creek Coast	March 21, 1974,	74-28	3
21.	San Nicolas Island and Begg Rock	March 21, 1974,	74-28	4
22.	Santa Barbara and Anacapa Islands	March 21, 1974,	74-28	4
23.	San Clemente Island	March 21, 1974,	74-28	4

Table V-1 Continued on next page…

* See Appendix I for definition of terms.

Table V-1 (Continued)

Areas of Special Biological Significance*
(Designated or Approved by the State Water Resources Control Board)

No.	ASBS Name	Date Designated	State Water Board Resolution No.	Region No.
24.	Laguna Point to Latigo Point	March 21, 1974,	74-28	4
25.	Northwest Santa Catalina Island	March 21, 1974,	74-28	4
26.	Western Santa Catalina Island	March 21, 1974,	74-28	4
27.	Farnsworth Bank	March 21, 1974,	74-28	4
28.	Southeast Santa Catalina	March 21, 1974,	74-28	4
29.	La Jolla	March 21, 1974,	74-28	9
30.	Heisler Park	March 21, 1974,	74-28	9
31.	San Diego-Scripps	March 21, 1974,	74-28	9
32.	Robert E. Badham	April 18, 1974	74-32	8
33.	Irvine Coast	April 18, 1974	74-32	8,9
34.	Carmel Bay	June 19, 1975	75-61	3

* See Appendix I for definition of terms.

APPENDIX VI

REASONABLE POTENTIAL ANALYSIS PROCEDURE FOR DETERMINING WHICH TABLE 1 OBJECTIVES REQUIRE EFFLUENT LIMITATIONS

In determining the need for an effluent limitation, the Regional Water Board shall use all representative information to characterize the pollutant discharge using a scientifically defensible statistical method that accounts for the averaging period of the water quality objective, accounts for and captures the long-term variability of the pollutant in the effluent, accounts for limitations associated with sparse data sets, accounts for uncertainty associated with censored data sets, and (unless otherwise demonstrated) assumes a lognormal distribution of the facility-specific effluent data.

The purpose of the following procedure (see also Figure VI-1) is to provide direction to the Regional Water Boards for determining if a pollutant discharge causes, has the reasonable potential to cause, or contributes to an excursion above Table 1 water quality objectives in accordance with 40 CFR 122.44 (d)(1)(iii). The Regional Water Board may use an alternative approach for assessing reasonable potential such as an appropriate stochastic dilution model that incorporates both ambient and effluent variability. The permit fact sheet or statement of basis will document the justification or basis for the conclusions of the reasonable potential assessment. This appendix does not apply to permits or any portion of a permit where the discharge is regulated through best management practices (BMP) unless such discharge is also subject to numeric effluent limitations.

Step 1: Identify C_o, the applicable water quality objective from Table 1 for the pollutant.

Step 2: Does information about the receiving water* body or the discharge support a reasonable potential assessment (RPA) without characterizing facility-specific effluent monitoring data? If yes, go to *Step 13* to conduct an RPA based on best professional judgment (BPJ). Otherwise, proceed to *Step 3*.

Step 3: Is facility-specific effluent monitoring data available? If yes, proceed to *Step 4.* Otherwise, go to *Step 13.*

Step 4: Adjust all effluent monitoring data C_e, including censored (ND or DNQ) values to the concentration X expected after complete mixing. For Table 1 pollutants use $X = (C_e + D_m C_s) / (D_m + 1)$; for acute toxicity* use $X = C_e / (0.1 D_m + 1)$; where D_m is the minimum probable initial dilution* expressed as parts seawater* per part wastewater and C_s is the background seawater* concentration from Table 3. For ND values, C_e is replaced with "<MDL*;" for DNQ values C_e is replaced with "<ML.*" Go to *Step 5*.

Step 5: Count the total number of samples n, the number of censored (ND or DNQ) values, c and the number of detected values, d, *such that* $n = c + d$.

Is any *detected* pollutant concentration after complete mixing greater than C_o? If yes, the discharge causes an excursion of C_o; go to *Endpoint 1*. Otherwise, proceed to *Step 6*.

Step 6: Does the effluent monitoring data contain three or more detected observations ($d \geq 3$)? If yes, proceed to *Step 7* to conduct a parametric RPA. Otherwise, go to *Step11* to conduct a nonparametric RPA.

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* See Appendix I for definition of terms.

Step 7: Conduct a parametric RPA. Assume data are lognormally distributed, unless otherwise demonstrated. Does the data consist entirely of detected values ($c/n = 0$)? If yes,

- calculate summary statistics M_L and S_L, the mean and standard deviation of the natural logarithm transformed effluent data expected after complete mixing, ln(X),
- go to *Step 9*.

Otherwise, proceed to *Step 8*.

Step 8: Is the data censored by 80% or less ($c/n \leq 0.8$)? If yes,

- calculate summary statistics M_L and S_L using the censored data analysis method of Helsel and Cohn (1988),
- go to *Step 9*.

Otherwise, go to Step 11.

Step 9: Calculate the UCB i.e., the one-sided, upper 95 percent confidence bound for the 95th percentile of the effluent distribution after complete mixing. For lognormal distributions, use $UCBL_{(.95,.95)} = \exp(M_L + S_L\, g'_{(.95,.95,n)})$, where g' is a normal tolerance factor obtained from the table below (Table VI-1). Proceed to *Step 10*.

Step 10: Is the UCB greater than C_o? If yes, the discharge has a reasonable potential to cause an excursion of C_o; go to *Endpoint 1*. Otherwise, the discharge has no reasonable potential to cause an excursion of C_o; go to *Endpoint 2*.

Step 11: Conduct a non-parametric RPA. Compare each data value X to C_o. Reduce the sample size n by 1 for each tie (i.e., inconclusive censored value result) present. An adjusted ND value having C_o < MDL* is a tie. An adjusted DNQ value having C_o < ML* is also a tie.

Step 12: Is the adjusted $n > 15$? If yes, the discharge has no reasonable potential to cause an excursion of C_o; go to *Endpoint 2*. Otherwise, go to *Endpoint 3*.

Step 13: Conduct an RPA based on BPJ. Review all available information to determine if a water quality-based effluent limitation is required, notwithstanding the above analysis in *Steps 1* through *12*, to protect beneficial uses. Information that may be used includes: the facility type, the discharge type, solids loading analysis, lack of dilution, history of compliance problems, potential toxic impact of discharge, fish tissue residue data, water quality and beneficial uses of the receiving water,* CWA 303(d) listing for the pollutant, the presence of endangered or threatened species or critical habitat, and other information.

Is data or other information unavailable or insufficient to determine if a water quality-based effluent limitation is required? If yes, go to *Endpoint 3.* Otherwise, go to either *Endpoint 1* or *Endpoint 2* based on BPJ.

Endpoint 1: An effluent limitation must be developed for the pollutant. Effluent monitoring for the pollutant, consistent with the monitoring frequency in Appendix III, is required.

Endpoint 2: An effluent limitation is not required for the pollutant. Appendix III effluent monitoring is not required for the pollutant; the Regional Board, however, may require occasional monitoring for the pollutant or for whole effluent toxicity as appropriate.

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* See Appendix I for definition of terms.

Endpoint 3: The RPA is inconclusive. Monitoring for the pollutant or whole effluent toxicity testing, consistent with the monitoring frequency in Appendix III, is required. An existing effluent limitation for the pollutant shall remain in the permit, otherwise the permit shall include a reopener clause to allow for subsequent modification of the permit to include an effluent limitation if the monitoring establishes that the discharge causes, has the reasonable potential to cause, or contributes to an excursion above a Table 1 water quality objective.

Appendix VI References:

Helsel D. R. and T. A. Cohn. 1988. Estimation of descriptive statistics for multiply censored water quality data. Water Resources Research, Vol 24(12):1977-2004.

Hahn J. H. and W. Q. Meeker. 1991. Statistical Intervals, A guide for practitioners. J. Wiley & Sons, NY.

TABLE VI-1: Tolerance factors $g'_{(.95,.95,n)}$ for calculating normal distribution one-sided upper 95 percent tolerance bounds for the 95th percentile (Hahn & Meeker 1991)

n	$g'_{(.95,.95,n)}$	***n***	$g'_{(.95,.95,n)}$
2	26.260	21	2.371
3	7.656	22	2.349
4	5.144	23	2.328
5	4.203	24	2.309
6	3.708	25	2.292
7	3.399	26	2.275
8	3.187	27	2.260
9	3.031	28	2.246
10	2.911	29	2.232
11	2.815	30	2.220
12	2.736	35	2.167
13	2.671	40	2.125
14	2.614	50	2.065
15	2.566	60	2.022
16	2.524	120	1.899
17	2.486	240	1.819
18	2.453	480	1.766
19	2.423	∞	1.645
20	2.396		

* See Appendix I for definition of terms.

Figure VI-1. Reasonable potential analysis flow chart

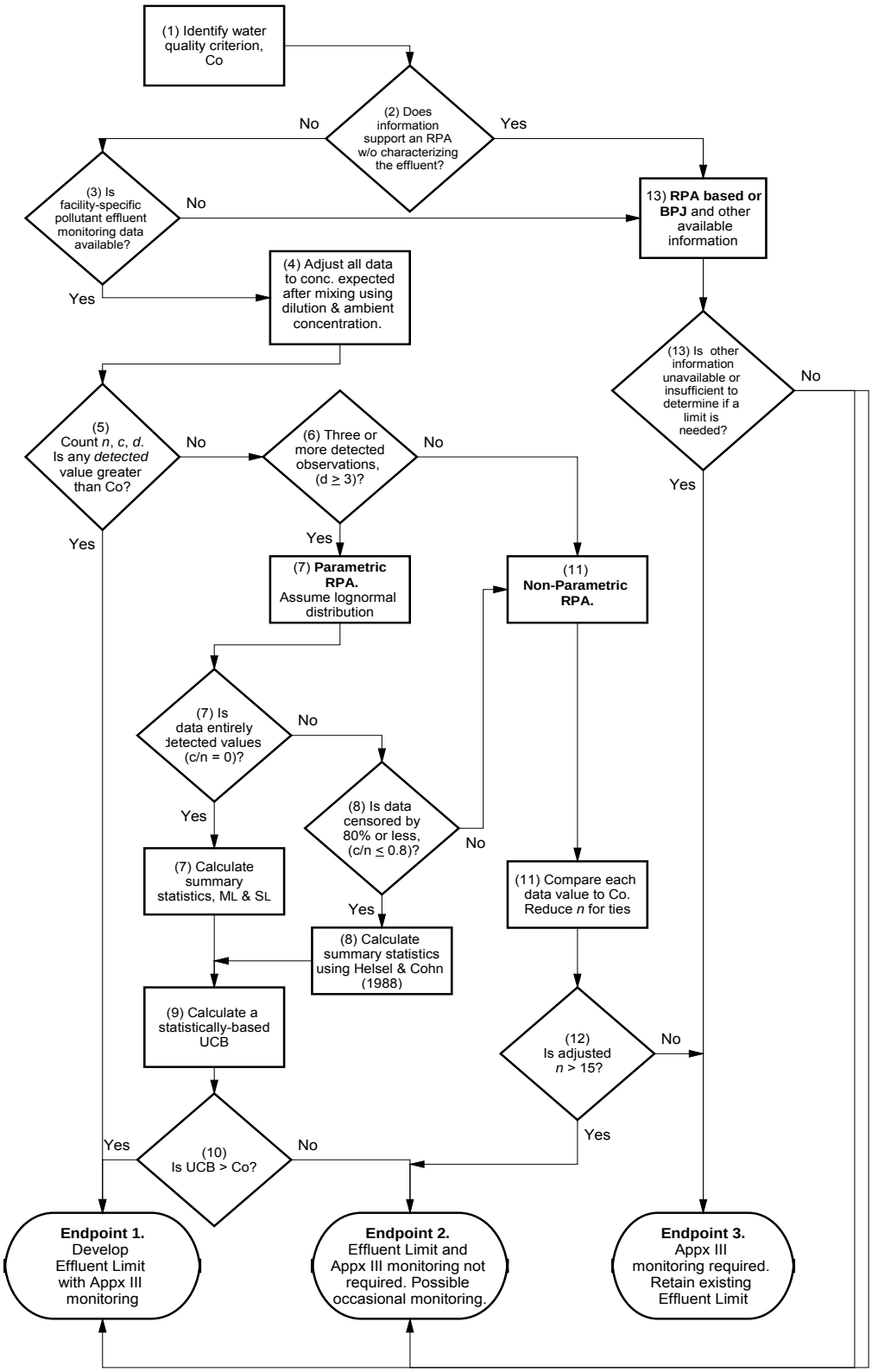

* See Appendix I for definition of terms.

APPENDIX VII

EXCEPTIONS TO THE CALIFORNIA OCEAN PLAN

TABLE VII-1
EXCEPTIONS TO THE OCEAN PLAN

(GRANTED BY THE STATE WATER RESOURCES CONTROL BOARD)

Year	Resolution	Applicable Provision	Discharger
1977	77-11	Discharge Prohibition, ASBS #23	US Navy San Clemente Island
1979	79-16	Discharge Prohibition for wet weather discharges from combined storm and wastewater collection system.	The City and County of San Francisco
1983	83-78	Discharge Prohibition, ASBS #7	Humboldt County Resort Improvement District No.1
1984	84-78	Discharge Prohibition, ASBS #34	Carmel Sanitary District
1988	88-80	Total Chlorine Residual Limitation	Haynes Power Plant Harbor Power Plant Scattergood Power Plant Alamitos Power Plant El Segundo Power Plant Long Beach Power Plant Mandalay Power Plant Ormond Beach Power Plant Redondo Power Plant
1990	90-105	Discharge Prohibition, ASBS #21	US Navy San Nicolas Island
2004	2004-0052	Discharge Prohibition, ASBS #31	UC Scripps Institution of Oceanography
2006	2006-0013	Discharge Prohibition, ASBS #25	USC Wrigley Marine Science Center
2007	2007-0058	Discharge Prohibition, ASBS #4	UC Davis Bodega Marine Laboratory
2011	2011-0049	Discharge Prohibition, ASBS #6	HSU Telonicher Marine lab
2011	2011-0050	Discharge Prohibition, ASBS #19	Monterey Bay Aquarium
2011	2011-0051	Discharge Prohibition, ASBS #19	Stanford Hopkins Marine Station
2012	2012-0012, as amended on June 19 2012; in 2012-0031	ASBS Discharge Prohibition, General Exception for Storm Water and Nonpoint Sources	27 applicants for the General Exception

* See Appendix I for definition of terms.

APPENDIX VIII
MAPS OF THE OCEAN, COAST, AND ISLANDS

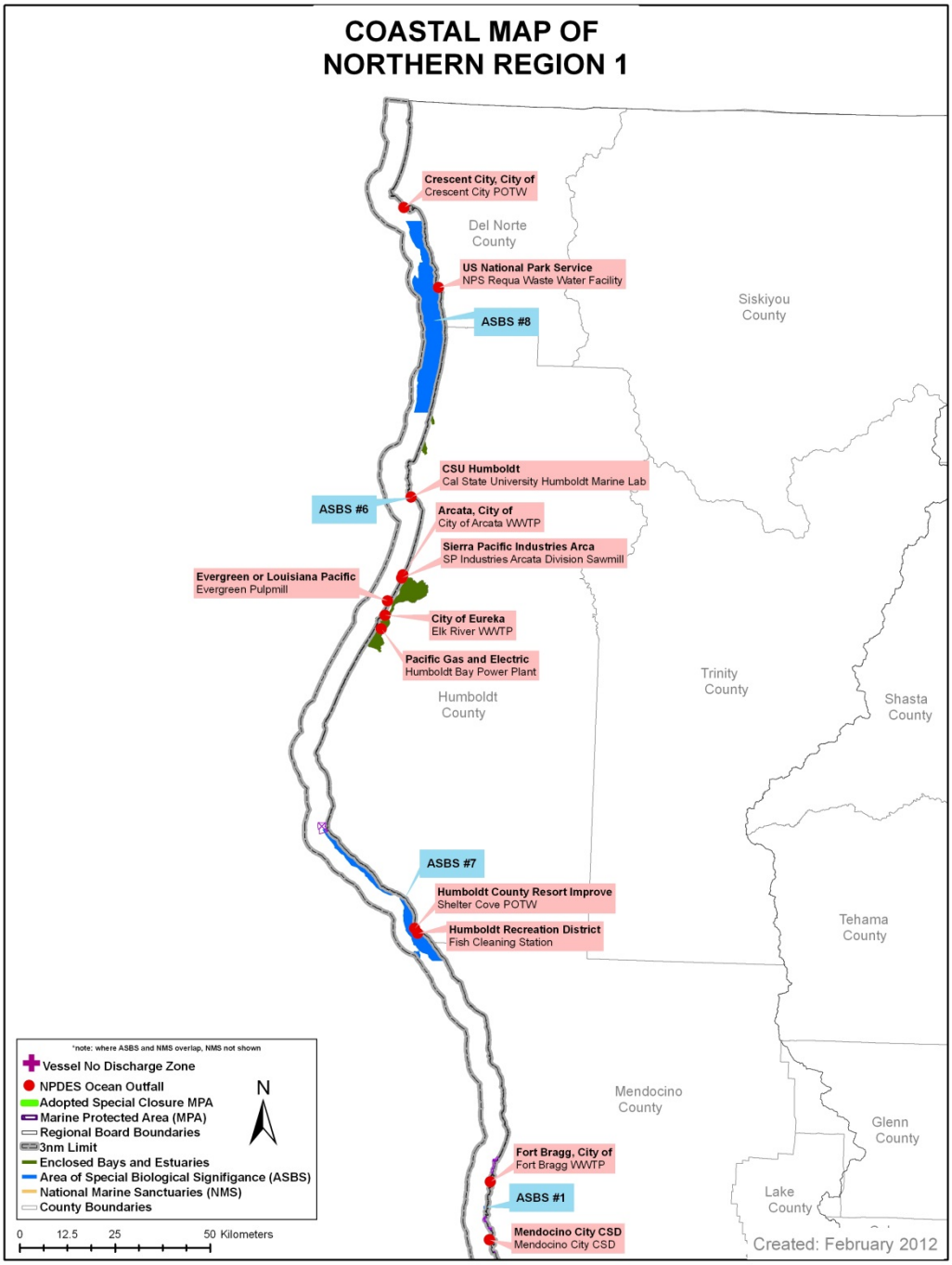

Figure VIII-1. ASBS Boundaries, MPA Boundaries, Wastewater Outfall Points, Marine Sanctuary Boundaries, and Enclosed Bays in northern Region 1.

* See Appendix I for definition of terms.

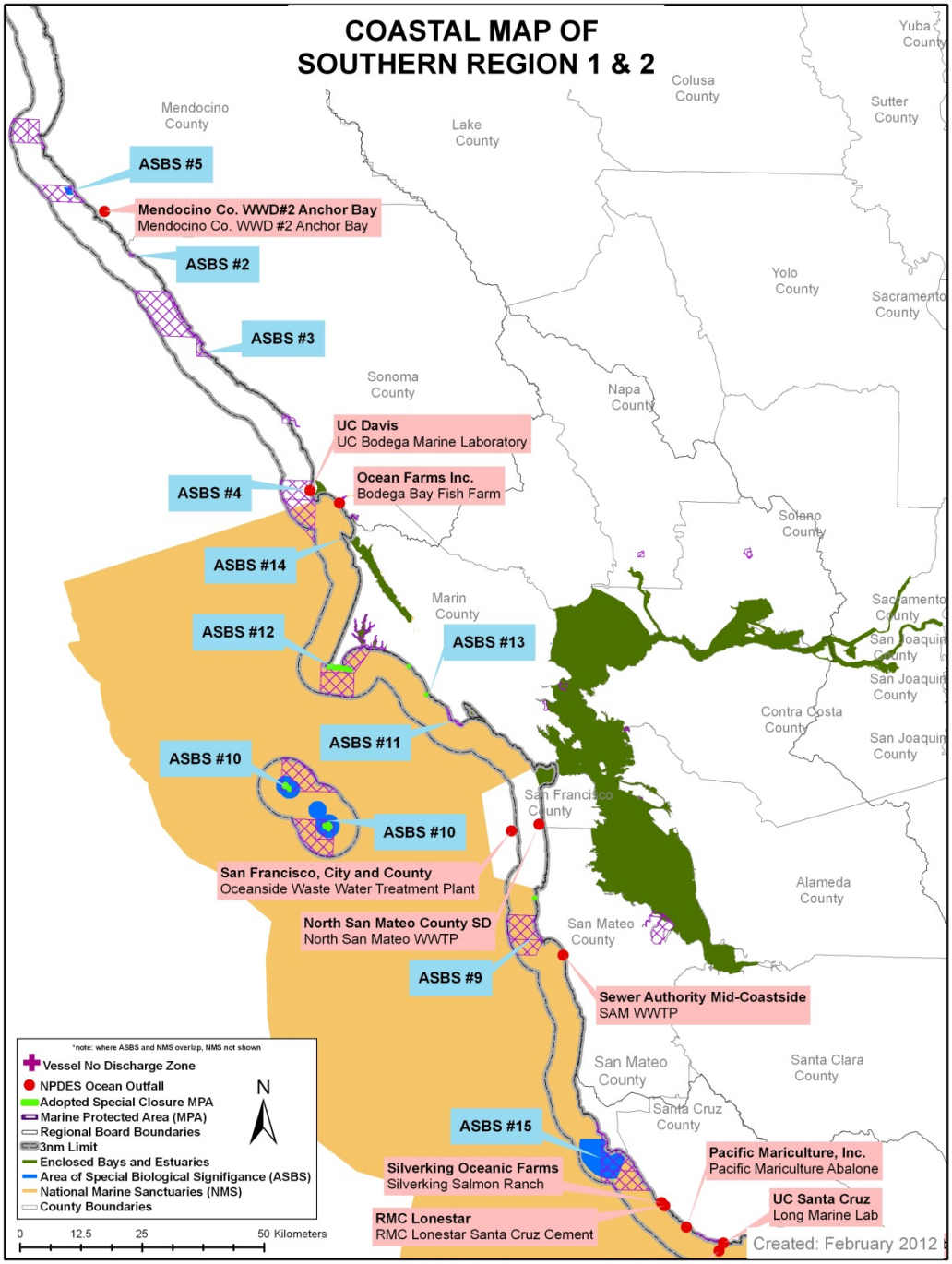

Figure VIII-2. ASBS Boundaries, MPA Boundaries, Wastewater Outfall Points, Marine Sanctuary Boundaries, and Enclosed Bays in southern Region 1 and Region 2.

* See Appendix I for definition of terms.

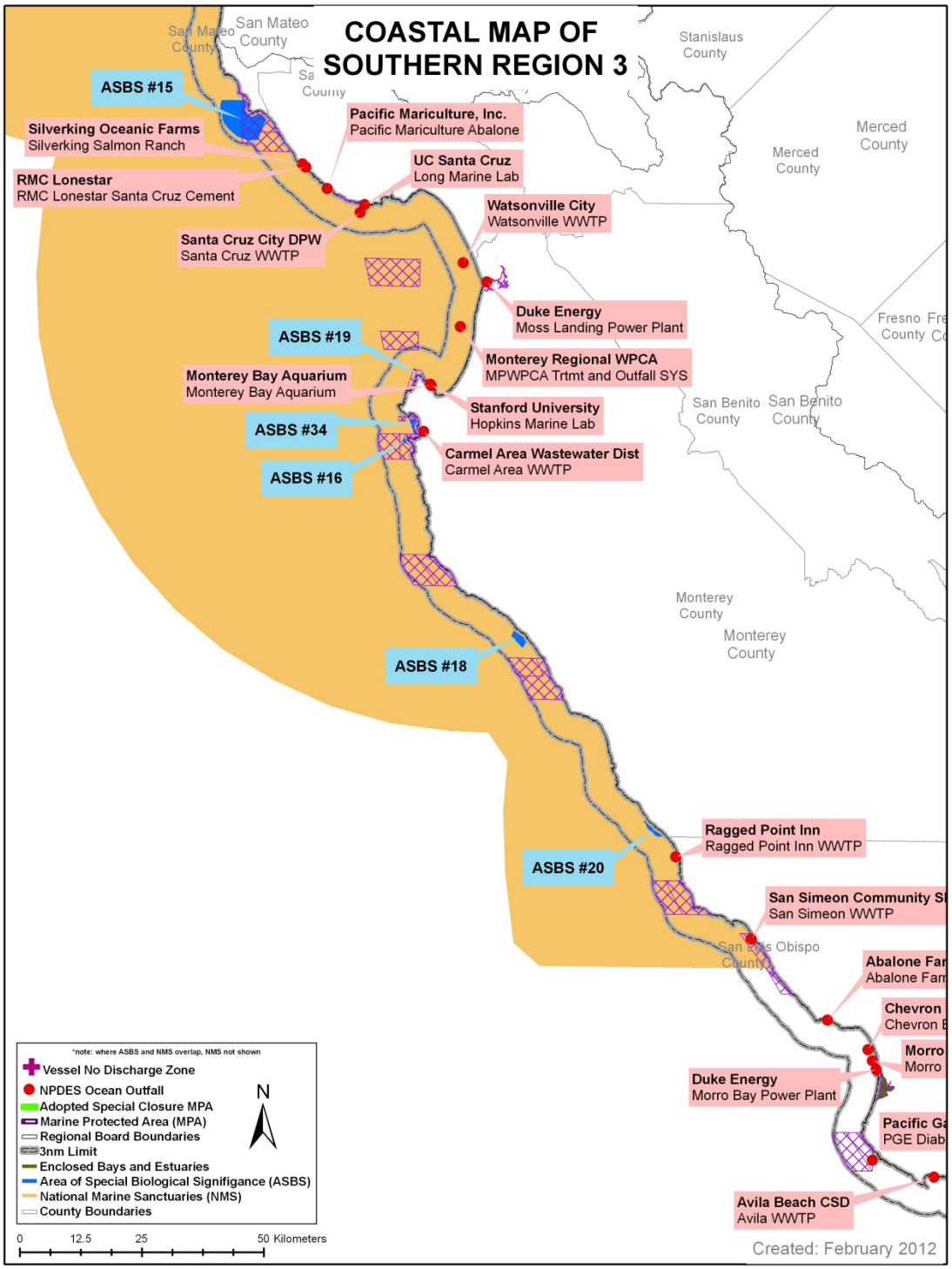

Figure VIII-3. ASBS Boundaries, MPA Boundaries, Wastewater Outfall Points, Marine Sanctuary Boundaries, and Enclosed Bays in northern Region 3.

* See Appendix I for definition of terms.

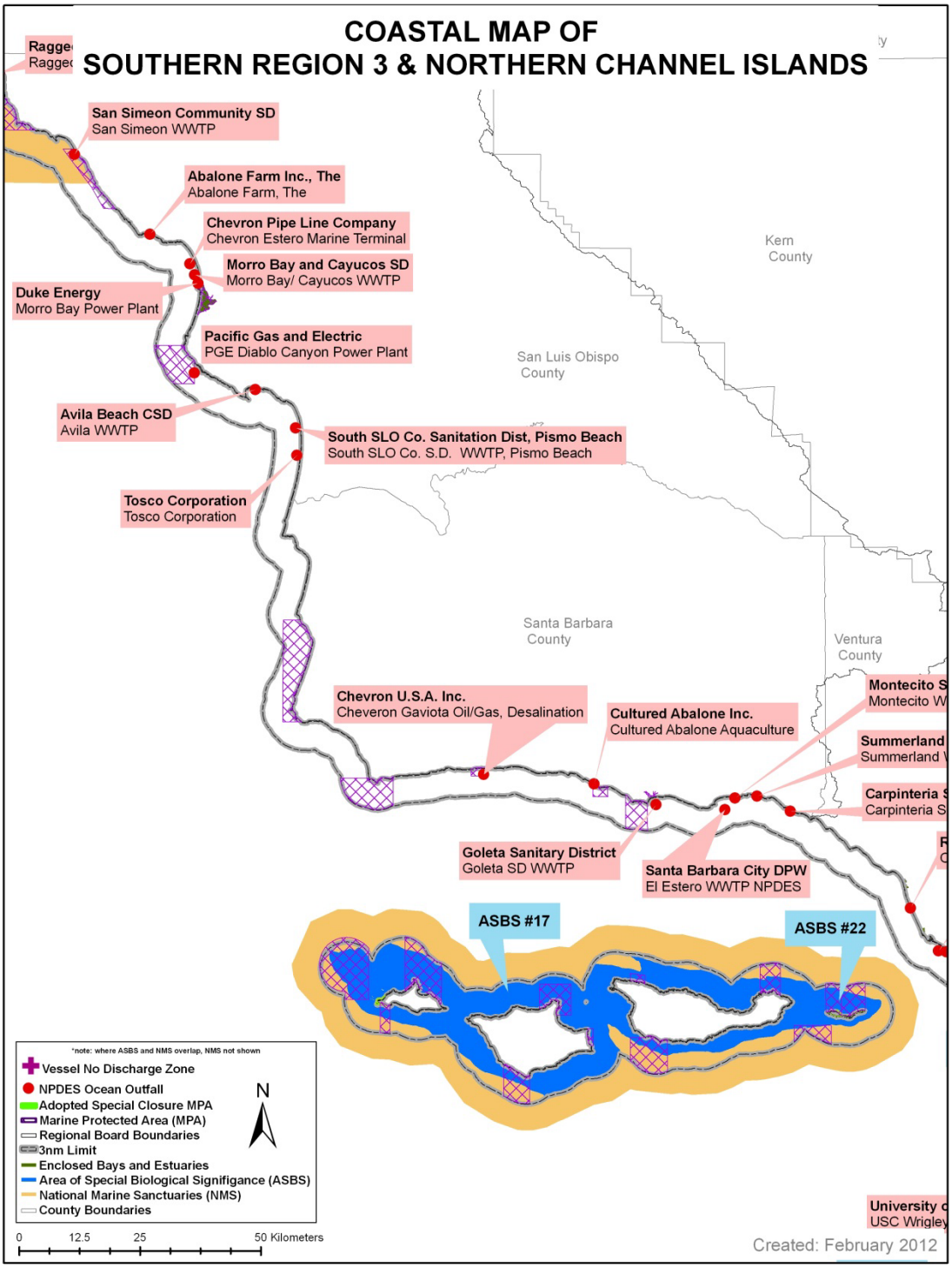

Figure VIII-4. ASBS Boundaries, MPA Boundaries, Wastewater Outfall Points, Marine Sanctuary Boundaries, and Enclosed Bays in southern Region 3 and northern Channel Islands.

* See Appendix I for definition of terms.

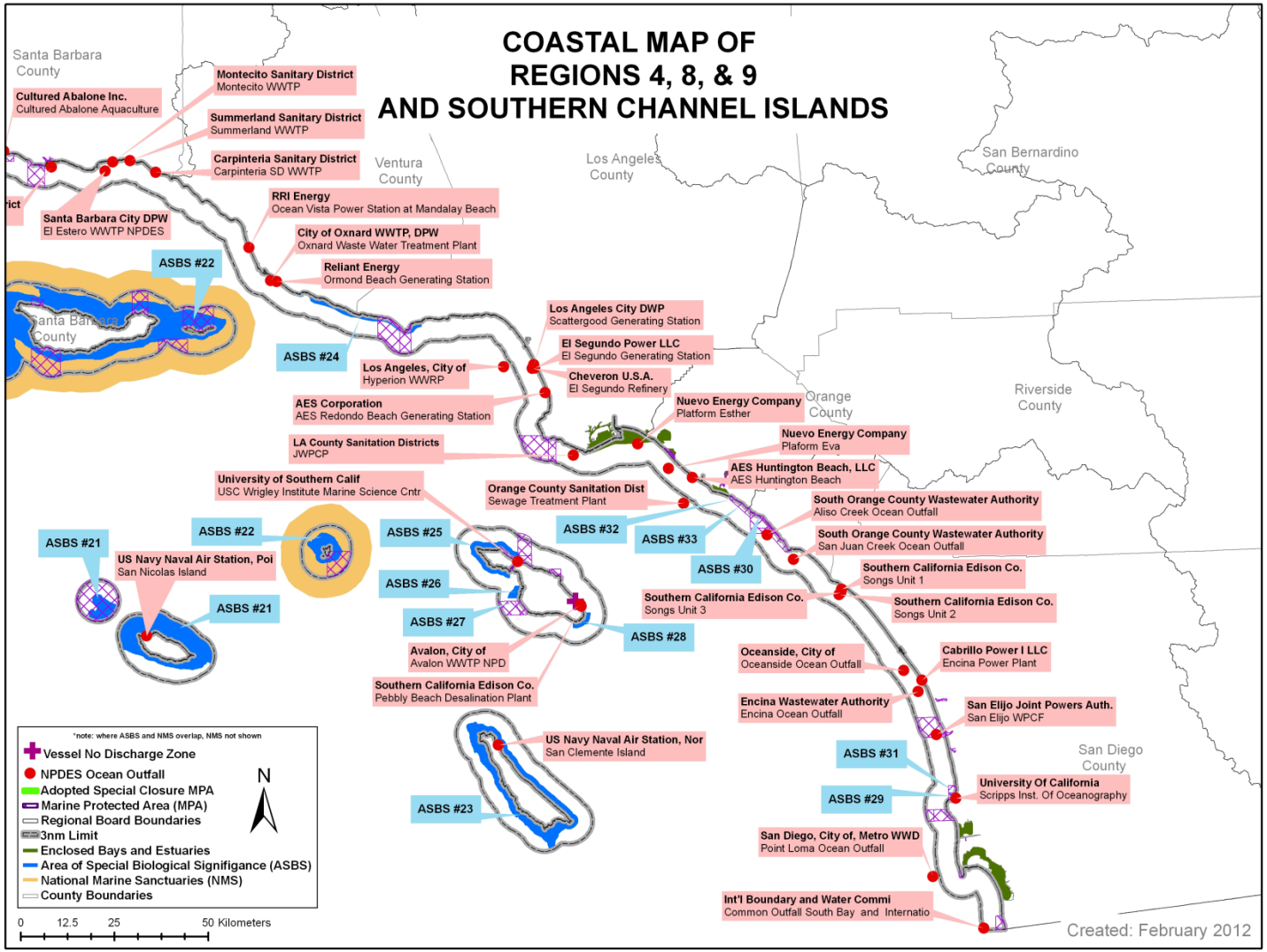

Figure VIII-5. ASBS Boundaries, MPA Boundaries, Wastewater Outfall Points, Marine Sanctuary Boundaries, and Enclosed Bays in southern Channel Islands and Regions 4, 8 and 9.

* See Appendix I for definition of terms.

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CALIFORNIA

Water Boards

STATE WATER RESOURCES CONTROL BOARD

REGIONAL WATER QUALITY CONTROL BOARDS

Porter-Cologne Water Quality Control Act

Water Code Division 7 and Related Sections
(As amended, including Statutes 2016)

APRIL 2017

CALIFORNIA STATE WATER RESOURCES CONTROL BOARD

STATE OF CALIFORNIA
Jerry Brown, Governor

STATE WATER RESOURCES CONTROL BOARD
Felicia Marcus, Chair
Stephen Moore, Vice Chair
Tam Doduc, Member
Dorene D'Adamo, Member
Joaquin Esquival, Member

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Thomas Howard, Executive Director
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STATE WATER RESOURCES CONTROL BOARD AND CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARDS

The State Water Resources Control Board was established in 1967 by the Legislature. The Board succeeded to the functions of the former State Water Rights Board and the State Water Quality Control Board. The nine California Regional Water Quality Control Boards were originally established in the Dickey Water Pollution Control Act of 1949. Together the ten water boards have primarily responsibility for implementing and enforcing the Porter-Cologne Water Quality Control Act (Porter-Cologne Act).

This pamphlet contains excerpts of the Porter-Cologne Act and other related Water Code sections. The State Water Resources Control Board publishes this collection as part of its public information program. This booklet is provided as a public service. Bracketed headings in Division 7 are not part of the code, but are editorial insertions for the benefit of the reader. While every effort is made to assure accuracy, persons should consult the official version of the California Code when making legal decisions. The California Legislative Counsel maintains the official code, which is accessible on the Internet at:
http://leginfo.legislature.ca.gov/faces/codes.xhtml.

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WATER CODE
GENERAL PROVISIONS

(General Provisions enacted by Stats. 1943, Ch. 368.)

§ 1. This act shall be known as the Water Code.
(Enacted By Stats. 1943, Ch. 368.)

§ 2. The provisions of this code, in so far as they are substantially the same as existing statutory provisions relating to the same subject matter, shall be construed as restatements and continuations thereof, and not as new enactments.
(Enacted by Stats. 1943, Ch. 368.)

§ 3. All persons who, at the time this code takes effect, hold office under any of the acts repealed by this code, which offices are continued by this code, continue to hold them according to their former tenure.
(Enacted by Stats. 1943, Ch. 368.)

§ 4. No action or proceeding commenced before this code takes effect, and no right accrued, is affected by this code, but all procedure thereafter taken therein shall conform to the provisions of this code so far as possible.
(Enacted by Stats. 1943, Ch. 368.)

§ 5. Unless the provision or the context otherwise requires, these definitions, rules of construction, and general provisions shall govern the construction of this code.
(Enacted by Stats. 1943, Ch. 368.)

§ 6. Division, part, chapter, article, and section headings do not in any manner affect the scope, meaning, or intent of the provisions of this code.
(Enacted by Stats. 1943, Ch. 368.)

§ 7. Whenever a power is granted to, or a duty is imposed upon, a public officer, the power may be exercised or the duty may be performed by a deputy of the officer or by a person authorized, pursuant to law, by the officer, unless this code expressly provides otherwise.
(Enacted by Stats. 1943, Ch. 368.)

§ 8. Writing includes any form of recorded message capable of comprehension by ordinary visual means. Whenever any notice, report, statement, petition, or record is required or authorized by this code, it shall be made in writing in the English language unless it is expressly provided otherwise.
(Enacted by Stats. 1943, Ch. 368.)

§ 9. Whenever reference is made to any portion of this code or of any other law of this State, the reference applies to all amendments and additions heretofore or hereafter made.
(Enacted by Stats. 1943, Ch. 368.)

§ 10. "Section" means a section of this code unless some other statute is specifically mentioned. "Subdivision" means a subdivision of the section in which that term occurs unless some other section is expressly mentioned.
(Enacted by Stats. 1943, Ch. 368.)

§ 11. The present tense includes the past and future tenses, and the future, the present.
(Enacted by Stats. 1943, Ch. 368.)

§ 12. The masculine gender includes the feminine and the neuter.
(Enacted by Stats. 1943, Ch. 368.)

§ 12.2. "Spouse" includes "registered domestic partner," as required by Section 297.5 of the Family Code.
(Added by Stats. 2016, Ch. 50, Sec. 118. Effective January 1, 2017.)

§ 13. The singular number includes the plural, and the plural, the singular.
(Enacted by Stats. 1943, Ch. 368.)

§ 14. "County" includes city and county.
(Enacted by Stats. 1943, Ch. 368.)

§ 15. "Shall" is mandatory and "may" is permissive.
(Enacted by Stats. 1943, Ch. 368.)

§ 16. "Oath" includes affirmation.
(Enacted by Stats. 1943, Ch. 368.)

§ 17. "Signature" or "subscription" includes mark when the signer or subscriber can not write, such signer's or subscriber's name being written near the mark by a witness who writes his own name near the signer's or subscriber's name; but a signature or subscription by mark can be acknowledged or can serve as a signature or subscription to a sworn statement only when two witnesses so sign their own names thereto.
(Enacted by Stats. 1943, Ch. 368.)

§ 18. "State" means the State of California, unless applied to the different parts of the United States. In the latter case, it includes the District of Columbia and the territories.
(Enacted by Stats. 1943, Ch. 368.)

§ 19. "Person" means any person, firm, association, organization, partnership, business trust, corporation, limited liability company, or company.

(Amended by Stats. 1994, Ch. 1010, Sec. 226. Effective January 1, 1995.)

§ 20. "United States" means the United States of America, and in relation to any particular matter includes the officers, agents, employees, agencies, or instrumentalities authorized to act in relation thereto.
(Enacted by Stats. 1943, Ch. 368.)

§ 21. If any provision of this code, or the application thereof to any person or circumstance, is held invalid, the remainder of the code, or the application of such provision to other persons or circumstances, shall not be affected thereby.
(Enacted by Stats. 1943, Ch. 368.)

§ 22. "Department," unless otherwise specified, means the Department of Water Resources.
(Amended by Stats. 1956, 1st Ex. Sess., Ch. 52.)

§ 23. "Director," unless otherwise specified, means the Director of Water Resources.
(Repealed and added by Stats. 1956, 1st Ex. Sess., Ch. 52.)

§ 24. The standard miner's inch of water is equivalent to one and one-half cubic feet of water per minute, measured through any aperture or orifice.
(Enacted by Stats. 1943, Ch. 368.)

§ 25. "Board," unless otherwise specified, means the State Water Resources Control Board.
(Added by Stats. 1967, Ch. 284.)

§ 26. For the purposes of this code, "recycled water" or "reclaimed water" has the same meaning as recycled water as defined in subdivision (n) of Section 13050.
(Added by Stats. 1995, Ch. 28, Sec. 11.5. Effective January 1, 1996.)

DIVISION 1. GENERAL STATE POWERS OVER WATER [100. - 540.]

(Division 1 enacted by Stats. 1943, Ch. 368.)

CHAPTER 1. GENERAL STATE POLICY [100. - 113.]

(Chapter 1 enacted by Stats. 1943, Ch. 368.)

§ 100. It is hereby declared that because of the conditions prevailing in this State the general welfare requires that the water resources of the State be put to beneficial use to the fullest extent of which they are capable, and that the waste or unreasonable use or unreasonable method of use of water be prevented, and that the conservation of such water is to be exercised with a view to the reasonable and beneficial use thereof in the interest of the people and for the public welfare. The right to water or to the use or flow of water in or

from any natural stream or watercourse in this State is and shall be limited to such water as shall be reasonably required for the beneficial use to be served, and such right does not and shall not extend to the waste or unreasonable use or unreasonable method of use or unreasonable method of diversion of water.
(Enacted by Stats. 1943, Ch. 368.)

§ 100.5. It is hereby declared to be the established policy of this state that conformity of a use, method of use, or method of diversion of water with local custom shall not be solely determinative of its reasonableness, but shall be considered as one factor to be weighed in the determination of the reasonableness of the use, method of use, or method of diversion of water, within the meaning of Section 2 of Article X of the California Constitution.
(Added by Stats. 1980, Ch. 933, Sec. 1.)

§ 101. Riparian rights in a stream or watercourse attach to, but to no more than so much of the flow thereof as may be required or used consistently with this and the next preceding section, for the purposes for which such lands are, or may be made adaptable, in view of such reasonable and beneficial uses; provided, however, that nothing in this or the next preceding section shall be construed as depriving any riparian owner of the reasonable use of water of the stream to which his land is riparian under reasonable methods of diversion and use, or of depriving any appropriator of water to which he is lawfully entitled.
(Enacted by Stats. 1943, Ch. 368.)

§ 102. All water within the State is the property of the people of the State, but the right to the use of water may be acquired by appropriation in the manner provided by law.
(Enacted by Stats. 1943, Ch. 368.)

§ 103. In the enactment of this code the Legislature does not intend thereby to effect any change in the law relating to water rights.
(Enacted by Stats. 1943, Ch. 368.)

§ 104. It is hereby declared that the people of the State have a paramount interest in the use of all the water of the State and that the State shall determine what water of the State, surface and underground, can be converted to public use or controlled for public protection.
(Enacted by Stats. 1943, Ch. 368.)

§ 105. It is hereby declared that the protection of the public interest in the development of the water resources of the State is of vital concern to the people of the State and that the State shall determine in what way the water of the State, both surface and underground, should be developed for the greatest public benefit.
(Enacted by Stats. 1943, Ch. 368.)

§ 106. It is hereby declared to be the established policy of this State that the use of water for domestic purposes is the highest use of water and that the next highest use is for irrigation.
(Enacted by Stats. 1943, Ch. 368.)

§ 106.3. (a) It is hereby declared to be the established policy of the state that every human being has the right to safe, clean, affordable, and accessible water adequate for human consumption, cooking, and sanitary purposes.

(b) All relevant state agencies, including the department, the state board, and the State Department of Public Health, shall consider this state policy when revising, adopting, or establishing policies, regulations, and grant criteria when those policies, regulations, and criteria are pertinent to the uses of water described in this section.

(c) This section does not expand any obligation of the state to provide water or to require the expenditure of additional resources to develop water infrastructure beyond the obligations that may exist pursuant to subdivision (b).

(d) This section shall not apply to water supplies for new development.

(e) The implementation of this section shall not infringe on the rights or responsibilities of any public water system.
(Added by Stats. 2012, Ch. 524, Sec. 1. Effective January 1, 2013.)

§ 106.4. (a) For the purposes of this section:

(1) "Bottled water" has the same meaning as defined in Section 111070 of the Health and Safety Code.

(2) "Residential development" has the same meaning as defined in Section 65008 of the Government Code.

(3) "Retail water facility" has the same meaning as defined in Section 111070 of the Health and Safety Code.

(4) "Water-vending machine" has the same meaning as defined in Section 111070 of the Health and Safety Code.

(5) "Water hauler" has the same meaning as defined in Section 111070 of the Health and Safety Code.

(b) A city, including a charter city, or a county shall not issue a building permit for the construction of a new residential development where a source of water supply is water transported by a water hauler, bottled water, a water-vending machine, or a retail water facility.

(c) This section does not apply to a residence that will be rebuilt because of a natural disaster.

(d) The Legislature finds and declares that this section addresses a matter of statewide concern and not a municipal affair, as that term is used in Section 5 of Article XI of the California Constitution.
(Added by Stats. 2016, Ch. 843, Sec. 4. Effective January 1, 2017.)

§ 106.5. It is hereby declared to be the established policy of this State that the right of a municipality to acquire and hold rights to the use of water should be protected to the fullest extent necessary for existing and future uses, but that no municipality shall acquire or hold any right to waste water, or to use water for other than municipal purposes, or to prevent the appropriation and application of water in excess of its reasonable and existing needs to useful purposes by others subject to the rights of the municipality to apply such water to municipal uses as and when necessity therefor exists.
(Added by Stats. 1945, Ch. 1344.)

§ 106.7. (a) It is hereby declared to be the established policy of this state to support and encourage the development of environmentally compatible small hydroelectric projects as a renewable energy source, provided that the projects do not result in surface disturbances within the following sensitive areas:

(1) Any component of the California Wild and Scenic Rivers System or the National Wild and Scenic Rivers System.

(2) Any river designated for study pursuant to Section 5(a) of the National Wild and Scenic River Act (16 U.S.C. 1276(a)). This paragraph shall not apply to any river which, upon the completion of the study, is not included in the National Wild and Scenic Rivers System.

(3) Any state or federally designated wilderness area.

(4) Any areas designated as a "Critical Condor Habitat" by the United States Fish and Wildlife Service.

(b) State agencies shall not approve small hydroelectric development within the sensitive areas specified in subdivision (a).

(c) Significant adverse impacts associated with small hydroelectric projects shall be identified by those agencies responsible for the preparation of the environmental impact document.

(d) Emphasis on the development of small hydroelectric power generating facilities which are "qualifying small power production facilities" under Section 210 of the Public Utilities Regulatory Policies Act of 1978, shall be on existing dams, diversions, and canals with a sufficient drop so that power may be efficiently generated without significant environmental effects.

(e) For hydroelectric power generating facilities, the applicant shall demonstrate that project revenues will exceed project costs, including the cost of mitigation measures over the life of the project.

(f) Subdivisions (d) and (e) do not apply to projects with a nameplate capacity of less than 100 kilowatts.
(Amended by Stats. 1986, Ch. 807, Sec. 1.)

§ 107. The declaration of the policy of the State in this chapter is not exclusive, and all other or further declarations of policy in this code shall be given their full force and effect.

(Enacted by Stats. 1943, Ch. 368.)

§ 108. It is hereby declared to be the established policy of this State that in the development and completion of any general or co-ordinated plan prepared and published by the Department of Water Resources or any predecessor thereof or successor thereto, all uses, including needs of the area in which the water originates, of water shall be given consideration.

Whenever the Legislature authorizes the construction or acquisition by the State of any project which will develop water for use outside the watershed in which it originates, the Legislature shall at the same time consider the authorization and the construction or acquisition of such other works as may be necessary to develop water to satisfy such of the reasonable ultimate requirements of such watershed as may be needed at the time the export project is authorized or as will be needed within a reasonable time thereafter. The authorization with respect to such additional works may provide for state acquisition or construction, in whole or in part, of any such additional works, or financial assistance to other entities in connection with the acquisition or construction of such works, or a combination thereof.
(Added by Stats. 1959, Ch. 2063.)

§ 109. (a) The Legislature hereby finds and declares that the growing water needs of the state require the use of water in an efficient manner and that the efficient use of water requires certainty in the definition of property rights to the use of water and transferability of such rights. It is hereby declared to be the established policy of this state to facilitate the voluntary transfer of water and water rights where consistent with the public welfare of the place of export and the place of import.

(b) The Legislature hereby directs the Department of Water Resources, the State Water Resources Control Board, and all other appropriate state agencies to encourage voluntary transfers of water and water rights, including, but not limited to, providing technical assistance to persons to identify and implement water conservation measures which will make additional water available for transfer.
(Amended by Stats. 1982, Ch. 867, Sec. 1.)

* * *

§ 113. It is the policy of the state that groundwater resources be managed sustainably for long-term reliability and multiple economic, social, and environmental benefits for current and future beneficial uses. Sustainable groundwater management is best achieved locally through the development, implementation, and updating of plans and programs based on the best available science.
(Added by Stats. 2014, Ch. 346, Sec. 2. Effective January 1, 2015.)

* * *

Article 3. State Water Resources Control Board [174. - 189.5.]

(Heading of Article 3 amended by Stats. 1967, Ch. 284.)

§ 174. (a) The Legislature hereby finds and declares that in order to provide for the orderly and efficient administration of the water resources of the state, it is necessary to establish a control board that shall exercise the adjudicatory and regulatory functions of the state in the field of water resources.

(b) It is also the intention of the Legislature to combine the water rights, water quality, and drinking water functions of the state government to provide for coordinated consideration of water rights, water quality, and safe and reliable drinking water.

(c) This section shall become operative on July 1, 2014.

(Repealed (in Sec. 181) and added by Stats. 2014, Ch. 35, Sec. 182. Effective June 20, 2014. Section operative July 1, 2014, by its own provisions.)

§ 175. (a) There is in the California Environmental Protection Agency the State Water Resources Control Board consisting of five members appointed by the Governor. One of the members appointed shall be an attorney admitted to practice law in this state who is qualified in the fields of water supply and water rights, one shall be a registered civil engineer under the laws of this state who is qualified in the fields of water supply and water rights, one shall be a registered professional engineer under the laws of this state who is experienced in sanitary engineering and who is qualified in the field of water quality, and one shall be qualified in the field of water quality. One of the above-appointed persons, in addition to having the specified qualifications, shall be qualified in the field of water supply and water quality relating to irrigated agriculture. One member shall not be required to have specialized experience.

(b) Each member shall represent the state at large and not any particular portion thereof and shall serve full time. The board shall, to the extent possible, be composed of members from different regions of the state. The appointments made by the Governor shall be subject to confirmation by the Senate in accordance with Article 2 (commencing with Section 1770) of Chapter 4 of Division 4 of Title 1 of the Government Code.

(Amended by Stats. 2010, Ch. 288, Sec. 2. Effective January 1, 2011.)

§ 175.5. (a) A member of the board shall not participate in any board action pursuant to Article 2 (commencing with Section 13320) of Chapter 5 of Division 7 in which the board member has a disqualifying financial interest in the decision within the meaning of Section 87103 of the Government Code.

(b) A board member shall not participate in any proceeding before any regional board as a consultant or in any other capacity on behalf of any waste discharger.

(c) Upon the request of any person, or on the Attorney General's own initiative, the Attorney General may file a complaint in the superior court for the county in which the board has its principal office alleging that a board member has knowingly violated this section and the facts upon which the allegation is based and asking that the member be removed from office. Further proceedings shall be in accordance as near as may be with rules governing civil actions. If after trial the court finds that the board member has knowingly violated this section it shall pronounce judgment that the member be removed from office.
(Amended by Stats. 2012, Ch. 39, Sec. 115. Effective June 27, 2012.)

§ 176. The annual salary of the members of the board is provided for by Chapter 6 (commencing at Section 11550) of Part 1 of Division 3 of Title 2 of the Government Code. Each member of the board shall receive the necessary traveling and other expenses incurred by him in the performance of his official duties out of appropriations made for the support of the board. When necessary the members of the board may travel within or without the State.
(Added by renumbering Section 186 by Stats. 1957, Ch. 1932.)

§ 177. All members of the board shall be appointed for terms of four years. Vacancies shall be immediately filled by the Governor for the unexpired portion of the terms in which they occur.
(Amended by Stats. 1983, Ch. 40, Sec. 2. Effective May 26, 1983.)

§ 178. The members of the board may be removed from office by the Legislature, by concurrent resolution adopted by a majority vote of all members elected to each house, for dereliction of duty or corruption or incompetency.
(Added by renumbering Section 188 by Stats. 1957, Ch. 1932.)

§ 179. The board succeeds to and is vested with all of the powers, duties, purposes, responsibilities, and jurisdiction vested in the Department and Director of Public Works, the Division of Water Resources of the Department of Public Works, the State Engineer, the State Water Quality Control Board, or any officer or employee thereof, under Division 2 (commencing with Section 1000), except Part 4 (commencing with Section 4000) and Part 6 (commencing with Section 5900) thereof; and Division 7 (commencing with Section 13000) of this code, or any other law under which permits or licenses to appropriate water are issued, denied, or revoked or under which the functions of water pollution and quality control are exercised.
(Amended by Stats. 1967, Ch. 284.)

§ 179.6. The board, or representatives authorized by the board to do so, may call, conduct or attend conferences or hearings, official or unofficial, within or without this state, or otherwise participate in such conferences or hearings with interested persons, agencies or officers, of this or any other state, or with the Congress of the United States, congressional committees, or officers of the

federal government, concerning any matter within the scope of the power and duties of the board.
(Added by Stats. 1967, Ch. 284.)

§ 179.7. As to any matter involving the United States, its departments or agencies, which is within the scope of the power and duties of the board, the board may represent the interest of the state or any county, city, state agency or public district upon their request, and to that end may correspond, confer and cooperate with the United States, its departments or agencies, and where necessary the board members, or authorized representatives, may travel either within or without the state.
(Added by Stats. 1967, Ch. 284.)

§ 181. The board shall maintain its headquarters at Sacramento and may establish branch offices in such parts of the state as the board deems necessary. The board shall hold meetings at such times and at such places as shall be determined by it. The Governor shall designate the time and place for the first meeting of the board. Three members of the board shall constitute a quorum for the purpose of transacting any business of the board.
(Amended by Stats. 1967, Ch. 1656.)

§ 182. The Governor shall designate the chairperson of the board from the membership of the board. The person so designated shall hold the office of chairperson at the pleasure of the Governor. The board shall elect a vice chairperson.
(Amended by Stats. 2010, Ch. 288, Sec. 3. Effective January 1, 2011.)

§ 183. The board may hold any hearings and conduct any investigations in any part of the state necessary to carry out the powers vested in it, and for such purposes has the powers conferred upon heads of departments of the state by Article 2 (commencing with Section 11180), Chapter 2, Part 1, Division 3, Title 2 of the Government Code.

Any hearing or investigation by the board may be conducted by any member upon authorization of the board, and he shall have the powers granted to the board by this section, but any final action of the board shall be taken by a majority of all the members of the board, at a meeting duly called and held.

All hearings held by the board or by any member thereof shall be open and public
(Amended by Stats. 1971, Ch. 1288.)

§ 184. The Department of Water Resources shall have an interest and may appear as a party in any hearing held by the board and may commence or appear in any judicial proceeding brought to inquire into the validity of any action, order, or decision of the board.
(Added by renumbering Section 194 by Stats. 1957, Ch. 1932.)

§ 185. The board shall adopt rules for the conduct of its affairs in conformity, as nearly as practicable, with the provisions of Chapter 3.5 (commencing with Section 11340) of Part 1 of Division 3 of Title 2 of the Government Code.
(Amended by Stats. 1982, Ch. 454, Sec. 184.)

§ 186. (a) The board shall have any powers, and may employ any legal counsel and other personnel and assistance, that may be necessary or convenient for the exercise of its duties authorized by law.

(b) For the purpose of administration, the board shall organize itself, with the approval of the Governor, in the manner it deems necessary properly to segregate and conduct the work of the board. The work of the board shall be divided into at least two divisions, known as the Division of Water Rights and the Division of Water Quality. The board shall appoint a deputy director or division chief for each division, who shall supervise the work of the division and act as technical adviser to the board on functions under his or her jurisdiction.

(c) The Attorney General shall represent the board, or any affected regional water quality control board, or both the board and the regional board, and the state in litigation concerning affairs of the board, or a regional board, or both, unless the Attorney General represents another state agency that is a party to the action. In that case, the Attorney General may represent the board, the regional board, or both, with the written consent of the board and the other state agency, the board may contract for the services of private counsel to represent the board, the regional board, or both, subject to Section 11040 of the Government Code, or the legal counsel of the board may represent the board, the regional board, or both. Sections 11041, 11042, and 11043 of the Government Code are not applicable to the board. The legal counsel of the board shall advise and furnish legal services, except representation in litigation, to the regional boards upon their request.
(Amended by Stats. 2010, Ch. 288, Sec. 4. Effective January 1, 2011.)

§ 187. The board, regional water quality control boards, the Department of Water Resources, and other state agencies shall, to the fullest extent possible, exchange records, reports, material, and any other information relating to water, water rights, water pollution or quality, or any areas of mutual concern, to the end that unnecessary duplication of effort may be avoided.
(Amended by Stats. 1967, Ch. 284.)

§ 188. The board may expend money appropriated for the administration of the laws the administration of which is committed to the board.

Such expenditures by the board shall be made in accordance with law in carrying on the work for which the appropriations were made.
(Added by Stats. 1957, Ch. 1932.)

§ 188.5. The board shall publish biennial progress reports relating to the activities of the board and California regional water quality control boards.
(Amended by Stats. 1969, Ch. 482.)

§ 189. (a) There is hereby established the Office of Sustainable Water Solutions within the state board, which may be administered by the state board as a separate organizational unit or within the state board's divisions or offices.

(b) The purpose of the office is to promote permanent and sustainable drinking water and wastewater treatment solutions to ensure the effective and efficient provision of safe, clean, affordable, and reliable drinking water and wastewater treatment services. In furtherance of this purpose, the office may take, but is not limited to, all of the following actions:

(1) Coordinating with and providing assistance to small drinking water systems, wastewater treatment systems, and disadvantaged communities without drinking water or wastewater treatment systems.

(2) Promoting and facilitating regional drinking water and wastewater projects.

(3) Promoting and facilitating regional solutions, including consolidation of existing water districts, expansion of existing water districts to serve communities unserved by public water systems and wastewater treatment systems, and extension of services to underserved communities and disadvantaged communities.

(4) Advancing the delivery of affordable, safe drinking water to disadvantaged communities throughout the state.

(5) Providing technical assistance to disadvantaged communities and small drinking water systems and wastewater systems, including grant application assistance, outreach and education in vulnerable communities, financial management support, and facilitation of discussions within and between communities.
(Added by Stats. 2015, Ch. 2, Sec. 6. Effective March 27, 2015.)

§ 189.5. (a) This section shall be known, and may be cited, as the Low-Income Water Rate Assistance Act.

(b) No later than January 1, 2018, the board, in collaboration with the State Board of Equalization and relevant stakeholders, shall develop a plan for the funding and implementation of the Low-Income Water Rate Assistance Program, which shall include all of the following elements:

(1) A description of the method for collecting moneys to support and implement the program, including a discussion of any constitutional restrictions on public water agency ratesetting.

(2) A description of the mechanism for providing funding assistance under the program through either direct credits to enrollees in the program or reimbursements to water service providers, including a method for verifying

income eligibility of low-income ratepayers, clarification of the role of the Public Utilities Commission and water utilities in determining and verifying customer eligibility, and recommendations regarding the structure of the program, particularly whether it will be administered by the state or locally administered.

(3) A description of the method to be used to determine the amount of moneys that may need to be collected from water ratepayers to fund the program. The plan shall include a set of recommendations and best practices of cost-savings measures to ensure water utilities are demonstrating whether and how they are keeping rates low. This section does not authorize the imposition of a state charge to fund the program.

(c) In developing the plan required in subdivision (b), the board may consider the existing rate assistance programs authorized by the Public Utilities Commission for investor-owned water utilities pursuant to Section 739.8 of the Public Utilities Code.

(d) The plan may also include recommendations for other cost-effective methods of offering assistance to low-income water customers besides rate assistance, including billing alternatives, installation of water conservation devices, and leak repair. In considering other methods, the board may consider the Public Utilities Commission's "Assessment of Water Utility Low-Income Assistance Programs."

(e) (1) No later than February 1, 2018, the board shall report to the Legislature on its findings regarding the feasibility, financial stability, and desired structure of the program, including any recommendations for legislative action that may need to be taken.

(2) The requirement for submitting a report imposed under this subdivision is inoperative on February 1, 2022, pursuant to Section 10231.5 of the Government Code.

(3) A report to be submitted pursuant to this subdivision shall be submitted in compliance with Section 9795 of the Government Code.

(f) For purposes of this section, the following terms have the following meanings:

(1) "Board" means the State Water Resources Control Board.

(2) "Low-income" means a household with income that is equal to or no greater than 200 percent of the federal poverty guideline level. For one-person households, program eligibility shall be based on two-person household guideline levels.

(3) "Program" means the Low-Income Water Rate Assistance Program.

(Added by Stats. 2015, Ch. 662, Sec. 1. Effective January 1, 2016.)

* * *

CHAPTER 2.5. MISCELLANEOUS POWERS OF DEPARTMENT [205. - 347.]

(Heading of Chapter 2.5 added by Stats. 1956, 1st Ex. Sess., Ch. 52.)

* * *

Article 3. Proceedings to Prevent Waste or Unreasonable Use [275. - 275.]

(Article 3 enacted by Stats. 1943, Ch. 368.)

§ 275. The department and board shall take all appropriate proceedings or actions before executive, legislative, or judicial agencies to prevent waste, unreasonable use, unreasonable method of use, or unreasonable method of diversion of water in this state.
(Amended by Stats. 1971, Ch. 794.)

* * *

DIVISION 2. WATER [1000. - 5976.]

(Division 2 enacted by Stats. 1943, Ch. 368.)

PART 1. GENERAL PROVISIONS [1000. - 1126.2.]

(Part 1 enacted by Stats. 1943, Ch. 368.)

* * *

CHAPTER 2. ADMINISTRATIVE PROVISIONS GENERALLY [1050. - 1060.]

(Chapter 2 enacted by Stats. 1943, Ch. 368.)

§ 1050. This division is hereby declared to be in furtherance of the policy contained in Section 2 of Article X of the California Constitution and in all respects for the welfare and benefit of the people of the state, for the improvement of their prosperity and their living conditions, and the board and the department shall be regarded as performing a governmental function in carrying out the provisions of this division.
(Amended by Stats. 1979, Ch. 373.)

§ 1051. The board for the purpose of this division may:

(a) Investigate all streams, stream systems, portions of stream systems, lakes, or other bodies of water.

(b) Take testimony in regard to the rights to water or the use of water thereon or therein.

(c) Ascertain whether or not water heretofore filed upon or attempted to be appropriated is appropriated under the laws of this State.
(Amended by Stats. 1957, Ch. 1932.)

§ 1051.5. In furtherance of its powers and duties under Parts 2 (commencing with Section 1200) and 3 (commencing with Section 2000) of this division, the

board may supervise trial distribution of water in accordance with agreements and court orders therefor.
(Amended by Stats. 1967, Ch. 284.)

§ 1052. (a) The diversion or use of water subject to this division other than as authorized in this division is a trespass.

(b) The Attorney General, upon request of the board, shall institute in the superior court in and for any county where the diversion or use is threatened, is occurring, or has occurred an action for the issuance of injunctive relief as may be warranted by way of temporary restraining order, preliminary injunction, or permanent injunction.

(c) Any person or entity committing a trespass as defined in this section may be liable in an amount not to exceed the following:

(1) If the unauthorized diversion or use occurs in a critically dry year immediately preceded by two or more consecutive below normal, dry, or critically dry years or during a period for which the Governor has issued a proclamation of a state of emergency under the California Emergency Services Act (Chapter 7 (commencing with Section 8550) of Division 1 of Title 2 of the Government Code) based on drought conditions, the sum of the following:

(A) One thousand dollars ($1,000) for each day in which the trespass occurs.

(B) Two thousand five hundred dollars ($2,500) for each acre-foot of water diverted or used in excess of that diverter's water rights.

(2) If the unauthorized diversion or use is not described by paragraph (1), five hundred dollars ($500) for each day in which the unauthorized diversion or use occurs.

(d) Civil liability for a violation of this section may be imposed by the superior court or the board as follows:

(1) The superior court may impose civil liability in an action brought by the Attorney General, upon request of the board, to impose, assess, and recover any sums pursuant to subdivision (c). In determining the appropriate amount, the court shall take into consideration all relevant circumstances, including, but not limited to, the extent of harm caused by the violation, the nature and persistence of the violation, the length of time over which the violation occurs, and the corrective action, if any, taken by the violator.

(2) The board may impose civil liability in accordance with Section 1055.

(e) All funds recovered pursuant to this section shall be deposited in the Water Rights Fund established pursuant to Section 1550.

(f) The remedies prescribed in this section are cumulative and not alternative.
(Amended by Stats. 2014, Ch. 3, Sec. 9. Effective March 1, 2014.)

§ 1053. A full and accurate record of business or acts performed or of testimony taken by the board and the department in pursuance of the provisions of this division shall be kept and be placed on file in the office of the board or the department, as the case may be.
(Amended by Stats. 1957, Ch. 1932.)

§ 1054. The board and the department may certify to all of their official acts and may certify copies of all official documents and orders filed in their respective offices. For the purpose of making such certifications, the board and the department may adopt seals.
(Amended by Stats. 1957, Ch. 947.)

§ 1055. (a) The executive director of the board may issue a complaint to any person or entity on which administrative civil liability may be imposed pursuant to Section 1052, Article 4 (commencing with Section 1845) of Chapter 12 of Part 2 of Division 2, or Section 5107. The complaint shall allege the act or failure to act that constitutes a trespass or violation, the provision of law authorizing civil liability to be imposed, and the proposed civil liability.

(b) The complaint shall be served by personal notice or certified mail. The complaint shall inform the party served that the party may request a hearing not later than 20 days from the date the party was served and that the board may adopt an order setting administrative civil liability based on the allegations set forth in the complaint without a hearing if the party does not sign a written request for a hearing that is delivered to, or received by mail by, the board within 20 days after the date the party was served. The hearing shall be before the board or a member of the board, in accordance with Section 183.

(c) The board, after any necessary hearing, may adopt an order setting administrative civil liability, or determining that a liability shall not be imposed.

(d) Orders setting administrative civil liability shall become effective and final upon issuance thereof and payment shall be made.
(Amended by Stats. 2015, Ch. 683, Sec. 43. Effective January 1, 2016.)

§ 1055.2. A person or entity shall not be subject to both civil liability imposed under Section 1055 and civil liability imposed by the superior court under Section 1052 or Article 4 (commencing with Section 1845) of Chapter 12 of Part 2 of Division 2 for the same act or failure to act.
(Amended by Stats. 2010, Ch. 288, Sec. 6. Effective January 1, 2011.)

§ 1055.3. In determining the amount of civil liability, the board shall take into consideration all relevant circumstances, including, but not limited to, the extent of harm caused by the violation, the nature and persistence of the violation, the length of time over which the violation occurs, and the corrective action, if any, taken by the violator.
(Added by Stats. 1987, Ch. 756, Sec. 5.)

§ 1055.4. After the time for review under Chapter 4 (commencing with Section 1120) has expired, the board may apply to the clerk of the appropriate court for a judgment to collect the administrative civil liability imposed in accordance with Section 1055. The application, which shall include a certified copy of the board action, constitutes a sufficient showing to warrant issuance of the judgment. The court clerk shall enter the judgment immediately in conformity with the application. The judgment so entered has the same force and effect as, and is subject to all the provisions of law relating to, a judgment in a civil action, and may be enforced in the same manner as any other judgment of the court in which it is entered.
(Added by Stats. 1997, Ch. 323, Sec. 1. Effective January 1, 1998.)

§ 1056. The board and the department may fix reasonable charges for publications issued under their respective authorities.
(Amended by Stats. 1957, Ch. 1932.)

§ 1057. All fees charged and collected under this chapter shall be paid, at least once each month, accompanied by a detailed statement thereof, into the State Treasury.
(Amended by Stats. 1963, Ch. 330.)

§ 1058. The board may make such reasonable rules and regulations as it may from time to time deem advisable in carrying out its powers and duties under this code.
(Amended by Stats. 1969, Ch. 482.)

§ 1058.5. (a) This section applies to any emergency regulation adopted by the board for which the board makes both of the following findings:

(1) The emergency regulation is adopted to prevent the waste, unreasonable use, unreasonable method of use, or unreasonable method of diversion, of water, to promote water recycling or water conservation, to require curtailment of diversions when water is not available under the diverter's priority of right, or in furtherance of any of the foregoing, to require reporting of diversion or use or the preparation of monitoring reports.

(2) The emergency regulation is adopted in response to conditions which exist, or are threatened, in a critically dry year immediately preceded by two or more consecutive below normal, dry, or critically dry years or during a period for which the Governor has issued a proclamation of a state of emergency under the California Emergency Services Act (Chapter 7 (commencing with Section 8550) of Division 1 of Title 2 of the Government Code) based on drought conditions.

(b) Notwithstanding Sections 11346.1 and 11349.6 of the Government Code, any findings of emergency adopted by the board, in connection with the

adoption of an emergency regulation under this section, are not subject to review by the Office of Administrative Law.

(c) An emergency regulation adopted by the board under this section may remain in effect for up to 270 days, as determined by the board, and is deemed repealed immediately upon a finding by the board that due to changed conditions it is no longer necessary for the regulation to remain in effect. An emergency regulation adopted by the board under this section may be renewed if the board determines that the conditions specified in paragraph (2) of subdivision (a) are still in effect.

(d) In addition to any other applicable civil or criminal penalties, any person or entity who violates a regulation adopted by the board pursuant to this section is guilty of an infraction punishable by a fine of up to five hundred dollars ($500) for each day in which the violation occurs.

(e) (1) Notwithstanding subdivision (b) of Section 1551 or subdivision (e) of Section 1848, a civil liability imposed under Chapter 12 (commencing with Section 1825) of Part 2 of Division 2 by the board or a court for a violation of an emergency conservation regulation adopted pursuant to this section shall be deposited, and separately accounted for, in the Water Rights Fund. Funds deposited in accordance with this subdivision shall be available, upon appropriation, for water conservation activities and programs.

(2) For purposes of this subdivision, an "emergency conservation regulation" means an emergency regulation that requires an end user of water, a water retailer, or a water wholesaler to conserve water or report to the board on water conservation. Water conservation includes restrictions or limitations on particular uses of water or a reduction in the amount of water used or served, but does not include curtailment of diversions when water is not available under the diverter's priority of right or reporting requirements related to curtailments.

(Amended by Stats. 2016, Ch. 32, Sec. 93. Effective June 27, 2016.)

§ 1059. The board and the department, as to matters under each of their respective jurisdictions, may designate one or more of their employees who shall have authority to certify under their respective seals all copies of orders, applications, permits, licenses, certificates, and other records under this division, and to attest all records, transcripts, evidence, and other original documents which it is necessary so to authenticate.

(Amended by Stats. 1957, Ch. 1932.)

§ 1060. (a) All fees collected by the State Water Resources Control Board or by a California regional water quality control board, and deposited in the State Treasury, except funds collected under Part 3 (commencing with Section 2000) of this division, funds received for trial distribution expenses in connection with the administration of Section 1051.5, and deposits and payments made

pursuant to Section 5007, shall be credited to the appropriation for the support of the board which is current at the time of the deposit of such fees in the State Treasury.

(b) Money deposited with or paid to the board pursuant to Section 1051.5 or 5007 and deposited by the board in the State Treasury is available for expenditure by the board in accordance with those sections without regard to fiscal years and irrespective of the provisions of Section 16304 of the Government Code, and any unused balance shall be refunded by the board to the person entitled thereto.
(Amended by Stats. 1971, Ch. 1288.)

CHAPTER 3. WITNESSES AND PRODUCTION OF EVIDENCE [1075. - 1106.]

(Chapter 3 enacted by Stats. 1943, Ch. 368.)

Article 1. Definitions [1075. - 1076.]

(Article 1 enacted by Stats. 1943, Ch. 368.)

§ 1075. As used in this chapter, "proceeding" means any inquiry, investigation, hearing, ascertainment, or other proceeding ordered or undertaken by the board pursuant to this code.
(Amended by Stats. 1969, Ch. 482.)

§ 1076. As used in this chapter, "evidence" means any paper, book, map, account, or document.
(Enacted by Stats. 1943, Ch. 368.)

Article 2. Attendance and Fees [1080. - 1086.]

(Article 2 enacted by Stats. 1943, Ch. 368.)

§ 1080. The board may administer oaths and issue subpenas for the attendance and giving of testimony by witnesses and for the production of evidence in any proceeding in any part of the State.
(Amended by Stats. 1957, Ch. 1932.)

§ 1081. Each witness who appears by order of the board shall receive for his attendance the same fees and mileage allowed by law to witnesses in civil cases, which shall be paid by the party at whose request the witness is subpenaed.
(Amended by Stats. 1957, Ch. 1932.)

§ 1082. When any witness who has not been required to attend at the request of any party is subpenaed by the board his fees and mileage shall be paid from the funds appropriated for the use of the board and available for the purpose.
(Amended by Stats. 1957, Ch. 1932.)

§ 1083. Any witness subpenaed, except one whose fees and mileage are payable from the funds of the board, may, at the time of service, demand the

fees to which he is entitled for travel to and from the place at which he is required to appear and one day's attendance.
(Amended by Stats. 1957, Ch. 1932.)

§ 1084. If the witness demands the fees to which he is entitled at the time of service and they are not at that time paid or tendered he shall not be required to attend as directed in the subpena.
(Enacted by Stats. 1943, Ch. 368.)

§ 1085. All fees and mileage to which any witness is entitled under the provisions of this chapter may be collected by action therefor instituted by the person to whom they are payable.
(Enacted by Stats. 1943, Ch. 368.)

§ 1086. No witness shall be compelled to attend as a witness before the board under this division out of the county in which he resides, unless the distance is less than 150 miles from his place of residence to the place of hearing, except that the board, upon affidavit of any party showing that the testimony of such witness is material and necessary, may indorse on the subpoena an order requiring the attendance of such witness.
(Amended by Stats. 1959, Ch. 667.)

Article 3. Compelling Attendance [1090. - 1097.]

(Article 3 enacted by Stats. 1943, Ch. 368.)

§ 1090. The superior court of the county in which any proceeding is held by the board may compel the attendance and giving of testimony by witnesses and the production of evidence as required by any subpena issued by the board.
(Amended by Stats. 1957, Ch. 1932.)

§ 1091. In case of the refusal of any witness to attend or testify or produce any evidence required by a subpena issued by it, the board may report by petition to the superior court in and for the county in which the proceeding is pending.
(Amended by Stats. 1957, Ch. 1932.)

§ 1092. The petition shall set forth the following:

(a) That due notice has been given of the time and place of attendance of the witness or for the production of evidence and that the witness has been summoned in the manner prescribed in this chapter.

(b) That the witness has failed and refused to attend or produce the evidence required by the subpena before the board in the proceeding named in the notice and subpena, or has refused to answer questions propounded to him in the course of the proceeding.
(Amended by Stats. 1957, Ch. 1932.)

§ 1093. The petition shall ask an order of court compelling the witness to attend, testify, and produce the evidence before the board.
(Amended by Stats. 1957, Ch. 1932.)

§ 1094. The court, upon the petition of the board, shall enter an order directing the witness to appear before the court at a time and place fixed by the court in the order and not more than 10 days from the date of the order, and then and there show cause, if any he have, why he refused to obey the subpena, or refused to answer questions propounded to him by the board, or neglected, failed, or refused to produce before the board the evidence called for in the subpena.
(Amended by Stats. 1957, Ch. 1932.)

§ 1095. A copy of the order and of the petition shall be served upon the witness.
(Enacted by Stats. 1943, Ch. 368.)

§ 1096. If it appears to the court that the subpena was regularly issued, the court shall thereupon enter an order that the witness appear before the board at the time and place fixed in the order and testify or produce the required evidence or both testify and produce.
(Amended by Stats. 1957, Ch. 1932.)

§ 1097. Upon failure to obey the order the witness shall be dealt with as for contempt of court.
(Enacted by Stats. 1943, Ch. 368.)

Article 4. Depositions [1100. - 1100.]

(Article 4 enacted by Stats. 1943, Ch. 368.)

§ 1100. The board or any party to a proceeding before it may, in any investigation or hearing, cause the deposition of witnesses residing within or without the state to be taken in the manner prescribed by law for depositions in civil actions in the superior courts of this state under Title 4 (commencing with Section 2016.010) of Part 4 of the Code of Civil Procedure.
(Amended by Stats. 2004, Ch. 182, Sec. 60. Effective January 1, 2005. Operative July 1, 2005, by Sec. 64 of Ch. 182.)

Article 5. Immunity [1105. - 1106.]

(Article 5 enacted by Stats. 1943, Ch. 368.)

§ 1105. (a) Except as provided in subdivision (c), no person shall be excused from testifying or from producing any evidence in any investigation or inquiry by or hearing before the board upon the ground that the testimony or evidence required of him or her may tend to incriminate him or her or subject him or her to any penalty.

(b) The board may grant immunity to any person who is compelled to testify or to produce documentary evidence before the board and who invokes the privilege against self-incrimination.

(c) If the board does not grant immunity after a person invokes the privilege against self-incrimination, the board shall excuse the person from giving any testimony or producing any evidence to which the privilege against self-incrimination applies, and the board shall dismiss, continue, or limit the scope of the proceedings as necessary to ensure that the unavailability of the testimony or evidence does not deny due process of law to any party.
(Amended by Stats. 1994, Ch. 45, Sec. 1. Effective January 1, 1995.)

§ 1106. No person who is granted immunity under subdivision (b) of Section 1105 shall be criminally prosecuted or be subjected to any criminal penalty for or on account of any act, transaction, matter, or thing material to the matter under investigation by the board concerning which he or she has been compelled as a witness to testify or to produce documentary evidence pursuant to the granting of immunity; but no person so testifying or producing shall be exempt from prosecution and punishment for any perjury committed by him or her in that testimony.
(Amended by Stats. 1994, Ch. 45, Sec. 2. Effective January 1, 1995.)

CHAPTER 4. RECONSIDERATION, AMENDMENT, AND JUDICIAL REVIEW OF WATER RIGHT DECISIONS AND ORDERS [1120. - 1126.2.]

(Chapter 4 added by Stats. 1996, Ch. 659, Sec. 2.)

Article 1. General Provisions [1120. - 1121.]

(Article 1 added by Stats. 1996, Ch. 659, Sec. 2.)

§ 1120. This chapter applies to any decision or order issued under this part or Section 275, Part 2 (commencing with Section 1200), Part 2 (commencing with Section 10500) of Division 6, Chapter 11 (commencing with Section 10735) of Part 2.74 of Division 6, Article 7 (commencing with Section 13550) of Chapter 7 of Division 7, or the public trust doctrine.
(Amended by Stats. 2014, Ch. 347, Sec. 6. Effective January 1, 2015.)

§ 1121. The board shall serve a copy of a decision or order on the parties by personal delivery or registered mail.
(Added by Stats. 1996, Ch. 659, Sec. 2. Effective January 1, 1997.)

Article 2. Reconsideration and Amendment of Decisions and Orders [1122. - 1124.]

(Article 2 added by Stats. 1996, Ch. 659, Sec. 2.)

§ 1122. The board may order a reconsideration of all or part of a decision or order on the board's own motion or on the filing of a petition of any interested

person or entity. The petition shall be filed not later than 30 days from the date the board adopts a decision or order. The authority of the board to order a reconsideration on its own motion shall expire 30 days after it has adopted a decision or order. The board shall order or deny reconsideration on a petition therefor not later than 90 days from the date the board adopts the decision or order.
(Amended by Stats. 2001, Ch. 315, Sec. 3. Effective January 1, 2002.)

§ 1123. The decision or order may be reconsidered by the board on all the pertinent parts of the record and such argument as may be permitted, or a further hearing may be held, upon notice to all interested persons, for the purpose of receiving such additional evidence as the board may, for cause, allow. The decision or order on reconsideration shall have the same force and effect as an original order or decision.
(Added by Stats. 1996, Ch. 659, Sec. 2. Effective January 1, 1997.)

§ 1124. The board at any time may amend or modify a decision or order to correct any obvious typographical or clerical error or oversight without the necessity of notice and a hearing thereon.
(Added by Stats. 1996, Ch. 659, Sec. 2. Effective January 1, 1997.)

Article 3. Review by Court of Decisions and Orders [1126. - 1126.]

(Article 3 added by Stats. 1996, Ch. 659, Sec. 2.)

§ 1126. (a) It is the intent of the Legislature that all issues relating to state water law decided by the board be reviewed in state courts, if a party seeks judicial review. It is further the intent of the Legislature that the courts assert jurisdiction and exercise discretion to fashion appropriate remedies pursuant to Section 389 of the Code of Civil Procedure to facilitate the resolution of state water rights issues in state courts.

(b) Any party aggrieved by any decision or order may, not later than 30 days from the date of final action by the board, file a petition for a writ of mandate for review of the decision or order. Except in cases where the decision or order is issued under authority delegated to an officer or employee of the board, reconsideration before the board is not an administrative remedy that is required to be exhausted before filing a petition for writ of mandate. The time for filing the petition for writ of mandate and the time for filing an action or proceeding in which the board is a respondent under Section 21167 of the Public Resources Code shall be extended for any person who seeks reconsideration by the board pursuant to this article. The amendment of this subdivision made during the 2001 portion of the 2001–02 Regular Session does not constitute a change in, but is declaratory of, existing law.

(c) Section 1094.5 of the Code of Civil Procedure shall govern judicial proceedings under this section. For the purposes of subdivision (c) of Section

1094.5 of the Code of Civil Procedure, the court shall exercise its independent judgment on the evidence in any case involving the judicial review of a cease and desist order issued pursuant to Article 2 (commencing with Section 1831) of Chapter 12 of Part 2 of Division 2, and in any other case in which the court is authorized by law to exercise its independent judgment on the evidence.

(d) If no aggrieved party petitions for a writ of mandate within the time provided by this section, the decision or order of the board is not subject to review by any court.

(e) In any court case reviewing a decision or order by the board relating to a permit or license to appropriate water held by the state through the department or any other state agency, or to a permit or license to appropriate water held by the United States through the Bureau of Reclamation or any other federal agency, the election by the United States, or any agency thereof, not to be a party shall not, in and of itself, be the basis for dismissal pursuant to Section 389 of the Code of Civil Procedure or any other provision of law.
(Amended by Stats. 2011, Ch. 296, Sec. 312. Effective January 1, 2012.)

* * *

DIVISION 7. WATER QUALITY [13000. - 16104.]

(Division 7 repealed and added by Stats. 1969, Ch. 482.)

CHAPTER 1. POLICY [13000. - 13002.]

(Chapter 1 added by Stats. 1969, Ch. 482.)

§ 13000. *[Legislative findings]*

The Legislature finds and declares that the people of the state have a primary interest in the conservation, control, and utilization of the water resources of the state, and that the quality of all the waters of the state shall be protected for use and enjoyment by the people of the state.

The Legislature further finds and declares that activities and factors which may affect the quality of the waters of the state shall be regulated to attain the highest water quality which is reasonable, considering all demands being made and to be made on those waters and the total values involved, beneficial and detrimental, economic and social, tangible and intangible.

The Legislature further finds and declares that the health, safety and welfare of the people of the state requires that there be a statewide program for the control of the quality of all the waters of the state; that the state must be prepared to exercise its full power and jurisdiction to protect the quality of waters in the state from degradation originating inside or outside the boundaries of the state; that the waters of the state are increasingly influenced by interbasin water development projects and other statewide considerations; that factors of precipitation, topography, population, recreation, agriculture, industry and economic development vary from region to region within the state;

and that the statewide program for water quality control can be most effectively administered regionally, within a framework of statewide coordination and policy.
(Repealed and added by Stats. 1969, Ch. 482.)

§ 13001. *[Legislative intent]*

It is the intent of the Legislature that the state board and each regional board shall be the principal state agencies with primary responsibility for the coordination and control of water quality. The state board and regional boards in exercising any power granted in this division shall conform to and implement the policies of this chapter and shall, at all times, coordinate their respective activities so as to achieve a unified and effective water quality control program in this state.
(Repealed and added by Stats. 1969, Ch. 482.)

§ 13002. *[Non-limiting clauses]*

No provision of this division or any ruling of the state board or a regional board is a limitation:

(a) On the power of a city or county or city and county to adopt and enforce additional regulations, not in conflict therewith, imposing further conditions, restrictions, or limitations with respect to the disposal of waste or any other activity which might degrade the quality of the waters of the state.

(b) On the power of any city or county or city and county to declare, prohibit, and abate nuisances.

(c) On the power of the Attorney General, at the request of a regional board, the state board, or upon his own motion, to bring an action in the name of the people of the State of California to enjoin any pollution or nuisance.

(d) On the power of a state agency in the enforcement or administration of any provision of law which it is specifically permitted or required to enforce or administer.

(e) On the right of any person to maintain at any time any appropriate action for relief against any private nuisance as defined in the Civil Code or for relief against any contamination or pollution.
(Repealed and added by Stats. 1969, Ch. 482.)

CHAPTER 1.5. SHORT TITLE [13020. - 13020.]

(Chapter 1.5 added by Stats. 1969, Ch. 482.)

§ 13020. *[Short Title]*

This division shall be known and may be cited as the Porter-Cologne Water Quality Control Act.
(Repealed and added by Stats. 1969, Ch. 482.)

CHAPTER 2. DEFINITIONS [13050. - 13051.]

(Chapter 2 added by Stats. 1969, Ch. 482.)

§ 13050. *[Definitions]*

As used in this division:

(a) "State board" means the State Water Resources Control Board.

(b) "Regional board" means any California regional water quality control board for a region as specified in Section 13200.

(c) "Person" includes any city, county, district, the state, and the United States, to the extent authorized by federal law.

(d) "Waste" includes sewage and any and all other waste substances, liquid, solid, gaseous, or radioactive, associated with human habitation, or of human or animal origin, or from any producing, manufacturing, or processing operation, including waste placed within containers of whatever nature prior to, and for purposes of, disposal.

(e) "Waters of the state" means any surface water or groundwater, including saline waters, within the boundaries of the state.

(f) "Beneficial uses" of the waters of the state that may be protected against quality degradation include, but are not limited to, domestic, municipal, agricultural and industrial supply; power generation; recreation; aesthetic enjoyment; navigation; and preservation and enhancement of fish, wildlife, and other aquatic resources or preserves.

(g) "Quality of the water" refers to chemical, physical, biological, bacteriological, radiological, and other properties and characteristics of water which affect its use.

(h) "Water quality objectives" means the limits or levels of water quality constituents or characteristics which are established for the reasonable protection of beneficial uses of water or the prevention of nuisance within a specific area.

(i) "Water quality control" means the regulation of any activity or factor which may affect the quality of the waters of the state and includes the prevention and correction of water pollution and nuisance.

(j) "Water quality control plan" consists of a designation or establishment for the waters within a specified area of all of the following:

(1) Beneficial uses to be protected.

(2) Water quality objectives.

(3) A program of implementation needed for achieving water quality objectives.

(k) "Contamination" means an impairment of the quality of the waters of the state by waste to a degree which creates a hazard to the public health through poisoning or through the spread of disease. "Contamination" includes

any equivalent effect resulting from the disposal of waste, whether or not waters of the state are affected.

(*l*) (1) "Pollution" means an alteration of the quality of the waters of the state by waste to a degree which unreasonably affects either of the following:

(A) The waters for beneficial uses.

(B) Facilities which serve these beneficial uses.

(2) "Pollution" may include "contamination."

(m) "Nuisance" means anything which meets all of the following requirements:

(1) Is injurious to health, or is indecent or offensive to the senses, or an obstruction to the free use of property, so as to interfere with the comfortable enjoyment of life or property.

(2) Affects at the same time an entire community or neighborhood, or any considerable number of persons, although the extent of the annoyance or damage inflicted upon individuals may be unequal.

(3) Occurs during, or as a result of, the treatment or disposal of wastes.

(n) "Recycled water" means water which, as a result of treatment of waste, is suitable for a direct beneficial use or a controlled use that would not otherwise occur and is therefor considered a valuable resource.

(o) "Citizen or domiciliary" of the state includes a foreign corporation having substantial business contacts in the state or which is subject to service of process in this state.

(p) (1) "Hazardous substance" means either of the following:

(A) For discharge to surface waters, any substance determined to be a hazardous substance pursuant to Section 311(b)(2) of the Federal Water Pollution Control Act (33 U.S.C. Sec. 1251 et seq.).

(B) For discharge to groundwater, any substance listed as a hazardous waste or hazardous material pursuant to Section 25140 of the Health and Safety Code, without regard to whether the substance is intended to be used, reused, or discarded, except that "hazardous substance" does not include any substance excluded from Section 311(b)(2) of the Federal Water Pollution Control Act because it is within the scope of Section 311(a)(1) of that act.

(2) "Hazardous substance" does not include any of the following:

(A) Nontoxic, nonflammable, and noncorrosive stormwater runoff drained from underground vaults, chambers, or manholes into gutters or storm sewers.

(B) Any pesticide which is applied for agricultural purposes or is applied in accordance with a cooperative agreement authorized by Section 116180 of the Health and Safety Code, and is not discharged accidentally or for purposes of disposal, the application of which is in compliance with all applicable state and federal laws and regulations.

(C) Any discharge to surface water of a quantity less than a reportable quantity as determined by regulations issued pursuant to Section 311(b)(4) of the Federal Water Pollution Control Act.

(D) Any discharge to land which results, or probably will result, in a discharge to groundwater if the amount of the discharge to land is less than a reportable quantity, as determined by regulations adopted pursuant to Section 13271, for substances listed as hazardous pursuant to Section 25140 of the Health and Safety Code. No discharge shall be deemed a discharge of a reportable quantity until regulations set a reportable quantity for the substance discharged.

(q) (1) "Mining waste" means all solid, semisolid, and liquid waste materials from the extraction, beneficiation, and processing of ores and minerals. Mining waste includes, but is not limited to, soil, waste rock, and overburden, as defined in Section 2732 of the Public Resources Code, and tailings, slag, and other processed waste materials, including cementitious materials that are managed at the cement manufacturing facility where the materials were generated.

(2) For the purposes of this subdivision, "cementitious material" means cement, cement kiln dust, clinker, and clinker dust.

(r) "Master recycling permit" means a permit issued to a supplier or a distributor, or both, of recycled water, that includes waste discharge requirements prescribed pursuant to Section 13263 and water recycling requirements prescribed pursuant to Section 13523.1.

(Amended by Stats. 1996, Ch. 1023, Sec. 429. Effective September 29, 1996.)

§ 13051. *[Injection well defined]*

As used in this division, "injection well" means any bored, drilled, or driven shaft, dug pit, or hole in the ground into which waste or fluid is discharged, and any associated subsurface appurtenances, and the depth of which is greater than the circumference of the shaft, pit, or hole.

(Added by Stats. 1985, Ch. 1591, Sec. 3.)

CHAPTER 3. STATE WATER QUALITY CONTROL [13100. - 13197.5.]

(Chapter 3 added by Stats. 1969, Ch. 482.)

Article 1. State Water Resources Control Board [13100. - 13100.]

(Article 1 added by Stats. 1969, Ch. 482.)

§ 13100. *[Organization]*

[Version as reflected in the California Code. This version is superceded as modified by Governor's Reorganization Plan No. 1 of 1991, see below.]

There is in the Resources Agency the State Water Resources Control Board and the California regional water quality control boards. The organization, membership, and some of the duties of the state board are provided for in

Article 3 (commencing with Section 174) of Chapter 2 of Division 1 of this code. (Amended by Stats. 1976, Ch. 596. Note: See this section as modified on July 17, 1991, in Governor's Reorganization Plan No. 1 of 1991.)

§ 13100. ***[Organization]***

[Version as modified by Governor's Reorganization Plan No. 1 of 1991. See above for superceded version reflected in the California Code.]

There is in the California Environmental Protection Agency the State Water Resources Control Board and the California regional water quality control boards. The organization, membership, and some of the duties of the state board are provided for in Article 3 (commencing with Section 174) of Chapter 2 of Division 1 of this code.

(Amended by Stats. 1976, Ch. 596, as modified on July 17, 1991, in Governor's Reorganization Plan No. 1 of 1991.)

Article 3. State Policy for Water Quality Control [13140. - 13148.]

(Article 3 added by Stats. 1969, Ch. 482.)

§ 13140. ***[Policy adoption]***

The state board shall formulate and adopt state policy for water quality control. Such policy shall be adopted in accordance with the provisions of this article and shall be in conformity with the policies set forth in Chapter 1 (commencing with Section 13000).

(Added by Stats. 1969, Ch. 482.)

§ 13141. ***[California Water Plan]***

State policy for water quality control adopted or revised in accordance with the provisions of this article, and regional water quality control plans approved or revised in accordance with Section 13245, shall become a part of the California Water Plan effective when such state policy for water quality control, and such regional water quality control plans have been reported to the Legislature at any session thereof.

However, prior to implementation of any agricultural water quality control program, an estimate of the total cost of such a program, together with an identification of potential sources of financing, shall be indicated in any regional water quality control plan.

(Amended by Stats. 1976, Ch. 149.)

§ 13142. ***[State policy for water quality control]***

State policy for water quality control shall consist of all or any of the following:

(a) Water quality principles and guidelines for long-range resource planning, including ground water and surface water management programs and control and use of recycled water.

(b) Water quality objectives at key locations for planning and operation of water resource development projects and for water quality control activities.

(c) Other principles and guidelines deemed essential by the state board for water quality control.

The principles, guidelines, and objectives shall be consistent with the state goal of providing a decent home and suitable living environment for every Californian.

(Amended by Stats. 1995, Ch. 28, Sec. 18. Effective January 1, 1996.)

§ 13142.5. *[Coastal marine environment]*

In addition to any other policies established pursuant to this division, the policies of the state with respect to water quality as it relates to the coastal marine environment are that:

(a) Wastewater discharges shall be treated to protect present and future beneficial uses, and, where feasible, to restore past beneficial uses of the receiving waters. Highest priority shall be given to improving or eliminating discharges that adversely affect any of the following:

(1) Wetlands, estuaries, and other biologically sensitive sites.

(2) Areas important for water contact sports.

(3) Areas that produce shellfish for human consumption.

(4) Ocean areas subject to massive waste discharge.

Ocean chemistry and mixing processes, marine life conditions, other present or proposed outfalls in the vicinity, and relevant aspects of areawide waste treatment management plans and programs, but not of convenience to the discharger, shall for the purposes of this section, be considered in determining the effects of such discharges. Toxic and hard-to-treat substances should be pretreated at the source if such substances would be incompatible with effective and economical treatment in municipal treatment plants.

(b) For each new or expanded coastal powerplant or other industrial installation using seawater for cooling, heating, or industrial processing, the best available site, design, technology, and mitigation measures feasible shall be used to minimize the intake and mortality of all forms of marine life.

(c) Where otherwise permitted, new warmed or cooled water discharges into coastal wetlands or into areas of special biological importance, including marine reserves and kelp beds, shall not significantly alter the overall ecological balance of the receiving area.

(d) Independent baseline studies of the existing marine system should be conducted in the area that could be affected by a new or expanded industrial facility using seawater in advance of the carrying out of the development.

(e) (1) Adequately treated recycled water should, where feasible, be made available to supplement existing surface and underground supplies and to assist in meeting future water requirements of the coastal zone, and

consideration, in statewide programs of financial assistance for water pollution or water quality control, shall be given to providing optimum water recycling and use of recycled water.

(2) If recycled water is available for industrial use, any discharge to waters in the coastal zone, including the San Francisco Bay, after industrial use, may be authorized if all of the following conditions are met:

(A) The discharge will not unreasonably affect beneficial uses.

(B) The discharge is consistent with applicable water quality control plans and state policy for water quality control.

(C) The use of recycled water is consistent with Chapter 7 (commencing with Section 13500).

(D) The discharge is consistent with all applicable requirements of Chapter 5.5 (commencing with Section 13370).

(E) The discharge is to the same general receiving water location as that to which the wastewater would be discharged if not reused.

(3) Any requirement imposed pursuant to Section 13263 or 13377 shall be adjusted to reflect a credit for waste present in the recycled water before reuse. The credit shall be limited to the difference between the amount of waste present in the nonrecycled water supply otherwise available to the industry and the amount of waste present in the recycled water.

(4) If the amount of waste in the discharge exceeds prescribed requirements because the amount of waste in the recycled water is in excess of that agreed to be furnished by the supplier to the discharger, no enforcement action shall be taken against the discharger unless both of the following statements apply:

(A) The supplier of the recycled water fails to correct the problem within 30 days after the cause of the problem is identified, or within any greater period of time agreed to by the appropriate regional board.

(B) The discharger continues to receive the recycled water from the supplier.

(f) This section shall not apply to industrial discharges into publicly owned treatment works.

(Amended by Stats. 1995, Ch. 28, Sec. 19. Effective January 1, 1996.)

§ 13143. *[Review and revision]*

State policy for water quality control shall be periodically reviewed and may be revised.

(Added by Stats. 1969, Ch. 482.)

§ 13144. *[Interagency consultation]*

During the process of formulating or revising state policy for water quality control the state board shall consult with and carefully evaluate the recommendations of concerned federal, state, and local agencies.

(Added by Stats. 1969, Ch. 482.)

§ 13145. ***[Consideration for the California Water Plan]***
The state board shall take into consideration the effect of its actions pursuant to this chapter on the California Water Plan as adopted or revised pursuant to Division 6 (commencing with Section 10000) of this code, and on any other general or coordinated governmental plan looking toward the development, utilization, or conservation of the waters of the state.
(Added by Stats. 1969, Ch. 482.)

§ 13146. ***[State agency compliance]***
State offices, departments and boards, in carrying out activities which affect water quality, shall comply with state policy for water quality control unless otherwise directed or authorized by statute, in which case they shall indicate to the state board in writing their authority for not complying with such policy.
(Added by Stats. 1969, Ch. 482.)

§ 13147. ***[Policy adoption process]***
The state board shall not adopt state policy for water quality control unless a public hearing is first held respecting the adoption of such policy. At least 60 days in advance of such hearing the state board shall notify any affected regional boards, unless notice is waived by such boards, and shall give notice of such hearing by publication within the affected region pursuant to Section 6061 of the Government Code. The regional boards shall submit written reommendations to the state board at least 20 days in advance of the hearing.
(Amended by Stats. 1971, Ch. 1288.)

§ 13148. ***[Self-generating water softener salinity input controls in specified hydrologic regions]***

(a) This section applies to the following hydrologic regions as identified in the California Water Plan: Central Coast, South Coast, San Joaquin River, Tulare Lake, and the Counties of Butte, Glenn, Placer, Sacramento, Solano, Sutter, and Yolo.

(b) Notwithstanding Article 1 (commencing with Section 116775) of Chapter 5 of Part 12 of Division 104 of the Health and Safety Code, any local agency that owns or operates a community sewer system or water recycling facility and that is subject to a finding made by a regional board pursuant to subdivision (e) may take action to control salinity input from residential self-regenerating water softeners to protect the quality of the waters of the state. A local agency may take action only by adoption of an ordinance or resolution after a public hearing. The local agency shall not consider the adoption of an ordinance or resolution until at least 30 days following the date of the public hearing on the proposed ordinance or resolution. An ordinance or resolution shall become effective 30 days from the date of adoption.

(c) Actions to control residential self-regenerating water softener salinity inputs authorized by subdivision (b) include, but are not limited to, any of the following:

(1) Require that residential self-regenerating water softeners installed within the jurisdiction of the local agency be rated at the highest efficiency commercially available and certified by NSF International or the American National Standards Institute.

(2) Require that plumbing permits be obtained prior to the installation of residential self-regenerating water softeners.

(3) Require that residential self-regenerating water softeners be plumbed to hook up to hot water only.

(4) Enact a voluntary buy-back or exchange program for residential self-regenerating water softeners, consistent with existing law. A voluntary buy-back or exchange program may be conducted in cooperation with local water treatment businesses.

(5) Require the removal of previously installed residential self-regenerating water softeners.

(6) Prohibit the installation of residential self-regenerating water softeners.

(7) Require the retrofit of clock control and demand control systems on previously installed residential self-regenerating water softeners.

(8) Require the replacement of previously installed residential self-regenerating water softeners with appliances that meet or exceed the salt efficiency rating set forth in paragraph (2) of subdivision (b) of Section 116785 of the Health and Safety Code.

(d) If a local agency adopts an ordinance or resolution to require the removal of previously installed residential self-regenerating water softeners pursuant to paragraph (5) of subdivision (c), the local agency shall make available to owners of residential self-regenerating water softeners within its service area a program to compensate the owner of the residential self-regenerating water softener for the reasonable value of the removed residential self-regenerating water softener, as determined by the local agency.

(e) Before a local agency may take action to control salinity input from residential self-regenerating water softeners pursuant to subdivision (b), a regional board with jurisdiction over a region identified in subdivision (a) shall have made a finding at a public hearing that the control of residential salinity input will contribute to the achievement of water quality objectives. The finding may be made in any of the following water quality actions adopted by a regional board:

(1) A total maximum daily load that addresses salinity-related pollutants in a water segment.

(2) A salt and nutrient management plan for a groundwater basin or subbasin.

(3) Waste discharge requirements for a local agency discharger.

(4) Master reclamation permit for a supplier or distributor of recycled water.

(5) Water recycling requirements for a supplier or distributor of recycled water.

(6) Cease and desist order directed to a local agency.

(f) The regional board making a finding pursuant to subdivision (e) shall base its finding on the evidence in the record, such as a source determination study or other appropriate studies. The standard of judicial review required for a finding made pursuant to subdivision (e) shall be the same as the standard of review required for the water quality action in which the finding is made.

(g) This section does not limit the use of portable exchange water softening appliances or limit the authority of a local agency to regulate the discharge from a centralized portable exchange tank servicing facility into the community sewer system.

(h) For purposes of this section, "residential self-regenerating water softener" means residential water softening equipment or conditioning appliances that discharge brine into a community sewer system.

(Added by Stats. 2009, Ch. 527, Sec. 2. Effective January 1, 2010.)

§ 13149. *[Principles and guidelines associated with cannabis cultivation]*

(a) (1) (A) The board, in consultation with the Department of Fish and Wildlife, shall adopt principles and guidelines for diversion and use of water for cannabis cultivation in areas where cannabis cultivation may have the potential to substantially affect instream flows. The principles and guidelines adopted under this section may include, but are not limited to, instream flow objectives, limits on diversions, and requirements for screening of diversions and elimination of barriers to fish passage. The principles and guidelines may include requirements that apply to groundwater extractions where the board determines those requirements are reasonably necessary for purposes of this section.

(B) Prior to adopting principles and guidelines under this section, the board shall allow for public comment and hearing, pursuant to Section 13147. The board shall provide an opportunity for the public to review and comment on the proposal for at least 60 days and shall consider the public comments before adopting the principles and guidelines.

(2) The board, in consultation with the Department of Fish and Wildlife, shall adopt principles and guidelines pending the development of long-term principles and guidelines under paragraph (1). The principles and guidelines, including the interim principles and guidelines, shall include measures to protect

springs, wetlands, and aquatic habitats from negative impacts of cannabis cultivation. The board may update the interim principles and guidelines as it determines to be reasonably necessary for purposes of this section.

(3) The Department of Fish and Wildlife, in consultation with the board, may establish interim requirements to protect fish and wildlife from the impacts of diversions for cannabis cultivation pending the adoption of long-term principles and guidelines by the board under paragraph (1). The requirements may also include measures to protect springs, wetlands, and aquatic habitats from negative impacts of cannabis cultivation.

(b) (1) Notwithstanding Section 15300.2 of Title 14 of the California Code of Regulations, actions of the board and the Department of Fish and Wildlife under this section shall be deemed to be within Section 15308 of Title 14 of the California Code of regulations, provided that those actions do not involve relaxation of existing streamflow standards.

(2) The board shall adopt principles and guidelines under this section as part of state policy for water quality control adopted pursuant to Article 3 (commencing with Section 13140) of Chapter 3 of Division 7.

(3) If the Department of Fish and Wildlife establishes interim requirements under this section, it shall do so as emergency regulations in accordance with Chapter 3.5 (commencing with Section 11340) of Part 1 of Division 3 of Title 2 of the Government Code. The adoption of those interim requirements is an emergency and shall be considered by the Office of Administrative Law as necessary for the immediate preservation of the public peace, health, safety, and general welfare. Notwithstanding Chapter 3.5 (commencing with Section 11340) of Part 1 of Division 3 of Title 2 of the Government Code, the emergency regulations shall remain in effect until revised by the Department of Fish and Wildlife, provided that the emergency regulations shall not apply after long-term principles and guidelines adopted by the board under this section take effect for the stream or other body of water where the diversion is located.

(4) A diversion for cannabis cultivation is subject to both the interim principles and guidelines and the interim requirements in the period before final principles and guidelines are adopted by the board.

(5) The board shall have primary enforcement responsibility for principles and guidelines adopted under this section, and shall notify the Department of Food and Agriculture of any enforcement action taken.

(Added by Stats. 2016, Ch. 32, Sec. 104. Effective June 27, 2016.)

Article 4. Other Powers and Duties of the State Board [13160. - 13193.9.]

(Article 4 added by Stats. 1969, Ch. 482.)

§ 13160. *[Federal Water Pollution Control Act]*

The state board is designated as the state water pollution control agency for all purposes stated in the Federal Water Pollution Control Act and any other federal act, heretofore or hereafter enacted, and is (a) authorized to give any certificate or statement required by any federal agency pursuant to any such federal act that there is reasonable assurance that an activity of any person subject to the jurisdiction of the state board will not reduce water quality below applicable standards, and (b) authorized to exercise any powers delegated to the state by the Federal Water Pollution Control Act (33 U.S.C. 1251, et seq.) and acts amendatory thereto.
(Amended by Stats. 1976, Ch. 596.)

§ 13160.1. *[Federal certificate fee]*

(a) The state board may establish a reasonable fee schedule to cover the costs incurred by the state board and the regional boards in connection with any certificate that is required or authorized by any federal law with respect to the effect of any existing or proposed facility, project, or construction work upon the quality of waters of the state, including certificates requested by applicants for a federal permit or license pursuant to Section 401 of the Federal Water Pollution Control Act, as amended, and certificates requested pursuant to Section 169 of the Internal Revenue Code, as amended, with respect to water pollution control facilities.

(b) In providing for the recovery of costs incurred by the state board and regional board pursuant to this section, the state board may include in the fee schedule, but is not limited to including, the costs incurred in reviewing applications for certificates, prescribing terms of certificates and monitoring requirements, enforcing and evaluating compliance with certificates and monitoring requirements, conducting monitoring and modeling, analyzing laboratory samples, reviewing documents prepared for the purpose of regulating activities subject to certificates, and administrative costs incurred in connection with carrying out these actions. The costs of reviewing applications for certificates include, but are not limited to, the costs incurred in anticipation of the filing of an application for a certificate, including participation in any prefiling consultation, and investigation or studies to evaluate the impacts of the proposed activity.

(c) (1) The fee schedule may provide for payment of a single fee in connection with the filing of an application, or for periodic or annual fees, as appropriate to the type of certificate issued and the activity authorized by the certificate.

(2) The fee schedule authorized by this section may impose a fee upon any of the following:

(A) Any person who files an application for a certificate.

(B) Any person who files with the state board or a regional board a notice of intent to file an application for a certificate, or who files with a federal agency a notice of intent to apply for a federal permit or license for which a certificate will be required under Section 401 of the Federal Water Pollution Control Act.

(C) Any person holding a federal permit or license for which a certificate has been issued.

(D) Any person required to send a notice of intent to the state board or a regional board to proceed with an activity permitted by a general permit subject to certification under Section 13160.

(d) (1) If the state board establishes a fee schedule pursuant to this section, the state board shall adopt the fee schedule by emergency regulation. The state board shall set the amount of total revenues collected each year through the fee authorized by this section at an amount equal to the revenue levels set forth in the annual Budget Act for this activity. The state board shall review and revise the fee each fiscal year as necessary to conform with the revenue levels set forth in the annual Budget Act. If the state board determines that the revenue collected during the preceding year was greater than, or less than, the revenue levels set forth in the annual Budget Act, the state board may further adjust the annual fees to compensate for the over or under collection of revenue.

(2) The emergency regulations adopted pursuant to this subdivision, any amendment thereto, or subsequent adjustments to the annual fees, shall be adopted by the state board in accordance with Chapter 3.5 (commencing with Section 11340) of Part 1 of Division 3 of Title 2 of the Government Code. The adoption of these regulations is an emergency and shall be considered by the Office of Administrative Law as necessary for the immediate preservation of the public peace, health, safety, and general welfare. Notwithstanding Chapter 3.5 (commencing with Section 11340) of Part 1 of Division 3 of Title 2 of the Government Code, any emergency regulations adopted by the state board, or adjustments to the annual fees made by the state board pursuant to this section, shall remain in effect until revised by the state board.

(e) Any fees collected pursuant to this section in connection with certificates for activities involving hydroelectric power projects subject to licensing by the Federal Energy Regulatory Commission shall be deposited in the Water Rights Fund.

(Amended by Stats. 2003, Ch. 741, Sec. 96. Effective January 1, 2004.)

§ 13161. *[Research projects]*

The state board shall annually determine state needs for water quality research and recommend projects to be conducted.

(Added by Stats. 1969, Ch. 482.)

§ 13162. *[Research administration]*

The state board shall administer any statewide program of research in the technical phases of water quality control which may be delegated to it by law and may accept funds from the United States or any person to that end. The state board may conduct such a program independently, or by contract or in cooperation with any federal or state agency, including any political subdivision of the state, or any person or public or private organization.
(Added by Stats. 1969, Ch. 482.)

§ 13163. *[Coordination of investigations]*

(a) The state board shall coordinate water-quality-related investigations of state agencies, recognizing that other state agencies have primary statutory authority for such investigations, and shall consult with the concerned regional boards in implementing this section.

(b) The state board from time to time shall evaluate the need for water-quality-related investigations to effectively develop and implement statewide policy for water quality control and shall transmit its recommendations for investigations to affected or concerned federal, state, and local agencies. The affected state agencies shall comply with the recommendations or shall advise the state board in writing why they do not comply with such recommendations.

(c) State agencies shall submit to the state board plans for and results of all investigations that relate to or have an effect upon water quality for review and comment.
(Added by Stats. 1969, Ch. 482.)

§ 13164. *[Regional water quality control plans]*

The state board shall formulate, adopt and revise general procedures for the formulation, adoption and implementation by regional boards of water quality control plans. During the process of formulating or revising such procedures, the state board shall consult with and evaluate the recommendations of any affected regional boards.
(Amended by Stats. 1972, Ch. 813.)

§ 13165. *[Water quality factors]*

The state board may require any state or local agency to investigate and report on any technical factors involved in water quality control; provided that the burden, including costs, of such reports shall bear a reasonable relationship to the need for the reports and the benefits to be obtained therefrom.
(Added by Stats. 1969, Ch. 482.)

§ 13166. *[Statewide water quality information program]*

The state board, with the assistance of the regional boards, shall prepare and implement a statewide water quality information storage and retrieval program. Such program shall be coordinated and integrated to the maximum extent practicable with data storage and retrieval programs of other agencies.

(Added by Stats. 1969, Ch. 482.)

§ 13167. ***[Public information]***

(a) The state board shall implement, with the assistance of the regional boards, a public information program on matters involving water quality, and shall place and maintain on its Internet Web site, in a format accessible to the general public, an information file on water quality monitoring, assessment, research, standards, regulation, enforcement, and other pertinent matters.

(b) The information file described in subdivision (a) shall include, but need not be limited to, copies of permits, waste discharge requirements, waivers, enforcement actions, and petitions for review of these actions pursuant to this division. The file shall include copies of water quality control plans and policies, including any relevant management agency agreements pursuant to this chapter and Chapter 4 (commencing with Section 13200), and monitoring data and assessment information, or shall identify Internet links to that information. The state board, in consultation with the regional boards, shall ensure that the information is available in single locations, rather than separately by region, and that the information is presented in a manner easily understandable by the general public.

(Amended by Stats. 2006, Ch. 750, Sec. 2. Effective January 1, 2007.)

§ 13167.5. ***[Notice of Orders]***

(a) The state board or the regional board, as applicable, shall provide notice and a period of at least 30 days for public comment prior to the adoption of any of the following:

(1) Waste discharge requirements prescribed pursuant to Sections 13263 or 13377.

(2) Water reclamation requirements prescribed pursuant to Section 13523.

(3) An order issued pursuant to Section 13320.

(4) A time schedule order adopted pursuant to Section 13300 that sets forth a schedule of compliance and required actions relating to waste discharge requirements prescribed pursuant to Section 13263 or 13377.

(b) The notification required by subdivision (a) may be provided by mailing a draft of the waste discharge requirements, water reclamation requirements, time schedule order, or order issued pursuant to Section 13320 to each person who has requested notice of the specific item, or by posting a draft of the respective requirements or order on the official Internet site maintained by the state board or regional board, and providing notice of that posting by electronic mail to each person who has requested notice.

(c) This section does not require the state board or the regional board to provide more than one notice or more than one public comment period prior to

the adoption of waste discharge requirements, water reclamation requirements, a time schedule order, or an order issued pursuant to Section 13320.
(Added by Stats. 2003, Ch. 690, Sec. 1. Effective January 1, 2004.)

§ 13167.6. ***[Translation of Bagley-Keene notices]***
For each meeting agenda notice that the state board provides pursuant to subdivision (b) of Section 11125 of the Government Code, the state board shall make the agenda notice available in both English and Spanish and may make the agenda notice available in any other language.
(Added by Stats. 2012, Ch. 551, Sec. 2. Effective January 1, 2013.)

§ 13168. ***[Regional Board budgets]***
The state board shall allocate to the regional boards from funds appropriated to the state board such part thereof as may be necessary for the administrative expenses of such boards. The regional boards shall submit annual budgets to the state board. Subject to the provisions of Chapter 3 (commencing with Section 13291) of Part 3, Division 3, Title 2 of the Government Code and any other laws giving the Department of Finance fiscal and budgetary control over state departments generally, the state board shall prepare an annual budget concerning its activities and the activities of the regional boards.
(Added by Stats. 1969, Ch. 482.)

§ 13169. ***[Groundwater protection programs]***
(a) The state board is authorized to develop and implement a groundwater protection program as provided under the Safe Drinking Water Act, Section 300 and following of Title 42 of the United States Code, and any federal act that amends or supplements the Safe Drinking Water Act. The authority of the state board under this section includes, but is not limited to, the following:
(1) To apply for and accept state groundwater protection grants from the federal government.
(2) To take any additional action as may be necessary or appropriate to assure that the state's groundwater protection program complies with any federal regulations issued pursuant to the Safe Drinking Water Act or any federal act that amends or supplements the Safe Drinking Water Act.
(b) Nothing in this section is intended to expand the authority of the state board as authorized under the Porter-Cologne Water Quality Control Act (Div. 7 (commencing with Sec. 13000) Wat. C.).
(Added by Stats. 1997, Ch. 734, Sec. 19. Effective October 7, 1997.)

§ 13170. ***[State Board plans]***
The state board may adopt water quality control plans in accordance with the provisions of Sections 13240 to 13244, inclusive, insofar as they are applicable, for waters for which water quality standards are required by the Federal Water Pollution Control Act and acts amendatory thereof or supplementary thereto.

Such plans, when adopted, supersede any regional water quality control plans for the same waters to the extent of any conflict.
(Added by Stats. 1971, Ch. 1288.)

§ 13170.1. ***[Management agency agreements]***
The state board shall consider all relevant management agency agreements, which are intended to protect a specific beneficial use of water, prior to adopting all water quality control plans pursuant to Section 13170.
(Added by Stats. 1989, Ch. 578, Sec. 1.)

§ 13170.2. ***[California Ocean Plan]***

(a) The state board shall formulate and adopt a water quality control plan for ocean waters of the state which shall be known as the California Ocean Plan.

(b) The plan shall be reviewed at least every three years to guarantee that the current standards are adequate and are not allowing degradation to indigenous marine species or posing a threat to human health.

(c) In formulating the plan, the state board shall develop bioassay protocols to evaluate the effect of municipal and industrial waste discharges on the marine environment.

(d) The state board shall adopt the bioassay protocols and complementary chemical testing methods and shall require their use in the monitoring of complex effluent ocean discharges. For purposes of this section, "complex effluent" means an effluent in which all chemical constituents are not known or monitored. The state board shall adopt bioassay protocols and complementary chemical testing methods for complex effluent ocean monitoring by January 1, 1990, and shall require their use in monitoring complex effluent ocean discharges by entities discharging 100 million gallons per day or more by January 1, 1991. The state board shall also adopt a schedule for requiring the use of these protocols for complex effluent ocean discharges of under 100 million gallons per day by January 1, 1992.
(Added by Stats. 1986, Ch. 1478, Sec. 2.)

§ 13170.3. ***[Brackish groundwater treatment for municipal supply]***
[Brackish groundwater treatment for municipal supply]
On or before January 1, 2013, the state board shall either amend the California Ocean Plan, or adopt separate standards, to address water quality objectives and effluent limitations that are specifically appropriate to brackish groundwater treatment system facilities that produce municipal water supplies for local use.
(Added by Stats. 2011, Ch. 241, Sec. 1. Effective January 1, 2012.)

§ 13170.5. ***[Waste treatment management]***
Notwithstanding any provision of law, any plan provided in Section 13170, 13240, or 13245, and any approval thereof, and any certification or approval of

an areawide waste treatment management plan prepared pursuant to Section 208 of the Federal Water Pollution Control Act shall be subject to the provisions of Article 5.5 (commencing with Section 53098) of Chapter 1 of Part 1 of Division 2 of Title 5 of the Government Code.
(Added by Stats. 1978, Ch. 934.)

§ 13171. ***[Water Quality Coordinating Committee]***
The state board may establish a Water Quality Coordinating Committee, consisting of at least one member of each of the nine regional boards, to assist the state board in carrying out its responsibilities in water quality control.
(Added by Stats. 1972, Ch. 813.)

§ 13172. ***[Waste disposal sites; standards & regulations]***
To ensure adequate protection of water quality and statewide uniformity in the siting, operation, and closure of waste disposal sites, except for sewage treatment plants or those sites which primarily contain fertilizer or radioactive material, the state board shall do all of the following:

(a) Classify wastes according to the risk of impairment to water quality, taking into account toxicity, persistence, degradability, solubility, and other biological, chemical, and physical properties of the wastes.

(b) Classify the types of disposal sites according to the level of protection provided for water quality, taking into account the geology, hydrology, topography, climatology, and other factors relating to ability of the site to protect water quality.

(c) Adopt standards and regulations to implement Sections 13226 and 13227.

(d) Adopt standards and regulations for hazardous waste disposal sites which apply and ensure compliance with all applicable groundwater protection and monitoring requirements of the Resource Conservation and Recovery Act of 1976, as amended (42 U.S.C. Sec. 6901 et seq.), any federal act, enacted before or after January 1, 1989, which amends or supplements the Resource Conservation and Recovery Act of 1976, any federal regulations adopted before or after January 1, 1989, pursuant to the Resource Conservation and Recovery Act of 1976, as amended, together with any more stringent requirements necessary to implement this division or Article 9.5 (commencing with Section 25208) of Chapter 6.5 of Division 20 of the Health and Safety Code.

(e) Adopt policies, standards, and regulations for discharges of mining waste which apply, and ensure compliance with, all surface water and groundwater protection and monitoring requirements of this division, Article 9.5 (commencing with Section 25208) of Chapter 6.5 of Division 20 of the Health and Safety Code, and Subchapter IV (commencing with Section 6941) of Chapter 82 of Title 42 of the United States Code, which are applicable to discharges of

mining waste. These policies, standards, and regulations shall include, but are not limited to, all of the following:

(1) A statewide policy for monitoring surface water and groundwater that may be affected by discharges of mining waste. The policy shall establish the principles the regional boards shall use in developing monitoring plans for discharges of mining waste, including the methods the regional boards shall use in determining the location, number, and type of monitoring sites.

(2) Regulations requiring that waste discharge requirements issued for discharges of mining waste by regional boards include monitoring requirements consistent with the statewide policy adopted pursuant to paragraph (1).

(3) Standards for reporting the results of surface water and groundwater monitoring to the regional board. The standards shall establish a reporting format that graphs monitoring data over an appropriate time period and compares the values found for each measured parameter against the standard for that parameter established in the waste discharge requirements.
(Amended by Stats. 1989, Ch. 642, Sec. 3.)

§ 13172.5. ***[Suction dredge equipment]***

(a) For purposes of this section, the use of any vacuum or suction dredge equipment, also known as suction dredging, is the use of a mechanized or motorized system for removing or assisting in the removal of, or the processing of, material from the bed, bank, or channel of a river, stream, or lake in order to recover minerals. This section does not apply to, prohibit, or otherwise restrict nonmotorized recreational mining activities, including panning for gold.

(b) In order to protect water quality, the state board or a regional board may take one or more of the following actions:

(1) Adopt waste discharge requirements or a waiver of waste discharge requirements that, at a minimum, address the water quality impacts of each of the following:

(A) Mercury loading to downstream reaches of surface water bodies affected by the use of vacuum or suction dredge equipment.

(B) Methylmercury formation in water bodies.

(C) Bioaccumulation of mercury in aquatic organisms.

(D) Resuspension of metals.

(2) Specify certain conditions or areas where the discharge of waste or other adverse impacts on beneficial uses of the waters of the state from the use of vacuum or suction dredge equipment is prohibited, consistent with Section 13243.

(3) Prohibit any particular use of, or methods of using, vacuum or suction dredge equipment, or any portion thereof, for the extraction of minerals that the state board or a regional board determines generally cause or contribute to

an exceedance of applicable water quality objectives or unreasonably impact beneficial uses.

(c) (1) Before determining what action to take pursuant to subdivision (b), the state board shall solicit stakeholder input by conducting public workshops in the vicinity of the cities of San Bernardino, Fresno, Sacramento, and Redding. A regional board considering independent action pursuant to subdivision (b) shall solicit stakeholder input by conducting at least one public workshop in that board's region. To promote participation in the public workshops, the state board or regional board shall proactively reach out to mining groups, environmental organizations, and California Native American tribes, as defined in Section 21073 of the Public Resources Code.

(2) Before taking a proposed action pursuant to subdivision (b), the state board or regional board shall conduct at least one public hearing regarding that proposed action pursuant to the Bagley-Keene Open Meeting Act (Article 9 (commencing with Section 11120) of Chapter 1 of Part 1 of Division 3 of Title 2 of the Government Code).

(3) To avoid duplication of efforts between the state board and a regional board of a public workshop or public hearing that covers the same regional area, the state board and a regional board may work in collaboration to share information obtained through the public workshops or public hearing.

(Added by Stats. 2015, Ch. 680, Sec. 3. Effective January 1, 2016.)

§ 13173. *[Suction dredge equipment]*

"Designated waste" means either of the following:

(a) Hazardous waste that has been granted a variance from hazardous waste management requirements pursuant to Section 25143 of the Health and Safety Code.

(b) Nonhazardous waste that consists of, or contains, pollutants that, under ambient environmental conditions at a waste management unit, could be released in concentrations exceeding applicable water quality objectives or that could reasonably be expected to affect beneficial uses of the waters of the state as contained in the appropriate state water quality control plan.

(Added by Stats. 1993, Ch. 705, Sec. 1. Effective January 1, 1994.)

§ 13173.2. *[Designated waste policies]*

The state board, after consultation with the California Integrated Waste Management Board and the Department of Toxic Substances Control, may, as available resources permit, adopt policies with regard to designated wastes to include, but not be limited to, both of the following:

(a) Policies that provide for the means by which a regional board shall identify designated waste and the waters of the state that the waste may potentially impact.

(b) Policies for regional boards with regard to the granting of waivers to make inapplicable the designated waste classification.
(Added by Stats. 1993, Ch. 705, Sec. 2. Effective January 1, 1994.)

§ 13176. ***[Certified laboratories]***

(a) (1) The analysis of any material required by this division shall be performed by a laboratory that has accreditation or certification pursuant to Article 3 (commencing with Section 100825) of Chapter 4 of Part 1 of Division 101 of the Health and Safety Code.

(2) This requirement does not apply to field tests, such as tests for color, odor, turbidity, pH, temperature, dissolved oxygen, conductivity, and disinfectant residual.

(b) A person or public entity of the state shall not contract with a laboratory for environmental analyses required by paragraph (1) of subdivision (a) unless the laboratory has valid accreditation or certification.
(Amended by Stats. 2015, Ch. 673, Sec. 20. Effective January 1, 2016.)

§ 13177. ***[California State Mussel Watch Program]***

(a) It is the intent of the Legislature that the state board continue to implement the California State Mussel Watch Program.

(b) The Legislature finds and declares that the California State Mussel Watch Program provides the following benefits to the people of the state:

(1) An effective method for monitoring the long-term effects of certain toxic substances in selected fresh, estuarine, and marine waters.

(2) An important element in the state board's comprehensive water quality monitoring strategy.

(3) Identification, on an annual basis, of specific areas where concentrations of toxic substances are higher than normal.

(4) Valuable information to guide the state and regional boards and other public and private agencies in efforts to protect water quality.

(c) To the extent funding is appropriated for this purpose, the state board, in conjunction with the Department of Fish and Wildlife, shall continue to implement the long-term coastal monitoring program known as the California State Mussel Watch Program. The program may consist of, but is not limited to, the following elements:

(1) Removal of mussels, clams, and other aquatic organisms from relatively clean coastal sites and placing them in sampling sites. For purposes of this section, "sampling sites" means selected waters of concern to the state board and the Department of Fish and Wildlife.

(2) After specified exposure periods at the sampling sites, removal of the aquatic organisms for analysis.

(3) Laboratory analysis of the removed aquatic organisms to determine the amounts of various toxic substances that may have accumulated in the bodies of the aquatic organisms.

(4) Making available both the short- and long-term results of the laboratory analysis to appropriate public and private agencies and the public. *(Amended by Stats. 2015, Ch. 673, Sec. 21. Effective January 1, 2016.)*

§ 13177.5. ***[Coastal Fish Contamination Program]***

(a) The state board, in consultation with the Office of Environmental Health Hazard Assessment, shall develop a comprehensive coastal monitoring and assessment program for sport fish and shellfish, to be known as the Coastal Fish Contamination Program. The program shall identify and monitor chemical contamination in coastal fish and shellfish and assess the health risks of consumption of sport fish and shellfish caught by consumers.

(b) The state board shall consult with the Department of Fish and Wildlife, the Office of Environmental Health Hazard Assessment, and regional water quality control boards with jurisdiction over territory along the coast, to determine chemicals, sampling locations, and the species to be collected under the program. The program developed by the state board shall include all of the following:

(1) Screening studies to identify coastal fishing areas where fish species have the potential for accumulating chemicals that pose significant health risks to human consumers of sport fish and shellfish.

(2) The assessment of at least 60 screening study monitoring sites and 120 samples in the first five years of the program and an assessment of additional screening study sites as time and resources permit.

(3) Comprehensive monitoring and assessment of fishing areas determined through screening studies to have a potential for significant human health risk and a reassessment of these areas every five years.

(c) Based on existing fish contamination data, the state board shall designate a minimum of 40 sites as fixed sampling locations for the ongoing monitoring effort.

(d) The state board shall contract with the Office of Environmental Health Hazard Assessment to prepare comprehensive health risk assessments for sport fish and shellfish monitored in the program. The assessments shall be based on the data collected by the program and information on fish consumption and food preparation. The Office of Environmental Health Hazard Assessment, within 18 months of the completion of a comprehensive study for each area by the state board, shall submit to the board a draft health risk assessment report for that area. Those health risk assessments shall be updated following the reassessment of areas by the board.

(e) The Office of Environmental Health Hazard Assessment shall issue health advisories when the office determines that consuming certain fish or shellfish presents a significant health risk. The advisories shall contain information for the public, and particularly the population at risk, concerning health risks from the consumption of the fish or shellfish. The office shall notify the appropriate county health officers, the State Department of Public Health, and the Department of Fish and Wildlife before the issuance of a health advisory. The notification shall provide sufficient information for the purpose of posting signage. The office shall urge county health officers to conspicuously post health warnings in areas where contaminated fish or shellfish may be caught including piers, commercial passenger fishing vessels, and shore areas where fishing occurs. The Department of Fish and Wildlife shall publish the office's health warnings in its Sport Fishing Regulations Booklet.
(Amended by Stats. 2015, Ch. 673, Sec. 22. Effective January 1, 2016.)

§ 13177.6. ***[Palos Verdes Shelf Monitoring Study]***

To the extent funding is appropriated for this purpose, the state board, in consultation with the Department of Fish and Wildlife and Office of Environmental Health Hazard Assessment, shall perform a monitoring study to reassess the geographic boundaries of the commercial fish closure off the Palos Verdes Shelf. The reassessment shall include collection and analysis of white croaker caught on the Palos Verdes Shelf, within three miles south of the Shelf, and within San Pedro Bay. Based on the results of the reassessment, the Department of Fish and Wildlife, with guidance from the Office of the Environmental Health Hazard Assessment, shall redelineate, if necessary, the commercial fish closure area to protect the health of consumers of commercially caught white croaker. The sample collection and analysis shall be conducted within 18 months of the enactment of this section and the reassessment of the health risk shall be conducted within 18 months of the completion of the analysis of the samples.
(Amended by Stats. 2015, Ch. 673, Sec. 23. Effective January 1, 2016.)

§ 13177.7. ***[Personnel reduction for military base oversight]***

(a) (1) Notwithstanding Section 12439 of the Government Code, the Controller may not eliminate any direct or indirect position that provides oversight and related support of remediation at a military base, including a closed military base, that is funded without General Fund moneys through an agreement with a state agency, or that is funded through an agreement with a party responsible for paying the state board's costs, and may not eliminate any direct or indirect position that is funded by a federal grant that does not require a state match funded from the General Fund.

(2) An agreement with a state agency subject to this section may not require the use of a state matching fund from the General Fund by that agency.

(3) Notwithstanding any other provision of law, including Section 4.10 of the Budget Act of 2003, the Director of Finance may not eliminate any direct or indirect position that provides oversight and related support of remediation at a military base, including a closed military base, that is funded through an agreement with a state agency or party responsible for paying the state board's costs, and may not eliminate any direct or indirect position that is funded by a federal grant that does not require a state match funded from the General Fund.

(b) Neither the Controller nor the Department of Finance may impose any hiring freeze or personal services limitations, including any position reductions, upon any direct or indirect position of the state board that provides oversight and related support of remediation at a military base, including a closed military base, that is funded through an agreement with a state agency or party responsible for paying the state board's costs, or on any direct or indirect position that is funded by a federal grant that does not require a state match funded from the General Fund.

(c) The Controller and the Department of Finance shall exclude, from the state board's base for purposes of calculating any budget or position reductions required by any state agency or any state law, the specific amounts and direct or indirect positions that provide oversight and related support of remediation at a military base, including a closed military base, that are funded through an agreement with a state agency or party responsible for paying the state board's costs, and shall exclude the specific amounts and any direct or indirect positions that are funded by a federal grant that does not require a state match funded from the General Fund.

(d) Notwithstanding any other provision of law, neither the Controller nor the Department of Finance may require the state board to reduce authorized positions or other appropriations for other state board programs, including personal services, to replace the reductions precluded by subdivisions (a), (b), and (c).

(e) Notwithstanding any other provision of law, upon the request of the state board, and upon review and approval of the Department of Finance, the Controller shall augment any Budget Act appropriations, except for appropriations from the General Fund, necessary to implement this section.

(f) (1) This section does not apply to any state board appropriation or expenditure of General Fund moneys.

(2) This section does not limit the authority of the Department of Finance to eliminate a position when funding for the position, through an agreement with a party or by a federal grant, is no longer available.

(Added by Stats. 2003, Ch. 869, Sec. 2. Effective January 1, 2004.)

§ 13178. ***[Source investigation protocols]***

(a) The state board, in conjunction with the State Department of Public Health and a panel of experts established by the state board, shall develop source investigation protocols for use in conducting source investigations of storm drains that produce exceedences of bacteriological standards established pursuant to subdivision (c) of Section 115880 of the Health and Safety Code. The protocols shall be based upon the experiences drawn from previous source investigations performed by the state board, regional boards, or other agencies, and other available data. The protocols shall include methods for identifying the location and biological origins of sources of bacteriological contamination, and, at a minimum, shall require source investigations if bacteriological standards are exceeded in any three weeks of a four-week period, or, for areas where testing is done more than once a week, 75 percent of testing days that produce an exceedence of those standards.

(b) The development of source investigation protocols pursuant to subdivision (a) is not subject to Chapter 3.5 (commencing with Section 11340) of Part 1 of Division 3 of Title 2 of the Government Code.

(Amended by Stats. 2015, Ch. 673, Sec. 24. Effective January 1, 2016.)

§ 13181. ***[Water quality monitoring]***

(a) (1) On or before December 1, 2007, the California Environmental Protection Agency and the Natural Resources Agency shall enter into a memorandum of understanding for the purposes of establishing the California Water Quality Monitoring Council, which shall be administered by the state board.

(2) As used in this section, "monitoring council" means the California Water Quality Monitoring Council established pursuant to this section.

(3) The monitoring council may include representatives from state entities and nonstate entities. The representatives from nonstate entities may include, but need not be limited to, representatives from federal and local government, institutions of higher education, the regulated community, citizen monitoring groups, and other interested parties.

(4) The monitoring council shall review existing water quality monitoring, assessment, and reporting efforts, and shall recommend specific actions and funding needs necessary to coordinate and enhance those efforts.

(5) (A) The recommendations shall be prepared for the ultimate development of a cost-effective, coordinated, integrated, and comprehensive statewide network for collecting and disseminating water quality information and ongoing assessments of the health of the state's waters and the effectiveness of programs to protect and improve the quality of those waters.

(B) For purposes of developing recommendations pursuant to this section, the monitoring council shall initially focus on the water quality monitoring efforts of state agencies, including, but not limited to, the state board, the

regional boards, the department, the Department of Fish and Wildlife, the California Coastal Commission, the State Lands Commission, the Department of Parks and Recreation, the Department of Forestry and Fire Protection, and the Department of Pesticide Regulation.

(C) In developing the recommendations, the monitoring council shall seek to build upon existing programs, rather than create new programs.

(6) Among other things, the memorandum of understanding shall describe the means by which the monitoring council shall formulate recommendations to accomplish both of the following:

(A) Reduce redundancies, inefficiencies, and inadequacies in existing water quality monitoring and data management programs in order to improve the effective delivery of sound, comprehensive water quality information to the public and decisionmakers.

(B) Ensure that water quality improvement projects financed by the state provide specific information necessary to track project effectiveness with regard to achieving clean water and healthy ecosystems.

(b) The monitoring council shall report, on or before December 1, 2008, to the California Environmental Protection Agency and the Natural Resources Agency with regard to its recommendations for maximizing the efficiency and effectiveness of existing water quality data collection and dissemination, and for ensuring that collected data are maintained and available for use by decisionmakers and the public. The monitoring council shall consult with the United States Environmental Protection Agency in preparing these recommendations. The monitoring council's recommendations, and any responses submitted by the California Environmental Protection Agency or the Natural Resources Agency to those recommendations, shall be made available to decisionmakers and the public by means of the Internet.

(c) The monitoring council shall undertake and complete, on or before April 1, 2008, a survey of its members to develop an inventory of their existing water quality monitoring and data collection efforts statewide and shall make that information available to the public.

(d) All state agencies, including institutions of higher education to the extent permitted by law, that collect water quality data or information shall cooperate with the California Environmental Protection Agency and the Natural Resources Agency in achieving the goals of the monitoring council as described in this section.

(e) In accordance with the requirements of the federal Clean Water Act (33 U.S.C. Sec. 1251 et seq.) and implementing guidance, the state board shall develop, in coordination with the monitoring council, all of the following:

(1) A comprehensive monitoring program strategy that utilizes and expands upon the state's existing statewide, regional, and other monitoring capabilities and describes how the state will develop an integrated monitoring

program that will serve all of the state's water quality monitoring needs and address all of the state's waters over time. The strategy shall include a timeline not to exceed 10 years to complete implementation. The strategy shall be comprehensive in scope and identify specific technical, integration, and resource needs, and shall recommend solutions for those needs so that the strategy may be implemented within the 10-year timeframe.

(2) Agreement, including agreement on a schedule, with regard to the comprehensive monitoring of statewide water quality protection indicators that provide a basic minimum understanding of the health of the state's waters. Indicators already developed pursuant to environmental protection indicators for statewide initiatives shall be given high priority as core indicators for purposes of the network described in subdivision (a).

(3) Quality management plans and quality assurance plans that ensure the validity and utility of the data collected.

(4) Methodology for compiling, analyzing, and integrating readily available information, to the maximum extent feasible, including, but not limited to, data acquired from discharge reports, volunteer monitoring groups, local, state, and federal agencies, and recipients of state-funded or federally funded water quality improvement or restoration projects.

(5) An accessible and user-friendly electronic data system with timely data entry and ready public access via the Internet. To the maximum extent possible, the geographic location of the areas monitored shall be included in the data system.

(6) Production of timely and complete water quality reports and lists that are required under Sections 303(d), 305(b), 314, and 319 of the federal Clean Water Act and Section 406 of the federal Beaches Environmental Assessment and Coastal Health Act of 2000, that include all available information from discharge reports, volunteer monitoring groups, and local, state, and federal agencies.

(7) An update of the state board's surface water ambient monitoring program needs assessment in light of the benefits of increased coordination and integration of information from other agencies and information sources. This update shall include identification of current and future resource needs required to fully implement the coordinated, comprehensive monitoring network, including, but not limited to, funding, staff, training, laboratory and other resources, and projected improvements in the network.

(f) The state board shall identify the full costs of implementation of the comprehensive monitoring program strategy developed pursuant to subdivision (e), and shall identify proposed sources of funding for the implementation of the strategy, including federal funds that may be expended for this purpose. Fees collected pursuant to paragraph (1) of subdivision (d) of Section 13260 may be used as a funding source for implementation of the strategy to the extent that

the funding is consistent with subparagraph (B) of paragraph (1) of subdivision (d) of Section 13260.

(g) Data, summary information, and reports prepared pursuant to this section shall be made available to appropriate public agencies and the public by means of the Internet.

(h) (1) Commencing December 1, 2008, the Secretary of the California Environmental Protection Agency shall conduct a triennial audit of the effectiveness of the monitoring program strategy developed pursuant to subdivision (e). The audit shall include, but need not be limited to, an assessment of the following matters:

(A) The extent to which the strategy has been implemented.

(B) The effectiveness of the monitoring and assessment program and the monitoring council with regard to both of the following:

(i) Tracking improvements in water quality.

(ii) Evaluating the overall effectiveness of programs administered by the state board or a regional board and of state and federally funded water quality improvement projects.

(2) The Secretary of the California Environmental Protection Agency shall consult with the Secretary of the Natural Resources Agency in preparing the audit, consistent with the memorandum of understanding entered into pursuant to subdivision (a).

(i) The state board shall prioritize the use of federal funding that may be applied to monitoring, including, but not limited to, funding under Section 106 of the Federal Water Pollution Control Act, for the purpose of implementing this section.

(j) The state board shall not use more than 5 percent of the funds made available to implement this section for the administrative costs of any contracts entered into for the purpose of implementing this section.

(Amended by Stats. 2015, Ch. 673, Sec. 25. Effective January 1, 2016.)

§ 13191. *[Evaluation of program structure]*

The state board shall convene an advisory group or groups to assist in the evaluation of program structure and effectiveness as it relates to the implementation of the requirements of Section 303(d) of the Clean Water Act (33 U.S.C. 1313(d)), and applicable federal regulations and monitoring and assessment programs. The advisory group or groups shall be comprised of persons concerned with the requirements of Section 303(d) of the Clean Water Act. The state board shall provide public notice on its website of any meetings of the advisory group or groups and, upon the request of any party shall mail notice of the time and location of any meeting of the group or groups. The board shall also ensure that the advisory group or groups meet in a manner that

facilitates the effective participation of the public and the stakeholder participants.

(Amended by Stats. 2004, Ch. 644, Sec. 36. Effective January 1, 2005.)

§ 13191.3. ***[Guidelines for listing and delisting waters]***

(a) The state board, on or before July 1, 2003, shall prepare guidelines to be used by the state board and the regional boards for the purpose of listing and delisting waters and developing and implementing the total maximum daily load (TMDL) program and total maximum daily loads pursuant to Section 303(d) of the federal Clean Water Act (33 U.S.C. Sec. 1313(d)).

(b) For the purposes of preparing the guidelines, the state board shall consider the consensus recommendations adopted by the public advisory group convened pursuant to Section 13191.

(c) The guidelines shall be finalized not later than January 1, 2004.

(Added by Stats. 2002, Ch. 20, Sec. 1. Effective April 8, 2002.)

§ 13193. ***[Sanitary sewer system overflow reports]***

(a) As used in this section, the following terms have the following meanings:

(1) "Collection system owner or operator" means the public or private entity having legal authority over the operation and maintenance of, or capital improvements to, the sewer collection system.

(2) "GIS" means Geographic Information System.

(b) On or before January 1 of a year in which the Legislature has appropriated sufficient funds for this purpose, the state board, in consultation with representatives of cities, counties, cities and counties, special districts, public interest groups, the State Department of Public Health, and the regional boards shall develop a uniform overflow event report form to be used for reporting of sanitary sewer system overflows as required in subdivision (c). This event report form shall include, but not be limited to, all of the following:

(1) The cause of the overflow. The cause shall be specifically identified, unless there is an ongoing investigation, in which case it shall be identified immediately after completion of the investigation. The cause shall be identified, at a minimum, as blockage, infrastructure failure, pump station failure, significant wet weather event, natural disaster, or other cause, which shall be specifically identified. If the cause is identified as a blockage, the type of blockage shall be identified, at a minimum, as roots, grease, debris, vandalism, or multiple causes of which each should be identified. If the cause is identified as infrastructure, it shall be determined, at a minimum, whether the infrastructure failure was due to leaks, damage to, or breakage of, collection system piping or insufficient capacity. If the cause is identified as a significant wet weather event or natural disaster, the report shall describe both the event and how it resulted in the overflow. If the precise cause cannot be identified

after investigation, the report shall include a narrative explanation describing the investigation conducted and providing the information known about the possible causes of the overflow.

(2) An estimate of the volume of the overflow event.

(3) Location of the overflow event. Sufficient information shall be provided to determine location for purposes of GIS mapping, such as specific street address or the latitude and longitude of the event.

(4) Date, time, and duration of the overflow event.

(5) Whether or not the overflow reached or may have reached waters of the state.

(6) Whether or not a beach closure occurred or may have occurred as a result of the overflow.

(7) The response and corrective action taken.

(8) Whether or not there is an ongoing investigation, the reasons for it and expected date of completion.

(9) The name, address, and telephone number of the reporting collection system owner or operator and a specific contact name.

(c) Commencing on July 1 of a year in which the Legislature has appropriated sufficient funds for this purpose, in the event of a spill or overflow from a sanitary sewer system that is subject to the notification requirements set forth in Section 13271, the applicable collection system owner or operator, in addition to immediate reporting duties pursuant to Section 13271, shall submit to the appropriate regional board, within 30 days of the date of becoming aware of the overflow event, a report using the form described in subdivision (b). The report shall be filed electronically, if possible, or by fax or mail if electronic submission is not possible.

(d) (1) Commencing on July 1 of a year in which the Legislature has appropriated sufficient funds for this purpose, in the event of a spill or overflow from a sanitary sewer system that is not subject to the reporting requirements set forth in Section 13271 that is either found by the State Department of Public Health or any local health officer to result in contamination pursuant to Section 5412 of the Health and Safety Code, or is found by the State Department of Public Health to result in pollution or nuisance pursuant to Section 5413 of the Health and Safety Code, the agency making the determination shall submit to the appropriate regional board, within 30 days of making the determination, a report that shall include, at a minimum, the following information:

(A) Date, time, and approximate duration of the overflow event.

(B) An estimate of the volume of the overflow event.

(C) Location of the overflow event.

(D) A description of the response or corrective action taken by the agency making the determination.

(E) The name, address, and telephone number of the reporting collection system owner or operator, and a specific contact name.

(2) The report shall be filed electronically, if possible, or by fax or mail if electronic submission is not possible.

(e) Before January 1 of a year in which the Legislature has appropriated sufficient funds for this purpose, the state board, in consultation with representatives of cities, counties, cities and counties, and special districts, public interest groups, the State Department of Public Health, and regional boards, shall develop and maintain a sanitary sewer system overflow database that, at a minimum, contains the parameters described in subdivisions (b) and (d).

(f) Commencing on July 1 of a year in which the Legislature has appropriated sufficient funds for this purpose, each regional board shall coordinate with collection system owners or operators, the State Department of Public Health, and local health officers to compile the reports submitted pursuant to subdivisions (c) and (d). Each regional board shall report that information to the state board on a quarterly basis, to be included in the sanitary sewer system overflow database.

(g) The state board shall make available to the public, by Internet and other cost-effective means, as determined by the state board, information that is generated pursuant to this section. In a year in which the Legislature has appropriated sufficient funds for the purposes described in this subdivision, the state board shall prepare a summary report of the information collected in the sanitary sewer system overflow database, and make it available to the general public through the Internet and other cost-effective means, as determined by the state board. To the extent resources and the data allow, this report shall include GIS maps compiling coastal overflow events.

(Amended by Stats. 2010, Ch. 288, Sec. 18. Effective January 1, 2011.)

§ 13193.9. ***[Assistance to Small Disadvantaged Communities]***

(a) The state board, to the extent permitted by law, shall take all of the following actions for the purpose of allocating funds on behalf of a wastewater collection, treatment, or disposal project, if the recipient of financial assistance is a small, disadvantaged community:

(1) If the state board determines that an advance is needed for the project to proceed in an efficient manner, allocate to the recipient up to 25 percent of the financial assistance amount, not exceeding one million dollars ($1,000,000), in advance of actual expenditures. The recipient shall repay to the state board any funds advanced pursuant to this section, including any interest earned on the advance funds, if the funds are unused upon expiration of the funding agreement or if the funds are not expended in accordance with the financial assistance agreement.

(2) Establish a payment process pursuant to which the recipient of financial assistance receives funds within 30 days of the date on which the state board receives a project payment request unless the state board, within that 30-day period, determines that the project payment would not be in accordance with the terms of the program guidelines.

(3) Utilize wire transfers or other appropriate payment procedures to expedite project payments.

(b) The amount of financial assistance received by a recipient, including any funds advanced pursuant to paragraph (1) of subdivision (a), shall not exceed the total amount of the financial assistance that the state board agrees to provide for a project. If financial assistance is advanced to a recipient pursuant to paragraph (1) of subdivision (a), the state board shall reduce subsequent disbursements of financial assistance by the amount advanced.

(c) For the purposes of this section, "small disadvantaged community" means a municipality with a population of 20,000 persons or less, or a reasonably isolated and divisible segment of a larger municipality encompassing 20,000 persons or less, with an annual median household income that is less than 80 percent of the statewide annual median household income.

(Added by Stats. 2008, Ch. 609, Sec. 2. Effective January 1, 2009.)

Article 5. Electronic Submission of Reports [13195. - 13197.5.]

(Article 5 added by Stats. 2000, Ch. 727, Sec. 4.)

§ 13195. *[Definitions]*

For purposes of this article, the following terms have the following meanings:

(a) "Public domain" means a format that may be duplicated, distributed, and used without payment of a royalty or license fee.

(b) "Report" means any document or item that is required for submission in order for a person to comply with a regulation, directive, or order issued by the state board, a regional board, or a local agency pursuant to a program administered by the state board, including, but not limited to, any analysis of material by a laboratory that has accreditation or certification pursuant to Article 3 (commencing with Section 100825) of Chapter 4 of Part 1 of Division 101 of the Health and Safety Code.

(Added by Stats. 2000, Ch. 727, Sec. 4. Effective January 1, 2001.)

§ 13196. *[Electronic format]*

(a) The state board may require a person submitting a report to the state board, a regional board, or a local agency to submit the report in electronic format. The state board may also require that any report submitted in electronic format include the latitude and longitude, accurate to within one meter, of the location where any sample analyzed in the report was collected.

(b) The state board shall adopt a single, standard format for the electronic submission of analytical and environmental compliance data contained in reports. In adopting a standard format, the state board shall only consider formats that meet all of the following criteria:

(1) Are available free of charge.

(2) Are available in the public domain.

(3) Have available public domain means to import, manipulate, and store data.

(4) Allow the importation of data into tables indicating relational distances.

(5) Allow the verification of data submission consistency.

(6) Allow for inclusion of all of the following information:

(A) The physical site address from which the sample was taken, along with any information already required for permitting and reporting unauthorized releases.

(B) Environmental assessment data taken during the initial site investigation phase, as well as the continuing monitoring and evaluation phases.

(C) The latitude and longitude, accurate to within one meter, of the location where any sample was collected.

(D) A description of all tests performed on the sample, the results of that testing, any quality assurance and quality control information, any available narrative information regarding the collection of the sample, and any available information concerning the laboratory's analysis of the sample.

(7) Fulfill any additional criteria the state board determines appropriate for an effective electronic report submission program.

(Added by Stats. 2000, Ch. 727, Sec. 4. Effective January 1, 2001.)

§ 13197.5. ***[Regulations]***

(a) The state board shall adopt, not later than March 1, 2001, emergency regulations in accordance with Chapter 3.5 (commencing with Section 11340) of Part 1 of Division 3 of Title 2 of the Government Code implementing a statewide program for the electronic submission of reports required pursuant to Chapter 6.7 (commencing with Section 25280) of Division 20 of the Health and Safety Code and Article 4 (commencing with Section 25299.36) of Chapter 6.75 of Division 20 of the Health and Safety Code, for those reports that contain soil or water chemistry analysis by a laboratory certified or accredited pursuant to Article 3 (commencing with Section 100825) of Chapter 4 of Part 1 of Division 101 of the Health and Safety Code.

(b) (1) The adoption of any regulations pursuant to this section that are filed with the Office of Administrative Law on or before March 1, 2001, shall be deemed to be an emergency and necessary for the immediate preservation of the public peace, health, safety, and general welfare.

(2) (A) Except as specified in subparagraph (B), subdivisions (e) to (h), inclusive, of Section 11346.1 of the Government Code apply to any emergency regulations adopted pursuant to this section.

(B) Notwithstanding the 120-day period imposed in subdivision (e) of Section 11346.1 of the Government Code, the state board shall have one calendar year from the effective date of any emergency regulations adopted pursuant to this section to comply with that subdivision.

(c) Regulations adopted pursuant to this section may not require the electronic submission of reports before July 1, 2001, but may require the electronic submission of reports on or after July 1, 2001.

(d) Regulations adopted pursuant to this section may specify either of the following as the required reporting format:

(1) The Geographic Environmental Information Management System format as described in the report submitted to the state board on July 1, 1999, by the Lawrence Livermore National Laboratory, entitled, "Evaluating the Feasibility of a Statewide Geographic Information System."

(2) The Electronic Deliverable Format (EDF) developed by the United States Army Corps of Engineers, as the same may be revised from time to time. The specification of the EDF as the reporting format shall be deemed to satisfy the requirements of subdivision (b) of Section 13196.

(Added by Stats. 2000, Ch. 727, Sec. 4. Effective January 1, 2001.)

CHAPTER 4. REGIONAL WATER QUALITY CONTROL [13200. - 13286.9.]

(Chapter 4 added by Stats. 1969, Ch. 482.)

Article 1. Organization and Membership of Regional Boards [13200. - 13208.]

(Article 1 added by Stats. 1969, Ch. 482.)

§ 13200. *[Regional board boundaries]*

The state is divided, for the purpose of this division, into nine regions:

(a) North Coast region, which comprises all basins including Lower Klamath Lake and Lost River Basins draining into the Pacific Ocean from the California-Oregon state line southerly to the southerly boundary of the watershed of Estero de San Antonio and Stemple Creek in Marin and Sonoma Counties.

(b) San Francisco Bay region, which comprises San Francisco Bay, Suisun Bay, from Sacramento River and San Joaquin River westerly from a line which passes between Collinsville and Montezuma Island and follows thence the boundary common to Sacramento and Solano Counties and that common to Sacramento and Contra Costa Counties to the westerly boundary of the watershed of Markley Canyon in Contra Costa County, all basins draining into the bays and rivers westerly from this line, and all basins draining into the Pacific Ocean between the southerly boundary of the north coastal region and the

southerly boundary of the watershed of Pescadero Creek in San Mateo and Santa Cruz Counties.

(c) Central Coast region, which comprises all basins, including Carrizo Plain in San Luis Obispo and Kern Counties, draining into the Pacific Ocean from the southerly boundary of the watershed of Pescadero Creek in San Mateo and Santa Cruz Counties to the southeasterly boundary, located in the westerly part of Ventura County, of the watershed of Rincon Creek.

(d) Los Angeles region, which comprises all basins draining into the Pacific Ocean between the southeasterly boundary, located in the westerly part of Ventura County, of the watershed of Rincon Creek and a line which coincides with the southeasterly boundary of Los Angeles County from the ocean to San Antonio Peak and follows thence the divide between San Gabriel River and Lytle Creek drainages to the divide between Sheep Creek and San Gabriel River drainages.

(e) Santa Ana region, which comprises all basins draining into the Pacific Ocean between the southeasterly boundary of the Los Angeles region and a line which follows the drainage divide between Muddy and Moro Canyons from the ocean to the summit of San Joaquin Hills; thence along the divide between lands draining into Newport Bay and into Laguna Canyon to Niguel Road; thence along Niguel Road and Los Aliso Avenue to the divide between Newport Bay and Aliso Creek drainages; thence along that divide and the southeasterly boundary of the Santa Ana River drainage to the divide between Baldwin Lake and Mojave Desert drainages; thence along that divide to the divide between Pacific Ocean and Mojave Desert drainages.

(f) San Diego region, which comprises all basins draining into the Pacific Ocean between the southern boundary of the Santa Ana region and the California-Mexico boundary.

(g) Central Valley region, which comprises all basins including Goose Lake Basin draining into the Sacramento and San Joaquin Rivers to the easterly boundary of the San Francisco Bay region near Collinsville. The Central Valley region shall have section offices in the Sacramento Valley and the San Joaquin Valley.

(h) Lahontan region, which comprises all basins east of the Santa Ana, Los Angeles and Central Valley regions from the California-Oregon boundary to the southerly boundary located in Los Angeles and San Bernardino Counties of the watersheds draining into Antelope Valley, Mojave River Basin and Dry Lake Basin near Ivanpah.

(i) Colorado River Basin region, which comprises all basins east of the Santa Ana and San Diego regions draining into the Colorado River, Salton Sea and local sinks from the southerly boundary of the Lahontan region to the California-Mexico boundary.

The regions defined and described in this section shall be as precisely delineated on official maps of the department and include all of the areas within the boundaries of the state.

For purposes of this section the boundaries of the state extend three nautical miles into the Pacific Ocean from the line of mean lower low water marking the seaward limits of inland waters and three nautical miles from the line of mean lower low water on the mainland and each offshore island.

Nothing in this section shall limit the power conferred by this chapter to regulate the disposal of waste into ocean waters beyond the boundaries of the state.

(Added by Stats. 1969, Ch. 482.)

§ 13201. ***[Regional board members]***

(a) There is a regional board for each of the regions described in Section 13200. Each board shall consist of seven members appointed by the Governor, each of whom shall represent, and act on behalf of, all the people and shall reside or have a principal place of business within the region.

(b) Except as specified in subdivision (c), each member shall be appointed on the basis of his or her demonstrated interest or proven ability in the field of water quality, including water pollution control, water resource management, water use, or water protection. The Governor shall consider appointments from the public and nonpublic sectors. In regard to appointments from the nonpublic sector, the Governor shall consider including members from key economic sectors in a given region, such as agriculture, industry, commercial activities, forestry, and fisheries.

(c) At least one member shall be appointed as a public member who is not required to meet the criteria established pursuant to subdivision (b).

(d) All persons appointed to a regional board shall be subject to Senate confirmation, but shall not be required to appear before any committee of the Senate for purposes of such confirmation unless specifically requested to appear by the Senate Committee on Rules.

(e) Insofar as practicable, appointments shall be made in such manner as to result in representation on the board from all parts of the region.

(f) Insofar as practicable, appointments shall be made in a manner as to result in representation on the board from diverse experiential backgrounds.

(g) Each member shall be appointed on the basis of his or her ability to attend substantially all meetings of the board and to actively discharge all duties and responsibilities of a member of the board.

(h) The reduction in the number of members of each regional board required by the act that added this subdivision shall be achieved according to the ordinary expiration of the terms of incumbents and other vacancies. Notwithstanding Section 13202 the Governor shall not fill a vacancy on any

regional board until the number of members serving on that regional board falls below seven members. When the numbers of members serving on the regional board falls below seven members, the Governor shall appoint or reappoint individuals pursuant to this section.
(Amended by Stats. 2012, Ch. 39, Sec. 117. Effective June 27, 2012.)

§ 13202. ***[Terms]***

(a) Each member of a regional board shall be appointed for a term of four years. Vacancies shall be immediately filled by the Governor for the unexpired portion of the terms in which they occur.

(b) The term of office for members of each regional board shall be staggered and shall expire in accordance with the following schedule:

(1) Two members on September 30, 2013, and every four years thereafter.

(2) Two members on September 30, 2014, and every four years thereafter.

(3) Two members on September 30, 2015, and every four years thereafter.

(4) One member on September 30, 2016, and every four years thereafter.

(Amended by Stats. 2012, Ch. 39, Sec. 118. Effective June 27, 2012.)

§ 13203. ***[Official designations]***

The official designation of each regional board shall be: California Regional Water Quality Control Board, (region name).
(Added by Stats. 1969, Ch. 482.)

§ 13204. ***[Regional board meetings]***

Each regional board shall hold at least six regular meetings each calendar year and the additional special meetings or hearings as shall be called by the chairperson or any two members of the regional board.
(Amended by Stats. 2010, Ch. 288, Sec. 19. Effective January 1, 2011.)

§ 13205. ***[Member compensation]***

Each member of a regional board shall receive two hundred fifty dollars ($250) for each day during which that member is engaged in the performance of official duties. The performance of official duties includes, but is not limited to, reviewing agenda materials for no more than one day in preparation for each regional board meeting. The total compensation received by members of all of the regional boards shall not exceed, in any one fiscal year, the sum of three hundred seventy-eight thousand two hundred fifty dollars ($378,250). A member may decline compensation. In addition to the compensation, each member shall be reimbursed for necessary traveling and other expenses incurred in the performance of official duties.
(Amended by Stats. 2016, Ch. 340, Sec. 47. Effective September 13, 2016.)

§ 13206. ***[Eligibility of public officers]***

Public officers associated with any area of government, including planning or water, and whether elected or appointed, may be appointed to, and may serve contemporaneously as members of, a regional board.
(Amended by Stats. 1978, Ch. 622.)

§ 13207. ***[Conflict of interest]***

(a) A member of a regional board shall not participate in any board action pursuant to Article 4 (commencing with Section 13260) of this chapter, or Article 1 (commencing with Section 13300) of Chapter 5, in which he or she has a disqualifying financial interest in the decision within the meaning of Section 87103 of the Government Code.

(b) A board member shall not participate in any proceeding before any regional board or the state board as a consultant or in any other capacity on behalf of any waste discharger.

(c) Upon the request of any person, or on the Attorney General's own initiative, the Attorney General may file a complaint in the superior court for the county in which the regional board has its principal office alleging that a board member has knowingly violated this section and the facts upon which the allegation is based and asking that the member be removed from office. Further proceedings shall be in accordance as near as may be with rules governing civil actions. If after trial the court finds that the board member has knowingly violated this section it shall pronounce judgment that the member be removed from office.
(Amended by Stats. 2012, Ch. 39, Sec. 119. Effective June 27, 2012.)

§ 13208. ***[Executive officer conflict of interest]***

(a) No regional board executive officer may make, participate in making, or use his or her official position to influence, any decision of the regional board, or made on behalf of the regional board, affecting any person or entity subject to waste discharge requirements under this division if the regional board executive officer has received, during the previous two years, 10 percent or more of his or her income from that person or entity.

(b) "Income," for purposes of this section, has the same meaning as in Section 82030 of the Government Code.
(Added by Stats. 1993, Ch. 773, Sec. 1. Effective January 1, 1994.)

Article 2. General Provisions Relating to Powers and Duties of Regional Boards [13220. - 13228.15.]

(Article 2 added by Stats. 1969, Ch. 482.)

§ 13220. ***[Organization]***

Each regional board shall do all of the following:

(a) Establish an office.

(b) Select one of its members as chairperson at the first regular meeting held each year.

(c) Appoint as its confidential employee, who may be exempt from civil service under Section 4 of Article VII of the California Constitution, and fix the salary of, an executive officer who shall meet technical qualifications as defined by the state board. The executive officer shall serve at the pleasure of the regional board.

(d) Employ any other assistants that may be determined necessary to assist the executive officer.

(Amended by Stats. 2010, Ch. 288, Sec. 20. Effective January 1, 2011.)

§ 13221. ***[Oaths and subpoenas]***

Members of the regional board shall be empowered to administer oaths and issue subpoenas for the attendance and giving of testimony by witnesses and for the production of evidence in any proceeding before the board in any part of the region. The provisions of Chapter 3 (commencing with Section 1075) of Part I of Division 2 of this code shall apply to regional boards within their own regions, where they shall have the same power as the state board within the state.

(Added by Stats. 1969, Ch. 482.)

§ 13222. ***[Regulations]***

Pursuant to such guidelines as the state board may establish, each regional board shall adopt regulations to carry out its powers and duties under this division.

(Added by Stats. 1969, Ch. 482.)

§ 13223. ***[Delegation]***

(a) Each regional board may delegate any of its powers and duties vested in it by this division to its executive officer excepting only the following: (1) the promulgation of any regulation; (2) the issuance, modification, or revocation of any water quality control plan, water quality objectives, or waste discharge requirement; (3) the issuance, modification, or revocation of any cease and desist order; (4) the holding of any hearing on water quality control plans; and (5) the application to the Attorney General for judicial enforcement but excluding cases of specific delegation in a cease and desist order and excluding the cases described in subdivision (c) of Section 13002 and Sections 13304 and 13340.

(b) Whenever any reference is made in this division to any action that may be taken by a regional board, such reference includes such action by its executive officer pursuant to powers and duties delegated to him by the regional board.

(Amended by Stats. 1970, Ch. 918.)

§ 13224. ***[Policy statements]***

Each regional board may issue policy statements relating to any water quality matter within its jurisdiction.

(Added by Stats. 1969, Ch. 482.)

§ 13225. ***[Responsibilities]***

Each regional board, with respect to its region, shall do all of the following:

(a) Coordinate with the state board and other regional boards, as well as other state agencies with responsibility for water quality, with respect to water quality control matters, including the prevention and abatement of water pollution and nuisance.

(b) Encourage and assist in waste disposal programs, as needed and feasible, and upon application of any person, advise the applicant of the condition to be maintained in any disposal area or receiving waters into which the waste is being discharged.

(c) Require as necessary any state or local agency to investigate and report on any technical factors involved in water quality control or to obtain and submit analyses of water; provided that the burden, including costs, of such reports shall bear a reasonable relationship to the need for the report and the benefits to be obtained therefrom.

(d) Request enforcement by appropriate federal, state and local agencies of their respective water quality control laws.

(e) Report rates of compliance with the requirements of this division.

(f) Recommend to the state board projects which the regional board considers eligible for any financial assistance which may be available through the state board.

(g) Report to the state board and appropriate local health officer any case of suspected contamination in its region.

(h) File with the state board, at its request, copies of the record of any official action.

(i) Take into consideration the effect of its actions pursuant to this chapter on the California Water Plan adopted or revised pursuant to Division 6 (commencing with Section 10000) and on any other general or coordinated governmental plan looking toward the development, utilization, or conservation of the water resources of the state.

(j) Encourage coordinated regional planning and action for water quality control.

(k) In consultation with the state board, identify and post on the Internet a summary list of all enforcement actions undertaken by that regional board and the dispositions of those actions, including any fines assessed. This list shall be updated at least quarterly.

(Amended by Stats. 2006, Ch. 293, Sec. 1. Effective January 1, 2007.)

§ 13226. ***[Waste disposal sites]***

Consistent with classifications adopted by the state board pursuant to Section 13172, each regional board shall review and classify any proposed or currently operating waste disposal site, except any sewage treatment plant or any site which primarily contains fertilizer or radioactive material, within its region.

(Added by Stats. 1982, Ch. 90, Sec. 5. Effective March 2, 1982.)

§ 13227. ***[Postclosure plans]***

(a) Each regional board, with respect to its region, shall review the facility closure and postclosure plans submitted pursuant to Section 25246 of the Health and Safety Code, to ensure that water quality is adequately protected during closure and the post-closure maintenance period.

(b) The regional board shall approve the facility closure and postclosure plans if it finds that the plans comply with applicable state and federal laws and regulations relating to water quality protection and monitoring.

(c) The regional board may condition its approval of the plans in accordance with the requirements of this section.

(Amended by Stats. 1988, Ch. 1631, Sec. 46.)

§ 13228. ***[Designation of board]***

(a) Concerning any matter that may be submitted to a regional board by a person or entity that is subject to regulation by more than one regional board, the person or entity may submit the matter to one of those regional boards if both of the following requirements are met:

(1) The person or entity submits a written request to all affected regional boards that one regional board be designated to regulate the matter.

(2) All affected regional boards agree in writing to the designation. Unless the board of any affected regional board denies the request, the executive officer of a regional board may grant a request submitted pursuant to paragraph (1) on behalf of that board.

(b) Notwithstanding subdivision (a), any regional board that is affected by a matter for which a designation is made in accordance with subdivision (a) may take enforcement action with regard to that matter.

(Added by Stats. 1994, Ch. 536, Sec. 1. Effective January 1, 1995.)

§ 13228.14. ***[Hearing panels; translation of Bagley-Keene notices]***

(a) Any hearing or investigation by a regional board relating to investigating the quality of waters of the state, prescribing waste discharge requirements, issuing cease and desist orders, requiring the cleanup or abatement of waste, or imposing administrative civil liabilities or penalties may be conducted by a panel of three or more members of the regional board, but any final action in the matter shall be taken by the regional board. Due notice of any hearing shall be given to all affected persons. After a hearing, the panel shall

report its proposed decision and order to the regional board and shall supply a copy to all parties who appeared at the hearing and requested a copy.

(b) No party who appears before the panel is precluded from appearing before the regional board at any subsequent hearing relating to the matter. Members of the panel are not disqualified from sitting as members of the regional board in deciding the matter.

(c) The regional board, after making an independent review of the record and taking additional evidence as may be necessary, may adopt, with or without revision, or reject, the proposed decision and order of the panel.

(d) For each meeting agenda notice that a regional board provides pursuant to subdivision (b) of Section 11125 of the Government Code, a regional board shall make the agenda notice available in both English and Spanish and may make the agenda notice available in any other language.

(Amended by Stats. 2012, Ch. 551, Sec. 3. Effective January 1, 2013.)

§ 13228.15. *[Prehearing conferences]*

The members of a regional board, or their designees, with respect to matters within the regional board's jurisdiction, may carry out prehearing conferences to address any of the matters described in subdivision (b) of Section 11511.5 of the Government Code. No party who appears at a prehearing conference is precluded from appearing before the regional board at any subsequent hearing relating to the matter.

(Added by Stats. 2002, Ch. 420, Sec. 4. Effective January 1, 2003.)

Article 3. Regional Water Quality Control Plans [13240. - 13248.]

(Heading of Article 3 amended by Stats. 1969, Ch. 800.)

§ 13240. *[Regional water quality control plans]*

Each regional board shall formulate and adopt water quality control plans for all areas within the region. Such plans shall conform to the policies set forth in Chapter 1 (commencing with Section 13000) of this division and any state policy for water quality control. During the process of formulating such plans the regional boards shall consult with and consider the recommendations of affected state and local agencies. Such plans shall be periodically reviewed and may be revised.

(Added by Stats. 1969, Ch. 482.)

§ 13241. *[Water quality objectives]*

Each regional board shall establish such water quality objectives in water quality control plans as in its judgment will ensure the reasonable protection of beneficial uses and the prevention of nuisance; however, it is recognized that it may be possible for the quality of water to be changed to some degree without unreasonably affecting beneficial uses. Factors to be considered by a regional

board in establishing water quality objectives shall include, but not necessarily be limited to, all of the following:

(a) Past, present, and probable future beneficial uses of water.

(b) Environmental characteristics of the hydrographic unit under consideration, including the quality of water available thereto.

(c) Water quality conditions that could reasonably be achieved through the coordinated control of all factors which affect water quality in the area.

(d) Economic considerations.

(e) The need for developing housing within the region.

(f) The need to develop and use recycled water.

(Amended by Stats. 1991, Ch. 187, Sec. 2.)

§ 13242. *[Implementation]*

The program of implementation for achieving water quality objectives shall include, but not be limited to:

(a) A description of the nature of actions which are necessary to achieve the objectives, including recommendations for appropriate action by any entity, public or private.

(b) A time schedule for the actions to be taken.

(c) A description of surveillance to be undertaken to determine compliance with objectives.

(Added by Stats. 1969, Ch. 482.)

§ 13243. *[Discharge of waste]*

A regional board, in a water quality control plan or in waste discharge requirements, may specify certain conditions or areas where the discharge of waste, or certain types of waste, will not be permitted.

(Added by Stats. 1969, Ch. 482.)

§ 13244. *[Hearing requirements]*

The regional boards shall not adopt any water quality control plan unless a public hearing is first held, after the giving of notice of such hearing by publication in the affected county or counties pursuant to Section 6061 of the Government Code. When the plan proposes to prohibit discharges of waste pursuant to Section 13243, similar notice shall be given by publication pursuant to Section 6061.3 of the Government Code.

(Added by Stats. 1969, Ch. 482.)

§ 13245. *[Approval by the state board]*

A water quality control plan, or a revision thereof adopted by a regional board, shall not become effective unless and until it is approved by the state board. The state board may approve such plan, or return it to the regional board for further consideration and resubmission to the state board. Upon resubmission the state

board may either approve or, after a public hearing in the affected region, revise and approve such plan.
(Amended by Stats. 1971, Ch. 1288.)

§ 13245.5. *[Approval of guidelines]*

Guidelines adopted by a regional board shall not become effective unless and until approved by the state board.
(Added by Stats. 1986, Ch. 758, Sec. 3.)

§ 13246. *[Time for approval]*

(a) The state board shall act upon any water quality control plan not later than 60 days from the date the regional board submitted the plan to the state board, or 90 days from the date of resubmission of the plan.

(b) When the state board is acting upon a water quality control plan that is being amended solely for an action related to a regional board's total maximum daily load submittal, not including submittals related to listing, the state board shall not exceed the 60-day timeline, inclusive of the time spent sending the submittal back to the regional board, unless one of the following circumstances exists:

(1) The proposed amendment is for an exceedingly complex total maximum daily load. In order to determine if a total maximum daily load is exceedingly complex, the state board may consider a number of factors including, but not limited to, the volume of the record, the number of pollutants included, the number of dischargers and land uses involved, and the size of the watershed. The reason or reasons that any total maximum daily load is determined to be exceedingly complex shall be provided by the state board to the regional board in writing.

(2) The submittal by the regional board is clearly incomplete.
(Amended by Stats. 2002, Ch. 20, Sec. 2. Effective April 8, 2002.)

§ 13247. *[Compliance with plans]*

State offices, departments, and boards, in carrying out activities which may affect water quality, shall comply with water quality control plans approved or adopted by the state board unless otherwise directed or authorized by statute, in which case they shall indicate to the regional boards in writing their authority for not complying with such plans.
(Amended by Stats. 1971, Ch. 1288.)

§ 13248. *[Own motion review by the state board of failure to act]*

(a) At any time, the state board may, on its own motion, review the regional board's failure to act under this article.

(b) The state board may find that the failure of the regional board to act was appropriate and proper. Upon finding that the failure of the regional board to act was inappropriate or improper, the state board may direct that

appropriate action be taken by the regional board, refer the matter to another state agency having jurisdiction, take appropriate action itself, or take any combination of those actions. In taking any action, the state board is vested with all the powers of the regional boards under this division.
(Added by Stats. 2010, Ch. 288, Sec. 21. Effective January 1, 2011.)

Article 4. Waste Discharge Requirements [13260. - 13276.]

(Article 4 added by Stats. 1969, Ch. 482.)

§ 13260. *[Reports; fees; exemptions]*

(a) Each of the following persons shall file with the appropriate regional board a report of the discharge, containing the information that may be required by the regional board:

(1) A person discharging waste, or proposing to discharge waste, within any region that could affect the quality of the waters of the state, other than into a community sewer system.

(2) A person who is a citizen, domiciliary, or political agency or entity of this state discharging waste, or proposing to discharge waste, outside the boundaries of the state in a manner that could affect the quality of the waters of the state within any region.

(3) A person operating, or proposing to construct, an injection well.

(b) No report of waste discharge need be filed pursuant to subdivision (a) if the requirement is waived pursuant to Section 13269.

(c) Each person subject to subdivision (a) shall file with the appropriate regional board a report of waste discharge relative to any material change or proposed change in the character, location, or volume of the discharge.

(d) (1) (A) Each person who is subject to subdivision (a) or (c) shall submit an annual fee according to a fee schedule established by the state board.

(B) The total amount of annual fees collected pursuant to this section shall equal that amount necessary to recover costs incurred in connection with the issuance, administration, reviewing, monitoring, and enforcement of waste discharge requirements and waivers of waste discharge requirements.

(C) Recoverable costs may include, but are not limited to, costs incurred in reviewing waste discharge reports, prescribing terms of waste discharge requirements and monitoring requirements, enforcing and evaluating compliance with waste discharge requirements and waiver requirements, conducting surface water and groundwater monitoring and modeling, analyzing laboratory samples, adopting, reviewing, and revising water quality control plans and state policies for water quality control, and reviewing documents prepared for the purpose of regulating the discharge of waste, and administrative costs incurred in connection with carrying out these actions.

(D) In establishing the amount of a fee that may be imposed on a confined animal feeding and holding operation pursuant to this section, including, but not

limited to, a dairy farm, the state board shall consider all of the following factors:

(i) The size of the operation.

(ii) Whether the operation has been issued a permit to operate pursuant to Section 1342 of Title 33 of the United States Code.

(iii) Any applicable waste discharge requirement or conditional waiver of a waste discharge requirement.

(iv) The type and amount of discharge from the operation.

(v) The pricing mechanism of the commodity produced.

(vi) Any compliance costs borne by the operation pursuant to state and federal water quality regulations.

(vii) Whether the operation participates in a quality assurance program certified by a regional water quality control board, the state board, or a federal water quality control agency.

(2) (A) Subject to subparagraph (B), the fees collected pursuant to this section shall be deposited in the Waste Discharge Permit Fund, which is hereby created. The money in the fund is available for expenditure by the state board, upon appropriation by the Legislature, solely for the purposes of carrying out this division.

(B) (i) Notwithstanding subparagraph (A), the fees collected pursuant to this section from stormwater dischargers that are subject to a general industrial or construction stormwater permit under the national pollutant discharge elimination system (NPDES) shall be separately accounted for in the Waste Discharge Permit Fund.

(ii) Not less than 50 percent of the money in the Waste Discharge Permit Fund that is separately accounted for pursuant to clause (i) is available, upon appropriation by the Legislature, for expenditure by the regional board with jurisdiction over the permitted industry or construction site that generated the fee to carry out stormwater programs in the region.

(iii) Each regional board that receives money pursuant to clause (ii) shall spend not less than 50 percent of that money solely on stormwater inspection and regulatory compliance issues associated with industrial and construction stormwater programs.

(3) A person who would be required to pay the annual fee prescribed by paragraph (1) for waste discharge requirements applicable to discharges of solid waste, as defined in Section 40191 of the Public Resources Code, at a waste management unit that is also regulated under Division 30 (commencing with Section 40000) of the Public Resources Code, shall be entitled to a waiver of the annual fee for the discharge of solid waste at the waste management unit imposed by paragraph (1) upon verification by the state board of payment of the fee imposed by Section 48000 of the Public Resources Code, and provided that the fee established pursuant to Section 48000 of the Public Resources Code

generates revenues sufficient to fund the programs specified in Section 48004 of the Public Resources Code and the amount appropriated by the Legislature for those purposes is not reduced.

(e) Each person that discharges waste in a manner regulated by this section shall pay an annual fee to the state board. The state board shall establish, by regulation, a timetable for the payment of the annual fee. If the state board or a regional board determines that the discharge will not affect, or have the potential to affect, the quality of the waters of the state, all or part of the annual fee shall be refunded.

(f) (1) The state board shall adopt, by emergency regulations, a schedule of fees authorized under subdivision (d). The total revenue collected each year through annual fees shall be set at an amount equal to the revenue levels set forth in the Budget Act for this activity. The state board shall automatically adjust the annual fees each fiscal year to conform with the revenue levels set forth in the Budget Act for this activity. If the state board determines that the revenue collected during the preceding year was greater than, or less than, the revenue levels set forth in the Budget Act, the state board may further adjust the annual fees to compensate for the over and under collection of revenue.

(2) The emergency regulations adopted pursuant to this subdivision, any amendment thereto, or subsequent adjustments to the annual fees, shall be adopted by the state board in accordance with Chapter 3.5 (commencing with Section 11340) of Part 1 of Division 3 of Title 2 of the Government Code. The adoption of these regulations is an emergency and shall be considered by the Office of Administrative Law as necessary for the immediate preservation of the public peace, health, safety, and general welfare. Notwithstanding Chapter 3.5 (commencing with Section 11340) of Part 1 of Division 3 of Title 2 of the Government Code, any emergency regulations adopted by the state board, or adjustments to the annual fees made by the state board pursuant to this section, shall not be subject to review by the Office of Administrative Law and shall remain in effect until revised by the state board.

(g) The state board shall adopt regulations setting forth reasonable time limits within which the regional board shall determine the adequacy of a report of waste discharge submitted under this section.

(h) Each report submitted under this section shall be sworn to, or submitted under penalty of perjury.

(i) The regulations adopted by the state board pursuant to subdivision (f) shall include a provision that annual fees shall not be imposed on those who pay fees under the national pollutant discharge elimination system until the time when those fees are again due, at which time the fees shall become due on an annual basis.

(j) A person operating or proposing to construct an oil, gas, or geothermal injection well subject to paragraph (3) of subdivision (a) shall not be required to

pay a fee pursuant to subdivision (d) if the injection well is regulated by the Division of Oil and Gas of the Department of Conservation, in lieu of the appropriate California regional water quality control board, pursuant to the memorandum of understanding, entered into between the state board and the Department of Conservation on May 19, 1988. This subdivision shall remain operative until the memorandum of understanding is revoked by the state board or the Department of Conservation.

(k) In addition to the report required by subdivision (a), before a person discharges mining waste, the person shall first submit both of the following to the regional board:

(1) A report on the physical and chemical characteristics of the waste that could affect its potential to cause pollution or contamination. The report shall include the results of all tests required by regulations adopted by the board, any test adopted by the Department of Toxic Substances Control pursuant to Section 25141 of the Health and Safety Code for extractable, persistent, and bioaccumulative toxic substances in a waste or other material, and any other tests that the state board or regional board may require, including, but not limited to, tests needed to determine the acid-generating potential of the mining waste or the extent to which hazardous substances may persist in the waste after disposal.

(2) A report that evaluates the potential of the discharge of the mining waste to produce, over the long term, acid mine drainage, the discharge or leaching of heavy metals, or the release of other hazardous substances.

(l) Except upon the written request of the regional board, a report of waste discharge need not be filed pursuant to subdivision (a) or (c) by a user of recycled water that is being supplied by a supplier or distributor of recycled water for whom a master recycling permit has been issued pursuant to Section 13523.1.

(Amended by Stats. 2011, Ch. 2, Sec. 28. Effective March 24, 2011.)

§ 13260.2. *[Fee for no exposure certifications]*

(a) The state board shall establish a fee in an amount sufficient to recover its costs in reviewing, processing, and enforcing "no exposure" certifications issued to facilities that apply for those certifications in accordance with a general industrial stormwater permit.

(b) Revenue generated pursuant to this section shall be deposited in the Waste Discharge Permit Fund.

(Added by Stats. 2003, 1st Ex. Sess., Ch. 1, Sec. 4. Effective October 28, 2003.)

§ 13260.3. *[Fee Report]*

On or before January 1 of each year, the state board shall report to the Governor and the Legislature on the expenditure of annual fees collected pursuant to Section 13260.

(Added by Stats. 2003, 1st Ex. Sess., Ch. 1, Sec. 5. Effective October 28, 2003.)

§ 13261. ***[Civil liability]***

(a) A person who fails to furnish a report or pay a fee under Section 13260 when so requested by a regional board is guilty of a misdemeanor and may be liable civilly in accordance with subdivision (b).

(b) (1) Civil liability may be administratively imposed by a regional board or the state board in accordance with Article 2.5 (commencing with Section 13323) of Chapter 5 for a violation of subdivision (a) in an amount not exceeding one thousand dollars ($1,000) for each day in which the violation occurs. Civil liability shall not be imposed by the regional board pursuant to this section if the state board has imposed liability against the same person for the same violation.

(2) Civil liability may be imposed by the superior court in accordance with Article 5 (commencing with Section 13350) and Article 6 (commencing with Section 13360) of Chapter 5 for a violation of subdivision (a) in an amount not exceeding five thousand dollars ($5,000) for each day the violation occurs.

(c) A person who discharges or proposes to discharge hazardous waste, as defined in Section 25117 of the Health and Safety Code, who knowingly furnishes a false report under Section 13260, or who either willfully fails to furnish a report or willfully withholds material information under Section 13260 despite actual knowledge of that requirement, may be liable in accordance with subdivision (d) and is guilty of a misdemeanor.

This subdivision does not apply to any waste discharge that is subject to Chapter 5.5 (commencing with Section 13370).

(d) (1) Civil liability may be administratively imposed by a regional board in accordance with Article 2.5 (commencing with Section 13323) of Chapter 5 for a violation of subdivision (c) in an amount not exceeding five thousand dollars ($5,000) for each day the violation occurs.

(2) Civil liability may be imposed by the superior court in accordance with Article 5 (commencing with Section 13350) and Article 6 (commencing with Section 13360) of Chapter 5 for a violation of subdivision (c) in an amount not exceeding twenty-five thousand dollars ($25,000).

(Amended by Stats. 2010, Ch. 288, Sec. 22. Effective January 1, 2011.)

§ 13262. ***[Injunctive relief]***

The Attorney General, at the request of the regional board or the state board, shall petition the superior court for the issuance of a temporary restraining order, temporary injunction, or permanent injunction, or combination thereof, as may be appropriate, requiring any person not complying with Section 13260 to comply therewith.

(Amended by Stats. 2001, Ch. 869, Sec. 2. Effective January 1, 2002.)

§ 13263. ***[Requirements for discharge]***

(a) The regional board, after any necessary hearing, shall prescribe requirements as to the nature of any proposed discharge, existing discharge, or material change in an existing discharge, except discharges into a community sewer system, with relation to the conditions existing in the disposal area or receiving waters upon, or into which, the discharge is made or proposed. The requirements shall implement any relevant water quality control plans that have been adopted, and shall take into consideration the beneficial uses to be protected, the water quality objectives reasonably required for that purpose, other waste discharges, the need to prevent nuisance, and the provisions of Section 13241.

(b) A regional board, in prescribing requirements, need not authorize the utilization of the full waste assimilation capacities of the receiving waters.

(c) The requirements may contain a time schedule, subject to revision in the discretion of the board.

(d) The regional board may prescribe requirements although no discharge report has been filed.

(e) Upon application by any affected person, or on its own motion, the regional board may review and revise requirements. All requirements shall be reviewed periodically.

(f) The regional board shall notify in writing the person making or proposing the discharge or the change therein of the discharge requirements to be met. After receipt of the notice, the person so notified shall provide adequate means to meet the requirements.

(g) No discharge of waste into the waters of the state, whether or not the discharge is made pursuant to waste discharge requirements, shall create a vested right to continue the discharge. All discharges of waste into waters of the state are privileges, not rights.

(h) The regional board may incorporate the requirements prescribed pursuant to this section into a master recycling permit for either a supplier or distributor, or both, of recycled water.

(i) The state board or a regional board may prescribe general waste discharge requirements for a category of discharges if the state board or that regional board finds or determines that all of the following criteria apply to the discharges in that category:

(1) The discharges are produced by the same or similar operations.

(2) The discharges involve the same or similar types of waste.

(3) The discharges require the same or similar treatment standards.

(4) The discharges are more appropriately regulated under general discharge requirements than individual discharge requirements.

(j) The state board, after any necessary hearing, may prescribe waste discharge requirements in accordance with this section.

(Amended by Stats. 1995, Ch. 421, Sec. 2. Effective January 1, 1996.)

§ 13263.1. *[Mining waste]*

Before a regional board issues or revises waste discharge requirements pursuant to Section 13263 for any discharge of mining waste, the regional board shall first determine that the proposed mining waste discharge is consistent with a waste management strategy that prevents the pollution or contamination of the waters of the state, particularly after closure of any waste management unit for mining waste.

(Added by Stats. 1989, Ch. 642, Sec. 7.)

§ 13263.2. *[Groundwater treatment facilities]*

The owner or operator of a facility that treats groundwater which qualifies as a hazardous waste pursuant to Chapter 6.5 (commencing with Section 25100) of Division 20 of the Health and Safety Code is exempt from the requirement to obtain a hazardous waste facility permit pursuant to Section 25201 of the Health and Safety Code for the treatment of groundwater if all of the following conditions are met:

(a) The facility treats groundwater which is extracted for the purposes of complying with one or more of the following:

(1) Waste discharge requirements prescribed pursuant to Section 13263.

(2) A cleanup or abatement order issued pursuant to Section 13304.

(3) A written authorization issued by a regional board or local agency designated pursuant to Section 25283 of the Health and Safety Code.

(4) An order or approved remedial action plan issued pursuant to Chapter 6.8 (commencing with Section 25300) of Division 20 of the Health and Safety Code.

(b) The facility meets, at a minimum, all of the following operating standards:

(1) The treatment does not require a hazardous waste facilities permit pursuant to the Resource Conservation and Recovery Act, as amended (42 U.S.C. Sec. 6901 et seq.).

(2) The facility operator prepares and maintains written operating instructions and a record of the dates, amounts, and types of waste treated.

(3) The facility operator prepares and maintains a written inspection schedule and log of inspections conducted.

(4) The records specified in paragraphs (2) and (3) are maintained by the owner or operator of the facility for a period of three years.

(5) The owner or operator maintains adequate records to demonstrate that it is in compliance with all of the pretreatment standards and with all of the applicable industrial waste discharge requirements issued by the agency operating the publicly owned treatment works into which the wastes are discharged.

(6) (A) Upon terminating the operation of any treatment process or unit exempted pursuant to this section, the owner or operator that conducted the treatment removes or decontaminates all waste residues, containment system components, soils, and other structures or equipment contaminated with hazardous waste from the unit. The removal of the unit from service shall be conducted in a manner that does both of the following:

(i) Minimizes the need for further maintenance.

(ii) Eliminates the escape of hazardous waste, hazardous constituents, leachate, contaminated runoff, or waste decomposition products to the environment after the treatment process ceases operation.

(B) Any owner or operator who permanently ceases operation of a treatment process or unit that is exempted pursuant to this section shall provide written notification to the regional board or local agency upon completion of all activities required by this subdivision.

(7) The waste is managed in accordance with all applicable requirements for generators of hazardous waste under Chapter 6.5 (commencing with Section 25100) of Division 20 of the Health and Safety Code and the regulations adopted by the Department of Toxic Substances Control pursuant to that chapter.

(c) The groundwater is treated at the site where it is extracted in compliance with one or more of paragraphs (1), (2), (3), and (4) of subdivision (a).

(d) All other regulatory requirements applicable to the facility pursuant to Chapter 6.5 (commencing with Section 25100) of Division 20 of the Health and Safety Code are met by the owner or operator.

(e) The treatment of the contaminated groundwater is not performed under corrective action required by Section 25200.10 of the Health and Safety Code.

(Added by Stats. 1993, Ch. 1203, Sec. 3. Effective January 1, 1994.)

§ 13263.3. ***[Legislative findings; definitions]***

[This version remains in the code, but has been superceded by a later enacted version; see below.]

(a) The Legislature finds and declares that pollution prevention should be the first step in a hierarchy for reducing pollution and managing wastes, and to achieve environmental stewardship for society. The Legislature also finds and declares that pollution prevention is necessary to achieve the federal goal of zero discharge of pollutants into navigable waters.

(b) (1) For the purposes of this section, "pollution prevention" means any action that causes a net reduction in the use or generation of a hazardous substance or other pollutant that is discharged into water and includes any of the following:

(A) "Input change," which means a change in raw materials or feedstocks

used in a production process or operation so as to reduce, avoid, or eliminate the generation of pollutants discharged in wastewater.

(B) "Operational improvement," which means improved site management so as to reduce, avoid, or eliminate the generation of pollutants discharged in wastewater.

(C) "Production process change," which means a change in a process, method, or technique that is used to produce a product or a desired result, including the return of materials or their components for reuse within the existing processes or operations, so as to reduce, avoid, or eliminate the generation of pollutants discharged in wastewater.

(D) "Product reformulation," which means changes in design, composition, or specifications of end products, including product substitution, so as to reduce, avoid, or eliminate the generation of problem pollutants discharged in wastewater.

(2) For the purposes of this section, "pollution prevention" does not include actions that merely shift a pollutant in wastewater from one environmental medium to another environmental medium, unless clear environmental benefits of such an approach are demonstrated.

(c) (1) For the purposes of this section, "discharger" means any entity required to obtain a national pollutant discharge elimination system (NPDES) permit pursuant to the Clean Water Act (33 U.S.C. Sec. 1251 et seq.), or any entity subject to the pretreatment program as defined in Part 403 (commencing with Section 403.1) of subchapter N of Chapter 1 of Part 403 of Title 40 of the Code of Federal Regulations.

(2) For the purposes of this section, "industrial discharger" means any discharger other than a publicly owned treatment works (POTW).

(d) (1) The state board, a regional board, or a POTW may require a discharger subject to its jurisdiction to complete a pollution prevention plan if any of the following apply:

(A) A discharger is determined to be a chronic violator and the board or the POTW determines that pollution prevention could achieve compliance.

(B) The discharger contributes, or has the potential to contribute, to the formation of a toxic hot spot as defined in Section 13391.5.

(C) The discharger discharges a pollutant for which the permitted level is lower than the practical quantification limit and the state board, a regional board, or the POTW determines that additional reductions of the pollutant are necessary.

(D) The board determines pollution prevention is necessary to achieve a water quality objective.

(2) The state board, a regional board, or a POTW may require an industrial discharger subject to its jurisdiction to complete a pollution prevention plan that includes all of the following:

(A) An analysis of the pollutants that the facility discharges into water or introduces into POTWs, a description of the sources of the pollutants, and a comprehensive review of the processes used by the discharger that result in the generation and discharge of the pollutants.

(B) An analysis of the potential for pollution prevention to reduce the generation of the pollutants, including the application of innovative and alternative technologies and any adverse environmental impacts resulting from the use of those methods.

(C) A detailed description of the tasks and time schedules required to investigate and implement various elements of pollution prevention techniques.

(D) A statement of the discharger's pollution prevention goals and strategies, including priorities for short-term and long-term action.

(E) A description of the discharger's intended pollution prevention activities for the immediate future.

(F) A description of the discharger's existing pollution prevention methods.

(G) A statement that the discharger's existing and planned pollution prevention strategies do not constitute cross-media pollution transfers, and information that supports that statement.

(H) Toxic chemical release data for those dischargers subject to Section 313 of the Emergency Planning and Community Right to Know Act of 1986 (42 U.S.C. Sec. 11023).

(I) Proof of compliance with the Hazardous Waste Source Reduction and Management Review Act of 1989 (Article 11.9 (commencing with Section 25244.12) of Chapter 6.5 of Division 20 of the Health and Safety Code) if the discharger is also subject to that act.

(J) An analysis of the relative costs and benefits of the possible pollution prevention activities.

(3) A regional board may require a POTW to complete a pollution prevention plan that includes all of the following:

(A) An estimate of all of the sources of a pollutant contributing, or potentially contributing, to the loadings of a pollutants in the treatment plant influent.

(B) An analysis of the methods that could be used to prevent the discharge of the pollutants into the POTW, including application of local limits to industrial or commercial dischargers regarding pollution prevention techniques, public education and outreach, or other innovative and alternative approaches to reduce discharges of the pollutant to the POTW. The analysis also shall identify sources, or potential sources, not within the ability or authority of the POTW to control, such as pollutants in the potable water supply, airborne pollutants, pharmaceuticals, or pesticides, and estimate the magnitude of those sources, to the extent feasible.

(C) An estimate of load reductions that may be attained through the

methods identified in subparagraph (B).

(D) A plan for monitoring the results of the pollution prevention program.

(E) A description of the tasks, cost, and time required to investigate and implement various elements in the pollution prevention plan.

(F) A statement of the POTW's pollution prevention goals and strategies, including priorities for short-term and long-term action, and a description of the POTW's intended pollution prevention activities for the immediate future.

(G) A description of the POTW's existing pollution prevention programs.

(H) An analysis, to the extent feasible, of any adverse environmental impacts, including cross-media impacts or substitute chemicals, that may result from the implementation of the pollution prevention program.

(I) An analysis, to the extent feasible, of the costs and benefits that may be incurred to implement the pollution prevention program.

(e) The state board or the regional board may establish a schedule of actions identified in the pollution prevention plans for the discharger.

(f) The state board or regional board shall solicit comments from the public on a pollution prevention plan prepared pursuant to this section and address the public comments when determining what schedule of actions, if any, to establish for the discharger pursuant to this section.

(g) The state board and regional boards shall make the pollution prevention plans available for public review, except to the extent that information is classified as confidential because it is a trade secret. Trade secret information shall be set forth in an appendix that is not available to the public.

(h) Any costs incurred by the state board or a regional board resulting from actions required by this section shall be paid for from revenue generated by the fees imposed by Section 13260.

(i) The state board or regional board may assess civil penalties pursuant to Section 13385 against a discharger for failure to complete a pollution prevention plan ordered by the state board or a regional board, or for failure to comply with a schedule of actions ordered by the state board or a regional board pursuant to this section.

(j) A POTW may assess civil penalties and civil administrative penalties pursuant to Sections 54740, 54740.5, and 54740.6 of the Government Code against an industrial discharger for failure to complete a pollution prevention plan when ordered by the POTW, for submitting a plan that does not comply with the act, or for failure to comply with a schedule of actions ordered by the POTW pursuant to this section, unless the regional board has assessed penalties for the same action.

(k) A discharger may change its pollution prevention plan, including withdrawing from a pollution prevention measure approved by the state board, a regional board, or a POTW, if the discharger determines that the measure will have a negative impact on product quality, the safe operation of the facility, or

the environmental aspects of the facilities operation, and the discharger demonstrates to the board or the POTW an alternative measure that achieves that same pollution prevention objective.

(*l*) The state board shall adopt a format to be used by dischargers for completing the plan required by this section. The format shall address all of the factors the discharger is required to include in the plan. The board may include any other factors determined by the board to be necessary to carry out this section. The adoption of the format pursuant to this section is not subject to Chapter 3.5 (commencing with Section 11340) of Part 1 of Division 3 of Title 2 of the Government Code.

(Added by Stats. 1999, Ch. 92, Sec. 3. Effective January 1, 2000. See the prevailing Section 13263.3 (added by Stats. 1999, Ch. 93), as amended by Stats. 2000, Ch. 807, with same subject matter but with substantive differences.)

§ 13263.3. ***[Legislative findings; definitions]***

(a) The Legislature finds and declares that pollution prevention should be the first step in a hierarchy for reducing pollution and managing wastes, and to achieve environmental stewardship for society. The Legislature also finds and declares that pollution prevention is necessary to support the federal goal of zero discharge of pollutants into navigable waters.

(b) (1) For the purposes of this section, "pollution prevention" means any action that causes a net reduction in the use or generation of a hazardous substance or other pollutant that is discharged into water and includes any of the following:

(A) "Input change," which means a change in raw materials or feedstocks used in a production process or operation so as to reduce, avoid, or eliminate the generation of pollutants discharged in wastewater.

(B) "Operational improvement," which means improved site management so as to reduce, avoid, or eliminate the generation of pollutants discharged in wastewater.

(C) "Production process change," which means a change in a process, method, or technique that is used to produce a product or a desired result, including the return of materials or their components for reuse within the existing processes or operations, so as to reduce, avoid, or eliminate the generation of pollutants discharged in wastewater.

(D) "Product reformulation," which means changes in design, composition, or specifications of end products, including product substitution, so as to reduce, avoid, or eliminate the generation of problem pollutants discharged in wastewater.

(2) For the purposes of this section, "pollution prevention" does not include actions that merely shift a pollutant in wastewater from one environmental medium to another environmental medium, unless clear

environmental benefits of such an approach are identified to the satisfaction of the state board, the regional board, or POTW.

(c) For the purposes of this section, "discharger" means any entity required to obtain a national pollutant discharge elimination system (NPDES) permit pursuant to the Clean Water Act (33 U.S.C. Sec. 1251 et seq.), or any entity subject to the pretreatment program as defined in Part 403 (commencing with Section 403.1) of Subchapter N of Chapter 1 of Part 403 of Title 40 of the Code of Federal Regulations.

(d) (1) The state board, a regional board, or a POTW may require a discharger subject to its jurisdiction to complete and implement a pollution prevention plan if any of the following apply:

(A) A discharger is determined by the state board to be a chronic violator, and the state board, a regional board, or the POTW determines that pollution prevention could assist in achieving compliance.

(B) The discharger significantly contributes, or has the potential to significantly contribute, to the creation of a toxic hot spot as defined in Section 13391.5.

(C) The state board, a regional board, or a POTW determines pollution prevention is necessary to achieve a water quality objective.

(D) The discharger is subject to a cease and desist order issued pursuant to Section 13301 or a time schedule order issued pursuant to Section 13300 or 13308.

(2) A pollution prevention plan required of a discharger other than a POTW pursuant to paragraph (1) shall include all of the following:

(A) An analysis of one or more of the pollutants, as directed by the state board, a regional board, or a POTW, that the facility discharges into water or introduces into POTWs, a description of the sources of the pollutants, and a comprehensive review of the processes used by the discharger that result in the generation and discharge of the pollutants.

(B) An analysis of the potential for pollution prevention to reduce the generation of the pollutants, including the application of innovative and alternative technologies and any adverse environmental impacts resulting from the use of those methods.

(C) A detailed description of the tasks and time schedules required to investigate and implement various elements of pollution prevention techniques.

(D) A statement of the discharger's pollution prevention goals and strategies, including priorities for short-term and long-term action.

(E) A description of the discharger's existing pollution prevention methods.

(F) A statement that the discharger's existing and planned pollution prevention strategies do not constitute cross media pollution transfers unless clear environmental benefits of such an approach are identified to the

satisfaction of the state board, the regional board, or the POTW, and information that supports that statement.

(G) Proof of compliance with the Hazardous Waste Source Reduction and Management Review Act of 1989 (Article 11.9 (commencing with Section 25244.12) of Chapter 6.5 of Division 20 of the Health and Safety Code) if the discharger is also subject to that act.

(H) An analysis, to the extent feasible, of the relative costs and benefits of the possible pollution prevention activities.

(I) A specification of, and rationale for, the technically feasible and economically practicable pollution prevention measures selected by the discharger for implementation.

(3) The state board or a regional board may require a POTW to complete and implement a pollution prevention plan that includes all of the following:

(A) An estimate of all of the sources of a pollutant contributing, or potentially contributing, to the loading of that pollutant in the treatment plant influent.

(B) An analysis of the methods that could be used to prevent the discharge of the pollutants into the POTW, including application of local limits to industrial or commercial dischargers regarding pollution prevention techniques, public education and outreach, or other innovative and alternative approaches to reduce discharges of the pollutant to the POTW. The analysis also shall identify sources, or potential sources, not within the ability or authority of the POTW to control, such as pollutants in the potable water supply, airborne pollutants, pharmaceuticals, or pesticides, and estimate the magnitude of those sources, to the extent feasible.

(C) An estimate of load reductions that may be attained through the methods identified in subparagraph (B).

(D) A plan for monitoring the results of the pollution prevention program.

(E) A description of the tasks, cost, and time required to investigate and implement various elements in the pollution prevention plan.

(F) A statement of the POTW's pollution prevention goals and strategies, including priorities for short-term and long-term action, and a description of the POTW's intended pollution prevention activities for the immediate future.

(G) A description of the POTW's existing pollution prevention programs.

(H) An analysis, to the extent feasible, of any adverse environmental impacts, including cross media impacts or substitute chemicals, that may result from the implementation of the pollution prevention program.

(I) An analysis, to the extent feasible, of the costs and benefits that may be incurred to implement the pollution prevention program.

(e) The state board, a regional board, or a POTW may require a discharger subject to this section to comply with the pollution prevention plan developed

by the discharger after providing an opportunity for comment at a public proceeding with regard to that plan.

(f) The state board, regional boards, and POTWs shall make the pollution prevention plans available for public review, except to the extent that information is classified as confidential because it is a trade secret. Trade secret information shall be set forth in an appendix that is not available to the public.

(g) The state board or regional board may assess civil liability pursuant to paragraph (1) of subdivision (c) of Section 13385 against a discharger for failure to complete a pollution prevention plan required by the state board or a regional board, for submitting a plan that does not comply with the act, or for not implementing a plan, unless the POTW has assessed penalties for the same action.

(h) A POTW may assess civil penalties and civil administrative penalties pursuant to Sections 54740, 54740.5, and 54740.6 of the Government Code against a discharger for failure to complete a pollution prevention plan when required by the POTW, for submitting a plan that does not comply with the act, or for not implementing a plan, unless the state board or a regional board has assessed penalties for the same action.

(i) A discharger may change its pollution prevention plan, including withdrawing from a pollution prevention measure required by the state board, a regional board, or a POTW, if the discharger determines that the measure will have a negative impact on product quality, the safe operation of the facility, or the environmental aspects of the facility's operation, or the discharger determines that the measure is economically impracticable or technologically infeasible. Where practicable and feasible, the discharger shall replace the withdrawn measure with a measure that will likely achieve similar pollution prevention objectives. A measure may be withdrawn pursuant to this subdivision only with the approval of the executive officer of the state board or the regional board, or the POTW.

(j) The state board shall adopt a sample format to be used by dischargers for completing the plan required by this section. The sample format shall address all of the factors the discharger is required to include in the plan. The board may include any other factors determined by the board to be necessary to carry out this section. The adoption of the sample format pursuant to this section is not subject to Chapter 3.5 (commencing with Section 11340) of Part 1 of Division 3 of Title 2 of the Government Code.

(k) The state board, a regional board, or POTW may not include a pollution prevention plan in any waste discharge requirements or other permit issued by that agency.

(*l*) This section prevails over Section 13263.3, as added to the Water Code by Assembly Bill 1104 of the 1999–2000 Regular Session.

(Amended (as added by Stats. 1999, Ch. 93) by Stats. 2000, Ch. 807, Sec. 1. Effective January 1, 2001.)

§ 13263.5. ***[Requirements for injection wells]***

(a) When the regional board issues waste discharge requirements pursuant to Section 13263, or revises waste discharge requirements pursuant to subdivision (g) of Section 25159.17 of the Health and Safety Code, for any injection well into which hazardous waste is discharged, the waste discharge requirements shall be based upon the information contained in the hydrogeological assessment report prepared pursuant to Section 25159.18 of the Health and Safety Code and shall include conditions in the waste discharge requirements to ensure that the waters of the state are not polluted or threatened with pollution.

(b) If the state board applies to the federal Environmental Protection Agency to administer the Underground Injection Control Program pursuant to Part 145 (commencing with Section 145.1) of Subchapter D of Chapter 1 of Title 40 of the Code of Federal Regulations, that application shall not include a request to administer the Underground Injection Control Program for any oil, gas, or geothermal injection wells supervised or regulated by the Division of Oil and Gas pursuant to Section 3106 or 3714 of the Public Resources Code.
(Amended by Stats. 1992, Ch. 19, Sec. 1. Effective January 1, 1993.)

§ 13263.6. ***[Effluent limitations]***

[This version remains in the code, but has been superceded by a later enacted version; see below.]

(a) A publicly owned treatment works (POTW) may require pollution prevention plans as described in Section 13263.3 as part of the pretreatment requirements applicable to significant industrial users.

(b) The state board or a regional board shall prescribe effluent limitations as part of the waste discharge requirements of a POTW for all substances that the most recent toxic chemical release data reported to the state emergency response commission pursuant to Section 313 of the Emergency Planning and Community Right to Know Act of 1986 (42 U.S.C. Sec. 11023) indicate are discharged into the POTW and that the state board or a regional board has determined has the reasonable potential to impair water quality.
(Added by Stats. 1999, Ch. 92, Sec. 4. Effective January 1, 2000. See the prevailing Section 13263.6 added by Stats. 1999, Ch. 93, with same subject matter, but with substantive differences.)

§ 13263.6. ***[Effluent limitations]***

(a) The regional board shall prescribe effluent limitations as part of the waste discharge requirements of a POTW for all substances that the most recent toxic chemical release data reported to the state emergency response commission pursuant to Section 313 of the Emergency Planning and Community

Right to Know Act of 1986 (42 U.S.C. Sec. 11023) indicate as discharged into the POTW, for which the state board or the regional board has established numeric water quality objectives, and has determined that the discharge is or may be discharged at a level which will cause, have the reasonable potential to cause, or contribute to, an excursion above any numeric water quality objective.

(b) This section prevails over Section 13263.6, as added to the Water Code by Assembly Bill 1104 of the 1999–2000 Regular Session.

(Added by Stats. 1999, Ch. 93, Sec. 4. Effective January 1, 2000.)

§ 13263.7. ***[Compliance Point for Direct Potable Reuse or Surface Water Augmentation]***

(a) Compliance with effluent limitations and any other permit or waste discharge requirements, as appropriate, for the release or discharge of recycled water determined to be suitable for direct potable reuse or surface water augmentation, as defined in Section 13561, into a conveyance facility may be determined at the point where the recycled water enters the conveyance facility but prior to commingling with any raw water.

(b) Before the discharge may be allowed, consent must be obtained from the owner or operator of the conveyance facility that directly receives the recycled water.

(c) This section does not limit or restrict the authority of the State Water Resources Control Board.

(d) For purposes of this section, "raw water" means surface water or groundwater in its naturally occurring state prior to treatment.

(Added by Stats. 2013, Ch. 635, Sec. 4. Effective January 1, 2014.)

§ 13264. ***[Prerequisites to discharge]***

(a) No person shall initiate any new discharge of waste or make any material changes in any discharge, or initiate a discharge to, make any material changes in a discharge to, or construct, an injection well, prior to the filing of the report required by Section 13260 and no person shall take any of these actions after filing the report but before whichever of the following occurs first:

(1) The issuance of waste discharge requirements pursuant to Section 13263.

(2) The expiration of 140 days after compliance with Section 13260 if the waste to be discharged does not create or threaten to create a condition of pollution or nuisance and any of the following applies:

(A) The project is not subject to the California Environmental Quality Act (Division 13 (commencing with Section 21000) of the Public Resources Code).

(B) The regional board is the lead agency for purposes of the California Environmental Quality Act, a negative declaration is required, and at least 105 days have expired since the regional board assumed lead agency responsibility.

(C) The regional board is the lead agency for the purposes of the California Environmental Quality Act, and environmental impact report or written documentation prepared to meet the requirements of Section 21080.5 of the Public Resources Code is required, and at least one year has expired since the regional board assumed lead agency responsibility.

(D) The regional board is a responsible agency for purposes of the California Environmental Quality Act, and at least 90 days have expired since certification or approval of environmental documentation by the lead agency.

(3) The issuance of a waiver pursuant to Section 13269.

(b) The Attorney General, at the request of a regional board, shall petition the superior court for the issuance of a temporary restraining order, preliminary injunction, or permanent injunction, or combination thereof, as may be appropriate, prohibiting any person who is violating or threatening to violate this section from doing any of the following, whichever is applicable:

(1) Discharging the waste or fluid.

(2) Making any material change in the discharge.

(3) Constructing the injection well.

(c) (1) Notwithstanding any other provision of law, moneys collected under this division for a violation pursuant to paragraph (2) of subdivision (a) shall be deposited in the Waste Discharge Permit Fund and separately accounted for in that fund.

(2) The funds described in paragraph (1) shall be expended by the state board, upon appropriation by the Legislature, to assist regional boards, and other public agencies with authority to clean up waste or abate the effects of the waste, in cleaning up or abating the effects of the waste on waters of the state or for the purposes authorized in Section 13443.

(Amended by Stats. 2003, Ch. 683, Sec. 1. Effective January 1, 2004.)

§ 13265. ***[Civil penalties]***

(a) Any person discharging waste in violation of Section 13264, after such violation has been called to his attention in writing by the regional board, is guilty of a misdemeanor and may be liable civilly in accordance with subdivision (b). Each day of such discharge shall constitute a separate offense.

(b) (1) Civil liability may be administratively imposed by a regional board in accordance with Article 2.5 (commencing with Section 13323) of Chapter 5 for a violation of subdivision (a) in an amount which shall not exceed one thousand dollars ($1,000) for each day in which the violation occurs.

(2) Civil liability may be imposed by the superior court in accordance with Articles 5 (commencing with Section 13350) and 6 (commencing with Section 13360) of Chapter 5 for a violation of subdivision (a) in an amount which shall not exceed five thousand dollars ($5,000) for each day in which the violation occurs.

(c) Any person discharging hazardous waste, as defined in Section 25117 of the Health and Safety Code, in violation of Section 13264 is guilty of a misdemeanor and may be liable civilly in accordance with subdivision (d). That liability shall not be imposed if the discharger is not negligent and immediately files a report of the discharge with the board, or if the regional board determines that the violation of Section 13264 was insubstantial.

This subdivision shall not be applicable to any waste discharge which is subject to Chapter 5.5 (commencing with Section 13370).

(d) (1) Civil liability may be administratively imposed by a regional board in accordance with Article 2.5 (commencing with Section 13323) of Chapter 5 for a violation of subdivision (c) in an amount which shall not exceed five thousand dollars ($5,000) for each day in which the violation occurs.

(2) Civil liability may be imposed by the superior court in accordance with Articles 5 (commencing with Section 13350) and 6 (commencing with Section 13360) of Chapter 5 for a violation of subdivision (c) in an amount which shall not exceed twenty-five thousand dollars ($25,000) for each day in which the violation occurs.

(Amended by Stats. 1984, Ch. 1541, Sec. 2.)

§ 13266. *[Notice of filings]*

Pursuant to such regulations as the regional board may prescribe, each city, county, or city and county shall notify the regional board of the filing of a tentative subdivision map, or of any application for a building permit which may involve the discharge of waste, other than discharges into a community sewer system and discharges from dwellings involving five-family units or less.

(Added by Stats. 1969, Ch. 482.)

§ 13267. *[Investigations; inspections]*

(a) A regional board, in establishing or reviewing any water quality control plan or waste discharge requirements, or in connection with any action relating to any plan or requirement authorized by this division, may investigate the quality of any waters of the state within its region.

(b) (1) In conducting an investigation specified in subdivision (a), the regional board may require that any person who has discharged, discharges, or is suspected of having discharged or discharging, or who proposes to discharge waste within its region, or any citizen or domiciliary, or political agency or entity of this state who has discharged, discharges, or is suspected of having discharged or discharging, or who proposes to discharge, waste outside of its region that could affect the quality of waters within its region shall furnish, under penalty of perjury, technical or monitoring program reports which the regional board requires. The burden, including costs, of these reports shall bear a reasonable relationship to the need for the report and the benefits to be obtained from the reports. In requiring those reports, the regional board shall

provide the person with a written explanation with regard to the need for the reports, and shall identify the evidence that supports requiring that person to provide the reports.

(2) When requested by the person furnishing a report, the portions of a report that might disclose trade secrets or secret processes may not be made available for inspection by the public but shall be made available to governmental agencies for use in making studies. However, these portions of a report shall be available for use by the state or any state agency in judicial review or enforcement proceedings involving the person furnishing the report.

(c) In conducting an investigation pursuant to subdivision (a), the regional board may inspect the facilities of any person to ascertain whether the purposes of this division are being met and waste discharge requirements are being complied with. The inspection shall be made with the consent of the owner or possessor of the facilities or, if the consent is withheld, with a warrant duly issued pursuant to the procedure set forth in Title 13 (commencing with Section 1822.50) of Part 3 of the Code of Civil Procedure. However, in the event of an emergency affecting the public health or safety, an inspection may be performed without consent or the issuance of a warrant.

(d) The state board or a regional board may require any person, including a person subject to a waste discharge requirement under Section 13263, who is discharging, or who proposes to discharge, wastes or fluid into an injection well, to furnish the state board or regional board with a complete report on the condition and operation of the facility or injection well, or any other information that may be reasonably required to determine whether the injection well could affect the quality of the waters of the state.

(e) As used in this section, "evidence" means any relevant evidence on which responsible persons are accustomed to rely in the conduct of serious affairs, regardless of the existence of any common law or statutory rule which might make improper the admission of the evidence over objection in a civil action.

(f) The state board may carry out the authority granted to a regional board pursuant to this section if, after consulting with the regional board, the state board determines that it will not duplicate the efforts of the regional board.

(Amended by Stats. 2006, Ch. 293, Sec. 2. Effective January 1, 2007.)

§ 13268. *[Civil liability]*

(a) (1) Any person failing or refusing to furnish technical or monitoring program reports as required by subdivision (b) of Section 13267, or failing or refusing to furnish a statement of compliance as required by subdivision (b) of Section 13399.2, or falsifying any information provided therein, is guilty of a misdemeanor, and may be liable civilly in accordance with subdivision (b).

(2) Any person who knowingly commits any violation described in paragraph (1) is subject to criminal penalties pursuant to subdivision (e).

(b) (1) Civil liability may be administratively imposed by a regional board in accordance with Article 2.5 (commencing with Section 13323) of Chapter 5 for a violation of subdivision (a) in an amount which shall not exceed one thousand dollars ($1,000) for each day in which the violation occurs.

(2) Civil liability may be imposed by the superior court in accordance with Article 5 (commencing with Section 13350) and Article 6 (commencing with Section 13360) of Chapter 5 for a violation of subdivision (a) in an amount which shall not exceed five thousand dollars ($5,000) for each day in which the violation occurs.

(c) Any person discharging hazardous waste, as defined in Section 25117 of the Health and Safety Code, who knowingly fails or refuses to furnish technical or monitoring program reports as required by subdivision (b) of Section 13267, or who knowingly falsifies any information provided in those technical or monitoring program reports, is guilty of a misdemeanor, may be civilly liable in accordance with subdivision (d), and is subject to criminal penalties pursuant to subdivision (e).

(d) (1) Civil liability may be administratively imposed by a regional board in accordance with Article 2.5 (commencing with Section 13323) of Chapter 5 for a violation of subdivision (c) in an amount which shall not exceed five thousand dollars ($5,000) for each day in which the violation occurs.

(2) Civil liability may be imposed by the superior court in accordance with Article 5 (commencing with Section 13350) and Article 6 (commencing with Section 13360) of Chapter 5 for a violation of subdivision (c) in an amount which shall not exceed twenty-five thousand dollars ($25,000) for each day in which the violation occurs.

(e) (1) Subject to paragraph (2), any person who knowingly commits any of the violations set forth in subdivision (a) or (c) shall be punished by a fine that does not exceed twenty-five thousand dollars ($25,000).

(2) Any person who knowingly commits any of the violations set forth in subdivision (a) or (c) after a prior conviction for a violation set forth in subdivision (a) or (c) shall be punished by a fine that does not exceed twenty-five thousand dollars ($25,000) for each day of the violation.

(f) (1) Notwithstanding any other provision of law, fines collected pursuant to subdivision (e) shall be deposited in the Waste Discharge Permit Fund and separately accounted for in that fund.

(2) The funds described in paragraph (1) shall be expended by the state board, upon appropriation by the Legislature, to assist regional boards, and other public agencies with authority to clean up waste, or abate the effects of the waste, in cleaning up or abating the effects of the waste on waters of the state or for the purposes authorized in Section 13443.

(g) The state board may carry out the authority granted to a regional board pursuant to this section if, after consulting with the regional board, the state board determines that it will not duplicate the efforts of the regional board.

(Amended by Stats. 2006, Ch. 293, Sec. 3. Effective January 1, 2007.)

§ 13269. ***[Waiver]***

(a) (1) On and after January 1, 2000, the provisions of subdivisions (a) and (c) of Section 13260, subdivision (a) of Section 13263, or subdivision (a) of Section 13264 may be waived by the state board or a regional board as to a specific discharge or type of discharge if the state board or a regional board determines, after any necessary state board or regional board meeting, that the waiver is consistent with any applicable state or regional water quality control plan and is in the public interest. The state board or a regional board shall give notice of any necessary meeting by publication pursuant to Section 11125 of the Government Code.

(2) A waiver may not exceed five years in duration, but may be renewed by the state board or a regional board. The waiver shall be conditional and may be terminated at any time by the state board or a regional board. The conditions of the waiver shall include, but need not be limited to, the performance of individual, group, or watershed-based monitoring, except as provided in paragraph (3). Monitoring requirements shall be designed to support the development and implementation of the waiver program, including, but not limited to, verifying the adequacy and effectiveness of the waiver's conditions. In establishing monitoring requirements, the regional board may consider the volume, duration, frequency, and constituents of the discharge; the extent and type of existing monitoring activities, including, but not limited to, existing watershed-based, compliance, and effectiveness monitoring efforts; the size of the project area; and other relevant factors. Monitoring results shall be made available to the public.

(3) The state board or a regional board may waive the monitoring requirements described in this subdivision for discharges that it determines do not pose a significant threat to water quality.

(4) (A) The state board or a regional board may include as a condition of a waiver the payment of an annual fee established by the state board in accordance with subdivision (f) of Section 13260.

(B) Funds generated by the payment of the fee shall be deposited in the Waste Discharge Permit Fund for expenditure, upon appropriation by the Legislature, by the state board or appropriate regional board for the purpose of carrying out activities limited to those necessary to establish and implement the waiver program pursuant to this section. The total amount of annual fees collected pursuant to this section shall not exceed the costs of those activities

necessary to establish and implement waivers of waste discharge requirements pursuant to this section.

(C) In establishing the amount of a fee that may be imposed on irrigated agriculture operations pursuant to this section, the state board shall consider relevant factors, including, but not limited to, all of the following:

(i) The size of the operations.

(ii) Any compliance costs borne by the operations pursuant to state and federal water quality regulations.

(iii) Any costs associated with water quality monitoring performed or funded by the operations.

(iv) Participation in a watershed management program approved by the applicable regional board.

(D) In establishing the amount of a fee that may be imposed on silviculture operations pursuant to this section, the state board shall consider relevant factors, including, but not limited to, all of the following:

(i) The size of the operations.

(ii) Any compliance costs borne by the operations pursuant to state and federal water quality regulations.

(iii) Any costs associated with water quality monitoring performed or funded by the operations.

(iv) The average annual number of timber harvest plans proposed by the operations.

(5) The state board or a regional board shall give notice of the adoption of a waiver by publication within the affected county or counties as set forth in Section 6061 of the Government Code.

(b) (1) A waiver in effect on January 1, 2000, shall remain valid until January 1, 2003, unless the regional board terminates that waiver prior to that date. All waivers that were valid on January 1, 2000, and granted an extension until January 1, 2003, and not otherwise terminated, may be renewed by a regional board in five-year increments.

(2) Notwithstanding paragraph (1), a waiver for an onsite sewage treatment system that is in effect on January 1, 2002, shall remain valid until June 30, 2004, unless the regional board terminates the waiver prior to that date. Any waiver for onsite sewage treatment systems adopted or renewed after June 30, 2004, shall be consistent with the applicable regulations or standards for onsite sewage treatment systems adopted or retained in accordance with Section 13291.

(c) Upon notification of the appropriate regional board of the discharge or proposed discharge, except as provided in subdivision (d), the provisions of subdivisions (a) and (c) of Section 13260, subdivision (a) of Section 13263, and subdivision (a) of Section 13264 do not apply to a discharge resulting from any of the following emergency activities:

(1) Immediate emergency work necessary to protect life or property or immediate emergency repairs to public service facilities necessary to maintain service as a result of a disaster in a disaster-stricken area in which a state of emergency has been proclaimed by the Governor pursuant to Chapter 7 (commencing with Section 8550) of Division 1 of Title 2 of the Government Code.

(2) Emergency projects undertaken, carried out, or approved by a public agency to maintain, repair, or restore an existing highway, as defined in Section 360 of the Vehicle Code, except for a highway designated as an official state scenic highway pursuant to Section 262 of the Streets and Highways Code, within the existing right-of-way of the highway, damaged as a result of fire, flood, storm, earthquake, land subsidence, gradual earth movement, or landslide within one year of the damage. This paragraph does not exempt from this section any project undertaken, carried out, or approved by a public agency to expand or widen a highway damaged by fire, flood, storm, earthquake, land subsidence, gradual earth movement, or landslide.

(d) Subdivision (c) is not a limitation of the authority of a regional board under subdivision (a) to determine that any provision of this division shall not be waived or to establish conditions of a waiver. Subdivision (c) shall not apply to the extent that it is inconsistent with any waiver or other order or prohibition issued under this division.

(e) The regional boards and the state board shall require compliance with the conditions pursuant to which waivers are granted under this section.

(f) Prior to renewing any waiver for a specific type of discharge established under this section, the state board or a regional board shall review the terms of the waiver policy at a public hearing. At the hearing, the state board or a regional board shall determine whether the discharge for which the waiver policy was established should be subject to general or individual waste discharge requirements.

(Amended by Stats. 2004, Ch. 183, Sec. 360. Effective January 1, 2005.)

§ 13270. *[Public agency exemptions]*

Where a public agency as defined in subdivision (b) of Section 13400 leases land for waste disposal purposes to any other public agency, including the State of California, or to any public utility regulated by the Public Utilities Commission, the provisions of Sections 13260, 13263, and 13264 shall not require the lessor public agency to file any waste discharge report for the subject waste disposal, and the regional board and the state board shall not prescribe waste discharge requirements for the lessor public agency as to such land provided that the lease from the lessor public agency shall not contain restrictions which would unreasonably limit the ability of the lessee to comply with waste discharge requirements appurtenant to the leased property.

(Added by Stats. 1974, Ch. 207.)

§ 13271. ***[Notification requirement]***

(a) (1) Except as provided by subdivision (b), any person who, without regard to intent or negligence, causes or permits any hazardous substance or sewage to be discharged in or on any waters of the state, or discharged or deposited where it is, or probably will be, discharged in or on any waters of the state, shall, as soon as (A) that person has knowledge of the discharge, (B) notification is possible, and (C) notification can be provided without substantially impeding cleanup or other emergency measures, immediately notify the Office of Emergency Services of the discharge in accordance with the spill reporting provision of the state toxic disaster contingency plan adopted pursuant to Article 3.7 (commencing with Section 8574.16) of Chapter 7 of Division 1 of Title 2 of the Government Code.

(2) The Office of Emergency Services shall immediately notify the appropriate regional board, the local health officer, and the director of environmental health of the discharge. The regional board shall notify the state board as appropriate.

(3) Upon receiving notification of a discharge pursuant to this section, the local health officer and the director of environmental health shall immediately determine whether notification of the public is required to safeguard public health and safety. If so, the local health officer and the director of environmental health shall immediately notify the public of the discharge by posting notices or other appropriate means. The notification shall describe measures to be taken by the public to protect the public health.

(b) The notification required by this section shall not apply to a discharge in compliance with waste discharge requirements or other provisions of this division.

(c) Any person who fails to provide the notice required by this section is guilty of a misdemeanor and shall be punished by a fine of not more than twenty thousand dollars ($20,000) or imprisonment in a county jail for not more than one year, or both. Except where a discharge to the waters of this state would have occurred but for cleanup or emergency response by a public agency, this subdivision shall not apply to any discharge to land which does not result in a discharge to the waters of this state.

(d) Notification received pursuant to this section or information obtained by use of that notification shall not be used against any person providing the notification in any criminal case, except in a prosecution for perjury or giving a false statement.

(e) For substances listed as hazardous wastes or hazardous material pursuant to Section 25140 of the Health and Safety Code, the state board, in consultation with the Department of Toxic Substances Control, shall by

regulation establish reportable quantities for purposes of this section. The regulations shall be based on what quantities should be reported because they may pose a risk to public health or the environment if discharged to groundwater or surface water. Regulations need not set reportable quantities on all listed substances at the same time. Regulations establishing reportable quantities shall not supersede waste discharge requirements or water quality objectives adopted pursuant to this division, and shall not supersede or affect in any way the list, criteria, and guidelines for the identification of hazardous wastes and extremely hazardous wastes adopted by the Department of Toxic Substances Control pursuant to Chapter 6.5 (commencing with Section 25100) of Division 20 of the Health and Safety Code. The regulations of the Environmental Protection Agency for reportable quantities of hazardous substances for purposes of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended (42 U.S.C. Sec. 9601 et seq.) shall be in effect for purposes of the enforcement of this section until the time that the regulations required by this subdivision are adopted.

(f) (1) The state board shall adopt regulations establishing reportable quantities of sewage for purposes of this section. The regulations shall be based on the quantities that should be reported because they may pose a risk to public health or the environment if discharged to groundwater or surface water. Regulations establishing reportable quantities shall not supersede waste discharge requirements or water quality objectives adopted pursuant to this division. For purposes of this section, "sewage" means the effluent of a municipal wastewater treatment plant or a private utility wastewater treatment plant, as those terms are defined in Section 13625, except that sewage does not include recycled water, as defined in subdivisions (c) and (d) of Section 13529.2.

(2) A collection system owner or operator, as defined in paragraph (1) of subdivision (a) of Section 13193, in addition to the reporting requirements set forth in this section, shall submit a report pursuant to subdivision (c) of Section 13193.

(g) Except as otherwise provided in this section and Section 8589.7 of the Government Code, a notification made pursuant to this section shall satisfy any immediate notification requirement contained in any permit issued by a permitting agency. When notifying the Office of Emergency Services, the person shall include all of the notification information required in the permit.

(h) For the purposes of this section, the reportable quantity for perchlorate shall be 10 pounds or more by discharge to the receiving waters, unless a more restrictive reporting standard for a particular body of water is adopted pursuant to subdivision (e).

(i) Notification under this section does not nullify a person's responsibility to notify the local health officer or the director of environmental health pursuant to Section 5411.5 of the Health and Safety Code.

(Amended by Stats. 2013, Ch. 352, Sec. 532. Effective September 26, 2013. Operative July 1, 2013, by Sec. 543 of Ch. 352.)

§ 13272. ***[Oil or petroleum discharge]***

(a) Except as provided by subdivision (b), any person who, without regard to intent or negligence, causes or permits any oil or petroleum product to be discharged in or on any waters of the state, or discharged or deposited where it is, or probably will be, discharged in or on any waters of the state, shall, as soon as (1) that person has knowledge of the discharge, (2) notification is possible, and (3) notification can be provided without substantially impeding cleanup or other emergency measures, immediately notify the Office of Emergency Services of the discharge in accordance with the spill reporting provision of the California oil spill contingency plan adopted pursuant to Article 3.5 (commencing with Section 8574.1) of Chapter 7 of Division 1 of Title 2 of the Government Code.

(b) The notification required by this section shall not apply to a discharge in compliance with waste discharge requirements or other provisions of this division.

(c) Any person who fails to provide the notice required by this section is guilty of a misdemeanor and shall be punished by a fine of not less than five hundred dollars ($500) or more than five thousand dollars ($5,000) per day for each day of failure to notify, or imprisonment of not more than one year, or both. Except where a discharge to the waters of this state would have occurred but for cleanup or emergency response by a public agency, this subdivision shall not apply to any discharge to land that does not result in a discharge to the waters of this state. This subdivision shall not apply to any person who is fined by the federal government for a failure to report a discharge of oil.

(d) Notification received pursuant to this section or information obtained by use of that notification shall not be used against any person providing the notification in any criminal case, except in a prosecution for perjury or giving a false statement.

(e) Immediate notification to the appropriate regional board of the discharge, in accordance with reporting requirements set under Section 13267 or 13383, shall constitute compliance with the requirements of subdivision (a).

(f) The reportable quantity for oil or petroleum products shall be one barrel (42 gallons) or more, by direct discharge to the receiving waters, unless a more restrictive reporting standard for a particular body of water is adopted.
(Amended by Stats. 2014, Ch. 35, Sec. 184. Effective June 20, 2014.)

§ 13272.1. ***[List of discharges of MTBE]***

Each regional board shall publish and distribute on a quarterly basis to all public water system operators within the region of the regional board, a list of discharges of MTBE that occurred during the quarter and a list of locations

where MTBE was detected in the groundwater within the region of the regional board.

(Added by Stats. 1997, Ch. 815, Sec. 4. Effective January 1, 1998.)

§ 13273. ***[Solid waste disposal sites]***

(a) The state board shall, on or before January 1, 1986, rank all solid waste disposal sites, as defined in paragraph (5) of subdivision (i) of Section 41805.5 of the Health and Safety Code, based upon the threat they may pose to water quality. On or before July 1, 1987, the operators of the first 150 solid waste disposal sites ranked on the list shall submit a solid waste water quality assessment test to the appropriate regional board for its examination pursuant to subdivision (d). On or before July 1 of each succeeding year, the operators of the next 150 solid waste disposal sites ranked on the list shall submit a solid waste water quality assessment test to the appropriate regional board for its examination pursuant to subdivision (d).

(b) Before a solid waste water quality assessment test report may be submitted to the regional board, a professional geologist, registered pursuant to Section 7850 of the Business and Professions Code, a certified engineering geologist, certified pursuant to Section 7842 of the Business and Professions Code, or a civil engineer registered pursuant to Section 6762 of the Business and Professions Code, who has at least five years' experience in groundwater hydrology, shall certify that the report contains all of the following information and any other information which the state board may, by regulation, require:

(1) An analysis of the surface and groundwater on, under, and within one mile of the solid waste disposal site to provide a reliable indication whether there is any leakage of hazardous waste.

(2) A chemical characterization of the soil-pore liquid in those areas which are likely to be affected if the solid waste disposal site is leaking, as compared to geologically similar areas near the solid waste disposal site which have not been affected by leakage or waste discharge.

(c) If the regional board determines that the information specified in paragraph (1) or (2) is not needed because other information demonstrates that hazardous wastes are migrating into the water, the regional board may waive the requirement to submit this information specified in paragraphs (1) and (2) of subdivision (b). The regional board shall also notify the Department of Toxic Substances Control, and shall take appropriate remedial action pursuant to Chapter 5 (commencing with Section 13300).

(d) The regional board shall examine the report submitted pursuant to subdivision (b) and determine whether the number, location, and design of the wells and the soil testing could detect any leachate buildup, leachate migration, or hazardous waste migration. If the regional board determines that the monitoring program could detect the leachate and hazardous waste, the

regional board shall take the action specified in subdivision (e). If the regional board determines that the monitoring program was inadequate, the regional board shall require the solid waste disposal site to correct the monitoring program and resubmit the solid waste assessment test based upon the results from the corrected monitoring program.

(e) The regional board shall examine the approved solid waste assessment test report and determine whether any hazardous waste migrated into the water. If the regional board determines that hazardous waste has migrated into the water, it shall notify the Department of Toxic Substances Control and the California Integrated Waste Management Board and shall take appropriate remedial action pursuant to Chapter 5 (commencing with Section 13300).

(f) When a regional board revises the waste discharge requirements for a solid waste disposal site, the regional board shall consider the information provided in the solid waste assessment test report and any other relevant site-specific engineering data provided by the site operator for that solid waste disposal site as part of a report of waste discharge.

(Amended by Stats. 2004, Ch. 865, Sec. 38. Effective January 1, 2005.)

§ 13273.1. ***[Solid waste assessment]***

(a) Except as provided in subdivision (b), an operator of a solid waste disposal site may submit a solid waste assessment questionnaire to the appropriate regional board at least 24 months prior to the site's solid waste water quality assessment test due date as established pursuant to Section 13273. The regional board shall require the operator to submit any additional information, as needed, or require onsite verification of the solid waste assessment questionnaire data in order to render a decision pursuant to subdivision (c).

(b) Any solid waste disposal site which is larger than 50,000 cubic yards or is known or suspected to contain hazardous substances, other than household hazardous wastes, shall be prohibited from submitting a solid waste assessment questionnaire under this section.

(c) The regional board shall complete a thorough analysis of each solid waste assessment questionnaire submitted pursuant to this section by a date 18 months prior to the solid waste assessment test due date. Based upon this analysis, the regional board shall determine whether or not the site has discharged hazardous substances which will impact the beneficial uses of water. If the regional board determines that the site has not so discharged hazardous substances, the regional board shall notify the operator that the operator is not required to prepare a solid waste water quality assessment test pursuant to Section 13273.

(d) If the regional board does not make the determination specified in subdivision (c), the operator shall submit all, or a portion of, a solid waste water

quality assessment test. The regional board shall notify the operator of this determination and indicate if all, or what portion of, a solid waste water quality assessment test shall be required. The operator shall submit the solid waste water quality assessment test, or a portion thereof, by the date established pursuant to Section 13273.

(e) The state board shall develop a solid waste assessment questionnaire and guidelines for submittal no later than three months after the effective date of this statute adding this section. The questionnaire shall contain, but not be limited to, a characterization of the wastes, size of the site, age of the site, and other appropriate factors.

(f) Those operators of solid waste disposal sites listed by the state board pursuant to Section 13273 in Rank 3 and seeking an exemption under this section shall submit their solid waste assessment questionnaire no later than July 1, 1988. If the regional board does not make the determination specified in subdivision (c), the regional board shall require the operator to submit all, or a portion of, a solid waste water quality assessment test by July 1, 1990.
(Added by Stats. 1987, Ch. 932, Sec. 2. Effective September 22, 1987.)

§ 13273.2. *[Reevaluation of site]*

Notwithstanding subdivision (b) of Section 13273.1, a regional board may reevaluate the status of any solid waste disposal site ranked pursuant to Section 13273, including those sites exempted pursuant to Section 13273.1, and may require the operator to submit or revise a solid waste water quality assessment test after July 1, 1989. The regional board shall give written notification to the operator that a solid waste assessment test is required and the due date. This section shall not require submittal of a solid waste water quality assessment test by a date earlier than established in accordance with Section 13273.
(Added by Stats. 1987, Ch. 932, Sec. 3. Effective September 22, 1987.)

§ 13273.3. *[Operator defined]*

As used in Sections 13273, 13273.1, and 13273.2, "operator" means a person who operates or manages, or who has operated or managed, the solid waste disposal site. If the operator of the solid waste disposal site no longer exists, or is unable, as determined by the regional board, to comply with the requirements of Section 13273, 13273.1, or 13273.2, "operator" means any person who owns or who has owned the solid waste disposal site.
(Added by Stats. 1987, Ch. 932, Sec. 4. Effective September 22, 1987.)

§ 13273.5. *[Kings County exception]*

Notwithstanding Section 13273, a small city which operates a Class III solid waste disposal site is not required to submit a solid waste water quality assessment test report pursuant to Section 13273 if the city has a population of less than 20,000 persons, the solid waste disposal site receives less than 20,000

tons of waste per year, the water table of the highest aquifer under the disposal site is 250 or more feet below the base of the disposal site and the water in the highest aquifer is not potable, and the site receives less than an average of 12 inches of rainfall per year.

This section applies only if the disposal site is operational and has been granted all required permits as of January 1, 1991, if the site is located in Kings County, and if the city has completed an initial solid waste water quality assessment test and a solid waste air quality assessment test which establish that no significant air or water contamination has occurred, and, in that event, the city shall be exempted from conducting further assessment tests for seven years, or any longer time specified by the regional board, after the date of the initial assessment tests.

(Added by Stats. 1990, Ch. 1361, Sec. 3.)

§ 13274. ***[General waste discharge requirements]***

(a) (1) The state board or a regional board, upon receipt of applications for waste discharge requirements for discharges of dewatered, treated, or chemically fixed sewage sludge and other biological solids, shall prescribe general waste discharge requirements for that sludge and those other solids. General waste discharge requirements shall replace individual waste discharge requirements for sewage sludge and other biological solids, and their prescription shall be considered to be a ministerial action.

(2) The general waste discharge requirements shall set minimum standards for agronomic applications of sewage sludge and other biological solids and the use of that sludge and those other solids as a soil amendment or fertilizer in agriculture, forestry, and surface mining reclamation, and may permit the transportation of that sludge and those other solids and the use of that sludge and those other solids at more than one site. The requirements shall include provisions to mitigate significant environmental impacts, potential soil erosion, odors, the degradation of surface water quality or fish or wildlife habitat, the accidental release of hazardous substances, and any potential hazard to the public health or safety.

(b) The state board or a regional board, in prescribing general waste discharge requirements pursuant to this section, shall comply with Division 13 (commencing with Section 21000) of the Public Resources Code and guidelines adopted pursuant to that division, and shall consult with the State Air Resources Board, the Department of Food and Agriculture, and the Department of Resources Recycling and Recovery.

(c) The state board or a regional board may charge a reasonable fee to cover the costs incurred by the board in the administration of the application process relating to the general waste discharge requirements prescribed pursuant to this section.

(d) Notwithstanding any other law, except as specified in subdivisions (f) to (i), inclusive, general waste discharge requirements prescribed by a regional board pursuant to this section supersede regulations adopted by any other state agency to regulate sewage sludge and other biological solids applied directly to agricultural lands at agronomic rates.

(e) The state board or a regional board shall review general waste discharge requirements for possible amendment upon the request of any state agency, including, but not limited to, the Department of Food and Agriculture and the State Department of Public Health, if the board determines that the request is based on new information.

(f) This section is not intended to affect the jurisdiction of the Department of Resources Recycling and Recovery to regulate the handling of sewage sludge or other biological solids for composting, deposit in a landfill, or other use.

(g) This section is not intended to affect the jurisdiction of the State Air Resources Board or an air pollution control district or air quality management district to regulate the handling of sewage sludge or other biological solids for incineration.

(h) This section is not intended to affect the jurisdiction of the Department of Food and Agriculture in enforcing Sections 14591 and 14631 of the Food and Agricultural Code and any regulations adopted pursuant to those sections, regarding the handling of sewage sludge and other biological solids sold or used as fertilizer or as a soil amendment.

(i) This section does not restrict the authority of a local government agency to regulate the application of sewage sludge and other biological solids to land within the jurisdiction of that agency, including, but not limited to, the planning authority of the Delta Protection Commission, the resource management plan of which is required to be implemented by local government general plans.

(Amended (as amended by Stats. 1998, Ch. 485) by Stats. 2010, Ch. 288, Sec. 23. Effective January 1, 2011.)

§ 13275. *[Rights of public water systems]*

(a) Notwithstanding any other law, a public water system regulated by the state board pursuant to Chapter 4 (commencing with Section 116270) of Part 12 of Division 104 of the Health and Safety Code shall have the same legal rights and remedies against a responsible party, when the water supply used by that public water system is contaminated, as those of a private land owner whose groundwater has been contaminated.

(b) For purposes of this section, "responsible party" has the same meaning as defined in Section 25323.5 of the Health and Safety Code.

(Amended by Stats. 2015, Ch. 673, Sec. 26. Effective January 1, 2016.)

§ 13276. *[Multiagency cannabis task force; water quality requirements]*

(a) The multiagency task force, the Department of Fish and Wildlife and State Water Resources Control Board pilot project to address the Environmental Impacts of Cannabis Cultivation, assigned to respond to the damages caused by marijuana cultivation on public and private lands in California, shall continue its enforcement efforts on a permanent basis and expand them to a statewide level to ensure the reduction of adverse impacts of marijuana cultivation on water quality and on fish and wildlife throughout the state.

(b) Each regional board shall, and the State Water Resources Control Board may, address discharges of waste resulting from medical marijuana cultivation and commercial marijuana cultivation under Division 10 of the Business and Professions Code and associated activities, including by adopting a general permit, establishing waste discharge requirements, or taking action pursuant to Section 13269. In addressing these discharges, each regional board shall include conditions to address items that include, but are not limited to, all of the following:

(1) Site development and maintenance, erosion control, and drainage features.

(2) Stream crossing installation and maintenance.

(3) Riparian and wetland protection and management.

(4) Soil disposal.

(5) Water storage and use.

(6) Irrigation runoff.

(7) Fertilizers and soil.

(8) Pesticides and herbicides.

(9) Petroleum products and other chemicals.

(10) Cultivation-related waste.

(11) Refuse and human waste.

(12) Cleanup, restoration, and mitigation.

(Amended November 8, 2016, by initiative Proposition 64, Sec. 6.3.)

Article 5. Individual Disposal Systems [13280. - 13286.9.]

(Article 5 added by Stats. 1977, Ch. 1194.)

§ 13280. *[Prohibition of disposal systems]*

A determination that discharge of waste from existing or new individual disposal systems or from community collection and disposal systems which utilize subsurface disposal should not be permitted shall be supported by substantial evidence in the record that discharge of waste from such disposal systems will result in violation of water quality objectives, will impair present or future beneficial uses of water, will cause pollution, nuisance, or contamination, or will unreasonably degrade the quality of any waters of the state.

(Added by Stats. 1977, Ch. 1194.)

§ 13281. *[Determination basis]*

(a) In making a determination pursuant to Section 13280, except as specified in subdivision (b), the regional board shall consider all relevant evidence related to the discharge, including, but not limited to, those factors set forth in Section 13241, information provided pursuant to Section 117435 of the Health and Safety Code, possible adverse impacts if the discharge is permitted, failure rates of any existing individual disposal systems whether due to inadequate design, construction, maintenance, or unsuitable hydrogeologic conditions, evidence of any existing, prior, or potential contamination, existing and planned land use, dwelling density, historical population growth, and any other criteria as may be established pursuant to guidelines, regulations, or policies adopted by the state board.

(b) (1) To the extent that resources are available for that purpose, the regional board shall prohibit the discharge of waste from existing or new individual disposal systems on parcels of less than one-half acre that overlie the Mission Creek Aquifer or the Desert Hot Springs Aquifer in Riverside County, if a sewer system is available.

(2) For parcels of one-half acre or greater that overlie the aquifers described in paragraph (1), the maximum number of equivalent dwelling units with individual disposal systems shall be two per acre. For the purpose of this paragraph, the term "equivalent dwelling unit" means a single family dwelling as defined in Section 221.0 of the 1997 edition of the Uniform Plumbing Code of the International Association of Plumbing and Mechanical Officials.

(3) For the purposes of this subdivision, a sewer system is available if a sewer system, or a building connected to a sewer system, is within 200 feet of the existing or proposed dwelling unit, in accordance with Section 713.4 of the 1997 edition of the Uniform Plumbing Code of the International Association of Plumbing and Mechanical Officials.

(4) To the extent that resources are available for the purposes of this subdivision, the regional board shall achieve compliance with this subdivision on or before January 1, 2004.

(Amended by Stats. 1998, Ch. 437, Sec. 1. Effective January 1, 1999.)

§ 13282. *[Allowing disposal]*

(a) If it appears that adequate protection of water quality, protection of beneficial uses of water, and prevention of nuisance, pollution, and contamination can be attained by appropriate design, location, sizing, spacing, construction, and maintenance of individual disposal systems in lieu of elimination of discharges from systems, and if an authorized public agency provides satisfactory assurance to the regional board that the systems will be appropriately designed, located, sized, spaced, constructed, and maintained, the discharges shall be permitted so long as the systems are adequately designed, located, sized, spaced, constructed, and maintained.

(b) An authorized public agency shall notify the regional board if the systems are not adequately designed, located, sized, spaced, constructed, and maintained.

(c) For purposes of this section, "authorized public agency" means a public agency authorized by a water quality control board and having authority to ensure that systems are adequately designed, located, sized, spaced, constructed, and maintained.

(Amended by Stats. 1994, Ch. 1177, Sec. 3. Effective January 1, 1995.)

§ 13283. ***[Alternatives to disposal]***

In reviewing any determination that discharge of waste from existing or new individual disposal systems should not be permitted, the state board shall include a preliminary review of possible alternatives necessary to achieve protection of water quality and present and future beneficial uses of water, and prevention of nuisance, pollution, and contamination, including, but not limited to, community collection and waste disposal systems which utilize subsurface disposal, and possible combinations of individual disposal systems, community collection and disposal systems which utilize subsurface disposal, and conventional treatment systems.

(Added by Stats. 1977, Ch. 1194.)

§ 13284. ***[Guidelines]***

The state board may adopt guidelines, regulations, or policies necessary to implement the provisions of this article.

(Added by Stats. 1977, Ch. 1194.)

§ 13285. ***[MTBE discharges to drinking water]***

(a) A discharge from a storage tank, pipeline, or other container of methyl tertiary-butyl ether (MTBE), or of any pollutant that contains MTBE, that poses a threat to drinking water, or to groundwater or surface water that may reasonably be used for drinking water, or to coastal waters shall be cleaned up to a level consistent with subdivisions (a) and (b) of Section 25296.10 of the Health and Safety Code.

(b) (1) A public water system, or its customers, shall not be responsible for remediation or treatment costs associated with MTBE, or a product that contains MTBE. However, the public water system may, as necessary, incur MTBE remediation and treatment costs and include those costs in its customer rates and charges that are necessary to comply with drinking water standards or directives of the state board or other lawful authority. A public water system that incurs MTBE remediation or treatment costs may seek recovery of those costs from parties responsible for the MTBE contamination, or from other available alternative sources of funds.

(2) If the public water system has included the costs of MTBE treatment and remediation in its customer rates and charges, and subsequently recovers all, or a portion of, its MTBE treatment and remediation costs from responsible parties or other available alternative sources of funds, it shall make an adjustment to its schedule of rates and charges to reflect the amount of funding received from responsible parties or other available alternative sources of funds for MTBE treatment or remediation.

(3) Paragraph (1) does not prevent the imposition of liability on any person for the discharge of MTBE if that liability is due to the conduct or status of that person independently of whether the person happens to be a customer of the public water system.

(Amended by Stats. 2015, Ch. 673, Sec. 27. Effective January 1, 2016.)

§ 13286. *[Cove area of Cathedral City, Riverside County]*

(a) On and after January 1, 2012, the appropriate regional board shall prohibit the discharge of wastewater into the ground through the use of individual subsurface disposal systems in the Cove area of Cathedral City in Riverside County for the purposes of protecting the health and safety of the residents consuming the groundwater of the Upper Coachella Valley Groundwater Basin and achieving the applicable water quality objectives.

(b) The appropriate regional board shall revise its water quality control plan to reflect the prohibition set forth in subdivision (a).

(c) Notwithstanding subdivisions (a) and (b), the appropriate regional board, prior to January 1, 2012, may prohibit the discharge of wastewater through the use of individual subsurface disposal systems in the Cove area of Cathedral City in Riverside County, and if so prohibited, that board shall revise its water quality control plan to reflect the prohibition.

(d) To ensure that the purposes of this section are fulfilled, the state board, using existing resources, shall assist Cathedral City to identify and obtain state and federal funds to establish a sanitary public domestic and commercial wastewater disposal system.

(Added by Stats. 2001, Ch. 700, Sec. 2. Effective January 1, 2002.)

§ 13286.9. *[Secondary treatment requirements for Orange County Sanitation District]*

On and after the date determined by the Santa Ana Regional Water Quality Control Board, or January 1, 2013, whichever is earlier, all wastewater discharged by the Orange County Sanitation District into the Pacific Ocean shall be subject to at least secondary treatment requirements pursuant to subparagraph (B) of paragraph (1) of subsection (b) of Section 301 of the Clean Water Act (33 U.S.C. Sec. 1311(b)(1)(B)), and any more stringent requirements determined to be appropriate by the state board or that regional board.

(Added by Stats. 2002, Ch. 1019, Sec. 1. Effective September 28, 2002.)

CHAPTER 4.1. EX PARTE COMMUNICATIONS [13287. - 13287.]

(Chapter 4.1 added by Stats. 2012, Ch. 551, Sec. 4.)

§ 13287. *[Definitions; ex parte communications for certain general orders; disclosure requirements and remedies]*

(a) For the purposes of this section:

(1) "Board" means the state board or a regional board.

(2) "Ex parte communication" means an oral or written communication with one or more board members concerning matters, other than a matter of procedure or practice that is not in controversy, under the jurisdiction of a board, regarding a pending action of the board that satisfies both of the following:

(A) The action does not identify specific persons as dischargers, but instead allows persons to enroll or file an authorization to discharge under the action.

(B) The action is for adoption, modification, or rescission of one or more of the following:

(i) Waste discharge requirements pursuant to Section 13263 or 13377.

(ii) Conditions of water quality certification pursuant to Section 13160.

(iii) Conditional waiver of waste discharge requirements pursuant to Section 13269.

(3) "Interested person" means any of the following:

(A) Any person who will be required to enroll or file authorization to discharge pursuant to the action at issue before the board or that person's agents or employees, including persons receiving consideration to represent that person.

(B) Any person with a financial interest, as described in Article 1 (commencing with Section 87100) of Chapter 7 of Title 9 of the Government Code, in a matter at issue before a board, or that person's agents or employees, including persons receiving consideration to represent that person.

(C) A representative acting on behalf of any formally organized civic, environmental, neighborhood, business, labor, trade, or similar association who intends to influence the decision of a board member on a matter before the board.

(b) Notwithstanding Section 11425.10 of the Government Code, the ex parte communications provisions of the Administrative Procedure Act (Article 7 (commencing with Section 11430.10) of Chapter 4.5 of Part 1 of Division 3 of Title 2 of the Government Code) do not apply to a board action identified in paragraph (2) of subdivision (a). This section only applies to those actions.

(c) For the purposes of this section, and except as limited by subdivision (d), ex parte communications regarding a board action identified in paragraph (2) of subdivision (a) may be permitted as follows:

(1) All ex parte communications shall be reported by the interested person, regardless of whether the communication was initiated by the interested person.

(2) A notice of ex parte communication shall be filed with the board within seven working days of the communication. The notice may address multiple ex parte communications in the same proceeding, provided that notice of each communication identified therein is timely. The notice shall include all of the following information:

(A) The date, time, and location of the communication, and whether it was oral or written, or both.

(B) The identities of each board member involved, the person initiating the communication, and any persons present during the communication.

(C) A description of the interested person's communication and the content of this communication. A copy of any written, audiovisual, or other material used for or during the communication shall be attached to this description.

(3) Board staff shall promptly post any notices provided pursuant to paragraph (2) on the board's Internet Web site and distribute the notice on any available electronic distribution list concerning the action.

(d) A board may prohibit ex parte communications for a period beginning not more than 14 days before the day of a board meeting at which the decision in the proceeding is scheduled for board action. If a board continues the decision, it may permit ex parte communications during the interval between the originally scheduled date and the date that the decision is calendared for final decision, and may prohibit ex parte communications for 14 days before the day of the board meeting to which the decision is continued.

(e) If an interested person fails to provide any required notice in the manner required by this section, the board may use any of the remedies available pursuant to the administrative adjudication provisions of the Administrative Procedure Act (Chapter 4.5 (commencing with Section 11400) of Part 1 of Division 3 of Title 2 of the Government Code), including the issuance of an enforcement order, or sanctions pursuant to Article 12 (commencing with Section 11455.10) of Chapter 4 of Part 1 of Division 3 of Title 2 of the Government Code.

(Added by Stats. 2012, Ch. 551, Sec. 4. Effective January 1, 2013.)

CHAPTER 4.5. ONSITE SEWAGE TREATMENT SYSTEMS [13290. - 13291.7.]

(Chapter 4.5 added by Stats. 2000, Ch. 781, Sec. 1.)

§ 13290. *[Definitions]*

For the purposes of this chapter:

(a) "Local agency" means any of the following entities:

(1) A city, county, or city and county.

(2) A special district formed pursuant to general law or special act for the local performance of functions regarding onsite sewage treatment systems within limited boundaries.

(b) "Onsite sewage treatment systems" includes individual disposal systems, community collection and disposal systems, and alternative collection and disposal systems that use subsurface disposal.

(Added by Stats. 2000, Ch. 781, Sec. 1. Effective January 1, 2001.)

§ 13291. ***[Adoption of regulations or standards]***

(a) On or before January 1, 2004, the state board, in consultation with the State Department of Public Health, the California Coastal Commission, the California Conference of Directors of Environmental Health, counties, cities, and other interested parties, shall adopt regulations or standards for the permitting and operation of all of the following onsite sewage treatment systems in the state and shall apply those regulations or standards commencing six months after their adoptions:

(1) Any system that is constructed or replaced.

(2) Any system that is subject to a major repair.

(3) Any system that pools or discharges to the surface.

(4) Any system that, in the judgment of a regional board or authorized local agency, discharges waste that has the reasonable potential to cause a violation of water quality objectives, or to impair present or future beneficial uses of water, to cause pollution, nuisance, or contamination of the waters of the state.

(b) Regulations or standards adopted pursuant to subdivision (a), shall include, but shall not be limited to, all of the following:

(1) Minimum operating requirements that may include siting, construction, and performance requirements.

(2) Requirements for onsite sewage treatment systems adjacent to impaired waters identified pursuant to subdivision (d) of Section 303 of the Clean Water Act (33 U.S.C. Sec. 1313(d)).

(3) Requirements authorizing a qualified local agency to implement those requirements adopted under this chapter within its jurisdiction if that local agency requests that authorization.

(4) Requirements for corrective action when onsite sewage treatment systems fail to meet the requirements or standards.

(5) Minimum requirements for monitoring used to determine system or systems performance, if applicable.

(6) Exemption criteria to be established by regional boards.

(7) Requirements for determining a system that is subject to a major repair, as provided in paragraph (2) of subdivision (a).

(c) This chapter does not diminish or otherwise affect the authority of a local agency to carry out laws, other than this chapter, that relate to onsite sewage treatment systems.

(d) This chapter does not preempt any regional board or local agency from adopting or retaining standards for onsite sewage treatment systems that are more protective of the public health or the environment than this chapter.

(e) Each regional board shall incorporate the regulations or standards adopted pursuant to subdivisions (a) and (b) into the appropriate regional water quality control plans.

(Amended by Stats. 2010, Ch. 288, Sec. 26. Effective January 1, 2011.)

§ 13291.5. *[Legislative intent]*

It is the intent of the Legislature to assist private property owners with existing systems who incur costs as a result of the implementation of the regulations established under this section by encouraging the state board to make loans under Chapter 6.5 (commencing with Section 13475) to local agencies to assist private property owners whose cost of compliance with these regulations exceeds one-half of one percent of the current assessed value of the property on which the onsite sewage system is located.

(Added by Stats. 2000, Ch. 781, Sec. 1. Effective January 1, 2001.)

§ 13291.7. *[Non-limiting clause]*

Nothing in this chapter shall be construed to limit the land use authority of any city, county, or city and county.

(Added by Stats. 2000, Ch. 781, Sec. 1. Effective January 1, 2001.)

CHAPTER 4.7. FAIRNESS AND DUE PROCESS [13292. - 13292.]

(Chapter 4.7 added by Stats. 2002, Ch. 604, Sec. 1.)

§ 13292. *[Review of regional boards' public participation procedures; report to Legislature; copies of comments; training]*

(a) It is the responsibility of the state board to provide guidance to the regional boards in matters of procedure, as well as policy and regulation. In order to ensure that regional boards are providing fair, timely, and equal access to all participants in regional board proceedings, the state board shall undertake a review of the regional boards' public participation procedures. As part of the review process, and upon request by the state board, the regional boards shall solicit comments from participants in their proceedings. Upon completion of the review, the state board shall report to the Legislature regarding its findings and include recommendations to improve regional board public participation processes.

(b) (1) The state board shall provide annual training to regional board members to improve public participation and adjudication procedures at the regional level.

(2) Paragraph (1) shall be implemented only during fiscal years for which funding is provided for the purposes of that paragraph in the annual Budget Act or in another statute.
(Amended by Stats. 2006, Ch. 404, Sec. 2. Effective January 1, 2007.)

CHAPTER 5. ENFORCEMENT AND IMPLEMENTATION [13300. - 13365.]

(Chapter 5 added by Stats. 1969, Ch. 482.)

Article 1. Administrative Enforcement and Remedies [13300. - 13308.]

(Heading of Article 1 amended by Stats. 2010, Ch. 288, Sec. 27.)

§ 13300. ***[Time schedules]***
Whenever a regional board finds that a discharge of waste is taking place or threatening to take place that violates or will violate requirements prescribed by the regional board, or the state board, or that the waste collection, treatment, or disposal facilities of a discharger are approaching capacity, the board may require the discharger to submit for approval of the board, with such modifications as it may deem necessary, a detailed time schedule of specific actions the discharger shall take in order to correct or prevent a violation of requirements.
(Amended by Stats. 1971, Ch. 1288.)

§ 13301. ***[Cease and desist order]***
When a regional board finds that a discharge of waste is taking place, or threatening to take place, in violation of requirements or discharge prohibitions prescribed by the regional board or the state board, the board may issue an order to cease and desist and direct that those persons not complying with the requirements or discharge prohibitions (a) comply forthwith, (b) comply in accordance with a time schedule set by the board, or (c) in the event of a threatened violation, take appropriate remedial or preventive action. In the event of an existing or threatened violation of waste discharge requirements in the operation of a community sewer system, cease and desist orders may restrict or prohibit the volume, type, or concentration of waste that might be added to that system by dischargers who did not discharge into the system prior to the issuance of the cease and desist order. Cease and desist orders may be issued directly by a board, after notice and hearing.
(Amended by Stats. 2002, Ch. 420, Sec. 5. Effective January 1, 2003.)

§ 13301.1. ***[Assistance with order]***
The regional board shall render to persons against whom a cease and desist order is issued pursuant to Section 13301 all possible assistance in making available current information on successful and economical water quality control programs, as such information is developed by the state board pursuant

to Section 13167, and information and assistance in applying for federal and state funds necessary to comply with the cease and desist order.
(Added by Stats. 1970, Ch. 1464.)

§ 13303. ***[Effective date]***
Cease and desist orders of the board shall become effective and final upon issuance thereof. Copies shall be served forthwith by personal service or by registered mail upon the person being charged with the violation of the requirements and upon other affected persons who appeared at the hearing and requested a copy.
(Amended by Stats. 1972, Ch. 813.)

§ 13304. ***[Cleanup and abatement]***

(a) A person who has discharged or discharges waste into the waters of this state in violation of any waste discharge requirement or other order or prohibition issued by a regional board or the state board, or who has caused or permitted, causes or permits, or threatens to cause or permit any waste to be discharged or deposited where it is, or probably will be, discharged into the waters of the state and creates, or threatens to create, a condition of pollution or nuisance, shall, upon order of the regional board, clean up the waste or abate the effects of the waste, or, in the case of threatened pollution or nuisance, take other necessary remedial action, including, but not limited to, overseeing cleanup and abatement efforts. A cleanup and abatement order issued by the state board or a regional board may require the provision of, or payment for, uninterrupted replacement water service, which may include wellhead treatment, to each affected public water supplier or private well owner. Upon failure of a person to comply with the cleanup or abatement order, the Attorney General, at the request of the board, shall petition the superior court for that county for the issuance of an injunction requiring the person to comply with the order. In the suit, the court shall have jurisdiction to grant a prohibitory or mandatory injunction, either preliminary or permanent, as the facts may warrant.

(b) (1) The regional board may expend available moneys to perform any cleanup, abatement, or remedial work required under the circumstances set forth in subdivision (a), including, but not limited to, supervision of cleanup and abatement activities that, in its judgment, is required by the magnitude of the endeavor or the urgency for prompt action to prevent substantial pollution, nuisance, or injury to any waters of the state. The action may be taken in default of, or in addition to, remedial work by the waste discharger or other persons, and regardless of whether injunctive relief is being sought.

(2) The regional board may perform the work itself, or with the cooperation of any other governmental agency, and may use rented tools or equipment, either with operators furnished or unoperated. Notwithstanding any

other provisions of law, the regional board may enter into oral contracts for the work, and the contracts, whether written or oral, may include provisions for equipment rental and in addition the furnishing of labor and materials necessary to accomplish the work. The contracts shall not be subject to approval by the Department of General Services.

(3) The regional board shall be permitted reasonable access to the affected property as necessary to perform any cleanup, abatement, or other remedial work. The access shall be obtained with the consent of the owner or possessor of the property or, if the consent is withheld, with a warrant duly issued pursuant to the procedure described in Title 13 (commencing with Section 1822.50) of Part 3 of the Code of Civil Procedure. However, in the event of an emergency affecting public health or safety, the regional board may enter the property without consent or the issuance of a warrant.

(4) The regional board may contract with a water agency to perform, under the direction of the regional board, investigations of existing or threatened groundwater pollution or nuisance. The agency's cost of performing the contracted services shall be reimbursed by the regional board from the first available funds obtained from cost recovery actions for the specific site. The authority of a regional board to contract with a water agency is limited to a water agency that draws groundwater from the affected aquifer, a metropolitan water district, or a local public agency responsible for water supply or water quality in a groundwater basin.

(5) (A) If the state board or regional board, either directly or by contracting for services, undertakes to perform an investigation, cleanup, abatement, or other remedial work, both of the following shall apply:

(i) The state board, regional board, or an employee of the state board or regional board shall not be held liable in a civil proceeding for trespass or any other act that is necessary to carry out an investigation, cleanup, abatement, or other remedial work.

(ii) The state board, regional board, or any authorized person shall not incur any obligation to undertake additional investigation, cleanup, abatement, or other remedial work, solely as a result of having conducted the work.

(B) The following applies for purposes of this paragraph:

(i) "Authorized person" means any of the following:

(I) An employee or independent contractor of the state board or regional board.

(II) A person from whom investigation, cleanup, abatement, or other remedial work is contracted by the state board or regional board.

(III) An employee or independent contractor of a person described in subclause (I) or (II).

(ii) "Investigation, cleanup, abatement, or other remedial work" includes investigation, cleanup, abatement, or other remedial work performed pursuant

to this section or Section 13267, or corrective action performed pursuant to Section 25296.10 or 25299.36 of the Health and Safety Code.

(C) It is not the intent of this paragraph to do any of the following:

(i) Impair any cause of action by the state board or regional board against any person, including, but not limited to, a cause of action for breach of contract or indemnity.

(ii) Limit the state board's or regional board's authority over any person.

(iii) Limit any other applicable defenses to liability or create a cause of action.

(c) (1) If the waste is cleaned up or the effects of the waste are abated, or, in the case of threatened pollution or nuisance, other necessary remedial action is taken by a governmental agency, the person or persons who discharged the waste, discharges the waste, or threatened to cause or permit the discharge of the waste within the meaning of subdivision (a), are liable to that governmental agency to the extent of the reasonable costs actually incurred in cleaning up the waste, abating the effects of the waste, supervising cleanup or abatement activities, or taking other remedial action. The amount of the costs is recoverable in a civil action by, and paid to, the governmental agency and the state board to the extent of the latter's contribution to the cleanup costs from the State Water Pollution Cleanup and Abatement Account or other available funds.

(2) The amount of the costs constitutes a lien on the affected property upon service of a copy of the notice of lien on the owner and upon the recordation of a notice of lien, that identifies the property on which the condition was abated, the amount of the lien, and the owner of record of the property, in the office of the county recorder of the county in which the property is located. Upon recordation, the lien has the same force, effect, and priority as a judgment lien, except that it attaches only to the property posted and described in the notice of lien, and shall continue for 10 years from the time of the recording of the notice, unless sooner released or otherwise discharged. No later than 45 days after receiving a notice of lien, the owner may petition the court for an order releasing the property from the lien or reducing the amount of the lien. In this court action, the governmental agency that incurred the cleanup costs shall establish that the costs were reasonable and necessary. The lien may be foreclosed by an action brought by the state board on behalf of the regional board for a money judgment. Moneys recovered by a judgment in favor of the state board shall be deposited in the State Water Pollution Cleanup and Abatement Account.

(d) If, despite reasonable efforts by the regional board to identify the person responsible for the discharge of waste or the condition of pollution or nuisance, the person is not identified at the time cleanup, abatement, or

remedial work is required to be performed, the regional board is not required to issue an order under this section.

(e) "Threaten," for purposes of this section, means a condition creating a substantial probability of harm, when the probability and potential extent of harm make it reasonably necessary to take immediate action to prevent, reduce, or mitigate damages to persons, property, or natural resources.

(f) Replacement water provided pursuant to subdivision (a) shall meet all applicable federal, state, and local drinking water standards, and shall have comparable quality to that pumped by the public water system or private well owner before the discharge of waste.

(g) (1) A public water supplier or private well owner receiving replacement water by reason of an order issued pursuant to subdivision (a), or a person or entity who is ordered to provide replacement water pursuant to subdivision (a), may request nonbinding mediation of all replacement water claims.

(2) If requested, the public water suppliers receiving the replacement water and the persons or entities ordered to provide the replacement water, within 30 days of the submittal of a water replacement plan, shall engage in at least one confidential settlement discussion before a mutually acceptable mediator.

(3) Any agreement between parties regarding replacement water claims resulting from participation in the nonbinding mediation process shall be consistent with the requirements of any cleanup and abatement order.

(4) A regional board or the state board is not required to participate in any nonbinding mediation requested pursuant to paragraph (1).

(5) The party or parties requesting the mediation shall pay for the costs of the mediation.

(h) As part of a cleanup and abatement order that requires the provision of replacement water, a regional board or the state board shall request a water replacement plan from the discharger in cases where replacement water is to be provided for more than 30 days. The water replacement plan is subject to the approval of the regional board or the state board before its implementation.

(i) A "water replacement plan" means a plan pursuant to which the discharger will provide replacement water in accordance with a cleanup and abatement order.

(j) This section does not impose any new liability for acts occurring before January 1, 1981, if the acts were not in violation of existing laws or regulations at the time they occurred.

(k) Nothing in this section limits the authority of a state agency under any other law or regulation to enforce or administer any cleanup or abatement activity.

(*l*) The Legislature declares that the amendments made to subdivision (a) by Chapter 614 of the Statutes of 2003 do not constitute a change in, but are declaratory of, existing law.

(m) Paragraph (5) of subdivision (b) shall apply to a claim presented pursuant to Part 3 (commencing with Section 900) of Division 3.6 of Title 1 of the Government Code on or after January 1, 2015, or, if no claim is presented pursuant to those provisions, to a cause of action in a civil complaint or writ petition filed on or after January 1, 2015.

(Amended by Stats. 2014, Ch. 739, Sec. 1. Effective January 1, 2015.)

§ 13304.1. *[Groundwater cleanup systems; consultation]*

(a) A groundwater cleanup system that commences operation on or after January 1, 2002, and that is required to obtain a discharge permit from the regional board pursuant to the regional board's jurisdiction, and that discharges treated groundwater to surface water or groundwater, shall treat the groundwater to standards approved by the regional board, consistent with this division and taking into account the beneficial uses of the receiving water and the location of the discharge and the method by which the discharge takes place.

(b) In making its determination of the applicable water quality standards to be achieved by the operator of a groundwater cleanup system that commences operation on or after January 1, 2002, that draws groundwater from an aquifer that is currently being used, or has been used at any time since 1979 as a source of drinking water supply by the owner or operator of a public water system, and that discharges treated groundwater to surface water or groundwater from which a public water system draws drinking water, the regional board shall consult with the affected groundwater management entity, if any, affected public water systems, and the state board to ensure that the discharge, spreading, or injection of the treated groundwater will not adversely affect the beneficial uses of any groundwater basin or surface water body that is or may be used by a public water system for the provision of drinking water.

(Amended by Stats. 2015, Ch. 673, Sec. 28. Effective January 1, 2016.)

§ 13304.2. *[Human health or ecological risk assessment]*

(a) For purposes of this section, "brownfield site" means a real estate parcel or improvements located on the parcel, or both that parcel and the improvements, that is abandoned, idled, or underused, due to environmental contamination and that is proposed to be redeveloped.

(b) The state board or a regional board may require a person conducting cleanup, abatement, or other remedial action pursuant to Section 13304 for a brownfield site to assess the potential human health or ecological risks caused or created by the discharge, using human health and environmental screening levels or a site-specific assessment of risks.

(c) In conducting a site-specific assessment of human health or ecological risks, the discharger shall address all of the following factors to the extent relevant based on site-specific conditions:

(1) An evaluation of risks posed by acutely toxic hazardous substances.

(2) An evaluation of risks posed by carcinogenic or other hazardous substances that may cause chronic disease.

(3) Consideration of possible synergistic effects resulting from exposure to, or interaction with, two or more hazardous substances.

(4) Consideration of the effect of hazardous substances upon subgroups that comprise a meaningful portion of the general population, including, but not limited to, infants, children, pregnant women, or other subpopulations that are identifiable as being at greater risk than the general population of adverse health effects due to exposure to hazardous substances.

(5) Consideration of exposure level and body burden level that alter physiological function or structure in a manner that may significantly increase the risk of illness and of exposure to hazardous substances in all media, including, but not limited to, exposures in drinking water, food, ambient and indoor air, or soil.

(6) The development of reasonable maximum estimates of exposure for both current land use conditions and reasonably foreseeable future land uses at the site.

(7) The development of reasonable maximum estimates of exposure to volatile organic compounds that may enter structures that are on the site or that are proposed to be constructed on the site and that may cause exposure due to accumulation of these volatile organic compounds in the indoor air of those structures.

(d) The state board or a regional board may document its decision to require a site-specific assessment of human health or ecological risks in a letter issued to the discharger pursuant to Section 13267, through amendment of the cleanup and abatement order issued pursuant to Section 13304, or through other written means that the board deems appropriate.

(e) (1) Except as provided in paragraph (2), this section applies only to an order issued by the state board or a regional board issued pursuant to Section 13304 on or after January 1, 2008.

(2) The state board or a regional board may require a site-specific assessment of human health or ecological risks at a brownfield site that is subject to an order issued before January 1, 2008, only if the state board or a regional board makes a determination that site-specific circumstances demonstrate the need for that assessment. A site-specific assessment pursuant to this paragraph shall be done in accordance with the authority granted to the state board or a regional board pursuant to this division, as it read on December 31, 2007.

(Added by Stats. 2007, Ch. 597, Sec. 2. Effective January 1, 2008.)

§ 13305. ***[Nonoperating location]***

(a) Upon determining that a condition of pollution or nuisance exists that has resulted from a nonoperating industrial or business location within its region, a regional board may cause notice of the condition to be posted upon the property in question. The notice shall state that the condition constitutes either a condition of pollution or nuisance that is required to be abated by correction of the condition, or a condition that will be corrected by the city, county, other public agency, or regional board at the property owner's expense. The notice shall further state that all property owners having any objections to the proposed correction of the condition may attend a hearing to be held by the regional board at a time not less than 10 days from the posting of the notice.

(b) Notice of the hearing prescribed in this section shall be given in the county where the property is located pursuant to Section 6061 of the Government Code.

(c) In addition to posting and publication, notice as required in this section shall be mailed to the property owners as their names and addresses appear from the last equalized assessment roll.

(d) At the time stated in the notices, the regional board shall hear and consider all objections or protests, if any, to the proposed correction of the condition, and may continue the hearing from time to time.

(e) (1) After final action is taken by the regional board on the disposition of any protests or objections, or if no protests or objections are received, the regional board shall request the city, county, or other public agency in which the condition of pollution or nuisance exists to abate the condition or nuisance.

(2) If the city, county, or other public agency does not abate the condition within a reasonable time, the regional board shall cause the condition to be abated. The regional board may proceed by force account, contract or other agreement, or any other method deemed most expedient by the regional board, and shall apply to the state board for the necessary funds.

(3) The regional board shall be permitted reasonable access to the affected property as necessary to perform any cleanup, abatement, or other remedial work. Access shall be obtained with the consent of the owner or possessor of the property, or, if the consent is withheld, with a warrant duly issued pursuant to the procedure described in Title 13 (commencing with Section 1822.50) of Part 3 of the Code of Civil Procedure. However, in the event of an emergency affecting public health or safety, the regional board may enter the property without consent or the issuance of a warrant.

(f) The owner of the property on which the condition exists, or is created, is liable for all reasonable costs incurred by the regional board or any city, county, or public agency in abating the condition. The amount of the cost for

abating the condition upon the property in question constitutes a lien upon the property so posted upon the recordation of a notice of lien, which identifies the property on which the condition was abated, the amount the lien, and the owner of record of the property, in the office of the county recorder of the county in which the property is located. Upon recordation, the lien has the same force, effect, and priority as a judgment lien, except that it attaches only to the property so posted and described in the notice of lien, and shall continue for 10 years from the time of the recording of the notice unless sooner released or otherwise discharged. The lien may be foreclosed by an action brought by the city, county, other public agency, or state board, on behalf of the regional board, for a money judgment. Money recovered by a judgment in favor of the state board shall be returned to the State Water Pollution Cleanup and Abatement Account.

(g) The city, county, other public agency, or state board on behalf of a regional board, may, at any time, release all, or any portion, of the property subject to a lien imposed pursuant to subdivision (f) from the lien or subordinate the lien to other liens and encumbrances if it determines that the amount owed is sufficiently secured by a lien on other property or that the release or subordination of the lien will not jeopardize the collection of the amount owed. A certificate by the state board, city, county, or other public agency to the effect that any property has been released from the lien or that the lien has been subordinated to other liens and encumbrances is conclusive evidence that the property has been released or that the lien has been subordinated as provided in the certificate.

(h) As used in this section, the words "nonoperating" or "not in operation" mean the business is not conducting routine operations usually associated with that kind of business.

(i) Nothing in this section limits the authority of any state agency under any other law or regulation to enforce or administer any cleanup or abatement activity.

(Amended by Stats. 2005, Ch. 22, Sec. 210. Effective January 1, 2006.)

§ 13306. *[Majority requirement]*

A majority vote of the entire membership of a regional board shall be required to adopt, rescind, or modify any enforcement action authorized by Section 13301.

(Added by Stats. 1976, Ch. 1165.)

§ 13307. *[Supervision of abatement]*

(a) The state board and the Department of Toxic Substances Control shall concurrently establish policies and procedures consistent with this division that the state board's representatives and the representatives of regional boards shall follow in overseeing and supervising the activities of persons who are

carrying out the investigation of, and cleaning up or abating the effects of, a discharge of a hazardous substance which creates, or threatens to create, a condition of contamination, pollution, or nuisance. The policies and procedures shall be consistent with the policies and procedures established pursuant to Section 25355.7 of the Health and Safety Code and shall include, but are not limited to, all of the following:

(1) The procedures the state board and the regional boards will follow in making decisions as to when a person may be required to undertake an investigation to determine if an unauthorized hazardous substance discharge has occurred.

(2) Policies for carrying out a phased, step-by-step investigation to determine the nature and extent of possible soil and groundwater contamination or pollution at a site.

(3) Procedures for identifying and utilizing the most cost-effective methods for detecting contamination or pollution and cleaning up or abating the effects of contamination or pollution.

(4) Policies for determining reasonable schedules for investigation and cleanup, abatement, or other remedial action at a site. The policies shall recognize the dangers to public health and the waters of the state posed by an unauthorized discharge and the need to mitigate those dangers while at the same time taking into account, to the extent possible, the resources, both financial and technical, available to the person responsible for the discharge.

(b) The state board and the Department of Toxic Substances Control shall jointly review the policies and procedures that were established pursuant to this section and Section 25355.7 of the Health and Safety Code prior to the enactment of this subdivision and shall concurrently revise those policies and procedures as necessary to make them as consistent as possible. Where they cannot be made consistent because of the differing requirements of this chapter and Chapter 6.8 (commencing with Section 25300) of Division 20 of the Health and Safety Code, the state board and the Department of Toxic Substances Control shall, by July 1, 1994, jointly develop, and send to the Legislature, recommendations for revising this chapter and Chapter 6.8 (commencing with Section 25300) of Division 20 of the Health and Safety Code in order to make consistent the hazardous substance release cleanup policies and procedures followed by the state board, the Department of Toxic Substances Control, and the regional boards.

(Amended by Stats. 1993, Ch. 523, Sec. 2. Effective January 1, 1994.)

§ 13307.1. *[Notification of owners]*

(a) The state board and the regional boards shall not consider cleanup or site closure proposals from the primary or active responsible discharger, issue a closure letter, or make a determination that no further action is required with

respect to a site subject to a cleanup or abatement order pursuant to Section 13304, unless all current record owners of fee title to the site of the proposed action have been notified of the proposed action by the state board or regional board.

(b) The state board and regional boards shall take all reasonable steps necessary to accommodate responsible landowner participation in the cleanup or site closure process and shall consider all input and recommendations from any responsible landowner wishing to participate.

(c) In addition to the requirements of subdivision (a), if the state board or the regional board finds that the property is not suitable for unrestricted use and that a land use restriction is necessary for the protection of public health, safety, or the environment, then the state board and the regional boards may not issue a closure letter, or make a determination that no further action is required, with respect to a site that is subject to a cleanup or abatement order pursuant to Section 13304 and that is not an underground storage tank site, unless a land use restriction is recorded or required to be recorded pursuant to Section 1471 of the Civil Code.

(Amended by Stats. 2003, Ch. 62, Sec. 313. Effective January 1, 2004.)

§ 13307.5. ***[Notice and public participation for specified cleanup proposals]***

(a) The regional board shall take all of the following actions when reviewing or approving a cleanup proposal from a primary or active responsible discharger with respect to a site issued a cleanup and abatement order pursuant to Section 13304:

(1) Provide to all of the following, notification, in a factsheet format or another appropriate format, in English and any other languages commonly spoken in the area, as appropriate, of the proposed decision to approve the cleanup proposal for the site, including a contact list of appropriate regional board staff:

(A) An affected or potentially affected property owner, resident, or occupant in the area of the site.

(B) An appropriate governmental entity, including a local governmental entity with jurisdiction over the site.

(2) Provide timely access to written material, including reports and plans, addenda, and other supporting documentation, including materials listed as references, at the regional board's office and at a local repository in the area of the site, and, to the maximum extent possible, by posting on the Internet and acting in accordance with subdivision (a) of Section 13196.

(3) Provide no less than 30 days for an interested person to review and comment on the cleanup proposal regarding the site. The regional board shall consider any comments received before taking final action on a cleanup proposal regarding the site.

(4) Conduct a public meeting in the area of the site during the public comment period pursuant to paragraph (3), if any of the following conditions applies:

(A) A public meeting is requested by an affected or potentially affected property owner, resident, or occupant, in the area of the site.

(B) The level of expressed public interest warrants the conduct of a public meeting.

(C) A public meeting is specifically mandated by statute.

(D) The regional board determines that the existing site contamination poses a significant public health threat.

(b) In undertaking the requirements of this section, a regional board shall, to the extent possible, coordinate and integrate the public participation activities described in this section with those undertaken by the host jurisdiction and other public entities associated with development, investigation, or the response action at the site, in order to avoid unnecessary duplication and to integrate the public participation efforts of local government.

(c) For purposes of this section, "site" has the same meaning as defined in Section 25395.79.2 of the Health and Safety Code.

(Added by Stats. 2006, Ch. 562, Sec. 3. Effective January 1, 2007.)

§ 13307.6. *[Optional public participation]*

(a) In addition to the requirements of Section 13307.5, the regional board may develop and use any of the following procedures to disseminate information and assist the regional board in gathering community input regarding a site, if the regional board determines there is expressed community interest in the site, or the existing site contamination poses a significant public health threat:

(1) An annual factsheet.

(2) Internet posting or electronic distribution of an electronic copy of a document or report.

(3) An electronic comment or electronic feedback form.

(4) Formation and facilitation of an advisory group.

(5) An additional public meeting or workshop.

(6) Extension of a public comment period.

(7) Preparation of a public participation plan.

(8) Creation of a mailing list for notifying an interested party of a major regional board decision and the regional board's proposed or planned activity regarding the site.

(b) For purposes of this section, "site" has the same meaning as defined in Section 25395.79.2 of the Health and Safety Code.

(Added by Stats. 2006, Ch. 562, Sec. 4. Effective January 1, 2007.)

§ 13308. *[Violation of order; penalty]*

(a) If the regional board determines there is a threatened or continuing violation of any cleanup or abatement order, cease and desist order, or any order issued under Section 13267 or 13383, the regional board may issue an order establishing a time schedule and prescribing a civil penalty which shall become due if compliance is not achieved in accordance with that time schedule.

(b) The amount of the civil penalty shall be based upon the amount reasonably necessary to achieve compliance, and may not include any amount intended to punish or redress previous violations. The amount of the penalty may not exceed ten thousand dollars ($10,000) for each day in which the violation occurs.

(c) Any person who fails to achieve compliance in accordance with the schedule established in an order issued pursuant to subdivision (a) shall be liable civilly in an amount not to exceed the amount prescribed by the order. The regional board may impose the penalty administratively in accordance with Article 2.5 (commencing with Section 13323). If the regional board imposes the penalty in an amount less than the amount prescribed in the order issued pursuant to subdivision (a), the regional board shall make express findings setting forth the reasons for its action based on the specific factors required to be considered pursuant to Section 13327.

(d) The state board may exercise the powers of a regional board under this section if the violation or threatened violation involves requirements prescribed by an order issued by the state board.

(e) Funds collected pursuant to this section shall be deposited in the State Water Pollution Cleanup and Abatement Account.

(f) Civil liability may be imposed pursuant to this section only if civil liability is not imposed pursuant to Section 13261, 13265, 13268, 13350, or 13385.

(Added by Stats. 1994, Ch. 45, Sec. 3. Effective January 1, 1995.)

Article 2. Administrative Review by the State Board [13320. - 13321.]

(Heading of Article 2 amended by Stats. 2010, Ch. 288, Sec. 29.)

§ 13320. *[Review by state board of regional board action]*

(a) Within 30 days of any action or failure to act by a regional board under subdivision (c) of Section 13225, Article 4 (commencing with Section 13260) of Chapter 4, Chapter 5 (commencing with Section 13300), Chapter 5.5 (commencing with Section 13370), Chapter 5.9 (commencing with Section 13399.25), or Chapter 7 (commencing with Section 13500), an aggrieved person may petition the state board to review that action or failure to act. In case of a failure to act, the 30-day period shall commence upon the refusal of the regional board to act, or 60 days after request has been made to the regional

board to act. The state board may, on its own motion, at any time, review the regional board's action or failure to act.

(b) The evidence before the state board shall consist of the record before the regional board, and any other relevant evidence which, in the judgment of the state board, should be considered to effectuate and implement the policies of this division.

(c) The state board may find that the action of the regional board, or the failure of the regional board to act, was appropriate and proper. Upon finding that the action of the regional board, or the failure of the regional board to act, was inappropriate or improper, the state board may direct that the appropriate action be taken by the regional board, refer the matter to another state agency having jurisdiction, take the appropriate action itself, or take any combination of those actions. In taking any action, the state board is vested with all the powers of the regional boards under this division.

(d) If a waste discharge in one region affects the waters in another region and there is any disagreement between the regional boards involved as to the requirements that should be established, either regional board may submit the disagreement to the state board, which shall determine the applicable requirements.

(e) If a petition for state board review of a regional board action on waste discharge requirements includes a request for a stay of the waste discharge requirements, the state board shall act on the requested stay portion of the petition within 60 days of accepting the petition. The board may order any stay to be in effect from the effective date of the waste discharge requirements. *(Amended by Stats. 2010, Ch. 288, Sec. 30. Effective January 1, 2011.)*

§ 13321. ***[Stay of action]***

(a) (1) In the case of a review by the state board under Section 13320 or review by the state board of a decision or order issued under authority delegated to an officer or employee of the state board where the state board by regulation has authorized a petition for reconsideration, the state board, upon notice and hearing, if a hearing is requested, may stay in whole or in part the effect of the decision or order of a regional board or of the state board. Except as provided in paragraph (2), the state board shall issue or deny the stay within 90 days of receipt of a request for stay that complies with the applicable regulations for requesting a stay. The party requesting the stay may extend the 90-day period.

(2) (A) If the request for stay relates to either of the following, the state board shall issue or deny the stay within 45 days of receipt of a request for stay that complies with the applicable regulations for requesting the stay:

(i) A water quality certification issued under Section 13160 authority delegated to an officer or employee of the state board for a discharge for a

proposed activity associated with a hydroelectric facility and the proposed activity requires a license or an amendment to a license issued by the Federal Energy Regulatory Commission.

(ii) A cleanup and abatement order issued under Section 13304 authority delegated to an officer or employee of the state board or a regional board that requires the provision of alternate water supplies within 120 days of the date of the order.

(B) The party requesting a stay may extend the 45-day period described in subparagraph (A).

(3) If the state board fails to issue or deny the stay within the applicable period specified in paragraph (1) or (2), the request for stay shall be deemed denied on the first day following the applicable period.

(b) (1) Within 30 days of any order of the state board issuing or denying a stay or within 30 days of a stay being deemed denied pursuant to paragraph (3) of subdivision (a), any aggrieved party may file with the superior court a petition for writ of mandate for review of the state board's order issuing or denying a stay or failure to issue or deny a stay.

(2) (A) Except as otherwise provided in this section, Section 1094.5 of the Code of Civil Procedure shall govern proceedings for which petitions are filed under this section.

(B) If the superior court finds that the state board failed to follow the procedures specified in subdivision (a) or otherwise prejudicially abused its discretion, the superior court may set aside the state board's order issuing or denying the stay and may stay, in whole or in part, the effect of the decision or order of a regional board or of the state board pending review by the state board.

(C) Notwithstanding subparagraph (A) or (B), if a request for stay is subject to paragraph (2) of subdivision (a), the superior court may proceed without a certified administrative record and may stay, in whole or in part, the effect of the order or decision issued under delegated authority pending the state board's review of the order or decision, however, no such stay shall be imposed if the court is satisfied that it is against the public interest.

(3) In an action under this section or Section 13330 involving a water quality certification issued pursuant to Section 13160, the court shall not issue a stay or other order that enjoins or has the effect of preventing the state board from taking action necessary to avoid a waiver of water quality certification for failure to act within the period provided under federal law. In determining whether there is a risk of waiver, the court shall consider the applicable regulations or policies of the federal agency issuing the permit or license subject to the water quality certification.

(c) If the state board or the superior court grants a stay under this section, the stay may be made effective as of the effective date of the regional board or state board decision or order.

(d) If a petition is filed with the superior court under Section 13330, any stay in effect at the time of the filing of the petition shall remain in effect by operation of law for a period of 20 days from the date of the filing of that petition.

(Amended by Stats. 2016, Ch. 523, Sec. 2. Effective January 1, 2017.)

Article 2.5. Administrative Civil Liability [13323. - 13328.]

(Article 2.5 added by Stats. 1984, Ch. 1541, Sec. 4.)

§ 13323. *[Imposition of civil liability]*

(a) Any executive officer of a regional board may issue a complaint to any person on whom administrative civil liability may be imposed pursuant to this article. The complaint shall allege the act or failure to act that constitutes a violation of law, the provision of law authorizing civil liability to be imposed pursuant to this article, and the proposed civil liability.

(b) The complaint shall be served by certified mail or in accordance with Article 3 (commencing with Section 415.10) of, and Article 4 (commencing with Section 416.10) of, Chapter 4 of Title 5 of Part 2 of the Code of Civil Procedure, and shall inform the party so served that a hearing before the regional board shall be conducted within 90 days after the party has been served. The person who has been issued a complaint may waive the right to a hearing.

(c) In proceedings under this article for imposition of administrative civil liability by the state board, the executive director of the state board shall issue the complaint and any hearing shall be before the state board, or before a member of the state board in accordance with Section 183, and shall be conducted not later than 90 days after the party has been served.

(d) Orders imposing administrative civil liability shall become effective and final upon issuance thereof, and are not subject to review by any court or agency except as provided by Sections 13320 and 13330. Payment shall be made not later than 30 days from the date on which the order is issued. The time for payment is extended during the period in which a person who is subject to an order seeks review under Section 13320 or 13330. Copies of these orders shall be served by certified mail or in accordance with Article 3 (commencing with Section 415.10) of, and Article 4 (commencing with Section 416.10) of, Chapter 4 of Title 5 of Part 2 of the Code of Civil Procedure upon the party served with the complaint and shall be provided to other persons who appeared at the hearing and requested a copy.

(e) Information relating to hearing waivers and the imposition of administrative civil liability, as proposed to be imposed and as finally imposed,

under this section shall be made available to the public by means of the Internet.
(Amended by Stats. 2006, Ch. 293, Sec. 4. Effective January 1, 2007.)

§ 13326. ***[Limitation to civil liability]***
No person shall be subject to both civil liability imposed under this article and civil liability imposed by the superior court under Articles 5 (commencing with Section 13350) and 6 (commencing with Section 13360) for the same act or failure to act.
(Added by Stats. 1984, Ch. 1541, Sec. 4.)

§ 13327. ***[Amount of liability]***
In determining the amount of civil liability, the regional board, and the state board upon review of any order pursuant to Section 13320, shall take into consideration the nature, circumstance, extent, and gravity of the violation or violations, whether the discharge is susceptible to cleanup or abatement, the degree of toxicity of the discharge, and, with respect to the violator, the ability to pay, the effect on ability to continue in business, any voluntary cleanup efforts undertaken, any prior history of violations, the degree of culpability, economic benefit or savings, if any, resulting from the violation, and other matters as justice may require.
(Amended by Stats. 2001, Ch. 869, Sec. 4.5. Effective January 1, 2002.)

§ 13328. ***[Judgment to collect]***
After the time for judicial review under Section 13330 has expired, the state board may apply to the clerk of the appropriate court in the county in which the civil liability or penalty was imposed, for a judgment to collect the civil liability or penalty. The application, which shall include a certified copy of the state board or regional board action, constitutes a sufficient showing to warrant issuance of the judgment. The court clerk shall enter the judgment immediately in conformity with the application. The judgment so entered has the same force and effect as, and is subject to all the provisions of law relating to, a judgment in a civil action, and may be enforced in the same manner as any other judgment of the court in which it is entered.
(Amended by Stats. 2002, Ch. 420, Sec. 8. Effective January 1, 2003.)

Article 3. Judicial Review and Enforcement [13330. - 13331.]

(Article 3 added by Stats. 1969, Ch. 482.)

§ 13330. ***[Petition for judicial review]***
(a) Not later than 30 days from the date of service of a copy of a decision or order issued by the state board under this division, other than a decision or order issued pursuant to Article 7 (commencing with Section 13550) of Chapter 7, any aggrieved party may file with the superior court a petition for writ of mandate for review of the decision or order. An aggrieved party must file a

petition for reconsideration with the state board to exhaust that party's administrative remedies only if the initial decision or order is issued under authority delegated to an officer or employee of the state board and the state board by regulation has authorized a petition for reconsideration. The state board shall order or deny reconsideration on a petition therefor not later than 90 days from the date the state board adopts the decision or order.

(b) A party aggrieved by a final decision or order of a regional board subject to review under Section 13320 may obtain review of the decision or order of the regional board in the superior court by filing in the court a petition for writ of mandate not later than 30 days from the date on which the state board denies review.

(c) The time for filing an action or proceeding subject to Section 21167 of the Public Resources Code for a person who seeks review of the regional board's decision or order under Section 13320, or who seeks reconsideration under a state board regulation authorizing a petition for reconsideration, shall commence upon the state board's completion of that review or reconsideration.

(d) If no aggrieved party petitions for writ of mandate within the time provided by this section, a decision or order of the state board or a regional board shall not be subject to review by any court.

(e) Except as provided in this section, Section 1094.5 of the Code of Civil Procedure shall govern proceedings for which petitions are filed pursuant to this section. For the purposes of subdivision (c) of Section 1094.5 of the Code of Civil Procedure, the court shall exercise its independent judgment on the evidence in any case involving the judicial review of a decision or order of the state board issued under Section 13320, or a decision or order of a regional board for which the state board denies review under Section 13320, other than a decision or order issued under Section 13323.

(f) Except as provided in this section, no legal or equitable process shall issue in any proceeding in any court against the state board, a regional board, or any officer of the state board or a regional board to review, prevent, or enjoin any adjudicative proceeding under this division. Except as provided in this section and Section 13321, no legal or equitable process shall issue in any proceeding in any court against the state board, a regional board, or any officer or employee of the state board or a regional board to review, prevent, or enjoin a decision or order by the state board, a regional board, or any officer or employee of the state board or a regional board before a decision or order is issued and the procedures for administrative review of that decision or order have been exhausted.

(g) A party aggrieved by a decision or order issued by the state board under Article 7 (commencing with Section 13550) of Chapter 7 may petition for reconsideration or judicial review in accordance with Chapter 4 (commencing with Section 1120) of Part 1 of Division 2.

(h) For purposes of this section, a decision or order includes a final action in an adjudicative proceeding and an action subject to Section 11352 of the Government Code, but does not include an action subject to Section 11353 of the Government Code or the adoption, amendment, or repeal of a regulation under Chapter 3.5 (commencing with Section 11340) of Part 1 of Division 3 of Title 2 of the Government Code.
(Amended by Stats. 2016, Ch. 523, Sec. 3. Effective January 1, 2017.)

§ 13331. ***[Injunction]***

(a) Upon the failure of any person or persons to comply with any cease and desist order issued by a regional board or the state board, the Attorney General, upon request of the board, shall petition the superior court for the issuance of a preliminary or permanent injunction, or both, as may be appropriate, restraining such person or persons from continuing the discharge in violation of the cease and desist order.

(b) The court shall issue an order directing defendants to appear before the court at a time and place certain and show cause why the injunction should not be issued. The court may grant such prohibitory or mandatory relief as may be warranted.
(Amended by Stats. 1996, Ch. 659, Sec. 25. Effective January 1, 1997.)

Article 4. Summary Judicial Abatement [13340. - 13340.]

(Article 4 added by Stats. 1969, Ch. 482.)

§ 13340. ***[Injunctive relief for emergencies]***

Whenever a regional board finds that a discharge of waste within its region is taking place or threatening to take place which does or will cause a condition of pollution or nuisance, constituting an emergency requiring immediate action to protect the public health, welfare, or safety, the Attorney General, upon request of the board, shall petition the superior court to enjoin such discharge. The court shall have jurisdiction to grant such prohibitory or mandatory injunctive relief as may be warranted by way of temporary restraining order, preliminary injunction, and permanent injunction.
(Added by Stats. 1969, Ch. 482.)

Article 5. Civil Monetary Remedies [13350. - 13351.]

(Article 5 added by Stats. 1969, Ch. 482.)

§ 13350. ***[Civil liability; amount; recovery]***

[For a similar section that will become operative on July 1, 2017, see below]

(a) A person who (1) violates a cease and desist order or cleanup and abatement order hereafter issued, reissued, or amended by a regional board or the state board, or (2) in violation of a waste discharge requirement, waiver condition, certification, or other order or prohibition issued, reissued, or

amended by a regional board or the state board, discharges waste, or causes or permits waste to be deposited where it is discharged, into the waters of the state, or (3) causes or permits any oil or any residuary product of petroleum to be deposited in or on any of the waters of the state, except in accordance with waste discharge requirements or other actions or provisions of this division, shall be liable civilly, and remedies may be proposed, in accordance with subdivision (d) or (e).

(b) (1) A person who, without regard to intent or negligence, causes or permits a hazardous substance to be discharged in or on any of the waters of the state, except in accordance with waste discharge requirements or other provisions of this division, shall be strictly liable civilly in accordance with subdivision (d) or (e).

(2) For purposes of this subdivision, the term "discharge" includes only those discharges for which Section 13260 directs that a report of waste discharge shall be filed with the regional board.

(3) For purposes of this subdivision, the term "discharge" does not include an emission excluded from the applicability of Section 311 of the Clean Water Act (33 U.S.C. Sec. 1321) pursuant to Environmental Protection Agency regulations interpreting Section 311(a)(2) of the Clean Water Act (33 U.S.C. Sec. 1321(a)(2)).

(c) A person shall not be liable under subdivision (b) if the discharge is caused solely by any one or combination of the following:

(1) An act of war.

(2) An unanticipated grave natural disaster or other natural phenomenon of an exceptional, inevitable, and irresistible character, the effects of which could not have been prevented or avoided by the exercise of due care or foresight.

(3) Negligence on the part of the state, the United States, or any department or agency thereof. However, this paragraph shall not be interpreted to provide the state, the United States, or any department or agency thereof a defense to liability for any discharge caused by its own negligence.

(4) An intentional act of a third party, the effects of which could not have been prevented or avoided by the exercise of due care or foresight.

(5) Any other circumstance or event that causes the discharge despite the exercise of every reasonable precaution to prevent or mitigate the discharge.

(d) The court may impose civil liability either on a daily basis or on a per gallon basis, but not on both.

(1) The civil liability on a daily basis shall not exceed fifteen thousand dollars ($15,000) for each day the violation occurs.

(2) The civil liability on a per gallon basis shall not exceed twenty dollars ($20) for each gallon of waste discharged.

(e) The state board or a regional board may impose civil liability administratively pursuant to Article 2.5 (commencing with Section 13323) of Chapter 5 either on a daily basis or on a per gallon basis, but not on both.

(1) The civil liability on a daily basis shall not exceed five thousand dollars ($5,000) for each day the violation occurs.

(A) When there is a discharge, and a cleanup and abatement order is issued, except as provided in subdivision (f), the civil liability shall not be less than five hundred dollars ($500) for each day in which the discharge occurs and for each day the cleanup and abatement order is violated.

(B) When there is no discharge, but an order issued by the regional board is violated, except as provided in subdivision (f), the civil liability shall not be less than one hundred dollars ($100) for each day in which the violation occurs.

(2) The civil liability on a per gallon basis shall not exceed ten dollars ($10) for each gallon of waste discharged.

(f) A regional board shall not administratively impose civil liability in accordance with paragraph (1) of subdivision (e) in an amount less than the minimum amount specified, unless the regional board makes express findings setting forth the reasons for its action based upon the specific factors required to be considered pursuant to Section 13327.

(g) The Attorney General, upon request of a regional board or the state board, shall petition the superior court to impose, assess, and recover the sums. Except in the case of a violation of a cease and desist order, a regional board or the state board shall make the request only after a hearing, with due notice of the hearing given to all affected persons. In determining the amount to be imposed, assessed, or recovered, the court shall be subject to Section 13351.

(h) Article 3 (commencing with Section 13330) and Article 6 (commencing with Section 13360) apply to proceedings to impose, assess, and recover an amount pursuant to this article.

(i) A person who incurs any liability established under this section shall be entitled to contribution for that liability from a third party, in an action in the superior court and upon proof that the discharge was caused in whole or in part by an act or omission of the third party, to the extent that the discharge is caused by the act or omission of the third party, in accordance with the principles of comparative fault.

(j) Remedies under this section are in addition to, and do not supersede or limit, any and all other remedies, civil or criminal, except that no liability shall be recoverable under subdivision (b) for any discharge for which liability is recovered under Section 13385.

(k) Notwithstanding any other law, all funds generated by the imposition of liabilities pursuant to this section shall be deposited into the Waste Discharge Permit Fund. These moneys shall be separately accounted for, and shall be

available for expenditure, upon appropriation by the Legislature, for the following purposes:

(1) To the state board to assist regional boards, and other public agencies with authority to clean up waste or abate the effects of the waste, in cleaning up or abating the effects of the waste on waters of the state, or for the purposes authorized in Section 13443, or to assist in implementing Chapter 7.3 (commencing with Section 13560).

(2) Up to five hundred thousand dollars ($500,000) per fiscal year, to assist the Department of Fish and Wildlife to address the impacts of marijuana cultivation on the natural resources of the state.

(*l*) This section shall remain in effect only until July 1, 2017, and as of that date is repealed, unless a later enacted statute, that is enacted before July 1, 2017, deletes or extends that date.

(Amended by Stats. 2014, Ch. 35, Sec. 185. Effective June 20, 2014. Repealed as of January 1, 2017, by its own provisions. See later operative version added by Stats. 2014, Ch. 35.)

§ 13350. ***[Civil liability; amount; recovery]***

[Currently operative section is above; this section does not become operative until July 1, 2017]

(a) A person who (1) violates a cease and desist order or cleanup and abatement order hereafter issued, reissued, or amended by a regional board or the state board, or (2) in violation of a waste discharge requirement, waiver condition, certification, or other order or prohibition issued, reissued, or amended by a regional board or the state board, discharges waste, or causes or permits waste to be deposited where it is discharged, into the waters of the state, or (3) causes or permits any oil or any residuary product of petroleum to be deposited in or on any of the waters of the state, except in accordance with waste discharge requirements or other actions or provisions of this division, shall be liable civilly, and remedies may be proposed, in accordance with subdivision (d) or (e).

(b) (1) A person who, without regard to intent or negligence, causes or permits a hazardous substance to be discharged in or on any of the waters of the state, except in accordance with waste discharge requirements or other provisions of this division, shall be strictly liable civilly in accordance with subdivision (d) or (e).

(2) For purposes of this subdivision, the term "discharge" includes only those discharges for which Section 13260 directs that a report of waste discharge shall be filed with the regional board.

(3) For purposes of this subdivision, the term "discharge" does not include an emission excluded from the applicability of Section 311 of the Clean Water Act (33 U.S.C. Sec. 1321) pursuant to Environmental Protection Agency

regulations interpreting Section 311(a)(2) of the Clean Water Act (33 U.S.C. Sec. 1321(a)(2)).

(c) A person shall not be liable under subdivision (b) if the discharge is caused solely by any one or combination of the following:

(1) An act of war.

(2) An unanticipated grave natural disaster or other natural phenomenon of an exceptional, inevitable, and irresistible character, the effects of which could not have been prevented or avoided by the exercise of due care or foresight.

(3) Negligence on the part of the state, the United States, or any department or agency thereof. However, this paragraph shall not be interpreted to provide the state, the United States, or any department or agency thereof a defense to liability for any discharge caused by its own negligence.

(4) An intentional act of a third party, the effects of which could not have been prevented or avoided by the exercise of due care or foresight.

(5) Any other circumstance or event that causes the discharge despite the exercise of every reasonable precaution to prevent or mitigate the discharge.

(d) The court may impose civil liability either on a daily basis or on a per gallon basis, but not on both.

(1) The civil liability on a daily basis shall not exceed fifteen thousand dollars ($15,000) for each day the violation occurs.

(2) The civil liability on a per gallon basis shall not exceed twenty dollars ($20) for each gallon of waste discharged.

(e) The state board or a regional board may impose civil liability administratively pursuant to Article 2.5 (commencing with Section 13323) of Chapter 5 either on a daily basis or on a per gallon basis, but not on both.

(1) The civil liability on a daily basis shall not exceed five thousand dollars ($5,000) for each day the violation occurs.

(A) When there is a discharge, and a cleanup and abatement order is issued, except as provided in subdivision (f), the civil liability shall not be less than five hundred dollars ($500) for each day in which the discharge occurs and for each day the cleanup and abatement order is violated.

(B) When there is no discharge, but an order issued by the regional board is violated, except as provided in subdivision (f), the civil liability shall not be less than one hundred dollars ($100) for each day in which the violation occurs.

(2) The civil liability on a per gallon basis shall not exceed ten dollars ($10) for each gallon of waste discharged.

(f) A regional board shall not administratively impose civil liability in accordance with paragraph (1) of subdivision (e) in an amount less than the minimum amount specified, unless the regional board makes express findings setting forth the reasons for its action based upon the specific factors required to be considered pursuant to Section 13327.

(g) The Attorney General, upon request of a regional board or the state board, shall petition the superior court to impose, assess, and recover the sums. Except in the case of a violation of a cease and desist order, a regional board or the state board shall make the request only after a hearing, with due notice of the hearing given to all affected persons. In determining the amount to be imposed, assessed, or recovered, the court shall be subject to Section 13351.

(h) Article 3 (commencing with Section 13330) and Article 6 (commencing with Section 13360) apply to proceedings to impose, assess, and recover an amount pursuant to this article.

(i) A person who incurs any liability established under this section shall be entitled to contribution for that liability from a third party, in an action in the superior court and upon proof that the discharge was caused in whole or in part by an act or omission of the third party, to the extent that the discharge is caused by the act or omission of the third party, in accordance with the principles of comparative fault.

(j) Remedies under this section are in addition to, and do not supersede or limit, any and all other remedies, civil or criminal, except that no liability shall be recoverable under subdivision (b) for any discharge for which liability is recovered under Section 13385.

(k) Notwithstanding any other law, all funds generated by the imposition of liabilities pursuant to this section shall be deposited into the Waste Discharge Permit Fund. These moneys shall be separately accounted for, and shall be expended by the state board, upon appropriation by the Legislature, to assist regional boards, and other public agencies with authority to clean up waste or abate the effects of the waste, in cleaning up or abating the effects of the waste on waters of the state, or for the purposes authorized in Section 13443, or to assist in implementing Chapter 7.3 (commencing with Section 13560).

(*l*) This section shall become operative on July 1, 2017.

(Repealed (in Sec. 185) and added by Stats. 2014, Ch. 35, Sec. 186. Effective June 20, 2014. Section operative January 1, 2017, by its own provisions.)

§ 13351. ***[Determining the amount of civil liability]***

In determining the amount of civil liability to be imposed pursuant to this chapter, the superior court shall take into consideration the nature, circumstance, extent, and gravity of the violation or violations, whether the discharge is susceptible to cleanup or abatement, the degree of toxicity of the discharge, and, with respect to the violator, the ability to pay, the effect on ability to continue in business, any voluntary cleanup efforts undertaken, any prior history of violations, the degree of culpability, economic benefit or savings, if any, resulting from the violation, and such other matters as justice may require.

(Amended by Stats. 2001, Ch. 869, Sec. 6. Effective January 1, 2002.)

Article 6. General Provisions Relating to Enforcement and Review [13360. - 13362.]

(Article 6 added by Stats. 1969, Ch. 482.)

§ 13360. *[Manner of compliance]*

(a) No waste discharge requirement or other order of a regional board or the state board or decree of a court issued under this division shall specify the design, location, type of construction, or particular manner in which compliance may be had with that requirement, order, or decree, and the person so ordered shall be permitted to comply with the order in any lawful manner. However, the restrictions of this section shall not apply to waste discharge requirements or orders or decrees with respect to any of the following:

(1) Discharge of solid waste to disposal sites other than evaporation ponds from which there is no drainage or seepage which requires the installation of riprap, the construction of walls and dikes, the installation of surface and underground drainage facilities to prevent runoff from entering the disposal area or leakage to underground or surface waters, or other reasonable requirements to achieve the above or similar purposes.

(2) Discharges of waste or fluid to an injection well, except any well which is regulated by the Division of Oil and Gas in the Department of Conservation pursuant to Division 3 (commencing with Section 3000) of the Public Resources Code and Subpart F of Part 147 of Title 40 of the Code of Federal Regulations and is in compliance with that division and Subpart A (commencing with Section 146.1) of Subchapter D of Chapter 1 of Title 40 of the Code of Federal Regulations.

(b) If the court, in an action for an injunction brought under this division, finds that the enforcement of an injunction restraining the discharger from discharging waste would be impracticable, the court may issue any order reasonable under the circumstances requiring specific measures to be undertaken by the discharger to comply with the discharge requirements, order, or decree.

(Amended by Stats. 1986, Ch. 1013, Sec. 9. Effective September 23, 1986.)

§ 13361. *[Civil action; venue; procedures]*

(a) Every civil action brought under the provisions of this division at the request of a regional board or the state board shall be brought by the Attorney General in the name of the people of the State of California and any of those actions relating to the same discharge may be joined or consolidated.

(b) Any civil action brought pursuant to this division shall be brought in a county in which the discharge is made, or proposed to be made. However, any action by or against a city, city and county, county, or other public agency shall, upon motion of either party, be transferred to a county or city and county not a

party to the action or to a county or city and county other than that in which the city or public agency is located.

(c) In any civil action brought pursuant to this division in which a regional board or the state board seeks a temporary restraining order, preliminary injunction, or permanent injunction, it shall not be necessary to allege or prove at any stage of the proceeding that irreparable damage will occur should the temporary restraining order, preliminary injunction, or permanent injunction not be issued, or that the remedy at law is inadequate, and the temporary restraining order, preliminary injunction, or permanent injunction shall issue without those allegations and proof.

(Amended by Stats. 2016, Ch. 523, Sec. 4. Effective January 1, 2017.)

§ 13362. ***[Inspections]***

[This version remains in the code, but has been superceded by a later enacted version; see below.]

A publicly owned treatment works (POTW) with an approved pretreatment program may conduct inspections in accordance with the provisions of Sections 403.8(f)(1)(v) and 403.8(f)(2)(v) of Title 40 of the Code of Federal Regulations and assess and collect civil penalties and civil administrative penalties in accordance with Sections 54740, 54740.5, and 54740.6 of the Government Code, with regard to all dischargers of industrial waste to the POTW.

(Added by Stats. 1999, Ch. 92, Sec. 5. Effective January 1, 2000. See the prevailing Section 13362 added by Stats. 1999, Ch. 92, with the same substantive provisions.)

§ 13362. ***[Inspections]***

(a) A publicly owned treatment works (POTW) with an approved pretreatment program may conduct inspections in accordance with the provisions of Sections 403.8(f)(1)(v) and 403.8(f)(2)(v) of Title 40 of the Code of Federal Regulations and assess and collect civil penalties and civil administrative penalties in accordance with Sections 54740, 54740.5, and 54740.6 of the Government Code, with regard to all dischargers of industrial waste to the POTW.

(b) This section prevails over Section 13362, as added to the Water Code by Assembly Bill 1104 of the 1999–2000 Regular Session.

(Added by Stats. 1999, Ch. 93, Sec. 5. Effective January 1, 2000.)

Article 7. Hazardous Substance Removal and Remedial Action Charges [13365. - 13365.]

(Article 7 added by Stats. 1996, Ch. 607, Sec. 1.)

§ 13365. ***[Definitions; billing; cost recovery; requirements]***

(a) (1) For purposes of this article, unless the context otherwise requires, "agency" means the state board or a regional board.

(2) The terms used in this article shall have the same meaning as the definitions specified in the statutory authority under which the agency takes any action subject to this article, except that, notwithstanding Section 25317 of the Health and Safety Code, for purposes of this article, "hazardous substance" includes a hazardous substance specified in subdivision (h) of Section 25281 of the Health and Safety Code.

(b) On or before July 1, 1997, the agency shall adopt a billing system for the agency's cost recovery of investigation, analysis, planning, implementation, oversight, or other activity related to the removal or remedial or corrective action of a release of a hazardous substance that includes both of the following:

(1) Billing rates and overhead rates by employee job classification.

(2) Standardized description of work tasks.

(c) Notwithstanding any other provision of law, after July 1, 1997, any charge imposed upon a responsible party by the agency, to compensate the agency for some, or all, of its costs incurred in connection with the agency's investigation, analysis, planning, implementation, oversight, or other activity related to a removal or remedial action or a corrective action to a release of a hazardous substance, shall not be assessed or collected unless all of the following requirements are met:

(1) Except as provided in subdivision (f), prior to commencing the work or service for which the charge is assessed, and at least annually thereafter if the work or service is continuing, the agency shall provide all of the following information to the responsible party:

(A) A detailed estimate of the work to be performed or services to be provided, including a statement of the expected outcome of that work, based upon data available to the agency at the time.

(B) The billing rates for all individuals and classes of employees expected to engage in the work or service.

(C) An estimate of all expected charges to be billed to the responsible party by the agency, including, but not limited to, any overhead assessments that the agency may be authorized to levy.

(2) (A) Invoices shall be issued not less than semiannually with appropriate incentives for prompt payment.

(B) Invoices shall be mailed to the correct person or persons for the responsible party or parties.

(C) Invoices shall provide a daily detail of work performed and time spent by each employee and contractor employee using the billing and overhead rates and the standardized description of work tasks adopted pursuant to subdivision (b).

(D) Invoices shall include the source and amount of all other charges.

(E) Invoices shall be supplemented with statements of any changes in rates and a justification for any changes.

(F) Invoices shall be reviewed for accuracy and appropriateness.

(3) Upon request and within a reasonable time, not to exceed 30 working days from the date of receipt of a request, the agency shall provide the responsible party with copies of time records and other materials supporting the invoice described in paragraph (2). No fees or charges may be assessed for the preparation and delivery of those copies pursuant to this section.

(4) The agency shall identify a party who is responsible for resolving disputes regarding the charges subject to this section and who is not responsible for, or performing, the work or service for which the charges are assessed.

(d) The agency may adjust the scope of the work or service, type of studies, or other tasks to be performed, based upon analyses necessary to accommodate new information regarding the extent of contamination of the site, and only after providing written notice of the change to the responsible party containing the information specified in paragraph (1) of subdivision (c).

(e) The agency may increase billing rates not more than once each calendar year, to the extent authorized by law. Any increase in billing rates or other charges, including, but not limited to, overhead charges, shall operate prospectively only, and shall take effect not sooner than 10 days from the date that written notice has been provided to the responsible party.

(f) (1) Paragraph (1) of subdivision (c) shall not apply when a situation exists that requires prompt action to protect human health or safety or the environment.

(2) Paragraph (1) of subdivision (c) does not apply with respect to those responsible parties who are not identified until after the beginning of a removal or remedial action or corrective action to a release of a hazardous substance.
(Amended by Stats. 2002, Ch. 999, Sec. 65. Effective January 1, 2003.)

CHAPTER 5.2. PREPRODUCTION PLASTIC DEBRIS PROGRAM [13367. - 13367.]

(Chapter 5.2 added by Stats. 2007, Ch. 735, Sec. 2.)

§ 13367. *[Program for control of preproduction plastics; minimum BMPs to control discharge]*

(a) For purposes of this chapter, "preproduction plastic" includes plastic resin pellets and powdered coloring for plastics.

(b) (1) The state board and the regional boards shall implement a program to control discharges of preproduction plastic from point and nonpoint sources. The state board shall determine the appropriate regulatory methods to address the discharges from these point and nonpoint sources.

(2) The state board, when developing this program, shall consult with any regional board with plastic manufacturing, handling, and transportation facilities located within the regional board's jurisdiction that has already voluntarily implemented a program to control discharges of preproduction plastic.

(c) The program control measures shall, at a minimum, include waste discharge, monitoring, and reporting requirements that target plastic manufacturing, handling, and transportation facilities.

(d) The program shall, at a minimum, require plastic manufacturing, handling, and transportation facilities to implement best management practices to control discharges of preproduction plastics. A facility that handles preproduction plastic shall comply with either subdivision (e) or the criteria established pursuant to subdivision (f).

(e) At a minimum, the state board shall require the following best management practices in all permits issued under the national pollutant discharge elimination system (NPDES) program that regulate plastic manufacturing, handling, or transportation facilities:

(1) Appropriate containment systems shall be installed at all onsite storm drain discharge locations that are down-gradient of areas where preproduction plastic is present or transferred. A facility shall install a containment system that is defined as a device or series of devices that traps all particles retained by a one millimeter mesh screen and has a design treatment capacity of not less than the peak flowrate resulting from a one-year, one-hour storm in each of the down-gradient drainage areas. When the installation of a containment system is not appropriate because one or more of a facility's down-gradient drainage areas is not discharged through a stormwater conveyance system, or when the regional board determines that a one millimeter or similar mesh screen is not appropriate at one or more down-gradient discharge locations, the regulated facility shall identify and propose for approval by the regional board technically feasible alternative storm drain control measures that are designed to achieve the same performance as a one millimeter mesh screen.

(2) At all points of preproduction plastic transfer, measures shall be taken to prevent discharge, including, but not limited to, sealed containers durable enough so as not to rupture under typical loading and unloading activities.

(3) At all points of preproduction plastic storage, preproduction plastic shall be stored in sealed containers that are durable enough so as not to rupture under typical loading and unloading activities.

(4) At all points of storage and transfer of preproduction plastic, capture devices shall be in place under all transfer valves and devices used in loading, unloading, or other transfer of preproduction plastic.

(5) A facility shall make available to its employees a vacuum or vacuum type system, for quick cleanup of fugitive preproduction plastic.

(f) The state board shall include criteria for submitting a no exposure certification pursuant to Section 122.26(g) of Title 40 of the Code of Federal Regulations in all NPDES permits regulating plastic manufacturing, handling, or transportation facilities. Facilities that satisfy the no exposure certification criteria are conditionally exempt from the permitting requirements pursuant to

Section 122.26 of Title 40 of the Code of Federal Regulations. The no exposure certification shall be required every five years or more frequently as determined by the state board or a regional board.

(g) The state board and the regional boards shall implement this chapter by January 1, 2009.

(h) Nothing in this chapter limits the authority of the state board or the regional boards to establish requirements in addition to the best management practices for the elimination of discharges of preproduction plastic.

(Added by Stats. 2007, Ch. 735, Sec. 2. Effective January 1, 2008.)

CHAPTER 5.4. NONPOINT SOURCE POLLUTION CONTROL PROGRAM [13369. - 13369.]

(Chapter 5.4 added by Stats. 1999, Ch. 560, Sec. 1.)

§ 13369. *[Implementation of the nonpoint source management plan]*

(a) The state board, in consultation with the regional boards, the California Coastal Commission, and other appropriate state agencies and advisory groups, as necessary, shall prepare a detailed program for the purpose of implementing the state's nonpoint source management plan. The board shall address all applicable provisions of the Clean Water Act, including Section 319 (33 U.S.C. Sec. 1329), as well as Section 6217 of the federal Coastal Zone Act Reauthorization Amendments of 1990 (16 U.S.C. Sec. 1455b), and this division in the preparation of this detailed implementation program.

(b) (1) The program shall include all of the following components:

(A) Nonregulatory implementation of best management practices.

(B) Regulatory-based incentives for best management practices.

(C) The adoption and enforcement of waste discharge requirements that will require the implementation of best management practices.

(2) In connection with its duties under this subdivision to prepare and implement the state's nonpoint source management plan, the state board shall develop, on or before February 1, 2001, guidance to be used by the state board and the regional boards for the purpose of describing the process by which the state board and the regional boards will enforce the state's nonpoint source management plan, pursuant to this division.

(Amended by Stats. 2012, Ch. 728, Sec. 182. Effective January 1, 2013.)

CHAPTER 5.5. COMPLIANCE WITH THE PROVISIONS OF THE FEDERAL WATER POLLUTION CONTROL ACT AS AMENDED IN 1972 [13370. - 13389.]

(Chapter 5.5 added by Stats. 1972, Ch. 1256.)

§ 13370. *[Legislative intent]*

The Legislature finds and declares as follows:

(a) The Federal Water Pollution Control Act (33 U.S.C. Sec. 1251 et seq.), as amended, provides for permit systems to regulate the discharge of pollutants

and dredged or fill material to the navigable waters of the United States and to regulate the use and disposal of sewage sludge.

(b) The Federal Water Pollution Control Act, as amended, provides that permits may be issued by states which are authorized to implement the provisions of that act.

(c) It is in the interest of the people of the state, in order to avoid direct regulation by the federal government of persons already subject to regulation under state law pursuant to this division, to enact this chapter in order to authorize the state to implement the provisions of the Federal Water Pollution Control Act and acts amendatory thereof or supplementary thereto, and federal regulations and guidelines issued pursuant thereto, provided, that the state board shall request federal funding under the Federal Water Pollution Control Act for the purpose of carrying out its responsibilities under this program.
(Amended by Stats. 1987, Ch. 1189, Sec. 1.)

§ 13370.5. ***[Legislative findings]***

(a) The Legislature finds and declares that, since the Federal Water Pollution Control Act (33 U.S.C. Sec. 1251 et seq.), as amended, and applicable federal regulations (40 C.F.R. 403 et seq.) provide for a pretreatment program to regulate the discharge of pollutants into publicly owned treatment works and provide that states with approved national pollutant discharge elimination system (NPDES) permit programs shall apply for approval of a state pretreatment program, it is in the interest of the people of the state to enact this section in order to avoid direct regulation by the federal government of publicly owned treatment works already subject to regulation under state law pursuant to this division.

(b) The state board shall develop a state pretreatment program and shall, not later than September 1, 1985, apply to the Environmental Protection Agency for approval of the pretreatment program in accordance with federal requirements.
(Added by Stats. 1984, Ch. 1542, Sec. 1.)

§ 13372. ***[Consistency]***

(a) This chapter shall be construed to ensure consistency with the requirements for state programs implementing the Federal Water Pollution Control Act and acts amendatory thereof or supplementary thereto. To the extent other provisions of this division are consistent with the provisions of this chapter and with the requirements for state programs implementing the Federal Water Pollution Control Act and acts amendatory thereof or supplementary thereto, those provisions apply to actions and procedures provided for in this chapter. The provisions of this chapter shall prevail over other provisions of this division to the extent of any inconsistency. The provisions of this chapter apply

only to actions required under the Federal Water Pollution Control Act and acts amendatory thereof or supplementary thereto.

(b) The provisions of Section 13376 requiring the filing of a report for the discharge of dredged or fill material and the provisions of this chapter relating to the issuance of dredged or fill material permits by the state board or a regional board shall be applicable only to discharges for which the state has an approved permit program, in accordance with the provisions of the Federal Water Pollution Control Act, as amended, for the discharge of dredged or fill material.
(Amended by Stats. 2003, Ch. 683, Sec. 5. Effective January 1, 2004.)

§ 13373. *[Definitions]*

The terms "navigable waters," "administrator," "pollutants," "biological monitoring," "discharge" and "point sources" as used in this chapter shall have the same meaning as in the Federal Water Pollution Control Act and acts amendatory thereof or supplementary thereto.
(Amended by Stats. 1987, Ch. 1189, Sec. 4.)

§ 13374. *[Waste discharge requirements defined]*

The term "waste discharge requirements" as referred to in this division is the equivalent of the term "permits" as used in the Federal Water Pollution Control Act, as amended.
(Added by Stats. 1972, Ch. 1256.)

§ 13375. *[Discharges prohibited]*

The discharge of any radiological, chemical, or biological warfare agent into the waters of the state is hereby prohibited.
(Added by Stats. 1972, Ch. 1256.)

§ 13376. *[Reports of discharges]*

A person who discharges pollutants or proposes to discharge pollutants to the navigable waters of the United States within the jurisdiction of this state or a person who discharges dredged or fill material or proposes to discharge dredged or fill material into the navigable waters of the United States within the jurisdiction of this state shall file a report of the discharge in compliance with the procedures set forth in Section 13260. Unless required by the state board or a regional board, a report need not be filed under this section for discharges that are not subject to the permit application requirements of the Federal Water Pollution Control Act, as amended. A person who proposes to discharge pollutants or dredged or fill material or to operate a publicly owned treatment works or other treatment works treating domestic sewage shall file a report at least 180 days in advance of the date on which it is desired to commence the discharge of pollutants or dredged or fill material or the operation of the treatment works. A person who owns or operates a publicly owned treatment works or other treatment works treating domestic sewage, which treatment

works commenced operation before January 1, 1988, and does not discharge to navigable waters of the United States, shall file a report within 45 days of a written request by a regional board or the state board, or within 45 days after the state has an approved permit program for the use and disposal of sewage sludge, whichever occurs earlier. The discharge of pollutants or dredged or fill material or the operation of a publicly owned treatment works or other treatment works treating domestic sewage by any person, except as authorized by waste discharge requirements or dredged or fill material permits, is prohibited. This prohibition does not apply to discharges or operations if a state or federal permit is not required under the Federal Water Pollution Control Act, as amended.
(Amended by Stats. 2010, Ch. 288, Sec. 32. Effective January 1, 2011.)

§ 13377. ***[Requirements and permits]***
Notwithstanding any other provision of this division, the state board or the regional boards shall, as required or authorized by the Federal Water Pollution Control Act, as amended, issue waste discharge requirements and dredged or fill material permits which apply and ensure compliance with all applicable provisions of the act and acts amendatory thereof or supplementary, thereto, together with any more stringent effluent standards or limitations necessary to implement water quality control plans, or for the protection of beneficial uses, or to prevent nuisance.
(Amended by Stats. 1978, Ch. 746.)

§ 13378. ***[Notice and hearing]***
Waste discharge requirements and dredged or fill material permits shall be adopted only after notice and any necessary hearing. Such requirements or permits shall be adopted for a fixed term not to exceed five years for any proposed discharge, existing discharge, or any material change therein.
(Amended by Stats. 1978, Ch. 746.)

§ 13380. ***[Review of requirements]***
Any waste discharge requirements or dredged or fill material permits adopted under this chapter shall be reviewed at least every five years and, if appropriate, revised.
(Amended by Stats. 1978, Ch. 746.)

§ 13381. ***[Termination or modification of requirements]***
Waste discharge requirements or dredged or fill material permits may be terminated or modified for cause, including, but not limited to, all of the following:

(a) Violation of any condition contained in the requirements or permits.

(b) Obtaining the requirements by misrepresentation, or failure to disclose fully all relevant facts.

(c) A change in any condition that requires either a temporary or permanent reduction or elimination of the permitted discharge.
(Amended by Stats. 1978, Ch. 746.)

§ 13382. ***[Wells]***
Waste discharge requirements shall be adopted to control the disposal of pollutants into wells or in areas where pollutants may enter into a well from the surrounding groundwater.
(Amended by Stats. 1984, Ch. 1461, Sec. 1.)

§ 13382.5. ***[Managed aquaculture]***
Waste discharge requirements shall be adopted to permit the discharge of a specific pollutant or pollutants in a controlled manner from a point source to a defined managed aquaculture project if such discharge meets all applicable requirements of the Federal Water Pollution Control Act and acts amendatory thereof and supplementary thereto, together with any more stringent effluent standards or limitations necessary to implement water quality control plans.
(Added by Stats. 1978, Ch. 618.)

§ 13383. ***[Monitoring requirements]***
(a) The state board or a regional board may establish monitoring, inspection, entry, reporting, and recordkeeping requirements, as authorized by Section 13160, 13376, or 13377 or by subdivisions (b) and (c) of this section, for any person who discharges, or proposes to discharge, to navigable waters, any person who introduces pollutants into a publicly owned treatment works, any person who owns or operates, or proposes to own or operate, a publicly owned treatment works or other treatment works treating domestic sewage, or any person who uses or disposes, or proposes to use or dispose, of sewage sludge.
(b) The state board or the regional boards may require any person subject to this section to establish and maintain monitoring equipment or methods, including, where appropriate, biological monitoring methods, sample effluent as prescribed, and provide other information as may be reasonably required.
(c) The state board or a regional board may inspect the facilities of any person subject to this section pursuant to the procedure set forth in subdivision (c) of Section 13267.
(Amended by Stats. 2003, Ch. 683, Sec. 6. Effective January 1, 2004.)

§ 13383.5. ***[Storm water discharge monitoring requirements]***
(a) As used in this section, "regulated municipalities and industries" means the municipalities and industries required to obtain a storm water permit under Section 402(p) of the Clean Water Act (33 U.S.C. Sec. 1342(p)) and implementing regulations.
(b) This section only applies to regulated municipalities that were subject to a storm water permit on or before December 31, 2001, and to regulated

industries that are subject to the General Permit for Storm Water Discharges Associated with Industrial Activities Excluding Construction Activities.

(c) Before January 1, 2003, the state board shall develop minimum monitoring requirements for each regulated municipality and minimum standard monitoring requirements for regulated industries. This program shall include, but is not limited to, all of the following:

(1) Standardized methods for collection of storm water samples.

(2) Standardized methods for analysis of storm water samples.

(3) A requirement that every sample analysis under this program be completed by a state certified laboratory or by the regulated municipality or industry in the field in accordance with the quality assurance and quality control protocols established pursuant to this section.

(4) A standardized reporting format.

(5) Standard sampling and analysis programs for quality assurance and quality control.

(6) Minimum detection limits.

(7) Annual reporting requirements for regulated municipalities and industries.

(8) For the purposes of determining constituents to be sampled for, sampling intervals, and sampling frequencies, to be included in a municipal storm water permit monitoring program, the regional board shall consider the following information, as the regional board determines to be applicable:

(A) Discharge characterization monitoring data.

(B) Water quality data collected through the permit monitoring program.

(C) Applicable water quality data collected, analyzed, and reported by federal, state, and local agencies, and other public and private entities.

(D) Any applicable listing under Section 303(d) of the Clean Water Act (33 U.S.C. Sec. 1313).

(E) Applicable water quality objectives and criteria established in accordance with the regional board basin plans, statewide plans, and federal regulations.

(F) Reports and studies regarding source contribution of pollutants in runoff not based on direct water quality measurements.

(d) The requirements prescribed pursuant to this section shall be included in all storm water permits for regulated municipalities and industries that are reissued following development of the requirements described in subdivision (c). Those permits shall include these provisions on or before July 1, 2008. In a year in which the Legislature appropriates sufficient funds for that purpose, the state board shall make available to the public via the Internet a summary of the results obtained from storm water monitoring conducted in accordance with this section.

(Added by Stats. 2001, Ch. 492, Sec. 1. Effective January 1, 2002.)

§ 13383.6. ***[School educational materials required by municipal stormwater permits]***

On and after January 1, 2007, if a regional board or the state board issues a municipal stormwater permit pursuant to Section 402(p) of the Clean Water Act (33 U.S.C. Sec. 1342(p)) that includes a requirement to provide elementary and secondary public schools with educational materials on stormwater pollution, the permittee may satisfy the requirement, upon approval by the regional board or state board, by contributing an equivalent amount of funds to the Environmental Education Account established pursuant to subdivision (a) of Section 71305 of the Public Resources Code.

(Added by Stats. 2005, Ch. 581, Sec. 7. Effective January 1, 2006.)

§ 13383.7. ***[Guidance on quantifiable effectiveness of municipal storm water programs]***

(a) No later than July 1, 2009, and after holding public workshops and soliciting public comments, the state board shall develop a comprehensive guidance document for evaluating and measuring the effectiveness of municipal stormwater management programs undertaken, and permits issued, in accordance with Section 402(p) of the Clean Water Act (33 U.S.C. Sec. 1342(p)) and this division.

(b) For the purpose of implementing subdivision (a), the state board shall promote the use of quantifiable measures for evaluating the effectiveness of municipal stormwater management programs and provide for the evaluation of, at a minimum, all of the following:

(1) Compliance with stormwater permitting requirements, including all of the following:

(A) Inspection programs.

(B) Construction controls.

(C) Elimination of unlawful discharges.

(D) Public education programs.

(E) New development and redevelopment requirements.

(2) Reduction of pollutant loads from pollution sources.

(3) Reduction of pollutants or stream erosion due to stormwater discharge.

(4) Improvements in the quality of receiving water in accordance with water quality standards.

(c) The state board and the regional boards shall refer to the guidance document developed pursuant to subdivision (a) when establishing requirements in municipal stormwater programs and permits.

(Added by Stats. 2007, Ch. 610, Sec. 6. Effective January 1, 2008.)

§ 13383.8. ***[Stormwater management task force]***

(a) The state board shall appoint a stormwater management task force comprised of public agencies, representatives of the regulated community, and nonprofit organizations with expertise in water quality and stormwater management. The task force shall provide advice to the state board on its stormwater management program that may include, but is not limited to, program priorities, funding criteria, project selection, and interagency coordination of state programs that address stormwater management.

(b) The state board shall submit a report, including, but not limited to, stormwater and other polluted runoff control information, to the Ocean Protection Council no later than January 1, 2009, on the way in which the state board is implementing the priority goals and objectives of the council's strategic plan.

(Added by Stats. 2007, Ch. 610, Sec. 7. Effective January 1, 2008.)

§ 13384. ***[Hearings]***

The state board or the regional boards shall ensure that the public, and that any other state, the waters of which may be affected by any discharge of pollutants or dredged or fill material to navigable waters within this state, shall receive notice of each application for requirements or report of waste discharge or application for a dredged or fill material permit or report of dredged or fill material discharge and are provided an opportunity for public hearing before adoption of such requirements or permit.

(Amended by Stats. 1978, Ch. 746.)

§ 13385. ***[Civil liability]***

(a) A person who violates any of the following shall be liable civilly in accordance with this section:

(1) Section 13375 or 13376.

(2) A waste discharge requirement or dredged or fill material permit issued pursuant to this chapter or any water quality certification issued pursuant to Section 13160.

(3) A requirement established pursuant to Section 13383.

(4) An order or prohibition issued pursuant to Section 13243 or Article 1 (commencing with Section 13300) of Chapter 5, if the activity subject to the order or prohibition is subject to regulation under this chapter.

(5) A requirement of Section 301, 302, 306, 307, 308, 318, 401, or 405 of the federal Clean Water Act (33 U.S.C. Sec. 1311, 1312, 1316, 1317, 1318, 1341, or 1345), as amended.

(6) A requirement imposed in a pretreatment program approved pursuant to waste discharge requirements issued under Section 13377 or approved pursuant to a permit issued by the administrator.

(b) (1) Civil liability may be imposed by the superior court in an amount not to exceed the sum of both of the following:

(A) Twenty-five thousand dollars ($25,000) for each day in which the violation occurs.

(B) Where there is a discharge, any portion of which is not susceptible to cleanup or is not cleaned up, and the volume discharged but not cleaned up exceeds 1,000 gallons, an additional liability not to exceed twenty-five dollars ($25) multiplied by the number of gallons by which the volume discharged but not cleaned up exceeds 1,000 gallons.

(2) The Attorney General, upon request of a regional board or the state board, shall petition the superior court to impose the liability.

(c) Civil liability may be imposed administratively by the state board or a regional board pursuant to Article 2.5 (commencing with Section 13323) of Chapter 5 in an amount not to exceed the sum of both of the following:

(1) Ten thousand dollars ($10,000) for each day in which the violation occurs.

(2) Where there is a discharge, any portion of which is not susceptible to cleanup or is not cleaned up, and the volume discharged but not cleaned up exceeds 1,000 gallons, an additional liability not to exceed ten dollars ($10) multiplied by the number of gallons by which the volume discharged but not cleaned up exceeds 1,000 gallons.

(d) For purposes of subdivisions (b) and (c), "discharge" includes any discharge to navigable waters of the United States, any introduction of pollutants into a publicly owned treatment works, or any use or disposal of sewage sludge.

(e) In determining the amount of any liability imposed under this section, the regional board, the state board, or the superior court, as the case may be, shall take into account the nature, circumstances, extent, and gravity of the violation or violations, whether the discharge is susceptible to cleanup or abatement, the degree of toxicity of the discharge, and, with respect to the violator, the ability to pay, the effect on its ability to continue its business, any voluntary cleanup efforts undertaken, any prior history of violations, the degree of culpability, economic benefit or savings, if any, resulting from the violation, and other matters that justice may require. At a minimum, liability shall be assessed at a level that recovers the economic benefits, if any, derived from the acts that constitute the violation.

(f) (1) Except as provided in paragraph (2), for the purposes of this section, a single operational upset that leads to simultaneous violations of more than one pollutant parameter shall be treated as a single violation.

(2) (A) For the purposes of subdivisions (h) and (i), a single operational upset in a wastewater treatment unit that treats wastewater using a biological treatment process shall be treated as a single violation, even if the operational upset results in violations of more than one effluent limitation and the violations continue for a period of more than one day, if all of the following apply:

(i) The discharger demonstrates all of the following:

(I) The upset was not caused by wastewater treatment operator error and was not due to discharger negligence.

(II) But for the operational upset of the biological treatment process, the violations would not have occurred nor would they have continued for more than one day.

(III) The discharger carried out all reasonable and immediately feasible actions to reduce noncompliance with the applicable effluent limitations.

(ii) The discharger is implementing an approved pretreatment program, if so required by federal or state law.

(B) Subparagraph (A) only applies to violations that occur during a period for which the regional board has determined that violations are unavoidable, but in no case may that period exceed 30 days.

(g) Remedies under this section are in addition to, and do not supersede or limit, any other remedies, civil or criminal, except that no liability shall be recoverable under Section 13261, 13265, 13268, or 13350 for violations for which liability is recovered under this section.

(h) (1) Notwithstanding any other provision of this division, and except as provided in subdivisions (j), (k), and (*l*), a mandatory minimum penalty of three thousand dollars ($3,000) shall be assessed for each serious violation.

(2) For the purposes of this section, a "serious violation" means any waste discharge that violates the effluent limitations contained in the applicable waste discharge requirements for a Group II pollutant, as specified in Appendix A to Section 123.45 of Title 40 of the Code of Federal Regulations, by 20 percent or more or for a Group I pollutant, as specified in Appendix A to Section 123.45 of Title 40 of the Code of Federal Regulations, by 40 percent or more.

(i) (1) Notwithstanding any other provision of this division, and except as provided in subdivisions (j), (k), and (*l*), a mandatory minimum penalty of three thousand dollars ($3,000) shall be assessed for each violation whenever the person does any of the following four or more times in any period of six consecutive months, except that the requirement to assess the mandatory minimum penalty shall not be applicable to the first three violations:

(A) Violates a waste discharge requirement effluent limitation.

(B) Fails to file a report pursuant to Section 13260.

(C) Files an incomplete report pursuant to Section 13260.

(D) Violates a toxicity effluent limitation contained in the applicable waste discharge requirements where the waste discharge requirements do not contain pollutant-specific effluent limitations for toxic pollutants.

(2) For the purposes of this section, a "period of six consecutive months" means the period commencing on the date that one of the violations described in this subdivision occurs and ending 180 days after that date.

(j) Subdivisions (h) and (i) do not apply to any of the following:

(1) A violation caused by one or any combination of the following:

(A) An act of war.

(B) An unanticipated, grave natural disaster or other natural phenomenon of an exceptional, inevitable, and irresistible character, the effects of which could not have been prevented or avoided by the exercise of due care or foresight.

(C) An intentional act of a third party, the effects of which could not have been prevented or avoided by the exercise of due care or foresight.

(D) (i) The operation of a new or reconstructed wastewater treatment unit during a defined period of adjusting or testing, not to exceed 90 days for a wastewater treatment unit that relies on a biological treatment process and not to exceed 30 days for any other wastewater treatment unit, if all of the following requirements are met:

(I) The discharger has submitted to the regional board, at least 30 days in advance of the operation, an operations plan that describes the actions the discharger will take during the period of adjusting and testing, including steps to prevent violations and identifies the shortest reasonable time required for the period of adjusting and testing, not to exceed 90 days for a wastewater treatment unit that relies on a biological treatment process and not to exceed 30 days for any other wastewater treatment unit.

(II) The regional board has not objected in writing to the operations plan.

(III) The discharger demonstrates that the violations resulted from the operation of the new or reconstructed wastewater treatment unit and that the violations could not have reasonably been avoided.

(IV) The discharger demonstrates compliance with the operations plan.

(V) In the case of a reconstructed wastewater treatment unit, the unit relies on a biological treatment process that is required to be out of operation for at least 14 days in order to perform the reconstruction, or the unit is required to be out of operation for at least 14 days and, at the time of the reconstruction, the cost of reconstructing the unit exceeds 50 percent of the cost of replacing the wastewater treatment unit.

(ii) For the purposes of this section, "wastewater treatment unit" means a component of a wastewater treatment plant that performs a designated treatment function.

(2) (A) Except as provided in subparagraph (B), a violation of an effluent limitation where the waste discharge is in compliance with either a cease and desist order issued pursuant to Section 13301 or a time schedule order issued pursuant to Section 13300, if all of the following requirements are met:

(i) The cease and desist order or time schedule order is issued after January 1, 1995, but not later than July 1, 2000, specifies the actions that the discharger is required to take in order to correct the violations that would otherwise be subject to subdivisions (h) and (i), and the date by which

compliance is required to be achieved and, if the final date by which compliance is required to be achieved is later than one year from the effective date of the cease and desist order or time schedule order, specifies the interim requirements by which progress towards compliance will be measured and the date by which the discharger will be in compliance with each interim requirement.

(ii) The discharger has prepared and is implementing in a timely and proper manner, or is required by the regional board to prepare and implement, a pollution prevention plan that meets the requirements of Section 13263.3.

(iii) The discharger demonstrates that it has carried out all reasonable and immediately feasible actions to reduce noncompliance with the waste discharge requirements applicable to the waste discharge and the executive officer of the regional board concurs with the demonstration.

(B) Subdivisions (h) and (i) shall become applicable to a waste discharge on the date the waste discharge requirements applicable to the waste discharge are revised and reissued pursuant to Section 13380, unless the regional board does all of the following on or before that date:

(i) Modifies the requirements of the cease and desist order or time schedule order as may be necessary to make it fully consistent with the reissued waste discharge requirements.

(ii) Establishes in the modified cease and desist order or time schedule order a date by which full compliance with the reissued waste discharge requirements shall be achieved. For the purposes of this subdivision, the regional board may not establish this date later than five years from the date the waste discharge requirements were required to be reviewed pursuant to Section 13380. If the reissued waste discharge requirements do not add new effluent limitations or do not include effluent limitations that are more stringent than those in the original waste discharge requirements, the date shall be the same as the final date for compliance in the original cease and desist order or time schedule order or five years from the date that the waste discharge requirements were required to be reviewed pursuant to Section 13380, whichever is earlier.

(iii) Determines that the pollution prevention plan required by clause (ii) of subparagraph (A) is in compliance with the requirements of Section 13263.3 and that the discharger is implementing the pollution prevention plan in a timely and proper manner.

(3) A violation of an effluent limitation where the waste discharge is in compliance with either a cease and desist order issued pursuant to Section 13301 or a time schedule order issued pursuant to Section 13300 or 13308, if all of the following requirements are met:

(A) The cease and desist order or time schedule order is issued on or after July 1, 2000, and specifies the actions that the discharger is required to take in

order to correct the violations that would otherwise be subject to subdivisions (h) and (i).

(B) The regional board finds that, for one of the following reasons, the discharger is not able to consistently comply with one or more of the effluent limitations established in the waste discharge requirements applicable to the waste discharge:

(i) The effluent limitation is a new, more stringent, or modified regulatory requirement that has become applicable to the waste discharge after the effective date of the waste discharge requirements and after July 1, 2000, new or modified control measures are necessary in order to comply with the effluent limitation, and the new or modified control measures cannot be designed, installed, and put into operation within 30 calendar days.

(ii) New methods for detecting or measuring a pollutant in the waste discharge demonstrate that new or modified control measures are necessary in order to comply with the effluent limitation and the new or modified control measures cannot be designed, installed, and put into operation within 30 calendar days.

(iii) Unanticipated changes in the quality of the municipal or industrial water supply available to the discharger are the cause of unavoidable changes in the composition of the waste discharge, the changes in the composition of the waste discharge are the cause of the inability to comply with the effluent limitation, no alternative water supply is reasonably available to the discharger, and new or modified measures to control the composition of the waste discharge cannot be designed, installed, and put into operation within 30 calendar days.

(iv) The discharger is a publicly owned treatment works located in Orange County that is unable to meet effluent limitations for biological oxygen demand, suspended solids, or both, because the publicly owned treatment works meets all of the following criteria:

(I) Was previously operating under modified secondary treatment requirements pursuant to Section 301(h) of the Clean Water Act (33 U.S.C. Sec. 1311(h)).

(II) Did vote on July 17, 2002, not to apply for a renewal of the modified secondary treatment requirements.

(III) Is in the process of upgrading its treatment facilities to meet the secondary treatment standards required by Section 301(b)(1)(B) of the Clean Water Act (33 U.S.C. Sec. 1311(b)(1)(B)).

(C) (i) The regional board establishes a time schedule for bringing the waste discharge into compliance with the effluent limitation that is as short as possible, taking into account the technological, operational, and economic factors that affect the design, development, and implementation of the control measures that are necessary to comply with the effluent limitation. Except as

provided in clause (ii), for the purposes of this subdivision, the time schedule shall not exceed five years in length.

(ii) (I) For purposes of the upgrade described in subclause (III) of clause (iv) of subparagraph (B), the time schedule shall not exceed 10 years in length.

(II) Following a public hearing, and upon a showing that the discharger is making diligent progress toward bringing the waste discharge into compliance with the effluent limitation, the regional board may extend the time schedule for an additional period not exceeding five years in length, if the discharger demonstrates that the additional time is necessary to comply with the effluent limitation. This subclause does not apply to a time schedule described in subclause (I).

(iii) If the time schedule exceeds one year from the effective date of the order, the schedule shall include interim requirements and the dates for their achievement. The interim requirements shall include both of the following:

(I) Effluent limitations for the pollutant or pollutants of concern.

(II) Actions and milestones leading to compliance with the effluent limitation.

(D) The discharger has prepared and is implementing in a timely and proper manner, or is required by the regional board to prepare and implement, a pollution prevention plan pursuant to Section 13263.3.

(k) (1) In lieu of assessing all or a portion of the mandatory minimum penalties pursuant to subdivisions (h) and (i) against a publicly owned treatment works serving a small community, the state board or the regional board may elect to require the publicly owned treatment works to spend an equivalent amount towards the completion of a compliance project proposed by the publicly owned treatment works, if the state board or the regional board finds all of the following:

(A) The compliance project is designed to correct the violations within five years.

(B) The compliance project is in accordance with the enforcement policy of the state board, excluding any provision in the policy that is inconsistent with this section.

(C) The publicly owned treatment works has prepared a financing plan to complete the compliance project.

(2) For the purposes of this subdivision, "a publicly owned treatment works serving a small community" means a publicly owned treatment works serving a population of 10,000 persons or fewer or a rural county, with a financial hardship as determined by the state board after considering such factors as median income of the residents, rate of unemployment, or low population density in the service area of the publicly owned treatment works.

(l) (1) In lieu of assessing penalties pursuant to subdivision (h) or (i), the state board or the regional board, with the concurrence of the discharger, may

direct a portion of the penalty amount to be expended on a supplemental environmental project in accordance with the enforcement policy of the state board. If the penalty amount exceeds fifteen thousand dollars ($15,000), the portion of the penalty amount that may be directed to be expended on a supplemental environmental project may not exceed fifteen thousand dollars ($15,000) plus 50 percent of the penalty amount that exceeds fifteen thousand dollars ($15,000).

(2) For the purposes of this section, a "supplemental environmental project" means an environmentally beneficial project that a person agrees to undertake, with the approval of the regional board, that would not be undertaken in the absence of an enforcement action under this section.

(3) This subdivision applies to the imposition of penalties pursuant to subdivision (h) or (i) on or after January 1, 2003, without regard to the date on which the violation occurs.

(m) The Attorney General, upon request of a regional board or the state board, shall petition the appropriate court to collect any liability or penalty imposed pursuant to this section. Any person who fails to pay on a timely basis any liability or penalty imposed under this section shall be required to pay, in addition to that liability or penalty, interest, attorney's fees, costs for collection proceedings, and a quarterly nonpayment penalty for each quarter during which the failure to pay persists. The nonpayment penalty shall be in an amount equal to 20 percent of the aggregate amount of the person's penalty and nonpayment penalties that are unpaid as of the beginning of the quarter.

(n) (1) Subject to paragraph (2), funds collected pursuant to this section shall be deposited in the State Water Pollution Cleanup and Abatement Account.

(2) (A) Notwithstanding any other provision of law, moneys collected for a violation of a water quality certification in accordance with paragraph (2) of subdivision (a) or for a violation of Section 401 of the federal Clean Water Act (33 U.S.C. Sec. 1341) in accordance with paragraph (5) of subdivision (a) shall be deposited in the Waste Discharge Permit Fund and separately accounted for in that fund.

(B) The funds described in subparagraph (A) shall be expended by the state board, upon appropriation by the Legislature, to assist regional boards, and other public agencies with authority to clean up waste or abate the effects of the waste, in cleaning up or abating the effects of the waste on waters of the state or for the purposes authorized in Section 13443.

(o) The state board shall continuously report and update information on its Internet Web site, but at a minimum, annually on or before January 1, regarding its enforcement activities. The information shall include all of the following:

(1) A compilation of the number of violations of waste discharge requirements in the previous calendar year, including stormwater enforcement violations.

(2) A record of the formal and informal compliance and enforcement actions taken for each violation, including stormwater enforcement actions.

(3) An analysis of the effectiveness of current enforcement policies, including mandatory minimum penalties.

(p) The amendments made to subdivisions (f), (h), (i), and (j) during the second year of the 2001–02 Regular Session apply only to violations that occur on or after January 1, 2003.

(Amended by Stats. 2011, Ch. 296, Sec. 314. Effective January 1, 2012.)

§ 13385.1. ***[Definitions of "serious violation" and "effluent limitation"]***

(a) (1) For the purposes of subdivision (h) of Section 13385, a "serious violation" also means a failure to file a discharge monitoring report required pursuant to Section 13383 for each complete period of 30 days following the deadline for submitting the report, if the report is designed to ensure compliance with limitations contained in waste discharge requirements that contain effluent limitations. This paragraph applies only to violations that occur on or after January 1, 2004.

(2) (A) Notwithstanding paragraph (1), a failure to file a discharge monitoring report is not a serious violation for purposes of subdivision (h) of Section 13385 at any time prior to the date a discharge monitoring report is required to be filed or within 30 days after receiving written notice from the state board or a regional board of the need to file a discharge monitoring report, if the discharger submits a written statement to the state board or the regional board that includes both of the following:

(i) A statement that there were no discharges to waters of the United States reportable under the applicable waste discharge requirements during the relevant monitoring period.

(ii) The reason or reasons the required report was not submitted to the regional board by the deadline for filing that report.

(B) Upon the request of the state board or regional board, the discharger may be required to support the statement with additional explanation or evidence.

(C) If, in a statement submitted pursuant to subparagraph (A), the discharger willfully states as true any material fact that he or she knows to be false, that person shall be subject to a civil penalty not exceeding ten thousand dollars ($10,000). Any public prosecutor may bring an action for a civil penalty under this subparagraph in the name of the people of the State of California, and the penalty imposed shall be enforced as a civil judgment.

(D) Notwithstanding subparagraph (A), the failure to file a discharge monitoring report is subject to penalties in accordance with subdivisions (c) and (e) of Section 13385.

(b) (1) Notwithstanding paragraph (1) of subdivision (a), a mandatory minimum penalty shall continue to apply and shall be assessed pursuant to subdivision (h) of Section 13385, but only for each required report that is not timely filed, and shall not be separately assessed for each 30-day period following the deadline for submitting the report, if both of the following conditions are met:

(A) The discharger did not on any occasion previously receive, from the state board or a regional board, a complaint to impose liability pursuant to subdivision (b) or (c) of Section 13385 arising from a failure to timely file a discharge monitoring report, a notice of violation for failure to timely file a discharge monitoring report, or a notice of the obligation to file a discharge monitoring report required pursuant to Section 13383, in connection with its corresponding waste discharge requirements.

(B) The discharges during the period or periods covered by the report do not violate effluent limitations, as defined in subdivision (d), contained in waste discharge requirements.

(2) Paragraph (1) shall only apply to a discharger who does both of the following:

(A) Files a discharge monitoring report that had not previously been timely filed within 30 days after the discharger receives written notice, including notice transmitted by electronic mail, from the state board or regional board concerning the failure to timely file the report.

(B) Pays all penalties assessed by the state board or regional board in accordance with paragraph (1) within 30 days after an order is issued to pay these penalties pursuant to Section 13385.

(3) Notwithstanding paragraph (1), the failure to file a discharge monitoring report is subject to penalties in accordance with subdivisions (c) and (e) of Section 13385.

(4) This subdivision shall become inoperative on January 1, 2014.

(c) (1) Notwithstanding any other provision of law, moneys collected pursuant to this section for a failure to timely file a report, as described in subdivision (a), shall be deposited in the State Water Pollution Cleanup and Abatement Account.

(2) Notwithstanding Section 13340 of the Government Code, the funds described in paragraph (1) are continuously appropriated, without regard to fiscal years, to the state board for expenditure by the state board to assist regional boards, and other public agencies with authority to clean up waste or abate the effects of the waste, in responding to significant water pollution problems.

(d) For the purposes of this section, paragraph (2) of subdivision (f) of Section 13385, and subdivisions (h), (i), and (j) of Section 13385 only, "effluent limitation" means a numeric restriction or a numerically expressed narrative restriction, on the quantity, discharge rate, concentration, or toxicity units of a pollutant or pollutants that may be discharged from an authorized location. An effluent limitation may be final or interim, and may be expressed as a prohibition. An effluent limitation, for those purposes, does not include a receiving water limitation, a compliance schedule, or a best management practice.

(e) The amendments made to this section by Senate Bill 1284 of the 2009–10 Regular Session of the Legislature shall apply to violations for which an administrative civil liability complaint or a judicial complaint has not been filed before July 1, 2010, without regard to the date on which the violations occurred.
(Amended by Stats. 2010, Ch. 645, Sec. 2. Effective January 1, 2011.)

§ 13385.2. ***[Compliance project funding demonstration]***

(a) Prior to the state board or regional board making its findings pursuant to subdivision (k) of Section 13385, the publicly owned treatment works shall demonstrate to the satisfaction of the state board or regional board that the financing plan prepared pursuant to subparagraph (C) of paragraph (1) of subdivision (k) of that section is designed to generate sufficient funding to complete the compliance project within the time period specified pursuant to subparagraph (A) of paragraph (1) of subdivision (k) of that section.

(b) This section shall only become operative if Senate Bill 1733 of the 2005–06 Regular Session is enacted and becomes operative.
(Added by Stats. 2006, Ch. 725, Sec. 1. Effective September 29, 2006. Note: Condition in subd. (b) was satisfied by enactment of Stats. 2006, Ch. 404.)

§ 13385.3. ***[Operative date for 2006/2007 amendments to 13385(k)]***

(a) The amendments made to subdivision (k) of Section 13385 of the Water Code by Senate Bill 1733 of the 2005–06 Regular Session shall become operative on July 1, 2007.

(b) This section shall only become operative if Senate Bill 1733 of the 2005–06 Regular Session is enacted and becomes operative.
(Added by Stats. 2006, Ch. 725, Sec. 2. Effective September 29, 2006. Note: Condition in subd. (b) was satisfied by enactment of Stats. 2006, Ch. 404.)

§ 13386. ***[Injunction]***

Upon any threatened or continuing violation of any of the requirements listed in paragraphs (1) to (6), inclusive, of subdivision (a) of Section 13385, or upon the failure of any discharger into a public treatment system to comply with any cost or charge adopted by any public agency under Section 204(b) of the Federal Water Pollution Control Act, as amended, the Attorney General, upon the request of the state board or regional board shall petition the appropriate court

for the issuance of a preliminary or permanent injunction, or both, as appropriate, restraining that person or persons from committing or continuing the violation. Subdivision (b) of Section 13331 shall be applicable to proceedings under this section.

(Amended by Stats. 1996, Ch. 659, Sec. 27. Effective January 1, 1997.)

§ 13387. ***[Criminal penalties]***

(a) Any person who knowingly or negligently does any of the following is subject to criminal penalties as provided in subdivisions (b), (c), and (d):

(1) Violates Section 13375 or 13376.

(2) Violates any waste discharge requirements or dredged or fill material permit issued pursuant to this chapter or any water quality certification issued pursuant to Section 13160.

(3) Violates any order or prohibition issued pursuant to Section 13243 or 13301, if the activity subject to the order or prohibition is subject to regulation under this chapter.

(4) Violates any requirement of Section 301, 302, 306, 307, 308, 318, 401, or 405 of the Clean Water Act (33 U.S.C. Sec. 1311, 1312, 1316, 1317, 1318, 1328, 1341, or 1345), as amended.

(5) Introduces into a sewer system or into a publicly owned treatment works any pollutant or hazardous substances that the person knew or reasonably should have known could cause personal injury or property damage.

(6) Introduces any pollutant or hazardous substance into a sewer system or into a publicly owned treatment works, except in accordance with any applicable pretreatment requirements, which causes the treatment works to violate waste discharge requirements.

(b) Any person who negligently commits any of the violations set forth in subdivision (a) shall, upon conviction, be punished by a fine of not less than five thousand dollars ($5,000), nor more than twenty-five thousand dollars ($25,000), for each day in which the violation occurs, by imprisonment for not more than one year in a county jail, or by both that fine and imprisonment. If a conviction of a person is for a violation committed after a first conviction of the person under this subdivision, subdivision (c), or subdivision (d), punishment shall be by a fine of not more than fifty thousand dollars ($50,000) for each day in which the violation occurs, by imprisonment pursuant to subdivision (h) of Section 1170 of the Penal Code for 16, 20, or 24 months, or by both that fine and imprisonment.

(c) Any person who knowingly commits any of the violations set forth in subdivision (a) shall, upon conviction, be punished by a fine of not less than five thousand dollars ($5,000), nor more than fifty thousand dollars ($50,000), for each day in which the violation occurs, by imprisonment pursuant to subdivision (h) of Section 1170 of the Penal Code, or by both that fine and

imprisonment. If a conviction of a person is for a violation committed after a first conviction of the person under this subdivision or subdivision (d), punishment shall be by a fine of not more than one hundred thousand dollars ($100,000) for each day in which the violation occurs, by imprisonment pursuant to subdivision (h) of Section 1170 of the Penal Code for two, four, or six years, or by both that fine and imprisonment.

(d) (1) Any person who knowingly commits any of the violations set forth in subdivision (a), and who knows at the time that the person thereby places another person in imminent danger of death or serious bodily injury, shall, upon conviction, be punished by a fine of not more than two hundred fifty thousand dollars ($250,000), imprisonment pursuant to subdivision (h) of Section 1170 of the Penal Code for 5, 10, or 15 years, or by both that fine and imprisonment. A person that is an organization shall, upon conviction under this subdivision, be subject to a fine of not more than one million dollars ($1,000,000). If a conviction of a person is for a violation committed after a first conviction of the person under this subdivision, the punishment shall be by a fine of not more than five hundred thousand dollars ($500,000), by imprisonment pursuant to subdivision (h) of Section 1170 of the Penal Code for 10, 20, or 30 years, or by both that fine and imprisonment. A person that is an organization shall, upon conviction for a violation committed after a first conviction of the person under this subdivision, be subject to a fine of not more than two million dollars ($2,000,000). Any fines imposed pursuant to this subdivision shall be in addition to any fines imposed pursuant to subdivision (c).

(2) In determining whether a defendant who is an individual knew that the defendant's conduct placed another person in imminent danger of death or serious bodily injury, the defendant is responsible only for actual awareness or actual belief that the defendant possessed, and knowledge possessed by a person other than the defendant, but not by the defendant personally, cannot be attributed to the defendant.

(e) Any person who knowingly makes any false statement, representation, or certification in any record, report, plan, notice to comply, or other document filed with a regional board or the state board, or who knowingly falsifies, tampers with, or renders inaccurate any monitoring device or method required under this division shall be punished by a fine of not more than twenty-five thousand dollars ($25,000), by imprisonment pursuant to subdivision (h) of Section 1170 of the Penal Code for 16, 20, or 24 months, or by both that fine and imprisonment. If a conviction of a person is for a violation committed after a first conviction of the person under this subdivision, punishment shall be by a fine of not more than twenty-five thousand dollars ($25,000) per day of violation, by imprisonment pursuant to subdivision (h) of Section 1170 of the Penal Code for two, three, or four years, or by both that fine and imprisonment.

(f) For purposes of this section, a single operational upset which leads to simultaneous violations of more than one pollutant parameter shall be treated as a single violation.

(g) For purposes of this section, "organization," "serious bodily injury," "person," and "hazardous substance" shall have the same meaning as in Section 309(c) of the Clean Water Act (33 U.S.C. Sec. 1319(c)), as amended.

(h) (1) Subject to paragraph (2), funds collected pursuant to this section shall be deposited in the State Water Pollution Cleanup and Abatement Account.

(2) (A) Notwithstanding any other provision of law, fines collected for a violation of a water quality certification in accordance with paragraph (2) of subdivision (a) or for a violation of Section 401 of the Clean Water Act (33 U.S.C. Sec. 1341) in accordance with paragraph (4) of subdivision (a) shall be deposited in the Water Discharge Permit Fund and separately accounted for in that fund.

(B) The funds described in subparagraph (A) shall be expended by the state board, upon appropriation by the Legislature, to assist regional boards, and other public agencies with authority to clean up waste or abate the effects of the waste, in cleaning up or abating the effects of the waste on waters of the state, or for the purposes authorized in Section 13443.

(Amended by Stats. 2011, Ch. 15, Sec. 616. Effective April 4, 2011. Operative October 1, 2011, by Sec. 636 of Ch. 15, as amended by Stats. 2011, Ch. 39, Sec. 68.)

§ 13388. ***[Member eligibility]***

(a) Notwithstanding any other provision of this division or Section 175, and except as provided in subdivision (b), a person shall not be a member of the state board or a regional board if that person receives, or has received during the previous two years, a significant portion of his or her income directly or indirectly from any person subject to waste discharge requirements or applicants for waste discharge requirements pursuant to this chapter.

(b) (1) A person shall not be disqualified from being a member of a regional board because that person receives, or has received during the previous two years, a significant portion of his or her income directly or indirectly from a person subject to waste discharge requirements, or an applicant for waste discharge requirements, that are issued pursuant to this chapter by the state board or regional board other than the regional board of which that person is a member.

(2) Paragraph (1) shall be implemented only if the United States Environmental Protection Agency either determines that no program approval is necessary for that implementation, or approves of a change in California's National Pollutant Discharge Elimination System program, to allow the state to administer the National Pollutant Discharge Elimination System permit program consistent with paragraph (1).

(Amended by Stats. 2012, Ch. 39, Sec. 121. Effective June 27, 2012.)

§ 13389. ***[CEQA exemption]***

Neither the state board nor the regional boards shall be required to comply with the provisions of Chapter 3 (commencing with Section 21100) of Division 13 of the Public Resources Code prior to the adoption of any waste discharge requirement, except requirements for new sources as defined in the Federal Water Pollution Control Act or acts amendatory thereof or supplementary thereto.

(Added by Stats. 1972, Ch. 1256.)

CHAPTER 5.6. BAY PROTECTION AND TOXIC CLEANUP [13390. - 13396.9.]

(Chapter 5.6 added by Stats. 1989, Ch. 269, Sec. 50.)

§ 13390. ***[Legislative intent]***

It is the intent of the Legislature that the state board and the regional boards establish programs that provide maximum protection for existing and future beneficial uses of bay and estuarine waters, and that these programs include a plan for remedial action at toxic hot spots. It is also the intent of the Legislature that these programs further compliance with federal law pertaining to the identification of waters where the protection and propagation of shellfish, fish, and wildlife are threatened by toxic pollutants and contribute to the development of effective strategies to control these pollutants. It is also the intent of the Legislature that these programs be structured and maintained in a manner which allows the state board and the regional boards to make maximum use of any federal funds which may be available for any of the purposes specified in this chapter.

(Added by Stats. 1989, Ch. 269, Sec. 50. Effective August 3, 1989.)

§ 13391. ***[California Enclosed Bays and Estuaries Plan]***

(a) The state board shall formulate and adopt a water quality control plan for enclosed bays and estuaries, which shall be known as the California Enclosed Bays and Estuaries Plan, in accordance with the procedures established by this division for adopting water quality control plans.

(b) As part of its formulation and adoption of the California Enclosed Bays and Estuaries Plan, the state board shall review and update the Water Quality Control Policy for Enclosed Bays and Estuaries of California, as adopted in 1974 pursuant to Article 3 (commencing with Section 13140) of Chapter 3, and incorporate the results of that review and update in the California Enclosed Bays and Estuaries Plan.

(c) State and regional offices, departments, boards and agencies shall fully implement the California Enclosed Bays and Estuaries Plan. Pending adoption of the California Enclosed Bays and Estuaries Plan by the state board, state and

regional offices, departments, boards and agencies shall fully implement the Water Quality Control Policy for Enclosed Bays and Estuaries of California.

(d) Each regional board shall review and, if necessary, revise waste discharge requirements that are inconsistent with those policies and principles. *(Amended by Stats. 1989, Ch. 1032, Sec. 30. Effective September 29, 1989.)*

§ 13391.5. ***[Definitions]***

The definitions in this section govern the construction of this chapter.

(a) "Enclosed bays" means indentations along the coast which enclose an area of oceanic water within distinct headlands or harbor works. "Enclosed bays" include all bays where the narrowest distance between the headlands or outermost harbor works is less than 75 percent of the greatest dimension of the enclosed portion of the bay. "Enclosed bays" include, but are not limited to, Humboldt Bay, Bodega Harbor, Tomales Bay, Drake's Estero, San Francisco Bay, Morro Bay, Los Angeles-Long Beach Harbor, Upper and Lower Newport Bay, Mission Bay, and San Diego Bay. For the purposes of identifying, characterizing, and ranking toxic hot spots pursuant to this chapter, Monterey Bay and Santa Monica Bay shall also be considered to be enclosed bays.

(b) "Estuaries" means waters, including coastal lagoons, located at the mouths of streams which serve as mixing zones for fresh and ocean waters. Coastal lagoons and mouths of streams which are temporarily separated from the ocean by sandbars shall be considered as estuaries. Estuarine waters shall be considered to extend from a bay or the open ocean to a point upstream where there is no significant mixing of fresh water and sea water. Estuarine waters include, but are not limited to, the Sacramento-San Joaquin Delta, as defined in Section 12220, Suisun Bay, Carquinez Strait downstream to the Carquinez Bridge, and appropriate areas of the Smith, Mad, Eel, Noyo, Russian, Klamath, San Diego, and Otay Rivers.

(c) "Health risk assessment" means an analysis which evaluates and quantifies the potential human exposure to a pollutant that bioaccumulates or may bioaccumulate in edible fish, shellfish, or wildlife. "Health risk assessment" includes an analysis of both individual and population wide health risks associated with anticipated levels of human exposure, including potential synergistic effects of toxic pollutants and impacts on sensitive populations.

(d) "Sediment quality objective" means that level of a constituent in sediment which is established with an adequate margin of safety, for the reasonable protection of the beneficial uses of water or the prevention of nuisances.

(e) "Toxic hot spots" means locations in enclosed bays, estuaries, or any adjacent waters in the "contiguous zone" or the "ocean," as defined in Section 502 of the Clean Water Act (33 U.S.C. Sec. 1362), the pollution or contamination of which affects the interests of the state, and where hazardous substances

have accumulated in the water or sediment to levels which (1) may pose a substantial present or potential hazard to aquatic life, wildlife, fisheries, or human health, or (2) may adversely affect the beneficial uses of the bay, estuary, or ocean waters as defined in water quality control plans, or (3) exceeds adopted water quality or sediment quality objectives.

(f) "Hazardous substances" has the same meaning as defined in subdivision (h) of Section 25281 of the Health and Safety Code.

(Amended by Stats. 2002, Ch. 999, Sec. 66. Effective January 1, 2003.)

§ 13392. *[Toxic hot spots]*

The state board and the regional boards, in consultation with the State Department of Public Health and the Department of Fish and Wildlife, shall develop and maintain a comprehensive program to (1) identify and characterize toxic hot spots, as defined in Section 13391.5, (2) plan for the cleanup or other appropriate remedial or mitigating actions at the sites, and (3) amend water quality control plans and policies to incorporate strategies to prevent the creation of new toxic hot spots and the further pollution of existing hot spots. As part of this program, the state board and regional boards shall, to the extent feasible, identify specific discharges or waste management practices that contribute to the creation of toxic hot spots, and shall develop appropriate prevention strategies, including, but not limited to, adoption of more stringent waste discharge requirements, onshore remedial actions, adoption of regulations to control source pollutants, and development of new programs to reduce urban and agricultural runoff.

(Amended by Stats. 2015, Ch. 673, Sec. 30. Effective January 1, 2016.)

§ 13392.5. *[Monitoring and surveillance]*

(a) Each regional board that has regulatory authority for one or more enclosed bays or estuaries shall, on or before January 30, 1994, develop for each enclosed bay or estuary, a consolidated database that identifies and describes all known and potential toxic hot spots. Each regional board shall, in consultation with the state board, also develop an ongoing monitoring and surveillance program that includes, but is not limited to, the following components:

(1) Establishment of a monitoring and surveillance task force that includes representation from agencies, including, but not limited to, the State Department of Public Health and the Department of Fish and Wildlife, that routinely monitor water quality, sediment, and aquatic life.

(2) Suggested guidelines to promote standardized analytical methodologies and consistency in data reporting.

(3) Identification of additional monitoring and analyses that are needed to develop a complete toxic hot spot assessment for each enclosed bay and estuary.

(b) Each regional board shall make available to state and local agencies and the public all information contained in the consolidated database, as well as the results of new monitoring and surveillance data.
(Amended by Stats. 2015, Ch. 673, Sec. 31. Effective January 1, 2016.)

§ 13392.6. ***[Sediment quality objectives workplan]***

(a) On or before July 1, 1991, the state board shall adopt and submit to the Legislature a workplan for the adoption of sediment quality objectives for toxic pollutants that have been identified in known or suspected toxic hot spots and for toxic pollutants that have been identified by the state board or a regional board as a pollutant of concern. The workplan shall include priorities and a schedule for development and adoption of sediment quality objectives, identification of additional resource needs, and identification of staff or funding needs. The state board is not prohibited from adopting sediment quality objectives in the workplan for a constituent for which the workplan identifies additional research needs.

(b) In preparing the workplan pursuant to subdivision (a), the state board shall conduct public hearings and workshops and shall consult with persons associated with municipal discharges, industrial discharges, other public agencies, research scientists, commercial and sport fishing interests, marine interests, organizations for the protection of natural resources and the environment, and the general public.
(Amended by Stats. 1989, Ch. 1032, Sec. 33. Effective September 29, 1989.)

§ 13393. ***[Adoption of objectives]***

(a) The state board shall adopt sediment quality objectives pursuant to the workplan submitted pursuant to Section 13392.6.

(b) The state board shall adopt the sediment quality objectives pursuant to the procedures established by this division for adopting or amending water quality control plans. The sediment quality objectives shall be based on scientific information, including, but not limited to, chemical monitoring, bioassays, or established modeling procedures, and shall provide adequate protection for the most sensitive aquatic organisms. The state board shall base the sediment quality objectives on a health risk assessment if there is a potential for exposure of humans to pollutants through the food chain to edible fish, shellfish, or wildlife.

(c) (1) Notwithstanding subdivision (a), in adopting sediment quality objectives pursuant to this section, the state board shall consider the federal sediment criteria for toxic pollutants that are being prepared, or that have been adopted, by the Environmental Protection Agency pursuant to Section 1314 of Title 33 of the United States Code.

(2) If federal sediment criteria have been adopted, the state board shall review the federal sediment criteria and determine if the criteria meet the

requirements of this section. If the state board determines that a federal sediment criterion meets the requirements of this section, the state board shall adopt the criterion as a sediment quality objective pursuant to this section. If the state board determines that a federal sediment criterion fails to meet the requirements of this section, the state board shall adopt a sediment quality objective that meets the requirements of this section.
(Amended by Stats. 1993, Ch. 1157, Sec. 3. Effective January 1, 1994.)

§ 13393.5. ***[Ranking of toxic hot spots]***
On or before January 30, 1994, the state board, in consultation with the State Department of Public Health and the Department of Fish and Wildlife, shall adopt general criteria for the assessment and priority ranking of toxic hot spots. The criteria shall take into account the pertinent factors relating to public health and environmental quality, including, but not limited to, potential hazards to public health, toxic hazards to fish, shellfish, and wildlife, and the extent to which the deferral of a remedial action will result, or is likely to result, in a significant increase in environmental damage, health risks, or cleanup costs.
(Amended by Stats. 2015, Ch. 673, Sec. 32. Effective January 1, 2016.)

§ 13394. ***[Cleanup plan]***
On or before January 1, 1998, each regional board shall complete and submit to the state board a toxic hot spots cleanup plan. On or before June 30, 1999, the state board shall submit to the Legislature a consolidated statewide toxic hot spots cleanup plan. The cleanup plan submitted by each regional board and the state board shall include, but not be limited to, the following information:

(a) A priority ranking of all hot spots, including the state board's recommendations for remedial action at each toxic hot spot site.

(b) A description of each hot spot site including a characterization of the pollutants present at the site.

(c) An estimate of the total costs to implement the plan.

(d) An assessment of the most likely source or sources of pollutants.

(e) An estimate of the costs that may be recoverable from parties responsible for the discharge of pollutants that have accumulated in sediment.

(f) A preliminary assessment of the actions required to remedy or restore a toxic hot spot.

(g) A two-year expenditure schedule identifying state funds needed to implement the plan.

(h) A summary of actions that have been initiated by the regional board to reduce the accumulation of pollutants at existing hot spot sites and to prevent the creation of new hot spots.

(i) The plan submitted by the state board shall include findings and recommendations concerning the need for establishment of a toxic hot spots cleanup program.

(Amended by Stats. 1993, Ch. 1157, Sec. 5. Effective January 1, 1994.)

§ 13394.5. *[Expenditure plan]*

The state board, as part of the annual budget process, shall prepare and submit to the Legislature a recommended annual expenditure plan for the implementation of this chapter.

(Added by Stats. 1989, Ch. 269, Sec. 50. Effective August 3, 1989.)

§ 13394.6. *[Advisory committee]*

(a) The state board shall establish an advisory committee to assist in the implementation of this chapter. The members of the advisory committee shall be appointed by the state board to represent all of the following interests:

(1) Trade associations whose members are businesses that use the bay, estuaries, and coastal waters of the state as a resource in their business activities.

(2) Dischargers required to pay fees pursuant to Section 13396.5.

(3) Environmental, public interest, public health, and wildlife conservation organizations.

(b) The members of the advisory committee shall select a member as the chairperson of the committee. The chairperson shall convene meetings of the committee every three months in any calendar year. The members of the advisory committee shall serve without compensation.

(c) The advisory committee shall have access to all information and documents, except for internal communications, that are prepared to implement this chapter and may provide the state board with its views on how that information should be interpreted and used.

(Added by Stats. 1993, Ch. 1157, Sec. 6. Effective January 1, 1994.)

§ 13395. *[Reevaluation of discharge requirements]*

Each regional board shall, within 120 days from the ranking of a toxic hot spot, initiate a reevaluation of waste discharge requirements for dischargers who, based on the determination of the regional board, have discharged all or part of the pollutants which have caused the toxic hot spot. These reevaluations shall be for the purpose of ensuring compliance with water quality control plans and water quality control plan amendments. These reevaluations shall be initiated according to the priority ranking established pursuant to subdivision (a) of Section 13394 and shall be scheduled so that, for each region, the first reevaluation shall be initiated within 120 days from, and the last shall be initiated within one year from, the ranking of the toxic hot spots. The regional board shall, consistent with the policies and principles set forth in Section 13391, revise waste discharge requirements to ensure compliance with water quality control plans and water quality control plan amendments adopted pursuant to Article 3 (commencing with Section 13240) of Chapter 4, including

requirements to prevent the creation of new toxic hot spots and the maintenance or further pollution of existing toxic hot spots. The regional board may determine it is not necessary to revise a waste discharge requirement only if it finds that the toxic hot spot resulted from practices no longer being conducted by the discharger or permitted under the existing waste discharge requirement, or that the discharger's contribution to the creation or maintenance of the toxic hot spot is not significant.
(Added by Stats. 1989, Ch. 269, Sec. 50. Effective August 3, 1989.)

§ 13395.5. *[Evaluation agreements]*

The state board may enter into contracts and other agreements for the purpose of evaluating or demonstrating methods for the removal, treatment, or stabilization of contaminated bottom sediment. For the purpose of preparing health risk assessments pursuant to Section 13393, the state board shall enter into contracts or agreements with the Office of Environmental Health Hazard Assessment, or with other state or local agencies, subject to the approval of the Office of Environmental Health Hazard Assessment. The costs incurred for work conducted by other state agencies pursuant to this chapter shall be reimbursed according to the terms of an interagency agreement between the state board and the agency.
(Amended by Stats. 2014, Ch. 544, Sec. 13. Effective January 1, 2015.)

§ 13396. *[Dredging certification]*

No person shall dredge or otherwise disturb a toxic hot spot site that has been identified and ranked by a regional board without first obtaining certification pursuant to Section 401 of the Clean Water Act (33 U.S.C. Sec. 1341) or waste discharge requirements. The state board and any regional board to which the state board has delegated authority to issue certification shall not waive certification for any discharge resulting from the dredging or disturbance unless waste discharge requirements have been issued. If the state board or a regional board does not issue waste discharge requirements or a certification within the period provided for certification under Section 401 of the Clean Water Act. The certification shall be deemed denied without prejudice. On or after January 1, 1993, the state and regional boards shall not grant approval for a dredging project that involves the removal or disturbance of sediment which contains pollutants at or above the sediment quality objectives established pursuant to Section 13393 unless the board determines all of the following:

(a) The polluted sediment will be removed in a manner that prevents or minimizes water quality degradation.

(b) Polluted dredge spoils will not be deposited in a location that may cause significant adverse effects to aquatic life, fish, shellfish, or wildlife or may harm the beneficial uses of the receiving waters, or does not create maximum benefit to the people of the state.

(c) The project or activity will not cause significant adverse impacts upon a federal sanctuary, recreational area, or other waters of significant national importance.

(Amended by Stats. 1989, Ch. 1032, Sec. 36. Effective September 29, 1989.)

§ 13396.6. *[Habitat for water-dependent wildlife]*

No fees may be imposed pursuant to Section 13396.5 on dischargers who discharge into enclosed bays, estuaries, or adjacent waters in the contiguous zone or the ocean from lands managed solely to provide habitat for waterfowl and other water-dependent wildlife.

(Added by Stats. 1993, Ch. 203, Sec. 1. Effective January 1, 1994.)

§ 13396.7. *[Recreational water quality standards]*

(a) The state board, in consultation with the State Department of Public Health, shall contract with an independent contractor to conduct a study to determine the adverse health effects of urban runoff on swimmers at urban beaches. The contract shall include a provision that requires the study to be conducted as prescribed in the study proposal approved by the Santa Monica Bay Restoration Project. The study shall be paid for by using available resources or state funds appropriated in the annual Budget Act.

(b) It is the intent of the Legislature that the state board and the State Department of Public Health use the results of the study undertaken pursuant to subdivision (a) to establish recreational water quality standards.

(Amended by Stats. 2010, Ch. 288, Sec. 36. Effective January 1, 2011.)

§ 13396.9. *[Los Angeles Basin Contaminated Sediments Task Force]*

(a) The California Coastal Commission and the Los Angeles Regional Water Quality Control Board shall establish and participate in the multiagency Los Angeles Basin Contaminated Sediments Task Force, in cooperation with all interested parties, including, but not limited to, the United States Environmental Protection Agency, the United States Army Corps of Engineers, the Port of Long Beach, and the Port of Los Angeles.

(b) (1) On or before January 1, 2005, the California Coastal Commission shall, based upon the recommendations of the task force, develop a long-term management plan for the dredging and disposal of contaminated sediments in the coastal waters adjacent to the County of Los Angeles. The plan shall include identifiable goals for the purpose of minimizing impacts to water quality, fish, and wildlife through the management of sediments. The plan shall include measures to identify environmentally preferable, practicable disposal alternatives, promote multiuse disposal facilities and beneficial reuse, and support efforts for watershed management to control contaminants at their source.

(2) The California Coastal Commission and the Los Angeles Regional Water Quality Control Board shall seek to enter into an agreement with the United States Environmental Protection Agency and the United States Army Corps of Engineers for those federal agencies to participate in the preparation of the long-term management plan.

(c) The California Coastal Commission and the Los Angeles Regional Water Quality Control Board, in cooperation with the task force, shall conduct not less than one annual public workshop to review the status of the plan and to promote public participation.

(Amended by Stats. 2012, Ch. 728, Sec. 183. Effective January 1, 2013.)

CHAPTER 5.7. DRAINAGE FROM ABANDONED MINES [13397. - 13398.9.]

(Chapter 5.7 added by Stats. 1995, Ch. 878, Sec. 1.)

§ 13397. *[Legislative findings]*

(a) The Legislature finds and declares all of the following:

(1) Thousands of abandoned mines have been identified in this state. Waste, including acid rock drainage from abandoned mines, has a devastating effect on aquatic life and has degraded some major water bodies in the state. Abandoned mines are the overwhelming source of copper loading to the Sacramento River and the San Francisco Bay/Sacramento-San Joaquin Delta. In some instances, waste from abandoned mines can cause public health and safety problems.

(2) The formation of acid rock drainage is a process that can continue for centuries after the abandonment of a mine and is difficult to control. The complete elimination of acid rock drainage is not possible at this time.

(3) Unless action is taken either by public agencies or private parties, who are not responsible for creating the waste, abandoned mines will continue to discharge waste indefinitely. The cleanup of this waste for the protection of the public and the waterways of the state should be facilitated by limiting the financial responsibility for that cleanup.

(4) Public agencies and private parties, who are not otherwise legally responsible for the abandoned mined land, are reluctant to remediate abandoned mined lands unless they are assured that they will be held responsible for completing only the remedial work that they undertake. The public agencies and private parties may be willing to implement partial remediation but they do not have sufficient resources to pay the cost of meeting all applicable regulatory standards.

(b) The Legislature further finds and declares that it is the policy of the state to establish a program that permits public agencies and cooperating private parties to reduce the threat to water quality caused by abandoned mined lands without becoming responsible for completely remediating abandoned mine waste to a point that meets water quality objectives and

related regulatory requirements. This program should provide a streamlined process for the purpose of approving an abandoned mine remediation plan in lieu of certain state permits and requirements. The implementation of this program will foster projects to improve water quality while ensuring that the taxpayers are not unfairly burdened.

(Added by Stats. 1995, Ch. 878, Sec. 1. Effective January 1, 1996.)

§ 13397.5. ***[Definitions]***

Unless the context requires otherwise, the following definitions govern the construction of this chapter:

(a) "Abandoned mine waste" means the residual of soil, rock, mineral, liquid, vegetation, equipment, machines, tools, or other materials or property on, or discharging from, abandoned mined lands, directly resulting from, or displaced by, surface mining operations.

(b) "Abandoned mined lands" has the same meaning as "abandoned surface mined area," as defined in clause (ii) of subparagraph (A) of paragraph (2) of subdivision (b) of Section 2796 of the Public Resources Code.

(c) "Acid rock drainage" means acid waste discharge that results from the oxidation of metal sulfide in minerals associated with mined lands.

(d) "Mined lands" has the same meaning as set forth in Section 2729 of the Public Resources Code.

(e) "Oversight agency" means either the state board or a regional board. If the remediating agency is a regional board, the state board shall be the oversight agency. If the remediating agency is the state board, the oversight agency shall be the Site Designation Committee established pursuant to Section 25261 of the Health and Safety Code. The committee shall have the powers and functions specified in Chapter 6.65 (commencing with Section 25260) of Division 20 of the Health and Safety Code, except that neither the chairperson of the state board, nor any designee, shall participate in the actions of the committee relating to the state board as a remediating agency.

(f) "Remediating agency" or "agency" means any public agency, or any private individual or entity acting under a cooperative agreement with a public agency, that prepares and submits a remediation plan in accordance with this chapter. "Remediating agency" includes, but is not limited to, a public agency that holds title to abandoned mined lands for the purpose of remediating those lands or that is engaging in remediation activities that are incidental to the ownership of the lands for other than mining purposes. "Remediating agency" does not include any person or entity that is not a public agency, that, before implementing an approved remediation plan, owns or has owned a property interest, other than a security interest, in the abandoned mined lands being remediated, or is or has been legally responsible for, or had a direct financial

interest in, or participated in, any mining operation, including exploration, associated with the abandoned mined lands being remediated.

(g) "Remediation plan" means a plan to improve the quality of the waters of the state that have been directly and adversely impacted by abandoned mine waste.

(Amended by Stats. 2000, Ch. 727, Sec. 5. Effective January 1, 2001.)

§ 13398. ***[Remediating agency responsibilities]***

(a) Notwithstanding any other provision of law, a remediating agency that has implemented an approved remediation plan, or a public agency that is effecting reclamation of a mine site pursuant to the Surface Mining and Reclamation Act of 1975 (Chapter 9 (commencing with Section 2710) of Division 2 of the Public Resources Code), shall not be deemed, based on the actions taken to implement the remediation plan or the reclamation, to be the owner or operator of the abandoned mined lands, or any structure, improvement, waste management unit, or facility on the abandoned mined lands, and shall not be deemed, based on the actions taken to implement the remediation plan or the reclamation, to be responsible for any discharge, or the results of any discharge, of abandoned mine waste on or from any abandoned mined lands, including discharges which have been affected by the activities of the remediating agency or the public agency effecting reclamation of a mine site.

(b) Except as provided in paragraph (c), Chapter 5.5 (commencing with Section 13370), and Section 13398.9, the responsibilities of a remediating agency are limited to the following:

(1) Submitting a remediation plan to the oversight agency for approval in accordance with Section 13398.3. A remediation plan may be submitted in connection with a remediation project that was commenced or completed prior to January 1, 1996.

(2) Implementing a remediation plan that has been approved by the oversight agency.

(3) If required by a remediation plan approved by the oversight agency, maintaining any structure, waste management unit, improvement, or other facility constructed, improved, or placed on the abandoned mined lands.

(4) Periodically monitoring and reporting as required by the oversight agency.

(5) (A) Determining if the remediation plan implemented by the remediating agency has been effective to provide a substantial improvement in water quality affected by abandoned mine waste.

(B) If the remediating agency determines that the remediation plan implemented by the agency is not effective, the remediating agency shall promptly report that determination to the oversight agency. If the remediating agency or the oversight agency determines that the remediation plan

implemented by the remediating agency is not effective, the remediating agency shall submit a modified remediation plan to the oversight agency which includes a proposal to improve the plan to make it effective, or a proposal to cease remedial activities on the abandoned mined lands and return those lands, including the water quality on those lands, to a condition that approximates the quality that existed prior to commencing remedial activities. The remediating agency shall implement the modified remediation plan as approved by the oversight agency.

(6) Notwithstanding any other provision of law, except as provided in Chapter 5.5 (commencing with Section 13370), if the remediating agency implements or has implemented the approved remediation plan and any modifications to the plan approved by the oversight agency, the remediating agency, with regard to any discharge of abandoned mine waste that is the subject of the plan, shall not be required to achieve water quality objectives or to comply with other requirements of this division or other laws that are administered by the state board or the regional boards, and shall not be subject to any enforcement actions pursuant to state law based on actions taken to implement the approved remediation plan, except for violations involving gross negligence, including reckless, willful, or wanton misconduct, or intentional misconduct by the remediating agency.

(c) The responsibilities of a remediating agency that engages in surface mining operations, as defined in Section 2735 of the Public Resources Code, in conjunction with the remediation or reclamation of abandoned mine waste or that performs reclamation of a surface mining operation pursuant to Section 2773.1 or 2796 of the Public Resources Code, include performing the applicable requirements of Section 2207 of the Public Resources Code and the Surface Mining and Reclamation Act of 1975 (Chapter 9 (commencing with Section 2710) of Division 2 of the Public Resources Code). The State Mining and Geology Board may grant an exemption from the requirements of Section 2207 of the Public Resources Code or from the Surface Mining and Reclamation Act of 1975 to a remediating agency and its contractors solely for the purpose of removing abandoned mine waste in connection with the implementation of an approved remediation plan.

(Added by Stats. 1995, Ch. 878, Sec. 1. Effective January 1, 1996.)

§ 13398.3. *[Remediation plan]*

The remediation plan to be submitted by a remediating agency to the oversight agency shall include all of the following:

(a) Identification of the remediating agency, and a certification that the remediating agency is a remediating agency as defined in this chapter.

(b) Identification of the abandoned mined lands that are the subject of the plan.

(c) Identification of the waters of the state, if any, that are affected by the abandoned mined lands.

(d) A description of the physical conditions at the abandoned mined lands that are causing or have caused adverse water quality impacts.

(e) A description of the practices, including system design and construction plans, and operation and maintenance plans, proposed to reduce, control, mitigate, or eliminate the adverse water quality impacts and a schedule for implementing those practices. If the plan is prepared for an existing remediation project, the remediation plan shall include a description of practices that have been implemented and the practices that are proposed to improve the existing project, if any.

(f) An analysis demonstrating that the implementation of the practices described in the plan have caused, or are expected to cause, a substantial improvement in water quality for the identified waters.

(g) A description of monitoring or other assessment activities to be undertaken to evaluate the success of the implemented practices during and after implementation, including an assessment of baseline conditions.

(h) A budget and identified funding to pay for the implementation of the plan.

(i) Remediation goals and objectives.

(j) Contingency plans.

(k) A description of the remediating agency's legal right to enter and conduct remedial activities.

(*l*) The signature of an authorized representative of the remediating agency.

(m) Identification of the pollutants to be addressed by the plan.

(Added by Stats. 1995, Ch. 878, Sec. 1. Effective January 1, 1996.)

§ 13398.5. *[Oversight agency responsibilities]*

The oversight agency shall do all of the following:

(a) Comply with the requirements of the California Environmental Quality Act (Division 13 (commencing with Section 21000) of the Public Resources Code) in connection with the review of any remediation plan.

(b) Provide an opportunity for public review of, and comment with regard to, the remediation plan.

(c) Disapprove, approve, or modify and approve a remediation plan at a public meeting.

(Added by Stats. 1995, Ch. 878, Sec. 1. Effective January 1, 1996.)

§ 13398.7. *[Approval of remediation plans]*

(a) The oversight agency may approve the remediation plan if the oversight agency finds that there is substantial evidence in the record that the plan will substantially improve water quality affected by abandoned mine waste.

(b) The oversight agency may approve a remediation plan for a project that the remediating agency implemented prior to January 1, 1996, if that oversight agency finds that there is substantial evidence in the record that the project has substantially improved water quality adversely impacted by mining activities on the abandoned mined lands undertaken before the project was implemented.

(c) The remediating agency is not required to include in the remediation plan a plan to achieve water quality objectives, with regard to any discharge of abandoned mine waste that is the subject of the plan, to comply with other requirements of this division, except for Chapter 5.5 (commencing with Section 13370), or to comply with any other law that is administered by the state board or the regional boards, with regard to that discharge.

(d) The oversight agency may approve a modification of an approved remediation plan to permit additional time for completing the remediation project or to otherwise modify the plan, after an opportunity for public comment.

(e) If the oversight agency determines that a remediating agency is not implementing the approved remediation plan in substantial compliance with its terms, that oversight agency shall notify the remediating agency of its determination, including the specific causes for that determination.

(f) If the oversight agency determines that the specific causes for the determination are not adequately addressed pursuant to subdivision (e), or if a compliance plan is not submitted to, and approved by, the oversight agency within 180 days from the date of the notification pursuant to subdivision (e), the oversight agency may determine that the remediating agency is in violation of this chapter. A remediating agency that is in violation of this chapter is not protected by the limitations on responsibility for remediation of abandoned mined lands provided by this chapter and may be subject to any enforcement action authorized by law.

(Added by Stats. 1995, Ch. 878, Sec. 1. Effective January 1, 1996.)

§ 13398.9. *[Remediating agency liability; Penn Mine]*

(a) This chapter has no effect on the tort liability of a remediating agency for personal injury or wrongful death.

(b) This chapter has no effect on the liability of a remediating agency based upon activities other than those undertaken in connection with the implementation of an approved remediation plan.

(c) This chapter has no effect on the liability of a remediating agency if that agency, following implementation of an approved remediation plan, benefits from, or participates in, any mining operation, including exploration, associated with the abandoned mined lands subject to the approved remediation plan.

(d) For the purposes of this chapter, the remediation plan for the Penn Mine property located in Calaveras County shall, if a memorandum of understanding is entered into by the state and other appropriate parties, include the terms and conditions set forth in that memorandum of understanding.

(Added by Stats. 1995, Ch. 878, Sec. 1. Effective January 1, 1996.)

CHAPTER 5.8. MINOR VIOLATIONS [13399. - 13399.3.]

(Chapter 5.8 added by Stats. 1996, Ch. 775, Sec. 4.)

§ 13399. *[Legislative findings]*

(a) The Legislature hereby finds and declares that the purpose of this chapter is to establish an enforcement policy for violations of this division that the enforcement agency finds are minor when the danger they pose to, or the potential that they have for endangering, human health, safety, or welfare or the environment are taken into account.

(b) It is the intent of the Legislature in enacting this chapter to provide a more resource-efficient enforcement mechanism, faster compliance times, and the creation of a productive and cooperative working relationship between the state board, the regional boards, and the regulated community while maintaining protection of human health and safety and the environment.

(c) This chapter applies solely to the actions of the state board and the regional boards in administering this division and has no application to the administrative enforcement actions of other public agencies.

(d) The state board and each regional board shall implement this chapter by determining the types of violations of this division, or of the regulations, rules, standards, orders, permit conditions, or other requirements adopted pursuant to this division that the state board or the regional board finds are minor violations in accordance with subdivisions (e) and (f). The state board shall implement this chapter through adoption of regulations or state policy for water quality control pursuant to Article 3 (commencing with Section 13140) of Chapter 3.

(e) In determining the types of violations that are minor violations, the state board or regional board shall consider all of the following factors:

(1) The magnitude of the violation.

(2) The scope of the violation.

(3) The severity of the violation.

(4) The degree to which a violation puts human health, safety, or welfare or the environment into jeopardy.

(5) The degree to which a violation could contribute to the failure to accomplish an important goal or program objective as established by this division.

(6) The degree to which a violation may make it difficult to determine if the violator is in compliance with other requirements of this division.

(f) For purposes of this chapter, a minor violation of this division shall not include any of the following:

(1) Any knowing, willful, or intentional violation of this division.

(2) Any violation of this division that enables the violator to benefit economically from noncompliance, either by realizing reduced costs or by gaining a competitive advantage.

(3) Any violation that is a chronic violation or that is committed by a recalcitrant violator.

(g) In determining whether a violation is chronic or a violator is recalcitrant, for purposes of paragraph (3) of subdivision (f), the state board or regional board shall consider whether there is evidence indicating that the violator has engaged in a pattern of neglect or disregard with respect to the requirements of this division or the requirements adopted pursuant to this division.

(Added by Stats. 1996, Ch. 775, Sec. 4. Effective January 1, 1997.)

§ 13399.1. *[Notice to comply]*

For purposes of this chapter, "notice to comply" means a written method of alleging a minor violation that is in compliance with all of the following requirements:

(a) The notice to comply is written in the course of conducting an inspection by an authorized representative of the state board or regional board. If testing is required by the state board or regional board to determine compliance, and the testing cannot be conducted during the course of the inspection, the representative of the state board or regional board shall have a reasonable period of time to conduct the required testing. If, after the test results are available, the representative of the state board or regional board determines that the issuance of a notice to comply is warranted, the representative shall immediately notify the facility owner or operator in writing.

(b) A copy of the notice to comply is presented to a person who is an owner, operator, employee, or representative of the facility being inspected at the time that the notice to comply is written. If offsite testing is required pursuant to subdivision (a), a copy of the notice to comply may be mailed to the owner or operator of the facility.

(c) The notice to comply clearly states the nature of the alleged minor violation, a means by which compliance with the requirement cited by the representative of the state board or regional board may be achieved, and a time limit in which to comply, which shall not exceed 30 days.

(d) The notice to comply shall contain the information specified in subdivision (h) of Section 13399.2 with regard to the possible reinspection of the facility.

(Added by Stats. 1996, Ch. 775, Sec. 4. Effective January 1, 1997.)

§ 13399.2. ***[Issuance of notice]***

(a) An authorized representative of the state board or regional board, who, in the course of conducting an inspection, detects a minor violation shall issue a notice to comply before leaving the site at which the minor violation is alleged to have occurred if the authorized representative finds that a notice to comply is warranted.

(b) A person who receives a notice to comply pursuant to subdivision (a) shall have the period specified in the notice to comply from the date of receipt of the notice to comply in which to achieve compliance with the requirement cited on the notice to comply. Within five working days of achieving compliance, the person who received the notice to comply shall sign the notice to comply, and return it to the representative of the state board or regional board, stating that the person has complied with the notice to comply. A false statement that compliance has been achieved is a violation of this division pursuant to subdivision (a) of Section 13268, Section 13385, or subdivision (e) of Section 13387.

(c) A single notice to comply shall be issued for all minor violations cited during the same inspection and the notice to comply shall separately list each cited minor violation and the manner in which each minor violation may be brought into compliance.

(d) A notice to comply shall not be issued for any minor violation that is corrected immediately in the presence of the inspector. Immediate compliance in that manner may be noted in the inspection report, but the person shall not be subject to any further action by the representative of the state board or regional board.

(e) Except as otherwise provided in subdivision (g), a notice to comply shall be the only means by which the representative of the state board or regional board shall cite a minor violation. The representative of the state board or regional board shall not take any other enforcement action specified in this division against a person who has received a notice to comply if the person is in compliance with this section.

(f) If a person who receives a notice to comply pursuant to subdivision (a) disagrees with one or more of the alleged violations cited in the notice to comply, the person shall give written notice of appeal to the state board or regional board.

(g) Notwithstanding any other provision of this section, if a person fails to comply with a notice to comply within the prescribed period, or if the state

board or regional board determines that the circumstances surrounding a particular minor violation are such that immediate enforcement is warranted to prevent harm to the public health or safety or to the environment, the state board or regional board may take any needed enforcement action authorized by this division.

(h) A notice to comply issued to a person pursuant to this section shall contain a statement that the inspected facility may be subject to reinspection at any time. Nothing in this section shall be construed as preventing the reinspection of a facility to ensure compliance or to ensure that minor violations cited in a notice to comply have been corrected.

(i) Nothing in this section shall be construed as preventing the state board or regional board, on a case-by-case basis, from requiring a person subject to a notice to comply to submit reasonable and necessary documentation to support a claim of compliance by the person.

(j) Nothing in this section restricts the power of a city attorney, district attorney, county counsel, or the Attorney General to bring, in the name of the people of California, any criminal proceeding otherwise authorized by law. Furthermore, nothing in this section prevents the state board or regional board, or a representative of the state board or regional board, from cooperating with, or participating in, such a proceeding.

(k) Notwithstanding any other provision of this section, if the state board or regional board determines that the circumstances surrounding a particular minor violation are such that the assessment of a civil penalty pursuant to this division is warranted or required by federal law, in addition to issuance of a notice to comply, the state board or regional board shall assess a civil penalty in accordance with this division, if the state board or regional board makes written findings that set forth the basis for the determination of the state board or regional board.

(Added by Stats. 1996, Ch. 775, Sec. 4. Effective January 1, 1997.)

§ 13399.3. *[Report to the Legislature]*

On or before January 1, 2000, the state board shall report to the Legislature on actions taken by the state board and the regional boards to implement this chapter and the results of that implementation. Each regional board shall provide the state board with the information that the state board requests to determine the degree to which the purposes described in subdivision (a) of Section 13399 have been achieved.

(Amended by Stats. 2000, Ch. 727, Sec. 6. Effective January 1, 2001.)

CHAPTER 5.9. THE STORM WATER ENFORCEMENT ACT OF 1998 [13399.25. - 13399.43.]

(Chapter 5.9 added by Stats. 1998, Ch. 998, Sec. 3.)

§ 13399.25. *[Chapter defined]*

This chapter supplements, and does not supplant, other laws relating to the discharge of storm water.

(Added by Stats. 1998, Ch. 998, Sec. 3. Effective January 1, 1999.)

§ 13399.27. *[Reports]*

On or before February 1, 2000, and on each February 1 thereafter, the state board, after any necessary investigation, shall prepare, and make available to the public, a report that includes both of the following:

(a) A list of those persons that were notified of their duty to comply with applicable general storm water NPDES permits pursuant to Section 13399.30 and a description of the responses received to those notifications, including the filing of notices of intent to obtain coverage or notices of nonapplicability, returned mail and no response, appeals of filing or permitting requirements pursuant to this chapter, site inspections, enforcement actions taken, and penalties assessed therefor.

(b) A list of those dischargers identified pursuant to Section 13399.31 that, during the previous calendar year, failed to submit an annual report or construction certification required by a regional board, and any penalties assessed therefor.

(Added by Stats. 1998, Ch. 998, Sec. 3. Effective January 1, 1999.)

§ 13399.30. *[Identification of dischargers]*

(a) (1) Each year the regional boards shall undertake reasonable efforts to identify dischargers of storm water that have not obtained coverage under an appropriate storm water NPDES permit.

(2) Any person, including a person subject to waste discharge requirements under Section 1342(p) of Title 33 of the United States Code, that discharges, proposes to discharge, or is suspected by a regional board or the state board of discharging storm water associated with industrial activity that has not obtained coverage under an appropriate storm water NPDES permit, shall submit to the regional board, within 30 days from the date on which a notice is sent by the regional board, the appropriate notice of intent to obtain coverage or a notice of nonapplicability that specifies the basis for not needing to obtain coverage under an NPDES permit.

(b) If a person to which a notice is sent pursuant to subdivision (a) fails to submit the appropriate notice of intent to obtain coverage or the required notice of nonapplicability to the regional board within 30 days from the date on

which that notice is sent, the executive officer of the regional board shall send a second notice to that discharger.

(c) (1) If a person to which a notice is sent pursuant to subdivision (b) fails to submit the required notice of nonapplicability to the regional board within 60 days from the date on which the notice pursuant to subdivision (a) was sent, the regional board shall impose the penalties described in subdivision (b) of Section 13399.33.

(2) If a person to which a notice is sent pursuant to subdivision (b) fails to submit the required notice of intent to obtain coverage to the regional board within 60 days from the date on which the notice pursuant to subdivision (a) was sent, the regional board shall impose the penalties described in subdivision (a) of Section 13399.33.

(Added by Stats. 1998, Ch. 998, Sec. 3. Effective January 1, 1999.)

§ 13399.31. *[Notice of noncompliance]*

(a) Each year the regional board shall conduct a review of the annual reports and construction certifications submitted in accordance with the requirements of an applicable NPDES permit and Section 1342(p) of Title 33 of the United States Code and shall identify the dischargers that have failed to submit that annual report or construction certification required by the regional board.

(b) The regional board shall notify each discharger that is identified pursuant to subdivision (a) with regard to its noncompliance and the penalties therefor.

(c) If a discharger to which a notice is sent pursuant to subdivision (b) fails to submit the annual report or construction certification required by the regional board to the regional board within 30 days from the date on which that notice is sent, the executive officer of the regional board shall send a second notice to that discharger.

(d) If a discharger to which a notice is sent pursuant to subdivision (c) fails to submit the annual report or construction certification required by the regional board to the regional board within 60 days from the date on which the notice is sent pursuant to subdivision (b), the regional board shall impose the penalties described in subdivision (c) of Section 13399.33.

(Added by Stats. 1998, Ch. 998, Sec. 3. Effective January 1, 1999.)

§ 13399.33. *[Penalties]*

Except as provided in Section 13399.35, the regional board shall do all of the following with regard to a discharger that is subject to the requirements prescribed in accordance with Section 1342(p) of Title 33 of the United States Code:

(a) (1) With regard to a discharger of storm water associated with industrial activity that fails to submit the required notice of intent to obtain

coverage in accordance with Section 13399.30, impose civil liability administratively in an amount that is not less than five thousand dollars ($5,000) per year of noncompliance or fraction thereof, unless the regional board makes express findings setting forth the reasons for its failure to do so, based on the specific factors required to be considered pursuant to paragraph (2).

(2) In determining the amount of the penalty imposed under this section, the regional board shall consider the nature, circumstances, extent, and gravity of the violation, and, with respect to the violator, the ability to pay, any prior history of violations, the degree of culpability, economic benefits or savings resulting from the violation, and other matters as justice may require. These considerations shall be balanced against the need for the regulatory costs of environmental protection to be borne equally by dischargers throughout the state, and the need for predictability of enforcement when making business decisions.

(b) With regard to a person that fails to submit the required notice of nonapplicability in accordance with Section 13399.30, impose civil liability administratively in the amount of one thousand dollars ($1,000).

(c) With regard to a person that fails to submit an annual report or construction certification in accordance with Section 13399.31, impose civil liability administratively in an amount that is not less than one thousand dollars ($1,000).

(d) Recover from the persons described in subdivisions (a), (b), and (c) the costs incurred by the regional board with regard to those persons.

(e) It is an affirmative defense to the penalties imposed under this section for a person described in subdivision (a) or (b) to prove that he or she did not, in fact, receive the notices required under Section 13399.30 or 13399.31.
(Added by Stats. 1998, Ch. 998, Sec. 3. Effective January 1, 1999.)

§ 13399.35. ***[Reduction of penalties]***

(a) The regional board may allow a person to reduce the penalties described in subdivisions (a), (b), and (c) of Section 13399.33 by up to 50 percent by undertaking a supplemental environmental project in accordance with the enforcement policy of the state board and any applicable guidance document.

(b) For the purposes of this section, a "supplemental environmental project" means an environmentally beneficial project that a person agrees to undertake, with the approval of the regional board, which would not be undertaken in the absence of an enforcement action under Section 13399.33.
(Added by Stats. 1998, Ch. 998, Sec. 3. Effective January 1, 1999.)

§ 13399.37. ***[Deposit of funds]***

(a) The money generated from the imposition of liability and cost recovery pursuant to Section 13399.33 shall be deposited, and separately accounted for, in the Waste Discharge Permit Fund.

(b) The money described in subdivision (a) shall be available, upon appropriation by the Legislature, to the regional boards from which the revenues were generated for the purpose of carrying out storm water programs under this division.

(Added by Stats. 1998, Ch. 998, Sec. 3. Effective January 1, 1999.)

§ 13399.41. *[Agency cooperation]*

Notwithstanding any other provision of law, appropriate state agencies, as requested by the executive director of the state board, shall provide the state board with the names, addresses, and standard industrial classifications or types of business facilities that are subject to storm water programs under this division. The information obtained pursuant to this section shall be used by the state board solely to regulate the discharge of storm water associated with industrial activity under this division. The state shall reimburse state agencies for all reasonable expenses incurred in connection with complying with this section.

(Added by Stats. 1998, Ch. 998, Sec. 3. Effective January 1, 1999.)

§ 13399.43. *[Definition]*

For the purposes of this chapter, "NPDES permit" means a permit issued under the national pollutant discharge elimination system program in accordance with the Clean Water Act (33 U.S.C.A. Sec. 1251 et seq.).

(Added by Stats. 1998, Ch. 998, Sec. 3. Effective January 1, 1999.)

CHAPTER 6. STATE FINANCIAL ASSISTANCE [13400. - 13443.]

(Chapter 6 added by Stats. 1969, Ch. 482.)

Article 1. State Water Quality Control Fund [13400. - 13401.]

(Article 1 added by Stats. 1969, Ch. 482.)

§ 13400. *[Definitions]*

As used in this chapter, unless otherwise apparent from the context:

(a) "Facilities" means any of the following:

(1) Facilities for the collection, treatment, or export of waste when necessary to prevent water pollution.

(2) Facilities to recycle wastewater and to convey recycled water.

(3) Facilities or devices to conserve water.

(4) Any combination of the facilities described in paragraph (1), (2), or (3).

(b) "Fund" means the State Water Quality Control Fund.

(c) "Not-for-profit organization" means an organization operated on a not-for-profit basis, including, but not limited to, an association, cooperative, or

private corporation that is a public water system, as defined in Section 116275 of the Health and Safety Code, that meets technical, managerial, and financial capacity criteria specified by the state board for public water systems, or that is subject to regulatory authority pursuant to this division."Not-for-profit organization" includes only an organization that is either controlled by a local public body or bodies or has a broadly based ownership by, or membership of, people of the local community.

(d) "Public agency" means any city, county, city and county, district, or other political subdivision of the state.

(Amended by Stats. 2015, Ch. 673, Sec. 33. Effective January 1, 2016.)

§ 13401. *[The State Water Quality Control Fund]*

(a) The State Water Quality Control Fund is continued in existence. The following moneys in the fund are appropriated, without regard to fiscal years, for expenditure by the state board in making loans to public agencies in accordance with this chapter:

(1) The balance of the original moneys deposited in the fund.

(2) Any money repaid to the fund.

(3) Any remaining balance of the money in the fund deposited therein after the specific appropriations for loans to the South Tahoe Public Utility District, the North Tahoe Public Utility District, the Tahoe City Public Utility District, the Truckee Sanitary District, and to any other governmental entity in the areas served by such districts have been made.

(b) Notwithstanding subdivision (a), upon the order of the state board, the money in the State Water Quality Control Fund shall be transferred to the State Water Pollution Control Revolving Fund.

(Amended by Stats. 1993, Ch. 775, Sec. 1. Effective January 1, 1994.)

Article 2. Loans to Local Agencies [13410. - 13418.]

(Article 2 added by Stats. 1969, Ch. 482.)

§ 13410. *[Construction loans]*

Applications for construction loans under this chapter shall include:

(a) A description of the proposed facilities.

(b) A statement of facts showing the necessity for the proposed facilities and showing that funds of the public agency are not available for financing such facilities and that the sale of revenue or general obligation bonds through private financial institutions is impossible or would impose an unreasonable burden on the public agency.

(c) A proposed plan for repaying the loan.

(d) Other information as required by the state board.

(Added by Stats. 1969, Ch. 482.)

§ 13411. *[Conditions]*

Upon a determination by the state board, after consultation with the State Department of Health, that (a) the facilities proposed by an applicant are necessary to the health or welfare of the inhabitants of the state, (b) that the proposed facilities meet the needs of the applicant, (c) that funds of the public agency are not available for financing such facilities and that the sale of revenue or general obligation bonds through private financial institutions is impossible or would impose an unreasonable burden on the public agency, (d) that the proposed plan for repayment is feasible, (e) in the case of facilities proposed under Section 13400(c)(1) that such facilities are necessary to prevent water pollution, (f) in the case of facilities proposed under Section 13400(c)(2) that such facilities will produce recycled water and that the public agency has adopted a feasible program for use thereof, and (g) in the case of facilities proposed under Section 13400(c)(3) that such facilities are a cost effective means of conserving water, the state board, subject to approval by the Director of Finance, may loan to the applicant such sum as it determines is not otherwise available to the public agency to construct the proposed facilities.
(Amended by Stats. 1995, Ch. 28, Sec. 23. Effective January 1, 1996.)

§ 13412. *[Repayment]*

No loan shall be made to a public agency unless it executes an agreement with the state board under which it agrees to repay the amount of the loan, with interest, within 25 years at 50 percent of the average interest rate paid by the state on general obligation bonds sold in the calendar year immediately preceding the year in which the loan agreement is executed.
(Amended by Stats. 1986, Ch. 978, Sec. 1.)

§ 13413. *[Special consideration]*

It is the policy of this state that, in making construction loans under this article, the state board should give special consideration to facilities proposed to be constructed by public agencies in areas in which further construction of buildings has been halted by order of the State Department of Health or a local health department, or both, or notice has been given that such an order is being considered; provided, however, that the public agencies designated in this section shall otherwise comply with and meet all requirements of other provisions of this chapter.
(Amended by Stats. 1971, Ch. 1593.)

§ 13414. *[Payments]*

All money received in repayment of loans under this chapter shall be paid to the State Treasurer and credited to the fund.
(Added by Stats. 1969, Ch. 482.)

§ 13415. *[Studies and investigations]*

(a) Loans may be made by the state board to public agencies to pay not more than one-half of the cost of studies and investigations made by such public agencies in connection with waste water reclamation.

(b) Not more than a total of two hundred thousand dollars ($200,00) shall be loaned pursuant to this section in any fiscal year, and not more than fifty thousand dollars ($50,000) shall be loaned to any public agency in any fiscal year pursuant to this section. In the event that less than two million dollars ($2,000,000) is available in any fiscal year for loans under this article, then not more than 10 pecent of the available amount shall be available for loans for studies and investigations pursuant to this section.

(c) Applications for such loans shall be made in such form, and shall contain such information, as may be required by the state board.

(d) Such loans shall be repaid within a period not to exceed 10 years, with interest at a rate established in the manner provided in Section 13412.
(Added by Stats. 1969, Ch. 482.)

§ 13416. ***[Election requirement]***
Before a public agency may enter into a contract with the state board for a construction loan under this chapter, the public agency shall hold an election on the proposition of whether or not the public agency shall enter into the proposed contract and more than 50 percent of the votes cast at such election must be in favor of such proposition.
(Added by Stats. 1969, Ch. 482.)

§ 13417. ***[Election procedure]***
The election shall be held in accordance with the following provisions:

(a) The procedure for holding an election on the incurring of bonded indebtedness by such public agency shall be utilized for an election of the proposed contract as nearly as the same may be applicable. Where the law applicable to such agency does not contain such bond election procedure, the procedure set forth in the Revenue Bond Law of 1941 (Chapter 6 (commencing with Section 54300) Part 1, Division 2, Title 5 of the Government Code), as it may now or hereafter be amended, shall be utilized as nearly as the same may be applicable.

(b) No particular form of ballot is required.

(c) The notice of the election shall include a statement of the time and place of the election, the purpose of the election, the general purpose of the contract, and the maximum amount of money to be borrowed from the state under the contract.

(d) The ballots for the election shall contain a brief statement of the general purpose of the contract substantially as stated in the notice of the election, shall state the maximum amount of money to be borrowed from the

state under the contract, and shall contain the words "Execution of contract—Yes" and "Execution of contract—No."

(e) The election shall be held in the entire public agency except where the public agency proposes to contract with the state board on behalf of a specified portion, or of specified portions of the public agency, in which case the election shall be held in such portion or portions of the public agency only.
(Added by Stats. 1969, Ch. 482.)

§ 13418. *[Tahoe moratorium]*

Notwithstanding any provision of this chapter or any other provision of law, including, but not limited to, the provisions of Chapter 47 and 137 of the Statutes of 1966, First Extraordinary Session, Chapter 1679 of the Statutes of 1967, Chapter 1356 of the Statutes of 1969, and Chapter 920 of the Statutes of 1970, or the provisions of any existing loan contract entered into pursuant to this chapter or any other such provision of law, there shall be a two-year moratorium following the effective date of this section on that portion of the principal and interest payments otherwise required in repayment of funds heretofore loaned to the North Tahoe Public Utility District, the Tahoe City Public Utility District, the South Tahoe Public Utility District, the Truckee Sanitary District, the Squaw Valley County Water District, and the Alpine Springs County Water District pursuant to this chapter or any act of the Legislature authorizing a state loan for the purpose of permitting any such agency to construct necessary sewage and storm drainage facilities to prevent and control water pollution in the area served by such agency, equal in percentage, as determined by the Department of Finance, to the percentage of property tax revenues lost to the agency by reason of the adoption of Article XIII A of the California Constitution, unless moneys are otherwise available for such repayment from state allocations or the sale of bonds authorized on or before July 1, 1978, but unissued. The provisions of this section do not apply to any sums which are required to be repaid immediately or in accordance with an accelerated time schedule pursuant to a duly entered stipulated judgment between the State of California and the Tahoe City Public Utility District. Interest on loans shall accrue during the moratorium period and be repaid by the recipients of the loans, in addition to the normal principal and interest payments.
(Added by Stats. 1979, Ch. 528.)

Article 2.5. Guarantees for Local Agency Bonds [13425. - 13433.]

(Article 2.5 added by Stats. 1988, Ch. 47, Sec. 1.)

§ 13425. *[Applications]*

Applications for guarantees for local agency bonds under this chapter shall include:

(a) A description of the proposed facilities.

(b) A financing plan for the proposed facilities, including the amount of debt and maximum term to maturity of the proposed local agency bond issue and identification of sources of revenue that will be dedicated to payment of principal and interest on the bonds.

(c) Other information as required by the state board.

The state board may provide that the application may be combined with applications for any other source of funds administered by the state board.

(Added by Stats. 1988, Ch. 47, Sec. 1. Effective March 18, 1988.)

§ 13426. *[Determinations]*

The state board, subject to approval by the Director of Finance, may agree to provide a guarantee pursuant to this article for all or a specified part of the proposed local agency bond issue upon making all of the following determinations:

(a) The facilities proposed by an applicant are necessary to the health or welfare of the inhabitants of the state and are consistent with water quality control plans adopted by regional boards.

(b) The proposed facilities meet the needs of the applicant.

(c) The proposed bond issue and plan repayment are sound and feasible.

(d) In the case of facilities proposed under paragraph (2) of subdivision (a) of Section 13400, the facilities will produce recycled water and the applicant has adopted a feasible program for the use of the facilities. The state board may adopt criteria for ranking and setting priorities among applicants for those guarantees.

(Amended by Stats. 2015, Ch. 673, Sec. 34. Effective January 1, 2016.)

§ 13427. *[Required agreement]*

No guarantee shall be extended to any applicant unless it executes an agreement with the state board under which the applicant agrees to the following provisions:

(a) To proceed expeditiously with, and complete, the proposed project.

(b) To commence operation of the project on completion, and to properly operate and maintain the work in accordance with applicable provisions of law.

(c) To issue bonds and to levy fines, charges, assessments, or taxes to pay the principal of, and interest on, the bonds as described in the application.

(d) To diligently and expeditiously collect those levies, including timely exercise of available legal remedies in the event of delinquency or default.

(e) To act in accordance with such other provisions as the state board may require.

(Added by Stats. 1988, Ch. 47, Sec. 1. Effective March 18, 1988.)

§ 13428. *[Continuous appropriation]*

Notwithstanding Section 13340 of the Government Code, the money in the Clean Water Bond Guarantee Fund, which is hereby created, is continuously appropriated to the state board without regard to fiscal years for the purposes of this chapter.
(Added by Stats. 1988, Ch. 47, Sec. 1. Effective March 18, 1988.)

§ 13429. ***[Investment]***
Money in the Clean Water Bond Guarantee Fund not needed for making payments on guaranteed bonds pursuant to this chapter shall be invested pursuant to law. All proceeds of the investment shall be deposited in that fund to the extent permitted by federal law.
(Added by Stats. 1988, Ch. 47, Sec. 1. Effective March 18, 1988.)

§ 13430. ***[Limitation]***
The state board's authorization to guarantee bonds under this article shall be limited to bonds with a total principal amount of not more than 10 times the amount in the Clean Water Bond Guarantee Fund at the time the state board determines to extend each guarantee pursuant to Section 13426.
(Added by Stats. 1988, Ch. 47, Sec. 1. Effective March 18, 1988.)

§ 13431. ***[Limitation on amount available]***
Under no circumstances shall the amount paid out as a result of bond guarantees extended pursuant to this article exceed the amount in the Clean Water Bond Guarantee Fund. This article does not express or imply any commitment by the state board or any other agency of the state to pay any money or levy any charge or tax or otherwise exercise its faith and credit on behalf of any local agency or bondholder beyond the funds in the Clean Water Bond Guarantee Fund.
(Added by Stats. 1988, Ch. 47, Sec. 1. Effective March 18, 1988.)

§ 13432. ***[Fee]***
The state board may charge an annual fee not to exceed one-tenth of 1 percent of the principal amount of each bond issue that it guarantees for guarantee coverage. The state board may charge a lesser amount. The proceeds of any fee shall be paid into the Clean Water Bond Guarantee Fund.
(Added by Stats. 1988, Ch. 47, Sec. 1. Effective March 18, 1988.)

§ 13433. ***[Rules and procedures]***
The state board shall, by regulation, prescribe rules and procedures for all of the following:

(a) To pay money from the Clean Water Bond Guarantee Fund to an insured local agency or bondholder in the event that the amount in the local agency's bond reserve fund falls below a minimum amount, or in the event of failure by the local agency to pay the principal of, or interest on, an insured bond issue on time, as the state board may require.

(b) To require, by court action if necessary, a local agency to raise sewer service charges, levy additional assessments, collect charges or assessments, or foreclose or otherwise sell property as needed to prevent a reduction in the local agency's bond reserve fund, or to prevent default, or to collect funds to repay to the fund any payments made pursuant to subdivision (a).
(Added by Stats. 1988, Ch. 47, Sec. 1. Effective March 18, 1988.)

Article 3. State Water Pollution Cleanup and Abatement Account [13440. - 13443.]

(Article 3 added by Stats. 1969, Ch. 482.)

§ 13440. *[The account]*

There is in the State Water Quality Control Fund the State Water Pollution Cleanup and Abatement Account (hereinafter called the "account"), to be administered by the state board.
(Added by Stats. 1969, Ch. 482.)

§ 13441. *[Fund sources]*

There is to be paid into the account all moneys from the following sources:

(a) All moneys appropriated by the Legislature for the account.

(b) All moneys contributed to the account by any person and accepted by the state board.

(c) One-half of all moneys collected by way of criminal penalty and all moneys collected civilly under any proceeding brought pursuant to any provison of this division.

(d) All moneys collected by the state board for the account under Section 13304.

The first unencumbered five hundred thousand dollars ($500,000) paid into the account in any given fiscal year is available without regard to fiscal years, for expenditure by the state board in accordance with the provisions of this article. The next unencumbered five hundred thousand dollars ($500,000), or any portion thereof, deposited in any given fiscal year, is available for expenditure by the state board for the purposes of this article, subject to the provisions set forth in Section 28 of the Budget Act of 1984 (Chapter 258 of the Statutes of 1984). The next unencumbered one million dollars ($1,000,000) deposited in the account in any given fiscal year is available for expenditure by the state board for the purposes of Section 13443. The remaining unencumbered funds deposited in the account in any given fiscal year is available without regard to fiscal years to the state board for expenditure for the purposes set forth in Section 13442.
(Amended by Stats. 1984, Ch. 1535, Sec. 2.)

§ 13441.5. *[Transfers]*

The State Treasurer, when requested by the state board and approved by the Director of Finance, shall transfer moneys in the nature of a loan from the State Water Quality Control Fund to the account created pursuant to Section 13440, which shall be repayable from the account to such fund; provided, that the moneys transferred from the fund to the account shall not exceed the sum of twenty-five thousand dollars ($25,000) at any one time.
(Added by Stats. 1970, Ch. 918.)

§ 13442. ***[Grants to public agencies and tribal governments]***

[For a similar section that will become operative on July 1, 2018, see below]

(a) Upon application by an eligible entity, as described in subdivision (b), the state board may approve the payment of moneys from the account to that entity to assist in cleaning up a waste, abating the effects of a waste on waters of the state, or addressing an urgent drinking water need without regard to whether the need for drinking water is a result of the discharge of waste.

(b) An entity is eligible to apply for funding pursuant to this section if that entity has authority to undertake the activity for which it seeks moneys and the entity is any of the following:

(1) A public agency.

(2) A tribal government that is on the California Tribal Consultation List maintained by the Native American Heritage Commission and is a disadvantaged community, as defined in Section 79505.5, that agrees to waive tribal sovereign immunity for the explicit purpose of regulation by the state board pursuant to this division.

(3) A not-for-profit organization serving a disadvantaged community, as defined in Section 79505.5.

(4) A community water system, as defined in Section 116275 of the Health and Safety Code, that serves a disadvantaged community, as defined in Section 79505.5.

(c) An eligible entity shall not become liable to the state board for repayment of moneys paid to the entity under this section and expended in accordance with the state board's approval of payment, but this shall not be a defense to an action brought pursuant to subdivision (c) of Section 13304 for the recovery of moneys paid under this section.

(d) Projects using moneys that are paid to an eligible entity pursuant to this section shall be exempt from state contracting and procurement requirements set forth in the Government Code and the Public Contract Code to the extent necessary to take immediate action to protect public health and safety.

(e) The state board may adopt guidelines for the allocation and administration of these moneys that shall not be subject to Chapter 3.5

(commencing with Section 11340) of Part 1 of Division 3 of Title 2 of the Government Code.

(f) This section shall become inoperative on July 1, 2018, and, as of January 1, 2019, is repealed, unless a later enacted statute, that becomes operative on or before January 1, 2019, deletes or extends the dates on which it becomes inoperative and is repealed.

(Amended by Stats. 2015, Ch. 2, Sec. 7. Effective March 27, 2015. Inoperative July 1, 2018. Repealed as of January 1, 2019, by its own provisions. See later operative version added by Sec. 8 of Stats. 2015, Ch. 2.)

§ 13442. *[Grants to public agencies and tribal governments]*

[Currently operative section is above; this section does not become operative until July 1, 2018]

(a) Upon application by a public agency, a tribal government that is on the California Tribal Consultation List maintained by the Native American Heritage Commission and is a disadvantaged community, as defined in Section 79505.5, that agrees to waive tribal sovereign immunity for the explicit purpose of regulation by the state board pursuant to this division, or a not-for-profit organization serving a disadvantaged community, as defined in Section 79505.5, with authority to clean up a waste or abate the effects of a waste, the state board may order moneys to be paid from the account to the agency, tribal government, or organization to assist it in cleaning up the waste or abating its effects on waters of the state.

(b) The agency, a tribal government that is on the California Tribal Consultation List maintained by the Native American Heritage Commission and is a disadvantaged community, as defined in Section 79505.5, that agrees to waive tribal sovereign immunity for the explicit purpose of regulation by the state board pursuant to this division, or a not-for-profit organization serving a disadvantaged community, as defined in Section 79505.5, shall not become liable to the state board for repayment of moneys paid under this section, but this shall not be a defense to an action brought pursuant to subdivision (c) of Section 13304 for the recovery of moneys paid under this section.

(c) This section shall become operative on July 1, 2018.

(Repealed (in Sec. 7) and added by Stats. 2015, Ch. 2, Sec. 8. Effective March 27, 2015. Section operative July 1, 2018, by its own provisions.)

§ 13443. *[Grants to regional boards]*

Upon application by a regional board that is attempting to remedy a significant unforeseen water pollution problem, posing an actual or potential public health threat, or is overseeing and tracking the implementation of a supplemental environmental project required as a condition of an order imposing administrative civil liability, and for which the regional board does not have

adequate resources budgeted, the state board may order moneys to be paid from the account to the regional board to assist it in responding to the problem.
(Amended by Stats. 2001, Ch. 869, Sec. 9. Effective January 1, 2002.)

CHAPTER 6.1. WATER CONSERVATION AND WATER QUALITY BOND LAW OF 1986 [13450. - 13469.]

(Chapter 6.1 added by Stats. 1986, Ch. 6, Sec. 1.)

Chapter 6.1, which contains the Water Conservation and Water Quality Bond Law of 1986 as approved by the voters in Proposition 44, is omitted from this version of the Porter-Cologne Act.

CHAPTER 6.5. STATE WATER POLLUTION CONTROL REVOLVING FUND [13475. - 13485.]

(Chapter 6.5 added by Stats. 1987, Ch. 1313, Sec. 1.)

§ 13475. *[Legislative findings]*

(a) The Legislature hereby finds and declares that since the federal Clean Water Act (33 U.S.C. Sec. 1251 et seq.) provides for establishment of a perpetual water pollution control revolving loan fund, which will be partially capitalized by federal contributions, it is in the interest of people of the state, in order to ensure full participation by the state under the federal Clean Water Act, to enact this chapter to authorize the state to establish and implement a state/federal water pollution control revolving fund in accordance with federal provisions, requirements, and limitations.

(b) The primary purpose of this chapter is to enact a statute consistent with the provisions and requirements of the federal Clean Water Act, as those provisions, requirements, and limitations relate to establishment, management, and operation of a state/federal water pollution control revolving fund. It is the intent of the Legislature that the terms of this chapter shall be liberally construed to achieve this purpose.
(Added by Stats. 1987, Ch. 1313, Sec. 1. Effective September 28, 1987.)

§ 13476. *[Definitions]*

Unless the context otherwise requires, the following definitions govern the construction of this chapter:

(a) "Administration fund" means the State Water Pollution Control Revolving Fund Administration Fund.

(b) "Board" means the State Water Resources Control Board.

(c) "Federal Clean Water Act" or "federal act" means the Clean Water Act (33 U.S.C. Sec. 1251 et seq.) and acts amendatory thereof or supplemental thereto.

(d) (1) "Financial assistance" means assistance authorized under Section 13480. Financial assistance includes loans, refinancing, installment sales agreements, purchase of debt, and loan guarantees for municipal revolving funds, but excludes grants.

(2) Notwithstanding paragraph (1), financial assistance may include grants or other assistance directed by a federal grant deposited in the fund to the extent authorized and funded by that grant.

(e) "Fund" means the State Water Pollution Control Revolving Fund.

(f) "Grant fund" means the State Water Pollution Control Revolving Fund Small Community Grant Fund.

(g) "Matching funds" means money that equals that percentage of federal contributions required by the federal act to be matched with state funds.

(h) "Municipality" has the same meaning and construction as in the federal act and also includes all state, interstate, and intermunicipal agencies.

(i) "Publicly owned" means owned by a municipality.

(j) "Severely disadvantaged community" means a community with a median household income of less than 60 percent of the statewide median household income.

(Amended by Stats. 2015, Ch. 673, Sec. 35. Effective January 1, 2016.)

§ 13477. ***[Creation and continuation of the revolving fund]***

The State Water Pollution Control Revolving Fund is hereby created in the State Treasury, and, notwithstanding Section 13340 of the Government Code, all moneys in the fund are continuously appropriated without regard to fiscal years to the board for expenditure in accordance with this chapter. The board is the state agency responsible for administering the fund. In order to facilitate compliance with the federal Tax Reform Act of 1986 (Public Law 99-514), there is hereby established in the fund a Federal Revolving Loan Fund Account and a State Revolving Loan Fund Account. From time-to-time thereafter, the board may modify existing accounts in the fund and may establish other accounts in the fund, and in all other funds administered by the board, which the board deems appropriate or necessary for proper administration.

(Added by Stats. 1987, Ch. 1313, Sec. 1. Effective September 28, 1987.)

§ 13477.5. ***[Water Pollution Control Revolving Fund Administration Fund]***

(a) The State Water Pollution Control Revolving Fund Administration Fund is hereby created in the State Treasury.

(b) The following moneys shall be deposited in the administration fund:

(1) Moneys transferred to the administration fund to pay the costs incurred by the board in connection with the administration of this chapter.

(2) The amounts collected for financial assistance services pursuant to subdivision (c).

(3) Notwithstanding Section 16475 of the Government Code, any interest earned upon the moneys deposited in the administration fund.

(c) (1) For any financial assistance made pursuant to Section 13480, the board may assess an annual charge for financial assistance services with regard to the financial assistance, not to exceed 1 percent of the financial assistance balance computed according to the true interest cost method.

(2) Any amounts collected under this subdivision shall be deposited in the administration fund.

(3) The financial assistance service rate authorized by this subdivision may be applied at any time during the term of the financial assistance, and once applied, shall remain unchanged for the duration of the financial assistance and shall not increase the financial assistance repayment amount as set forth in the terms and conditions imposed pursuant to this chapter.

(d) Moneys in the administration fund, upon appropriation by the Legislature to the board, may be expended for payment of the reasonable costs of administering the fund.

(e) The board shall set the total amount of revenue collected each year through the charges authorized by subdivision (c) at an amount that is as equal as practicable to the revenue levels set forth in the annual Budget Act for this activity. At least once each fiscal year, the board shall adjust the financial assistance service rate imposed pursuant to subdivision (c) to conform with the revenue levels set forth in the annual Budget Act.

(Amended by Stats. 2008, Ch. 609, Sec. 4. Effective January 1, 2009.)

§ 13477.6. *[State Water Pollution Control Revolving Fund Small Community Grant Fund]*

(a) The State Water Pollution Control Revolving Fund Small Community Grant Fund is hereby created in the State Treasury.

(b) The following moneys shall be deposited in the grant fund:

(1) Moneys transferred to the grant fund pursuant to subdivision (c).

(2) Notwithstanding Section 16475 of the Government Code, any interest earned upon the moneys deposited in the grant fund.

(3) Any moneys deposited pursuant to Section 79723.

(c) (1) For any financing made pursuant to Section 13480, the board may assess an annual charge to be deposited in the grant fund in lieu of interest that would otherwise be charged.

(2) The charge authorized by this subdivision may be applied at any time during the term of the financing, and, once applied, shall remain unchanged unless the board determines that the application of the charge is any of the following:

(A) No longer consistent with federal requirements regarding the fund.

(B) No longer necessary.

(C) Negatively affecting the board's ability to fund projects that support its water quality goals.

(3) The charge shall not increase the financing repayment amount as set forth in the terms and conditions imposed pursuant to this chapter.

(4) If the board ceases collecting the charge before the financing repayment is complete, the board shall replace the charge with an identical interest rate.

(d) (1) Moneys in the grant fund, upon appropriation by the Legislature to the board, may be expended, in accordance with this chapter, for grants for wastewater projects described in subdivision (c) of Section 1383 of Title 33 of the United States Code that serve small communities as defined in subdivision (a) of Section 30925 of the Public Resources Code. The board shall expend moneys appropriated from the grant fund within four years from the date of encumbrance.

(2) For the purpose of approving grants, the board shall give priority to projects that serve severely disadvantaged communities.

(3) In addition to the uses set forth in paragraph (1), moneys deposited in the grant fund pursuant to Section 79723, upon appropriation by the Legislature to the board, may be expended for technical assistance as authorized by Section 79725.

(Amended by Stats. 2015, Ch. 673, Sec. 36. Effective January 1, 2016.)

§ 13478. ***[Board authority]***

(a) The board may undertake any of the following:

(1) Enter into agreements with the federal government for federal contributions to the fund.

(2) Accept federal contributions to the fund.

(3) Enter into an agreement with, and accept matching funds from, a municipality. A municipality that seeks to enter into an agreement with the board and provide matching funds pursuant to this subdivision shall provide to the board evidence of the availability of those funds in the form of a written resolution adopted by the governing body of the municipality before it requests a preliminary financial assistance commitment.

(4) Use moneys in the fund for the purposes permitted by the federal act.

(5) Provide for the deposit of matching funds and any other available and necessary moneys into the fund.

(6) Make requests on behalf of the state for deposit into the fund of available federal moneys under the federal act and determine on behalf of the state appropriate maintenance of progress toward compliance with the enforceable deadlines, goals, and requirements of the federal act.

(7) Determine on behalf of the state that publicly owned treatment works that receive financial assistance from the fund will meet the requirements of, and otherwise be treated as required by, the federal act.

(8) Provide for appropriate audit, accounting, and fiscal management services, plans, and reports relative to the fund.

(9) Take additional incidental action as appropriate for the adequate administration and operation of the fund.

(10) Charge municipalities that elect to provide matching funds a fee to cover the actual cost of obtaining the federal funds pursuant to Section 603(d)(7) of the federal act (33 U.S.C. Sec. 1383(d)(7)) and processing the financial assistance application. The fee shall be waived by the board if sufficient funds to cover those costs are available from other sources.

(11) Use money returned to the fund under clause (ii) of subparagraph (D) of paragraph (1) of subdivision (b) of Section 13480, and any other source of matching funds, if not prohibited by statute, as matching funds for the federal administrative allowance under Section 603(d)(7) of the federal act (33 U.S.C. Sec. 1383(d)(7)).

(12) Expend money repaid by financial assistance recipients for financial assistance service under clauses (i) and (ii) of subparagraph (D) of paragraph (1) of subdivision (b) of Section 13480 to pay administrative costs incurred by the board under this chapter.

(13) Engage in the transfer of capitalization grant funds, as authorized by Section 35.3530(c) of Title 40 of the Code of Federal Regulations and reauthorized by Public Law 109-54, to the extent set forth in an Intended Use Plan, that shall be subject to approval by the board.

(14) Cross-collateralize revenue bonds with the Safe Drinking Water State Revolving Fund created pursuant to Section 116760.30 of the Health and Safety Code, as authorized by Section 35.3530(d) of Title 40 of the Code of Federal Regulations.

(b) This section shall become operative on July 1, 2014.

(Repealed (in Sec. 187) and added by Stats. 2014, Ch. 35, Sec. 188. Effective June 20, 2014. Section operative July 1, 2014, by its own provisions.)

§ 13479. ***[Federal contributions]***

(a) The board may enter into an agreement with the federal government for federal contributions to the fund only if both of the following conditions have been met:

(1) The state has identified any required matching funds.

(2) The board is prepared to commit to the expenditure of any minimum amount in the fund in the manner required by the federal act.

(b) Any agreement between the board and the federal government shall contain those provisions, terms, and conditions required by the federal act, and

any implementing federal rules, regulations, guidelines, and policies, including, but not limited to, agreement to the following:

(1) Moneys in the fund shall be expended in an expeditious and timely manner.

(2) All moneys in the fund as a result of federal capitalization grants shall be used to assure maintenance of progress toward compliance with the enforceable deadlines, goals, and requirements of the federal act, including any applicable municipal compliance deadlines.

(Amended by Stats. 1995, Ch. 370, Sec. 3. Effective August 4, 1995.)

§ 13480. ***[Authorized uses]***

(a) Moneys in the fund shall be used only for the permissible purposes allowed by the federal act or a federal grant deposited in the fund, to the extent authorized and funded by that grant.

(b) Consistent with expenditure for authorized purposes, moneys in the fund may be used for the following purposes:

(1) Loans that meet all of the following requirements:

(A) Are made at or below market interest rates.

(B) Require annual payments of principal and any interest, with repayment commencing not later than one year after completion of the project for which the loan is made and full amortization not later than 30 years after project completion unless otherwise authorized by a federal grant deposited in the fund to the extent authorized and funded by that grant. Loan forgiveness is permissible to the extent authorized by a federal grant deposited in the fund to the extent authorized and funded by that grant.

(C) Require the loan recipient to establish an acceptable dedicated source of revenue for repayment of a loan.

(D) (i) Contain other terms and conditions required by the board or the federal act or applicable rules, regulations, guidelines, and policies. To the extent permitted by federal law, the combined interest and loan service rate shall be set at a rate that does not exceed 50 percent of the interest rate paid by the state on the most recent sale of state general obligation bonds and the combined interest and loan service rate shall be computed according to the true interest cost method. If the combined interest and loan service rate so determined is not a multiple of one-tenth of 1 percent, the combined interest and loan service rate shall be set at the multiple of one-tenth of 1 percent next above the combined interest and loan service rate so determined. A loan from the fund used to finance costs of facilities planning, or the preparation of plans, specifications, or estimates for construction of publicly owned treatment works shall comply with Section 603(e) of the federal act (33 U.S.C. Sec. 1383(e)).

(ii) Notwithstanding clause (i), if the loan applicant is a municipality, an applicant for a loan for the implementation of a management program pursuant

to Section 319 of the federal act (33 U.S.C. Sec. 1329), or an applicant for a loan for nonpoint source or estuary enhancement pursuant to Section 320 of the federal act (33 U.S.C. Sec. 1330), and the applicant provides matching funds, the combined interest and loan service rate on the loan shall be 0 percent. A loan recipient that returns to the fund an amount of money equal to 20 percent of the remaining unpaid federal balance of an existing loan shall have the remaining unpaid loan balance refinanced at a combined interest and loan service rate of 0 percent over the time remaining in the original loan contract.

(2) To buy or refinance the debt obligations of municipalities within the state at or below market rates if those debt obligations were incurred after March 7, 1985.

(3) To guarantee, or purchase insurance for, local obligations where that action would improve credit market access or reduce interest rates.

(4) As a source of revenue or security for the payment of principal and interest on revenue or general obligation bonds issued by the state, if the proceeds of the sale of those bonds will be deposited in the fund.

(5) To establish loan guarantees for similar revolving funds established by municipalities.

(6) To earn interest.

(7) For payment of the reasonable costs of administering the fund and conducting activities under Subchapter VI (commencing with Section 601) of the federal act (33 U.S.C. Sec. 1381 et seq.). Those costs shall not exceed 4 percent of all federal contributions to the fund, four hundred thousand dollars ($400,000) per year, or one-fifth of 1 percent per year of the current valuation of the fund, whichever amount is greatest, plus the amount of any fees collected by the state for this purpose regardless of the source.

(8) For financial assistance toward the nonfederal share of the costs of grant-funded treatment works projects, to the extent permitted by the federal act.

(9) Grants, principal forgiveness, negative interest rates, and any other type of, or variation on the above types of, assistance authorized by a federal grant deposited in the fund, to the extent authorized and funded by that grant.
(Amended by Stats. 2015, Ch. 673, Sec. 37. Effective January 1, 2016.)

§ 13481. *[Limitations on use]*

The fund shall be used to provide financial assistance only for projects which are (a) consistent with plans, if any, developed under Sections 205(j), 208, 303(e), 319, and 320 of the federal act, and (b) on the approved state priority list adopted under Section 216 of the federal act.
(Added by Stats. 1987, Ch. 1313, Sec. 1. Effective September 28, 1987.)

§ 13481.5. *[Projects that receive favorable consideration]*

The board, for the purposes of administering the fund, shall give favorable consideration to the following types of eligible projects: projects that address public health problems or the pollution of impaired water bodies, projects necessary to comply with regulatory requirements, water recycling projects, projects undertaken to prevent or minimize water quality degradation, and projects undertaken in response to an administrative enforcement order.
(Added by Stats. 2004, Ch. 559, Sec. 1. Effective January 1, 2005.)

§ 13481.7. ***[Municipal indebtedness]***
Subject to all applicable constitutional restrictions, a municipality may borrow money and incur indebtedness pursuant to this chapter.
(Added by Stats. 2011, Ch. 513, Sec. 8. Effective January 1, 2012.)

§ 13482. ***[Transfer of funds]***

(a) In accordance with the Clean Water Bond Law of 1984 (Chapter 13 (commencing with Section 13999)), the board, with the approval of the Clean Water Finance Committee, may transfer funds from the Clean Water Construction Grant Account to the fund for the purpose of meeting federal requirements for matching moneys in the fund.

(b) Any repayment of fund moneys, including interest payments, and all interest earned on, or accruing to, any moneys in the fund, shall be deposited in the fund and shall be available, in perpetuity, for expenditure for the purposes and uses authorized by the federal act.

(c) A municipality that elects to provide matching funds shall do all of the following:

(1) Establish an account or other funding mechanism permitted by law for the deposit and use of those funds.

(2) Pay the state's share of the amount of money owed to any contractor for services rendered to that municipality and transmit evidence of payment to that contractor to the board before the federal matching funds become available pursuant to the federal act.

(3) Grant to the state access to the financial records of the account or other funding mechanism established pursuant to paragraph (1).
(Amended by Stats. 1995, Ch. 370, Sec. 5. Effective August 4, 1995.)

§ 13483. ***[Rebate to federal government]***

(a) To the extent permitted by federal and state law, moneys in the fund may be used to rebate to the federal government all arbitrage profits required by the federal Tax Reform Act of 1986 (Public Law 99-514), or any amendment thereof or supplement thereto. To the extent that this use of the moneys in the fund is prohibited by federal or state law, any rebates required by federal law shall be paid from the General Fund or other sources, upon appropriation by the Legislature.

(b) Notwithstanding any other provision of law or regulation, the board may enter into contracts, or may procure those services and equipment, which may be necessary to ensure prompt and complete compliance with any provisions relating to the fund imposed by either the federal Tax Reform Act of 1986 (Public Law 99-514) or the federal Clean Water Act.
(Added by Stats. 1987, Ch. 1313, Sec. 1. Effective September 28, 1987.)

§ 13485. ***[Regulations]***

(a) The board may adopt rules and regulations necessary or convenient to implement this chapter and to meet federal requirements pursuant to the federal act.

(b) The board may implement this chapter through a policy handbook that shall not be subject to the requirements of Chapter 3.5 (commencing with Section 11340) of Part 1 of Division 3 of the Government Code.

(c) This section shall become operative on July 1, 2014.
(Repealed (in Sec. 189) and added by Stats. 2014, Ch. 35, Sec. 190. Effective June 20, 2014. Section operative July 1, 2014, by its own provisions.)

CHAPTER 7. WATER RECLAMATION [13500. - 13557.]

(Chapter 7 added by Stats. 1969, Ch. 482.)

Article 1. Short Title [13500. - 13500.]

(Article 1 added by Stats. 1969, Ch. 482.)

§ 13500. ***[Citation]***

This chapter shall be known as and may be cited as the Water Recycling Law.
(Amended by Stats. 1995, Ch. 28, Sec. 25. Effective January 1, 1996.)

Article 2. Declaration of Policy [13510. - 13512.]

(Article 2 added by Stats. 1969, Ch. 482.)

§ 13510. ***[Legislative declaration]***

It is hereby declared that the people of the state have a primary interest in the development of facilities to recycle water containing waste to supplement existing surface and underground water supplies and to assist in meeting the future water requirements of the state.
(Amended by Stats. 1995, Ch. 28, Sec. 26. Effective January 1, 1996.)

§ 13511. ***[Legislative findings]***

The Legislature finds and declares that a substantial portion of the future water requirements of this state may be economically met by beneficial use of recycled water.

The Legislature further finds and declares that the utilization of recycled water by local communities for domestic, agricultural, industrial, recreational, and fish and wildlife purposes will contribute to the peace, health, safety and welfare of the people of the state. Use of recycled water constitutes the

development of "new basic water supplies" as that term is used in Chapter 5 (commencing with Section 12880) of Part 6 of Division 6.
(Amended by Stats. 1995, Ch. 28, Sec. 27. Effective January 1, 1996.)

§ 13512. ***[Legislative intent]***
It is the intention of the Legislature that the state undertake all possible steps to encourage development of water recycling facilities so that recycled water may be made available to help meet the growing water requirements of the state.
(Amended by Stats. 1995, Ch. 28, Sec. 28. Effective January 1, 1996.)

Article 3. State Assistance [13515. - 13515.]

(Article 3 added by Stats. 1969, Ch. 482.)

§ 13515. ***[Authorization to provide loans]***
In order to implement the policy declarations of this chapter, the state board is authorized to provide loans for the development of water reclamation facilities, or for studies and investigations in connection with water reclamation, pursuant to the provisions of Chapter 6 (commencing with Section 13400) of this division.
(Repealed and added by Stats. 1969, Ch. 482.)

Article 4. Regulation of Reclamation [13520. - 13529.4.]

(Article 4 added by Stats. 1969, Ch. 482.)

§ 13520. ***[Definition]***
As used in this article "recycling criteria" are the levels of constituents of recycled water, and means for assurance of reliability under the design concept which will result in recycled water safe from the standpoint of public health, for the uses to be made.
(Amended by Stats. 1995, Ch. 28, Sec. 29. Effective January 1, 1996.)

§ 13521. ***[Statewide criteria]***
The State Department of Public Health shall establish uniform statewide recycling criteria for each varying type of use of recycled water where the use involves the protection of public health.
(Amended by Stats. 2010, Ch. 700, Sec. 2. Effective January 1, 2011.)

§ 13521.1. ***[Evaluation of recycled water for animal use]***
(a) By December 31, 2016, the state board, in consultation with impacted state agencies, shall determine whether the use of disinfected tertiary treated recycled water, as defined by Section 60301.230 of Title 22 of the California Code of Regulations, for the purpose of providing water to animals, would not pose a significant risk to public and animal health. If the state board determines that the use of disinfected tertiary treated recycled water for the purpose of providing water to animals would pose a significant risk to public or animal health, the state board shall establish uniform statewide recycling criteria for the use of disinfected tertiary treated recycled water for the purpose of

providing water to animals. Except as provided in subdivision (c), if the state board determines that the use of disinfected tertiary treated recycled water for the purpose of providing water to animals would not pose a significant risk to public or animal health, the state board may approve the use of disinfected tertiary treated recycled water for these purposes.

(b) In evaluating the use of disinfected tertiary treated recycled water for the purpose of providing water to animals, the state board shall consider, at minimum, all of the following:

(1) Recommendations from the existing Advisory Panel on Constituents of Emerging Concerns in Recycled Water.

(2) State-funded research performed pursuant to Section 79144 and subdivision (b) of Section 79145.

(3) Research by the state board relating to unregulated pollutants.

(c) Disinfected tertiary treated recycled water shall not be used in the water supply for dairy animals that are currently producing dairy products for human consumption.

(d) A person shall not be required to use disinfected tertiary treated recycled water for the purposes described in this section.

(e) The adoption of uniform statewide recycling criteria pursuant to this section shall be subject to the provisions of Chapter 3.5 (commencing with Section 11340) of Part 1 of Division 3 of Title 2 of the Government Code.

(f) For purposes of this section, "animal" includes any domesticated bird, bovine animal, horse, mule, burro, sheep, goat, or swine.

(Added by Stats. 2014, Ch. 731, Sec. 1. Effective January 1, 2015.)

§ 13522. *[Abatement order]*

(a) If the State Department of Public Health or a local health officer finds that a contamination exists as a result of the use of recycled water, the department or local health officer shall order the contamination abated in accordance with the procedure provided for in Chapter 6 (commencing with Section 5400) of Part 3 of Division 5 of the Health and Safety Code.

(b) The use of recycled water in accordance with the uniform statewide recycling criteria established pursuant to Section 13521, ***[Reports]*** for the purpose of this section, does not cause, constitute, or contribute to, any form of contamination, unless the department or the regional board determines that contamination exists.

(Amended by Stats. 2010, Ch. 288, Sec. 40. Effective January 1, 2011.)

§ 13522.5. *[Reports]*

(a) Except as provided in subdivision (e), any person recycling or proposing to recycle water, or using or proposing to use recycled water, within any region for any purpose for which recycling criteria have been established, shall file with

the appropriate regional board a report containing information required by the regional board.

(b) Except as provided in subdivision (e), every person recycling water or using recycled water shall file with the appropriate regional board a report of any material change or proposed change in the character of the recycled water or its use.

(c) Each report under this section shall be sworn to, or submitted under penalty of perjury.

(d) This section shall not be construed so as to require any report in the case of any producing, manufacturing, or processing operation involving the recycling of water solely for use in the producing, manufacturing, or processing operation.

(e) Except upon the written request of the regional board, a report is not required pursuant to this section from any user of recycled water which is being supplied by a supplier or distributor for whom a master recycling permit has been issued pursuant to Section 13523.1.

(Amended by Stats. 1995, Ch. 28, Sec. 32. Effective January 1, 1996.)

§ 13522.6. *[Misdemeanor]*

Any person failing to furnish a report under Section 13522.5 when so requested by a regional board is guilty of a misdemeanor.

(Added by Stats. 1970, Ch. 918.)

§ 13522.7. *[Enforcement]*

The Attorney General, at the request of the regional board, shall petition the superior court for the issuance of a temporary restraining order, temporary injunction or permanent injunction, or combination thereof, as may be appropriate, requiring any person not complying with Section 13522.5 to comply forthwith.

(Added by Stats. 1970, Ch. 918.)

§ 13523. *[Reclamation requirements]*

(a) Each regional board, after consulting with and receiving the recommendations of the State Department of Public Health and any party who has requested in writing to be consulted, and after any necessary hearing, shall, if in the judgment of the board, it is necessary to protect the public health, safety, or welfare, prescribe water reclamation requirements for water that is used or proposed to be used as recycled water.

(b) The requirements may be placed upon the person recycling water, the user, or both. The requirements shall be established in conformance with the uniform statewide recycling criteria established pursuant to Section 13521. The regional board may require the submission of a preconstruction report for the purpose of determining compliance with the uniform statewide recycling

criteria. The requirements for a use of recycled water not addressed by the uniform statewide recycling criteria shall be considered on a case-by-case basis.
(Amended by Stats. 2010, Ch. 288, Sec. 41. Effective January 1, 2011.)

§ 13523.1. *[Master reclamation permit]*

(a) Each regional board, after consulting with, and receiving the recommendations of, the State Department of Public Health and any party who has requested in writing to be consulted, with the consent of the proposed permittee, and after any necessary hearing, may, in lieu of issuing waste discharge requirements pursuant to Section 13263 or water recycling requirements pursuant to Section 13523 for a user of recycled water, issue a master recycling permit to a supplier or distributor, or both, of recycled water.

(b) A master recycling permit shall include, at least, all of the following:

(1) Waste discharge requirements, adopted pursuant to Article 4 (commencing with Section 13260) of Chapter 4.

(2) A requirement that the permittee comply with the uniform statewide recycling criteria established pursuant to Section 13521. Permit conditions for a use of recycled water not addressed by the uniform statewide water recycling criteria shall be considered on a case-by-case basis.

(3) A requirement that the permittee establish and enforce rules or regulations for recycled water users, governing the design and construction of recycled water use facilities and the use of recycled water, in accordance with the uniform statewide recycling criteria established pursuant to Section 13521.

(4) A requirement that the permittee submit a quarterly report summarizing recycled water use, including the total amount of recycled water supplied, the total number of recycled water use sites, and the locations of those sites, including the names of the hydrologic areas underlying the recycled water use sites.

(5) A requirement that the permittee conduct periodic inspections of the facilities of the recycled water users to monitor compliance by the users with the uniform statewide recycling criteria established pursuant to Section 13521 and the requirements of the master recycling permit.

(6) Any other requirements determined to be appropriate by the regional board.
(Amended by Stats. 2010, Ch. 288, Sec. 42. Effective January 1, 2011.)

§ 13523.5. *[Salinity standards]*

A regional board may not deny issuance of water reclamation requirements to a project which violates only a salinity standard in the basin plan.
(Added by Stats. 1984, Ch. 1541, Sec. 9.)

§ 13524. *[Recycling criteria and requirements]*

No person shall recycle water or use recycled water for any purpose for which recycling criteria have been established until water recycling requirements have been established pursuant to this article or a regional board determines that no requirements are necessary.
(Amended by Stats. 1995, Ch. 28, Sec. 33. Effective January 1, 1996.)

§ 13525. ***[Injunction]***
Upon the refusal or failure of any person or persons recycling water or using recycled water to comply with the provisions of this article, the Attorney General, at the request of the regional board, shall petition the superior court for the issuance of a temporary restraining order, preliminary injunction, or permanent injunction, or combination thereof, as may be appropriate, prohibiting forthwith any person or persons from violating or threatening to violate the provisions of this article.
(Amended by Stats. 1995, Ch. 28, Sec. 34. Effective January 1, 1996.)

§ 13525.5. ***[Misdemeanor]***
Any person recycling water or using recycled water in violation of Section 13524, after such violation has been called to his attention in writing by the regional board, is guilty of a misdemeanor. Each day of such recycling or use shall constitute a separate offense.
(Amended by Stats. 1995, Ch. 28, Sec. 35. Effective January 1, 1996.)

§ 13526. ***[Misdemeanor]***
Any person who, after such action has been called to his attention in writing by the regional board, uses recycled water for any purpose for which recycling criteria have been established prior to the establishment of water recycling requirements, is guilty of a misdemeanor.
(Amended by Stats. 1995, Ch. 28, Sec. 36. Effective January 1, 1996.)

§ 13527. ***[Financial assistance]***
(a) In administering any statewide program of financial assistance for water pollution or water quality control which may be delegated to it pursuant to Chapter 6 (commencing with Section 13400) of this division, the state board shall give added consideration to water quality control facilities providing optimum water recycling and use of recycled water.
(b) Nothing in this chapter prevents the appropriate regional board from establishing waste discharge requirements if a discharge is involved.
(Amended by Stats. 1995, Ch. 28, Sec. 37. Effective January 1, 1996.)

§ 13528. ***[Disclaimer]***
This chapter shall not be construed as affecting the powers of the State Department of Public Health.
(Amended by Stats. 2010, Ch. 288, Sec. 43. Effective January 1, 2011.)

§ 13528.5. *[State Board authority]*

(a) The state board may carry out the duties and authority granted to a regional board pursuant to this chapter.

(b) This section shall become operative on July 1, 2014.

(Added by Stats. 2014, Ch. 35, Sec. 191. Effective June 20, 2014. Section operative July 1, 2014, by its own provisions.)

§ 13529. *[Legislative findings]*

The Legislature hereby finds and declares all of the following:

(a) The purpose of Section 13529.2 is to establish notification requirements for unauthorized discharges of recycled water to waters of the state.

(b) It is the intent of the Legislature in enacting this section to promote the efficient and safe use of recycled water.

(c) The people of the state have a primary interest in the development of facilities to recycle water to supplement existing water supplies and to minimize the impacts of growing demand for new water on sensitive natural water bodies.

(d) A substantial portion of the future water requirements of the state may be economically met by the beneficial use of recycled water.

(e) The Legislature has established a statewide goal to recycle 700,000 acre-feet of water per year by the year 2000 and 1,000,000 acre-feet of water per year by the year 2010.

(f) The use of recycled water has proven to be safe and the State Department of Health Services is drafting regulations to provide for expanded uses of recycled water.

(Added by Stats. 1997, Ch. 833, Sec. 2. Effective January 1, 1998.)

§ 13529.2. *[Unauthorized discharges]*

(a) Any person who , without regard to intent or negligence, causes or permits an unauthorized discharge of 50,000 gallons or more of recycled water, as defined in subdivision (c), or 1,000 gallons or more of recycled water, as defined in subdivision (d), in or on any waters of the state , or causes or permits such unauthorized discharge to be discharged where it is, or probably will be, discharged in or on any waters of the state, shall, as soon as (1) that person has knowledge of the discharge, (2) notification is possible, and (3) notification can be provided without substantially impeding cleanup or other emergency measures, immediately notify the appropriate regional board.

(b) For the purposes of this section, an unauthorized discharge means a discharge not authorized by waste discharge requirements pursuant to Article 4 of Chapter 4 (commencing with Section 13260), water reclamation requirements pursuant to Section 13523, a master reclamation permit pursuant to Section 13523.1, or any other provision of this division.

(c) For the purposes of this section, "recycled water" means wastewater treated as "disinfected tertiary 2.2 recycled water," as defined or described by the State Department of Health Services or wastewater receiving advanced treatment beyond disinfected tertiary 2.2 recycled water.

(d) For purposes of this section, "recycled water" means "recycled water," as defined in subdivision (n) of Section 13050, which is treated at a level less than "disinfected tertiary 2.2 recycled water," as defined or described by the State Department of Health Services.

(e) The requirements in this section supplement, and shall not supplant, any other provisions of law.

(Added by Stats. 1997, Ch. 833, Sec. 3. Effective January 1, 1998.)

§ 13529.4. ***[Administrative liability]***

(a) Any person refusing or failing to provide the notice required by Section 13529.2, or as required by a condition of waste discharge requirements requiring notification of unauthorized releases of recycled water as defined in Section 13529.2, may be subject to administrative civil liability in an amount not to exceed the following:

(1) For the first violation, or a subsequent violation occurring more than 365 days from a previous violation, five thousand dollars ($5,000).

(2) For a second violation occurring within 365 days of a previous violation, ten thousand dollars ($10,000).

(3) For a third or subsequent violation occurring within 365 days of a previous violation, twenty-five thousand dollars ($25,000).

(b) The penalties in this section supplement, and shall not supplant, any other provisions of law.

(Added by Stats. 1997, Ch. 833, Sec. 4. Effective January 1, 1998.)

Article 5. Surveys and Investigations [13530. - 13530.]

(Article 5 added by Stats. 1969, Ch. 482.)

§ 13530. ***[Surveys]***

The department, either independently or in cooperation with any person or any county, state, federal, or other agency, or on request of the state board, to the extent funds are allocated therefor, shall conduct surveys and investigations relating to the reclamation of water from waste pursuant to Section 230.

(Repealed and added by Stats. 1969, Ch. 482.)

Article 6. Waste Well Regulation [13540. - 13541.]

(Article 6 added by Stats. 1969, Ch. 482.)

§ 13540. ***[In water-bearing strata]***

(a) A person shall not construct, maintain, or use any waste well extending to or into a subterranean water-bearing stratum that is used or intended to be used as, or is suitable for, a source of water supply for domestic purposes.

(b) (1) Notwithstanding subdivision (a), when a regional board finds that water quality considerations do not preclude controlled recharge of the stratum by direct injection, and when the State Department of Public Health, following a public hearing, finds the proposed recharge will not degrade the quality of water in the receiving aquifer as a source of water supply for domestic purposes, recycled water may be injected by a well into the stratum. The State Department of Public Health may make and enforce any regulations pertaining to this subdivision as it deems proper.

(2) This section shall not be construed to do either or both of the following:

(A) Affect the authority of the state board or regional boards to prescribe and enforce requirements for the discharge.

(B) Preempt the exercise by a water district of its existing ordinance authority to impose or implement stricter standards for protecting groundwater quality in the receiving aquifer.

(c) If the State Department of Public Health makes the findings provided for in subdivision (b), the department shall consider the state board's Statement of Policy with Respect to Maintaining High Quality of Waters in California, as set forth in Resolution 68-16, dated October 28, 1968, and shall also consider current and potential future public health consequences of the controlled recharge.

(Amended by Stats. 2010, Ch. 288, Sec. 44. Effective January 1, 2011.)

§ 13541. *["Waste well"]*

As used in this article, "waste well" includes any hole dug or drilled into the ground, used or intended to be used for the disposal of waste.

(Added by Stats. 1969, Ch. 482.)

Article 7. Water Reuse [13550. - 13557.]

(Heading of Article 7 amended by Stats. 1994, Ch. 724, Sec. 6.)

§ 13550. *[Legislative findings]*

(a) The Legislature hereby finds and declares that the use of potable domestic water for nonpotable uses, including, but not limited to, cemeteries, golf courses, parks, highway landscaped areas, and industrial and irrigation uses, is a waste or an unreasonable use of the water within the meaning of Section 2 of Article X of the California Constitution if recycled water is available which meets all of the following conditions, as determined by the state board, after notice to any person or entity who may be ordered to use recycled water or to cease using potable water and a hearing held pursuant to Article 2 (commencing

with Section 648) of Chapter 1.5 of Division 3 of Title 23 of the California Code of Regulations:

(1) The source of recycled water is of adequate quality for these uses and is available for these uses. In determining adequate quality, the state board shall consider all relevant factors, including, but not limited to, food and employee safety, and level and types of specific constituents in the recycled water affecting these uses, on a user-by-user basis. In addition, the state board shall consider the effect of the use of recycled water in lieu of potable water on the generation of hazardous waste and on the quality of wastewater discharges subject to regional, state, or federal permits.

(2) The recycled water may be furnished for these uses at a reasonable cost to the user. In determining reasonable cost, the state board shall consider all relevant factors, including, but not limited to, the present and projected costs of supplying, delivering, and treating potable domestic water for these uses and the present and projected costs of supplying and delivering recycled water for these uses, and shall find that the cost of supplying the treated recycled water is comparable to, or less than, the cost of supplying potable domestic water.

(3) After concurrence with the State Department of Public Health, the use of recycled water from the proposed source will not be detrimental to public health.

(4) The use of recycled water for these uses will not adversely affect downstream water rights, will not degrade water quality, and is determined not to be injurious to plantlife, fish, and wildlife.

(b) In making the determination pursuant to subdivision (a), the state board shall consider the impact of the cost and quality of the nonpotable water on each individual user.

(c) The state board may require a public agency or person subject to this article to furnish information which the state board determines to be relevant to making the determination required in subdivision (a).

(Amended by Stats. 2014, Ch. 544, Sec. 14. Effective January 1, 2015.)

§ 13551. *[Availability of recycled water]*

A person or public agency, including a state agency, city, county, city and county, district, or any other political subdivision of the state, shall not use water from any source of quality suitable for potable domestic use for nonpotable uses, including cemeteries, golf courses, parks, highway landscaped areas, and industrial and irrigation uses if suitable recycled water is available as provided in Section 13550; however, any use of recycled water in lieu of water suitable for potable domestic use shall, to the extent of the recycled water so used, be deemed to constitute a reasonable beneficial use of that water and the use of recycled water shall not cause any loss or diminution of any existing water right.

(Amended by Stats. 1995, Ch. 28, Sec. 40. Effective January 1, 1996.)

§ 13552. ***[Legislative intent]***

The amendments to Sections 13550 and 13551 of the Water Code made during the first year of the 1991–92 Regular Session are not intended to alter any rights, remedies, or obligations which may exist prior to January 1, 1992, pursuant to, but not limited to, those sections or Chapter 8.5 (commencing with Section 1501) of Part 1 of Division 1 of the Public Utilities Code.

(Added by Stats. 1991, Ch. 553, Sec. 3.)

§ 13552.2. ***[Legislative findings]***

(a) The Legislature hereby finds and declares that the use of potable domestic water for the irrigation of residential landscaping is a waste or an unreasonable use of water within the meaning of Section 2 of Article X of the California Constitution if recycled water, for this use, is available to the residents and meets the requirements set forth in Section 13550, as determined by the state board after notice and a hearing.

(b) The state board may require a public agency or person subject to this section to submit information that the state board determines may be relevant in making the determination required in subdivision (a).

(Amended by Stats. 1995, Ch. 28, Sec. 41. Effective January 1, 1996.)

§ 13552.4. ***[Required use for landscaping]***

(a) Any public agency, including a state agency, city, county, city and county, district, or any other political subdivision of the state, may require the use of recycled water for irrigation of residential landscaping, if all of the following requirements are met:

(1) Recycled water, for this use, is available to the user and meets the requirements set forth in Section 13550, as determined by the state board after notice and a hearing.

(2) The use of recycled water does not cause any loss or diminution of any existing water right.

(3) The irrigation systems are constructed in accordance with Chapter 3 (commencing with Section 60301) of Division 4 of Title 22 of the California Code of Regulations.

(b) This section applies to both of the following:

(1) New subdivisions for which the building permit is issued on or after March 15, 1994, or, if a building permit is not required, new structures for which construction begins on or after March 15, 1994, for which the State Department of Public Health has approved the use of recycled water.

(2) Any residence that is retrofitted to permit the use of recycled water for landscape irrigation and for which the State Department of Public Health has approved the use of recycled water.

(c) (1) Division 13 (commencing with Section 21000) of the Public Resources Code does not apply to any project that only involves the repiping, redesign, or use of recycled water for irrigation of residential landscaping necessary to comply with a requirement prescribed by a public agency under subdivision (a).

(2) The exemption in paragraph (1) does not apply to any project to develop recycled water, to construct conveyance facilities for recycled water, or any other project not specified in this subdivision.

(Amended by Stats. 2010, Ch. 288, Sec. 45. Effective January 1, 2011.)

§ 13552.5. ***[General statewide permit for recycled water use to irrigate landscape]***

(a) (1) On or before July 31, 2009, the state board shall adopt a general permit for landscape irrigation uses of recycled water for which the State Department of Public Health has established uniform statewide recycling criteria pursuant to Section 13521.

(2) The state board shall establish criteria to determine eligibility for coverage under the general permit.

(3) For the purpose of developing the general permit and establishing eligibility criteria to carry out paragraph (1), the state board shall hold at least one workshop and shall consult with and consider comments from the regional boards, groundwater management agencies and water replenishment districts with statutory authority to manage groundwater pursuant to their principal act, and any interested party.

(4) The general permit shall include language that provides for the modification of the terms and conditions of the general permit if a regulatory or statutory change occurs that affects the application of the general permit or as necessary to ensure protection of beneficial uses.

(b) The state board shall establish a reasonable schedule of fees to reimburse the state board for the costs it incurs in implementing, developing, and administering this section.

(c) Following the adoption of the general permit pursuant to this section, an applicant may obtain coverage for a landscape irrigation use of recycled water by filing a notice of intent to be covered under the general permit and submitting the appropriate fee established pursuant to subdivision (b) to the state board.

(d) Coverage under the general permit adopted pursuant to this section is effective if all of the following apply:

(1) The applicant has submitted a completed application.

(2) The state board has determined that the applicant meets the eligibility criteria established pursuant to paragraph (2) of subdivision (a).

(3) The state board has made the application available for public review and comment for 30 days.

(4) The state board has consulted with the appropriate regional board.

(5) The executive officer of the state board approves the application.

(e) (1) Except as provided by modification of the general permit, a person eligible for coverage under the general permit pursuant to subdivision (d) is not required to become or remain subject to individual waste discharge requirements or water reclamation requirements.

(2) For a landscape irrigation use of recycled water, a person who is subject to general or individual waste discharge requirements prescribed pursuant to Section 13263 or 13377, or is subject to individual or master water reclamation requirements prescribed pursuant to Section 13523 or 13523.1, may apply for coverage under the general permit adopted pursuant to this section in lieu of remaining subject to requirements prescribed pursuant to those sections.

(f) (1) The state board shall designate an ombudsperson to coordinate and facilitate communication on recycled water, on the issuance of water reclamation requirements or waste discharge requirements, as applicable, pursuant to Section 13523 or 13523.1 or this section, and on the promotion of water recycling while ensuring reasonable protection of water quality in accordance with applicable provisions of state and federal water quality law.

(2) The person appointed pursuant to paragraph (1) shall facilitate consultations between the state board and the regional boards relating to matters described in that paragraph.

(Added by Stats. 2007, Ch. 535, Sec. 2. Effective January 1, 2008.)

§ 13552.6. *[Regarding cooling]*

(a) The Legislature hereby finds and declares that the use of potable domestic water for floor trap priming, cooling towers, and air-conditioning devices is a waste or an unreasonable use of water within the meaning of Section 2 of Article X of the California Constitution if recycled water, for these uses, is available to the user, and the water meets the requirements set forth in Section 13550, as determined by the state board after notice and a hearing.

(b) The state board may require a public agency or person subject to this section to submit information that the state board determines may be relevant in making the determination required in subdivision (a).

(Amended by Stats. 1995, Ch. 28, Sec. 43. Effective January 1, 1996.)

§ 13552.8. *[Required use for cooling]*

(a) Any public agency, including a state agency, city, county, city and county, district, or any other political subdivision of the state, may require the use of recycled water in floor trap priming, cooling towers, and air-conditioning devices, if all of the following requirements are met:

(1) Recycled water, for these uses, is available to the user and meets the requirements set forth in Section 13550, as determined by the state board after notice and a hearing.

(2) The use of recycled water does not cause any loss or diminution of any existing water right.

(3) If public exposure to aerosols, mist, or spray may occur, appropriate mist mitigation or mist control is provided, such as the use of mist arrestors or the addition of biocides to the water in accordance with criteria established pursuant to Section 13521.

(4) The person intending to use recycled water has prepared an engineering report pursuant to Section 60323 of Title 22 of the California Code of Regulations that includes plumbing design, cross-connection control, and monitoring requirements for the public agency, which are in compliance with criteria established pursuant to Section 13521.

(b) This section applies to both of the following:

(1) New industrial facilities and subdivisions for which the building permit is issued on or after March 15, 1994, or, if a building permit is not required, new structures for which construction begins on or after March 15, 1994, for which the State Department of Public Health has approved the use of recycled water.

(2) Any structure that is retrofitted to permit the use of recycled water for floor traps, cooling towers, or air-conditioning devices, for which the State Department of Public Health has approved the use of recycled water.

(c) (1) Division 13 (commencing with Section 21000) of the Public Resources Code does not apply to any project which only involves the repiping, redesign, or use of recycled water for floor trap priming, cooling towers, or air-conditioning devices necessary to comply with a requirement prescribed by a public agency under subdivision (a).

(2) The exemption in paragraph (1) does not apply to any project to develop recycled water, to construct conveyance facilities for recycled water, or any other project not specified in this subdivision.

(Amended by Stats. 2014, Ch. 544, Sec. 15. Effective January 1, 2015.)

§ 13553. *[Regarding toilet flushing]*

(a) The Legislature hereby finds and declares that the use of potable domestic water for toilet and urinal flushing in structures is a waste or an unreasonable use of water within the meaning of Section 2 of Article X of the California Constitution if recycled water, for these uses, is available to the user and meets the requirements set forth in Section 13550, as determined by the state board after notice and a hearing.

(b) The state board may require a public agency or person subject to this section to furnish any information that may be relevant to making the determination required in subdivision (a).

(c) For purposes of this section and Section 13554, "structure" or "structures" means commercial, retail, and office buildings, theaters, auditoriums, condominium projects, schools, hotels, apartments, barracks, dormitories, jails, prisons, and reformatories, and other structures as determined by the State Department of Public Health.

(d) Recycled water may be used in condominium projects, as defined in Section 4125 or 6542 of the Civil Code, subject to all of the following conditions:

(1) Prior to the indoor use of recycled water in any condominium project, the agency delivering the recycled water to the condominium project shall file a report with, and receive written approval of the report from, the State Department of Public Health. The report shall be consistent with the provisions of Title 22 of the California Code of Regulations generally applicable to dual-plumbed structures and shall include all the following:

(A) That potable water service to each condominium project will be provided with a backflow protection device approved by the State Department of Public Health to protect the agency's public water system, as defined in Section 116275 of the Health and Safety Code. The backflow protection device approved by the State Department of Public Health shall be inspected and tested annually by a person certified in the inspection of backflow prevention devices.

(B) That any plumbing modifications in the condominium unit or any physical alteration of the structure will be done in compliance with state and local plumbing codes.

(C) That each condominium project will be tested by the recycled water agency or the responsible local agency at least once every four years to ensure that there are no indications of a possible cross connection between the condominium's potable and nonpotable systems.

(D) That recycled water lines will be color coded consistent with current statutes and regulations.

(2) The recycled water agency or the responsible local agency shall maintain records of all tests and annual inspections conducted.

(3) The condominium's declaration, as defined in Section 4135 or 6546 of the Civil Code, shall provide that the laws and regulations governing recycled water apply, shall not permit any exceptions to those laws and regulations, shall incorporate the report described in paragraph (1), and shall contain the following statement:

> "NOTICE OF USE OF RECYCLED WATER This property is approved by the State Department of Public Health for the use of recycled water for toilet and urinal flushing. This water is not potable, is not suitable for indoor purposes other than toilet and urinal flushing purposes, and requires dual plumbing. Alterations and modifications to the plumbing system require a permit and are prohibited without first consulting

with the appropriate local building code enforcement agency and your property management company or owners' association to ensure that the recycled water is not mixed with the drinking water."

(e) The State Department of Public Health may adopt regulations as necessary to assist in the implementation of this section.

(f) This section shall only apply to condominium projects that are created, within the meaning of Section 4030 or 6580 of the Civil Code, on or after January 1, 2008.

(g) This section and Section 13554 do not apply to a pilot program adopted pursuant to Section 13553.1.

(Amended (as amended by Stats. 2012, Ch. 181, Sec. 84) by Stats. 2013, Ch. 605, Sec. 53. Effective January 1, 2014.)

§ 13553.1. ***[Legislative findings]***

(a) The Legislature hereby finds and declares that certain coastal areas of the state have been using sea water to flush toilets and urinals as a means of conserving potable water; that this practice precludes the beneficial reuse of treated wastewater and has had a deleterious effect on the proper wastewater treatment process, and has led to corrosion of the sea water distribution pipelines and wastewater collection systems; and that this situation must be changed.

(b) There is a need for a pilot program to demonstrate that conversion to the use of recycled water in residential buildings for toilet and urinal flushing does not pose a threat to public health and safety.

(c) A city that is providing a separate distribution system for sea water for use in flushing toilets and urinals in residential structures may, by ordinance, authorize the use of recycled water for the flushing of toilets and urinals in residential structures if the level of treatment and the use of the recycled water meets the criteria set by the State Department of Public Health.

(Amended by Stats. 2014, Ch. 544, Sec. 16. Effective January 1, 2015.)

§ 13554. ***[Required use for toilet flushing]***

(a) Any public agency, including a state agency, city, county, city and county, district, or any other political subdivision of the state, may require the use of recycled water for toilet and urinal flushing in structures, except a mental hospital or other facility operated by a public agency for the treatment of persons with mental disorders, if all of the following requirements are met:

(1) Recycled water, for these uses, is available to the user and meets the requirements set forth in Section 13550, as determined by the state board after notice and a hearing.

(2) The use of recycled water does not cause any loss or diminution of any existing water right.

(3) The public agency has prepared an engineering report pursuant to Section 60323 of Title 22 of the California Code of Regulations that includes plumbing design, cross-connection control, and monitoring requirements for the use site, which are in compliance with criteria established pursuant to Section 13521.

(b) This section applies only to either of the following:

(1) New structures for which the building permit is issued on or after March 15, 1992, or, if a building permit is not required, new structures for which construction begins on or after March 15, 1992.

(2) Any construction pursuant to subdivision (a) for which the State Department of Public Health has, prior to January 1, 1992, approved the use of recycled water.

(c) Division 13 (commencing with Section 21000) of the Public Resources Code does not apply to any project which only involves the repiping, redesign, or use of recycled water by a structure necessary to comply with a requirement issued by a public agency under subdivision (a). This exemption does not apply to any project to develop recycled water, to construct conveyance facilities for recycled water, or any other project not specified in this subdivision.
(Amended by Stats. 2014, Ch. 544, Sec. 17. Effective January 1, 2015.)

§ 13554.2. ***[Reimbursement of costs]***

(a) Any person or entity proposing the use of recycled water shall reimburse the State Department of Public Health for reasonable costs that department actually incurs in performing duties pursuant to this chapter.

(b) (1) Upon a request from the person or entity proposing the use of recycled water, the State Department of Public Health shall, within a reasonable time after the receipt of the request, provide an estimate of the costs that it will reasonably incur in the performance of its duties pursuant to this chapter.

(2) For purposes of implementing subdivision (a), that department shall maintain a record of its costs. In determining those costs, that department may consider costs that include, but are not limited to, costs relating to personnel requirements, materials, travel, and office overhead. The amount of reimbursement shall be equal to, and may not exceed, that department's actual costs.

(c) With the consent of the person or entity proposing the use of recycled water, the State Department of Public Health may delegate all or part of the duties that department performs pursuant to this chapter within a county to a local health agency authorized by the board of supervisors to assume these duties, if, in the judgment of that department, the local health agency can perform these duties. Any person or entity proposing the use of recycled water shall reimburse the local health agency for reasonable costs that the local health

agency actually incurs in the performance of its duties delegated pursuant to this subdivision.

(d) (1) Upon a request from the person or entity proposing the use of recycled water, the local health agency shall, within a reasonable time after the receipt of the request, provide an estimate of the cost it will reasonably incur in the performance of its duties delegated under subdivision (c).

(2) The local health agency, if delegated duties pursuant to subdivision (c), shall maintain a record of its costs that include, but is not limited to, costs relating to personnel requirements, materials, travel, and office overhead. The amount of reimbursement shall be equal to, and may not exceed, the local health agency's actual costs.

(e) The State Department of Public Health or local health agency shall complete its review of a proposed use of recycled water within a reasonable period of time. That department shall submit to the person or entity proposing the use of recycled water a written determination as to whether the proposal submitted is complete for purposes of review within 30 days from the date of receipt of the proposal and shall approve or disapprove the proposed use within 30 days from the date on which that department determines that the proposal is complete.

(f) An invoice for reimbursement of services rendered shall be submitted to the person or entity proposing the use of recycled water subsequent to completion of review of the proposed use, or other services rendered, that specifies the number of hours spent by the State Department of Public Health or local health agency, specific tasks performed, and other costs actually incurred. Supporting documentation, including receipts, logs, timesheets, and other standard accounting documents, shall be maintained by that department or local health agency and copies, upon request, shall be provided to the person or entity proposing the use of recycled water.

(g) For the purposes of this section, "person or entity proposing the use of recycled water" means the producer or distributor of recycled water submitting a proposal to the department.

(Amended by Stats. 2014, Ch. 544, Sec. 18. Effective January 1, 2015.)

§ 13554.3. *[Fees]*

The State Water Resources Control Board may establish a reasonable schedule of fees by which it is reimbursed for the costs it incurs pursuant to Sections 13553 and 13554.

(Added by Stats. 1991, Ch. 723, Sec. 4.)

§ 13555.2. *[Finding on dual delivery systems]*

The Legislature hereby finds and declares that many local agencies deliver recycled water for nonpotable uses and that the use of recycled water is an effective means of meeting the demands for new water caused by drought

conditions or population increases in the state. It is the intent of the Legislature to encourage the design and construction of water delivery systems on private property that deliver water for both potable and nonpotable uses in separate pipelines.

(Amended by Stats. 1995, Ch. 28, Sec. 47. Effective January 1, 1996.)

§ 13555.3. *[Requirement of dual delivery systems]*

(a) Water delivery systems on private property that could deliver recycled water for nonpotable uses described in Section 13550, that are constructed on and after January 1, 1993, shall be designed to ensure that the water to be used for only potable domestic uses is delivered, from the point of entry to the private property to be served, in a separate pipeline which is not used to deliver the recycled water.

(b) This section applies to water delivery systems on private property constructed within either of the following jurisdictions:

(1) One that has an urban water management plan that includes the intent to develop recycled water use.

(2) One that does not have an urban water management plan that includes recycled water use, but that is within five miles of a jurisdiction that does have an urban water management plan that includes recycled water use, and has indicated a willingness to serve the water delivery system.

(c) This section does not preempt local regulation of the delivery of water for potable and nonpotable uses and any local governing body may adopt requirements which are more restrictive than the requirements of this section.

(Amended by Stats. 1995, Ch. 28, Sec. 48. Effective January 1, 1996.)

§ 13555.5. *[Proposed delivery of recycled water for state landscape use; pipe installation]*

(a) If a recycled water producer determines that within 10 years the recycled water producer proposes to provide recycled water for use for state landscape irrigation that meets all of the conditions set forth in Section 13550, the recycled water producer shall so notify the Department of Transportation and the Department of General Services, and shall identify in the notice the area that is eligible to receive the recycled water, and the necessary infrastructure that the recycled water producer or the retail water supplier proposes to provide, to facilitate delivery of the recycled water.

(b) If notice has been provided pursuant to subdivision (a), all pipe installed by the Department of Transportation or the Department of General Services for landscape irrigation within the identified area shall be of the type necessary to meet the requirements of Section 116815 of the Health and Safety Code and applicable regulations.

(Added by Stats. 2006, Ch. 541, Sec. 3. Effective January 1, 2007.)

§ 13556. ***[Delivery of recycled water]***

In addition to any other authority provided in law, any water supplier described in subdivision (b) of Section 1745 may acquire, store, provide, sell, and deliver recycled water for any beneficial use, including, but not limited to, municipal, industrial, domestic, and irrigation uses, if the water use is in accordance with statewide recycling criteria and regulations established pursuant to this chapter.
(Amended by Stats. 1995, Ch. 28, Sec. 49. Effective January 1, 1996.)

§ 13557. ***[DPH regulations for plumbing recycled water delivery]***

(a) On or before December 31, 2009, the department, in consultation with the State Department of Public Health, shall adopt and submit to the California Building Standards Commission regulations to establish a state version of Chapter 16 of the Uniform Plumbing Code adopted by the International Association of Plumbing and Mechanical Officials to provide design standards to safely plumb buildings with both potable and recycled water systems.

(b) Commencing July 1, 2011, and annually thereafter, the department shall review and update, as necessary, the regulations developed pursuant to subdivision (a).

(c) This section shall be exempt from the provisions of Section 161.
(Amended by Stats. 2009, Ch. 178, Sec. 1. Effective October 11, 2009.)

CHAPTER 7.3. DIRECT AND INDIRECT POTABLE REUSE [13560. - 13569.]

(Chapter 7.3 added by Stats. 2010, Ch. 700, Sec. 3.)

§ 13560. ***[Legislative findings]***

The Legislature finds and declares the following:

(a) In February 2009, the state board unanimously adopted, as Resolution No. 2009-0011, an updated water recycling policy, which includes the goal of increasing the use of recycled water in the state over 2002 levels by at least 1,000,000 acre-feet per year by 2020 and by at least 2,000,000 acre-feet per year by 2030.

(b) Section 13521 requires the department to establish uniform statewide recycling criteria for each varying type of use of recycled water where the use involves the protection of public health.

(c) The use of recycled water for indirect potable reuse is critical to achieving the state board's goals for increased use of recycled water in the state. If direct potable reuse can be demonstrated to be safe and feasible, implementing direct potable reuse would further aid in achieving the state board's recycling goals.

(d) Although there has been much scientific research on public health issues associated with indirect potable reuse through groundwater recharge, there are a number of significant unanswered questions regarding indirect potable reuse through surface water augmentation and direct potable reuse.

(e) Achievement of the state's goals depends on the timely development of uniform statewide recycling criteria for indirect and direct potable water reuse.

(f) This chapter is not intended to delay, invalidate, or reverse any study or project, or development of regulations by the department, the state board, or the regional boards regarding the use of recycled water for indirect potable reuse for groundwater recharge, surface water augmentation, or direct potable reuse.

(g) This chapter shall not be construed to delay, invalidate, or reverse the department's ongoing review of projects consistent with Section 116551 of the Health and Safety Code.

(Added by Stats. 2010, Ch. 700, Sec. 3. Effective January 1, 2011.)

§ 13561. *[Definitions]*

For purposes of this chapter, the following terms have the following meanings:

(a) "Department" means the State Department of Public Health.

(b) "Direct potable reuse" means the planned introduction of recycled water either directly into a public water system, as defined in Section 116275 of the Health and Safety Code, or into a raw water supply immediately upstream of a water treatment plant.

(c) "Indirect potable reuse for groundwater recharge" means the planned use of recycled water for replenishment of a groundwater basin or an aquifer that has been designated as a source of water supply for a public water system, as defined in Section 116275 of the Health and Safety Code.

(d) "Surface water augmentation" means the planned placement of recycled water into a surface water reservoir used as a source of domestic drinking water supply.

(e) "Uniform water recycling criteria" has the same meaning as in Section 13521.

(Added by Stats. 2010, Ch. 700, Sec. 3. Effective January 1, 2011.)

§ 13561.5. *[State Board agreement to assist]*

The state board shall enter into an agreement with the department to assist in implementing this chapter.

(Added by Stats. 2010, Ch. 700, Sec. 3. Effective January 1, 2011.)

§ 13562. *[Uniform water recycling criteria]*

(a) (1) On or before December 31, 2013, the department shall adopt uniform water recycling criteria for indirect potable reuse for groundwater recharge.

(2) (A) Except as provided in subparagraph (C), on or before December 31, 2016, the department shall develop and adopt uniform water recycling criteria for surface water augmentation.

(B) Prior to adopting uniform water recycling criteria for surface water augmentation, the department shall submit the proposed criteria to the expert panel convened pursuant to subdivision (a) of Section 13565. The expert panel shall review the proposed criteria and shall adopt a finding as to whether, in its expert opinion, the proposed criteria would adequately protect public health.

(C) The department shall not adopt uniform water recycling criteria for surface water augmentation pursuant to subparagraph (A), unless and until the expert panel adopts a finding that the proposed criteria would adequately protect public health.

(b) Adoption of uniform water recycling criteria by the department is subject to the requirements of Chapter 3.5 (commencing with Section 11340) of Part 1 of Division 3 of Title 2 of the Government Code.

(Added by Stats. 2010, Ch. 700, Sec. 3. Effective January 1, 2011.)

§ 13562.5. ***[Groundwater replenishment emergency regulations]***

Notwithstanding any other law, no later than June 30, 2014, the department shall adopt, by emergency regulations in accordance with Chapter 3.5 (commencing with Section 11340) of Part 1 of Division 3 of Title 2 of the Government Code, requirements for groundwater replenishment using recycled water. The adoption of these regulations is an emergency and shall be considered by the Office of Administrative Law as necessary for the immediate preservation of the public peace, health, safety, and general welfare. Notwithstanding Chapter 3.5 (commencing with Section 11340) of Part 1 of Division 3 of Title 2 of the Government Code, emergency regulations adopted by the department pursuant to this section shall not be subject to review by the Office of Administrative Law and shall remain in effect until revised by the department.

(Added by Stats. 2014, Ch. 3, Sec. 15. Effective March 1, 2014.)

§ 13563. ***[Investigation and report to the Legislature on uniform water recycling criteria]***

(a) (1) On or before December 31, 2016, the department, in consultation with the state board, shall investigate and report to the Legislature on the feasibility of developing uniform water recycling criteria for direct potable reuse.

(2) The department shall complete a public review draft of its report by September 1, 2016. The department shall provide the public not less than 45 days to review and comment on the public review draft.

(3) The department shall provide a final report to the Legislature by December 31, 2016. The department shall make the final report available to the public.

(b) In conducting the investigation pursuant to subdivision (a), the department shall examine all of the following:

(1) The availability and reliability of recycled water treatment technologies necessary to ensure the protection of public health.

(2) Multiple barriers and sequential treatment processes that may be appropriate at wastewater and water treatment facilities.

(3) Available information on health effects.

(4) Mechanisms that should be employed to protect public health if problems are found in recycled water that is being served to the public as a potable water supply, including, but not limited to, the failure of treatment systems at the recycled water treatment facility.

(5) Monitoring needed to ensure protection of public health, including, but not limited to, the identification of appropriate indicator and surrogate constituents.

(6) Any other scientific or technical issues that may be necessary, including, but not limited to, the need for additional research.

(c) (1) Notwithstanding Section 10231.5 of the Government Code, the requirement for submitting a report imposed under paragraph (3) of subdivision (a) is inoperative on December 31, 2020.

(2) A report to be submitted pursuant to paragraph (3) of subdivision (a) shall be submitted in compliance with Section 9795 of the Government Code. *(Amended by Stats. 2013, Ch. 637, Sec. 1. Effective January 1, 2014.)*

§ 13564. ***[Considerations for recycling criteria for surface water augmentation]*** In developing uniform water recycling criteria for surface water augmentation, the department shall consider all of the following:

(a) The final report from the National Water Research Institute Independent Advisory Panel for the City of San Diego Indirect Potable Reuse/Reservoir Augmentation (IPR/RA) Demonstration Project.

(b) Monitoring results of research and studies regarding surface water augmentation.

(c) Results of demonstration studies conducted for purposes of approval of projects using surface water augmentation.

(d) Epidemiological studies and risk assessments associated with projects using surface water augmentation.

(e) Applicability of the advanced treatment technologies required for recycled water projects, including, but not limited to, indirect potable reuse for groundwater recharge projects.

(f) Water quality, limnology, and health risk assessments associated with existing potable water supplies subject to discharges from municipal wastewater, stormwater, and agricultural runoff.

(g) Recommendations of the State of California Constituents of Emerging Concern Recycled Water Policy Science Advisory Panel.

(h) State funded research pursuant to Section 79144 and subdivision (b) of Section 79145.

(i) Research and recommendations from the United States Environmental Protection Agency Guidelines for Water Reuse.

(j) The National Research Council of the National Academies' report titled "Water Reuse: Potential for Expanding the Nation's Water Supply Through Reuse of Municipal Wastewater."

(k) Other relevant research and studies regarding indirect potable reuse of recycled water.

(Amended by Stats. 2013, Ch. 637, Sec. 2. Effective January 1, 2014.)

§ 13565. ***[Expert panel and advisory group]***

(a) (1) On or before February 15, 2014, the department shall convene and administer an expert panel for purposes of advising the department on public health issues and scientific and technical matters regarding development of uniform water recycling criteria for indirect potable reuse through surface water augmentation and investigation of the feasibility of developing uniform water recycling criteria for direct potable reuse. The expert panel shall assess what, if any, additional areas of research are needed to be able to establish uniform regulatory criteria for direct potable reuse. The expert panel shall then recommend an approach for accomplishing any additional needed research regarding uniform criteria for direct potable reuse in a timely manner.

(2) The expert panel shall be comprised, at a minimum, of a toxicologist, an engineer licensed in the state with at least three years' experience in wastewater treatment, an engineer licensed in the state with at least three years' experience in treatment of drinking water supplies and knowledge of drinking water standards, an epidemiologist, a limnologist, a microbiologist, and a chemist. The department, in consultation with the advisory group and the state board, shall select the expert panel members.

(3) Members of the expert panel may be reimbursed for reasonable and necessary travel expenses.

(b) (1) On or before January 15, 2014, the department shall convene an advisory group, task force, or other group, comprised of no fewer than nine representatives of water and wastewater agencies, local public health officers, environmental organizations, environmental justice organizations, public health nongovernmental organizations, the department, the state board, the United States Environmental Protection Agency, ratepayer or taxpayer advocate organizations, and the business community, to advise the expert panel regarding the development of uniform water recycling criteria for direct potable reuse and the draft report required by Section 13563. The department, in consultation with the state board, shall select the advisory group members.

(2) Environmental, environmental justice, and public health nongovernmental organization representative members of the advisory group, task force, or other group may be reimbursed for reasonable and necessary travel expenses.

(3) In order to ensure public transparency, the advisory group established pursuant to paragraph (1) shall be subject to the Bagley-Keene Open Meeting Act (Article 9 (commencing with Section 11120) of Chapter 1 of Part 1 of Division 3 of Title 2 of the Government Code).

(c) On or before June 30, 2016, the department shall prepare a draft report summarizing the recommendations of the expert panel.

(d) The department may contract with a public university or other research institution with experience in convening expert panels on water quality or potable reuse to meet all or part of the requirements of this section should the department find that the research institution is better able to fulfill the requirements of this section by the required date.

(Amended by Stats. 2013, Ch. 637, Sec. 3. Effective January 1, 2014.)

§ 13566. *[Considerations for feasibility for direct potable reuse]*

In performing its investigation of the feasibility of developing the uniform water recycling criteria for direct potable reuse, the department shall consider all of the following:

(a) Recommendations from the expert panel appointed pursuant to subdivision (a) of Section 13565.

(b) Recommendations from an advisory group, task force, or other group appointed by the department pursuant to subdivision (b) of Section 13565.

(c) Regulations and guidelines for these activities from jurisdictions in other states, the federal government, or other countries.

(d) Research by the state board regarding unregulated pollutants, as developed pursuant to Section 10 of the recycled water policy adopted by state board Resolution No. 2009-0011.

(e) Results of investigations pursuant to Section 13563.

(f) Water quality and health risk assessments associated with existing potable water supplies subject to discharges from municipal wastewater, stormwater, and agricultural runoff.

(Added by Stats. 2010, Ch. 700, Sec. 3. Effective January 1, 2011.)

§ 13567. *[Consistency with Federal Act]*

An action authorized pursuant to this chapter shall be consistent, to the extent applicable, with the federal Clean Water Act (33 U.S.C. Sec. 1251 et seq.), the federal Safe Drinking Water Act (42 U.S.C. Sec. 300f et seq.), this division, and the California Safe Drinking Water Act (Chapter 4 (commencing with Section 116270) of Part 12 of Division 104 of the Health and Safety Code).

(Added by Stats. 2010, Ch. 700, Sec. 3. Effective January 1, 2011.)

§ 13569. ***[Acceptance of funds]***

The department may accept funds from nonstate sources and may expend these funds, upon appropriation by the Legislature, for the purposes of this chapter.

(Amended by Stats. 2013, Ch. 637, Sec. 4. Effective January 1, 2014.)

§ 13570. ***[Advanced purified demonstration water]***

(a) As used in this section, "advanced purified demonstration water" means product water from an advanced water purification facility that satisfies both of the following requirements:

(1) The product water is treated by means of all of the following treatment processes:

(A) Microfiltration, ultrafiltration, or other filtration processes to remove particulates before reverse osmosis.

(B) Reverse osmosis.

(C) Advanced oxidation.

(2) The product water meets or exceeds all federal and state drinking water standards and is produced in accordance with the advanced treatment criteria for purified water specified in Section 60320.201 of Title 22 of the California Code of Regulations.

(b) As used in this section, "advanced water purification facility" means a water recycling treatment plant that produces advanced purified demonstration water in accordance with the advanced treatment criteria specified in Section 60320.201 of Title 22 of the California Code of Regulations.

(c) As used in this section, "batch" means an increment of advanced purified treatment water that has completed the treatment process, is separate from incoming water, and is not receiving any additional source water.

(d) Except as expressly set forth in this section, the operator of an advanced water purification facility may cause advanced purified demonstration water to be bottled and distributed as samples for educational purposes and to promote water recycling, without complying with the requirements of Article 12 (commencing with Section 111070) of Chapter 5 of Part 5 of Division 104 of the Health and Safety Code. The volume of advanced purified demonstration water in each bottle shall not exceed eight ounces.

(e) Any operator of an advanced water purification facility seeking to bottle advanced purified demonstration water shall collect water samples from the batch prior to the commencement of the bottling process, and test that batch in accordance with Section 111165 of the Health and Safety Code. Advanced purified demonstration water shall not be distributed unless the following requirements are met:

(1) The water meets or exceeds all federal and state drinking water standards, including all maximum contaminant levels applicable to public drinking water systems.

(2) The advanced water purification facility meets or exceeds all purification requirements imposed by regulatory agencies to produce the advanced purified demonstration water, including the removal of constituents of emerging concern where the removal is otherwise required of an advanced water purification facility.

(3) The water is produced using a treatment process that is consistent with the advanced treatment criteria for purified water specified in Section 60320.201 of Title 22 of the California Code of Regulations and, if established by the state board, in accordance with any uniform statewide water recycling criteria developed for the direct potable reuse of recycled water.

(f) (1) Advanced purified demonstration water may be bottled only at a licensed water-bottling plant in compliance with Sections 111070.5, 111080, 111120, 111145, and 111155 of the Health and Safety Code.

(2) Before bottling advanced purified demonstration water, an advanced water purification facility shall follow all pretreatment and labeling regulations for water bottling, including the requirements described in Section 111070.5 of the Health and Safety Code and the requirements for bottled water and vended water pursuant to Section 111080 of the Health and Safety Code.

(g) Advanced purified demonstration water shall be handled from the point of production to the completion of bottling in accordance with all regulations governing the transportation, bottling, labeling, and handling of bottled water, as defined in subdivision (a) of Section 111070 of the Health and Safety Code, including, but not limited to, subdivisions (a), (b), (f), and (h) of Section 111075 of the Health and Safety Code and Section 111070.5 of the Health and Safety Code. A water-bottling plant that bottles advanced purified demonstration water in accordance with this section may also bottle potable water, subject to compliance with Article 12 (commencing with Section 111070) of Chapter 5 of Part 5 of Division 104 of the Health and Safety Code.

(h) An advanced water purification facility shall not provide bottled advanced purified demonstration water to any person under 18 years of age without the consent of that person's parent or legal guardian.

(i) An advanced water purification facility shall not provide advanced purified demonstration water for human consumption, as defined in Section 116275 of the Health and Safety Code, including, but not limited to, in bottles, to more than 25 individuals per day for 60 or more days in a calendar year.

(j) Advanced purified demonstration water shall be bottled in nonreturnable (one-way) bottles or packages with labels containing the following information in an easily readable format that complies with all of the following:

(1) The label shall state "sample water--not for sale" and "Advanced Purified Water Sourced From Wastewater."

(2) The label shall set forth the name, address, telephone number, and Internet Web site of the operator of the facility producing the advanced purified demonstration water.

(3) The label shall include a brief description of the advanced purified demonstration water, including its source and the treatment processes to which the water is subjected.

(k) A single advanced water purification facility shall not cause more than 1,000 gallons of advanced purified demonstration water to be bottled in a calendar year.

(l) Advanced purified demonstration water shall not be sold or otherwise distributed in exchange for financial consideration.

(m) Any operator of an advanced water purification facility seeking to bottle advanced purified demonstration water shall establish a collection and recycling program for distributed bottles.

(n) The operator of an advanced water purification facility that is bottling advanced purified demonstration water shall do all of the following:

(1) Maintain a daily record of the number of individuals to whom advanced purified demonstration water is distributed, served, made available, or otherwise provided, including, but not limited to, from a bottle.

(2) Compile a report of all daily records described in paragraph (1) for each calendar year.

(3) Certify under penalty of perjury that the report is accurate.

(4) Provide the report within 45 days of the end of the calendar year for which the report was made to the deputy director of the Division of Drinking Water of the State Water Resources Control Board.

(o) This section does not exempt an advanced water purification facility from any standard for bottling water imposed pursuant to federal law.
(Added by Stats. 2016, Ch. 408, Sec. 2. Effective January 1, 2017.)

CHAPTER 7.5. WATER RECYCLING ACT OF 1991 [13575. - 13583.]

(Chapter 7.5 added by Stats. 1991, Ch. 187, Sec. 3.)

§ 13575. *[Citation; definitions]*

(a) This chapter shall be known and may be cited as the Water Recycling Act of 1991.

(b) As used in this chapter, the following terms have the following meanings:

(1) "Customer" means a person or entity that purchases water from a retail water supplier.

(2) "Entity responsible for groundwater replenishment" means any person or entity authorized by statute or court order to manage a groundwater basin and acquire water for groundwater replenishment.

(3) "Recycled water" has the same meaning as defined in subdivision (n) of Section 13050.

(4) "Recycled water producer" means any local public entity that produces recycled water.

(5) "Recycled water wholesaler" means any local public entity that distributes recycled water to retail water suppliers and which has constructed, or is constructing, a recycled water distribution system.

(6) "Retail water supplier" means any local entity, including a public agency, city, county, or private water company, that provides retail water service.

(7) "Retailer" means the retail water supplier in whose service area is located the property to which a customer requests the delivery of recycled water service.

(Amended by Stats. 1998, Ch. 753, Sec. 1. Effective January 1, 1999.)

§ 13576. ***[Legislative findings]***

The Legislature hereby makes the following findings and declarations:

(a) The State of California is subject to periodic drought conditions.

(b) The development of traditional water resources in California has not kept pace with the state's population, which is growing at the rate of over 700,000 per year and which is anticipated to reach 36,000,000 by the year 2010.

(c) There is a need for a reliable source of water for uses not related to the supply of potable water to protect investments in agriculture, greenbelts, and recreation and to replenish groundwater basins, and protect and enhance fisheries, wildlife habitat, and riparian areas.

(d) The environmental benefits of recycled water include a reduced demand for water in the Sacramento-San Joaquin Delta that is otherwise needed to maintain water quality, reduced discharge of waste into the ocean, and the enhancement of groundwater basins, recreation, fisheries, and wetlands.

(e) The use of recycled water has proven to be safe from a public health standpoint, and the State Department of Public Health is updating regulations for the use of recycled water.

(f) The use of recycled water is a cost-effective, reliable method of helping to meet California's water supply needs.

(g) The development of the infrastructure to distribute recycled water will provide jobs and enhance the economy of the state.

(h) Retail water suppliers and recycled water producers and wholesalers should promote the substitution of recycled water for potable water and

imported water in order to maximize the appropriate cost-effective use of recycled water in California.

(i) Recycled water producers, retail water suppliers, and entities responsible for groundwater replenishment should cooperate in joint technical, economic, and environmental studies, as appropriate, to determine the feasibility of providing recycled water service.

(j) Retail water suppliers and recycled water producers and wholesalers should be encouraged to enter into contracts to facilitate the service of recycled and potable water by the retail water suppliers in their service areas in the most efficient and cost-effective manner.

(k) Recycled water producers and wholesalers and entities responsible for groundwater replenishment should be encouraged to enter into contracts to facilitate the use of recycled water for groundwater replenishment if recycled water is available and the authorities having jurisdiction approve its use.

(l) Wholesale prices set by recycled water producers and recycled water wholesalers, and rates that retail water suppliers are authorized to charge for recycled water, should reflect an equitable sharing of the costs and benefits associated with the development and use of recycled water.

(Amended by Stats. 2010, Ch. 288, Sec. 47. Effective January 1, 2011.)

§ 13577. *[Water recycling goals]*

This chapter establishes a statewide goal to recycle a total of 700,000 acre-feet of water per year by the year 2000 and 1,000,000 acre-feet of water per year by the year 2010.

(Added by Stats. 1991, Ch. 187, Sec. 3.)

§ 13578. *[Report to the Legislature; task force]*

(a) In order to achieve the statewide goal for recycled water use established in Section 13577 and to implement the Governor's Advisory Drought Planning Panel Critical Water Shortage Contingency Plan recommendations, Section F2, as submitted December 29, 2000, the department shall identify and report to the Legislature on opportunities for increasing the use of recycled water, as defined in paragraph (3) of subdivision (b) of Section 13575, and identify constraints and impediments, including the level of state financial assistance available for project construction, to increasing the use of recycled water.

(b) The department shall convene a task force, to be known as the 2002 Recycled Water Task Force, to advise the department in implementation of subdivision (a), including making recommendations to the Legislature regarding the following:

(1) How to further the use of recycled water in industrial and commercial applications, including, but not limited to, those applications set forth in Section 13552.8. The task force shall evaluate the current regulatory framework of state

and local rules, regulations, ordinances, and permits to identify the obstacles and disincentives to industrial and commercial reuse. Issues to be investigated include, but are not limited to, applicability of visual inspections instead of pressure tests for cross-connections between potable and nonpotable water systems, dual piping trenching restrictions, fire suppression system design, and backflow protections.

(2) Changes in the Uniform Plumbing Code, published by the International Association of Plumbing and Mechanical Officials, that are appropriate to facilitate the use of recycled water in industrial and commercial settings. The department shall make recommendations to the California Building Standards Commission with regard to suggested revisions to the California Plumbing Code necessary to incorporate the changes identified by the task force.

(3) Changes in state statutes or the current regulatory framework of state and local rules, regulations, ordinances, and permits appropriate to increase the use of recycled water for commercial laundries and toilet and urinal flushing in structures including, but not limited to, those defined in subdivision (c) of Section 13553. The department shall identify financial incentives to help offset the cost of retrofitting privately and publicly owned structures.

(4) The need to reconvene the California Potable Reuse Committee established by the department in 1993 or convene a successor committee to update the committee's finding that planned indirect potable reuse of recycled water by augmentation of surface water supplies would not adversely affect drinking water quality if certain conditions were met.

(5) The need to augment state water supplies using water use efficiency strategies identified in the CALFED Bay-Delta Program. In its report pursuant to subdivision (a), the department shall identify ways to coordinate with CALFED to assist local communities in educating the public with regard to the statewide water supply benefits of local recycling projects and the level of public health protection ensured by compliance with the uniform statewide water recycling criteria developed by the State Department of Public Health in accordance with Section 13521.

(6) Impediments or constraints, other than water rights, related to increasing the use of recycled water in applications for agricultural, environmental, or irrigation uses, as determined by the department.

(c) (1) The task force shall be convened by the department and be comprised of one representative from each of the following state agencies:

(A) The department.

(B) The State Department of Public Health.

(C) The state board.

(D) The California Environmental Protection Agency.

(E) The CALFED Bay-Delta Program.

(F) The Department of Food and Agriculture.

(G) The California Building Standards Commission.

(H) The University of California.

(I) The Natural Resources Agency.

(2) The task force shall also include one representative from a recognized environmental advocacy group and one representative from a consumer advocacy group, as determined by the department, and one representative of local agency health officers, one representative of urban water wholesalers, one representative from a groundwater management entity, one representative of water districts, one representative from a nonprofit association of public and private members created to further the use of recycled water, one representative of commercial real estate, one representative of land development, one representative of industrial interests, and at least two representatives from each of the following as defined in Section 13575:

(A) Recycled water producer.

(B) Recycled water wholesaler.

(C) Retail water supplier.

(d) The department and the task force shall report to the Legislature not later than July 1, 2003.

(e) The department shall carry out the duties of this section only to the extent that funds pursuant to Section 79145, enacted as part of the Safe Drinking Water, Clean Water, Watershed Protection, and Flood Protection Act (Division 26 (commencing with Section 79000)), are made available for the purposes of this section.

(Amended by Stats. 2010, Ch. 288, Sec. 48. Effective January 1, 2011.)

§ 13579. ***[Potential uses and sources]***

(a) In order to achieve the goals established in Section 13577, retail water suppliers shall identify potential uses for recycled water within their service areas, potential customers for recycled water service within their service areas, and, within a reasonable time, potential sources of recycled water.

(b) Recycled water producers and recycled water wholesalers may also identify potential uses for recycled water, and may assist retail water suppliers in identifying potential customers for recycled water service within the service areas of those retail water suppliers.

(c) Recycled water producers, retail water suppliers, and entities responsible for groundwater replenishment may cooperate in joint technical, economic, and environmental studies, as appropriate, to determine the feasibility of providing recycled water service and recycled water for groundwater replenishment consistent with the criteria set forth in paragraphs (1) to (3), inclusive, of subdivision (a) of Section 13550 and in accordance with Section 60320 of Title 22 of the California Code of Regulations.

(Amended by Stats. 1998, Ch. 164, Sec. 3. Effective January 1, 1999.)

§ 13580. ***[Application for supply]***

(a) A retail water supplier that has identified a potential use or customer pursuant to Section 13579 may apply to a recycled water producer or recycled water wholesaler for a recycled water supply.

(b) A recycled water producer or recycled water wholesaler that has identified a potential use or customer pursuant to Section 13579, that is within the service territory or jurisdiction of a retail water supplier, may, in writing, request a retail water supplier to enter into an agreement to provide recycled water to the potential customer.

(c) A customer may request, in writing, a retailer to enter into an agreement to provide recycled water to the customer.

(d) (1) An entity responsible for groundwater replenishment that is a customer of a retail water supplier and that has identified the potential use of recycled water for groundwater replenishment purposes may, in writing, request that retail water supplier to enter into an agreement to provide recycled water for that purpose consistent with Sections 13580.5, 13580.7, and 13580.8, as applicable. That entity may not obtain recycled water for that purpose from a recycled water producer, a recycled water wholesaler, or another retail water supplier without the agreement of the entity's retail water supplier.

(2) An entity responsible for groundwater replenishment that is not a customer of a retail water supplier and that has identified the potential use of recycled water for groundwater replenishment purposes may, in writing, request a retail water supplier, a recycled water producer, or a recycled water wholesaler to enter into an agreement to provide recycled water for that purpose.

(Amended by Stats. 2014, Ch. 817, Sec. 2. Effective January 1, 2015.)

§ 13580.5. ***[Agreement to provide recycled water]***

(a) (1) Subject to subdivision (e) of Section 13580.7, a retail water supplier that receives a request from a customer pursuant to subdivision (c) of Section 13580 shall enter into an agreement to provide recycled water, if recycled water is available, or can be made available, to the retail water supplier for sale to the customer.

(2) Notwithstanding paragraph (1), in accordance with a written agreement between a recycled water producer or a recycled water wholesaler and a retail water supplier, the retail water supplier may delegate to a recycled water producer or a recycled water wholesaler its responsibility under this section to provide recycled water.

(b) A customer may not obtain recycled water from a recycled water producer, a recycled water wholesaler, or a retail water supplier that is not the retailer without the agreement of the retailer.

(c) If either a recycled water producer or a recycled water wholesaler provides a customer of a retail water supplier with a written statement that it can and will provide recycled water to the retailer, the retail water supplier shall, not later than 120 days from the date on which the retail water supplier receives the written statement from the customer, by certified mail, return receipt requested, submit a written offer to the customer that includes the items listed in subdivision (f) of Section 13580.7. A determination of availability pursuant to Section 13550 is not required.

(d) If the state board pursuant to Section 13550 makes a determination that there is available recycled water to serve a customer of a retail water supplier, the retail water supplier, not later than 120 days from the date on which the retail water supplier receives a copy of that determination from the customer, by certified mail, return receipt requested, shall submit a written offer to the customer.

(Amended by Stats. 2014, Ch. 817, Sec. 3. Effective January 1, 2015.)

§ 13580.7. ***[Public agency supplier]***

(a) This section applies only to a retail water supplier that is either a mutual water company, formed and operating pursuant to Part 7 (commencing with Section 14300) of Division 3 of Title 1 of the Corporations Code, or a public agency.

(b) A customer may request, in writing, a retail water supplier to enter into an agreement or adopt recycled water rates in order to provide recycled water service to the customer. The retail water supplier, by certified mail return receipt requested, shall submit a written offer to the customer not later than 120 days from the date on which the retail water supplier receives the written request from the customer that complies with subdivision (f).

(c) If no rate is in effect for recycled water service within the service area of a retail water supplier, the rate and conditions for recycled water service shall be established by contract between the retail water supplier and the customer, not later than 120 days from the date on which the customer requests a contract, or, by resolution or ordinance by the retail water supplier if it is a public agency, or by resolution if the retail water supplier is a mutual water company, not later than 120 days from the date on which the retail water supplier receives the customer's written request for an ordinance or resolution.

(d) A rate for recycled water service established by contract, ordinance, or resolution, shall reflect a reasonable relationship between the amount of the rate and the retail cost of obtaining or producing the recycled water, the cost of conveying the recycled water, and overhead expenses for providing and administering the use of recycled water service. Capital costs of facilities required to serve the customer shall be amortized over the economic life of the facility, or the length of time the customer agrees to purchase recycled water,

whichever is less. The rate shall not exceed the estimated reasonable cost of providing the service, and any additional costs agreed to by the customer for recycled water supplemental treatment.

(e) To the extent feasible, the rate for recycled water shall be comparable to, or less than, the retail water supplier's rate for potable water. If recycled water service cannot be provided at a rate comparable to, or less than, the rate for potable water, the retail water supplier is not required to provide the recycled water service, unless the customer agrees to pay a rate that reimburses the retail water supplier for the costs described in subdivision (c).

(f) The offer required by subdivision (b) and subdivisions (c) and (d) of Section 13580.5 shall identify all of the following:

(1) The source for the recycled water.

(2) The method of conveying the recycled water.

(3) A schedule for delivery of the recycled water.

(4) The terms of service.

(5) The rate for the recycled water, including the per-unit cost for that water.

(6) The costs necessary to provide service and the basis for determining those costs.

(g) This section does not apply to recycled water service rates established before January 1, 1999, or any amendments to those rates.

(Amended by Stats. 2014, Ch. 817, Sec. 4. Effective January 1, 2015.)

§ 13580.8. *[Suppliers regulated by the P.U.C.]*

(a) This section applies only to a retail water supplier that is regulated by the Public Utilities Commission.

(b) Rates for recycled water that is provided to the customer by a retail water supplier regulated by the Public Utilities Commission shall be established by the commission pursuant to Section 455.1 of the Public Utilities Code. A regulated water utility may request the commission to establish the rate or rates for the delivery of recycled or nonpotable water, with the objective of providing, where practicable, a reasonable economic incentive for the customer to purchase recycled or nonpotable water in place of potable water.

(c) A regulated water utility may propose a rate or rates for recycled or nonpotable water by tariff or by contract between the retail water supplier and the customer. Where the rate or rates are set by contract, the water utility and its customer shall meet, confer, and negotiate in good faith to establish a contract rate.

(d) The commission shall, as appropriate, provide a discount from the general metered rate of the water utility for potable water by either of the following means:

(1) Passing through to the customer the net reduction in cost to the water utility in purchasing and delivering recycled or nonpotable water as compared to the cost of purchasing and delivering potable water.

(2) Granting to the customer a uniform discount from the water utility's general metered potable water rate when the discount in paragraph (1) is determined to be an insufficient incentive for the customer to convert to the use of recycled or nonpotable water. If the commission provides for a discount pursuant to this paragraph that is greater than the water utility's reduction in cost, the commission shall authorize the water utility to include the aggregate amount of that discount in its revenue requirements to be applied to, and recovered in, rates that are applicable to all general metered customers.
(Added by Stats. 1998, Ch. 753, Sec. 5. Effective January 1, 1999.)

§ 13580.9. ***[West Covina]***

(a) Notwithstanding any other law, and except as otherwise previously provided for in a contract agreed to by the customer and the City of West Covina, if the purchaser, contractor, or lessee of, or successor to, all or a portion of the water utility owned by the City of West Covina is a retail water supplier that is regulated by the Public Utilities Commission, rates for recycled or nonpotable water service to a closed hazardous waste and solid waste facility located within the boundaries of the City of West Covina for the purposes of irrigation, recreation, or dust suppression or any other use at that facility shall be established in accordance with subdivisions (a) to (e), inclusive, of Section 13580.7, and if there is a failure to agree on the terms and conditions of a recycled or nonpotable water supply agreement for the delivery of water for those purposes by that purchaser, contractor, lessee, or successor, Section 13581 shall apply.

(b) For the purpose of this section, nonpotable water that is not the result of the treatment of waste shall be treated as the equivalent of recycled water if it is suitable for a direct beneficial use or a controlled use that would not otherwise occur and is therefor considered a valuable resource, if the use of that water will not adversely affect downstream water rights, degrade water quality, or be injurious to plant life, fish, or wildlife, as provided by statute or by regulations of the State Department of Public Health and the state board or a regional board, as appropriate.
(Amended by Stats. 2010, Ch. 288, Sec. 49. Effective January 1, 2011.)

§ 13581. ***[Mediation of agreements]***

(a) If there is a failure to agree on terms and conditions of a recycled water supply agreement involving a retail water supplier that is a public agency within 180 days from the date of the receipt of a request for recycled water pursuant to subdivision (c) of Section 13580, a written statement pursuant to subdivision (c) of Section 13580.5, or a determination of availability pursuant to subdivision

(d) of Section 13580.5, any party may request a formal mediation process. The parties shall commence mediation within 60 days after the mediation request is made. If the parties cannot agree on a mediator, the director shall appoint a mediator. The mediator may recommend to the parties appropriate terms and conditions applicable to the service of recycled water. The cost for the services of the mediator shall be divided equally among the parties to the mediation and shall not exceed twenty thousand dollars ($20,000).

(b) If the parties in mediation reach agreement, both parties together shall draft the contract for the recycled water service. The parties shall sign the contract within 30 days.

(c) If the parties in mediation fail to reach agreement, the affected retail water supplier shall, within 30 days, by resolution or ordinance, adopt a rate for recycled water service. The agency action shall be subject to validating proceedings pursuant to Chapter 9 (commencing with Section 860) of Part 2 of Title 10 of the Code of Civil Procedure, except that there shall not be a presumption in favor of the retail water supplier under the action taken to set the rate for recycled water service. The mediator shall file a report with the superior court setting forth the recommendations provided to the parties regarding appropriate terms and conditions applicable to the service of recycled water. Each party shall bear its own costs and attorney's fees.

(Amended by Stats. 1998, Ch. 753, Sec. 7. Effective January 1, 1999.)

§ 13581.2. *[Determination by the P.U.C.]*

If the retail water supplier is regulated by the Public Utilities Commission, and there is a failure to agree on terms and conditions of a recycle water supply agreement with a customer within 180 days from the date of the receipt of a request for recycled water pursuant to subdivision (c) of Section 13580, a written statement pursuant to subdivision (c) of Section 13580.5, or a determination of availability pursuant to subdivision (d) of Section 13580.5, the matter shall be submitted to the Public Utilities Commission for resolution, and the commission shall determine a contract rate or rates for recycled water as provided in Section 13580.8.

(Added by Stats. 1998, Ch. 753, Sec. 8. Effective January 1, 1999.)

§ 13582. *[Rights, remedies, obligations]*

This chapter is not intended to alter either of the following:

(a) Any rights, remedies, or obligations which may exist pursuant to Article 1.5 (commencing with Section 1210) of Chapter 1 of Part 2 of Division 2 of this code or Chapter 8.5 (commencing with Section 1501) of Part 1 of Division 1 of the Public Utilities Code.

(b) Any rates established or contracts entered into prior to January 1, 1999.

(Amended by Stats. 1998, Ch. 753, Sec. 9. Effective January 1, 1999.)

§ 13583. ***[Failure to comply]***

(a) If a retail water supplier that is a public agency does not comply with this chapter, the customer may petition a court for a writ of mandate pursuant to Chapter 2 (commencing with Section 1084) of Title 1 of Part 3 of the Code of Civil Procedure.

(b) If a retail water supplier is regulated by the Public Utilities Commission and does not comply with this chapter, the Public Utilities Commission may order the retailer to comply with this chapter after receiving a petition from the customer specifying the provisions of this chapter with which the retailer has failed to comply.

(Added by Stats. 1998, Ch. 753, Sec. 10. Effective January 1, 1999.)

CHAPTER 8. FEDERAL ASSISTANCE FOR TREATMENT FACILITIES [13600. - 13609.]

(Chapter 8 added by Stats. 1969, Ch. 482.)

§ 13600. ***[Administration]***

The state board shall administer any program of financial assistance for water quality control which may be delegated to it by law, and may accept funds from the United States or any person to that end.

(Repealed and added by Stats. 1969, Ch. 482.)

§ 13601. ***[Needs survey]***

The state board, in cooperation with the regional boards, shall survey the statewide need for waste collection, treatment and disposal facilities which will be required during the five-year period, January 1, 1968, to December 31, 1972, inclusive, to adequately protect the waters of the state for beneficial use. The state board shall also, biennially, commencing in 1970, survey the need for facilities which will be required by public agencies for the ensuing five-year period. The state board may request a local public agency operating such facilities to transmit to its regional board a report on the following:

(a) A summary of the construction or improvement of its waste collection, treatment and disposal facilities and amounts expended therefor.

(b) An estimate of its needs for the five-year period, January 1, 1968, to December 31, 1972, inclusive, and for any ensuing five-year period.

The state board shall review the information contained in the reports made by the local public agencies. The state board shall submit to the Legislature findings and conclusions as to the anticipated local, state, and federal financing necessary to provide the needed facilities for such periods.

(Repealed and added by Stats. 1969, Ch. 482.)

§ 13602. ***[Fund availability]***

The state board shall make no commitment or enter into any agreement pursuant to an exercise of authority under this chapter until it has determined

that any money required to be furnished as the state's share of project cost is available for such purpose.
(Repealed and added by Stats. 1969, Ch. 482.)

§ 13603. ***[Budget bill]***
The Governor may request the funds required to finance the state's share of project costs for each fiscal year through inclusion of the anticipated state's share in the annual Budget Bill.
(Repealed and added by Stats. 1969, Ch. 482.)

§ 13604. ***[State board review]***
The state board shall review and approve each waste collection, treatment, and disposal project for which an application for a grant under the Federal Water Pollution Control Act has been made. The state board shall, in reviewing each project, determine whether such project is in conformity with state policy for water quality control and in conformity with water quality control plans adopted by regional boards, and shall certify that such project is entitled to priority over other eligible projects on the basis of financial as well as water pollution control needs.
(Amended by Stats. 1970, Ch. 254.)

§ 13605. ***[Optimum recycling and use]***
For the purpose of reviewing applications for grants made pursuant to authority granted in Section 13600, the state board shall give added consideration to applicants having facilities providing optimum water recycling and use of recycled water.
(Amended by Stats. 1995, Ch. 28, Sec. 50. Effective January 1, 1996.)

§ 13606. ***[Sewerage service charge]***
If an application states that the applicant is not able to finance the local agency share of the project, the state board shall consider whether the applicant should be required to levy a sewerage service charge. If the state board determines a sewerage service charge is necessary to pay such costs, the state board shall not approve the grant application unless, as a condition to such approval, the applicant agrees to levy a reasonable and equitable sewerage service charge in connection with the proposed project.

Any such applicant, not otherwise authorized, is authorized by this section to levy a sewerage service charge pursuant to such an agreement, and shall levy such charge in the manner provided in the agreement.
(Added by Stats. 1969, Ch. 482.)

§ 13607. ***[Continuing appropriation]***
All money appropriated by the Legislature for the state's share of the project costs shall be appropriated without regard to fiscal years, or shall augment an appropriation without regard to fiscal years.

(Added by Stats. 1969, Ch. 482.)

§ 13608. ***[Certification requirements]***

After the effective date of the amendment of this section by the 1972 Regular Session of the Legislature, no application for a grant under this division or under the Federal Water Pollution Control Act, or amendment thereof, or for a loan pursuant to Chapter 6 (commencing with Section 13400) of this division, shall be accepted by the state board unless such application contains assurances that supervisors and operators of the plant meet or will meet certification requirements, adopted pursuant to Chapter 9 (commencing with Section 13625) of this division, for the proposed plant, as well as the plant in current operation.
(Amended by Stats. 1972, Ch. 1315.)

§ 13609. ***[Transfer of funds]***

The money in the State Clean Water Grants Administration Revolving Fund is transferred to the State Clean Water Fund to pay, upon appropriation, for administrative costs relating to adjustments of grant processing fees paid pursuant to this chapter.
(Repealed and added by Stats. 1992, Ch. 426, Sec. 2. Effective January 1, 1993.)

CHAPTER 8.5. PERCHLORATE [13610. - 13613.]

(Chapter 8.5 added by Stats. 2003, Ch. 614, Sec. 3.)

§ 13610. ***[Definitions]***

Unless the context otherwise requires, the definitions set forth in this section govern the construction of this chapter:

(a) (1) Subject to paragraph (2), "perchlorate" means all perchlorate-containing compounds, including ammonium, potassium, magnesium, and sodium perchlorate.

(2) Perchlorate does not include perchlorate located in unused military munitions, as defined in Section 260.10 of Title 40 of the Code of Federal Regulations, that were stored on or after January 1, 2004.

(b) Subject to Section 13610.5, "perchlorate storage facility" means a facility, not including a military munitions storage facility within a military installation that meets the Department of Defense Explosive Safety Board requirements set forth in DOD 6055.9-STD (Department of Defense Ammunition and Explosives Safety Standards), that stores over 500 pounds of perchlorate in any calendar year.

(c) For the purposes of this section, "military munitions storage facility" does not include the entire military installation within which the military munitions storage facility is located.
(Amended by Stats. 2004, Ch. 508, Sec. 1. Effective January 1, 2005.)

§ 13610.5. ***[Applicability of chapter]***

This chapter does not apply to the following:

(a) A facility that stores perchlorate for retail purposes or for law enforcement purposes.

(b) Drinking water storage reservoirs.

(Added by Stats. 2003, Ch. 614, Sec. 3. Effective January 1, 2004.)

§ 13611. ***[Notification Requirements]***

(a) The notification required by Section 13611.5 does not apply to a discharge that is in compliance with this division, or to a water agency conveying water in compliance with all state and federal drinking water standards.

(b) Any person who fails to provide the notifications required by Section 13271 relating to perchlorate or by Section 13611.5 may be civilly liable in accordance with subdivision (c).

(c) (1) Civil liability may be administratively imposed by a regional board in accordance with Article 2.5 (commencing with Section 13323) of Chapter 5 for a violation described in subdivision (b) in an amount that does not exceed one thousand dollars ($1,000) for each day in which the violation occurs.

(2) Civil liability may be imposed by the superior court in accordance with Article 5 (commencing with Section 13350) and Article 6 (commencing with Section 13360) of Chapter 5 for a violation described in subdivision (b) in an amount that is not less than five hundred dollars ($500), nor more than five thousand dollars ($5,000), for each day in which the violation occurs.

(d) Notwithstanding Section 13441, all moneys collected by the state pursuant to this section shall be available to the state board upon appropriation by the Legislature.

(Amended by Stats. 2006, Ch. 538, Sec. 679. Effective January 1, 2007.)

§ 13611.5. ***[Reporting requirements]***

(a) On or before January 1, 2005, and annually thereafter, unless the owner or operator has met the alternative compliance requirements of subdivision (b), an owner or operator of a storage facility that has stored in any calendar year since January 1, 1950, over 500 pounds of perchlorate shall submit to the state board, to the extent feasible, all of the following information:

(1) The volume of perchlorate stored each year.

(2) The method of storage.

(3) The location of storage. To the extent authorized by federal law, in the case of a perchlorate storage facility under the control of the Armed Forces of the United States, "location" means the name and address of the property within which the perchlorate storage facility is located.

(4) Copies of documents relating to any monitoring undertaken for potential leaks into the water bodies of the state.

(b) The owner or operator of a storage facility that has stored in any calendar year since January 1, 1950, over 500 pounds of perchlorate, is in compliance with this section if both of the following conditions are met:

(1) The owner or operator has provided substantially similar information as required pursuant to subdivision (a) to a state, local, or federal agency pursuant to any of the following:

(A) An order issued by a regional board pursuant to Chapter 5 (commencing with Section 13300) of Division 7.

(B) An order, consent order, or consent decree issued or entered into by the Department of Toxic Substances Control pursuant to Chapter 6.8 (commencing with Section 25300) of Division 20 of the Health and Safety Code.

(C) An order, consent order, or consent decree issued or entered into by the United States Environmental Protection Agency pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended (42 U.S.C. Sec. 9601 et seq.).

(D) The requirement under Section 25504.1 of the Health and Safety Code, as added by Assembly Bill 826 of the 2003–04 Regular Session.

(2) The owner or operator, on or before January 1, 2005, and annually thereafter, notifies the state board of the governmental entity to which the information is provided and the state board determines the information supplied is substantially similar as the information required to be reported pursuant to subdivision (a). In the case of any information submitted to a federal or local agency, the state board may require the owner or operator, in addition, to submit that information to the state board if the state board determines that the information is not otherwise reasonably available to the state board.

(c) This section shall not be administered or implemented if the state board receives notification from the Secretary for Environmental Protection pursuant to Section 13613 that the Secretary for Environmental Protection has established a database that is able to receive perchlorate inventory information.

(d) Information on perchlorate storage need only be submitted pursuant to this section one time, unless information originally submitted pursuant to this section has changed.

(Amended by Stats. 2004, Ch. 183, Sec. 365. Effective January 1, 2005.)

§ 13612. ***[List of Facilities]***

(a) The state board shall publish and make available to the public on or before January 1, 2006, a list of past and present perchlorate storage facilities within the state. The state board may charge an annual fee to each owner of a storage facility that provides information to the board for that purpose, which fee shall not exceed one hundred dollars ($100) for each year information is provided. The fees shall be deposited in the State Water Quality Control Fund,

and notwithstanding any other provision of law, shall be available to the state board upon appropriation by the Legislature.

(b) The state board shall compile and maintain centrally all information obtained pursuant to Section 13611.5. The information shall be available for public review.

(Added by Stats. 2003, Ch. 614, Sec. 3. Effective January 1, 2004.)

§ 13613. *[Reporting to Secretary]*

Upon notification from the Secretary for Environmental Protection that he or she has established a database that is able to receive perchlorate inventory information pursuant to paragraph (2) of subdivision (e) of Section 25404 of the Health and Safety Code, the state board shall submit to the Secretary for Environmental Protection all perchlorate storage information obtained pursuant to Section 13611.5.

(Added by Stats. 2003, Ch. 614, Sec. 3. Effective January 1, 2004.)

CHAPTER 9. WASTE WATER TREATMENT PLANT CLASSIFICATION AND OPERATOR CERTIFICATION [13625. - 13633.]

(Heading of Chapter 9 amended by Stats. 1985, Ch. 653, Sec. 2.)

§ 13625. *[Definitions]*

As used in this chapter unless the context otherwise requires, the following definitions apply:

(a) "Chief plant operator" means the person designated by the owner of the wastewater treatment plant as the person responsible for the overall operation of the wastewater treatment plant, including compliance with effluent limitations established in the wastewater treatment plant's waste discharge requirements.

(b) "Operates" means actions or decisions to control performance or outcome of one or more wastewater treatment processes and includes the supervision of any other person who acts or makes decisions to control the performance or outcome of one or more wastewater treatment processes.

(c) "Wastewater certificate" means a certificate of competency issued by the state board stating that a person has met the requirements to be certified for a specific classification and grade level in the certification program. At a minimum, wastewater certificate classifications shall include operators and operators-in-training.

(d) (1) "Wastewater treatment plant" means any of the following:

(A) Any facility owned by a state, local, or federal agency and used in the treatment or reclamation of sewage or industrial wastes.

(B) Any privately owned facility used in the treatment or reclamation of sewage or industrial wastes, and regulated by the Public Utilities Commission

pursuant to Sections 216 and 230.6 of, and Chapter 4 (commencing with Section 701) of Part 1 of Division 1 of, the Public Utilities Code.

(C) Any privately owned facility used primarily in the treatment or reclamation of sewage for which the state board or a regional board has issued waste discharge requirements.

(2) "Wastewater treatment plant" does not include onsite sewage treatment systems as regulated by the state board or a regional water quality control board pursuant to Chapter 4.5 (commencing with Section 13290).

(e) "Wastewater treatment process" means a process that improves the quality of wastewater before it is discharged from a wastewater treatment plant and includes all of the following:

(1) Use of preliminary, primary, pond, secondary, or tertiary treatment for liquid-solids separation of wastewater.

(2) Use of disinfection to inactivate or destroy pathogens in wastewater.

(3) Use of solids treatment for solids stabilization and volume reduction before removal from the wastewater treatment plant site.

(f) "Water treatment operator certificate" has the same meaning as defined in Section 106876 of the Health and Safety Code.

(g) "Water recycling treatment plant" means a wastewater treatment plant that further treats secondary or tertiary effluent, or both, for the purpose of meeting the uniform statewide recycling criteria established pursuant to Section 13521 for the use of recycled water.

(Amended by Stats. 2016, Ch. 305, Sec. 19. Effective January 1, 2017.)

§ 13625.1. *[Exemption for certain Class 1 plants]*

(a) The state board may exempt from the requirements of this chapter any facility that is classified as a Class 1 plant by the state board under Section 3675 of Title 23 of the California Code of Regulations, and the facility could not, due to operator error, violate water quality objectives.

(b) An exemption granted pursuant to this section is valid for four years, and may be renewed by the state board upon request.

(c) The state board may condition an exemption under this section, and the exemption may be terminated at any time by the board.

(d) The state board may charge a reasonable administrative fee for processing a facility's original or renewal application for exemption.

(Added by Stats. 2002, Ch. 422, Sec. 2. Effective January 1, 2003.)

§ 13626. *[Treatment plant classification]*

The state board shall classify types of wastewater treatment plants for the purpose of determining the levels of competence necessary to operate them. The state board shall adopt regulations setting forth the types of plants and the factors on which the state board based its classification.

(Amended by Stats. 2016, Ch. 305, Sec. 20. Effective January 1, 2017.)

§ 13627. ***[Operator certification]***

(a) Except as provided in Section 13625.1 and subdivision (b), a person who operates a wastewater treatment plant shall possess a valid, unexpired wastewater certificate of the appropriate grade.

(b) A person who operates a water recycling treatment plant may comply with subdivision (a) by possessing a valid, unexpired water treatment operator certificate of the appropriate grade.

(c) All wastewater certificates shall be issued in accordance with regulations adopted by the state board. The state board shall develop and specify in its regulations the training necessary to qualify a person for a wastewater certificate for each type and class of plant. The state board may accept experience in lieu of qualification training.

(d) The state board may refuse to grant, suspend, or revoke any wastewater certificate or may place on probation, or reprimand, the certificate holder upon any reasonable ground, including, but not limited to, all of the following reasons:

(1) Submitting false or misleading information on an application for a wastewater certificate or an examination for a wastewater certificate.

(2) The employment of fraud or deception in the course of operating the wastewater treatment plant.

(3) A wastewater certificate holder's failure to use reasonable care or judgment in the operation of the plant.

(4) A wastewater certificate holder's inability to perform operating duties properly.

(5) Willfully or negligently violating, or causing, or allowing the violation of, waste discharge requirements or permits issued pursuant to the Clean Water Act (33 U.S.C. Sec. 1251 et seq.) or this division.

(6) Engaging in dishonest conduct during an examination for a wastewater certificate.

(e) The state board shall conduct all proceedings for the refusal to grant a wastewater certificate, and suspension or revocation of a certificate, pursuant to subdivision (d), in accordance with the rules adopted pursuant to Section 185.
(Amended by Stats. 2016, Ch. 305, Sec. 21. Effective January 1, 2017.)

§ 13627.1. ***[Misdemeanor; civil liability]***

(a) Any person who commits either of the following violations is guilty of a misdemeanor and may be liable civilly in an amount not to exceed one hundred dollars ($100) for each day of violation:

(1) Operates a wastewater treatment plant that is not a water recycling treatment plant but does not hold a valid, unexpired wastewater certificate of the appropriate grade issued pursuant to this chapter.

(2) Operates a water recycling treatment plant but does not hold either a valid, unexpired wastewater certificate of the appropriate grade issued pursuant to this chapter or a valid, unexpired water treatment operator certificate of the appropriate grade.

(b) Any person or entity who commits either of the following violations is guilty of a misdemeanor and may be liable civilly in an amount not to exceed one hundred dollars ($100) for each day of violation:

(1) Owns or operates a wastewater treatment plant that is not a water recycling treatment plant that employs, or allows the employment of, any person who operates the wastewater treatment plant but does not hold a valid, unexpired wastewater certificate of the appropriate grade issued pursuant to this chapter.

(2) Owns or operates a water recycling treatment plant that employs, or allows the employment of, any person who operates the water recycling treatment plant but does not hold a valid, unexpired wastewater certificate of the appropriate grade issued pursuant to this chapter or a valid, unexpired water treatment operator certificate of the appropriate grade.

(c) Any person who commits any of the acts listed in paragraph (2), (3), (5), or (6) of subdivision (d) of Section 13627 or paragraph (3) or (5) of subdivision (c) of Section 13627.3 may be liable civilly in an amount not to exceed five thousand dollars ($5,000) for each violation.

(Amended by Stats. 2016, Ch. 305, Sec. 22. Effective January 1, 2017.)

§ 13627.2. *[Civil liability]*

Any person who submits to the state board false or misleading information on an application for a wastewater certificate, on an application for an examination for a wastewater certificate, or on an application for registration may be liable civilly in an amount not to exceed five thousand dollars ($5,000) for each violation.

(Amended by Stats. 2016, Ch. 305, Sec. 23. Effective January 1, 2017.)

§ 13627.3. *[Operator registration]*

(a) Any person or entity that contracts with the owner of a wastewater treatment plant to operate that plant shall register with the state board, and shall, within a year after the registration or the renewal of the registration, and annually thereafter, prepare and submit to the state board a report with all of the following information:

(1) The name and address of the person or entity.

(2) The name and address of the wastewater treatment plants that the person or entity operates, or has operated during the preceding year, and the name of the applicable regional board that oversees each wastewater treatment plant.

(3) The name and grade of each wastewater treatment plant operator employed at each plant.

(4) Other information that the state board requires.

(b) The state board shall, by regulation, prescribe the procedures, and requirements for, registration pursuant to subdivision (a).

(c) The state board may refuse to grant, and may suspend or revoke, any registration issued by the state board pursuant to this section for good cause, including, but not limited to, any of the following reasons:

(1) The submission of false or misleading information on an application for registration.

(2) (A) Employment of a person to operate a wastewater treatment plant that is not a water recycling treatment plant who does not hold a valid, unexpired wastewater certificate of the appropriate grade.

(B) Employment of a person to operate a water recycling treatment plant who does not hold either a valid, unexpired wastewater certificate of the appropriate grade issued pursuant to this chapter or a valid, unexpired water treatment operator certificate of the appropriate grade.

(3) Willfully or negligently causing or allowing a violation of waste discharge requirements or permits issued pursuant to the Clean Water Act (33 U.S.C. Sec. 1251 et seq.) or this division.

(4) Failure to meet the registration requirements prescribed by the state board pursuant to subdivision (b).

(5) Failure to use reasonable care in the management or operation of the wastewater treatment plant.

(d) The state board shall conduct all proceedings relating to the refusal to grant, or the suspension or revocation of, registration pursuant to subdivision (c) in accordance with the rules adopted pursuant to Section 185.

(e) The state board shall establish a fee schedule to pay for its costs to implement this section.

(f) Any person or entity that fails to comply with subdivision (a) is guilty of a misdemeanor and may be civilly liable in an amount not to exceed one thousand dollars ($1,000) for each day of the violation.

(Amended by Stats. 2016, Ch. 305, Sec. 24. Effective January 1, 2017.)

§ 13627.4. ***[Imposition of civil liability]***

(a) The state board may administratively impose the civil liability described in Section 13627.1, 13627.2, or 13627.3 in accordance with Article 2.5 (commencing with Section 13323) of Chapter 5.

(b) A remedy under this chapter is in addition to, and does not supersede or limit, any other remedy, civil or criminal, except that liability is not recoverable against an operator under subdivision (c) of Section 13627.1 for a violation for which liability is recovered against the operator under Section 13350 or 13385.

(Amended by Stats. 2010, Ch. 288, Sec. 51. Effective January 1, 2011.)

§ 13627.5. ***[Written examination]***

(a) Any operator employed at a wastewater treatment plant described in paragraph (3) of subdivision (b) of Section 13625 shall pass any written examination that may be administered by the state board. Upon passage of the examination, the operator shall be credited with one year of experience for purposes of operator certification.

(b) The state board may charge a reasonable fee for administering this section.

(Added by Stats. 2002, Ch. 422, Sec. 4. Effective January 1, 2003.)

§ 13627.6. ***[Regulations]***

The state board, by regulation, shall prescribe the procedures and requirements for designation of a person as the chief plant operator and the duties that a chief plant operator is required to perform.

(Added by Stats. 2016, Ch. 305, Sec. 26. Effective January 1, 2017.)

§ 13628. ***[Certification fees]***

(a) Wastewater certificates issued or renewed pursuant to this chapter on or after January 1, 2017, shall be renewed triennially, subject to compliance by applicants with renewal requirements prescribed by regulations.

(b) Fees shall be payable to the state board at the time of issuance of a wastewater certificate and at the time of renewal. The state board shall establish a fee schedule to provide revenues that shall not exceed the amount necessary, but shall be sufficient, to recover all the costs of this program.

(c) The state board may establish reduced fees for the issuance or renewal of a wastewater certificate for applicants who hold a valid, unexpired water treatment operator certificate or a valid, unexpired water distribution operator certificate.

(d) The state board shall set the amount of total revenue collected each year through the fee schedules established pursuant to this chapter at an amount equal to the amount appropriated by the Legislature in the annual Budget Act from the Wastewater Operator Certification Fund for expenditure for the administration of this chapter, taking into account the reserves in the fund. The state board shall review the fees each fiscal year and revise the fees as necessary to conform with the amounts appropriated by the Legislature. If the state board determines that the revenue collected during the preceding year was greater than, or less than, the amounts appropriated by the Legislature, the state board may further adjust the fees to compensate for the overcollection or undercollection of the revenue.

(e) The state board may adopt regulations pursuant to this section, including any subsequent adjustments to the fees or subsequent amendments

to the regulations, as emergency regulations in accordance with Chapter 3.5 (commencing with Section 11340) of Part 1 of Division 3 of Title 2 of the Government Code. The adoption of these emergency regulations is an emergency and shall be considered by the Office of Administrative Law as necessary for the immediate preservation of the public peace, health, safety, and general welfare. Notwithstanding Chapter 3.5 (commencing with Section 11340) of Part 1 of Division 3 of Title 2 of the Government Code, any emergency regulations adopted by the state board, or any adjustment to the fees made by the state board pursuant to this section, shall remain in effect until revised by the state board.

(Amended by Stats. 2016, Ch. 305, Sec. 27. Effective January 1, 2017.)

§ 13628.5. *[Wastewater Operator Certification Fund]*

(a) The Wastewater Operator Certification Fund is hereby created in the State Treasury.

(b) All of the following moneys shall be deposited in the Wastewater Operator Certification Fund:

(1) Any moneys made available by the Legislature for the purposes of the fund.

(2) Fees collected pursuant to this chapter.

(3) Notwithstanding Section 16305.7 of the Government Code, all interest earned upon moneys that are deposited in the fund.

(c) The state board may expend the moneys in the Wastewater Operator Certification Fund, upon appropriation by the Legislature, for purposes of administering this chapter.

(Amended by Stats. 2016, Ch. 305, Sec. 28. Effective January 1, 2017.)

§ 13629. *[Certification instruction]*

The state board may approve courses of instruction at higher educational institutions that will qualify operators for each grade of certification. The state board shall also approve courses of instruction given by professional associations, or other private or public agencies that shall be deemed equivalent to courses of instruction given by higher educational institutions.

(Amended by Stats. 2016, Ch. 305, Sec. 29. Effective January 1, 2017.)

§ 13630. *[Training funds]*

The state board is the state agency which is authorized to represent the state and its local governmental agencies in administering any federal or state funds available for wastewater treatment plant operator training. The state board may provide technical and financial assistance to organizations providing operator training programs.

(Amended by Stats. 2002, Ch. 422, Sec. 5. Effective January 1, 2003.)

§ 13631. *[Advisory committee]*

Prior to adopting or amending any regulations or approving any courses for operator training, the state board shall appoint an advisory committee to assist it in carrying out its responsibilities under this chapter.
(Repealed and added by Stats. 1985, Ch. 420, Sec. 3. Effective July 30, 1985.)

§ 13632. *[Committee membership]*

The advisory committee appointed pursuant to Section 13631 shall consist of the following:

(a) Two persons from a statewide organization representing wastewater treatment plant operators who shall be employed at a wastewater treatment plant as operators.

(b) Two persons from statewide organizations representing municipalities, including counties or private utility wastewater treatment plants.

(c) Two persons from statewide organizations representing local sanitation agencies, other than agencies specified in subdivision (b).

(d) One person who is employed as an operator at a water recycling treatment plant.

(e) One person from an educational institution's school or division of engineering.

(f) One person who is a member of an organized labor union that represents wastewater treatment plant operators.

(g) One person who is a professional engineer specializing in sanitary engineering.
(Amended by Stats. 2016, Ch. 305, Sec. 30. Effective January 1, 2017.)

§ 13633. *[Committee duties]*

The advisory committee shall review all proposed regulations and make recommendations to the state board prior to adoption of any regulations or amendments thereto.
(Repealed and added by Stats. 1985, Ch. 420, Sec. 3. Effective July 30, 1985.)

CHAPTER 10. WATER WELLS AND CATHODIC PROTECTION WELLS [13700. - 13806.]

(Chapter 10 added by Stats. 1969, Ch. 482.)

Article 1. Declaration of Policy [13700. - 13701.]

(Article 1 added by Stats. 1969, Ch. 482.)

§ 13700. *[Legislative findings]*

The Legislature finds that the greater portion of the water used in this state is obtained from underground sources and that those waters are subject to impairment in quality and purity, causing detriment to the health, safety and welfare of the people of the state. The Legislature therefore declares that the people of the state have a primary interest in the location, construction,

maintenance, abandonment, and destruction of water wells, cathodic protection wells, groundwater monitoring wells, and geothermal heat exchange wells, which activities directly affect the quality and purity of underground waters.
(Amended by Stats. 1996, Ch. 581, Sec. 1. Effective January 1, 1997.)

§ 13701. ***[Legislative declarations]***
The Legislature finds and declares all of the following:

(a) Improperly constructed and abandoned water wells, cathodic protection wells, groundwater monitoring wells, and geothermal heat exchange wells can allow contaminated water on the surface to flow down the well casing, thereby contaminating the usable groundwater.

(b) Improperly constructed and abandoned water wells, cathodic protection wells, groundwater monitoring wells, and geothermal heat exchange wells can allow unusable or low quality groundwater from one groundwater level to flow along the well casing to usable groundwater levels, thereby contaminating the usable groundwater.

(c) Contamination of groundwater poses serious public health and economic problems for many areas of the state.
(Amended by Stats. 1996, Ch. 581, Sec. 2. Effective January 1, 1997.)

Article 2. Definitions [13710. - 13713.]

(Article 2 added by Stats. 1969, Ch. 482.)

§ 13710. ***["Well"]***
"Well" or "water well" as used in this chapter, means any artificial excavation constructed by any method for the purpose of extracting water from, or injecting water into, the underground. This definition shall not include: (a) oil and gas wells, or geothermal wells constructed under the jurisdiction of the Department of Conservation, except those wells converted to use as water wells; or (b) wells used for the purpose of (1) dewatering excavation during construction, or (2) stabilizing hillsides or earth embankments.
(Repealed and added by Stats. 1969, Ch. 482.)

§ 13711. ***["Cathodic protection well"]***
"Cathodic protection well," as used in this chapter, means any artificial excavation in excess of 50 feet constructed by any method for the purpose of installing equipment or facilities for the protection electrically of metallic equipment in contact with the ground, commonly referred to as cathodic protection.
(Repealed and added by Stats. 1969, Ch. 482.)

§ 13712. ***["Monitoring well"]***
"Monitoring well" as used in this chapter, means any artificial excavation by any method for the purpose of monitoring fluctuations in groundwater levels,

quality of underground waters, or the concentration of contaminants in underground waters.
(Added by Stats. 1986, Ch. 1373, Sec. 1.)

§ 13712.5. *[Exemption]*

Notwithstanding Section 13712, all wells constructed for the purpose of monitoring the presence of groundwater which has adversely affected, or threatens to adversely affect, crop root zones are exempt from the reporting requirements of this chapter.
(Added by Stats. 1988, Ch. 622, Sec. 1.)

§ 13713. *["Geothermal heat exchange well"]*

"Geothermal heat exchange well," as used in this chapter, means any uncased artificial excavation, by any method, that uses the heat exchange capacity of the earth for heating and cooling, in which excavation the ambient ground temperature is 30 degrees Celsius (86 degrees Fahrenheit) or less, and which excavation uses a closed loop fluid system to prevent the discharge or escape of its fluid into surrounding aquifers or other geologic formations. Geothermal heat exchange wells include ground source heat pump wells.
(Added by Stats. 1996, Ch. 581, Sec. 3. Effective January 1, 1997.)

Article 3. Reports [13750.5. - 13755.]

(Article 3 added by Stats. 1969, Ch. 482.)

§ 13750.5. *[License]*

No person shall undertake to dig, bore, or drill a water well, cathodic protection well, groundwater monitoring well, or geothermal heat exchange well, to deepen or reperforate such a well, or to abandon or destroy such a well, unless the person responsible for that construction, alteration, destruction, or abandonment possesses a C-57 Water Well Contractor's License.
(Amended by Stats. 1996, Ch. 581, Sec. 5. Effective January 1, 1997.)

§ 13751. *[Report of completion]*

(a) Every person who digs, bores, or drills a water well, cathodic protection well, groundwater monitoring well, or geothermal heat exchange well, abandons or destroys such a well, or deepens or reperforates such a well, shall file with the department a report of completion of that well within 60 days from the date its construction, alteration, abandonment, or destruction is completed.

(b) The report shall be made on forms furnished by the department and shall contain information as follows:

(1) In the case of a water well, cathodic protection well, or groundwater monitoring well, the report shall contain information as required by the department, including, but not limited to all of the following information:

(A) A description of the well site sufficiently exact to permit location and identification of the well.

(B) A detailed log of the well.

(C) A description of type of construction.

(D) The details of perforation.

(E) The methods used for sealing off surface or contaminated waters.

(F) The methods used for preventing contaminated waters of one aquifer from mixing with the waters of another aquifer.

(G) The signature of the well driller.

(2) In the case of a geothermal heat exchange well, the report shall contain all of the following information:

(A) A description of the site that is sufficiently exact to permit the location and identification of the site and the number of geothermal heat exchange wells drilled on the same lot.

(B) A description of borehole diameter and depth and the type of geothermal heat exchange system installed.

(C) The methods and materials used to seal off surface or contaminated waters.

(D) The methods used for preventing contaminated water in one aquifer from mixing with the water in another aquifer.

(E) The signature of the well driller.

(Amended by Stats. 1996, Ch. 581, Sec. 6. Effective January 1, 1997.)

§ 13752. *[Availability of report]*

(a) Reports made in accordance with paragraph (1) of subdivision (b) of Section 13751 shall be made available as follows:

(1) To governmental agencies.

(2) To the public, upon request, in accordance with subdivision (b).

(b) (1) The department may charge a fee for the provision of a report pursuant to paragraph (2) of subdivision (a) that does not exceed the reasonable costs to the department of providing the report, including costs of promulgating any regulations to implement this section.

(2) Notwithstanding subdivision (g) of Section 1798.24 of the Civil Code, the disclosure of a report in accordance with paragraph (2) of subdivision (a) in the possession of the department or another governmental agency shall comply with the Information Practices Act of 1977 (Chapter 1 (commencing with Section 1798) of Title 1.8 of Part 4 of Division 3 of the Civil Code).

(Amended by Stats. 2015, Ch. 24, Sec. 42. Effective June 24, 2015.)

§ 13753. *[Conversion of oil or gas well]*

Every person who hereafter converts, for use as a water well, cathodic protection well, or monitoring well, any oil or gas well originally constructed under the jurisdiction of the Department of Conservation pursuant to Article 4 (commencing with Section 3200) of Chapter 1 of Division 3 of the Public Resources Code, shall comply with all provisions of this chapter.

(Amended by Stats. 1986, Ch. 1373, Sec. 5.)

§ 13754. *[Misdemeanor]*

Failure to comply with any provision of this article, or willful and deliberate falsification of any report required by this article, is a misdemeanor.

Before commencing prosecution against any person, other than for willful and deliberate falsification of any report required by this article, the person shall be given reasonable opportunity to comply with the provisions of this article.

(Repealed and added by Stats. 1969, Ch. 482.)

§ 13755. *[Compliance]*

This chapter does not affect the powers and duties of the State Department of Public Health with respect to water and water systems pursuant to Chapter 4 (commencing with Section 116270) of Part 12 of Division 104 of the Health and Safety Code. Every person shall comply with this chapter and any regulation adopted pursuant thereto, in addition to standards adopted by any city or county.

(Amended by Stats. 2010, Ch. 288, Sec. 52. Effective January 1, 2011.)

Article 4. Quality Control [13800. - 13806.]

(Article 4 added by Stats. 1969, Ch. 482.)

§ 13800. *[Required reports]*

The department, after the studies and investigations pursuant to Section 231 as it finds necessary, on determining that water well, cathodic protection well, and monitoring well construction, maintenance, abandonment, and destruction standards are needed in an area to protect the quality of water used or that may be used for any beneficial use, shall so report to the appropriate regional water quality control board and to the State Department of Public Health. The report shall contain the recommended standards for water well, cathodic protection well, and monitoring well construction, maintenance, abandonment, and destruction as, in the department's opinion, are necessary to protect the quality of any affected water.

(Amended by Stats. 2010, Ch. 288, Sec. 53. Effective January 1, 2011.)

§ 13800.5. *[Recommended standards]*

(a) (1) The department shall develop recommended standards for the construction, maintenance, abandonment, or destruction of geothermal heat exchange wells.

(2) Until the department develops recommended standards pursuant to paragraph (1), a local enforcement agency with authority over geothermal heat exchange wells may adopt temporary regulations applicable to geothermal heat exchange wells that the local enforcement agency determines to be consistent with the intent of existing department standards to prevent wells from becoming conduits of contamination.

(3) The department, not later than July 1, 1997, shall submit to the state board a report containing the recommended geothermal heat exchange well standards.

(b) The state board, not later than January 1, 1998, shall adopt a model geothermal heat exchange well ordinance that implements the recommended standards developed by the department pursuant to subdivision (a). The state board shall circulate the model ordinance to all cities and counties.

(c) Notwithstanding any other provision of law, each county, city, or water agency, where appropriate, not later than April 1, 1998, shall adopt a geothermal heat exchange well ordinance that meets or exceeds the recommended standards developed by the department pursuant to subdivision (a). If a water agency that has permit authority over well drilling adopts a geothermal heat exchange well ordinance that meets or exceeds the recommended standards developed by the department pursuant to subdivision (a), a county or city shall not be required to adopt an ordinance for the same area.

(d) If a county, city, or water agency, where appropriate, fails to adopt an ordinance that establishes geothermal heat exchange well standards, the model ordinance adopted by the state board pursuant to subdivision (b) shall take effect on May 1, 1998, and shall be enforced by the county or city and have the same force and effect as if adopted as a county or city ordinance.
(Added by Stats. 1996, Ch. 581, Sec. 8. Effective January 1, 1997.)

§ 13801. ***[Regional board hearing]***

(a) The regional board, upon receipt of a report from the department pursuant to Section 13800, shall hold a public hearing on the need to establish well standards for the area involved. The regional board may hold a public hearing with respect to any area regardless of whether a report has been received from the department if it has information that standards may be needed.

(b) Notwithstanding subdivision (a), the state board shall, not later than September 1, 1989, adopt a model water well, cathodic protection well, and monitoring well drilling and abandonment ordinance implementing the standards for water well construction, maintenance, and abandonment contained in Bulletin 74-81 of the department. If the model ordinance is not adopted by this date, the state board shall report to the Legislature as to the reasons for the delay. The state board shall circulate the model ordinances to all cities and counties.

(c) Notwithstanding any other law, each county, city, or water agency, where appropriate, shall, not later than January 15, 1990, adopt a water well, cathodic protection well, and monitoring well drilling and abandonment ordinance that meets or exceeds the standards contained in Bulletin 74-81.

Where a water agency that has permit authority over well drilling within the agency adopts a water well, cathodic protection well, and monitoring well drilling and abandonment ordinance that meets or exceeds the standards contained in Bulletin 74-81, a county or city shall not be required to adopt an ordinance for the same area.

(d) If a county, city, or water agency, where appropriate, fails to adopt an ordinance establishing water well, cathodic protection well, and monitoring well drilling and abandonment standards, the model ordinance adopted by the state board pursuant to subdivision (b) shall take effect on February 15, 1990, and shall be enforced by the county or city and have the same force and effect as if adopted as a county or city ordinance.

(e) The minimum standards recommended by the department and adopted by the state board or local agencies for the construction, maintenance, abandonment, or destruction of monitoring wells or class 1 hazardous injection wells shall not be construed to limit, abridge, or supersede the powers or duties of the State Department of Public Health in their application of standards to the construction, maintenance, abandonment, or destruction of monitoring wells or class 1 hazardous injection wells at facilities that treat, store, or dispose of hazardous waste or at any site where the State Department of Public Health is the lead agency responsible for investigation and remedial action at that site, as long as the standards used by the State Department of Public Health meet or exceed those in effect by any city, county, or water agency where appropriate, responsible for developing ordinances for the area in question.
(Amended by Stats. 2010, Ch. 288, Sec. 54. Effective January 1, 2011.)

§ 13802. *[Well standards]*

If the regional board finds that standards of water well, cathodic protection well, and monitoring well construction, maintenance, abandonment, and destruction are needed in any area to protect the quality of water used, or which may be used, for any beneficial use, it shall determine the area to be involved and so report to each affected county and city in the area. The report shall also contain any well standards which have been recommended by the department.
(Amended by Stats. 1986, Ch. 1373, Sec. 7.)

§ 13803. *[Local ordinances]*

Each such affected county and city shall, within 120 days of receipt of the report, adopt an ordinance establishing standards of water well, cathodic protection well, and monitoring well construction, maintenance, abandonment, and destruction for the area designated by the regional board. Prior to adoption of the ordinance each affected county and city shall consult with all interested parties, including licensed well drillers. A copy of the ordinance shall be sent to the regional board on its adoption and the regional board shall transmit the ordinance to the department for its review and comments.

(Amended by Stats. 1986, Ch. 1373, Sec. 8.)

§ 13804. ***[Effective dates of standards]***

Such county and city well standards shall take effect 60 days from the date of their adoption by the county or city unless the regional board, on its own motion, or on the request of any affected person, holds a public hearing on the matter and determines that the county or city well standards are not sufficiently restrictive to protect the quality of the affected waters. If the board makes such a determination it shall so report to the affected county or city and also recommend the well standards, or the modification of the county or city well standards, which it determines are necessary.

(Repealed and added by Stats. 1969, Ch. 482.)

§ 13805. ***[Regional standards by default]***

If a county or city fails to adopt an ordinance establishing water well, cathodic protection well, and monitoring well construction, maintenance, abandonment, and destruction standards within 120 days of receipt of the regional board's report of its determination and those standards are necessary pursuant to Section 13802, or fails to adopt or modify those well standards in the manner determined as necessary by the regional board pursuant to Section 13804 within 90 days of receipt of the regional board's report, the regional board shall adopt standards for water well, cathodic protection well, and monitoring well construction, maintenance, abandonment, and destruction for the area. The regional board well standards shall take effect 30 days from the date of their adoption by the regional board and shall be enforced by the city or county and have the same force and effect as if adopted as a county or city ordinance.

(Amended by Stats. 1986, Ch. 1373, Sec. 9.)

§ 13806. ***[State board review]***

Any action, report, or determination taken or adopted by a regional board or any failure of a regional board to act pursuant to this article, or any county or city ordinance in the event of the failure of a regional board to review such ordinance pursuant to Section 13804, may be reviewed by the state board on its own motion, and shall be reviewed by the state board on the request of any affected county or city, in the same manner as other action or inaction of the regional board is reviewed pursuant to Section 13320. The state board has the same powers as to the review of action or inaction of a regional board or of a county or city ordinance under this article as it has as to other action or inaction of a regional board under Section 13320, including being vested with all the powers granted a regional board under this article, with like force and effect if it finds that appropriate action has not been taken by a regional board. Any action of a regional board under this article or any county or city ordinance affected by

the review of the state board shall have no force or effect during the period of the review by the state board.
(Amended by Stats. 1969, Ch. 800.)

CHAPTER 10.2. CALIFORNIA SAFE DRINKING WATER BOND LAW OF 1984 [13810. - 13845.]

(Chapter 10.2 added by Stats. 1984, Ch. 378, Sec. 1.)

Chapter 10.2, which contains the California Safe Drinking Water Bond Law of 1984 as approved by the voters in Proposition 28, is omitted from this version of the Porter-Cologne Act.

CHAPTER 10.5. CALIFORNIA SAFE DRINKING WATER BOND LAW OF 1976 [13850. - 13875.]

(Chapter 10.5 added by Stats. 1975, Ch. 1008.)

Chapter 10.5, which contains the California Safe Drinking Water Bond Law of 1976 as approved by the voters in Proposition 3, is omitted from this version of the Porter-Cologne Act.

CHAPTER 10.6. CALIFORNIA SAFE DRINKING WATER GRANT PROGRAM [13880. - 13892.]

(Chapter 10.6 added by Stats. 1978, Ch. 322.)

Chapter 10.6, which contains the California Safe Drinking Water Grant Program, is omitted from this version of the Porter-Cologne Act.

CHAPTER 10.7. CALIFORNIA SAFE DRINKING WATER BOND LAW OF 1986 [13895. - 13898.5.]

(Chapter 10.7 added by Stats. 1986, Ch. 410, Sec. 1.)

Chapter 10.7, which contains the California Safe Drinking Water Bond Law of 1986 as approved by the voters in Proposition 55, is omitted from this version of the Porter-Cologne Act.

CHAPTER 11. DISCHARGES FROM HOUSEBOATS ON OR IN THE WATERS OF THE STATE [13900. - 13908.]

(Chapter 11 added by Stats. 1969, Ch. 482.)

§ 13900. *[Legislative findings]*

The Legislature finds and hereby declares that discharges from houseboats in or on the waters of the state constitute a significant source of waste as defined in Section 13050; that discharges of waste from houseboats in or on the waters of

the state may impair the beneficial uses of the waters of the state to the detriment of the health, safety, and welfare of the people of the state; and that the discharges of waste from houseboats are not adequately regulated. The Legislature therefore declares that the people of the state have a primary interest in the coordination and implementation of the regulation of discharges of waste from houseboats on or in the waters of the state.
(Added by Stats. 1969, Ch. 482.)

§ 13901. ***[Definitions]***
As used in this article, "houseboat" means a watercraft or industrial or commercial structure on or in the waters of the state, floating or nonfloating, which is designed or fitted out as a place of habitation and is not principally used for transportation. "Houseboat" includes platforms, and waterborne hotels and restaurants. "City or county" means any city, county, city and county, or port authority.
(Added by Stats. 1969, Ch. 482.)

§ 13902. ***[Regional Board investigations]***
Each regional board shall investigate its region to determine areas in which discharges of waste from houseboats are inadequately regulated by local ordinance.
(Added by Stats. 1969, Ch. 482.)

§ 13903. ***[Regional Board reports]***
Each regional board shall notify each affected city or county, the State Department of Public Health and the Department of Boating and Waterways of areas of inadequate regulation by ordinance of discharges of waste from houseboats and shall recommend provisions necessary to control the discharges of waste from houseboats into the waters.
(Amended by Stats. 2010, Ch. 288, Sec. 55. Effective January 1, 2011.)

§ 13904. ***[Adoption of ordinances]***
Each affected city or county shall within 120 days of receipt of the notice from the regional board, adopt an ordinance for control of discharges of waste from houseboats within the area for which notice was given by the board. A copy of the ordinance shall be sent to the regional board on its adoption and the regional board shall transmit the ordinance to the state board, the State Department of Public Health and the Department of Boating and Waterways.
(Amended by Stats. 2010, Ch. 288, Sec. 56. Effective January 1, 2011.)

§ 13905. ***[Effective date]***
Such city or county ordinance shall take effect 60 days from the date of adoption by the city or county, unless the regional board holds a public hearing on the matter and determines that the city or county ordinance is not sufficiently restrictive to protect the quality of the waters affected. If the board

makes such a determination, it shall so report to the affected city or county and also recommend the ordinance, or modification of the city or county ordinance, which it determines is necessary.
(Added by Stats. 1969, Ch. 482.)

§ 13906. *[Failure to adopt ordinance]*

If a city or county fails to adopt an ordinance controlling discharges of waste from houseboats within 120 days of receipt of the regional board's notice pursuant to Section 13903, or fails to adopt or modify such ordinance in the manner determined as necessary by the regional board pursuant to Section 13905, within 90 days of receipt of the regional board's notice, the regional board may adopt regulations necessary for the control of discharges of waste from houseboats for the area designated. Such regional board regulations shall take effect 30 days from the date of their adoption and shall be enforced by the city or county and have the same force and effect as if adopted as a city or county ordinance.
(Added by Stats. 1969, Ch. 482.)

§ 13907. *[State Board review]*

Any action, report, determination, or regulation taken or adopted by a regional board, or any failure of a regional board to act may be reviewed by the state board, and shall be reviewed by the state board on the request of any affected city or county. The state board has all powers as to the review of action or inaction of a regional board under this article as it has to other action or inaction of a regional board, including all powers granted to a regional board to initially determine areas in which discharges of waste from houseboats are inadequately regulated by local ordinance and to adopt regulations when a city or county fails to do so, if the state board finds that appropriate action has not been taken by a regional board. Any action of a regional board under this chapter or any city or county ordinance affected by the review of the state board shall have no force or effect during the period of the review by the state board.
(Amended by Stats. 1969, Ch. 800.)

§ 13908. *[Nonlimiting clause]*

No provision in this chapter and no action thereunder by a regional board or the state board is a limitation on the power of a city or county to adopt and enforce additional ordinances or regulations not in conflict therewith imposing further conditions, restrictions, or limitations with respect to the discharges of waste from houseboats.
(Added by Stats. 1969, Ch. 482.)

CHAPTER 12. SPECIAL WATER QUALITY PROVISIONS [13950. - 13952.5.]

(Chapter 12 added by Stats. 1969, Ch. 800.)

§ 13950. *[Lake Tahoe Basin cesspools]*

Notwithstanding any other provision of law, upon any district in the Lake Tahoe Basin providing in any area of the district a sewer system and treatment facilities sufficient to handle and treat any resultant waste and transportation facilities sufficient to transport any resultant effluent outside the Lake Tahoe Basin, the further maintenance or use of cesspools or other means of waste disposal in such area is a public nuisance and the district shall require all buildings from which waste is discharged to be connected with the sewer system within a period of not less than 90 days from the completion of such system and facilities.

(Added by Stats. 1969, Ch. 800.)

§ 13951. ***[Exceptions]***

Notwithstanding any other provision of law, on or after January 1, 1972, waste from within the Lake Tahoe watershed shall be placed only into a sewer system and treatment facilities sufficient to handle and treat any such waste and transportation facilities sufficient to transport any resultant effluent outside the Lake Tahoe watershed, except that such waste may be placed in a holding tank which is pumped and transported to such treatment and transportation facilities.

As used in this section "waste" shall not include solid waste refuse.

The further maintenance or use of cesspools, septic tanks, or other means of waste disposal in the Lake Tahoe watershed on or after January 1, 1972, by any person, except as permitted pursuant to this section, is a public nuisance. The occupancy of any building from which waste is discharged in violation of this section is a public nuisance, and an action may be brought to enjoin any person from occupying any such building.

This section shall not be applicable to a particular area of the Lake Tahoe watershed whenever the regional board for the Lahontan region finds that the continued operation of septic tanks, cesspools, or other means of waste disposal in such area will not, individually or collectively, directly or indirectly, affect the quality of the waters of Lake Tahoe and that the sewering of such area would have a damaging effect upon the environment.

This section shall not be applicable to any area or areas within the Fallen Leaf Lake watershed in the event the regional board for the Lahontan region finds that with the export of toilet wastes by single-family residences or with the export of toilet and kitchen wastes with respect to any commercial properties, the continued use of septic tanks, cesspools, or other means of waste disposal in such area or areas for the treatment and disposal of the remaining wastes, will not, individually or collectively, directly or indirectly, affect the quality of the waters of Lake Tahoe, and that the sewering of such area or areas would have a damaging effect upon the environment.

This section shall not affect the applicability of Section 13950.

(Amended by Stats. 1975, Ch. 637.)

§ 13952. ***[Pilot reclamation projects]***

Notwithstanding the provisions of Sections 13950 and 13951, water containing waste which has been placed in a sanitary sewer system for treatment and transportation outside of the Lake Tahoe Basin may be reclaimed in a pilot reclamation project to demonstrate the technological and environmental feasibility of using such water for beneficial purposes within the Lake Tahoe Basin in accordance with the provisions of the Water Reclamation Law (Chapter 7 (commencing with Section 13500) of this division) and the provisions of this section.

Prior to the initiation of any pilot reclamation project within the Lake Tahoe Basin, the reclaimer or reuser shall submit the project with technical data to the regional board for the Lahontan region for approval. Only those projects submitted before January 1, 1984, shall be considered. The technical data submitted shall demonstrate that such pilot reclamation project will not, individually or collectively, directly or indirectly, adversely affect the quality of the waters of Lake Tahoe. The intended operational life of the project shall be at least 10 years.

No pilot reclamation project shall be initiated unless and until such regional board approves the project, and finds that such pilot reclamation project or projects will not, individually or collectively, directly or indirectly, adversely affect the quality of the waters of Lake Tahoe. The regional board for the Lahontan region shall place conditions on any approved project to include specification of maximum project size. The regional board for the Lahontan region may suspend or terminate an approved project for cause at any time.
(Added by Stats. 1978, Ch. 682.)

§ 13952.1. ***[South Tahoe Public Utility District; Luther Pass]***

(a) Notwithstanding Section 13951, the South Tahoe Public Utility District may provide recycled water only to prevent the destruction of its Luther Pass recycled water pump station from a catastrophic fire if all of the following conditions are met:

(1) The district submits an engineering report to the Lahontan Regional Board and the State Department of Public Health, as required by that regional board and that department.

(2) The Lahontan Regional Board, the State Department of Public Health, and the Tahoe Regional Planning Agency authorize the use of recycled water, and the specified area or areas in the immediate vicinity of the pump station where that recycled water may be used, only to prevent the destruction of the district's Luther Pass recycled water pump station from a catastrophic fire.

(3) The fire incident commander authorizes the use of the recycled water to prevent the destruction of the district's Luther Pass recycled water pump station from a catastrophic fire, as authorized pursuant to this section.

(b) For purposes of this section, "catastrophic fire" means a condition exists that will result in severe harm to life, property, and the environment if the use of recycled water as authorized pursuant to this section is not used, and all other methods to extinguish the fire have been exhausted.

(Amended by Stats. 2010, Ch. 288, Sec. 57. Effective January 1, 2011.)

§ 13952.5. *[Waste discharge requirements]*

The declared statewide interest in the preservation of Lake Tahoe, and the state and federal actions mandating the transportation of treated sewage effluent out of the Lake Tahoe watershed, requires that the law relating to the authority for prescribing waste discharge requirements for the effluent, and requirements pertaining to the storage of the effluent, the receiving waters, and the disposal areas, be clarified, and that law is hereby clarified and confirmed, to provide that, notwithstanding Section 13002 or any other provision of law, the regional board for the Lahontan region has exclusive authority to prescribe, under existing law, waste discharge requirements for treated sewage effluent transported out of the Lake Tahoe watershed to Alpine County within the Lahontan region, including requirements pertaining to the storage of the effluent, the receiving waters, and the disposal areas in Alpine County within the Lahontan region. However, any such action by that regional board is subject to review as provided in Sections 13320 and 13330.

(Added by Stats. 1985, Ch. 447, Sec. 1.)

CHAPTER 12.2. SAN JOAQUIN VALLEY AGRICULTURAL DRAIN [13953. - 13953.4.]

(Chapter 12.2 added by Stats. 1982, Ch. 33, Sec. 1.)

§ 13953. *[State and federal discharge requirements]*

There shall be no discharge from a San Joaquin Valley agricultural drain to the Delta, Suisun Bay, or Carquinez Straits until the requirements of this division and the Federal Clean Water Act (33 U.S.C. Sec. 1251 et seq.) are satisfied.

(Added by Stats. 1982, Ch. 33, Sec. 1.)

§ 13953.1. *[Prohibited discharges]*

There shall be no discharge from a San Joaquin Valley drain into Monterey Bay or tributaries draining into Monterey Bay.

(Added by Stats. 1982, Ch. 33, Sec. 1.)

§ 13953.2. *[Delta discharge requirements]*

If a San Joaquin Valley agricultural drain, including the drainage facility authorized as part of the San Luis Unit of the federal Central Valley Project, is constructed and discharges to the Delta, Suisun Bay, or Carquinez Straits, the

state board shall permit the discharge pursuant to this division only if the state board finds that the following additional requirements are satisfied:

(a) The discharge of the drain, which is to carry only subsurface agricultural drainage effluent, shall be located and shall discharge at rates of flow to protect the beneficial uses of the Delta, Suisun Marsh, and the bays westerly to the Golden Gate. If it is determined to be in the public interest to provide a substitute water supply to water users in lieu of modifying the operation or changing the discharge point of the drain, no added financial burden shall be placed on the water users solely by virtue of that substitution.

(b) The drainage facility shall include built-in operational flexibility, control, and treatment to protect the beneficial uses of the Delta, Suisun Marsh, and the bays westerly to the Golden Gate.

(c) There is established an acceptable comprehensive monitoring program prior to and during the operation of the drain to determine the impact of the discharge effluent, if any, on the Delta, Suisun Marsh, and the bays westerly to the Golden Gate.

(d) A program has been developed, funded, and initiated to evaluate the feasibility of using drain water to establish wetland habitat capable of producing wintering waterfowl food supplies.

(e) The repayment schedule for the drain takes into account the following:

(1) The quantity of effluent discharged into the drain by the discharger.

(2) The concentration of salts in the effluent of the discharger.

(3) The distance the effluent of the discharger is carried in the drain.

(4) The quantity of water applied in the areas contributing to the drainage problem.

(f) There is an enforceable provision in the permit that any surface or subsurface effluent leakage shall be confined within the drainage facility right-of-way, and that in the event that this condition is violated the drainage facility shall not be operated until the leakage is stopped.

(g) The alignment of the drainage facility, to the extent feasible, shall be designed to minimize severance and access problems to land, roadways, and other facilities along the right-of-way.

(Added by Stats. 1982, Ch. 33, Sec. 1.)

§ 13953.3. *[Beneficial use of subsurface drainage]*

Subsurface drainage effluent may be made available for any beneficial uses for which it is suitable, including, but not limited to, industrial uses, powerplant cooling, energy development, enhancement of fish and wildlife resources, and irrigation. These programs may reduce the demands for new fresh water supplies.

(Added by Stats. 1982, Ch. 33, Sec. 1.)

§ 13953.4. *[Legislative intent]*

It is the intent of the Legislature that, to the extent feasible, features for the enhancement of fish and wildlife resources shall be incorporated into the drain. The state's participation in the drain shall be subject to the Davis-Dolwig Act (Chapter 10 (commencing with Section 11900) of Part 3 of Division 10).
(Added by Stats. 1982, Ch. 33, Sec. 1.)

CHAPTER 12.5. CLEAN WATER AND WATER CONSERVATION BOND LAW OF 1978 [13955. - 13969.]

(Chapter 12.5 added by Stats. 1977, Ch. 1160.)

Chapter 10.5, which contains the Clean Water and Water Conservation Bond Law of 1978 as approved by the voters in Proposition 2, is omitted from this version of the Porter-Cologne Act.

CHAPTER 15. CLEAN WATER BOND LAW OF 1984 [13999. - 13999.19.]

(Chapter 15 added by Stats. 1984, Ch. 377, Sec. 1.)

Chapter 10.5, which contains the Clean Water Bond Law of 1978 as approved by the voters in Proposition 25, is omitted from this version of the Porter-Cologne Act.

CHAPTER 16. CALIFORNIA SAFE DRINKING WATER BOND LAW OF 1988 [14000. - 14040.]

(Chapter 16 added by Stats. 1988, Ch. 45, Sec. 1.)

Chapter 16, which contains the California Safe Drinking Water Bond Law of 1988 as approved by the voters in Proposition 81, is omitted from this version of the Porter-Cologne Act.

CHAPTER 17. CLEAN WATER AND WATER RECLAMATION BOND LAW OF 1988 [14050. - 14076.]

(Chapter 17 added by Stats. 1988, Ch. 47, Sec. 2.)

Chapter 17, which contains the Clean Water and Water Reclamation Bond Law of 1988 as approved by the voters in Proposition 83, is omitted from this version of the Porter-Cologne Act.

CHAPTER 23. THE SAN JOAQUIN VALLEY DRAINAGE RELIEF ACT [14900. - 14920.]

(Chapter 23 added by Stats. 1992, Ch. 959, Sec. 1.)

Article 1. General Provisions [14900. - 14902.]

(Article 1 added by Stats. 1992, Ch. 959, Sec. 1.)

§ 14900. ***[Short title]***

This chapter shall be known and may be cited as the San Joaquin Valley Drainage Relief Act.

(Added by Stats. 1992, Ch. 959, Sec. 1. Effective January 1, 1993. Section operative July 1, 1993, pursuant to Section 14920.)

§ 14901. ***[Legislative findings]***

The Legislature finds and declares as follows:

(a) A report on the San Joaquin Valley Drainage Program entitled, "A Management Plan for Agricultural Subsurface Drainage and Related Problems on the Westside San Joaquin Valley," has identified 75,000 acres of irrigated agricultural lands that should be retired by the year 2040 primarily due to characteristics of low productivity, poor drainability, and high levels of selenium in shallow groundwater.

(b) Federal, state, and local water organizations and officials should consider the management plan and adopt those parts appropriate for their long-term strategy of contributing to the management or solution of the drainage problems of the west side of the San Joaquin Valley.

(c) The United States Department of the Interior and the State of California should jointly develop a technical assistance program to ameliorate the drainage problems.

(d) The people of the state are concerned with the continued leaching of harmful elements from these lands.

(e) Continued irrigation of these lands could create significant drainage and environmental problems.

(f) Implementing solutions to the drainage and environmental problems associated with these lands will be very costly.

(g) The department is responsible for water planning and development activities throughout the state, has participated in the development of the plan for the management of subsurface drainage problems, and shall take an active leadership role in implementing the plan, including the land retirement element of the plan.

(h) Local agencies have decisionmaking authority, and are subject to court judgments, and statutory and contractual obligations, relating to water use and distribution. The department shall coordinate its activities under this chapter with those local agencies.

(i) The federal government has ongoing statutory and contractual obligations to provide drainage service to the lands within the San Luis Unit of the Central Valley Project. The department shall recognize those obligations and shall coordinate land retirement activities with appropriate federal agencies.

(j) The Department of Fish and Game is responsible for the stewardship of the state's fish and wildlife resources and the habitat on which they depend,

and can offer its considerable expertise to the department on matters relating to the management of lands in accordance with this chapter and shall be consulted concerning the management of the lands acquired pursuant to this chapter and managed as fish and wildlife habitat.

(k) The Department of Conservation is responsible for administering programs to conserve the state's agricultural lands and has information on the state's soil and farmlands and shall be consulted for the purpose of identifying agricultural lands that may be acquired pursuant to this chapter.

(Added by Stats. 1992, Ch. 959, Sec. 1. Effective January 1, 1993. Section operative July 1, 1993, pursuant to Section 14920.)

§ 14901.5. *[Legislative intent]*

(a) It is the intent of the Legislature that the initial funding for the administrative costs of the San Joaquin Valley Drainage Relief Program be appropriated by the Legislature for the 1993–94 fiscal year from the water quality program component of the Environmental Water Fund.

(b) It is the further intent of the Legislature that, upon full implementation of the program, the program shall become self-supporting.

(Added by Stats. 1992, Ch. 959, Sec. 1. Effective January 1, 1993. Section operative July 1, 1993, pursuant to Section 14920.)

§ 14902. *[Definitions]*

Unless the context otherwise requires, the terms used in this chapter have the following meanings:

(a) "Fund" means the San Joaquin Valley Drainage Relief Fund.

(b) "Management plan" or "plan" means the management plan for agricultural subsurface drainage and related problems as described in the final report of the San Joaquin Valley Drainage Program, dated September 1990, described in subdivision (a) of Section 14901.

(c) "Program" means the San Joaquin Valley Drainage Relief Program.

(d) "Retirement land" means the lands recommended for retirement in the management plan, other irrigated agricultural lands characterized by low productivity, poor drainability, and high levels of dissolved selenium in shallow groundwater, or lands that contribute to agricultural subsurface drainage problems.

(Added by Stats. 1992, Ch. 959, Sec. 1. Effective January 1, 1993. Section operative July 1, 1993, pursuant to Section 14920.)

Article 2. The San Joaquin Valley Drainage Relief Program [14903. - 14920.]

(Article 2 added by Stats. 1992, Ch. 959, Sec. 1.)

§ 14903. *[Establishment, regulations, purpose]*

(a) The San Joaquin Valley Drainage Relief Program is hereby established in the department.

(b) The department shall carry out the program and may develop, in consultation with the state board, the Department of Conservation, and the Department of Fish and Game, a land retirement demonstration program.

(c) The department may adopt regulations to carry out the program.

(d) The purpose of the program is to encourage the cessation of irrigation of retirement land and to otherwise assist in the resolution of the agricultural subsurface drainage problems in the San Joaquin Valley through the coordinated efforts of federal, state, and local agencies, nonprofit organizations, and private landowners who elect to participate in the program.

(Added by Stats. 1992, Ch. 959, Sec. 1. Effective January 1, 1993. Section operative July 1, 1993, pursuant to Section 14920.)

§ 14904. *[Funding]*

The San Joaquin Valley Drainage Relief Fund is hereby created for purposes of the program.

(Added by Stats. 1992, Ch. 959, Sec. 1. Effective January 1, 1993. Section operative July 1, 1993, pursuant to Section 14920.)

§ 14905. *[Interagency cooperation]*

The department may enter into agreements with the state board, the Department of Fish and Game, the Department of Conservation, possessors of water rights, and other appropriate public agencies and nonprofit organizations to provide for the purchase and management of retirement land and water pursuant to this chapter.

(Added by Stats. 1992, Ch. 959, Sec. 1. Effective January 1, 1993. Section operative July 1, 1993, pursuant to Section 14920.)

§ 14906. *[Land management]*

Property acquired pursuant to this chapter shall be managed as upland habitat, wetlands, riparian habitat, or nonirrigated agricultural land, as appropriate. The department shall coordinate with the Department of Fish and Game to ensure that adequate funding is available for management of the retirement land and use of water for environmental purposes.

(Added by Stats. 1992, Ch. 959, Sec. 1. Effective January 1, 1993. Section operative July 1, 1993, pursuant to Section 14920.)

§ 14907. *[Water sale or distribution]*

(a) Agreements to sell water that is conserved as a result of the retirement of land pursuant to this chapter to public agencies, nonprofit organizations, investor-owned water utilities, corporations, or persons shall carry out the intent of the Legislature set forth in subdivision (b) of Section 14901.5.

(b) (1) Agreements to distribute water that is conserved as a result of the retirement of land pursuant to this chapter shall maximize amounts for environmental purposes, including the restoration and enhancement of riparian habitat, wetlands, fisheries, and instream flows.

(2) It is the intent of the Legislature that water distributed pursuant to paragraph (1) be deemed contributions to a water resources mitigation bank, if established by the state, to meet state or federal requirements to dedicate water for environmental purposes.

(c) Up to one-third of the amount of water conserved as a result of the retirement of land pursuant to this chapter and not sold pursuant to subdivision (a) may be used by local public agencies for environmental purposes, including the restoration and enhancement of riparian habitat, wetlands, fisheries, instream flows, or replenishment of groundwater resources.

(Added by Stats. 1992, Ch. 959, Sec. 1. Effective January 1, 1993. Section operative July 1, 1993, pursuant to Section 14920.)

§ 14907.5. *[Water rights]*

Notwithstanding any other provision of this chapter, the possessor of the water right determines the final disposition of the water.

(Added by Stats. 1992, Ch. 959, Sec. 1. Effective January 1, 1993. Section operative July 1, 1993, pursuant to Section 14920.)

§ 14907.6. *[Participation]*

Participation in the program by local public agencies and landowners is voluntary and shall be undertaken in accordance with applicable statutory and regulatory requirements, court judgments, and contractual obligations.

(Added by Stats. 1992, Ch. 959, Sec. 1. Effective January 1, 1993. Section operative July 1, 1993, pursuant to Section 14920.)

§ 14908. *[Fund management]*

The funds received from the sale of water pursuant to subdivision (a) of Section 14907 shall be deposited in the fund. Notwithstanding Section 13340 of the Government Code, money in the fund is continuously appropriated, without regard to fiscal years, to pay for the purchase of the title to, or interests in, the retirement land from landowners who elect to participate in the program, for the management of that land, applicable charges and assessments for water and land, administrative costs, grants and loans made pursuant to Section 14913, and for related water transfer costs.

(Added by Stats. 1992, Ch. 959, Sec. 1. Effective January 1, 1993. Section operative July 1, 1993, pursuant to Section 14920.)

§ 14909. *[Other financial support]*

The department may apply for, and accept, federal and state grants and receive gifts, donations, and other financial support from public and private sources to be deposited in the fund to carry out this chapter.

(Added by Stats. 1992, Ch. 959, Sec. 1. Effective January 1, 1993. Section operative July 1, 1993, pursuant to Section 14920.)

§ 14910. ***[Acquiring other interests]***

The department may acquire or accept the gift or dedication of fee title, easements, including conservation easements, leases, development rights, or other interests in retirement lands to carry out this chapter.

(Added by Stats. 1992, Ch. 959, Sec. 1. Effective January 1, 1993. Section operative July 1, 1993, pursuant to Section 14920.)

§ 14911. ***[Payments]***

The department may accept advance payments for future water deliveries undertaken pursuant to this chapter.

(Added by Stats. 1992, Ch. 959, Sec. 1. Effective January 1, 1993. Section operative July 1, 1993, pursuant to Section 14920.)

§ 14912. ***[Departmental authority]***

(a) The department may purchase, lease, rent, sell, exchange, or otherwise transfer any land, interest in land or water, or option acquired pursuant to this chapter.

(b) The proceeds from any lease, rental, sale, exchange, or transfer of land or water, or any interest therein, or option, shall be deposited in the fund.

(c) The department, in consultation with appropriate federal, state, and local agencies, shall determine the minimum acreage of contiguous land in which interests are needed to be acquired to carry out the purposes of this chapter with regard to drainage reduction. The determination required by this subdivision is exempt from Chapter 3.5 (commencing with Section 11340) of Part 1 of Division 3 of Title 2 of the Government Code.

(d) No interest in land is eligible for purchase unless the department determines that the purchase of the interest, by itself or together with other interest in land, is consistent with the minimum acreage determination made pursuant to subdivision (c).

(e) The rate of acquisition of title to, and interests in, retirement lands is within the discretion of the department, based on the availability of funds and other appropriate factors.

(Added by Stats. 1992, Ch. 959, Sec. 1. Effective January 1, 1993. Section operative July 1, 1993, pursuant to Section 14920.)

§ 14913. ***[Grants and loans]***

The department may, by contract or agreement, make grants or loans to local public entities, state agencies, or nonprofit organizations to carry out this chapter.
(Added by Stats. 1992, Ch. 959, Sec. 1. Effective January 1, 1993. Section operative July 1, 1993, pursuant to Section 14920.)

§ 14914. ***[Price reflective of benefit]***
The purchase price of any interest in land or water acquired pursuant to this chapter may reflect the benefit to the state of alleviating drainage problems in the San Joaquin Valley and the conversion of property to wildlife habitats.
(Added by Stats. 1992, Ch. 959, Sec. 1. Effective January 1, 1993. Section operative July 1, 1993, pursuant to Section 14920.)

§ 14915. ***[Price of water sold]***
The price of water conserved and sold pursuant to this chapter shall be determined by the department so as to carry out the intent of the Legislature set forth in subdivision (b) of Section 14901.5.
(Added by Stats. 1992, Ch. 959, Sec. 1. Effective January 1, 1993. Section operative July 1, 1993, pursuant to Section 14920.)

§ 14916. ***[Return to irrigated use]***
Purchase agreements entered into pursuant to this chapter may provide for the return of the property, that is the subject of the purchase, to irrigated agricultural use if affordable technological solutions to the drainage and environmental problems are identified and implemented.
(Added by Stats. 1992, Ch. 959, Sec. 1. Effective January 1, 1993. Section operative July 1, 1993, pursuant to Section 14920.)

§ 14917. ***[Economic considerations]***
In carrying out this chapter, the department shall consider the effects of purchases of property pursuant to this chapter on the overall economy of the local communities, including the impact on job opportunities and businesses.
(Added by Stats. 1992, Ch. 959, Sec. 1. Effective January 1, 1993. Section operative July 1, 1993, pursuant to Section 14920.)

§ 14918. ***[Coordination with C.V.P.]***
The department shall coordinate with the United States Department of the Interior regarding water distribution undertaken pursuant to this chapter in those areas served by the federal Central Valley Project.
(Added by Stats. 1992, Ch. 959, Sec. 1. Effective January 1, 1993. Section operative July 1, 1993, pursuant to Section 14920.)

§ 14920. ***[Operative date]***
This chapter shall become operative on July 1, 1993.

(Added by Stats. 1992, Ch. 959, Sec. 1. Effective January 1, 1993. Note: This section prescribes a delayed operative date (July 1, 1993) for Chapter 23, commencing with Section 14900.)

CHAPTER 24. SHELLFISH PROTECTION ACT OF 1993 [14950. - 14958.]

(Chapter 24 added by Stats. 1993, Ch. 1081, Sec. 1.)

§ 14950. *[Short title]*

This chapter shall be known and may be cited as the Shellfish Protection Act of 1993.

(Added by Stats. 1993, Ch. 1081, Sec. 1. Effective January 1, 1994.)

§ 14951. *[Legislative findings]*

The Legislature finds and declares all of the following:

(a) Commercial shellfish harvesting is a beneficial use of the waters of the state and, in addition, benefits the economy of the state through the creation of jobs.

(b) Pollution, from both point and nonpoint sources, currently threatens many of the state's commercial shellfish growing areas.

(c) In order to maintain the health, and encourage the expansion, of commercial shellfish harvesting within the state, it is necessary to protect the commercial shellfish growing areas from ongoing point and nonpoint sources of pollution.

(d) The regional boards whose jurisdictions include commercial shellfish growing areas shall have primary responsibility for the protection of commercial shellfish harvesting from the effects of point and nonpoint pollution sources.

(Added by Stats. 1993, Ch. 1081, Sec. 1. Effective January 1, 1994.)

§ 14952. *[Commercial shellfish growing area]*

For the purposes of this chapter, a commercial shellfish growing area is an area certified pursuant to Section 112170 of the Health and Safety Code in which shellfish are grown and harvested.

(Amended by Stats. 1996, Ch. 1023, Sec. 452. Effective September 29, 1996.)

§ 14953. *[Technical advisory committee]*

(a) If a commercial shellfish growing area is threatened by point or nonpoint source pollution, as specified in Section 14954, the regional board shall form a technical advisory committee, within 90 days of the effective date of this act, devoted solely to the threatened area. A technical advisory committee shall be formed for any subsequently threatened area within 90 days of the date the threat is identified pursuant to Section 14954. The technical advisory committee shall advise and assist that board in developing a strategy for appropriate investigation and remediation pursuant to Sections 14955 and 14956 to reduce pollution affecting that area. The regional board shall give

public notice of the formation of the technical advisory committee. All meetings of the technical advisory committee shall be public.

(b) For the purpose of subdivision (a), the technical advisory committee shall include both of the following:

(1) One commercial shellfish grower from the threatened area, one representative from the State Department of Health Services, one representative from the Department of Fish and Game, one representative from the California Coastal Commission, one representative from each category of potential pollution source, one representative from a local environmental group, and one representative from the local health department.

(2) Additional members and a chairperson appointed by the regional board.

(c) Members of the technical advisory committee established pursuant to subdivision (a) shall not receive a per diem or other compensation, and shall not be reimbursed for any expenses.

(Added by Stats. 1993, Ch. 1081, Sec. 1. Effective January 1, 1994.)

§ 14954. *["Threatened" conditions]*

For the purpose of Section 14953, a commercial shellfish growing area is threatened if any of the following applies:

(a) The State Department of Health Services downgrades the classification applicable to the commercial shellfish growing area.

(b) The commercial shellfish growing area is subjected to harvest closure for more than 30 days per calendar year during the previous three years.

(c) The State Department of Health Services classifies the commercial shellfish growing area as restricted.

(d) The regional board, the Department of Fish and Game, or the California Coastal Commission determines that the commercial shellfish growing area is threatened.

(Added by Stats. 1993, Ch. 1081, Sec. 1. Effective January 1, 1994.)

§ 14955. *[Additional efforts]*

(a) The technical advisory committee shall review existing data to determine whether additional investigatory efforts are needed to identify the pollution sources that threaten the commercial shellfish growing area, the scope of the pollution sources, and the degree to which those sources threaten the commercial shellfish growing area.

(b) If the technical advisory committee determines pursuant to subdivision (a) that additional investigatory efforts are needed, the regional board shall develop, with the assistance of the technical advisory committee, a water quality investigation project for funding under Sections 205 and 319 of the federal Clean Water Act (33 U.S.C. Sec. 1251 et seq.; Secs. 1285 and 1329) or any other appropriate funding sources.

(c) Any water quality investigation project developed pursuant to subdivision (b) shall be limited to accomplishing that which is reasonably necessary for the regional board to gather sufficient data to determine the appropriate remedial actions.

(d) The regional board shall not undertake any investigatory efforts determined to be necessary pursuant to subdivision (a) unless the regional board determines that funding is available to carry out those efforts.

(Added by Stats. 1993, Ch. 1081, Sec. 1. Effective January 1, 1994.)

§ 14956. ***[Remedial action]***

(a) Once the nature, sources, scope, and degree of the pollution affecting a commercial shellfish growing area have been determined, the regional board, with the advice of the local technical advisory committee, shall order appropriate remedial action, including the adoption of best management practices, to abate the pollution affecting that area. The regional board shall monitor water quality in the threatened area during the implementation of pollution abatement measures to ensure that the measures are effective and shall provide the results of the monitoring to the technical advisory committee. The regional board shall give public notice of any actions proposed for adoption.

(b) If agricultural sources of pollution have been identified as contributing to the degradation of shellfish growing areas, the regional board shall invite members of the local agricultural community representing the type of agricultural discharge affecting the local shellfish growing area, the local resource conservation district, the local soil conservation service, the local agricultural stabilization and conservation service, the cooperative extension of the University of California, and affected shellfish growers to develop and implement appropriate short- and long-term remediation strategies that will lead to a reduction in the pollution affecting the commercial shellfish growing area.

(Added by Stats. 1993, Ch. 1081, Sec. 1. Effective January 1, 1994.)

§ 14957. ***[Rating proposals]***

When rating project proposals affecting shellfish growing areas for state and federal funding under Sections 205 and 319 of the federal Clean Water Act (33 U.S.C. Sec. 1251 et seq.; Secs. 1285 and 1329) or from other funding sources, the state board and regional boards shall give timely notice to the California Aquaculture Association and shall provide shellfish growers with the opportunity to comment on the following types of project proposals:

(a) Project proposals that seek to identify the nature, sources, scope, and degree of pollution threatening a commercial shellfish growing area.

(b) Project proposals that seek to reduce or eliminate the impact of point or nonpoint pollution that affects a commercial shellfish growing area. Proposals under this subdivision shall include waste reclamation projects.

(Added by Stats. 1993, Ch. 1081, Sec. 1. Effective January 1, 1994.)

§ 14958. *[Dissolving advisory committee]*

When a commercial shellfish area is no longer threatened, as specified in Section 14954, the regional board shall dissolve the technical advisory committee for that area. If the area is subsequently threatened, as specified in Section 14954, the regional board shall re-form the committee pursuant to Section 14953.

(Added by Stats. 1993, Ch. 1081, Sec. 1. Effective January 1, 1994.)

CHAPTER 27. CALIFORNIA WATERSHED IMPROVEMENT ACT OF 2009 [16100. - 16104.]

(Chapter 27 added by Stats. 2009, Ch. 577, Sec. 1.)

§ 16100. *[Title]*

This chapter shall be known and may be cited as the California Watershed Improvement Act of 2009.

(Added by Stats. 2009, Ch. 577, Sec. 1. Effective January 1, 2010.)

§ 16101. *[Watershed improvement plan development and requirements]*

(a) Each county, city, or special district that is a permittee or copermittee under a national pollutant discharge elimination system (NPDES) permit for municipal separate storm sewer systems may develop, either individually or jointly with one or more permittees or copermittees, a watershed improvement plan that addresses major sources of pollutants in receiving water, stormwater, urban runoff, or other surface runoff pollution within the watershed or subwatershed to which the plan applies. The principal purpose of a watershed improvement plan is to implement existing and future water quality requirements and regulations by, among other things, where appropriate, identifying opportunities for stormwater detention, infiltration, use of natural treatment systems, water recycling, reuse, and supply augmentation; and providing programs and measures designed to promote, maintain, or achieve compliance with water quality laws and regulations, including water quality standards and other requirements of statewide plans, regional water quality control plans, total maximum daily loads, and NPDES permits.

(b) The process of developing a watershed improvement plan shall be open and transparent, and shall be conducted consistent with all applicable open meeting laws. A county, city, special district, or combination thereof, shall solicit input from entities representing resource agencies, water agencies, sanitation districts, the environmental community, landowners, home builders, agricultural interests, and business and industry representatives.

(c) Each county, city, special district, or combination thereof shall notify the appropriate regional board of its intention to develop a watershed improvement plan. The regional board may, in its discretion, participate in the

preparation of the plan. A watershed improvement plan shall be consistent with the regional board's water quality control plan.

(d) A watershed improvement plan shall include all of the following elements relevant to the waters within the watershed or subwatershed to which the plan applies:

(1) A description of the watershed or subwatershed improvement plan area, the rivers, streams, or manmade drainage channels within the plan area, the agencies with regulatory jurisdiction over matters to be addressed in the plan, the relevant receiving waters within or downstream from the plan area, and the county, city, special district, or combination thereof, participating in the plan.

(2) A description of the proposed facilities and actions that will improve the protection and enhancement of water quality and the designated beneficial uses of waters of the state, consistent with water quality laws and regulations.

(3) Recommendations for appropriate action by any entity, public or private, to facilitate achievement of, or consistency with, water quality objectives, standards, total maximum daily loads, or other water quality laws, regulations, standards, or requirements, a time schedule for the actions to be taken, and a description of appropriate measurement and monitoring to be undertaken to determine improvement in water quality.

(4) A coordinated economic analysis and financing plan that identifies the costs, effectiveness, and benefits of water quality improvements specified in the watershed improvement plan, and, where feasible, incorporates user-based and cost recovery approaches to financing, which place the cost of managing and treating surface runoff pollution on the generators of the pollutants.

(5) To the extent applicable, a description of regional best management practices, watershed-based natural treatment systems, low-flow diversion systems, stormwater capture, urban runoff capture, other measures constituting structural treatment best management practices, pollution prevention measures, low-impact development strategies, and site design, source control, and treatment control best management practices to promote improved water quality.

(6) A description of the proposed structure, operations, powers, and duties of the implementing entity for the watershed improvement plan.

(Added by Stats. 2009, Ch. 577, Sec. 1. Effective January 1, 2010.)

§ 16102. ***[Watershed improvement plan review by regional boards]***

(a) A regional board shall review, in accordance with the reimbursement requirement described in subdivision (c), a watershed improvement plan developed pursuant to Section 16101 and may approve the plan, including any appropriate conditions to the approval, if the regional board finds that the proposed watershed improvement plan will facilitate compliance with water

quality requirements. A regional board's review and approval of the watershed improvement plan shall be limited to components described in paragraphs (1), (2), (3), and (5) of subdivision (d) of Section 16101.

(b) A regional board may not approve a proposed watershed improvement plan that includes a geographical area included in an existing approved watershed improvement plan unless the regional board determines that it is infeasible to amend either the proposed watershed improvement plan or the approved watershed improvement plan to achieve the purposes of this chapter.

(c) The entity or entities that develop a watershed improvement plan that is submitted to the regional board for approval shall reimburse the regional board for its costs, including the costs to review and oversee the implementation of the plan, if nonstate funds are not available to cover the costs of the review and oversight. For the purpose of this paragraph, the state board shall adopt a fee schedule by emergency regulation in the manner prescribed in paragraph (2) of subdivision (f) of Section 13260. Fees collected pursuant to this section shall be deposited in the Waste Discharge Permit Fund established by Section 13260.

(d) A regional board may, if it deems appropriate, utilize provisions of approved watershed improvement plans to promote compliance with one or more of the regional board's regulatory plans or programs.

(e) Unless a regional board incorporates the provisions of a watershed improvement plan into waste discharge requirements issued to a permittee, the implementation of a watershed improvement plan by a permittee shall not be deemed to be compliance with those waste discharge requirements.

(Added by Stats. 2009, Ch. 577, Sec. 1. Effective January 1, 2010.)

§ 16103. *[Fees for watershed improvement plan]*

(a) In addition to making use of other financing mechanisms that are available to local agencies to fund watershed improvement plans and plan measures and facilities, a county, city, special district, or combination thereof may impose fees on activities that generate or contribute to runoff, stormwater, or surface runoff pollution, to pay the costs of the preparation of a watershed improvement plan, and the implementation of a watershed improvement plan if all of the following requirements are met:

(1) The regional board has approved the watershed improvement plan.

(2) The entity or entities that develop the watershed improvement plan make a finding, supported by substantial evidence, that the fee is reasonably related to the cost of mitigating the actual or anticipated past, present, or future adverse effects of the activities of the feepayer. "Activities," for the purposes of this paragraph, means the operations and existing structures and improvements subject to regulation under an NPDES permit for municipal separate storm sewer systems.

(3) The fee is not imposed solely as an incident of property ownership.

(b) A county, city, special district, or combination thereof may plan, design, implement, construct, operate, and maintain controls and facilities to improve water quality, including controls and facilities related to the infiltration, retention and reuse, diversion, interception, filtration, or collection of surface runoff, including urban runoff, stormwater, and other forms of runoff, the treatment of pollutants in runoff or other waters subject to water quality regulatory requirements, the return of diverted and treated waters to receiving water bodies, the enhancement of beneficial uses of waters of the state, or the beneficial use or reuse of diverted waters.

(c) The fees authorized under subdivision (a) may be imposed as user-based or regulatory fees consistent with this chapter.

(Added by Stats. 2009, Ch. 577, Sec. 1. Effective January 1, 2010.)

§ 16104. ***[No effect on water diversion requirements]***

Nothing in this chapter alters requirements that govern the diversion of water.

(Added by Stats. 2009, Ch. 577, Sec. 1. Effective January 1, 2010.)

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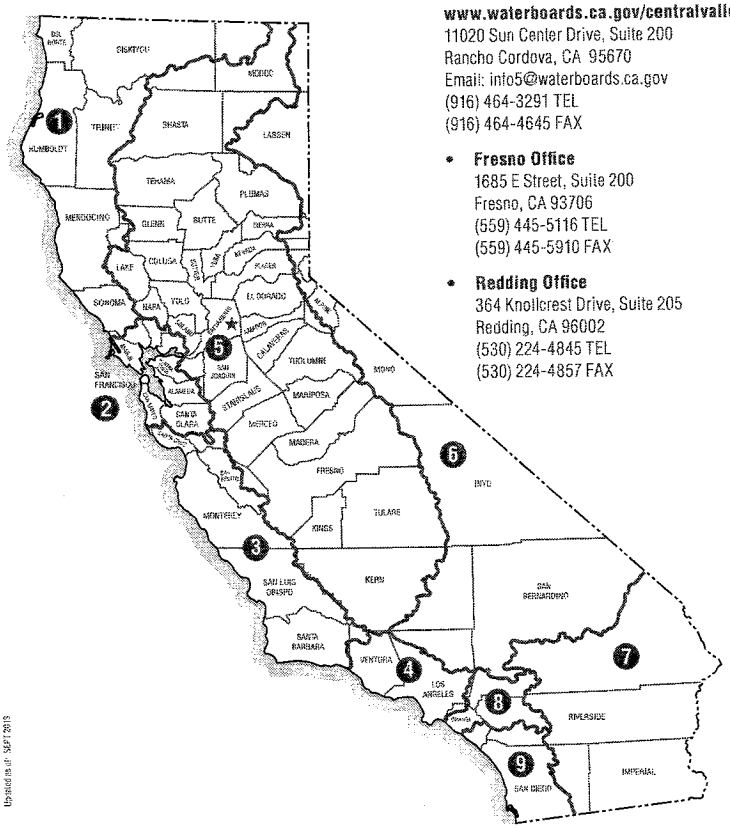

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Updated as of: SEPT 2013

023120

Clean Water Act, Section 402: National Pollutant Discharge Elimination System

(a) PERMITS FOR DISCHARGE OF POLLUTANTS

(1) Except as provided in sections 1328 and 1344 of this title, the Administrator may, after opportunity for public hearing issue a permit for the discharge of any pollutant, or combination of pollutants, notwithstanding section 1311(a) of this title, upon condition that such discharge will meet either (A) all applicable requirements under sections 1311, 1312, 1316, 1317, 1318, and 1343 of this title, or (B) prior to the taking of necessary implementing actions relating to all such requirements, such conditions as the Administrator determines are necessary to carry out the provisions of this chapter.

(2) The Administrator shall prescribe conditions for such permits to assure compliance with the requirements of paragraph (1) of this subsection, including conditions on data and information collection, reporting, and such other requirements as he deems appropriate.

(3) The permit program of the Administrator under paragraph (1) of this subsection, and permits issued thereunder, shall be subject to the same terms, conditions, and requirements as apply to a State permit program and permits issued thereunder under subsection (b) of this section.

(4) All permits for discharges into the navigable waters issued pursuant to section 407 of this title shall be deemed to be permits issued under this subchapter, and permits issued under this subchapter shall be deemed to be permits issued under section 407 of this title, and shall continue in force and effect for their term unless revoked, modified, or suspended in accordance with the provisions of this chapter.

(5) No permit for a discharge into the navigable waters shall be issued under section 407 of this title after October 18, 1972. Each application for a permit under section 407 of this title, pending on October 18, 1972, shall be deemed to be an application for a permit under this section. The Administrator shall authorize a State, which he determines has the capability of administering a permit program which will carry out the objectives of this chapter to issue permits for discharges into the navigable waters within the jurisdiction of such State. The Administrator may exercise the authority granted him by the preceding sentence only during the period which begins on October 18, 1972, and ends either on the ninetieth day after the date of the first promulgation of guidelines required by section 1314(i)(2) of this title, or the date of approval by the Administrator of a permit program for such State under subsection (b) of this section, whichever date first occurs, and no such authorization to a State shall extend beyond the last day of such period. Each such permit shall be subject to such conditions as the Administrator determines are necessary to carry out the provisions of this chapter. No such permit shall issue if the Administrator objects to such issuance.

(b) STATE PERMIT PROGRAMS At any time after the promulgation of the guidelines required by subsection (i)(2) of section 1314 of this title, the Governor of each State desiring to administer its own permit program for discharges into navigable waters within its jurisdiction may submit to the

Administrator a full and complete description of the program it proposes to establish and administer under State law or under an interstate compact. In addition, such State shall submit a statement from the attorney general (or the attorney for those State water pollution control agencies which have independent legal counsel), or from the chief legal officer in the case of an interstate agency, that the laws of such State, or the interstate compact, as the case may be, provide adequate authority to carry out the described program. The Administrator shall approve each submitted program unless he determines that adequate authority does not exist:

(1) To issue permits which -

(A) apply, and insure compliance with, any applicable requirements of sections 1311, 1312, 1316, 1317, and 1343 of this title;

(B) are for fixed terms not exceeding five years; and

(C) can be terminated or modified for cause including, but not limited to, the following:

(i) violation of any condition of the permit;

(ii) obtaining a permit by misrepresentation, or failure to disclose fully all relevant facts;

(iii) change in any condition that requires either a temporary or permanent reduction or elimination of the permitted discharge;

(D) control the disposal of pollutants into wells;

(2)

(A) To issue permits which apply, and insure compliance with, all applicable requirements of section 1318 of this title; or

(B) To inspect, monitor, enter, and require reports to at least the same extent as required in section 1318 of this title;

(3) To insure that the public, and any other State the waters of which may be affected, receive notice of each application for a permit and to provide an opportunity for public hearing before a ruling on each such application;

(4) To insure that the Administrator receives notice of each application (including a copy thereof) for a permit;

(5) To insure that any State (other than the permitting State), whose waters may be affected by the issuance of a permit may submit written recommendations to the permitting State (and the Administrator) with respect to any permit application and, if any part of such written recommendations are not accepted by the permitting State, that the permitting State will notify such affected State (and the Administrator) in writing of its failure to so accept such recommendations together with its reasons for so doing;

(6) To insure that no permit will be issued if, in the judgment of the Secretary of the Army acting through the Chief of Engineers, after consultation with the Secretary of the department in which the Coast Guard is operating, anchorage and navigation of any of the navigable waters would be substantially impaired thereby;

(7) To abate violations of the permit or the permit program, including civil and criminal penalties and other ways and means of enforcement;

(8) To insure that any permit for a discharge from a publicly owned treatment works includes conditions to require the identification in terms of character and volume of pollutants of any significant source introducing pollutants subject to pretreatment standards under section 1317(b) of this title into such works and a program to assure compliance with such pretreatment standards by each such source, in addition to adequate notice to the permitting agency of (A) new introductions into such works of pollutants from any source which would be a new source as defined in section 1316 of this title if such source were discharging pollutants, (B) new introductions of pollutants into such works from a source which would be subject to section 1311 of this title if it were discharging such pollutants, or (C) a substantial change in volume or character of pollutants being introduced into such works by a source introducing pollutants into such works at the time of issuance of the permit. Such notice shall include information on the quality and quantity of effluent to be introduced into such treatment works and any anticipated impact of such change in the quantity or quality of effluent to be discharged from such publicly owned treatment works; and

(9) To insure that any industrial user of any publicly owned treatment works will comply with sections 1284(b), 1317, and 1318 of this title.

(c) SUSPENSION OF FEDERAL PROGRAM UPON SUBMISSION OF STATE PROGRAM; WITHDRAWAL OF APPROVAL OF STATE PROGRAM; RETURN OF STATE PROGRAM TO ADMINISTRATOR

(1) Not later than ninety days after the date on which a State has submitted a program (or revision thereof) pursuant to subsection (b) of this section, the Administrator shall suspend the issuance of permits under subsection (a) of this section as to those discharges subject to such program unless he determines that the State permit program does not meet the requirements of subsection (b) of this section or does not conform to the guidelines issued under section 1314(i)(2) of this title. If the Administrator so determines, he shall notify the State of any revisions or modifications necessary to conform to such requirements or guidelines.

(2) Any State permit program under this section shall at all times be in accordance with this section and guidelines promulgated pursuant to section 1314(i)(2) of this title.

(3) Whenever the Administrator determines after public hearing that a State is not administering a program approved under this section in accordance with requirements of this section, he shall so notify the State and, if appropriate corrective action is not taken within a reasonable time, not to exceed ninety days, the Administrator shall withdraw approval of such program. The Administrator shall not withdraw approval of any such program unless he shall first have notified the State, and made public, in writing, the reasons for such withdrawal.

(4) LIMITATIONS ON PARTIAL PERMIT PROGRAM RETURNS AND WITHDRAWALS. - A State may return to the Administrator administration, and the Administrator may withdraw under paragraph (3) of this subsection approval, of -

(A) a State partial permit program approved under subsection (n)(3) of this section only if the entire permit program being administered by the State department or agency at the time is returned or withdrawn; and

(B) a State partial permit program approved under subsection (n)(4) of this section only if an entire phased component of the permit program being administered by the State at the time is returned or withdrawn.

(d) Notification of Administrator

(1) Each State shall transmit to the Administrator a copy of each permit application received by such State and provide notice to the Administrator of every action related to the consideration of such permit application, including each permit proposed to be issued by such State.

(2) No permit shall issue (A) if the Administrator within ninety days of the date of his notification under subsection (b)(5) of this section objects in writing to the issuance of such permit, or (B) if the Administrator within ninety days of the date of transmittal of the proposed permit by the State objects in writing to the issuance of such permit as being outside the guidelines and requirements of this chapter. Whenever the Administrator objects to the issuance of a permit under this paragraph such written objection shall contain a statement of the reasons for such objection and the effluent limitations and conditions which such permit would include if it were issued by the Administrator.

(3) The Administrator may, as to any permit application, waive paragraph (2) of this subsection.

(4) In any case where, after December 27, 1977, the Administrator, pursuant to paragraph (2) of this subsection, objects to the issuance of a permit, on request of the State, a public hearing shall be held by the Administrator on such objection. If the State does not resubmit such permit revised to meet such objection within 30 days after completion of the hearing, or, if no hearing is requested within 90 days after the date of such objection, the Administrator may issue the permit pursuant to subsection (a) of this section for such source in accordance with the guidelines and requirements of this chapter.

(e) Waiver OF NOTIFICATION REQUIREMENT
In accordance with guidelines promulgated pursuant to subsection (i)(2) of section 1314 of this title, the Administrator is authorized to waive the requirements of subsection (d) of this section at the time he approves a program pursuant to subsection (b) of this section for any category (including any class, type, or size within such category) of point sources within the State submitting such program.

(f) POINT SOURCE CATEGORIES
The Administrator shall promulgate regulations establishing categories of point sources which he determines shall not be subject to the requirements of subsection (d) of this section in any State with a program approved pursuant to subsection (b) of this section. The Administrator may distinguish among classes, types, and sizes within any category of point sources.

(g) OTHER REGULATIONS FOR SAFE TRANSPORTATION, HANDLING, CARRIAGE, STORAGE, AND STOWAGE OF POLLUTANTS
Any permit issued under this section for the discharge of pollutants into the navigable waters from a vessel or other floating craft shall be subject to any applicable regulations promulgated by the Secretary of the department in which the Coast Guard is operating, establishing specifications for safe transportation, handling, carriage, storage, and stowage of pollutants.

(h) VIOLATION OF PERMIT CONDITIONS; RESTRICTIONS OR PROHIBITION UPON INTRODUCTION OF POLLUTANT BY SOURCE NOT PREVIOUSLY UTILIZING TREATMENT WORKS
In the event any condition of a permit for discharges from a treatment works (as defined in section 1292 of this title) which is publicly owned is violated, a State with a program approved under

subsection (b) of this section or the Administrator, where no State program is approved or where the Administrator determines pursuant to section 1319(a) of this title that a State with an approved program has not commenced appropriate enforcement action with respect to such permit, may proceed in a court of competent jurisdiction to restrict or prohibit the introduction of any pollutant into such treatment works by a source not utilizing such treatment works prior to the finding that such condition was violated.

(i) FEDERAL ENFORCEMENT NOT LIMITED
Nothing in this section shall be construed to limit the authority of the Administrator to take action pursuant to section 1319 of this title.

(j) PUBLIC INFORMATION
A copy of each permit application and each permit issued under this section shall be available to the public. Such permit application or permit, or portion thereof, shall further be available on request for the purpose of reproduction.

(k) COMPLIANCE WITH PERMITS
Compliance with a permit issued pursuant to this section shall be deemed compliance, for purposes of sections 1319 and 1365 of this title, with sections 1311, 1312, 1316, 1317, and 1343 of this title, except any standard imposed under section 1317 of this title for a toxic pollutant injurious to human health. Until December 31, 1974, in any case where a permit for discharge has been applied for pursuant to this section, but final administrative disposition of such application has not been made, such discharge shall not be a violation of (1) section 1311, 1316, or 1342 of this title, or (2) section 407 of this title, unless the Administrator or other plaintiff proves that final administrative disposition of such application has not been made because of the failure of the applicant to furnish information reasonably required or requested in order to process the application. For the 180-day period beginning on October 18, 1972, in the case of any point source discharging any pollutant or combination of pollutants immediately prior to such date which source is not subject to section 407 of this title, the discharge by such source shall not be a violation of this chapter if such a source applies for a permit for discharge pursuant to this section within such 180-day period.

(l) LIMITATION ON PERMIT REQUIREMENT

(1) AGRICULTURAL RETURN FLOWS
The Administrator shall not require a permit under this section for discharges composed entirely of return flows from irrigated agriculture, nor shall the Administrator directly or indirectly, require any State to require such a permit.

(2) STORMWATER RUNOFF FROM OIL, GAS, AND MINING OPERATIONS
The Administrator shall not require a permit under this section, nor shall the Administrator directly or indirectly require any State to require a permit, for discharges of stormwater runoff from mining operations or oil and gas exploration, production, processing, or treatment operations or transmission facilities, composed entirely of flows which are from conveyances or systems of conveyances (including but not limited to pipes, conduits, ditches, and channels) used for collecting and conveying precipitation runoff and which are not contaminated by contact with, or do not come into contact with, any overburden, raw material, intermediate products, finished product, byproduct, or waste products located on the site of such operations.

(3) SILVICULTURAL ACTIVITIES

(A) NPDES permit requirements for silvicultural activities.—The Administrator shall not require a permit under this section nor directly or indirectly require any State to require a permit under this section for a discharge from runoff resulting from the conduct of the following silviculture activities conducted in accordance with standard industry practice: nursery operations, site preparation, reforestation and subsequent cultural treatment, thinning, prescribed burning, pest and fire control, harvesting operations, surface drainage, or road construction and maintenance.

(B) Other requirements.— Nothing in this paragraph exempts a discharge from silvicultural activity from any permitting requirement under *section 1344 of this title*, existing permitting requirements under *section 1342 of this title*, or from any other federal law.

(C) The authorization provided in Section 1365(a) of this title does not apply to any non-permitting program established under 1342(p)(6) of this title for the silviculture activities listed in 1342(*l*)(3)(A) of this title, or to any other limitations that might be deemed to apply to the silviculture activities listed in 1342(*l*)(3)(A) of this title.

(m) ADDITIONAL PRETREATMENT OF CONVENTIONAL POLLUTANTS NOT REQUIRED To the extent a treatment works (as defined in section 1292 of this title) which is publicly owned is not meeting the requirements of a permit issued under this section for such treatment works as a result of inadequate design or operation of such treatment works, the Administrator, in issuing a permit under this section, shall not require pretreatment by a person introducing conventional pollutants identified pursuant to section 1314(a)(4) of this title into such treatment works other than pretreatment required to assure compliance with pretreatment standards under subsection (b)(8) of this section and section 1317(b)(1) of this title. Nothing in this subsection shall affect the Administrator's authority under sections 1317 and 1319 of this title, affect State and local authority under sections 1317(b)(4) and 1370 of this title, relieve such treatment works of its obligations to meet requirements established under this chapter, or otherwise preclude such works from pursuing whatever feasible options are available to meet its responsibility to comply with its permit under this section.

(n) PARTIAL PERMIT PROGRAM

(1) STATE SUBMISSION
The Governor of a State may submit under subsection (b) of this section a permit program for a portion of the discharges into the navigable waters in such State.

(2) MINIMUM COVERAGE
A partial permit program under this subsection shall cover, at a minimum, administration of a major category of the discharges into the navigable waters of the State or a major component of the permit program required by subsection (b) of this section.

(3) APPROVAL OF MAJOR CATEGORY PARTIAL PERMIT PROGRAMS
The Administrator may approve a partial permit program covering administration of a major category of discharges under this subsection if -

(A) such program represents a complete permit program and covers all of the discharges under the jurisdiction of a department or agency of the State; and

(B) the Administrator determines that the partial program represents a significant and identifiable part of the State program required by subsection (b) of this section.

(4) APPROVAL OF MAJOR COMPONENT PARTIAL PERMIT PROGRAMS
The Administrator may approve under this subsection a partial and phased permit program covering administration of a major component (including discharge categories) of a State permit program required by subsection (b) of this section if -

(A) the Administrator determines that the partial program represents a significant and identifiable part of the State program required by subsection (b) of this section; and

(B) the State submits, and the Administrator approves, a plan for the State to assume administration by phases of the remainder of the State program required by subsection (b) of this section by a specified date not more than 5 years after submission of the partial program under this subsection and agrees to make all reasonable efforts to assume such administration by such date.

(o) ANTI-BACKSLIDING

(1) GENERAL PROHIBITION
In the case of effluent limitations established on the basis of subsection (a)(1)(B) of this section, a permit may not be renewed, reissued, or modified on the basis of effluent guidelines promulgated under section 1314(b) of this title subsequent to the original issuance of such permit, to contain effluent limitations which are less stringent than the comparable effluent limitations in the previous permit. In the case of effluent limitations established on the basis of section 1311(b)(1)(C) or section 1313(d) or (e) of this title, a permit may not be renewed, reissued, or modified to contain effluent limitations which are less stringent than the comparable effluent limitations in the previous permit except in compliance with section 1313(d)(4) of this title.

(2) EXCEPTIONS
A permit with respect to which paragraph (1) applies may be renewed, reissued, or modified to contain a less stringent effluent limitation applicable to a pollutant if -

(A) material and substantial alterations or additions to the permitted facility occurred after permit issuance which justify the application of a less stringent effluent limitation;

(B)

(i) information is available which was not available at the time of permit issuance (other than revised regulations, guidance, or test methods) and which would have justified the application of a less stringent effluent limitation at the time of permit issuance; or

(ii) the Administrator determines that technical mistakes or mistaken interpretations of law were made in issuing the permit under subsection (a)(1)(B) of this section;

(C) a less stringent effluent limitation is necessary because of events over which the permittee has no control and for which there is no reasonably available remedy;

(D) the permittee has received a permit modification under section 1311(c), 1311(g), 1311(h), 1311(i), 1311(k), 1311(n), or 1326(a) of this title; or

(E) the permittee has installed the treatment facilities required to meet the effluent limitations in the previous permit and has properly operated and maintained the facilities but has nevertheless been unable to achieve the previous effluent limitations, in which case the limitations in the reviewed, reissued, or modified permit may reflect the level of pollutant control actually achieved (but shall not be less stringent than required by effluent guidelines in effect at the time of permit renewal,

reissuance, or modification). Subparagraph (B) shall not apply to any revised waste load allocations or any alternative grounds for translating water quality standards into effluent limitations, except where the cumulative effect of such revised allocations results in a decrease in the amount of pollutants discharged into the concerned waters, and such revised allocations are not the result of a discharger eliminating or substantially reducing its discharge of pollutants due to complying with the requirements of this chapter or for reasons otherwise unrelated to water quality.

(3) LIMITATIONS
In no event may a permit with respect to which paragraph (1) applies be renewed, reissued, or modified to contain an effluent limitation which is less stringent than required by effluent guidelines in effect at the time the permit is renewed, reissued, or modified. In no event may such a permit to discharge into waters be renewed, reissued, or modified to contain a less stringent effluent limitation if the implementation of such limitation would result in a violation of a water quality standard under section 1313 of this title applicable to such waters.

(p) MUNICIPAL AND INDUSTRIAL STORMWATER DISCHARGES

(1) GENERAL RULE
Prior to October 1, 1994, the Administrator or the State (in the case of a permit program approved under this section) shall not require a permit under this section for discharges composed entirely of stormwater.

(2) EXCEPTIONS Paragraph (1) shall not apply with respect to the following stormwater discharges:

(A) A discharge with respect to which a permit has been issued under this section before February 4, 1987.

(B) A discharge associated with industrial activity.

(C) A discharge from a municipal separate storm sewer system serving a population of 250,000 or more.

(D) A discharge from a municipal separate storm sewer system serving a population of 100,000 or more but less than 250,000.

(E) A discharge for which the Administrator or the State, as the case may be, determines that the stormwater discharge contributes to a violation of a water quality standard or is a significant contributor of pollutants to waters of the United States.

(3) PERMIT REQUIREMENTS

(A) Industrial discharges
Permits for discharges associated with industrial activity shall meet all applicable provisions of this section and section 1311 of this title.

(B) Municipal discharge
Permits for discharges from municipal storm sewers -

(i) may be issued on a system- or jurisdiction-wide basis;

(ii) shall include a requirement to effectively prohibit non-stormwater discharges into the storm

sewers; and

(iii) shall require controls to reduce the discharge of pollutants to the maximum extent practicable, including management practices, control techniques and system, design and engineering methods, and such other provisions as the Administrator or the State determines appropriate for the control of such pollutants.

(4) PERMIT APPLICATION REQUIREMENTS

(A) Industrial and large municipal discharges
Not later than 2 years after February 4, 1987, the Administrator shall establish regulations setting forth the permit application requirements for stormwater discharges described in paragraphs (2)(B) and (2)(C). Applications for permits for such discharges shall be filed no later than 3 years after February 4, 1987. Not later than 4 years after February 4, 1987, the Administrator or the State, as the case may be, shall issue or deny each such permit. Any such permit shall provide for compliance as expeditiously as practicable, but in no event later than 3 years after the date of issuance of such permit.

(B) Other municipal discharges
Not later than 4 years after February 4, 1987, the Administrator shall establish regulations setting forth the permit application requirements for stormwater discharges described in paragraph (2)(D). Applications for permits for such discharges shall be filed no later than 5 years after February 4, 1987. Not later than 6 years after February 4, 1987, the Administrator or the State, as the case may be, shall issue or deny each such permit. Any such permit shall provide for compliance as expeditiously as practicable, but in no event later than 3 years after the date of issuance of such permit.

(5) STUDIES
The Administrator, in consultation with the States, shall conduct a study for the purposes of -

(A) identifying those stormwater discharges or classes of stormwater discharges for which permits are not required pursuant to paragraphs (1) and (2) of this subsection;

(B) determining, to the maximum extent practicable, the nature and extent of pollutants in such discharges; and

(C) establishing procedures and methods to control stormwater discharges to the extent necessary to mitigate impacts on water quality.
Not later than October 1, 1988, the Administrator shall submit to Congress a report on the results of the study described in subparagraphs (A) and (B). Not later than October 1, 1989, the Administrator shall submit to Congress a report on the results of the study described in subparagraph (C).

(6) REGULATIONS
Not later than October 1, 1993, the Administrator, in consultation with State and local officials, shall issue regulations (based on the results of the studies conducted under paragraph (5)) which designate stormwater discharges, other than those discharges described in paragraph (2), to be regulated to protect water quality and shall establish a comprehensive program to regulate such designated sources. The program shall, at a minimum, (A) establish priorities, (B) establish requirements for State stormwater management programs, and (C) establish expeditious deadlines. The program may include performance standards, guidelines, guidance, and management practices and treatment requirements, as appropriate.

LAST UPDATED ON MAY 1, 2017

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Stormwater Discount Program

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The Ahwahnee Water Principles | A Blueprint for Regional Sustainability

023133

Local Government Commission

New Approaches to Stormwater Management

"Low Impact Development" (LID) & MS4 Permitting

The State Water Resources Control Board, via their nine Regional Water Quality Control Boards, implements the federal Clean Water Act by issuing "municipal separate storm sewer" (MS4) permits. The State Board encourages augmenting water supplies through multi-benefit, green infrastructure-based stormwater projects.

3 Principles of LID Stormwater Management

Low impact development promotes the integration of stormwater management techniques that mimic natural hydrology into all aspects of development and community design, including streets and parking, homes and buildings, and parks, public spaces and landscaped areas. The landscape areas used in low impact development create flood management and public health benefits, as well as "quality of life" benefits that contribute to livability, property values, community vitality and aesthetics.

The three key principles of LID are **"slow it, spread it, sink it."**
Slow down stormwater flows, to allow pollutants to settle out of the water.
Spread stormwater out over a larger area so plants and soil can filter out pollutants.
Sink stormwater into the soil to provide water for plants and to replenish groundwater.

LID technologies

A wide range of LID implementation strategies or "green technologies" are now available. The most common, and often most preferred by developers, are vegetated swales and flow-through planters. The diagram below outlines popular LID strategies and other stormwater management techniques.

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Economic implications

LID is economical; it often costs less than conventional systems to install and maintain because of fewer pipes and belowground infrastructure. Landscaped areas create "quality of life" benefits that contribute to livability, property values, community vitality and aesthetics.

The City of Los Angeles passed a comprehensive LID ordinance in 2011, requiring on-site capture of 100% of all stormwater runoff from a ¾ inch storm. The City estimates that recharging this stormwater into the aquifer will offset imported water needs, with an imbedded energy cost savings of over $23 million a year [i].

❝ In the past, Low Impact Development was only encouraged; now it's a requirement. ❞

– Fernando Duenas, Sacramento County Stormwater Quality Partnership

In 2013, the City of Modesto installed a new 164-space parking lot for Woodward Community Park, using all LID design features. Their team gained a 20% savings on installation costs, as well as a long-term operations cost savings because there are no storm filters to maintain.

Many local governments are now requiring developers to use these solutions in order to meet state permitting requirements. As long as the rules are clear and projects can be completed without excessive delay, developers are finding cost savings and environmental-permitting benefits from LID practices. Coordinating local development codes and stormwater management creates a more streamlined process and ensures that low-cost stormwater controls are effective long-lasting.

Permitting Changes & Opportunities

Low impact development (LID) techniques are not merely encouraged, but are now required by the State and Regional Water Boards. Larger cities (municipalities > 100,000 people) covered under Phase I MS4 permits have had to treat or infiltrate stormwater runoff with LID since 2009 (although some regions were doing so prior to this requirement). Since 2012, the State Water Board's Phase II Permit (municipalities < 100,000 people) now includes LID standards for new and re-development. These standards emphasize landscape-based site design features and porous pavement treatment systems. Each Regional Permit is unique, and includes varying LID requirements, depending on the region's identified priorities for watershed health and function. Regardless, all projects are required to implement the LID standards, with the goal of reducing runoff and improving stormwater quality.

Municipal stormwater permits issued by the Regional Boards encourage augmenting water supplies through multi-benefit, green infrastructure projects that infiltrate runoff to recharge groundwater and capture runoff for direct onsite reuse. This supports California's Recycled Water Policy, with the goal of increasing stormwater capture to two million acre-feet/year by 2030. Stormwater capture to increase water supply is critical to California's ability to continue providing safe, reliable drinking water for its current and future citizens.

Regulatory Alignment & Streamlining

In 2007, the State Water Board commissioned the Beltsville, Maryland "Low Impact Development Center" to review California's LID policies. The LID Center provided guidance on removing regulatory and institutional barriers for statewide adoption. According to the LID Center, regulations should set a minimum benchmark, and then be paired with other programs to achieve the desired environmental outcome. "Designing regulations and integrating them with other programs to achieve desired outcomes and benefits is critical to improving stormwater management."

Municipalities are a vital partner in moving LID measures forward, and should not be content with just meeting the requirements. As LID requirements are implemented, local governments can urge the State and Regional Boards to adapt permit requirements to be more effective and workable with other municipal departments, residents and

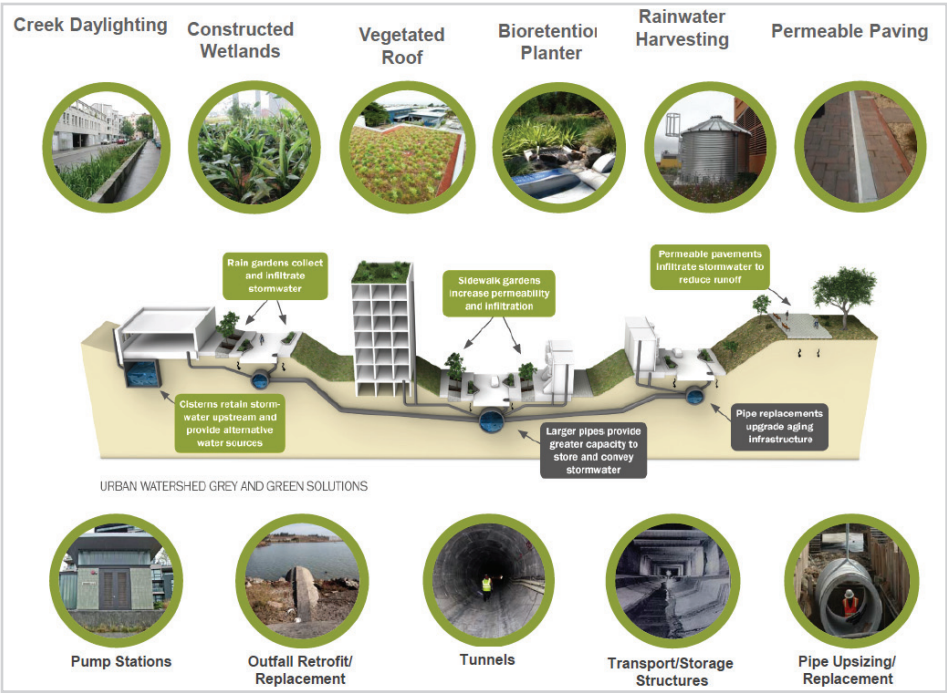

New Approaches to Stormwater Management
"Low Impact Development" (LID) & MS4 Permitting

businesses in their respective region. Municipalities at the cutting edge of LID requirements should be encouraged and supported for implementing innovative concepts that create a new template for other communities to follow.

Stormwater "Alternative Compliance"

The State of California charges local municipalities with the responsibility to ensure water quality standards are met while maximizing multi-benefit opportunities through LID. However, on-site LID is not appropriate for all projects. Sites with shallow groundwater, low soil infiltration, or contamination concerns are particularly challenging for on-site treatment, and are better suited for the "alternative compliance" approach. Some Phase I and Phase II MS4 Permits (e.g., Central Coast (3), L.A. (4), and San Diego (9) Regional Water Boards) are revising their permit structures to require watershed-scale planning in stormwater management options. This will help identify appropriate sites for LID, and provide alternative solutions for project sites not conducive to LID.

	On-Site Treatment (Conventional LID)	Centralized Treatment (Alternative Compliance Approach)
Benefits	▪ Source control ▪ Clear ownership	▪ Flexibility ▪ Ease of monitoring ▪ Potential community benefit (e.g. Multifunctional open space)
Challenges	▪ Uses valuable space within properties ▪ Difficult in highly developed areas ▪ Piecemeal approach ▪ Problematic maintenance	▪ Difficult in highly developed areas ▪ Additional burden placed on city to locate, design, and maintain systems

Table 1 - Approaches to Stormwater Treatment

The space and funding constraints associated with infill development and redevelopment are particularly onerous for on-site LID stormwater treatment. Some MS4s are looking to overcome this challenge through alternative compliance: identifying larger treatment areas downstream of a redevelopment or infill project site where stormwater can be more effectively collected and treated. This is especially important as state regulations (such as SB 375 - the Sustainable Communities and Climate Protection Act of 2008) and funding sources (such as the Affordable Housing Sustainable Communities Cap and Trade funding) focus on infill and transit-oriented development.

Unlike the expansive retention and detention ponds of the 1990s, "alternative compliance" provides multiple community benefits while meeting stormwater quality requirements. Communities have created recessed parks, baseball fields, neighborhood rain gardens, and similar features to hold water during excessively rainy periods. Some are even daylighting urban creeks and restoring ponds. A study in the L.A. River Watershed found that converting 1,000 acres of public land into "smart" green spaces would provide 600 million gallons of water from treated stormwater runoff [ii].

Alternative Compliance via Enhanced Watershed Management Programs

Under the 2012 Los Angeles County MS4 Permit [iii], permittees can seek "Alternative Compliance" by participating in an "Enhanced Watershed Management Program" (EWMP). Permittees can propose regional projects to replenish ground water supplies at offsite locations that have a designated beneficial use in the Basin Plan. Municipalities implementing an EWMP will develop larger-scale, regional stormwater capture projects to meet permit conditions.

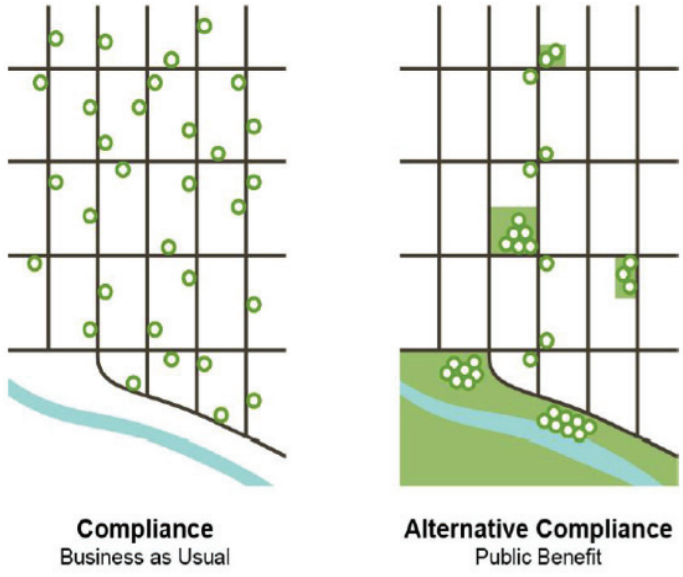

Figure 2–2 Compliance vs. Alternative Compliance - Alternative Compliance can lead to clustered LID projects that provide greater community-wide benefits; e.g., several rain gardens grouped together can form an aesthetic and functioning wetland surrounded by a recreation trail.

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LID a Tough Sell for Small Communities Seeking Infill Development

The City of Riverbank sought an alternative compliance strategy to support downtown revitalization through infill and redevelopment, while also protecting and improving the water quality of the Stanislaus River. Projected in-fill development is not significant enough to finance neighborhood-scale LID features without placing too high a cost burden on existing property-owners and developers. Alternative Compliance projects would need to be partially financed by federal and state grants, or through Enhanced Infrastructure Financing Districts (EIFDs). Municipalities should urge the State Board to provide additional options or flexibility for situations where LID is particularly onerous if they are to achieve both water quality and infill development goals. For more information: www.lgc.org/LIDACPlan_FinalReport

Regional Water Quality Control Boar (year enacted)	Minimum Size Impervious Area Thresholds	Notes
Region 1 -- North Coast (2003, draft 2010)	2,500 sq. ft.	Applies to New Development or Redevelopment projects that create and/or replace >2,500 square feet of impervious surface; LID systems must retain stormwater runoff equal to that generated by the 85th percentile 24-hour storm event, based on local rainfall data.
Region 2 -- San Francisco (2011)	2,500 sq. ft.	Applies to projects that create and/or replace 10,000 sq.. ft.. (5,000 sq..ft.. for certain special land uses). Some "small projects" are required to implement at least one LID site design feature, rather than meeting a specific retention standard.
Region 3 -- Central Coast (2013)	15,000 sq. ft.	LID systems must retain stormwater runoff equal to that generated by the 85th or 95th percentile 24-hour storm event, depending on the Watershed Management Zone where the project is located.
Region 4 -- Los Angeles (Date depends on MS4)	Depends on Approving Agency	LID systems must capture 0.75 inch per 24-hour storm, or the 85th percentile storm 24-hour storm.
Region 5 -- Central Valley (2009)	1 acre	Sacramento Stormwater Quality Partnership Draft LID requirements include projects that impact 1 acre or more. LID is built on a 100-point credit system (in accordance with the Draft Stormwater Design Guide Manual).
Region 6 -- Lahontan (2011)	Depends on Approving Agency	LID Requirements set by Tahoe Regional Planning Agency around Lake Tahoe, and Phase 2 and Construction General Permits.
Region 7 -- Colorado River (N/A)	Phase II and CGP	Subject to Phase II and Construction General Permit Requirements.
Region 8 -- Santa Ana (2010)	2,500 sq. ft.	Requires projects to infiltrate, harvest and use, evapo-transpire, and/or bio-treat the 85th percentile storm event.
Region 9 -- San Diego (2013)	2,500 sq. ft.	LID systems must retain stormwater runoff equal to the volume of runoff generated by the 85th percentile 24-hour storm event, based on local rainfall data.

Table 2 - Volumetric Retention Standards for Discharges from New Development and Redevelopment Projects (June 2015).

i. Banking on Green http://www.americanrivers.org/assets/pdfs/reports-and-publications/banking-on-green-report.pdf
ii. Green Solution Project; Community Conservation Solutions http://www.conservationsolutions.org/html/projects/greensolution/greensolution_ULAR3.html
iii. 2012 Los Angeles County MS4 Permit (Los Angeles Regional Water Quality Control Board) – currently under petition before the State Water Board.

023137

Street Edge Alternatives

Seattle's pilot Street Edge Alternatives Project (SEA Streets) was completed in the spring of 2001. It is designed to provide drainage that more closely mimics the natural landscape prior to development than traditional piped systems.

To accomplish this, we reduced impervious surfaces to 11 percent less than a traditional street, provided surface detention in swales, and added over 100 evergreen trees and 1100 shrubs.

Two years of monitoring show that SEA Street has reduced the total volume of stormwater leaving the street by 99 percent.

Location

The project is located on 2nd Ave NW, between NW 117th and 120th Streets. View vicinity map (pdf).

Community Benefits

Learn more about how the SEA Streets project benefited the community:

- Landscape Architecture
- Community Cost and Benefits
- Drainage Improvements

Maintenance

The bioretention cells in the project are maintained by SPU Operations and Maintenance to ensure stormwater functionality at a service level B. Residents are welcome to provide additional maintenance to improve curb aesthetics.

Project Resources

- Contract Plans (pdf)

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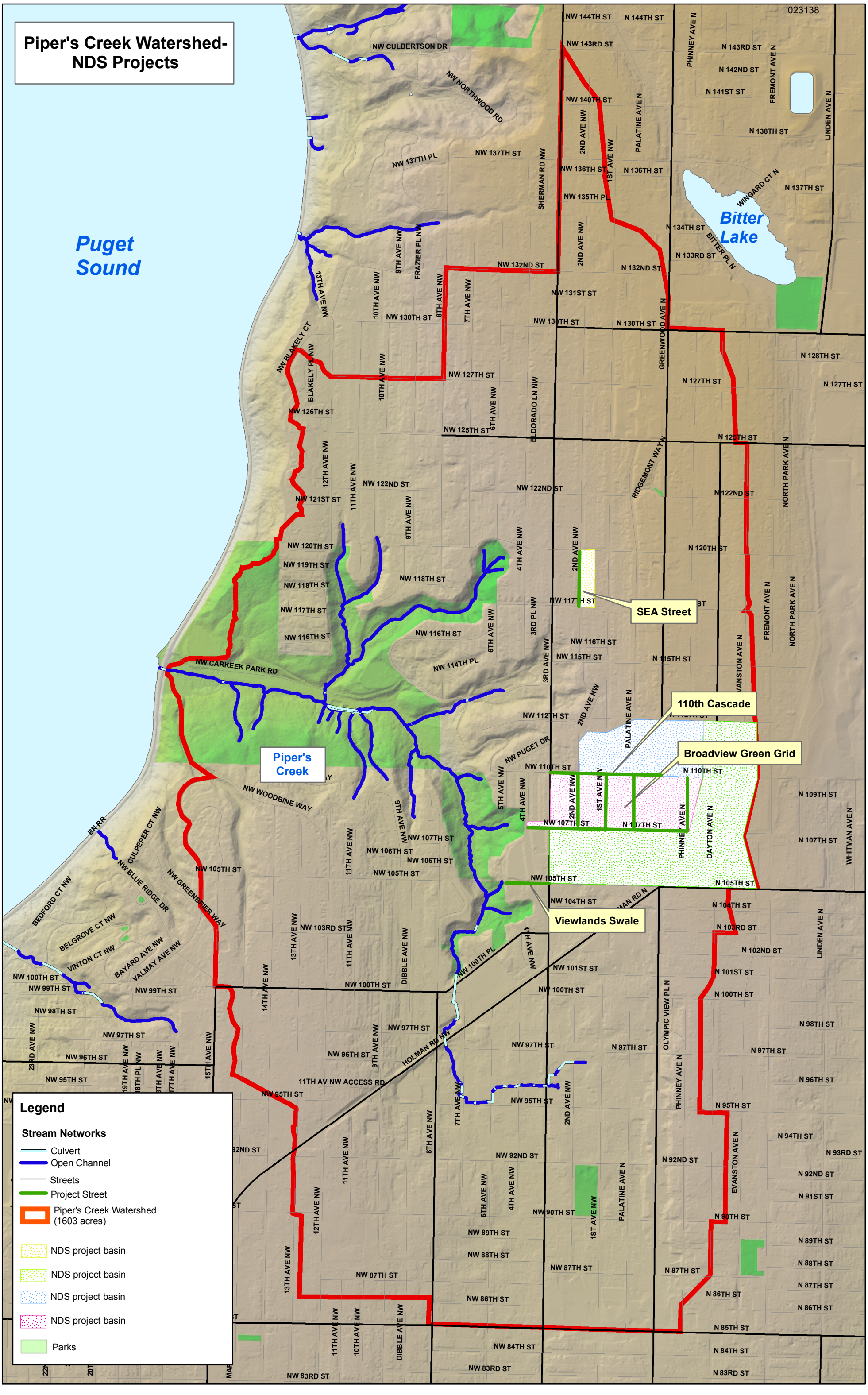
Piper's Creek Watershed-
NDS Projects
023138
Puget
Sound
Bitter
Lake
Piper's
Creek
SEA Street
110th Cascade
Broadview Green Grid
Viewlands Swale
Legend
Stream Networks
Culvert
Open Channel
Streets
Project Street
Piper's Creek Watershed
(1603 acres)
NDS project basin
NDS project basin
NDS project basin
NDS project basin
Parks

023139

Landscape Architecture

The landscape elements serve an important role in both providing an aesthetic benefit as well as contributing to the management of rainfall. Trees will help to restore more of the evaporation and transpiration that was present before development.

The other vegetation in the drainage swales will also help to filter and slow the flow of storm water. Over 100 deciduous and evergreen trees and 1100 shrubs were added as part of the project.

Design involvement

The landscape architect was involved more during the design than a typical project. The most apparent example of this is a sidewalk design that not only serves but attracts pedestrians.

There also was an emphasis on retaining existing large-scale trees and relocating vegetation to meet homeowner needs and project goals. The swales and surrounding areas are artfully graded and planted with native wetland and upland plant species. Granite boulders and various sizes of washed river rock provide both function and beauty.

Landscape design

The landscape design complements the drainage system function and focuses on native and salmon-friendly plantings. The system is unique in its use of grading, soil engineering, plant selection and layout as components that function together -- much as they do in a natural ecosystem.

Natural systems approach

Returning drainage and vegetation in the area to a natural systems approach is an important element of this demonstration project.

For example, native soil from excavations was mixed with organic compost to provide rich topsoil and reduce water and fertilizer needs.

As another example, clay was the preferred liner material for swales. This helps to ensure vegetation can survive in the summer months by allowing moisture to move up through the soil. A liner fabric would be less effective in this role.

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Community Cost and Benefits

Cost

The cost of this project was $850,000. This included an extensive design and communications budget due to the need to work closely with residents on the design. Future projects will cost less than traditional street improvements.

Benefits

The project helps creeks by reducing stormwater at the source. As Seattle has developed, stormwater running off impervious surfaces has had a major impact on our creeks and wildlife.

SEA Streets provides an example of the environmental benefits that can be realized with natural systems instead of traditional systems, especially in areas which are installing new infrastructure.

Residents of this neighborhood enjoy walking along SEA Streets because it is a natural, soft-edged environment, in contrast to the hard edges of traditional linear streets. Also, more tree cover helps reduce summer heat while absorbing air pollutants and rainfall.

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Drainage Improvements

The drainage design represents a unique hybrid, combining hydraulic engineering with soil science and botany to create a more natural system.

Hydraulic engineering required strict control of elevations utilizing various aggregates and soil mixes below grade. Drainage improvements combine contoured swales with traditional drainage infrastructure (culverts, catch basins, flow control structures and slotted pipe) to regulate the flow and discharge of storm water.

Project goals

One of our primary drainage goals was to use surface retention or detention to reduce 2-year, 24-hour storm event (1.68-inches) peak runoff rate and volume to pre-developed conditions.

Since our goal was developed to reduce the impacts of our urban environment on streams inhabited by salmon, we chose to detain stormwater for the entire contributing drainage area (street right-of-way and properties along the east side, total 2.3 acres), not just new or redone impervious area.

Also, we worked to meet the goal of conveying the site's 25-year, 24-hour storm event, which is the design requirement for all City of Seattle drainage systems.

Methods used

The method we used for achieving this goal was to maximize the stormwater time of concentration and the sites detention volume, without compromising homeowner access and parking needs on the street.

Using a long flow path length and high surface roughness along the flow path increased the basin's time of concentration. All areas within the right-of-way without hard surfaces were used toward detention.

Some additional considerations

Our original hope for retaining flows and allowing infiltration into the native soils throughout the length of the block was not possible because some homes had an existing groundwater intrusion problem. To limit the potential for stormwater to adversely impact the residences of concern, our geotechnical engineers identified some swales that needed an impermeable liner – for example, a six inch depth of natural clay material was used as the preferred material.

Sizing the swales to detain the pre-developed two-year, 24-hr storm event, while not allowing infiltration, resulted in the need for very small outlet orifice diameters. Due to maintenance concerns, we wanted outlet orifice diameters greater than ½-inch. To reduce potential for these small orifices to clog, we also provided a sump in the flow control structure. Working with the site's flat topography (1% longitudinal slope) and the minimum orifice size restraint, we chose to use only 3 flow control facilities on the block.

We hydraulically connected the swales into three groups, with each group controlled by a flow control structure. Detention volume achieved by swales was 2,500 cubic feet; 37% more volume than would have been required by our drainage ordinance.

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Operations and Maintenance

Seattle Public Utilities (SPU) has employed various strategies for O&M of our vegetated systems (i.e., containing living plants) since our program began in 1999. Initial projects relied heavily on homeowners to provide or supplement City maintenance. For any system installed by the City, SPU's minimum duty is to ensure system functionality. Property owners next to the system are encouraged to maintain the system for additional visual appeal.

SPU Operations and Maintenance by the City

Minimum system functionality is defined as "Level of Service D" in the SPU O&M manual below. Drainage performance goals increased the City's commitment to "Level of Service B" for some projects. The following O&M packet components are used by SPU staff to identify and track O&M activities.

- NDS O&M Manual (pdf)
- NDS Field Checklist (pdf)
- NDS O&M KPI Reporting (pdf)

Operations and Maintenance by Property owners

For the High Point project, SPU and the Seattle Housing Authority have a Memorandum of Agreement to maintain the landscape using the following guidelines.

High Point Landscape Maintenance Guidelines (pdf)

Operations and Maintenance by Homeowners

As a means to encourage homeowner participation, the City of Seattle developed the following materials.

- Practically Easy Landscape Manual: A Care Manual for Natural Drainage Systems, Fall 2006 Edition (pdf)
- Landscape Maintenance Calendar and Guide (pdf)
- Plant Identification (pdf)

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Green Stormwater Operations and Maintenance Manual

Seattle Public Utilities

August 2009

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I. Overview

This manual is a summary of *routine* maintenance activities for the design of Natural Drainage System (NDS) Projects. Several *non-routine* maintenance activities are also included within this chart. The manual is divided into four service levels for the vegetation section and three service levels for the hardscape and Infrastructure section. For some design elements, the service levels are very similar.

This chart is intended to be a Maintenance Manual for scheduling and performing maintenance activities. The manual features images and descriptions for vegetation, hardscape, infrastructure, and infiltration rates. It includes NDS sites used currently in Seattle and several images from NDS projects in other municipalities. It is important to realize that *no single project includes every design element*. (That is, all the NDS portrayed in this chart will *NOT* be found within a given NDS project.) Maintenance crew coordinators need to use the relevant maintenance categories for a given project per the NDS Service Agreement.

II. How to Use This Manual

The successful use of this manual hinges on the inspection of project features, which in turn triggers the appropriate maintenance activities. To use this chart first select the desired Service Level for maintenance on an existing NDS project, then maintenance crews will inspect the system for the conditions listed in the left-hand column of the chart. Note that the desired service level may vary from project to project, based on the NDS goals, the project location, the project age (i.e. whether or not the plants have successfully established), and economic considerations. The descriptions and images for each service level may be used to help determine by visual inspection whether recommended maintenance activities, in the right-hand column, will need to be performed.

III. Contacts

Name	Phone Number	Title
Drena Donofrio	206-571-1566	GSI O&M Asset Manager
Deb Heiden	206-386-1802	Urban Ecosystems Asset Manager
Tracy Tackett	206-386-0052	GSI Program Manager

Table I. Landscape and Vegetation Manual

Service Category	Service Level A (Excellent Effort)	Service Level B (Good Effort)	Service Level C (Moderate Effort)	Service D (Poor Effort)

Aesthetics (vegetation and trash)	• **Vegetation**
	  • Healthy and attractive
	  • No bare spots
	  • Plant palette is working for facility
	  • At least 95% survival of establishing plants
	• **Weeds -** Little or no weeds are present
	• **Asthetics**
	  • Clean, distinct edges
	  • Vegetation confined to planted areas
	  • No overgrown appearance/dead growth
	• **Mulch**
	  • Evenly distributed & approximately 4" of arborist woodchip mulch. No evidence of erosion (stabilized surfaces)
	  • Limited shoulder compaction
	• Homeowner is fully maintaining (where applicable)
		• **Vegetation**
		  • Healthy with a good appearance
		  • Occasional bare spots
		  • Plant palette is mostly working for facility (At least 75%)
		• **Weeds -** Small quantities of weeds are present
		• **Asthetics**
		  • Loose edges: grass/mulch encroaching on swale or vice versa
		  • Some vegetation overlapping into pedestrian areas
		  • Overgrown in isolated areas with some dead material
		• **Mulch**
		  • 2"-4" layer of mulch is present
		  • Erosion likely unless maintenance improved
		  • Some shoulder compaction
		• Homeowner is providing some maintenance (where applicable)
		• Able to achieve Level A without complete retrofit
			• **Vegetation**
			  • Poor vegetation health and appearance
			  • Bare spots are frequent
			  • Plant palette is not working for facility (75%-50%)
			• **Weeds -** Weeds common
			• **Asthetics**
			  • No edges;
			  • Surrounding vegetation spills into swale and pedestrian areas
			• **Mulch**
			  • Mulch is less than 2"
			  • Substantial eroded areas
			  • Shoulder compaction
			• Homeowner is not maintaining swale (where applicable)
			• Unable to achieve higher service levels without complete retrofit
				• **Vegetation**
				  • Poor Planted vegetation health and appearance
				  • Bare spots are common
				  • Plant palette has failed Less than 50%
				• **Weeds** - Weeds dominant
				• **Asthetics**
				  • No edges; surrounding vegetation spills into swale or vice versa
				• **Mulch**
				  • Mulch is absent
				  • Substantial eroded areas
				  • Shoulder compaction
				• Homeowner is not maintaining swale (where applicable)
				• Unable to achieve higher service levels without complete retrofit

Service Category	Service Level A (Excellent Effort)	Service Level B (Good Effort)	Service Level C (Moderate Effort)	Service D (Poor Effort)
Special Considerations for Noxious Weeds	Zero tolerance of Class A, B, C and non-designated noxious weeds	Zero tolerance of Class A and B. Class C weeds are controlled or absent. Non-designated weeds are controlled or absent.	Zero tolerance of Class A weeds. Class B and C are controlled. Non-designated are present (Control Prog. Is minimal)	Zero tolerance of Class A weeds. Class B, C, and Non-Designated are largely uncontrolled except for public safety reasons (illegal dumping, obstructs vision)
	Link to King County Noxious Weed List			
Vegetation	Lush vegetation; excellent appearance	Mostly healthy vegetation with good appearance	Mostly healthy vegetation with neglected appearance	Poorly planted vegetation health and neglected appearance

Service Category	Service Level A (Excellent Effort)	Service Level B (Good Effort)	Service Level C (Moderate Effort)	Service D (Poor Effort)
Aesthetics	Healthy, well-maintained vegetation; excellent appearance	Appearance is good	Moderate appearance 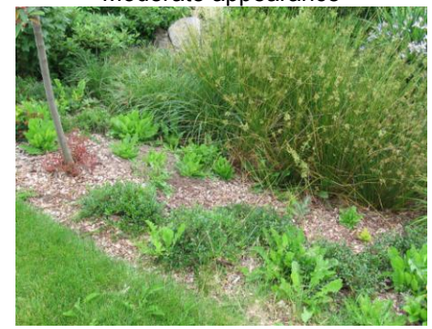	Poorly maintained appearance
Mulch	Deep mulch layer(4”-6”), clean edges, limited compaction	Some mulch(2”-4”), loose edges, some compaction	Little mulch(Less than 2”), no defined edge, shoulder compaction	No mulch present, no defined edge, shoulder compaction

Service Category	Service Level A (Excellent Effort)	Service Level B (Good Effort)	Service Level C (Moderate Effort)	Service D (Poor Effort)
Weeds	No weedy species present	Occasional weedy species (5-10%)	Lots of Weedy species (10-20%)	Weedy species predominant (More than 20%)
Erosion and bare spots	No erosion or bare spots	Some erosion and bare spots (0-5%)	Substantial erosion and bare spots (5-10%)	Completely eroded and bare spots(More than 10%)

Table II. System Functionality

Service Category	Service Level A (Excellent Effort)	Service Level B (Good Effort)	Service Level C (Moderate Effort)	Service Level D (Poor Effort)
SYSTEM FUNCTIONALITY				

Bioretention (vegetation & soils/substrate)	• **Vegetation**
	  • 100% of swale bottom is covered with healthy, wetland vegetation
	  • No bare spots
	• **Infiltration**
	  • Soil is well aerated, no evidence of compaction
	  • Water drains within 48 hours
	• **Maintenance**
	  • No erosion, channelization or scouring
	  • No significant sediment or debris accumulation
		• **Vegetation**
		  • At least 80% of swale bottom is covered with healthy, wetland vegetation
		  • Minimal bare spots 10%
		• **Infiltration**
		  • Some evidence of compaction (2" of mulch)
		  • Most water drains within 24 hours, minimal long-term ponding
		• **Maintenance**
		  • Some erosion, channelization or scouring
		  • Sediment or debris accumulation does not affect the function of the facility.
			• **Vegetation**
			  • Between 60-80%of swale bottom is covered with healthy, wetland vegetation
			  • A few bare spots 10-20%
			• **Infiltration**
			  • Compacted soils (Lack of Mulch)
			  • The presence of long-term ponding (> 72 hours)
			• **Maintenance**
			  • Erosion, channelization or scouring
			  • Sediment and debris accumulations inhibit the water quality function of the facility without affecting conveyance
				• **Vegetation**
				  • Less than 60% of swale bottom is covered with healthy, wetland vegetation
				  • Many bare spots
				• **Infiltration**
				  • Compacted soils (Lack of Mulch)
				  • The presence of long-term ponding (> 72 hours)
				• **Maintenance**
				  • Erosion, channelization or scouring
				  • Sediment and debris accumulations inhibit the water quality and conveyance of the system

Biofiltration (vegetation & soils/substrate)	• **Vegetation** • At least 80% of swale bottom covered with healthy, uniformed fine-stemmed vegetation at least 18 - 24 inches high • No bare spots • **Maintenance** • No erosion, channelization or scouring • No ponding • No significant sediment or debris accumulation	• **Vegetation** • Between 60-80% of swale bottom covered with healthy, uniformed fine-stemmed vegetation at least 18 - 24 inches high • A few bare spots 10% • **Maintenance** • Some erosion, channelization or scouring • No ponding • Sediment and debris does not affect the function of the facility.	• **Vegetation** • Between 60-40% of swale bottom covered with healthy, uniformed fine-stemmed vegetation, of at least 18 -24 inches high • Many bare spots 10-30% • **Maintenance** • Erosion, channelization or scouring • The presence of ponding • Sediment and debris affect the water quality function of the facility with out affecting conveyance.	• **Vegetation** • Less than 40% of swale bottom covered with healthy, uniformed fine-stemmed vegetation, of at least 18 -24 inches high • Many bare spots • Maintenance • Erosion, channelization or scouring • The presence of ponding Sediment and debris accumulations inhibit the water quality and conveyance of the system

Service Category	Service Level A (Excellent Effort)	Service Level B (Good Effort)	Service Level C (Moderate Effort)	Service Level D (Poor Effort)
Bioretention + biofiltration (vegetation & soils/substrate)	• At least 100% of swale bottom is covered with healthy, uniformed fine-stemmed wetland vegetation at least 18 - 24 inches high • Soil is well aerated, no evidence of vehicle compaction • No erosion, channelization or scouring • Water drains within 24 hours • No visible bare spots • Acceptable level of sediment or debris accumulation	• 80% of swale bottom is covered with healthy, uniformed fine-stemmed wetland vegetation at least 18 - 24 inches high • Some evidence of vehicle compaction (lack of mulch) • Some erosion, channelization or scouring • Most water drains within 24 hours, minimal long-term ponding • A few bare spots 10-20% • Acceptable level of sediment or debris accumulation	• Less than 80-50% of swale bottom is covered with healthy, uniformed fine-stemmed wetland vegetation at least 18 - 24 inches high • Compacted soils • Erosion, channelization or scouring • The presence of long-term ponding (> 72 hours) • Many bare spots • Significant build up of sediment or debris	• Less than 50% of swale bottom is covered with healthy, uniformed fine-stemmed wetland vegetation at least 18 - 24 inches high • Compacted soils • Erosion, channelization or scouring • The presence of long-term ponding (> 72 hours) • Many bare spots or noxious weeds/grass • Significant build up of sediment or debris
Swale bottom vegetation				

Service Category	Service Level A (Excellent Effort)	Service Level B (Good Effort)	Service Level C (Moderate Effort)	Service Level D (Poor Effort)
Sediment or debris accumulation				
Conveyance (vegetation & soils/substrate)	• Healthy vegetation • No erosion, channelization or scouring • No bare spots • No build up of sediment or debris • No non-designed obstructions to flow	• Mostly healthy vegetation • Some erosion, channelization or scouring • Minimal bare spots 10-20% • Some build up of sediment or debris • Minimal non-designed obstructions to flow (over-grown vegetation, trash rack blockages)	• Some vegetation • Erosion, channelization or scouring • Many bare spots 20-40% • Significant build up of sediment or debris • Significant non-designed obstructions to flow (over-grown vegetation, trash rack blockage)	• Poor or no vegetation • Erosion, channelization or scouring • Many bare spots 40% or more • Significant build up of sediment or debris • Significant non-designed obstructions to flow (over-grown vegetation, trash rack blockage)

Table III. Hardscape Manual

Service Category	Service Level B (Good Effort)	Service Level C (Moderate Effort)	Service Level D (Low Effort)	Recommended Maintenance Activities
HARDSCAPE & INFRA-STRUCTURE	**Summary** • sediment Is minimal • infrastructure is always accessible • no competition between roots(/dense plant material?) and pipes • no trash is present • small accumulation of organic debris on grates or screens • limited buildup of sediment behind check dams or log weirs • no erosion or undercutting surrounding weir walls • rockery and walls are stable and secure • stormwater sedimentation structures less than ½ full (NPDES)	**Summary** • some sediment is present • infrastructure is usually accessible • some competition between roots(/dense plant material?) and pipes • small amounts of trash are present • moderate accumulation of organic debris on grates or screens • occasional large sediment deposits behind check dams or log weirs • minimal erosion and/or undercutting surrounding weir walls • occasional loose rocks; walls are secure • stormwater sedimentation structures less than ½ full (NPDES)	**Summary** • Lots of sediment buildup is observed • infrastructure is mostly inaccessible • Significant competition between roots(/dense plant material?) and pipes • Trash is present • Heavy accumulations of organic debris on grates or screens • frequent large sediment deposits behind check dams or log weirs • Erosion and/or undercutting surrounding weir walls • Loose rocks; walls are not secure • stormwater sedimentation structures less than ½ full (NPDES)	
Sedimentation structures— TYPE 2	Sediment is blocking 10% of structure 	Sediment is blocking 30% of structure 	Sediment is blocking 50% of structure 	□ if sediment present, remove trash and unwanted organic debris □ muck out / vactor structure and dispose of waste properly

Service Category	Service Level B (Good Effort)	Service Level C (Moderate Effort)	Service Level D (Low Effort)	Recommended Maintenance Activities
Grates and debris screens on catch basins (CBs)	Accumulation of organic debris covers 10% of structure	Accumulation of organic debris covers 30% of structure	Accumulation of organic debris covers 50% of structure	□ if present, muck out / vactor catch basins and dispose of waste properly. Clear debris and vegetation growth around intakes.
□ Outlet structures—TYPE 2	Accumulation of organic debris covers 10% of structure	Accumulation of organic debris covers 30% of structure	Accumulation of organic debris covers 50% of structure	□ remove debris and dispose of waste properly

Service Category	Service Level B (Good Effort)	Service Level C (Moderate Effort)	Service Level D (Low Effort)	Recommended Maintenance Activities
Flow control structures and overflow structures or pipes	Accumulation of organic debris covers 10% of structure	Accumulation of organic debris covers 30% of structure	Accumulation of organic debris covers 50% of structure	Remove debris and vegetation growth and dispose of waste properly
□ Log weirs and check dams	Sediment deposit of check dams or log weirs is about 10%	Sediment deposits of check dams or log weirs is about 30%	Sediment deposits of check dams or log weirs is about 50% or more	□ add splash-pool (rocks) to reduce scouring of swale-bottom for undercutting or eroding □ remove sediment, debris, and trash if ponding upstream of check-dam

Service Category	Service Level B (Good Effort)	Service Level C (Moderate Effort)	Service Level D (Low Effort)	Recommended Maintenance Activities
Weir walls w/ flow control notch	Sediment deposit downstream of check dams or log weirs is about 10% 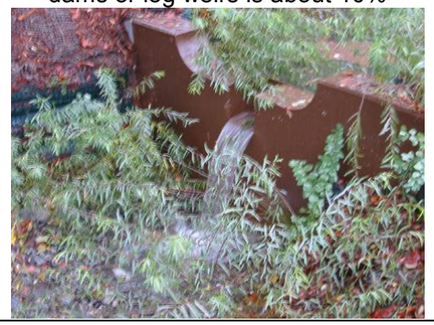	Sediment deposit downstream of check dams or log weirs is about 30%	Sediment deposit downstream of check dams or log weirs is about 50% or more	add rocks to splash-pool to prevent scouring reinforce weir wall *(non-routine)*if leakage occurs at structure edges
Rockery / boulders PHOTOS TO BE UPDATED (shown here with little vegetative cover, but rocks may become covered in plant growth in well-established projects)	10% of rocks or walls are unsecured	30% of rocks or walls are unsecured	50% of rocks or walls are unsecured	□ ensure large rocks and boulders are stable

Service Category	Service Level B (Good Effort)	Service Level C (Moderate Effort)	Service Level D (Low Effort)	Recommended Maintenance Activities
Manufactured block sidewalls	10% of rocks or walls are unsecured	30% of rocks or walls are unsecured	50% of rocks or walls are unsecured	ensure blocks and bricks are stable
Soil-wrap walls ("green walls")	Erosion or undercutting of 10% is walls visible around rockery, walls and weirs	Erosion or undercutting of 30% is visible around rockery, walls and weirs	Erosion or undercutting of 50% is walls visible around rockery, walls and weirs	□ repair as needed stabilize loose soil-bricks, notify vegetation crew if weeds present, water needed, or re-planting required

Table IV. Porous Pavement Manual

Level of Service	Service Level B (Good Effort)	Service Level C (Moderate Effort)	Service Level D (Low Effort)	Recommended Maintenance Activities
Street	Infiltration rate of 20 +in/hr	Infiltration rate of 10 in/hr	Infiltration rate of 3 in/hr	based on peak flows for 100yr design storm 3 in/hr and excess capacity for localized failure
Sidewalk	Infiltration rate of 20 +in/hr	Infiltration rate of 10 in/hr	Infiltration rate of 1 in/hr	
				Test infiltration rates per SPU Materials Lab procedure.
	Pressure wash @2500 psi bi-annually	Pressure wash @ 2500 psi annually	Pressure wash @ 2500 psi annually	
	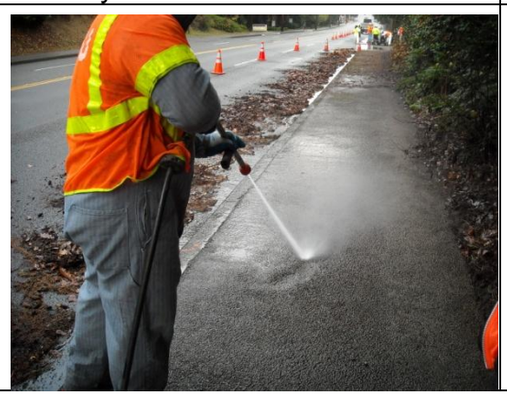		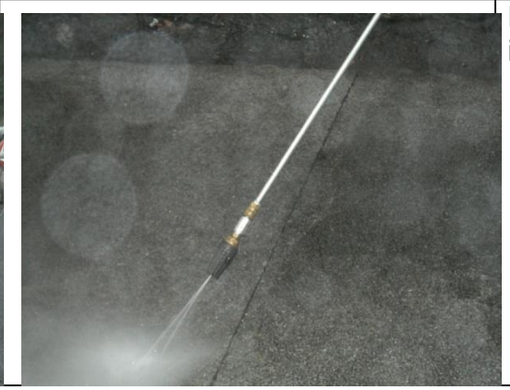	Pressure wash pavement with an industrial machine

Level of Service	Service Level B (Good Effort)	Service Level C (Moderate Effort)	Service Level D (Low Effort)	Recommended Maintenance Activities
	Remove 100% of Garbage	Remove 75% of Garbage	Remove 20% of Garbage	
				Remove all garbage and debris as required with wire brush, broom, or pressure washer. Dispose of debris and garbage off site.
	Remove 100% vegetation growth (moss/creeping plants) adjacent to pavement	Remove 75% vegetation growth (moss/creeping plants) adjacent to pavement	Remove 40% vegetation growth (moss/creeping plants) adjacent to pavement	
				Vegetated, landscaped, eroded, or soiled areas need to be maintained to prevent growth on to porous pavement, debris clogging, and lateral transport of adjacent materials. Keep joints free of material mechanically, with a weed burner, or pressure washer.

Level of Service	Service Level B (Good Effort)	Service Level C (Moderate Effort)	Service Level D (Low Effort)	Recommended Maintenance Activities
Infiltration Failure	Any evidence ponding water needs to be reported to USM Green Stormwater Infrastructure O&M Asset Manager for monitoring and restoration. Contact: Drena Donofrio at 206-571-1566			
Misc.	Inspect pavement for spalling, cracking edges, pot holes, depressions, large cracks, skid resistance, and raveling concrete 2X per year.	Inspect pavement for spalling, cracking edges, pot holes, depressions, large cracks, skid resistance, and raveling concrete 1X per year.	Inspect pavement for spalling, cracking edges, pot holes, depressions, large cracks, skid resistance, and raveling concrete every other year.	*SPU Materials lab (to quantify variability in field testing)*
	Pavement condition survey every 2 years	Pavement condition survey every 3 years	Pavement condition survey every 7 years	SDOT - contact Ben Hansen or current manager
	Address all safety issue to SDOT			Contact 684-ROAD for repair.

Table V. Other Elements

Service Category	Service Level B (Good Effort)	Service Level C (Moderate Effort)	Service Level D (Low Effort)	Recommended Maintenance Activities
OTHER ELEMENTS	• up to 10% blockage caused by organic matter, sediment, debris or trash • irrigation system functions properly with no blockages or breaks in drip system • ponding only to intended depth (varies by location) • pond capacity is maintained • no liner leakages reported	• between 10-30% blockage caused by organic matter, sediment, debris or trash • irrigation system functions properly with no blockages or breaks in drip system • ponding only to intended depth (varies by location) • some sediment may reduce pond capacity • no liner leakages reported	• more than 30% blockage caused by organic matter, sediment, debris or trash • irrigation system has occasional blockages or breaks in drip lines • ponding only to intended depth (varies by location) • sediment buildup causes reduced pond capacity • no leakages reported	
□ Curb cuts	Curb is up to 10% blocked 	Curb is between 10-40% blocked 	Curb is above 40% blocked 	□ remove trash and organic debris and dispose properly

Service Category	Service Level B (Good Effort)	Service Level C (Moderate Effort)	Service Level D (Low Effort)	Recommended Maintenance Activities
Culverts	Culvert is up to 10% blocked	Culvert is between 10-40% blocked	Culvert is more than 40% blocked	remove trash and organic debris and dispose properly
□ Irrigation systems (for establishing vegetation)	holes in drip irrigation correspond with plant locations; nozzles have no breaks, leaks, or blocks	plants and drip holes mostly aligned minimal seeping of water when system is off; no breaks or blockages	system has breaks or leaks; vegetation is not being adequately watered; complaints of ponding	repair as needed (for establishing vegetation 0-3 years old)

Service Category	Service Level B (Good Effort)	Service Level C (Moderate Effort)	Service Level D (Low Effort)	Recommended Maintenance Activities
Porous/pervious pavers	water infiltrates well, pavers are up to 10% clogged or minimal ponding is observed	water infiltrates well, pavers are between 10-40% clogged and minimal ponding is observed	water does not infiltrate well, pavers are more than 40% clogged	vactor debris, weed burn as required

Table VI. Infiltration

Infiltration Failure	Any evidence of a cell holding water for more than 24 hours needs to be reported to USM Green Stormwater Operations and Maintenance Asset Manager for monitoring or retrofitting. Contact: Drena Donofrio at 206-571-1566

Table VII. Safety, Spill Prevention and Response, and Pest Control

Service Category	Service Level A (Excellent Effort)	Service Level B (Good Effort)	Service Level C (Moderate Effort)	Service Level D (Low Effort)
SAFETY, MOBILITY, ACCESS	• Vegetation causes no visibility (line of sight) or driver safety issues • Infrastructure is always accessible and has clear access path • Vegetation around infrastructure is maintained at height to prevent damage during routine maintenance • Fire hydrant access clearly visible and accessible • Vegetation does not impede pedestrian access	• Vegetation causes minimal visibility (line of sight) or driver safety issues • Infrastructure is mostly accessible and has access path • Most vegetation around infrastructure is maintained at height to prevent damage during routine maintenance • Fire hydrant access clearly visible and accessible • Vegetation does not impede pedestrian access	• Vegetation causes visibility (line of sight) or driver safety issues • Infrastructure is not accessible and has clear access path • Vegetation around infrastructure is will be damaged during routine maintenance • Fire hydrant access clearly visible and accessible • Vegetation does not impede pedestrian access	• Vegetation causes visibility (line of sight) or driver safety issues • Infrastructure is not accessible and has clear access path • Vegetation around infrastructure is will be damaged during routine maintenance • Fire hydrant access clearly visible and accessible • Vegetation does not impede pedestrian access
			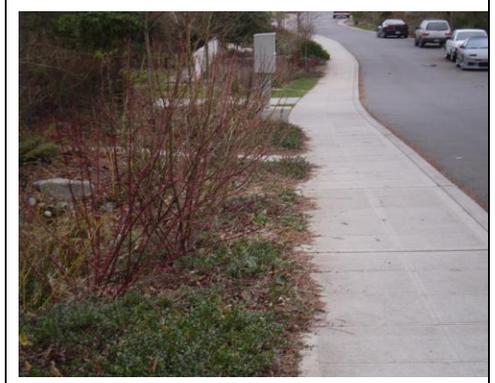	
SPILL PREVENTION	• Exercise spill prevention measures whenever handling or storing potential contaminants. • Fertilizers, Herbicides, Fungicides and Insecticides are prohibited in GSI.			

SPILL RESPONSE	• Clean up spills as soon as possible to prevent contamination of stormwater.
PEST CONTROL	Insects: • Standing water remains in the basin for time periods suitable to insect development. • Identify the cause of the standing water and take appropriate actions to address the problem. Rodents: • Rodent holes are present near the facility. • Fill and compact soil around the holes.

Seattle Public Utilities

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Natural Drainage Systems
Landscape Maintenance Categories (LMC) and Characteristics Checklist
Items for reporting in bold

Project Sites

- □ **Carkeek Cascade at NW 110th**
- □ **Broadview Green Grid - Carkeek Cascades at NW107th**
- □ **Pinehurst Green Grid**
- □ 19th Avenue NE
- □ 20th Avenue NE
- □ 23rd Avenue NE
- □ NE 117th Street
- □ NE 113th Street
- □ 25th Ave NE
- □ **Broadview Green Grid - SEA Streets**
- □ Phinney Ave N SEA Street
- □ Palatine Ave N SEA Street
- □ 1st Ave NW SEA Street
- □ 2nd Ave NW SEA Street
- □ **SEA Streets #1**
- □ **Viewlands Cascade**

		Maintenance Category A (Excellent)	Maintenance Category B (Good)	Maintenance Category C (Moderate)	Maintenance Category D (Low)
NDS Element					
Aesthetics (vegetation & trash)	All				
		□ **At least 90% of planted vegetation is healthy, dense, and attractive**	□ **At least 75% of planted vegetation is healthy with a generally good appearance**	□ **Between 40-75% of planted vegetation is healthy with a generally good appearance**	□ **Less than 40% of planted vegetation is healthy and has a generally good appearance**
		□ **Less than 10% of the vegetation are weeds, unless on edge and provided erosion control**	□ **Less than 25% of the vegetation are weeds, unless on edge and providing erosion control**	□ **Between 60-25% of the vegetation are weeds, unless on edge and providing erosion control**	□ **Greater than 60% of the vegetation are weeds**
		□ **Zero tolerance for noxious weeds**	□ **Goal of zero tolerance for noxious weeds**	□ **Control noxious weeds**	□ **Control noxious weeds**
		□ Clean, distinct edges	□ Loose edges: grass starting to encroach on swale or vice versa, plants starting to hang over street/sidewalk	□ Loose edges: grass encroaching on swale or vice versa, plant hanging over street/sidewalk	□ No edges; surrounding vegetation spills into swale or vice versa
		□ Mulch covers 100% of swale and is at least 4" deep	□ Mulch covers at least 90% of swale and is at least 4" deep	□ Mulch covers at least 60% of swale and is at least 4" deep	□ Mulch covers less than 60% of swale
		□ No bare spots	□ Less than 10% bare spots	□ Less than 40% bare spots	□ More than 40% bare spots
		□ No evidence of erosion (stabilized surfaces)	□ A few areas of potential erosion	□ Some areas of erosion	□ Substantial eroded areas
		□ Homeowner is fully maintaining (where applicable	□ Homeowner is providing some maintenance (where applicable)	□ Homeowner is providing low level of maintenance (where applicable)	□ Homeowner is not maintaining swale (where applicable)
				Able to achieve Level B without complete retrofit	□ Unable to achieve higher service levels without complete retrofit
Consideration for Noxious Weeds		Zero tolerance for Class A and Class B noxious weeds. Goal of zero tolerance for Class C noxious weeds.	Zero tolerance for Class A noxious weeds. Goal of zero tolerance for Class C noxious weeds.	Zero tolerance for Class A noxious weeds. Class B and Class C noxious weeds are controlled.	Zero tolerance for Class A noxious weeds. Class B and Class C noxious weeds are controlled.
		King County Noxious Weed List			

System Type					
Bioretention (vegetation & soils/substrate)	SEA Streets *(2nd Ave NW from NW 117th St to NW 120th St)*				
	SEA Streets *(2nd Ave NW from NW 117th St to NW 120th St)*				
	BGG SEA Streets *(Phinney Ave N, Palatine Ave N, 1st Ave NW, 2nd Ave NW from NW 110th St to NW 107th St)*				
	Pinehurst *(19th Ave NE from NE 115th St to NE 117th St, 20th Ave NE and 23rd Ave NE from NE 113th St to NE 117th St, NE 113th St from 20th Ave NE and 23rd Ave NE)*				
		□ **At least 90% of swale bottom is covered with healthy, wetland vegetation**	□ **At least 75% of swale bottom is covered with healthy, wetland vegetation**	□ **Between 40-75% of swale bottom is covered with healthy, wetland vegetation**	□ **Less than 40% of swale bottom is covered with healthy, wetland vegetation**
		□ Bottom soil is well aerated, less than 10% compaction	□ Bottom soil is well aerated, less than 20% compaction	□ Less than 40% compaction	□ More than 40% compaction
		□ No erosion, channelization or scouring	□ No erosion, channelization or scouring	□ Some erosion, channelization or scouring	□ Erosion, channelization or scouring
		□ Less than 10% bare spots	□ Less than 25% bare spots	□ Less than 40% bare spots	□ Greater than 40% bare spots
		□ Acceptable level of sediment or debris accumulation – 2 inches, unless otherwise noted or accumulation prevents achievement of previous bullet	□ Acceptable level of sediment or debris accumulation – 2 inches, otherwise noted or accumulation prevents achievement of previous bullet	□ Less than 40% bare spots	□ Significant build up of sediment or debris – greater than 3 inches, unless otherwise noted
				□ Moderate level of sediment or debris accumulation – 3 inches, unless otherwise noted or accumulation prevents achievement of previous bullet	
Biofiltration (vegetation & soils/substrate)					
**this value is equal to 3 x design flow depth and will vary with each project*		□ **At least 90% of swale bottom covered with healthy, uniformed fine-stemmed vegetation at least XX* inches high**	□ **At least 80% of swale bottom covered with healthy, uniformed fine-stemmed vegetation at least XX* inches high**	□ **Between 60-80% of swale bottom covered with healthy, uniformed fine-stemmed vegetation at least XX* inches high**	□ **Less than 60% of swale bottom covered with healthy, uniformed fine-stemmed vegetation, of at least XX* inches high**
		□ No erosion, channelization or scouring	□ No erosion, channelization or scouring	□ Some erosion, channelization or scouring	□ Erosion, channelization or scouring
		□ **Less than 10% bare spots**	□ **Less than 20% bare spots**	□ **Less than 40% bare spots**	□ **Greater than 40% bare spots**

		□ Acceptable level of sediment or debris accumulation – 2 inches, unless otherwise noted or accumulation prevents achievement of previous bullet	□ Acceptable level of sediment or debris accumulation – 2 inches, unless otherwise noted or accumulation prevents achievement of previous bullet	□ Acceptable level of sediment or debris accumulation – 3 inches, unless otherwise noted or accumulation prevents achievement of previous bullet	□ Acceptable level of sediment or debris accumulation – greater than 3 inches, unless otherwise noted
Bioretention with Biofiltration (vegetation & soils/substrate) *this value is equal to 3 x design flow depth and will vary with each project		Which ones?			
		□ **At least 90% of swale bottom is covered with healthy, uniformed fine-stemmed wetland vegetation at least XX* inches high**	□ **At least 80% of swale bottom is covered with healthy, uniformed fine-stemmed wetland vegetation at least XX* inches high**	□ **Between 40-80% of swale bottom is covered with healthy, uniformed fine-stemmed wetland vegetation at least XX* inches high**	□ **Less than 40% of swale bottom is covered with healthy, uniformed fine-stemmed wetland vegetation at least XX* inches high**
		□ Bottom soil is well aerated, less than 10% compaction	□ Bottom soil is well aerated, less than 20% compaction	□ Less than 40% compaction	□ More than 40% compaction
		□ No erosion, channelization or scouring	□ No erosion, channelization or scouring	□ Some erosion, channelization or scouring	□ Erosion, channelization or scouring
		□ Less than 10% bare spots	□ Less than 25% bare spots	□ Less than 40% bare spots	□ Greater than 40% bare spots
		□ Acceptable level of sediment or debris accumulation – 2 inches, unless otherwise noted or accumulation prevents achievement of previous bullet	□ Acceptable level of sediment or debris accumulation – 2 inches, otherwise noted or accumulation prevents achievement of previous bullet	□ Less than 40% bare spots	□ Significant build up of sediment or debris – greater than 3 inches, unless otherwise noted
				□ Moderate level of sediment or debris accumulation – 3 inches, unless otherwise noted or accumulation prevents achievement of previous bullet	

Conveyance (vegetation & soils/substrate)		□ **At least 90% of swale bottom is covered with healthy vegetation**	□ **At least 75% of swale bottom is covered with healthy, wetland vegetation**	□ **Between 40-75% of swale bottom is covered with healthy, wetland vegetation**	□ **Less than 40% of swale bottom is covered with healthy, wetland vegetation**
		□ No erosion, channelization or scouring	□ No erosion, channelization or scouring	□ Some erosion, channelization or scouring	□ Erosion, channelization or scouring
		□ Less than 10% bare spots	□ Less than 25% bare spots	□ Less than 40% bare spots	□ Greater than 40% bare spots
		□ Acceptable level of sediment or debris accumulation – 2 inches, unless otherwise noted or accumulation prevents achievement of previous bullet	□ Acceptable level of sediment or debris accumulation – 2 inches, unless otherwise noted or accumulation prevents achievement of previous bullet	□ Less than 40% bare spots	□ Significant build up of sediment or debris – greater than 3 inches, unless otherwise noted
		□ **No non-designed obstructions to flow**	□ **Minimal non-designed obstructions to flow (over-grown vegetation, trash rack blockages)**	□ Moderate level of sediment or debris accumulation – 3 inches, unless otherwise noted or accumulation prevents achievement of previous bullet	□ **Significant non-designed obstructions to flow (over-grown vegetation, trash rack blockage)**
				□ **Several non-designed obstructions to flow (over-grown vegetation, trash rack blockages)**	
Other Structures	All				
Weir walls, check dams, and log weirs			□ **Weir walls,check dams and log weirs are stable and secure**	□ **Minimal erosion and/or undercutting around weir walls, check dams and log weirs**	□ **Moderate erosion and/or undercutting around weir walls, check dams, and log weirs**
Rockery, boulders, manufactured block sidewalls, soil-wrapped green walls			□ **Acceptable level of sediment or debris accumulation behind weir walls, check dams or log weirs – 2 inches, unless otherwise noted**	□ **Moderate level of sediment or debris accumulation behind weir walls, check dams or log weirs – 3 inches, unless otherwise noted**	□ **Significant level of sediment or debris accumulation behind weir walls, check dams or log weirs – greater than 3 inches, unless otherwise noted**

			□ **Rockery, boulders, and walls are stable and secure**	□ **10 % of the rocks or boulders are loose; 10 % of walls have areas of erosion or lack vegetation**	□ **30 % of the rocks or boulders are loose; 30 % of walls have areas of erosion or lack vegetation**
			□ **No erosion or undercutting visible around rockery, boulders or walls**	□ **Minimal erosion or undercutting visible around rockery, boulders or walls**	□ **Moderate erosion or undercutting visible around rockery, boulders or walls**
Safety, mobility, access	All	□ **Vegetation causes no visibility (line**	□ **Vegetation causes minimal visibility (line of sight) or driver safety issues**	□ **Vegetation causes moderate visibility (line of sight) or driver safety issues**	□ **Vegetation causes significant visibility (line of sight) or driver safety issues**
		□ **of sight) or driver safety issues**	□ **Infrastructure access is 20% blocked**	□ **Infrastructure is 50% blocked**	□ **Infrastructure is not accessible**
		□ **Infrastructure is accessible**	□ 80% of vegetation around infrastructure is maintained at height to prevent damage during routine maintenance	□ 60% of vegetation around infrastructure is maintained at height to prevent damage during routine maintenance	□ Vegetation around infrastructure is too tall and will be damaged during routine maintenance
		□ Vegetation around infrastructure is maintained at height to prevent damage during routine maintenance			
Long-term Ponding - ***if failing report to USM with in one week***		□ **Water drains within 24 hours (100% of swale)**	□ **Water drains within 24 hours (100% of swale)**	□ **Water drains within 24 hours for at least 90% of swale bottom**	□ **Water drains within 24 hours for at least 90% of swale bottom**

Overall score for KPI Reporting Form* _____

Overall score will be lowest category of check box

NDS KPI Reporting Form
USM Urban Watersheds

Date:

Project Location	Drainage area (sq ft)	Hardscape Maintained to: Target	Hardscape Maintained to: Actual	Land-scaped area (sq ft)	Vegetation Maintained to: Target	Vegetation Maintained to: Actual	Infiltration Failure Yes/ No	Cells retrofited *(Urban Ecosystems)*
Carkeek Cascade at NW 110th	4,730	**B**		17,130	**B**			
Comments								
Project Achievement								
Broadview Green Grid - Carkeek Cascades at NW107th	8,240	**B**		29,330	**B**			
Comments								
Project Achievement								
Pinehurst Green Grid	19,160	**B**		69,650	**B**			
19th Avenue NE	3,170	**B**		9,850	**B**			
20th Avenue NE	5,390	**B**		27,370	**B**			
23rd Avenue NE	5,710	**B**		18,160	**B**			
NE 117th Street	2,240	**B**		6,400	**B**			
NE 113th Street	2,320	**B**		7,870	**B**			
25th Ave NE	330	**B**		??	**B**			
Comments								
Project Achievement								
High Point		**B**			**B**			
Comments								
Project Achievement								
Broadview Green Grid - SEA Streets	9,470	**B**		63,640	**D**			
Phinney Ave N SEA Street	2,000	**B**		15,700	**D**			
Palatine Ave N SEA Street	2,840	**B**		19,080	**D**			
1st Ave NW SEA Street	2,060	**B**		12,130	**D**			
2nd Ave NW SEA Street	2,570	**B**		16,730	**D**			

Comments								
Project Achievement								
SEA Streets #1	1,390	**C**		15,860	**D**			
Comments								
Project Achievement								
Viewlands Cascade	2,680	**B**		7,120	**D**			
Comments								
Project Achievement								
Other								
Comments								
Total Achievement	**45,670**			**202,730**				

Reported by: _____

NOTE: Form to be filed out by Field Operations Representative, sent to Drena Donofrio in USM and Diane Clausen

Key	A=	4
	B=	3
	C=	2
	D=	1

How to Use
Project achievement is deterimed for each project location. Total Achievement is the KPI for all NDS
To determine project achievement multiply project area by actual numerical maintenance
To determine total achievement sum project achievement and divide by total number of project

023177

High Point Community

Natural Drainage and Landscape Maintenance Guidelines
For Right-of-way and Open Space

SvR DESIGN COMPANY

revised 06/2010

High Point Community Maintenance Responsibilities Plan

High Point Community NDS Swales Plan

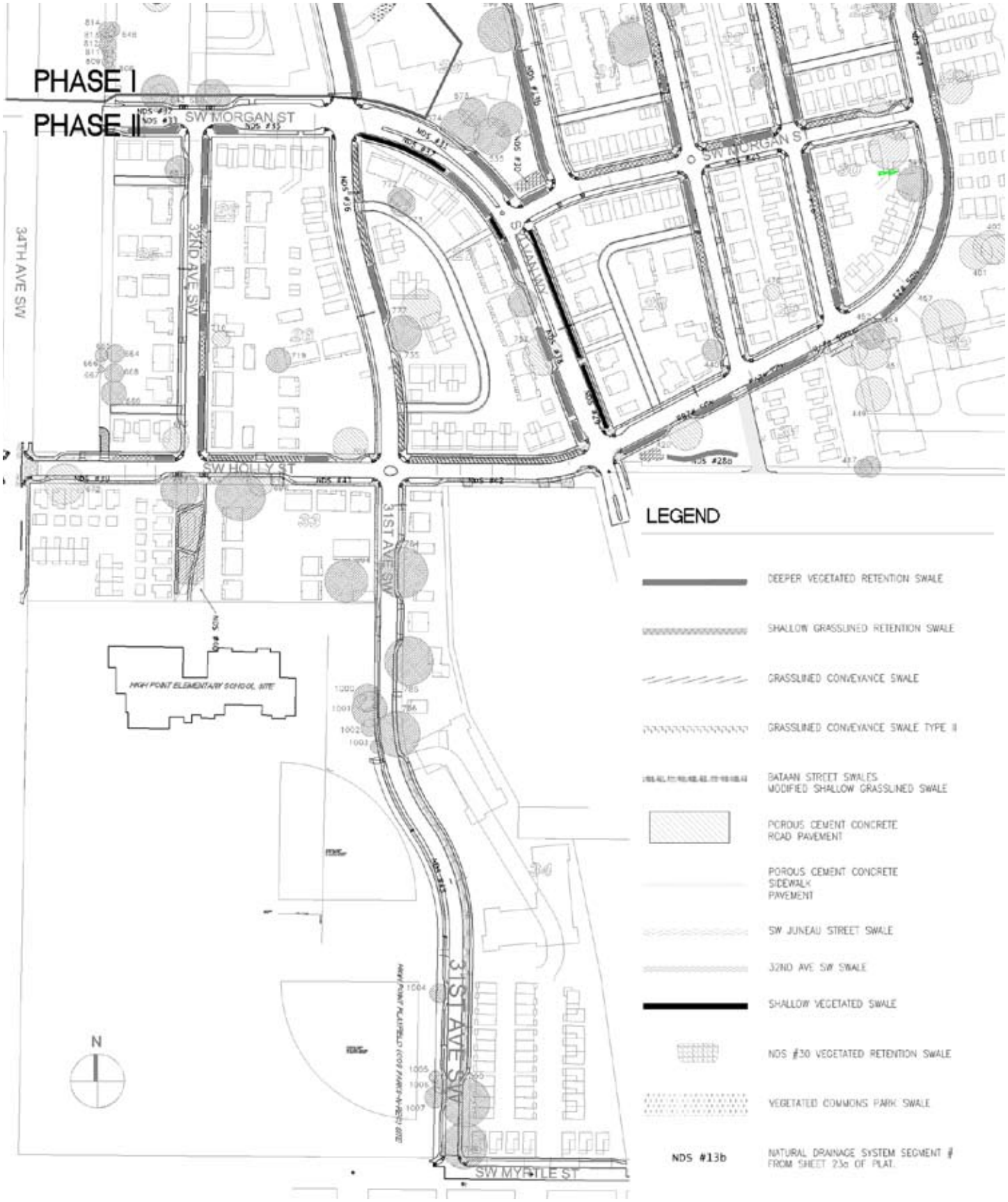
PHASE I
PHASE II
SW MORGAN ST
SW MORGAN ST
34TH AVE SW
32ND AVE SW
SULLIVAN WAY
SW HOLLY ST
31ST AVE SW
31ST AVE SW
SW MYRTLE ST
HIGH POINT ELEMENTARY SCHOOL SITE
N
LEGEND
DEEPER VEGETATED RETENTION SWALE
SHALLOW GRASSLINED RETENTION SWALE
GRASSLINED CONVEYANCE SWALE
GRASSLINED CONVEYANCE SWALE TYPE II
BATAAN STREET SWALES
MODIFIED SHALLOW GRASSLINED SWALE
POROUS CEMENT CONCRETE
ROAD PAVEMENT
POROUS CEMENT CONCRETE
SIDEWALK
PAVEMENT
SW JUNEAU STREET SWALE
32ND AVE SW SWALE
SHALLOW VEGETATED SWALE
NDS #30 VEGETATED RETENTION SWALE
VEGETATED COMMONS PARK SWALE
NDS #13b
NATURAL DRAINAGE SYSTEM SEGMENT #
FROM SHEET 23a OF PLAT.

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CREDITS

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Irrigation equipment	Name Phone Fax Email Website
Plant supplier	Name Phone Fax Email Website
Equipment supplier	Name Phone Fax Email Website
Equipment supplier	Name Phone Fax Email Website
	Name Phone Fax Email Website

1 INTRODUCTION

Natural Drainage Infrastructure

The *Right-of-way (ROW)* and *open space* landscape at High Point Community consists of parks, tree-lined streets, grass planting strips, and pockets of shrub and ground cover plantings. These elements not only serve to enhance and unify the neighborhood, they also provide a natural drainage function. This natural drainage approach to *stormwater* management utilizes conveyance and treatment structures that mimic the functions of natural systems such as streams and wetlands, through the use of soil, grading, and vegetation.

The High Point Community is located within a sub-basin of the Longfellow Creek *Watershed*. Because stormwater drainage from the High Point Community is a significant contributor to the Longfellow Creek system, the natural systems drainage approach was incorporated into the *infrastructure* of the new community to enhance *water quality* and reduce peak flows draining to the creek. High Point Community's drainage goals, defined in the Drainage Covenant and the Plat of High Point Community, are achieved through a combination of public stormwater control systems and private drainage facilities. The Natural Drainage System (NDS) is a combination of grass-lined and vegetated *swales* located in the ROW that receive street and residential stormwater runoff. This system allows stormwater to infiltrate into the soil then conveys excess stormwater through the swales to a pond that serves this drainage basin.

Natural Landscape Approach

Long-term maintenance of the High Point Community landscape will utilize a natural approach, conforming to the most current *integrated pest management* (IPM) techniques in use by the City of Seattle and King County. Using a natural landscape approach supports long-term NDS functions, reduces maintenance efforts, minimizes negative impacts on the Longfellow Creek watershed, improves the longevity and health of plantings, and enhances the quality of the environment for people who reside in the neighborhood.

High Point Community's natural landscape approach for the ROW and open spaces includes the following objectives:

- Protect the aesthetic and functional values of the Natural Drainage System.
- Use ecological methods to maintain the landscaping.
- Maintain to support an attractive, safe and user-friendly landscape.
- Protect and enhance the natural character of plantings.
- Minimize water and material waste.

Maintenance Guidelines

This manual provides the Maintenance Association with a guide to maintain the landscape and soils within the ROW and open space areas. It is a working and living document and is not intended to be an exhaustive or stand alone maintenance resource. In addition to following standard horticultural and best management practices, High Point Community maintenance should be adaptive, adjusting in response to what is learned on-site and current industry best practices.

A glossary of terms (shown in *italics)* is located in Section 9. For additional information on maintenance techniques, materials, tree preservation guidelines, plant selection and other related topics see:

- **Section 10 – Recommended Publications**
- **Section 11 – Additional Resources**
- **Section 12 – Current Tree Survey & Preservation Code**
- **Section 13 - Maps**
- **Section 14 – Included Documents**

⇒ *This icon indicates resources for further information on a particular topic. Print outs are located in Included Documents, Section 13. Related websites are listed in the Resources section.*

Maintenance Schedule At-A-Glance

Applies to All Landscaped Areas (Non-NDS and NDS)

	Remove Trash	Remove Leaf and Branch Debris	Mow Lawn	Redefine Lawn Edge	Trim Lawn	Weed Lawn Areas Including Swales	Aerate, Overseed and Topdress Lawn	Trim Planted Areas Along Paved Edges	Weed Planted Areas	Groom Perennials and Grasses	Prune Trees and Shrubs	Irrigation System
January	1 time/ week	1 time/ month								See grooming schedule, Section 2.4d		
February	1 time/ week	1 time/ month	1 time						swales 1 time		Late dormant season	
March	1 time/ week	1 time/ month	2 times	1 time	1 time	1 time			beds 1 time pond 1 time		Late dormant season	
April	1 time/ week	1 time/ month	3 times		2 times	1 time	1/3 spring and/or fall				Post bloom season	
May	1 time/ week	1 time/ month	3 times	1 time	2 times	1 time		1 time			Post bloom season	System Start Up
June	1 time/ week	1 time/ month	weekly		3 times	1 time			beds, swales and pond 1 time			Manual Walk-thru.
July	1 time/ week	1 time/ month	weekly	1 time	3 times	1 time					Prune suckers in summer	Manual Walk-thru.
August	1 time/ week	1 time/ month	weekly		3 times	1 time			beds 1 time			Manual Walk-thru.
September	1 time/ week	1 time/ week	weekly	1 time late Sept. OR...	3 times	1 time		1 time	swales 1 time pond 1 time			Manual Walk-thru.
October	1 time/ week	1 time/ week	3 times	... early Oct.	2 times	1 time	1/3 spring and/or fall				Bleeding sap pruning season	
November	1 time/ week	1 time/ week	2 times		1 time							
December	1 time/ week	1 time/ month										

Maintenance Schedule At-A-Glance

	NDS Areas*								Non-NDS Areas ONLY		Pond
	Apply Compost Mulch & Compost Tea	Sweep Porous & Regular Concrete Walks	Vacuum and/or Pressure Wash Porous Concrete Walks	Sweep Gravel Back into Gravel Pave Areas	Vacuum Sediment From Gravel Pave, Refill Gravel	Sediment Removal at Lowest Curb Cuts	Sediment Removal at All Curb Cuts	Sediment Removal at Low Points in Swales	Add Medium Bark Mulch	Fertilize	Pond Maintenance
January		1 time		1 time			1 time (plus as needed)				See Pond Operations and Maintenance Manual in Pond section of binder
February		1 time		1 time			1 time (plus as needed)				
March	Tea- 1 time March thru...	1 time		1 time			1 time (plus as needed)		After 1st weeding	Mixed plantings 1 time early spring	
April	...	1 time	1 time (as needed)	1 time			1 time (plus as needed)			lawn - 1 time late spring	
May	...June	1 time		1 time			1 time (plus as needed)	1 time / 3 yrs			
June	Mulch-1 time	1 time		1 time							
July		1 time		1 time	1 time / 3 yrs					Mixed plantings 1 time mid grow. seasn.	
August		1 time		1 time							
September		2-3 times	1 time (as needed)	1 time		every Friday (plus as needed)	1 time (plus as needed)		After last weeding	lawn - 1 time early fall	
October		2-3 times		1 time		every Friday (plus as needed)	1 time (plus as needed)				
November		2-3 times		1 time		every Friday (plus as needed)	1 time (plus as needed)				
December		1 time		1 time			1 time (plus as needed)				

* See Section 3.1a for guideline on Protecting Swales During Maintenance

2 LANDSCAPE MAINTENANCE

Regular maintenance of the High Point Community landscape enhances the appearance, safety and drainage functions of the right-of-way and open spaces.

- **Carry out regular maintenance of landscaped areas in accordance with the information contained below and the Schedule At-A-Glance.**
- **Regular maintenance includes using the High Point ROW and Open Space Maintenance Checklist.**
  - Submit all completed checklists to the Maintenance Association Site Manager.

⇒ *High Point ROW Swale Section(s) (Section 14.3)*

⇒ *High Point ROW and Open Space Maintenance Checklists (Section 14.3)*

2.1 Natural Landscape Approach

In keeping with High Point Community's natural landscape approach, all planted and lawn areas are to be cared for using integrated pest management (IPM) techniques. Physical and mechanical means should be the method of first resort for control of weeds, unwanted insects, and other pests. If chemical means become necessary, the most environmentally-benign products should be selected; all use of chemical products should follow the City of Seattle's current pesticide Tier Tables and the City and/or King County's most recent IPM guidelines. This commitment will protect the NDS, the Longfellow Creek watershed, High Point's residents and wildlife. Specific alternatives to chemical landscape maintenance products are covered in the Weed Control, Pest Control, Fertilization and Materials sections of this document.

⇒ *Tri-County Integrated Pest and Vegetation Management Guidelines (Section 14.9)*

⇒ *City of Seattle Pesticide Tier Tables (Section 14.9)*

2.2 Debris and Trash Removal

Leaves, branches and trash can prevent water and light from getting to lawn and other landscaped areas. Excessive leaf litter around plantings can provide cover for pests and allow mildew growth. Removal of this debris enhances the appearance and success of planted areas.

- **Clear leaves, branches and other organic matter from the following areas:**
  - Planting beds
  - Gutters and depressions
  - Curb cuts

leaf litter around plantings and on lawn area

- Culverts
- Trench grates
- Drainage swales
- Walks
- Lawn areas

- **Collection frequency should be 1 time/month normally, but at least 1 time/week during fall leaf drop (mid-September to mid-November or longer if needed). See Fall Maintenance, Section 2.6.**
- **Collect and properly dispose of trash/litter (1 time/week) from the following areas:**
  - Culverts
  - Trench grates
  - Catch basin grates
  - Inlet grates
  - "Beehive" grates (raised grates in swales)
  - Drainage swales
  - Gutters and depressions
  - Curb cuts
  - Walks
  - Lawn areas
  - Planting beds

2.2a Blowing

- **When using leaf blowers to move and collect organic debris, DO NOT blow any material over or across porous pavements. Material should be blown off of and away from porous paving.**

multi-bin on-site compost system

2.2b Debris and Trash Disposal

- ***Biodegradable* landscape debris should be collected for on-site composting, green waste pick up or off site disposal to a recycling facility.**
  - Dispose of NO biodegradable materials on the surface of the *hillside greenbelt*, or at landfill sites.
  - If future compost bins are located in hillside greenbelt by agreement with owner, refer to City of Seattle (COS) for slope and use requirements.
  - Do not compost any potentially diseased plant material on-site.

- **If space is available, establish small (under 3 cubic yard) on-site composting area(s) for biodegradable landscape debris (clippings, thatch, leaves, branches, annuals, dead plant materials, etc.); use the composted material to mulch the vegetated swales.**
  - Construct a simple three-bin turning system
- **Dispose of trash through COS approved waste collection.**
  - If debris is recyclable, such as bottles and cans, recycle through COS approved recycle collection.

⇒ *Plans for a 3-bin composting system (Section 14.1)*

⇒ *SPU Yard Waste Composting website (Section 14.1)*

2.3 Lawn Areas

Proper care of lawn areas will ensure an attractive appearance year-round, reduced maintenance costs and improved function of the NDS. There are two types of lawn areas in the High Point Community ROW:

- **The "traditional" grassy planting strips along the sidewalks within the ROW.**
- **The grass swales in the natural drainage system (NDS).**

⇒ *The Natural Lawn & Garden - Choosing the Right Plants for a Beautiful, Trouble-Free Garden article (Section 14.7)*

⇒ *Ecologically Sound Lawn Care for the Pacific NW (Section 14.7)*

2.3a Mowing Tasks

- **Mow with a mulching mower.**
- **Mow per At-A-Glance schedule.**
- **Maintain uniform grass height (2 to 2.5 inches)**
  - Note: the grass swales in Phase One construction include a layer of sand; however, the grass swales in Phase Two construction do not and if grass in Phase Two swales is cut short small rocks will be encountered.
- **Do not scalp**
- **Large areas - alternate mowing directions each mowing cycle.**
- **Small strips - alternate mowing directions one time per month.**

⇒ *SPU Mulching Lawn Mower information (Section 14.2)*

tree planter may be enlarged to facilitate trimming and edging of lawn

2.3b Edging

Edging of lawn areas reduces migration of lawn onto walkways and into planted areas. Areas to be edged include lawn perimeters, tree zones and other areas where the spread of lawn is not desired.

- **Redefine lawn edges with mechanical blade-type edger 3X/ year.**
  - First: Early to mid-March
  - Second: Late July
  - Third: Late September to mid October
- **Tree plantings in lawn areas should be rectangular in shape, not circular.** See Landscaping Trouble-shooting, Section 5.1f, Tree Plantings in Lawn, for recommended modifications.
- **If plants overhang lawn at lawn/planting area edge, making it difficult to trim the grass, it is acceptable to increase the planting area slightly by creating a new edge and removing excess grass.**
  - See Landscaping Trouble-shooting, Section 5.1f, Tree Plantings in Lawn, for recommended tree planter dimensions.
- **Remove clippings and debris.**
- **Do not use edger <u>within 2 feet</u> of trees to avoid accidental trunk damage.**

2.3c Trimming

Trimming of lawn areas improves their appearance.

- **Regularly trim lawn at edges using a power (or hand trimmer where needed) per At-A-Glance schedule.**
  - Lawn perimeters
  - Tree zones
  - Other areas inaccessible by mower (adjacent to poles, vaults, signs, walls, above-grade structures, and other obstacles).
- **Trim to same height as mowing.**
- **Remove clippings and debris.**
- **Do not use trimmer <u>within 2 feet</u> of tree trunks to avoid scarring.**

2.3d Weed Control

Weeds negatively impact the health of lawn areas by competing for sunlight, water and nutrients and should be kept under control.

lawn overwhelmed by clover

- **Regularly weed all lawn areas, including drainage swales, per the At-A-Glance schedule.**
- **Remove weeds manually using pincer-type weeding tools, flame weeders, or hot water weeders (see Equipment, Section 8 for information).**
- **Repair, reseed and mulch bare spots resulting from weeding in lawn areas.**
- **Pay special attention to nuisance and invasive vegetation before it establishes a foothold.**
  - Particular threats to wet areas in swales are reed canary grass and Japanese knot weed.
  - Others threats include clover, horsetail, morning glory, alder seedlings and, of course, blackberry.
  - Watch for <u>any</u> signs of these plants and remove them completely!
- **When regular maintenance cannot control lawn weeds, including clover, see Weed Control, Section 5.1c in Landscape Troubleshooting.**

⇒ *King County Noxious Weed Control brochures (Section 14.9)*

2.3e Aeration, Overseeding and Top Dressing

Lawn aeration improves root growth and water penetration into the root zone during storm events and irrigation. Reseeding with a top dressing will help to maintain dense and healthy lawn areas. Begin lawn aeration Spring 2007. In the NDS areas topdressing is compost only, with a sand/compost mix used in the non-NDS areas.

- **Aerate one-third of the total lawn areas one time per year in the spring and/or fall.**
- **Rotate applications to achieve 100% lawn area coverage every 3 years minimum.**
  - Adjust aeration schedule based on need (some areas one time per year and others only as required to meet the 3 year minimum rotation).
  - More frequent aeration is recommended where clover is an issue.
- **Complete a double aeration pass for greater impact, especially where soil condition or lawn coverage is poor.**

- **Vacuum plugs after aeration, before topdressing.**
  - Dispose of plugs in accordance with COS requirements.
- **Overseed following aeration, when conditions are good for germination and growth.**
  - Typically between March 15 to April 15 in the spring, or September 15 to October 15 in the fall.
- **Apply seed mix at a rate of approximately 7 pounds/1000 sf.**
  - Adding a mycorrhizal inoculant to the seed mix will give an extra boost, especially in problem areas. See Materials and Products, Section 7.1d.
- **Apply topdressing at a rate of approximately 1.5 cy/1000 sf.**
  - NDS areas: Use specified compost topdressing
  - Non-NDS areas: Use specified compost/sand mix, 70/30, topdressing.
- **Rake or drag topdressing to:**
  - Fill plug holes. This is critical for NDS function.
  - Provide ¼ to ½ inch topdressing depth.
- **To prevent accumulation of surface organics, check a soil core prior to repeated applications to see that previous applications have been mixed into the upper soil.**
- **Note: If drainage systems are clogged by sand used in non-NDS topdressing mix, discontinue use of sand in those areas.**
- **Note: Timing of compost application should be after aeration/overseeding/topdressing. See Section 2.3g.**

2.3f Fertilization

Fertilizer is used to replenish nutrients within the soil, which enhances the appearance of lawn areas.

- **Do not apply fertilizer to NDS lawn areas.**
- **Fertilize non-NDS lawn areas 2 times per year (late spring and fall). See the At-A-Glance schedule for timing.**
  - Note: Natural fertilizers must be applied before October 15th.
  - Note: Apply fertilizer after aeration/reseeding/topdressing.

- **Use only approved natural, non-chemical fertilizers. See Materials, Section 7.**
- **Consider using corn gluten to naturally "weed and feed" lawn areas. See Materials and Products, Section 7.4a.**
- **Follow product guidelines for application schedule and rates.**

2.3g Compost and Compost Tea

A compost topdressing or application of compost tea introduces nutrients and beneficial microorganisms to the soil, resulting in improved growing conditions. Compost and compost tea is approved for application to the NDS lawn areas.

- **Apply 1 inch layer of specified compost mulch to NDS lawn areas 1 time per year (spring or fall, opposite of aeration/topdressing schedule).**
- **Apply compost tea 1 time per year (between March and June).**
  - Outdoor temperature should be above 40 degrees and below 90 degrees.
  - Avoid applying in bright sunlight, which can kill the beneficial organisms in compost tea.
  - Compost tea must be used within 24 hours of tea production to ensure product quality.
  - Order special "brews" for different uses, plant types and/or soil conditions.
- **If excess buildup results from compost applications, replace compost mulch application with a compost tea application.**
- **If nutrient deficiencies exist, apply additional compost tea applications.**
- **See Materials, Section 7.4 for specified compost and approved compost teas.**

2.3h Lime Application

Acidic conditions may allow moss to establish in lawn areas. Lime can be used periodically to correct soil conditions by raising the pH. This adjustment improves the ability of lawn areas to take in nutrients. See the Moss section under Landscape Trouble-shooting, Section 5.1e for more information.

2.3i Pest Control

The best way to prevent pests is by following a regular maintenance schedule for a natural healthy lawn. If pest populations become too large, however, they can negatively impact lawn health and appearance. Under these conditions, pest control may be needed.

- **Monitor lawn for signs of pests, such as wilting grass, bare areas, spotting or other indicators.**
- **Control lawn pest insects by applying beneficial nematodes to the soil. See Materials, Section 7.2 and follow manufacturer instructions.**
- **Remove pests using IPM-approved natural pesticides. See Materials, Section 7.2. Reapply, if necessary.**

⇒ *WSU Extension - Gardening Fact Sheets (Section 14.9)*

⇒ *Journal of Pesticide Reform - Managing Crane Flies in Lawns article (Section 14.9)*

2.4 Planted Areas - Tree, Shrub and Ground Cover Care

The following information is a guideline for the long-term maintenance of planted areas in the ROW, pond and the NDS swales at the High Point Community. For further information on plant care and pruning techniques see the resources in the Included Documents and Recommended Publications sections.

2.4a Staking and Guying

Stakes and guys are used to support trees during establishment.

- **Repair tree stakes and guys as needed.**
- **Remove tree stakes as soon as they are no longer needed for tree stabilization.**
  - Minimum of one year and a maximum of two years after installation.
- **Inspect and adjust stakes and connections to provide support, to prevent girdling of trunks or branches, and to prevent rubbing that causes bark wounds.**

⇒ *High Point Tree Staking Detail (Section 14.3)*

2.4b Edging and Trimming Planted Areas

Edging and trimming of planted areas to control ground covers and shrubs from overreaching the sidewalks, paths and street edge improves appearance and reduces clogging of porous pavements by leaf litter, mulch and soil.

- **Redefine edges with mechanical blade-type edger 2X/ year.**
  - First: early to mid-May
  - Second: early to mid-September
- **Remove clippings and debris.**
- **Do not use edger or trimmer within 2 feet of tree trunks.**
- **Where plant migration onto porous pavement is an issue, see Drainage Facilities Modification, Section 6.2b Porous Pavement and Ground Cover Migration.**

strawberry ground cover encroaching on porous walk

2.4c Weed Control

Weeds compromise plant health by competing for water, nutrients and sunlight. Weeds can be controlled through hand-removal, flame or hot water weeders, mulching and the use of herbicides approved through the IPM process.

- **Weed all planted areas, including the vegetated swales and the pond hillsides, per the following schedule:**

Month	Weeding Schedule by Landscaped Area Type		
	Planted beds	Vegetated swales	Pond area
February		X	
March	X		X
June	X	X	X
August	X		
September		X	X
October	X		

- **Remove weeds with their roots manually with pincer-type weeding tools, flame weeders, or hot water weeders as appropriate.**
- **Spot treat stubborn weed infestations with an IPM-approved fatty-acid (soap) based non-selective herbicide. Reapply, if necessary.**
- **Remove weeds with their roots.**
- **Watch for and respond to new occurrences of especially aggressive weeds such as Himalayan blackberry, Japanese knotweed, morning glory, English ivy, reed canary grass and horsetail to avoid invasions.**
- **When installed plants appear overly aggressive, see Section 5.2e When a Landscape Plant Becomes a Weed**

weeds establishing in ground cover plantings

- **Monitor and maintain records of weeds as time allows:**
  - Establish tolerance thresholds within a maintenance program.
  - Evaluate and record effectiveness.
  - Modify maintenance plan to promote plant recovery and prevent weed recurrence.

⇒ *Tri-County Integrated Pest and Vegetation Management Guidelines (Section 14.9)*

⇒ *City of Seattle Pesticide Tier Tables (Section 14.9)*

⇒ *Sample Maintenance Log forms (Section 14.7)*

⇒ *King County Noxious Weed Control brochures (Section 14.9)*

⇒ *WSU Extension - Gardening Fact Sheets (Section 14.9)*

⇒ *TNC Weed Management - Documents for Reed Canary Grass, English Ivy and Himalayan Blackberry (Section 14.9)*

⇒ *Journal of Pesticide Reform - Nonchemical Methods for Removing Unwanted Blackberry Plants (Section 14.9)*

2.4d Pest Control

Pests can compromise the health of plants by increasing their vulnerability to disease and should be kept under control. The best way to control pests is to prevent them in the first place. When needed, however, pests can be controlled through the use pesticides that are approved through the IPM process.

- **Reduce hiding places for pests by removing diseased and dead plants.**
- **Look for signs of pests, such as wilting leaves, chewed leaves spotting or other indicators.**
- **For infestations, apply an IPM-approved, soap-based or other pesticide. See Materials, Section 7.2 for approved products.**
- **Monitor and maintain records of pest infestations with every site visit:**
  - Establish tolerance thresholds within a maintenance program.
  - Evaluate and record effectiveness.
  - Modify maintenance plan to promote plant recovery and prevent pest recurrence.

⇒ *Tri-County Integrated Pest and Vegetation Management Guidelines (Section 14.9)*

⇒ *City of Seattle Pesticide Tier Tables (Section 14.9)*

⇒ *Sample Maintenance Log forms (Section 14.7)*

⇒ *WSU Extension - Gardening Fact Sheets (Section 14.9)*

⇒ *WSU Extension - Insecticidal Soaps Info Sheet (Section 14.9)*

2.4e Grooming Perennials and Ornamental Grasses

Grooming maintains a tidy appearance and encourages next year's growth and flowering. Grooming includes cutting off spent blooms and leaves, deadheading during the bloom period and hand-raking or cutting back grasses.

- **Flowering plants – remove spent flowers (deadhead) by cutting just above the nearest branch or bud.**
- **Perennials – cut back dying or dead and fallen foliage and stems.**
- **Perennial grasses – leave dry foliage for winter interest. Cut it back to within several inches from the soil <u>before</u> new growth emerges or earlier if the foliage collapses.**
- **Evergreen grasses - Hand-rake with a small rake or fingers to remove dead growth. Cut when grasses become too tall.**
- **See resource section for additional information on plant specific grooming methods and timing. See the table below for a general plant grooming schedule.**
- **High Point plant-specific grooming techniques should be reviewed with the Association Manager.**

Season	**Grooming Perennials and Ornamental Grasses**			
	Flowering plants	Perennials	Ornamental grasses (perennial)	Ornamental grasses (evergreen)
Fall		cut back spent plants	leave foliage for winter interest	cut back to ground or thin every 2-3 years as needed
Winter			cut back if foliage collapses	
Spring	deadhead 1 time/ month during bloom period		cut back before new growth emerges	**hand-rake before new growth emerges**
Summer	deadhead 1 time/ month during bloom period			

perennial grasses provide winter interest

perennial grasses cut back in late winter

new growth emerges from trimmed grasses

2.4f Pruning

low growing branches over walkway

Pruning is performed to promote plant health, enhance the natural character of trees and shrubs, meet clearances for vehicular and pedestrian traffic and for visual safety. Improper or excessive pruning can increase vulnerability to pests and disease and result in unnatural, oddly shaped plants.

Reasons for Pruning

- **Enhance the natural growth and shape of the plant.**
- **Maintain proper sight lines for vehicular and pedestrian safety.**
  - Provide a minimum height clearance at roadways and walkways for vehicular and pedestrian traffic.
  - Remove visual obstructions of street signs, traffic signals and streetlights to provide clear visibility, especially at intersections.
- **Maintain appropriate access for pedestrian and vehicular use and facilities.**
  - Keep ADA ramps in intersections clear by pruning shrubs and ground covers to prevent them from overflowing onto the ramps.
- **Prevent some evergreen grasses (rushes) from becoming too tall. These grasses can be cut back or thinned if over-crowding occurs.**
- **<u>Note</u>: Maintenance of the cherry trees located on SW Sylvan Street along the cemetery property shall be performed by the Maintenance Association.**

cut back aggressive fragaria if needed so that slower growing plants may establish

When to Prune

The best time to prune most shrubs and trees is during the dormant season. Late winter pruning leaves wounds exposed for a shorter time before spring growth can heal them. It is also easier to see and make proper cuts without leaves obscuring the branches.

- **There are exceptions to dormant season pruning - always check pruning resources for each plant species before cutting.**
- **Annually assess for pruning needs by plant type.**
  - Late winter for dormant season plant group
  - Spring following bloom for some early blooming trees and shrubs
  - Fall for sap bleeder plant group
  - Summer for removing suckers from trees

- **See the At-A-Glance schedule for an overview of pruning timing.**
- **Inspect trees for limb damage following large storm events with high winds, freezing conditions and/or snow accumulation.**
- **Where shrubs and ground covers are planted around street trees, prune 3 years after they are installed and again every 1 to 2 years or as needed.**
  - This pruning is intended to maintain a maximum height of 36 inches for sight clearance.
- **When continued, regular pruning (more than one time/ growing season) is required to maintain visual sight lines for safety or clearance along a walk or drive, consider relocating the plant to a more appropriate location. See Trouble-shooting, Section 5.2c Relocating Plants.**

bad pruning with cut made at the wrong angle and torn bark

How to Prune

Proper cutting technique is a critical step in avoiding disease. It also lends to a more natural and attractive appearance.

- **Never leave a stub!**
- **Remove any dead, diseased or damaged growth.**
- **Remove severely crossing tree branches and branches that grow in toward the tree trunk.**
- **Do not shear, top, heavily prune or hedge plantings. Always cut just above future growth (a bud or stem).**
- **Plantings (shrubs & ground covers) in and adjacent to intersections should be pruned to a 3 foot maximum height.**
- **Trees branches should be pruned to allow 8 feet clearance over sidewalks and 14 feet over roadway travel lanes.**
  - See Conifer Pruning, Section 2.4h, for guidelines on pruning young conifers
- **Use the right tool for the job.**
- **Cut at the correct angle.**
- **Look under Recommended Publications, Section 11 for further resources on pruning.**

⇒ *Plant Amnesty Pruning Guide (Section 14.4)*

good pruning with branch collar left intact

2.4g Mature Tree Care

- **The mature trees at High Point have different needs. Contact an ISA certified arborist for tree by tree maintenance recommendations.**
- **All pruning of mature trees should be performed by or under the direct guidance of an ISA certified arborist.**
- **When working around and below mature trees take care to minimize any damage to tree roots and avoid compaction of soil.**
- **Planting of small shrubs or groundcovers beneath mature trees may be desirable in some cases; such plantings should use mainly plants that come as bulbs, bare root or in 4-inch (4") pots; plants should be in no larger than 1 gallon containers.**
- **If planting below mature trees, select species that tolerate some shade, are not overly aggressive or invasive, and are suitable for the conditions. Potentially suitable plants include *Epimedium* species, mondo grass, ferns, kinnikinnick, and various bulbs.**
- **See Open Space Association requirements for specific conditions that may be required for access to mature trees. Some locations may require a temporary street use permit for access and pruning work.**
- **See Current Tree Survey & Preservation Code, Section 12, for further information on current mature tree conditions and regulations affecting their care.**

2.4h Conifer Pruning

Conifers along the right-of-way shall be pruned (limbed up) as growth allows.

- **Maintain 3 foot clearance from grade for the first three years after planting.**
- **Limb up as growth allows to eventually achieve 6 to 7-foot clearance.**
- **Thin internal branches as appropriate for species.**
- **No topping of conifers.**
- **Pay particular attention to cypress or cedar trees that may be diseased, and take precautions to avoid spread of disease on site. Do not chip or compost trimmings on site. See Diseases, Section 5.2b.**

2.4i Non-NDS Areas - Bark Mulch Replacement

Bark mulch reduces the ability of weeds to establish and keeps soil moist longer. Bark mulch is not used in the NDS planted areas. Composted mulch may, however, be used in non-NDS areas (see section 2.4h) given maintenance staff accepts that additional weeding may be required.

- **Use a medium-grade Douglas fir bark mulch, not shredded or chips.**
- **Apply 1 to 2 inches of mulch 2 times/year.**
  - First following first weeding of growing season
  - Second following fall weeding (September or October)
- **See Materials, Section 7.3 for approved mulch products.**

medium bark mulch around trees and shrubs in non-NDS areas

2.4j NDS Areas - Composted Mulch Replacement

Composted mulch reduces the ability of weeds to establish, keeps soil moist longer and replenishes nutrients in the soil. Compost is used in place of bark mulch for all NDS planted areas.

- **Apply 1 to 2 inches of composted mulch 1 time/year.**
  - Following the June weeding
- **Use only specified composted mulch. See Materials, Section 7.3 for approved composted mulch products.**

composted mulch on swale sideslope planting

2.4k Fertilization (Non-NDS Only) and Compost Tea

Fertilizer and compost tea are used to replenish soil nutrients, enhancing the appearance of planted areas. For the health and maintenance of the High Point landscapes and to reflect the goals of High Point Community, fertilizers must be made of non-chemical ingredients and are only applied to the non-NDS areas.

- **Apply NO fertilizers in the NDS or Pond areas without prior approval by the Maintenance Association Site Manager.**
- **Apply compost tea to NDS planted areas 1 time per year (between March and June).**
- **Additional applications of compost tea may be made in the NDS and non-NDS areas as needed.**
  - See Compost and Compost Tea, Section 2.3g, for guidelines on the application of compost tea

plant mortality

- **Fertilize non-NDS planted areas per the following guidelines:**

Non-NDS Planted Area Fertilizer Guidelines	
Deciduous trees	Use deep root injection system. Fertilizer, application and timing as approved by an ISA certified arborist.
Conifers	Apply only as needed.
Mixed planting areas	Once early spring (Feb. - Mar.). Second time (mid growing season) where nutrient deficient.
Gaultheria shallon (salal)	Typically does not benefit from fertilizing.
Ornamental grasses	Typically do not benefit from fertilzing.

- **See Materials, Section 7.4, for approved fertilizers and compost tea.**

2.5 Plant Replacement and Installation

Plants may die due to unsuitable conditions or microclimates, disease, pests or other unforeseen issues. These plants must be removed/ replaced to avoid the spread of disease, establishment of weeds in bare areas and reduction of NDS functionality. Proper and careful installation of plant material will increase establishment rates and reduce maintenance requirements. Unless otherwise noted, the information in this section can be applied to B & B, bare-root and container plants.

dead tree requiring replacement

- **Report dead and dying plants immediately to Maintenance Association Site Manager to obtain direction regarding their replacement.**
- **Coordinate removal and replacement of dead and dying plants within 30 days of notification by the Maintenance Association Site Manager.**
- **Replacement vegetation shall be of equal size, conditions, and variety (when appropriate) to original plantings.**
- **For replacement guidelines, see Landscape Troubleshooting, Section 5.2d Plant Species Replacement.**
- **Confirm that as-built conditions are appropriate for species planted there. When conditions are not working for the original plantings, see Landscape Troubleshooting - Plant Species Replacement, Section 5.2d.**

⇒ *WSU Community Horticulture - Planting Landscape Plants Fact Sheet (Section 14.4)*

2.5a Planting Pit Preparation

- **Excavate circular plant pits and scarify vertical sides**
  - Use care when planting near existing plants.
- **Provide planting pits at least twice the diameter of the root system or container and deep enough to accommodate the entire root ball.**
- **For trees, scarify the bottom and sides of the pit to a depth of approximately 4 inches into adjacent soil.**

fern planted with crown too high above finish grade

2.5b Tree and Shrub Placement

Proper placement of plants improves a plant's ability to establish and its long-term growth.

- **Container plants - carefully remove plants from containers.**
- **If plant is rootbound or roots are growing in a circle, loosen them.**
- **Set crown of plant material at the finish grade. Avoid filling soil around trunks or stems or above grafts on grafted trees.**
- **Backfill planting pit with native soil that is not frozen or muddy. For areas needing NDS soil replacement less than 2 cu. ft., use NDS minor soil replacement mix. See Section 7.5d.**
- **Trees and B & B plants - form a raised ring of soil around the edge of the planting pit to retain water. Provide water bags to allow for establishment watering.**
- **B & B plants - cut away and remove all burlap or plastic wrapping materials, twine, wires, and wire baskets from root balls. Avoid damage to the rootball, particularly cracking, which can lead to dessication.**
- **Following planting, broadcast approved natural fertilizer (non-NDS areas only) at rate recommended by supplier, but not to exceed one-half pound (1/2#) of nitrogen per 1,000 square feet.**

2.5c Ground Cover Placement

Ground covers are used to enhance the character of planted areas, reduce the ability of weeds to establish and reduce erosion. Proper spacing ensures full coverage of an area once plants are established.

- **Follow plant placement guidelines in the previous section.**

ground cover spacing "on-center"

- **Space ground cover plants using on-center (O.C.) triangular spacing following the Ground Cover Spacing Chart located in Section 13, Included Documents.**
- **Adjust spacing as necessary to evenly fill planting bed with indicated quantity of plants and to avoid damaging roots of adjacent plants.**
- **Plant to within eighteen inches (18”) of tree trunks and shrubs and to within twelve inches (12”) of the planting bed edge.**

⇒ *Ground Cover Spacing Chart (Section 14.4)*

2.5d Mulching Replacement Plantings

Mulch all replacement plantings to reduce weed establishment and keep the soil moist for longer periods.

- **Apply the appropriate mulch type for the area:**
  - Composted mulch for NDS planted areas
  - Medium bark mulch for non-NDS areas
- **Mulch to a depth of two inches (2”) immediately after planting.**
- **Thoroughly water mulched areas.**
- **After watering, rake mulch to provide a uniform finished surface.**

stakes and guys on a newly planted tree

2.5e Staking Replacement Plantings

Stake newly planted replacement trees to stabilize and prevent leaning during establishment.

- **Stake all deciduous and coniferous trees immediately after planting.**
- **See Included Documents, Section 10 for approved staking detail.**
- **Follow Section 2.4a for staking and guying maintenance.**

⇒ *High Point Tree Staking Detail (Section 14.3)*

2.6 Fall Maintenance

This section on fall maintenance has been included to address issues that are pertinent at all times of the year, but need particular attention during the fall. This is due to the large volume of leaves and plant material dropped by trees and other plants during the fall. Stormwater from the typical wet fall weather patterns will tend to collect and concentrate the plant material in low areas during that time of year, potentially leading to blocked elements in the NDS and erosion, washouts, excessive ponding, or flooding.

See map of Low Points in NDS System, Section 13.1, for sketch of low points in the streets for priority checking in the fall.

2.6a Leaf Blowing

Leaf blowing and collection should be done regularly, to prevent excessive transport and buildup of leaves in the natural drainage system features and along curb gutters.

- **When using leaf blowers to move and collect organic debris, DO NOT blow any material over or across porous pavements. Material should be blown off of and away from porous paving.**
- ***Biodegradable* landscape debris such as fallen leaves should be collected for on-site composting, green waste pick up or off site disposal to a recycling facility.**
  - Dispose of NO biodegradable materials on the surface of the *hillside greenbelt*, or at landfill sites.
  - If future compost bins are located in hillside greenbelt by agreement with owner, refer to COS for slope and use requirements.
  - Do not compost any potentially diseased plant material on-site.

2.6b Clearing Curb Cuts and Drain Inlets

Curb cuts and drain inlets are particularly susceptible to clogging in the fall during the leaf drop period. These areas should be cleared regularly during the fall; see the Maintenance Schedule At-A-Glance.

- **Clear the lowest curb cuts and drain inlets at regular intervals, and first during and after any storm events.**
- **Clear leaves, debris, and sediment from all curb cuts, culverts, and drain inlets at least once a month; see Schedule At-A-Glance.**
- **Check for any signs of erosion within the NDS, and if found follow the maintenance and repair guidelines found in Erosion, Section 3.1c.**

3 DRAINAGE FACILITIES MAINTENANCE

Regular maintenance of the natural drainage systems enhances their appearance and long-term function. Features associated with the NDS, such as drain curb cuts, inlets, culverts, pedestrian berms and porous cement concrete walks, driveways and streets require their own scheduled upkeep.

- **Carry out regular maintenance of all drainage facilities in accordance with the following guidelines.**
- **Regular maintenance includes monitoring of drainage facilities using the Maintenance Checklist.**
  - Submit all completed checklists to the Maintenance Association Site Manager.

⇒ *High Point ROW Swale Section(s) (Section 14.3)*

⇒ *High Point ROW and Open Space Maintenance Checklists (Section 14.3)*

3.1 Drainage Swales

3.1a Protecting Swales During Maintenance

Soils in natural drainage areas have been carefully engineered and installed to allow specific stormwater infiltration rates and capacities, while providing appropriate conditions for plant growth. Care must be taken when working in swales to avoid soil compaction, which would alter their stormwater function. This includes swales planted with shrubs and ground covers, as well as the grass-lined swales.

- **When performing extensive maintenance in swales (such as major plant changes, tree removal, utility or irrigation work) place 2- to 4-foot long x 6- to 8-inch wide board(s) for walking and standing on in swales, to distribute weight and avoid soil compaction.**
  - Stay on board during construction/repairs to reduce compaction.
  - Lay board flat on bottom of swale taking care not to damage plants.

3.1b Debris

- **Clean out trash**
  - One time per week
  - If rain is forecasted, verify all culverts, openings for drainage structures and grates are clear of debris and monitor during storm event.

debris in swale

  - Within 1 to 2 days after all major storm events (1 inch or more rainfall in 24 hours).

- **Remove organic debris (leaves, twigs and plant material)**
  - One time per month normally, but 1 time/week during fall leaf drop (mid September to mid November or longer if needed)
  - Within 1 to 4 days after rainfall to prevent debris blockage.
- **When working in swales, protect from compaction following guidelines in Section 3.1a.**
- **Deposit trash and other debris in proper waste facilities.**
  - All biodegradable debris (leaves, branches and dead plant material) to on-site composting, green waste pick up or off site yard recycling facility.
  - Dispose of NO biodegradable materials in the hillside greenbelt, in regular waste bins, or at landfill sites.
  - Dispose of trash through COS approved waste collection.
  - If debris is recyclable such as bottles and cans, dispose of through COS approved recycle collection.
- **Immediately report any contaminants found in swales (paint, oil, gas, antifreeze, or other spilled/dumped pollutants) to the Maintenance Association Site Manager.**
  - If a vehicle is associated with the spill, record and report the license number.
  - Maintenance Associate Site Manager is responsible for reporting spills to SPU's Surface Water hotline at 206/684-7587 and SPU's Maintenance Division at 206/386-1800.
- **Once reported, follow applicable safety standards to remove substance from swale.**

channeling and erosion in grass swale

3.1c Erosion

Soil erosion (such as channels, cuts and soil migration) can be caused by improper stabilization through plantings, grading issues and point discharge. Eroded areas can clog the NDS and reduce its ability to function as a drainage system. The following steps are required to minimize erosion impacts:

- **Inspect for channels or cuts over 2 inches wide throughout the swale.**
  - One time per month.

  - Within 1 to 4 days after all major storm events (1 inch or more rainfall in 24 hours).

- **Report erosion on Maintenance Checklist sheet and submit to Maintenance Association Site Manager.**
  - Note channel or cut location on map provided with checklist.
  - Clearly describe location.
  - Note if channel or cut is reccurring.
- **Note: A supply of specified NDS Soil Mix #1 shall be kept in maintenance vehicle during all routine maintenance activities and at least one cubic yard shall be kept on-site at all times.**
- **When working in swales, protect from compaction following guidelines in Section 3.1a.**
- **Shallow channels (under 3 inches in ponding depth) shall be graded out and remulched.**
- **For deep channels or cuts (over 3 inches in ponding depth), temporary erosion control measures should be put in place until permanent repairs can be made.**
  - Install coir logs or compost berms across the path of erosion, as a temporary measure during seasons or weather when seeding or plants will not have time to establish and hold soil in place
  - When weather permits, eroding areas shall be filled with NDS Soil Mix #1 and compacted lightly with hand tamper.
  - See Materials, Section 7.5 for approved NDS Soil Mix #1.
- **Install plants or sod, or reseed area.**
  - Replace vegetation with in-kind material.
  - See Plant Replacement & Installation, Section 2.5.
- **Mulch newly planted vegetation.**
  - See Mulching, Section 2.5d and Materials, Section 7.3
- **Check area within 6 weeks to see all exposed soils within the facility are covered by erosion control material (seed, vegetation, sod, or the like).**
- **If repeated erosion occurs, see Excessive and Repeated Erosion, Section 6.1A.**

3.1d Sediment Accumulation

erosion and sediment build-up in swale

Sediment can accumulate in the bottom of drainage swales due to erosion or silty runoff. Sediment may also accumulate at curb cut openings or other low points where water slows down or backs up. This sediment can infiltrate into open spaces of the NDS soil and clog it, reducing its function.

- **Where sediment accumulation is visible remove it.**
- **Only remove sediment when the facility is dry.**
- **When working in swales, protect from compaction following guidelines in Section 3.1a.**
- **Remove manually, using shovels.**
- **Dispose of sediment in accordance with COS requirements.**
- **Replace any vegetation damaged or destroyed by sediment accumulation and removal.**
  - Replace vegetation with in-kind material.
  - See Plant Replacement & Installation, Section 2.5.
- **Mulch newly planted vegetation.**
  - See Mulching, Section 2.5d and Materials, Section 7.3
- **Report areas of heavy or frequent sediment buildup on Maintenance Checklist Sheet and submit to Maintenance Association Site Manager.**
- **Monitor sediment accumulation to identify problem areas, as time allows.**
- **For problem areas, see Sediment Buildup, Section 6.1b.**

3.1e Ponding and Mosquito Control

ponding at swale bottom

Areas of shallow ponding for longer than 72 hours may become breeding areas for virus carrying insects such as mosquitoes. Proper monitoring of swales and other low points beginning in early spring and continuing through the fall, until cold weather ends mosquito activity, can reduce these risks.

- **Do not use pesticides or Bacillus thuringiensis israelensis (Bti). They are not permitted.**
- **Remove cattails from stormwater pond.**
- **See High Point's Stormwater Pond Maintenance Manual for additional recommendations regarding mosquito control for the pond.**
- **Monitor infiltration rates of water in grass-lined and vegetated swales.**

- If water does not infiltrate within 24 hours, contact Maintenance Association Site Manager.

- **Where excessive sediment causes ponding, see Ponding, Section 6.1c for corrective actions.**
- **If ponding lasts up to 72 hours alert the Maintenance Association Site Manager to contact SPU Maintenance Division at 206/386-1800.**

⇒ *SPU - "About West Nile Virus" (Section 14.8)*

⇒ *City of Seattle, West Nile Virus Response Plan (Section 14.8)*

3.1f Drain Curb Cut Openings

Street runoff is directed to the drainage swales through cuts in the curbs. These cuts must be unobstructed to allow water to flow from the street to the NDS.

- **Remove accumulated sediment within the drain curb cut opening when accumulation exceeds 1/2 inch and/or when water is blocked from draining into the swale.**
  - Follow removal guidelines in Sediment Accumulation, Section 3.1d.
- **Remove any accumulated debris within the drain curb cut opening. Dispose of debris properly.**
- **Manually remove any weeds that establish in pavement cracks at drain curb cut.**
- **In grass swales, maintain grass low and trimmed at drain curb cut opening to facilitate water flow in to swale.**
- **Monitor during rain event to ensure proper functioning.**
- **In planted swales where vegetation blocks flow from entering, adjust location of plants located within 1 foot (1') of curb cut opening.**
- **Report any damage to the drain curb cut opening such as chipped concrete or cracking.**
- **Report any damaged or missing bronze art element curb cut markers to the Maintenance Association Site Manager.**
- **Coordinate with Maintenance Association Site Manager on repair and/or replacement.**
- **Report sediment accumulation at drain curb cut openings on Maintenance Checklist Sheet and submit to Maintenance Association Site Manager.**
- **Monitor sediment accumulation to identify problem areas.**

examples of sediment build-up in drain curb cut openings

curb cut inlet art requires sediment removal

overflow channel and pedestrian berm

- If repeated erosion occurs at a drain curb cut opening, see Drainage Facilities Modifications, Section 6.1.

3.1g Overflow Channels and Pedestrian Berms

Overflow channels and pedestrian berms are raised areas between individual drainage swale cells. These areas are intended to direct stormwater and provide crossings for pedestrians. They must be kept clear of sediment, debris and other obstructions at all times to facilitate movement of stormwater.

- **Remove any sediment within the overflow channel when accumulation exceeds depth of 1 inch.**
  - Follow removal guidelines in Sediment Accumulation, Section 3.1d.
- **When working in swales, protect from compaction following guidelines in Section 3.1a.**
- **Remove any accumulated debris.**
  - Dispose of debris in accordance with COS requirements.
- **Maintain grass and/or vegetation within the overflow channel.**
  - Replace any damaged or dead vegetation and reseed bare lawn areas.
  - Replace with in-kind plant material.
  - For more information see Plant Replacement & Installation, Section 2.5.
- **If vegetation across a pedestrian berm is excessively worn, see Drainage Facilities Modifications, Section 6.1h.**

3.1h Culverts (Outlets)

outlet

Culverts, also called outlets, direct stormwater via storm pipes under driveways or pedestrian pathways from one drainage swale cell to the next and from the site to the Community Pond.

- **When working in swales, protect from compaction following guidelines in Section 3.1a.**
- **Remove any accumulated sediment within the culvert or path to culvert.**
  - Follow removal guidelines in Sediment Accumulation, Section 3.1d.
- **Maintain grass and/or vegetation within the route of travel to the culvert.**

- **Maintain grass low and trimmed along the path to the culvert.**
- **Remove debris and obstructions within the path to the culvert.**
- **In planted swales where vegetation blocks flow from reaching a culvert or outlet, the location of vegetation planted within two feet (2') of an outlet may be adjusted slightly to allow for improved flow to the culvert/outlet.**
- **During rain events, monitor culverts to ensure pipes are clear for conveying stormwater.**

3.1i Catch Basins and Inlets

Catch basins and inlets are structures that collect stormwater and direct it to the community pond via a storm pipe. Maintenance of the interior of the structures themselves is the responsibility of Seattle Public Utilities (SPU). However, keeping the nearby gutters and catch basin grates clear will reduce maintenance and benefit the NDS.

inlet grate

- **Remove debris and obstructions from catch basin and inlet grates within the public right-of-way.**
- **During rain events, monitor grates at catch basins and inlets in order to ensure structures are clear and able to collect stormwater.**
- **Manually remove and properly dispose of sediment and weeds that establish in pavement cracks adjacent to catch basins.**

3.2 Hardscape and Other Features

There are various types of porous pavements constructed at High Point. Porous cement concrete pavement is cement concrete pavement without the sand in the mix which allows water to filter through the pavement section into the underlying gravel subbase layer below the pavement section. Porous gravel pave pavement is a grid cell system filled with gravel and placed over a gravel subbase layer below the grid cells.

Porous cement concrete walks, gravel pave parking stalls and porous cement concrete streets serve to reduce stormwater runoff by capturing rainwater in voids of the pavement's gravel subbase and allowing it to infiltrate. Keeping the porous pavement surfaces clean and free of plants decreases sediment clogging and lengthens their functional life.

Note: Maintenance of the porous street on 32nd Ave SW is the responsibility of the City; however routine maintenance of the porous sidewalks in the right-of-way is the responsibility of the Association. If

major clogging occurs that results in extensive ponding, then notify SPU for maintenance.

3.2a Porous Cement Concrete Walks

soil and mulch deposited on a porous cement concrete walk

- **Manually sweep walks to maintain appearance per Right-of-way Maintenance Schedule At-A-Glance.**
- **Vacuum and/or pressure wash walks per Right-of-way Maintenance Schedule At-A-Glance.**
- **Watch for washouts from planted areas where soil, mulch or sediment is deposited on walks.**
  - Clear immediately and vacuum or sweep area.
  - Report washouts on Maintenance Checklist Sheet and submit to Maintenance Association Site Manager.
  - Monitor washout occurrences to identify problem areas.
  - For problem areas, follow guidelines in Section 6.2a, Washout, for corrective actions.
- **Moss growth has been a particular issue for porous pavements in the Pacific Northwest. Moss begins to fill in the open pores in the concrete aggregate and can reduce or block stormwater infiltration.**
  - The extent of moss growth should be controlled through regular cleaning and maintenance. See Right-of-way Maintenance Schedule At-A-Glance.
  - Pressure washing, vacuum sweeping, or some combination of the two have been found to be effective for cleaning moss from porous concrete.
  - Both the City of Seattle (SPU) and the City of Olympia have tested various cleaning techniques for porous cement concrete sidewalks.
  - Local cleaning and restoration consultants may also have experience cleaning porous pavements. Local companies include ServiceMaster and the Belarde Company.
- **If adjacent ground covers spread to porous pavement, see Section 6.2b, Porous Pavement and Ground Cover Migration, for corrective actions.**
- **Immediately report any spills (paint, oil, gas, antifreeze, or other spilled/dumped pollutants) or other damage to the porous cement concrete, to the Maintenance Association Site Manager.**
  - If a vehicle is associated with the spill, record and report the license number.

- The Maintenance Associate Site Manager is responsible for reporting spills to SPU's Surface Water hotline at 206/684-7587 and SPU's Maintenance Division at 206/386-1800.

⇒ *City of Olympia (porous pavement maintenance research) (Section 11)*

⇒ *The American Concrete Institute (Section 11)*

⇒ *National Ready Mixed Concrete Association (Section 11)*

3.2b Porous Gravel Pave Pathways

Note: It is possible that areas other than pathways have used gravel pave for surfacing. If that is the case then the Maintenance Association should review approach for the specific application.

gravel pave

- **If porous system has been clogged by debris, when dry, vacuum up gravel from pavement section and properly dispose of waste material. Replace and fill cells with clean crushed gravel and bring back up to grade.**
- **If gravel has worn away exposing grid cells of gravel pave, refill cells with approved gravel to top of geogrid surface.**
  - See Materials and Products, Section 7.6 for approved gravel.
- **Watch for washouts from planted areas where soil, mulch or sediment is deposited on driveways or streets.**
  - Clear immediately and sweep area.
  - Report washouts on Maintenance Checklist Sheet and submit to Maintenance Association Site Manager.
  - Monitor washout occurrences to identify problem areas.
  - For problem areas, follow guidelines in Section 6.2a, Washout, for corrective actions.
- **Weeds or moss may become an issue in porous gravel pave areas. Weeds can reduce the stormwater function of the porous gravel pave materials and should be removed.**
  - Weeds should be hand removed regularly through routine maintenance.
  - For persistent weed problems, refer to weed control products listed in Materials and Products, Section 7.

⇒ *Grass Pave and Gravel Pave, reinforced lawn and paving geogrid - Manufacturer information for maintenance and installation (Section 14.5)*

4 IRRIGATION

The irrigation system installed at the High Point Community is a hybrid type allowing for fully automatic or manual operation. It includes a Rainbird field satellite controller and Maxicom central control setup. This system has significant capability in terms of programming, responsiveness to weather conditions and remote operation (monitoring, programming and troubleshooting). Because the system's capabilities are extensive and the options for how they are used vary greatly, only general irrigation guidelines are included in this manual. For a current status of how the system is being used, contact the Maintenance Association Site Manager. For technical guidance on the system, refer to the appropriate product manuals.

4.1 Irrigation Schedule

Following initial landscape installation at the High Point Community, the irrigation schedule should be programmed to promote strong establishment of lawn and planted areas. To encourage the development of healthy plants with vigorous root systems, both drought AND over-watering should be avoided.

Establishment of landscaped areas throughout the High Point Community will require regular irrigation during the growing season. As the landscape becomes established irrigation may be decreased so that watering matches the maturity of plantings. A general guideline is that once plantings are established and stable (2-3 years), the irrigation schedule may be cut back to one or two deep waterings per week with additional watering during periods of high temperatures (above 80 degrees). Ongoing monitoring of plant and root system health should inform the irrigation schedule.

4.1a Lawn Irrigation

- **Irrigate to achieve approximately 1 inch of water per week.**
- **Adjust controller in accordance with manufacturer's recommendations for this amount.**
- **Do not irrigate during times of heavy rainfall.**
- **Set irrigation system timers to run during off hours (at night/very early morning) to reduce irrigation conflicts with users and resulting damage to sprinklers/pop up heads.**
- **Monitor lawn areas for dry patches, saturated areas or other inconsistent water conditions.**
- **Contact a professional irrigation specialist to correct problem conditions.**

4.1b Tree, Shrub and Ground Cover Irrigation

- **Irrigate to achieve approximately 1 inch of water per week.**
- **Adjust controller in accordance with manufacturer's recommendations for this amount.**
- **Avoid irrigation during times of heavy rainfall.**
- **Monitor bed areas for dry patches, over-saturated areas or other inconsistent water conditions.**
- **Contact a professional irrigation specialist to correct problem conditions.**

4.1c Extreme Drought Conditions

In the event of extreme drought conditions resulting in mandated city-wide irrigation reductions, the NDS areas at High Point are the highest priority for receiving irrigation. Cut back irrigation in the following order:

- **First: cut back water to level lawn areas (not swales/ NDS areas).**
- **Second: cut back water to trees and other level planted areas (not swales/ NDS areas).**
- **Continue limited irrigation to maintain health and function of all swale/ NDS areas.**

4.1d Irrigation System Maintenance

- **Refer to owner's manual for proper irrigation system maintenance.**
- **Monitor irrigation heads, controllers, automatic control valves and quick coupler valves for damage or improper function.**
- **Carry out the following visual walk through tests of irrigation system:**
  - First: beginning of growing season, spring irrigation start up (May)
  - Ongoing: one time per month during the growing season (June – September).
  - Utilize system's hand held remote to facilitate walk through testing.
- **Note broken sprinkler and pop up head locations on Maintenance Checklist.**

- **Maintain a record of locations to identify problem areas associated with vandalism or vehicular conflicts.**
  - See Irrigation Trouble-Shooting below.
- **Contact a professional irrigation specialist to correct problem conditions.**
- **Irrigation audit by outside certified auditor recommended at least every 3 years.**

⇒ *Irrigation system manuals (Section 14.2)*

4.2 Irrigation Trouble-Shooting

Irrigation maintenance records may identify areas where conflicts occur between the installed system and use of certain areas. The primary issues will likely be related to accidental damage by users, vandalism and vehicular impacts.

irrigation overspray and day time watering necessitate irrigation adjustments.

4.2a User Damage

- **Check irrigation timing and adjust schedule to avoid user conflicts.**
- **If continued damage or vandalism occurs, consider changing sprinkler or pop up head type.**

4.2b Vehicular Damage

In the case of vehicular damage, assess adjacent vehicular travel to identify the best possible intervention.

dead lawn area points to a need for irrigation adjustment.

- **Above ground damage to system:**
  - Where appropriate, install a half buried one-man boulder to protect sprinkler head from vehicles.
  - Where vehicles will continue to impact system, modify system layout.
  - Relocate sprinkler heads further away from pavement.
- **Below ground impacts to system caused by vehicular loads:**
  - Install a reinforcing geogrid material for added protection.
  - Replace swing joints with flex poly pipe.

5 LANDSCAPE TROUBLE-SHOOTING

5.1 Lawns

A healthy lawn is light green in color. It may contain small amounts of weeds and some bare patches. If a lawn area begins to look unhealthy, such as a yellow appearance, brown patches, many weeds, ponding or excess thatch, steps may be taken to return it to a healthy condition. Many of the following recommendations are taken from Ecologically Sound Lawn Care for the Pacific Northwest.

bare patches in lawn areas

- **More questions? Call the Natural Lawn and Garden Hotline 206.633.0224 and talk to an expert!**

⇒ *Ecologically Sound Lawn Care for the Pacific NW (Section 14.7)*

⇒ *Green Meridian, Total Lawn Health Care article (Section 14.7)*

5.1a Poor Color

For lawns that are yellow or brown, the optimal time for repairs is in spring or fall.

yellow, poorly establishing lawn

- **Aerate, overseed and topdress unhealthy areas.**
  - See Landscape Maintenance, Section 2.3e
- **Dethatch (see below) unhealthy areas with more than 1 inch of thatch.**
- **For areas impacted by significant pet urine, water regularly.**

5.1b Excess Thatch

The tough layer of roots and stems that accumulates on top of the soil is thatch. This layer can be beneficial; however, if it is more than 1 inch thick, it can inhibit root development and water infiltration. Excess thatch can be prevented by avoiding over watering and over-fertilizing. The following may improve excess thatch conditions.

- **Use a power thatcher to remove excess build up from dense areas**
  - Make several passes with the power thatcher.
- **Aerate, overseed and topdress areas following thatch removal.**
  - See Landscape Maintenance, Section 2.3e
- **Check irrigation schedule and set for less frequent and deeper watering.**
- **Avoid overfertilizing.**

5.1c Weed Problem Areas

Where lawn areas are comprised of large patches of weeds or particularly aggressive weeds are establishing and standard maintenance can not keep up, additional maintenance steps are needed.

Annual weeds: Examples include crabgrass, dandelions, redroot pigweed, purslane, lambsquarters, foxtail, and barnyard grass. A corn gluten regimen can be beneficial. Corn gluten is approved for use in NDS areas.

- **Hand-remove weeds in problem area.**
- **Apply corn gluten using a spreader.**
  - For best results time application with weed germination.
  - Follow manufacturer's guidelines for application schedule and rates.
  - Repeat applications are necessary.
  - Note: results are not immediate. Benefits are cumulative and will be achieved if product is used for several years.
- **Repair, reseed and mulch bare spots resulting from weed removal.**

⇒ *Journal of Pesticide Reform - Corn Gluten Meal (Section 14.9)*

⇒ *Iowa State - How to Use Corn Gluten Meal (Section 14.9)*

⇒ *Eartheasy Corn Gluten article (Section 14.9)*

clover comprises much of lawn area

Clover: Where large patches of clover out-compete turf grasses, it is likely that soils are nitrogen deficient. A specialized approach to amending these soils should be carried out, and differs for the NDS and non-NDS lawns.

- **Hand-remove weed patches, including roots.**
  - Where appropriate, consider using flame weeders on patches.
  - Aerate, reseed and topdress any bare patches, see Section 2.3e.
- **Test soil to identify nitrogen or other deficiency.**
- **<u>NDS areas</u>:**
  - Apply custom compost tea brews based on soil testing results and supplier recommendations.
  - If deficiency continues, apply compost tea with natural nutrient additives or an approved natural fertilizer.

    - Application (including formulation) must be pre-approved by Maintenance Association Site Manager.
    - Seek input from SPU contact to provide best timing from a watershed perspective.
  - See Materials and Products, Section 7.4 on Fertilizers and Amendments.

- **<u>Non-NDS areas</u>:**
  - Apply natural fertilizer based on soil testing results.
  - If continued efforts do not control clover, consult with a professional knowledgeable in the area of natural amendments.
  - See Materials and Products, Section 7.4 on Fertilizers and Amendments.

Last Resort: Where manual removal and addressing soil deficiencies does not control weed infestations, chemical weed removal products approved through the IPM process may be applied.

- **Obtain approval from Maintenance Association Site Manager.**
- **Spot treat weeds with IPM-approved natural herbicides. See Materials and Products, Section 7.2a.**
- **Apply according to manufacturer's directions.**
- **Reapply, if necessary.**

⇒ *Tri-County Integrated Pest and Vegetation Management Guidelines (Section 14.9)*

⇒ *City of Seattle Pesticide Tier Tables (Section 14.9)*

5.1d Compacted Soils

Signs of compacted soils in lawn areas include poor drainage, shallow root development (less than four inches into soil), worn patches and hard surface. The following may improve compacted soil conditions.

- **Aerate, overseed and topdress (see Landscape Maintenance, Section 2.3e)**
- **Monitor irrigation to avoid overwatering.**

In extreme cases, renovating the problem lawn may be the best option. If so, be sure to identify and correct or adjust conditions contributing to original compaction, such as poor grading, foot traffic, excessive irrigation and nutrient deficiencies.

- **Remove existing grass turf.**

soils compacted from construction activity

- **Test the soil to learn what corrections may be needed.**
- **Apply organic natural amendments (lime or in non-NDS areas specialized natural fertilizers) as recommended by test results.**
- **Spread 2 inches of approved compost material and till it to a depth of 6-8 inches.**
- **Rake to level the soil, roll with a landscape roller, water to settle for a day, and rake again.**
- **Apply approved High Point lawn seed mix and water as recommended by seed supplier.**

5.1e Moss

Moss can accumulate in shady areas, acidic, compacted or infertile soils or in areas that are saturated or poorly draining. The following actions can reduce moss growth.

- **Take core samples in affected lawn area and test the soil pH. Apply agricultural grade pellet form of lime to attain a pH between 5.5 and 7.5. Apply lime at a rate based on samples and not to exceed 40 pounds per 1,000 square feet.**
- **If area is saturated or poorly draining, use measures described in this section, under Compacted Soils, 5.1d.**
- **Stop watering the area or let it dry completely between waterings.**
- **Remove moss with a dethatching tool and overseed area with a shade-tolerant local lawn mix.**
- **If moss returns, apply iron treatments annually to burn moss in the summer (treatments will not harm lawn).**
  - Avoid iron treatment contact with concrete as it may stain.
- **If these measures do not alleviate the problem, obtain Maintenance Association Site Manager's permission to plant the area with shade-tolerant shrubs and/or ground covers.**

⇒ *Journal of Pesticide Reform - Moss in Lawn Areas (Section 14.9)*

5.1f Tree Plantings in Lawn

tree planting area round and too small - square and enlarge

For ease of long-term maintenance, the lawn edge around all trees located in lawn areas should be rectangular or rectangular with rounded corners and of sufficient dimensions. In some cases, these areas were incorrectly installed as round planters, which should be corrected. Use the following tree planting area guidelines:

- **Where planter is round, replace with rectangular edge.**
  - Maximum dimension of planter should be six by seven feet (6’ x 7’).
- **Where too small, enlarge to six by five feet (6’ x 5’).**

5.1g Reinforced Grass Edges

Reinforced grass edges (a geogrid system planted with grass) are installed along alleys where vehicular impact is anticipated. These areas should be monitored for excessive wear and retrofitted if needed. If after a period of one year, grass appears excessively worn (many or large bald patches) replace grass with gravel or ground covers.

worn reinforced grass edge

- **Manually remove all remaining grass, all roots and soil from geogrid.**
- **Prepare geogrid for pocket planting with fast-growing, tough, evergreen ground cover.**
  - Backfill some cells with a planting soil mix
  - Select planting cells based on desired ground cover spacing
  - Locate planting cells away from paved edge to decrease vehicular impacts.
- **Plant soil filled cells with ground cover plugs.**
  - Utilize the High Point Community plant lists to select ground cover.
- **Backfill remaining geogrid cells with approved gravel to top of geogrid surface.**
  - See Materials and Products, Section 7.6 for approved gravel.

⇒ *Grass Pave and Gravel Pave, reinforced lawn and paving geogrid - Manufacturer information for maintenance and installation (Section 14.5)*

⇒ *High Point Community ROW Plant Lists for Phases 1 and 2 (Section 14.3)*

5.1h Ponding in Lawn Areas

Ponding should not be occurring in non-NDS lawn areas. Instances of ponding in these areas should be investigated and addressed. Possible reasons for ponding in these areas include:

as-built conditions resulted in bare areas needing plant material

- **Overly compacted soils or subgrade**
- **High groundwater in the area**
- **Broken or leaking irrigation lines or heads**

- **Improper grading leading to a closed depression**
- **Possible solutions to such issues include: small adjustments to finished grade; removal of sod and re-preparation (tilling, amendment) of soils; or installation of French drains or other minor conveyance facilities. Any changes should be approved by the Maintenance Association Site Manager, and any necessary permitting agencies.**
- **Any work around the Pond should avoid disturbance of the sub-surface pond liner or any element integral to the Pond facility.**

5.2 Trees, Shrubs and Ground Covers

Healthy trees, shrubs and ground covers show growth, habit and flowering according to their species. Signs of ill-health can include poor growth, dying branches, yellowing or spotted leaves, few or excessive buds on flowering plants and much more. The following are general problems associated with unhealthy plants. For more information on plant types or species, refer to Section 11, Recommended Publications.

5.2a Nutrient Deficiencies

Look for plants to have a color, growth habit and character typical of their species. Yellowing, poor growth, weak flowering, spotting or weakness may be a sign of nutrient deficiencies. Some typical symptoms and their deficiencies are:

- **Yellowing: Nitrogen (N) deficiency.**
- **Poor growth: Phosphorous (P) deficiency.**
- **Poor flowering, spotting or curled leaves, or weak roots or stems: Potassium (K) deficiency.**
- **If needed, test soil to identify specific nutrient deficiencies.**
- **Consult with a professional knowledgeable in the area of natural amendments.**
  - See Materials and Products, Section 7.4.
- **<u>NDS areas:</u>**
  - Apply custom compost tea brews based on soil testing results and recommendations.
  - If deficiency continues apply compost tea with natural nutrient additives or an approved natural fertilizer.
    - Must be pre-approved by Maintenance Association Site Manager.
    - Seek input from SPU contact to provide best timing from a watershed perspective.

- **Non-NDS areas:**
  - Apply natural fertilizer based on soil testing results and recommendations.

5.2b Diseases

Look for plants to have a color, growth habit and character typical of their species. Spotting, rust, blackened leaves and other irregularities can be signs of disease. In all cases, disinfect gardening tools after pruning or treating a diseased plant to reduce spreading. For more information on plant types or species, refer to Section 11 Recommended Publications.

diseased dwarf red-twig dogwood

Diseased plant material disposal: Any whole diseased plants, and all plant material removed from plants that appear to be diseased should be removed from site and disposed of in commercial compost or landfill, to avoid risk of spreading the disease to other plants. Pay particular attention to potentially diseased coniferous trees, especially cypress and cedar.

- **Dark gray to tan sunken spots on leaves: May be caused by anthracnose.**
  - Avoid overhead watering
  - Add mulch to root zone
  - Increase air circulation around plant
  - Remove and destroy infected portions of plant
- **Blackened portions of plant: May be caused by fireblight.**
  - Remove and destroy infected portions of plant, pruning 6 inches minimum from diseased area.
- **Dull, yellow leaves, sparse, wilting, whitish fungal tissue below on roots below soil line: May be caused by oak root fungus.**
  - Remove tree and all roots larger than ½ inch in diameter.
- **White to gray circular patches, poor growth and fruiting: May be caused by powdery mildew.**
  - Spray infected areas with water early in the day to wash spores from plants.
  - Spray with IPM-approved natural treatment, such as Neem oil, vegetable oil or a 10:1 mix of water and milk.
- **Wilting, leaves with poor color and premature drop: May be caused by root rots or water molds.**

  - Check irrigation to eliminate overwatering.
  - Check for and remedy poor drainage.
- **Yellow to purple-brown powdery bumps on leaf underside or yellow spots: May be caused by rust.**
  - Remove infected leaves.
  - Remove fallen leaves or branches.
  - Increase air circulation around plants.
- **Wilting or failing on one side of plant, yellowing leaves: May be caused by verticillium wilt. It can take more than one season to kill a larger plant.**
  - Irrigate deeply and infrequently.
  - Fertilize if plant shows poor growth.
  - Remove dead branches.
- **Coniferous trees, particularly cedar and cypress species, exhibiting yellowing, wilting, or browning through all or most of crown: May be caused by *Phytophthora* spp., a fungus which attacks the roots.**
  - Consult immediately with a certified arborist
  - Test root material and/or adjacent soil for presence of the fungus
  - If disease is strongly suspected or confirmed, remove tree and surrounding soil from site.
  - Use extreme care not to spread or track any soil or plant material from site of diseased tree to other areas of site.
- **Clean and disinfect any equipment used to remove, handle, or transport any diseased plant material or soil.**

⇒ *Tri-County Integrated Pest and Vegetation Management Guidelines (Section 14.9)*

⇒ *City of Seattle Pesticide Tier Tables (Section 14.9)*

rosemary planted too close to sidewalk requires excessive trimming

5.2c Relocating Plants

Relocating plants is labor intensive and can be hard on the plant. There are times, however, when this is the best course of action. The most common reasons for relocating plants are when shrubs grow too large for their location and when as-built conditions do not match plant requirements. The following are guidelines for electing to relocate a plant:

- **A shrub requires frequent, extensive pruning or shearing to maintain visual sight lines for safety or clearances along a walk or roadway.**

- **Understory plants overtaken by adjacent shrubs are shaded out and will die if not moved.**
- **A conifer has been placed in a spot that impairs necessary sight lines or is too close to curb/roadway or sidewalk.**
- **Initial understory plantings are too dense.**
  - Consider moving to underplanted or otherwise bare areas of landscape.
- **A plant is suffering due to as-built conditions that will not change.**
  - Wet-loving in dry location
  - Dry-loving in wet location
  - Sun-loving in full shade
  - Shade-loving in full sun

plants may be thinned by relocating to other areas where vegetation is sparse

When relocation is the best option, follow these guidelines to lessen the impact on plants:

- **Move plants when conditions are best.**
  - During cool weather
  - When plants are dormant or semi-dormant
- **Replant the same day.**
- **Prepare the new location first to shorten transition time.**
- **Presoak the plant several days before moving to ease digging and hold the root ball together.**
- **Trench around the plant <u>outside</u> of the drip line.**
  - For larger shrubs consider a partial root prune at least three months ahead of time.
  - Trench should be as deep as root ball width.
- **It may be necessary to hold together the root ball of larger plants with burlap or chicken wire during transfer.**
- **Transplanting trees will require special care.**
  - For trees under 4-inch (4") diameter, follow standard transplanting practices.
  - For trees over 4-inch (4") diameter, consult with a tree specialist with experience moving larger trees.
- **Refer to planting guidelines in Plant Replacement and Installation, Section 2.5.**

5.2d Plant Species Replacement

The plant species in the High Point Community ROW were carefully selected for their locations. However, as-built conditions can differ from plans resulting in poor performance, mortality and the need for replacement plants with different requirements (see the previous section, Relocating Plants). Use the following guidelines when a different plant species must be selected:

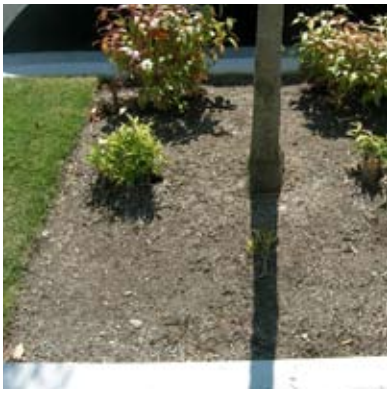

tree planter with large gaps

- **Select plants from the attached High Point Community ROW Plant List.**
- **Identify basic desired characteristics of replacement plant.**
  - Type (shrub, perennial, ground cover)
  - Size and form
  - Function (flowering, water quality, weed suppression)
- **Narrow down choices matching plant requirements to as-built conditions.**
  - Sun
  - Shade
  - Wet
  - Dry
  - Soil type
  - Foot traffic
- **Submit proposed replacement plants to Maintenance Association Site Manager for review/approval.**
  - Provide notes outlining replacement on a Maintenance Checklist Sheet noting location on map (included with checklist).
- **Refer to planting guidelines in Plant Replacement and Installation, Section 2.5.**

⇒ *High Point Community ROW Plant Lists for Phases 1 and 2 (Section 14.3)*

⇒ *King County, Going Native brochure (Section 14.7)*

5.2e When a Landscape Plant Becomes a Weed

Occasionally, plants intended for use in the landscape begin to exhibit invasive characteristics and may be reclassified as a weed. This is especially common when plants are new to the region and have a limited horticultural track record. Invasive plants will exhibit weedy characteristics that may be used to identify them as problem plants needing extra maintenance or requiring removal.

- **Watch for plants exhibiting the following invasive characteristics:**
  - Highly self-sowing – many seeds
  - Broad germination – high germination and success rate
  - Early maturing – can germinate and reproduce within same season
  - Quick colonizing
  - Outcompete other plants
  - Difficult to remove seedlings or spreading growth
- **Plants in the High Point landscape with potential invasive character should be monitored:**
  - *Stipa tenuissima (Nassella tenuissima)* commonly known as Mexican feather grass is a species of possible concern. It self-sows broadly, reproduces quickly and is known to invade rangelands in other regions. Watch this plant.
  - *Fragaria chiloensis*, or beach strawberry. A creeping, low groundcover that may spread too aggressively, potentially spilling out of planting beds into sidewalks, roadway, lawn, or other plantings.
  - Report potential invasive landscape plants to the Maintenance Association Site Manager on a Maintenance Checklist, noting its location on the included map.
- **See Relocating Plants (Section 5.2c), Plant Species Replacement (Section 5.2d), and/or Excessive Vegetation (Section 6.1d) for guidelines on plant removal and replacement, should that become necessary.**

5.2f Vehicle/Landscape Edge Conflicts

Over time areas of vehicular conflict may become apparent. Some examples are where vehicles cross into landscaped areas at alley or driveway entrances and where car parking occurs along curbless road edges. These areas should be monitored for excessive wear and retrofitted or protected as appropriate.

- **Where edge plantings are impacted at drive and alley entrances:**
  - If after a period of one year, plants do not establish (compacted soil little or no plant cover) replace with gravel.

vehicle damage to landscape edge

  - Excavate soil in problem area to a **width of no more than 12 inches (12”)** and a **depth of 6 inches (6”)**.
  - Backfill area with 1 inch (1”) drain rock to a depth that is level with the adjacent paved surface.

- **Where vehicle parking overextends onto natural drainage systems, potentially impacting swale function:**
  - Consult with Maintenance Association Site Manager to obtain technical guidance in troubleshooting this conflict.
  - Possible retrofitting includes adding protective barriers.
  - Excessive compacting of swale soils may require excavation and replanting.
  - Where conflicts are not easily removed, it may be necessary to replace plantings with cobbles or other free-draining material.
- **Another retrofit option where vehicle/landscape edge conflicts occur is to add a structural (drivable) planting grid system, such as Ecogrid™ or Grasspave2™, and fill void spaces with appropriate replacement plantings.**

6 DRAINAGE FACILITIES MODIFICATIONS

There may be problem areas within the ROW drainage facilities that require special ongoing maintenance and may warrant field modifications. Drainage facility problem areas can result from grading issues, improper material use, plant growth and establishment, intensive rain events or user impacts. Obtain approval from the Maintenance Association Site Manager before making modifications.

6.1 Drainage Swales

6.1a Excessive and Repeated Erosion

- **When working in swales, protect from compaction following guidelines in Section 3.1a.**
- **Install cobbles at top of erosion channel.**
- **Cobble area should be 3 times the width of the erosion channel and at least 12 inches minimum length**
- **See Materials and Products, Section 7.6 for approved cobble type.**
- **Avoid using river rock, gravel or rip rap.**

cobbles placed in erosion-prone area near outlet pipe

6.1b Repeated Sediment Buildup

Where monitoring has identified problem areas for sediment build-up (see Sediment Accumulation, Section 3.1d) cobbles may be added to reduce erosion.

- **Identify upstream source.**
- **Install cobbles at source.**
  - See Section 6.1a above for guidelines on installing cobbles.
- **When sediment issues require additional expertise and support, the Maintenance Association Site Manager should contact SPU Maintenance Division at 206/386-1800.**

6.1c Ponding

If water is ponding for more than 24 hrs following a rain event, notify Maintenance Association Site Manager then take the following steps:

- **When working in swales, protect from compaction following guidelines in Section 3.1a.**
- **Determine if sediment is built up within the top 2-3 inches of soil in cell.**

grading adjustments are needed where extended ponding occurs

  - If so, remove sediment and replace with mulch.
  - See Sediment Accumulation, Section 3.1d
  - See NDS Areas - Composted Mulch Replacement, Section 2.4j.
- **Fill any unintentional depressions with NDS Soil Mix #1 and grade to smooth.**
- **Smooth soil to direct water to the designated drainage point.**
- **Remove soil to a depth of 2 inches more than the accumulated sediment and replace with NDS Soil Mix #1.**
- **If extended ponding is recurring or lasts up to 72 hours alert the Maintenance Association Site Manager to contact SPU Maintenance Division at 206/386-1800.**

6.1d Excessive Vegetation

In general, strong plant establishment is a positive sign; however, dense plantings in a drainage swale may cause stormwater to back up and may inhibit stormwater flow beyond typical ponding. This condition will require assessment and corrective actions.

In addition to potential interference with stormwater flows, excessive vegetation may become a nuisance or hazard for pedestrian and vehicular circulation and safety. Overly aggresive or abundant vegetation can block sight lines and begin to encroach on sidewalk and roadway spaces.

- **Determine that pruning or other routine maintenance are not adequate or feasible to maintain proper plant density and aesthetics in an efficient manner.**
- **Determine if planting type should be replaced to avoid ongoing maintenance issues.**
  - An aggressive grower under perfect growing conditions should be transplanted to a location where it will not impact flow.
- **Look for areas that were planted too densely.**
  - A moderate grower planted too densely should be thinned by transplanting some individuals to make space for future growth while allowing for adequate flow-through.
- **When working in swales, protect from compaction following guidelines in Section 3.1a.**
- **Use the following general guidelines for modifications to areas with excessive vegetation:**

  - Remove plants that are weak, broken or not true to form.
  - Thin grass clumps at regular intervals at a ratio of 1:6.
  - Thin grass or plants so as not to leave visual holes or bare soil areas.
  - Smooth bare soil areas.
- **Corrections should not noticeably alter the character of the planting layout.**
- **During transplanting and replacement, follow the planting guidelines in Plant Replacement and Installation, Section 2.5.**

6.1e Change from Lawn to Planting

There may be requests to replace lawn with plantings. This may be done in areas where grades make it difficult to obtain an even mowing height or in areas that are too shady or moist for dense lawn growth.

- **Replace with plants using the nearest vegetated cell as a guide for plant species.**
  - See High Point ROW planting details and plant lists for reference.
- **Replacement plants should be installed following the planting guidelines in Plant Replacement and Installation, Section 2.5.**

6.1f Drain Curb Cut Channelization

Continued erosion and channelization in the swale at the drain curb cut may suggest the need for energy dissipation. A small amount of cobbles can be added to reduce erosion at these points.

- **Place cobbles in swale where flow from drain curb cut enters.**
  - Added cobbles shall not reduce or block in any way stormwater flow into the swale.
- **See Materials and Products, Section 7.6 for approved cobble type.**

6.1g Drain Curb Cut Ponding or Blockage from Excess Turf or Plantings

Where continued gutter line ponding or blockage occurs at curb cut opening due to built-up grass turf, improper soil elevation and/or plant material build up, removal of lawn/plant material and lowering of grade may be required.

- **Where excess turf exists:**
  - Remove grass.
  - Excavate a portion of soil.
  - Replace with new sod set slightly lower to allow proper inflow.
- **Where plantings cause similar backups at drain curb cut openings:**
  - Remove or thin out plantings.
  - Lower grade if needed.
  - Smooth soil.
  - Replace plants with smaller shrubs, ground cover or grasses.
  - See Plant Replacement and Selection, Section 2.5.
  - Replace mulch. See Mulching, Section 2.5d.

6.1h Pedestrian Berm

Vegetation within a pedestrian berm may become excessively worn from pedestrian use. The following modifications may remedy the issue.

- **If original ground cover type is too fragile for this application, replace with more durable species from High Point ROW Plant List.**
- **Add stepping stones at logical crossing points.**

6.1i Grading Modifications around Trees in Drainage Swales

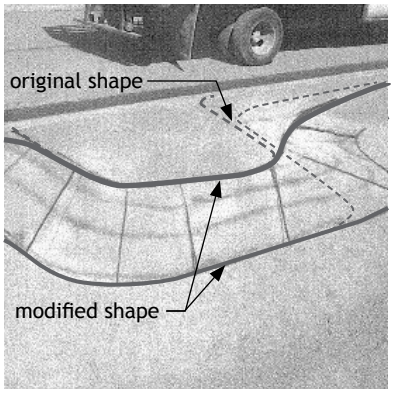

modify for gradual grading at tree berms

Grading adjustments around trees planted in drainage swales may be made for easier mowing and a more natural appearance.

- **Follow general regrading and vegetation replacement techniques to those listed in Section 6.1g.**
- **Avoid grading changes within the critical root zone.**
- **Avoid impacting tree roots.**
- **Avoid grading changes that block the drain curb cuts.**
- **Replace any damaged plants or lawn with in-kind material.**
  - See Plant Replacement and Selection, Section 2.5.
  - Replace mulch. See Mulching, Section 2.5d.

6.1j Grading Modifications to Grass Berms in Swales

The berms in grass lined swales are intended to allow ponding in storm events. Although the berms may have a square shape, it is acceptable to make adjustments resulting in a rounded shape. However care should be taken during mowing and other maintenance activities to preserve the berms, which are integral to the proper function of the engineered stormwater system design.

- **Top dress lawn with a thick layer (2 to 3 inches) of composted mulch, rounding out square edges.**
- **Grass will slowly grow up through the mulch, extending the mound in these areas.**
- **Apply seed mix to avoid the establishment of weeds.**
- **Once lawn has established on compost layer, additional applications may be made until a rounded form is achieved.**
- **If scalping is an issue when mowing, alternative maintenance equipment, such as a hand-held trimmer, should be used on berms.**

6.2 Other Drainage Related Issues

6.2a Washout

A washout occurs when stormwater flows out of planted areas or swales and deposits soil, mulch or sediment on paving or elsewhere. This is of particular concern when material is deposited onto porous walks, drives or streets, which are intended to allow stormwater to infiltrate. Identify what is causing the stormwater to flow outside of the planted area and take steps to remedy the problem.

washout from planting area onto street

- **Clean deposited soil or other materials from porous pavement or other adjacent surfacing. See Hardscape and Other Features, Section 3.2a.**
- **Is the surface elevation too high at edge of planted area? If so:**
  - Protect porous pavement by covering with plastic and secure covering in place prior to start of regrading.
  - Remove lawn or plants at edge of planted area.
  - Remove soil so it slopes away from washout.
  - Replace removed plants with in-kind material. See Plant Replacement and Installation, Section 2.5.
  - Replace mulch. See Mulching, Section 2.5d.

- **Does grading of swale channel need adjustment?**
  - Protect porous pavement by covering with plastic and secure covering in place prior to start of regrading.
  - Remove plant material where work is to be done.
  - Grade at bottom and edges to match High Point ROW Swale Section.
  - Add NDS soil mix #1 and if necessary replace plants with in-kind material.
  - See Plant Replacement and Installation, Section 2.5.
  - Replace mulch. See Mulching, Section 2.5d.
- **Are there blockages (plant material, mulch build-up) in the channel redirecting water?**
  - Protect porous pavement by covering with plastic and secure covering in place prior to start of regrading.
  - Remove plant material causing blockage.
  - Remove mulch.
  - Replace plants at proper grade and provide appropriate spacing.
  - Use original plants or replace with in-kind material.
  - See Plant Replacement and Installation, Section 2.5.
  - Replace mulch. See Mulching, Section 2.5d.

⇒ *High Point ROW Swale Section(s) (Section 14.3)*

6.2b Porous Pavement and Ground Cover Migration

Where *Fragaria* species (strawberry) or other fast-spreading ground covers are planted adjacent to porous pavement, the ground cover may spread too aggressively and root in the pavement. This migration is of particular concern with porous paving, as the ground cover will establish, collect sediment and reduce the pavement's function. Ground cover plantings must be kept from establishing on porous pavement.

- **Regularly trim ground covers along porous pavement edge.**
  - Time trimming as needed to keep plants from rooting in adjacent porous pavement.
- **Vacuum porous pavement if sediment has collected.**
- **Note areas where ground cover is removed on High Point Maintenance Checklist map and submit to Maintenance Association Site Manager.**

For problem areas where removal cannot keep up, obtain Maintenance Association Site Manager approval to retrofit planting as follows:

- **Remove all *Fragaria* (or other invasive ground cover) from the swale on the porous pavement side (from the bottom up to the porous pavement edge).**
  - Remove all *Fragaria* plant material, including all roots.
  - Replace with a ground cover appropriate for the location.
  - See Plant Replacement and Installation, Section 2.5.
  - Be sure to use "steppable" plants for high traffic pedestrian berms.
  - Select plants from the High Point Community Plant Lists.

6.2c Moss and Weed Growth in Porous Pavement

In addition to the potential for colonizing by aggressive groundcovers, porous pavements can also become host substrate to moss and other invasive weeds. Such plant growth will eventually clog the porous pavement, and possibly damage it structurally. Thus, moss and other plants should be removed regularly through appropriate maintenance techniques.

- **See Drainage Facilities Maintenance - Hardscape and Other Features, Section 3.2, for guidance on removing weeds from and maintaining porous pavement.**

⇒ *City of Olympia (porous pavement maintenance research) (Section 11)*

7 MATERIALS AND PRODUCTS

The following materials and products are approved for use. Any substitutions must meet material or product requirements and be approved by the Maintenance Association Site Manager. Any additional materials or products not covered in this section must also be approved for use by the Maintenance Association Site Manager.

7.1 Plant Material

7.1a Plant Selection

Plant materials at High Point Community have been carefully selected to suit the varied conditions within the ROW. To ensure successful establishment and function of vegetation, select plants suited to the locations' microclimates.

Select plants based on these guidelines:

- **Typical of their species or variety**
- **Healthy with vigorous growth**
- **Fully developed form with dense branching**
- **Vigorous, fibrous root systems**

Select plants that are free from the following:

- **Voids and open spaces in branching**
- **Broken branches, flush cuts or stubs**
- **Circling roots within container**
- **Disfiguring knots**
- **Sunscald injuries**
- **Abrasions of the bark**
- **Weeds**
- **Plant diseases**
- **Insect eggs**
- **Evidence of borers and other forms of infestation**
- **Other defects**

7.1b Balled and Burlapped (B&B) and Bare-Root Plants

Trees and shrubs are often sold balled and burlapped (B & B) or bare-root. In addition to the general plant selection guidelines above, there are special characteristics to look for in B & B and bareroot plants.

Select B & B plants with the following characteristics:

- **Firm ball of soil.**
- **Diameter and depth to encompass a root system of sufficient size to support the plant given its species and size.**
- **Balls that are not cracked or mushroomed.**
- **Free from pruning wounds that are more than one inch in diameter and do not show vigorous callusing.**
- **Firmly wrapped with burlap or similar landscape material and bound carefully with twine, cord or wire mesh.**

Select bare-root plants with the following characteristics:

- **Firm and moist roots.**
- **Note: Only accept delivery and bare-root material from October 15th to March 15th.**

7.1c Container Plants

Trees are sometimes sold in containers. Shrubs, perennials and grasses are usually sold in containers. In addition to the general plant selection guidelines above, select container plants with the following characteristics:

- **Sufficiently developed root system that holds soil together.**
- **Free of root-bound conditions (roots that encircle pot perimeter, grow out of container drainage holes or protrude above soil level.**
- **Free of weeds.**
- **Moist, not dried out soil.**

7.1d Lawn Seed Mix

Use the same fine lawn seed mix applied in the initial construction or if not available, a similar mix approved by the Maintenance Association Site Manager. Mixing seeds with a mycorrizhal inoculant at application will give them additional support taking root.

- **High Point Fine Lawn Seed Mix following:**

	Proportions by Weight	Percent Purity	Percent Germination
Three-Way Rye	66%	98	90
Creeping Red Fescue	17%	98	90
Chewings Fescue	17%	98	90

- **Mycorrizhal inoculants:**
  - Hendrikus Organics, Endo & Ecto Mycorrhizal
  - Plant Health Care, Mycor™ Turf Saver™
  - See Section 7.4 for contact information.

7.2 Pest, Weed and Disease Control Products

If products are to be used for pest, weed or disease control they must meet the following requirements.

It is recommended that a community notice about any pest, weed, or disease control products be posted on site at the time of application. Such notice should include any manufacturer- or industry-recommended times that the public should avoid use of the affected areas (e.g. playing, pet walking, etc.).

7.2a Weed Control

Weed control should first be by manual methods and soil amendment. For problem areas or when threatening invasions appear, manual removal may be supplemented with IPM-approved natural "weed and feed" corn gluten products or approved natural herbicides. Some accepted products include:

- **Corn gluten, a natural "weed and feed" product.**
  - See Section 7.4a below for use guidelines and products.
- **Approved vinegar-based products such as Burn-out (some such products are listed in Tier 1 of the pesticide tables due to the danger to handlers from corrosiveness of industrial-strength acetic acid).**
- **Approved non-selective fatty acid soap-based herbicides such as Safer brand Fast Acting Weed and Grass Killer.**

7.2b Pest and Disease Control

Prevention is the best approach to pest control, however, if pest populations begin to impact landscape health and appearance controls may be needed. All products used should be approved through the IPM process and pesticide Tier Tables. Following are a

number of products which are considered generally acceptable for use.

The following biological controls are approved:

- **Beneficial nematodes**
  - Available from numerous on-line suppliers.
  - Select nematode species based upon target pest.

The following natural/organic pesticides are approved:

- **Safer brand Insect Killing Soap II (OMRI Listed)**
- **Safer brand Bug Patrol (OMRI Listed) (test for colorfastness before use on evergreens)**
- **Neem oil**
  - For aphids, cutworms, leaf-miners, whitefly and mites.

The following natural products are approved to control mildew:

- **Neem oil**
- **Vegetable oil**
- **A 10:1 mix of water and milk**
- **See Supplier Websites, Section11.**

⇒ *Tri-County Integrated Pest and Vegetation Management Guidelines (Section 14.9)*

⇒ *City of Seattle Pesticide Tier Tables (Section 14.9)*

7.3 Mulch

Mulch type differs depending on the application. Compost mulch is used for topdressing in planted NDS areas and on lawns. Medium bark mulch is used as a topdressing for non-NDS planted areas.

7.3a Compost Mulch

Compost mulch shall meet the following guidelines:

- **Made up of composted yard debris or organic waste material consisting of 100% recycled content with the following characteristics:**
  - Screened to 7/17 inch
  - Ph from 5.5 to 7.5
  - Maximum electrical conductivity of 3.0 ohms/cm
  - Maximum carbon to nitrogen ratio of 40:1
  - Certified by the Reduce Pathogens (PFRP) guideline for hot composting as established by the US EPA

- Fully composted, mature and stable

- **Accepted products include:**
  - Cedar Grove Compost
  - Whitney Farms Planting Compost
  - Any other compost mulch source must meet all of the above guidelines and be approved by the Maintenance Association Site Manager.

7.3b Medium Bark Mulch

Medium bark mulch shall meet the following guidelines:

- **Contains only medium ground Douglas fir bark.**
- **Shall not contain other plant materials, weed seeds, or substances injurious to plant growth.**
- **Accepted products include:**
  - Whitney Farms Bark Mulch
  - Any medium bark mulch source that meets all the above guidelines and is approved by the Maintenance Association Site Manager.

7.4 Fertilizers and Amendments

Approved natural fertilizers are for use in non-NDS lawn and planted areas only. Any application of fertilizer to NDS areas must be pre-approved by the Maintenance Association Site Manager with guidance from SPU contact. Because they are repeated within the subsections, a list of suppliers' contact information is provided at the end of this section.

It is recommended that a community notice about any fertilizer or amendment products be posted on site at the time of application. Such notice should include any manufacturer- or industry-recommended times that the public should avoid use of the affected areas (e.g. playing, pet walking, etc.).

7.4a Lawn Areas

A full range of natural lawn fertilizers are available on the market. Products used shall meet the following guidelines:

- **Contains all natural ingredients.**
- **Contains no petrochemical or synthetic ingredients.**
- **Approved products include:**
  - Hendrikus Organics, Seasons 8-2-4
  - Nature Safe, High Potassium 7-1-14

  - Plant Health Care, Healthy Turf™ 8-1-9
- **Many specialized natural fertilizer blends are available depending upon the conditions.**
- **Approved fertilizers shall be applied at the rate recommended by the supplier, but shall not exceed 1 pound of nitrogen per 1,000 square feet.**

Corn gluten is a naturally occurring substance which has been found to provide similar benefits as "weed and feed" products. It simultaneously adds nitrogen while suppressing weed seed germination. Corn gluten may be applied to NDS areas.

- **Corn gluten products may be obtained locally from:**
  - Walt's Organics

7.4b Trees

Tree fertilizers shall meet the following guidelines:

- **Contains all natural ingredients.**
- **Use a deep root pressurized injection system.**
- **Fertilizer product to be approved by an ISA certified arborist.**
- **Approved products may include:**
  - Plant Health Care, MycorTree Injectable
  - Plant Health Care (PHC) for Trees (select specific blend based on tree health, soil testing and location)

7.4c Mixed Planted Areas

In mixed planted areas (shrubs, perennials, ground covers and ornamental grasses) use multi-purpose fertilizers.

- **Approved products include:**
  - Hendrikus Organics, Complete 6-4-4
  - Nature Safe, Landscape Fertilizer 8-5-5
  - Walt's Rainy Pacific NW Blend 7-4-9
- **Corn gluten may also be applied to mixed planted areas to add nitrogen and suppress weed seed germination (see Section 7.4a above).**

Approved Fertilizer and Amendment Suppliers/Consultants:

Local

- Hendrikus Organics (Natural plant care products and consulting)

Contact: Jules Durant or Tina Peterson
PO Box 1289
14461 Tiger Mtn Road SE
Issaquah, WA 98027
425/392-9977 (phone) 425/392-4335 (fax)
www.hendrikusorganics.com/

– Walt's Organics

1528 Leary Way (in Ballard)
Seattle, WA 98107
206/783-6685 (phone) 206/297.9093 (fax)

National

– Nature Safe

800/252-4727
www.naturesafe.com

– Plant Health Care

800/421.9051
www.planthealthcare.com

- **Also see Included Documents Section 10 for supplier brochures.**

7.4d Compost Tea

Compost tea may be used in all landscape areas of High Point, NDS and non-NDS. Compost tea contains aerobic organisms, and should be used within 24 hours of production. Tea brews can be special ordered to best meet needs of application.

- **Local suppliers include:**
  - Hendrikus Organics (provides application services in addition to tea)

    (see preceding supplier list)
  - Bob's Brewers (compost tea brewing and application equipment)

    9616 Fauntleroy Way SW
    Seattle, WA 98136
    206/937-2901 (phone)
    http://www.net-time.com/bobsbrew/index.html
    bob@bobsbrewers.com
- **Compost tea should be tested and verified to be free of human pathogens (e.g. *E. coli*, *Salmonella* spp., etc.)**
- **Consider displaying public informational/educational signage about compost tea during applications**

7.4e Lime

Lime is to be used as needed in lawn areas.

- **Lime - agricultural grade pellet form**

7.5 Sand and Soil Mixes

7.5a Fill sand

Fill sand is mixed with compost (60/40, compost/sand mix) to fill aeration holes and provide topdressing following aeration and overseeding of non-NDS lawn areas only.

- **The Fill Sand Mix shall meet the following requirements:**

Size Sieve	Percent Passing
No. 10	100%
No. 20	85-100
No. 60	40-60
No. 100	30-50
0.02 mm	10-15
0.002 mm	0-10

7.5b Gravelly Sand

Gravelly sand is mixed with compost to achieve the approved NDS #1 soil mix.

- **The Gravelly Sand Mix shall meet the following requirements:**

Size Sieve	Percent Passing
2-inch	100
¾-inch	70-100
¼-inch	50-80
No. 40	15-40
No. 200	0-3

7.5c NDS Soil Mix #1

The NDS Soil Mix #1 is a combination of gravelly sand mixed with compost (approximately 35/65, compost/sand mix).

- **The NDS Soil Mix #1 shall contain the following:**
  - Organic compost at 30 to 35 percent by volume
  - Remaining volume gravelly sand
- **Mix to provide an organic soil mix with the following properties:**
  - Organic content between 4 and 8 percent by dry weight per ASTM D 2974.
  - Minimum hydraulic conductivity rate of 4 inches per hour per ASTM Designation D 2434 when compacted to 80 percent of maximum dry density per ASTM Designation D 1557.

- **Mix each NDS Soil Mix uniformly to a homogeneous consistency.**
- **Do not mix in the rain or wet conditions.**

7.5d NDS Minor Soil Replacement Mix

For areas smaller than 2 cubic feet, the following mix of materials that are available at a local hardware store can be used.

- **Mix well the following quantities of material.**
  - 1 bag of pea gravel (1/2 cubic foot)
  - 1 bag of play sand (1/2 cubic foot)
  - 1 bag of Cedar Grove compost (1 cubic foot)
- **Commercial rain garden soil mix may also be used.**

7.6 Rock, Cobbles, Drain Rock and Gravel

7.6a Cobbles for Drainage Facilities

Cobbles are installed at top of erosion areas to dissipate energy of flows.

- **Cobbles shall meet the following requirements:**
  - 4-inch (4”) min to 10-inch (10”) max in dimension
  - Well-graded, washed cobblestone rock
  - Rough rounded is ok; angular rip-rap is not acceptable

7.6b Drain Rock for Landscaped Edges

Drain rock may be added in high vehicle conflict areas where plants will not establish.

- **Drain Rock shall meet the following requirements:**
  - 1 (1”) to 2-inch (2”) in diameter
  - Washed
  - Not river rock

7.6c Drain rock or gravel for Gravel Pave Geogrid Cells

Used to replace grass where it will not establish in reinforced grass areas.

- **Drain rock shall meet the following requirements:**
  - ¾ (¾”) to ½ -inch (½”) washed gravel
  - With less than 3% passing the U.S. No. 200 sieve
  - Not river rock

8 EQUIPMENT

The following equipment is recommended for use (purchase or rental) by maintenance personnel to ensure efficient and proper maintenance of the ROW landscape.

8.1 Power Equipment

Truck

Riding Mulching Mower - to be used for lawn areas where feasible.

Walk-behind Power Mulching Mower - to be used for lawn areas where a riding mower is not practical or accessible (small areas, steeper slopes).

Power Trimmer - to be used for cutting grass where a mower cannot reach.

Power Edger - for redefining lawn edge along walks, driveways and planted areas.

Power Core Aerator - to be used for aeration of lawn areas.

Power Lawn Vacuum - for vacuuming up aeration plugs in lawn areas. It may be possible to locate a multi-purpose vacuum for both hard surface and lawn applications.

Power Overseeder - for applying lawn seed following aeration.

Power Thatcher - for thatch removal of lawn areas.

Chipper – For breaking down woody material to be composted on-site or hauled away as green waste.

Golf Cart - for moving crews and equipment between areas.

Pressure Washer - for cleaning porous pavement and other paving or hardscapes.

Vacuum Sweeper - for vacuuming debris and sediment from porous paving areas. Vacuum sweepers can be very costly. Equipment can be rented or the tasks contracted to an outside maintenance provider.

8.2 Manual Equipment

Blade Sharpeners

Bypass Pruner - for shrub and perennial pruning and deadheading. Look for ¾ (¾”) to 1-inch (1”) curved blades.

Cultivator/fork - for turning material at on-site compost facility.

Gloves - leather and cloth.

Hand Tamper – for compacting NDS soils in drainage swales.

Long-reach Pruners - for areas not easily accessible. Choose pruners with a 4 (4') to 5-foot (5') long handle and cut and hold feature.

Loppers - for pruning shrubs and smaller tree branches. Look for 24 (24") to 36-inch (36") handles and 2-inch (2") curved blades.

Manual Edger – for redefining lawn edge where power edger is not possible.

Manual Seed Broadcaster - for applying lawn seed following aeration, in place of power overseeder.

Pincer-type Weeders – long-handled weeder for pulling weeds with their roots.

Pruner Grease or Lubricant

Push Broom

Rakes - metal construction, seeding rakes and lawn rakes, including narrow width for raking in planted areas.

Shovels - flat, spade, transplanting spade. Various widths and lengths.

T-handle Soil Core Sampler or Soil Augur – for collecting samples in lawn areas for monitoring soil texture, color, compaction and running pH tests.

Tree Pruner - for trimming branches. Choose pruners with a 10 (10') to 14-foot (14') long handle.

Wheelbarrow – for transporting soil, mulch, plants and other landscape materials as needed.

8.3 Other Equipment/ Specialty Items

Flame Weeders - a set of propane flames that are used to burn weeds. They are best used over paved or larger weedy areas and are not appropriate for planted areas where they can potentially cause damage to plants. Small, single-flame weeders may be appropriate for use in lawn and planted areas.

Hot water weeders - for hand weeding of lawn and bed areas.

Small on-site composting bins – these are bins similar to those used at local P-patches. They are larger than residential bins, but small enough that they do not require large yard spaces, anything more than manual turning or regulation.

⇒ *Plans for a 3-bin composting system (Section 14.1) -or- call the Natural Lawn and Garden Hotline (206) 633-0224*

⇒ *Flame, radiant (infrared) and hot water weeders (Section 14.2)*

9 GLOSSARY

Biodegradable Material
An organic substance, such as plant matter, that can be broken down through decomposition, such as *composting*.

Composting
The controlled decomposition of organic matter achieved by creating the optimal environment (mix of carbon, nitrogen, oxygen and water) for composting organisms.

Hillside Greenbelt (also Greenbelt)
The open space area to the east of High Point Drive.

Infrastructure
A set of interconnected structural elements that provide the framework to support a developed area. Most typically this refers to roads, power, sewer and water supply.

Integrated Pest Management (IPM)
Note that 'pest' here includes insects, weeds, plant pathogens, etc.
(From 17.15.010 RCW, via Tri-County IP&VM Model Policy, 1999) A coordinated decision making and action process that uses the most appropriate pest control methods and strategy in an environmentally and economically sound manner to meet agency programmatic pest management objectives. The elements of integrated pest management include:

a) Preventing pest problems;
b) Monitoring for the presence of pests and pest damage;
c) Establishing the density of the pest population, that may be set at zero, that can be tolerated or correlated with a damage level sufficient to warrant treatment of the problem based on health, public safety, economic, or aesthetic thresholds;
d) Treating pest problems to reduce populations below those levels established by damage thresholds using strategies that may include biological, cultural, mechanical, and chemical control methods and that must consider human health, ecological impact, feasibility, and cost effectiveness; and
e) Evaluating the effects and efficacy of pest treatments.

Market Garden
A separate organization located within the High Point Community. The Market Garden itself is located at the SE corner of SW Juneau Street and 32nd Ave SW.

Natural Drainage System
A drainage system that uses a combination of grass-lined and vegetated swales, pervious/porous paving, downspout disconnects, rainwater gardens, tree preservation and bioretention to manage stormwater runoff. Emphasis is on decentralizing stormwater collection and dispersal to many areas to maximize infiltration of water back into the soil.

Open Space
Areas, typically with few or only small buildings, that are intended for outdoor enjoyment and use by all.

Porous or Pervious Pavement
Pavement that allows water to filter through the pavement section via voids in the paving material. There are various types of porous pavements constructed at High Point. Special cleaning measures are required depending upon the porous pavement type.

Porous cement concrete pavement
Cement concrete pavement without the fines/sand in the mix which allows water to filter through the concrete section into the underlying gravel subbase layer below the pavement section.

Porous gravel pave pavement
A grid cell system filled with gravel and placed over a gravel subbase layer below the grid cells.

Right-of-way (ROW)
Land that is public and is owned by the City of Seattle and under the control of the Seattle Department of Transportation. The right-of-way typically includes sidewalks, landscaped area, the street and underground utilities.

Stormwater
The rainfall runoff from rooftops, streets, parking lots and other impervious surfaces that flows to waterways.

Swale
An open and gently sloping vegetated channel designed for treating and conveying stormwater runoff.

Water Quality
The chemical and physical characterization of water. The primary bases of which, are parameters relating to potability, safety of human contact and health of ecosystems.

Watershed
An area of land, defined by topography, upon which water drains into a specified body of water.

10 RECOMMENDED PUBLICATIONS

The following publications can be used as references on maintenance practices, plant materials and selection, weed and pest control, water conservation and other topics.

General Gardening

How to Get Your Lawn off Grass: A North American Guide to Turning Off the Water Tap and Going Native by Carole Rubin, 2002

Sunset Western Garden Book, 2001 Edition by Kathleen Norris Brenzel, 2001

Plant Selection & Identification

A Field Guide to the Common Wetland Plants of Western Washington & Northwestern Oregon by Sarah S. Cooke, 1997

Plants Of The Pacific Northwest Coast: Washington, Oregon, British Columbia & Alaska by Pojar and MacKinnon, 2004

Right Plant, Right Place by Nicola Ferguson, 1984

Plant Maintenance

Cass Turnbull's Guide to Pruning: What, When, Where, and How to Prune for a More Beautiful Garden by Cass Turnbull, 2004

Pruning Made Easy : A gardener's visual guide to when and how to prune everything, from flowers to trees by Lewis Hill, 1998

Pruning and Training: A fully illustrated plant-by-plant manual by Christopher Brickell and David Joyce, 1996

The Compost Tea Brewing Manual by Dr. Elaine Ingham, 2005 (5th ed.)

Disease & Pest Control

American Horticultural Society Pests and Diseases: The Complete Guide to Preventing, Identifying and Treating Plant Problems by Pippa Greenwood and Andrew Halstead, 2000

The Organic Gardener's Handbook of Natural Insect and Disease Control: A Complete Problem-Solving Guide to Keeping Your Garden and Yard Healthy Without Chemicals by Barbara W. Ellis, 1992

Paving

Porous Pavements by Bruce K. Ferguson, Taylor and Francis Group, 2005.

522 Guideline for Pervious Pavement by American Concrete Institute (ACI)

NRMCA publication #2 PPCRT Pervious Concrete Contractor Certification

Pervious Concrete Pavements by Paul Tennis, Michael Leming and David Akers, 2004

11 ADDITIONAL RESOURCES

The following resources can be used to gather further information on maintenance practices, plant materials and selection, weed and pest control, water conservation and other topics.

American Concrete Institute
Publication 522R-06 on Pervious Concrete May 2006
http://www.aci-int.org/PUBS/newpubs/522.htm

City of Olympia
Resources on maintenance and cleaning of porous pavements, including equipment comparisons and costs.
http://www.olympiawa.gov/en/city-utilities/storm-and-surface-water/science-and-innovations/science-and-innovations-porous-pavement.aspx

International Society of Arboriculture's Pacific Northwest Chapter
An organization providing information on tree protection and pruning techniques.
http://www.pnwisa.org/tree-care.html

King County Department of Natural Resources
This agency provides information on a variety of natural lawn and garden care topics. Detailed information on pest and weed-identification and control are available. http://dnr.metrokc.gov/topics/yard-and-garden/

WSU King County Extension
An organization that provides year-round advice on landscape issues, such as pests, diseases and plant selection. They are available weekdays by phone at 206/296-3440 and at various locations throughout the city, including West Seattle's Farmers Market.
http://king.wsu.edu/Gardening/

National Ready Mixed Concrete Association
Pervious Concrete Publications
www.nrmca.org

Seattle Tilth
A local organization that provides information on organic gardening with a focus on urban agriculture. Their website provides links to information on organic gardening, soils, plant selection and many other topics. Their Maritime Northwest Garden Guide may be purchased from their website.
http://www.seattletilth.org/

Seattle Public Utilities
This agency provides information on natural systems drainage, lawn care, plant selections, water use and other topics.
http://www.seattle.gov/util/services/

West Nile virus
http://www.seattle.gov/util/Services/Drainage_&_Sewer/Keep_Water_Safe_&_Clean/About_West_Nile_Virus/index.asp

Washington Department of Ecology
http://www.ecy.wa.gov/pubs/0310023.pdf

Supplier Websites

- **Bob's Brewers - compost tea brewing and application equipment**

  http://www.net-time.com/bobsbrew/index.html

- **Earth Fortification (EarthFort) - soil, compost, and compost tea information and supplies**

  http://www.earthfort.com/

- **Eartheasy Corn Gluten Meal**

  www.eartheasy.com/article_corn_gluten.htm

- **Hendrikus Organics - natural plant care products and consulting**

  www.hendrikusorganics.com/fertilizerblends.htm

- **Nature Safe - natural fertilizers and amendments**

  www.naturesafe.com/content/products/organic.html

- **Plant Health Care - natural fertilizers and amendments**

  http://www.planthealthcare.com/Home

- **Soil Foodweb's Oregon Lab - compost testing and information**

  http://oregonfoodweb.com/

- **Walt's Organics - organic garden products & services**

  www.waltsorganic.com

12 CURRENT TREE SURVEY & PRESERVATION CODE

This section is intended to contain a copy of the most recent tree survey for the High Point community. The survey can be used as a reference to check on the most recent professional opinion on the size and health of the trees in the community.

Users should also print and insert a copy of the most current City of Seattle tree preservation guidelines. Comparing the most recent survey with the current preservation guidelines can assist maintenance staff in determining which trees are currently listed as "exceptional," etc (which may be due to growth since previous surveys), and thus fall under specific preservation guidelines.

13 MAPS

This section includes the following maps:

13.1 Fall Maintenance/Storm Event Priority Clearing Guide

This map will assist with fall maintenance tasks relating to clearing low points and drain inlets of debris.

13.2 Quick Couple Locations

This map will help locate quick coupler locations when water sources are needed for watering, pressure washing, or other tasks.

13.3 High Point Community Phase I Irrigation Zoning Map

Shows irrigation zones and controller locations for Phase I.

13.4 High Point Community Phase II Irrigation Zoning Map

Shows irrigation zones and controller locations for Phase II.

14 INCLUDED DOCUMENTS

Index of Included Documents by Subject Area

14.1 Composting

- ⇒ *SPU Yard Waste Composting website (http://www.seattle.gov/util/Services/Yard/Composting/SPU01_001996.asp)*
- ⇒ *Plans for a 3-bin composting system (http://www.seattletilth.org/resources/compost); (http://www.rdn.bc.ca/cms/wpattachments/wpID1725atID2373.pdf)*

14.2 Equipment

- ⇒ *Irrigation system manuals (located in Association Office).*
- ⇒ *SPU Mulching Lawn Mower information (http://www.seattle.gov/util/Services/Yard/Natural_Lawn_&_Garden_Care/Natural_Lawn_Care/MULCHINGL_200311261655016.asp)*
- ⇒ *JOURNAL OF PESTICIDE REFORM -Radiant Heat Weeders (http://www.pesticide.org/solutions/home-and-garden-toolbox/landscape-and-plant-solutions/radiantheatweeders.pdf/view)*
- ⇒ *Flame, radiant (infrared) and hot water weeders (http://www.rtol.net/jonathanmeyer/flameweeder/); (http://www.the-organic-gardener.com/flame-weeder.html); (http://www.invasive.org/gist/tools/hotsteam.html)*

14.3 High Point Documents, Details and Specifications

- ⇒ *High Point Community ROW Plant Lists for Phases 1 and 2*
- ⇒ *High Point ROW and Open Space Maintenance Checklists*
- ⇒ *High Point ROW Swale Section(s)*
- ⇒ *High Point Tree Staking Detail*

14.4 Landscape Horticultural Practices

- ⇒ *City of Seattle Landscape and Grounds Management Guidelines (http://seattle.gov/environment/documents/landscape.pdf)*
- ⇒ *Plant Amnesty Pruning Guide (http://www.plantamnesty.org/pruning_guides/pg_northwest_pacific_maritime.htm)*
- ⇒ *University of Minnesota Extension Article: Pruning Trees and Shrubs (http://www.extension.umn.edu/distribution/horticulture/DG0628.html)*
- ⇒ *Ground Cover Spacing Chart*
- ⇒ *WSU Community Horticulture - Planting Landscape Plants Fact Sheet (http://king.wsu.edu/gardening/gardenfacts.htm)*

14.5 Materials

- ⇒ *Grass Pave and Gravel Pave, reinforced lawn and paving geogrid - Manufacturer information for maintenance and installation (http://www.invisiblestructures.com/); (http://www.mutualmaterials.com/professional/products/hardscape-products/pavers-and-architectural-slabs/environmental/turfstone)*

14.6 Fertilizers

- ⇒ *Hendrikus Organics (http://www.hendrikusorganics.com/fertilizerblends.php)*
- ⇒ *Nature Safe (http://www.naturesafe.com/content/products/organic.html)*
- ⇒ *Plant Health Care (http://www.planthealthcare.com/HT/Soil)*
- ⇒ *Walt's Organics (http://www.waltsorganic.com/page4.html)*

14.7 Natural Landscape Maintenance

- ⇒ *Sample Maintenance Log forms*
- ⇒ *Ecologically Sound Lawn Care for the Pacific NW (http://www.seattle.gov/util/stellent/groups/public/@spu/@csb/documents/webcontent/ecological_200312021255394.pdf)*
- ⇒ *King County, Going Native brochure (http://your.kingcounty.gov/dnrp/library/2003/gonative.pdf)*
- ⇒ *Mulching Lawn Mower information (see Equipment section)*
- ⇒ *The Natural Lawn & Garden - Choosing the Right Plants for a Beautiful, Trouble-Free Garden article (http://www.seattle.gov/util/stellent/groups/public/@spu/@csb/documents/webcontent/choosingt_200311261701525.pdf)*
- ⇒ *SPU Reasons to Choose Natural Lawn article (http://www.seattle.gov/util/Services/Yard/Natural_Lawn_&_Garden_Care/Natural_Lawn_Care/REASONSTO_200311261654543.asp)*
- ⇒ *Natural Pest Control (see Weeds and Pests section)*

14.8 Stormwater Management/Natural Drainage Systems

- ⇒ *City of Seattle, West Nile Virus Response Plan (http://www.seattle.gov/util/stellent/groups/public/@spu/@csb/documents/webcontent/spu01_002060.pdf)*
- ⇒ *SPU - "About West Nile Virus" (http://www.seattle.gov/util/Services/Drainage_&_Sewer/Keep_Water_Safe_&_Clean/About_West_Nile_Virus/GeneralInformation/SPU01_002198.asp)*

14.9 Weeds and Pests

- ⇒ *Tri-County Integrated Pest and Vegetation Management Guidelines (http://www.lhwmp.org/home/ChemToxPesticides/documents/IPMTriCountyGuidelines.pdf)*
- ⇒ *City of Seattle Pesticide Tier Tables (Herbicides, Insecticides) (http://www.lhwmp.org/home/ChemToxPesticides/ipm-eval.aspx)*
- ⇒ *Eartheasy Corn Gluten article (http://www.eartheasy.com/article_corn_gluten.htm)*
- ⇒ *Walt's Organic Corn Gluten Weed Control website printout (http://www.waltsorganic.com/page6.html)*
- ⇒ *Iowa State - How to Use Corn Gluten Meal (http://www.hort.iastate.edu/gluten/pdf/how-to-use-corn-gluten-meal.pdf)*
- ⇒ *Journal of Pesticide Reform - Corn Gluten Meal (http://www.pesticide.org/solutions/home-and-garden-toolbox/landscape-and-plant-solutions/corn-gluten-meal)*
- ⇒ *Journal of Pesticide Reform - Moss in Lawn Areas (http://www.pesticide.org/solutions/home-and-garden-toolbox/weed-solutions/moss-in-lawns)*
- ⇒ *Journal of Pesticide Reform - Managing Crane Flies in Lawns (http://www.pesticide.org/solutions/home-and-garden-toolbox/pest-solutions/crane-flies)*
- ⇒ *Journal of Pesticide Reform - Nonchemical Methods for Removing Unwanted Blackberry Plants (http://www.pesticide.org/solutions/home-and-garden-toolbox/weed-solutions/blackberries)*
- ⇒ *King County Noxious Weed Control brochures (http://www.kingcounty.gov/environment/animalsAndPlants/noxious-weeds/brochures-reports.aspx)*
- ⇒ *The Natural Lawn & Garden - Natural Pest, Weed & Disease Control (http://www.seattle.gov/util/stellent/groups/public/@spu/@csb/documents/webcontent/naturalpe_200311261701589.pdf)*
- ⇒ *TNC Weed Management - Documents for Reed Canary Grass, English Ivy and Himalayan Blackberry (http://www.invasive.org/gist/moredocs/phaaru01.pdf); (http://www.invasive.org/gist/moredocs/hedhel02.pdf); (http://www.invasive.org/gist/moredocs/rubarm01.pdf)*
- ⇒ *WSU Extension - Gardening Fact Sheets (http://king.wsu.edu/gardening/gardenfacts.htm)*
- ⇒ *WSU Extension - Insecticidal Soaps Info Sheet (http://spokane-county.wsu.edu/spokane/eastside/Fact%20Sheets/C183%20Insecticidal%20Soaps%2005.pdf)*

023274

Practically Easy Landscape Maintenance

A Care Manual for Natural Drainage Systems

Fall 2006
Second Edition

SEA Streets/Seattle Public Utilities

SEA Streets/Seattle Public Utilities

RESPONSIBILITIES

You have a Natural Drainage System in front of your home.
Now what will you need to do to maintain it?
And what will the City of Seattle do?

"To Do" List for Residents:

- Water, weed, mulch, mow and do other maintenance for Natural Drainage System plants and lawns. Please note that residents throughout the City are responsible for maintaining the planting or landscape strips in front of their homes.
- Remove leaves and debris blocking storm drains and pipes to help prevent local flooding.

  Please call Seattle Public Utilities, Drainage Operations at (206) 386-1800, if you see any drainage system problems, accidents, spills or pollution that appear harmful, dangerous, or need immediate attention beyond your efforts to keep storm drains and pipes clear of debris.
- Pick up trash in front of homes, in the Natural Drainage System and the street right-of-way.
- Keep sidewalks in front of homes clear of plant growth, debris, snow and other impediments to pedestrian access and safety. Prune shrubs and ground covers only as needed to keep sidewalks clear and sightlines open from street corners and driveways.

  Call the City for street tree pruning and other tree-related needs. See City Contacts below.
- Maintain stair handrails, if you have one (including painting handrails if desired.)
- Need help or have questions? See City Contacts below.

City of Seattle will:

- Regularly monitor and maintain Natural Drainage System "hardware" – pipes, culverts, outlets, drains, grates, maintenance structures and the like.
- Provide emergency services and repairs. See City Contacts below.
- Prune street trees as needed. See City Contacts below.
- Respond to your calls for help and information. See City Contacts below.

City Contacts:

Seattle Public Utilities, Drainage Operations, 24-hour emergency hotline: (206) 386-1800

Seattle City Light, 24-hour emergency hotline: (206) 705-0051

Seattle Public Utilities, Natural Drainage System, general information: (206) 684-3000

Seattle City Light, Powerline Clearance Program: (206) 386-1733

Seattle Department of Transportation, Arborist, street tree pruning needs: (206) 684-7649

Seattle Department of Transportation, Landscape Architect, landscape questions: (206) 684-5041

Seattle Department of Transportation, general information: (206) 684-ROAD

Natural Lawn & Garden Hotline, for gardening questions & advice: (206) 633-0224

A Care Manual for Natural Drainage Systems

What's in this Manual?

This manual includes helpful tips for major landscape maintenance tasks needed to establish and nurture Natural Drainage System plantings, or to maintain any residential yard, such as ...

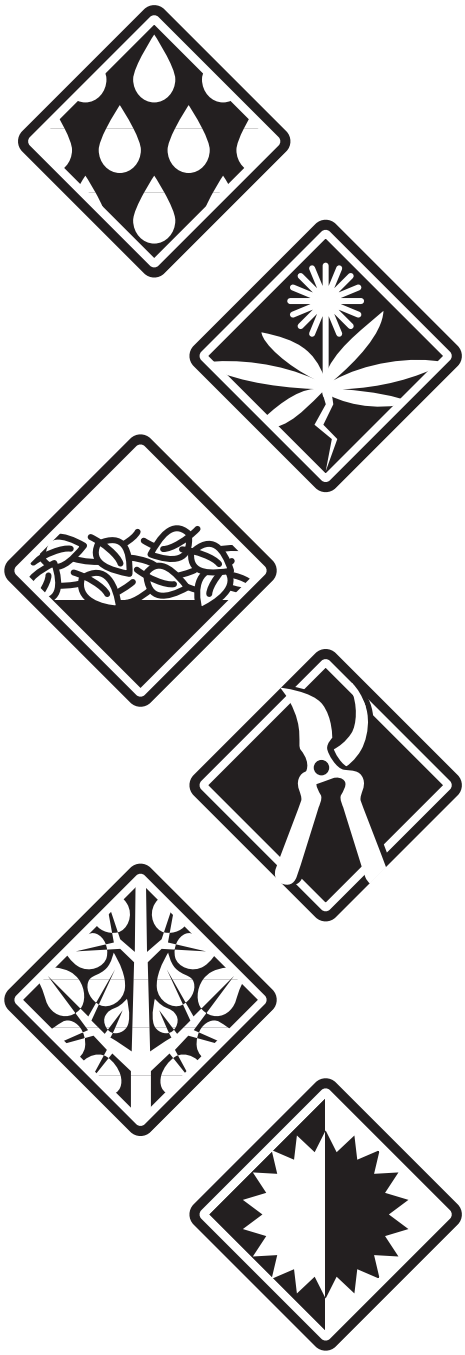

Watering

Answers questions about how much and how often plants need to be watered.

Weeding

Answers questions about which plants are weeds and how to minimize weeding.

Mulching

Answers questions about why mulch is good, how to mulch and with what materials.

Other Gardening Tasks

Other maintenance tasks include trash removal, lawn care, fall leaves, pruning, fertilizing and pest/disease control.

Landscape Maintenance Calendar & Guide Card

Summarizes tasks and tips, and illustrates common weeds likely to sprout. Take the laminated version, located in the back pocket of this guide, outside with you while gardening or post it in your home or garden shed.

Plant Identification

Illustrates a typical planting cross section, and provides photos and descriptions of plants installed for the Natural Drainage System in your neighborhood.

Resources

Bibliography, web sites, contact numbers.

Additional publications included in the manual:

Natural Yard Care
Natural Lawn Care
Smart Watering
Saving Water with Soaker Hoses
Natural Pest, Weed & Disease Control
Growing Healthy Soil
Get to Know Your Soil
Choosing the Right Plants

WATERING

Peggy Gaynor

Practically Easy Watering

How much water?

Watering's fun and easy, right? But how often should plants be watered? And how much water do plants really need?

Deep, infrequent watering that moistens the top 12 to 18 inch root zone is recommended to keep plants alive and healthy and to promote deep roots. Deep roots help plants be drought tolerant.

For the first three years, deeply water plants once every 7 to 14 days in hot, dry weather. Small plants and flowers may need more frequent watering in hot weather – up to twice a week.

> ***Tip:*** *Watch for stressed plants. When leaves wilt and don't perk up overnight, or evergreen needles start to fade, it's time to water!*

To know you're giving plants enough water, dig down an hour or so after watering to see if the top 12 to 18 inches of soil is moist. If not, add watering time until at least the top 12 inches is moistened.

After three to five years, plants should be well-established, deep rooted and drought tolerant. Watering established plants then becomes an infrequent task – only needed when plants show signs of stress during hot, dry weather.

> ***Tip:*** *Keep mulch layer thick on planting beds to save watering and weeding time and money! See "Mulching" on page 6 to learn why and how.*

Too much or too little?

Be careful to avoid watering too little or too much.

1) **Too Little:** Hand spraying water wets leaves and soil surface but doesn't apply enough water to soak soil down to thirsty roots.

2) **Too Much:** Overwatering literally rots roots, invites disease, drowns and starves plants (they can't absorb nutrients from soggy soil).

Two good ways to water: Soaker Hoses and Spot Watering

Soaker Hose Watering: Soaker or Leaky Hoses slowly release water drops all along their length. Snake soaker hoses through planting areas and close to plant trunks or stems, or space soaker hose loops 18 inches apart (sandy soils) to 24 inches apart (clay soils) to water a whole area. Moisture is applied directly and efficiently to the soil and plant root zones. Evaporation is minimized, particularly if the hose is covered with 3 to 4 inches of mulch. Start with 40 to 60 minutes and check that water is penetrating 12 to 18 inches deep!

Spot Watering: Spot watering is simply running a hose at the base of a plant - uphill side is best, or into a 2 to 5 gallon bucket with holes in the bottom! You can use a garden soaker or shower-type wand (not a spray nozzle!) on the hose end to spread out the flow and reduce erosion. Turn the hose on softly (enough to fill a bucket to the 2 gallon/8 liter mark in 1 minute or so) and let it run for 30 seconds to 5 minutes (½ to 10 gallons), depending on the plant type and size. Spot watering takes more time, but really helps establish trees and large shrubs, which need more water to reach larger, deeper root systems, or to rescue drought-stressed plants at any time.

continued on next page

Year 1: Watering Schedule for Summer (June – August)

Type of Plant	*Amount of Water*	*Frequency for Year 1*
Tree	5 – 10 gallons	Once a Week
Shrub	3 – 5 gallons	Once a Week
Ground Cover	1 – 2 gallons	Once or Twice a Week
Perennial/Annual	½ gallons	Twice a Week
Grass Lawn*	1 inch	Per Week

Option: Stop watering lawn. Mowing is reduced while grass is dormant.

Type of Plant	*Time for Soaker Hose Watering* **adjust for 12–18 inch penetration**	*Time for Spot Watering* **at approx. 2 gallons per minute**
Tree	40 - 60 minutes	2.5 – 5 minutes
Shrub	40 - 60 minutes	1.5 – 2.5 minutes
Ground Cover	40 - 60 minutes	0.5 – 1 minute
Perennial/Annual	40 - 60 minutes	15 – 20 seconds
Grass Lawn	Not Applicable	Not Applicable

Watering Tips:

- Water deeply and infrequently, in morning or evening. Water evaporates during midday heat. See Watering on Landscape Maintenance Calendar & Guide.
- Water where roots are: top 12-18 inches of soil for trees, shrubs, ground covers and perennials/annuals, and top 4 -6 inches for lawns.
- Plants are installed with a watering basin or saucer, a small earth berm or donut formed around each plant to hold water at its base. Keep watering basin intact, particularly for the first year!
- Do “pulsed” watering. Water 2 days in a row, or morning & evening on 1 day. Like a damp sponge, already moist soil allows more water to absorb deeper into the ground.
- Drill or poke holes into the bottom of a 5 gallon bucket. Put at the base of a tree or shrub, fill and let drain slowly into soil. Water 5-10 gallons per tree, and 3–5 gallons per shrub.
- Use soaker hoses and spot watering to water planting beds, instead of garden sprinklers and hand spraying. Drip irrigation systems apply water to individual plants and are water efficient but more complicated and expensive to properly design and install.
- Use a timer – either on the hose itself for soaker hoses, or a kitchen timer or stop watch for spot watering.

Want to know more?
Read *Natural Yard Care, Smart Watering* and *Saving Water with Soaker Hoses*, and see *Landscape Maintenance Calendar & Guide, Year 1: Watering Schedule for Summer Months* and *Watering Tips*, in this manual.

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WEEDING

Peggy Gaynor

Practically Easy Weeding

The Big Question:
Which plants to weed and which plants to keep?

Some common weeds likely to pop up in your neighborhood are pictured here. Learn about good landscape plants to keep in the Plant Identification section.

Tip: *Look around your yard and neighborhood to see what trees and other plants may be spreading unwanted seeds to unwelcome locations.*

How to get rid of weeds?
Pull them by hand before they go to seed!

Be sure to pull or dig out the roots. Tearing off weed tops is just “pruning” - they’ll grow right back! The easiest time to weed is when soil is moist and weeds are small – especially in spring and again in fall. The best way to discourage weeds is with 3 to 4 inches of organic mulch.

Treating your yard as Wildlife Habitat

Natural Drainage Systems absorb urban runoff and improve water quality before runoff flows into local streams, lakes and Puget Sound. Many of the plants are attractive to wildlife. Please do not use chemicals to kill weeds, pests, diseases, or to fertilize plants. Instead try environmentally friendly hand weeding and pest control methods, and organic products. Without chemicals, your yard will be healthier and safer for you, your family and pets - and be full of birds, beneficial insects and other critters to watch and enjoy!

Weeding Tips:

- Pull or dig out weed roots – removing weed tops only is “pruning.” Pull weeds when they're small and soil is moist – it's easier!
- Use a sharp pointed trowel or garden fork to loosen soil and dig out weeds. Is your back tired? Use a long-handled weed puller to yank weeds.

* State-regulated noxious weeds may also be locally regulated. Make efforts to contain, suppress and/or eliminate these weeds. For more information, go to Washington State Noxious Weed Control Board website at www.nwcb.wa.gov

continued on next page

Want to know more?
Read *Natural Yard Care and Natural Pest, Weed & Disease Control,* and see *Landscape Maintenance Calendar & Guide and Weeding Tips*, in this manual.

Some common weeds:

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*State-regulated noxious weeds may also be locally regulated. Make efforts to contain, suppress and/or eliminate these weeds. For more information, go to Washington State Noxious Weed Control Board website at www.nwcb.wa.gov

*Bindweed

*Butterfly Bush

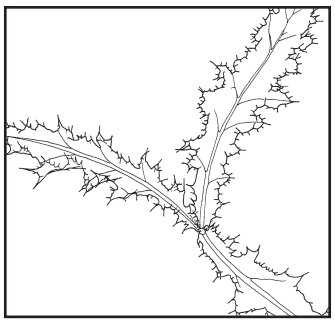

*Canada Thistle

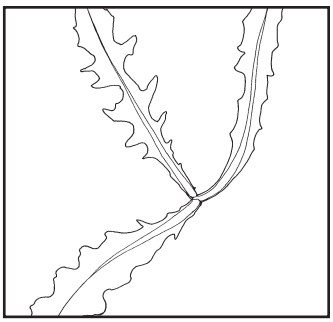

*Catsear

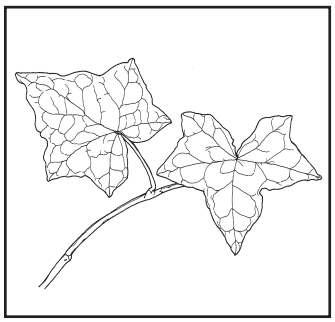

*English Ivy

*Groundsel

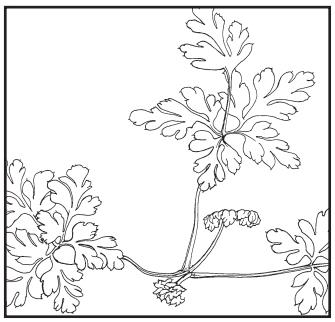

*Herb Robert

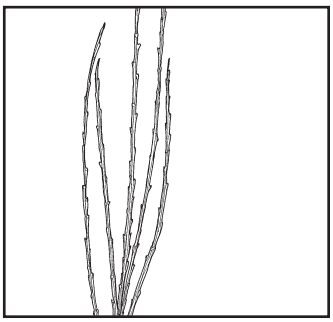

*Scotch Broom

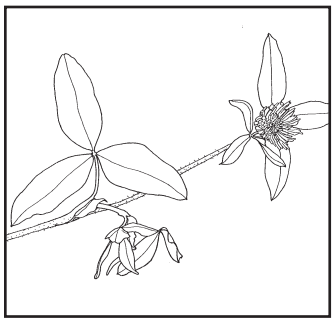

Clover

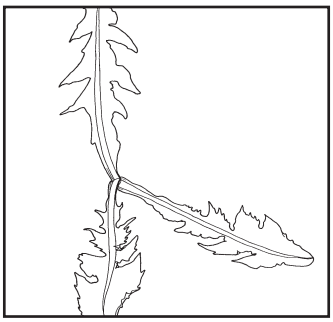

Dandelion

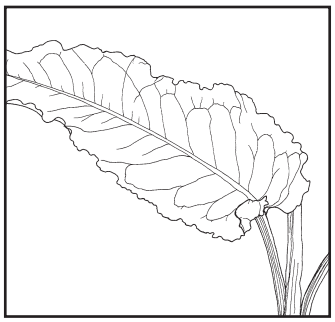

Dock

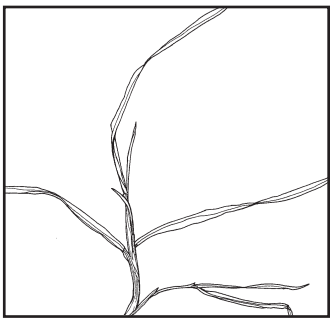

Grass

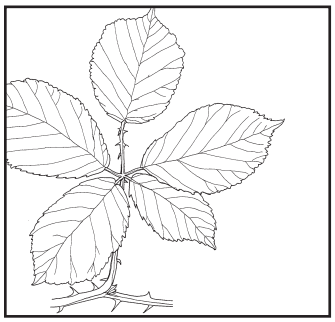

Himalayan Blackberry

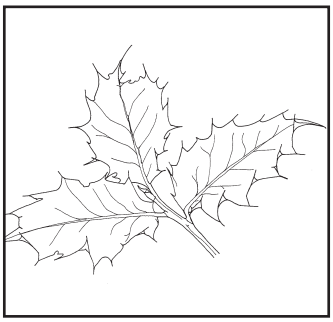

Holly

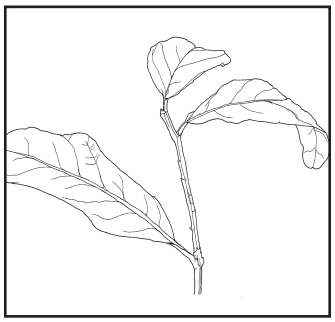

Laurel

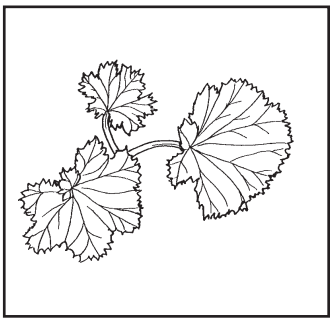

Mallow

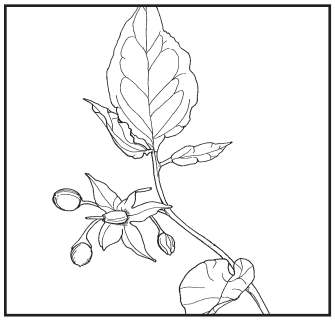

Nightshade

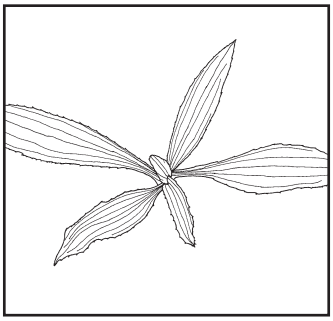

Plantain

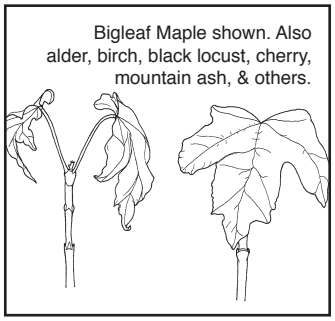

Tree Seedlings

Vetch

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MULCHING

Peggy Gaynor

Practically Easy Mulching

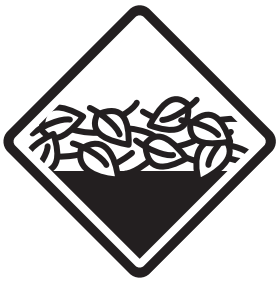

Why is mulching around plants good?

Mulching planting beds with a 3 to 4 inch layer of organic material - like wood chips or tree trimmings, leaves, bark or compost - retains moisture, keeps roots cool, discourages weeds and feeds the soil.

Will putting down mulch really save time and money?

You'll spend less time weeding, less money and time watering and grow a healthier, more attractive landscape.

Don't be afraid to install a thick layer of mulch initially – as much as 6 to 8 inches of tree trimming or leaf mulch, or 4 to 6 inches of bark or compost. Be careful to leave plant trunks and stems open to air - burying plants in mulch will rot them! After settling and composting, the mulch layer will quickly shrink to the recommended 3 to 4 inches.

Mulching can happen at any time of year, and is best to have in place before hot, dry summer days. Install mulch during fall, winter or spring (pace yourself – some mulches are pretty heavy!) Then sit back, take a summer "vacation" and enjoy the benefits of a healthier, water-conserving garden.

Tip: *If a truck load of mulch is more than you need, consider having a "Block Mulching Party."*

Mulch Types & Sources:

Wood Chip or Tree Trimming Mulch: Available free from commercial tree services as a by-product of pruning, tree trimming mulch is a variable mix of shredded wood (limbs), leaves and conifer needles. Although it may contain weed seeds, spread disease and/or grow mushrooms (do not eat!), chipped tree trimmings make an effective, inexpensive moisture-holding mulch that lasts longer and has more structure (woody material) than leaves, bark or compost mulches.

Leaves and Grass Clippings: Available free from your yard (or from neighbors), fall leaves and grass clippings may be added to planting beds as mulch and allowed to compost in place. If you dislike the odor and appearance of composting leaves or grass clippings, an alternative is to compost the materials before putting them on planting beds. See Compost.

Bark Mulch: Available commercially by the cubic yard, bark mulch is a by-product of the timber industry. Consisting primarily of Douglas fir and hemlock bark, it comes in coarse, medium-fine and fine textures and is often installed for aesthetics as much as for mulch. Bark mulch may be contaminated with weed seeds and salt, is naturally waxy and repels rain - all creating poor conditions for plant growth. It can also be tough on hands! Avoid using fine bark, cedar chip or sawdust products that can be especially water-repellent and harmful to plants.

Compost: Available commercially by the cubic yard or free from your own home composter, compost is a recycled product made from aged yard waste, manure and other biosolids. With an attractive dark brown soil-like texture, compost can be used as mulch or mixed into soil to improve fertility. Compost mulch can form a dry "crust" that resists water at first. It also breaks down quickly, meaning more frequent re-mulching.

continued on next page

Mulching Tips:

- Maximize time & water saving benefits of mulching. Maintain 3-4 inch thick mulch layer over all planting beds – but don't bury plants. Burying plants in mulch will rot them!
- One cubic yard of mulch spread 3-4 inches thick covers approximately 100 square feet (10' x 10') of planting bed. Share a truck load or two of mulch and have a “Block Mulching Party.”

Want to know more?
Read *Natural Yard Care, Natural Lawn Care, Growing Healthy Soil, Get to Know Your Soil, Natural Pest, Weed & Disease Control* and *Choosing the Right Plant*; and see *Landscape Maintenance Calendar & Guide* and *Gardening Tips*, in this manual.

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OTHER GARDENING TASKS

Peggy Gaynor

Other Gardening Tasks

Trash Removal:

Pick up trash within your yard and Natural Drainage System and right-of-way in front of your home. Remove leaves and debris blocking storm drains and pipes to help prevent local flooding. Add trash to other garbage or recyclables for waste collection.

Lawns:

Lawns require regular mowing and 1 inch of water per week to stay green. To water wisely and avoid over-watering, use a straight-sided can (tuna or cat food cans work great) to measure when you have put 1 inch of water on lawns and then turn off the sprinklers! Hand weeding, fertilizing (with organic fertilizers, please!) and raking off leaves in fall are other tasks you can do to keep lawns looking good. Consider letting grass go brown (dormant) by not watering in summer. This cuts down on mowing and the grass will green up with fall rain. Also consider reducing the size of your lawn to what you really use (compost the sod!) and adding more native habitat plantings.

Fall Leaves:

Rake leaves off of lawns in fall, but let leaves lie on planting beds as mulch. Or compost leaves and add to planting beds in spring as soil amendment or mulch.

Pruning:

Your new plants should need very little if any pruning. If you do prune, only prune shrubs and ground covers as needed to keep sidewalks clear and sightlines open from street corners and driveways. You can remove broken or dead limbs and tree suckers. For street tree pruning, information and permits, call City Arborist at **(206) 684-7649**.

Fertilizing:

Planting soil has been amended with compost and should not require any other fertilizer, other than re-mulching with compost, leaves, or tree trimming mulch.

Pests & Diseases:

Instead of spraying at the first sign of pests or disease, try these environmentally friendly approaches. You can also call the Natural Lawn & Garden Hotline, for expert advice on pests and other gardening questions: **(206) 633-0224**.

continued on next page

More about Pests & Diseases:

1. Prevent pests and diseases. Nurture healthy soil with compost and mulch. Keep planting beds clean of diseased or dead plants. Pull weeds before they go to seed.
2. Identify the problem. Some bugs are good! For bad bugs, handpick (squish) larger pests, prune out infected plant parts, or wash pests off with a strong spray of water from the hose. You can also use traps and barriers to keep out bugs and critters!
3. Be patient and live with a little pest or disease damage. Given time, nature may cure the problem without your help, or plants may simply “outgrow” the problem.

Other Gardening Tips:

- In late March, take a flashlight out into the garden around midnight to literally catch root weevils and cut worms in the act, munching new foliage. Pluck & pinch (or squish) to manually remove the pesky critters!

Typical section natural drainage system plants

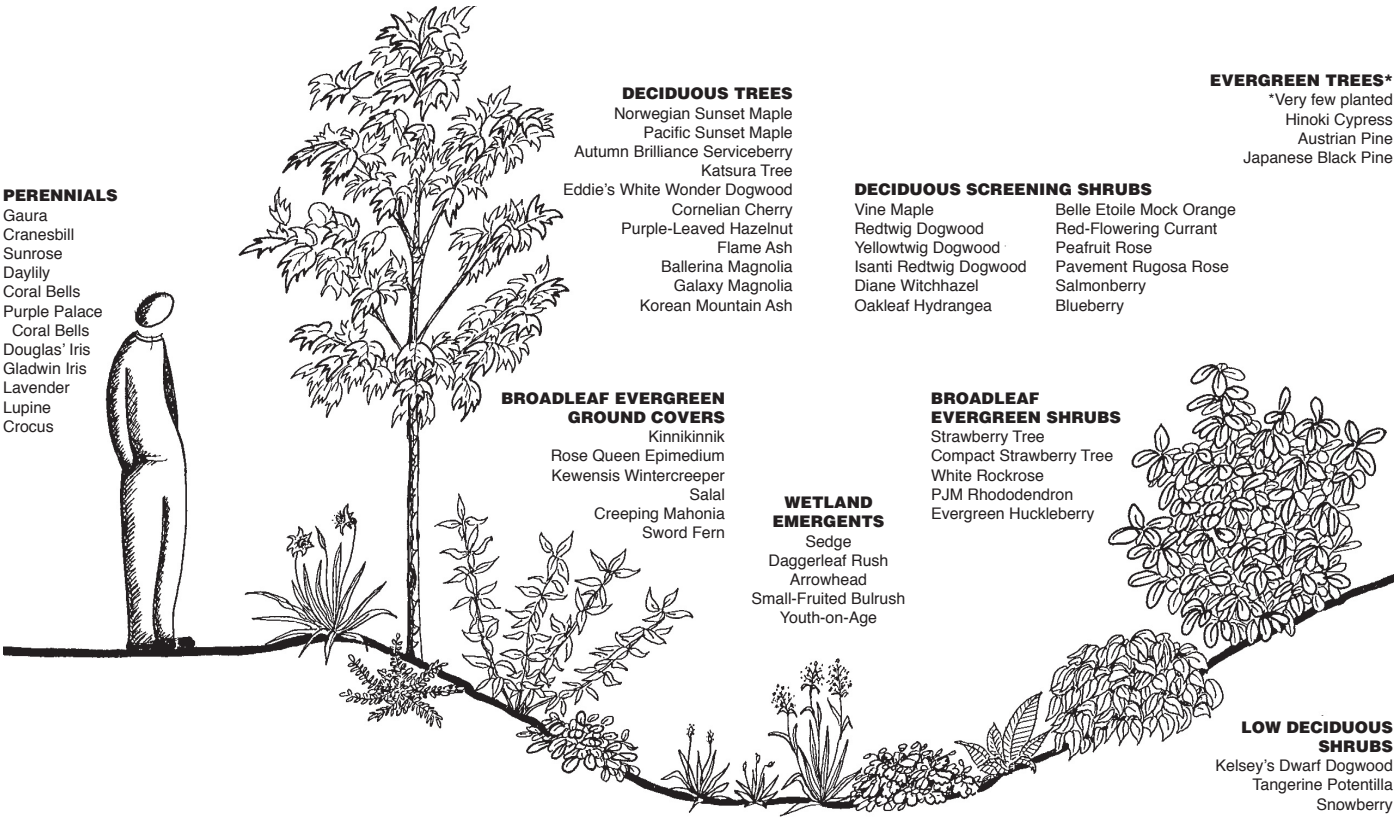

Want more info?
Read *Natural Yard Care, Natural Lawn Care, Growing Healthy Soil, Get to Know Your Soil, Natural Pest, Weed & Disease Control* and *Choosing the Right Plant*; and see *Landscape Maintenance Calendar & Guide* and *Gardening Tips*, in this manual.

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RESOURCES

Peggy Gaynor

Resources

Natural Lawn & Garden Guides included in the manual

Natural Yard Care

Natural Lawn Care

Smart Watering

Saving Water with Soaker Hoses

Natural Pest, Weed & Disease Control

Growing Healthy Soil

Get to Know Your Soil

Choosing the Right Plants

Other City of Seattle Natural Lawn & Garden Guides available at:
www.seattle.gov/util/Directory/Conservation_Index
Look under "Landscape Naturally," "Conserve Water At Home," & "Prevent Water Pollution At Home"

Questions? Call the Natural Lawn & Garden Hotline at 206-633-0224
or e-mail info@lawnandgardenhotline.org

Other Books and References

- *Sunset Western Garden Book* (Sunset Books, 2001)
- *Gardening with Native Plants of the Pacific Northwest* (Arthur R. Kruckeberg, 1996)
- *Weeds of the West* (The Western Society of Weed Science, 2002)
- *Northwest Weeds – The Ugly and Beautiful Villains of Fields, Gardens and Roadsides* (Ronald J. Taylor, 1990)
- *The Mulch Book: A Complete Guide for Gardeners* (Stu Campbell and Donna Moore, Storey Books, 1991)
- *Let It Rot: The Gardener's Guide to Composting* (Stu Campbell, Storey Books, 1988)
- *Pruning Simplified* (Lewis, Hill, 1986)
- *A New Tree Biology* (Alex Shigo, 1986)
- *Arboriculture* (Richard W. Harris, 1983)
- *Trees and Shrubs Hardy in the British Isles*, 4 volumes (W.J. Bean, 1981)
- *Manual of Woody Landscape Plants: Their Identification, Ornamental Characterisics, Culture, Propagation, and Uses* (Michael A. Dirr, 1983)

continued on next page

Website resources

- Soil and composting (King County) — www.metrokc.gov/soils
- Yard and garden topics (King County) — http://dnr.metrokc.gov/topics/yard-and-garden
- Water conservation, indoors and outdoors (Saving Water Partnership) — www.savingwater.org (206) 684-SAVE (684-7283)
- Less toxic gardening and pest control — www.govlink.org/hazwaste/house Look under “Natural Yard Care”
- Washington State University King County Extension — www.metrokc.gov.WSU%2DCE
- Washington State University Master Gardener information — http://mastergardener.wsu.edu (206) 296-3440
- Gardening in Western Washington WSU Master Gardener Program — http://gardening.wsu.edu
- Native plant information — http://gardening.wsu.edu/nwnative
- Salmon information — http://seattle.gov/salmon
- Choosing the right plant for the right place — www.GreatPlantPicks.org
- Washington State Noxious Weed Control Board — www.nwcb.wa.gov

Other publications available through websites

- How to be a Salmon Friendly Gardener — www.seattle.gov/util/Directory/Conservation_Index
- Composting at Home "Using Compost" — www.seattle.gov/util/Directory/Conservation_Index
- Stop Before You Spray: A photo guide to beneficial insects — www.govlink.org/hazwaste/house Look under “Natural Yard Care – Avoid pesticides – Beneficial insects”
- Four Reasons to Kick the Weed and Feed Habit — www.govlink.org/hazwaste/house Look under “Natural Lawn Care – Avoid weed and feed”
- The Right Tree Book (Seattle City Light, 1988) — www.seattle.gov/light/publications Look under “Brochures You Can Print”

Plant Identification and Information websites

- Landscape Plants - Images, Identification and Information OSU Dept. of Horticulture http://oregonstate.edu/dept/hort, Extension and Outreach - Landscape Plants
- Plants Database, United States Department of Agriculture http://plants.usda.gov
- Web Resources - Directory of Horticulture Websites University of Washington, Center for Urban Horticulture, Elisabeth C. Miller Library http://depts.washington.edu/hortlib/resources/hort_web_sites/plant_id.shtml

Seattle Public Utilities

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Landscape Maintenance Calendar & Guide

GARDEN TASKS	***WATERING*** **Year as Noted**	***WEEDING*** **Year as noted**	***MULCHING*** **Year 1 thru Long-term**	***OTHER TASKS*** **Year 1 thru Long-term**
SPRING: ***March*** ***April*** ***May***	**Year 1** thru Long-term: If unusually hot, dry weather causes plants to wilt, then water like it's SUMMER!	**Year 1:** Weekly **Years 2 – 5:** Biweekly **Long-term:** Monthly Weed well in spring to save time in summer!	Mulch 3–4 inches deep in spring to save weeding and watering time in summer. Remember to pull mulch back from stems to allow plants to breathe! Where ground cover is filling in, add thin layer (dusting) of mulch and broom in.	Pick up trash as needed. Mow lawn regularly to recommended 2 inch mowing height. Use mulching mower to feed soil with grass clippings! Hand pick root weevils & cutworms at midnight in late March.
SUMMER: ***June*** ***July*** ***August***	***See Year 1: Watering Schedule for Summer on reverse.*** **Years 2 – 3:** During hot, dry periods, deep water stressed trees & shrubs every 2 weeks and ground covers & flowers every 7–10 days. **Long-term:** Deep water stressed plants only. ***Option: Stop watering lawn in summer and allow grass to go dormant. Saves water and mowing time.***	**Years 1 – 5:** Weekly, unless you weeded so well in spring that monthly will do! **Long-term:** Monthly & as needed	Mulch in spring - or fall or winter!	Pick up trash as needed. Mow lawn to 2 inch height. ***Option: Stop watering lawn. Mowing is reduced while grass is dormant.***
FALL: ***September*** ***October***	**Year 1 – 5:** If rain soaks 12–18 inches deep, relax. If not, deep water plants - especially evergreens – to help plants resist drying from winter sun and wind! **Long-term:** None usually needed.	**Year 1 thru Long-term:** Do one thorough weeding and clean up during fall.	Use fall leaves and/or grass clippings to mulch around plants, and keep down winter weeds! Or compost leaves and grass clippings and add in spring.	Pick up trash as needed. Mow lawn to 2 inch height. Rake leaves from lawns.
WINTER: ***November*** ***December*** ***January*** ***February***	Take a break! No need to water in winter.	**Years 1 – 5:** Monthly & as needed. Adding mulch in fall prevents most winter weeds. **Long-term:** 1 or 2 times during winter months.	Alternative season for mulching as needed. See also SPRING & FALL.	Pick up trash as needed. Remove dead and broken wood, and suckers at base of trees. Mow lawn to 2 inch height

Watering Tips:

- Water deeply and infrequently, in morning or evening. Water evaporates during midday heat. See Watering on Landscape Maintenance Calendar & Guide.
- Water where roots are: top 12-18 inches of soil for trees, shrubs, ground covers and perennials/annuals, and top 4 -6 inches for lawns.
- Plants are installed with a watering basin or saucer, a small earth berm or donut formed around each plant to hold water at its base. Keep watering basin intact, particularly for the first year!
- Do “pulsed” watering. Water 2 days in a row, or morning & evening on 1 day. Like a damp sponge, already moist soil allows more water to absorb deeper into the ground.
- Drill or poke holes into the bottom of a 5 gallon bucket. Put at the base of a tree or shrub, fill and let drain slowly into soil. Water 5-10 gallons per tree, and 3–5 gallons per shrub.
- Use soaker hoses and spot watering to water planting beds, instead of garden sprinklers and hand spraying. Drip irrigation systems apply water to individual plants and are water efficient but more complicated and expensive to properly design and install.
- Use a timer – either on the hose itself for soaker hoses, or a kitchen timer or stop watch for spot watering.

Mulching Tips:

- Maximize time & water saving benefits of mulching. Maintain 3-4 inch thick mulch layer over all planting beds – but don't bury plants. Burying plants in mulch will rot them!
- One cubic yard of mulch spread 3-4 inches thick covers approximately 100 square feet (10' x 10') of planting bed. Share a truck load or two of mulch and have a “Block Mulching Party.”

Weeding Tips:

- Pull or dig out weed roots – removing weed tops only is “pruning.” Pull weeds when they're small and soil is moist – it's easier!
- Use a sharp pointed trowel or garden fork to loosen soil and dig out weeds. Back tired? Use a long-handled weed puller to yank weeds.

Other Gardening Tips:

- In late March, take a flashlight out into the garden around midnight to literally catch root weevils and cut worms in the act, munching new foliage. Pluck & pinch (or squish) to manually remove the pesky critters!

Year 1: Watering Schedule for Summer

(June – August)

Type of Plant	*Amount of Water*	*Frequency for Year 1*
Tree	5 – 10 gallons	Once a Week
Shrub	3 – 5 gallons	Once a Week
Ground Cover	1 – 2 gallons	Once or Twice a Week
Perennial/Annual	½ gallons	Twice a Week
Grass Lawn*	1 inch	Per Week

Type of Plant	***Time for Soaker Hose Watering* adjust for 12–18 inch penetration**	***Time for Spot Watering* at approx. 2 gallons per minute**
Tree	40 - 60 minutes	2.5 – 5 minutes
Shrub	40 - 60 minutes	1.5 – 2.5 minutes
Ground Cover	40 - 60 minutes	0.5 – 1 minute
Perennial/Annual	40 - 60 minutes	15 – 20 seconds
Grass Lawn	Not Applicable	Not Applicable

**** Option: Stop watering lawn. Mowing is reduced while grass is dormant.***

Typical section natural drainage system plants

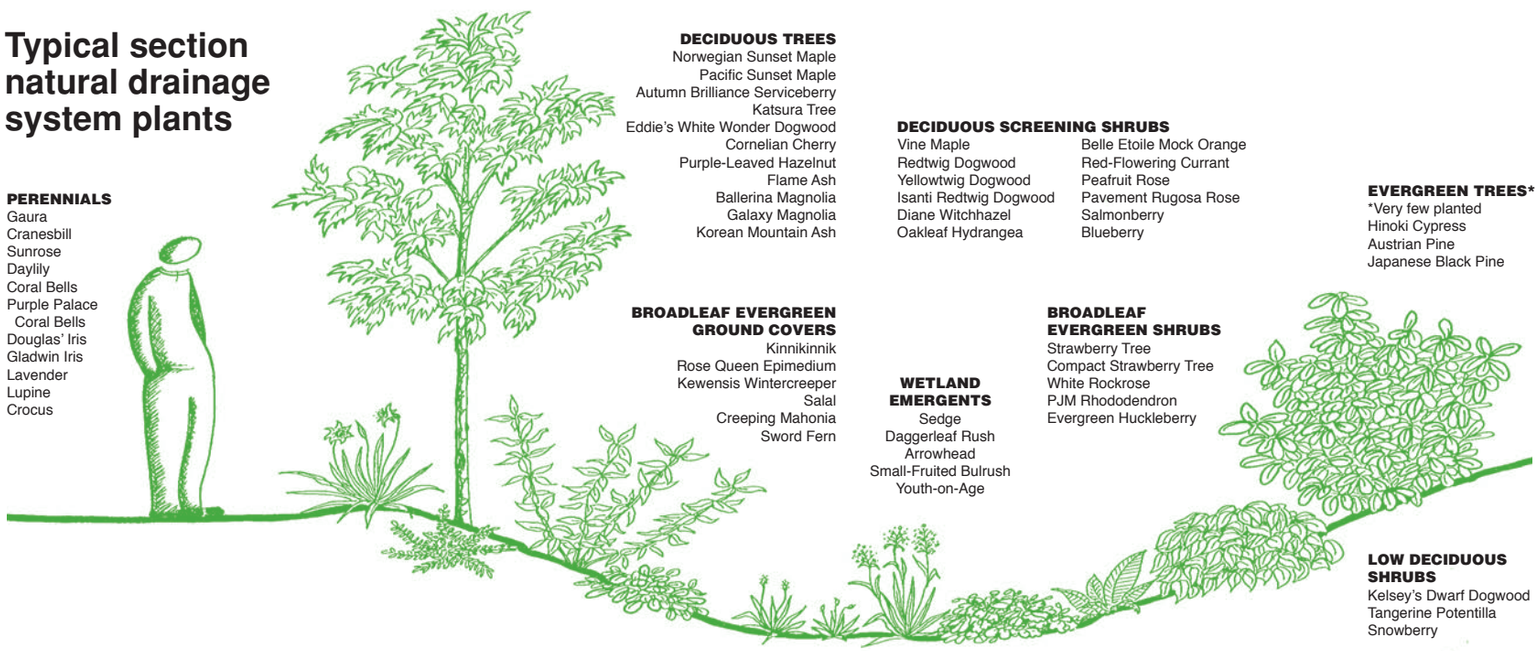

PERENNIALS
Gaura
Cranesbill
Sunrose
Daylily
Coral Bells
Purple Palace Coral Bells
Douglas' Iris
Gladwin Iris
Lavender
Lupine
Crocus

DECIDUOUS TREES
Norwegian Sunset Maple
Pacific Sunset Maple
Autumn Brilliance Serviceberry
Katsura Tree
Eddie's White Wonder Dogwood
Cornelian Cherry
Purple-Leaved Hazelnut
Flame Ash
Ballerina Magnolia
Galaxy Magnolia
Korean Mountain Ash

DECIDUOUS SCREENING SHRUBS
Vine Maple
Redtwig Dogwood
Yellowtwig Dogwood
Isanti Redtwig Dogwood
Diane Witchhazel
Oakleaf Hydrangea
Belle Etoile Mock Orange
Red-Flowering Currant
Peafruit Rose
Pavement Rugosa Rose
Salmonberry
Blueberry

EVERGREEN TREES*
*Very few planted
Hinoki Cypress
Austrian Pine
Japanese Black Pine

BROADLEAF EVERGREEN GROUND COVERS
Kinnikinnik
Rose Queen Epimedium
Kewensis Wintercreeper
Salal
Creeping Mahonia
Sword Fern

WETLAND EMERGENTS
Sedge
Daggerleaf Rush
Arrowhead
Small-Fruited Bulrush
Youth-on-Age

BROADLEAF EVERGREEN SHRUBS
Strawberry Tree
Compact Strawberry Tree
White Rockrose
PJM Rhododendron
Evergreen Huckleberry

LOW DECIDUOUS SHRUBS
Kelsey's Dwarf Dogwood
Tangerine Potentilla
Snowberry

Some common weeds:

*State-regulated noxious weeds may also be locally regulated. Make efforts to contain, suppress and/or eliminate these weeds. For more information, go to Washington State Noxious Weed Control Board website at www.nwcb.wa.gov

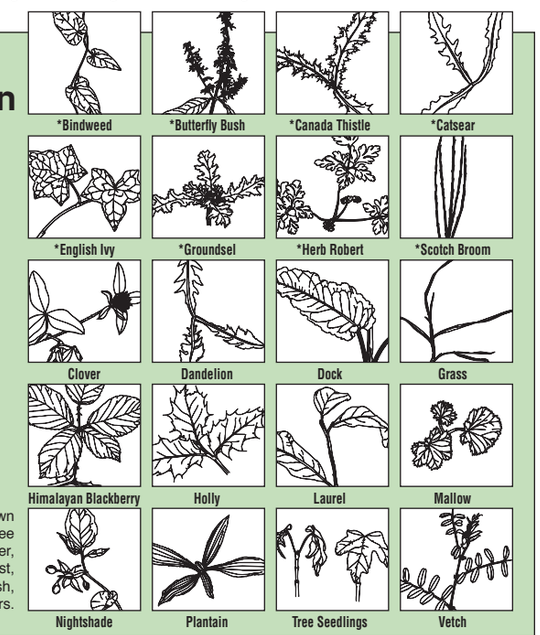

Bigleaf Maple shown as example of Tree Seedlings. Also alder, birch, black locust, cherry, mountain ash, & others.

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PLANT IDENTIFICATION

Pat Breen, Oregon State University

Typical section natural drainage system plants

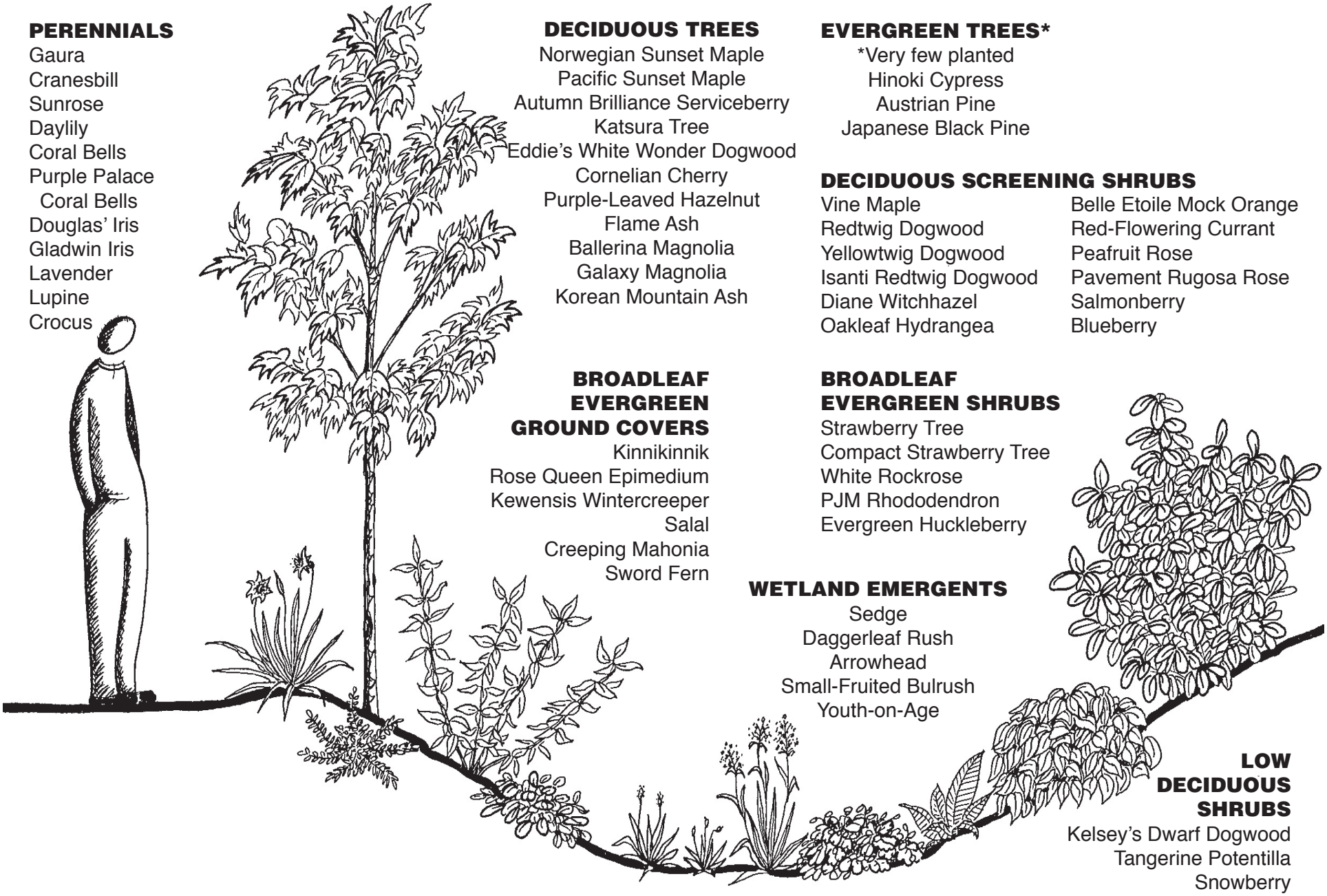

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Flame Ash
Ballerina Magnolia
Galaxy Magnolia
Korean Mountain Ash

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*Very few planted
Hinoki Cypress
Austrian Pine
Japanese Black Pine

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Yellowtwig Dogwood
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Tangerine Potentilla
Snowberry

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Norwegian Sunset Maple Deciduous Tree
(Acer truncatum x Acer platanoides 'Keithsform')
Mature Size: 30'-35' height by 20'-25' spread
Shape: Upright oval to pyramidal
Environment: Adaptable to range of soils & conditions
Interest: Yellow-orange-red fall color
Special Needs: None

Peggy Gaynor

Pacific Sunset Maple Deciduous Tree
(Acer truncatum x Acer platanoides 'Warrenred')
Mature Size: 25'- 30' height by 20'-25' spread
Shape: Upright spreading to round
Environment: Adaptable to range of soils & conditions
Interest: Yellow-orange to bright red fall color
Special Needs: None

Peggy Gaynor

Autumn Brilliance Serviceberry Deciduous Tree
(Amelanchier x grandiflora 'Autumn Brilliance')
Mature Size: 20' height by 15' spread
Shape: Upright, moderately spreading; May sucker
Environment: Sun; Good soil: Moderate water
Interest: White Spring flowers; Red fall color
Special Needs: Water in hot, dry weather; Prune suckers

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Katsura Tree Deciduous Tree
(Cercidiphyllum japonicum)
Mature Size: 35' 40' height by 35'-40' spread
Shape: Upright, pyramidal to rounded
Environment: Protect from hot sun and dry wind
Interest: Heart-shaped foliage; Yellow-orange fall color
Special Needs: Water in hot, dry weather

Peggy Gaynor; Pat Breen, Oregon State University (inset)

Eddie's White Wonder Dogwood Deciduous Tree
(Cornus florida x C. nuttalii 'Eddie's White Wonder')
Mature Size: 25' height by 20' spread
Shape: Upright, pyramidal
Environment: Needs shade; Deep, infrequent water
Interest: White May flowers
Special Needs: Water in hot, dry weather

Peggy Gaynor

Cornelian Cherry Deciduous Tree
(Cornus mas)
Mature Size: 15'-20' height by 15'-20' spread
Shape: Multi-trunk or single-trunk forms; Round to vase-shaped
Environment: Part sun to shade; Deep, infrequent water
Interest: Very early yellow flowers before leaves; Edible red fruit; Yellow-red fall color
Special Needs: Water in hot, dry weather

Peggy Gaynor

Purple-Leaved Hazelnut Deciduous Tree
(Corylus maxima 'Purpurea')
Mature Size: 15'-20' height by 10'-15' spread
Shape: Upright spreading to round; May sucker
Environment: Sun; Well-drained soils
Interest: Dark purple leaves; Edible fall nuts
Special Needs: Prune suckers

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Flame Ash Deciduous Tree
(Fraxinus oxycarpa 'Flame')
Mature Size: 35'-40' height by 35'-40' spread
Shape: Upright, rounded
Environment: Adaptable to range of soils & conditions
Interest: Red-purple fall color
Special Needs: None

Pat Breen, Oregon State University

Ballerina Magnolia Deciduous Tree
(Magnolia x loebneri 'Ballerina')
Mature Size: 20' height by 20' spread
Shape: Rounded, low branched
Environment: Full sun; Moist, well-drained organic soil
Interest: Light pink-white early spring flowers

Peggy Gaynor

Galaxy Magnolia Deciduous Tree
(Magnolia liliiflora x M. sprengeri 'Diva')
Mature Size: 30' height by 15' spread
Shape: Pyramidal to oval
Environment: Full sun; Moist, well-drained organic soil
Interest: Reddish purple late spring flowers
Special Needs: Water in hot, dry weather; Mulch well

Peggy Gaynor

Korean Mountain Ash Deciduous Tree
(Sorbus alnifolia)
Mature Size: 40' height by 30' spread
Shape: Oval to rounded; Simple undivided leaves
Environment: Adaptable to conditions; Resists borers
Interest: White spring flowers; Edible red-orange fruit; Yellow-orange fall color
Special Needs: None

Peggy Gaynor; Pat Breen, Oregon State University (inset)

Hinoki Cypress Evergreen Tree
(Chamaecyparis obtusa)
Mature Size: 20'-40' height by 15'-30' spread
Shape: Spreading, irregular, open; Very slow-growing
Environment: Sun; Well-drained soils
Interest: Evergreen foliage; Sculptural form
Special Needs: Susceptible to root rot in heavy, wet soil

Peggy Gaynor; Pat Breen, Oregon State University (cones)

Austrian Pine Evergreen Tree
(Pinus nigra)
Mature Size: 40’-50’ height by 20’-25’ spread
Shape: Dense pyramidal; Moderate to slow growing
Environment: Adaptable to conditions
Interest: Evergreen needle foliage; Strong form
Special Needs: None

Pat Breen, Oregon State University

Japanese Black Pine Evergreen Tree
(Pinus thunbergiana)
Mature Size: 50’-100’ height by 30’-60’ spread
Shape: Broad cone to irregular & spreading; Fast growing
Environment: Adaptable to conditions
Interest: Evergreen needle foliage; Irregular form
Special Needs: Option - May be pruned to sculptural form

Pat Breen, Oregon State University

Vine Maple Deciduous Screening Shrub
(Acer circinatum)
Mature Size: 15’ height by 10’-15’ spread
Shape: Multi-stemmed; Understory tree or shrub
Environment: Shade; Moist soil; Pacific NW native
Interest: Branching pattern; Orange-red fall color
Special Needs: Water in hot, dry weather

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Redtwig Dogwood Deciduous Screening Shrub
(Cornus stolonifera)
Mature Size: 6’-15’ height by 8’-15’ spread
Shape: Large spreading, twiggy; Pacific NW native
Environment: Adaptable; Prefers moist conditions
Interest: White flowers; Red branches; Red fall color
Special Needs: Option - Prune old branches to ground to control size & encourage brighter red new growth

Pat Breen, Oregon State University

Yellowtwig Dogwood Deciduous Screening Shrub
(Cornus stolonifera'Flaviramea')
Mature Size: 6'-15' height by 8'-15' spread
Shape: Large spreading, twiggy
Environment: Adaptable; Prefers moist conditions
Interest: White flowers; Yellow branches; Red fall color
Special Needs: Option - Prune old branches to ground to control size & encourage brighter yellow new growth

Pat Breen, Oregon State University

Isanti Redtwig Dogwood Decid. Screening Shrub
(Cornus stolonifera 'Isanti')
Mature Size: 3'-4" height by 4'-6' spread
Shape: Compact spreading, twiggy; Low screen
Environment: Adaptable; Prefers moist conditions
Interest: White flowers; Red branches; Red fall color
Special Needs: Option - Prune old branches to ground to encourage brighter red new growth

Pat Breen, Oregon State University

Diane Witchhazel Deciduous Screening Shrub
(Hamamelis x intermedia 'Diane')
Mature Size: 10' height by 10' spread
Shape: Upright, spreading; Understory tree or shrub
Environment: Sun to light shade; Prefers moist soil
Interest: Red late winter flowers; Orange-red fall color
Special Needs: Water in hot, dry weather

Pat Breen, Oregon State University

Oakleaf Hydrangea Deciduous Screening Shrub
(Hydrangea quercifolia)
Mature Size: 6' height by 6' spread
Shape: Broad, rounded shrub
Environment: Prefers moist, rich, well-draining soil
Interest: Oak-shaped foliage; White flower clusters
Special Needs: Water in hot, dry weather; Option - Prune to ground in February to keep at 3' height

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Mock Orange Decid. Screening Shrub
(Philadelphus lewisii & ornamental varieties)
Mature Size: 6' height by 6' spread
Shape: Rounded, arching branches; P. lewisii, Pacific NW native
Environment: Adaptable to range of conditions
Interest: Fragrant white spring flowers
Special Needs: Option - Prune out old wood after bloom

Pat Breen, Oregon State University

Red-Flowering Currant Decid. Screening Shrub
(Ribes sanguineum)
Mature Size: 4'-8' height by 4'-6' spread
Shape: Upright branching; Pacific NW native
Environment: Adaptable to range of conditions
Interest: Pink-red spring flowers; Edible blue-black berries
Special Needs: May need water in hot, dry weather

Peggy Gaynor

Peafruit Rose Deciduous Screening Shrub
(Rosa pisocarpa)
Mature Size: 5'-6' height by 4'-5' spread
Shape: Upright spreading; Pacific NW native
Environment: Prefers moist conditions
Interest: Pink spring flowers; Red rose hips
Special Needs: May need water in hot, dry weather

Pat Breen, Oregon State University

Pavement Rugosa Rose Decid. Screening Shrub
(Rosa rugosa 'Pavement cultivars'?)
Mature Size: 3'-4' height by 4'-6' spread
Shape: Round, spreading
Environment: Adaptable to range of soils & conditions
Interest: Fragrant spring flowers; Large edible red rose hips; Crinkly textured leaves
Special Needs: None

Pat Breen, Oregon State University

Salmonberry Deciduous Screening Shrub
(Rubus spectabilis)
Mature Size: 5'-8' height by 5'-8' spread
Shape: Upright, spreading; Pacific NW native
Environment: Prefers shade & moist conditions
Interest: Purple-red spring flowers; Edible pinkish fruit
Special Needs: Water in hot, dry weather

Pat Breen, Oregon State University

Blueberry Deciduous Screening Shrub
(Vaccinium corymbosum fruiting varieties)
Mature Size: 5'-6' height by 4'-5' spread
Shape: Upright to spreading; Twiggy
Environment: Sun to light shade; Cool, moist soil
Interest: Edible blueberries; Yellow-red fall color
Special Needs: Water for larger berries; Mulch well

Pat Breen, Oregon State University

Strawberry Tree Broadleaf Evergreen Shrub
(Arbutus unedo)
Mature Size: 8'- 15' height by 8''-15' spread
Shape: Round, irregular branching; Slow growing screen
Environment: Adaptable to range of soils & conditions
Interest: White spring flowers; Edible red fruit; Shredding bark; Glossy evergreen leaves
Special Needs: Option – Prune to train as small tree; Stake if top-heavy; Prune suckers

Peggy Gaynor

Compact Strawberry Tree Brdlf. Evergr. Shrub
(Arbutus unedo 'Compacta')
Mature Size: 5'- 8' height by 5'-8' spread
Shape: Upright to round; Slow growing; Screening shrub
Environment: Adaptable to range of soils & conditions
Interest: White spring flowers; Edible red fruit; Shredding bark; Glossy evergreen leaves
Special Needs: None

Pat Breen, Oregon State University

White Rockrose Broadleaf Evergreen Shrub
(Cistus hybridus)
Mature Size: 3'-4' height by 4'-5' spread
Shape: Spreading to round; Low screening shrub
Environment: Adaptable; Prefers sun & well-drained soil
Interest: White spring flowers; Crinkly gray-green, fragrant evergreen leaves
Special Needs: None; Option – prune out old stems

Pat Breen, Oregon State University

PJM Rhododendron Broadleaf Evergreen Shrub
(Rhododendron 'PJM')
Mature Size: 4' -5' height by 4'-5' spread
Shape: Upright spreading to round; Screening shrub
Environment: Adaptable to range of soils & conditions
Interest: Lavender-pink early spring flowers; Evergreen leaves turn mahogany in winter
Special Needs: Water in hot, dry weather; Mulch well

Pat Breen, Oregon State University; Peggy Gaynor (inset)

Evergreen Huckleberry Broadlf. Evergreen Shrub
(Vaccinium ovatum)
Mature Size: 5'- 8' height by 5'-6' spread
Shape: Upright spreading; Screening shrub
Environment: Prefers partial shade; Pacific NW native
Interest: White spring flowers; Edible blue-black berries; Glossy evergreen leaves
Special Needs: Water in hot, dry weather; Mulch well

Pat Breen, Oregon State University

Kelsey's Dwarf Dogwood Low Deciduous Shrub
(Cornus stolonifera 'Kelseyi')
Mature Size: 2' height by 3' spread
Shape: Spreading, mounded
Environment: Adaptable; Prefers moist conditions
Interest: Bright red twigs; Neat dwarf form
Special Needs: May need water in hot, dry weather

Peggy Gaynor; Pat Breen, Oregon State University (inset)

Tangerine Potentilla Low Deciduous Shrub
(Potentilla fruticosa 'Tangerine')
Mature Size: 2'-3' height by 3' spread
Shape: Spreading, arching; Twiggy mound
Environment: Prefers full sun & well-drained soil
Interest: Yellow-orange summer flowers
Special Needs: None

Pat Breen, Oregon State University

Snowberry Low Deciduous Shrub
(Symphoricarpos albus)
Mature Size: 3' height by 3'-4' spread
Shape: Upright, spreading; Pacific NW native
Environment: Adaptable to range of soils & conditions
Interest: Pink spring flowers; White winter berries
Special Needs: None

Pat Breen, Oregon State University

Kinnikinnik Broadleaf Evergreen Ground Cover
(Arctostapylos uva-ursi)
Mature Size: 6"-12" height by 4' – 6'+ spread
Shape: Prostrate, spreading; Pacific NW native
Environment: Adaptable; Prefers sun & well-drained soils
Interest: White to pink spring flowers; Edible red berries; Bright, glossy evergreen leaves
Special Needs: Water in hot, dry weather; Mulch well

Peggy Gaynor

Rose Queen Epimedium Brdlf. Evergr. Grd. Cover
(Epimedium grandiflorum 'Rose Queen')
Mature Size: 1' height by 3' – 4'+ spread
Shape: Upright spreading, mounding
Environment: Prefers shade & moist conditions
Interest: Crimson with white spring flowers; Heart-shaped evergreen leaves; New growth bronze-pink
Special Needs: Water in hot, dry weather; Mulch well

Pat Breen, Oregon State University

Kewensis Wintercreeper Brdlf. Evergr. Grd. Cover
(Euonymous fortunei 'Kewensis')
Mature Size: 3' height maximum by 4' – 6'+ spread
Shape: Dense spreading, climbing or mounding
Environment: Adaptable to range of soils & conditions
Interest: Fine-textured, dark evergreen leaves
Special Needs: Mulch well

Pat Breen, Oregon State University

Salal Broadleaf Evergreen Ground Cover
(Gaultheria shallon)
Mature Size: 2'-4' height by 4'+ spread
Shape: Upright, spreading; Pacific NW native
Environment: Adaptable; Prefers summer shade, moisture
Interest: White spring flowers; Edible blue-black berries
Special Needs: Water in hot, dry weather to establish

Pat Breen, Oregon State University

Creeping Mahonia Broadlf. Evergr. Ground Cover
(Mahonia repens)
Mature Size: 2'-3' height by 3'-4'+ spread
Shape: Upright, open, spreading
Environment: Adaptable to range of soils & conditions; Pacific NW native
Interest: Yellow spring flowers; Edible blue berries; Dull blue green evergreen leaves turn bronze in winter
Special Needs: Mulch well

Pat Breen, Oregon State University

Sword Fern Broadleaf Evergreen Ground Cover
(Polystichum munitum)
Mature Size: 2'- 3' height by 2'-3' spread
Shape: Upright arching, spreading fronds; Pacific NW native
Environment: Adaptable; Prefers shade, moist conditions
Interest: Evergreen fern fronds
Special Needs: Water in hot, dry weather; Mulch well

Peggy Gaynor

Gaura Perennial
(Gaura lindheimeri & varieties)
Mature Size: 2'-4' height by 2'-4' spread
Shape: Open, upright, fine-textured
Environment: Full sun; Drought-tolerant
Interest: White-pink summer flowers
Special Needs: Option - Cut spent flower stalks

Peggy Gaynor

Cranesbill Perennial
(Geranium pratense *& other Geranium species)*
Mature Size: 3' height by 3' spread
Shape: Spreading mound
Environment: Sun to light shade; Moist soil
Interest: Blue-purple summer flowers; Shiny lobed leaves
Special Needs: Water throughout summer

Peggy Gaynor

Sunrose Perennial Evergreen Shrublet
(Helianthemum nummularium & varieties)
Mature Size: 6"-12" height by 3' spread
Shape: Low arching, spreading mound
Environment: Full sun; Well-drained soil
Interest: Bright colored summer flowers; Fuzzy gray-green evergreen leaves
Special Needs: Lightly cover with evergreen branches in winter; Option – Cut back after flowering for fall bloom

Peggy Gaynor

Daylily Perennial
(Hemerocallis hybrids)
Mature Size: 2'-4' height by 2'-4' spread
Shape: Arching clump of sword-shaped leaves
Environment: Adaptable to range of soils & conditions
Interest: Colorful lily-like summer flowers on tall stems; Sword-shaped deciduous to evergreen leaves
Special Needs: Cut spent flower stalks

Peggy Gaynor

Coral Bells Perennial
(Heuchera sanguinea & green-leaved varieties)
Mature Size: 1'-2' height by 1'-2' spread
Shape: Compact mound
Environment: Sun to light shade; Moist soil
Interest: Red to pink spring-summer flowers on tall stems; Neat scalloped, green leaves
Special Needs: Water throughout summer

Peggy Gaynor

Purple-Leaved Coral Bells Perennial
(Heuchera 'Plum Pudding' & other purple-leaved varieties)
Mature Size: 1'-2' height by 1'-2' spread
Shape: Compact mound
Environment: Sun to light shade; Moist soil
Interest: Maple-shaped rich bronze to red-purple leaves all year; Tiny pink flowers on tall stems
Special Needs: Water throughout summer

Peggy Gaynor

Douglas' Iris Perennial Evergreen
(Iris douglasiana)
Mature Size: 1'-2' height by 1'-2' spread
Shape: Upright, spreading clump; Pacific NW native
Environment: Adaptable; Sun to light shade
Interest: White to lavender spring flowers; Long shiny evergreen leaves
Special Needs: Water in hot, dry weather

Peggy Gaynor

Gladwin Iris Perennial Evergreen
(Iris foetidissima)
Mature Size: 1'-2' height by 1'-2' spread
Shape: Upright, spreading clump
Environment: Adaptable to range of soils & conditions
Interest: Large red seed capsules; Long evergreen leaves; Spring flowers subtle
Special Needs: None

Peggy Gaynor

Lavender Perennial Evergreen Herb
(Lavendula angustifolia)
Mature Size: 2'-3' height by 2'-3' spread
Shape: Round clump or mound; Fine-textured
Environment: Full sun; Well-drained soil
Interest: Lavendar summer flowers; Fragrant gray-green evergreen foliage
Special Needs: Option – Prune after bloom for neat, compact form

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Lupine Perennial
(Lupinus species)
Mature Size: 2'-4' height by 2'-4' spread
Shape: Loose mound
Environment: Adaptable; Nitrogen-fixing legume
Interest: Blue-purple late spring flowers
Special Needs: Susceptible to mildew & aphids; Re-seeds

Peggy Gaynor

Sedge Wetland Emergent
(Carex species)
Mature Size: 1'-2' height by 1'-2' spread
Shape: Upright grass-like leaves; some species are Pacific NW natives
Environment: Moist soil to wet conditions
Interest: Flower & seedheads; Some species evergreen
Special Needs: Water throughout summer

© 2002 Dean Wm. Taylor

Daggerleaf Rush Wetland Emergent
(Juncus ensifolius)
Mature Size: 6"- 18" height by 1' spread
Shape: Upright iris-like leaves; Pacific NW native
Environment: Moist soil to wet conditions
Interest: Flat, dagger-shaped leaves
Special Needs: Water throughout summer

Peggy Gaynor

Arrowhead Wetland Emergent
(Sagittaria latifolia)
Mature Size: 1'-2' height by 1'-2' spread
Shape: Upright arrowhead leaves; Pacific NW native
Environment: Moist soil to 18" deep water
Interest: White flowers; Arrowhead-shaped leaves
Special Needs: Water throughout summer

© 2003 Steve Matson

Small-Fruited Bulrush Wetland Emergent
(Scirpus microcarpus)
Mature Size: 1.5'-4' height by 2'-4' spread
Shape: Upright flat grasslike blades; Pacific NW native
Environment: Moist soil to 18" deep water
Interest: Flower & seed heads; Large, flat leaf blades
Special Needs: Water throughout summer

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Youth-on-Age Wetland Perennial
(Tolmiea menziesii)
Mature Size: 6"-12" height by 1'-2' spread
Shape: Spreading mound; Pacific NW native
Environment: Shade; Moist soil
Interest: Wide lobed leaves with plantlets on stems
Special Needs: Water throughout summer

Peggy Gaynor

Crocus Perennial Bulb
(Crocus species & varieties)
Mature Size: 3"-6" height by 3"-6" spread
Shape: Grass-like leaves at base; Upright flower stalk
Environment: Sun to light shade; Well-drained soils
Interest: Early spring flowers of many colors
Special Needs: None; Dies back in summer

023311

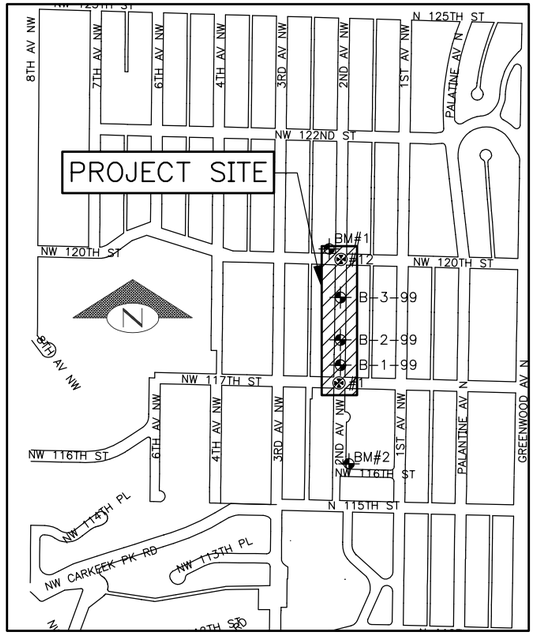

VICINITY MAP

SCALE:1"=400'

DRAINAGE NOTES

UNLESS OTHERWISE NOTED:

1. DATUM: CITY OF SEATTLE. (SEE DATUM/SURVEY CONTROL)
2. PIPE LESS THAN 12" DIAMETER SHALL BE CONCRETE PER ASTM C14 CLASS 3.
3. PIPES GREATER THAN OR EQUAL TO 12" DIAMETER SHALL BE ASTM C76 CLASS V.
4. DUCTILE IRON PIPE SHALL BE PER ANSI A21.51 CLASS 52 WITH PUSH-ON JOINTS. FITTINGS FOR DUCTILE IRON PIPE SHALL BE DUCTILE PER ANSI A21.10 OR ANSI A21.53 WITH PUSH-ON JOINTS.
5. PVC PIPE AND FITTINGS SHALL BE PER ASTM D 1785, SCH 40, WITH EITHER RUBBER GASKET JOINTS OR SOLVENT WELDED JOINTS. PVC PSS AND PSD PIPES SHALL BE TESTED FOR EXCESSIVE DEFLECTION WITH A MANDREL PER SECTION 7-17.3(4) OF THE SPECIFICATIONS.
6. SUBSURFACE DRAIN (SSD) PIPE AND FITTINGS SHALL BE PVC PER ASTM D1785, SCH 40 WITH SOLVENT WELDED JOINTS. PIPE SHALL HAVE SLOTTED PERFORATIONS. SLOTS ARE TO BE 0.040" WIDE BY 1.0" LONG AND SPACED 0.25" APART. SLOT LOCATIONS SHALL BE LOCATED PER SLOT DETAIL ON PLAN.
7. BEDDING SHALL BE CLASS B FOR ALL PIPE EXCEPT DUCTILE IRON PIPE, WHICH SHALL BE CLASS D. BEDDING MATERIAL FOR PVC PIPE SHALL BE MINERAL AGGREGATE TYPE 22. BEDDING MATERIAL FOR PVC PIPE AND CMP SHALL BE MECHANICALLY COMPACTED TO 90% OF MAXIMUM DRY DENSITY AS MEASURED BY ASTM D-698.
8. WHERE A NEW PIPE CLEARS AND EXISTING OR UTILITY BY 6" OR LESS, POLYETHYLENE PLASTIC FOAM SHALL BE PLACED AS A CUSHION BETWEEN EACH UTILITY.
9. TEES, CATCH BASIN CONNECTIONS, SIDE SEWER, AND SERVICE DRAINS SHALL BE PLACED AT A MINIMUM SLOPE OF 0.5% AND A MAXIMUM SLOPE OF 50%.
10. SERVICE DRAINS AND SIDE SEWERS SHALL BE CONNECTED/RECONNECTED AS APPROVED BY THE ENGINEER.
11. RELAY EXISTING SERVICE DRAINS/SIDE SEWERS TO CLEAR OVER OR UNDER THE NEW UTILITY AS APPROVED BY THE ENGINEER.
12. SERVICE DRAINS AND SIDE SEWERS SHALL NOT BE BACKFIELD UNTIL THE PIPE HAS BEEN INSPECTED AND APPROVED AND THE LOCATION AND DEPTH IS RECORDED BY THE ENGINEER.
13. TEES ON NEW PIPE SHALL BE PREFABRICATED.
14. SOILS TEST BORING LOCATIONS ARE INDICATED ON THE VICINITY MAP. TEST DATA IS INCLUDED IN THE SPECIFICATIONS.
15. THE CONTRACTOR SHALL PROVIDE SUPPORTS FOR POWER POLES NEAR EXCAVATIONS PER SEATTLE CITY LIGHT STANDARDS NO. D3-6.
16. GRADING PLAN TO BE PROVIDED AT TIME OF PRECONSTRUCTION MEETING. STATIONING & ELEVATION MAY BE MODFIED IN THE FIELD AS DIRECTED BY ENGINEER.

Sheet Index

Sht No.	Sheet Description
1	VICINITY MAP, GENERAL NOTES, DETAIL AND SECTION REFERENCING
2	REMOVAL & RELOCATION PLAN
3	DRAINAGE PLAN & PROFILE
4	DRAINAGE PLAN & PROFILE
5	DRAINAGE PROFILE WEST SIDE
6	CROSS SECTION DETAILS
7	DRAINAGE DETAILS SHEET
8	DRAINAGE DETAILS SHEET
9	PAVING ALIGNMENT PLAN
10	PAVING PLAN
11	PAVING PLAN
12	LANDSCAPING PLAN
13	LANDSCAPING PLAN
14	TREE SCHEDULE AND PLANTING SCHEDULE

PAVING NOTES

UNLESS OTHERWISE NOTED:

1. JOINTS BETWEEN EXISTING PAVEMENT AND NEW ASPHALT SHALL BE BUTT JOINTS.
2. EXISTING ASPHALT PAVING SHALL BE REMOVED ON A NEAT LINE ADJACENT TO NEW CONSTRUCTION.
3. IF SUBGRADE SOFT SPOTS ARE ENCOUNTERED, THE CONTRACTOR SHALL OBTAIN REQUIRED COMPACTION IN ACCORDANCE WITH SECTIONS 2-06.3 (2) AND 2-06.3 (3) OF THE STANDARD SPECIFICATIONS.
4. PAVEMENT RESTORATION FOR CONCRETE STREETS AND CONCRETE WALKS WHICH ARE NOT SHOWN ON THE PLANS SHALL BE IN ACCORDANCE WITH THE "STREET AND SIDEWALK PAVEMENT OPENING AND RESTORATION RULES", THE CURRENT VERSION.
5. REPLACEMENT OF CASTINGS AND COVERS WILL BE PROVIDED BY THE OWNER(S) OF THE UTILITIES. THE CONTRACTOR SHALL ADJUST ALL UTILITY CASTINGS AND METER BOXES TO GRADE PRIOR TO THE INSTALLATION OF THE FINAL WEARING COURSE. CASTINGS AND METER BOXES DAMAGED DUE TO THE CONTRACTOR SHALL BE REPLACED BY THE CONTRACTOR AT THE CONTRACTOR'S EXPENSE.
6. HYDRANTS, WATER METERS, AND OTHER WATER SERVICES SHALL BE ADJUSTED OR RELOCATED BY SPU WATER OPERATIONS.
7. CONTRACTOR SHALL NOTIFY THE LANDSCAPE ARCHITECT (SHANE DEWALD AT 206-684-5041) FOUR (4) WORKING DAYS PRIOR TO TRIMMING ANY TREES.
8. EXISTING MONUMENT CASTINGS WITHIN THE CONSTRUCTION AREA SHALL BE ADJUSTED OR RESET. CONTRACTOR SHALL CONTACT SPU SURVEY (W.M. BLANKENSHIP AT 684-5073) FOUR (4) WORKING DAYS PRIOR TO REMOVING MONUMENT CASTINGS TO ENSURE THAT THE MONUMENTS ARE "TIED OUT" PRIOR TO REMOVAL.
9. CONTRACTOR SHALL NOTIFY TRANSPORTATION DIVISION (ROBERT BURNS AT 206-684-5370) FOUR (4) WORKING DAYS PRIOR TO SIGN AND PARKING METER REMOVAL AND INSTALLATIONS. INSTALLATIONS ARE TO BE INSTALLED IN ACCORDANCE WITH STANDARD PLANS.
10. PARKING AREAS SHALL BE FIELD MARKED BY THE ENGINEER. STALL WIDTHS ARE 9'.

DETAIL AND SECTION REFERENCING

4/8 — DETAIL REFERENCE NUMBER / SHEET ON WHICH DETAIL APPEARS

(Title) 4/9 (Scale) — DETAIL REFERENCE NUMBER / SHEET FROM WHICH DETAIL WAS TAKEN

("TYP" SPECIFIES THAT DETAIL IS UNIFORMLY TYPICAL THROUGHOUT PROJECT EXCEPT WHERE OTHERWISE NOTED.)
("VAR" SPECIFIES THAT DETAIL WAS TAKEN FROM SEVERAL SHEETS.)

A — A 32 — SECTION A-A IS SHOWN ON SHEET 32.

Section A-A 30 (Scale) — SECTION A-A IS TAKEN FROM SHEET 30.

ABBREVIATIONS

TSE: TOP SWALE ELEVATION
BSE: BOTTOM SWALE ELEVATION
ORF DIAM: ORIFICE DIAMETER
* PERF: PREFERRED

DATUM/SURVEY CONTROL

1. VERTICAL DATUM: CITY OF SEATTLE.
   BM#1 EL: 380.11 FIELDBOOK 2086-N / PAGE 43
   FND. CHISELED SQUARE, CENTER CONC WALK, 6' N. OF S. END, AT NW CORNER 2ND AVE NW AND NW 120TH ST.
   BM#2 EL: 366.23 FIELDBOOK 2086-N / PAGE 43
   FND. CHISELED SQUARE, ON S SIDE PRIVATE CONC WALK AT FIRST SEAM, HOUSE #11602, AT NE CORNER INTX OF 2ND AVE NW AND NW 116TH ST.
2. HORIZONTAL DATUM: HPGN/NAD83/91 PER CITY DETERMINED COORDINATES ON MONUMENTS AT STREET INTERSECTIONS.
   #1 N:264234.82 E:1264726.57
   MON IN CASE AT INTX 2ND AVE NW AND NW 117TH ST
   #12 N:264897.30 E:1264735.09
   CONC MON IN CASE AT INTX 2ND AVE NW AND NW 120TH ST

EROSION CONTROL

FLOW MONITORING POOL CONSTRUCTION SHALL BE FIRST ORDER OF WORK AND SHALL BE CONSTRUCTED AND OPERATED TO CHANNEL ALL SURFACE DRAINAGE THROUGH AND DURING CONSTRUCTION. THIS SHALL BE OPERATED AS A SEDIMENT CONTAINMENT AREA SO THAT NO SEDIMENT ENTERS THE DOWN STREAM DRAINAGE SYSTEM OR PIPERS CREEK AND IT'S TRIBUTARIES (SEE SHEET 3).

VAULT SERIAL NO.	DATE	MARK	NATURE REVISIONS	MADE	CHK'D	REV'D
3355S						

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S.E.A. STREET
2nd AVE NW
(NW 117TH TO NW 120TH)

JOB NO. PC C399312 R/W CO C399312
VAULT PLAN NO. 777-162
SHEET 1 OF 14

023312

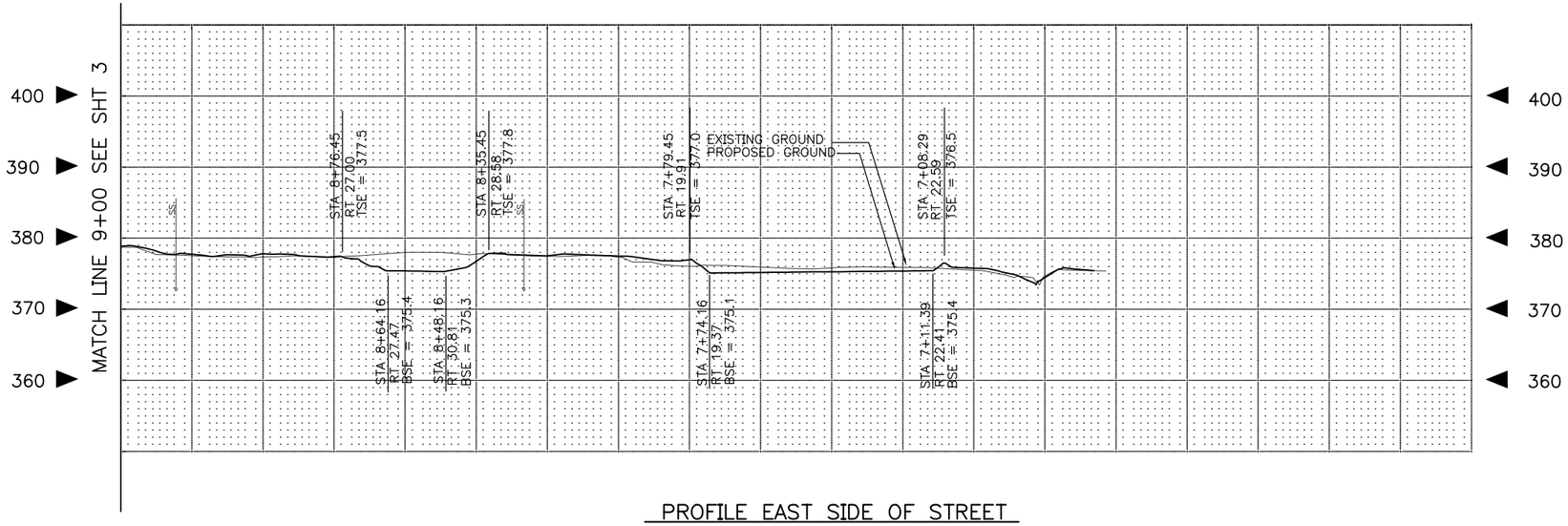

PROFILE EAST SIDE OF STREET

FOR PROFILE ON WEST SIDE OF STREET
SEE SHEET 5

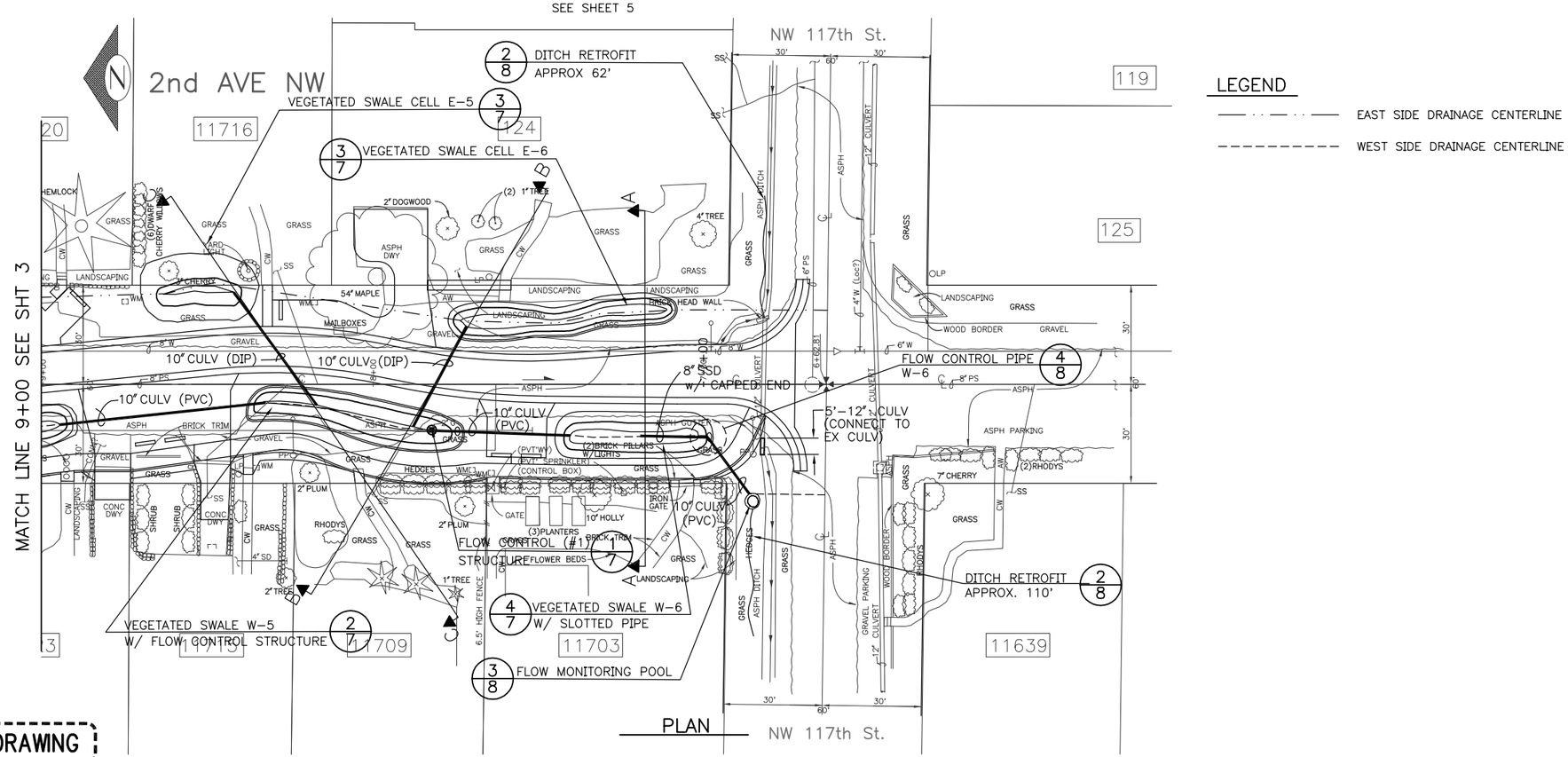

LEGEND

- EAST SIDE DRAINAGE CENTERLINE
- WEST SIDE DRAINAGE CENTERLINE

FOR PAVING PLAN, SEE SHEET 10&11
FOR DRAINAGE PLAN, SEE SHEET 3&4
FOR LANSCAPING PLAN, SEE SHEET 12&13

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DRAINAGE PLAN & PROFILE

VAULT SERIAL NO.	DATE	MARK	NATURE REVISIONS	MADE	CHK'D	REV'D
33655						

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SHEET 4 OF 14

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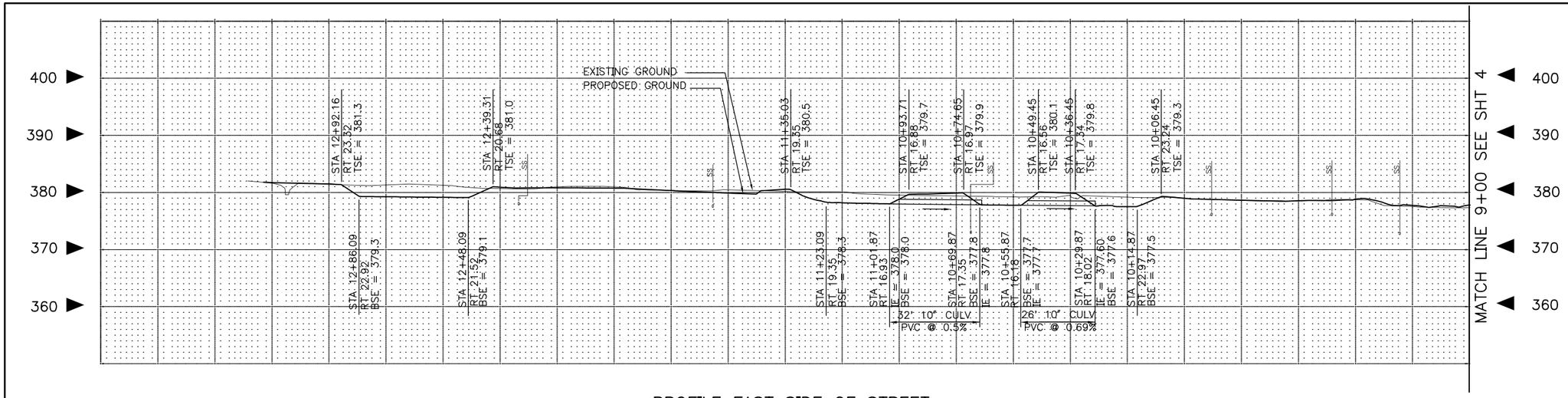

PROFILE EAST SIDE OF STREET

FOR PROFILE ON WEST SIDE OF STREET
SEE SHEET 5

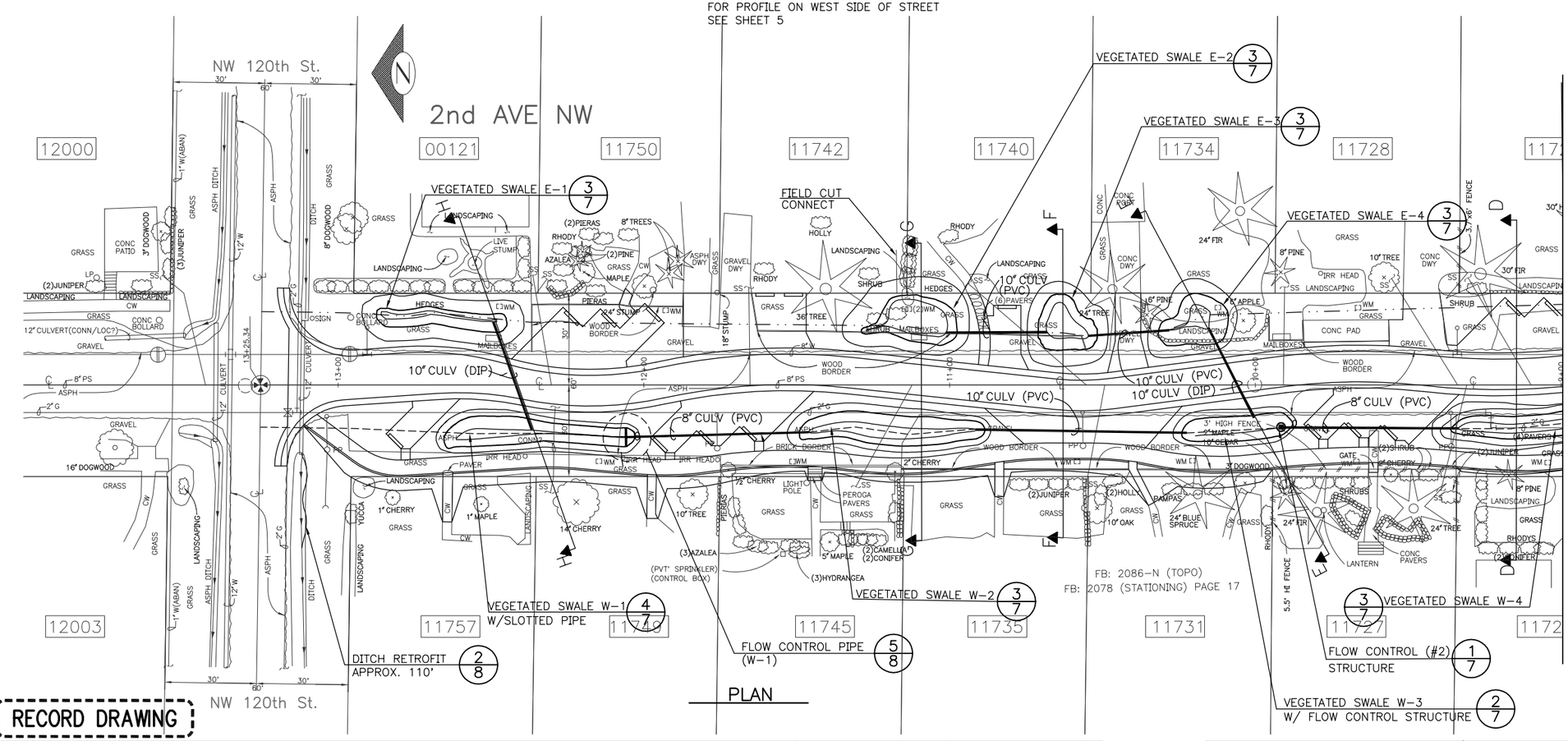

PLAN

LEGEND

- EAST SIDE DRAINAGE CENTERLINE
- WEST SIDE DRAINAGE CENTERLINE

FOR PAVING PLAN, SEE SHEET 10&11
FOR DRAINAGE PLAN, SEE SHEET 3&4
FOR LANSCAPING PLAN, SEE SHEET 12&13

DRAINAGE PLAN & PROFILE

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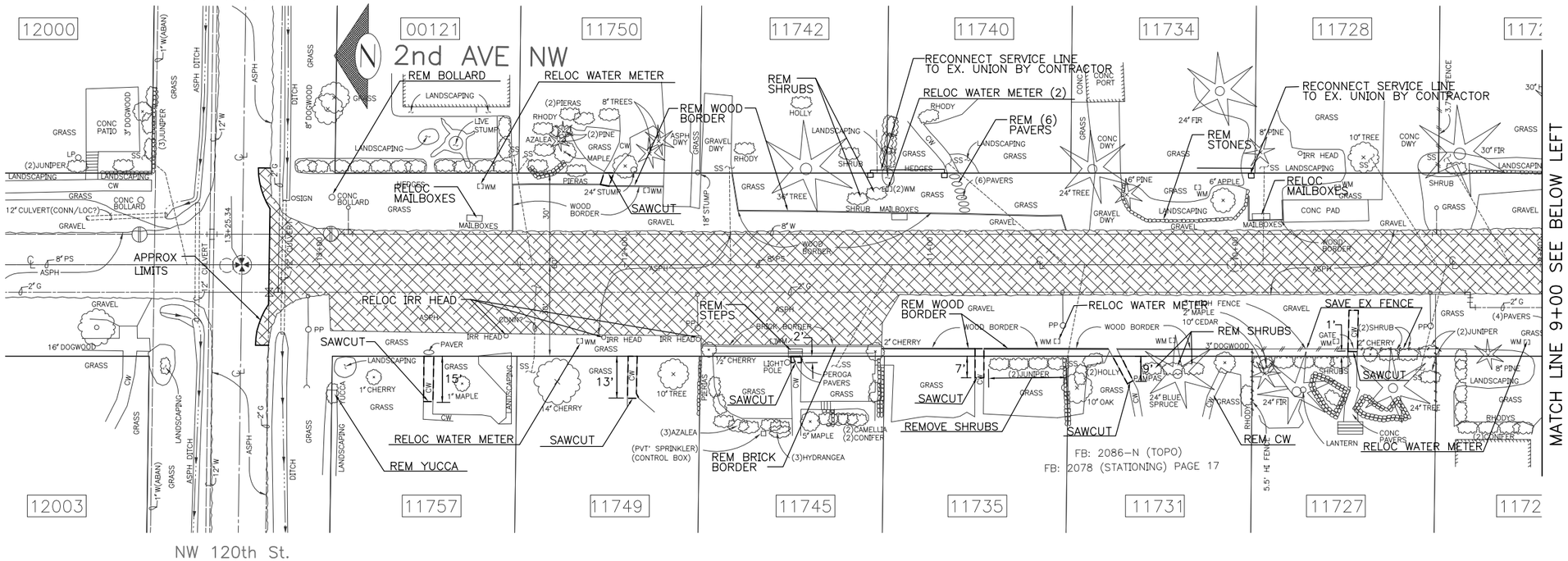

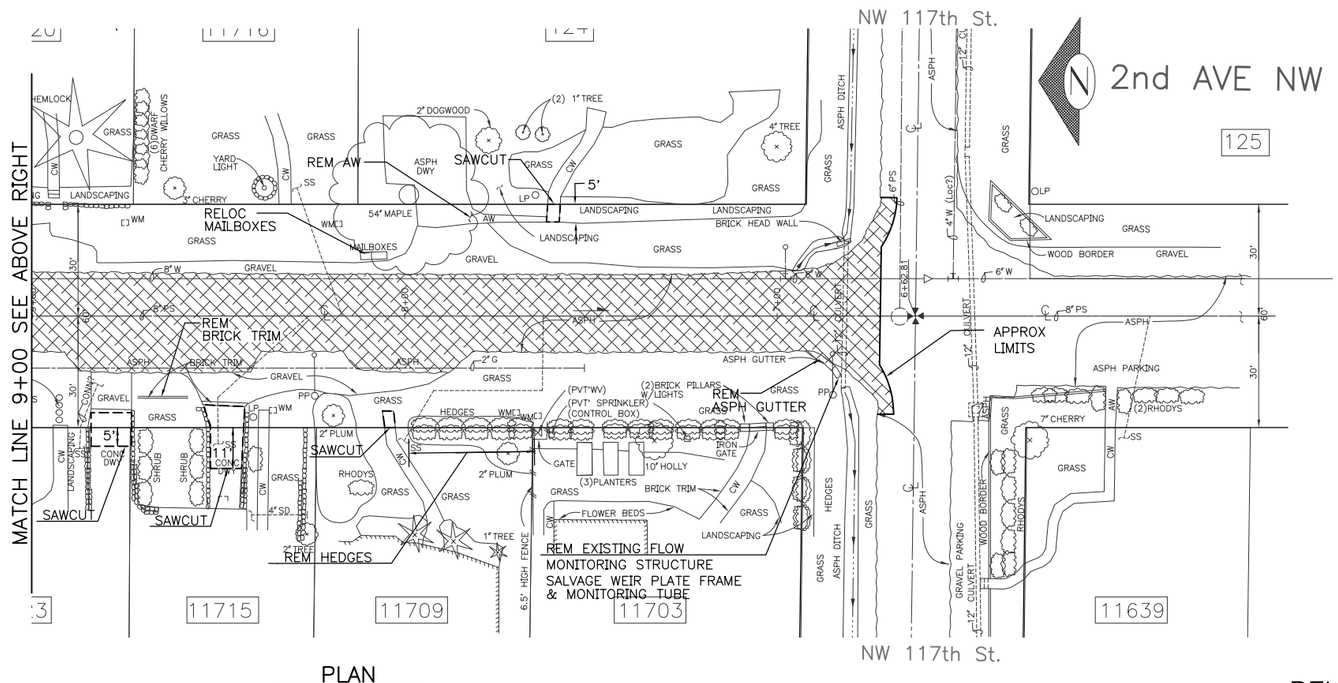

LEGEND

REMOVE ASPH

SAWCUT/REMOVE

NOTE:

WATER METERS SHALL BE ADJUSTED BY SPU

FOR PAVING PLAN, SEE SHEET 10&11
FOR DRAINAGE PLAN, SEE SHEET 3&4
FOR LANSCAPING PLAN, SEE SHEET 12&13

PLAN

REMOVAL & RELOCATION PLAN

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VAULT PLAN NO. 777-162

SHEET 2 OF 14

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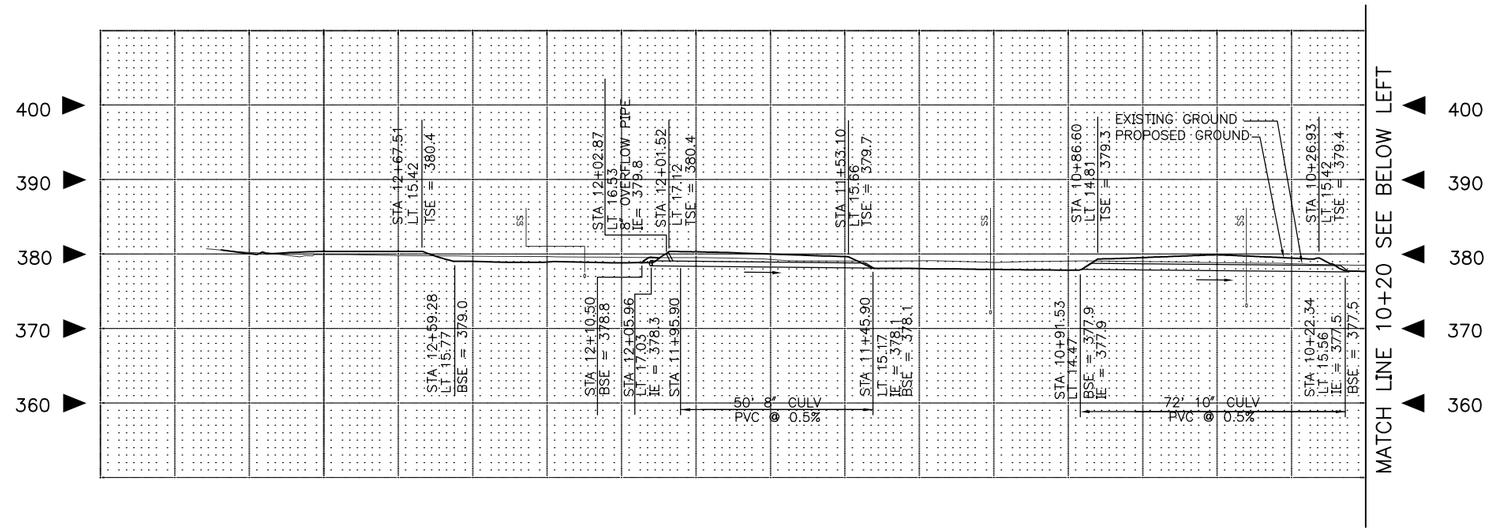

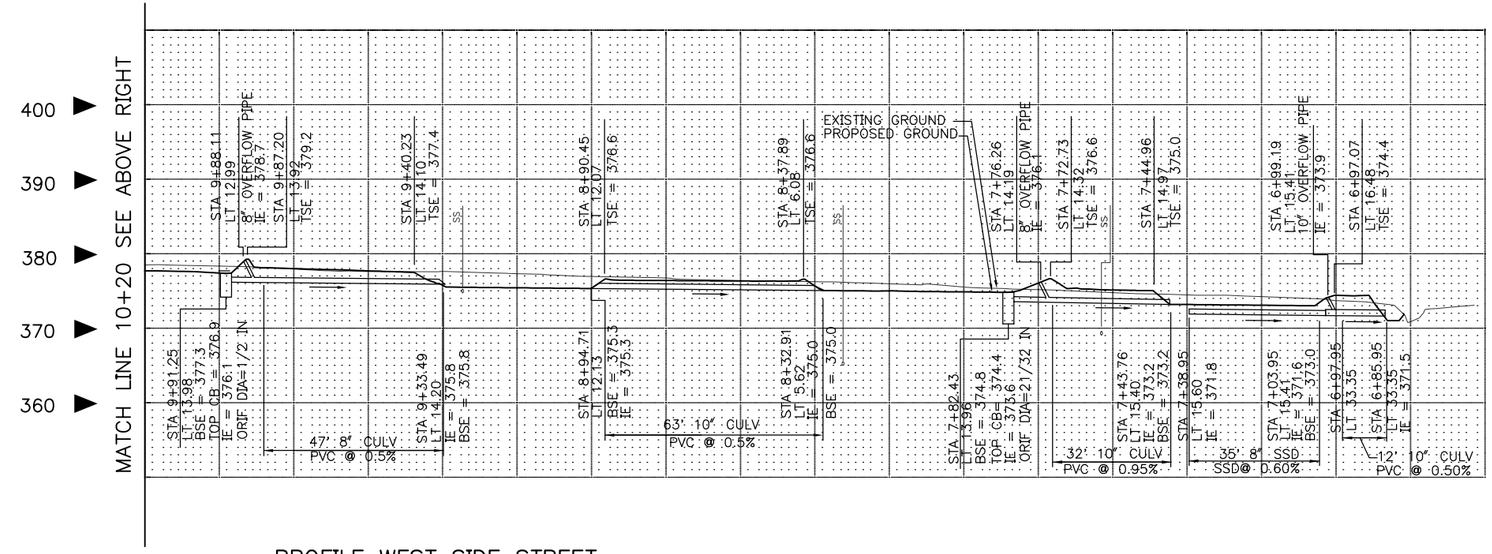

PROFILE WEST SIDE STREET

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DRAINAGE PROFILE WEST SIDE

VAULT SERIAL NO.	DATE	MARK	NATURE REVISIONS	MADE	CHK'D	REV'D
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VAULT PLAN NO. 777-162
SHEET 5 OF 14

023316

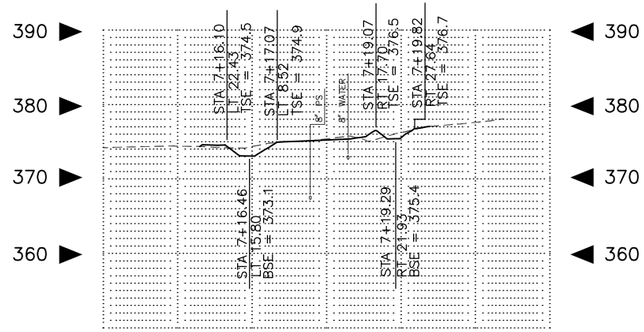

SECTION A–A: VEGETATED SWALE W6,E6

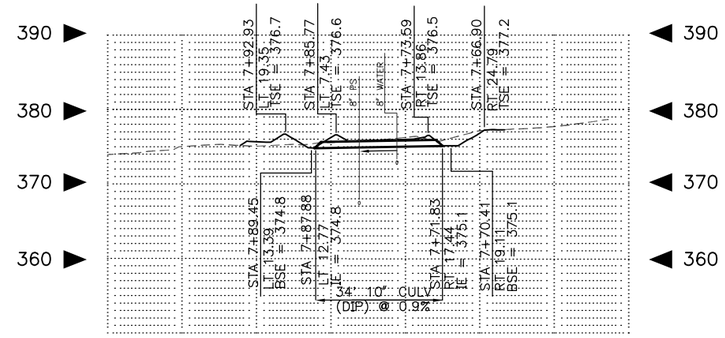

SECTION B–B: VEGETATED SWALE W5,E6

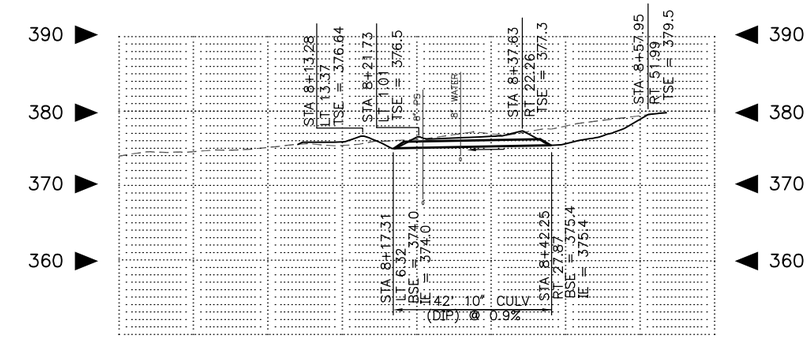

SECTION C–C: VEGETATED SWALE W5,E5

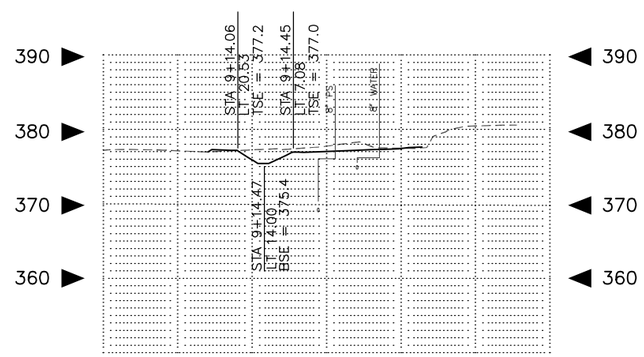

SECTION D–D: VEGETATED SWALE W4

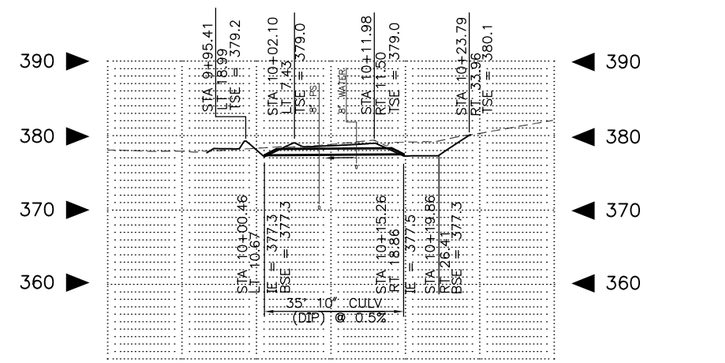

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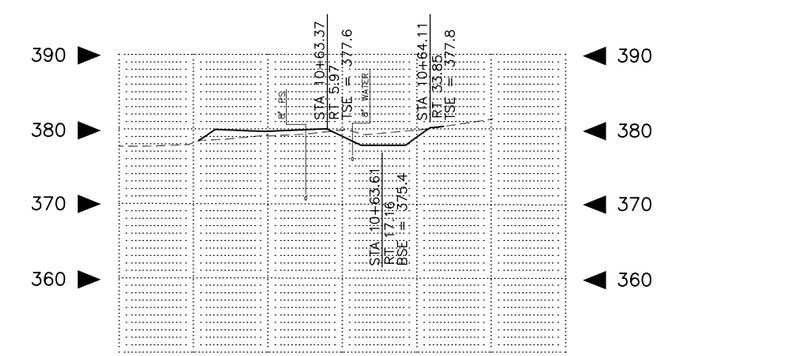

SECTION F–F: VEGETATED SWALE E5

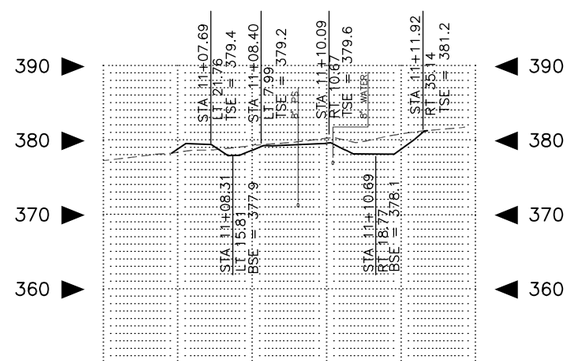

SECTION G–G: VEGETATED SWALE W2,E2

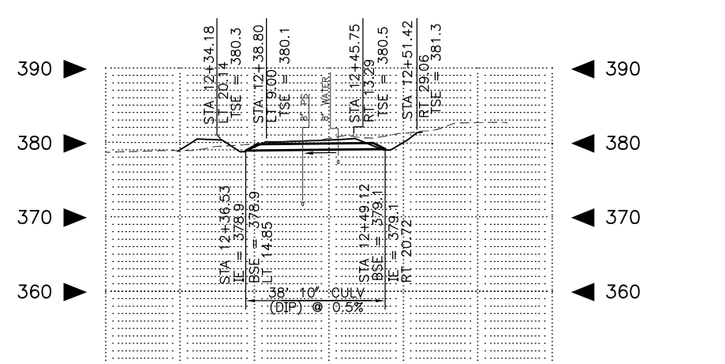

SECTION H–H: VEGETATED SWALE W1,E1

VAULT SERIAL NO.	DATE	MARK	NATURE REVISIONS	MADE	CHK'D	REV'D
3,655						

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VAULT PLAN NO. 777–162
SHEET 6 OF 14

023317

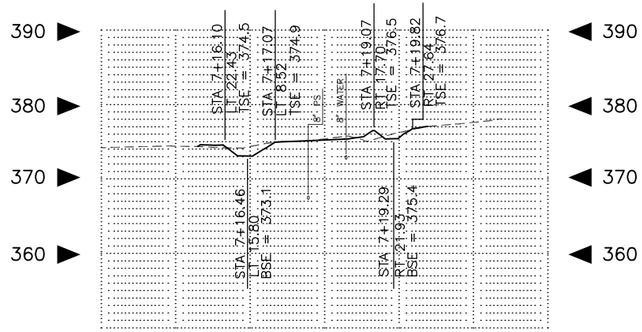

SECTION A–A: VEGETATED SWALE W6,E6

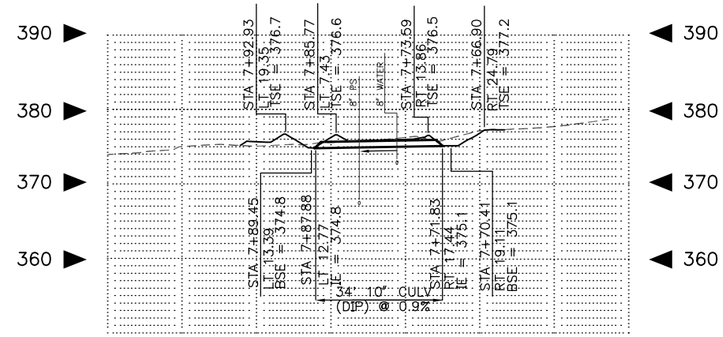

SECTION B–B: VEGETATED SWALE W5,E6

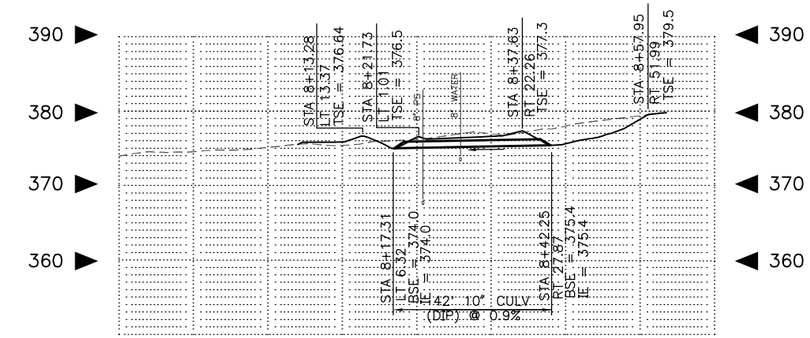

SECTION C–C: VEGETATED SWALE W5,E5

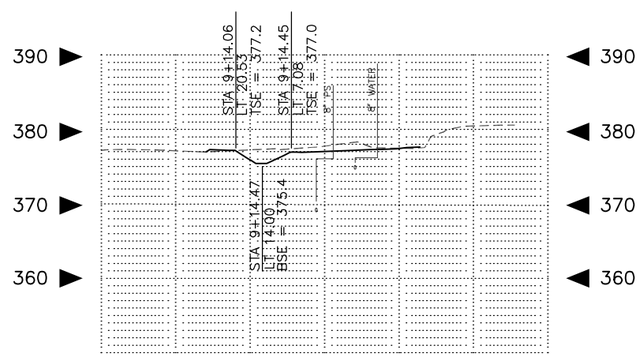

SECTION D–D: VEGETATED SWALE W4

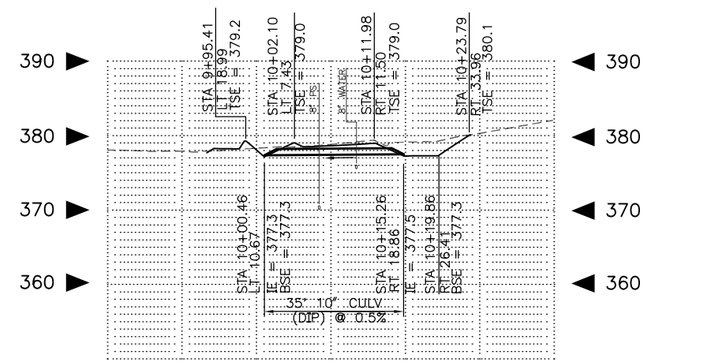

SECTION E–E: VEGETATED SWALE W3,E4

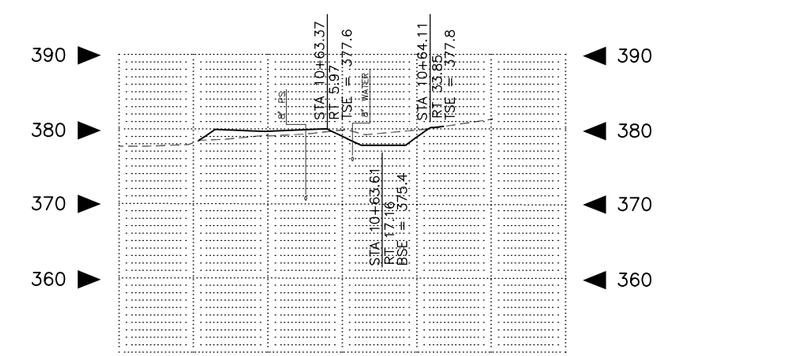

SECTION F–F: VEGETATED SWALE E5

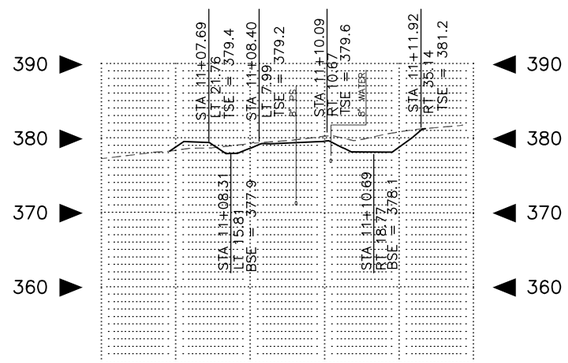

SECTION G–G: VEGETATED SWALE W2,E2

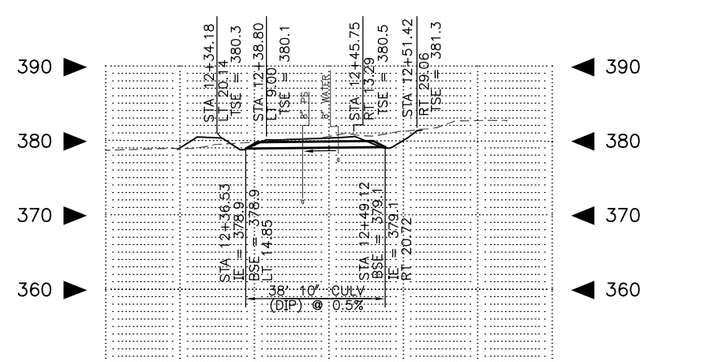

SECTION H–H: VEGETATED SWALE W1,E1

VAULT SERIAL NO.	DATE	MARK	NATURE REVISIONS	MADE	CHK'D	REV'D
3,655						

P:\RecordDrawings\C399312\SWT06_P.dwg rainwab 09/21/00 09:36 AM

RECORD DRAWING

CROSS SECTION DETAILS

APPROVED FOR ADVERTISING
DWIGHT DIVELY
EXECUTIVE SERVICES DIRECTOR
SEATTLE, WASHINGTON 20

BY:
CONTRACTING MANAGER

NAME OR INITIALS AND DATE	INITIALS AND DATE
DESIGNED	REVIEWED: DES. CONST. SEATRAN PROJ. MGR.
CHECKED	
DRAWN	RECEIVED
CHECKED	REVISED AS BUILT

ALL WORK DONE IN ACCORDANCE WITH THE CITY OF SEATTLE STANDARD PLANS AND SPECIFICATIONS AND OTHER DOCUMENTS CALLED FOR IN SECTION 0-02.3 OF THE PROJECT MANUAL.

City of Seattle
Seattle Public Utilities
Diana Gale, Director

ORDINANCE NO. APPROVED
FUND:
SCALE: H 1"=20' V 1"=10' INSPECTOR'S BOOK

S.E.A. STREET
2nd AVE NW
(NW 117TH TO NW 120TH)

JOB NO. PC C399312 R/W CO C399312
VAULT PLAN NO. 777–162
SHEET 6 OF 14

023318

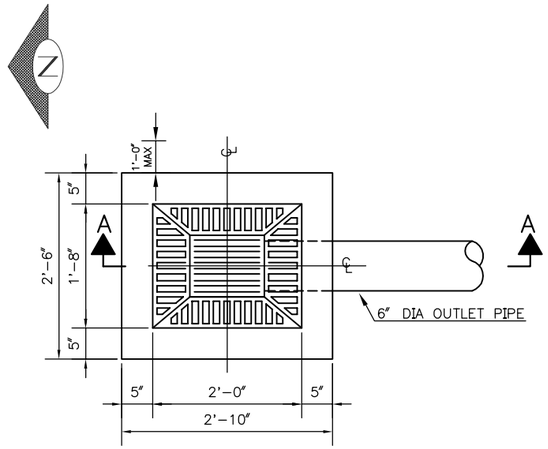

PLAN

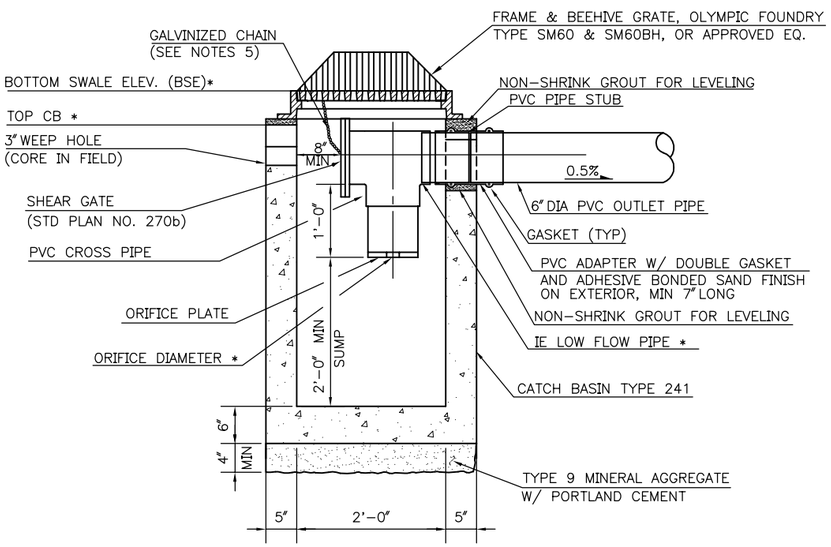

SECTION A–A

FLOW CONTROL STRUCTURE (1 / 3,4)

SCALE: 1" = 1'-0"

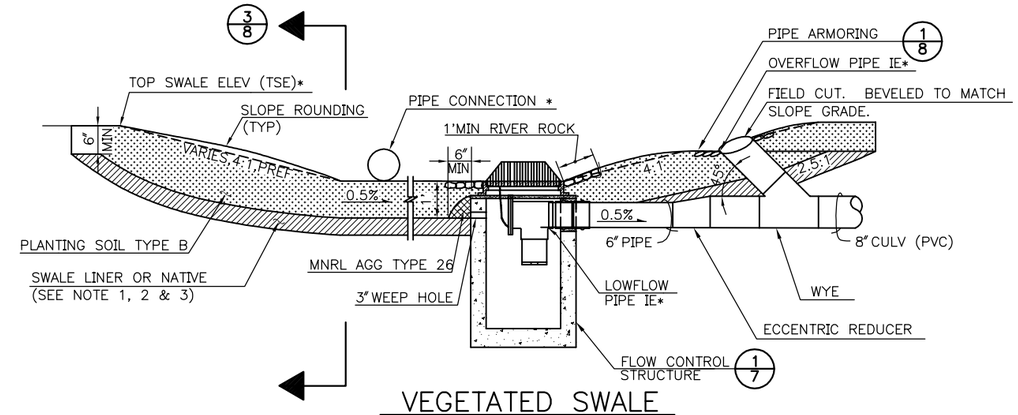

VEGETATED SWALE W/FLOW CONTROL STRUCTURE (2 / 3,4)

SCALE: 1/2" = 1'-0"

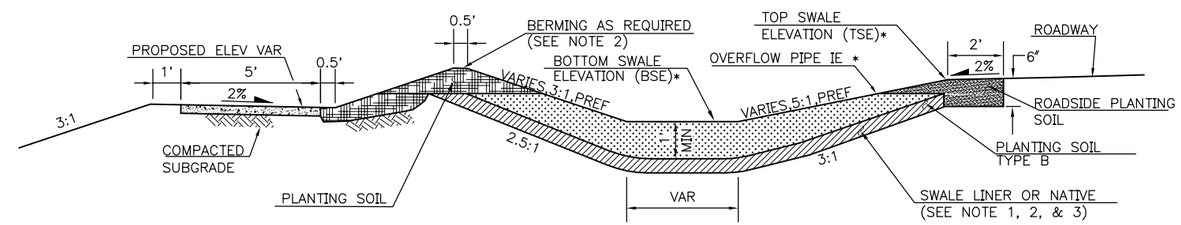

CROSS–SECTION VEGETATED SWALE (TYP) (3 / 3,4)

SCALE: 3/8" = 1'-0"

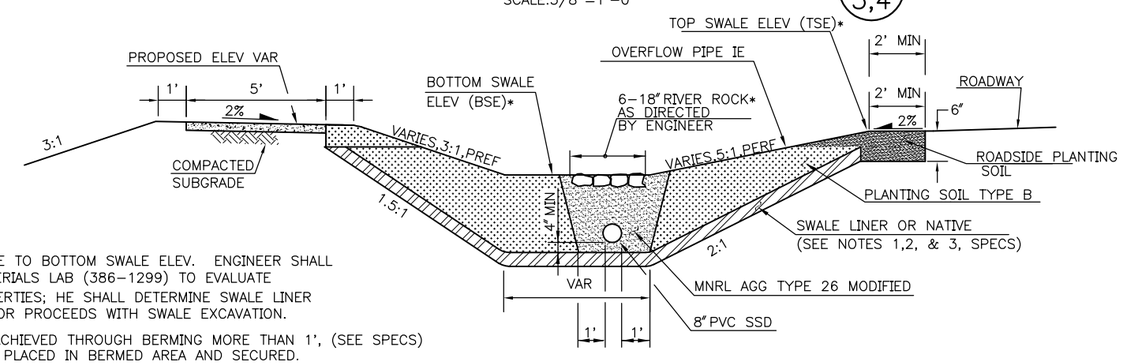

CROSS–SECTION VEGETATED SWALE W/ SUB SURFACE DRAIN (4 / 3,4)

SCALE: 3/8" = 1'-0"

NOTES:

1. CONTRACTOR SHALL EXCAVATE TO BOTTOM SWALE ELEV. ENGINEER SHALL CONTACT AL RICE, SPU MATERIALS LAB (386–1299) TO EVALUATE NATIVE SOIL MATERIAL PROPERTIES; HE SHALL DETERMINE SWALE LINER MATERIAL BEFORE CONTRACTOR PROCEEDS WITH SWALE EXCAVATION.
2. WHEN TOP SWALE ELEV. IS ACHIEVED THROUGH BERMING MORE THAN 1', (SEE SPECS) PVC SWALE LINER SHALL BE PLACED IN BERMED AREA AND SECURED.
3. SWALE LINER SHALL EXTEND, AT MINIMUM, TO ELEV. OF OVERFLOW PIPE IE.
4. ALL EXPOSED PIPE ENDS SHALL USE PIPE ARMORING. (1 / 8)
5. GALVINIZED CHAIN SHALL BE CONNECTED TO DRIFT WOOD (PROVIDE BY OTHERS)

* SPECIFIC DESIGN INFORMATION AS INDICATED ON PLAN SHEETS.

RECORD DRAWING

DRAINAGE DETAILS SHEET

VAULT SERIAL NO.	DATE	MARK	NATURE REVISIONS	MADE	CHK'D	REV'D
3355						

P:\RecordDrawings\C399312\SW107__P.dwg rainwab 09/21/00 09:37 AM

APPROVED FOR ADVERTISING
DWIGHT DIVELY
EXECUTIVE SERVICES DIRECTOR
SEATTLE, WASHINGTON 20

BY:
CONTRACTING MANAGER

NAME OR INITIALS AND DATE	INITIALS AND DATE
DESIGNED	REVIEWED: DES. CONST. SEATRAN PROJ. MGR.
CHECKED	
DRAWN	RECEIVED
CHECKED	REVISED AS BUILT

ALL WORK DONE IN ACCORDANCE WITH THE CITY OF SEATTLE STANDARD PLANS AND SPECIFICATIONS AND OTHER DOCUMENTS CALLED FOR IN SECTION 0-02.3 OF THE PROJECT MANUAL.

City of Seattle
Seattle Public Utilities
Diana Gale, Director

ORDINANCE NO. APPROVED
FUND:
SCALE: AS SHOWN INSPECTOR'S BOOK

S.E.A. STREET
2nd AVE NW
(NW 117TH TO NW 120TH)

JOB NO. PC C399312 R/W CO C399312
VAULT PLAN NO. 777–162
SHEET 7 OF 14

023319

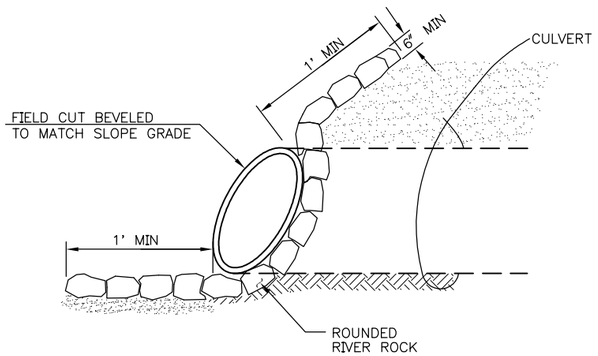

PIPE ARMORING (1/3,4)
N.T.S.

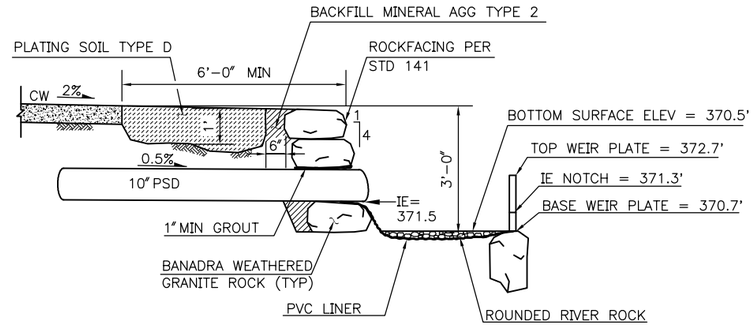

SECTION A–A

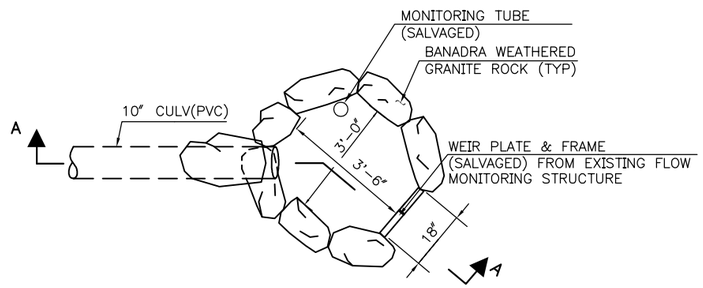

FLOW MONITORING POOL (3/4)
SCALE: 1/2" = 1'-0"

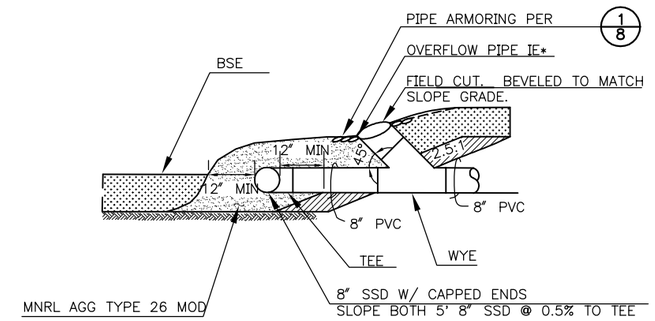

FLOW CONTROL PIPE (W1) (5/3)
SCALE:1/2" = 1'-0"

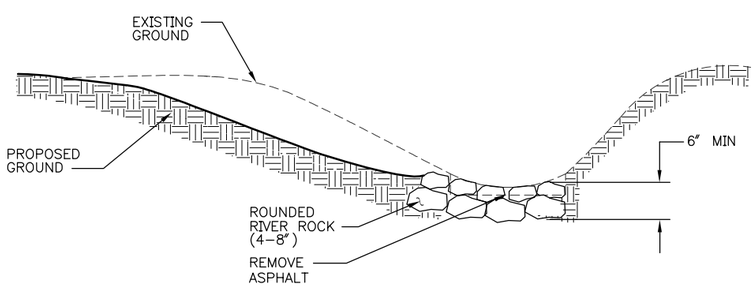

DITCH RETROFIT (2/3,4)
N.T.S.

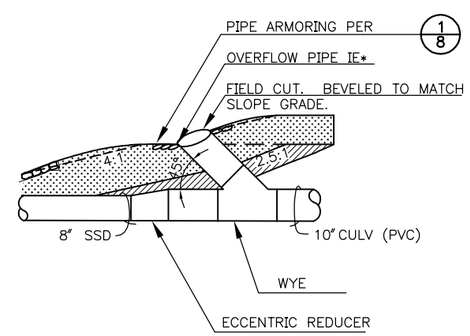

* SPECIFIC DESIGN INFORMATION
AS INDICATED ON PLAN SHEETS

FLOW CONTROL PIPE (W–6) (4/4)
SCALE:1/2" = 1'-0"

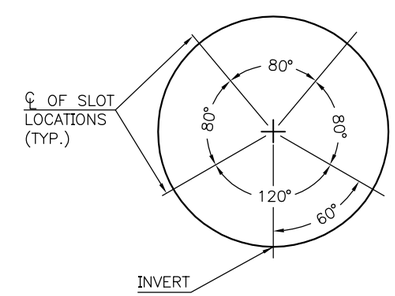

SLOT LOCATION DETAIL (6/8)
NO SCALE

RECORD DRAWING

DRAINAGE DETAILS SHEET

MARK	DATE	REV'D	CHK'D	MADE

NATURE REVISIONS

VAULT SERIAL NO. 3,365S

P:\RecordDrawings\C399312\SWT08__P.dwg rainwob 09/21/00 09:38 AM

APPROVED FOR ADVERTISING
DWIGHT DIVELY
EXECUTIVE SERVICES DIRECTOR
SEATTLE, WASHINGTON 20

BY:
CONTRACTING MANAGER

NAME OR INITIALS AND DATE	INITIALS AND DATE
DESIGNED	REVIEWED:
CHECKED	DES. CONST.
	SEATRAN PROJ. MGR.
DRAWN	RECEIVED
CHECKED	REVISED AS BUILT

ALL WORK DONE IN ACCORDANCE WITH THE CITY OF SEATTLE STANDARD PLANS AND SPECIFICATIONS AND OTHER DOCUMENTS CALLED FOR IN SECTION 0-02.3 OF THE PROJECT MANUAL.

City of Seattle
Seattle Public Utilities
Diana Gale, Director

ORDINANCE NO. APPROVED
FUND:
SCALE: AS SHOWN INSPECTOR'S BOOK

S.E.A. STREET
2nd AVE NW
(NW 117TH TO NW 120TH)

JOB NO. PC C399312 R/W CO C399312
VAULT PLAN NO. 777–162
SHEET 8 OF 14

023320

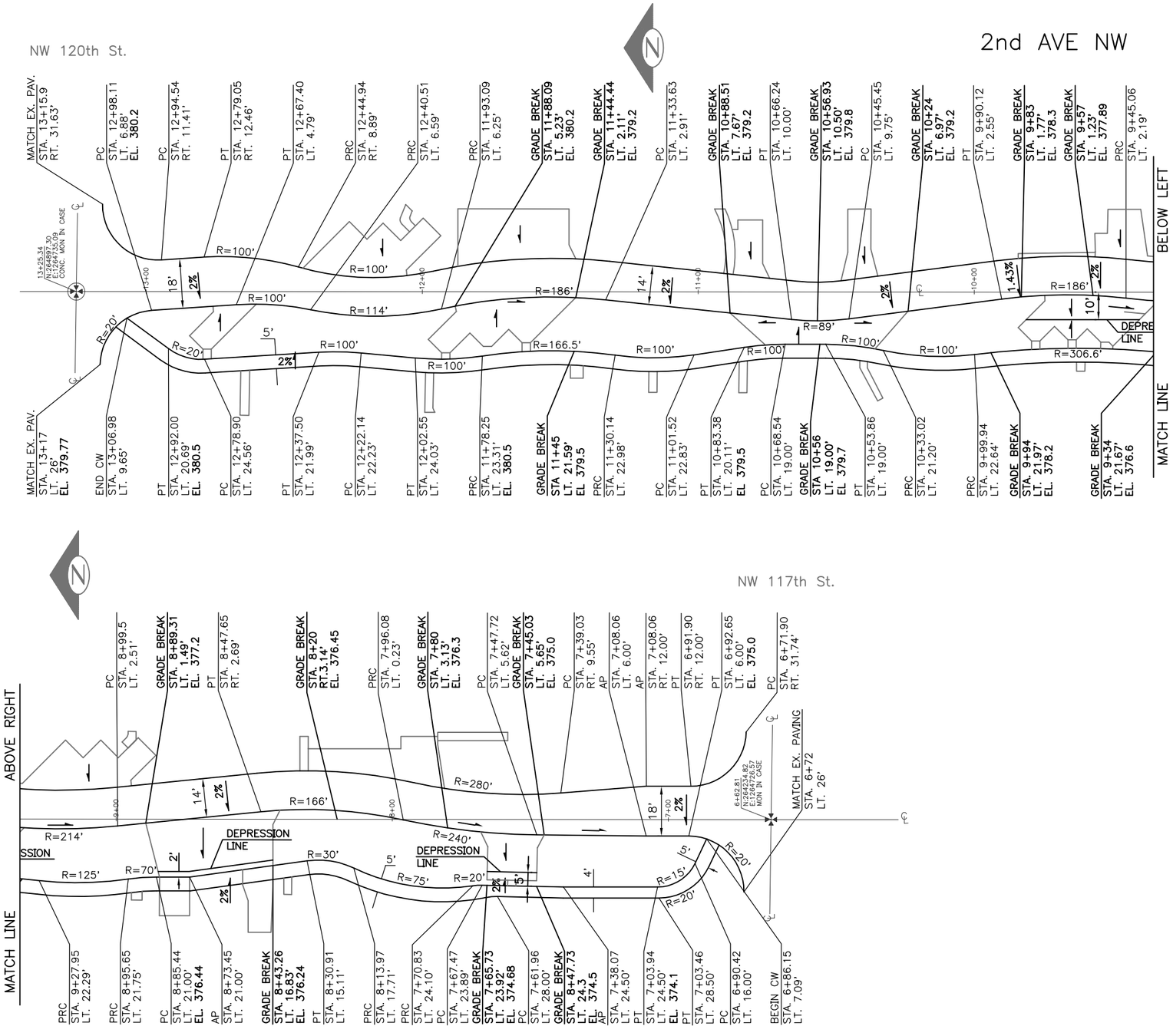

PAVING ALIGNMENT PLAN

APPROVED FOR ADVERTISING DWIGHT DIVELY EXECUTIVE SERVICES DIRECTOR SEATTLE, WASHINGTON . . . . . 20 . . . . BY: . . . . . . CONTRACTING MANAGER	NAME OR INITIALS AND DATE DESIGNED . . . . . . CHECKED . . . . . . DRAWN . . . . . . CHECKED . . . . . . ALL WORK DONE IN ACCORDANCE WITH THE CITY OF SEATTLE STANDARD PLANS AND SPECIFICATIONS AND OTHER DOCUMENTS CALLED FOR IN SECTION 0-02.3 OF THE PROJECT MANUAL.	INITIALS AND DATE REVIEWED: DES. . . . . SPU CONST. . . . . SEATRAN . . . . . PROJ. MGR. . . . RECEIVED . . . . . . REVISED AS BUILT	City of Seattle SEATRAN Seattle Transportation ORDINANCE NO. . . . . APPROVED . . . . . . FUND: . . . . . . SCALE: H. V. INSPECTOR'S BOOK. . . . .

S.E.A. STREETS
2ND AVENUE NW
(NW 117TH TO NW 120TH)

JOB NO.	PC	C399312
	R/W	
	CO	C399312
VAULT PLAN NO.		774-162
SHEET 9 OF 14		

P:\RecordDrawings\C399312\Sal00_p.dwg rainwab 09/21/00 07:42 AM 33655

MARK	REVISIONS	DATE	MADE	CHK'D	REV'D	DESCRIPTION
VAULT SERIAL NO.						

LANDSCAPING LEGEND

- PLANTING AREA PREPARATION
- SEEDED LAWN INSTALLATION

TREE SYMBOL LEGEND

(SIZES/QUANTITIES ON PLANT SCHEDULE)

- FRAXINUS OXYCARPA 'RAYWOOD' RAYWOOD ASH
- ACER TRUNCATUM 'PACIFIC SUNSET' PACIFIC SUNSET MAPLE
- CORNUS NUTALLI HYBRID 'EDDIES WHITE WONDER'
- AMELANCHIER LAEVIS 'CUMULUS'
- CHAMAECYPARIS 'PLUMOSA'
- PINUS THUNBERGIANA JAPANESE BLACK PINE
- ARBUTUS UNEDO STRAWBERRY TREE
- CHAMAECYPARIS OBTUSA HINOKI CYPRESS

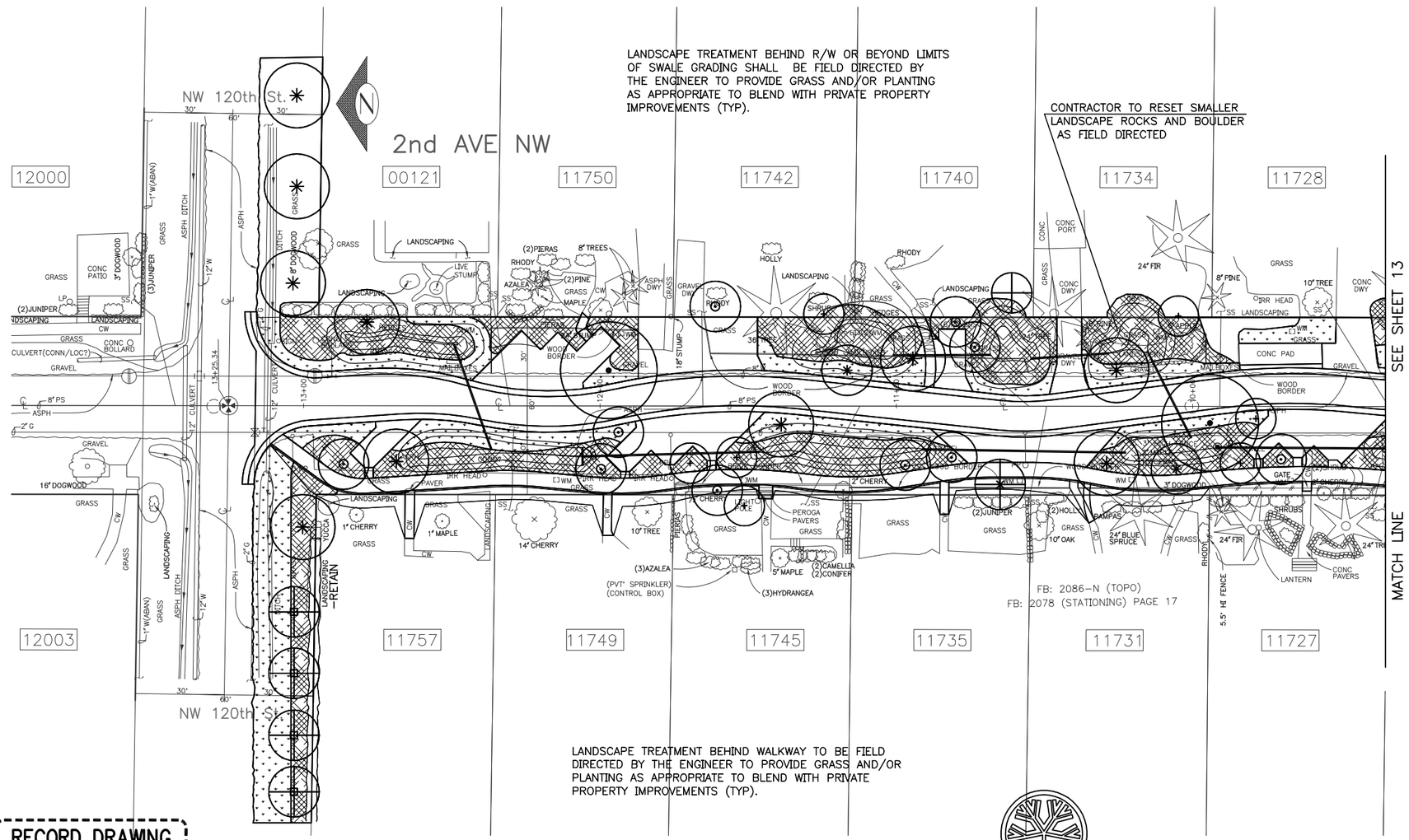

NOTES:

1. ALL TREE LOCATIONS ARE CONCEPTUAL AND ARE TO BE FIELD VERIFIED BY THE ENGINEER PRIOR TO EXCAVATION OF PLANTING PITS TO ENSURE PROPER PLACEMENT WITH RESPECT TO VIEWS, SIGHT DISTANCES, AND CLEARANCES FROM STREET EDGE AND/OR UTILITIES.

2. PRIOR TO CONSTRUCTION, THE CONTRACTOR SHALL NOTIFY THE ENGINEER TO REQUEST FIELD MARKING OF PLANT MATERIALS TO BE REMOVED (48 HOUR NOTICE). ALL PLANT MATERIALS NOT DESIGNATED TO BE REMOVED SHALL BE RETAINED AND PROTECTED. LIMITS OF GRADING SHALL BE FIELD MARKED BY THE ENGINEER. WHERE GRADING EXTENDS WITHIN THE DRIPLINE OF EXISTING TREES AND SHRUBS TO BE RETAINED, THE CONTRACTOR SHALL REQUEST FIELD DIRECTION TO EITHER TRANSPLANT OR TO ALTER GRADING TO MINIMIZE IMPACTS TO THE PLANT MATERIALS. PLANT MATERIAL DESTROYED AND/OR IRREPARABLY DAMAGED DUE TO LACK OF DIRECTION AND/OR LACK OF PROPER CARE BY THE CONTRACTOR SHALL BE REPLACED IN KIND AND/OR EVALUATED TO ASSESS DAMAGE WITH VALUE DEDUCTED FROM THE CONTRACT.

FOR TREE SCHEDULE AND PLANTING SCHEDULE, SEE SHEET 14
FOR REMOVAL PLAN, SEE SHEET 2
FOR DRAINAGE PLAN, SEE SHEET 3 & 4
FOR PAVING PLAN, SEE SHEET 10 & 11

P:\RecordDrawings\C399312\Sis01_p.dwg rainwab 09/21/00 07:44 AM 33655

RECORD DRAWING

VAULT SERIAL NO.	MARK	CHK'D	DATE	REV'D	DESCRIPTION

APPROVED FOR ADVERTISING
DWIGHT DIVELY
EXECUTIVE SERVICES DIRECTOR
SEATTLE, WASHINGTON . . . . . 20 . . .
BY: . . . . . .
CONTRACTING MANAGER

NAME OR INITIALS AND DATE	INITIALS AND DATE
DESIGNED	REVIEWED: DES. . . . SPU CONST. . . . SEATRAN . . . . PROJ. MGR. . . .
CHECKED	RECEIVED . . . . .
DRAWN	REVISED AS BUILT . . . . .
CHECKED	

ALL WORK DONE IN ACCORDANCE WITH THE CITY OF SEATTLE STANDARD PLANS AND SPECIFICATIONS AND OTHER DOCUMENTS CALLED FOR IN SECTION 0-02.3 OF THE PROJECT MANUAL.

STATE OF WASHINGTON REGISTERED LANDSCAPE ARCHITECT
SHANE E DeWALD
CERTIFICATE NO. 473

City of Seattle
SEATRAN
Seattle Transportation
ORDINANCE NO. . . . . APPROVED . . . . . .
FUND: . . . . . .
SCALE: H. V. INSPECTOR'S BOOK. . . . . .

S.E.A. STREETS
2ND AVENUE NW
(NW 117TH TO NW 120TH)

JOB NO. PC C399312 R/W CO C399312
VAULT PLAN NO. 774-162
SHEET 12 OF 14

LANDSCAPING PLAN

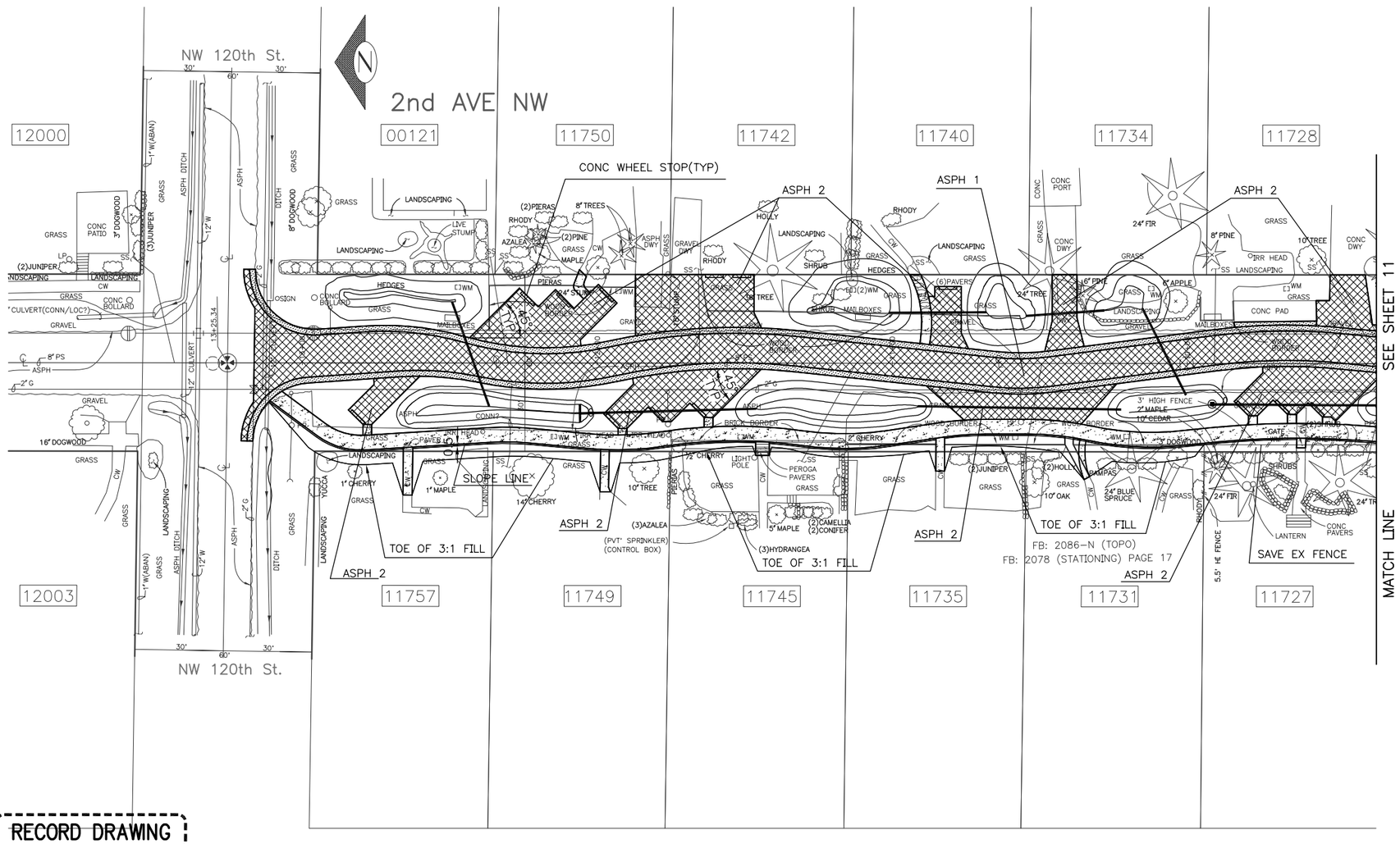

PAVING LEGEND

- ASPH 1 – 3" CL A ASPH OVER 6" TYPE 2 MNRL AGG.
- ASPH 2 – 3" CL A ASPH OVER 4" TYPE 2 MNRL AGG.
- CW – TYPE 420A
- CONC DWY – 6" TYPE 430A OR MODIFIED CURB AND GUTTER TYPE 410B(NO CURB)

FOR REMOVAL PLAN, SEE SHEET 2
FOR DRAINAGE PLAN, SEE SHEET 3 & 4
FOR LANDSCAPING PLAN, SEE SHEET 12 & 13

PAVING PLAN

RECORD DRAWING

P:\RecordDrawings\C399312\Spv01_p.dwg rainwob 09/21/00 08:46 AM 33655

VAULT SHEET NO.	MARK	CHK'D	DATE	REV'D	DESCRIPTION

APPROVED FOR ADVERTISING
DWIGHT DIVELY
EXECUTIVE SERVICES DIRECTOR
SEATTLE, WASHINGTON . . . . . 20 . . .
BY: . . . . . .
CONTRACTING MANAGER

NAME OR INITIALS AND DATE
DESIGNED . . . . . .
CHECKED . . . . . .
DRAWN . . . . . .
CHECKED . . . . . .

INITIALS AND DATE
REVIEWED:
DES. . . . SPU CONST. . . . .
SEATRAN . . . . PROJ. MGR. . .
RECEIVED . . . . . .
REVISED AS BUILT . . . . . .

ALL WORK DONE IN ACCORDANCE WITH THE CITY OF SEATTLE STANDARD PLANS AND SPECIFICATIONS AND OTHER DOCUMENTS CALLED FOR IN SECTION 0-02.3 OF THE PROJECT MANUAL.

City of Seattle
SEATRAN
Seattle Transportation
ORDINANCE NO. . . . . APPROVED . . . . . .
FUND: . . . . . .
SCALE: H. V. INSPECTOR'S BOOK. . . . . .

S.E.A. STREETS
2ND AVENUE NW
(NW 117TH TO NW 120TH)

JOB NO. PC C399312 R/W CO C399312
VAULT PLAN NO. 774-162
SHEET 10 OF 14

TREE SCHEDULE

ADDRESS	@ L.F.	@ S.F. SEEDED	@ S.F. PLANTED	ORGANIC MULCH C.Y.	BARK MULCH C.Y.	FRAXINUS OXYCARPA 'RAYWOOD' RAYWOOD ASH	ACER TRUNCATUM PACIFIC SUNSET MAPLE	CORNUS HYBRID 'EDDIES WHITE'	AMELANCHIER LAEVIS 'CUMULUS'	CORYLUS CORNUTA HAZELNUT	ACER CIRCINATUM VINE MAPLE	ARBUTUS UNEDO STRAWBERRY TREE	PINUS THUNBERGIANA JAPANESE BLACK PINE	CALOCEDRUS DECURRENS INCENSE CEDAR	CHAMAECYPARIS OBTUSA HINOKI CYPRESS	CHAMAECYPARIS 'PLUMOSA'	VACCINIUM PARVIFLORUM	PHILADELPHUS LEWIS MOCKORANGE	RIBES SANGUINEUM RED CURRANT	ROSA NUTKANA NOOTKA ROSE	CORNUS SERICEA RED TWIG DOGWOOD	CORNUS SERICEA 'FLAVIRAMEA' YELLOW DOGWOOD	RUBUS SPECTABILIS SALMONBERRY	RUBUS PARVIFLORA THIMBLEBERRY	RHODODENDRON 'PJM'	STRANVAESIA DAVIDIANA 'UNDULATA'	ARBUTUS UNEDO 'COMPACTA'	VACINIUM OVATUM EVERGREEN HUCKLEBERRY
						DECIDUOUS TREES 2–2½" CAL.					DECIDUOUS TREES 1½–1¾" CAL.					EVERGREEN TREES 5–6' HT.			DECIDUOUS SHRUBS 2 GALLON						EVERGREEN SHRUBS 2 GALLON			
121 (2ND)	80'	600	700	5	5	–	1	–	–			–	–	–	–	–									6			6
(120TH)	120'	1000	100	3	1	–	3	–	–			–	–	–	–	–												
11750	60'	100	500	3	4	1																			3	3	3	3
11742	60'	200	600	4	5			1	1			1					3		3	3	3		6		3		3	3
11740	60'	300	1150	5	6		1	2							1		3	1	3	3	3		6		3		3	3
11734	60'	300	1100	5	6		1					1					3	1	3	3	3		6		3		3	3
11728	60'	200	125	2	1																				6			
11720	60'	140	360	2	2	1																			3	3	3	3
11716	140'	400	1000	5	6	1	1	1	1								6	3	6	6	3		12		6		6	6
124 (2ND)	120'	660	1000	5	6		1	–					–	–		1												
(117TH)	80'	1800	500	4	6		3																		6			
11757 (2ND)	120'	450	600	4	4		1	1						–				3		6	6	6			3			6
(120TH)	60'	1200	1200	6	6		1						4												5			
11749	60'	300	460	3	4			2										2		3	3	3						3
11745	60'	200	600	3	4	–	1	1				3	–	–	–	–		2	–	6	–	–	–	–	2		3	–
11735	60'	180	320	2	2	–	1	2					–	–		1		–	–						3	3	3	–
11731	60'	180	400	3	3	1	1		1			–	–	–	–	–			3		3		3		3		3	3
11727	60'	120	400	3	3	–	–	1	–	–	–	2	–	–	–	–		–	3	–	3	3	–	–	3	2	3	2
11723	60'	270	600	4	4			1	2								3			6	6		6		3		3	3
11715	50'	180	200	2	2				1										3						3		3	3
11709	60'	480	600	3	4	1	1								1		3		6	6	6		6		3		6	6
11703 (2ND)	90'	350	660	3	4		1	1	1									–	9	–	9	3			3	2	–	5
(117TH)	120'	1200	1200	6	8	4												–		–					5	3	–	2
ADDITIONAL / FIELD LOCATED				18	4	4	2	3	3	12	12	6	2	4	2	2	6	3	6	12	12	6	12	12	12	12	12	12
PROJECT TOTALS		11,000	15,000	100	100	13	20	16	10	12	12	13	6	4	4	4	27	15	45	63	60	21	57	12	87	28	57	72

PLANTING SCHEDULE

ADDRESS	CORNUS 'KELSEYII' DWARF RED DOGWOOD	ROSA RUGOSA 'PAVEMENT SERIES' (MIXED VARIETIES)	POTENTILLA FRUTICOSA 'MOONLIGHT'	SYMPHORICARPOS ALBUS SNOWBERRY	GAULTHERIA SHALLON SALAL	MAHONIA REPENS CREEPING MAHONIA	POLYSTICHUM MUNITUM SWORDFERN	TOLMIEA MENZIESII YOUTH-ON-AGE	IRIS DOUGLASIANA PACIFIC COAST IRIS	SMILACINA RACEMOSA FALSE SOLOMON'S SEAL	CORNUS CANADENSIS	LUPINE	GERANIUM SANGUINEUM	ASARUM CAUDATUM WILD GINGER	MAIANTHEMUM DILATATUM WILD LILY OF THE VALLEY	GEUM MACROPHYLLUM	SIBERIAN IRIS	ARCTOSTAPHYLOS UVA URSI	KINNIK–KINNIK	FRAGARIA CHILOENSIS WILD STRAWBERRY	SAGITARIA LATIFOLIA ARROWHEAD	SCIRPUS MICROCARPUS SMALL–FRUITED BULRUSH	CAREX LENTICULARIS	RANUNCULUS REPENS CREEPING BUTTERCUP	JUNCUS ENSIPOLUOS DAGGERLEAF RUSH	JUNCUS EFFUSUS SOFT RUSH
	DECIDUOUS SHRUBS 1 GALLON								GROUNDCOVER 1 GALLON		PERENNIALS/FERNS 1 GALLON									GROUNDCOVER 4" POTS		WETLAND PLANTS 6" POTS				
121 (2ND)	24	16	16		24				6				12					36								
(120TH)																										
11750	6	16	6	6	32	12	6		6	3			9				6	24								
11742	24	12	6		24		6	6	6	6	6	6	6	6	6	6	6	24		12	12	12		12	12
11740	24	12	6		24		6	6	6	6	6	6	6	6	6	6	6	24		12	12	12		12	12
11734	24	12	6		24		6	6	6	6	6	6	6	6	6	6	6	24		12	12	12		12	12
11728																										
11720	6	6	3		12	6	3		3	3			6				3	24								
11716	36	24	12		36		9	9	9	9	9	9	9	9	9	9	9	36		18	18	18		18	18
124 (2ND)		16			36						12							36	120						
(117TH)																										
11757 (2ND)	24	24	12		12		9	3	6	3	3	3	12	3	–		12			12	12	12		12	12
(120TH)																										
11749	12	12	12		12		3	3	3	3	3	3	6	3			6			12	12	12		12	12
11745	–	24	24	6	36	–	6		3	6			8	6	3			36							
11735	12	6	6	–	24	–	6		3				6	3	3			12		6	6	6		6	6
11731	24	6	6		12	12	3	3	6	3	3	3	6	3	3	3	6	12		6	6	6		6	6
11727	18	–	–		–	–	6	–	3	–	–	–	–	6	2		3	34		3	3	3		3	3
11723	24	12	12		24	12	6	6	3	6			6	3	3		6			12	12	12		12	12
11715	6	3	3		12		3		3	3				3			3	12		3	3	3		3	3
11709	24	12	12		24		6		3	6			6	6	6		6	24		12	12	12		12	12
11703 (2ND)	24				24		6		6	9	12	6	6					24		12	12	12		12	12
(117TH)																			250	12	12	12	250	12	12
	130	130	120	12	160	60	12	12	12	12	12	12	12	12	12	12	12	200	100	24	24	24	24	24	24
TOTALS	442	243	162	24	552	102	102	54	93	84	72	54	122	75	59	42	90	582	470	268	268	268	274	268	268

RECORD DRAWING

TREE SCHEDULE AND PLANTING SCHEDULE

MULT. SHEET NO.	MARK	REVISIONS DESCRIPTION	MADE	CHK'D	DATE	REV'D

P:\RecordDrawings\C399312\Sls03_p.dwg rainwab 09/21/00 08:31 AM 33655

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CONTRACTING MANAGER

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DRAWN . . . . . .
CHECKED . . . . . .

INITIALS AND DATE
REVIEWED:
DES. . . . . SPU CONST. . . . .
SEATRAN . . . . . PROJ. MGR. . .
RECEIVED . . . . . .
REVISED AS BUILT . . . . . .

ALL WORK DONE IN ACCORDANCE WITH THE CITY OF SEATTLE STANDARD PLANS AND SPECIFICATIONS AND OTHER DOCUMENTS CALLED FOR IN SECTION 0-02.3 OF THE PROJECT MANUAL.

STATE OF WASHINGTON REGISTERED LANDSCAPE ARCHITECT
SHANE E DeWALD
CERTIFICATE NO. 473

City of Seattle
SEATRAN
Seattle Transportation
ORDINANCE NO. . . . . APPROVED . . . . . .
FUND: . . . . . .
SCALE: H. V. INSPECTOR'S BOOK. . . . . .

S.E.A. STREETS
2ND AVENUE NW
(NW 117TH TO NW 120TH)

JOB NO. PC C399312 R/W CO C399312
VAULT PLAN NO. 774–162
SHEET 14 OF 14

023324

Urban Runoff Contact:
Neal Shapiro
Senior Admin. Analyst
(310) 458-8223
neal.shapiro@smgov.net

Urban Runoff Case Studies

Pico Branch Library

Completed in 2014, the Pico Branch Library is Santa Monica's first municipal building to be certified LEED Platinum by the US Green Building Council. The project demonstrates the feasibility of harvesting rooftop rainwater for direct onsite indoor use: toilet and urinal flushing.

Project Details:

- Pico Branch Library

Bicknell Avenue Green Street

Reopened in May 2009, the 100 block of Bicknell Avenue has been designed to direct water runoff from the street into depressed planted areas (bioswales) and underground infiltration basins to protect the water quality of the Santa Monica Bay.

Project Details:

- Bicknell Avenue Green Street
- Additional Information on this Project

Beach Green

The Beach Green demonstration project is an exciting example of how communities across the country, often cramped for space, can transform existing parking lots into parks and open space vital to sustainable communities; while losing no parking spots, and adding water quality protections from polluted rainwater runoff.

Video

Project Details:

- Beach Green

San Vicente Blvd at Ocean Ave

With funding from a grant from the Metropolitan Water District of Southern California, this project demonstrates the feasibility of using runoff to recharge groundwater for future extraction or store the runoff in cisterns for direct reuse, and reduce dependence on imported water.

Project Details:

- San Vicente Blvd at Ocean Ave

Matrix 2.0 Alternative Water Guidelines

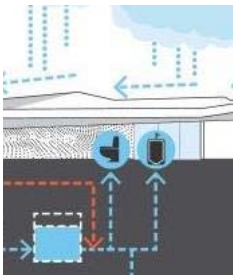

download (pdf)

New roadmap for decentralized, alternate water supplies - indoor and outdoor non-potable water regulations streamlined for rainwater, graywater, stormwater, blackwater use.

KCRW 89.9 Story

Rain Barrel & Cistern Rebate Program

Harvesting rainwater protects the Bay from runoff and makes watering your yard fun.

If that's not enough incentive, what about a generous rebate?

Would that help?

023325

Montana Ave at Ocean Ave / Wilshire Blvd at Ocean Ave

Opened in the spring of 2007 and early 2008, the Montana Ave and Wilshire Blvd Sub-Watershed Runoff Quality Improvement Projects treat to the maximum extent practicable urban runoff from the north-central portions of the City of Santa Monica, which run from the west to east borders.

Project Details:

- Montana Ave at Ocean Ave / Wilshire Blvd at Ocean Ave
- Additional Information on this Project

Santa Monica Main Library

601 Santa Monica Blvd

Runoff from roofs, decks and surface parking areas is collected and piped through 17 downspout filters before entering the 200,000 gallon concrete cistern BMP, which is located beneath the underground parking structure. Downspout filters are capable of removing some pollutants. Stored water is pumped to the library's sub-surface irrigation system.

Project Details:

- Santa Monica Main Library

---

502 Colorado Ave

With little open space available at this city-owned multi-family housing project, a BMP was installed in the adjacent alley. All runoff flows into a storage chamber, which is composed of five rows of plastic devices, and extends the entire width and length of the alley adjacent to the building.

Project Details:

- 502 Colorado Ave

Virginia Avenue Park

Reopened in December 2005, Virginia Avenue Park has several BMPs in use. These include Bay Boxes (Santa Monica's term for a filtering or infiltration device that serves to protect the water quality of the Santa Monica Bay) installed along the park perimeter, as well as in other locations near impermeable surfaces like the parking lots.

Project Details:

- Virginia Avenue Park

Airport Park

3201 Airport Avenue

Opened in 2007, Airport Park was able to implement many BMPs in its construction. The north and south parking losts use permeable asphalt, which allows runoff to pass through the permeable hard surface and in to the sub-surface for infiltration, where soil ecology acts as an effective natural filter.

Project Details:

023326

- Airport Park

Westside Water Quality Improvement Project

McLaughlin Avenue/ Palms Blvd : Mar Vista Park : Los Angeles

This project, which operates on gravity flow alone, is capable of treating all dry weather runoff up to 3 cubic feet per second (cfs) and stormwater runoff up to 33 cfs in a 24-hour period. Runoff is diverted out of the Sawtelle Channel by a concrete "speed bump" diversion weir in the floor of the culvert and into the upstream diversion vault, which then flows into a 36 inch diversion pipe to a transverse diversion weir that leads to several BMPs.

Project Details:

- Mar Vista Park: Westside / Centinela
- Additional Information on this Project

Big Blue Bus Facility

612 Colorado Avenue

The upgrades incorporated Low Impact Development strategies with Best Management Practices (BMPs) to harvest onsite stormwater for proprietary treatment and infiltration. The site was large and open enough to allow for some notable sub-surface treatment and infiltration devices - three separate, large infiltration zones were incorporated into the site in order to capture runoff from roofs and surface parking areas.

Project Details:

- Big Blue Bus Facility

Download all the Project information sheets in one file here:

- Low Impact Development Tip Sheets

Last updated: Thursday, 03/05/2015

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MS4 Project

Evaluation of NPDES Phase I Municipal Stormwater Monitoring Data

USGS Stormwater Monitoring Station in Madison , WI

There have been serious concerns about the reliability and utility of Phase 1 stormwater NPDES monitoring data, mainly due to a wide variety of experimental designs, sampling procedures, and analytical techniques used. On the other hand, the cumulative value of the monitoring data collected over almost a ten year period from hundreds of municipal outfalls and streams has great potential value to characterize the quality of stormwater runoff, and compare it against historical benchmarks (such as the NURP and USGS national datasets). This project will create a national database of Phase 1 stormwater monitoring data, provide a scientific analysis of the data, and provide recommendations for improving the quality and management value of future NPDES monitoring efforts.

Recent Papers and Presentations

Click in the following link to visit the recent papers and presentations of the:

National Stormwater Quality Database.

National Stormwater Quality Database (NSQD). Version 1.1 -- Spreadsheets

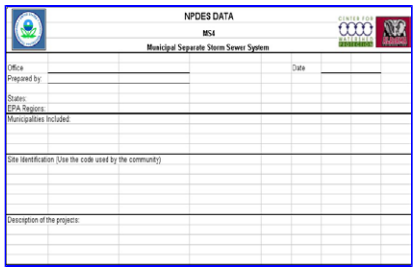

NPDES DATA
MS4
Municipal Separate Storm Sewer System

Office
Prepared by:
Date
States:
EPA Regions:
Municipalities Included:
Site Identification (Use the code used by the community)
Description of the projects:

Click on the image to open or save the spreadsheet

NSQD Version 3 Spreadsheet

This most recent update on NSQD. It contains contains 8,602 rain events from 104 cities throughout the continental United States, and represents all 9 EPA Rain Zones and 12 land use categories.

Total size: 7.51 Mb

Updated: February 3, 2008, Version 3

NSQD Version 1.1 Spreadsheet

NPDES DATA
MS4
Municipal Separate Storm Sewer System

Office
Date
Prepared by:
States:
EPA Regions:
Municipalities included:
Site Identification (Use the code used by the community)
Description of the projects:

Click on the image to open or save the spreadsheet

023328

This version of the NPDES MS4 database contains the data for more than 100 constituents in 64 communities for a total of 3700 events in 360 sites. The table is organized for different land uses and seasons.

Total size: 4.78 Mb

Updated: March 4, 2005, Version 1.1

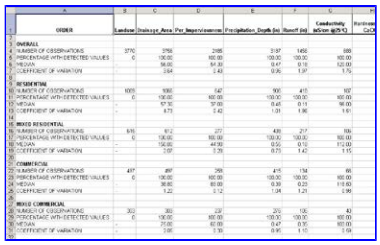

	A	B	C	D	E	F	G
1	ORDER	Landuse	Drainage_Area	Per_Impervious	Precipitation_Depth (in)	Runoff (in)	Conductivity (µS/cm @25°C)
2							
3	OVERALL						
4	NUMBER OF OBSERVATIONS	3770	3766	2986	3197	1492	888
5	PERCENTAGE WITH DETECTED VALUES	0	100.00	100.00	100.00	100.00	100.00
6	MEDIAN	-	96.00	64.00	0.47	0.18	120.00
7	COEFFICIENT OF VARIATION	-	2.64	2.48	0.96	1.37	1.75
8							
9	RESIDENTIAL						
10	NUMBER OF OBSERVATIONS	1009	1008	542	906	415	107
11	PERCENTAGE WITH DETECTED VALUES	0	100.00	100.00	100.00	100.00	100.00
12	MEDIAN	-	57.50	37.00	0.49	0.11	98.00
13	COEFFICIENT OF VARIATION	-	4.73	2.42	1.01	1.96	1.61
14							
15	MIXED RESIDENTIAL						
16	NUMBER OF OBSERVATIONS	676	672	277	438	217	106
17	PERCENTAGE WITH DETECTED VALUES	0	100.00	100.00	100.00	100.00	100.00
18	MEDIAN	-	150.00	44.00	0.55	0.10	112.00
19	COEFFICIENT OF VARIATION	-	3.07	3.26	0.75	1.42	1.15
20							
21	COMMERCIAL						
22	NUMBER OF OBSERVATIONS	417	417	299	415	134	66
23	PERCENTAGE WITH DETECTED VALUES	0	100.00	100.00	100.00	100.00	100.00
24	MEDIAN	-	38.00	80.00	0.39	0.20	119.00
25	COEFFICIENT OF VARIATION	-	1.22	0.12	1.34	1.21	1.98
26							
27	MIXED COMMERCIAL						
28	NUMBER OF OBSERVATIONS	303	303	237	273	135	43
29	PERCENTAGE WITH DETECTED VALUES	0	100.00	100.00	100.00	100.00	100.00
30	MEDIAN	-	77.00	82.00	0.47	0.10	102.00
31	COEFFICIENT OF VARIATION	-	1.98	1.36	0.95	1.15	1.09
32							

Click on the image to open or save the spreadsheet

Summary Table

This is the summary of observations by land use

Total size: 572 Kb

Updated: April 30, 2005, Version 1.1

Site Descriptions

ALABAMA	ARIZONA	CALIFORNIA	COLORADO
Huntsville, Jefferson County, Mobile, Montgomery.	Maricopa County, Tucson	Alameda, Caltrans	Colorado Springs, Denver Metro
GEORGIA	**IDAHO**	**KANSAS**	**KENTUCKY**
Atlanta, Clayton County, Cobb County, Fulton County.	Ada County Highway District	Topeka, Wichita	Jefferson County-Louisville, Lexington
MASSACHUSETTS	**MARYLAND**	**MINNESOTA**	**NORTH CAROLINA**
Boston	Anne Arundel County, Baltimore County, Baltimore City, Carroll County, Charles County, Harford County, Howard County, Montgomery County, Princes Georges County, State Highway	Minneapolis	Charlotte, Fayetteville, Greensboro, Raleigh
OREGON	**PENNSYLVANIA**	**TENNESSEE**	**TEXAS**
Clackamas County, Eugene, Gresham, Portland, Salem,	Philadelphia	Knoxville, Memphis	Arlington, Dallas, Dallas County, Forth Worth, Gargland, Harris County,

ODOT

Houston, Irving, Mesquite, Plano, Tarrant County

VIRGINIA

Arlington County, Chesapeake, Chesterfield County, Fairfax County, Hampton, Henrico County, Newport News, Norfolk, Portsmouth, Virginia Beach.

04/30/2005

Back to Main CE Back to Faculty Page Back to Pitt's webpage

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Edmund G. Brown Jr.
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Board Chair
Felicia Marcus
Visit the Water Board Members Page

3.1B – Planning and Design – Land Development

Management Measure

1. Limit disturbance and development of natural drainage features and sensitive areas; such as clearing and grading and cut and fill to reduce erosion and sediment loss; and
2. Prepare an effective, approved erosion and sediment control plan or similar administrative document that specifies erosion and sediment control provisions.

Bridges by their nature are built in riparian areas and can have pronounced habitat and water quality impacts if care is not taken to protect sensitive areas from both construction and post-construction impacts. Practices to meet these goals include designing bridges to minimize damage to riparian or wetland habitats and treating runoff from bridge decks before it is allowed to enter watercourses. Bridge maintenance activities should be conducted using containment practices to prevent pollutants, such as paint, rust, hazardous chemicals, and building materials, from entering the water or riparian habitat below. Restoration of damaged riparian or aquatic habitats should be done after bridge construction, maintenance, and demolition (see Management Measure 6B for restoration and mitigation of wetlands and riparian areas).

Management Practices

- **Limiting Disturbance**
  The type and location of permanent storm water management practices should be considered when planning new development including highways, roads, and bridges, such that rights-of-way are sized to accommodate structural controls. Highways and roads should be planned to minimize mileage through areas that might adversely affect sensitive areas, such as wetlands or estuaries. Wetlands that are within the right-of-way and cannot be avoided should be protected with the use of mitigation measures. Highway and road construction should be limited in sensitive areas, and highways should be sited so there is a sufficient setback distance between the highway right-of-way and any wetland or riparian areas. Another consideration is tidal flows to wetlands; highways and rights-of-way should not restrict this flow. Mitigation will be required if wetlands, riparian areas, or estuaries are affected (see Management Measure 6B for restoration and mitigation of wetlands and riparian areas).
- **Site fingerprinting is a technique that can be used to protect vegetation and reduce erosion**
  This practice limits clearing to areas that will be used for buildings, roads, and other infrastructure, leaving undisturbed areas that will be vegetated open space in the final plan. Areas that will remain undisturbed need to be marked off and construction equipment and stockpiles must be excluded to protect the existing vegetation and prevent compaction or erosion. The advantages of site fingerprinting are that natural areas are protected and fewer costs for landscaping are incurred. A disadvantage is that equipment will need to be maneuvered around these protected areas, possibly leading to increased labor hours.
- **Bridges**
  Bridges should be planned to minimize mileage and protect sensitive areas such as wetlands or estuaries. Setbacks should be used for river crossings during construction to minimize disturbance to the riparian area. Bridge construction can adversely impact water circulation in wetland areas, so allowances should be made for these impacts when designing bridges.

Areas requiring excessive cut and fill and those that may be subject to subsidence, sink holes, landsides, rock outcropping, and highly erodible soils should be avoided when sitting bridge locations.

Runoff should be directed away from bridge decks and watercourses by diverting it toward land for treatment. This can be accomplished using drains that pipe water along the bridge edge to either side of the shore. Recommended practices for treating bridge deck runoff include ponds, wetlands, infiltration basins and trenches, media filters, bioretention areas, vegetated swales, filter strips, and hydrodynamic devices. The use of scupper drains should be restricted on bridges less than 400 feet long and on bridges crossing sensitive areas.

- **Highways and Roads**
  Disconnect impervious surfaces by eliminated curbs (when local development codes permit) to allow highway and road runoff to be filtered through vegetated shoulders and medians. Eliminating curbs also increases infiltration to ground water. If eliminating curbs is not possible, curbs can be designed with breaks to direct runoff to vegetated surfaces. Care must be taken to ensure that the curb breaks do not receive so much runoff that vegetated infiltration areas are eroded. Storm water control structures should be designed so that the storm water does not run directly to receiving waters. Highway runoff should be routed through a combination of treatment practices or over stabilized vegetated areas such as vegetated shoulders or swales before it enters receiving waters.
- **Erosion and Sediment Control Plans**
  Storm Water Pollution Prevention Plan (SWPPP) describes in detail how a contractor or developer will reduce soil erosion and contain and treat runoff bearing eroded sediments and construction site chemicals. It normally includes the locations and type of pollutants present, as well as practices used on the site for soil stabilization, perimeter control, and runoff treatment, including vegetation practices, structural and nonstructural practices. It also details spill control measures, response actions, and a monitoring program. The SWPPP entails more than filing written documentation. It requires follow-through on the part of both the developer (for implementation) and regulator or permitting agency (for inspection and enforcement). This follow-through can include reviewing and modifying the SWPPP to account for unexpected events that occur after plans have been approved, and adapting to unforeseen conditions on the site. It must also include inspecting and assessing the effectiveness of implemented management practices on storm water quality. In some cases, practices will require maintenance or alternative or additional management practices.

Programs

- Alameda Countywide Clean Water Program, New Development and Redevelopment.
- SWRCB, Division of Water Quality, Storm Water Program Discharges of pollutants from construction activities are for the most part regulated under the NPDES permitting program. Regulated entities include all construction sites with one or more acres of disturbed area. Discharges of pollutants from construction sites smaller than 1 acre typically are considered nonpoint sources but might also be regulated at the local level. Construction site operators should contact the municipal department for more information about local requirements, including air quality requirements for dust control.
- Surface Transportation Policy Project (STPP) provides assistance to local transportation agencies, elected officials, and citizen groups to help stakeholders take advantage of the new opportunities available under the federal transportation bill to link transportation to land use, housing, social equity, livable communities, and smart growth.
- California Department of Transportation (Caltrans), Statewide Storm Water Management Program integrates appropriate stormwater control activities into ongoing activities, thus making control of stormwater pollution a part of Caltrans normal business practices.
- Green Highways Partnership (GHP) is a voluntary, public/private initiative that is revolutionizing our nation's transportation infrastructure. Through concepts such as integrated planning, regulatory flexibility, and market-based rewards, GHP seeks to incorporate environmental streamlining and stewardship into all aspects of the highway lifecycle.
- Portland Green Streets Program was approved a Green street resolution, report, and policy to promote and incorporate the use of green street facilities in public and private

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development. Portland has also adopted a progressive Division Green Street Plan to create a pedestrian-friendly commercial district that reflects and reinforces community values, including a focus on sustainable and "green" development. Community interest in sustainable practices encompasses a broad spectrum of ideas and strategies, however, this project looked specifically at green infrastructure opportunities at a conceptual level within the public right-of-way. This was done through a transportation and land use planning process that included extensive community, business and interagency collaboration.

- Santa Clara Valley Urban Runoff Pollution Prevention Program, Hydromodification Management Plan (HMP) was prepared in response to the NPDES Permit C-3 requirements to address the impacts from new and redevelopment projects on stream morphology, habitat, and erosion potential.
- SWRCB & RWQCBs, Clean Water Act section 401 Certification and Wetlands Program, RWQCBs review projects that require a federal permit under CWA section 404 or involve dredge or fill activities that may result in a discharge to waters of the United States. This is to ensure that the State's interests are protected on any federally permitted activity occurring in or adjacent to waters of the State.

Information Resources

- FishXing Website provides software and learning systems for calculating fish passage through culverts.
- Caltrans Stormwater Water Quality Planning Tool is a database of water quality standards and possible pollutants from Caltrans facilities. This unique tool is another valuable resource being used by Caltrans in its continuing commitment to prevent storm water pollution.
- Caltrans Environmental Handbook, provides guidance on the identification and evaluation of the environment, including cultural resources (Volume 2), biological resource (Volume 3), and community impact assessment (Volume 4).
- Caltrans, Statewide Storm Water Management Plan was approved by the SWRCB in March 2003, describes procedures and practices Caltrans uses to manage pollutants discharged from storm water drainage systems.
- CERES, California Wetland Information System is designed to provide wetland information to the public, educational community, and government agencies. It includes information on wetland mitigation and the mitigation role and responsibility for the California Department of Transportation.
- National Cooperative Highway Research Program (NCHRP), Evaluation of Best Management Practices for Highway Runoff Control includes information on Low Impact Design.
- Washington Department of Transportation (WSDOT), Roadside Manual provides guidance on roadside maintenance, including planning, design, construction, and maintenance. The manual has information on sustainable roadsides, environmental functions, wetlands, water quality, parking area design, erosion control, contour grading, soil bioengineering, and vegetative restoration concepts.
- WSDOT, Highway Runoff Manual provides guidelines that WSDOT, engineering consultants, and many local agencies use to design stormwater systems for transportation projects in Washington State. The manual includes guidelines for retrofitting and design guidance for BMP approaches that many would characterize as LID. The manual also received an honorable mention for Environmental Excellence in the Wetlands, Watersheds, and Water Quality Category in the Federal Highway Administration 2007 Environmental Excellence Awards.

References

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Richman, T., K.H. Lichten, J. Worth, and B.K. Ferguson. 1998. *Landscape Architecture Technical Information Series: Vegetated Swales*. American Society of Landscape Architects, Washington, DC.

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NPS Encyclopedia Site Map

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Office of Governor
Edmund G. Brown Jr.
Visit his Website

Board Chair
Felicia Marcus
Visit the Water Board Members Page

3.3 – Education and Outreach

Management Measure

Implement educational programs to provide greater understanding of watersheds and to raise awareness and increase the use of applicable urban management measures and practices to control and prevent adverse impacts on surface and ground waters. Public education, outreach, and training programs should involve targeted groups in the community. Implementation of urban pollution prevention and education programs includes the following subjects:

1. **Households**
   Improper storage, use, and disposal of household hazardous chemicals, including automobile fluids, pesticides, paints, and solvents; lawn and garden activities, including the application and disposal of lawn and garden care products, and improper disposal of leaves and yard trimmings; improper operation and maintenance of onsite disposal systems; and improper disposal of pet excrement.
2. **Landscaping**
   Turf management on golf courses and in parks and recreational areas.
3. **Commercial**
   Commercial activities, including parking lots, restaurants, vehicle service facilities, and other entities.
4. **Municipal**
   Discharge of pollutants (including floatables, waste oil, and litter) into storm drains; roads, highways, and bridges.

Pollution prevention practices are those that seek to educate the public on the potential for everyday activities to create nonpoint source pollution. Pollution is generated by everyday household activities, commercial and residential lawn and garden care, commercial activities, pet waste, and trash. There are abundant opportunities to involve the public in NPS pollution management, including distributing educational materials, holding training sessions and workshops, involving the public in water resource-specific activities such as cleanups and festivals, and encouraging stakeholder involvement in water resource-related decisions via public hearings and meetings. These activities can be focused on high-priority water bodies, groups who contribute to pollution (e.g., lawn care professionals, homeowners with yards, pet owners), or specific demographic groups (e.g., Spanish-speaking populations, school children). Finally, municipalities should inform the public of local stewardship groups and encourage participation among them. Local governments can organize environmental stewardship groups that focus specifically on urban pollution prevention if they do not already exist. Increasing public participation in stewardship groups will help to better facilitate outreach and education and will result in greater buy-in by the community nonpoint source and storm water control efforts. In addition, educational programs that encourage environmental stewardship among younger populations can help to ensure long-term nonpoint source and watershed awareness and can help bring the stewardship message home to family members.

Management Practices

- **Household**
  Everyday household chemicals can be considered pollutants if they are improperly handled,

stored, or disposed of. Automotive substances, household cleaners, fertilizers, pesticides, and home improvement materials must all be carefully managed to prevent contamination of runoff or ground water. Car washing can flush nutrients, metals and hydrocarbons into storm drains. Watershed managers can address these problems through public outreach and education efforts such as pamphlet distribution, training on proper lawn care practices, and storm drain stenciling. Municipalities should also provide facilities for the disposal of household chemicals. In residential neighborhoods, pet waste can also be a major contributor to NPS pollution. Pet owners can be informed about proper disposal of waste, and municipalities can install "pet waste stations," pass and enforce ⬩pooper scooper⬩ ordinances, and post signs.

- **Landscaping**
  Outreach campaigns should also inform both commercial lawn care specialists and residents of the importance of proper application of fertilizers and pesticides. In particular, techniques such as Integrated Pest Management and timing of fertilizer application should be emphasized to provide citizens with the tools to use these substances efficiently and reduce overall pesticide and fertilizer use.
- **Commercial**
  One way commercial activities can generate NPS pollution is through the release of wastewater into a storm sewer system without a permit (this is known as an illicit discharge). Municipalities must develop programs to help detect and eliminate these illicit discharges, as well as educate businesses and their employees. Commercial and industrial establishments should also implement good housekeeping practices, employee education and training programs and spill prevention plans. Measures should be taken to reduce the possibility of spills or leaks during general operation, maintenance, washing, construction, or repairs and to limit the exposure of pollutants to areas where they might come in contact with storm water.
- **Municipal**
  Municipalities should implement good housekeeping practices, including programs to control trash, debris collected from street sweeping, stockpiled material, and corporation yard pollutant sources, and reduce pollutants from activities such as park and road maintenance. Programs that reduce the amount of trash on the streets include public education, increased waste disposal facilities and cleanup campaigns. Municipalities can also clean streets and prevent trash from entering storm water with street sweeping and trash collection devices for storm drain inlets.

Programs

- Alameda Countywide Clean Water Program (ACCWP) is a consortium of local agencies in Alameda County dedicated to preventing urban storm water pollution. The program grew out of a need to meet NPDES requirements and participate in the development of the Water Quality Control Plan for the San Francisco Bay region. The program engages in efforts to educate the general public, contractors, and government employees through the distribution of literature, information fairs, training workshops, and television ads. In addition, the consortium works to identify and correct illicit discharges into the storm water system.
- Algalita Marine Research Foundation in collaboration with the SWRCB and CCC, Plastic Debris River to Sea Project, seeks to minimize the land-based discharges of marine debris. Just like ocean-based marine debris, land-based discharges of human-made debris are comprised mostly of plastics.
- California Department of Pesticide Regulation, Home2Ocean Program provides information for residential users of pesticides on their proper use and disposal. The Home2Ocean workbook is a capacity-building resource for launching or conducting a public education program for preventing water pollution from household pesticides.
- California Department of Toxic Substance Control (DTSC) Pollution Prevention (P2) Program provides resources for industry, local government, and other environmental agencies to promote source reduction and pollution prevention. This includes technology transfer, inspection/enforcement program support, and public outreach.
- California Department of Resources Recycling and Recovery (CalRecycle) provides assistance with solid waste minimization and pollution prevention. Material-specific guidance,

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educational materials, and information on financial assistance are provided for industry and the general public.

- San Diego City's Storm Water Pollution Prevention Program aims to reduce pollution in urban runoff through a variety of programs. These include public education, training programs, monitoring for water quality, watershed management, and the development and implementation of management practices.
- San Mateo Countywide Water Pollution Prevention Program (STOPPP) serves as a community resource for pollution prevention, focusing on educating residential and business communities via publications on management practices, commercials, and training programs.

Information Resources

General Pollution Prevention Websites

- California Coastal Commission, Model Urban Runoff Program (MURP) is a step-by-step guide designed for small municipalities to help them manage NPS pollution from urban runoff in California.
- USEPA, Pollution Prevention Information Clearinghouse (PPIC) is a free information service dedicated to reducing and eliminating industrial pollutants through technology transfer, source reduction, education and public awareness.

Educational Resources

- Orange County Stormwater Program, Public Education has a variety of brochures that are available for download and distribution. These include general stormwater pollution prevention brochures to inform the community about the origins of non-point source pollution and pollutant and business specific brochures which provide Best Management Practice's guidelines for specific activities.
- University of Wisconsin Cooperative State Research, Education, and Extension Service, Best Education Practices Project helps natural resource management and outreach professionals to choose appropriate education techniques and resources for their water management programs. T he Best Education Practices project will work in collaboration with the federal agency clean and safe water partnership and other networks to develop and promote best education practices for water education and to improve access to education resources and strategies. Project activities reflect advice provided by federal agency clean and safe water partners and a national network of water education organizations created and supported by the work of several national organizations over the last decade. Projects have included a 2002 Study of Provider Needs, Model Education Technique, a literature search, Best Education Practices Pilot Website, and other reference materials related to water outreach education.
- USEPA Watershed Academy offers 50 self-paced training modules that represent a basic and broad introduction to the watershed management field. The module themes include introduction/overview, watershed ecology, watershed change, analysis and planning, management practices, and community/social/water law. Eight Tools of Watershed Protection in Developing Areas describes ways in which nonpoint source managers can address pollution using planning, regulatory, and education techniques.

Residential Pollution Prevention (Household hazardous waste, lawn and garden care, pet waste, car washing)

- Natural Resources Conservation Service, Backyard Conservation Tip Sheets provide information for homeowners on ways to reduce erosion and manage fertilizer and pesticide application for water quality protection.
- Stormwater Manager's Resource Center, Fact Sheets on Residential Pollution Prevention Practices describe various residential storm water pollution prevention practices, such as pet waste collection, car washing, lawn care, car maintenance, and rain barrels.

Municipal/Commercial Pollution Prevention

- California Municipal Handbook contains information about storm water quality planning for municipal operations, including permit requirements, planning principles, techniques for reducing runoff and managing impervious areas, source controls, runoff treatment controls, staff training, and inspections and maintenance.
- California Department of Transportation, Maintenance Storm Water Pollution Prevention Bulletin is a monthly bulletin that provides technical information on management practices for municipal maintenance activities.
- California Environmental Protection Agency (CalEPA), CalGOLD - Permit Assistance Centers assists in providing businesses the information they need to comply with environmental and other regulatory and permitting requirements.
- Stormwater Manager's Resource Center, Fact Sheets on Municipal Pollution Prevention Practices provide general information on a variety of stormwater management practices that municipalities and institutions can apply in across the community as a whole. The primary goal of each pollution prevention practice is to reduce the amount of pollutants in stormwater runoff. To the extent practicable, the fact sheets address pollution prevention measures that can easily be incorporated into existing municipal programs and routine institutional maintenance activities such as street sweeping and catchbasin cleaning.
- USEPA, National Menu of Best Management Practices for Storm Water Phase II, Public Education and Outreach on Stormwater Impacts provides information on BMPs based on the Stormwater Phase II Rule's six minimum control measures. Most stormwater runoff is generated from dispersed land surfaces—pavements, yards, driveways, and roofs—efforts to control stormwater pollution must consider individual, household, and public behaviors and activities that can generate pollution from these surfaces. Pollution Prevention/Good Housekeeping Operations provides information on BMPs to contain spills, manage trash, and handle nonstormwater discharges.
- USEPA, Phase II Pollution Prevention/Good Housekeeping Fact Sheet describes general requirements and provides guidance for the Phase II Pollution Prevention/Good Housekeeping minimum control measures.

Public Participation Resources

- American Forest Foundation, Project Learning Tree is designed to develop students' ability to make informed decisions on environmental issues and instill in students the commitment to take responsible action on behalf of the environment. The Project's Website offers environmental curricula, links to additional resources, grants for educators to implement community action and service-learning projects, and the GreenWorks! Connecting Community Action and Service Learning Guide, which provides guidance to educators on how to partner with business, nonprofit, and other community organizations for environmental action projects and to involve students in service learning activities.
- Arbor Day Foundation, National Tree Trust provides resources that educate and empower people to grow and care for urban and community forests. The Seeds Program provides grants to urban and community forest organizations for day-to-day operations and offers leadership training, while the Roots Program provides grants to assist project implementation. To date, the National Tree Trust has mobilized nearly $8 million for urban and community forestry-related programs across California.
- California Stormwater Quality Association, California Stormwater BMP Handbook: Storm Drain Signage provides general information regarding storm drain signage/stencils, this fact sheet outlines design considerations and overall maintenance for these signs.
- USEPA, National Menu of Best Management Practices for Storm Water Phase II, Public Involvement builds on community capital, the wealth of interested citizens and groups, to help spread the message on preventing stormwater pollution, to undertake group activities that highlight storm drain pollution, storm drain marking, and contribute volunteer community actions to restore and protect local water resources.

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What is Low Impact Development (LID)?

LID is an ecologically friendly approach to site development and storm water management that aims to mitigate development impacts to land, water, and air. The approach emphasizes the integration of site design and planning techniques that conserve natural systems and hydrologic functions on a site. The practice has been successfully integrated into many municipal development codes and storm water management ordinances throughout the United States. Specifically, LID aims to:

- Preserve Open Space and Minimize Land Disturbance;
- Protect Natural Systems and Processes (drainage ways, vegetation, soils, sensitive areas);
- Reexamine the Use and Sizing of Traditional Site Infrastructure (lots, streets, curbs, gutters, sidewalks) and Customize Site Design to Each Site;
- Incorporate Natural Site Elements (wetlands, stream corridors, mature forests) as Design Elements; and
- Decentralize and Micromanage Storm Water at its Source.

Source: City of Portland, BES

Courtyard with Bioretention Areas

Buckman Heights Community
Portland, OR

Cover Photo: R. Arendt

Questions and Answers

Information on the most frequently asked low impact development questions.

Public Safety

Q. I am aware that in some instances, LID advocates the reduction of street widths and the reduced use of sidewalks to decrease impervious surfaces. Isn't this a threat to public safety?

A. No. Studies have shown that reduced street widths still provide all the functions of access, parking, and circulation for residents and emergency vehicles alike. Depending on density, minimizing the use of sidewalks may help to reduce development costs, increase housing affordability, and reduce impervious surfaces.

Q. Don't LID storm water management practices increase the likelihood of flooding?

A. No. LID designs provide adequate conveyance of storm water by using designs that maintain predevelopment volumes and rates of runoff. Since bioretention areas are designed to completely drain within a specified period of time, they do not provide breeding grounds for mosquitos. Overflow controls within bioretention areas control the risk of flooding.

Public Perception

Q. Aren't homeowners concerned about maintaining storm water controls on their properties?

A. Environmental stewardship is everyone's responsibility. Most homeowners view these systems as additional landscaping and once they are aware of the benefits that these systems provide to local hydrology, few remain opposed.

Maintenance

Q. LID practices sound great, but who maintains all of the open space and various storm water controls?

A. Communities designed using LID practices often rely on a combination of homeowner stewardship and maintenance agreements. When designed correctly, most homeowners perceive these systems as value-added builder amenities and actively provide for their maintenance.

For More Information

- Low Impact Development Center
  http://www.lowimpactdevelopment.org
- Prince George's County, Maryland
  http://www.goprincegeorgescounty.com
- NAHB Research Center Toolbase Services
  http://www.toolbase.org
- U.S. EPA
  http://www.epa.gov/owow/nps/urban.html

NAHB RESEARCH CENTER

*Assumes paving costs of $15/sq. yd.

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023339

Municipal Guide to Low Impact Development

Would you be interested in saving upwards of $70,000* per mile in street infrastructure costs by eliminating one lane of on-street parking on residential streets?

Did you know that communities designed to maximize open space and preserve mature vegetation are highly marketable and command higher lot prices?

Are you aware that most homeowners perceive Low Impact Development practices, such as bioretention, as favorable since such practices are viewed as additional builder landscaping?

Did you know that by reducing impervious surfaces, disconnecting runoff pathways, and using on-site infiltration techniques, you can reduce or eliminate the need for costly storm water ponds?

Source: Low Impact Development Center

Grassed Swale and Narrow Street

Montgomery County, MD

Source: Applied Ecological Services, Inc.

Bioretention with Native Vegetation

Prairie Crossing
Grayslake, IL

LID Benefits

In addition to the practice just making good sense, low impact development techniques can offer many benefits to a variety of stakeholders.

Municipalities

- Protect regional flora and fauna
- Balance growth needs with environmental protection
- Reduce municipal infrastructure and utility maintenance costs (streets, curbs, gutters, sidewalks, storm sewer)
- Increase collaborative public/private partnerships

Developers

- Reduce land clearing and grading costs
- Potentially reduce infrastructure costs (streets, curbs, gutters, sidewalks)
- Reduce storm water management costs
- Potentially reduce impact fees and increases lot yields
- Increase lot and community marketability

Environment

- Preserve integrity of ecological and biological systems
- Protect site and regional water quality by reducing sediment, nutrient, and toxic loads to water bodies
- Reduce impacts to local terrestrial and aquatic plants and animals
- Preserve trees and natural vegetation

Case Study

023340

Somerset is an 80-acre development in Prince George's County, Maryland consisting of 199 homes on 10,000-square-foot lots. During its creation, the developer used LID practices to reduce the storm water management burden. By using LID, the developer:

- Eliminated the need for storm water ponds by using bioretention techniques saving approximately $300,000;
- Gained six additional lots and their associated revenues; and
- Reduced finished lot cost by approximately $4,000.

Lot with Bioretention

Grassed Swale and Street without Curb and Gutter

Bioretention Area and Open Space

Photos: Low Impact Development Center

Description	Conventional Design	Bioretention System
Engineering Redesign	0	$110,000
Land Reclamation (6 lots x $40,000 Net)	0	<$240,000>
Total Costs	$2,457,843	$1,541,461
Total Costs (-Land Reclamation + Redesign Costs)	$2,457,843	$1,671,461
Total Cost Savings = $916,382		
Cost Savings Per Lot = $4,604		

Cost Comparison: Conventional Design vs. Bioretention

Aerial View of Somerset Development Site Plan, Prince George's County, MD

Hydrologic Comparison between Conventional Storm Water Management and LID

Hydrologic alterations within the landscape occur whenever land is developed. Conventional development approaches to storm water management have used practices to quickly and efficiently convey water away from developed areas. Usually these practices are designed to control the peak runoff rate for predetermined storm events, usually the 2- and 10-year storms. While these systems have worked to some degree, they still have not accounted for the increased runoff rates and volumes from smaller, more frequent storms, nor have they addressed the larger watershed functions of storage, filtration, and infiltration.

In contrast, LID utilizes a system of source controls and small-scale, decentralized treatment practices to help maintain a hydrologically functional landscape. The conservation of open space, the reduction of impervious surfaces, and the use of small-scale storm water controls, such as bioretention, are just a few of the LID practices that can help maintain predevelopment hydrological conditions.

What is Low Impact Development (LID)?

Ever wish you could simultaneously lower your site infrastructure costs, protect the environment, and increase your project's marketability? With LID techniques, you can. LID is an ecologically friendly approach to site development and storm water management that aims to mitigate development impacts to land, water, and air. The approach emphasizes the integration of site design and planning techniques that conserve the natural systems and hydrologic functions of a site.

Source: Prince George's County DER

Residential Lot with Bioretention

Somerset Development
Prince George's County, MD

LID Benefits

In addition to the practice just making good sense, LID techniques can offer many benefits to a variety of stakeholders.

Developers
- Reduce land clearing and grading costs
- Potentially reduce infrastructure costs (streets, curbs, gutters, sidewalks)
- Reduce storm water management costs
- Potentially reduce impact fees and increase lot yield
- Increase lot and community marketability

Municipalities
- Protect regional flora and fauna
- Balance growth needs with environmental protection
- Reduces municipal infrastructure and utility maintenance costs (streets, curbs, gutters, sidewalks, storm sewer)
- Increase collaborative public/private partnerships

Environment
- Preserve integrity of ecological and biological systems
- Protect site and regional water quality by reducing sediment, nutrient, and toxic loads to water bodies
- Reduce impacts to local terrestrial and aquatic plants and animals
- Preserve trees and natural vegetation

Cover Photo: R. Arendt

Case Study

Kensington Estates is a conventional development on 24 acres consisting of 103 single-family homes in Pierce County, WA. A study was conducted to redesign the site using a new state storm water model and to illustrate the full range of LID practices and technologies available to developers.

Overall, the redesigned LID site could have:

- Resulted in construction cost savings of over 20%;
- Preserved 62% of the site in open space;
- Maintained the project density of 103 lots;
- Reduced the size of storm pond structures and eliminated catchments and piped storm conveyances; and
- Achieved "zero" effective impervious surfaces.

Source: AHBL, Inc.

Cost Comparison: LID vs. Conventional Development

For More Information

- Low Impact Development Center
  http://www.lowimpactdevelopment.org
- Prince George's County, Maryland
  http://www.goprincegeorgescounty.com
- NAHB Research Center Toolbase Services
  http://www.toolbase.org
- U.S. EPA
  http://www.epa.gov/owow/nps/urban.html

NAHB RESEARCH CENTER

*Assumes paving costs of $15/sq. yd.

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023341

Builder's Guide to Low Impact Development

Would you be interested in saving upwards of $70,000* per mile in street infrastructure costs by eliminating one lane of on-street parking on residential streets?

Did you know that communities designed to maximize open space and preserve mature vegetation are highly marketable and command higher lot prices?

Are you aware that most homeowners perceive Low Impact Development practices, such as bioretention, as favorable since such practices are viewed as additional builder landscaping?

Did you know that by reducing impervious surfaces, disconnecting runoff pathways, and using on-site infiltration techniques, you can reduce or eliminate the need for costly storm water ponds?

LID Site Planning and Design Concepts

Successful LID projects simultaneously reduce land development and infrastructure costs while protecting a property's natural resources and functions. During the development process, the designer, developer, and reviewing agency should work together to identify solutions that integrate the following concepts:

- Preserve Open Space and Minimize Land Disturbance;
- Protect and Incorporate Natural Systems (wetlands, stream/wildlife corridors, mature forests) as Design Elements;
- Utilize Neo-Traditional Street and Lot Layouts and Designs; and
- Decentralize and Micromanage Storm Water at its Source Using LID Storm Water Management Practices.

LID and Storm Water Management

LID aims to mimic natural hydrology and processes by using small-scale, decentralized practices that infiltrate, evaporate, and transpire rainwater. Specifically, LID aims to:

- Minimize impervious surfaces;
- Disconnect hydrologic elements (roofs, downspouts, parking areas);
- Maintain/increase flow paths and times; and
- Utilize decentralized treatment practices.

Bioretention Areas
Storm water directed to these shallow topographic depressions in the landscape is filtered, stored, and infiltrated into the ground using specialized vegetation and engineered soils.

Grassed Swales
Water moving through these systems is slowed, filtered, and percolated into the ground. These systems can act as low cost alternatives to curbs, gutters, and pipes.

Source: Low Impact Development Center

LID Lot Level Source Controls

Preserve Open Space and Minimize Land Disturbance

Source: Bielinski Homes

Community Open Space

Bielinski Homes
Waukesha, WI

023342

Decentralize and Micromanage Storm Water at its Source using LID Storm Water Management Practices

Source: Low Impact Development Center

Grassed Swales

Somerset Development
Prince George's County, MD

From Conservation Design for Subdivisions: A Practical Guide to Creating Open Space Networks, by Randall G. Arendt. Copyright (©) 1996 by Island Press. Reprinted by permission of Island Press, Washington, D.C. and Covelo, CA.

Protect and Incorporate Natural Systems as Design Elements

Source: Applied Ecological Services, Inc.

Wetland System

Prairie Crossing
Grayslake, IL

Utilize Neo-Traditional Street and Lot Layouts and Designs

Source: DPZ & Co.

Bowman Park

Vermillion Community
Vermillion, NC

023343

Clean Water Act, Section 404

(a) The Secretary may issue permits, after notice and opportunity for public hearings for the discharge of dredged or fill material into the navigable waters at specified disposal sites. Not later than the fifteenth day after the date an applicant submits all the information required to complete an application for a permit under this subsection, the Secretary shall publish the notice required by this subsection.

(b) Subject to subsection (c) of this section, each such disposal site shall be specified for each such permit by the Secretary:

(1) through the application of guidelines developed by the Administrator, in conjunction with the Secretary, which guidelines shall be based upon criteria comparable to the criteria applicable to the territorial seas, the contiguous zone, and the ocean under section 403(c), and

(2) in any case where such guidelines under clause (1) alone would prohibit the specification of a site, through the application additionally of the economic impact of the site on navigation and anchorage.

(c) The Administrator is authorized to prohibit the specification (including the withdrawal of specification) of any defined area as a disposal site, and he is authorized to deny or restrict the use of any defined area for specification (including the withdrawal of specification) as a disposal site, whenever he determines, after notice and opportunity for public hearings, that the discharge of such materials into such area will have an unacceptable adverse effect on municipal water supplies, shellfish beds and fishery areas (including spawning and breeding areas), wildlife, or recreational areas. Before making such determination, the Administrator shall consult with the Secretary. The Administrator shall set forth in writing and make public his findings and his reasons for making any determination under this subsection.

(d) The term "Secretary" as used in this section means the Secretary of the Army, acting through the Chief of Engineers.

(e)

(1) In carrying out his functions relating to the discharge of dredged or fill material under this section, the Secretary may, after notice of opportunity for public hearing, issue general permits on a State, regional, or nationwide basis for any category of activities involving discharges of dredged or fill material if the Secretary determines that the activities in such category are similar in nature, will cause only minimal adverse environmental effects when performed separately, and will have only minimal cumulative adverse effects on the environment. Any general permit issued under this subsection shall

(A) be based on the guidelines described in subsection (b)(l) of this section, and

(B) set forth the requirements and standards which shall apply to any activity authorized by such general permit.

(2) No general permit issued under this subsection shall be for a period of more than five years after the date of its issuance and such general permit may be revoked or modified by the Secretary if, after opportunity for public hearing, the Secretary determines that the activities authorized by such general permit have an adverse impact on the environment or such activities are more appropriately authorized by individual permits.

(f)

(1) Except as provided in paragraph (2) of this subsection, the discharge of dredge or fill material -

(A) from normal farming, silviculture, and ranching activities such as plowing, seeding, cultivating, minor drainage, harvesting for the production of food, fiber, and forest products, or upland soil and water conservation practices;

(B) for the purpose of maintenance, including emergency reconstruction of recently damaged parts, of currently serviceable structures such as dikes, dams, levees, groins, riprap, breakwaters, causeways, and bridge abutments or approaches, and transportation structures;

(C) for the purpose of construction or maintenance of farm or stock ponds or irrigation ditches, or the maintenance of drainage ditches;

(D) for the purpose of construction of temporary sedimentation basins on a construction site which does not include placement of fill material into the navigable waters;

(E) for the purpose of construction or maintenance or farm roads or forest roads, or temporary roads for moving mining equipment, where such roads are constructed and maintained, in accordance with best management practices, to assure that flow and circulation patterns and chemical and biological characteristics of the navigable waters are not impaired, that the reach of the navigable waters is not reduced, and that any adverse effect on the aquatic environment will be otherwise minimized;

(F) resulting from any activity with respect to which a State has an approved program under section 1288(b)(4) of this title which meets the requirements of subparagraphs (B) and (C) of such section, is not prohibited by or otherwise subject to regulation under this section or section 1311(a) or 1342 of this title (except for effluent standards or prohibitions under section 1317 of this title).

(2) Any discharge of dredged or fill material into the navigable waters incidental to any activity having as its purpose bringing an area of the navigable waters into a use to which it was not previously subject, where the flow or circulation of navigable waters may be impaired or the reach of such waters be reduced, shall be required to have a permit under this section.

(g)

(1) The Governor of any State desiring to administer its own individual and general permit program for the discharge of dredged or fill material into the navigable waters (other than those waters which are presently used, or are susceptible to use in their natural condition or by reasonable improvement as a means to transport interstate or foreign commerce shoreward to their ordinary high water mark, including all waters which are subject to the ebb and flow of the tide shoreward to their mean high water mark, or mean higher high water mark on the west coast, including wetlands adjacent thereto), within its jurisdiction may submit to the Administrator a full and complete description of the program it proposes to establish and administer under State law or under an interstate compact. In addition,

such State shall submit a statement from the attorney general (or the attorney for those State agencies which have independent legal counsel), or from the chief legal officer in the case of an interstate agency, that the laws of such State, or the interstate compact, as the case may be, provide adequate authority to carry out the described program.

(2) Not later than the tenth day after the date of the receipt of the program and statement submitted by any State under paragraph (1) of this subsection, the Administrator shall provide copies of such program and statement to the Secretary and the Secretary of the Interior, acting through the Director of the United States Fish and Wildlife Service.

(3) No later than the ninetieth day after the date of the receipt by the Administrator of the program and statement submitted by any State, under paragraph (1) of this subsection, the Secretary and the Secretary of the Interior, acting through the Director of the United States Fish and Wildlife Service, shall submit any comments with respect to such program and statement to the Administrator in writing.

(h)

(1) Not later than the one-hundred-twentieth day after the date of the receipt by the Administrator of a program and statement submitted by any State under paragraph (1) of this subsection, the Administrator shall determine, taking into account any comments submitted by the Secretary and the Secretary of the Interior, acting through the Director of the United States Fish and Wildlife Service, pursuant to subsection (g) of this section, whether such State has the following authority with respect to the issuance of permits pursuant to such program:

(A) To issue permits which -

(i) apply, and assure compliance with, any applicable requirements of this section, including, but not limited to, the guidelines established under subsection (b)(l) of this section, and sections 307 and 403 of this Act;

(ii) are for fixed terms not exceeding five years; and

(iii) can be terminated or modified for cause including, but not limited to, the following:

(I) violation of any condition of the permit;

(II) obtaining a permit by misrepresentation, or failure to disclose fully all relevant facts;

(III) change in any condition that requires either a temporary or permanent reduction or elimination of the permitted discharge.

(B) To issue permits which apply, and assure compliance with, all applicable requirements of section 308 of this Act, or to inspect, monitor, enter, and require reports to at least the same extent as required in section 308 of this Act.

(C) To assure that the public, and any other State the waters of which may be affected, receive notice of each application for a permit and to provide an opportunity for public hearing before a ruling on each such application.

(D) To assure that the Administrator receives notice of each application (including a copy thereof)

for a permit.

(E) To assure that any State (other than the permitting State), whose waters may be affected by the issuance of a permit may submit written recommendation to the permitting State (and the Administrator) with respect to any permit application and, if any part of such written recommendations are not accepted by the permitting State, that the permitting State will notify such affected State (and the Administrator) in writing of its failure to so accept such recommendations together with its reasons for so doing.

(F) To assure that no permit will be issued if, in the judgement of the Secretary, after consultation with the Secretary of the department in which the Coast Guard is operating, anchorage and navigation of any of the navigable waters would be substantially impaired thereby.

(G) To abate violations of the permit or the permit program, including civil and criminal penalties and other ways and means of enforcement.

(H) To assure continued coordination with Federal and Federal-State water-related planning and review processes.

(2) If, with respect to a State program submitted under subsection (g)(l) of this section, the Administrator determines that such State -

(A) has the authority set forth in paragraph (1) of this subsection, the Administrator shall approve the program and so notify (i) such State, and (ii) the Secretary, who upon subsequent notification from such State that it is administering such program, shall suspend the issuance of permits under subsections (a) and (e) of this section for activities with respect to which a permit may be issued pursuant to such State program; or

(B) does not have the authority set forth in paragraph (1) of this subsection, the Administrator shall so notify such State, which notification shall also describe the revisions or modifications necessary so that such State may resubmit such program for a determination by the Administrator under this subsection.

(3) If the Administrator fails to make a determination with respect to any program submitted by a State under subsection (g)(l) of this section within one-hundred-twenty days after the date of the receipt of such program, such program shall be deemed approved pursuant to paragraph (2)(A) of this subsection and the Administrator shall so notify such State and the Secretary who, upon subsequent notification from such State that it is administering such program, shall suspend the issuance of permits under subsection (a) and (e) of this section for activities with respect to which a permit may be issued by such State.

(4) After the Secretary receives notification from the Administrator under paragraph (2) or (3) of this subsection that a State permit program has been approved, the Secretary shall transfer any applications for permits pending before the Secretary for activities with respect to which a permit may be issued pursuant to such State program to such State for appropriate action.

(5) Upon notification from a State with a permit program approved under this subsection that such State intends to administer and enforce the terms and conditions of a general permit issued by the Secretary under subsection (e) of this section with respect to activities in such State to which such general permit applies, the Secretary shall suspend the administration and enforcement of such general permit with respect to such activities.

(i) Whenever the Administrator determines after public hearing that a State is not administering a program approved under section (h)(2)(A) of this section, in accordance with this section, including, but not limited to, the guidelines established under subsection (b)(l) of this section, the Administrator shall so notify the State, and, if appropriate corrective action is not taken within a reasonable time, not to exceed ninety days after the date of the receipt of such notification, the Administrator shall:

(1) withdraw approval of such program until the Administrator determines such corrective action has been taken, and

(2) notify the Secretary that the Secretary shall resume the programs for the issuance of permits under subsection (a) and (e) of this section for activities with respect to which the State was issuing permits and that such authority of the Secretary shall continue in effect until such time as the Administrator makes the determination described in clause (1) of this subsection and such State again has an approved program.

(j) Each State which is administering a permit program pursuant to this section shall transmit to the Administrator

(1) a copy of each permit application received by such State and provide notice to the Administrator of every action related to the consideration of such permit application, including each permit proposed to be issued by such State, and

(2) a copy of each proposed general permit which such State intends to issue. Not later than the tenth day after the date of the receipt of such permit application or such proposed general permit, the Administrator shall provide copies of such permit application or such proposed general permit to the Secretary and the Secretary of the Interior, acting through the Director of the United States Fish and Wildlife Service. If the Administrator intends to provide written comments to such State with respect to such permit application or such proposed general permit, he shall so notify such State not later than the thirtieth day after the date of the receipt of such application or such proposed general permit and provide such written comments to such State, after consideration of any comments made in writing with respect to such application or such proposed general permit by the Secretary and the Secretary of the Interior, acting through the Director of the United States Fish and Wildlife Service, not later than the ninetieth day after the date of such receipt. If such State is so notified by the Administrator, it shall not issue the proposed permit until after the receipt of such comments from the Administrator, or after such ninetieth day, whichever first occurs. Such State shall not issue such proposed permit after such ninetieth day if it has received such written comments in which the Administrator objects

(A) to the issuance of such proposed permit and such proposed permit is one that has been submitted to the Administrator pursuant to subsection (h)(l)(E), or

(B) to the issuance of such proposed permit as being outside the requirements of this section, including, but not limited to, the guidelines developed under subsection (b)(l) of this section unless it modified such proposed permit in accordance with such comments. Whenever the Administrator objects to the issuance of a permit under the preceding sentence such written objection shall contain a statement of the reasons for such objection and the conditions which such permit would include if it were issued by the Administrator. In any case where the Administrator objects to the issuance of a permit, on request of the State, a public hearing shall be held by the Administrator on such objection. If the State does not resubmit such permit revised to meet such objection within 30 days after completion of the hearing or, if no hearing is requested within 90 days after the date of such objection, the Secretary may issue the permit pursuant to subsection (a) or (e) of this section, as the cause may be, for such source in accordance with the guidelines and requirements of this Act.

(k) In accordance with guidelines promulgated pursuant to subsection (i)(2) of section 304 of this Act, the Administrator is authorized to waive the requirements of subsection (j) of this section at the time of the approval of a program pursuant to subsection (h)(2)(A) of this section or any category (including any class, type, or size within such category) of discharge within the State submitting such program.

(l) The Administrator shall promulgate regulations establishing categories of discharges which he determines shall not be subject to the requirements of subsection (j) of this section in any State with a program approved pursuant to subsection (h)(2)(A) of this section. The Administrator may distinguish among classes, types, and sizes within any category of discharges.

(m) Not later than the ninetieth day after the date on which the Secretary notifies the Secretary of the Interior, acting through the Director of the United States Fish and Wildlife Service that

(1) an application for a permit under subsection (a) of this section has been received by the Secretary, or

(2) the Secretary proposes to issue a general permit under subsection (e) of this section, the Secretary of the Interior, acting through the Director of the United States Fish and Wildlife Service, shall submit any comments with respect to such application or such proposed general permit in writing to the Secretary.

(n) Nothing in this section shall be construed to limit the authority of the Administrator to take action pursuant to section 309 of this Act.

(o) A copy of each permit application and each permit issued under this section shall be available to the public. Such permit application or portion thereof, shall further be available on request for the purpose of reproduction.

(p) Compliance with a permit issued pursuant to this section, including any activity carried out pursuant to a general permit issued under this section, shall be deemed compliance, for purposes of sections 309 and 505, with sections 301, 307, and 403.

(q) Not later than the one-hundred-eightieth day after the date of enactment of this subsection, the Secretary shall enter into agreements with the Administrator, the Secretaries of the Departments of Agriculture, Commerce, Interior, and Transportation, and the heads of other appropriate Federal agencies to minimize, to the maximum extent practicable, duplication, needless paperwork, and delays in the issuance of permits under this section. Such agreements shall be developed to assure that, to the maximum extent practicable, a decision with respect to an application for a permit under subsection (a) of this section will be made not later than the ninetieth day after the date the notice of such application is published under subsection (a) of this section.

(r) The discharge of dredged or fill material as part of the construction of a Federal project specifically authorized by Congress, whether prior to or on or after the date of enactment of his subsection, is not prohibited by or otherwise subject to regulation under this section, or a State program approved under this section, or section 301(a) or 402 of the Act (except for effluent standards or prohibitions under section 307), if information on the effects of such discharge, including consideration of the guidelines developed under subsection (b)(l) of this section, is included in an environmental impact statement for such project pursuant to the National Environmental Policy

Act of 1969 and such environmental impact statement has been submitted to Congress before the actual discharge of dredged or fill material in connection with the construction of such project and prior to either authorization of such project or an appropriation of funds for each construction.

(s)

(1) Whenever on the basis of any information available to him the Secretary finds that any person is in violation of any condition or limitation set forth in a permit issued by the Secretary under this section, the Secretary shall issue an order requiring such persons to comply with such condition or limitation, or the Secretary shall bring a civil action in accordance with paragraph (3) of this subsection.

(2) A copy of any order issued under this subsection shall be sent immediately by the Secretary to the State in which the violation occurs and other affected States. Any order issued under this subsection shall be by personal service and shall state with reasonable specificity the nature of the violation, specify a time for compliance, not to exceed thirty days, which the Secretary determines is reasonable, taking into account the seriousness of the violation and any good faith efforts to comply with applicable requirements. In any case in which an order under this subsection is issued to a corporation, a copy of such order shall be served on any appropriate corporate officers.

(3) The Secretary is authorized to commence a civil action for appropriate relief, including a permanent or temporary injunction for any violation for which he is authorized to issue a compliance order under paragraph (1) of this subsection. Any action under this paragraph may be brought in the district court of the United States for the district in which the defendant is located or resides or is doing business, and such court shall have jurisdiction to restrain such violation and to require compliance. Notice of the commencement of such action shall be given immediately to the appropriate State.

(4)

(A) Any person who willfully or negligently violates any condition or limitation in a permit issued by the Secretary under this section shall be punished by a fine of not less than $2,500 nor more than $25,000 per day of violation, or by imprisonment for not more than one year, or by both. If the conviction is for a violation committed after a first conviction of such person under this paragraph, punishment shall be by fine of not more than $50,000 per day of violation, or by imprisonment for not more than two years, or by both.

(B) For the purposes of this paragraph, the term "person" shall mean, in addition to the definition contained in section 502(5) of this Act, any responsible corporate officer.

(5) Any person who violates any condition or limitation in a permit issued by the Secretary under this section, and any person who violates any order issued by the Secretary under paragraph (1) of this subsection, shall he subject to a civil penalty not to exceed $10,000 per day of such violation.

(t) Nothing in this section shall preclude or deny the right of any State or interstate agency to control the discharge of dredged or fill material in any portion of the navigable waters within the jurisdiction of such State, including any activity of any Federal agency, and each such agency shall comply with such State or interstate requirements both substantive and procedural to control the discharge of

dredged or fill material to the same extent that any person is subject to such requirements. This section shall not be construed as affecting or impairing the authority of the Secretary to maintain navigation.

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PUBLIC RESOURCES CODE - PRC

DIVISION 13. ENVIRONMENTAL QUALITY [21000 - 21189.57]

(Division 13 added by Stats. 1970, Ch. 1433.)

CHAPTER 1. Policy [21000 - 21006]

(Chapter 1 added by Stats. 1970, Ch. 1433.)

21000.

The Legislature finds and declares as follows:
(a) The maintenance of a quality environment for the people of this state now and in the future is a matter of statewide concern.
(b) It is necessary to provide a high-quality environment that at all times is healthful and pleasing to the senses and intellect of man.
(c) There is a need to understand the relationship between the maintenance of high-quality ecological systems and the general welfare of the people of the state, including their enjoyment of the natural resources of the state.
(d) The capacity of the environment is limited, and it is the intent of the Legislature that the government of the state take immediate steps to identify any critical thresholds for the health and safety of the people of the state and take all coordinated actions necessary to prevent such thresholds being reached.
(e) Every citizen has a responsibility to contribute to the preservation and enhancement of the environment.
(f) The interrelationship of policies and practices in the management of natural resources and waste disposal requires systematic and concerted efforts by public and private interests to enhance environmental quality and to control environmental pollution.
(g) It is the intent of the Legislature that all agencies of the state government which regulate activities of private individuals, corporations, and public agencies which are found to affect the quality of the environment, shall regulate such activities so that major consideration is given to preventing environmental damage, while providing a decent home and satisfying living environment for every Californian.
(Amended by Stats. 1979, Ch. 947.)

21001.

The Legislature further finds and declares that it is the policy of the state to:
(a) Develop and maintain a high-quality environment now and in the future, and take all action necessary to protect, rehabilitate, and enhance the environmental quality of the state.
(b) Take all action necessary to provide the people of this state with clean air and water, enjoyment of aesthetic, natural, scenic, and historic environmental qualities, and freedom from excessive noise.
(c) Prevent the elimination of fish or wildlife species due to man’s activities, insure that fish and wildlife populations do not drop below self-prepetuating levels, and

preserve for future generations representations of all plant and animal communities and examples of the major periods of California history.
(d) Ensure that the long-term protection of the environment, consistent with the provision of a decent home and suitable living environment for every Californian, shall be the guiding criterion in public decisions.
(e) Create and maintain conditions under which man and nature can exist in productive harmony to fulfill the social and economic requirements of present and future generations.
(f) Require governmental agencies at all levels to develop standards and procedures necessary to protect environmental quality.
(g) Require governmental agencies at all levels to consider qualitative factors as well as economic and technical factors and long-term benefits and costs, in addition to short-term benefits and costs and to consider alternatives to proposed actions affecting the environment.
(Amended by Stats. 1979, Ch. 947.)

21001.1.

The Legislature further finds and declares that it is the policy of the state that projects to be carried out by public agencies be subject to the same level of review and consideration under this division as that of private projects required to be approved by public agencies.
(Added by Stats. 1984, Ch. 1514, Sec. 1.)

21002.

The Legislature finds and declares that it is the policy of the state that public agencies should not approve projects as proposed if there are feasible alternatives or feasible mitigation measures available which would substantially lessen the significant environmental effects of such projects, and that the procedures required by this division are intended to assist public agencies in systematically identifying both the significant effects of proposed projects and the feasible alternatives or feasible mitigation measures which will avoid or substantially lessen such significant effects. The Legislature further finds and declares that in the event specific economic, social, or other conditions make infeasible such project alternatives or such mitigation measures, individual projects may be approved in spite of one or more significant effects thereof.
(Amended by Stats. 1980, Ch. 676, Sec. 277.)

21002.1.

In order to achieve the objectives set forth in Section 21002, the Legislature hereby finds and declares that the following policy shall apply to the use of environmental impact reports prepared pursuant to this division:
(a) The purpose of an environmental impact report is to identify the significant effects on the environment of a project, to identify alternatives to the project, and

to indicate the manner in which those significant effects can be mitigated or avoided.
(b) Each public agency shall mitigate or avoid the significant effects on the environment of projects that it carries out or approves whenever it is feasible to do so.
(c) If economic, social, or other conditions make it infeasible to mitigate one or more significant effects on the environment of a project, the project may nonetheless be carried out or approved at the discretion of a public agency if the project is otherwise permissible under applicable laws and regulations.
(d) In applying the policies of subdivisions (b) and (c) to individual projects, the responsibility of the lead agency shall differ from that of a responsible agency. The lead agency shall be responsible for considering the effects, both individual and collective, of all activities involved in a project. A responsible agency shall be responsible for considering only the effects of those activities involved in a project which it is required by law to carry out or approve. This subdivision applies only to decisions by a public agency to carry out or approve a project and does not otherwise affect the scope of the comments that the public agency may wish to make pursuant to Section 21104 or 21153.
(e) To provide more meaningful public disclosure, reduce the time and cost required to prepare an environmental impact report, and focus on potentially significant effects on the environment of a proposed project, lead agencies shall, in accordance with Section 21100, focus the discussion in the environmental impact report on those potential effects on the environment of a proposed project which the lead agency has determined are or may be significant. Lead agencies may limit discussion on other effects to a brief explanation as to why those effects are not potentially significant.
(Amended by Stats. 1994, Ch. 1230, Sec. 1. Effective September 30, 1994.)

21003.

The Legislature further finds and declares that it is the policy of the state that:
(a) Local agencies integrate the requirements of this division with planning and environmental review procedures otherwise required by law or by local practice so that all those procedures, to the maximum feasible extent, run concurrently, rather than consecutively.
(b) Documents prepared pursuant to this division be organized and written in a manner that will be meaningful and useful to decisionmakers and to the public.
(c) Environmental impact reports omit unnecessary descriptions of projects and emphasize feasible mitigation measures and feasible alternatives to projects.
(d) Information developed in individual environmental impact reports be incorporated into a data base which can be used to reduce delay and duplication in preparation of subsequent environmental impact reports.
(e) Information developed in environmental impact reports and negative declarations be incorporated into a data base which may be used to make subsequent or supplemental environmental determinations.
(f) All persons and public agencies involved in the environmental review process be responsible for carrying out the process in the most efficient, expeditious manner in

order to conserve the available financial, governmental, physical, and social resources with the objective that those resources may be better applied toward the mitigation of actual significant effects on the environment.
(Amended by Stats. 1993, Ch. 1130, Sec. 2. Effective January 1, 1994.)

21003.1.

The Legislature further finds and declares it is the policy of the state that:
(a) Comments from the public and public agencies on the environmental effects of a project shall be made to lead agencies as soon as possible in the review of environmental documents, including, but not limited to, draft environmental impact reports and negative declarations, in order to allow the lead agencies to identify, at the earliest possible time in the environmental review process, potential significant effects of a project, alternatives, and mitigation measures which would substantially reduce the effects.
(b) Information relevant to the significant effects of a project, alternatives, and mitigation measures which substantially reduce the effects shall be made available as soon as possible by lead agencies, other public agencies, and interested persons and organizations.
(c) Nothing in subdivisions (a) or (b) reduces or otherwise limits public review or comment periods currently prescribed either by statute or in guidelines prepared and adopted pursuant to Section 21083 for environmental documents, including, but not limited to, draft environmental impact reports and negative declarations.
(Added by Stats. 1985, Ch. 85, Sec. 1.)

21004.

In mitigating or avoiding a significant effect of a project on the environment, a public agency may exercise only those express or implied powers provided by law other than this division. However, a public agency may use discretionary powers provided by such other law for the purpose of mitigating or avoiding a significant effect on the environment subject to the express or implied constraints or limitations that may be provided by law.
(Added by Stats. 1982, Ch. 1438, Sec. 3.)

21005.

(a) The Legislature finds and declares that it is the policy of the state that noncompliance with the information disclosure provisions of this division which precludes relevant information from being presented to the public agency, or noncompliance with substantive requirements of this division, may constitute a prejudicial abuse of discretion within the meaning of Sections 21168 and 21168.5, regardless of whether a different outcome would have resulted if the public agency had complied with those provisions.

(b) It is the intent of the Legislature that, in undertaking judicial review pursuant to Sections 21168 and 21168.5, courts shall continue to follow the established principle that there is no presumption that error is prejudicial.
(c) It is further the intent of the Legislature that any court, which finds, or, in the process of reviewing a previous court finding, finds, that a public agency has taken an action without compliance with this division, shall specifically address each of the alleged grounds for noncompliance.
(Amended by Stats. 1994, Ch. 1230, Sec. 2. Effective September 30, 1994.)

21006.

The Legislature finds and declares that this division is an integral part of any public agency's decisionmaking process, including, but not limited to, the issuance of permits, licenses, certificates, or other entitlements required for activities undertaken pursuant to federal statutes containing specific waivers of sovereign immunity.
(Added by Stats. 1998, Ch. 272, Sec. 2. Effective January 1, 1999.)

CHAPTER 2. Short Title [21050- 21050.]

(Chapter 2 added by Stats. 1970, Ch. 1433.)

21050.

This division shall be known and may be cited as the California Environmental Quality Act.
(Amended by Stats. 1976, Ch. 1312.)

CHAPTER 2.5. Definitions [21060 - 21074]

(Chapter 2.5 added by Stats. 1972, Ch. 1154.)

21060.

Unless the context otherwise requires, the definitions in this chapter govern the construction of this division.
(Added by Stats. 1972, Ch. 1154.)

21060.1.

(a) "Agricultural land" means prime farmland, farmland of statewide importance, or unique farmland, as defined by the United States Department of Agriculture land inventory and monitoring criteria, as modified for California.
(b) In those areas of the state where lands have not been surveyed for the classifications specified in subdivision (a), "agricultural land" means land that meets the requirements of "prime agricultural land" as defined in paragraph (1), (2), (3), or (4) of subdivision (c) of Section 51201 of the Government Code.
(Added by Stats. 1993, Ch. 812, Sec. 2. Effective January 1, 1994.)

21060.3.

"Emergency" means a sudden, unexpected occurrence, involving a clear and imminent danger, demanding immediate action to prevent or mitigate loss of, or damage to, life, health, property, or essential public services. "Emergency" includes such occurrences as fire, flood, earthquake, or other soil or geologic movements, as well as such occurrences as riot, accident, or sabotage.
(Added by Stats. 1976, Ch. 1312.)

21060.5.

"Environment" means the physical conditions which exist within the area which will be affected by a proposed project, including land, air, water, minerals, flora, fauna, noise, objects of historic or aesthetic significance.
(Added by Stats. 1972, Ch. 1154.)

21061.

"Environmental impact report" means a detailed statement setting forth the matters specified in Sections 21100 and 21100.1; provided that information or data which is relevant to such a statement and is a matter of public record or is generally available to the public need not be repeated in its entirety in such statement, but may be specifically cited as the source for conclusions stated therein; and provided further that such information or data shall be briefly described, that its relationship to the environmental impact report shall be indicated, and that the source thereof shall be reasonably available for inspection at a public place or public building. An environmental impact report also includes any comments which are obtained pursuant to Section 21104 or 21153, or which are required to be obtained pursuant to this division.
An environmental impact report is an informational document which, when its preparation is required by this division, shall be considered by every public agency prior to its approval or disapproval of a project. The purpose of an environmental impact report is to provide public agencies and the public in general with detailed information about the effect which a proposed project is likely to have on the environment; to list ways in which the significant effects of such a project might be minimized; and to indicate alternatives to such a project.
In order to facilitate the use of environmental impact reports, public agencies shall require that such reports contain an index or table of contents and a summary. Failure to include such index, table of contents, or summary shall not constitute a cause of action pursuant to Section 21167.
(Amended by Stats. 1976, Ch. 1312.)

21061.1.

"Feasible" means capable of being accomplished in a successful manner within a reasonable period of time, taking into account economic, environmental, social, and technological factors.
(Added by Stats. 1976, Ch. 1312.)

21061.2.

"Land evaluation and site assessment" means a decisionmaking methodology for assessing the potential environmental impact of state and local projects on agricultural land.
(Added by Stats. 1993, Ch. 812, Sec. 3. Effective January 1, 1994.)

21061.3.

"Infill site" means a site in an urbanized area that meets either of the following criteria:
(a) The site has not been previously developed for urban uses and both of the following apply:
(1) The site is immediately adjacent to parcels that are developed with qualified urban uses, or at least 75 percent of the perimeter of the site adjoins parcels that are developed with qualified urban uses, and the remaining 25 percent of the site adjoins parcels that have previously been developed for qualified urban uses.
(2) No parcel within the site has been created within the past 10 years unless the parcel was created as a result of the plan of a redevelopment agency.
(b) The site has been previously developed for qualified urban uses.
(Amended by Stats. 2008, Ch. 728, Sec. 13. Effective January 1, 2009.)

21062.

"Local agency" means any public agency other than a state agency, board, or commission. For purposes of this division a redevelopment agency and a local agency formation commission are local agencies, and neither is a state agency, board, or commission.
(Amended by Stats. 1975, Ch. 222.)

21063.

"Public agency" includes any state agency, board, or commission, any county, city and county, city, regional agency, public district, redevelopment agency, or other political subdivision.
(Added by Stats. 1972, Ch. 1154.)

21064.

"Negative declaration" means a written statement briefly describing the reasons that a proposed project will not have a significant effect on the environment and does not require the preparation of an environmental impact report.
(Added by Stats. 1976, Ch. 1312.)

21064.3.

"Major transit stop" means a site containing an existing rail transit station, a ferry terminal served by either a bus or rail transit service, or the intersection of two or more major bus routes with a frequency of service interval of 15 minutes or less during the morning and afternoon peak commute periods.
(Added by Stats. 2002, Ch. 1039, Sec. 3. Effective January 1, 2003.)

21064.5.

"Mitigated negative declaration" means a negative declaration prepared for a project when the initial study has identified potentially significant effects on the environment, but (1) revisions in the project plans or proposals made by, or agreed to by, the applicant before the proposed negative declaration and initial study are released for public review would avoid the effects or mitigate the effects to a point where clearly no significant effect on the environment would occur, and (2) there is no substantial evidence in light of the whole record before the public agency that the project, as revised, may have a significant effect on the environment.
(Amended by Stats. 1994, Ch. 1230, Sec. 3. Effective September 30, 1994.)

21065.

"Project" means an activity which may cause either a direct physical change in the environment, or a reasonably foreseeable indirect physical change in the environment, and which is any of the following:
(a) An activity directly undertaken by any public agency.
(b) An activity undertaken by a person which is supported, in whole or in part, through contracts, grants, subsidies, loans, or other forms of assistance from one or more public agencies.
(c) An activity that involves the issuance to a person of a lease, permit, license, certificate, or other entitlement for use by one or more public agencies.
(Amended by Stats. 1994, Ch. 1230, Sec. 4. Effective September 30, 1994.)

21065.3.

"Project-specific effect" means all the direct or indirect environmental effects of a project other than cumulative effects and growth-inducing effects.
(Added by Stats. 2002, Ch. 1039, Sec. 4. Effective January 1, 2003.)

21065.5.

“Geothermal exploratory project” means a project as defined in Section 21065 composed of not more than six wells and associated drilling and testing equipment, whose chief and original purpose is to evaluate the presence and characteristics of geothermal resources prior to commencement of a geothermal field development project as defined in Section 65928.5 of the Government Code. Wells included within a geothermal exploratory project must be located at least one-half mile from geothermal development wells which are capable of producing geothermal resources in commercial quantities.
(Added by Stats. 1978, Ch. 1271.)

21066.

“Person” includes any person, firm, association, organization, partnership, business, trust, corporation, limited liability company, company, district, county, city and county, city, town, the state, and any of the agencies and political subdivisions of those entities, and, to the extent permitted by federal law, the United States, or any of its agencies or political subdivisions.
(Amended by Stats. 1998, Ch. 272, Sec. 3. Effective January 1, 1999.)

21067.

“Lead agency” means the public agency which has the principal responsibility for carrying out or approving a project which may have a significant effect upon the environment.
(Added by Stats. 1972, Ch. 1154.)

21068.

“Significant effect on the environment” means a substantial, or potentially substantial, adverse change in the environment.
(Added by Stats. 1976, Ch. 1312.)

21068.5.

“Tiering” or “tier” means the coverage of general matters and environmental effects in an environmental impact report prepared for a policy, plan, program or ordinance followed by narrower or site-specific environmental impact reports which incorporate by reference the discussion in any prior environmental impact report and which concentrate on the environmental effects which (a) are capable of being mitigated, or (b) were not analyzed as significant effects on the environment in the prior environmental impact report.
(Added by Stats. 1983, Ch. 967, Sec. 1.)

21069.

“Responsible agency” means a public agency, other than the lead agency, which has responsibility for carrying out or approving a project.
(Added by Stats. 1976, Ch. 1312.)

21070.

“Trustee agency” means a state agency that has jurisdiction by law over natural resources affected by a project, that are held in trust for the people of the State of California.
(Added by Stats. 2004, Ch. 744, Sec. 1. Effective January 1, 2005.)

21071.

“Urbanized area” means either of the following:
(a) An incorporated city that meets either of the following criteria:
(1) Has a population of at least 100,000 persons.
(2) Has a population of less than 100,000 persons if the population of that city and not more than two contiguous incorporated cities combined equals at least 100,000 persons.
(b) An unincorporated area that satisfies the criteria in both paragraph (1) and (2) of the following criteria:
(1) Is either of the following:
(A) Completely surrounded by one or more incorporated cities, and both of the following criteria are met:
(i) The population of the unincorporated area and the population of the surrounding incorporated city or cities equals not less than 100,000 persons.
(ii) The population density of the unincorporated area at least equals the population density of the surrounding city or cities.
(B) Located within an urban growth boundary and has an existing residential population of at least 5,000 persons per square mile. For purposes of this subparagraph, an “urban growth boundary” means a provision of a locally adopted general plan that allows urban uses on one side of the boundary and prohibits urban uses on the other side.
(2) The board of supervisors with jurisdiction over the unincorporated area has previously taken both of the following actions:
(A) Issued a finding that the general plan, zoning ordinance, and related policies and programs applicable to the unincorporated area are consistent with principles that encourage compact development in a manner that does both of the following:
(i) Promotes efficient transportation systems, economic growth, affordable housing, energy efficiency, and an appropriate balance of jobs and housing.
(ii) Protects the environment, open space, and agricultural areas.
(B) Submitted a draft finding to the Office of Planning and Research at least 30 days prior to issuing a final finding, and allowed the office 30 days to submit comments on the draft findings to the board of supervisors.
(Added by Stats. 2002, Ch. 1039, Sec. 5. Effective January 1, 2003.)

21072.

"Qualified urban use" means any residential, commercial, public institutional, transit or transportation passenger facility, or retail use, or any combination of those uses.
(Added by Stats. 2002, Ch. 1039, Sec. 6. Effective January 1, 2003.)

21073.

"California Native American tribe" means a Native American tribe located in California that is on the contact list maintained by the Native American Heritage Commission for the purposes of Chapter 905 of the Statutes of 2004.
(Added by Stats. 2014, Ch. 532, Sec. 3. Effective January 1, 2015.)

21074.

(a) "Tribal cultural resources" are either of the following:
(1) Sites, features, places, cultural landscapes, sacred places, and objects with cultural value to a California Native American tribe that are either of the following:
(A) Included or determined to be eligible for inclusion in the California Register of Historical Resources.
(B) Included in a local register of historical resources as defined in subdivision (k) of Section 5020.1.
(2) A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Section 5024.1. In applying the criteria set forth in subdivision (c) of Section 5024.1 for the purposes of this paragraph, the lead agency shall consider the significance of the resource to a California Native American tribe.
(b) A cultural landscape that meets the criteria of subdivision (a) is a tribal cultural resource to the extent that the landscape is geographically defined in terms of the size and scope of the landscape.
(c) A historical resource described in Section 21084.1, a unique archaeological resource as defined in subdivision (g) of Section 21083.2, or a "nonunique archaeological resource" as defined in subdivision (h) of Section 21083.2 may also be a tribal cultural resource if it conforms with the criteria of subdivision (a).
(Added by Stats. 2014, Ch. 532, Sec. 4. Effective January 1, 2015.)

CHAPTER 2.6. General [21080 - 21098]
(Chapter 2.6 added by Stats. 1972, Ch. 1154.)

21080.

(a) Except as otherwise provided in this division, this division shall apply to discretionary projects proposed to be carried out or approved by public agencies, including, but not limited to, the enactment and amendment of zoning ordinances, the issuance of zoning variances, the issuance of conditional use permits, and the

approval of tentative subdivision maps unless the project is exempt from this division.
(b) This division does not apply to any of the following activities:
(1) Ministerial projects proposed to be carried out or approved by public agencies.
(2) Emergency repairs to public service facilities necessary to maintain service.
(3) Projects undertaken, carried out, or approved by a public agency to maintain, repair, restore, demolish, or replace property or facilities damaged or destroyed as a result of a disaster in a disaster-stricken area in which a state of emergency has been proclaimed by the Governor pursuant to Chapter 7 (commencing with Section 8550) of Division 1 of Title 2 of the Government Code.
(4) Specific actions necessary to prevent or mitigate an emergency.
(5) Projects which a public agency rejects or disapproves.
(6) Actions undertaken by a public agency relating to any thermal powerplant site or facility, including the expenditure, obligation, or encumbrance of funds by a public agency for planning, engineering, or design purposes, or for the conditional sale or purchase of equipment, fuel, water (except groundwater), steam, or power for a thermal powerplant, if the powerplant site and related facility will be the subject of an environmental impact report, negative declaration, or other document, prepared pursuant to a regulatory program certified pursuant to Section 21080.5, which will be prepared by the State Energy Resources Conservation and Development Commission, by the Public Utilities Commission, or by the city or county in which the powerplant and related facility would be located if the environmental impact report, negative declaration, or document includes the environmental impact, if any, of the action described in this paragraph.
(7) Activities or approvals necessary to the bidding for, hosting or staging of, and funding or carrying out of, an Olympic games under the authority of the International Olympic Committee, except for the construction of facilities necessary for the Olympic games.
(8) The establishment, modification, structuring, restructuring, or approval of rates, tolls, fares, or other charges by public agencies which the public agency finds are for the purpose of (A) meeting operating expenses, including employee wage rates and fringe benefits, (B) purchasing or leasing supplies, equipment, or materials, (C) meeting financial reserve needs and requirements, (D) obtaining funds for capital projects necessary to maintain service within existing service areas, or (E) obtaining funds necessary to maintain those intracity transfers as are authorized by city charter. The public agency shall incorporate written findings in the record of any proceeding in which an exemption under this paragraph is claimed setting forth with specificity the basis for the claim of exemption.
(9) All classes of projects designated pursuant to Section 21084.
(10) A project for the institution or increase of passenger or commuter services on rail or highway rights-of-way already in use, including modernization of existing stations and parking facilities. For purposes of this paragraph, “highway” shall have the same meaning as defined in Section 360 of the Vehicle Code.
(11) A project for the institution or increase of passenger or commuter service on high-occupancy vehicle lanes already in use, including the modernization of existing stations and parking facilities.

(12) Facility extensions not to exceed four miles in length which are required for the transfer of passengers from or to exclusive public mass transit guideway or busway public transit services.
(13) A project for the development of a regional transportation improvement program, the state transportation improvement program, or a congestion management program prepared pursuant to Section 65089 of the Government Code.
(14) Any project or portion thereof located in another state which will be subject to environmental impact review pursuant to the National Environmental Policy Act of 1969 (42 U.S.C. Sec. 4321 et seq.) or similar state laws of that state. Any emissions or discharges that would have a significant effect on the environment in this state are subject to this division.
(15) Projects undertaken by a local agency to implement a rule or regulation imposed by a state agency, board, or commission under a certified regulatory program pursuant to Section 21080.5. Any site-specific effect of the project which was not analyzed as a significant effect on the environment in the plan or other written documentation required by Section 21080.5 is subject to this division.
(c) If a lead agency determines that a proposed project, not otherwise exempt from this division, would not have a significant effect on the environment, the lead agency shall adopt a negative declaration to that effect. The negative declaration shall be prepared for the proposed project in either of the following circumstances:
(1) There is no substantial evidence, in light of the whole record before the lead agency, that the project may have a significant effect on the environment.
(2) An initial study identifies potentially significant effects on the environment, but (A) revisions in the project plans or proposals made by, or agreed to by, the applicant before the proposed negative declaration and initial study are released for public review would avoid the effects or mitigate the effects to a point where clearly no significant effect on the environment would occur, and (B) there is no substantial evidence, in light of the whole record before the lead agency, that the project, as revised, may have a significant effect on the environment.
(d) If there is substantial evidence, in light of the whole record before the lead agency, that the project may have a significant effect on the environment, an environmental impact report shall be prepared.
(e) (1) For the purposes of this section and this division, substantial evidence includes fact, a reasonable assumption predicated upon fact, or expert opinion supported by fact.
(2) Substantial evidence is not argument, speculation, unsubstantiated opinion or narrative, evidence that is clearly inaccurate or erroneous, or evidence of social or economic impacts that do not contribute to, or are not caused by, physical impacts on the environment.
(f) As a result of the public review process for a mitigated negative declaration, including administrative decisions and public hearings, the lead agency may conclude that certain mitigation measures identified pursuant to paragraph (2) of subdivision (c) are infeasible or otherwise undesirable. In those circumstances, the lead agency, prior to approving the project, may delete those mitigation measures and substitute for them other mitigation measures that the lead agency finds, after holding a public hearing on the matter, are equivalent or more effective in mitigating significant effects on the environment to a less than significant level and

that do not cause any potentially significant effect on the environment. If those new mitigation measures are made conditions of project approval or are otherwise made part of the project approval, the deletion of the former measures and the substitution of the new mitigation measures shall not constitute an action or circumstance requiring recirculation of the mitigated negative declaration.
(g) Nothing in this section shall preclude a project applicant or any other person from challenging, in an administrative or judicial proceeding, the legality of a condition of project approval imposed by the lead agency. If, however, any condition of project approval set aside by either an administrative body or court was necessary to avoid or lessen the likelihood of the occurrence of a significant effect on the environment, the lead agency's approval of the negative declaration and project shall be invalid and a new environmental review process shall be conducted before the project can be reapproved, unless the lead agency substitutes a new condition that the lead agency finds, after holding a public hearing on the matter, is equivalent to, or more effective in, lessening or avoiding significant effects on the environment and that does not cause any potentially significant effect on the environment.
(Amended by Stats. 2013, Ch. 523, Sec. 1. Effective January 1, 2014.)

21080.01.

This division shall not apply to any activity or approval necessary for the reopening and operation of the California Men's Colony West Facility in San Luis Obispo County.
(Added by Stats. 1983, Ch. 958, Sec. 6.5. Effective September 20, 1983.)

21080.02.

This division shall not apply to any activity or approval necessary for or incidental to planning, design, site acquisition, construction, operation, or maintenance of the new prison facility at or in the vicinity of Corcoran in Kings County as authorized by the act that enacted this section.
(Added by Stats. 1985, Ch. 931, Sec. 3. Effective September 25, 1985.)

21080.03.

This division shall not apply to any activity or approval necessary for or incidental to the location, development, construction, operation, or maintenance of the prison in the County of Kings, authorized by Section 9 of Chapter 958 of the Statutes of 1983, as amended, and of the prison in the County of Amador (Ione), authorized by Chapter 957 of the Statutes of 1983, as amended.
(Added by Stats. 1985, Ch. 931, Sec. 4. Effective September 25, 1985.)

21080.04.

(a) Notwithstanding paragraph (10) of subdivision (b) of Section 21080, this division applies to a project for the institution of passenger rail service on a line paralleling State Highway 29 and running from Rocktram to Krug in the Napa Valley. With respect to that project, and for the purposes of this division, the Public Utilities Commission is the lead agency.
(b) It is the intent of the Legislature in enacting this section to abrogate the decision of the California Supreme Court "that Section 21080, subdivision (b)(11), exempts Wine Train's institution of passenger service on the Rocktram-Krug line from the requirements of CEQA" in Napa Valley Wine Train, Inc. v. Public Utilities Com., 50 Cal. 3d 370.
(c) Nothing in this section is intended to affect or apply to, or to confer jurisdiction upon the Public Utilities Commission with respect to, any other project involving rail service.
(Amended by Stats. 1995, Ch. 91, Sec. 142. Effective January 1, 1996.)

21080.05.

This division does not apply to a project by a public agency to lease or purchase the rail right-of-way used for the San Francisco Peninsula commute service between San Francisco and San Jose, together with all branch and spur lines, including the Dumbarton and Vasona lines.
(Added by Stats. 1989, Ch. 1283, Sec. 2.)

21080.07.

This division shall not apply to any activity or approval necessary for or incidental to planning, design, site acquisition, construction, operation, or maintenance of the new prison facilities located in any of the following places:
(a) The County of Riverside.
(b) The County of Del Norte.
(Added by Stats. 1985, Ch. 933, Sec. 2.6. Effective September 25, 1985.)

21080.09.

(a) For purposes of this section, the following definitions apply:
(1) "Public higher education" has the same meaning as specified in Section 66010 of the Education Code.
(2) "Long range development plan" means a physical development and land use plan to meet the academic and institutional objectives for a particular campus or medical center of public higher education.
(b) The selection of a location for a particular campus and the approval of a long range development plan are subject to this division and require the preparation of an environmental impact report. Environmental effects relating to changes in enrollment levels shall be considered for each campus or medical center of public higher education in the environmental impact report prepared for the long range development plan for the campus or medical center.

(c) The approval of a project on a particular campus or medical center of public higher education is subject to this division and may be addressed, subject to the other provisions of this division, in a tiered environmental analysis based upon a long range development plan environmental impact report.
(d) Compliance with this section satisfies the obligations of public higher education pursuant to this division to consider the environmental impact of academic and enrollment plans as they affect campuses or medical centers, provided that any such plans shall become effective for a campus or medical center only after the environmental effects of those plans have been analyzed as required by this division in a long range development plan environmental impact report or tiered analysis based upon that environmental impact report for that campus or medical center, and addressed as required by this division.
(Added by Stats. 1989, Ch. 659, Sec. 1.)

21080.1.

(a) The lead agency shall be responsible for determining whether an environmental impact report, a negative declaration, or a mitigated negative declaration shall be required for any project which is subject to this division. That determination shall be final and conclusive on all persons, including responsible agencies, unless challenged as provided in Section 21167.
(b) In the case of a project described in subdivision (c) of Section 21065, the lead agency shall, upon the request of a potential applicant, provide for consultation prior to the filing of the application regarding the range of actions, potential alternatives, mitigation measures, and any potential and significant effects on the environment of the project.
(Amended by Stats. 1994, Ch. 1230, Sec. 6. Effective September 30, 1994.)

21080.2.

In the case of a project described in subdivision (c) of Section 21065, the determination required by Section 21080.1 shall be made within 30 days from the date on which an application for a project has been received and accepted as complete by the lead agency. This period may be extended 15 days upon the consent of the lead agency and the project applicant.
(Amended by Stats. 1984, Ch. 586, Sec. 1.)

21080.3.

(a) Prior to determining whether a negative declaration or environmental impact report is required for a project, the lead agency shall consult with all responsible agencies and trustee agencies. Prior to that required consultation, the lead agency may informally contact any of those agencies.
(b) In order to expedite the requirements of subdivision (a), the Office of Planning and Research, upon request of a lead agency, shall assist the lead agency in determining the various responsible agencies and trustee agencies, for a proposed

project. In the case of a project described in subdivision (c) of Section 21065, the request may also be made by the project applicant.
(Amended by Stats. 2004, Ch. 744, Sec. 2. Effective January 1, 2005.)

21080.3.1.

(a) The Legislature finds and declares that California Native American tribes traditionally and culturally affiliated with a geographic area may have expertise concerning their tribal cultural resources.
(b) Prior to the release of a negative declaration, mitigated negative declaration, or environmental impact report for a project, the lead agency shall begin consultation with a California Native American tribe that is traditionally and culturally affiliated with the geographic area of the proposed project if: (1) the California Native American tribe requested to the lead agency, in writing, to be informed by the lead agency through formal notification of proposed projects in the geographic area that is traditionally and culturally affiliated with the tribe, and (2) the California Native American tribe responds, in writing, within 30 days of receipt of the formal notification, and requests the consultation. When responding to the lead agency, the California Native American tribe shall designate a lead contact person. If the California Native American tribe does not designate a lead contact person, or designates multiple lead contact people, the lead agency shall defer to the individual listed on the contact list maintained by the Native American Heritage Commission for the purposes of Chapter 905 of the Statutes of 2004. For purposes of this section and Section 21080.3.2, “consultation” shall have the same meaning as provided in Section 65352.4 of the Government Code.
(c) To expedite the requirements of this section, the Native American Heritage Commission shall assist the lead agency in identifying the California Native American tribes that are traditionally and culturally affiliated with the project area.
(d) Within 14 days of determining that an application for a project is complete or a decision by a public agency to undertake a project, the lead agency shall provide formal notification to the designated contact of, or a tribal representative of, traditionally and culturally affiliated California Native American tribes that have requested notice, which shall be accomplished by means of at least one written notification that includes a brief description of the proposed project and its location, the lead agency contact information, and a notification that the California Native American tribe has 30 days to request consultation pursuant to this section.
(e) The lead agency shall begin the consultation process within 30 days of receiving a California Native American tribe’s request for consultation.
(Added by Stats. 2014, Ch. 532, Sec. 5. Effective January 1, 2015.)

21080.3.2.

(a) As a part of the consultation pursuant to Section 21080.3.1, the parties may propose mitigation measures, including, but not limited to, those recommended in Section 21084.3, capable of avoiding or substantially lessening potential significant impacts to a tribal cultural resource or alternatives that would avoid significant impacts to a tribal cultural resource. If the California Native American tribe requests

consultation regarding alternatives to the project, recommended mitigation measures, or significant effects, the consultation shall include those topics. The consultation may include discussion concerning the type of environmental review necessary, the significance of tribal cultural resources, the significance of the project's impacts on the tribal cultural resources, and, if necessary, project alternatives or the appropriate measures for preservation or mitigation that the California Native American tribe may recommended to the lead agency.
(b) The consultation shall be considered concluded when either of the following occurs:
(1) The parties agree to measures to mitigate or avoid a significant effect, if a significant effect exists, on a tribal cultural resource.
(2) A party, acting in good faith and after reasonable effort, concludes that mutual agreement cannot be reached.
(c) (1) This section does not limit the ability of a California Native American tribe or the public to submit information to the lead agency regarding the significance of the tribal cultural resources, the significance of the project's impact on tribal cultural resources, or any appropriate measures to mitigate the impact.
(2) This section does not limit the ability of the lead agency or project proponent to incorporate changes and additions to the project as a result of the consultation, even if not legally required.
(d) If the project proponent or its consultants participate in the consultation, those parties shall respect the principles set forth in this section.
(Added by Stats. 2014, Ch. 532, Sec. 6. Effective January 1, 2015.)

21080.4.

(a) If a lead agency determines that an environmental impact report is required for a project, the lead agency shall immediately send notice of that determination by certified mail or an equivalent procedure to each responsible agency, the Office of Planning and Research, and those public agencies having jurisdiction by law over natural resources affected by the project that are held in trust for the people of the State of California. Upon receipt of the notice, each responsible agency, the office, and each public agency having jurisdiction by law over natural resources affected by the project that are held in trust for the people of the State of California shall specify to the lead agency the scope and content of the environmental information that is germane to the statutory responsibilities of that responsible agency, the office, or the public agency in connection with the proposed project and which, pursuant to the requirements of this division, shall be included in the environmental impact report. The information shall be specified in writing and shall be communicated to the lead agency by certified mail or equivalent procedure not later than 30 days after the date of receipt of the notice of the lead agency's determination. The lead agency shall request similar guidance from appropriate federal agencies.
(b) To expedite the requirements of subdivision (a), the lead agency, any responsible agency, the Office of Planning and Research, or a public agency having jurisdiction by law over natural resources affected by the project that are held in trust for the people of the State of California, may request one or more meetings

between representatives of those agencies and the office for the purpose of assisting the lead agency to determine the scope and content of the environmental information that any of those responsible agencies, the office, or the public agencies may require. In the case of a project described in subdivision (c) of Section 21065, the request may also be made by the project applicant. The meetings shall be convened by the lead agency as soon as possible, but not later than 30 days after the date that the meeting was requested.
(c) To expedite the requirements of subdivision (a), the Office of Planning and Research, upon request of a lead agency, shall assist the lead agency in determining the various responsible agencies, public agencies having jurisdiction by law over natural resources affected by the project that are held in trust for the people of the State of California, and any federal agencies that have responsibility for carrying out or approving a proposed project. In the case of a project described in subdivision (c) of Section 21065, that request may also be made by the project applicant.
(d) With respect to the Department of Transportation, and with respect to any state agency that is a responsible agency or a public agency having jurisdiction by law over natural resources affected by the project that are held in trust for the people of the State of California, subject to the requirements of subdivision (a), the Office of Planning and Research shall ensure that the information required by subdivision (a) is transmitted to the lead agency, and that affected agencies are notified regarding meetings to be held upon request pursuant to subdivision (b), within the required time period.
(Amended by Stats. 2000, Ch. 738, Sec. 1. Effective January 1, 2001.)

21080.5.

(a) Except as provided in Section 21158.1, when the regulatory program of a state agency requires a plan or other written documentation containing environmental information and complying with paragraph (3) of subdivision (d) to be submitted in support of an activity listed in subdivision (b), the plan or other written documentation may be submitted in lieu of the environmental impact report required by this division if the Secretary of the Resources Agency has certified the regulatory program pursuant to this section.
(b) This section applies only to regulatory programs or portions thereof that involve either of the following:
(1) The issuance to a person of a lease, permit, license, certificate, or other entitlement for use.
(2) The adoption or approval of standards, rules, regulations, or plans for use in the regulatory program.
(c) A regulatory program certified pursuant to this section is exempt from Chapter 3 (commencing with Section 21100), Chapter 4 (commencing with Section 21150), and Section 21167, except as provided in Article 2 (commencing with Section 21157) of Chapter 4.5.
(d) To qualify for certification pursuant to this section, a regulatory program shall require the utilization of an interdisciplinary approach that will ensure the

integrated use of the natural and social sciences in decisionmaking and that shall meet all of the following criteria:
(1) The enabling legislation of the regulatory program does both of the following:
(A) Includes protection of the environment among its principal purposes.
(B) Contains authority for the administering agency to adopt rules and regulations for the protection of the environment, guided by standards set forth in the enabling legislation.
(2) The rules and regulations adopted by the administering agency for the regulatory program do all of the following:
(A) Require that an activity will not be approved or adopted as proposed if there are feasible alternatives or feasible mitigation measures available that would substantially lessen a significant adverse effect that the activity may have on the environment.
(B) Include guidelines for the orderly evaluation of proposed activities and the preparation of the plan or other written documentation in a manner consistent with the environmental protection purposes of the regulatory program.
(C) Require the administering agency to consult with all public agencies that have jurisdiction, by law, with respect to the proposed activity.
(D) Require that final action on the proposed activity include the written responses of the issuing authority to significant environmental points raised during the evaluation process.
(E) Require the filing of a notice of the decision by the administering agency on the proposed activity with the Secretary of the Resources Agency. Those notices shall be available for public inspection, and a list of the notices shall be posted on a weekly basis in the Office of the Resources Agency. Each list shall remain posted for a period of 30 days.
(F) Require notice of the filing of the plan or other written documentation to be made to the public and to a person who requests, in writing, notification. The notification shall be made in a manner that will provide the public or a person requesting notification with sufficient time to review and comment on the filing.
(3) The plan or other written documentation required by the regulatory program does both of the following:
(A) Includes a description of the proposed activity with alternatives to the activity, and mitigation measures to minimize any significant adverse effect on the environment of the activity.
(B) Is available for a reasonable time for review and comment by other public agencies and the general public.
(e) (1) The Secretary of the Resources Agency shall certify a regulatory program that the secretary determines meets all the qualifications for certification set forth in this section, and withdraw certification on determination that the regulatory program has been altered so that it no longer meets those qualifications. Certification and withdrawal of certification shall occur only after compliance with Chapter 3.5 (commencing with Section 11340) of Part 1 of Division 3 of Title 2 of the Government Code.
(2) In determining whether or not a regulatory program meets the qualifications for certification set forth in this section, the inquiry of the secretary shall extend only to the question of whether the regulatory program meets the generic requirements of subdivision (d). The inquiry may not extend to individual decisions to be reached

under the regulatory program, including the nature of specific alternatives or mitigation measures that might be proposed to lessen any significant adverse effect on the environment of the activity.
(3) If the secretary determines that the regulatory program submitted for certification does not meet the qualifications for certification set forth in this section, the secretary shall adopt findings setting forth the reasons for the determination.
(f) After a regulatory program has been certified pursuant to this section, a proposed change in the program that could affect compliance with the qualifications for certification specified in subdivision (d) may be submitted to the Secretary of the Resources Agency for review and comment. The scope of the secretary's review shall extend only to the question of whether the regulatory program meets the generic requirements of subdivision (d). The review may not extend to individual decisions to be reached under the regulatory program, including specific alternatives or mitigation measures that might be proposed to lessen any significant adverse effect on the environment of the activity. The secretary shall have 30 days from the date of receipt of the proposed change to notify the state agency whether the proposed change will alter the regulatory program so that it no longer meets the qualification for certification established in this section and will result in a withdrawal of certification as provided in this section.
(g) An action or proceeding to attack, review, set aside, void, or annul a determination or decision of a state agency approving or adopting a proposed activity under a regulatory program that has been certified pursuant to this section on the basis that the plan or other written documentation prepared pursuant to paragraph (3) of subdivision (d) does not comply with this section shall be commenced not later than 30 days from the date of the filing of notice of the approval or adoption of the activity.
(h) (1) An action or proceeding to attack, review, set aside, void, or annul a determination of the Secretary of the Resources Agency to certify a regulatory program pursuant to this section on the basis that the regulatory program does not comply with this section shall be commenced within 30 days from the date of certification by the secretary.
(2) In an action brought pursuant to paragraph (1), the inquiry shall extend only to whether there was a prejudicial abuse of discretion by the secretary. Abuse of discretion is established if the secretary has not proceeded in a manner required by law or if the determination is not supported by substantial evidence.
(i) For purposes of this section, a county agricultural commissioner is a state agency.
(j) For purposes of this section, an air quality management district or air pollution control district is a state agency, except that the approval, if any, by a district of a nonattainment area plan is subject to this section only if, and to the extent that, the approval adopts or amends rules or regulations.
(k) (1) The secretary, by July 1, 2004, shall develop a protocol for reviewing the prospective application of certified regulatory programs to evaluate the consistency of those programs with the requirements of this division. Following the completion of the development of the protocol, the secretary shall provide a report to the Senate Committee on Environmental Quality and the Assembly Committee on Natural Resources regarding the need for a grant of additional statutory authority

authorizing the secretary to undertake a review of the certified regulatory programs.
(2) The secretary may update the protocol, and may update the report provided to the legislative committees pursuant to paragraph (1) and provide, in compliance with Section 9795 of the Government Code, the updated report to those committees if additional statutory authority is needed.
(3) The secretary shall provide a significant opportunity for public participation in developing or updating the protocol described in paragraph (1) or (2), including, but not limited to, at least two public meetings with interested parties. A notice of each meeting shall be provided at least 10 days prior to the meeting to a person who files a written request for a notice with the agency and to the Senate Committee on Environmental Quality and the Assembly Committee on Natural Resources.
(Amended by Stats. 2013, Ch. 76, Sec. 174. Effective January 1, 2014.)

21080.8.

This division does not apply to the conversion of an existing rental mobilehome park to a resident initiated subdivision, cooperative, or condominium for mobilehomes if the conversion will not result in an expansion of or change in existing use of the property.
(Added by Stats. 1990, Ch. 272, Sec. 1. Effective July 17, 1990.)

21080.9.

This division shall not apply to activities and approvals by any local government, as defined in Section 30109, or any state university or college, as defined in Section 30119, as necessary for the preparation and adoption of a local coastal program or long-range land use development plan pursuant to Division 20 (commencing with Section 30000); provided, however, that certification of a local coastal program or long-range land use development plan by the California Coastal Commission pursuant to Chapter 6 (commencing with Section 30500) of Division 20 shall be subject to the requirements of this division. For the purpose of Section 21080.5, a certified local coastal program or long-range land use development plan constitutes a plan for use in the California Coastal Commission's regulatory program.
(Amended by Stats. 1979, Ch. 961.)

21080.10.

This division does not apply to any of the following:
(a) An extension of time, granted pursuant to Section 65361 of the Government Code, for the preparation and adoption of one or more elements of a city or county general plan.
(b) Actions taken by the Department of Housing and Community Development or the California Housing Finance Agency to provide financial assistance or insurance for the development and construction of residential housing for persons and families

of low or moderate income, as defined in Section 50093 of the Health and Safety Code, if the project that is the subject of the application for financial assistance or insurance will be reviewed pursuant to this division by another public agency.
(Amended by Stats. 2002, Ch. 1039, Sec. 8. Effective January 1, 2003.)

21080.11.

This division shall not apply to settlements of title and boundary problems by the State Lands Commission and to exchanges or leases in connection with those settlements.
(Added by Stats. 1982, Ch. 1463, Sec. 6.)

21080.13.

(a) This division shall not apply to any railroad grade separation project that eliminates an existing grade crossing or that reconstructs an existing grade separation.
(b) (1) Whenever a state agency determines that a project is not subject to this division pursuant to this section, and it approves or determines to carry out the project, the state agency shall file a notice with the Office of Planning and Research in the manner specified in subdivisions (b) and (c) of Section 21108.
(2) Whenever a local agency determines that a project is not subject to this division pursuant to this section, and it approves or determines to carry out the project, the local agency shall file a notice with the Office of Planning and Research and with the county clerk in each county in which the project will be located in the manner specified in subdivisions (b) and (c) of Section 21152.
(Amended by Stats. 2015, Ch. 143, Sec. 1. Effective January 1, 2016.)

21080.14.

(a) This division does not apply to the closure of a railroad grade crossing by order of the Public Utilities Commission, pursuant to the commission's authority under Chapter 6 (commencing with Section 1201) of Part 1 of Division 1 of the Public Utilities Code, if the commission finds the crossing to present a threat to public safety.
(b) This section shall not apply to any crossing for high-speed rail, as defined in subdivision (c) of Section 185012 of the Public Utilities Code, or any crossing for any project carried out by the High-Speed Rail Authority, as described in Section 185020 of the Public Utilities Code, or a successor agency.
(c) (1) Whenever a state agency determines that a project is not subject to this division pursuant to this section, and it approves or determines to carry out the project, the state agency shall file a notice with the Office of Planning and Research in the manner specified in subdivisions (b) and (c) of Section 21108.
(2) Whenever a local agency determines that a project is not subject to this division pursuant to this section, and it approves or determines to carry out the project, the local agency shall file a notice with the Office of Planning and Research and with the

county clerk in each county in which the project will be located in the manner specified in subdivisions (b) and (c) of Section 21152.
(d) This section shall remain in effect only until January 1, 2019, and as of that date is repealed, unless a later enacted statute, that is enacted before January 1, 2019, deletes or extends that date.
(Amended by Stats. 2015, Ch. 143, Sec. 2. Effective January 1, 2016. Repealed as of January 1, 2019, by its own provisions.)

21080.17.

This division does not apply to the adoption of an ordinance by a city or county to implement the provisions of Section 65852.1 or Section 65852.2 of the Government Code.
(Added by Stats. 1983, Ch. 1013, Sec. 10. Effective September 22, 1983.)

21080.18.

This division does not apply to the closing of any public school in which kindergarten or any of grades 1 through 12 is maintained or the transfer of students from that public school to another school if the only physical changes involved are categorically exempt under Chapter 3 (commencing with Section 15000) of Division 6 of Title 14 of the California Administrative Code.
(Amended by Stats. 1986, Ch. 1316, Sec. 1.)

21080.19.

This division does not apply to a project for restriping of streets or highways to relieve traffic congestion.
(Added by Stats. 1984, Ch. 750, Sec. 1.)

21080.20.

(a) This division does not apply to a bicycle transportation plan prepared pursuant to Section 891.2 of the Streets and Highways Code for an urbanized area for restriping of streets and highways, bicycle parking and storage, signal timing to improve street and highway intersection operations, and related signage for bicycles, pedestrians, and vehicles.
(b) Prior to determining that a project is exempt pursuant to this section, the lead agency shall do both of the following:
(1) Hold noticed public hearings in areas affected by the bicycle transportation plan to hear and respond to public comments. Publication of the notice shall be no fewer times than required by Section 6061 of the Government Code, by the public agency in a newspaper of general circulation in the area affected by the proposed project. If more than one area will be affected, the notice shall be published in the newspaper of largest circulation from among the newspapers of general circulation in those areas.

(2) Prepare an assessment of any traffic and safety impacts of the project and include measures in the bicycle transportation plan to mitigate potential vehicular traffic impacts and bicycle and pedestrian safety impacts.
(c) If a local agency determines that a project is not subject to this division pursuant to this section, and it determines to approve or carry out that project, the notice shall be filed with the Office of Planning and Research and the county clerk in the county in which the project is located in the manner specified in subdivisions (b) and (c) of Section 21152.
(d) This section shall remain in effect only until January 1, 2018, and as of that date is repealed, unless a later enacted statute, that is enacted before January 1, 2018, deletes or extends that date.
(Added by Stats. 2013, Ch. 613, Sec. 1. Effective January 1, 2014.)

21080.20.5.

(a) This division does not apply to a project that consists of the restriping of streets and highways for bicycle lanes in an urbanized area that is consistent with a bicycle transportation plan prepared pursuant to Section 891.2 of the Streets and Highways Code.
(b) Prior to determining that a project is exempt pursuant to this section, the lead agency shall do both of the following:
(1) (A) Prepare an assessment of any traffic and safety impacts of the project and include measures in the project to mitigate potential vehicular traffic impacts and bicycle and pedestrian safety impacts.
(B) The requirement to prepare an assessment pursuant to subparagraph (A) shall not apply if either of the following conditions is met:
(i) Measures to mitigate these impacts are identified in an environmental impact report, negative declaration, or mitigated negative declaration prepared pursuant to this division for the bicycle transportation plan, certified or approved no more than five years prior to making the determination, the measures are included in the plan, and those measures are incorporated into the project.
(ii) An assessment was prepared pursuant to paragraph (2) of subdivision (b) of Section 21080.20 no more than five years prior to making the determination, the measures to mitigate these impacts are included in the plan, and those measures are incorporated into the project.
(2) Hold noticed public hearings in areas affected by the project to hear and respond to public comments. Publication of the notice shall be no fewer times than required by Section 6061 of the Government Code, by the public agency in a newspaper of general circulation in the area affected by the proposed project. If more than one area will be affected, the notice shall be published in the newspaper of largest circulation from among the newspapers of general circulation in those areas.
(c) (1) If a state agency determines that a project is not subject to this division pursuant to this section, and it determines to approve or carry out that project, the notice shall be filed with the Office of Planning and Research in the manner specified in subdivisions (b) and (c) of Section 21108.

(2) If a local agency determines that a project is not subject to this division pursuant to this section, and it determines to approve or carry out that project, the notice shall be filed with the Office of Planning and Research, and filed with the county clerk in the county in which the project is located in the manner specified in subdivisions (b) and (c) of Section 21152.
(d) This section shall remain in effect only until January 1, 2018, and as of that date is repealed, unless a later enacted statute, that is enacted before January 1, 2018, deletes or extends that date.
(Amended by Stats. 2013, Ch. 613, Sec. 2. Effective January 1, 2014. Repealed as of January 1, 2018, by its own provisions.)

21080.21.

(a) This division does not apply to any project of less than one mile in length within a public street or highway or any other public right-of-way for the installation of a new pipeline or the maintenance, repair, restoration, reconditioning, relocation, replacement, removal, or demolition of an existing pipeline.
(b) For purposes of this section, “pipeline” means subsurface pipelines and subsurface or surface accessories or appurtenances to a pipeline, such as mains, traps, vents, cables, conduits, vaults, valves, flanges, manholes, and meters.
(c) In determining the applicability of the exemption provided by this section to a natural gas pipeline safety enhancement activity under review by a resource agency, the resource agency shall consider only the length of pipeline that is within its legal jurisdiction.
(d) For purposes of this section, the following definitions shall apply:
(1) “Natural gas pipeline safety enhancement activity” means an activity undertaken by a public utility as part of a program to enhance the safety of intrastate natural gas pipelines in accordance with a decision, rule, or regulation adopted by the Public Utilities Commission.
(2) “Resource agency” means the State Lands Commission, the California Coastal Commission, the Department of Fish and Game, or the State Water Resources Control Board, and local or regional agencies with permitting authority under the California Coastal Act of 1976 (Division 20 (commencing with Section 30000)) or Chapter 4 (commencing with Section 13200) of Division 7 of the Water Code.
(e) This section shall remain in effect only until January 1, 2018, and as of that date is repealed, unless a later enacted statute, that is enacted before January 1, 2018, deletes or extends that date.
(Amended by Stats. 2012, Ch. 487, Sec. 2. Effective September 23, 2012. Repealed as of January 1, 2018, by its own provisions. See later operative version added by Sec. 3 of Ch. 487.)

21080.21.

(a) This division does not apply to any project of less than one mile in length within a public street or highway or any other public right-of-way for the installation of a new pipeline or the maintenance, repair, restoration, reconditioning, relocation, replacement, removal, or demolition of an existing pipeline. For purposes of this

section, “pipeline” includes subsurface facilities but does not include any surface facility related to the operation of the underground facility.
(b) This section shall become operative January 1, 2018.
(Repealed (in Sec. 2) and added by Stats. 2012, Ch. 487, Sec. 3. Effective September 23, 2012. Section operative January 1, 2018, by its own provisions.)

21080.22.

(a) This division does not apply to activities and approvals by a local government necessary for the preparation of general plan amendments pursuant to Section 29763, except that the approval of general plan amendments by the Delta Protection Commission is subject to the requirements of this division.
(b) For purposes of Section 21080.5, a general plan amendment is a plan required by the regulatory program of the Delta Protection Commission.
(Added by Stats. 1992, Ch. 898, Sec. 1. Effective January 1, 1993.)

21080.23.

(a) This division does not apply to any project which consists of the inspection, maintenance, repair, restoration, reconditioning, relocation, replacement, or removal of an existing pipeline, as defined in subdivision (a) of Section 51010.5 of the Government Code, or any valve, flange, meter, or other piece of equipment that is directly attached to the pipeline, if the project meets all of the following conditions:
(1) (A) The project is less than eight miles in length.
(B) Notwithstanding subparagraph (A), actual construction and excavation activities undertaken to achieve the maintenance, repair, restoration, reconditioning, relocation, replacement, or removal of an existing pipeline are not undertaken over a length of more than one-half mile at any one time.
(2) The project consists of a section of pipeline that is not less than eight miles from any section of pipeline that has been subject to an exemption pursuant to this section in the past 12 months.
(3) The project is not solely for the purpose of excavating soil that is contaminated by hazardous materials, and, to the extent not otherwise expressly required by law, the party undertaking the project immediately informs the lead agency of the discovery of contaminated soil.
(4) To the extent not otherwise expressly required by law, the person undertaking the project has, in advance of undertaking the project, prepared a plan that will result in notification of the appropriate agencies so that they may take action, if determined to be necessary, to provide for the emergency evacuation of members of the public who may be located in close proximity to the project.
(5) Project activities are undertaken within an existing right-of-way and the right-of-way is restored to its condition prior to the project.
(6) The project applicant agrees to comply with all conditions otherwise authorized by law, imposed by the city or county planning department as part of any local agency permit process, that are required to mitigate potential impacts of the proposed project, and to otherwise comply with the Keene-Nejedly California

Wetlands Preservation Act (Chapter 7 (commencing with Section 5810) of Division 5), the California Endangered Species Act (Chapter 1.5 (commencing with Section 2050) of Division 3 of the Fish and Game Code), and other applicable state laws, and with all applicable federal laws.
(b) If a project meets all of the requirements of subdivision (a), the person undertaking the project shall do all of the following:
(1) Notify, in writing, any affected public agency, including, but not limited to, any public agency having permit, land use, environmental, public health protection, or emergency response authority of the exemption of the project from this division by subdivision (a).
(2) Provide notice to the public in the affected area in a manner consistent with paragraph (3) of subdivision (b) of Section 21092.
(3) In the case of private rights-of-way over private property, receive from the underlying property owner permission for access to the property.
(4) Comply with all conditions otherwise authorized by law, imposed by the city or county planning department as part of any local agency permit process, that are required to mitigate potential impacts of the proposed project, and otherwise comply with the Keene-Nejedly California Wetlands Preservation Act (Chapter 7 (commencing with Section 5810) of Division 5), the California Endangered Species Act (Chapter 1.5 (commencing with Section 2050) of Division 3 of the Fish and Game Code), and other applicable state laws, and with all applicable federal laws.
(c) This section does not apply to either of the following:
(1) A project in which the diameter of the pipeline is increased.
(2) A project undertaken within the boundaries of an oil refinery.
(Amended by Stats. 2012, Ch. 548, Sec. 3. Effective January 1, 2013.)

21080.23.5.

(a) For purposes of Section 21080.23, “pipeline” also means a pipeline located in Fresno, Kern, Kings, or Tulare County, that is used to transport biogas, and meeting the requirements of Section 21080.23 and all local, state, and federal laws.
(b) For purposes of this section, “biogas” means natural gas that meets the requirements of Section 2292.5 of Title 13 of the California Code of Regulations and is derived from anaerobic digestion of dairy animal waste.
(c) This section shall remain in effect only until January 1, 2018, and as of that date is repealed, unless a later enacted statute, that is enacted before January 1, 2018, deletes or extends that date.
(Added by Stats. 2014, Ch. 534, Sec. 1. Effective January 1, 2015. Repealed as of January 1, 2018, by its own provisions.)

21080.24.

This division does not apply to the issuance, modification, amendment, or renewal of a permit by an air pollution control district or air quality management district pursuant to Title V, as defined in Section 39053.3 of the Health and Safety Code, or pursuant to a district Title V program established pursuant to Sections 42301.10, 42301.11, and 42301.12 of the Health and Safety Code, unless the issuance,

modification, amendment, or renewal authorizes a physical or operational change to a source or facility.
(Amended by Stats. 2012, Ch. 548, Sec. 4. Effective January 1, 2013.)

21080.25.

(a) For purposes of this section, the following definitions shall apply:
(1) “Antenna support structures” means lattice towers, monopoles, and roof-mounts.
(2) “Authority” means the Los Angeles Regional Interoperable Communication System Joint Powers Authority.
(3) “Habitat of significant value” includes all of the following:
(A) Wildlife habitat of national, statewide, or regional importance.
(B) Habitat identified as candidate, fully protected, sensitive, or species of special status by a state or federal agency.
(C) Habitat essential to the movement of resident or migratory wildlife.
(4) “LA-RICS” means the Los Angeles Regional Interoperable Communications System, consisting of a long-term evolution broadband mobile data system, a land mobile radio system, or both.
(5) “LMR” means a land mobile radio system.
(6) “LTE” means a long-term evolution broadband mobile data system.
(7) “Riparian area” means an area that is transitional between terrestrial and aquatic ecosystems, that is distinguished by gradients in biophysical conditions, ecological processes, and biota, and that meets the following criteria:
(A) Is an area through which surface and subsurface hydrology connect bodies of water with their adjacent uplands.
(B) Is adjacent to perennial, intermittent, and ephemeral streams, lakes, or estuarine or marine shorelines.
(C) Includes those portions of terrestrial ecosystems that significantly influence exchanges of energy and matter with aquatic ecosystems.
(8) “Wetlands” has the same meaning as defined in the United States Fish and Wildlife Service Manual, Part 660 FW 2 (June 21, 1993).
(9) “Wildlife habitat” means the ecological communities upon which wild animals, birds, plants, fish, amphibians, and invertebrates depend for their conservation and protection.
(b) Except as provided in subdivision (d), if all the criteria specified in subdivision (c) are met at the individual project site, this division does not apply to the design, site acquisition, construction, operation, or maintenance of the following elements of the LA-RICS:
(1) Antennas, including microwave dishes and arrays.
(2) Antenna support structures.
(3) Equipment enclosures.
(4) Central system switch facilities.
(5) Associated foundations and equipment.
(c) As a condition of the exemption specified in subdivision (b), all of the following criteria shall be met at the individual project site:
(1) The project site is publicly owned and already contains either of the following:

(A) An antenna support structure and either of the following components:
(i) Antennas.
(ii) Equipment enclosures.
(B) A police or sheriff station or other public facility that transmits or receives public safety radio signals, except a fire station.
(2) Construction and implementation at the project site would not have a substantial adverse impact on wetlands, riparian areas, or habitat of significant value, and would not harm any species protected by the federal Endangered Species Act of 1973 (16 U.S.C. Sec. 1531 et seq.), the Native Plant Protection Act (Chapter 10 (commencing with Section 1900) of Division 2 of the Fish and Game Code), or the California Endangered Species Act (Chapter 1.5 (commencing with Section 2050) of Division 3 of the Fish and Game Code) or the habitat of those species.
(3) Construction and implementation of the project at the site would not have a substantial adverse impact on historical resources pursuant to Section 21084.1.
(4) Operation of the project at the site would not exceed the maximum permissible exposure standards established by the Federal Communications Commission, as set forth in Sections 1.1307 and 1.1310 of Title 47 of the Code of Federal Regulations.
(5) Any new LTE antenna support structures or LMR antenna support structures would comply with applicable state and federal height restrictions and any height restrictions mandated by an applicable comprehensive land use plan adopted by an airport land use commission. The new monopoles shall not exceed 70 feet in height without appurtenances and attachments, and new lattice towers shall not exceed 180 feet in height without appurtenances and attachments.
(6) Each new central system switch is located within an existing enclosed structure at a publicly owned project site or is housed at an existing private communications facility.
(d) Subdivision (b) does not apply if the individual project site is located on either of the following:
(1) A school site.
(2) A cultural or sacred site, as described in Section 5097.9 or 5097.993.
(e) (1) Before determining that a project is not subject to this division pursuant to this section, the authority shall hold a noticed public meeting in each county supervisorial district in which the project is located to hear and respond to public comments. The notice shall be provided at least 72 hours in advance of the meeting and published no fewer times than required by Section 6061 of the Government Code by the authority in a newspaper of general circulation in each county supervisorial district in which the project is located.
(2) If the authority determines that a project is not subject to this division pursuant to this section, and it determines to approve or carry out that project, the notice of exemption shall be filed with the Office of Planning and Research and the county clerk in the county in which the project is located in the manner specified in subdivisions (b) and (c) of Section 21152. The authority shall post the notice of exemption on its Internet Web site.
(f) The authority shall post on its Internet Web site all of the following, as applicable:

(1) Draft and final environmental documentation in compliance with this division or the federal National Environmental Policy Act of 1969 (42 U.S.C. Sec. 4321 et seq.).
(2) The date of filing of notices required pursuant to this division or the federal National Environmental Policy Act of 1969.
(3) All notice and hearing information regarding review and approval of environmental documentation by federal agencies.
(g) On or after January 1, 2017, the authority and its member agencies shall approve use agreements for the LA-RICS in an open and noticed public meeting.
(h) This section shall remain in effect only until January 1, 2020, and as of that date is repealed, unless a later enacted statute, that is enacted before January 1, 2020, deletes or extends that date.
(Amended by Stats. 2016, Ch. 588, Sec. 1. Effective January 1, 2017. Repealed as of January 1, 2020, by its own provisions.)

21080.26.

This division does not apply to minor alterations to utilities made for the purposes of complying with Sections 4026.7 and 4026.8 of the Health and Safety Code or regulations adopted thereunder.
(Added by Stats. 1995, Ch. 660, Sec. 3. Effective January 1, 1996.)

21080.29.

(a) A project located in Los Angeles County that is approved by a public agency before the effective date of the act adding this section is not in violation of any requirement of this division by reason of the failure to construct a roadway across the property transferred to the state pursuant to subdivision (c) and to construct a bridge over the adjacent Ballona Channel in Los Angeles County, otherwise required as a mitigation measure pursuant to this division, if all of the following conditions apply:
(1) The improvements specified in this subdivision are not constructed, due in whole or in part, to the project owner's or developer's relinquishment of easement rights to construct those improvements.
(2) The easement rights in paragraph (1) are relinquished in connection with the State of California, acting by and through the Wildlife Conservation Board of the Department of Fish and Game, acquiring a wetlands project that is a minimum of 400 acres in size and located within the coastal zone.
(b) Where those easement rights have been relinquished, any municipal ordinance or regulation adopted by a charter city or a general law city shall be inapplicable to the extent that the ordinance or regulation requires construction of the transportation improvements specified in subdivision (a), or would otherwise require reprocessing or resubmittal of a permit or approval, including, but not limited to, a final recorded map, a vesting tentative map, or a tentative map, as a result of the transportation improvements specified in subdivision (a) not being constructed.

(c) (1) If the Wildlife Conservation Board of the Department of Fish and Game acquires property within the coastal zone that is a minimum of 400 acres in size pursuant to a purchase and sale agreement with Playa Capital Company, LLC, the Controller shall direct the trustee under the Amendment to Declaration of Trust entered into on or about December 11, 1984, by First Nationwide Savings, as trustee, Summa Corporation, as trustor, and the Controller, as beneficiary, known as the HRH Inheritance Tax Security Trust, to convey title to the trust estate of the trust, including real property commonly known as Playa Vista Area C, to the State of California acting by and through the Wildlife Conservation Board of the Department of Fish and Game for conservation, restoration, or recreation purposes only, with the right to transfer the property for those uses to any other agency of the State of California.
(2) This subdivision shall constitute the enabling legislation required by the Amendment to Declaration of Trust to empower the Controller to direct the trustee to convey title to the trust estate under the HRH Inheritance Tax Security Trust to the State of California or an agency thereof.
(3) The conveyance of the trust estate to the Wildlife Conservation Board pursuant to this subdivision shall supersede any duty or obligation imposed upon the Controller under the Probate Code or the Revenue and Taxation Code with respect to the disposition or application of the net proceeds of the trust estate.
(Added by Stats. 2003, Ch. 739, Sec. 2. Effective January 1, 2004.)

21080.32.

(a) This section shall only apply to publicly owned transit agencies, but shall not apply to any publicly owned transit agency created pursuant to Section 130050.2 of the Public Utilities Code.
(b) Except as provided in subdivision (c), and in accordance with subdivision (d), this division does not apply to actions taken on or after July 1, 1995, by a publicly owned transit agency to implement budget reductions caused by the failure of agency revenues to adequately fund agency programs and facilities.
(c) This section does not apply to any action to reduce or eliminate a transit service, facility, program, or activity that was approved or adopted as a mitigation measure in any environmental document authorized by this division or the National Environmental Policy Act (42 U.S.C. Sec. 4321 et seq.) or to any state or federal requirement that is imposed for the protection of the environment.
(d) (1) This section applies only to actions taken after the publicly owned transit agency has made a finding that there is a fiscal emergency caused by the failure of agency revenues to adequately fund agency programs and facilities, and after the publicly owned transit agency has held a public hearing to consider those actions. A publicly owned transit agency that has held such a hearing shall respond within 30 days at a regular public meeting to suggestions made by the public at the initial public hearing. Those actions shall be limited to projects defined in subdivision (a) or (b) of Section 21065 which initiate or increase fees, rates, or charges charged for any existing public service, program, or activity; or reduce or eliminate the availability of an existing publicly owned transit service, facility, program, or activity.

(2) For purposes of this subdivision, “fiscal emergency,” when applied to a publicly owned transit agency, means that the agency is projected to have negative working capital within one year from the date that the agency makes the finding that there is a fiscal emergency pursuant to this section. Working capital shall be determined by adding together all unrestricted cash, unrestricted short-term investments, and unrestricted short-term accounts receivable and then subtracting unrestricted accounts payable. Employee retirement funds, including Internal Revenue Code Section 457 deferred compensation plans and Section 401(k) plans, health insurance reserves, bond payment reserves, workers’ compensation reserves, and insurance reserves, shall not be factored into the formula for working capital.
(Added by Stats. 1996, Ch. 500, Sec. 1. Effective January 1, 1997.)

21080.33.

This division does not apply to any emergency project undertaken, carried out, or approved by a public agency to maintain, repair, or restore an existing highway, as defined in Section 360 of the Vehicle Code, except for a highway designated as an official state scenic highway pursuant to Section 262 of the Streets and Highways Code, within the existing right-of-way of the highway, damaged as a result of fire, flood, storm, earthquake, land subsidence, gradual earth movement, or landslide, within one year of the damage. This section does not exempt from this division any project undertaken, carried out, or approved by a public agency to expand or widen a highway damaged by fire, flood, storm, earthquake, land subsidence, gradual earth movement, or landslide.
(Added by Stats. 1996, Ch. 825, Sec. 6. Effective January 1, 1997.)

21080.34.

For the purposes of Section 21069, the phrase “carrying out or approving a project” shall include the carrying out or approval of a plan for a project that expands or enlarges an existing publicly owned airport by any political subdivision, as described in Section 21661.6 of the Public Utilities Code.
(Added by renumbering Section 21080.35 (as added by Stats. 2001, Ch. 534, Sec. 1) by Stats. 2015, Ch. 303, Sec. 432. Effective January 1, 2016.)

21080.35.

(a) Except as provided in subdivision (d), this division does not apply to the installation of a solar energy system on the roof of an existing building or at an existing parking lot.
(b) For the purposes of this section, the following terms mean the following:
(1) “Existing parking lot” means an area designated and used for parking of vehicles as of the time of the application for the solar energy system and for at least the previous two years.
(2) “Solar energy system” includes all associated equipment. Associated equipment consists of parts and materials that enable the generation and use of solar

electricity or solar-heated water, including any monitoring and control, safety, conversion, and emergency responder equipment necessary to connect to the customer's electrical service or plumbing and any equipment, as well as any equipment necessary to connect the energy generated to the electrical grid, whether that connection is onsite or on an adjacent parcel of the building and separated only by an improved right-of-way. "Associated equipment" does not include a substation.
(c) (1) Associated equipment shall be located on the same parcel of the building, except that associated equipment necessary to connect the energy generated to the electrical grid may be located immediately adjacent to the parcel of the building or immediately adjacent to the parcel of the building and separated only by an improved right-of-way.
(2) Associated equipment shall not occupy more than 500 square feet of ground surface and the site of the associated equipment shall not contain plants protected by the Native Plant Protection Act (Chapter 10 (commencing with Section 1900) of Division 2 of the Fish and Game Code).
(d) This section does not apply if the associated equipment would otherwise require one of the following:
(1) An individual federal permit pursuant to Section 401 or 404 of the federal Clean Water Act (33 U.S.C. Sec. 1341 or 1344) or waste discharge requirements pursuant to the Porter-Cologne Water Quality Control Act (Division 7 (commencing with Section 13000) of the Water Code).
(2) An individual take permit for species protected under the federal Endangered Species Act of 1973 (16 U.S.C. Sec. 1531 et seq.) or the California Endangered Species Act (Chapter 1.5 (commencing with Section 2050) of Division 3 of the Fish and Game Code).
(3) A streambed alteration permit pursuant to Chapter 6 (commencing with Section 1600) of Division 2 of the Fish and Game Code.
(e) This section does not apply if the installation of a solar energy system at an existing parking lot involves either of the following:
(1) The removal of a tree required to be planted, maintained, or protected pursuant to local, state, or federal requirements, unless the tree dies and there is no requirement to replace the tree.
(2) The removal of a native tree over 25 years old.
(f) This section does not apply to any transmission or distribution facility or connection.
(Added by Stats. 2011, Ch. 469, Sec. 3. Effective January 1, 2012.)

21080.37.

(a) This division does not apply to a project or an activity to repair, maintain, or make minor alterations to an existing roadway if all of the following conditions are met:
(1) The project is carried out by a city or county with a population of less than 100,000 persons to improve public safety.
(2) (A) The project does not cross a waterway.

(B) For purposes of this paragraph, “waterway” means a bay, estuary, lake, pond, river, slough, or a perennial, intermittent, or ephemeral stream, lake, or estuarine-marine shoreline.
(3) The project involves negligible or no expansion of an existing use beyond that existing at the time of the lead agency’s determination.
(4) The roadway is not a state roadway.
(5) (A) The site of the project does not contain wetlands or riparian areas and does not have significant value as a wildlife habitat, and the project does not harm any species protected by the federal Endangered Species Act of 1973 (16 U.S.C. Sec. 1531 et seq.), the Native Plant Protection Act (Chapter 10 (commencing with Section 1900) of Division 2 of the Fish and Game Code), or the California Endangered Species Act (Chapter 1.5 (commencing with Section 2050) of Division 3 of the Fish and Game Code), and the project does not cause the destruction or removal of any species protected by a local ordinance.
(B) For the purposes of this paragraph:
(i) “Riparian areas” mean those areas transitional between terrestrial and aquatic ecosystems and that are distinguished by gradients in biophysical conditions, ecological processes, and biota. A riparian area is an area through which surface and subsurface hydrology connect waterbodies with their adjacent uplands. A riparian area includes those portions of terrestrial ecosystems that significantly influence exchanges of energy and matter with aquatic ecosystems. A riparian area is adjacent to perennial, intermittent, and ephemeral streams, lakes, and estuarine-marine shorelines.
(ii) “Significant value as a wildlife habitat” includes wildlife habitat of national, statewide, regional, or local importance; habitat for species protected by the federal Endangered Species Act of 1973 (16 U.S.C. Sec. 1531, et seq.), the California Endangered Species Act (Chapter 1.5 (commencing with Section 2050) of Division 3 of the Fish and Game Code), or the Native Plant Protection Act (Chapter 10 (commencing with Section 1900) of Division 2 of the Fish and Game Code); habitat identified as candidate, fully protected, sensitive, or species of special status by local, state, or federal agencies; or habitat essential to the movement of resident or migratory wildlife.
(iii) “Wetlands” has the same meaning as in the United States Fish and Wildlife Service Manual, Part 660 FW 2 (June 21, 1993).
(iv) “Wildlife habitat” means the ecological communities upon which wild animals, birds, plants, fish, amphibians, and invertebrates depend for their conservation and protection.
(6) The project does not impact cultural resources.
(7) The roadway does not affect scenic resources, as provided pursuant to subdivision (c) of Section 21084.
(b) Prior to determining that a project is exempt pursuant to this section, the lead agency shall do both of the following:
(1) Include measures in the project to mitigate potential vehicular traffic and safety impacts and bicycle and pedestrian safety impacts.
(2) Hold a noticed public hearing on the project to hear and respond to public comments. The hearing on the project may be conducted with another noticed lead agency public hearing. Publication of the notice shall be no fewer times than

required by Section 6061 of the Government Code, by the public agency in a newspaper of general circulation in the area.
(c) For purposes of this section, “roadway” means a roadway as defined pursuant to Section 530 of the Vehicle Code and the previously graded and maintained shoulder that is within a roadway right-of-way of no more than five feet from the edge of the roadway.
(d) Whenever a local agency determines that a project is not subject to this division pursuant to this section, and it approves or determines to carry out that project, the local agency shall file a notice with the Office of Planning and Research, and with the county clerk in the county in which the project will be located in the manner specified in subdivisions (b) and (c) of Section 21152.
(e) This section shall remain in effect only until January 1, 2020, and as of that date is repealed, unless a later enacted statute, that is enacted before January 1, 2020, deletes or extends that date.
(Amended by Stats. 2015, Ch. 52, Sec. 1. Effective January 1, 2016. Repealed as of January 1, 2020, by its own provisions.)

21080.42.

(a) The following transportation projects are exempt from this division:
(1) U.S. Highway 101 interchange modification, adding southbound auxiliary lane and southbound mixed flow lane, from Interstate 280 to Yerba Buena Road, in Santa Clara County.
(2) Construct north and southbound high-occupancy vehicle lanes on I-805 from I-5 to Carroll Canyon Road, including construction of north-facing direct access ramps in San Diego County.
(3) State Route 99, Los Molinas rehabilitation and traffic calming, from Orange Street to Tehama Vine Road, in Tehama County.
(4) State Route 99, Island Park widening project, adding one mixed flow lane in each direction, from Ashlan Avenue to Grantlund Avenue, in Fresno County.
(5) State Route 99 median widening, adding one mixed flow lane in each direction, from State Route 120 west to 0.4 miles north of Arch Road, in Manteca in San Joaquin County.
(6) State Route 12 pavement rehabilitation and shoulder widening in San Joaquin County on Bouldin Island.
(7) State Route 91 widening, adding one mixed flow lane in each direction, from State Route 55 to Weir Canyon Road in Orange County.
(8) U.S. Highway 101 pavement rehabilitation and shoulder widening in San Luis Obispo County.
(b) An exemption provided pursuant to subdivision (a) shall not apply to a transportation project if, on or after February 1, 2009, a lead agency changes the scope of that project from the manner in which the project is described in subdivision (a).
(Added by Stats. 2009, 2nd Ex. Sess., Ch. 6, Sec. 4. Effective May 21, 2009.)

21080.45.

(a) This division does not apply to the development and approval of building standards by state agencies for recycled water systems.
(b) This section shall become inoperative on July 1, 2017, and, as of January 1, 2018, is repealed, unless a later enacted statute, that becomes operative on or before January 1, 2018, deletes or extends the dates on which it becomes inoperative and is repealed.
(Added by Stats. 2015, Ch. 27, Sec. 7. Effective June 24, 2015. Inoperative July 1, 2017. Repealed as of January 1, 2018, by its own provisions.)

21080.46.

(a) Without limiting any other statutory exemption or categorical exemption, this division does not apply to the adoption of an ordinance by a city, county, or city and county to limit or prohibit the drilling of new or deeper groundwater wells, or to limit or prohibit increased extractions from existing groundwater wells, through stricter conditions on the issuance of well permits or changes in the intensity of land use that would increase demand on groundwater.
(b) (1) This section shall remain operative until July 1, 2017, or so long as the state of emergency due to drought conditions declared by the Governor in the proclamation of a state of emergency issued on January 17, 2014, remains in effect, whichever is later.
(2) This section is repealed on January 1 of the year following the date on which this section becomes inoperative.
(c) Notwithstanding subdivision (a) or (b), this section does not apply to either of the following:
(1) The issuance of any permit for a new or deeper groundwater well by a city, county, or city and county.
(2) The adoption of any ordinance affecting or relating to new residential, commercial, institutional, or industrial projects or any mix of these uses, or any change in the intensity or use of land for these purposes, if that project or change in use requires approval by a city, county, or city and county. Nor does this section apply to the adoption of any ordinance that would limit or prohibit new or deeper groundwater wells, or increased extraction from existing groundwater wells, that may be needed to serve these projects.
(Added by Stats. 2015, Ch. 27, Sec. 8. Effective June 24, 2015. Inoperative on July 1, 2017, or later date, as prescribed in subd. (b). Repealed, by its own provisions, on January 1 following inoperative date.)

21081.

Pursuant to the policy stated in Sections 21002 and 21002.1, no public agency shall approve or carry out a project for which an environmental impact report has been certified which identifies one or more significant effects on the environment that would occur if the project is approved or carried out unless both of the following occur:
(a) The public agency makes one or more of the following findings with respect to each significant effect:

(1) Changes or alterations have been required in, or incorporated into, the project which mitigate or avoid the significant effects on the environment.
(2) Those changes or alterations are within the responsibility and jurisdiction of another public agency and have been, or can and should be, adopted by that other agency.
(3) Specific economic, legal, social, technological, or other considerations, including considerations for the provision of employment opportunities for highly trained workers, make infeasible the mitigation measures or alternatives identified in the environmental impact report.
(b) With respect to significant effects which were subject to a finding under paragraph (3) of subdivision (a), the public agency finds that specific overriding economic, legal, social, technological, or other benefits of the project outweigh the significant effects on the environment.
(Amended by Stats. 1994, Ch. 1294, Sec. 2. Effective October 1, 1994. Note: October 1, 1994, is the date that Ch. 1294 became law without the Governor's signature.)

21081.2.

(a) Except as provided in subdivision (c), if a residential project, not exceeding 100 units, with a minimum residential density of 20 units per acre and within one-half mile of a transit stop, on an infill site in an urbanized area is in compliance with the traffic, circulation, and transportation policies of the general plan, applicable community plan, applicable specific plan, and applicable ordinances of the city or county with jurisdiction over the area where the project is located, and the city or county requires that the mitigation measures approved in a previously certified project area environmental impact report applicable to the project be incorporated into the project, the city or county is not required to comply with subdivision (a) of Section 21081 with respect to the making of any findings regarding the impacts of the project on traffic at intersections, or on streets, highways, or freeways.
(b) Nothing in subdivision (a) restricts the authority of a city or county to adopt feasible mitigation measures with respect to the impacts of a project on pedestrian and bicycle safety.
(c) Subdivision (a) does not apply in any of the following circumstances:
(1) The application for a proposed project is made more than five years after certification of the project area environmental impact report applicable to the project.
(2) A major change has occurred within the project area after certification of the project area environmental impact report applicable to the project.
(3) The project area environmental impact report applicable to the project was certified with overriding considerations pursuant to subdivision (b) of Section 21081 to the significant impacts on the environment with respect to traffic or transportation.
(4) The proposed project covers more than four acres.
(d) A project shall not be divided into smaller projects in order to qualify pursuant to this section.
(e) Nothing in this section relieves a city or county from the requirement to analyze the project’s effects on traffic at intersections, or on streets, highways, or freeways,

or from making a determination that the project may have a significant effect on traffic.
(f) For the purposes of this section, “project area environmental impact report” means an environmental impact report certified on any of the following:
(1) A general plan.
(2) A revision or update to the general plan that includes at least the land use and circulation elements.
(3) An applicable community plan.
(4) An applicable specific plan.
(5) A housing element of the general plan, if the environmental impact report analyzed the environmental effects of the density of the proposed project.
(6) A zoning ordinance.
(Added by Stats. 2006, Ch. 715, Sec. 1. Effective January 1, 2007.)

21081.5.

In making the findings required by paragraph (3) of subdivision (a) of Section 21081, the public agency shall base its findings on substantial evidence in the record.
(Amended by Stats. 1994, Ch. 1294, Sec. 3. Effective October 1, 1994. Note: October 1, 1994, is the date that Ch. 1294 became law without the Governor's signature.)

21081.6.

(a) When making the findings required by paragraph (1) of subdivision (a) of Section 21081 or when adopting a mitigated negative declaration pursuant to paragraph (2) of subdivision (c) of Section 21080, the following requirements shall apply:
(1) The public agency shall adopt a reporting or monitoring program for the changes made to the project or conditions of project approval, adopted in order to mitigate or avoid significant effects on the environment. The reporting or monitoring program shall be designed to ensure compliance during project implementation. For those changes which have been required or incorporated into the project at the request of a responsible agency or a public agency having jurisdiction by law over natural resources affected by the project, that agency shall, if so requested by the lead agency or a responsible agency, prepare and submit a proposed reporting or monitoring program.
(2) The lead agency shall specify the location and custodian of the documents or other material which constitute the record of proceedings upon which its decision is based.
(b) A public agency shall provide that measures to mitigate or avoid significant effects on the environment are fully enforceable through permit conditions, agreements, or other measures. Conditions of project approval may be set forth in referenced documents which address required mitigation measures or, in the case of the adoption of a plan, policy, regulation, or other public project, by incorporating the mitigation measures into the plan, policy, regulation, or project design.

(c) Prior to the close of the public review period for a draft environmental impact report or mitigated negative declaration, a responsible agency, or a public agency having jurisdiction over natural resources affected by the project, shall either submit to the lead agency complete and detailed performance objectives for mitigation measures which would address the significant effects on the environment identified by the responsible agency or agency having jurisdiction over natural resources affected by the project, or refer the lead agency to appropriate, readily available guidelines or reference documents. Any mitigation measures submitted to a lead agency by a responsible agency or an agency having jurisdiction over natural resources affected by the project shall be limited to measures which mitigate impacts to resources which are subject to the statutory authority of, and definitions applicable to, that agency. Compliance or noncompliance by a responsible agency or agency having jurisdiction over natural resources affected by a project with that requirement shall not limit the authority of the responsible agency or agency having jurisdiction over natural resources affected by a project, or the authority of the lead agency, to approve, condition, or deny projects as provided by this division or any other provision of law.
(Amended by Stats. 1994, Ch. 1294, Sec. 4.5. Effective October 1, 1994. Note: October 1, 1994, is the date that Ch. 1294 became law without the Governor's signature.)

21081.7.

Transportation information resulting from the reporting or monitoring program required to be adopted by a public agency pursuant to Section 21081.6 shall be submitted to the transportation planning agency in the region where the project is located and to the Department of Transportation for a project of statewide, regional, or areawide significance according to criteria developed pursuant to Section 21083. The transportation planning agency and the Department of Transportation shall adopt guidelines for the submittal of those reporting or monitoring programs.
(Amended by Stats. 2001, Ch. 867, Sec. 1. Effective January 1, 2002.)

21082.

All public agencies shall adopt by ordinance, resolution, rule, or regulation, objectives, criteria, and procedures for the evaluation of projects and the preparation of environmental impact reports and negative declarations pursuant to this division. A school district, or any other district, whose boundaries are coterminous with a city, county, or city and county, may utilize the objectives, criteria, and procedures of the city, county, or city and county, as may be applicable, in which case, the school district or other district need not adopt objectives, criteria, and procedures of its own. The objectives, criteria, and procedures shall be consistent with the provisions of this division and with the guidelines adopted by the Secretary of the Resources Agency pursuant to Section 21083. Such objectives, criteria, and procedures shall be adopted by each public agency no later than 60 days after the Secretary of the Resources Agency has adopted guidelines pursuant to Section 21083.

(Amended by Stats. 1976, Ch. 1312.)

21082.1.

(a) A draft environmental impact report, environmental impact report, negative declaration, or mitigated negative declaration prepared pursuant to the requirements of this division shall be prepared directly by, or under contract to, a public agency.
(b) This section does not prohibit, and shall not be construed as prohibiting, a person from submitting information or other comments to the public agency responsible for preparing an environmental impact report, draft environmental impact report, negative declaration, or mitigated negative declaration. The information or other comments may be submitted in any format, shall be considered by the public agency, and may be included, in whole or in part, in any report or declaration.
(c) The lead agency shall do all of the following:
(1) Independently review and analyze any report or declaration required by this division.
(2) Circulate draft documents that reflect its independent judgment.
(3) As part of the adoption of a negative declaration or a mitigated negative declaration, or certification of an environmental impact report, find that the report or declaration reflects the independent judgment of the lead agency.
(4) Submit a sufficient number of copies, in either a hard-copy or electronic form as required by the Office of Planning and Research, of the draft environmental impact report, proposed negative declaration, or proposed mitigated negative declaration to the State Clearinghouse for review and comment by state agencies, if any of the following apply:
(A) A state agency is any of the following:
(i) The lead agency.
(ii) A responsible agency.
(iii) A trustee agency.
(B) A state agency otherwise has jurisdiction by law with respect to the project.
(C) The proposed project is of sufficient statewide, regional, or areawide environmental significance as determined pursuant to the guidelines certified and adopted pursuant to Section 21083.
(Amended by Stats. 2016, Ch. 476, Sec. 1. Effective January 1, 2017.)

21082.2.

(a) The lead agency shall determine whether a project may have a significant effect on the environment based on substantial evidence in light of the whole record.
(b) The existence of public controversy over the environmental effects of a project shall not require preparation of an environmental impact report if there is no substantial evidence in light of the whole record before the lead agency that the project may have a significant effect on the environment.
(c) Argument, speculation, unsubstantiated opinion or narrative, evidence which is clearly inaccurate or erroneous, or evidence of social or economic impacts which do

not contribute to, or are not caused by, physical impacts on the environment, is not substantial evidence. Substantial evidence shall include facts, reasonable assumptions predicated upon facts, and expert opinion supported by facts.
(d) If there is substantial evidence, in light of the whole record before the lead agency, that a project may have a significant effect on the environment, an environmental impact report shall be prepared.
(e) Statements in an environmental impact report and comments with respect to an environmental impact report shall not be deemed determinative of whether the project may have a significant effect on the environment.
(Amended by Stats. 1993, Ch. 1131, Sec. 7. Effective January 1, 1994.)

21082.3.

(a) Any mitigation measures agreed upon in the consultation conducted pursuant to Section 21080.3.2 shall be recommended for inclusion in the environmental document and in an adopted mitigation monitoring and reporting program, if determined to avoid or lessen the impact pursuant to paragraph (2) of subdivision (b), and shall be fully enforceable.
(b) If a project may have a significant impact on a tribal cultural resource, the lead agency's environmental document shall discuss both of the following:
(1) Whether the proposed project has a significant impact on an identified tribal cultural resource.
(2) Whether feasible alternatives or mitigation measures, including those measures that may be agreed to pursuant to subdivision (a), avoid or substantially lessen the impact on the identified tribal cultural resource.
(c) (1) Any information, including, but not limited to, the location, description, and use of the tribal cultural resources, that is submitted by a California Native American tribe during the environmental review process shall not be included in the environmental document or otherwise disclosed by the lead agency or any other public agency to the public, consistent with subdivision (r) of Section 6254 of, and Section 6254.10 of, the Government Code, and subdivision (d) of Section 15120 of Title 14 of the California Code of Regulations, without the prior consent of the tribe that provided the information. If the lead agency publishes any information submitted by a California Native American tribe during the consultation or environmental review process, that information shall be published in a confidential appendix to the environmental document unless the tribe that provided the information consents, in writing, to the disclosure of some or all of the information to the public. This subdivision does not prohibit the confidential exchange of the submitted information between public agencies that have lawful jurisdiction over the preparation of the environmental document.
(2) (A) This subdivision does not prohibit the confidential exchange of information regarding tribal cultural resources submitted by a California Native American tribe during the consultation or environmental review process among the lead agency, the California Native American tribe, the project applicant, or the project applicant's agent. Except as provided in subparagraph (B) or unless the California Native American tribe providing the information consents, in writing, to public disclosure, the project applicant or the project applicant's legal advisers, using a reasonable

degree of care, shall maintain the confidentiality of the information exchanged for the purposes of preventing looting, vandalism, or damage to tribal cultural resources and shall not disclose to a third party confidential information regarding tribal cultural resources.
(B) This paragraph does not apply to data or information that are or become publicly available, are already in the lawful possession of the project applicant before the provision of the information by the California Native American tribe, are independently developed by the project applicant or the project applicant's agents, or are lawfully obtained by the project applicant from a third party that is not the lead agency, a California Native American tribe, or another public agency.
(3) This subdivision does not affect or alter the application of subdivision (r) of Section 6254 of the Government Code, Section 6254.10 of the Government Code, or subdivision (d) of Section 15120 of Title 14 of the California Code of Regulations.
(4) This subdivision does not prevent a lead agency or other public agency from describing the information in general terms in the environmental document so as to inform the public of the basis of the lead agency's or other public agency's decision without breaching the confidentiality required by this subdivision.
(d) In addition to other provisions of this division, the lead agency may certify an environmental impact report or adopt a mitigated negative declaration for a project with a significant impact on an identified tribal cultural resource only if one of the following occurs:
(1) The consultation process between the California Native American tribe and the lead agency has occurred as provided in Sections 21080.3.1 and 21080.3.2 and concluded pursuant to subdivision (b) of Section 21080.3.2.
(2) The California Native American tribe has requested consultation pursuant to Section 21080.3.1 and has failed to provide comments to the lead agency, or otherwise failed to engage, in the consultation process.
(3) The lead agency has complied with subdivision (d) of Section 21080.3.1 and the California Native American tribe has failed to request consultation within 30 days.
(e) If the mitigation measures recommended by the staff of the lead agency as a result of the consultation process are not included in the environmental document or if there are no agreed upon mitigation measures at the conclusion of the consultation or if consultation does not occur, and if substantial evidence demonstrates that a project will cause a significant effect to a tribal cultural resource, the lead agency shall consider feasible mitigation pursuant to subdivision (b) of Section 21084.3.
(f) Consistent with subdivision (c), the lead agency shall publish confidential information obtained from a California Native American tribe during the consultation process in a confidential appendix to the environmental document and shall include a general description of the information, as provided in paragraph (4) of subdivision (c) in the environmental document for public review during the public comment period provided pursuant to this division.
(g) This section is not intended, and may not be construed, to limit consultation between the state and tribal governments, existing confidentiality provisions, or the protection of religious exercise to the fullest extent permitted under state and federal law.
(Amended by Stats. 2015, Ch. 303, Sec. 433. Effective January 1, 2016.)

21083.

(a) The Office of Planning and Research shall prepare and develop proposed guidelines for the implementation of this division by public agencies. The guidelines shall include objectives and criteria for the orderly evaluation of projects and the preparation of environmental impact reports and negative declarations in a manner consistent with this division.
(b) The guidelines shall specifically include criteria for public agencies to follow in determining whether or not a proposed project may have a “significant effect on the environment.” The criteria shall require a finding that a project may have a “significant effect on the environment” if one or more of the following conditions exist:
(1) A proposed project has the potential to degrade the quality of the environment, curtail the range of the environment, or to achieve short-term, to the disadvantage of long-term, environmental goals.
(2) The possible effects of a project are individually limited but cumulatively considerable. As used in this paragraph, “cumulatively considerable” means that the incremental effects of an individual project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects.
(3) The environmental effects of a project will cause substantial adverse effects on human beings, either directly or indirectly.
(c) The guidelines shall include procedures for determining the lead agency pursuant to Section 21165.
(d) The guidelines shall include criteria for public agencies to use in determining when a proposed project is of sufficient statewide, regional, or areawide environmental significance that a draft environmental impact report, a proposed negative declaration, or a proposed mitigated negative declaration shall be submitted to appropriate state agencies, through the State Clearinghouse, for review and comment prior to completion of the environmental impact report, negative declaration, or mitigated negative declaration.
(e) The Office of Planning and Research shall develop and prepare the proposed guidelines as soon as possible and shall transmit them immediately to the Secretary of the Resources Agency. The Secretary of the Resources Agency shall certify and adopt the guidelines pursuant to Chapter 3.5 (commencing with Section 11340) of Part 1 of Division 3 of Title 2 of the Government Code, which shall become effective upon the filing thereof. However, the guidelines shall not be adopted without compliance with Sections 11346.4, 11346.5, and 11346.8 of the Government Code.
(f)The Office of Planning and Research shall, at least once every two years, review the guidelines adopted pursuant to this section and shall recommend proposed changes or amendments to the Secretary of the Resources Agency. The Secretary of the Resources Agency shall certify and adopt guidelines, and any amendments thereto, at least once every two years, pursuant to Chapter 3.5 (commencing with Section 11340) of Part 1 of Division 3 of Title 2 of the Government Code, which shall become effective upon the filing thereof. However, guidelines may not be adopted or amended without compliance with Sections 11346.4, 11346.5, and 11346.8 of the Government Code.
(Amended by Stats. 2004, Ch. 689, Sec. 1. Effective January 1, 2005.)

21083.01.

(a) On or after January 1, 2013, at the time of the next review of the guidelines prepared and developed to implement this division pursuant to subdivision (f) of Section 21083, the Office of Planning and Research, in cooperation with the Department of Forestry and Fire Protection, shall prepare, develop, and transmit to the Secretary of the Natural Resources Agency recommended proposed changes or amendments to the initial study checklist of the guidelines implementing this division for the inclusion of questions related to fire hazard impacts for projects located on lands classified as state responsibility areas, as defined in Section 4102, and on lands classified as very high fire hazard severity zones, as defined in subdivision (i) of Section 51177 of the Government Code.
(b) Upon receipt and review, the Secretary of the Natural Resources Agency shall certify and adopt the recommended proposed changes or amendments prepared and developed by the Office of Planning and Research pursuant to subdivision (a).
(Added by Stats. 2012, Ch. 311, Sec. 5. Effective January 1, 2013.)

21083.05.

The Office of Planning and Research and the Natural Resources Agency shall periodically update the guidelines for the mitigation of greenhouse gas emissions or the effects of greenhouse gas emissions as required by this division, including, but not limited to, effects associated with transportation or energy consumption, to incorporate new information or criteria established by the State Air Resources Board pursuant to Division 25.5 (commencing with Section 38500) of the Health and Safety Code.
(Amended by Stats. 2012, Ch. 548, Sec. 5. Effective January 1, 2013.)

21083.09.

On or before July 1, 2016, the Office of Planning and Research shall prepare and develop, and the Secretary of the Natural Resources Agency shall certify and adopt, revisions to the guidelines that update Appendix G of Chapter 3 (commencing with Section 15000) of Division 6 of Title 4 of the California Code of Regulations to do both of the following:
(a) Separate the consideration of paleontological resources from tribal cultural resources and update the relevant sample questions.
(b) Add consideration of tribal cultural resources with relevant sample questions.
(Added by Stats. 2014, Ch. 532, Sec. 8. Effective January 1, 2015.)

21083.1.

It is the intent of the Legislature that courts, consistent with generally accepted rules of statutory interpretation, shall not interpret this division or the state guidelines adopted pursuant to Section 21083 in a manner which imposes

procedural or substantive requirements beyond those explicitly stated in this division or in the state guidelines.
(Added by Stats. 1993, Ch. 1070, Sec. 2. Effective January 1, 1994.)

21083.2.

(a) As part of the determination made pursuant to Section 21080.1, the lead agency shall determine whether the project may have a significant effect on archaeological resources. If the lead agency determines that the project may have a significant effect on unique archaeological resources, the environmental impact report shall address the issue of those resources. An environmental impact report, if otherwise necessary, shall not address the issue of nonunique archaeological resources. A negative declaration shall be issued with respect to a project if, but for the issue of nonunique archaeological resources, the negative declaration would be otherwise issued.
(b) If it can be demonstrated that a project will cause damage to a unique archaeological resource, the lead agency may require reasonable efforts to be made to permit any or all of these resources to be preserved in place or left in an undisturbed state. Examples of that treatment, in no order of preference, may include, but are not limited to, any of the following:
(1) Planning construction to avoid archaeological sites.
(2) Deeding archaeological sites into permanent conservation easements.
(3) Capping or covering archaeological sites with a layer of soil before building on the sites.
(4) Planning parks, greenspace, or other open space to incorporate archaeological sites.
(c) To the extent that unique archaeological resources are not preserved in place or not left in an undisturbed state, mitigation measures shall be required as provided in this subdivision. The project applicant shall provide a guarantee to the lead agency to pay one-half the estimated cost of mitigating the significant effects of the project on unique archaeological resources. In determining payment, the lead agency shall give due consideration to the in-kind value of project design or expenditures that are intended to permit any or all archaeological resources or California Native American culturally significant sites to be preserved in place or left in an undisturbed state. When a final decision is made to carry out or approve the project, the lead agency shall, if necessary, reduce the specified mitigation measures to those which can be funded with the money guaranteed by the project applicant plus the money voluntarily guaranteed by any other person or persons for those mitigation purposes. In order to allow time for interested persons to provide the funding guarantee referred to in this subdivision, a final decision to carry out or approve a project shall not occur sooner than 60 days after completion of the recommended special environmental impact report required by this section.
(d) Excavation as mitigation shall be restricted to those parts of the unique archaeological resource that would be damaged or destroyed by the project. Excavation as mitigation shall not be required for a unique archaeological resource if the lead agency determines that testing or studies already completed have adequately recovered the scientifically consequential information from and about

the resource, if this determination is documented in the environmental impact report.
(e) In no event shall the amount paid by a project applicant for mitigation measures required pursuant to subdivision (c) exceed the following amounts:
(1) An amount equal to one-half of 1 percent of the projected cost of the project for mitigation measures undertaken within the site boundaries of a commercial or industrial project.
(2) An amount equal to three-fourths of 1 percent of the projected cost of the project for mitigation measures undertaken within the site boundaries of a housing project consisting of a single unit.
(3) If a housing project consists of more than a single unit, an amount equal to three-fourths of 1 percent of the projected cost of the project for mitigation measures undertaken within the site boundaries of the project for the first unit plus the sum of the following:
(A) Two hundred dollars ($200) per unit for any of the next 99 units.
(B) One hundred fifty dollars ($150) per unit for any of the next 400 units.
(C) One hundred dollars ($100) per unit in excess of 500 units.
(f) Unless special or unusual circumstances warrant an exception, the field excavation phase of an approved mitigation plan shall be completed within 90 days after final approval necessary to implement the physical development of the project or, if a phased project, in connection with the phased portion to which the specific mitigation measures are applicable. However, the project applicant may extend that period if he or she so elects. Nothing in this section shall nullify protections for Indian cemeteries under any other provision of law.
(g) As used in this section, “unique archaeological resource” means an archaeological artifact, object, or site about which it can be clearly demonstrated that, without merely adding to the current body of knowledge, there is a high probability that it meets any of the following criteria:
(1) Contains information needed to answer important scientific research questions and that there is a demonstrable public interest in that information.
(2) Has a special and particular quality such as being the oldest of its type or the best available example of its type.
(3) Is directly associated with a scientifically recognized important prehistoric or historic event or person.
(h) As used in this section, “nonunique archaeological resource” means an archaeological artifact, object, or site which does not meet the criteria in subdivision (g). A nonunique archaeological resource need be given no further consideration, other than the simple recording of its existence by the lead agency if it so elects.
(i) As part of the objectives, criteria, and procedures required by Section 21082 or as part of conditions imposed for mitigation, a lead agency may make provisions for archaeological sites accidentally discovered during construction. These provisions may include an immediate evaluation of the find. If the find is determined to be a unique archaeological resource, contingency funding and a time allotment sufficient to allow recovering an archaeological sample or to employ one of the avoidance measures may be required under the provisions set forth in this section. Construction work may continue on other parts of the building site while archaeological mitigation takes place.

(j) This section does not apply to any project described in subdivision (a) or (b) of Section 21065 if the lead agency elects to comply with all other applicable provisions of this division. This section does not apply to any project described in subdivision (c) of Section 21065 if the applicant and the lead agency jointly elect to comply with all other applicable provisions of this division.
(k) Any additional costs to any local agency as a result of complying with this section with respect to a project of other than a public agency shall be borne by the project applicant.
(l) Nothing in this section is intended to affect or modify the requirements of Section 21084 or 21084.1.
(Amended by Stats. 1993, Ch. 375, Sec. 1. Effective January 1, 1994.)

21083.3.

(a) If a parcel has been zoned to accommodate a particular density of development or has been designated in a community plan to accommodate a particular density of development and an environmental impact report was certified for that zoning or planning action, the application of this division to the approval of any subdivision map or other project that is consistent with the zoning or community plan shall be limited to effects upon the environment which are peculiar to the parcel or to the project and which were not addressed as significant effects in the prior environmental impact report, or which substantial new information shows will be more significant than described in the prior environmental impact report.
(b) If a development project is consistent with the general plan of a local agency and an environmental impact report was certified with respect to that general plan, the application of this division to the approval of that development project shall be limited to effects on the environment which are peculiar to the parcel or to the project and which were not addressed as significant effects in the prior environmental impact report, or which substantial new information shows will be more significant than described in the prior environmental impact report.
(c) Nothing in this section affects any requirement to analyze potentially significant offsite impacts and cumulative impacts of the project not discussed in the prior environmental impact report with respect to the general plan. However, all public agencies with authority to mitigate the significant effects shall undertake or require the undertaking of any feasible mitigation measures specified in the prior environmental impact report relevant to a significant effect which the project will have on the environment or, if not, then the provisions of this section shall have no application to that effect. The lead agency shall make a finding, at a public hearing, as to whether those mitigation measures will be undertaken.
(d) An effect of a project upon the environment shall not be considered peculiar to the parcel or to the project, for purposes of this section, if uniformly applied development policies or standards have been previously adopted by the city or county, with a finding based upon substantial evidence, which need not include an environmental impact report, that the development policies or standards will substantially mitigate that environmental effect when applied to future projects, unless substantial new information shows that the policies or standards will not substantially mitigate the environmental effect.

(e) Where a community plan is the basis for application of this section, any rezoning action consistent with the community plan shall be a project subject to exemption from this division in accordance with this section. As used in this section, “community plan” means a part of the general plan of a city or county which (1) applies to a defined geographic portion of the total area included in the general plan, (2) complies with Article 5 (commencing with Section 65300) of Chapter 3 of Division 1 of Title 7 of the Government Code by including or referencing each of the mandatory elements specified in Section 65302 of the Government Code, and (3) contains specific development policies adopted for the area included in the community plan and identifies measures to implement those policies, so that the policies which will apply to each parcel can be determined.
(f) No person shall have standing to bring an action or proceeding to attack, review, set aside, void, or annul a finding of a public agency made at a public hearing pursuant to subdivision (a) with respect to the conformity of the project to the mitigation measures identified in the prior environmental impact report for the zoning or planning action, unless he or she has participated in that public hearing. However, this subdivision shall not be applicable if the local agency failed to give public notice of the hearing as required by law. For purposes of this subdivision, a person has participated in the public hearing if he or she has either submitted oral or written testimony regarding the proposed determination, finding, or decision prior to the close of the hearing.
(g) Any community plan adopted prior to January 1, 1982, which does not comply with the definitional criteria specified in subdivision (e) may be amended to comply with that criteria, in which case the plan shall be deemed a “community plan” within the meaning of subdivision (e) if (1) an environmental impact report was certified for adoption of the plan, and (2) at the time of the conforming amendment, the environmental impact report has not been held inadequate by a court of this state and is not the subject of pending litigation challenging its adequacy.
(Amended by Stats. 1992, Ch. 1102, Sec. 1. Effective January 1, 1993.)

21083.4.

(a) For purposes of this section, “oak” means a native tree species in the genus Quercus, not designated as Group A or Group B commercial species pursuant to regulations adopted by the State Board of Forestry and Fire Protection pursuant to Section 4526, and that is 5 inches or more in diameter at breast height.
(b) As part of the determination made pursuant to Section 21080.1, a county shall determine whether a project within its jurisdiction may result in a conversion of oak woodlands that will have a significant effect on the environment. If a county determines that there may be a significant effect to oak woodlands, the county shall require one or more of the following oak woodlands mitigation alternatives to mitigate the significant effect of the conversion of oak woodlands:
(1) Conserve oak woodlands, through the use of conservation easements.
(2) (A) Plant an appropriate number of trees, including maintaining plantings and replacing dead or diseased trees.
(B) The requirement to maintain trees pursuant to this paragraph terminates seven years after the trees are planted.

(C) Mitigation pursuant to this paragraph shall not fulfill more than one-half of the mitigation requirement for the project.
(D) The requirements imposed pursuant to this paragraph also may be used to restore former oak woodlands.
(3) Contribute funds to the Oak Woodlands Conservation Fund, as established under subdivision (a) of Section 1363 of the Fish and Game Code, for the purpose of purchasing oak woodlands conservation easements, as specified under paragraph (1) of subdivision (d) of that section and the guidelines and criteria of the Wildlife Conservation Board. A project applicant that contributes funds under this paragraph shall not receive a grant from the Oak Woodlands Conservation Fund as part of the mitigation for the project.
(4)Other mitigation measures developed by the county.
(c) Notwithstanding subdivision (d) of Section 1363 of the Fish and Game Code, a county may use a grant awarded pursuant to the Oak Woodlands Conservation Act (Article 3.5 (commencing with Section 1360) of Chapter 4 of Division 2 of the Fish and Game Code) to prepare an oak conservation element for a general plan, an oak protection ordinance, or an oak woodlands management plan, or amendments thereto, that meets the requirements of this section.
(d) The following are exempt from this section:
(1) Projects undertaken pursuant to an approved Natural Community Conservation Plan or approved subarea plan within an approved Natural Community Conservation Plan that includes oaks as a covered species or that conserves oak habitat through natural community conservation preserve designation and implementation and mitigation measures that are consistent with this section.
(2) Affordable housing projects for lower income households, as defined pursuant to Section 50079.5 of the Health and Safety Code, that are located within an urbanized area, or within a sphere of influence as defined pursuant to Section 56076 of the Government Code.
(3) Conversion of oak woodlands on agricultural land that includes land that is used to produce or process plant and animal products for commercial purposes.
(4) Projects undertaken pursuant to Section 21080.5 of the Public Resources Code.
(e) (1) A lead agency that adopts, and a project that incorporates, one or more of the measures specified in this section to mitigate the significant effects to oaks and oak woodlands shall be deemed to be in compliance with this division only as it applies to effects on oaks and oak woodlands.
(2) The Legislature does not intend this section to modify requirements of this division, other than with regard to effects on oaks and oak woodlands.
(f) This section does not preclude the application of Section 21081 to a project.
(g) This section, and the regulations adopted pursuant to this section, shall not be construed as a limitation on the power of a public agency to comply with this division or any other provision of law.
(Added by Stats. 2004, Ch. 732, Sec. 1. Effective January 1, 2005.)

21083.5.

(a) The guidelines prepared and adopted pursuant to Section 21083 shall provide that, when an environmental impact statement has been, or will be, prepared for

the same project pursuant to the requirements of the National Environmental Policy Act of 1969 (42 U.S.C. Sec. 4321 et seq.) and implementing regulations, or an environmental impact report has been, or will be, prepared for the same project pursuant to the requirements of the Tahoe Regional Planning Compact (Section 66801 of the Government Code) and implementing regulations, all or any part of that statement or report may be submitted in lieu of all or any part of an environmental impact report required by this division, if that statement or report, or the part which is used, complies with the requirements of this division and the guidelines adopted pursuant thereto.
(b) Notwithstanding subdivision (a), compliance with this division may be achieved for the adoption in a city or county general plan, without any additions or change, of all or any part of the regional plan prepared pursuant to the Tahoe Regional Planning Compact and implementing regulations by reviewing environmental documents prepared by the Tahoe Regional Planning Agency addressing the plan, providing an analysis pursuant to this division of any significant effect on the environment not addressed in the environmental documents, and proceeding in accordance with Section 21081. This subdivision does not exempt a city or county from complying with the public review and notice requirements of this division.
(Amended by Stats. 1988, Ch. 493, Sec. 1.)

21083.6.

In the event that a project requires both an environmental impact report prepared pursuant to the requirements of this division and an environmental impact statement prepared pursuant to the requirements of the National Environmental Policy Act of 1969, an applicant may request and the lead agency may waive the time limits established pursuant to Section 21100.2 or 21151.5 if it finds that additional time is required to prepare a combined environmental impact report-environmental impact statement and that the time required to prepare such a combined document would be shorter than that required to prepare each document separately.
(Added by Stats. 1977, Ch. 1200.)

21083.7.

(a) In the event that a project requires both an environmental impact report prepared pursuant to the requirements of this division and an environmental impact statement prepared pursuant to the requirements of the National Environmental Policy Act of 1969, the lead agency shall, whenever possible, use the environmental impact statement as such environmental impact report as provided in Section 21083.5.
(b) In order to implement this section, each lead agency to which this section is applicable shall do both of the following, as soon as possible:
(1) Consult with the federal agency required to prepare such environmental impact statement.
(2) Notify the federal agency required to prepare the environmental impact statement regarding any scoping meeting for the proposed project.

(Amended by Stats. 2000, Ch. 387, Sec. 1. Effective September 11, 2000.)

21083.8.1.

(a) (1) For purposes of this section, “reuse plan” for a military base means an initial plan for the reuse of a military base adopted by a local government or a redevelopment agency in the form of a general plan, general plan amendment, specific plan, redevelopment plan, or other planning document, except that the reuse plan shall also consist of a statement of development policies, include a diagram or diagrams illustrating its provisions, and make the designation required in paragraph (2). “Military base” or “base” means a military base or reservation either closed or realigned by, or scheduled for closure or realignment by, the federal government.
(2) The reuse plan shall designate the proposed general distribution and general location of development intensity for housing, business, industry, open space, recreation, natural resources, public buildings and grounds, roads and other transportation facilities, infrastructure, and other categories of public and private uses of land.
(b) (1) When preparing and certifying an environmental impact report for a reuse plan, including when utilizing an environmental impact statement pursuant to Section 21083.5, the determination of whether the reuse plan may have a significant effect on the environment may be made in the context of the physical conditions that were present at the time that the federal decision became final for the closure or realignment of the base. The no project alternative analyzed in the environmental impact report shall discuss the existing conditions on the base, as they exist at the time that the environmental impact report is prepared, as well as what could be reasonably expected to occur in the foreseeable future if the reuse plan were not approved, based on current plans and consistent with available infrastructure and services.
(2) For purposes of this division, all public and private activities taken pursuant to, or in furtherance of, a reuse plan shall be deemed to be a single project. However, further environmental review of any such public or private activity shall be conducted if any of the events specified in Section 21166 have occurred.
(c) Prior to preparing an environmental impact report for which a lead agency chooses to utilize the provisions of this section, the lead agency shall do all of the following:
(A) Hold a public hearing at which is discussed the federal environmental impact statement prepared for, or in the process of being prepared for, the closure of the military base. The discussion shall include the significant effects on the environment examined in the environmental impact statement, potential methods of mitigating those effects, including feasible alternatives, and the mitigative effects of federal, state, and local laws applicable to future nonmilitary activities. Prior to the close of the hearing, the lead agency may specify the baseline conditions for the reuse plan environmental impact report prepared, or in the process of being prepared, for the closure of the base. The lead agency may specify particular physical conditions that it will examine in greater detail than were examined in the environmental impact

statement. Notice of the hearing shall be given as provided in Section 21092. The hearing may be continued from time to time.
(B) Identify pertinent responsible agencies and trustee agencies and consult with those agencies prior to the public hearing as to the application of their regulatory policies and permitting standards to the proposed baseline for environmental analysis, as well as to the reuse plan and planned future nonmilitary land uses of the base. The affected agencies shall have not less than 30 days prior to the public hearing to review the proposed reuse plan and to submit their comments to the lead agency.
(C) At the close of the hearing, the lead agency shall state in writing how the lead agency intends to integrate the baseline for analysis with the reuse planning and environmental review process, taking into account the adopted environmental standards of the community, including, but not limited to, the applicable general plan, specific plan, and redevelopment plan, and including other applicable provisions of adopted congestion management plans, habitat conservation or natural communities conservation plans, integrated waste management plans, and county hazardous waste management plans.
(D) At the close of the hearing, the lead agency shall state, in writing, the specific economic or social reasons, including, but not limited to, new job creation, opportunities for employment of skilled workers, availability of low- and moderate-income housing, and economic continuity, which support the selection of the baseline.
(d) (1) Nothing in this section shall in any way limit the scope of a review or determination of significance of the presence of hazardous or toxic wastes, substances, or materials including, but not limited to, contaminated soils and groundwater, nor shall the regulation of hazardous or toxic wastes, substances, or materials be constrained by prior levels of activity that existed at the time that the federal agency decision to close the military base became final.
(2) This section does not apply to any project undertaken pursuant to Chapter 6.5 (commencing with Section 25100) of, or Chapter 6.8 (commencing with Section 25300) of, Division 20 of the Health and Safety Code, or pursuant to the Porter-Cologne Water Quality Control Act (Division 7 (commencing with Section 13000) of the Water Code).
(3) This section may apply to any reuse plan environmental impact report for which a notice of preparation pursuant to subdivision (a) of Section 21092 is issued within one year from the date that the federal record of decision was rendered for the military base closure or realignment and reuse, or prior to January 1, 1997, whichever is later, if the environmental impact report is completed and certified within five years from the date that the federal record of decision was rendered.
(e) All subsequent development at the military base shall be subject to all applicable federal, state, or local laws, including, but not limited to, those relating to air quality, water quality, traffic, threatened and endangered species, noise, and hazardous or toxic wastes, substances, or materials.
(Amended by Stats. 2004, Ch. 525, Sec. 1. Effective January 1, 2005.)

21083.9.

(a) Notwithstanding Section 21080.4, 21104, or 21153, a lead agency shall call at least one scoping meeting for either of the following:
(1) A proposed project that may affect highways or other facilities under the jurisdiction of the Department of Transportation if the meeting is requested by the department. The lead agency shall call the scoping meeting as soon as possible, but not later than 30 days after receiving the request from the Department of Transportation.
(2) A project of statewide, regional, or areawide significance.
(b) The lead agency shall provide notice of at least one scoping meeting held pursuant to paragraph (2) of subdivision (a) to all of the following:
(1) A county or city that borders on a county or city within which the project is located, unless otherwise designated annually by agreement between the lead agency and the county or city.
(2) A responsible agency.
(3) A public agency that has jurisdiction by law with respect to the project.
(4) A transportation planning agency or public agency required to be consulted pursuant to Section 21092.4.
(5) A public agency, organization, or individual who has filed a written request for the notice.
(c) For a public agency, organization, or individual that is required to be provided notice of a lead agency public meeting, the requirement for notice of a scoping meeting pursuant to subdivision (b) may be met by including the notice of a scoping meeting in the public meeting notice.
(d) A scoping meeting that is held in the city or county within which the project is located pursuant to the federal National Environmental Policy Act of 1969 (42 U.S.C. Sec. 4321 et seq.) and the regulations adopted pursuant to that act shall be deemed to satisfy the requirement that a scoping meeting be held for a project subject to paragraph (2) of subdivision (a) if the lead agency meets the notice requirements of subdivision (b) or subdivision (c).
(e) The referral of a proposed action to adopt or substantially amend a general plan to a city or county pursuant to paragraph (1) of subdivision (a) of Section 65352 of the Government Code may be conducted concurrently with the scoping meeting required pursuant to this section, and the city or county may submit its comments as provided pursuant to subdivision (b) of that section at the scoping meeting.
(Amended by Stats. 2012, Ch. 218, Sec. 1. Effective January 1, 2013.)

21084.

(a) The guidelines prepared and adopted pursuant to Section 21083 shall include a list of classes of projects that have been determined not to have a significant effect on the environment and that shall be exempt from this division. In adopting the guidelines, the Secretary of the Natural Resources Agency shall make a finding that the listed classes of projects referred to in this section do not have a significant effect on the environment.
(b) A project's greenhouse gas emissions shall not, in and of themselves, be deemed to cause an exemption adopted pursuant to subdivision (a) to be inapplicable if the project complies with all applicable regulations or requirements

adopted to implement statewide, regional, or local plans consistent with Section 15183.5 of Title 14 of the California Code of Regulations.
(c) A project that may result in damage to scenic resources, including, but not limited to, trees, historic buildings, rock outcroppings, or similar resources, within a highway designated as an official state scenic highway, pursuant to Article 2.5 (commencing with Section 260) of Chapter 2 of Division 1 of the Streets and Highways Code, shall not be exempted from this division pursuant to subdivision (a). This subdivision does not apply to improvements as mitigation for a project for which a negative declaration has been approved or an environmental impact report has been certified.
(d) A project located on a site that is included on any list compiled pursuant to Section 65962.5 of the Government Code shall not be exempted from this division pursuant to subdivision (a).
(e) A project that may cause a substantial adverse change in the significance of a historical resource, as specified in Section 21084.1, shall not be exempted from this division pursuant to subdivision (a).
(Amended by Stats. 2013, Ch. 76, Sec. 175. Effective January 1, 2014.)

21084.1.

A project that may cause a substantial adverse change in the significance of an historical resource is a project that may have a significant effect on the environment. For purposes of this section, an historical resource is a resource listed in, or determined to be eligible for listing in, the California Register of Historical Resources. Historical resources included in a local register of historical resources, as defined in subdivision (k) of Section 5020.1, or deemed significant pursuant to criteria set forth in subdivision (g) of Section 5024.1, are presumed to be historically or culturally significant for purposes of this section, unless the preponderance of the evidence demonstrates that the resource is not historically or culturally significant. The fact that a resource is not listed in, or determined to be eligible for listing in, the California Register of Historical Resources, not included in a local register of historical resources, or not deemed significant pursuant to criteria set forth in subdivision (g) of Section 5024.1 shall not preclude a lead agency from determining whether the resource may be an historical resource for purposes of this section.
(Added by Stats. 1992, Ch. 1075, Sec. 8. Effective January 1, 1993.)

21084.2.

A project with an effect that may cause a substantial adverse change in the significance of a tribal cultural resource is a project that may have a significant effect on the environment.
(Added by Stats. 2014, Ch. 532, Sec. 9. Effective January 1, 2015.)

21084.3.

(a) Public agencies shall, when feasible, avoid damaging effects to any tribal cultural resource.
(b) If the lead agency determines that a project may cause a substantial adverse change to a tribal cultural resource, and measures are not otherwise identified in the consultation process provided in Section 21080.3.2, the following are examples of mitigation measures that, if feasible, may be considered to avoid or minimize the significant adverse impacts:
(1) Avoidance and preservation of the resources in place, including, but not limited to, planning and construction to avoid the resources and protect the cultural and natural context, or planning greenspace, parks, or other open space, to incorporate the resources with culturally appropriate protection and management criteria.
(2) Treating the resource with culturally appropriate dignity taking into account the tribal cultural values and meaning of the resource, including, but not limited to, the following:
(A) Protecting the cultural character and integrity of the resource.
(B) Protecting the traditional use of the resource.
(C) Protecting the confidentiality of the resource.
(3) Permanent conservation easements or other interests in real property, with culturally appropriate management criteria for the purposes of preserving or utilizing the resources or places.
(4) Protecting the resource.
(Added by Stats. 2014, Ch. 532, Sec. 10. Effective January 1, 2015.)

21086.

(a) A public agency may, at any time, request the addition or deletion of a class of projects, to the list designated pursuant to Section 21084. That request shall be made in writing to the Office of Planning and Research and shall include information supporting the public agency's position that the class of projects does, or does not, have a significant effect on the environment.
(b) The Office of Planning and Research shall review each request and, as soon as possible, shall submit its recommendation to the Secretary of the Resources Agency. Following the receipt of that recommendation, the Secretary of the Resources Agency may add or delete the class of projects to the list of classes of projects designated pursuant to Section 21084 that are exempt from the requirements of this division.
(c) The addition or deletion of a class of projects, as provided in this section, to the list specified in Section 21084 shall constitute an amendment to the guidelines adopted pursuant to Section 21083 and shall be adopted in the manner prescribed in Sections 21083 and 21084.
(Amended by Stats. 2004, Ch. 689, Sec. 2. Effective January 1, 2005.)

21088.

The Secretary of the Resources Agency shall provide for the timely distribution to all public agencies of the guidelines and any amendments or changes thereto. In addition, the Secretary of the Resources Agency may provide for publication of a

bulletin to provide public notice of the guidelines, or any amendments or changes thereto, and of the completion of environmental impact reports prepared in compliance with this division.
(Added by Stats. 1972, Ch. 1154.)

21089.

(a) A lead agency may charge and collect a reasonable fee from a person proposing a project subject to this division in order to recover the estimated costs incurred by the lead agency in preparing a negative declaration or an environmental impact report for the project and for procedures necessary to comply with this division on the project. Litigation expenses, costs, and fees incurred in actions alleging noncompliance with this division under Section 21167 are not recoverable under this section.
(b) The Department of Fish and Game may charge and collect filing fees, as provided in Section 711.4 of the Fish and Game Code. Notwithstanding Section 21080.1, a finding required under Section 21081, or a project approved under a certified regulatory program authorized pursuant to Section 21080.5 is not operative, vested, or final until the filing fees required pursuant to Section 711.4 of the Fish and Game Code are paid.
(c) (1) A public agency may charge and collect a reasonable fee from members of the public for a copy of an environmental document not to exceed the cost of reproducing the environmental document. A public agency may provide the environmental document in an electronic format as provided pursuant to Section 6253.9 of the Government Code.
(2) For purposes of this subdivision, “environmental document” means an initial study, negative declaration, mitigated negative declaration, draft and final environmental impact report, a document prepared as a substitute for an environmental impact report, negative declaration, or mitigated negative declaration under a program certified pursuant to Section 21080.5, and a document prepared under the federal National Environmental Policy Act of 1969 (42 U.S.C. Sec. 4321 et seq.) and used by a state or local agency in the place of the initial study, negative declaration, mitigated negative declaration, or an environmental impact report.
(Amended by Stats. 2010, Ch. 210, Sec. 1. Effective January 1, 2011.)

21090.

(a) An environmental impact report for a redevelopment plan may be a master environmental impact report, program environmental impact report, or a project environmental impact report. Any environmental impact report for a redevelopment plan shall specify the type of environmental impact report that is prepared for the redevelopment plan.
(b) If the environmental impact report for a redevelopment plan is a project environmental impact report, all public and private activities or undertakings pursuant to, or in furtherance of, a redevelopment plan shall be deemed to be a single project. However, further environmental review of any public or private

activity or undertaking pursuant to, or in furtherance of, a redevelopment plan for which a project environmental impact report has been certified shall be conducted if any of the events specified in Section 21166 have occurred.
(Amended by Stats. 2002, Ch. 625, Sec. 3. Effective September 17, 2002.)

21090.1.

For all purposes of this division, a geothermal exploratory project shall be deemed to be separate and distinct from any subsequent geothermal field development project as defined in Section 65928.5 of the Government Code.
(Added by Stats. 1978, Ch. 1271.)

21091.

(a) The public review period for a draft environmental impact report shall not be less than 30 days. If the draft environmental impact report is submitted to the State Clearinghouse for review, the review period shall be at least 45 days, and the lead agency shall provide a sufficient number of copies of the document, in either a hard-copy or electronic form as required by the Office of Planning and Research, to the State Clearinghouse for review and comment by state agencies.
(b) The public review period for a proposed negative declaration or proposed mitigated negative declaration shall not be less than 20 days. If the proposed negative declaration or proposed mitigated negative declaration is submitted to the State Clearinghouse for review, the review period shall be at least 30 days, and the lead agency shall provide a sufficient number of copies of the document, in either a hard-copy or electronic form as required by the Office of Planning and Research, to the State Clearinghouse for review and comment by state agencies.
(c) (1) Notwithstanding subdivisions (a) and (b), if a draft environmental impact report, proposed negative declaration, or proposed mitigated negative declaration is submitted to the State Clearinghouse for review and the period of review by the State Clearinghouse is longer than the public review period established pursuant to subdivision (a) or (b), whichever is applicable, the public review period shall be at least as long as the period of review and comment by state agencies as established by the State Clearinghouse.
(2) The public review period and the state agency review period may, but are not required to, begin and end at the same time. Day one of the state agency review period shall be the date that the State Clearinghouse distributes the CEQA document to state agencies.
(3) If the submittal of a CEQA document is determined by the State Clearinghouse to be complete, the State Clearinghouse shall distribute the document within three working days from the date of receipt. The State Clearinghouse shall specify the information that will be required in order to determine the completeness of the submittal of a CEQA document.
(d) (1) The lead agency shall consider comments it receives on a draft environmental impact report, proposed negative declaration, or proposed mitigated negative declaration if those comments are received within the public review period.

(2) (A) With respect to the consideration of comments received on a draft environmental impact report, the lead agency shall evaluate comments on environmental issues that are received from persons who have reviewed the draft and shall prepare a written response pursuant to subparagraph (B). The lead agency may also respond to comments that are received after the close of the public review period.
(B) The written response shall describe the disposition of each significant environmental issue that is raised by commenters. The responses shall be prepared consistent with Section 15088 of Title 14 of the California Code of Regulations.
(3) (A) With respect to the consideration of comments received on a draft environmental impact report, proposed negative declaration, proposed mitigated negative declaration, or notice pursuant to Section 21080.4, the lead agency shall accept comments via electronic mail and shall treat electronic-mail comments as equivalent to written comments.
(B) Any law or regulation relating to written comments received on a draft environmental impact report, proposed negative declaration, proposed mitigated negative declaration, or notice received pursuant to Section 21080.4 shall also apply to electronic-mail comments received for those reasons.
(e) (1) Criteria for shorter review periods by the State Clearinghouse for documents that must be submitted to the State Clearinghouse shall be set forth in the written guidelines issued by the Office of Planning and Research and made available to the public.
(2) Those shortened review periods may not be less than 30 days for a draft environmental impact report and 20 days for a negative declaration.
(3) A request for a shortened review period shall only be made in writing by the decisionmaking body of the lead agency to the Office of Planning and Research. The decisionmaking body may designate by resolution or ordinance a person authorized to request a shortened review period. A designated person shall notify the decisionmaking body of this request.
(4) A request approved by the State Clearinghouse shall be consistent with the criteria set forth in the written guidelines of the Office of Planning and Research.
(5) A shortened review period may not be approved by the Office of Planning and Research for a proposed project of statewide, regional, or areawide environmental significance as determined pursuant to Section 21083.
(6) An approval of a shortened review period shall be given prior to, and reflected in, the public notice required pursuant to Section 21092.
(f) Prior to carrying out or approving a project for which a negative declaration has been adopted, the lead agency shall consider the negative declaration together with comments that were received and considered pursuant to paragraph (1) of subdivision (d).
(Amended by Stats. 2016, Ch. 476, Sec. 2. Effective January 1, 2017.)

21091.5.

Notwithstanding subdivision (a) of Section 21091, or any other provision of this division, the public review period for a draft environmental impact report prepared for a proposed project involving the expansion or enlargement of a publicly owned

airport requiring the acquisition of any tide and submerged lands or other lands subject to the public trust for commerce, navigation, or fisheries, or any interest therein, shall be not less than 120 days.
(Added by Stats. 2001, Ch. 534, Sec. 2. Effective January 1, 2002.)

21092.

(a) A lead agency that is preparing an environmental impact report or a negative declaration or making a determination pursuant to subdivision (c) of Section 21157.1 shall provide public notice of that fact within a reasonable period of time prior to certification of the environmental impact report, adoption of the negative declaration, or making the determination pursuant to subdivision (c) of Section 21157.1.
(b) (1) The notice shall specify the period during which comments will be received on the draft environmental impact report or negative declaration, and shall include the date, time, and place of any public meetings or hearings on the proposed project, a brief description of the proposed project and its location, the significant effects on the environment, if any, anticipated as a result of the project, the address where copies of the draft environmental impact report or negative declaration, and all documents referenced in the draft environmental impact report or negative declaration, are available for review, and a description of how the draft environmental impact report or negative declaration can be provided in an electronic format.
(2) This section shall not be construed in any manner that results in the invalidation of an action because of the alleged inadequacy of the notice content if there has been substantial compliance with the notice content requirements of this section.
(3) The notice required by this section shall be given to the last known name and address of all organizations and individuals who have previously requested notice, and shall also be given by at least one of the following procedures:
(A) Publication, no fewer times than required by Section 6061 of the Government Code, by the public agency in a newspaper of general circulation in the area affected by the proposed project. If more than one area will be affected, the notice shall be published in the newspaper of largest circulation from among the newspapers of general circulation in those areas.
(B) Posting of notice by the lead agency on- and off-site in the area where the project is to be located.
(C) Direct mailing to the owners and occupants of contiguous property shown on the latest equalized assessment roll.
(c) For a project involving the burning of municipal wastes, hazardous waste, or refuse-derived fuel, including, but not limited to, tires, meeting the qualifications of subdivision (d), notice shall be given to all organizations and individuals who have previously requested notice and shall also be given by at least the procedures specified in subparagraphs (A), (B), and (C) of paragraph (3) of subdivision (b). In addition, notification shall be given by direct mailing to the owners and occupants of property within one-fourth of a mile of any parcel or parcels on which is located a project subject to this subdivision.
(d) The notice requirements of subdivision (c) apply to both of the following:

(1) The construction of a new facility.
(2) The expansion of an existing facility that burns hazardous waste which would increase its permitted capacity by more than 10 percent. For purposes of this paragraph, the amount of expansion of an existing facility shall be calculated by comparing the proposed facility capacity with whichever of the following is applicable:
(A) The facility capacity approved in the facility's hazardous waste facilities permit pursuant to Section 25200 of the Health and Safety Code or its grant of interim status pursuant to Section 25200.5 of the Health and Safety Code, or the facility capacity authorized in any state or local agency permit allowing the construction or operation of a facility for the burning of hazardous waste, granted before January 1, 1990.
(B) The facility capacity authorized in the facility's original hazardous waste facilities permit, grant of interim status, or any state or local agency permit allowing the construction or operation of a facility for the burning of hazardous waste, granted on or after January 1, 1990.
(e) The notice requirements specified in subdivision (b) or (c) shall not preclude a public agency from providing additional notice by other means if the agency so desires, or from providing the public notice required by this section at the same time and in the same manner as public notice otherwise required by law for the project.
(Amended by Stats. 2012, Ch. 162, Sec. 148. Effective January 1, 2013.)

21092.1.

When significant new information is added to an environmental impact report after notice has been given pursuant to Section 21092 and consultation has occurred pursuant to Sections 21104 and 21153, but prior to certification, the public agency shall give notice again pursuant to Section 21092, and consult again pursuant to Sections 21104 and 21153 before certifying the environmental impact report.
(Added by Stats. 1984, Ch. 1514, Sec. 7.)

21092.2.

(a) The notices required pursuant to Sections 21080.4, 21083.9, 21092, 21108, 21152, and 21161 shall be mailed to every person who has filed a written request for notices with either the clerk of the governing body or, if there is no governing body, the director of the agency. If the agency offers to provide the notices by email, upon filing a written request for notices, a person may request that the notices be provided to him or her by email. The request may also be filed with any other person designated by the governing body or director to receive these requests. The agency may require requests for notices to be annually renewed. The public agency may charge a fee, except to other public agencies, that is reasonably related to the costs of providing this service.
(b) Subdivision (a) shall not be construed in any manner that results in the invalidation of an action because of the failure of a person to receive a requested

notice, if there has been substantial compliance with the requirements of this section.
(c) The notices required pursuant to Sections 21080.4 and 21161 shall be provided by the State Clearinghouse to any legislator in whose district the project has an environmental impact, if the legislator requests the notice and the State Clearinghouse has received it.
(Amended by Stats. 2012, Ch. 218, Sec. 2. Effective January 1, 2013.)

21092.3.

The notices required pursuant to Sections 21080.4 and 21092 for an environmental impact report shall be posted in the office of the county clerk of each county in which the project will be located and shall remain posted for a period of 30 days. The notice required pursuant to Section 21092 for a negative declaration shall be so posted for a period of 20 days, unless otherwise required by law to be posted for 30 days. The county clerk shall post the notices within 24 hours of receipt.
(Amended by Stats. 1993, Ch. 1130, Sec. 13. Effective January 1, 1994.)

21092.4.

(a) For a project of statewide, regional, or areawide significance, the lead agency shall consult with transportation planning agencies and public agencies that have transportation facilities within their jurisdictions that could be affected by the project. Consultation shall be conducted in the same manner as for responsible agencies pursuant to this division, and shall be for the purpose of the lead agency obtaining information concerning the project's effect on major local arterials, public transit, freeways, highways, overpasses, on-ramps, off-ramps, and rail transit service within the jurisdiction of a transportation planning agency or a public agency that is consulted by the lead agency. A transportation planning agency or public agency that provides information to the lead agency shall be notified of, and provided with copies of, environmental documents pertaining to the project.
(b) As used in this section, "transportation facilities" includes major local arterials and public transit within five miles of the project site and freeways, highways, overpasses, on-ramps, off-ramps, and rail transit service within 10 miles of the project site.
(Amended by Stats. 2008, Ch. 707, Sec. 2. Effective January 1, 2009.)

21092.5.

(a) At least 10 days prior to certifying an environmental impact report, the lead agency shall provide a written proposed response to a public agency on comments made by that agency which conform with the requirements of this division. Proposed responses shall conform with the legal standards established for responses to comments on draft environmental impact reports. Copies of responses or the environmental document in which they are contained, prepared in conformance with other requirements of this division and the guidelines adopted

pursuant to Section 21083, may be used to meet the requirements imposed by this section.
(b) The lead agency shall notify any public agency which comments on a negative declaration, of the public hearing or hearings, if any, on the project for which the negative declaration was prepared. If notice to the commenting public agency is provided pursuant to Section 21092, the notice shall satisfy the requirement of this subdivision.
(c) Nothing in this section requires the lead agency to respond to comments not received within the comment periods specified in this division, to reopen comment periods, or to delay acting on a negative declaration or environmental impact report.
(Added by Stats. 1991, Ch. 905, Sec. 2.)

21092.6.

(a) The lead agency shall consult the lists compiled pursuant to Section 65962.5 of the Government Code to determine whether the project and any alternatives are located on a site which is included on any list. The lead agency shall indicate whether a site is on any list not already identified by the applicant. The lead agency shall specify the list and include the information in the statement required pursuant to subdivision (f) of Section 65962.5 of the Government Code, in the notice required pursuant to Section 21080.4, a negative declaration, and a draft environmental impact report. The requirement in this section to specify any list shall not be construed to limit compliance with this division.
(b) If a project or any alternatives are located on a site which is included on any of the lists compiled pursuant to Section 65962.5 of the Government Code and the lead agency did not accurately specify or did not specify any list pursuant to subdivision (a), the California Environmental Protection Agency shall notify the lead agency specifying any list with the site when it receives notice pursuant to Section 21080.4, a negative declaration, and a draft environmental impact report. The California Environmental Protection Agency shall not be liable for failure to notify the lead agency pursuant to this subdivision.
(Amended by Stats. 2012, Ch. 548, Sec. 8. Effective January 1, 2013.)

21093.

(a) The Legislature finds and declares that tiering of environmental impact reports will promote construction of needed housing and other development projects by (1) streamlining regulatory procedures, (2) avoiding repetitive discussions of the same issues in successive environmental impact reports, and (3) ensuring that environmental impact reports prepared for later projects which are consistent with a previously approved policy, plan, program, or ordinance concentrate upon environmental effects which may be mitigated or avoided in connection with the decision on each later project. The Legislature further finds and declares that tiering is appropriate when it helps a public agency to focus upon the issues ripe for decision at each level of environmental review and in order to exclude duplicative

analysis of environmental effects examined in previous environmental impact reports.
(b) To achieve this purpose, environmental impact reports shall be tiered whenever feasible, as determined by the lead agency.
(Amended by Stats. 1985, Ch. 418, Sec. 1.)

21094.

(a) Where a prior environmental impact report has been prepared and certified for a program, plan, policy, or ordinance, the lead agency for a later project that meets the requirements of this section shall examine significant effects of the later project upon the environment by using a tiered environmental impact report, except that the report on the later project is not required to examine those effects that the lead agency determines were either of the following:
(1) Mitigated or avoided pursuant to paragraph (1) of subdivision (a) of Section 21081 as a result of the prior environmental impact report.
(2) Examined at a sufficient level of detail in the prior environmental impact report to enable those effects to be mitigated or avoided by site-specific revisions, the imposition of conditions, or by other means in connection with the approval of the later project.
(b) This section applies only to a later project that the lead agency determines is all of the following:
(1) Consistent with the program, plan, policy, or ordinance for which an environmental impact report has been prepared and certified.
(2) Consistent with applicable local land use plans and zoning of the city, county, or city and county in which the later project would be located.
(3) Not subject to Section 21166.
(c) For purposes of compliance with this section, an initial study shall be prepared to assist the lead agency in making the determinations required by this section. The initial study shall analyze whether the later project may cause significant effects on the environment that were not examined in the prior environmental impact report.
(d) All public agencies that propose to carry out or approve the later project may utilize the prior environmental impact report and the environmental impact report on the later project to fulfill the requirements of Section 21081.
(e) When tiering is used pursuant to this section, an environmental impact report prepared for a later project shall refer to the prior environmental impact report and state where a copy of the prior environmental impact report may be examined.
(f) This section shall become operative on January 1, 2016.
(Repealed (in Sec. 3.5) and added by Stats. 2010, Ch. 496, Sec. 4. Effective September 29, 2010. Section operative January 1, 2016, by its own provisions.)

21094.5.

(a) (1) If an environmental impact report was certified for a planning level decision of a city or county, the application of this division to the approval of an infill project shall be limited to the effects on the environment that (A) are specific to the project or to the project site and were not addressed as significant effects in the prior

environmental impact report or (B) substantial new information shows the effects will be more significant than described in the prior environmental impact report. A lead agency's determination pursuant to this section shall be supported by substantial evidence.
(2) An effect of a project upon the environment shall not be considered a specific effect of the project or a significant effect that was not considered significant in a prior environmental impact report, or an effect that is more significant than was described in the prior environmental impact report if uniformly applicable development policies or standards adopted by the city, county, or the lead agency, would apply to the project and the lead agency makes a finding, based upon substantial evidence, that the development policies or standards will substantially mitigate that effect.
(b) If an infill project would result in significant effects that are specific to the project or the project site, or if the significant effects of the infill project were not addressed in the prior environmental impact report, or are more significant than the effects addressed in the prior environmental impact report, and if a mitigated negative declaration or a sustainable communities environmental assessment could not be otherwise adopted, an environmental impact report prepared for the project analyzing those effects shall be limited as follows:
(1) Alternative locations, densities, and building intensities to the project need not be considered.
(2) Growth inducing impacts of the project need not be considered.
(c) This section applies to an infill project that satisfies both of the following:
(1) The project satisfies any of the following:
(A) Is consistent with the general use designation, density, building intensity, and applicable policies specified for the project area in either a sustainable communities strategy or an alternative planning strategy for which the State Air Resources Board, pursuant to subparagraph (H) of paragraph (2) of subdivision (b) of Section 65080 of the Government Code, has accepted a metropolitan planning organization's determination that the sustainable communities strategy or the alternative planning strategy would, if implemented, achieve the greenhouse gas emission reduction targets.
(B) Consists of a small walkable community project located in an area designated by a city for that purpose.
(C) Is located within the boundaries of a metropolitan planning organization that has not yet adopted a sustainable communities strategy or alternative planning strategy, and the project has a residential density of at least 20 units per acre or a floor area ratio of at least 0.75.
(2) Satisfies all applicable statewide performance standards contained in the guidelines adopted pursuant to Section 21094.5.5.
(d) This section applies after the Secretary of the Natural Resources Agency adopts and certifies the guidelines establishing statewide standards pursuant to Section 21094.5.5.
(e) For the purposes of this section, the following terms mean the following:
(1) "Infill project" means a project that meets the following conditions:
(A) Consists of any one, or combination, of the following uses:
(i) Residential.

(ii) Retail or commercial, where no more than one-half of the project area is used for parking.
(iii) A transit station.
(iv) A school.
(v) A public office building.
(B) Is located within an urban area on a site that has been previously developed, or on a vacant site where at least 75 percent of the perimeter of the site adjoins, or is separated only by an improved public right-of-way from, parcels that are developed with qualified urban uses.
(2) “Planning level decision” means the enactment or amendment of a general plan, community plan, specific plan, or zoning code.
(3) “Prior environmental impact report” means the environmental impact report certified for a planning level decision, as supplemented by any subsequent or supplemental environmental impact reports, negative declarations, or addenda to those documents.
(4) “Small walkable community project” means a project that is in an incorporated city, which is not within the boundary of a metropolitan planning organization and that satisfies the following requirements:
(A) Has a project area of approximately one-quarter mile diameter of contiguous land completely within the existing incorporated boundaries of the city.
(B) Has a project area that includes a residential area adjacent to a retail downtown area.
(C) The project has a density of at least eight dwelling units per acre or a floor area ratio for retail or commercial use of not less than 0.50.
(5) “Urban area” includes either an incorporated city or an unincorporated area that is completely surrounded by one or more incorporated cities that meets both of the following criteria:
(A) The population of the unincorporated area and the population of the surrounding incorporated cities equal a population of 100,000 or more.
(B) The population density of the unincorporated area is equal to, or greater than, the population density of the surrounding cities.
(Added by Stats. 2011, Ch. 469, Sec. 6. Effective January 1, 2012.)

21094.5.5.

(a) On or before July 1, 2012, the Office of Planning and Research shall prepare, develop, and transmit to the Natural Resources Agency for certification and adoption guidelines for the implementation of Section 21094.5 and the Secretary of the Natural Resources Agency, on or before January 1, 2013, shall certify and adopt the guidelines.
(b) The guidelines prepared pursuant to this section shall include statewide standards for infill projects that may be amended from time to time and promote all of the following:
(1) The implementation of the land use and transportation policies in the Sustainable Communities and Climate Protection Act of 2008 (Chapter 728 of the Statutes of 2008).

(2) The state planning priorities specified in Section 65041.1 of the Government Code and in the most recently adopted Environmental Goals and Policy Report issued by the Office of Planning and Research supporting infill development.
(3) The reduction of greenhouse gas emissions under the California Global Warming Solutions Act of 2006 (Division 25.5 (commencing with Section 38500) of the Health and Safety Code).
(4) The reduction in per capita water use pursuant to Section 10608.16 of the Water Code.
(5) The creation of a transit village development district consistent with Section 65460.1 of the Government Code.
(6) Substantial energy efficiency improvements, including improvements to projects related to transportation energy.
(7) Protection of public health, including the health of vulnerable populations from air or water pollution, or soil contamination.
(c) The standards for projects on infill sites shall be updated as frequently as necessary to ensure the protection of the environment.
(Added by Stats. 2011, Ch. 469, Sec. 7. Effective January 1, 2012.)

21095.

(a) The Resources Agency, in consultation with the Office of Planning and Research, shall develop an amendment to Appendix G of the state guidelines, for adoption pursuant to Section 21083, to provide lead agencies an optional methodology to ensure that significant effects on the environment of agricultural land conversions are quantitatively and consistently considered in the environmental review process.
(b) The Department of Conservation, in consultation with the United States Department of Agriculture pursuant to Section 658.6 of Title 7 of the Code of Federal Regulations, and in consultation with the Resources Agency and the Office of Planning and Research, shall develop a state model land evaluation and site assessment system, contingent upon the availability of funding from non-General Fund sources. The department shall seek funding for that purpose from non-General Fund sources, including, but not limited to, the United States Department of Agriculture.
(c) In lieu of developing an amendment to Appendix G of the state guidelines pursuant to subdivision (a), the Resources Agency may adopt the state model land evaluation and site assessment system developed pursuant to subdivision (b) as that amendment to Appendix G.
(Added by Stats. 1993, Ch. 812, Sec. 4. Effective January 1, 1994.)

21096.

(a) If a lead agency prepares an environmental impact report for a project situated within airport land use compatibility plan boundaries, or, if an airport land use compatibility plan has not been adopted, for a project within two nautical miles of a public airport or public use airport, the Airport Land Use Planning Handbook published by the Division of Aeronautics of the Department of Transportation, in compliance with Section 21674.5 of the Public Utilities Code and other documents,

shall be utilized as technical resources to assist in the preparation of the environmental impact report as the report relates to airport-related safety hazards and noise problems.
(b) A lead agency shall not adopt a negative declaration for a project described in subdivision (a) unless the lead agency considers whether the project will result in a safety hazard or noise problem for persons using the airport or for persons residing or working in the project area.
(Amended by Stats. 2002, Ch. 438, Sec. 8.5. Effective January 1, 2003.)

21098.

(a) For the purposes of this section, the following terms have the following meanings:
(1) “Low-level flight path” includes any flight path for any aircraft owned, maintained, or that is under the jurisdiction of the United States Department of Defense that flies lower than 1,500 feet above ground level, as indicated in the United States Department of Defense Flight Information Publication, “Area Planning Military Training Routes: North and South America (AP/1B)” published by the United States National Imagery and Mapping Agency.
(2) “Military impact zone” includes any area, including airspace, that meets both of the following criteria:
(A) Is within two miles of a military installation, including, but not limited to, any base, military airport, camp, post, station, yard, center, homeport facility for a ship, or any other military activity center that is under the jurisdiction of the United States Department of Defense.
(B) Covers greater than 500 acres of unincorporated land, or greater than 100 acres of city incorporated land.
(3) “Military service” means any branch of the United States Armed Forces.
(4) “Special use airspace” means the land area underlying the airspace that is designated for training, research, development, or evaluation for a military service, as that land area is established by the United States Department of Defense Flight Information Publication, “Area Planning: Special Use Airspace: North and South America (AP/1A)” published by the United States National Imagery and Mapping Agency.
(b) If the United States Department of Defense or a military service notifies a lead agency of the contact office and address for the military service and the specific boundaries of a low-level flight path, military impact zone, or special use airspace, the lead agency shall submit notices, as required pursuant to Sections 21080.4 and 21092, to the military service if the project is within those boundaries and any of the following apply:
(1) The project includes a general plan amendment.
(2) The project is of statewide, regional, or areawide significance.
(3) The project is required to be referred to the airport land use commission, or appropriately designated body, pursuant to Article 3.5 (commencing with Section 21670) of Chapter 4 of Part 1 of Division 9 of the Public Utilities Code.
(c) The requirement to submit notices imposed by this section does not apply to any of the following:

(1) Response actions taken pursuant to Chapter 6.8 (commencing with Section 25300) of Division 20 of the Health and Safety Code.
(2) Response actions taken pursuant to Chapter 6.85 (commencing with Section 25396) of Division 20 of the Health and Safety Code.
(3) Sites subject to corrective action orders issued pursuant to Section 25187 of the Health and Safety Code.
(d) (1) The effect or potential effect that a project may have on military activities does not itself constitute an adverse effect on the environment for the purposes of this division.
(2) Notwithstanding paragraph (1), a project's impact on military activities may cause, or be associated with, adverse effects on the environment that are subject to the requirements of this division, including, but not limited to, Section 21081.
(Amended by Stats. 2003, Ch. 62, Sec. 250. Effective January 1, 2004.)

CHAPTER 2.7. Modernization of Transportation Analysis for Transit-Oriented Infill Projects [21099- 21099.]
(Chapter 2.7 added by Stats. 2013, Ch. 386, Sec. 5.)

21099.

(a) For purposes of this section, the following terms mean the following:
(1) "Employment center project" means a project located on property zoned for commercial uses with a floor area ratio of no less than 0.75 and that is located within a transit priority area.
(2) "Floor area ratio" means the ratio of gross building area of the development, excluding structured parking areas, proposed for the project divided by the net lot area.
(3) "Gross building area" means the sum of all finished areas of all floors of a building included within the outside faces of its exterior walls.
(4) "Infill site" means a lot located within an urban area that has been previously developed, or on a vacant site where at least 75 percent of the perimeter of the site adjoins, or is separated only by an improved public right-of-way from, parcels that are developed with qualified urban uses.
(5) "Lot" means all parcels utilized by the project.
(6) "Net lot area" means the area of a lot, excluding publicly dedicated land and private streets that meet local standards, and other public use areas as determined by the local land use authority.
(7) "Transit priority area" means an area within one-half mile of a major transit stop that is existing or planned, if the planned stop is scheduled to be completed within the planning horizon included in a Transportation Improvement Program adopted pursuant to Section 450.216 or 450.322 of Title 23 of the Code of Federal Regulations.
(b) (1) The Office of Planning and Research shall prepare, develop, and transmit to the Secretary of the Natural Resources Agency for certification and adoption proposed revisions to the guidelines adopted pursuant to Section 21083 establishing criteria for determining the significance of transportation impacts of projects within transit priority areas. Those criteria shall promote the reduction of greenhouse gas emissions, the development of multimodal transportation networks,

and a diversity of land uses. In developing the criteria, the office shall recommend potential metrics to measure transportation impacts that may include, but are not limited to, vehicle miles traveled, vehicle miles traveled per capita, automobile trip generation rates, or automobile trips generated. The office may also establish criteria for models used to analyze transportation impacts to ensure the models are accurate, reliable, and consistent with the intent of this section.
(2) Upon certification of the guidelines by the Secretary of the Natural Resources Agency pursuant to this section, automobile delay, as described solely by level of service or similar measures of vehicular capacity or traffic congestion shall not be considered a significant impact on the environment pursuant to this division, except in locations specifically identified in the guidelines, if any.
(3) This subdivision does not relieve a public agency of the requirement to analyze a project's potentially significant transportation impacts related to air quality, noise, safety, or any other impact associated with transportation. The methodology established by these guidelines shall not create a presumption that a project will not result in significant impacts related to air quality, noise, safety, or any other impact associated with transportation. Notwithstanding the foregoing, the adequacy of parking for a project shall not support a finding of significance pursuant to this section.
(4) This subdivision does not preclude the application of local general plan policies, zoning codes, conditions of approval, thresholds, or any other planning requirements pursuant to the police power or any other authority.
(5) On or before July 1, 2014, the Office of Planning and Research shall circulate a draft revision prepared pursuant to paragraph (1).
(c) (1) The Office of Planning and Research may adopt guidelines pursuant to Section 21083 establishing alternative metrics to the metrics used for traffic levels of service for transportation impacts outside transit priority areas. The alternative metrics may include the retention of traffic levels of service, where appropriate and as determined by the office.
(2) This subdivision shall not affect the standard of review that would apply to the new guidelines adopted pursuant to this section.
(d) (1) Aesthetic and parking impacts of a residential, mixed-use residential, or employment center project on an infill site within a transit priority area shall not be considered significant impacts on the environment.
(2) (A) This subdivision does not affect, change, or modify the authority of a lead agency to consider aesthetic impacts pursuant to local design review ordinances or other discretionary powers provided by other laws or policies.
(B) For the purposes of this subdivision, aesthetic impacts do not include impacts on historical or cultural resources.
(e) This section does not affect the authority of a public agency to establish or adopt thresholds of significance that are more protective of the environment.
(Added by Stats. 2013, Ch. 386, Sec. 5. Effective January 1, 2014.)

CHAPTER 3. State Agencies, Boards and Commissions [21100 - 21108]
(Chapter 3 added by Stats. 1970, Ch. 1433.)

21100.

(a) All lead agencies shall prepare, or cause to be prepared by contract, and certify the completion of, an environmental impact report on any project which they propose to carry out or approve that may have a significant effect on the environment. Whenever feasible, a standard format shall be used for environmental impact reports.
(b) The environmental impact report shall include a detailed statement setting forth all of the following:
(1) All significant effects on the environment of the proposed project.
(2) In a separate section:
(A) Any significant effect on the environment that cannot be avoided if the project is implemented.
(B) Any significant effect on the environment that would be irreversible if the project is implemented.
(3) Mitigation measures proposed to minimize significant effects on the environment, including, but not limited to, measures to reduce the wasteful, inefficient, and unnecessary consumption of energy.
(4) Alternatives to the proposed project.
(5) The growth-inducing impact of the proposed project.
(c) The report shall also contain a statement briefly indicating the reasons for determining that various effects on the environment of a project are not significant and consequently have not been discussed in detail in the environmental impact report.
(d) For purposes of this section, any significant effect on the environment shall be limited to substantial, or potentially substantial, adverse changes in physical conditions which exist within the area as defined in Section 21060.5.
(e) Previously approved land use documents, including, but not limited to, general plans, specific plans, and local coastal plans, may be used in cumulative impact analysis.
(Amended by Stats. 1994, Ch. 1230, Sec. 9. Effective September 30, 1994.)

21100.1.

The information described in subparagraph (B) of paragraph (2) of subdivision (b) of Section 21100 shall be required only in environmental impact reports prepared in connection with the following:
(a) The adoption, amendment, or enactment of a plan, policy, or ordinance of a public agency.
(b) The adoption by a local agency formation commission of a resolution making determinations.
(c) A project which will be subject to the requirement for preparing an environmental impact statement pursuant to the requirements of the National Environmental Policy Act of 1969.
(Amended by Stats. 1994, Ch. 1230, Sec. 10. Effective September 30, 1994.)

21100.2.

(a) (1) For projects described in subdivision (c) of Section 21065, each state agency shall establish, by resolution or order, time limits that do not exceed the following:
(A) One year for completing and certifying environmental impact reports.
(B) One hundred eighty days for completing and adopting negative declarations.
(2) The time limits specified in paragraph (1) shall apply only to those circumstances in which the state agency is the lead agency for a project. These resolutions or orders may establish different time limits for different types or classes of projects, but all limits shall be measured from the date on which an application requesting approval of the project is received and accepted as complete by the state agency.
(3) No application for a project may be deemed incomplete for lack of a waiver of time periods prescribed in state regulations.
(4) The resolutions or orders required by this section may provide for a reasonable extension of the time period in the event that compelling circumstances justify additional time and the project applicant consents thereto.
(b) If a draft environmental impact report, environmental impact report, or focused environmental impact report is prepared under a contract to a state agency, the contract shall be executed within 45 days from the date on which the state agency sends a notice of preparation pursuant to Section 21080.4. The state agency may take longer to execute the contract if the project applicant and the state agency mutually agree to an extension of the time limit provided by this subdivision.
(c) (1) A public agency may establish a process that would allow an applicant for a natural gas pipeline safety enhancement activity to elect to pay additional fees to be used by the public agency in determining whether to approve a natural gas pipeline safety enhancement activity by entering into a contract with one or more third parties to assist the public agency to perform the analysis, consistent with Article VII of the California Constitution and Section 19130 of the Government Code and the charter of a chartered city or county, as applicable. The public agency may, but is not required to, offer an applicant the option to pay those fees and subject a project to this process.
(2) All fees paid by a natural gas pipeline safety enhancement activity applicant shall be used exclusively for analysis of that applicant's application for certification.
(3) For purposes of this section, "natural gas pipeline safety enhancement activity" has the same meaning as defined in paragraph (1) of subdivision (d) of Section 21080.21.
(d) This section shall remain in effect only until January 1, 2018, and as of that date is repealed, unless a later enacted statute, that is enacted before January 1, 2018, deletes or extends that date.
(Amended by Stats. 2012, Ch. 487, Sec. 4. Effective September 23, 2012. Repealed as of January 1, 2018, by its own provisions. See later operative version added by Sec. 5 of Ch. 487.)

21100.2.

(a) (1) For projects described in subdivision (c) of Section 21065, each state agency shall establish, by resolution or order, time limits that do not exceed the following:

(A) One year for completing and certifying environmental impact reports.
(B) One hundred eighty days for completing and adopting negative declarations.
(2) The time limits specified in paragraph (1) shall apply only to those circumstances in which the state agency is the lead agency for a project. These resolutions or orders may establish different time limits for different types or classes of projects, but all limits shall be measured from the date on which an application requesting approval of the project is received and accepted as complete by the state agency.
(3) No application for a project may be deemed incomplete for lack of a waiver of time periods prescribed in state regulations.
(4) The resolutions or orders required by this section may provide for a reasonable extension of the time period in the event that compelling circumstances justify additional time and the project applicant consents thereto.
(b) If a draft environmental impact report, environmental impact report, or focused environmental impact report is prepared under a contract to a state agency, the contract shall be executed within 45 days from the date on which the state agency sends a notice of preparation pursuant to Section 21080.4. The state agency may take longer to execute the contract if the project applicant and the state agency mutually agree to an extension of the time limit provided by this subdivision.
(c) This section shall become operative January 1, 2018.
(Repealed (in Sec. 4) and added by Stats. 2012, Ch. 487, Sec. 5. Effective September 23, 2012. Section operative January 1, 2018, by its own provisions.)

21101.

In regard to any proposed federal project in this state which may have a significant effect on the environment and on which the state officially comments, the state officials responsible for such comments shall include in their report a detailed statement setting forth the matters specified in Section 21100 prior to transmitting the comments of the state to the federal government. No report shall be transmitted to the federal government unless it includes such a detailed statement as to the matters specified in Section 21100.
(Added by Stats. 1970, Ch. 1433.)

21102.

No state agency, board, or commission shall request funds, nor shall any state agency, board, or commission which authorizes expenditures of funds, other than funds appropriated in the Budget Act, authorize funds for expenditure for any project, other than a project involving only feasibility or planning studies for possible future actions which the agency, board, or commission has not approved, adopted or funded, which may have a significant effect on the environment unless such request or authorization is accompanied by an environmental impact report. Feasibility and planning studies exempted by this section from the preparation of an environmental impact report shall nevertheless include consideration of environmental factors.
(Amended by Stats. 1972, Ch. 1154.)

21104.

(a) Prior to completing an environmental impact report, the state lead agency shall consult with, and obtain comments from, each responsible agency, trustee agency, any public agency that has jurisdiction by law with respect to the project, and any city or county that borders on a city or county within which the project is located unless otherwise designated annually by agreement between the state lead agency and the city or county, and may consult with any person who has special expertise with respect to any environmental impact involved. In the case of a project described in subdivision (c) of Section 21065, the state lead agency shall, upon the request of the applicant, provide for early consultation to identify the range of actions, alternatives, mitigation measures, and significant effects to be analyzed in depth in the environmental impact report. The state lead agency may consult with persons identified by the applicant who the applicant believes will be concerned with the environmental effects of the project and may consult with members of the public who have made a written request to be consulted on the project. A request by the applicant for early consultation shall be made not later than 30 days after the determination required by Section 21080.1 with respect to the project.
(b) The state lead agency shall consult with, and obtain comments from, the State Air Resources Board in preparing an environmental impact report on a highway or freeway project, as to the air pollution impact of the potential vehicular use of the highway or freeway.
(c) A responsible agency or other public agency shall only make substantive comments regarding those activities involved in a project that are within an area of expertise of the agency or that are required to be carried out or approved by the agency. Those comments shall be supported by specific documentation.
(Amended by Stats. 2004, Ch. 744, Sec. 3. Effective January 1, 2005.)

21104.2.

The state lead agency shall consult with, and obtain written findings from, the Department of Fish and Game in preparing an environmental impact report on a project, as to the impact of the project on the continued existence of any endangered species or threatened species pursuant to Article 4 (commencing with Section 2090) of Chapter 1.5 of Division 3 of the Fish and Game Code.
(Added by Stats. 1984, Ch. 1240, Sec. 3.)

21105.

The state lead agency shall include the environmental impact report as a part of the regular project report used in the existing review and budgetary process. It shall be available to the Legislature. It shall also be available for inspection by any member of the general public, who may secure a copy thereof by paying for the actual cost of such a copy. It shall be filed by the state lead agency with the appropriate local planning agency of any city, county, or city and county which will be affected by the project.
(Amended by Stats. 1977, Ch. 1200.)

21106.

All state agencies, boards, and commissions shall request in their budgets the funds necessary to protect the environment in relation to problems caused by their activities.
(Added by Stats. 1970, Ch. 1433.)

21108.

(a) If a state agency approves or determines to carry out a project that is subject to this division, the state agency shall file notice of that approval or that determination with the Office of Planning and Research. The notice shall identify the person or persons in subdivision (b) or (c) of Section 21065, as reflected in the agency's record of proceedings, and indicate the determination of the state agency whether the project will, or will not, have a significant effect on the environment and shall indicate whether an environmental impact report has been prepared pursuant to this division.
(b) If a state agency determines that a project is not subject to this division pursuant to subdivision (b) of Section 21080 or Section 21172, and the state agency approves or determines to carry out the project, the state agency or the person specified in subdivision (b) or (c) of Section 21065 may file notice of the determination with the Office of Planning and Research. A notice filed pursuant to this subdivision shall identify the person or persons in subdivision (b) or (c) of Section 21065, as reflected in the agency's record of proceedings. A notice filed pursuant to this subdivision by a person specified in subdivision (b) or (c) of Section 21065 shall have a certificate of determination attached to it issued by the state agency responsible for making the determination that the project is not subject to this division pursuant to subdivision (b) of Section 21080 or pursuant to Section 21172. The certificate of determination may be in the form of a certified copy of an existing document or record of the state agency.
(c) A notice filed pursuant to this section shall be available for public inspection, and a list of these notices shall be posted on a weekly basis in the Office of Planning and Research. Each list shall remain posted for a period of 30 days. The Office of Planning and Research shall retain each notice for not less than 12 months.
(Amended by Stats. 2012, Ch. 162, Sec. 149. Effective January 1, 2013.)

CHAPTER 4. Local Agencies [21150 - 21154]
(Chapter 4 added by Stats. 1970, Ch. 1433.)

21150.

State agencies, boards, and commissions, responsible for allocating state or federal funds on a project-by-project basis to local agencies for any project which may have a significant effect on the environment, shall require from the responsible local governmental agency a detailed statement setting forth the matters specified in Section 21100 prior to the allocation of any funds other than funds solely for

projects involving only feasibility or planning studies for possible future actions which the agency, board, or commission has not approved, adopted, or funded.
(Amended by Stats. 1972, Ch. 1154.)

21151.

(a) All local agencies shall prepare, or cause to be prepared by contract, and certify the completion of, an environmental impact report on any project that they intend to carry out or approve which may have a significant effect on the environment. When a report is required by Section 65402 of the Government Code, the environmental impact report may be submitted as a part of that report.
(b) For purposes of this section, any significant effect on the environment shall be limited to substantial, or potentially substantial, adverse changes in physical conditions which exist within the area as defined in Section 21060.5.
(c) If a nonelected decisionmaking body of a local lead agency certifies an environmental impact report, approves a negative declaration or mitigated negative declaration, or determines that a project is not subject to this division, that certification, approval, or determination may be appealed to the agency's elected decisionmaking body, if any.
(Amended by Stats. 2002, Ch. 1121, Sec. 2. Effective January 1, 2003.)

21151.1.

(a) Notwithstanding paragraph (6) of subdivision (b) of Section 21080, or Section 21080.5 or 21084, or any other provision of law, except as provided in this section, a lead agency shall prepare or cause to be prepared by contract, and certify the completion of, an environmental impact report or, if appropriate, a modification, addendum, or supplement to an existing environmental impact report, for a project involving any of the following:
(1) The burning of municipal wastes, hazardous waste, or refuse-derived fuel, including, but not limited to, tires, if the project is either of the following:
(A) The construction of a new facility.
(B) The expansion of an existing facility that burns hazardous waste that would increase its permitted capacity by more than 10 percent.
(2) The initial issuance of a hazardous waste facilities permit to a land disposal facility, as defined in subdivision (d) of Section 25199.1 of the Health and Safety Code.
(3) The initial issuance of a hazardous waste facilities permit pursuant to Section 25200 of the Health and Safety Code to an offsite large treatment facility, as defined pursuant to subdivision (d) of Section 25205.1 of the Health and Safety Code.
(4) A base reuse plan as defined in Section 21083.8.1. The Legislature hereby finds that no reimbursement is required pursuant to Section 6 of Article XIII B of the California Constitution for an environmental impact report for a base reuse plan if an environmental impact report is otherwise required for that base reuse plan pursuant to any other provision of this division.

(b) For purposes of clause (ii) of subparagraph (A) of paragraph (1) of subdivision (a), the amount of expansion of an existing facility shall be calculated by comparing the proposed facility capacity with whichever of the following is applicable:
(1) The facility capacity authorized in the facility's hazardous waste facilities permit pursuant to Section 25200 of the Health and Safety Code or its grant of interim status pursuant to Section 25200.5 of the Health and Safety Code, or the facility capacity authorized in a state or local agency permit allowing the construction or operation of a facility for the burning of hazardous waste, granted before January 1, 1990.
(2) The facility capacity authorized in the facility's original hazardous waste facilities permit, grant of interim status, or a state or local agency permit allowing the construction or operation of a facility for the burning of hazardous waste, granted on or after January 1, 1990.
(c) For purposes of paragraphs (2) and (3) of subdivision (a), the initial issuance of a hazardous waste facilities permit does not include the issuance of a closure or postclosure permit pursuant to Chapter 6.5 (commencing with Section 25100) of Division 20 of the Health and Safety Code.
(d) Paragraph (1) of subdivision (a) does not apply to a project that does any of the following:
(1) Exclusively burns digester gas produced from manure or any other solid or semisolid animal waste.
(2) Exclusively burns methane gas produced from a disposal site, as defined in Section 40122, that is used only for the disposal of solid waste, as defined in Section 40191.
(3) Exclusively burns forest, agricultural, wood, or other biomass wastes.
(4) Exclusively burns hazardous waste in an incineration unit that is transportable and that is either at a site for not longer than three years or is part of a remedial or removal action. For purposes of this paragraph, "transportable" means any equipment that performs a "treatment" as defined in Section 66216 of Title 22 of the California Code of Regulations, and that is transported on a vehicle as defined in Section 66230 of Title 22 of the California Code of Regulations, as those sections read on June 1, 1991.
(5) Exclusively burns refinery waste in a flare on the site of generation.
(6) Exclusively burns in a flare methane gas produced at a municipal sewage treatment plant.
(7) Exclusively burns hazardous waste, or exclusively burns hazardous waste as a supplemental fuel, as part of a research, development, or demonstration project that, consistent with federal regulations implementing the Resource Conservation and Recovery Act of 1976, as amended (42 U.S.C. Sec. 6901 et seq.), has been determined to be innovative and experimental by the Department of Toxic Substances Control and that is limited in type and quantity of waste to that necessary to determine the efficacy and performance capabilities of the technology or process. However, a facility that operated as a research, development, or demonstration project and for which an application is thereafter submitted for a hazardous waste facility permit for operation other than as a research, development, or demonstration project shall be considered a new facility for the burning of hazardous waste and shall be subject to subdivision (a) of Section 21151.1.

(8) Exclusively burns soils contaminated only with petroleum fuels or the vapors from these soils.
(9) Exclusively treats less than 3,000 pounds of hazardous waste per day in a thermal processing unit operated in the absence of open flame, and submits a worst-case health risk assessment of the technology to the Department of Toxic Substances Control for review and distribution to the interested public. This assessment shall be prepared in accordance with guidelines set forth in the Air Toxics Assessment Manual of the California Air Pollution Control Officers Association.
(10) Exclusively burns less than 1,200 pounds per day of medical waste, as defined in Section 117690 of the Health and Safety Code, on hospital sites.
(11) Exclusively burns chemicals and fuels as part of firefighter training.
(12) Exclusively conducts open burns of explosives subject to the requirements of the air pollution control district or air quality management district and in compliance with OSHA and Cal-OSHA regulations.
(13) Exclusively conducts onsite burning of less than 3,000 pounds per day of fumes directly from a manufacturing or commercial process.
(14) Exclusively conducts onsite burning of hazardous waste in an industrial furnace that recovers hydrogen chloride from the flue gas if the hydrogen chloride is subsequently sold, distributed in commerce, or used in a manufacturing process at the site where the hydrogen chloride is recovered, and the burning is in compliance with the requirements of the air pollution control district or air quality management district and the Department of Toxic Substances Control.
(e) Paragraph (1) of subdivision (a) does not apply to a project for which the State Energy Resources Conservation and Development Commission has assumed jurisdiction under Chapter 6 (commencing with Section 25500) of Division 15.
(f) Paragraphs (2) and (3) of subdivision (a) do not apply if the facility only manages hazardous waste that is identified or listed pursuant to Section 25140 or 25141 of the Health and Safety Code on or after January 1, 1992, but not before that date, or only conducts activities that are regulated pursuant to Chapter 6.5 (commencing with Section 25100) of Division 20 of the Health and Safety Code on or after January 1, 1992, but not before that date.
(g) This section does not exempt a project from any other requirement of this division.
(h) For purposes of this section, offsite facility means a facility that serves more than one generator of hazardous waste.
(Amended by Stats. 2012, Ch. 548, Sec. 10. Effective January 1, 2013.)

21151.2.

To promote the safety of pupils and comprehensive community planning the governing board of each school district before acquiring title to property for a new school site or for an addition to a present school site, shall give the planning commission having jurisdiction notice in writing of the proposed acquisition. The planning commission shall investigate the proposed site and within 30 days after receipt of the notice shall submit to the governing board a written report of the investigation and its recommendations concerning acquisition of the site.

The governing board shall not acquire title to the property until the report of the planning commission has been received. If the report does not favor the acquisition of the property for a school site, or for an addition to a present school site, the governing board of the school district shall not acquire title to the property until 30 days after the commission's report is received.
(Added by Stats. 1987, Ch. 1452, Sec. 533.)

21151.4.

(a) An environmental impact report shall not be certified or a negative declaration shall not be approved for any project involving the construction or alteration of a facility within one-fourth of a mile of a school that might reasonably be anticipated to emit hazardous air emissions, or that would handle an extremely hazardous substance or a mixture containing extremely hazardous substances in a quantity equal to or greater than the state threshold quantity specified pursuant to subdivision (j) of Section 25532 of the Health and Safety Code, that may pose a health or safety hazard to persons who would attend or would be employed at the school, unless both of the following occur:
(1) The lead agency preparing the environmental impact report or negative declaration has consulted with the school district having jurisdiction regarding the potential impact of the project on the school.
(2) The school district has been given written notification of the project not less than 30 days prior to the proposed certification of the environmental impact report or approval of the negative declaration.
(b) As used in this section, the following definitions apply:
(1) "Extremely hazardous substance" means an extremely hazardous substance as defined pursuant to paragraph (2) of subdivision (g) of Section 25532 of the Health and Safety Code.
(2) "Hazardous air emissions" means emissions into the ambient air of air contaminants that have been identified as a toxic air contaminant by the State Air Resources Board or by the air pollution control officer for the jurisdiction in which the project is located. As determined by the air pollution control officer, hazardous air emissions also means emissions into the ambient air of a substance identified in subdivisions (a) to (f), inclusive, of Section 44321 of the Health and Safety Code.
(Amended by Stats. 2008, Ch. 148, Sec. 1. Effective January 1, 2009.)

21151.5.

(a) (1) For projects described in subdivision (c) of Section 21065, each local agency shall establish, by ordinance or resolution, time limits that do not exceed the following:
(A) One year for completing and certifying environmental impact reports.
(B) One hundred eighty days for completing and adopting negative declarations.
(2) The time limits specified in paragraph (1) shall apply only to those circumstances in which the local agency is the lead agency for a project. These ordinances or resolutions may establish different time limits for different types or classes of projects and different types of environmental impact reports, but all

limits shall be measured from the date on which an application requesting approval of the project is received and accepted as complete by the local agency.
(3) No application for a project may be deemed incomplete for lack of a waiver of time periods prescribed by local ordinance or resolution.
(4) The ordinances or resolutions required by this section may provide for a reasonable extension of the time period in the event that compelling circumstances justify additional time and the project applicant consents thereto.
(b) If a draft environmental impact report, environmental impact report, or focused environmental impact report is prepared under a contract to a local agency, the contract shall be executed within 45 days from the date on which the local agency sends a notice of preparation pursuant to Section 21080.4. The local agency may take longer to execute the contract if the project applicant and the local agency mutually agree to an extension of the time limit provided by this subdivision.
(Amended by Stats. 1996, Ch. 808, Sec. 3. Effective January 1, 1997.)

21151.7.

Notwithstanding any other provision of law, a lead agency shall prepare or cause to be prepared by contract, and certify the completion of, an environmental impact report for any open-pit mining operation that is subject to the permit requirements or reclamation plan requirements of the Surface Mining and Reclamation Act of 1975 (Chapter 9 (commencing with Section 2710) of Division 2) and utilizes a cyanide heap-leaching process for the purpose of producing gold or other metallic minerals.
(Amended by Stats. 2002, Ch. 1154, Sec. 5.5. Effective January 1, 2003. Operative April 7, 2003, pursuant to Stats. 2003, Ch. 3, Secs. 2 and 3. Note: Stats. 2003, Ch. 3 (effective April 7) repealed the condition in Stats. 2002, Ch. 1154, Sec. 8, which had prevented Ch. 1154 from becoming operative.)

21151.8.

(a) An environmental impact report shall not be certified or a negative declaration shall not be approved for a project involving the purchase of a schoolsite or the construction of a new elementary or secondary school by a school district unless all of the following occur:
(1) The environmental impact report or negative declaration includes information that is needed to determine if the property proposed to be purchased, or to be constructed upon, is any of the following:
(A) The site of a current or former hazardous waste disposal site or solid waste disposal site and, if so, whether the wastes have been removed.
(B) A hazardous substance release site identified by the Department of Toxic Substances Control in a current list adopted pursuant to Section 25356 of the Health and Safety Code for removal or remedial action pursuant to Chapter 6.8 (commencing with Section 25300) of Division 20 of the Health and Safety Code.
(C) A site that contains one or more pipelines, situated underground or aboveground, that carries hazardous substances, extremely hazardous substances,

or hazardous wastes, unless the pipeline is a natural gas line that is used only to supply natural gas to that school or neighborhood, or other nearby schools.
(D) A site that is within 500 feet of the edge of the closest traffic lane of a freeway or other busy traffic corridor.
(2) (A) The school district, as the lead agency, in preparing the environmental impact report or negative declaration has notified in writing and consulted with the administering agency in which the proposed schoolsite is located, pursuant to Section 2735.3 of Title 19 of the California Code of Regulations, and with any air pollution control district or air quality management district having jurisdiction in the area, to identify both permitted and nonpermitted facilities within that district's authority, including, but not limited to, freeways and busy traffic corridors, large agricultural operations, and railyards, within one-fourth of a mile of the proposed schoolsite, that might reasonably be anticipated to emit hazardous emissions or handle hazardous or extremely hazardous substances or waste. The notification by the school district, as the lead agency, shall include a list of the locations for which information is sought.
(B) Each administering agency, air pollution control district, or air quality management district receiving written notification from a lead agency to identify facilities pursuant to subparagraph (A) shall provide the requested information and provide a written response to the lead agency within 30 days of receiving the notification. The environmental impact report or negative declaration shall be conclusively presumed to comply with subparagraph (A) as to the area of responsibility of an agency that does not respond within 30 days.
(C) If the school district, as a lead agency, has carried out the consultation required by subparagraph (A), the environmental impact report or the negative declaration shall be conclusively presumed to comply with subparagraph (A), notwithstanding any failure of the consultation to identify an existing facility or other pollution source specified in subparagraph (A).
(3) The governing board of the school district makes one of the following written findings:
(A) Consultation identified no facilities of this type or other significant pollution sources specified in paragraph (2).
(B) The facilities or other pollution sources specified in paragraph (2) exist, but one of the following conditions applies:
(i) The health risks from the facilities or other pollution sources do not and will not constitute an actual or potential endangerment of public health to persons who would attend or be employed at the proposed school.
(ii) Corrective measures required under an existing order by another agency having jurisdiction over the facilities or other pollution sources will, before the school is occupied, result in the mitigation of all chronic or accidental hazardous air emissions to levels that do not constitute an actual or potential endangerment of public health to persons who would attend or be employed at the proposed school. If the governing board makes a finding pursuant to this clause, it shall also make a subsequent finding, prior to occupancy of the school, that the emissions have been so mitigated.
(iii) For a schoolsite with a boundary that is within 500 feet of the edge of the closest traffic lane of a freeway or other busy traffic corridor, the governing board of the school district determines, through analysis pursuant to paragraph (2) of

subdivision (b) of Section 44360 of the Health and Safety Code, based on appropriate air dispersion modeling, and after considering any potential mitigation measures, that the air quality at the proposed site is such that neither short-term nor long-term exposure poses significant health risks to pupils.
(C) The facilities or other pollution sources specified in paragraph (2) exist, but conditions in clause (i), (ii), or (iii) of subparagraph (B) cannot be met, and the school district is unable to locate an alternative site that is suitable due to a severe shortage of sites that meet the requirements in subdivision (a) of Section 17213 of the Education Code. If the governing board makes this finding, the governing board shall adopt a statement of overriding considerations pursuant to Section 15093 of Title 14 of the California Code of Regulations.
(b) As used in this section, the following definitions shall apply:
(1) “Hazardous substance” means any substance defined in Section 25316 of the Health and Safety Code.
(2) “Extremely hazardous substances” means an extremely hazardous substance as defined pursuant to paragraph (2) of subdivision (g) of Section 25532 of the Health and Safety Code.
(3) “Hazardous waste” means any waste defined in Section 25117 of the Health and Safety Code.
(4) “Hazardous waste disposal site” means any site defined in Section 25114 of the Health and Safety Code.
(5) “Hazardous air emissions” means emissions into the ambient air of air contaminants that have been identified as a toxic air contaminant by the State Air Resources Board or by the air pollution control officer for the jurisdiction in which the project is located. As determined by the air pollution control officer, hazardous air emissions also means emissions into the ambient air from any substances identified in subdivisions (a) to (f), inclusive, of Section 44321 of the Health and Safety Code.
(6) “Administering agency” means an agency authorized pursuant to Section 25502 of the Health and Safety Code to implement and enforce Chapter 6.95 (commencing with Section 25500) of Division 20 of the Health and Safety Code.
(7) “Handle” means handle as defined in Article 1 (commencing with Section 25500) of Chapter 6.95 of Division 20 of the Health and Safety Code.
(8) “Facilities” means any source with a potential to use, generate, emit, or discharge hazardous air pollutants, including, but not limited to, pollutants that meet the definition of a hazardous substance, and whose process or operation is identified as an emission source pursuant to the most recent list of source categories published by the California Air Resources Board.
(9) “Freeway or other busy traffic corridors” means those roadways that, on an average day, have traffic in excess of 50,000 vehicles in a rural area, as defined in Section 50101 of the Health and Safety Code, and 100,000 vehicles in an urban area, as defined in Section 50104.7 of the Health and Safety Code.
(Amended by Stats. 2008, Ch. 148, Sec. 2. Effective January 1, 2009.)

21151.9.

Whenever a city or county determines that a project, as defined in Section 10912 of the Water Code, is subject to this division, it shall comply with Part 2.10 (commencing with Section 10910) of Division 6 of the Water Code.
(Amended by Stats. 2001, Ch. 643, Sec. 2. Effective January 1, 2002.)

21152.

(a) If a local agency approves or determines to carry out a project that is subject to this division, the local agency shall file notice of the approval or the determination within five working days after the approval or determination becomes final, with the county clerk of each county in which the project will be located. The notice shall identify the person or persons in subdivision (b) or (c) of Section 21065, as reflected in the agency's record of proceedings, and indicate the determination of the local agency whether the project will, or will not, have a significant effect on the environment and shall indicate whether an environmental impact report has been prepared pursuant to this division. The notice shall also include certification that the final environmental impact report, if one was prepared, together with comments and responses, is available to the general public.
(b) If a local agency determines that a project is not subject to this division pursuant to subdivision (b) of Section 21080 or pursuant to Section 21172, and the local agency approves or determines to carry out the project, the local agency or the person specified in subdivision (b) or (c) of Section 21065 may file a notice of the determination with the county clerk of each county in which the project will be located. A notice filed pursuant to this subdivision shall identify the person or persons in subdivision (b) or (c) of Section 21065, as reflected in the agency's record of proceedings. A notice filed pursuant to this subdivision by a person specified in subdivision (b) or (c) of Section 21065 shall have a certificate of determination attached to it issued by the local agency responsible for making the determination that the project is not subject to this division pursuant to subdivision (b) of Section 21080 or Section 21172. The certificate of determination may be in the form of a certified copy of an existing document or record of the local agency.
(c) A notice filed pursuant to this section shall be available for public inspection, and shall be posted within 24 hours of receipt in the office of the county clerk. A notice shall remain posted for a period of 30 days. Thereafter, the clerk shall return the notice to the local agency with a notation of the period it was posted. The local agency shall retain the notice for not less than 12 months.
(Amended by Stats. 2012, Ch. 162, Sec. 150. Effective January 1, 2013.)

21152.1.

(a) When a local agency determines that a project is not subject to this division pursuant to Section 21159.22, 21159.23, or 21159.24, and it approves or determines to carry out that project, the local agency or the person specified in subdivision (b) or (c) of Section 21065, shall file notice of the determination with the Office of Planning and Research.

(b) All notices filed pursuant to this section shall be available for public inspection, and a list of these notices shall be posted on a weekly basis in the Office of Planning and Research. Each list shall remain posted for a period of 30 days.
(c) Failure to file the notice required by this section does not affect the validity of a project.
(d) Nothing in this section affects the time limitations contained in Section 21167.
(Added by Stats. 2003, Ch. 837, Sec. 1. Effective January 1, 2004.)

21153.

(a) Prior to completing an environmental impact report, every local lead agency shall consult with, and obtain comments from, each responsible agency, trustee agency, any public agency that has jurisdiction by law with respect to the project, and any city or county that borders on a city or county within which the project is located unless otherwise designated annually by agreement between the local lead agency and the city or county, and may consult with any person who has special expertise with respect to any environmental impact involved. In the case of a project described in subdivision (c) of Section 21065, the local lead agency shall, upon the request of the project applicant, provide for early consultation to identify the range of actions, alternatives, mitigation measures, and significant effects to be analyzed in depth in the environmental impact report. The local lead agency may consult with persons identified by the project applicant who the applicant believes will be concerned with the environmental effects of the project and may consult with members of the public who have made written request to be consulted on the project. A request by the project applicant for early consultation shall be made not later than 30 days after the date that the determination required by Section 21080.1 was made with respect to the project. The local lead agency may charge and collect a fee from the project applicant in an amount that does not exceed the actual costs of the consultations.
(b) In the case of a project described in subdivision (a) of Section 21065, the lead agency may provide for early consultation to identify the range of actions, alternatives, mitigation measures, and significant effects to be analyzed in depth in the environmental impact report. At the request of the lead agency, the Office of Planning and Research shall ensure that each responsible agency, and any public agency that has jurisdiction by law with respect to the project, is notified regarding any early consultation.
(c) A responsible agency or other public agency shall only make substantive comments regarding those activities involved in a project that are within an area of expertise of the agency or that are required to be carried out or approved by the agency. Those comments shall be supported by specific documentation.
(Amended by Stats. 2004, Ch. 744, Sec. 4. Effective January 1, 2005.)

21154.

Whenever any state agency, board, or commission issues an order which requires a local agency to carry out a project which may have a significant effect on the environment, any environmental impact report which the local agency may prepare

shall be limited to consideration of those factors and alternatives which will not conflict with such order.
(Added by Stats. 1972, Ch. 1154.)

CHAPTER 4.2. Implementation of the Sustainable Communities Strategy [21155 - 21155.4]
(Chapter 4.2 added by Stats. 2008, Ch. 728, Sec. 14.)

21155.

(a) This chapter applies only to a transit priority project that is consistent with the general use designation, density, building intensity, and applicable policies specified for the project area in either a sustainable communities strategy or an alternative planning strategy, for which the State Air Resources Board, pursuant to subparagraph (H) of paragraph (2) of subdivision (b) of Section 65080 of the Government Code, has accepted a metropolitan planning organization's determination that the sustainable communities strategy or the alternative planning strategy would, if implemented, achieve the greenhouse gas emission reduction targets.
(b) For purposes of this chapter, a transit priority project shall (1) contain at least 50 percent residential use, based on total building square footage and, if the project contains between 26 percent and 50 percent nonresidential uses, a floor area ratio of not less than 0.75; (2) provide a minimum net density of at least 20 dwelling units per acre; and (3) be within one-half mile of a major transit stop or high-quality transit corridor included in a regional transportation plan. A major transit stop is as defined in Section 21064.3, except that, for purposes of this section, it also includes major transit stops that are included in the applicable regional transportation plan. For purposes of this section, a high-quality transit corridor means a corridor with fixed route bus service with service intervals no longer than 15 minutes during peak commute hours. A project shall be considered to be within one-half mile of a major transit stop or high-quality transit corridor if all parcels within the project have no more than 25 percent of their area farther than one-half mile from the stop or corridor and if not more than 10 percent of the residential units or 100 units, whichever is less, in the project are farther than one-half mile from the stop or corridor.
(Added by Stats. 2008, Ch. 728, Sec. 14. Effective January 1, 2009.)

21155.1.

If the legislative body finds, after conducting a public hearing, that a transit priority project meets all of the requirements of subdivisions (a) and (b) and one of the requirements of subdivision (c), the transit priority project is declared to be a sustainable communities project and shall be exempt from this division.
(a) The transit priority project complies with all of the following environmental criteria:
(1) The transit priority project and other projects approved prior to the approval of the transit priority project but not yet built can be adequately served by existing

utilities, and the transit priority project applicant has paid, or has committed to pay, all applicable in-lieu or development fees.
(2) (A) The site of the transit priority project does not contain wetlands or riparian areas and does not have significant value as a wildlife habitat, and the transit priority project does not harm any species protected by the federal Endangered Species Act of 1973 (16 U.S.C. Sec. 1531 et seq.), the Native Plant Protection Act (Chapter 10 (commencing with Section 1900) of Division 2 of the Fish and Game Code), or the California Endangered Species Act (Chapter 1.5 (commencing with Section 2050) of Division 3 of the Fish and Game Code), and the project does not cause the destruction or removal of any species protected by a local ordinance in effect at the time the application for the project was deemed complete.
(B) For the purposes of this paragraph, “wetlands” has the same meaning as in the United States Fish and Wildlife Service Manual, Part 660 FW 2 (June 21, 1993).
(C) For the purposes of this paragraph:
(i) “Riparian areas” means those areas transitional between terrestrial and aquatic ecosystems and that are distinguished by gradients in biophysical conditions, ecological processes, and biota. A riparian area is an area through which surface and subsurface hydrology connect waterbodies with their adjacent uplands. A riparian area includes those portions of terrestrial ecosystems that significantly influence exchanges of energy and matter with aquatic ecosystems. A riparian area is adjacent to perennial, intermittent, and ephemeral streams, lakes, and estuarine-marine shorelines.
(ii) “Wildlife habitat” means the ecological communities upon which wild animals, birds, plants, fish, amphibians, and invertebrates depend for their conservation and protection.
(iii) Habitat of “significant value” includes wildlife habitat of national, statewide, regional, or local importance; habitat for species protected by the federal Endangered Species Act of 1973 (16 U.S.C. Sec. 1531, et seq.), the California Endangered Species Act (Chapter 1.5 (commencing with Section 2050) of Division 3 of the Fish and Game Code), or the Native Plant Protection Act (Chapter 10 (commencing with Section 1900) of Division 2 of the Fish and Game Code); habitat identified as candidate, fully protected, sensitive, or species of special status by local, state, or federal agencies; or habitat essential to the movement of resident or migratory wildlife.
(3) The site of the transit priority project is not included on any list of facilities and sites compiled pursuant to Section 65962.5 of the Government Code.
(4) The site of the transit priority project is subject to a preliminary endangerment assessment prepared by an environmental assessor to determine the existence of any release of a hazardous substance on the site and to determine the potential for exposure of future occupants to significant health hazards from any nearby property or activity.
(A) If a release of a hazardous substance is found to exist on the site, the release shall be removed or any significant effects of the release shall be mitigated to a level of insignificance in compliance with state and federal requirements.
(B) If a potential for exposure to significant hazards from surrounding properties or activities is found to exist, the effects of the potential exposure shall be mitigated to a level of insignificance in compliance with state and federal requirements.

(5) The transit priority project does not have a significant effect on historical resources pursuant to Section 21084.1.
(6) The transit priority project site is not subject to any of the following:
(A) A wildland fire hazard, as determined by the Department of Forestry and Fire Protection, unless the applicable general plan or zoning ordinance contains provisions to mitigate the risk of a wildland fire hazard.
(B) An unusually high risk of fire or explosion from materials stored or used on nearby properties.
(C) Risk of a public health exposure at a level that would exceed the standards established by any state or federal agency.
(D) Seismic risk as a result of being within a delineated earthquake fault zone, as determined pursuant to Section 2622, or a seismic hazard zone, as determined pursuant to Section 2696, unless the applicable general plan or zoning ordinance contains provisions to mitigate the risk of an earthquake fault or seismic hazard zone.
(E) Landslide hazard, flood plain, flood way, or restriction zone, unless the applicable general plan or zoning ordinance contains provisions to mitigate the risk of a landslide or flood.
(7) The transit priority project site is not located on developed open space.
(A) For the purposes of this paragraph, “developed open space” means land that meets all of the following criteria:
(i) Is publicly owned, or financed in whole or in part by public funds.
(ii) Is generally open to, and available for use by, the public.
(iii) Is predominantly lacking in structural development other than structures associated with open spaces, including, but not limited to, playgrounds, swimming pools, ballfields, enclosed child play areas, and picnic facilities.
(B) For the purposes of this paragraph, “developed open space” includes land that has been designated for acquisition by a public agency for developed open space, but does not include lands acquired with public funds dedicated to the acquisition of land for housing purposes.
(8) The buildings in the transit priority project are 15 percent more energy efficient than required by Chapter 6 of Title 24 of the California Code of Regulations and the buildings and landscaping are designed to achieve 25 percent less water usage than the average household use in the region.
(b) The transit priority project meets all of the following land use criteria:
(1) The site of the transit priority project is not more than eight acres in total area.
(2) The transit priority project does not contain more than 200 residential units.
(3) The transit priority project does not result in any net loss in the number of affordable housing units within the project area.
(4) The transit priority project does not include any single level building that exceeds 75,000 square feet.
(5) Any applicable mitigation measures or performance standards or criteria set forth in the prior environmental impact reports, and adopted in findings, have been or will be incorporated into the transit priority project.
(6) The transit priority project is determined not to conflict with nearby operating industrial uses.

(7) The transit priority project is located within one-half mile of a rail transit station or a ferry terminal included in a regional transportation plan or within one-quarter mile of a high-quality transit corridor included in a regional transportation plan.
(c) The transit priority project meets at least one of the following three criteria:
(1) The transit priority project meets both of the following:
(A) At least 20 percent of the housing will be sold to families of moderate income, or not less than 10 percent of the housing will be rented to families of low income, or not less than 5 percent of the housing is rented to families of very low income.
(B) The transit priority project developer provides sufficient legal commitments to the appropriate local agency to ensure the continued availability and use of the housing units for very low, low-, and moderate-income households at monthly housing costs with an affordable housing cost or affordable rent, as defined in Section 50052.5 or 50053 of the Health and Safety Code, respectively, for the period required by the applicable financing. Rental units shall be affordable for at least 55 years. Ownership units shall be subject to resale restrictions or equity sharing requirements for at least 30 years.
(2) The transit priority project developer has paid or will pay in-lieu fees pursuant to a local ordinance in an amount sufficient to result in the development of an equivalent number of units that would otherwise be required pursuant to paragraph (1).
(3) The transit priority project provides public open space equal to or greater than five acres per 1,000 residents of the project.
(Amended by Stats. 2012, Ch. 39, Sec. 95. Effective June 27, 2012.)

21155.2.

(a) A transit priority project that has incorporated all feasible mitigation measures, performance standards, or criteria set forth in the prior applicable environmental impact reports and adopted in findings made pursuant to Section 21081, shall be eligible for either the provisions of subdivision (b) or (c).
(b) A transit priority project that satisfies the requirements of subdivision (a) may be reviewed through a sustainable communities environmental assessment as follows:
(1) An initial study shall be prepared to identify all significant or potentially significant impacts of the transit priority project, other than those which do not need to be reviewed pursuant to Section 21159.28 based on substantial evidence in light of the whole record. The initial study shall identify any cumulative effects that have been adequately addressed and mitigated pursuant to the requirements of this division in prior applicable certified environmental impact reports. Where the lead agency determines that a cumulative effect has been adequately addressed and mitigated, that cumulative effect shall not be treated as cumulatively considerable for the purposes of this subdivision.
(2) The sustainable communities environmental assessment shall contain measures that either avoid or mitigate to a level of insignificance all potentially significant or significant effects of the project required to be identified in the initial study.
(3) A draft of the sustainable communities environmental assessment shall be circulated for public comment for a period of not less than 30 days. Notice shall be

provided in the same manner as required for an environmental impact report pursuant to Section 21092.
(4) Prior to acting on the sustainable communities environmental assessment, the lead agency shall consider all comments received.
(5) A sustainable communities environmental assessment may be approved by the lead agency after conducting a public hearing, reviewing the comments received, and finding that:
(A) All potentially significant or significant effects required to be identified in the initial study have been identified and analyzed.
(B) With respect to each significant effect on the environment required to be identified in the initial study, either of the following apply:
(i) Changes or alterations have been required in or incorporated into the project that avoid or mitigate the significant effects to a level of insignificance.
(ii) Those changes or alterations are within the responsibility and jurisdiction of another public agency and have been, or can and should be, adopted by that other agency.
(6) The legislative body of the lead agency shall conduct the public hearing or a planning commission may conduct the public hearing if local ordinances allow a direct appeal of approval of a document prepared pursuant to this division to the legislative body subject to a fee not to exceed five hundred dollars ($500).
(7) The lead agency's decision to review and approve a transit priority project with a sustainable communities environmental assessment shall be reviewed under the substantial evidence standard.
(c) A transit priority project that satisfies the requirements of subdivision (a) may be reviewed by an environmental impact report that complies with all of the following:
(1) An initial study shall be prepared to identify all significant or potentially significant effects of the transit priority project other than those that do not need to be reviewed pursuant to Section 21159.28 based upon substantial evidence in light of the whole record. The initial study shall identify any cumulative effects that have been adequately addressed and mitigated pursuant to the requirements of this division in prior applicable certified environmental impact reports. Where the lead agency determines that a cumulative effect has been adequately addressed and mitigated, that cumulative effect shall not be treated as cumulatively considerable for the purposes of this subdivision.
(2) An environmental impact report prepared pursuant to this subdivision need only address the significant or potentially significant effects of the transit priority project on the environment identified pursuant to paragraph (1). It is not required to analyze off-site alternatives to the transit priority project. It shall otherwise comply with the requirements of this division.
(Added by Stats. 2008, Ch. 728, Sec. 14. Effective January 1, 2009.)

21155.3.

(a) The legislative body of a local jurisdiction may adopt traffic mitigation measures that would apply to transit priority projects. These measures shall be adopted or amended after a public hearing and may include requirements for the installation of

traffic control improvements, street or road improvements, and contributions to road improvement or transit funds, transit passes for future residents, or other measures that will avoid or mitigate the traffic impacts of those transit priority projects.
(b) (1) A transit priority project that is seeking a discretionary approval is not required to comply with any additional mitigation measures required by paragraph (1) or (2) of subdivision (a) of Section 21081, for the traffic impacts of that project on intersections, streets, highways, freeways, or mass transit, if the local jurisdiction issuing that discretionary approval has adopted traffic mitigation measures in accordance with this section.
(2) Paragraph (1) does not restrict the authority of a local jurisdiction to adopt feasible mitigation measures with respect to the effects of a project on public health or on pedestrian or bicycle safety.
(c) The legislative body shall review its traffic mitigation measures and update them as needed at least every five years.
(Added by Stats. 2008, Ch. 728, Sec. 14. Effective January 1, 2009.)

21155.4.

(a) Except as provided in subdivision (b), a residential, employment center, as defined in paragraph (1) of subdivision (a) of Section 21099, or mixed-use development project, including any subdivision, or any zoning, change that meets all of the following criteria is exempt from the requirements of this division:
(1) The project is proposed within a transit priority area, as defined in subdivision (a) of Section 21099.
(2) The project is undertaken to implement and is consistent with a specific plan for which an environmental impact report has been certified.
(3) The project is consistent with the general use designation, density, building intensity, and applicable policies specified for the project area in either a sustainable communities strategy or an alternative planning strategy for which the State Air Resources Board, pursuant to subparagraph (H) of paragraph (2) of subdivision (b) of Section 65080 of the Government Code, has accepted a metropolitan planning organization's determination that the sustainable communities strategy or the alternative planning strategy would, if implemented, achieve the greenhouse gas emissions reduction targets.
(b) Further environmental review shall be conducted only if any of the events specified in Section 21166 have occurred.
(Added by Stats. 2013, Ch. 386, Sec. 6. Effective January 1, 2014.)

CHAPTER 4.5. Streamlined Environmental Review [21156 - 21159.28]

(Chapter 4.5 added by Stats. 1993, Ch. 1130, Sec. 18.)

ARTICLE 1. Findings [21156- 21156.]

(Article 1 added by Stats. 1993, Ch. 1130, Sec. 18.)

21156.

It is the intent of the Legislature in enacting this chapter that a master environmental impact report shall evaluate the cumulative impacts, growth inducing impacts, and irreversible significant effects on the environment of subsequent projects to the greatest extent feasible. The Legislature further intends that the environmental review of subsequent projects be substantially reduced to the extent that the project impacts have been reviewed and appropriate mitigation measures are set forth in a certified master environmental impact report.
(Added by Stats. 1993, Ch. 1130, Sec. 18. Effective January 1, 1994.)

CHAPTER 4.5. Streamlined Environmental Review [21156 - 21159.28]

(Chapter 4.5 added by Stats. 1993, Ch. 1130, Sec. 18.)

ARTICLE 2. Master Environmental Impact Report [21157 - 21157.7]

(Article 2 added by Stats. 1993, Ch. 1130, Sec. 18.)

21157.

(a) A master environmental impact report may be prepared for any one of the following projects:
(1) A general plan, element, general plan amendment, or specific plan.
(2) A project that consists of smaller individual projects that will be carried out in phases.
(3) A rule or regulation that will be implemented by subsequent projects.
(4) A project that will be carried out or approved pursuant to a development agreement.
(5) A public or private project that will be carried out or approved pursuant to, or in furtherance of, a redevelopment plan.
(6) A state highway project or mass transit project that will be subject to multiple stages of review or approval.
(7) A regional transportation plan or congestion management plan.
(8) A plan proposed by a local agency for the reuse of a federal military base or reservation that has been closed or that is proposed for closure.
(9) Regulations adopted by the Fish and Game Commission for the regulation of hunting and fishing.
(10) A plan for district projects to be undertaken by a school district, that also complies with applicable school facilities requirements, including, but not limited to, the requirements of Chapter 12.5 (commencing with Section 17070.10) of Part 10 of, and Article 1 (commencing with Section 17210) of Chapter 1 of Part 10.5 of, Division 1 of Title 1 of the Education Code.
(b) When a lead agency prepares a master environmental impact report, the document shall include all of the following:
(1) A detailed statement as required by Section 21100.
(2) A description of anticipated subsequent projects that would be within the scope of the master environmental impact report, that contains sufficient information with regard to the kind, size, intensity, and location of the subsequent projects, including, but not limited to, all of the following:
(A) The specific type of project anticipated to be undertaken.

(B) The maximum and minimum intensity of any anticipated subsequent project, such as the number of residences in a residential development, and, with regard to a public works facility, its anticipated capacity and service area.
(C) The anticipated location and alternative locations for any development projects.
(D) A capital outlay or capital improvement program, or other scheduling or implementing device that governs the submission and approval of subsequent projects.
(3) A description of potential impacts of anticipated subsequent projects for which there is not sufficient information reasonably available to support a full assessment of potential impacts in the master environmental impact report. This description shall not be construed as a limitation on the impacts which may be considered in a focused environmental impact report.
(c) Lead agencies may develop and implement a fee program in accordance with applicable provisions of law to generate the revenue necessary to prepare a master environmental impact report.
(Amended by Stats. 2006, Ch. 882, Sec. 1. Effective January 1, 2007.)

21157.1.

The preparation and certification of a master environmental impact report, if prepared and certified consistent with this division, may allow for the limited review of subsequent projects that were described in the master environmental impact report as being within the scope of the report, in accordance with the following requirements:
(a) The lead agency for a subsequent project shall be the lead agency or any responsible agency identified in the master environmental impact report.
(b) The lead agency shall prepare an initial study on any proposed subsequent project. This initial study shall analyze whether the subsequent project may cause any significant effect on the environment that was not examined in the master environmental impact report and whether the subsequent project was described in the master environmental impact report as being within the scope of the report.
(c) If the lead agency, based on the initial study, determines that a proposed subsequent project will have no additional significant effect on the environment, as defined in subdivision (d) of Section 21158, that was not identified in the master environmental impact report and that no new or additional mitigation measures or alternatives may be required, the lead agency shall make a written finding based upon the information contained in the initial study that the subsequent project is within the scope of the project covered by the master environmental impact report. No new environmental document nor findings pursuant to Section 21081 shall be required by this division. Prior to approving or carrying out the proposed subsequent project, the lead agency shall provide notice of this fact pursuant to Section 21092 and incorporate all feasible mitigation measures or feasible alternatives set forth in the master environmental impact report which are appropriate to the project. Whenever a lead agency approves or determines to carry out any subsequent project pursuant to this section, it shall file a notice pursuant to Section 21108 or 21152.

(d) Where a lead agency cannot make the findings required in subdivision (c), the lead agency shall prepare, pursuant to Section 21157.7, either a mitigated negative declaration or environmental impact report.
(Amended by Stats. 1994, Ch. 1294, Sec. 13. Effective October 1, 1994. Note: October 1, 1994, is the date that Ch. 1294 became law without the Governor's signature.)

21157.5.

(a) A proposed mitigated negative declaration shall be prepared for any proposed subsequent project if both of the following occur:
(1) An initial study has identified potentially new or additional significant effects on the environment that were not analyzed in the master environmental impact report.
(2) Feasible mitigation measures or alternatives will be incorporated to revise the proposed subsequent project, before the negative declaration is released for public review, in order to avoid the effects or mitigate the effects to a point where clearly no significant effect on the environment will occur.
(b) If there is substantial evidence in light of the whole record before the lead agency that the proposed subsequent project may have a significant effect on the environment and a mitigated negative declaration is not prepared, the lead agency shall prepare an environmental impact report or a focused environmental impact report pursuant to Section 21158.
(Added by Stats. 1993, Ch. 1130, Sec. 18. Effective January 1, 1994.)

21157.6.

(a) The master environmental impact report shall not be used for the purposes of this chapter if either of the following has occurred:
(1) The certification of the master environmental impact report occurred more than five years prior to the filing of an application for the subsequent project.
(2) The filing of an application for the subsequent project occurs following the certification of the master environmental impact report, and the approval of a project that was not described in the master environmental impact report, may affect the adequacy of the environmental review in the master environmental impact report for any subsequent project.
(b) A master environmental impact report that was certified more than five years prior to the filing of an application for the subsequent project may be used for purposes of this chapter to review a subsequent project that was described in the master environmental impact report if the lead agency reviews the adequacy of the master environmental impact report and does either of the following:
(1) Finds that no substantial changes have occurred with respect to the circumstances under which the master environmental impact report was certified or that no new information, which was not known and could not have been known at the time that the master environmental impact report was certified as complete, has become available.
(2) Prepares an initial study and, pursuant to the findings of the initial study, does either of the following:

(A) Certifies a subsequent or supplemental environmental impact report that has been either incorporated into the previously certified master environmental impact report or references any deletions, additions, or any other modifications to the previously certified master environmental impact report.
(B) Approves a mitigated negative declaration that addresses substantial changes that have occurred with respect to the circumstances under which the master environmental impact report was certified or the new information that was not known and could not have been known at the time the master environmental impact report was certified.
(Amended by Stats. 2004, Ch. 684, Sec. 1. Effective January 1, 2005.)

21157.7.

(a) For purposes of this section, a master environmental impact report is a document prepared in accordance with subdivision (c) for the projects described in subdivision (b) that, upon certification, is followed by review of subsequent projects as provided in Sections 21157.1 and 21157.5.
(b) A master environmental impact report may be prepared for a plan adopted by the Department of Transportation for improvements to regional segments of Highway 99 funded pursuant to subdivision (b) of Section 8879.23 of the Government Code, to streamline, coordinate, and improve environmental review.
(c) The report shall include all of the following:
(1) A detailed statement as required by Section 21100.
(2) A description of the anticipated highway improvements along Highway 99 that would be within the scope of the master environmental impact report, that contains sufficient information about all phases of the Highway 99 construction activities, including, but not limited to, all of the following:
(A) The specific types of improvements that will be undertaken.
(B) The anticipated location and alternative locations for any of the Highway 99 improvements, including overpasses, bridges, railroad crossings, and interchanges.
(C) A capital outlay or capital improvement program, or other scheduling or implementing device that governs the construction activities associated with the Highway 99 improvements.
(d) The Department of Transportation may communicate, coordinate, and consult with the Resources Agency, Wildlife Conservation Board, Department of Fish and Game, Department of Conservation, and other appropriate federal, state, or local governments, including interested stakeholders, to consider and implement mitigation requirements on a regional basis for the projects described in subdivision (b). This may include both of the following:
(1) Identification of priority areas for mitigation, using information from these agencies and departments as well as from other sources.
(2) Utilization of existing conservation programs of the agencies or departments identified in this subdivision, if mitigation under those programs for improvements under this section does not supplant mitigation for a project.
(e) The Department of Transportation may execute an agreement, memorandum of understanding, or other similar instrument to memorialize its understanding of any

communication, coordination, or implementation activities with other state agencies for the purposes of meeting mitigation requirements on a regional basis.
(f) Notwithstanding any other provision of law, nothing in this section is intended to interfere with or prevent the existing authority of an agency or department to carry out its programs, projects, or responsibilities to identify, review, approve, deny, or implement any mitigation requirements, and nothing in this section shall be construed as a limitation on mitigation requirements for the project, or a limitation on compliance with requirements under this division or any other provision of law.
(g) Notwithstanding Section 21157.6, the master environmental impact report shall not be used for the purposes of this section, if the certification of the master environmental impact report occurred more than seven years prior to the filing of an application for the subsequent project.
(Amended by Stats. 2007, Ch. 503, Sec. 2. Effective January 1, 2008.)

CHAPTER 4.5. Streamlined Environmental Review [21156 - 21159.28]

(Chapter 4.5 added by Stats. 1993, Ch. 1130, Sec. 18.)

ARTICLE 3. Focused Environmental Impact Report [21158 - 21158.5]

(Article 3 added by Stats. 1993, Ch. 1130, Sec. 18.)

21158.

(a) A focused environmental impact report is an environmental impact report on a subsequent project identified in a master environmental impact report. A focused environmental impact report may be utilized only if the lead agency finds that the analysis in the master environmental impact report of cumulative impacts, growth inducing impacts, and irreversible significant effects on the environment is adequate for the subsequent project. The focused environmental impact report shall incorporate, by reference, the master environmental impact report and analyze only the subsequent project's additional significant effects on the environment, as defined in subdivision (d), and any new or additional mitigation measures or alternatives that were not identified and analyzed by the master environmental impact report.
(b) The focused environmental impact report need not examine those effects which the lead agency finds were one of the following:
(1) Mitigated or avoided pursuant to paragraph (1) of subdivision (a) of Section 21081 as a result of mitigation measures identified in the master environmental impact report which will be required as part of the approval of the subsequent project.
(2) Examined at a sufficient level of detail in the master environmental impact report to enable those significant environmental effects to be mitigated or avoided by specific revisions to the project, the imposition of conditions, or by other means in connection with the approval of the subsequent project.
(3) Subject to a finding pursuant to paragraph (2) of subdivision (a) of Section 21081.
(c) A focused environmental impact report on any subsequent project shall analyze any significant effects on the environment where substantial new or additional

information shows that the adverse environmental impact may be more significant than was described in the master environmental impact report. The substantial new or additional information may also show that mitigation measures or alternatives identified in the master environmental impact report, which were previously determined to be infeasible, are feasible and will avoid or reduce the significant effects on the environment of the subsequent project to a level of insignificance.
(d) For purposes of this chapter, “additional significant effects on the environment” are those project specific effects on the environment which were not addressed as significant effects on the environment in the master environmental impact report.
(e) Nothing in this chapter is intended to limit or abridge the ability of a lead agency to focus upon the issues that are ripe for decision at each level of environmental review, or to exclude duplicative analysis of environmental effects examined in previous environmental impact reports pursuant to Section 21093.
(Amended by Stats. 1994, Ch. 1294, Sec. 16. Effective October 1, 1994. Note: October 1, 1994, is the date that Ch. 1294 became law without the Governor's signature.)

21158.1.

When a lead agency is required to prepare an environmental impact report pursuant to subdivision (d) of Section 21157.1 or is authorized to prepare a focused environmental impact report pursuant to Section 21158, the lead agency may not rely on subdivision (a) of Section 21080.5 for that purpose even though the lead agency’s regulatory program is otherwise certified in accordance with Section 21080.5.
(Added by Stats. 1996, Ch. 444, Sec. 4. Effective January 1, 1997.)

21158.5.

(a) Where a project consists of multiple-family residential development of not more than 100 units or a residential and commercial or retail mixed-use development of not more than 100,000 square feet which complies with all of the following, a focused environmental impact report shall be prepared, notwithstanding that the project was not identified in a master environmental impact report:
(1) Is consistent with a general plan, specific plan, community plan, or zoning ordinance for which an environmental impact report was prepared within five years of the certification of the focused environmental impact report.
(2) The lead agency cannot make the finding described in subdivision (c) of Section 21157.1, a negative declaration or mitigated negative declaration cannot be prepared pursuant to Section 21080, 21157.5, or 21158, and Section 21166 does not apply.
(3) Meets one or more of the following conditions:
(A) The parcel on which the project is to be developed is surrounded by immediately contiguous urban development.
(B) The parcel on which the project is to be developed has been previously developed with urban uses.
(C) The parcel on which the project is to be developed is within one-half mile of an existing rail transit station.

(b) A focused environmental impact report prepared pursuant to this section shall be limited to a discussion of potentially significant effects on the environment specific to the project, or which substantial new information shows will be more significant than described in the prior environmental impact report. No discussion shall be required of alternatives to the project, cumulative impacts of the project, or the growth inducing impacts of the project.
(Added by Stats. 1993, Ch. 1130, Sec. 18. Effective January 1, 1994.)

CHAPTER 4.5. Streamlined Environmental Review [21156 - 21159.28]

(Chapter 4.5 added by Stats. 1993, Ch. 1130, Sec. 18.)

ARTICLE 4. Expedited Environmental Review for Environmentally Mandated Projects [21159 - 21159.4]

(Article 4 added by Stats. 1993, Ch. 1131, Sec. 8.)

21159.

(a) An agency listed in Section 21159.4 shall perform, at the time of the adoption of a rule or regulation requiring the installation of pollution control equipment, or a performance standard or treatment requirement, including a rule or regulation that requires the installation of pollution control equipment or a performance standard or treatment requirement pursuant to the California Global Warming Solutions Act of 2006 (Division 25.5 (commencing with Section 38500) of the Health and Safety Code), an environmental analysis of the reasonably foreseeable methods of compliance. In the preparation of this analysis, the agency may utilize numerical ranges or averages where specific data is not available; however, the agency shall not be required to engage in speculation or conjecture. The environmental analysis shall, at minimum, include all of the following:
(1) An analysis of the reasonably foreseeable environmental impacts of the methods of compliance.
(2) An analysis of reasonably foreseeable feasible mitigation measures.
(3) An analysis of reasonably foreseeable alternative means of compliance with the rule or regulation.
(4) For a rule or regulation that requires the installation of pollution control equipment adopted pursuant to the California Global Warming Solutions Act of 2006 (Division 25.5 (commencing with Section 38500) of the Health and Safety Code), the analysis shall also include reasonably foreseeable greenhouse gas emission impacts of compliance with the rule or regulation.
(b) The preparation of an environmental impact report at the time of adopting a rule or regulation pursuant to this division shall be deemed to satisfy the requirements of this section.
(c) The environmental analysis shall take into account a reasonable range of environmental, economic, and technical factors, population and geographic areas, and specific sites.
(d) This section does not require the agency to conduct a project-level analysis.
(e) For purposes of this article, the term “performance standard” includes process or raw material changes or product reformulation.

(f) This section is not intended, and may not be used, to delay the adoption of any rule or regulation for which an analysis is required to be performed pursuant to this section.
(Amended by Stats. 2010, Ch. 195, Sec. 2. Effective January 1, 2011.)

21159.1.

(a) A focused environmental impact report may be utilized if a project meets all of the following requirements:
(1) The project consists solely of the installation of either of the following:
(A) Pollution control equipment required by a rule or regulation of an agency listed in subdivision (a) of Section 21159.4 and other components necessary to complete the installation of that equipment.
(B) Pollution control equipment and other components necessary to complete the installation of that equipment that reduces greenhouse gases required by a rule or regulation of an agency listed in Section 21159.4 pursuant to the California Global Warming Solutions Act of 2006 (Division 25.5 (commencing with Section 38500) of the Health and Safety Code).
(2) The agency certified an environmental impact report on the rule or regulation or reviewed it pursuant to a certified regulatory program, and, in either case, the review included an assessment of growth inducing impacts and cumulative impacts of, and alternatives to, the project.
(3) The environmental review required by paragraph (2) was completed within five years of certification of the focused environmental impact report.
(4) An environmental impact report is not required pursuant to Section 21166.
(b) The discussion of significant effects on the environment in the focused environmental impact report shall be limited to project-specific potentially significant effects on the environment of the project that were not discussed in the environmental analysis of the rule or regulation required pursuant to subdivision (a) of Section 21159. A discussion of growth-inducing impacts or cumulative impacts shall not be required in the focused environmental impact report, and the discussion of alternatives shall be limited to a discussion of alternative means of compliance, if any, with the rule or regulation.
(Amended by Stats. 2010, Ch. 195, Sec. 3. Effective January 1, 2011.)

21159.2.

(a) If a project consists solely of compliance with a performance standard or treatment requirement imposed by an agency listed in Section 21159.4, the lead agency for the compliance project shall, to the greatest extent feasible, utilize the environmental analysis required pursuant to subdivision (a) of Section 21159 in the preparation of a negative declaration, mitigated negative declaration, or environmental impact report on the compliance project or in otherwise fulfilling its responsibilities under this division. The use of numerical averages or ranges in an environmental analysis shall not relieve a lead agency of its obligations under this division to identify and evaluate the environmental effects of a compliance project.

(b) If the lead agency determines that an environmental impact report on the compliance project is required, the lead agency shall prepare an environmental impact report which addresses only the project-specific issues related to the compliance project or other issues that were not discussed in sufficient detail in the environmental analysis to enable the lead agency to fulfill its responsibilities under Section 21100 or 21151, as applicable. The mitigation measures imposed by the lead agency for the project shall relate only to the significant effects on the environment to be mitigated. The discussion of alternatives shall be limited to a discussion of alternative means of compliance, if any, with the rule or regulation.
(Added by Stats. 1993, Ch. 1130, Sec. 18. Effective January 1, 1994.)

21159.3.

In the preparation of any environmental impact report pursuant to Section 21159.1 or 21159.2, the following deadlines shall apply:
(a) A lead agency shall determine whether an environmental impact report should be prepared within 30 days of its determination that the application for the project is complete.
(b) If the environmental impact report will be prepared under contract to the lead agency pursuant to Section 21082.1, the lead agency shall issue a request for proposals for preparation of the environmental impact report as soon as it has enough information to prepare a request for proposals, and in any event, not later than 30 days after the time for response to the notice of preparation has expired. The contract shall be awarded within 30 days of the response date for the request for proposals.
(Added by Stats. 1993, Ch. 1130, Sec. 18. Effective January 1, 1994.)

21159.4.

(a) This article shall apply to all of the following agencies:
(1) The State Air Resources Board.
(2) A district as defined in Section 39025 of the Health and Safety Code.
(3) The State Water Resources Control Board.
(4) A California regional water quality control board.
(5) The Department of Toxic Substances Control.
(6) The Department of Resources Recycling and Recovery.
(b) This article shall apply to the State Energy Resources Conservation and Development Commission and the California Public Utilities Commission for rules and regulations requiring the installation of pollution control equipment adopted pursuant to the California Global Warming Solutions Act of 2006 (Division 25.5 (commencing with Section 38500) of the Health and Safety Code).
(Amended by Stats. 2010, Ch. 195, Sec. 4. Effective January 1, 2011.)

CHAPTER 4.5. Streamlined Environmental Review [21156 - 21159.28]

(Chapter 4.5 added by Stats. 1993, Ch. 1130, Sec. 18.)

ARTICLE 5. Public Assistance Program [21159.9- 21159.9.]
(Article 5 added by Stats. 1993, Ch. 1130, Sec. 18.)

21159.9.

The Office of Planning and Research shall implement a public assistance and information program to ensure efficient and effective implementation of this division and to do both of the following:
(a) Establish a public education and training program for planners, developers, and other interested parties to assist them in implementing this division.
(b) (1) Establish and maintain a database for the collection, storage, retrieval, and dissemination of environmental documents, notices of exemption, notices of preparation, notices of determination, and notices of completion provided to the Office of Planning and Research. The database shall be available online to the public through the Internet. The Office of Planning and Research may coordinate with another state agency to host and maintain the online database.
(2) The Office of Planning and Research may phase in the submission of electronic documents and use of the database by state and local public agencies.
(3) (A) Pursuant to Section 9795 of the Government Code, the Office of Planning and Research shall, no later than July 1, 2017, submit to the Legislature a report describing how it plans to implement this subdivision, and shall provide an additional report to the Legislature no later than July 1, 2019, describing the status of the implementation of this subdivision.
(B) Pursuant to Section 10231.5 of the Government Code, this paragraph is inoperative on July 1, 2023.
(Amended by Stats. 2016, Ch. 476, Sec. 3. Effective January 1, 2017.)

CHAPTER 4.5. Streamlined Environmental Review [21156 - 21159.28]
(Chapter 4.5 added by Stats. 1993, Ch. 1130, Sec. 18.)

ARTICLE 6. Special Review of Housing Projects [21159.20 - 21159.28]
(Article 6 added by Stats. 2002, Ch. 1039, Sec. 12.)

21159.20.

For the purposes of this article, the following terms have the following meanings:
(a) “Census-defined place” means a specific unincorporated land area within boundaries determined by the United States Census Bureau in the most recent decennial census.
(b) “Community-level environmental review” means either of the following:
(1) An environmental impact report certified on any of the following:
(A) A general plan.
(B) A revision or update to the general plan that includes at least the land use and circulation elements.
(C) An applicable community plan.
(D) An applicable specific plan.
(E) A housing element of the general plan, if the environmental impact report analyzed the environmental effects of the density of the proposed project.

(2) Pursuant to this division and the implementing guidelines adopted pursuant to this division that govern subsequent review following a program environmental impact report, or pursuant to Section 21157.1, 21157.5, or 21166, a negative declaration or mitigated negative declaration was adopted as a subsequent environmental review document, following and based upon an environmental impact report on any of the projects listed in subparagraphs (A), (C), or (D) of paragraph (1).
(c) “Low-income households” means households of persons and families of very low and low income, as defined in Sections 50093 and 50105 of the Health and Safety Code.
(d) “Low- and moderate-income households” means households of persons and families of low or moderate income, as defined in Section 50093 of the Health and Safety Code.
(Added by Stats. 2002, Ch. 1039, Sec. 12. Effective January 1, 2003.)

21159.21.

A housing project qualifies for an exemption from this division pursuant to Section 21159.22, 21159.23, or 21159.24 if it meets the criteria in the applicable section and all of the following criteria:
(a) The project is consistent with any applicable general plan, specific plan, and local coastal program, including any mitigation measures required by a plan or program, as that plan or program existed on the date that the application was deemed complete and with any applicable zoning ordinance, as that zoning ordinance existed on the date that the application was deemed complete, except that a project shall not be deemed to be inconsistent with the zoning designation for the site if that zoning designation is inconsistent with the general plan only because the project site has not been rezoned to conform with a more recently adopted general plan.
(b) Community-level environmental review has been adopted or certified.
(c) The project and other projects approved prior to the approval of the project can be adequately served by existing utilities, and the project applicant has paid, or has committed to pay, all applicable in-lieu or development fees.
(d) The site of the project does not contain wetlands, does not have any value as a wildlife habitat, and the project does not harm any species protected by the federal Endangered Species Act of 1973 (16 U.S.C. Sec. 1531 et seq.) or by the Native Plant Protection Act (Chapter 10 (commencing with Section 1900) of Division 2 of the Fish and Game Code), the California Endangered Species Act (Chapter 1.5 (commencing with Section 2050) of Division 3 of the Fish and Game Code), and the project does not cause the destruction or removal of any species protected by a local ordinance in effect at the time the application for the project was deemed complete. For the purposes of this subdivision, “wetlands” has the same meaning as in Section 328.3 of Title 33 of the Code of Federal Regulations and “wildlife habitat” means the ecological communities upon which wild animals, birds, plants, fish, amphibians, and invertebrates depend for their conservation and protection.
(e) The site of the project is not included on any list of facilities and sites compiled pursuant to Section 65962.5 of the Government Code.

(f) The site of the project is subject to a preliminary endangerment assessment prepared by an environmental assessor to determine the existence of any release of a hazardous substance on the site and to determine the potential for exposure of future occupants to significant health hazards from any nearby property or activity.
(1) If a release of a hazardous substance is found to exist on the site, the release shall be removed, or any significant effects of the release shall be mitigated to a level of insignificance in compliance with state and federal requirements.
(2) If a potential for exposure to significant hazards from surrounding properties or activities is found to exist, the effects of the potential exposure shall be mitigated to a level of insignificance in compliance with state and federal requirements.
(g) The project does not have a significant effect on historical resources pursuant to Section 21084.1.
(h) The project site is not subject to any of the following:
(1) A wildland fire hazard, as determined by the Department of Forestry and Fire Protection, unless the applicable general plan or zoning ordinance contains provisions to mitigate the risk of a wildland fire hazard.
(2) An unusually high risk of fire or explosion from materials stored or used on nearby properties.
(3) Risk of a public health exposure at a level that would exceed the standards established by any state or federal agency.
(4) Within a delineated earthquake fault zone, as determined pursuant to Section 2622, or a seismic hazard zone, as determined pursuant to Section 2696, unless the applicable general plan or zoning ordinance contains provisions to mitigate the risk of an earthquake fault or seismic hazard zone.
(5) Landslide hazard, flood plain, flood way, or restriction zone, unless the applicable general plan or zoning ordinance contains provisions to mitigate the risk of a landslide or flood.
(i) (1) The project site is not located on developed open space.
(2) For the purposes of this subdivision, “developed open space” means land that meets all of the following criteria:
(A) Is publicly owned, or financed in whole or in part by public funds.
(B) Is generally open to, and available for use by, the public.
(C) Is predominantly lacking in structural development other than structures associated with open spaces, including, but not limited to, playgrounds, swimming pools, ballfields, enclosed child play areas, and picnic facilities.
(3) For the purposes of this subdivision, “developed open space” includes land that has been designated for acquisition by a public agency for developed open space, but does not include lands acquired by public funds dedicated to the acquisition of land for housing purposes.
(j) The project site is not located within the boundaries of a state conservancy.
(Amended by Stats. 2012, Ch. 39, Sec. 96. Effective June 27, 2012.)

21159.22.

(a) This division does not apply to any development project that meets the requirements of subdivision (b), and meets either of the following criteria:

(1) Consists of the construction, conversion, or use of residential housing for agricultural employees, and meets all of the following criteria:
(A) Is affordable to lower income households, as defined in Section 50079.5 of the Health and Safety Code.
(B) Lacks public financial assistance.
(C) The developer of the development project provides sufficient legal commitments to the appropriate local agency to ensure the continued availability and use of the housing units for lower income households for a period of at least 15 years.
(2) Consists of the construction, conversion, or use of residential housing for agricultural employees and meets all of the following criteria:
(A) Is housing for very low, low-, or moderate-income households as defined in paragraph (2) of subdivision (h) of Section 65589.5 of the Government Code.
(B) Public financial assistance exists for the development project.
(C) The developer of the development project provides sufficient legal commitments to the appropriate local agency to ensure the continued availability and use of the housing units for low- and moderate-income households for a period of at least 15 years.
(b) (1) If the development project is proposed within incorporated city limits or within a census defined place with a minimum population density of at least 5,000 persons per square mile, it is located on a project site that is adjacent, on at least two sides, to land that has been developed, and consists of not more than 45 units, or is housing for a total of 45 or fewer agricultural employees if the housing consists of dormitories, barracks, or other group living facilities.
(2) If the development project is located on a project site zoned for general agricultural use, and consists of not more than 20 units, or is housing for a total of 20 or fewer agricultural employees if the housing consists of dormitories, barracks, or other group living facilities.
(3) The project satisfies the criteria in Section 21159.21.
(4) The development project is not more than five acres in area, except that a project site located in an area with a population density of at least 1,000 persons per square mile shall not be more than two acres in area.
(c) Notwithstanding subdivision (a), if a project satisfies the criteria described in subdivisions (a) and (b), but does not satisfy the criteria described in paragraph (1) of subdivision (b), this division does not apply to the project if the project meets all of the following criteria:
(1) Is located within either an incorporated city or a census-defined place.
(2) The population density of the incorporated city or census-defined place has a population density of at least 1,000 persons per square mile.
(3) The project site is adjacent on at least two sides to land that has been developed and the project consists of not more than 45 units, or the project consist of dormitories, barracks, or other group housing facilities for a total of 45 or fewer agricultural employees.
(d) Notwithstanding subdivision (c), this division shall apply to a project that meets the criteria described in subdivision (c) if a public agency that is carrying out or approving the project determines that there is a reasonable possibility that the project, if completed, would have a significant effect on the environment due to unusual circumstances or that the cumulative impacts of successive projects of the same type in the same area, over time, would be significant.

For the purposes of this section, “agricultural employee” has the same meaning as defined by subdivision (b) of Section 1140.4 of the Labor Code.
(Added by Stats. 2002, Ch. 1039, Sec. 12. Effective January 1, 2003.)

21159.23.

(a) This division does not apply to any development project that consists of the construction, conversion, or use of residential housing consisting of 100 or fewer that is affordable to low-income households if both of the following criteria are met:
(1) The developer of the development project provides sufficient legal commitments to the appropriate local agency to ensure the continued availability and use of the housing units for lower income households, as defined in Section 50079.5 of the Health and Safety Code, for a period of at least 30 years, at monthly housing costs, as determined pursuant to Section 50053 of the Health and Safety Code.
(2) The development project meets all of the following requirements:
(A) The project satisfies the criteria described in Section 21159.21.
(B) The project site meets one of the following conditions:
(i) Has been previously developed for qualified urban uses.
(ii) The parcels immediately adjacent to the site are developed with qualified urban uses, or at least 75 percent of the perimeter of the site adjoins parcels that are developed with qualified urban uses and the remaining 25 percent of the perimeter of the site adjoins parcels that have previously been developed for qualified urban uses, and the site has not been developed for urban uses and no parcel within the site has been created within 10 years prior to the proposed development of the site.
(C) The project site is not more than five acres in area.
(D) The project site is located within an urbanized areaor within a census-defined place with a population density of at least 5,000 persons per square mile or, if the project consists of 50 or fewer units, within an incorporated city with a population density of at least 2,500 persons per square mile and a total population of at least 25,000 persons.
(b) Notwithstanding subdivision (a), if a project satisfies all of the criteria described in subdivision (a) except subparagraph (D) of paragraph (2) of that subdivision, this division does not apply to the project if the project is located within either an incorporated city or a census defined place with a population density of at least 1,000 persons per square mile.
(c) Notwithstanding subdivision (b), this division applies to a project that meets the criteria of subdivision (b), if there is a reasonable possibility that the project would have a significant effect on the environment or the residents of the project due to unusual circumstances or due to the related or cumulative impacts of reasonably foreseeable projects in the vicinity of the project.
(d) For the purposes of this section, “residential” means a use consisting of either of the following:
(1) Residential units only.
(2) Residential units and primarily neighborhood-serving goods, services, or retail uses that do not exceed 15 percent of the total floor area of the project.
(Added by Stats. 2002, Ch. 1039, Sec. 12. Effective January 1, 2003.)

21159.24.

(a) Except as provided in subdivision (b), this division does not apply to a project if all of the following criteria are met:
(1) The project is a residential project on an infill site.
(2) The project is located within an urbanized area.
(3) The project satisfies the criteria of Section 21159.21.
(4) Within five years of the date that the application for the project is deemed complete pursuant to Section 65943 of the Government Code, community-level environmental review was certified or adopted.
(5) The site of the project is not more than four acres in total area.
(6) The project does not contain more than 100 residential units.
(7) Either of the following criteria are met:
(A) (i) At least 10 percent of the housing is sold to families of moderate income, or not less than 10 percent of the housing is rented to families of low income, or not less than 5 percent of the housing is rented to families of very low income.
(ii) The project developer provides sufficient legal commitments to the appropriate local agency to ensure the continued availability and use of the housing units for very low, low-, and moderate-income households at monthly housing costs determined pursuant to paragraph (3) of subdivision (h) of Section 65589.5 of the Government Code.
(B) The project developer has paid or will pay in-lieu fees pursuant to a local ordinance in an amount sufficient to result in the development of an equivalent number of units that would otherwise be required pursuant to subparagraph (A).
(8) The project is within one-half mile of a major transit stop.
(9) The project does not include any single level building that exceeds 100,000 square feet.
(10) The project promotes higher density infill housing. A project with a density of at least 20 units per acre shall be conclusively presumed to promote higher density infill housing. A project with a density of at least 10 units per acre and a density greater than the average density of the residential properties within 1,500 feet shall be presumed to promote higher density housing unless the preponderance of the evidence demonstrates otherwise.
(b) Notwithstanding subdivision (a), this division shall apply to a development project that meets the criteria described in subdivision (a), if any of the following occur:
(1) There is a reasonable possibility that the project will have a project-specific, significant effect on the environment due to unusual circumstances.
(2) Substantial changes with respect to the circumstances under which the project is being undertaken that are related to the project have occurred since community-level environmental review was certified or adopted.
(3) New information becomes available regarding the circumstances under which the project is being undertaken and that is related to the project, that was not known, and could not have been known, at the time that community-level environmental review was certified or adopted.
(c) If a project satisfies the criteria described in subdivision (a), but is not exempt from this division as a result of satisfying the criteria described in subdivision (b), the analysis of the environmental effects of the project in the environmental impact

report or the negative declaration shall be limited to an analysis of the project-specific effect of the projects and any effects identified pursuant to paragraph (2) or (3) of subdivision (b).
(d) For the purposes of this section, “residential” means a use consisting of either of the following:
(1) Residential units only.
(2) Residential units and primarily neighborhood-serving goods, services, or retail uses that do not exceed 25 percent of the total building square footage of the project.
(Amended by Stats. 2014, Ch. 549, Sec. 1. Effective January 1, 2015.)

21159.26.

With respect to a project that includes a housing development, a public agency may not reduce the proposed number of housing units as a mitigation measure or project alternative for a particular significant effect on the environment if it determines that there is another feasible specific mitigation measure or project alternative that would provide a comparable level of mitigation. This section does not affect any other requirement regarding the residential density of that project.
(Added by Stats. 2002, Ch. 1039, Sec. 12. Effective January 1, 2003.)

21159.27.

A project may not be divided into smaller projects to qualify for one or more exemptions pursuant to this article.
(Added by Stats. 2002, Ch. 1039, Sec. 12. Effective January 1, 2003.)

21159.28.

(a) If a residential or mixed-use residential project is consistent with the use designation, density, building intensity, and applicable policies specified for the project area in either a sustainable communities strategy or an alternative planning strategy, for which the State Air Resources Board pursuant to subparagraph (I) of paragraph (2) of subdivision (b) of Section 65080 of the Government Code has accepted the metropolitan planning organization’s determination that the sustainable communities strategy or the alternative planning strategy would, if implemented, achieve the greenhouse gas emission reduction targets and if the project incorporates the mitigation measures required by an applicable prior environmental document, then any findings or other determinations for an exemption, a negative declaration, a mitigated negative declaration, a sustainable communities environmental assessment, an environmental impact report, or addenda prepared or adopted for the project pursuant to this division shall not be required to reference, describe, or discuss (1) growth inducing impacts; or (2) any project specific or cumulative impacts from cars and light-duty truck trips generated by the project on global warming or the regional transportation network.

(b) Any environmental impact report prepared for a project described in subdivision (a) shall not be required to reference, describe, or discuss a reduced residential density alternative to address the effects of car and light-duty truck trips generated by the project.
(c) “Regional transportation network,” for purposes of this section, means all existing and proposed transportation system improvements, including the state transportation system, that were included in the transportation and air quality conformity modeling, including congestion modeling, for the final regional transportation plan adopted by the metropolitan planning organization, but shall not include local streets and roads. Nothing in the foregoing relieves any project from a requirement to comply with any conditions, exactions, or fees for the mitigation of the project’s impacts on the structure, safety, or operations of the regional transportation network or local streets and roads.
(d) A residential or mixed-use residential project is a project where at least 75 percent of the total building square footage of the project consists of residential use or a project that is a transit priority project as defined in Section 21155.
(Added by Stats. 2008, Ch. 728, Sec. 15. Effective January 1, 2009.)

CHAPTER 5. Submission of Information [21160 - 21161]
(Chapter 5 added by Stats. 1972, Ch. 1154.)

21160.

Whenever any person applies to any public agency for a lease, permit, license, certificate, or other entitlement for use, the public agency may require that person to submit data and information which may be necessary to enable the public agency to determine whether the proposed project may have a significant effect on the environment or to prepare an environmental impact report.
If any or all of the information so submitted is a “trade secret” as defined in Section 6254.7 of the Government Code by those submitting that information, it shall not be included in the impact report or otherwise disclosed by any public agency. This section shall not be construed to prohibit the exchange of properly designated trade secrets between public agencies who have lawful jurisdiction over the preparation of the impact report.
(Added by Stats. 1972, Ch. 1154.)

21161.

Whenever a public agency has completed an environmental impact report, it shall cause a notice of completion of that report to be filed with the Office of Planning and Research. The notice of completion shall briefly identify the project and shall indicate that an environmental impact report has been prepared. The notice of completion shall identify the project location by latitude and longitude. Failure to file the notice required by this section shall not affect the validity of a project.
(Amended by Stats. 2007, Ch. 253, Sec. 3. Effective September 26, 2007.)

CHAPTER 6. Limitations [21165 - 21177]

(Chapter 6 added by Stats. 1972, Ch. 1154.)

21165.

(a) When a project is to be carried out or approved by two or more public agencies, the determination of whether the project may have a significant effect on the environment shall be made by the lead agency, and that agency shall prepare, or cause to be prepared by contract, the environmental impact report for the project, if a report is required by this division. In the event that a dispute arises as to which is the lead agency, any of the disputing public agencies, or in the case of a project described in subdivision (c) of Section 21065 the applicant for such project, may submit the question to the Office of Planning and Research, and the Office of Planning and Research shall designate, within 21 days of receiving the request, the lead agency, giving due consideration to the capacity of that agency to adequately fulfill the requirements of this division.
(b) For the purposes of this section, a “dispute” means a contested, active difference of opinion between two or more public agencies as to which of those agencies shall prepare any necessary environmental document. A dispute exists where each of those agencies claims that it either has or does not have the obligation to prepare that environmental document. The Office of Planning and Research shall not designate a lead agency in the absence of such a dispute.
(Amended by Stats. 2005, Ch. 267, Sec. 2. Effective January 1, 2006.)

21166.

When an environmental impact report has been prepared for a project pursuant to this division, no subsequent or supplemental environmental impact report shall be required by the lead agency or by any responsible agency, unless one or more of the following events occurs:
(a) Substantial changes are proposed in the project which will require major revisions of the environmental impact report.
(b) Substantial changes occur with respect to the circumstances under which the project is being undertaken which will require major revisions in the environmental impact report.
(c) New information, which was not known and could not have been known at the time the environmental impact report was certified as complete, becomes available.
(Amended by Stats. 1977, Ch. 1200.)

21166.1.

The decision of a lead agency to prepare an environmental impact report with respect to environmental impacts within a geographic area or for a group of projects shall not be a basis for determining that an environmental document prepared for an individual project within that area or group is inadequate.
(Added by Stats. 1984, Ch. 1514, Sec. 11.)

21167.

An action or proceeding to attack, review, set aside, void, or annul the following acts or decisions of a public agency on the grounds of noncompliance with this division shall be commenced as follows:
(a) An action or proceeding alleging that a public agency is carrying out or has approved a project that may have a significant effect on the environment without having determined whether the project may have a significant effect on the environment shall be commenced within 180 days from the date of the public agency's decision to carry out or approve the project, or, if a project is undertaken without a formal decision by the public agency, within 180 days from the date of commencement of the project.
(b) An action or proceeding alleging that a public agency has improperly determined whether a project may have a significant effect on the environment shall be commenced within 30 days from the date of the filing of the notice required by subdivision (a) of Section 21108 or subdivision (a) of Section 21152.
(c) An action or proceeding alleging that an environmental impact report does not comply with this division shall be commenced within 30 days from the date of the filing of the notice required by subdivision (a) of Section 21108 or subdivision (a) of Section 21152 by the lead agency.
(d) An action or proceeding alleging that a public agency has improperly determined that a project is not subject to this division pursuant to subdivision (b) of Section 21080 or Section 21172 shall be commenced within 35 days from the date of the filing by the public agency, or person specified in subdivision (b) or (c) of Section 21065, of the notice authorized by subdivision (b) of Section 21108 or subdivision (b) of Section 21152. If the notice has not been filed, the action or proceeding shall be commenced within 180 days from the date of the public agency's decision to carry out or approve the project, or, if a project is undertaken without a formal decision by the public agency, within 180 days from the date of commencement of the project.
(e) An action or proceeding alleging that another act or omission of a public agency does not comply with this division shall be commenced within 30 days from the date of the filing of the notice required by subdivision (a) of Section 21108 or subdivision (a) of Section 21152.
(f) If a person has made a written request to the public agency for a copy of the notice specified in Section 21108 or 21152 prior to the date on which the agency approves or determines to carry out the project, then not later than five days from the date of the agency's action, the public agency shall deposit a written copy of the notice addressed to that person in the United States mail, first class postage prepaid. The date upon which this notice is mailed shall not affect the time periods specified in subdivisions (b), (c), (d), and (e).
(Amended by Stats. 2004, Ch. 744, Sec. 7. Effective January 1, 2005.)

21167.1.

(a) In all actions or proceedings brought pursuant to Sections 21167, 21168, and 21168.5, including the hearing of an action or proceeding on appeal from a decision

of a lower court, all courts in which the action or proceeding is pending shall give the action or proceeding preference over all other civil actions, in the matter of setting the action or proceeding for hearing or trial, and in hearing or trying the action or proceeding, so that the action or proceeding shall be quickly heard and determined. The court shall regulate the briefing schedule so that, to the extent feasible, the court shall commence hearings on an appeal within one year of the date of the filing of the appeal.
(b) To ensure that actions or proceedings brought pursuant to Sections 21167, 21168, and 21168.5 may be quickly heard and determined in the lower courts, the superior courts in all counties with a population of more than 200,000 shall designate one or more judges to develop expertise in this division and related land use and environmental laws, so that those judges will be available to hear, and quickly resolve, actions or proceedings brought pursuant to Sections 21167, 21168, and 21168.5.
(c) In an action or proceeding filed pursuant to this chapter that is joined with any other cause of action, the court, upon a motion by any party, may grant severance of the actions. In determining whether to grant severance, the court shall consider such matters as judicial economy, administrative economy, and prejudice to any party.
(Amended by Stats. 2006, Ch. 538, Sec. 578. Effective January 1, 2007.)

21167.2.

If no action or proceeding alleging that an environmental impact report does not comply with the provisions of this division is commenced during the period prescribed in subdivision (c) of Section 21167, the environmental impact report shall be conclusively presumed to comply with the provisions of this division for purposes of its use by responsible agencies, unless the provisions of Section 21166 are applicable.
(Added by Stats. 1977, Ch. 1200.)

21167.3.

(a) If an action or proceeding alleging that an environmental impact report or a negative declaration does not comply with the provisions of this division is commenced during the period described in subdivision (b) or (c) of Section 21167, and if an injunction or stay is issued prohibiting the project from being carried out or approved pending final determination of the issue of such compliance, responsible agencies shall assume that the environmental impact report or the negative declaration for the project does comply with the provisions of this division and shall issue a conditional approval or disapproval of such project according to the timetable for agency action in Article 5 (commencing with Section 65950) of Chapter 4.5 of Division 1 of Title 7 of the Government Code. A conditional approval shall constitute permission to proceed with a project when and only when such action or proceeding results in a final determination that the environmental impact report or negative declaration does comply with the provisions of this division.

(b) In the event that an action or proceeding is commenced as described in subdivision (a) but no injunction or similar relief is sought and granted, responsible agencies shall assume that the environmental impact report or negative declaration for the project does comply with the provisions of this division and shall approve or disapprove the project according to the timetable for agency action in Article 5 (commencing with Section 65950) of Chapter 4.5 of Division 1 of Title 7 of the Government Code. Such approval shall constitute permission to proceed with the project at the applicant's risk pending final determination of such action or proceeding.
(Amended by Stats. 1980, Ch. 131, Sec. 2. Effective May 28, 1980.)

21167.4.

(a) In any action or proceeding alleging noncompliance with this division, the petitioner shall request a hearing within 90 days from the date of filing the petition or shall be subject to dismissal on the court's own motion or on the motion of any party interested in the action or proceeding.
(b) The petitioner shall serve a notice of the request for a hearing on all parties at the time that the petitioner files the request for a hearing.
(c) Upon the filing of a request by the petitioner for a hearing and upon application by any party, the court shall establish a briefing schedule and a hearing date. In the absence of good cause, briefing shall be completed within 90 days from the date that the request for a hearing is filed, and the hearing, to the extent feasible, shall be held within 30 days thereafter. Good cause may include, but shall not be limited to, the conduct of discovery, determination of the completeness of the record of proceedings, the complexity of the issues, and the length of the record of proceedings and the timeliness of its production. The parties may stipulate to a briefing schedule or hearing date that differs from the schedule set forth in this subdivision if the stipulation is approved by the court.
(d) This section shall become operative on January 1, 2016.
(Repealed (in Sec. 5) and added by Stats. 2010, Ch. 496, Sec. 6. Effective September 29, 2010. Section operative January 1, 2016, by its own provisions.)

21167.5.

Proof of prior service by mail upon the public agency carrying out or approving the project of a written notice of the commencement of any action or proceeding described in Section 21167 identifying the project shall be filed concurrently with the initial pleading in such action or proceeding.
(Added by Stats. 1972, Ch. 1154.)

21167.6.

Notwithstanding any other law, in all actions or proceedings brought pursuant to Section 21167, except as provided in Section 21167.6.2 or those involving the Public Utilities Commission, all of the following shall apply:

(a) At the time that the action or proceeding is filed, the plaintiff or petitioner shall file a request that the respondent public agency prepare the record of proceedings relating to the subject of the action or proceeding. The request, together with the complaint or petition, shall be served personally upon the public agency not later than 10 business days from the date that the action or proceeding was filed.
(b) (1) The public agency shall prepare and certify the record of proceedings not later than 60 days from the date that the request specified in subdivision (a) was served upon the public agency. Upon certification, the public agency shall lodge a copy of the record of proceedings with the court and shall serve on the parties notice that the record of proceedings has been certified and lodged with the court. The parties shall pay any reasonable costs or fees imposed for the preparation of the record of proceedings in conformance with any law or rule of court.
(2) The plaintiff or petitioner may elect to prepare the record of proceedings or the parties may agree to an alternative method of preparation of the record of proceedings, subject to certification of its accuracy by the public agency, within the time limit specified in this subdivision.
(c) The time limit established by subdivision (b) may be extended only upon the stipulation of all parties who have been properly served in the action or proceeding or upon order of the court. Extensions shall be liberally granted by the court when the size of the record of proceedings renders infeasible compliance with that time limit. There is no limit on the number of extensions that may be granted by the court, but no single extension shall exceed 60 days unless the court determines that a longer extension is in the public interest.
(d) If the public agency fails to prepare and certify the record within the time limit established in paragraph (1) of subdivision (b), or any continuances of that time limit, the plaintiff or petitioner may move for sanctions, and the court may, upon that motion, grant appropriate sanctions.
(e) The record of proceedings shall include, but is not limited to, all of the following items:
(1) All project application materials.
(2) All staff reports and related documents prepared by the respondent public agency with respect to its compliance with the substantive and procedural requirements of this division and with respect to the action on the project.
(3) All staff reports and related documents prepared by the respondent public agency and written testimony or documents submitted by any person relevant to any findings or statement of overriding considerations adopted by the respondent agency pursuant to this division.
(4) Any transcript or minutes of the proceedings at which the decisionmaking body of the respondent public agency heard testimony on, or considered any environmental document on, the project, and any transcript or minutes of proceedings before any advisory body to the respondent public agency that were presented to the decisionmaking body prior to action on the environmental documents or on the project.
(5) All notices issued by the respondent public agency to comply with this division or with any other law governing the processing and approval of the project.
(6) All written comments received in response to, or in connection with, environmental documents prepared for the project, including responses to the notice of preparation.

(7) All written evidence or correspondence submitted to, or transferred from, the respondent public agency with respect to compliance with this division or with respect to the project.
(8) Any proposed decisions or findings submitted to the decisionmaking body of the respondent public agency by its staff, or the project proponent, project opponents, or other persons.
(9) The documentation of the final public agency decision, including the final environmental impact report, mitigated negative declaration, or negative declaration, and all documents, in addition to those referenced in paragraph (3), cited or relied on in the findings or in a statement of overriding considerations adopted pursuant to this division.
(10) Any other written materials relevant to the respondent public agency's compliance with this division or to its decision on the merits of the project, including the initial study, any drafts of any environmental document, or portions thereof, that have been released for public review, and copies of studies or other documents relied upon in any environmental document prepared for the project and either made available to the public during the public review period or included in the respondent public agency's files on the project, and all internal agency communications, including staff notes and memoranda related to the project or to compliance with this division.
(11) The full written record before any inferior administrative decisionmaking body whose decision was appealed to a superior administrative decisionmaking body prior to the filing of litigation.
(f) In preparing the record of proceedings, the party preparing the record shall strive to do so at reasonable cost in light of the scope of the record.
(g) The clerk of the superior court shall prepare and certify the clerk's transcript on appeal not later than 60 days from the date that the notice designating the papers or records to be included in the clerk's transcript was filed with the superior court, if the party or parties pay any costs or fees for the preparation of the clerk's transcript imposed in conformance with any law or rules of court. Nothing in this subdivision precludes an election to proceed by appendix, as provided in Rule 8.124 of the California Rules of Court.
(h) Extensions of the period for the filing of any brief on appeal may be allowed only by stipulation of the parties or by order of the court for good cause shown. Extensions for the filing of a brief on appeal shall be limited to one 30-day extension for the preparation of an opening brief and one 30-day extension for the preparation of a responding brief, except that the court may grant a longer extension or additional extensions if it determines that there is a substantial likelihood of settlement that would avoid the necessity of completing the appeal.
(i) At the completion of the filing of briefs on appeal, the appellant shall notify the court of the completion of the filing of briefs, whereupon the clerk of the reviewing court shall set the appeal for hearing on the first available calendar date.
(Amended by Stats. 2016, Ch. 476, Sec. 4. Effective January 1, 2017.)

21167.6.2.

(a) (1) Notwithstanding Section 21167.6, upon the written request of a project applicant received no later than 30 days after the date that the lead agency makes a determination pursuant to subdivision (a) of Section 21080.1, Section 21094.5, or Chapter 4.2 (commencing with Section 21155) and with the consent of the lead agency as provided in subdivision (e), the lead agency shall prepare and certify the record of proceedings in the following manner:
(A) The lead agency for the project shall prepare the record of proceedings pursuant to this division concurrently with the administrative process.
(B) All documents and other materials placed in the record of proceedings shall be posted on, and be downloadable from, an Internet Web site maintained by the lead agency commencing with the date of the release of the draft environmental document for the project. If the lead agency cannot maintain an Internet Web site with the information required pursuant to this section, the lead agency shall provide a link on the agency's Internet Web site to that information.
(C) The lead agency shall make available to the public in a readily accessible electronic format the draft environmental document for the project, and all other documents submitted to, cited by, or relied on by the lead agency, in the preparation of the draft environmental document for the project.
(D) A document prepared by the lead agency or submitted by the applicant after the date of the release of the draft environmental document for the project that is a part of the record of the proceedings shall be made available to the public in a readily accessible electronic format within 5 business days after the document is released or received by the lead agency.
(E) The lead agency shall encourage written comments on the project to be submitted in a readily accessible electronic format, and shall make any comment available to the public in a readily accessible electronic format within 5 business days of its receipt.
(F) Within 7 business days after the receipt of any comment that is not in an electronic format, the lead agency shall convert that comment into a readily accessible electronic format and make it available to the public in that format.
(G) The lead agency shall certify the record of proceedings within 30 days after the filing of the notice required pursuant to Section 21108 or 21152.
(2) This subdivision does not require the disclosure or posting of any trade secret as defined in Section 6254.7 of the Government Code, information about the location of archaeological sites or sacred lands, or any other information that is subject to the disclosure restrictions of Section 6254 of the Government Code.
(b) Any dispute regarding the record of proceedings prepared pursuant to this section shall be resolved by the court in an action or proceeding brought pursuant to subdivision (b) or (c) of Section 21167.
(c) The content of the record of proceedings shall be as specified in subdivision (e) of Section 21167.6.
(d) The negative declaration, mitigated negative declaration, draft and final environmental impact report, or other environmental document shall include a notice in no less than 12-point type stating the following:

"THIS DOCUMENT IS SUBJECT TO SECTION 21167.6.2 OF THE PUBLIC RESOURCES CODE, WHICH REQUIRES THE RECORD OF PROCEEDINGS FOR THIS PROJECT TO BE PREPARED CONCURRENTLY WITH THE ADMINISTRATIVE PROCESS;

DOCUMENTS PREPARED BY, OR SUBMITTED TO, THE LEAD AGENCY TO BE POSTED ON THE LEAD AGENCY'S INTERNET WEB SITE; AND THE LEAD AGENCY TO ENCOURAGE WRITTEN COMMENTS ON THE PROJECT TO BE SUBMITTED TO THE LEAD AGENCY IN A READILY ACCESSIBLE ELECTRONIC FORMAT."

(e) (1) The lead agency shall respond to a request by the project applicant within 10 business days from the date that the request pursuant to subdivision (a) is received by the lead agency.
(2) A project applicant and the lead agency may mutually agree, in writing, to extend the time period for the lead agency to respond pursuant to paragraph (1), but they shall not extend that period beyond the commencement of the public review period for the proposed negative declaration, mitigated negative declaration, draft environmental impact report, or other environmental document.
(3) The request to prepare a record of proceedings pursuant to this section shall be deemed denied if the lead agency fails to respond within 10 business days of receiving the request or within the time period agreed upon pursuant to paragraph (2), whichever ends later.
(f) The written request of the applicant submitted pursuant to subdivision (a) shall include an agreement to pay all of the lead agency's costs of preparing and certifying the record of proceedings pursuant to this section and complying with the requirements of this section, in a manner specified by the lead agency.
(g) The costs of preparing the record of proceedings pursuant to this section and complying with the requirements of this section are not recoverable costs pursuant to Section 1032 of the Code of Civil Procedure.
(h) Pursuant to subdivision (f) and Section 21089, the lead agency may charge and collect a reasonable fee from the person making the request pursuant to subdivision (a) to recover the costs incurred by the lead agency in preparing the record of proceedings pursuant to this section.
(Added by Stats. 2016, Ch. 476, Sec. 5. Effective January 1, 2017.)

21167.6.5.

(a) The petitioner or plaintiff shall name, as a real party in interest, the person or persons identified by the public agency in its notice filed pursuant to subdivision (a) or (b) of Section 21108 or Section 21152 or, if no notice is filed, the person or persons in subdivision (b) or (c) of Section 21065, as reflected in the agency's record of proceedings for the project that is the subject of an action or proceeding brought pursuant to Section 21167, 21168, or 21168.5, and shall serve the petition or complaint on that real party in interest, by personal service, mail, facsimile, or any other method permitted by law, not later than 20 business days following service of the petition or complaint on the public agency.
(b) The public agency shall provide the petitioner or plaintiff, not later than 10 business days following service of the petition or complaint on the public agency, with a list of responsible agencies and a public agency having jurisdiction over a natural resource affected by the project.
(c) The petitioner or plaintiff shall provide the responsible agencies, and a public agency having jurisdiction over a natural resource affected by the project, with

notice of the action or proceeding within 15 days of receipt of the list described in subdivision (b).
(d) Failure to name potential persons, other than those real parties in interest described in subdivision (a), is not grounds for dismissal pursuant to Section 389 of the Code of Civil Procedure.
(e) This section is not intended to affect an existing right of a party to intervene in the action.
(Amended by Stats. 2012, Ch. 162, Sec. 151. Effective January 1, 2013.)

21167.7.

Every person who brings an action pursuant to Section 21167 shall comply with the requirements of Section 388 of the Code of Civil Procedure. Every such person shall also furnish pursuant to Section 388 of the Code of Civil Procedure a copy of any amended or supplemental pleading filed by such person in such action to the Attorney General. No relief, temporary or permanent, shall be granted until a copy of the pleading has been furnished to the Attorney General in accordance with such requirements.
(Amended by Stats. 2002, Ch. 664, Sec. 183.5. Effective January 1, 2003.)

21167.8.

(a) Not later than 20 days from the date of service upon a public agency of a petition or complaint brought pursuant to Section 21167, the public agency shall file with the court a notice setting forth the time and place at which all parties shall meet and attempt to settle the litigation. The meeting shall be scheduled and held not later than 45 days from the date of service of the petition or complaint upon the public agency. The notice of the settlement meeting shall be served by mail upon the counsel for each party. If the public agency does not know the identity of counsel for any party, the notice shall be served by mail upon the party for whom counsel is not known.
(b) At the time and place specified in the notice filed with the court, the parties shall meet and confer regarding anticipated issues to be raised in the litigation and shall attempt in good faith to settle the litigation and the dispute which forms the basis of the litigation. The settlement meeting discussions shall be comprehensive in nature and shall focus on the legal issues raised by the parties concerning the project that is the subject of the litigation.
(c) The settlement meeting may be continued from time to time without postponing or otherwise delaying other applicable time limits in the litigation. The settlement meeting is intended to be conducted concurrently with any judicial proceedings.
(d) If the litigation is not settled, the court, in its discretion, may, or at the request of any party, shall, schedule a further settlement conference before a judge of the superior court. If the petition or complaint is later heard on its merits, the judge hearing the matter shall not be the same judge conducting the settlement conference, except in counties that have only one judge of the superior court.

(e) The failure of any party, who was notified pursuant to subdivision (a), to participate in the litigation settlement process, without good cause, may result in an imposition of sanctions by the court.
(f) Not later than 30 days from the date that notice of certification of the record of proceedings was filed and served in accordance with Section 21167.6, the petitioner or plaintiff shall file and serve on all other parties a statement of issues which the petitioner or plaintiff intends to raise in any brief or at any hearing or trial. Not later than 10 days from the date on which the respondent or real party in interest has been served with the statement of issues from the petitioner or plaintiff, each respondent and real party in interest shall file and serve on all other parties a statement of issues which that party intends to raise in any brief or at any hearing or trial.
(g) This section shall become operative on January 1, 2016.
(Repealed (in Sec. 7) and added by Stats. 2010, Ch. 496, Sec. 8. Effective September 29, 2010. Section operative January 1, 2016, by its own provisions.)

21167.9.

Any action brought in the superior court relating to this division may be subject to a mediation proceeding conducted pursuant to Chapter 9.3 (commencing with Section 66030) of Division 1 of Title 7 of the Government Code.
(Added by Stats. 2010, Ch. 699, Sec. 36. Effective January 1, 2011.)

21168.

Any action or proceeding to attack, review, set aside, void or annul a determination, finding, or decision of a public agency, made as a result of a proceeding in which by law a hearing is required to be given, evidence is required to be taken and discretion in the determination of facts is vested in a public agency, on the grounds of noncompliance with the provisions of this division shall be in accordance with the provisions of Section 1094.5 of the Code of Civil Procedure.
In any such action, the court shall not exercise its independent judgment on the evidence but shall only determine whether the act or decision is supported by substantial evidence in the light of the whole record.
(Amended by Stats. 1976, Ch. 1312.)

21168.5.

In any action or proceeding, other than an action or proceeding under Section 21168, to attack, review, set aside, void or annul a determination, finding, or decision of a public agency on the grounds of noncompliance with this division, the inquiry shall extend only to whether there was a prejudicial abuse of discretion. Abuse of discretion is established if the agency has not proceeded in a manner required by law or if the determination or decision is not supported by substantial evidence.
(Amended by Stats. 1976, Ch. 1312.)

21168.6.

In any action or proceeding under Sections 21168 or 21168.5 against the Public Utilities Commission the writ of mandate shall lie only from the Supreme Court to such commission.
(Added by Stats. 1972, Ch. 1154.)

21168.6.5.

(a) For the purposes of this section, the following definitions shall apply:
(1) "Applicant" means a private entity or its affiliates that proposes the project and its successors, heirs, and assignees.
(2) "Initial project approval" means any actions, activities, ordinances, resolutions, agreements, approvals, determinations, findings, or decisions taken, adopted, or approved by the lead agency required to allow the applicant to commence the construction of the project, as determined by the lead agency.
(3) "Project" means a project that substantially conforms to the project description for the Convention Center Modernization and Farmers Field Project set forth in the notice of preparation released by the City of Los Angeles on March 17, 2011.
(4) "Stadium" means, except as the context indicates otherwise, the stadium built pursuant to the project for football and other spectator events.
(5) "Subsequent project approval" means any actions, activities, ordinances, resolutions, agreements, approvals, determinations, findings, or decisions by the lead agency required for, or in furtherance of, the project that are taken, adopted, or approved following the initial project approvals until the project obtains certificates of occupancy.
(6) "Trip ratio" means the total annual number of private automobiles arriving at the stadium for spectator events divided by the total annual number of spectators at the events.
(b) (1) This section does not apply to the project and shall become inoperative on the date of the release of the draft environmental impact report and is repealed on January 1 of the following year, if the applicant fails to notify the lead agency prior to the release of the draft environmental impact report for public comment that the applicant is electing to proceed pursuant to this section.
(2) The lead agency shall notify the Secretary of State if the applicant fails to notify the lead agency of its election to proceed pursuant to this section.
(c) (1) (A) Notwithstanding any other law, the procedures set forth in subdivision (d) shall apply to any action or proceeding brought to attack, review, set aside, void, or annul the certification of the environmental impact report for the project or the granting of any initial project approvals.
(B) Notwithstanding any other law, the procedures set forth in subdivision (j) shall apply to any action or proceeding brought to attack, review, set aside, void, or annul any subsequent project approvals.
(2) Notwithstanding any other law, the procedure set forth in subdivision (f) shall apply to the certification of the environmental impact report for the project and to any initial project approvals.

(d) (1) An action or proceeding to attack, set aside, void, or annul a determination, finding, or decision of the lead agency certifying the environmental impact report or granting one or more initial project approvals shall be commenced by filing a petition for a writ of mandate with the Second District Court of Appeal and shall be served on the respondent and the real party in interest within 30 days of the filing by the lead agency of the notice required by subdivision (a) of Section 21152.
(2) The petitioner shall file and serve the opening brief in support of the petition for writ of mandate within 40 days of the filing of the petition for a writ of mandate.
(3) The respondent and real party in interest shall file and serve any brief in opposition to the petition for writ of mandate within 25 days of the filing of the opening brief.
(4) The petitioner shall file and serve the reply brief within 20 days of the filing of the last opposition brief to the petitioner's opening brief.
(5) Except as provided in paragraph (6), parties to the action shall comply with all applicable California Rules of Court in the filing of the petition for writ of mandate and the briefs.
(6) (A) Rule 8.220 of the California Rules of Court shall not apply to the time periods set forth in paragraphs (2) to (4), inclusive.
(B) If a petitioner fails to file the opening brief pursuant to paragraph (2), the Court of Appeal shall dismiss the petition.
(C) If the respondents and real party in interest fail to file the brief in opposition pursuant to paragraph (3), the Court of Appeal shall decide the petition for writ of mandate based on the record, the opening brief, and any oral argument by the petitioner.
(7) Except upon a showing of extraordinary good cause, the Court of Appeal shall not grant any extensions of time to the deadlines specified in this subdivision. Any extension shall be limited to the minimum amount the Court of Appeal deems to be necessary.
(8) The Court of Appeal may, on its motion or upon request from a party, appoint a special master to assist the Court of Appeal in conducting the expedited judicial review required pursuant to this subdivision. If the Court of Appeal appoints a special master, the applicant shall pay all reasonable costs for the special master, not to exceed one hundred fifty thousand dollars ($150,000). If the Court of Appeal determines that the cost of the special master may exceed one hundred fifty thousand dollars ($150,000), it may request that additional funds be provided by the applicant and, if the applicant agrees to provide the funding, shall use the funds to pay the additional costs of the special master.
(9) The Court of Appeal shall hold a hearing and issue a decision on all petitions for writ of mandate filed pursuant to this subdivision within 60 days of the filing of the last timely reply brief.
(10) (A) A petition for review of the decision rendered by the Court of Appeal shall be filed with the Supreme Court and served on all parties to the petition for writ of mandate within 15 days of the decision.
(B) Any opposition to the petition for review shall be filed and served within 15 days of the filing of the petition for review.
(C) The Supreme Court shall render a decision on the petition for review within 30 days after the filing of the petition for review or within 15 days after the filing of the opposition to the petition for review, whichever is earlier.

(11) All briefs and notices filed pursuant to this subdivision shall be electronically served on parties pursuant to Rule 8.71 of the California Rules of Court. Each party to the petition shall provide an electronic service address at which the party agrees to accept the service.
(12) (A) No provision of law that is inconsistent or conflicts with this subdivision shall apply to a petition for a writ of mandate subject to this subdivision, including, but not limited to, any of the following:
(i) Section 21167.4.
(ii) Subdivisions (a) through (d), inclusive, and (g) through (i), inclusive, of Section 21167.6.
(iii) Subdivision (f) of Section 21167.8.
(iv) Section 21167.6.5.
(v) Sections 66031 through 66035, inclusive, of the Government Code.
(B) Except as provided in this section, including subparagraph (A), the requirements of this division are fully applicable to the project.
(e) (1) The draft and final environmental impact report shall include a notice in not less than 12-point type stating the following:

THIS EIR IS SUBJECT TO SECTION 21168.6.5 OF THE PUBLIC RESOURCES CODE, WHICH PROVIDES, AMONG OTHER THINGS, THAT THE LEAD AGENCY NEED NOT CONSIDER CERTAIN COMMENTS FILED AFTER THE CLOSE OF THE PUBLIC COMMENT PERIOD FOR THE DRAFT EIR. ANY JUDICIAL ACTION CHALLENGING THE CERTIFICATION OF THE EIR OR THE APPROVAL OF THE PROJECT DESCRIBED IN THE EIR IS SUBJECT TO THE PROCEDURES SET FORTH IN SECTION 21168.6.5 OF THE PUBLIC RESOURCES CODE AND MUST BE FILED WITH THE SECOND DISTRICT COURT OF APPEAL. A COPY OF SECTION 21168.6.5 OF THE PUBLIC RESOURCES CODE IS INCLUDED IN THE APPENDIX TO THIS EIR.

(2) The draft environmental impact report and final environmental impact report shall contain, as an appendix, the full text of this section.
(f) (1) Within 10 days after the release of the draft environmental impact report, the lead agency shall conduct an informational workshop to inform the public of the key analyses and conclusions of that report.
(2) Within 10 days before the close of the public comment period, the lead agency shall hold a public hearing to receive testimony on the draft environmental impact report. A transcript of the hearing shall be included as an appendix to the final environmental impact report.
(3) (A) Within five days following the close of the public comment period, a commenter on the draft environmental impact report may submit to the lead agency a written request for nonbinding mediation. The lead agency and applicant shall participate in nonbinding mediation with all commenters who submitted timely comments on the draft environmental impact report and who requested the mediation. Mediation conducted pursuant to this paragraph shall end no later than 35 days after the close of the public comment period.
(B) A request for mediation shall identify all areas of dispute raised in the comment submitted by the commenter that are to be mediated.

(C) The lead agency shall select one or more mediators who shall be retired judges or recognized experts with at least five years experience in land use and environmental law or science, or mediation. The applicant shall bear the costs of mediation.
(D) A mediation session shall be conducted on each area of dispute with the parties requesting mediation on that area of dispute.
(E) The lead agency shall adopt, as a condition of approval, any measures agreed upon by the lead agency, the applicant, and any commenter who requested mediation. A commenter who agrees to a measure pursuant to this subparagraph shall not raise the issue addressed by that measure as a basis for a petition for writ of mandate challenging the lead agency's decision to certify the environmental impact report or to grant one or more initial project approvals.
(4) The lead agency need not consider written comments submitted after the close of the public comment period, unless those comments address any of the following:
(A) New issues raised in the response to comments by the lead agency.
(B) New information released by the public agency subsequent to the release of the draft environmental impact report, such as new information set forth or embodied in a staff report, proposed permit, proposed resolution, ordinance, or similar documents.
(C) Changes made to the project after the close of the public comment period.
(D) Proposed conditions for approval, mitigation measures, or proposed findings required by Section 21081 or a proposed reporting and monitoring program required by paragraph (1) of subdivision (a) of Section 21081.6, where the lead agency releases those documents subsequent to the release of the draft environmental impact report.
(E) New information that was not reasonably known and could not have been reasonably known during the public comment period.
(5) (A) The lead agency shall file the notice required by subdivision (a) of Section 21152 within five days after the last initial project approval.
(B) If the notice required by subdivision (a) of Section 21152 is filed after June 1, 2013, this section shall become inoperative as of June 1, 2013, and is repealed as of January 1, 2014.
(C) In the event this section is repealed pursuant to subparagraph (B), the lead agency shall notify the Secretary of State.
(g) (1) For a petition for writ of mandate filed pursuant to this section, the lead agency shall prepare and certify the record of the proceedings in accordance with this subdivision and in accordance with Rule 3.1365 of the California Rules of Court. The applicant shall pay the lead agency for all costs of preparing and certifying the record of proceedings.
(2) No later than the date of the release of the draft environmental impact report, the lead agency shall make available to the public in a readily accessible electronic format the draft environmental impact report and all other documents submitted to or relied on by the lead agency in the preparation of the draft environmental impact report. A document prepared by the lead agency or submitted by the applicant after the date of the release of the draft environmental impact report that is a part of the record of the proceedings shall be made available to the public in a readily accessible electronic format within five business days after the document is prepared or received by the lead agency.

(3) The lead agency shall encourage written comments on the project to be submitted in a readily accessible electronic format, and shall make any such comment available to the public in a readily accessible electronic format within five days of its receipt.
(4) Within seven business days after the receipt of any comment that is not in an electronic format, the lead agency shall convert that comment into a readily accessible electronic format and make it available to the public in that format.
(5) The lead agency shall indicate in the record of the proceedings comments received that were not considered by the lead agency pursuant to paragraph (4) of subdivision (f) and need not include the content of the comments as a part of the record.
(6) Within five days after the filing of the notice required by subdivision (a) of Section 21152, the lead agency shall certify the record of the proceedings for the approval or determination and shall provide an electronic copy of the record to a party that has submitted a written request for a copy. The lead agency may charge and collect a reasonable fee for the electronic copy, which shall not exceed the reasonable cost of reproducing that copy.
(7) Within 10 days after being served with a petition for a writ of mandate pursuant to paragraph (1) of subdivision (d), the lead agency shall lodge a copy of the certified record of proceedings with the Court of Appeal.
(8) Any dispute over the content of the record of the proceedings shall be resolved by the Court of Appeal. Unless the Court of Appeal directs otherwise, a party disputing the content of the record shall file a motion to augment the record at the time it files its initial brief.
(9) The contents of the record of proceedings shall be as set forth in subdivision (e) of Section 21167.6.
(h) It is the intent of the Legislature that the project minimize traffic congestion and air quality impacts that may result from private automobile trips to the stadium through the requirements of this division as supplemented, pursuant to subdivision (i), by the implementation of measures that will do both of the following:
(1) Achieve and maintain carbon neutrality by reducing to zero the net emissions of greenhouse gases, as defined in subdivision (g) of Section 38505 of the Health and Safety Code, from private automobile trips to the stadium.
(2) Achieve and maintain a trip ratio that is no more than 90 percent of the trip ratio at any other stadium serving a team in the National Football League.
(i) (1) As a condition of approval of the project subject to this section, the lead agency shall require the applicant to implement measures that will meet the requirements of this division and paragraph (1) of subdivision (h) by the end of the first season during which a National Football League team has played at the stadium. To maximize public health, environmental, and employment benefits, the lead agency shall place the highest priority on feasible measures that will reduce greenhouse gas emissions on the stadium site and in the neighboring communities of the stadium. Offset credits shall be employed by the applicant only after feasible local emission reduction measures have been implemented. The applicant shall, to the extent feasible, place the highest priority on the purchase of offset credits that produce emission reductions within the city or the boundaries of the South Coast Air Quality Management District.

(2) To ensure that the stadium achieves a trip ratio that is no more than 90 percent of the trip ratio at any other stadium serving a team in the National Football League, the applicant shall implement the necessary measures as follows:
(A) Not later than the date of the certification of the environmental impact report for the project, the lead agency shall develop and adopt a protocol to implement this subdivision pursuant to this division and subdivision (h), including, but not limited to, criteria and guidelines that will be used to determine the trip ratio.
(B) Following the conclusion of the second, third, fourth, and fifth seasons during which a National Football League team has played at the stadium, the applicant shall prepare a report to the lead agency that describes the measures it has undertaken to reduce trips based on the protocol developed and adopted pursuant to subparagraph (A), the trip ratio at the stadium, and the results of those measures. The report shall also include a summary of publicly available data and other data gathered by the applicant regarding average vehicle ridership, nonpassenger automobile modes of arrival, and trip reduction measures undertaken at other stadiums serving a team in the National Football League.
(C) Following the lead agency's review of the report submitted following the fourth season, the lead agency shall determine whether adequate data is available to determine whether the trip ratio at stadium events is more than 90 percent of the trip ratio at any other stadiums serving a National Football League team. If the lead agency concludes that adequate data does not exist, the lead agency shall take necessary steps to collect, or cause to be collected, the data reasonably necessary to make the determination. The applicant shall pay the reasonable costs of collecting the data pursuant to subdivision (a) of Section 21089.
(D) Following the lead agency's review of the report submitted following the fifth season, the lead agency shall determine the trip ratio at stadium events and the lowest trip ratio at any other stadium serving a National Football League team. If the trip ratio at the stadium is more than 90 percent of the trip ratio at the other stadium with the lowest trip ratio, the lead agency shall, within six months following the receipt of the report, require the applicant to implement additional feasible measures that the lead agency determines pursuant to subparagraph (E) will be sufficient for the stadium to achieve the target specified in paragraph (2) of subdivision (h).
(E) Any trip reduction measure used at other stadiums serving a National Football League team shall be presumed to be feasible unless a preponderance of the evidence demonstrates that the measure is infeasible. The lead agency's decision whether to adopt any mitigation measures pursuant to subparagraph (D) other than those used at another stadium serving a National Football League team shall be governed by the substantial evidence test. This subparagraph does not require the applicant to bear the cost of improving the capacity or performance of transit facilities other than the following:
(i) Temporarily expanding the capacity of a public transit line, as needed, to serve stadium events.
(ii) Providing private charter buses or other similar services, as needed, to serve stadium events.
(iii) Paying its fair share of the cost of measures that expand the capacity of a public fixed or light rail station that is used by spectators attending stadium events.

(F) Any action or proceeding to attack, review, set aside, void, or annul a determination, finding, or decision of the lead agency regarding the additional mitigation measures pursuant to subparagraph (D) shall be commenced within 30 days following the lead agency's filing of the notice required by subdivision (a) of Section 21152 and shall be governed by this division. The procedures set forth in subdivision (d) shall not apply to that action or proceeding. Notwithstanding any other law, compliance or noncompliance with this paragraph shall not result in the stadium being required to cease or limit operations.
(G) If the lead agency requires the applicant to implement additional measures pursuant to subparagraph (D), the applicant shall submit the report described in subparagraph (B) to the lead agency following the conclusion of each subsequent season until the lead agency determines that the applicant has achieved a trip ratio at the stadium that is not more than 90 percent of the trip ratio at any other stadium serving a National Football League team for two consecutive seasons or until the applicant submits the required report following the conclusion of the 10th season, whichever occurs earlier. Nothing in this subparagraph affects the ongoing obligations of the applicant pursuant to subdivision (h) and this subdivision.
(H) All obligations of the applicant set forth in this subdivision or imposed upon the applicant by the lead agency pursuant to this subdivision shall run with the land.
(3) This subdivision and subdivision (h) shall not serve as a basis for any action or proceeding to attack, set aside, void, or annul a determination, finding, or decision of the lead agency in certifying the environmental impact report for the project or in granting the initial or subsequent project approvals.
(4) The obligations imposed pursuant to this subdivision and subdivision (h) supplement, and do not replace, mitigation measures otherwise imposed on the project pursuant to this division.
(j) (1) An action or proceeding to attack, set aside, void, or annul a determination, finding, or decision of the lead agency granting a subsequent project approval shall be subject to the requirements of Chapter 6 (commencing with Section 21165).
(2) (A) In granting relief in an action or proceeding brought pursuant to this subdivision, the court shall not stay or enjoin the construction or operation of the project unless the court finds either of the following:
(i) The continued construction or operation of the project presents an imminent threat to the public health and safety.
(ii) The project site contains unforeseen important Native American artifacts or unforeseen important historical, archaeological, or ecological values that would be materially, permanently, and adversely affected by the continued construction or operation of the project.
(B) If the court finds that clause (i) or (ii) is satisfied, the court shall only enjoin those specific project activities that present an imminent threat to public health and safety or that materially, permanently, and adversely affect unforeseen important Native American artifacts or unforeseen important historical, archaeological, or ecological values.
(k) The provisions of this section are severable. If any provision of this section or its application is held invalid, that invalidity shall not affect other provisions or applications that can be given effect without the invalid provision or application.

(Added by Stats. 2011, Ch. 353, Sec. 2. Effective January 1, 2012. Conditionally inoperative as prescribed in either subd. (b) or subd. (f) (para. (5)). Repealed, by its own provisions, on January 1 following earliest inoperative date.)

21168.6.6.

(a) For the purposes of this section, the following definitions shall have the following meanings:
(1) “Applicant” means a private entity or its affiliates that proposes the project and its successors, heirs, and assignees.
(2) “City” means the City of Sacramento.
(3) “Downtown arena” means the following components of the entertainment and sports center project from demolition and site preparation through operation:
(A) An arena facility that will become the new home to the City of Sacramento’s National Basketball Association (NBA) team that does both of the following:
(i) Receives Leadership in Energy and Environmental Design (LEED) gold certification for new construction within one year of completion of the first NBA season.
(ii) Minimizes operational traffic congestion and air quality impacts through either or both project design and the implementation of feasible mitigation measures that will do all of the following:
(I) Achieve and maintain carbon neutrality or better by reducing to at least zero the net emissions of greenhouse gases, as defined in subdivision (g) of Section 38505 of the Health and Safety Code, from private automobile trips to the downtown arena as compared to the baseline as verified by the Sacramento Metropolitan Air Quality Management District.
(II) Achieve a per attendee reduction in greenhouse gas emissions from automobiles and light trucks compared to per attendee greenhouse gas emissions associated with the existing arena during the 2012–13 NBA season that will exceed the carbon reduction targets for 2020 and 2035 achieved in the sustainable communities strategy prepared by the Sacramento Area Council of Governments for the Sacramento region pursuant to Chapter 728 of the Statutes of 2008.
(III) Achieve and maintain vehicle-miles-traveled per attendee for NBA events at the downtown arena that is no more than 85 percent of the baseline.
(B) Associated public spaces.
(C) Facilities and infrastructure for ingress, egress, and use of the arena facility.
(4) “Entertainment and sports center project” or “project” means a project that substantially conforms to the project description for the entertainment and sports center project set forth in the notice of preparation released by the City of Sacramento on April 12, 2013.
(b) (1) The city may prosecute an eminent domain action for 545 and 600 K Street, Sacramento, California, and surrounding publicly accessible areas and rights-of-way within 200 feet of 600 K Street, Sacramento, California, through order of possession pursuant to the Eminent Domain Law (Title 7 (commencing with Section 1230.010) of Part 3 of the Code of Civil Procedure) prior to completing the environmental review under this division.

(2) Paragraph (1) shall not apply to any other eminent domain actions prosecuted by the City of Sacramento or to eminent domain actions based on a finding of blight.
(c) Notwithstanding any other law, the procedures established pursuant to subdivision (d) shall apply to an action or proceeding brought to attack, review, set aside, void, or annul the certification of the environmental impact report for the project or the granting of any project approvals.
(d) On or before July 1, 2014, the Judicial Council shall adopt a rule of court to establish procedures applicable to actions or proceedings brought to attack, review, set aside, void, or annul the certification of the environmental impact report for the project or the granting of any project approvals that require the actions or proceedings, including any potential appeals therefrom, be resolved, to the extent feasible, within 270 days of certification of the record of proceedings pursuant to subdivision (f).
(e) (1) The draft and final environmental impact report shall include a notice in not less than 12-point type stating the following:

THIS EIR IS SUBJECT TO SECTION 21168.6.6 OF THE PUBLIC RESOURCES CODE, WHICH PROVIDES, AMONG OTHER THINGS, THAT THE LEAD AGENCY NEED NOT CONSIDER CERTAIN COMMENTS FILED AFTER THE CLOSE OF THE PUBLIC COMMENT PERIOD FOR THE DRAFT EIR. ANY JUDICIAL ACTION CHALLENGING THE CERTIFICATION OF THE EIR OR THE APPROVAL OF THE PROJECT DESCRIBED IN THE EIR IS SUBJECT TO THE PROCEDURES SET FORTH IN SECTION 21168.6.6 OF THE PUBLIC RESOURCES CODE. A COPY OF SECTION 21168.6.6 OF THE PUBLIC RESOURCES CODE IS INCLUDED IN THE APPENDIX TO THIS EIR.

(2) The draft environmental impact report and final environmental impact report shall contain, as an appendix, the full text of this section.
(3) Within 10 days after the release of the draft environmental impact report, the lead agency shall conduct an informational workshop to inform the public of the key analyses and conclusions of that report.
(4) Within 10 days before the close of the public comment period, the lead agency shall hold a public hearing to receive testimony on the draft environmental impact report. A transcript of the hearing shall be included as an appendix to the final environmental impact report.
(5) (A) Within five days following the close of the public comment period, a commenter on the draft environmental impact report may submit to the lead agency a written request for nonbinding mediation. The lead agency and applicant shall participate in nonbinding mediation with all commenters who submitted timely comments on the draft environmental impact report and who requested the mediation. Mediation conducted pursuant to this paragraph shall end no later than 35 days after the close of the public comment period.
(B) A request for mediation shall identify all areas of dispute raised in the comment submitted by the commenter that are to be mediated.
(C) The lead agency shall select one or more mediators who shall be retired judges or recognized experts with at least five years experience in land use and

environmental law or science, or mediation. The applicant shall bear the costs of mediation.
(D) A mediation session shall be conducted on each area of dispute with the parties requesting mediation on that area of dispute.
(E) The lead agency shall adopt, as a condition of approval, any measures agreed upon by the lead agency, the applicant, and any commenter who requested mediation. A commenter who agrees to a measure pursuant to this subparagraph shall not raise the issue addressed by that measure as a basis for an action or proceeding challenging the lead agency's decision to certify the environmental impact report or to grant one or more initial project approvals.
(6) The lead agency need not consider written comments submitted after the close of the public comment period, unless those comments address any of the following:
(A) New issues raised in the response to comments by the lead agency.
(B) New information released by the public agency subsequent to the release of the draft environmental impact report, such as new information set forth or embodied in a staff report, proposed permit, proposed resolution, ordinance, or similar documents.
(C) Changes made to the project after the close of the public comment period.
(D) Proposed conditions for approval, mitigation measures, or proposed findings required by Section 21081 or a proposed reporting and monitoring program required by paragraph (1) of subdivision (a) of Section 21081.6, where the lead agency releases those documents subsequent to the release of the draft environmental impact report.
(E) New information that was not reasonably known and could not have been reasonably known during the public comment period.
(7) The lead agency shall file the notice required by subdivision (a) of Section 21152 within five days after the last initial project approval.
(f) (1) The lead agency shall prepare and certify the record of the proceedings in accordance with this subdivision and in accordance with Rule 3.1365 of the California Rules of Court. The applicant shall pay the lead agency for all costs of preparing and certifying the record of proceedings.
(2) No later than three business days following the date of the release of the draft environmental impact report, the lead agency shall make available to the public in a readily accessible electronic format the draft environmental impact report and all other documents submitted to or relied on by the lead agency in the preparation of the draft environmental impact report. A document prepared by the lead agency or submitted by the applicant after the date of the release of the draft environmental impact report that is a part of the record of the proceedings shall be made available to the public in a readily accessible electronic format within five business days after the document is prepared or received by the lead agency.
(3) Notwithstanding paragraph (2), documents submitted to or relied on by the lead agency that were not prepared specifically for the project and are copyright protected are not required to be made readily accessible in an electronic format. For those copyright protected documents, the lead agency shall make an index of these documents available in an electronic format no later than the date of the release of the draft environmental impact report, or within five business days if the document is received or relied on by the lead agency after the release of the draft environmental impact report. The index must specify the libraries or lead agency

offices in which hardcopies of the copyrighted materials are available for public review.
(4) The lead agency shall encourage written comments on the project to be submitted in a readily accessible electronic format, and shall make any such comment available to the public in a readily accessible electronic format within five days of its receipt.
(5) Within seven business days after the receipt of any comment that is not in an electronic format, the lead agency shall convert that comment into a readily accessible electronic format and make it available to the public in that format.
(6) The lead agency shall indicate in the record of the proceedings comments received that were not considered by the lead agency pursuant to paragraph (6) of subdivision (e) and need not include the content of the comments as a part of the record.
(7) Within five days after the filing of the notice required by subdivision (a) of Section 21152, the lead agency shall certify the record of the proceedings for the approval or determination and shall provide an electronic copy of the record to a party that has submitted a written request for a copy. The lead agency may charge and collect a reasonable fee from a party requesting a copy of the record for the electronic copy, which shall not exceed the reasonable cost of reproducing that copy.
(8) Within 10 days after being served with a complaint or a petition for a writ of mandate, the lead agency shall lodge a copy of the certified record of proceedings with the superior court.
(9) Any dispute over the content of the record of the proceedings shall be resolved by the superior court. Unless the superior court directs otherwise, a party disputing the content of the record shall file a motion to augment the record at the time it files its initial brief.
(10) The contents of the record of proceedings shall be as set forth in subdivision (e) of Section 21167.6.
(g) (1) As a condition of approval of the project subject to this section, the lead agency shall require the applicant, with respect to any measures specific to the operation of the downtown arena, to implement those measures that will meet the requirements of this division by the end of the first NBA regular season or June of the first NBA regular season, whichever is later, during which an NBA team has played at the downtown arena.
(2) To maximize public health, environmental, and employment benefits, the lead agency shall place the highest priority on feasible measures that will reduce greenhouse gas emissions on the downtown arena site and in the neighboring communities of the downtown arena. Mitigation measures that shall be considered and implemented, if feasible and necessary, to achieve the standards set forth in subclauses (I) to (III), inclusive, of clause (ii) of subparagraph (A) of paragraph (3) of subdivision (a), including, but not limited to:
(A) Temporarily expanding the capacity of a public transit line, as needed, to serve downtown arena events.
(B) Providing private charter buses or other similar services, as needed, to serve downtown arena events.

(C) Paying its fair share of the cost of measures that expand the capacity of a public fixed or light rail station that is used by spectators attending downtown arena events.
(3) Offset credits shall be employed by the applicant only after feasible local emission reduction measures have been implemented. The applicant shall, to the extent feasible, place the highest priority on the purchase of offset credits that produce emission reductions within the city or the boundaries of the Sacramento Metropolitan Air Quality Management District.
(h) (1) (A) In granting relief in an action or proceeding brought pursuant to this section, the court shall not stay or enjoin the construction or operation of the downtown arena unless the court finds either of the following:
(i) The continued construction or operation of the downtown arena presents an imminent threat to the public health and safety.
(ii) The downtown arena site contains unforeseen important Native American artifacts or unforeseen important historical, archaeological, or ecological values that would be materially, permanently, and adversely affected by the continued construction or operation of the downtown arena unless the court stays or enjoins the construction or operation of the downtown arena.
(B) If the court finds that clause (i) or (ii) is satisfied, the court shall only enjoin those specific activities associated with the downtown arena that present an imminent threat to public health and safety or that materially, permanently, and adversely affect unforeseen important Native American artifacts or unforeseen important historical, archaeological, or ecological values.
(2) An action or proceeding to attack, set aside, void, or annul a determination, finding, or decision of the lead agency granting a subsequent project approval shall be subject to the requirements of Chapter 6 (commencing with Section 21165).
(3) Where an action or proceeding brought pursuant to this section challenges aspects of the project other than the downtown arena and those portions or specific project activities are severable from the downtown arena, the court may enter an order as to aspects of the project other than the downtown arena that includes one or more of the remedies set forth in Section 21168.9.
(i) The provisions of this section are severable. If any provision of this section or its application is held invalid, that invalidity shall not affect other provisions or applications that can be given effect without the invalid provision or application.
(j) (1) This section does not apply to the project and shall become inoperative on the date of the release of the draft environmental impact report and is repealed on January 1 of the following year, if the applicant fails to notify the lead agency prior to the release of the draft environmental impact report for public comment that the applicant is electing to proceed pursuant to this section.
(2) The lead agency shall notify the Secretary of State if the applicant fails to notify the lead agency of its election to proceed pursuant to this section.
(Added by Stats. 2013, Ch. 386, Sec. 7. Effective January 1, 2014. Conditionally inoperative as provided in subd. (j). Repealed, by its own provisions, on January 1 following inoperative date.)

21168.7.

Sections 21168 and 21168.5 are declaratory of existing law with respect to the judicial review of determinations or decisions of public agencies made pursuant to this division.
(Added by Stats. 1972, Ch. 1154.)

21168.9.

(a) If a court finds, as a result of a trial, hearing, or remand from an appellate court, that any determination, finding, or decision of a public agency has been made without compliance with this division, the court shall enter an order that includes one or more of the following:
(1) A mandate that the determination, finding, or decision be voided by the public agency, in whole or in part.
(2) If the court finds that a specific project activity or activities will prejudice the consideration or implementation of particular mitigation measures or alternatives to the project, a mandate that the public agency and any real parties in interest suspend any or all specific project activity or activities, pursuant to the determination, finding, or decision, that could result in an adverse change or alteration to the physical environment, until the public agency has taken any actions that may be necessary to bring the determination, finding, or decision into compliance with this division.
(3) A mandate that the public agency take specific action as may be necessary to bring the determination, finding, or decision into compliance with this division.
(b) Any order pursuant to subdivision (a) shall include only those mandates which are necessary to achieve compliance with this division and only those specific project activities in noncompliance with this division. The order shall be made by the issuance of a peremptory writ of mandate specifying what action by the public agency is necessary to comply with this division. However, the order shall be limited to that portion of a determination, finding, or decision or the specific project activity or activities found to be in noncompliance only if a court finds that (1) the portion or specific project activity or activities are severable, (2) severance will not prejudice complete and full compliance with this division, and (3) the court has not found the remainder of the project to be in noncompliance with this division. The trial court shall retain jurisdiction over the public agency's proceedings by way of a return to the peremptory writ until the court has determined that the public agency has complied with this division.
(c) Nothing in this section authorizes a court to direct any public agency to exercise its discretion in any particular way. Except as expressly provided in this section, nothing in this section is intended to limit the equitable powers of the court.
(Amended by Stats. 1993, Ch. 1131, Sec. 9. Effective January 1, 1994.)

21169.

Any project defined in subdivision (c) of Section 21065 undertaken, carried out or approved on or before the effective date of this section and the issuance by any public agency of any lease, permit, license, certificate or other entitlement for use executed or issued on or before the effective date of this section notwithstanding a

failure to comply with this division, if otherwise legal and valid, is hereby confirmed, validated and declared legally effective. Any project undertaken by a person which was supported in whole or part through contracts with one or more public agencies on or before the effective date of this section, notwithstanding a failure to comply with this division, if otherwise legal and valid, is hereby confirmed, validated and declared legally effective.
(Added by Stats. 1972, Ch. 1154.)

21170.

(a) Section 21169 shall not operate to confirm, validate or give legal effect to any project the legality of which was being contested in a judicial proceeding in which proceeding the pleadings, prior to the effective date of this section, alleged facts constituting a cause of action for, or raised the issue of, a violation of this division and which was pending and undetermined on the effective date of this section; provided, however, that Section 21169 shall operate to confirm, validate or give legal effect to any project to which this subdivision applies if, prior to the commencement of judicial proceedings and in good faith and in reliance upon the issuance by a public agency of any lease, permit, license, certificate or other entitlement for use, substantial construction has been performed and substantial liabilities for construction and necessary materials have been incurred.
(b) Section 21169 shall not operate to confirm, validate or give legal effect to any project which had been determined in any judicial proceeding, on or before the effective date of this section to be illegal, void or ineffective because of noncompliance with this division.
(Added by Stats. 1972, Ch. 1154.)

21171.

This division, except for Section 21169, shall not apply to the issuance of any lease, permit, license, certificate or other entitlement for use for any project defined in subdivision (c) of Section 21065 or to any project undertaken by a person which is supported in whole or in part through contracts with one or more public agencies until the 121st day after the effective date of this section. This section shall not apply to any project to which Section 21170 is applicable or to any successor project which is the same as, or substantially identical to, such a project.
This section shall not prohibit or prevent a public agency, prior to the 121st day after the effective date of this section, from considering environmental factors in connection with the approval or disapproval of a project and from imposing reasonable fees in connection therewith.
(Added by Stats. 1972, Ch. 1154.)

21173.

If any provision of this division or the application thereof to any person or circumstances is held invalid, such invalidity shall not affect other provisions or

applications of this division which can be given effect without the invalid provision or application thereof, and to this end the provisions of this division are severable.
(Added by Stats. 1972, Ch. 1154.)

21174.

No provision of this division is a limitation or restriction on the power or authority of any public agency in the enforcement or administration of any provision of law which it is specifically permitted or required to enforce or administer, including, but not limited to, the powers and authority granted to the California Coastal Commission pursuant to Division 20 (commencing with Section 30000). To the extent of any inconsistency or conflict between the provisions of the California Coastal Act of 1976 (Division 20 (commencing with Section 30000)) and the provisions of this division, the provisions of Division 20 (commencing with Section 30000) shall control.
(Amended by Stats. 1991, Ch. 285, Sec. 1.)

21177.

(a) An action or proceeding shall not be brought pursuant to Section 21167 unless the alleged grounds for noncompliance with this division were presented to the public agency orally or in writing by any person during the public comment period provided by this division or prior to the close of the public hearing on the project before the issuance of the notice of determination.
(b) A person shall not maintain an action or proceeding unless that person objected to the approval of the project orally or in writing during the public comment period provided by this division or prior to the close of the public hearing on the project before the filing of notice of determination pursuant to Sections 21108 and 21152.
(c) This section does not preclude any organization formed after the approval of a project from maintaining an action pursuant to Section 21167 if a member of that organization has complied with subdivision (b).
(d) This section does not apply to the Attorney General.
(e) This section does not apply to any alleged grounds for noncompliance with this division for which there was no public hearing or other opportunity for members of the public to raise those objections orally or in writing prior to the approval of the project, or if the public agency failed to give the notice required by law.
(f) This section shall become operative on January 1, 2016.
(Repealed (in Sec. 11) and added by Stats. 2010, Ch. 496, Sec. 12. Effective September 29, 2010. Section operative January 1, 2016, by its own provisions.)

CHAPTER 6.5. Jobs and Economic Improvement Through Environmental Leadership Act of 2011 [21178 - 21189.3]
(Chapter 6.5 added by Stats. 2011, Ch. 354, Sec. 1.)

21178.

The Legislature finds and declares all of the following:
(a) The California Environmental Quality Act (Division 13 (commencing with Section 21000) of the Public Resources Code) requires that the environmental impacts of development projects be identified and mitigated.
(b) The act also guarantees the public an opportunity to review and comment on the environmental impacts of a project and to participate meaningfully in the development of mitigation measures for potentially significant environmental impacts.
(c) There are large projects under consideration in various regions of the state that would replace old and outmoded facilities with new job-creating facilities to meet those regions' needs while also establishing new, cutting-edge environmental benefits to those regions.
(d) These projects are privately financed or financed from revenues generated from the projects themselves and do not require taxpayer financing.
(e) These projects further will generate thousands of full-time jobs during construction and thousands of additional permanent jobs once they are constructed and operating.
(f) These projects also present an unprecedented opportunity to implement nation-leading innovative measures that will significantly reduce traffic, air quality, and other significant environmental impacts, and fully mitigate the greenhouse gas emissions resulting from passenger vehicle trips attributed to the project.
(g) These pollution reductions will be the best in the nation compared to other comparable projects in the United States.
(h) The purpose of this chapter is to provide unique and unprecedented streamlining benefits under the California Environmental Quality Act for projects that provide the benefits described above for a limited period of time to put people to work as soon as possible.
(Amended by Stats. 2016, Ch. 210, Sec. 1. Effective August 26, 2016. Repealed as of January 1, 2019, pursuant to Section 21189.3.)

21180.

For the purposes of this chapter, the following terms shall have the following meanings:
(a) "Applicant" means a public or private entity or its affiliates, or a person or entity that undertakes a public works project, that proposes a project and its successors, heirs, and assignees.
(b) "Environmental leadership development project," "leadership project," or "project" means a project as described in Section 21065 that is one the following:
(1) A residential, retail, commercial, sports, cultural, entertainment, or recreational use project that is certified as LEED silver or better by the United States Green Building Council and, where applicable, that achieves a 10-percent greater standard for transportation efficiency than for comparable projects. These projects must be located on an infill site. For a project that is within a metropolitan planning organization for which a sustainable communities strategy or alternative planning strategy is in effect, the infill project shall be consistent with the general use designation, density, building intensity, and applicable policies specified for the

project area in either a sustainable communities strategy or an alternative planning strategy, for which the State Air Resources Board, pursuant to subparagraph (H) of paragraph (2) of subdivision (b) of Section 65080 of the Government Code, has accepted a metropolitan planning organization's determination that the sustainable communities strategy or the alternative planning strategy would, if implemented, achieve the greenhouse gas emission reduction targets.
(2) A clean renewable energy project that generates electricity exclusively through wind or solar, but not including waste incineration or conversion.
(3) A clean energy manufacturing project that manufactures products, equipment, or components used for renewable energy generation, energy efficiency, or for the production of clean alternative fuel vehicles.
(c) "Transportation efficiency" means the number of vehicle trips by employees, visitors, or customers of the residential, retail, commercial, sports, cultural, entertainment, or recreational use project divided by the total number of employees, visitors, and customers.
(Added by Stats. 2011, Ch. 354, Sec. 1. Effective January 1, 2012. Repealed as of January 1, 2019, pursuant to Section 21189.3.)

21181.

This chapter does not apply to a project if the Governor does not certify the project as an environmental leadership development project eligible for streamlining pursuant to this chapter prior to January 1, 2018.
(Amended by Stats. 2016, Ch. 210, Sec. 2. Effective August 26, 2016. Repealed as of January 1, 2019, pursuant to Section 21189.3.)

21182.

A person proposing to construct a leadership project may apply to the Governor for certification that the leadership project is eligible for streamlining provided by this chapter. The person shall supply evidence and materials that the Governor deems necessary to make a decision on the application. Any evidence or materials shall be made available to the public at least 15 days before the Governor certifies a project pursuant to this chapter.
(Added by Stats. 2011, Ch. 354, Sec. 1. Effective January 1, 2012. Repealed as of January 1, 2019, pursuant to Section 21189.3.)

21183.

The Governor may certify a leadership project for streamlining pursuant to this chapter if all the following conditions are met:
(a) The project will result in a minimum investment of one hundred million dollars ($100,000,000) in California upon completion of construction.
(b) (1) The project creates high-wage, highly skilled jobs that pay prevailing wages and living wages and provide construction jobs and permanent jobs for Californians, and helps reduce unemployment. For purposes of this subdivision, "jobs that pay

prevailing wages" means that all construction workers employed in the execution of the project will receive at least the general prevailing rate of per diem wages for the type of work and geographic area, as determined by the Director of Industrial Relations pursuant to Sections 1773 and 1773.9 of the Labor Code. If the project is certified for streamlining, the project applicant shall include this requirement in all contracts for the performance of the work.

(2) (A) If the project is certified pursuant to this chapter, contractors and subcontractors shall pay to all construction workers employed in the execution of the project at least the general prevailing rate of per diem wages.

(B) Except as provided in subparagraph (C), the obligation of the contractors and subcontractors to pay prevailing wages pursuant to subparagraph (A) may be enforced by the Labor Commissioner through the issuance of a civil wage and penalty assessment pursuant to Section 1741 of the Labor Code, which may be reviewed pursuant to Section 1742 of the Labor Code, within 18 months after the completion of the project, or by an underpaid worker through an administrative complaint or civil action. If a civil wage and penalty assessment is issued, the contractor, subcontractor, and surety on a bond or bonds issued to secure the payment of wages covered by the assessment shall be liable for liquidated damages pursuant to Section 1742.1 of the Labor Code.

(C) Subparagraph (B) does not apply if all contractors and subcontractors performing work on the project are subject to a project labor agreement that requires the payment of prevailing wages to all construction workers employed in the execution of the project and provides for enforcement of that obligation through an arbitration procedure. For purposes of this subparagraph, "project labor agreement" has the same meaning as set forth in paragraph (1) of subdivision (b) of Section 2500 of the Public Contract Code.

(c) The project does not result in any net additional emission of greenhouse gases, including greenhouse gas emissions from employee transportation, as determined by the State Air Resources Board pursuant to Division 25.5 (commencing with Section 38500) of the Health and Safety Code.

(d) The project applicant has entered into a binding and enforceable agreement that all mitigation measures required pursuant to this division to certify the project under this chapter shall be conditions of approval of the project, and those conditions will be fully enforceable by the lead agency or another agency designated by the lead agency. In the case of environmental mitigation measures, the applicant agrees, as an ongoing obligation, that those measures will be monitored and enforced by the lead agency for the life of the obligation.

(e) The project applicant agrees to pay the costs of the Court of Appeal in hearing and deciding any case, including payment of the costs for the appointment of a special master if deemed appropriate by the court, in a form and manner specified by the Judicial Council, as provided in the Rules of Court adopted by the Judicial Council pursuant to Section 21185.

(f) The project applicant agrees to pay the costs of preparing the administrative record for the project concurrent with review and consideration of the project pursuant to this division, in a form and manner specified by the lead agency for the project.

(Amended by Stats. 2016, Ch. 210, Sec. 3. Effective August 26, 2016. Repealed as of January 1, 2019, pursuant to Section 21189.3.)

21184.

(a) The Governor may certify a project for streamlining pursuant to this chapter if it complies with the conditions specified in Section 21183.
(b) (1) Prior to certifying a project, the Governor shall make a determination that each of the conditions specified in Section 21183 has been met. These findings are not subject to judicial review.
(2) (A) If the Governor determines that a leadership project is eligible for streamlining pursuant to this chapter, he or she shall submit that determination, and any supporting information, to the Joint Legislative Budget Committee for review and concurrence or nonconcurrence.
(B) Within 30 days of receiving the determination, the Joint Legislative Budget Committee shall concur or nonconcur in writing on the determination.
(C) If the Joint Legislative Budget Committee fails to concur or nonconcur on a determination by the Governor within 30 days of the submittal, the leadership project is deemed to be certified.
(c) The Governor may issue guidelines regarding application and certification of projects pursuant to this chapter. Any guidelines issued pursuant to this subdivision are not subject to the rulemaking provisions of the Administrative Procedure Act (Chapter 3.5 (commencing with Section 11340) of Part 1 of Division 3 of Title 2 of the Government Code).
(Added by Stats. 2011, Ch. 354, Sec. 1. Effective January 1, 2012. Repealed as of January 1, 2019, pursuant to Section 21189.3.)

21184.5.

(a) Notwithstanding any other law, except as provided in subdivision (b), a multifamily residential project certified under this chapter shall provide unbundled parking, such that private vehicle parking spaces are priced and rented or purchased separately from dwelling units.
(b) Subdivision (a) shall not apply if the dwelling units are subject to affordability restrictions in law that prescribe rent or sale prices, and the cost of parking spaces cannot be unbundled from the cost of dwelling units.
(Added by Stats. 2016, Ch. 210, Sec. 4. Effective August 26, 2016. Repealed as of January 1, 2019, pursuant to Section 21189.3.)

21185.

On or before July 1, 2014, the Judicial Council shall adopt a rule of court to establish procedures applicable to actions or proceedings brought to attack, review, set aside, void, or annul the certification of the environmental impact report for an environmental leadership development project certified by the Governor pursuant to this chapter or the granting of any project approvals that require the actions or proceedings, including any potential appeals therefrom, be resolved, within 270 days of certification of the record of proceedings pursuant to Section 21186.
(Repealed and added by Stats. 2013, Ch. 386, Sec. 11. Effective January 1, 2014. Repealed as of January 1, 2019, pursuant to Section 21189.3.)

21186.

Notwithstanding any other law, the preparation and certification of the administrative record for a leadership project certified by the Governor shall be performed in the following manner:
(a) The lead agency for the project shall prepare the administrative record pursuant to this division concurrently with the administrative process.
(b) All documents and other materials placed in the administrative record shall be posted on, and be downloadable from, an Internet Web site maintained by the lead agency commencing with the date of the release of the draft environmental impact report.
(c) The lead agency shall make available to the public in a readily accessible electronic format the draft environmental impact report and all other documents submitted to, or relied on by, the lead agency in the preparation of the draft environmental impact report.
(d) A document prepared by the lead agency or submitted by the applicant after the date of the release of the draft environmental impact report that is a part of the record of the proceedings shall be made available to the public in a readily accessible electronic format within five business days after the document is released or received by the lead agency.
(e) The lead agency shall encourage written comments on the project to be submitted in a readily accessible electronic format, and shall make any comment available to the public in a readily accessible electronic format within five days of its receipt.
(f) Within seven business days after the receipt of any comment that is not in an electronic format, the lead agency shall convert that comment into a readily accessible electronic format and make it available to the public in that format.
(g) Notwithstanding paragraphs (b) to (f), inclusive, documents submitted to or relied on by the lead agency that were not prepared specifically for the project and are copyright protected are not required to be made readily accessible in an electronic format. For those copyright-protected documents, the lead agency shall make an index of these documents available in an electronic format no later than the date of the release of the draft environmental impact report, or within five business days if the document is received or relied on by the lead agency after the release of the draft environmental impact report. The index must specify the libraries or lead agency offices in which hardcopies of the copyrighted materials are available for public review.
(h) The lead agency shall certify the final administrative record within five days of its approval of the project.
(i) Any dispute arising from the administrative record shall be resolved by the superior court. Unless the superior court directs otherwise, a party disputing the content of the record shall file a motion to augment the record at the time it files its initial brief.
(j) The contents of the record of proceedings shall be as set forth in subdivision (e) of Section 21167.6.
(Amended by Stats. 2013, Ch. 386, Sec. 12. Effective January 1, 2014. Repealed as of January 1, 2019, pursuant to Section 21189.3.)

21187.

Within 10 days of the Governor certifying an environmental leadership development project pursuant to this section, the lead agency shall, at the applicant's expense, issue a public notice in no less than 12-point type stating the following:

"THE APPLICANT HAS ELECTED TO PROCEED UNDER CHAPTER 6.5 (COMMENCING WITH SECTION 21178) OF THE PUBLIC RESOURCES CODE, WHICH PROVIDES, AMONG OTHER THINGS, THAT ANY JUDICIAL ACTION CHALLENGING THE CERTIFICATION OF THE EIR OR THE APPROVAL OF THE PROJECT DESCRIBED IN THE EIR IS SUBJECT TO THE PROCEDURES SET FORTH IN SECTIONS 21185 TO 21186, INCLUSIVE, OF THE PUBLIC RESOURCES CODE. A COPY OF CHAPTER 6.5 (COMMENCING WITH SECTION 21178) OF THE PUBLIC RESOURCES CODE IS INCLUDED BELOW."

The public notice shall be distributed by the lead agency as required for public notices issued pursuant to paragraph (3) of subdivision (b) of Section 21092.
(Amended by Stats. 2013, Ch. 386, Sec. 13. Effective January 1, 2014. Repealed as of January 1, 2019, pursuant to Section 21189.3.)

21188.

The provisions of this chapter are severable. If any provision of this chapter or its application is held to be invalid, that invalidity shall not affect any other provision or application that can be given effect without the invalid provision or application.
(Added by Stats. 2011, Ch. 354, Sec. 1. Effective January 1, 2012. Repealed as of January 1, 2019, pursuant to Section 21189.3.)

21189.

Except as otherwise provided expressly in this chapter, nothing in this chapter affects the duty of any party to comply with this division.
(Added by Stats. 2011, Ch. 354, Sec. 1. Effective January 1, 2012. Repealed as of January 1, 2019, pursuant to Section 21189.3.)

21189.1.

If, prior to January 1, 2019, a lead agency fails to approve a project certified by the Governor pursuant to this chapter, then the certification expires and is no longer valid.
(Amended by Stats. 2016, Ch. 210, Sec. 5. Effective August 26, 2016. Repealed as of January 1, 2019, pursuant to Section 21189.3.)

21189.2.

The Judicial Council shall report to the Legislature on or before January 1, 2017, on the effects of this chapter on the administration of justice.
(Amended by Stats. 2014, Ch. 913, Sec. 33. Effective January 1, 2015. Repealed as of January 1, 2019, pursuant to Section 21189.3.)

21189.3.

This chapter shall remain in effect until January 1, 2019, and as of that date is repealed unless a later enacted statute extends or repeals that date.
(Amended by Stats. 2016, Ch. 210, Sec. 6. Effective August 26, 2016. Repealed as of January 1, 2019, by its own provisions. Note: Repeal affects Chapter 6.5, commencing with Section 21178.)

CHAPTER 6.7. Judicial Review of Capitol Building Annex Projects [21189.50 - 21189.57]
(Chapter 6.7 added by Stats. 2016, Ch. 31, Sec. 271.)

21189.50.

As used in this chapter, “capitol building annex project” means any work of construction of a state capitol building annex or restoration, rehabilitation, renovation, or reconstruction of the State Capitol Building Annex described in Section 9105 of the Government Code that is performed pursuant to Article 5.2 (commencing with Section 9112) of Chapter 1.5 of Part 1 of Division 2 of Title 2 of the Government Code.
(Added by Stats. 2016, Ch. 31, Sec. 271. Effective June 27, 2016.)

21189.51.

On or before July 1, 2017, the Judicial Council shall adopt a rule of court to establish procedures applicable to actions or proceedings brought to attack, review, set aside, void, or annul the certification of the environmental impact report for a capitol building annex project or the granting of any project approvals that require the actions or proceedings, including any potential appeals therefrom, be resolved, to the extent feasible, within 270 days of certification of the record of proceedings pursuant to Section 21189.52.
(Added by Stats. 2016, Ch. 31, Sec. 271. Effective June 27, 2016.)

21189.52.

(a) The lead agency shall prepare and certify the record of the proceedings in accordance with this section and in accordance with Rule 3.1365 of the California Rules of Court.
(b) No later than three business days following the date of the release of the draft environmental impact report, the lead agency shall make available to the public in a readily accessible electronic format the draft environmental impact report and all other documents submitted to or relied on by the lead agency in the preparation of

the draft environmental impact report. A document prepared by the lead agency after the date of the release of the draft environmental impact report that is a part of the record of the proceedings shall be made available to the public in a readily accessible electronic format within five business days after the document is prepared or received by the lead agency.
(c) Notwithstanding subdivision (b), documents submitted to or relied on by the lead agency that were not prepared specifically for the capitol building annex project and are copyright protected are not required to be made readily accessible in an electronic format. For those copyright protected documents, the lead agency shall make an index of these documents available in an electronic format no later than the date of the release of the draft environmental impact report, or within five business days if the document is received or relied on by the lead agency after the release of the draft environmental impact report. The index must specify the libraries or lead agency offices in which hard copies of the copyrighted materials are available for public review.
(d) The lead agency shall encourage written comments on the capitol building annex project to be submitted in a readily accessible electronic format, and shall make any such comment available to the public in a readily accessible electronic format within five days of its receipt.
(e) Within seven business days after the receipt of any comment that is not in an electronic format, the lead agency shall convert that comment into a readily accessible electronic format and make it available to the public in that format.
(f) The lead agency shall indicate in the record of the proceedings comments received that were not considered by the lead agency pursuant to subdivision (d) of Section 21189.55 and need not include the content of the comments as a part of the record.
(g) Within five days after the filing of the notice required by subdivision (a) of Section 21152, the lead agency shall certify the record of the proceedings for the approval or determination and shall provide an electronic copy of the record to a party that has submitted a written request for a copy. The lead agency may charge and collect a reasonable fee from a party requesting a copy of the record for the electronic copy, which shall not exceed the reasonable cost of reproducing that copy.
(h) Within 10 days after being served with a complaint or a petition for a writ of mandate, the lead agency shall lodge a copy of the certified record of proceedings with the superior court.
(i) Any dispute over the content of the record of the proceedings shall be resolved by the superior court. Unless the superior court directs otherwise, a party disputing the content of the record shall file a motion to augment the record at the time it files its initial brief.
(j) The contents of the record of proceedings shall be as set forth in subdivision (e) of Section 21167.6.
(Added by Stats. 2016, Ch. 31, Sec. 271. Effective June 27, 2016.)

21189.53.

(a) In granting relief in an action or proceeding brought pursuant to this chapter, the court shall not enjoin the capitol building annex project unless the court finds either of the following:
(1) The continuation of the capitol building annex project presents an imminent threat to the public health and safety.
(2) The capitol building annex project site contains unforeseen important Native American artifacts or unforeseen important historical, archaeological, or ecological values that would be materially, permanently, and adversely affected by the continuation of the capitol building annex project unless the court stays or enjoins the capitol building annex project.
(b) If the court finds that either paragraph (1) or (2) of subdivision (a) is satisfied, the court shall only enjoin those specific activities associated with the capitol building annex project that present an imminent threat to public health and safety or that materially, permanently, and adversely affect unforeseen important Native American artifacts or unforeseen important historical, archaeological, or ecological values.
(Added by Stats. 2016, Ch. 31, Sec. 271. Effective June 27, 2016.)

21189.54.

(a) The draft and final environmental impact report shall include a notice in not less than 12-point type stating the following:

THIS EIR IS SUBJECT TO CHAPTER 6.7 (COMMENCING WITH SECTION 21189.50) OF DIVISION 13 OF THE PUBLIC RESOURCES CODE, WHICH PROVIDES, AMONG OTHER THINGS, THAT THE LEAD AGENCY NEED NOT CONSIDER CERTAIN COMMENTS FILED AFTER THE CLOSE OF THE PUBLIC COMMENT PERIOD FOR THE DRAFT EIR. ANY JUDICIAL ACTION CHALLENGING THE CERTIFICATION OF THE EIR OR THE APPROVAL OF THE PROJECT DESCRIBED IN THE EIR IS SUBJECT TO THE PROCEDURES SET FORTH IN SECTIONS 21189.51 TO 21189.53, INCLUSIVE, OF THE PUBLIC RESOURCES CODE. A COPY OF CHAPTER 6.7 (COMMENCING WITH SECTION 21189.50) OF DIVISION 13 OF THE PUBLIC RESOURCES CODE IS INCLUDED IN THE APPENDIX TO THIS EIR.

(b) The draft environmental impact report and final environmental impact report shall contain, as an appendix, the full text of this chapter.
(Added by Stats. 2016, Ch. 31, Sec. 271. Effective June 27, 2016.)

21189.55.

(a) Within 10 days after the release of the draft environmental impact report, the lead agency shall conduct an informational workshop to inform the public of the key analyses and conclusions of that report.
(b) Within 10 days before the close of the public comment period, the lead agency shall hold a public hearing to receive testimony on the draft environmental impact

report. A transcript of the hearing shall be included as an appendix to the final environmental impact report.
(c) (1) Within five days following the close of the public comment period, a commenter on the draft environmental impact report may submit to the lead agency a written request for nonbinding mediation. The lead agency shall participate in nonbinding mediation with all commenters who submitted timely comments on the draft environmental impact report and who requested the mediation. Mediation conducted pursuant to this paragraph shall end no later than 35 days after the close of the public comment period.
(2) A request for mediation shall identify all areas of dispute raised in the comment submitted by the commenter that are to be mediated.
(3) The lead agency shall select one or more mediators who shall be retired judges or recognized experts with at least five years experience in land use and environmental law or science, or mediation.
(4) A mediation session shall be conducted on each area of dispute with the parties requesting mediation on that area of dispute.
(5) The lead agency shall adopt, as a condition of approval, any measures agreed upon by the lead agency and any commenter who requested mediation. A commenter who agrees to a measure pursuant to this subparagraph shall not raise the issue addressed by that measure as a basis for an action or proceeding challenging the lead agency's decision to certify the environmental impact report or to grant one or more initial project approvals.
(d) The lead agency need not consider written comments submitted after the close of the public comment period, unless those comments address any of the following:
(1) New issues raised in the response to comments by the lead agency.
(2) New information released by the public agency subsequent to the release of the draft environmental impact report, such as new information set forth or embodied in a staff report, proposed permit, proposed resolution, ordinance, or similar documents.
(3) Changes made to the project after the close of the public comment period.
(4) Proposed conditions for approval, mitigation measures, or proposed findings required by Section 21081 or a proposed reporting and monitoring program required by paragraph (1) of subdivision (a) of Section 21081.6, where the lead agency releases those documents subsequent to the release of the draft environmental impact report.
(5) New information that was not reasonably known and could not have been reasonably known during the public comment period.
(Added by Stats. 2016, Ch. 31, Sec. 271. Effective June 27, 2016.)

21189.56.

The provisions of this chapter are severable. If any provision of this chapter or its application is held to be invalid, that invalidity shall not affect any other provision or application that can be given effect without the invalid provision or application.
(Added by Stats. 2016, Ch. 31, Sec. 271. Effective June 27, 2016.)

21189.57.

Except as otherwise provided expressly in this chapter, nothing in this chapter affects the duty of any party to comply with this division.
(Added by Stats. 2016, Ch. 31, Sec. 271. Effective June 27, 2016.)

DECLARATION OF SERVICE BY EMAIL

I, the undersigned, declare as follows:

I am a resident of the County of Sacramento and I am over the age of 18 years, and not a party to the within action. My place of employment is 980 Ninth Street, Suite 300, Sacramento, California 95814.

On September 27, 2017, I served the:

- **Administrative Record on Order No. R9-2010-0016 California Regional Water Quality Control Board, San Diego Region filed September 22, 2017**

  California Regional Water Quality Control Board, San Diego Region, Order No. R9-2010-0016, 11-TC-03
  County of Riverside, Riverside County Flood Control and Water Conservation District, Cities of Murrieta, Temecula, and Wildomar, Co-Claimants

By making it available on the Commission's website and providing notice of how to locate it to the email addresses provided on the attached mailing list.
I declare under penalty of perjury under the laws of the State of California that the foregoing is true and correct, and that this declaration was executed on September 27, 2017 at Sacramento, California.

Lorenzo Duran
Commission on State Mandates
980 Ninth Street, Suite 300
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(916) 323-3562

COMMISSION ON STATE MANDATES

Mailing List

Last Updated: 9/21/17

Claim Number: 11-TC-03

Matter: California Regional Water Quality Control Board, San Diego Region, Order No. R9-2010-0016

Claimants: City of Murrieta
City of Temecula
City of Wildomar
County of Riverside
Riverside County Flood Control and Water Conservation District

TO ALL PARTIES, INTERESTED PARTIES, AND INTERESTED PERSONS:

Each commission mailing list is continuously updated as requests are received to include or remove any party or person on the mailing list. A current mailing list is provided with commission correspondence, and a copy of the current mailing list is available upon request at any time. Except as provided otherwise by commission rule, when a party or interested party files any written material with the commission concerning a claim, it shall simultaneously serve a copy of the written material on the parties and interested parties to the claim identified on the mailing list provided by the commission. (Cal. Code Regs., tit. 2, § 1181.3.)

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